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Jupiter's Magnetic Field and Magnetosphere at the Midpoint of Juno's Mapping Mission

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The Juno spacecraft was launched in August 2011 and inserted into polar orbit about Jupiter on July 4th, 2016, performing close periJove passes (to ∼1.05 Rj radial distance) every 53 days. The Juno magnetic field investigation is equipped with two magnetometer sensor suites, located at 10 and 12 m from the spacecraft body at the end of one of Juno's three solar arrays. Each contains a vector fluxgate magnetometer (FGM) sensor and a pair of co-located non-magnetic star tracker camera heads that provide accurate attitude determination for the FGM sensors. Observations acquired within ∼7 Rj of Jupiter during the first 9 polar passes led to a detailed (spherical harmonic of degree and order 10) magnetic field model (JRM09), providing the first detailed view of a planetary dynamo beyond Earth's. The Jovian magnetic field is unlike anything previously imagined, evidencing a complexity that portends great insight into the dynamo process in general and the dynamics of Jupiter's interior in particular. A dramatic hemispherical asymmetry is evidenced in a very non-dipolar magnetic field in the northern hemisphere, and a dipolar magnetic field south of the equator, where an enigmatic "Great Blue Spot" resides within an equatorial band of opposite polarity. Jupiter's magnetic field is likely sculpted by differential rotation of its belts and zones, extending to depths (few thousand km) where the electrical conductivity of its molecular hydrogen atmosphere grips field lines. With 16 equally spaced longitudes now available we can begin to address secular variation of the main field, the systematic mapping of Birkeland currents above the polar aurorae, and magnetodisc variability. These and other developments will be presented with Juno approximately midway through its mission, designed to collect a global map with 32 polar orbits separated by <12° longitude.