



## **Simultaneous measurements of electrostatic turbulence and plasma density fluctuations gathered by probes on the DEMETER spacecraft**

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Simultaneous observations of plasma density irregularities and electrostatic turbulence near 700 km are provided by the ion analyzer and the electric field instrument onboard the DEMETER spacecraft. Plasma density irregularities are inferred from the fast variations of the total ion current measured by the ion analyzer with a temporal resolution of 6.4 ms in burst modes and 12.8 ms in survey modes, corresponding respectively to scalelengths of  $\sim 50$  and 100 m along the orbital track. The electrostatic turbulence is obtained from the electric field double probe instrument which provides complete waveforms up to 1 kHz on 3 axes in the burst modes and at 15 Hz in the survey mode along with power spectra every 2 sec with a frequency resolution of  $\sim 20$  Hz. The burst mode observations are used for detailed case studies in order to analyze the physical mechanisms that are at the origin of irregularities in the mid-latitude and sub-auroral upper ionosphere. We present a comparison of the phase and amplitude of the density and electric field fluctuations for several cases at various latitudes including equatorial “Spread-F” plasma depletions. The low temporal resolution observations reveal the latitudinal extent of the ionospheric turbulence. The results show that although ionospheric turbulence is present essentially independent of magnetic activity in the sub-auroral regions, the low latitude boundary of the irregular ionosphere is well correlated with the magnetic activity index, suggesting a possible association with the penetration of a convection electric field towards low latitudes. Observations of ion density fluctuations are also used to establish the general patterns of ionospheric turbulence and to distinguish among any possible effects of seismic activity in these data that might be manifest in the upper atmosphere.