

Polar Space weather studies during IPY2007: First results from South African Antarctic experiments.

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The ionosphere significantly affects radio propagation, affecting satellite navigation and communications systems and making it an important polar space weather parameter to monitor. Periods of high geomagnetic disturbances, caused by high sunspot activity, solar flares or solar coronal mass ejections are especially significant as rapid changes in the ionosphere incapacitates GPS navigation and HF communication systems, critical life-dependent systems in polar regions. The HMO, in collaboration with other research partners, manages and operates several ionospheric measurement instruments at SANAE IV (71.67°S, 2.84°W), located in the auroral oval, to facilitate our understanding of ionospheric dynamics and behaviour. These instruments include the SHARE radar used for monitoring ionospheric convection, i.e. the noon-midnight-oval edge motion of ionospheric plasma over the polar cap due to the ExB drift effected by the electric field resulting from the interplanetary magnetic field (IMF) coupling with the earth's magnetosphere; an ionospheric scintillation monitor (ISM) observing rapid, small scale structural changes in the ionosphere; total field magnetometer used for monitoring changes in the magnetic field and predicting auroral and sub storm onsets and a dual frequency GPS receiver used for monitoring the Total Electron Content of the ionosphere. First results from the IPY 2007 campaign are presented illustrating the correlation between measurements and investigating possible driving forces of the ionospheric behaviour. The application of these instruments to observe other phenomena like field resonance PC5 Ultra Low Frequency pulsations and polar night-time ionospheric plasma transport mechanisms are also illustrated.