



## **Statistical modelling of the coupled F-region ionosphere-thermosphere at high latitude during polar darkness.**

Gareth Dorrian (1), Alan Wood (1), Amy Ronksley (2), Anasuya Aruliah (2), and Golnaz Shahtahmassebi (1)

(1) School of Science & Technology, Nottingham Trent University, Nottingham, UK (gareth.dorrian@ntu.ac.uk), (2) Department of Physics and Astronomy, University College London, London, UK

Statistical models have been developed for predicting the behaviour of the coupled high-latitude ionosphere-thermosphere system. The modelled parameters were the F-layer peak electron density, plasma structuring, ion temperature, neutral temperature, and the difference between these temperatures, which is a key term in the Joule heating equation. Ionospheric measurements from the EISCAT (European Incoherent Scatter) Svalbard Radar and neutral atmosphere measurements from the co-located UCL Fabry Perot Interferometers (FPI) have been made across a solar cycle. These data were all acquired during night time conditions as the observations with the FPI are restricted to such times. Geophysical proxies were used to represent the processes which influence the modelled parameters. The dominant geophysical proxy for each modelled parameter was determined. Multi-variate models were also developed showing the combinations of parameters which best explained the observed variability. A comparison with climatology showed that the models give an improvement in every case with skill scores based on the mean squared error, of up to 0.88.