



4D-var assimilation of CRISTA-NF H₂O, MIPAS-IMK and MLS retrievals with the high resolution SACADA system

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In order to draw full advantage from high resolution limb sounding instruments, like CRISTA-NF, the grid configuration of the SACADA assimilation system has been improved. SACADA is a 4-dimensional variational assimilation system for trace gas observations. Kernel of this system is a novel global chemistry transport model and its adjoint version. The German Weather Service global forecast model (GME) serves as an online meteorological driver, and the icosahedral grid structure, the horizontal transport and the parallelisation strategy are adopted from GME. For this study horizontal and vertical resolution of model grid was refined: Now the distance of the horizontal grid points is about 150 km and vertical separation between grid levels is less than 1 km below 22 km altitude. In order to better describe chemical processes in the lower stratosphere/upper troposphere (UT/LS) the chemistry module was extended and revised.

The improved system was tested by means of a case study: Assimilation of MIPAS retrievals provided by IMK (Research Centre Karlsruhe) and MLS data with old and new grid configuration served as a baseline run. Additionally, data from the CRISTA-NF instrument, which has been operated onboard the Russian high altitude research aircraft M-55 Geophysica, was assimilated. These CRISTA-NF observations have been taken during the SCOUT-O3 Tropical Aircraft Campaign (4th Nov. - 11th Dec. 2005) by ICG I (Research Centre Julich). It is demonstrated that the H₂O-analysis based on the additional CRISTA data in the UT/LS region improves considerably with the

SACADA high resolution configuration.