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Microwindow Selection for new* Nominal Mode

*1.5km spacing, floating altitude, used Feb'05 onwards

New Microwindows

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- '200 series' microwindows (eg PT__0201) were selected for Aug'04 data: 0.0625cm^{-1} spectral resolution but original elevation scan (6,9,12 … 68km) - already delivered

- '300 series' are being selected for
  - 0.0625cm^{-1} spectral resolution
  - 27 step elevation scan: 6,7.5,9, … 70 km
  - floating lower altitude: 6km ± 3km

New Microwindows

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& Planetary Physics,
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Main developments:

- Recompute entire dataset of error and Jacobian spectra allowing for new spectral resolution, vertical grid and offset

- Vertical oversampling ⇒ full pT covariance error propagation now has to be used instead of previous simple fixed diagonal (2%,1K) representation

- pT microwindows have to be decided first before selection of others can start. Current status is that pT almost finalised, other species still in selection process

New Microwindows

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Following plots show comparison of error analyses of '200' series microwindows (3km vertical spacing) with 5 best current '300' series microwindows (1.5km spacing)

Temperature

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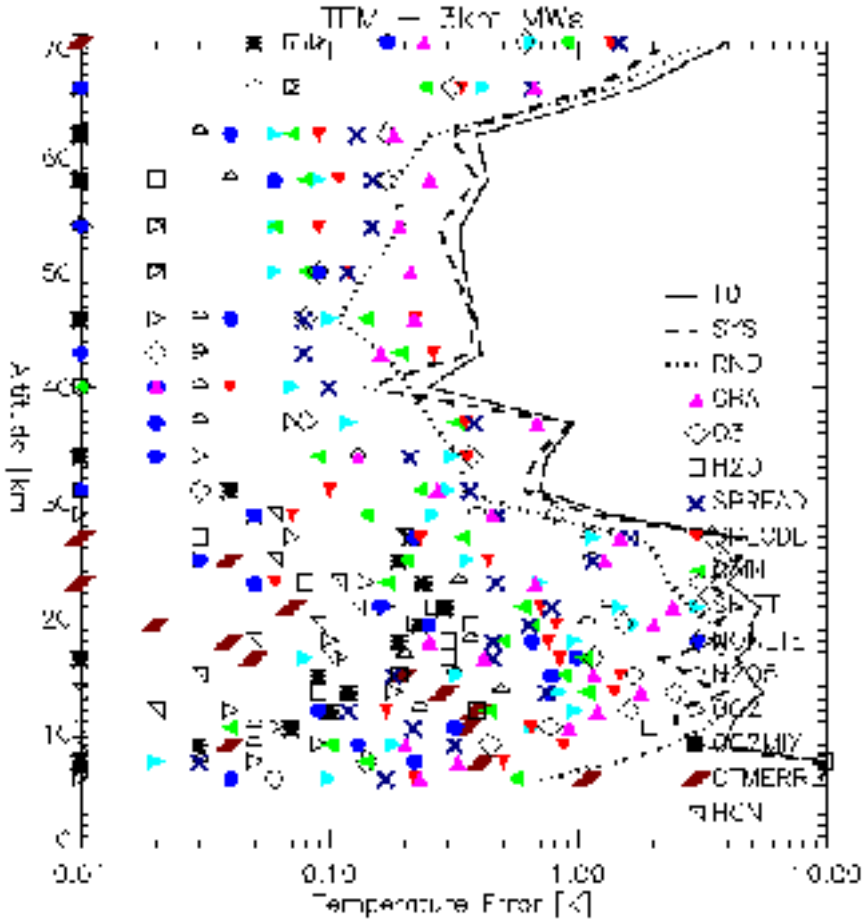
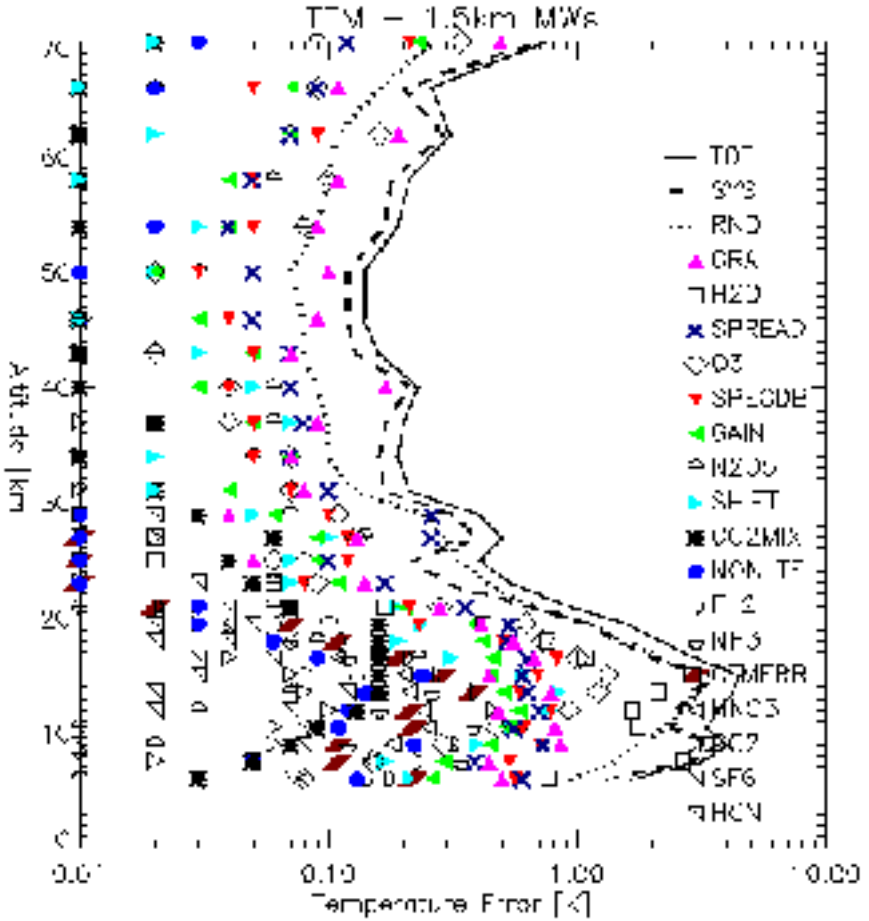
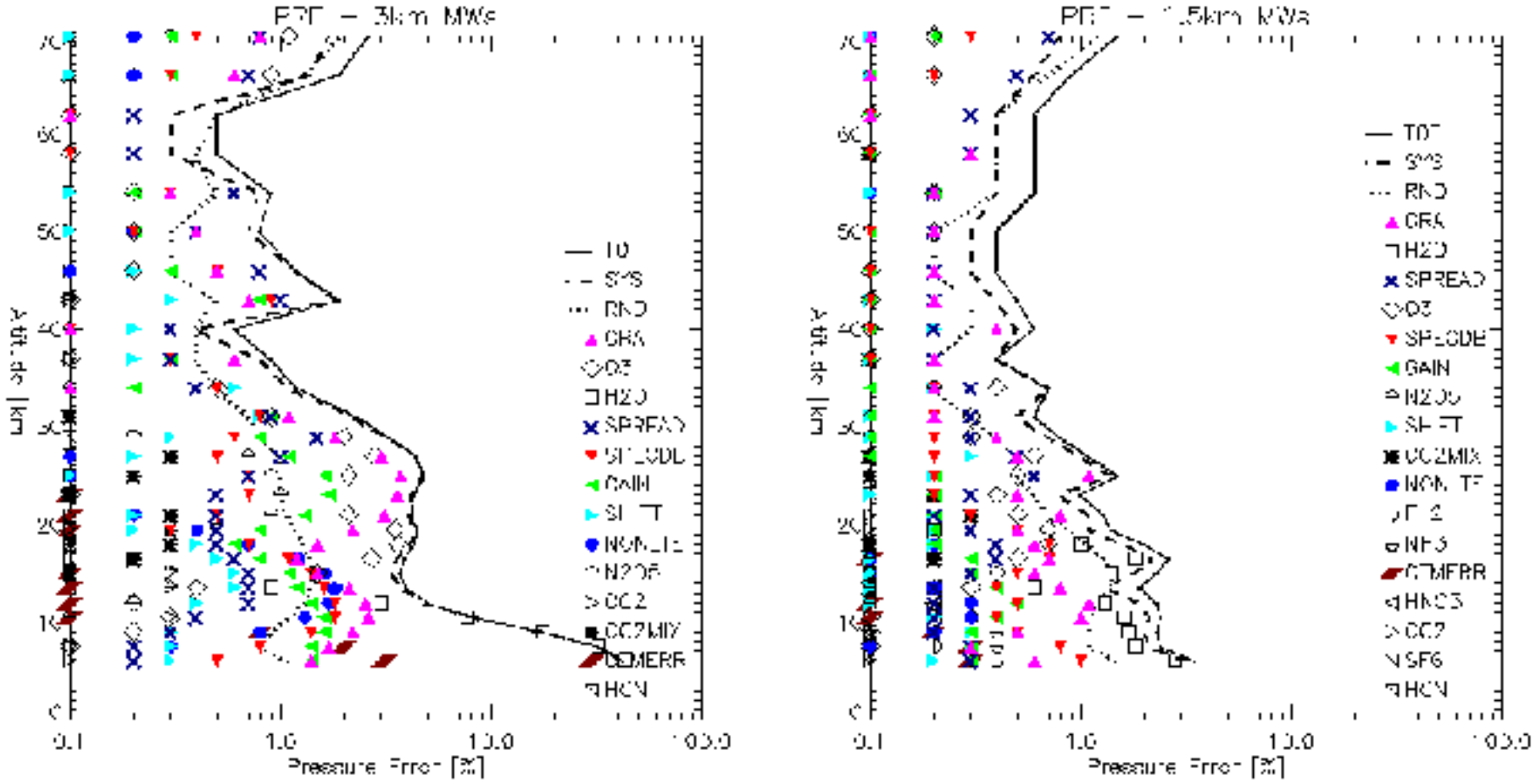




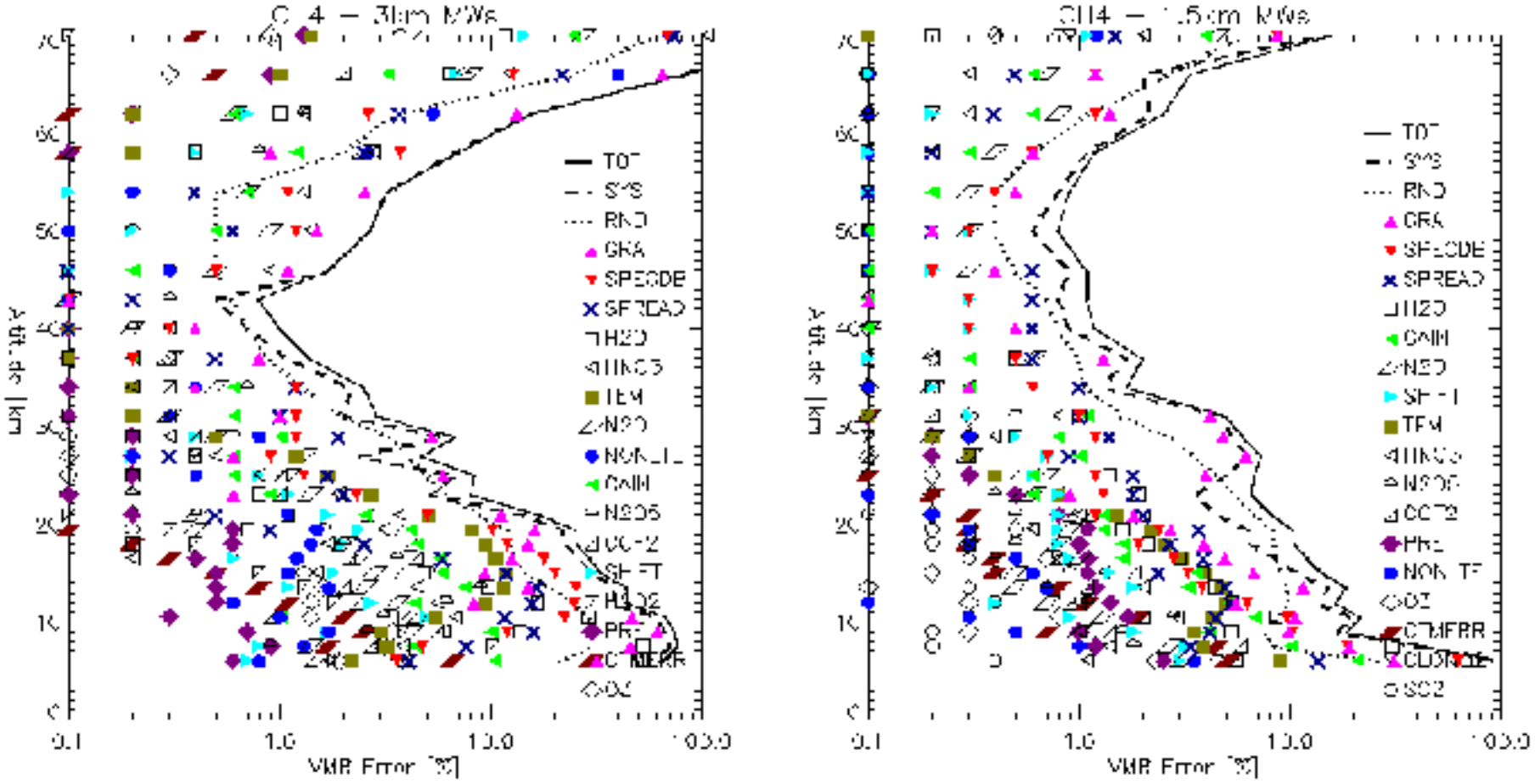
Pressure

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



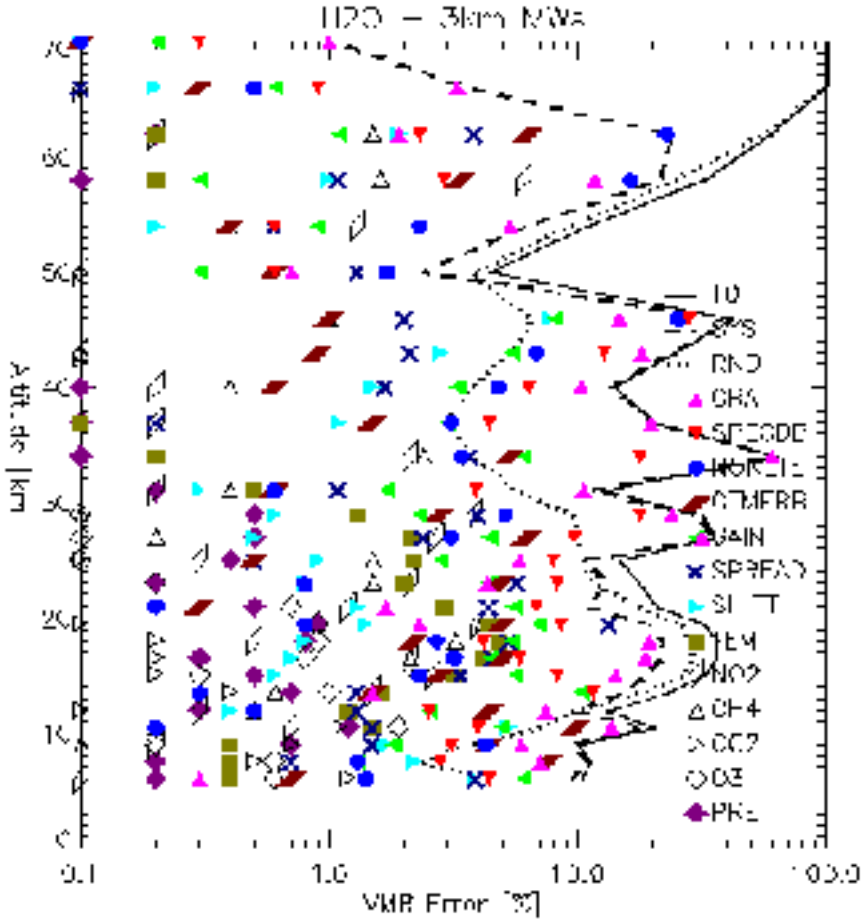
CH4

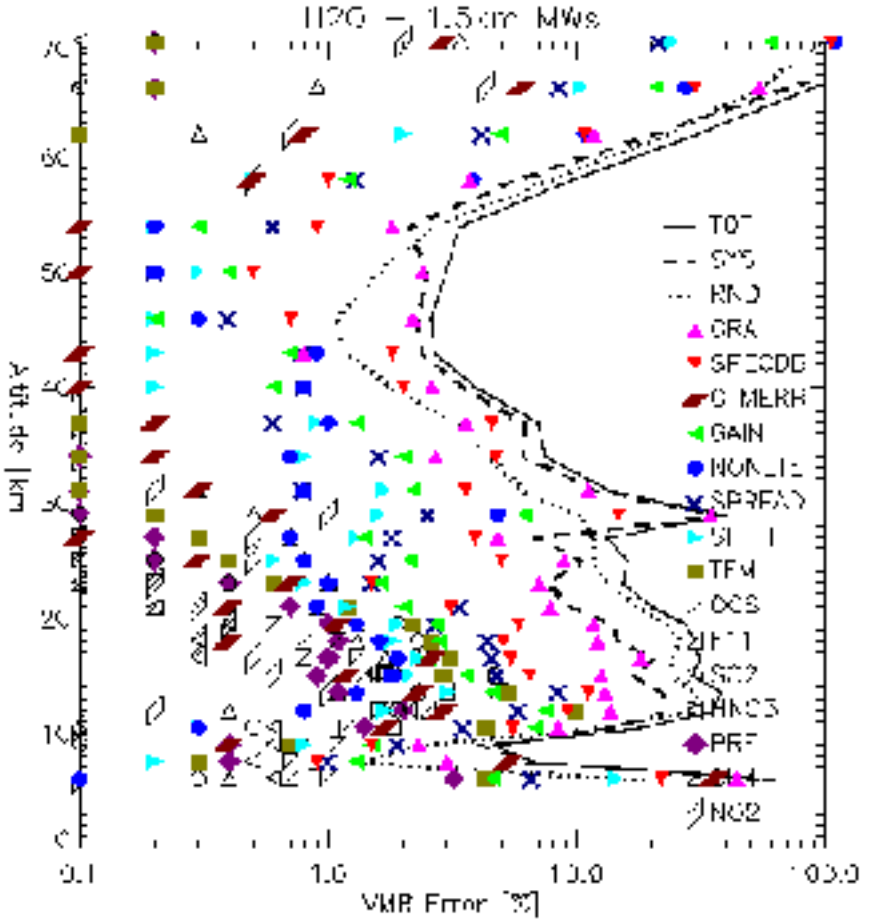
Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



H2O

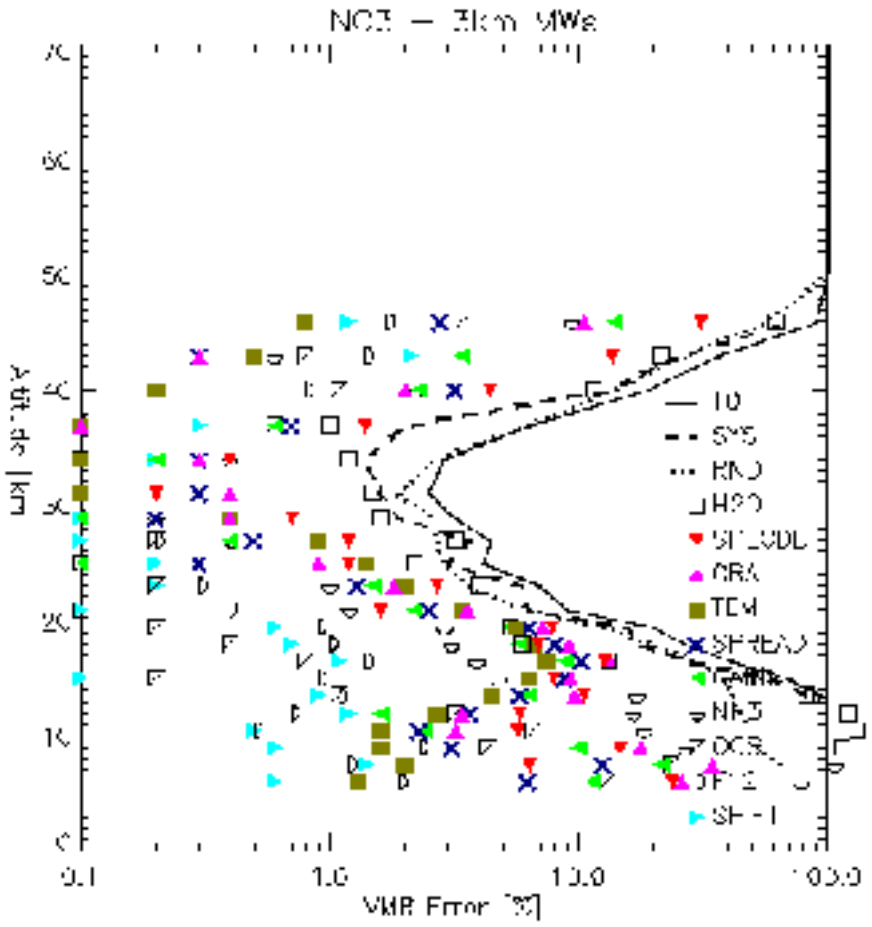
Atmospheric, Oceanic
& Planetary Physics,
University of Oxford

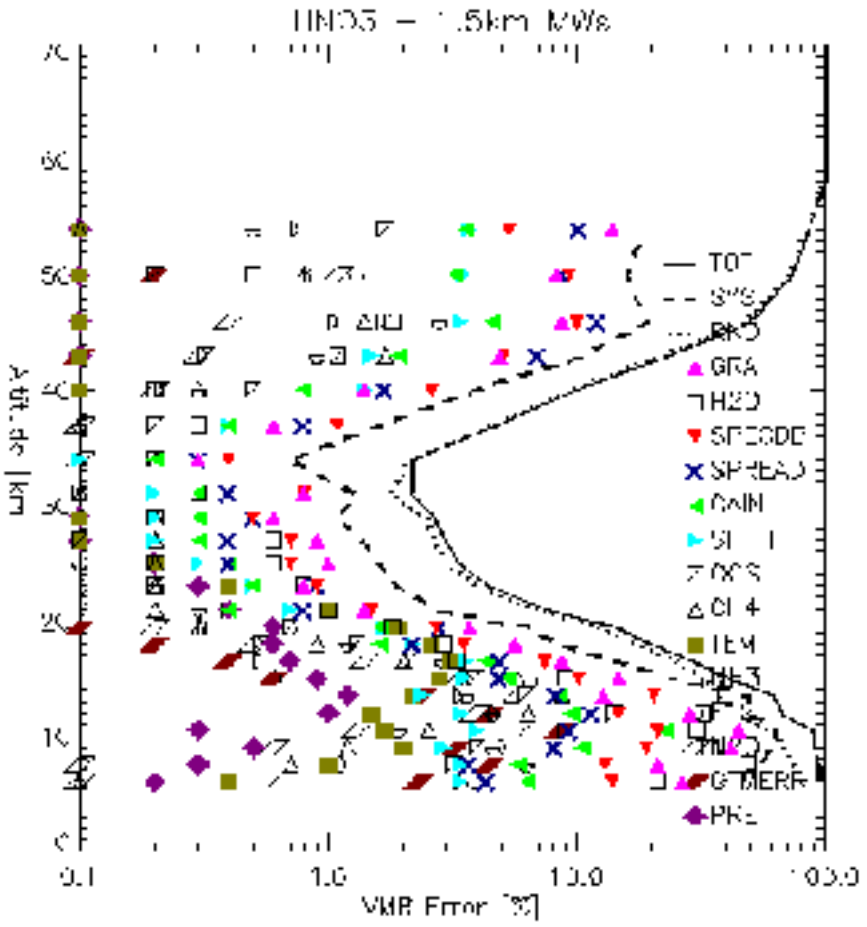




HNO3

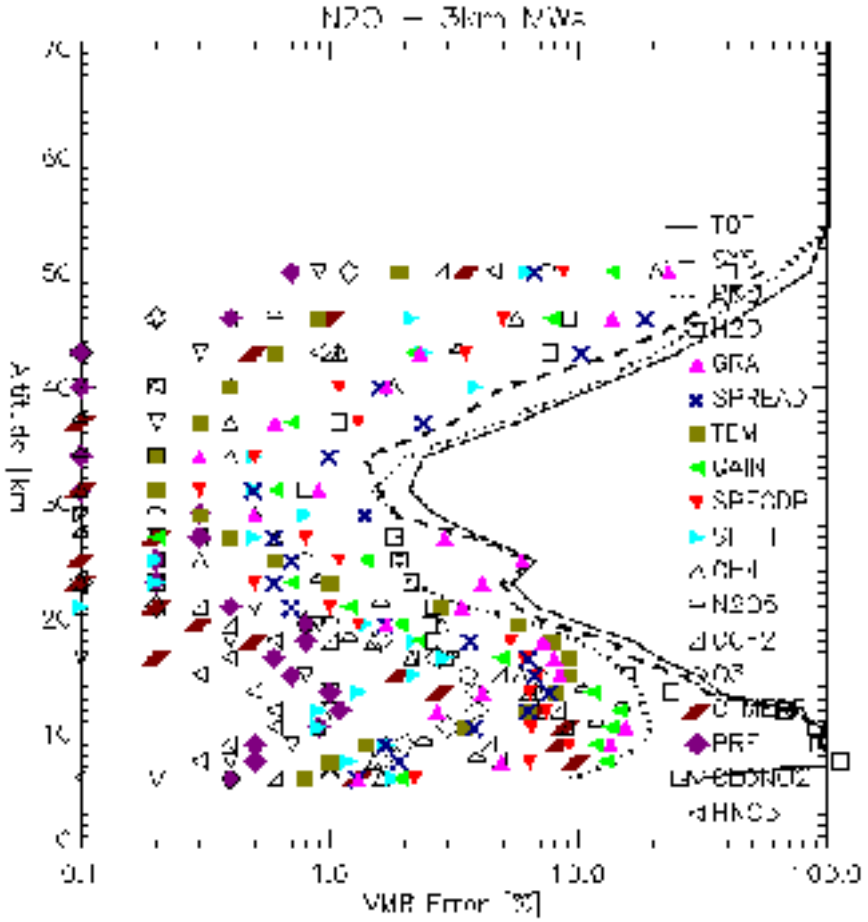
Atmospheric, Oceanic
& Planetary Physics,
University of Oxford

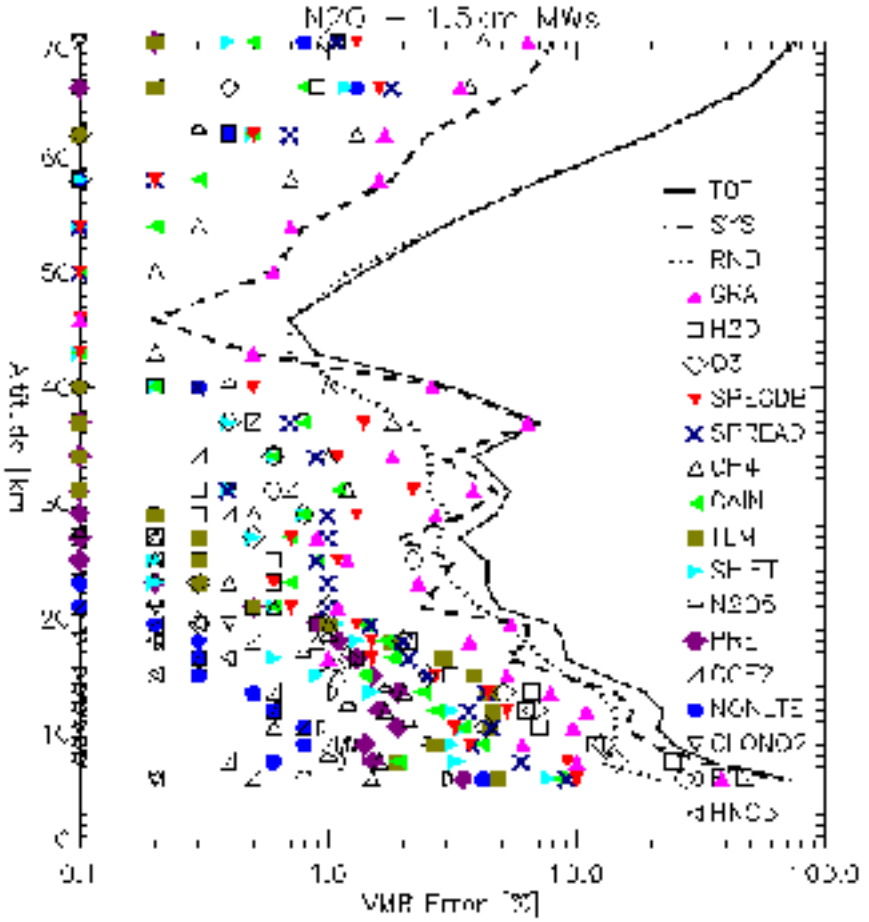




N2O

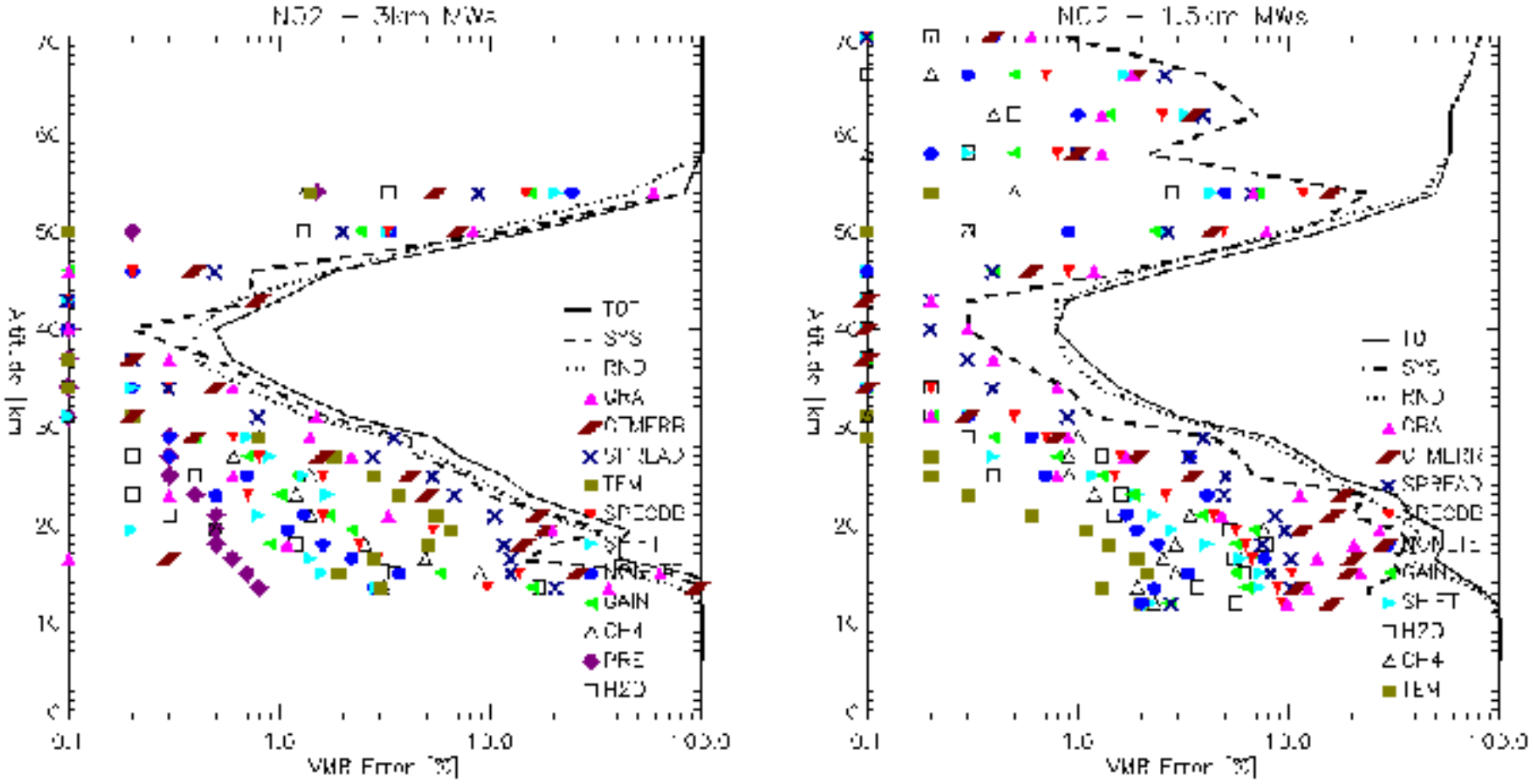
Atmospheric, Oceanic
& Planetary Physics,
University of Oxford





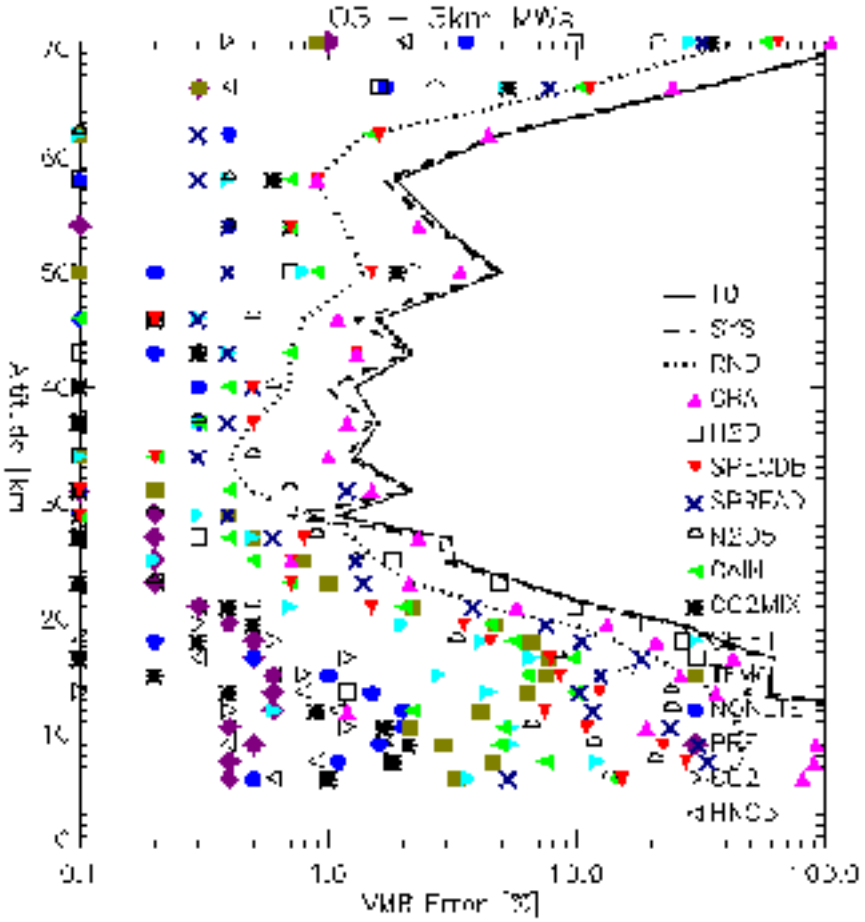
NO2

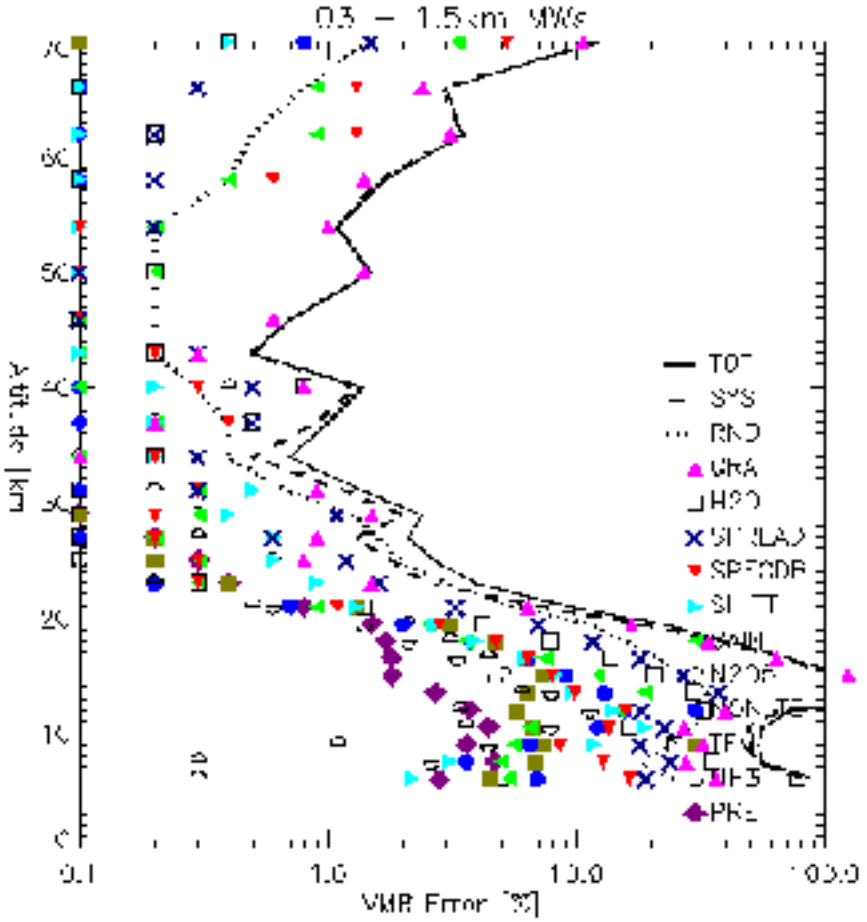
Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



O3

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford





Summary

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University of Oxford

- It appears that similar precision can be achieved for 1.5km resolution as for 3km, although generally using slightly more microwindows
- Therefore it *may* be possible to retrieve pT and many species at 1.5km resolution

Analyses of Dec04/Jan05 Spectra

L1B Data

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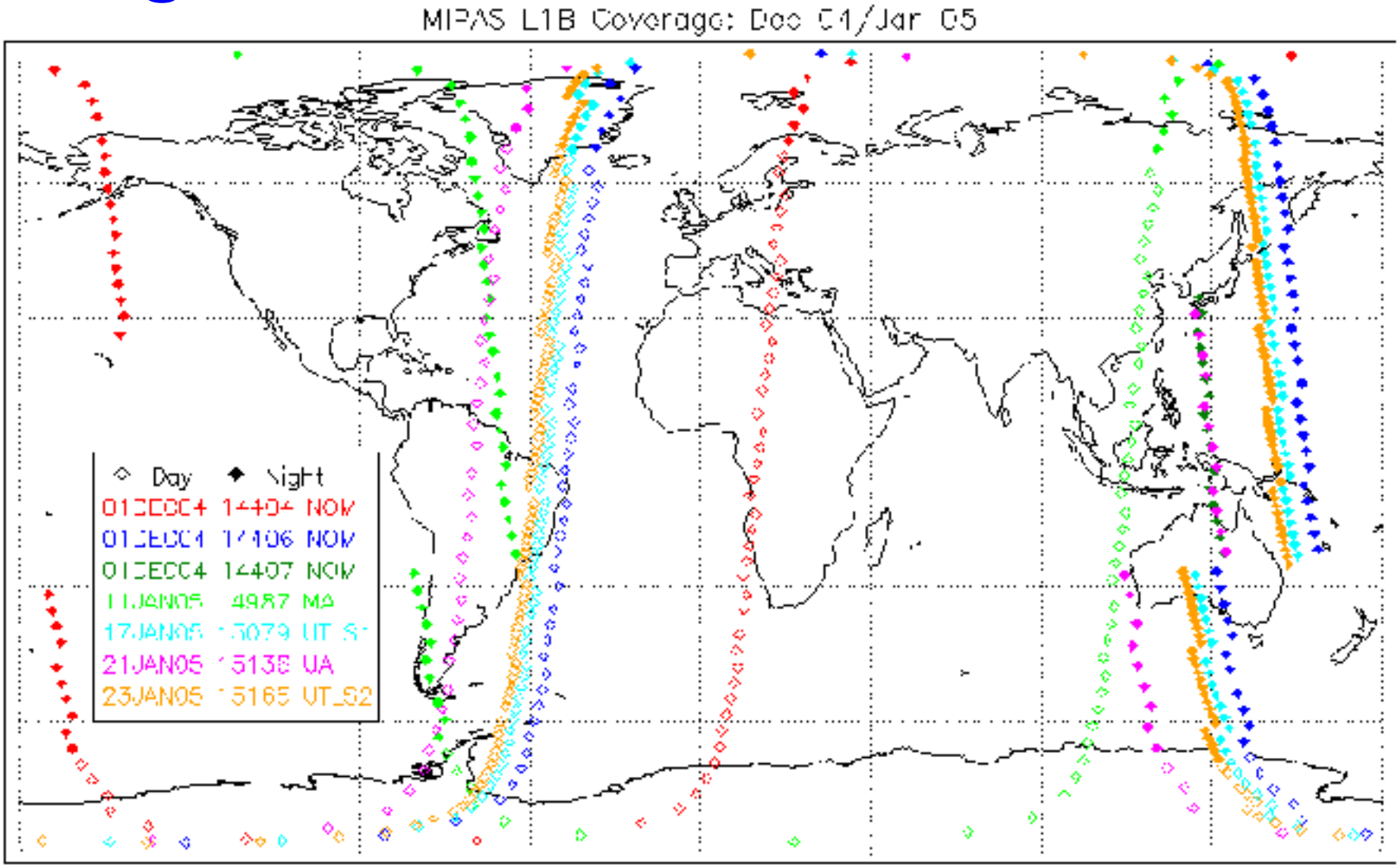
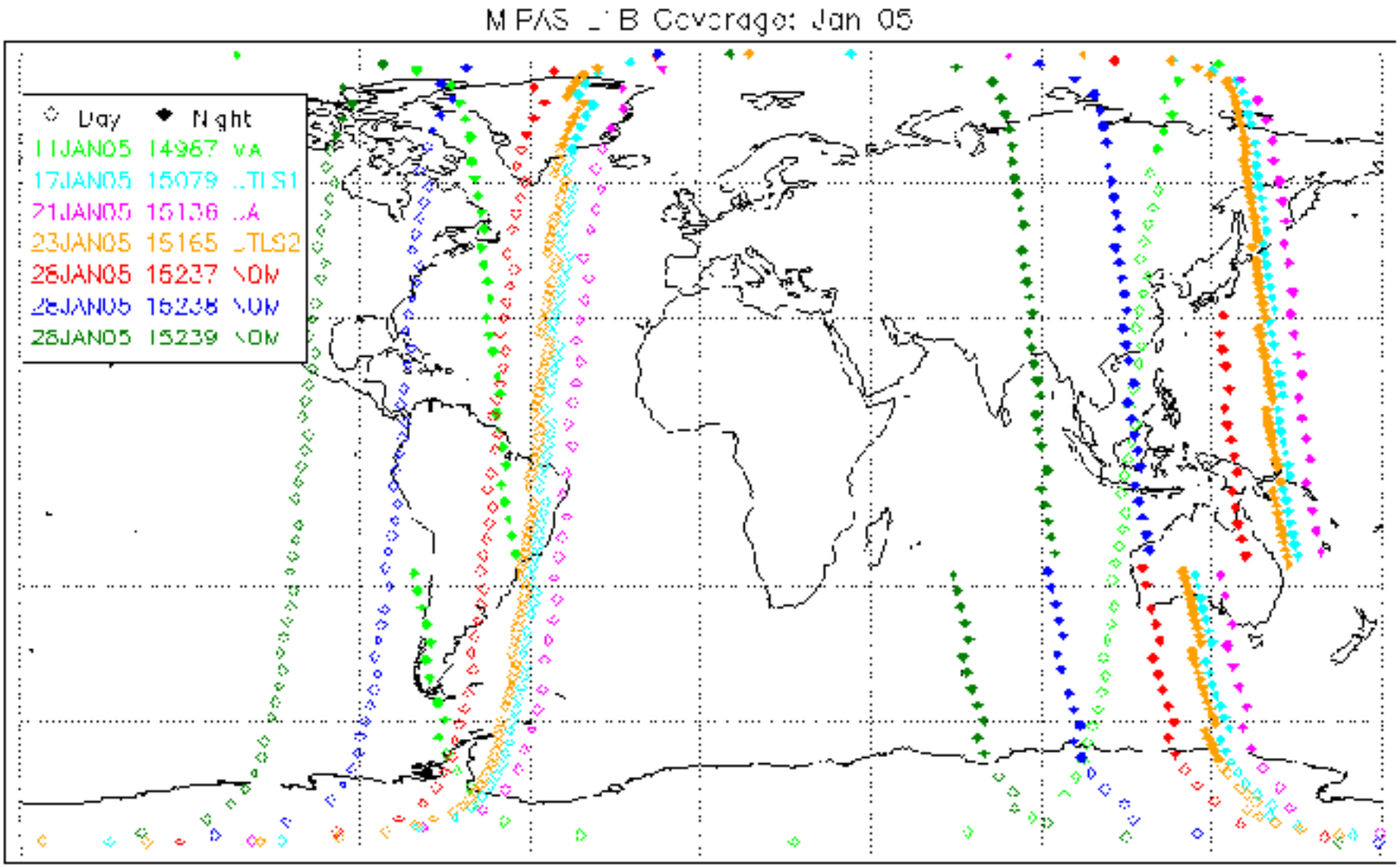
Date	Orbit	Mode	Scans	Sweeps	Altitudes
01DEC04	14404	NOM	82	27	6-70km
"	14406	"	96	"	"
"	14407	"	16	"	"
11JAN05	14987	MA	90	29	18-102km
17JAN05	15079	UTLS1	139	18	8.5-49±3km
21JAN05	15136	UA	65	35	42-172km
23JAN05	15165	UTLS2	215	11	12-42km
28JAN05	15237	NOM	83	27	6-70km
"	15238	"	96	"	"
"	15239	"	96	"	"

Original data only	Original & Reprocessed	Changed orbit	New data only

Original Data



New Data


MIPAS _1B Coverage: Jan 05
Day
Night
11JAN05 14967 VA
17JAN05 15079 _TIS1
21JAN05 15136 _A
23JAN05 15165 _TIS2
26JAN05 15237 NOM
26JAN05 15238 NOM
26JAN05 15239 NOM

Retrieval

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- Used Oxford optimal estimation retrieval code ‘MORSE’
- Use microwindows originally selected for 3km spacing (6,9,12km etc scan pattern, Aug04)

" The following sequence of plots compares retrievals from the two nominal mode orbits 14404 and 14406 from 01Dec04

" 14407 also retrieved but short data segment so not plotted

" Grey squares indicate tangent points where no data was available, eg due to cloud contamination or out of microwindow altitude range - at these points information comes from the IG atmosphere used as the *a priori* constraint

Orbit 14404 NOM

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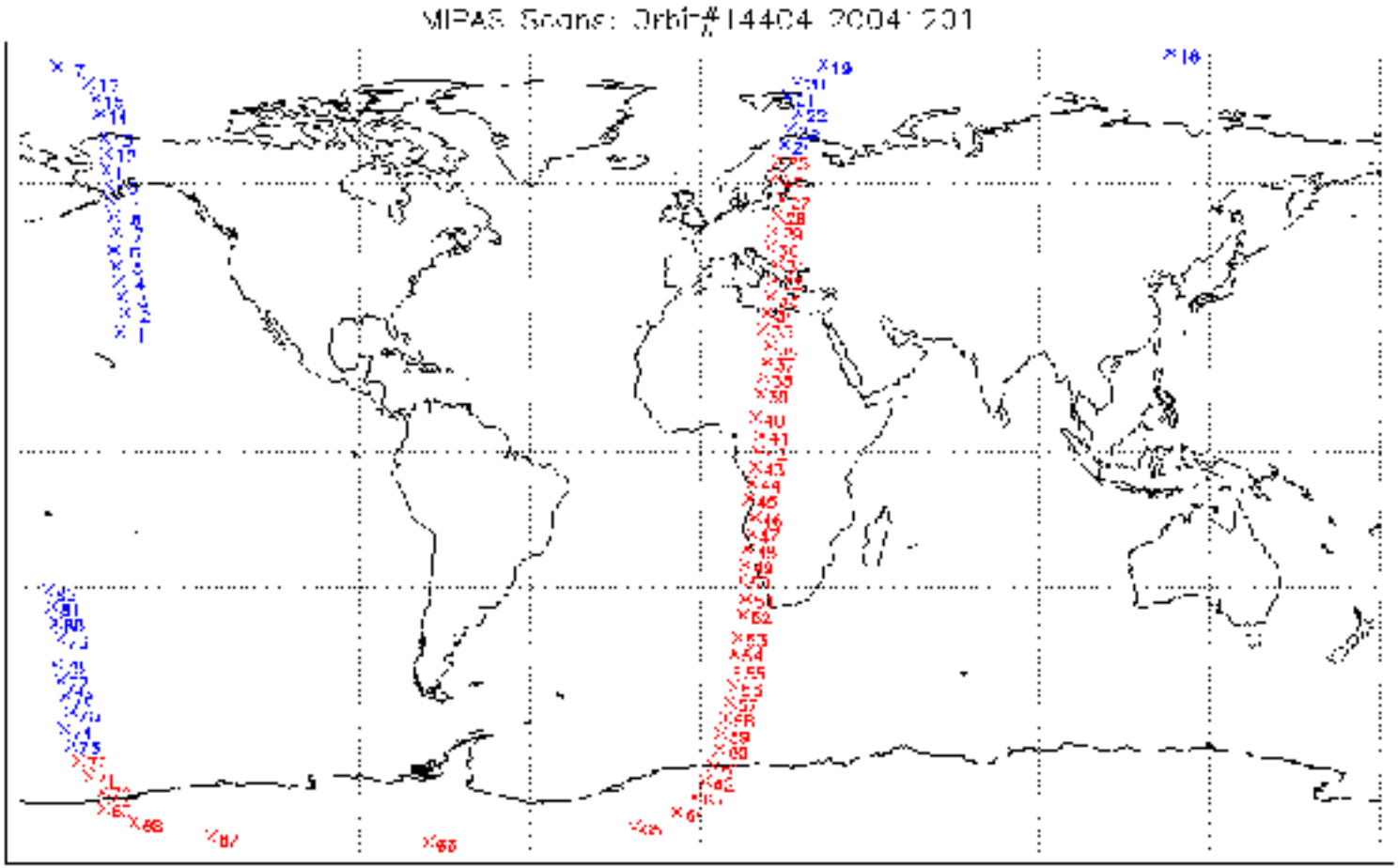
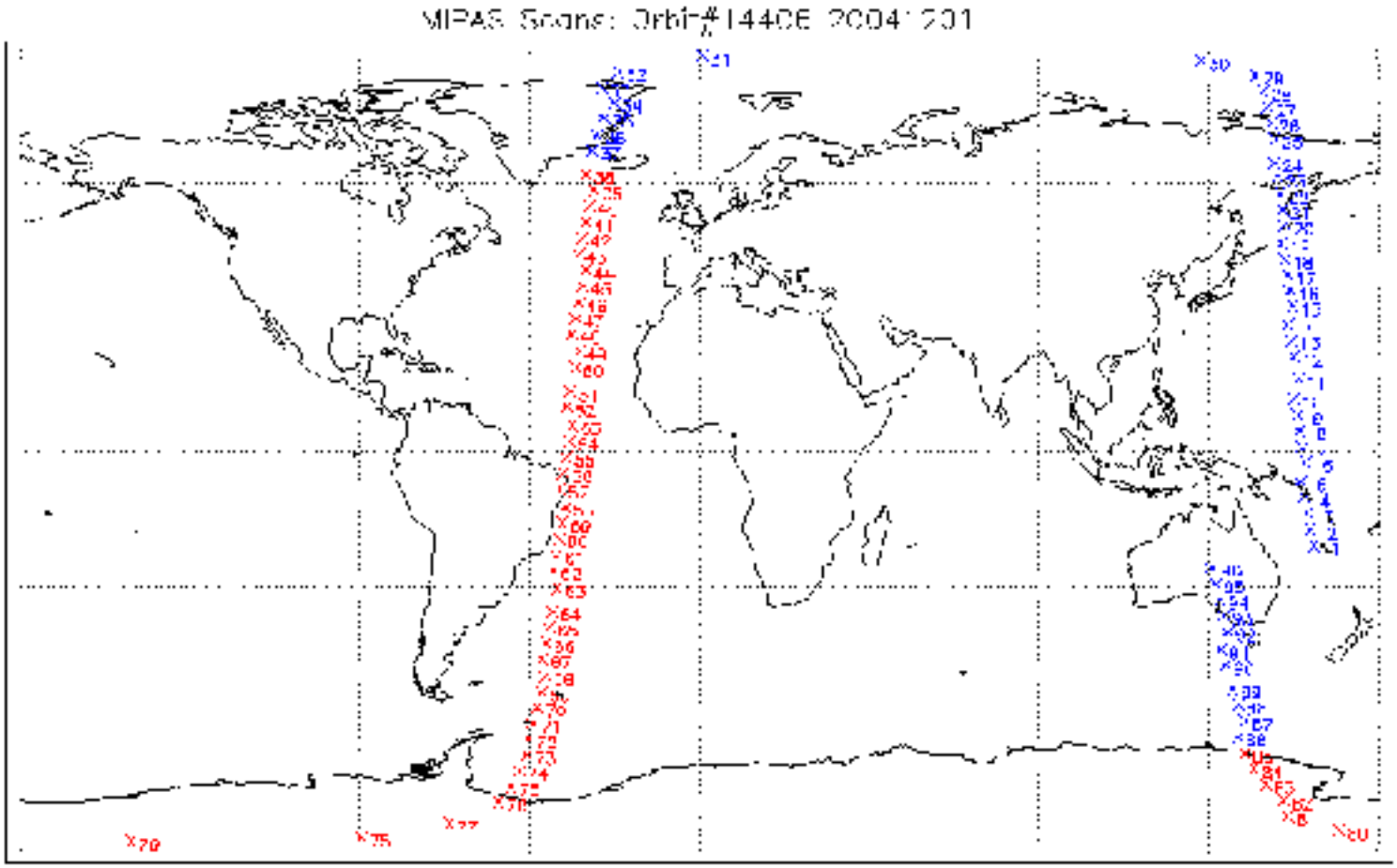
& Planetary Physics,
University of Oxford



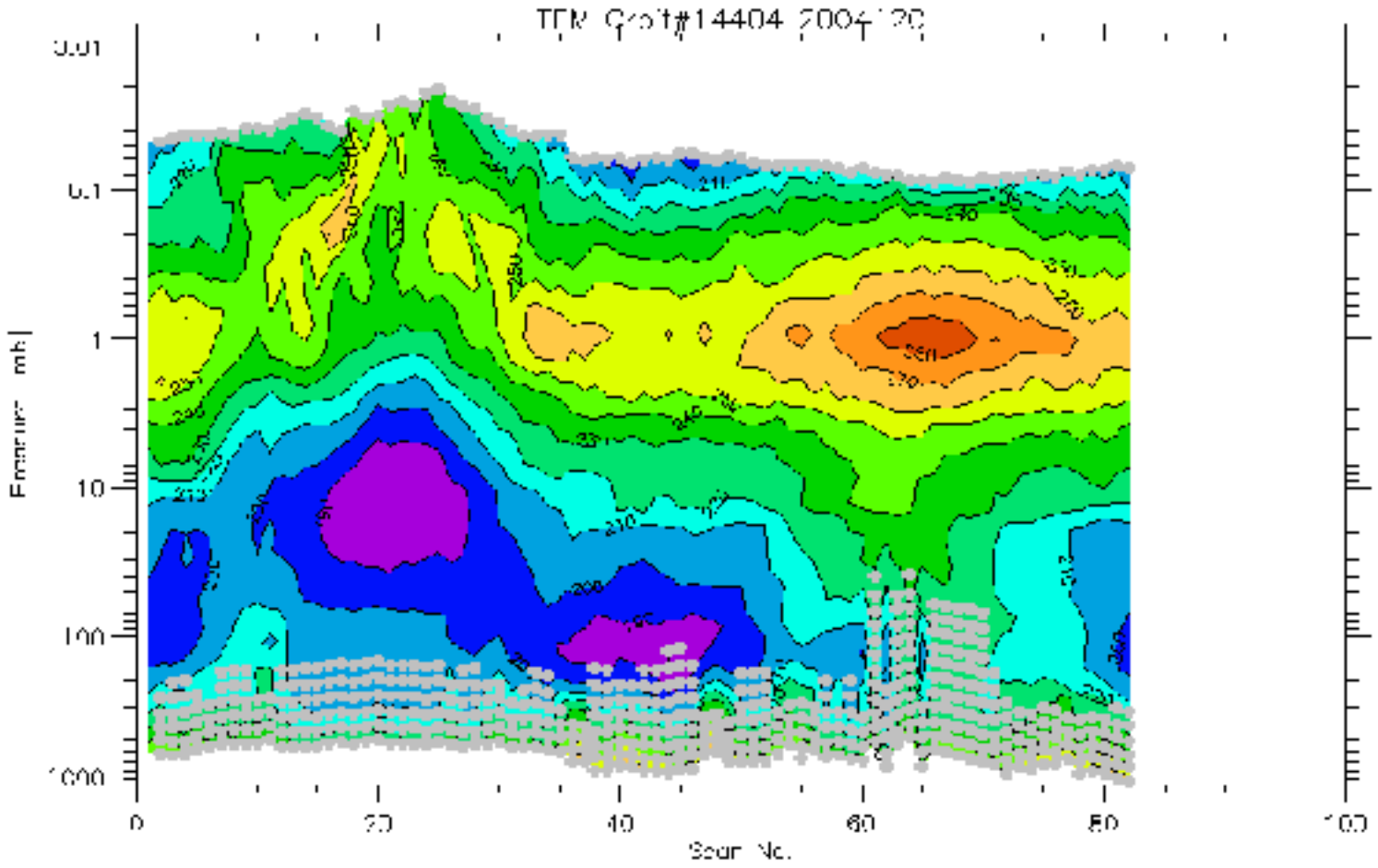
Orbit 14406 NOM

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



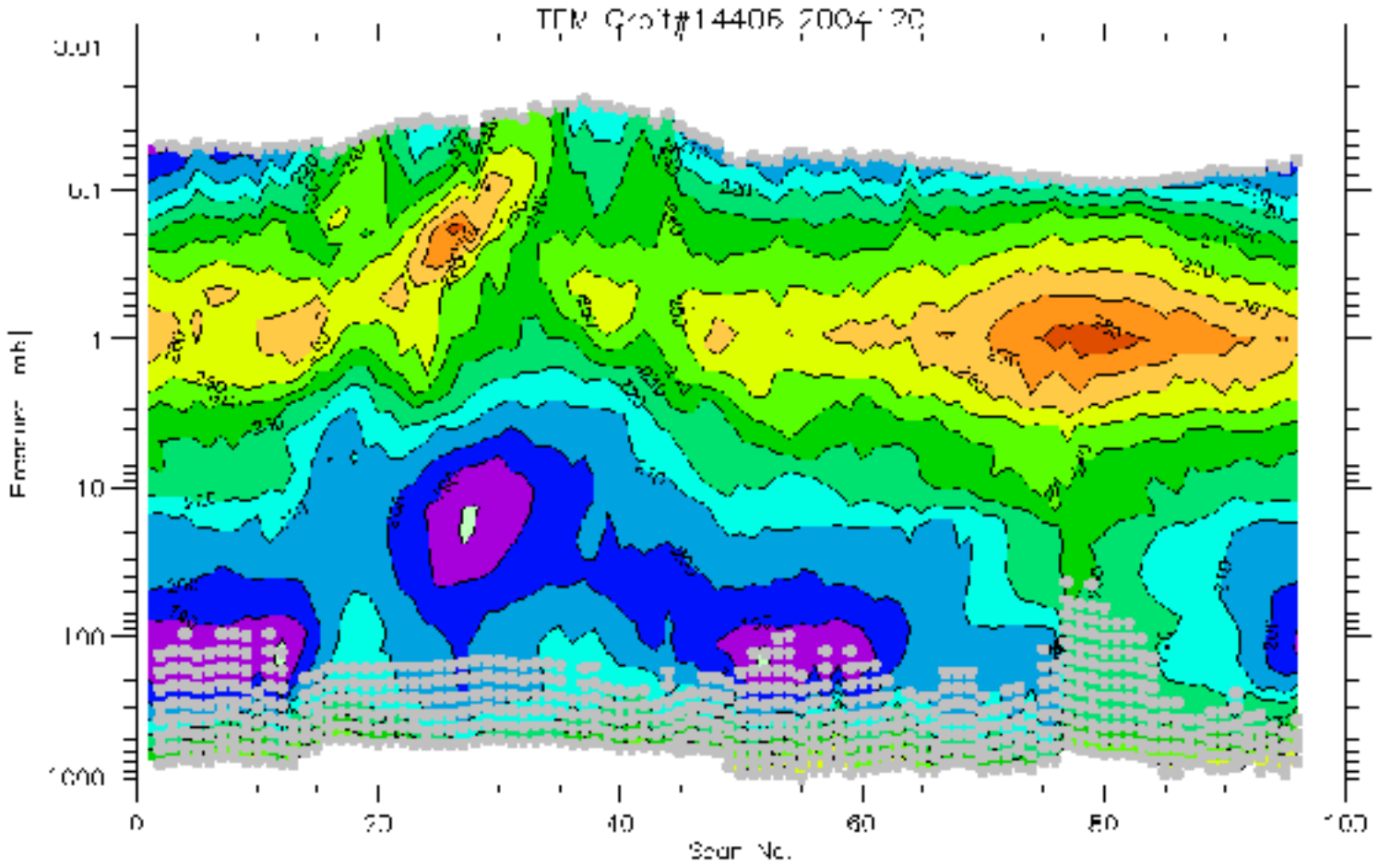
Orbit 14404 TEM

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



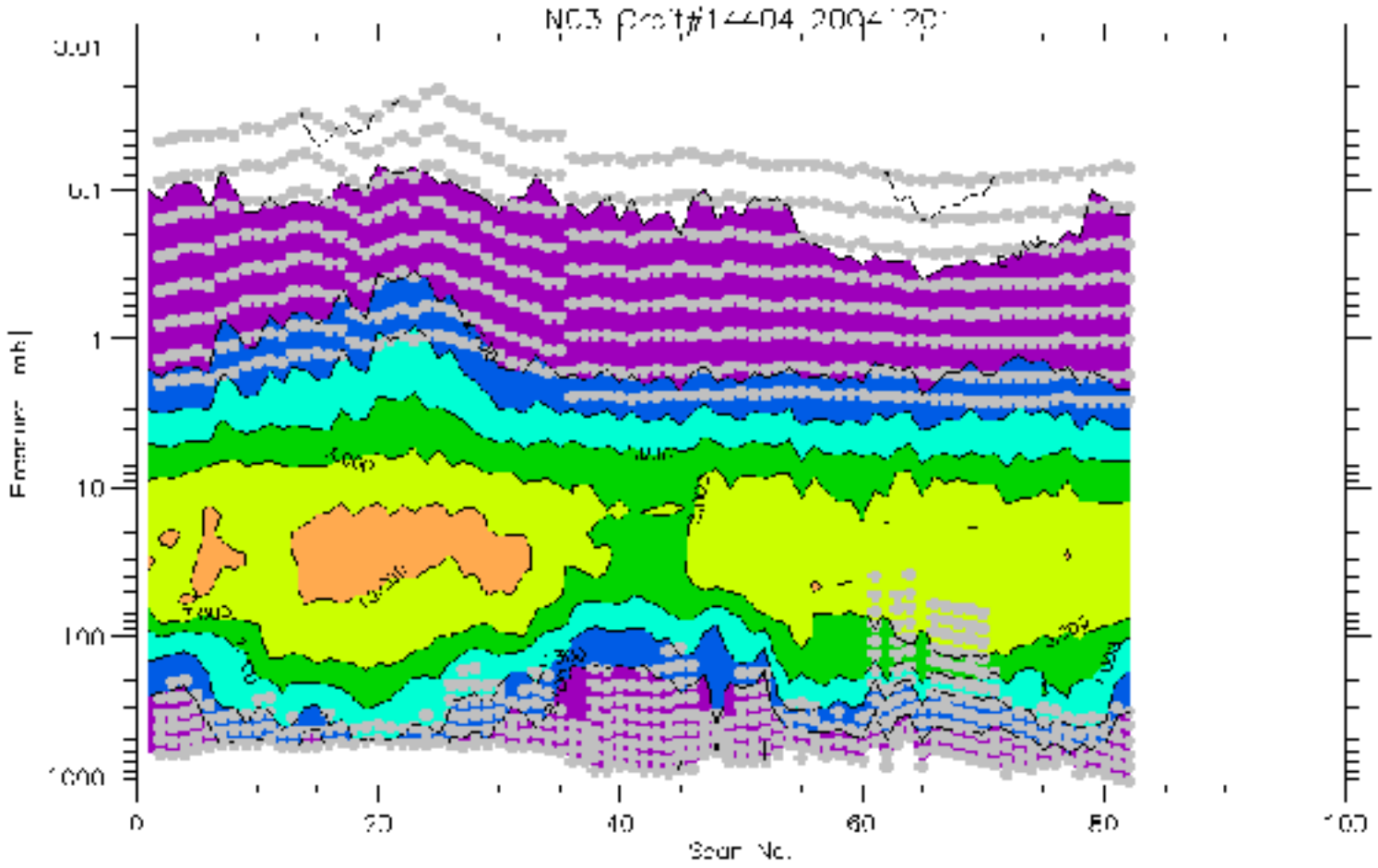
Orbit 14406 TEM

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



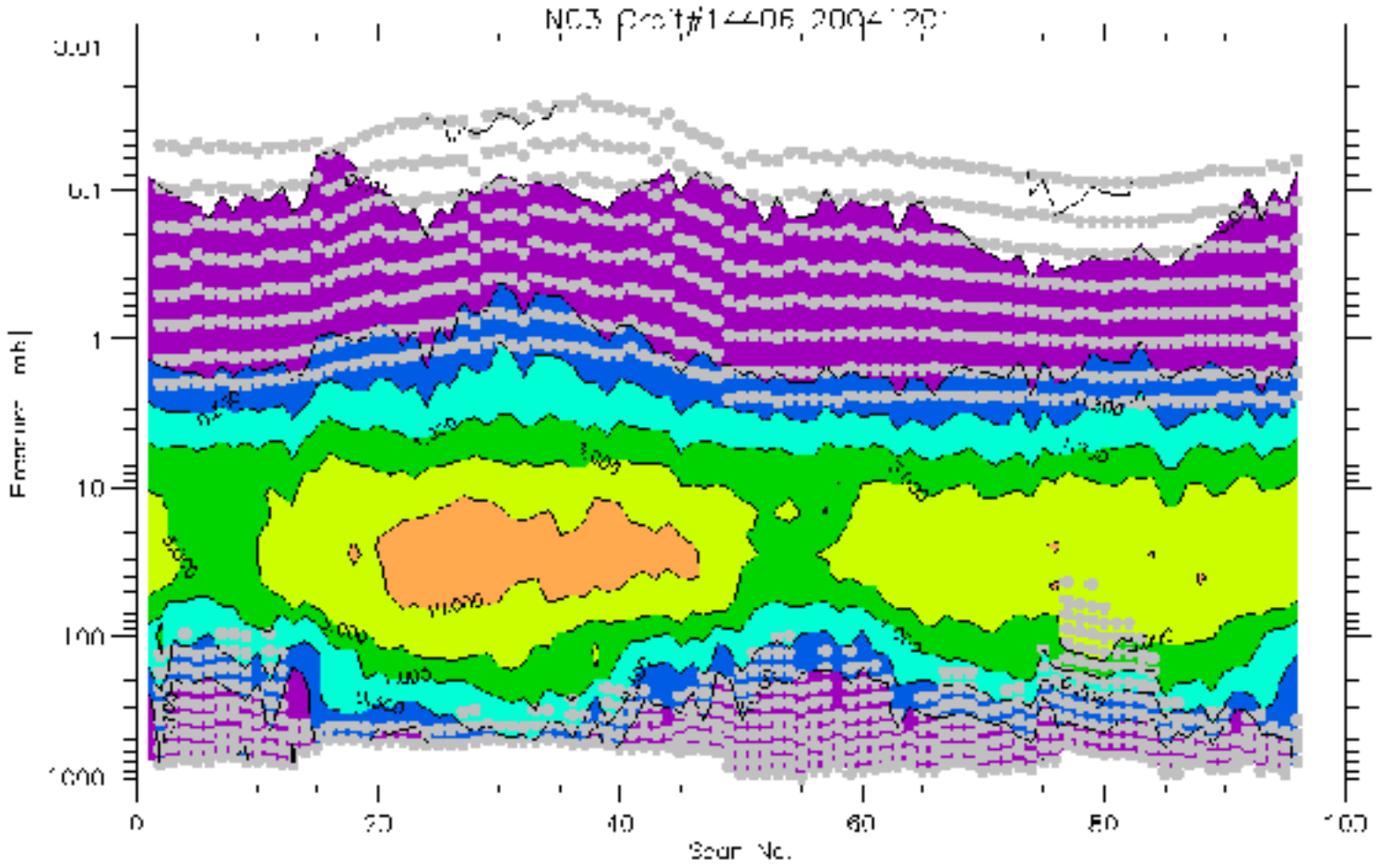
Orbit 14404 HNO3

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



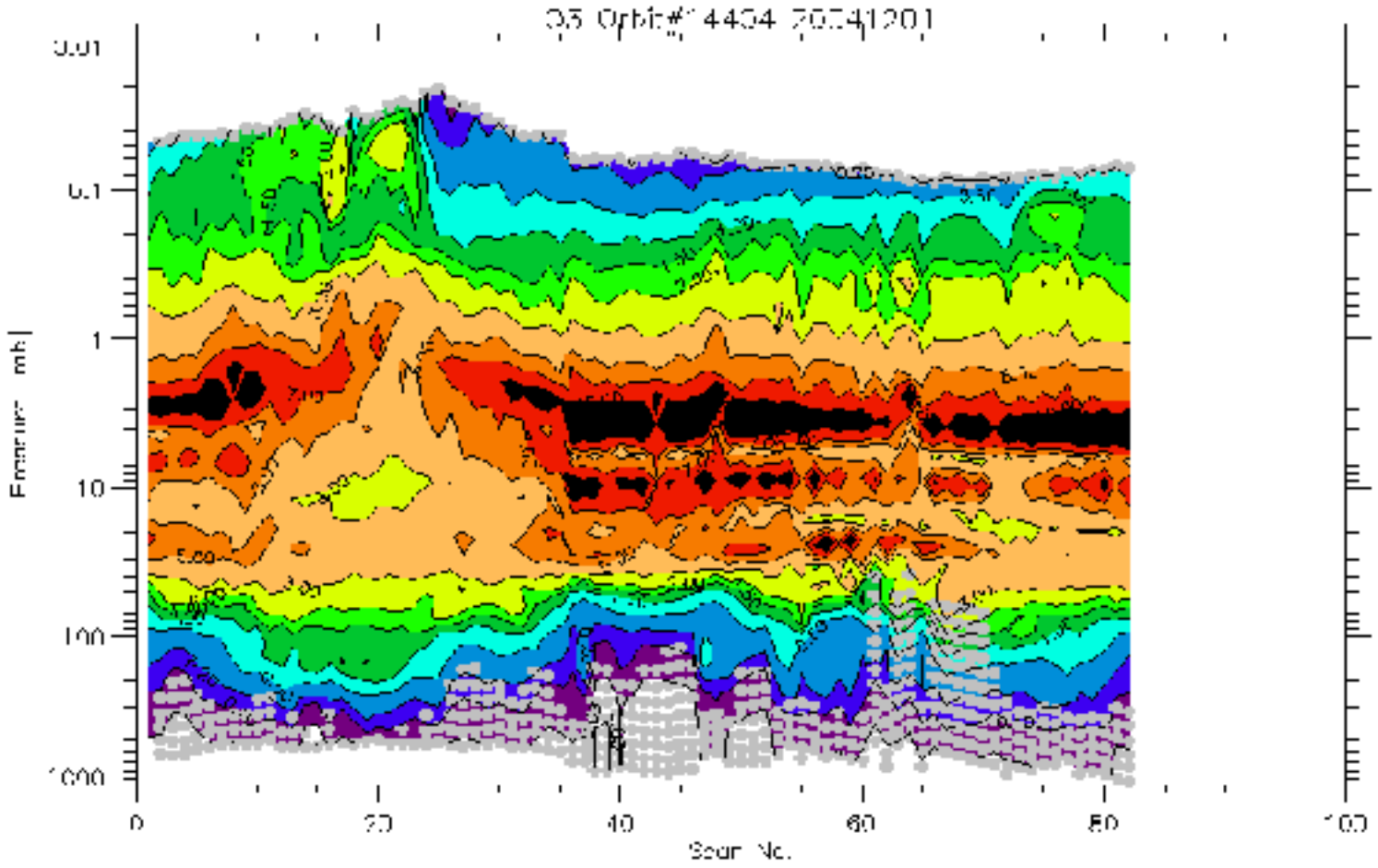
Orbit 14406 HNO3

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



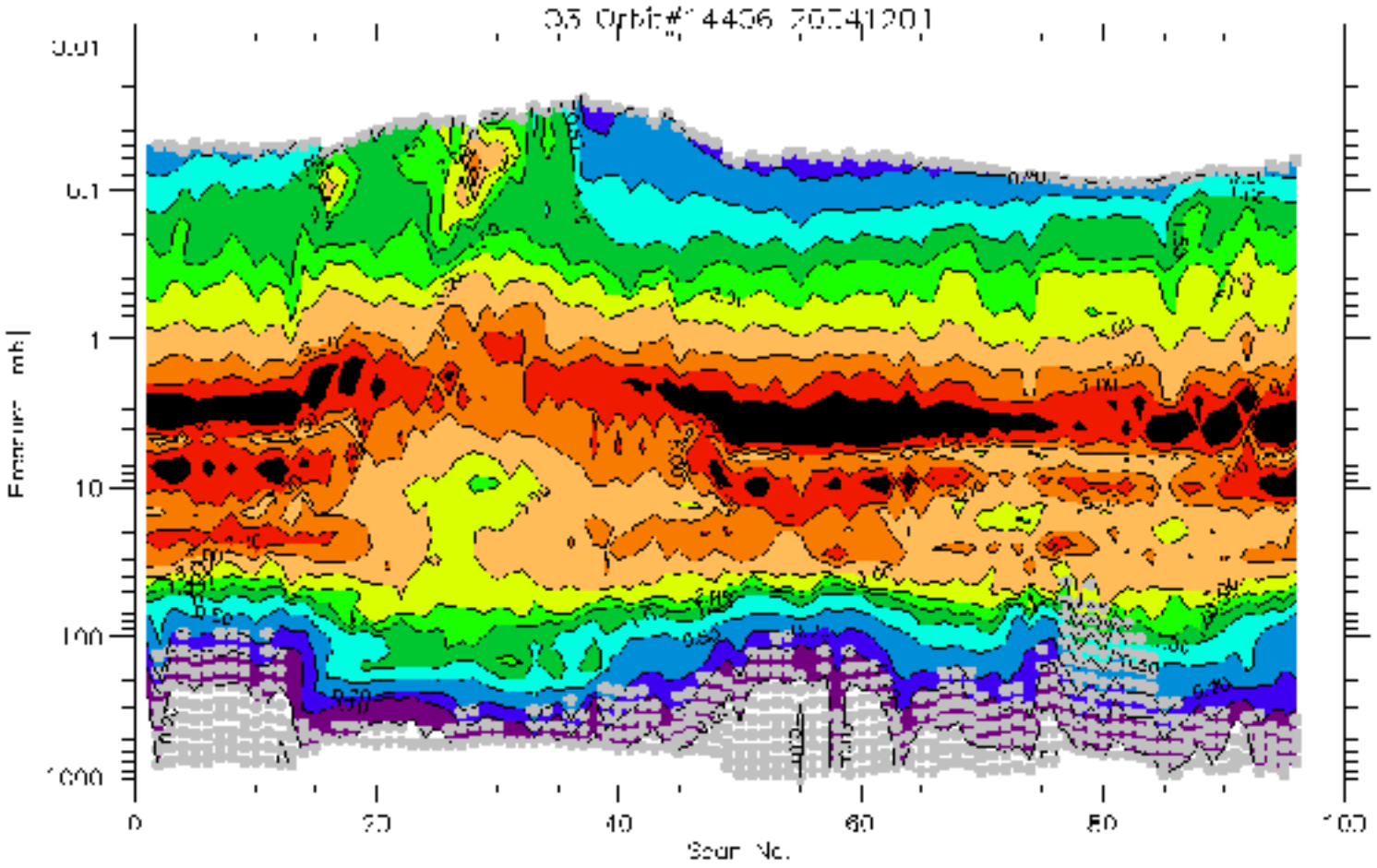
Orbit 14404 O3

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



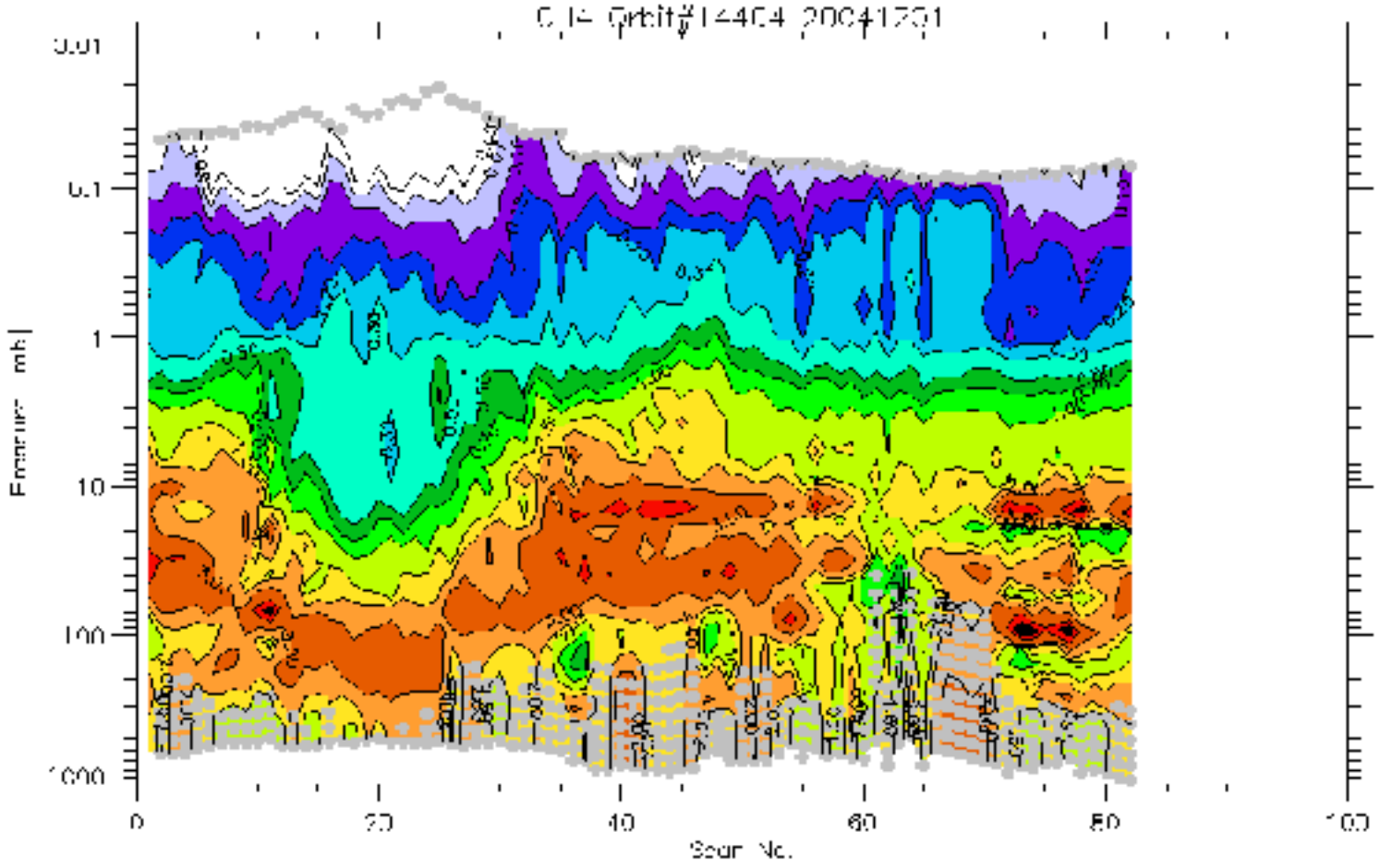
Orbit 14406 O3

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



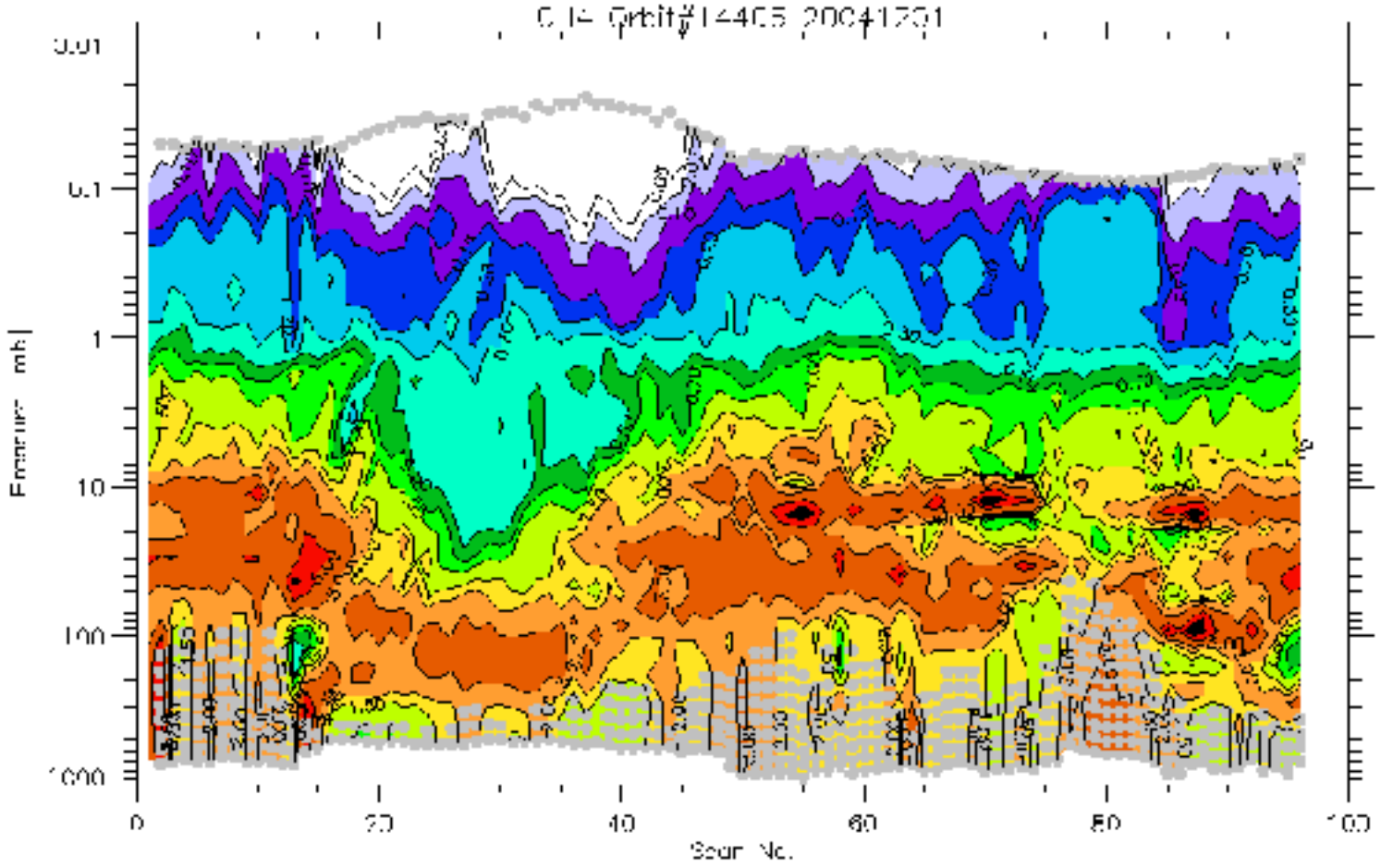
Orbit 14404 CH4

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



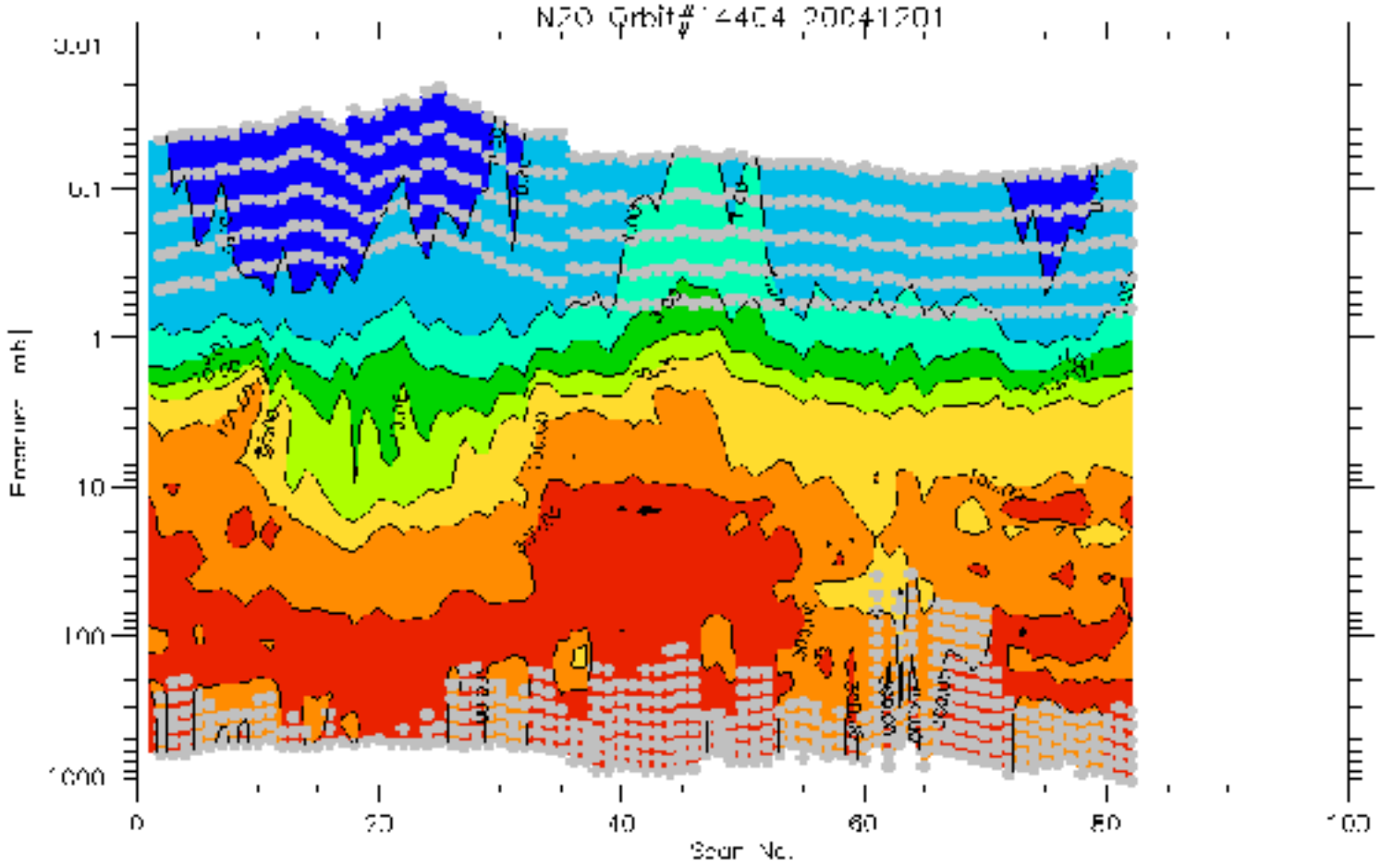
Orbit 14406 CH4

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



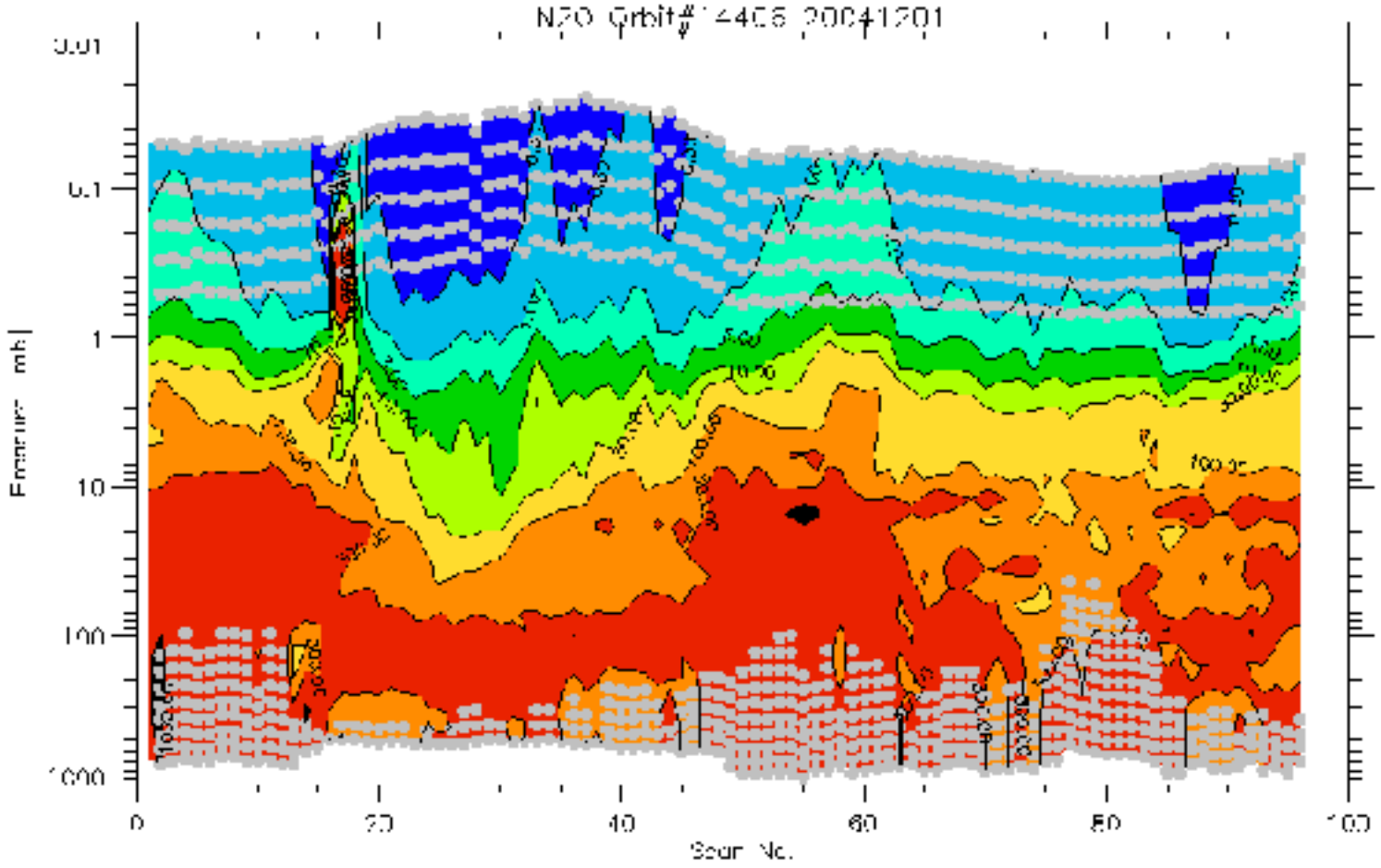
Orbit 14404 N2O

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



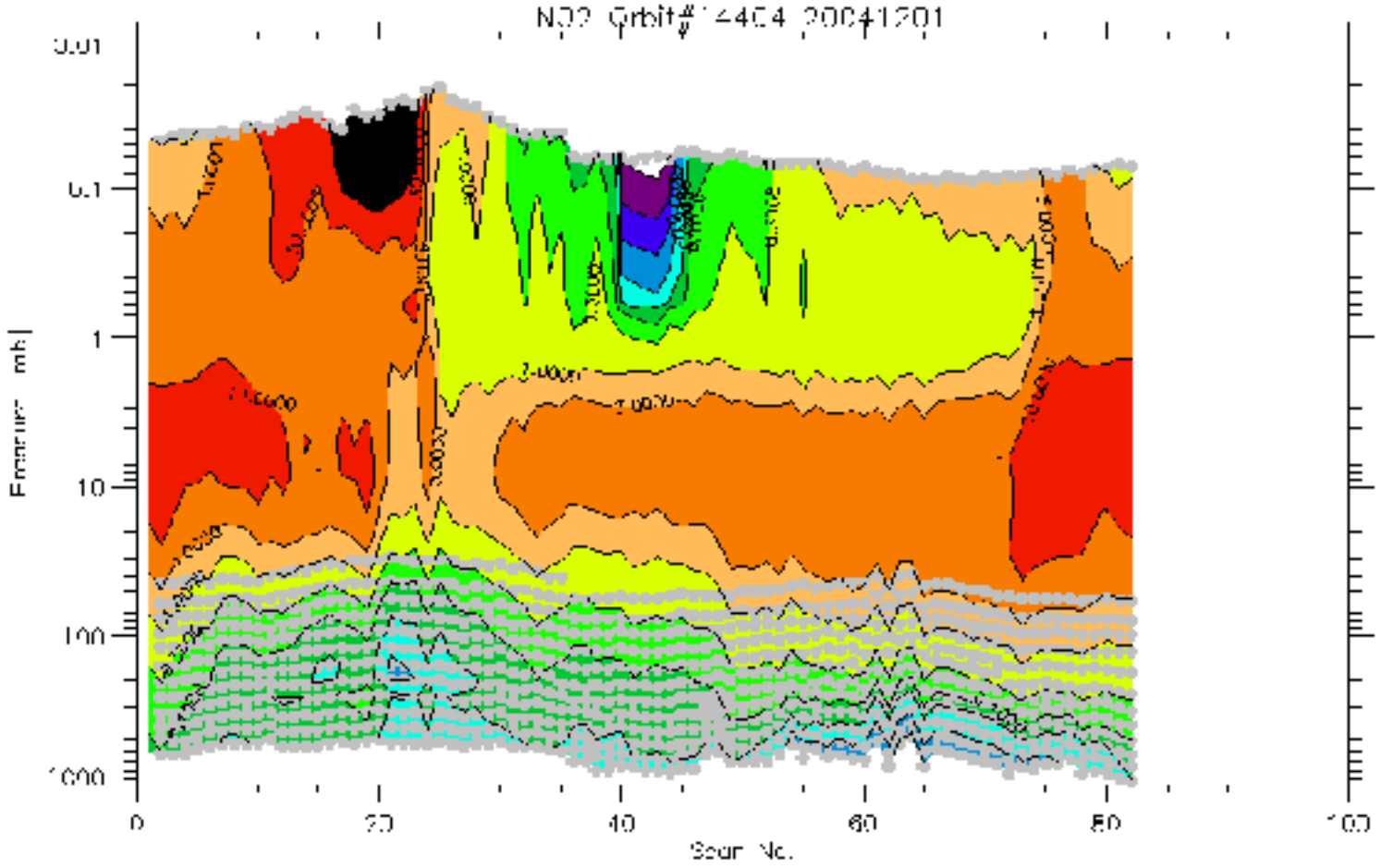
Orbit 14406 N2O

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



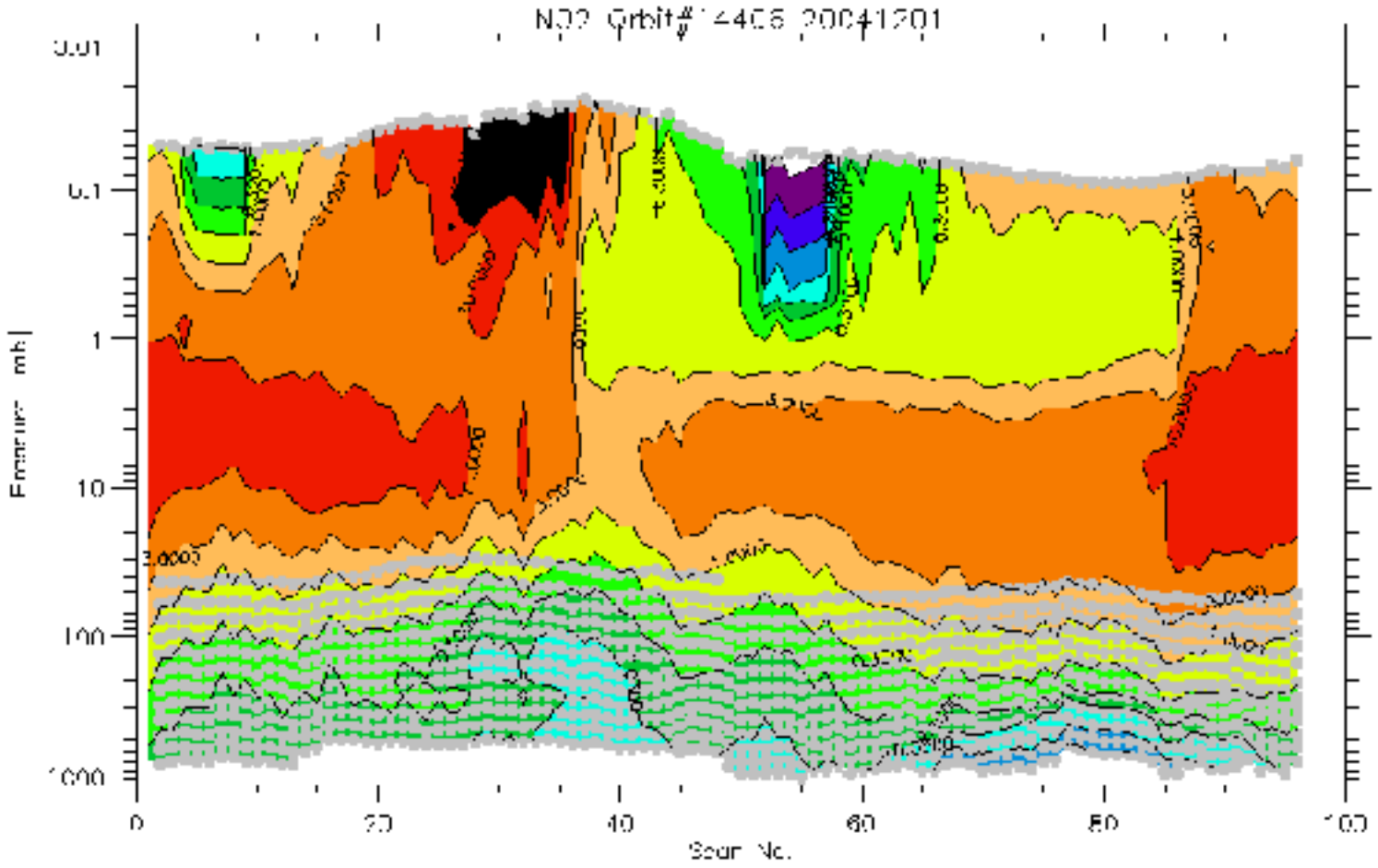
Orbit 14404 NO2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



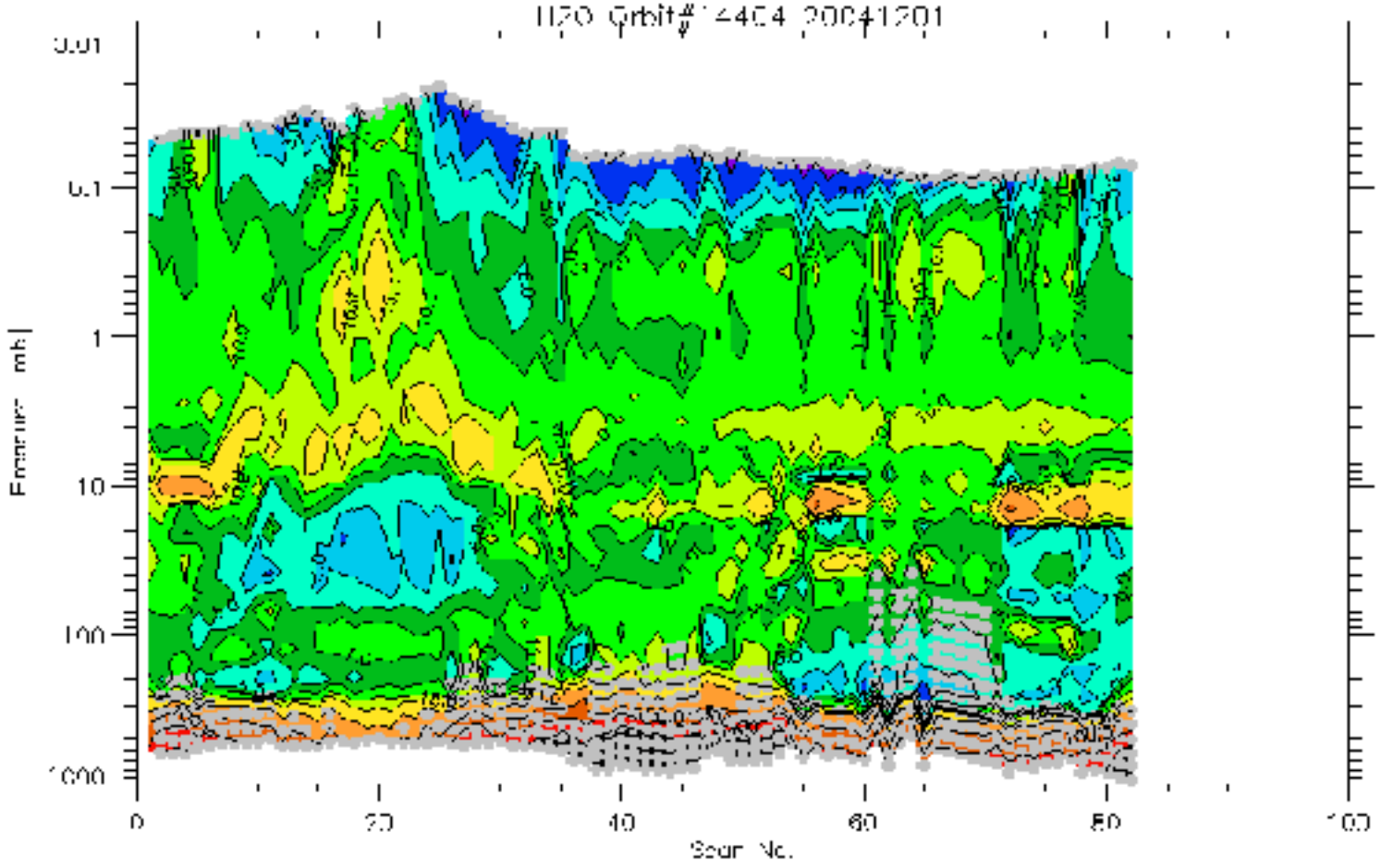
Orbit 14406 NO2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



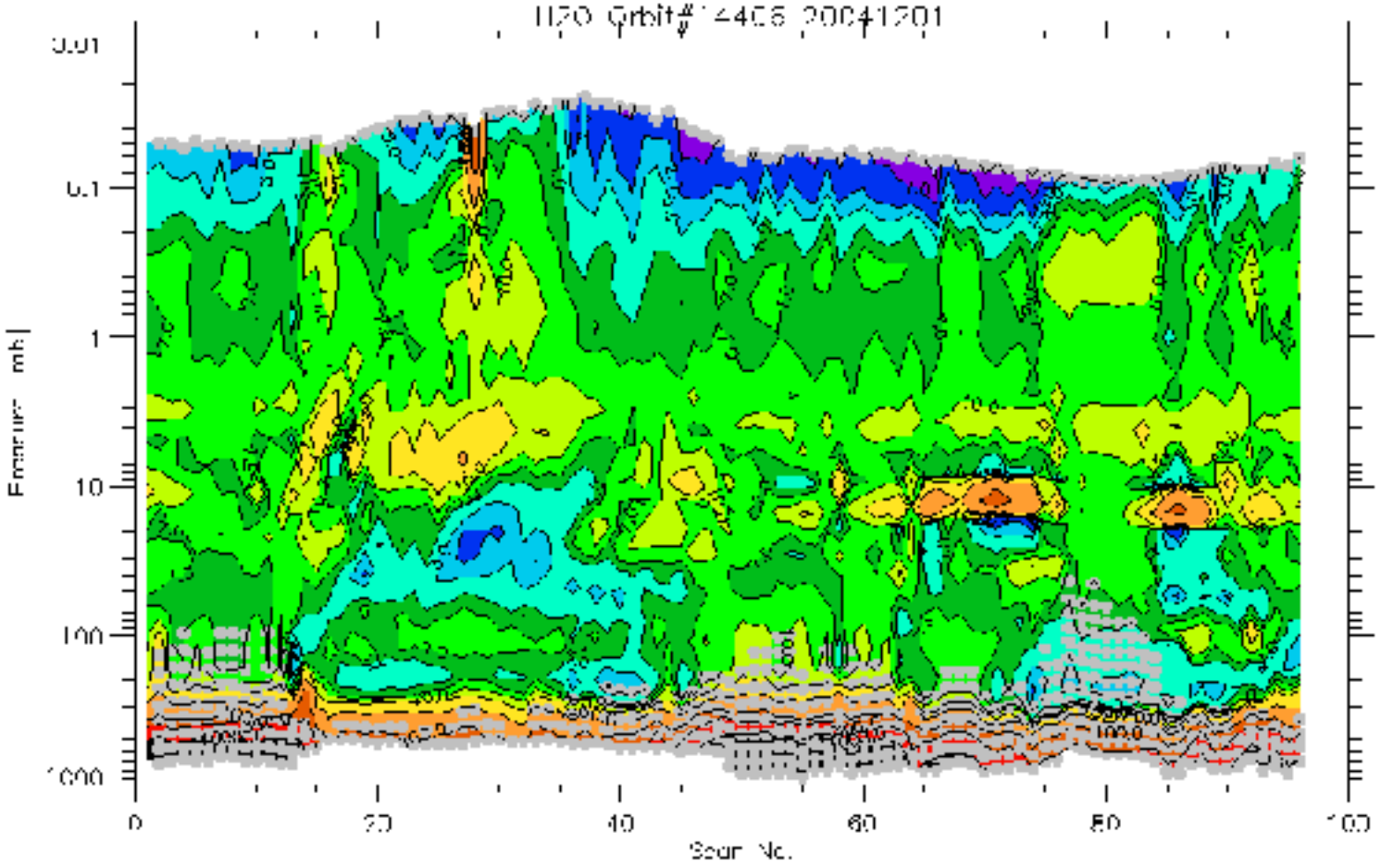
Orbit 14404 H2O

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



Orbit 14406 H2O

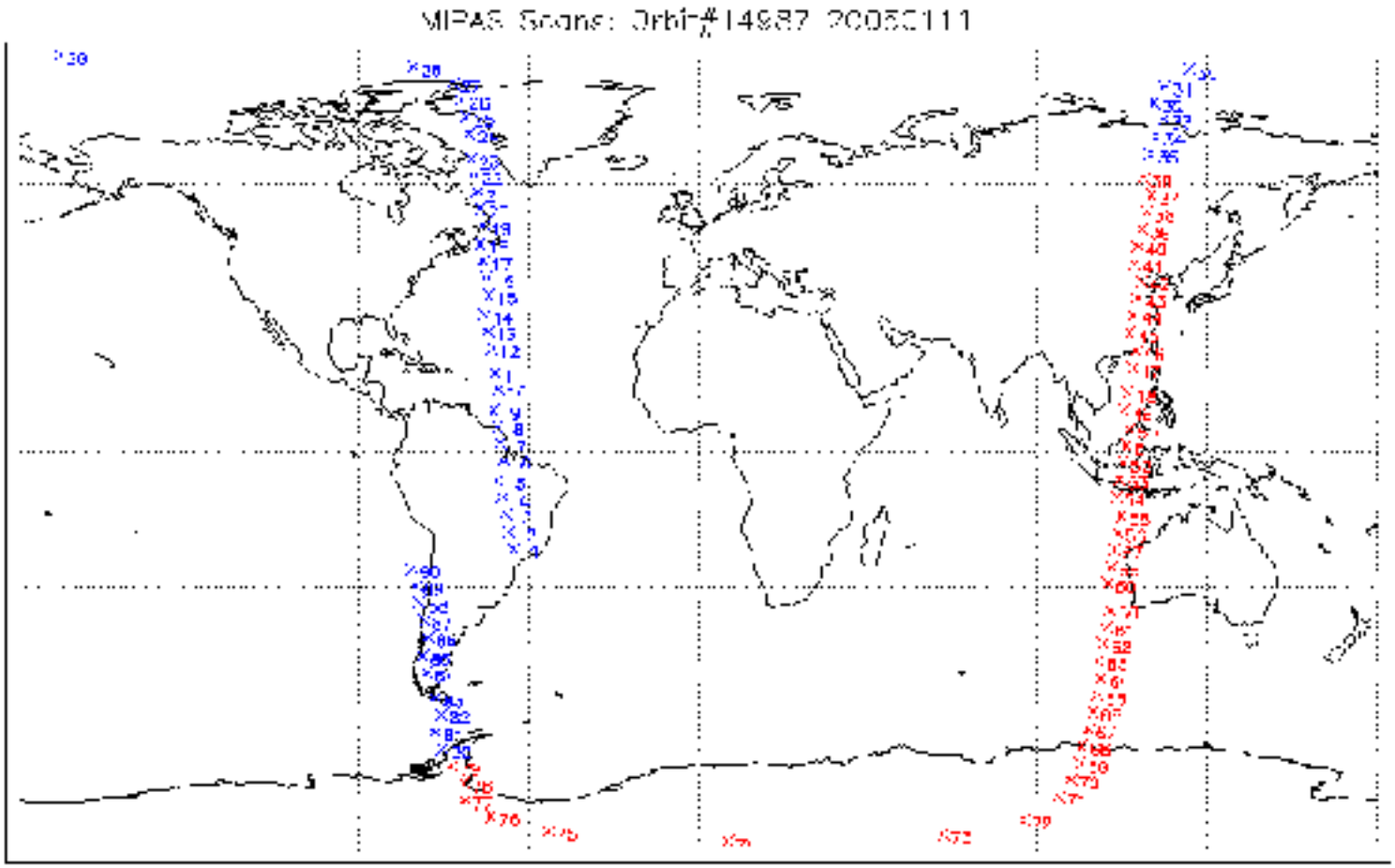
Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



" The following sequence of plots compares retrievals from the two versions of the middle atmosphere mode orbit 14987 from 11Jan05

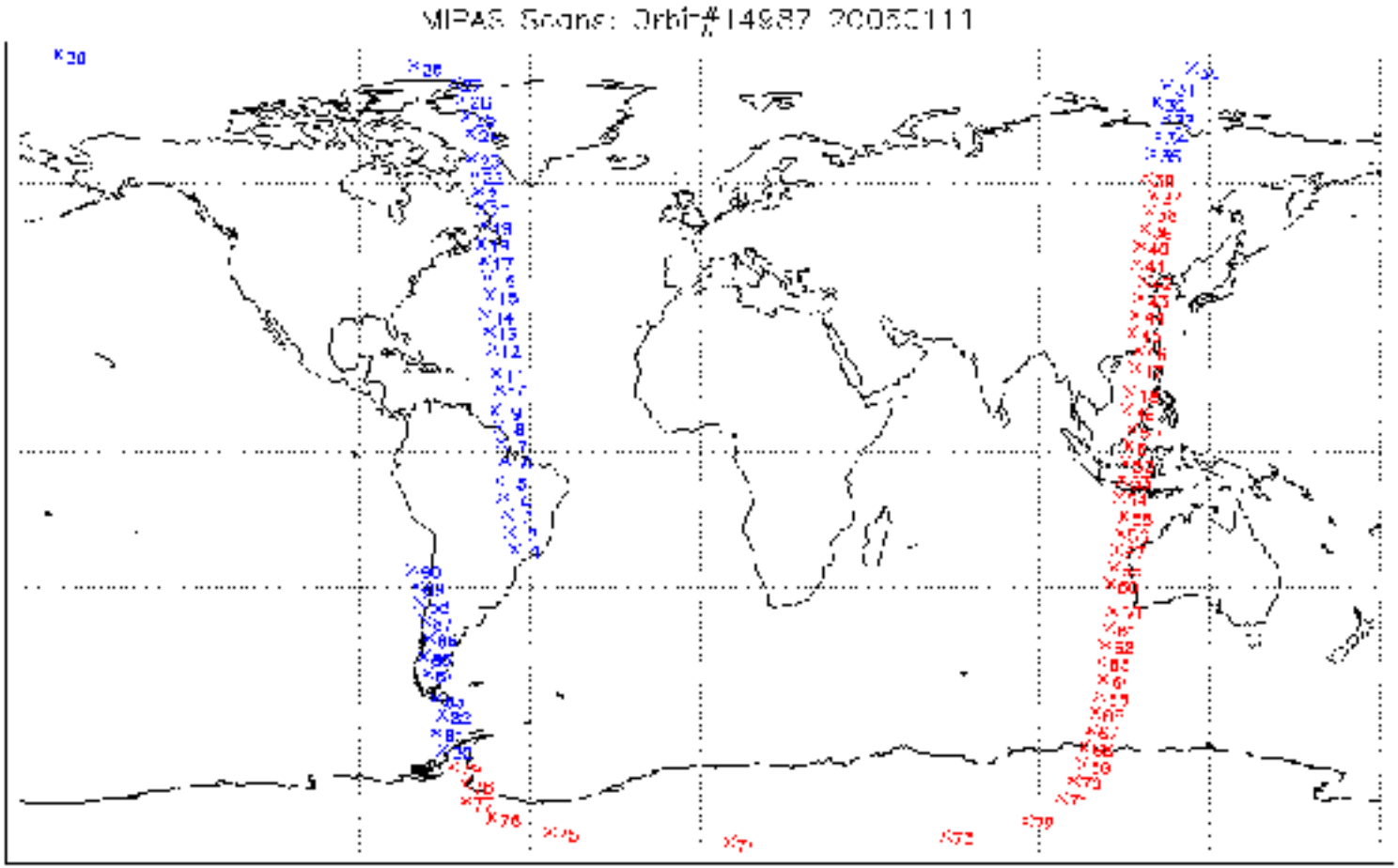
Orbit 14987 MA v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



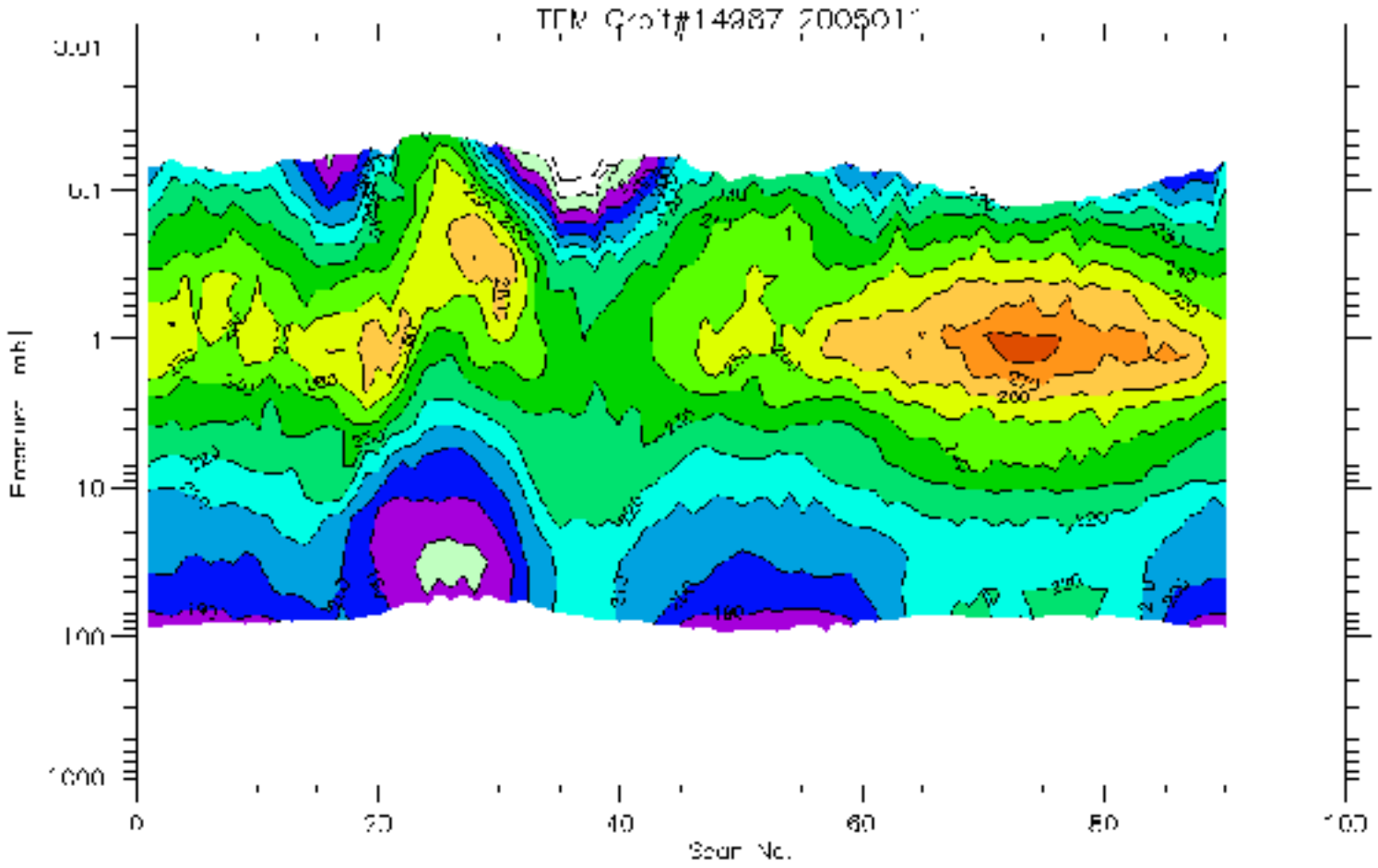
Orbit 14987 MA v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



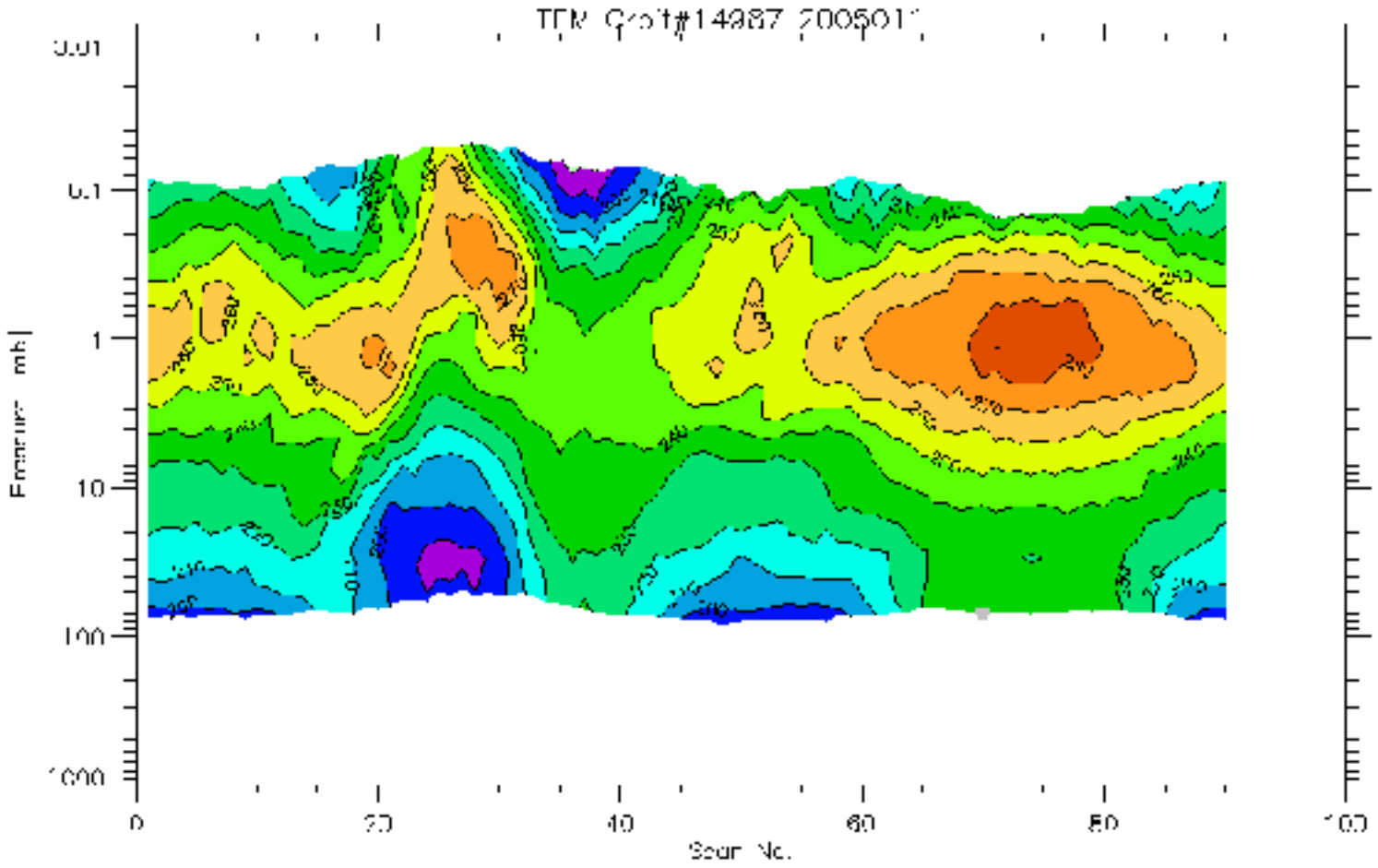
Orbit 14987 TEM v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



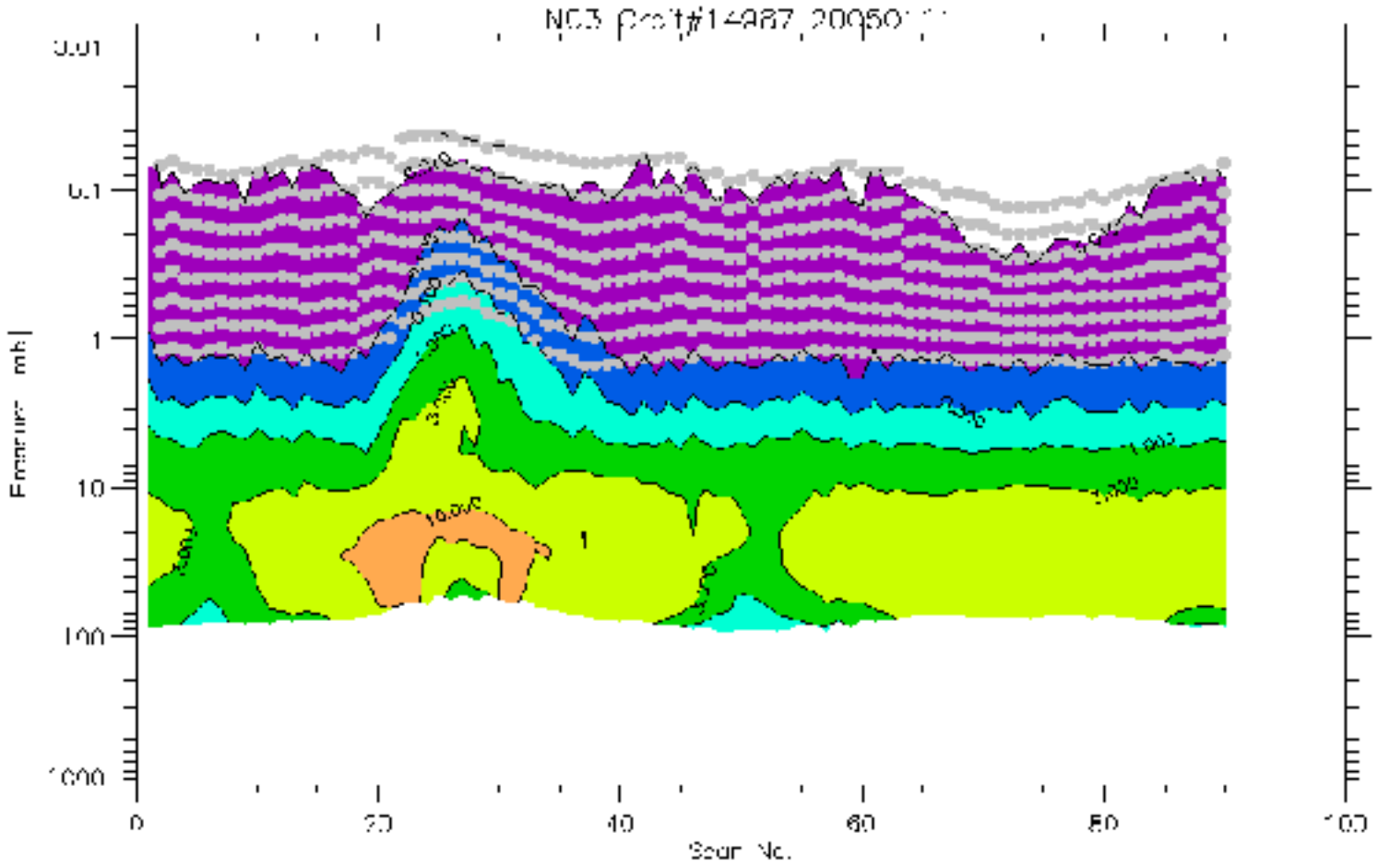
Orbit 14987 TEM v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



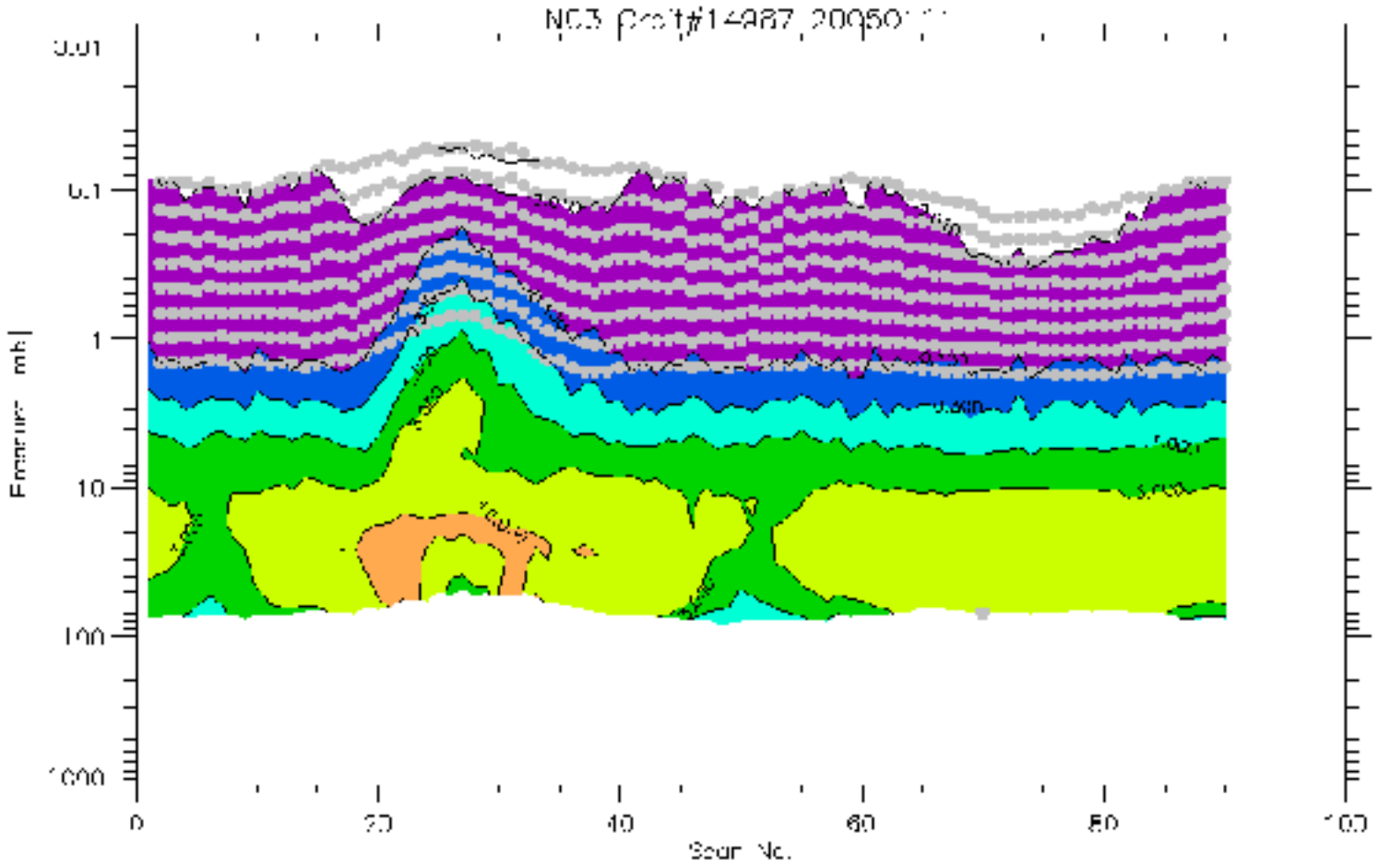
Orbit 14987 HNO3 v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



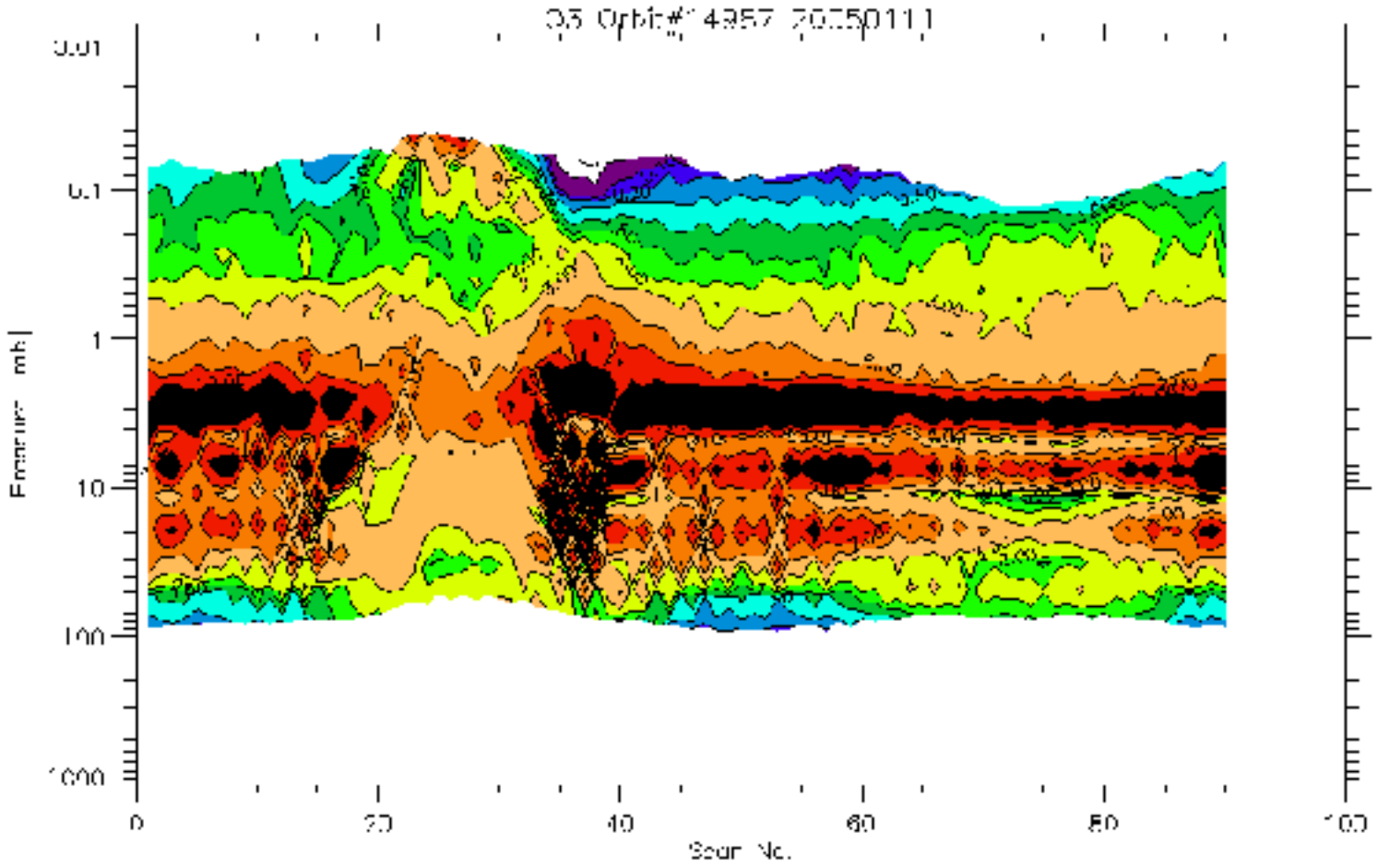
Orbit 14987 HNO3 v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



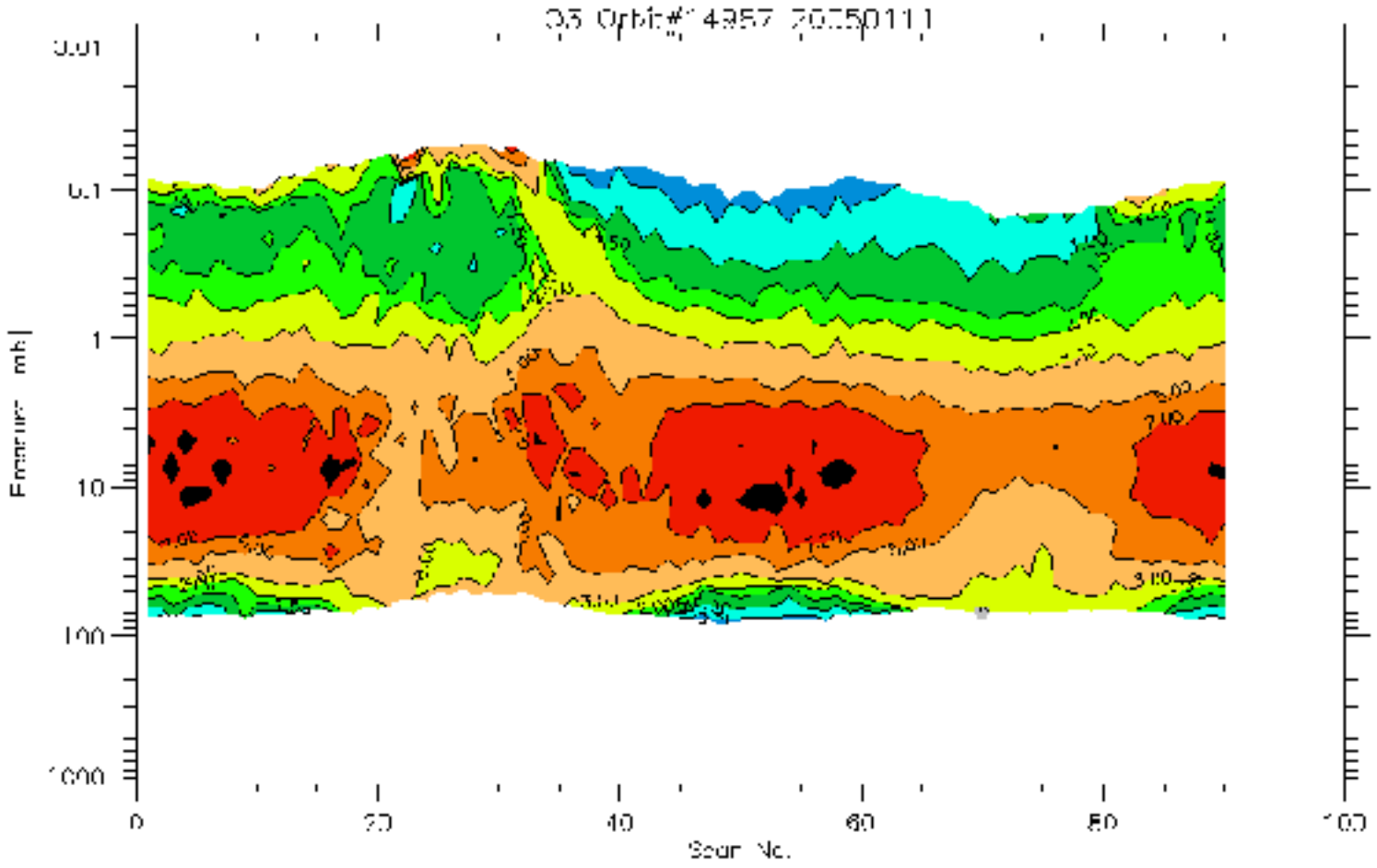
Orbit 14987 O3 v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



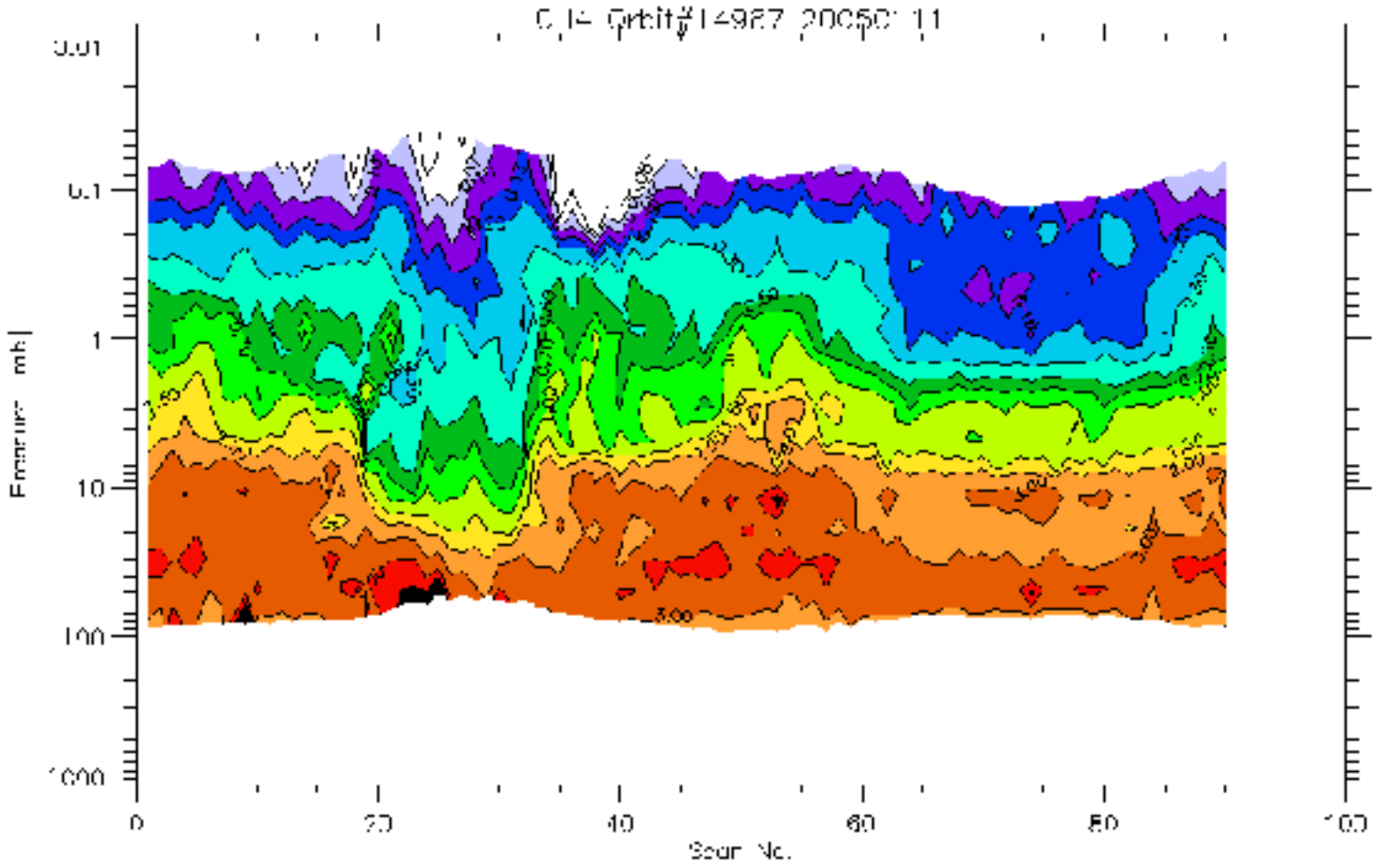
Orbit 14987 O3 v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



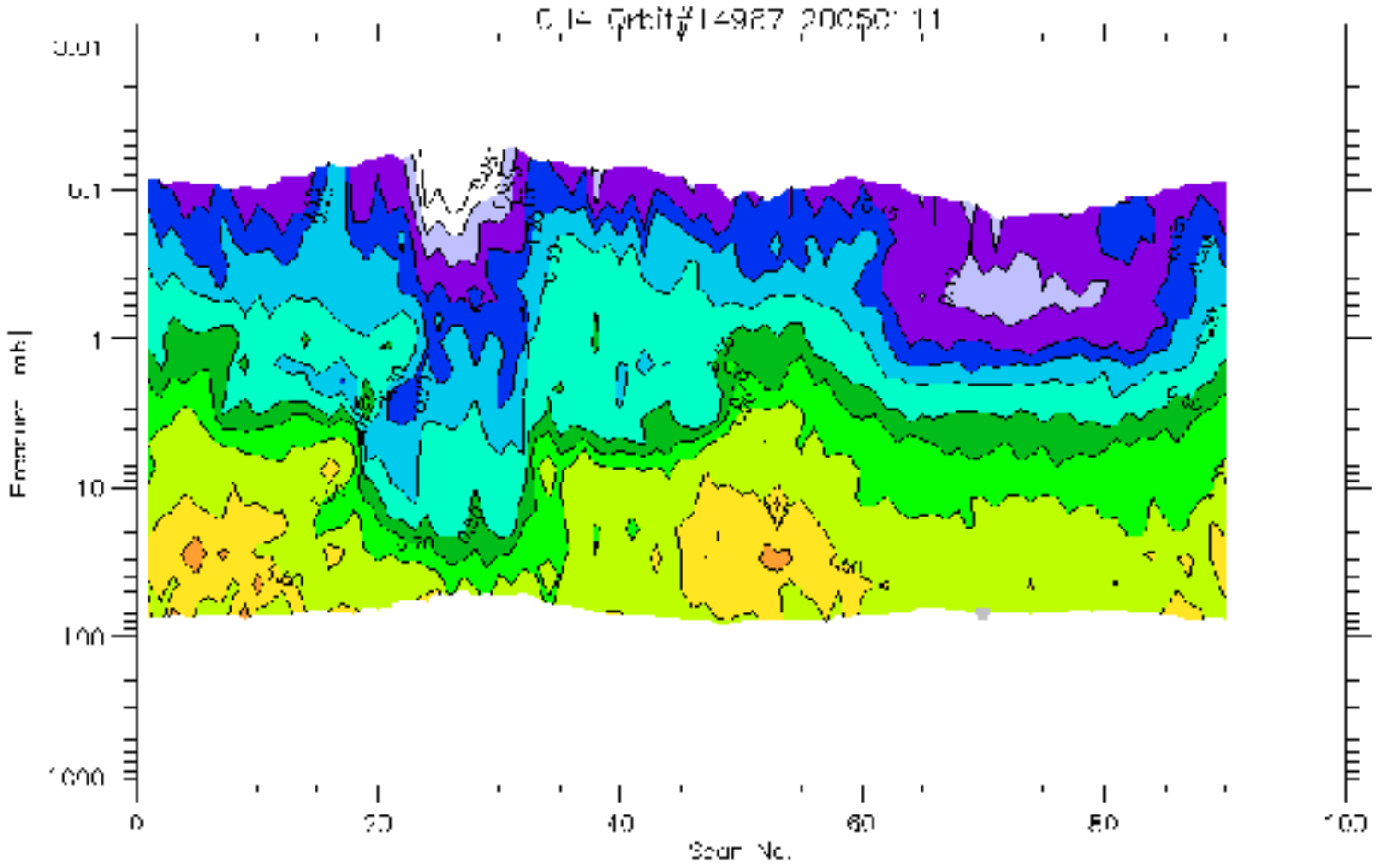
Orbit 14987 CH4 v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



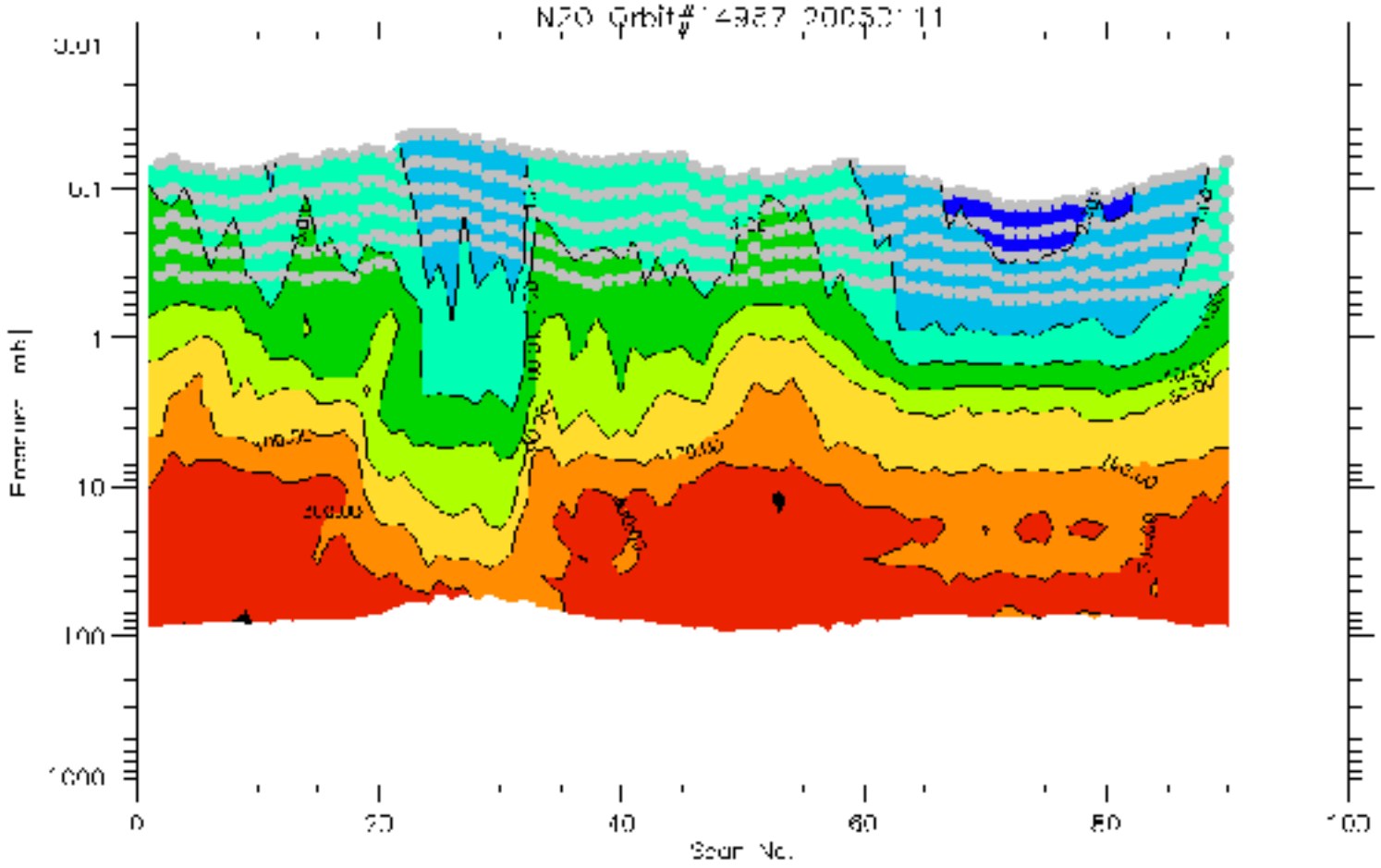
Orbit 14987 CH4 v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



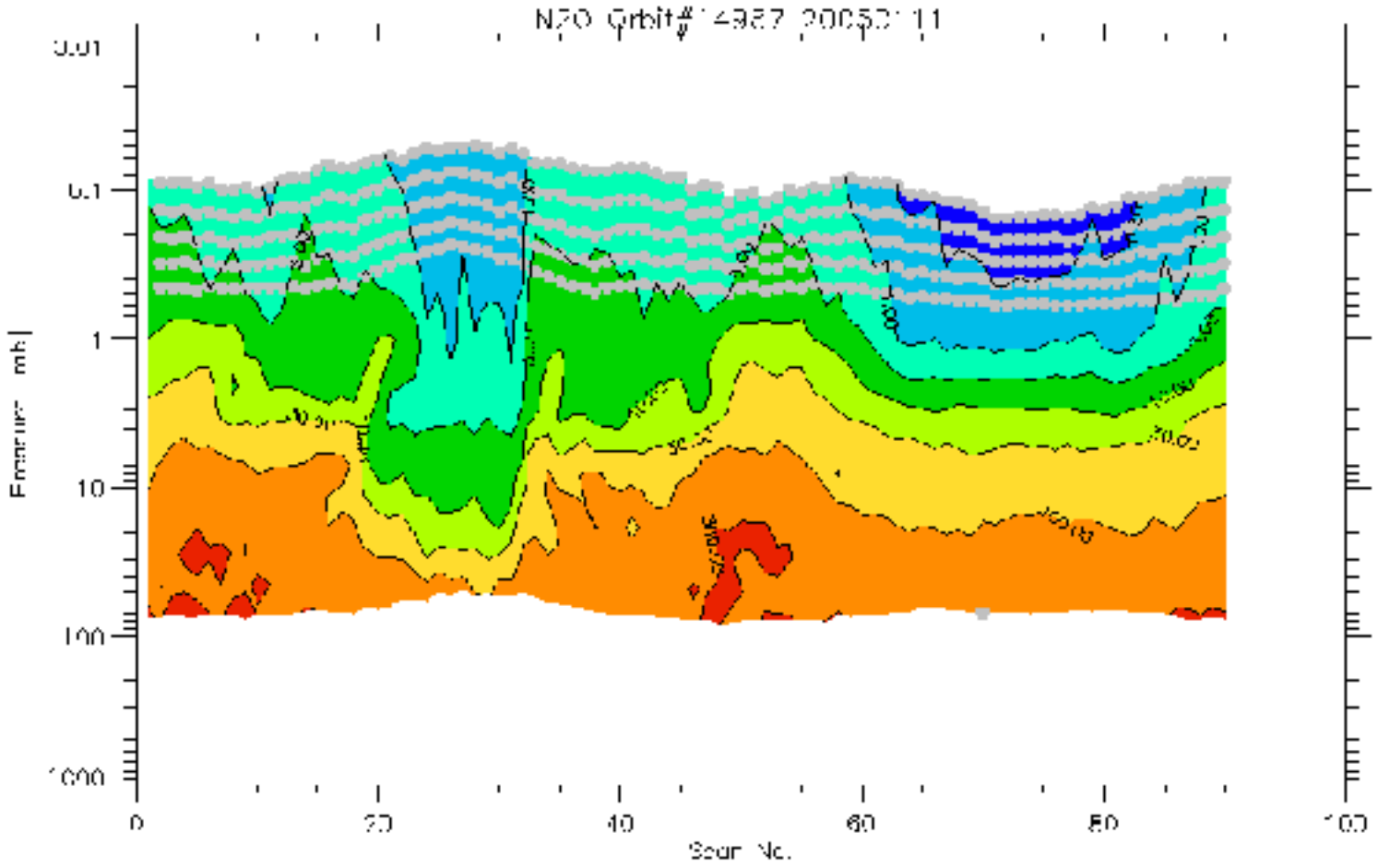
Orbit 14987 N2O v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



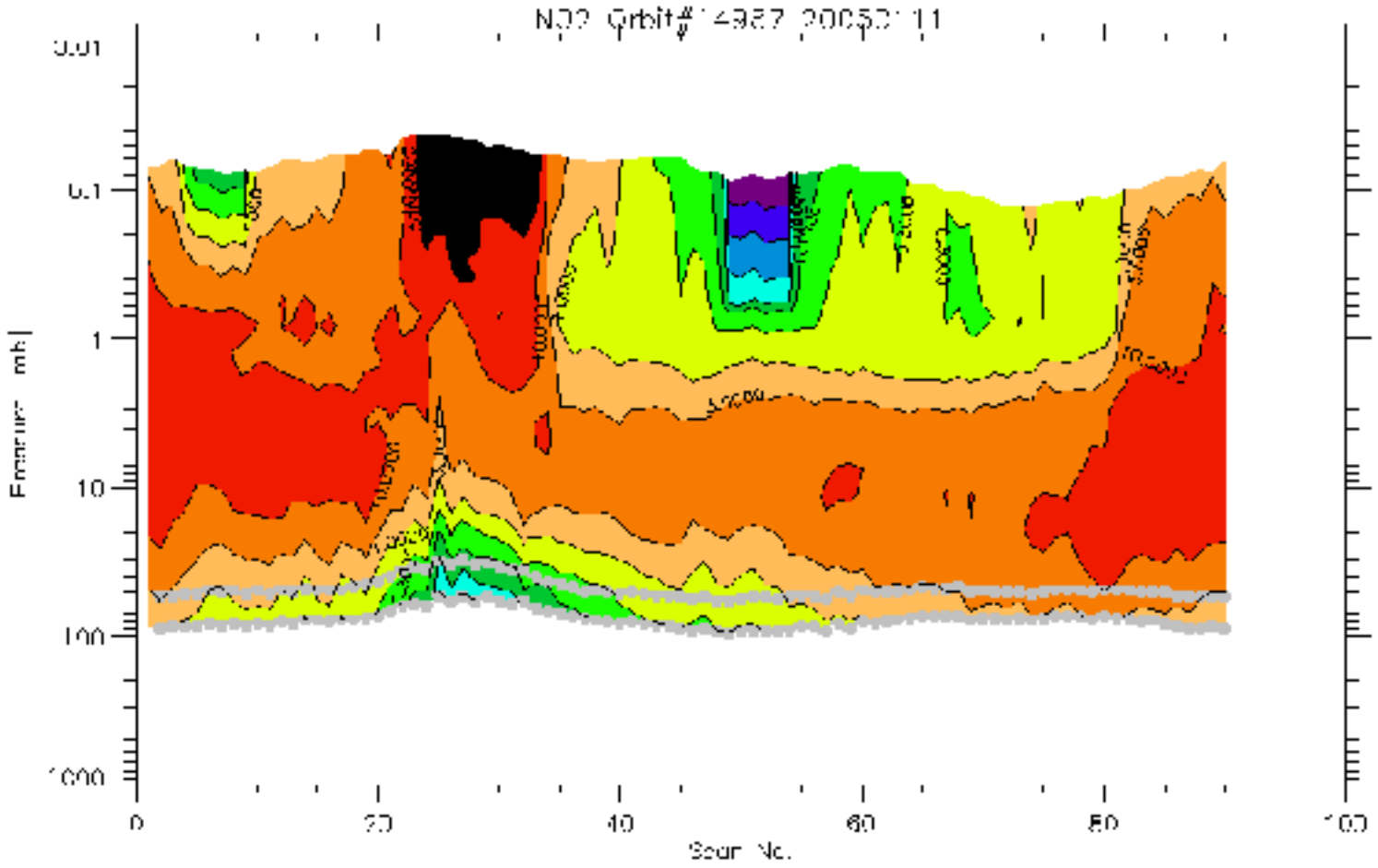
Orbit 14987 N2O v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



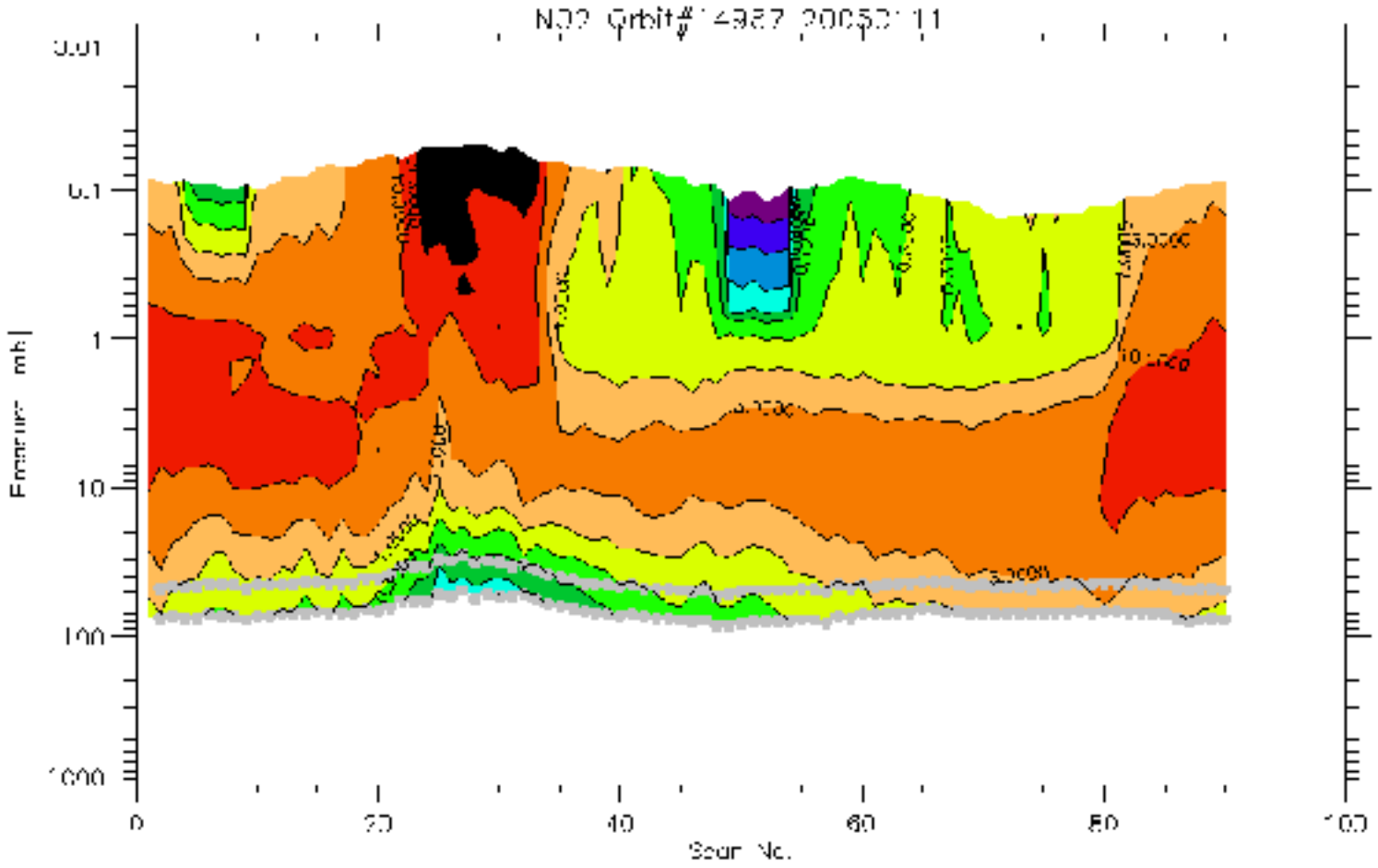
Orbit 14987 NO2 v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



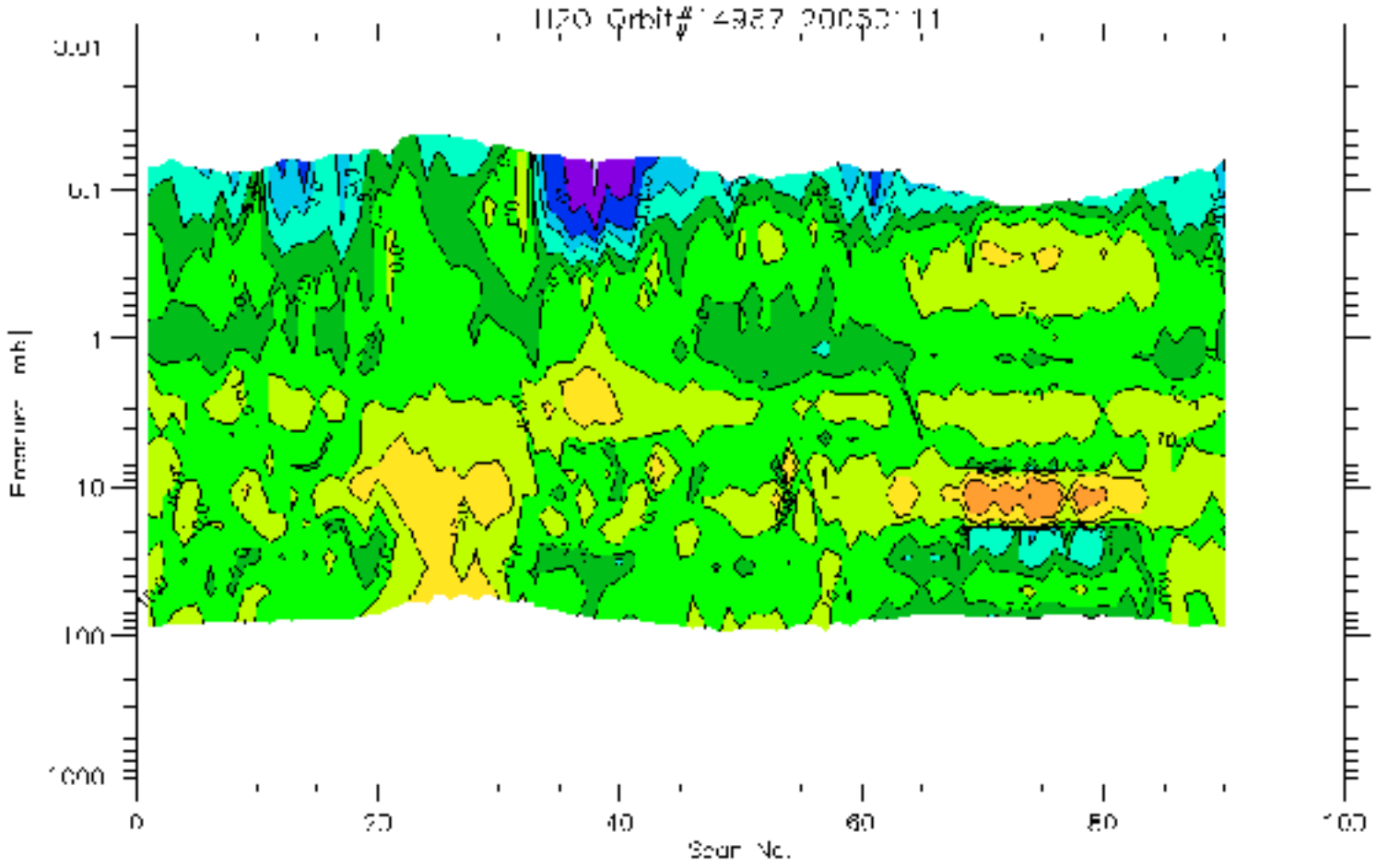
Orbit 14987 NO2 v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



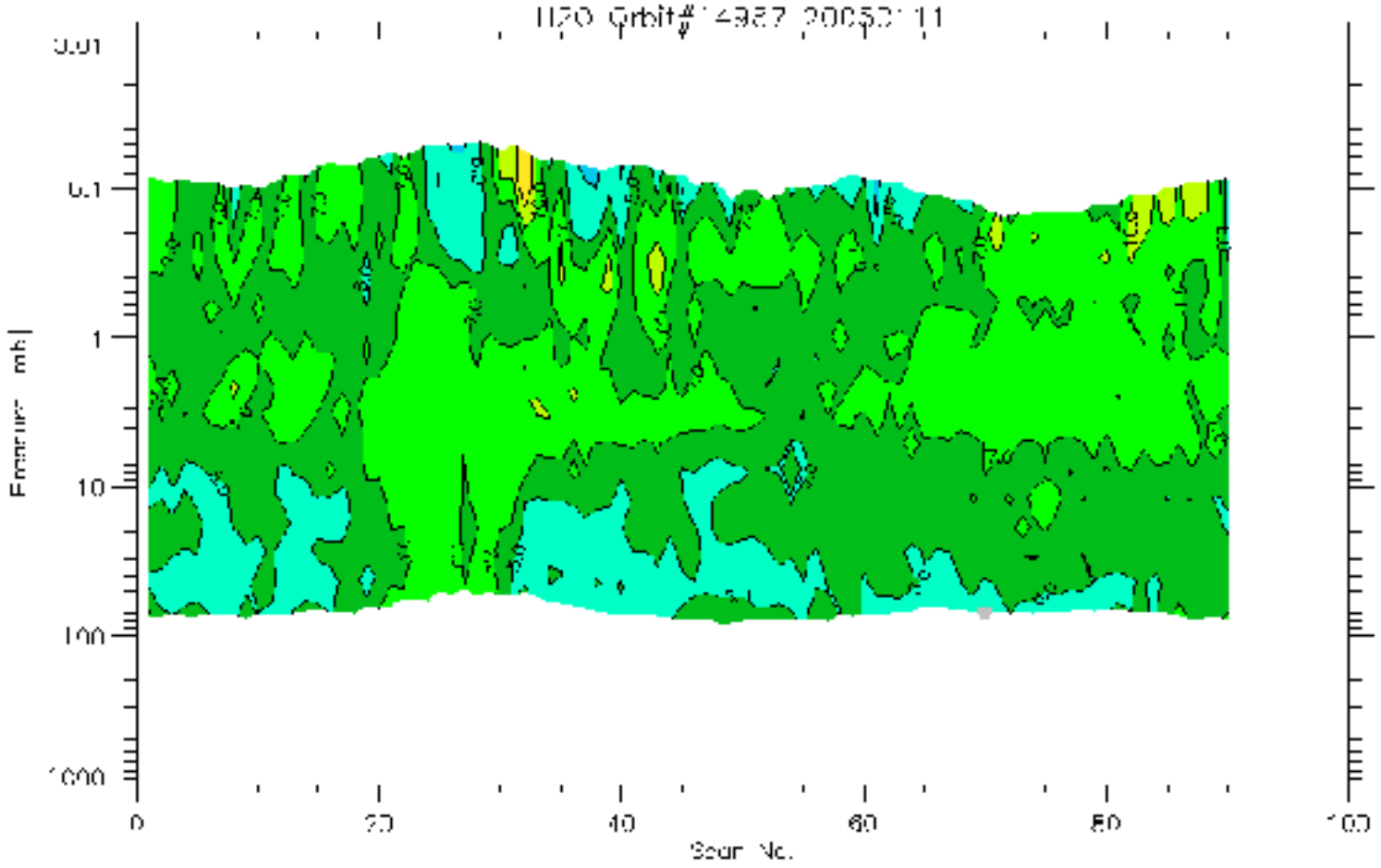
Orbit 14987 H2O v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



Orbit 14987 H2O v2

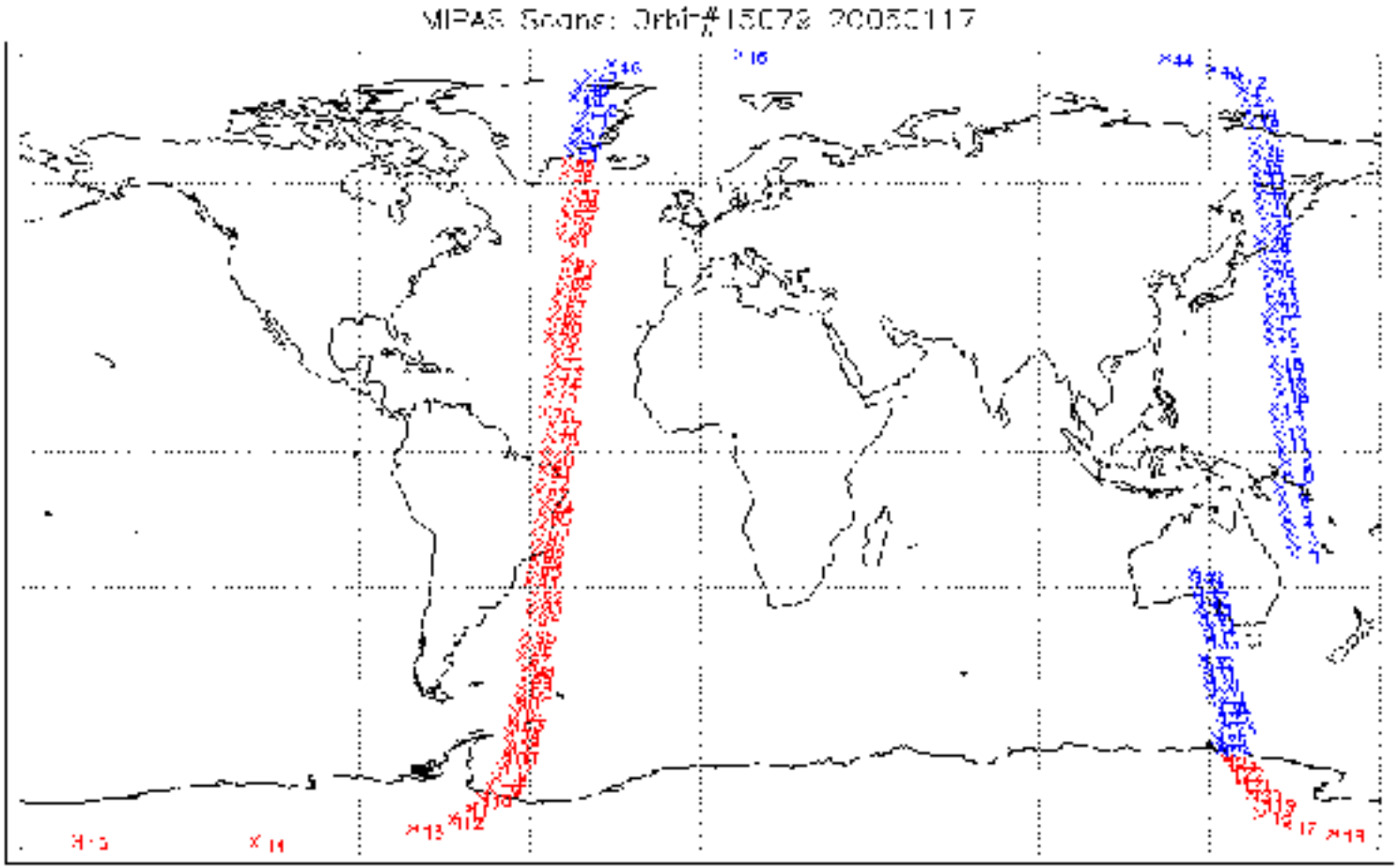
Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



" The following sequence of plots compares retrievals from the two versions of the UTLS1 mode orbit 15079 from 17Jan05

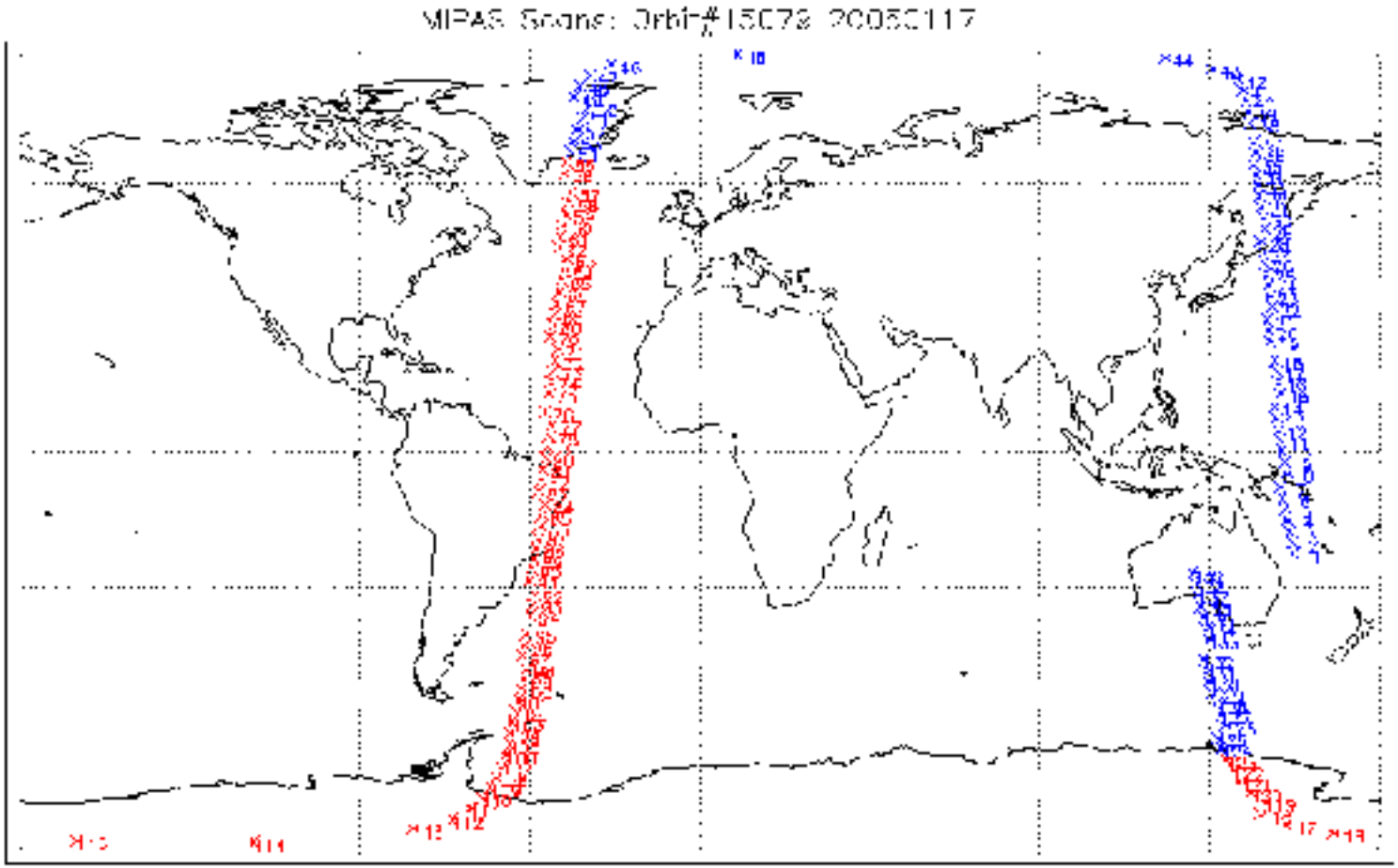
Orbit 15079 UTLS1 v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



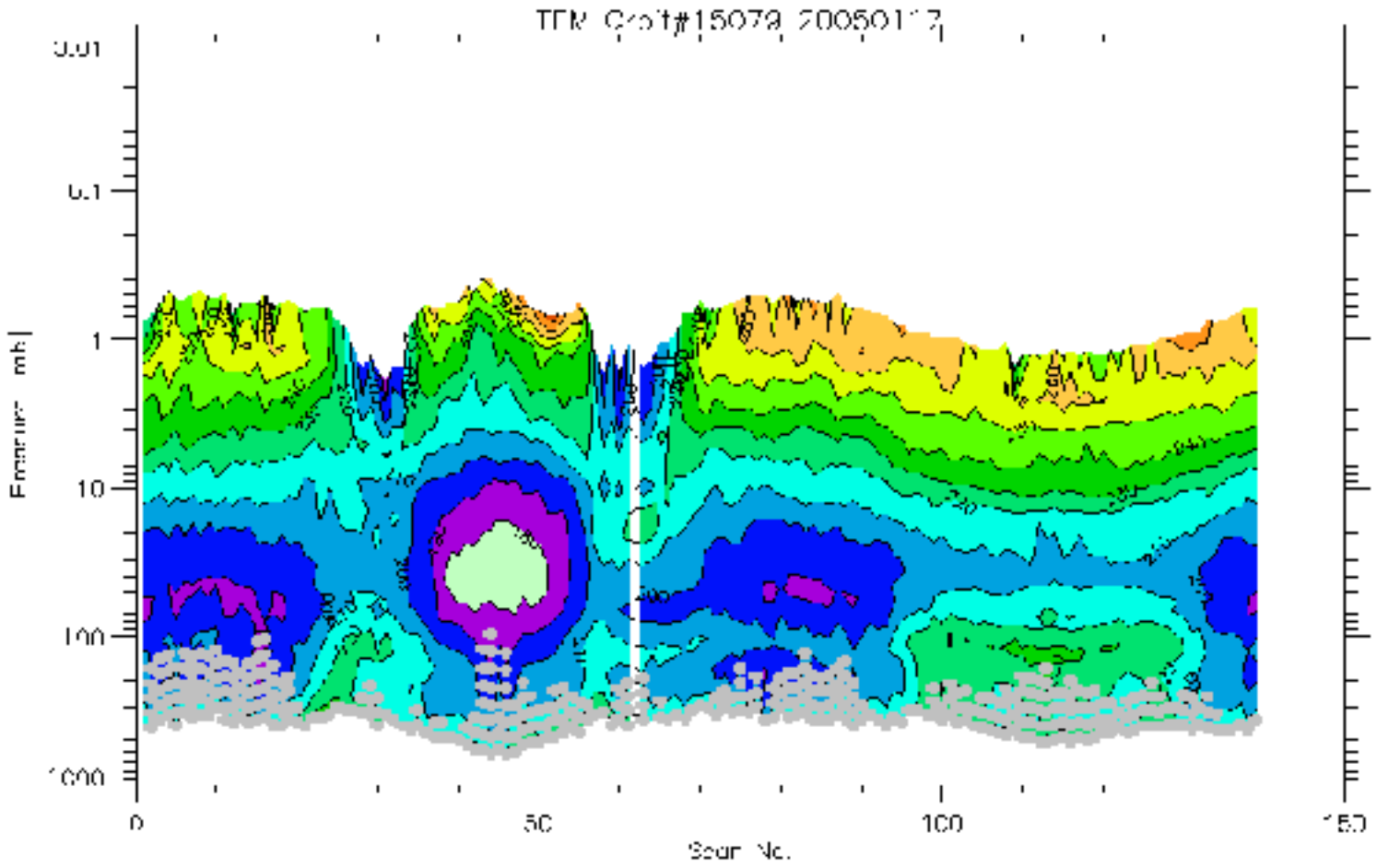
Orbit 15079 UTLS1 v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



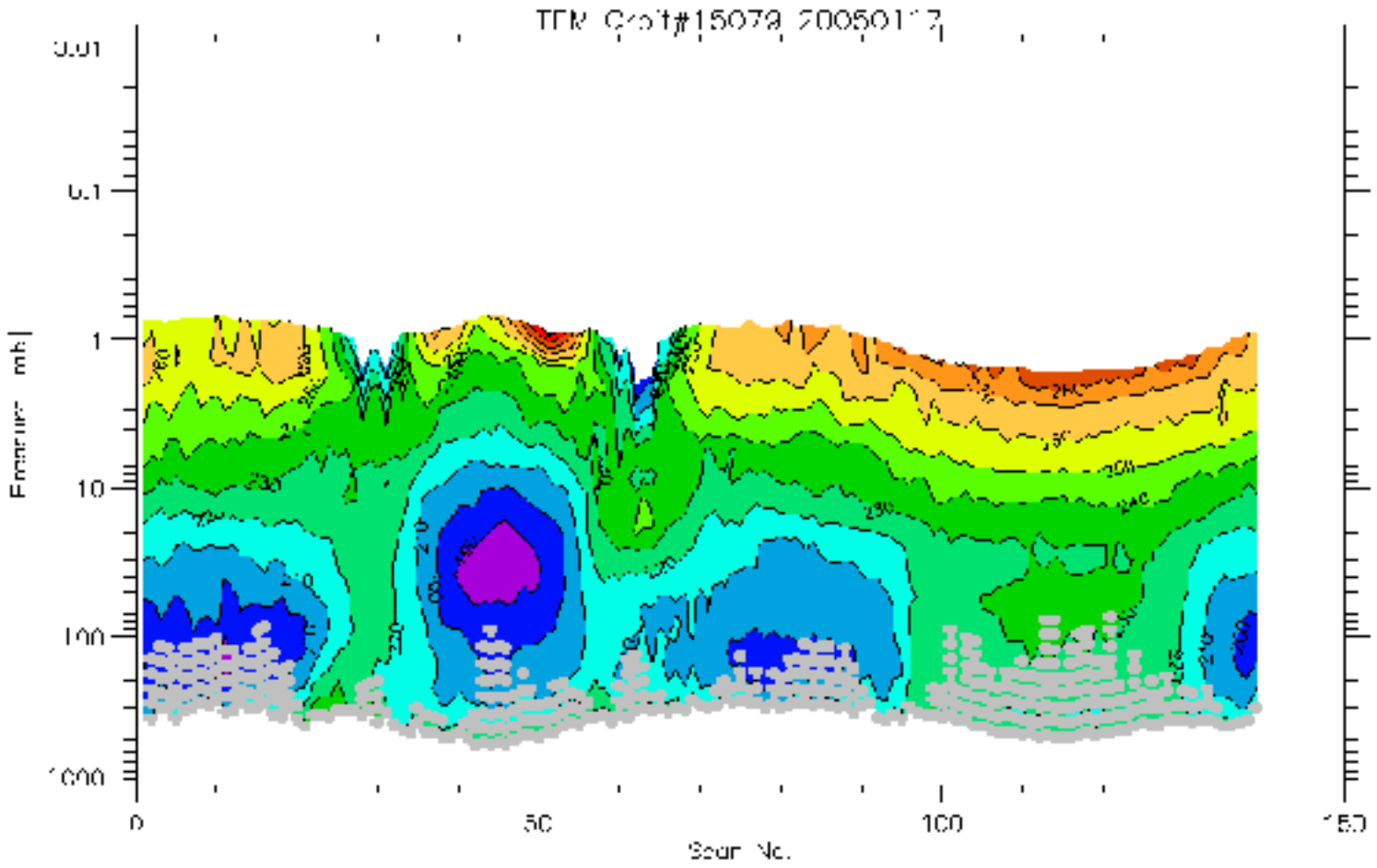
Orbit 15079 TEM v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



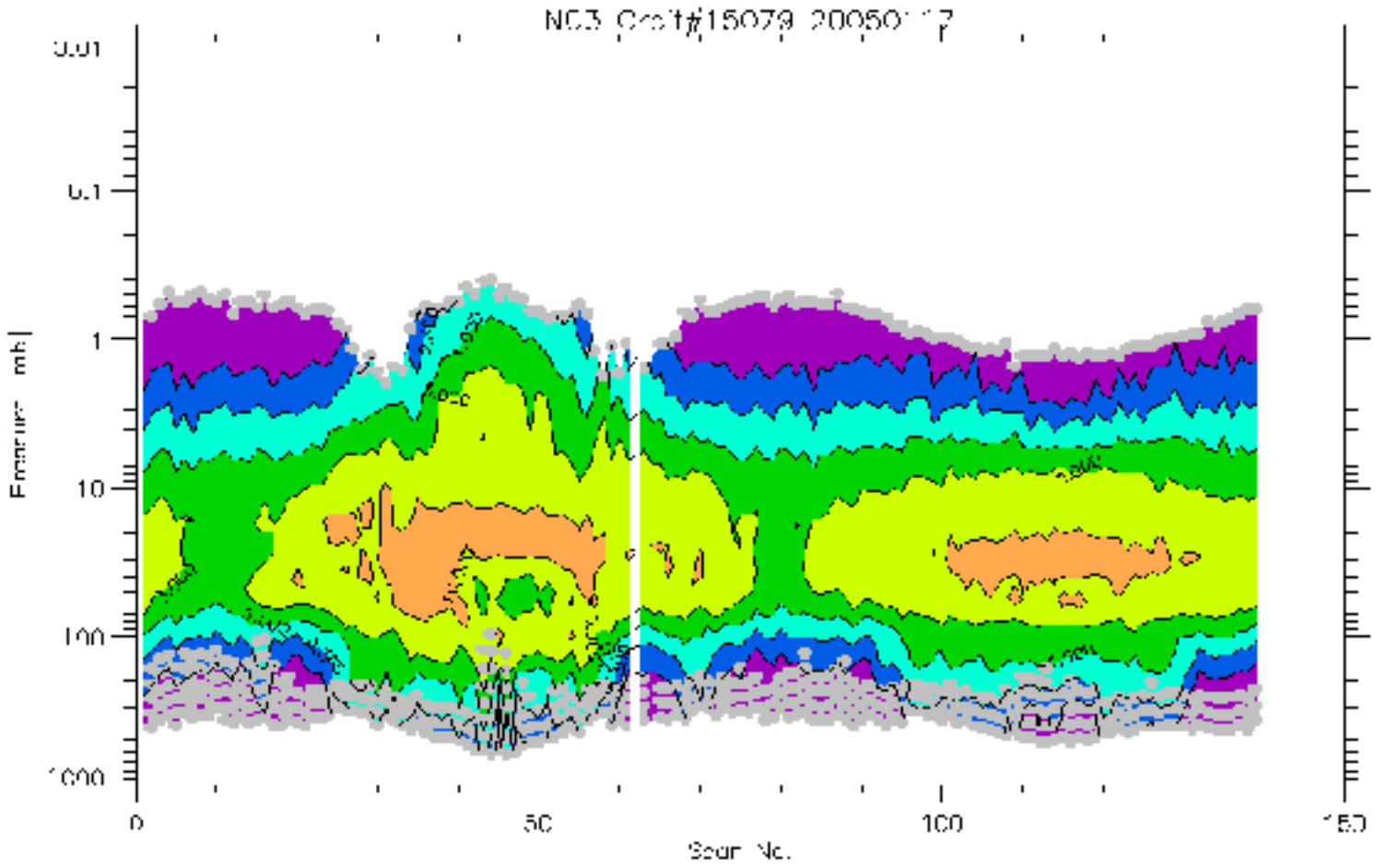
Orbit 15079 TEM v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



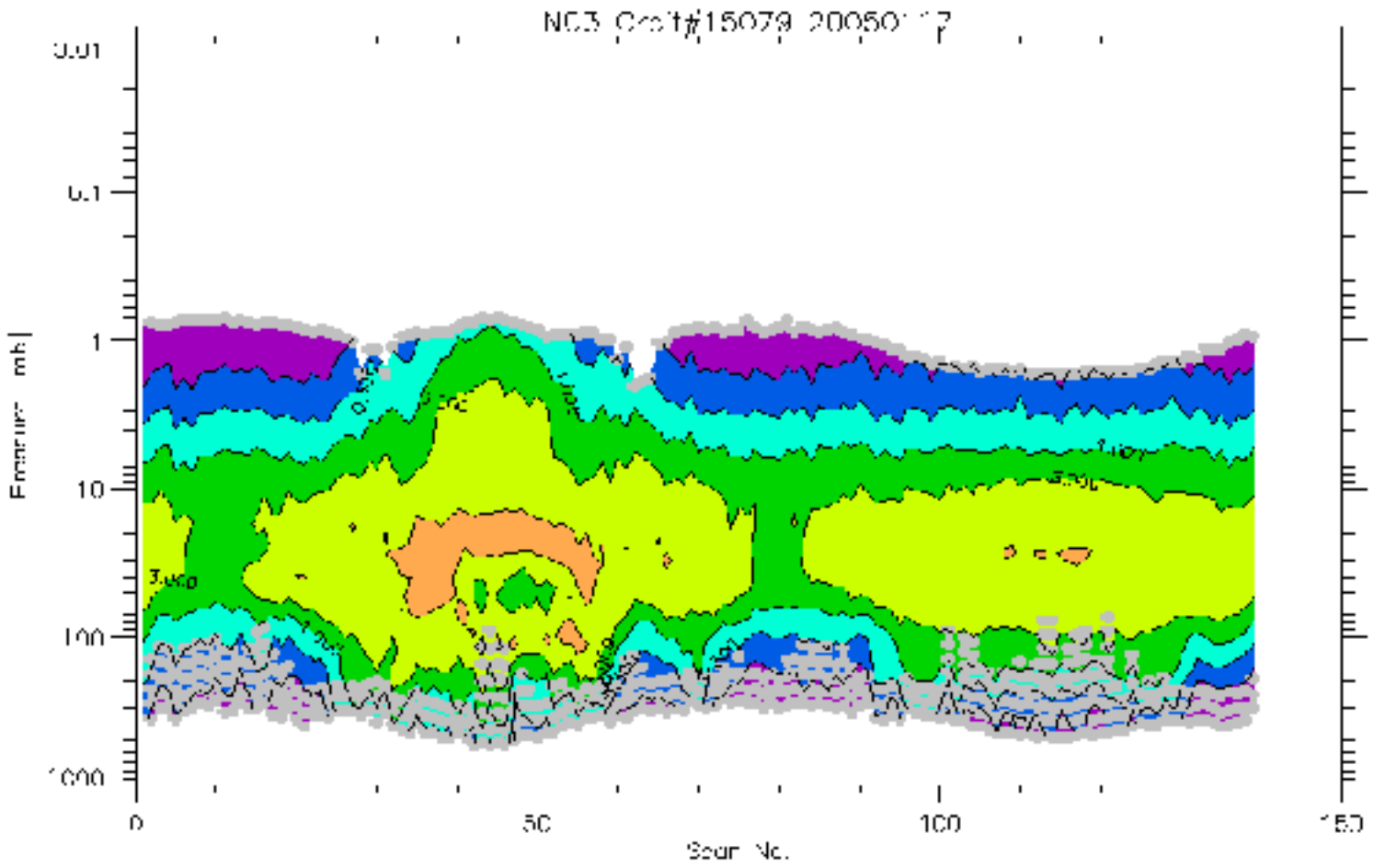
Orbit 15079 HNO3 v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



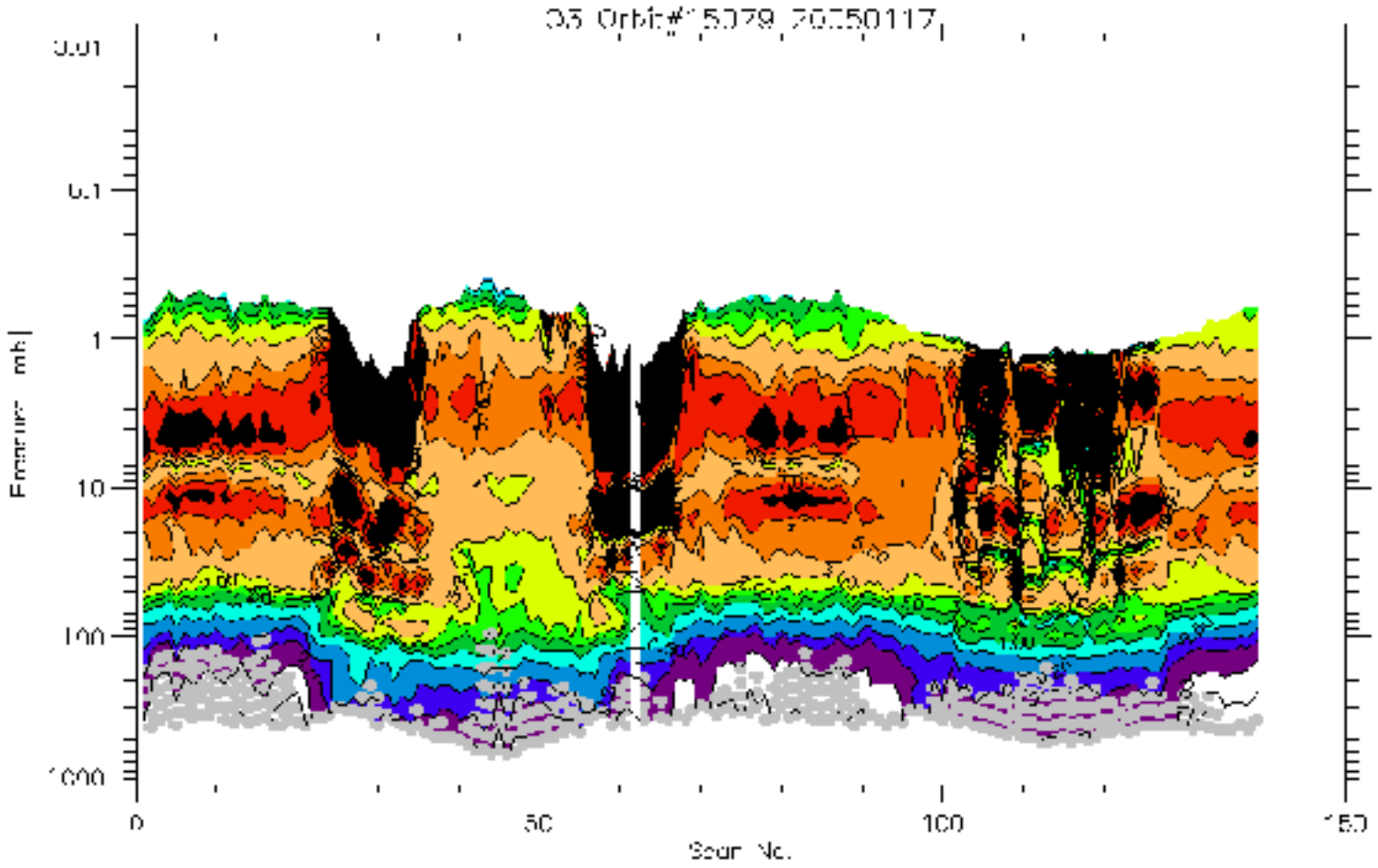
Orbit 15079 HNO3 v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



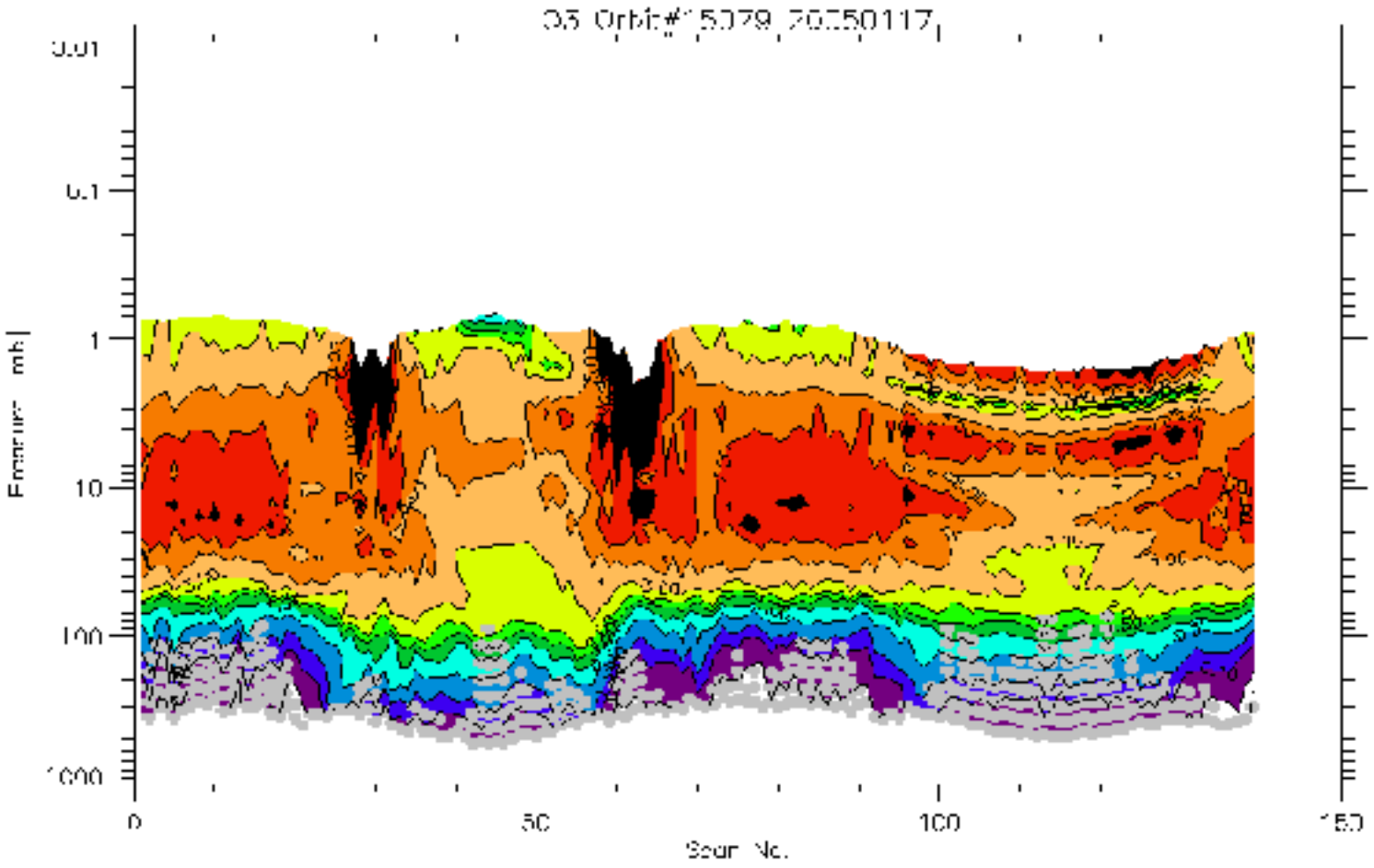
Orbit 15079 O3 v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



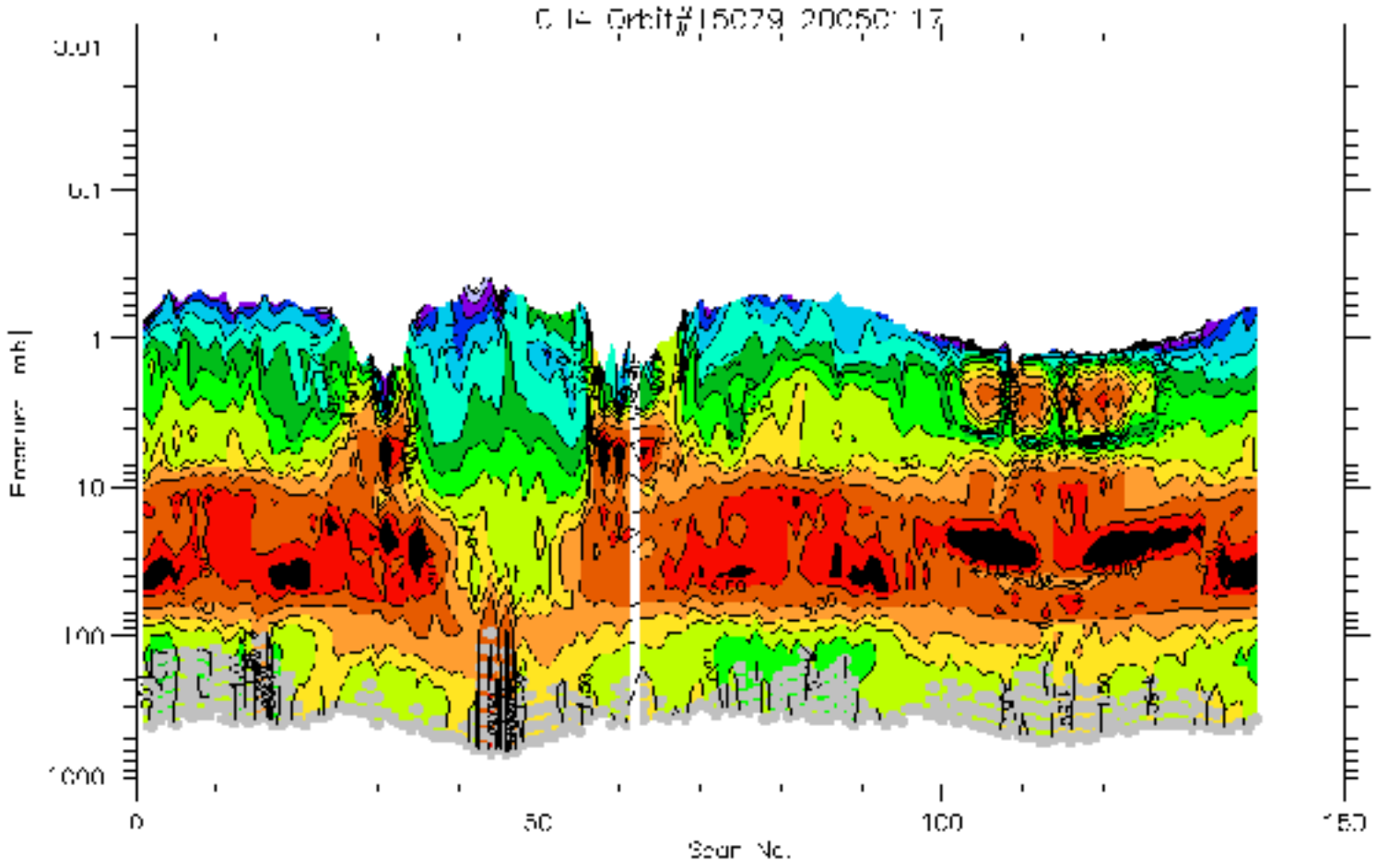
Orbit 15079 O3 v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



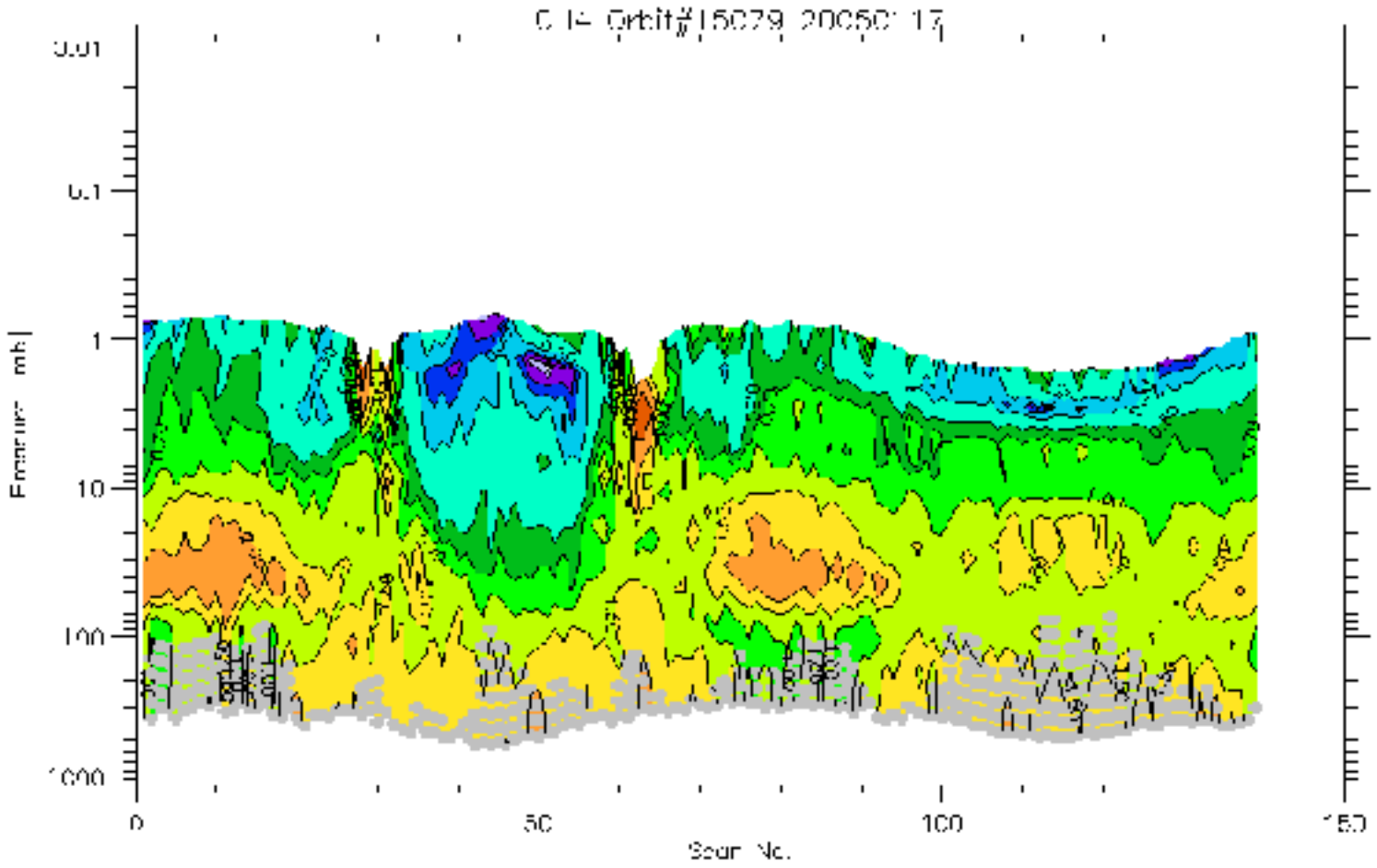
Orbit 15079 CH4 v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



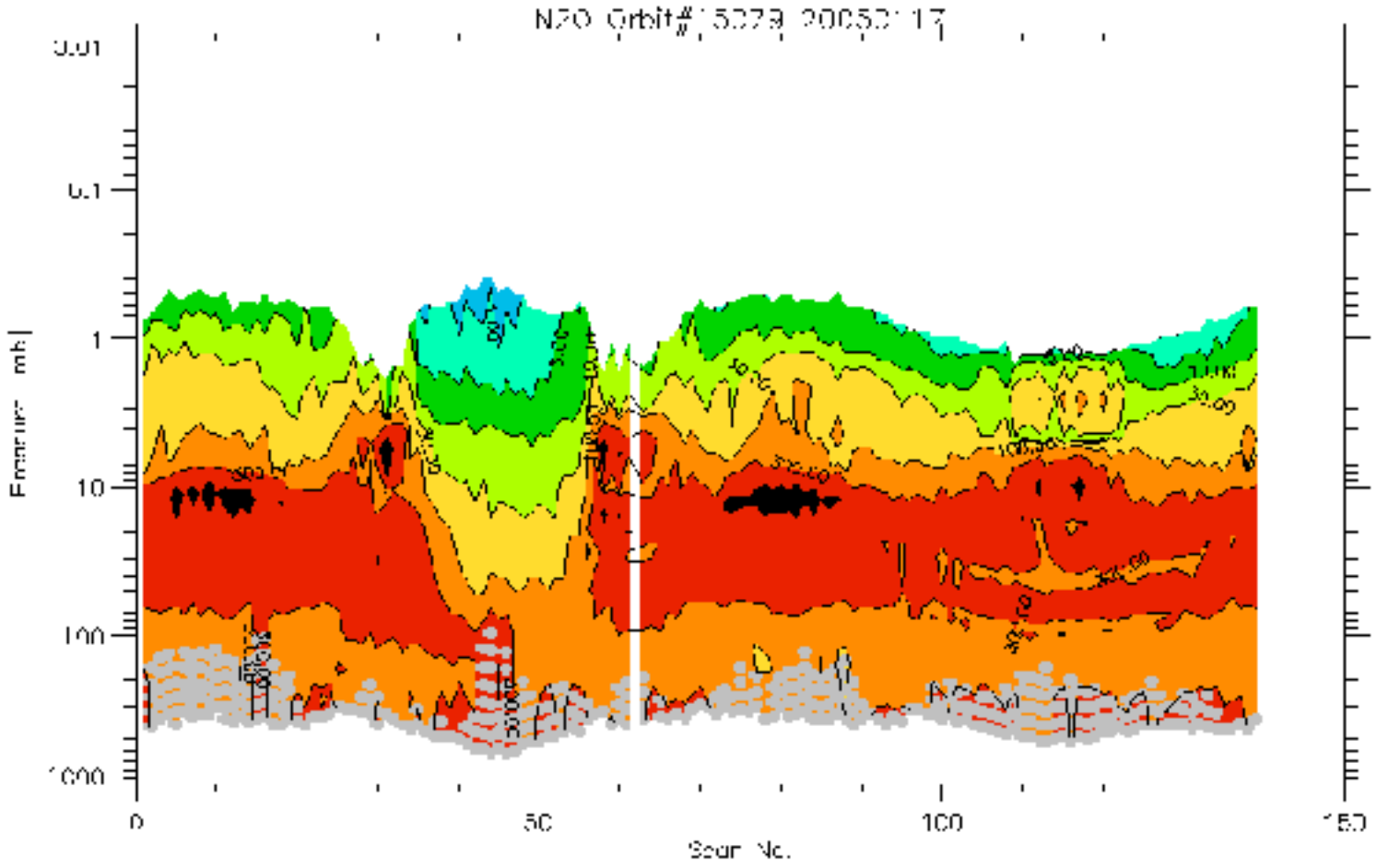
Orbit 15079 CH4 v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



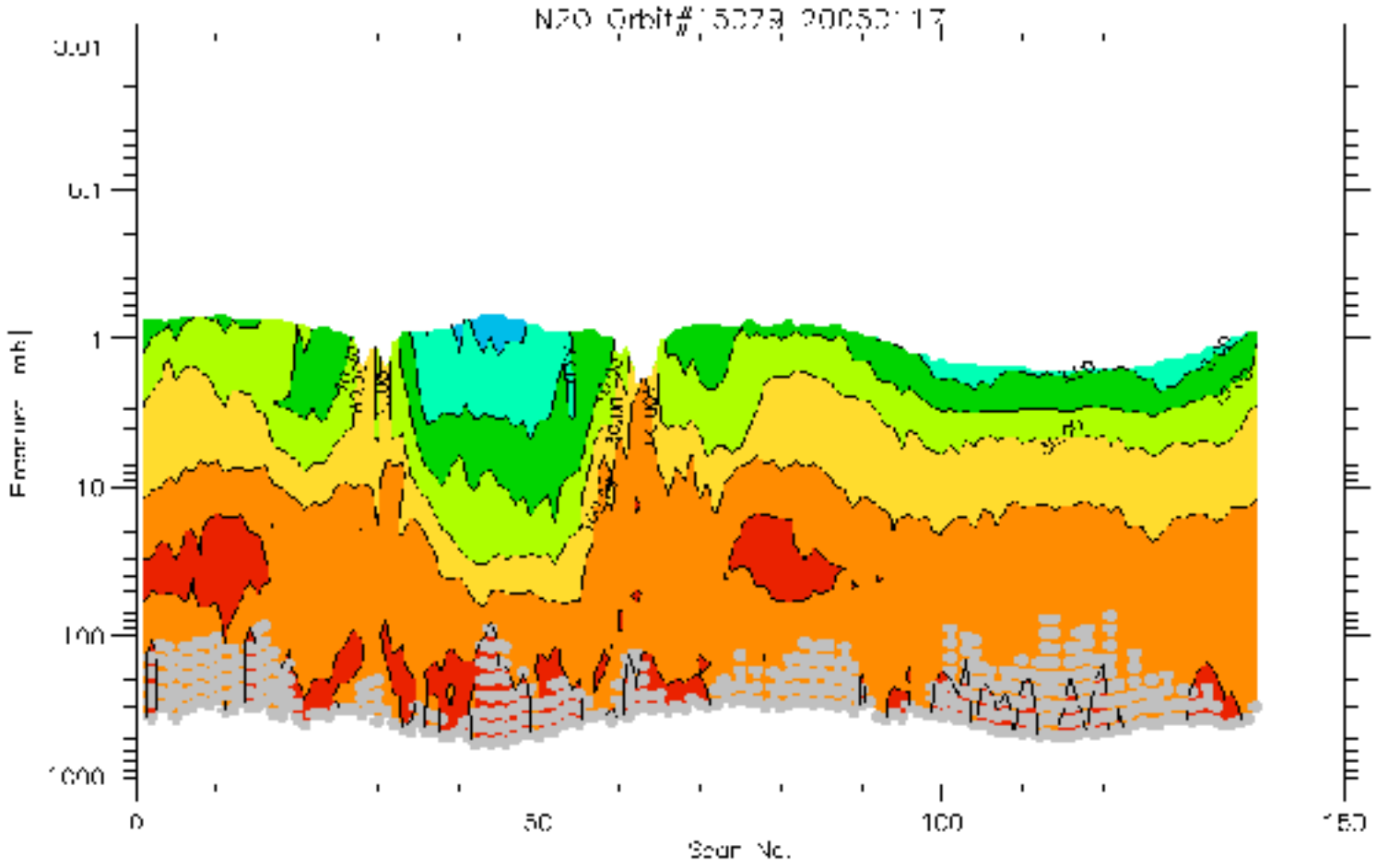
Orbit 15079 N2O v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



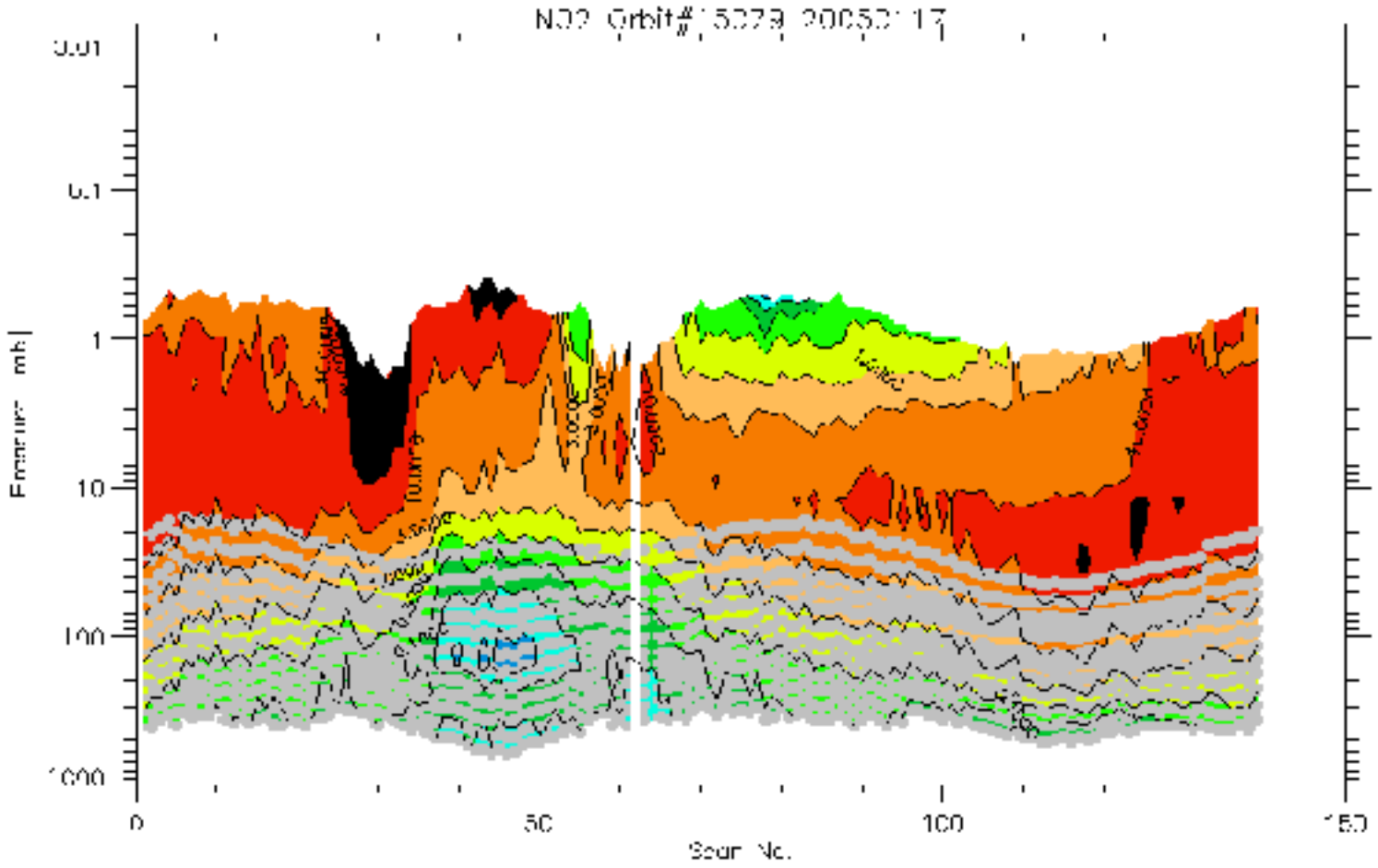
Orbit 15079 N2O v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



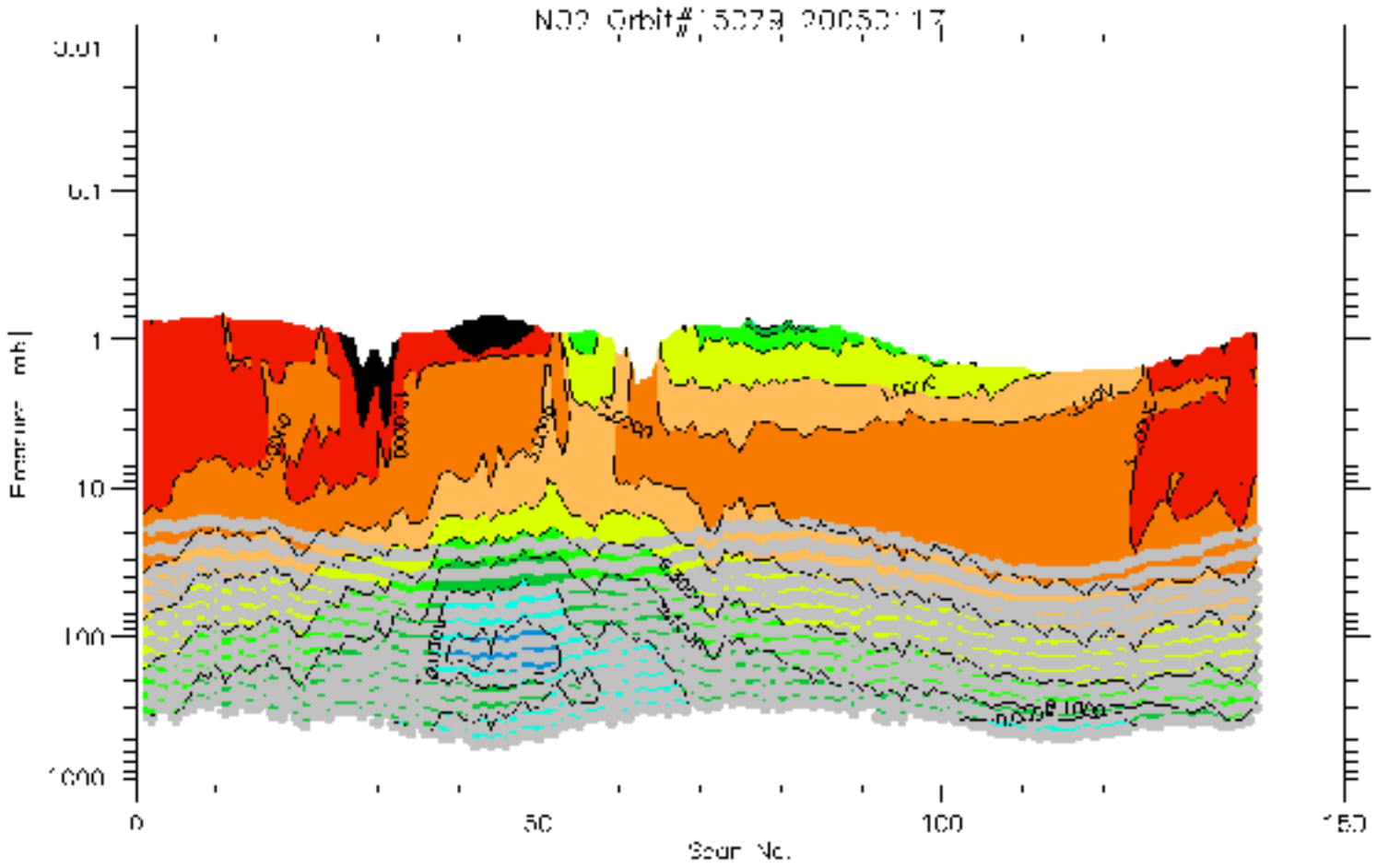
Orbit 15079 NO2 v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



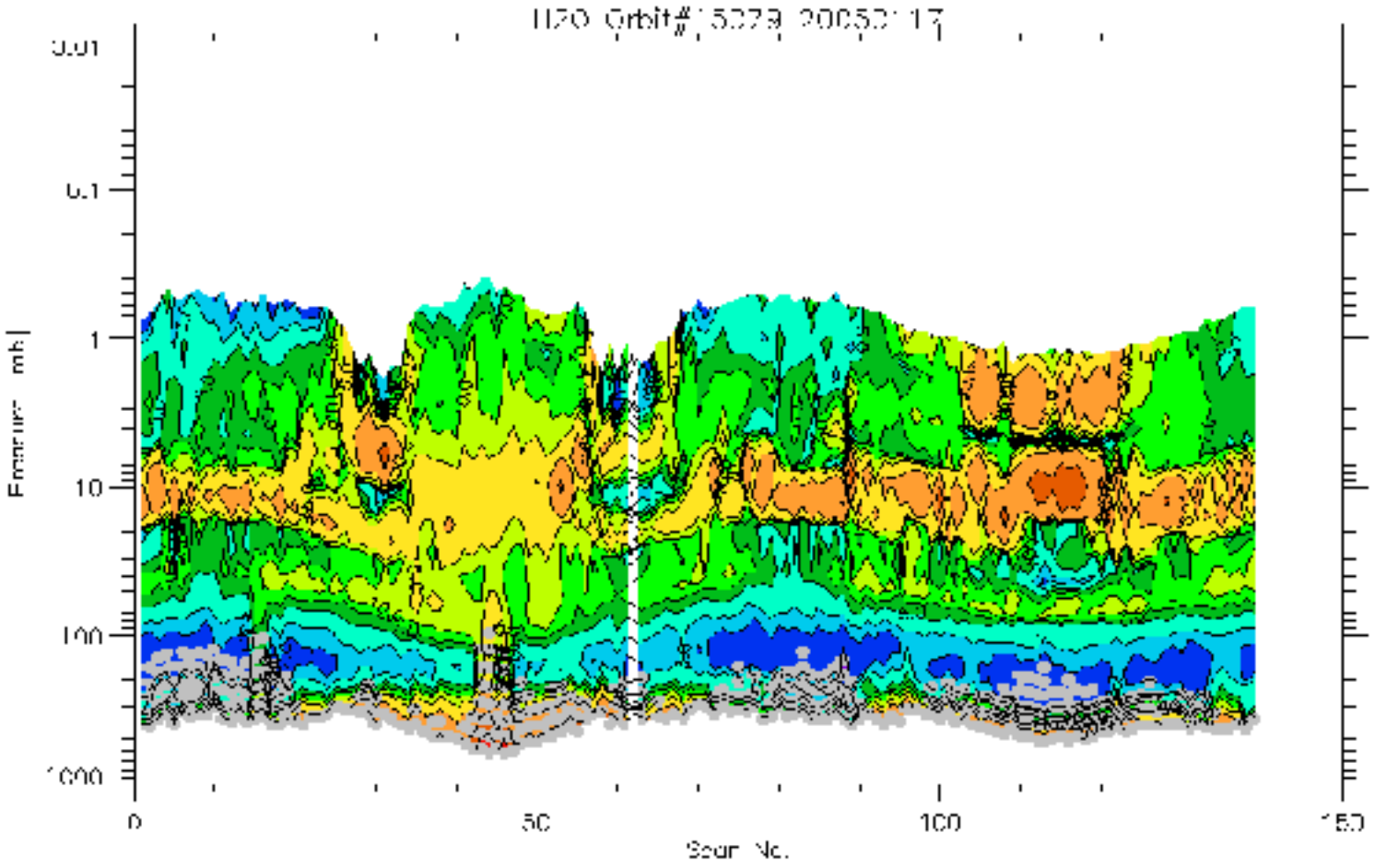
Orbit 15079 NO2 v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



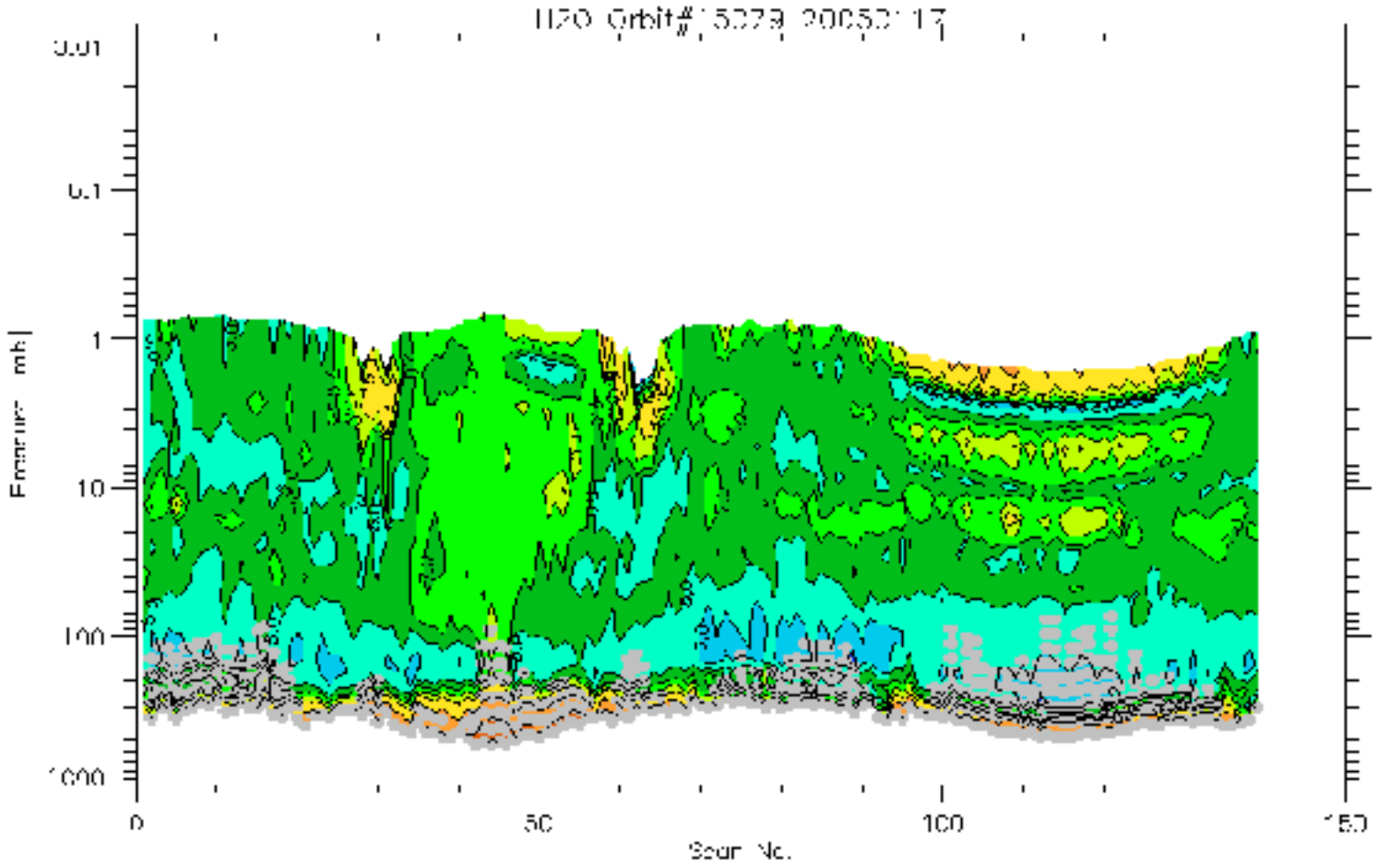
Orbit 15079 H2O v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



Orbit 15079 H2O v2

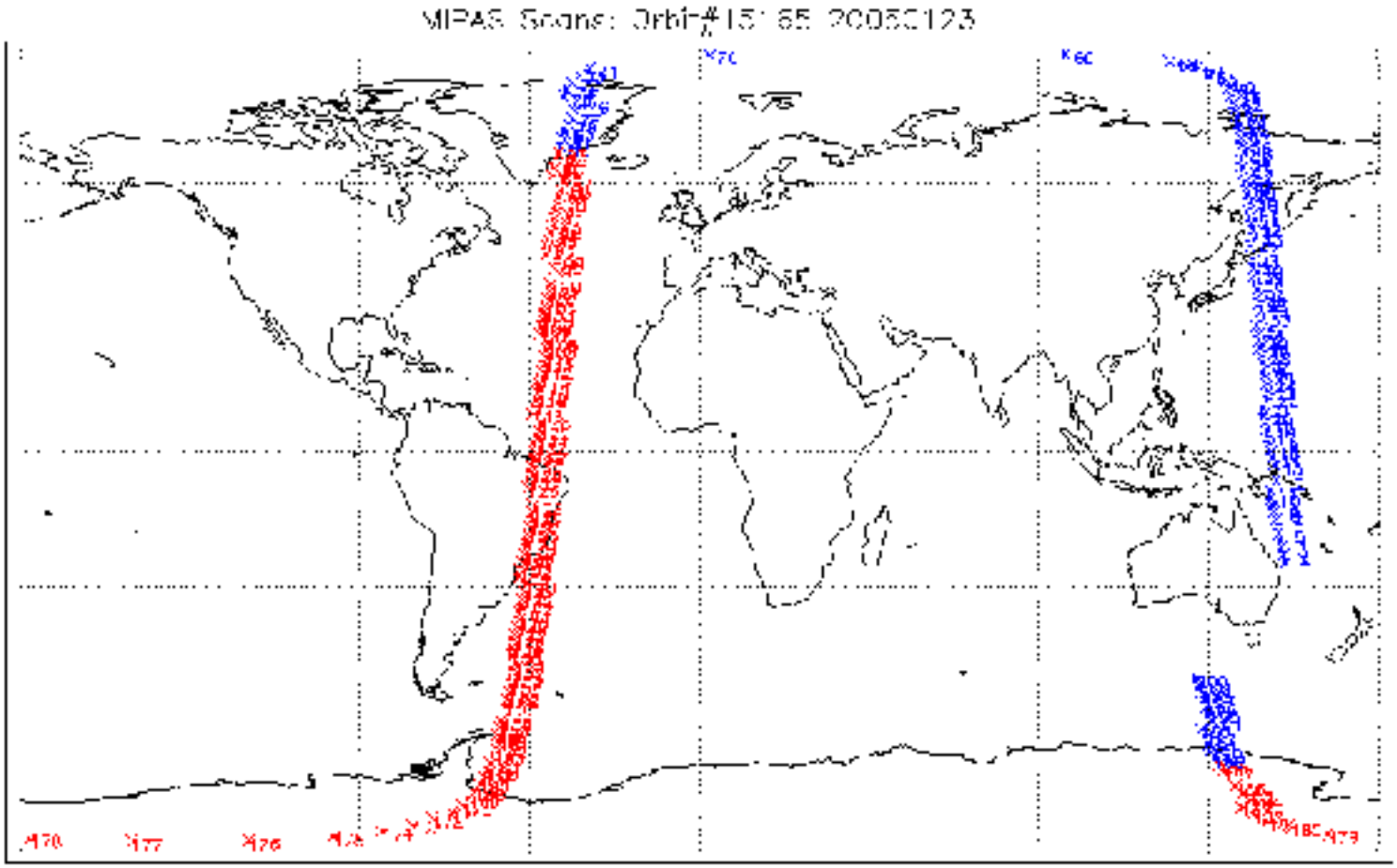
Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



" The following sequence of plots compares retrievals from the two versions of the UTLS2 mode orbit 15165 from 23Jan05

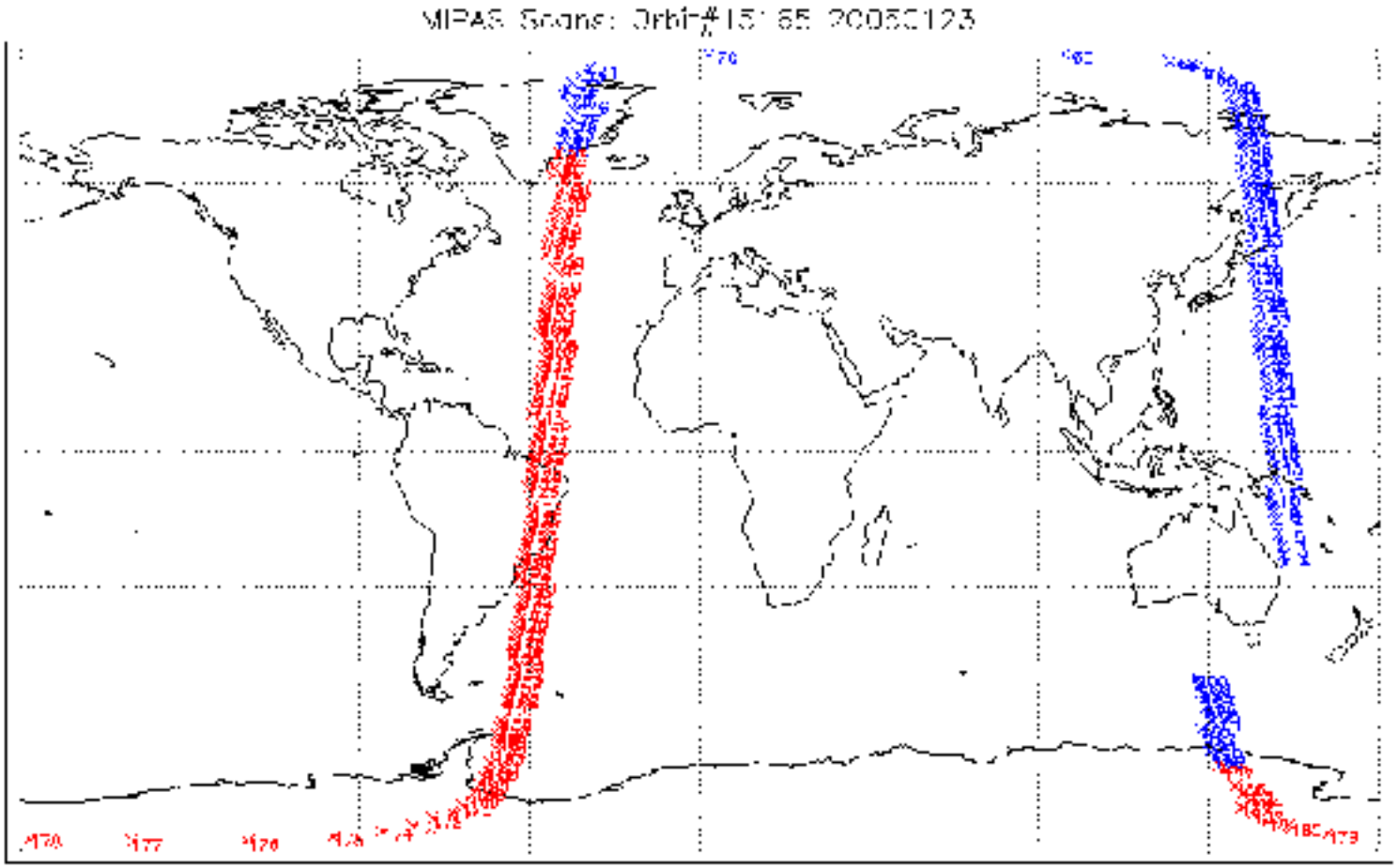
Orbit 15165 UTLS2 v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



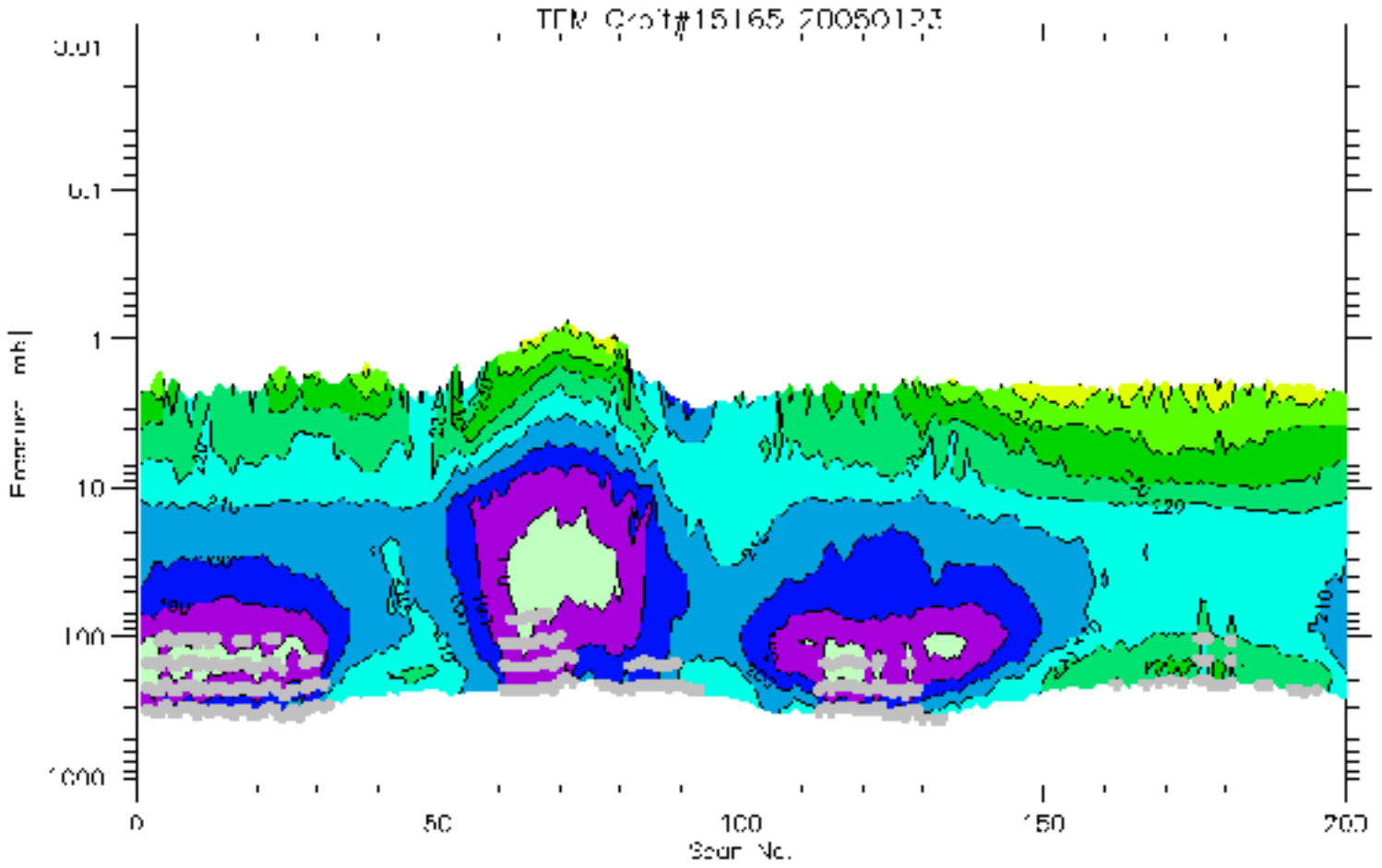
Orbit 15165 UTLS2 v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



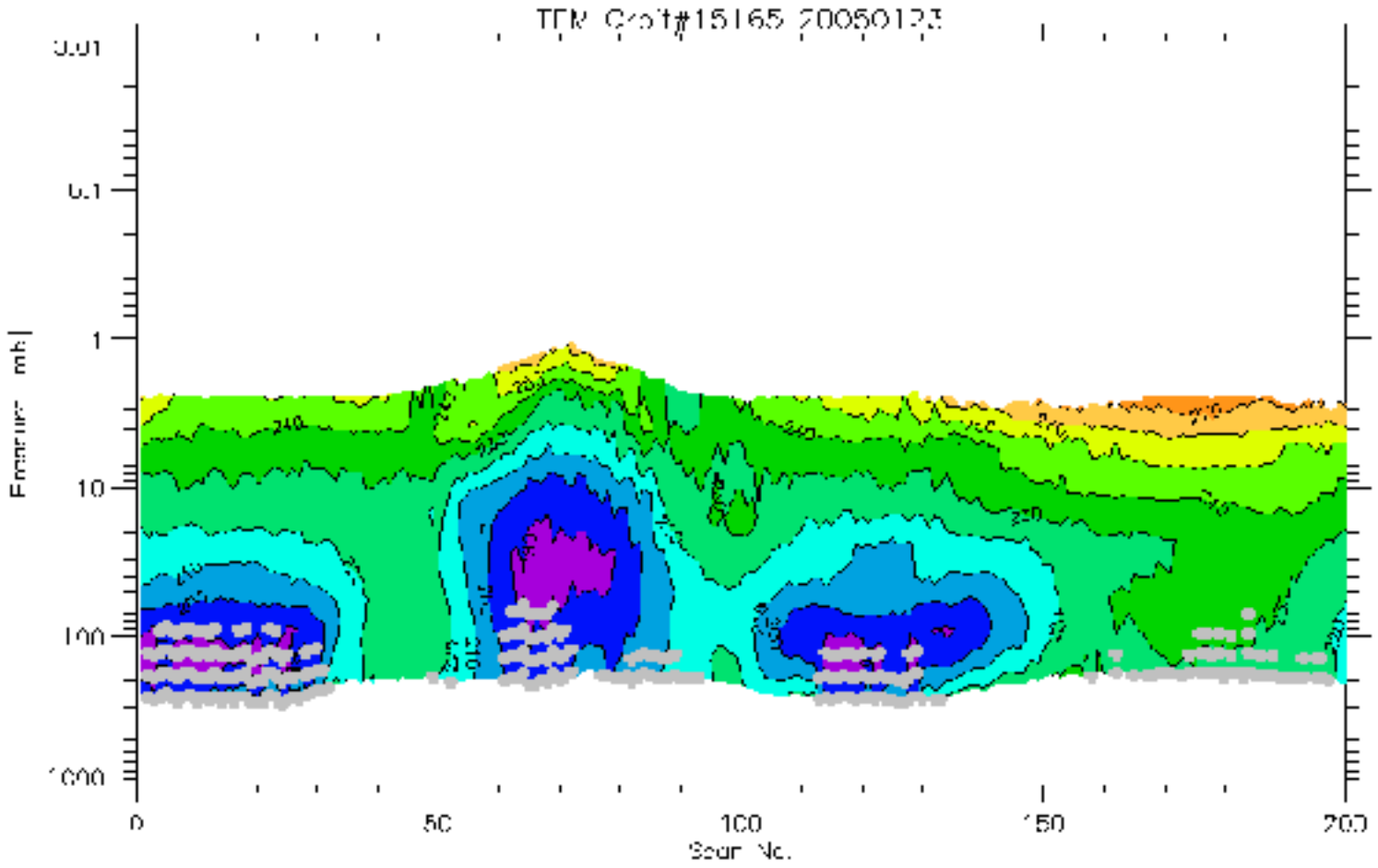
Orbit 15165 TEM v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



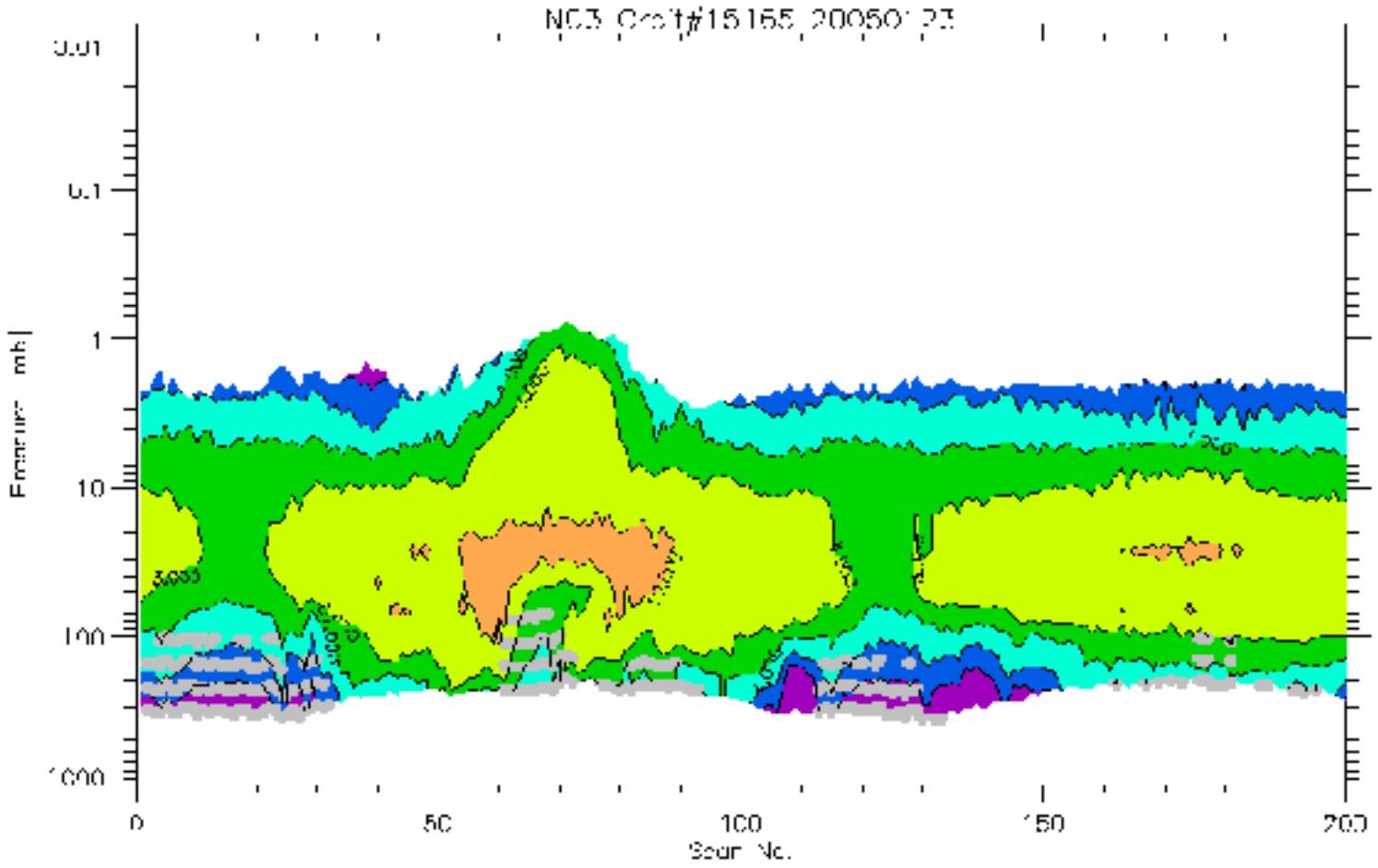
Orbit 15165 TEM v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



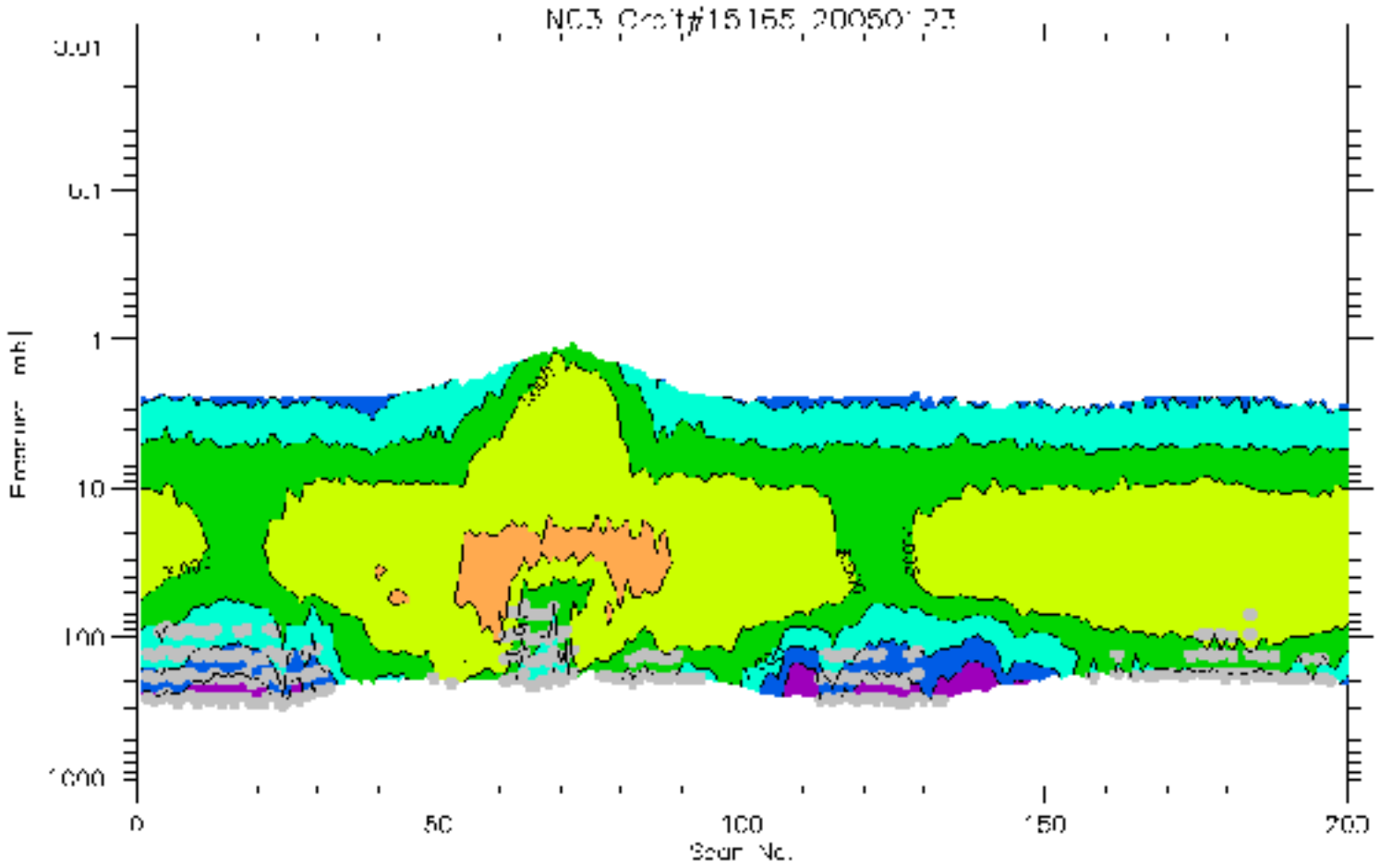
Orbit 15165 HNO3 v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



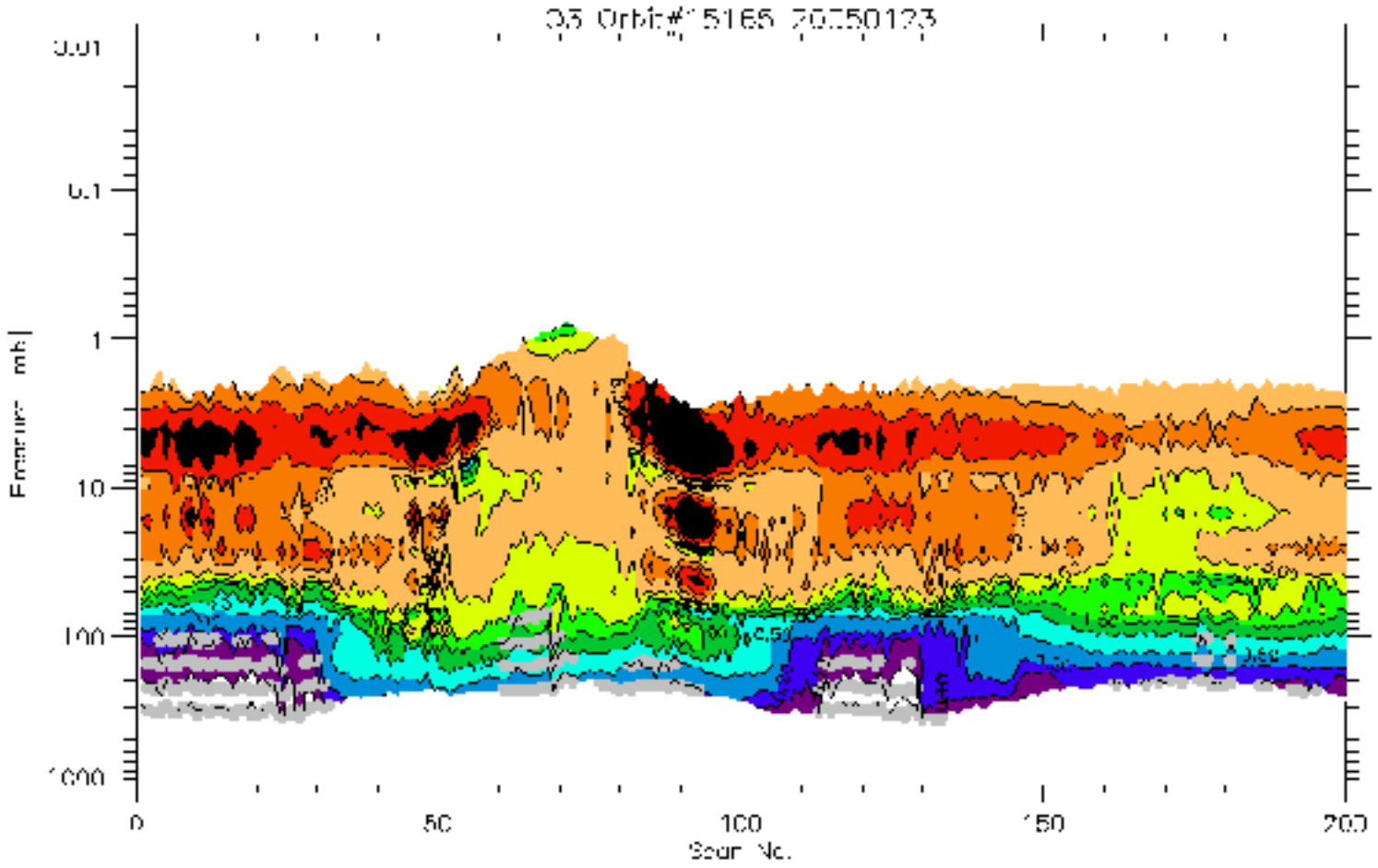
Orbit 15165 HNO3 v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



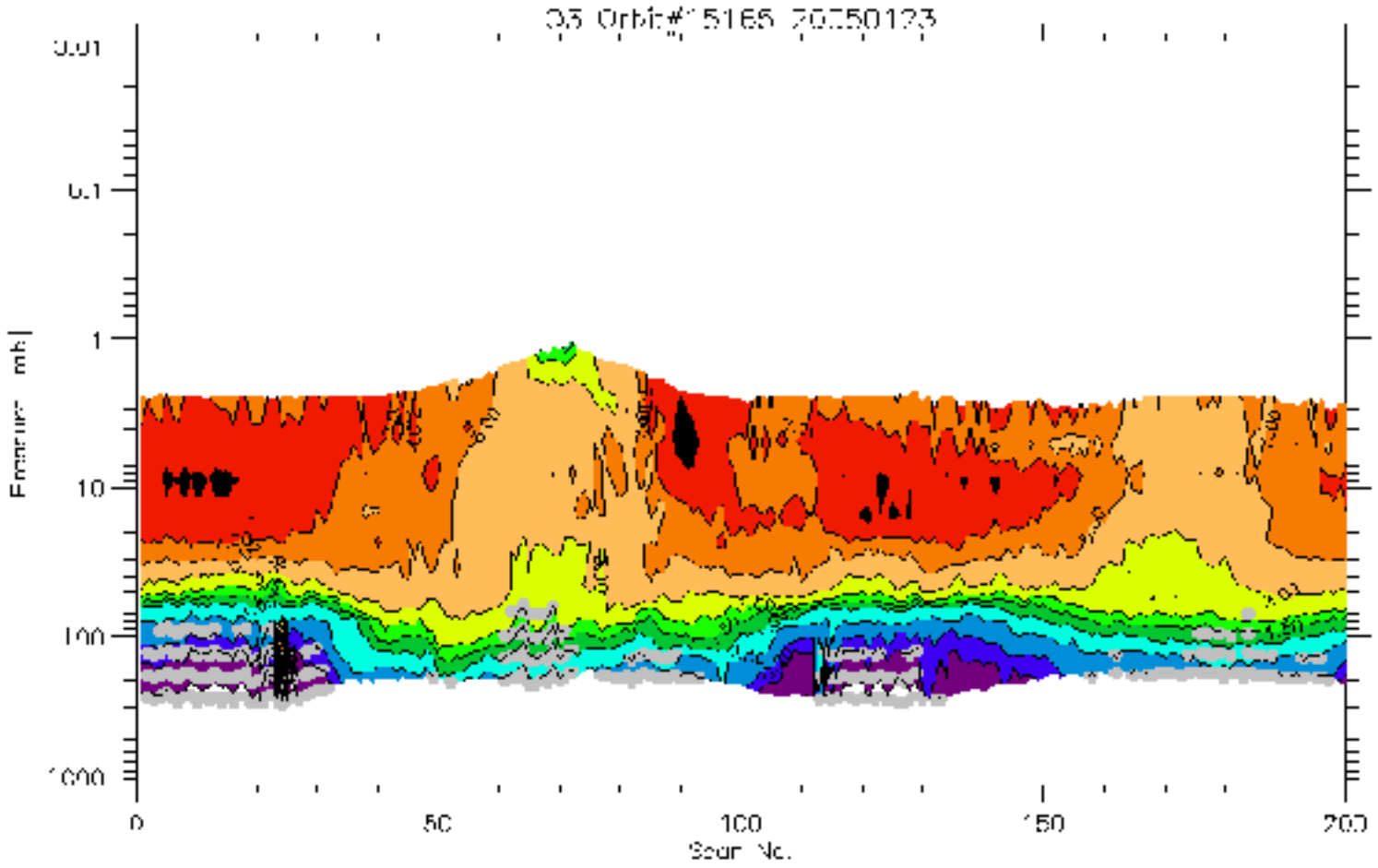
Orbit 15165 O3 v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



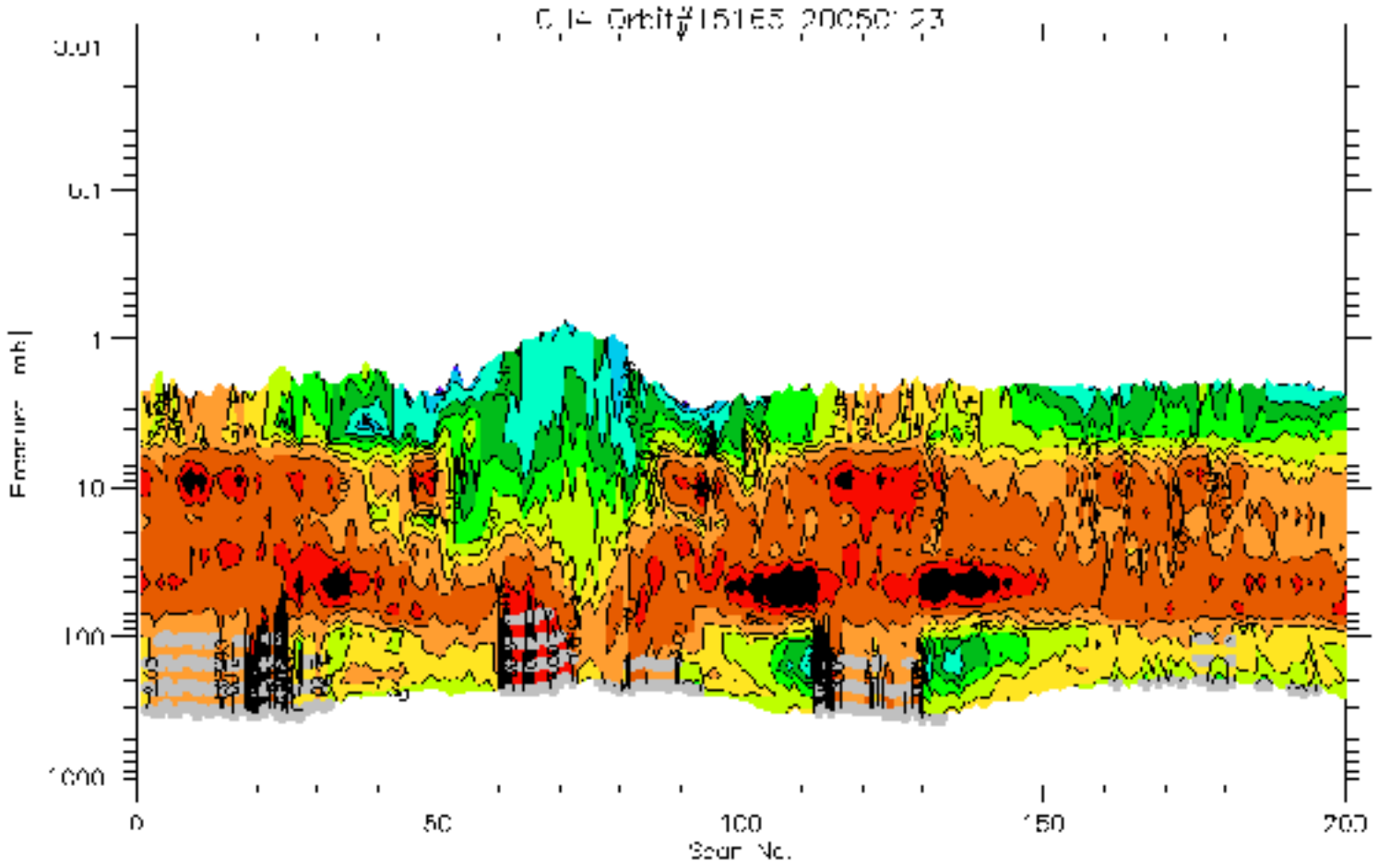
Orbit 15165 O3 v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



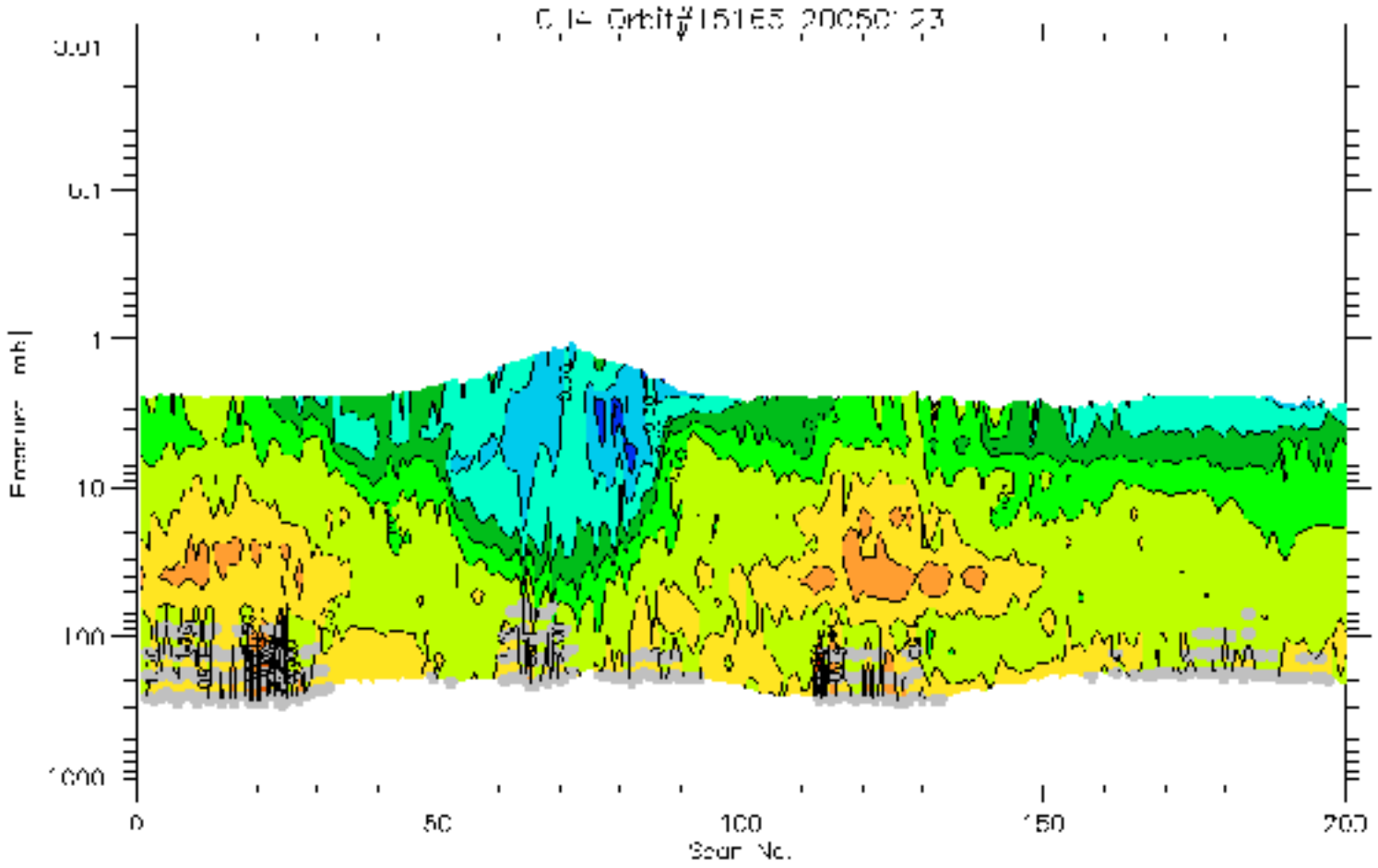
Orbit 15165 CH4 v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



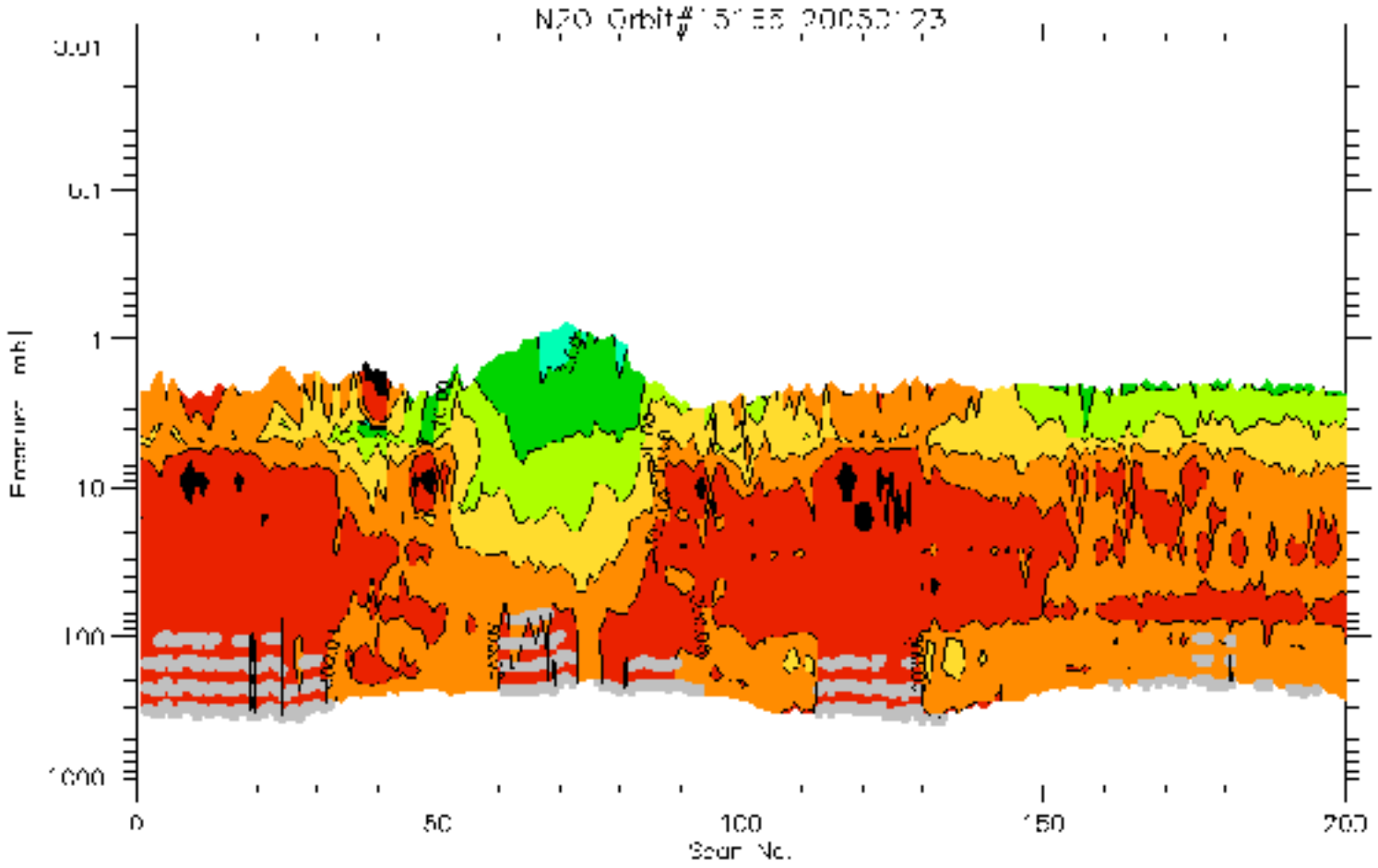
Orbit 15165 CH4 v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



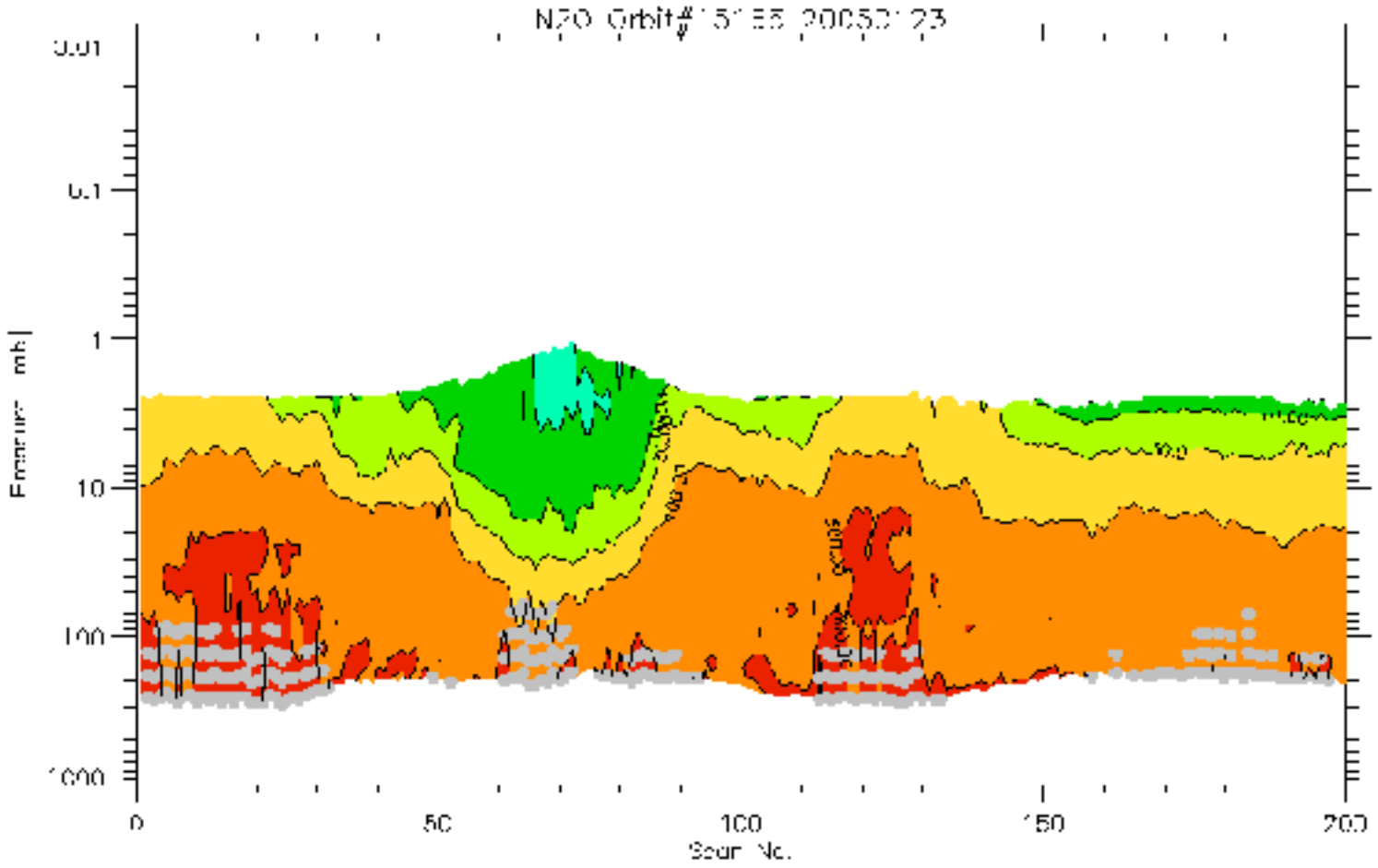
Orbit 15165 N2O v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



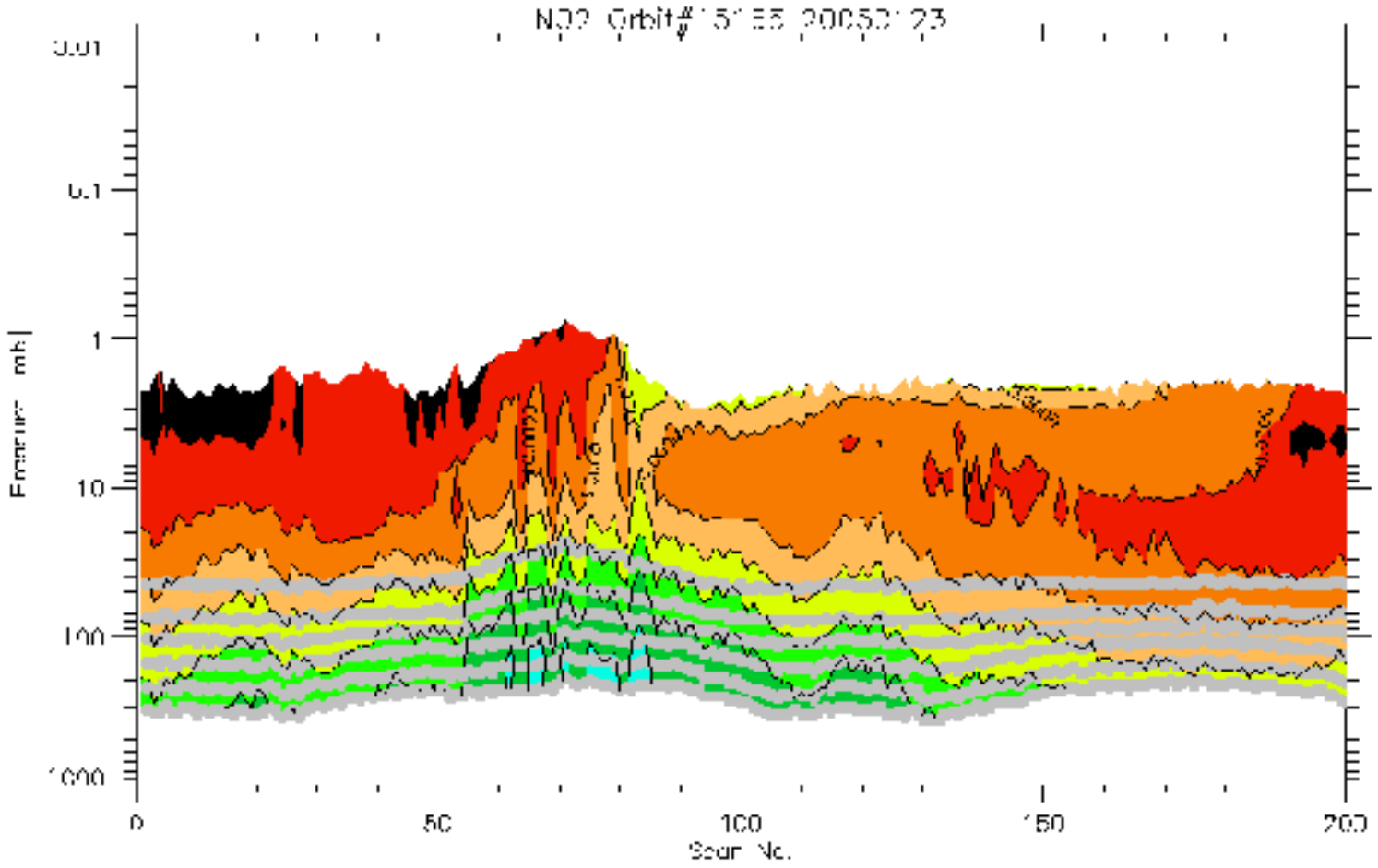
Orbit 15165 N2O v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



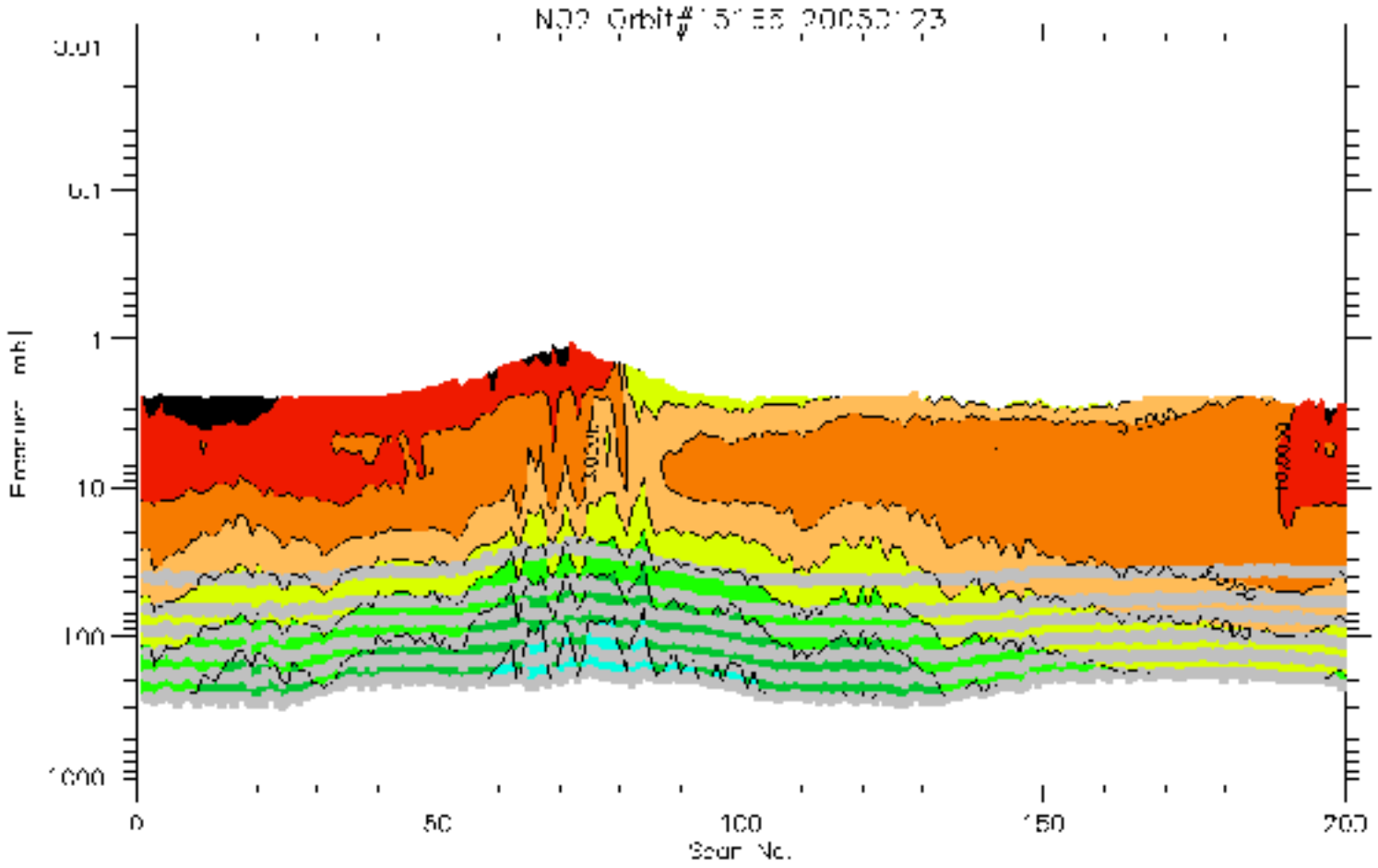
Orbit 15165 NO2 v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



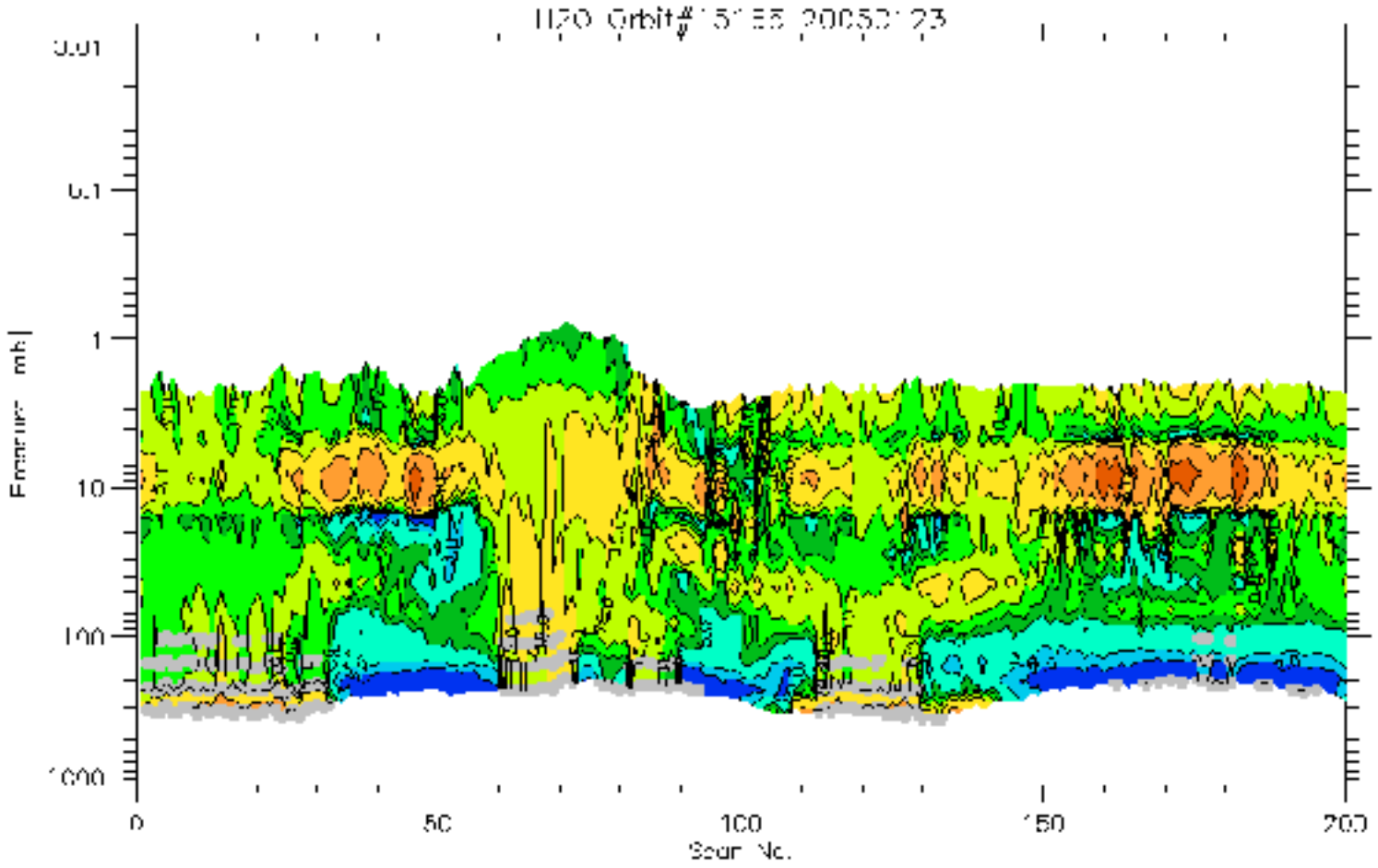
Orbit 15165 NO2 v2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



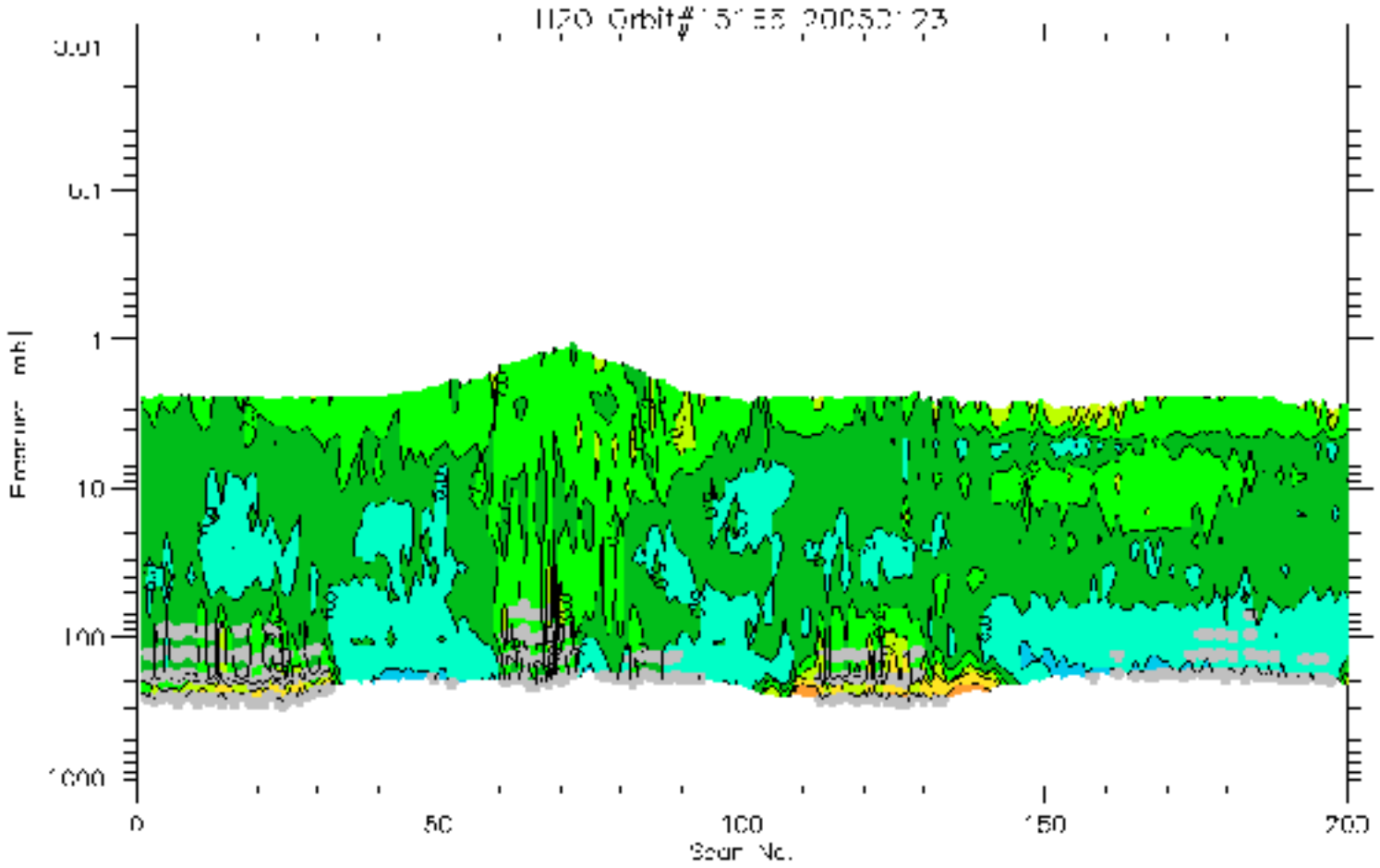
Orbit 15165 H2O v1

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



Orbit 15165 H2O v2

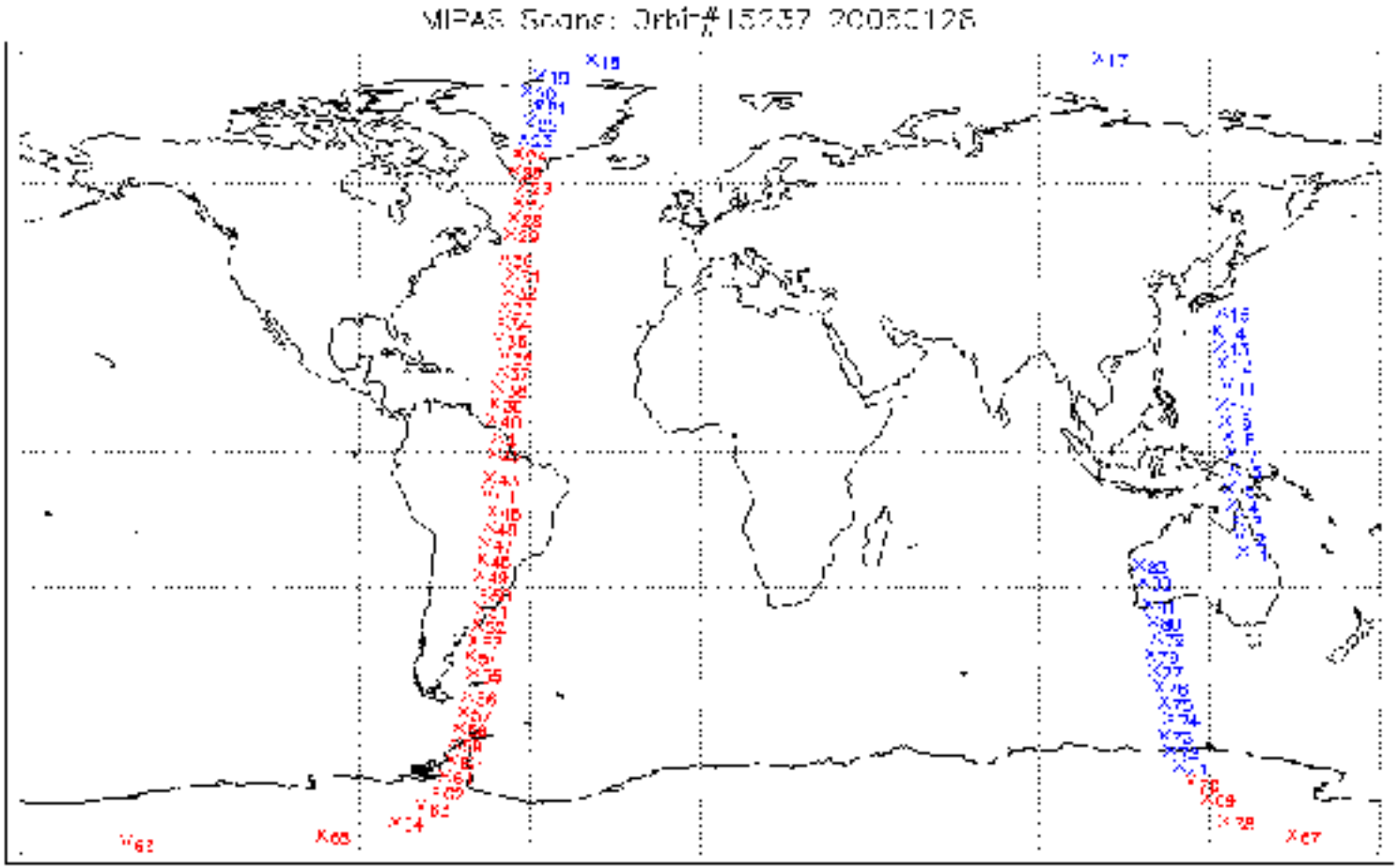
Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



" The following sequence of plots compares retrievals from the three orbits of nominal mode 15237,15238,15239 from 28Jan05

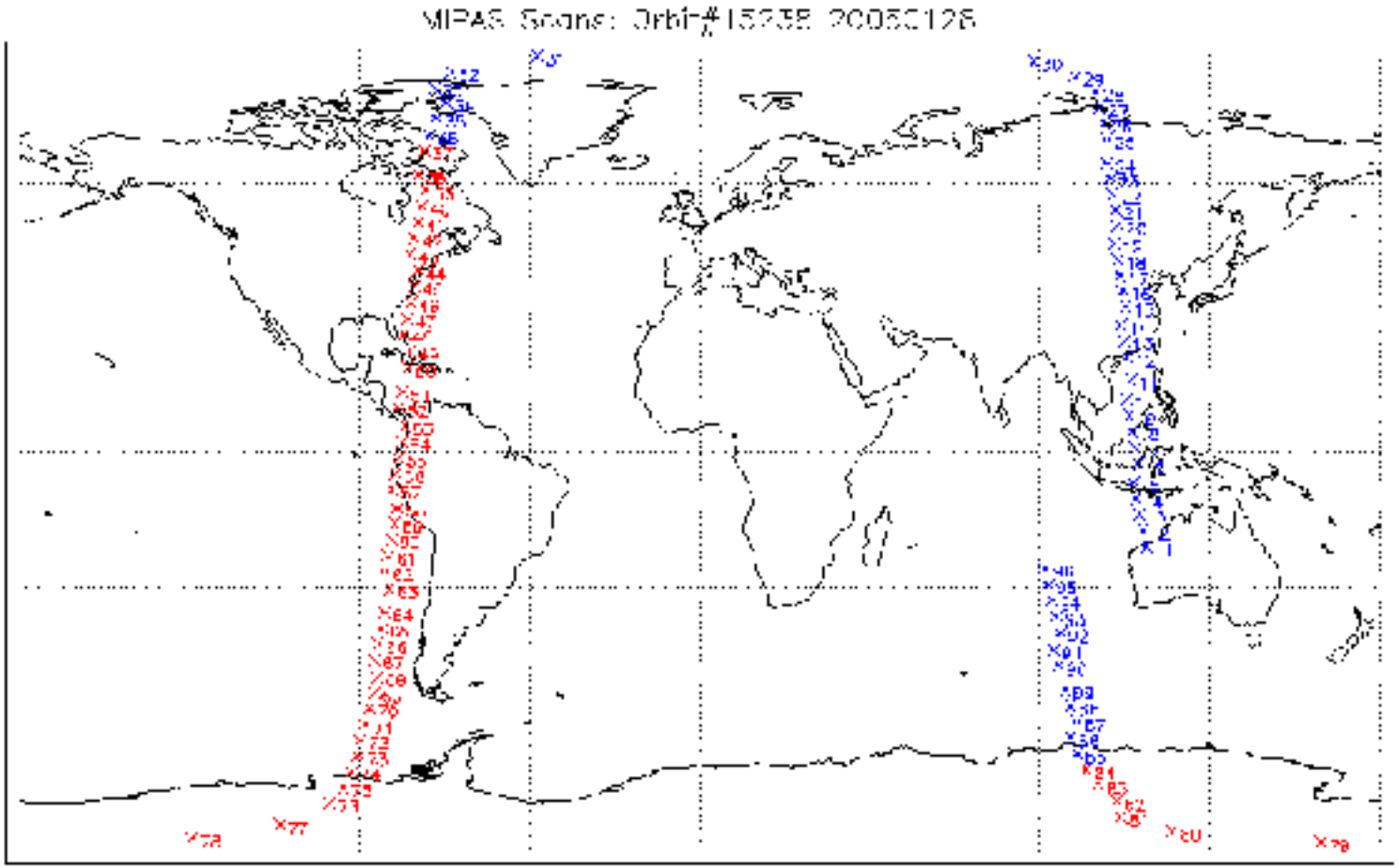
Orbit 15237 NOM

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



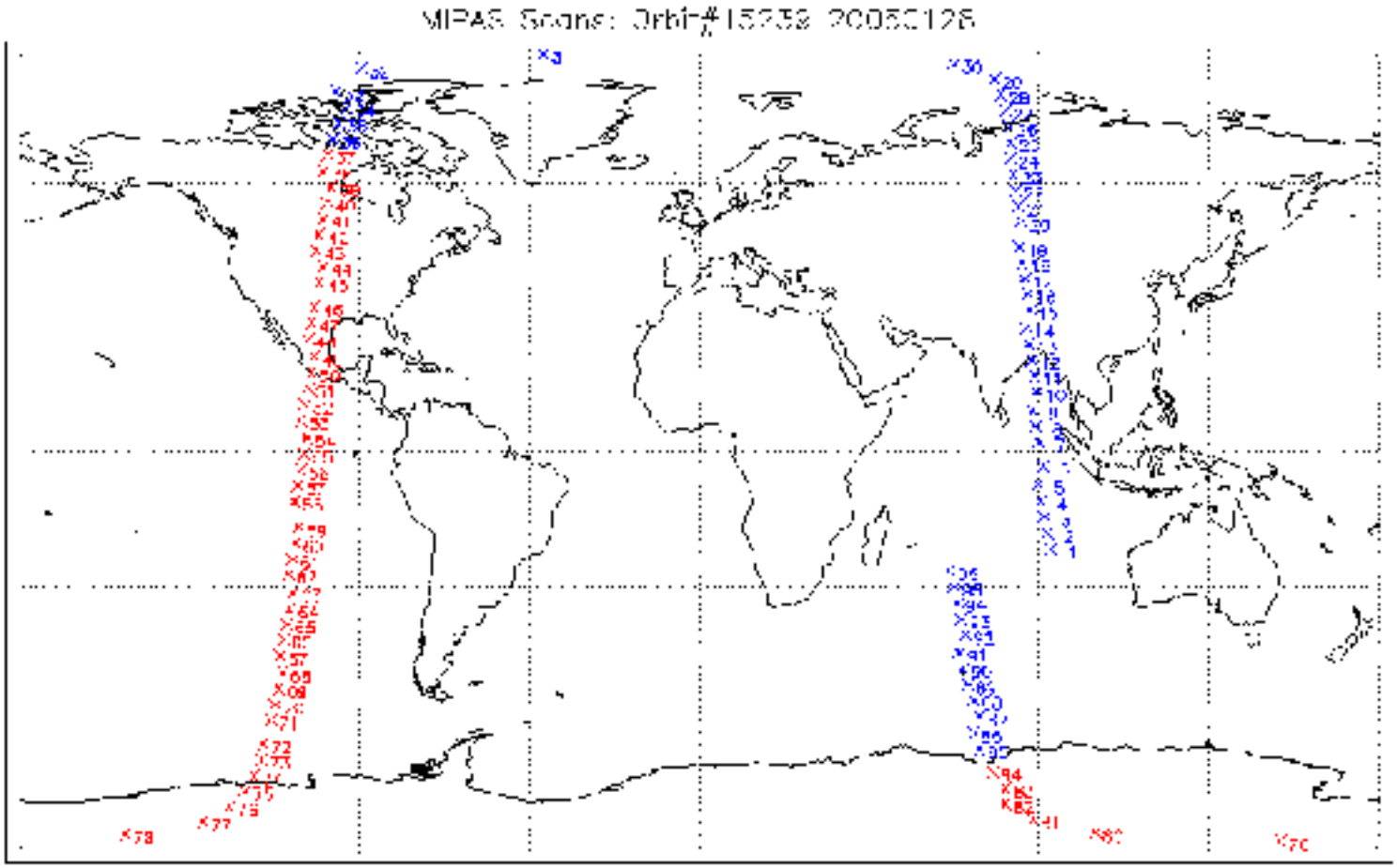
Orbit 15238 NOM

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



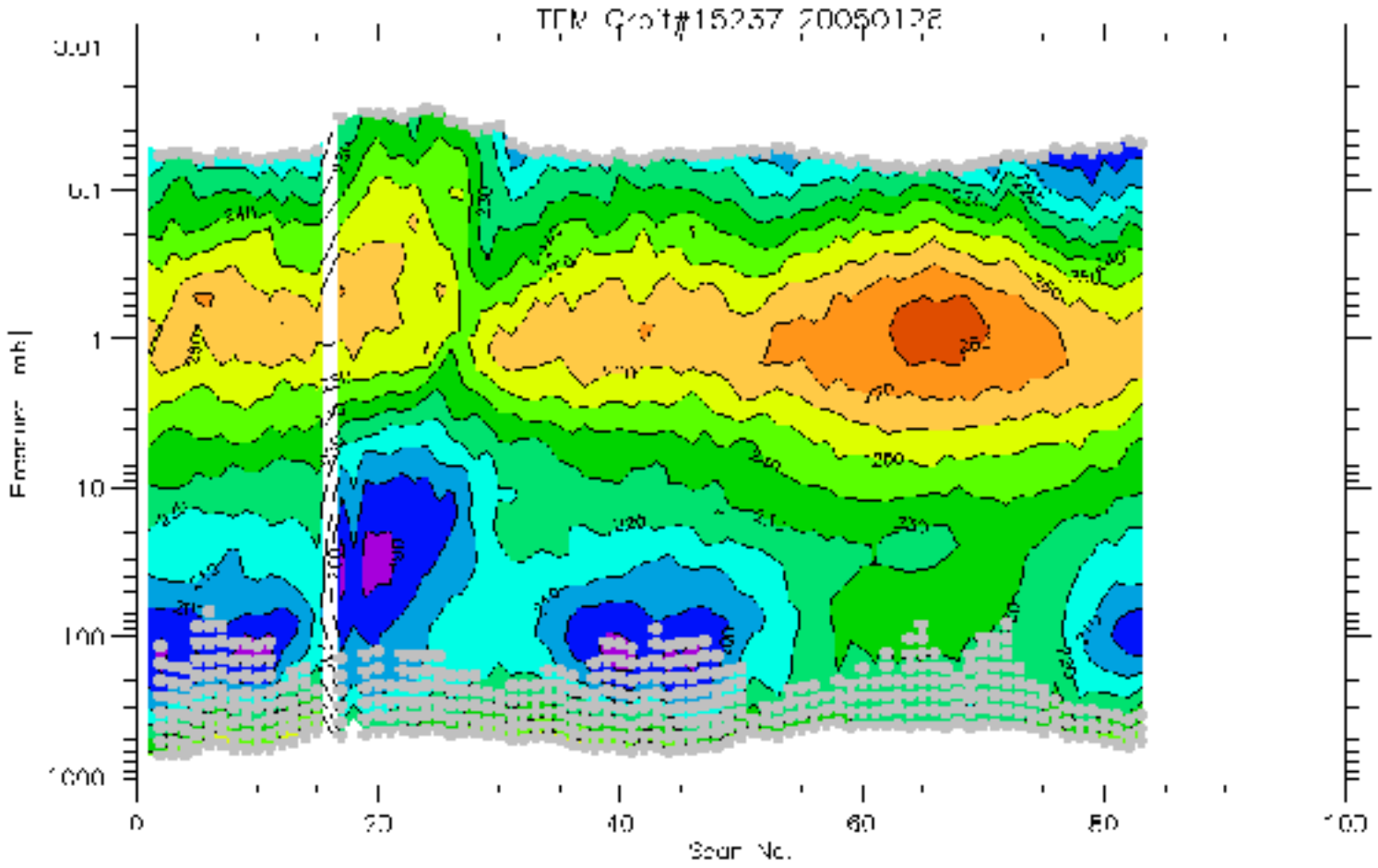
Orbit 15239 NOM

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



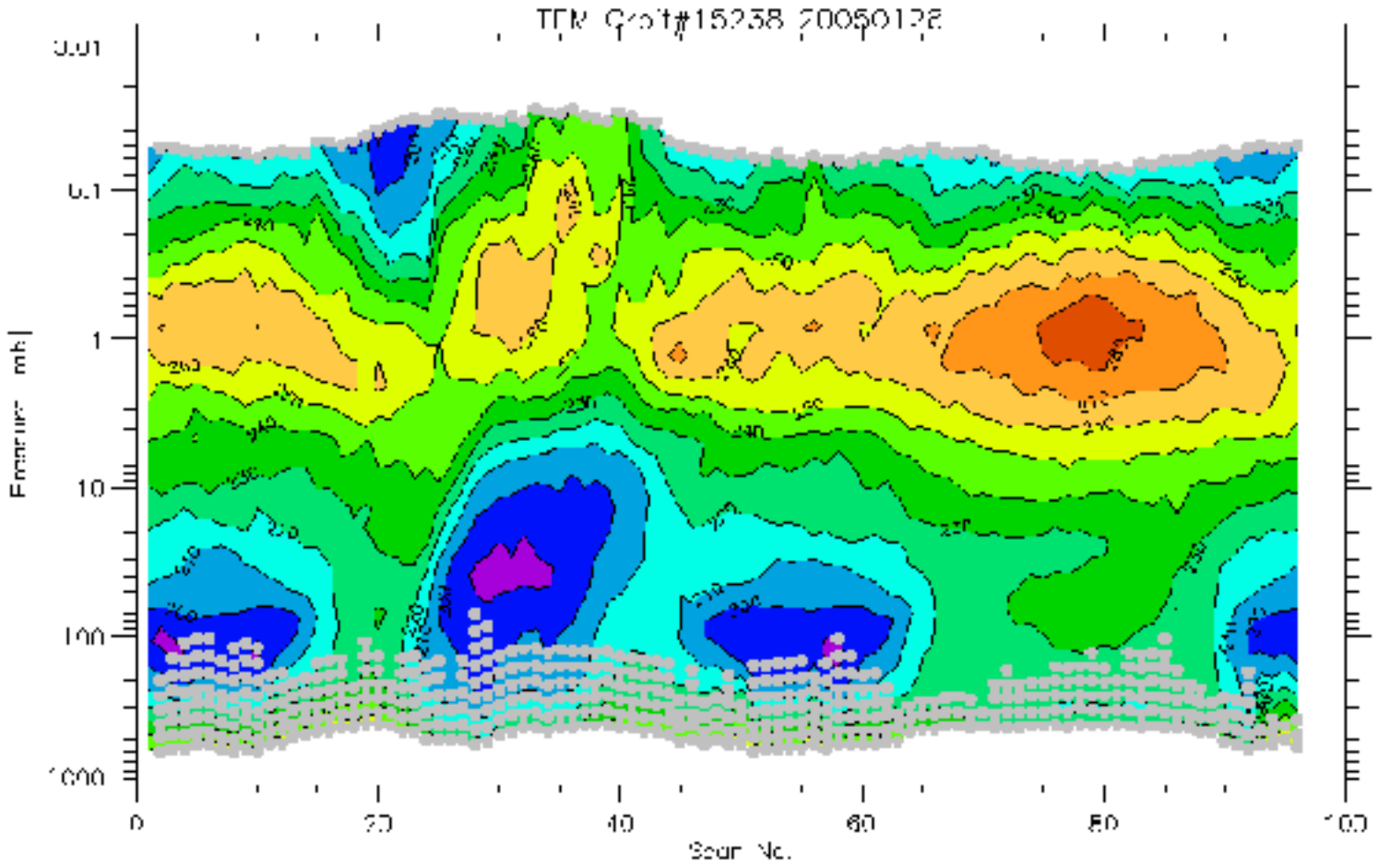
Orbit 15237 TEM

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



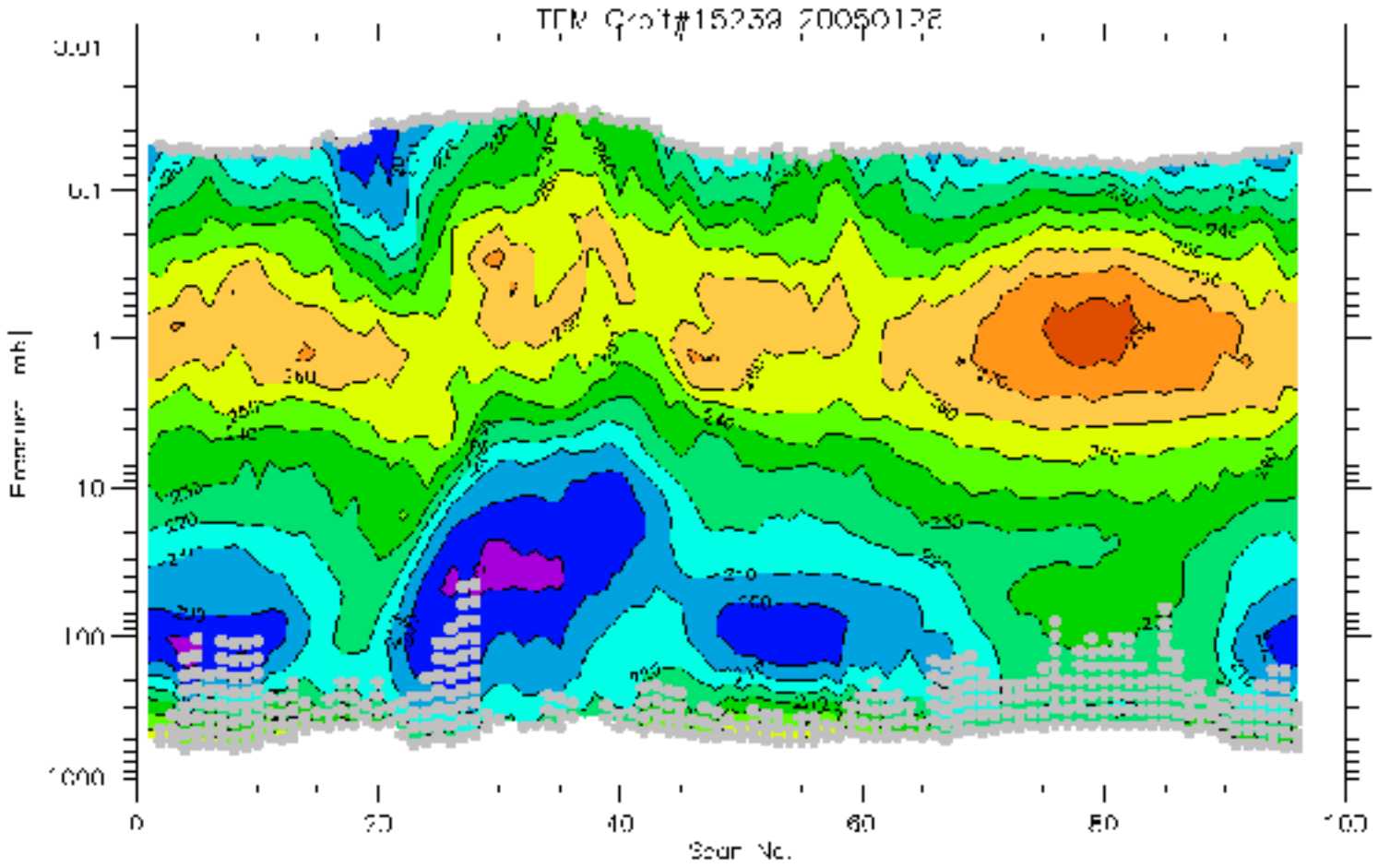
Orbit 15238 TEM

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



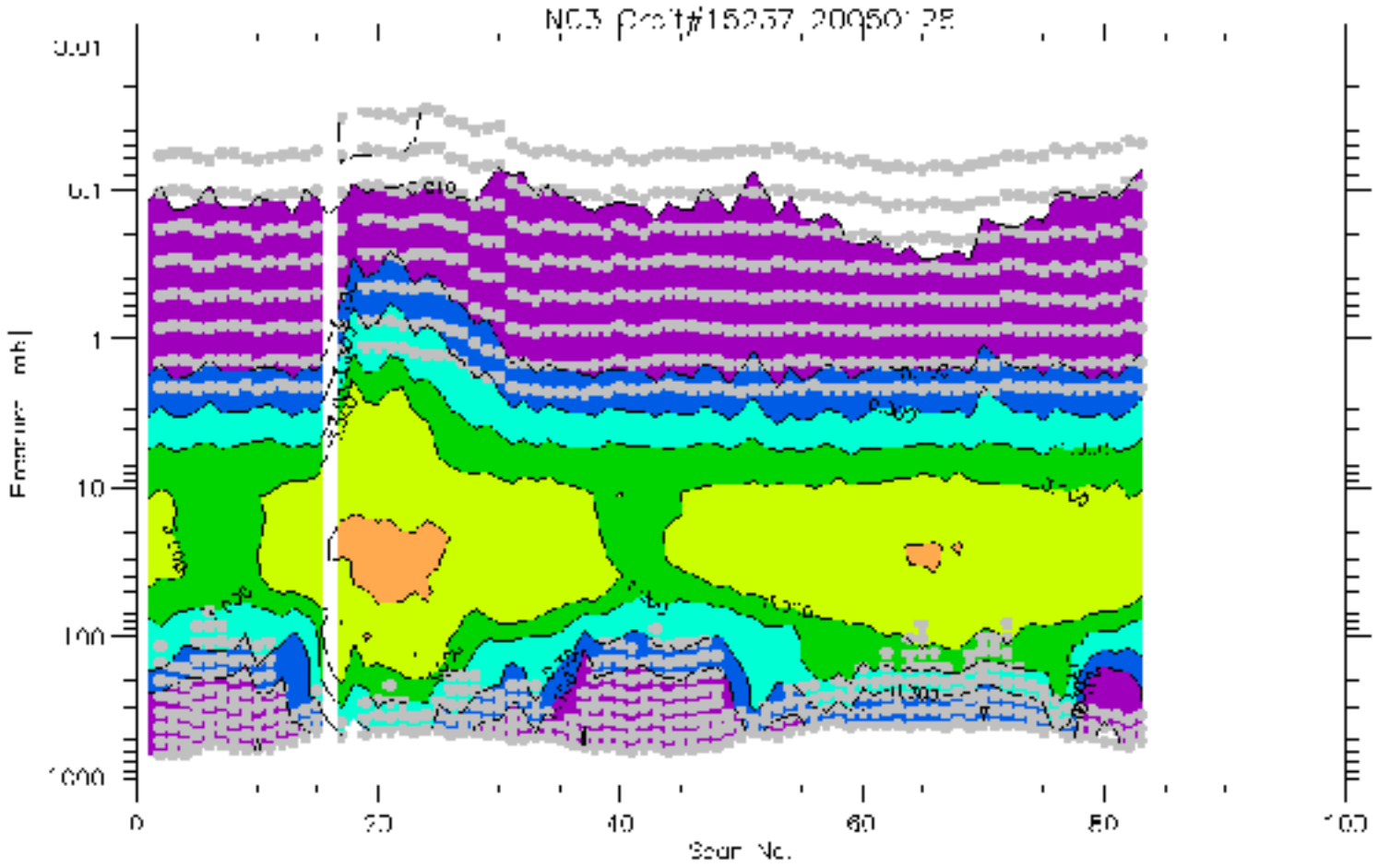
Orbit 15239 TEM

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



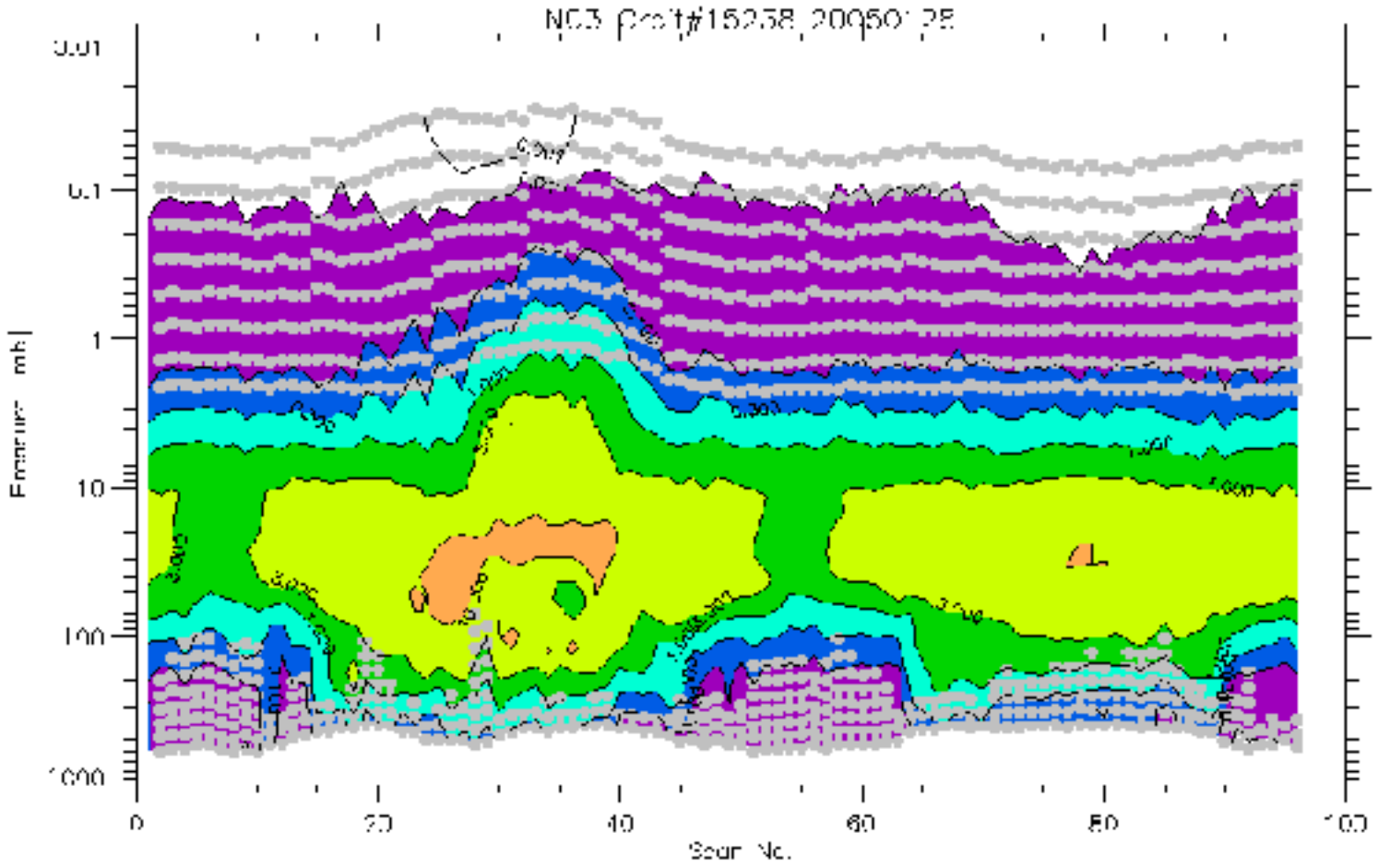
Orbit 15237 HNO3

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



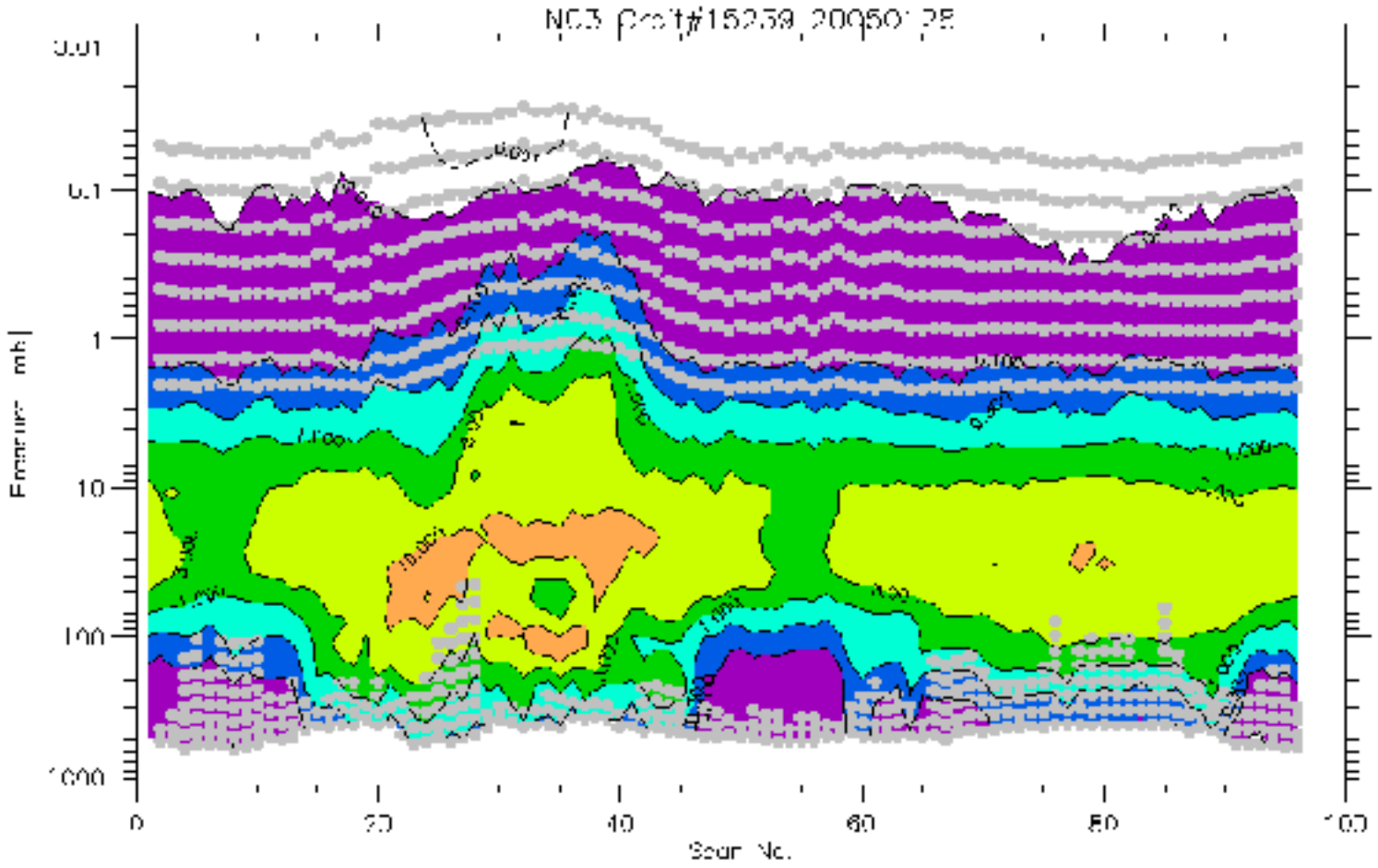
Orbit 15238 HNO3

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



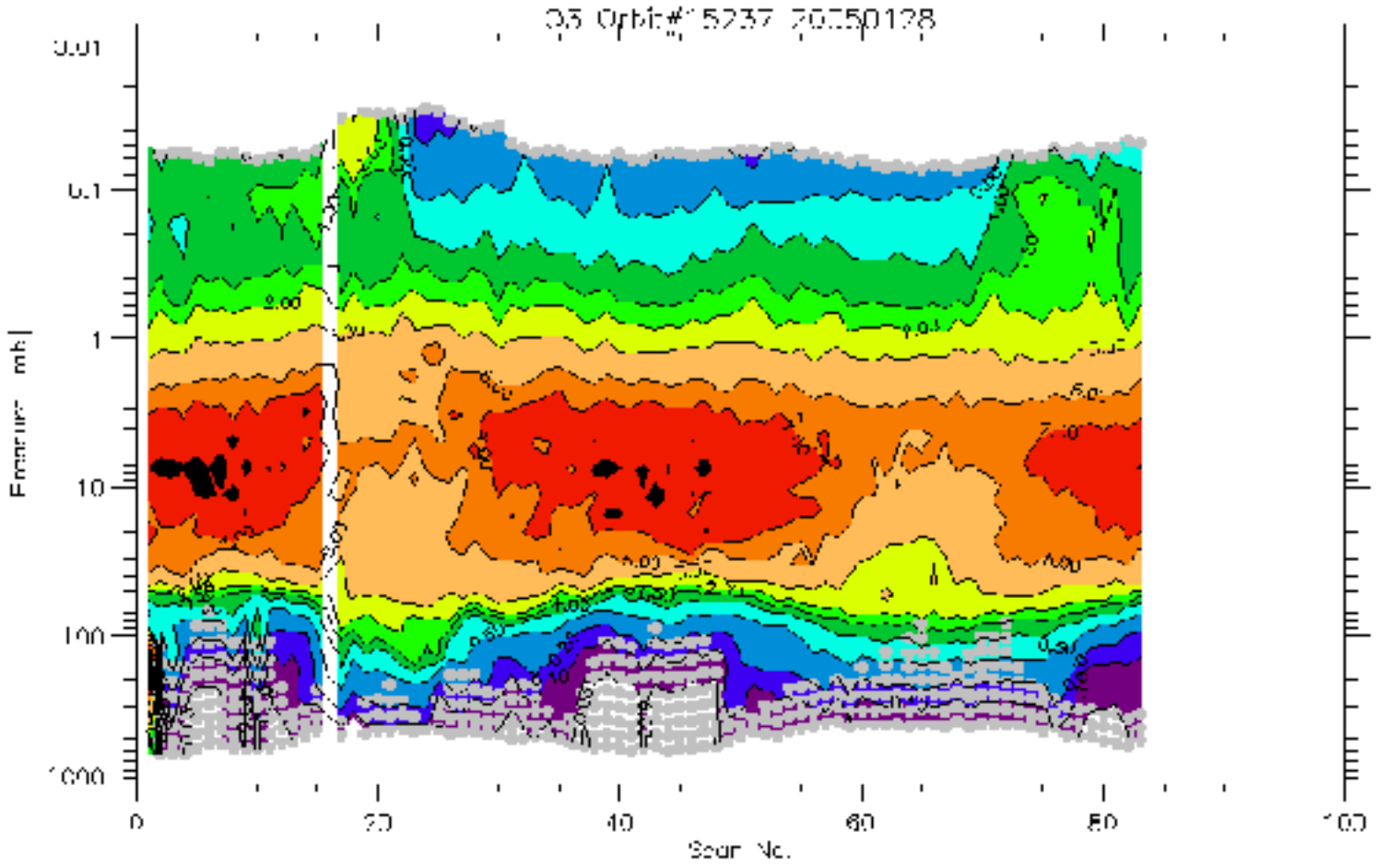
Orbit 15239 HNO3

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



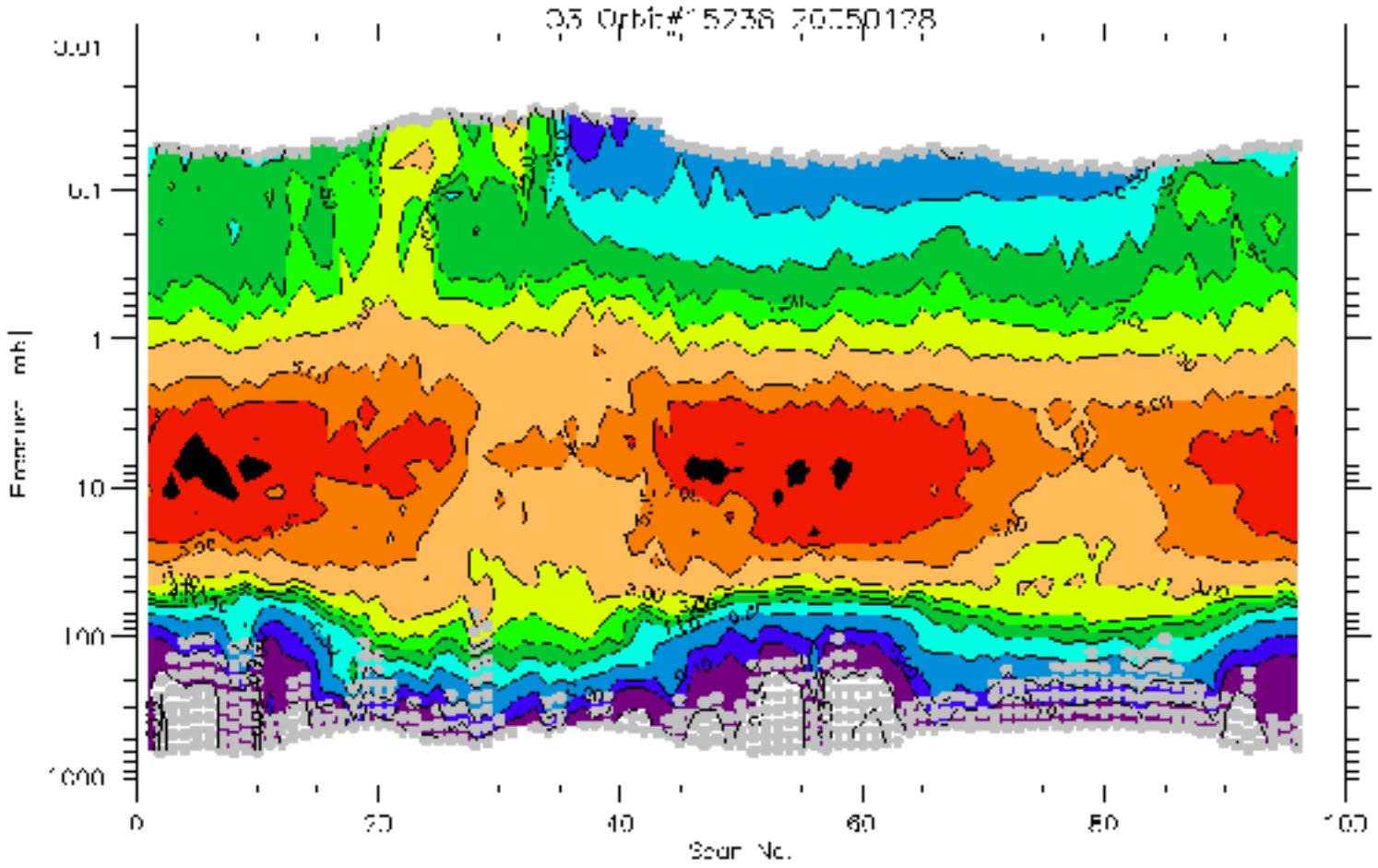
Orbit 15237 O3

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



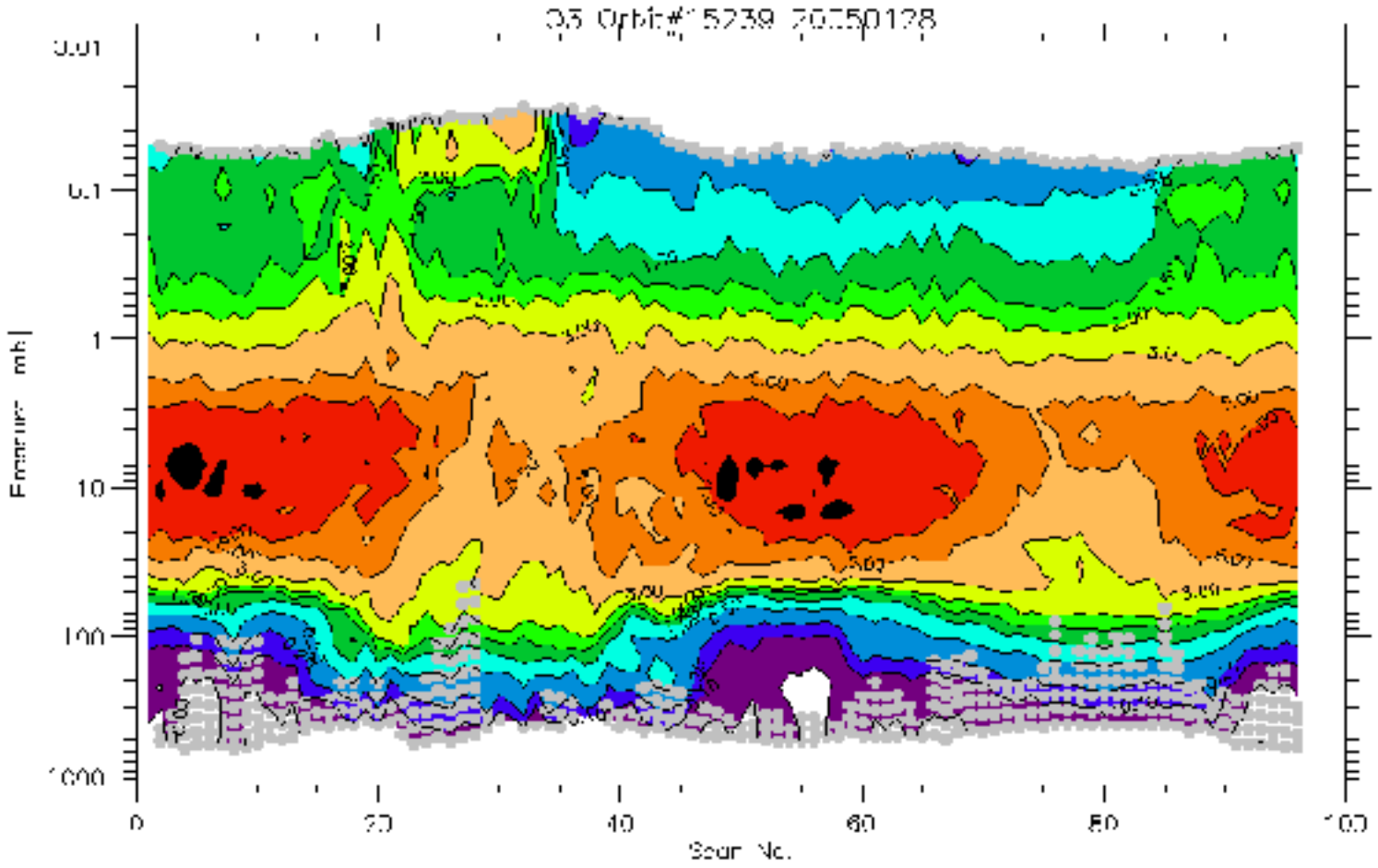
Orbit 15238 O3

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



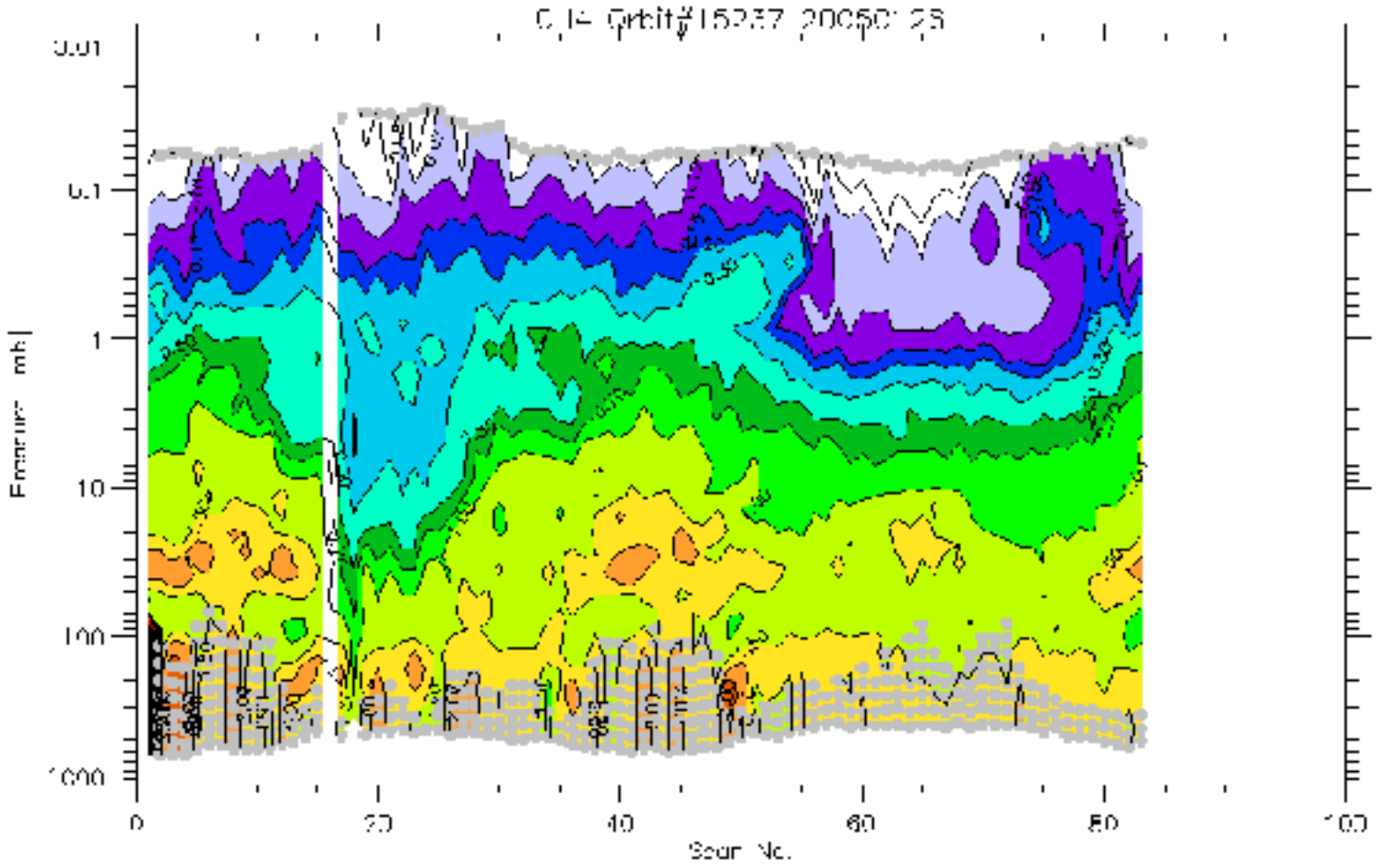
Orbit 15239 O3

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



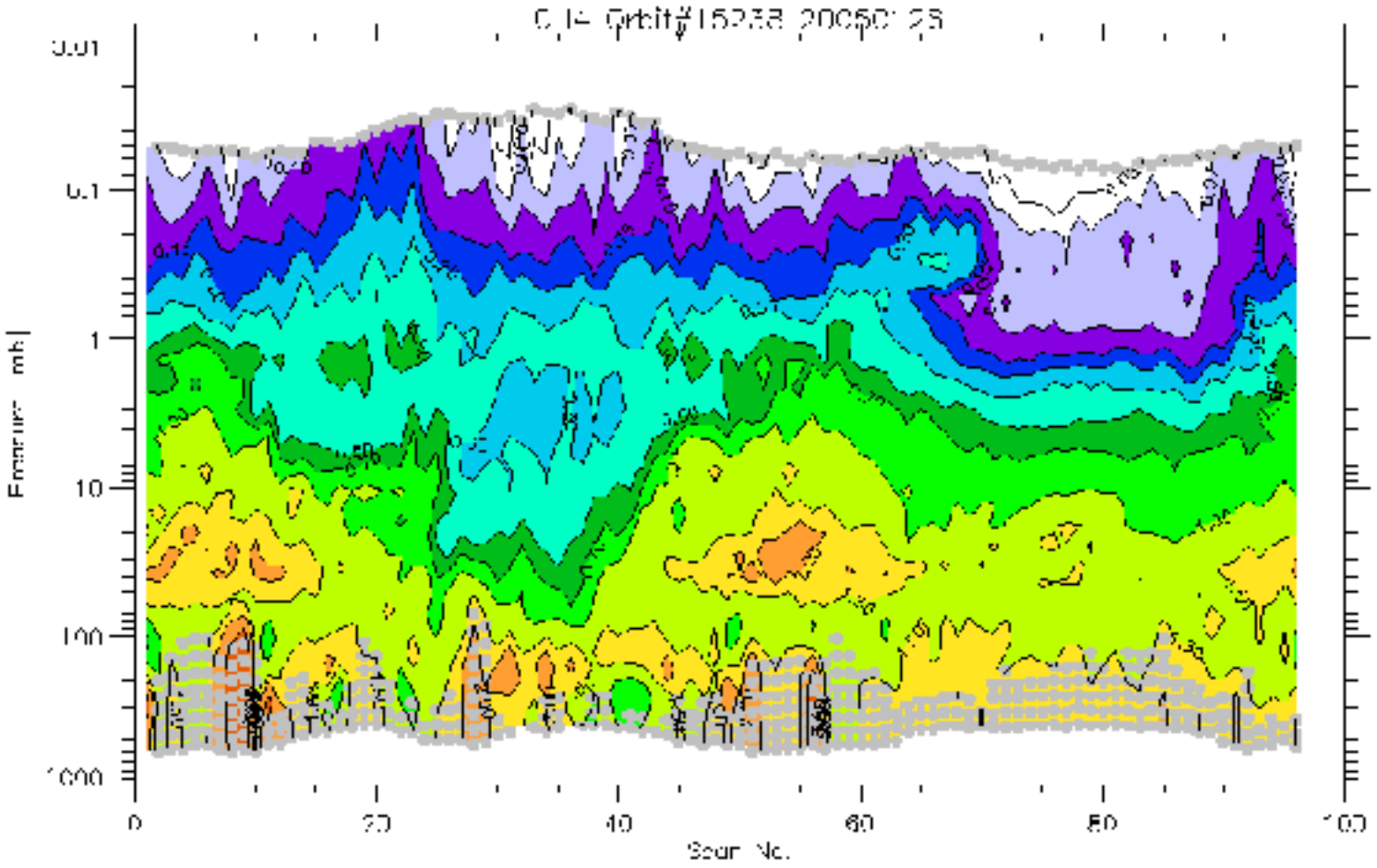
Orbit 15237 CH4

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



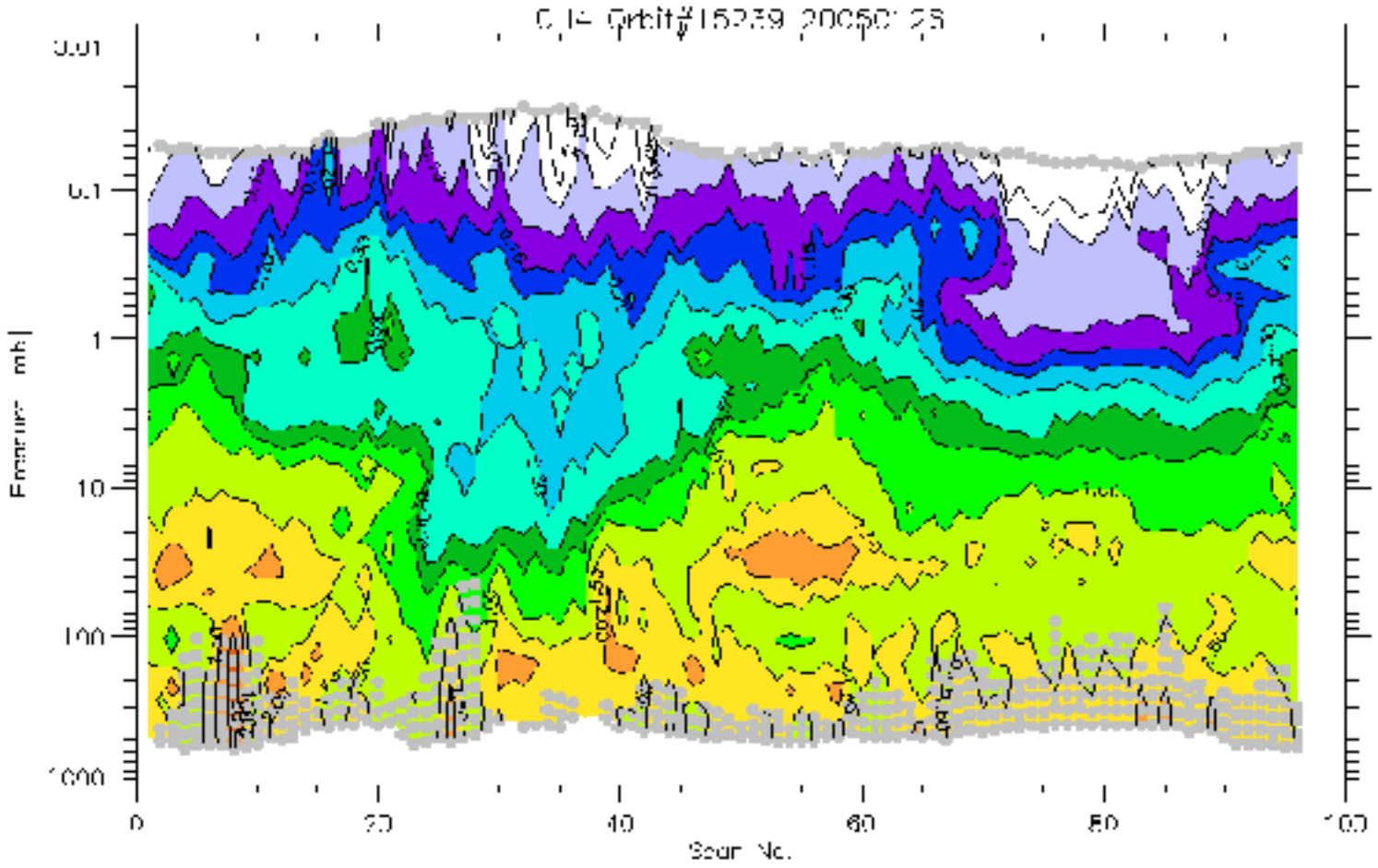
Orbit 15238 CH4

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



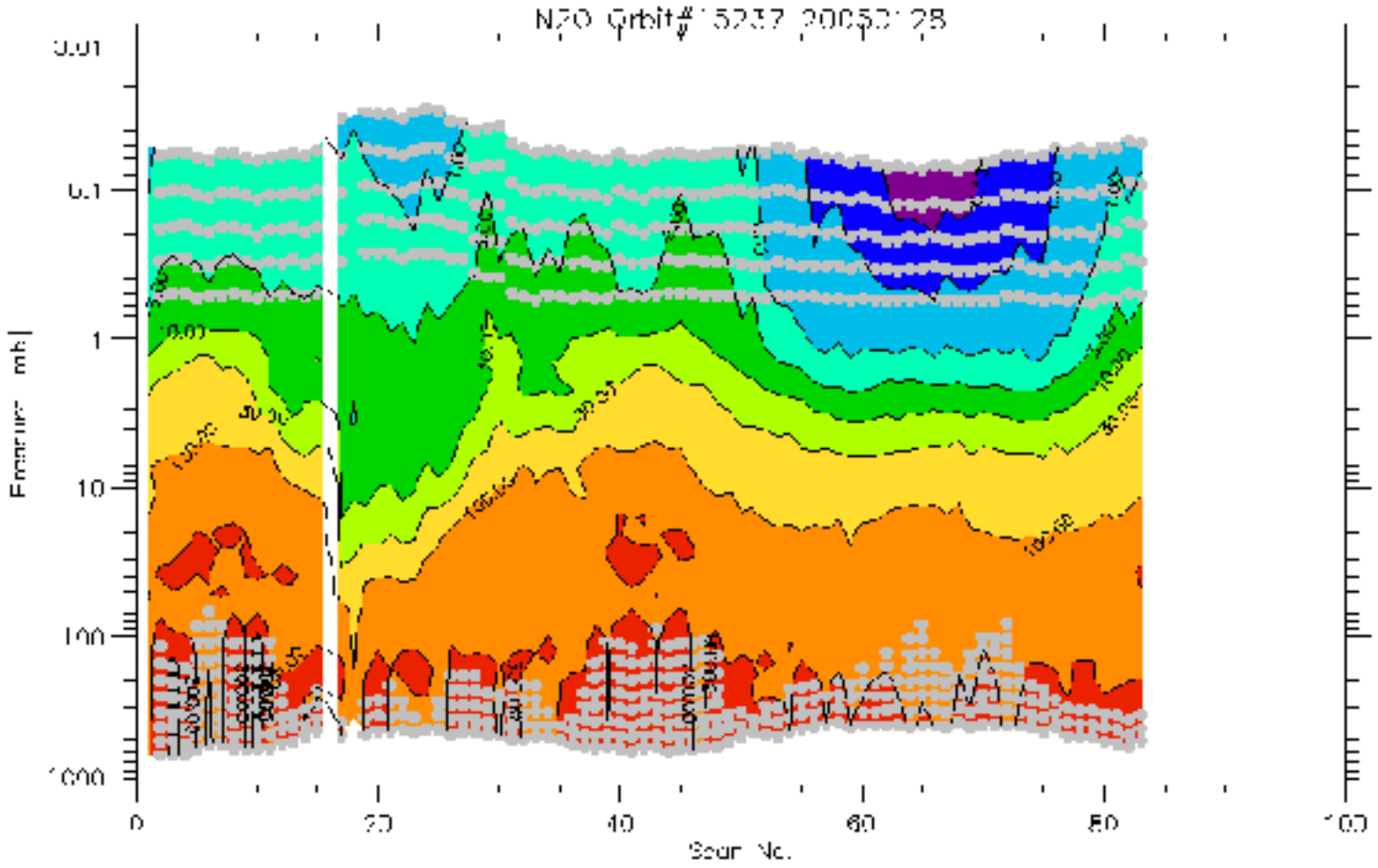
Orbit 15239 CH4

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



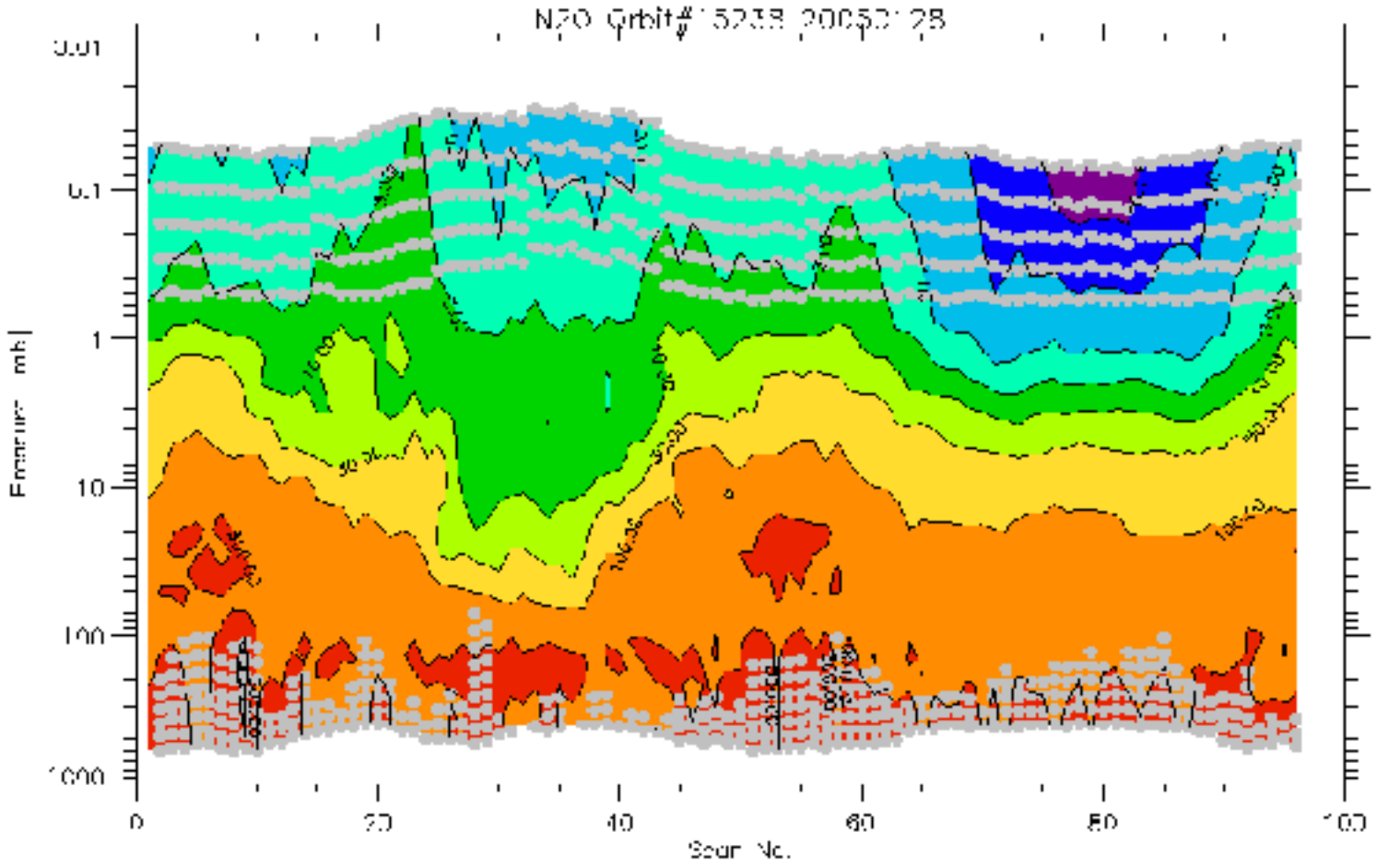
Orbit 15237 N2O

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



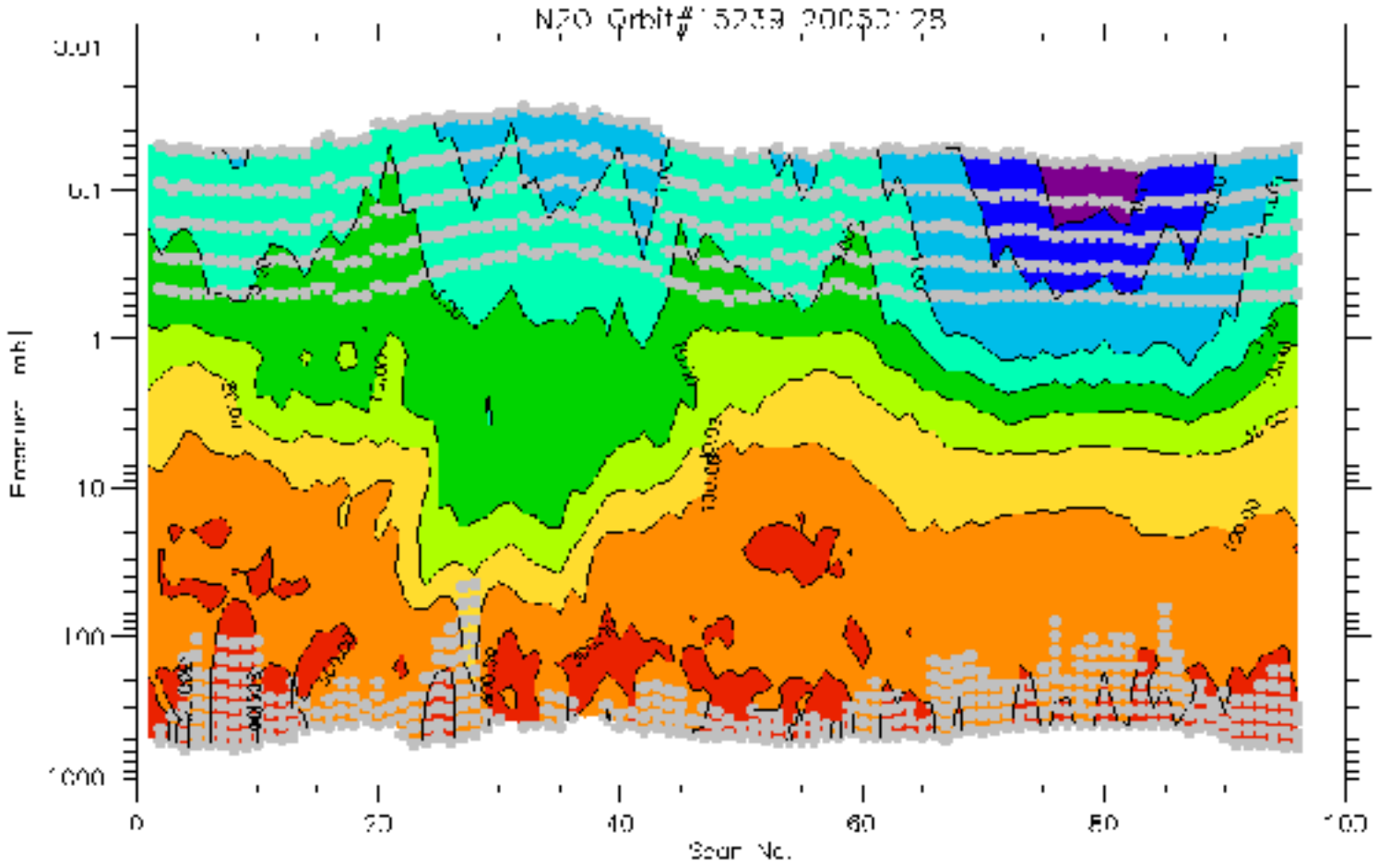
Orbit 15238 N2O

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



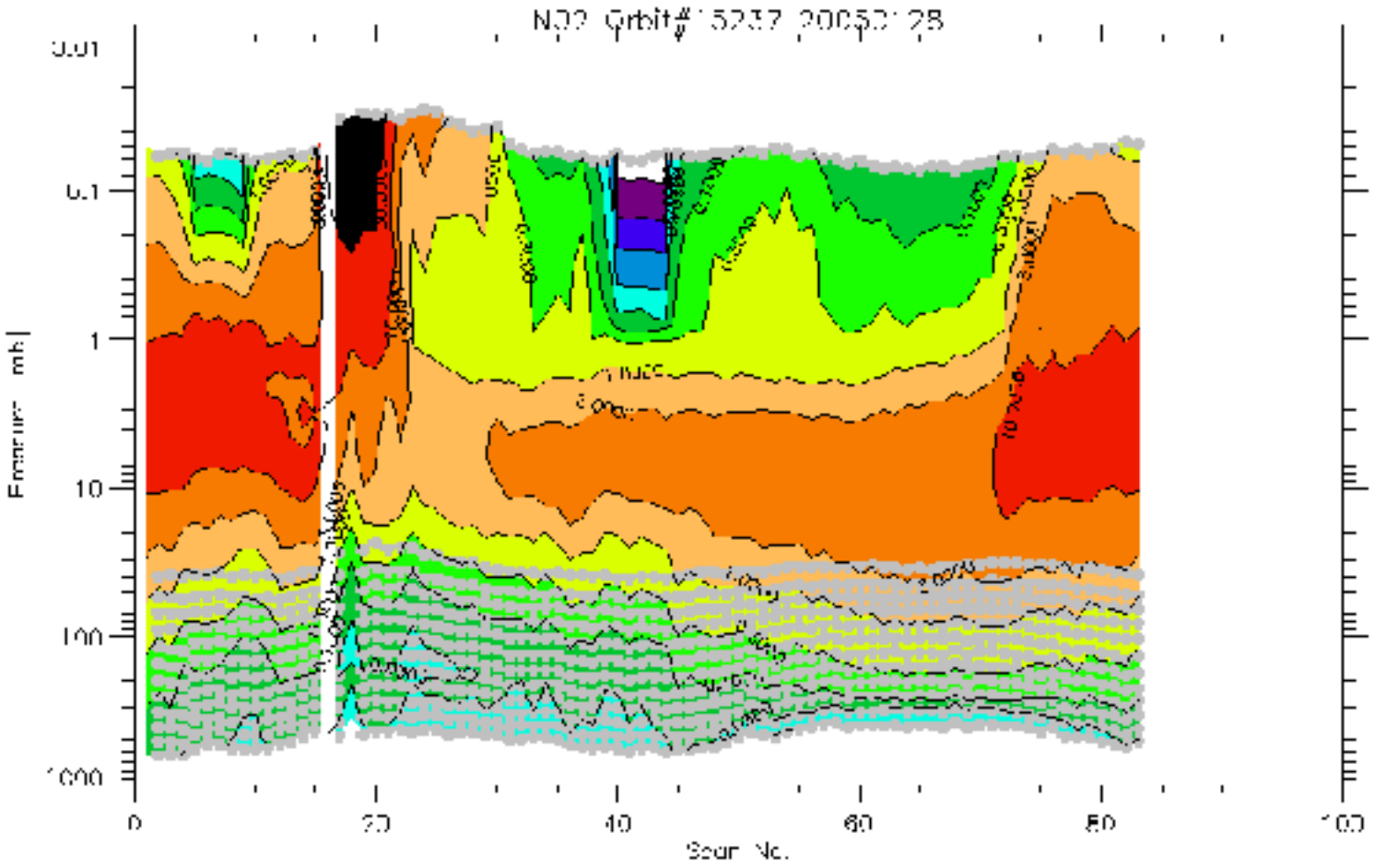
Orbit 15239 N2O

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



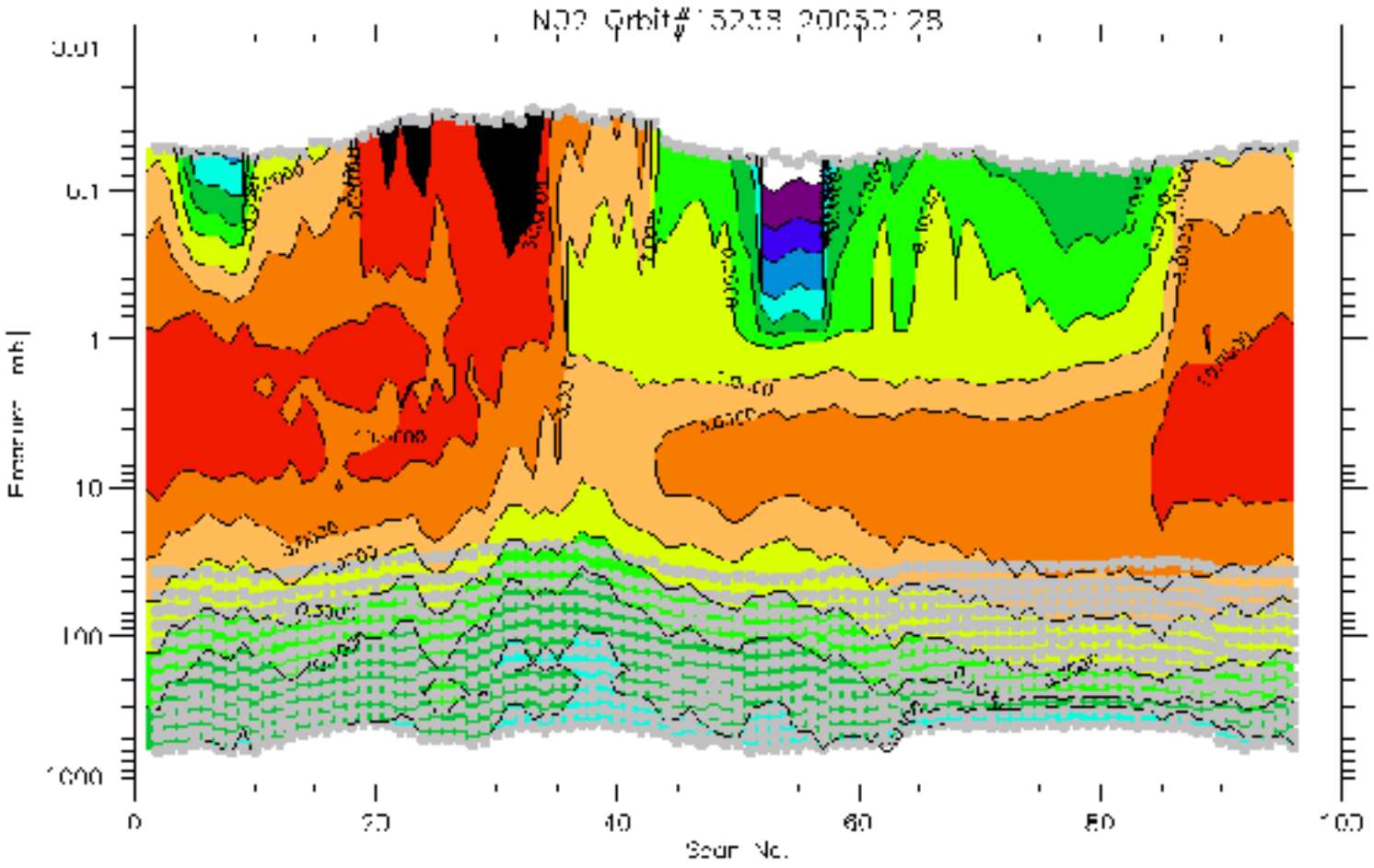
Orbit 15237 NO2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



Orbit 15238 NO2

Atmospheric, Oceanic
& Planetary Physics,
University of Oxford



Orbit 15239 NO2

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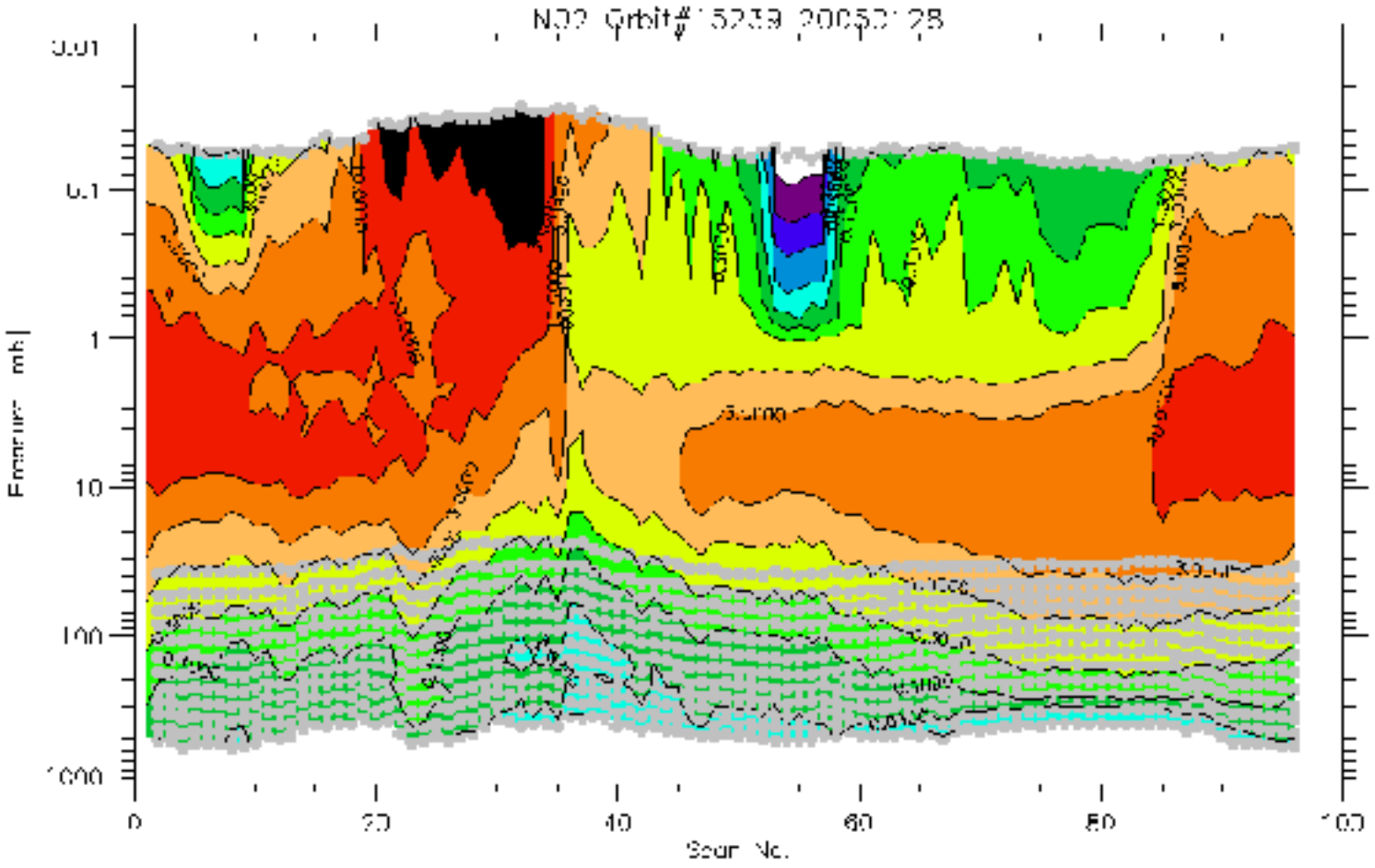

Orbit 15237 H2O

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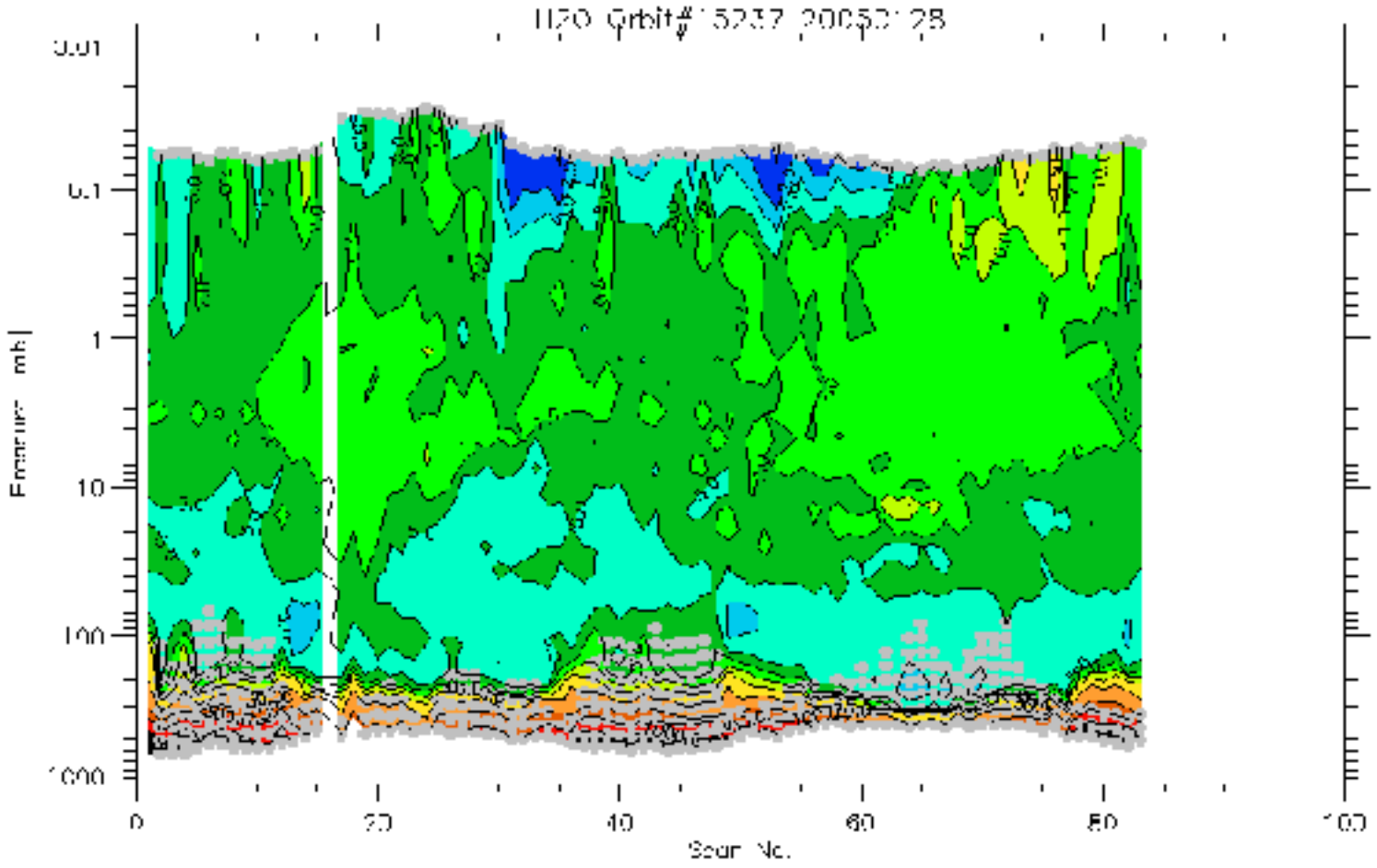
& Planetary Physics,
University of Oxford



Orbit 15238 H2O

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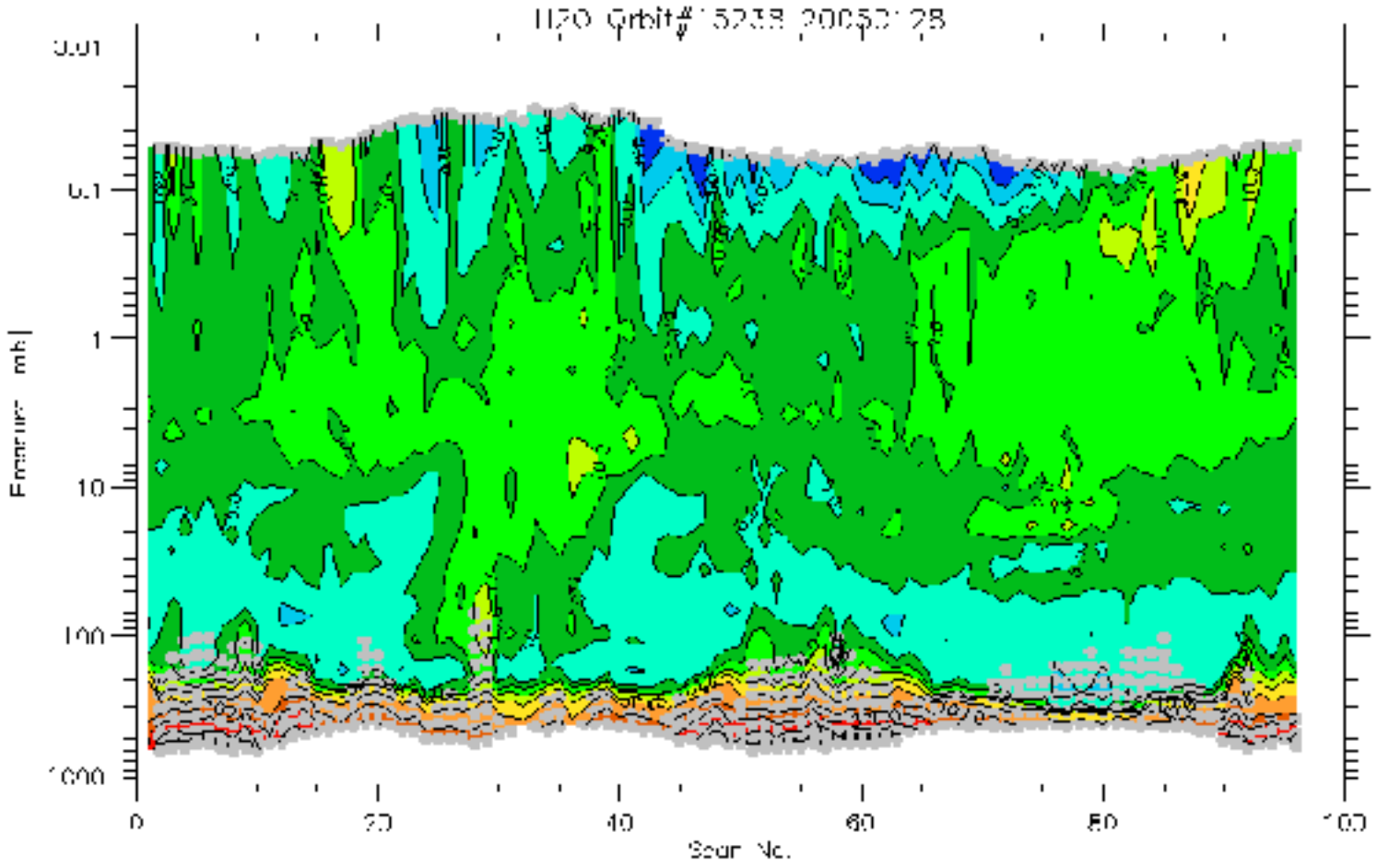
University of Oxford



Orbit 15239 H2O

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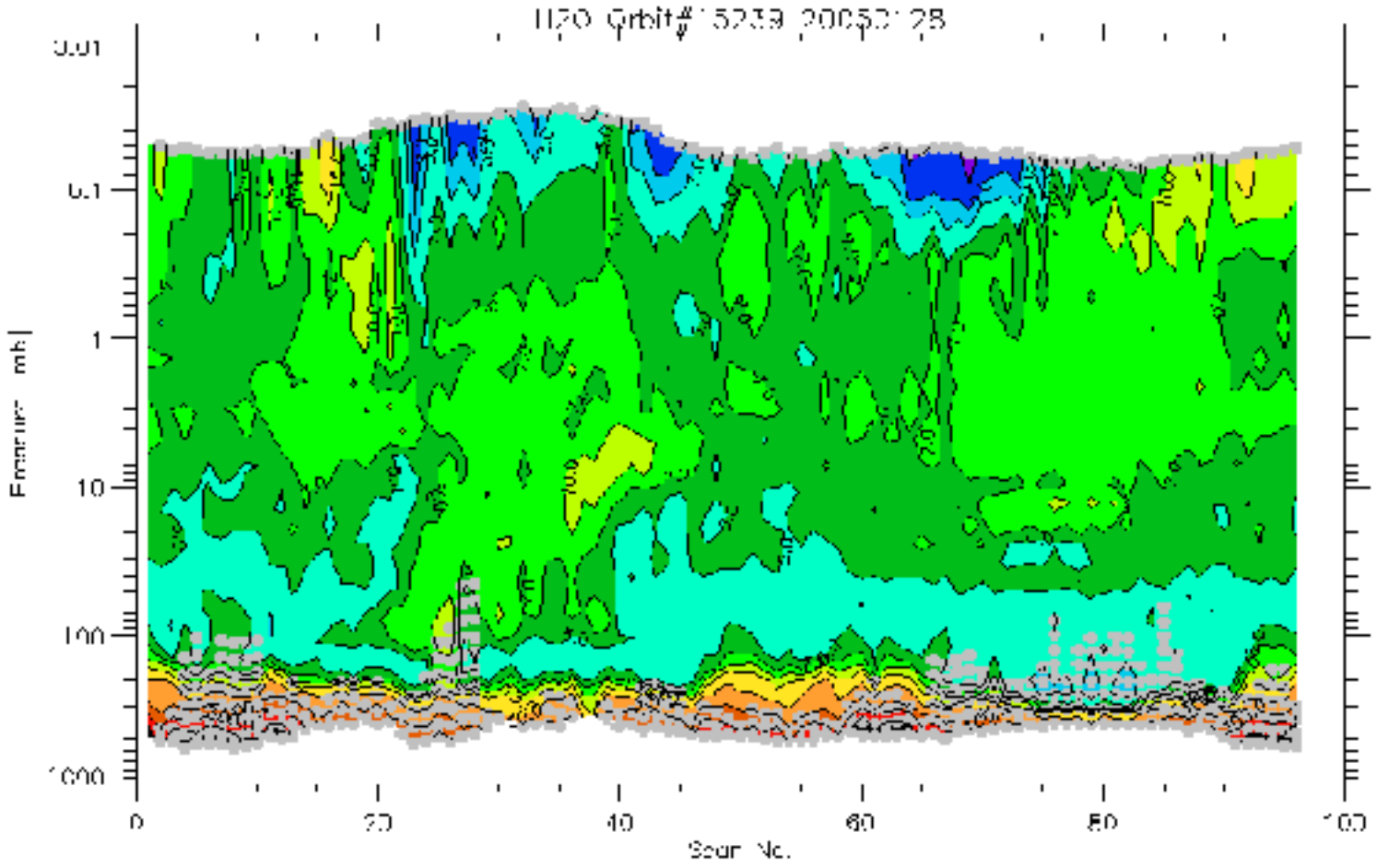
University of Oxford



Summary

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"Reprocessed (ie correctly calibrated) data from January 2005 a definite improvement on first version

"Data quality looks uniform for bands A-C (D not checked) - no obvious scan/sweep dependent anomalies

"A few remaining problems, eg maxima in CH4 and N2O, but may be due to retrieval/microwindow problems