# ELF/VLF wave generation associated with magnetospheric compression: conjugated observations from satellite- and subauroral ground-based instruments.

*Claudia Martinez Calderon[1], Kazuo Shiokawa[1], Kunihiro Keika[1], Mitsunori Ozaki[2], Ian Schofield[3], Martin Connors[3], Craig Kletzing[4], Ondrej Santolik[5]

1.Institute for Space-Earth Environmental Research, Nagoya University, 2.Faculty of Electrical and Computer Engineering, Institute of Science and Engineering, Kanazawa University, 3.Athabasca University Observatories, Athabasca, Alberta, Canada, 4.Department of Physics and Astronomy, University of Iowa, Iowa, USA, 5.Institute of Atmospheric Physics, Prague, Czech Republic

On February 2012, during the VLF-CHAIN campaign a VLF loop antenna was installed at the Athabasca University Geophysical Observatory in Alberta, Canada. The receiver, located at subauroral latitudes (ATH, 54.7N, 246.7E, L=4.3), has continuously monitored ELF/VLF emissions since September 2012. We found a rare conjugate event of ELF/VLF waves between ATH and the RBSP-B satellite, which was associated with strong magnetic compression.
On December 23, 2014 at 11:17 UT (03:17 MLT), both ATH and RBSP-B observed a chorus-like burst centered at ~2.5 kHz showing discrete elements and lasting approximately 3 minutes. This emission was observed 2 to 3 minutes after an intense sudden commencement (SYM-H amplitude ~63 nT) caused by the enhancement of solar wind speed (~330 to ~420 km/s) and dynamic pressure (~2 to 6 nPa) during northward IMF. The increasing magnetic field on the dayside, caused by the compression of the magnetosphere, lead to betatron acceleration of plasma-sheet electrons and thus enhancement of the temperature anisotropy. This anisotropy regulates electron cyclotron instability and in turn, generates whistler-mode plasma waves.
We use survey and burst mode electric and magnetic field data from RBSP-B, combined with electron fluxes and density, to discuss the characteristics of the waves. We found that wave vectors are highly oblique and frequency dependent (lower k-vector with higher frequencies). We also found that the Poynting vector was anti-parallel to the field line, directed southwards, away from the magnetic equator. Even though this emission was associated with a slight increase of the electron fluxes between 75 to 743 keV (due to the adiabatic compression), it did not cause local relativistic electron acceleration.
All-sky and horizon imagers located at ATH allow investigation of the relationship of the compression with auroras.

Keywords: ELF/VLF, magnetospheric compression, conjugate event, subauroral latitudes

 