PyCAMA report generated by tropl2-proc

tropl2-proc

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1 Short Introduction

1.1 The list of parameters

You may want to keep the list given in table 1 at hand when viewing the results.

2 Definitions

The averages shown here are *unweighed* averages:

$$\overline{x} = \frac{1}{N}\sum_{i=1}^{N} x_i \tag{1}$$

with N the number of observations in the dataset.

The spread of the measurements is indicated with the variance $V(x)$, or rather the standard deviation $\sigma(x) = \sqrt{V(x)}$.

$$V(x) = \frac{1}{N-1}\sum_{i=1}^{N}(x_i - \overline{x})^2 \tag{2}$$

We also report the more robust statistics median, minimum, maximum, various percentiles and inter quartile range.

The median m is the value of parameter x for which half of the observations of x is smaller than m:

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^{m} f(x)\,\mathrm{d}x = \frac{1}{2} \tag{3}$$

with $f(x)$ the probability density function.

The median is a special case of a percentile. Instead of ½ in equation 3, other threshold values can be used. We report results for 1 %, 5 %, 10 %, 15.9 %, 25 %, 75 %, 84.1 %, 90 %, 95 % and 99 %. The inter quartile range is the difference between the 75 % and 25 % percentiles. Similarly the minimum and maximum values correspond to the 0 % and 100 % percentiles respectively.

For normally distributed parameters the mean and median are the same, while the $\mu \pm \sigma$ values and the 15.9 % and 84.1 % percentiles coincide.

To get a measure for the relation of one variable $x_{(k)}$ with another $x_{(l)}$, we calculate the covariance matrix C_{kl}.

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1}\sum_{i=1}^{N}(x_{(k),i} - \overline{x_{(k)}})(x_{(l),i} - \overline{x_{(l)}}) \tag{4}$$

Rather than a dimensionally dependent covariance, it is often easier to interpret a correlation matrix R_{kl}, a matrix of Pearson's r coefficients:

$$R_{kl} = R(x_{(k)}, x_{(l)}) = \frac{C_{kl}}{\sqrt{C_{kk}C_{ll}}} = \frac{C_{kl}}{\sqrt{V(x_k)V(x_l)}} \tag{5}$$

The diagonal elements of the covariance matrix are the variances of the elements, $V(x_{(k)}) = C_{kk}$ and obviously $R_{kk} = 1$.

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm\sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.757 ± 0.254	21915969	0.735	0.270	0.740	0.0	1.000
nitrogendioxide tropospheric column [mol m^{-2}]	$(7.292 \pm 27.748) \times 10^{-6}$	21915969	9.253×10^{-6}	1.298×10^{-5}	3.796×10^{-6}	-4.298×10^{-3}	4.537×10^{-3}
nitrogendioxide tropospheric column precision [mol m^{-2}]	$(1.089 \pm 4.559) \times 10^{-5}$	21915969	6.458×10^{-6}	5.277×10^{-6}	6.584×10^{-6}	3.006×10^{-6}	5.532×10^{-2}
air mass factor troposphere [1]	2.44 ± 1.34	21915969	1.86	1.47	2.09	9.003×10^{-3}	9.13
air mass factor total [1]	3.44 ± 1.93	21915969	2.10	1.32	2.75	0.343	14.3
number of spectral points in retrieval [1]	304 ± 1	21915969	304	1.000	304	234	305
number of iterations [1]	3.87 ± 1.17	21915969	4.22	1.000	4.00	3.00	10.00
wavelength calibration offset [nm]	$(-1.859 \pm 5.636) \times 10^{-3}$	21915969	-8.000×10^{-4}	4.614×10^{-3}	-1.629×10^{-3}	-6.743×10^{-2}	6.264×10^{-2}
nitrogendioxide stratospheric column [mol/m^2]	$(5.072 \pm 2.188) \times 10^{-5}$	21915969	3.050×10^{-5}	3.352×10^{-5}	4.697×10^{-5}	1.117×10^{-5}	1.420×10^{-4}
nitrogendioxide stratospheric column precision [mol/m^2]	$(3.321 \pm 0.000) \times 10^{-6}$	21915969	3.350×10^{-6}	0.0	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}
nitrogendioxide total column [mol/m^2]	$(5.778 \pm 2.284) \times 10^{-5}$	21915969	6.443×10^{-5}	2.849×10^{-5}	5.842×10^{-5}	3.250×10^{-6}	1.383×10^{-3}
nitrogendioxide total column precision [mol/m^2]	$(1.216 \pm 0.560) \times 10^{-5}$	21915969	1.289×10^{-5}	5.358×10^{-6}	1.212×10^{-5}	1.386×10^{-6}	1.350×10^{-3}
nitrogendioxide summed total column [mol/m^2]	$(5.802 \pm 2.960) \times 10^{-5}$	21915969	6.443×10^{-5}	2.930×10^{-5}	5.915×10^{-5}	-4.198×10^{-3}	4.551×10^{-3}
nitrogendioxide summed total column precision [mol/m^2]	$(1.168 \pm 4.552) \times 10^{-5}$	21915969	4.899×10^{-6}	4.754×10^{-6}	7.374×10^{-6}	4.479×10^{-6}	5.532×10^{-2}
chi square [1]	527 ± 590	21915969	312	199	400	160	7.573×10^{4}
root mean square error of fit [1]	$(4.075 \pm 2.676) \times 10^{-4}$	21915969	5.130×10^{-4}	3.217×10^{-4}	3.430×10^{-4}	8.373×10^{-5}	6.992×10^{-3}
air mass factor stratosphere [1]	3.82 ± 2.26	21915969	2.22	1.62	2.99	2.06	15.3

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	3.000×10^{-2}	7.000×10^{-2}	0.330	0.690	0.730	1.000	1.000	1.000	1.000	1.000
nitrogendioxide tropospheric column [mol m^{-2}]	-3.173×10^{-5}	-1.343×10^{-5}	-7.994×10^{-6}	-5.232×10^{-6}	-2.473×10^{-6}	1.050×10^{-5}	1.493×10^{-5}	2.088×10^{-5}	3.585×10^{-5}	1.129×10^{-4}
nitrogendioxide tropospheric column precision [mol m^{-2}]	3.224×10^{-6}	3.443×10^{-6}	3.690×10^{-6}	4.018×10^{-6}	4.656×10^{-6}	9.932×10^{-6}	1.341×10^{-5}	1.827×10^{-5}	3.044×10^{-5}	8.457×10^{-5}
air mass factor troposphere [1]	0.325	0.728	1.04	1.30	1.59	3.06	3.82	4.45	5.15	6.55
air mass factor total [1]	1.69	2.04	2.11	2.18	2.30	3.62	4.54	5.90	7.97	11.3
number of spectral points in retrieval [1]	303	304	304	304	304	305	305	305	305	305
number of iterations [1]	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	8.00	8.00
wavelength calibration offset [nm]	-1.922×10^{-2}	-1.012×10^{-2}	-7.322×10^{-3}	-5.856×10^{-3}	-4.258×10^{-3}	3.558×10^{-4}	1.591×10^{-3}	3.278×10^{-3}	6.458×10^{-3}	1.562×10^{-2}
nitrogendioxide stratospheric column [mol/m^2]	1.385×10^{-5}	2.025×10^{-5}	2.704×10^{-5}	3.018×10^{-5}	3.308×10^{-5}	6.660×10^{-5}	7.465×10^{-5}	8.287×10^{-5}	9.053×10^{-5}	1.031×10^{-4}
nitrogendioxide stratospheric column precision [mol/m^2]	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}
nitrogendioxide total column [mol/m^2]	1.570×10^{-5}	2.926×10^{-5}	3.357×10^{-5}	3.694×10^{-5}	4.157×10^{-5}	7.006×10^{-5}	7.637×10^{-5}	8.197×10^{-5}	8.823×10^{-5}	1.077×10^{-4}
nitrogendioxide total column precision [mol/m^2]	3.485×10^{-6}	6.418×10^{-6}	7.353×10^{-6}	8.049×10^{-6}	8.988×10^{-6}	1.435×10^{-5}	1.558×10^{-5}	1.666×10^{-5}	1.800×10^{-5}	2.509×10^{-5}
nitrogendioxide summed total column [mol/m^2]	1.551×10^{-6}	2.312×10^{-5}	3.114×10^{-5}	3.569×10^{-5}	4.144×10^{-5}	7.074×10^{-5}	7.700×10^{-5}	8.200×10^{-5}	8.840×10^{-5}	1.413×10^{-4}
nitrogendioxide summed total column precision [mol/m^2]	4.628×10^{-6}	4.784×10^{-6}	4.964×10^{-6}	5.213×10^{-6}	5.719×10^{-6}	1.047×10^{-5}	1.382×10^{-5}	1.857×10^{-5}	3.062×10^{-5}	8.464×10^{-5}
chi square [1]	229	258	278	296	321	520	612	757	1.148×10^{3}	2.950×10^{3}
root mean square error of fit [1]	1.231×10^{-4}	1.401×10^{-4}	1.546×10^{-4}	1.717×10^{-4}	2.033×10^{-4}	5.250×10^{-4}	6.128×10^{-4}	7.192×10^{-4}	9.188×10^{-4}	1.386×10^{-3}
air mass factor stratosphere [1]	2.09	2.14	2.20	2.28	2.43	4.04	5.26	6.91	9.32	12.7

Table 3: Parameterlist and basic statistics for the analysis for observations in the northern hemisphere

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.752 ± 0.296	8619085	0.270	0.740	0.0	1.000	0.730	1.000
nitrogendioxide tropospheric column [mol m^{-2}]	$(1.620 \pm 4.052) \times 10^{-5}$	8619085	1.798×10^{-5}	8.175×10^{-6}	-1.146×10^{-3}	4.537×10^{-3}	8.142×10^{-7}	1.880×10^{-5}
nitrogendioxide tropospheric column precision [mol m^{-2}]	$(1.827 \pm 5.786) \times 10^{-5}$	8619085	9.989×10^{-6}	1.020×10^{-5}	3.232×10^{-6}	4.203×10^{-2}	7.370×10^{-6}	1.736×10^{-5}
air mass factor troposphere [1]	1.72 ± 0.85	8619085	0.955	1.67	9.003×10^{-3}	6.88	1.16	2.12
air mass factor total [1]	3.43 ± 1.91	8619085	1.32	2.74	0.343	13.7	2.32	3.64
number of spectral points in retrieval [1]	304 ± 1	8619085	1.000	304	238	305	304	305
number of iterations [1]	3.73 ± 1.05	8619085	1.000	4.00	3.00	9.00	3.00	4.00
wavelength calibration offset [nm]	$(-1.514 \pm 5.947) \times 10^{-3}$	8619085	4.858×10^{-3}	-1.251×10^{-3}	-6.173×10^{-2}	6.099×10^{-2}	-3.993×10^{-3}	8.652×10^{-4}
nitrogendioxide stratospheric column [mol/m^2]	$(3.135 \pm 0.812) \times 10^{-5}$	8619085	1.009×10^{-5}	3.238×10^{-5}	1.117×10^{-5}	6.124×10^{-5}	2.698×10^{-5}	3.708×10^{-5}
nitrogendioxide stratospheric column precision [mol/m^2]	$(3.321 \pm 0.000) \times 10^{-6}$	8619085	0.0	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}
nitrogendioxide total column [mol/m^2]	$(4.651 \pm 2.770) \times 10^{-5}$	8619085	1.592×10^{-5}	4.174×10^{-5}	3.250×10^{-6}	1.383×10^{-3}	3.484×10^{-5}	5.076×10^{-5}
nitrogendioxide total column precision [mol/m^2]	$(1.033 \pm 0.786) \times 10^{-5}$	8619085	3.337×10^{-6}	9.007×10^{-6}	1.386×10^{-6}	1.350×10^{-3}	7.585×10^{-6}	1.092×10^{-5}
nitrogendioxide summed total column [mol/m^2]	$(4.755 \pm 4.095) \times 10^{-5}$	8619085	2.011×10^{-5}	4.147×10^{-5}	-1.121×10^{-3}	4.551×10^{-3}	3.247×10^{-5}	5.258×10^{-5}
nitrogendioxide summed total column precision [mol/m^2]	$(1.879 \pm 5.779) \times 10^{-5}$	8619085	9.590×10^{-6}	1.073×10^{-5}	4.635×10^{-6}	4.203×10^{-2}	8.084×10^{-6}	1.767×10^{-5}
chi square [1]	461 ± 509	8619085	145	337	160	5.979×10^{4}	289	435
root mean square error of fit [1]	$(4.020 \pm 2.866) \times 10^{-4}$	8619085	3.107×10^{-4}	3.171×10^{-4}	9.672×10^{-5}	6.302×10^{-3}	1.932×10^{-4}	5.039×10^{-4}
air mass factor stratosphere [1]	4.34 ± 2.59	8619085	2.17	3.32	2.12	15.3	2.66	4.83

Table 4: Parameterlist and basic statistics for the analysis for observations in the southern hemisphere

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.761 ± 0.222	13296884	0.150	0.740	0.0	1.000	0.730	0.880
nitrogendioxide tropospheric column [mol m^{-2}]	$(1.517 \pm 10.952) \times 10^{-6}$	13296884	1.066×10^{-5}	1.658×10^{-6}	-4.298×10^{-3}	1.526×10^{-3}	-3.514×10^{-6}	7.143×10^{-6}
nitrogendioxide tropospheric column precision [mol m^{-2}]	$(6.114 \pm 34.619) \times 10^{-6}$	13296884	2.766×10^{-6}	5.230×10^{-6}	3.006×10^{-6}	5.532×10^{-2}	3.980×10^{-6}	6.746×10^{-6}
air mass factor troposphere [1]	2.91 ± 1.39	13296884	1.87	2.49	1.132×10^{-2}	9.13	1.91	3.78
air mass factor total [1]	3.45 ± 1.95	13296884	1.32	2.76	0.608	14.3	2.29	3.61
number of spectral points in retrieval [1]	304 ± 1	13296884	1.000	304	234	305	304	305
number of iterations [1]	3.96 ± 1.24	13296884	1.000	4.00	3.00	10.00	3.00	4.00
wavelength calibration offset [nm]	$(-2.082 \pm 5.413) \times 10^{-3}$	13296884	4.429×10^{-3}	-1.853×10^{-3}	-6.743×10^{-2}	6.264×10^{-2}	-4.409×10^{-3}	2.028×10^{-5}
nitrogendioxide stratospheric column [mol/m^2]	$(6.328 \pm 1.859) \times 10^{-5}$	13296884	2.377×10^{-5}	6.225×10^{-5}	2.438×10^{-5}	1.420×10^{-4}	5.168×10^{-5}	7.546×10^{-5}
nitrogendioxide stratospheric column precision [mol/m^2]	$(3.321 \pm 0.000) \times 10^{-6}$	13296884	0.0	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}
nitrogendioxide total column [mol/m^2]	$(6.508 \pm 1.508) \times 10^{-5}$	13296884	1.738×10^{-5}	6.532×10^{-5}	9.151×10^{-6}	3.520×10^{-4}	5.741×10^{-5}	7.479×10^{-5}
nitrogendioxide total column precision [mol/m^2]	$(1.334 \pm 0.284) \times 10^{-5}$	13296884	3.313×10^{-6}	1.334×10^{-5}	4.525×10^{-6}	1.433×10^{-4}	1.183×10^{-5}	1.515×10^{-5}
nitrogendioxide summed total column [mol/m^2]	$(6.480 \pm 1.551) \times 10^{-5}$	13296884	1.715×10^{-5}	6.559×10^{-5}	-4.198×10^{-3}	1.625×10^{-3}	5.746×10^{-5}	7.461×10^{-5}
nitrogendioxide summed total column precision [mol/m^2]	$(7.078 \pm 34.594) \times 10^{-6}$	13296884	2.336×10^{-6}	6.195×10^{-6}	4.479×10^{-6}	5.532×10^{-2}	5.184×10^{-6}	7.519×10^{-6}
chi square [1]	570 ± 633	13296884	195	440	167	7.573×10^{4}	358	553
root mean square error of fit [1]	$(4.110 \pm 2.545) \times 10^{-4}$	13296884	3.189×10^{-4}	3.606×10^{-4}	8.373×10^{-5}	6.992×10^{-3}	2.140×10^{-4}	5.329×10^{-4}
air mass factor stratosphere [1]	3.48 ± 1.95	13296884	1.29	2.79	2.06	14.6	2.32	3.62

Table 5: Parameterlist and basic statistics for the analysis for observations over water

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.795 ± 0.205	13692843	0.260	0.740	0.0	1.000	0.740	1.000
nitrogendioxide tropospheric column [mol m^{-2}]	$(4.564 \pm 14.686) \times 10^{-6}$	13692843	1.041×10^{-5}	4.451×10^{-6}	-4.169×10^{-3}	2.720×10^{-3}	-8.676×10^{-7}	9.538×10^{-6}
nitrogendioxide tropospheric column precision [mol m^{-2}]	$(8.742 \pm 21.534) \times 10^{-6}$	13692843	3.684×10^{-6}	6.454×10^{-6}	3.110×10^{-6}	5.532×10^{-2}	5.053×10^{-6}	8.737×10^{-6}
air mass factor troposphere [1]	2.14 ± 0.91	13692843	0.882	2.03	9.003×10^{-3}	8.92	1.64	2.52
air mass factor total [1]	3.01 ± 1.55	13692843	0.825	2.55	0.609	14.3	2.26	3.08
number of spectral points in retrieval [1]	304 ± 1	13692843	1.000	304	234	305	304	305
number of iterations [1]	4.03 ± 1.23	13692843	1.000	4.00	3.00	9.00	3.00	4.00
wavelength calibration offset [nm]	$(-1.772 \pm 6.097) \times 10^{-3}$	13692843	4.979×10^{-3}	-1.591×10^{-3}	-6.501×10^{-2}	5.997×10^{-2}	-4.339×10^{-3}	6.401×10^{-4}
nitrogendioxide stratospheric column [mol/m^2]	$(5.016 \pm 2.020) \times 10^{-5}$	13692843	2.976×10^{-5}	4.743×10^{-5}	1.149×10^{-5}	1.420×10^{-4}	3.327×10^{-5}	6.303×10^{-5}
nitrogendioxide stratospheric column precision [mol/m^2]	$(3.321 \pm 0.000) \times 10^{-6}$	13692843	0.0	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}
nitrogendioxide total column [mol/m^2]	$(5.551 \pm 1.834) \times 10^{-5}$	13692843	2.663×10^{-5}	5.575×10^{-5}	3.250×10^{-6}	4.939×10^{-4}	4.046×10^{-5}	6.708×10^{-5}
nitrogendioxide total column precision [mol/m^2]	$(1.161 \pm 0.361) \times 10^{-5}$	13692843	5.009×10^{-6}	1.166×10^{-5}	1.386×10^{-6}	2.174×10^{-4}	8.766×10^{-6}	1.377×10^{-5}
nitrogendioxide summed total column [mol/m^2]	$(5.472 \pm 2.109) \times 10^{-5}$	13692843	2.807×10^{-5}	5.623×10^{-5}	-4.066×10^{-3}	2.734×10^{-3}	3.972×10^{-5}	6.779×10^{-5}
nitrogendioxide summed total column precision [mol/m^2]	$(9.535 \pm 21.454) \times 10^{-6}$	13692843	3.300×10^{-6}	7.259×10^{-6}	4.550×10^{-6}	5.532×10^{-2}	6.047×10^{-6}	9.347×10^{-6}
chi square [1]	569 ± 632	13692843	219	421	160	7.573×10^{4}	338	557
root mean square error of fit [1]	$(3.401 \pm 2.262) \times 10^{-4}$	13692843	2.239×10^{-4}	2.853×10^{-4}	9.635×10^{-5}	6.302×10^{-3}	1.863×10^{-4}	4.102×10^{-4}
air mass factor stratosphere [1]	3.23 ± 1.74	13692843	0.990	2.66	2.06	15.1	2.32	3.31

Table 6: Parameterlist and basic statistics for the analysis for observations over land

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.696 ± 0.306	6725841	0.210	0.810	0.0	1.000	0.670	0.880
nitrogendioxide tropospheric column [mol m^{-2}]	$(8.670 \pm 33.993) \times 10^{-6}$	6725841	1.597×10^{-5}	3.065×10^{-7}	-4.298×10^{-3}	4.537×10^{-3}	-4.421×10^{-6}	1.155×10^{-5}
nitrogendioxide tropospheric column precision [mol m^{-2}]	$(1.219 \pm 7.075) \times 10^{-5}$	6725841	7.065×10^{-6}	6.029×10^{-6}	3.006×10^{-6}	4.203×10^{-2}	3.664×10^{-6}	1.073×10^{-5}
air mass factor troposphere [1]	3.23 ± 1.72	6725841	2.84	3.41	9.823×10^{-3}	9.13	1.67	4.51
air mass factor total [1]	4.30 ± 2.24	6725841	2.37	3.61	0.366	14.2	2.75	5.12
number of spectral points in retrieval [1]	304 ± 1	6725841	1.000	304	236	305	304	305
number of iterations [1]	3.58 ± 1.00	6725841	1.000	3.00	3.00	10.00	3.00	4.00
wavelength calibration offset [nm]	$(-2.020 \pm 4.460) \times 10^{-3}$	6725841	3.951×10^{-3}	-1.681×10^{-3}	-6.743×10^{-2}	6.264×10^{-2}	-4.064×10^{-3}	-1.125×10^{-4}
nitrogendioxide stratospheric column [mol/m^2]	$(5.577 \pm 2.427) \times 10^{-5}$	6725841	4.116×10^{-5}	5.790×10^{-5}	1.117×10^{-5}	1.184×10^{-4}	3.556×10^{-5}	7.672×10^{-5}
nitrogendioxide stratospheric column precision [mol/m^2]	$(3.321 \pm 0.000) \times 10^{-6}$	6725841	0.0	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}
nitrogendioxide total column [mol/m^2]	$(6.230 \pm 2.311) \times 10^{-5}$	6725841	2.734×10^{-5}	6.395×10^{-5}	4.233×10^{-6}	1.383×10^{-3}	4.802×10^{-5}	7.536×10^{-5}
nitrogendioxide total column precision [mol/m^2]	$(1.300 \pm 0.617) \times 10^{-5}$	6725841	4.964×10^{-6}	1.307×10^{-5}	1.519×10^{-6}	1.350×10^{-3}	1.034×10^{-5}	1.531×10^{-5}
nitrogendioxide summed total column [mol/m^2]	$(6.444 \pm 3.212) \times 10^{-5}$	6725841	2.632×10^{-5}	6.487×10^{-5}	-4.198×10^{-3}	4.551×10^{-3}	4.988×10^{-5}	7.621×10^{-5}
nitrogendioxide summed total column precision [mol/m^2]	$(1.305 \pm 7.068) \times 10^{-5}$	6725841	6.286×10^{-6}	6.883×10^{-6}	4.479×10^{-6}	4.203×10^{-2}	4.945×10^{-6}	1.123×10^{-5}
chi square [1]	447 ± 449	6725841	168	373	164	6.434×10^{4}	302	470
root mean square error of fit [1]	$(5.302 \pm 2.838) \times 10^{-4}$	6725841	3.008×10^{-4}	5.187×10^{-4}	8.373×10^{-5}	6.992×10^{-3}	3.378×10^{-4}	6.386×10^{-4}
air mass factor stratosphere [1]	4.79 ± 2.61	6725841	2.62	3.82	2.07	15.3	3.02	5.64

3 Granule outlines

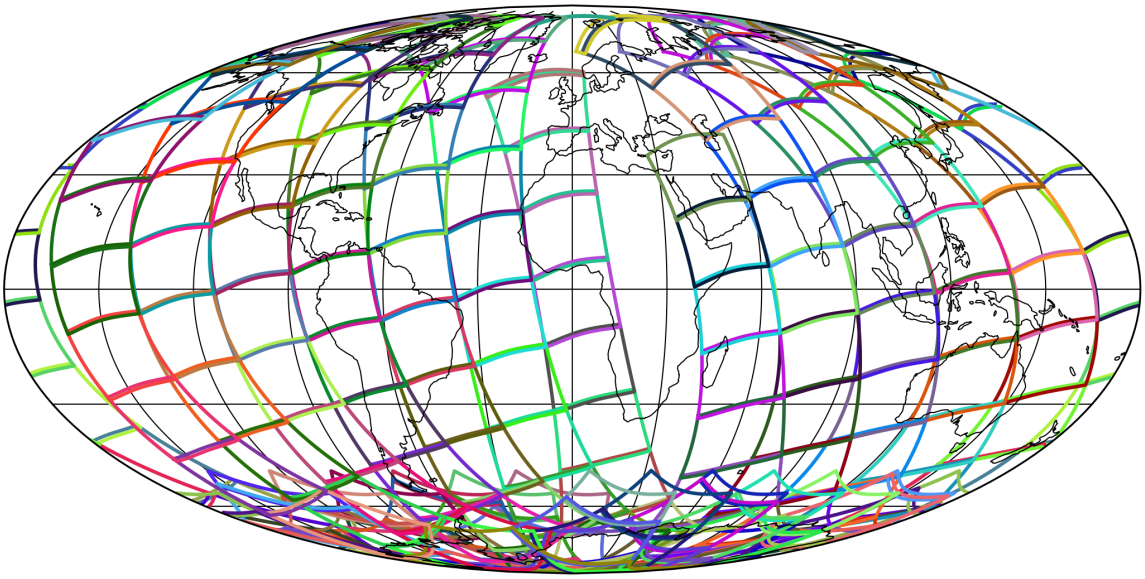

Figure 1: Outline of the granules.

4 Input data monitoring

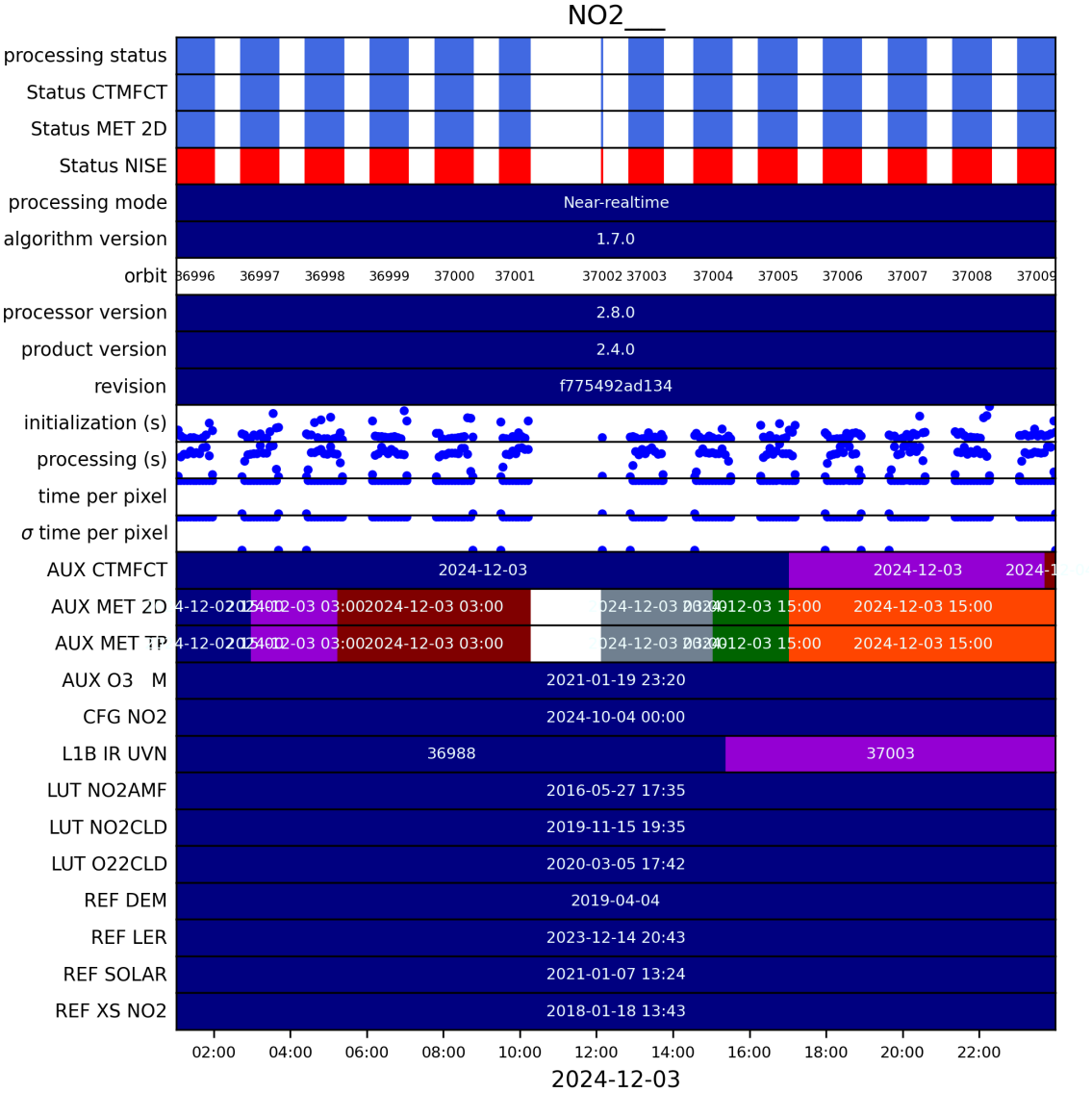

Figure 2: Input data per granule

5 Warnings and errors

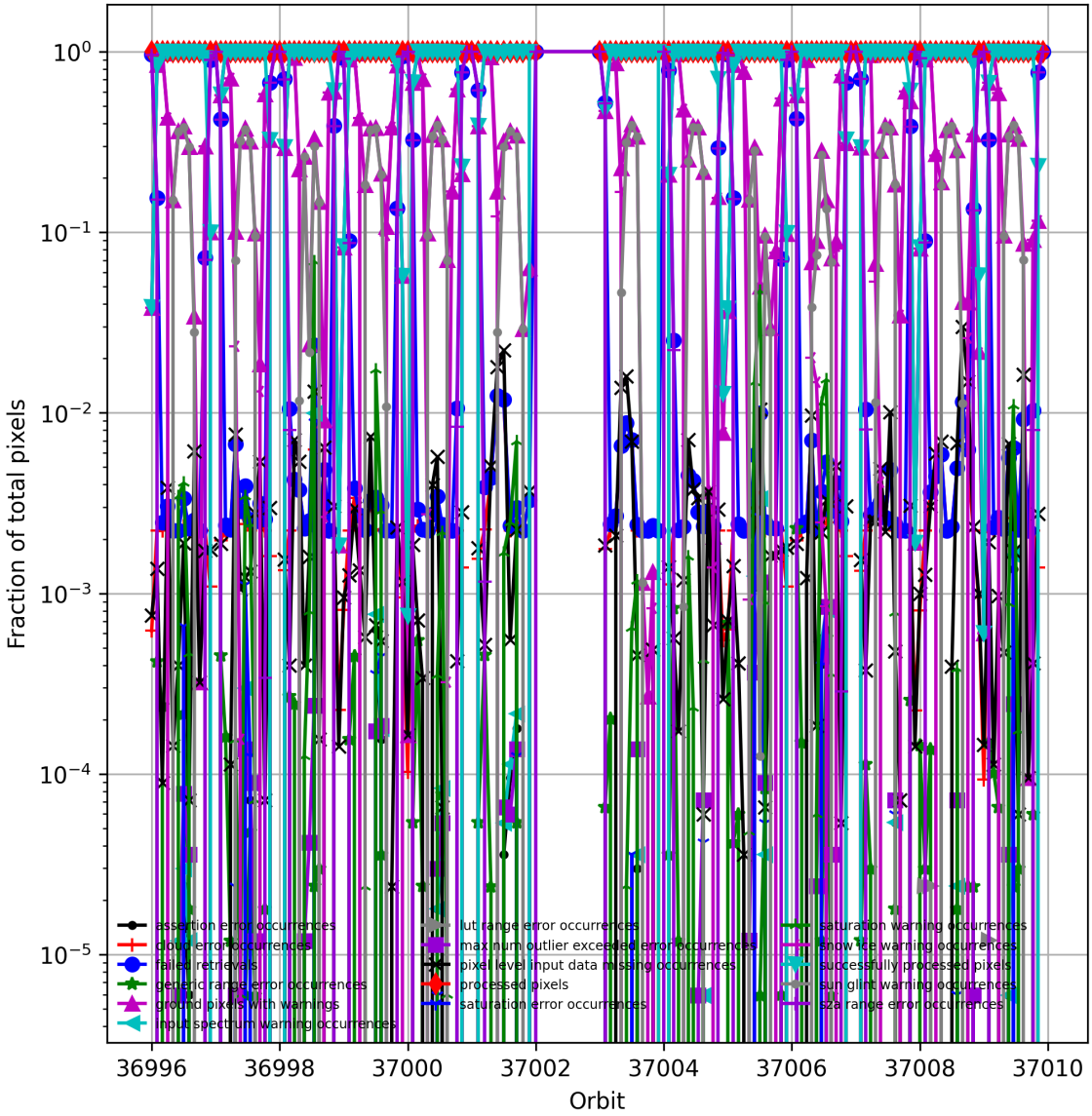

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

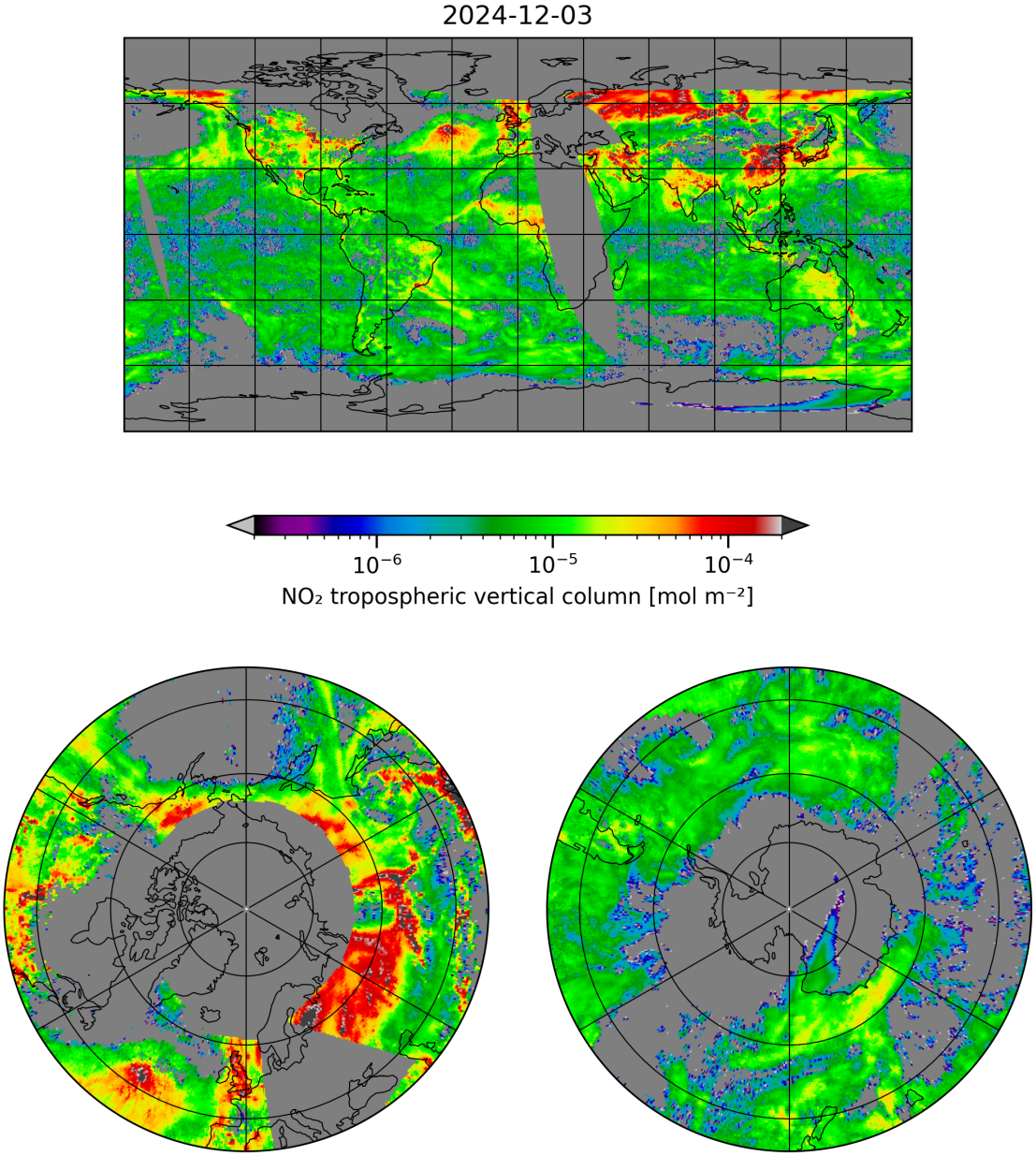

Figure 4: Map of "NO_2 tropospheric vertical column" for 2024-12-03 to 2024-12-03

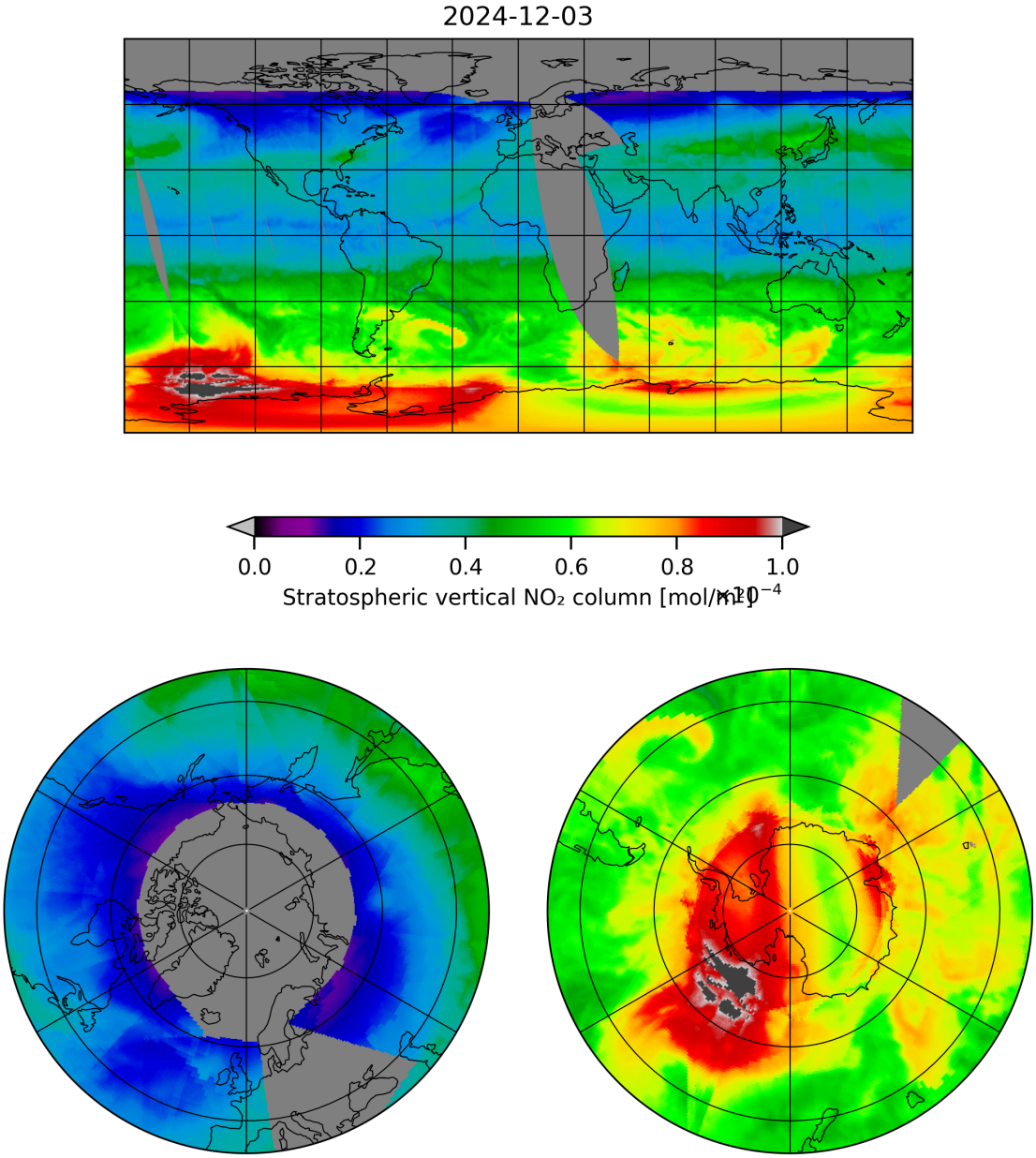

Figure 5: Map of “Stratospheric vertical NO_2 column” for 2024-12-03 to 2024-12-03

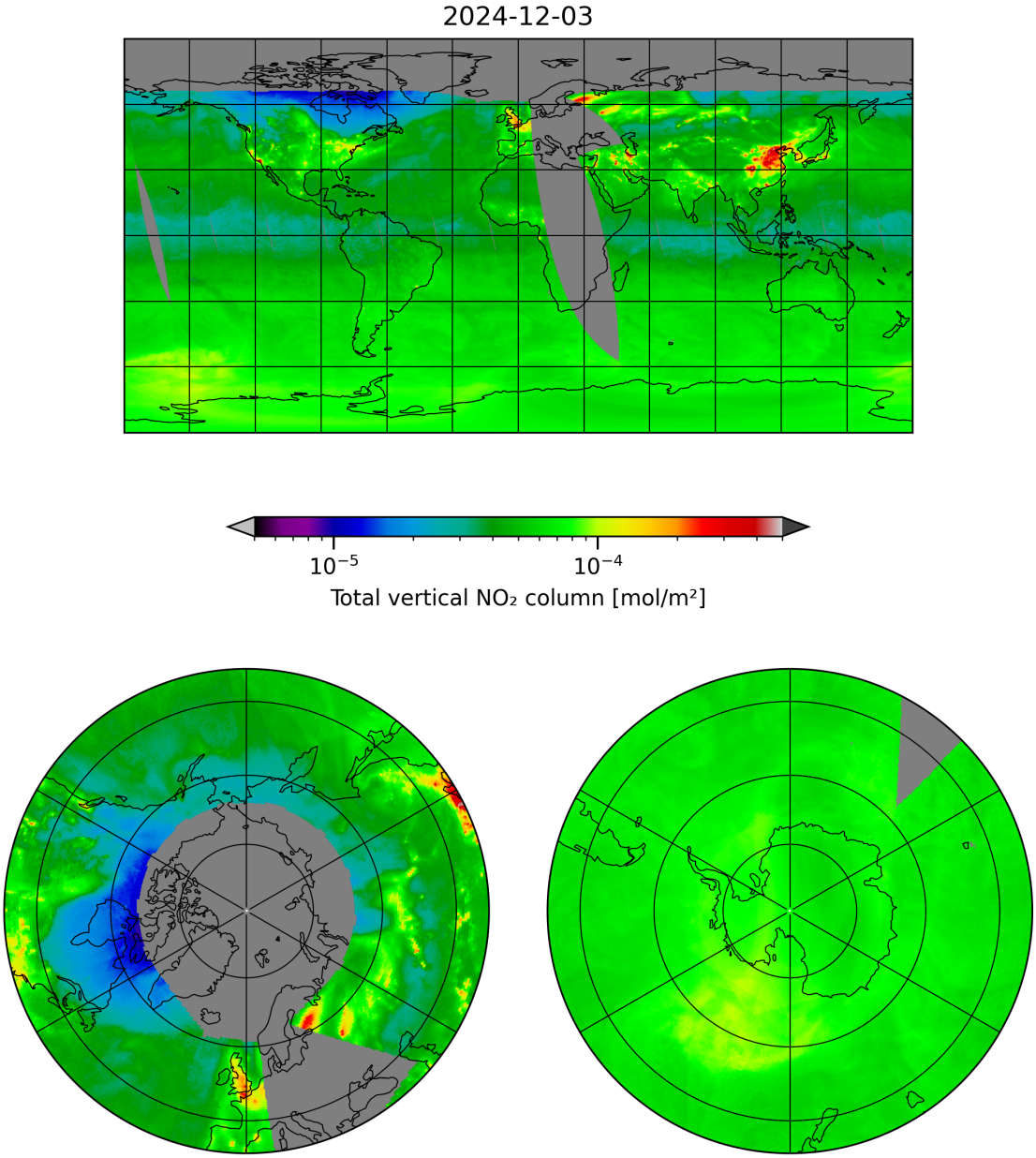

Figure 6: Map of "Total vertical NO_2 column" for 2024-12-03 to 2024-12-03

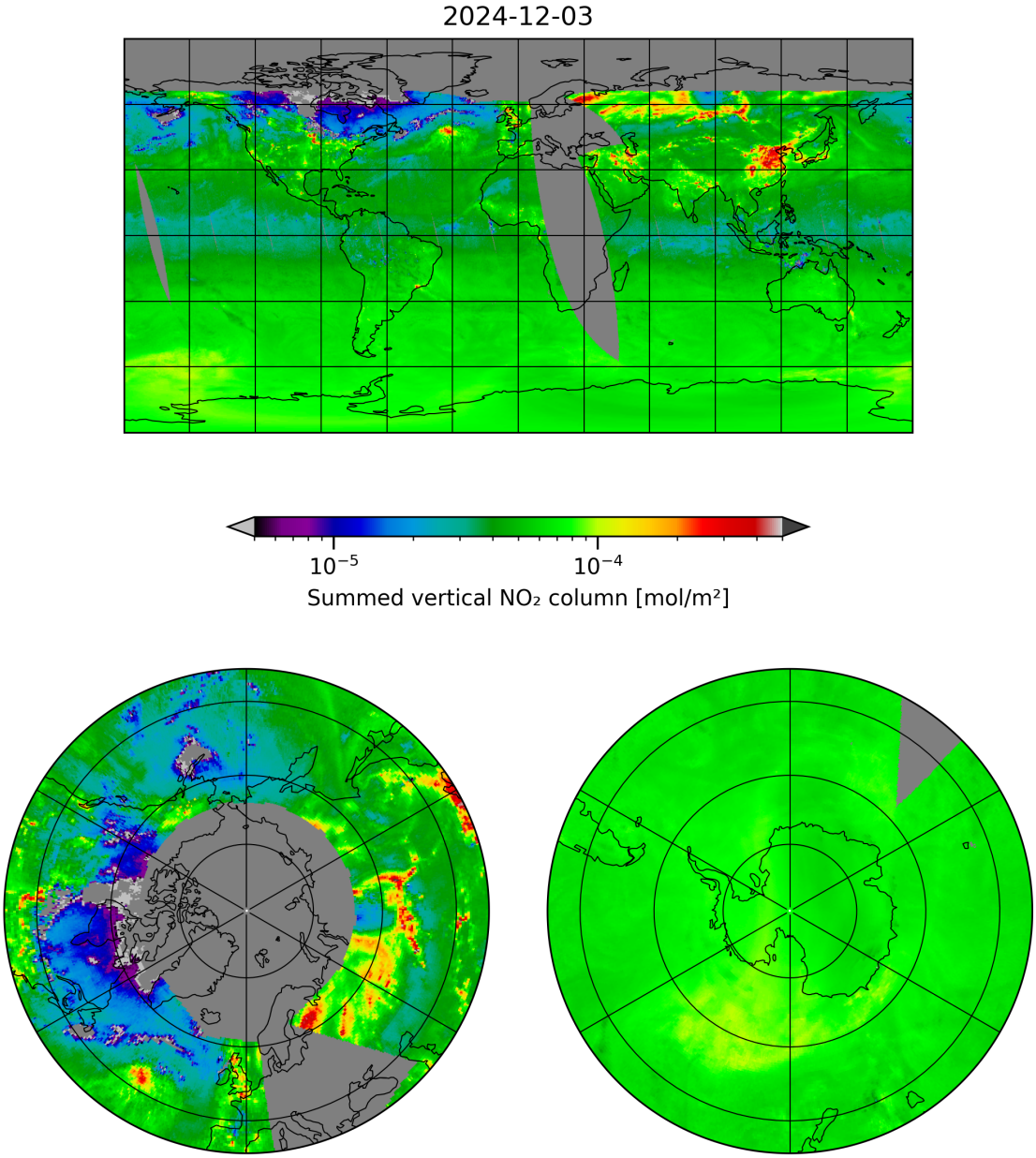

Figure 7: Map of “Summed vertical NO_2 column” for 2024-12-03 to 2024-12-03

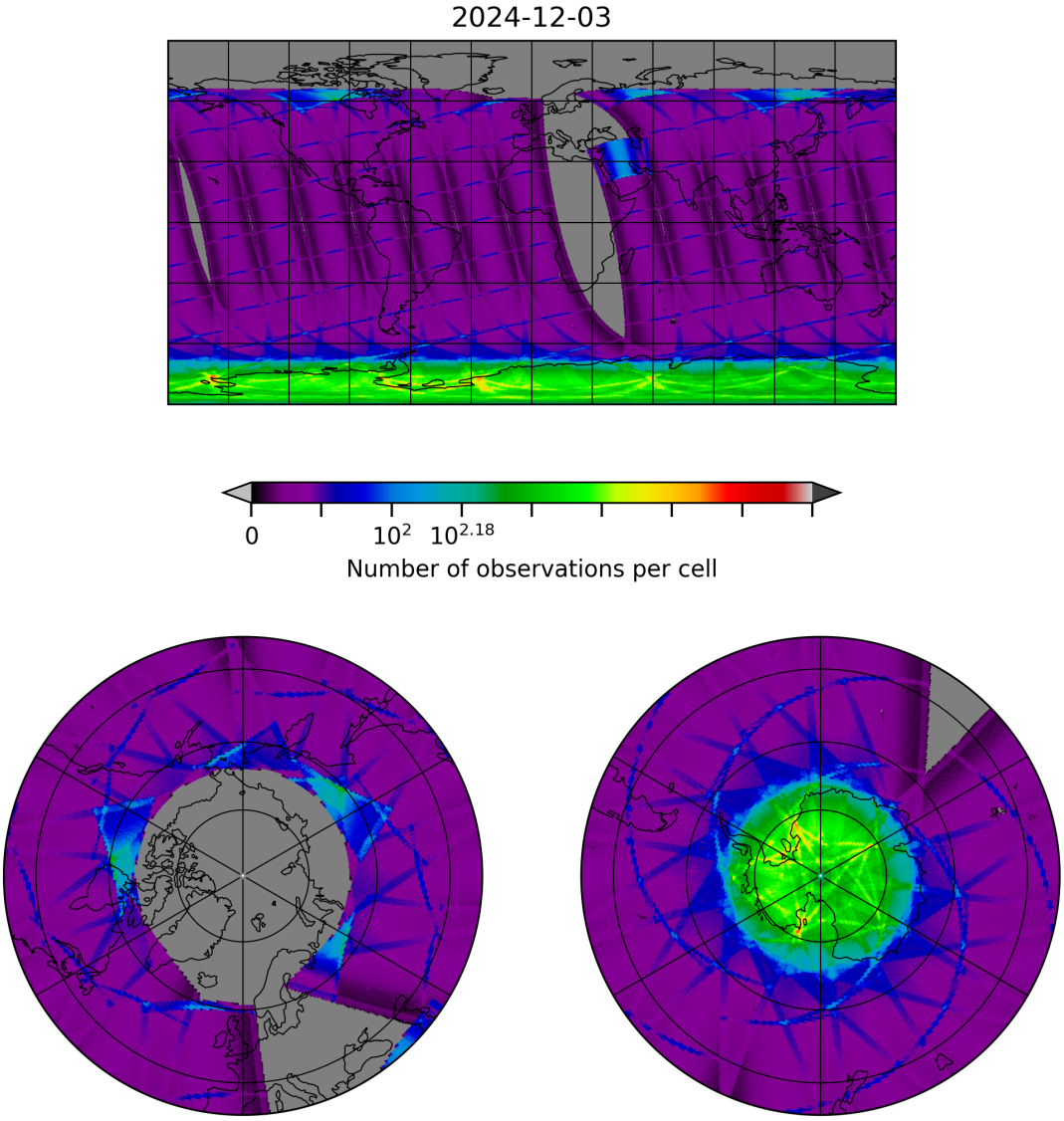

Figure 8: Map of the number of observations for 2024-12-03 to 2024-12-03

7 Zonal average

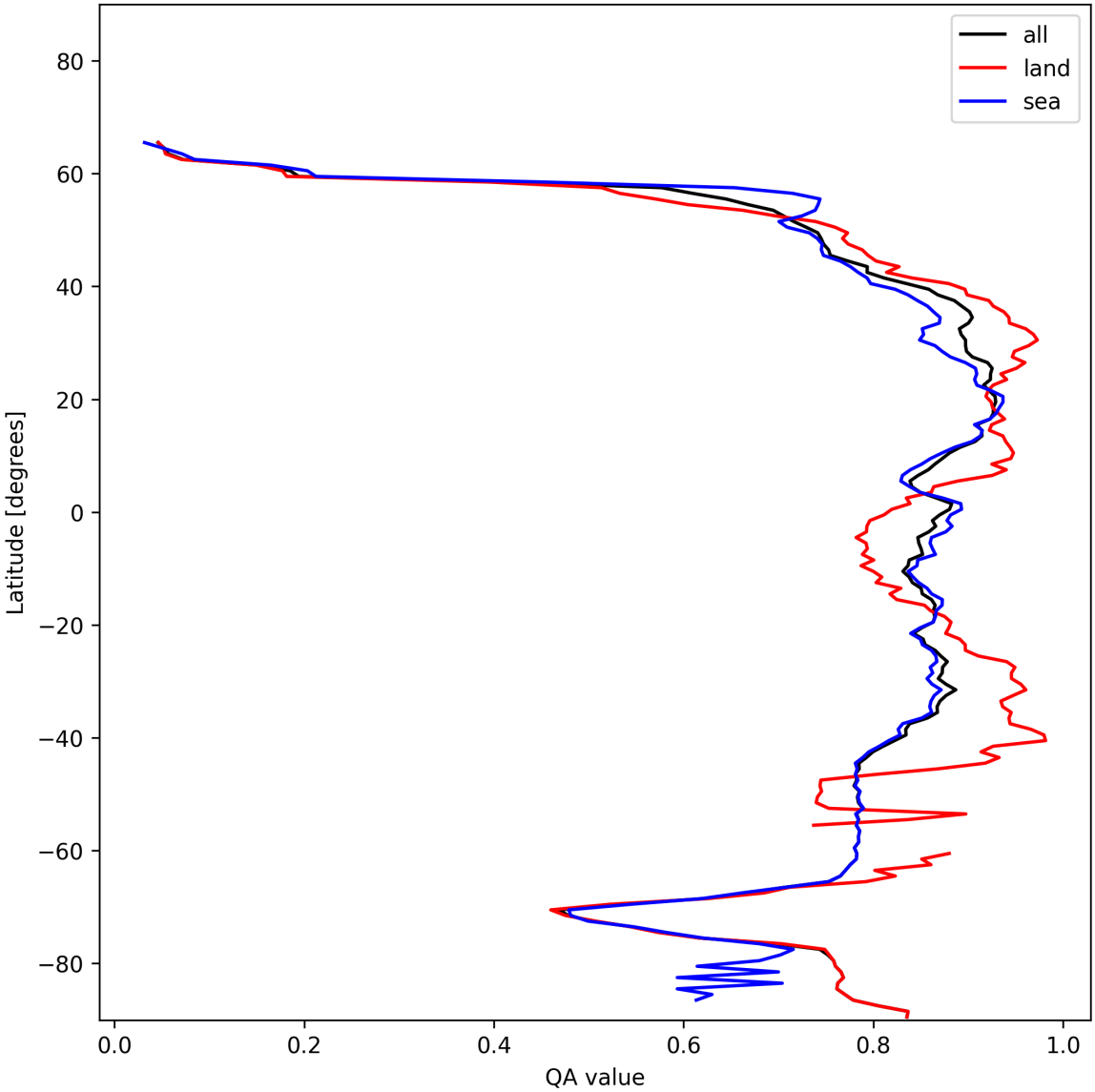

Figure 9: Zonal average of “QA value” for 2024-12-03 to 2024-12-03.

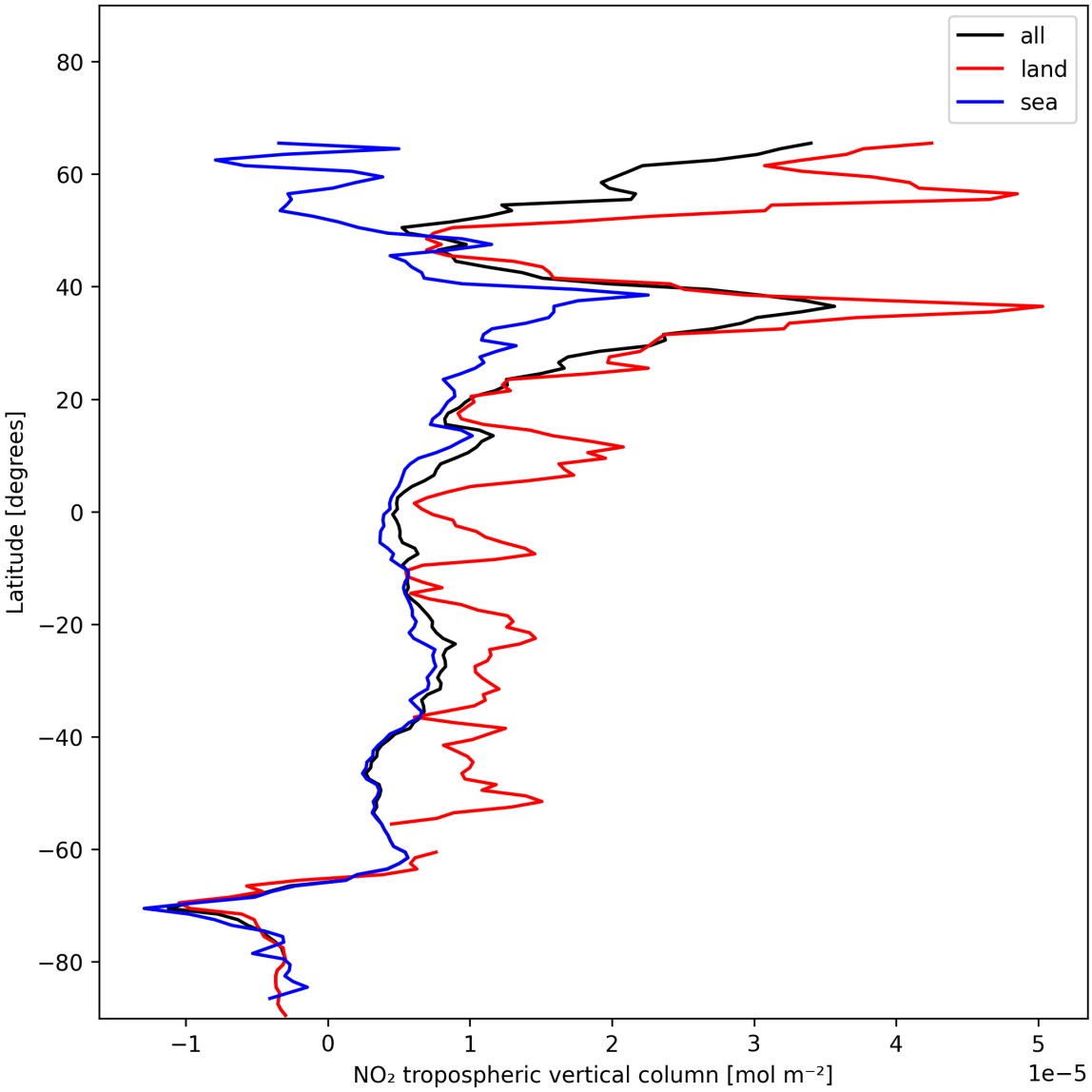

Figure 10: Zonal average of "NO_2 tropospheric vertical column" for 2024-12-03 to 2024-12-03.

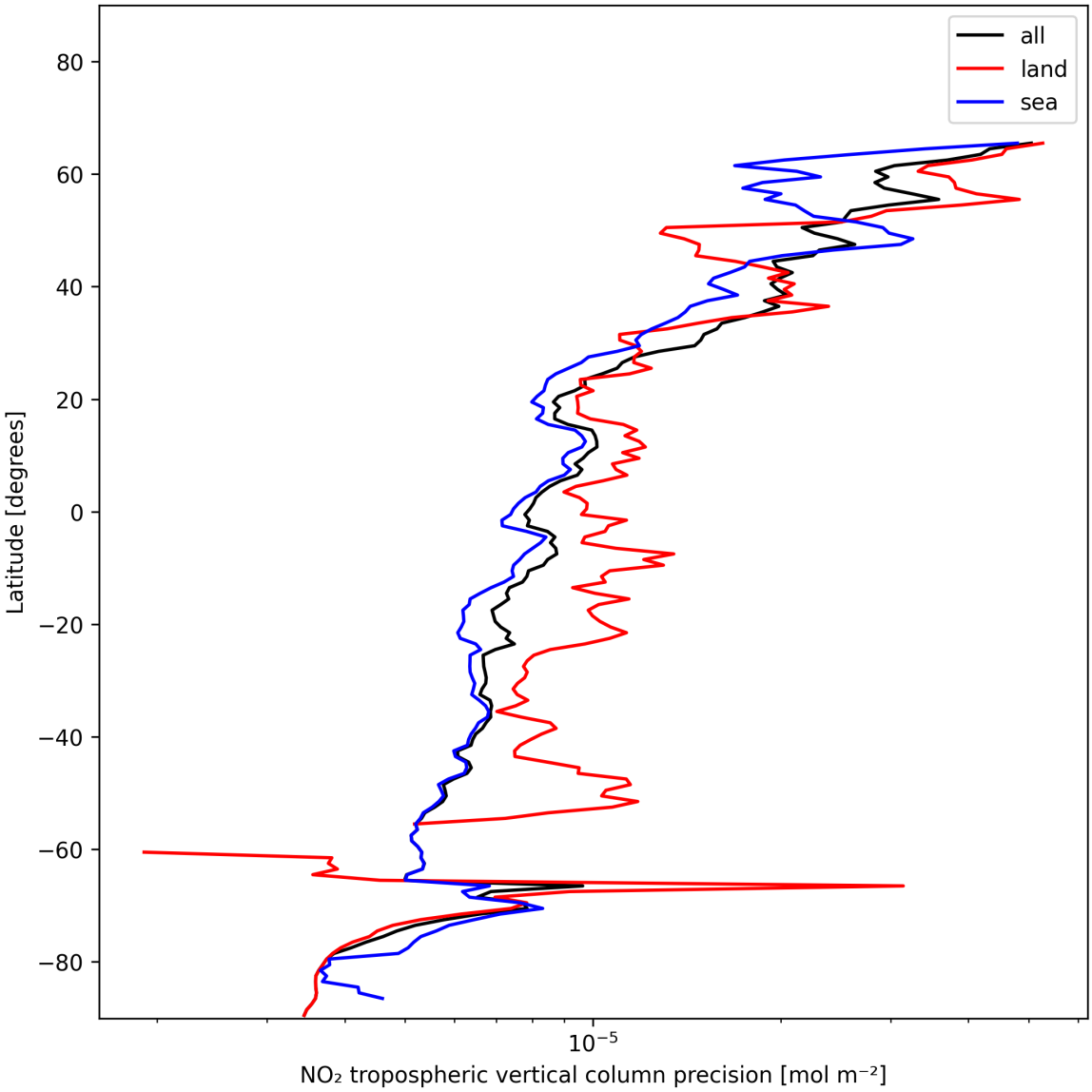

Figure 11: Zonal average of "NO_2 tropospheric vertical column precision" for 2024-12-03 to 2024-12-03.

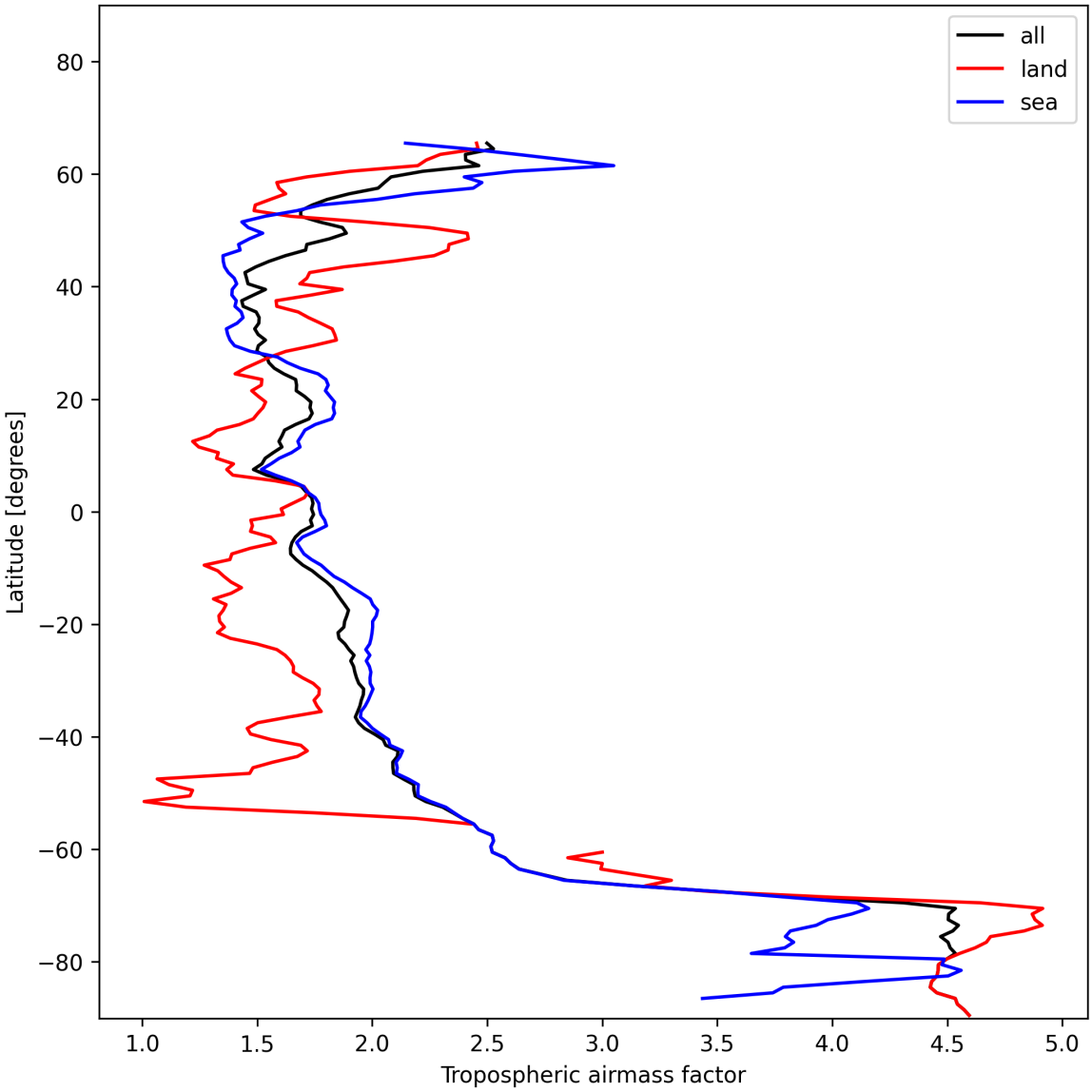

Figure 12: Zonal average of “Tropospheric airmass factor” for 2024-12-03 to 2024-12-03.

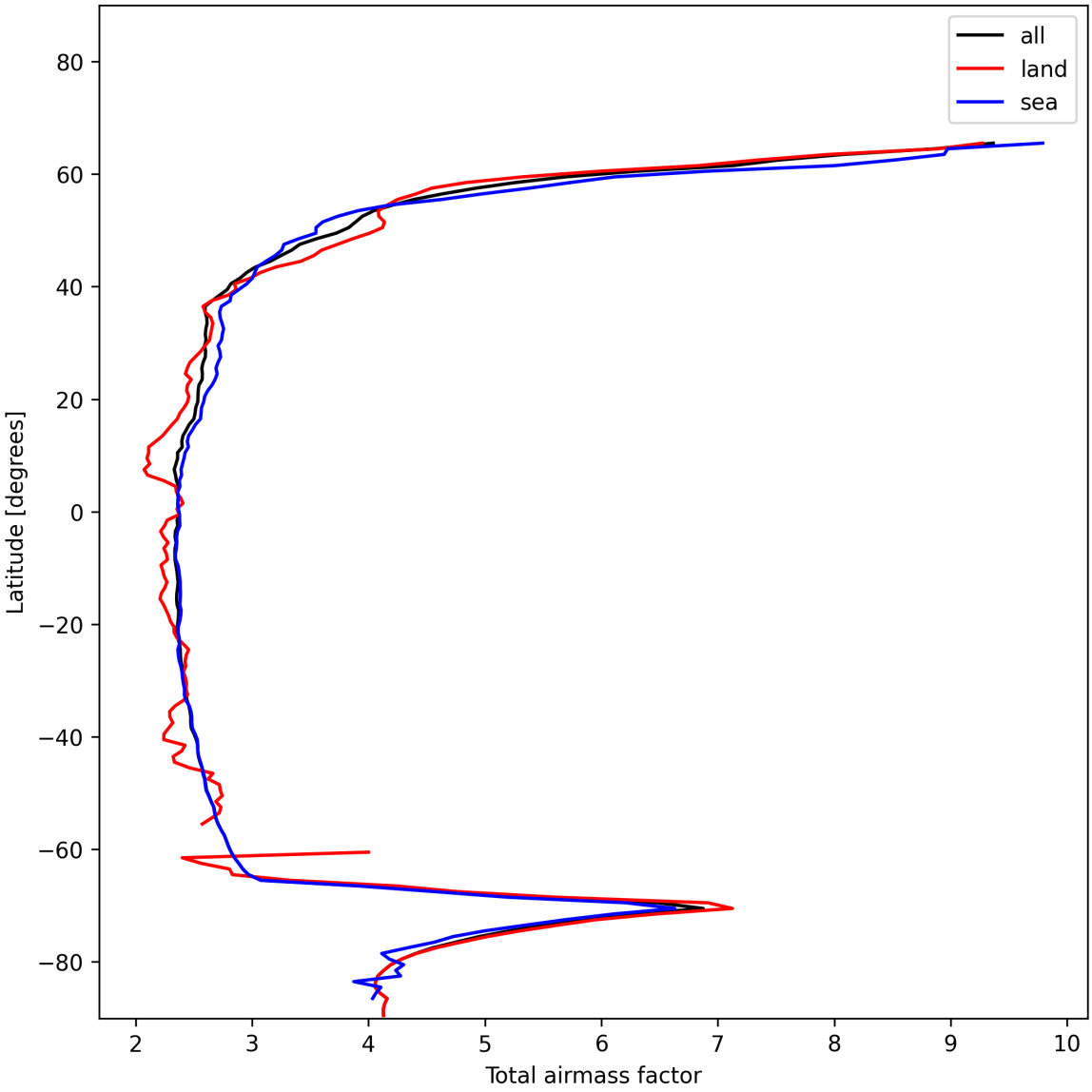

Figure 13: Zonal average of “Total airmass factor” for 2024-12-03 to 2024-12-03.

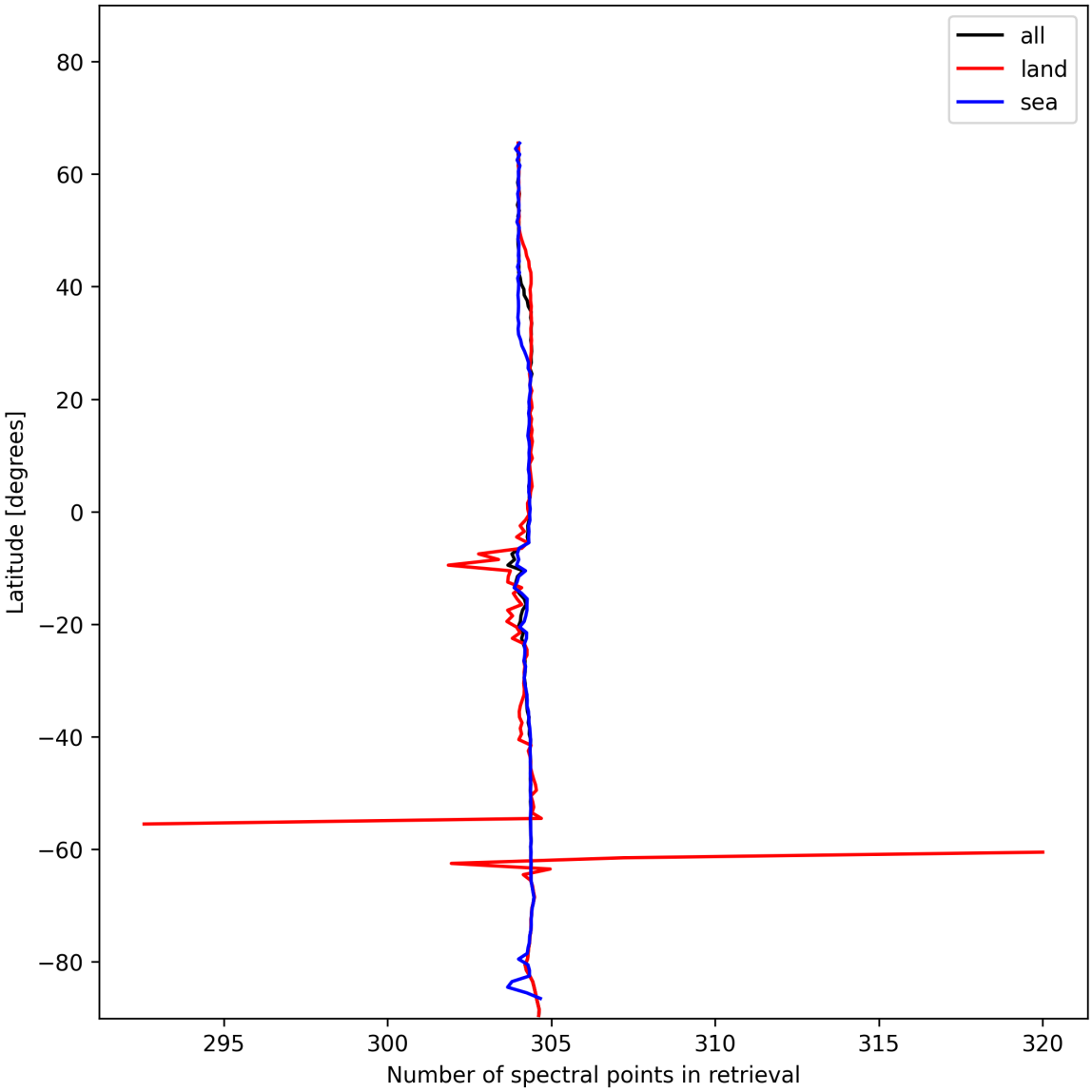

Figure 14: Zonal average of “Number of spectral points in retrieval” for 2024-12-03 to 2024-12-03.

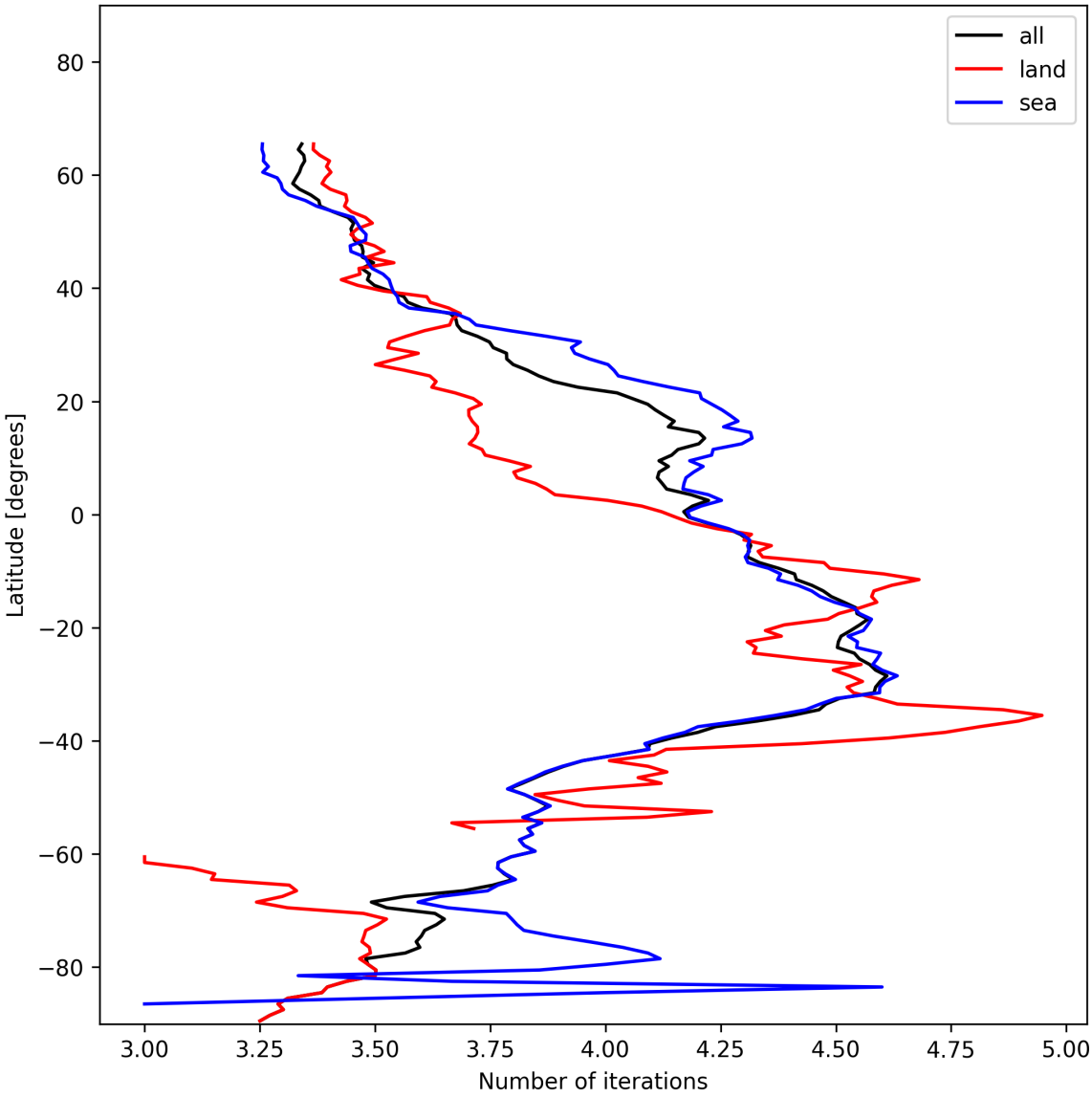

Figure 15: Zonal average of “Number of iterations” for 2024-12-03 to 2024-12-03.

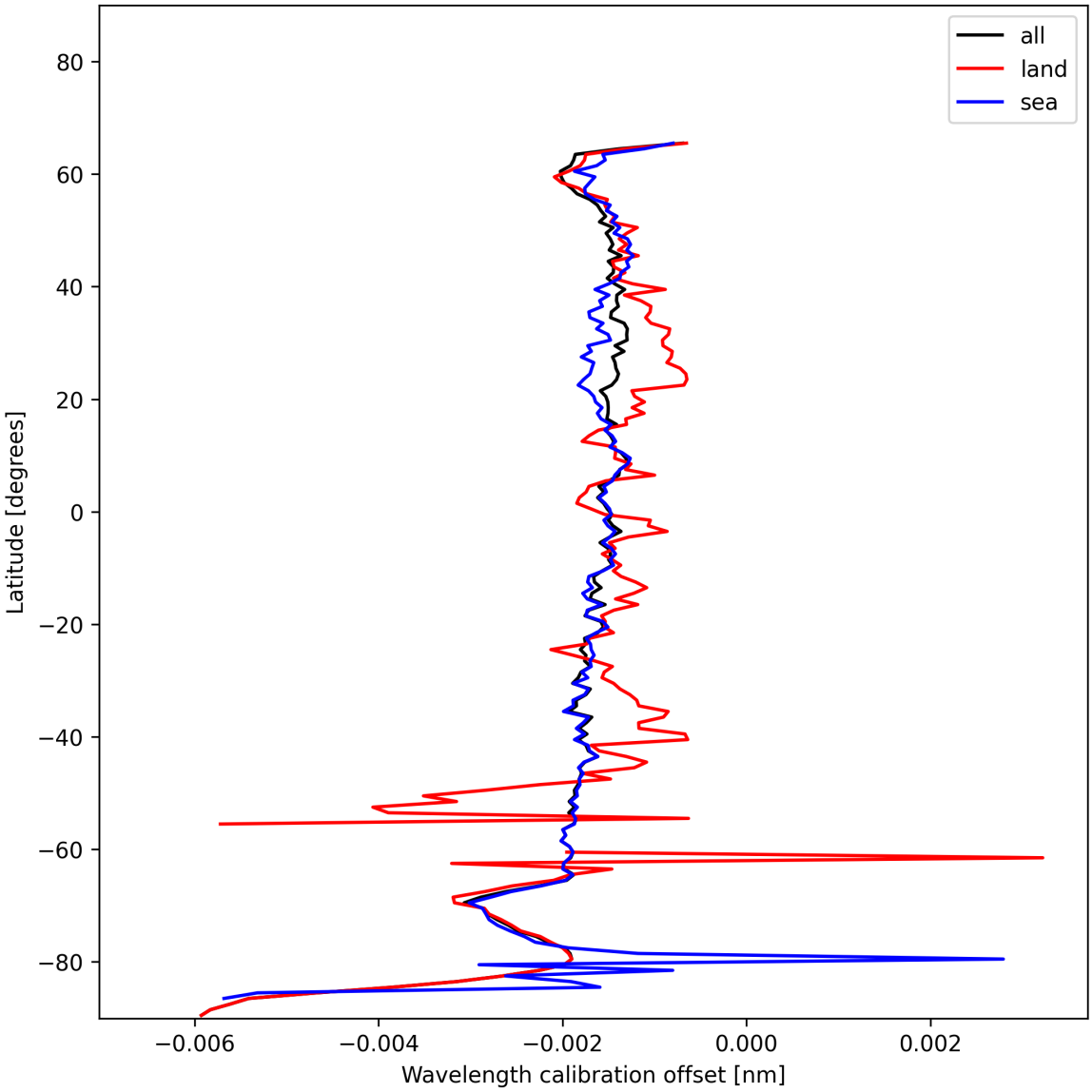

Figure 16: Zonal average of “Wavelength calibration offset” for 2024-12-03 to 2024-12-03.

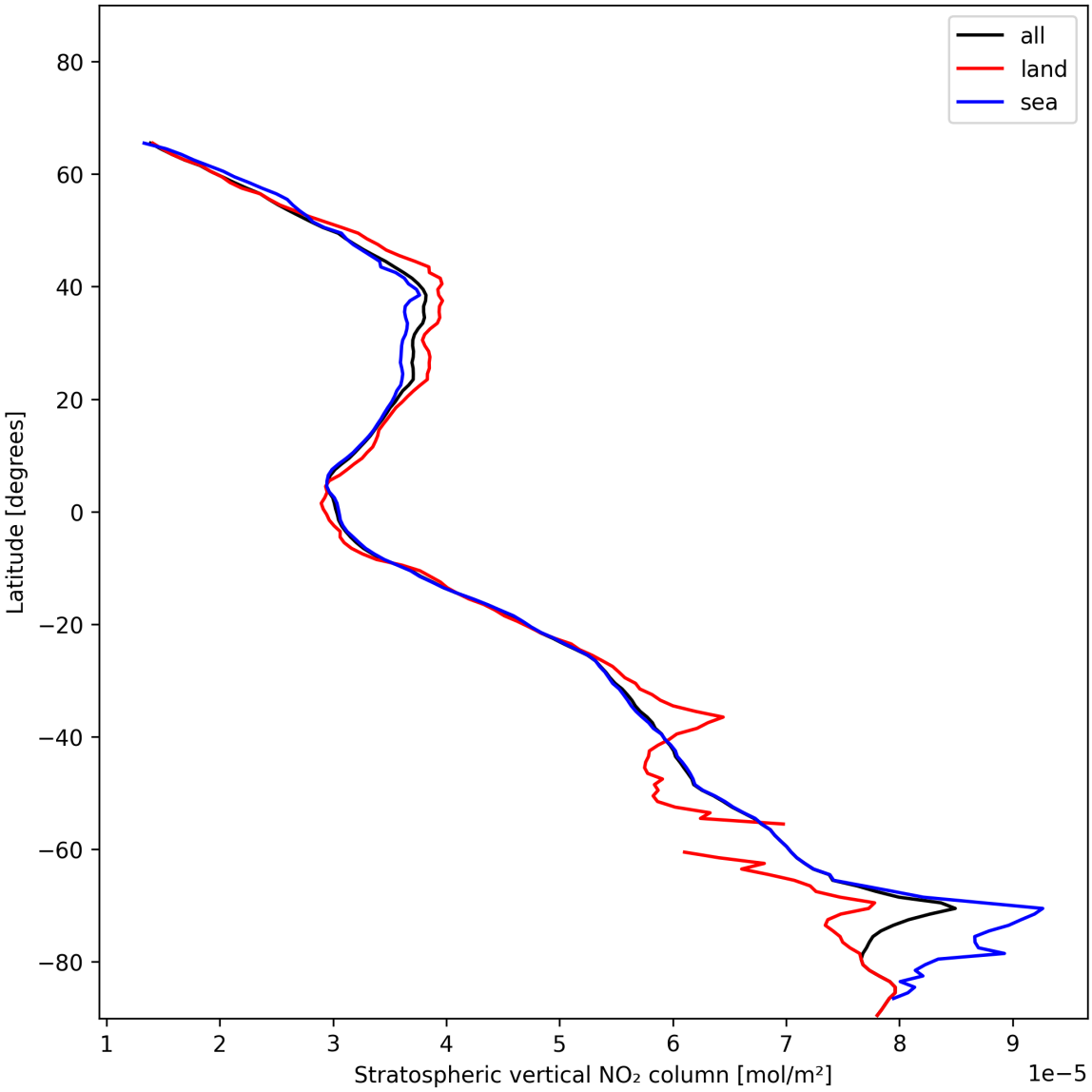

Figure 17: Zonal average of “Stratospheric vertical NO_2 column” for 2024-12-03 to 2024-12-03.

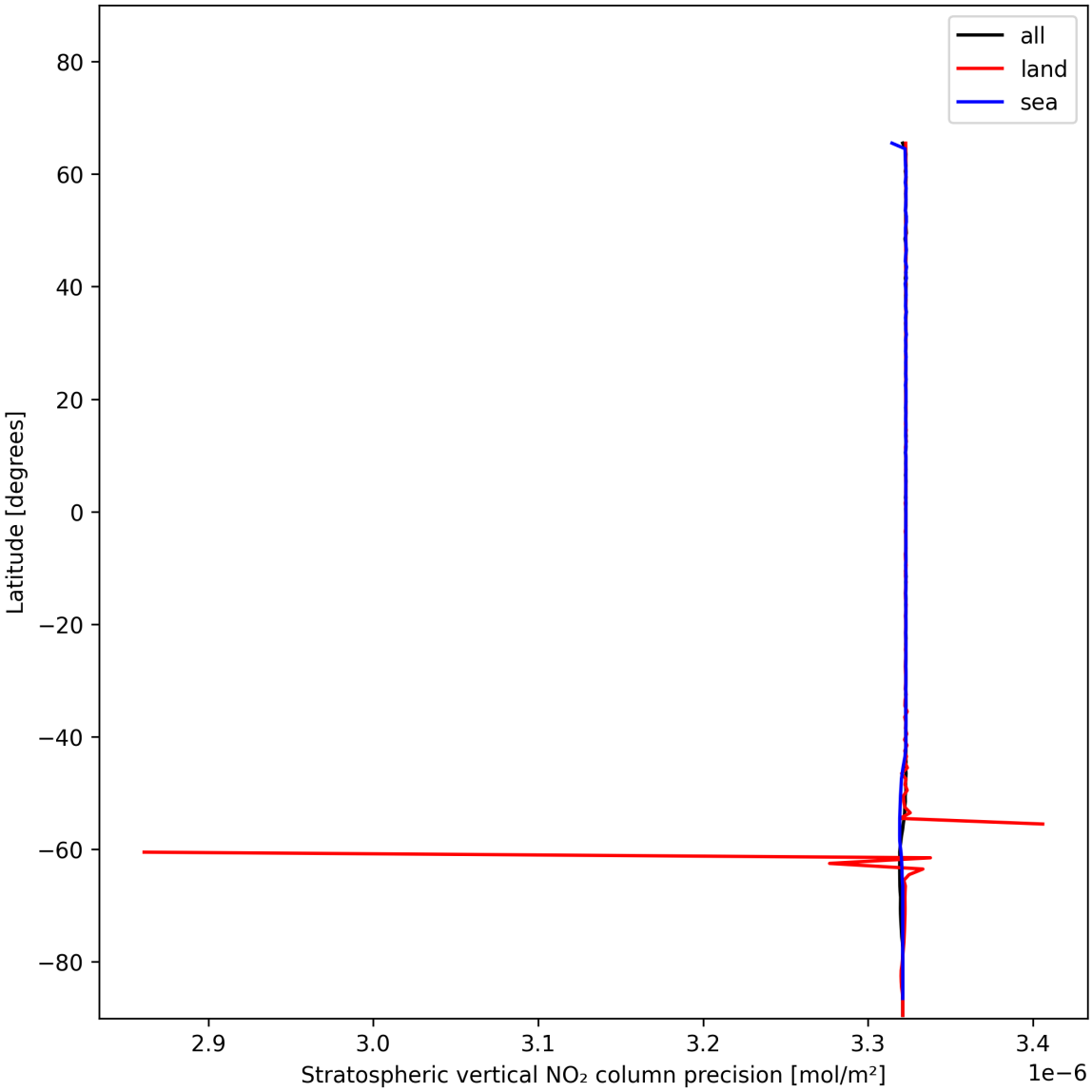

Figure 18: Zonal average of "Stratospheric vertical NO_2 column precision" for 2024-12-03 to 2024-12-03.

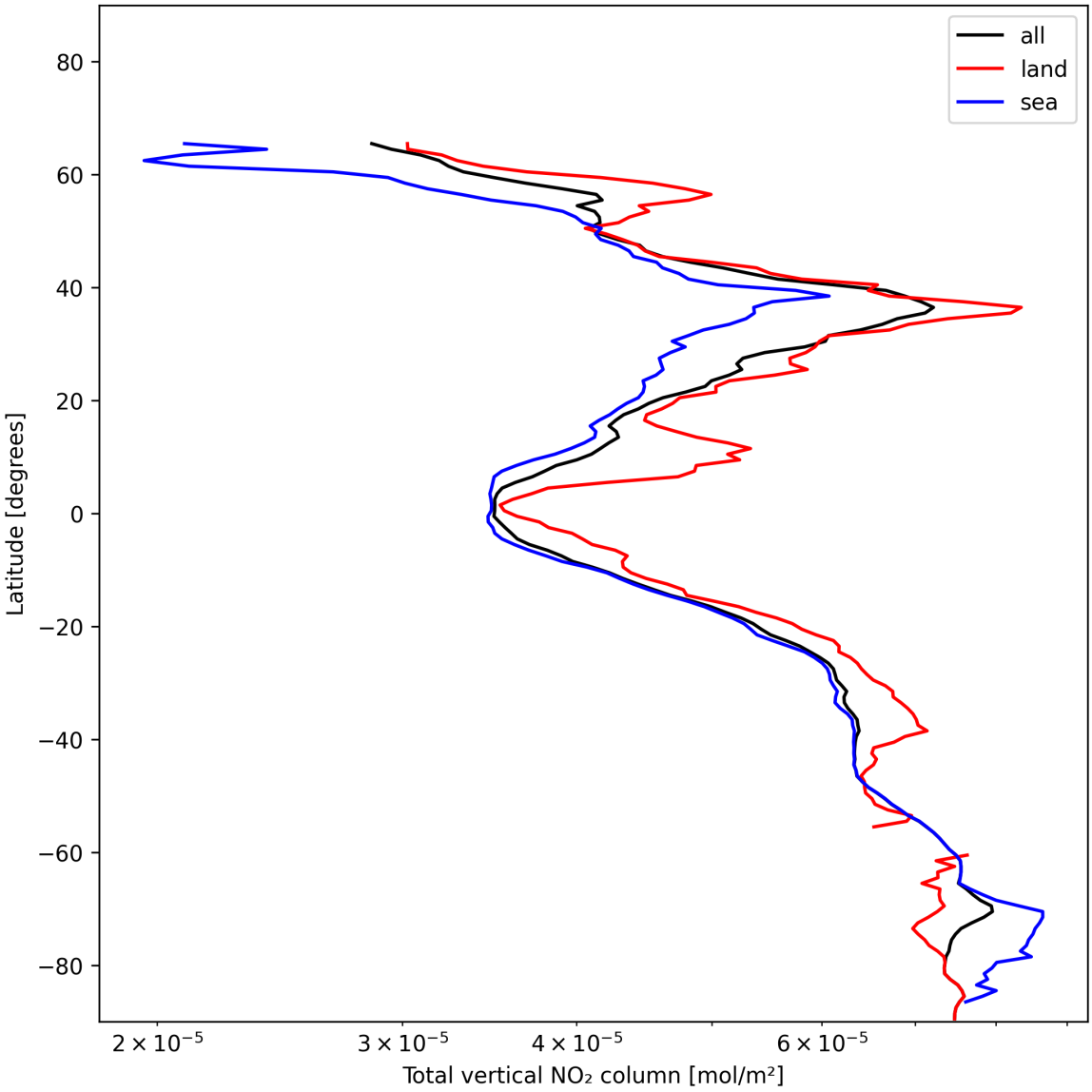

Figure 19: Zonal average of "Total vertical NO_2 column" for 2024-12-03 to 2024-12-03.

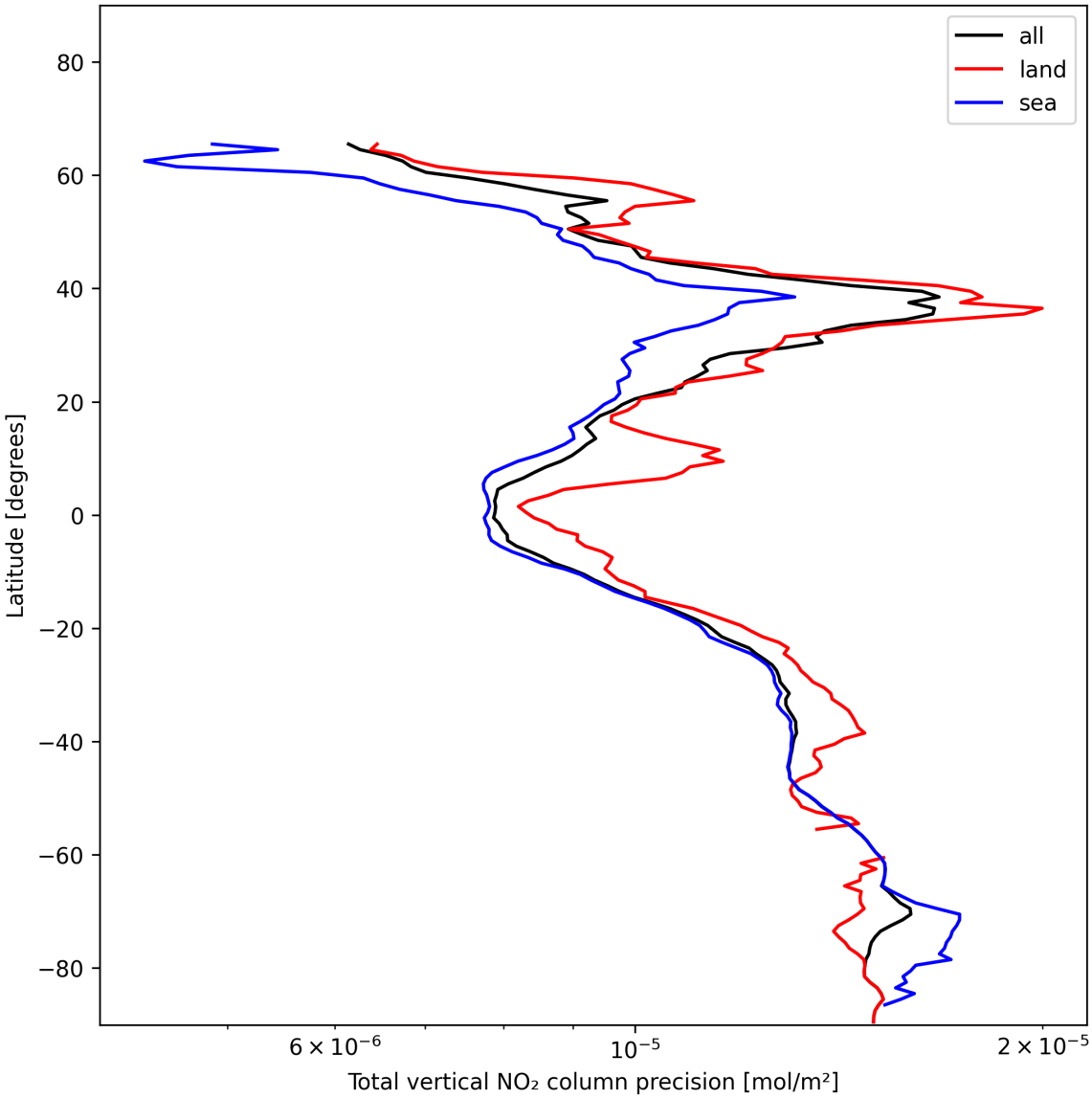

Figure 20: Zonal average of "Total vertical NO_2 column precision" for 2024-12-03 to 2024-12-03.

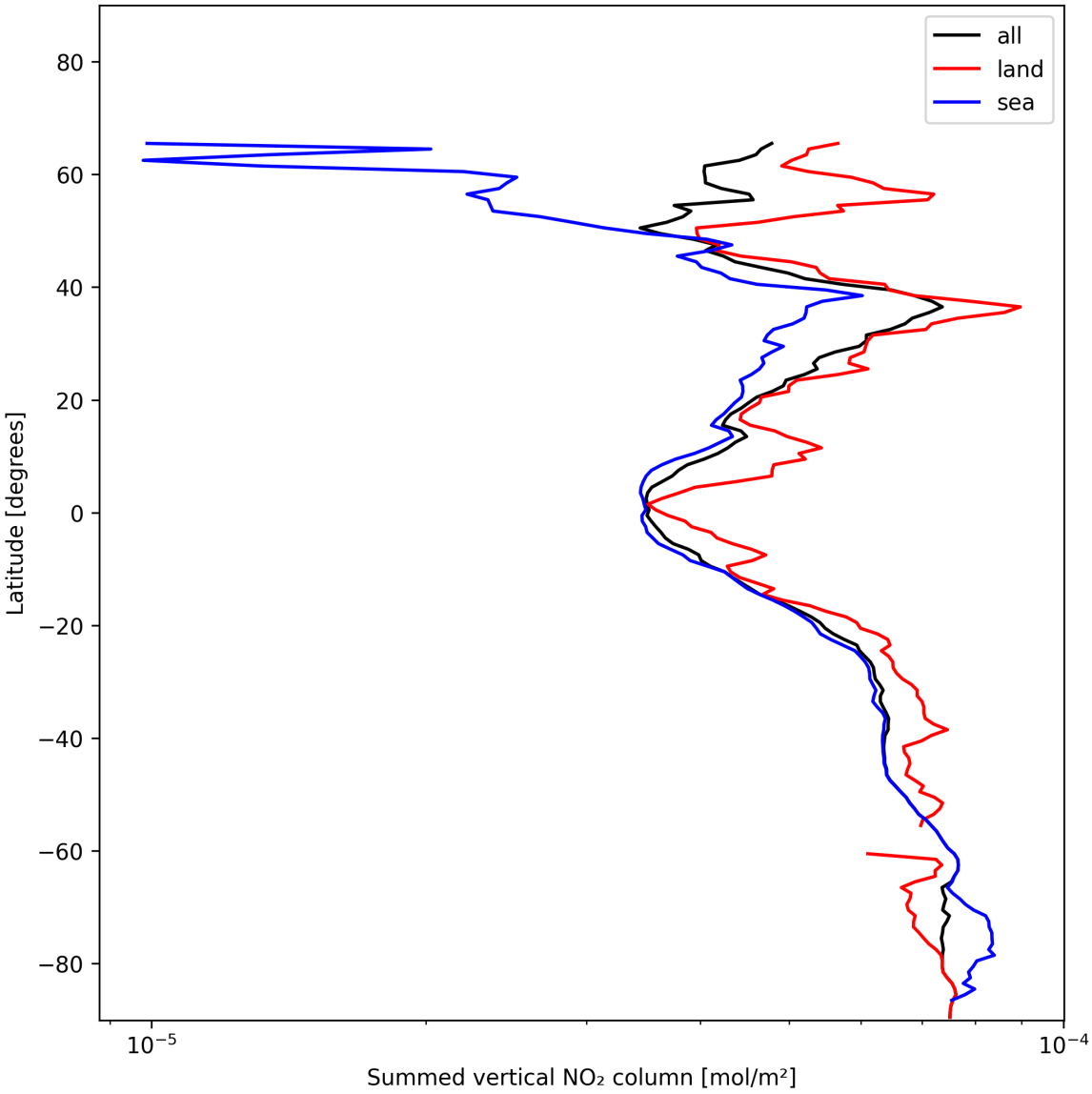

Figure 21: Zonal average of "Summed vertical NO_2 column" for 2024-12-03 to 2024-12-03.

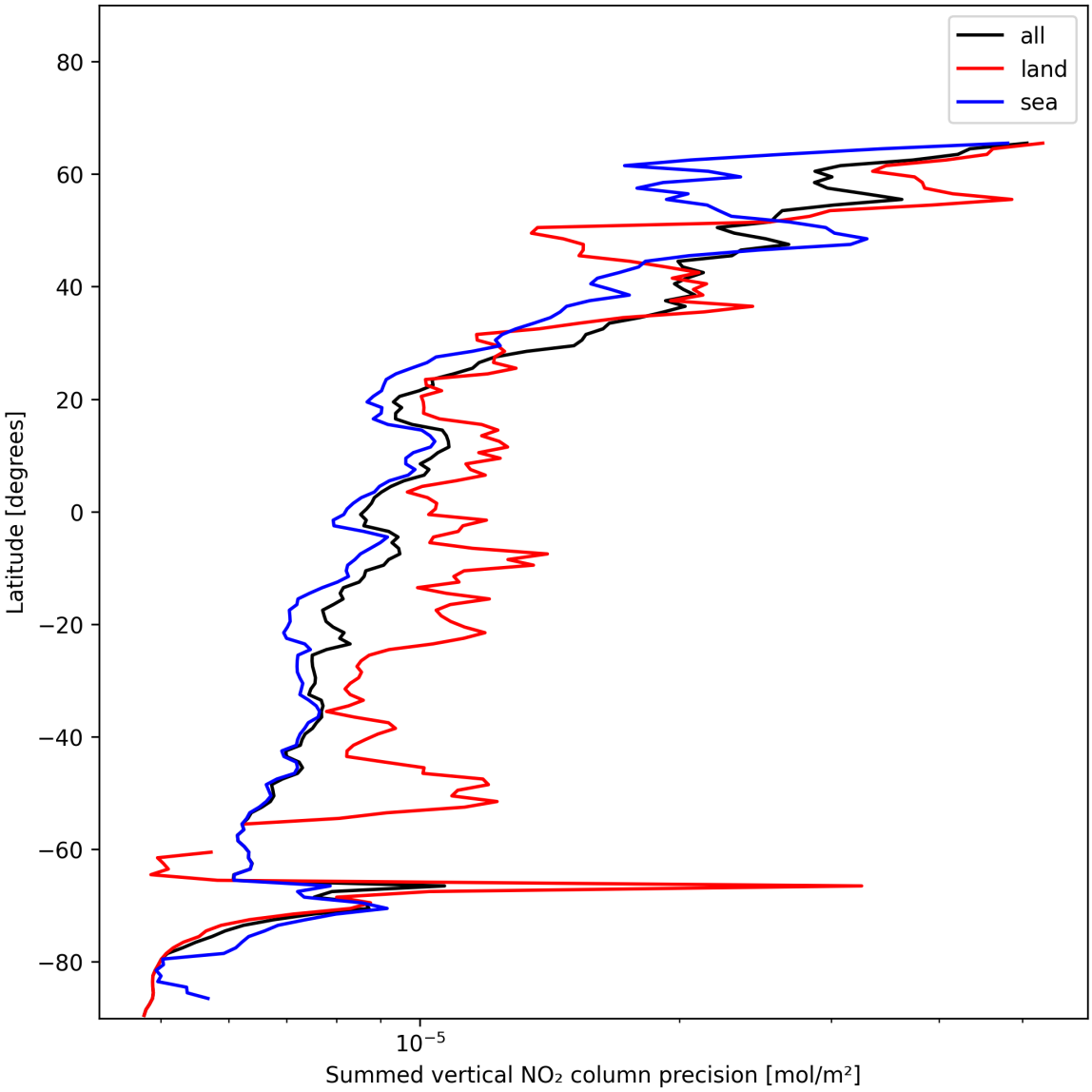

Figure 22: Zonal average of "Summed vertical NO_2 column precision" for 2024-12-03 to 2024-12-03.

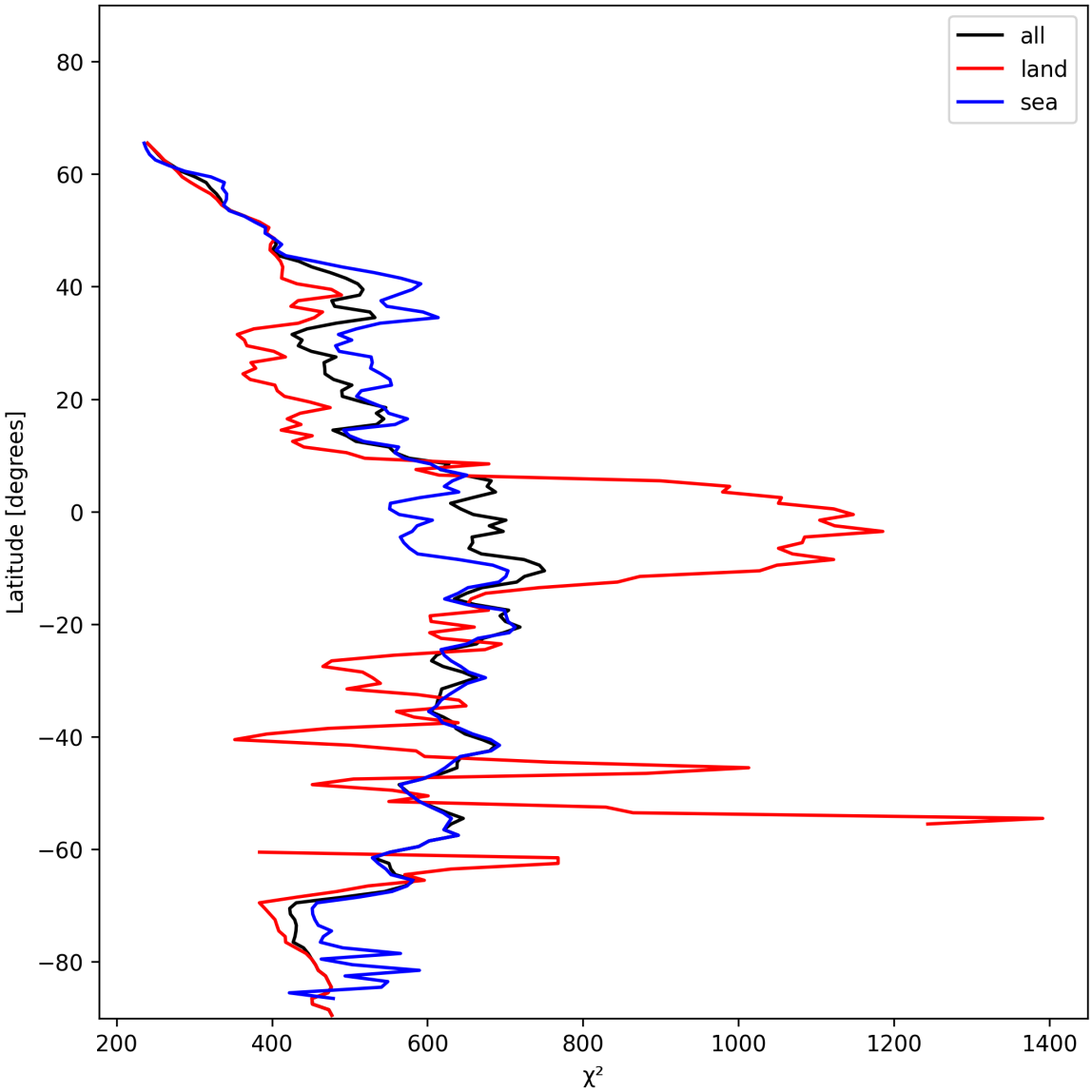

Figure 23: Zonal average of "χ^2" for 2024-12-03 to 2024-12-03.

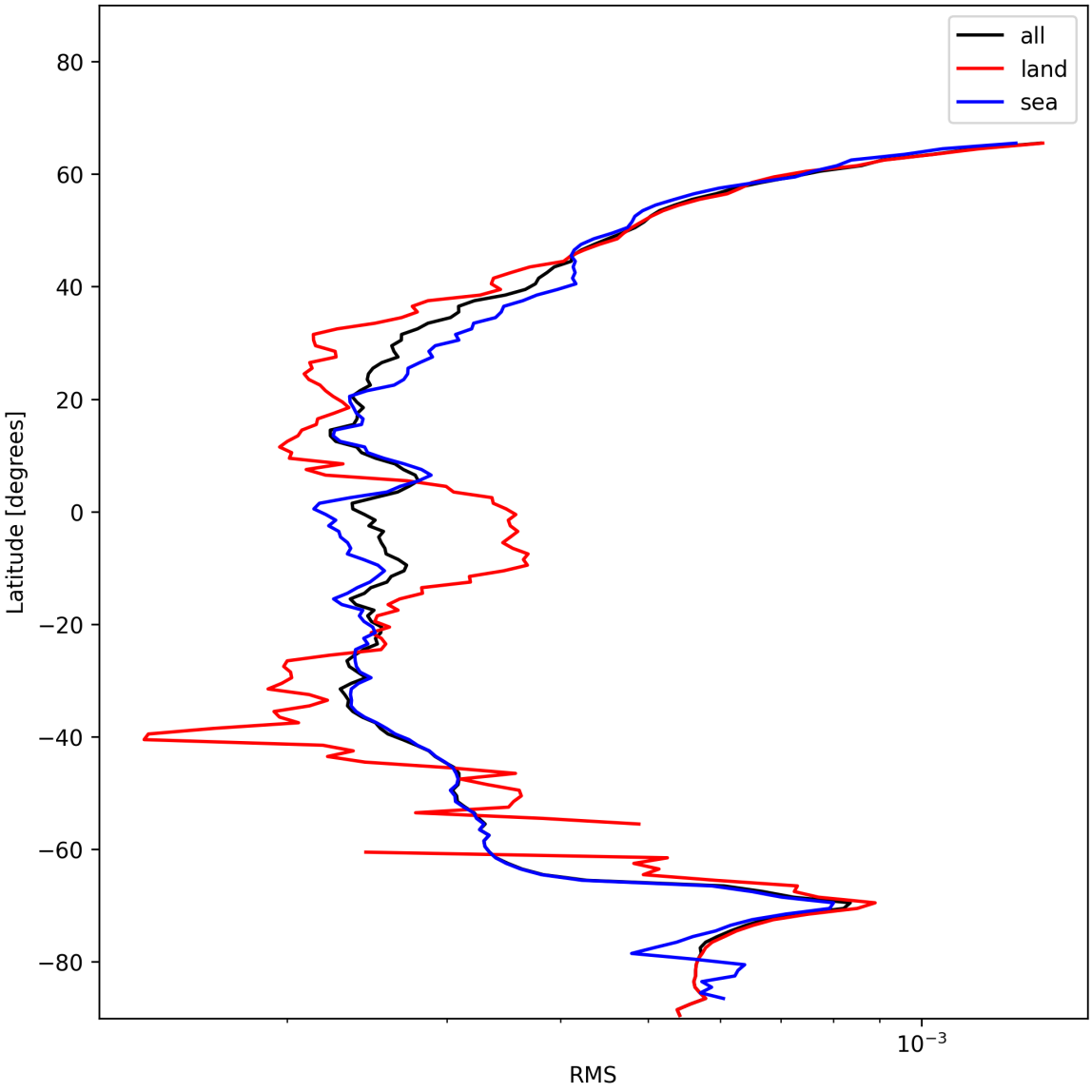

Figure 24: Zonal average of “RMS” for 2024-12-03 to 2024-12-03.

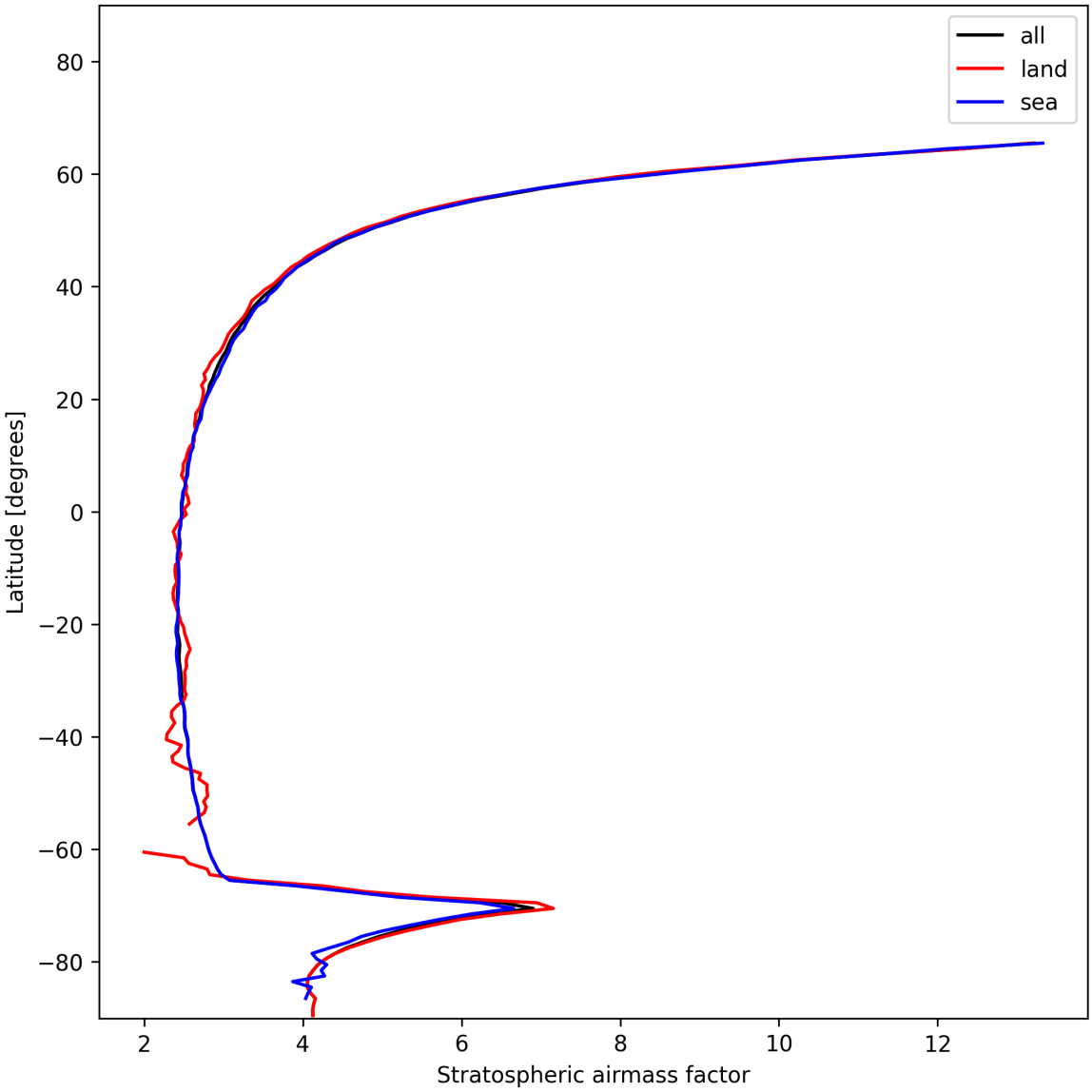

Figure 25: Zonal average of “Stratospheric airmass factor” for 2024-12-03 to 2024-12-03.

8 Histograms

The definitions of the parameters given in this section can be found in section 2.

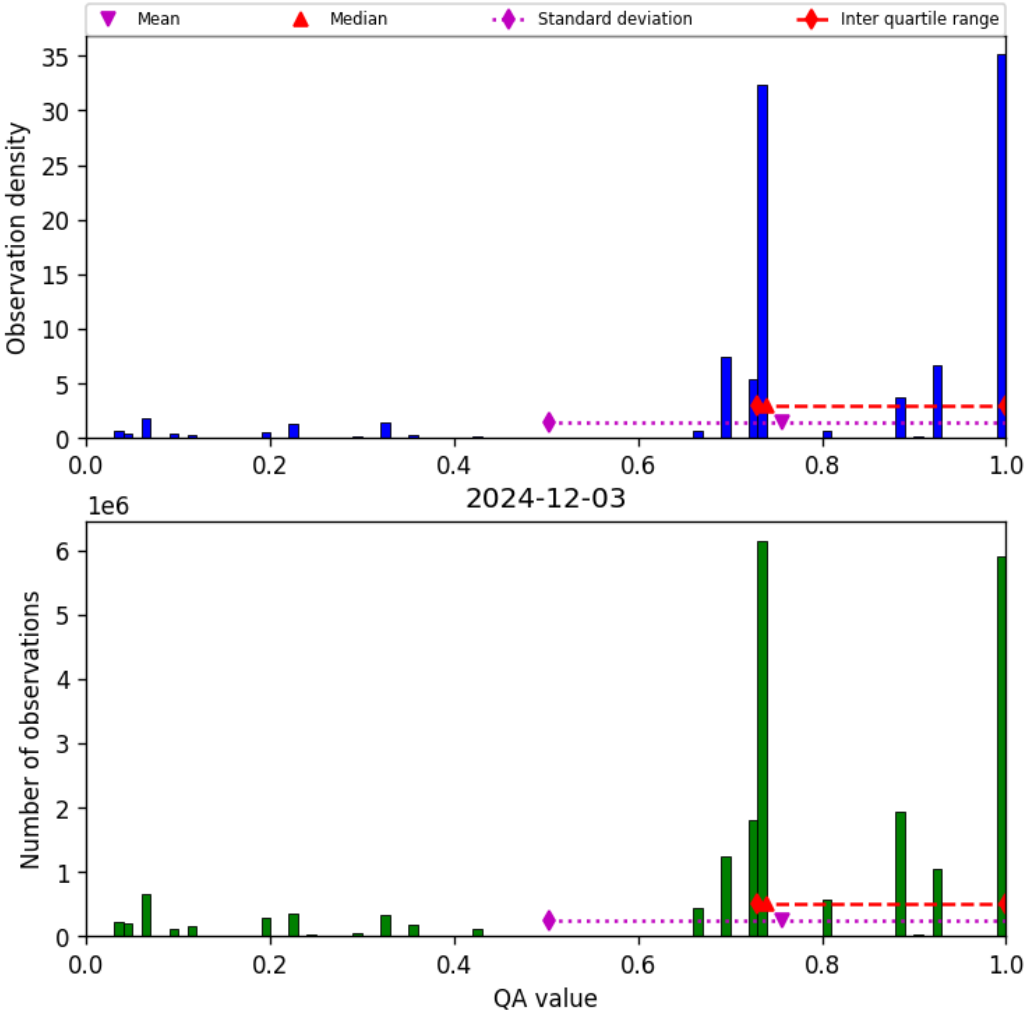

Figure 26: Histogram of “QA value” for 2024-12-03 to 2024-12-03

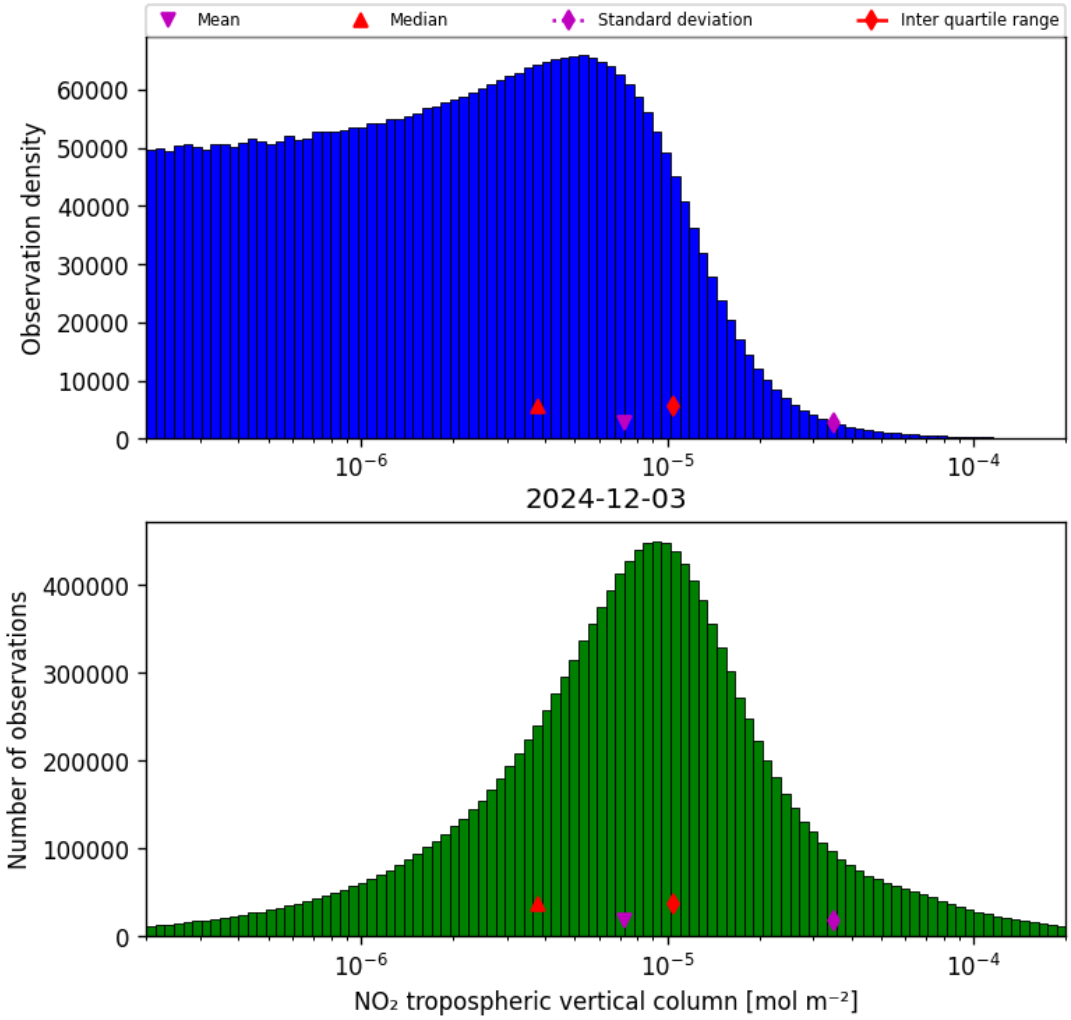

Figure 27: Histogram of "NO_2 tropospheric vertical column" for 2024-12-03 to 2024-12-03

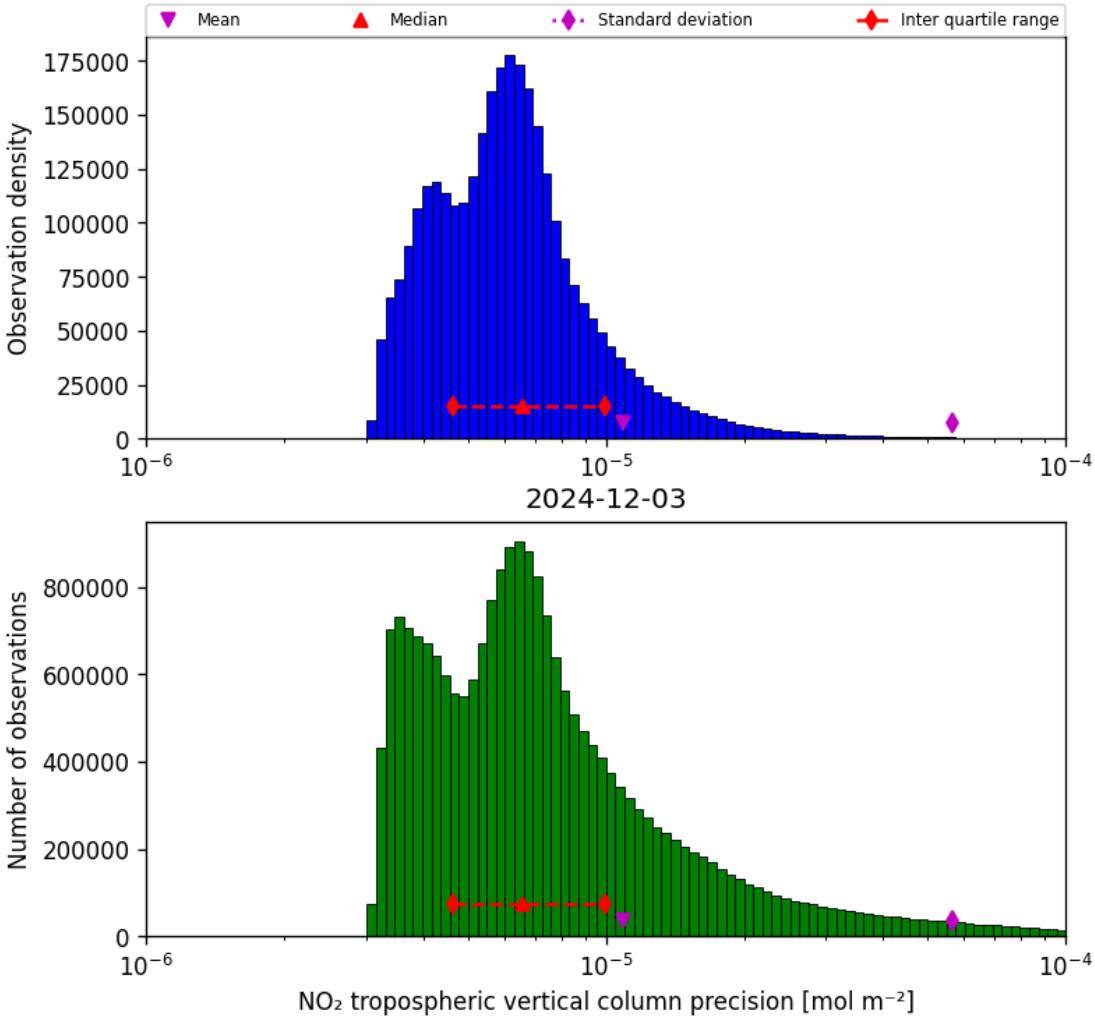

Figure 28: Histogram of "NO_2 tropospheric vertical column precision" for 2024-12-03 to 2024-12-03

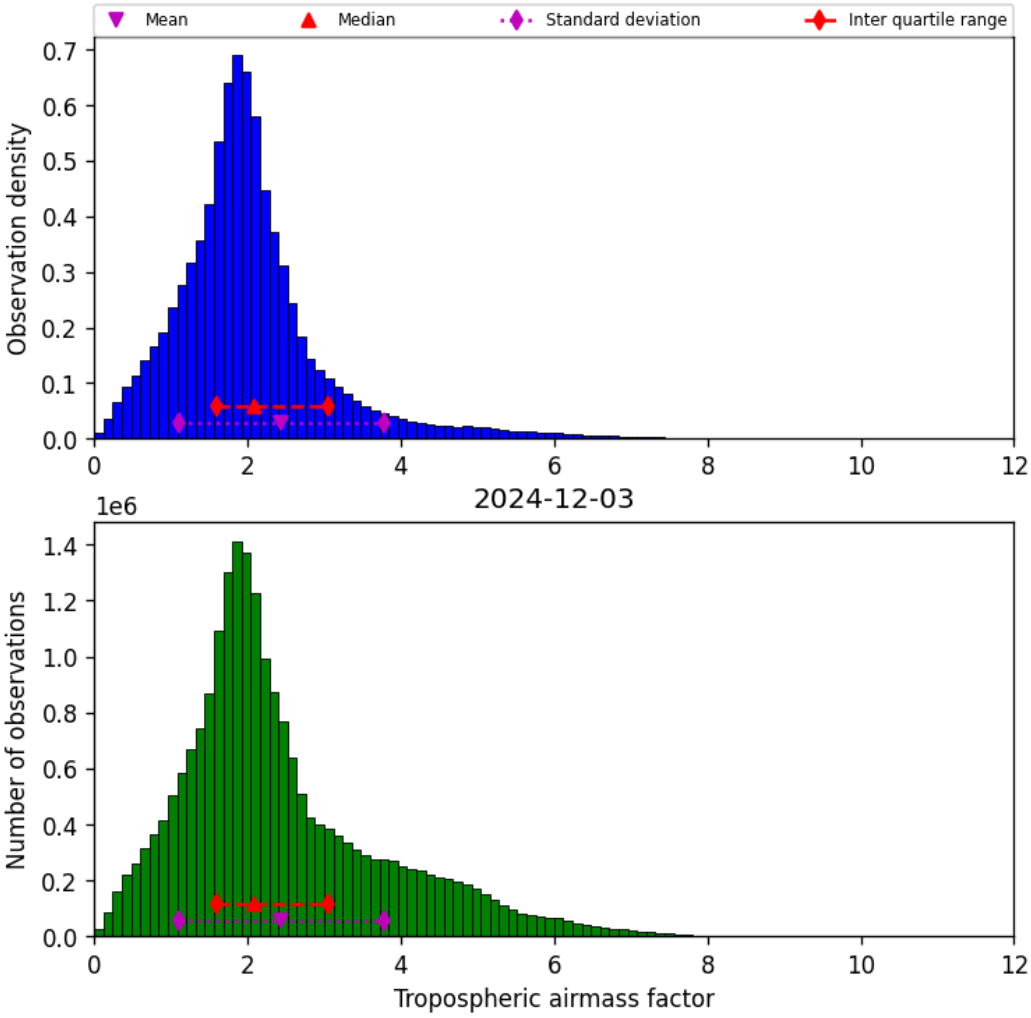

Figure 29: Histogram of “Tropospheric airmass factor” for 2024-12-03 to 2024-12-03

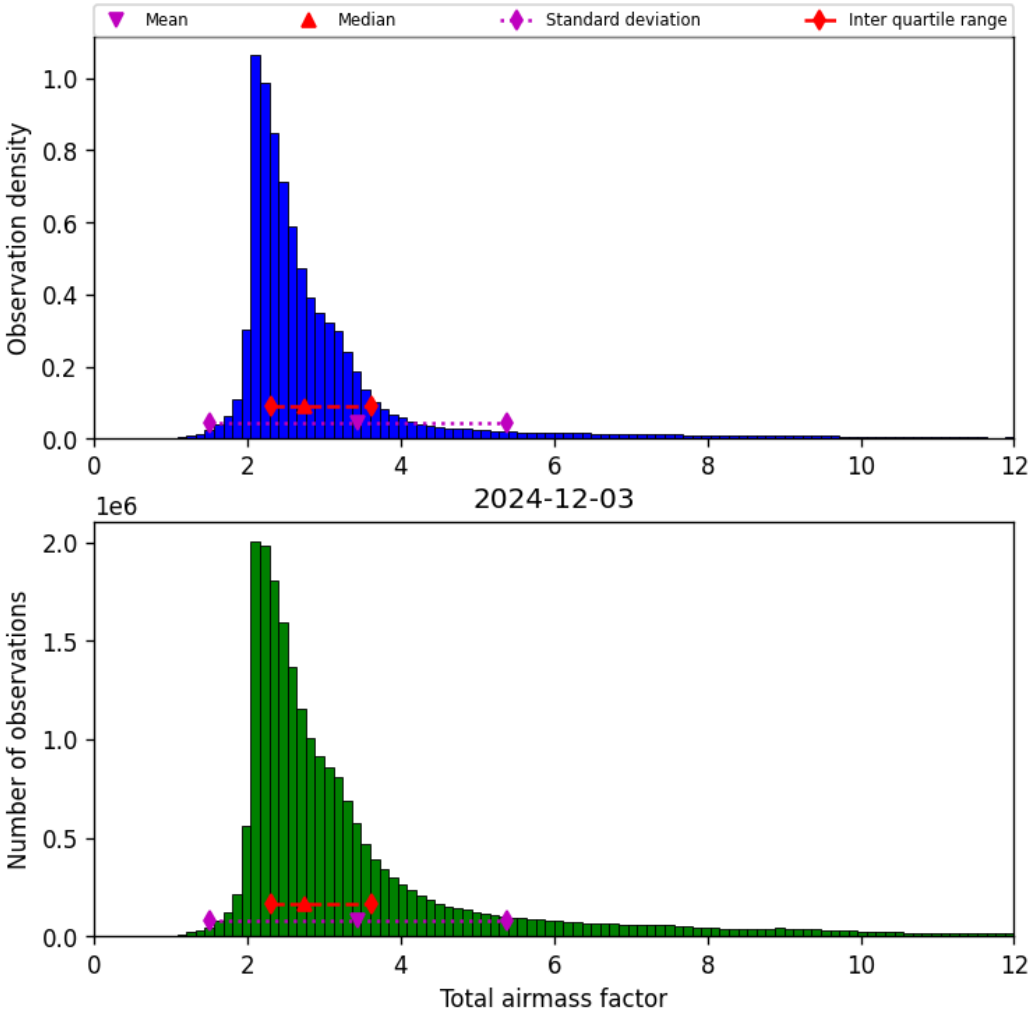

Figure 30: Histogram of “Total airmass factor” for 2024-12-03 to 2024-12-03

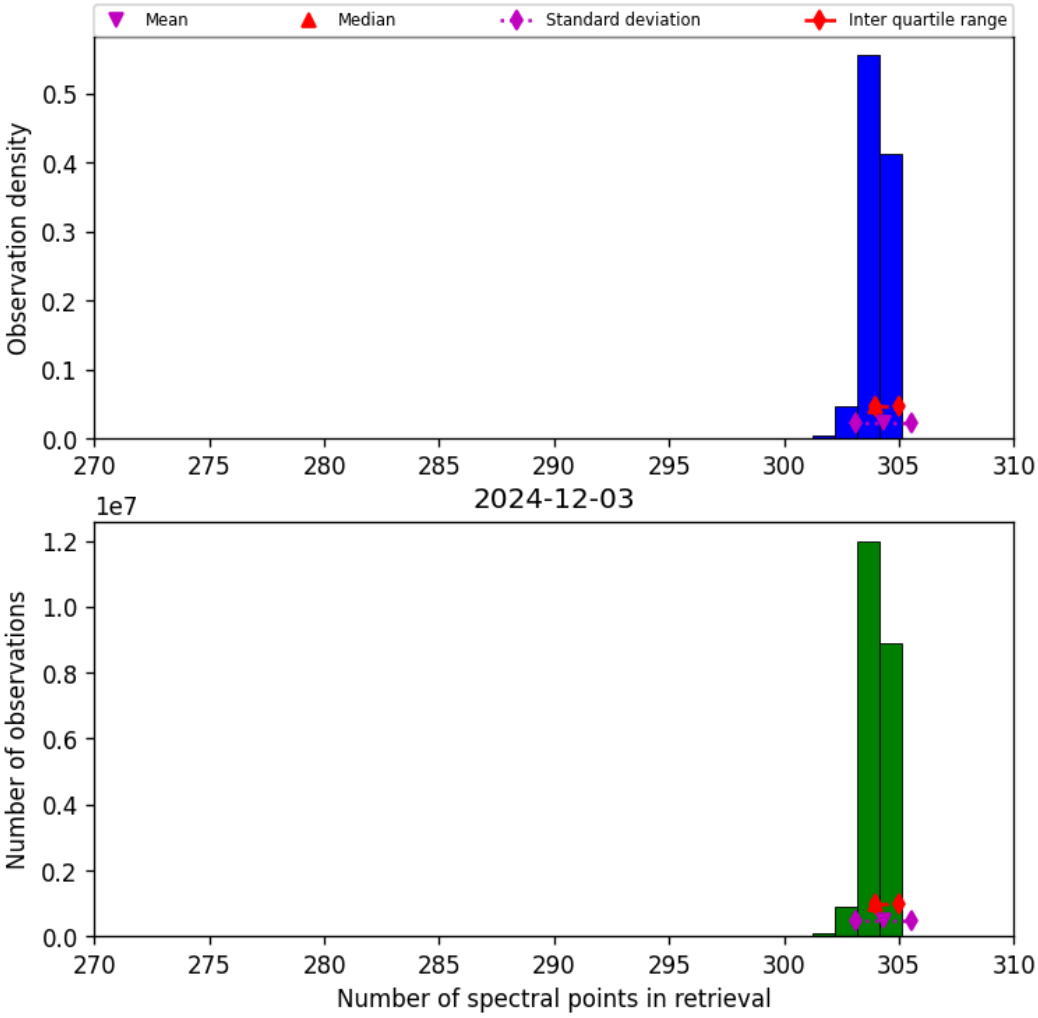

Figure 31: Histogram of “Number of spectral points in retrieval” for 2024-12-03 to 2024-12-03

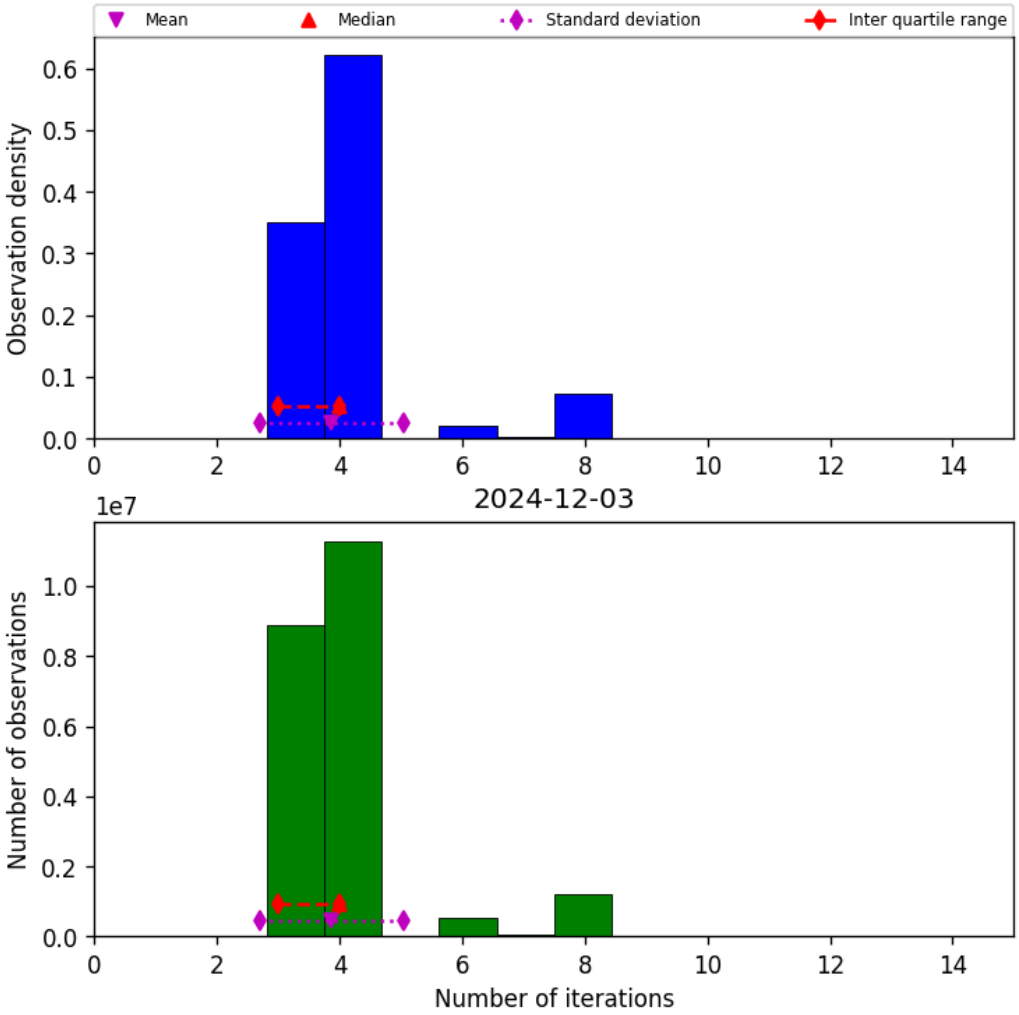

Figure 32: Histogram of “Number of iterations” for 2024-12-03 to 2024-12-03

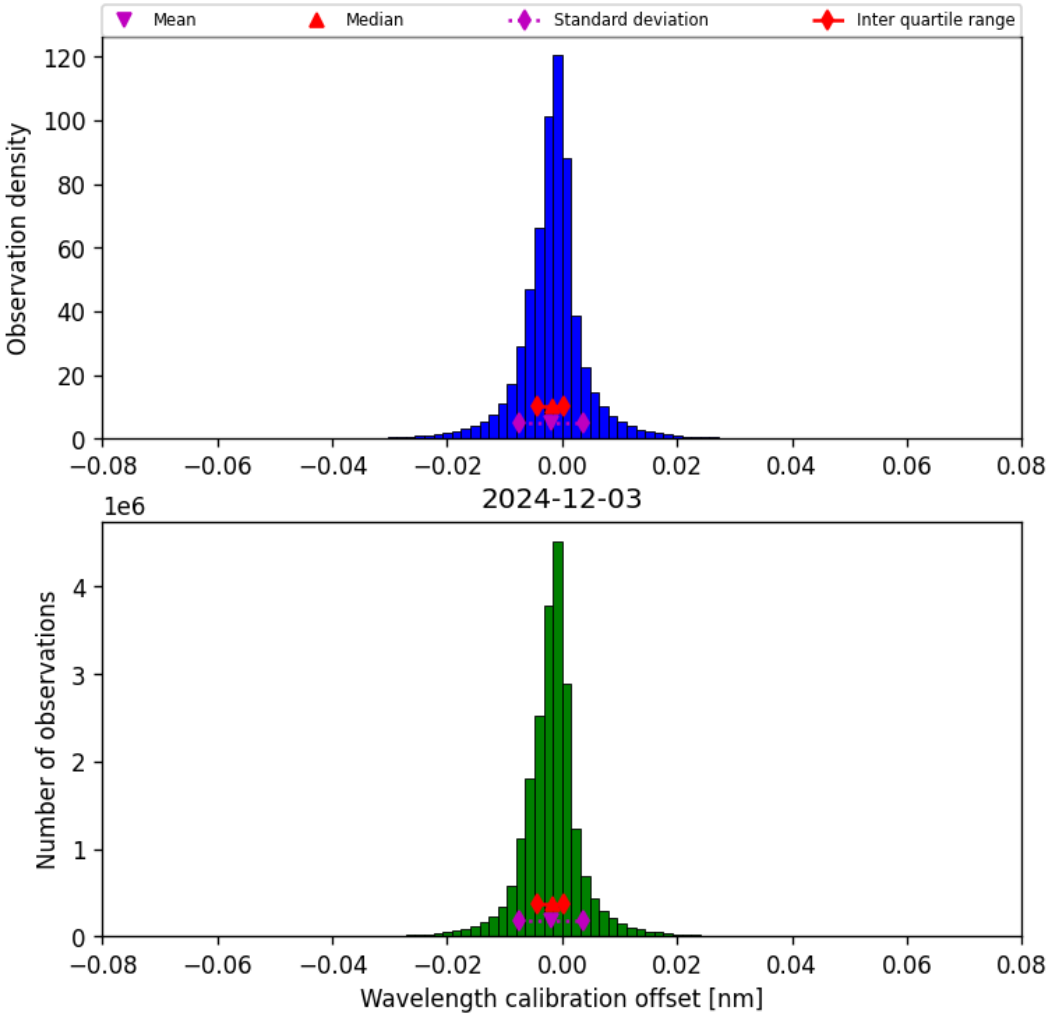

Figure 33: Histogram of “Wavelength calibration offset” for 2024-12-03 to 2024-12-03

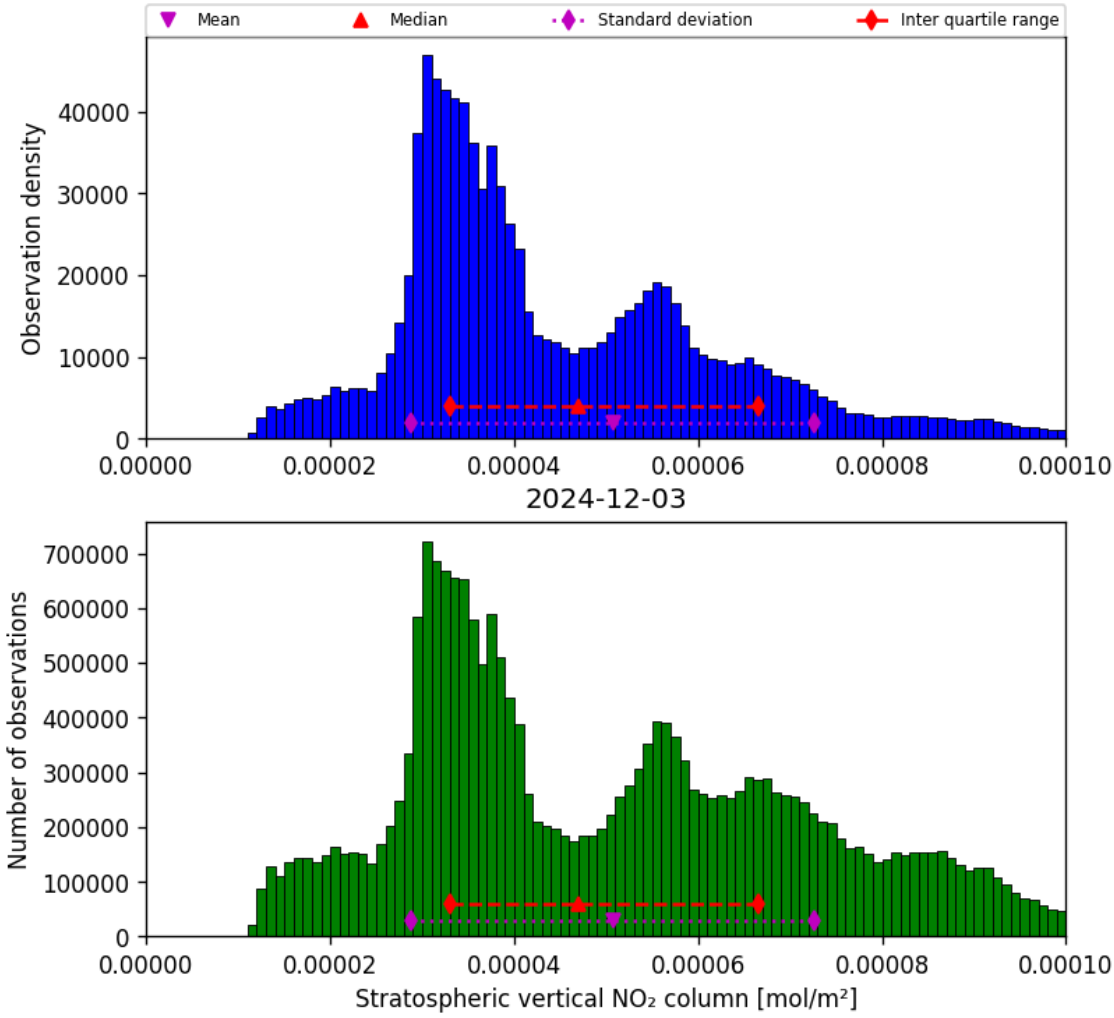

Figure 34: Histogram of “Stratospheric vertical NO_2 column” for 2024-12-03 to 2024-12-03

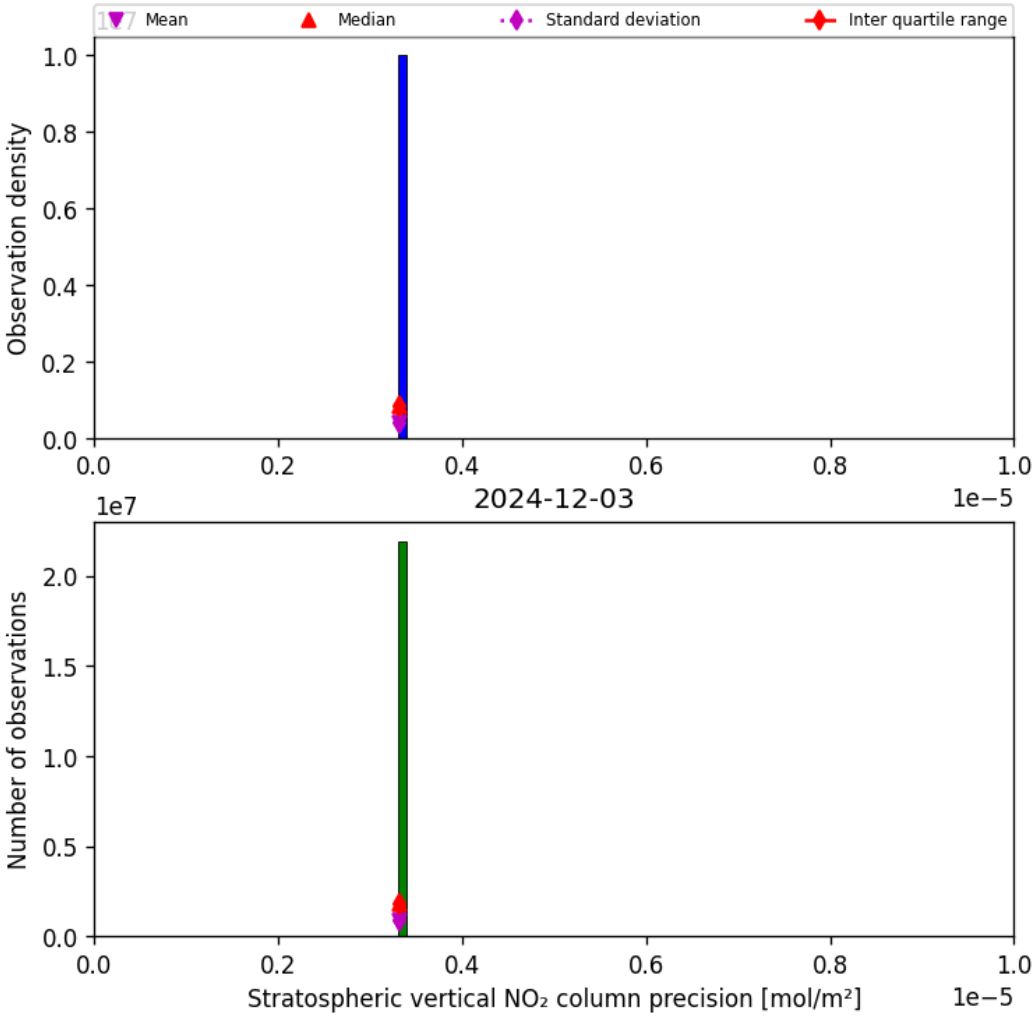

Figure 35: Histogram of “Stratospheric vertical NO_2 column precision” for 2024-12-03 to 2024-12-03

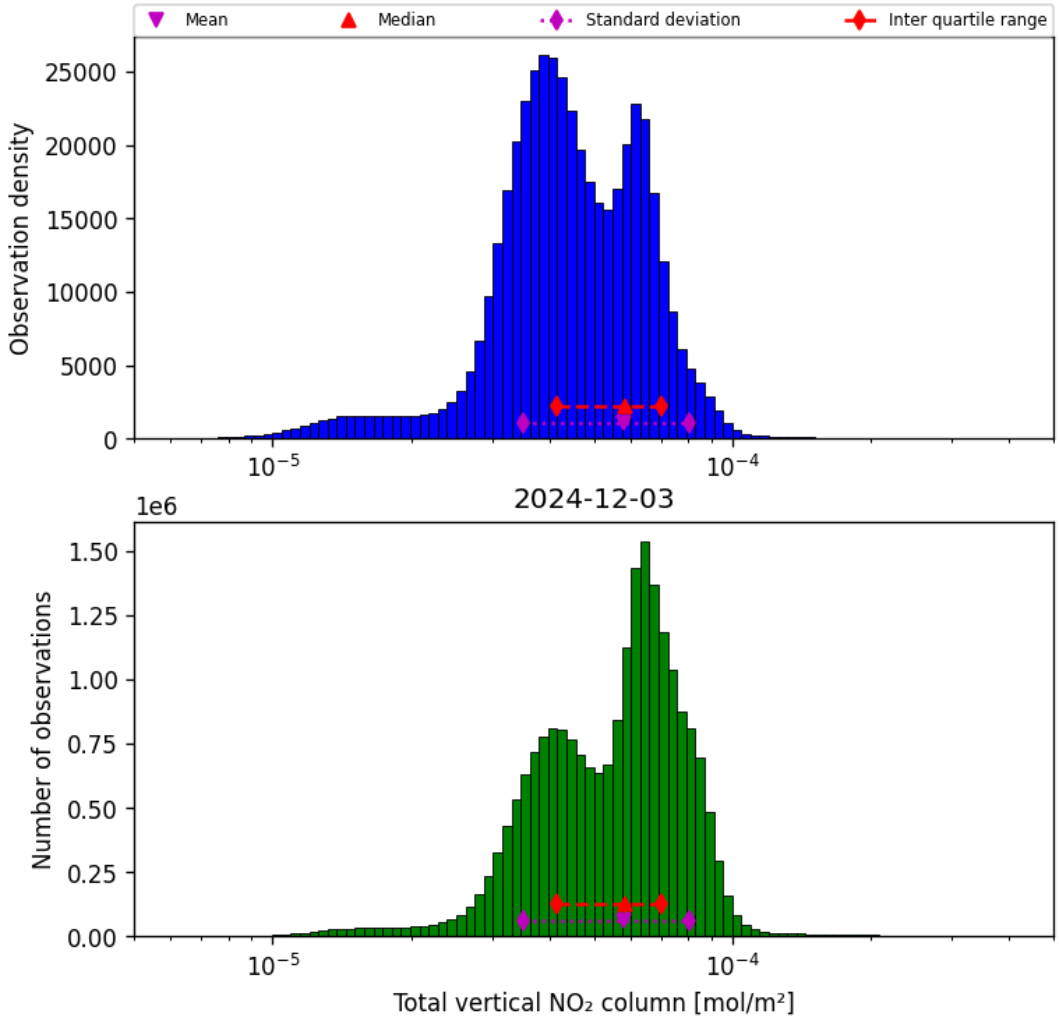

Figure 36: Histogram of "Total vertical NO_2 column" for 2024-12-03 to 2024-12-03

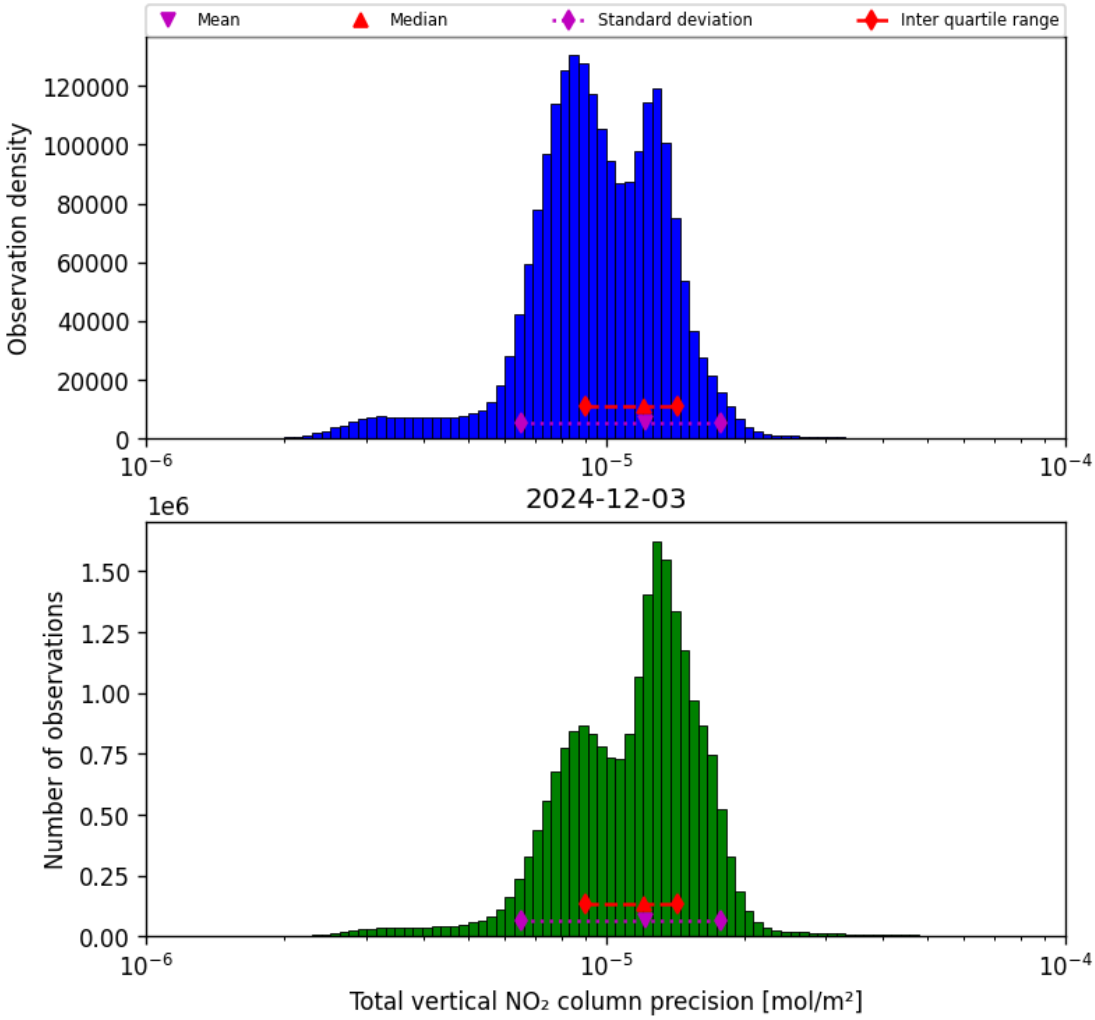

Figure 37: Histogram of "Total vertical NO_2 column precision" for 2024-12-03 to 2024-12-03

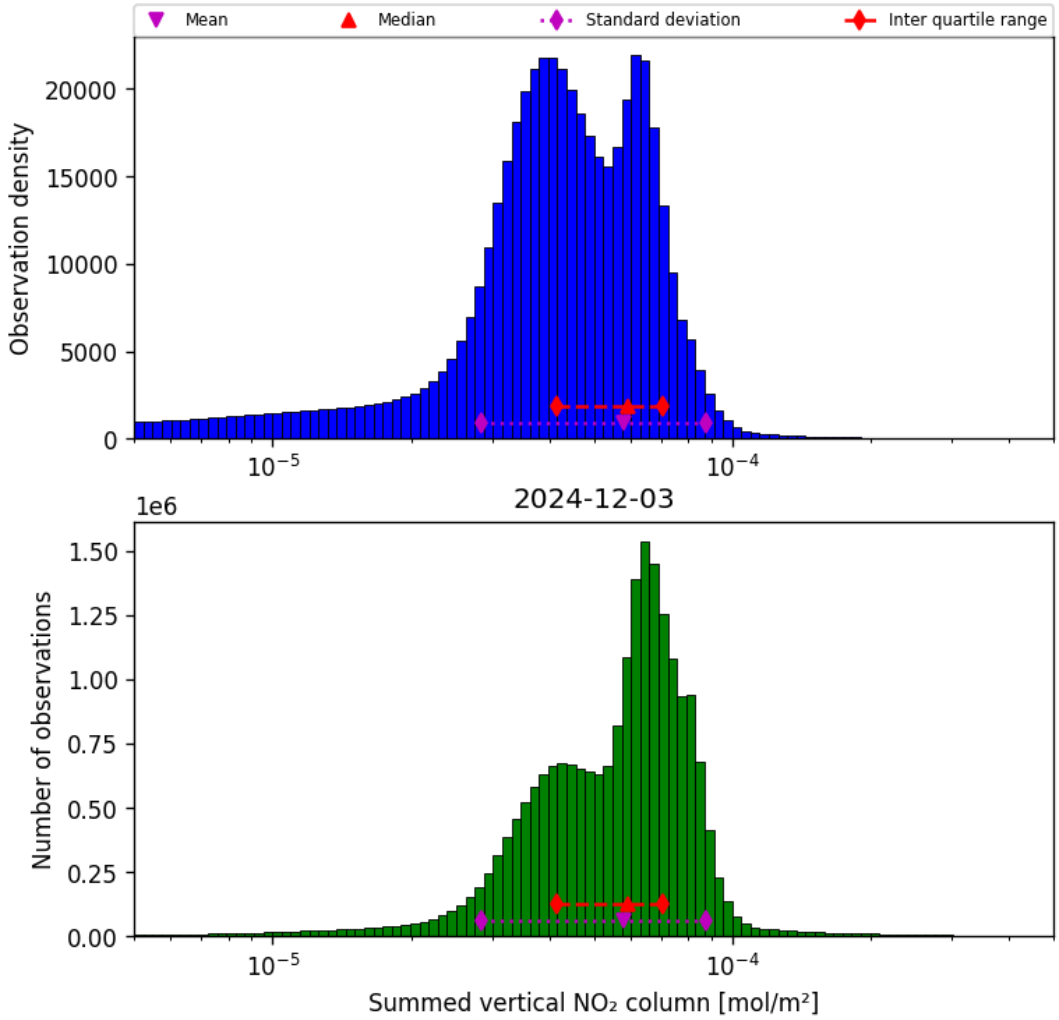

Figure 38: Histogram of "Summed vertical NO_2 column" for 2024-12-03 to 2024-12-03

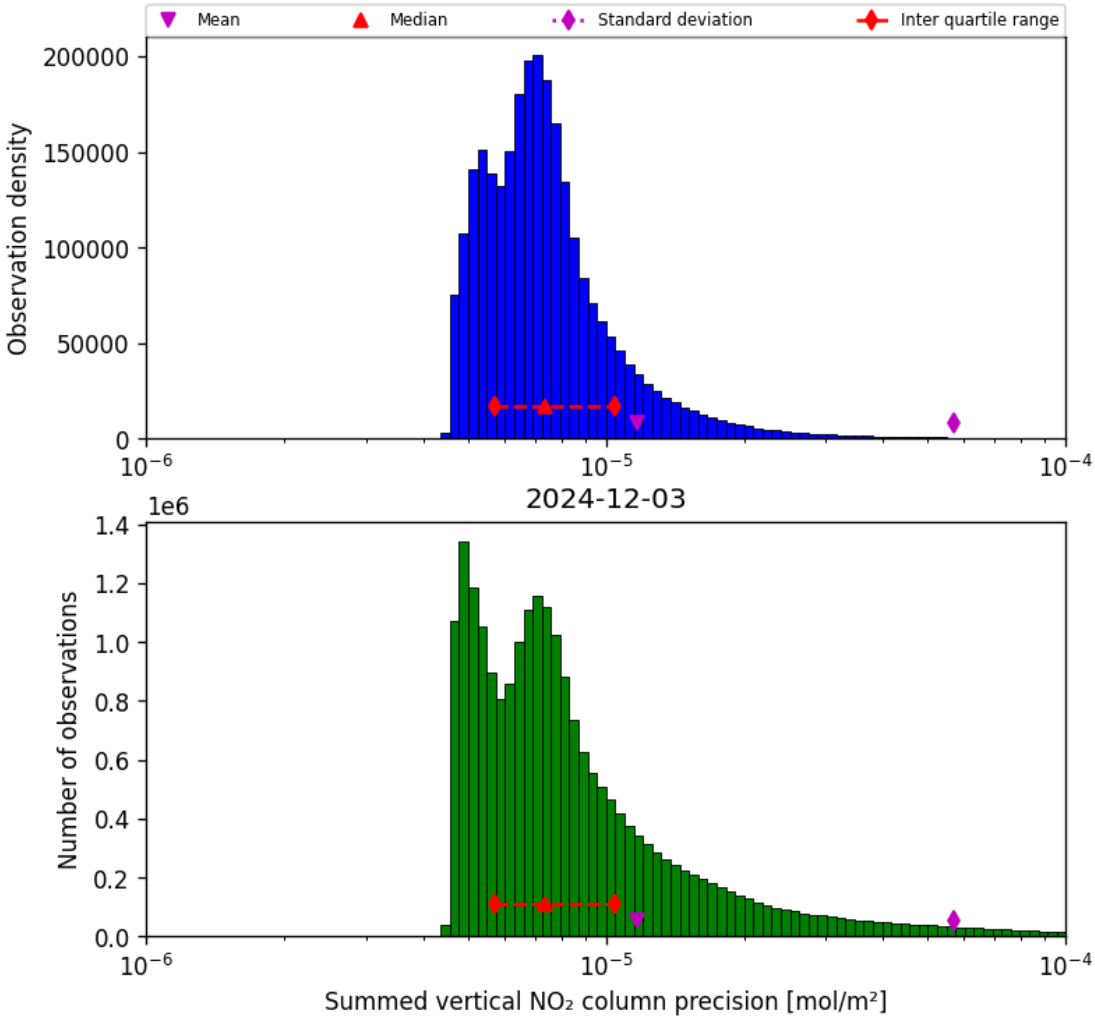

Figure 39: Histogram of "Summed vertical NO_2 column precision" for 2024-12-03 to 2024-12-03

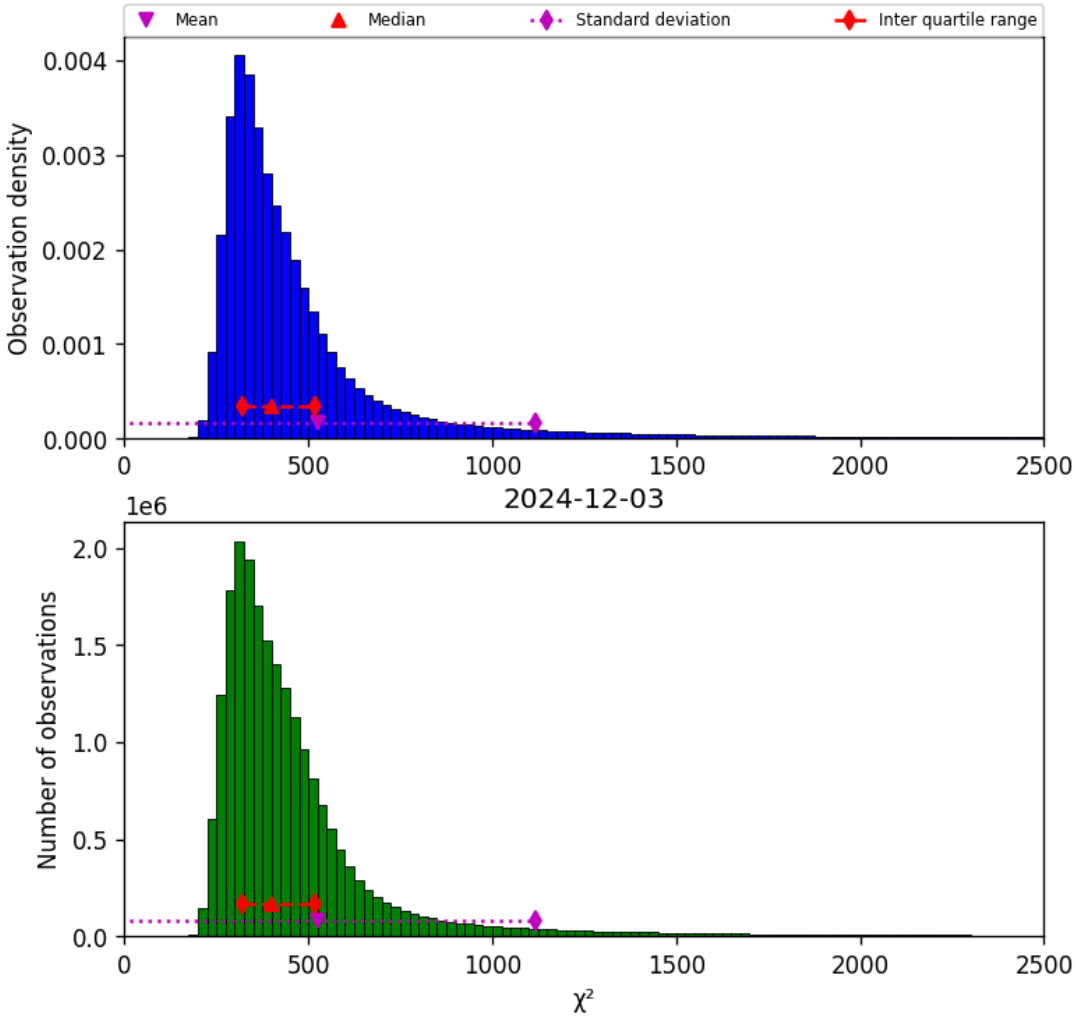

Figure 40: Histogram of "χ^2" for 2024-12-03 to 2024-12-03

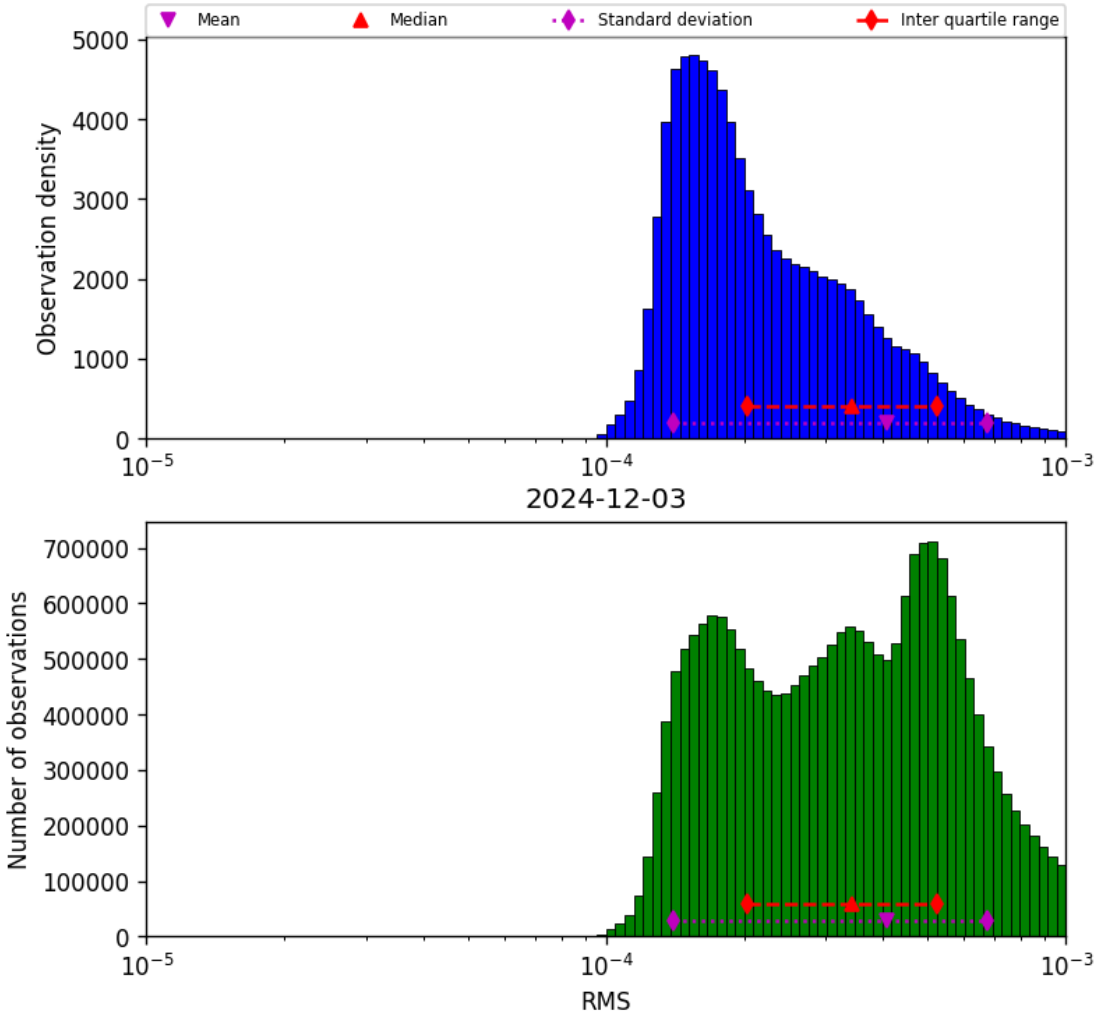

Figure 41: Histogram of “RMS” for 2024-12-03 to 2024-12-03

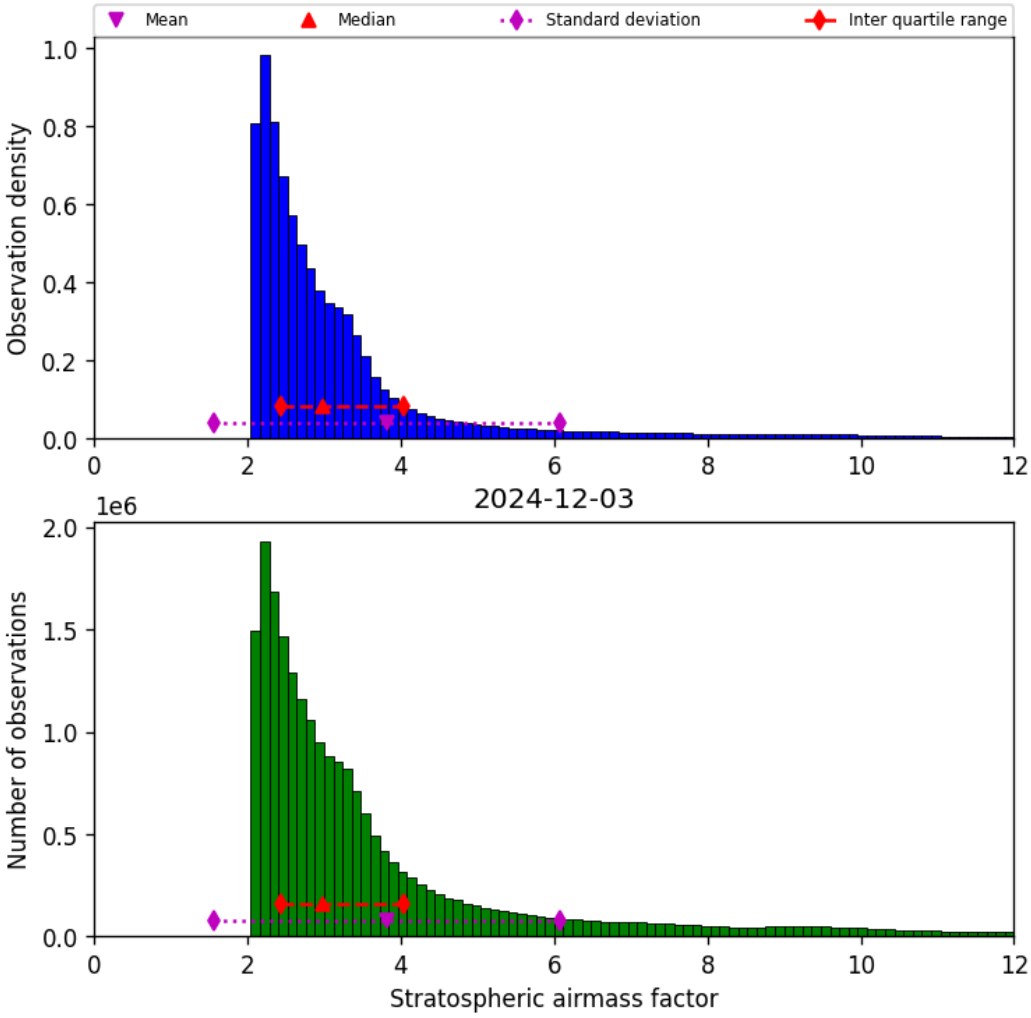

Figure 42: Histogram of “Stratospheric airmass factor” for 2024-12-03 to 2024-12-03

9 Along track statistics

The TROPOMI instrument uses different binned detector rows for different viewing directions. In this section statistics are presented for each of the binned rows in the instrument.

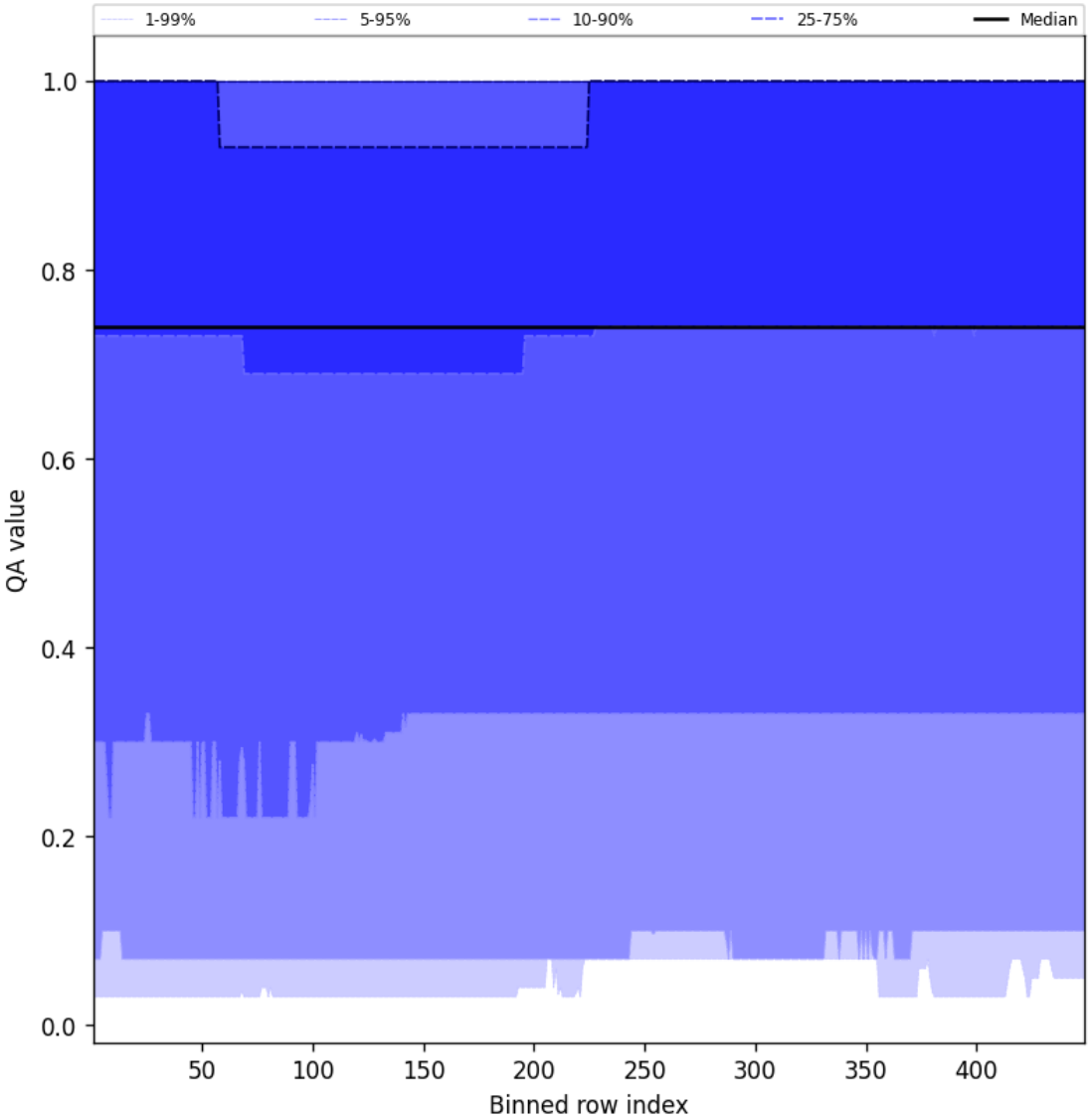

Figure 43: Along track statistics of “QA value” for 2024-12-03 to 2024-12-03

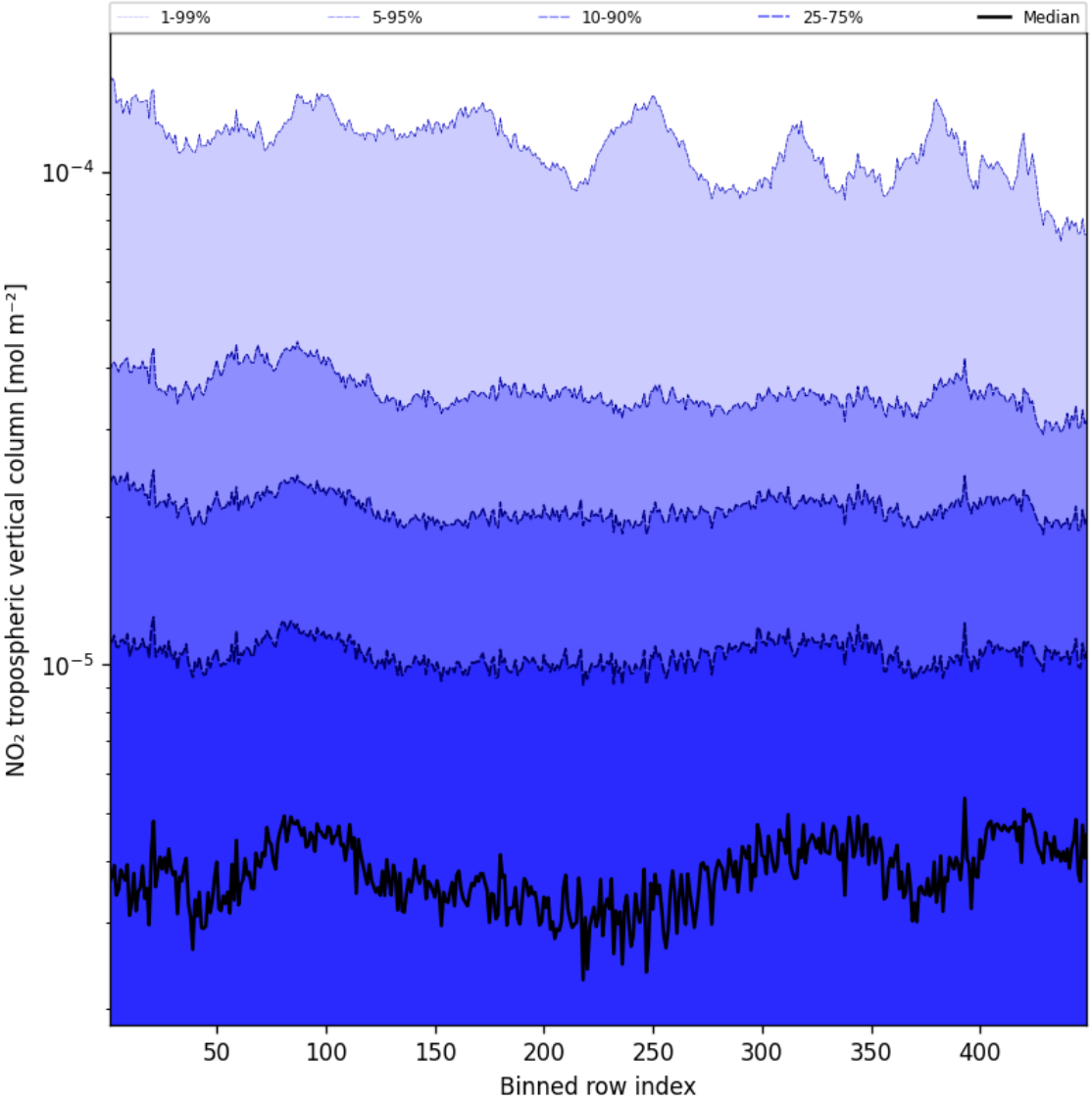

Figure 44: Along track statistics of "NO_2 tropospheric vertical column" for 2024-12-03 to 2024-12-03

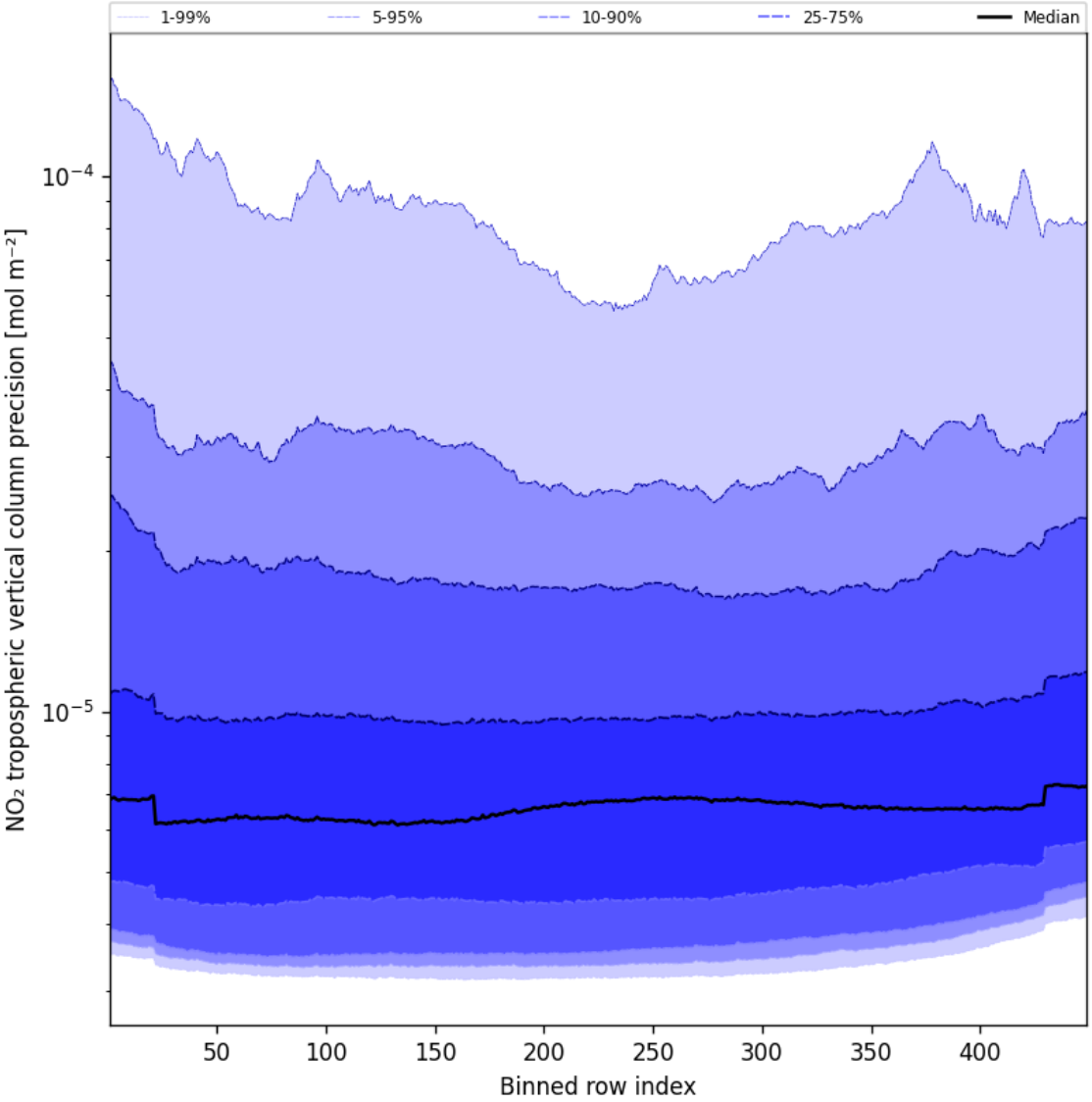

Figure 45: Along track statistics of "NO_2 tropospheric vertical column precision" for 2024-12-03 to 2024-12-03

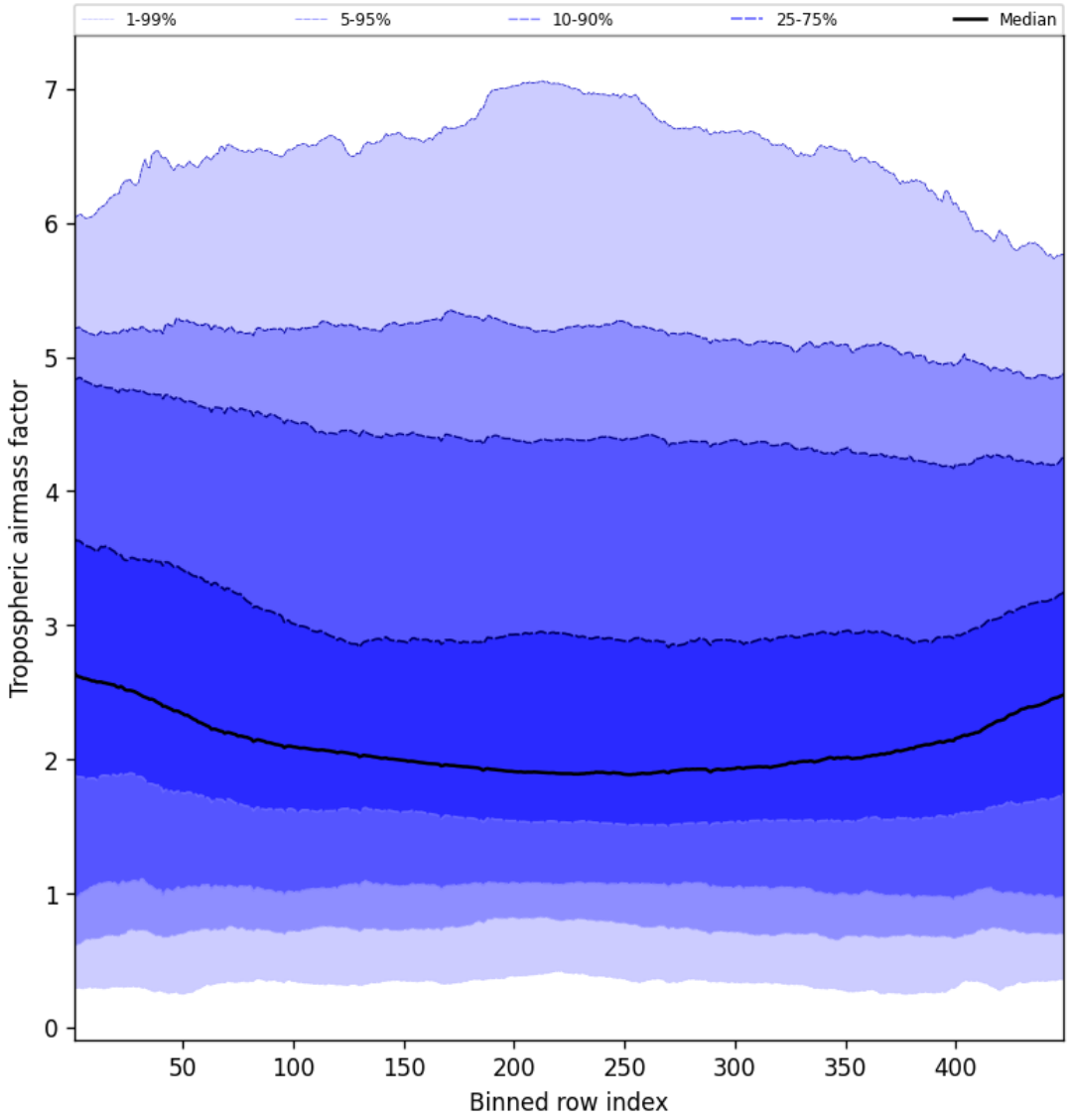

Figure 46: Along track statistics of “Tropospheric airmass factor” for 2024-12-03 to 2024-12-03

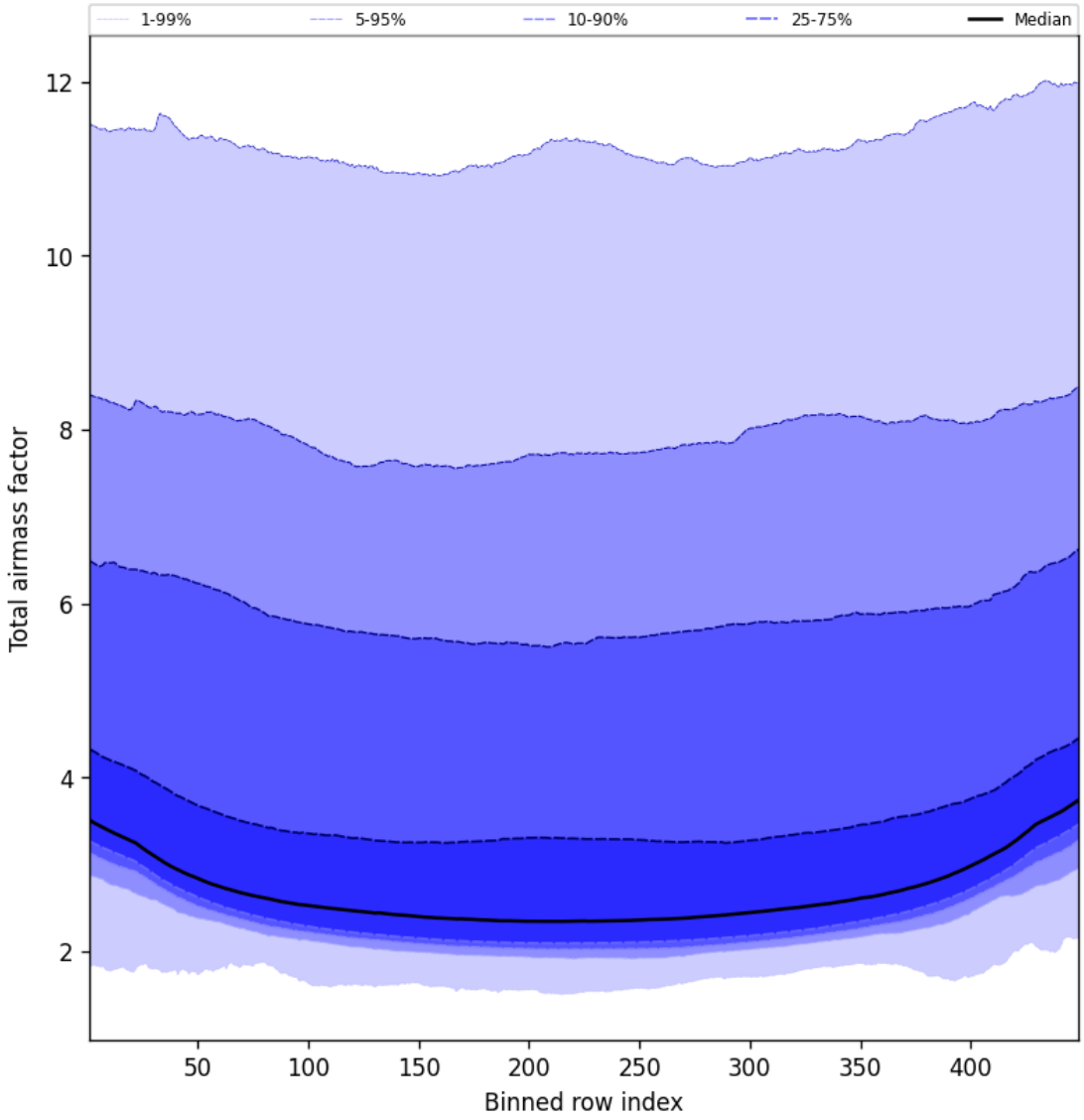

Figure 47: Along track statistics of “Total airmass factor” for 2024-12-03 to 2024-12-03

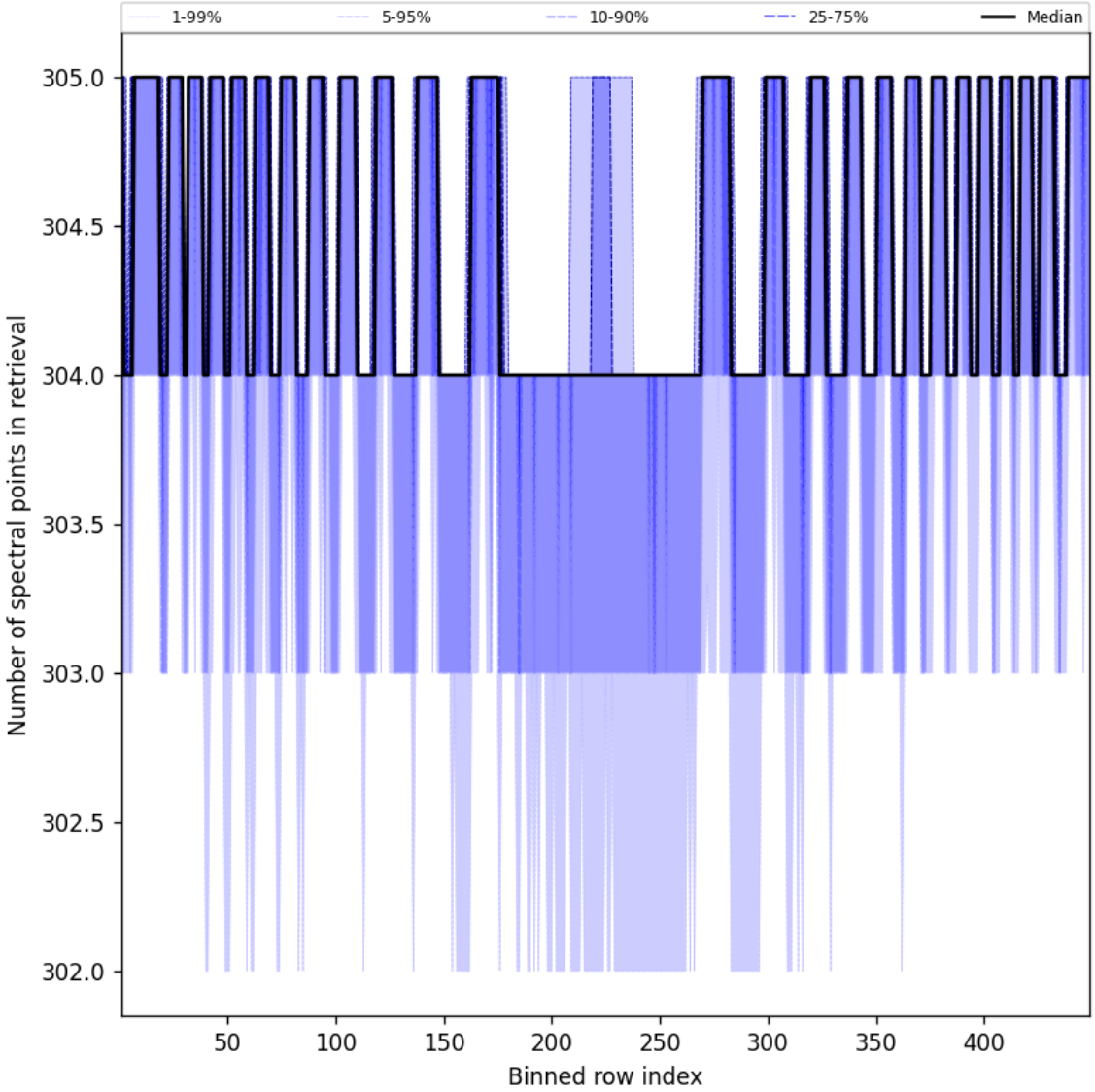

Figure 48: Along track statistics of “Number of spectral points in retrieval” for 2024-12-03 to 2024-12-03

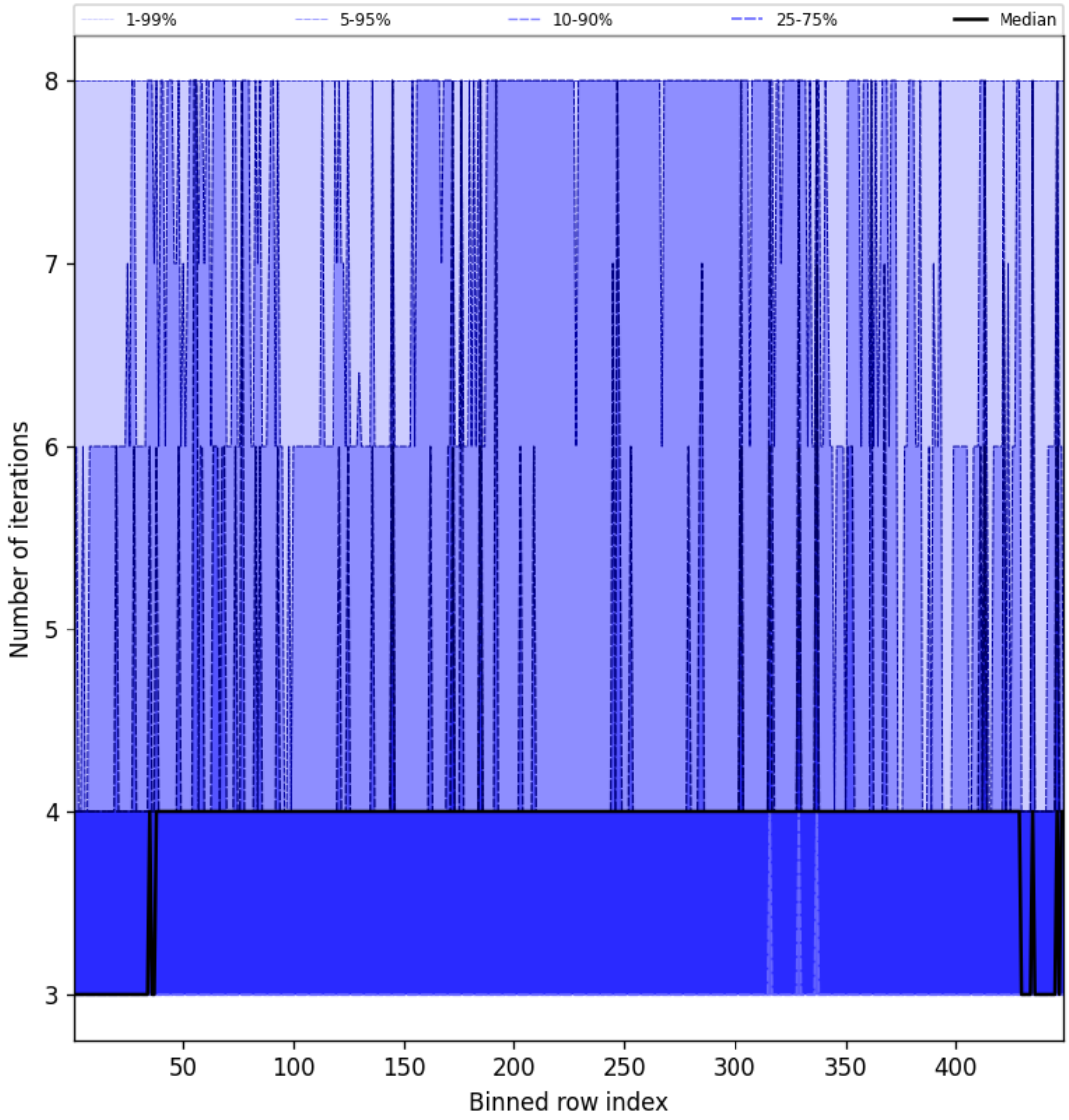

Figure 49: Along track statistics of “Number of iterations” for 2024-12-03 to 2024-12-03

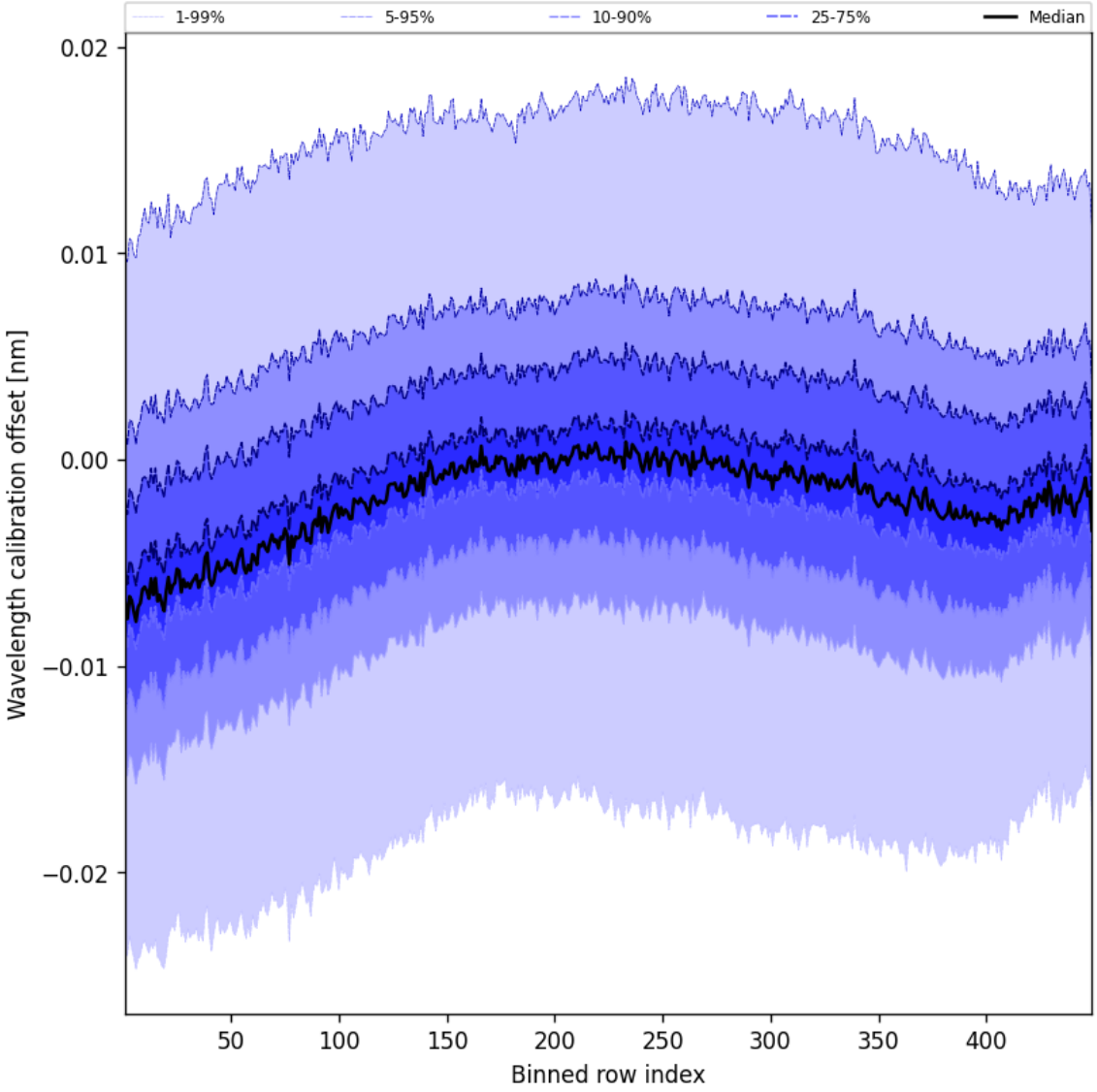

Figure 50: Along track statistics of “Wavelength calibration offset” for 2024-12-03 to 2024-12-03

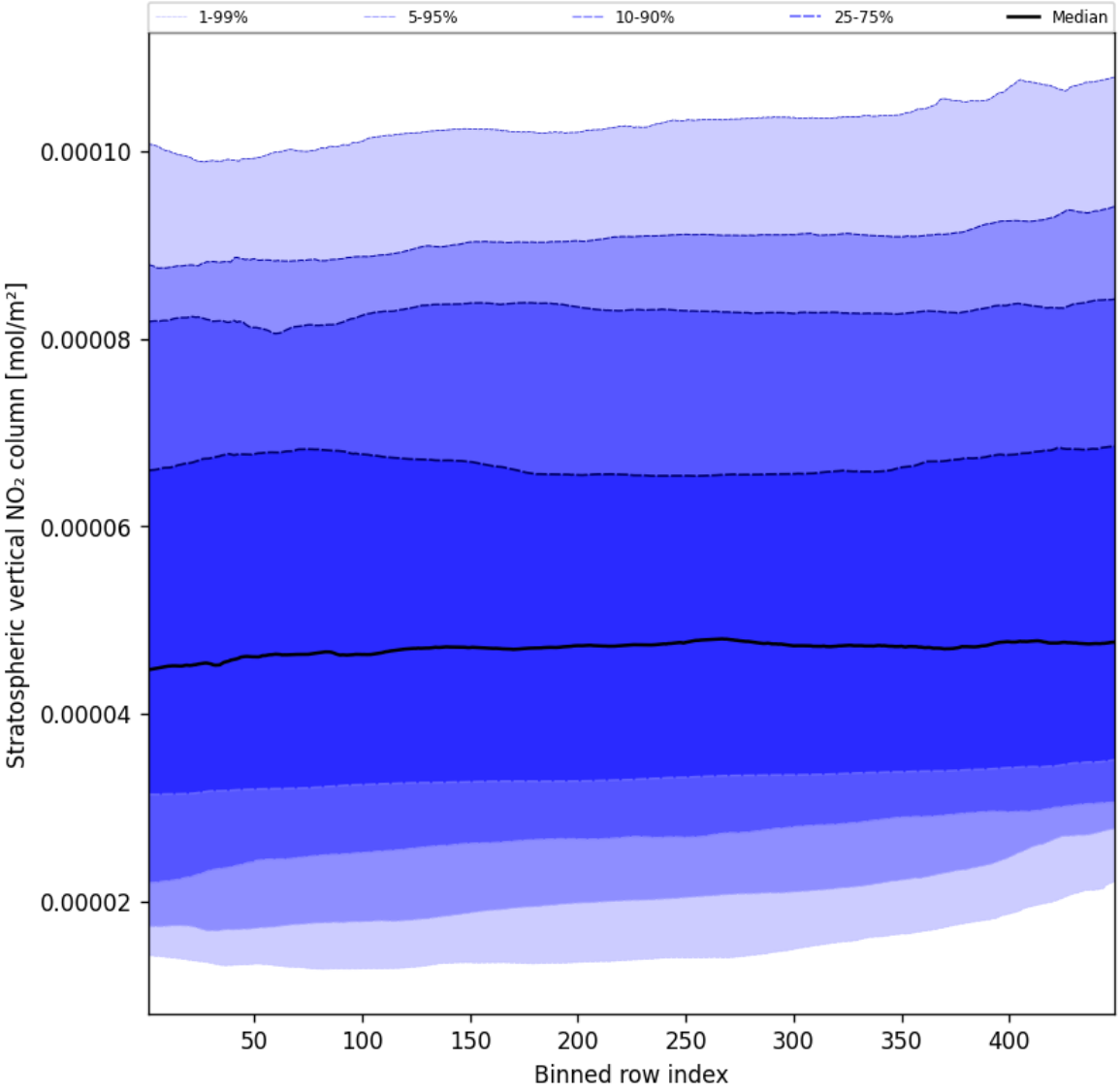

Figure 51: Along track statistics of “Stratospheric vertical NO_2 column” for 2024-12-03 to 2024-12-03

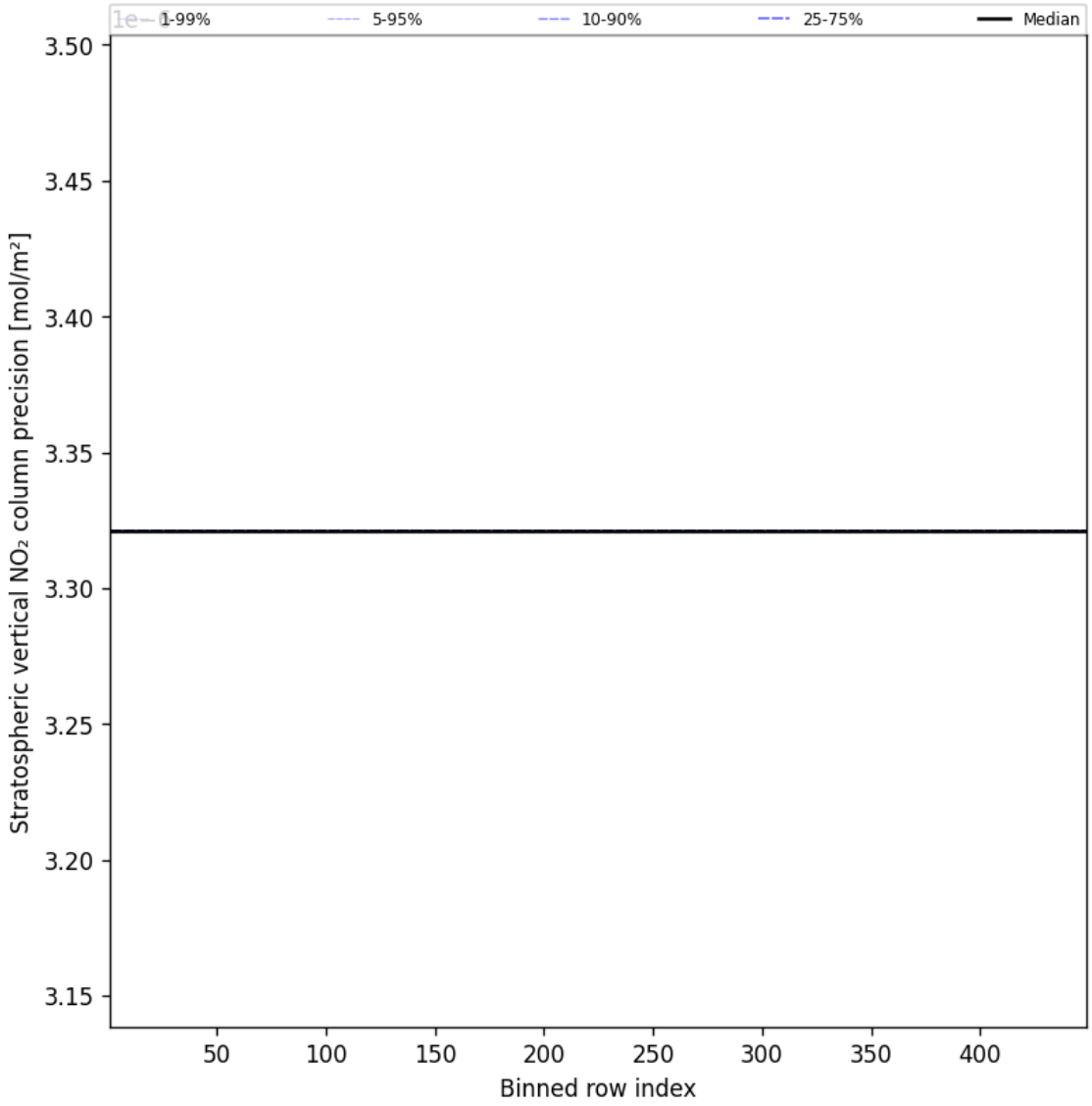

Figure 52: Along track statistics of “Stratospheric vertical NO_2 column precision” for 2024-12-03 to 2024-12-03

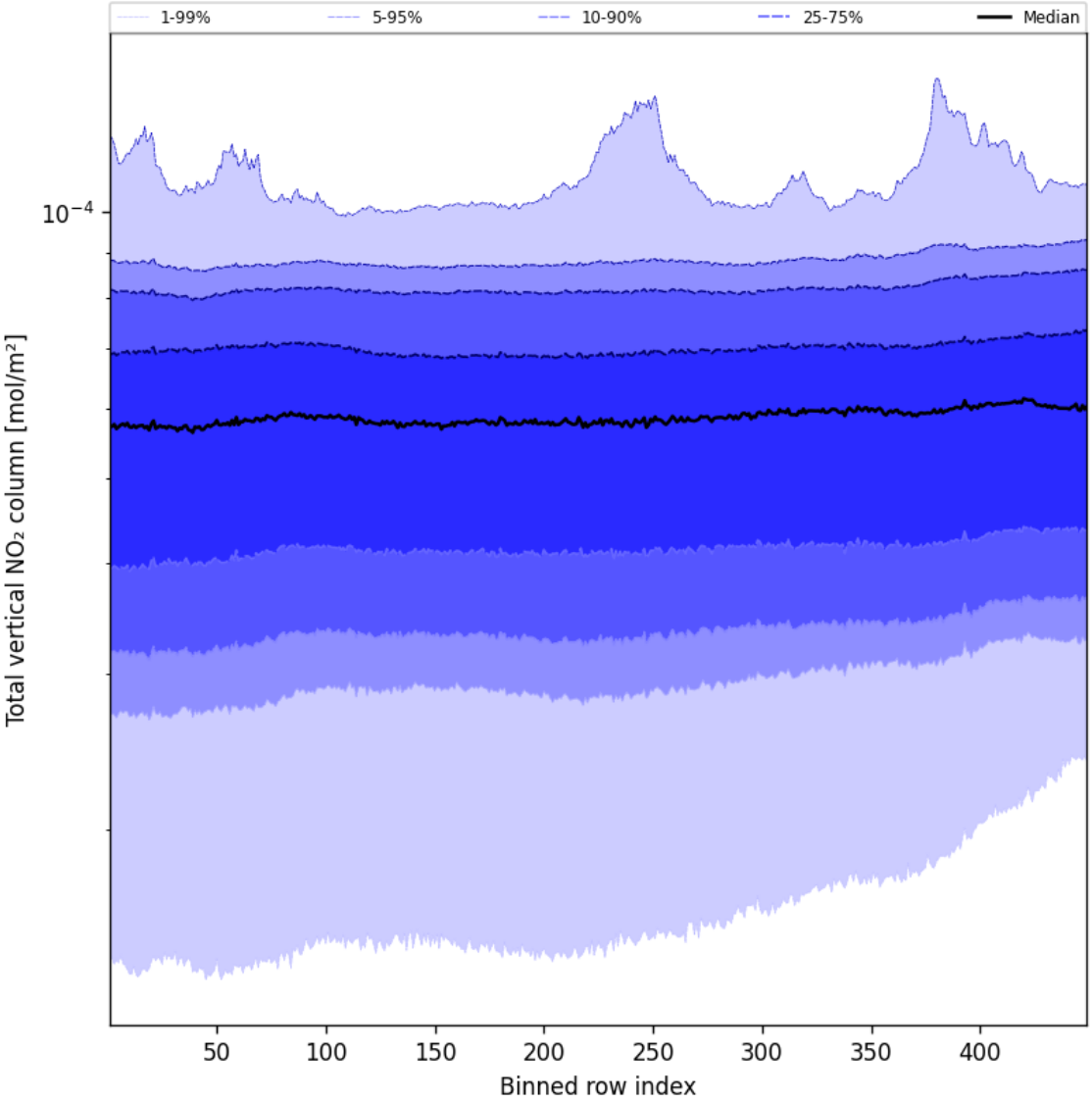

Figure 53: Along track statistics of "Total vertical NO_2 column" for 2024-12-03 to 2024-12-03

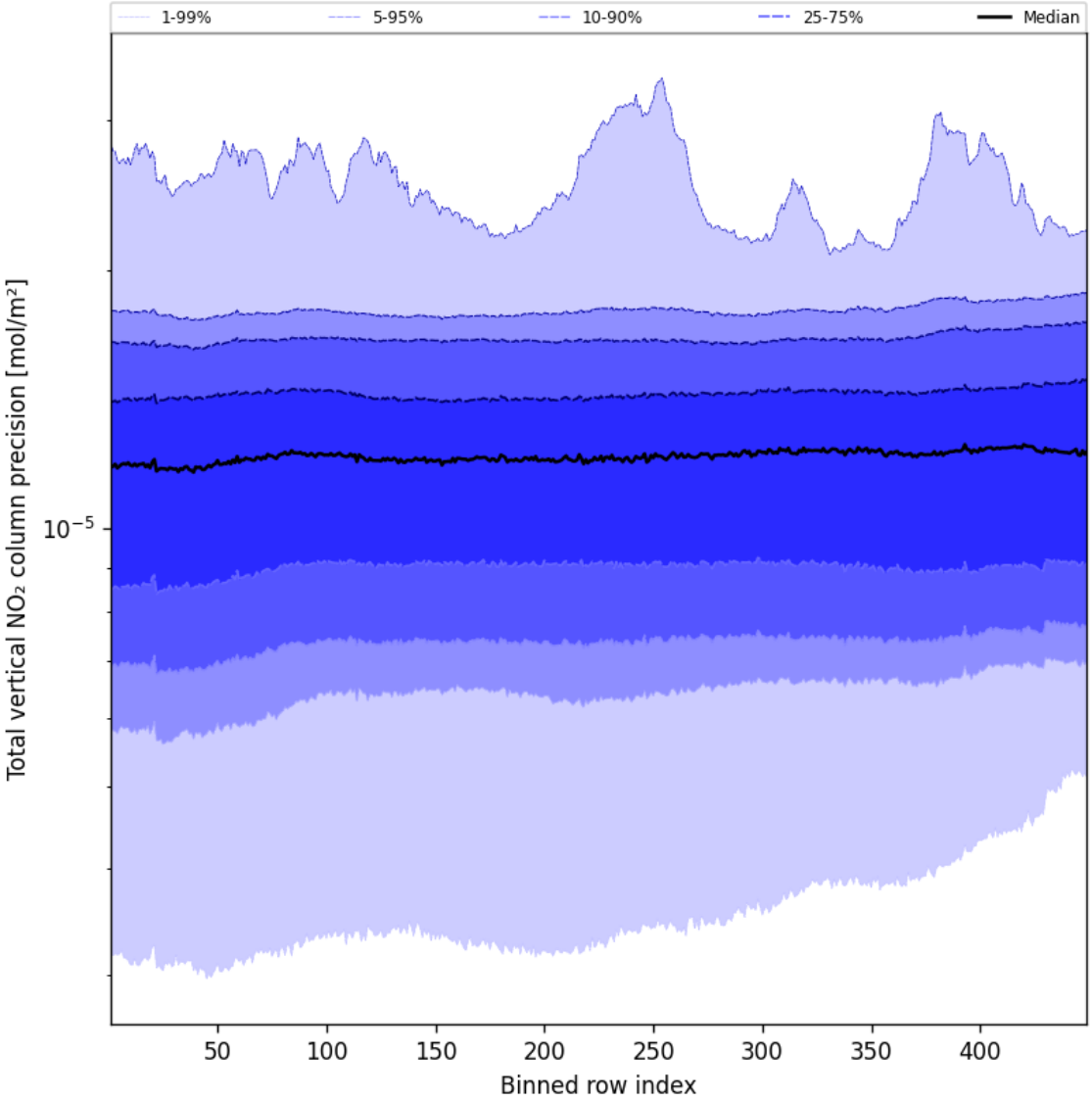

Figure 54: Along track statistics of “Total vertical NO_2 column precision” for 2024-12-03 to 2024-12-03

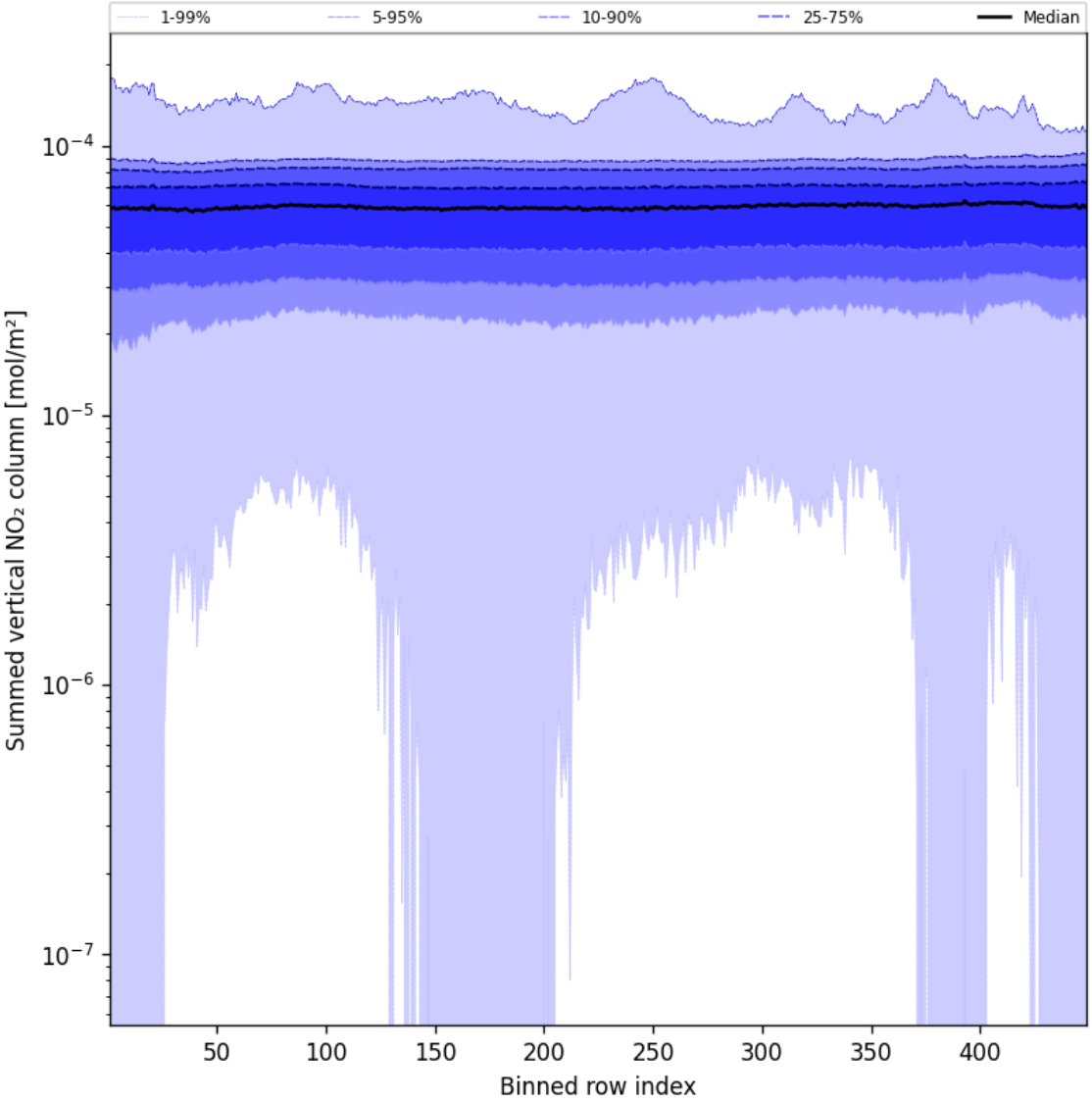

Figure 55: Along track statistics of “Summed vertical NO_2 column” for 2024-12-03 to 2024-12-03

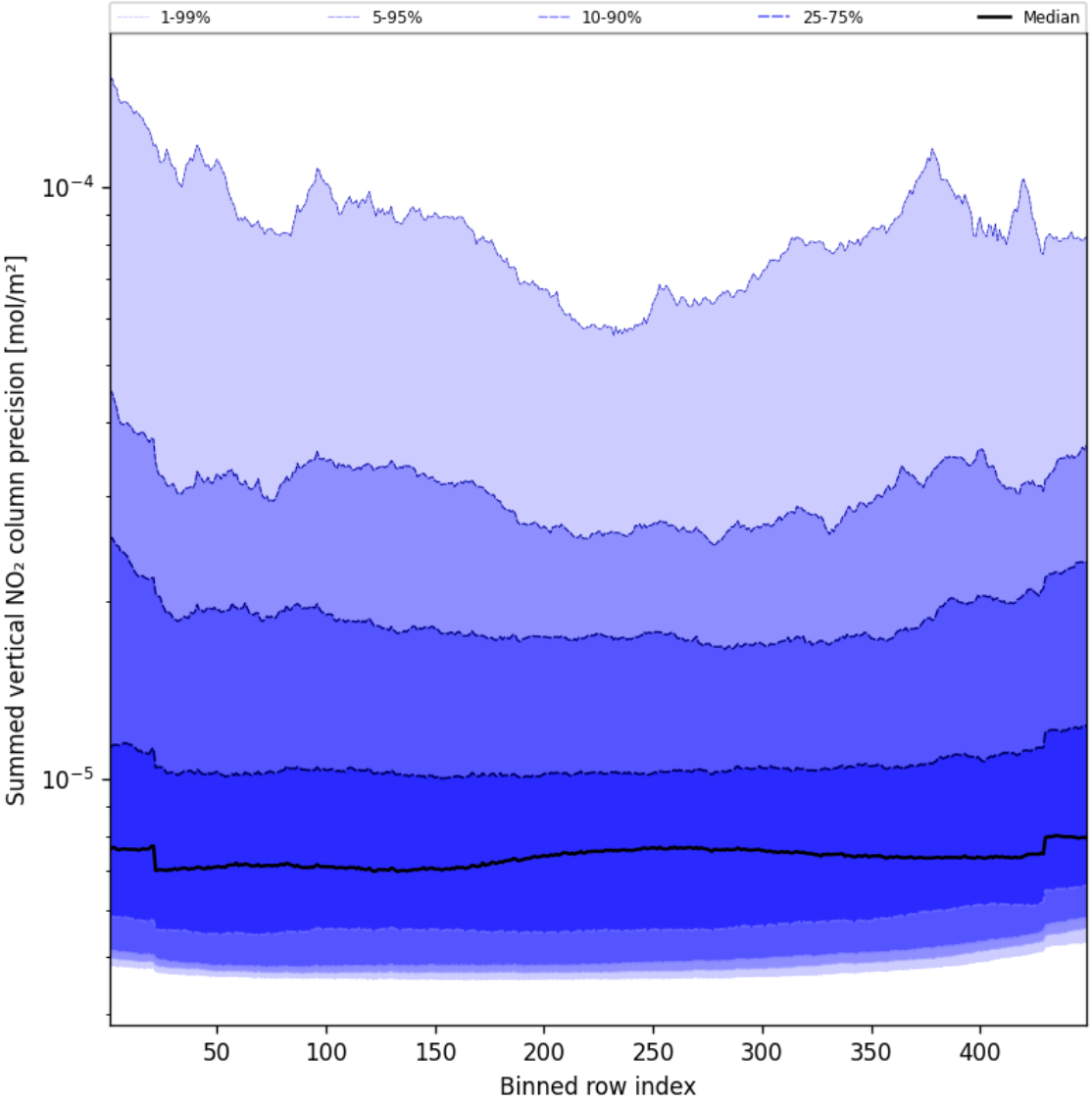

Figure 56: Along track statistics of “Summed vertical NO_2 column precision” for 2024-12-03 to 2024-12-03

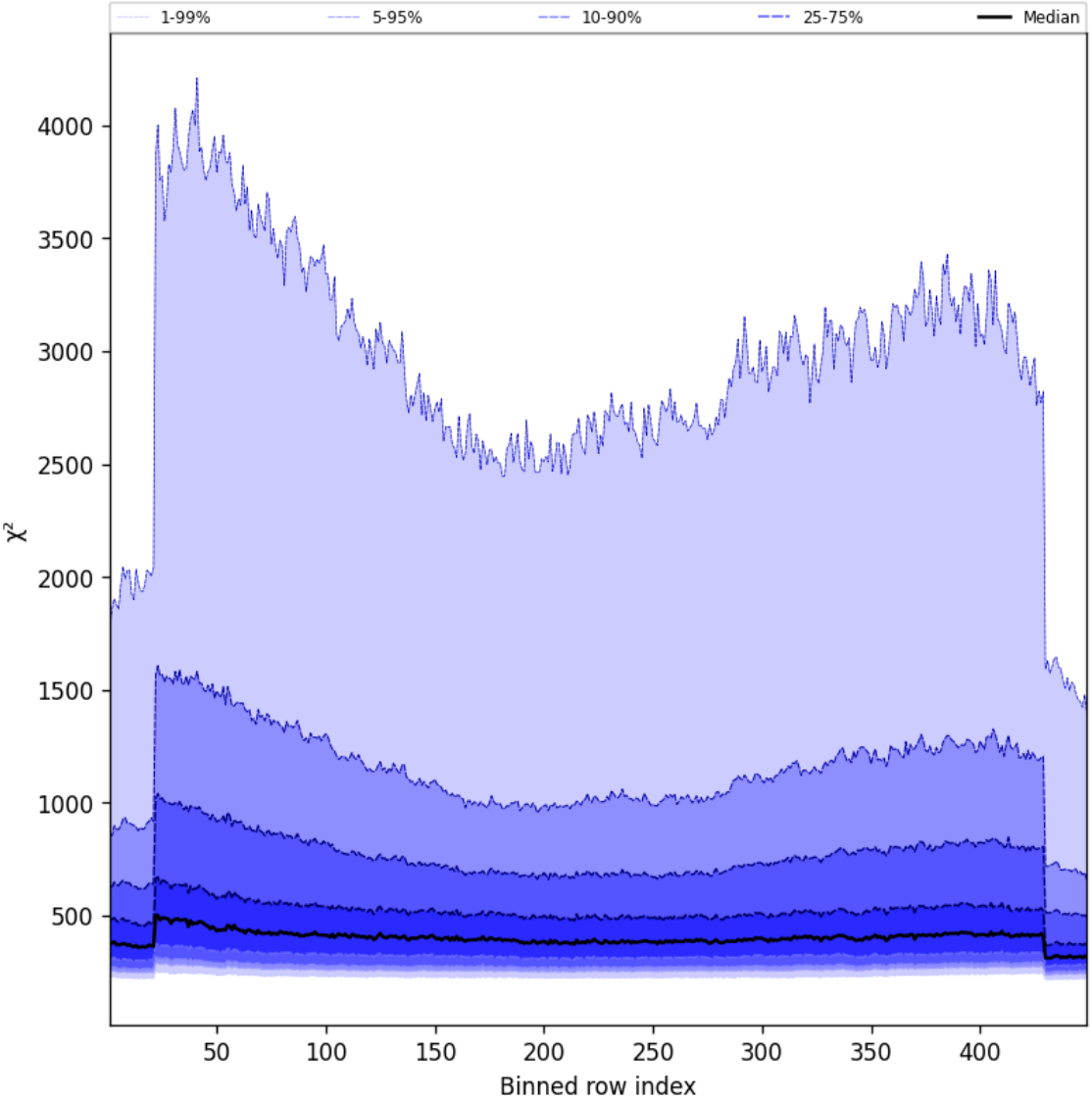

Figure 57: Along track statistics of "χ^2" for 2024-12-03 to 2024-12-03

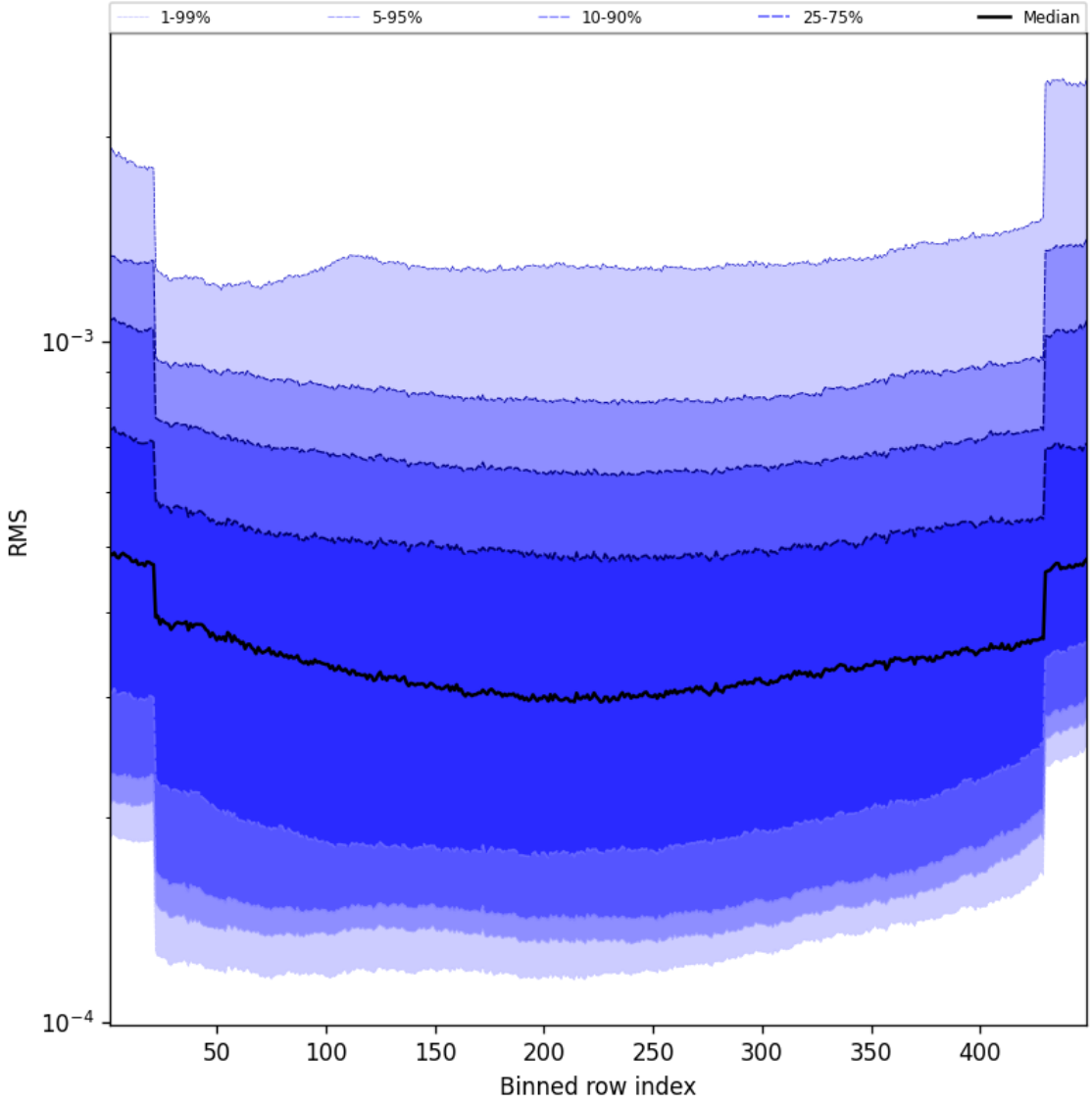

Figure 58: Along track statistics of “RMS” for 2024-12-03 to 2024-12-03

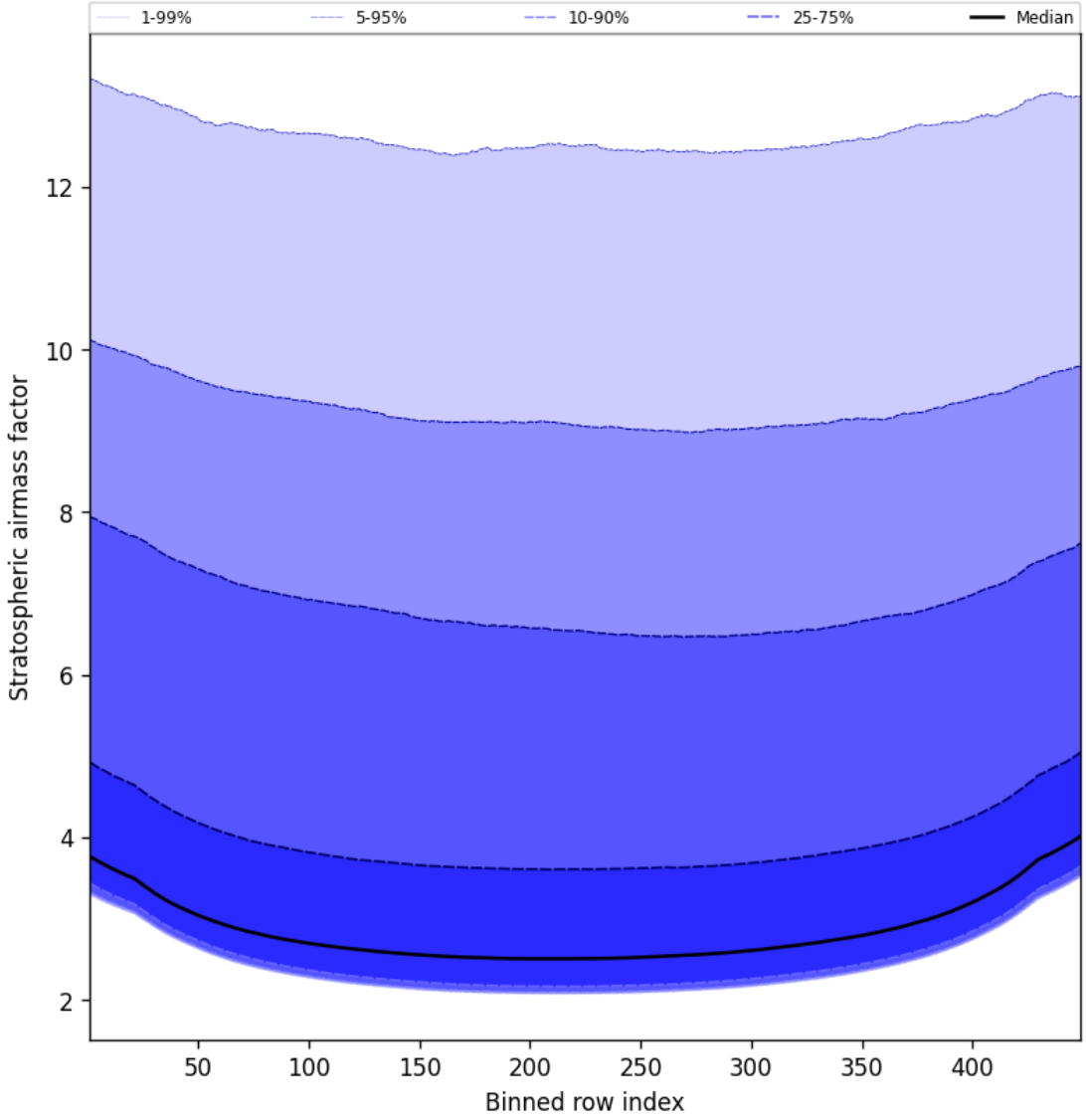

Figure 59: Along track statistics of “Stratospheric airmass factor” for 2024-12-03 to 2024-12-03

10 Coincidence density

To investigate the relation between parameters scatter density plots are produced. These include some 'hidden' parameters, latitude and the solar- and viewing geometries, in addition to all configured parameters. All combinations of pairs of parameters are included *once*, in one direction alone.

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