



## **Eleven years of Cluster observations of whistler-mode chorus**

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Electromagnetic emissions of whistler-mode chorus carry enough power to increase electron fluxes in the outer Van Allen radiation belt at time scales on the order of one day. However, the ability of these waves to efficiently interact with relativistic electrons is controlled by the wave propagation directions and time-frequency structure.

Eleven years of measurements of the STAFF-SA and WBD instruments onboard the Cluster spacecraft are systematically analyzed in order to determine the probability density functions of propagation directions of chorus as a function of geomagnetic latitude, magnetic local time,  $L^*$  parameter, and frequency. A large database of banded whistler-mode emissions and time-frequency structured chorus has been used for this analysis. This work has received EU support through the FP7-Space grant agreement no 284520 for the MAARBLE collaborative research project.