

Mike Paniccia

Abstract:

As spacecraft orbit Earth they are subject to bombardment from particles from the sun and other space weather effects. This bombardment can cause an anomaly, which is an interruption of data flow to Earth caused by the particle's interference. There are three main types of anomalies caused by space weather: surface charge, deep dielectric discharge, and single event upset. The goal of this project was to analyze the 131 anomalies that occurred on the Cluster Spacecraft from August 2000 through March 2005, and determine how many were the result of space weather, which type of anomalies they were, and if possible predict when more anomalies will occur. There were 86 anomalies that were the result of space weather, with 37 surface charging, 31 single event upsets, and 18 deep dielectric discharging. It has been shown that anomalies are more likely to occur the higher the space weather indices are. Also, the longer the satellites remain in orbit, a higher percentage of anomalies due to space weather occur. Lastly, the prediction of future anomalies was correct with a margin of 12% error.