



Pc 1-2 waves and associated wave vectors observed by Cluster

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Even though many properties of Pc 1-2 waves (0.2 - 5 Hz) in the magnetosphere have been studied, those related to the wave vector remain relatively unexplored. When its four spacecraft form a closely spaced regular tetrahedron, Cluster offers a unique opportunity to directly measure the wave vector of Pc 1-2 waves. Using the wave telescope technique, we present the results of a study of wave vectors for Pc 1-2 waves observed by Cluster. Particular attention is given to waves observed while Cluster was at apogee in the magnetotail with radial distance between 15 and 19 R_E . Harmonically structured with the fundamental frequency at or near the local ion cyclotron frequency, these waves had fluctuations parallel and perpendicular to the local magnetic field (B). Application of the wave telescope on multiple events showed propagation perpendicular to B . One event, for which the wave telescope could not be used, occurred during the plasma sheet motion studied by Marghita et al. [Annales Geophysicae, 24, 619-635, 2006] and Hamrin et al. [Annales Geophysicae, 24, 637-649, 2006] in which they identified three concentrated generator regions. This event and another were observed in the southern plasma sheet boundary layer and were associated with a nearly 1000-fold increase in ion flux near 10 keV propagating parallel and anti-parallel to B , suggesting these beams may be the source of the waves.