



## **SPACECRAFT & SPACE SYSTEMS TECHNOLOGY**

The Spacecraft Engineering Department (SED) at the Naval Research Laboratory (NRL) performs research and development by applying advanced technologies and techniques to provide new space capabilities that address critical Navy, DoD, and national needs. The emphasis at the NRL's SED is incubating critical technologies and assembling them into systems that provide relevant and often revolutionary new space capabilities. Past examples include first flight of solar cells, atomic precision clocks leading to the NAVSTAR Global Positioning System (GPS), and the first tactical downlink of space data and on-board processed products to Tactical Receive Equipment (TRE). Each of these systems radically improved operational capability and each was enabled by innovative, system application of new technologies. Therefore, NRL's SED seeks a broad range of innovative space systems technologies included associated and enabling ground systems technologies.

NRL has been a leader in the development and joint evolution of Operationally Responsive Space and GPS. NRL's SED supports spiral development of ORS technology by regularly pairing technologies with Combatant Command (COCOMs) and Services concepts in an operational experimental environment. Therefore, NRL's SED seeks innovative space systems technologies to support this continued ORS capabilities development. NRL's SED also maintains an on-going interest in technologies to enhance the time transfer and navigation with a current emphasis on improving the operational star catalog.

NRL's SED performs research and exploratory development in, but not limited to, the following areas: spacecraft structures; spacecraft mechanisms; spacecraft guidance, navigation, and control; spacecraft robotics; spacecraft thermal control, spacecraft power systems, spacecraft propulsion systems, advanced materials for spaceflight use, on-orbit environment monitoring, ground and flight software, spacecraft electronics, spacecraft ground systems, integration and testing, operational user interfaces, and space integration into operational tiered systems. SED projects range from basic theory and component technology development to full space systems development and operations.

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