



Empirical Plasmapause Model based on Swarm Observations

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Recently a new method for monitoring the plasmapause location in the equatorial plane was introduced by the authors based on magnetic field observations made by the CHAMP satellite in the topside ionosphere. Related signals are small-scale field-aligned currents (some 10km scale size) driven by interactions between the solar wind and the magnetosphere. Their equatorial boundary was found to be a good proxy for the location of the plasmapause. The method has been applied to the Swarm constellation of three identical satellites orbiting the Earth in the topside ionosphere on a polar orbit. Since the orbital period is around 90 minutes, the plasmapause is crossed around 60 times daily by each satellite. This makes this constellation very efficient in monitoring plasmapause dynamics. The boundary can be clearly found on the night side, especially during disturbed conditions, while on the day side the signals related to the plasmapause are often masked by other phenomena (e.g. ULF waves). These observations are validated and calibrated using the in-situ plasma density observations of the Van Allen Probes, and based on the calibrated values, a plasmapause model is constructed. The model, combined with recent Swarm observations, yield an estimate of the plasmapause location at any MLT.