

NERC GW4+ Research Experience Placement Project 2019

Assessing radiation belt simulations using data from the GIOVE-A spacecraft

Lead Supervisor: Dr. Sarah Glauert

Space Weather & Atmosphere

Proposed 8 week placement.

The electron flux in the Earth's radiation belts is highly variable and can vary by orders of magnitude in hours but observations of the flux are sparse. Understanding this variability is important because society is increasingly reliant on satellites orbiting through the radiation belts and these satellites can be damaged by high-energy electrons. The British Antarctic Survey (BAS) has developed the BAS Radiation Belt Model (BAS-RBM) [Glauert *et al.*, 2014], a physics-based model that can simulate the radiation belts and also provides forecasts of the radiation belt fluxes for ESA (SaRIF on <http://swe.ssa.esa.int/space-radiation>).

The SURF instrument on the GIOVE-A spacecraft has measured plate currents in the radiation belts for over 10 years. The aim of this project is to compare these measurements with the electron flux predicted by the BAS-RBM, to highlight areas where the model is reliable and where it requires improvement. Since SURF measures plate currents, the student will need to use the instrument response functions to convert between electron flux and plate currents, and to determine whether the comparison should be made in terms of flux [see Ryden *et al.*, 2008] or plate currents.

The student will join the Space Weather and Atmosphere team at BAS, supervised by Dr. Sarah Glauert. BAS will provide office facilities and computing resources. The student will learn radiation belt physics in an active research group and will visit the Surrey Space Centre, at the University of Surrey, to learn about GIOVE-A and the SURF instrument. Additionally, they will gain experience with a large research model, learn how to analyse both spacecraft data and modelling results and develop their programming skills.

Applicants for this position should be undergraduates in Physics, Maths or a closely related subject, with a good working knowledge of FORTRAN, C or other similar high-level language and Unix type operating systems. Knowledge of the radiation belts, experience using IDL or working with large data sets would be an advantage. Applicants should clearly state their computing experience (languages, systems, projects undertaken etc.) and mathematical background on their applications.

Students must meet all of the following criteria to be eligible to apply for a REP:

- Be studying for an undergraduate degree in a quantitative discipline outside of NERC's scientific remit (eg mathematics, statistics, computing, engineering, physics).
- Be applying for a placement in a different department to their undergraduate degree.
- Be undertaking their first undergraduate degree studies (or integrated Masters).
- Be expected to obtain a first or upper second class UK honours degree.
- Be eligible for subsequent NERC PhD funding (ie UK, EU or right to remain in the UK).

Applications (no more than 2 sides A4) and enquiries should be sent directly to: Dr Sarah Glauert sagl@bas.ac.uk no later than noon, 15th May 2019