



Field-Aligned Current Systems at Mercury

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Mercury exhibits a very dynamic magnetosphere, which is partially due to strong dayside reconnection and fast magnetospheric convection. It has been shown that dayside reconnection occurs even on low magnetic shear angles across the magnetopause. This drives quasi-steady region 1 field-aligned currents (FAC) that are observable in in-situ MESSENGER data. Here, the structure of the Hermean FAC-system is discussed and compared to the terrestrial counterpart. Due to the lack of a significant ionosphere at Mercury, it has to be examined how much of the poloidal FAC is reflected back to the magnetosphere, closed via toroidal currents in the planetary interior or via Pedersen currents in the tenuous exosphere. This investigation gives insights into the planetary conductivity structure as well as the exospheric plasma densities. Furthermore, it will be examined how much the only partially developed ring current at Mercury produces possible region 2 FAC signatures. We conclude with requirements to simulations that are needed to forecast the FAC structure on the southern hemisphere that will be closely studied with the upcoming Bepi-Colombo mission.