



Air Force Research Laboratory



Integrity ★ Service ★ Excellence

Space Vehicles Directorate Overview

March 12, 2012

**Col William T. Cooley,
Commander
Space Vehicles Directorate
Air Force Research Laboratory**



Organization

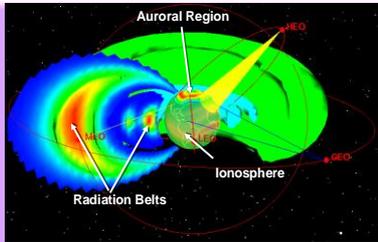
AFRL/Space Vehicles Directorate





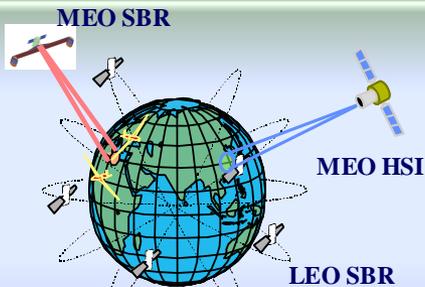
Core Technical Competencies

AFRL/Space Vehicles Directorate



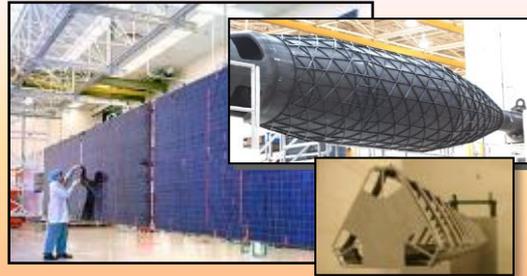
Space Environment Impacts & Mitigation

Solar, solar wind, radiation belt/interplanetary, ionospheric effects; thermosphere & satellite drag; reentry environment; plasma physics & chemistry



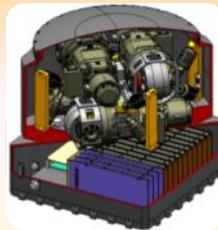
Space EO/IR

Hyperspectral, hypertemporal, polarimetric imaging; space-based imaging; focal plane technologies; cryocoolers; nuclear explosion monitoring



Space Platforms & Ops Tech

Power generation, decision support for C2 and SSA, guidance, navigation, and control, strategic navigation, structures, thermal, autonomy, and communications



Miniature Momentum Control System

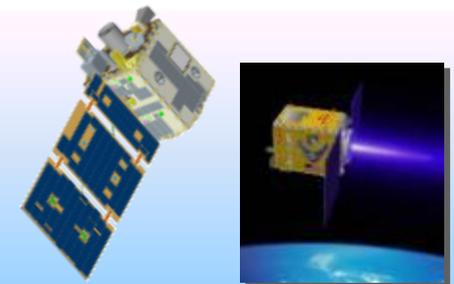
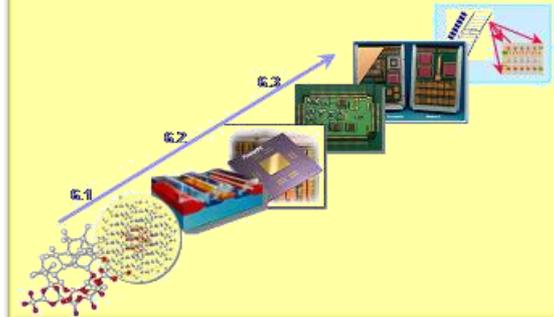


JSpOC Mission Systems

Basic Research to Technology on Orbit

Space Electronics

Microelectronic foundations and components



Space Experiments

space system/payload development, Integration, test, & flight; M&S; space system engineering



Spacecraft Technologies Division

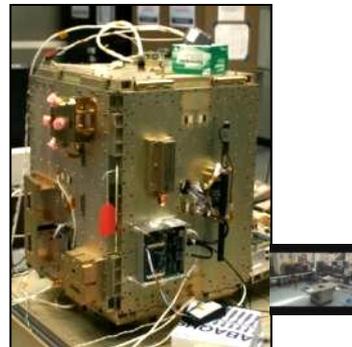


Mission & Technical Objectives

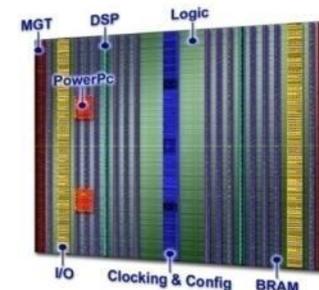
Develop next-generation spacecraft bus & payload technology elements to reduce cost, improve performance & enable new missions

Main Technology Research Areas

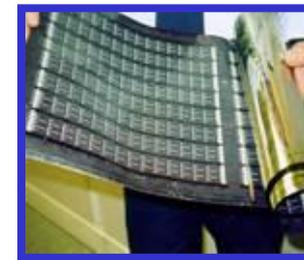
- **Space Electronics**
 - Bus Architecture—“plug-n-play”
 - Design Hardening
 - Reconfigurable Electronics
- **Spacecraft Components**
 - Guidance, Navigation, Controls & Autonomy
 - Integrated Structural Systems
 - Advanced Space Power Generation
- **Space-based Advanced Sensing**
 - Focal Plane Arrays
 - Space Cryocoolers
 - Advanced Detectors
 - Protection Technologies



Building Plug-n-Play Satellite in 2 hrs!



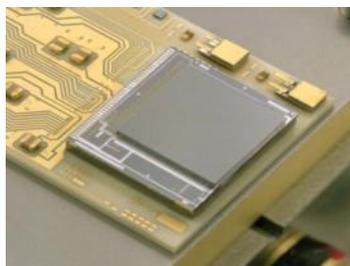
Field Programmable Gate Array



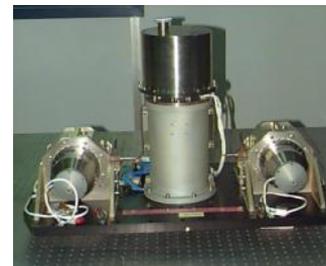
Thin film solar array



Deployable Truss



Focal Plane



Cyrocooler



Miniature Satellite Threat Reporting System on STS-107

Enabling Responsive Space and Space Situational Awareness





Integrated Experiments & Evaluation Division



Mission & Technical Objectives

Prove advanced technologies and concepts for continual enhancement of national security, space missions

Main Technology Research Areas

- Flight experiments
- Simulation & Tech Assessment
 - Military Utility Analysis
 - System modeling and trades
- Integration and test facilities



Facilities On-Site



System Concepts & Analyses



TacSat-3 Satellite



XSS-10 Satellite

Expertise in All Aspects of Small Satellite Development



Battlespace Environment Division



Mission & Technical Objectives

Specify, forecast, mitigate, and exploit environmental impacts to enable US space systems and operations

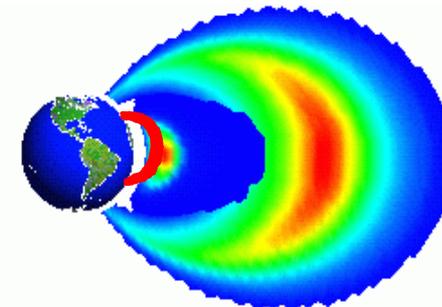
- Provide 72 hr space weather forecasts and system impacts
- Develop response to High Altitude Nuclear Detonation threat
- Develop advanced detection techniques

Main Technology Research Areas

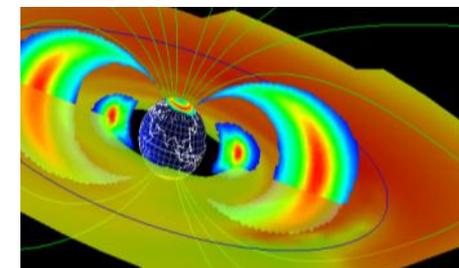
- Space weather sensing and modeling
- Hyperspectral data exploitation
- Hypertemporal imaging
- Space object surveillance technologies



Communication/Navigation
Outage Forecasting System



Radiation Belt Remediation



Integrated Space Environment Forecast Model

**Supporting Space Situational Awareness, Defensive Counterspace,
and Intelligence, Surveillance, Reconnaissance Tech Areas**



Summary

AFRL/Space Vehicles Directorate



- *Know what's in space...friend or foe*
- *Protect our systems...from natural/man-made events*
- *Freedom to conduct space operations*
- *More affordable satellites*
- *Improved communications*
- *Assess anything, anytime, anywhere from space*
- *Prove it works in space*





***Air Force Research Laboratory
Space Vehicles Directorate
www.kirtland.af.mil/afri_vs***