

Space Studies of the Earth's Surface, Meteorology and Climate (A)
Atmospheric Chemistry and Physics of Our Changing Planet (A1.1)

RETRIEVAL OF TEMPERATURE AND OZONE PROFILES IN THE UPPER TROPOSPHERE / LOWER STRATOSPHERE AS MEASURED BY GLORIA DURING ESSENCE11

Joerg Blank, j.blank@fz-juelich.de
Forschungszentrum Juelich, Juelich, Germany
Joern Ungermann, j.ungermann@fz-juelich.de
Forschungszentrum Juelich, Juelich, Germany
Tobias Guggenmoser, t.guggenmoser@fz-juelich.de
Forschungszentrum Jülich, Jülich, Germany
Martin Kaufmann, m.kaufmann@fz-juelich.de
Forschungszentrum Juelich, Juelich, Germany
GLORIA

N. Bayer, J. Blank, R. Dapp, M. Dick, A. Ebersoldt, H. Fischer, F. Friedl-Vallon, T. Gulde, G. Günther, F. Hase, M. Höpfner, M. Kaufmann, A. Kleinert, E. Kretschmer, T. Kulesa, G. Maucher, T. Neubert, H. Nordmeyer, H. Oelhaf, F. Olschewski, J. Orphal, C. Piesch, P. Preusse, M. Riese, H. Rongen, C. Sartorius, G. Schardt, H. Schneider, A. Schönfeld, M. Kumar Sha, O. Suminska-Ebersoldt, V. Tan, J. Ungermann, B. Vogel

The Gimballed Limb Observer for Radiance Imaging in the Atmosphere (GLORIA) is a new remote sensing instrument combining a Fourier transform infrared spectrometer with a highly flexible gimbal mount. Measurements are made with uniquely high spatial and spectral resolution by a 2-D detector array. The gimbal frame allows to turn the instrument's line of sight forward and backward, so that air masses can be observed from different directions.

We developed the JUTIL toolkit (Juelich tomographic inversion library) and the JURASSIC2 forward model to calculate atmospheric profiles from measurement data. JUTIL provides general methods to solve large scale inverse problems, JURASSIC2 is a fast radiative transport model based on the Emissivity Growth Approximation (EGA). As each spectral sample can contain thousands of separate spectral lines for each of the contributing trace gases, the selection of appropriate spectral windows is a non trivial task. We will present a method to select good spectral windows based on the Shannon Information content. Our method provides a fast selection algorithm which uses genetic optimization on whole ensembles of spectral windows.

During December 2011 the instrument was flown for the first time on the Russian Geophysica M-55 research plane over Kiruna (Sweden). At that time, there was a very strong and cold polar vortex with several filamentary structures at its boundary and within the operation radius of the aircraft. preliminary fields of temperature and ozone abundance obtained during the ESSenCe campaign will be presented and compared to 3-D model calculations.