



Ionospheric electron density profiles obtained with CHAMP/GPS occultation measurements – initial results from GFZ

C. Arras (1), W.-K.Lee (2), J. Wickert (1), S. Heise (1), G. Beyerle (1), T. Schmidt (1), M. Rothacher (1), N. Jakowski (3)

(1) GeoForschungsZentrum Potsdam, Germany (arras@gfz-potsdam.de)

(2) Korea Astronomy and Space Science Institute

(3) DLR Institute of Communications and Navigation Neustrelitz

The Global Positioning System (GPS) radio occultation signals received by a low-Earth orbit satellite provide information about lower atmospheric and ionospheric variables. CHAMP, the German geoscience satellite, has collected measurements from about 400,000 occultations since its launch in July 2000. These data form a unique global long-term dataset of ionospheric profiles, but also of other geophysical variables as temperature, pressure and water vapour in the lower atmosphere.

We present initial GFZ electron density profiles from CHAMP. To receive electron densities from calibrated TEC (Total Electron Content) data the so-called onion peeling method is used. This method solves the electron densities iteratively starting at the top altitude. The profiles are validated with corresponding data processed by UCAR (University Corporation of Atmospheric Research) and DLR Neustrelitz and independent PLP (Planar Langmuir Probe) measurements from CHAMP. These studies are complemented by case studies comparing the profiles with ground based ionosonde measurements.

The high vertical resolution of the profiles reveals thin vertical ionospheric structures such as sporadic E layers. These layers of enhanced electron density appear predominantly during summer in the lower ionosphere and have a considerable effect on GPS

radio occultation signals. Important information on the altitude and on the intensity of these irregularities can be derived.