

TES GDS

Instrument Team Ground Data System Reports

Doug Shepard

Jet Propulsion Laboratory
California Institute of Technology

Aura DSWG
October, 2012



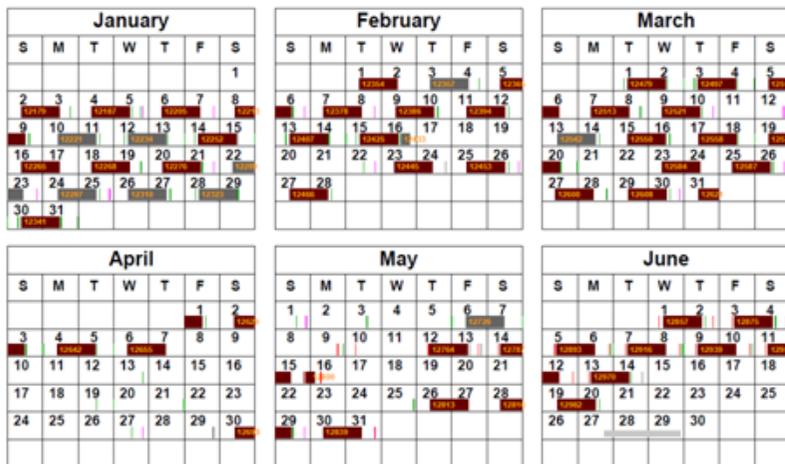
Overview

- Current State of SIPS Data Production
- Current Data Product Version
- Current and Upcoming Releases
- Issues and Other Items

- TES GDS software Release R12.1 (L2 ESDT Version 5) started reprocessing August '11
- TES GDS software version: 'R12.2', active at SIPS from March '12 (R12.0 from February '11)
 - L1B ESDTs
 - Version 004, File version F03_05
 - L2 ESDTs
 - Standard/Ancillary products: Version 005, File Version F06_09
 - Supplemental products: Version 005, File Version F02_09
 - Summary products: Version 005, File Version F03_09
 - L3 ESDTs
 - L3 products (daily, monthly grid and browse): Version 003, File Version F01_09
- Global Surveys to date: 1054
- Special Observations to date: 3346

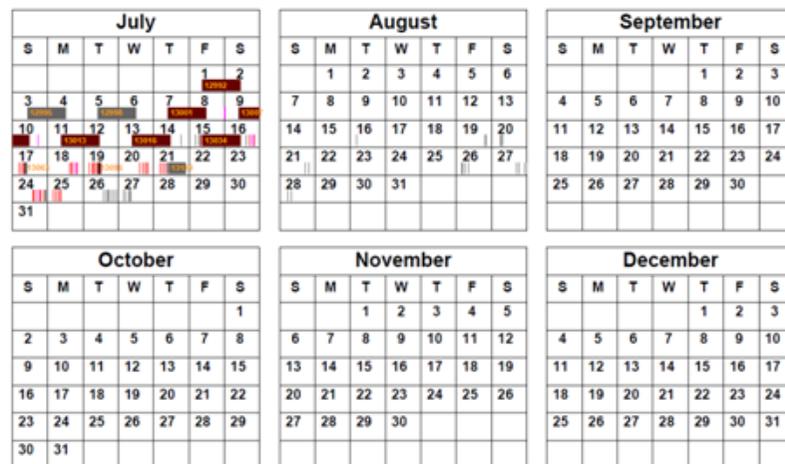
TES Science Observations and L2 Products at DAAC: 2011

Updated 2011-08-29



TES Science Observations and L2 Products at DAAC: 2011

Updated 2011-08-29



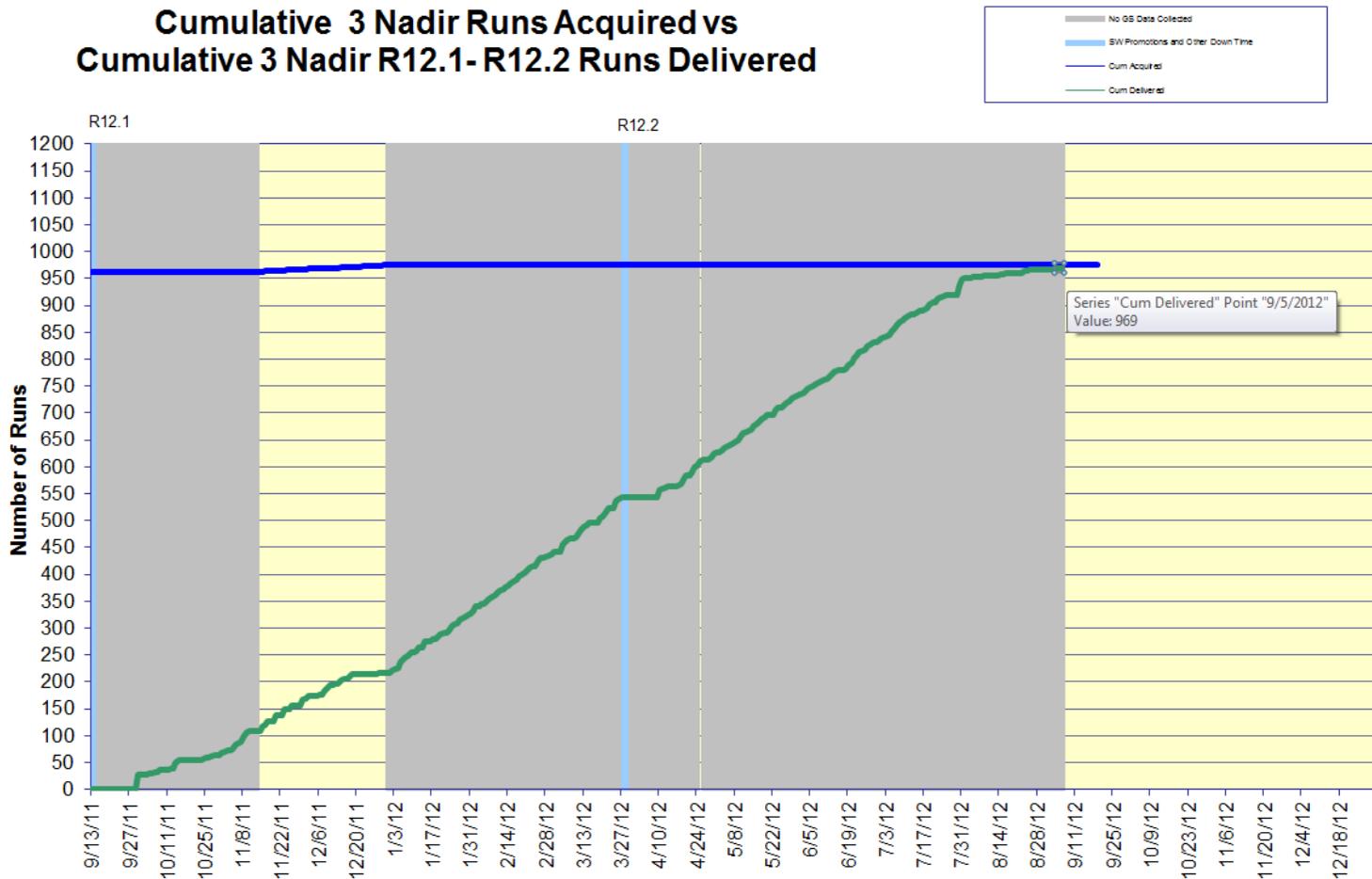
Available Global Surveys: Dull Red = GS (V005, R12) Blue = GS (V004, R11)
 Available Special Obs (V005): Red = Step&Stare Green = Transect Magenta = Stare Violet = Limb
 Dark Gray = L2 V5/V4 Data Not Available Orange = RunID for Global Survey Light Gray = Focal Plane De-Ice

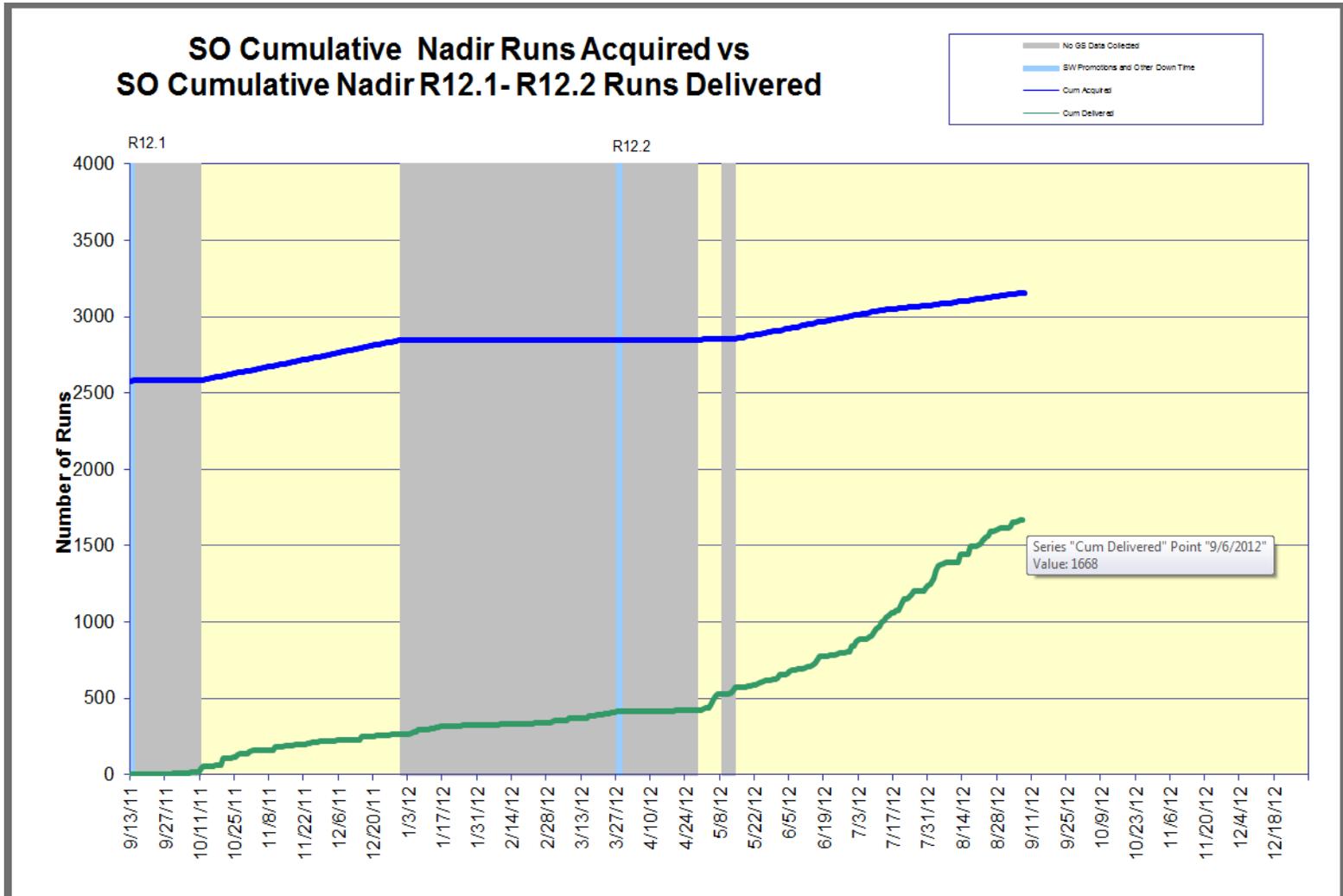
Available Global Surveys: Dull Red = GS (V005, R12) Blue = GS (V004, R11)
 Available Special Obs (V005): Red = Step&Stare Green = Transect Magenta = Stare Violet = Limb
 Dark Gray = L2 V5/V4 Data Not Available Orange = RunID for Global Survey Light Gray = Focal Plane De-Ice

Tropospheric Emission Spectrometer

SIPS R12 Reprocessing – Global Survey

Cumulative 3 Nadir Runs Acquired vs Cumulative 3 Nadir R12.1- R12.2 Runs Delivered





Data Processing Configuration

- Two processing centers
 - SIPS: processes nominal Global Survey and Special Observations
 - SCF: supports development and small scale investigations
- SIPS
 - 120 nodes with dual Intel Xeon quad-core CPUs with 16GB RAM and 2TB storage
 - 120 nodes with dual Intel Xeon quad-core CPUs with 24GB RAM and 2TB storage
 - 30 nodes with dual AMD Opteron single-core CPUs with 6GB RAM and 500GB storage (out of warranty)
 - Total of 270 nodes with 495TB data storage
 - 55TB Network Attached Storage (NAS)
- SCF:
 - 40 nodes with dual Intel Xeon quad-core CPUs with 32GB RAM and 1TB storage
 - 150 TB online storage



Hardware/Processing upgrades

- SIPS: 16 nodes to be delivered in September with dual Intel Xeon (Romley class) quad-core CPU , 32 GB ram, 1 TB disk & 180 GB SSD
- SCF: 40 nodes with dual Intel Xeon (Romley class) quad-core CPU , 32 GB ram, 1 TB disk & 180 GB SSD
- SIPS data throughput enhancements for Level 2 processing
 - Intel Xeon Nehalem class quad-core CPUs are capable of supporting 12 synchronized retrievals. This a 4x improvement over the previous generation nodes. Additionally, onboard RAM provided an almost immediate 30% improved processing time
 - Using high performance NAS server for shared access to the TES PGE Work-Space instead of explicitly moving data to and from each compute node improved L2 PGE execution times by 3x. This reduced the total PGE execution and data access time from 69.7 minutes to 23.23 minutes per PGE execution.

SIPS Data Throughput

- TES safe-mode events and modifications to the flight software will reduced data volume by ~40% for 2011.
 - These events have caused the TES Flight Operations team to implement a number of macro modifications to accommodate the TES instruments current state – SIPS has to modify operations to accommodate.
- SIPS has completed the Release 12 processing of 1042 Global Surveys and 1786 Special Observation data collected (YTD). Completion of all data through R12 expected by mid-September.
- The last six months SIPS has delivered the following volume to ASDC under a rate of ~6x; where 1x is the volume for 3.5 Global Surveys/week:
 - L1B: 353 GB L2: 1962 GB L3: 19 GB

Release 12.4 and Upcoming Releases

- Release 12.4 product enhancements
 - Support of GEOS-5.9 GMAO data set. This has been very challenging due to the fact that the requirements to read the new inputs has necessitated an upgrade of multiple libraries (i.e. – HDF, SDP Toolkit, netCDF).
- Future Product enhancements (Release 13, Early 2013)
 - Joint TES-MLS Carbon Monoxide (CO)
 - Introduce standard products for Methanol (CH₃OH) and Formic Acid (HCO₂)
 - Update the TES ground data system executable to utilize 64-bit compilers and 64-bit compiled support libraries (i.e. - SDP Toolkit, HDF, HDF-EOS,...)
 - Joint TES-OMI Ozone (O₃) product in R13 overload (Spring 2013)

TES-MLS Joint CO Product Development

- TES and MLS science teams members have been working with the ground data system to help define and design a new PGE which will generate a TES-MLS joint CO output product.
- Significant milestones reached:
 - Successful algorithmic development target scene matching code utilizing TES and MLS datasets
 - Incorporate MLS callable forward model (CFM) into TES retrieval code
 - Naming conventions and joint product metadata definitions (inventory, core, instrument specific) which have been incorporated from Aura guidelines defined in the technical note, “A File Format for Satellite Atmospheric Chemistry Data Based On Aura File Format Guidelines” (ESDS-RFS-009)
- PGE Specification documentation including:
 - High level design
 - PGE execution details
 - Inputs/Outputs definitions
 - Resources required (i.e. – CPU, disk usage, database usage,...)

- TES and MLS science teams members have been working with the ground data system to help define and design a new PGE which will generate a TES-MLS joint CO output product.
- Significant milestones reached:
 - Successful algorithmic development target scene matching code utilizing TES and MLS datasets
 - Incorporate MLS callable forward model (CFM) into TES retrieval code
 - Naming conventions and joint product metadata definitions (inventory, core, instrument specific) which have been incorporated from Aura guidelines defined in the technical note, "A File Format for Satellite Atmospheric Chemistry Data Based On Aura File Format Guidelines" (ESDS-RFS-009)
- PGE Specification documentation including:
 - High level design
 - PGE execution details
 - Inputs/Outputs definitions
 - Resources required (i.e. – CPU, disk usage, database usage,...)

Accessing TES data

- ASDC Data Pool & WIST Data access; all V3 and V4 data available
- ESDT Version 005 Release 12 Level 2 standard products have been successfully ingested at ASDC for processing since February 2011.
- ESDT Version 005 Release 12.1 Level 2 standard products have been successfully ingested at ASDC for processing since August 2011.
- Documentation & IDL data readers available from
 - http://eosweb.larc.nasa.gov/PRODOCS/tes/table_tes.html
- Documentation provided via ASDC site
 - Data Product Specification
 - Level 2 & Level 3 User's Guides
 - Data Quality Statements
 - Data Versioning
 - Validation Reports
 - ATBDs

Issues & Other Items

- Delay in delivery of new GEOS-5.9 delivery has caused a Release 12.4 delivery
- Compatibility with the compiled versions of the SDP Toolkit, HDF, HDF5 and netCDF libraries has been time consuming in support of the upcoming GMAO delivery.
- Data management providing easy access to large TES datasets is a recurring theme from Co-Investigators and other TES data users.
- Walt Baskin (ASDC) has developed a TES Level 2 output subsetting tool and provided the TES team access to provide feedback for future enhancements. This may turn out to be a very useful utility to provide easy access to smaller snapshots of TES output products.