

## ASTER Science Team Meeting

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The forty-fourth meeting of the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Science Team Meeting (ASTM) was held at Kikai Shinko Kaikan in Tokyo, Japan, March 10-12, 2014<sup>1</sup>. The meeting was well attended, with ASTER Science Team members and participants from the ASTER Instrument Team, ASTER Ground Data System (GDS) team, Earth Observing System Operations Center, and NASA Headquarters.

The meeting opened with a plenary session that included project and system updates on the status of ASTER and Terra. The proposed changes to ASTER operations in Japan after FY 2015 were presented to examine the effects on the ASTER project, especially the impact on users. Seven working group splinter sessions were subsequently held to deepen the discussions in each field. The meeting concluded with a closing plenary session, where reports and summaries from each working group were presented.

### Opening Plenary Session

The session opened with remarks by **H. Tsu** [Japan Space Systems (J-spacesystems)—*Japan ASTER Science Team Leader*], **M. Abrams** [NASA/Jet Propulsion Lab (JPL)—*U.S. ASTER Science Team Leader*], and **K. Muto** [Director of Space Industry Office in Ministry of Economy, Trade, and Industry (METI), Japan].

In the opening remarks **H. Tsu** provided a brief outline of changes to ASTER operations in Japan after 2015. **K. Muto** assured the group that the ASTER project will continue even if operations in Japan are changed.

**M. Abrams** expressed expectations that the changes will bring an explosive increase in the usage of ASTER products by implementation of a free and open policy. He also suggested that Terra and ASTER operations are possible for five more years after 2017.

**K. Thome** [NASA's Goddard Space Flight Center (GSFC)—*Terra Project Scientist*] reported on the current status of ASTER from the NASA point of view and outlined NASA's Earth Science plan, indicating that the next NASA Senior Review for Terra will be held in early 2015. He also mentioned that a special session is planned for the 2014 American Geophysical Union (AGU) Fall

Meeting (to be held December 15-19) to commemorate Terra's fifteenth anniversary. Thome also announced that the ASTER calibration team will host a session on the theme of calibration and present their accomplishments at the 2015 International Society for Optical Engineering conference, planned for February in San Francisco, CA. In conclusion, Thome reported that the next Terra Science Working Group Meeting will be held in late summer.

**M. Abrams** provided updates on ASTER Science Team activities, describing the NASA Senior Review process previously mentioned by K. Thome. He then discussed a presentation planned for the 2014 International Union for Conservation of Nature and Natural Resources (IUCN) World Parks Congress to be held in Sydney, Australia, and provisions for emergency Earth observations.

**A. Kelly** [GSFC] presented the current status of Terra from the perspective of Earth Science Mission Operations. Based on the predicted rate of usage, Terra should be able to remain on-orbit until 2017 and should be able to continue to support science requirements after it exits the Morning Constellation—until 2020 and possibly beyond.

**M. Kikuchi** [J-spacesystems] reported on the current status of the ASTER instrument. **K. Mouri** [J-spacesystems] and **D. Meyer** [U.S. Geological Survey (USGS) Land Processes Distributed Active Archive Center (LPDAAC)] provided updates on the distribution and processing at ASTER GDS and the Land Processes Distributed Active Archive Center (LPDAAC), respectively.

**M. Fujita** [J-spacesystems] discussed the Operation and Mission Planning (OMP) report, elaborating on the status of scene acquisition, achievement of data acquisition requests, and urgent observations.

**T. Tachikawa** [J-spacesystems] concluded the plenary session with an overview of ASTER operations in Japan after the planned changes in 2015. He gave an overview of the issues to be discussed by the Science Team. **Y. Yamaguchi** [Nagoya University] sorted out the issues and assigned subjects of discussion to each working group. Summaries of these discussions follow.

<sup>1</sup> A summary of the forty-third meeting was provided in the September-October 2013 issue of *The Earth Observer*, [Volume 25, Issue 5, pp. 24-26].

## Working Group Sessions

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

The focal point in the first half of the Level-1/Geometric/Digital Elevation Model Working Group session was validation of results from application of ASTER Level-1 (L1) algorithm software, for which there are no major issues or concerns. An L1A reprocessing tool has been developed, which contains a visible and near infrared (VNIR) radiometric correction program, based on radiometric calibration working group studies. This tool has been implemented and operations have begun at the GDS. It was agreed that the tool should also be implemented at the LPDAAC.

**H. Fujisada** [Sensor Information Laboratory Corporation] reported on the status of *Version 3* of the ASTER Global Digital Elevation Model (GDEM). The working group affirmed that the science team needs to decide if Version 3 should be released or not. Fujisada also proposed a solution independent of GDEM for the problem of determining elevation in large bodies of water where ASTER scenes contain no shoreline. **B. Crippen** [JPL] showed GDEM results for the highest peak in Burma, an error in the water mask of Shuttle Radar Topography Mission (SRTM) Water Body Data (SWBD), and the status of the NASA DEM. **T. Tachikawa** demonstrated that a one-pixel shift in Band 3B data can be attributed to an error in the code that processes Level 0 data to Level 1, and proposed to add the new function to the previously mentioned L1A reprocessing tool to help correct the problem. After Tachikawa's presentation, the focus of the discussion shifted to ASTER operations after 2015, as mentioned during the opening plenary session. Considering the stable results of geometric validation, it will not be a problem to suspend further validation activities. Also, the software has been stable enough to essentially suspend maintenance activities, except for "fatal" issues—e.g., the failure of the spacecraft's pointing, or the instrument's scanning or cooler mechanisms.

### *Radiometric Calibration/Atmospheric Correction Working Group*

**B. Eng** [JPL] opened the Radiometric Calibration/Atmospheric Correction Working Group discussion with a report on the status of an atmospheric correction software update. The Instrument Team explained the results of *onboard calibration*, performed by monitoring a standard, well-characterized light source onboard the spacecraft. **F. Sakuma** [J-spacesystems], **T. Koyama** [National Institute of Advanced Industrial Science and Technology (AIST)], and **S. Kato** [AIST] proposed *lunar calibration*, i.e., using the moon as an on-orbit standard. **K. Arai** [Saga University], **H. Yamamoto** [AIST], **H. Tonooka** [Ibaraki University], **S. Hook** [JPL], and **S. Kato** showed the results and plans for

*vicarious calibration* in the field, done by comparing simultaneous ASTER and ground-based observations. **K. Thome** then introduced Committee on Earth Observation Satellites (CEOS) calibration/validation activities. **T. Tachikawa** provided an update by the L1A reprocessing tool that is being used to reprocess radiometric corrections, in response to suggestions made by this Working Group at the last ASTM. The group agreed that discussions regarding the degradation coefficient must continue. **A. Iwasaki** [Tokyo University] reported on offset estimation as a result of the L1A reprocessing tool update, noting that the offset error in Band 1 has been improved. The session concluded with a discussion of future work.

### *Temperature-Emissivity Separation Working Group*

Reports from this Working Group began with a discussion of Temperature-Emissivity Separation (TES) validation. **H. Tonooka** reported on the evaluation of National Centers for Environmental Prediction (NCEP)/Global Data Assimilation System (GDAS)-based atmospheric correction, and infrared IR band-to-band registration error analysis. **M. Ramsey** [University of Pittsburgh] described correcting shadowing errors in thermal inertia data. **D. Pieri** [JPL] showed reconciliation of 10-100-cm (-4-40-in) resolution thermal infrared (TIR) data with ASTER data for *in situ* distribution of ground temperatures under a volcanic plume in Turrialba, Costa Rica. **A. Gillespie** [University of Washington] reported on validation of the TES algorithm and the *AST05* surface emissivity data product.

The discussion then transitioned to maintenance of global-scale TES data. **S. Hook** described ongoing efforts to develop the ASTER Global Emissivity Dataset (GED)—a large-scale emissivity dataset maintained at JPL. **H. Tonooka** elaborated on the global mapping of ASTER/TIR time-series orthorectified products. Tonooka also showed a global lake temperature database developed using ASTER/TIR data. Lastly, **M. Fujita** and **Tonooka** discussed the status of nighttime TIR global mapping (TGM). The group agreed to recommend continuing TGM processing for current target areas.

### *Operations and Mission Planning Working Group*

**A. Miura** [J-spacesystems] reported that the flow of shortwave infrared (SWIR) data stopped in August 2013, and the number of *full-mode* observations in September 2013 have increased compared to those from September 2012. **M. Fujita** then reviewed the status of Global Mapping 5<sup>th</sup> Round (GM5) and TIR Global Mapping 6<sup>th</sup> Round (TGM6). GM5 will be replaced with GM6 in October 2014; TGM6 will continue until the next ASTM. Fujita also reported on the Underserved Area (UA) Science Team Acquisition Request (STAR). **T. Tachikawa** proposed updating the

target area for the UA STAR based on GDEM processing. The group decided to start UA STAR with a new target area as soon as possible. Fujita reported on Global Land Ice Measurements from Space (GLIMS) and the Volcano STAR, both of which are doing well. Tachikawa showed that adding a scheduling parameter has improved the performance of the cloud avoidance algorithm. **L. Maldonado** [JPL] analyzed the worldwide distribution of Data Acquisition Request (DAR) users, and reported on the scheduling failures of urgent DARs due to GDS operations reductions. The remainder of the session was devoted to discussion of ASTER operations after 2015. The group recommended continuing cloud assessments and stated that as the One Day Schedule (ODS) generation frequency decreases, it is acceptable to decrease Normal ODS frequency, but automated Late Change ODS (LC-ODS) generation

should be considered. The prospect of free distribution of data to all users was acceptable.

#### *Ecosystem/Oceanography Working Group*

**K. Iwao** [AIST] and **G. Geller** [JPL] opened the session and reviewed the action items and STAR status. The rest of the session was taken up by a series of seven presentations dealing with projects and research activities—see **Table 1**.

#### *Geology/Spectral Working Group*

**M. Urai** [AIST] and **D. Pieri** [JPL] began this session with an action item review. The session then featured eight research activity presentations on topics that addressed geological mapping, glaciers, and volcanic activities—see **Table 2**. After the presentations, there

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

| Speaker           | Institution                                       | Title   |
|-------------------|---|---|
| <b>L. Prashad</b> | Arizona State University (ASU)                    | Remote Sensing for Citizen Science and Science Journalism   |
| <b>L. Prashad</b> | ASU   | Update on the JEarth 100 Cities Project   |
| <b>K. Iwao</b>    | Advanced Industrial Science and Technology (AIST) | Simulated True Color ASTER Images   |
| <b>K. Iwao</b>    | AIST  | Progress of ASTER Global Urban Map (AGURAM)   |
| <b>K. Hirose</b>  | J-spacesystems                                    | Wetland, Forest, and Mangrove Development and Monitoring in Uganda, Zambia, and Madagascar                            |
| <b>G. Geller</b>  | NASA/Jet Propulsion Laboratory (JPL)              | TerraLook/Google Earth Engine Update  |
| <b>G. Geller</b>  | JPL   | Introduction to Essential Biodiversity Variables and the Group on Earth Observations Biodiversity Observation Network |

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

| Speaker             | Institution  | Title  |
|---------------------|--|--|
| <b>T. Cudahy</b>    | Commonwealth Scientific and Industrial Research Organization | ASTER SWIR-TIR Capability for Measuring Clay (Size) Loss: Implications for Baseline Mapping and Monitoring Desertification of the World's Vulnerable Dry Lands |
| <b>A. Gillespie</b> | University of Washington                                     | Measuring Pleistocene Displacements and Offset Rates Along the Dead Sea Transform with ASTER and ALOS-PALSAR Data  |
| <b>T. Yajima</b>    | Japan Oil, Gas and Metals National Corporation               | Application of Inverted Slope Images for Geological Mapping: Reduction of Artifacts in Digital Elevation Models by Filtering in the Frequency Domain           |
| <b>S. Tulaczyk</b>  | University of California                                     | Greenland Ice Sheet Retreat Since the Little Ice Age   |

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

|                  |                                 |  |
|------------------|---------------------------------|--|
| <b>M. Ramsey</b> | University of Pittsburgh (Pitt) | Update and Continuing Progress on the ASTER Urgent Request Protocol (URP) System   |
| <b>M. Ramsey</b> | Pitt                            | Ash Cloud Compositional Mapping and Source Tracking                                |
| <b>M. Urai</b>   | AIST                            | A New Submarine Volcanic Activity at Nishinoshima, Ogasawara, Japan                |
| <b>D. Pieri</b>  | JPL                             | Update on the ASTER Volcano Archive and <i>In Situ</i> Volcanic Plume Measurements |

was discussion about open action items, especially the Volcano STAR resource. Finally, the participants discussed ASTER operations after 2015.

#### *STAR Committee*

New STAR proposals for “Calibration and Validation of Thermal Infrared Products” were reviewed and accepted by the STAR committee.

#### **Closing Plenary Session**

The closing plenary session started with summaries and outcomes of the sessions from each working group. Subsequently, consensus was reached on the issues proposed at the opening plenary as follows:

- *L1 software freeze* (no update): Agreed
- *Geometric performance check termination*: Agreed

- *VNIR radiometric calibration coefficient freeze*: Agreed (vicarious and onboard calibration may be continued)
- *TIR cloud assessment termination*: Continue
- *ODS generation frequency decrease*: Further discussion needed for LC-ODS
- *Free data distribution to all users*: Agreed (terminate charging for access)

The forty-fourth ASTM concluded with closing remarks as well as adjustment of the date and venue for the next meeting. The forty-fifth meeting is scheduled for December 8-10, 2014, in Tokyo, Japan. ■

## Erratum

In our May–June 2014 issue we ran a meeting summary titled “Celebrating Ten Years of OMI Observations” [Volume 26, Issue 3, pp. 23–30]. In the *How OMI Became Part of Aura* section, third paragraph, second sentence on **page 24**, we mistakenly reported that “The agreement stipulated that NIVR—which later became KNMI—would be the principal investigator (PI) institution and would work in conjunction with NASA’s Goddard Space Flight Center (GSFC) and the Finnish Meteorological Institute (FMI).” However, NIVR did not become KNMI. It should have said, “The agreement stipulated that KNMI would be the principal investigator (PI) institution...” *The Earth Observer* regrets this error; the online PDF version of the newsletter has been corrected.

erratum