EPSC Abstracts
Vol. 16, EPSC2022-505, 2022
https://doi.org/10.5194/epsc2022-505
Europlanet Science Congress 2022


# Magnetosphere-Ionosphere-Thermosphere Coupling study at Jupiter Based on Juno First 30 Orbits and Modeling Tools

**Sariah Al Saati**[1,2], Noé Clément[1,2,3], Corentin Louis[4,1], Michel Blanc[1,5], Yuxian Wang[6], Nicolas André[1], Laurent Lamy[7,5], Jean-Claude Gérard[8], Bertrand Bonfond[8], Barry Mauk[9], George Clark[9], Frédéric Allegrini[10], Scott Bolton[11], Randy Gladstone[11], John Connerney[12], Stavros Kotsiaros[10], and William Kurth[13]

[1]IRAP, CNRS-UPS-CNES, Toulouse, France
[2]Ecole polytechnique, Palaiseau, France
[3]Laboratoire d'Astrophysique de Bordeaux, Universite de Bordeaux, France
[4]School of Cosmic Physics, DIAS Dunsink Observatory, Dublin Institute for Advanced Studies, Dublin 15, Ireland
[5]LAM, Pytheas, Aix Marseille Universite, CNRS, CNES, Marseille, France
[6]State Key Laboratory for Space Weather, NSSC, CAS, China
[7]LESIA, Observatoire de Paris, Universite PSL, CNRS, Sorbonne Universite, Universite de Paris, Meudon, France
[8]University of Liege, Belgium
[9]JHU-APL, Laurel, MD, USA
[10]Technical University of Denmark
[11]SwRI, San Antonio, TX, USA
[12]NASA-Goddard Space Flight Center, Greenbelt, MD, USA
[13]University of Iowa, USA

The dynamics of the Jovian magnetosphere is controlled by the complex interplay of the planet's fast rotation, its solar-wind interaction and its main plasma source at the Io torus, mediated by coupling processes involving its magnetosphere, ionosphere, and thermosphere. At the ionospheric level, these processes can be characterized by a set of key parameters including conductances, field-aligned and horizontal currents, electric fields, transport of charged particles along field lines, including the fluxes of electrons precipitating into the upper atmosphere which trigger auroral emissions, as well as the particle and Joule heating power dissipation rates into the upper atmosphere. Determination of these keys parameters makes it possible to estimate the net transfer of momentum and energy between Jovian upper atmosphere and equatorial magnetosphere. A method based on a combined use of Juno multi-instrument data and three modeling tools was developed by Wang et al. (2021) and applied to an analysis of the first nine orbits to retrieve these key parameters along the Juno magnetic footprint. In this article, we extend this method to the first thirty Juno science orbits and to both north and south auroral crossings. Our results reveal a large variability of these parameters from orbit to orbit and between the two hemispheres, but they also show dominant trends. Southern current systems are consistent with the generation of a region of sub-corotating ionospheric plasma flows, while both super-corotating and sub-corotating plasma flows are found in the north. These results are discussed in the light of the previous space and ground-based observations and currently available models of plasma convection and current systems, and their implications on our understanding of MIT coupling at Jupiter are assessed.