

Helioseismic and Magnetic Imager

Stanford University

Contract NAS5-02139
Progress Report for July 2004

Introduction

The Helioseismic and Magnetic Imager (HMI) proposal was submitted to NASA on 24 April 2002 in response to the Solar Dynamics Observatory Announcement of Opportunity AO 02-OSS-01, and this investigation was accepted by NASA on 15 August 2002. The contract to NAS5-02139 between NASA and Stanford University was in place as of 27 September 2002. That contract has been modified (via Modification #13) to extend through Phase-E at launch plus 30 days plus six years with the launch expected in 31 August 2007. We have submitted a proposal for the additional effort needed to extend the launch date to 30 April 2008. We expect the launch delay modification to be negotiated in the next few months. We have submitted a proposal to provide the electronic parts including CCDs for AIA. This proposal has been accepted by NASA and is now modification #15. Modification #16 provided a sufficient additional funding allotment to extend through 10 September. We are developing a proposal to support the additional tasks to incorporate AIA data capture and level-0 processing.

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 report for E/PO activities is also attached to this report. All monthly reports are available at http://hmi.stanford.edu/Status_Reports/.

Status and Activities during July.

Both Stanford and Lockheed personnel have participated in weekly SDO instrument interface, ground system, and individual instrument team telecons.

The SU team supported regular Weekly HMI meetings at the LMSAL facilities including the regular weekly status meeting and topical design meetings in areas including mechanical, optics, thermal, electrical, software, CCD cameras, and others as needed.

The Stanford personnel responsible for the HMI instrument performance (R. Bush and J. Schou) continued work on understanding the optical, thermal, and filter performance specifications for the HMI filter oven and front window and blocking filters to assist LMSAL. Additional work continued in the form of technical discussions of the Michelson Interferometer development with LMSAL personnel to support the subcontract (from LMSAL) with Light Machinery in Canada. Additional work continued in the form of discussions and management activities on the CCD camera systems for

both the development and flight camera systems for both HMI and AIA in support of the LMSAL activities.

P. Scherrer attended CCD and CCD-camera status meetings in the U.K. in July. The detailed minutes of these meetings have been reported by LMSAL.

The Stanford personnel responsible for the design and development of the HMI-AIA Joint Science Operations Center (JSOC) and science data processing participated in several SDO ground data system telecons. The emphasis has been on completing comments on the various sections of ICDs.

The data EGSE for HMI&AIA work led by J. Aloise continued. The package was used for initial tests with the spacecraft simulator in mid July. The data EGSE units 1 and 2 have been procured and are ready to have the base software installed. These will be ready to move to LMSAL as needed to support HSB testing in early fall. Work is continuing on the level-0 image display and quick analysis functions that will be done in an analysis workstation.

One of the key modifications needed to the SOHO/MDI data handling system to enable efficient processing of HMI and AIA data is the separate handling of data metadata and the image data. We expect to implement this by placing the image header information into a relational database. We have had several design discussions led by R. Larsen to examine the implications for processing both in and outside the “pipeline”.

Hardware configuration studies for the data system, led by K. Chu, continued with detailed discussions of NAS vs SAN architectures. We had a presentation by SGI on their proprietary hierarchal storage system that might be selected to provide our core data storage system as an alternative to “disk cache” function in the MDI system. Advantages would include ease of management of disk free space and ease of incorporating massive near-line storage as needed to support the AIA level-0 data requirements. Disadvantages include cost and reliance on a particular vendor.

We had a presentation by R. Bogart and K. Tien on the applicability of the Virtual Solar Observatory for export of HMI and AIA data. The VSO is being supported by another NASA grant but will be coordinated with the JSOC data export function.

We have completed advertising for the JSOC Software System Engineer and will schedule interviews in early August.

Stanford University planning for the new Varian-II Physics building is progressing and we have initial space allocations sufficient for about 40% of our needs. Work is continuing on this issue. At present we have an allocation sufficient for the JSOC data center and 1/3 of our needed office space. The Dean of Research has forwarded to the Provost our request for approval for a detailed study of the costs and feasibility of constructing a temporary building on the Stanford campus to house the remainder of our program. We expect to have a resolution of our future space needs before the HMI CDR in November 2004.

Planned Activities for August

We are planning a 1-day “retreat” to examine in detail the development plan and schedule for the data part of the JSOC. This will be in the last week of August or first week of September.

Data EGSE work will continue development for processing the instrument housekeeping stream that will be merged into the high speed bus data stream. The Data EGSE units 1 and 2 will have the base software (our CM software and Oracle) installed as time allows. These are not needed for a few months.

The draft of the IT security plan may be complete and delivered to SDO. Some details will need to be modified after the referenced documents are available.

We expect to complete negotiations with LMSAL on the CCD and parts contract modification.

We expect to hire the JSOC Software System Engineer in August.

We will hold an MDI/HMI Local Helioseismology Workshop on August 18-20.

We expect the subcontract with HAO Co-I Tomczyk to be extended for the next four years to provide support of vector field technique development and polarization measurement and calibration on the HMI instrument.

Near-term Milestones

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| 31 August 2004 | Decision on database system to use for image header metadata. |
| 1 November 2004 | Decision on space allocation within Stanford for the JSOC and Stanford HMI team facilities. |

Attachments

Lockheed Martin Solar and Astrophysics Laboratory HMI progress report for July 2004 is attached by reference. It is forwarded to GSFC separately by LMSAL and is also available at http://hmi.stanford.edu/Status_Reports for convenience. Also the HMI EPO progress report for July is attached and available online.