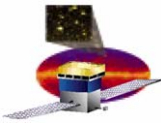**Gamma-ray Large Area Space Telescope**

GLAST Large Area Telescope
## Instrument Science Operations Center

**Monthly Status Review
2 May 2007**

**Rob Cameron
ISOC Manager**

ISOC Highlights

❑ **Recent Events**

– **ETE1a, 3 April 2007**

– **LAT Calibration Unit returned to SLAC, 30 April 2007**

❑ **Current Events**

– **ISOC Workshop at SLAC, 30 Apr – 2 May 2007**

❑ **Upcoming Events**

– **Instrument Commission Simulation #1: 15-17 May 2007**

– **ETE1b: ? May 2007**

– **ETE2, 22 June 2007**

– **Mission Planning Exercise #2, 25 June – 13 July**

– **Flight Operations Review, @GSFC, September? 2007**
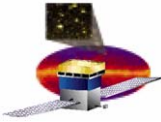
ISOC Workshop #2

- ❏ **Goals**
  - – **To refine the planning for the LEO phase of LAT operations, including test (simulated) data sets**
  - – **To discuss the analyses needed for LEO and routine monitoring of the LAT**
  - – **To clarify the roles and responsibilities of SO, FO, and the mission-level SOOG during operations, including decisions about configurations, calibrations, and mission planning**
  - – **To explain the infrastructure for processing, accessing, and monitoring data**
  - – **To discuss the operations tasks with Collaborators**
- ❏ **Morning presentations; afternoon tool demonstrations & discussions**
- ❏ **43 registrants**
- ❏ **Agenda:**
  http://confluence.slac.stanford.edu/display/ISOC/ISOC+Workshop+Apr+2007+Agenda
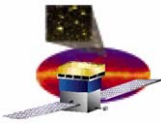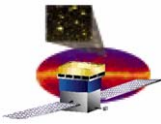
Narrative Procedure Development

- **Narrative procedure development has been flat due to time spent updating existing NPs and reviewing PROCs for ETE1b and ETE2**
  - **92 NPs currently identified**
    - **Three (unwritten) NPs deleted because the activities that would have been described by these NPs are accomplished with an existing PROC**
    - **One new procedure will be needed for the new LPA command – LPASETDEFAULT (B1-0-0)**
  - **61 NPs are at level 3 or higher**
  - **75 NPs are in draft form**
- **Development of ARR and ToO procedures on-hold until release of B1-0-0**
- **Began updating NPs to identify the PROCs they are associated with**
- **Observatory-level procedures being worked with GD in bi-weekly meetings**
  - **Instrument turn on sequence (LAT and GBM)**
  - **LAT Power On**
  - **Observatory Command Checkout**
  - **ARR and ToO Tests**
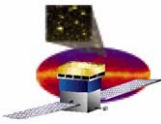 - **Earth-pointed Observation**

Narrative Procedure Status

Status by ETE									
ETE	**Date**	**# of Procedures**	**Level**						
			1	**2**	**3**	**4**	**5**	**6**	
ETE 1	Apr-07	9	0	0	0	0	9	0	
ETE 2	May-07	21	0	0	17	3	1	0	
ETE 3	Jul-07	24	1	1	21	0	0	0	
ETE 4	Aug-07	38	9	3	10	0	0	0	
		92	10	4	48	3	10	0	

Schedule				
	Planned Draft	**Draft Actual**	**Planned Level 3**	**Level 3 Actual**
Apr	3	4	0	0
May	7	8	0	0
Jun	9	5	0	0
Jul	4	0	2	2
Aug	6	8	1	1
Sep	4	9	11	11
Oct	6	7	12	11
Nov	12	11	8	16
Dec	13	12	2	1
Jan	8	7	16	10
Feb	7	2	16	9
Mar	6	1	7	0
Apr	6	1	10	0
May	1	0	6	0
Jun	0	0	1	0
	92	**75**	**92**	**61**

Cumulative NP Progress				
	Planned Draft	**Draft Actual**	**Planned Level 3**	**Level 3 Actual**
Apr	3	4	0	0
May	10	12	0	0
Jun	19	17	0	0
Jul	23	17	2	2
Aug	29	25	3	3
Sep	33	34	14	14
Oct	39	41	26	25
Nov	51	52	34	41
Dec	64	64	36	42
Jan	72	71	52	52
Feb	79	73	68	61
Mar	85	74	75	61
Apr	91	75	85	61
May	92		91	
Jun	92		92	

Narrative Procedure Development Progress

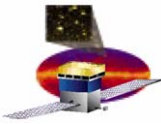**Cumulative NP Progress**

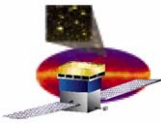4/30/2007
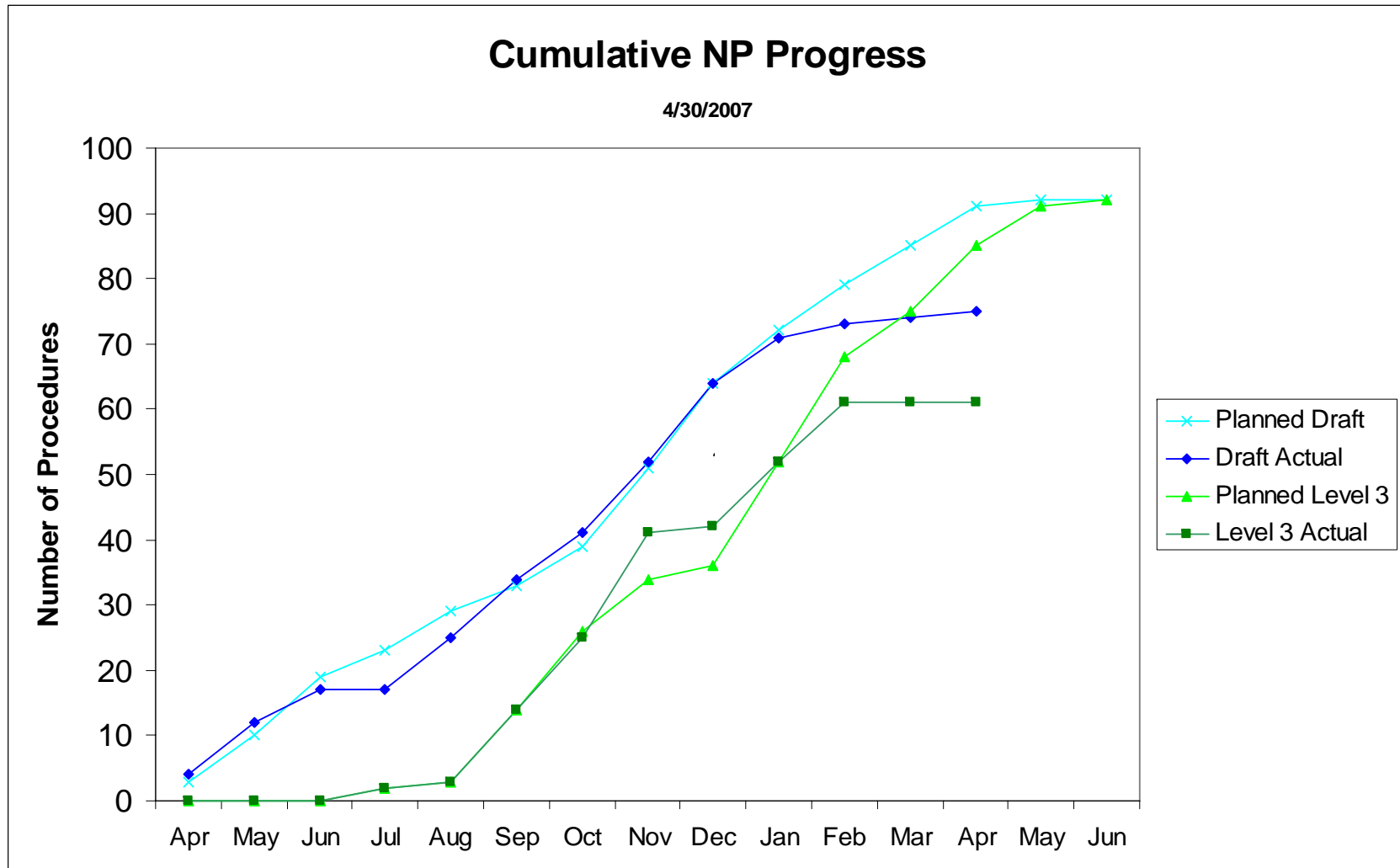
PROC Development

- ❑ **12 ETE1a/b PROCs validated and tested**
  - – **Ready for ETE1b**
- ❑ **34 PROCs currently in development or ready for ETE2 and ETE3**
  - – **Focused on L&EO PROCs that will be used in the Instrument Simulation for LAT turn-on (May 15-17)**
  - – **PROCs reviewed by ISOC personnel**

| PROC	Not Started	Draft	Not complete	Coded	Ready for test	Tested	Total
ETE1	0	0	0	0	0	12	12
ETE2	6	7	5	7	7	1	33
ETE3	16	5	0	0	2	0	23
ETE4	41	0	0	0	0	0	41
Total	63	12	5	7	9	13	109

ETE 1a Test Support

- **Successfully supported ETE1a on 4/3/07**
  - **LAT powered up and down through I&T**
  - **LISOC represented in MOC during the test**
  - **LAT data delivered to ISOC through both I&T and MOC paths**
- **Compared ETE1A data from MOC with data from I&T**
  - **data from MOC was more complete than I&T data**
    - **I&T data incomplete – limitations on data received are understood**
    - **check of sequence counts showed no data gaps in data from MOC (good!)**
  - **identified several issues – entered SOARS**
    - **S-GLAST-0069   Incorrect S/C ID in MOC-delivered level 0 data during ETE 1A**
    - **S-GLAST-0073   Bad packets received in VC00 level 0 file**
    - **S-GLAST-0074   Packets with duplicate CCSDS header received from I&T and MOC**
- **A total of 6 SOARS submitted by ISOC (3 on Level 0 files, 1 on slow receipt of data via MOC display pages, 2 on minor corrections to NPs and associated PROCs)**
- **Observed increasing delay in receipt of LAT diagnostic packets during S-band 1kbps downlink**
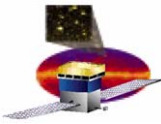- **Feedback provided to the project test lead on overall ETE1a test**

Beyond ETE1a and Simulations

❑ **Reviewed and approved the LISOC parts of the test procedures for ETE1b**

❑ **Internal planning meeting held to define/refine specifics of LAT/LISOC activities for ETE2**
   – **LAT will be powered on by PROC at MOC**
   – **Physics runs will be performed by ATS and PROC**
   – **MOC-delivered L0 data into pipeline 2 will be nominal processing path**
      • **LAT L0 data delivered via I&T will still be used for comparison with the MOC datasets**

❑ **Instrument Commissioning # 1**
   – **Internal planning meeting held to identify specific L&EO activities for the sim**
      • **Identified Procedures: OBS-02, LEO-01, LEO-03**
   – **Involves nominal initial instrument activation**
      • **LAT Power up**
      • **SAA Check**
      • **One or more LPA runs (?)**
   – **LAT personnel at MOC: Thayer, Thayer, Hascall, Grove, Cameron**
   – **Real-time data will be transmitted from MOC to LISOC during test**
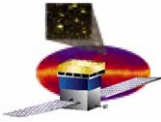
Flight Operations Software Progress

- ❑ **ETE 1a support**
- ❑ **ETE 1b preparation**
- ❑ **Applying ETE 1a lessons learned**
- ❑ **Software development**
  - – **Configuration tools**
  - – **Mission Planning Tool augmentation**
  - – **Software package deployment tools**
  - – **Physics event data dispatch (half-pipe)**
  - – **Web tools (Calibration trending, Mission Plan Viewer)**
- ❑ **Iterated proposal for telemetry ITAR data filtering with MOC/FOT**
  - – **ISOC-provided real-time packet filter ("RedactRT") will control packet data transmission from MOC to ISOC**
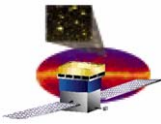- ❑ **Ops Facility infrastructure**
- ❑ **ISOC release 3.0 preparation**

FO Software JIRA issues (as of 4/30)

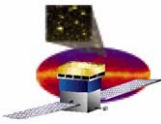| Package	Issues opened since 3/5	Issues closed since 3/5	Total # of issues currently open
Core	95	94	33
Monitor: FASTcopy	4	3	4
Monitor: Logging	6	4	6
Ops Facility	1	4	2
Packages & Installers	29	28	1
Trending: Calibration	2	0	2
Trending: Telemetry	2	4	6
LAT T&C	1	1	2
Totals	140	138	56
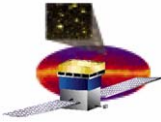
CHS Activities

❑ **Mission Planning Exercise #2 planning**

  – **TDRS planning**

  – **PROC requests input into Timeline Management Tool**

  – **Exercise file uploads**

  – **ToO with replanned ATS timeline**

  – **Exercise PROC parameter file**

❑ **Timeline Planning Tool working group established with MOC, LAT, GD and GBM participants**

  – **Work begun on mission timeline**

  – **Identifying activities for L&EO**

CHS Testing

- ❑ **GRT 6 follow-up completed**
  - – **checked ICD conformance of received data products**
  - – **identified several issues – entered SOARS**
    - • **S-GLAST-0067   ToO notification & Ack files not fully ICD compliant**
    - • **S-GLAST-0068   MOC File Transfer Log files not ICD compliant**
  - – **also entered S-GLAST-0066 (Extraction of Data from CCSDS Packets data product is not ICD compliant)**
    - • **OBE, superseded by new approach for receiving redacted L0 & RT data**
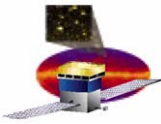 - – **completed GRT6 follow-up activities & forwarded needed info to GRT Lead**

- ❑ **Preparing for release 3.0 acceptance testing**
  - – **changed 3.0 from "regression" to "incremental" test**
    - • **too much testing to do full verification**
    - • **4.0 release to remain full regression test (full execution of all preceding tests)**
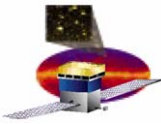
Requirements Tracking

Requirement Category	Release Status & Plan (as of 04/30/07)									total
	1 6/05	1.2 11/05	1.3 2/06	1.4 5/06	2 7/06	2.1 10/06	2.2 2/06	3 6/07	4 9/07	
	GRT2	GRT3			GRT5	GRT6	ETE1 MPEX1	GRT7 ETE2-3 MPEX2	ETE4-6	
Misc (Facility, Redundancy, Security, Doc, etc.)	3	1		2	7	2	4	22	21	62
Mission Planning	2	2					30	12	6	52
Telemetry Processing	1	3	1	7	4	13	1	11	3	44
Science Data Processing				1	2	3		8	22	36
Telemetry Monitoring		1	1	2	1	15	1	7	5	33
Logging			3			4		1	2	10
Trending			12		6	3		1		22
Anomaly Tracking & Notification						6	3	7	1	17
# new reqts verified	6	7	17	12	20	46	39	69	60	276
cumulative total	6	13	30	42	62	108	147	216	276	

Key:	
	Incremental release (only new requirements tested)
	Major release (all requirements satisfied to date tested)

Development Status of Remaining Requirements

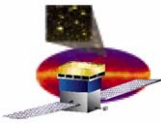| Requirement Category	Release 3.0				Release 4.0			
	Done	I/P	Not Started	Total	Done	I/P	Not Started	Total
Misc (Facility, Redundancy, Security, Doc, etc.)	21	1		22		9	12	21
Mission Planning	8	2	2	12		2	4	6
Telemetry Processing	8	3		11		1	2	3
Science Data Processing	6	2		8	2	20		22
Telemetry Monitoring	4	2	1	7			5	5
Logging	1			1		1	1	2
Trending		1		1				0
Anomaly Tracking & Notification	6	1		7		1		1
# new reqts developed	54	12	3	69	2	34	24	60
cumulative total	201			216	203			276

Science Operations Activities

❑ **Review of SO requirements performed**

- **identified status of each item against ISOC core release schedule, and revisiting the timeline and applicability of software releases**

❑ **Developed an overview of monitoring activities for on-orbit operations as part of lessons learned from ETE1 test**

- **Series of tools already available**
  - **using workshop to gather users feedback to tailor displays for operations and assess interdependence between them**

❑ **Workshop discussions**

- **Discussion on Instrument Commissioning and ETE2 tests**
- **Obtaining Pointing & Livetime History from the L1 Pipeline**
- **Data monitoring**
- **ISOC CCB and "SOOG" discussion**
- **Documenting L&EO analyses**
- **Technical discussions on how to treat pointing and livetime information**
- **Data processing, bookkeeping and missing data policy**
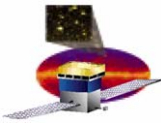- **Overview of Shift-Taking Activities for Flight Ops and Science Ops**

LAT Calibration Unit returned from Beam Test

❑ **Arrived at SFO on 29 April 2007**

❑ **Currently in Building 33 at SLAC**
   – **will be moved into the clean room morning of May 2**

❑ **Installation of EGSE already started**
   – **expect post-ship functional tests to be started either Tuesday afternoon or Wednesday morning**
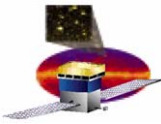
❑ **Plan to hand CU back to Project/ISOC by the end of the week**
   – **To fulfill flight hardware requirements it will remain in B33 until details on transportation and mechanical set-up are finalized**

SAS Status: Service Challenge
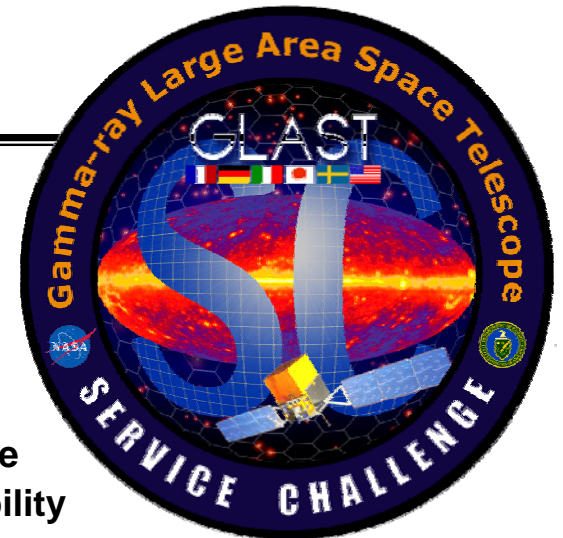
❑ **Service Challenge Work**
- **Working to 3 near term goals**
  - **1-year gtobssim run (early April)**
    - **New orbit, sky model**
    - **Include diffuse response and exposure cubes in pipeline**
      - » **Nicola Omodei (Pisa) took over pipeline responsibility**
      - » **Done (found bug in gtmaketime postprocessing; redoing)**
  - **5-day Gleam run with pointing**
    - **Pointing, new background new interleave scheme tested**
    - **Issues with ACD sim found/fixed. Background rej shows real improvement!**
    - **Leading to new 55 day run (early May)**
    - **Backgrounds used for (almost) final PASS5 analysis (Atwood)**
    - **Development of IRFs**
  - **L0 Gleam run (leading to single downlink runs)**
    - **L0 file simulation now being tested; first runs happening**
    - **Investigating tools to allow L0 interleave**
    - **Bari folks looking at LAT failure modes etc for downlink tests**
      - » **Looking at using calibrations rather than on/off of units to simulate failures**

SAS: Sundry Items

- **Ordered 50 TB disk**
  - **install at end of this week**
  - **Planning remaining hardware purchases (240 cores, 200 TB disk).**
  - **Computing center addressing power issues with Sun "Black Box" and water cooled racks. Seems to be on track.**
- **Operations Tools being configured**
  - **Ops Log, Data portal, Processing summary pages**
  - **In conjunction with SO**
- **Xrootd**
  - **Will use 55 day run to stress test**
- **Pipeline 2 stress testing**
  - **Buildup to 55-day run providing a lot of stress testing and opportunity to add similar user machinery to P1 for QC etc.**
- **Pipeline2 @ Lyon**
  - **Now testing running jobs at Lyon, submitted from Pipeline 2**
  - **Working details (eg batch id's are nnnn.nodeName at Lyon, not nnnn)**