TES GDS

Instrument Team Ground Data System Reports

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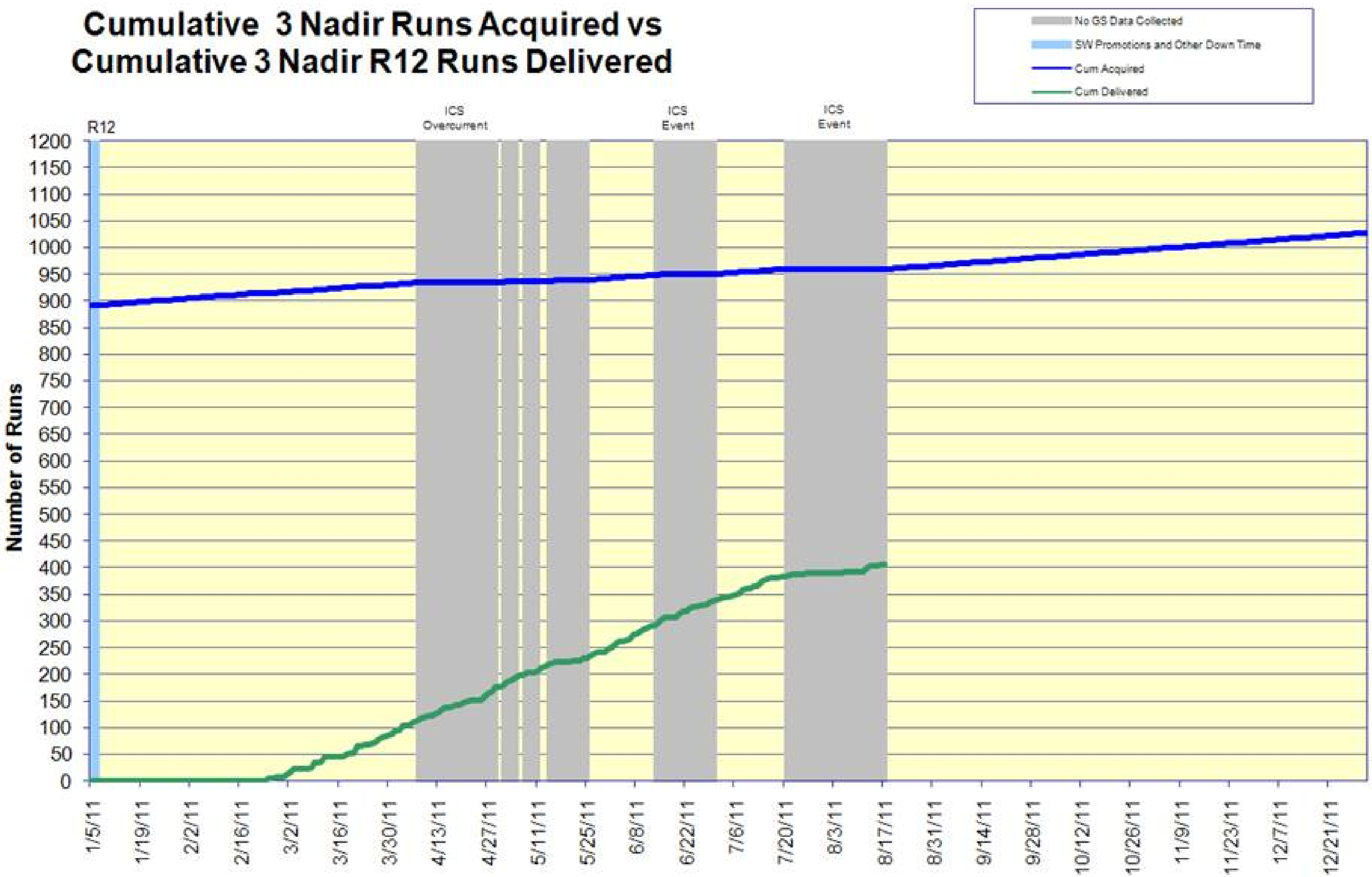
Overview

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

Current State of SIPS Data Production

- TES GDS software Release R12.1 (L2 ESDT Version 5) started reprocessing August ’11
- TES GDS software version: ‘R12.1’, active at SIPS from August ’11 (R12.0 from February ‘11)
  - L1B ESDTs
    - Version 004, File version F03_05
  - L2 ESDTs
    - Standard/Ancillary products: Version 005, File Version F06_08
    - Supplemental products: Version 005, File Version F02_08
    - Summary products: Version 005, File Version F03_08
  - L3 ESDTs
    - L3 products (daily, monthly grid and browse): Version 003, File Version F01_08
- Global Surveys to date: 1038, 7+ years of data L2 ESDT Version 5
- Special Observations to date: 2716, 7+ years of data L2 ESDT Version 5

SIPS R12 Reprocessing



Data Processing Configuration

- Three 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
  - 60 nodes with dual Intel Xeon quad-core CPUs with 24GB RAM and 2TB storage
  - 190 nodes with dual AMD Opteron single-core CPUs with 6GB RAM and 500GB data storage (out of warranty)
  - Total of 370 nodes with 455TB data storage
  - 55TB Network Attached Storage

- SCF:
  - 40 nodes with dual Intel Xeon quad-core CPUs with 16GB RAM and 1TB storage
  - 130 TB online storage

Hardware/Processing upgrades

- Additional File Server is scheduled to arrive on 9/15/11 and to be implemented in SIPS OPS in September 2011

- SIPS data throughput enhancements for Level 2 processing
  - Intel Nehalem Xeon 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 NFS mounted disks for the large and shared access to the TES PGE Work-Space, instead of local mounting this data for each compute node, improving the 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 completed the Release 12 processing of 407 Global Survey and 526 Special Observation data collected while the Release 12.1 software upgrades were in progress. SIPS has started the R12.1 reprocessing and will have all data products previously delivered for R12 superseded as they are reprocessed.

- The last six months SIPS has delivered the following volume to ASDC under a rate of 3x; where 1x is the volume for 3.5 Global Surveys:
  - L1B: 1721 GB L2: 652 GB L3: 10 GB

TES Level 2, Data Version 5

- The Version 5 TES L2 standard product data generated by the Release 12.1 software includes:
  - Computation of Instantaneous Radiative Kernel (IRK) product for ozone (O_3)
    - Using TES jacobians, TES ozone profiles and an estimate of angular anisotropy, it is possible to compute vertical profiles of instantaneous radiative forcing and instantaneous radiative forcing kernels (IRK) for ozone. The IRK values would provide unique information to questions of chemistry-climate coupling since they are a direct measure of the radiative role of ozone while implicitly accounting for more dominant radiative processes such as clouds and water vapor. These products can be compared to climate model predictions of the present day radiative forcing from ozone.
  - All Band Retrieval (BAR)
    - Algorithmic updates to the Level 2 retrieval processing will result in an improved CO_2 product, improved sensitivity to methane (CH_4), water (H_2O/HDO) and the addition of nitrous oxide (N_2O) species. These updates will better utilize the TES instrument's potential and highlight the capability of the instrument to support future scientific analysis and proposals.
    - Updated covariance and constraint matrices for surface temperature
    - Updated absorption coefficient (ABSCO) tables

TES Level 2, Data Version 5 (cont.)

- Added nitrous oxide (N_2O) as a new retrieved species and as a deliverable product to the Langley DAAC.
- Data supporting the joint TES-MLS carbon monoxide (CO) product written to the TES database on the TES pressure level grid.
- Updated TES Level 2 Laser Frequency PGE, supporting ozone retrieval step processing.
- A validation analyses is underway; Validation report will be provided late this year.
- A data quality statement and Data Users Guide will be provided to ASDC for Version 5.

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 prototype target scene matching code utilizing TES and MLS datasets
  - Naming conventions and joint product metadata definitions (inventory, core, instrument specific) which have been incorporated into the wider 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,…)

Release 12.2 and Upcoming Releases

- Release 12.2 product enhancements
  - Support of GEOS-5.7.2 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).
  - Generation of gridded and reformatted TES Level 2 ozone products to support IPCC pressure levels. This is formatted according CF and CMIP5 specifications.
- Future Product enhancements (Release 13, and beyond)
  - Joint TES-MLS Carbon Monoxide (CO) and TES-OMI products
  - New standard products for Methanol (CH_3OH) and Formic Acid (HCO_2)
  - Level 2 “Lite” products for HDO, Methanol, Ammonia
  - 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,…)

Future State of SIPS Data Production

- TES GDS software Release R12.1 reprocessing scheduled, August 2011 – November 2012

- ESDT updates for future Release 13
  - L1B ESDTs
    - Version 004, File version F03_05
  - L2 ESDTs
    - Standard/Ancillary products: Version 006, File Version F07_09
    - Supplemental products: Version 006, File Version F07_09
    - Summary/Ancillary products: Version 006, File Version F04_09
  - L3 ESDTs
    - L3 products (daily, monthly grid and browse): Version 004, File Version F01_09

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-5.7.2 delivery in late 2011 has caused a Release 12.2 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.