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

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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 thermosphere, ionosphere and magnetosphere, referred to as "MIT coupling processes". At the ionospheric level, these processes can be characterized by a set of key parameters which include ionospheric conductances, currents and electric fields, transport of charged particles along field lines which carry electric currents connecting the ionosphere and magnetosphere, and among them fluxes of electrons precipitating into the upper atmosphere which trigger auroral emissions. Determination of these key parameters in turn makes it possible to estimate the net deposition/extraction of momentum and energy into/out of the Jovian upper atmosphere. A method based on a combined use of Juno multi-instrument data (MAG, JADE, JEDI, UVS, JIRAM and WAVES) and three modelling tools was first developed by Wang et al. (2021) and applied to an analysis of the first nine Juno orbits to retrieve these key parameters along the Juno magnetic footprint. In this communication we will extend this method to the first thirty Juno science orbits and to both north and south main auroral ovals crossings. Our results make it possible to characterize how the local systems of field-aligned electric currents, height-integrated ionospheric conductances, electric currents and fields, and Joule and particle heating rates vary across the main ovals between their poleward and equatorward edges. They suggest that southern current systems display a trend consistent with the generation of a region of sub-corotating ionospheric plasma poleward of the main aurora, while this dominant trend is not found around the northern main auroral oval.