Geophysical Research Abstracts
Vol. 18, EGU2016-2638, 2016
EGU General Assembly 2016

Empirical modeling of the location of the Earth's magnetopause

Anna Machková, Frantisek Nemec, Zdenek Nemecek, and Jana Safrankova
Faculty of Mathematics and Physics, Charles University in Prague, Prague, Czech Republic

We systematically examine the location of the magnetopause using a database of 16800 magnetopause crossings registered by 8 different satellites. The analysis is limited to the best sampled region near the subsolar point. We analyze the influence of the Dst and corrected Dst* indices, solar wind flow speed, and the eccentricity of the terrestrial magnetic dipole, i.e., the parameters typically unconsidered in former empirical models. The effects on the magnetopause location are investigated by comparing the observed and model magnetopause distances. We show that the magnetopause distance increases with decreasing Dst index, which can be likely linked to the increasing magnetic field magnitude at the magnetopause due to the enhanced ring current. The magnetopause distance is further higher at the times of higher solar wind flow speeds, in particular during high solar wind dynamic pressures. The eccentricity of the magnetic dipole also results in a statistically observable magnetopause displacement, as the magnetic field magnitude increases at the locations toward which the eccentric dipole is shifted (by about 2.5 percent). Finally, we employ the IGRF internal magnetic field model (accounting thus for the eccentricity of the terrestrial magnetic dipole) and the T96 external magnetic field model (accounting thus for the ring current and the Chapman-Ferraro current). We suggest a simple improvement of existing empirical magnetopause models based on the observed dependencies.