

National Polar-orbiting Operational Environmental Satellite System (NPOESS) Ground Segments



On May 5, 1994, President Clinton signed a National Science & Technology Council Presidential Decision Directive, to establish "... a single, converged, operational (environmental satellite) system [that] can reduce duplication of efforts in meeting common requirements while satisfying the unique requirements of the civil and national security communities."

Key Features and Benefits

- Unique integration of multiple new and legacy technologies
- Satisfies diverse civil, military and scientific environmental needs
- A fully integrated global ground system that speeds data delivery
- High-performance data processing design
- Flexible data delivery subscription tailored to the user
- Flexible, scalable, modular architecture that evolves with dynamic needs
- Extensive command & control system operational heritage providing proven reliability
- Enterprise management ensuring high system availability
- Optimal human-machine mix delivering low operational costs

From farmers and fighter pilots to fishermen and forecasters, timely and accurate weather reports can mean all the difference between success and disaster.

Precise predictions help farmers fend off frost and guard against hail, protecting crops. Sailors gauge ocean winds, waves and currents to improve vessel routing for safety, fuel savings and efficient operations. Combat pilots, armed with accurate environmental information, can rendezvous safely with aerial tankers for in-flight refueling and increase the precision of air strikes.

Improved early warning can also lessen the devastating effects of tornados, floods and severe storms through enhanced disaster planning and response, reducing the potential loss of life and property.

Although today's weather satellites provide a wealth of information, the data is often hours old before it reaches decision makers and other key users.

The nation's next-generation environmental satellite system – the National Polar-orbiting Operational Environmental Satellite System (NPOESS), will cut the time between observation and delivery from hours to minutes.

Users in civil, military, scientific, and operational communities will put NPOESS data to work immediately through faster access to vital data and better forecasts – saving lives, planning successful military campaigns, minimizing impacts to the national and local economies, and affecting long-range policy decisions.

NPOESS converges NOAA's Polar-orbiting Operational Environmental Satellite program and DoD's Defense Meteorological Satellite Program into a single system that satisfies the nation's critical civil and national security requirements for space-based, remotely sensed environmental data. This is the most significant

change in U.S. operational environmental remote sensing since the launch of the nation's first weather satellite in 1960. NPOESS will improve weather forecasting and continue climate monitoring.

NPOESS will go beyond legacy systems to meet additional civilian and military requirements, such as increased sensitivity in moisture and temperature profiles, high-resolution, multi-spectral imagery, exceptional data availability, and rapid data access.

For the military, NPOESS will shift tactical and strategic focus from "coping with and avoiding the weather" to anticipating, exploiting and precisely forecasting atmospheric, oceanographic and space environmental conditions.

The NPOESS program, overseen by the Integrated Program Office (IPO), is a joint effort of the Department of Commerce, DoD and NASA.

National Polar-orbiting Operational Environmental Satellite System

The joint IPO and NASA NPOESS Preparatory Project (NPP) will fly key sensor technologies, reducing development risks, and ensuring continuity of key climate measurements, demonstrate and validate new imaging and sounding technology, as well as algorithms and operational ground systems prior to the first NPOESS launch.

Northrop Grumman Aerospace Systems, the prime contractor, is responsible for overall system design and development, system engineering and integration, instrument acquisition, spacecraft assembly, and testing.

Raytheon Intelligence and Information Systems, under contract to Northrop Grumman, provides the full NPOESS ground capability, from design and development through operations and sustainment. The NPOESS ground segments consist of three main components.

The Command, Control and Communications Segment (C3S) manages the operational mission. This includes mission planning and resource scheduling, satellite command and control, active reception and accounting of mission data, en-

terprise management, anomaly resolution, system security, and reliable delivery of data to and from central users.

Our environment is constantly changing; consequently, environmental data's operational utility diminishes quickly with time. C3S addresses this issue with 15 unmanned global ground stations, termed as **SafetyNet™**, to receive mission data as NPOESS satellites pass overhead. These receptors are linked with high bandwidth commercial telecommunications fiber that quickly transport the data to four data processing centers. Nearly all of the data is completely processed and delivered to the weather Centrals in less than 28 minutes from the time of collection.

The Mission Management Center provides accurate, high performance tools that precisely manage the entire NPOESS mission. These C3S tools give crews keen insight, comprehensive operational oversight, detailed mission planning capability, full control of space and ground assets, continuous monitoring, and assessment of overall system performance.

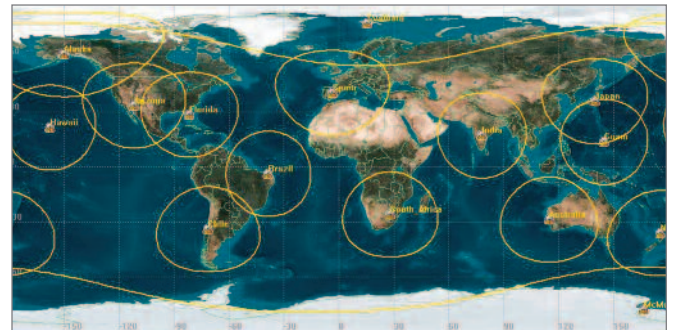
The Interface Data Processing Segment (IDPS) features high-speed, symmetric, multi-processing computers that rapidly convert large streams of NPP and NPOESS sensor data providing an average of 40 Environmental Data Records at four weather Centrals in the United States. These vital environmental data records range from atmospheric to land and ocean surface products. They detail cloud coverage, temperature, humidity and ozone distribution, as well as snow cover, vegetation, sea surface temperature depiction, Aerosols, space environment and earth radiation budget information.

This wealth of information enables numerous users to monitor and predict changes in weather, climate, ocean and space environment conditions. NPOESS products will also be available to the scientific community to expand our knowledge of the environment.

The Field Terminal Segment, equipped with specially configured IDPS software, will permit worldwide fixed and mobile field terminals deployed aboard ships, at military bases, in theaters of operation, and at educational and scientific institutions to receive and process the continuous broadcasts of NPOESS data.

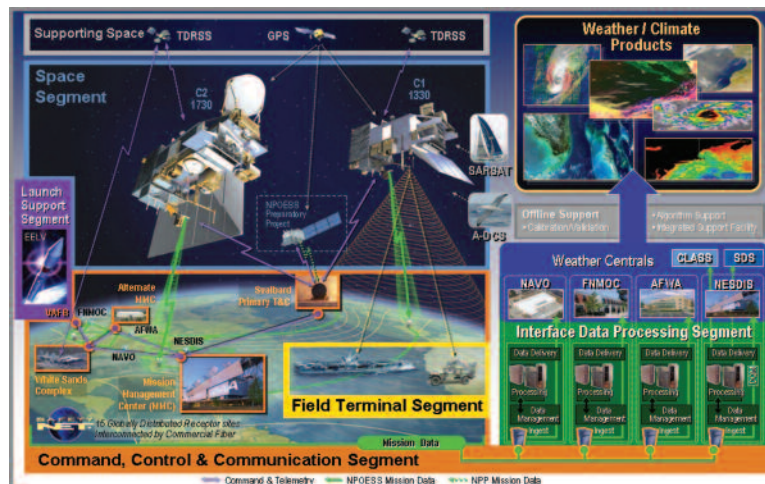
The NPOESS Program

- A single government — contractor team with a common vision, mission, and objective
- Timely, accurate, reliable data from sensors to users
- Flexibility to support NPOESS growth and evolution
- NPOESS — Serving the nation's needs for decades to come



NPOESS SafetyNet™ Sites

NPOESS Architecture



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