HIT08 vs HIT16 N2O retrieval

and ATM18 (Geoff) is tested now too

1. changes to the target species
==> No

2. changes to interfering species, in particular water vapor / WV isotopes.
==> No

3. changes to a fit
==> No

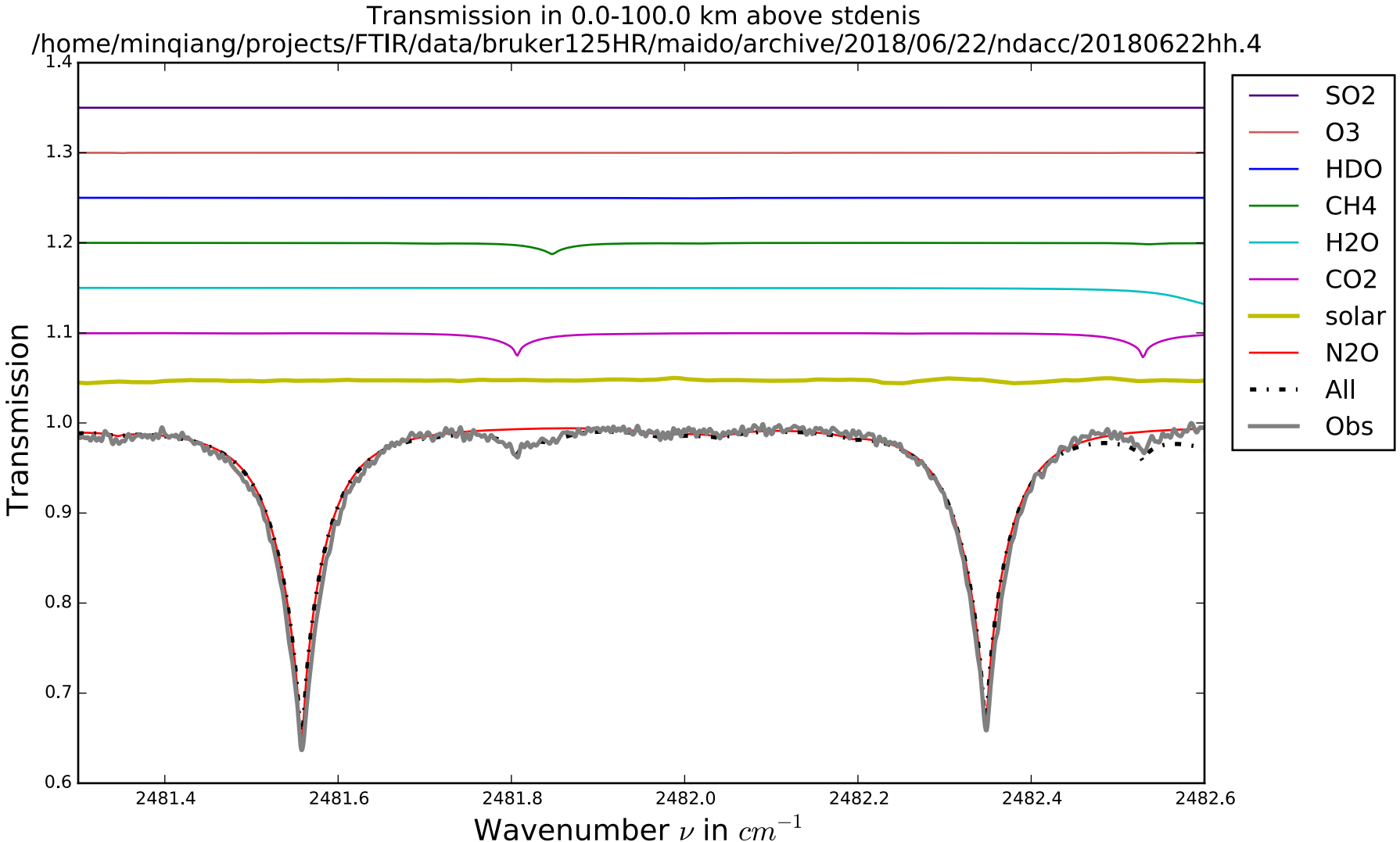
4. changes to column or profile
==> No

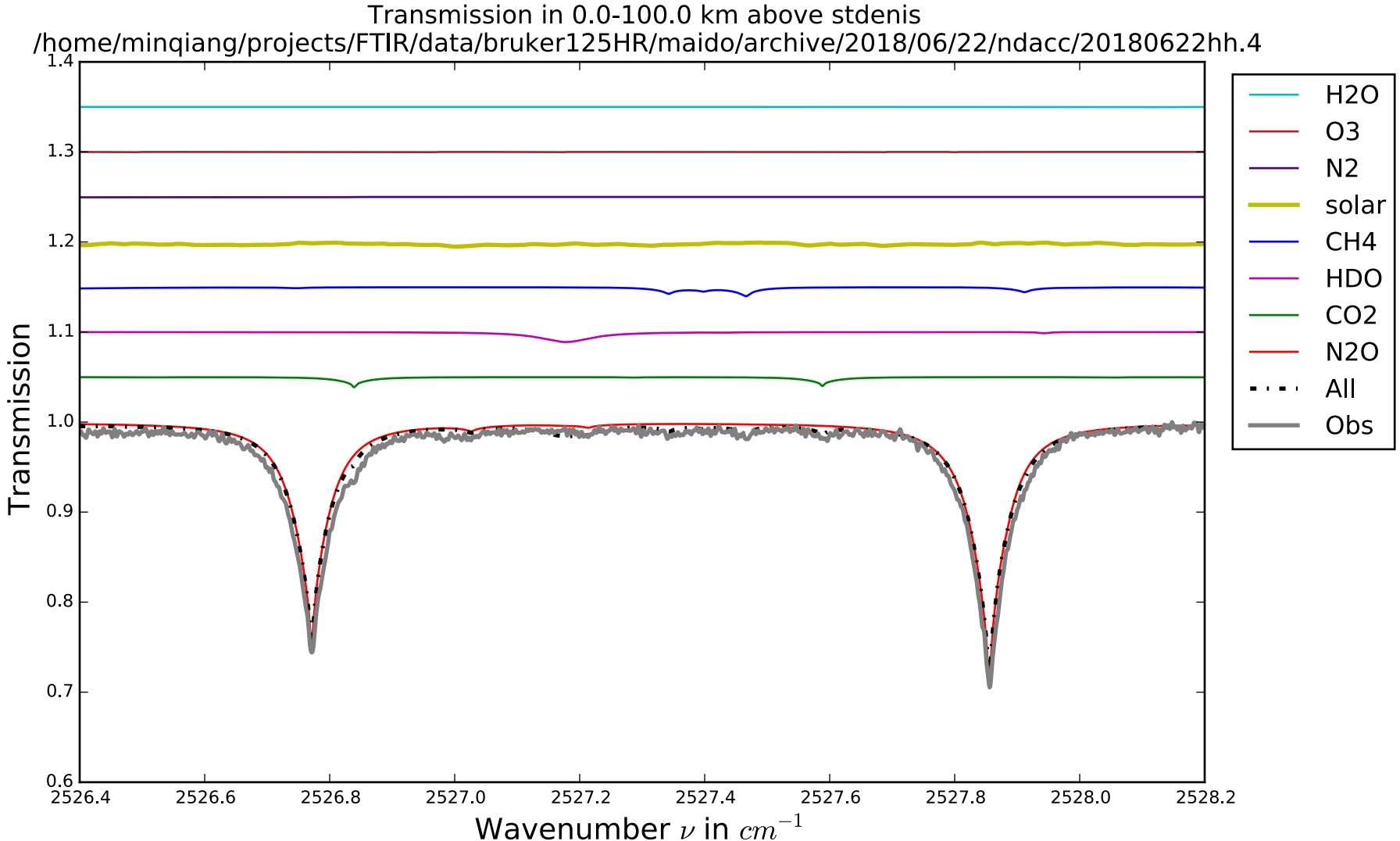
5. recommendations e.g. would new lines in these microwindows precipitate a change in Sa?
=> Add the interfering species in the first 3 windows, column retrievals for interfering species are enough
<suggestion: keep the DOFS of N2O in the range of 2.5 - 3.5>

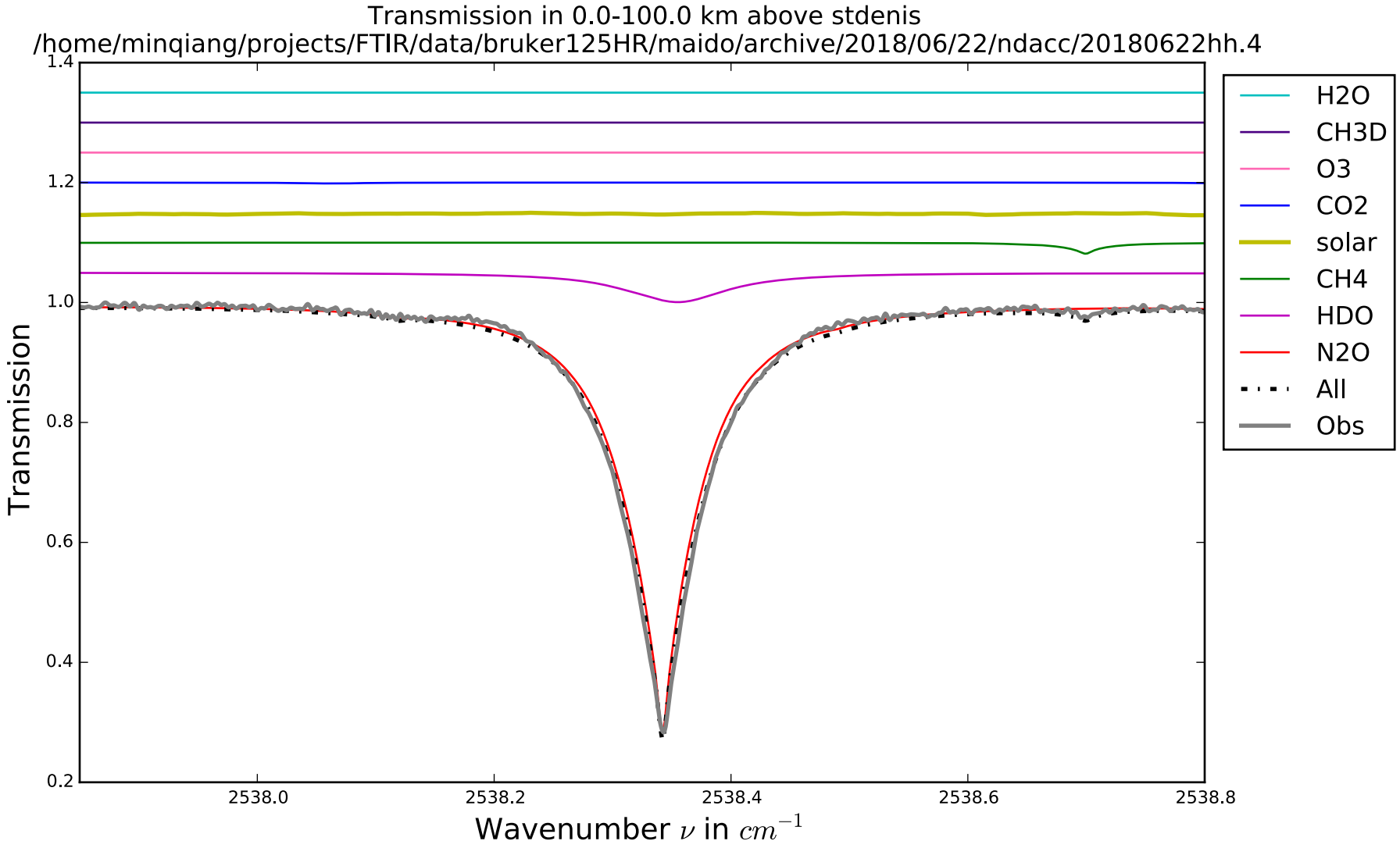
IRWG_Uniform_RP_summary

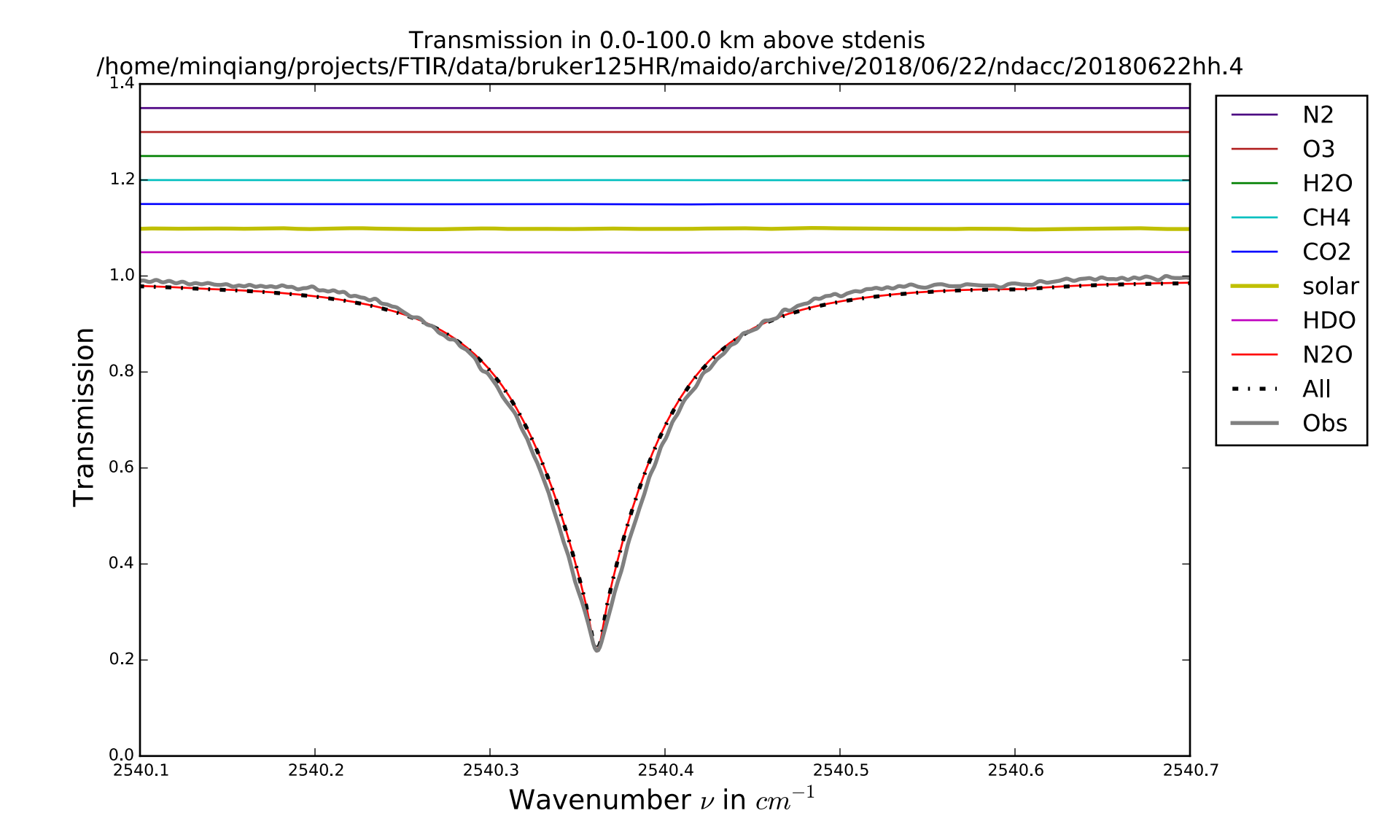
Gas	Required μ-w(s) [cm^{-1}]	Optional μw	OPD [cm]	Interfering species to be fit (pre- or simul-)	a Priori Linelist	Column or Profile	Note
O3	1000.0-1005.0	782.56-782.86 788.85-789.37 993.30-993.80	250	H2O, CO2, CH4, O668, O686	WACCMV5 HIT08	P	a,e
HCl	2727.73-2727.83 2775.70-2775.80 2925.80-2926.00		>180	O3, HDO N2O, O3 O3, CH4, NO2	WACCMV5 HIT08	P	
HF	4038.81 4039.07	4000.86-4001.10 4109.77-4110.07	>180	H2O, HDO, CH4 H2O, O3 H2O, HDO, CH4	WACCMV6 HIT08	P	c
ClONO2	780.10-780.35	780.0-781.3 779.0-780.0	>50	H2O CO2, O3 H2O	WACCMV5 HIT-XC/PL	C	d,g
HNO3	867.05-870.00	872.25-874.00			WACCMV5 HIT08	P	
N2O	2481.30-2482.60 2526.40-2528.20 2537.85-2538.80 2540.10-2540.70		250	CO2 CH4 H2O CO2 CH4 HDO HDO CH4 —	WACCMV5 HIT08	P	

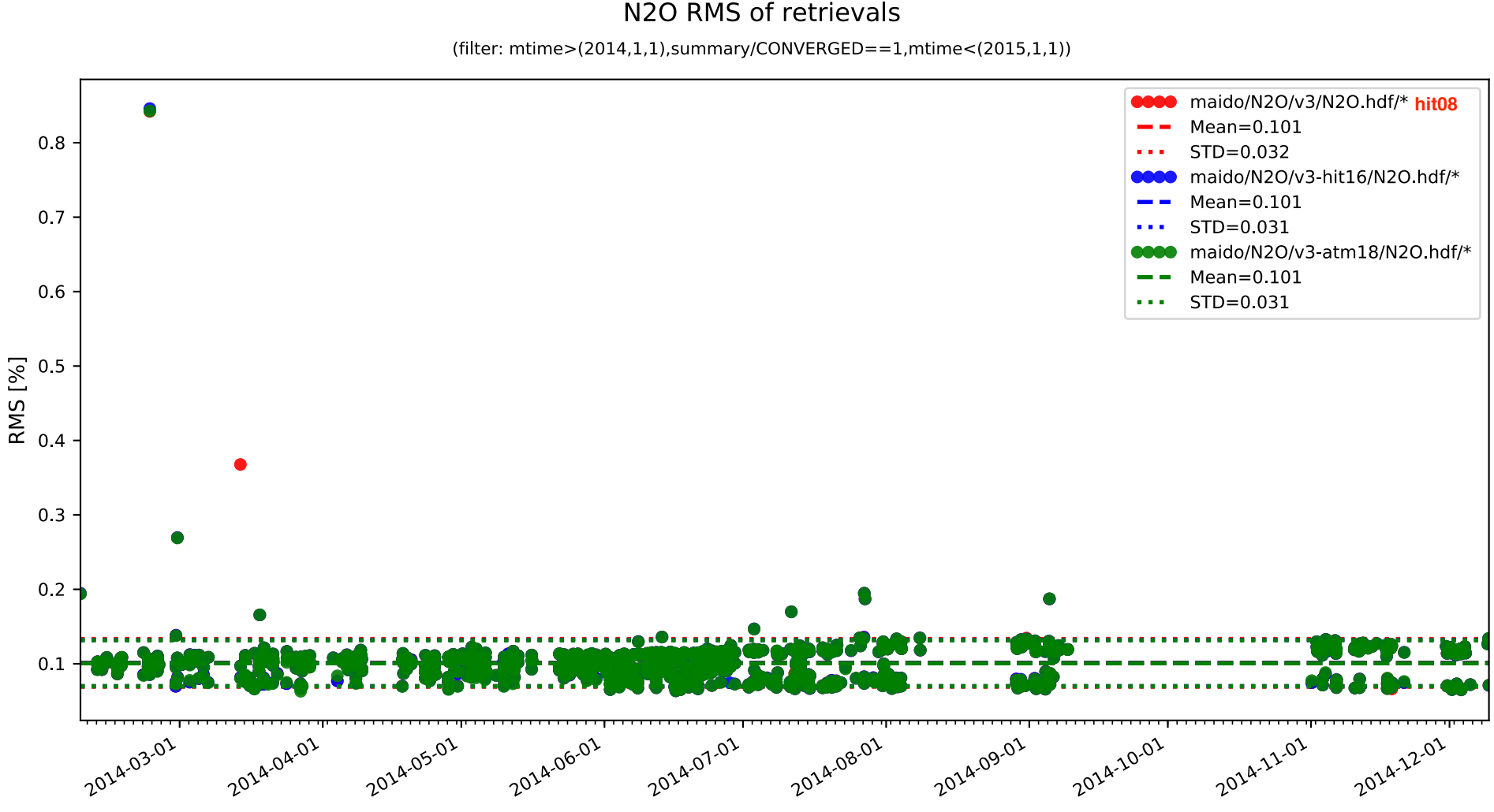
HDO is important

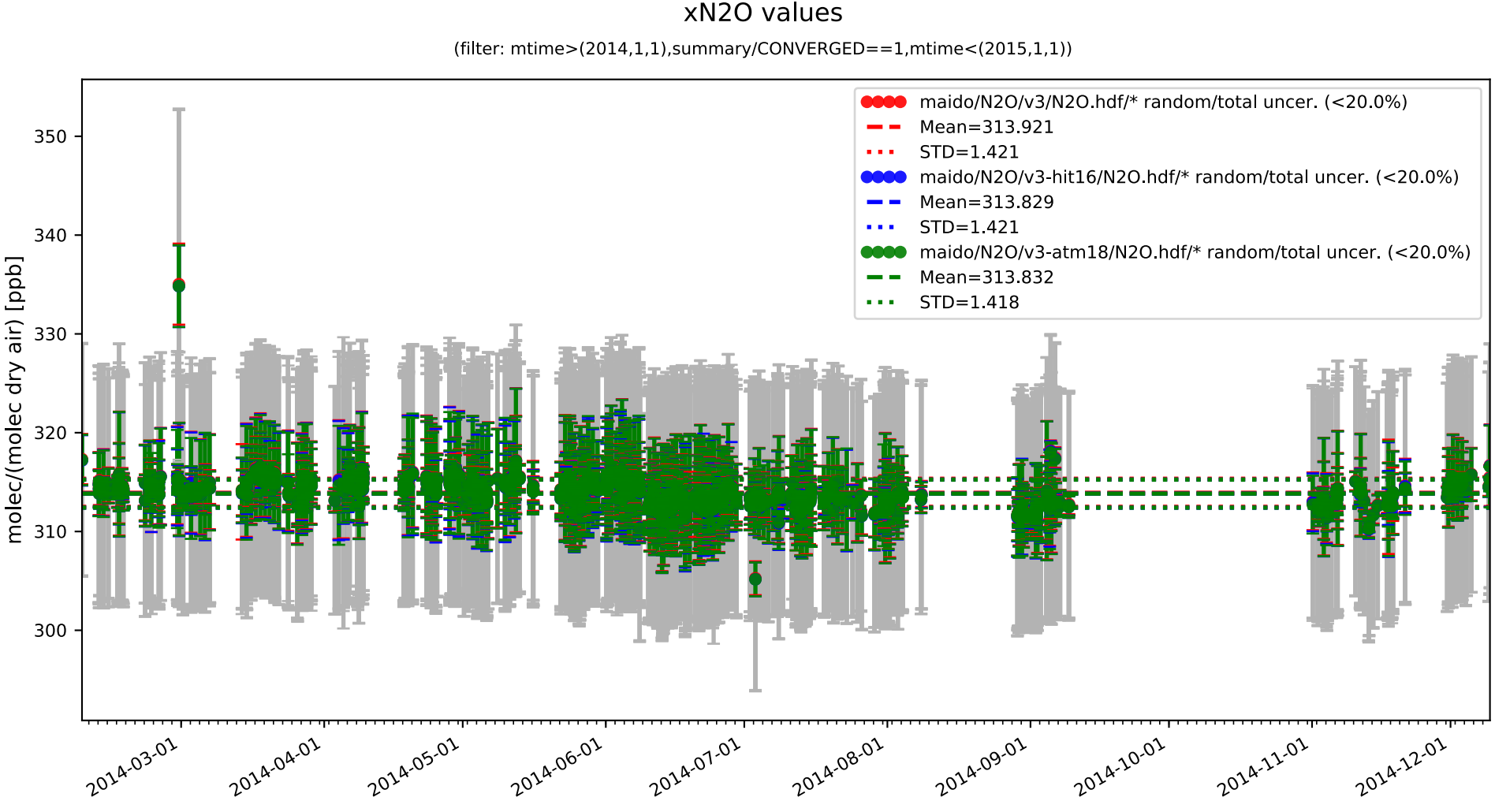

Transmission in 0.0-100.0 km above stdenis
/home/minqiang/projects/FTIR/data/bruker125HR/maido/archive/2018/06/22/ndacc/20180622hh.4
Transmission
Wavenumber ν in cm^{-1}
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
2481.4
2481.6
2481.8
2482.0
2482.2
2482.4
2482.6
SO2
O3
HDO
CH4
H2O
CO2
solar
N2O
All
Obs

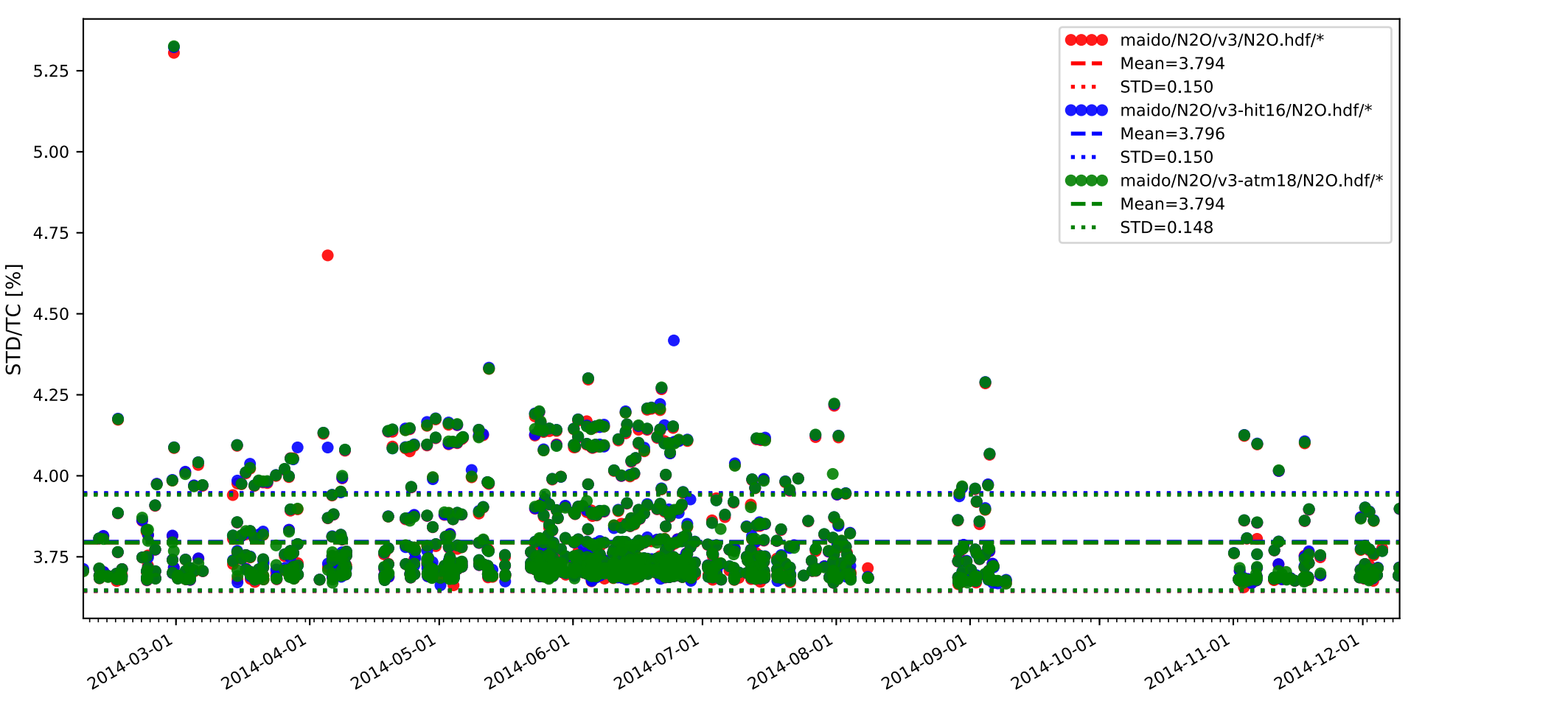

Transmission in 0.0-100.0 km above stdenis
/home/minqiang/projects/FTIR/data/bruker125HR/maido/archive/2018/06/22/ndacc/20180622hh.4
Transmission
Wavenumber ν in cm^{-1}
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
2526.4
2526.6
2526.8
2527.0
2527.2
2527.4
2527.6
2527.8
2528.0
2528.2
H2O
O3
N2
solar
CH4
HDO
CO2
N2O
All
Obs

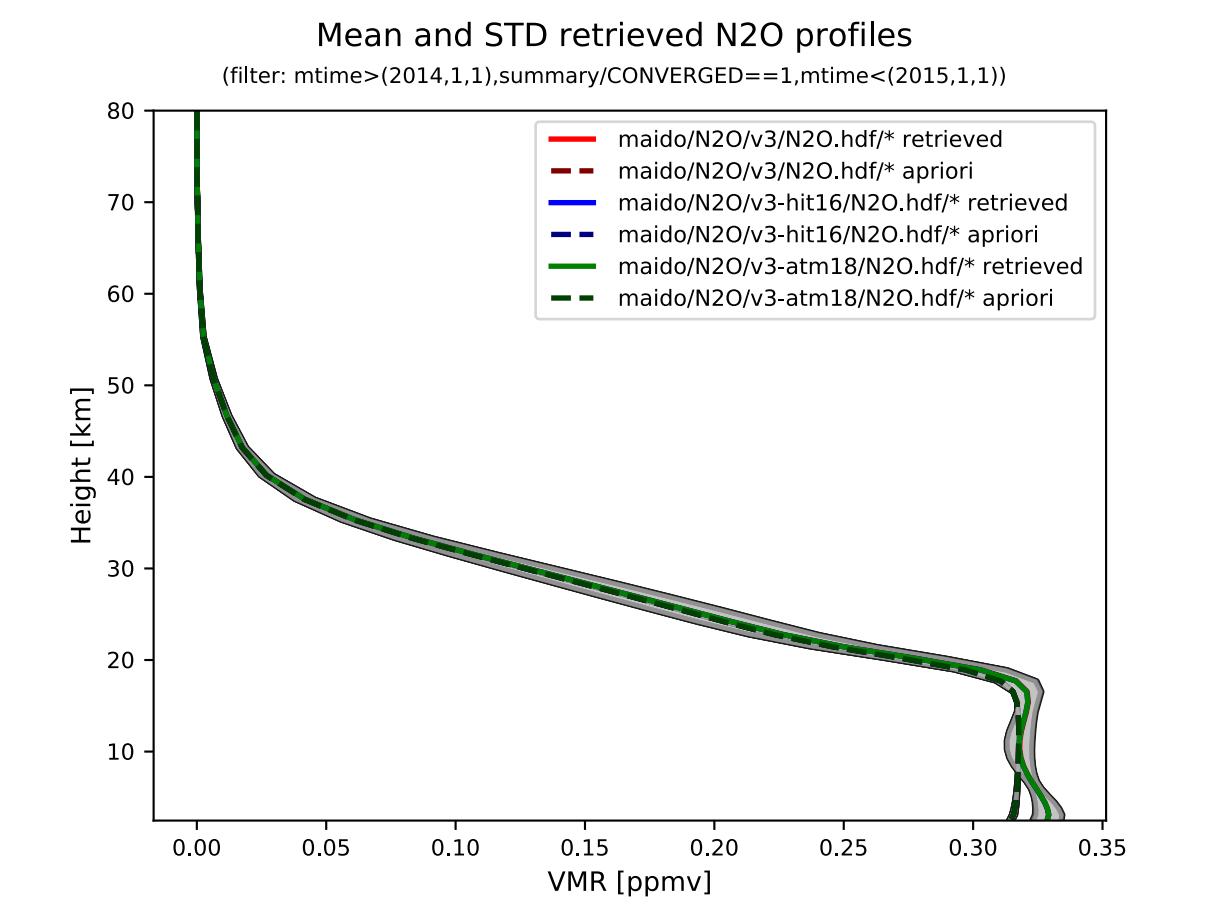

Transmission in 0.0-100.0 km above stdenis
/home/minqiang/projects/FTIR/data/bruker125HR/maido/archive/2018/06/22/ndacc/20180622hh.4
Transmission
Wavenumber ν in cm^{-1}
1.4
1.2
1.0
0.8
0.6
0.4
0.2
2538.0
2538.2
2538.4
2538.6
2538.8
H2O
CH3D
O3
CO2
solar
CH4
HDO
N2O
All
Obs

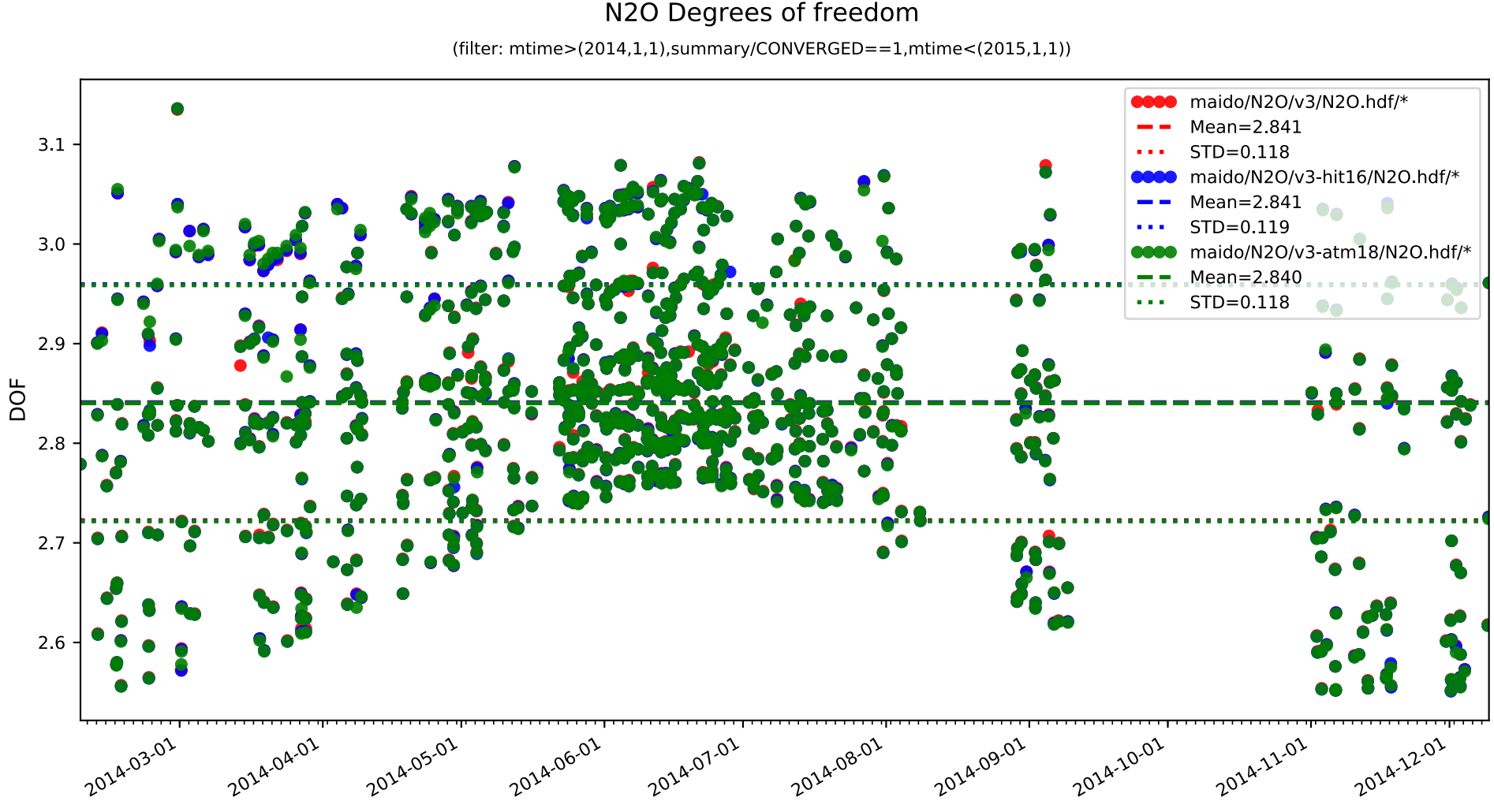

Transmission in 0.0-100.0 km above stdenis
/home/minqiang/projects/FTIR/data/bruker125HR/maido/archive/2018/06/22/ndacc/20180622hh.4
Transmission
Wavenumber ν in cm^{-1}
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
2540.1
2540.2
2540.3
2540.4
2540.5
2540.6
2540.7
N2
O3
H2O
CH4
CO2
solar
HDO
N2O
All
Obs

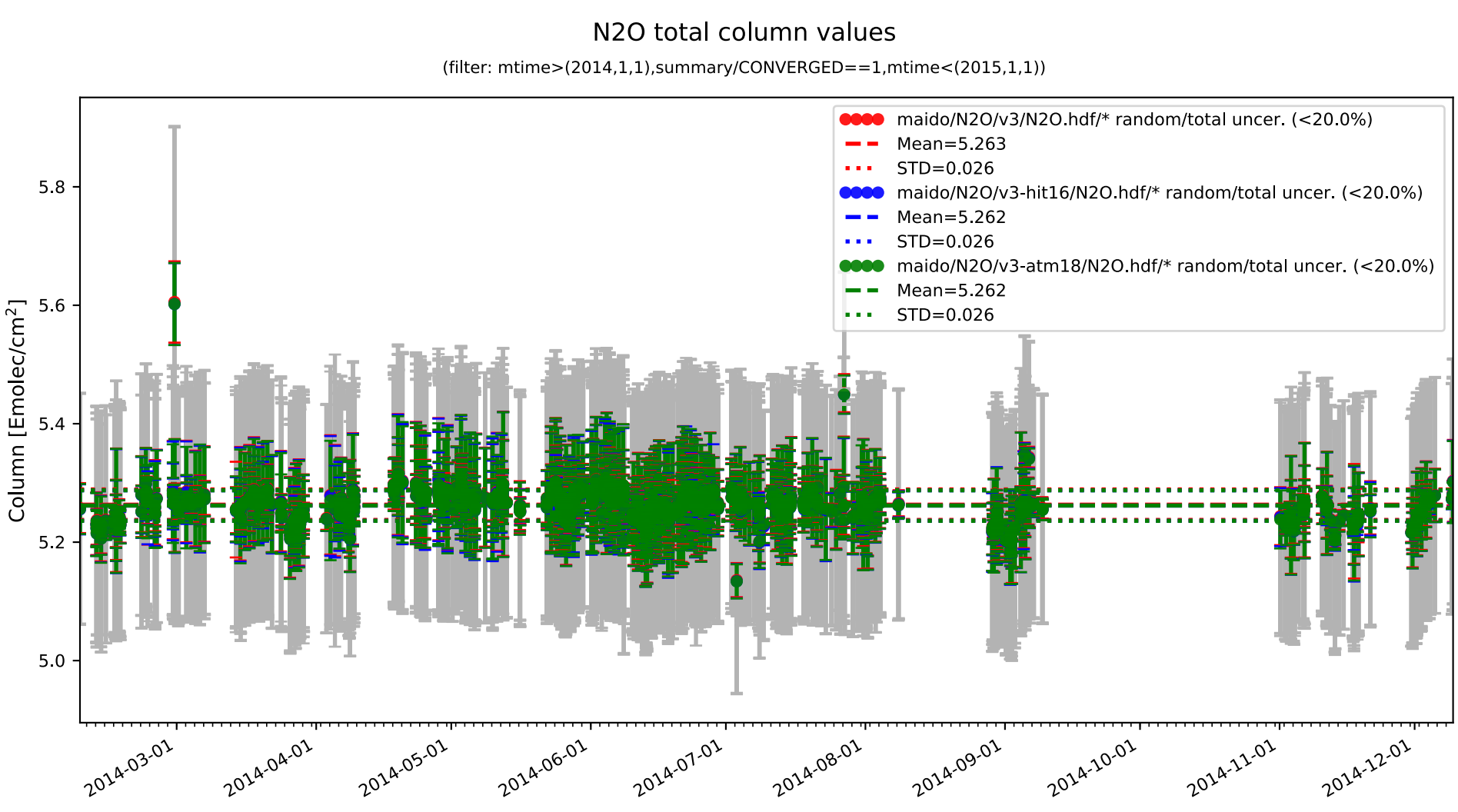

N2O RMS of retrievals
(filter: mtime>(2014,1,1),summary/CONVERGED==1,mtime<(2015,1,1))
RMS [%]
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
2014-03-01
2014-04-01
2014-05-01
2014-06-01
2014-07-01
2014-08-01
2014-09-01
2014-10-01
2014-11-01
2014-12-01
maido/N2O/v3/N2O.hdf/* hit08
Mean=0.101
STD=0.032
maido/N2O/v3-hit16/N2O.hdf/*
Mean=0.101
STD=0.031
maido/N2O/v3-atm18/N2O.hdf/*
Mean=0.101
STD=0.031


xN2O values
(filter: mtime>(2014,1,1),summary/CONVERGED==1,mtime<(2015,1,1))
maido/N2O/v3/N2O.hdf/* random/total uncer. (<20.0%)
Mean=313.921
STD=1.421
maido/N2O/v3-hit16/N2O.hdf/* random/total uncer. (<20.0%)
Mean=313.829
STD=1.421
maido/N2O/v3-atm18/N2O.hdf/* random/total uncer. (<20.0%)
Mean=313.832
STD=1.418
molec/(molec dry air) [ppb]
350
340
330
320
310
300
2014-03-01
2014-04-01
2014-05-01
2014-06-01
2014-07-01
2014-08-01
2014-09-01
2014-10-01
2014-11-01
2014-12-01


N2O Error budget on total column
(filter: mtime>(2014,1,1),summary/CONVERGED==1,mtime<(2015,1,1))
STD/TC [%]
5.25
5.00
4.75
4.50
4.25
4.00
3.75
2014-03-01
2014-04-01
2014-05-01
2014-06-01
2014-07-01
2014-08-01
2014-09-01
2014-10-01
2014-11-01
2014-12-01
maido/N2O/v3/N2O.hdf/*
Mean=3.794
STD=0.150
maido/N2O/v3-hit16/N2O.hdf/*
Mean=3.796
STD=0.150
maido/N2O/v3-atm18/N2O.hdf/*
Mean=3.794
STD=0.148


Mean and STD retrieved N2O profiles
(filter: mtime>(2014,1,1),summary/CONVERGED==1,mtime<(2015,1,1))
maido/N2O/v3/N2O.hdf/* retrieved
maido/N2O/v3/N2O.hdf/* apriori
maido/N2O/v3-hit16/N2O.hdf/* retrieved
maido/N2O/v3-hit16/N2O.hdf/* apriori
maido/N2O/v3-atm18/N2O.hdf/* retrieved
maido/N2O/v3-atm18/N2O.hdf/* apriori
Height [km]
VMR [ppmv]
80
70
60
50
40
30
20
10
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35


N2O Degrees of freedom
(filter: mtime>(2014,1,1),summary/CONVERGED==1,mtime<(2015,1,1))
DOF
3.1
3.0
2.9
2.8
2.7
2.6
2014-03-01
2014-04-01
2014-05-01
2014-06-01
2014-07-01
2014-08-01
2014-09-01
2014-10-01
2014-11-01
2014-12-01
maido/N2O/v3/N2O.hdf/*
Mean=2.841
STD=0.118
maido/N2O/v3-hit16/N2O.hdf/*
Mean=2.841
STD=0.119
maido/N2O/v3-atm18/N2O.hdf/*
Mean=2.840
STD=0.118


N2O total column values
(filter: mtime>(2014,1,1),summary/CONVERGED==1,mtime<(2015,1,1))
maido/N2O/v3/N2O.hdf/* random/total uncer. (<20.0%)
Mean=5.263
STD=0.026
maido/N2O/v3-hit16/N2O.hdf/* random/total uncer. (<20.0%)
Mean=5.262
STD=0.026
maido/N2O/v3-atm18/N2O.hdf/* random/total uncer. (<20.0%)
Mean=5.262
STD=0.026
Column [Emolec/cm^2]
5.8
5.6
5.4
5.2
5.0
2014-03-01
2014-04-01
2014-05-01
2014-06-01
2014-07-01
2014-08-01
2014-09-01
2014-10-01
2014-11-01
2014-12-01