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Correlation analysis of corresponding chorus elements observed on different CLUSTER spacecraft: open questions on propagation and generation

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We perform a correlation analysis of wave packets of lower band chorus observed on four CLUSTER spacecraft during two different orbits at low latitudes. We present the correlation coefficients, characteristic frequencies and relative time shifts between the corresponding elements as a function of perpendicular and parallel separations of the spacecraft with respect to the ambient magnetic field. We demonstrate that the WBD instruments on spacecraft located closer to the magnetic equator sometimes detect chorus wave packets later than the same instruments on spacecraft located at higher magnetic latitudes. At the same time, wave propagation analysis based on multi-component data from the STAFF instruments confirms that the source region of chorus emission is located close to the geomagnetic equatorial plane. We show that this behavior can be explained taking into account that the spacecraft are located on different L-shells. We also discuss possible properties of the chorus source that may lead to these observations.