45th SYMPOSIUM ON SAFETY AND QUALITY IN SPACE ACTIVITIES (D5)
Space Weather and Effects: Prediction, Analysis and Protection (3)

Author: Mr. Jaewon Choi
University of Alabama in Huntsville, United States, jc0020@uah.edu

Dr. Qiang Hu
University of Alabama in Huntsville, United States, qh0001@uah.edu

ANALYSIS OF INTERPLANETARY SHOCK WAVES AND THEIR IMPACT ON SPACE WEATHER

Abstract

Our Sun, as a variable star, plays a dominant role in controlling the Solar-Terrestrial environment. It is constantly emitting highly ionized material (plasma) mostly composed of protons and electrons (so-called "solar wind"), carrying along solar magnetic field. Transient structures, often originating from explosive events on the Sun, propagate in the solar wind and impact on near-Earth space environment, generating various adverse effects. These effects include spacecraft malfunction, disruption of communication and navigation systems, radiation hazard to astronauts and passengers on polar flights, and power outage on the ground. One particular type of such structures, the interplanetary shock waves, driven by masses ejected from the Sun, is well observed and studied. We report our analysis of the set of interplanetary shock waves observed by the spacecraft Advanced Composition Explorer (ACE) between the year 1998 and 2004. We report on their properties characterizing their geometries and strengths etc. In particular, we examine the properties of turbulence associated with interplanetary shocks that have implications for energetic particle effect. We will further relate these shocks with geomagnetic storms and develop a preliminary tool for shock identification from real-time ACE solar wind data for the purpose of Space Weather forecasting.