

Data Analytics Approach to Extreme Events in Space Weather

Supervisor S. C. Chapman S.C.Chapman@warwick.ac.uk

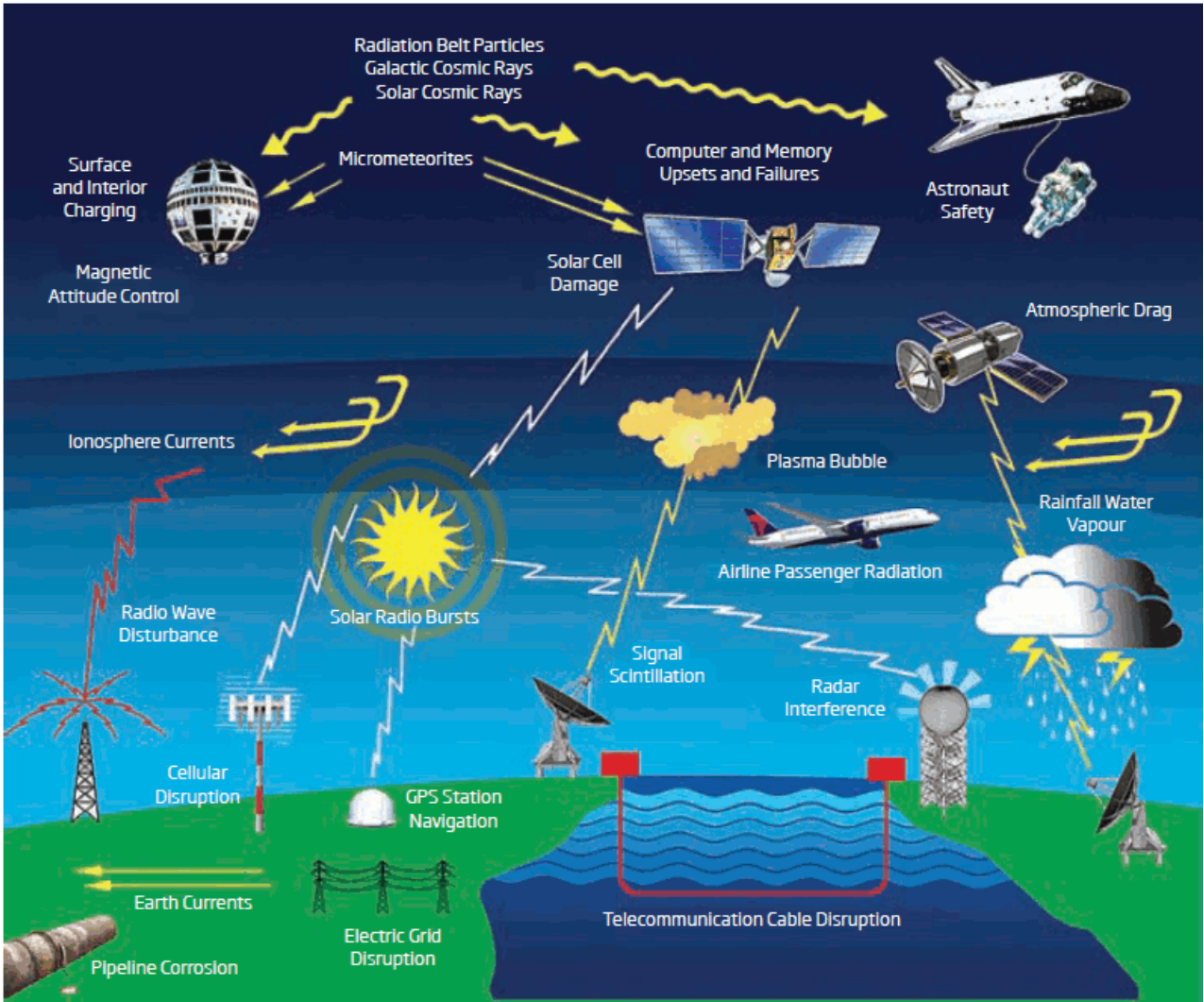
www.warwick.ac.uk/go/cfsa/people/sandrac

Centre for Fusion, Space and Astrophysics

Research at the Centre for Fusion, Space and Astrophysics (CFSa) focuses on plasma physics applied to the grand challenges of fusion power, space physics, solar physics, and astrophysics. Our work spans fundamental theory, observation, and the analysis of experimental data, combined with high performance computing. For more details of the CFSa see <http://www.warwick.ac.uk/go/cfsa/>

Extreme space weather events or super-storms have a high impact over a wide range of systems, from power supplies, aviation, satellites and radio communications to economic and social behaviour. They are becoming increasingly important as our society relies more and more on being interconnected. This project will utilize the extensive datasets available from satellite based solar observatories and monitors of the solar wind, to ground based magnetometers and observations of ionospheric plasma density which observe the impact of geomagnetic activity at earth- 'space weather'. In principle, this chain of observations should allow both the dynamics and the statistical likelihood of space weather events to be understood. However, the extent of these observations makes this a data mining grand challenge. This project will focus on novel methods to quantify extreme events in space weather, the probable extent of their impact on earth systems and what aspects of these events may be predictable.

The project will involve understanding, modelling and adapting current data analytics methods to apply them to the rich and varied classes of in-situ and ground based space weather observations. It requires a careful understanding of the varied nature of the observations and their uncertainties. The work is in collaboration with: in the USA, NASA-Jet Propulsion Laboratory, (GPS observations of ionospheric Total Electron Content) and Johns Hopkins University Applied Physics Laboratory, (SuperMAG ground based magnetometers) and in the UK, the Rutherford Appleton Laboratory (space based observations).



Space weather hazards