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Induced magnetic field within Mercury

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Mercury has a weak intrinsic magnetic field and the solar wind can flow close to the planet. Because of the formed “pocket size” magnetosphere, electric currents and, consequently, magnetic field can be induced inside Mercury. The magnitude of the induced magnetic field inside Mercury, i.e., the magnetic field component excluding the intrinsic magnetic field of Mercury, depends on the electric conductivity of the planet and temporal variations in the solar wind.

In the present work, we study the strength and the morphology of the induced magnetic field within Mercury, using a three dimensional quasi-neutral hybrid model (HYB-Mercury) with different electric conductivity models for Mercury. We show how the strength and the topology of the induced magnetic field depend on the adopted spherically symmetric electric conductivity model. We also compare the obtained magnetic field to a magnetic field situation in which the total magnetic field contains only the induced magnetic field part because the object itself, for example, Venus, does not have an intrinsic global magnetic field.