Visualizing models and observations of the thermosphere-ionosphere in support of the ESA EE10 candidate mission Daedalus

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Daedalus is a new satellite mission concept for studying the lower thermosphere-ionosphere (LTI). The mission is currently undergoing Phase 0 studies, funded by ESA as one of three missions that are candidates for becoming its Earth Explorer 10 mission (EE10).

Using an elliptical orbit with a very low perigee (140 km and lower), the mission will make comprehensive in-situ measurements, including local density, composition, temperature and velocities of both the neutral and charged particles. An option of having two Daedalus satellites is being studied to allow better separation of temporal and spatial variability, and to better measure the strong vertical gradients and wave activity that occur in the LTI. The complete suite of instruments on Daedalus will allow the computation of higher level products such as local collision frequencies, conductivities and heating rates, along the orbit. The unique complementarity of instrumentation and orbit sampling over a large range of altitudes will be extremely valuable in advancing the science of the LTI region, which is a key region for many space weather phenomena.

High quality visualizations of models and data are very important during the definition of the mission. They allow both experts and newcomers to the field to better comprehend the physics of the LTI region, how it couples with other regions and systems, as well as how Daedalus will be able to sample this region from its unconventional orbit. The presentation will showcase 2D and 3D visuals that were developed during the phase 0 studies, and that make use of empirical and physics-based models of the thermosphere-ionosphere, Earth's magnetic field and simulated satellite orbits.