Update of NOAA Plans for Climate Sensors and Climate Data Records

John Bates
NOAA’s National Climatic Data Center

presented by Jörg Schulz, CM-SAF, Deutscher Wetterdienst
The White House Science Office requested NOAA and NASA to provide:
- An analysis of possible mitigation options of the climate impacts of the NPOESS Nunn-McCurdy Certification through 2026
- An assessment of the potential costs of these options
- All options are contingent on getting new funding

Primary goal: Ensure continuity of long-term climate records

NOAA and NASA analyzed the following options:
- Remanifesting the climate sensors on NPOESS spacecraft
- Placing sensors on currently planned non-NPOESS spacecraft
- Developing new gap-filling climate satellite missions
- Partnering opportunities (commercial and international)

Key results:
- OMPS-Limb restored to NPP but not to NPOESS
- CERES added to NPP
- $74M funding in President’s FY09-FY14 budget for CERES and TSIS on NPOESS C1 and for start of Climate Data Record (CDR) Project
# NPOESS Nunn-McCurdy Certification

## Reductions of Climate-Relevant Sensors

<table>
<thead>
<tr>
<th>NPOESS Instruments</th>
<th>NPP</th>
<th>EARLY-AM</th>
<th>MID-AM</th>
<th>PM</th>
</tr>
</thead>
</table>

### Reduced Capability Sensors

- **CMIS***
  - EARLY-AM
  - MID-AM
  - PM

### Reduced Coverage Sensors

- **CrIS/ATMS**
  - EARLY-AM
  - MID-AM
  - PM

- **VIIRS**
  - EARLY-AM
  - MID-AM
  - PM

### De-manifested Sensors

- **TSIS**
  - EARLY-AM
  - MID-AM
  - PM

- **CERES/ERBS**
  - EARLY-AM
  - MID-AM
  - PM

- **ALT**
  - EARLY-AM
  - MID-AM
  - PM

- **OMPS**
  - EARLY-AM
  - MID-AM
  - PM

- **APS**
  - EARLY-AM
  - MID-AM
  - PM

---

*CMIS to be redefined as a less capable, less expensive sensor

**OMPS Limb Subsystem is cancelled and only the Nadir capability is maintained
Global Essential Climate Variables (ECVS-Groups of CDRs) with Heritage Records
Multiple options exist to mitigate the loss of sensors from NPOESS

Developed options using following criteria:

- Minimize risk to measurement continuity
  - First priority for existing climate data records
- Minimize risk to existing programs
- Cost effectiveness
  - Economies of scale
  - Leverage planned missions and sensors including partnerships with other space agencies
## Range of Options* Examined for Climate Data Continuity

<table>
<thead>
<tr>
<th>Primary Mitigation Strategy</th>
<th>2008</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSIS</td>
<td>SORCE</td>
<td>Glory</td>
<td>NPOESS C1?</td>
<td>NPOESS C2?</td>
<td>NPOESS C4?</td>
</tr>
<tr>
<td>CERES (CERES-2)</td>
<td>Terra, Aqua</td>
<td>NPP</td>
<td>NPOESS C1</td>
<td>NPOESS C3</td>
<td></td>
</tr>
<tr>
<td>Altimeter</td>
<td>Jason-1</td>
<td>OSTM</td>
<td>Jason-3</td>
<td>Jason-4 / Adv Alt 1</td>
<td>Jason-x / Adv Alt x</td>
</tr>
<tr>
<td>OMPS (Nadir + Limb)</td>
<td>Aura</td>
<td>NPP</td>
<td>NPOESS C1?</td>
<td>NPOESS C3?</td>
<td></td>
</tr>
<tr>
<td>APS</td>
<td>Glory</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Current and Planned Missions**

**NASA-NOAA Mitigation Flight**

**NPOESS Mitigation Flight**

*Final option still under discussion*
Current Status – De-manifested Sensors

- **Total Solar Irradiance Sensor (TSIS)**
  - President’s FY2009 budget request includes support for instrument development and ongoing analyses to identify a suitable satellite platform for hosting the sensor

- **Clouds and Earth Radiant Energy System (CERES)**
  - A CERES instrument is approved for flight on the NPOESS Preparatory Project (NPP) in 2010
  - President’s FY2009 budget request includes funds to build another CERES instrument to fly on the first NPOESS planned for 2013 launch

- **Ocean Altimetry (ALT)**
  - NOAA plans to provide operational continuity for satellite altimetry data with a Jason-3 mission
  - Jason-3 is a NOAA-EUMETSAT partnership mission, planned for launch in 2013

- **Ozone Mapping and Profiler Suite (OMPS) Limb sensor**
  - Approved for flight on NPP
  - Resources not identified for NPOESS OMPS-Limb

- **Aerosol Polarimeter Sensor (APS)**
  - NOAA is monitoring NASA’s development of APS scheduled to launch in March 2009 on the GLORY mission and will evaluate it before making a decision
Current Status – Reduced Capability Sensors

- Re-scoped MIS to fly on NPOESS C2, C3, and C4
- NOAA and the Japanese Aerospace Exploration Agency (JAXA) are actively exploring prospects for cooperation in NPOESS and the Japanese Global Change Observation Mission (GCOM) series of satellites
  - GCOM-W (Water Cycle observation) – series of 3 satellites, beginning in 2012 (AMSR-2 in particular)
  - GCOM-C (Climate observation) – series of 3 satellites, launch TBD
- NOAA and JAXA are drafting Joint Letter of Intent for GCOM / NPOESS cooperation.
- Formal agreement contingent on both sides obtaining budget support for their part in the cooperation
  - Data exchange, cal/val, data relay support
Current Status – Reduced Coverage Sensors

- CrIS/ATMS – No climate mitigation recommended
- VIIRS – Concerns remain that VIIRS on NPP will not provide sensitivity required for ocean color
  - VIIRS work ongoing
  - Explore possible International partnerships for ocean color