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Monitoring HF transmissions with the e-POP RRI instrument on the CASSIOPE Satellite

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The Radio Receiving Instrument (RRI) on e-POP payload of the CASSIOPE satellite has a relatively high sampling rate and orthogonal dipole antennas which permit the observation of continuous wave (CW), pulse and phase coded signals from transmitters on the earth. In this study, high frequency (HF) 13-bit Barker-coded binary phase shifting keying (BPSK) and CW signals are detected from a transmitter in Ottawa during satellite overpasses. The HF signal experiences several of physical effects such as ionospheric delay, Faraday rotation, Doppler shifting and mode splitting during propagation through the ionosphere. Using the BPSK pulses (of 15 msec repetition rate), independent Doppler shift estimates can be rapidly determined using amplitude and phase characteristics of the waves. During the CW transmissions, amplitude variations on the orthogonal dipoles highlight the nature of the wave propagation through the ionosphere in the HF band.

Primary author: DANSKIN, Donald (Natural Resources Canada)

Co-author: JAMES, Gordon (Canadian Space Agency)

Presenter: DANSKIN, Donald (Natural Resources Canada)

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