**Themis Software Task Priorities (In Play / In the Queue) - 8/15/08**

To Be Discussed - Top of Meeting

1. Data and Misc Issues
   a. L1 ESA CDF and thm_load_esa feedback to Thomas (Jim McFadden and Davin).
   Jim McFadden stated not this month. (ask again in September)
2. Jim McFadden
   a. n_3d_new_3
3. Davin
   a. thm_sst_pseb, thm_part_moments - two bugs (from Pat)
   b. default sst mask (from Bryan)
   c. default masking of full/burst SST bins [0,16,32,48] is still necessary (from Bryan)
4. John B.
   a. Document EFI caveats
5. Harald
   a. Re-process new Keograms from Calgary Rsync. All data through 4/1/8 processed.
   Another week to complete the processing. b. Reprocessing of Mosaic issues from Jim M
   c. no jpegs since May
6. Web
   a. Beef up instrument web pages and include caveats for each.
   b. Enhanced Data Drop Down web page and new Data web pages.

Tim

1. Support Mirror Sites: a. Japan (ISAS) b. Austria c. France (**Rumi** - not always up to date for gmags)
   d. UCLA - Generate and send to **UCLA existing data via data bricks**.
   UCLA will need to supply SSH key - RSYNC Key
1. Support gmag data remote sites:
   a. Augsburg - they received UCB software and have ran it successfully. Waiting for their next move.
   b. Japan - made contact c. Alberta d. APL
2. 2hr plots: fitmoms, and overviews - **revisions requested by Vassilis**
2. Automate ASI Processing
   a. ~~Automate job to run every night to create ASI Summary Plots and create L1 cdf's on low resolution data.~~
   b. Automate job that runs every night that creates Orbit and ground track plots accessing Themis data.
   c. Once Hard Drives from Calgary automate job that runs Software to create full resolution cdf's and replaces Keograms and Overview plots.
3. 20 Themis scripts review to optimize processing. (40% complete)
4. ~~Inventory of Products, monitoring and building new alarms for Production Data Processing.~~
   ~~Draft document produced.~~ Next version with Harald's info as well. (On Hold)

Hannes

1. V03 State
   a. definitive attitude info - in progress awaiting the following from Jim L:
   a1. thm_contrans mods checked into the trunk a2. Verify V02 reprocessed State data in QA
   a3. V03 State with spin phase offsets
2. L2 State cdf
   a. See email concerning parms ("thx_sci_mode", "thx_hsk_issr_mode") sci_mode - know fast survey
   issr_mode - when IDPU thinks fast survey
   b. quality flag for FGM data - talk to Uli
3. Spin Axis offsets – Improve the new spin axis offsets calibration routine – In progress. A new technique has been developed for inside magnetosphere with high accuracy. Once complete a paper to be published. Sent data to Karl Heinz, included in the distribution.

Jim L.

1. "Add spin model data to state CDFs", format change, reprocessing will be needed - in progress
   a. ~~thm_load_state mods: Load spin data from the state cdf instead of the spin model - completed~~
      Will not be put into trunk until #c is complete
   b. thm_cotrans changed to use spin model instead of current method of interpolating spin period. - in testing
      b0. ~~thm_cotrans bugs (BugZid=117, 119-123) - fixed in distribution~~
      b1. Once code in the trunk to be reviewed with Hannes.
      b2. Once Jim completes his testing, Hannes will be asked to QA new functionality. BugzID=100.
      b3. Ask Olivier about making default and to check noise removal code with new sun pulse data.
          Jim to send email to Olivier.
      b4. thm_cal_fgm mods - awaiting #b2 to be complete.
      b5. Review QA scripts and test suites
   c. Once #a is completed, reprocess V00, V01, V02 and V03 State cdf's with the new master cdf from
      Hannes into QA. V02 is now in QA and awaiting Hannes's review.
   d. changes to tdas spin model routines to use spin phase offset provided by Hannes.
   e. Work with Hannes to independently verify V03 QA State cdf's from #c.
   f. Update QA State cdf's for entire mission and copy into production. Put new State master cdf into production
      and thm_load_state into trunk. Talk to Tim concerning V00 script for reprocessing.
2. ESA Sweep Mode - L0->L1 Processing Issue from Davin. Sort out eta - 8/18
   a. patch for sweep mode timing b. fix for reduced distributions only c. flatsat test
2. thm_cotrans test script updates for bugs found
2. L1 File definitions Document. BugzID=xx.
3. GOES 12 Test data - create read to cdf routine, load cdf routine, master cdf, telecon with Howard Singer,
   pass in other coordinate systems.
4. Refactor repeated CDF library code in CDF processing tools BugZid=50
4. Bfield mid-packet jumps.
4. L0 to L1 processing: look ahead to the next packet before processing the current packet. BugzID=67
4. Repeated timestamps and gaps in spin fit data BugZid=113 (#67 may fix this one as well).
5. Separate E and B timestamps for spin fits
   a) make a revised V02 master CDF with E and B separated
   b) change thm_load_fit to support V01 and V02 of the L1 CDFs
   c) change the L0->L1 processing code d) change the L1->L2 processing code
   e) test the changes, then reprocess to create the V02 CDFs (keeping the V01 files around for a while to ease
      the transition) BugzID=45
6. FGS sample times and values, showing repeated timestamps. BugzID=113 (BugzID=67 must be done first)
6. FGM range changes in the mid packet. Post Proc maybe a solution to eliminate the spike. BugzID=44.
7. Non Monotonic timestamps. BugzID=72
8. Latest ESA modes not yet implemented (BugzID=4) (Hold until sent to Probes)
9. bau_sunpulse_met assumes x86 endiannes (BugzID=13)
10. FGL issue. We have learned that FGL data from probes C, D and E has a 0.25 sec timing error, starting in
    summer 2007, and continuing to the present (Feb 2008) time. We would like to fix these timestamps in the L1
    CDF files. Process should be generic so future corrections can be easily handled. Low Priority steps or tasks:
    a. create a flag for the affected L1 variables somehow, to prevent confusion about which corrections have
       or have not yet been applied. So each entry in the proposed correction file should have some sort of tag
       identifying what the correction is, which could be looked up in the CDF as a variable, variable attribute,
       or global attribute. (low priority)
    b. Change L0-L1 code to take corrections into account. (low priority)
11. "Phantom packets" cause non-monotonic distribution times. BugzID=25, low priority.
12. Evaluate CDF compression algorithms BugZid=81, low priority.
13. Spin modeling during shadows BugZid=43. low priority.
14. Add "last processed" time to L1 (and L2?) CDFs BugZid=115, low priority

Jim M.

1. Reprocess Mosaics to pick up Rankin and Yellowknife. - in progress (up to July 21)
1. Reprocess ASI data (full resolution) for **Feb 2008**. 8/25-8/29
2. ESA and MOM quality flags (actual variables) eta - 8/28
    a. create new variables
    b. create test data for SPDF
    c. email with explanation of values. to SPDF
2. FFT (onboard) L2 cdf – **Sort out with SPDF 8/25-8/29**
3. Provide in the L2 cdf's a version # and/or SVN version # as an global attribute.
   With global attributes provide the users the ability to know what changed when the L2 cdf has been changed. Scheme needs to provide Scientists with a way to know what changed with new versions and the ability to request and receive previous versions of L2 cdf's - in progress
   Will go into production 8/25-8/29. Must update document for Pat and Michael.
3. SCM L2 cdf - keep Olivier in the loop. In repository.
4. Themis SCM CAL File Processing - produce table of contents and assign sections with Patrick R.
   Turnover from Ken
5. Orbit Plot on Summary Plot web page - on the right side, 3 plots vertically, each overview plot there would be orbit panels (coordinate with Harald).
5. thm_load_mom: for quantities like velocity, the coordinate system isn't stored in the meta data, and none of the units are stored in the place we normally try to store them (from Pat - Vassilis concurs) Will take a look.
6. Thm_fgm_overviews currently loads the data out of the fit file. It should probably load the data out of the fgm file. That was it only needs to load from one data source.
   Jim M: I think the thm_load_fit can be deleted without any problems.
6. routine that streamlines the generation of gmag stackplots and a crib to show how to do this. (< than a day)
6. Once Jim McFadden completes his mods for n_3d_new_3 reprocess L2 cdf's - entire mission.
7. Administrator's Guide
8. Themis Developers Guide
9. thm_load_mom changes
    a. reconcile mods with Davin at an appropriate time.
10. AE Indexes Issue Jan 8-12, keyograms Jan 12-13, Stripes- Vassilis: minor nuisance - low priority
11. Overview plot change: mode bar seems thick (nothing we can do easily - low priority)
12. Extraneous scmcal directory under L1 products (from Jim L.) BugzID=98.
13. Mosaic Processing - permanent script needed (very low priority)

L2 Product Status:
Completed: ESA, MOM, FIT (onboard), FBK, FGM, SST (needs upgrades), GMAG
In Progress: FFT (onboard)
Yet to be done: SCM, EFI (Michael), ASI (Harald)

Pat

1. magstations txt document revision for ATHA and SNKQ
1. ~~Interpolation code sent to Bryan~~
1. Particle Instrument tasks. In Progress
   a. Plot generation for Vassilis
1. thm_parts_moments2 testing with Bryan
2. High pass filter issues
   a. Fix bug where NaN is inserted into result accidentally.
   b. Generate warning notification if high pass filter is going to allocate an especially large array or take a very long time
   c. Provide an option for the user to select binning resolution.
2. Training on the day to day operations of the Summary Plots and Mosaics
3. An option in tdegap so that if you provide several inputs, it will interpolate the outputs onto the same time cadence.(Given time to do this, it should be a pretty straightforward change for me to make.)
3. wavepol.pro and twavepol.pro - Put Olivier's into the distribution, test
3. VMO Deliverables: data product description files (only L2 data goes to VMO)

   VMO Product Status:

   Completed: FGM (all probes) , State, ESA (all probes), FIT (onboard for all probes)

   In Progress: GMAG - received files from Peter Chi, need to split into separate files by station, sorting out acknowledgements

   On hold: EFI (awaiting EFI caveats from John B)

   Yet to be done: SST, FBK, FFT (onboard), MOM, SCM, ASI
4. Tplot enhanced crib - Davin should be involved and the cribs should not be to overwhelming. Possibly multiple cribs by functions.
4. Mini language to operate on tplot variables - first provide concept write up
4. boundary normal coordinates. On Hold. BugzID=59.
5. Christine's code to rotate the XY coord's along Earth direction was very effective. Also it was used by others. We need to streamline it, and it’s very similar to the others you've already written.
5. Error msg for when timestamps of data do not match in tvector_rotate, tdotp, and tcrossp.
6. Tplot auto scaling. BugzID=41.
6. invalid inputs to the version keyword
7. Clean-up of makepng and makegif
7. General Routine 'Add magnitude' vector - adding it's magnitude in its structure. 4 vectors, colors=BGRB.

Bryan

1. call to tpart_moments to replace call to new interpolation routine
1. thm_crib_esa_slice2d.pro system compatibility (global search for others)
1. Mod thm_part_getspec/thm_part_moments2 so that energy spectra generation is subject to pitch and gyrophase keywords. Completed. Update crib/testscript - yet to be done.
   why plotting no counts white instead of black.
   Done. Will check in after feedback from Davin regarding bins2mask mods (see below).
1. thm_parts_moments2 default coord system and document
   Done. Awaiting feedback from Davin regarding whether default masking of full/burst SST bins [0,16,32,48] is still necessary.
1. gyrophase in doc should be gyro particle velocity
1. Create replacement keyword for bins2mask (badbins2mask) in thm_part_getspec/thm_part_moments2 and make it a 0-1 array. Update crib/testscript. - in progress. eta - 8/12
1. Overplotting of not just lines and spectra, but also spectra over spectra. **Evaluate Art Hull's feedback.**
   a. test mods and confirm tests with Davin ~~b. finalize keyword~~. c. crib to Vladimir, Davin and Vassilis
   Nearly finished with testing. Profiling of specplot so far shows minor performance decreases in some cases (6%), significantly better performance in most others. In progress. QA test scripts and suites as well.
   Done. Vassilis said to go ahead and check it in will do on Monday.
1. Setup ARTEMIS (Solaris 8 machine for mission design)
   a. ~~Research Forte 6.2 Fortran compilers~~
   b. ~~Configure network settings so that users can log into and out from cluster~~
   c. ~~Setup user accounts: bkerr, Vassilis, cgoethel~~
   ~~d. resolve hostname conflict with 128.97.68.34 (talk to Bill or Todd to make change)~~
   e. Install OS patches as needed
   f. Install IDL 6.1
   g. Install Sun compilers
   h. Setup so that anyone with IGPP acct can log in
   i. Security
   j. Install working web browser (Netscape's very slow and crashes)
2. Think about making 2D slices through distribution. See medical imaging code in IDL demo."
   in the coming weeks have a demo. In progress:
   a. 2D first with crib b. 2D with med imaging code– c. 3D slices
3. thm_load_state - phase II (consult with Ken)
   a. For STATE CDF files, the following variable attributes should be defined, consistent with they way they are defined in the L2 FGM file: units, coordinate_system (consult with Jim L.)
   b. Once defined in the CDF, thm_load_state should take the values from the dlimits.cdf.vatt to set the metadata for the tplot variables: dlimits.data_att.units, dlimits.data_att.coord_sys
   c. For thm_load_state, the suffix gets added to support data, but support data is not transformed: if you call thm_load_state, coord='gse', suffix='_gse', /get_support_data only the pos and vel get transformed, but all get the _gse suffix.
   d. in thm_load_state, the code to delete support data that was loaded for coordinate transformation should be just del_data, '*_state_temp' e. THC braid photoelectrons
   f. Finishing the coordinate transformation of the thm_load_state data at input, to include transformation of spinaxis attitude, need to determine keyword switch, implement the rotation of the spinaxis elevation/azimuth from gei to arbitrary coordinates (consult with Pat, Vassilis and Ken)
4. From Hannes:
   a. Provided is the most common plot used by scientists that look at magnetic field data. Four panels Bx By Bz Bt and the position X Y Z as variables. Often the radial distance R is another variable. It would be great if someone enters e.g. tplot,'tha_fgs_gsm' such a useful default plot would appear. I am currently not able to produce such a plot using tplot. Another useful plot would be instead of one trace per panel, 5 traces per panel. One for each spacecraft and 5 sets of positions as variables at the bottom. For example: tplot,'th?_fgs_gsm' could produce such a plot. Also some standard plots that combine ground and

spacecraft data could be useful. Notes from Vassilis: define keyword /positions default 'none', allow GSM X Y Z, R Lat Long,.....

b. The level 2 CDF files at http://themis.ssl.berkeley.edu/data_download.shtml should contain position in various coordinate systems as well. Preferably in the same resolution as the data. Otherwise Scientists need to get the position from another source. Notes from Vassilis: option to introduce the data in RE with keyword (one RE =6,478 kilometers ???). Like thm_load_fgm /pos_units= 'RE'. Also thm_load_state keyword out_coord = 'GSM', 'GSE',...etc.

c. If one loads fgm data from probe 'a' and let's say there are no data for the chosen interval. The variables tha_fgl and tha_fgl_gsm etc. should all be empty. It could be those variables still contain data from the previously loaded interval.

5. Variable units – generic solution - thm_load_spin, _state, _hsk, _sst, _esa, _bau, _fgm, _fbk, _fft, _fit, _scm, _efi, _trg, _asi, _gmag, _ask, _mom, _esa_pkt
6. If requesting 1 hour of data using timespan, then load data using one of our load data routines. Recommend if there is a fix at the load cdf level.
7. upgrade thm_load to work with probe assignments
8. move functionality of thm_load_state2 into thm_load_state and delete thm_load_state2
9. Multiple enhancements concerning keywords, valid_names and thm_load routines

Hithesh

1. Coordinate with Mission Ops controllers to Re-run FSW v5.0 tests on Flatsat now that the Table errors have been fixed and see if the IDPU reset issue reappears. Total Tests to be Run: 15 Test Run Successfully: 15
2. In parallel to the Flatsat v5.0 tests, run the CPT tests for the following four modules - in progress.
   a) SCI & SCI2 - 12 (3 done successfully) c) CMP - 4 d) EEPROM - 18
   v5.0 can be uploaded to the S/C even if CPT tests not completed as per Peter.
2. Reviewing FSW Specifications document for v5 changes. **Waiting reviewed by Peter.**
3. Participate and learning the procedures for burning the eprom on the ~~etu~~, ~~Flatsat~~ and on the s/c.
4. FGM - 11hz noise - participate and watch in the analysis. Either there is no solution or sort out the FSW mod to fix the issue. Locate source of noise. Requests plots from Uli. Work with Dorothy at SSL first week of September.
5. Sort out dialing in to the FSW Engineering Test Unit (ETU) at SSL from UCLA with Jim Lewis. Sort out any special computer needs by 6/18. Implement by 7/31.
6. SCW spikes analysis - understand what was done in loading the new burst configuration that caused the problem and recommend a solution (only when change of the burst configuration)
7. Review FSW code of all 24 modules and the CPT tests for each (ongoing)
8. Learn how to create a stol procedure from Mission Ops.
9. Watch engineering is going along, tools for plotting (ongoing)
10. Review scripts and/or macros with Michael Ludlam (ongoing)

Michael

1. The 1 Hz bug fix (noted by John Bonnell) is in progress thm_efi_despin. In progress
    a. Periods selected for 30-40 periods for Probe 'C'.
    b. Run the SDT Calibration. **Send the results to John B for review and guidance**
    **Also discuss with John changes to thm_cal_efi as per Forrest's suggestions for coding changes**
    c. Steps #a-#b will need to be completed for the other four probes as well.

1. The poor despinning bug fix in thm_efi_despin (awaiting completion of 1hz bug fix)

1. Make code read Time-dependent calibration files - awaiting John B.'s review and testing
   Send John new version of code and ask John to review and guidance. **John will send feedback by 8/15**

2. FBK Frequencies
    b. Per Vassilis, ask Chris Cully about constructing a "no gaps" version of the FBK frequencies.
    This would mitigate John Bonnell's concerns about the difficulties in plotting gapped data.

3. Photo Potential

3. Make calibration files time-dependent. I will need these numbers from J. B., or instructions/code for producing them. (needed to allow user to use #3). Sort out with John (6/2-6/6)

4. Get EAC offsets from J.B. -- this *cannot* be done until AC-coupled data is taken.

5. EFI L2 cdf

5. EFI CAL Document

6. "Case-by-case" calibration parameters ("short-term" high accuracy corrections).
   involves generalizing some code from Chris C. as a tool for the general user. The tool will look at short time ranges, and pass out high-resolution calibration parameters in a structure. We envision that this structure will be passed into THM_CAL_EFI disabling those parameters that are normally gotten from the calibration files. LASP is working on this and when done would be incorporated in the tdas software.

7. deconvolution, any other tasks to have a working load and cal efi.

8. The EFI program headers should include what inputs are valid for each keyword.

9. thm_load_efi - allow multiple coord's to be entered. Do not overwrite plot variables.

10. efs data deleted when thm_load_fit run twice, second time only fgs data requested

10. Modify THM_CAL_FIT to treat efs datatype - Install E12/E34 conditional based on th?_fit_code TPLOT variable. If E12 switched to E34 software needs to be revised to handle (low priority).

11. Kyoto - tasks for Andreas - a) ~~AE2tplot complete~~ b) DST2tplot -
    **Andreas requested changes, also waiting info from Andreas to complete changes**

11. Correlate to onboard spin fits using EFP data. Look at FGM. Talk to Jim L.

12. Add the DATATYPE kw to KYOTO_AE_LOAD , and load only AE data by default (low priority).

13. Get the downloader (KYOTO_AE_DOWNLOAD based on the new version of FILE_HTTP_COPY ) working (low priority).

14. Build an informational widget.
    a) (From Jim M.) Break THM_UI_SHOW_DLIM out of THM_GUI to use as a stand-alone routine. - Make the name of the displayed sub-structure(s) a parameter. (low priority)

The following recommendations have been made by Jim McFadden and need to be reviewed and prioritized by John Bonnell:

1. The baseline offsets seem not to be sufficiently accurate, therefore spintone residuals remain in the data. It may be that only an on-the-fly calibration (a la SDT) will work, and that the EFI code would need to be modified from its current list-style calibration.

2. We should have code that duplicates the on-board spin fits in order to understand why the ground and on-board fits are different. I do not know if such code exists -- we should run this question by John Bonnell.

Cindy

1. Develop functionality of Splash into Themis Gui
    a. ~~Define List of functionality to be included~~
    b. ~~Define Table of Contents for Design Document~~
    ~~c. Prototype GUI Main Window to verify IDL can handle the functionality to be added~~
    ~~d. Complete Design Document - Draft Completed~~
    e. ~~Hold Initial Design Review with scientists, splash and Themis Programmers~~
    ~~Discuss IDL-GUI Limitations with scientists who use Splash and with Kate, Krishan and Margie~~
    ~~Modify Prototype~~
    ~~Hold Final Pre-Development Demos with scientists, splash and Themis Programmers~~
    f. Outline coding and testing tasks and begin development
    g. User's Guide and QA Test Suite Updates (David will support as well)
    h. Hold Training (get ready for web training) for scientists, splash and other programmers
    i. QA
    j. Tweaks based upon Training and QA
    k. Release and hold web training - worldwide
2. Routine to transform state data into RE in the gui. There is already a routine in the distribution that does this, but it is not currently part of the gui. Add a button, call to the transform routine, and put some checks into place. 2 days to implement.
3. Add an additional button and a call to IDL's save routine. A day at most to implement.
3. An IDL crib sheet has been provided that generates magnetic field and position data with the same resolution. Scientists very often like to have a set of dayfiles of magnetic field data and position. So the crib sheet could be called inside a loop and for each day an output ASCII file could be produced. An option could be all 5 spacecraft merged with only one time column. Additionally a desired resolution could be another option From Hannes.
4. Post Splash Gui Mods Phase I - Mac (David Sibeck's machine from Ken)
    a. when selecting data, L1 and L2 can be selected at the same time and the result was confusing. since the low-level commands can only load one or the other, the GUI interface should enforce the same restriction.
    b. the script output does not match the standard crib sheets: e.g. you don't see thm_load_fgm anywhere in the script. so you need a new document to describe to people how to modify scripts made with the GUI...or you need to change the GUI to follow the crib sheets...or just live with it..
    c. Label S/C Position button (GSE or GSN - default) (for UCLA)
5. Post Splash Gui Mods Phase II - Mac (David Sibeck's machine from Ken)
    See List on last page of task list.

Vladimir

1. Jonathan to review Outlier Removal code and Transformation to the boundary-normal coordinates. Vladimir sent code. (start after 8/24).
2. Convol approaches.

Kate

What's cooking?

Andreas

1. Awaiting review of Kyoto DST2plot code.
2. L2 File Definitions Document - awaiting L1 document to be completed to use as template.
3. Support VWO - Shing Fung with wave data.

UCLA

1. Clean-up the power ripples from the FGM data. (Krishan). Awaiting new programmer

Christian Jacquey and Thomas Moreau **(updated 4/29/8)**

1. Converging toward our primary goal, i.e., to interface the THEMIS data with the CL software. It is almost finish for the ESA data, some details are now being fixed and then we will go to the SST data.
   a. Compliance tests and primary data studies have shown matching data quantity values and plots between data processed and plotted with tdas and CL software. Subsequent data studies will normally validate CL reliability. At the time, and based on the successful primary tests that have been accomplished, we could obviously close this task.
   b. We've have implemented the corrections for effective spacecraft potential, and obtained same derived products as computed tdas. Previous data studies have raised no anomalous features on this point. **Done.**
   c. With the help of a young student (bachelor) , we have started a study of the response of the particle instruments.
      - As a first step, we are performing the statistical analysis of the perpendicular pressure (ESA i+ and e-, and SST i+) versus magnetic pressure observed during crossing or penetration of the spacecraft inside the plasma sheet during quite interplanetary conditions (BZ>0, Pd~ct). Assuming 1D current sheet balance, the goal is to infer if there is under/over-estimation of the plasma pressure and to characterize it if necessary.
      - Then, we will study the ESA versus SST spectra and then see what can be done for adjusting them.
2. L1 ESA CDF and thm_load_esa
   a) define and write a new skeleton cdf file that would be use as a data model for producing the new CDF ESA L1 files. This task needs to reconstruct entirely the skeleton of the CDF ESA L1 data file based on the IDL structures content of the Jim's L0 code. Following the last suggestions from Jim L., data model will consist of 2 separated L1 ESA CDF files, one containing time varying quantities (as counts..), the other one storing calibrations stuff that have no time dependence and that may be so refined without the need to reprocess all the ESA L1 CDFs. I attached those new skeleton cdf files and wait for Jim L. analysis and comments.
   b) submit skeleton together with a text file listing all items contained within the new model to Jim Lewis for feedback and validation. **Done.**
   c) Develop the code assigned to create and read L1 ESA cdf files. 3-4 weeks should be sufficient. The reading code is almost finished. Particular but minimal developments have still to be done for incorporating returns of the L1 ESA CDF files exams. Detailed information about ESA L1 CDF related routines that compose the code, together with a list of all CDF data quantities contained within CDF files, are explained within the delivered guide titled guide_readCDF_ESAL1.doc. Hope to get feedbacks and corrections about it. Task still open
   d) From Jim L. ESA packet loading routines use depreciated spinmodel.txt BugzID=101 Not sure to be concerned by this part. Let me know

Software Tasks To Be Discussed (TBD) / To Be Assigned (TBA)

1. TBA - Data contain engineering, deployment, maneuver, and science data are in the same stream.
   From the data description, only maneuver flag state_man is provided. Do you provide information about the time intervals when the data are on, say, engineering level? This data, though valuable in many respects, may be confusing if interpreted as science data. To provide such information, it is possible, for example, to add some bits to existing state_man flag. (from Vladimir)
   Quality flags (for each instrument to be added to L2 State cdf).
2. TBA - Tplot User's Guide (David and Vassilis to talk further)
3. TBD - print, dprint, msg continue, verbose options for a standard
4. TBD - Mini Language to operate on tplot variables
5. TBD - Tplot FAQ's (Amanda) Maybe replaced by #1
6. TBD - Mull over: Allow Tplot: overplot color spectra, multiple angles, variable angles.
7. Hold - Spin modeling during shadows (BugzID=43)
8. Hold - Separate E and B timestamps for spin fits (BugzID=45)
9. Hold - Refactor repeated CDF library code in CDF processing tools (BugzID=50)
10. Hold - Bugzilla enhancements: Graphical charts and graphs don't work (BugzID=7)
    Extend Platform/OS options (BugzID=73)
11. Hold - str_element does not add to embedded structures (BugzID=69)
12. Hold - SM coord transformation in thm_cotrans does not work: fixing that would be too drastic a change for a patch release, because it might break a lot of existing code. The issue is: if the in_coord parameter is not explicitly specified, and the dlimits structure also does not specify the coordinate system, do we want to try to figure it out from the "in_suffix" argument (current behavior, doesn't work for SM coords), or just fail with a message that a coordinate system must be specified with either the in_coord argument or dlimit structure (probably a better solution, but might break existing code).

Non GUI Future Release Mods

1. Many of the data processing routines that are tested here do not inherit the plotting options from the tplot variable that they take as input. For data processing routines that I've written Vassilis has had me modify them so that they inherit these options. It shouldn't be very hard to do this, but whether we do it or not depends on whether we think these data processing routines are useful only for the gui or for the command line user as well. (from Pat).
2. Load routines to all support keywords suffix and relpathnames_all.
3. tplot does not fail gracefully after illegal margin set. In this case: tplot_options,'xmargin',[100,100], tplot does not fail gracefully after illegal margin set. In this case: tplot_options,'xmargin',[-1,-1]
-tplot does not fail gracefully after illegal margin set. In this case: tplot_options,'ymargin',[100,100]
4. Errors 45 and 46 are the same in character. In the former, THM_COTRANS is called with IN_COORD set to something that does not match the metadata. The test script expects an error, but THM_COTRANS just prints an informational message without stopping. In the latter, THM_COTRANS is called with COORD set to 'dsl' whereas the data is in 'scs' (this transformation is invalid). Again the script expects and error, but none is generated. (Michael and Jim M have different opinions)
There are two easy fixes:
   a. Remove /INFOMATIONAL from the call the MESSAGE, so execution stops and the command line test script catches the error.
   b. Remove tests 45, and 46.
   #a will force the programmers to make sure that the initial coordinates are correctly predicted (or the metadata is up to date), to make sure that only valid transformations are requested, and it will make it harder to run scripts without stopping. #b will force the user to catch such "non-transformations" in the text output, and it will make it easier to run scripts without stopping.
6. fac_matrix_make: do a better job putting the inputs into the correct coordinate system.
7. minvar_matrix_make documentation is a little sparse, so it couldn't hurt to improve the function header.

8. With a pre-mission and future dates, thm_gen_overplot does not exit gracefully. The user sees a lot of "Remote file not found messages", but is not offered any indication that the date requested is before the mission began. It would also be useful to have a check for when DATE plus DUR is greater than the current date, and then ignore the requested days beyond the current.
9. There's a possible bug thm_gen_overplot when an illegal device is set with the DEVICE keyword. The code doesn't check to make sure if the graphics device is valid. It passes the test script because thm_gen_overplot has its own catch error statement embedded in the code. The catch statement does report, "Graphics device not available: a", but only after data have been loaded and tplot vars have been created. If a long time range is requested this could be a significant waste of time to the user.
10. Issue with thm_load_fgm, I'm not sure if this is intentional or what but...an old version of thm_load_fgm would return the fgm data is whatever coordinate system you requested. It would call cotrans if the data was not available in that system in the file, but now, it seems like it will no longer automatically perform the transformation for you.
12. NO_DOWNLOAD keyword missing from thm_load_fbk.
13. The plots should not be blank, and they weren't before the QA started. Fortunately, the code is working correctly in that when data doesn't exist the code gracefully moves on to the next datatype. However, perhaps the code should be modified such that a blank tplot var isn't created when this happens. (thm_part_moments2 ).
14. a. When thm_load_fit is called requesting a single data type it will also return some auxiliary data types. For example: thm_load_fit,probe='b',datatype='fgs' returns:
1 thb_fit_code 2 thb_fit_npts 3 thb_fgs (low priority load bug or test script bug)
b. The relpathnames all keyword is broken. (low priority bug)
16. THM_LOAD_MOM doesn't recognize the datatype keyword for L1 data. (It does for L2).
17. thm_Load_Mom Dpwrspec button gives no results -- due to a problem in SVDFIT routine. Linear fit routine needed.

GUI Mods Post Splash Release

1. Issues with GUI State test suite: store_data seems to be getting called twice for each variable loaded.
2. Issues with GUI State test suite: It sometimes loads more data than I asked for.
3. shift clicked to select probes A & B then I tried to shift click on the level 2 data types to select them and got error #80 (also #86).
4. When block_average is called with a block length(in seconds) that is shorter than the cadence of the data it will create nans between the data points. For example if an input vector at a 30 second cadence is block_averaged with a requested block length of 10 seconds it will perform a transformation like this:
Input Data: [1,2,3,NaN,5]
Output Data: [1,NaN,NaN,2,NaN,NaN,3,NaN,NaN,NaN,NaN,NaN,5,NaN,NaN]
The problem is that when this output is plotted, it draws nothing because there are NaNs between all data points. This can be confusing and perhaps make the user think that the routine has a bug when it does not.
Pat proposes that only in the GUI we change the default so that the output from the input above is:
Output Data: [1,1,1,2,2,2,3,3,3,NaN,NaN,NaN,5,5,5]
This seems to be a reasonable expectation for how the block average should perform in this error situation. It will let the user know the routine worked, but also clue the user in to the fact that their requested block length is too short when they look at the shape of the output curve. Also, It is hard to detect the exact cadence of the data because it may change and may have gaps, but I would also have the GUI generate a popup error if the median cadence is longer than the requested block length. While this may not catch all instances of the problem, it will also ensure that the user is explicitly warned in most cases.
Vassilis: I think to first order we should leave block_average as it was. These are standard problems the user faces when dealing with data analysis. There is a deflag routine that is supposed to take care of the situation.
The option implemented in 4.0 now is confusing for data analysis. A better option for block_average would be to add two new features:
- a keyword /noNaN which would prevent adding NaNs (for blocks with zero points).
- an output array called npoints which contains an array with the number of points that went into the average (or median...) If zero then the average is presumably a NaN. The user can search and throw away data where confidence in statistical significance is low.

5. a. When thm_load_fit is called requesting a single data type it will also return some auxiliary data types. For example: thm_load_fit,probe='b',datatype='fgs'  returns:

1 thb_fit_code  2 thb_fit_npts  3 thb_fgs (low priority load bug or test script bug)

b. The relpathnames all keyword is broken. (low priority bug)