Magnetospheric Electric Fields at Mercury

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Just like at Earth, the solar wind – magnetosphere interaction at Mercury sets up a large scale electric field in the magnetosphere. Solar wind fluctuations cause low-frequency waves and pulsations within the Mercury magnetosphere. Transient, or possibly quasi-stationary, field-aligned current systems are likely to exist, and will typically be associated with electric fields. These stationary, transient, and pulsating electric fields play an important role in the solar wind – magnetosphere – exosphere – surface coupling.

We briefly review the properties of the electric fields and low-frequency electric fluctuations expected at Mercury, summarize what can be inferred from the three MESSENGER flybys, and discuss what may be learned from the MESSENGER orbital phase as well as from BepiColombo. Diagnostic techniques are exemplified. Particular emphasis is on the interaction of the magnetosphere with the exosphere and planetary surface. We conclude by discussing future directions, both for MESSENGER and for BepiColombo.