CERES Flight Model 6 & Radiation Budget Instrument (RBI) Status

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CERES Science Team Meeting
University of Washington
Seattle, WA
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Discussion Topics

- ERB missions Overview
  - Flight history/future
- Instrument Status
  - FM-6 on JPSS-1
  - RBI on JPSS-2
- Summary
We now have over 63 years of flight experience with the CERES instruments
CERES FM-6
JPSS-1 Satellite I&T Overview

- Ball Aerospace & Technologies Corporation (BATC) in Boulder, CO is the JPSS-1 spacecraft provider and satellite integrator
  - BATC was also NPP S/C provider and integrator
- NGST will run first Bench Acceptance Test at BATC
- NASA LaRC personnel will perform CERES I&T activities at BATC
- JPSS will coordinate launch operations through NASA KSC
  - Launch will be from Vandenberg Air Force Base, CA (same as NPP)
  - Launch vehicle provider has not been selected yet
- I&T will heavily leverage success accomplished on NPP
  - Reuse NPP I&T flow & procedures minimizing changes
  - Integrate lessons learned from NPP for JPSS-1 I&T
CERES FM-6 Upcoming Activities

- CERES Delivery to BATC: June 2014
- CERES Bench Acceptance Test: June 2014
- First Instrument Integrated (CERES): October 2014
- Satellite Pre-Environmental Review: August 2015
  - Dynamics Testing Complete: November 2015
  - EMI – EMC Complete: February 2016
  - TVAC Complete: March 2016
- Satellite I&T Complete: May 2016
- Ship to Launch Site: September 2016
- Launch Readiness Date: October 2016
CERES FM-6 I&T Team

- CERES I&T Activities for integration to JPSS-1 are being planned
  - Activities and documents are being coordinated with BATC
- CERES Project expects to retain most key I&T personnel from CERES FM5 on NPP
  - Some new personnel will be added and young team members to be mentored to gain experience for longevity
- I&T staffing levels are planned and conflicts with other LaRC Projects seems manageable
- CERES Team personnel have already been participating in I&T discussions with JPSS and BATC

CERES Team will be ready to support JPSS-1 Satellite I&T
RBI Instrument Overview

Kory Priestley, Project Scientist
RBI is a New Instrument Developed as a Follow-on to CERES Flown on TRMM, EOS, NPP, and JPSS-1

Partnerships and Teams

• NASA/NOAA Partnership
  – NOAA provides JPSS-2 satellite for accommodation of RBI
  – NASA provides RBI instrument and support through spacecraft I&T and launch/activation
  – NASA funds radiation budget science data analysis and generation of science products (RBM Project)

• NASA Langley
  – Manages prime contractor development of RBI instrument, provides management, technical, and mission assurance insight and oversight; provides support to spacecraft I&T thru launch and early on-orbit checkout (thru Phase D)
  – Hand-over and release of RBI instrument ownership by RBI Project occurs at the JPSS-2 Operational Hand-over Review (OHR). For Phase E, the Langley Science Directorate (SD) Radiation Budget Measurement (RBM) Project assumes responsibility for RBI for mission planning and operations

• Exelis Inc.
  – RBI Instrument provider/prime contractor with subcontractors providing key elements and support (SDL for Calibration, JPL for Thermopile Detectors, Sierra Nevada for Azimuth Rotation Module)

• JPSS-2 Spacecraft and Mission Interface
  -- Interface Control (ICD & MICD) and Data Format

RBI scanning radiometer measuring three spectral bands at top of Atmosphere (TOA)

• Total 0.3 to > 50+\(\mu\)m
• Shortwave 0.3 to 5.0\(\mu\)m
• Longwave 5.0 to 50\(\mu\)m

Science Goal

• To continue the measurements from the last two decades in support of global climate monitoring.
• RBI extends the Earth radiation budget measurements of the Earth Observing System (EOS) and Joint Polar Satellite System (JPSS)

• Category 3 Mission per NPR 7120.5E
• Risk Classification B per 8705.4
• Follow-on instrument to the Clouds and the Earth’s Radiant Energy System (CERES)
• Flight Instrument Complete – Exelis CBE is May 2018
• Flight Instrument Delivery – NLT April 2019 (per NOAA/NASA IAA)
• “Notional” JPSS-2 on-dock delivery date – Nov 2018 (TBR after JPSS-2 spacecraft is awarded, April 2015)
RBI Accommodated on JPSS-2 Spacecraft Nadir Deck

**JPSS-2 Instrument Complement**
- Radiation Budget Instrument (RBI)
- Advanced Technology Microwave Sounder (ATMS)
- Cross-track Infrared Sounder (CrIS)
- Visible Infrared Imagining Radiometer Suite (VIIRS)
- Ozone Mapping and Profiler Suite (OMPS)

**JPSS-2 Observatory Requirements**
- Nominal Altitude: 824 km ± 17 km
- Ground Track Repeatability Accuracy: ±20 km at the equator
- Ground Track Repeat Cycle: <20 days
- Nominal Ascending Equator Crossing Time: 1330 (local time) ± 10 min

Spacecraft design and Instrument locations are notional and representative of JPSS-1
JPSS-2 configuration has not been determined
Chronology and Recent Developments

♦ 5/14/14: RBI contract Awarded to Exelis
♦ 12/10/14: System Requirements Review (SRR) completed
♦ 6/9/15: Gov’t issued a stop work order and Cure Letter
♦ 8/21/15: Exelis given approval to resume work on RBI

♦ Next Steps:
  ▪ Management face-to-face meeting 26 & 27 August (complete)
    • Ensure that desired baseline is understood and agreed upon
  ▪ Technical leads face-to-face meeting.
    • Tentatively scheduled for week of September 7.

♦ Deliver the RBI instrument to meet the JPSS-2 launch
  ▪ Date will be adjusted to take the stop work period into account
  ▪ NASA will work the delivery with JPSS-2

♦ No requirements have been changed