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Ring Current Morphology and Properties: Statistics from Cluster

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The ring current, a torroidal current system centred at the equatorial plane at geocentric distances between ∼2Re and ∼9Re, is formed due to the gradient and curvature drifts of the energetic particles (up to a few hundreds of keV) trapped in the inner magnetosphere. This region plays an important role in the magnetospheric/ionospheric dynamics: the ring current is highly variable and is much stronger during magnetic storms, which can be monitored by ground-based measurements of the H-component of the geomagnetic field near equator (Dst index). The ring current behaviour and its sources have been extensively studied over the past 2 decades. There is still a lack of in-situ measurements of the electric current density, however, and its statistical analysis. This work is an extension of the previous studies of the ring current region (Vallat et al. (2005), Zhang et al. (2011)) based on the magnetic field measurements by 4 Cluster SC. We have extended the analysed data set of the ring current crossings for different years, included events during non-storm and storm times, estimated the total current density and azimuthal component from curlometer technique (Dunlop et al., 2002), analysed the spatial extent of the ring current region, and related estimated parameters to the magnetic position and level of the geomagnetic activity. We present here initial results of this statistical study.