

Status Report on SG 1.15

Responsible Commission

Commission 1.

Study Number and Title

Study Group 1.15 International Cooperation on Space Weather

The purpose of the present study is to review, from an international, scientific, economic and policy perspective: our present knowledge of space weather and its socioeconomic effects on: human society. Past and ongoing programmes in this regard will be reviewed as the work proceeds. Also, initiatives to identify still existing knowledge gaps and untapped opportunities to increase our understanding of the effects of Space Weather on society will be targeted.

Ultimately, recommendations and proposals charting ways forward that could contribute to increasing the resilience of human society to Space Weather both on Earth and in space will be formulated.

First Steps

SG 1.15 (a defunct study in Commission V) was relaunched by the International Academy of Astronautics/IAA under the auspices of Commission I (Basic Sciences) with new objectives. The invited study lead (Acad. Susan McKenna-Lawlor) approached several international specialists in Space Weather and secured their commitment to join this study. The Academy then issued formal invitations to these experts to participate and the following team, from six countries. was built up:

S McKenna-Lawlor (Chair)	Ireland
A,Bhardwaj,	India
P..Goncalves,	Portugal
G.Reitz	Germany
P.Rochus	Belgium
B. Jackson	USA
L. Paxton	USA
L. Townsend	USA

A comprehensive view of relevant publications was then carried out and it emerged that the study covers a very broad spectrum since Space Weather can interrupt and damage a plethora of technologies critical to modern society both on the ground and in space.

Progress in the last six months

Society is dependent on the successful functioning in space of satellites vulnerable to Space Weather (for instance those that monitor terrestrial weather; enable television and radio broadcasting; support a variety of societal services (e.g. credit card validation; track the transport of packages) etc.

Surface charging and deep dielectric charging; material damage and single event upsets cause Space Weather related degradation in spacecraft performance and potentially complete failure. Also, impacts on radio communications, and errors in data received from the Global Navigation Satellite System (GNSS) can accrue.

A paper for Acta Astronautica reviewing ‘The performance and reliability of spacecraft in the near Earth environment to Space Weather’ is under development.

Disruption to avionics and threats to the health of airline passengers, as well as to astronauts can also result from Space Weather, as well as disruptions to ground based systems/activities (Power grids, Pipelines, precision farming, new building construction technologies) etc.

Over the last six months the most important impacts of Space Weather on society have been reviewed and related to specific aspects of Space Weather generated by Solar Activity (e.g. enhanced electromagnetic emissions; energetic particles; coronal mass ejections; the aurora, magnetic storms). Also, Single Event Upsets/ SEUs produced in electronic components by galactic cosmic rays at high terrestrial latitudes have been included.

Issue

Unfortunately, the Team has no experts to estimate the economic impacts of Space Weather on society (a critical component of this study). The team leader approached the Academy to ask for help in identifying such experts and it was recommended that a presentation be made on Academy Day at Bremen (30 September 2018) seeking the engagement of experts from within the Academy with the study and/or the names of external personnel with relevant expertise who might be invited to participate. This presentation will be duly made.

Expert inputs on the influence of Space Weather on the design of spacecraft to transport Astronauts in LEO and in BLEO is also sought.

Interested persons are kindly asked to contact:

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The study group aims at producing a final report by the end of 2019.

Status Report Date

29 September 2018