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Arase (ERG) Observations of Electron Scattering by Chorus Waves near the Magnetospheric Equator

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Medium-Energy Particle experiments - electron analyzer (MEP-e) onboard Exploration of energization and Radiation in Geospace (ERG, also called Arase) spacecraft measures the energy and the direction of each incoming electron in the range of ˜7 to 87 keV. The sensor covers 2-pi radian disk-like field-of-view with 16 detectors, and the full solid angle coverage is achieved using spacecraft spin motion. The electron energy is independently measured by an electrostatic analyzer and avalanche photodiodes, enabling the significant background reduction. The medium energy range is key to understanding the formation and decay of the radiation belt, as these electrons excite whistler-mode waves (Kennel and Petchek 1966; Omura et al. 2008), which have been theoretically suggested to play significant roles in the acceleration and loss of electrons (Summers et al. 1998; Katoh and Omura 2007; Hikishima et al. 2010). Furthermore, they are important as the seed population for the relativistic electrons (Horne et al. 2007). Using MEP-e, we obtain the velocity distribution functions of medium-energy electrons, providing key information regarding the local energization and pitch angle scattering, as well as on the global dynamics. The main topics to be addressed with MEP-e are the 1) enhancement and decay of the electron ring current, which is the seed population for higher energy electrons, 2) evolution of pitch-angle distributions during flux increase/decrease, and 3) energy transfer between electrons and electromagnetic waves via Landau/gyro-resonances. Here we present initial results obtained by MEP-e, putting special emphasis on the energetic electron scattering by whistler chorus waves near the magnetospheric equator.

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