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## GGOS Focus Area on Geodetic Space Weather Research – Current Status

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Space weather means a very up-to-date and interdisciplinary field of research. It describes physical processes in space mainly caused by the Sun's radiation of energy. The manifestations of space weather are multiple, for instance, the variations of the Earth's magnetic field or the changing states of the upper atmosphere, in particular the ionosphere and the thermosphere.

The main objectives of the Focus Area on Geodetic Space Weather Research (FA GSWR) are (1) the development of improved ionosphere models, (2) the development of improved thermosphere models and (3) the study of the coupled processes between magnetosphere, ionosphere and thermosphere (MIT).

Objective (1) aims at the high-precision and the high-resolution (spatial and temporal) modelling of the electron density. This allows to compute a signal propagation delay, which will be used in many geodetic applications, in particular in positioning, navigation and timing (PNT). Moreover, it is also important for other techniques using electromagnetic waves, such as satellite- or radio-communications. Concerning objective (2), satellite geodesy will obviously benefit when working on Precise Orbit Determination (POD), but there are further technical matters like collision analysis or re-entry calculation, which will become more reliable when using high-precision and high-resolution thermospheric drag models. Objective (3) links the magnetosphere with the first two objectives by introducing physical laws and principles such as continuity, energy and momentum equations and solving partial differential equations.

To arrive at the above described objectives of the FA GSWR one new Joint Study Groups (JSG) and three Joint Working Groups (JWG) have been installed recently. In detail, these groups are titled as JSG 1: Coupling processes between magnetosphere, thermosphere and ionosphere, JWG 1: Electron density modelling, JWG 2: Improvement of thermosphere models, and JWG 3: Improved understanding of space weather events and their monitoring by satellite missions. Other implemented IAG Study and Working Groups within the IAG programme 2019 to 2023 will provide valuable input for the FA GSWR. In this presentation we provide the latest investigations and results from the above mentioned Joint Study and Working Groups JSG 1, JWG 1, JWG 2 and JWG 3 of the FA GSWR.

