

GLAST Large Area Telescope Instrument Science Operations Center

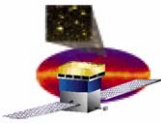
Monthly Status Review 6 June 2007

Rob Cameron
ISOC Manager



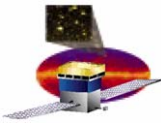
ISOC Highlights

- ❑ **Recent Events**
 - ISOC Workshop at SLAC: 30 April – 2 May
 - GLAST Instrument Commissioning Simulation #1
 - GSFC: 15-17 May 2007
 - Supported GIOC review at NSSTC
- ❑ **Upcoming Events**
 - ISOC Core Release 3.0: June 8
 - GSSC review: 11 June (telecon participation)
 - GRT #7: 20-21 June
 - ETE1b, ETE2: mid-July
 - Mission Planning Exercise #2: 25 June – 13 July
 - LAT Collaboration Meeting: SLAC, 31 July – 3 August
 - Instrument Commissioning Simulation #2: 15-16 August
 - Flight Operations Review
- ❑ **Jon Pineau extended to continue support for NP development and PROC review**
 - Concentrating on L&EO NPs and PROCs



Narrative Procedure Development

- ❑ **Re-planned Narrative Procedure development to match current schedule of ETE2, ETE3, and ETE4. Instrument Sims included in setting NP development schedule.**
 - **Total of 105 NPs identified**
 - **86 written (82%)**
 - **73 reviewed at level 3 or higher (70%)**
 - **All ETE2 NPs are at level 3 or higher**
 - **Expect to bring 3 more NPs to level 3 before end of month**
- ❑ **Thirteen new NPs identified**
 - **Ten for LRA commands – to be written by end of July**
 - **Three for LIM commands – in draft form**
- ❑ **Updated existing NPs for B0-10-0 T&C changes**
 - **Changes to LIM**
 - **Change to LPASTART command**



Narrative Procedure Status

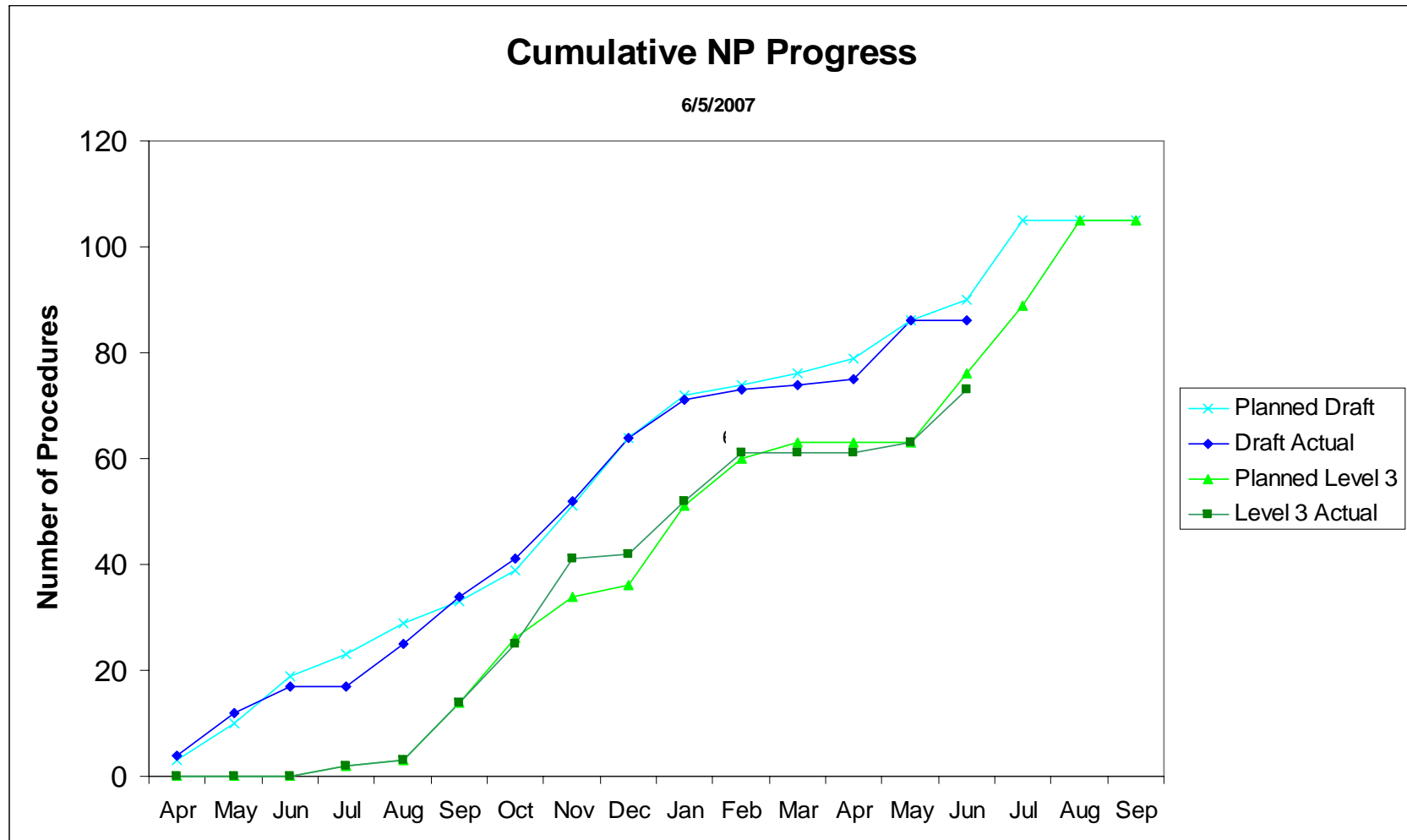
Status by ETE								
ETE	Date	# of Procedures	Level					
			1	2	3	4	5	6
ETE 1a	Apr-07	2	0	0	0	0	2	0
ETE 1b	Jul-07	8	0	0	0	0	8	0
ETE 2	Jul-07	24	0	0	16	8	0	0
ETE 3	Aug-07	25	2	0	22	1	0	0
ETE 4	Oct-07	46	11	0	16	0	0	0
		105	13	0	54	9	10	0

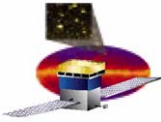
Schedule				
	Planned Draft	Draft Actual	Planned Level 3	Level 3 Actual
Apr	3	4	0	0
May	7	8	0	0
Jun	9	5	0	0
Jul	4	0	2	2
Aug	6	8	1	1
Sep	4	9	11	11
Oct	6	7	12	11
Nov	12	11	8	16
Dec	13	12	2	1
Jan	8	7	15	10
Feb	2	2	9	9
Mar	2	1	3	0
Apr	3	1	0	0
May	7	11	0	2
Jun	4	0	13	10
Jul	15	0	13	0
Aug	0	0	16	0
	105	86	105	73

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	51	52
Feb	74	73	60	61
Mar	76	74	63	61
Apr	79	75	63	61
May	86	86	63	63
Jun	90	86	76	73
Jul	105		89	
Aug	105		105	



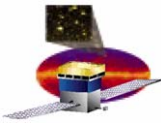
Narrative Procedure Development Progress





NP Preparation for Instrument Simulation #2

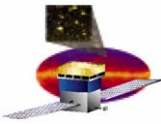
- ❑ **Instrument simulation #2 scheduled for Aug 15-16**
 - **All NPs for LEO activities except for one are at level 3 or higher**
 - **Remaining NP is LIM-13 TOO Monitor, which is in draft form and scheduled to be at level 3 by August**
- ❑ **Inst Sim #2 will include contingency testing**
 - **Preliminary identification of 28 NPs that could be used for contingency commanding during LEO**
 - **23 are at level 3 or higher**
 - **Remaining 5 will be at level 3 by August**



Preliminary List of Contingency NPs

L-LAT-03	Send No-op Commands
L-LFS-05	Directory Dump
L-LFS-07	File Dump
L-FIL-03	File Upload Cancel
L-LTC-01	Start LAT Thermal Control
L-LIM-04	Set ACD Bias Voltages
L-LIM-05	Set CAL Bias Voltages
L-LIM-06	Set TKR Bias Voltages
L-LIM-07	Configure GBM Interface Handling
L-LIM-08	Configure ACD High-Voltage Handling
L-LPA-02	Terminate Physics Observation
L-LIM-01	Hold Mode
L-LIM-12	Abort ToO Observation
L-LTC-02	Stop LAT Thermal Control
L-LTC-04	Restart LAT Thermal Control
L-LTC-05	Set LTC Parameters
L-LTC-06	Control LTC Heaters
L-LTC-07	LTC Diagnostic Data
L-LHK-01	Restart and Reinitialize LHK*
L-LIM-02	Load Shed
L-LIM-15	Component Power On
L-LIM-16	Component Power Off
L-LIM-17	ARR Abort
L-LAT-02	LAT Power Down
L-PBC-02	SIU Primary Boot (Warm Reset)*
L-PBC-04	EPU Primary Boot (Warm Reset)*
L-PBC-08	Boot No-op*
L-PBC-09	PBC Error Dump*

*not at level 3 yet



PROC Development

- ❑ From Elizabeth Ferrara, 1 June
- ❑ 12 ETE1a/b PROCs have been revised and need to be retested
 - Revised due to update of ITOS, for handling of NULL object comparisons
- ❑ 40 PROCs currently in development or ready for ETE2 and ETE3
 - PROCs being reviewed with ISOC personnel
- ❑ Elizabeth Ferrara will be at SLAC during 18-22 June for PROC testing
 - Testbed time being coordinated with FSW needs.

PROC	Not Started	Draft	Not complete	Coded	Ready for test	Tested	Total
ETE1	0	0	0	0	12	0	12
ETE2	5	1	9	2	19	1	37
ETE3	16	5	1	0	2	0	24
ETE4	41	0	9	0	0	0	50
Total	62	6	19	2	33	1	123



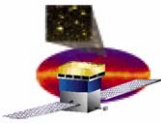
Test Support Activities

- **Continuing to prepare for GLAST Mission Planning Exercise #2**
 - **3 week activity**
 - **Will exercise weekly MP product exchange and review as in MPEx1**
 - **New test items**
 - **ISOC will send a PROC request with an associated upload file**
 - **ISOC will send a PROC request with a parameter file**
 - **PROCs will be automatically entered as activities in the Timeline Management Tool and the FOT will schedule them on the timeline**
 - **GSSC and MOC will exercise a ToO request and the ISOC will receive a notification**
- **Planning for MPEx3**
 - **Delivery of RPS report to GSSC**



ETE2 Test Preparations

- Preparations are underway to participate in ETE2 currently scheduled for July 14-15
 - LAT will be powered up via PROCs at MOC for the first time
 - Physics runs will be performed by PROC (and by ATS?)
 - 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
 - L1 data will be delivered to GSSC post-test
- Meeting held to review the planned activities and ensure adequate time and comm availability for LAT to accomplish objectives of the test
 - Currently, day 2 of ETE2 allocated to LAT activities
 - 132 LAT PROCs to be executed in total; 35 PROCs to be used with the LAT for the first time
 - **Cannot realistically expect all the above to be accomplished in one 12-hour test day.**
- Current plan is for 4 LISOC personnel at the MOC to support ETE2 activities



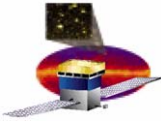
Mission Simulations

Instrument Commissioning # 1

- ❑ **Successfully supported the Instrument Commissioning # 1 on May 15 – 17**
 - 6 LAT/LISOC personnel supported the Test at the MOC
 - Helped the LAT team become familiar with how to work in the MOC environment
 - Practiced on-console activities, voice loops, Exercised anomaly resolution, used the Time Management Tool, Change Request Process, etc.
 - Voice-loop patch in from SLAC and real-time data flow to SLAC was established for the final test day

- ❑ **Participated in post-sim Project debrief and shared lessons learned with other participating elements**

- ❑ **Internal Lessons Learned meeting held amongst the LAT personnel participating at the MOC and at the SLAC**
 - About a dozen Action Items identified are currently being worked

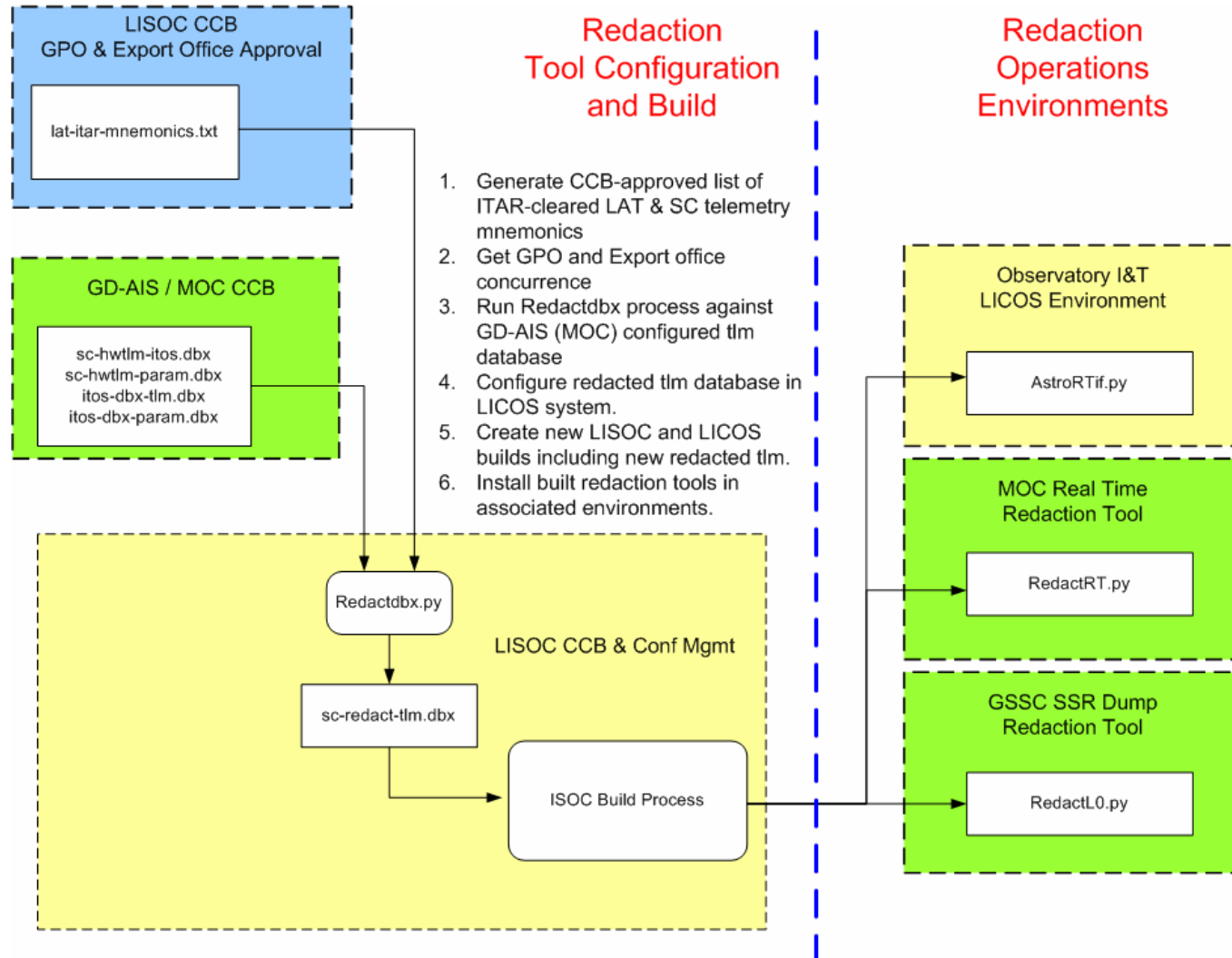


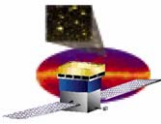
Flight Operations Software Progress

- ❑ **ISOC Release 3.0 preparation**
 - Configuration tool development (populates MOOT DB)
 - Mission Planning Tool development
 - Timeline reconciliation. Reconciles LAT data against plan.
 - Data accounting
 - Pipeline processing of non-event data
 - Software package deployment tools
 - Web tools (Logger, Trending, Mission Plan Viewer)
- ❑ **ISOC Release 3.0 V&V preparation**
- ❑ **Computing platform infrastructure maintenance**
- ❑ **Packaged and delivered telemetry Redactors to MOC & GSSC**
 - Applies mask filter to deliver only allowed telemetry to ISOC.
 - Executables delivered MOC and GSSC.
 - MOC has installed and internally tested RedactRT. Request made to MOC to exercise it during EMI testing.
 - Accompanying CCR submitted.
- ❑ **ISOC Ops Facility infrastructure work**



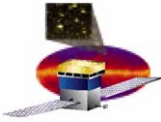
Redaction Tool Development





FOS JIRA issues (as of 6/4)

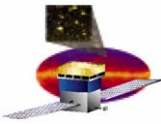
Package	Issues opened since 4/30	Issues closed since 4/30	Total # of issues currently open
Core	40	66	39
Monitor: FASTcopy	0	0	4
Monitor: Logging	1	2	5
Ops Facility	10	8	4
Packages & Installers	19	41	5
Trending: Calibration	4	0	4
Trending: Telemetry	10	9	7
LAT T&C	0	0	2
Totals	84	126	70



CHS Testing

- ❑ **ISOC release 3.0 to be used for three near-term tests**
 - **GRT7, MPEX2, ETE2**
 - **development being wrapped up this week**
 - **acceptance tests next week**
 - **unexpected sickness & leaves delayed some test preps**
 - **verifying functions needed for upcoming June tests first (e.g. most mission planning changes)**
 - **acceptance test of other reqts can be delayed to following weeks without delaying SW release freeze or affecting outside groups**

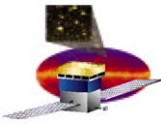
- ❑ **Some GSRD-derived ISOC reqts sign-off being reassigned from GRT 7 to other tests**
 - **many mission planning reqts better verified in MPEX #2**
 - **ETE provides more realistic data for verifying automatic L0/L1 processing**



Requirements Tracking

Requirement Category	Release Status & Plan (as of 06/04/07)									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	2	3	1	7	4	13	2	9	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	7	7	17	12	20	46	40	67	60	276
cumulative total	7	14	31	43	63	109	149	216	276	

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



Current Developments in Science Ops

- ❑ The application for assembling the pointing/livetime/mode history (FT2) from the LAT science data has been prototyped (A. Tramacere/ASI, SLAC)
 - Reads the attitude and location quaternions and time stamps from the Magic 7 data and derives incremental livetime from the digi file for the same time range
 - Will be integrated with the L1 pipeline in June, and accounting for livetime lost due to missing data or incomplete reconstruction of L1 processing 'crumbs' will be added
- ❑ IRF monitoring group (led by C. Cecchi/INFN)
 - testing their monitoring scripts using the obssim2 data set and unifying them for implementation in the Pipeline system at SLAC
- ❑ Configurations infrastructure for monitoring (M. Kocian/SLAC, T. Burnett/U.W.)
 - Gleam is being updated to allow it to read alternate specifications of the configuration of the GEM, which includes the trigger specifications
 - This advance is quite important for SO testing
- ❑ Effect of the high rate of ACD hits by low-energy particles on the trigger and veto (A. Tramacere, ASI/SLAC)
 - Estimated at the order of magnitude level and found to be small
 - The energy dependence of the effect will be quantified and documented with a special AllGamma run
- ❑ Data Analysis for Timing in for L&EO (M. Kocian/SLAC, E. Grove/NRL)
 - Evaluating rate of particles needed for MIP filter
 - may lead to additional LATC configuration
- ❑ Defining Science Ops goals for ETE2 including training with Flight Ops (E. do Couto e Silva/ M Hakimi/SLAC)
 - Fast Monitoring, Time Dependent Monitoring, End of Run Digi Monitoring and Data Processing Monitoring (Pisa/SLAC) on target for E2E



LAT ISOC Operations Simulations

- **What are they ?**
 - **two (maybe three) rehearsals @ SLAC prior to launch**
 - relies on participation of the LAT Collaboration
 - internal requirements imposed on us by us

- **Goals**
 - **To rehearse ISOC launch and early orbit activities**
 - **To rehearse command and control of LAT in flight-like manner**
 - **To practice roles and responsibilities of SO, FO, and the mission-level SOOG during operations, including decisions involving operations**
 - e.g. mission planning, contingency actions, changes in configurations and calibrations, etc.
 - **To demonstrate readiness of the infrastructure used for transferring, processing, accessing, and monitoring data and data processing**
 - **To generate plots, tables and reports necessary for L&EO**
 - **To address data analysis needed for L&EO**
 - present results and corresponding analysis methods
 - » in coordination with the Science Groups, in particular C&A.



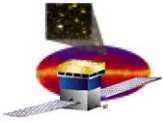
ISOC Operations Simulation 1

□ Date and Location

- 1 week (Oct 8 to 12, 2007) @ SLAC ROB room (C&D) and ISOC ops room
 - We will have a brief introductory session to explain how the rehearsal will work (day 1)
 - Rehearsal means only a few ppt presentations! (days 2-4)
 - » shifts needed depending on attendance and scope of the rehearsal
 - Debriefing session and presentations of L&EO analysis (day 5)

□ Topics

- Operations
 - Procedures/Processes
 - On console activities
 - Contingency activities
 - » data analysis to resolve issues (timescale hours to a day)
- Infrastructure
 - Data Transfer
 - Data Processing
 - Data and Data Processing Monitoring
- Data Analysis as planned for L&EO
 - short term (timescale a few days)
 - long term (timescale weeks or more)



LAT Calibration Unit

❑ Hardware Status

- Currently in the clean room in Building 33 at SLAC
- All hand-off tests from Pisa to SLAC have been successfully completed and documented

❑ Mechanical Support

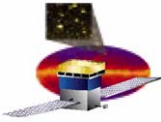
- currently assessing mechanical modifications to support structure so that CU can be moved into the ISOC dataflow lab



SAS Status: Service Challenge

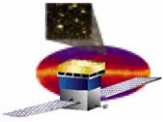
- ❑ Service Challenge Work
 - 1-year gtobssim run (redone and just released to GSSC)
 - New orbit (with pointing), sky model
 - Large Backgrounds run completed
 - All sims in Pipeline 2 now - stress testing
 - ~6B events generated (1 orbit day)
 - 21400 batch jobs on 350 - 400 CPUs
 - 5 days elapsed time
 - Now in use for PASS5 backgrounds analysis - “final” pre-launch
 - Preparing bookkeeping for backgrounds interleave process
 - Upcoming simulations: all to be done by end June
 - 1-day sampled run of backgrounds with alternate hadron shower model - to see if backgrounds analysis notices any difference
 - 3 hr run, full simulation, pointed at vela
 - Ditto, but with interleave to see how interleave and pointing behave
 - Ditto, with L0 included for SO & L1 pipeline testing
 - Ditto, with L0 interleave for future SO test datasets
 - GRB sims with interleave
 - 55 day run



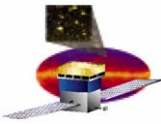


Sundry Items

- ❑ **Ordered 50 TB disk & 240 compute cores**
 - To be installed in mid July in SCCS water cooled racks
 - Represents full CPU allotment for launch (data + MC)
 - Plan to add 150 TB before launch
 - Current 50 TB is to tide us over
- ❑ **Data access tools being configured**
 - Data Catalogue, LAT Data & Astro Servers
 - Timed for release of 55 day data to collaboration
- ❑ **Xrootd**
 - Used recent sims to test it. Now have a production mode set up and are working through error handling issues.
- ❑ **Pipeline2 @ Lyon**
 - Now testing running jobs at Lyon, submitted from Pipeline 2
 - Working details (eg transfer of log and output files to SLAC)
- ❑ **Pipeline @ Bologna**
 - 2 Italian colleagues getting “GRID training” this week



Backup slides



Science Ops: ISOC Workshop 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