Software Task Priorities (In Play / In the Queue) - 2/18/08

<u>Jim L.</u>

1. FGL issue. We have learned that FGL data from probes 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. Steps or tasks:

- a. Determine correction (Sci team)
- b. Detect dates for each probe (Hannes)
- c. create a file of known corrections for each probe. File should be in SVN.
- d. 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.
- e. Change L0-L1 code to take corrections into account.
- 1. Feedback on the skeleton of the CDF ESA L1 data file based on the IDL structure's content of the Jim's L0 code from Thomas by 2/11. Jim awaiting confirmation of info on modes from Jim McFadden. Awaiting sit down with Davin to discuss which support variables are in/out new esa cdf.
- 1. Compress and Decompress routines for MOMs. BugzID=81
- 1. Compress and Decompress routines for Fields. BugzID=81

Test patterns (couple of packets for each appid) for MOMs and Fields verified.

Awaiting output of Flatsat or Orbit Testing

Update production code to be ready for new compression algorithms - ideally before flight software patches are uploaded to the probes.

- 1. L1 File definitions Document. BugzID=xx. In Progress
- 2. Log File Processing (in progress)
 - a. Issue a log msg for any VC files which contain mixed SCIDs or otherwise invalid transfer frames.
 - b. Each processing script should, at the very least, take a command-line option specifying a log file where sufficiently-important messages can be written.
 - c. Log message format is TBD, but should probably include:
 - 1) wall clock date/time when the log message was generated
 - 2) A file or directory name identify the input data that provoked the msg
 - 3) A severity field (e.g. "info", "warning", "critical")
 - d. Modify lzp_wrapper and process_lzp_dir scripts. BugzID=49.
 - e. Clean-up current VC->L0 processing scripts temporary files. BugzID=50.
 - f. Unexpected transfer frames time matched packet time yet in the past. BugzID=38.
- 2. thm_load_state changes to load L1 spin model cdf by default.
- 2. See Michael to make any changes required for despin development for efi.
- 2. 2007 Reprocessing for R-S errors (probably HKP not SCI)
- 2. thm_cotrans changed to use spin model instead of current method of interpolationg spin period. Code will be review with Hannes before testing begins. Once Jim completes his testing Hannes will be asked to QA new functionality.
- 2. Bfield mid-packet jumps.
- 3. Help out with Compression Flatsat Testing
- 3. L0 to L1 processing: look ahead to the next packet before processing the current packet. BugzID=67
- 4. FGM range changes in the mid packet. Post Proc maybe a solution to eliminate the spike. BugzID=44.
- 5. Provide Higher Cadence State Files Spin period and spin phase double precision. BugzID=91
- 6. Non Monotonic timestamps. BugzID=72

Jim M.

- 1. Mozaic Processing up to 12/29/7 (from 12/1/7) on 1/29/8. Catch-up expected by 2/22. Verify the process works after catch-up.
- 1. MOM (Onboard) in separate L2 cdf, and as part of task put Coord Systems into metadata. User's Guide, Data Description list need update? Awaiting feedback from SPDF before **Starting the Reprocessing.**
- 1. thm_load_mom changes
 - a. Add coord labels to thm_load_mom: Thm_load_mom should properly label the coordinate system of any 3-d data in the dlimits structure.
 - b. read mom 12 cdf's
 - c. thm_load_mom's datatype keyword should be implemented
 - d. reconcile mods with mods that Davin is making when Davin is complete.
- 1. FIT (Onboard) in separate L2 cdf, and as part of task put Coord Systems into metadata.
- User's Guide, Data Description list need update? Start the reprocessing.
- 1. thm_cotrans and thm_load_esa changes
 - a. Add coord labels to thm_load_esa: Thm_load_esa should properly label the coordinate system of any 3-d data in the dlimits structure.
- 1. Implement Moment Overviews (from Pat) into production and let Tim know it's ready.
- 2. "th?_fgs_sigma" and "th?_efs_sigma" already in L1 CDFs per Jim L. and need to be copied into L2 cdfs.
- 2. L2 Reprocessing
 - a. Of the 311(!) files that weren't processed, 292 were missed because there is no longer an L1 file present for the appropriate date and instrument. (There must have been files there at some point, though.)
 - b. Of the those files, 18 are FGM files in the time period 2007-04-26 to 2007-05-01. The current L2 process ignores those dates, I believe, because there were issues with the coordinate transforms. I guess that I need to revisit this issue.
 - c. Ths other one is thb_l1_esa_20071128_v01.cdf. This is odd -- since it had been reprocessed on 25-Dec, and nothing changed in the ESA code between then and this last reprocessing.
- 2. Decouple display variable types in the 'Choose Data widget' from the valid data types in thm_load_*.
- 2. Vladimir Help Request
 - a. fit efs data as zeroes for the dates 2007/3/21 28. Isn't it better to put there fill values if you do not have measurements?
 - b. It would be good to be consistent with the fill values and use the same everywhere NaN or 0 or 1.e31. Generally, it is better to use a number as this is a standard everywhere else.
- 2. ESA and SST Tohban plots
- 3. SVD-FIT instead of POLY-FIT from Vladimir
- 3. Review Patches for CDF's to increase speed
- 3. Overview plot change: mode bar seems thick (nothing we can do easily low priority)
- 3. Administrator's Guide, Virtual Machine
- 4. GUI Mods
 - a. Save Ascii fix precision, add header (with Pat for UCLA)
 - b. button for postscripts (for Stephen Mende)
 - c. thm_ui_config bug found by Davin
 - d. No dialogue box appears for save ASCII, no file location in msg box
 - e. See email with history file ...231920 abort.
 - f. Upper flatfile button (for Vassilis, work with Kate / UCLA Splash)
 - g. Add new coord transf options to SM, GSM and GEO into GUI
 - h. buttons on overview plot sub widget for fgm, esa and sst Tohban plots

Jim M. (continued)

5. GUI Mods

- a. current plot window tell you which one (for UCLA)
- b. Lower flatfile button (for Vassilis / Chris Russell)
- c Label S/C Position button (GSE or GSN default) (for UCLA)
- d. De-Gap widget add units
- e. DP Delete or Overview Plot or Clear History warning message
- f. Long Variable Names truncated in IDL-D

<u>Tim</u>

- 1. Review Mirror site processing may need to hold them back for new server to get setup. France turned back on, Japan awaiting things to settle down.
- 1. Mozaics bug on ASI web site must click +3 sec to get display. in progress
- 1. When Jim M. finishes his part install Moments Overviews (from Pat) link on the web site Select Type on the Summary Web Page drop down Menu (ESA Ground MOMS, ESA Onboard MOMS)
- 2. High Pass filter function few tweaks left to do.
- 2. tsmooth2 needs to accept a time keyword (say, seconds) rather than # of points. (for Vassilis, Davin)
- 3. GMAG Stack Plots In progress few more Spikes, limits changed, reprocess. BugzID=86

Pat

1 File Tracking USN Stations - sorting out hiccup in reference to new server.

- 1. tplotxy and the ttrace_crib mods per Vassilis (all in testing):
 - a. Change tplotxy/plotxy behavior to generate isotropic plots by default.
 - b. Take tplotxy should read title information from dlimits by default.
 - c. Code documentation(header) should explain how the dlimits are used by tplotxy.
 - d. Multiple plot convention should agree with the convention used by idl !P.multi keyword.
 - e. When replotting a plot using plotxy/tplotxy called with no arguments it should not store xsize, ysize, and any other windowing information.
 - f. tplotxy/plotxy crib examples should be in re not km.
 - g.. tplotxy/plotxy should include examples of font manipulation.
 - h. tplotxy/plotxy should include examples of the xrange/yrange keyword.
 - i. The crib should use plotxy to demonstrate plotting using arrays (not just call plotxy implicitly from tplotxy calls).
- 2. Write a procedure that will plot spectrographic data versus position. This procedure will be called plotxyz. It should work with plotxy so that line and spectrographic position plots can be mixed in the same way that tplot can perform line and spectrographic time series plots. ** Design approved by Vassilis **
- 2. VMO Deliverables: data product description files
 - a. Review FGM SPASE numerical data and instrument files for all probes.
 - b. Review Ephemeris SPASE numerical data instrument files for all probes.
 - c. Review Observatory files for all probes and the person file for Themis.
 - d.(option 1) Generate an instrument file for Thermal Plasma measurements(Moment Temperature) then numerical data files for this quantity for each probe, repeat this process for other moments.
 - d.(option 2) Generate an instrument file for EFI or SCM and corresponding numerical data files for each probe.
- d.(option 3) Cease doing VMO for a bit.
- 2. Variable units generic solution

thm_load_spin.pro, thm_load_state.pro, thm_load_hsk.pro, thm_load_sst.pro thm_load_esa.pro, thm_load_bau.pro, thm_load_fgm.pro, thm_load_fbk.pro thm_load_fft.pro, thm_load_fit.pro, thm_load_scm.pro, thm_load_efi.pro thm_load_trg.pro, thm_load_asi.pro, thm_load_gmag.pro, thm_load_ask.pro thm_load_mom, thm_load_esa_pkt

Pat (continued)

- 2. IDL v7.0
- 2. Mini language to operate on tplot variables first provide concept write up
- 3. boundary normal coordinates. On Hold. BugzID=59.
- wavepol.pro and twavepol.pro When cribs from Chris Cully, Bob Strangeway, and others received, condense cribs and add to the distribution.
 a. Check in Kaori's crib
- 4. 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 its very similar to the others you've already written.
- 4. Tplot auto scaling. BugzID=41.
- 4. invalid inputs to the version keyword
- 4. Clean-up of makepng and makegif

<u>Bryan</u>

- 1. Testing Davin's implementation of the 6-angle pser code. For now, I've made the requested changes to my own local copy of the code in order to test how well my code handles 6-angle pser data. I've since found a bug to with my code in how it handles the 6-angle data. Bug has been fixed. **Need info from Davin**.
- 1. Add ability to calculate pitch angular spectrum in progress
- a. allow angle bins to be broken down into smaller (user defined) sub-bins
- 1. Add ability to calculate gyro phase angular spectrum
- 2. Add ability to convert to GSM coordinates (requested by Kaori)
- 3. Overplotting of not just lines and spectra, but also spectra over spectra. This means that the gap would be filled if another plot is below it. This way the data would not have to be merged, just tplot has to account for gaps and plot them as true gaps. (Submitted by Vladimir)
- 3. thm_load_state phase I
 - a. hardcode (units = "km/s" or "km", or "deg")
 - b. finish "no_update" loading option (consult with Davin)
- c. 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)
- 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
- 4. upgrade thm_load to work with probe assignments
- 5. move functionality of thm_load_state2 into thm_load_state and delete thm_load_state2
- 6. Shadow Indicator (for Vassilis using functionality in ...load_state2 and tplot roi)
- 7. Multiple enhancements concerning keywords, valid_names and thm_load routines

Michael

1. Develop a prototype version of the EFI offset and correction algorithm.

- a. Code evolving and testing of algorithm in progress
 - Determine if the SCM generic despin routine should be used for efi.
 - 1. Y title utility awaiting review from John Bonnell
 - 2. Compare and contrast SCM and C. C. despin.
 - 3. Try despinning EFI data with SCM code.
 - 4. Generate plots of a few spins/page to examine algorithm(s) for target dates (dates to come from J. B.).
- b. Document offsets and corrections in data attributes structure in progress
- c. Incorporate subtraction/correction code into LOAD/CAL suite (tbd) later after prototype has reached some level of maturity).
- 2. Build an informational widget to route the output of tplot_names to a text box.

a. Study widget building.(on-going) b. testing of widget continues

Hithesh

- 1. Read the THEMIS IDPU Software Requirements Specifications Completed
- 2. Read the THEMIS IDPU Software Design overview in progress
- 3. Discuss any questions with Peter ongoing
- 4. Read 8085 Instruction set Completed
- 5. Work with Peter on changes to the THEMIS Solid State Telescope flight software. Testing on workbench and flatsat in progress.

<u>Vladimir</u>

1. Magnetopause Coordinates

Zero order step to create pre-processed solar wind data

Awaiting Vassilis's review of Solar Wind crib and code

- 2. Shue MP routine
- 3. Outlier Routine awaiting Vassilis Review
- 3. Help Requests from Vladimir
 - a. fit efs data as zeroes for the dates 2007/3/21 28. Isn't it better to put there fill values if you do not have measurements? assigned to Jim McTiernan
 - b. It would be good to be consistent with the fill values and use the same everywhere NaN or 0 or 1.e31. Generally, it is better to use a number as this is a standard everywhere else. (Jim M.)
 - c. Overplotting of not just lines and spectra, but also spectra over spectra. This means that the gap would be filled if another plot is below it. This way the data would not have to be merged, just tplot has to account for gaps and plot them as true gaps. -assigned to Bryan

Christian Jacquey and Thomas Moreau

- 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.
- 2. We have finished the migration of our server. The mirror THEMIS database is now opened and can be used at the REMOTE DATA DIR for TPLOT. We tested it. It seems to work properly and thus, this could be communicated to the THEMIS community Emmanuel Penou will communicate soon with Tim Quinn on this topic.(*Did this happen?*)
- 3. Tested TPLOT by using the mirror database as the REMOTE DATA DIR. It seems to work. The possibility of using the CDPP/CESR mirror database as an alternative remote data dir could be opened to the whole THEMIS Community, if you agree.
- 4. CDPP/CESR is in discussion with the GFI company for prolongating the contract in order to develop and provide the code for producing the new ESA L1 data in the cdf files, as asked by Vassilis. The following sub-actions are planned:
 - a) writing a document describing all the objects to be contained inside the new L1 CDF files.
 - b) sending this document to you for validation of the specifications of the new L1 data.
 - c) developing the code for producing the new ESA L1 files
 - d) testing and validating the code
 - e) writing the code documentation (user guide)
 - f) develop a new version of the TPLOT module reading the new ESA L1 data files.

5. Related to #4.

- 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 structure's content of the Jim's L0 code.
- b) submit skeleton together with a text file listing all items contained within the new model to Jim Lewis for feedback and validation by 1/22.
- c) Develop the code assigned to create and read L1 ESA cdf files. 3-4 weeks should be sufficient..

Ken

- 1. thm_cal_scm bug using a special Fmax error msg Variable undefined F2.
- 2. Send David list of GUI bugs
- 3. Themis SCM CAL File Processing produce table of contents and assign sections with Patrick R.
- 4. Themis System Administrators Guide
- 5. Themis Developers Guide
- 6. If requesting 1 hour of data using timespan, then load data using one of our load data routines, the load Recommend if there is a fix at the load cdf level.

<u>Hannes</u>

- 1. Possible Support for fgl issue.
- 1. V03 L2 State cdf.
 - a. definitive attitude info
 - b. See email concerning parms ("thx_sci_mode", "thx_hsk_issr_mode")
 - c. quality flag for FGM data
 - d. spin model data (talk to Jim Lewis)

Vassilis

1. Check out Outlier routine, LMN and Solar Wind crib and code from Vladimir.

David

1. Science Software Analysis distribution list- update.

<u>Davin</u>

- 1. thm_load_mom SST calibration onboard mom issue.
- 2. Two emails from Bryan:
- 2a. While testing thm_sst_dist3d_16x6.pro noticed that dat.dtheta isn't replicated to all the energy channels like dat.theta:
 - dat.theta = replicate(1,16) # [67.5,-67.5,0,0,0,0.]
 - dat.dtheta = [45.,45,90,90,90,90.]
 - dat.phi = replicate(1,16) # [0,0,45,135.,225,315]
 - dat.dphi = replicate(1,16) # [360.,360.,90.,90.,90]

Is there a reason for this? It'd be preferable to me that dat.dtheta is the same dimension dat.theta in order for my code to remain generalized for all data types.

2b I also notice that 16x64 distribution doesn't replicate dat.dphi as well as dat.dtheta. Do you think that replicating these variables would break something else? If so, let me know, and I'll add some branches to my code. Just trying to think further down the road and make the code as general as Vassilis wants.

Christine

1. Correlation and dynamic correlation code: include these 2 routines and make a wrapper that works with tplot variables (and possibly interpolation if necessary)

<u>Harald</u>

1. Validate Tsygenko work from Pat (Feb-March 2008)

Andreas

1. L2 File Definitions Document - awaiting L1 document to be completed to use as template.

UCLA

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

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

- 1. TBD print, dprint, msg continue, verbose options for a standard
- 2. TBD Mini Language to operate on tplot variables
- 3. TBA Tplot FAQ's (Amanda)
- 4. TBA Sun Pulse contamination not removed yet (for Davin).
- 5. TBD Test Suite to test despin from Science Team

THEMIS Science Data Analysis Software Monthly Accomplishments – February 2008

1. New FGM Calibration files installed

2. New procedure created for checking on VC1 data to support THEMIS Mission Operations lights out support.