The National Polar-orbiting Operational Environmental Satellite System: Future U.S. Operational Earth Observation System

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Over the last decade, the tri-agency Integrated Program Office (IPO), comprised of the National Oceanic and Atmospheric Administration (NOAA), the Department of Defense (DoD), and the National Aeronautics and Space Administration (NASA), has been managing the development of the National Polar-orbiting Operational Environmental Satellite System (NPOESS). NPOESS will replace the current military and civilian polar-orbiting environmental satellites. The IPO, through its Acquisition and Operations (A&O) contractor, Northrop Grumman, will begin in 2009 to launch NPOESS spacecraft into three orbital planes to provide a single, national system capable of satisfying both civil and national security requirements for space-based, remotely sensed environmental data.

In 1997, the IPO initiated a robust sensor risk reduction effort that was focused on early development of the critical sensor suites and algorithms necessary to support NPOESS. In 2001, preliminary design efforts were completed for the last of five critical imaging/sounding instruments for NPOESS. Three of these sensors are scheduled to fly on the joint NASA/IPO NPOESS Preparatory Project (NPP) mission in 2006. Early flight-testing of instruments will reduce development risk and demonstrate and validate global imaging and sounding instruments, algorithms, and pre-operational ground processing systems prior to delivery of the first NPOESS spacecraft.

To meet user-validated requirements for 55 geophysical parameters, NPOESS will deliver global Stored Mission Data (SMD) to four U.S. centers for processing and distribution, with 95% of the data being delivered in less than 28 minutes from the time of collection. Global SMD will be downlinked to 15 globally distributed ground stations at Ka-band frequencies and will be the complete, full resolution data set containing all sensor data and auxiliary data necessary to generate all NPOESS Environmental Data Records. NPOESS spacecraft will also simultaneously broadcast two types of real-time data to suitably equipped ground stations. The NPOESS High Rate Data broadcast (X-band frequencies) will be a complete, full resolution data set and is intended to support users at regional hubs. The NPOESS Low Rate Data broadcast (L-band frequencies) will be a subset of the full data set and is intended for U.S. and worldwide users of remote/mobile field terminals.

The advanced technology visible, infrared, and microwave imagers and sounders that will fly on NPOESS will deliver higher spatial and temporal resolution atmospheric, oceanic, terrestrial, climatic, and solar-geophysical data, enabling more accurate short-term weather forecasts and severe storm warnings, as well as serving the data continuity requirements for improved global climate change assessment and prediction.