A multi-instrument analysis of Juno data to investigate the sources of non-thermal radiation at Jupiter

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Since August 2016, the Juno MicroWave Radiometer (MWR) has continuously measured the radiation emitted by Jupiter and the surrounding environment, over a frequency range from 0.6 to 22 GHz, from Juno’ s highly elliptical 53-day polar orbit about Jupiter. The contributors to the strongest radio signals at the shorter frequencies are the thermal, cosmic microwave background, and synchrotron emission produced by the inner electron belt. Weaker but perceptible signatures in MWR are also reported at the shortest frequency during perijove 1 (PJ1) and PJ3-PJ11. Some of them are identified as a source of synchrotron emission produced by downward field-aligned MeV electrons in the middle magnetosphere. In this paper, we focus on synchrotron emissions originating from regions beyond Io's plasma torus that we believe to be linked to auroral activity. To support our findings, we discuss the results of a multi-instrument analysis of radio (MWR, WAVES), field (Juno magnetometer), extreme and far-ultraviolet auroral emission (Juno/UVS), plasma and energetic electron (JADE, JEDI) datasets, and background radiation signatures in Juno's ASC instrument for PJ1.

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