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| Investigation: FIELDS |
| Progress accomplished this period: | March 2014 Reporting Period |
| 1. | Project Management and Product Assurance |
|  | a. | Project Management* Attended the FIELDS data processing meeting at U of Iowa. Compiled a list of actions and agreements.
* Attended the EDI team commissioning and data processing meeting at U of Iowa. Topics discussed included operational strategies to mitigate risk of GDU degradation.
* Supported the following PERs and associated TRRs
	+ GDU SN6
* Supported the following FRBs
	+ None
* Supported the following Acceptance Reviews or PSRs
	+ None
* Received delivery of the following flight hardware items at UNH
	+ None
* Delivery of the following flight hardware items from UNH to FIELDS partners
	+ 1 set of DEFL boards assembled at UNH to be used for Gun SN4 refurbishment (to IWF)
	+ SN4 EDI Gun and GDE for refurbishment and recalibration (to IWF)
* Delivery of the following flight hardware items from UNH or LASP to the IS and Observatories
	+ None
* CDRL and contract deliverable submissions this month:
	+ None
* Prioritized and coordinated the efforts of the UNH team, subcontractors, foreign partners, outside vendors and in-house workshops to optimize schedule performance.
* Supported processing of NCRs
 |
|  | b. | Product Assurance |
|  |  | Turco / Salwen* SDP 2 preamp closeout and assembly support.
* EDI Gun DEFL board testing support
* EDI HVOC life test support
* GDU SN6 test support
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| 2. | Systems Engineering and FIELDS I&T |
|  |  | Rau, Dors, Needell* Met with S/C Systems and discussed mag boom alignment verification
* Continue supporting commissioning planning discussions
* Updated some GSEOS screens in preparation for flight ops
* Attended MMS SWT, FIELDS team and Commissioning meetings in Iowa
* Support continued GDU problem investigations and risk analysis
* Continued submitting FIELDS verification material for closure
* Continued with the AFG/DFG sensor temperature calibrations
 |
| 3. | Post-Delivery Support (UNH) |
|  |  | * Supported OBS-2 EMI test at GSFC and UNH
* Supported OBS-3 Acoustics Testing
* Supported OBS-3 EMI test at GSFC and UNH
* Performed SCM low freq AC magnetics test during OBS2 and OBS3 EMI
* Supported VIF development and dry run on OBS
* Supported OBS-3 operating hours
* Supported OBS-4 TV testing
* Supported and reviewed WOA and procedure development at IS/OBS levels
* Reviewing all test data from previous OBS tests
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| 4. | Science and Science Data Processing  |
|  |  | SWT and SWG * Torbert: Prepared for and attended March SWT, SWG and FIELDS data processing meetings at U of Iowa.

Science data processing activities (Compiled by Chutter)* ALL
	+ Continued working through coordinate system definitions
	+ Continued working on software to run at SDC – SIT 5B declared a success for FIELDS
	+ Continued working on revising MMS CDF Guide and providing input to SDC Developers Guide
	+ Continued populating FIELDS Processing documents
	+ Participated in the Fields data processing group meeting, Iowa, March 2014 – many details resolved, defined magnetometer and E field calibration conferences
* UNH
	+ Scripts to manage FIELDS processing at SDC updated
	+ Worked through details to complete SIT 5B
	+ Continued review of science and engineering telemetry from observatory level testing
* LPP
	+ L1A to L1B v.0 software now includes full SCM calibration process
* UCLA
	+ Work continues on magnetic field data processing
	+ Work continues on inflight calibration and procedures
* GSFC
	+ Evaluating LANL GeoMag code
	+ Worked on getting Mag sensor mounting alignment measurements.
	+ Worked on aspects of the orthogonalization (calibration by spin-tone removal) code from UCLA.
	+ Worked on finalizing the AFG/DFG Level1B processing for the March SWT deadline
* IRFU
	+ Resolved remaining issues with CDF file format and file names
	+ Reorganized the Matlab routines and bash scripts to reduce complexity
	+ Worked on implementing functional version of DCV and DCE processes
* LASP
	+ Some updates to quicklook and SITL ADP DCE and DCV code on SDC sandbox
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| 5. | Magnetometers |
|  | a. | DFG  |  |
|  |  |  | * Evaluation of observatory test data
* Various activities in the frame of EDI/MAG data processing and calibration
* Participation in the MMS meeting Marathon
 |
|  | b. | AFG |  |
|  |  |  | Science* Magnetometer paper submitted, reviews received, under revision.

Prelaunch Preparations* Work continues and code is being developed and documentation written for magnetic field data processing.
* Hannes Leinweber developing inflight calibration and inflight calibration procedures, and generating code.
* Louise Lee converting analysis software to Python. Has a working interactive module.
* Support SODAWG – emphasis on coordinate systems, which are now well defined. Coordinate systems to be used for different data products discussed at FIELDS meeting.
* Held magnetometer team meeting in Iowa to prepare for SWT and FIELDS meetings later in the week.
* Attended MMS SWT and FIELDS meetings [UCLA – C. T. Russell, R. J. Strangeway, H. Leinweber; GSFC – G. Le, K. Bromund; UMICH – J. Slavin ].

Engineering: Post-delivery Activity* Watching over activities in assessing LM6142.
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|  | c. | SCM | * SCM FMS => SENSOR S/N FM4 + PREAMP S/N FM3
	+ - SCM FMS (sensor, preamp) fully packed and ready for delivery.
		- ADP complete.
* Assessment of the SCM calibration signal analysis at observatory level is complete. SCM calibration signal is compliant on all observatories even if noise identified as coming from environment (60Hz and harmonics) has been detected on Obs2 and Obs3.
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| 6. | EDI |
|  |  | EDI SE* Prepared for and participated at EDI Data Processing and Commissioning Planning Meeting at UIowa

Ship Set 4 - SN 6* Diagnostic testing of Gun in vacuum after out-of-family safe-to-mate result

Ship Set 4 - SN6* Performed functional test of gun in vacuum after disconnection of HV-diode
* Assembled GDU
* Baseline FFT in vacuum
* PER
* Vibration
* Detector Characterization

Sensor* Ship Set 1 - SN 9
	+ Final assembly
	+ Electrical Test

Gun - UNH efforts* Retested spare beam generation system with new filament

Gun - IWF efforts* Ship Set 1 - SN9
	+ Integrated DEFL boards into board stack
	+ Started Gun Calibration

Flight Software Continued implementation and testing of electric field modeHV amplifier trend root cause investigations (UNH)* The Gun HV amplifier trending root cause investigation continues at UNH using the FM4 Gun DEFL boards. Board level tests to date show characteristics of gain and baseline LED current drift that are similar to those seen at Gun or GDU level, but are significantly lower (factor ~7) in magnitude. The UNH EDI team reviewed these results and will pursue a test setup that is more representative of the integrated Gun. The plan is to add a Gun housing, EM HV-Fil board and EM HV stack.
* CTR measurements of the 12 UNH HVOCs in the life testing sequence indicate stable behavior after 500 hours dynamic cycling. This testing will continue with the next CTR measurement planned after 1000 hours.
* HVOC LED luminosity testing continues at GSFC in coordination with UNH. This effort is intended to provide additional data for the Gun HV amplifier trend root cause analysis.

HVOCs* Life testing of 12 UNH HVOCs is continuing. More than 500 hours have been logged.
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| 7. | SDP/BEB/LVPS  |

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|  | a. | SDP/BEB/LVPS (KTH/IRFU/Oulu)* All hardware efforts are complete.
 |
|  | b. | SDP (UNH)Flight Spare SDP (SN2):* Integrated boom cable.
* Closed out preamp
* These activities completed assembly of the flight spare unit (SN 2). FFT will be conducted after EMI testing. That activity is part of the investigation of deployment stoppage anomalies in TV (additional EMI/EMC testing)
 |
|  | c.  | SDP (LASP)* SDP work at LASP is complete
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| 8. | ADP |
|  | a. | LASP ADP Post-Delivery Support Activities * Obs #1 – No LASP activity
* Obs #2 – No LASP activity
* Obs #3 – No LASP activity
* Obs #4 – No LASP activity
* ADP WOA closure review
* Supported MMS IS I&T planning teleconferences
* Reviewed WOA paperwork as required.

Axial Electronics Box (AEB)* No activity
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| 9. | DSP, Thermal, Systems Engineering, Product Assurance and Management (LASP) |
|  |  | DSP, Thermal - No activities this month. Systems Engineering and Program Management* Supported project as needed

Quality Assurance, Parts, and Materials Engineering* No activity
 |
| 10. | CEB  |
|  | a. | Hardware |
|  |  |  | * No activity. CEB hardware activities are complete.
 |
|  | b. | CDPU Software  |
|  |  |  | * Continued implementing FSW modifications for final FSW build.
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| 11. | GSE (Mello) |
|  |  | GSE Hardware* No activity

FIELDS Simulator* No activity

GSEOS & GSE Software* Update telemetry screens as needed to support testing.
* Improve monitoring features for testing.
* Update CMD & TLM spreadsheets.
* Support FIELDS testing.
 |
| 12. | Commissioning and Mission Operations (Needell) |
|  |  | * Supported planning for and dry run of VIF Functional Test
* Prepared for and participated in Commissioning TIM during SWT
* Prepared for and participated in FIELDS Team Meeting
* Participated in EDI Team Meeting
* Began weekly FIELDS Commissioning meetings
* Provided updates to SOC regarding ADP RE Deployment plan
* Continued working with SOC to plan FIELDS commissioning activities
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| 13. Problems encountered and updates this period |

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|  |  | EDI* [UPDATE] Lower than expected impedance measurement during safe to mate (EDI GUN FM8) (PFR-10160.53-133-IP)
	+ During the safe to mate incoming receiving inspection test at UNH, a lower than usual impedance measurement was seen across the +5V line (P5V2) to ground: (800 Ohm versus ~4M Ohm for earlier units). IWF reported also that their incoming test at UNH showed a higher than previously measured and out of family supply current at the P5V2 line.
	+ UPDATE: Subsequent tests at UNH to investigate the cause of the anomaly, including tests in vacuum, have identified the LVDS driver on the beam board as the likely source of the problem. The Gun performance is otherwise nominal. Disposition awaits FRB discussion. The likely recommendation is for rework and recalibration at IWF.
* [UPDATE] EDI GDU FM6 Red limit violation of Gun Anode HV amplifier LED current (PFR-10160.53-128-IP)
	+ When switching the gun energy from 250 eV to 500eV during the first (baseline) full functional test in vacuum, the GDU primary current increased to 156 mA which is out of family compared to other GDUs (expected current in that instrument state: ~121 mA). The next analog HK sample showed a red limit violation on the Gun Anode HV amplifier LED current (39mA). The red limit violation was not a transitional effect but stayed, as did the non-nominal primary current.
	+ Subsequent investigation and FRB discussion indicate that the problem is most likely related to the HVOC in the negative side of the anode amplifier. Analysis showed that the circuit would perform within requirements with this device disconnected. The recommended modification to the beam board was made. Subsequent tests in vacuum of the Gun were successful. The GDU6 was reintegrated and the FFT in air was successful.
	+ UPDATE: GDU6, having successfully completed vibration testing and detector characterization in vacuum, is currently in TV testing. Performance of the anode HV amplifier is, so far, as expected.
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| 14. Issues and concerns |
|  |  | From FIELDS PM* The EDI Gun continues to be the critical path for GDU and FIELDS. Commitments of the IWF team to the Solar Orbiter project have made the schedule issue more acute. UNH has provided support to IWF in efforts to help resolve technical issues and minimize schedule impacts. Plans and options for support will be discussed again during the April IWF visit to UNH.
* The risk record regarding GDU performance and schedule (PIMS ID 176, MMS Project) is being used as a tool to help coordinate mitigation efforts. Recent additions include operational strategies to reduce GDU stress on orbit.

Science Data Processing Issues (Compiled by Chutter)* UNH
	+ No issues reported.
* LPP
	+ [still pending] Conversion of TT2000 (64 bits long integers) to double precision floating point numbers introduces errors (tents of nanoseconds). This conversion is needed to correct for leap seconds and also for tplot variable timing => need to keep LONG64 all along the process => calibration software has to be modified.
* UCLA
	+ No issues reported.
* GSFC
	+ Awaiting mounting orientation information of AFG and DFG on mag booms
	+ LANL GeoMag (coordinate transformation software to be used by MMS) will not install on my Mac. Awaiting support from LANL on specific issues. Some discrepancies found between documentation and code -- or else the software is too difficult for me to understand how to use properly. Documentation on the implementation of the mag field models is minimal.
	+ Coordinate system issues (to be discussed at March meeting) - Common coordinate systems w/o excessive proliferation
* IRFU
	+ Complete basic functionality for DCV and DCE processes
* LASP
	+ No issues reported.
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NCR Summary: Provided separately (Excel file)

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| Activities planned for next reporting period |
|  |  | Management |
|  |  |  | * Update the Gun and GDE schedule.
* Continue to review and update the EDI GDU delivery and risk mitigation.
* Continue to push open NCRs to closure. Support FRBs as needed.
* Continue to prioritize and coordinate the work of the UNH team and its FIELDS partners.
* Support/staff T/V testing as needed
* Receive delivery of the following items at UNH
	+ EDI SN9 Gun and GDE (from IWF)
* Delivery of the following flight hardware items from UNH to FIELDS partners
	+ EDI Gun/GDE SN8 to IWF for rework and repeat of calibration
* Prepare and conduct the following PERs and associated TRRs
	+ EDI GDU SN9
* Prepare and conduct the following PSRs or Acceptance Reviews.
	+ EDI GDU SN6
* Make or coordinate delivery of the following to GSFC IS or S/C teams
	+ EDI GDU SN6
* CDRL and contract deliverable submissions:
	+ None planned
 |
|  |  | Product Assurance, Configuration Management, Parts, Materials, Facilities |
|  |  |  | Turco/Salwen* TV test support of EDI FM6
* Integration support as needed for EDI FM9
* Continued support of DEFL board testing
 |
|  |  | Systems Engineering & FIELDS I&T |
|  |  |  | Rau, Dors, Needell* Support continued GDU problem investigations
* Perform GDU SN06 EMI, Magnetics, FIT and Acceptance Test
* Begin SDP FM2 EMI testing
* Continue submitting FIELDS verification material for closure
 |
|  |  | Post-Delivery Support (UNH) |
|  |  |  | IS and Observatory Support (FIELDS)* Update documentation in preparation for Post Stack testing
* Support the Observatory EMI Test Campaign Review
* Present FIELDS Observatory status at OBS TV review
* Prepare SDP door deployment procedures
* Support Observatory Stack Vibe as needed
 |
|  |  | Science |
|  |  |  | SWT and SWG* Support science telecons as needed
* Continue preparation FIELDS Instrumentation papers

Science data processing plans* ALL
	+ Develop plans for completing INITIAL versions of software by end of November
	+ Continue populating FIELDS Processing document
	+ Use SPDF tools to verify CDF and skeleton files follow MMS CDF Guide
	+ Finalize errors and warning management
	+ Support SODAWG
* UNH
	+ Continue work on scripting to control processing
	+ Continue L0 to L1 software updates as necessary – many new features added at Iowa meeting
	+ Work on error and warning management at SDC
* LPP
	+ Test further the SCM calibration software with the new SCM L1A CDF files provided by M. Chutter in Mag123 system.
	+ Digital filter response will be tested in the calibration software (may be postponed to later in 2014 depending on work load)
	+ Convert time processing from double precision floating points (Epoch16) to long64 (TT2000)
	+ Include coordinate transformation from mechanical frame OMB to GSE in L1BtoL2 : interface with K. Bromund’s software as decided on the data processing group meeting, Iowa, March 2014
	+ Include CDF version number computation (vX.Y.Z)
* UCLA
	+ Continue developing in-flight calibration procedures
	+ Continue converting analysis software to python
* GSFC
	+ Continue evaluation and development of orthogonalization code.
	+ Modify calibration file as agreed at FIELDS meeting: add uncertainties and temperature correction coefficients.
* IRFU
	+ Enhance functionality for DCV and DCE processes
* LASP
	+ Continue improving DCE software
 |
|  |  | AFG |
|  |  |  | * Continue work on data products guide.
* Continue developing inflight calibration procedures.
* Continue software analysis activities.
* Continue to support SODAWG.
* Develop milestones for prelaunch preparations. Milestones, based on activities conducted in association with Mission Readiness Tests.
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|  |  | DFG |
|  |  |  | * Continue support of observatory testing.
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|  |  | SCM |
|  |  |  | * FMS ADP: final review before delivery still to be done.
 |
|  |  | EDI |
|  |  |  | Ship Set 4, SN6* TVAC Test, EMI, FIT, Magnetics, Pre-Ship Inspections
* Shipment to GSFC

Ship Set 1 - SN9* GDU Assembly
* Baseline FFT, EMI, FIT, PER, Vibration

Sensor* Ship Set 1 - SN 9
	+ Vacuum Test (completed 3 Apr).

Gun - IWF efforts* Ship Set 1 - SN9
	+ Ship Gun and GDE to UNH for GDU Assembly

Flight Software* Continue implementation and testing of electric field mode

HVOCs (UNH)* Continue the HVOC life testing (12 devices).
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|  |  | SDP/LVPS/BEBs/Preamp/Probe (KTH/ Oulu/IRFU) |
|  |  |  | * Hardware work is complete. No hardware activity planned.
 |
|  |  | SDP/LVPS/BEBs/Preamp/Probe (UNH) |
|  |  |  | UNH SDP:* Investigation of deployment stoppage anomalies in TV (additional EMI/EMC testing)
	+ Continue to work the EMC study for SDP
	+ Prepare procedure and request quotation for EMI testing of SDP SN2 (flight spare).

LVPS* No activity planned
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|  |  | ADP/SDP/DSP (LASP) |
|  |  |  | QA/Parts/Materials – No activities plannedDSP – No activity plannedADP* Support I&T at Goddard as needed

AEB, SDP, Thermal – No activity plannedSystems and Program Management* Support project as needed.
 |
|  |  | CEB Hardware and Software |
|  |  |  | * Complete implementation of Final build FSW changes
 |
|  |  |  |  |
|  |  | GSE (Mello) |
|  |  |  | GSE hardware* No planned activity

GSEOS & GSE Software* Update telemetry screens as needed to support testing.
* Improve monitoring features for testing.
* Update CMD & TLM spreadsheets.
* Support FIELDS testing.

FIELDS Simulator (FS)* No planned activity
 |
|  |  | Commissioning and Mission Operations (Needell) |
|  |  |  | * Conduct weekly FIELDS Commissioning meetings
* Continue to work with SOC to plan FIELDS Commissioning activities
* Support I&T activities as needed
* Prepare for and participate in SDP Contingency Telecon
* Respond to Action Items from March Commissioning TIM
* Respond to Action Items from March FIELDS and EDI Team Meetings
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