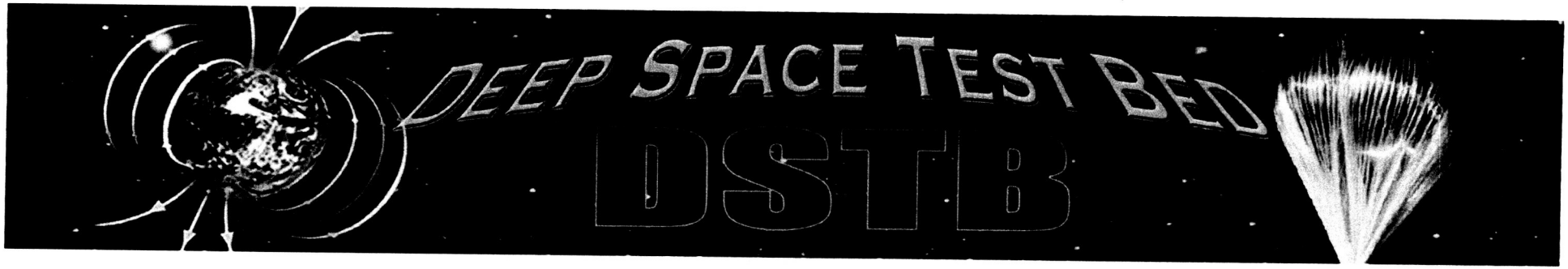
National Space & Missile Material Symposium
Moon & Mars: There and Back Session



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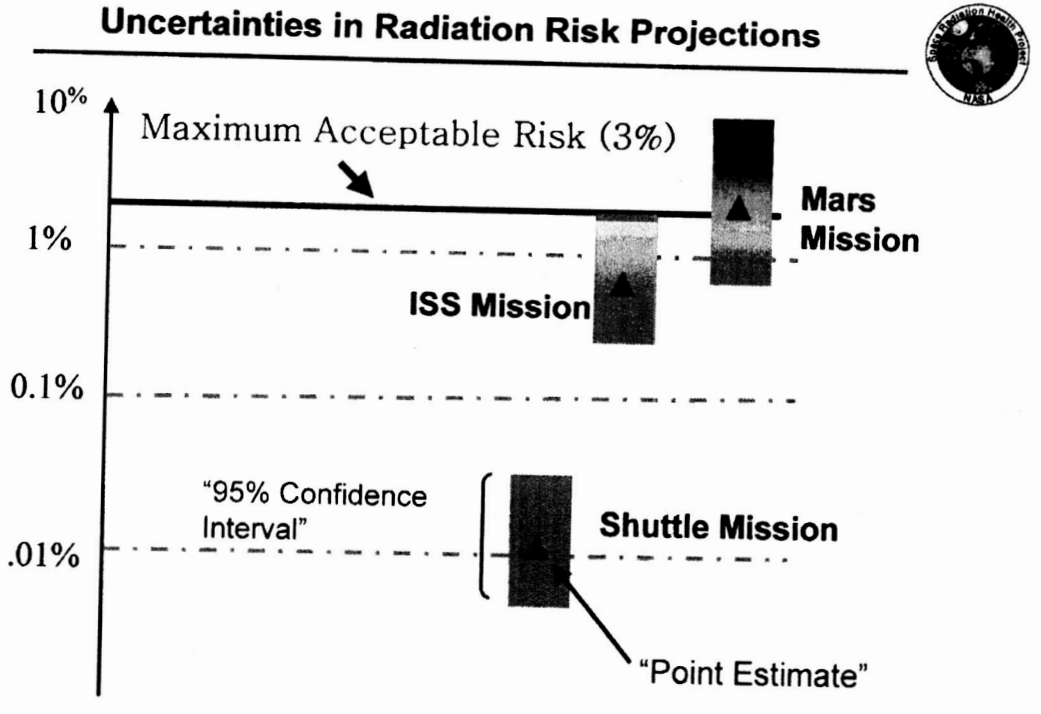
Deep Space Radiation Risk

- Since 1995 NASA has had a permanent presence in Low Earth Orbit (LEO)
- Mission planning is limited to 180 days in LEO due to annual exposure limit (.25 Sv/year)
- For Mars mission deep space exposure due to GCR is ~2 times above LEO allowable limits
- Current uncertainty in radiation exposure prediction and its effects necessitates improved radiation shielding and better understanding of biological consequences

Individual's Excess Fatality Risk for cancer

F. Cucinotta/JSC

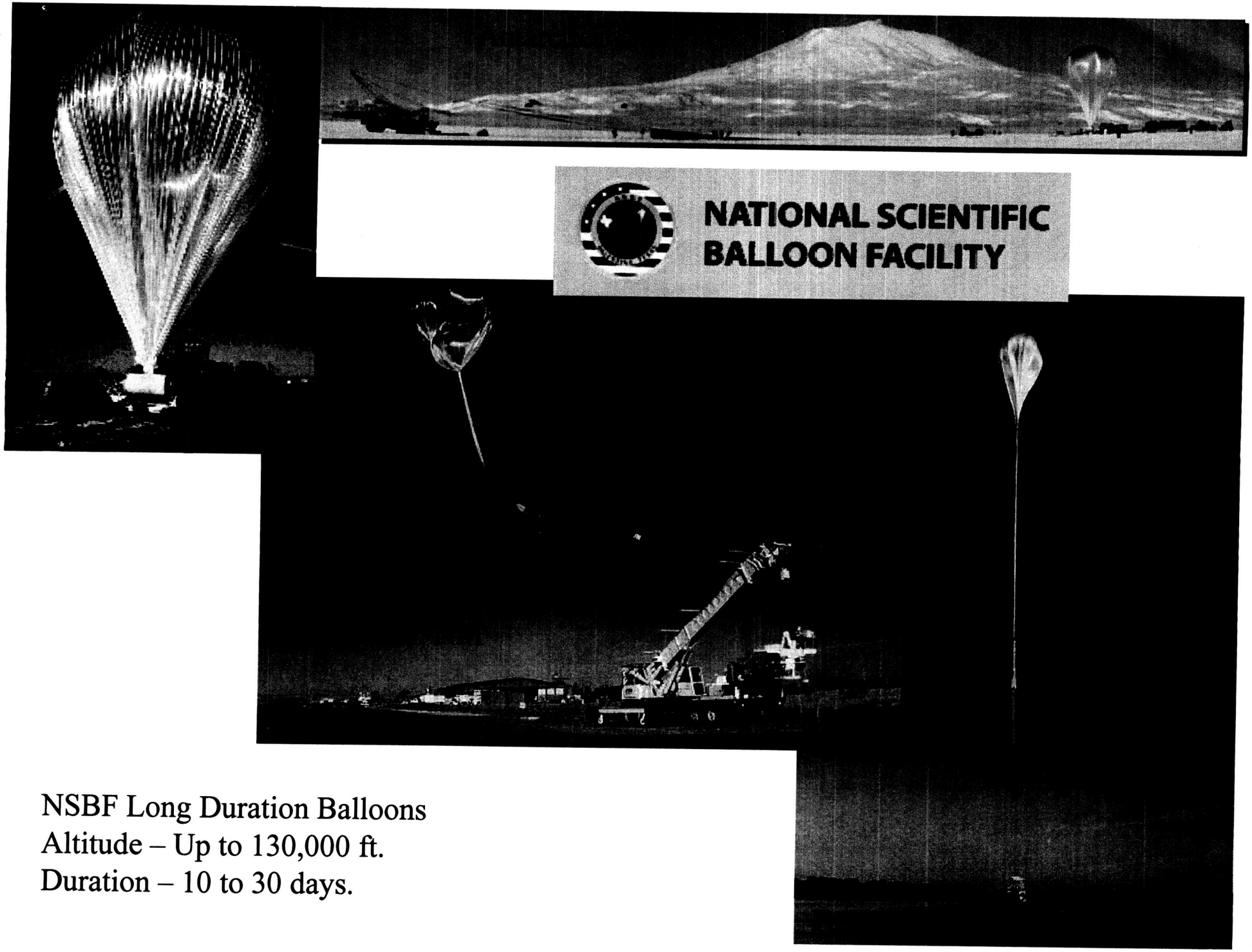


Radiation Protection Roadmap Recommendations (UC Berkeley, 2000)

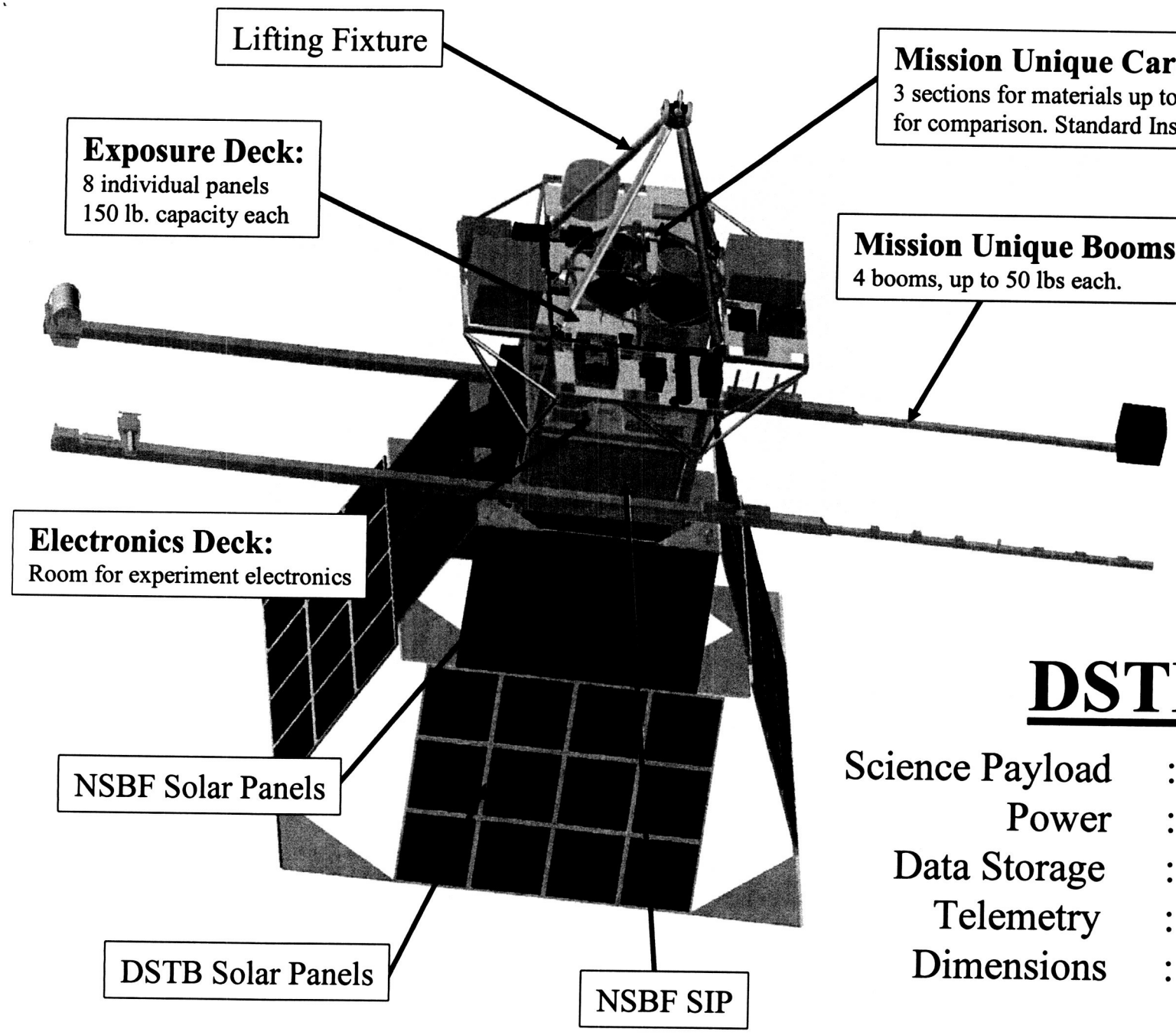
- Perform Ground [National Science Research Lab] & space-based **[DSTB]** measurements of shielding effectiveness

Deep Space Test Bed

- Provides access for multiple experiments to the interplanetary Galactic Cosmic Ray environment on 2-4 week high-altitude polar balloon flights to:
  - Validate Radiation Transport Codes
  - Measure the Shielding Effectiveness of Multifunctional Spacecraft Materials
  - Test New Dosimeters and Radiation Monitors
  - Simulate the Lunar or Martian Radiation Environment



NSBF Long Duration Balloons
Altitude – Up to 130,000 ft.
Duration – 10 to 30 days.



DSTB

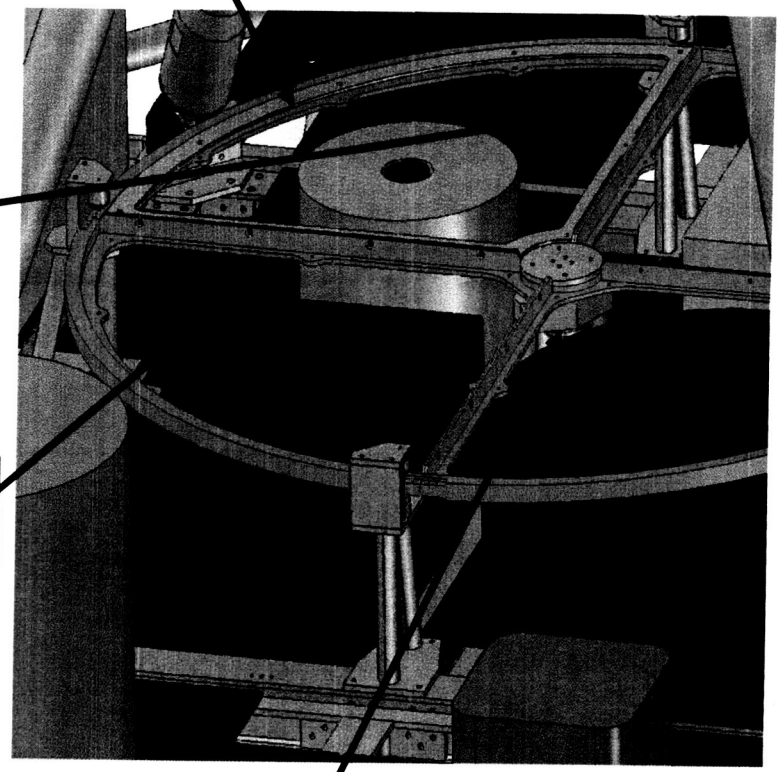
Science Payload	: 4000 lbs
Power	: 600 watt
Data Storage	: 20 Gigabytes
Telemetry	: 6 kbs
Dimensions	: 11.7ft sq. at base
	19.6 ft tall

DSTB Measurement Metrics

Tissue Equivalent Proportional Counter-TePC
Measures Dose, Linear Energy Transfer and Dose-equivalent

Dosimeters
Measures Dose, Linear Energy Transfer and Dose-equivalent

Neutron Monitoring System-NMS
Measures Neutron Flux

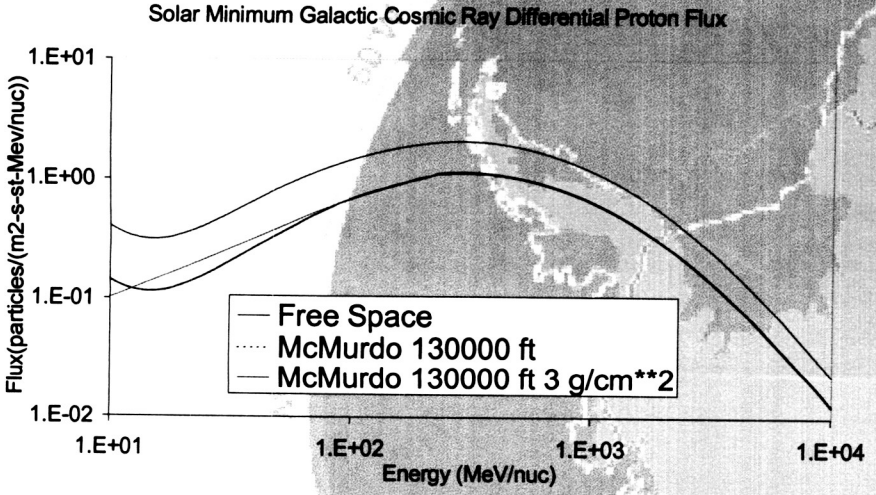


Charged Particle Spectrometer-CPS
Measure particle spectra behind candidate spacecraft shielding materials and reference materials

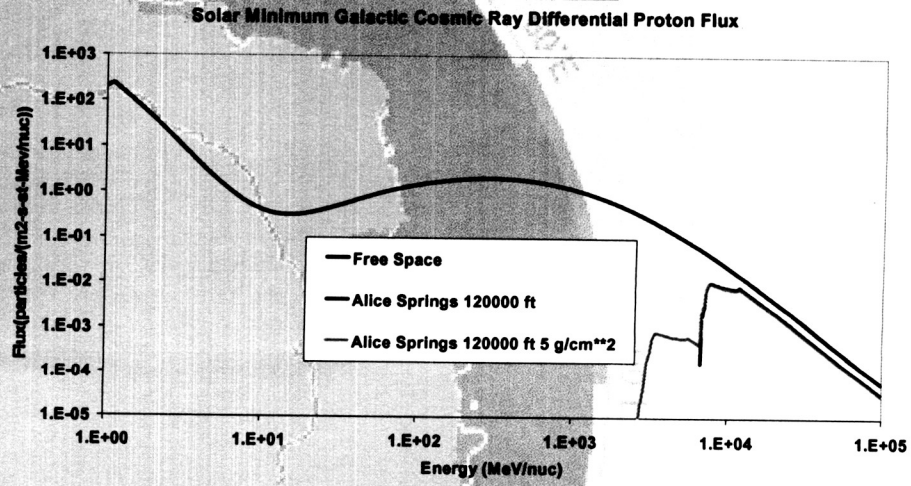
Why Fly at the Poles ???

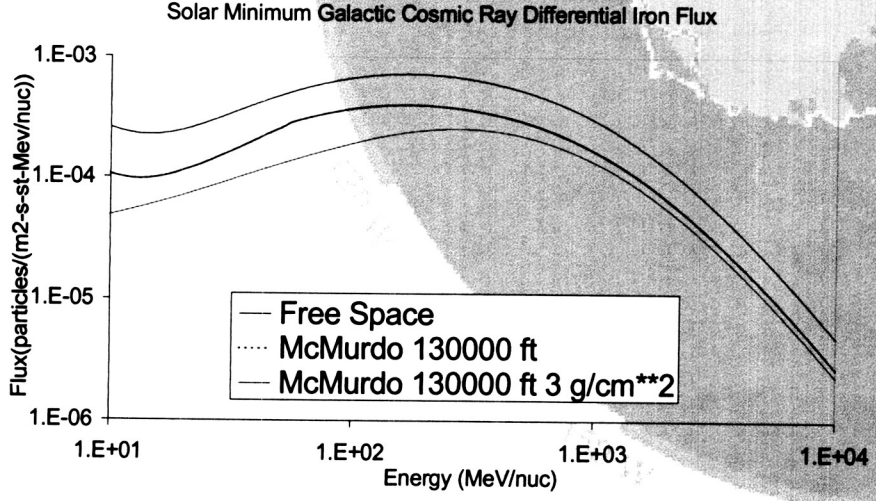
Polar Flights avoid Geomagnetic Cut-offs

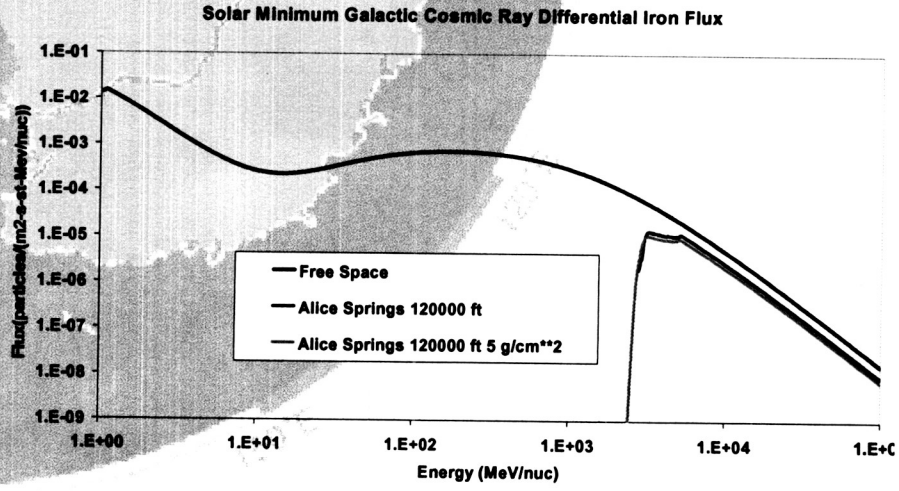
Polar Latitude



Middle Latitude

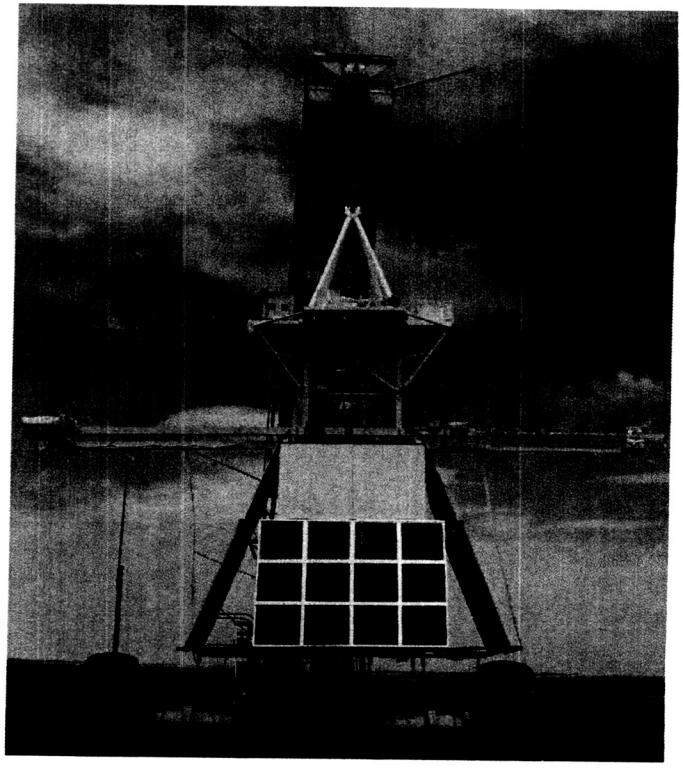






Deep Space Test Bed Status

- June, 2005 - DSTB has successfully completed its Certification Flight at Ft Sumner, NM
- FY 2006 - First Polar flight planned.



The DSTB has capability of flying 12 payload per flight

- NASA Research Announcements (NRA) are posted yearly by the Radiation Shielding Element for experiments to use the DSTB in their materials testing and instrument development.
- Contact Martha Milton at 256-961-7543 or martha.e.milton@nasa.gov for information.