



Effects of mass density enhancements on VLF transmitter signals

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We study the variation of the electric field measurements recorded by DEMETER micro-satellite above specific very low frequency (VLF) transmitters. The investigated period starts from August 2004 to December 2010. The VLF signals are combined with the mass density measurements recorded, in the same time interval, by GRACE and CHAMP satellites. Particular enhancements of the mass densities were observed at polar and sub-polar regions by both satellites. Those mass density enhancements are found to propagate from the northern or southern hemisphere to the equator region. We attempt in this study to analyse the VLF signal variations in the time interval where the mass density enhancements are recorded. Such disturbances of the atmosphere can probably affect the Earth's ionosphere. The VLF signal may be attenuated and then not detected by DEMETER. We find that it is the case at some specific occasions. Nevertheless we show that several parameters have to be taken into consideration: (a) the origin of the mass density enhancement in the polar region (e.g. solar particles), (b) its phase speed from the pole to the equator and (c) the satellite (CHAMP, DEMETER, GRACE) local time.