

**Full Article (Nonsubscribers may purchase for \$9.00, Includes print PDF, file size: 1119574 bytes)**

JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 112, A04204, doi:10.1029/2006JA011900, 2007

## An automatic wave detection algorithm applied to Pc1 pulsations

**J. Bortnik**

Department of Atmospheric and Oceanic Sciences, University of California, Los Angeles, California, USA

**J. W. Cutler**

Department of Aeronautics and Astronautics, Space Systems Development Laboratory, Stanford University, Palo Alto, California, USA

**C. Dunson**

QuakeFinder, LLC., Palo Alto, California, USA

**T. E. Bleier**

QuakeFinder, LLC., Palo Alto, California, USA

### Abstract

A new technique designed to automatically identify and characterize waves in three-axis data is presented, which can be applied in a variety of settings, including triaxial ground-magnetometer data or satellite wave data (particularly when transformed to a field-aligned coordinate system). This technique is demonstrated on a single Pc1 event recorded on a triaxial search coil magnetometer in Parkfield, California ( $35.945^\circ, -120.542^\circ$ ), and then applied to a 6-month period between 1 June 2003 and 31 December 2003. The technique begins with the creation of a standard dynamic spectrogram and consists of three steps: (1) for every column of the spectrogram (which represents the spectral content of a short period in the time series), spectral peaks are identified whose power content significantly exceeds the ambient noise; (2) the series of spectral peaks from step 1 are grouped into continuous blocks representing discrete wave events using a “spectral-overlap” criterion; and (3) for each identified event, wave parameters (e.g., wave normal angles, polarization ratio) are calculated which can be used to check the continuity of individual identified wave events or to further filter wave events (e.g., by polarization ratio).

*Received 7 June 2006; accepted 29 November 2006; published 6 April 2007.*

**Keywords:** automatic identification; detection; Pc1 pulsations.

**Index Terms:** 0910 Exploration Geophysics: Data processing; 2772 Magnetospheric Physics: Plasma waves and instabilities (2471); 2794 Magnetospheric Physics: Instruments and techniques; 9820 General or Miscellaneous: Techniques applicable in three or more fields.

---

**Full Article (Nonsubscribers may purchase for \$9.00, Includes print PDF, file size: 1119574 bytes)**

**Citation:** Bortnik, J., J. W. Cutler, C. Dunson, and T. E. Bleier (2007), An automatic wave detection algorithm applied to Pc1 pulsations, *J. Geophys. Res.*, *112*, A04204, doi:10.1029/2006JA011900.