



State of CERES



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NASA Langley Research Center, Hampton, VA



CERES Science Team Meeting, May 5-7, 2015

NASA LaRC, Hampton, VA

CERES Meeting & Workshop Objectives

1. Review status of CERES Instruments and Data Products:

- Status of CERES
- CERES Terra, Aqua and S-NPP SW/LW/TOTAL Channel Calibration Update
- CERES FM6 and RBI Update
- MODIS & VIIRS Cloud Algorithm & Validation Status
- ADM, SOFA, SARB and TISA Working Group Reports
- FLASHFLUX Update
- EBAF Update
- Data Management Team Update: Terra/Aqua/S-NPP
- Atmospheric Sciences Data Center (ASDC) Update
- CERES Communication Activities

2. Invited Presentations Session: On the creation & improvement of key ancillary datasets used to generate CERES Earth radiation budget climate data records:

- Aerosol retrievals from MODIS & VIIRS
- GMAO reanalysis data

3. Contributed Science Reports.

- Each report is 20 min including time for questions.

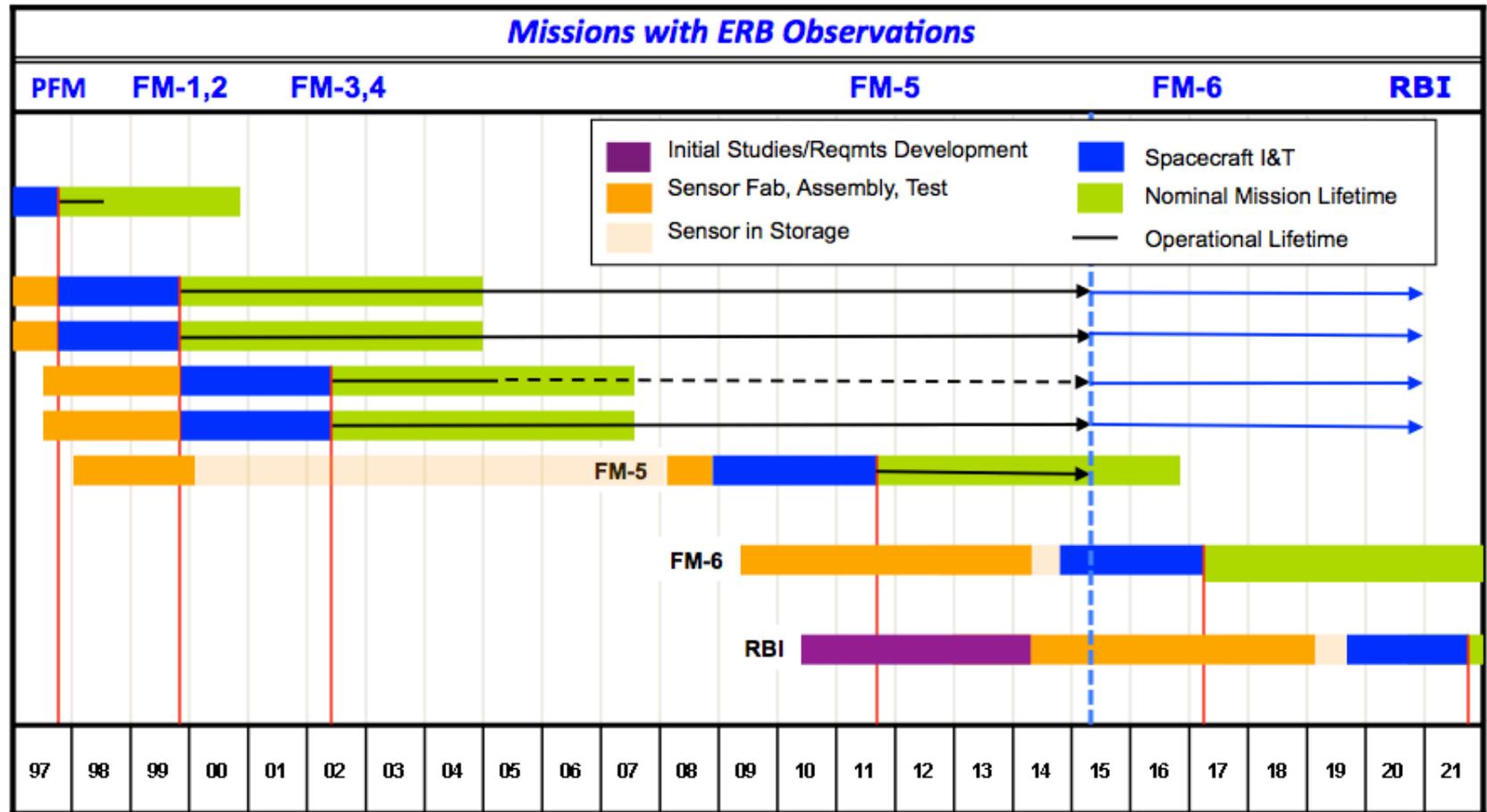
CERES Team Leads

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

CERES Working Groups:

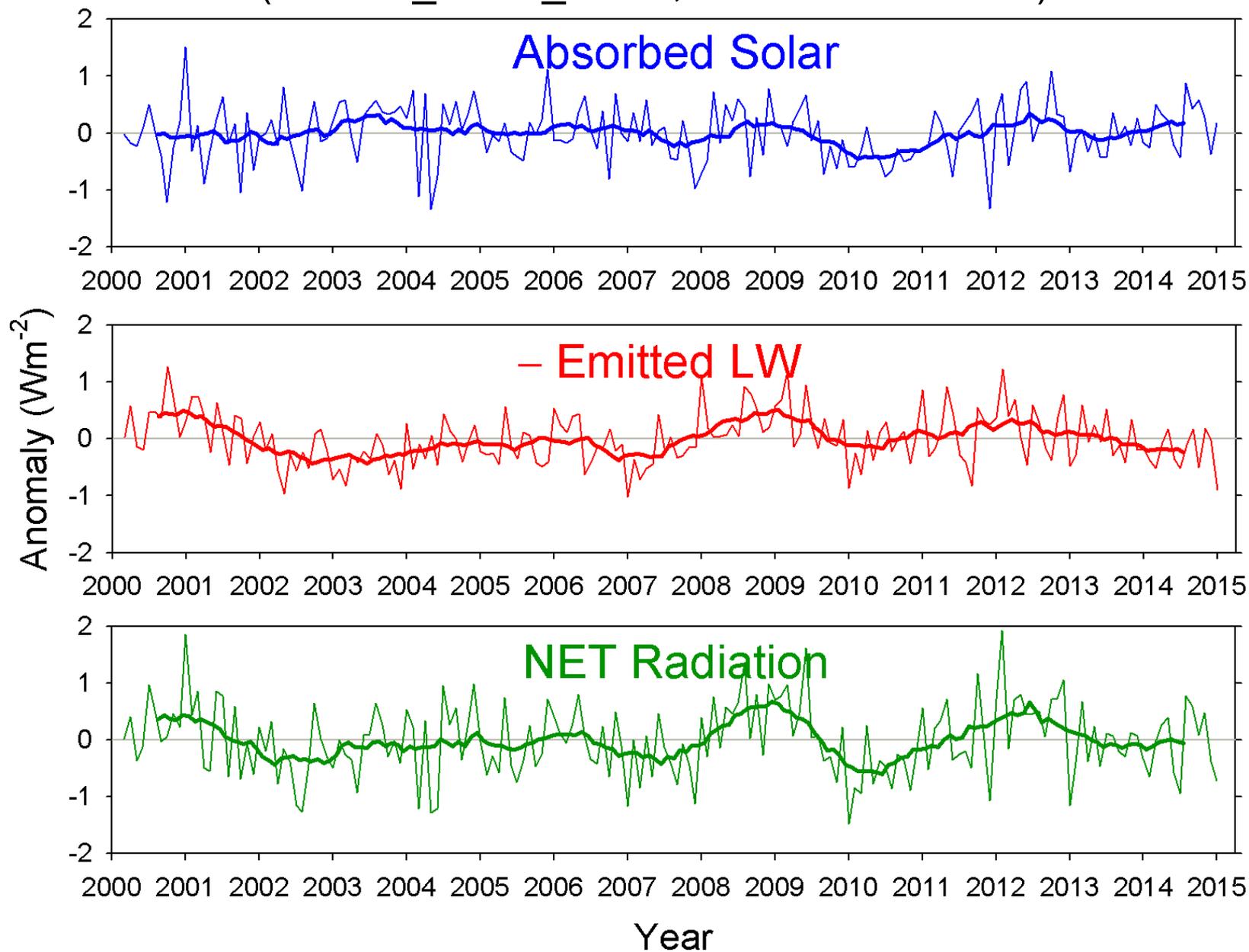
- **Instrument: Kory Priestley**
- **ERBElike: Takmeng Wong**
- **Clouds: Pat Minnis (Lead); Bill Smith Jr., (Deputy)**
- **Inversion: Wenying Su**
- **SOFA: David Kratz**
- **SARB: Seiji Kato**
- **TISA: David Doelling**
- **FLASHFlux: Paul Stackhouse & David Kratz**
- **Data Management: Jonathan Gleason**
- **ASDC: John Kusterer**

CERES & RBI Flight Schedules



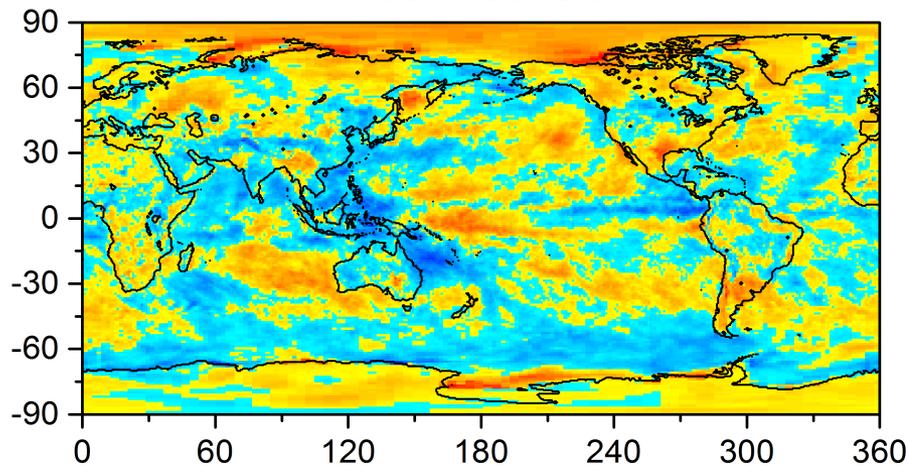
- Currently, 5 CERES instruments fly on 3 satellites: Terra (L1999), Aqua (L2002) and SNPP(L2011).
- CERES FM6 will fly on JPSS-1 in FY17 (2nd Qtr). The CERES follow-on instrument (Radiation Budget Instrument, or RBI) will fly on JPSS-2 in FY21 (4th Qtr).

Global TOA All-Sky Radiation Anomalies (CERES_EBAF_Ed2.8; 03/2000 – 01/2015)

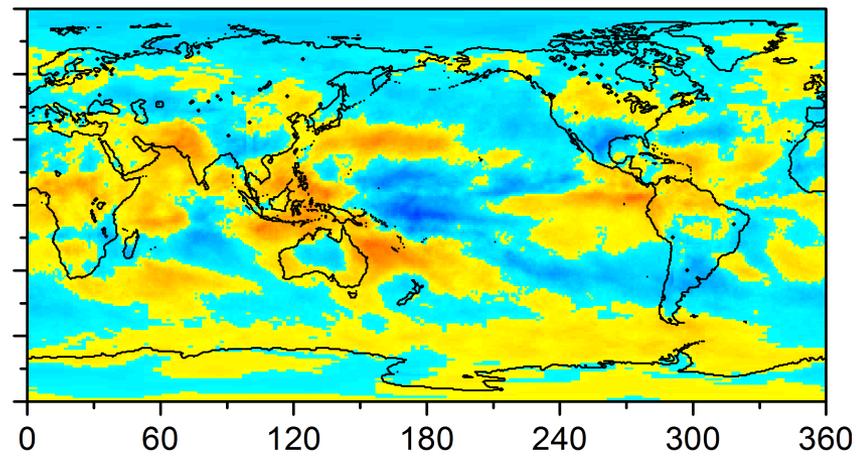


TOA Radiation Changes (March 2000 – October 2014)

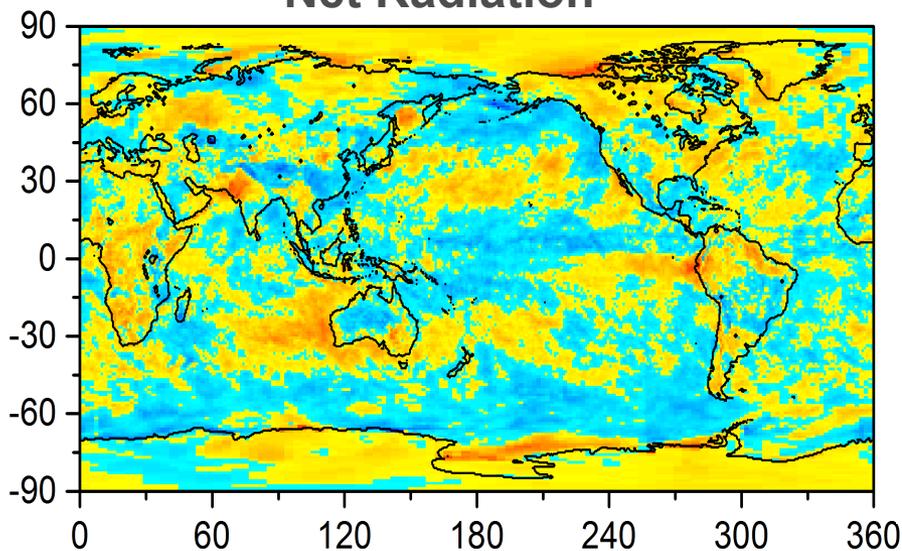
Absorbed Solar



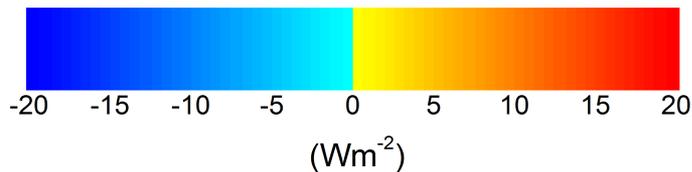
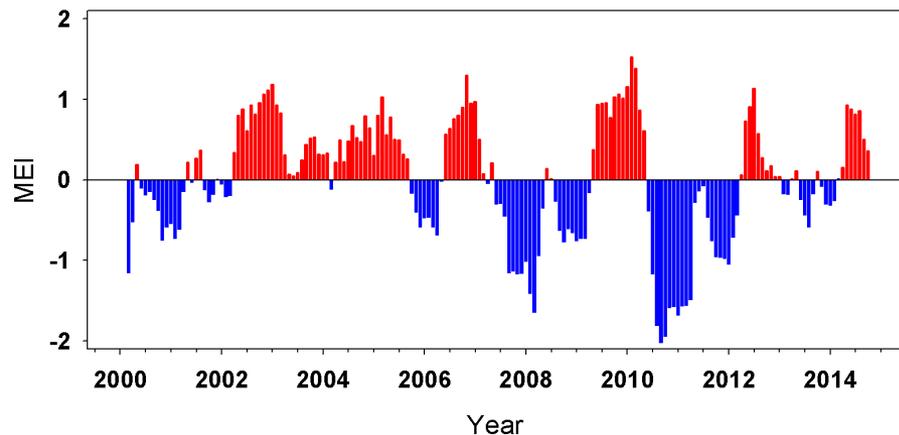
-Emitted LW



Net Radiation



Multivariate ENSO Index



Earth Radiation Budget Science Team

- Idea is to consolidate CERES Terra, Aqua & SNPP budgets into a single CERES budget line managed by LaRC SD.
- Instrument Operations budget is still split between Terra, Aqua and SNPP missions.
- FM6 and RBI budgets will eventually be added to ERB science team.
- ERB science team submits and presents its own budget in the NASA Planning, Programming, Budgeting, and Execution (PPBE) process.
- We still contribute to Senior Review process every 2 years.
- We undergo an additional annual ERB science team review.

CERES Reviews

- 1) Earth Radiation Budget Science PPBE Review (April 15)
- 2) Terra and Aqua Senior Reviews
 - Proposal submitted in late March
 - Panel review April 29
- 3) Earth Radiation Budget Science Team Review (May 4)

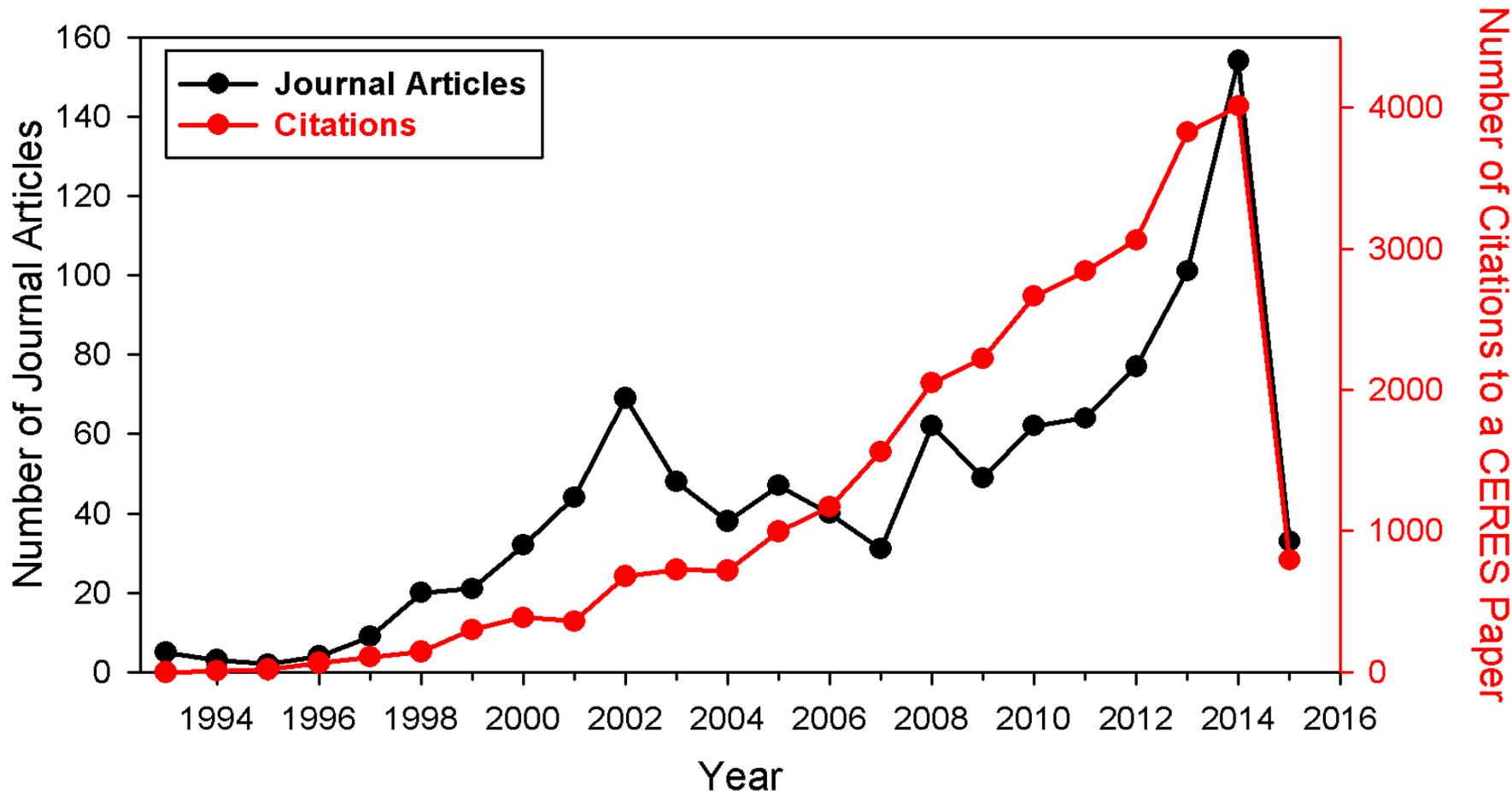
Highlights from Terra & Aqua Senior Review Proposals

Selected CERES Accomplishments During Past 2 Years:

- 29 journal publications describing CERES algorithms and validation results.
- 241 journal publications by the science community involving CERES data products, a 73% increase over 2011-2012.
- 1604 unique users ordered CERES data products, a 117% increase over 2011-2012.
- 20 major code deliveries to the NASA Langley Atmospheric Science Data Center (ASDC) to support ongoing processing (Edition 3) and Edition 4 reprocessing.
- Led a field experiment called the Arctic Radiation IceBridge Sea and Ice Experiment (ARISE) in September 2014 over the Arctic Ocean.
- Conducted Terra/Aqua/SNPP and Terra/GERB/ScaRaB intercalibration campaigns.
- Expanded applied science use of CERES near-realtime data products.
- Expanded the capabilities of the CERES Ordering Tool (COT), which enables users to subset, visualize, and order CERES data products.
- Completing implementation and deployment of Version 1.0 of the CERES AuTomAted job Loading sYSTem (CATALYST).

CERES Journal Publication and Citation Counts

(For Papers Between 1993-2015; Updated April 15, 2015)



- Total number of peer-reviewed journal articles: 1,015
- Total number of citations to CERES papers : 28,713

Number of Unique Users by CERES Data Product

Level	Product	2010	2011	2012	2013	2014	2015
1b	BDS	11	9	14	8	7	2
2	SSF	84	77	138	201	211	82
	FLASH_SSF	25	8	15	12	24	17
	C3M	31	32	33	19	6	3
	ES8	22	20	18	21	5	2
	SSF-MISR	9	4	2	5	4	0
3 & 3b	EBAF-TOA	72	160	346	480	567	217
	EBAF-Surface			147	285	364	155
	SYN1deg	41	126	179	315	355	151
	SSF1deg-lite	46	106	93	139	157	55
	ISCCP-D2like	17	12	37	53	38	15
	ES4	59	36	11	17	6	2
	ES9	21	12	5	9	3	2
	FLASH_TISA	17	18	20	11	3	1
	SFC	31	20	14	6	2	0

CERES Terra and Aqua Edition 4 – Status

- Instrument gains and SRFs: Delivered
 - Improvement to Aqua SW part of TOT SRF.
- CERES Clouds code: Delivered.
 - Increased cloud fraction (more consistent with CALIPSO).
 - Decreased cloud optical depth (more thin clouds).
 - Significant improvements to polar cloud mask.
- Inversion (ADMs and SOFA) code: Delivered.
 - 2nd generation CERES ADMs; Improved parameterized surface fluxes.
- SARB and TISA code: Delivered.
 - Use of 5-channel 1-hourly GEO cloud retrievals.
 - Consistent reanalysis and MODIS calibration throughout.
 - SYN1deg to be released 1-hourly, 3-hourly, daily and monthly.
 - Consistent non-GEO and GEO TISA products (all GMT).
 - Improved to Fu-Liou RT code and ancillary inputs (e.g., Ed4 clouds+overlap, surface albedo, MATCH aerosols).

CERES Terra and Aqua Edition 4 Status

Current Processing:

- BDS processed through December 2013
- SSF processed through December 31, 2009

Anticipated Level 3 Release Dates

(After 2 years have been processed):

- SSF1deg-Hr anticipated release – June 10th, 2015
- SSF1deg-Day/Month anticipated release – August 12th, 2015
- SYN1deg anticipated release – July 8th, 2015
- CldTypHist anticipated release – March 2016

EBAF Ed4.0

(After 5 years have been processed):

- Early CY 2016

CERES FM5 SNPP

- CERES FM5 time-varying gains and beginning of mission SRFs to be used in SSF Edition 1.
- Receiving Collection 1.1 calibrated VIIRS radiances from GSFC Land PEATE (Xiong).
- CERES Edition 1 Clouds: Delivered.
- SSF Edition1 uses Edition 4 Aqua ADMs.
- Anticipate “MODIS-Like” VIIRS aerosols from Land PEATE (POCs: Rob Levy & Christina Hsu). Consider including in Edition 2.
- Current Status: Ed1 SSF production halted because code error found that excluded footprints in each hourly file. Code redelivery has been made and production will restart June 2015.

Highlights from Terra & Aqua Senior Review Proposals

Selected Major Objectives of the CERES Team for the Next 2 Years:

- Work with the MODIS calibration and aerosol teams to ensure a seamless transition of imager radiances and aerosol optical thickness using MODIS and VIIRS.
- Deliver Edition 1 Level 3 SNPP CERES production code consistent with recent Terra and Aqua Edition 4 deliveries.
- Develop production software changes to support the upcoming CERES FM-6 data stream.
- Develop an implementation strategy to incorporate the new generation of high spatial/temporal resolution 16-band geostationary imagers.
- Evaluate alternate sources of snow/sea-ice data used in CERES production.
- Implement Version 2.0 of the CATALYST production automation system.
- Revise and restructure the CERES production code (especially Clouds and TISA codes).

Future Earth Radiation Budget Missions

- Responsibility for sustained climate measurements transferred from NOAA to NASA.
- CERES FM6 to launch on JPSS-1 in Nov 2016.
 - CERES team to produce Earth Radiation Budget Climate Data Records using CERES FM6, closely following FM5/SNPP approach.
- Radiation Budget Instrument (RBI) Status:
 - Draft RFP released in April, 2013
 - Industry-Day April 30, 2013
 - Official RFP release: June 14, 2013
 - Award: Spring 2014
 - RBI delivery date: Spring 2019.
 - Launch on JPSS-2: November 2021.

COVE

- DOE wanted us to remove all equipment in Dec 2014 while they excess the CLT through GSA, but we told them that a Winter exit was not practical or safe.
- GSA excess process will take 9-12 months.
- BSRN suite is presently running autonomously at the lighthouse.
- DOE *might* let us continue to run autonomously until a new owner is found.
- We are tentatively planning a cargo boat trip this summer to remove hazmat for DOE, and possibly re-install AERONET.
- Meeting with GSA in Atlanta revealed that owners of Frying Pan and Diamond Shoal lights want to purchase Ches Light.
- Both owners would prefer that we stay on the platform and pay them rent.
- Additionally, DOE is looking to rent a platform for locating "windcube" profiling lidars.



Upcoming Conferences & Meetings of Interest

Joint Assembly

- May 3–May 7, 2015, Montreal, Quebec, Canada

ARISE Science Team Meeting

- May 19–20, 2015, NASA GSFC.

26th IUGG General Assembly 2015

- June 22–July 2, 2015, Prague, Czech Republic

Gordon Research Conference

- July 26–31, 2015, Bates College, Lewiston, ME

Intl Conference on the Water and Energy cycles in the Tropics

- November 17-19, 2015, Paris, France

American Geophysical Union

- December 14-18, 2015, San Francisco, CA

International Radiation Symposium 2016

- April 17-23, 2016, Auckland, New Zealand

Other CERES Related News

- Terra lunar deep space calibration maneuver. Request awaiting approval at NASA HQ.
- CERES/ScaRaB PAPS campaign (March 22 – May 31).
 - Idea is to repeat campaign conducted two years earlier.

Other News

- SORCE operating in “hybrid” mode (collecting solar measurements during orbit day and then going into safe-hold during eclipse periods to conserve battery power).
- TSIS is planned for a launch on ISS in the 2017-2018 timeframe.
- CALIPSO – Functioning nominally
- CloudSat – Returned to the A-Train. Nominal Daylight Only Operations (DO-Op) continue.
- Deep Space Climate Observatory (DSCOVR)
 - Launched Feb 11, 2015.
 - Will take 110 days to get to its observing point between Earth and sun at Lagrange point 1.5 million km from Earth.
 - EPIC and NISTAR are the Earth-viewing instruments.
 - LaRC received grant to generate NISTAR fluxes (Minnis/Su Co-Pis).

Other News

- Cloud-Aerosol Transport System (CATS) on ISS
 - Launched Jan 10 and installed on the ISS Jan 22. First science data received in February.
 - Backscatter & depol. lidar at 355, 532 and 1064 nm; HSRL at 532 nm.
 - 51 deg inclined orbit of ISS => diurnal sampling of clouds & aerosols.
 - LaRC CALIPSO team to develop CALIPSO-Like data product
- CLARREO Pathfinder mission on ISS in FY2019 in President's budget.

End