



Initial Orbital Phase Results of the MESSENGER Geophysics Investigation

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The MESSENGER spacecraft is on track to insert into an elliptical, near-polar orbit around Mercury on March 18, 2011. After a short check out period, the spacecraft will initiate a yearlong phase of global mapping of the closest planet to the sun. This presentation will highlight initial data returned from the MESSENGER geophysics investigation. Early observations are anticipated to include profiles of the northern hemisphere of Mercury from the MESSENGER Laser Altimeter, which will sample Mercury's surface at an 8-Hz rate with 1-m range error when the slant range of the spacecraft to the surface is 1500 km or less. Topography over most of the southern hemisphere will be derived from stereo imaging, radio occultations, and limb profiles. MESSENGER's radio science investigation will utilize X-band Doppler tracking observations using signals transmitted from both the spacecraft's high gain and low gain antennae to improve knowledge of the low-degree gravity field of Mercury. Of particular note is the fact that MESSENGER's polar orbital mapping configuration is well suited to enable significant improvement of the $C_{2,0}$ coefficient of the gravitational field, which is the most poorly constrained of the parameters required to understand the nature of Mercury's core state. MESSENGER's orbit is also favorable for mapping of Mercury's vector magnetic field with the magnetometer, a low-noise, tri-axial, fluxgate instrument that will determine the structure of Mercury's intrinsic magnetic field.