

- 11:30 Space weather and geospace research with ESA's Swarm constellation: results, perspectives and opportunities *Floberghagen, R et al.* Invited Oral

Rune Floberghagen and many members of the Swarm team

Directorate of Earth Observation Programmes, European Space Agency, Frascati, Italy

The Earth-orbiting four-satellite Swarm constellation continuously delivers high-quality data on the magnetosphere-ionosphere-thermosphere region through in-situ measurements of the magnetic field vector, the ionospheric plasma environment and thermospheric neutral density. This contribution first highlights examples of current research and services utilising Swarm and affiliated data, and furthermore provides an outlook into the future of Swarm in the context of solar-terrestrial physics and space weather. It also aims to describe the mission's initial steps towards improving the observation and understanding of the link between terrestrial weather phenomena and weather in space. Following in the footsteps of the CHAMP mission and aiming for a long on-orbit lifetime, Swarm extends the available magnetic field, ionosphere and thermosphere data into the next solar cycle, and for the first time provides multi-point/multi-payload measurements of this environment. These observations enable a broad variety of investigations of the response of the thermosphere to energy inputs and cooling processes over a wide range of external conditions. Likewise, the high-accuracy magnetic and electric field data of the Swarm satellites contribute to improved climatological models of the high-latitude current system and energy exchange. In addition, the high temporal resolution of these measurements enables the investigation of the plasma environment at much smaller scales than has been possible before, unravelling details on the relationship between small and large scale currents. As such, the comprehensive set of observations acquired by Swarm, including simultaneous observations of B, E, plasma temperature and density, ion flow and neutrals provide a powerful toolbox for the community, and for aeronomy and solar-terrestrial physics in particular. Based on a highly successful four-year nominal mission Swarm has recently received an extension. All three satellites are in excellent overall health and carry sufficient propellant for a prolonged on-orbit lifetime. Mission stakeholders are enthusiastically continuing to invest in improving its data products and implementing a broad earth system science and applications agenda. Further improvement and development of space weather applications based on Swarm and affiliated data are key to this endeavour.