

MAJOR STORMS OF 2000-2005 AS OBSERVED BY THE RADIO
PLASMA IMAGER AND THEIR SONIFICATION

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The Radio Plasma Imager (RPI) on NASAs IMAGE mission is continuously monitoring plasma wave natural emissions in the magnetosphere and plasmasphere of the Earth using high-sensitivity passive-mode reception between 3 and 1200 kHz. The 14.2 hour elliptical orbit of the IMAGE spacecraft with the perigee at 1200 km and the apogee altitude at 7.2 RE gives an excellent opportunity to record a variety of signatures pertaining to the processes in the solar-terrestrial system. Even outside the plasmasphere, the RPI can capture a detailed record of the solar type III radio bursts often associated with an elevated explosive activity on the Sun such as the coronal mass ejections (CME) that often accompany the solar flares. When inside the plasmasphere, RPI observes the whistler-mode radiations that reflect dynamics of the energetic particle streams via the particle-wave interaction mechanism. Finally, passive mode RPI spectrograms can be inspected for signatures of the upper-hybrid resonance and gyrofrequency harmonics, providing means of obtaining local measurements of the plasma density and the Earths magnetic field strength along the orbit. Thus, the RPI passive reception mode has a good potential for space weather applications, providing within a single frame of observation a set of identifiable signatures belonging to important events associated with the storm activity in the Sun-Earth system. We have developed a sonification technique that translates the RPI spectrograms to sound indicating intensity and frequency range of the received radiation. This paper presents several case studies of the major storms during 2000-2005 observed by the RPI instrument, including the Tax Day storm of 2002, the Halloween storm of 2003, the Bastille Day storm of 2000, and a recent sequence of solar flares in September 2005. The identified RPI signatures recorded during these events are compared to observations made by other space weather instruments.

Abstract Submission Form

2006 National Radio Science Meeting

Abstract: galkin12835

Date Received: September 19, 2005

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2. G - Ionospheric Radio and Propagation
3. (a)
4. C - Contributed Paper
5. No special instructions