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Validation of stratospheric temperatures in ECMWF analyses with CHAMP radio occultation climatologies from March 2002 to August 2004

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Operational analyses from the integrated forecasting system (IFS) of the European Centre for Medium-Range Weather Forecasts (ECMWF) are used for numerous applications in atmospheric sciences. The wide field of application of ECMWF analyses (often as reference dataset) makes it difficult, but at the same time particularly important, to evaluate the analysis itself. Especially the stratospheric part, which is weakly constrained by observations, is not well validated.

The radio occultation (RO) technique is based on a satellite-to-satellite limb sounding concept using global navigation satellite system (GNSS) signals to probe the Earth's atmosphere. It offers new possibilities for the evaluation of analyses by providing globally distributed profiles of temperature and geopotential height ranging from the lower troposphere to the middle/upper stratosphere with high long-term stability. Based on data from the German-US research satellite CHAMP over 2.5 years from March 2002 to August 2004, a climatological validation study focusing on ECMWF stratospheric temperatures is presented.

The results generally show good agreement between ECMWF operational analyses and CHAMP RO temperatures in their seasonal zonal means between 10 and 30 km (bias $<$0.5 K). They also reveal problems in the analyses, however, such as in the representation of the Austral polar vortex (bias up to 3.5 K). Recent changes in the ECMWF assimilation scheme (in fall 2003) apparently reduced these problems in the 20-30 km region but below 20 km the biases remain. The presentation will demon-

strate the discrepancies in detail and discuss its potential origins. The study underlines the utility of RO data for model-independent climate monitoring.