Smarter Ensembles for solar wind forecasts

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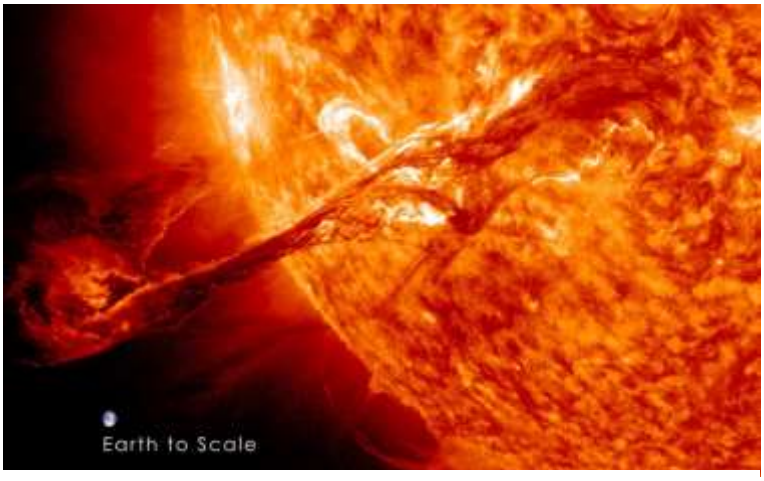
The solar wind is a continuous outflow of charged particles and magnetic field from the Sun's upper atmosphere. Variability in the solar wind conditions leads to space weather, which can adversely affect technological infrastructures, such as power grids and telecommunications networks, as well as the health of humans in space and on high-altitude flights.



A coronal mass ejection (CME), approximately a billion metric tons of material moving at around a million km/h, erupts into the solar wind. CMEs drive the most extreme space weather which can damage power grids and space hardware.

Space-weather forecasting requires accurate prediction of the solar wind conditions in near-Earth space**.** The Met Office uses numerical solar wind models for this purpose. In order to assess forecast uncertainty, an "ensemble" of many model runs with slightly different initial conditions is used. This project will attempt to answer three important research questions:

1. How well do these ensembles capture forecast uncertainty?
2. How can we better define the starting ensembles?
3. What are the primary solar wind sources of forecast uncertainty?

This will be achieved through comparison of the Met Office forecast model output with of data from NASA and ESA spacecraft, and through use of Reading's computationally efficient solar wind model.

Training opportunities:
The student will be given the opportunity to attend relevant summer schools, both in the UK and the US. The student will also visit the UK Met Office to work with their solar wind forecasting system.

Student profile:
This project would be suitable for students with a degree in physics, mathematics or a closely related environmental or physical science.

Funding particulars:
This is a CASE studentship with the UK Met Office.

https://research.reading.ac.uk/scenario/