

46th SYMPOSIUM ON SAFETY AND QUALITY IN SPACE ACTIVITIES (D5)  
Space Weather and Effects: Prediction, Analysis and Protection (3)

Author: Dr. Rogan Shimmin  
International Space University (ISU), United States

SOLAR MAXIMUM AND SPACECRAFT PROTECTION

**Abstract**

Many assumptions have been made regarding the effect of a solar storm equivalent to the one in 1859, the so-called Carrington event, should one occur today. It was reported at the time that even the US Telegraph system was considerably affected, with some equipment reported to catch fire. The intensity of the next solar activity which, according the solar cycle forecast, is scheduled for 2013, cannot be predicted, but the analogy of some previous bursts have been estimated to be so intense that no doubt they will damage even protected satellites. Such an event could have a dual effect, both on strategically important satellites as well as on the fleet of commercial satellite operators.

A team project was undertaken at the International Space University (ISU) Space Studies Program (SSP) 2013 to follow a classical risk assessment approach putting the various satellites in different categories in terms of the protection against such electromagnetic impact. In addition to the basic built-in protection systems, the lead-time on warnings for such events has increased thanks to a greater number of solar observation satellites such as SOHO. Indeed, being forewarned will allow operators to implement a limited number of countermeasures.

The impact on strategic assets such as navigation systems is important as it may lead to a disruption of location-based services. A similar effect would take place on military and other strategic satellite.

There is also no doubt that there is a considerable business risk for satellite operators. The loss of transponder capacity, temporarily or permanent, will lead to interruption of services and associated income losses. In this case, apart from the technical aspects, operators must consider a number of business risk mitigation strategies (e.g. insurance or risk-sharing). A mitigation strategy will need to take into account such countermeasure possibilities for a system to react to an advanced warning.