6th Asia-Pacific Conference on Plasma Physics, 9-14 Oct, 2022, Remote e-conference

Magnetic reconnection near the terminator at Mars: MAVEN observations

Guo Chen[1,2,3], Can Huang[1,3,*], Ying Zhang[1,3], Yasong Ge[1,3], Aimin Du[1,3], Rongsheng Wang[4,5], Lei Wang[1,3], Lican Shan[1,3], Christian Mazelle[6], Hao Luo[1,3]

[1] Key Laboratory of Earth and Planetary Physics, Institute of Geology and Geophysics, Chinese Academy of Sciences, [2] State Key Laboratory of Space Weather, Chinese Academy of Sciences, [3] College of Earth and Planetary Sciences, University of Chinese Academy of Sciences, [4] CAS Key Laboratory of Geospace Environment, Department of Geophysics and Planetary Science, University of Science and Technology of China, [5] CAS Center for Excellence in Comparative Planetology, Hefei, 230026, China, [6] Institut de Recherche en Astrophysique et Planétologie, University Paul Sabatier

e-mail (speaker):chenguo@mail.iggcas.ac.cn

Abstract: Magnetic reconnection is a fundamental process in space plasma physics, which is responsible for many explosive phenomena such as stellar flares, coronal mass ejection, magnetospheric substorms, and fusion experiments. Mars has no intrinsic magnetic field, but large localized regions with strong crustal magnetic fields. The orientation of the localized remnant magnetic field relative to the shocked solar wind constantly change, which provides a dynamic environment for the study of magnetic reconnections (MRs). Using MAVEN observations, we present comprehensive plasma and field signatures of the magnetic reconnection near the terminator, including the carrier of the reconnection current sheet, Hall magnetic field, and electron energizations. These results indicate that magnetic reconnection may contribute to the energy transformation and mass transport, which possibly provide energized ions for the higher ion escape rate near the terminator.

References

Acuna, M. H., Connerney, J. E. P., Ness, N. F., Lin, R. P., Mitchell, D., Carlson, C. W., et al. (1999). Global distribution of crustal magnetization discovered by the Mars Global Surveyor MAG/ER experiment. Science, 284(5415), 790-793. doi:10.1126/science.284.5415.790

Eastwood, J. P., Brain, D. A., Halekas, J. S., Drake, J. F., Phan, T. D., Oieroset, M., et al. (2008). Evidence for collisionless magnetic reconnection at Mars. Geophysical Research Letters, 35(2), L02106. doi:10.1029/2007gl032289

Harada, Y., Halekas, J. S., DiBraccio, G. A., Xu, S., Espley, J., Mcfadden, J. P., et al. (2018). Magnetic Reconnection on Dayside Crustal Magnetic Fields at Mars: MAVEN Observations. Geophysical Research Letters, 45(10), 4550-4558. doi:10.1002/2018gl077281