

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

Author: Mr. Saiteja Vangala
National Law University, Delhi, India, India

Mr. Sameer Dawar
National Law University, Delhi, India, India

SPACE WEATHER EFFECTS AND SPACE OPERATIONS PROTECTION

Abstract

Space has its own physical properties that make it unique and outside the experience of most people. Space is a harsh environment that limits the functional lifetime of satellites, which has important consequences on the amount of orbital debris that is created. Environmental factors can degrade the performance of a satellite, shortening its lifespan. These features of the space environment are directly related to the causes and effects of orbital debris and effects on planned missions.

Thus the paper will start by discussing a number of weather/environmental factors which are important, namely:

- Earth's gravity- The gravity of the Sun, the Moon, and Jupiter causes subtle changes to a satellite's orbit; the farther the satellite is from Earth, the more noticeable the effect.
- Furthermore, during peak periods of solar activity, the outer layers of Earth's atmosphere expand outward, increasing the amount of drag in unpredictable ways. Therefore, satellites in low orbits must carry fuel to raise their altitude and maintain the desired orbit.
- The Van Allen radiation belts create significant limitations on the operation of satellites.

The paper will discuss the impacts of these weather disturbances and how the impact of these hazards can be mitigated if the time, duration and severity of impending storms can be accurately predicted in a timely manner. The purpose of this paper is to set out the salient aspects of space weather. The paper analyses the continuous technological efforts being applied and developed to forecast, monitor and predict space weather.

Conclusions: Thus, the paper will analyze that how space weather forecasting is important for protecting national assets in both the commercial and military sectors and how unnecessary maneuvers have taken place in the past leading to shortened lifespan of satellites and space station. The impact of damage can be mitigated to a large extent if there is a well placed prediction mechanism. Putting satellites in 'safe mode' and disconnecting transformers can protect these assets from damaging electrical surges. But that would obviously not suffice. What is required is Preventative action, which requires accurate forecasting.

The paper will adopt the doctrinal method of research with reference to International Conventions/instruments, Books, reports of International working groups, Papers/documents, and any other source that is relevant to the area of research.