



Cluster Observations of the Modulation of Electrostatic Noise Bursts at the PC1 Frequency

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We present Cluster observations made by the Wideband Data (WBD) plasma wave receiver on March 30, 2002 of electrostatic noise bursts that are modulated at approximately 1.6 Hz. These noise bursts are observed when the Cluster spacecraft are located near the perigee of their orbit at approximately 4.5 Re, low magnetic latitude and on the nightside at about 22 MLT. At the same time, the STAFF-SC instrument observes ULF waves with a peak frequency around 1.5 – 1.6 Hz, which is consistent with the modulation of the electrostatic bursts. The ULF waves are linear and have a polarization perpendicular to the magnetic field, giving a mixture of right and left hand polarizations, putting them in the PC1 category. The electrostatic bursts are quite wideband, ranging in frequency from 200 Hz to about 4 kHz, and occasionally have well defined, isolated nonlinear electrostatic solitary waves embedded within them. The four Cluster spacecraft, which are separated on the order of about 100-200 km from each other, appear to be at or near the plasmopause boundary layer at this time. IMAGE EUV images of the plasmasphere taken around the time of the Cluster observations show the plasmopause located at about 4-6 Re, and that Cluster was likely inside a plasmaspheric notch. We show the correlation of the modulated electrostatic noise bursts with the PC1 waves, as well as other data and images to support our conclusion that the Cluster spacecraft are located in the plasmopause boundary layer, probably in a notch. We discuss the various processes that may be active to locally create the noise bursts, as well as the likely origin of the PC1 waves. We also show a case of modulated electrostatic noise bursts near the magnetopause boundary layer, showing that similar processes occur in the different boundary layers.