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Current density and boundaries localisation in the ring current region

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The existence of a ring current around the Earth was established at the end of the 50's. Since then, the calculation of the current density and the study of the changes in the ring current is an active field of research as it is a good proxy for the magnetic activity. In order to calculate the current density, several methods were developed. The most common one is to deduce the perpendicular component of the current from the particle pressure gradient measurement. Another method developed is using four points' measurements: the curlometer technique. This method uses the magnetic field data from four satellites located in the same current sheet and was first used by Vallat et al. (2005) using the CLUSTER satellites data at 4.1 RE. This allows a direct measurement of the total current density. This method also allows the calculation of div B which allows testing the accuracy of the method. Since 2008, the CLUSTER satellites enter deeper inside the inner magnetosphere. Using the curlometer technique, it is possible to use the curlometer technique deeper inside the inner magnetosphere, where the pressure gradient is expected to invert direction. Some first results will be presented in this presentation.