Geophysical Research Abstracts
Vol. 21, EGU2019-10614, 2019
EGU General Assembly 2019

Modelled magnetic reconnection at the Mercury's magnetopause in support of the scientific objectives of SERENA

Stavro L. Ivanovski (1), Anna Milillo (2), Monio Kartalev (3), Stefano Massetti (2), Stefano Orsini (2), Valeria Mangano (2), Alessandro Mura (2), Roberto Sordini (2), Elisabetta De Angelis (2), Rosana Rispoli (2), Francesco Lazzarotto (2), Adrian Kazakov (2), and Alessandro Aronica (2)

(1) National Institute for Astrophysics - Osservatorio Astronomico di Trieste, via Giambattista Tiepolo, 11, 34143 Trieste, Italy, (2) National Institute for Astrophysics, Italy, Institute for Space Astrophysics and Planetology, Rome, Italy , (3) Geospace Consult Ltd, Institute of Mechanics, Bulgarian Academy of Sciences, Acad. G. Bontchev St., bl. 4, 1113 Sofia, Bulgaria

The ESA/JAXA BepiColombo mission was launched successfully in October 2018 and among its scientific objectives is the investigation of the physical conditions in which magnetic reconnection occurs. Kelvin-Helmholtz (KH) waves and magnetic reconnection are believed to be the key drivers of plasma transport and planetary magnetospheres are excellent laboratories to investigate them. In the preparation of the scientific phase of BepiColombo, as a first step, we use two MESSANGER datasets for investigating the development of MHD instabilities as a possible mechanism causing magnetic reconnection phenomena at Mercury's magnetopause. Based on a flexible numerical incompressible magnetohydrodynamic (MHD) approach utilized for studying coupled Kelvin-Helmholtz (KH) and tearing mode (TM) instabilities [1], we investigate the applicability of such mixing-boundary-layer MHD approach to the Mercury's magnetopause and by means of numerical simulations we explore the model parameter space using the MESSENGER data [2]. In the case of high-shear magnetopause reconnection, for example on 24 November 2011, we obtained the typical vortex features that exhibit magnetic reconnection in the developed KH and TM instabilities. In the case of low-shear magnetopause reconnection, for example on 21 November 2011, we obtained no manifestation of magnetic reconnection. We discuss the scientific applicability of this approach to support the scientific objectives of SERENA experiment [3] onboard BepiColombo, providing information on the coupling processes that occur in the Mercury complex system surface-exosphere-magnetosphere. References: [1] Ivanovski et al. 2011, JTAM, vol. 41, No. 3, pp. 31–42. [2] DiBraccio et al. 2013, JGR, 118, 997-1008 [3] Milillo et al. 2005, SSR Acknowledgements:This work is supported by the SERENA ASI-INAF agreement.