
Level 2 near real time analysis of MIPAS measurements on ENVISAT: updated performance assessment

Piera Raspollini & the ORM team

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IFAC-CNR - Italy



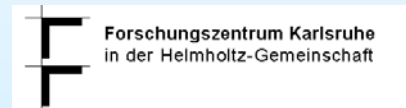
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- D. Alpaslan, E. Castelli, B. M. Dinelli - ISAC-CNR - Italy



- M. Hopfner, H. Oelhaf - IMK - Germany



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- J. Remedios, R. Spang - University of Leicester - U.K.



- J.-M. Flaud - LPPM - France



- Scientific code for the **near real time** Level 2 analysis of MIPAS measurements (basis of the code implemented in the ENVISAT Ground Segment)

- Starting from the calibrated and geolocated spectra of each scan, ORM retrieves vertical profiles of:
 - **Tangent altitude correction and temperature** (p,T retrieval)
 - **VMR of minor constituents** (H_2O , O_3 , HNO_3 , CH_4 , N_2O and NO_2)

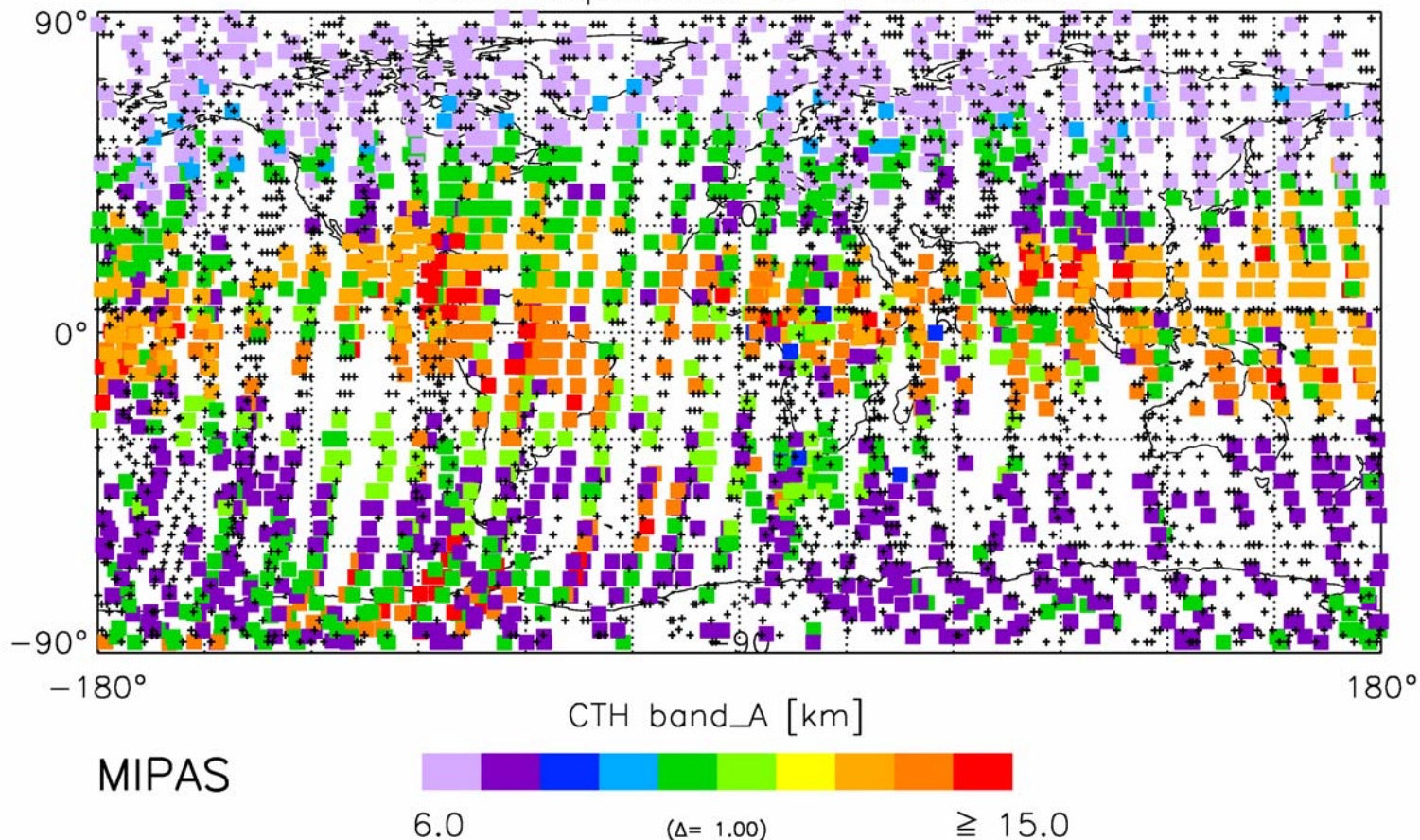
- Recommended upgrades from ENVISAT Validation Workshop
 - Use cloud filtering
 - Perform retrievals on the whole MIPAS measurement range (6-68 km)
 - Use new spectroscopic database
- Results with the new upgrades
- Monitoring
 - Monitoring of χ^2
 - Monitoring of the ILS
 - Monitoring of frequency shift
- Concluding remarks

Cloud filtering

- A cloud detection algorithm will soon be implemented in MIPAS Level 2 pre-processor that detects the presence of clouds in the line of sights and excludes from the analysis the sweeps that are affected by clouds.

Cloud filtering

Date: September 07 to 25 2002

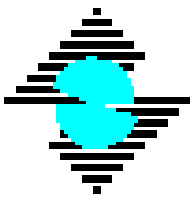


See Poster
EAE03-A-06361
‘Observations of
clouds by the
MIPAS instrument
on ENVISAT’,
J.Remedios and al.

Current approach is based on a species customised retrieval altitude range

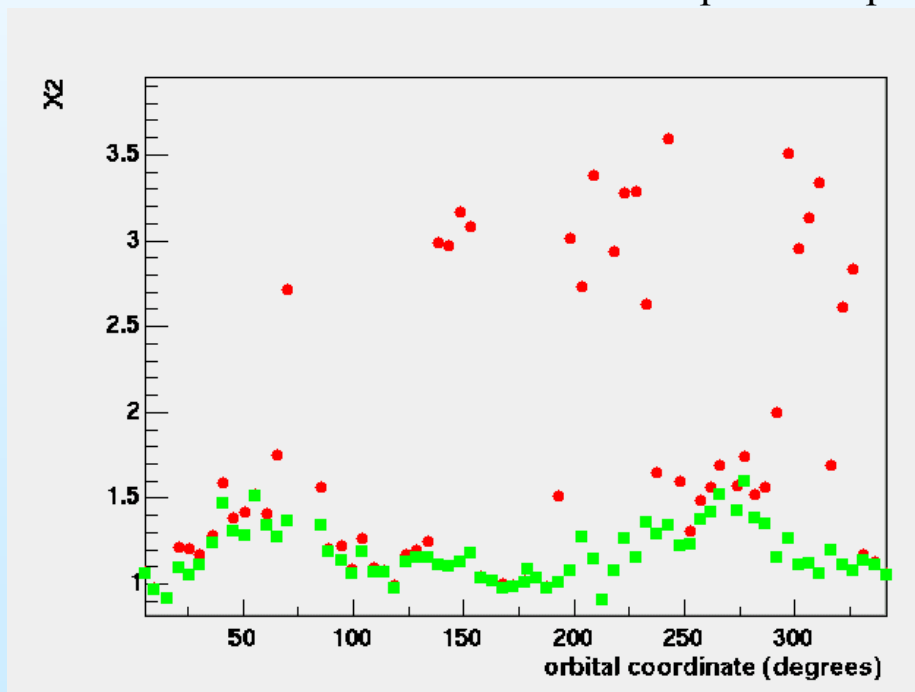
PT	H ₂ O	O ₃	HNO ₃	CH ₄	N ₂ O	NO ₂
12-68	12-60	12-60	12-42	12-60	12-47	24-47

Exploitation of full altitude range for all species is desirable provided that instabilities are not introduced.



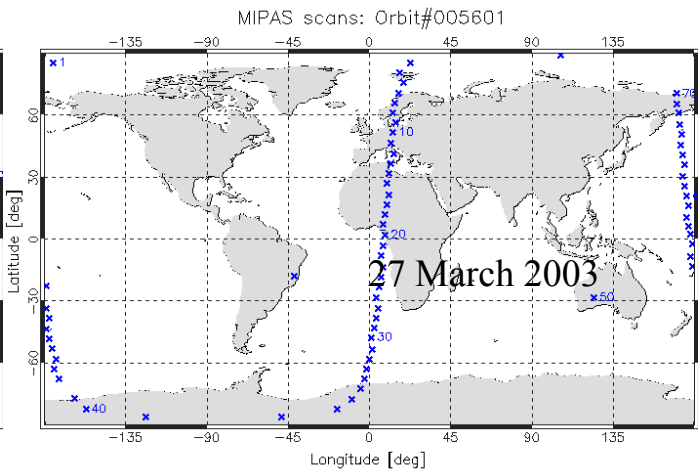
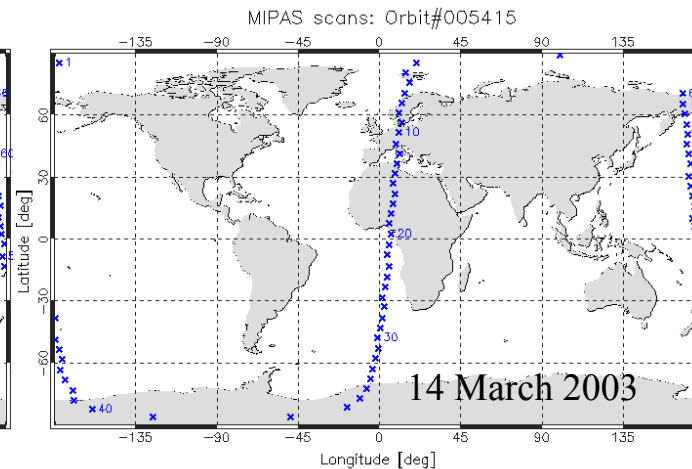
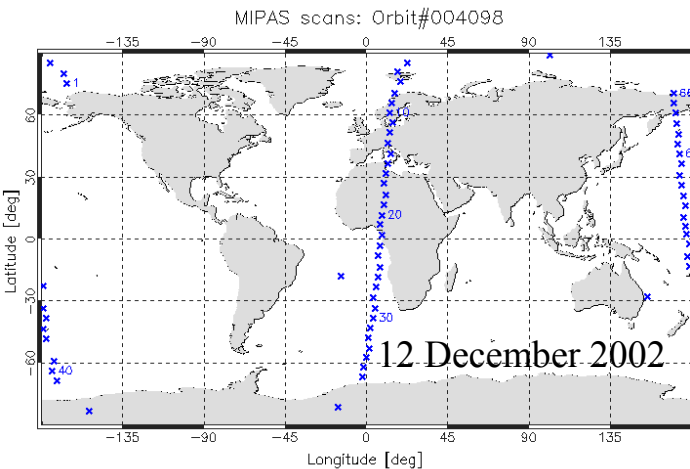
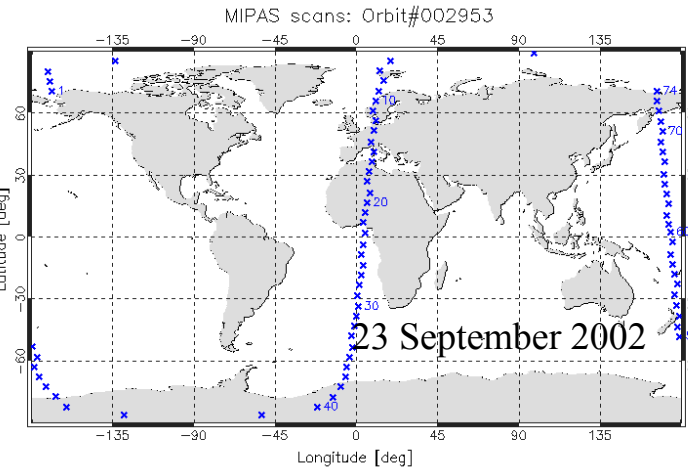
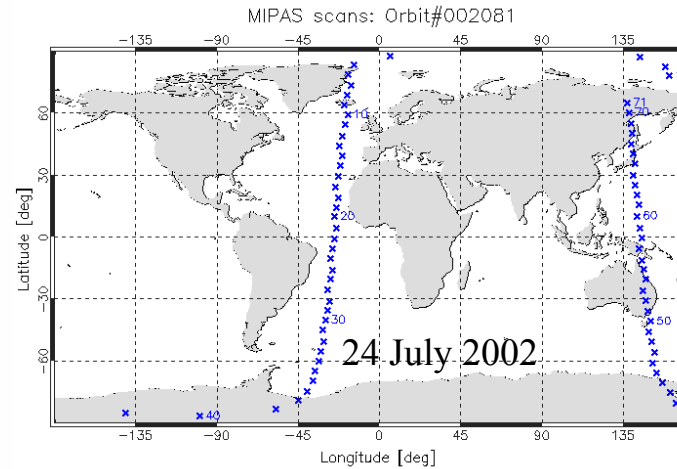
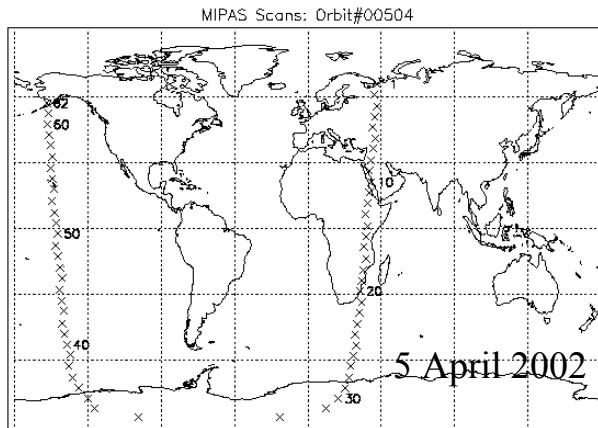
- Version 3.1 of MIPAS spectroscopic database has been released
- Main modifications in HNO_3

HNO_3 χ^2 vs orbital coordinate with **old** and **new** spectroscopic database for orbit # 5415



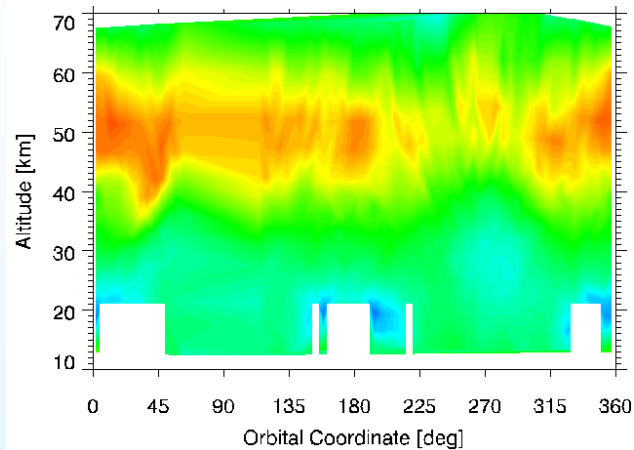
RESULTS

Analysed orbits and their geolocation

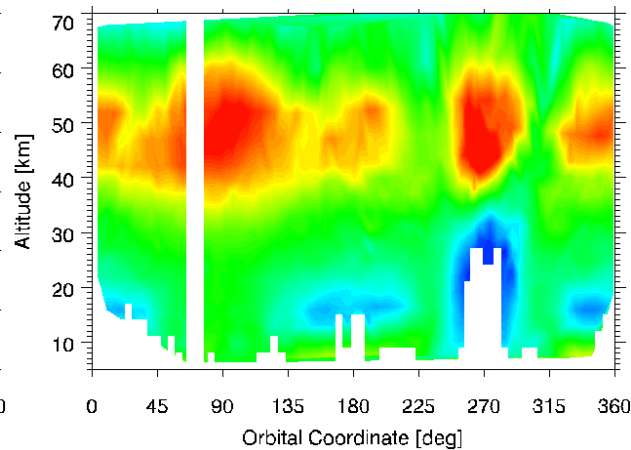


Temperature

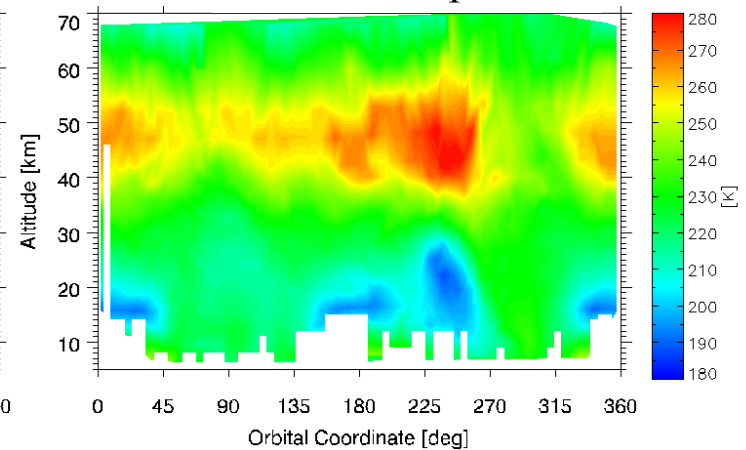
504 5 April 2002



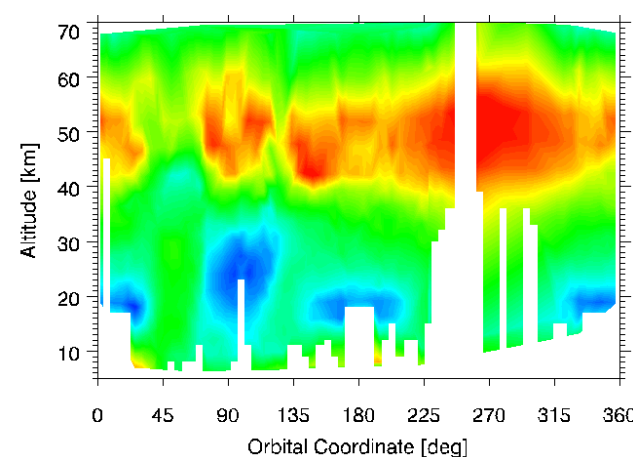
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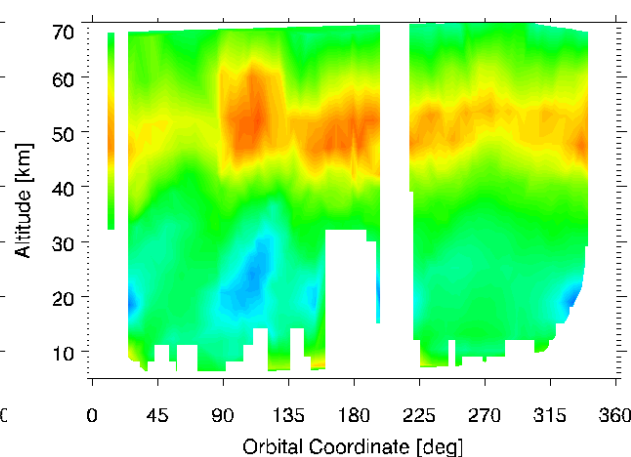
#2953 23 Sept.2002



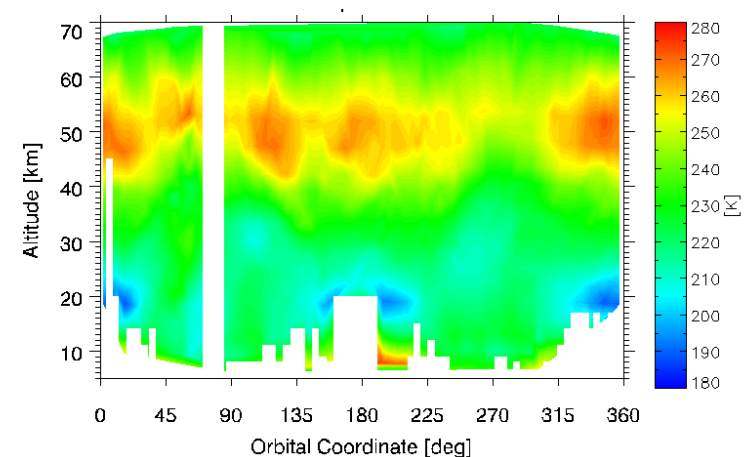
4098 12 December 2002



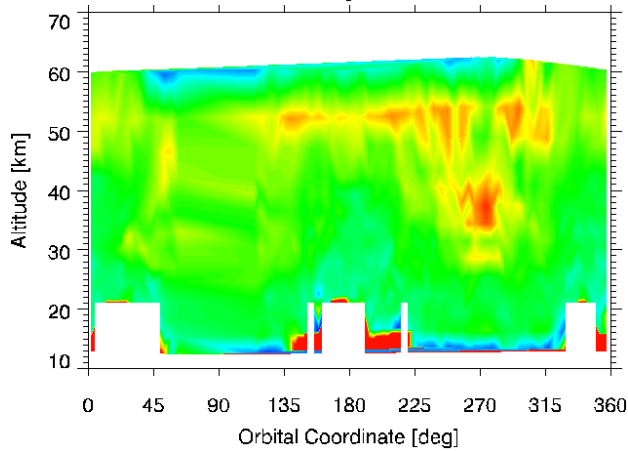
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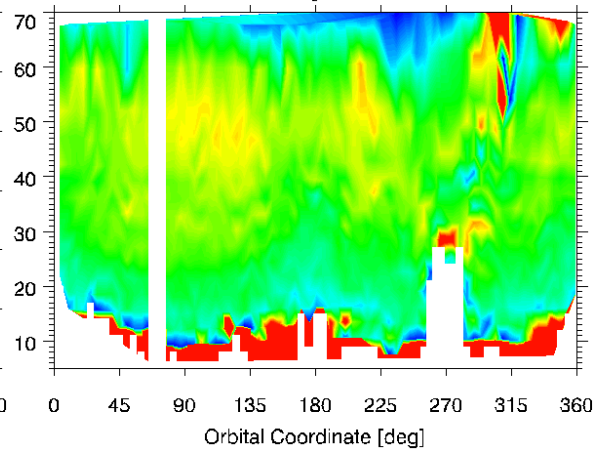
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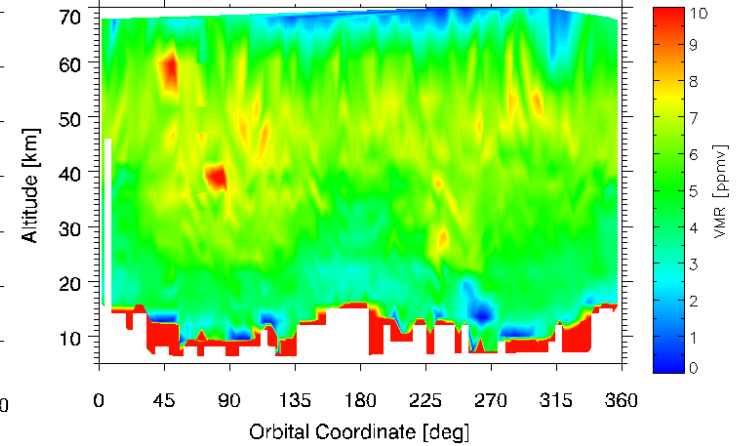
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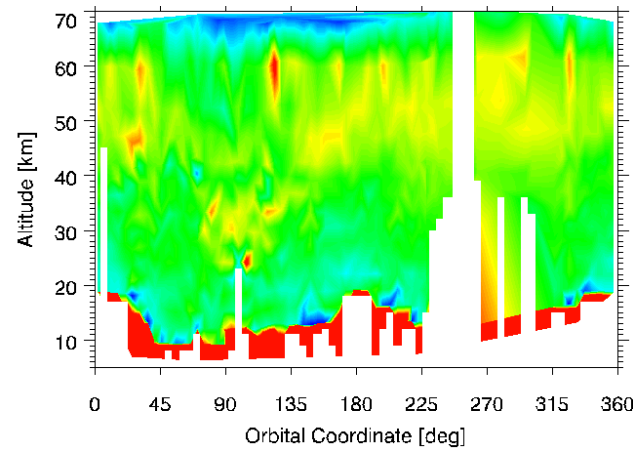
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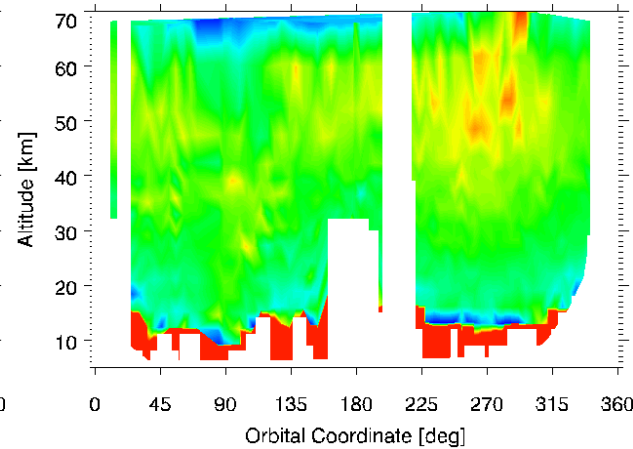
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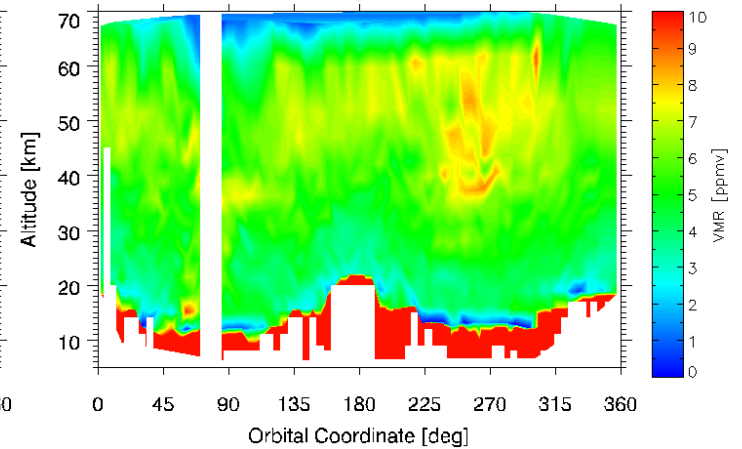
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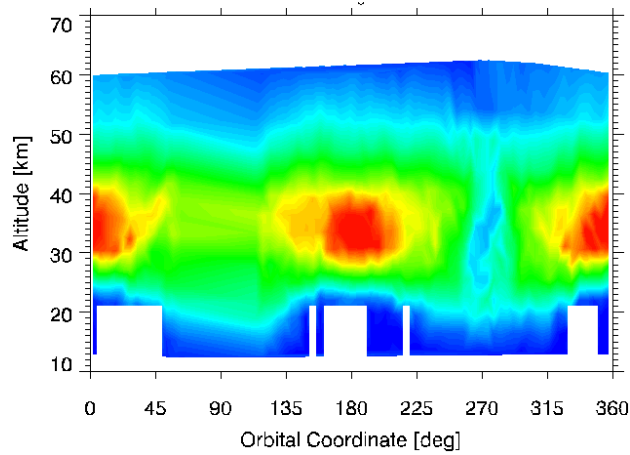
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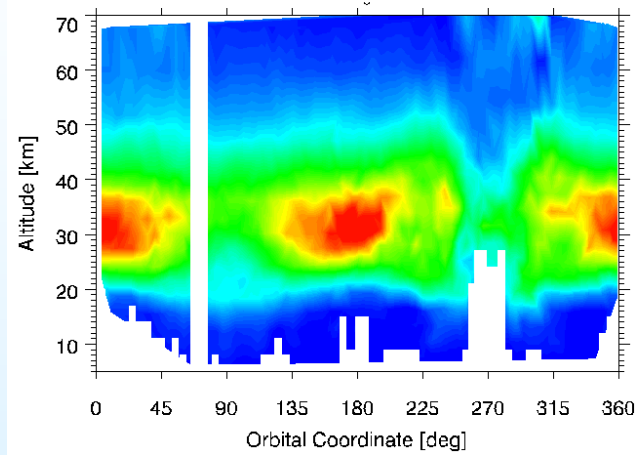
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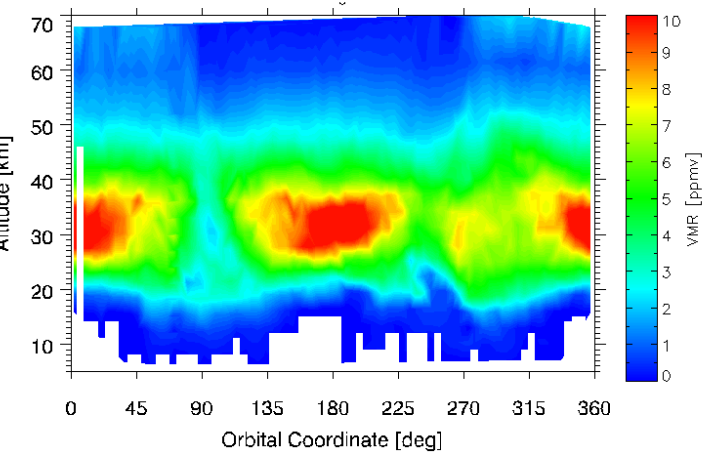
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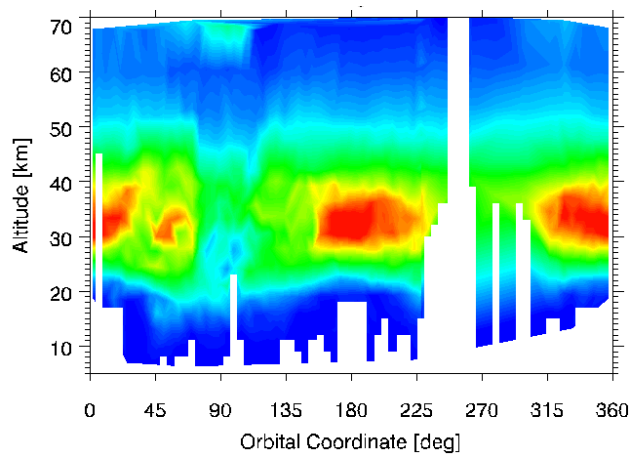
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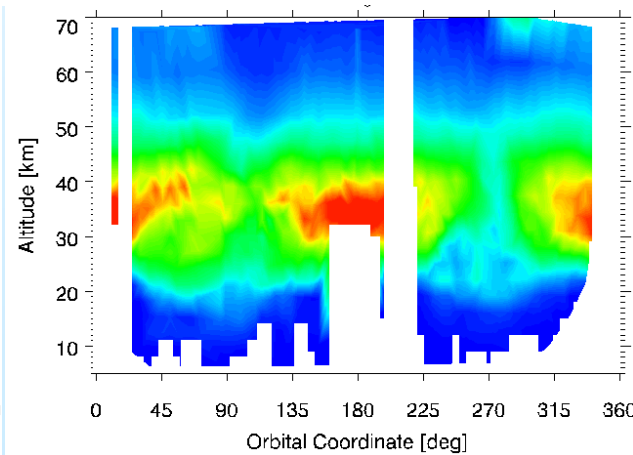
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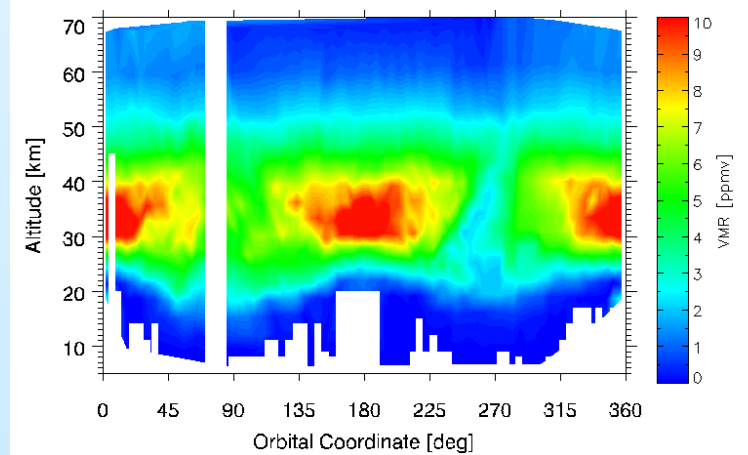
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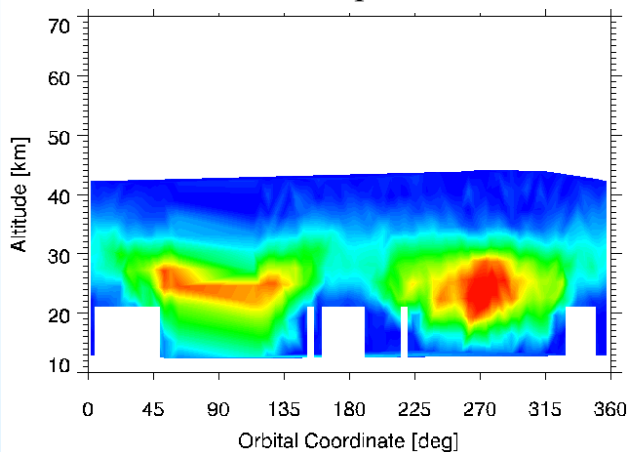
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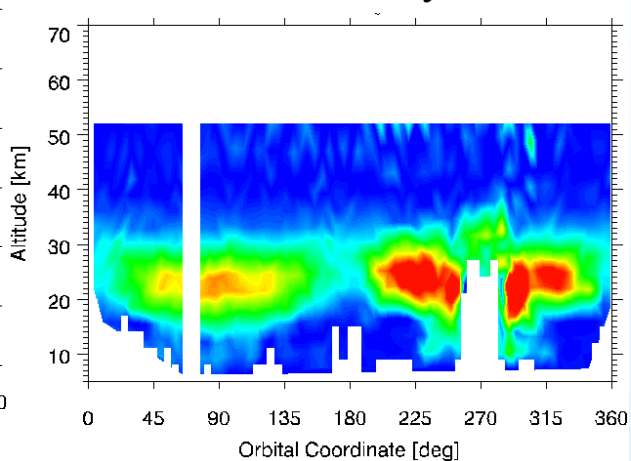
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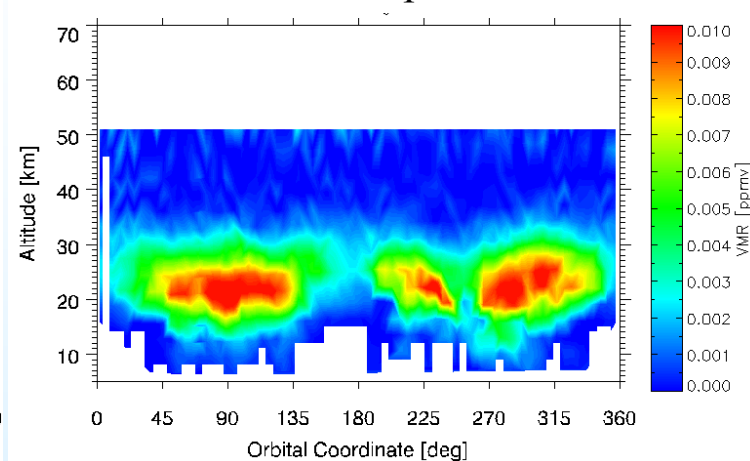
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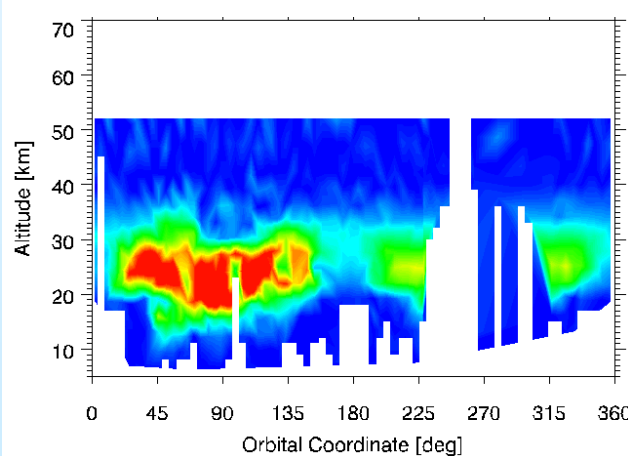
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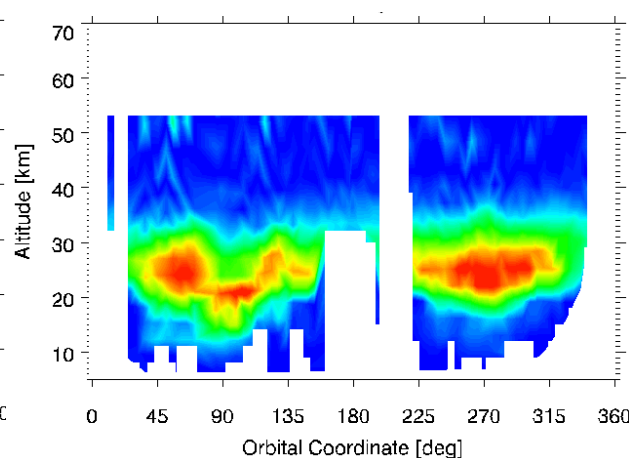
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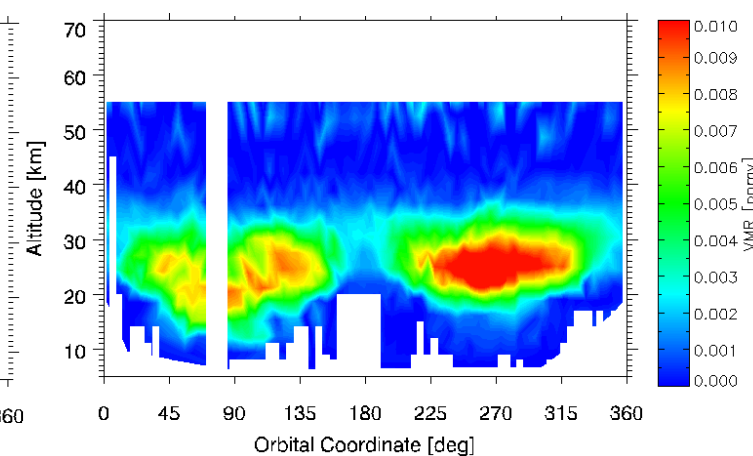
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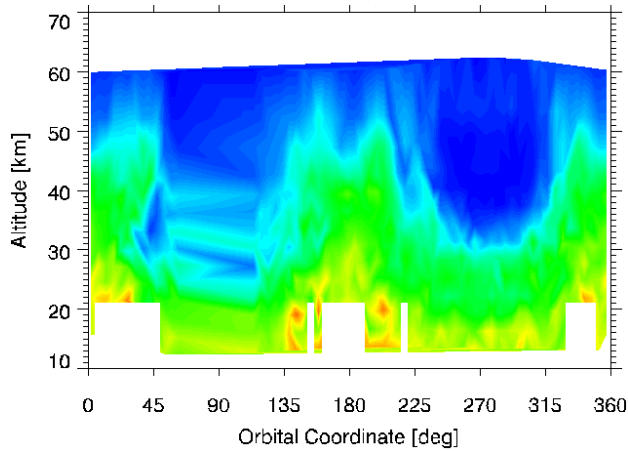
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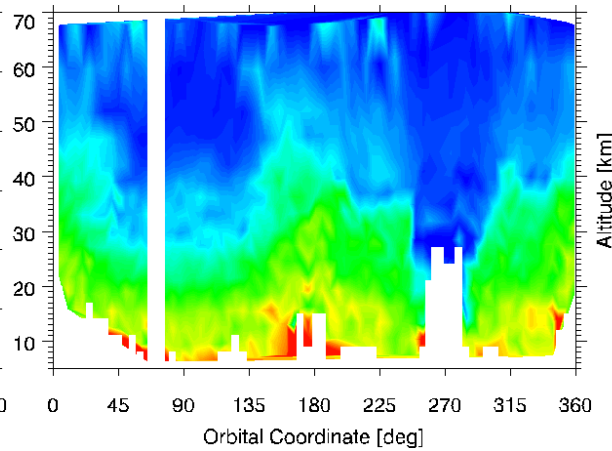
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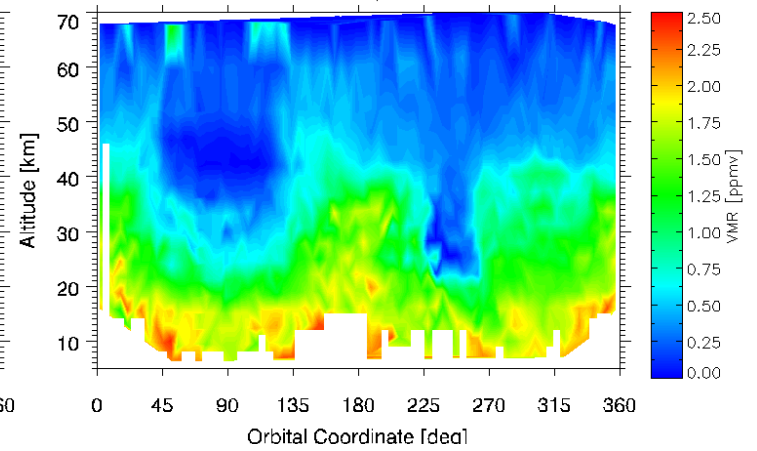
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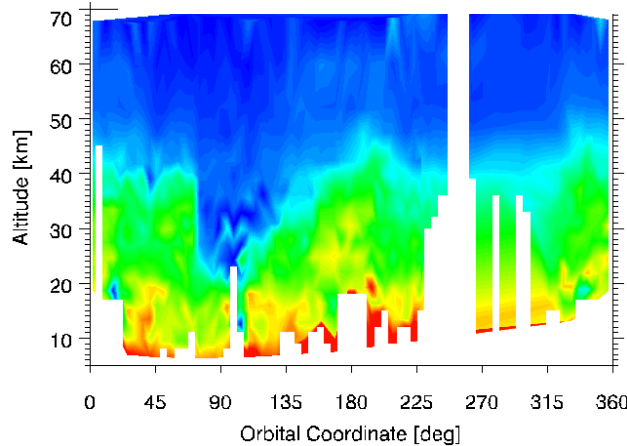
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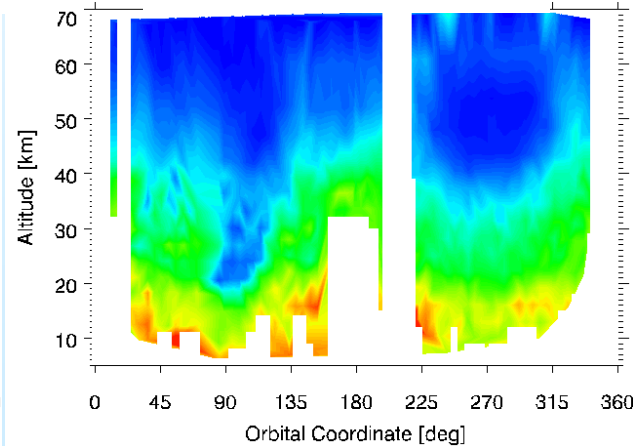
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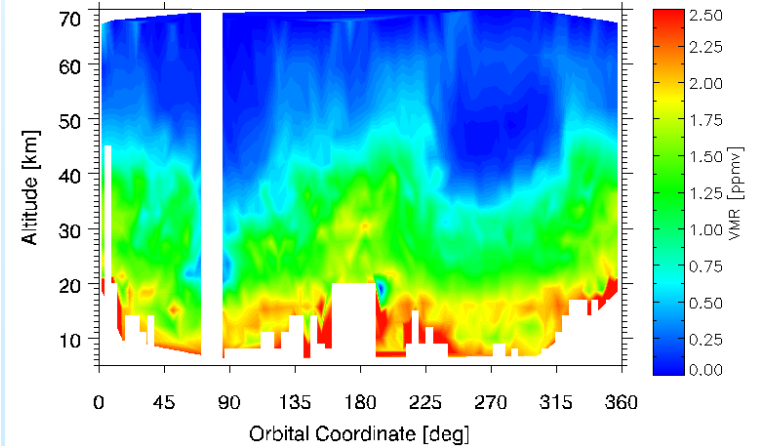
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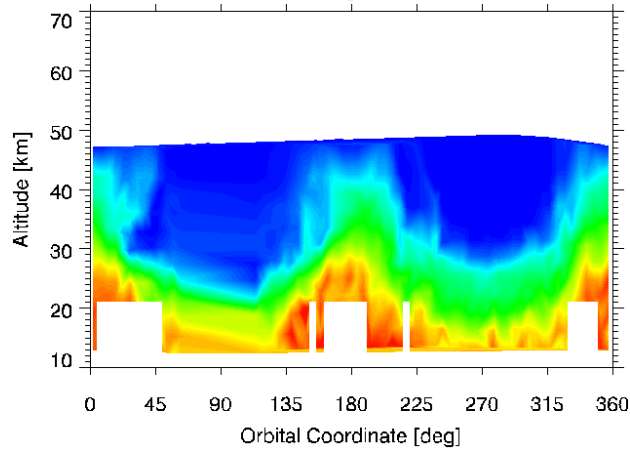
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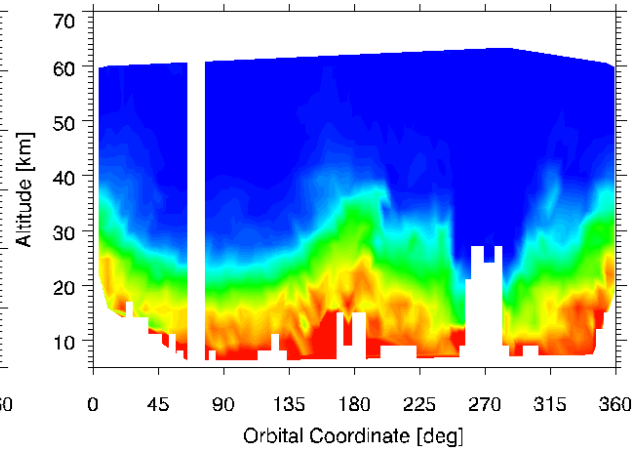
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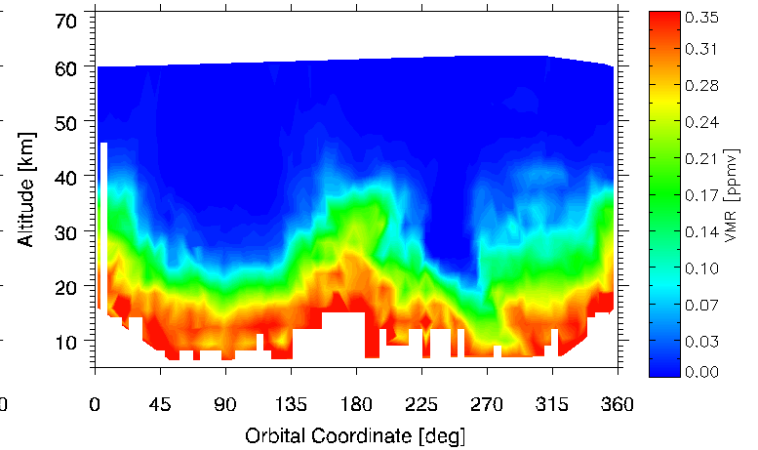
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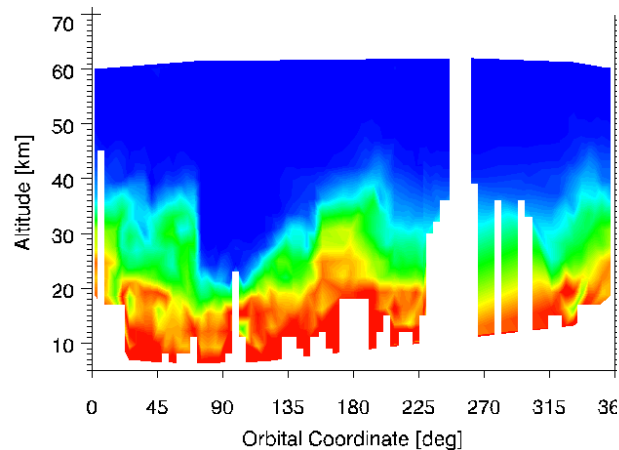
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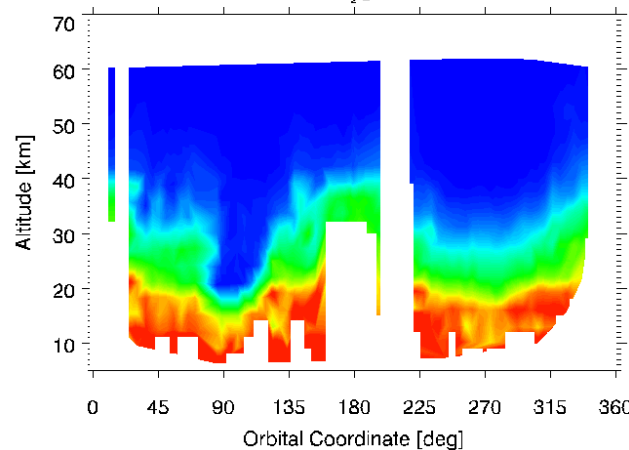
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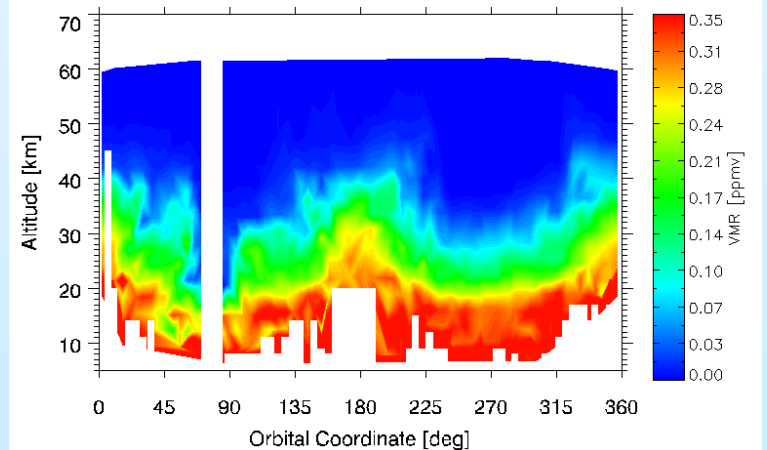
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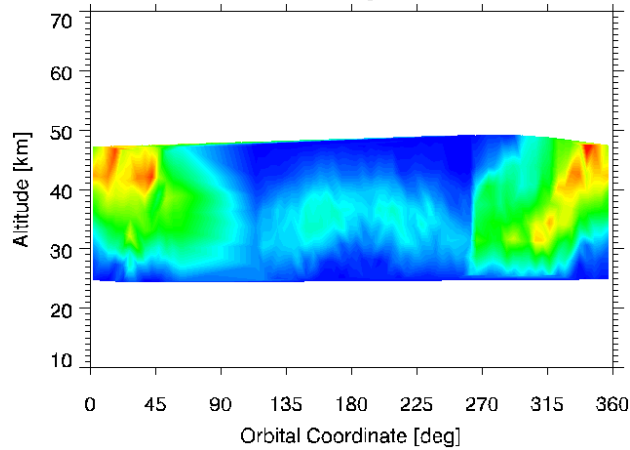
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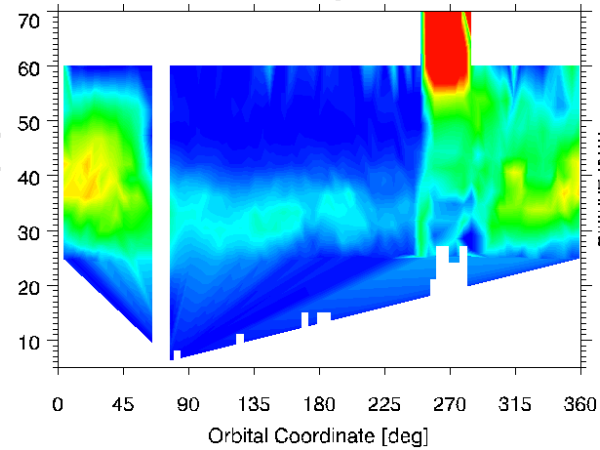
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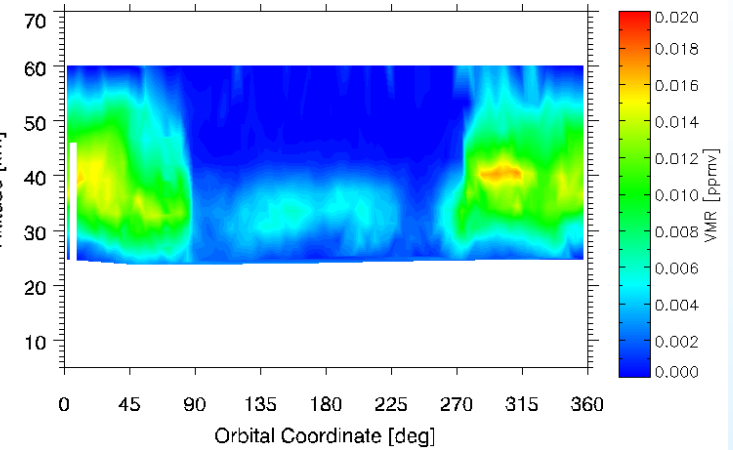
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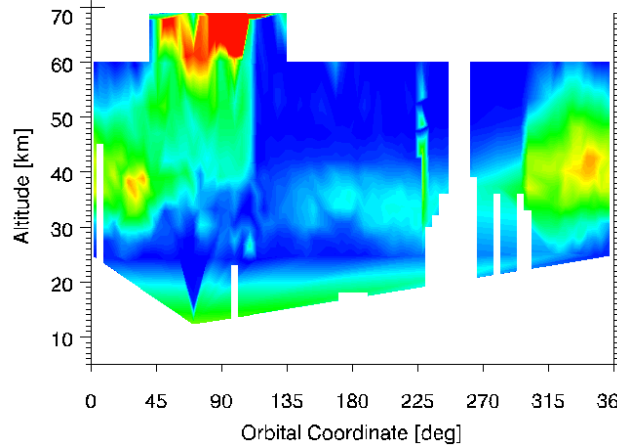
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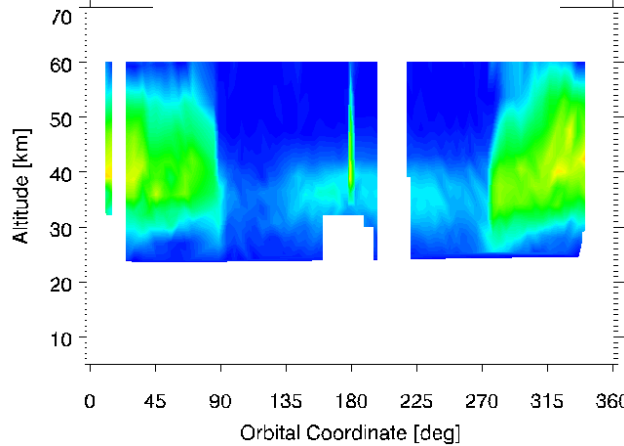
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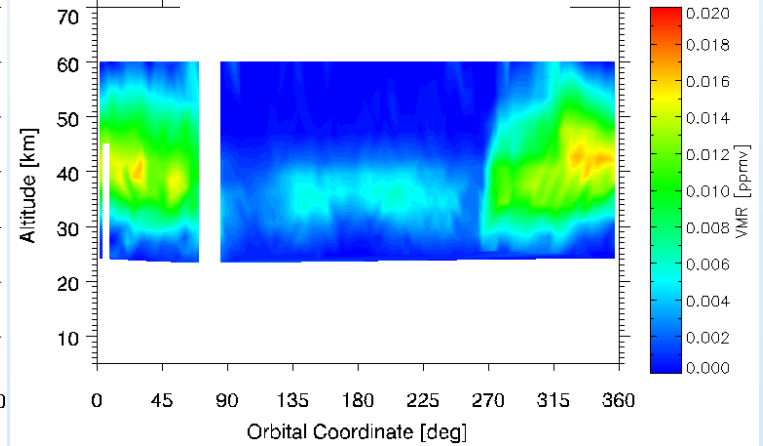
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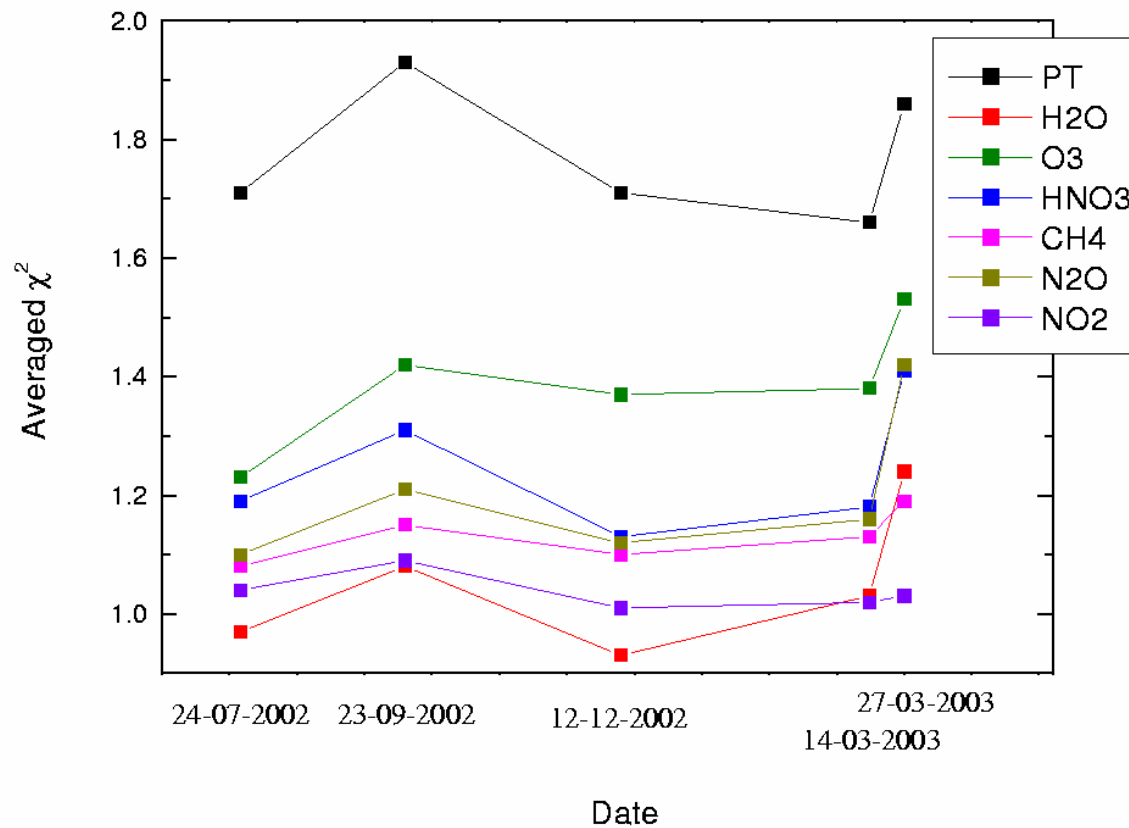


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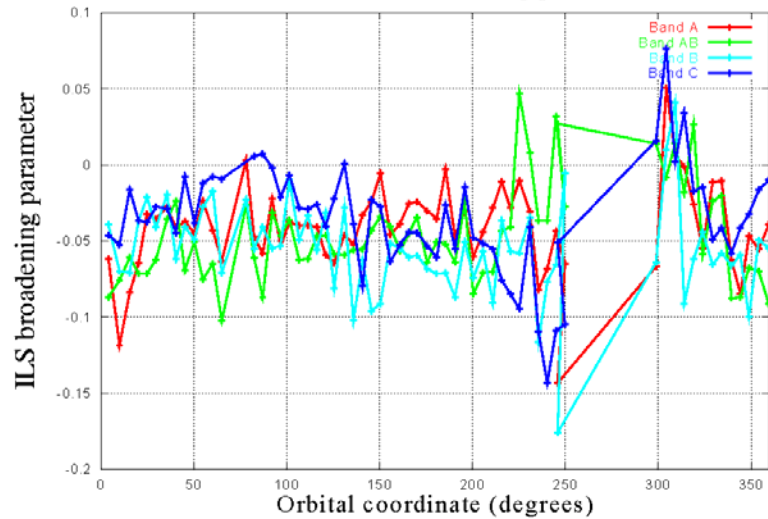
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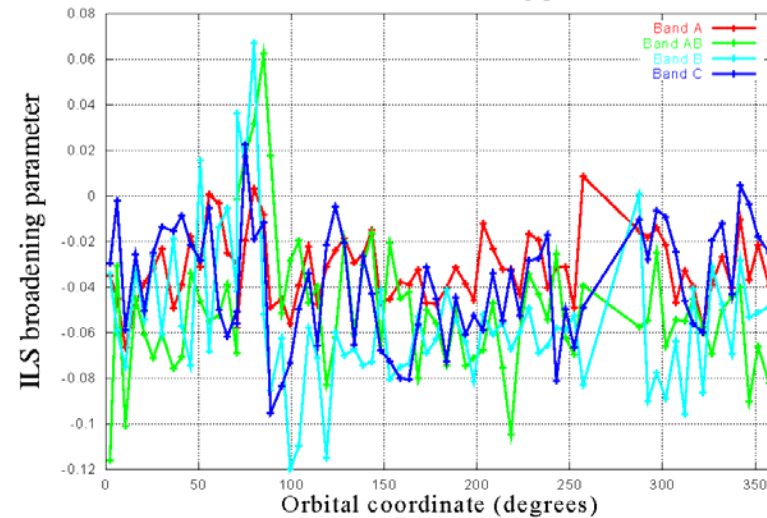


Monitoring of the ILS

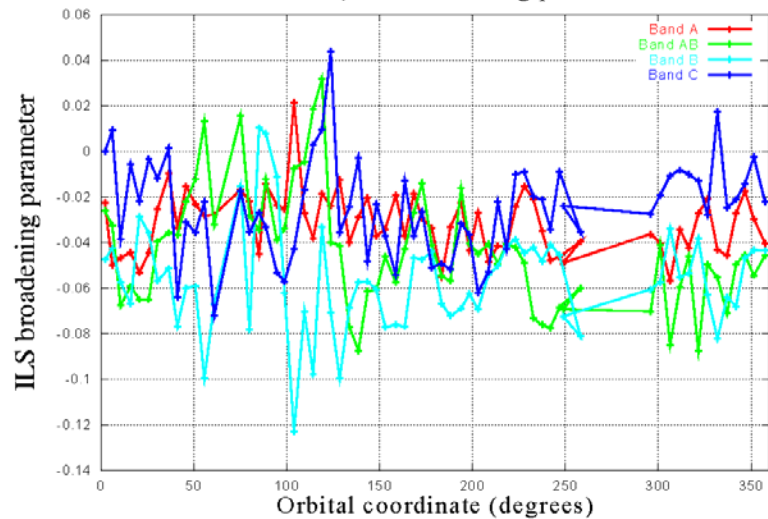
Orbit 2081, ILS broadening parameter



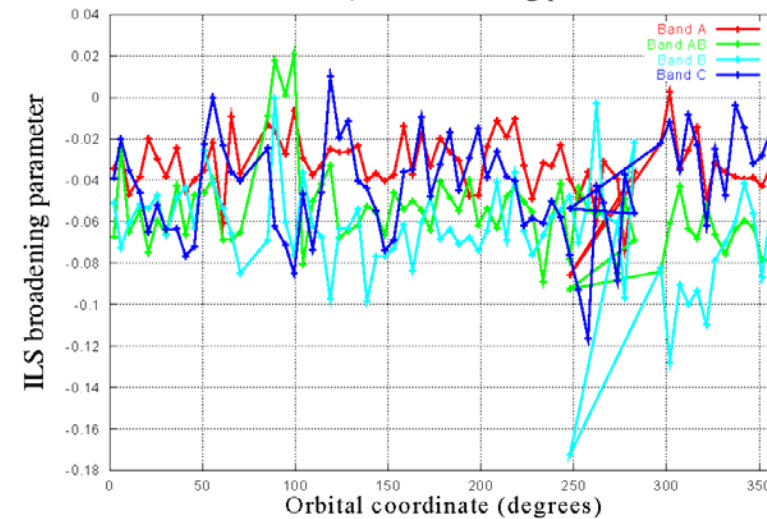
Orbit 2953, ILS broadening parameter



Orbit 4098, ILS broadening parameter



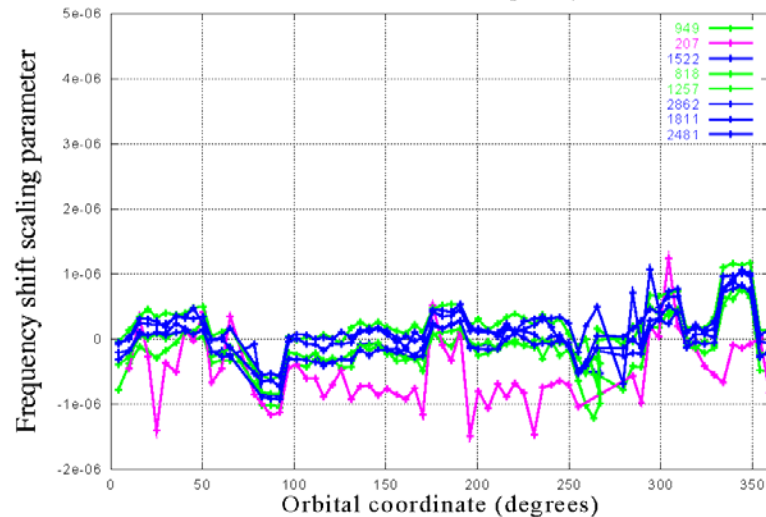
Orbit 5601, ILS broadening parameter



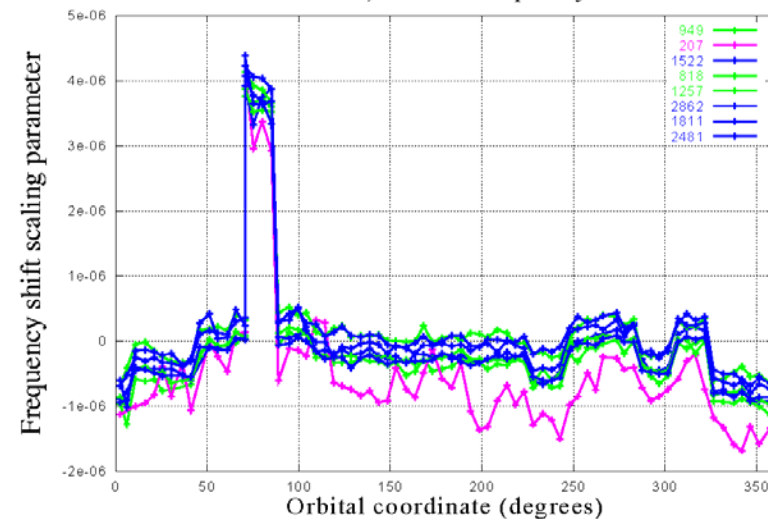
Monitoring of frequency shift



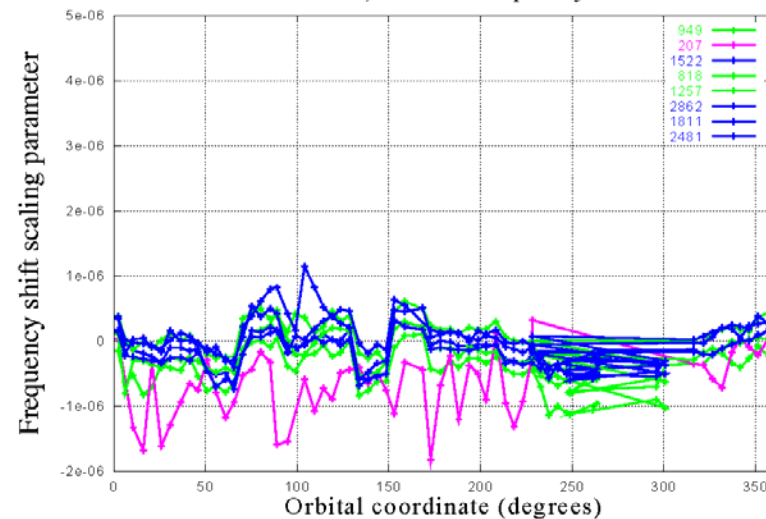
Orbit 2081, residual frequency shift



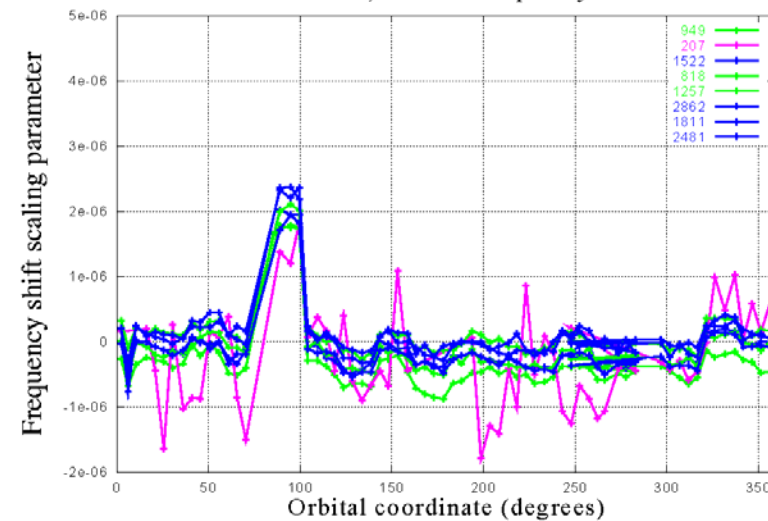
Orbit 2953, residual frequency shift



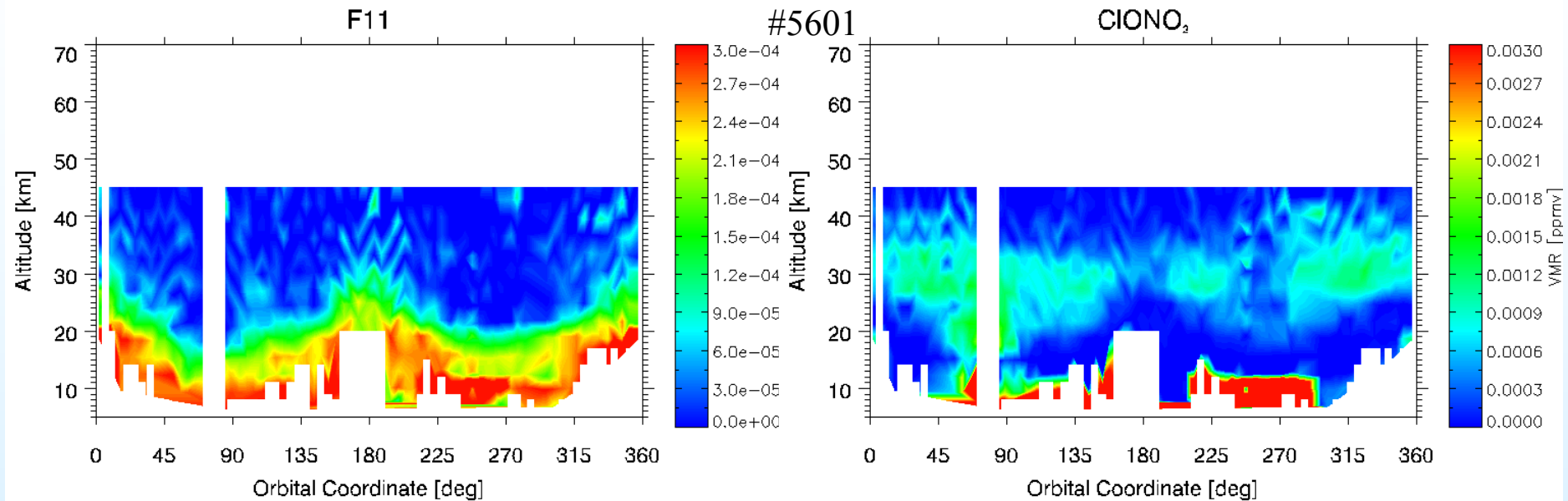
Orbit 4098, residual frequency shift



Orbit 5601, residual frequency shift



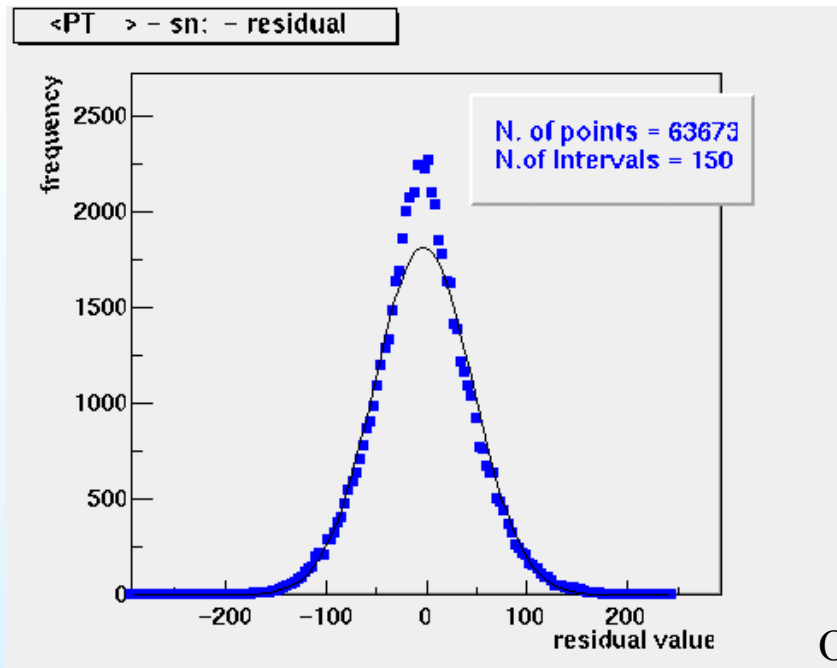
Concluding remarks



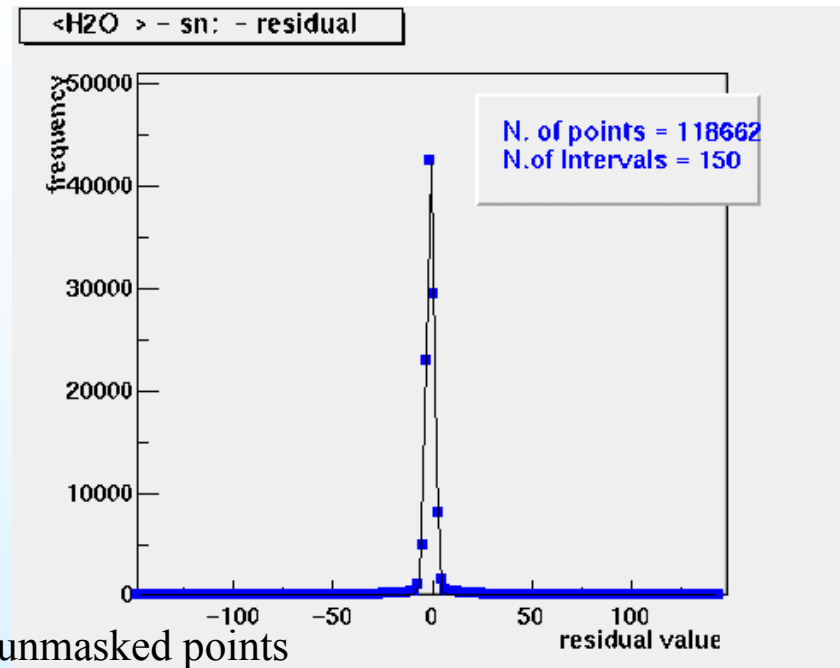
- Several further actions are desirable for improving both the quality and the number of the near real time products



Assessment of the errors ???

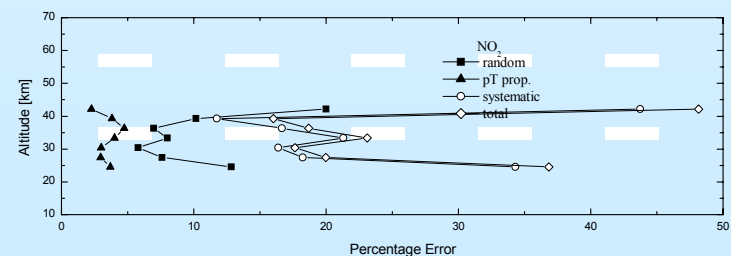
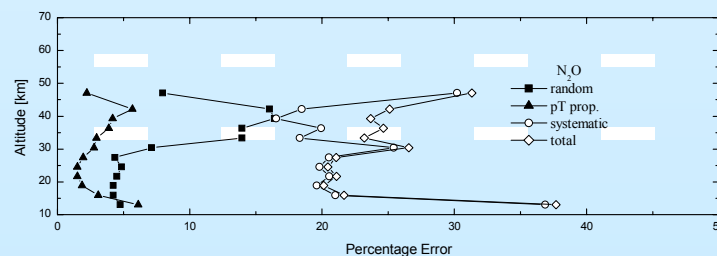
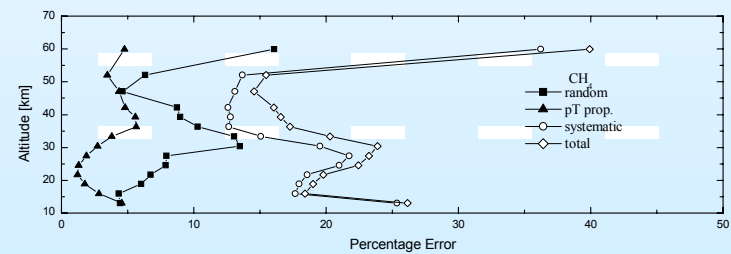
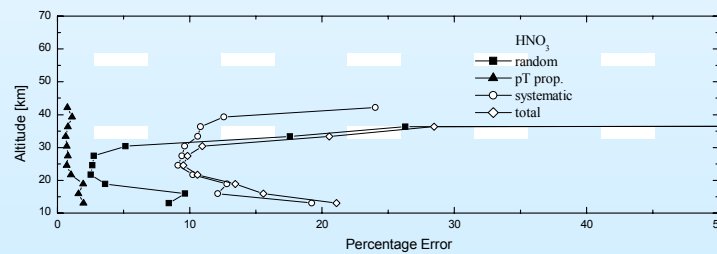
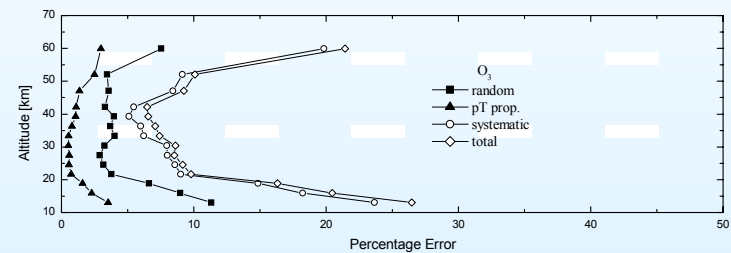
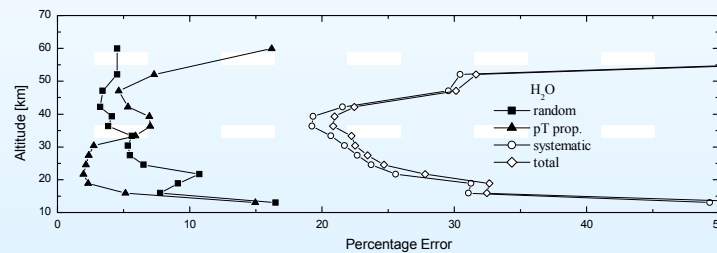
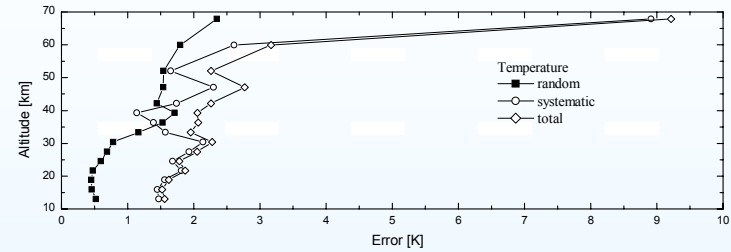
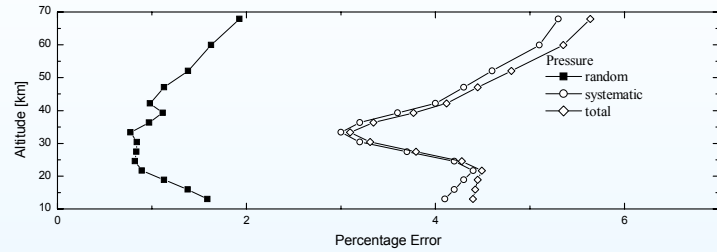


Only unmasked points



Evaluation of systematic errors is under study

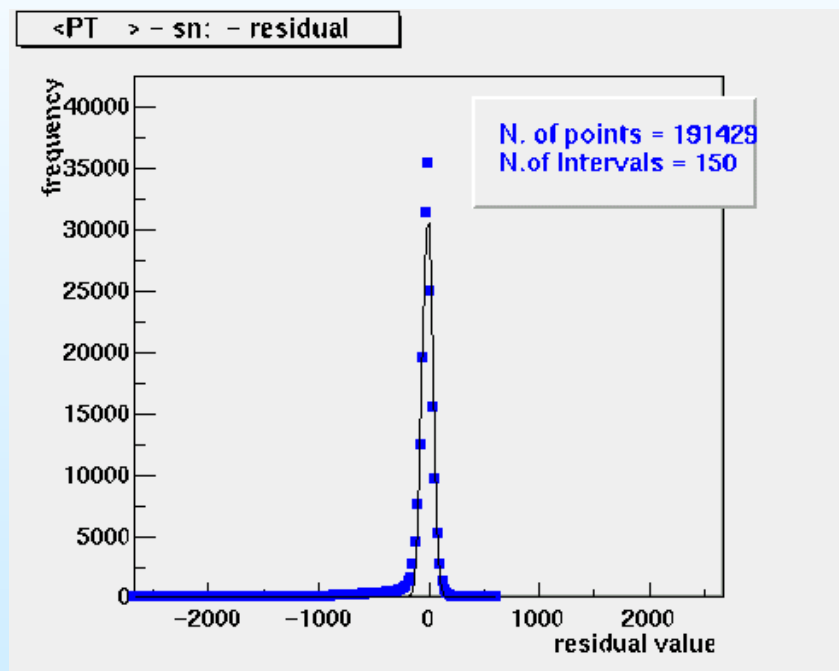
Plot con nuovi errori forniti da Anu?



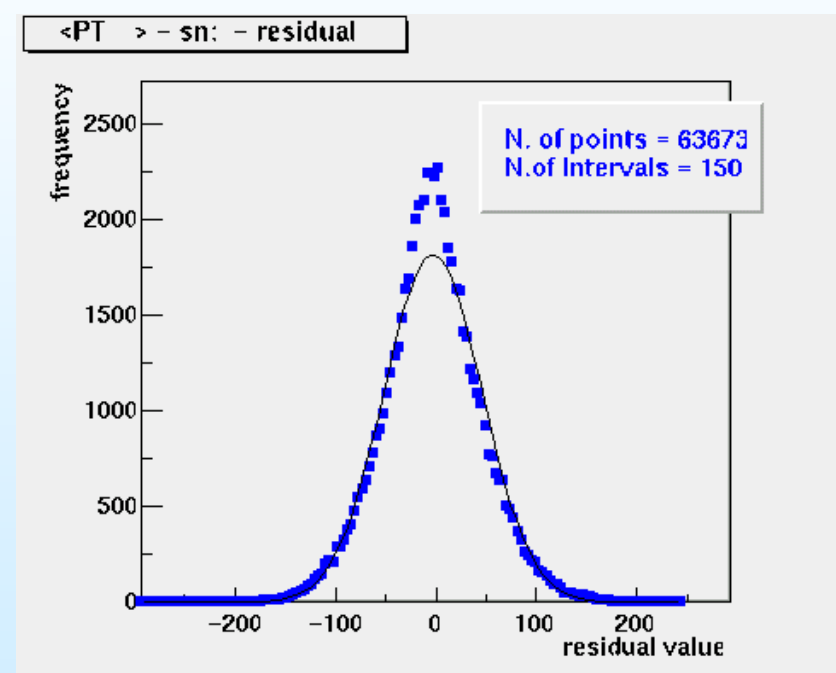


Istogram of the residuals

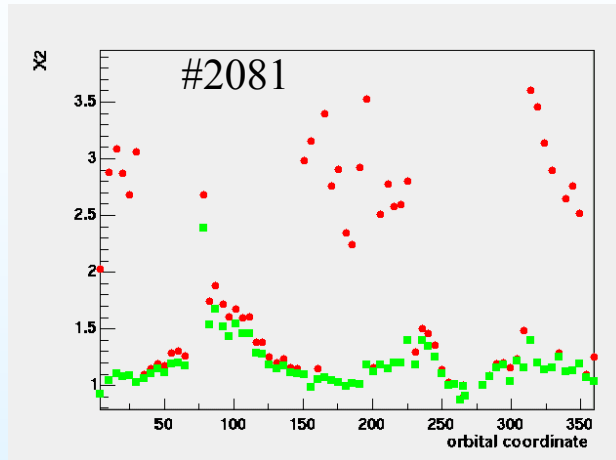
All points



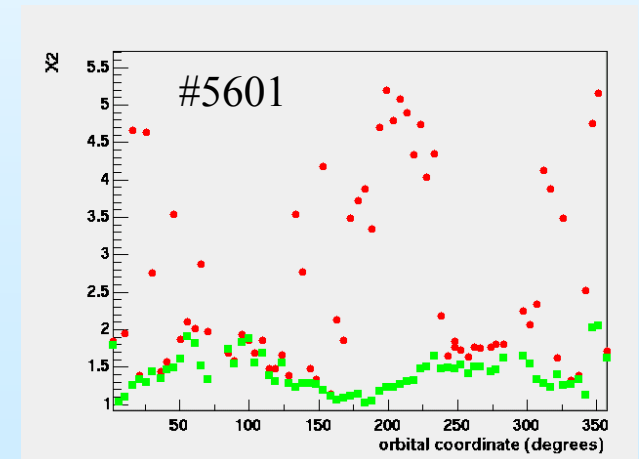
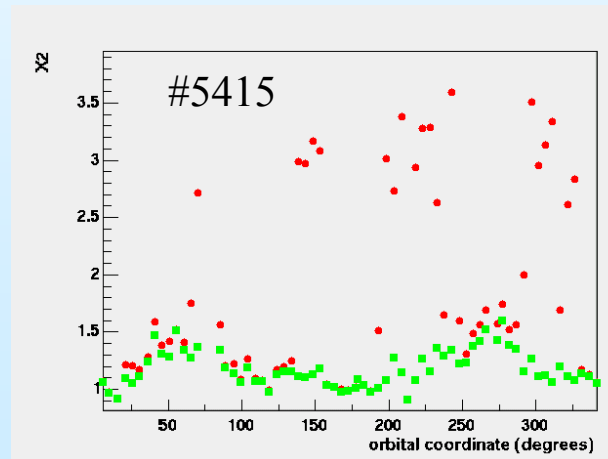
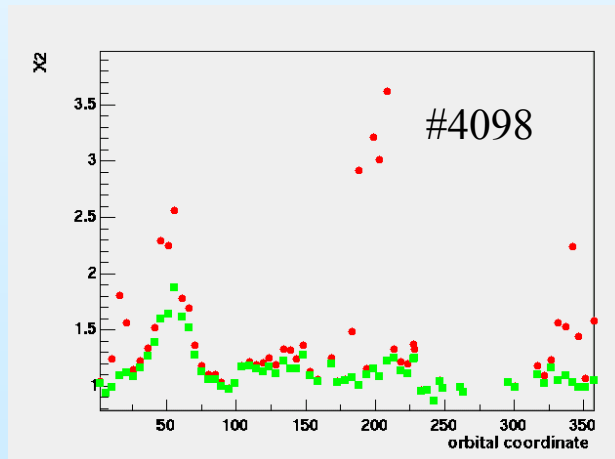
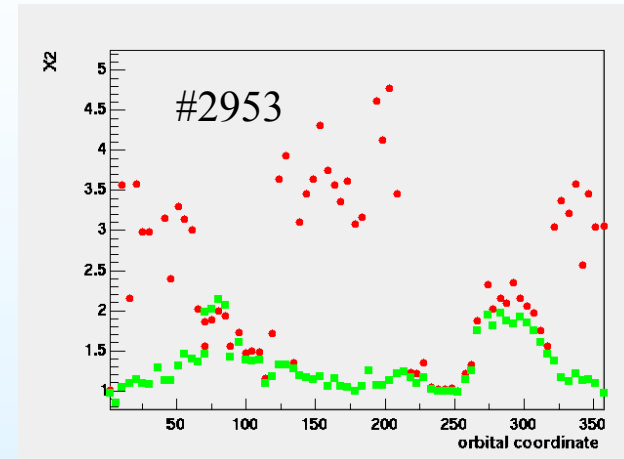
Only unmasked points



χ^2 vs orbital coordinate with **old** and **new** spectroscopic database

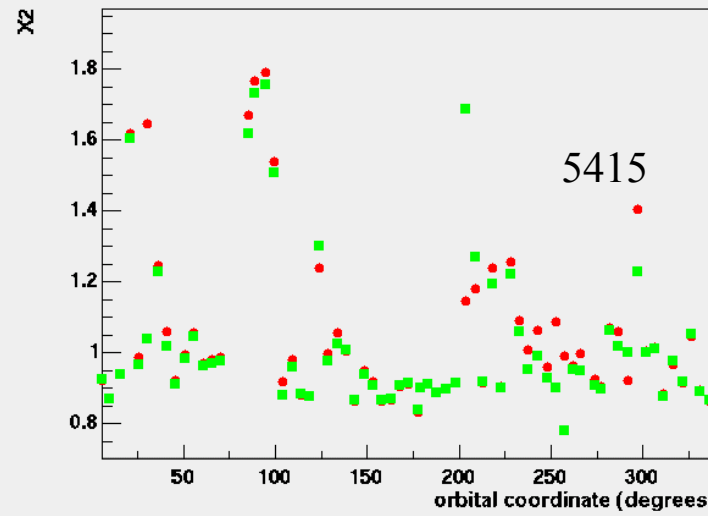
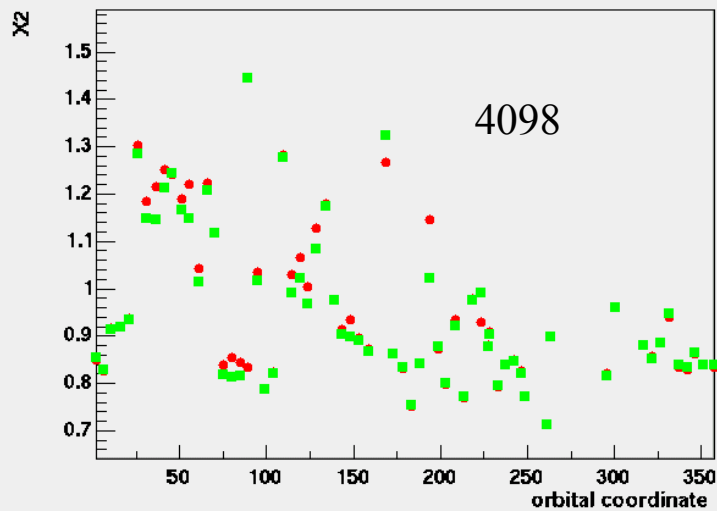
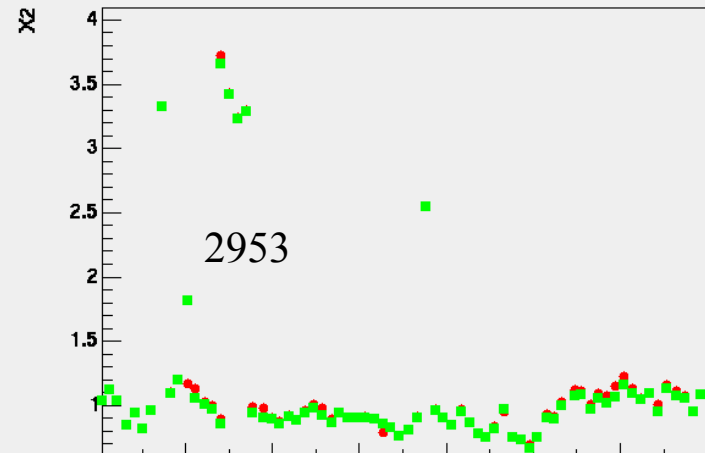
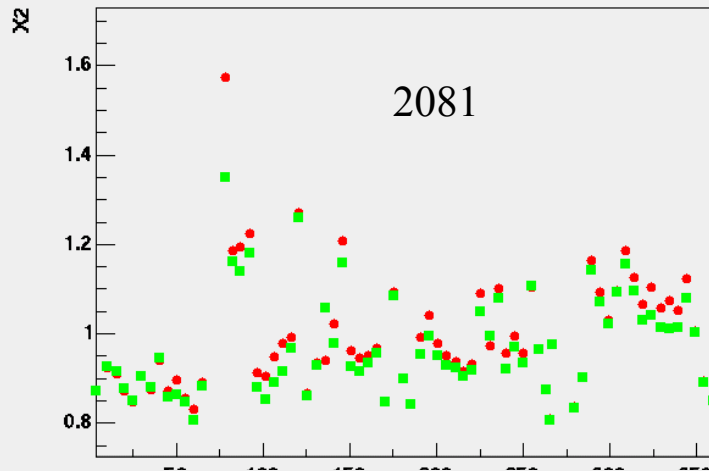


hno3 retrieval



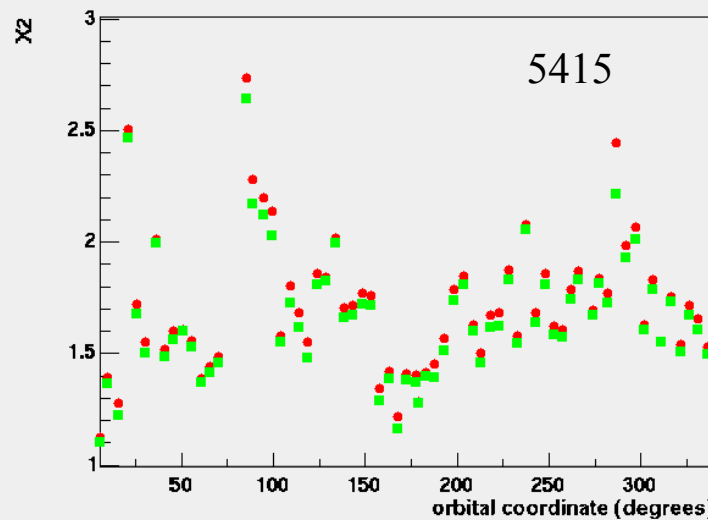
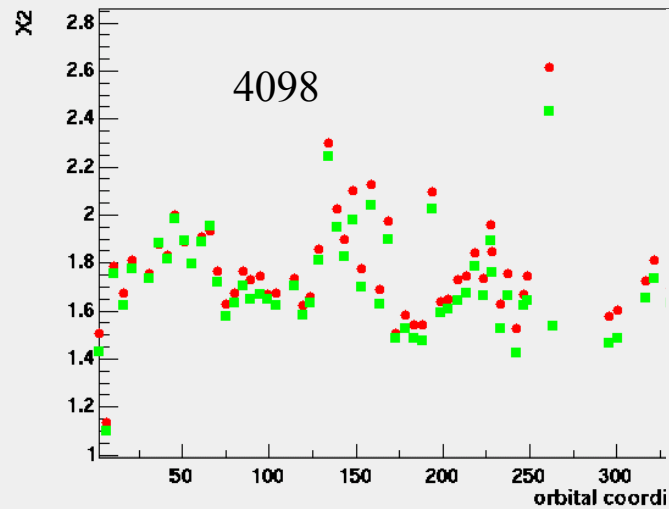
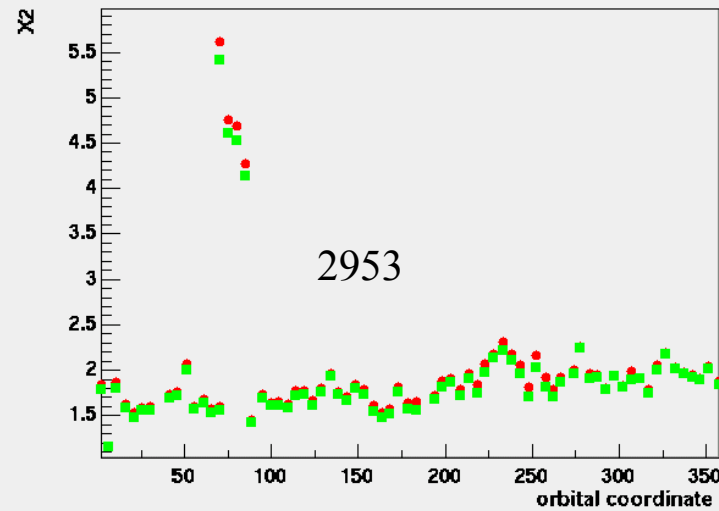
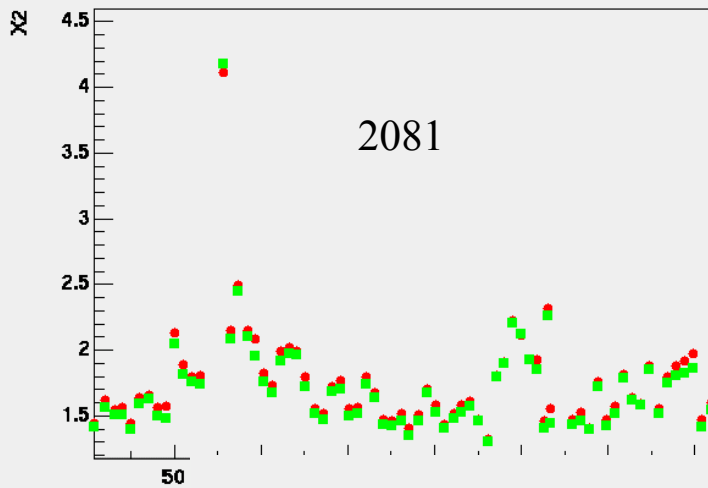
χ^2 vs orbital coordinate with **old** and **new** spectroscopic database

h2o retrieval



χ^2 vs orbital coordinate with **old** and **new** spectroscopic database

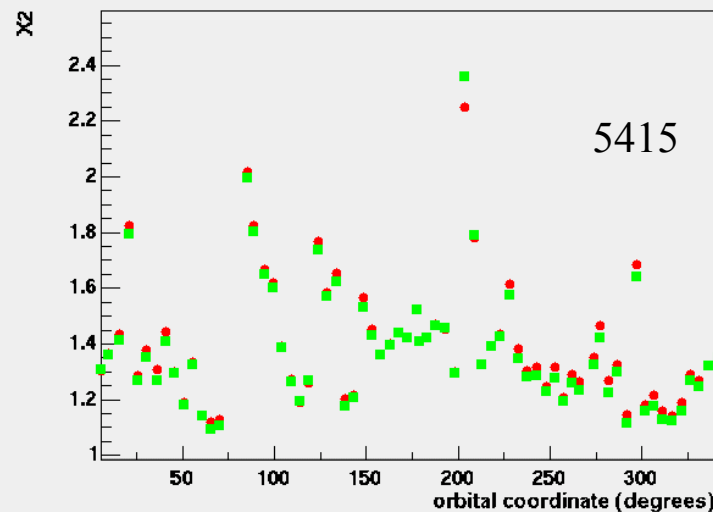
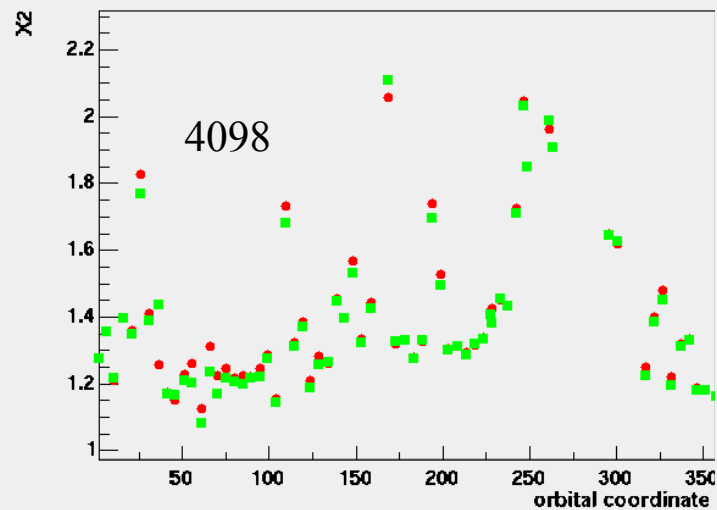
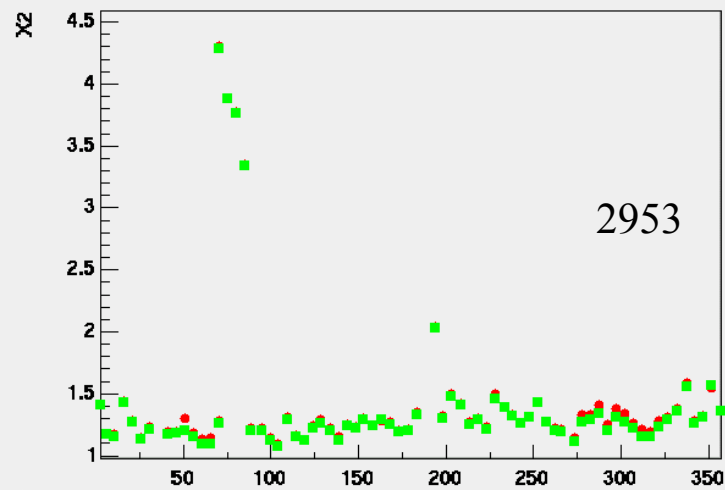
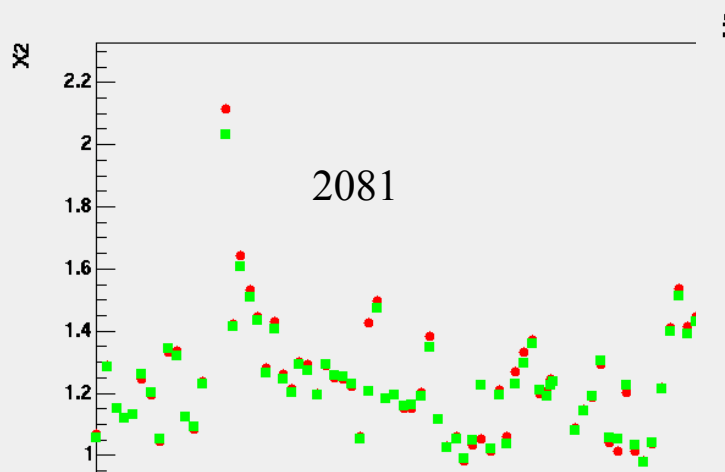
pT retrieval



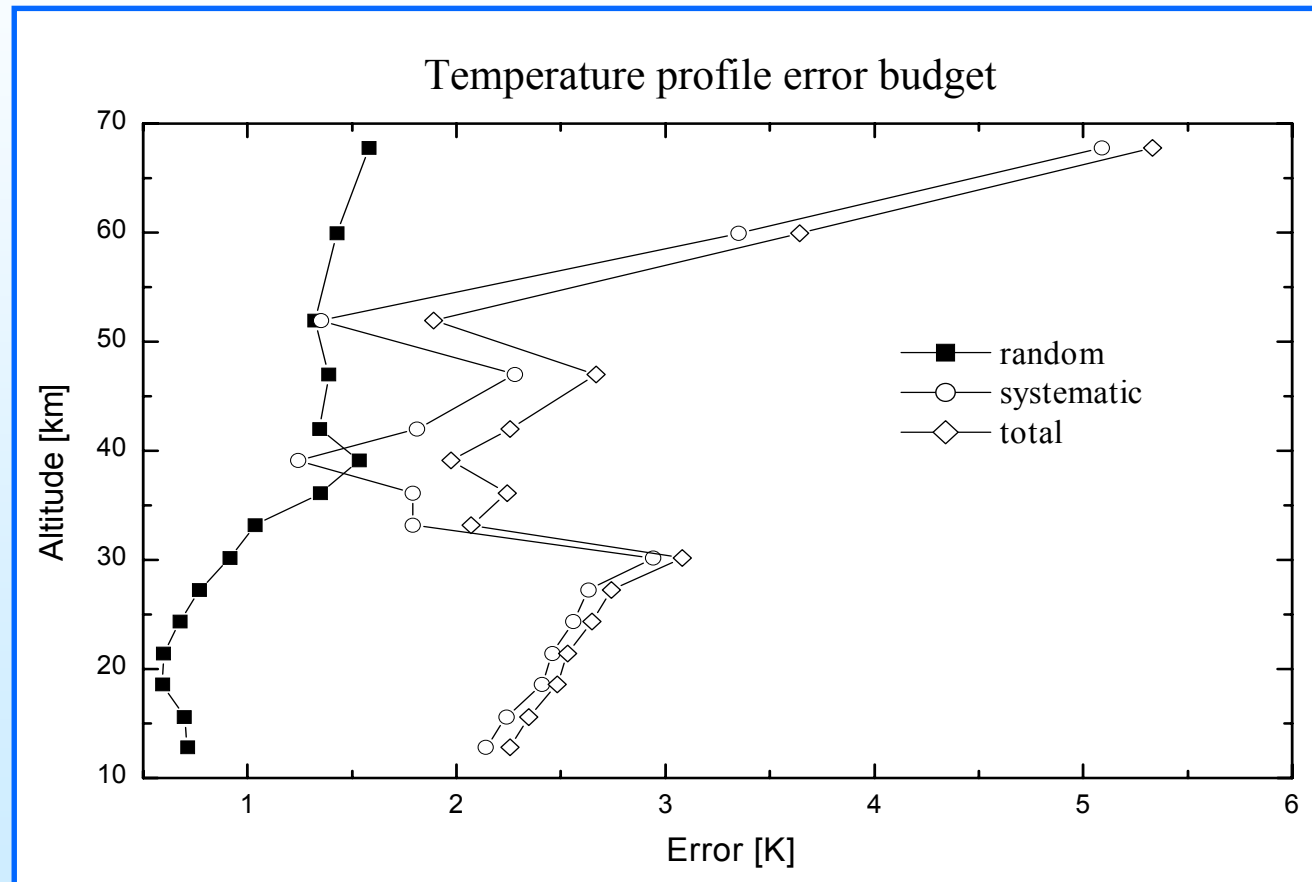
Nice, France, April 2

χ^2 vs orbital coordinate with **old** and **new** spectroscopic database

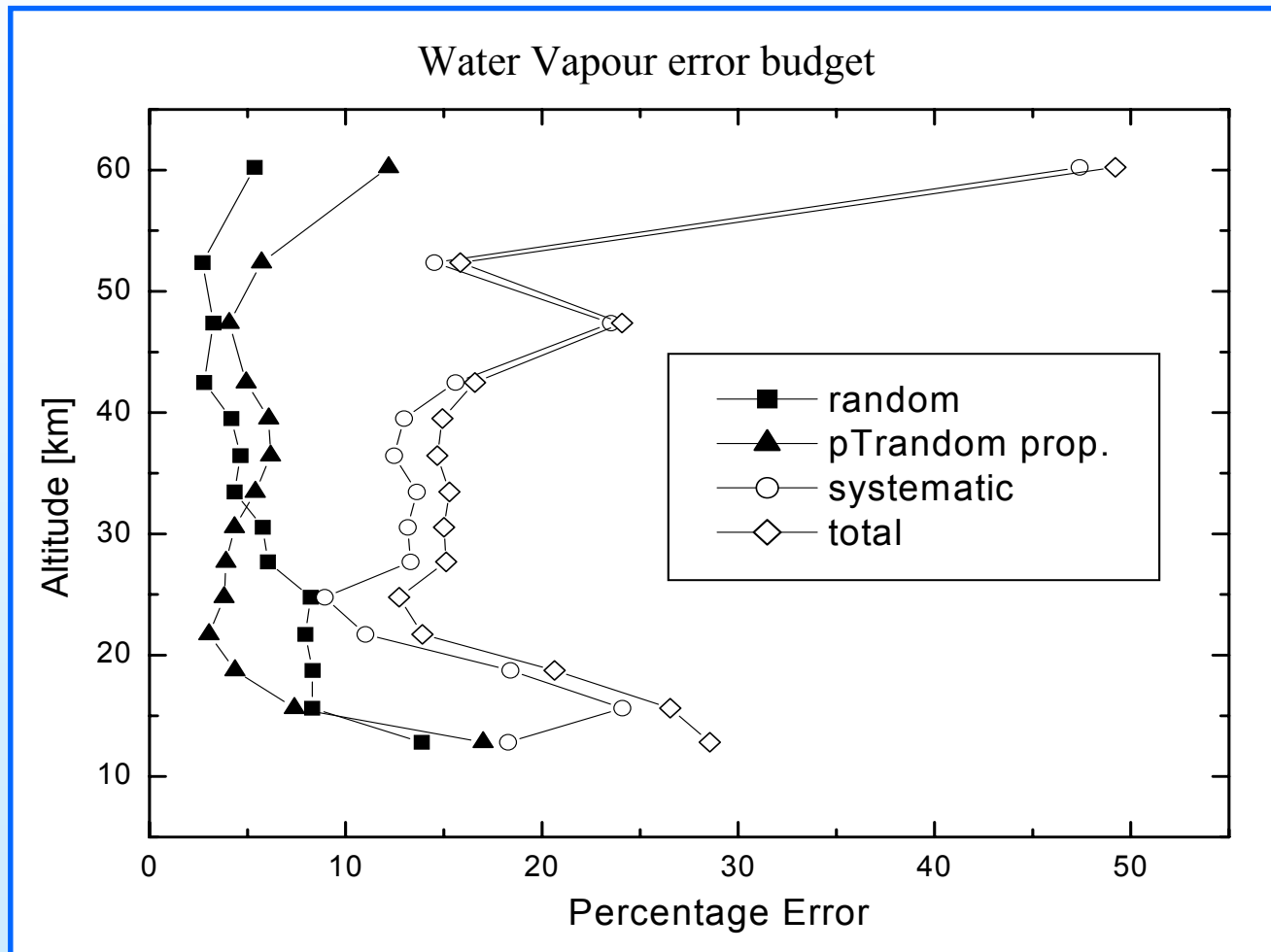
o3 retrieval



Error budget



Error budget

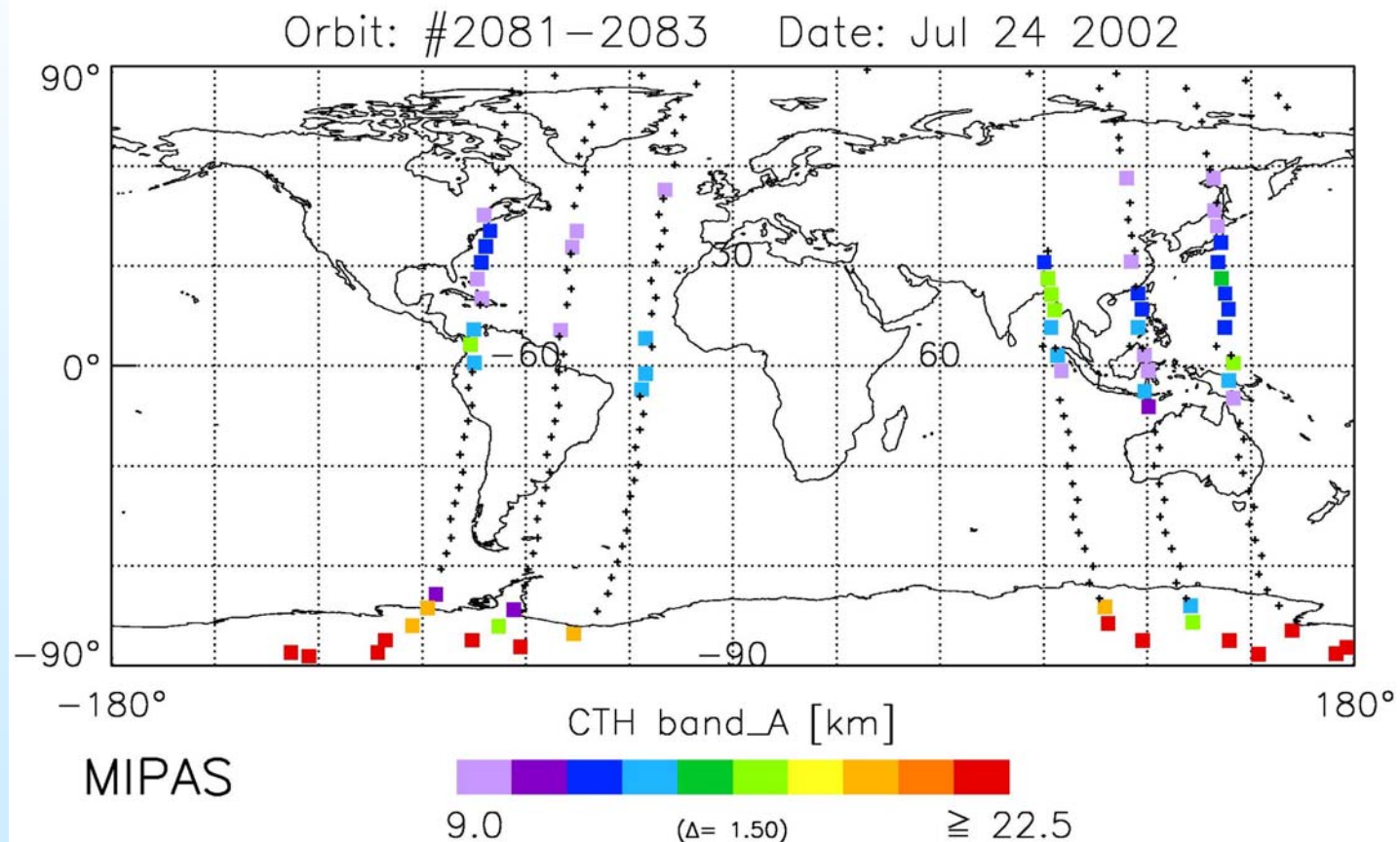


Performances of orbit #504 retrievals

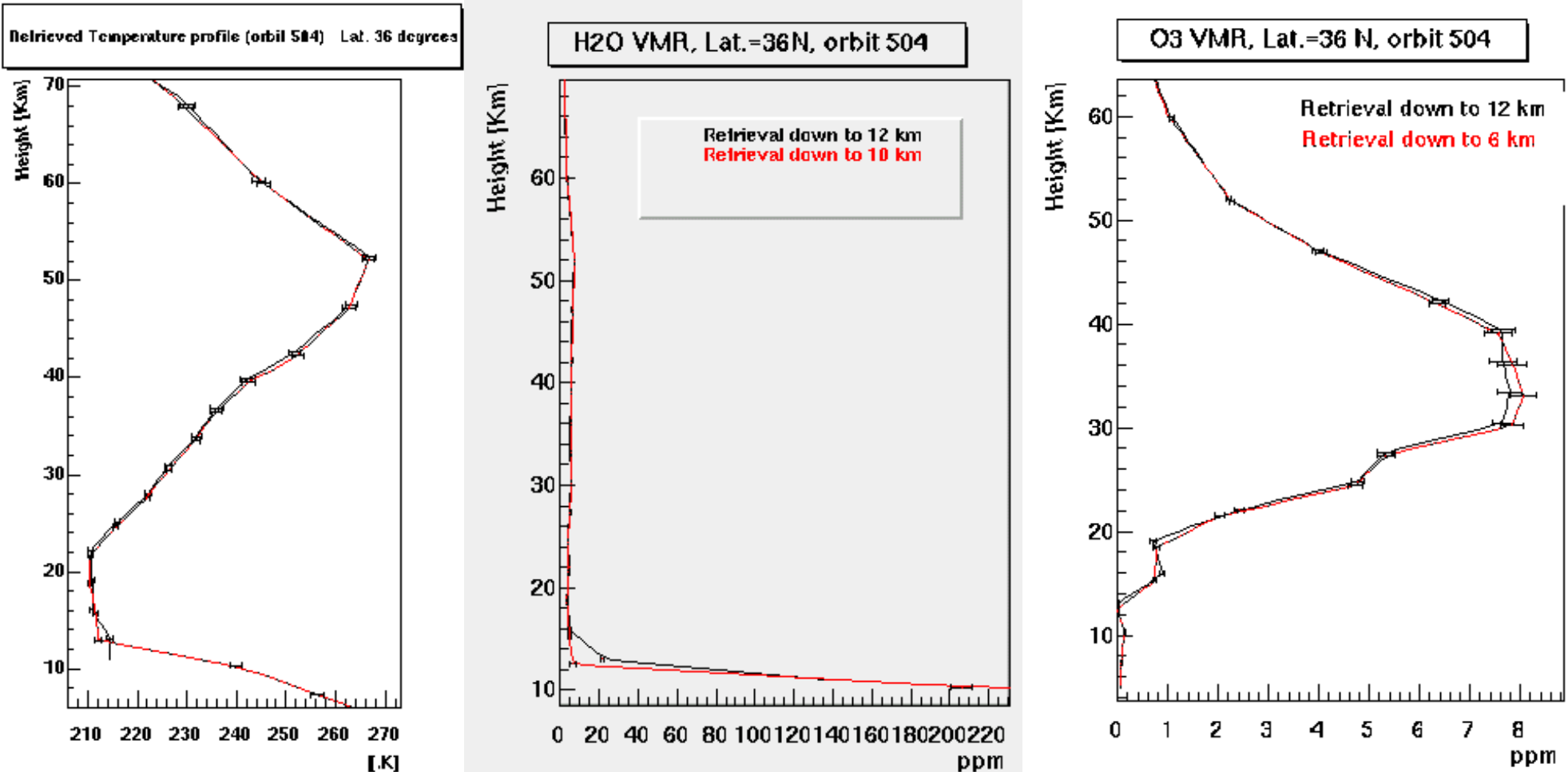
	pT	H ₂ O	O ₃	HNO ₃	CH ₄	N ₂ O	NO ₂
Obtained χ^2 -test	2.21	1.14	1.49	1.29	1.15	1.18	1.09
Expected χ^2 -test	2.82	1.76	1.79	1.11	2.23	1.27	1.23
Average N. of iterations	1.94	1.29	1.44	1.67	1.52	1.57	1.81
% of successful retrievals	100	100	100	100	100	100	100

The time for the full analysis (62 available scans of the 75 made in one orbit) is less than one hour on a COMPAQ ES45 Server with 2 CPU at 1000 MHz.

Cloud top height



Extension of retrieval to 6 km altitude



- ORM succeeds in processing MIPAS measurements with small χ^2 and a relative short run-time
- A small number of iterations is sufficient to reach convergence
- Our error budget is slightly overestimated
- Retrieval is robust
- Possible to extend retrieval to 6 km

