## The 3D Dynamic Kinetic Model of the Plasmasphere

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The BPIM (Belgian Plasmasphere-Ionosphere Model) is a 3D-Kinetic semi-empirical model of the plasmasphere developed by the Solar Wind Division of BIRA-IASB (Pierrard et al., 2021). Based on physical mechanisms for the plasmapause formation and trajectories of particles trapped in the Earth's magnetic field, it provides the number density and temperature of the electrons and protons inside and outside the plasmasphere, as well as the position of the plasmapause, as a function of the geomagnetic activity driven by the Kp index. During geomagnetic storms, the plasmasphere is eroded and structures like plasma plumes and channels can appear. During quiet times, the ionosphere refills the plasmasphere. The model is coupled to the International Reference Ionosphere (IRI) model used to determine the number density and temperatures of the particles between 60 and 600 km of altitude. The values at 600 km are used as boundary conditions to provide the density and temperatures up to 10 Earth radii inside and outside the plasmasphere. The model is available on the PITHIA platform. It is running in a near-real-time basis by the name of 'SPM' at the Space Situational Awareness site (https://swe.ssa.esa.int/bira-swiff-federated/) of ESA (European Space Agency) using a previous IDL-Fortran version that evaluates the electron density and temperature without the ionosphere coupling, and providing animations of the equatorial and meridian plasmasphere dynamics since 2017. In the present implementation, a PYTHON-Fortran version is used, which is essentially the same model version as the IDL-Fortran one. This implementation is available in the frame of the ESA Virtual Space Weather Modeling Center (https://swe.ssa.esa.int/kul-cmpa-federated/) for on-demand executions providing the electron density of the plasmasphere, the ionosphere coupling as well as the electron density beyond the plasmapause, i.e., the plasmatrough for the requested day. Output of the model consist of data files, movies and figures for every hour of a simulated day.

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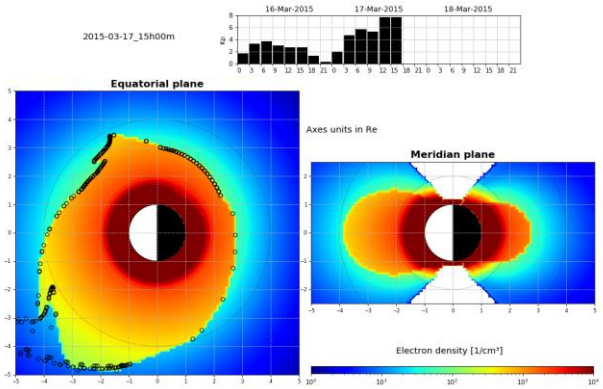


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