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Optimal Fusion of Radio-Occultation Data with ERA40 Derived Background Fields within a 3D-Var Framework to Conduct Climate Studies on a Monthly Mean Base.

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The global coverage all- weather capability long term stability and high accuracy of RO measurements makes them an ideal candidate to build global climatologies of fundamental variables. The development of global climate maps based on such RO data from the GRAS instrument onboard the forthcoming Metop satellite is ongoing at the GRAS SAF. With the successful launch of CHAMP in summer 2000 and the start of the Radio-Occultation Experiment in February 2001 the number of available RO based atmospheric profiles increased in a way that makes climatological studies and test runs feasible. A 3D-Var System for assimilation of refractivity profiles derived from RO measurements and its first trial runs are discussed. The system is tuned for high vertical and moderate horizontal resolution best suited for the spatial characteristics of these satellite based observations. The used grid is a fully GCM compliant Gaussian Grid (T42L60 based on ECMWF conventions). The first guess data used is temperature, specific humidity and surface pressure derived from 21 years (1980-2000) of monthly mean ERA40 data fields, covering a period marked by the increasing and lately extensive use of satellite observations within GCM's, improving the analysis quality of remote and data sparse areas (especially over the southern hemisphere) significantly. To use the RO observations in an optimal way an intermediate approach was chosen, so the profiles are assimilated at the refractivity level. This system will

provide somewhat background dependent global data products of temperature, specific humidity and surface pressure in contrast to the RO only derived climatologies which are currently under development. As a test bed for impact studies and climate analysis trials, a sub-set of quasi operational processed CHAMP RO-refractivity profiles over the summer season 2003 is used. The results of this study will be shown.