



VALIDATION OF TRACER MEASUREMENTS BY THE ENVISAT CHEMISTRY INSTRUMENTS BY MEANS OF IN SITU OBSERVATIONS FROM BALLOON AND AIRCRAFT

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Conclusion, Summary and Outlook



The TRIPLE Gondola and its instruments

Independent in-situ measurements

Three main instruments:

- ✦ Cryogenic Whole air sampler BONBON
- ✦ Lyman - alpha Hygrometer FISH
- ✦ Chemical Conversion Resonance Fluorescence BrO/ClO

Guest instrument for SCIA validation flight:

- ✦ Tunable diode laser instrument CHILD

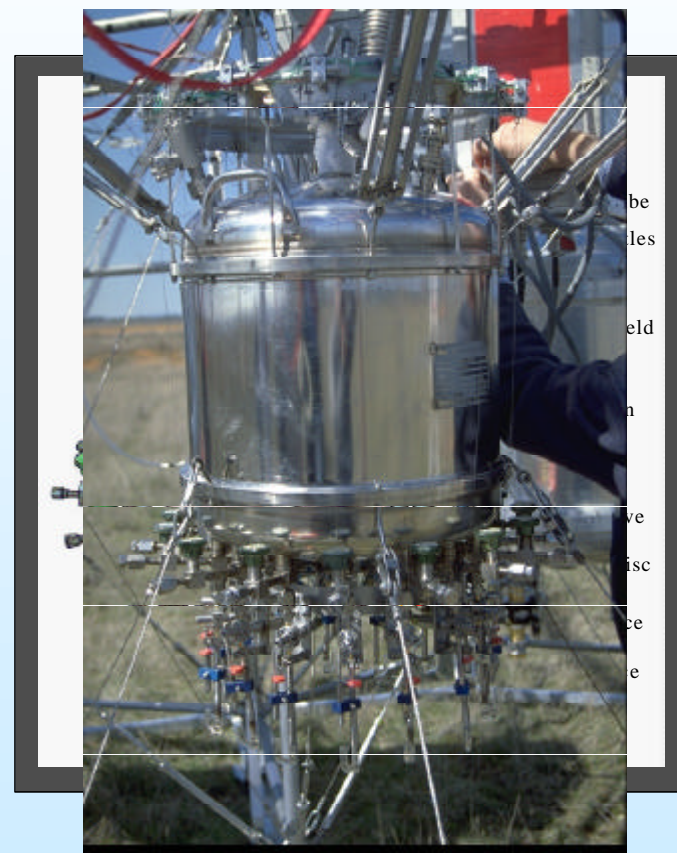


Planned and Realised Balloon Observations

Date	Launch site	comment
24.09.2002	Aire sur l'Adour, France, (44°N, 0°W)	succesfull mid latitude flight, up to 33 km
06.03.2003	Esrangle, Kiruna Sweden 68°N, 21°E	succesfull high latitude flight, up to 32 km
June 2003	Esrangle, Kiruna Sweden 68°N, 21°E	ongoing activity
Fall 2004	tropics	launch site and date under discussion



Cryosampler BONBON on the TRIPLE Gondola





Airborne Validation with Geophysika

Multi-Instrument payload

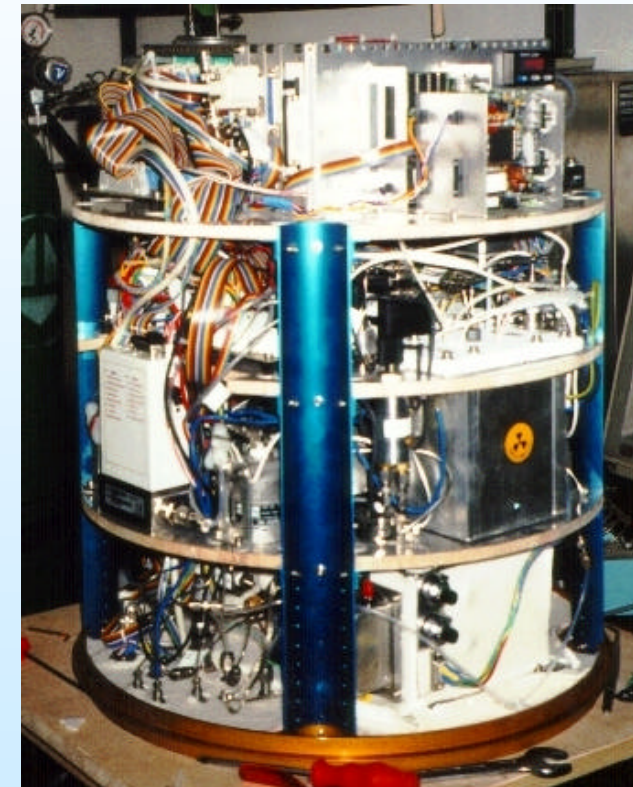
ceiling altitude 20 km

in-situ GC HAGAR: validation of CH₄ and N₂O

Date	Launch site	comment
July 2-26, 2002	Forli, Italy (44°N, 12.5°E)	4 successful flights first test of CH ₄ channel
October 1-29, 2002	Forli, Italy (44°N, 12.5°E)	7 successful flights
February 24 - March 20, 2003	Kiruna, Sweden 68°N, 21°E	5 successful flights



The in-situ GC HAGAR on board M55 Geophysika





BONBON and HAGAR

Ceiling of up to 35 km
relatively low temp. res.
many species measurable
15 samples per flight
mainly *vertical* information

Ceiling of 20 km
relatively high temp. res.
less species measurable
up to 400 meas. per flight
mainly *horizontal* information

Both instruments yield CH₄ and N₂O validation with a precision better than 1 % and an absolute error of better than 2 %.

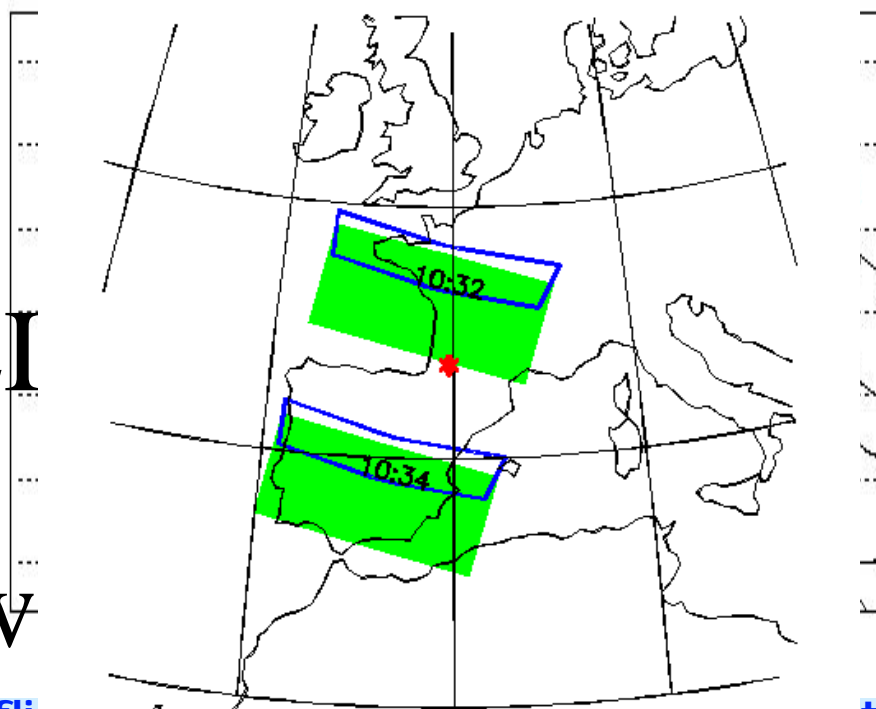


Balloon Flight on 24.9.2003

CO LOCATION SCIAMACHY - LI

good co-location w orbit 2968

SCIAMACHY overpasses on 24-SEP-2002



Back and Forward Trajectories started along flight

altitude



Balloon Flight on

24.9.2003

CO LOCATION

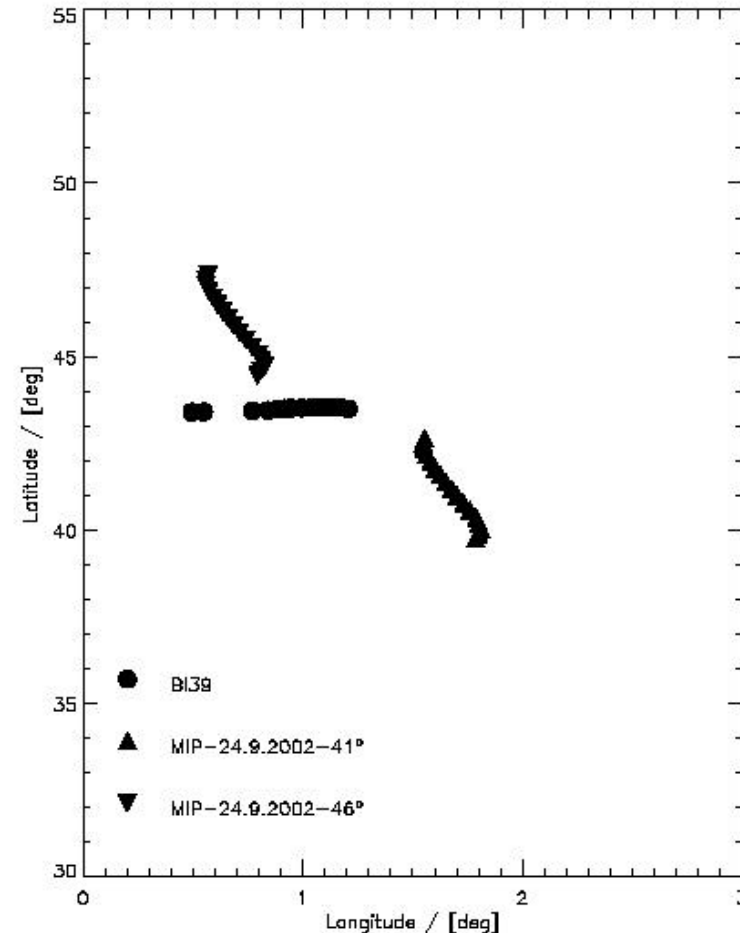
MIPAS - E

orbit 2975

12 hrs time delay

much better timely match

with orbit 2968



DATA



INSTITUT FÜR METEOROLOGIE UND GEOPHYSIK, PHYSIK DER ATMOSPHERE
JOHANN WOLFGANG GOETHE UNIVERSITÄT FRANKFURT

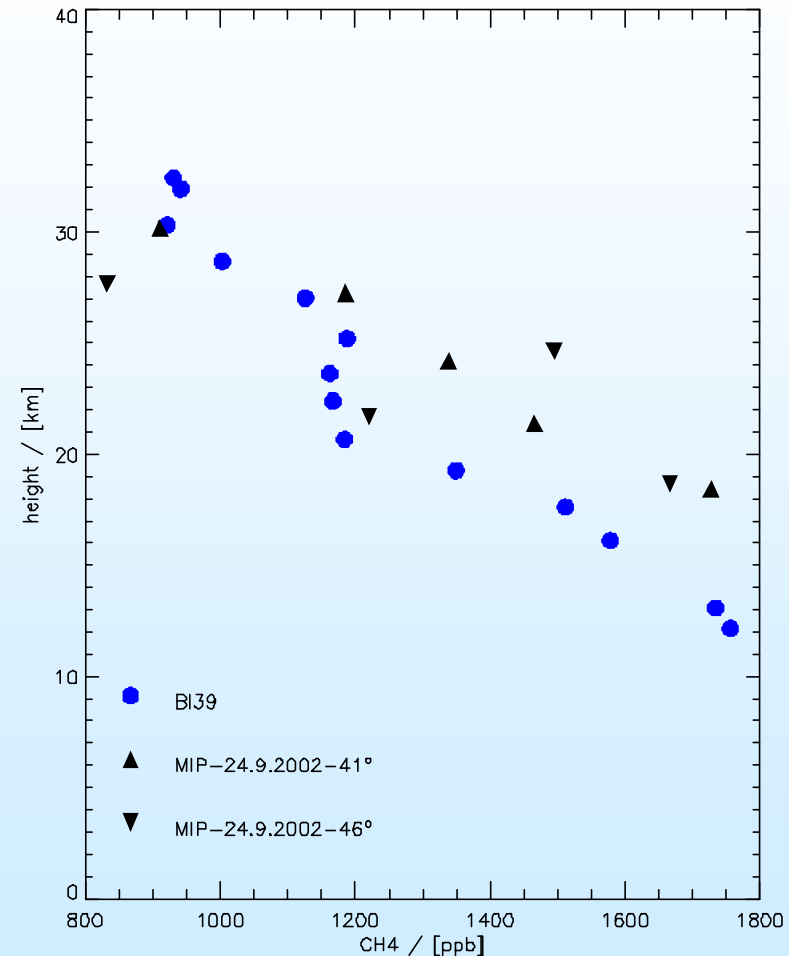
INTERCOMPARISON:



24.9.2003

Methane

MIPAS: triangles
(orbit 2975)

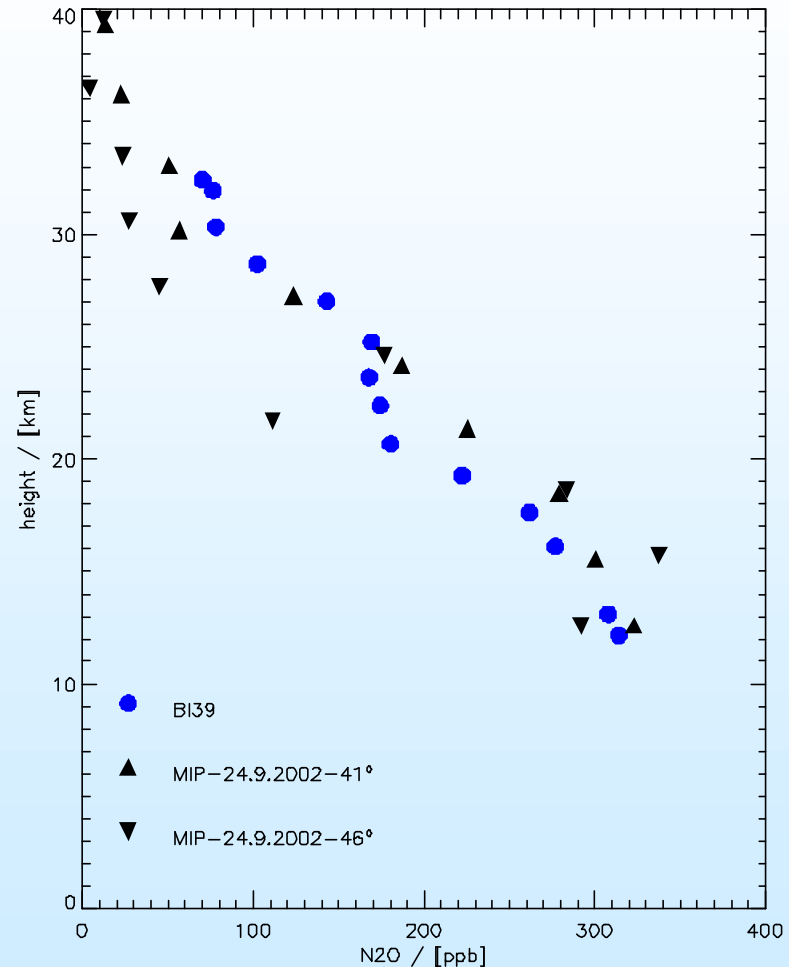


INTERCOMPARISON:

24.9.2002

N₂O

MIPAS: triangles
(orbit 2975)



TRIPLE (BONBON): dots



TRIPLE Validation Flight on

6.3.2003

No Satellite

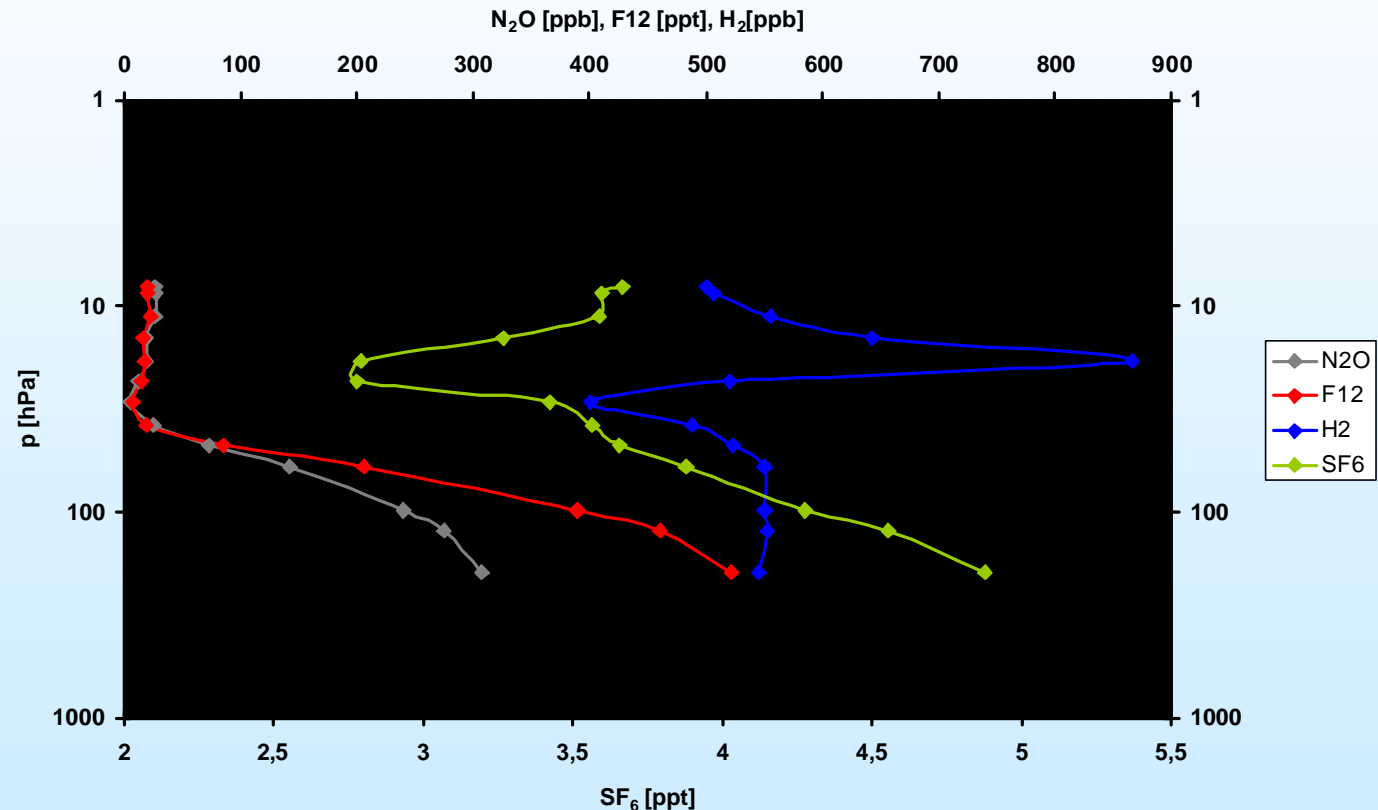
Data available

Good co-location with
MIPAS-E and SCIA

inside vortex
measurements

SF₆ loss

mesospheric air

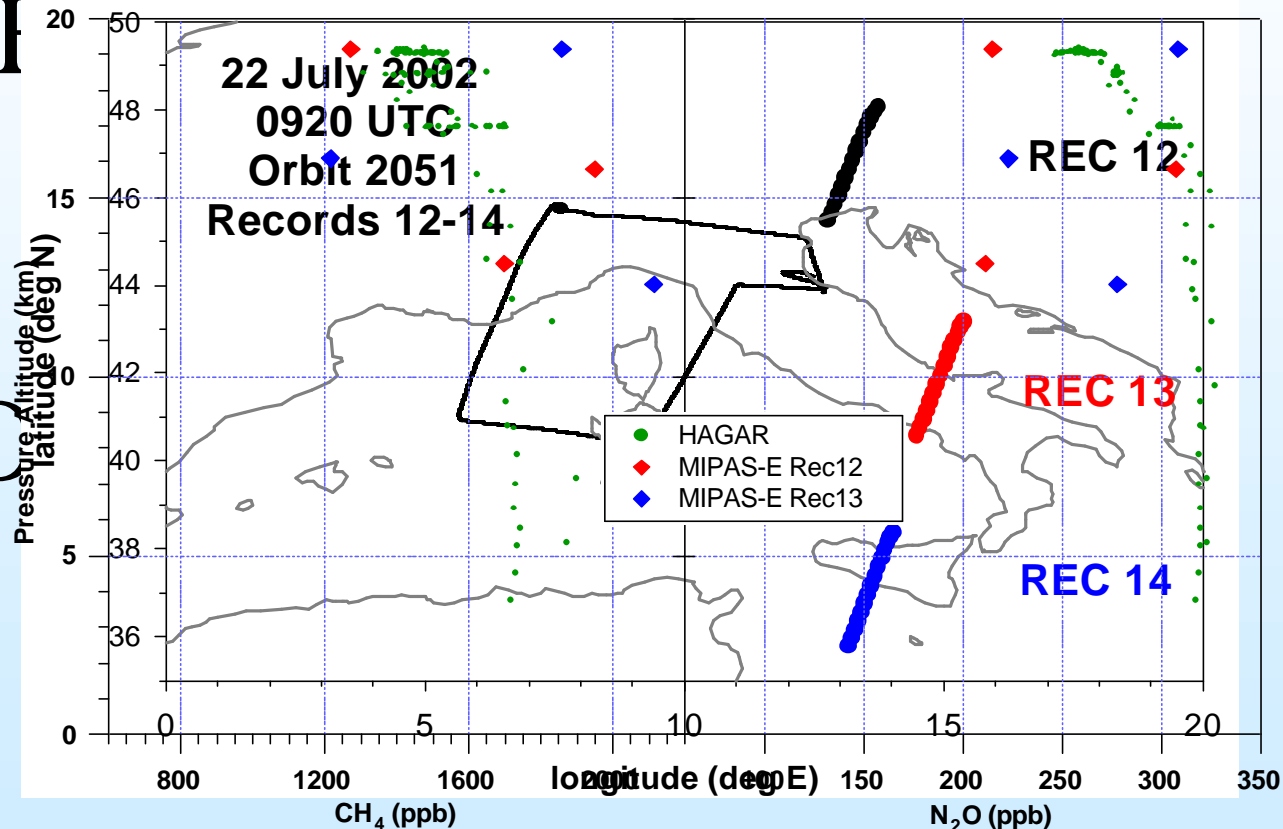




Geophysika I

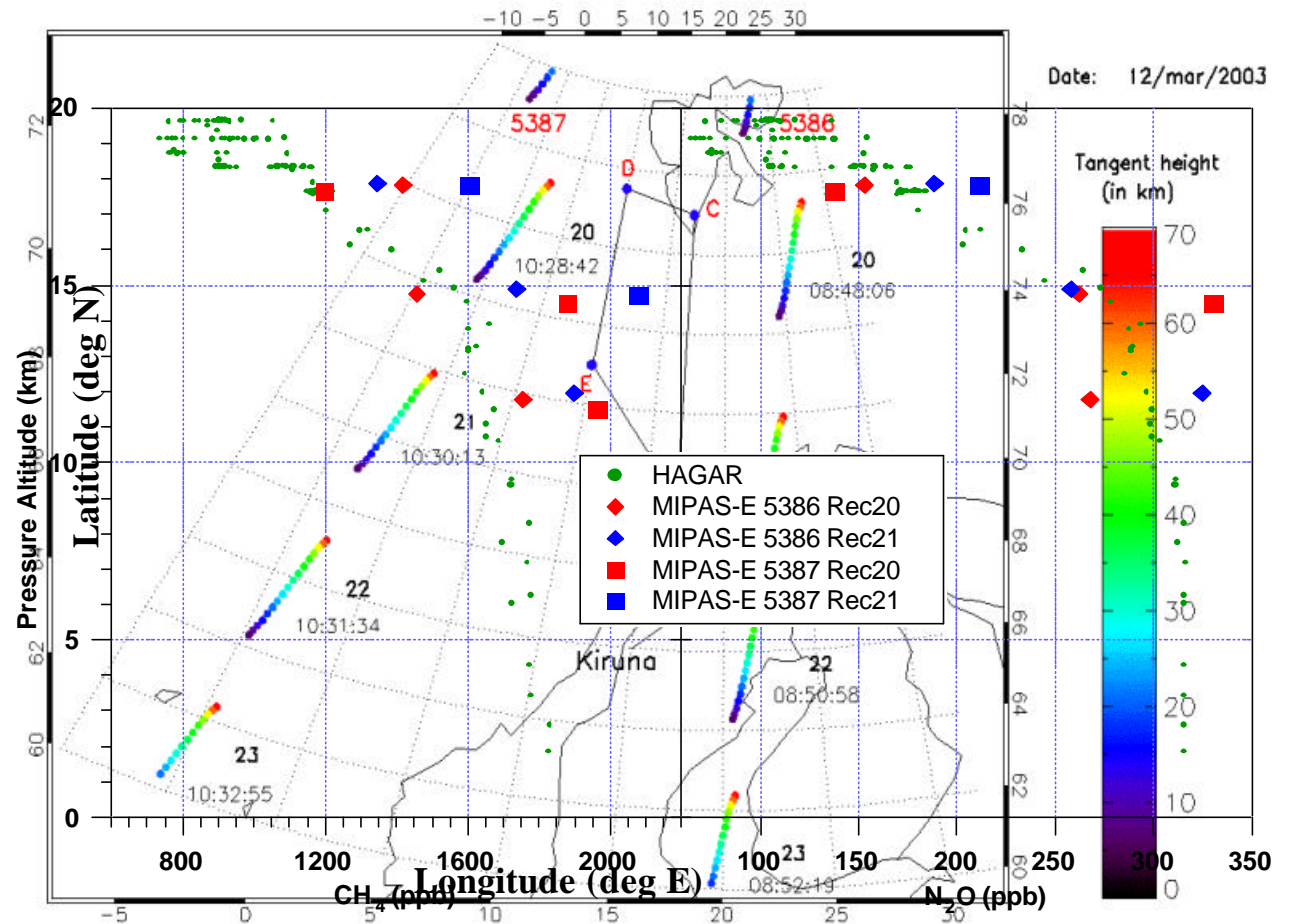
22.7.2002

Co-Location CH₄ and N₂O Validation





Geophysika 12.3.2003 Co-Location CH₄ and N₂ Validation





Conclusions and Summary

Generally reasonable co-locations in time and space with MIPAS-E for both the balloon and the Geophysica flights.

MIPAS-E CH₄ and N₂O data show much larger scatter than the HAGAR and BONBON in situ observations.

MIPAS-E CH₄ profiles exhibit mostly a high bias (up to 30%) below 25 km compared to HAGAR and BONBON

MIPAS-E N₂O profiles show mostly reasonable (~15%) agreement with the in situ data, but exhibit a significant low bias compared to midlatitude HAGAR data below 20km on July 22, 2002 and BONBON data above 22km on Sept. 24, 2002.



Summary, Outstanding issues and Problems

No SCI A Limb data from the I R channels so far
MIPAS-E data only for very few orbits available
intercomparisons to be enhanced by mapping
difficulty in accessing ENVI SAT data
handling of HDF data format for submission of validation data



Further Validation Activities

- ✍ Measurements in the Geophysika validation programme is finished
- ✍ One arctic summer balloon flight planned from Kiruna in June 2003 in the frame of the German national HGF project for ENVI SAT-MI PAS validation.
- ✍ Tropical validation flight envisaged for fall 2004
- ✍ Long-term validation to be determined.