TRANSVERSE SCALE SIZE OF PC3 ULF WAVES NEAR THE EXTERIOR CUSP

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The concept of a geomagnetic field line has been widely used in the study of magnetospheric physical phenomena. For example, the mode in which ULF waves propagate relates to the direction of the field, with the Alfven wave mode propagating along the field direction. Very little is known about the perpendicular extent of the propagating wave. In this paper wave coherency methods are utilized to analyse ULF waves in Pc3 band that were simultaneously observed by the Cluster-II satellites near the exterior cusp and ground stations at local magnetic noon near the footprint of the cusp. The results show that the coherency of waves observed at the ground on the H component is much larger than on the D component, which is opposite to that seen by Cluster-II in space. The coherency between the H component on the ground and the y component in space was higher than the other combination of pairs, with the coherency between the satellite and the Danmarkshavn (DNB) station having the maximum value. These suggest that the polarization of the waves are rotated by 90 degree after propagating through the ionosphere, and the magnetic footprint of Cluster-II is closest to DNB site in this time. The coherency of the Pc3 waves between the satellites is highly related with the alignment of satellite pairs with respect to the geomagnetic field direction. This may provide a transverse scale size of the geomagnetic Pc3 ULF waves near the exterior cusp at about 900 km with a coherency of 0.65.

Pc3 waves, Cusp, Coherency

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