



Large Amplitude Alfvén Waves and Non-Linear, Steepened “Spikey” Electric and Magnetic Fields observed within the High Latitude Ionosphere with the Dynamics Explorer-2 Satellite

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The high time resolution (16 s/sec) vector electric field and magnetic field measurements gathered on NASA’s Dynamics Explorer-2 satellite reveal numerous examples of large amplitude Alfvén waves in the high latitude ionosphere, with amplitudes that are often 100’s of mV/m and 100’s of nT. The waves appear in packets that typically extend for 10-60 seconds along the satellite track (100-500 km horizontal distance), with characteristic wave periods on the order of a second or less. In many cases, the wave amplitudes reveal non-linear, steepened structures, characterized by well defined, periodic “spikes”. We present a new analysis of the vector electric field and magnetic field data on DE-2 to reveal Poynting Flux energy flux associated with the Alfvén wave and structured fields. The data are analyzed in conjunction with energetic particle observations as well as magnetic activity. The new, detailed findings present a new perspective on magnetosphere-ionosphere coupling at high latitudes, including energy deposition and momentum exchange at different spatial and temporal scales during disturbed conditions.