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CHAMPCLIM: Observing climate with CHAMP radio occultation data

U. Foelsche (1,2), A. Gobiet (1,2), A.K. Steiner (1,2), G. Kirchengast (1,2), M. Borsche (1,2) and J. Wickert (3)

(1) Wegener Center for Climate and Global Change (WegCenter), University of Graz, Austria [ulrich.foelsche@uni-graz.at], (2) Institute for Geophysics, Astrophysics, and Meteorology (IGAM), Univ. of Graz, Austria, (3) GeoForschungsZentrum (GFZ), Potsdam, Germany

The German/US research satellite CHAMP (CHAllenging Minisatellite Payload for geoscientific research) continuously records RO profiles since March 2002. The mission is expected to last at least until 2007, thus CHAMP RO data provide the first opportunity to create real RO based climatologies on a longer term. CHAMPCLIM is a joint project of the Institute for Geophysics, Astrophysics, and Meteorology (IGAM) in Graz and the GeoForschungsZentrum (GFZ) in Potsdam. It aims at exploiting the CHAMP RO data in the best possible manner for climate research. For this purpose, all CHAMP RO profiles provided by GFZ on excess phase level are currently processed at IGAM to obtain atmospheric profiles of refractivity, geopotential height, and dry temperature. The IGAM retrieval scheme is tailored to minimizing biases and yields a new atmospheric data set especially tuned for monitoring climate variability and change. The retrieved atmospheric profiles (about 150 profiles/day) are used to create climatologies on a monthly, seasonal, and annual basis by two different techniques: On the one hand by standard averaging-and-binning techniques, on the other hand, by 3D-variational assimilation of RO refractivity data into ECMWF analysis fields, yielding global climate analyses on a denser horizontal grid. After focus on optimizing the RO data processing for climate applications and validation of the retrieval results using various reference data sources (now continued as "background" activity), the main emphasis is currently the creation of global climatologies including error estimates. After an overview on the status of the CHAMPCLIM project, we will focus on dry temperature climatologies from seasons within spring (MAM) 2002 to summer (JJA) 2004, obtained by averaging-and-binning. Our results show that useful

dry temperature climatologies resolving horizontal scales $>$ 1000 km can be obtained even with data from a single RO receiver. RO based climatologies have the potential to improve modern operational climatologies, especially in regions where the data coverage and/or the vertical resolution and accuracy of RO data is superior to traditional data sources.