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# Dynamic models for the inner magnetosphere developed in SWIFF: Plasmasphere-ionosphere, Polar Wind, Radiation Belts

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In this presentation, the capabilities developed to study inner and outer magnetosphere coupling will be explained. Dynamic models have been developed for the plasmasphere coupled to the ionosphere, the polar wind and the radiation belts. These models are provided on the space weather portal www.spaceweather.eu.
A 3D dynamic model of the plasmasphere has been developed using the kinetic approach and coupled to the International Reference Ionosphere model. The coupled model determines at any chosen time the number density and the temperatures of the electrons and ions for altitudes from 60 km to the position of the plasmapause and even at higher radial distances in the plasmaspheric trough. The plasmapause position is dependent on the geomagnetic activity and solar wind variability.

The polar wind is modeled using a similar kinetic approach, but along open magnetic field lines at high latitudes so that particles escape from the terrestrial atmosphere. The model determines the profiles of all the moments of the particles, and especially density, temperatures, escape flux and heat flux.

The variability of the outer electron belt with space weather is studied with CLUSTER observations. During geomagnetic storms, the electron fluxes vary from several orders of magnitudes and the outer belt penetrates closer to the Earth. Dynamical simulations have been developed to determine the flux variations associated to the geomagnetic storms. Links between the dynamics of the radiation belts and the position of the plasmapause have also been identified with satellite observations.