

Scale sizes of mass density enhancements inferred from accelerometer measurements

*Yanshi Huang¹, Cheryl Huang²

1. Harbin Institute of Technology, Shenzhen, China, 2. Space Physics Directorate, Air Force Research Laboratory, Kirtland AFB, USA

The spatial scale sizes of neutral mass density enhancements inferred from the accelerometer measurements on CHAMP and GRACE satellites are analyzed. Density enhancements are found as the peaks with more than 30% above the average density baseline fitted over a 90 degree magnetic latitude window. The widths of mass density peaks are defined in two different methods, one using the maximum above the average density baseline, the other method using the two minima surrounding each one density peak above a threshold value. We study various cases including one-peak and multi-peak cases using high-resolution density data from year 2002 to 2010. The results give a statistical understanding of the scale sizes of the density enhancements observed at high and polar latitudes. The scale sizes using the baseline are rather independent of solar activity, and the average is over 2500 km, whereas the scale sizes using adjacent density minima vary with solar activity, and the mean value is more than 1000 km. No significant different results are found between northern and southern hemisphere. We also investigate the impact of these mass density peaks on the orbit-averaged densities.

Keywords: neutral mass density , accelerometer measurements , CHAMP and GRACE satellites , spatial scale sizes