What do we learn on the role and nature of ULF waves at the magnetopause by comparing Cluster and Double Star data ?

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It is now well know that the magnetopause, and the magnetosheath in its close vicinity, are the seat of strong ULF wave activity. These turbulent-like waves are possibly one of the contributors to particle penetration from the Solar Wind to the Magnetosphere through the magnetopause. The similarity of STAFF (waves), FGM (magnetometer) and HIA (ion detector) experiments onboard Cluster and Double Star TC1 spacecraft permits the comparison of those waves together with the local plasma parameters during coordinated magnetopause crossings, at the same local time, but at different latitude; the TC1 Double Star orbit being nearly equatorial and the Cluster one polar. The DSP/Cluster comparison gives access to global wave characteristics, whereas Cluster data set, especially in 2004 where the spacecraft separation was about 200 km, can give access to the mode(s) present in turbulent wave spectra (Saharaoui et al, 2003). For the first half of year 2004, a data set of 21 Cluster and DSP coordinated magnetopause crossings has been identified, i.e. within less than 3 hours, out of which 16 are within one hour time delay. A first analysis of some characteristics of the ULF wave data in the vicinity of these crossings has been done, concerning in particular the wave power and frequency spectra power law. These results first confirm the relation between the solar wind pressure and the ULF wave power. They indicate that, in most cases, the wave power measured by Double Star, at low latitude, is stronger than the one measured by the Cluster spacecraft at high latitude, whereas no local time dependence has been found. If those first results were to be confirmed, it could imply a predominant role of the equatorial plane in the solar wind/ magnetosphere coupling via ULF wave turbulence, with no preference for the sub-solar region. In order to better determine the nature of those ULF waves, the first results recalled above will be complemented by an analysis of the correlation of the wave characteristics with the local plasma parameters, as temperature anisotropy and plasma beta, and possibly an analysis of the ULF turbulence wave mode for different events. In order to improve the validity of the statistical results, the data set will be extended to more recent coordinated crossings.