

## Space Environments and Effects Concept: Transitioning research to operations and applications

David L. Edwards\*

National Aeronautics and Space Administration, Marshall Space Flight Center  
EV40, MSFC, AL 35812

[David.L.Edwards@NASA.gov](mailto:David.L.Edwards@NASA.gov)

Jim Spann

National Aeronautics and Space Administration, Marshall Space Flight Center  
ZP60, MSFC, AL 35812

Howard D. Burns

National Aeronautics and Space Administration, Marshall Space Flight Center  
EM50, MSFC, AL 35812

Dan Schumacher

National Aeronautics and Space Administration, Marshall Space Flight Center  
ZP01, MSFC, AL 35812

### Abstract

The National Aeronautics and Space Administration (NASA) is embarking on a course to expand human presence beyond Low Earth Orbit (LEO) while expanding its mission to explore the solar system. Destinations such as Near Earth Asteroids (NEA), Mars and its moons, and the outer planets are but a few of the mission targets. NASA has established numerous offices specializing in specific space environments disciplines that will serve to enable these missions. To complement these existing discipline offices, a concept focusing on the development of space environment and effects application is presented. This includes space climate, space weather, and natural and induced space environments. This space environment and effects application is composed of 4 topic areas; characterization and modeling, engineering effects, prediction and operation, and mitigation and avoidance. These topic areas are briefly described below. Characterization and modeling of space environments will primarily focus on utilization during Program mission concept, planning, and design phases. Engineering effects includes materials testing and flight experiments producing data to be used in mission planning and design phases. Prediction and operation pulls data from existing sources into decision-making tools and empirical data sets to be used during the operational phase of a mission. Mitigation and avoidance will develop techniques and strategies used in the design and operations phases of the mission.

The goal of this space environment and effects application is to develop decision-making tools and engineering products to support the mission phases of mission concept through operations by focusing on transitioning research to operations. Products generated by this space environments and effects application are suitable for use in anomaly investigations. This paper will outline the four topic areas, describe the need, and discuss an organizational structure for this space environments and effects application.

\* Author to whom correspondence should be addressed.

- This paper will fit into either the Space Weather session, or the Cooperative approaches to improved space sustainability.