National Polar-Orbiting Operational Environmental Satellite System (NPOESS)

Peter A. Wilczynski
Senior Technical Policy Advisor
to the
Program Executive Officer
for Environmental Satellites

May 2008
NPOESS Program Status

- NPOESS has completed restructure and is executing to re-baseline contract
- Performance on NPOESS Engineering, Manufacturing & Development program
  - On schedule and budget for last two years
  - Contract modification signed in July 2007
  - On track to deliver essential weather measurements and 14 of 26 essential climate variables
  - System capacity to accommodate de-manifested sensors and other sensors to provide additional monitoring
    - Currently re-manifesting OMPS-Limb and CERES on NPP

*NPOESS remains on track for Jan 2013 launch of C1 spacecraft*
Program Schedule

As of March 2008

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<tr>
<th>Program</th>
<th>FY06</th>
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Legend:
- Concept activities
- Production / fielding
- Design / development
- Operations / sustainment
- Integration / test
- Key events
- Margin

C3: Command, Control, Communications
Cal/Val: Calibration/Validation
I&T: Integration & Test
IDP: Interface Data Processing
CDR: Critical Design Review
GR: Ground Readiness
PDR: Preliminary Design Review
NPOESS C-3 and C-4: Production units to be incrementally funded

As of March 2008
# NPOESS 12 Month Schedule

As of March 2008

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<th>JAN</th>
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<th>MAR</th>
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<th>MAY</th>
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<td>☢️ OMPS Electronics Test</td>
<td>☢️ CrIS Vibration</td>
<td>☢️ VIIRS PER</td>
<td>☢️ CrIS TVAC</td>
<td>☢️ CrIS Delivery</td>
<td>☢️ VIIRS Vibration</td>
<td>☢️ VIIRS Start TVAC</td>
<td>☢️ OMPS Delivery</td>
<td>☢️ VIIRS TVAC Complete</td>
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**Legend:**
- ▲ Completed Milestone
- △ Current Milestone
- ▼ Slipped Milestone

TVAC - Thermal Vacuum
PER - Pre-Environmental Review
Continuity of Polar Operational Satellite Programs

Calendar Year

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**PM Orbit**

- NOAA 17
- NOAA 18
- NOAA N-Prime
- NPP
- NPOESS C1

**AM Orbit**

- METOP-A
- METOP-B
- METOP-C
- NPOESS C2 *

* Early AM Orbit

Projected launch & mission life

3/19/2008
NPOESS International Initiatives
With Eumetsat & JAXA
Overview of Nunn-McCurdy Changes to NPOESS Program

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<thead>
<tr>
<th></th>
<th>Pre Nunn-McCurdy</th>
<th>Post Nunn-McCurdy *</th>
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<tbody>
<tr>
<td>Number of Satellites</td>
<td>6</td>
<td>4</td>
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<tr>
<td>Number of Sensors</td>
<td>16</td>
<td>9</td>
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<tr>
<td>Number of Orbits</td>
<td>3</td>
<td>2</td>
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<tr>
<td>First Launch</td>
<td>2010</td>
<td>2013</td>
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<td>Satellite Life Expectancy</td>
<td>7 Years</td>
<td>7 Years</td>
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<td>Final Satellite on Orbit</td>
<td>2024</td>
<td>2026</td>
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- Restructured program provides for continuity of weather measurements

- Restructured program does not include the following climate measurements:
  - Atmospheric aerosols and ozone
  - Solar environment
  - Sea surface height (via altimetry)

*As documented in the DoD Acquisition Decision Memorandum dated June 5, 2006
McMurdo Overview for MetOp Data Recovery
High Level Responsibilities

- IPO – Project Sponsor/Coordinator
  - SafetyNet™ receptor procurement, installation, test, and operations via NGST/Raytheon
  - Off-ice communications via NGST/Raytheon/Optus/AT&T
- NASA – McMurdo Ground Station owner/operator
  - MGS (MG1 and MG2) procurement, installation, test, operations and scheduling, maintenance, and sustainment
    - Will eventually includes maintenance of NPOESS’ McMurdo receptors
- US National Science Foundation (NSF) – On-ice logistics, facilities and infrastructure (including on-ice comm services)
Proposed GCOM W-1 C3 Architecture:
- NOAA provides Ground Station Services at Svalbard
  - Communication link for mission data to NSOF
  - Interface to Asian-Pacific Advanced Network (APAN)
- JAXA provides T&C thru own communication link
What are the User Benefits?

- Mary M. Glackin’s Letter on *User Interest in data from JAXA’s GCOM - Oct 22, 2007*
  - “…Due to program restructure of NPOESS, some requirements will not be provided by NPOESS…”
  - “Research and foreign sources could provide very useful data to supplement our critical data needs provided by NPOESS.”
  - “…This interest in GCOM data does not constitute a commitment to use the data nor does it imply planning, programming, or funding actions to receive, process, exploit, or disseminate these data.”
User Benefits (cont.)

• AMSR-2 Benefits:
  – AMSR-2 will provide continuity of oceanographic and maritime meteorological data currently provided by NASA's Aqua satellite.
  – These measurements have proven valuable for numerical weather prediction in areas over the open oceans which subsequently impact medium to long range weather forecasting in coastal regions.
  – Precipitation data from this instrument will aid tropical and extratropical forecasting of major storm systems threatening human safety, and damage to coastal infrastructures.
  – These global microwave imaging and sounding data have also been identified by the National Academies of Science Decadal Survey as critical to our understanding of the ocean-atmosphere interactions driving global climate change.
  – AMSR-2 will provide intercalibration opportunities with other microwave imagers to develop consistent microwave measurements needed for weather and climate applications.

• ATMS AMSR-2 Blended Products Benefits:
  – Improved microwave surface products by using ATMS to correct for atmospheric effects.
  – Improved ATMS sounding products by better characterizing surface emission.

• SGLI Benefits:
  – As a complement to NPP and NPOESS advanced Visible and IR imaging capability, SGLI will complete a balanced nominal coverage of the earth every 4-hours.
  – High resolution data requires both low data latencies and high data refresh in order to be most useful for weather forecasting.
  – The benefits of such fine scale, high temporal weather forecasting include cloud and precipitation forecasting, faster identification of hazardous weather conditions, smoke, and volcanic ash.
  – Oceanographic benefits include improved ocean current analysis and forecast, fine scale ocean color, turbidity, and sea state.
  – These global high resolution Vis/IR imaging capabilities have also been identified by the National Academies of Science Decadal Survey as critical to our understanding of the ocean-atmosphere interactions driving global climate change.

• GCOM Direct Readout Data Interest:
  – US Users are interested in receiving regional data directly from the GCOM spacecraft as they pass over receiving sites within the US territory and abroad.
  – Direct data receipt from NASA's EOS missions has proven to be useful.
NOAA’s Conclusion

- Users recognize benefits of GCOM as a supplement to NPOESS and an opportunity to achieve some important objectives from the Decadal Survey

- NOAA and JAXA will gain capability without a formidable financial investment
  - This includes long-term mission collaboration (i.e., satellite phasing decisions, satellite sensor co-registration, etc) and data sharing
  - Operationalize a new “A” train in the 1330 orbit, Ocean color and improved aerosols in 10:30 orbit
  - This partnership could be used as an example for future international cooperation

- Working together with JAXA to establish optimal satellite phasing for NPP, GCOM W-1 and NPOESS C1

- NESDIS STAR, JAXA, NPOESS and JMA to form science team
Summary

• Program restructured in July to complete EMD
  – Integrated Master Schedule out through 2016

• Substantial progress – real hardware delivered
  – Command and Control System complete & installed at NOAA Satellite Operations facility
  – Data Processing System completed 4 of 5 software builds; ready to handle weather and climate data
  – NPOESS Sensor EDU integration onto NPP spacecraft on plan to support launch
  – Sensor Flight Hardware completing rigorous testing
  – Operational Space Segment development on track for implementing Nation’s next generation environmental monitoring system

• International cooperation and collaboration is essential
  – MetOp data recovery from McMurdo will significantly improve data timeliness
  – NPOESS/NOAA & GCOM cooperation is occurring at many levels