GSSC USER SUPPORT

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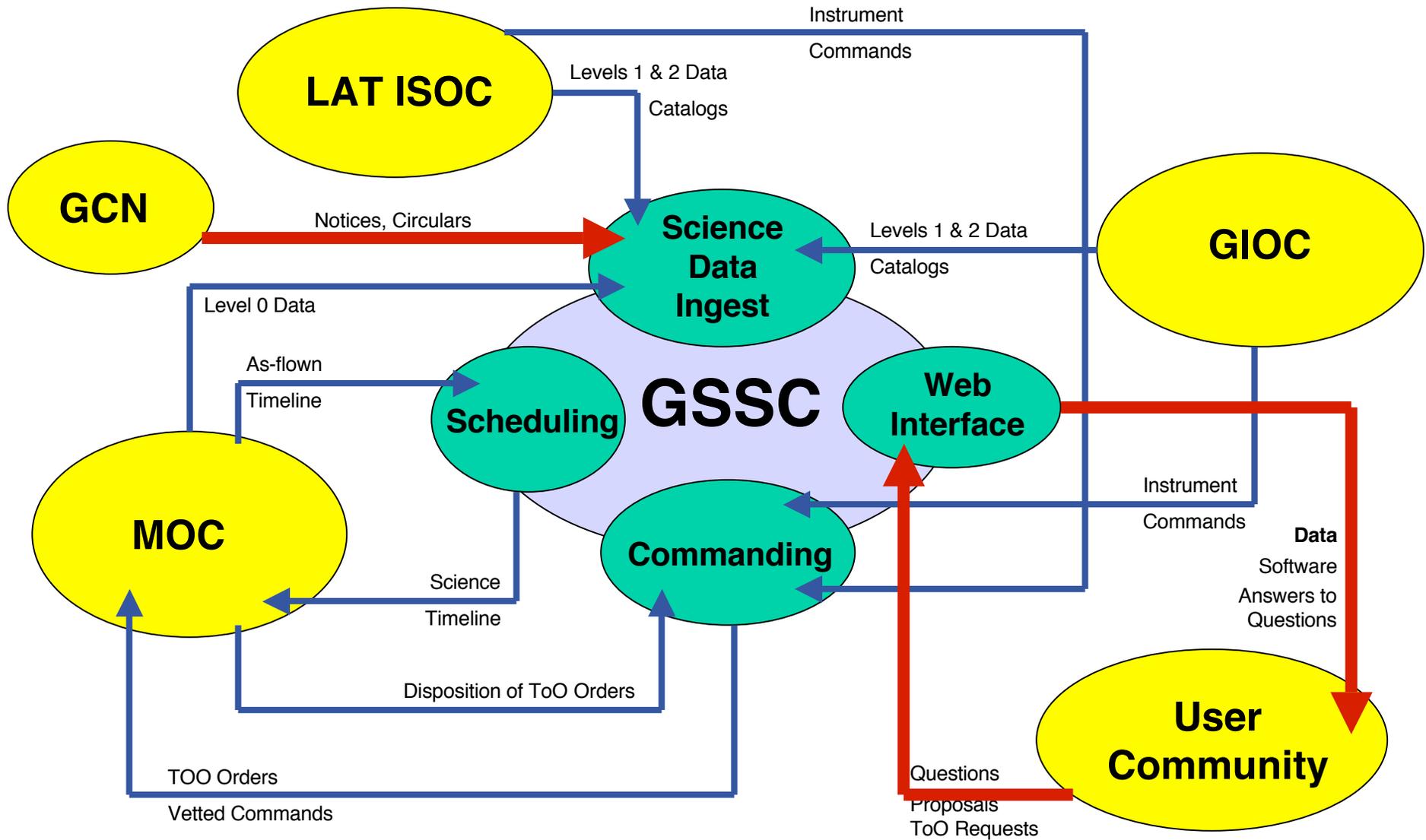
Overview

- The User Support section assists the scientific community:
  - Analyze GLAST data
  - Prepare Guest Investigator (GI) Proposals

- This section also runs the GI Program for NASA HQ:
  - NASA Research Announcement (NRA) development
  - GI proposal administration
  - Technical evaluation of proposals

- Requirements are found in the GSSC Functional Requirements Document (433-RQMT-0002) while the tool designs are in the GSSC Design Document (GSSC-0003).

User Support Among GSSC Systems

GLAST

LAT ISOC

Instrument Commands

Levels 1 & 2 Data

Catalogs

GCN

Notices, Circulars

Science Data Ingest

Levels 1 & 2 Data

Catalogs

GIOC

Level 0 Data

As-flown

Timeline

GSSC

Scheduling

Web Interface

MOC

Science

Timeline

Commanding

Instrument

Commands

Data

Software

Answers to

Questions

Disposition of ToO Orders

Questions

TOO Orders

Vetted Commands

Proposals

ToO Requests

User Community

Guest Investigator (GI) Program—Time Periods

- The mission has 3 phases:
  - Phase 0—the ~60 day checkout period after launch
  - Phase 1—the 1 year sky survey while instrument teams calibrate their instruments. Except for observations of transients, the data are restricted to the instrument teams and a small number of GIs.
  - Phase 2—the rest of the mission until deorbit. The GI program drives the observations, although survey mode will probably predominate.

- There will be yearly GI cycles. Cycle 1 and Phase 1 will coincide and only ~a dozen GIs will be selected. ~100 GIs will be selected in each subsequent cycle.

- A GLAST Fellows Program is planned.

The GI Program—Administration

- We plan to administer the GI program using standard LHEA procedures. We are consulting with the Guest Observer Facility (GOF) managers in LHEA.

- A two step proposal process will be used: the funding proposal will be submitted only if the science proposal has been accepted. The NASA Program Scientist has approved this.

- For a February 1, 2007, launch:
    - NRA development—10/1/05
    - NRA release—5/15/06 ($\therefore$ Included in ROSS-06)
    - Proposal deadline—8/15/06
    - Peer review—11/15/06
    - Cycle begins—4/1/07

GI Program Administration Tools

- Proposal information will be submitted using OGIP's Remote Proposal System (RPS), customized for GLAST. Target information entered through RPS will be transferred electronically to the scheduling tool for the accepted proposals with observations.

- The scientific justification will be FTPed to a GSSC server.

- Abstracts of successful proposals will be accessible through a BROWSE interface and the GSSC website.

- OGIP software and services will assist in administering the peer reviews.

Proposal Tools

One Tool (vertical label, spanning S-01a through S-01e)

ID	Name	Description	Code reuse
S-01a	Source Name Resolver	Resolves standard source names in to coordinates using NED and SIMBAD	Perl scripts available
S-01b	Background Estimator	This tool estimates the background flux from the diffuse Galactic and extra-galactic emission from a given point or region on the sky.	May use SAE code.
S-01c	Exposure Calculator	This tool calculates the rate at which exposure is accumulated (e.g., cm^2-s per day) for a point on the sky. Trade studies will determine whether the exposure accumulation rate depends significantly on the orbit precession phase.	
S-01d	??PIMMS	This tool calculates the expected count rate for a given source and a given mission. Input may be the source parameters from another mission.	PIMMS
S-01e	Sensitivity Calculator	This tool uses the background, the source count rate and the exposure accumulation rate to calculate the time for a source detection, for significant variability, etc.	
S-02	Exposure Analyzer	Reads in pointing history (FT2) and plots ex posure map and history. Can be used to evaluate past, future and proposed observations	May use SAE code.
S-03	Orbit Simulator	Simulates an orbit with an observation plan	SAE's O1 with web interface
S-04	Observation Simulator	Simulates an observation of a given region	SAE's O2, no additional interface
S-05	Simulated spectral analysis A	Permits user to simulate the 1D spectral analysis of a source.	Webspec or XSPEC, no additional interface
S-06	Simulated spectral analysis B	Permits user to simulate the 3D (spectr al+spatial) analysis of a source.	Likelihood , no additional interface
S-07	GBM Simulated Spectral Analysis	Simulates the spectral analysis of a burst observed by the GBM.	Webspec or XSPEC, no additional interface

Color groups related software.

Delivery of the SAE

- Users will download the SAE to their servers using the HEASARC distribution software for UNIX platforms. A similar methodology will be developed for Windows.

- Initially, the software will be downloaded from the GSSC website (with links from the HEASARC website), while later in the mission it will be downloaded from the HEASARC website (with links from the GSSC website).

- A full port to all FTOOLS-supported platforms, including Windows, will be performed before launch.

Documentation

- Clear documentation is crucial for the success of the SAE.

- The documentation of the analysis system will evolve during the data challenges (i.e., the drivers are the data challenges and the GI program), starting with contributions from the tool developers. The ISOC recently hired a technical writer.

- The GLAST Science Plan will describe the observatory and its capabilities, and will be part of the NRA package.

- All GLAST scientists and the Users' Committee will be asked to review these documents.

- User Support will also assist users through a helpdesk (discussed next)

Helpdesk

- In addition to copious on-line documentation, the GSSC will answer user questions through a 'helpdesk' with a response time of 2 business days.

- The 'helpdesk' administration tool can track the response time.

ID	Name	Description
S-61	Help Desk Question Submission	Enables users to submit questions about GLAST analysis to the GSSC via a webform.
S-62	Help Desk Response Administration	Transfers the questions submitted via the GSSC helpdesk (S -61) to duty scientists responsible for answering them, tracks the response time, archives subsequent correspondence.
S-63	FAQ Access	Enables the website user to browse and search the list of frequently asked questions compiled from the GSSC helpdesk submissions.

- This software already exists for S-61 and S-62.

Target of Opportunity (TOO) Tools

- The GSSC will receive TOO requests through a customized RPS form that will allow the requester to justify the request, and to input the source's coordinates and the requested TOO duration. Target information entered through RPS will be transferred electronically to the TOO order tool. RXTE uses this methodology.

- Once the TOO has been approved, the GSSC's submission of the TOO order to the MOC will trigger the posting of the TOO's approval to the GSSC website. The TOO webpage will be updated with the results of the TOO.

Posting Mission Results

- The GSSC is required to post on its public website information related to the GLAST mission and its results.

- Many of the GLAST data products—e.g., Level 1 data and catalogs—will be in databases accessed through BROWSE. The posting of these data is NOT handled by User Support.

- Here is described the posting of:
  - Timelines
  - Count Maps
  - Exposure Maps
  - Maps of the Diffuse Emission
  - GRB Data

Posting Timelines

- The GSSC will post:

  – Annual science timelines (planned observations for 1 year with 1 week resolution)

  – Preliminary science timelines (covers 1 week, created ~month in advance)

  – Final science timelines (covers 1 week, created a few days in advance)

  – As-flown timelines (covers 1 week).

- Ingest of these timelines will trigger the posting; therefore the latency should be hours.

ID	Name	Description
S-11	Weekly Timeline Display	Posts the weekly science timelines
S-12	Annual Timeline Display	Posts the annual science timeline
S-13	As-Flown Timeline Display	Posts the as-flown timeline

- These timelines are simple lists of when the observatory was/will be in survey mode, and if in pointed mode, what was/will be the target.

- But users might want to know when a source was/will be observed and how much exposure was/will be accumulated.

- The LAT pointing/livetime history, a LAT Level 1 data product, reports the spacecraft position and LAT pointing with 30 s resolution. The FITS file type is called FT2.

- The Exposure Analyzer tool (included in the proposal preparation tools above) will read an FT2 file and produce an exposure map for a desired space and time range, AND an exposure timeseries for a particular point on the sky.

Therefore:

- The LAT data product provides the exposure history for the past.

- Production of preliminary and final science timelines will include corresponding FT2 files, providing a prediction of the exposure history for up to a month in the future.
    - A user will then know precisely when his/her source will be observed by GLAST.

- A user can run the Orbit Simulator, an SAE tool, with a desired pointing, producing an FT2 file.
    - Note that the accuracy of any orbit simulation diverges.

Posting Scientific Results

The GSSC is required to post mission results. Some of these postings are regular products—exposure and count maps—that will be created regularly (e.g., weekly, monthly, yearly), while other postings will be triggered by the ingest of the relevant data products.

ID	Name	Description
S-51	Count Map Generator	Generates count maps. The tool will be run periodically by a software pipeline.
S-52	Exposure Map Generator	Plots the exposure map for the entire sky and select regions. The tool will be run periodically by a software pipeline.
S-53	LAT Diffuse Emission Display	Displays the current diffuse emission model
S-54	GRB Map Display	Creates and displays map of GRB locations
S-55	GRB Lightcurve Display	Displays a lightcurve for each GRB
S-56	GCN Post	Receives, arc hives and posts on a webpage GLAST GCN Notices and Circulars.

Schedule—Principles

- The GI program is the driver for the User Support tools and documentation:

  – The proposal tools and documentation must be ready when the NRA is released

      (L-10.5 month = mid-May 2006 $\Rightarrow$ GSSC Release 6 on 4/3/06)

  – The display tools are not required until there are data after launch (GSSC Release 7 on 1/31/07).

- The software release schedule reflects this driver.

- If tools are ready before their release date, they may be used in the Ground Readiness Tests; their availability when the corresponding simulated data are ingested would be a nice touch.

- Many of the tools exist or can be based on existing tools.

Summary

- The User Support tools have been defined, and the use of SAE tools and code identified.

- The proposal preparation tools will provide users with different levels of generality and accuracy.

- Interactions with other sections have been resolved.

- Development of the NRA and documentation will be a major activity.