Introduction
The Helioseismic and Magnetic Imager (HMI) investigation contract (NAS5-02139) between NASA and Stanford University has been in place since 27 September 2002. As of this date the contract has been modified 47 times. The contractual launch date is 31 August 2008 which is now in the past; however the NASA specified “launch date” is now January 2009 but will likely be later.

The development of the HMI flight instrument is subcontracted to the Lockheed Martin Space System Company at its Lockheed-Martin Solar and Astrophysics Laboratory (LMSAL) in Palo Alto California. The monthly progress of the LMSAL subcontract is reported in parallel with this report and is considered to be an attachment to this report. The monthly (or bi-monthly) report for E/PO activities is also attached to this report. All periodic reports are available at http://hmi.stanford.edu/Status_Reports/. The quarterly reports from science Co-Investigators are also available and are considered to be attachments to this report. These monthly reports are written a week or two into the following month and include some status as of the date written. This section of the monthly report is written on 14 September 2009 and describes activities at Stanford University in support of HMI and JSOC-SDP development.
Status and Activities during August.

Administrative Issues:

The mod for launch delay III (to December 2008) and inclusion of a science component for all of Phase-E has finally been sent to Stanford. It is nearly acceptable except for clerical errors that may be corrected soon. The proposal for launch delay IV was submitted some time ago. We have received a proposal from Lockheed for the first two years of Phase-E Co-I effort. We will negotiate this contract with LMSAL soon, now that we know the approximate start of Phase-E.

HMI Instrument:

Overview:

HMI is finished and ready for launch. Details are in the LM monthly report. There are a few flight software issues that will be corrected after launch. We supported SDO CPT in August.

Instrument Calibration:

The HMI calibration team is still working on completing the detailed calibration report and the instrument description and performance papers to be published prior to launch.

HMI SDP:

HMI Level 1

The base level 1.0 program is complete and is running with test data. After the “10-day” DDS test is complete in mid September we will test the level-1 code with re-tagged HMI sun light test data from 2007. The 10-day test is being used to verify unpacking and coordinate transformations to convert the SDO FDS and ACP data to the needed coordinates for HMI.

The observables computation program (level-1.5) is now complete with all needed functionality included. We expect to test from sun-test filtergrams through to Dopplergrams and magnetograms as soon as the level-1 code is ready. Further work on the observables code must await specifics of frame sequence labeling and sequence decisions that will be made during instrument commissioning after launch.

HMI Level 2

Work is continuing on tasks for several standard product pipelines. The status described here is for projects that extend over many months and the status thus is slowly changing from month to month.
Work is proceeding on implementing the time-distance pipeline. The code between Dopplergrams and inversions is now complete. The lower-degree global helioseismology pipeline work is done. Work has now shifted the “high-l” peak fitting code which has been developed by two groups over the past decade. The more complex (and higher degree l) code has been moved into the local system (it was developed at USC and in Germany) and is being tested for reliability. Regular bi-weekly meetings are resulting in steady progress for this code.

The synoptic LOS magnetic field has been ported into the DRMS system.

Work is underway for other magnetic field modules needed for initial vector field products.

The set of standard products is documented via the jsocwiki. See e.g. http://jsoc.stanford.edu/jsocwiki/Processing

**JSOC SDP:**

We have selected a database sysadmin contractor to help completion of the DRMS/SUMS database standby and replication system. Work has begun to finalize our warm-standby configuration.

We have set specific final dates for the three members of the JSOC software team whose roles are complete at or near the end of Phase-D. This will shift some responsibility for ongoing maintenance to the science team. The dates may shift if the launch is delayed beyond 4 December.

**JSOC Capture System**

The Data Capture System (DCS) is complete. We believe all requirements have been verified. The Offsite system is still waiting to move to Lockheed.

**JSOC Storage Unit Management System (SUMS)**

The SUMS system code development is complete.

The migration of the MDI archive into the JSOC (supported by MDI) is complete.

RemoteSUMS is now functioning as needed.

**JSOC Data Record Management System (DRMS)**

The base DRMS system is complete except for minor bug fixing and better documentation.
**JSOC Database Development**

The distributed remote DRMS/SUMS code now has full functionality. We have now started to export data on a routine test mode to at least two sites. We are presently exploring actual end-to-end bandwidth performance and taking steps to improve bandwidth leaving the JSOC room to allow at least 2 GBps which will allow several full AIA and HMI level-1 data streams to be forwarded to Co-Is.

**JSOC Level-0 Processing**

Work is done. We do not expect further level-0 changes until commissioning, if then.

**JSOC Data Export**

The prototype development of the basic web access code is complete. We still need to implement export transport protocols for efficient export of large datasets. Work is continuing as part of the VSO (Virtual Solar Observatory) to allow “daisy-chaining” of exported storage units. This is part of work now underway to integrate SDO data access into the VSO. Work is proceeding on a browse-able data catalog vs relying on the user to “know” what data is available.

**JSOC Hardware**

The JSOC-SDP hardware is in place and in regular use. We are nearing the end of the hardware procurement and configuration for the beginning of the mission. The upgraded database server machines have arrived at Stanford and have been installed. We have put their use on hold until the end of the DDS 10-day test in Mid September but expect to switch to the new pair at the end of that test. The watchdog machine that will provide system status on all key systems and programs is now functioning. A prototype monitor is available on the JSOC web page.
Science Team:

We held an HMI team meeting at Stanford in the second week of September. The meeting page is at: http://hmi.stanford.edu/TeamMeetings/Sep_2009/. We had about 75 participants and feel that the meeting was successful with a number of analysis development tasks re-invigorated as launch approaches.
Planned Activities for September

Continue work on science product pipeline.

Support HMI Team Meeting

Near-term Milestones

30 Sept 2009  Vector field disambiguation and Force-Free field line mapping ready for initial use.

30 September  Upgraded database prime and warm standby machines put into service. This will be delayed a week or two to allow completion of the DDS 10-day test with processing through to level-1.

30 September  Data Export browseable catalog prototype available.

29,30 September Support visit from SDO NASA project leaders.

Attachments

Lockheed Martin Solar and Astrophysics Laboratory HMI progress report and the HMI/AIA EPO progress report for the month are attached. This report, the LMSAL report, and EPO reports are also available at http://hmi.stanford.edu/Status_Reports for convenience.