Geophysical Research Abstracts
Vol. 12, EGU2010-7119-1, 2010
EGU General Assembly 2010

Mercury's interior dipole and magnetospheric current systems after the MESSENGER flybys

Igor I. Alexeev (1), Elena S. Belenkaya (1), James A. Slavin (2), Haje Korth (3), Brian J. Anderson (3), Daniel N. Baker (4), Scott A. Boardsen (2), Catherine L. Johnson (5), Menelaos Sarantos (2), and Sean C. Solomon (6)

(1) Scobeltsyn Instituite of Nuclear Physics, Moscow State University, Moscow, Russian Federation (alexeev@dec1.sinp.msu.ru), (2) Heliophysics Science Division, NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA, (3) The Johns Hopkins University Applied Physics Laboratory, Laurel, MD 20723, USA, (4) Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder, CO 80309-7814, USA, (5) Department of Earth and Ocean Sciences, University of British Columbia, 6339 Stores Road, Vancouver, BC, V6T 1Z4, Canada, (6) Department of Terrestrial Magnetism, Carnegie Institution of Washington, Washington, DC 20015, USA

The "paraboloid" model of Mercury's magnetospheric magnetic field is used to determine the best-fit magnetospheric current system and internal dipole parameters from magnetic field measurements taken during the first and second MESSENGER flybys of Mercury on 14 January and 6 October 2008. From our model formulation and fitting procedure a Mercury dipole moment of 196 nT*RMˆ3 (where RM is Mercury's radius) was determined. The dipole is offset from Mercury's center by 405 km in the northward direction. The dipole inclination to Mercury's rotation axis is relatively small, $\sim$4°, with an eastern longitude of 193° for the dipole northern pole. Our model is based on the a priori assumption that the dipole position and the moment orientation and strength do not change in time. The root mean square (rms) deviation between the Mariner 10 and MESSENGER magnetic field measurements and the predictions of our model for all four flybys is 10.7 nT. For each magnetic field component the rms residual is $\sim$6 nT or about 1.5% of the maximum measured magnetic field, $\sim$400 nT. This level of agreement is possible only because the magnetospheric stand-off distance, the distance from the planet's center to the inner edge of the tail current sheet, the tail lobe magnetic flux, and the displacement of the tail current sheet relative to the Mercury solar-magnetospheric equatorial plane have been determined independently for each flyby.