Space weather

Bursts of energetic particles from the Sun and magnetic storms at the Earth can increase the number of high energy particles trapped inside the Earth's magnetic field. These high energy particles can damage electronic components on satellites leading to malfunctions, loss of service and in some cases total loss. These events are a part of Space Weather.

In 2003 a major magnetic storm disrupted 47 satellites, including one scientific satellite costing $640 million which was written off as a total loss. However, much larger magnetic storms have occurred in the past, such as the Carrington super-storm of 1859. Today we rely more than ever on satellites for TV, internet, GPS navigation, communications and many other applications. If such a super-storm occurred again the cost of satellite disruption could be as high as $30 billion*.

The number of magnetic storms varies with the 11 year sunspot cycle. Sunspot maximum is expected over the next few years, but the number of magnetic storms is expected to maximise up to two years later, between 2013 and 2015, at around 60 per year based on past experience.

SPACECAST will provide a forecast of high energy particles in the Earth's radiation belts for magnetic storms and other disruptive events. It will have a system in place by March 2012, and issue warnings and alerts to help protect satellites on orbit. It will be ready for the new peak in solar activity, and ready for Galileo—the new European constellation of 30 radio-navigation satellites.

SPACECAST will target scientific research into the Earth's radiation belts, and solar energetic particle events, to improve forecasting models. It will deliver a space weather forecasting capability that will continue beyond the lifetime of the project and which will lay the foundation for an operational system that will help protect our space assets.

*Odenwald, S. F., and J. L. Green (2007), Forecasting the impact of an 1859-caliber superstorm on geosynchronous Earth-orbiting satellites: Transponder resources, Space Weather, 5, S06002, **doi:10.1029/2006SW000262**.