



Comparison of water vapour and temperature results from GPS radio occultation aboard CHAMP with MOZAIC aircraft measurements

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Global Positioning System (GPS) radio occultation (RO) observations aboard Low Earth Orbiting (LEO) satellites provide a powerful tool for global atmospheric sounding. The CHAMP (CHALLENGING Minisatellite Payload) GPS RO experiment is activated continuously since mid 2001, providing up to 200 vertical atmospheric profiles per day. Basic RO observable is the atmospheric excess phase of the occultation satellite link which is used to retrieve vertical profiles of refractivity and subsequently meteorological quantities like pressure, temperature and water vapour. Since dry air and water vapour both contribute to atmospheric refractivity, vertical profiles of the tropospheric humidity can only be derived using ancillary atmospheric information from e.g. meteorological analyses. In this study we intercompare CHAMP RO humidity results and analyses from the European Centre for Medium-Range Weather Forecasts (ECMWF, used as ancillary data in humidity retrieval) with coinciding MOZAIC (Measurement of OZone and wAter vapour by Airbus In-service airCRAFT) data collected during aircraft ascents and descents. Since MOZAIC data are not assimilated to ECMWF analyses, this comparison provides an opportunity to assess whether GPS RO data provide significant additional water vapour information. Currently, the MOZAIC programme includes five aircraft performing up to 2500 flights per year. About 200 coinciding profiles with CHAMP were found from 2001 until 2005 (coincidence radius: 3 hours, 300 km). Beside the water vapour validation (ascent and descent data), we also compare CHAMP temperature results (dry retrieval) with MOZAIC cruise data at typically 10-11 km altitude.