Contribution ID: **231** Type: **Poster**

Solar flares and their impacts on the Earth's lower ionosphere.

Tuesday, 7 September 2021 12:18 (13 minutes)

Solar flares have direct consequences on the Earth's ionosphere. The enhancement of extreme ultraviolet (EUV) and X-ray emission during a flare results in the rapid increase of ionization on the entire dayside ionosphere causing a sudden ionospheric disturbance (SID). While SIDs occur in all regions of the ionosphere, the effect on the lowest-lying D-region (60-100km in altitude) is the most apparent. In particular, X-rays with wavelengths < 10 angstroms penetrate down to D-region altitudes and dominate photoionization of all neutral constituents there. This can cause substantial electron density increases in the lower ionosphere to extents large enough to affect the propagation of radio waves used in high-frequency radio telecommunications. Here, by using a combination of solar flare multi-wavelength observations (X-ray and EUV) together with remote sensing of the ionospheric conditions using very low frequency (VLF: 3-30kHz) radio wave propagation, we probe the geophysical effects of flare emission. This work presents a statistical study of flares from the past solar cycle and their impacts on the ionospheric D-region electron density. We look at the relationship between the incident X-ray flux and the D-region response including amplitude variations, heliographic position of flare, relative time-delay analysis and select several events to further investigate the spectral components of a flare and their geophysical impact. We will also discuss the opportunities looking towards solar cycle 25 with both ground-based remote sensing observations of the ionospheric conditions that can be combined with newly available space-based solar which can be utilized in future studies.

Primary authors: HAYES, Laura (Dublin Institute of Advanced Studies (DIAS)); Prof. GALLAGHER, Peter (Dublin Institute of Advanced Studies); Dr MURRAY, Sophie (Dublin Institute of Advanced Studies); Mr O HARA, Oscar (Trinity College Dublin)

Presenter: HAYES, Laura (Dublin Institute of Advanced Studies (DIAS))

Session Classification: Poster Session 4.6

Track Classification: Session 5 - Solar-Terrestrial Relations, Solar Wind, Space Weather and Space Climate