



Time-varying exospheric magnetic fields of Mercury

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In this study we derive spherical harmonic models of Mercury's magnetic field from measurements of the MESSENGER mission. The models describe large scale external and internal magnetic fields. The Gauss coefficients of the magnetic fields mainly show periodic temporal variations that are related to Mercury's orbital period around the sun. Analyses of the time-varying magnetic features reveal that their source regions are located in Mercury's exosphere and magnetosphere. It is known that magnetospheric fields are due to interactions of the planet's internal magnetic field and the interplanetary (solar) magnetic field. Our new results suggest that magnetic fields are also generated in Mercury's exosphere. Most likely by transient current systems. Possible mechanisms that generate these transient exospheric magnetic fields include wind-driven electrical current systems, and the diamagnetic effect. These results may hold implications for the production of electrically charged particles in Mercury's exosphere at altitudes upward 400 km above the Planet's surface.