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Oceanography and Atmospheric Sci. Atmospheric Physics

Observations of ELF Fields near the Low-Altitude CRRES Chemical Releases

Authors: [Harry C. Koons](#); [James L. Roeder](#); [AEROSPACE CORP EL SEGUNDO CA TECHNOLOGY OPERATIONS](#)

Abstract: The Combined Release and Radiation Effects Satellite (**CRRES**) performed a series of seven low altitude chemical releases between September 10, 1990, and August 12, 1991. Immediately following each chemical release, electric and magnetic fields were detected by the extremely low frequency wave analyzer sensors of the Low Altitude Satellite Studies of Ionospheric Irregularities (LASSII) experiment on the spacecraft. The time series and spectra of the two field components are quite similar for each of the releases but vary in detail from release to release. The index of refraction estimated from the ratio of the magnetic field to the electric field is too small by about 2 orders of magnitude for either the right hand wave or the extraordinary wave modes which are the only propagating electromagnetic modes in the detected band above the O+ ion gyrofrequency (about 30 Hz). ELF hiss observed at higher altitudes is found to be propagating in the extraordinary wave mode with the correct index of refraction. This confirms that the intensity measurements are being made correctly by the instrument and that an alternative explanation is required for the signals detected following the chemical releases. We show that the waves are primarily electrostatic and that the magnitude of the wave magnetic field is consistent with the transverse magnetic field component of ion acoustic waves.

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