SWARM4ANOM - OUTPUT FILES FROM THE TIEGCM SIMULATIONS

Synthetic index I_{NDD} derived from the TIEGCM model supplements in-situ registrations from Swarm. For the present work, the TIEGCM 2.0 version is used with the double-resolution. Such configuration provides a grid of $2.5° \times 2.5°$ for latitude and longitude, and 58 pressure levels in the vertical direction. The lower boundary of the model is at approximately 97 km, and the upper boundary ranges from 400 to 700 km depending on the solar activity and settings of solar flux. The option for lower boundary forcing is switched off to minimize the contribution from factors other than the magnetic field. The purpose of using TIEGCM is to reconstruct the I_{NDD} index at the altitude of a satellite, thus we make an approximation between neighboring pressure levels in order to obtain the optimal agreement for the scale height.

Focusing on the role of the Earth's magnetic field and its impact on the formation of the WSA-like phenomena, we examined independent scenarios for the TIEGCM runs:

- Scenario #1: TIEGCM runs with a realistic magnetic field configuration determined by the IGRF model for a set of selected years.
- Scenario #2: Simplified magnetic field model reduced to dipole representation, with various configurations reflecting different eccentricity and tilt angle of the magnetic dipole.

Through all simulations, we used identical configuration of controlling parameters describing solar minimum and quiet geomagnetic conditions. The following parameters were used in the TIEGCM standalone runs: the solar flux ($F107 = 70$), the cross-tail potential ($CTPOTEN = 30$) and the hemispheric power ($POWER = 18$).

The model web-page (`http://www.hao.ucar.edu/modeling/tgcm/tiegcm2.0/userguide/html/`) provides more details on the physical meaning of the parameters used in the configuration and physics included in the model. Such configuration of model runs, minimizes the variability of the index originating from varying solar conditions and allows to isolate effects related to changes in the main magnetic field. Before the index is computed, the TIEGCM output for the diagnostic field of the electron density N_e is converted to the LT frame. Using configurations defined above, we performed 5-day standalone runs, with the time-resolution of 10 minutes for March equinox, at two separate altitudes 360 km and 460 km. Simulations were carried out for the years 1910, 1960,1980, 2005, and 2015. Data are accessed from the following repository: `http://swarm4anom.cbk.waw.pl/TIEGCM_OUT/`.

- Earth‘s magnetic field represented as an straight dipole, placed in the centre of the Earth: **tiegcm2.0_res2.5_mareqx_smin_sec_100_GSWN0_1900_004.nc**
- Earth‘s magnetic field represented as a tilted dipole, placed in the centre of the Earth:

  tiegcm2.0_res2.5_mareqx_smin_sec_123_GSWN0_1900_004.nc

- Earth‘s magnetic field represented as mirrored tilted dipole, placed in the centre of the Earth:
  tiegcm2.0_res2.5_mareqx_smin_sec_12-3_GSWN0_1900_004.nc
- Earth‘s magnetic field represented as an eccentric tilted dipole:
  tiegcm2.0_res2.5_mareqx_smin_sec_678_GSWN0_1900_004.nc
- Realistic Earth‘s magnetic field based on the IGRF model for years: 1910, 1960, 2005, 2015:
  tiegcm2.0_res2.5_mareqx_smin_sec_all_GSWN0_{1910,1960,2005,2016}_004.nc