



## Study of mass density enhancements at high geomagnetic latitudes

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We report on mass density deduced from measurements of the accelerometer onboard Gravity Recovery And Climate Experiment (GRACE) satellite. The investigated period starts from the beginning of November 2004 to the end of September 2007. In this time interval maximum mass densities (MMD) have been recorded by GRACE satellite at more than ten occasions. These MMD events are observed when the satellite is located near the auroral regions at high geomagnetic latitudes. We combine the MMD events and radio VLF signals recorded by ICE experiment onboard DEMETER satellite. We principally consider the reception onboard the DEMETER satellite of the VLF signals emitted by ground transmitters in the frequency range between 10 – 40 kHz. The VLF radio signals provide helpful information on the perturbations in the upper-atmosphere/lower-ionosphere layers. We emphasize in this work on the time delay between the observations of the MMS events onboard GRACE satellite in the polar regions and the disturbances of the VLF transmitter signals on DEMETER satellite at sub-polar regions. We discuss the origin of the MMD events by taking into consideration the particle environments in the cusps and auroral regions. Then we attempt to clarify how the maximum mass density events observed close to the polar regions progressed towards the mid-latitude regions and disturbed the detection of the VLF transmitter signals.