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### Mercury's Magnetosphere during Northward and Southward IMF

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The first two MESSENGER flybys on 14 January 2008 and 6 October 2008 encountered very different solar wind interplanetary magnetic field (IMF) conditions. During the first flyby the IMF was northward, while during the second it was southward; in addition, during both flybys the IMF had a large radial (planetward) component. As is well known at Earth, the orientation of the IMF strongly influences the structure and dynamics of the planetary bow shock, magnetopause, and magnetosphere, which in turn strongly affect how particles are transported and accelerated as they move through the system. To examine Mercury's magnetosphere and its major boundaries, as well as the energization of plasma for the solar wind conditions observed during the MESSENGER flybys, three-dimensional global hybrid (kinetic ions, fluid electrons) simulations of Mercury's magnetosphere are used, along with charged particle (heavy ion and electron) tracing through the magnetospheric system. Regions that include Mercury's upstream foreshock, the magnetopause, and the magnetosphere are examined for the two different IMF conditions to understand particle acceleration, reconnection, large-scale flow vortices, and the formation and dynamics of a quasi-stable particle ring around Mercury.