

Magnetic Field Measurements as a Tool for Mercury's Exploration

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The origin of the Hermean magnetic field is still not fully confirmed. The Messenger (launch: 2004) and the BepiColombo (launch: 2013) probe measurements are thus eagerly awaited for. The first measurements by these satellites will undoubtedly reveal the nature of the magnetic field. If the deep origin is confirmed, direct conclusion will be the presence of a liquid, conductive, convecting layer inside Mercury. Additional measurements will allow the structure and the temporal variations of the Hermean magnetic field to be modeled. In this paper we simulate the magnetic measurements of the Mercury Planetary Orbiter part of Bepi Colombo. The measured field by the spacecraft is the sum of the planetary magnetic field (internal and external sources, as well as the induced response) and on-board generated magnetic fields. Here, we first synthesize different on-board generated magnetic fields as a function of the distance to the satellite body. We then predict what would be the internal Hermean magnetic field, assuming an a priori value for the liquid core radius. We finally compute magnetic models, and compare the output to the initial hypothesis, as a function of the measurement error.