



Lion roars: Cluster observations

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Lion roars are intense narrow-band electromagnetic emissions with typical frequencies about 100 Hz. They propagate in the whistler mode in the Earth's magnetosheath. It has been suggested that local electron temperature instabilities are responsible for generation of lion roars. The four CLUSTER spacecraft provide us with complex measurements of the plasma parameters in a vicinity of the Earth. We have found about 5000 time-frequency intervals containing the lion roar emissions during years 2001 and 2005 from the STAFF-SA instrument (a spectral analyser of the three magnetic and two electric components). In this paper we will present a statistical study of their spatial, frequency and wave power distributions. We have frequently observed more intense emissions on the day side. We have found that the lion roars are more frequent on the dawn side than on the dusk side of the magnetosheath. We have also investigated the orientation of the wave-vectors of Lion roars calculated from measured spectral matrices using the singular value decomposition method.