# IAG Scientific Assembly 2025:
# Geodesy for a changing environment

## Symposium J01: Geodetic Space Weather Research

Conveners: Michael Schmidt, Ehsan Forootan, Fabricio Dos Santos Prol, Ningbo Wang, Andrés Calabia Aibar

Space weather is now a distinct, highly interdisciplinary field of research that focuses on physical processes in space that are primarily driven by solar energy emissions. Its effects are diverse, including variations in the Earth's magnetic field and changes in the upper atmosphere, particularly the ionosphere, plasmasphere and thermosphere. Modern society's increasing reliance on space-based technologies, including terrestrial and space-based Global Navigation Satellite Systems (GNSS), airglow remote sensing, ionosondes, magnetometers, accelerometers, satellite altimetry, Very Long Baseline Interferometry (VLBI), Satellite Laser Ranging (SLR), and Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS), provide essential data on the state and dynamics of the upper atmosphere. Geodesy, with its long history of advanced analytical techniques and modelling, is well suited to provide measurements and products for space weather research. The GGOS (Global Geodetic Observing System) Focus Area Geodetic Space Weather Research (GSWR) advances the geodetic Earth system monitoring by treating the magnetosphere, ionosphere, plasmasphere and thermosphere as a physically interconnected system extending from the Sun to the Earth's surface. It fosters interdisciplinary research to better understand and forecast the whole chain of causes and effects, starting with processes and events on the Sun, continuing with effects in the near-Earth space, and finalising with the impact on geodetic applications and systems. To this end, geodetic space weather research aims to use of all available space geodetic observation methods, solar observations, real-time modelling and forecasting techniques, including both deterministic and stochastic approaches and data assimilation strategies. In this frame, this session solicits contributions focusing on the following aspects:

- Combination of ground- and space-based geodetic observations (including terrestrial GNSS, satellite altimetry, radio occultation, VLBI, DORIS, InSar) with solar observations (including EUV, X-ray, magnetic field from ACE, DSCOVR, Stereo, etc.).
- Modelling of parameters of the upper atmosphere (e.g. ionosphere, plasmasphere, and thermosphere), such as electron and neutral density, including near real-time (NRT) approaches and forecasting techniques.
- Coupling processes between magnetosphere, ionosphere, plasmasphere and thermosphere.
- Improvement of empirical and physical models, e.g. for key parameters of the ionosphere, plasmasphere and thermosphere.