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A Kp-dependent three-dimensional model of the plasmasphere

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A three dimensional physical dynamic model of the plasmasphere that is constrained by realistic data has been developed at BISA. The core of the plasmasphere is obtained from the kinetic exospheric approach assuming a kappa velocity distribution function for the particles. The relative abundance of trapped particles is constrained so that the equatorial density profiles correspond to ISEE satellite observations. The position of the plasmapause, the limit of the plasmasphere, is determined by the interchange instability mechanism. The electric field model is a combination of corotation and E5D convection empirical model, which depends on the level of geomagnetic activity determined by the Kp index measured during the previous 24h. The deformation of the plasmasphere during quiet and disturbed geomagnetic periods is illustrated and compared with the results of other plasmaspheric models and observations of IMAGE and CLUSTER satellites. During quiet periods, the plasmasphere is extended to radial distances larger than 4 Re. During geomagnetic storms and substorms, the plasmasphere is eroded. Plumes are formed in the afternoon MLT sector and then rotate with the Earth.