The Upper Troposphere-Lower Stratosphere (UTLS) is crucial for the atmosphere in terms of radiative forcing and climate. However, the highly interconnection of dynamics, chemistry, radiation and microphysics makes it possibly the most complex and highly variable layer of the atmosphere, preventing until today to determining in detail its behavior and influence on the troposphere.

Satellite missions, with their global and multi-year coverage, give unprecedented possibilities in studying the physical and chemical quantities of the atmosphere, as their distribution, variability and long term trends. Among these missions, the Michelson Interferometer for Passive Atmospheric Sounding (MIPAS), onboard ENVISAT limb sounds the upper troposphere and stratosphere since March 2002.

Measurements from MIPAS, both in its original configuration (July 2002-March 2004) and in its new configuration (since January 2005) have been analyzed with the 2-D tomographic Geo-fit Multi-Target Retrieval (GMTR) system.

The UTLS-1 observation mode is, as expected, with its finer measurement grid in the UTLS both in the vertical and in the horizontal domain, making it highly suitable for UTLS studies, from troposphere-stratosphere intrusion events to long term chemistry trends. In this paper we present an insight into these measurements.

The GMTR [1] is an open source code specifically designed for MIPAS measurements, delivered to ESA to be included in the BEAT tools repository [2]. The GMTR inversion system is based on the Geo-fit approach [3] upgraded with the Multi-Target Retrieval (MTR) functionality [4]. The Geo-fit approach performs a 2-D retrieval of the whole orbit adopting a 2-D discretization of the atmosphere which enables to model horizontal atmospheric inhomogeneities. The MTR method fits simultaneously target species that can interfere, thus eliminating the systematic error components due to the propagation of the uncertainties on p, T and on the amount of molecules that generate interfering spectral features. The capabilities of the GMTR are particularly important in regions such as the polar vortex or the day-night terminator where strong horizontal gradients are poorly reproduced by common 1-D retrievals [5].

The MIPAS2D database contains 2-D fields of pressure, temperature and Volume Mixing Ratio (VMR) of six key atmospheric constituents (H2O, O3, HNO3, CH4, N2O and NO2) from MIPAS full resolution, optimized resolution and UTLS-1 measurements. The derived fields are provided on a retrieval grid defined as follows: in the vertical domain the grid is defined by the nominal tangent altitudes of the full resolution measurements while in the horizontal domain profiles are retrieved every 5 degree latitude (thus equispaced) along the entire orbit track (this latter option is possible only with a 2D retrieval system).

Fig. 4 maps show five-days averaged values of temperature, and VMRs of ozone, nitric acid, water vapor, methane and nitrous oxide in the Antarctic region.

References