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Plasma Waves Associated with Broadband Auroral Electron Spectra at Jupiter

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Very large amplitude electromagnetic plasma waves are observed at the same time as extremely intense fluxes of electrons traveling downward on auroral field lines at Jupiter. Here we present plasma wave observations from the Juno Waves instrument obtained during an instance of very intense broadband electron precipitation observed by the Jupiter Energetic Particle Detector Instrument connecting to Jupiter's main auroral oval on 11 July 2017. The downward energy flux attributed to the electron spectrum extending to $>$ 1MeV reaches 3 W/m^2. The plasma wave spectrum extends to $\sim$10 kHz with peak amplitudes of a few nT in the magnetic channel and of $\sim$1 V/m in the electric channel, representing some of the most intense plasma waves observed by Juno. The E/cB ratio of the observed plasma waves is near 1, suggesting an electromagnetic mode. The E and B fields are correlated and have apparent polarization perpendicular to Jupiter's magnetic field. The direction of the Poynting flux is downward, toward Jupiter. We conclude the plasma waves are whistler mode emissions likely associated with an instability that may have quenched a strong field-aligned potential, and in doing so, transformed an inverted-V electron spectrum near 200 keV into the observed broadband electron spectrum.