



Estimation of field-aligned current density with Swarm spacecraft: testing the methods capabilities using synthetic data

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Field-aligned currents (FACs) flow along geomagnetic field lines, providing the transfer of energy and momentum between the distant collision-free magnetospheric plasma and the collisional ionosphere. The ESA's multi-point Swarm mission offers a unique opportunity to explore the low altitude end of the FAC system by a broad range of techniques.

The techniques used to estimate the FAC densities rely on certain underlying physical assumptions (e.g. time-stationarity, linear field variations over the spacecraft array etc) and are expected to provide reliable results for 'reasonably good' spacecraft configurations (e.g. the dual-satellite method based on Swarm A and Swarm C measurements becomes unstable close to the geographic poles). Due to the complexity of the system under investigation, it is useful to examine the methods' performance with the help of synthetic data, where different influences can be separately analyzed. We will show results of such studies, which are relevant for establishing the methods' validity range and suggests means to improve the Swarm FAC product currently available to the end-user.