

Analysis and modelling results using CHAMP/STAR density data

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The CHAMP mission profile is particularly interesting for upper atmosphere studies, since it provides a nearly complete latitudinal coverage, while complete solar local time sampling is achieved approximately every four months. Total atmospheric densities have been derived from STAR accelerometer measurements from May 2001 through December 2005. During that time, CHAMP has measured the response of the thermosphere to virtually every significant geomagnetic storm, including the largest one ever recorded. Satellite and instruments are still healthy; in a few years, CHAMP will very probably be the first mission to provide the community with consistent and geographically well-distributed density data, covering solar maximum to minimum. Since March 2002, accelerometer data from the GRACE satellites can also be used to derive densities, although a more complex processing is required. A short analysis of CHAMP and GRACE density observations, made when both satellites were in the same orbital plane, will be given.

These densities can be used to study the following, non-exhaustive, list of topics: 1-analysis of short- and long-term thermospheric variability; 2-evaluation of proxy-indicators for solar or geomagnetic activity, such as F10.7, the chromospheric Mg II index, E10.7, sectorial kp; 3-thermospheric wave activity/travelling atmospheric disturbances related to solar storm events; 4-thermosphere model error analysis and improvement. An overview of results obtained over the last 5 years for these 4 topics is given. Fall 2006 will mark the start of a major revision of the DTM-2000 model: new solar and geomagnetic activity proxies will be used, and the CHAMP and GRACE density data assimilated.