

MAVEN OBSERVATIONS OF MARS CRUSTAL MAGNETISM J. E. P. Connerney¹, J. Espley¹, ¹NASA Goddard Space Flight Center, Planetary Magnetospheres Laboratory, Code 695, Greenbelt, MD 20771, jack.connerney@nasa.gov.

Introduction: The MAVEN spacecraft successfully executed orbit insertion at Mars on September 22, 2014, after a 10 month cruise en route to the red planet. The magnetic field instruments [1], along with other sensors in the Particles and Fields Package, operated flawlessly throughout cruise to Mars, instrument commissioning, and transition orbit phase, and began routine science operations in November, 2014. MAVEN's high inclination, elliptical orbit provides low-altitude (~150 km) periapsis passes over the Mars crust every ~4.5 hours. MAVEN's primary science objectives dictate a mission plan and orbit that samples all local times and plasma environments (solar wind, magnetosheath, magnetotail) and maintains a periapsis altitude within a specified atmospheric density corridor; as a result, periapsis passes are not generally phased (to the Mars rotation period) in such a way as to provide a series of adjacent passes optimized for mapping crustal magnetic sources. However, a few opportunities to acquire such a sequence have materialized during routine operations and we show some examples of surveys and compare them with results obtained during the Mars Global Surveyor aerobraking passes (to similar altitudes).

Over the course of MAVEN's primary and extended mission(s), the elliptical orbit evolves in such a way as to provide low-altitude passages at latitudes that eventually span the globe. So while the distribution of such passes in longitude is not controlled, over time an increasingly dense set of low-altitude measurements accumulates. This affords the opportunity to compare MAVEN's low-altitude observations with that continued from the map obtained by MGS at ~400 km altitude. We present a comparison of MAVEN and MGS observations that illustrates the potential of MAVEN observations in improving knowledge of the crustal magnetic field, with significant implications for Mars evolution [2].

References: [1] Connerney, J. E. P., J. Espley, P. Lawton, S. Murphy, J. Odom, R. Oliverson, and D. Sheppard, (2015) "The MAVEN Magnetic Field Investigation", *Space Science Reviews*, doi: 10.1007/s11214-015-0169-4. [2] Connerney, J. E. P., M. H. Acuna, N. F. Ness, G. Kletetschka, D. Mitchell, R. P. Lin, and H. Reme, (2005) "Tectonic implications of Mars crustal magnetism", *Proc. Nat. Acad. Sci.*, Vol. 102, (42), 14970-14975, doi: 10.1073/pnas.0507469102.

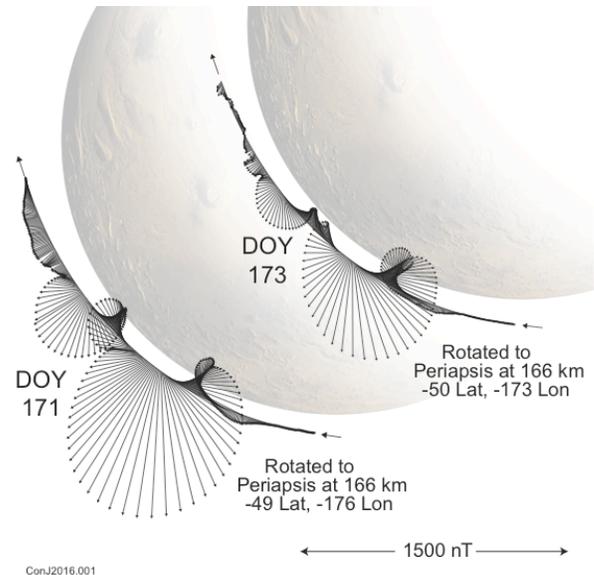


Figure 1: Magnetic field observations obtained by the magnetometer on MAVEN during low-altitude passages over the southern highlands crust in 2015.