

Juno/JEDI observations of energetic particles near closest approach to Jupiter – Evidence for heavy ion precipitation in the Jovian auroral region

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The Juno spacecraft's polar orbit provides an exceptional opportunity to study auroral processes in the largest and most dynamic auroral region in the solar system. The Jupiter Energetic particle Detector Instruments (JEDI) have SSD telescopes with multiple look directions and additional time-of-flight capabilities to measure ions and electrons from ~ 6 keV to ~ 20 MeV. These instruments resolve major ion species beginning at ~ 30 keV/n, with coarser mass resolution for lower energy ions. JEDI instruments observed energetic heavy ions up to 20 MeV precipitating into the auroral regions during the first few Juno perijoves that have occurred to date. The observed heavy ion intensity was lower than expected, but composition of the precipitating ions included the predicted species oxygen and sulfur. During the first perijove pass, an unexpected element was observed with an atomic mass between oxygen and sulfur with intensity comparable to the other heavy ions. Preliminary analysis of the JEDI composition data indicates magnesium, with an unexpected energy spectrum beginning around 500 keV and extending up through 20 MeV. During the third perijove pass no significant intensity of energetic magnesium was observed, which suggests that the source of this element is intermittent. We report on the new findings of energetic heavy ions from the first few Juno orbits including the auroral regions, observations through closest approach, and discuss possible source mechanisms for the unexpected and transient observation of heavy ions.