



MMS-Cluster joint observations of plasma sheet boundary layer crossings

Olivier Le Contel (1), Alessandro Retino (1), Alexandra Alexandrova (1), Thomas Chust (1), Patrick Canu (1), Dominique Fontaine (1), Sergio Toledo (2), Christian Jacquy (2), Benoit Lavraud (2), Stefan Kiehas (3), Rumi Nakamura (3), Yuri Khotyaintsev (4), Frederick D. Wilder (5), Daniel J. Gershman (6), Robert J. Strangeway (7), Ferdinand Plaschke (3), Matthew R. Argall (8), Drew L. Turner (9), Ian J. Cohen (10), James L. Burch (11), and the MMS-Cluster PSBL team

(1) Laboratoire de Physique des Plasmas, CNRS - Ecole Polytechnique - Sorbonne Université - Univ. Paris Sud - Observatoire de Paris, Paris, France (olivier.lecontel@lpp.polytechnique.fr), (2) Institut de Recherche en Astrophysique et Planétologie, Université de Toulouse, France, (3) Space Research Institute, Austrian Academy of Sciences, Graz, Austria, (4) Swedish Institute of Space Physics, Uppsala, Sweden, (5) Laboratory of Atmospheric and Space Physics, University of Boulder, USA, (6) NASA/GSFC, Greenbelt, MD, USA, (7) Institute of Geophysics and Planetary Physics, University of California, Los Angeles, USA, (8) University of New Hampshire, Durham, NH, USA, (9) Space Sciences Department, The Aerospace Corporation, El Segundo, California, USA, (10) Johns Hopkins University Applied Physics Laboratory, Laurel, MD, USA, (11) Southwest Research Institute, Space Science and Engineering Division, San Antonio, TX, USA, (12) Space and Plasma Group, Royal Institute of Technology, Stockholm, Sweden, (13) ESTEC, European Space Agency, Keplerlaan 1, 2201 AZ, Noordwijk, The Netherlands

Thinning and thickening of the near-Earth plasma sheet is the result of a variety of processes such as substorms, large scale plasma waves, isolated moving structures like flux-ropes or plasmoids, etc. On 28th of August 2018 at 5:30 UT, MMS and Cluster were located in the magnetotail at about 16 Earth radii (RE). They both crossed the plasma sheet boundary layer. Cluster transitioned from the lobe region to the plasma sheet whereas MMS, located at 4 RE duskward of Cluster, transitioned the opposite way. At 05:50 UT MMS returned to the plasma sheet and detected a quasi-parallel earthward flow ~ 400 km/s and increased energetic ion and electron fluxes. While MMS transitioned from the plasma sheet to the lobe and back to the plasma sheet, Cluster remained in the plasma sheet. We use observations from both missions during this conjunction to describe the possible macroscale evolution of the magnetotail as well as some associated kinetic processes.