Geophysical Research Abstracts
Vol. 12, EGU2010-4004, 2010
EGU General Assembly 2010
© Author(s) 2010

Observational characteristics of the tropopause inversion layer derived from CHAMP/GRACE radio occultations and MOZAIC aircraft data

Torsten Schmidt (1), Jean-Pierre Cammas (2), Stefan Heise (1), Jens Wickert (1), and Antonia Haser (1)

(1) GFZ German Research Centre for Geosciences, Potsdam, Germany (tschmidt@gfz-potsdam.de), (2) Laboratoire d'Aérologie, CNRS, Toulouse, France (Jean-Pierre.Cammas@aero.obs-mip.fr)

In this study we discuss characteristics of the tropopause inversion layer (TIL) based on two datasets. Temperature measurements from GPS radio occultation (RO) data (CHAMP and GRACE) for the time interval 2001–2009 are used to exhibit seasonal properties of the TIL on a global scale. In agreement with previous studies the vertical structure of the TIL is investigated using the square of the buoyancy frequency N. For the extratropics on both hemispheres N^2 has an universal distribution independent from season: a local minimum about 2 km below the lapse rate tropopause height (LRTH), an absolute maximum about 1 km above the LRTH, and a local minimum about 4 km above the LRTH. In the tropics (15°N–15°S) the N^2 maximum above the tropopause is 200–300 m higher compared with the extratropics and the local minimum of N^2 below the tropopause appears about 4 km below the LRTH. Trace gas measurements onboard commercial aircrafts from 2001–2007 are used as a complementary dataset (MOZAIC program). We demonstrate that the mixing ratio gradients of ozone, carbon monoxide and water vapor are suitable parameters for characterizing the TIL reproducing most of the vertical structure of N^2. We also show that the LRTH is strongly correlated with the absolute maxima of ozone and carbon monoxide mixing ratio gradients. Mean deviations of the heights of the absolute maxima of mixing ratio gradients from O_3 and CO to the LRTH are (-0.02$\pm$1.51) km and (-0.35$\pm$1.28) km, respectively.