Geophysical Research Abstracts
Vol. 20, EGU2018-5284, 2018
EGU General Assembly 2018

Juno's exploration of Jupiter's auroral and magnetospheric phenomena: observations from Juno/JEDI

George Clark (1), Barry Mauk (1), Chris Paranicas (1), Dennis Haggerty (1), Peter Kollmann (1), Abi Rymer (1), Joachim Saur (2), Alberto Adriani (3), Frederic Allegrini (4,5), Fran Bagenal (6), Scott Bolton (4), Jack Connerney (7), Robert Ebert (4), Dan Gershman (7), Randy Gladstone (4), George Hospodarsky (8), Bill Kurth (8), Steve Levin (9), David McComas (10,4), Phil Valek (4,5)

(1) Johns Hopkins University Applied Physics Lab, Laurel, Maryland, USA (george.clark@jhuapl.edu), (2) Institut für Geophysik und Meteorologie, Universität zu Köln, Köln, Germany, (3) Istituto Nazionale di Astrofisica–Istituto di Fisica dello Spazio Interplanetario (INAF-IFSI), Rome, Italy, (4) Southwest Research Institute, San Antonio, Texas, USA, (5) Department of Physics and Astronomy, University of Texas at San Antonio, San Antonio, Texas, USA, (6) University of Colorado Boulder, Laboratory for Atmospheric and Space Physics, (7) Goddard Space Flight Center, Greenbelt, Maryland, USA, (8) Department of Physics and Astronomy, University of Iowa, Iowa City, Iowa, USA, (9) Jet Propulsion Laboratory, Pasadena, California, USA, (10) Department of Astrophysical Sciences, Princeton University, Princeton, New Jersey, USA

The energetic particle observations made during Juno's exploration of both the polar and equatorial magnetosphere of Jupiter has unearthed new and exciting discoveries. These discoveries provide crucial keys to aid in our understanding of auroral acceleration, radiation belt dynamics, heavy ion precipitation, magnetopause boundary structure and much more. Perhaps one of the most intriguing mysteries from Juno/JEDI observations is that Jupiter's most powerful aurora are driven in a different manner than Earth's. For example, Juno/JEDI often, but not always, observes the largest energy fluxes in the loss cone associated with broadband energy distributions. In contrast, at Earth it appears that the discrete acceleration processes drive the transient, bright aurora. Differences may be attributed to instabilities arising from powerful electric currents flowing between the ionosphere and magnetosphere. Energetic particle observations also show clear evidence of large, megavolt potentials over the polar cap and precipitating heavy ions – one possible pathway for heavy ions to gain enough energy to produce the X-ray aurora. In addition to the auroral discoveries, Juno's observations near its closest approach ($\sim$4000 km) reveal a belt of heavy ions residing inside Jupiter's main ring. Characterization of the high-latitude radiation belt "horns" depict energetic > 15 MeV electrons can dominate the signal during these times. Lastly, unique injection features seen at the higher magnetic latitudes also provide additional ways to constrain transport mechanisms of energetic particles in the inner magnetosphere. In this presentation, we will present a few key discoveries from Juno/JEDI, their impact to our current understanding and future mysteries going forward.