

CERES Meeting Objectives

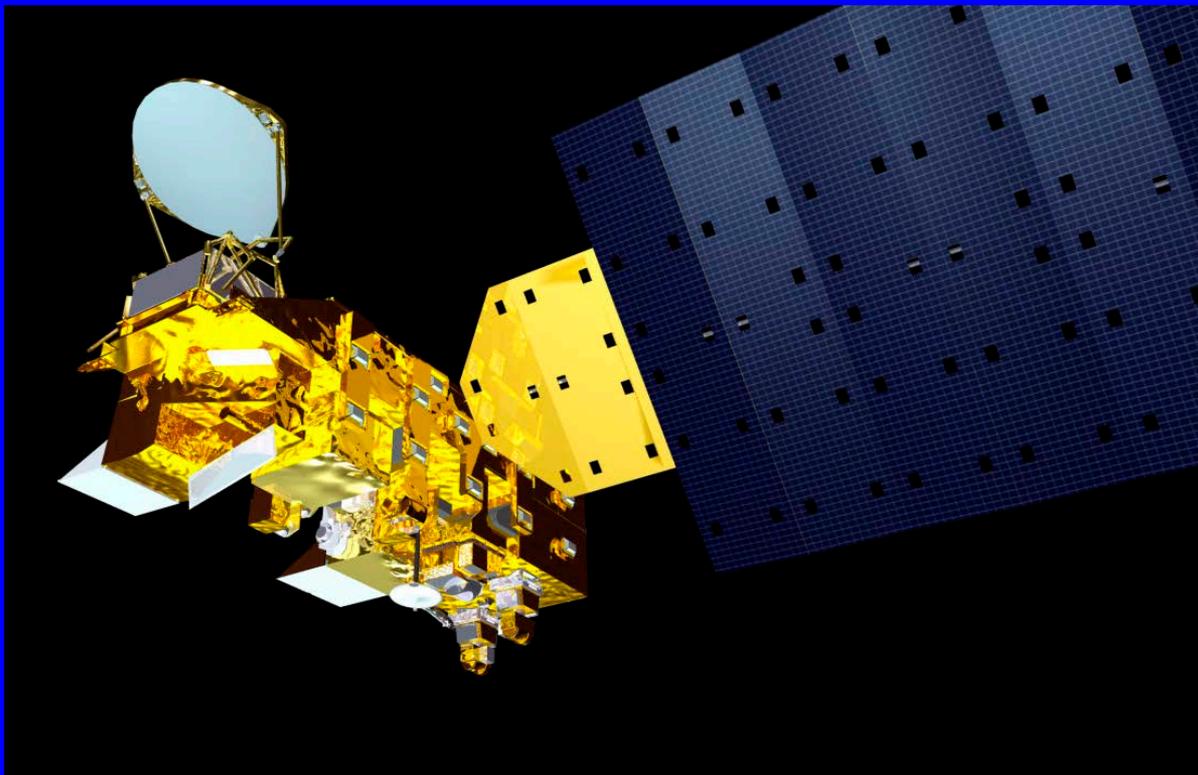
1) CERES Instrument, Algorithm and Validation Status:

- Status of CERES/NASA/EOS/CERES on NPP and Beyond
- Terra and Aqua SW/LW/TOTAL channel calibration update
- CERES FM5, FM6 Update
- Edition 4 cloud algorithm development and validation status
- CERES Edition4 ADM development status
- Development of a Surface EBAF data product
- Update on Edition3 merged Terra+Aqua+Geo SYN1deg Gridded TOA and surface fluxes
- Data Management Team Update: Terra/Aqua/NPP
- Atmospheric Sciences Data Center (ASDC) Update
- CERES Education Outreach

2) Invited and co-I presentations from science community.



State of CERES



Norman G. Loeb, NASA LaRC

CERES Science Team Meeting May 1, 2012, Newport News, VA

NASA Earth Science

- NASA Administrator is Charles Bolden, Jr.
- AA for Space and Earth Science is John Grunsfeld (**NEW**).
- Head of Earth Science is Mike Freilich.
- Jack Kaye is Associate Director for R&A.
- David Considine is NASA HQ Modeling lead and CERES Program Scientist.
- Hal Maring remains Radiation Sciences program lead.
- Steve Volz is the Earth Science Deputy for Missions.

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**

HAPPY BIRTHDAY AQUA !!



- Launch: May 4, 2002
- Clouds and the Earth's Radiant Energy System (CERES) (FM3 & FM4)
- Moderate Resolution Imaging Spectroradiometer (MODIS)
- Advanced Microwave Scanning Radiometer for EOS (AMSR-E)
- Atmospheric Infrared Sounder (AIRS)
- Advanced Microwave Sounding Unit (AMSU-A)
- Humidity Sounder for Brazil (HSB)
- The projection is that propulsive maneuvers to maintain orbital science requirements can be performed through Spring 2022 (10 more years).
- For Terra: 7.5 more years (until Sept. 2019).

HAPPY BIRTHDAY NPP !!



- Launch: October 28, 2011 2:48am PDT aboard Delta II rocket from Vandenberg AFB.
- Clouds and the Earth's Radiant Energy System (CERES) (FM5)
- Visible Infrared Imaging Radiometer Suite (VIIRS)
- Cross-track Infrared Sounder (CrIS)
- Ozone Mapping & Profiler Suite (OMPS)
- Advanced Technology Microwave Sounder (ATMS)
- 5-year nominal mission

Future CERES Missions

- CERES FM6 to launch in 2016 on JPSS-1.
- CERES Follow-on (JPSS-2) in 2021. Current fiscal environment raises some concern. Not funded in FY 2013 and funding for it was removed in the FY2012 proposed budget.
- No ERB instrument on Metop-SG. Would have required NOAA to donate CERES-like instrument or Europeans to fly a ScaRaB instrument.

NASA Senior Review

- Proposals (Terra & Aqua) submitted March 4th, 2011
- Panel review May 3 (Terra) and May 4 (Aqua), 2011
- July, 2011: Publication of the panel's report.

- The report recommended extending all 12 missions evaluated under the Senior Review. Terra and Aqua proposals were given highest ranking in science merit, relevance and product maturity, with medium technical risk.

- Official guidance specific to each mission, including budget allocations were received Sept 27, 2011.

- Responses to ESD from missions sent Oct 30, 2011.

CERES Budget Guideline & 2013 Senior Review

Aqua & Terra:

- Proposed 7% reduction in budget to science teams and Mission Operations (GSFC)
- Actual reduction was 3.5%
- Do not expect change in FY13

Next Senior Review proposal is due in March 2013 for FY14-15 budgets:

- Priorities: Process several years of Edition4 Clouds; show progress on Edition4 algorithm improvements for ADM, SARB, TISA; DMT partial-automation of SSF.

NPP:

- NPP budget not part of Senior Review
- FY13: Do not expect a change from FY12

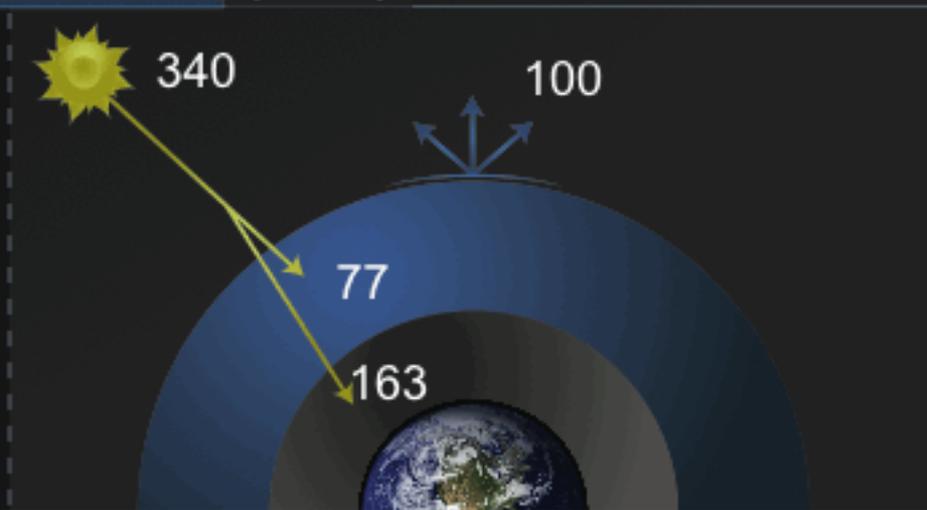
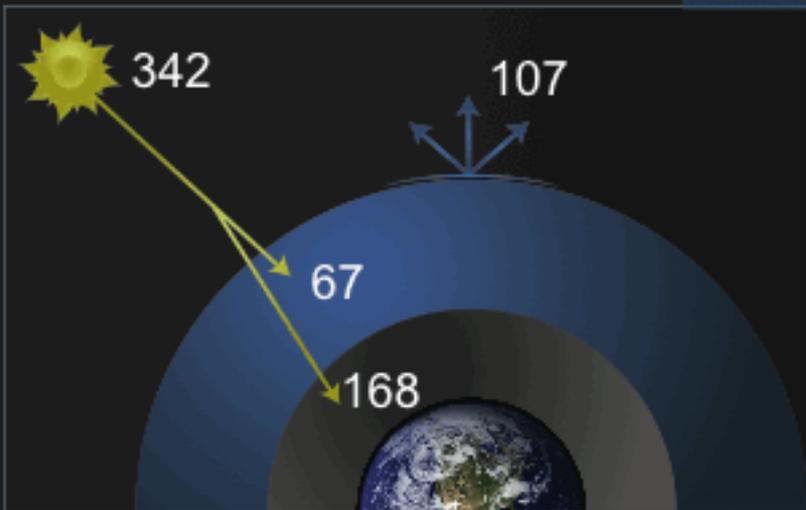
NASA-PCMDI (Program for Climate Model Diagnosis and Intercomparison) Effort

- NASA initiative to provide observational datasets to the Earth System Grid for CMIP5 model-data comparison.
- CERES TOA LW & SW radiation datasets were identified by PCMDI and NASA as being desirable for this initiative.
- ESG Gateway hosted by the Program for Climate Model Diagnosis and Intercomparison
- CERES provided the following to the ESG Gateway in July 2011:
 - TOA Outgoing Longwave Radiation (rlut)
 - TOA Outgoing Clear-Sky Longwave Radiation (rlutcs)
 - TOA Incident Shortwave Radiation (rsdt)
 - TOA Outgoing Shortwave Radiation (rsut)
 - TOA Outgoing Clear-Sky Shortwave Radiation (rsutcs)
- **CERES Team will be adding surface radiative fluxes (EBAF-SFC) this summer. (Seiji Kato SARB presentation).**

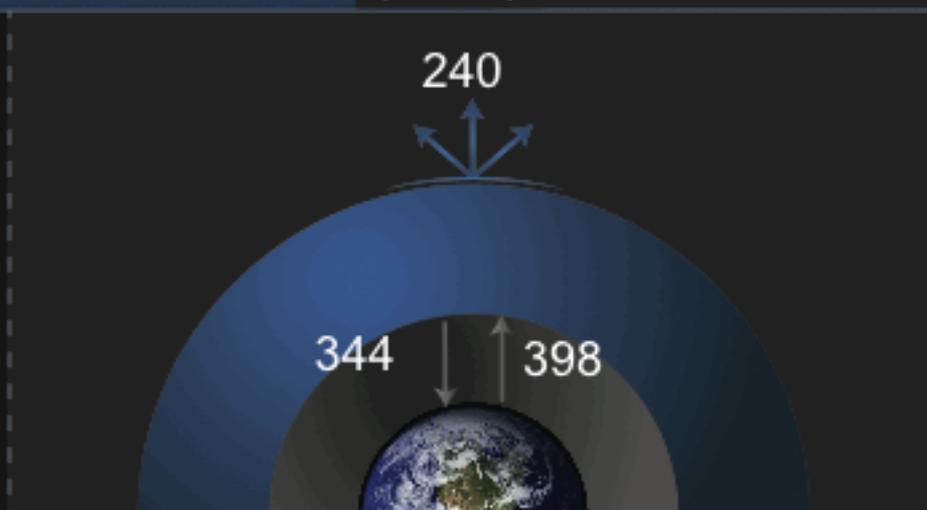
Pre-EOS, A-Train

Post-EOS, A-Train

SOLAR RADIATION (Wm^{-2})



EMITTED THERMAL RADIATION (Wm^{-2})



Upcoming Conferences & Meetings of Interest

Workshop on Earth's Energy Imbalance: Measurement and Implications on Climate Sensitivity

- May 16-18, 2012, Long Island, NY

Cloud Feedback Model Intercomparison Project Annual Meeting

- May 28-June 1, 2012, Paris, France

CALIPSO, CloudSat, EarthCARE Joint Workshop

- June 18-22, 2012, Paris, France

IGARSS 2012

- Aqua@10 Session, July 22-27, 2012, Munich, Germany

International Radiation Symposium (IRS) 2012

- August 6-10, 2012, Berlin, Germany

2012 EUMETSAT Meteorological Satellite Conference

- Sept 3-7, 2012, Sopot, Poland.

CERES Science Team Meeting (Joint with GERB & ScaRaB)

- Oct 22-26, 2012, GFDL, Princeton, NJ.

AGU Fall Meeting

- Dec 3-7, 2012, San Francisco, CA

Other News

- New AIRS Science Team Leader is Joao Teixeira – Invited talk
- JAXA GCOM-W to join the A-Train (LRD: May 17, 2012)
- ScaRaB on Megha-Tropiques launched October 12, 2011.
- CALIPSO – Functioning nominally
- Plans for OCO-2 mission (LRD: mid-2014)

AMSR-E (Aqua):

- AMSR-E has over 480 pounds of spinning mass, and the lubricant in the bearing assembly gradually deteriorates over time.
- Automatic shutdown procedures are in place if the amount of torque required to keep AMSR-E spinning exceeds a certain threshold.
- April 2007: Noticeable increase in Antenna Drive Electronics (ADE) motor current and commanded torque was observed.
- AMSR-E Antenna Drive Assembly (ADA) began exhibiting significantly noisier behavior in July 2011.
- Spin down to 0 RPM on Oct 4, 2011.
- Restart of AMSR-E at 0 RPM on Feb 6, 2012.
- Ultimate goal (hope): Resume to 40 RPM nominal operation in order to get overlap with AMSRE2 on GCOM-W.
- Next: Plan to spin up to 4 RPM.
- Aqua Mission and Instrument Ops teams reviewing potential impact of what would happen if spacecraft and instruments transitioned to SAFE state if a failure occurs (last time SC in safe mode: 2002).

Cloudsat:

- April 17, 2011: Experienced a spacecraft battery anomaly. Started drifting away from CALIPSO.
- June 18, 2011: CloudSat executed orbit lowering maneuver and safely passed under Aqua.
- Week of Sept 25, 2011: Began bringing the radar back to operations.
- Jan 4, 2012: CloudSat briefing at NASA HQ (approved to return to A-Train).
- Feb 3, 2012: First ascent maneuver failed to execute (star tracker lost stars)
- Cloudsat expected to return to A-Train in June, 2012.
- Because of the spacecraft battery issues, CloudSat will no longer be able to operate during nighttime.

VIIRS (NPP) Status

- 22 spectral bands covering wavelengths from 0.41 to 12.5 μ m at two spatial resolutions: 375 m for imagery and 750 m at nadir for radiometric data.
- VIIRS SDR Review Meeting held 4/5/2012 to assess VIIRS SDR data maturity.
- Consensus reached that the VIIRS SDR has achieved “beta” status and should be made available to the public through CLASS.
- Items of interest to EDR users:
 - VIIRS SDR Data before 2/6/2012 were not reliable due to the use of erroneous prelaunch LUTs. Reprocessing is required but not in the plan at this point.
 - Weekly calibration LUT update started on 2/10/2012. Daily update proposed.
 - Some areas are more mature than “Beta”:
Geolocation, Spectral Response, and TEB calibration

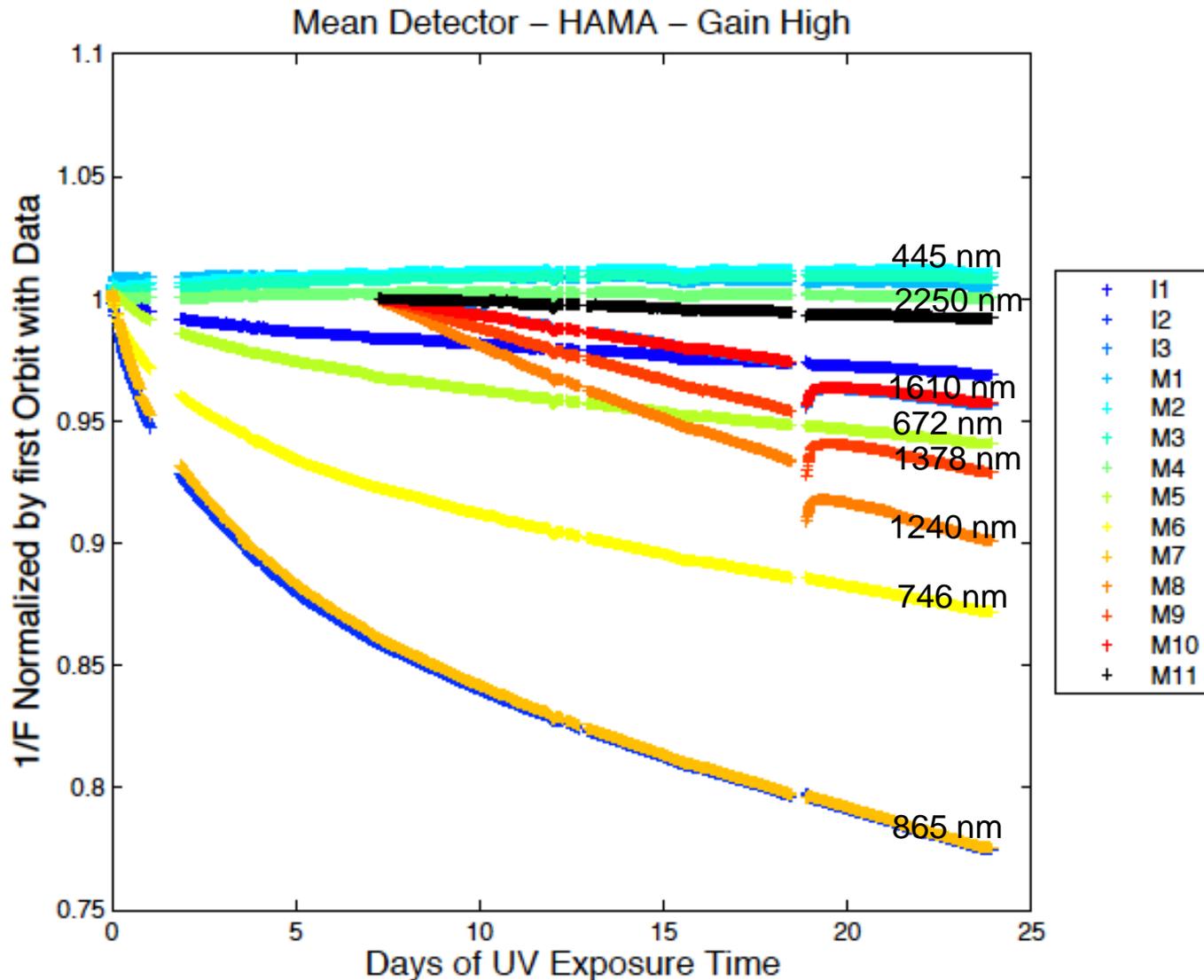
VIIRS Responsivity Degradation

- Larger than expected instrument responsivity degradation in bands M7, M6, M5, M8, I2, and I1 (865, 746, 672, 1240, 640 nm).
- Anomaly Resolution Team concluded degradation is due to scan mirror contamination with tungsten and tungsten oxide in the manufacturing process and on-orbit ultraviolet (UV) exposure leading to mirror darkening in those spectral bands.
- The VIIRS SDR team has developed a strategy to mitigate the effects of this degradation through more frequent updates of the calibration lookup tables (LUT).
- A weekly LUT update is currently implemented which significantly reduces the impact of degradation but with a residual effect of 0.8% between weekly updates.
- A daily LUT update is currently being investigated which would reduce the weekly calibration drift below 0.3% once implemented.
- Based on early studies, the current calibration update scheme makes the degradation impact negligible for most EDR products, except for more calibration sensitive products such as ocean color.

VIIRS Responsivity Degradation

- Current maximum throughput rate of change is about 0.8%/week in M7, I2 and M8
- Likely to be many months before observed throughput rate of change falls below 0.1%
- It is estimated that the signal to noise ratio for all bands should still meet the specification by end of the mission (5 years), according to model predictions by the instrument vendor.

VIIRS Responsivity Degradation



End