

Themis Software Task Priorities (In Play / In the Queue) - 7/25/08

To Be Discussed - Top of Meeting

1. Data and Misc Issues

- a. Possibly update catdesc of MOM variables, combining files (Consensus says No!)?
ESA quality flag – Jim McTiernan to present possible values.
- b. Orbit Plot somehow on Summary Plot web page
- c. Creation date of L2 File cdf put into the file. Calibration file date, and file name into L2 cdf
Jim M to investigate. Already global attributes
- d. Start using version #'s in cdf files – Consensus was No! put version # and/or SVN version # as an
global attribute.
- f. Link from the Data Drop Down Directly to the data (<http://themis.ssl.berkeley.edu/data/themis>). Jim L
- g. L1 ESA CDF and thm_load_esa feedback to Thomas (Jim McFadden and Davin). Email resent.

2. Jim McFadden

- a. IDL Software for Michael that processes Themis data and produces output for SDT
- b. thm_load_state mods: Load spin data from the state cdf instead of the spin model
- c. n_3d_new_3

3. Davin

- a. Add options to allow user to remove electronic noise from the sst data, - thm_part_moments
Will review Pat's mods.
- b. Review Bryan's code and tests for overplotting

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

6. Web

- a. Beef up instrument web pages and include caveats for each.

Tim

1. Wrapper for State cdf data processing - Jim L has supplied script. In progress, eta 7/25.
1. Support Mirror Sites: a. Japan (ISAS) b. Austria c. France (**Rumi** - not always up to date for gmags)
d. UCLA - UCLA will need to supply SSH key - RSYNC Key
1. Support gmag data remote sites:
 - a. Augsburg b. Japan - made contact c. Alberta – gmag data – IDL routine failed d. APLAugsburg - they received UCB software and have ran it successfully. Waiting for their next move.
2. 2hr plots: fitmoms, and overviews - Beta site revisions in progress
2. What is involved in putting Themis web pages under SVN? Analysis in progress.
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 Jim L. spin model, will include)
 - b. spin model data (talk to Jim Lewis)
 1. ~~Send Jim updated master cdf with new variables~~
 2. Help verify reprocessed State cdf's in QA
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 – Routinely validate the spin axis offsets.
In addition a technique has been developed for inside magnetosphere with high accuracy.
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
 - b. thm_cotrans changed (see Pat) to use spin model instead of current method of interpolating spin period. Code will be reviewed with Hannes before testing begins. Once Jim completes his testing, Hannes will be asked to QA new functionality. BugZID=100. - in testing Ask Olivier about making default and to check noise removal code with new sun pulse data.
 - c. Reprocess V00, V01, V02 and V03 State cdf's with the new master cdf from Hannes into QA.
 - d. changes to tdas spin model routines to use spin phase offset provided by Hannes.
 - e. Work with Hannes and independently to verify QA State cdf's
 - f. Update QA State cdf's for entire mission and copy into production. Put new State master cdf into production and thm_cotrans and thm_load_state into trunk.
1. Link from the Data Drop Down Directly to the data (<http://themis.ssl.berkeley.edu/data/themis>)
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
5. L0->L1 processing scripts need better logging. BugZID=96,
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. FBK files - Tami reported allot of data in some early files. Jim will check packets. (7/25)
1. Reprocess Mosaics to pick up Rankin and Yellowknife. - in progress
1. Jim McFadden's new mods for thm_load_esa. thd data for 7/21-7/25.
1. Reprocess ASI data (full resolution)
2. Possibly update catdesc of MOM variables, combining files (Consensus says No!)?
ESA quality flag - present possible values.
2. Creation date of L2 File cdf put into the file. Calibration file date, and file name into L2 cdf.
Investigate. Make attributes if not already
3. FFT (onboard) L2 cdf – put test data online for SPDF review
4. SCM L2 cdf
4. Themis SCM CAL File Processing - produce table of contents and assign sections with Patrick R.
Turnover from Ken
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.
5. 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.
5. 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.
6. Administrator's Guide
7. Themis Developers Guide
8. thm_load_mom changes
 - a. reconcile mods with Davin at an appropriate time.
9. AE Indexes Issue Jan 8-12, keyograms Jan 12-13, Stripes- Vassilis: minor nuisance - low priority
10. Overview plot change: mode bar seems thick (nothing we can do easily - low priority)
11. Extraneous scmcad directory under L1 products (from Jim L.) BugzID=98.
12. 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. Possible label issue with FIT data.
1. Particle Instrument tasks. In Progress
 - a. Add options to allow user to remove electronic noise from the sst data, as per Vassilis's specification
 - a. document and send to **Davin** for verification of **thm_part_moments**. **Watch for backward Capability.**
 - Mod made and checked into the trunk. Awaiting feedback from Davin.**
 - b. Identify pressure scaling values for SST and ESA, so that total pressure is flat within the neutral sheet. (**On hold** until SST Calibration available)
 - c. Write a routine that will overplot arrows on plots that are generated by plotxy and by plotxyz. This will basically follow the example of a routine in a library that Vassilis used to use at Berkeley. In progress. crib, QA Test suites and scripts updated as well. (7/25)
2. AACGM mods - APL approved mods. In progress
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. 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)
 - c. Write FIT Numerical Data description - Jan's feedback - a few tweaks.
Almost ready to propagate to other S/C's.
EFI awaiting feedback caveats from John B.
 - d. Review Ephemeris SPASE numerical data, instrument files. This includes making improvements in the description of support quantities, particularly the mode descriptions.
3. VMO updates to completed products due to other Software changes
 - a. ESA - L2 cdf changes (cdf master available)
 - b. State - V00, V01, V02 and V03 changes
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.

VMO Product Status:

Completed: FGM, State (mods maybe needed),

In Progress: FIT (onboard) , EFI

Yet to be done: FBK, GMAG, FFT (onboard), ESA (mods), MOM, SST, SCM, ASI

1. Overplotting of not just lines and spectra, but also spectra over spectra. **On hold awaiting Davin's feedback.**
 - a. test mods and confirm tests with Davin ~~b. finalize keyword.~~ c. crib to Vladimir, Davin and VassilisNearly 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.
1. Setup cluster (Solaris 8 machine for mission design)
 - a. ~~Research Forte 6.2 Fortran compilers~~
 - Forte 6.2 no longer available (can't download, can't purchase license)
 - Sun Studio 10 (released Jan '05) is oldest available. Cost \$2995.
 - Sun Studio 11 (released Nov '05) is available free.
 - b. ~~Configure network settings so that users can log into and out from cluster~~
 - c. ~~Setup user accounts: bkerr, Vassilis, egoethel~~
 - d. ~~resolve hostname conflict with 128.97.68.34 (talk to Bill or Todd to make change)~~
 - e. Install OS patches
 - f. Install working web browser (netscape's very slow and crashes)
 - g. Install IDL 6.1
 - Need to find an install disk
 - Need license
 - h. Install Sun compilers
 - i. Setup so that anyone with igpp acct can log in
2. thm_load_state (for new State cdf's - **code completed awaiting next step from Jim L**
 - a. ~~Add the spin model variables to d_names. They are all considered "support_data".~~
 - b. ~~Ensure that the get_support_data, no_spin, and keep_spin_data keywords are passed to thm_load_state_post, the post processing routine for thm_load_state.~~
 - c. ~~Move the code block that calls thm_load_spin from thm_load_state into thm_load_state_post.~~
 - d. ~~Replace the call to thm_load_spin with a call to spinmodel_post_process.~~
3. 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. ~~Call Jim McFadden for modularity~~
 - c. 3D slices
4. 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)
5. 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.
6. 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
7. 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.
8. upgrade thm_load to work with probe assignments
9. move functionality of thm_load_state2 into thm_load_state and delete thm_load_state2
10. 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: 10 (eta - 7/28)
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. **Awaiting reviewed by Peter.**
3. Participate and learning the procedures for burning the eeprom 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. Pick Periods 20 periods selected for thc and need a few more. Also for other probes.
 - b. Jim McFadden's code for output of calibration parameters for SDT.
 - c. Run the SDT Calibration.
1. The poor despinning bug fix in thm_efi_despin in progress
1. Make code read Time-dependent calibration files - awaiting John B.'s review and testing
Also data attribute bug thm_cal_efi TD version. Working on bug.
2. FBK Frequencies - John Bonnell sent an email. Vassilis suggested tvbytescale to be used in specplot
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 voltage offsets from J. B. (he has to pull bench-testing data).
5. Get EAC offsets from J.B. -- this *cannot* be done until AC-coupled data is taken.
6. deconvolution, any other tasks to have a working load and cal efi.
7. "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.
8. EFI L2 cdf
8. EFI CAL Document
9. 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 overwritetplot 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 TPLLOT 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 - **sent to Andreas for approval**
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
 - e1. ~~Panels to be developed: 48 - Panels completed: 48~~
 - e2. Mouse actions realigned to Splash - in progress
 - e3. ~~Plots within the one main window~~
 - e4. nudge option
 - e5. zoom in/out
- Hold Final Pre-Development Demo with scientists, splash and Themis Programmers on Monday 8/4.
- 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 Eastwood's to review Solar Wind code. In progress.
2. Jonathan will be asked to review Outlier Removal code and Transformation to the boundary-normal coordinates after Solar Wind Code review complete.

Kate

What's cooking?

Andreas

1. L2 File Definitions Document - awaiting L1 document to be completed to use as template.
2. 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 ($BZ > 0$, $P_d \sim ct$). 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)

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 an 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)