Software Task Priorities (In Play / In the Queue) - 3/3/08

Jim L.
1. Compress and Decompress routines for MOMs. BugzID=81, for Fields. BugzID=81.
   ~~Test patterns (couple of packets for each appid) for MOMs and Fields verified.~~
   Awaiting output of Orbit Testing (**attenuator patch as well**)
   Update production code to be ready for new compression algorithms - ideally before flight software
   patches are uploaded to the probes.
1. 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. Steps or tasks:
   a. Determine correction - Hannes stated the correction looks okay except 'D' on 7/15/7. **Jim will check.**
   b. **Jim to send Hannes email** with date that 'C' was reset in 2/08 so he check if error is corrected.
   c. Detect dates for each probe all the back to start of mission (Hannes)
   d. create a file of known corrections for each probe. File should be in SVN.
   e. 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.
   f. Change L0-L1 code to take corrections into account.
   g. **Inform Jim M. so he can do a separate reprocessing of L2.**
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. due date 3/7
1. Add feedback suggestions from Andreas to Tohban Info and send to David for turnover to Jonathan. due 3/7.
2. Log File Processing (in progress) due 3/14
   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.
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2. L1 SST changes - **coordinate with Jim M.**
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. L1 File definitions Document. BugzID=xx. **Awaiting word doc from Amanda/David.**
2. thm_cotrans changed to use spin model instead of current method of interpolating 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

<u>Jim M.</u>
1. Mozaic Processing catching up. Catch-up expected by tbd? **Email** David with computer needs to speed up processing. Meeting with Jon Loran being arranged. **Processing hung again. Now only processing 1/2 of days data in one day.** Verify the process works after catch-up.
1. thm_load_sst abort (support request from Chih Ping/Bryan) missing data program aborted. **Check with Davin if okay to update his program.**
1. MOM and FIT (Onboard) in separate L2 cdf, ESA L2 cdf with updated labels. Left to do:
    a. ~~mods to be made to FIT master cdf~~
    b. Regenerated MOM, ESA and FIT test cdf's and notify SPDF and QSAS. **Awaiting feedback.**
    c. Start reprocessing. **Also awaiting Davin's analysis/mod for the pressure calibration issue.**
    c. User's Guide, Data Description list updates.
1. Reprocess all overview plot data
    a. Implement Moment Overviews (from Pat) into production and let Tim know it's ready.
    b. Change all plots to have both A-E and P1-P5 designations.
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1. A separate paragraph or couple sentences on each L2 cdf's that are available to the public.
1. SST L2 cdf upgrades - coordinate with Jim L. (L1 cdf changes)
1. 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.
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. The 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. 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 l2 cdf's~~
    c. ~~thm_load_mom's datatype keyword should be implemented~~
    d. reconcile mods with Davin
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

<u>Jim M. (continued)</u>
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
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 - see if Austria can get there data for mirroring from France.
1. From Christian Jacquey: 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?)**
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)
1. Inventory of Products, monitoring and building new alarms for Production Data Processing.
1. 12 ASI drives, 6 off-loaded, 6 still to be done.
1. Themis web page - Update Status web page.
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1. Support Amanda with Web Page updates as follows:
      a. update the beta web site to be indentical to the official web site if they are currently not in sync.
      b. Making a change to the beta site
      c. Transfer mod from the beta site to the official site
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

<u>Pat</u>

1. Shadow Bar on overview plots. Same task:
   Shadow Indicator (for Vassilis - using functionality in ...load_state2 and tplot roi)?
   Update the key for the overview plots. Need access to a windows machine that has Photoshop.
1. File Tracker bug from Tim.
1. ~~tplotxy and the ttrace_crib mods per Vassilis (**Completed - Review with Vassilis week of 2/25**):~~
   ~~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. Development in progress.

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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
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.
3. 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. Bug fixes (Completed)~~
~~a. Bug in thm_part_getanbins that fails to properly handle cases when no phi bins occur within PHI range.~~
~~b. Bug in them_part_getspec causing fgm data to load if angle keyword not set.~~
~~c. Bug in thm_part_moments2 that senses incorrect angle mode at the beginning of given timespan.~~
~~d. Account for fact that thm_sst_* doesn't set dat.mode~~
~~make output echoing current angle mode more user friendly by outputting numbers of energies/angles.~~

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. Found a bug with code in how it handles the 6-angle data. Bug fixed. **Davin** to see why his changes never made it to the trunk.
1. Add ability to calculate pitch angular spectrum - due 3/7
   a. incorporate fac_matrix_make and tvector_rotate
      1. Copy fac_matrix_make to new file, thm_fac_matrix_make, and modify to handle DSL coordinates for FAC-Xgse matrix generation and rotation - in progress
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      2. Re-code thm_part_moments2 to calculate pitch angle spectra using theta spectra algo.
   b. allow angle bins to be broken down into smaller (user defined) sub-bins
1. Add ability to limit for thm_part_moments2 to limit moments calculation to erange specified by user. This was requested by Andrei, but Vassilis said there might be some other code already written to perform this. Perhaps we want thm_part_moments to have this ability as well anyway. It's a relatively minor mod. Determine if code exists, and if it does do we still want the mod.
1. Add ability to calculate gyro phase angular spectrum (in parallel with pitch angle development)
2. Fix a bug that causes the code to bomb when a phi range is specified for theta spectragrams.
2. Finish modifying thm_fac_matrix_make to handle DSL coordinates for Rgeo, Ygeo, and Ysm options.
2. Add demonstration of thm_fac_matrix_make to thm_crib_fac.
3. Tplot issue with angle mode changes. Since tplot only works with square arrays, it can't plot a time range that contains an angle mode change in which the number and distribution of the angles (y-axis) changes. The user is forced to limit the timerange that contains only the angle mode in which they're most interested.
3. Add ability to convert to GSM coordinates (requested by Kaori)
4. 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)
4. 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)
   d. minor bug found by Pat (email of 2/15/08)
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
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. Multiple enhancements concerning keywords, valid_names and thm_load routines

Michael
1. Develop a prototype version of the EFI calibration (gain, offset, and despinning) algorithm from
   Chris Cully's v.2 code. To become a subset of THM_CAL_EFI.PRO
   a. Write a working version that generates diagnostic plots per J. Bonnell's specs.
      v.2 of this (plots and code) are **awaiting J. B.'s feedback**.
   b. Determine if the SCM generic despin routine should be used for efi.
      i. Compare and contrast SCM and C. C. despin, stepping through Ken's code in progress. 3/7 to complete
      ii. Review results to John. B/others to get a decision.
   ~~c. Y title utility - declare routine w/in THM_CAL_EFI.PRO so that John does not have to approve it.~~
      ~~2/29 to complete.~~
   d. Incorporate subtraction/correction code into LOAD/CAL suite. Will be worked later after prototype has
      reached some level of maturity.
2. Modify existing EFI calibration routines.
   a. Document offsets and corrections in data attributes structure. (**Completed awaiting John. B's review**)
      BugzID=106.
      ~~1. Required subtask: Fill the new attributes from EFI calib. files via THM_GET_EFI_CAL_PARS.PRO~~
         ~~(modify passed structure).~~
      ~~2. Req. subtask: Introduce "probes" param., and FILE_RETIEVE() mechanism to~~
         ~~THM_GET_EFI_CAL_PARS.PRO.~~
      3. Minor modifications to make on THM_CAL_EFI.PRO and/or THM_GET_EFI_CAL_PARS.PRO
         and then John will approve all changes together for #2a.
   b. Implement time-dependent EFI calibration parameters. **Awaiting John. B.'s request to start**.
3. ~~Req. subtask: replicate cal. files for each satellite~~. Unique manual generated calibration files to be setup
   for each probe. **Awaiting requirements from John B**.
4. Investigate Ez=0 and E dot B=0 sections of THM_CAL_EFI.PRO for correctness.
5. Build an informational widget.
   ~~a. Route the output of TPLOT_NAMES to a text box.~~
   ~~b. Rewrite widget to display contents of default limit structure~~
   ~~c. Make sure output widget is left justified.~~
      To be reviewed with Vassilis, Jim M. and David first week in March.
      Mass production awaiting the above review and item #e.
   ~~d. Update event handling to recognize clicking on a particular tplot variable name~~.
      J. McTiernan to approve.
   e. Debug Windows compatibility problem.

Hithesh
1. Read the THEMIS IDPU Software Design overview - in progress
2. Discuss any questions with Peter - ongoing
3. ~~Work with Peter on changes to the THEMIS Solid State Telescope flight~~
   ~~software. Testing on workbench and Flatsat complete ready for upload.~~
4. ~~Test changes for FGM data (apid 460, 461) to use algorithm 5 (three-channel delta mod) for compression.~~
   ~~Fltsat testing completed.~~ Awaiting upload to the probe.
5. Test SST Attenuator Logic modification on Flatsat.
6. Moments triggering off of the density and pressure for the day side. Begin week of 3/3-3/7.
   For 3/10 generate list of sub tasks and an estimated date for completion.

Vladimir

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

Hannes

1. From date that 'C' was reset in 2/08 verify if error is corrected. Jim L. will send date.
1. Determine for all the probes for all the days from start of the mission when the fgl issue
   (as described in Jim Lewis's list) occurred and a program that can be run
   monthly to determine if it has occurred again. to be completed by 3/7.
2. V03 - L2 State cdf.
        a. definitive attitude info - in progress
        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)

Davin

1. Pressure calibration issue - factor of 100 difference between ps?f_density and ps_m_density for all probes.
1. thm_load_mom - SST calibration onboard mom issue.
2. Email from Bryan: It turns out that the latest version of thm_sst_dist3d_16x6.pro in the trunk
   didn't have the replication of dat.dtheta for all energy channels.
2. thm_load_sst issue - update the code when data not available.

Vassilis

1. Check out Outlier routine, LMN and Solar Wind crib and code from Vladimir.
2. See Christian Jacquey #3

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)

Harald

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

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.

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
6. 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)