

# Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Science Team Meeting

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The forty-first meeting of the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Science Team was held at Kikai Shinko Kaikan in Tokyo, Japan, June 11-14, 2012. In addition to the Science Team, participants in ASTER-related and other projects also attended. The opening plenary session included discussions of ASTER status and of future Earth-observing satellite instruments; this was followed by splinter sessions for each working group. The meeting concluded with a closing plenary session that included reports from the working groups.

## Opening Plenary

**H. Tsu** [Japan Space Systems (J-spacesystems)—*Japan ASTER Science Team Leader*] and **M. Abrams** [NASA/Jet Propulsion Lab (JPL)—*U.S. ASTER Science Team Leader*] made opening remarks. Tsu announced that as of March 30, 2012, the Earth Remote Sensing Data Analysis Center (ERSDAC), the Japan Resources Observation System and Space Utilization Organization (JAROS), and the Institute for Unmanned Space Experiment Free Flyer (USEF) have merged to establish a new organization, to be known as Japan Space Systems (J-spacesystems). **M. Kato** [J-spacesystems] presented the meeting logistics.

**M. Abrams** outlined NASA's current status, addressing its organization, future missions, and budget. He reported on the Terra platform's predicted propellant usage and battery status, and presented an update on the status of the U.S. component of ASTER's science activities. He showed examples of global digital elevation models (GDEM) currently in use, and reported on the publication of papers, meeting participation, and other science team activities. Further, he introduced several other missions/instruments, including the Landsat Data Continuity Mission (LDCM), the Hyperspectral Thermal Emission Scanner (HyTES)<sup>1</sup>, and the Mineral And Gas Identifier (MAGI)<sup>2</sup>.

<sup>1</sup> HyTES is an airborne simulator designed to test spaceborne thermal imaging technology that will be used on the Hyperspectral Infrared Imager (HyspIRI)—a proposed *Tier 2* Decadal Survey mission—that recently successfully completed its first test flight.

<sup>2</sup> MAGI is an airborne simulator designed to demonstrate key technologies planned for a proposed satellite called MAGI-L (or MAGI in Low Earth Orbit), which is being considered as a possible follow-on to HyspIRI. The design is based on ASTER, with particular focus on volcano monitoring, natural-resources mapping, surface-temperature determination, drought monitoring, air pollution studies, and acute-pollution-event monitoring.

**M. Kikuchi** [J-spacesystems—*Instrument Team*] reported on the status of the ASTER instrument. He provided an update on instrument lifetime management, radiometric degradation, and the action plan for the mission's end. As of now, there are no actions planned or being taken.

**T. Matsunaga** [National Institute for Environmental Studies (NIES)] provided an update on the Hyperspectral Imager Suite (HISUI)<sup>3</sup>. He described the mission structure, project timeline, instrument development, and activities of science working groups.

**M. Hato** [J-spacesystems—*Ground Data System (GDS)*] reported on GDS status. He gave an update on production and distribution at GDS. Hato also reported on the changes associated with the merger that resulted in J-spacesystems on GDS.

**D. Meyer** [U.S. Geological Survey, Land Processes Distributed Active Archive Center (USGS, LPDAAC)] reported on the status of operations, distribution, science, and developments at the LPDAAC.

**M. Fujita** [J-spacesystems—*Science Scheduling Support Group (SSSG)*] presented the SSSG and Operations and Mission Planning (OMP) report. He discussed the status of scheduling and observations.

To close the plenary, **Y. Yamaguchi** [Nagoya University] raised three issues for discussion in the working groups: data acquisition monitoring, GDEM updates, and radiometric calibration coefficients.

## Working Group Sessions

### *Level-1/Geometric/Digital Elevation Model (DEM) Working Group*

In the first half of the session, the focus was on validation results from ASTER Level-1 (L1) algorithm/software; there are no major issues or concerns. The group discussed the update of the L1 algorithm in relation to power reduction. The consensus was that the update

<sup>3</sup> HISUI is composed of both a hyperspectral and multispectral imager, and planned as part of the payload of the Japanese Advanced Land Observation Satellite-3 (ALOS-3), planned for launch in 2014.

should be performed regardless of the power issue, as it increases observation resources by 25%. This will be discussed further, and is subject to budget limitations.

The second half of the session focused on the ASTER GDEM project. **H. Fujisada** [Sensor Information Laboratory Corporation (SILC)] reported on the plan for GDEM *Version 2* and later. **T. Tachikawa** [J-spacesystems] reported that the GDEM has the regular striped pattern that is due to geolocation error caused by ASTER pointing. **M. Urai** [National Institute of Advanced Industrial Science and Technology (AIST)] suggested that the GDEM may be improved by the registration of ASTER DEMs. **B. Crippen** [JPL] described the fusion and differentiation of data from various DEMs. **M. Abrams** introduced the land-water mask and demonstrated the improvements in the ASTER DEMs. **D. Meyer** reported on the L1 software update at the USGS.

#### *Radiometric Calibration/Atmospheric Correction (RC/AC) Working Group*

**B. Eng** [JPL] reported on the status of an atmospheric correction (Level-2 software) update. The instrument team reported the results of onboard calibration. **S. Biggar** [University of Arizona], **S. Tsuchida** [AIST], **H. Tonooka** [Ibaraki University], and **S. Kato** [NIES] reported on the results of *vicarious calibration* from field campaigns—where the radiometric properties measured during ground campaigns are used for comparisons. **H. Yamamoto** [AIST] pointed out the significant radiometric error in shortwave infrared (SWIR) Bands 8 and 9. **H. Yamamoto** and **K. Arai** [Saga University] reported the results of visible/near infrared (VNIR) *cross calibration*—comparing with a sensor on another satellite. The results of cross calibration agree with those obtained through vicarious calibration but differ from those obtained through *on-board calibration*—comparing with the lamp onboard the spacecraft. The Science Calibration Working Group (WG) recommends the use of vicarious and cross calibration data for radiometric correction as they are considered more accurate than onboard calibration.

#### *Temperature-Emissivity Separation (TES) Working Group*

**H. Tonooka** presented the regression imputation with ground air temperature for the satellite-based lake and reservoir temperature database in Japan, and reported on the mapping of stationary “hot spots”

around Xinjiang, China. **H. Tonooka** and **G. Hulley** [JPL] described the ongoing efforts to develop large-scale emissivity datasets. **A. Gillespie** [University of Washington] introduced the results of an experiment that showed emissivity rise with increasing temperature. **G. Hulley** and **S. Kato** reported on validation for the TES product. **M. Fujita** presented the status of nighttime thermal infrared (TIR) global mapping (TGM), and **H. Tonooka** reported on the updates for cloud assessment and new areas of interest (AOIs) for TGM.

#### *Operations and Mission Planning (OMP) Working Group*

The group began its time together by reviewing all previous action items. Only one item, regarding the GDEM Science Team Acquisition Request (STAR), and based on **B. Crippen's** input, was still open. **M. Fujita** then reviewed the status of Global Mapping 5<sup>th</sup> Round (GM5), TGM 5<sup>th</sup> Round (TGM5), and Underserved Area (UA) STAR. The GM5 started on February 25, 2012; GM4 was suspended at that time. The TGM5 in Africa is difficult to schedule; the supporting Data Acquisition Request (DAR) will be submitted. When an important observation request is not scheduled, related or all GM5 and/or TGM5 requests will be suspended or temporarily given a zero priority. The number of scheduled scenes for UA STAR was decreased recently; it will be resubmitted. Fujita also reported on Global Land Ice Measurements from Space (GLIMS) and a Volcano STAR. The current GLIMS STAR will be terminated at the end of June 2012; the next round must be prepared in a timely fashion. **M. Urai** presented data acquisition strategies for the ASTER GDEM, which will be also presented at the August 2012 International Society of Photogrammetry and Remote Sensing (ISPRS) meeting in Melbourne, Australia. **L. Maldonado** [JPL] reported on the update for U.S. DARs. **T. Tachikawa** suggested the possibility of improving the performance of cloud avoidance algorithms by adjusting the scheduling parameter. **K. Duda** [USGS, LPDAAC] reported on the status of LPDAAC Expedited Data Set operations.

#### *Ecosystem/Oceanography Working Group*

**K. Iwao** [AIST] and **M. Ramsey** [University of Pittsburgh] began the session by reviewing the group's action items and STAR status. After that came a series of seven presentations, describing project and research activities—see **Table 1** (next page).

**Table 1.** Science presentations from the Ecosystems/Oceanography Working Group

Topic	Presenter
J Earth and the 100 Cities Project	<b>L. Prashad</b> [Arizona State University]
ASTER and MODIS Observations of Dust Storms in the Middle East	<b>M. Ramsey</b> [University of Pittsburgh]
Terra Look Update and Related New Activities	<b>M. Abrams</b> [JPL]
Understandings of Paddy Fields in the World Using ASTER Data	<b>G. Saito</b> [Tokyo Institute of Technology]
Mangrove Tree Morphology Estimation with Remote Sensing for Tsunami Inundation Simulation	<b>W. Ohira</b> [Asian Institute of Technology (AIST)]
Louis Gonzalez Alvarez: Simulated True-Color ASTER Images	<b>H. Yamamoto</b> [AIST]
A Method for Developing High-Accuracy Global Urban Extent Map by Integrating Synthetic Aperture Radar and Optical Data	<b>Y. Duan</b> [University of Tokyo]

*Geology/Spectral Working Group*

There were six research activity presentations given during this group's meeting—see **Table 2**. After the presentations, continuing action items were discussed and assigned.

**Table 2.** Research presentations from the Geology/Spectral Working Group.

Topic	Presenter
Identification of Rare Earth Minerals by Near-Infrared Reflectance Spectra	<b>S. Miyatake</b> [Japan Oil, Gas and Metals National Corporation (JOGMEC)]
ASTER Observations Near the Source Vents of Volcanic Plumes	<b>V. Realmuto</b> [JPL]—presented by <b>M. Abrams</b>
Statistical Analysis of the Expanded ASTER Urgent Request Protocol Program for Volcanic Observations	<b>M. Ramsey</b> [University of Pittsburgh]
Update on Development of Hot Spot Detection Systems Using GeoRSS <sup>4</sup>	<b>N. Yamamoto</b> [AIST]
Seti River Flood, Nepal: The Disaster and Its Causes	<b>R. Wessels</b> [USGS]
Multispectral Observations of Terrestrial Impact Craters Using Spectral Data Obtained by ASTER	<b>S. Yamamoto</b> [NIES]

<sup>4</sup> GeoRSS is an emerging standard for embedding location as part of a web feed.

*STAR Committee*

There were no STAR proposals that needed review. Therefore, the STAR Committee WG went over the agreed-upon points from the OMP WG session, described above.

**Closing Plenary**

After the splinter sessions, the groups reconvened for a closing plenary to hear the outcomes of each working group's session. Based on the recommendation of the RC/AC WG, there was a proposal to use vicarious and cross-calibration for radiometric correction instead of onboard calibration. However, the team concluded that a consensus proposal should be submitted after discussing the issue more thoroughly in the RC/AC WG.

**M. Abrams** announced that the next (forty-second) ASTER Science Team meeting would be held in Pasadena, CA, in the U.S. the week of December 10, and then closed the meeting. ■