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Electron density in the refillling plasmasphere, as observed at Cluster orbit

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Characterizing electron density distributions in the inner magnetosphere is of primary importance to improve our comprehension of the interactions between the plasmasphere and the others regions of the magnetosphere. For instance, plasmapause is known to be the site of wave-particle interaction processes capable of affecting radiation belts and ring current particle populations. In this contest, the ESA Cluster mission offers a great opportunity to study a large part of the inner magnetosphere, over a complete solar cycle. In particular, the WHISPER instrument provides a reliable and accurate measurements of the electron density between 0.2 and 80 cm^{-3}. We have designed a dataset in order to study the evolution of the electron density in the inner magnetosphere ($2 < L < 10 R_E$) at high latitudes ($< 70^\circ$ $MLat$) by examining WHISPER observations along 1361 perigee passes distributed over more than three years of the Cluster mission. From a statistical description, we will focus here on the refilling process of the plasmasphere during extended quiet periods.

We present the method used to elaborate a dataset of electronic density profiles, which consists in coupling data to a magnetic model of the magnetosphere (IGRF-11 + Tsyganenko 2004) to estimate geomagnetic coordinates of the measurements. Based on the 3 hours ap index, density profiles are then filtered and sorted out in order to reconstruct the electron density distribution at three distinct stages of the plasmaspheric refilling (i.e. after 24, 48 and 72 hours of quiet magnetic activity). We compare the distributions in L and in magnetic latitude at different local time sectors and discuss their evolution with time.