

Canadian Association of Physicists Division of Atmospheric and Space Physics
Annual Workshop 18-21 February 2020, Fredericton, NB Canada

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E-POP/RRI Looks for Whistler Mode from DSX

The Demonstration and Science Experiment (DSX) payload was conceived in the U.S.A. as a method for establishing the protection capabilities of whistler-mode (WM) waves, through removal of harmful energetic electrons on terrestrial field lines. Early workers in the 1970s developed wave-particle ideas to illustrate how electrons on field lines in the Van Allen belts could be scattered to lower pitch angles on the same field lines. This lower pitch angle would permit them to go lower into the dense ionosphere, and thus be collisionally lost from their trapped condition. Arguments for military funding of sources were forthcoming with a view of trying some proto-experiments. These eventually led to the building of a WM source to operate at working frequencies in the observed range from a few kiloHertz to the upper limit of very low frequencies, ~30 kHz. This first DSX payload was launched by the USAF in June 2019 into a 12000 x 6000 km orbit at 40° inclination, but no conjunction between it and CASSIOPE/RRI has ever been detected at VLF. The tendency of dipoles to radiate WM waves near their resonance cone, indicated by the OEDIPUS-C experiment, may explain this negative result, because field-aligned conjunctions is all that has been looked for so far.

Whistler mode; resonance cone