



Statistical survey of compressional Pc3 pulsations at low Earth orbit observed by CHAMP

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The CHAMP satellite, which has a near polar (inclination 87.3°) orbit with an altitude of ~ 350 - 450 km, yields a unique opportunity to study the compressional Pc3 wave activity at low Earth orbit (LEO) for the first time. An advantage of this orbit is the global coverage provided by the high inclination and the local time variation of the satellite's ground track, which makes it possible to investigate the local time dependence of wave activity. As a result of a statistical survey, it was concluded that compressional waves with upstream origin can be found also in the topside ionosphere. The amplitude of these pulsations peaks at the geomagnetic equator in the pre-noon sector. It is likely that UWs reach the ground propagating inward directly from the subsolar magnetopause, although there may exist additional channels through the cusp region. The possible role of cavity resonances at low latitudes seems to be secondary. The close relation between both the observed compressional wave activity and IMF orientation, as well as wave frequency and IMF strength support this picture.

The other important result of this survey is the first demonstration of the Doppler shift of UWs by the solar wind in the magnetosheath, as predicted by the theory, i.e. it is shown that the UW frequency, which is controlled primarily by the IMF strength, also depends on the Alfvénic Mach number in the upstream region.