Geophysical Research Abstracts, Vol. 7, 03637, 2005
SRef-ID: 1607-7962/gra/EGU05-A-03637

Cluster observations of the source region of whistler-mode chorus

O. Santolík (1,2), D. A. Gurnett (3), M. Parrot (4), J. S. Pickett (3), N. Cornilleau-Wehrlin (5)

(1) Charles University, Faculty of Mathematics and Physics, Prague, Czech Republic, (2) IAP/CAS, Prague, Czech Republic, (3) Department of Physics and Astronomy, University of Iowa, Iowa City, Iowa, USA (4) LPCE/CNRS, Orleans, France, (5) CETP/UVSQ, Vélizy, France

We investigate whistler-mode chorus emissions in their source region. We analyze high-resolution waveforms recorded by the Wideband Plasma Wave Instrument (WBD) and multicomponent measurements of the spectrum analyzers of the STAFF instrument on the four Cluster spacecraft. Using the measurements of the electric and magnetic field fluctuations we determine the direction of the Poynting flux and from its divergence we deduce the central position of the source region. Comparison of the measurements on board the different spacecraft shows large-scale motion of the average source position at speeds of hundreds of km/s parallel to the magnetic field lines. We systematically obtain the central position of the source region fluctuating within a few degrees of the geomagnetic equatorial plane. Analysis of the electromagnetic planarity, reflecting the presence of antiparallel propagating waves, indicates that the global dimension of the source region is of the order of 1000 km parallel to the magnetic field lines. When the spacecraft move inside the source region we can investigate the fine structure of that region. We compute the linear correlation coefficient of the chorus intensities across the six baselines, obtaining the transverse size of the chorus wave packets of the order of 100 km. The high-resolution waveforms of chorus then reveal a fine structure of subpackets with large amplitudes embedded in the interior of the wave packets. These observations are useful for further development of nonlinear theory of generation of chorus emissions and for theory on chorus-related acceleration of radiation-belt electrons.