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“Mercury’s Magnetic Field: Stories from the Planet, Present and Past”

ABSTRACT: Mercury is the only planet other than Earth in the inner solar system to possess a global-scale magnetic field. The field was detected by the Mariner 10 spacecraft on two of its flybys of Mercury in the 1970s. Until the MESSENGER mission to Mercury, little was known about the planet’s magnetic field other than that it is about 100x weaker than Earth’s field (as estimated at the planetary surface) but still strong enough to "stand off" the solar wind and form a small, but dynamic magnetosphere. Importantly, even the origin of the planetary field was unknown. Observations made by MESSENGER during two flybys of, and four years in orbit around, the planet have yielded a wealth of discoveries including the core dynamo origin of the global field and the detection of remanent crustal magnetization. These discoveries provide critical constraints on Mercury’s interior structure and evolution. In addition, the weak magnetic field, the absence of an atmosphere, and Mercury’s proximity to the sun result in a unique interaction of the planet with the solar wind, that has consequences for interior, surface, and exospheric processes.