Geophysical Research Abstracts, Vol. 9, 06987, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-06987

Climate monitoring with CHAMP and FORMOSAT-3/COSMIC radio occultation data

U. Foelsche (1), M. Borsche (1), B. Pirscher (1), A.K. Steiner (1), J. Wickert (2) and G. Kirchengast (1)

(1) Wegener Center for Climate and Global Change (WegCenter) and Institute for Geophysics, Astrophysics, and Meteorology (IGAM), Univ. of Graz, Austria (ulrich.foelsche@uni-graz.at), (2) GeoForschungsZentrum (GFZ), Potsdam, Germany

Radio Occultation (RO) data, using Global Navigation Satellite System (GNSS) signals, are well suited for monitoring global climate change. The special climate utility of RO data arises from their long-term stability due to their self-calibrated nature. The German research satellite CHAMP (CHAllenging Minisatellite Payload for geoscientific research) continuously records RO profiles since August 2001, providing the first opportunity to create RO based climatologies for a multi-year period of over 5 years. We have built seasonal and zonal mean climatologies of atmospheric (dry) temperature, refractivity, geopotential height and pressure. We show representative results with focus on dry temperatures and compare them with analysis data from the European Centre for Medium-range Weather Forecasts (ECMWF). Although we have available only about 150 CHAMP profiles per day (compared to millions of data entering the ECMWF analyses) the overall agreement between 4 - 8 km and 30 km altitude is in general very good with systematic differences < 0.5 K in most parts of the domain. Pronounced systematic differences (exceeding 2 K) in the tropical tropopause region and above Antarctica in southern winter can almost entirely be attributed to errors in the ECMWF analyses. This is confirmed by data from February 2006 onwards, where an enhancement of the ECMWF analyses became effective. The Taiwan/U.S. FORMOSAT-3/COSMIC constellation of 6 RO satellites, launched in April 2006, started to provide more than thousand RO profiles per day. We will show initial results for monthly zonal mean climatologies as well as tropical tropopause parameters based on FORMOSAT-3/COSMIC RO data, indicating excellent agreement between RO climatologies from different satellites.