

MIPAS Temperature

ESABC (ENVISAT Stratospheric Aircraft and Balloon Campaign)

Cornelis E. Blom

Forschungszentrum Karlsruhe

With contributions from (PI's)

Joëlle Ovarlez, LMD, Ecole Polytechnique, Palaiseau

Hermann Oelhaf, IMK, Forschungszentrum Karlsruhe

Claude Camy-Peyret, LPMA, Univ. Pierre et Marie Curie, Paris

Valery Catoire, Universite d'Orleans

Kelly Chance, Harvard-Smithsonian for Astrophysics, Cambridge MA

TEAMS: FIRS-2, ELHYSA, SPIRALE, MIPAS-B, LPMA, MIPAS-STR

MIPAS Temperature Validation

- correlative T data mainly from the GBMCD and MASI
- Relatively small contribution from ESABC
V4.61 for 2002 and 2004 (2003 will follow later)
- Accurate T data from MIPAS essential for the retrieval of the trace gases.
Species derived from the short wavelength channels (NO₂ but also CH₄ and N₂O) depend strongly on the retrieved T.
HNO₃ and O₃ (from the long wavelength channel) less sensitive on T.

Correlative T Data from the ESABC subgroup

- ☞ V 4.61
- ☞ 20 October 2002 : FIRS-2
- ☞ 11 March 2004 : ELHYSA
- ☞ 24 September 2002 : MIPAS-B
(Comparison of V 4.61 and V 4.55 for 24 September 2002)

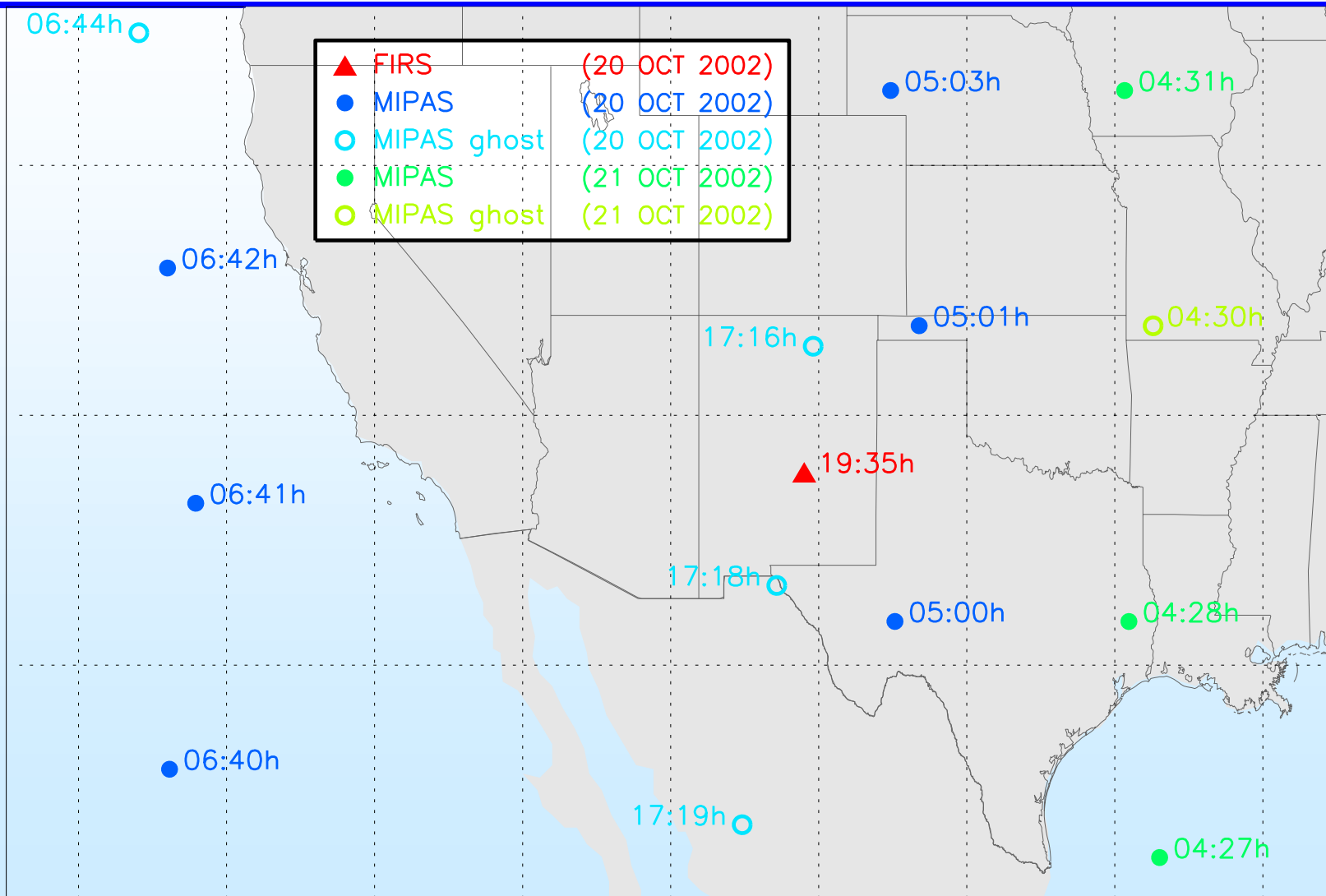
- ☞ 21 January 2003 : SPIRALE

- ☞ V 4.57 (meteorological MIPAS products).
- ☞ 23 March 2003 : LPMA

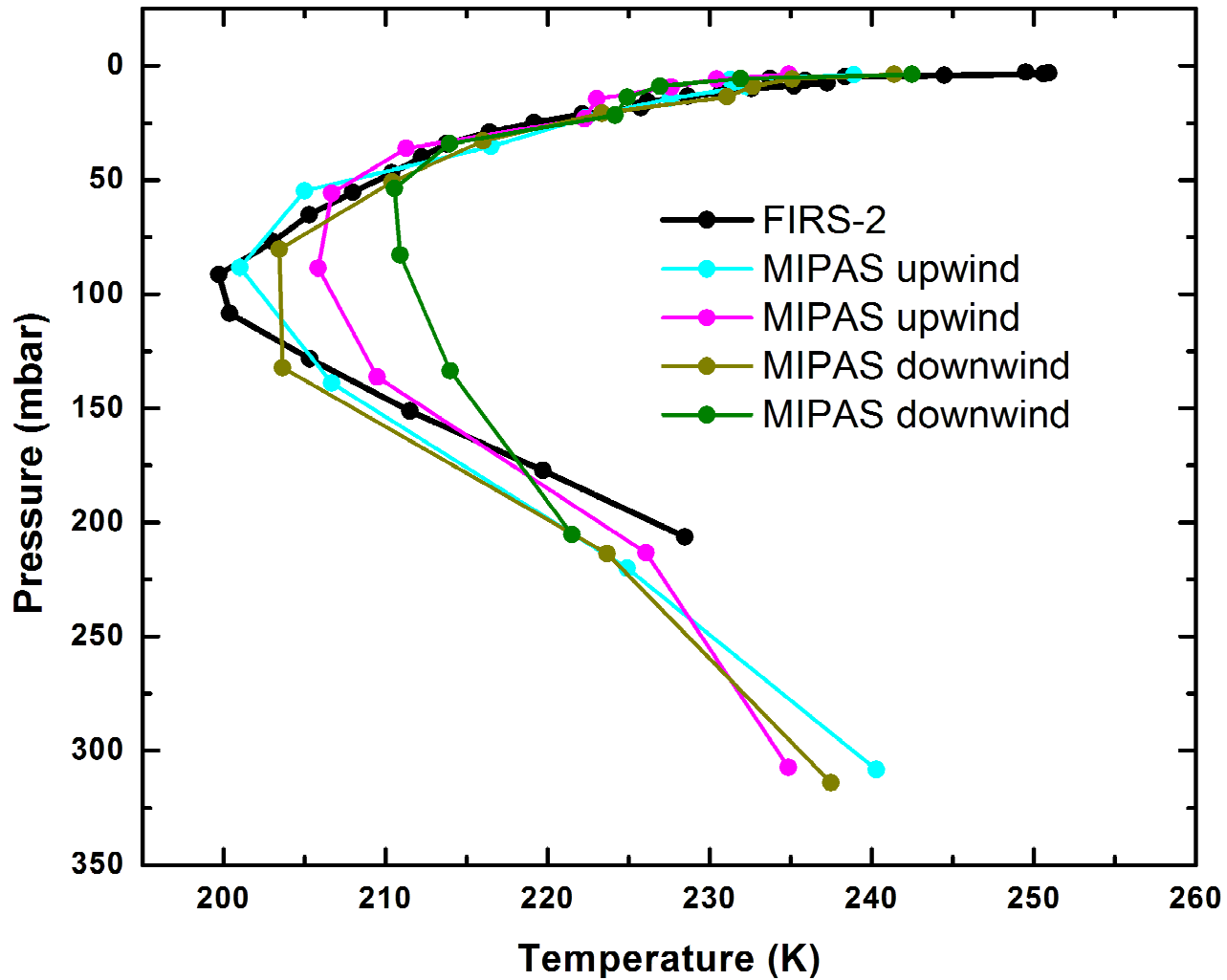
- ☞ Orbit 2051 : V 4.55 -> V 4.61
- ☞ 22 July 2002 : MIPAS-STR

FIRS-2 (contribution from Kelly Chance)

- Balloon flight from Ft. Sumner on 20 October 2002
- T derived from the $15 \mu\text{m CO}_2$ band ($615 - 700 \text{ cm}^{-1}$)
- Accuracy 0.5 K
- Very good coincidence, but no V4.61 data for that scan
- Coincidence not very good for available V4.61 data



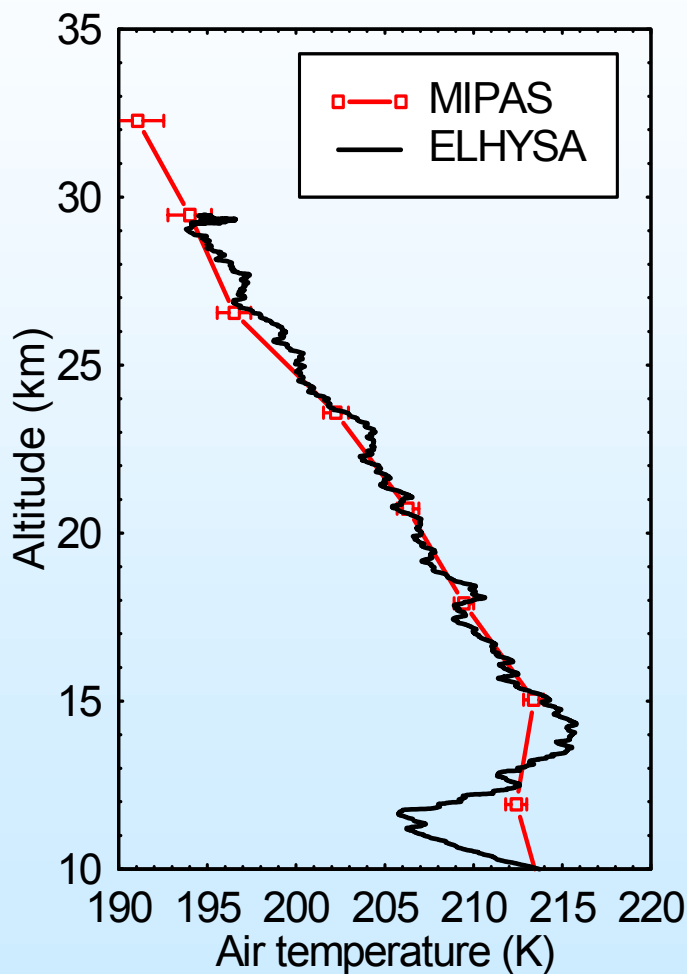
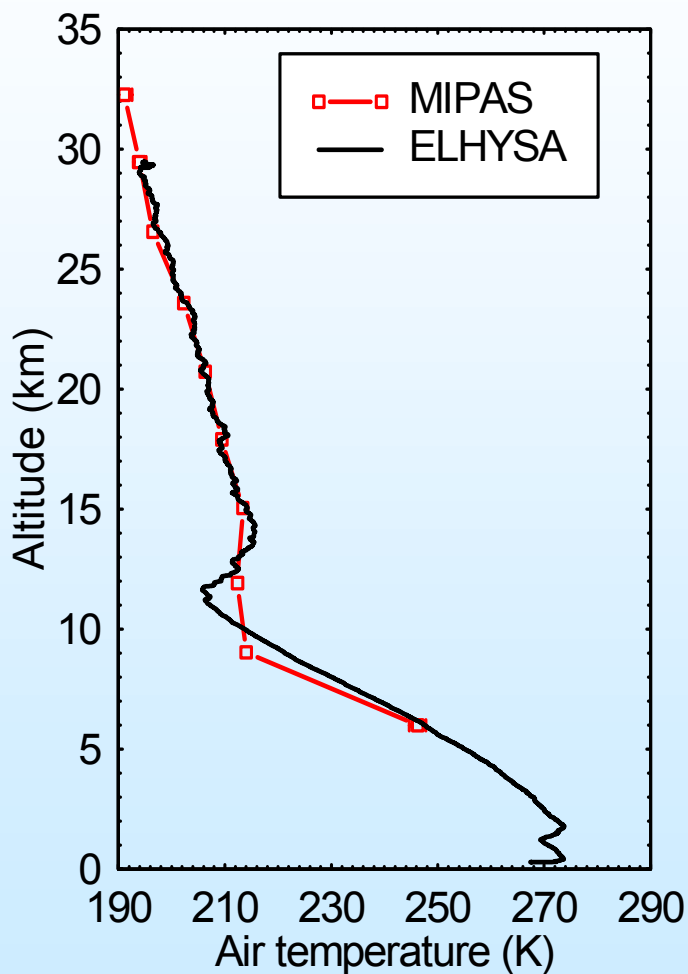
FIRS-2 vs. MIPAS: Oct. 20/21, 2002



ELHYSA (contribution from Joëlle Ovarlez)

- Balloon launch from ESRANGE on 11 March 2004
- A microbead thermistor was part of the ELHYSA payload
- Accuracy of the measurement about 0.2 K
- Balloon profile < 200 km and < 1 hour from MIPAS limb scan
- MIPAS V4.61 data available since last week

ESABC 2 - Kiruna - ELHYSA balloon profile / MIPAS



ACVE-2 Frascati. 3 - 7 May 2004

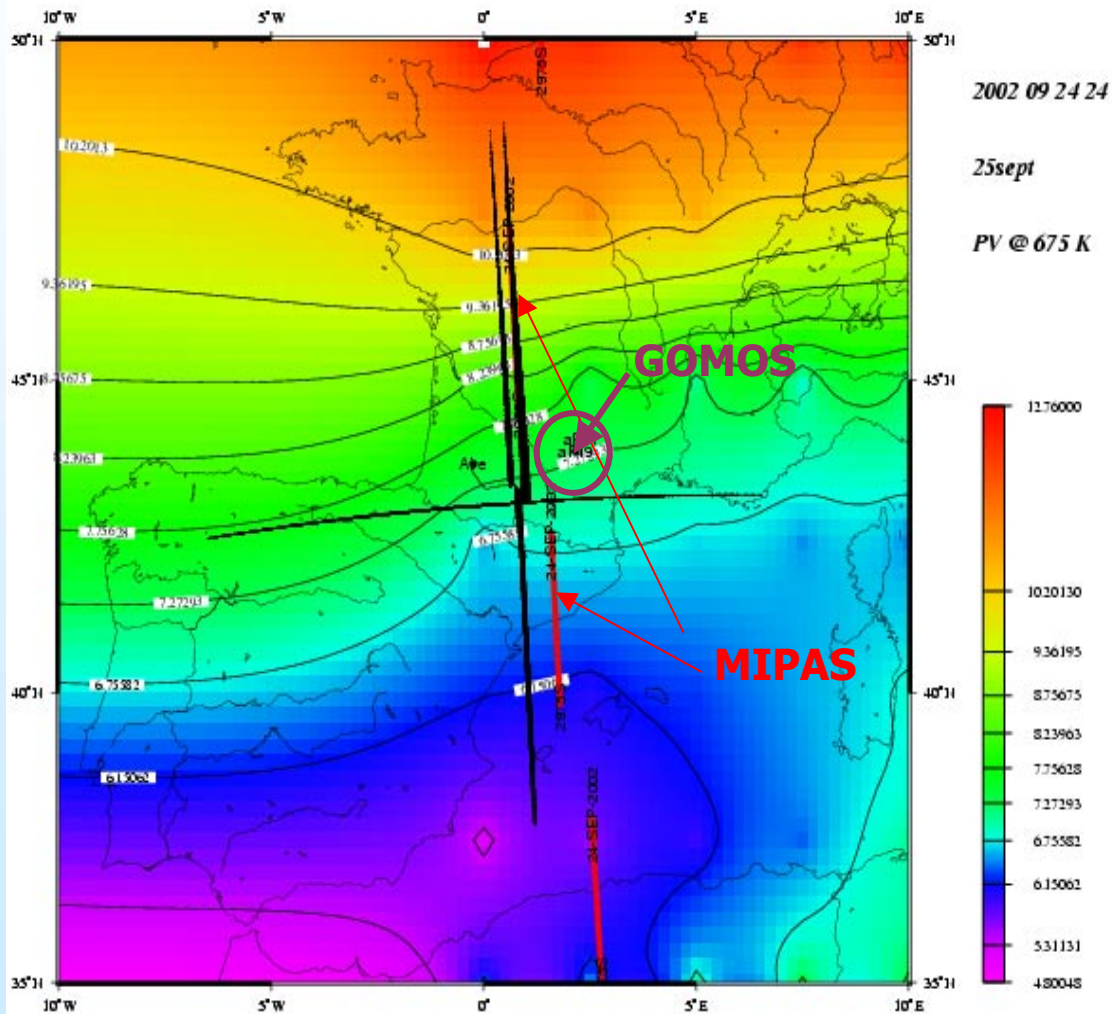
Balloon profile at < 200 km, < 1 hour from MIPAS occultation

Laboratoire de Météorologie Dynamique, CNRS IPSL, Ecole Polytechnique Palaiseau, France

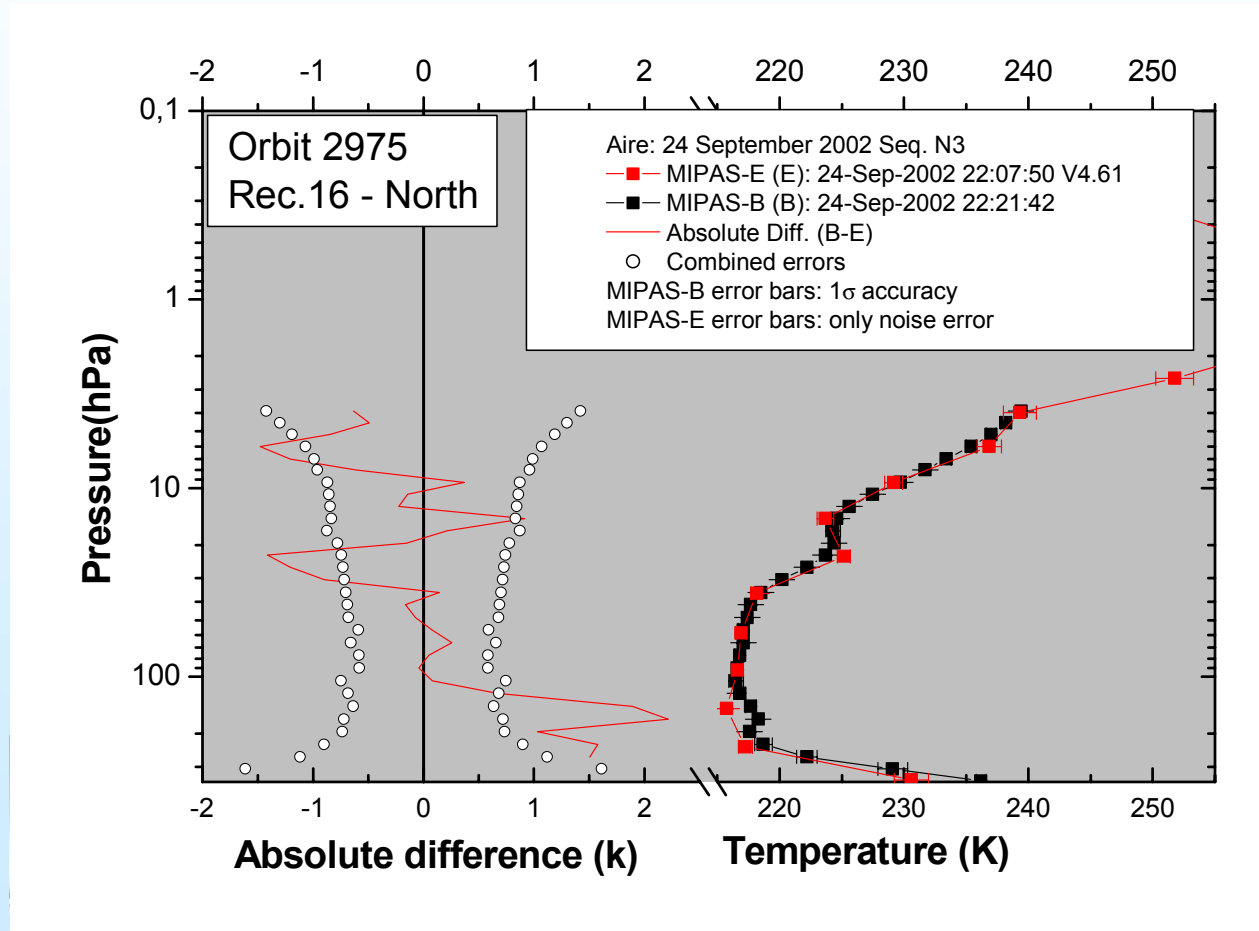
MIPAS-B (contribution from Hermann Oelhaf)

- Balloon launched on 24 September 2002
- Several limb sequences measured
- Perfect coincidence with MIPAS in time and location
- Reprocessed V4.61 data
- Comparison of V4.61 with former V4.55

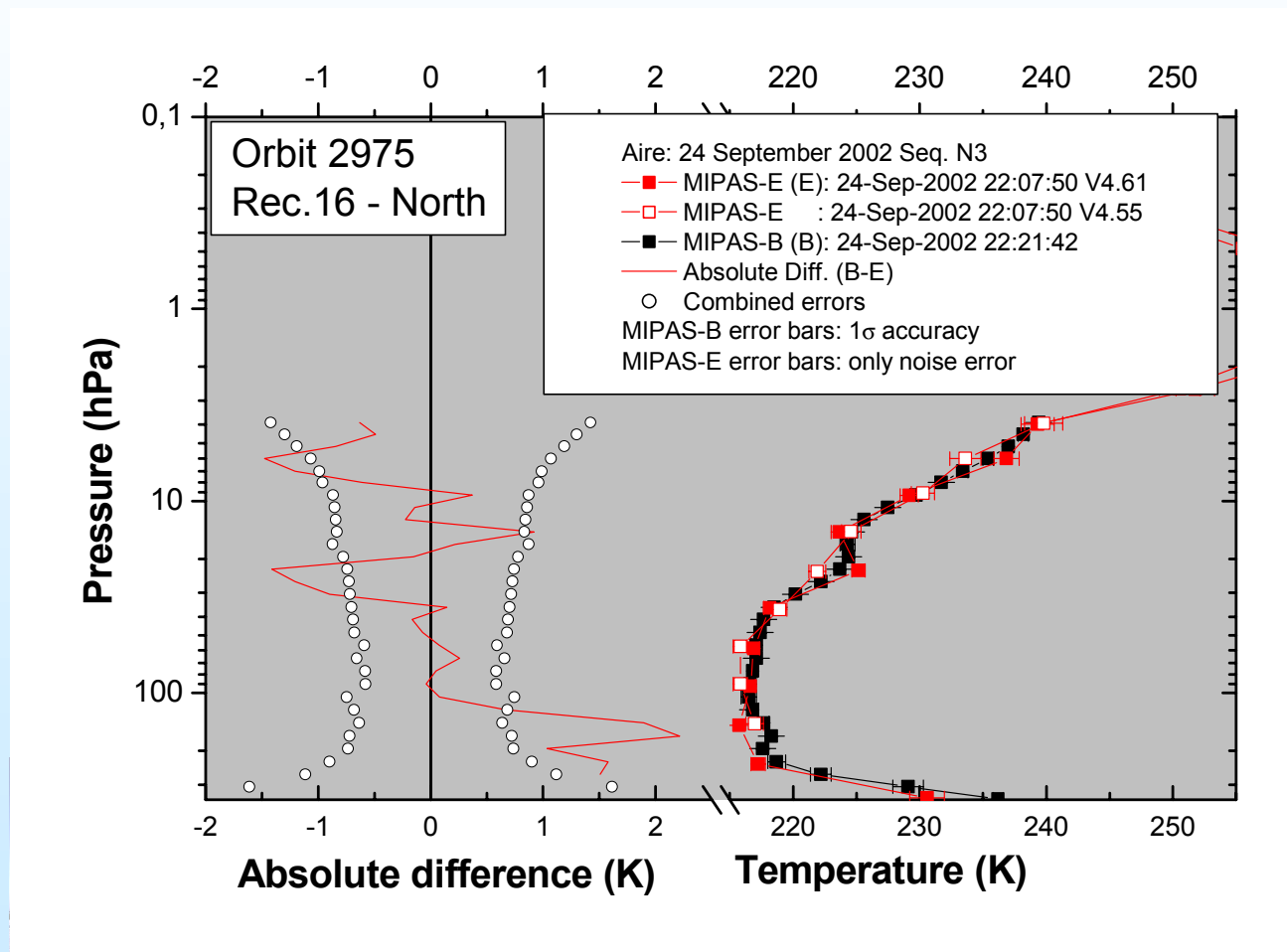
Coincidences: MIPAS-B vs. MIPAS-E & GOMOS



Temperature: MIPAS-B vs. MIPAS-E



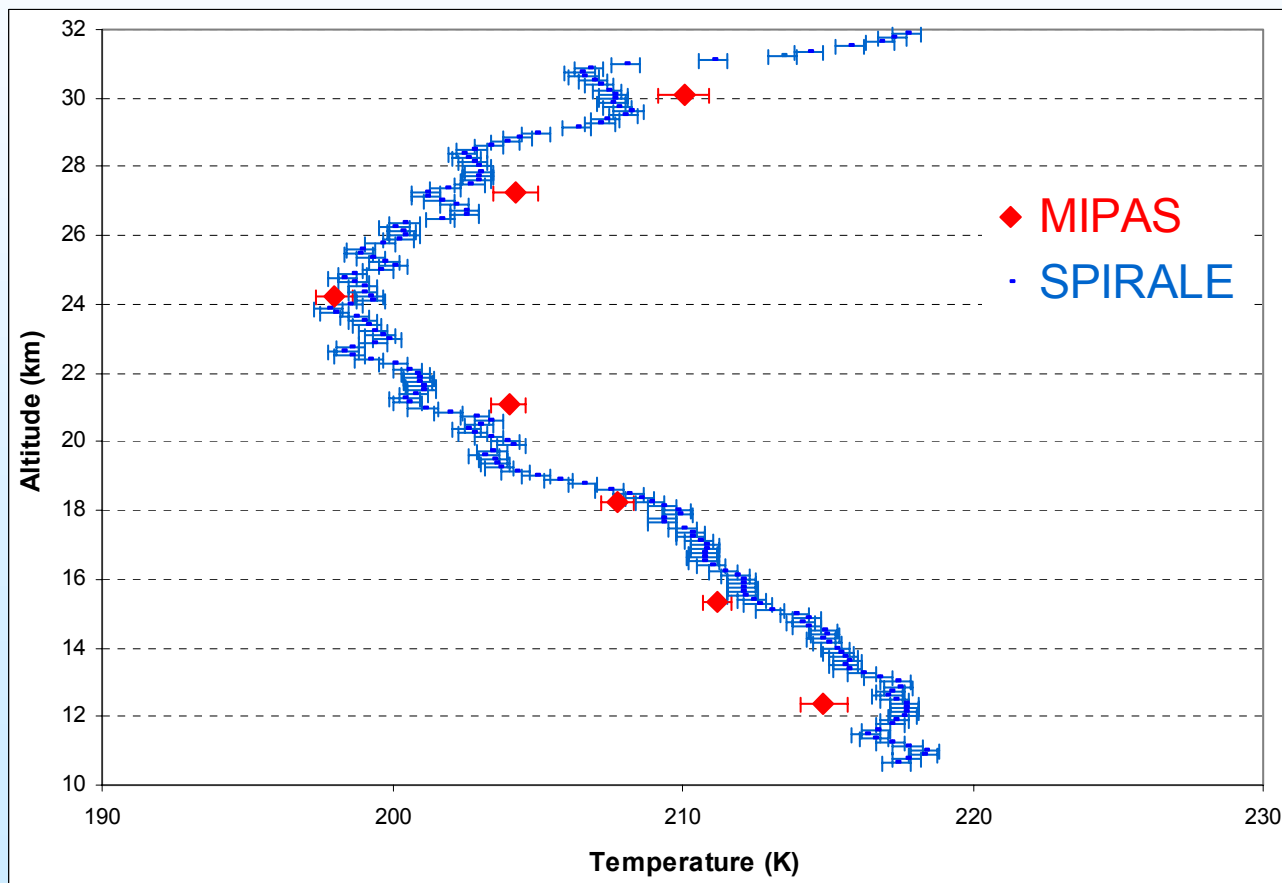
Temperature: MIPAS-B vs. MIPAS-E



SPIRALE (contribution from Valery Catoire)

- Balloon launch from ESRANGE on 21 January 2003
- in situ infrared absorption spectroscopy by tunable diodes
- Two flights were performed for MIPAS-ENVISAT, one in very good coincidence (January 21, 2003)
- 'global' uncertainties are 0.5 K
- Comparison with MIPAS V4.55

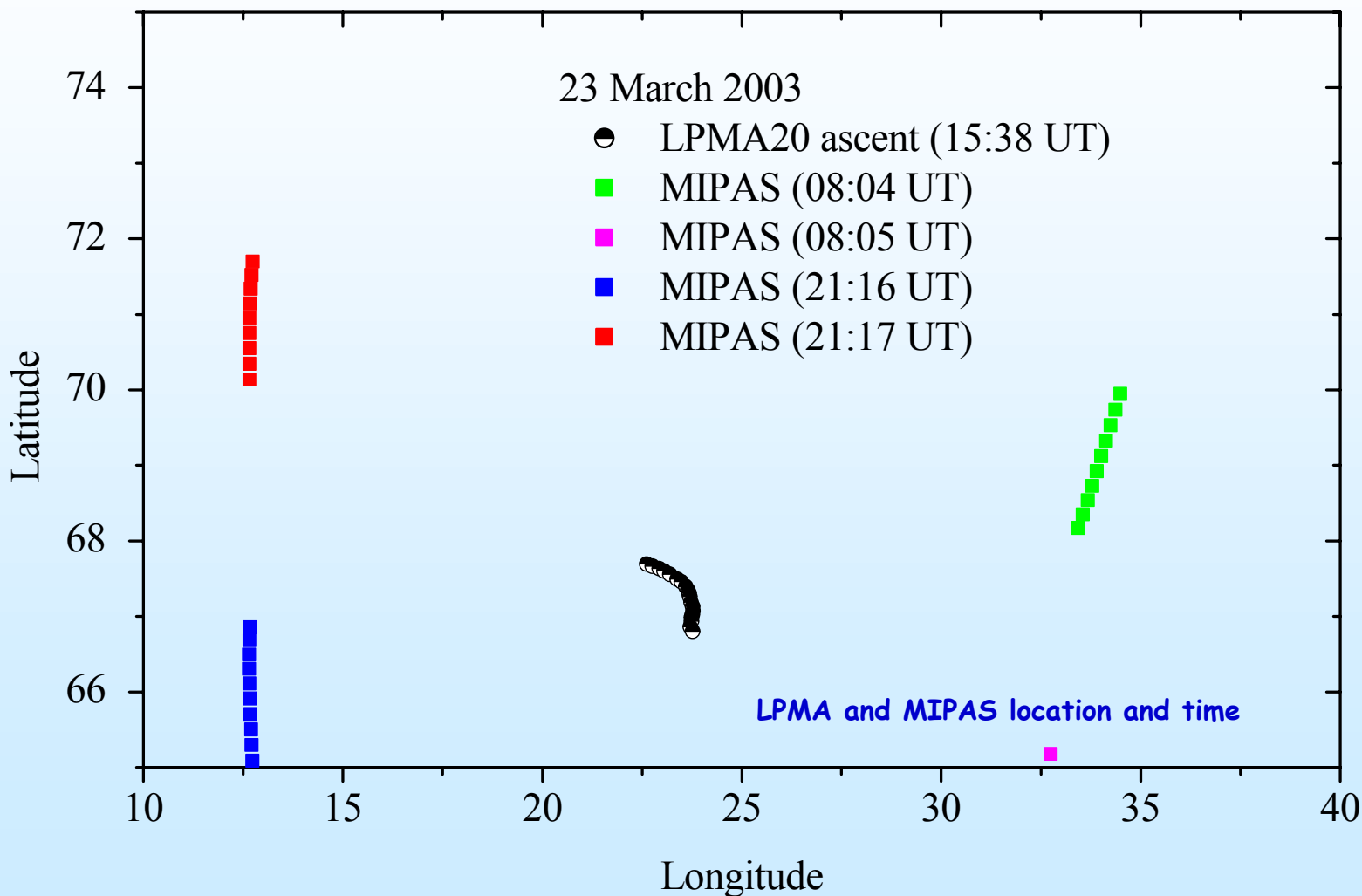
MIPAS: 21 January 2003 19h52 UT, 65.7N 33.5E
SPIRALE: 21 January 2003 19-21h UT, 67.8N 25.1E



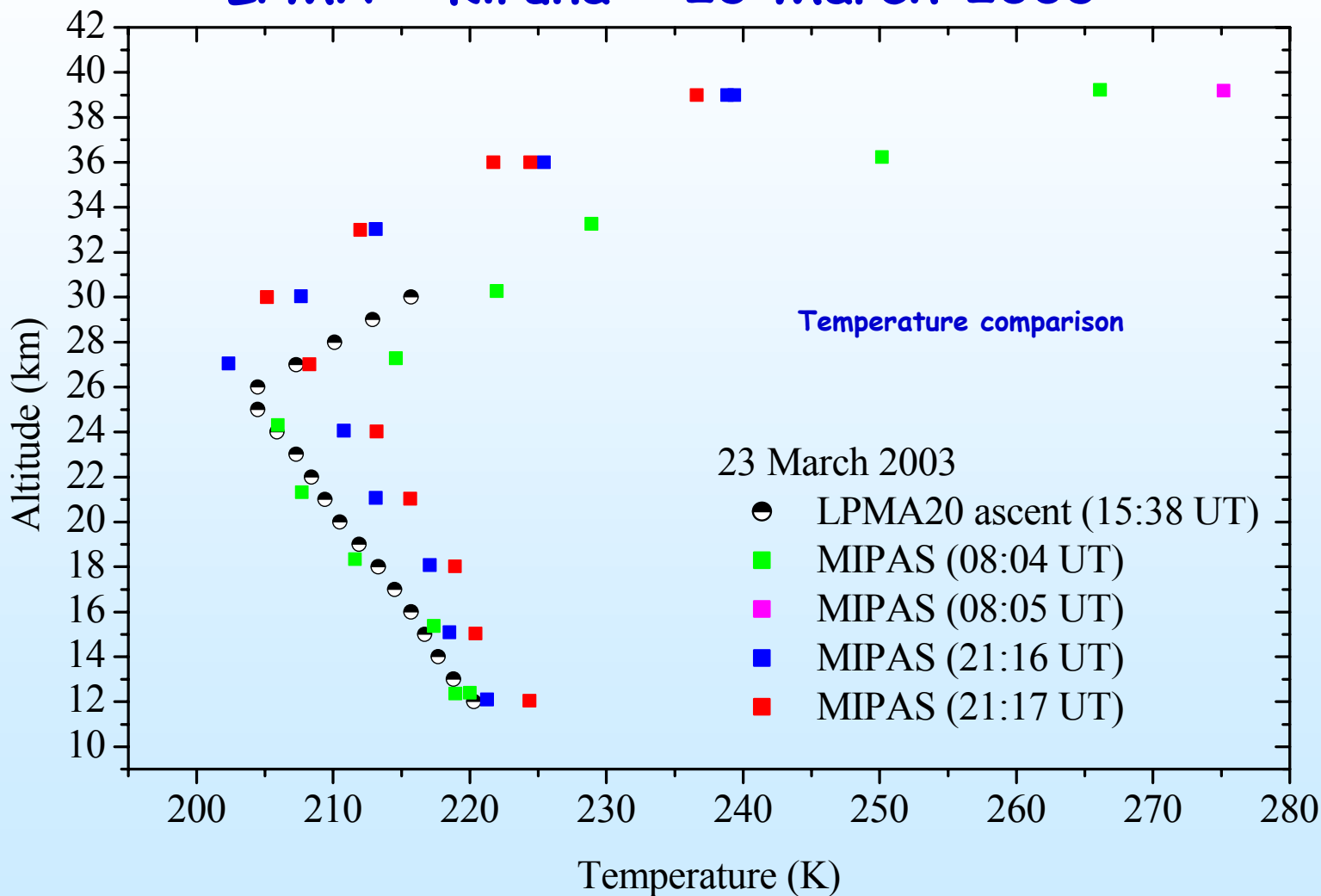
LPMA (from Sebastien Payan and Claude Camy-Peyret)

- Balloon launched from ESRANGE on 23 March 2003
- One of the 2 sondes launched shortly before and after the launch of LPMA
- Coincidence in time > 7.5 hrs
- Comparison with several limb sequences of 2 orbits
- 4.57 (the so called meteorological MIPAS products)

LPMA - Kiruna - 23 March 2003



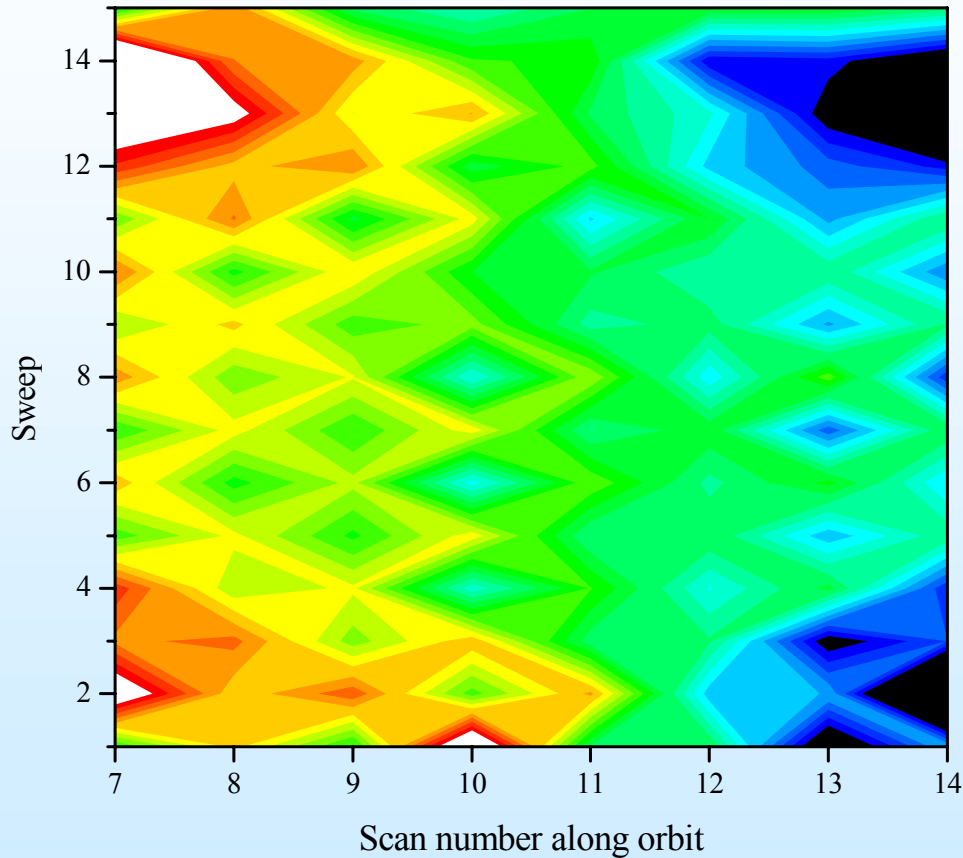
LPMA - Kiruna - 23 March 2003



MIPAS-STR

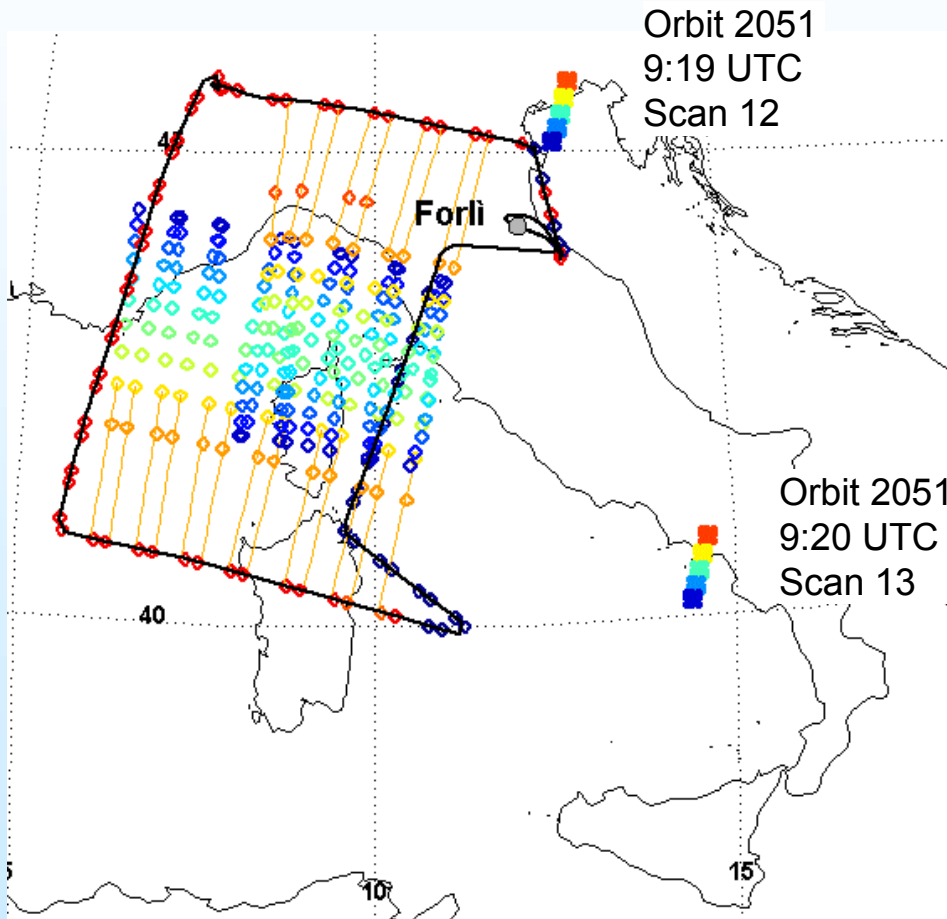
- M-55 Geophysica flight from Forli, Italy, on 22 July 2002
- Excellent coincidence in time, 300 km for the location
- Comparison with two limb scans of orbit 2051
- Reprocessed V4.61 data
- Orbit 2051 with V4.55 behaved different from others

Temperature orbit 2051: T-Tmean



The difference between temperature and mean temperature (T-Tmean) of MIPAS-ENV for 8 scans of orbit 2051.

V4.55 (ACVE-1, Frascati 2002)



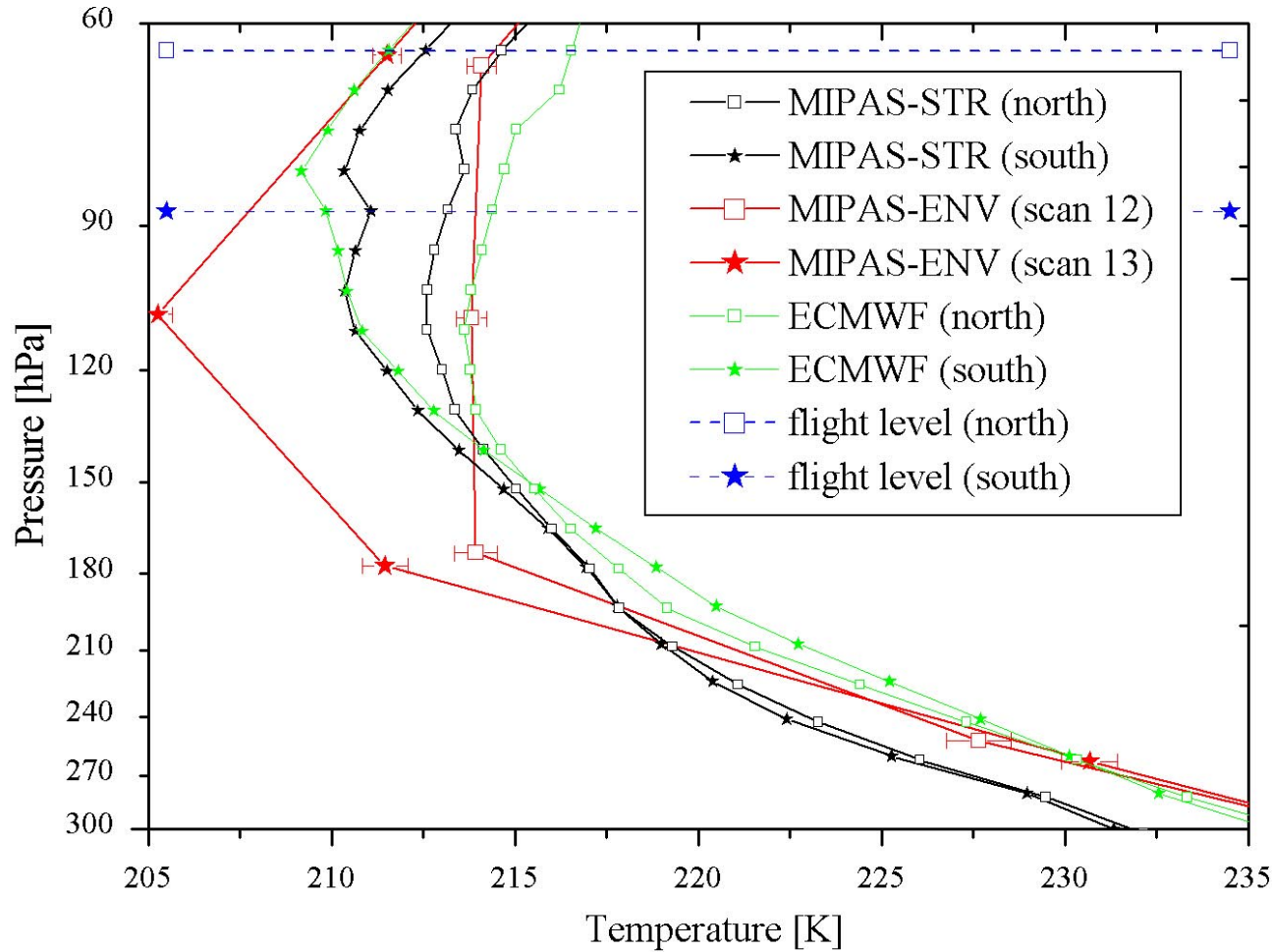
Coincidences in Time and Space

MIPAS-E Scan 12 at 09:19 UTC
MIPAS-E Scan 13 at 09:20 UTC

MIPAS-STR south
(mean of 12 profiles) 7:28 - 7:59 UTC
MIPAS-STR north
(mean of 7 profiles) 9:06 - 9:27 UTC

MIPAS-STR vs. MIPAS-E 22.7.02 Orbit 2051

M55-flight 22-Jul-2002 / ENVISAT orbit 2051 (v4.61)



T: MIPAS-STR vs. MIPAS-E 22.7.02 Orbit 2051

Conclusions

- From the ESABC subgroup only few temperature data available for comparison with MIPAS v4.61 profiles
- No statistics possible from ESABC results only
- MIPAS-B and ELHYS A seem to agree very well with v4.61
- For many measurements, mainly 2003, either V4.61 data and/or interpolation required
- Orbit 2051 also for v4.61 different (see CH₄ and N₂O)