



State of CERES



Norman G. Loeb

NASA Langley Research Center, Hampton, VA



CERES Science Team Meeting, May 7, 2013, NASA LaRC

CERES Meeting Objectives

1) CERES Instrument, Algorithm and Validation Status:

- Status of CERES Project
- CERES Terra, Aqua and NPP Calibration Update; CERES FM6 and RBI Update.
- MODIS and VIIRS Calibration Update
- Terra & Aqua Edition-4 Cloud Algorithm Validation Status
- CERES Suomi-NPP SSF Edition-1: Cloud Algorithm Status
- CERES Edition-4 ADM Development status
- SOFA, SARB and TISA Working Group Reports
- Status of EBAF TOA and Surface
- FLASHFLUX Update
- Data Management Team Update: Terra/Aqua/NPP
- Atmospheric Sciences Data Center (ASDC) & CERES EPO Updates.

2) Invited Presentations Session: Observational challenges of closing the surface energy budget

3) Contributed Science Presentations

CERES Team Leads

- **Principal Investigator: Norman Loeb**
- **Project Scientist: Kory Priestley**

CERES Working Groups:

- **Instrument: Kory Priestley**
- **ERBELike: Takmeng Wong**
- **Clouds: Pat Minnis**
- **Inversion: Wenying Su**
- **SOFA: David Kratz**
- **SARB: Seiji Kato**
- **TISA: David Doelling**
- **FLASHFlux: Paul Stackhouse & David Kratz**
- **Data Management: Jonathan Gleason**
- **ASDC: John Kusterer**

2013 Terra and Aqua Senior Review

- Proposal to continue missions for next 2 years
- Science highlights involving CERES and other Terra & Aqua instruments
- Publication, citation, processing and distribution metrics
- Health of CERES Instruments
- Summary of FY12-13 accomplishments, FY14-15 plans and budget, projection for FY16-17

Schedule

Proposal due: March 2013

Panel meeting: May 1, 2013

Publication of the panel's report: June 2013

New budget guidelines and instructions to projects: July 2013

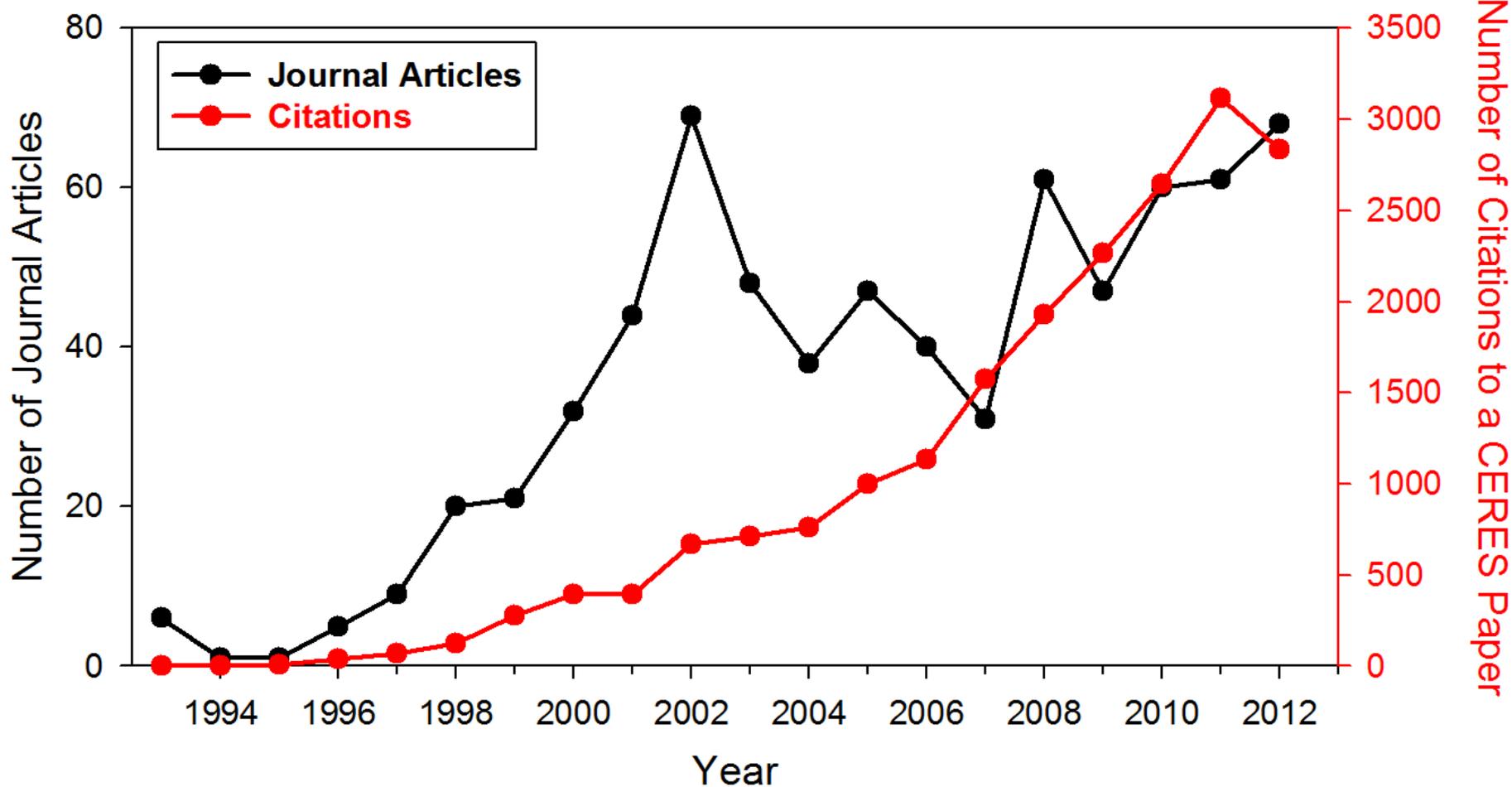
Projects revised implementation plans to ESD: August 2013

2013 Terra and Aqua Senior Review

Specific CERES Themes:

- Accomplishments during past 2 years. Plans for next 2 years.
- Continue to monitor instrument health, safety and performance.
- Continue Edition3 processing.
- Complete Edition 4 algorithm improvements, validation studies.
- Improving efficiency of producing CERES data products (e.g., CATALYST).
- Improving efficiency of validation approach by exploiting CERES subsetting/visualization tool.
- Overhaul of CERES ERBE-Like using ANN approach.

CERES Journal Publication and Citation Counts (Through January 1, 2013)



- Total number of peer-reviewed journal articles: 709
- Total number of citations to CERES papers : 19,951



SAMPLE SENIOR REVIEW PANEL QUESTION

Review Panel Item 7: Please explain your plans to more clearly document product uncertainty and make the product validation documentation more publically available.



Review Panel Item 7 (documentation): CERES Team response, p. 1

The CERES team provides documentation on data product uncertainty and validation in two primary forms:

1. Data Quality Summaries (DQS).

When users order CERES data products, they are provided a DQS that describes the nature of the data product, tables of uncertainty as a function of time and space scales, validation results, a “Cautions and Helpful Hints” section, information on expected future reprocessing of the data product, and journal references providing more detailed information about the algorithms and validation results. A sample CERES DQS can be viewed at https://eosweb.larc.nasa.gov/sites/default/files/project/ceres/quality_summaries/CER_SSF_Aqua_Edition3A.pdf (excerpt presented below).

Investigation:	CERES
Data Product:	Single Scanner Footprint TOA/Surface Fluxes and Clouds (SSF)
Data Set:	Aqua (Instruments: CERES-FM3 or CERES-FM4, MODIS)
Data Set Version:	Edition3A and Ed3A-NoSW

The purpose of this document is to inform users of the accuracy of this data product as determined by the CERES Science Team. The document summarizes its history, key validation results, provides cautions where users might easily misinterpret the data, provides links to further information about the data product, algorithms, and accuracy, and gives information about planned data improvements. This document also automates registration in order to keep users informed of new validation results, cautions, or improved data sets as they become available.

This document is a high-level summary and represents the minimum information needed by scientific users of this data product. It is strongly suggested that authors, researchers, and reviewers of research papers re-check this document for the latest status before publication of any scientific papers using this data product.

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Review Panel Item 7: CERES Team response, p. 2

2. Peer-Reviewed Literature.

Each CERES team member responsible for a data product is required to submit peer-reviewed journal articles that describe the algorithm and validation results. Below are examples of relevant recent peer-reviewed CERES articles. A more comprehensive list is available at the CERES website (ceres.larc.nasa.gov) and in individual data product DQS documents.

- Loeb, N. G., B. A. Wielicki, D. R. Doelling, G. L. Smith, D. F. Keyes, S. Kato, N. Manalo-Smith, and T. Wong, 2009: Toward optimal closure of the Earth's top-of-atmosphere radiation budget, *J. Climate*, 22(3), 748-766, doi: 10.1175/2008jcli2637.1.
- Priestley, K. J., G. L. Smith, S. Thomas, D. Cooper, R. B. Lee, D. Walikainen, P. Hess, Z. P. Szewczyk, and R. Wilson, 2011: Radiometric performance of the CERES Earth radiation budget climate record sensors on the EOS Aqua and Terra spacecraft through April 2007, *J. Atmos. Ocean. Tech.*, 28(1), 3-21.
- Minnis, P., S. Sun-Mack, D. F. Young, P. W. Heck, D. P. Garber, Y. Chen, P. Yang, et al., 2011: CERES Edition-2 cloud property retrievals using TRMM VIRS and Terra and Aqua MODIS data-Part I: Algorithms, *IEEE Trans. Geosci. Rem. Sens.*, 49(11), 4374-4400, doi:10.1109/tgrs.2011.2144601.
- Kratz, D. P., S. K. Gupta, A. C. Wilber, and V. E. Sothcott, 2010: Validation of the CERES Edition 2B surface-only flux algorithms, *J. Appl. Meteor. and Climatol.*, 49(1), 164-180, doi: 10.1175/2009jamc2246.1.
- Doelling, D.R., N. G. Loeb, D. F. Keyes, M. L. Nordeen, D. Morstad, B. A. Wielicki, D. F. Young, and M. Sun, 2013: Geostationary enhanced temporal interpolation for CERES flux products, *J. Atmos. Ocean. Tech.*, in press.
- Kato, S., N. G. Loeb, F. G. Rose, D. R. Doelling, D. A. Rutan, T. E. Caldwell, L. Yu, and R. Weller, 2013: Surface irradiances consistent with CERES-derived top-of-atmosphere shortwave and longwave irradiances, *J. Climate*, in press.

CERES Software Delivery and Data Processing Schedule

Edition 4

5/3/13

Key Milestones	FY13		FY14				FY15		
		Q4'13	Q1'14	Q2'14	Q3'14	Q4'14	Q1'15	Q2'15	
Edition 4 SSF1deg-Hour									
Working Group Lead Deliver Ed 4 SSF1deg-Hour Science		△ 6/28							
Delivery, Testing, & ValR Approval	6/28			1/6					
Reprocess Launch to Current (154 mo. Terra, 136 mo. Aqua)			1/7			6/30			
Public Release					△ 4/24				
Edition 4 SSF1deg-Month									
Working Group Lead Deliver Ed 4 SSF1deg-Month Science		△ 7/31							
Delivery, Testing, & ValR Approval	7/31			1/9					
Reprocess Launch to Current (154 mo. Terra, 136 mo. Aqua)				3/31			6/30		
Public Release						△ 6/27			
Edition 4 Inversion									
Working Group Lead Deliver Ed 4 SOFA Science Code			△ 9/27						
Working Group Lead Deliver Ed 4 ADMs Science Code			△ 10/18						
Delivery, Testing, & ValR Approval		10/18			12/23				
Reprocess Launch to Current (160 mo. Terra, 132 mo. Aqua)			12/24	12/27					
Public Release					△ 1/3				
Edition 4 TSI -> SYNI -> SYN1deg									
Clouds Group Provides TISA WG Sample 5 Channel GEO	△ 6/21								
Clouds Group Freeze 5 Channel GEO Code	△ 6/21								
Working Group Lead Deliver Ed 4 TSI Science Code				△ 12/27					
Working Group Lead Deliver Ed 4 SYNI Science Code					△ 3/31				
Working Group Lead Deliver Ed 4 SYN1deg-Month Science					△ 4/11				
Delivery, Testing, & ValR Approval			12/27			5/27			
Reprocess Launch to Current (166 months)					5/28			9/11	
Public Release						△ 6/16			
Edition 4 ISCCP-D2 Like									
Working Group Lead Deliver Ed 4 ISCCP-D2 Like Science						△ 5/30			
Delivery, Testing, & Promote to Production					5/30			7/11	
Reprocess Launch to Current (166 mo. Terra, 138 mo. Aqua)						7/14			
Public Release							△ 7/24	8/20	
Edition 4 CRS									
Working Group Lead Deliver Ed 4 CRS Science Code							△ 7/31		
Delivery, Testing, & ValR Approval						7/31			
Reprocess Launch to Current (172 mo. Terra, 144 mo. Aqua)							10/13		
Public Release								△ 12/22	
Edition 4 Flux-by-Cloud Type									
Working Group Lead Deliver Ed 4 Flux-by-Cloud Type								△ 9/30	
Delivery, Testing, & ValR Approval							9/30		
Reprocess Launch to Current (172 mo. Terra, 144 mo. Aqua)								11/18	12/16
Public Release								△ 11/28	

△ Open Milestone

▲ Completed Milestone

▬ Work Effort

1/27

CERES FM5 SNPP

- SNPP PEATE review meeting: Jan 2013
- Calibrated VIIRS radiances from GSFC Land PEATE (Xiong) in April 2013
- CERES Edition1 Cloud group delivery: end of June 2013
- CERES FM5 time-varying gains included in SSF Edition1 via “inversion-only” run
- Anticipate “MODIS-Like” VIIRS aerosols from Land PEATE in early 2014 (POCs: Rob Levy & Christina Hsu). Consider including in Edition2.
- Consider also using CriS for CO2 bands in Edition 2.

Future CERES Missions

- CERES FM6 to launch on JPSS-1 in Nov 2016. New proposed plan is for NASA LaRC to produce Earth Radiation Budget Climate Data Records using CERES FM6. Closely follow FM5/SNPP approach.
- CERES Follow-on instrument: Radiation Budget Instrument (RBI).
 - Draft RFP released in April; Industry-Day April 30; Official RFP release: June 6. Instrument delivery 2019. Launch on JPSS-2 in 2021.
 - President's Budget: Transfer responsibility for RBI and other climate sensors from NOAA to NASA.
 - "Responsibility has been transferred to NASA for the sustained climate measurements that were to have been made from the Total Solar Irradiance Sensor (TSIS-2), the Clouds and Earth's Radiant Energy System follow-on (CERES-C), and the limb soundings from the Ozone Mapping and Profiler Suite (OMPS-L), previously planned for NOAA's Joint Polar Satellite System (JPSS) series."
 - "NASA will begin studying the best options and approaches for economically conducting these earth observations, which are needed to monitor and study the Earth's climate system."
 - "...The CERES study will evaluate the continued system measurement requirements in combination and coordination with the other pre-formulation missions from the 2007 decadal survey, and will define an implementation approach that best achieve the measurement objectives."

CERES Ocean Validation Experiment (COVE) Site Update

- Chesapeake Lighthouse purchased by DOE in 2012.
- DOE is planning to host a Reference Facility for Offshore Research (RFORE).
 - Includes a 100 m tower instrumented with anemometers for wind energy research.
 - If RFORE plan goes through, the lighthouse might be demolished and replaced.
 - RFORE will be an interagency platform. DOE wants our participation.
- COVE team has not been allowed to visit site since November.
 - The automatic cleaning system has emptied its water tank, so data is compromised.
 - MPLNET is not operating. Will be moved to the CAPABLE air-quality site at LaRC.
- Possible Alternate site: Frying Pan Tower (near Wilmington, NC).
 - Site inspection on March 29, 2013 indicated that two main trusses are severely compromised. Unsafe for helicopter landings. No stairwell or boat dock, so the site is inaccessible. Many other safety/structural issues exist as well.
 - Owner of FPT has expressed a willingness to repair the tower, but it is unlikely that a private individual with a volunteer workforce will be able to accomplish this to government safety standards within 1 year.

Upcoming Conferences & Meetings of Interest

Gordon Research Conference – Radiation and Climate

- Jul 7-12, 2013, Colby-Sawyer College, NH

EUMETSAT Meteorological Satellite Conference

- 16-20 September, 2013, Vienna, Austria

Fall 2013 CERES Science Team Meeting

- October 29-31, 2013, Scripps Institution of Oceanography – UC San Diego or NASA LaRC, Hampton, VA

Fall American Geophysical Union

- December 9-12, 2013, San Francisco, CA

Note: Sequestration has resulted in severe reductions in NASA and contractor travel.

Other News

- AMSR-E – Has been operating at 2 RPM since Dec 4, 2012. Data needed for calibration overlap with AMSR2.
- AMSR2 is on JAXA GCOM-W1 (“SHIZUKU”), which joined the A-Train ahead of Aqua in May 18, 2012.
- CALIPSO – Functioning nominally
- CloudSat – Returned to the A-Train. Nominal Daylight Only Operations (DO-Op) continue.
- Landsat Data Continuity Mission (LDCM) successfully launched Feb 11, 2013.
- Plans for OCO-2 mission (LRD: July 1, 2014). Will fly in front of GCOM-W1 (“SHIZUKU”).
- Plans for EarthCARE (LRD: 2015)

End