



MESSENGER Observations of Magnetopause Reconnection and Its Effects on Mercury's Magnetosphere

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MESSENGER's orbit about Mercury skims the dayside magnetopause when periapsis is located over the dayside hemisphere, and the final crossing in the magnetosheath usually takes place at mid- to low latitudes. The magnetic field and plasma measurements taken during these "hot-season" orbits indicate that the rate of magnetopause reconnection becomes large as the interplanetary magnetic field (IMF) becomes strongly southward. The signatures of this intense reconnection include flux transfer events with core magnetic fields > 200 nT, magnetic fields normal to the magnetopause exceeding 10 nT, and the jetting of plasma toward higher latitudes with peak velocities up to 800 km/s. During strong southward IMF intervals, the character of the high-altitude dayside magnetosphere changes markedly. The strength of the dayside magnetic field decreases, large-amplitude magnetic fluctuations including flux-transfer-event-type traveling compression regions appear, and the latitudinal width of the northern magnetic cusp increases. These new orbital observations confirm the dominant role of magnetic reconnection in the dynamics of this small magnetosphere and further suggest that plasma accelerated by low-latitude dayside reconnection and flowing along newly opened magnetospheric flux tubes affects global properties of the dayside magnetosphere.