S5.02 Accommodation and Mitigation of Space Environmental Effects

Lead Center: GSFC
Participating Center(s): GRC, JPL, KSC, MSFC

This subtopic is concerned with improving the capability to accommodate or mitigate the effects of the space environment on spacecraft design and operations. It will achieve its goal by designing and building flight investigations, developing models, collecting data from investigations in space and from ground tests, and analyzing data to improve the models, tools, and/or databases used for spacecraft design and operations. The resulting products will reduce the design margins and uncertainties in the induced environment definition (i.e., the environment in the presence of a spacecraft) and its effects on spacecraft design and operations. The environments to be considered include planetary-trapped radiation, solar proton events, cosmic rays, the plasma environment at planets and in the solar wind, magnetic fields, EUV/VUV, and the interplanetary meteoroid environment.

The investigations selected have the opportunity to be integrated on the Space Environment Testbed (SET) Carrier. The SET Project opportunities for flight will be in orbits other than LEO. Investigations do not need to fly with the SET Carrier if an investigator makes arrangements for other access to space.

Examples of investigations and models that would satisfy those requirements are described below. A more detailed description, with examples of investigation needs, can be found at: http://lws-set.gsfc.nasa.gov/Opportunities.htm.

Areas for which proposals are sought include:

- Characterization of the space environment, both natural and induced, in the vicinity of a spacecraft;
- Definition of the mechanisms for material and materials applications degradation and the performance characterization of materials (such as coatings, optical properties, composites, etc.) in the space environment;
- Accommodation and/or mitigation of charging/discharging effects on spacecraft and spacecraft components;
• Methods for performance improvement of radiation tolerance of microelectronics used in space, including reduction of single event upsets and other single particle-induced soft errors, and elimination of single event latch-ups and other single particle-induced destructive conditions;

• Development of novel methods for increasing crew safety and system performance relative to the effects of the natural space environment; and

• Development of novel methods of increasing ground-based systems performance and reliability by reducing the effects of the natural space environment on those systems (e.g., space environment-induced soft errors in the power grid).