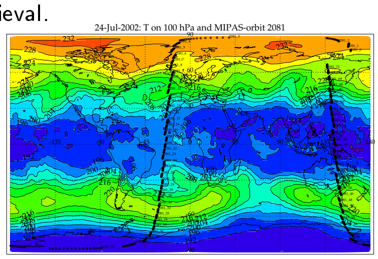
Forschungszentrum Karlsruhe
in der Helmholtz-Gemeinschaft

[a] Forschungszentrum Karlsruhe, Institut für Meteorologie und Klimaforschung,
Postfach 3640, 76021 Karlsruhe, Germany
[b]Instituto de Astrofísica de Andalucía (IAA) CSIC, Apartado Postal 3004, 18080 Granada, Spain
G.P. Stiller[a], T. von Clarmann[a], H. Fischer[a], B. Funke[b], N. Glatthor[a], U. Grabowski[a],
M. Höpfner[a], S. Kellmann[a], M. Kiefer[a], A. Linden[a], G. Mengistu Tsidu[a], M. Milz[a],
T. Steck[a], D.Y. Wang[a]

Retrievals of trace species in the UTLS region from MIPAS/ENVISAT

MIPAS measurements and retrievals

- Level-1b data: Orbit 2081, measured on 24 July 2002, during commissioning phase.
- Retrievals done with non-operational KOPRA-RCP processing system.
- Retrieval is based on constrained multi-parameter, mult-microwindow least-squares-fitting.
- Constituent retrievals based on temperature/line-of-sight retrieval performed in a preceding step.
- Cloud-contaminated spectra excluded from retrieval.

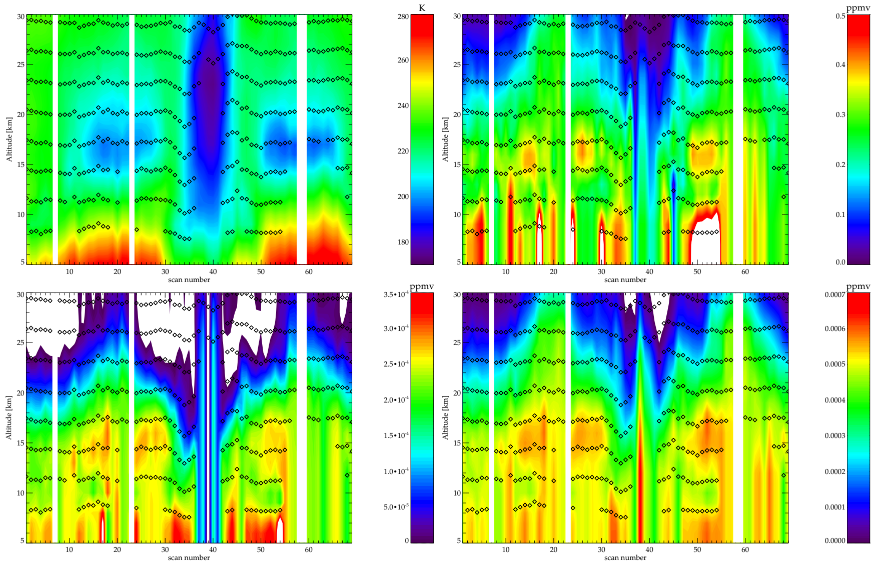


Scan geolocation and ECMWF temperature distribution at 100 hPa (appr. 16 km altitude).

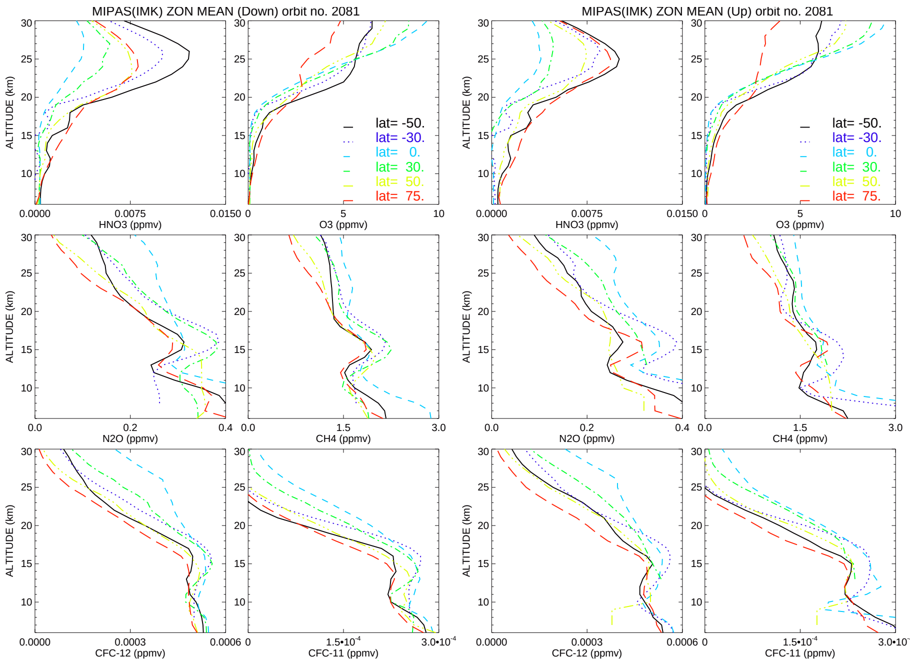
Retrieval artefacts or atmospheric dynamics?

UTLS tangent altitudes often are excluded from retrieval because they trigger errors which are propagated to higher altitudes; here we assess the benefits of their inclusion.

- Intrusion of stratospheric air into the troposphere seems visible near the subtropical barrier.
- All source gas profiles show similar shapes → excludes gas specific artefacts in analysis.
- Some source gas profiles seem biased high; no explanation so far.
- The following candidate reasons for potential retrieval artefacts have already been excluded: non-linear random error mapping; spectroscopic issues; asymmetric field-of-view (FOV) distortions; solar straylight; temperature error propagation.
- Horizontal temperature gradients are compensated for by retrieving (1-D) the temperature field.
- Currently under investigation: terrestrial straylight; symmetric FOV distortion; undetected clouds.
- Geophysical validation has not yet been feasible due to sparse data basis at these geolocations/altitudes.



Along-orbit distribution of temperature (top left), N_2O (top right), CFC-11 (bottom left), and CFC-12 (bottom right). The diamonds mark the positions of tangent points as retrieved in a preceding step. Note the low volume mixing ratios around 10 to 12 km for scans no. 12 to 17, around scan no. 30, and for scans no. 47 to 54.



Zonal mean profiles for various trace species from orbit 2081 data for day (down-leg, left) and night (up-leg, right); latitude bins: -60^o to -40^o; -40^o to -20^o; -20^o to +20^o; +20^o to +40^o; +40^o to +60^o; +60^o to +90^o. Values below altitude of lowermost used spectrum were excluded from averaging since dominated by *a priori* information. Most structured profiles occur in the subtropical barrier region (-30^o and +30^o bins).

Acknowledgment: We thank ESA (esp. H. Nett, ESTEC) for providing us with MIPAS data during commissioning phase. Meteorological analyses were provided by ECMWF via the NILU data base. Part of the work was funded by BMBF under contract 01SF9953/8.