

# National Polar-Orbiting Operational Environment Satellite (NPOESS)

### SUMMARY

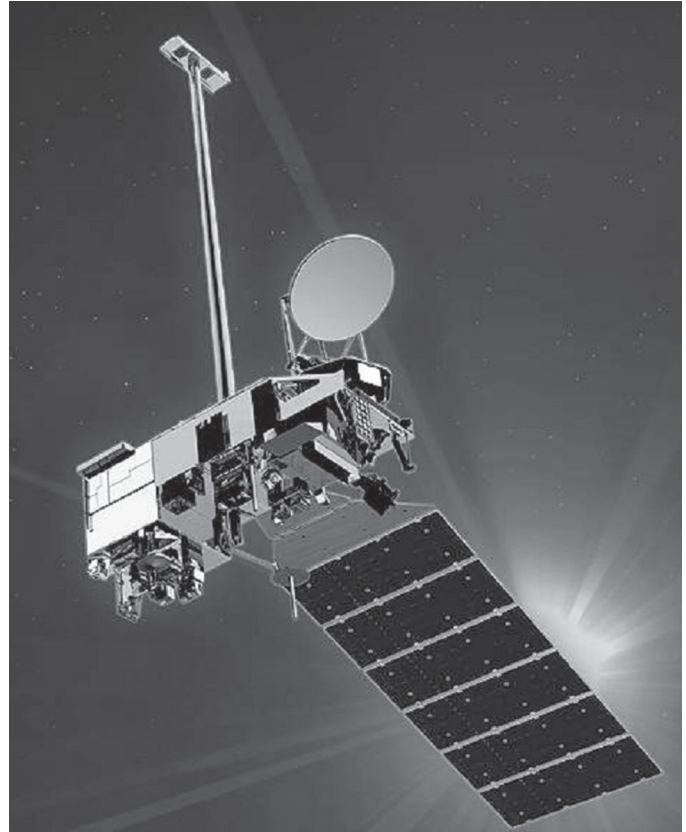
- The National Polar-Orbiting Operational Environmental Satellite System (NPOESS) is making adequate progress as system plans mature.
- Concerns remain in the areas of testing, design, and requirements that warrant special attention as the program progresses.
- Test and evaluation activity this past year included completion of an operational assessment and refinement of test planning and documentation.

### SYSTEM DESCRIPTION AND MISSION

The NPOESS architecture includes four major segments plus launch support. The four major segments are Space; Command, Control, and Communications (C3); Interface Data Processing; and Field Terminals.

The Space Segment consists of three satellites in sun-synchronous, near polar orbits with multiple, complex sensors that collect electromagnetic radiation in several bands. The C3 Segment provides all inter-segment communications to include routing of stored data to processing centers (Centrals) and routing of telemetry data to Mission Management Centers. The Interface Data Processing Segment (IDPS) consists of ground hardware and software at Centrals and software for use in Field Terminals. The IDPS converts raw sensor data into formats used to develop environmental, meteorological, and oceanographic products for weather users. The fixed and mobile Field Terminals are tactical systems designed to accept data directly from satellites and produce products needed by weather users. NPOESS provides capability for both civilian and military weather missions. Those NPOESS missions include aviation and space forecasts, ocean surface and internal structure forecasts for ship movements, search and rescue, and tropical storm reconnaissance and warnings.

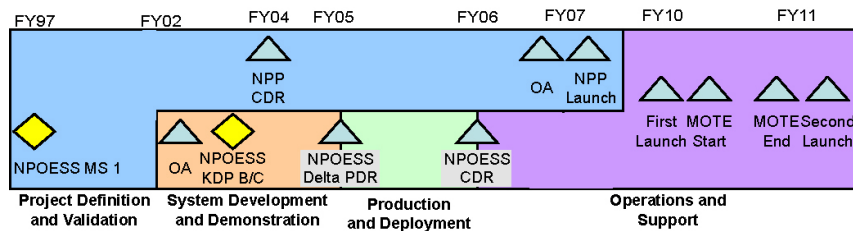
NPOESS is a tri-agency program jointly administered by the DoD, the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA), and the National Aeronautics and Space Administration (NASA). An NPOESS Executive Committee provides program management through an Integrated Program Office (IPO) with the Air Force as acquisition authority. NPOESS will provide a national remote sensing capability to acquire and disseminate global and regional environment data for a period of at least ten years. In 2003, the IPO restructured the program in response to funding constraints. A key risk reduction activity is the NPOESS Preparatory Project, which is a joint Integrated Program Office/NASA spacecraft with selected critical imaging and sounding sensor systems. As part of restructuring, the IPO delayed the Critical Design Review, NPOESS Preparatory Project launch, and the first potential NPOESS launch. Office of Secretary of Defense approval of the NPOESS Test and Evaluation Master Plan occurred in October 2002, with an update planned prior to the Critical Design Review in FY06.



*NPOESS will provide a national remote sensing capability to acquire and disseminate global and regional environment data.*

# AIR FORCE PROGRAMS

## TEST AND EVALUATION ACTIVITY



The Air Force Operational Test and Evaluation Center is the lead agency for all operational test and evaluation events, but will combine other Service operational test agencies, NOAA, and NASA efforts as appropriate to make efficient use of expertise and resources. The Air Force Operational Test and Evaluation Center completed the first part of an operational assessment and issued an Interim Summary Report in July 2002. The operational assessment completed in 2004 with a final report issued in December 2004 to support the April 2005 Delta Preliminary Design Review. The plan is for a new operational assessment to occur after the NPOESS Preparatory Project launch, currently planned for October 2006.

Test and evaluation efforts during this past year focused on planning to ensure that events synchronize with the program's restructure and that testing contributes to overall risk reduction and sound decision making. Activities in 2004 included publication of a Combined Test Force charter to define organizational roles and responsibilities, continuation of Direct Readout User Forum meetings to mature field terminal development and test planning, and meetings of the Test Planning Working Group to refine overall test planning and synchronize events.

## TEST AND EVALUATION ASSESSMENT

NPOESS progress is adequate, but concerns remain in the areas of testing, design, and requirements that warrant special attention as plans continue to mature. In addition, the program's sensors, their integration, and algorithm development remain on a tight schedule and continue to face technical challenges.

Test-related concerns include Field Terminals and planning for Information Assurance testing. Field Terminal interoperability is one of the critical Information Exchange Requirements for the Interoperability Key Performance Parameter. Although the IPO is not responsible for developing Field Terminals, it plans to provide software and a demonstration terminal at each of two data rates to assist in terminal development by user agencies. In addition, risk reduction testing of individual agency Field Terminal prototypes should take place before launch, with terminals operationally interfacing with realistic NPOESS data sources in a controlled setting. Information assurance testing will be a focus area in the DOT&E evaluation, but is not addressed in the current NPOESS System Test Plan. The System Test Plan should incorporate information assurance, Electromagnetic Environmental Effects testing, and Air Force Satellite Control Network testing to support an integrated developmental and operational test program.

Design concerns relate to the Centrals, which were not designed to receive and process the magnitude of data expected from NPOESS. Furthermore, the models used by Centrals require modifications in order to match new NPOESS sensors. While these concerns are outside the IPO's control, allocation of resources for these improvements is critical to NPOESS success.

Requirements concerns involve differences between the system specification and Integrated Operational Requirements Document, and the lack of low-rate data thresholds. The cases of differences between the system specification and the Integrated Operational Requirements Document (such as the initial lack of space environment sensors on the first spacecraft and the potential lack of NPOESS satellite compatibility with the Air Force Satellite Control Network) require understanding and resolution so that developmental and operational testing goals are in consonance. In addition, the lack of adequate threshold definitions for low-rate data field terminal users will make it difficult to conduct integrated operational testing on low rate data terminals. The IPO has recently taken action to understand and address resolution of these differences.