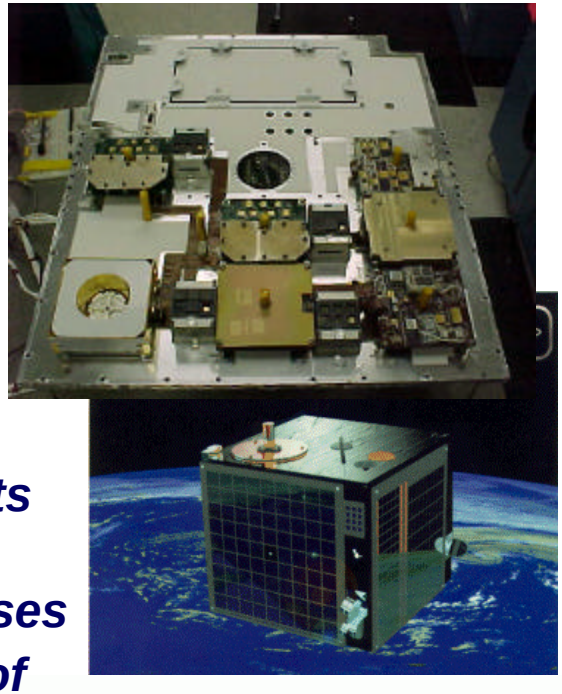
Living With a Star Space Environment Testbeds

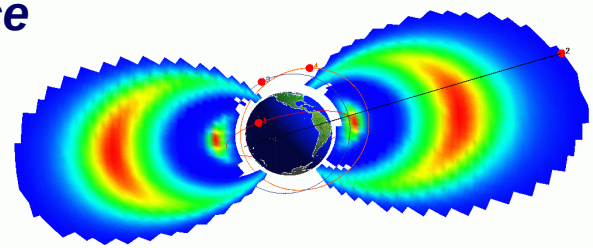
Objective

Improve the engineering approach to accommodate and/or mitigate the effects of solar variability on spacecraft design & operations



Approach

- ***Collect data in space to validate new & existing ground test protocols for the effects of solar variability on emerging technologies & components***
- ***Develop & validate engineering environment prediction & specification models, tools, & databases***
- ***Collect data in space to validate the performance of instruments for LWS science missions & new space technology***



Scope

Spacecraft hardware & design /operations tools whose performance changes with solar variability

Changes in Design Environment Change the Design Methodology

Changes in Design Environment

- *Demise of environment hardened market*
- *Commercial demand for electronics*
- *Short mission development times*
- *Smaller, lighter spacecraft*
- *More demanding mission requirements*
- *Desire to operate in more severe environments*

Consequences

- *Use of commercial off the shelf (COTS) components*
- *Use of emerging technologies*
- *Higher environment specifications*

Result

- *Risk avoidance → Risk management*
- *Accommodations in Design Phase → Accommodations in Flight*
- *Capability is eroded with environment accommodation overhead*

Space Environment Testbed Products

Bridge the Gap Between Science, Engineering, & User Application Communities

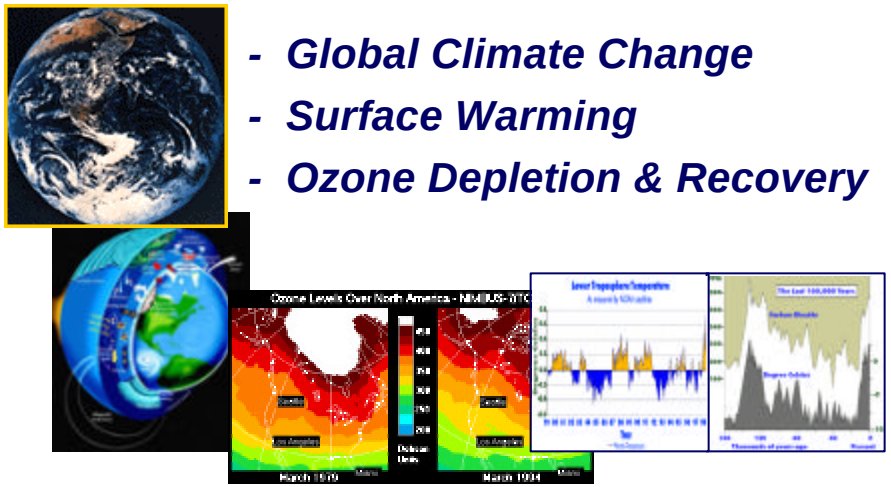
Human Radiation Exposure

- Space Station
- Space Exploration
- High Altitude Flight
- Space Utilization & Colonization

Impacts on Technology

- Space Systems
- Communication & Navigation
- Aircraft Systems
- Ground Systems

Impacts on Life & Society



- Global Climate Change
- Surface Warming
- Ozone Depletion & Recovery

Space Environment Testbed Implementation

- ***Design modular carrier concepts to capitalize on launch opportunities***
- ***Fly testbed in space every 2 years – Pathfinder in 2004; Competed SET-1 NET 2006***
- ***Hold bi-yearly workshops***
  - *Requirements definition & partnering*
  - *Presentations of results*
- ***Fund NASA Research Announcements for induced space environment and effects investigations***
  - *Categories:*
    - ***Sensors/detectors***
    - ***Materials***
    - ***Spacecraft Charging***
    - ***Ionizing Radiation Effects***
    - ***Induced Environment***
  - *NRA for SET-1 Experiments Will Be Released on Sept. 17, 2002*
  - *Awards from NRA for analysis made in January 2002*

Space Environments Testbed (SET) Concept