TRINNOVIM

April 14, 2015

Dr. Emily Michaud
NASA/Goddard Institute for Space Studies
2880 Broadway
New York, NY 10025

Dear Dr. Michaud:

Attached is the Quarterly Report for Trinnovim for January 01, 2015 – March 31, 2015. If you have any questions regarding the contents herein, please contact me.

Sincerely yours,

Reto A Ruedy

Dr. Reto Ruedy
Project Manager

[redacted]

PREPARED FOR

GODDARD INSTITUTE FOR SPACE STUDIES

CODE 611.0

GODDARD SPACE FLIGHT CENTER

BY

TRINNOVIM

QUARTERLY REPORT

JANUARY 2015 – MARCH 2015

CONTRACT OBJECTIVE

The objective of this contract is to furnish comprehensive support services to the Goddard Institute for Space Studies in the following areas: scientific programming; scientific programming analysis; systems programming; data handling and data teleprocessing; computer operations; library services; publication services, including manuscript preparation, illustration and duplicating photography services; and reproduction services.

Global Climate Modeling (GCM) Support [SOW 3.1.1.1]

GISS GCM Maintenance and Improvement [3.1.1.1.1]

Changes at and Communication with NCCS/GSFC:

After NCCS introduced the new batch system SLURM replacing pbs, GISS is supporting NCCS in testing and adapting to the introduction of new particular SLURM features that are supposed to optimize the usage of the Goddard computer facilities. Monthly telecoms with the Goddard Systems Group are being held to discuss upcoming changes, current problems, and give GISS people a chance to make suggestions.

Further changes in NCCS's computing environment including introducing a newer release of the operating system and the addition of a new type of nodes, Haswell nodes with 28 cores, and the loss of all westmere 12-core nodes required repeated modifications of the GISS utilities. Also changing is the SLURM batch submission system as new options are activated, e.g. instead of having nodes dedicated to GISS jobs, a new Quality-of-Service option was introduced that increases the priority of a job.

Half of the remaining 16-core Sandy Bridge nodes will be changed from SP1 to SP3. Models were recompiled under both operating systems. For most versions this was possible, in some cases the appropriate versions of ESMF had to be rebuilt. The compiler version used for CMIP3 models is still available but no longer supported under SP3. However it was found that the code does properly compile using the latest release (intermediate releases had various problems and could not be used).

NCCS staff created a utility "policeme" to monitor memory usage of a job without affecting the performance of that job; it automatically kills the job whenever that memory usage gets close to saturation, preventing a much more serious problem that occurs when a job runs out of memory. This utility is activated by default by the "run" script.

Ocean model developments:

The control run Eh169 without interactive chemistry using HYCOM (hybrid isopycnal ocean model) was stopped after running one thousand and five hundred model years. The Atlantic Maximum Overturning at 45N is about 15 Sv which is lower than the observed about 20 Sv. Surface Air Temperature started to stabilize at about 13.8 degrees C. In addition, the ENSO variability is very weak in this model.

In an attempt to improve the model's behavior, it was decided to decrease the vertical mixing to test its impact on Nino variability. This experiment Eh169min ran for almost five hundred model years. The ENSO variability is somewhat improved but not close enough to the observed variability. However, the Atlantic Maximum Overturning at 45N turned out to drop to an unrealistic 5 Sv and the run was stopped.

A new run Eh169min_diag was started in which the decrease depends on latitude. The first two hundred model years so far didn't show a definite improvement neither with respect to the overturning nor to the ENSO variability. That run was also stopped.

Investigations were started to determine whether it is the diapycnal diffusivity and buoyancy frequency or the diapycnal mixing that determines vertical mixing in the tropics, and how to differentiate between the high diapycnal diffusivity at high latitudes and the low diapycnal diffusivity in the tropics. Adjustments to the prescription of tidally induced diapycnal mixing were made in order to reduce ocean interior warming trends created by this type of mixing. This was not successful, since the east-west SST gradient disappeared in all cases and never recovered. Possible explanations were examined:

- The transition from sigma2 to sigma1 was reversed, yet this did not help.
- Changing the thickness of the top ocean layers did not help
- Increasing the zonal wind stress in the Equatorial Pacific did not help
- Increasing the kpp mixing by 50% in the mixing layer only did not help
- Analyzing the zonal wind in the Equatorial Pacific showed that they are weaker in the newer model, which then might not induce weak upwelling of deep cold water. This investigation is continuing by trying to track down the reason for this weakening.

However, the run Eh176Tcadi (TCADI = interactive Tracer Chemistry, aerosols and dust, computed Aerosol Indirect Effect) reached almost 600 model years so far and its Atlantic Maximum Overturning at 45N of 19Sv manifests excellent agreement with the observed 20Sv. The Surface Air Temperature also exhibited a stable value of 13.95 C in agreement with the preindustrial global mean temperature of 13-14 C, and the Arctic and Antarctic seasonal sea ice area agree very well with Hadley hadISST data. The main deficiency is the weak ENSO variability in that model.

The transient Tcadi ensemble of 5 runs with only time-varying stratospheric aerosols have been started. This experiment ran to completion and the results were archived.

Another such ensemble Eh134TiLLGHG1[a-e] was conducted with time-varying CO2, N2O, and trace gases but with CH4, CFC-11, CFC-12 remaining fixed at the 1850 level, satisfying a request from Kate Marvel.

Trinnovim staff is continuing carrying out the century-scale simulations of HYCOM forced with a prescribed atmospheric forcing for Common Ocean-ice Reference Experiments (CORE) at the standard 26 vertical layers, as a control experiment. Meanwhile, experiments are made increasing the vertical resolution to 36 vertical layers in the model in order to investigate the sensitivity in the long run, including sea surface temperature, seasonal ice extent, Atlantic Meridional Overturning Circulation (AMOC), etc.

Trinnovim staff is collaborating with Gokhan Danabasoglu (NCAR) in order to create a common database of the results of our runs for the COREs experiments.

In the first quarter of 2015, several simulations with HYCOM were made, mainly focusing on the sensitivity of ENSO variability's to the diapycnal diffusion as well as the vertical resolution. So far the simulated Atlantic Meridional Overturning Circulation is stable. However, there is some numerical instability with the increased vertical resolution near the surface, which is currently under investigation.

Trinnovim staff participated in efforts to employ the NUOPC (National Unified Operational Prediction Capability) framework to couple the atmosphere and ocean components of the GCM. This is related to the GISS model being a test bed for ESMF (the Earth System Modeling Framework).

The development of the next-generation ocean model continued, paying special attention to the treatment of the gridline-parallel component of the pressure gradient force near steep seafloor bathymetry, especially in the vicinity of discontinuities (steps) of bathymetry. The main effort was devoted to assemble the results of the 4 previous steps of the development of a new ocean model:

(1) new cubed-sphere horizontal grid
(2) new hybrid vertical grid
(3) MPI-3 parallelization
(4) accelerated timestepping

A fully 3-dimensional and parallelized version will be running shortly. Main focus is now on load-balancing procedures to most effectively use distributed computation, on techniques to properly apply high-order transport schemes near the cube edges, and on a new high-order direction-split transport scheme.

Sea ice modeling:
Work continued on the new sea ice model both on the thermodynamics and on the numerical aspect. The latter involves starting to work on how to implement a JFNK solver. The former involves fixing issues with sea ice thickness in model AR5 v2. This may be achieved by looking into solving issues that arise when the enthalpy of the sea ice becomes positive – a potential reason for the increased sea ice thickness.

First assessments were made of the experiments for CMIP6 as far as the sea ice is involved.

Radiative transfer scheme:
Work is continuing on the radiative transfer scheme. The main focus for the next few months will be the development and implementation of a new correlated-k formulation for handling the solar radiation in a GCM. Progress was made in the new band-specific correlated-k approach for calculating solar-region spectral line absorption in the GCM.

Further work mainly involved modifications and fix-ups to the new code for calculating spectral line absorption in the solar region of the GCM in order to increase the accuracy for a wide range of absorber amounts.

GISS Climate Model Diagnostics [3.1.1.1.2]
An extensive documentation of all diagnostics built into the GISS GCM was compiled and is being edited and will be kept up-to-date.

Ocean velocity fields were prepared (for both modelE+R and modelE+H) to investigate the Equatorial Undercurrent (EUC) and North Equatorial Countercurrent (NECC) for the future

scenario RCP4.5. In this analysis, the fully interactive chemistry-aerosol-cloud atmospheric model was used, as well as the data for an ensemble of 5 runs for both E2R and E2H models and different annual averages for 2010, 2100, 2200, 2300, 2400 model years. Total volume of post-processing data is 2.6Tb from archive AR5. This satisfied a request from Jet Propulsion Laboratory (JPL). The first draft of the post processing results was delivered to JPL. A short summary of the results is as follows:

An analysis was done of the 10-year averaged EUC transports produced in the NASA Goddard Institute for Space Studies climate models ModelE-H and GISS ModelE-R, which differed only in the ocean component. ModelE-H and ModelE-R oceans have different latitudinal grid spacings near the equator and different representations of vertical mixing. Studied was 140°W, since the present-day EUC transport approaches its maximum annual-mean value between 145°E and 95°W. The ModelE-H and ModelE-R EUC transports in 2096-2105 were 12% and 5%, respectively, smaller compared to those in 2006-2015. The apparent 21st century trend of decreasing ModelE-H EUC transport was not distinguishable from decade-to-decade variability. Consecutive 10-year averaged ModelE-H EUC transports from 2010 to 2100 were not monotonically decreasing, had a maximum variation of 7.5% in 2040 to 2050, and on three occasions the decade-to-decade transport increased with time. The 10-year averaged ModelE-H EUC transports in 2100, 2200, 2300 and 2400 were the same within 5%; similarly for the ModelE-R EUC. The EUC transport estimated at other longitudes will be described as well as the substantial (~ 60%) difference between the ModelE-H and ModelE-R representations of the EUC transport at 140°W over the next 400 years.

Longitudinal profiles of EUC and NECC transports were made, with both curves on the same plot, from 135°E to 85°W for the time periods: 2016-2025, 2026-2035, 2036-2045, 2046-2055, 2056-2065, 2066-2075, 2076-2085, 2086-2095, 2096-2105, 2196-2205, 2296-2305 and 2396-2405 years (total 26 plots) . Transports plots (8 total) of transports as a function of longitude and time were made that help to see global picture. All data were sent to JPL.

Improved Parameterization of GCM Sub-grid scale Turbulence Transport [3.1.1.1.3]
Trinnovim staff continued to work with V. Canuto and Ye Cheng implementing and testing a mesoscale and sub-mesoscale parameterization for coarse resolution OGCMs momentum and tracer equations.

At present, the main difficulty of mesoscale parameterization in coarse resolution ocean general circulation models (OGCMs) is due to the different nature of the ocean flow in the adiabatic interior (A-region) and near ocean surface where the flow is strongly diabatic (D-region). Thus, in the A-region an ocean flow may be considered as a set of two dimensional flows along isopycnal surfaces between which non-linear interactions are almost absent. Correspondingly, in A-regions solutions of the default OGCMs equation for tracer fields are considered as those for thickness weighted isopycnal averaged.

However, in D-regions where flows are diabatic and have considerable diapycnal fluxes, isopycnal coordinates and isopycnal averaging are inappropriate (Killworth, 2005, hereafter K5; Ferrari et al., 2008). For this reason, in D-regions only the Eulerian averaging procedure is feasible. Since solutions in A- and D-regions must match at their interface, in both regions the

same averaging procedure must be applied which may be the Eulerian averaging only. Thus, in self consistent OGCMs equations the three problems must be solved: 1) Eulerian mesoscale parameterization in the A-region, 2) analogous parameterization in the D region, and 3) matching those parameterizations at the A-D interface.

The solution of those problems is the main goal of our group. As for the first problem, for the tracer equation it is considerably more difficult than for the buoyancy one. The reason is that in the latter case the equations for isopycnal and Eulerian averaged formally are similar while for an arbitrary tracer in the Eulerian equation an additional term $\mathbf{E}(\tau)$ arises. As McDougal and McIntosh noticed, $\mathbf{E}(\tau)$ "would be very difficult to parameterize". Our group approaches the problem on the basis of transformation of isopycnal averaged fields to the Eulerian ones developed by Dubovikov and Canuto (2006). As for the default mesoscale parameterization in D-regions, it is an extension of that of A-regions corrected by a rather arbitrary ad hoc tapering factor (Griffies, 2004; Gnanadesikan et al., 2007; Ferrari et al., 2010). The latter ensures the necessary boundary condition of vanishing vertical fluxes at the ocean surface.

No wonder that the results of using the tapered mesoscale characteristics are rather dispersive due to the indeterminacy of the tapering function (see Ferrari et al., 2008; Griffies, 2004; Gnanadesikan et al., 2007). Canuto and Dubovikov (2011, CD11) developed a D-region parameterization on the basis of dynamical equations for mesoscale fields. Recently the CD11 parameterization has been tested by Luneva, Clayson and Dubovikov whose paper is described in the last paragraph of this section.

Finally, the problem of matching the A- and D-solutions at the A-D interface arises due to the different nature of the ocean flows in those regions and, therefore, different equations. The paper *Development of matched mesoscale parameterization in mixed layer and ocean interior* was accepted by the journal *Geophysical and Astrophysical Fluid Dynamics*

In eddy resolving simulations a mixed layer mesoscale parameterization, developed recently by Canuto and Dubovikov, was tested. With no adjustable parameters, the parameterization yields the horizontal and vertical mesoscale fluxes in terms of coarse-resolution fields and eddy kinetic energy. An expression for the latter in terms of mean fields has been found to get a closed parameterization in terms of the mean fields only. In 40 numerical experiments the following two types of flows were investigated: idealized flows driven by baroclinic instabilities only, and more realistic flows, driven by wind and surface fluxes as well as by inflow-outflow. The diagnosed quasi-instantaneous horizontal and vertical mesoscale buoyancy fluxes (averaged over 1° - 2° and 10 days) demonstrate a strong scatter typical of turbulent flows; however, the fluxes are highly correlated with the parameterization. Averaged over 3-4 months, diffusivities diagnosed from the eddy resolving simulations are quite consistent with the parameterization for a broad range of parameters. Diagnosed vertical mesoscale fluxes restratify mixed layer and are in good agreement with the parameterization unless vertical turbulent mixing in the upper layer becomes strong enough in comparison with mesoscale advection. In the latter case, numerical simulations demonstrate that the deviation of the fluxes from the parameterization is controlled by a dimensionless parameter estimating the ratio of vertical turbulent mixing term to mesoscale advection. An analysis using a modified omega-equation reveals that the effects of the vertical mixing of vorticity is responsible for the two-three fold amplification of vertical mesoscale flux.

Possible physical mechanisms responsible for the amplification of vertical mesoscale flux are discussed. The paper describing these investigations was accepted by "Geophysical and Astrophysical Fluid Dynamics" under the title: "Effects of mesoscale eddies in the active mixed layer: test of the parameterization in eddy resolving simulations".

Documentation of the Core GISS Climate Model [3.1.1.1.4]

Documentation is an ongoing project; any changes are documented by the programmer implementing the changes in two places:

- Marked and unmarked inline documentation in the code
- Documentation requested by git when committing the changes to the modelE repository.

Documentation may be produced by running a program that processes the marked comments.

In addition an extensive overhaul of the documentation provided on the web about how the basic ideas implemented in the climate model and how to set up and run model experiments has been initiated.

Cumulus Cloud Studies [3.1.1.1.5]

The implementation of a new mixed-phase cloud scheme in the GCM was finalized, focusing upon its impacts upon the aerosol and chemical species.

More changes in clouds and moist convection were committed to the master branch of modelE. An updated version of the condensation scheme involving the parameter U00a was also included. U00a tunes the critical temperature for condensation above the 850 mb level. Test runs were made to analyze the effects of those changes.

Various test runs were made to identify the source that caused the computational instability when the cold pool scheme was included in modelE.

The energy flow, when the precipitation phase is changed entering the lower layers, was changed from between precipitation and downdrafts to between precipitation and the environment. This change stabilized the computations when the cold pool was included in the modelE.

Trinnovim staff assisted researchers of JPL in analyzing cloud and moist convection data produced from the development branch of the modelE.

Some runs were made to analyze and improve the simulations of zonal wind over the tropical upper troposphere. Errors in these simulations can degrade the simulations of QBO.

The convective cold pool scheme is being implemented in the development branch of modelE.

GCM Deliverables

GCM Deliverable	Due Date	Date Delivered	Notes/Description
Production management utilities	ongoing	3/31/2015	Production management utilities adapted to new SLURM features, new OS and new types of nodes
Ocean-Atmosphere model runs	ongoing	3/31/2015	Eh176Tcadi maintains observed AMOC and ice cover over 600 yrs.
Turb. Transports	ongoing	1/30/2015	Development of new scheme for improved ocean stratification
Mesoscale param.	ongoing	3/31/2015	2 papers in that field were accepted
Clouds	ongoing	1/23/2015	Mixed-phase scheme finalized and tested
Clouds	ongoing	1/30/2015	Improved Cloud Condensation scheme committed after testing
Clouds	ongoing	2/20/2015	Stabilized cold pool scheme

GCM Problems, Issues, and Performance Risks

GCM Problem/Issue/Risk	Potential Impact	Plan to Resolve
Recent changes in GCM	Long-term stability of the model	Monitor long test runs
Code efficiency	On-time completion of runs	Identify bottlenecks
Code development	Introduction of errors	Enhance automated nightly testing
Code development	Degradation of realism	Automated comparisons to observations

Analysis of GCM Results

Investigation of the Equatorial Undercurrent (EUC) and North Equatorial Countercurrent (NECC) for future RCP4.5 scenario showed that the centennial-scale variations are small in both model oceans, and both oceans yield different representations of the EUC and NECC.

Further steps were completed towards creating a new ocean dynamic scheme for a high-resolution model.

GCM Recommendations

It is recommended to set up an automatic system to regularly compare selected model results to observations with reminders to analyze the results depending on the size of the deviations.

GCM Work Planned for Next Quarter

Continuing investigation the behavior SST cold tongue in Equatorial Pacific at AR5_v2 modelE+H.

Test of early version source code from AR5_v2 repository requires rebalancing of the atmosphere-only model.

Conduct production and sensitivity runs with modelE+H.

Earth Observations (EO) [3.1.1.2]

ISCCP [3.1.1.2.1]
The article "Evaluation of Long-term Calibrations of the AVHRR Visible Radiances," authored by Rossow and Ferrier, has been accepted for publication by the *Journal of Atmospheric and Oceanic Technology*.

Future processing will no longer be needed at GISS. Rather, ISCCP is providing guidance to NOAA in the procedures needed for processing image data.

GISS Global Surface Air Temperature Time Series Support [3.1.1.2.2]
GHCN surface air temperatures and ERSST Sea Surface Temperatures (SST) were downloaded. The data were analyzed, tabulated, and plotted for public use. Version 3 of GHCN data and version 3b of ERSST were used in computing the surface air temperature. ERSST v4 data were downloaded but not yet used for the public web site. The differences between ERSST Versions 3b and 4 are being investigated.

Weekly SST anomalies were downloaded to study the potential for the onset or development of an El Nino/La Nina event.

Graphs, maps, animations were prepared for the NOAA/NCDC and NASA/GISS joint Climate Teleconference on January 16, announcing that 2014 was the warmest year since 1880 in both analyses.

WWW Development Support [3.1.1.2.3]
The following GISS web sites were maintained and updated: Glory Mission, Global Aerosol Climatology Project, Electromagnetic Scattering by Particles and Surfaces, and Directory of Members of the Electromagnetic Scattering Community.

Aerosol Polarimetry Sensor (APS) Algorithm Package Development [3.1.1.2.4]
An attempt was made to use histograms of image pixels to distinguish between pixels with (sea) glint that have clear skies vs. cloudy skies. A test was run to find a threshold value of polarized reflectance as a proxy for "clear vs. cloudy" in a scene with glint. However, the data showed no significant differences between the two types of scenes.

For the first time, the SDPS system refused to start jobs to process new data. It was determined that the SDPS system will not start new jobs if there are a certain number of jobs already loaded in the system. The default threshold was raised by a significant amount to avoid this problem in the future.

The definition of viewing-zenith angle and solar-zenith angle was changed for images. Appropriate changes were then made to the relevant cloud-product software.

RSP data were processed for three more HISPIRI flights, and RSP COCOA mission data were reprocessed.

Climate Model Simulation Diagnostic Dataset Generation [3.1.1.2.5]

Output from various GCM runs was extracted and analyzed in support of research work at GISS. Output from the GCM runs is archived on magnetic tapes.

Output data from Coupled Model Inter-Comparison Project (CMIP5) projects were processed with CMOR2 programs. These include data from control, transient, and aerosol runs. The work included extracting data from GISS model output, reformatting the data to meet CMOR2 requirements, and running the data with CMOR2 programs.

Daily, 6-hourly, and 3-hourly data from climate simulations of rapid increase of atmospheric carbon dioxide concentration to four times the present amount. Data from climate simulations of all forcing's, except aerosol indirect effects, were processed. In this model, aerosols and atmospheric chemistry were calculated online as a function of atmospheric state and transient-emissions inventories. The aerosol indirect effect was parameterized. The ocean configuration was the HYCOM ocean model.

Daily cloud feedback diagnostics were reprocessed to form monthly diagnostics. They were then processed with CMOR2 and released to the public.

Inquiries about CMIP5 data from users outside GISS were investigated and processed.

Work on developing a web page to map and display CMIP5 data on-the-fly has begun. In addition, a Python module was installed on Webdev for array manipulations.

The SciPy Python module was installed for NetCDF files, but it lacked the capability to create (write) NetCDF files, so the netCDF4 Python module was installed to allow both read/write capabilities of NetCDF files on Webdev (using Python).

The CMIP5 web page is now running with limited functionality. It is currently using the Command Line version of Panoply (Panoply CL) to display user-selected maps that are calculated in real time. Work will continue to improve the flexibility (options available), robustness (missing/incorrect data), and security (inconsistent/faulty user input) of the web page.

EO Deliverables

EO Deliverable	**Due Date**	**Date Delivered**	**Notes/Description**
Monthly GISTEMP update	15th of the month	On time	
Weekly SST update	Mondays	On time	

EO Problem/Issue/Risk	Potential Impact	Plan to Resolve
Media attacks (CEI, etc.)	Misinformed public	Detailed description of methods on web cooperation with NASA PR department

Evaluation of EO Results

Trinnovim rates its performance as excellent as all tasks were completed in a timely manner. The ISCCP archive is being maintained. In addition, web sites for ISCCP and aerosol work continue to be updated when appropriate. Software tools for the Glory Mission were developed, when needed, in an efficient and expedient manner.

EO Recommendations

Trinnovim recommends continuing to maintain and update the GISS aerosol and ISCCP web sites. Finally, generating software tools to process RSP data should proceed on an as needed basis.

EO Work Planned for Next Quarter

Update GISTEMP website every month.

Update SST anomalies weekly.

Create a test site for the analysis based on GHCN v3 to allow inspection of the data before they are made public.

Prepare transition from ERSST v3b to ERSST v4; analyze the differences between the two data collections. Make ERSST v4 and data products based on ERSST v4 available on the test site simultaneously with the corresponding displays based on ERSST v3b.

Keep the various GISS aerosol web sites up to date.

Analyze RSP data, as needed.

Planetary Atmospheres (PA) [3.1.1.3]

Mapping Saturn's Northern and Southern Hemisphere Eddy Momentum Fluxes [3.1.1.3.1]
Automated wind tracking with a different set of filters, MT3 (889-nm methane band) and UV3 (338 nm), has been started using observations of Saturn's Southern Hemisphere from 2004. UV3 images are being calibrated and projected in preparation for wind tracking.

Automated wind tracking of CB2 (750-nm continuum band) and UV3 filters using images between 20-degrees and 70-degrees south latitude of Saturn has begun. The next step will apply quality controls in an effort to identify spurious vectors and determine if UV3 tracking was successful.

For comparison with UV3/CB2 wind profiles of the Southern Hemisphere, MT3 images were processed and tracked between 20-degrees and 70-degrees south latitude.

A survey of Titan Meteorological Campaign images collected from 10/7/14 - 10/20/14 and from 11/23/14 - 12/4/14 revealed no visible clouds.

PA Deliverables

PA Deliverable	Due Date	Date Delivered	Notes/Description
Map clouds on Titan at every available opportunity	3/2015	3/2015	No clouds were found in any of the images inspected

PA Problems, Issues, and Performance Risks

PA Problem/Issue/Risk	Potential Impact	Plan to Resolve

Evaluation of PA Results
Trinnovim rates its performance as excellent. Analysis of Titan's images continues, and Trinnovim will keep monitoring each imaging opportunity for additional clouds. It should be pointed out that finding no clouds on Titan is of scientific importance because it helps further define the seasonality of Titan's cloudiness (or lack thereof). In addition, cluster analysis of Saturnian clouds is now being used to see if it can improve data analysis.

PA Recommendations
Trinnovim recommends continuing the search for clouds in images of Titan. As more Titan flybys occur, more clouds may or may not be found. Increased temporal coverage provides greater understanding of the seasonal distribution of Titan's cloud cover.

PA Work Planned for Next Quarter
See if cluster analysis can be used to improve upon previously used techniques for Saturnian cloud analysis.

Keep monitoring images from Titan flybys for clouds.

Computer Facility (CF) Operations [SOW 3.1.2]

GISS Computer Facility Maintenance and Monitoring

Server Maintenance

- Patching of servers was performed regularly, as well as patches on Foundstone and KACE reported issues.

Other Systems

- Regular patching continues per Foundstone and KACE vulnerability scans on Linux/Mac and printers.
- Software was installed on various machines. Compilers, libraries and so forth were the main packages.

LAN

- The correct 400Mb/s circuit has finally been installed and so far we have had no problems.
- The DS3 and T-1's between GSFC and GISS were disconnected 2/28/2015.
- Updates continue to be made to the NextGen phone list and are submitted to HQ and Trinnovim for proper recordkeeping and distribution.

NASA Network

- Machines were added/removed from the Active Directory domain as needed for NASA compliant machines.
- DNS entries continue to be made through DDI/QIP and all problems were addressed and resolved with HQ.

GISS Computer Facility Component Installation and Inventory

New Equipment

- Work continues on the hyperwall including helping to decide on specs for parts (motherboard, chassis, CPU, InfiniBand), asking for some new and revised SEWP quotes, and requesting the purchase of the parts. Testing of the parts continue.
- The two Epson EX7235 Pro, 3LCD Projectors was received and set up in the 3rd and 7th floor conference rooms. The units were each tagged #3081284 and 3081285 and the relevant paperwork filled out and submitted to HQ.

Relocation

- The N-props weblink was changed and it is no longer accessible online. I was told GISS needs to be added to allow access to the site but there is no set date as to when this will be done. All entries currently has to be entered manually in a very complex spreadsheet and then submitted to HQ, which is time consuming.
- Work continues regarding excessing of NASA equipment. All NASA tagged machines to be excessed have been manually inventoried and is being stored in room 230. These items will now have to be entered into a spreadsheet for excessing and shipment.
- Property passes for computers and monitors were issued to several users who work remotely.

- The ODIN legacy machines to be returned to HP have been manually inventoried and are stored in room 230A. The database was sent to HP and we are awaiting shipment details.

Computer Facility Supply Maintenance

Stock Item	Quantity In-house	Pending Orders
Paper	50 Hammermill Cartons; 161 Xerox Cartons & Reams	Sufficient supplies maintained.
Toner	47 color & b/w cartridges- H.P, Xerox, Lexmark, Samsung, Konica	Sufficient supplies maintained.

Requested/Purchased/Received:

- Two perpetual standalone Matlab license
- Adobe Acrobat Pro

User Support

- Requests were made to Code 700 to remove several users' accounts in SATERN that did not require IT.
- WebEx/Lync/uStream/Skype sessions support was given for the following:
  - Education Staff Meeting
  - Code 600 Townhall meeting
  - ROSES 2015 with Max Bernstein
  - The Future of IT at Goddard - Business Services Assessment Center All-Hands
  - Women's History Month
  - GSFC OE Staff Meeting
  - College Financing 101: Smart Options for Your Child's College Financing

Communication

- GISS wide emails were sent out regarding the NextGen phones and network maintenance.
- Meetings attended:
  - GISS IT Quarterly meeting
  - Code 600 IT Monthly Meeting
- Regular communication via the GISS-wide email listing continues regarding Agency and GISS security policies and procedures. Some of these included: Agency Heads-up: Phishing Attempts Attributed to NASA -- The Real Story; Java 8 Upgrade; ACES Windows and Mac VM users: Windows 7 Personal Identity Verification (PIV) Smartcard Mandatory Deployment to ACES Machines; Code 700 Data Center Availability.
  - An IT FAQ at http://internal.giss.nasa.gov/faq.html was updated to reflect the new rules for Personal Oversees Travel using personal IT to check NOMAD email.

Assistance

- Two new mailing lists were created/configured; giss-protectiveservices-l and giss-scm-l.

- Provided logistic and technical assistance in deploying the NextGen phones to new users.
- Provided HQ with updated information on the floor plans for the upcoming construction, and furniture requirements.

Training

- On-job mentoring of junior staff.

GISS Computing Facility Planning and Evolution

DAR

- Reported to Rosa Kao and GISS CSO that GISS had no need for DAR waivers; all field and office machines have been DAR'ed with the exception of a few servers.

MacOS/Linux Upgrades

- Only one NASA compliant Mac remain at GISS to be upgraded to 10.9. The server gs611-magnus which once served as a print for the Macs and is our CSR server will be decommissioned soon as it cannot be upgraded. The new Linux server is being set up. A waiver was also put in to VST for this machine, to ensure it will not be blocked.

ODIN legacy/ACES seats/refresh systems

- The USB port was enabled on all 6 ACES Konica Black and White copier/printer/fax/scanner at GISS to enable "scan to USB". Instructions on using the USB port were written up and posted next to each printer.
- 3 new ACES Color printer/copier/scanner were researched and purchased through ESD and are being configured to allow "scan to USB" also.
- ACES Accrual Invoice Validation and Liquidation spreadsheet for January 2015 was carefully reviewed and the few minor discrepancies were addressed with GISS's RA.
- A database of all ODIN legacy machines to be shipped back to GSFC was finalized and submitted to ACES for review and shipping instructions.
- In an effort to use NASA Standard software which are supported by ACES, we are moving away from Apple Mail and have begun migrating users over to Microsoft Outlook as the preferred mail client for Mac users. Third party software "Mail Exporter Pro" to convert the Apple Mail folders to Outlook was recently purchased to handle the conversion and has worked successfully.
- Updated the ACES IT Asset Management (ITAM) Tool database and worked with David Bloom on rectifying some issues; how to add a missing seat is still being investigated, and de-assigning some seats that no longer should be charged to GISS.
- Two Windows PC and one Mac laptop were ordered, received and configured for GISS; overlay, custom software, printers, and firewall rules were installed and implemented.
- Applied for one ACES seat to be wiped and reloaded and which was then reassigned to new user.
- Request for Skype waivers were submitted to our DCSE's for approval and users were notified when approved.
- Continue to work with Stella Adesina, Naymon Brown, Wes Campbell, Bob Speed, and Allison Kaese on closing IM and SR tickets, and solving problems with the ACES refresh systems.

- A discovery at GISS has reinforced concerns that the ACES OS X build has security configuration flaws that need to be addressed. The most recent issue is about world writable executables that are available for all users of the system in the Application Directory. Previous concerns have been expressed about home folder access controls, the root account being enabled and the disabling of Apple's application whitelisting features.
    a. This CR ticket was escalated to the ACES and I3P Enterprise civil servant security leads for their attention.
    b. Ron Colvin is also working with the Agency ETADS on the general topic of Mac OS benchmark updates, to include this issue.
    c. Ron's draft recommendation is listed below and was submitted to the CR.
    d. NASA is using CIS as the basis of its security controls for OS X. All of the settings mentioned above are part of the latest OS X Benchmarks and should be implemented on all ACES delivered systems. We are including all of the controls in spreadsheet format for both 10.8 and 10.9. The Agency ASCS leads have reviewed the controls and believe that all of the level 1 and level 2 scored controls should be implemented except the three below. Any concerns about these controls should be addressed to ASCS (https://etads.nasa.gov/ascs/communications/)

  (5.12) The Agency password policy is for a minimum of 12 characters and local passwords for OS X should meet the NASA criteria as well instead of 15 characters.
  (2.11) The secure empty trash control is not selected as a NASA requirement.
  (2.6.1) While FileVault is recommended, the Agency PGP solution is accepted as meeting the Full Disk Encryption solution required in the Benchmark.

This remains unresolved by ACES.

- A reminder was received again by HP and sent out to our SA's regarding the handling of ACES tickets.
    e. Communicate with the users on their tickets. There is no excuse for not at least calling and leaving a voice mail or firing off a quick E-mail. Document, Document, DOCUMENT!!
    f. Update the ticket when you communicate with the user.
    g. Do not leave tickets in pending customer status.
    h. Do not leave tickets in WIP status overnight or even all day.
    i. Update tickets when appointments are kept.
    j. If customer is happy, ask for a great survey. Not just a good one.
- Updating of all IMs and SRs via SM9 continue.
- New DAR and ACES admin passwords for both the Mac and PCs were received and distributed to the SAs.
- GISS-wide emails were sent out to the users regarding: ACES Windows and Mac VM users: Windows 7 Personal Identity Verification (PIV) Smartcard Mandatory Deployment to ACES Machines; Java 8 upgrade; and Agency Heads-up: Phishing Attempts Attributed to NASA -- The Real Story and Windows 7 Personal Identity Verification (PIV) Smartcard Mandatory Deployment to ACES Machines.
- Continue to assist users with the install of the new VPN (https://vpn.nasa.gov), Junos Pulse, and configure our machines to use the new VPN IP range to allow SSH access. Troubleshot and resolved with HQ VPN login issues encountered by VPN users.

- ACES TA/RA worked with Allison Kaese and Naymon Brown in obtaining tokens and PKI reference and authorization codes for users.
- Daily administrative work* continues to be conducted on the ACES machines that pass through the SM9 ticketing system.

*Daily administrative work includes but was not limited to:

- Updating machines with patches when not done automatically or when requested by the users (Flash/Windows Updates/Adobe Reader/Java etc.)
- Installing software (Cygwin/Putty/Adobe Acrobat Pro/Matlab/KACE/Symantec, Python, Mac Ports/MS-Office/Mozilla Firefox/Google Chrome/Adobe Creative Suite etc.)
- Installing hardware
- Troubleshooting local/network printers errors
- Troubleshooting hardware and software problems
- Listening to users inquiries and trying to find workable solutions for them
- Communicating with Trinnovim, NASA and ACES managers' et al and attending meetings on matters of: deadlines, upgrades, encryptions, ticketing systems, accounts, NASA policies, etc.
- All utilities are upgraded to the newest available versions to keep the machines secure; disk utilities to repair and verify permissions are run after each update as a preventive measure to minimize user tickets.

GISS Computer Facility Security

Network Security

- Several Mac computers at GISS were found to be dual homing. In an effort to ensure that users follow the proper rules and regulations, memos were sent out reminding users of the need to be vigilant when switching from wireless to LAN and vice versus. A Wi-Fi toggle script created by an SA at HQs is being modified and tested, and which, when it works will automatically turn off Wi-Fi once it detects that a machine is plugged directly into the GISS LAN.
- Completed several Security Technology Transfer Control Placement (STTCP) and Technology Transfer Control Placement (TTCP) applications for approval following the guidelines and ensuring that the proper firewall rules are implemented on the user's machines once approved. STTCP forms are no longer needed for FNs to use the "guest wireless".
- Continue to assist FN's sponsors with systems configurations for their users' machines.
- Users were reminded of NASA Security policy requiring that all personnel using NASA computers (desktop, laptop, workstation, and tablet and are using the NASA network) be cognizant of their organization's IT Rules of Behavior (NIST SP 800-53, control PL-04 Rules of Behavior). All new users have been requested to go to http://science.gsfc.nasa.gov/rob, read the Rules of Behavior for Code 600 and click at the bottom to electronically sign the document. (This replaces the old processes in which paper copies had to be signed and stored). Users are informed that a pdf version of the "RoB" can be found on the GISS Intranet under "General GISS Resources". For those users who do not have access to the NASA network and cannot access the link, but do work for NASA, the pdf version is submitted to them.

- The posting of all new policies and procedures continues to be added to the GISS intranet for better communication between the Systems group and users.
- Continue to submit requests through NAMS for VPN, PKI, Secure token, EP and NCCS access.
- Continued to assist users with the install of the new VPN (https://vpn.nasa.gov), Junos Pulse, and configure our machines to use the new VPN IP range to allow SSH access. Troubleshot and resolved with HQ VPN login issues encountered by VPN users. Users are reminded to use only the new VPN client to connect to the NASA networks.
- Skype waivers continue to be submitted on a "need to" basis.
- Request for SSH service on a handful of servers/workstations were renewed via GSARS.
- Windows users were reminded to use their PIV smartcard to login to their machines.
- Our TA/RA continues to work with HQ and end users in supplying tokens, delivering PKI authorization/reference codes and confirming identity.

System Security and Monitoring

- An inventory was taken and submitted to HQ identifying the number of OS X computers lacking the required card readers. We reported that GISS has no Mac OS running VM Windows.
- NASA OCIO issued an action requiring the implementation of secure TLS configurations in the NASA environment. We were required to immediately update and/or remediate non-compliant configurations, develop a POAM to address in a timely manner and support requisite testing, or provide a detailed business justification for services or systems that cannot be configured as required. Eight of the ten devices at GISS were printers and we have tried our best to remove these vulnerabilities from all devices involved, devices were rescanned, and reports were submitted back to our DSCE's. One Mac server could not be fixed and will be removed from the network by end of May. A business justification was provided for that machine.
- Submitted waivers via VST for all machines not reporting in KACE that should be.
- As a part of our upcoming transition from having our own System Security Plan (SSP) to being a part of the larger Code 600 Plan at GSFC we submitted to the CSO exactly how we do our patching for our Linux and Mac machines. We still need to investigate the use of auditd on MacOS and Linux and see if we can get it to log all of the commands used by sudo.
- Reported to Rosa Kao that GISS did not need any waivers for M-PIV exclusions for non- ACES machines.
- Compliance scripts have been updated and made compatible with the latest CIS benchmarks for Linux. The Mac OS X.8 and 9 script is being tested.
- The Federal Government requires that all Federal agencies use the Personal Identity Verification (PIV) Smartcard, otherwise known as a NASA badge, as a common credential for accessing systems, networks, and facilities. To comply with this requirement, NASA has deployed the mandatory use of the PIV smartcard login on all Windows 7 workstations connected to the NDC domain. GISS has reported that they are up to date with the install of PIV-M and they currently have no non-ACES Windows VM. Mandatory PIV was implemented on all machines on September 30 2014, and continues to be enforced. Waivers are requested through ESD when users forget to

bring in their smartcards and for new users who did not receive their smartcard (badge) as yet.

- We continue to implement the new rules from Agency and Center that all EP requests for non-ACES users must go through NAMS using the correct workflow: GSFC Code 600 Elevated Privileges-User/Admin. These requests are first approved by Jack Richards; the user then takes all the required SATERN training, and once completed the NAMS request is submitted by us. FNs are not allowed EP rights.
- Monitoring of our syslog servers at GISS continues, and all loopholes are fixed immediately. All non-ACES Macs are now reporting. Work has begun on making sure that all ACES Macs are configured to log to the servers. We should complete this task by mid-May.

Incident Reporting

- None

Virus/Adware/Etc.

- Users were reminded of their responsibility to remain vigilant and to maintain a heightened level of awareness in identifying and reporting any phishing attempts.
- Virus software is installed and kept updated on all machines as per NASA standards.

CF Status

Critical System/Services Uptime

- Nothing unusual.

Backups

- Backups are primarily the user's responsibility and they are reminded of this.

CF Problems, Issues, and Performance Risks

CF Problem/Issue/Risk	Potential Impact	Plan to Resolve

- None to report.

Library and Publication Services (LPS) [SOW 3.1.3]

GISS Technical Library Operations

Operation	Status
Journal subscriptions	• Library currently subscribes to 57 journal titles.
Books Processed	• Ordered, cataloged and processed 4 books.
Circulation	• 787 library items currently charged out to patrons.
ILL / Document Retrieval	• Processed 31 interlibrary loans.

On-line Library System Participation

Library System	Description of Work Performed
NASA GALAXIE	• Searched NASA online library catalog system to assist in patrons' reference inquiries & interlibrary loans.
OCLC	• Submitted 19 interlibrary loan requests for books and articles for GISS patrons in OCLC.

LPS Deliverables

LPS Deliverable	Due Date	Date Delivered	Notes/Description
Record/assist with DAA submissions	04/01/2015	03/31/2015	Completed and submitted 67 eDAAs.

LPS Problems, Issues, and Performance Risks

LPS Problem/Issue/Risk	Potential Impact	Plan to Resolve
Journal subscription prices continue to rise each year, while library budget does not increase accordingly.	GISS scientists' research will be adversely affected. Every journal title the GISS Library currently subscribes to is essential to GISS research staff.	Continue to monitor usage and readership of journals.

LPS Recommendations

Continue to perform tasks required to assist GISS patrons find information.

LPS Work Planned for Next Quarter

Continue to perform ongoing tasks required to maintain library and assist GISS patrons.

Library Expense and Projection Report

GISS LIBRARY FY 2014-2015 FINANCIAL REPORT
March 2015

LIBRARY SERVICES - THE FOLLOWING TASKS WERE OUTLINED IN THE CURRENT QUARTERLY FORECAST DOCUMENTATION OF THE MONTHLY PRODUCTION RECORD. BOOKS PROCESSED, BORROWED, AND COMPUTER SEARCHES.

	March 2015	CUMULATIVE
BOOKS PROCESSED	2	8
INTERLIBRARY LOANS		
OCLC	5	43
OTHER	7	31
eDAAs COMPLETED	19	296

Logistical and Utility Support (LUS) [SOW 3.1.4]

Postal Mail Handling

Mail distribution within the GISS building was provided and deliveries to the Post Office were made. Equipment and deliveries were unloaded from trucks and messenger service was provided as needed.

The monthly reports for Code 200 were provided indicating postage usage on the Neopost mail meter. The detailed reports include the total items shipped, cost per item, mail type (i.e. parcel), destination zip or country, and the sender's name.

GISS MAIL LOG SHEET January - March 2015							
Date	Mail Type	Qty	Weight	Destination Zip Code	Country	[redacted]	Sender
1/12	Standard	1	14.8oz	08807	USA	[redacted]	Library
1/13	Standard	1	14.8oz	05405	USA	[redacted]	Library
1/22	Standard	1	6.7oz	80301	USA	[redacted]	Library
1/29	Standard	1	2lb 1.3oz	39522	USA	[redacted]	Library
1/30	Standard	1	2lb 10.10z	85721	USA	[redacted]	Mishchenko
2/2	Parcel	1	1lb. 8.5 oz.	64050	USA	[redacted]	Library
2/2	Parcel	1	2lb. 8.7 oz.	13441	USA	[redacted]	Library
2/3	Parcel	1	1lb. 9.7oz.	65150	USA	[redacted]	Library
2/4	1st class	1	6.4 oz.	26500	USA	[redacted]	Library
2/10	Parcel	1	1lb. 14.8 oz.	27708	USA	[redacted]	Library
2/10	Parcel	1	14.8 oz.	14853	USA	[redacted]	Library
2/11	Parcel	1	2lb. 10.2 oz.	85721	USA	[redacted]	Library
2/18	Parcel	1	10.5 oz.	87102	USA	[redacted]	Library
2/18	Parcel	1	1lb. 0.3 oz.	21204	USA	[redacted]	Library
2/20	Parcel	1	2lb. 10.2 oz.	85721	USA	[redacted]	Library
2/23	Parcel	1	1lb. 6.8 oz.	17837	USA	[redacted]	Library
2/23	Letter	1	0.0 oz.	95060	USA	[redacted]	Library
2/24	Flat Rate	1	3lb.1.8 oz.	27708	USA	[redacted]	Shindell
3/13	Letter	1	0.0oz	40292	USA	[redacted]	Library
3/13	Parcel	1	3lb 1.8 oz	10603	USA	[redacted]	Library
3/16	Parcel	1	0.0oz	20530	USA	[redacted]	Library
3/18	1st class	1	0.0oz	20771	USA	[redacted]	Library
3/23	Parcel	1	2lb 7.1 oz	21094	USA	[redacted]	Library
3/24	Parcel	1	0.0oz	06106	USA	[redacted]	Library
	TOTAL # OF PIECES	**24**		**TOTAL COST**		[redacted]	

Property Inventory Support

Newly purchased NASA equipment was tagged accordingly and appropriate paperwork was submitted. Updating of the GISS Inventory continues via N-Props *(see section **3.1.2.2** under Computer Facility).*

Building door tags, floor directories, and extension lists were updated according to new reassignment of offices, new hires and terminations. Office furniture and computer hardware/equipment were moved as needed.

Offices of terminated employees were cleared of papers and broken office furniture so that new employees could occupy those spaces.

Reorganization of the mail room and well as cleanup of the computer room, room 230, continues. Non-NASA tagged equipment is being sorted to determine which contain usable parts and what should be discarded.

The implementation of Voice Over Internet Protocol (VoIP) and Next Generation Voice (NextGen) took place the week of January 16. The new phone line system replaced the Centrix system providing a more stable telephone services. New phones and a brief tutorial were provided in all offices. *(See section **3.1.2** under Computer Facility -LAN)*

The Konica Minolta MFDs that replaced the Xerox copiers have proven efficient, providing printing, copying, scanning and faxing services. Users now have the capability to scan and fax securely using their NASA badge (PIV card) but it is *not* required. Users now also have the capability to print encrypted documents using their PIV card.

The maintenance schedule established to clean and service all printers in the building is functioning well and provides continued usage of these printers except during necessary repairs.

A delivery of 30 "lightly used" desks is expected from GSFC. Desks are being allocated on a "first come, first serve" basis. Delivery is being coordinated with Jack Richards, GSFC, and Code 610. Employees receiving the desks will have their old desks hauled away and their new desks built and set up on the same day.

Conference and Workshop Support

The following seminars, conferences, workshops and meetings were hosted. Appropriate logistical support was provided including teleconferencing services, systems support (i.e. LCD projector), and refreshments as requested.

- Dust Group meeting on January 5 and January 7
- Global Climate Modeling (GCM) meetings on January 6, January 27, February 3, February 17, March 3, March 17, and March 31
- GISS Lunch Seminar: *The impact of projected decreasing aerosol concentrations on future climate* by Dan Westervelt, Princeton University on January 14
- Ocean Modeling meeting on January 15, February 19, and March 18

- Presentation from the Office of the Executive VP of Research at Columbia University on topics that range from grant management, effort reporting, PI responsibilities and travel reimbursements on January 20
- Climate Impacts Research Meeting on January 21
- GISS Special Seminar: *Does Planetary Warming Always Dry Out the Continents? Lessons from Theory, GCMs, and Paleoclimates* by Jack Scheff, LDEO on January 22
- GISS Lunch Seminar: *Aerosol Reanalysis Efforts at NASA* by Cynthia Randles, GESTAR/Goddard on January 28
- GISS Astrobiology discussion on February 5 and February 12
- Dust Group meeting on February 6
- Exoplanet discussion on February 11
- GISS Lunch Seminar: *Do responses to different anthropogenic forcings add linearly in climate models?* by Kate Marvel, GISS on February 11
- ROSES Cloud discussion on February 20
- GISS Informal Seminar: *Tropical water isotopes and climate discussion* by Bronwen Konecky, CIRES on February 24
- GISS Friday Seminar given by Karen Smith, CU-LDEO on February 27
- GISS Lunch Seminar: *Exploring new radar constraints on cloud microphysical uncertainty* by Marcus van Lier-Walqui, GISS on March 4
- NYCRI Spring STEM Teacher Training Research Institute on March 7
- HAIC/HIWC Meeting on March 9 to March 13
- GISS Friday Seminar: *Atmospheric chemistry, stratospheric ozone, and the role of arctic ozone variability on climate* by Karen Smith, a postdoctoral fellow at the Lamont-Doherty Earth Observatory on March 13
- GISS Special Seminar: *The Hiatus, Tropical Climate Feedbacks, Extreme ENSOs and the Role of Model Biases* by Mat Collins, University of Exeter, UK on March 13
- GISS Special Seminar: *Correcting the record of volcanic stratospheric aerosol impact: Nabro and Sarychev Peak* by Mike Fromm, NRL on March 16
- GISS Lunch Seminar: *Multi-site modeling of land surface-atmosphere exchanges at the extent of an agricultural Mediterranean region* by Carlo Montes, new NPP at GISS on March 18
- GISS Friday Seminar: *Current and future darkening of the Greenland ice sheet* by Marco Tedesco, CCNY on March 20
- GISS Informal Seminar: *Practice masters meeting presentation* by Olivia Clifton, Columbia University on March 20
- GISS Special Seminar: *The development and use of a weather and climate forecasting system* by Jon Petch, UK Met Office on March 23
- Climate Impacts Group Brown Bag Seminar on March 26
- GISS Friday Seminar: *The development and use of a weather and climate forecasting system* by Jon Petch, UK Met Office on March 27

Please note that all ViTS conferences and seminars, as well as Webinars coordinated with GSFC can be found under the Computer Facility section of this report.

Community Outreach and Educational Programs

Engagement activities continue for alignment with co-STEM initiatives and NASA Education goals. This includes the development of interactive learning management systems to provide educators ongoing professional development and STEM engagement support, the creation of the GISS Office of Education Facebook page, and collaboration with Apple software developers to develop education applications for GISS.

Collaborative efforts continue to improve STEM instruction in NYC schools including presentations at Medgar Evars College, Vaughn College of Aerospace and Technology, and Teacher's College at Columbia University.

Meetings and discussions continue with NYC City Councilman Dromm (Chair of the Education Committee), as well as teachers and administrators from NYC schools to improve STEM instruction.

The NYCRI program for GISS is currently being developed for summer 2015. In addition, STEM internship opportunities are being developed in collaboration with New York City College of Technology, and development of the Spring NYCRI STEM Teacher Research Training Institute in collaboration with Medgar Evars College continues.

LUS Deliverables

LUS Deliverable	**Due Date**	**Date Delivered**	**Notes/Description**
GISS Lunch Seminars	1/14, 1/28, 2/11, 3/18	1/14, 1/28, 2/11, 3/18	Systems support (i.e. LCD projector); Pizza provided
GISS Friday & Special Seminars	1/22, 2/24, 2/27, 3/13, 3/16, 3/20, 3/23, 3/27	1/22, 2/24, 2/27, 3/13, 3/16, 3/20, 3/23, 3/27	Systems support (i.e. LCD projector)
HAIC/HIWC Meeting	3/9-3/13	3/9-3/13	Conference logistics including meals and Systems support (i.e. LCD projector)

Program Management (PM) [SOW 3.1.5]

Staffing
The following staff changes were made for the period January 1 – March 31:

[redacted]

Hires
None

Transfers
None

[redacted]

Task Management
Trinnovim updated the NASA/Goddard Space Flight Center Locator and Information Services Tracking System (LISTS) personnel roster.

Coordination with Anthony Loggia and Rhonda McCarter was established to update all GISS entries in the NASA Enterprise Directory (NED) including deletions of terminated employees.

Smart cards continue to be issued to all GISS personnel in accordance with Goddard Space Flight Center's security procedures. Trinnovim's Project Management office begins the badging process by first creating an identity for each employee in IdMAX and forwarding a LISTS form to GSFC Security. Once a new identity is created and submitted, the employee receives an email with instructions on how to complete an eQIP (electronic Questionnaire for Investigations Processing). Upon submission and approval of an eQIP, employees are fingerprinted and await their badge. Temp IDs are no longer valid and all personnel without a valid badge are signed in as visitors.

The contract cost by program category was updated through March 31, 2015.

A monthly breakdown of contract charges, including supplies, travel and Other Direct Costs (ODCs) was completed and delivered to group leaders in each discipline.

STI/eDAA forms continue to be completed and processed for all GISS publications. To date, all GISS published papers have an eDAA on file. A reminder was sent to all GISS staff regarding the NASA policy on eDAAs and their processing before papers are submitted to a journal or conference.

The following documents were reviewed and updated if necessary:
- Position Description for Uniformed Security Post at GISS

- GISS on-duty Security Officer Procedures (SOP)
- GISS Occupant Emergency Program, with special emphasis on the fire evacuation plan; the escape routes were adapted to changes in the floor plans
- Emergency Computer Shutdown Procedures
- Continuity of Operations Plan (COOP); the general Reconstitution Plan was customized for GISS and copied to the COOP SharePoint site. The call tree was modified and was tested.

Contract Reporting

The following reports were delivered on time:

- Health and Safety report
- 533 & Variance report
- Contract Budget
- Room and Extension report
- Costs reports
- ACES (formerly ODIN) monthly report

Coordination with COTR

The following was discussed with COTR:

- Contingency Plan for GISS
- NASA One email address seats
- Goddard security badging and HSPD-12 (Homeland Security Presidential Directive – 12)
- Reviewed different funding for each group and the Project Manager spoke to each PI regarding funding
- Process to set up NOMAD accounts
- GISS equipment inventory
- Status and completion of COOP Plan; definition and outline of "Reconstitution" step
- Status of GISS LAN upgrade and switch to CNE
- Room assignments for new hires and office reassignments
- eDAA process as required by NASA GSFC for all publications submitted from GISS

Logistical Support

Access to NASA facilities by foreign nationals from designated countries continues to be monitored. The NASA Administrator announced that he has initiated a complete review of the access which foreign nationals from Designated Countries are granted at NASA facilities, as well as our security procedures with regard to these individuals more broadly. In addition, the Administrator ordered a moratorium on granting any NEW access to NASA facilities to individuals from specific designated countries, including China (PRC), Burma, Eritrea, Iran, North Korea, Saudi Arabia, Sudan, and Uzbekistan. In compliance with this directive, office space was provided at Columbia University for foreign nationals collaborating with GISS. Whereas foreign visitors from the eight countries mentioned above have to be escorted at all times, ALL foreign nationals (unless they have a green card) have to be APPROVED before they can visit GISS. The approval process involves IdMAX and has to be initiated by Patricia in the project management office at least 10 or 20 days before the visit to be sure that it gets granted in time. The 20-day limit applies to people from the 41 countries (including Israel)

listed at: http://oiir.hq.nasa.gov/nasaecp/DCList_11-28-12.pdf; the 10-day limit applies to all other foreigners. Even escorted visits are prohibited before the approval has been granted.

An email was sent to all GISS staff advising them of newly available information regarding building access via the GISS intranet website http://internal.giss.nasa.gov/access/

New documents were forwarded to all GISS staff regarding new requirements for foreign national employees/visitors, specifically for those from designated countries. In addition, a reminder was sent regarding the completion and acknowledgement of the GSFC RULES AND PROCEDURES FOR ESCORTING VISITORS, specifically foreign nationals.

Issued LISTS & NASA 1760 forms to new employees/foreign visitors and created NASA identities in IdMAX for badge enrollment. The following entries were made for the period January 1 through March 31:

Name	Citizenship	Host	Affiliation	Expiration Date
José Stoop	The Netherlands	Michael Mishchenko	GISS Sci. Collab.	01/20/2015
Chetan Deva	United Kingdom	Joshua Elliott	GISS Sci. Collab	08/31/2015
Corey Lesk	U.S.	Radley Horton	C.U.	08/31/2015
Matthew Fulakeza	Malawai	Len Druyan	C.U	01/14/2016
Manishka De Mel	Sri Lanka	Malgosia	C.U	09/30/2016
Ken Sinclair	Canada	Bastiaan Vandierhoven	C.U	02/24/2017
Roberto Tinella	Italy	Shari Lifson	GISS Sci. Collab	02/13/2015
Jing Li	LPR	Barbara Carlson	GISS Sci. Collab	01/16/2018
Daehyun Kim	S. Korea	Tony Del Genio	GISS. Sci. Collab	02/02/2017
Kenneth Sinclair	Canada	Bastian Van-Diedenhoven	Columbia Uni.	02/24/2017
Michael Rampino	U.S.	Vittorio Canuto	GISS Sci. Collab.	01/16/2018
Karen Smith	Canada	Darren Engwirda	GISS. Sci. Collab.	3/13/15
Johannes Quaas	Germany	Susanne Bauer	GISS. Sci. Collab	7/31/2015
Jon Petch	U.K.	Ann Fridlind	GISS Sci. Collab.	03/23/2015
Yoshi Wada	Japan	Michael Puma	GISS Sci. Collab.	02/28/2017
Vivien Green	Brazil	Cynthia Rosenzweig	GISS Sci. Collab.	02/04/2016
Matthew Collins	U.K.	Gavin Schmidt	GISS Sci. Collab.	03/13/2015
Brown Konecky	U.S.	Gavin Schmidt	GISS Sci. Collab.	02/27/2015
Anna Chulaki	U.S.	Neal Most	Trinnovim-GSFC	02/28/2020
Karen Catucci	U.S.	Neal Most	Trinnovim-GSFC	02/28/2020
Joyce Fetherston	U.S.	Neal Most	Trinnovim-GSFC	02/28/2020
Maria Liebrecht	U.S.	Neal Most	Trinnovim-GSFC	02/28/2020
Anne Mendoza	LPR/Philippines	Neal Most	Trinnovim-GSFC	02/28/2020
Daniel Berdichesvsky	U.S.	Neal Most	Trinnovim-GSFC	02/28/2020
Wei Wu	China	Andrew Ackerman	GISS Sci. Collab	03/13/2015
Shichu Zhu	China	Andrew Ackerman	GISS Sci. Collab	03/13/2015
Walter Strapp	Canada	Andrew Ackerman	GISS Sci. Collab	03/13/2015
Alexei Korolev	Canada	Andrew Ackerman	GISS Sci. Collab	03/13/2015
Jan Lukas	Czech Republic	Andrew Ackerman	GISS Sci. Collab	03/11/2015

Alain Protat	France	Andrew Ackerman	GISS Sci. Collab	03/13/2015
Aurelien Bourdon	France	Andrew Ackerman	GISS Sci. Collab	03/13/2015
Mengistu Wolde	Canada	Andrew Ackerman	GISS Sci. Collab	03/13/2015
Alfrons Schwarzenboeck	Denmark	Andrew Ackerman	GISS Sci. Collab	03/13/2015
Biago Esposito	Italy	Andrew Ackerman	GISS Sci. Collab	03/13/2015
Delphine Leroy	France	Andrew Ackerman	GISS Sci. Collab	03/13/2015
Alice Grandin	France	Andrew Ackerman	GISS Sci. Collab	03/13/2015
Patricia King	Canada	Andrew Ackerman	GISS Sci. Collab	03/13/2015
Hartwig Deneke	Germany	Ann Fridlind	GISS Sci. Collab	4/10/2015
Franziska Glassmeier	Switzerland	Ann Fridlind	GISS Sci. Collab	4/10/2015
Michael Herzog	U.K	Ann Fridlind	GISS Sci. Collab	4/10/2015
Corinna Hoose	Germany	Ann Fridlind	GISS Sci. Collab	4/10/2015
Andreas Macke	Germany	Ann Fridlind	GISS Sci. Collab	4/10/2015
Danny Rosenfeld	Israel	Ann Fridlind	GISS Sci. Collab	4/10/2015
Philip Stier	U.K	Ann Fridlind	GISS Sci. Collab	4/10/2015
Bernhard Vogel	Germany	Ann Fridlind	GISS Sci. Collab	4/10/2015
Andrea Flossmann	Germany	Ann Fridlind	GISS Sci. Collab	4/10/2015
Geradus de Leeuw	France	Ann Fridlind	GISS Sci. Collab	4/10/2015
Daniel Grosvenor	U.K	Ann Fridlind	GISS Sci. Collab	4/10/2015
Annette Miltenberger	U.K	Ann Fridlind	GISS Sci. Collab	4/10/2015
Shuguang Wang	China	Ann Fridlind	GISS Sci. Collab	4/10/2015

Contractor Safety Support

New building procedures were implemented on February 9, 2015 as an added safety and health measure. All employees who remain in the building beyond the normal work hour of 7:00 PM on any given day must visit the security desk on said day and sign the Out-of-Hours register.

The Safety Committee held monthly meetings. All managers were asked to continue to be alert to any potential health and safety hazards in their areas.

Fire alarms were tested in March and were scheduled to be tested again in April.

Numerous safety hazards have been reported to Columbia University and needed action was taken to resolve them.

The monthly Health and Safety reports were prepared and submitted on time.

An assessment was sent to all GISS occupants to complete so that an industrial hygienist at Goddard can investigate the ongoing issue of restaurant fumes throughout the GISS building.

An occupational health hazard inspection was conducted on February 25. The air quality was tested and confirmed to be normal. A complete building walk-through revealed no major hazards. A full report will be forwarded for review upon completion.

GSFC's Emergency Management Officer will conduct a Continuity of Operations Planning (COOP) table top exercise at GISS in April.

GISS Facility Management

An update on the new lease was sent to GISS employees. The new lease is expected to be signed in a couple of weeks. There is an interim lease that will go to next February and the new lease will be for a newly renovated space starting February 2016. Shortly after the new lease is signed, a planning meeting will be held with the GSFC architects/planners and Columbia to finalize a plan for the contractors to follow. The estimated timeframe of when renovations will commence is at the end of May/early June and the work itself may last until December 2015.

An email address was created, giss-supportservices-l@lists.nasa.gov, to be used my GISS staff for specific requests. Where computer related problems should be sent to csr@csr.giss.nasa.gov, all other GISS building related items should be sent to GISS Support Services at giss-supportservices-l@lists.nasa.gov. These items include requests for supplies (including toner), copier issues, phone issues, and all other miscellaneous items pertaining to the GISS building and employee questions. Emails will be directed to the appropriate person and the issue will be addressed promptly with a follow up email to the requestor confirming receipt and completion.

Trinnovim worked with Columbia University Facilities Management to identify the source of fumes permeating throughout the building, and proper measures have been taken.

New signs were posted on all floors in both stair ways indicating floor and stair well replacing missing or damaged signs.

Light fixtures were replaced and other small tasks (i.e. shelf installation) were completed in several offices as needed.

Security cameras were replaced with new ones and others added in areas of need.

In accordance with new rules from the NYC Dept. of Sanitation, a notice was sent to all GISS employees regarding the acceptance of all rigid plastics along with metal, glass bottles and jars, and beverage cartons in the recycling stream.

In an effort to get an up-to-date inventory of the GISS facility office keys, a form was sent to all employees asking them to verify the office keys they were given.

Relabeling of all mail boxes to more easily keep them in alphabetical order was initiated.

Maintenance was performed as needed throughout the building and proper communication was disseminated to all building occupants.

On January 28, several bathrooms were renovated to provide increased privacy in bathrooms and accessible baby-changing facilities, and to increase the number of stalls available for everyone. The renovations included switching all single-stall bathrooms to gender-neutral bathrooms with external locks (on the 2nd, 5th, 6th, and 7th floors) and adding baby changing facilities in the gender-neutral bathrooms (2nd and 7th floors).

Electronic Information Technology Accessibility Compliance [SOW 3.2]

GISS Website Upgrade and Maintenance
The system software was updated on public, staging, and internal web servers. Security patches were applied to the systems on the webserver remote backup.

Datasets were prepared and provided to NASA and the media related to the annual temperature news release.

A redesign of the NYCRI education webpages was implemented and new content was added; the news/features display on the top GISS homepage was redesigned.

Panoply data visualization software adaptions were implemented that have to do with using it as a website tool.

Development of Utilities
Version 4.1.0, 4.1.1 and 4.1.2 of the Panoply desktop visualization software were released.

Support was provided to users of Panoply in person at GISS and by email to researchers at NASA-GSFC, NASA-JPL, Univ. California-Davis, Univ. Colorado, Univ. Washington, EUMETSAT, British Antarctic Survey, Univ. Bristol (UK), University of Leeds (UK), and National Oceanogr. Centre Southampton *UK), Royal Netherlands Meteorol. Inst., Univ. Amsterdam (Netherlands), Univ. Utrecht (Netherlands), Royal Meteorol. Inst. Belgium, Research Inst. for Development (France), Univ. Köln (Germany), Granada Univ. (Spain), Inst. de Astrofísica de Andalucía (Spain), Univ. Melbourne (Australia), Tropical Agr. Res. and Higher Edu. Center (Costa Rica), Univ. Fed. Rio de Janeiro (Brazil), and Univ. Nacional de Colombia.

Work was performed on updates to the Mars24 timekeeping software.

Versions 1.7.1 and 1.7.2 of the G. Projector map projection software were released.

EIT Work Planned for Next Quarter
Completion of modification and approval of all interactive web utilities, including the interactive site to view results from new runs.

Completion of the manual for version 4 for the Panoply data visualization software.

Continuing work on a scriptable version of Panoply with the goal of using it on the GISTEMP site.

TRINNOVIM

July 16, 2015

Dr. Emily Michaud,
NASA Goddard Institute for Space Studies
2880 Broadway
New York, NY 10025

Dear Dr. Michaud:

Attached is the Quarterly Report for Trinnovim, LLC for April 1 to June 30, 2015. If you have any questions regarding the contents herein, please contact me.

Sincerely yours,

Reto A. Ruedy
Project Manager

[redacted]

PREPARED FOR

GODDARD INSTITUTE FOR SPACE STUDIES

CODE 611.0

GODDARD SPACE FLIGHT CENTER

BY

TRINNOVIM

QUARTERLY REPORT

APRIL 2015 – JUNE 2015

CONTRACT OBJECTIVE

The objective of this contract is to furnish comprehensive support services to the Goddard Institute for Space Studies in the following areas: scientific programming; scientific programming analysis; systems programming; data handling and data teleprocessing; computer operations; library services; publication services, including manuscript preparation, illustration and duplicating photography services; and reproduction services.

Global Climate Modeling (GCM) Support [SOW 3.1.1.1]

GISS GCM Maintenance and Improvement [3.1.1.1.1]

Changes at and Communication with NCCS/GSFC:

Changes in NCCS's computing environment continued and the corresponding modifications of the production utilities were applied. Some of the older nodes were upgraded to SP3. All westmere nodes were removed from the system and the batch script was modified to provide all current options.

Timing tests were made to determine the best combination of environment variables; further tests were made to determine the optimal number of cpus to be specified for different models and nodes. It was found that reducing the number of requested cpus can be done with a penalty that was much smaller than expected. Corresponding recommendations allowed satisfactory turn-around of production jobs despite the temporary reduction of available cpus.

Radiative transfer scheme:

Work is continuing on the radiative transfer scheme. The main focus for the next few months will be the development and implementation of a new correlated-k formulation for handling the solar radiation in a GCM.

In addition, new tau tables, as well as transmission correction factors, for the case of no ozone in the thermal region of the GCM have essentially been completed - the case of very low water vapor amounts, however, required a bit more care. A temporary workaround was devised to eliminate errors in the long wave radiation scheme when the top of the atmospheric model is in the mesosphere.

Work commenced on a rewrite of the correlated-k radiation scheme to accommodate very large values for CH4 absorber amounts. This project should be completed in the next quarter.

Ocean model developments:

The integration of the new mesoscale and tidal mixing schemes into the current operational GISS coupled model was finalized. Previously these schemes had been tested as full replacements for the default schemes, but now the effort was made to reorganize the model to enable them to co-exist with the defaults.

The default mesoscales code needed to be broken up into three parts: (1) evaluation of ocean structure (2) calculation of mesoscale diffusivity (3) calculation of mesoscale transports from the diffusivity. A great deal of care was taken to ensure exact reproducibility of previous results for the default mesoscale scheme.

In addition, methods had to be conceived to enable the set of transport diagnostics reported by the default mesoscale scheme to also be reported for the alternate scheme. This was slightly nontrivial due to the very different numerical formulations. For example, certain nonlocal terms arise in the new scheme due to its casting the equations in a transformed coordinate system.

Finally, a method was devised to enable prognostic subgrid profiles of tracers to be updated fully consistently with the mesoscale activity. Previously, these subgrid profiles were updated to ensure numerical stability but not the maximum possible level of accuracy/consistency.

The development of the next-generation ocean model continued, the implementation of a new framework for enabling application of high-order advection schemes near the cube edges of the new ocean model grid was completed and some initial testing was performed with encouraging results.

Various materials were prepared on the design and initial results of the new GISS ocean model for a NASA MAP proposal on the use of this model in the GSFC GMAO data assimilation framework.

Parts of the new framework were re-implemented for enabling application of high-order advection schemes near the cube edges of the ocean model grid in order to be friendlier to parallelization and other requirements for eventual use in a full 3D configuration.

HYCOM developments:
The observed cold tongue sea surface temperature in the Eastern Equatorial Pacific disappeared in the modelE-HYCOM combination when a more complex turbulence scheme was introduced. Work was done trying to determine what feature was responsible for that degradation. Reversing the choice of the length scale was unsuccessful. Another interesting fact is that the cold tongue is present with both versions of the turbulence scheme if the Russell ocean model is used instead of HYCOM. Another observation is that rainfall increased significantly in that area with the new scheme only with HYCOM. Further investigations are needed. Adding the new cold pool scheme might alleviate the problem.

There is some evidence that suggests that the coupled HYCOM model simulations are different in the tropical ocean, especially the cold tongue, when different vertical coordinates are used in HYCOM, namely, sigma1 vs. sigma2. An investigation was started whether a similar sensivitity is seen in the uncoupled HYCOM forced by prescribed atmospheric forcing. A centennial experiment is being carried out for such a comparison.

The HYCOM experiment with the sigma2 as the vertical coordinate and forced by CORE2 atmosphere has completed 200 out of the total 300 year goal. It has shown some sensitivities comparing with the sigma1 vertical coordinate, among them is the SST in the Southern Ocean. Meanwhile, another concern rises about the impact from the equatorial grid refinement on the model results, as this is done only in the meridional direction. A version of HYCOM is being set up without the grid refinement, in order to explore the numerical sensitivity of this aspect.

Several such experiments with sigma2 and unrefined horizontal mesh were conducted using the HYCOM alone. They are now being done with the coupled version. Work is being done on the coupler to interpolate fields between the atmospheric 2x2.5 degree grid and the unrefined 1x1 degree ocean grid.

However, problems occurred in the modelE-HYCOM that prevented its running when the cold pool scheme was added. This was investigated, and the cause of the problem turned out to be a bug in the subroutine geopar.f. After correcting that routine, the model ran without problems for 300 years so far.

The latest HYCOM results were presented at the Layered Ocean Model Users' Workshop in early June at Copenhagen, Denmark.

Sea ice modeling:

Analysis of recently completed experiments discovered some unexpectedly thick sea ice at some Greenland and Antarctic coastal points. This issue is being looked into more closely.

Work continued on the new sea ice model both on the thermodynamics and on the numerical aspect. The problem of the brine pocket parameterization instabilities that prevent the model run from continuing was resolved as well as the problem of creating unrealistic sea ice thicknesses. It will now be possible to test the scheme in longer runs and to compare its impact to the previous thermodynamics and to observations.

Currently the sea-ice dynamics is being rewritten. Up until now, the snow and sea-ice quantities (mass, enthalpy, salinity) were advected together. The new cleaner version of the dynamics scheme separates all the quantities for sea-ice on one hand and for the snow on the other and advects them separately in order to avoid energy corrections at the end of the advection process.

This new sea ice dynamics is also tested in combination with the newly developed sea ice thermodynamics.

GISS Climate Model Diagnostics [3.1.1.1.2]

An extensive documentation of all diagnostics built into the GISS GCM was compiled and is being edited and will be kept up-to-date.

In support of collaborative work with JPL's David Halpern an analysis is being conducted of equatorial undercurrent and North equatorial countercurrent transports as to the large differences between the GISS ocean model and HYCOM; in order to manifest the behaviors of the two ocean models in the equatorial zone the depth-longitude distribution of temperature along the equator was plotted from 135°E to 85°W and from 0 m to 400 m depths; the depth-latitude distribution of temperature was analyzed along 155°W from 20°S to 20°N and from 0 m to 400 m depths.

On the base of those data David Halpern delivered a joint presentation "Decadal-to-Centennial Variability of the Pacific Equatorial Undercurrent Over the Next 400 Years Under RCP4.5 Greenhouse Gas Emissions" in Paris, France, at the Fourth Climate Variability and Predictability Workshop on the Evaluation of ENSO in Climate Models: ENSO in a Changing Climate. Below is the abstract of that presentation:

The Equatorial Undercurrent (EUC) flows along the equator in the eastward direction, which is opposite to the direction of the prevailing westward tradewind, and occurs at about 50- to 250-m depths in the Atlantic and Pacific Oceans. The Pacific EUC, which is a major ocean current with a typical transport of about 25 Sv, has an annual cycle in strength and core-speed depth and exhibits large inter-annual variability associated with the El Nino phenomenon, which, when strong enough as in 1982-1983, causes a temporary disappearance of the EUC. We ask the question: Would the Pacific EUC transport increase or decrease over the next 400 years under the IPCC representative greenhouse gas concentration pathway 4.5 scenario? We analyzed 10-year averaged EUC transports produced in the NASA Goddard Institute for Space Studies climate models ModelE-H and GISS ModelE-R, which differed only in the ocean component. ModelE-H and ModelE-R oceans have different latitudinal grid spacings near the equator and different representations of vertical mixing. We chose 140°W, where the present-day EUC transport approaches its maximum annual-mean value between 145°E and 95°W. The ModelE-H and ModelE-R EUC transports in 2096-2105 were 12% and 5%, respectively, smaller compared to those in 2006-2015. The apparent 21st century trend of decreasing ModelE-H EUC transport was not distinguishable from decade-to-decade variability. Consecutive 10-year averaged ModelE-H

EUC transports from 2010 to 2100 were not monotonically decreasing, had a maximum variation of 7.5% in 2040 to 2050, and on three occasions the decade-to-decade transport increased with time. The 10-year averaged ModelE-H EUC transports in 2100, 2200, 2300 and 2400 were the same within 5%; similarly for the ModelE-R EUC. The EUC transport estimated at other longitudes will be described as well as the substantial (~ 60%) difference between the ModelE-H and ModelE-R representations of the EUC transport at 140°W over the next 400 years.

The Hadley Centre Sea Ice and Sea Surface Temperature data set (HadISST) were downloaded and updated until January 2015. The data were reformatted on GCM grid for 1x1, 2.5x2 and 4x5 grid resolutions. Internal GISS and NETCDF formats were made available.

Improved Parameterization of GCM Sub-grid scale Turbulence Transport [3.1.1.1.3]
Progress has been made in solving the following famous problem of the general ocean circulation: how does energy cascade from the large climate scales where most of it is generated to the small scales where all of it is dissipated. An explanation of this phenomenon has been suggested which is based on the Canuto-Dubovikov mesoscale model; it involves a cycle of eddy potential energy cascades and inverse eddy kinetic energy cascades combined with vertical eddy shear and microscopic turbulence. The whole process will be described in a paper with the working title "Cascades, conversion and dissipation of energy within mesoscale eddies".

Two papers are being revised, one is a collaboration with G. Danabasoglu from NCAR, the other with John Marshall from MIT.

In collaboration with V.M. Canuto and Ye Cheng, Trinnovim staff is developing a matched mesoscale parameterization for the coarse resolution OGCMs in the adiabatic ocean interior (A-region) and diabatic mixed layer (D-region). Even though in the A-region the most appropriate averaging of resolved fields is the thickness weighted isopycnal one, in the D-region where mesoscale fluxes have considerable diapycnal components, isopycnal coordinates and isopycnal averaging are inappropriate.

Therefore, in the D-region only the Eulerian averaging is feasible. Since solutions in A- and D-regions must match at their interface, in both regions the same averaging procedure must be applied which may be the Eulerian averaging only. Thus, in self consistent OGCMs we have the three problems:

1) Eulerian mesoscale parameterization in the A-region,
2) analogous parameterization in the D-region, and
3) matching those parameterizations at the A-D interface.

McDougall and McIntosh (2001, MM) argued that the first problem for the tracer field is rather difficult since the Eulerian residual flux of a tracer does not coincide with the Redi flux that is commonly used in OGCMs but has an additional term which, as they pointed out, would be very difficult to parameterize. Meanwhile, such a parameterization is indispensable for matching the A-region mesoscale parameterization with its mixed layer (D-region) counterpart.

However, a model independent relation between the Eulerian residual flux and the horizontal buoyancy flux was found which implies that the Eulerian mesoscale parameterization for an arbitrary trace requires no additional parameterization in comparison with that presently used in OGCMs. Thus, an adequate parameterization of the eddy induced velocity is a crucial factor for OGCMs. In fact, within the usual Gent-McWilliams parameterization the tracer residual flux has no vertical component in the whole ocean interior; this considerably worsens a description of the

global ocean flow. As an alternative, the parameterization developed at GISS is considered. It is shown that predictions of that parameterization for the D-region are in an agreement with observational, fine and coarse resolution simulation data. As for the problem (2) mentioned above, in the D-region the default definition of the mesoscale stream-function was modified to satisfy the zero surface boundary condition. As a result, in the D-region a streamfunction was obtained which has a form similar to the presently used tapering model which contains a unknown tapering function. Here the tapering function depends on local fields. Its shape is determined by the profile of the vertical buoyancy flux whose GISS parameterization has been recently tested by Luneva, Clayson and Dubovikov in a recent publication.

Work was also done preparing a paper titled "Parameterization of sub-mesoscales: dynamical features and global implications".

Documentation of the Core GISS Climate Model [3.1.1.1.4]

Documentation is an ongoing project; any changes are documented by the programmer implementing the changes in two places:

(1) Marked and unmarked inline documentation in the code
(2) Documentation requested by git when committing the changes to the modelE repository.

Documentation may be produced by running a program that processes the marked comments.

In addition an extensive overhaul of the documentation provided on the web about how the basic ideas implemented in the climate model and how to set up and run model experiments has been initiated.

Cumulus Cloud Studies [3.1.1.1.5]

The programming and testing of the convective cold pool parameterization was completed and the code was committed to the modelE repository. Test runs were analyzed and appropriate plots were made available.

A virtual mixed phase cloud scheme was designed and committed to the modelE repository. This scheme was adopted, since the current model does not (yet) permit liquid water and ice to co-exist in the same grid cell.

Test runs were made in the AR5 modelE in which the most negatively buoyant downdraft mixture was modified depending on a random number (a stochastic method). The cold pool properties and climate was compared with the runs without using the stochastic method.

Additional parameters (WMU_multiplier, radiusi_multiplier and radiusl_multiplier) were used for tuning the cloud scheme of modelE. These parameters along with other tuning parameters help find out better simulations when new physics are included, rather than just using U00a and U00b to get radiative balance. An ensemble of hundreds of short runs is planned to assess the effects of various parameter settings.

A power point file introducing the cold pool parameterization was prepared and was presented in the model meeting on 6/9/2015 explaining the necessity of using them and how it works.

GCM Deliverables

GCM Deliverable	Due Date	Date Delivered	Notes/Description
GISS utilities to run GCM on discover	ongoing	4/10/2015	Timing tests showed low penalty for using fewer cpus
Climate modeling	ongoing	6/30/2015	Presentation at workshop in Paris prepared (ENSO in a changing climate)
Sea Ice modeling	ongoing	5/22/2015	Brine pocket parameterization stabilized – ready for long tests
Ocean modeling	ongoing	6/30/2015	Integration of new mesoscale/tidal mixing schemes into ocean model
Turbulence transport studies	ongoing	4/30/2015	Cascade problem explained
Turbulence transport studies	ongoing	5/29/2015	GISS turbulence scheme analysis completed
Clouds	ongoing	4/20/2015	Completed cold pool scheme
Clouds	ongoing	5/29/2015	Stochastic cold pool scheme programmed
Clouds	ongoing	6/30/2015	Cold pool scheme presentation

GCM Problems, Issues, and Performance Risks

GCM Problem/Issue/Risk	Potential Impact	Plan to Resolve
Recent changes in GCM	Long-term stability of the model	Monitor long test runs
Code efficiency	On-time completion of runs	Identify bottlenecks
Code development	Introduction of errors	Enhance automated nightly testing
Code development	Degradation of realism	Automated comparisons to observations

Analysis of GCM Results

Conclusions of the study for the ENSO workshop:

- The decadal variation of EUC (Equatorial Undercurrent) transport over the next 100 years is small (< 10%) with no visible trend.
- The GISS Model with Russell ocean produced EUC transport 50% larger than GISS Model with HYCOM.
- The Russell ocean had a "flatter" thermocline slope in north-south direction than HYCOM.
- The Russell ocean had a "flatter" thermocline slope along the equator than HYCOM.
- The EUC transport was greater with the Russell ocean than with HYCOM.
- The centennial variation of the EUC transport over the next 400 years was small (< 10%) with an indication of a decreasing trend.
- The longitudinal profile of the EUC transport in the Russell ocean showed a steady increase from 180° to 120°W, a feature that was absent in HYCOM.

- The longitudinal profiles of the EUC transport in both ocean models did not capture the bell-shaped profile computed with ECCO.

Further steps were completed towards creating a new ocean dynamic scheme for a high-resolution model.

GCM Recommendations

It is recommended to set up an automatic system to regularly compare selected model results to observations with reminders to analyze the results depending on the size of the deviations.

GCM Work Planned for Next Quarter

Investigate and suggest methods to modify the GSFC batch system to get better turn-around for non-production test runs.

Investigate the potential use of new hardware/software installed in the Goddard cluster.

Investigate SP1 to SP3 transition problems for certain model versions.

Incorporate the new transfer tables and routines into modelE.

Test sigma2 vertical coordinates and unrefined horizontal mesh in the coupled modelE AR5_v2 in an attempt to restore the proper mean East-West Sea Surface Temperature gradient in the Equatorial Pacific.

Earth Observations (EO) [SOW 3.1.1.2]

ISCCP [3.1.1.2.1]
The article "Evaluation of Long-term Calibrations of the AVHRR Visible Radiances," authored by Rossow and Ferrier, has been published by the **Journal of Atmospheric and Oceanic Technology** (dated April 2015): Vol.32, pp 744-766.

Future processing will no longer be needed at GISS. Rather, ISCCP is providing guidance to NOAA in the procedures needed for processing image data.

GISS Global Surface Air Temperature Time Series Support [3.1.1.2.2]
GHCN surface air temperatures and ERSST Sea Surface Temperatures (SST) were downloaded. The data were analyzed, tabulated and plotted for public use. Version 3 of GHCN data was used in computing the surface air temperature. ERSST v4 data were downloaded but not yet used for the public web site. The differences between ERSST v3b and ERSST v4 are being investigated. The display utilities were modified to provide the option to use either file for the maps and graphs that users may generate.

Requests for clarification by people interested in our web site were answered to their satisfaction.

The web utilities are being modified to switch the base of the GISS temperature analysis to ERSST v4. The time series in the animations showed on the GISTEMP page were extended to the most recent period and newer and better image viewers are being tested.

Weekly SST anomalies were downloaded to study the potential for the onset or development of an El Nino/La Nina event.

WWW Development Support [3.1.1.2.3]
The following GISS web sites were maintained and updated: Glory Mission, Global Aerosol Climatology Project, Electromagnetic Scattering by Particles and Surfaces, and Directory of Members of the Electromagnetic Scattering Community.

Aerosol Polarimetry Sensor (APS) Algorithm Package Development [3.1.1.2.4]
Originally, clouds were mapped to the last mapped altitude, but not to the higher altitude of the aircraft. Additionally, the aircraft could change altitude and fly below the last mapped altitude. Software has now been corrected to work for these conditions.

During a few flights, the aircraft flew over a ship that was part of the experiment. Matching the AVIRIS geo-location for images (which actually imaged the ship itself) with the ship's GPS values confirmed that AVIRIS geo-location is very precise. It was then decided to improve the RSP geo-location so it matches that of the AVIRIS.

The assumption that the GPS value of a scan was obtained at the beginning of the scan was questioned. Indeed, matching the GPS value at the end of the scan helped reduce the pitch of the RSP instrument to reasonable values in order to match AVIRIS geo-location. As a result, a tool was written to vary instrument pitch to get the best alignment of the RSP. Finally, it was possible to improve wing-flex coefficients and determine a fixed yaw value for the RSP as well.

Data files that have an aircraft roll of over 5 degrees now include "Turn" in their names. Next, SDPS was adjusted to process filenames with "Turn" correctly.

All ER-2 missions were reprocessed, and pointing geometry corrections (due to changes in aircraft yaw, pitch, roll, and wingflex) were made as needed. DEVOTE mission data were also reprocessed with appropriate pitch corrections made.

HITEMP databases needed for radiation code were downloaded, corrected, read, and then stored as needed.

Climate Model Simulation Diagnostic Dataset Generation [3.1.1.2.5]
Output from various GCM runs was extracted and analyzed in support of research work at GISS. Output from the GCM runs is archived on magnetic tapes.

Output data from the Coupled Model Inter-Comparison Project (CMIP5) were processed with CMOR2 programs. These include data from control, transient, and aerosol runs. The work included extracting data from GISS model output, reformatting the data to meet CMOR2 requirements, and running the data with CMOR2 programs.

Metadata of netCDF files from climatic simulations of volcanic forcing with methane were modified. The ocean configuration was the HYCOM ocean model. The files were sent to the NASA Center for Climate Simulation to be archived and also were released to the public.

Inquiries about CMIP5 data from users outside GISS were investigated and processed.

Simulations of 20th century climate are being run using the solar orbit as the only forcing. This model uses the Russell ocean model and an atmospheric model with no aerosol interactions.

Work on developing a web page to map and display CMIP5 data on-the-fly continues. The option to change the default (Equirectangular) projection of Figure 1 (a global map of a physical variable) has been added. This allows for a Robinson Projection (less distortion at the poles than Equirectangular), a Canters Polyclinic Projection (with even less polar distortion than Robinson), a Polar Orthographic Projection (with 2 circles for the Northern and Southern Hemispheres, each centered at the respective pole), or an Equal-Area Azimuthal Projection (with 2 circles each divided in half by the Equator, respectively centered at lat,lon = 0,0 and lat,lon = 0,180).

In addition, the PanoplyCL script can now generate Figure 2: a zonal-mean line plot (of a physical variable) from the South Pole to the North Pole. Also, the option to generate a "map-type" of "anomaly/mean" between a user-selected target period and a user-selected base period was added.

Relevant sections of the code were changed to allow for different diagnostic variables to be chosen by the user. After this was accomplished, the following were added: some surface and near-surface variables (temperatures, wind speeds, evaporation, and precipitation), sea level pressure, and total cloud cover.

EO Deliverables

EO Deliverable	Due Date	Date Delivered	Notes/Description
Monthly GISTEMP update	15th of the month	On time	Add and process latest available data
Weekly SST update	Mondays	On time	Add and process latest available data

EO Problems, Issues, and Performance Risks

EO Problem/Issue/Risk	Potential Impact	Plan to Resolve
Media attacks (CEI, etc)	Misinformed public	Detailed description of methods on web cooperation with NASA PR department

Evaluation of EO Results

Trinnovim rates its performance as excellent as all tasks were completed in a timely manner. Web sites for ISCCP and aerosol work continue to be updated when appropriate. Software tools for the Glory type missions were developed, when needed, in an efficient and expedient manner.

EO Recommendations

Trinnovim recommends continuing to maintain and update the GISS aerosol web sites. Finally, generating software tools to process RSP data should proceed on an as-needed basis.

EO Work Planned for Next Quarter

Replace ERSST v3b by ERSST v4 in the standard GISTEMP analysis.

Update GISTEMP web site every month. Make that site more attractive and easier to use by replacing the static map to select station displays by a scalable map with selectable topological and geographical features (maps, satellite images, etc.) and the ability to go directly to the data.

Replace the programs supporting the GISTEMP analysis by a version that is more easily maintainable. In particular, the no longer supported Python Berkeley Data Base should be replaced by a version independent construct.

Update SST anomalies weekly.

Maintain a test site for the analysis based on GHCN v3 to allow inspection of the data before they are made public and to test the development of new features.

Keep the various GISS aerosol web sites up to date.

Process and analyze RSP data, as needed.

Planetary Atmospheres (PA) [3.1.1.3]

Mapping Saturn's Northern and Southern Hemisphere Eddy Momentum Fluxes [3.1.1.3.1]
Consistent with what was found with the MT2 (727-nm methane band) filter, the Southern Hemisphere MT3 (889-nm methane band) zonal wind profile shows notably decreased velocities at the eastward jet cores.

Automated wind tracking of the equatorial zone has been completed in MT3 map mosaics. Quality control criteria at extremely low latitudes (within 2 degrees of the Equator, both north and south) are not met. Further image processing may better identify features at these extremely low latitudes.

A survey of Titan Meteorological Campaign images collected from 12/10/14 – 1/8/15, 2/8/15 – 2/12/15, and 3/12/15 – 3/16/15 revealed no visible clouds.

PA Deliverables

PA Deliverable	Due Date	Date Delivered	Notes/Description
Map clouds on Titan at every available opportunity	3/2016	6/2015	No clouds were found in any of the images inspected

Evaluation of PA Results
Trinnovim rates its performance as excellent. Analysis of Titan's images continues, and Trinnovim will keep monitoring each imaging opportunity for additional clouds. It should be pointed out that finding no clouds on Titan is of scientific importance because it helps further define the seasonality of Titan's cloudiness (or lack thereof). In addition, cluster analysis of Saturnian clouds is now being used to see if it can improve data analysis.

PA Recommendations
Trinnovim recommends continuing the search for clouds in images of Titan. As more Titan flybys occur, more clouds may or may not be found. Increased temporal coverage provides greater understanding of the seasonal distribution of Titan's cloud cover.

PA Work Planned for Next Quarter
See if low-latitude cloud tracking can be improved over previously used techniques for Saturnian cloud analysis.

Keep monitoring images from Titan flybys for clouds.

Computer Facility (CF) Operations [SOW 3.1.2]
GISS Computer Facility Maintenance and Monitoring
Server Maintenance

- Patching of servers was performed regularly, as well as patches on Foundstone and KACE reported issues.

Other Systems

- Regular patching continues per Foundstone and KACE vulnerability scans on Linux/Mac.
- Approval was granted for the purchase of a centralized backup unit at GISS for its servers and GS611 compliant machines. Quotes are being requested and received by SEWP and parts are being ordered.
- Software was installed on various machines. Compilers, libraries and so forth were the main packages.

LAN

- Requested and approved via NAMS, GISS's read access only for our CNE network hardware devices.
- The 400Mb/s circuit is working with no problems so far.
- Worked with Steven Beitzell on some IP conflict and bandwidth issues.
- Cisco 2821 router, Node ID: 37152 with modem was disconnected and returned to HQ.
- Two UPSes on the old network switches were disconnected from the LAN because of the TLS vulnerability.

NASA Network

- Machines were added/removed from the Active Directory domain as needed for NASA compliant machines.
- DNS entries continue to be made through DDI/QIP and all problems were addressed and resolved with HQ. Received notification that SAs will no longer have rights to QIP. A waiver with justification can be submitted but it most likely will not be approved.
- Updates continue to be made to the NextGen phone list and are submitted to HQ and Trinnovim for proper recordkeeping and distribution.

GISS Computer Facility Component Installation and Inventory
New Equipment

- Work continues on the hyperwall including helping to decide on specs for parts (motherboard, chassis, CPU, InfiniBand). New quotes from SEWP had to be requested and are being received as they moved from SEWP IV to SEWP V. Some orders have already been placed and parts received.
- Rails were researched and purchased for the Hyperwall via the contract.
- The new ViTS Life Size unit was received and tested.

Relocation

- Prep work has begun for the FY14/15 Property Inventory. The scanner was received and initial scanner will take place later this week.
- Our two log servers will be relocated to HQ soon, paperwork is being handled.
- Relocated one machine from the Global Modeling and Assimilation Office to GISS, filling out all required paperwork.
- Arrangements have been made to have the rack and hardware (server) belonging to CIESEN removed prior to the GISS renovations. These items were placed at GISS as a data recovery site for the NASA project SEDAC.

- All NASA tagged machines to be excessed continues to be manually inventoried and is being stored in room 230. The Equipment link is now accessible to GISS and actual excessing work has begun.
- Property passes for computers and monitors were issued to several users who work remotely.
- The ODIN legacy machines were inventoried and shipped back to HQ. All items have been accounted for.
- Conducted a walkthrough to access the Glory Satellite equipment GISS acquired back in 2013 from Raytheon. Worked with the Property Manager at GSFC on figuring out what we have to do to excess the equipment we do not want to keep, and those we will be keeping. All equipment we want to keep will be tagged appropriately, filling out the necessary paperwork, and those that we will not keep, will also be tagged as non-controlled, labeled and shipped back to HQ.

Computer Facility Supply Maintenance

Stock Item	Quantity In-house	Pending Orders
Paper	50 Hammermill Cartons; 10 Xerox Cartons	Sufficient supplies maintained.
Toner	61 color & b/w cartridges- H.P, Lexmark, & Xerox	Sufficient supplies maintained.

Requested/Purchased/Received:

- Several components for Hyperwall
- Several components for 2 Backup server
- Microsoft LifeCam HD3000
- Western Digital Blue WD10EZEX 1TB 7200 RPM drive
- Matlab
- Adobe Acrobat Pro
- PC Computer Headset to 3.5mm Smartphone Adapter

User Support

- Requests were made to Code 700 to remove several users' accounts in SATERN that did not require IT.
- WebEx/Lync/uStream/Skype/Vidyo sessions support was given for the following:
  - NExSS Synching Radiation Use in ModelE
  - Code 610 Townhall meeting
  - Mortgage Basics
  - IT Matters – Talk Back
  - Business Services Assessment (BSA): Announcing Changes in IT
  - GOOGLE Earth Engine Seminars
  - Tech Talk
  - Google Earth Engine Workshop Sign-up
  - ROSES 2015 proposal policies
  - Code 600 2015 Safety Awareness Campaign (SAC)
  - 2015 Code 600 Stand Down meeting
  - Education Staff Meeting
  - All Hands - Center Education
  - IT Matters - Jabber
  - Second Level Reviewer Training
  - Planning for a Financially Successful Retirement

- 2015 Memorial Day Commemoration
- Education & Communication Colloquium Co-STEM
- Code 600 2015 Safety Awareness Campaign (SAC)

Communication

- Meetings attended:
  - Code 600 IT Monthly Meetings
  - 2015 Contingency Plan Meeting
  - Code 600 Foreign National Visitor Information Session
  - Trinnovim's Management Meetings
  - Video conferencing Meetings
  - GISS IT Quarterly Meeting
  - NYCRI 2015 Internship Orientation
- Regular communication via the GISS-wide email listing continues regarding Agency and GISS security policies and procedures. Some of these included: Beware of Scams Associated with Natural Disasters -- Nepal Earthquake; Wide Spread Computer Infections Due to Outdated Adobe Flash Player; and Scheduled NGV System Testing; Advisory: Outage Notification for NASA Agency Internet Access; Standard Maintenance; Next Generation Voice System Upgrade; and Schedule Maintenance for VoIP.
- Instructions for using the new ViTS unit were distributed.
- The IT FAQ at http://internal.giss.nasa.gov/faq.html is revised and updated to reflect changes as need be.

Assistance

- Several request for the use of IT during Personal and/or Business Foreign Travel were submitted to Code 700 for "approval"/notification. The users were then informed of the approval and route sheet kept by IT at GISS.
- Worked with NCCS team regarding old and new user's accounts and their data.
- Continue to work directly with the CSO/ISSO on security matters at GISS.
- Reviewed relevant sections of the 2015 Contingency Plan and submitted changes to our CSO/ISSO.
- In order to make sure GISS users have a NAMs workflow for requesting accounts on GISS systems covered by Code 600 security plans, a modification to NAMS ICAM account was submitted to be able to utilize the "GSFC Code 600 Non-Privileged User Account workflow" for all existing NDC non-privileged user accounts on GISS systems.
- Updated and submitted a database of our hardware inventory to our CSO/ISSO.
- Submitted the updated ITSEC-EDW database to our CSO/ISSO regarding our machines at GISS without KACE.
- Continue to provide logistic and technical assistance in deploying the NextGen phones to new users. We no longer have any spare GISS numbers and a request was made to activate 30 new lines. We were approved for 40 and they are being "configured" for use. The new numbers will not be "678" numbers.
- Looking into allowing 311 calls on our VoIP phones.
- Worked with NASA counterparts in setting up arrangements for a video demo by Haivision (webcasting) in conjunction with our new ViTS unit and on using Vidyo. After the demo, Haivision was asked to deliver us some quotes based on scenarios that were presented to them.
- Vidyo testing and training were conducted with several key personnel at GISS. Vidyo accounts were requested and approved for these personnel so they could manage their own video sessions.

- Provided guidance and assistance to the Utility Clerk in setting up the equipment to be used by the NYCRI 2015 Internship and other minor tasks.
- Worked with EI IT Manager and CUIT technician in sorting out issues with the CCSR group regarding their computers, wired and wireless network, their SYNOLOGY drive, computers and IT support.

Training

- Training was received on using our new ViTS Life Size unit.
- Training was received on using Vidyo.
- On-job mentoring of junior staff.

GISS Computing Facility Planning and Evolution

Network

- Planning is being done on how best to consolidate all the network cables in the various network closets on each floor.

DAR

- All field and office machines have been DAR'ed with the exception of a few servers.
- Reported to Rosa Kao and GISS CSO that GISS had no need for DAR waivers; all field and office machines have been DAR'ed with the exception of a few servers.

MacOS/Linux Upgrades

- The server gs611-magnus which once served as a print server for the Macs and CSR has been decommissioned. The new Linux CSR server is in production and works well.
- All gs611 Macs have been upgraded to 10.9.

ODIN legacy/ACES seats/refresh systems

- Received notification that all new Mac orders will come preconfigured with Yosemite 10.10 OS. We will now have to upgrade all our ACES Macs to 10.10. Currently working out the details as it is unclear which OS builds we have to use, how these upgrades are to be done, and if there is a deadline.
- Approval was granted for GISS to acquire 11 ODIN legacy computers for use at GISS as spares/loaners. All necessary paperwork was filled out to ensure proper billing. The machines have all been de-subscribed and will be scrubbed of the OS. They will now have to be tagged as NASA's property; awaiting the Form 20-4 from HP on this, so they can be tagged.
- An IP3 change request was put in to HP requesting that the function "Print from USB" be enabled on all our ACES printers. Approval was already obtained from Barbara Grofic for this and HP was informed. The approval from HP is still pending as they now have to go back and figure out how to reconfigure the printers to allow this feature, without compromising the use of smartcard logins. Further justification was recently requested and provided to HP by our CSO/ISSO.
- ACES Accrual Invoice Validation and Liquidation spreadsheet for Feb-Apr 2015 were carefully reviewed and the few minor discrepancies were addressed with GISS's RA.
- Worked with the Logistic I3P/ESM team at NASA and Pegasus to ensure proper shipment of our ODIN legacy machines with peripherals back to GSFC. All machines were accounted for on both ends: at pickup and drop off.
- NASA SOC reported that an ACES-managed system assigned to a user had the "Hola" VPN software installed, which has several critical vulnerabilities and had to be removed from the system. The software was removed and SOC and other GSFC security team of Code 610 were notified. The machine was then scanned as clean.

- A requirement to update the AGCY0025 Active Directory Resource Management Account for our ACES admins were submitted in NAMS and approved.
- We continue to migrate Mac users to Microsoft Outlook; the preferred mail client for NASA/ACES.
- One ACES Windows laptop was ordered, received and configured.
- ACES Accrual Invoice Validation and Liquidation spreadsheet for February-April 2015 were carefully reviewed and the few minor discrepancies were addressed with GISS's RA.
- The final GISS refresh was received; overlay, printers, and firewall rules were installed and implemented. The user's data was transfer over.
- An order was placed via ESD for 4 new seats. The seats were received and configured for GISS; overlay, custom software, printers, and firewall rules were installed and implemented.
- Requested an ACES seat to be wiped and reloaded via ESD. A re-assign was then requested for new user.
- Seat move via ESD from GISS to AMES was completed and the user is now set up at AMES.
- HP was contacted to send out a technician to repair a laptop that was overheating. The fan and heat sink were replaced. The laptop is no longer overheating.
- The 3 new color printers were received from ACES and we worked with the Konica technician to ensure everything was working properly. Drivers for the new ACES printers were installed on all ACES computers to enable users to print and scan directly.
- User accounts for our new SA were requested and received. There were minor issues which we sorted out as the new SA was not placed in the correct groups in the accounts requested, and therefore was not able to use his AA password to assist users.
- Submitted to Code 700 several requests to use IT while on personal oversees travel.
- Several requests for ACES workflow for Elevated Privileges were reviewed and renewed. New requests were also put in and approved.
- Request for Skype waivers were submitted to our DCSE's for approval and users were notified when approved.
- Continue to work with Stella Adesina, Naymon Brown, Wes Campbell, Bob Speed, and Allison Kaese on closing IM and SR tickets, and solving problems with the ACES refresh systems.
- A discovery at GISS has reinforced concerns that the ACES OS X build has security configuration flaws that need to be addressed. The most recent issue is about world writable executables that are available for all users of the system in the Application Directory. Previous concerns have been expressed about home folder access controls, the root account being enabled and the disabling of Apple's application whitelisting features.
  This CR ticket was escalated to the ACES and I3P Enterprise civil servant security leads for their attention.
  Ron Colvin is also working with the Agency ETADS on the general topic of Mac OS benchmark updates, to include this issue.
  Ron's draft recommendation is listed below and was submitted to the CR.
  NASA is using CIS as the basis of its security controls for OS X. All of the settings mentioned above are part of the latest OS X Benchmarks and should be implemented on all ACES delivered systems. We are including all of the controls in spreadsheet format for both 10.8 and 10.9. The Agency ASCS leads have reviewed the controls and believe that all of the level 1 and level 2 scored controls should be implemented except the three below. Any concerns about these controls should be addressed to ASCS (https://etads.nasa.gov/ascs/communications/)

a) (5.12) The Agency password policy is for a minimum of 12 characters and local passwords for OS X should meet the NASA criteria as well instead of 15 characters.
b) (2.11) The secure empty trash control is not selected as a NASA requirement.
c) (2.6.1) While FileVault is recommended, the Agency PGP solution is accepted as meeting the Full Disk Encryption solution required in the Benchmark.

This still remains unresolved by ACES.

- A reminder was received again by HP and sent out to our SA's regarding the handling of ACES tickets.
  - Communicate with the users on their tickets. There is no excuse for not at least calling and leaving a voice mail or firing off a quick E-mail. Document, Document, DOCUMENT!!
  - Update the ticket when you communicate with the user.
  - Do not leave tickets in pending customer status.
  - Do not leave tickets in WIP status overnight or even all day.
  - Update tickets when appointments are kept.
  - If customer is happy, ask for a great survey. Not just a good one.
- Updating of all IMs and SRs via SM9 continue.
- New DAR and ACES admin and image passwords for both the Mac and PCs were received and distributed to the SAs.
- New OS images were received, downloaded and distributed.
- GISS-wide emails were sent out to the users regarding: MIP Backup Client Installation and Confirming a Successful Backup on your ACES computer; Beware of Scams Associated with Natural Disasters -- Nepal Earthquake; Wide Spread Computer Infections Due to Outdated Adobe Flash Player - USE CHROME for all external sites; NGV Intermittent Phone Outage; ESD/ESRS - ServiceNow Training; and FY 2015 Annual Information Technology Security and Privacy Awareness Training.
- Continue to assist users with the install of the new VPN (https://vpn.nasa.gov), Junos Pulse, and configure our machines to use the new VPN IP range to allow SSH access. Troubleshot and resolved with HQ VPN login issues encountered by VPN users.
- GISS ACES TA/RA worked with Allison Kaese, Olivia Leckner and Naymon Brown in obtaining tokens and PKI reference and authorization codes for users.
- Daily administrative work* continues to be conducted on the ACES machines that pass through the SM9 ticketing system.

*Daily administrative work includes but was not limited to:

- Installing OS
- Updating machines with patches when not done automatically or when requested by the users (Flash/Windows Updates/Adobe Reader/Pro/Java etc.)
- Installing software (e.g. Cygwin, Putty, Adobe Acrobat Pro, Matlab, KACE, IDL, Symantec, Python, Macports* (Fortran/NetCDF/TeX/Xquartz/Aquamacs/UV-CDAT/R), MS-Office, Mozilla Firefox, Google Chrome, Adobe Creative Suite, etc.)
- Installing hardware
- Troubleshooting local/network printers errors
- Troubleshooting hardware and software problems
- Listening to users inquiries and trying to find workable solutions for them
- Communicating with Trinnovim, NASA and ACES managers' et al and attending meetings on matters of: deadlines, upgrades, encryptions, ticketing systems, accounts, NASA policies, etc.
- All utilities are upgraded to the newest available versions to keep the machines secure; disk utilities to repair and verify permissions are run after each update as a preventive measure to minimize user tickets.

- Updating the CSR ticketing system and documenting work.

GISS Computer Facility Security

Network Security

- A port waiver was applied for and granted to our AgMIP group who is implementing Simgen at GISS. Simgen is a suite of Python modules for generating gridbox-level near-term climate scenarios for particular region of interest.
- Several Mac computers at GISS were found to be dual homing. In an effort to ensure that users follow the proper rules and regulations, memos were sent out reminding users of the need to be vigilant when switching from wireless to LAN and vice versus. We continue to monitor our Systems for dual homing and revise the Wi-Fi toggle script depending on the Mac OS version. Currently the script does not work under Mac OS10.9.
- Completed and submitted several Technology Transfer Control Placement (TTCP) IT/no IT applications following the required guidelines for designated and non-designated countries, and ensured that the proper firewall rules were implemented on the user's machine/s once approved. TTCP forms are no longer needed for FNs to use the "guest wireless".
- Continue to assist FN's sponsors with systems configurations for their users' machines.
- Users were reminded of NASA Security policy requiring that all personnel using NASA computers (desktop, laptop, workstation, and tablet and are using the NASA network) be cognizant of their organization's IT Rules of Behavior (NIST SP 800-53, control PL-04 Rules of Behavior). All new users have been requested to go to http://science.gsfc.nasa.gov/rob, read the Rules of Behavior for Code 600 and click at the bottom to electronically sign the document. (This replaces the old processes in which paper copies had to be signed and stored). Users are informed that a pdf version of the "RoB" can be found on the GISS Intranet under "General GISS Resources". For those users who do not have access to the NASA network and cannot access the link, but do work for NASA, the pdf version is submitted to them.
- The posting of all new policies and procedures continues to be added to the GISS intranet for better communication between the Systems group and users.
- Continue to submit requests through NAMS for VPN, PKI, Secure token, EP and NCCS access.
- Continued to assist users with the install of the new VPN (https://vpn.nasa.gov), Junos Pulse, and configure our machines to use the new VPN IP range to allow SSH access. Troubleshot and resolved with HQ VPN login issues encountered by VPN users. Users are reminded to use only the new VPN client to connect to the NASA networks.
- Skype waivers continue to be submitted on a "need to" basis.
- Request for SSH service on a handful of servers/workstations were renewed via GSARS.
- Windows users were reminded to use their PIV smartcard to login to their machines.
- Our TA/RA continues to work with HQ and end users in supplying tokens, delivering PKI authorization/reference codes, confirming identity, and identifying and troubleshooting issues with encryption.

System Security and Monitoring

- The Puppet server is up and running. It can be reached via Foreman. It is running on a Linux virtual machine. Testing using manifests and modules work as required. All Mac machines were added to the Puppet server and they can be retrieved from the web console. Also created was an ftp server ftp://gs611-infra.giss.nasa.gov to keep a repository of source files that can be pushed to puppet agents.

- The Agency license we had been utilizing on our Directorate SEP antivirus server was due to expire on 6/30/15. Since all LOW systems may use "unmanaged" antivirus software, our gs611 machines will no longer be supported via our Directorate SEP server. We have since removed SEP antivirus clients on all our gs611 Macs and installed ClamAV.
- Worked on making sure that all systems in KACE currently not assigned to a System Security Plan (SSP) were tagged with the appropriate SSP information as of June 17.
- Submitted waivers via VST for all machines not reporting in KACE that should be.
- The upgrading of KACE on all Mac and Linux machines was resumed and all machines are now running version 6.2.
- As a part of our upcoming transition from having our own System Security Plan (SSP) to being a part of the larger Code 600 Plan at GSFC we submitted to the CSO exactly how we do our patching for our Linux and Mac machines. Still in the works is the need to investigate the use of auditd on MacOS and Linux and see if we can get it to log all of the commands used by sudo.
- Reported to Rosa Kao that GISS did not need any waivers for M-PIV exclusions for non-ACES machines.
- Compliance scripts have been updated and made compatible with the latest CIS benchmarks for Linux and Mac OS 10.9 and 10.8.
- The Federal Government requires that all Federal agencies use the Personal Identity Verification (PIV) Smartcard, otherwise known as a NASA badge, as a common credential for accessing systems, networks, and facilities. To comply with this requirement, NASA has deployed the mandatory use of the PIV smartcard login on all Windows 7 workstations connected to the NDC domain. GISS has reported that they are up to date with the install of PIV-M and they currently have no non-ACES Windows VM. Mandatory PIV was implemented on all machines on September 30 2014, and continues to be enforced. Waivers are requested through ESD when users forget to bring in their smartcards and for new users who did not receive their smartcard (badge) as yet.
- We continue to implement the new rules from Agency and Center that all EP requests for non-ACES users must go through NAMS using the correct workflow: GSFC Code 600 Elevated Privileges-User/Admin. These requests are first approved by Jack Richards; the user then takes all the required SATERN training, and once completed the NAMS request is submitted by us. FNs are not allowed EP rights.
- Monitoring of our syslog servers at GISS continues, and all loopholes are fixed immediately. All non-ACES Macs are now reporting. Work continues to ensure that all ACES Macs are configured properly to log to the log server.

Incident Reporting

- Reported a phishing incident to SOC Abuse team.

Virus/Adware/Etc.

- Users were reminded of their responsibility to remain vigilant and to maintain a heightened level of awareness in identifying and reporting any phishing attempts.
- Virus software is installed and kept updated on all machines as per NASA standards.

CF Status

Critical System/Services Uptime

- Nothing unusual.

Backups

- Backups are primarily the user's responsibility and they are reminded of this.

CF Problems, Issues, and Performance Risks

CF Problem/Issue/Risk	Potential Impact	Plan to Resolve

- None to report.

Library and Publication Services (LPS) [SOW 3.1.3]

GISS Technical Library Operations

Operation	Status
Journal subscriptions	• Library currently subscribes to 57 journal titles.
Books Processed	• Ordered, cataloged and processed 3 books.
Circulation	• 789 library items currently charged out to patrons.
ILL / Document Retrieval	• Processed 48 interlibrary loans.

On-line Library System Participation

Library System	Description of Work Performed
NASA GALAXIE	• Searched NASA online library catalog system to assist in patrons' reference inquiries & interlibrary loans.
OCLC	• Processed 32 interlibrary loan requests for books and articles for in OCLC.

LPS Deliverables

Approval system	Description of Work Performed
STI/eDAA (electronic Document Availability Authorization) form submissions for GISS publications	Completed and submitted 62 eDAAs in accordance with NASA STI policy. Continue to keep up to date with new STI directives and procedures to ensure compliance.
Create the annual GISS Research Publications document	The 2014 GISS Research Publications document was made available in hard copy format and on USB drives and online at: http://pubs.giss.nasa.gov/docs/annual/2014RP_compressed.pdf,

LPS Problems, Issues, and Performance Risks LPS Deliverables

LPS Problem/Issue/Risk	Potential Impact	Plan to Resolve
Journal subscription prices continue to rise each year, while library budget does not increase accordingly.	GISS scientists' research will be adversely affected. Every journal title the GISS Library currently subscribes to is essential to GISS research staff.	Continue to monitor usage and readership of journals.

LPS Recommendations

Continue to perform tasks required to assist GISS patrons find information.

LPS Work Planned for Next Quarter

Continue to perform ongoing tasks required to maintain library and assist GISS patrons.

Library Expense and Projection Report

GISS LIBRARY FY 2014-2015 FINANCIAL REPORT
June 2015

LIBRARY SERVICES - THE FOLLOWING TASKS WERE OUTLINED IN THE CURRENT QUARTERLY FORECAST DOCUMENTATION OF THE MONTHLY PRODUCTION RECORD. BOOKS PROCESSED, BORROWED, AND COMPUTER SEARCHES.

	June 2015	CUMULATIVE
BOOKS PROCESSED	1	3
INTERLIBRARY LOANS		
OCLC	6	27
OTHER	1	8
eDAAs COMPLETED	27	62

Logistical and Utility Support (LUS) [SOW 3.1.4]

Postal Mail Handling

Mail distribution within the GISS building was provided and deliveries to the Post Office were made. Equipment and deliveries were unloaded from trucks and messenger service was provided as needed.

The monthly reports for Code 200 were provided indicating postage usage on the Neopost mail meter. The detailed reports include the total items shipped, cost per item, mail type (i.e. parcel), destination zip or country, and the sender's name.

Date	Mail Type	Qty	Weight	ZipCode/Country	[redacted]	Sender
3-Apr	letter	1	0.0oz	USA	[redacted]	Library
13-Apr	parcel	1	1llb 2oz	USA	[redacted]	Library
13-Apr	parcel	1	1lb 4.2oz	USA	[redacted]	Library
13-Apr	1st class single flat	1	5.8oz	USA	[redacted]	Library
13-Apr	parcel	1	1lb 14.2oz	USA	[redacted]	Library
13-Apr	parcel	1	4lb 7.30z	USA	[redacted]	Library
17-Apr	flat rate	1	2lb 14.2oz	USA	[redacted]	Library
20-Apr	flat rate	1	13.5oz	USA	[redacted]	Library
21-Apr	first class letter	1	1.7oz	USA	[redacted]	Library
28-Apr	library	1	1lb 0.8 oz	USA	[redacted]	Library
1-May	letter	1	0.2 oz	20771	[redacted]	A. Fridlind
4-May	letter 1st class	1	1.9 oz	27268	[redacted]	Library
5-May	letter	1	0.2 oz	04109	[redacted]	Library
5-May	letter 1st class	1	2.2 oz	84602	[redacted]	Library
7-May	priority flat rate	1	14 oz	12901	[redacted]	Library
11-May	priority flat rate	1	3lb 0.3 oz	06117	[redacted]	Library
18-May	standard post	1	2lbs 8.0 oz	70123	[redacted]	Library
18-May	1st class single	1	0.4 oz	27707	[redacted]	Library
19-May	media book	1	5lb 0.7 oz	28792	[redacted]	Library
20-May	media book	1	12lb 0.4 oz	13502	[redacted]	Library
26-May	standard post	1	0.5 oz	20783	[redacted]	Library
29-May	letter	1	0.4 oz	20771	[redacted]	Library
15-Jun	Library	1	3lb 0.6oz	11210	[redacted]	Library
17-Jun	Library	1	1lb 0.3 0z	2115	[redacted]	Library
19-Jun	Library	1	2lb 8.9 oz	87545	[redacted]	Library
22-Jun	1st class single	1	4.3 oz	20783	[redacted]	Library
25-Jun	1st class single	1	2.4 oz	20783	[redacted]	Library
26-Jun	1st class single	1	3.8 oz	94025	[redacted]	Library
26-Jun	Library	1	1lb 7.0 oz	32307	[redacted]	Library
26-Jun	Library	1	13.6 0z	68182	[redacted]	Library
29-Jun	Letter int	1	0.4 oz	Germany	[redacted]	Quaas
30-Jun	Library	1	2lb 8.8 oz	20771	[redacted]	Library

	TOTAL # OF PIECES	32		[redacted]	[redacted]	

Property Inventory Support
Newly purchased NASA equipment was tagged accordingly and appropriate paperwork was submitted. Updating of the GISS Inventory continues via N-Props *(see section **3.1.2.2** under Computer Facility).*

Office furniture and computer hardware/equipment were moved as needed.

Offices of terminated employees were cleared of papers and broken office furniture so that new employees could occupy those spaces.

Reorganization of the computer room, room 230, continues as excess of NASA tagged equipment is being prepared for return to GSFC.

The implementation of Voice Over Internet Protocol (VoIP) and Next Generation Voice (NextGen) took place the week of January 16. The new phone line system replaced the Centrix system providing a more stable telephone services. New phones and a brief tutorial were provided in all offices. *(See section **3.1.2** under Computer Facility -LAN)*

The Konica Minolta MFDs that replaced the Xerox copiers have proven efficient, providing printing, copying, scanning and faxing services. Users now have the capability to scan and fax securely using their NASA badge (PIV card) but it is *not* required. Users now also have the capability to print encrypted documents using their PIV card.

The maintenance schedule established to clean and service all printers in the building is functioning well and provides continued usage of these printers except during necessary repairs.

A delivery of "lightly used" furniture is expected from GSFC on July 14, 2015. Desks were allocated on a "first come, first serve" basis. Delivery is being coordinated with Jack Richards, GSFC, and Code 610. Employees receiving the desks will have their old desks hauled away and their new desks built and set up on the same day.

Conference and Workshop Support
The following seminars, conferences, workshops and meetings were hosted. Appropriate logistical support was provided including teleconferencing services, systems support (i.e. LCD projector), and refreshments as requested.

- GISS Lunch Seminar: An overview of NASA's Pre-Aerosols, Clouds, and ocean Ecosystems (PACE) mission plans and goals by Brian Cairns and Jacek Chowdhary on April 1
- Aerosols, Clouds, Precipitation and Climate (ACPC) Meeting on April 8 to April 10
- Global Climate Modeling (GCM) meetings on April 14 and April 28, May 12, May 26 June 9, and June 23
- GISS Lunch Seminar: Process-based evaluation of LES and SCM simulations using in-situ observations and satellite retrievals and implications for GCM cloud parameterizations by Jasmine Remillard, GISS on April 15
- All Hands-on Meeting with Piers Sellers on Code 610 updates on April 16
- GISS Friday Seminar: Sub-seasonal to seasonal prediction of monsoons: How predictable are onset dates and daily weather characteristics? by Andy Robertson from IRI on April 17

- Ocean Modeling meeting on April 17 and June 23
- Climate Impacts Group Brown Bag Seminar on April 28
- GISS Education Focus Groups
- GISS Friday Seminar: *Satellite view of quasi-equilibrium states in tropical convection and precipitation microphysics* by Toshihisa Matsui (ESSIC-UMPC, NASA GSFC) on May 1
- GISS Friday Seminar: *What Ice Nucleation Studies Can Tell Us about Atmospheric Ice Formation* by Daniel Knopf (SUNY Stony Brook) on May 8
- GISS Lunch Seminar: Speaker: *: Early Sun, early Earth, early life* by Vittorio Canuto (GISS) on May 13
- Education All Hands with the NEW Education Associate Administrator for NASA on May 13
- GISS Friday Seminar: *Ice crystals at the nanoscale -- measurements, movies, and meaning* by Natan Magee (The College of New Jersey) on May 15
- GISS Special Seminar: *Local and remote climate effects of regional aerosol emissions* by Apostolos Voulgarakis (Imperial College London) on May 19
- NExSS ROCKE3D Team Meeting on May 27-28
- All Hands-on Meeting with Chris Scolese – GISS Overview and Space Act on May 29
- GISS Lunch Seminar: *Predicting the Mineral Composition of Dust Aerosols With an Earth System Model (NASA GISS ModelE2)* by Jan Perlwitz, GISS on June 3
- GISS Special Seminar: *Regional aerosol climate impacts in Middle East and North Africa* by Georgiy L. Stenchikov, King Abdullah University of Science and Technol on June 17
- GISS Special Seminar: *Atmospheric mechanisms of central Saharan dust storm formation in boreal summer: observations from the Fennec campaign* by Christopher Allen, Oxford University on June 25

Please note that all ViTS conferences and seminars, as well as Webinars coordinated with GSFC can be found under the Computer Facility section of this report.

Community Outreach and Educational Programs

Engagement activities continue for alignment with co-STEM initiatives and NASA Education goals. This includes the development of interactive learning management systems to provide educators ongoing professional development and STEM engagement support, the creation of the GISS Office of Education Facebook page, and collaboration with Apple software developers to develop education applications for GISS.

Collaborative efforts continue to improve STEM instruction in NYC schools including presentations at Medgar Evars College, Vaughn College of Aerospace and Technology, and Teacher's College at Columbia University.

Meetings and discussions continue teachers and administrators from NYC schools to improve STEM instruction.

The NYCRI program for GISS began on June 3, 2015. In addition, STEM internship opportunities are being developed in collaboration with New York City College of Technology, and

development of the Spring NYCRI STEM Teacher Research Training Institute in collaboration with Medgar Evars College continues.

Two separate education focus groups were held at GISS on April 28, one for non-civil servants and the other for civil servants, to gain a better understanding of gaps in education initiatives.

An Education Co-STEM Communication Colloquium was held on May 13 at GISS.

GISS Facility Operations

An update on the new lease was sent to GISS employees. The new lease was signed on June 29. There is an interim lease that will go to next February and the new lease will be for a newly renovated space starting February 2016. On July 30, a planning meeting will be held with the GSFC architects/planners and Columbia to finalize a plan for the contractors to follow. The estimated timeframe of when renovations will commence is August and the work itself may last until January 2016.

A memo was sent to all GISS staff regarding the "Clean & Go Green" program offered by Columbia University. GISS will have the opportunity to properly dispose of unwanted items at no cost. As part of the program, Columbia University Facilities will separate and recycle the items. The program is scheduled for July 8-10, 2015.

An email address was created, giss-supportservices-l@lists.nasa.gov, to be used my GISS staff for specific requests. Whereas computer related problems should be sent to csr@csr.giss.nasa.gov, all other GISS building related items should be sent to GISS Support Services at giss-supportservices-l@lists.nasa.gov. These items include requests for supplies (including toner), copier issues, phone issues, and all other miscellaneous items pertaining to the GISS building and employee questions.

Emails will be directed to the appropriate person and the issue will be addressed promptly with a follow up email to the requestor confirming receipt and completion.

Trinnovim worked with Columbia University Facilities Management to identify the source of fumes permeating throughout the building, and proper measures have been taken.

New signs were posted on all floors in both stair ways indicating floor and stair well replacing missing or damaged signs.

Building door tags, floor directories, and extension lists were updated according to new reassignment of offices, new hires and terminations.

Light fixtures were replaced and other small tasks (i.e. shelf installation) were completed in several offices as needed.

Security cameras were replaced with new ones and others added in areas of need.

In accordance with new rules from the NYC Dept. of Sanitation, a notice was sent to all GISS employees regarding the acceptance of all rigid plastics along with metal, glass bottles and jars, and beverage cartons in the recycling stream.

Relabeling of all mail boxes to more easily keep them in alphabetical order was initiated and is being kept updated.

Maintenance was performed as needed throughout the building and proper communication was disseminated to all building occupants.

Program Management (PM) [SOW 3.1.5]

Staffing
The following staff changes were made for the period April 1 to June 30:

Terminations
NONE

[redacted]

Transfers
NONE

Task Management
Trinnovim updated the NASA/Goddard Space Flight Center Locator and Information Services Tracking System (LISTS) personnel roster.

Coordination with Anthony Loggia and Rhonda McCarter was established to update all GISS entries in the NASA Enterprise Directory (NED) including deletions of terminated employees.

Smart cards continue to be issued to all GISS personnel in accordance with Goddard Space Flight Center's security procedures. Trinnovim's Project Management office begins the badging process by first creating an identity for each employee in IdMAX and forwarding a LISTS form to GSFC Security. Once a new identity is created and submitted, the employee receives an email with instructions on how to complete an eQIP (electronic Questionnaire for Investigations Processing). Upon submission and approval of an eQIP, employees are fingerprinted and await their badge. Temp IDs are no longer valid and all personnel without a valid badge are signed in as visitors. Since the current badges were initiated about 5 years ago and their 5 year validity period ends in August for many employees, the renewal process was started early to allow enough time to cause no access interruption for anybody.

The contract cost by program category was updated through June 30, 2015.

A monthly breakdown of contract charges, including supplies, travel and Other Direct Costs (ODCs) was completed and delivered to group leaders in each discipline.

The following documents were reviewed and updated if necessary:

- Position Description for Uniformed Security Post at GISS
- GISS on-duty Security Officer Procedures (SOP)
- GISS Occupant Emergency Program, with special emphasis on the fire evacuation plan; the escape routes were adapted to changes in the floor plans
- Emergency Computer Shutdown Procedures
- Continuity of Operations Plan (COOP); the general Reconstitution Plan was customized for GISS and copied to the COOP SharePoint site. The call tree was modified and was tested.
- Detailed job descriptions for all positions were established, augmented if possible by a list of specific goals to be achieved during the current contract year. Those lists will be reviewed twice a year.

Contract Reporting

The following reports were delivered on time:

- Health and Safety report
- 533 & Variance report
- Contract Budget
- Room and Extension report
- Costs reports
- ACES (formerly ODIN) monthly report

Coordination with COR

The following was discussed with COR:

- Contingency Plan for GISS
- NASA One email address seats
- Goddard security badging and HSPD-12 (Homeland Security Presidential Directive – 12)
- Reviewed different funding for each group and the Project Manager spoke to each PI regarding funding
- Process to set up NOMAD accounts
- GISS equipment inventory
- Status and completion of COOP Plan; definition and outline of "Reconstitution" step
- Room assignments for new hires and office reassignments
- eDAA process as required by NASA GSFC for all publications submitted from GISS
- Support and information were provided to the COR in her preparation of the new RFP

Logistical Support

Access to NASA facilities by foreign nationals from designated countries continues to be monitored. The NASA Administrator announced that he has initiated a complete review of the access which foreign nationals from Designated Countries are granted at NASA facilities, as well as our security procedures with regard to these individuals more broadly. In addition, the Administrator ordered a moratorium on granting any NEW access to NASA facilities to individuals from specific designated countries, including China (PRC), Burma, Eritrea, Iran, North Korea, Saudi Arabia, Sudan, and Uzbekistan. In compliance with this directive, office space was provided at Columbia University for foreign nationals collaborating with GISS. Whereas foreign visitors from the eight countries mentioned above have to be escorted at all times, ALL foreign nationals (unless they have a green card) have to be APPROVED before they can visit GISS. The approval process involves IdMAX and has to be initiated by Patricia in the project management office at least 10 or 20 days before the visit to be sure that it gets granted in time. The 20-day limit applies to people from the 41 countries (including Israel) listed at: http://oiir.hq.nasa.gov/nasaecp/DCList_11-28-12.pdf; the 10-day limit applies to all other foreigners. Even escorted visits are prohibited before the approval has been granted.

An email was sent to all GISS staff informing them of any newly available information regarding building access via the GISS intranet website http://internal.giss.nasa.gov/access/

New documents were forwarded to all GISS staff regarding new requirements for foreign national employees/visitors, specifically for those from designated countries. In addition, a reminder was sent regarding the completion and acknowledgement of the GSFC RULES AND PROCEDURES FOR ESCORTING VISITORS, specifically foreign nationals.

Issued LISTS & NASA 1760 forms to new employees/foreign visitors and created NASA identities in IdMAX for badge enrollment. The following entries were made for the period April 1 to June 30:

Name	Citizenship	Host	Affiliation	Expiration Date
Sara Basart Alpuente	Spain	Carlos Perez	GISS Sci. Collaborator	05/07/2015
Martin Abbott	Australia	Cynthia Rosenzweig	GISS Sci. Collaborator	04/02/2015
Nicholas Sakowski	U.S.	Robert Field	GISS Sci. Collaborator	09/01/2015
Michael Szoenyi	Switzerland	Alex Ruane	GISS Sci. Collaborator	04/28/2015
Wasim Shaikh	U.S.	Reto Ruedy	Trinnovim	03/31/2017
Parker Case	U.S	Allegra LeGrande	GISS Sci. Collaborator	08/04/2015
David Amundsen	Norway	Tony Del Genio	GISS Sci. Collaborator	05/27/2015
Wim Debucquoy	Belgium	Cynthia Rosenzweig	GISS Sci. Collaborator	05/15/2015
Apostolos Voulgarakis	Greece	Robert Field	GISS Sci. Collaborator	05/28/2015
Roxana Lupu	Romania	Tony Del Genio	GISS Sci. Collaborator	05/28/2015
Henry Klein	U.S.	Said Khosrowshahi	GSFC/Trinnovim	Terminated
Haitao Tan	U.S.	Xiaoming Haugh	Columbia Uni.	3/27/2017
Margaretha van Marle	Netherlands	Robert Fields	Columbia Uni.	6/08/2015
Jonah Garnick	U.S.	Cynthia Rosenzweig	Columbia Uni.	8/31/2015
Joseph Gibbs	U.S.	Richard Mok	GISS Sci. Collaborator	1/16/2018
Avi Persin	U.S.	Reto Ruedy	Trinnovim	3/31/2017
Al Chelle	U.S	Richard Mok	GISS Sci. Collaborator	01/16/2018
Colin Raymond	U.S.	Cynthia Rosenzweig	Columbia University	03/27/2017
Yunass Hosein	U.S	Richard Mok	GISS Sci. Collaborator	01/16/2018
Christopher Allen	U.K	Ron Miller	GISS Sci. Collaborator	06/25/2015
Nicolas Bellouin	France	Kostas Tsigaridis	GISS Sci. Collaborator	07/10/2015
Xiaoli Zhou	China	George Tselioudis	GISS Sci. Collaborator	10/02/2015
Adrien Deroubaix	France	Carlos Perez	GISS Sci. Collaborator	06/29/2016
Martha Barata	Brazil	Cynthia Rosenzweig	GISS Sci. Collaborator	06/29/2015

Contractor Safety Support

The Safety Committee held monthly meetings. All managers were asked to continue to be alert to any potential health and safety hazards in their areas.

Fire alarms were tested throughout the building as scheduled.

Numerous safety hazards have been reported to Columbia University and needed action was taken to resolve them.

Electronic Information Technology Accessibility Compliance [SOW 3.2]

GISS Website Upgrade and Maintenance
The internal website was migrated to the server that was recently rebuilt for the Systems group's CSR tracking system. Work was performed on security benchmarks for this internal webserver.

The system software was updated on public, staging, and internal web servers. Security patches were applied to the systems on the webserver remote backup. Work was done on creating security benchmarks for the internal webservers.

A new "Evaluate" website was designed and set up to more easily allow members of the modeling group to share the results of their experiments.

News and features were prepared for reposting to the GISS homepage.

The GISS publication website was updated and new items were added.

A new interactive web browser-based selector for GISTEMP station data was created using the Leaflet Javascript library. Preparatory work involved creating a server-side parser for the station inventory and monthly data for use with the geoJSON format.

A review of the GISTEMP CGI scripts on the Data website is being performed and work was started to modernize the code used by these scripts to Python 3. This became necessary because some of the utilities currently used (e.g. the Berkeley Data Base) are no longer being supported in the newer releases of Python.

Another transition that has been initiated is the future replacement in all the GISS web sites of NCARgraphics by Panoply, a far superior visualization utility that is being maintained and further developed at GISS. Adaptations for using Panoply as a website tool are developed and tested.

Development and Maintenance of Web Utilities
Versions 4.2.0, 4.2.1, and 4.2.2 of the Panoply visualization software were released.

Updates of the Panoply command-line visualization software were provided to beta testers.

Support was provided to users of the Panoply desktop data visualization software in person at GISS and by email to researchers at NASA-GSFC, NASA-JPL, NASA-MSFC, NCAR, NOAA-ESRL, NOAA-National Water Center, USGS=Woods Hole, USAF 14th Weather Squadron, US Army Engineer R&D Ctr., Penn State Univ., Univ. California, University of Minnesota, Univ. Utah, Univ. British Columbia, German Aerospace Center, Stockholm Univ., Norwegian Ice Service, Geol. Survey of Denmark and Greenland, Inst. Português do Mar e da Atmosfera, and Intl. Ctr. for Integrated Mountain Development (Nepal).

Version 1.7.3. of the G.Projector map projection software was released.

Version 7.1 of the Mars24 Mars timekeeping application was released.

TRINNOVIM

October 15, 2015

Dr. Emily Michaud,
NASA Goddard Institute for Space Studies
2880 Broadway
New York, NY 10025

Dear Dr. Michaud:

Attached is the Quarterly Report for Trinnovim, LLC for July 1 to September 30, 2015. If you have any questions regarding the contents herein, please contact me.

Sincerely yours,

Pedro A Urcuyo

PREPARED FOR

GODDARD INSTITUTE FOR SPACE STUDIES

CODE 611.0

GODDARD SPACE FLIGHT CENTER

BY

TRINNOVIM

QUARTERLY REPORT

JULY 2015 – SEPTEMBER 2015

CONTRACT OBJECTIVE

The objective of this contract is to furnish comprehensive support services to the Goddard Institute for Space Studies in the following areas: scientific programming; scientific programming analysis; systems programming; data handling and data teleprocessing; computer operations; library services; publication services, including manuscript preparation, illustration and duplicating photography services; and reproduction services.

Global Climate Modeling (GCM) Support [SOW 3.1.1.1]

GISS GCM Maintenance and Improvement [3.1.1.1.1]

Changes at and Communication with NCCS/GSFC:

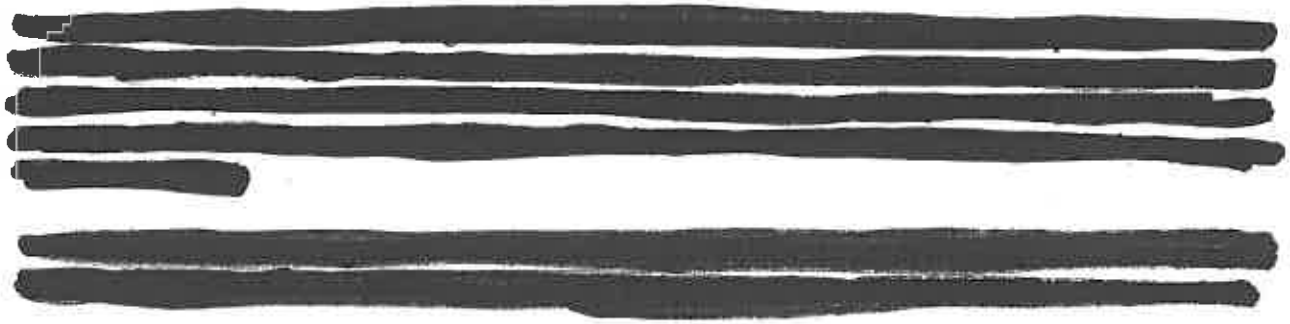
Changes in NCCS's computing environment continued and the corresponding modifications of the production utilities were applied. Production jobs were able to run without interruptions. A script was written to automatically submit a series of about 500 2-hour jobs sequentially and save the results appropriately. This was used to examine a wide range of five cloud tuning parameters.

Monthly tag-ups were held and attended by key GISS users and GSFC systems staff. The projected amount of computing resources and ways to safeguard and back up model input data are being discussed. Updates about remote visualization were presented as well as the details about the functioning of the "policeme" utility, a utility that was designed to provide information about memory usage and stop jobs before they bring down the whole system.

Radiative transfer scheme:

Work is continuing on the radiative transfer scheme. The main focus for the next few months will be the development and implementation of a new correlated-k formulation for handling the solar radiation in a GCM. The tau tables for atmospheres with very low ozone concentration were finalized and the corresponding changes to model and input files were committed to the repository.

Following requests to widen the range of validity of various absorber amounts in the GCM radiation, line-by-line calculations were performed for a large number of cases where the absorber amounts as well as the atmospheric structure was allowed to vary, thus providing a reference for determining the accuracy of the GCM code. The radiation code was modified to be able to handle large CH4 concentrations. That change was tested but worked only well in the presence of a sufficient concentration of water vapor and ozone. Various further modifications were made to accommodate large values of CH4 along with a larger range of other gas amounts. Similar changes were also made for the case of high CO2. A few more calculations of renormalizations are needed to get optimal agreements with line-by-line calculations. A small modification in subroutine taugas resulted in better extrapolation for temperatures beyond the grid values.

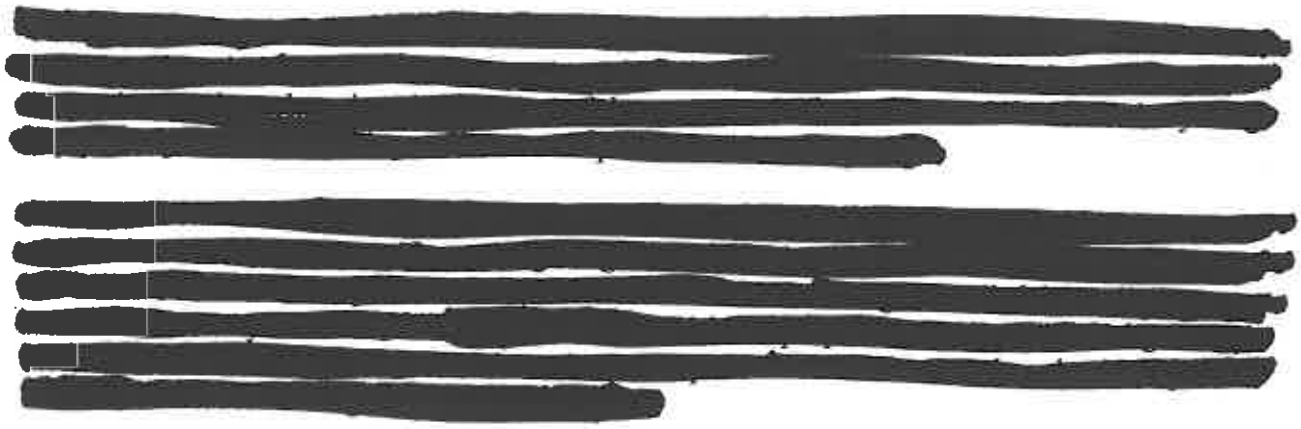


Ocean model developments:

The current GISS ocean model development continued with refactoring and testing the new mesoscale and tidal mixing schemes in preparation for committing those schemes to the modelE repository.

The integration of the new and improved ocean mixing codes (mesoscale and vertical tidally induced) into the current production versions of the GISS ocean model was completed. This

required a careful refactoring of the existing code, so as not to break any extant schemes. It also required some refactoring of the new codes to enable their behaviors to be controlled via runtime switches instead of hard-coded choices.



HYCOM developments:
Trinnovim staff has been working on the coupler for the 2x2.5 deg atmospheric grid and the unrefined 1 deg ocean grid. Initial and boundary data for the model were prepared to test this coupler. Initially, this new coupled model crashed at an early point; the cause for that behavior was investigated using totalview sessions in the context of a SLURM interactive MPI job. The building of a coupler to run the coupled atmosphere-ocean model was successfully accomplished after the crash problem was resolved. It was tested for all combinations of the refined and unrefined horizontal 1 degree resolution and 26 or 32 layers in the vertical direction. All were coupled to the 2x2.5 deg atmospheric model.

The model was tested for up to 170 years. It remained stable; however, it is showing severe SST biases in the tropics over the period of several months. In particular, it does not exhibit the cold tongue SST in the Equatorial Pacific. The cause of this problem was investigated; neither changing the vertical resolution nor other attempted fixes seemed to help. Then it was noticed that the trade wind maximum at 15N looked unrealistic, and further work led to the discovery of an error in the wind vector interpolation when mapping from the atmospheric to the ocean grid. After correction of this error, a long term run was initiated. The verification of coupled model results with HYCOM on an unrefined horizontal grid with increased vertical resolution will be the focus for the next quarter.

Totalview within the context of a SLURM interactive session was used to debug the updated MPI hycom ocean source code of modelE+H on the new uniform grid. The installation of VirtualBox on the ACES windows machine and starting a virtual machine with Fedora Linux increased the programming productivity.

Sea ice modeling:
Work continued on the new sea ice model both on the thermodynamics and on the numerical aspect. The problem of the brine pocket parameterization instabilities that prevent the model run from continuing was resolved as well as the problem of creating unrealistic sea ice thicknesses. The code was tested, cleaned, and committed to the AR5-v2 branch of the modelE repository, and then the same was done for the master branch. Sensitivity studies were started to assess the impact of changes in the flushing rate, the gravity drainage, and the lateral melting rate of the sea ice.

The new version of the sea ice dynamics, that advects the snow and sea ice separately in order to avoid some numerical issues, was tested and committed to the AR5-v2 branch of the modelE repository. That version then was also implemented in the master branch and assessments of its stability and impact on the climate are being conducted.

Other modeling activities:
Initial tests of a 96-layer C90 (~1-degree) version of the cubed-sphere atmosphere model were carried out.

Trinnovim staff investigated and fixed a bug in the matrix aerosol model that was introduced during a refactoring some time ago.

The current system of configuring the various model versions whose number has mushroomed has become very complicated. A new candidate system has been designed and presented to a small initial test group. Its goal is to give assistance to the user to select a consistent configuration with the desired characteristics.

Various layering choices are being studied in the atmospheric model and a scheme was devised that benefits many aspects of the circulation and hydrologic cycle.

An updated version of the gravity wave drag scheme was implemented and is being tested.

Various trouble shooting tasks were performed concerning the use of modelE to exoplanet simulations.

GISS Climate Model Diagnostics [3.1.1,1.2]
An extensive documentation of all diagnostics built into the GISS GCM was compiled and is being edited and will be kept up-to-date.

Funds were received to continue the collaborative project of GISS with JPL (David Halpern) to investigate decadal-to-centennial variability of the Pacific Equatorial undercurrent over the next 400 years under RCP4.5 greenhouse gas emissions. An abstract of that proposal was submitted to the AMS 28th Conference on Climate Variability and Change to be presented at the US CLIVAR Session on Ocean Fingerprints of Decadal-to-Centennial Natural Variability and Anthropogenic Change.

The NASA Goddard Institute for Space Studies (GISS) E2 system of climate models includes three models of various complexity for the atmosphere and two ocean models, Hycom (H) and Russell (R); experiments are run for various IPCC Representative Concentration Pathways (RCPs). In particular salinity, temperature and velocity produced by the "H" and "R" ocean models were used with the TCADI atmosphere model under RCP4.5 to describe decadal-to-centennial variations of the Equatorial Undercurrent (EUC) and North Equatorial Countercurrent (NECC). In 2006-2015 the H and R EUC transports were 12.2 and 18.4 Sv, respectively, and the 50% difference persisted over decadal and centennial times. Compared to the H EUC transport, the R EUC transport was in better agreement with non-coincident observations and results produced by an ocean general circulation model constrained with observations. The east-west slope of the thermocline along the Equator was about two times larger in the H model compared to the R model, producing an enigma because the strengths of EUC and east-west slope of the thermocline are connected. In the case of the NECC, a near agreement occurred in H and R

NECC transports (~ 6.4 Sv). However, the H model produced an upward slope of the thermocline from 5-10°N about 50% larger than that computed with the R model, although both estimates of the north-south slope were less than that observed. On longer time scales, the average 2006-2035 H and R EUC transports were both 1-Sv higher than in 2076-2105, which corresponded to a slowing of the H and R EUCs by 9.3 and 5.6%, respectively. The H and R EUC transports in 2100 remained constant over the following 300 years and the spatial structure of the EUC in 2400 was essentially unchanged from 2000.

Improved Parameterization of GCM Sub-grid scale Turbulence Transport [3.1.1.1.3]

In collaboration with V.M. Canuto, Ye Cheng, and A. Howard as well as Trinnovim staff prepared a paper on mesoscale parameterization for the coarse resolution OGCMs titled "Mesoscale parameterizations for diabatic and adiabatic regimes".

A complete description of oceanic mesoscales requires parameterizations of both adiabatic (A) and diabatic (D) regimes. Past *bottom-up approaches* assumed an A-regime parameterization and extended it to the D-regime with the help of ad-hoc tapering functions to satisfy the surface boundary conditions; the method faced several difficulties. This new scheme uses a *top-down approach:* it starts with a D-regime parameterization that satisfies the surface boundary conditions, has no tapering functions and was tested and assessed with a high resolution numerical simulation.

The predicted vertical profiles and magnitude of drift velocity, eddy kinetic energy and mesoscale diffusivity reproduce available observed data. The diffusivity exhibits the surface enhancement that ocean codes introduced ad-hoc to reproduce the "eddy saturation" effect. Both A-D parameterizations are expressed in the tensorial form commonly used in ocean codes. No other parameterization seems to describe both A-D regimes, satisfy the boundary conditions, match at the interface, ensure the adiabaticity of the A-regime and reproduce the same variety of results.

The following paper was submitted to GRL: "How well can we model observed mesoscales features?" In it, it is proposed that, in analogy with the case of vertical mixing, a mesoscale parameterization should be assessed before it is used in a coarse resolution OGCM. Here are presented several examples of this approach. The GM-Redi model of the adiabatic (A) regime and a new parameterization of the diabatic (D) regime are employed. A first crucial test of the latter was the assessment by Luneva et al. (2015) who used a mesoscale resolving numerical simulation. New assessments are presented of key ingredients of the parameterization: drift velocities vs. T/P data, trapping parameter vs. T/P data, vertical profiles of the mesoscale eddy kinetic energy vs. WOCE data, surface eddy kinetic energy vs. T/P data and mesoscale diffusivity vs. in-situ measurements. All these variables are expressed analytically. Use of this mesoscales parameterization must however await a similar procedure for sub-mesoscales before the two can be combined in coarse resolution OGCMs.

Documentation of the Core GISS Climate Model [3.1.1.1.4]

Documentation is an ongoing project; any changes are documented by the programmer implementing the changes in two places:

[redacted]

Cumulus Cloud Studies [3.1.1.1.5]

The cloud convection scheme was modified in order to make its behavior more independent of the model time step. Various longstanding bugs and issues in the cloud scheme were tracked down that were introduced when cloud condensate was stored in distinct arrays for liquid and ice.

A power point file comparing climate simulations with modelE with and without cold pool parameterization was prepared and was presented at the model meeting on 7/7/2015. The effects of cold pool parameterization on precipitation were also presented at the 2015 PMM Science Team Meeting at Baltimore, Maryland, July 12-17 by a poster entitled "Effects of Cold Pools on Precipitation Development in the GISS GCM."

To use pdf-based methods of computing stratiform cloud cover and cloud water, related publications and codes are being studied. The programming was started needed to implement such a scheme using the probability density function (pdf) based method of Smith (1990) described in the paper "A scheme for predicting layer clouds and their water content in a general circulation model." The scheme was implemented and test runs were made and analyzed.

GCM Deliverables

GCM Deliverable	Due Date	Date Delivered	Notes/Description
Sea Ice modeling	ongoing	7/31/2015	Brine pocket parameterization tested and ready for commitment
Clouds	ongoing	7/24/2015	Cloud scheme made less dependent on physics time step for greater flexibility
Clouds	ongoing	7/17/2015	cold pool scheme presented
Ocean modeling	ongoing	8/31/2015	New vertical mixing scheme implemented into modelE
AMS presentations	ongoing	8/31/2015	Abstract submitted in time for presentation at AMS 28th Conference
Sea Ice modeling	ongoing	8/31/2015	New sea ice dynamics committed to AR5 v2 branch
Radiative transfer	ongoing	9/15/2015	Tables for ozone finalized
Radiative transfer	ongoing	9/30/2015	Radiation range extended to case of large CH4 concentrations
Atmospheric modeling	ongoing	9/30/2015	Selection and testing of a new layering scheme

GCM Deliverable	Due Date	Date Delivered	Notes/Description
Clouds	ongoing	9/30/2015	Implementation of new stratiform cloud cover scheme

GCM Problems, Issues, and Performance Risks

GCM Problem/Issue/Risk	Potential Impact	Plan to Resolve
Recent changes in GCM	Long-term stability of the model	Monitor long test runs
Code efficiency	On-time completion of runs	Identify bottlenecks
Code development	Introduction of errors	Enhance automated nightly testing
Code development	Degradation of realism	Automated comparisons to observations

Analysis of GCM Results

Significant steps were achieved in the creation of the next release of modelE. Sea ice dynamics (separating snow and sea ice advection) and thermodynamics (brine pocket scheme) were substantially improved. A more physical vertical mixing scheme was implemented in the ocean model. Gravity wave drag and vertical layering studies will benefit modelE, and the clouds scheme was improved by making it less layering-dependent and adding a cold pool scheme.

GCM Recommendations

It is recommended to set up an automatic system to regularly compare selected model results to observations with reminders to analyze the results depending on the size of the deviations.

GCM Work Planned for Next Quarter

Assure that the ocean-atmosphere coupler now works properly.

Investigate and implement ways to better protect model data.

Investigate SP1 to SP3 transition problems for certain model versions.

Keep the modelE documentation up-to-date and continue devising a scheme that simplifies the selection and building of consistent modelE versions.

Improve the radiative transfer tables and routines in modelE for extreme cases.

Select and test the layering of the next modelE version.

Prepare transition to cubed-sphere production runs.

Earth Observations (EO) [SOW 3.1.1.2]

ISCCP [3.1.1.2.1]
Future processing will no longer be needed at GISS. Rather, ISCCP is providing guidance to NOAA in the procedures needed for processing image data.

GISS Global Surface Air Temperature Time Series Support [3.1.1.2.2]
GHCN surface air temperatures and ERSST (versions v3b and v4) Sea Surface Temperatures (SST) were downloaded. The data were analyzed, tabulated and plotted for public use. Version 3 of GHCN data was used in computing the surface air temperature. The differences between ERSST v3b and ERSST v4 are being investigated and documented with graphs and various trend and anomaly maps. The switch was made to base all static tables, maps, and graphs on ERSST v4 rather than staying with version v3b. The interactive display utilities however still provide the option to use either file for the maps and graphs that users may generate.

Trinnovim staff worked on updating the CCC-GISTEMP code, including an update to Python 3 with the goal of integrating that code with the current GISTEMP processing scheme; the binary file access and the Fortran-like file output system was changed to using compressed numpy arrays. The code was extended to automatically generate standard GISTEMP monthly line graphs using Python libraries. Finally, a web interface was created with ability to change default parameters before running the monthly analysis.

An mp4 movie file was produced that displays 10-year annual mean GISTEMP from 1880 to 2014.

Requests for clarification by people interested in our web site were answered to their satisfaction.

Weekly SST anomalies were downloaded to study the potential for the onset or development of an El Nino/La Nina event.

WWW Development Support [3.1.1.2.3]
Trinnovim staff supported the finalization of current 2-year update of the comprehensive thematic database of T-matrix publications classified into narrower subject categories. This update will soon be submitted to the Journal of Quantitative Spectroscopy and Radiative Transfer as a peer-reviewed paper. All previous updates of the T-matrix database were combined into the GISS web site.

Trinnovim staff finalized the 2015 update of the Electromagnetic Scattering web sites and the on-line GISS "Directory of Members of the Electromagnetic Scattering Community."

Trinnovim staff established the range of applicability of the effective-medium approximation as a function of the inclusion size parameter via a comparative analysis of massive Lorenz–Mie and superposition T-matrix computations. The results were visualized in the form of compact yet representative plots, and show that for this approximation to work, the size of the inclusions must be much smaller than the wavelength. The summary of this research was included in the review paper "Electromagnetic scattering by discrete and discretely heterogeneous random media" submitted to Physics Reports.

Aerosol Polarimetry Sensor (APS) Algorithm Package Development [3.1.1.2.4]

CALNEX and CARES RSP missions were reprocessed. The CARES mission had some flights which carried into the next day, but the attitude files for the next day's data were not being created. This was corrected.

RSP had flown on a CRYSTAL-FACE mission, but there were no attitude data collected. A search for attitude data on other instruments flying with the RSP was carried out, but nothing sufficient was found.

Flight tracks of ER-2, DC8, and Learjet aircraft during the SEAC4RS campaign were compared. All the ground track intersections were found and saved in an Excel spreadsheet.

It was found that dark pixels with low DN values for intensity were being assigned polarization values that were out of range. It was decided to check intensity DN values for a threshold value of 10; values lower than this would cause the polarization values for those pixels to be assigned a value of "undefined."

Figures were created for a paper to show comparisons between RSP data and AVIRIS data for bright scenes. Reprocessed HISPIRI data were used for this purpose.

The RACORO mission has been processed. An initial time discrepancy of 15 seconds was found to be due to the difference between GPS time and UT time. This was corrected for processing.

To check for a cloud, nadir and off-nadir (+/- 30 degrees) intensities are tested. If only the nadir view is very bright, that represents glint at the surface and is flagged as "no cloud" while being co-located to the surface. Alternatively, if the nadir **and** an off-nadir view are very bright, then the scene is marked as "cloud" and co-located to the retrieval height of the cloud tops. If it is a cloud, an algorithm is run to determine whether the cloud is liquid, ice, or a mix of the two.

Climate Model Simulation Diagnostic Dataset Generation [3.1.1.2.5]
Output from various GCM runs was extracted and analyzed in support of research work at GISS. Output from the GCM runs is archived on magnetic tapes.

Output data from the Coupled Model Inter-Comparison Project (CMIP5) were processed with CMOR2 programs. These include data from control, transient, and aerosol runs. The work included extracting data from GISS model output, reformatting the data to meet CMOR2 requirements, and running the data with CMOR2 programs.

Simulations of 20th century climate are being run using the solar orbit as the only forcing. This model uses HYCOM (the Hybrid Coordinate Ocean Model) and an atmospheric model with no aerosol interactions. Intermediate results are being processed to monitor the run.

Ocean barotropic mass streamfunction and ocean meridional overturning streamfunction of climate models simulating the 20th century were processed. Also, data from climate models of representative concentration pathways were processed. The aerosols and ozone in these models are read in via pre-computed transient aerosol and ozone fields and the aerosol indirect effect is parameterized.

Inquiries about CMIP5 data from users outside GISS were investigated and processed.

Work on developing a web page to map and display CMIP5 data on-the-fly continues.

Additional diagnostic variables have been added to the user-selectable menu: column water vapor, column condensed water (liquid + solid), column ice water, sea ice cover, net downward flux at the top of the model, emitted thermal radiation at the top of the atmosphere, incident solar radiation at the ground, and clear-sky incident solar radiation at the ground.

There are quite a few "compound" diagnostic variables which require more than one CMIP5 variable to be read in. (For example, mean daily temperature range – which is **not** a saved CMIP5 variable – requires both the mean daily maximum temperature and the mean daily minimum temperature – which **are** saved – to be read in.) First, some diagnostic variables - that are saved - were added to the user-selectable menu. Next, the program was modified to use these to generate desired "compound" diagnostic variables. These included: near-surface mean daily air-temperature range, column liquid water, absorbed solar radiation at top-of-the-atmosphere, and net solar radiation at ground.

The following additional diagnostic variables are also in the process of being added: sea ice thickness, total runoff, and snow cover over land.

Finally, some descriptive fields for the NetCDF file that is created for each plot were updated.

EO Deliverables

EO Deliverable	**Due Date**	**Date Delivered**	**Notes/Description**
Monthly GISTEMP update	15th of the month	On time	Add and process latest available data
Weekly SST update	Mondays	On time	Add and process latest available data

EO Problems, Issues, and Performance Risks

EO Problem/Issue/Risk	**Potential Impact**	**Plan to Resolve**
Media attacks (CEI, etc)	Misinformed public	Detailed description of methods on web cooperation with NASA PR department

Evaluation of EO Results

Trinnovim rates its performance as excellent as all tasks were completed in a timely manner. Web sites for ISCCP and aerosol work continue to be updated when appropriate. Software tools for the Glory type missions were developed, when needed, in an efficient and expedient manner.

EO Work Planned for Next Quarter

Update GISTEMP web site every month. Make that site more attractive and easier to use by replacing the static map to select station displays by a scalable map with selectable topological and geographical features (maps, satellite images, etc.) and the ability to go directly to the data.

Complete and test the new more easily maintainable programs supporting the GISTEMP analysis.

Update SST anomalies weekly.
Maintain a test site for the analysis based on GHCN v3 to allow inspection of the data before they are made public and to test the development of new features.

Keep the various GISS aerosol web sites up to date.

Process and analyze RSP data, as needed.

Planetary Atmospheres (PA) [3.1.1.3]

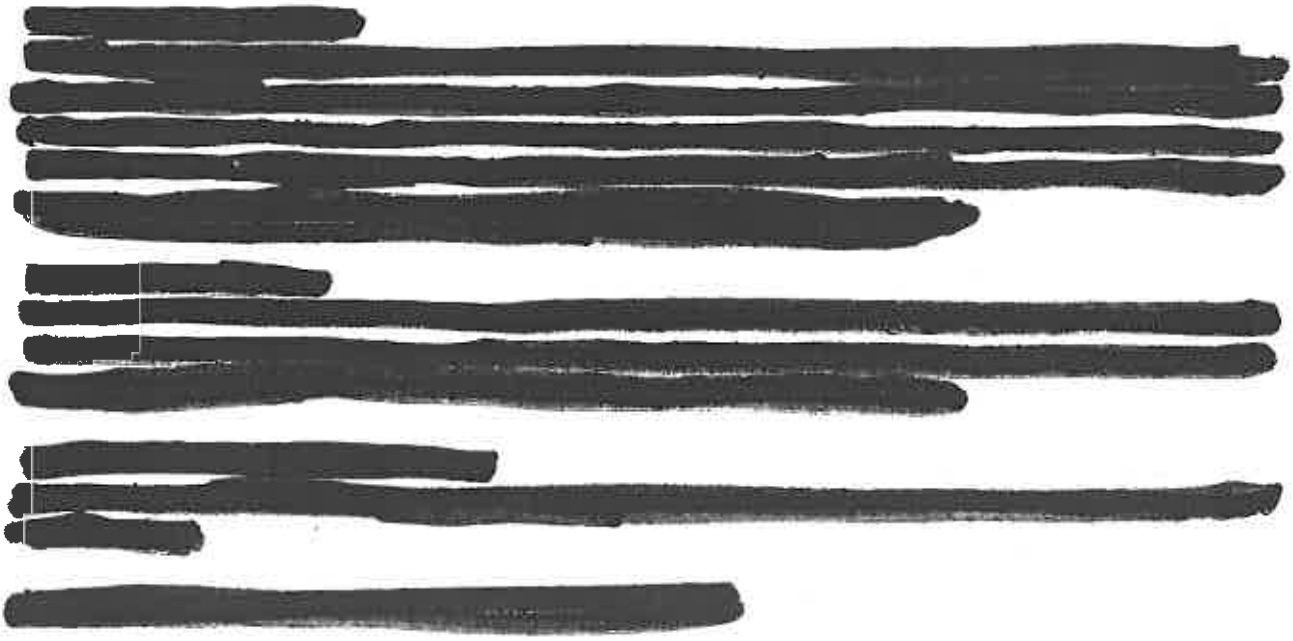
Mapping Saturn's Northern and Southern Hemisphere Eddy Momentum Fluxes [3.1.1.3.1]
The semi-automated version of the tracking program was used instead of the (fully) automated version in an attempt to track cloud features in the equatorial zone using MT2 (727-nm methane band) and MT3 (889-nm methane band) filters. There was significant scatter among the few vectors obtained at extreme low latitudes; thus, there is little confidence in this method's ability to identify features in this low-contrast region.

The semi-automated feature-tracking program was then modified to enable an option for fully-manual tracking. The new version allows a user to select both the feature of interest and its target location. The program outputs the manual zonal and meridional displacements, the automated displacements calculated by the correction algorithm, and the differences between the vectors.

A survey of Titan Meteorological Campaign images collected from 4/4/15 – 4/8/15, 5/2/15 – 5/7/15, 5/29, 6/4, 6/18 and 6/19/15 revealed no visible clouds.

PA Deliverables

PA Deliverable	Due Date		Date Delivered	Notes/Description
Map clouds on Titan at every available opportunity	3/2016		9/2015	No clouds were found i the images inspected



Computer Facility (CF) Operations [SOW 3.1.2]
GISS Computer Facility Maintenance and Monitoring

Server Maintenance

- httpd and mod_security were updated on Webdev and Web3.
- Patching of servers was performed regularly, as well as patches on Foundstone and KACE reported issues.

Other Systems

- Configured backup servers "gs611-glomt" and "gs611-forlorad".
- The two new "backup servers" were assembled and CentOS 7 was installed on them. Began testing backup software packages "Back in Time" and "Deja Dup" for use with the new backup servers.
- Troubleshooting was done on the LifeSize ViTS unit due to a UPS warning which resulted because of a power surge. The breaker was reset.
- Power supplies on both Webdev and Web3 failed, probably due to aging of power supplies that were not within spec as described by the motherboard documentation; electrolytic capacitor bulging on each in the same location. They were replaced with little downtime to the users.
- Our maintenance contract for our two Lexmark color printers had expired and a new quote was requested and received from Elbar Duplicator Corp.
- Regular patching continues per Foundstone and KACE vulnerability scans on Linux/Mac.
- Software was installed on various machines. Compilers, libraries and so forth were the main packages.

LAN

- Prep work in LAN closets has begun to facilitate upcoming renovations.
- Received CISCO backup power supply for VoIP router which will be installed next month.
- Two APS UPS units were unplugged and disconnected from the networks that are in the 6th and 7th floor closets due to vulnerabilities. These units are not needed and will be removed once the cable closets are cleaned up.
- Requested and approved via NAMS, GISS's read access only for our CNE network hardware devices. Testing continues.
- The 400Mb/s circuit is working with no problems so far.

NASA Network

- We were unable to reliably receive or update trouble tickets at GISS because a large proportion of mail to our service machine (CSR) was being returned as undeliverable by the NOMAD servers "ndmsvnpf102.ndc.nasa.gov" and "ndjsvnpf102.ndc.nasa.gov". We worked with our DCSE's on resolving a firewall issue between NASA Post forwarders and the Agnes servers.
- Worked with the NICS team on resolving an issue with the Network Time Protocol servers that GISS's machines pull time from. Since time.nasa.gov was being pulled from the Agency servers instead of the GSFC servers (really Domain Controllers) & the time wasn't in sync, but timehost.gsfc.nasa.gov maintained the correct time, a transfer of time.nasa.gov from the GSFC servers was set up, which appears to have fixed the problem.
- Machines were added/removed from the Active Directory domain as needed for NASA compliant machines.

- DNS entries continue to be made through DDI/QIP and all problems were addressed and resolved with HQ. Received notification that SAs will no longer have access to QIP. Still awaiting decision on the waiver that was submitted which would allow our SA's to keep their read/write DDI accounts.
- Minor issues regarding VoIP were reported and resolved.

GISS Computer Facility Component Installation and Inventory

New Equipment

Requested/Purchased/Received:

- Several components for Hyperwall
- Several components for 2 Backup servers
- 1 Brother HL-3170W USB/Wireless Color Laser Printer
- 2 EVGA SuperNOVA Power Supplies
- 2 Apple 45W MagSafe 2 Power Adapter for MacBook Air
- 2 MagSafe to MagSafe 2 Converter
- 2 Apple Thunderbolt Cable (2.0 m) – White
- 1 Logitech Professional Presenter R800 with Green Laser Pointer
- 1 Seagate 4TB Enterprise Capacity HDD 7200RPM SATA 6Gbps 128 MB Cache Internal Bare Drive (ST4000NM0033)
- 2 Mediabridge ULTRA Series HDMI Cable (6 Feet) - High-Speed Supports Ethernet, 3D and Audio Return [Newest Standard]

Software

- 1 IDL renewal stand-alone license
- Quote obtained for a 25 site license for GISS

Relocation

- Walkthrough was done again regarding the Glory equipment to be tagged and disposed of. Some items were tagged and shipped down to GSFC for safekeeping. The remaining items will either be properly excessed or tagged appropriately and kept at GISS. Working with Diane Goddard to properly tag and or excess these items.
- Walkthrough FY14/15 Property Inventory was completed and report submitted to HQ.
- FOS was submitted and Survey and Supplemental Surveys were completed and forwarded to HQ.
- All NASA tagged machines to be excessed continues to be manually inventoried and is being stored in room 230. The Equipment link is now accessible to GISS and excessing work continues.
- Property passes for computers and monitors were issued to several users who work remotely.
- Two GISS log servers (*Ganesh and Pyrrhus*) were relocated to GSFC for use by Code 600 and the necessary paperwork were submitted. Only one server remains at GISS (*Hanuman).*

Computer Facility Supply Maintenance

Stock Item	Quantity In-house	Pending Orders
Paper	6 Hammermill Cartons, 23 reams; 23 Xerox Cartons and 67 reams	Sufficient supplies maintained.
Toner	60 color & b/w cartridges- H.P, Konica and Brother	Sufficient supplies maintained.

User Support

- Trouble ticket was put in with the VoIP team to fix the problem of users not being able to log into https://voipphone.gsfc.nasa.gov/ucmuser/main and https://voipvoicemail.gsfc.nasa.gov/inbox/ (Voicemail User WEB access). Testing continues.
- Requests were made to Code 700 to remove several users' accounts in SATERN that did not require IT.
- An additional Global Instant Meeting conference room line was requested and obtained.
- WebEx/Lync/uStream/Skype/Vidyo sessions support was given for the following:
  - Code 610 Town Halls
  - All Hands Meetings
  - SAG Meetings
  - Education Staff Meetings
  - All Hands - Center Education
  - Google Earth Engine Hands-On Workshop
  - Safety Culture Training
  - NASA FCU – Understanding Your TSP
  - Nutritionist Brown Bag
  - Cholesterol Talk
  - Diabetes Discussion
  - American Association for the Advancement of Sciences
  - GSFC-FLSRG Forum: From Struggle to Success: Creating and Managing Position Descriptions
  - First-Line Supervisor Resource Group (FLSRG) - Office Safety Inspections for Supervisors
  - How to Schedule Reasonable Accommodations on Center and Remotely?
  - Securing your Home – NASA FCU

Communication

- Meetings attended:
  - DID workshop
  - Code 600 SysAdmin Security Plan Rollout, for the Directorate Moderate and Low Security Plans
  - Code 600 IT Monthly Meetings
  - GSFC/GISS Safety Meeting
  - IT meeting with GISS CSO
  - IT meeting with Director, CSO and COTR
  - IT meeting with CSO and GISS renovation Team Lead
  - ICAM Xceedium Demo
  - Tech Talks
  - Trinnovim's Management Meeting
- Regular communication via the GISS-wide email listing continues regarding Agency and GISS security policies and procedures.
- The IT FAQ at http://internal.giss.nasa.gov/faq.html is revised and updated to reflect changes as need be.

Assistance

- Returned to JUNO Venture the 8 extra DVD drives that they shipped to us in error.
- Obtained new quotes for expansion of Dansgaard's RAID which were then forwarded with all documentation to the government for purchase. Orders were then placed for

HDDs, chassis, UPS, cables and rails (to convert the rack from threaded round hole to square hole).
- Supplied Code 600 with a list of our current Adobe Acrobat Pro subscriptions and future need.
- Worked with NCCS team regarding removal of accounts and data transfers.
- Several requests for the use of IT during Personal and/or Business Foreign Travel were submitted to Code 700 for "approval"/notification. The users were then informed of the approval and route sheet kept by IT at GISS.
- Continue to work directly with the CSO/ISSO on security matters at GISS.
- The NAMs workflow for requesting accounts on GISS systems covered by Code 600 security plans, a modification to NAMS ICAM account was implemented.
- Continue to provide logistic and technical assistance in deploying the NextGen phones to new users. Forty new GISS numbers were approved and "configured" for use. The new numbers are not "678" numbers.
- Vidyo testing and training continue with several key personnel at GISS. Vidyo accounts were requested and approved for these personnel so they could manage their own video sessions.

Training
- Attended Vidyo training session.
- On-job mentoring of junior staff.

GISS Computing Facility Planning and Evolution

Network
- Planning continues on how best to consolidate all the network cables in the various network closets on each floor. Steve Beitzell is due to visit GISS in the upcoming month to assist with the cable consolidation, among other networking tasks.
- Reported to Code 610 our current number of DDI accounts, giving justifications for the accounts that we would like to keep read/write access. We are hoping to be able to keep all accounts but Agency wants to limit this to just one read/write per Code. All DNS requests will then have to go through ESD.

DAR/PIV
- On Monday, August 31, 2015, GISS's SAs, AGCY0025 Active Directory Resource Management Account (AA Account) role holders who selected the log in method of username and password were transition to use Xceedium (XCD) to retrieve a daily password for use. Xceedium, a PIV Smartcard enabled website (https://xcd.ndc.nasa.gov) is now used to provide a near-term two-factor authentication solution for privileged account holders. This product generates a daily password and it is valid for a 10 hour period.
- All field and office machines have been DAR'ed with the exception of a few servers.
- As of 06/05/15, the NASA PIV.Tokend Installer v1.2 is the required Smartcard Middleware for Mac systems due to unresolved issues with ActivClient on OS X 10.9 and 10.10. PIV.Tokend is being installed on all Macs and is tested to make sure that smartcard login works for the user.

MacOS/Linux Upgrades
- Testing of Mac OS 10.10 continues.

ODIN legacy/ACES seats/refresh systems

- New NOMAD mail servers were refusing to exchange mail with the CSR server Magnus. ESD Ticket# INC000001871590 was finally resolved with help from GSFC network and security teams on September 11.
- Tagged the 8 ODIN legacy PCs we acquired at GISS and submitted to Von Jenkins the 20-4's for them for entry into the GISS database.
- Still awaiting word for instructions on how to return the two non-working ODIN legacy machines we acquired but will no longer keep.
- Worked with Desmond Crowder in fixing an issue with Mac OS 10.10 not communicating with the Symantec server. Also worked with Desmond in fixing a NTP issue with ACES machines, not reporting correctly using time.nasa.gov.
- ACES Accrual Invoice Validation and Liquidation spreadsheet for Apr, May, and June 2015 was carefully reviewed and the few minor discrepancies were addressed with GISS's RA. One legacy ODIN seat was de-subscribed.
- Applied for several users to "Manage PIV Smartcard Login access", long term, via NAMS. These users are mostly FNs who do not have a chip embedded in their smartcard.
- We continue to migrate Mac users to Microsoft Outlook; the preferred mail client for NASA/ACES.
- Wipe/reloaded/reassigned two ACES computer.
- Received and configured two new ACES computers (Mac and Linux).
- Submitted to Code 700 several requests to use IT while on personal overseas travel.
- Several requests for ACES workflow for Elevated Privileges were reviewed and renewed. New requests were also put in and approved.
- Request for Skype waivers were submitted to our DCSE's for approval and users were notified when approved.
- Continue to work with Stella Adesina, Naymon Brown, Wes Campbell, Bob Speed, and Allison Kaese on closing IM and SR tickets, and solving problems with the ACES refresh systems.
- Updating of all IMs and SRs via SM9 continue.
- New DAR and admin passwords for Mac, Linux and PC were received and distributed to the SAs.
- GISS-wide emails were sent out to the users regarding policies/updates/procedures.
- Continue to assist users with the install of the new VPN (https://vpn.nasa.gov), Junos Pulse, and configure our machines to use the new VPN IP range to allow SSH access. Troubleshot and resolved with HQ VPN login issues encountered by VPN users.
- GISS ACES TA/RA worked with Allison Kaese, Olivia Leckner and Naymon Brown in obtaining tokens and PKI reference and authorization codes for users.
- A discovery at GISS has reinforced concerns that the ACES OS X build has security configuration flaws that need to be addressed. The most recent issue is about world writable executables that are available for all users of the system in the Application Directory. Previous concerns have been expressed about home folder access controls, the root account being enabled and the disabling of Apple's application whitelisting features.
    a) This CR ticket was escalated to the ACES and I3P Enterprise civil servant security leads for their attention.
    b) Ron Colvin is also working with the Agency ETADS on the general topic of Mac OS benchmark updates, to include this issue.
    c) Ron's draft recommendation is listed below and was submitted to the CR.
    d) NASA is using CIS as the basis of its security controls for OS X. All of the settings mentioned above are part of the latest OS X Benchmarks and should be implemented on all ACES delivered systems. We are including all of the

the Wi-Fi toggle script depending on the Mac OS version. Currently the script does not work under Mac OS10.9 and 10.10 and we manually monitor those machines and fix as need be.

- Completed and submitted several Technology Transfer Control Placement (TTCP) IT/no IT applications following the required guidelines for designated and non-designated countries, and ensured that the proper firewall rules were implemented on the user's machine/s once approved. TTCP forms are no longer needed for FNs to use the "guest wireless".
- Continue to assist FN's sponsors with systems configurations for their users' machines.
- Users were reminded of NASA Security policy requiring that all personnel using NASA computers (desktop, laptop, workstation, and tablet and are using the NASA network) be cognizant of their organization's IT Rules of Behavior (NIST SP 800-53, control PL-04 Rules of Behavior). All new users have been requested to go to http://science.gsfc.nasa.gov/rob, read the Rules of Behavior for Code 600 and click at the bottom to electronically sign the document. (This replaces the old processes in which paper copies had to be signed and stored). Users are informed that a pdf version of the "RoB" can be found on the GISS Intranet under "General GISS Resources". For those users who do not have access to the NASA network and cannot access the link, but do work for NASA, the pdf version is submitted to them.
- The posting of all new policies and procedures continues to be added to the GISS intranet for better communication between the Systems group and users.
- Continue to submit requests through NAMS for VPN, PKI, RSA token, EP and NCCS access.
- Continued to assist users with the install of the new VPN (https://vpn.nasa.gov), Junos Pulse, and configure our machines to use the new VPN IP range to allow SSH access. Troubleshot and resolved with HQ VPN login issues encountered by VPN users. Users are reminded to use only the new VPN client to connect to the NASA networks.
- Skype waivers continue to be submitted on a "need to" basis.
- Request for http and https service on a handful of servers/workstations were renewed via GSARS.
- Windows users were reminded to use their PIV smartcard to login to their machines.
- Our TA/RA continues to work with HQ and end users in supplying tokens, delivering PKI authorization/reference codes, confirming identity, and identifying and troubleshooting issues with encryption.

System Security and Monitoring

- Attended a "training session" for our upcoming onsite Assessment and Audit (A&A) and obtained accounts in NAMS for SSPTT's wiki as the information posted there will be needed for the audit.
- GSARS waivers for HTTP on our web servers were renewed.
- GSARS waivers for SSH are not being renewed. Users are now obtaining accounts on the GSFC bastion host for SSH.
- GISS was rolled over unto Code 600's SSP plan CD-9999-L-GSF-3277 - Sciences and Exploration Directorate Multi-Program/Project Low IT Science System. The necessary changes were made to the KACE SSP script which was then pushed to all gs611 machines to ensure proper reporting. We continue to monitor systems in KACE.
- All machines have been reconfigured to log to our log server Hanuman only.
- The Puppet server is up and running. It can be reached via Foreman. It is running on a Linux virtual machine. It is used to push out software updates, gather useful System Administration information, like machines having opened ports, and automate

applications. Testing using manifests and modules continue. To date, all Mac were added to the Puppet server and they can be retrieved from the web console. We are in the process of adding all Linux workstation to Puppet.

- Installation of the latest version of the Symantec Managed client on all Macs continues. Troubleshooting a Symantec popup issue with MPI and Mac OS 10.10 continues.
- DDI (DNS) and GSARS were cleaned up to ensure accurate reporting of all GISS systems with legit vulnerabilities.
- Reported to Rosa Kao that GISS did not need any waivers for M-PIV exclusions for non-ACES machines.
- Compliance scripts have been updated and made compatible with the latest CIS benchmarks for Linux and Mac OS 10.10, 10.9 and 10.8. FW rules for 10.9 and 10.8 are in place. Working on FW rules for 10.10.
- The Federal Government requires that all Federal agencies use the Personal Identity Verification (PIV) Smartcard, otherwise known as a NASA badge, as a common credential for accessing systems, networks, and facilities. To comply with this requirement, NASA has deployed the mandatory use of the PIV smartcard login on all Windows 7 workstations connected to the NDC domain. GISS has reported that they are up to date with the install of PIV-M and they currently have no non-ACES Windows VM. Mandatory PIV was implemented on all machines on September 30 2014, and continues to be enforced. Waivers are requested through ESD when users forget to bring in their smartcards and for new users who did not receive their smartcard (badge) upon hire.
- A mandated federal requirement was issued to protect access to NASA's high value assets, which includes access to NASA's Identity Management and Access Management systems. IdMAX, ICAM Support Console, Siteminder Admin Console, ICAS Viewer and NAMS (*excluding basic user submission and approval of requests) will enforce login by PIV Smartcard only *effective July 10, 2015*. For users without a PIV Smartcard, the RSA token will be acceptable for low-risk roles.
- We continue to implement the new rules from Agency and Center that all EP requests for non-ACES users must go through NAMS using the correct workflow: GSFC Code 600 Elevated Privileges-User/Admin. These requests are first approved by Jack Richards; the user then takes all the required SATERN training, and once completed the NAMS request is submitted by us. FNs are not allowed EP rights.
- Monitoring of our syslog server at GISS continues, and all loopholes are fixed immediately. All non-ACES Macs are now reporting. Work continues to ensure that all ACES Macs are configured properly to log to the log server.

Incident Reporting

- Reported several phishing incidents to SOC Abuse team.

Virus/Adware/Etc.

- Users were reminded of their responsibility to remain vigilant and to maintain a heightened level of awareness in identifying and reporting any phishing attempts.
- Virus software is installed and kept updated on all machines as per NASA standards.

CF Status

Critical System/Services Uptime

- Nothing unusual.

Backups

- Backups are primarily the user's responsibility and they are reminded of this.

CF Problems, Issues, and Performance Risks

CF Problem/Issue/Risk	Potential Impact	Plan to Resolve

- None to report.

Library and Publication Services (LPS) [SOW 3.1.3]

GISS Technical Library Operations

Operation	Status
Journal subscriptions	• Library currently subscribes to 57 journal titles.
Books Processed	• Ordered, cataloged and processed 2 books.
Circulation	• 783 library items currently charged out to patrons.
ILL / Document Retrieval	• Processed 34 interlibrary loans.

On-line Library System Participation

Library System	Description of Work Performed
NASA GALAXIE	• Searched NASA online library catalog system to assist in patrons' reference inquiries & interlibrary loans.
OCLC	• Processed 27 interlibrary loan requests for books and articles for in OCLC.

Publication Services

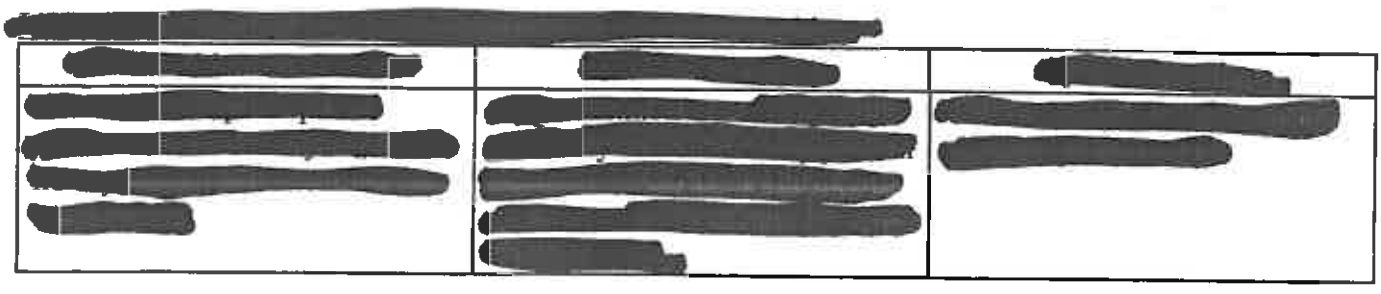
- Design and technical illustration services of charts and graphs were provided as requested by scientists for presentations and publications in scientific journals. This was achieved by using a combination of programs including Corel Draw 12, Excel 2013, Word Perfect 2013, Adobe Illustrator 10, Adobe Photoshop 7, Adobe Acrobat XI Pro, and Epson Scanner.

- Preparations of the yearly GISS Research Publication Document are underway. The Publications Book is a creation of two page summations of each and all GISS scientific papers, articles, presentations, chapters, proceedings and books produced yearly (over 100 separate pieces). GISS authors were sent instructions for submitting their two page summations by January 2016.

- Assistance was given as requested for poster printing for conferences and meetings.

LPS Deliverables

Approval system	Description of Work Performed
STI/eDAA (electronic Document Availability Authorization) form submissions for GISS publications	Completed and submitted 88 eDAAs in accordance with NASA STI policy. Continue to keep up to date with new STI directives and procedures to ensure compliance.
Create the annual GISS Research Publications document	The 2014 GISS Research Publications document was made available in hard copy format and on USB drives and online at: http://pubs.giss.nasa.gov/docs/annual/2014RP_compressed.pdf.



[redacted]

Library Expense and Projection Report

LIBRARY SERVICES - THE FOLLOWING TASKS WERE OUTLINED IN THE CURRENT QUARTERLY FORECAST DOCUMENTATION OF THE MONTHLY PRODUCTION RECORD. BOOKS PROCESSED, BORROWED, AND COMPUTER SEARCHES.

	September 2015	CUMULATIVE
BOOKS PROCESSED	0	5
INTERLIBRARY LOANS		
OCLC	7	45
OTHER	2	15
eDAAs COMPLETED	47	150

Logistical and Utility Support (LUS) [SOW 3.1.4]

Postal Mail Handling

Mail distribution within the GISS building was provided and deliveries to the Post Office were made. Equipment and deliveries were unloaded from trucks and messenger service was provided as needed.

The monthly reports for Code 200 were provided indicating postage usage on the Neopost mail meter. The detailed reports include the total items shipped, cost per item, mail type (i.e. parcel), destination zip or country, and the sender's name.

Date	Mail Type	Qty	Weight	Zip Code	[redacted]	Sender
Jul 6	1st Class Single	1	2.7 oz	12233	[redacted]	Library
Jul 9	1st Class Single	1	2.0 oz	01171	[redacted]	Library
Jul 10	Letter 1st Class	1	3.0 oz	21005	[redacted]	Library
Jul 13	Library	1	2lb 8.5 oz	48825	[redacted]	Library
Jul 13	Library	1	2lb 8.4 oz	91109	[redacted]	Library
Jul 13	Library	1	2lb 8.5 oz	80309	[redacted]	Library
Jul 13	Library	1	2lb 8.6 oz	11367	[redacted]	Library
Jul 13	Library	1	2lb 8.4 oz	80303	[redacted]	Library
Jul 13	Library	1	2lb 8.4 oz	14627	[redacted]	Library
Jul 13	Library	1	2lb 8.8 oz	48109	[redacted]	Library
Jul 13	Int'l 1st Class	1	2lb 8.5 oz	04905	[redacted]	Library
Jul 13	Flat Int'l 1st class	1	2lb 11.7 oz	20364	[redacted]	Library
Jul 14	Media	1	2lb 11.5 oz	48109	[redacted]	Library
Jul 14	Media	1	2lb 11.7 oz	48109	[redacted]	Library
Jul 15	Media	1	8.4 oz	11735	[redacted]	Library
Jul 15	Library	1	1lb 10.1 oz	08034	[redacted]	Library
Jul 21	Library	1	2lb 7.1 oz	21005	[redacted]	Library
Jul 29	Library	1	2.83 oz	48864	[redacted]	Library
Jul 31	1st Class Single	1	2.7 oz	08625	[redacted]	Library
	Total # of Pieces	**19**			[redacted]	

Date	Mail Type	Qty	Weight	Zip Code	[redacted]	Sender
August 4th	Priority flat	1	2lb 12.3oz	20771	[redacted]	Pearce
August 4th	Letter 1st class	1	0.2oz	14853	[redacted]	Library
August 7th	Library	1	2lb 11.6oz	95343	[redacted]	Library
August 12th	Library	1	2.7oz	92008	[redacted]	Library
August 31st	Library	1	1lb 2.2oz	11548	[redacted]	Library
August 31st	Library	1	2lb 3.5oz	12550	[redacted]	Library
August 31st	Library	1	2lb 8.3oz	30345	[redacted]	Library
	Total # of Pieces	**7**			[redacted]	

Date	Mail Type	Qty	Weight	Zip Code	[redacted]	Sender
Sept 1st	1st class letter	1	1.2 oz	49855	[redacted]	Library
Sept 11th	Letter	1	0.5 oz	20771	[redacted]	S. Hosein
Sept 7th	Letter	1	0.4 0z	20771	[redacted]	Library
Sept 22nd	Letter	1	0.9 0z	57301	[redacted]	Library
Sept 25th	1st class letter	1	1.5 0z	44017	[redacted]	Library
Sept 30th	1st class letter	1	2.0 oz	40512	[redacted]	Library
	Total # of Pieces	**6**			[redacted]	

Property Inventory Support

Newly purchased NASA equipment was tagged accordingly and appropriate paperwork was submitted. Updating of the GISS Inventory continues via N-Props *(see section **3.1.2.2** under Computer Facility).*

Building door tags, floor directories, and extension lists were updated according to new reassignment of offices, new hires and terminations. Office furniture and computer hardware/equipment were moved as needed.

Offices of terminated employees were cleared of papers and broken office furniture so that new employees could occupy those spaces.

Reorganization of the computer room, room 230, continues as excess of NASA tagged equipment is being prepared for return to GSFC.

The implementation of Voice Over Internet Protocol (VoIP) and Next Generation Voice (NextGen) took place at the beginning of the year. The new phone line system replaced the Centrix system providing a more stable telephone services. New phones and a brief tutorial were provided in all offices and continued maintenance is provided as needed for outages. *(See section **3.1.2** under Computer Facility -LAN)*

The Konica Minolta MFDs that replaced the Xerox copiers have proven efficient, providing printing, copying, scanning and faxing services. Users now have the capability to scan and fax securely using their NASA badge (PIV card) but it is *not* required. Users now also have the capability to print encrypted documents using their PIV card.

The maintenance schedule established to clean and service all printers in the building is functioning well and provides continued usage of these printers except during necessary repairs.

A delivery of "lightly used" furniture from GSFC was received on July 14, 2015. Desks were assembled and delivered to the appropriate offices. Old desks were recycled and conference room chairs were excessed back to GSFC.

Two sample chairs were sent from AllSteel, Inc. for all GISS employees to "test" and choose their preference. Chairs will be ordered prior to GISS renovations since many of employees are in desperate need of more suitable, ergonomic seating.

Conference and Workshop Support

Travel arrangements were made in support of the following meetings, workshops, and conferences:

- Global Programme of Research on Climate Change Vulnerability, Impacts, and Adaptation (PROVIA) Scientific Steering Committee and Our Common Future Under Climate Change conference in Paris, France
- NASA Precipitation Measurement Mission (PMM) Science Team Meeting in Baltimore, MD
- PACE mission Instrument Design Laboratory and NASA GSFC in preparation for the NAAMES project
- Live Shots outreach program at NASA GSFC, Greenbelt, MD
- Field trip to collect samples of chlorophyll at Moss Beach, CA and return to lab at NASA AMES

- Meeting with DOE Brookhaven National Laboratory in Upton, NY
- Sixth Indo-American Frontiers of Science symposium in Irvine, California
- Meeting with the World Wildlife Fund for discussion of WWF and CCSR partnership in Washington, DC
- Kent Presents panel "Climate Science, Climate Change & Public Policy" in Kent, Connecticut
- "Impact Relevance and Usability of High Resolution Climate Modeling & Datasets" workshop in Aspen, Colorado
- Meeting with JPL at NASA GSFC to evaluate their polarimeter concepts for the Pre-Aerosol Cloud Ecosystem (PACE) mission in Greenbelt, MD
- US DOE Panel Review for the Atmospheric Radiation Measurement Program and the Atmospheric System Research Program Science and Infrastructure Steering Committee in Rockville, MD
- "Agency Libraries Face-to-Face" workshop in Cleveland, Ohio
- World Congress of the International Desalination Association in San Diego, California
- PACE Polarimeter Final Concept Review in Utrecht, Netherlands
- Travel to NASA Langley for C130 flight planning
- Sciences and Exploration Directorate (SED) Director's Seminar at NASA GSFC
- "Climate change, Food Security, and Agricultural Development: Linked Regional and Global Assessments" in Aspen, Colorado
- Radiation mechanisms of astorophysical objects: classics today" in St. Petersburg, Russia
- Comparative Planetary Climates/Comparative Climates of Terrestrial Planets II Conference at NASA AMES
- US DOE workshop on Aerial Observation Needs for Climate and Environmental Sciences in Gaithersburg, MD
- Panel Review for Precipitation Measurement Missions Science Team in Tysons Corner, VA

The following seminars, conferences, workshops and meetings were hosted on-site at GISS. Appropriate logistical support was provided including teleconferencing services, systems support (i.e. LCD projector), and refreshments as requested.

- Group meetings on July 2, 6, 7, 13, 15 & 20
- OMB visit on July 8
- GISS Friday Seminar: *Recent developments in the quantification of aerosol radiative forcing* by Nicolas Bellouin (Department of Meteorology, University of Reading) on July 10
- GISS Lunch Seminar: *Insights in aerosol-cloud interactions gained in the past five months* by Johannes Quaas, GISS on July 22
- GISS Lunch Seminar: *Giga-LES of Hector the Convector Keeping the Tallest Updrafts Undiluted* by Thibaut Dauhut (PhD student working with Jean-Pierre Chaboureau at Laboratoire d'Aerologie, University of Toulouse) on July 30
- All Hands-on Meeting with Piers Sellers on Code 610 updates on July 30
- GCM meetings on August 7 and August 17, September 1, 15, and 29
- GISS planet model radiation meeting on August 17
- GISS Friday Seminar: *Tropical Cyclones in Climate Models* by Suzana Carmargo (LDEO) on September 4
- GISS Friday Seminar: *Chasing Carbon in the under-sampled Ocean* by Ivona Cetinic (NASA GSFC) on September 18

Please note that all ViTS conferences and seminars (including 610 Town Halls), as well as Webinars coordinated with GSFC can be found under the Computer Facility section of this report.

Community Outreach and Educational Programs

Engagement activities continue for alignment with co-STEM initiatives and NASA Education goals. This includes the development of interactive learning management systems to provide educators ongoing professional development and STEM engagement support, the creation of the GISS Office of Education Facebook page, and collaboration with Apple software developers to develop education applications for GISS.

Meetings and discussions continue with teachers and administrators from NYC schools to improve STEM instruction.

The summer STEM Research Symposium was held at the CUNY CREST (Cooperative Remote Sensing Science and Technology) center at the City College of New York on August 13, 2015. Twelve NYCRI intern research teams led by Matthew Pearce presented their research posters and won 1st place.

Met with educators for orientation of course sites and to build STEM Portfolio on August 19.

Participated at Intrepid Museum for The After School Corporation (TASC) workshop on August 20.

Staff meetings with the Office of Education at GSFC were held on August 19 and September 16.

NYCRI

The NYCRI program for GISS began on June 3, 2015 and ran through August 14, 2015. In addition, STEM internship opportunities are being developed in collaboration with New York City College of Technology, and development of the Spring NYCRI STEM Teacher Research Training Institute in collaboration with Medgar Evars College continues.

The NYCRI (New York Climate Research Initiative) Internship Poster Presentations were held on Thursday, August 6, 2015.

Explore@Goddard

- A planning telecom was held on August 31 to discuss Explore@Goddard was held on September 26, 2015.
- Assisted Michael Cabbage with NASA GISS Fact Sheet.
- Assisted Michael Cabbage with poster creation for Explore@Goddard Day event

Climate Change Research Initiative (CCRI)

The Climate Change Research Initiative (CCRI) Program for GISS begins on Tuesday, October 6th, 2015 and will run through August 19th, 2016. The CCRI team consists of the mentors: Stuart Gaffin, Linda Sohl, Dr. Dorothy Peteet, and Allegra Le Grande. The Educators are Mary Anne Woody, Stephanie Stern, Nicole Dulaney, and Katie Byrd. The Graduate students are: Annesia Lamb, Edwige Lauture, Cynthia D Herrera, and Nicholas Zanata.

- Visited Columbia University, Teacher's College, Lehman College, Hunter College, and CUNY Graduate Center to broadcast recruitment announcements for CCRI internship program.
- Created Educators Applied Research Stem Portfolio, organized computer lab, and created database for local Point of Contacts (POCs) for graduate/educator recruitment for CCRI OSSI (One Stop Shopping Initiative) training with Fawn Stanton.

- Engaged in a phone call marketing campaign to recruit graduate students and used database to contact universities for recruitment of CCRI program.

- Created database for CCRI program for graduate and educator applicants. Assisted mentors in scheduling interviews for prospective interns and educators. Extracted and compiled OSSI applications for record keeping.

- Created Doodle Poll to schedule teleconference for CCRI Program Review for mentors.

- Created and coordinated the CCRI Orientation event for Tuesday, October 6th, 2015 to be held on-site at GISS.

- Drafted decline letters to CCRI educator applicants. Contacted mentors for selections for CCRI applicants, and revised and edited CCRI orientation acceptance packages for both educators and graduate applicants.

GISS Facility Operations

An update on the new lease was provided at an All-hands meeting on July 30. The new lease was signed and planning meetings between GSFC architects/planners and Columbia regarding phases of renovation was held on August 11-12, 2015. Renovations are expected to begin in fall of 2015 and may last from six months to one year.

An email address was created, giss-supportservices-l@lists.nasa.gov, to be used my GISS staff for specific requests. Where computer related problems should be sent to csr@csr.giss.nasa.gov, all other GISS building related items should be sent to GISS Support Services at giss-supportservices-l@lists.nasa.gov. These items include requests for supplies (including toner), copier issues, phone issues, and all other miscellaneous items pertaining to the GISS building and employee questions. Emails will be directed to the appropriate person and the issue will be addressed promptly with a follow up email to the requestor confirming receipt and completion.

Trinnovim worked with Columbia University Facilities Management to identify the source of fumes permeating throughout the building, and proper measures have been taken.

New signs were posted on all floors in both stair ways indicating floor and stair well replacing missing or damaged signs.

Light fixtures were replaced and other small tasks (i.e. shelf installation) were completed in several offices as needed.

Security cameras were replaced with new ones and others added in areas of need.

In accordance with new rules from the NYC Dept. of Sanitation, a notice was sent to all GISS employees regarding the acceptance of all rigid plastics along with metal, glass bottles and jars, and beverage cartons in the recycling stream.

Relabeling of all mail boxes to more easily keep them in alphabetical order was initiated and is being kept updated.

Maintenance was performed as needed throughout the building and proper communication was disseminated to all building occupants.

The "Clean & Go Green" program offered by Columbia University was held on Wednesday, July 8, Thursday, July 9 and Friday, July 10. GISS participated in the program to properly dispose unwanted items at no

Program Management (PM) [SOW 3.1.5]

Staffing
The following staff changes were made for the period July 1 to September 30:

Terminations
NONE

[redacted]

Transfers
NONE

[redacted]

Task Management
Trinnovim updated the NASA/Goddard Space Flight Center Locator and Information Services Tracking System (LISTS) personnel roster.

Coordination with Anthony Loggia and Rhonda McCarter was established to update all GISS entries in the NASA Enterprise Directory (NED) including deletions of terminated employees.

Smart cards continue to be issued to all GISS personnel in accordance with Goddard Space Flight Center's security procedures. Trinnovim's Project Management office begins the badging process by first creating an identity for each employee in IdMAX and forwarding a LISTS form to GSFC Security. Once a new identity is created and submitted, the employee receives an email with instructions on how to complete an eQIP (electronic Questionnaire for Investigations Processing). Upon submission and approval of an eQIP, employees are fingerprinted and await their badge. Temp IDs are no longer valid and all personnel without a valid badge are signed in as visitors.

The contract cost by program category was updated through September 30, 2015.

A monthly breakdown of contract charges, including supplies, travel and Other Direct Costs (ODCs) was completed and delivered to group leaders in each discipline.

The following documents were reviewed and updated if necessary:

- Position Description for Uniformed Security Post at GISS
- GISS on-duty Security Officer Procedures (SOP)
- GISS Occupant Emergency Program, with special emphasis on the fire evacuation plan; the escape routes were adapted to changes in the floor plans
- In fulfillment of NYC Local Law 26/FDNY Rule 3 RCNY 6-02, a new list of fire safety personnel was put together, ensuring that each floor provide male and female searchers.
- Emergency Computer Shutdown Procedures
- Continuity of Operations Plan (COOP); the general Reconstitution Plan was customized for GISS and copied to the COOP SharePoint site. The call tree was modified and was tested.

Contract Reporting

The following reports were delivered on time:

- Health and Safety report
- 533 & Variance report
- Contract Budget
- Room and Extension report
- Costs reports
- ACES (formerly ODIN) monthly report

Coordination with COR

The following was discussed with COR:

- Contingency Plan for GISS
- NASA One email address seats
- Goddard security badging and HSPD-12 (Homeland Security Presidential Directive – 12)
- Reviewed different funding for each group and the Project Manager spoke to each PI regarding funding
- Process to set up NOMAD accounts
- GISS equipment inventory
- Status and completion of COOP Plan; definition and outline of "Reconstitution" step
- Room assignments for new hires and office reassignments
- eDAA process as required by NASA GSFC for all publications submitted from GISS
- Support and information were provided to the COR in preparation of the new RFP

Logistical Support

Access to NASA facilities by foreign nationals from designated countries continues to be monitored. The NASA Administrator announced that he has initiated a complete review of the access which foreign nationals from Designated Countries are granted at NASA facilities, as well as our security procedures with regard to these individuals more broadly. In addition, the Administrator ordered a moratorium on granting any NEW access to NASA facilities to individuals from specific designated countries, including China (PRC), Burma, Eritrea, Iran, North Korea, Saudi Arabia, Sudan, and Uzbekistan. In compliance with this directive, office space was provided at Columbia University for foreign nationals collaborating with GISS. Whereas foreign visitors from the eight countries mentioned above have to be escorted at all times, ALL foreign nationals (unless they have a green card) have to be APPROVED before they can visit GISS. The approval process involves IdMAX and has to be initiated by Patricia in the project management office at least 10 or 20 days before the visit to be sure that it gets granted in time. The 20-day limit applies to people from the 41 countries (including Israel) listed at: http://oiir.hq.nasa.gov/nasaecp/DCList_11-28-12.pdf; the 10-day limit applies to all other foreigners. Even escorted visits are prohibited before the approval has been granted.

An email was sent to all GISS staff informing them of any newly available information regarding building access via the GISS intranet website http://internal.giss.nasa.gov/access/

New documents were forwarded to all GISS staff regarding new requirements for foreign national employees/visitors, specifically for those from designated countries. In addition, a reminder was sent regarding the completion and acknowledgement of the GSFC RULES AND PROCEDURES FOR ESCORTING VISITORS, specifically foreign nationals.

Issued LISTS & NASA 1760 forms to new employees/foreign visitors and created NASA identities in IdMAX for badge enrollment. The following entries were made for the period July 1 to September 30:

Name	Host	Citizenship	Affiliation	Expiration Date
Enza di Tomaso	Italy	Carlos Perez	GISS Sci. Collaborator	08/22/2015
Maria Sand	Susanne Bauer	Norway	GISS Sci. Collaborator	08/19/2017
Joy Singarayer	Gavin Schmidt	U.K	GISS Sci. Collaborator	09/14/2015
Julia Hargreaves	Gavin Schmidt	U.K	GISS Sci. Collaborator	09/14/2015
Samuel Schlecht	Cynthia Rosenzweig	Germany	GISS Sci. Collaborator	10/28/2015
Sandra Harrison	Gavin Schmidt	U.K	GISS Sci. Collaborator	09/14/2015
Aiko Voigt	Allegra Le Grande	Germany	GISS Sci. Collaborator	09/14/2015
Seungbu Park	Andrew Ackerman	South Korea	GISS Sci. Collaborator	08/31/2016
Marco Tedesco	Gavin Schmidt	Italy	GISS Sci. Collaborator	01/16/2018
Maria Sand	Susanne Bauer	Norway	GISS Sci. Collaborator	08/19/2017
Joy Singarayer	Gavin Schmidt	U.K	GISS Sci. Collaborator	09/14/2015
Julia Hargreaves	Gavin Schmidt	U.K	GISS Sci. Collaborator	09/14/2015
Delphine Deryng	Joshua Elliott	France	GISS Sci. Collaborator	10/18/2015
Megi Zhamo	Cynthia Rosenzweig	Albania	GISS Sci. Collaborator	01/18/2018
Barbara Norman	Cynthia Rosenzweig	Austrailia	GISS Sci. Collaborator	10/15/2015
Stefan Konzett-Stoffl	Vittorio Canuto	Austria	GISS Sci. Collaborator	10/15/2016
Pascale Braconnot	Allegra LeGrande	France	GISS Sci. Collaborator	9/14/2015

Contractor Safety Support

The Safety Committee held monthly meetings. All managers were asked to continue to be alert to any potential health and safety hazards in their areas.

Fire alarms were tested throughout the building as scheduled.

Numerous safety hazards have been reported to Columbia University and needed action was taken to resolve them.

The monthly Health and Safety reports were prepared and submitted on time.

Jeff Dalhoff (Code 360) conducted a 2-day Indoor Air Quality Assessment on July 9-10. Air samples were taken and analyzed in several offices, visual observations was made of occupant spaces, furnishings; exhaust ventilation systems of nearby restaurants, outdoor alleys, and the roof. A report was furnished on July 24, noting that the measurement results indicate that according to the IAQ guidelines the building provides suitable environmental conditions for typical individuals.

Dean Wolf (301-286-1612, cell: 443-883-5354) and Ryan Smallcomb (301-286-9641) performed a safety audit at GISS on August 18, 2015. While Ryan Smallcomb, accompanied by Emily Michaud and Nestor Torres, inspected all offices finding some minor safety violations, Dean

Wolf offered a safety training attended by Security Officer Richard Mok, Systems Manager Sabrina Hosein, and the Project Manager. Some major points in that presentation were:

- There must be an 18" clearance around sprinklers in all directions
- No flammables are permitted within 36" of a space heater
- Space heaters and other high-current (>5 Amps) equipment have to be plugged directly into a wall outlet, not into a power strip or surge protector
- Toaster ovens are not permitted
- Extension cords should be of the type that does not get hot; they should be regularly checked for abrasions; don't chain extension cords.
- There should be a 36" clearance around electrical panels – mark the circumference with yellow tape
- Avoid obstructions to emergency paths out of offices, need 18" of clearing.

11 violations were noted on the SHEtrak system and were responded to within the required 30 days; most of them were completely eliminated; the remaining violations were handled with an abatement plan due to the imminent remodeling of the building which will bring it up to code.

Please note that the 'GISS Facility Management' section can be found under the Logistical and Utility Support section of this report.

Electronic Information Technology Accessibility Compliance [SOW 3.2]

GISS Website Upgrade and Maintenance

The system software was updated on public, staging, and internal web servers. Security patches were applied to the systems on the webserver remote backup. Work was done on creating security benchmarks for the internal webservers.

The public and staging webservers were recovered after both power supplies suffered a hardware failure. New more powerful power supplies were acquired and installed.

News and features were prepared for reposting to the GISS homepage.

The GISS publication website was updated and new items were added.

A partial redesign of the GISS homepage layout was implemented highlighting new publications and results and including some dynamic features. Static displays were moved to separate pages.

A new interactive web browser-based selector for GISTEMP station data was created using the Leaflet Javascript library. Preparatory work involved creating a server-side parser for the station inventory and monthly data for use with the geoJSON format.

A new Python version of many GISTEMP CGI scripts on the Data website has been completed and is being tested. This became necessary because some of the utilities currently used (e.g. the Berkeley Data Base) are no longer being supported in the newer releases of Python. That new version is based on the one created by the ccc (Clear Climate Code) project. Bottlenecks were investigated and resolved.

Global and zonal map scripts were rewritten to reduce the need to call external executables. Alternative graphics plotting utilities were investigated, replacing NCAR graphics and PostScript based in-house utilities nmaps and aplot by programs using Python libraries (e.g., Matplotlib). The website CGI form is being updated with JavaScript to make it more user friendly and the use of D3 graphics is explored to add further interactivity to the graphics output.

Another transition that has been initiated is the future replacement in all the GISS web sites of NCARgraphics by Panoply, a far superior visualization utility that is being maintained and further developed at GISS. Adaptations for using Panoply as a website tool are developed and tested.

Development and Maintenance of Web Utilities

Versions 4.3 and 4.3.1 of the Panoply visualization software were released.

Additional plotting features were added to the Panoply command-line visualization software.

Support was provided to users of the Panoply desktop data visualization software in person at GISS and by email to researchers at NASA/GSFC, NASA/JPL, NASA/MSFC, NOAA/NSDIS, DOE/Pacific Northwest National Lab, New York University, Univ. California Irvine, University of Minnesota, Lockheed Martin Aeronautics, St John's College Oxford University (UK), Aberystwyth University (UK), Swedish Meteorological and Hydrological Institute, Universidad de Murcia (Spain), and University of Melbourne (Australia).

Version 1.7.4 of the G.Projector map projection software was released.

TRINNOVIM

January 15, 2015

Dr. Emily Michaud,
NASA Goddard Institute for Space Studies
2880 Broadway
New York, NY 10025

Dear Dr. Michaud:

Attached is the Quarterly Report for Trinnovim, LLC for October 1 to December 30, 2015. If you have any questions regarding the contents herein, please contact me.

Sincerely yours,

Reto A. Ruedy
Project Manager

[redacted]

PREPARED FOR

GODDARD INSTITUTE FOR SPACE STUDIES

CODE 611.0

GODDARD SPACE FLIGHT CENTER

BY

TRINNOVIM

QUARTERLY REPORT

OCTOBER 2015 – DECEMBER 2015

CONTRACT OBJECTIVE

The objective of this contract is to furnish comprehensive support services to the Goddard Institute for Space Studies in the following areas: scientific programming; scientific programming analysis; systems programming; data handling and data teleprocessing; computer operations; library services; publication services, including manuscript preparation, illustration and duplicating photography services; and reproduction services.

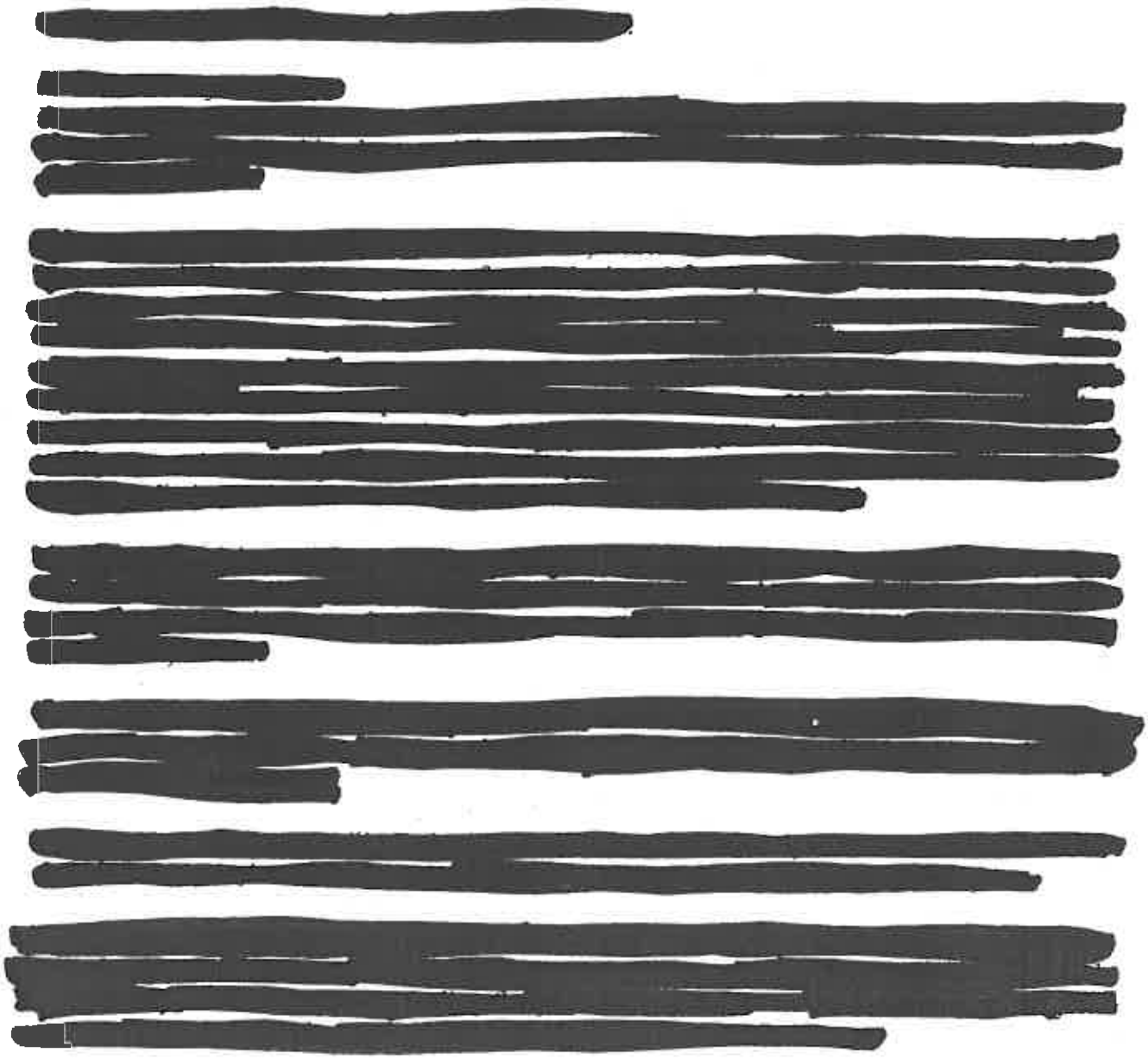
Global Climate Modeling (GCM) Support [SOW 3.1.1.1]

GISS GCM Maintenance and Improvement [3.1.1.1.1]

Changes at and Communication with NCCS/GSFC:

Changes in NCCS's computing environment continued and the corresponding modifications of the production utilities were applied. The utility to monitor and stop/resubmit long jobs was extended to allow other user groups to make use of it. It also was made more robust when dealing with exceptional situations.

Monthly tag-ups were held and attended by key GISS users and GSFC systems staff. The projected amount of computing resources and ways to safeguard and back up model input data are being discussed. To increase the protection of vital data sets, a special user group account was suggested with the sole control over those files. Preparations for implementing that "gissdata" group were completed; some approvals and security investigations are still needed for the full implementation.



Ocean model developments:
In preparation for final testing of high-order advection schemes near coastlines and abyssal bathymetry in the next-generation ocean model, the flat-space streamfunction generator was transplanted to the new cubed-sphere grid. This tool generates flow fields that are consistent with coastal boundary conditions and have controllable smoothness properties. It was necessary to adapt two crucial components of this tool to the semi-structured grid near cube edges:

(1) the pointwise Laplacian operator
(2) the algorithm enumerating "islands" given an arbitrary land/sea mask.

The current GISS ocean model development continued with refactoring and testing the new mesoscale and tidal mixing schemes in preparation for committing those schemes to the modelE repository.

Forcing files were prepared for the GISS submission to the FAMIP comparison which apply perturbations to wind stress and water/heat fluxes to the ocean component of coupled runs.

HYCOM developments:
The wind stress interpolation bug that was discovered and fixed in the HYCOM (alternate ocean model) did restore the cold tongue sea surface temperature in the Equatorial Pacific. This model ran for more than 1300 years so far using the AR5_v2 version; it showed strong variability in the NINO3 index. The Atlantic overturning at 45N is 18 Sv which is in good agreement with the observed value, Drake Passage transport is about 180 Sv, which is somewhat larger than observed.

Seasonal ocean sea ice area for Arctic and Antarctic show excellent agreement with Hadley Centre Sea Ice and Sea Surface Temperature data set (HadISST). Cold Sea Surface Temperature tongue at Eastern Equatorial Pacific Ocean is preserved after 1300 model years.

The experiments to determine the sensitivity of the ocean model HYCOM to changes in its horizontal and vertical resolution when coupled to modelE were continued using the following four HYCOM configurations: the standard 1deg horizontal grid (387x360) with refined meridional resolution from 15°N and 15°S, and the newly developed unrefined 1° mesh (359x360), both using the 26 and 32 vertical layers. These 4 experiments ran for 500-1000 years so far.

The focus is on updating the post-processing routines to accommodate all four configurations. These post-processing routines will help reveal remaining weaknesses in the current coupled model. Further details are reported in the model diagnostic section 3.1.1.1.2. Then in the next few months, the focus will be on the model improvement, to address any problems that could lead to major model biases.

Sea ice modeling:
Trinnovim staff conducted a sensitivity study in order to assess the individual impact of gravity drainage, flushing, strength of the ice and the melting rate on the sea ice with the new thermodynamics and how each of these physical parameters could help reduce the excessive sea ice in the arctic. Results were presented at the October 27 GISS GCM Meeting. These studies are being continued. The goal is to reduce the excess amount of sea ice produced by the model.

The new sea ice advection scheme as well as the brine pocket parameterization were committed to the master branch of the modelE repository.

Implementation of a parameterization of the atmosphere-ocean drag was started following a paper by Tsarnados et al. (2014).

Other modeling activities:
Setting up a model experiment with particular properties has become more and more complicated as new variations and enhancements were added to the GISS climate model. It seems that the point has been reached, where a system to produce a consistent configuration is being needed. Trinnovim staff is in the process of trying to develop such a configuration system that allows you to create the most important configurations in a simple straight forward way, and can be easily extended to deal with additional developments.

The current GISS climate model uses a hybrid vertical coordinate system using constant-pressure regime only in the stratosphere, whereas the tropospheric layers divide the columns using the same mass ratios over all grid cells. A novel hybrid layering scheme is being designed and tested which maintains a constant-pressure regime in most of the atmosphere. This should provide numerical and physical advantages, producing more realistic results in a simpler way.

Changes to the model dynamics and cloud schemes are designed and tested to better deal with the finer vertical resolution for the new GISS standard model, and to better handle transports in the vicinity of steep topography.

The new standard GISS climate model will use a cubed-sphere horizontal grid; that version was updated to use ESMF5; it was also kept up-to-date by implementing the new sea ice advection scheme.

Monitoring and analysis of the spin-up of a long coupled simulation continued. The model used is the current version of the GISS coupled model with improvements to ocean mixing processes.

The merging of development and the production version of the GISS climate model is continuing. Comparison of the two versions revealed discrepancies in the cloud and the radiation schemes.

In preparation for the introduction of the next-generation stratiform cloud model, the current model was refactored to extract the extensive portions which treat aerosol-cloud interactions; these are now in separate subroutines.

In preparation for the use of higher atmospheric vertical resolution in the CMIP6 configuration of the model, 40- and 96-layer versions were compared; the major goal is to find any unintended layering dependences of the results. Thus far, this exercise has revealed the following issues:

(1) A problem in the shortwave radiation scheme - it has been fixed,
(2) Various limits on convective intensity in the moist convection parameterization which was removed by introducing adaptive numerics
(3) Bugs in the moist convection parameterization which were fixed
(4) A mysterious layering dependence of ice water path which is partly related to one of the bugs listed in (3) but remains incompletely explained. Some issues in the convective microphysics have been identified which may partly resolve the discrepancy.
(5) The undesired increase in tropical tropopause temperature with finer layering is insensitive to various changes to the cloud scheme affecting LW fluxes.
(6) A longstanding error was found and corrected in the moist convection scheme that drastically weakened convection in the upper troposphere at high vertical resolution.

A new more flexible mechanism was devised for specifying the modification of air mass fluxes around steep topography in the atmosphere model. For now, this capability is needed when using finer layering.

Remaining discrepancies in results between the production and development versions of the atmospheric model were investigated and a number of issues were found in the dynamics and the boundary layer. In addition, this exercise exposed various avoidable roundoff-amplification mechanisms in the cloud scheme (tiny differences immediately becoming order-1 differences in state). Removal of these amplifications will facilitate future testing of structural changes to the atmospheric model.

GISS Climate Model Diagnostics [3.1.1.1.2]
An extensive documentation of all diagnostics built into the GISS GCM was compiled and is being edited and will be kept up-to-date.

The collaborative project of GISS with JPL was continued. Trinnovim staff met with David Halpern from JPL on October 28 for discussions about the following project studying Decadal-to-Centennial Variability of Tropical Currents over the next 400 years under increasing Greenhouse Gas Emission Scenarios. Three versions of the GISS climate model were selected, the model used for AR5 runs, E134Tcadi (GISS ocean), Eh134Tcadi (HYCOM); it was determined that the time period should include at least 230 years using a 10-year time averaging. It was also decided what type of figures will be used for future presentations and publications. This work will require about 2-3 months and include the development of some new shell and python scripts.

More than 4 TB of data were restored from archive, and decadal averages were computed for temperature and atmospheric winds for modelE versions coupled to both GISS ocean models. The means and standard deviations for these fields were calculated ending up with a total of only 1.2 Gb of data. The Equatorial Undercurrent and North Equatorial Countercurrent transports were computed including means, standard deviations, and trends for different time intervals. Assistance was given in the preparation of a presentation at the AMS meeting on January 11, 2016.

The scripts and programs for post-processing the ocean diagnostics are adapted for the new resolutions. This includes converting the ocean output from the native grid to a uniform 1x1 degree horizontal grid and the 33 vertical levels used in the Levitus climatology. The majority of the routines are updated from f77 to f90. The goal is to create a package that works for all ocean configurations. The ocean output format has changed from binary to netcdf recently.

The post-processing is aimed to read the ocean output from the native grid in the netcdf format, and then convert it to a uniform 1x1 degree horizontal grid and the 33 vertical levels used in the Levitus climatology. It also calculates zonally-averaged overturning stream functions in each basin and time series of various quantities including Nino index, mass transports through various passages and maximum Atlantic overturning rate. At this moment, not all the post-processing routines are producing reasonable results. Making this working well will be the priority for next month.

Improved Parameterization of GCM Sub-grid scale Turbulence Transport [3.1.1.1.3]
In collaboration with V.M. Canuto, Ye Cheng, and A. Howard, Trinnovim staff continued their work on mesoscale parameterizations in climate coarse resolution OGCM equations.

The paper "Mesoscale energy cascades and energy pathway in an adiabatic ocean" was completed and submitted to the journal "Geophysical and Astrophysical Fluid Dynamics". This investigation addresses the following well-known problem in ocean dynamics: *"How does the energy of the general circulation cascade from the large climate scales, where most of it is generated, to the small scales, where all of it is dissipated? In particular, how is the dynamical transition made from an anisotropic, 2D-like, geostrophic cascade at large scales (with its strong inhibition of down-scale energy flux) to 3D-like, down-scale cascades at small scales".* (Muller, McWilliams and Molemaker, 2002).

The paper "Parameterization of sub-mesoscales: dynamical features and global implications" was submitted to the Journal "Ocean Dynamics" and this month revised in accordance with the Editor and the reviewers. Mesoscales (M), sub-mesoscales (SM) and small scale turbulence (SS) contribute to ocean mixing but they are still unresolved by coarse resolution ocean codes. This paper concentrates on SM, the currently least developed parameterization, since the presently available SM parameterization is based on baroclinic instabilities and employs only the geostrophic component of the 2D mean velocity $\bar{\mathbf{u}}$. The SM parameterization we present here expresses vertical-horizontal tracer fluxes in terms of two variables, the complete 2D mean velocity $\bar{\mathbf{u}}$ and the SM kinetic energy. The latter is expressed in terms of wind stresses, horizontal buoyancy fluxes and their interaction for both down-front and up-fronts winds.

Work was done for another paper "Mesoscales parameterizations in tracer and mean momentum equations for diabatic and adiabatic regimes" in which two new parameterizations of the Reynolds stresses for OGCM mean momentum equation in both adiabatic and diabatic regimes are developed. Both parameterizations have two terms: the first one is the divergence of the eddy kinetic energy while the second term is related to the relative vorticity flux for which we present a parameterization in terms of resolved fields.

Documentation of the Core GISS Climate Model [3.1.1.1.4]

Documentation is an ongoing project; any changes are documented by the programmer implementing the changes in two places:

(1) Marked and unmarked inline documentation in the code
(2) Documentation requested by git when committing the changes to the modelE repository.

Documentation may be produced by running a program that processes the marked comments.

In addition an extensive overhaul of the documentation provided on the web about how the basic ideas implemented in the climate model and how to set up and run model experiments has been initiated.

Cumulus Cloud Studies [3.1.1.1.5]

The new large-scale cloud scheme that calculates cloud cover and cloud water content using the pdf-based method of Smith (1990) was completed with a single phase and is being coupled to a moist boundary layer with various vertical resolutions. Results in modelE and SCM model were evaluated.

To evaluate the performance of the 96 layer model, experiments were made with both 40 and 96 resolutions. Effects of cold pool and VMP (virtual mixed phase) in 96 layer model were evaluated. Plots were also made for clouds/moist convection and radiation related fields.

The specifications of cloud cover and optical thickness associated with precipitation below the convection base were modified. Some modifications in clouds/moist convection were also made to prevent the unintended discontinuity due to round-off when the model structure was changed.

A power point file was prepared for the model meeting to compare the simulations with 96 and 40 layers in the modelE.

GCM Deliverables

GCM Deliverable	Due Date	Date Delivered	Notes/Description
GCM development	ongoing	10/31/2015	Design of configuration system for modelE runs developed
GCM development	ongoing	11/30/2015	Sensitivity of model results to vertical layering investigated
GCM development	ongoing	12/20/2015	Error detected/corrected in moist convective scheme
HYOM modeling	ongoing	10/31/2015	Cold tongue problem solved
HYOM modeling	ongoing	11/30/2015	Sea ice cover annual cycle was dramatically improved
Sea Ice modeling	ongoing	10/31/2015	sea ice dynamics and brine pocket scheme ready to be committed to modelE master branch
Sea Ice modeling	ongoing	11/30/2015	Sensitivity studies results presented
Turbulence studies	ongoing	10/31/2015	Paper submitted to *Geophys. Astrophys. Fluid Dyn.*
Turbulence studies	ongoing	11/30/2015	Paper to *Ocean Dynamics* submitted/reviewed and revised
Cloud studies	ongoing	10/31/2015	Pdf-based cloud scheme implemented
Cloud studies	ongoing	11/30/2015	Pdf-based cloud scheme examined coupled to boundary layer scheme

GCM Problems, Issues, and Performance Risks

GCM Problem/Issue/Risk	Potential Impact	Plan to Resolve
Recent changes in GCM	Long-term stability of the model	Monitor long test runs
Code efficiency	On-time completion of runs	Identify bottlenecks
Code development	Introduction of errors	Enhance automated nightly testing
Code development	Degradation of realism	Automated comparisons to observations

Analysis of GCM Results

Significant steps were achieved in the creation of the next release of modelE:

- The seasonal cycle of ocean ice cover in the HYCOM (Hybrid-isopycnal coupled ocean model) now shows excellent agreement with observations.
- Problems encountered when doubling the vertical resolution were identified and resolved.
- A more realistic sea ice parameterization was implemented and tested.

[redacted]

GCM Work Planned for Next Quarter

Complete the implementation of ways to better protect model data.

Keep the modelE documentation up-to-date and continue devising a scheme that simplifies the selection and building of consistent modelE versions.

Maintain the support and testing the development of the new version of modelE including the selection and testing of the vertical layering.

Prepare the transition to cubed-sphere production runs.

Improve the radiative transfer tables and routines in modelE for extreme cases.

Decrease the ice thickness on the costal points in the coupled modelE/HYCOM.

Building scripts and programs for post-processing data for modelE+H with new resolutions

Compare the results with different (total 4) resolutions modelE+H and select best

Investigate and potentially improve the parameterization of the ocean/atmosphere drag on the sea ice.

Assess and start work on using a JFNK solver for the sea ice in modelE

Complete post-processing data and plotting software for the project "Decadal-Centennial Variability of Tropical Currents Over the next 400 years under Increasing Greenhouse Gas Emission Scenarios"

Earth Observations (EO) [SOW 3.1.1.2]

ISCCP [3.1.1.2.1]
Future processing will no longer be needed at GISS. Rather, ISCCP is providing guidance to NOAA in the procedures needed for processing image data.

GISS Global Surface Air Temperature Time Series Support [3.1.1.2.2]
GHCN surface air temperatures and ERSST (versions v3b and v4) Sea Surface Temperatures (SST) were downloaded as well as Reynold's OISST. The data were analyzed, tabulated and plotted. Version 3 of GHCN data was used in computing the surface air temperature. The differences between ERSST v3b and ERSST v4 were investigated and documented with graphs and various trend and anomaly maps. All static tables, maps, and graphs on the public site were based on ERSST v4. The interactive display utilities however still provide the option to use the other SST files for the maps and graphs that users may generate.

An effort is underway to revamp the GISTEMP site, modernize its appearance as well as the basic source code for the GISS temperature analysis. The all-python CCC (Clear Climate Code) version of the GISS analysis was modified to use the currently available release 3 of python and work with GHCN v3 data. It successfully duplicated the results of the traditional analysis.

A web-interface was created that runs the analysis via the internal webserver after setting the parameters involved in the GISTEMP analysis. This will allow us to more easily investigate the sensitivity of the results to the various parameter selections.

That program was also extended to handle the beta version of GHCN v4; that version provides about 3 times the amount of data (about 1,300,000 reports), increasing the number of reporting stations be a factor of 4 (from 6,300 to 26,000); the IDs of all stations were changed from numeric to alpha-numeric strings, and latitudes and longitudes are presented with higher accuracy.

Meta data are no longer provided in the GHCN v4 inventory files; fortunately, none of them are used in the current analysis, since it uses night-time brightness rather than population to distinguish between rural and urban environment. Finding this brightness index is now a standard part of the analysis currently using Imhoff's satellite data derived wrld-rad.data file.

A parser was created for reading the file "quest-countrymeans.spec", which will be used to create means over selected countries or groups of countries.

The leaflet station map was modified to accommodate GHCN v4 stations. The only disadvantage of that representation is the forced usage of the Mercator projection which produces severe problems in the polar regions. Orthographic D3 visualizations were implemented with rotation and zoom features.

Progress was also achieved in producing the graphs and maps showing the results of the analysis including interactive visualizations of line graphs using D3 and maps using python's graphics libraries. Data downloads may now be provided in CSV format readable by many popular spread sheet utilities. Those tools and the changes to the GISTEMP analysis were presented at a GISS Lunch Seminar entitled "Data Analysis and Visualization with Python".

Preliminary discussions with GISS scientists dealt with the possibility of increased cooperation involving the processing and visualization of climate model data and observational data. In

particular a custom installation of the ipython notebook is being considered. An open meeting about these topics is being planned for early January.

Requests for clarification by people interested in our web site were answered to their satisfaction.

Weekly SST anomalies were downloaded to study the potential for the onset or development of an El Nino/La Nina event.

WWW Development Support [3.1.1.2.3]
Trinnovim staff supported the finalization of the paper about the current 2-year update of the comprehensive thematic database of T-matrix publications classified into narrower subject categories. That paper was submitted to and accepted by the Journal of Quantitative Spectroscopy and Radiative Transfer after a peer review. It has now been posted on the GISS T-matrix web site http://www.giss.nasa.gov/staff/mmishchenko/t_matrix_database.html .

A template for the website of the 16th Electromagnetic and Light Scattering Conference to be held in the Spring of 2017 was designed: http://www.giss.nasa.gov/staff/mmishchenko/ELS-XVI/ . It is planned to be a joint GSFC/GISS/JPL event. Trinnovim is supporting GISS in the task to create and maintain that website.

Trinnovim staff continued to study the range of applicability of the effective-medium approximation as a function of the inclusion size parameter via a comparative analysis of massive Lorenz–Mie and superposition T-matrix computations. The results were visualized in the form of plots that were included in the revised version of the paper "First-principle Modeling of Electromagnetic Scattering by Discrete and Discretely heterogeneous random media" re-submitted to Physics Reports.

Aerosol Polarimetry Sensor (APS) Algorithm Package Development [3.1.1.2.4]
When reprocessing RSP1 data, it was found that the UNIQ function of the IDL language being used has a "bug:" If the first and last elements of an array are the same, it returns NO CHANGE even when intermediate elements have changed. Code has been added to deal with this situation after the UNIQ function is called.

During one day of the SABOR mission, there were 4 flights. Usually, one day's data are processed together, but the executable could not handle all the data contained in the 4 flights that day. Therefore, files are now being processed by individual flight to avoid this problem in the future.

The cloud product now contains all data co-located to cloud top; however, there are two cloud-top levels being used: cirrus clouds (detected best by the 1880-nm band) and other clouds (detected by the other bands). Thus, there are actually two sets of maps: one set for cirrus clouds, and a second for all other clouds.

The 1880-nm clouds appeared to be very "noisy." After inspection of the image files themselves, a solution was found to test for clouds only if the image was at least 10 DN (Digital Numbers) bright. This had the effect of reducing much of the "noisy" appearance of the detected clouds. If the image is less than 10 DN bright, then the data will not be co-located.

A water index was added to the processing of the 1880-nm band to indicate whether this band is detecting water or not. The Nakajima-King droplet-size retrieval is being done for liquid water clouds. A scene is assumed to have a water cloud if a rainbow is visible.

Climate Model Simulation Diagnostic Dataset Generation [3.1.1.2.5]
Output from various GCM runs was extracted and analyzed in support of research work at GISS. Output from the GCM runs is archived on magnetic tapes.

Output data from the Coupled Model Inter-Comparison Project (CMIP5) were processed with CMOR2 programs. These include data from control, transient, and aerosol runs. The work included extracting data from GISS model output, reformatting the data to meet CMOR2 requirements, and running the data with CMOR2 programs.

Inquiries about CMIP5 data from users outside GISS were investigated and processed.

Ocean barotropic mass streamfunction and ocean meridional overturning streamfunction of climate models were processed. The aerosols and ozone in these models are pre-computed.

Work on developing a web page to map and display CMIP5 data on-the-fly continues. The main program was modified to generate desired "compound" diagnostic variables (which require more than one CMIP5 variable to be read in). As a result, the following were added to the user-selectable menu: net downward flux at top-of-atmosphere, incident thermal radiation at ground, upwelling thermal radiation at ground, and energy into ground. The ability of reading out one level of a multiple-vertical-level diagnostic was added. Thus, cloud cover (at low level) and geopotential height (at 500mb, 300mb, and 30 mb) were also added. Finally, invalid values were found and corrected in snow cover over land, so this is now included in the user-selectable menu.

- The following diagnostic variables were added: sea ice thickness and total runoff. Because the weighting for averaging sea ice thickness is different from the previous variables, and because there may have been some inconsistencies in this variable, it was decided to add this to the list of variables which have to be processed using the GCM ACC output files. This processing will be done at a later date.

- The "anomaly/mean" selection for the averaging method of the calculation chosen by the user was failing if any gridpoint had a mean (denominator) value of zero. This has been corrected, and now any such gridpoints are plotted as gray (undefined value).

- All currently available diagnostic variables were tested to ensure that they are well-behaved in the second 25-year period. The program is being modified to merge this second group of 25 years of data files with the first group of 26 years of data for the test model.

EO Deliverables

EO Deliverable	Due Date	Date Delivered	Notes/Description
Monthly GISTEMP update	15th of the month	On time	Add and process latest available data
Weekly SST update	Mondays	On time	Add and process latest available data

EO Problems, Issues, and Performance Risks

EO Problem/Issue/Risk	Potential Impact	Plan to Resolve
Media attacks (CEI, etc)	Misinformed public	Detailed description of methods on web cooperation with NASA PR department

Evaluation of EO Results

Trinnovim rates its performance as excellent as all tasks were completed in a timely manner. Web sites for ISCCP and aerosol work continue to be updated when appropriate. Software tools for the Glory type missions were developed, when needed, in an efficient and expedient manner.

EO Recommendations

Trinnovim recommends continuing to maintain and update the GISS aerosol web sites. Finally, generating software tools to process RSP data should proceed on an as-needed basis.

EO Work Planned for Next Quarter

Update GISTEMP web site every month. Make that site more attractive and easier to use by replacing the static map to select station displays by a scalable map with selectable topological and geographical features (maps, satellite images, etc.) and the ability to go directly to the data.

Complete and test the new more easily maintainable programs supporting the GISTEMP analysis.

Update SST anomalies weekly.

Maintain a test site for the analysis based on GHCN v3 and GHCN v4 to allow inspection of the data before they are made public and to test the development of new features.

Keep the various GISS aerosol web sites up to date.

Process and analyze RSP data, as needed.

Planetary Atmospheres (PA) [3.1.1.3]

Mapping Saturn's Northern and Southern Hemisphere Eddy Momentum Fluxes [3.1.1.3.1]
For comparison with the UV3 (338 nm), CB2 (750-nm continuum band), and MT3 (889 nm) southern-hemisphere wind profiles, 48 near-simultaneous MT2 (727 nm) images of Saturn were calibrated, cylindrically mapped, and tracked between 5-degrees North and 70-degrees South latitude.

Three publication-quality figures and two tables were created in preparation for a manuscript describing the use of cluster analysis for objectively identifying weather regimes on Saturn.

A survey of Titan Meteorological Campaign images collected from 7/3/15 – 7/6/15, 7/22/15 – 7/25/15, 8/2/15 – 8/26/15, 9/5/15 – 9/6/15, and 9/24/15 – 9/28/15 revealed no visible clouds.

PA Deliverables

PA Deliverable	Due Date	Date Delivered	Notes/Description
Map clouds on Titan at every available opportunity	3/2016	12/2015	No clouds were found in any of the images inspected

Evaluation of PA Results
Trinnovim rates its performance as excellent. Analysis of Titan's images continues, and Trinnovim will keep monitoring each imaging opportunity for additional clouds. It should be pointed out that finding no clouds on Titan is of scientific importance because it helps further define the seasonality of Titan's cloudiness (or lack thereof). In addition, cluster analysis of Saturnian clouds is now being used to see if it can improve data analysis.

PA Recommendations
Trinnovim recommends continuing the search for clouds in images of Titan. As more Titan flybys occur, more clouds may or may not be found. Increased temporal coverage provides greater understanding of the seasonal distribution of Titan's cloud cover.

PA Work Planned for Next Quarter
Preparations will be made to provide supporting materials for an upcoming research article submission.

Keep monitoring images from Titan flybys for clouds.

Computer Facility (CF) Operations [SOW 3.1.2]

GISS Computer Facility Maintenance and Monitoring

Server Maintenance

- Patching of servers was performed regularly, as well as patches on Foundstone and KACE reported issues.

Other Systems

- All systems have been reconfigured to log our local log server Hanuman and the two GSFC's log servers (gs600-saw and gs600-saw2).
- Poster printer ink heads were replaced due to yellow streaking.
- The Puppet server continues to alert us if the configuration state of a given machine has changed.
- Testing of the two backup servers continues.
- Technician from Elbar Duplicator Corp was called in to service our two Lexmark color printers. The scanner was having problems and needed re-adjusting.
- Regular patching continues per Foundstone and KACE vulnerability scans on Linux/Mac workstations.
- Software was installed on various machines. Compilers, libraries and so forth were the main packages.

LAN

- Prep work in LAN closets has begun to facilitate upcoming renovations.
- Working with Carl Johnson in determining if we can move the Verizon rack to accommodate the new renovation plans.
- Requested and approved via NAMS, GISS's read access only for our CNE network hardware devices. Testing continues.
- The 400Mb/s circuit is working with no problems so far.

NASA Network

- Machines were added/removed from the Active Directory domain as needed for NASA compliant machines. SA's can use their regular NDC or AA account to add machines to the domain.
- DNS entries continue to be made through DDI/QIP and all problems were addressed and resolved with HQ. Received notification that SAs will no longer have access to QIP. Still awaiting decision on the waiver that was submitted which would allow our SA's to keep their read/write DDI accounts.
- Minor issues regarding VoIP were reported and resolved.

GISS Computer Facility Component Installation and Inventory

New Equipment

- Building of the 14 CPUs for the Hyperwall has begun and is being tested.
- New chairs and desks are expected to be purchased for users and inventory will be taken.

Requested/Purchased/Received:

- 24 SSD drives
- 3 KVM Switches
- 3 Tripp Lite racks
- 2 Logitech ClearChat Comfort/USB Headset H390
- 1 P3 P4400 Kill A Watt Electricity Usage Monitor

- 1 APC Back-UPS ES 750 12V 8Ah UPS
- 1 Lizone® High Performance Laptop Battery for Apple MacBook Pro 17"
- 1 Dell battery J1KND for Vostro laptop
- 1 each HP 11 Cyan, Magenta, Yellow, Black Printheads
- 2 Apple Thunderbolt cable
- 2 Dell UltraSharp 34 inches Curved U3415W monitors
- Wireless keyboard for iMac
- Several components for 2 Backup servers
- 5 HDMI Cable (15' and 10' Feet) –
- 1 6ft Mini Display Port to Display Port Cable

Met with and received several quotes from electricians and construction companies regarding work to be done for the installation of the Hyperwall in the 3rd floor conference room. Worked with several contractors and civil servants to resolve how GISS will pay for this work.

Software

- Disk Warrior

Relocation

- All NASA tagged machines to be excessed continues to be manually inventoried and is being stored in room 230. NASA and non-NASA equipment were sorted and all non NASA equipment located in the computer room were discarded through the Clean and Go Green initiative at Columbia University.
- Worked with Diane Goodman to properly tag and or excess the RSP equipment.
- Property passes for computers and monitors were issued to several users who work remotely.
- Worked with Phillip Guzman in understanding and filling out the FY 2015 NF-1018 report for NNG15PX05C (Trinnovim Contract).
- Several equipment (tagged/non tagged (not controlled) RSP items delivered to GSFC for their use/storage. The items will be entered into EQUIPMENT.
- Assisted HQ counterparts to locate equipment that are not in our GISS equipment inventory but are located at GISS.
- Memo was sent out to the GISS community reminding them of the rules governing NASA tagged equipment (moves, reassignment, excess, lost, stolen) and their responsibilities as users.

Computer Facility Supply Maintenance

Stock Item	Quantity In-house	Pending Orders
Paper	72 Hammermill reams; 19 Xerox Cartons and 72 reams	Sufficient supplies maintained.
Toner	62 color & b/w cartridges- H.P, Lexmark, Dell and Xerox	Toner order for Dell and Lexmark is pending.

User Support

- Requests were made to Code 700 to remove several users' accounts in SATERN that did not require IT.
- Trouble ticket was put in with the VoIP team to fix the problem of users not being able to log into https://voipphone.gsfc.nasa.gov/ucmuser/main
  and https://voipvoicemail.gsfc.nasa.gov/inbox/ (Voicemail User WEB access).
  The issue is resolved.

- Distributed several of our Global Instant Meeting conference room lines as requested.
- WebEx/Lync/uStream/Skype/Vidyo sessions support was given for the following:
  - Thrift Investment Board Briefing (TSP)
  - Cold vs. Flu What You Need To Know
  - Unconscious Bias Seminar (problems with setup)
  - Safety Culture Training
  - Code 600 Holiday Town Hall
  - Goddard's Unsung Heroes: From the Perspective of Our Veterans
  - SAG Meetings
  - All Hands - Center Education
  - NASA FCU - Get It Together-Organize Your Financial Records
  - Ethics training for Scientists
  - Code 610 Town Halls
  - All Hands Meetings
  - NASA FCU – Women, Money and Power

Communication

- Meetings attended:
  - GSFC DHCP Follow up with Goddard
  - FY16 Pre-Inventory Briefing
  - Code 600 IT Monthly Meeting
  - Assessment and Audit (A&A) Meeting
  - Trinnovim's Managers' Meeting
  - Tech Talks
- Regular communication via the GISS-wide email listing continues regarding Agency and GISS security policies and procedures.
- The IT FAQ at http://internal.giss.nasa.gov/faq.html is revised and updated to reflect changes as need be.

Assistance

- The Emergency Preparedness Meeting held at GISS was videotaped and a link to the video is posted on our Internal GISS website for viewing at http://internal.giss.nasa.gov/files/ .
- Worked on the drawing plans requested by the renovations committee for NASA regarding the layout of the equipment to be used in the new server/computer room. Some requirements were: list of equipment, equipment specifications, and power requirements.
- Walkthrough was conducted with Columbia University's building manager concerning the location of the Hyperwall and its electrical needs.
- Supplied to the renovations committee drawings of our current placement of data outlets and tentative locations.
- Continuing to work with the PKI team at Headquarters in resolving a PKI issue for one user whose email address needs "flattening". The user's account was changed to CAPI Export so it would work properly on a Mac. However the user still had problems sending encrypted emails. A request was then put in for a re-sync of the user's email addresses to the directory. Once that was completed an "update key pair" was performed but it seems the user is still having issues.
- Worked with Brian Rhodes in getting the VGA port to work on the LifeSize unit.
- Configured three printers to connect wirelessly to the Color printer in room 504 using the CU wireless.
- Worked with Level3 and GSFC's networking team in resolving the static and no dial tone on two analog lines ending in 8501 and 8535 in the network room.
- Worked with NCCS team regarding removal of accounts and data transfers.

- Several requests for the use of IT during Personal and/or Business Foreign Travel were submitted to Code 700 for "approval"/notification. The users were then informed of the approval and route sheet kept by IT at GISS.
- Continue to work directly with the CSO/ISSO on security matters at GISS.
- The NAMs workflow for requesting accounts on GISS systems covered by Code 600 security plans, a modification to NAMS ICAM account continues to be implemented.
- Continue to provide logistic and technical assistance in deploying the NextGen phones to new users. Forty new GISS numbers were approved and "configured" for use. The new numbers are not "678" numbers.
- Vidyo testing and training continue with several key personnel at GISS. Vidyo accounts were requested and approved for these personnel so they could manage their own video sessions.

Training
- On-job mentoring of junior staff.
- Attended a Vidyo training session.

GISS Computing Facility Planning and Evolution

Network
- Planning continues on how best to consolidate all the network cables in the various network closets on each floor.
- Walkthrough was conducted with Columbia University engineers regarding relocation of the Verizon rack in the computer room among other minor issues, in preparation for the upcoming renovations.

DAR/PIV
- All field and office machines have been DAR'ed with the exception of a few servers.
- As of 06/05/15, the NASA PIV.Tokend Installer v1.2 is the required Smartcard Middleware for Mac systems due to unresolved issues with ActivClient on OS X 10.9 and 10.10. PIV.Tokend is being installed on all Macs and is tested to make sure that smartcard login works for the user.

MacOS/Linux Upgrades
- Will begin installation of 10.11 on all GS611 machines at the start of the year.
- Testing of Mac OS 10.10 and 10.11 were conducted and compliance scripts for both versions were updated.
- Working on local FW rules for 10.11.

ODIN legacy/ACES seats/refresh systems
- Continued discussions with the DHCP pilot team regarding preparations for the upcoming transition of ACES users from using static IP addresses to DHCP continues. The proposed schedule for GISS is as follows:
  - Send out Notification 02/22/16 - 02/26/16
  - Develop exclude list 02/29/16 – 03/04/16
  - Migrate to DHCP Zone 03/04/16 – 03/11/16
  - Problem Resolution 003/14/16 – 03/18/16
- Mac OS 10.10 will be pushed to all ACES Macs in the Spring of next year. If any user needs an update to the OS before Spring we will do it manually (wipe and reload new OS and all software). ACES will be moving to FileVault at the same time.

- Several GISS wide emails were sent out to help users with the transition over to Outlook Web Access Using Launchpad for Authentication. Most Mac users had blank screens or users were not aware that they should be using their Launchpad password for login, and not their NDC.
- Still awaiting shipping labels for one ODIN legacy acquired seat, and two ACES seats.
- Ordered, received and configured two ACES seats; Windows and Linux.
- Re-assigned seats are still not corrected and reflected in the ACES Final Invoice reports.
- ACES Accrual Invoice Validation and Liquidation spreadsheet for September-October 2015 were carefully reviewed and the few minor discrepancies were addressed with GISS's RA.
- Attended several ACES meetings: ACES Mandatory Training meeting, ACES POC, ACES rep, Tech Talk, DHCP planning; GSFC-DHCP follow up.
- In preparation for the implementation of all Mac users having to login via smartcard for certain NASA websites, we requested and received additional spare card readers.
- Several GISS wide emails were sent out to help users with the transition over to Outlook Web Access Using Launchpad for Authentication. Most Mac users had blank screens or were not aware that they should be using their Launchpad password for login, and not their NDC.
- Called in for HP tech support to fix under warranty a HP EliteBook 8770w Base Model Mobile Workstation; the heatsink and fan were replaced again. This is the second time in eight months that this laptop has had an overheating problem.
- Attended several ACES meetings: ACES POC, ACES rep, Tech Talks, DHCP planning; GSFC-DHCP follow up, WFF-GISS-Greenbelt DHCP Transition.
- Reminder emails were sent out to a handful of users who were targeted for an ActivClient (SmartCard) software upgrade. No problems were reported after the upgrade.
- Reminder emails were sent out to an individual who was targeted for a Mobile Device Management upgrade and documentation was provided to the user to install the upgrade so they could continue to send and receive emails on their ACES provided iPhone, and iPad.
- Opened an internal ticket to resolve a problem with Connect Backup; the user is unable to generate a successful backup. The issue is still being worked on.
- We continue to migrate Mac users to Microsoft Outlook; the preferred mail client for NASA/ACES.
- Continue to work with Stella Adesina, Naymon Brown, Wes Campbell, Von Jenkins, Camilla Logan, and Allison Kaese on closing IM and SR tickets, and solving problems with the ACES refresh systems.
- Updating of all IMs and SRs via SM9 continue.
- New DAR and admin passwords for Mac, Linux and PC were received and distributed to the SAs.
- GISS-wide emails were sent out to the users regarding policies/updates/procedures.
- A discovery at GISS has reinforced concerns that the ACES OS X build has security configuration flaws that need to be addressed. The most recent issue is about world writable executables that are available for all users of the system in the Application Directory. Previous concerns have been expressed about home folder access controls, the root account being enabled and the disabling of Apple's application whitelisting features.
    a) This CR ticket was escalated to the ACES and I3P Enterprise civil servant security leads for their attention.
    b) Ron Colvin is also working with the Agency ETADS on the general topic of Mac OS benchmark updates, to include this issue.
    c) Ron's draft recommendation is listed below and was submitted to the CR.

d) NASA is using CIS as the basis of its security controls for OS X. All of the settings mentioned above are part of the latest OS X Benchmarks and should be implemented on all ACES delivered systems. We are including all of the controls in spreadsheet format for both 10.8 and 10.9. The Agency ASCS leads have reviewed the controls and believe that all of the level 1 and level 2 scored controls should be implemented except the three below. Any concerns about these controls should be addressed to ASCS (https://etads.nasa.gov/ascs/communications/)

(5.12) The Agency password policy is for a minimum of 12 characters and local passwords for OS X should meet the NASA criteria as well instead of 15 characters.

(2.11) The secure empty trash control is not selected as a NASA requirement.

(2.6.1) While FileVault is recommended, the Agency PGP solution is accepted as meeting the Full Disk Encryption solution required in the Benchmark.

This still remains unresolved by ACES.

- A reminder was received again by HP and sent out to our SA's regarding the handling of ACES tickets.
    a) Communicate with the users on their tickets. There is no excuse for not at least calling and leaving a voice mail or firing off a quick E-mail. Document, Document, DOCUMENT!!
    b) Update the ticket when you communicate with the user.
    c) Do not leave tickets in pending customer status.
    d) Do not leave tickets in WIP status overnight or even all day.
    e) Update tickets when appointments are kept.
    f) If customer is happy, ask for a great survey. Not just a good one.
- Daily administrative work* continues to be conducted on the ACES machines that pass through the SM9 ticketing system.

    *Daily administrative work includes but was not limited to:

    - Installing OS
    - Updating machines with patches when not done automatically or when requested by the users (Flash/Windows Updates/Adobe Reader/Pro/Java etc.)
    - Installing software (e.g. Cygwin, Putty, Adobe Acrobat Pro, Matlab, KACE, IDL, Symantec, Python, Macports* (Fortran/NetCDF/TeX/Xquartz/Aquamacs/UV-CDAT/R), MS-Office, Mozilla Firefox, Google Chrome, Adobe Creative Suite, etc.)
    - Installing hardware
    - Troubleshooting local/network printers errors
    - Troubleshooting hardware and software problems
    - Listening to users inquiries and trying to find workable solutions for them
    - Communicating with Trinnovim, NASA and ACES managers' et al and attending meetings on matters of: deadlines, upgrades, encryptions, ticketing systems, accounts, NASA policies, etc.
    - All utilities are upgraded to the newest available versions to keep the machines secure; disk utilities to repair and verify permissions are run after each update as a preventive measure to minimize user tickets.
    - Updating the GISS CSR ticketing system and documenting work.

GISS Computer Facility Security

Network Security

- In an effort to ensure that users follow the proper rules and regulations regarding dual homing, users are reminded of the need to be vigilant when switching from wireless to

LAN and vice versus. We continue to monitor our Systems for dual homing and revise the Wi-Fi toggle script depending on the Mac OS version. Currently the script does not work under Mac OS10.9 and 10.10 and we continue to manually monitor those machines and fix as need be.

- Completed and submitted several Technology Transfer Control Placement (TTCP) IT/no IT applications following the required guidelines for designated and non-designated countries, and ensured that the proper firewall rules were implemented on the user's machine/s once approved. TTCP forms are no longer needed for FNs to use the "guest wireless".
- Continue to assist FN's sponsors with systems configurations for their users' machines.
- Users were reminded of NASA Security policy requiring that all personnel using NASA computers (desktop, laptop, workstation, and tablet and are using the NASA network) be cognizant of their organization's IT Rules of Behavior (NIST SP 800-53, control PL-04 Rules of Behavior). All new users have been requested to go to http://science.gsfc.nasa.gov/rob, read the Rules of Behavior for Code 600. Users are informed that a pdf version of the "RoB" can be found on the GISS Intranet under "General GISS Resources". For those users who do not have access to the NASA network and cannot access the link, but do work for NASA, the pdf version is submitted to them. We no longer have to sign off on the "RoB", as this is taken care of in SATERN.
- The posting and revision of all new IT policies and procedures continues to be added to the GISS intranet for better communication between the Systems group and users.
- Continue to submit requests through NAMS for VPN, PKI, RSA token, EP, NCCS access and Bastion host accounts.
- Continued to assist users with the install of the new VPN (https://vpn.nasa.gov), Junos Pulse, and configure our machines to use the new VPN IP range to allow SSH access. Troubleshot and resolved with HQ VPN login issues encountered by VPN users. Users are reminded to use only the new VPN client to connect to the NASA networks.
- Skype waivers continue to be submitted on a "need to" basis.
- Request for http and https service on a handful of servers/workstations were renewed via GSARS.
- Windows users were reminded to use their PIV smartcard to login to their machines.
- Our TA/RA continues to work with HQ and end users in supplying tokens, delivering PKI authorization/reference codes, confirming identity, and identifying and troubleshooting issues with encryption.

System Security and Monitoring

- Continued to prep for our upcoming remote Assessment and Audit (A&A), ensuring that all our systems were compliant and up to date.
- Provided to our CSO/ISSO the updated ITSEC-EDW software inventory listing.
- Attended Assessment and Audit (A&A) meetings, reviewed all information posted on the Wiki, and continue to study from the little "Red handbook" regarding the audit.
- Reported to Rosa Kao that GISS did not have any Mission Critical machines that were not using PIV.
- Corrected waivers were submitted via VST regarding the latest Code 600 KACE, SEP and AD non-compliance list as issues were fixed.
- Ensured moderate SSP inventory was up to date and accurate by reporting again that all of our Admins are using ACES machines.
- GSARS waivers for SSH on our two servers will be revoked pending Bastion/VPN accounts by the users.
- GSARS waiver for SSH on our Repository server was renewed.

- Continue to use the Puppet servers to generate reports and push updates.
- Installation of the latest version of the Symantec Managed client on all Macs continues.
- DDI (DNS) and GSARS were cleaned up to ensure accurate reporting of all GISS systems with legit vulnerabilities.
- Compliance scripts have been updated and made compatible with the latest CIS benchmarks for Linux and Mac OS 10.11, 10.10. FW rules for Mac OX 10.11 and 10.10 are pending.
- The Federal Government requires that all Federal agencies use the Personal Identity Verification (PIV) Smartcard, otherwise known as a NASA badge, as a common credential for accessing systems, networks, and facilities. To comply with this requirement, NASA has deployed the mandatory use of the PIV smartcard login on all Windows 7 workstations connected to the NDC domain. GISS has reported that they are up to date with the install of PIV-M and they currently have no non-ACES Windows VM. Mandatory PIV was implemented on all machines on September 30 2014, and continues to be enforced. Waivers are requested through ESD when users forget to bring in their smartcards and for new users who did not receive their smartcard (badge) upon hire.
- A mandated federal requirement was issued to protect access to NASA's high value assets, which includes access to NASA's Identity Management and Access Management systems. IdMAX, ICAM Support Console, Siteminder Admin Console, ICAS Viewer and NAMS (*excluding basic user submission and approval of requests) will enforce login by PIV Smartcard only *effective July 10, 2015*. For users without a PIV Smartcard, the RSA token will be acceptable for low-risk roles.
- We continue to implement the new rules from Agency and Center that all EP requests for non-ACES users must go through NAMS using the correct workflow: GSFC Code 600 Elevated Privileges-User/Admin. These requests are first approved by Jack Richards; the user then takes all the required SATERN training, and once completed the NAMS request is submitted by us. FNs are not allowed EP rights.
- Monitoring of our syslog server at GISS continues, and all loopholes are fixed immediately. All non-ACES Macs are now reporting.

Incident Reporting

- Reported a few phishing incidents to SOC Abuse team.

Virus/Adware/Etc.

- Users were reminded of their responsibility to remain vigilant and to maintain a heightened level of awareness in identifying and reporting any phishing attempts.
- Virus software is installed and kept updated on all machines as per NASA standards.

CF Status

Critical System/Services Uptime

- Nothing unusual.

Backups

- Once testing is completed on our two new backup servers, a policy will be put in place for who and how user's data for Mac and Linux machines will get backed up.
- Currently backups are primarily the user's responsibility and they are reminded of this.

CF Problems, Issues, and Performance Risks

CF Problem/Issue/Risk	Potential Impact	Plan to Resolve

- None to report.

Library and Publication Services (LPS) [SOW 3.1.3]

GISS Technical Library Operations

Operation	Status
Journal subscriptions	• Library currently subscribes to 48 journal titles.
Books Processed	• Ordered, cataloged and processed 2 books.
Circulation	• 768 library items currently charged out to patrons.
ILL / Document Retrieval	• Processed 40 interlibrary loans.

On-line Library System Participation

Library System	Description of Work Performed
NASA GALAXIE	• Searched NASA online library catalog system to assist in patrons' reference inquiries & interlibrary loans.
OCLC	• Processed 27 interlibrary loan requests for books and articles for in OCLC.

Publication Services

- Design and technical illustration services of charts and graphs were provided as requested by scientists for presentations and publications in scientific journals. This was achieved by using a combination of programs including Corel Draw 12, Excel 2013, Word Perfect 2013, Adobe Illustrator 10, Adobe Photoshop 7, Adobe Acrobat XI Pro, and Epson Scanner.

- Preparations of the yearly GISS Research Publication Document is underway. The Publications Book is a creation of two page summations of each and all GISS scientific papers, articles, presentations, chapters, proceedings and books produced yearly (over 100 separate pieces). GISS authors were sent instructions for submitting their two page summations by January 2016. To date, edits to the below papers have been completed to include in the 2015 GISS Research Publications book.

    - Druyan, L.M., and M. Fulakeza, 2014: The impact of the Atlantic cold tongue on West African monsoon onset in regional model simulations for 1998-2002. Int. J. Climatol., 35, no. 2, 275-287, doi:10.1002/joc.3980.
    - Rossow, W.B., and J. Ferrier, 2015: Evaluation of long-term calibrations of the AVHRR visible radiances. *J. Atmos. Ocean. Technol.*, **32**, no. 4, 744-766, doi:10.1175/JTECH-D-14-00134.1.
    - Van Diedenhoven, B., A.S. Ackerman, A.M. Fridlind, and B. Cairns, 2015: On averaging aspect ratios and distortion parameters over ice crystal population ensembles for estimating effective scattering properties. *J. Atmos. Sci.*, in press, doi:10.1175/JAS-D-15-0150.1.
    - Puma, M.J., S. Chon, and Y. Wada, 2015: Exploring the potential impacts of historic volcanic eruptions on the contemporary global food system. *PAGES*, **23**, no. 2, 66-67.
    - Canuto, V.M., 2015: PV dynamics: The role of small-scale turbulence, submesoscales and mesoscales. J. Geophys. Res. Oceans, 120, no. 10, 6971-6985, doi:10.1002/2015JC011043.
    - Del Genio, A.D., and Y.H. Chen, 2015: Cloud-radiative driving of the Madden-Julian Oscillation as seen by the A-Train. J. Geophys. Res. Atmos., 120, no. 11, 5344-5356, doi: 10.1002/2015JD023278.

- Del Genio, A.D., J. Wu, A.B. Wolf, Y.H. Chen, M.-S. Yao, and D. Kim, 2015: Constraints on cumulus parameterization from simulations of observed MJO events. J. Climate, 28, no. 16, 6419-6442, doi:10.1175/JCLI-D-14-00832.1.

- Assistance was given as requested for poster printing for the AGU conference held in San Francisco, CA from December 13 – 18, 2015.

LPS Deliverables

Approval system	Description of Work Performed
STI/eDAA (electronic Document Availability Authorization) form submissions for GISS publications	Completed and submitted 103 eDAAs in accordance with NASA STI policy. Continue to keep up to date with new STI directives and procedures to ensure compliance.
Create the annual GISS Research Publications document	The 2014 GISS Research Publications document was made available in hard copy format and on USB drives and online at: http://pubs.giss.nasa.gov/docs/annual/2014RP_compressed.pdf,

LPS Problems, Issues, and Performance Risks LPS Deliverables

LPS Problem/Issue/Risk	Potential Impact	Plan to Resolve
Journal subscription prices continue to rise each year, while library budget does not increase accordingly.	GISS scientists' research will be adversely affected. Every journal title the GISS Library currently subscribes to is essential to GISS research staff.	Continue to monitor usage and readership of journals.

LPS Recommendations

Continue to perform tasks required to assist GISS patrons find information.

LPS Work Planned for Next Quarter

Continue to perform ongoing tasks required to maintain library and assist GISS patrons.

Library Expense and Projection Report

GISS LIBRARY FY 2014-2015 FINANCIAL REPORT
December 2015

LIBRARY SERVICES - THE FOLLOWING TASKS WERE OUTLINED IN THE CURRENT QUARTERLY FORECAST DOCUMENTATION OF THE MONTHLY PRODUCTION RECORD. BOOKS PROCESSED, BORROWED, AND COMPUTER SEARCHES.

	December 2015	CUMULATIVE
BOOKS PROCESSED	1	6
INTERLIBRARY LOANS		
OCLC	5	68
OTHER	1	27
eDAAs COMPLETED	53	205

Logistical and Utility Support (LUS) [SOW 3.1.4]

Postal Mail Handling

Mail distribution within the GISS building was provided and deliveries to the Post Office were made. Equipment and deliveries were unloaded from trucks and messenger service was provided as needed.

The monthly reports for Code 200 were provided indicating postage usage on the Neopost mail meter. The detailed reports include the total items shipped, cost per item, mail type (i.e. parcel), destination zip or country, and the sender's name.

Date	Mail type	Qty	Weight	Zip Code	[redacted]	Sender
October 1st	media	1	1lb 13.6 oz	60028	[redacted]	Library
October 1st	media	1	1lb 12.5 oz	23187	[redacted]	Library
October 1st	letter	1	1.3 oz	14420	[redacted]	Library
October 2nd	letter	1	1.3 oz	40050	[redacted]	Library
October 13th	letter	1	1.4 oz	96720	[redacted]	Library
October 13th	flat	1	1.3 0z	20771	[redacted]	Library
October 13th	letter	1	11.0 oz	74166	[redacted]	Library
October 14th	letter	1	1.6 oz	20771	[redacted]	Way
October 15th	flat	1	6.2 oz	19850	[redacted]	Library
October 16th	media	1	1lb 11.07 oz	46615	[redacted]	Library
October 26th	1st class letter	1	2.1 oz	12604	[redacted]	Library
October 29th	letter	1	2.8 oz	22572	[redacted]	Library
	Total # Of Pieces	12		[redacted]	[redacted]	

Date	Mail type	Qty	Weight	Zip Code	[redacted]	Sender
November 2nd	priority	1	2lbs 2.2oz	35899	[redacted]	Library
November 6th	1st class	1	2.7 oz	65899	[redacted]	Library
November 17th	1st class single	1	0.9 oz	27560	[redacted]	S. Hosein
November 25th	1st class single	1	5.4 oz	45268	[redacted]	Library
	Total # Of Pieces	4		[redacted]	[redacted]	

Date	Mail type	Qty	Weight	Zip Code	[redacted]	Sender
December 1st	Letter	1	0.4 oz	20771	[redacted]	Library
December 1st	Letter	1	0.8 oz	20771	[redacted]	Library
December 1st	Letter	1	1lbs.02 oz	92069	[redacted]	Library
December 1st	Letter	1	2lbs.02 oz	11973	[redacted]	Library
December 2nd	Letter	1	2lbs.04 oz	10010	[redacted]	Library
December 3rd	Letter	1	1lbs.05 oz	17837	[redacted]	Library
December 10th	Flat	1	3lbs.09 0z	45268	[redacted]	Library
December 18th	1st class single	1	0.6 oz	18766	[redacted]	Library
December 18th	1st class single	1	1lbs.01 oz	11423	[redacted]	Library
December 22nd	Library rate	1	2lbs.14 oz	83814	[redacted]	Library
December 29th	Int'l letter	1	0.3 oz	2300	[redacted]	G.Schmidt
	Total # of Pieces	10			[redacted]	

Property Inventory Support

Newly purchased NASA equipment was tagged accordingly and appropriate paperwork was submitted. Updating of the GISS Inventory continues via N-Props *(see section **3.1.2.2** under Computer Facility).*

Building door tags, floor directories, and extension lists were updated according to new reassignment of offices, new hires and terminations. Office furniture and computer hardware/equipment were moved as needed.

Offices of terminated employees were cleared of papers and broken office furniture so that new employees could occupy those spaces.

Reorganization of the computer room, room 230, continues as excess of NASA tagged equipment is being prepared for return to GSFC.

The implementation of Voice Over Internet Protocol (VoIP) and Next Generation Voice (NextGen) took place at the beginning of the year. The new phone line system replaced the Centrix system providing a more stable telephone services. New phones and a brief tutorial were provided in all offices and continued maintenance is provided as needed for outages. *(See section **3.1.2** under Computer Facility -LAN)*

The Konica Minolta MFDs that replaced the Xerox copiers have proven efficient, providing printing, copying, scanning and faxing services. Users now have the capability to scan and fax securely using their NASA badge (PIV card) but it is *not* required. Users now also have the capability to print encrypted documents using their PIV card.

The maintenance schedule established to clean and service all printers in the building is functioning well and provides continued usage of these printers except during necessary repairs.

Two sample chairs were sent from AllSteel, Inc. for all GISS employees to "test" and choose their preference. Chairs were ordered prior to GISS renovations (since many of employees are in desperate need of more suitable, ergonomic seating) and are expected to arrive January 14, 2015.

Conference and Workshop Support

Travel arrangements were made in support of the following meetings, workshops, and conferences:

- Ocean2K meeting focused on last millennium simulations by the NASA GISS model, which constitute ~1/3 of the GISS CMIP5 submission from 10/04/15-10/09/15 in Barcelona, Spain
- Chicago Council on Global Affairs' Global Agricultural Development Initiative Advisory Group meeting from 10/08/15-10/09/15 in Chicago, IL
- Peat Carbon Accumulation on Earth: An Integrated and Global Perspective — C-PEAT Launch and Integration Workshop from 10/10/15-10/13/15 at Lamont Doherty Earth Observatory in New York, NY
- 2nd International Conference on Global Food Security at Cornell University from 10/11/15-10/14/15 in Ithaca, NY
- Launch of Urban Climate Change Research Network's (UCCRN) Latin American Hub from 10/12/15-10/14/15 in Rio de Janeiro, Brazil

- Travel to Wallops Flight Facility for installation on the WFF C130 prior to flight readiness review on 10/14/15-10/16/15
- Translating Process Understanding to Improve Climate Models workshop on 10/14/15-10/16/15 in Princeton, NJ
- Meet with Dr. Jim Green, Planetary Science Division Director and Dr. Mary A. Voytek, NASA's Astrobiology Program at NASA Headquarters in Washington, DC to discuss continued funding for the Astrobiology Magazine on 10/17/15
- US Dept. of Energy (DOE) invitation-only meeting to coordinate research activities between the DOE Atmospheric Radiation Measurement/Atmospheric System Research program from 10/20/15-10/23/15 in Germantown, MD
- Two-part trip: 1) Seattle, WA. NASA Astobiology Institute (NAI) Virtual Planetary Laboratory (VPL) meeting of Task Lead for planning research directions. Kiang is Task Lead for The Living Earth component of VPL's research plan. 2) NASA Ames, Moffett Field, CA. NAI VPL meetings with Co-I Mary Nicole Parenteau on surface biosignatures and with research assistant on lab/field project on Acaryochoris species discovered at Moss Beach, CA, for research on the long wavelength limit of oxygenic photosynthesis from 10/20/15-11/03/15
- Concept definition point review of Pre-Aerosol Cloud Ecosystem (PACE) mission from 10/21/15-10/22/15 in Greenbelt, MD
- Ice2Ice Isotope modelling workshop focused on water isotopologues monitoring and modeling from 10/24/15-10/29/15 in Copenhagen, Denmark
- Travel to NASA HQs to attend the NASA Earth Science Division (ESD) Earth Science Subcommittee (ESS) meeting on 10/28/15 in Washington, DC
- Chairing the proposal review panel for the NASA Solar System Workings Program from November 1 – November 6, 2015.
- Travel to visit the Geography Department at the University of California, Berkeley to give invited talks in the Geography Colloquium and in "Climate Dynamics of the Western US Hydroclimate."from November 2 – November 5, 2015.
- The North Atlantic Aerosol and Marine Ecosystems Study (NAAMES) is an EVS mission that will be operating the NASA Wallops Flight Facility C-130 aircraft out of St. John's, New Foundland in Canada from November 9th to the 27th. The traveler is principal investigator for the Research Scanning Polarimeter that will be operating on the C130 during this mission. Complete installation of the Research Scanning Polarimeter (RSP) at Wallops Flight Facility (WFF) on the C130 and operate the instrument on a science test flight.
- NCTS #: 23061-16, Synergy in Science: Partnering for Solutions to give an invited talk at the annual meeting of the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America in Minneapolis, MN on November 15 – November 17, 2015 (2 attendees)
- FOREIGN IN-KIND travel to NCTS #: 23947-16, CLIVAR-ICTP International Workshop on Decadal Climate Variability and Predictability. The traveler will attend said conference and give the keynote presentation entitled "Forced aspects of decadal variability" from November 16-21. He will then give a seminar talk on the advocacy on climate change at the University of Venice in Mestre, Italy.

- Traveler is invited to participate in an invitation only workshop on "Observational needs for aerosol characterization: the SpectroPolarimeter for Exploration (SPEX) for the NASA PACE mission", Friday 27 November in The Hague, the Netherlands, organised by SRON – Netherlands Institute for Space Research and the Netherlands Organisation for Scientific Research (NWO). SPEX is a satellite instrument that is being developed in the Netherlands to measure aerosol properties with unprecedented detail and accuracy and may be a contribution of the Netherlands to the PACE mission. There is strong interest from NASA to fly the SPEX instrument on the PACE (Pre- Aerosols, Clouds, & Ecosystems) mission of which the launch is expected in ~2022 and the traveler who is Deputy Project Scientist for the PACE missions is expected to participate in the workshop to increase the likelihood that the Netherlands government will provide funding for the development of the SPEX instrument. The goal of the workshop is to inform potential users of SPEX data about the instrument, to hear from users about their aerosol/cloud research, their observational needs, and the value of SPEX data.
- NCTS#:22943-16, Conference of Parties 21 (COP-21). UNFCCC Conference of the Parties 21 (COP21) in Paris, France, to Launch the Second UCCRN Assessment Report on Climate Change and Cities (ARC3-2) and the UCCRN Regional Hubs in Paris, Rio de Janeiro, and Durban from November 29 – December 10, 2015.
- Travel to give an invited seminar talk at Portland State University. Physics Department seminar series on November 30, 2015.
- Travel to participate in NASA panel review for proposals submitted to ROSES14 A.29 "Climate Indicators for National Climate Assessment" from November 18 – November 20, 2015.
- Meetings with Co-I Mary Nicole Parenteau and a research assistant at NASA Ames/SETI, and field trips to a potential field sites at Bodega Marina Laboratory and Elkhorn Slough, both along the Central California Coast. Prior field trips to Moss Beach, CA, a one hour drive from NASA Ames have yielded previously unknown strains of a chlorophyll d cyanobacterium, which we are culturing in the lab, with planned physiological sensitivity studies. This work is supported by a NASA Astrobiology Institute Virtual Planetary Laboratory (VPL) grant, on which the traveler is a Co-I. This trip is for a research project to constrain the long wavelength limit of oxygenic photosynthesis.This work contributes to the Agency's core mission of space exploration, specifically with regard to understanding the evolutionary mechanisms and environmental limits of life, determining the principles that will shape life in the future, and recognizing signatures of life on other worlds.
- This trip is for a research project to constrain the long wavelength limit of oxygenic photosynthesis. The trip will include meetings and lab work with Co-I Mary Nicole Parenteau and a research assistant at NASA Ames/SETI, collaborator Brad Bebout (NASA Ames), to follow up on prior field trips to field along the Central California Coast. Prior field trips have yielded previously unknown strains of a chlorophyll d cyanobacterium, which we are culturing in the lab, with planned physiological sensitivity studies. This work is supported by a NASA Astrobiology Institute Virtual Planetary Laboratory (VPL) grant, on which the traveler is a Co-I. This work contributes to the Agency's core mission of space exploration, specifically with regard to understanding the evolutionary mechanisms and environmental limits of life, determining the principles that will shape life in the future, and recognizing signatures of life on other worlds.

- NCTS#:24180-16, JGCRI 2015 Annual Integrated Assessment Workshop; Travel as an invited participant at the Pacific Northwest National Labs (PNNL) Joint Global Change Research Institute (JGCRI) Integrated Assessment Workshop, 2015 to give an invited oral presentation, meet with PNNL partners to build new collaboration. JGCRI is a premier center for integrated assessment modeling, providing key scenarios for the CMIP5/6 and IPCC processes, as well as using their model for a range of policy-relevant work relating to energy, food, water, ecosystems, and other prominent sectors. Traveler has been invited to participate in order to launch a new, Department of Energy-funded collaboration between the JGCRI and NASA Goddard Institute for Space Studies related to the core response of agricultural lands and production to climate change factors (temperature, rainfall, and carbon dioxide concentration changes). Traveler is the point person for this collaboration due to his leadership roles within the Agricultural Model Intercomparison and Improvement Project (AgMIP; where he serves as Science Coordinator and Climate Team Leader) from November 30 – December 6.
- Travel to Wallops Flight Facility (WFF) for download of the Research Scanning Polarimeter (RSP) sensor from the WFF C130. Travel back to GISS with the RSP for further research and analysis from December 1 – 3, 2015.
- Technical Management Cost review of Pre-Aerosol Cloud Ecosystem (PACE) mission at Goddard Space Flight Center from December 8 – 9, 2015.
- Invitational travel for Dr. Allison (NASA Emeritus) to attend the Joint Juno/Cassini Jupiter-Saturn Atmospheric Dynamics meeting and give a talk entitled: Vertical structure, lapse rate, relative humidity, and clouds from December 12 – 14, 2015.
- Travel to 2015 American Geophysical Union (AGU) (NCTS#: 22185-16). This is the annual meeting of AGU, the main professional society to which NASA civil servants belong. While there, 11 civil servants presented research conducted as part of his NASA official duties. It is essential to present the most recent NASA results, learn about state-of-the-art research done at other science organizations, and discuss possible collaborations further advancing research done at NASA GISS.

The following seminars, conferences, workshops and meetings were hosted on-site at GISS. Appropriate logistical support was provided including teleconferencing services, systems support (i.e. LCD projector), and refreshments as requested.

- GISS Friday Seminar: *Cloud Condensates in Hot Jupiter Exoplanet Atmospheres* by Hannah Wakeford (NASA GSFC) on October 2
- GISS Lunch Seminar: *Panoply software package* by Robert Schmunk (Trinnovim) on October 21
- GISS Seminar: *Bjerknes Compensation and Climate Feedback* by Zhengyu Liu (Department of Atmospheric and Oceanic Sciences, University of Wisconsin-Madison) on October 26
- GISS Lunch Seminar: *Rapid rise in heat stress exposure during the 21st century* by Ethan Coffel on October 28
- GISS Lunch Seminar: *Response of Arctic temperature to changes in emissions of short-lived climate forcers* by Maria Sand (GISS) on November 4
- GISS Seminar: *Aerosol modeling in the Earth system* by Kostas Tsigaridis on November 13
- GISS Lunch Seminar: *Data Analysis and Visualizations with Python* by Avraham Persin (Trinnovim) on November 18
- GISS Seminar: *Are cloud processes key drivers of UTLS chemistry and constituent variability?* by Sunil Varma (Imperial College London) on November 24

- GISS Special Seminar: *Sniffing Alien Atmospheres: Exoplanet Spectrophotometry (from Ground-, Airborne- and Space-based Observatories by Daniel Angerhausen (GSFC)* on November 30
- GISS Special Seminar: *The influence of stratocumulus cloud feedbacks on Pacific Decadal Variability* by Katinka Bellomo (APAM/Columbia University) on December 8
- GISS Special Seminar: *Dynamic and Thermal Impacts of Explosive Low-latitude Volcanic Eruptions on the Middle East and North Africa Region* by Gera Stenchikov on December 22

Please note that all ViTS conferences and seminars (including 610 Town Halls), as well as Webinars coordinated with GSFC can be found under the Computer Facility section of this report.

Community Outreach and Educational Programs

Engagement activities continue for alignment with co-STEM initiatives and NASA Education goals. This includes the development of interactive learning management systems to provide educators ongoing professional development and STEM engagement support, the creation of the GISS Office of Education Facebook page, and collaboration with Apple software developers to develop education applications for GISS.

Developed brochure to disseminate to educators on NASA Education Resources including the Climate Change Science lesson plans and content.

Developed brochures for NASA Climate Change resources.

Developed brochure and materials for Scientists Symposium event.

Developed OSSI (One Stop Shopping Initiative) internship program registration and recruitment presentation.

Attended Earth Right Now (ERN) weekly tag up meeting.

Attended the Office of Education Code Staff Retreat hosted by Dean Kern.

Traveled to Bronx Community College (BCC) to meet with President of college, Dr. Sunil Bhaskaran regarding collaboration and development of curriculum and development of Associates Degree program for Geospatial Technology.

Developed brochure to disseminate to educators on NASA Education Resources including the Climate Change Science lesson plans and content.

Prepared orientation and presentation for scientific organization on how to access and apply for NASA internships.

Enrollment of mentors at GISS to help gain mentorship access onto OSSI system.

Drafted introduction letter to GISS local STEM schools, include LOB, CCRI, and GISS.

Developed Point of Contact for formal/informal education database within NYC area, and created database of institutions and communities near NASA GISS facilities.

Attended the Education and Communication Colloquium, New Opportunities in Scientific Publishing on Wednesday, November 4, 2015 via teleconference.

Coordinated event materials for STEM Mentoring Café located at the Intrepid Museum for Saturday, November 14, 2015 (10:00am-12:00pm).

Attended Time, Inc. "ISS Downlink" event at Time Life building on Thursday, November 19, 2015.

Meetings and discussions continue with teachers and administrators from NYC schools to improve STEM instruction.

Attended Goddard Space Flight Center (GFSC) Office of Education Program Staff Retreat in Washington, DC. Discussed the role of NASA in providing STEM education to our nation's education institutions.

Attended GFSC Office of Education Staff Meeting Retreat from SharePoint.

Created Educational Online Resources for educators and students and climate change resources.

Consolidated 2015 files and organized office room.

Scheduled appointment meetings for Matthew Pearce.

NYCRI
The New York Climate Research Initiative (NYCRI) program for GISS began on June 3, 2015 and ran through August 14, 2015. Worked with Robert Schmunk to create the 2015 NYCRI program online.

- Worked with Robert Schmunk to create the 2015 NYCRI program online.
- Compiled edits for NYCRI website research and PowerPoint submissions for 2014 and 2015 years.

Climate Change Research Initiative (CCRI)
The spring 2016 Climate Change Research Initiative (CCRI) Program for GISS begins on Monday, February 1st, 2016 and will run through August of 2016. The CCRI team consists of the mentors: Stuart Gaffin, Linda Sohl, Dr. Dorothy Peteet, and Allegra Le Grande. The Educators are Mary Anne Woody, Stephanie Stern, Nicole Dulaney, and Katie Byrd. The Graduate students are: Annesia Lamb, Edwige Lauture, Cynthia D Herrera, and Nicholas Zanata.

- Coordinated the orientation Climate Change Research Initiative Internship Program event for Tuesday, October 6th, 2015 at the GISS facility.
- Assisted with mentors of the CCRI Internship Program with Educator and Graduate student selections.Set up virtual platform for CCRI participants with Jordan Synder.
- Set up CCRI Intern room with well-functioning computers connected to the GISS/GSFC network.
- Scheduled weekly teleconference with educators for CCRI program.

- Coordinated meeting event for CCRI roundtable event.
- Prepared recruitment flyer for CCRI 2016 Internship Program for high school and undergraduate students
- Participated in the CCRI Online Community and provided feedback on the interns research projects for CCRI
- Coordinated CCRI roundtable presentation and teleconference meetings for mentors, educators, and intern participants
- Created formal/informal database with education contacts for CCRI recruitment opportunities
- Prepared recruitment flyer for CCRI 2016 Internship Program for high school and undergraduate students.
- Creation of GISS CCRI lunch seminar for January 27th, 2016 with Bastiaan Van Diedenhoven.
- Coordinated CCRI roundtable presentation and teleconference meetings for mentors, educators, and intern participants
- Reviewed/posted feedback on CCRI online discussion board community

GISS Facility Operations

The new lease was signed and planning meetings continue between GSFC architects/planners, GSA, and Columbia regarding phases of renovation. Renovations are expected to begin in late summer 2016 and may last from six months to one year.

An email address was created, giss-supportservices-l@lists.nasa.gov, to be used my GISS staff for specific requests. Where computer related problems should be sent to csr@csr.giss.nasa.gov, all other GISS building related items should be sent to GISS Support Services at giss-supportservices-l@lists.nasa.gov. These items include requests for supplies (including toner), copier issues, phone issues, and all other miscellaneous items pertaining to the GISS building and employee questions. Emails will be directed to the appropriate person and the issue will be addressed promptly with a follow up email to the requestor confirming receipt and completion.

Trinnovim worked with Columbia University Facilities Management to identify the source of fumes permeating throughout the building, and proper measures have been taken.

New signs were posted on all floors in both stair ways indicating floor and stair well replacing missing or damaged signs.

Light fixtures were replaced and other small tasks (i.e. shelf installation) were completed in several offices as needed.

Security cameras were replaced with new ones and others added in areas of need.

In accordance with new rules from the NYC Dept. of Sanitation, a notice was sent to all GISS employees regarding the acceptance of all rigid plastics along with metal, glass bottles and jars, and beverage cartons in the recycling stream.

Relabeling of all mail boxes to more easily keep them in alphabetical order was initiated and is being kept updated.

Maintenance was performed as needed throughout the building and proper communication was disseminated to all building occupants.

GISS participated in the "Clean & Go Green" program offered by Columbia University on Thursday, December 10 and Friday, December 11 and disposed of unwanted items prior to the start of the renovations.

Program Management (PM) [SOW 3.1.5]

Coordination with Sandy Strickland and Rhonda McCarter was established to update all GISS entries in the NASA Enterprise Directory (NED) Staffing
The following staff changes were made for the period October 1 to December 31:

[redacted]

Hires
NONE

Transfers
NONE

[redacted]

Task Management
Trinnovim updated the NASA/Goddard Space Flight Center Locator and Information Services Tracking System (LISTS) personnel roster.

[redacted]

Smart cards continue to be issued to all GISS personnel in accordance with Goddard Space Flight Center's security procedures. Trinnovim's Project Management office begins the badging process by first creating an identity for each employee in IdMAX and forwarding a LISTS form to GSFC Security. Once a new identity is created and submitted, the employee receives an email with instructions on how to complete an eQIP (electronic Questionnaire for Investigations Processing). Upon submission and approval of an eQIP, employees are fingerprinted and await their badge. Temp IDs are no longer valid and all personnel without a valid badge are signed in as visitors.

The contract cost by program category was updated through December 31, 2015.

A monthly breakdown of contract charges, including supplies, travel and Other Direct Costs (ODCs) was completed and delivered to group leaders in each discipline.

The following documents were reviewed and updated if necessary:

- Position Description for Uniformed Security Post at GISS
- GISS on-duty Security Officer Procedures (SOP)
- GISS Occupant Emergency Program, with special emphasis on the fire evacuation plan; the escape routes were adapted to changes in the floor plans

- The Buildings Emergency Plan was updated and sent to Desiree Taminelli
- In fulfillment of NYC Local Law 26/FDNY Rule 3 RCNY 6-02, a new list of fire safety personnel was put together, ensuring that each floor provide male and female searchers.
- Emergency Computer Shutdown Procedures
- Continuity of Operations Plan (COOP); the general Reconstitution Plan was customized for GISS and copied to the COOP SharePoint site. The call tree was modified and was tested.

Contract Reporting

The following reports were delivered on time:

- Health and Safety report
- 533 & Variance report
- Contract Budget
- Room and Extension report
- Costs reports
- ACES (formerly ODIN) monthly report

Coordination with COR

The following was discussed with COR:

- Contingency Plan for GISS
- NASA One email address seats
- Goddard security badging and HSPD-12 (Homeland Security Presidential Directive – 12)
- Reviewed different funding for each group and the Project Manager spoke to each PI regarding funding
- Process to set up NOMAD accounts
- GISS equipment inventory
- Status and completion of COOP Plan; definition and outline of "Reconstitution" step
- Room assignments for new hires and office reassignments
- eDAA process as required by NASA GSFC for all publications submitted from GISS
- Support and information were provided to the COR in preparation of the new RFP

Logistical Support

Access to NASA facilities by foreign nationals from designated countries continues to be monitored. The NASA Administrator announced that he has initiated a complete review of the access which foreign nationals from Designated Countries are granted at NASA facilities, as well as our security procedures with regard to these individuals more broadly. In addition, the Administrator ordered a moratorium on granting any NEW access to NASA facilities to individuals from specific designated countries, including China (PRC), Burma, Eritrea, Iran, North Korea, Saudi Arabia, Sudan, and Uzbekistan. In compliance with this directive, office space was provided at Columbia University for foreign nationals collaborating with GISS. Whereas foreign visitors from the eight countries mentioned above have to be escorted at all times, ALL foreign nationals (unless they have a green card) have to be APPROVED before they can visit GISS. The approval process involves IdMAX and has to be initiated by Patricia in the project management office at least 10 or 20 days before the visit to be sure that it gets granted in time. The 20-day limit applies to people from the 41 countries (including Israel) listed at: http://oiir.hq.nasa.gov/nasaecp/DCList_11-28-12.pdf; the 10-day limit applies to all other foreigners. Even escorted visits are prohibited before the approval has been granted.

An email was sent to all GISS staff informing them of any newly available information regarding building access via the GISS intranet website http://internal.giss.nasa.gov/access/

New documents were forwarded to all GISS staff regarding new requirements for foreign national employees/visitors, specifically for those from designated countries. In addition, a reminder was sent regarding the completion and acknowledgement of the GSFC RULES AND PROCEDURES FOR ESCORTING VISITORS, specifically foreign nationals.

Issued LISTS & NASA 1760 forms to new employees/foreign visitors and created NASA identities in IdMAX for badge enrollment. The following entries were made for the period October 1 to December 31:

Name	Host	Citizenship	Affiliation	Expiration Date
Justin Mankin	Radley Horton	U.S.	GISS Sci. Collaborator	07/01/2016
Alexander Fertig	Alex Ruane	U.S.	GISS Sci. Collaborator	10/2/2016
Kelesy Prieur	Dan Bader/Manishka De Mel	U.S.	GISS Sci. Collaborator	7/1/2016
Karl Seltzer	Gavin Schmidt	U.S.	GISS Sci. Collaborator	09/01/2017
Francesca Lingo	Linda Sohl	U.S.	GISS Sci. Collaborator	6/1/2016
Luz Elisa Cervantes Valdivieso	Manishka De Mel	Ecuador/Mexico	GISS Sci. Collaborator	7/1/2016
Sunil Varma	Kostas Tsigaridis	U.K.	GISS Sci. Collaborator	11/27/2015
Rayford Mukushi	Reto Ruedy/Trinnovim HQ	Zimbabwe/LPR	Trinnovim	3/31/2017
Katinka Bellomo	G. Tselioudis	Italy	GISS Sci. Collaborator	12/8/2015
Elisaveta Petkova	Linda Sohl	Bulgaria	GISS Sci. Collab	11/17/2015
Jasmine Remillard	George Tselioudis	Canada	GISS Sci. Collab	09/27/2017
James Oliver	Alex Ruane	U.S.	GISS Sci. Collab	12/31/2016
Gregory Reppuci	Alex Ruane	U.S.	GISS Sci. Collab	06/01/2016
Rachel Atlas	Ann Fridlind	U.S	GISS Sci. Collab	06/30/2016
Bjorn Samset	Maria Sand	Norway	GISS Sci. Collab	01/15/2016
Annel Hernandez	Cynthia Rosenzweig	U.S.	GISS Sci. Collab	06/01/2016
Yunha Lee	Gavin Schmidt	South Korea	GISS Sci. Collab	11/30/2016

Contractor Safety Support

The Safety Committee held monthly meetings. All managers were asked to continue to be alert to any potential health and safety hazards in their areas.

Fire alarms were tested throughout the building as scheduled.

Numerous safety hazards have been reported to Columbia University and needed action was taken to resolve them.

The monthly Health and Safety reports were prepared and submitted on time.

Dean Wolf (301-286-1612, cell: 443-883-5354) and Ryan Smallcomb (301-286-9641) performed a safety audit at GISS on August 18, 2015. 11 violations were noted on the SHEtrak system and were responded to within the required 30 days; all violations were remediated and documented; the remedial actions were all approved via the SHEtrak system.

On Friday, December 4, Joey Henderson, NASA/GSFC Emergency Management Officer gave a 1 hour Emergency Preparedness presentation. This presentation discussed some of the hazards that employees at GISS could face. The presentation also gave simple steps in handling those hazards and becoming better prepared

Please note that the 'GISS Facility Management' section can be found under the Logistical and Utility Support section of this report.

Electronic Information Technology Accessibility Compliance [SOW 3.2]

GISS Website Upgrade and Maintenance

The system software was updated on public, staging, and internal web servers. Security patches were applied to the systems on the webserver remote backup. Work was done on creating security benchmarks for the internal webservers.

The Apache server software was updated on the public and staging webservers.

News and features were prepared for reposting to the GISS homepage.

The GISS publication website was updated and new items were added.

The NYCRI education webpages were updated to include 2015 research result documents. A preliminary page was prepared for the summer 2016 educational program.

Minor revisions were applied to the GISS homepage layout. The model forcing's dataset webpages were edited; they were originally prepared by Dr. Gavin Schmidt.

A new interactive web browser-based selector for GISTEMP station data was created using D3 Orthographic maps, since the Mercator projection provided by the Leaflet Javascript library presents serious shortcomings in the polar regions.

The new Python version of the GISTEMP CGI scripts on the Data website has been modified to be able to import NOAA/NCEI's GHCN v4 data. That data set is still only available as a beta release. Since all station IDs were changed from numeric to alpha-numeric strings, ID-dependent parts of the analysis will have to be manually adapted.

New GISTEMP-Plotter tool were created for use on the internal website, with new fields to API (Application Program Interface), interactive graphics using D3, providing data downloads in CSV (Comma Separated Values) format and other downloads in TeX and in HTML recreation as web embeddable SVG (Scalable Vector Graphics) file, and revising interface and features in response to comments at presentations. See also Section 3.1.1.2.2 for further enhancements to the GISTEMP website.

Another transition that has been initiated is the future replacement in all the GISS web sites of NCARgraphics by Panoply, a far superior visualization utility that is being maintained and further developed at GISS. Adaptations for using Panoply as a website tool are developed and tested.

Development and Maintenance of Web Utilities

Versions 4.3.3, 4.4, and 4.4.1 of the Panoply visualization software were released.

The plotting features in the Panoply command-line interface were enhanced to the level of those in the GUI (graphics user interface) version.

A presentation of the history and capabilities of the Panoply software was prepared and given at the October 21 lunch seminar. The content of this talk was put on the GISS internal website, a website that is being updated and also contains a user guide for the command-line version of Panoply (PanoplyCL).

Support was provided to users of the Panoply desktop data visualization software in person at GISS and by email to researchers at NASA/GSFC, NASA/JPL, NASA/MSFC, NOAA/Meteorological Development Lab, DOE/Berkeley Lab, Colorado State University, Canada Centre for Remote Sensing, Univ. Manitoba, Dynamic Meteorology Lab (France), Leibniz Institute for Tropospheric Research (Germany), KTH Royal Inst. Technology (Sweden), Inst Portugues do Mar e da Atmosfera, Euro-Meditarranean Center on Climate Change (Italy), and Inst. Cosmophysical Research and Aeronomy (Russia).

Version 7.1.1 of the Mars24 sunclock software was released.