PyCAMA report generated by tropl2-proc

tropl2-proc

2025-03-30 (01:45)

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]	0.759 ± 0.252	23893656	0.735	0.270	0.740	0.0	1.000
nitrogendioxide tropospheric column [mol m^{-2}]	$(5.941 \pm 25.420) \times 10^{-6}$	23893656	8.059×10^{-6}	1.085×10^{-5}	4.266×10^{-6}	-4.074×10^{-3}	4.772×10^{-3}
nitrogendioxide tropospheric column precision [mol m^{-2}]	$(9.982 \pm 416.771) \times 10^{-6}$	23893656	6.763×10^{-6}	4.127×10^{-6}	6.851×10^{-6}	3.034×10^{-6}	0.981
air mass factor troposphere [1]	2.48 ± 1.39	23893656	1.74	1.71	2.07	1.070×10^{-2}	8.61
air mass factor total [1]	3.66 ± 2.23	23893656	2.10	1.85	2.84	0.280	14.8
number of spectral points in retrieval [1]	304 ± 1	23893656	304	1.000	304	234	305
number of iterations [1]	3.94 ± 1.19	23893656	4.22	1.000	4.00	3.00	10.00
wavelength calibration offset [nm]	$(-2.099 \pm 5.864) \times 10^{-3}$	23893656	-8.000×10^{-4}	4.844×10^{-3}	-1.854×10^{-3}	-6.663×10^{-2}	6.511×10^{-2}
nitrogendioxide stratospheric column [mol/m^2]	$(4.216 \pm 1.035) \times 10^{-5}$	23893656	4.550×10^{-5}	1.204×10^{-5}	4.199×10^{-5}	2.086×10^{-5}	1.155×10^{-4}
nitrogendioxide stratospheric column precision [mol/m^2]	$(3.321 \pm 0.000) \times 10^{-6}$	23893656	3.350×10^{-6}	0.0	3.321×10^{-6}	3.321×10^{-6}	3.321×10^{-6}
nitrogendioxide total column [mol/m^2]	$(4.824 \pm 1.576) \times 10^{-5}$	23893656	4.888×10^{-5}	1.414×10^{-5}	4.689×10^{-5}	7.704×10^{-6}	8.468×10^{-4}
nitrogendioxide total column precision [mol/m^2]	$(1.022 \pm 0.386) \times 10^{-5}$	23893656	1.024×10^{-5}	2.801×10^{-6}	9.774×10^{-6}	3.765×10^{-6}	8.885×10^{-4}
nitrogendioxide summed total column [mol/m^2]	$(4.810 \pm 2.411) \times 10^{-5}$	23893656	4.888×10^{-5}	1.547×10^{-5}	4.630×10^{-5}	-4.032×10^{-3}	4.804×10^{-3}
nitrogendioxide summed total column precision [mol/m^2]	$(1.073 \pm 41.676) \times 10^{-5}$	23893656	7.415×10^{-6}	3.742×10^{-6}	7.614×10^{-6}	4.499×10^{-6}	0.981
chi square [1]	536 ± 612	23893656	338	194	395	158	8.852×10^4
root mean square error of fit [1]	$(4.112 \pm 2.858) \times 10^{-4}$	23893656	3.716×10^{-4}	3.345×10^{-4}	3.398×10^{-4}	8.451×10^{-5}	6.331×10^{-3}
air mass factor stratosphere [1]	3.82 ± 2.24	23893656	2.10	1.73	3.00	2.01	14.9

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	4.000×10^{-2}	7.000×10^{-2}	0.220	0.730	0.730	1.000	1.000	1.000	1.000	1.000
nitrogendioxide tropospheric column [mol m^{-2}]	-6.833×10^{-5}	-1.069×10^{-5}	-5.718×10^{-6}	-3.068×10^{-6}	-5.505×10^{-7}	1.030×10^{-5}	1.456×10^{-5}	1.968×10^{-5}	3.043×10^{-5}	8.016×10^{-5}
nitrogendioxide tropospheric column precision [mol m^{-2}]	3.534×10^{-6}	3.970×10^{-6}	4.304×10^{-6}	4.687×10^{-6}	5.319×10^{-6}	9.446×10^{-6}	1.210×10^{-5}	1.561×10^{-5}	2.308×10^{-5}	5.486×10^{-5}
air mass factor troposphere [1]	0.303	0.716	1.03	1.27	1.53	3.24	3.96	4.57	5.29	6.51
air mass factor total [1]	1.53	1.93	2.01	2.08	2.23	4.08	5.32	6.84	8.92	11.9
number of spectral points in retrieval [1]	303	303	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]	-2.018×10^{-2}	-1.099×10^{-2}	-7.921×10^{-3}	-6.257×10^{-3}	-4.583×10^{-3}	2.608×10^{-4}	1.553×10^{-3}	3.341×10^{-3}	6.632×10^{-3}	1.588×10^{-2}
nitrogendioxide stratospheric column [mol/m^2]	2.561×10^{-5}	2.759×10^{-5}	2.951×10^{-5}	3.194×10^{-5}	3.545×10^{-5}	4.749×10^{-5}	4.992×10^{-5}	5.230×10^{-5}	5.606×10^{-5}	8.634×10^{-5}
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]	2.573×10^{-5}	3.031×10^{-5}	3.335×10^{-5}	3.601×10^{-5}	3.949×10^{-5}	5.363×10^{-5}	5.758×10^{-5}	6.182×10^{-5}	6.939×10^{-5}	1.005×10^{-4}
nitrogendioxide total column precision [mol/m^2]	5.842×10^{-6}	6.683×10^{-6}	7.231×10^{-6}	7.724×10^{-6}	8.376×10^{-6}	1.118×10^{-5}	1.204×10^{-5}	1.297×10^{-5}	1.466×10^{-5}	2.248×10^{-5}
nitrogendioxide summed total column [mol/m^2]	9.629×10^{-6}	2.675×10^{-5}	3.137×10^{-5}	3.462×10^{-5}	3.837×10^{-5}	5.384×10^{-5}	5.857×10^{-5}	6.397×10^{-5}	7.465×10^{-5}	1.236×10^{-4}
nitrogendioxide summed total column precision [mol/m^2]	4.850×10^{-6}	5.176×10^{-6}	5.437×10^{-6}	5.744×10^{-6}	6.271×10^{-6}	1.001×10^{-5}	1.255×10^{-5}	1.596×10^{-5}	2.331×10^{-5}	5.496×10^{-5}
chi square [1]	235	264	283	301	324	518	616	783	1.219×10^{3}	3.117×10^{3}
root mean square error of fit [1]	1.201×10^{-4}	1.345×10^{-4}	1.471×10^{-4}	1.633×10^{-4}	1.988×10^{-4}	5.333×10^{-4}	6.354×10^{-4}	7.544×10^{-4}	9.683×10^{-4}	1.468×10^{-3}
air mass factor stratosphere [1]	2.04	2.09	2.15	2.24	2.40	4.14	5.40	6.99	9.20	12.3

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]	0.750 ± 0.265	13211730	0.200	0.740	0.0	1.000	0.730	0.930
nitrogendioxide tropospheric column [mol m^{-2}]	$(7.774 \pm 32.314) \times 10^{-6}$	13211730	1.514×10^{-5}	5.656×10^{-6}	-2.377×10^{-3}	1.588×10^{-3}	-9.796×10^{-7}	1.416×10^{-5}
nitrogendioxide tropospheric column precision [mol m^{-2}]	$(1.148 \pm 1.742) \times 10^{-5}$	13211730	5.963×10^{-6}	7.557×10^{-6}	3.034×10^{-6}	1.313×10^{-2}	5.673×10^{-6}	1.164×10^{-5}
air mass factor troposphere [1]	2.29 ± 1.34	13211730	1.78	1.87	1.802×10^{-2}	6.94	1.37	3.15
air mass factor total [1]	3.56 ± 2.21	13211730	1.86	2.71	0.280	13.7	2.14	4.00
number of spectral points in retrieval [1]	304 ± 1	13211730	1.000	304	234	305	304	305
number of iterations [1]	3.92 ± 1.07	13211730	1.000	4.00	3.00	10.00	3.00	4.00
wavelength calibration offset [nm]	$(-1.773 \pm 5.382) \times 10^{-3}$	13211730	4.284×10^{-3}	-1.502×10^{-3}	-6.635×10^{-2}	6.056×10^{-2}	-3.911×10^{-3}	3.731×10^{-4}
nitrogendioxide stratospheric column [mol/m^2]	$(4.373 \pm 1.186) \times 10^{-5}$	13211730	1.237×10^{-5}	4.271×10^{-5}	2.086×10^{-5}	1.155×10^{-4}	3.657×10^{-5}	4.894×10^{-5}
nitrogendioxide stratospheric column precision [mol/m^2]	$(3.321 \pm 0.000) \times 10^{-6}$	13211730	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]	$(5.188 \pm 1.906) \times 10^{-5}$	13211730	1.694×10^{-5}	4.964×10^{-5}	7.704×10^{-6}	8.468×10^{-4}	4.114×10^{-5}	5.807×10^{-5}
nitrogendioxide total column precision [mol/m^2]	$(1.099 \pm 0.484) \times 10^{-5}$	13211730	3.461×10^{-6}	1.030×10^{-5}	3.765×10^{-6}	8.885×10^{-4}	8.638×10^{-6}	1.210×10^{-5}
nitrogendioxide summed total column [mol/m^2]	$(5.150 \pm 2.955) \times 10^{-5}$	13211730	1.946×10^{-5}	4.829×10^{-5}	-2.340×10^{-3}	1.623×10^{-3}	3.908×10^{-5}	5.854×10^{-5}
nitrogendioxide summed total column precision [mol/m^2]	$(1.217 \pm 1.726) \times 10^{-5}$	13211730	5.527×10^{-6}	8.255×10^{-6}	4.499×10^{-6}	1.313×10^{-2}	6.574×10^{-6}	1.210×10^{-5}
chi square [1]	523 ± 553	13211730	191	401	166	8.625×10^4	327	518
root mean square error of fit [1]	$(4.241 \pm 2.982) \times 10^{-4}$	13211730	3.790×10^{-4}	3.509×10^{-4}	8.451×10^{-5}	6.059×10^{-3}	1.870×10^{-4}	5.659×10^{-4}
air mass factor stratosphere [1]	3.81 ± 2.25	13211730	1.72	2.96	2.01	13.9	2.38	4.10

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]	0.770 ± 0.234	10681926	0.260	0.740	1.000×10^{-2}	1.000	0.740	1.000
nitrogendioxide tropospheric column [mol m^{-2}]	$(3.673 \pm 12.022) \times 10^{-6}$	10681926	7.475×10^{-6}	3.381×10^{-6}	-4.074×10^{-3}	4.772×10^{-3}	-2.138×10^{-7}	7.261×10^{-6}
nitrogendioxide tropospheric column precision [mol m^{-2}]	$(8.133 \pm 623.010) \times 10^{-6}$	10681926	2.697×10^{-6}	6.311×10^{-6}	3.377×10^{-6}	0.981	5.063×10^{-6}	7.760×10^{-6}
air mass factor troposphere [1]	2.71 ± 1.42	10681926	1.57	2.35	1.070×10^{-2}	8.61	1.74	3.31
air mass factor total [1]	3.78 ± 2.25	10681926	1.80	2.99	1.04	14.8	2.35	4.15
number of spectral points in retrieval [1]	304 ± 1	10681926	1.000	304	234	305	304	305
number of iterations [1]	3.97 ± 1.32	10681926	1.000	4.00	3.00	10.00	3.00	4.00
wavelength calibration offset [nm]	$(-2.501 \pm 6.388) \times 10^{-3}$	10681926	5.411×10^{-3}	-2.356×10^{-3}	-6.663×10^{-2}	6.511×10^{-2}	-5.373×10^{-3}	3.772×10^{-5}
nitrogendioxide stratospheric column [mol/m^2]	$(4.022 \pm 0.768) \times 10^{-5}$	10681926	1.192×10^{-5}	4.104×10^{-5}	2.154×10^{-5}	7.123×10^{-5}	3.426×10^{-5}	4.618×10^{-5}
nitrogendioxide stratospheric column precision [mol/m^2]	$(3.321 \pm 0.000) \times 10^{-6}$	10681926	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]	$(4.373 \pm 0.832) \times 10^{-5}$	10681926	1.191×10^{-5}	4.460×10^{-5}	7.732×10^{-6}	2.538×10^{-4}	3.781×10^{-5}	4.972×10^{-5}
nitrogendioxide total column precision [mol/m^2]	$(9.268 \pm 1.640) \times 10^{-6}$	10681926	2.237×10^{-6}	9.352×10^{-6}	3.970×10^{-6}	6.143×10^{-5}	8.125×10^{-6}	1.036×10^{-5}
nitrogendioxide summed total column [mol/m^2]	$(4.389 \pm 1.373) \times 10^{-5}$	10681926	1.266×10^{-5}	4.476×10^{-5}	-4.032×10^{-3}	4.804×10^{-3}	3.759×10^{-5}	5.025×10^{-5}
nitrogendioxide summed total column precision [mol/m^2]	$(8.954 \pm 623.008) \times 10^{-6}$	10681926	2.386×10^{-6}	7.131×10^{-6}	4.737×10^{-6}	0.981	6.055×10^{-6}	8.441×10^{-6}
chi square [1]	553 ± 676	10681926	198	389	158	8.852×10^{4}	321	520
root mean square error of fit [1]	$(3.954 \pm 2.689) \times 10^{-4}$	10681926	2.618×10^{-4}	3.302×10^{-4}	9.156×10^{-5}	6.331×10^{-3}	2.098×10^{-4}	4.715×10^{-4}
air mass factor stratosphere [1]	3.84 ± 2.24	10681926	1.74	3.04	2.02	14.9	2.43	4.17

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]	0.771 ± 0.239	16304055	0.260	0.740	0.0	1.000	0.740	1.000
nitrogendioxide tropospheric column [mol m^{-2}]	$(3.145 \pm 20.117) \times 10^{-6}$	16304055	9.258×10^{-6}	4.107×10^{-6}	-1.413×10^{-3}	8.914×10^{-4}	-2.952×10^{-7}	8.963×10^{-6}
nitrogendioxide tropospheric column precision [mol m^{-2}]	$(8.512 \pm 9.134) \times 10^{-6}$	16304055	3.199×10^{-6}	6.643×10^{-6}	3.034×10^{-6}	7.501×10^{-3}	5.324×10^{-6}	8.523×10^{-6}
air mass factor troposphere [1]	2.44 ± 1.16	16304055	1.47	2.15	2.680×10^{-2}	6.93	1.65	3.12
air mass factor total [1]	3.59 ± 2.03	16304055	1.80	2.87	0.373	14.5	2.26	4.06
number of spectral points in retrieval [1]	304 ± 1	16304055	1.000	304	234	305	304	305
number of iterations [1]	4.01 ± 1.24	16304055	1.000	4.00	3.00	9.00	3.00	4.00
wavelength calibration offset [nm]	$(-2.085 \pm 5.759) \times 10^{-3}$	16304055	4.701×10^{-3}	-1.816×10^{-3}	-6.463×10^{-2}	5.764×10^{-2}	-4.457×10^{-3}	2.442×10^{-4}
nitrogendioxide stratospheric column [mol/m^2]	$(4.224 \pm 1.118) \times 10^{-5}$	16304055	1.234×10^{-5}	4.211×10^{-5}	2.086×10^{-5}	1.155×10^{-4}	3.509×10^{-5}	4.744×10^{-5}
nitrogendioxide stratospheric column precision [mol/m^2]	$(3.321 \pm 0.000) \times 10^{-6}$	16304055	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]	$(4.639 \pm 1.052) \times 10^{-5}$	16304055	1.274×10^{-5}	4.650×10^{-5}	7.704×10^{-6}	4.002×10^{-4}	3.959×10^{-5}	5.233×10^{-5}
nitrogendioxide total column precision [mol/m^2]	$(9.785 \pm 2.207) \times 10^{-6}$	16304055	2.437×10^{-6}	9.693×10^{-6}	3.765×10^{-6}	2.675×10^{-4}	8.430×10^{-6}	1.087×10^{-5}
nitrogendioxide summed total column [mol/m^2]	$(4.539 \pm 1.678) \times 10^{-5}$	16304055	1.417×10^{-5}	4.579×10^{-5}	-1.379×10^{-3}	9.249×10^{-4}	3.819×10^{-5}	5.236×10^{-5}
nitrogendioxide summed total column precision [mol/m^2]	$(9.285 \pm 8.983) \times 10^{-6}$	16304055	2.872×10^{-6}	7.427×10^{-6}	4.499×10^{-6}	7.501×10^{-3}	6.275×10^{-6}	9.147×10^{-6}
chi square [1]	521 ± 555	16304055	182	394	158	8.625×10^4	327	509
root mean square error of fit [1]	$(3.880 \pm 2.700) \times 10^{-4}$	16304055	2.960×10^{-4}	3.210×10^{-4}	9.466×10^{-5}	6.059×10^{-3}	1.926×10^{-4}	4.886×10^{-4}
air mass factor stratosphere [1]	3.72 ± 2.09	16304055	1.72	2.98	2.01	14.8	2.38	4.10

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]	0.721 ± 0.292	5638516	0.150	0.740	0.0	1.000	0.730	0.880
nitrogendioxide tropospheric column [mol m^{-2}]	$(7.736 \pm 24.090) \times 10^{-6}$	5638516	1.407×10^{-5}	3.714×10^{-6}	-4.074×10^{-3}	4.772×10^{-3}	-1.707×10^{-6}	1.236×10^{-5}
nitrogendioxide tropospheric column precision [mol m^{-2}]	$(1.172 \pm 85.764) \times 10^{-5}$	5638516	5.462×10^{-6}	7.262×10^{-6}	3.111×10^{-6}	0.981	5.144×10^{-6}	1.061×10^{-5}
air mass factor troposphere [1]	2.81 ± 1.88	5638516	2.81	2.02	1.070×10^{-2}	8.61	1.39	4.20
air mass factor total [1]	4.11 ± 2.79	5638516	2.77	2.93	0.299	14.8	2.21	4.98
number of spectral points in retrieval [1]	304 ± 1	5638516	1.000	304	234	305	304	305
number of iterations [1]	3.77 ± 1.02	5638516	1.000	4.00	3.00	10.00	3.00	4.00
wavelength calibration offset [nm]	$(-2.158 \pm 5.947) \times 10^{-3}$	5638516	5.026×10^{-3}	-1.960×10^{-3}	-6.635×10^{-2}	6.184×10^{-2}	-4.823×10^{-3}	2.029×10^{-4}
nitrogendioxide stratospheric column [mol/m^2]	$(4.221 \pm 0.832) \times 10^{-5}$	5638516	1.171×10^{-5}	4.189×10^{-5}	2.154×10^{-5}	7.287×10^{-5}	3.617×10^{-5}	4.787×10^{-5}
nitrogendioxide stratospheric column precision [mol/m^2]	$(3.321 \pm 0.000) \times 10^{-6}$	5638516	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]	$(4.925 \pm 1.610) \times 10^{-5}$	5638516	1.680×10^{-5}	4.715×10^{-5}	7.732×10^{-6}	6.815×10^{-4}	3.891×10^{-5}	5.571×10^{-5}
nitrogendioxide total column precision [mol/m^2]	$(1.043 \pm 0.407) \times 10^{-5}$	5638516	3.533×10^{-6}	9.834×10^{-6}	3.970×10^{-6}	5.121×10^{-4}	8.145×10^{-6}	1.168×10^{-5}
nitrogendioxide summed total column [mol/m^2]	$(4.995 \pm 2.523) \times 10^{-5}$	5638516	1.772×10^{-5}	4.687×10^{-5}	-4.032×10^{-3}	4.804×10^{-3}	3.841×10^{-5}	5.613×10^{-5}
nitrogendioxide summed total column precision [mol/m^2]	$(1.246 \pm 85.764) \times 10^{-5}$	5638516	4.991×10^{-6}	7.985×10^{-6}	4.551×10^{-6}	0.981	6.123×10^{-6}	1.111×10^{-5}
chi square [1]	554 ± 711	5638516	209	385	162	8.852×10^4	312	521
root mean square error of fit [1]	$(4.846 \pm 3.305) \times 10^{-4}$	5638516	4.143×10^{-4}	4.107×10^{-4}	8.451×10^{-5}	6.331×10^{-3}	2.217×10^{-4}	6.361×10^{-4}
air mass factor stratosphere [1]	4.29 ± 2.75	5638516	2.60	3.13	2.01	14.9	2.43	5.03

3 Granule outlines

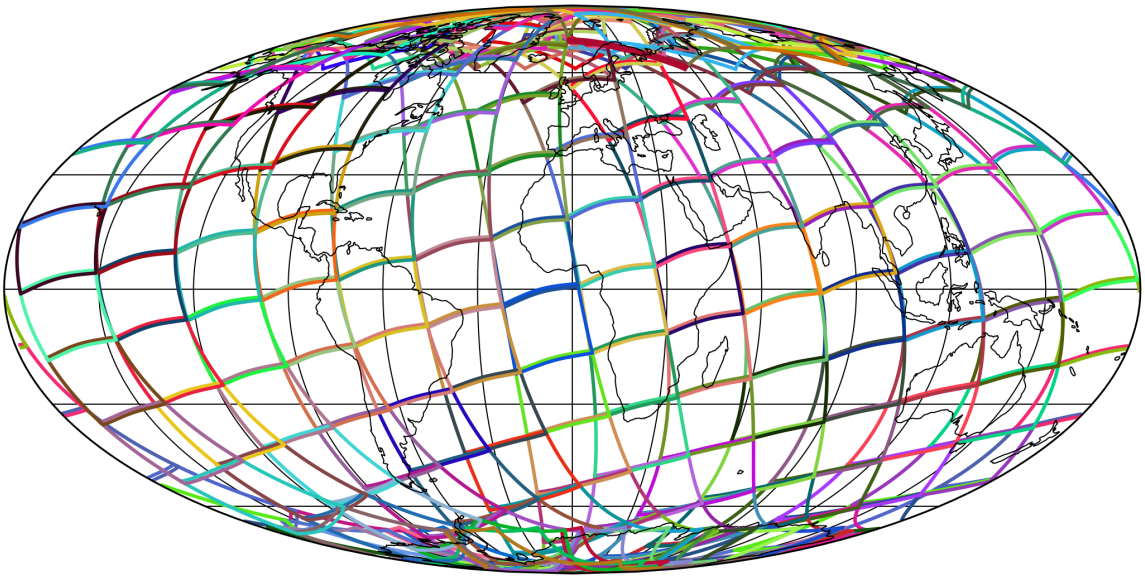

Figure 1: Outline of the granules.

4 Input data monitoring

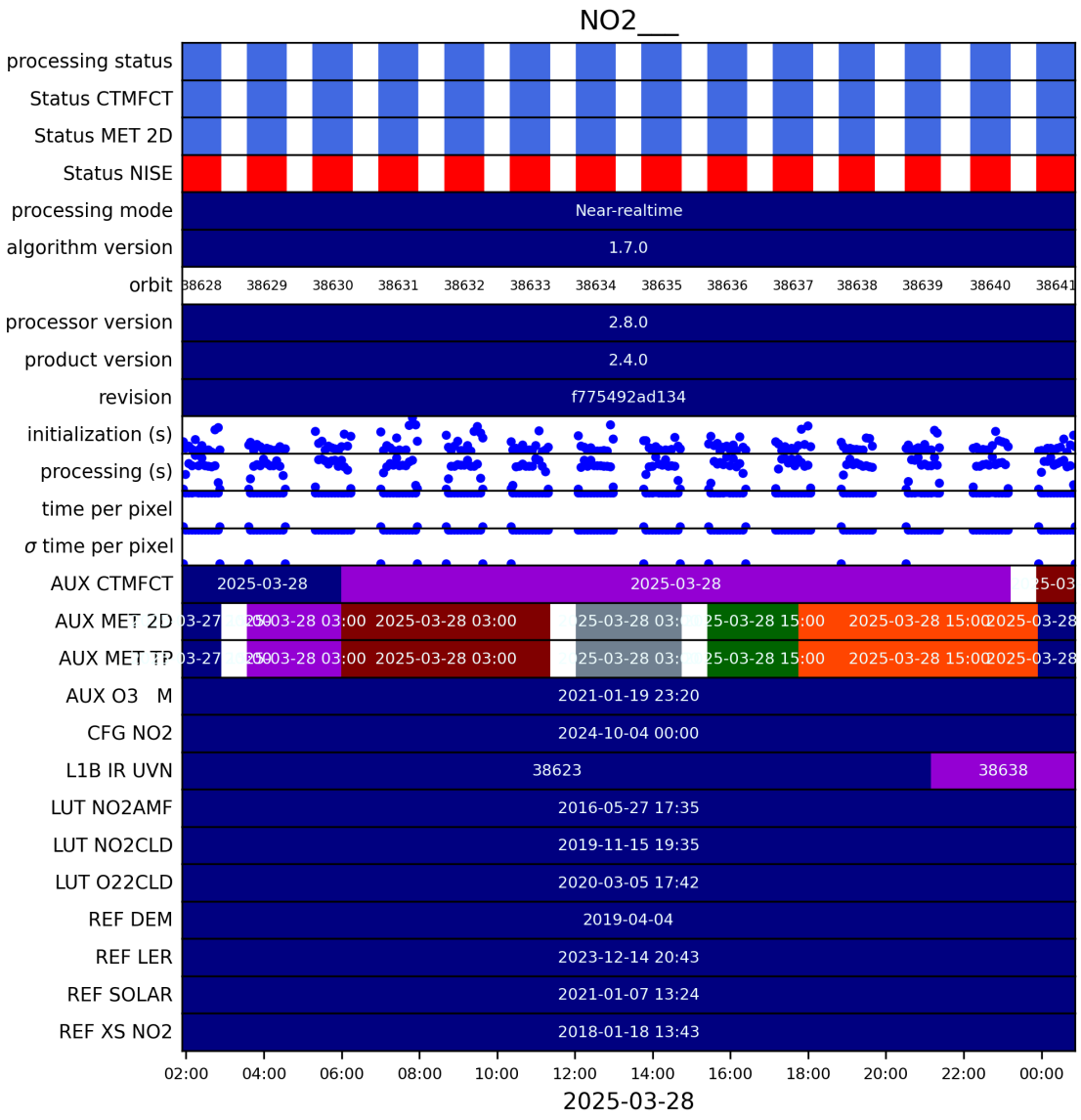

Figure 2: Input data per granule

5 Warnings and errors

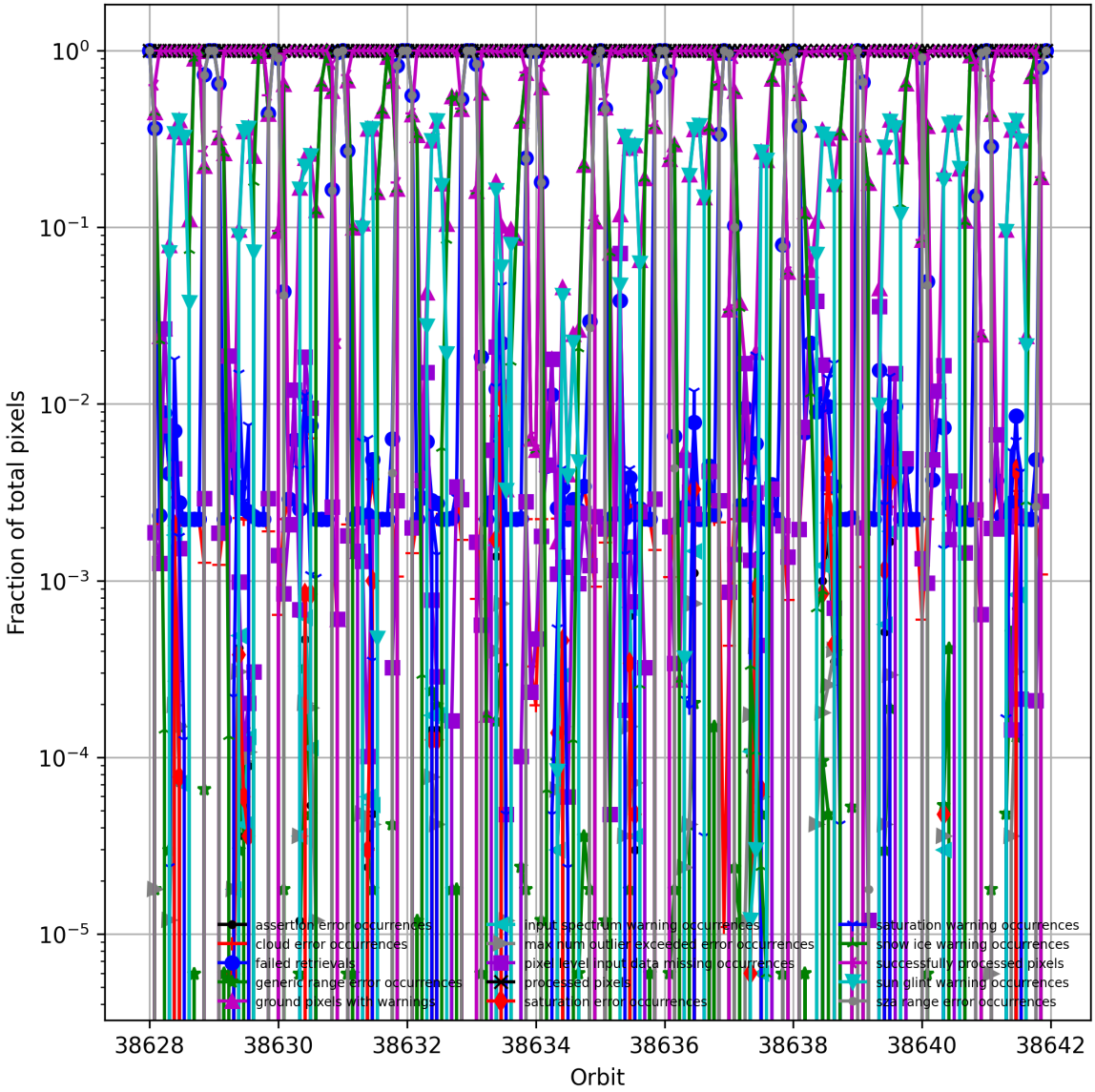

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

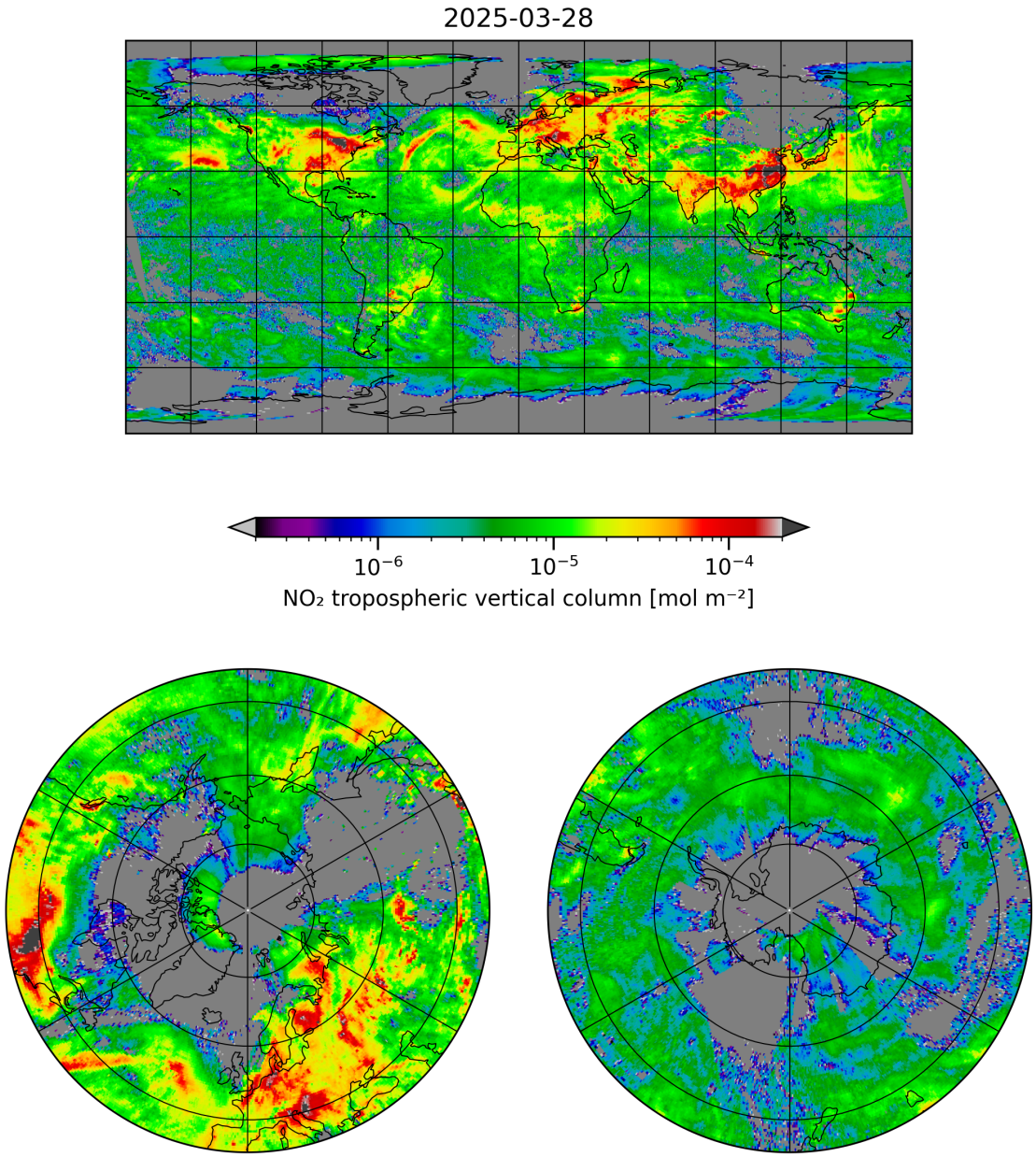

Figure 4: Map of "NO_2 tropospheric vertical column" for 2025-03-28 to 2025-03-29

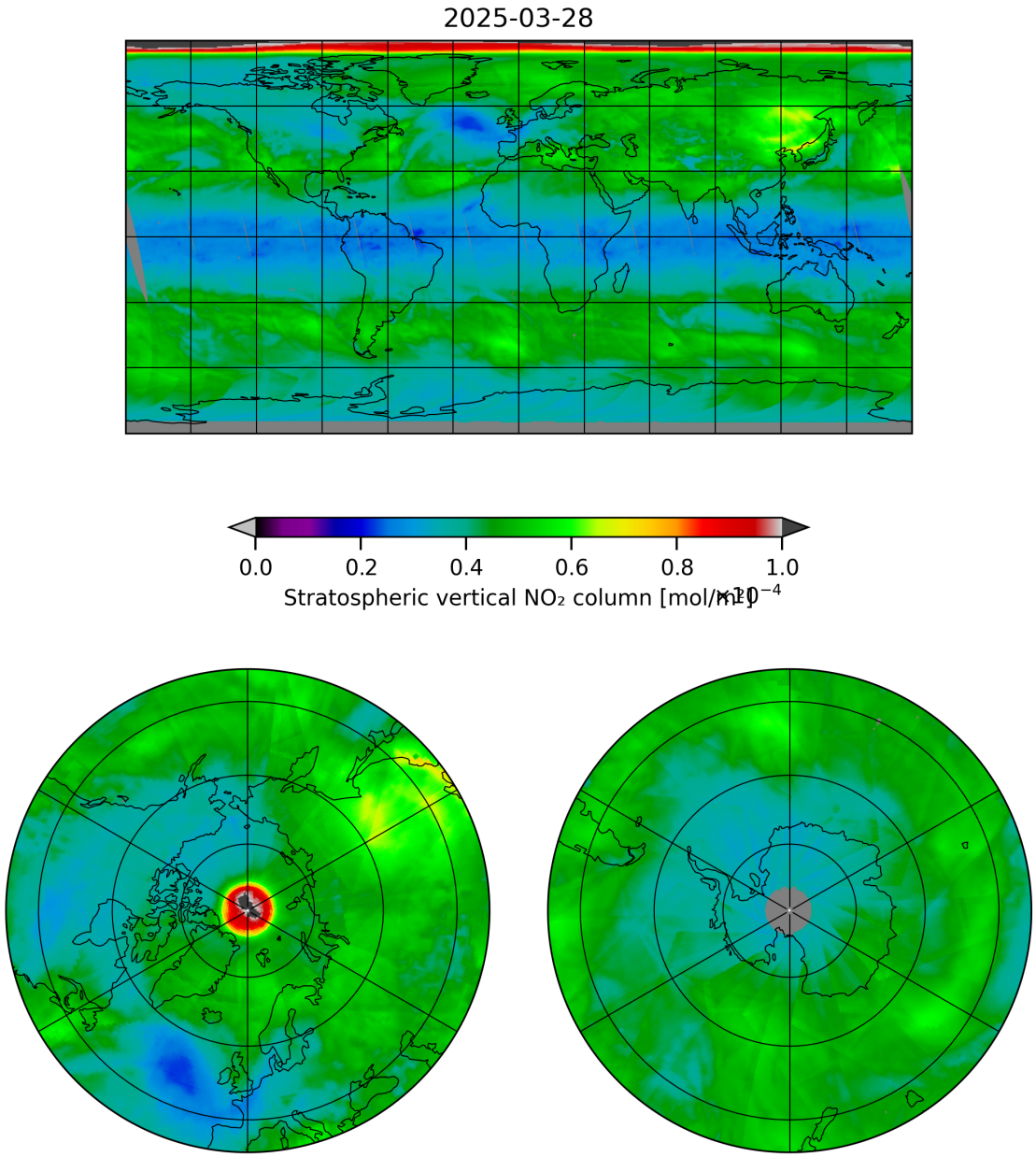

Figure 5: Map of “Stratospheric vertical NO_2 column” for 2025-03-28 to 2025-03-29

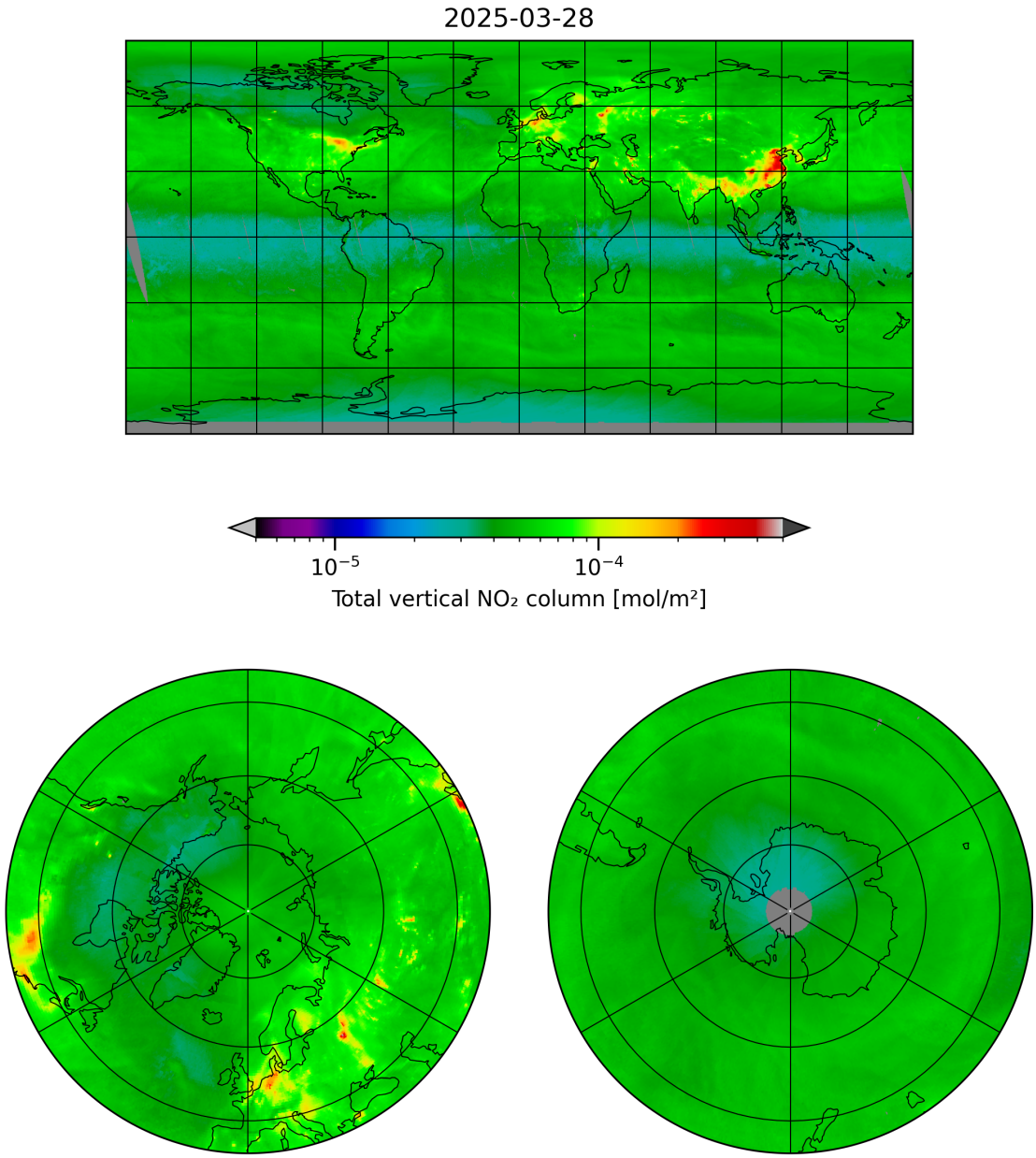

Figure 6: Map of "Total vertical NO_2 column" for 2025-03-28 to 2025-03-29

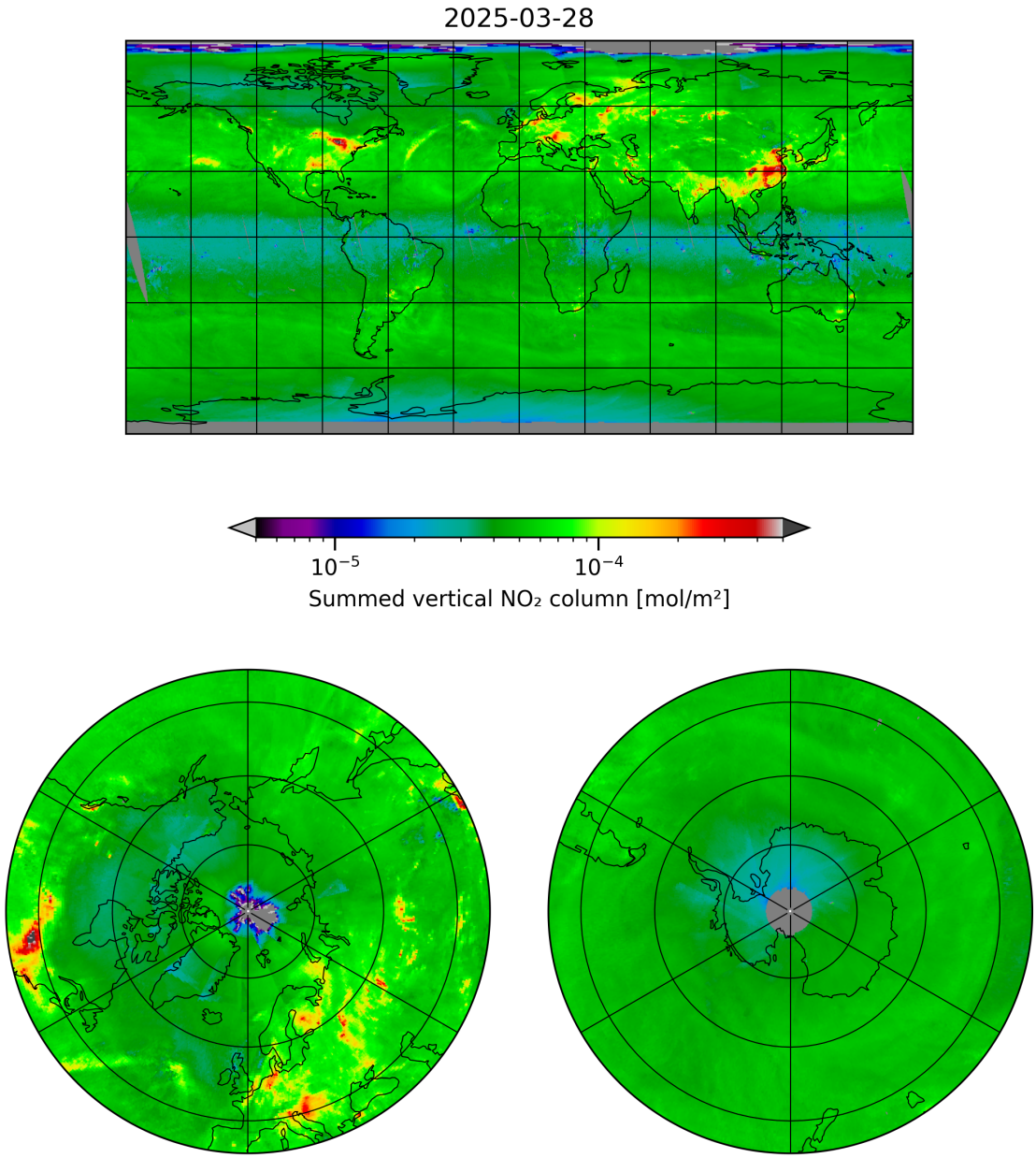

Figure 7: Map of “Summed vertical NO_2 column” for 2025-03-28 to 2025-03-29

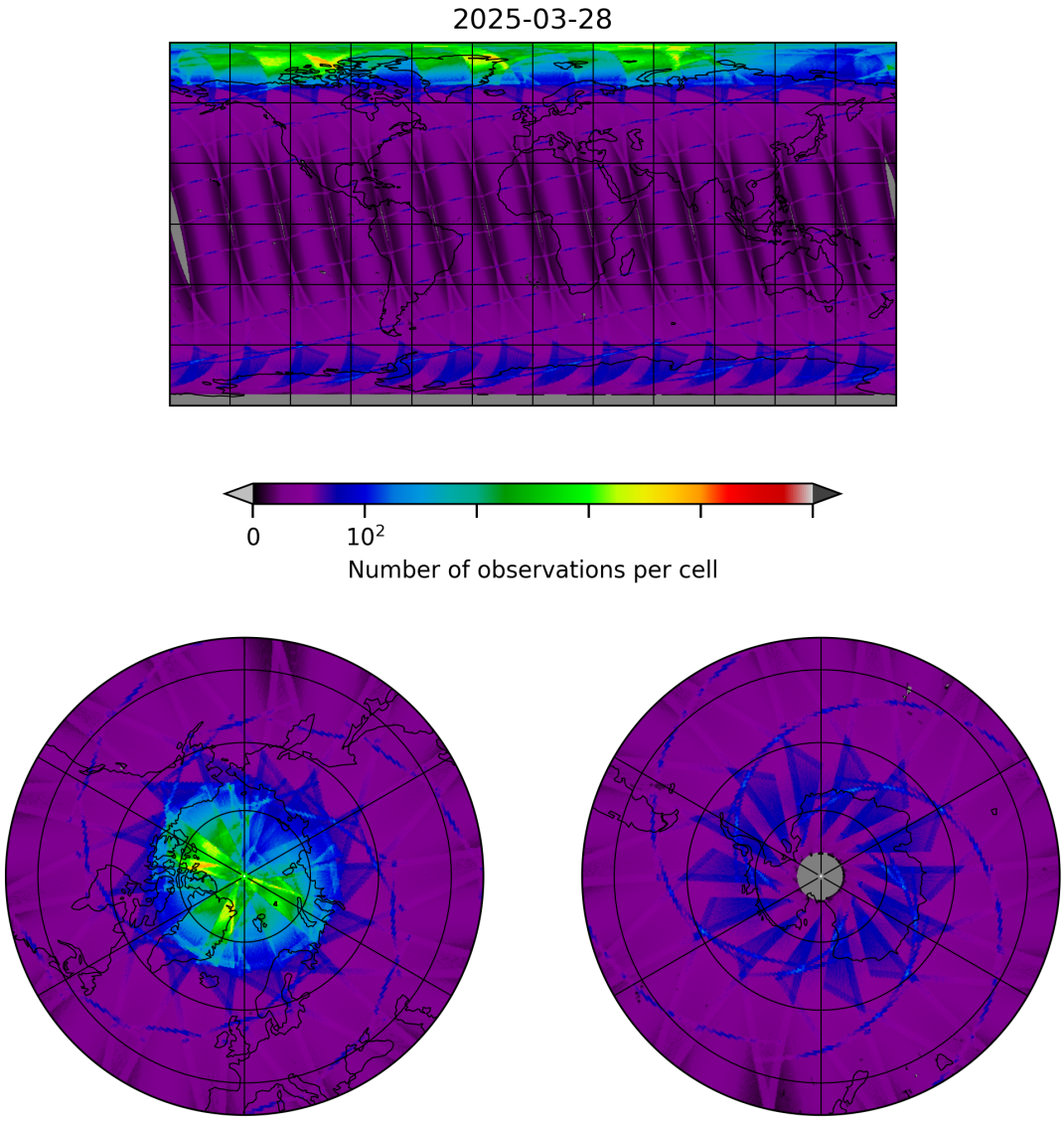

Figure 8: Map of the number of observations for 2025-03-28 to 2025-03-29

7 Zonal average

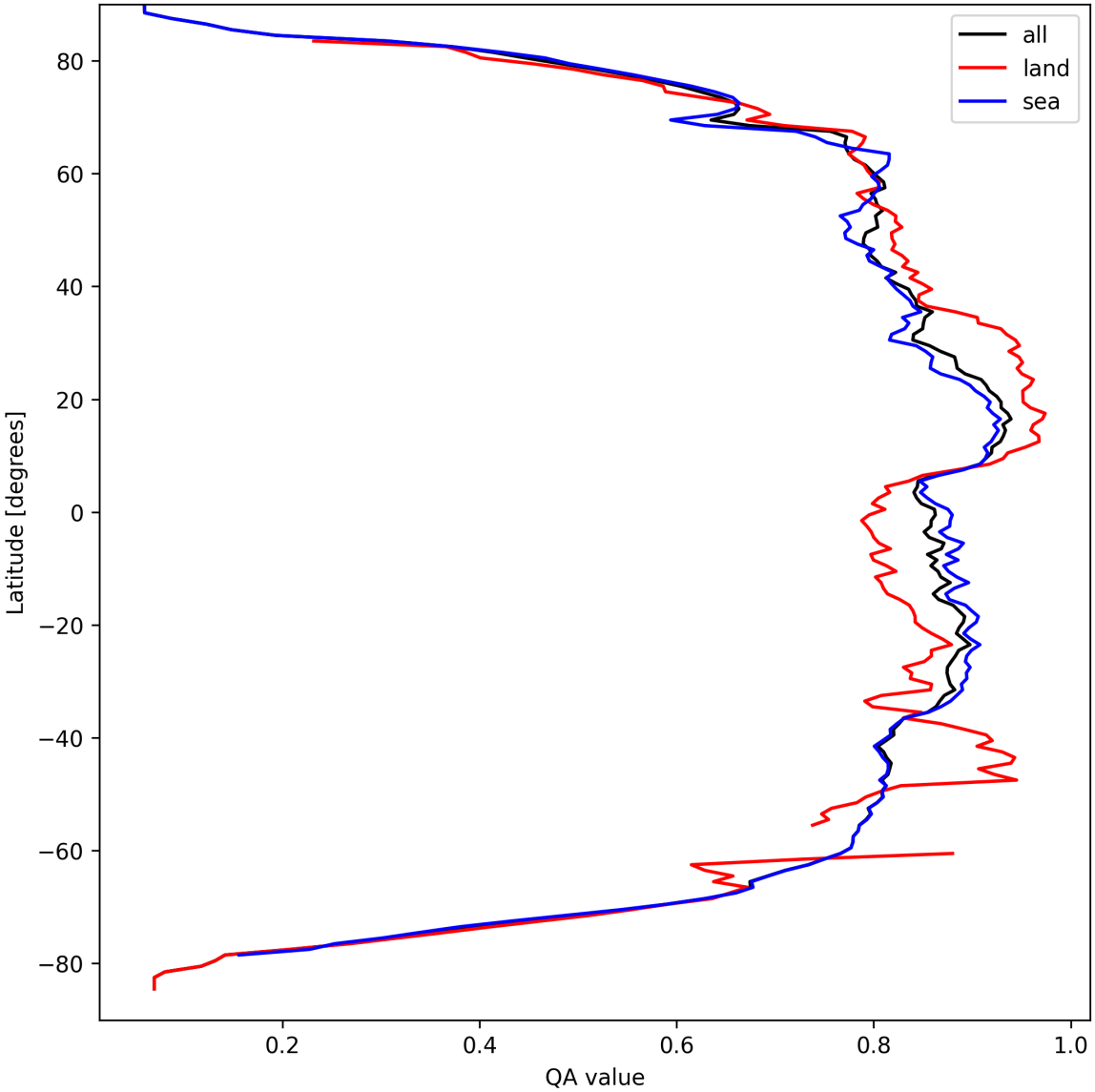

Figure 9: Zonal average of “QA value” for 2025-03-28 to 2025-03-29.

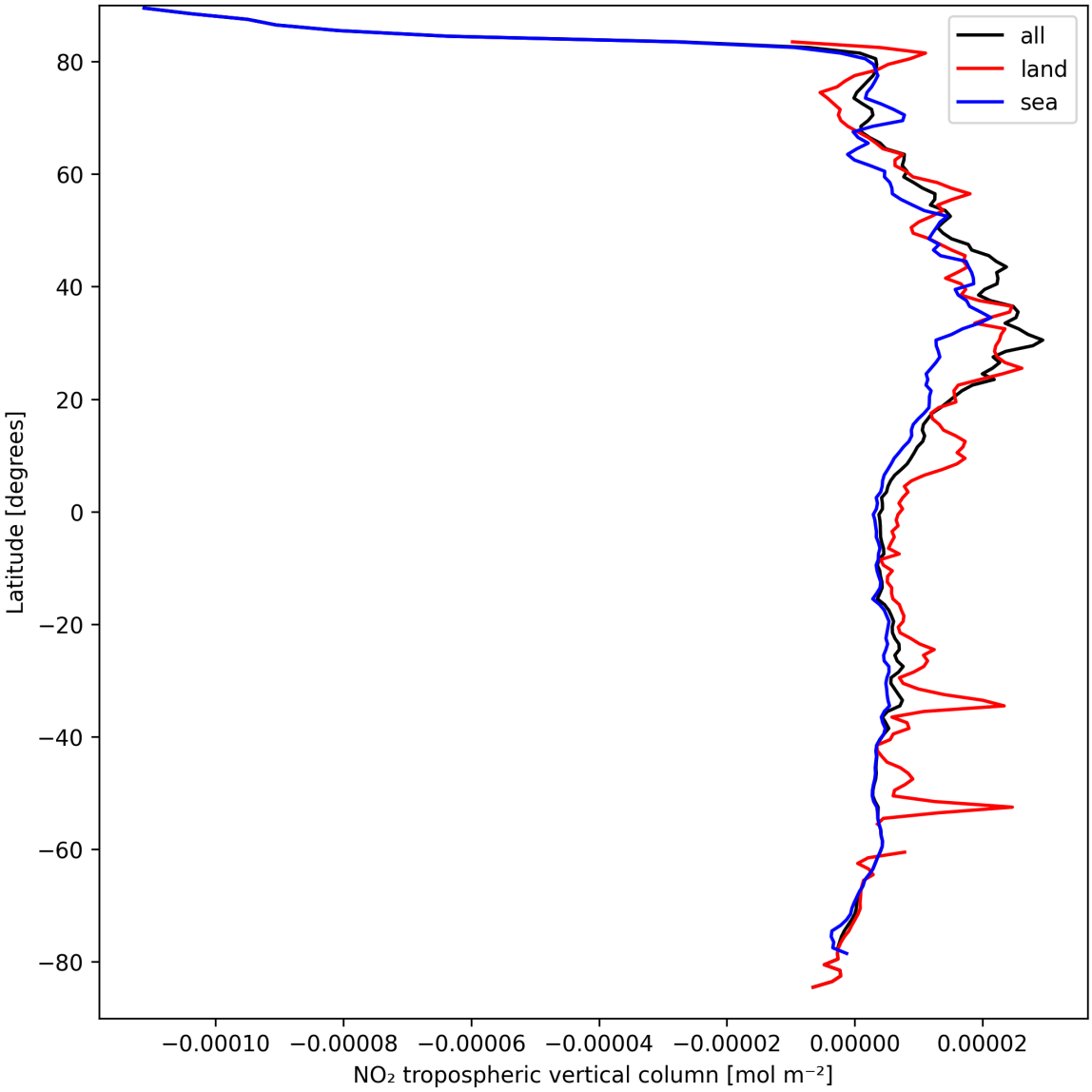

Figure 10: Zonal average of "NO_2 tropospheric vertical column" for 2025-03-28 to 2025-03-29.

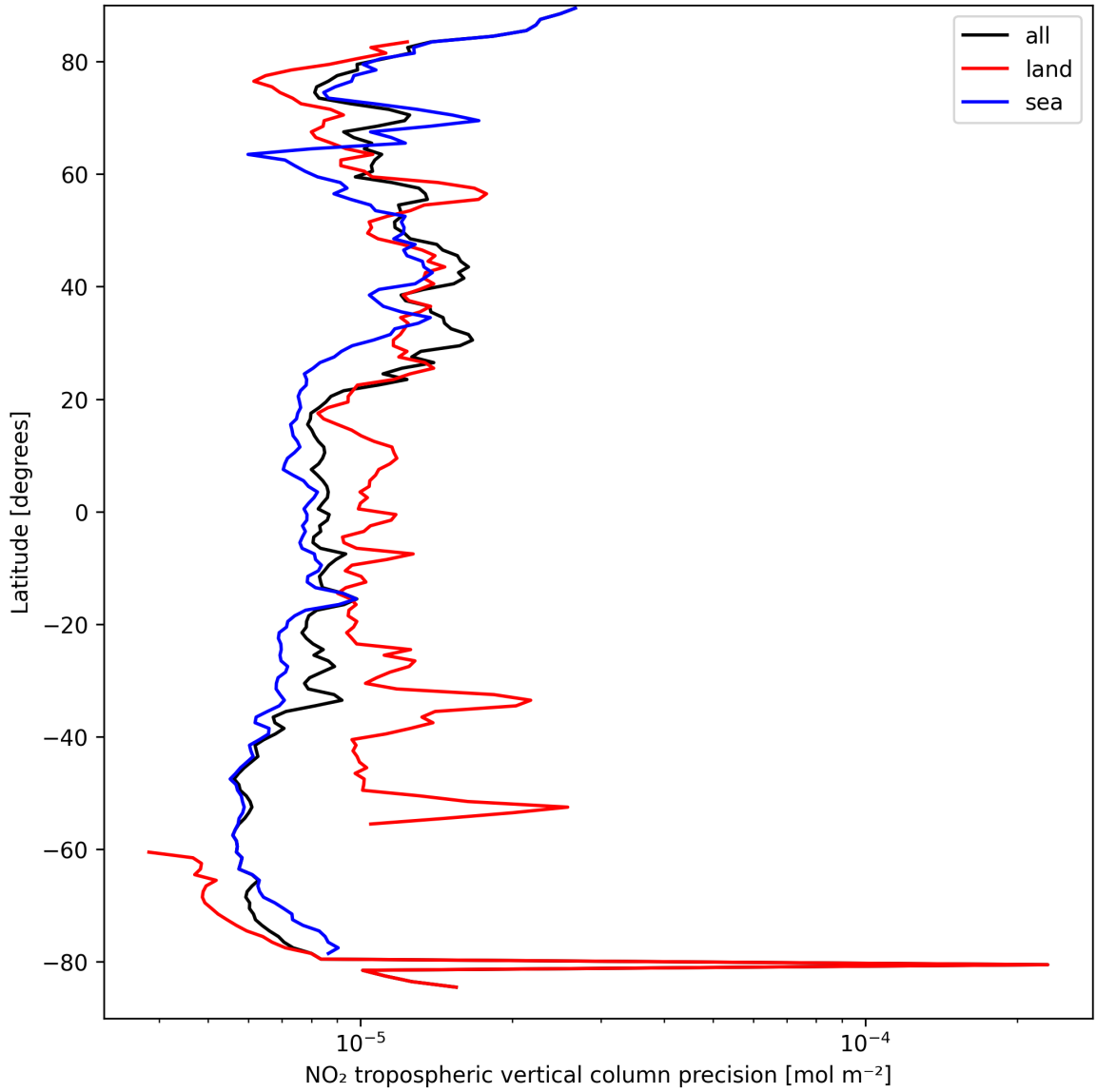

Figure 11: Zonal average of "NO_2 tropospheric vertical column precision" for 2025-03-28 to 2025-03-29.

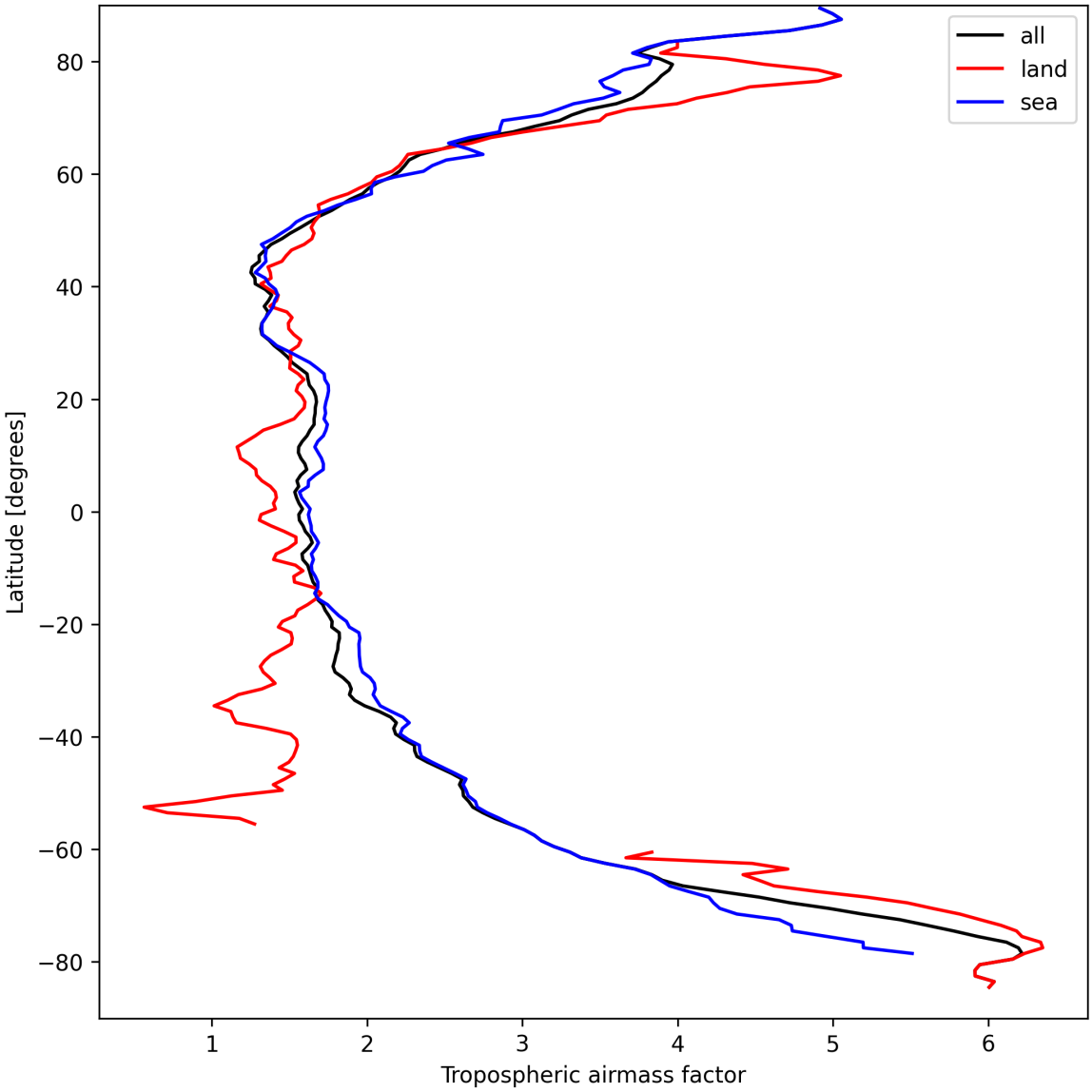

Figure 12: Zonal average of “Tropospheric airmass factor” for 2025-03-28 to 2025-03-29.

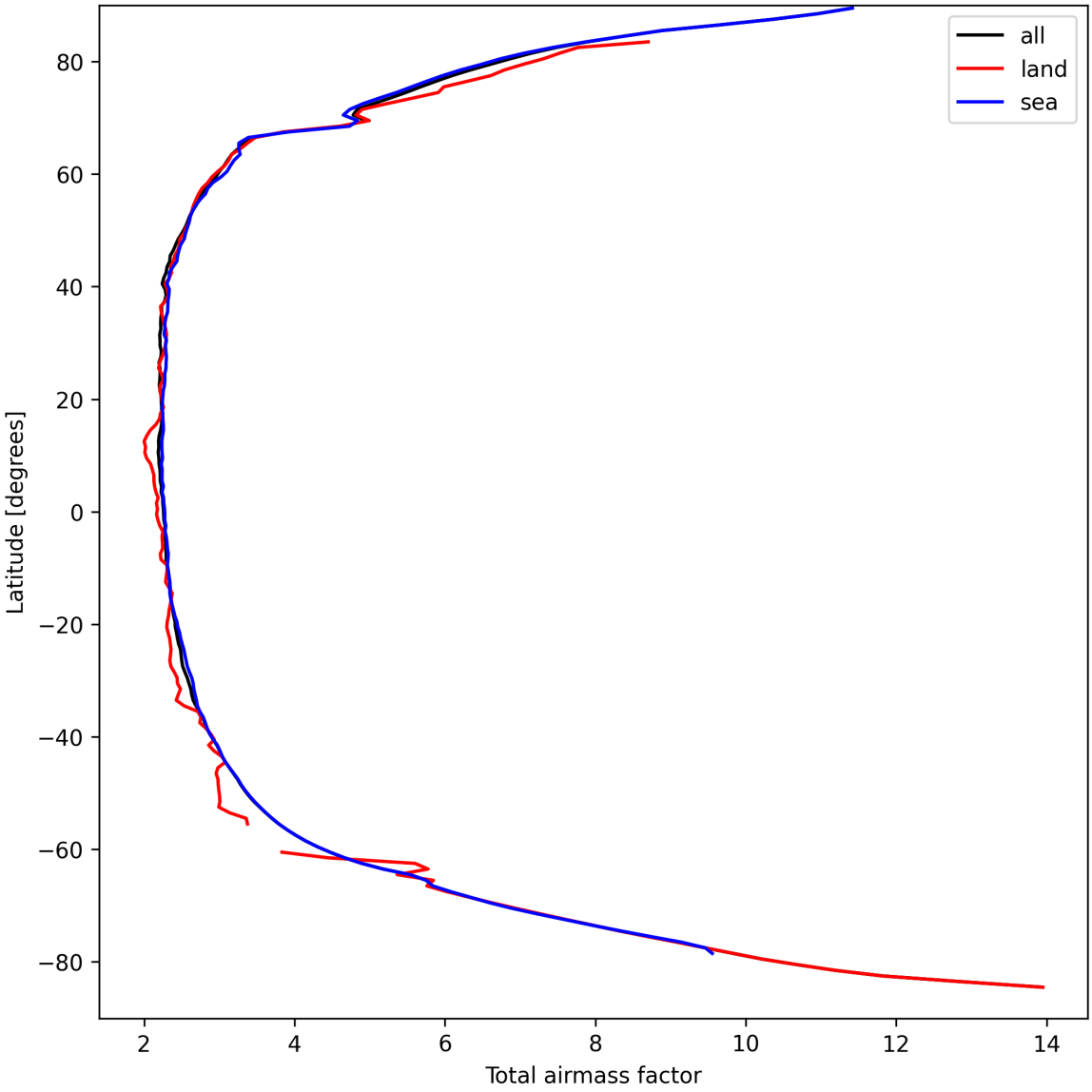

Figure 13: Zonal average of “Total airmass factor” for 2025-03-28 to 2025-03-29.

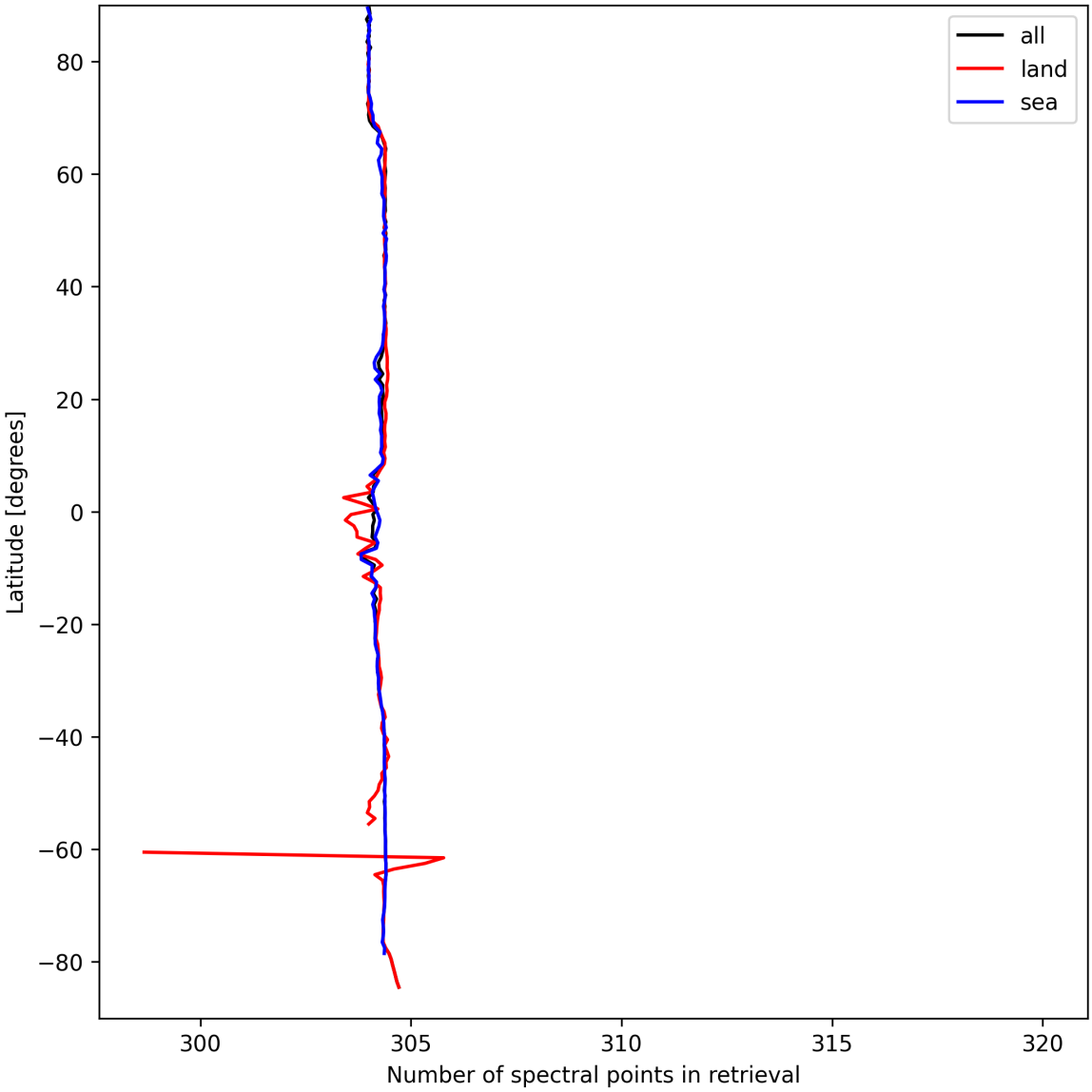

Figure 14: Zonal average of “Number of spectral points in retrieval” for 2025-03-28 to 2025-03-29.

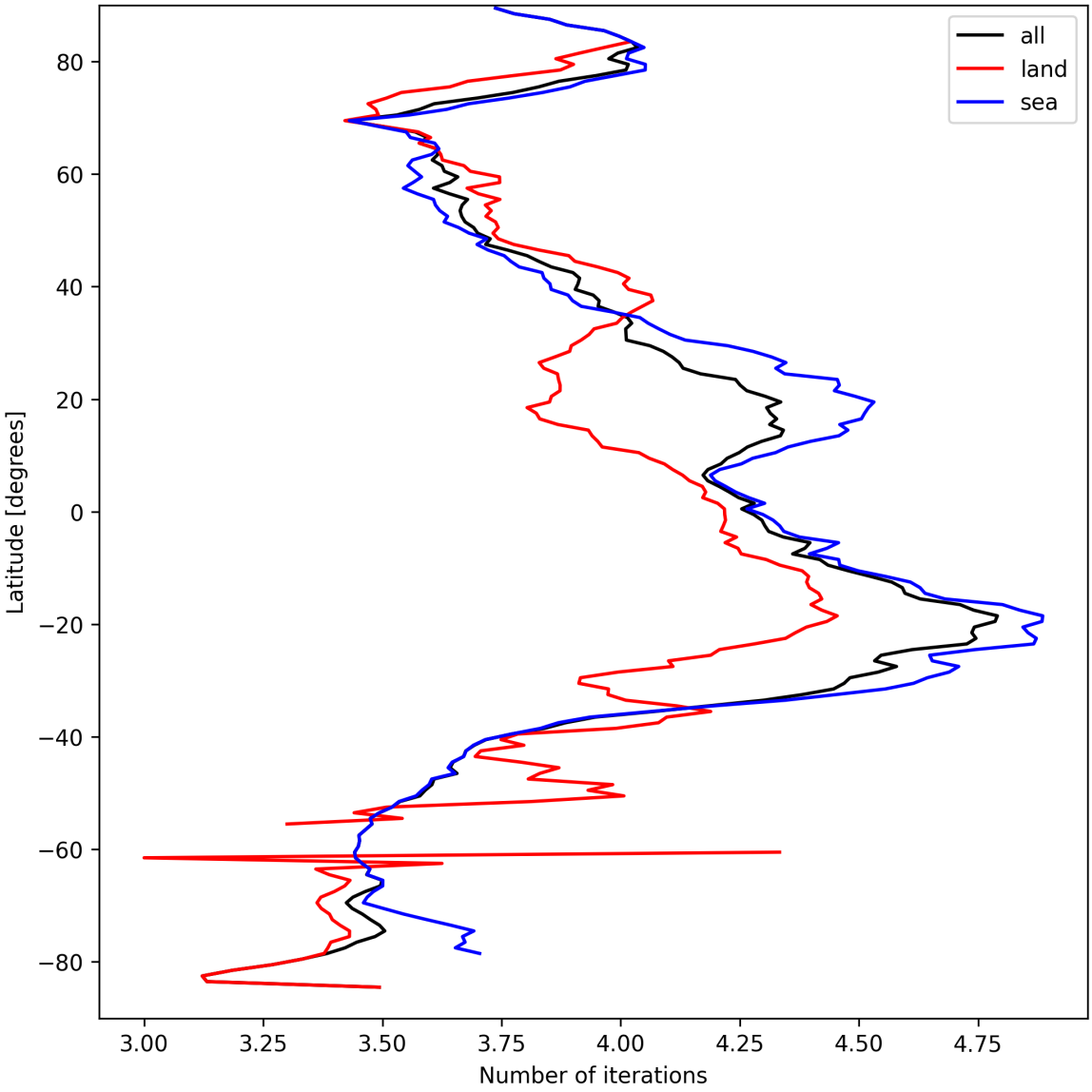

Figure 15: Zonal average of “Number of iterations” for 2025-03-28 to 2025-03-29.

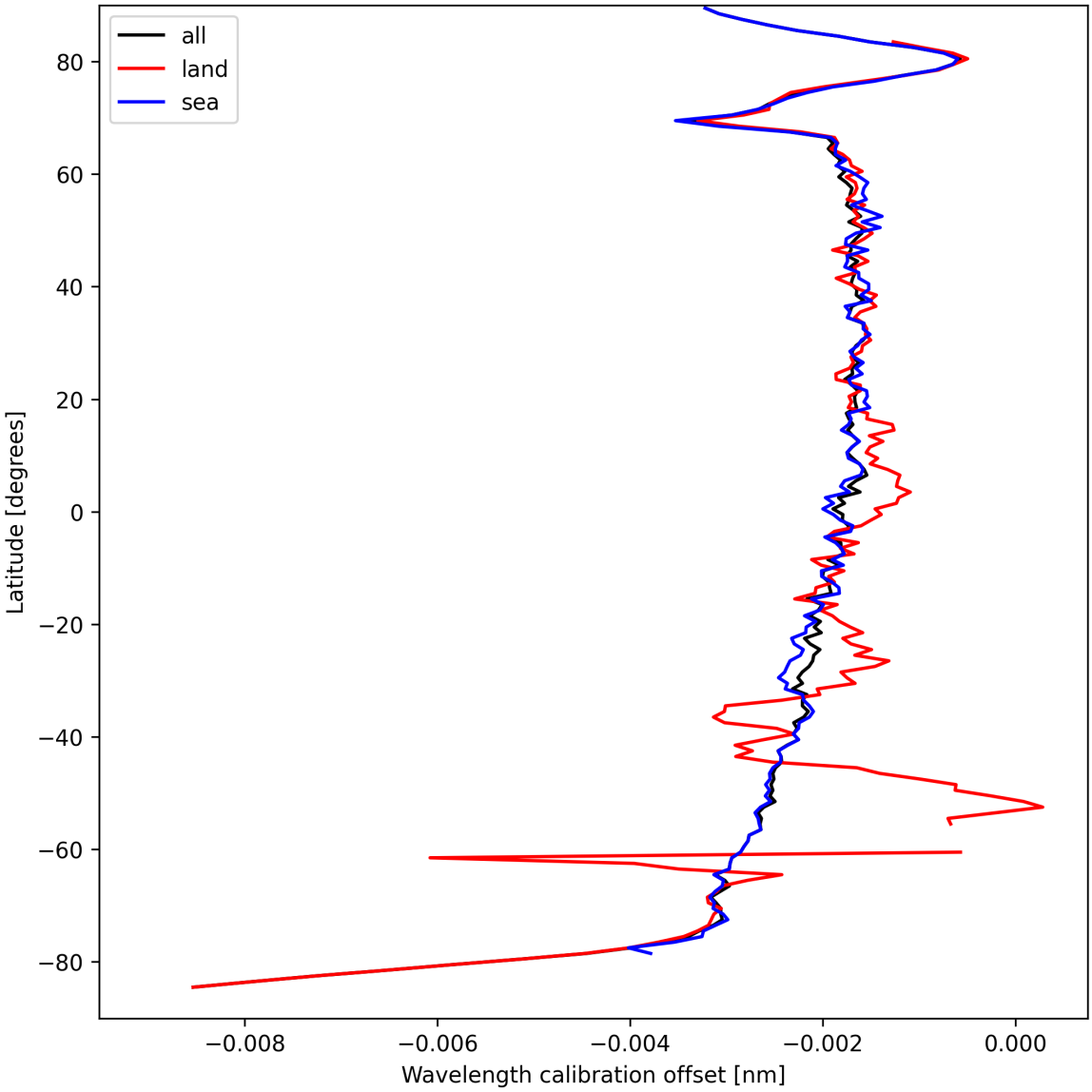

Figure 16: Zonal average of “Wavelength calibration offset” for 2025-03-28 to 2025-03-29.

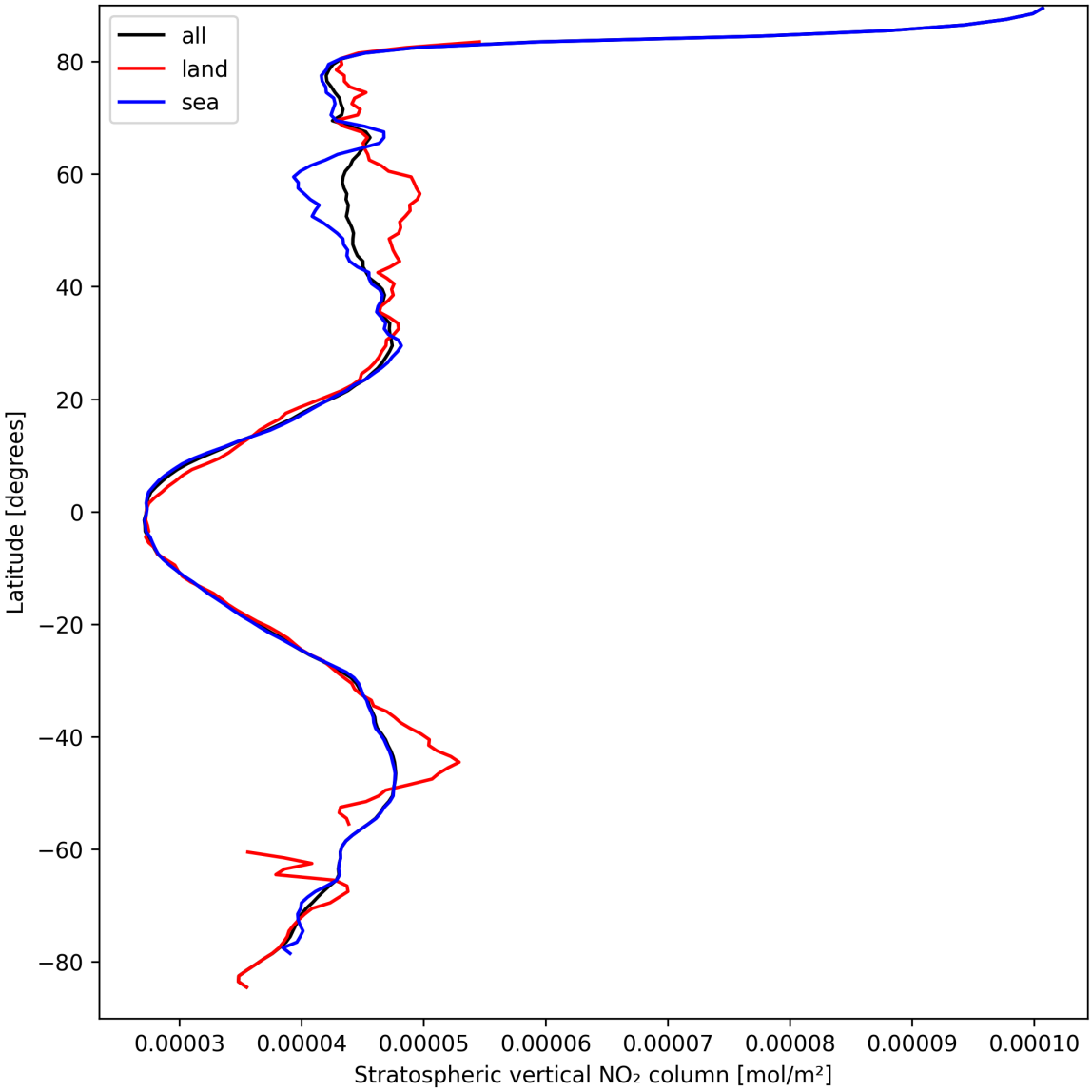

Figure 17: Zonal average of “Stratospheric vertical NO_2 column” for 2025-03-28 to 2025-03-29.

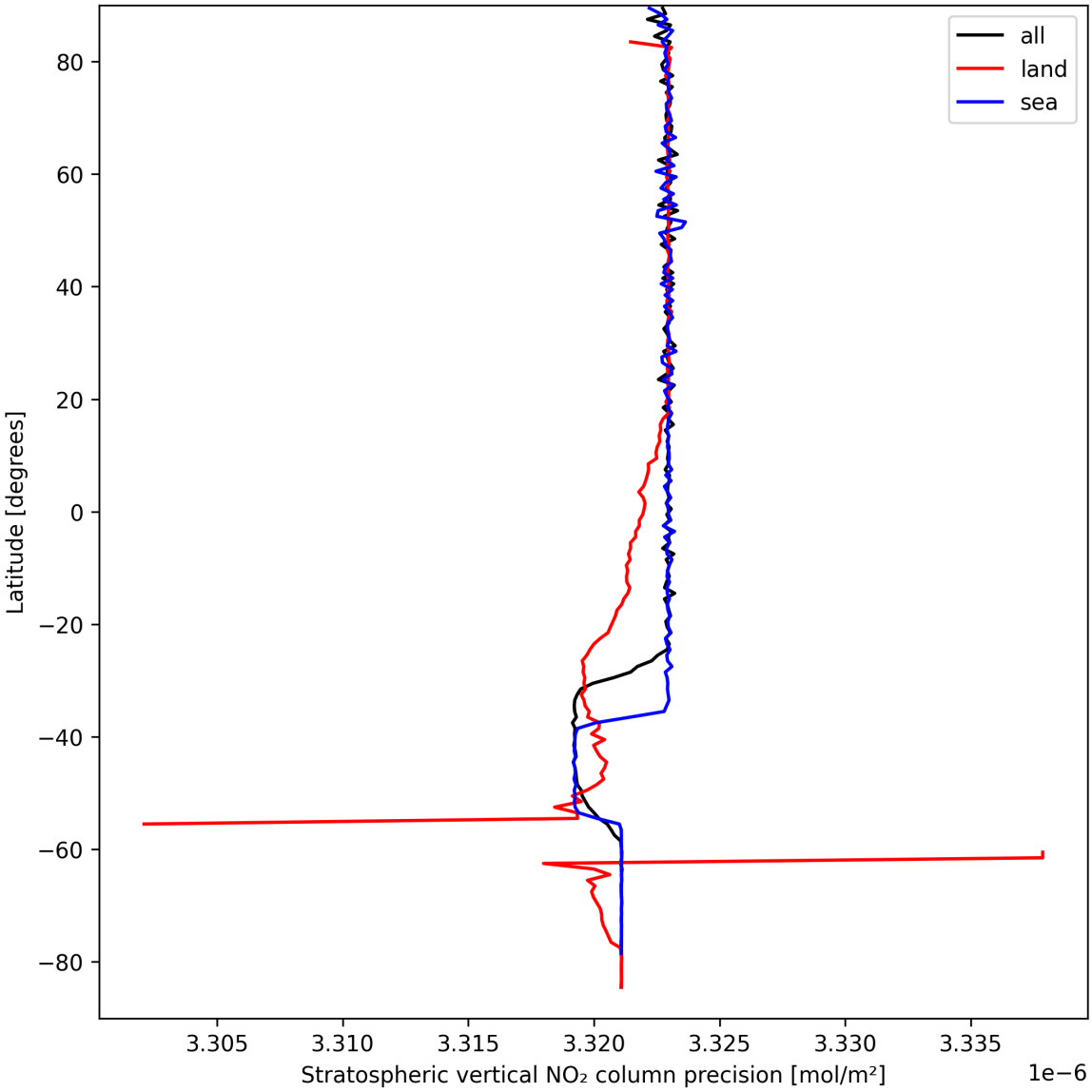

Figure 18: Zonal average of "Stratospheric vertical NO_2 column precision" for 2025-03-28 to 2025-03-29.

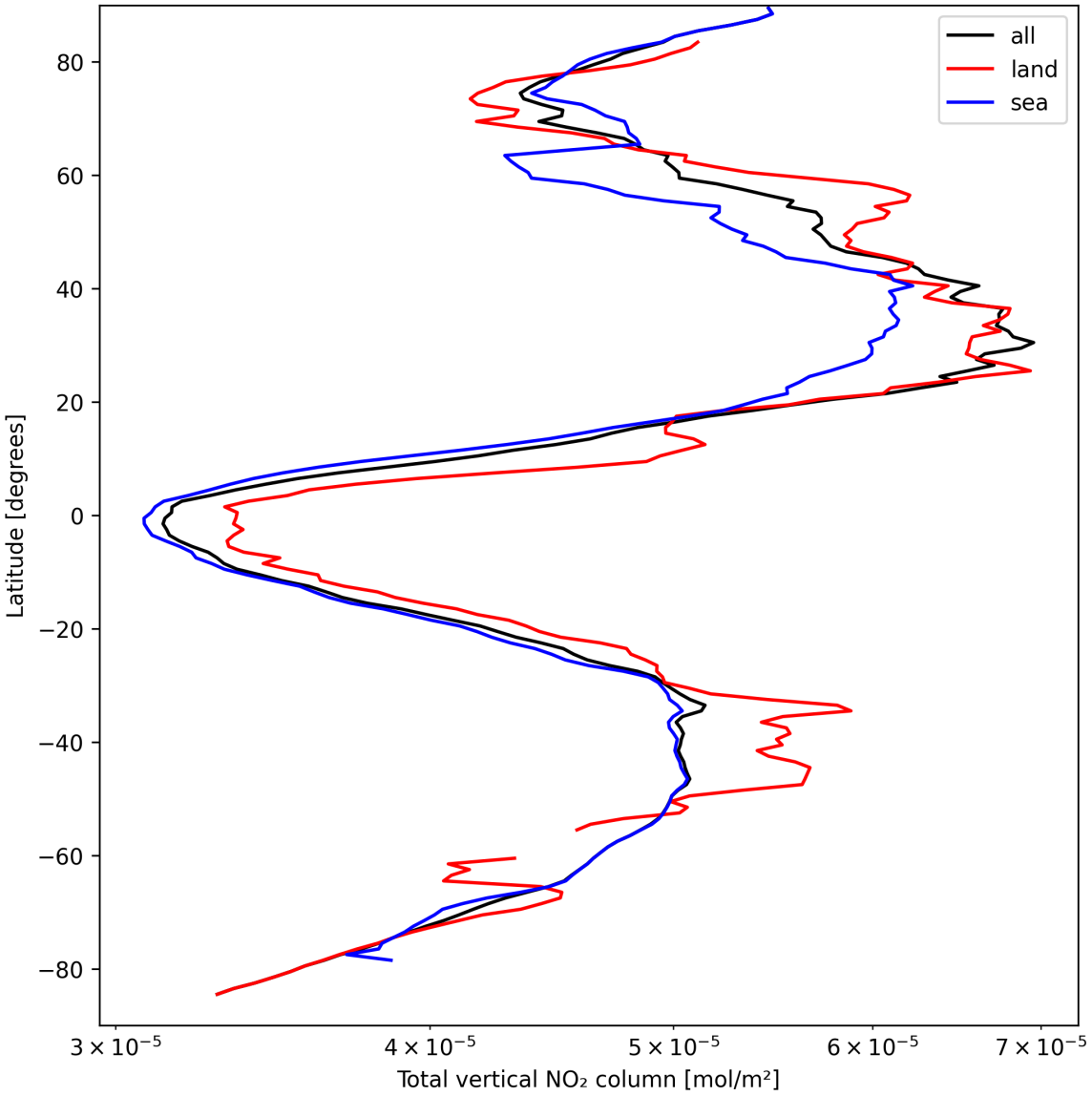

Figure 19: Zonal average of "Total vertical NO_2 column" for 2025-03-28 to 2025-03-29.

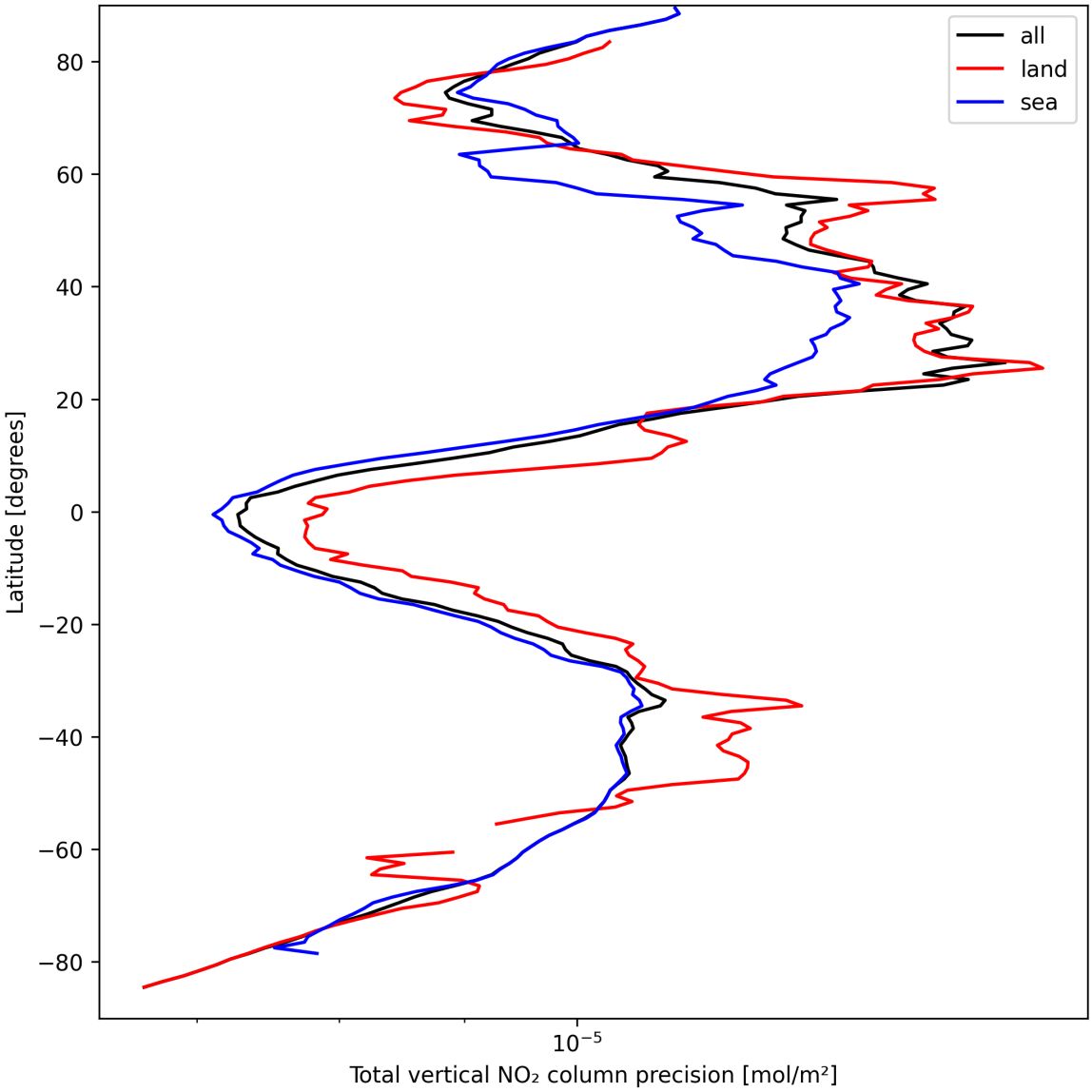

Figure 20: Zonal average of "Total vertical NO_2 column precision" for 2025-03-28 to 2025-03-29.

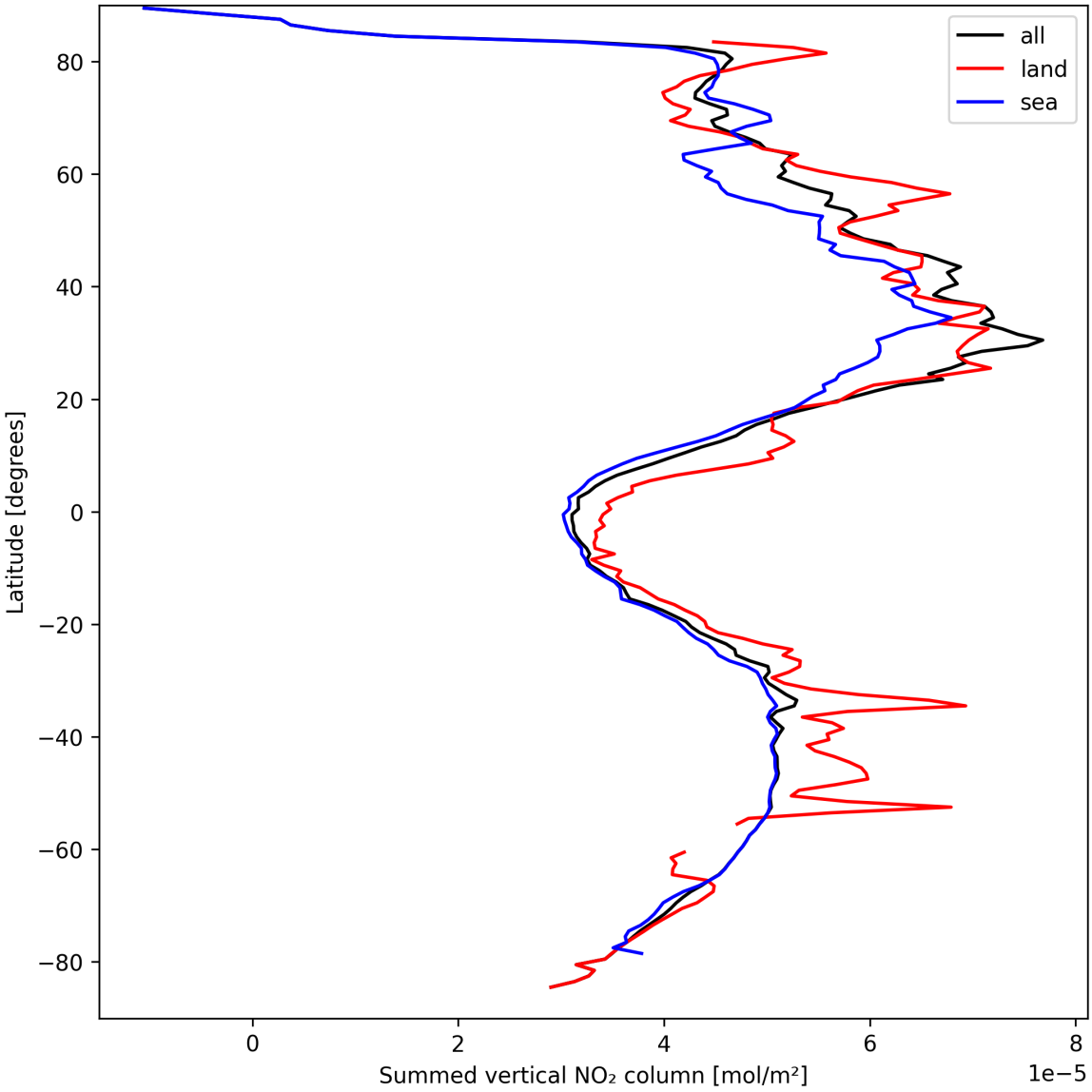

Figure 21: Zonal average of "Summed vertical NO_2 column" for 2025-03-28 to 2025-03-29.

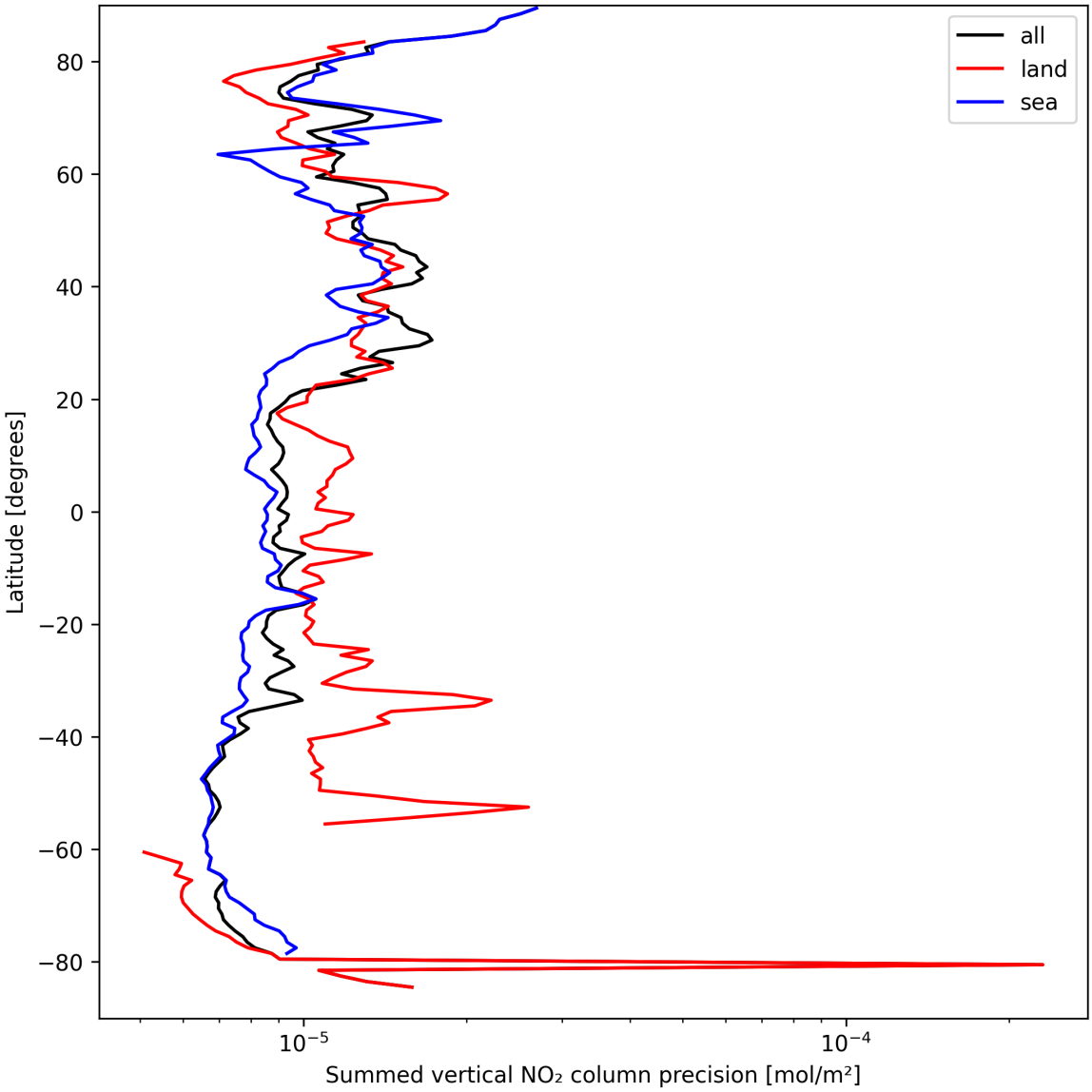

Figure 22: Zonal average of "Summed vertical NO_2 column precision" for 2025-03-28 to 2025-03-29.

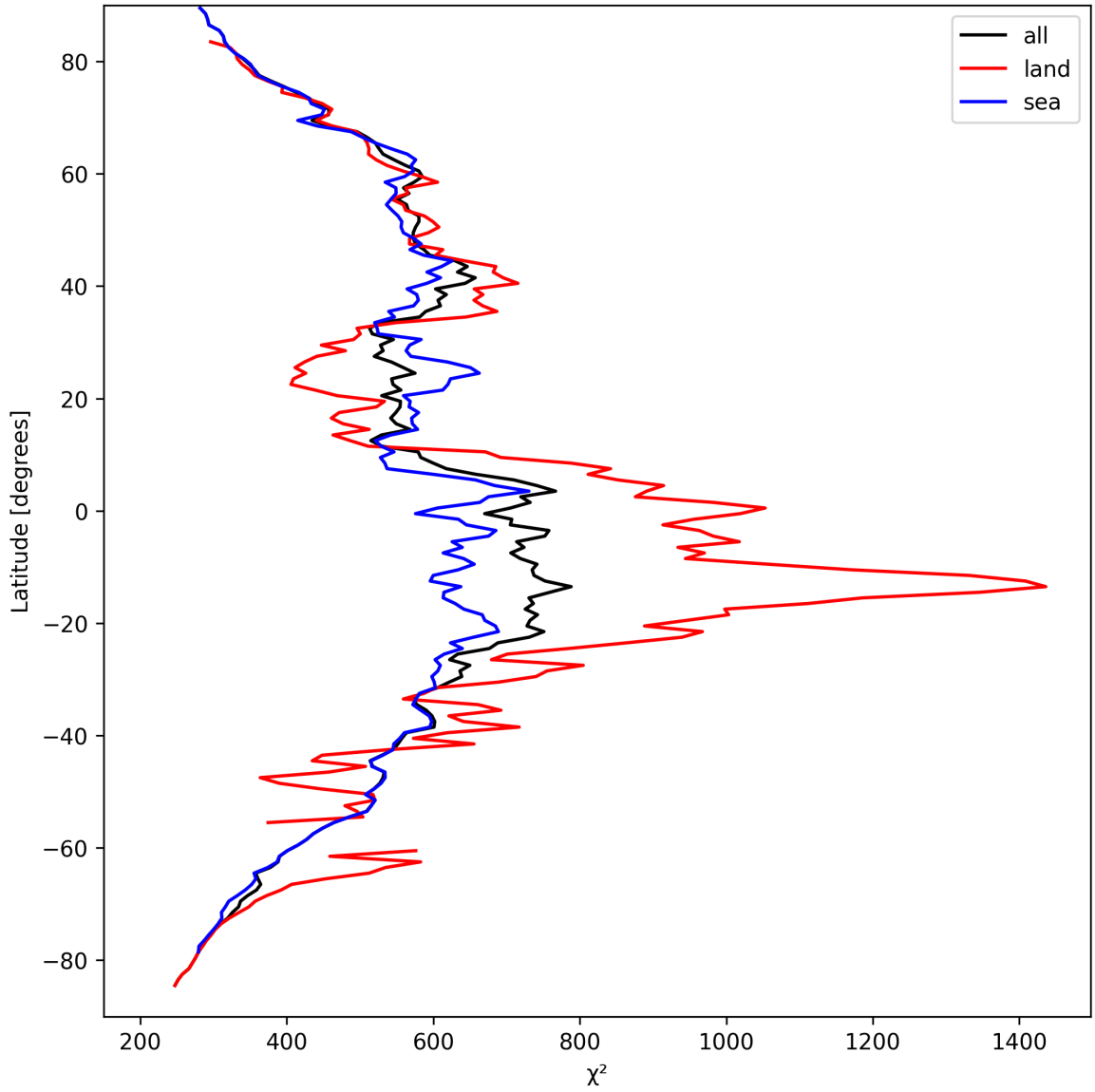

Figure 23: Zonal average of "χ^2" for 2025-03-28 to 2025-03-29.

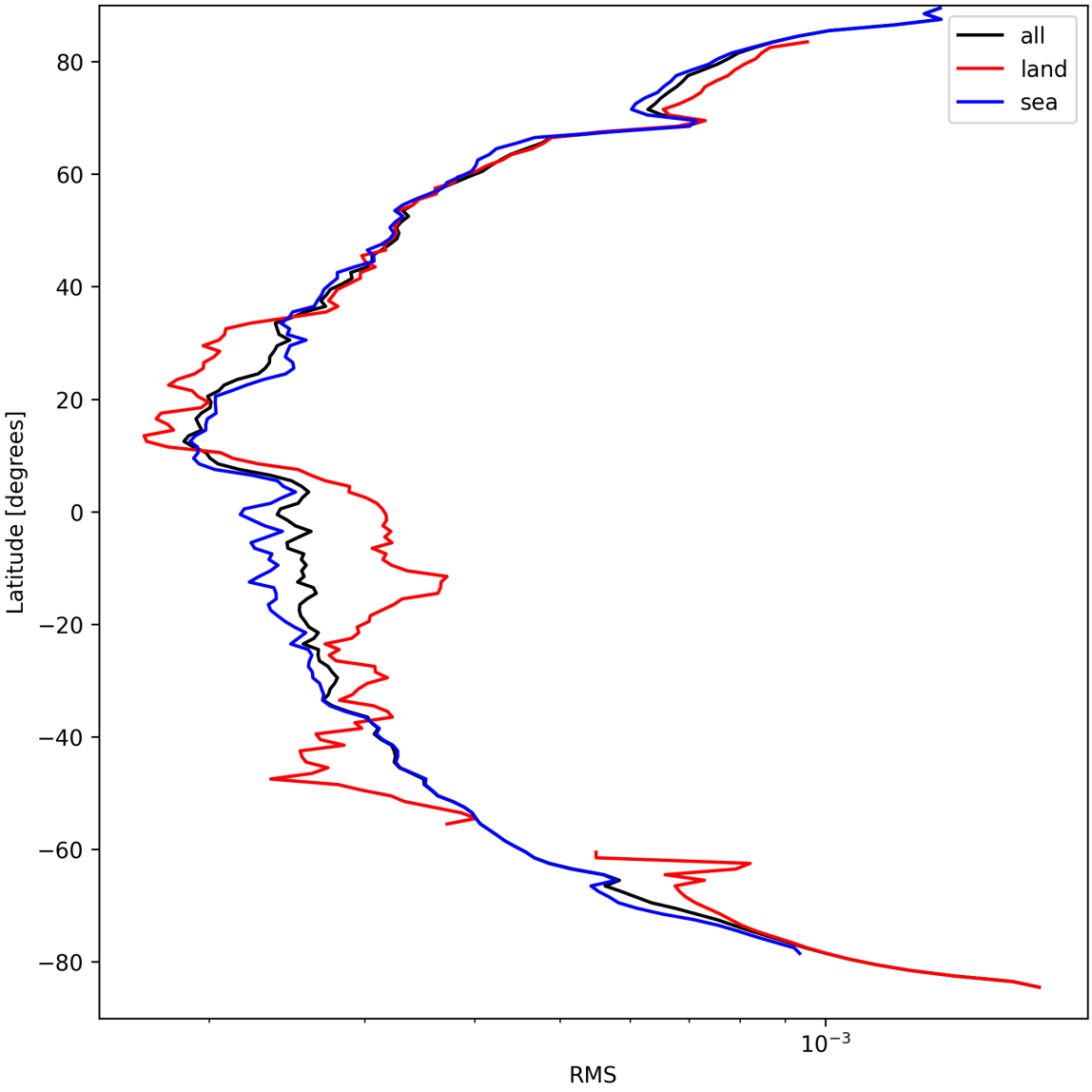

Figure 24: Zonal average of “RMS” for 2025-03-28 to 2025-03-29.

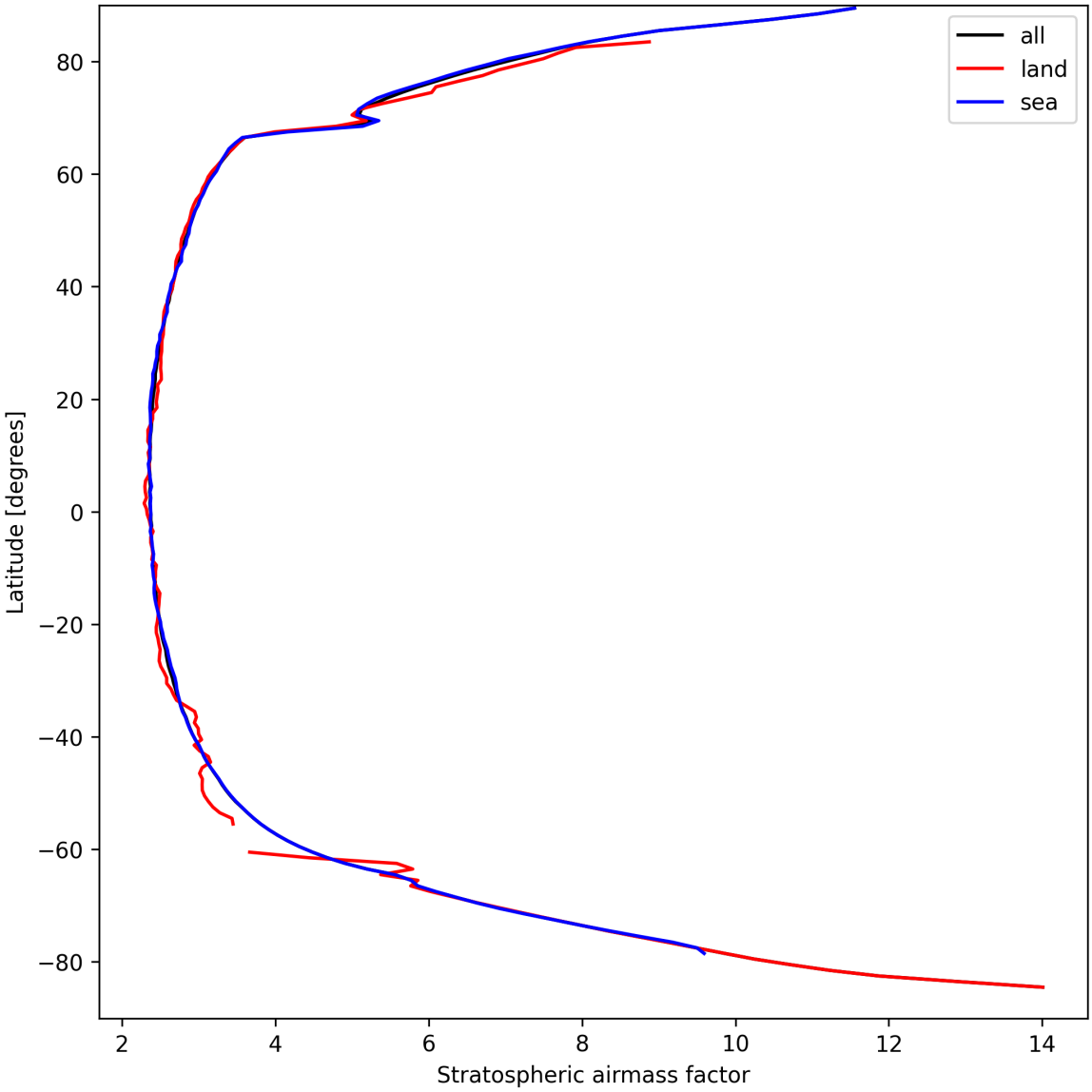

Figure 25: Zonal average of “Stratospheric airmass factor” for 2025-03-28 to 2025-03-29.

8 Histograms

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

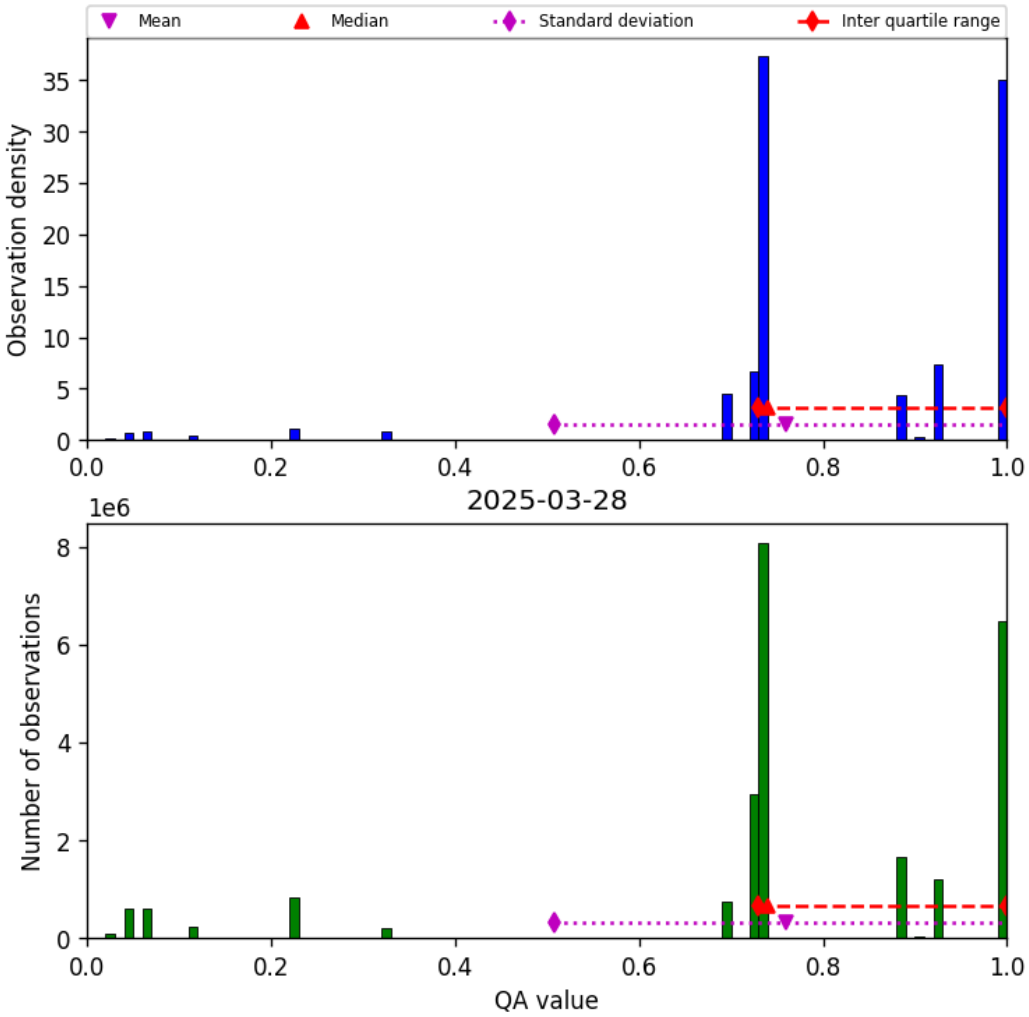

Figure 26: Histogram of “QA value” for 2025-03-28 to 2025-03-29

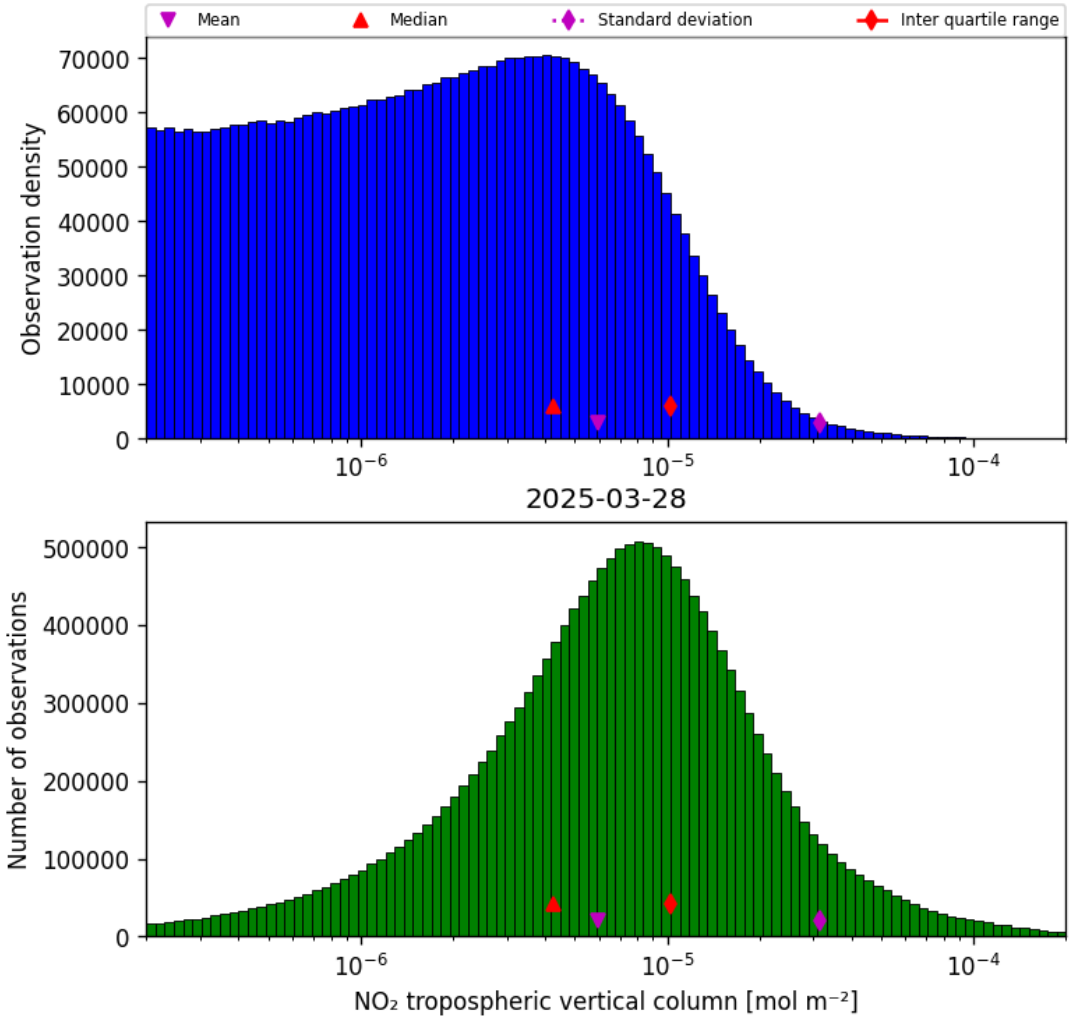

Figure 27: Histogram of "NO_2 tropospheric vertical column" for 2025-03-28 to 2025-03-29

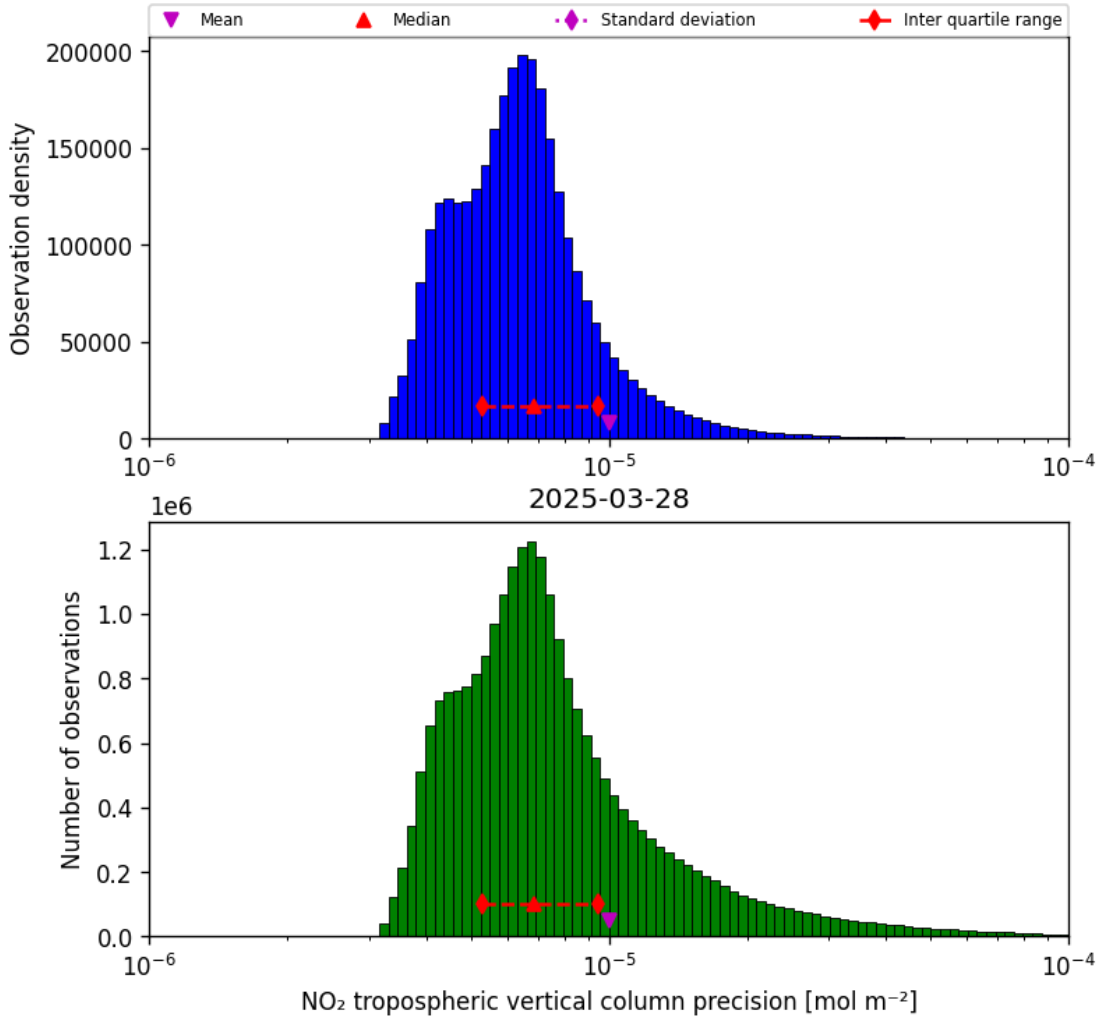

Figure 28: Histogram of "NO_2 tropospheric vertical column precision" for 2025-03-28 to 2025-03-29

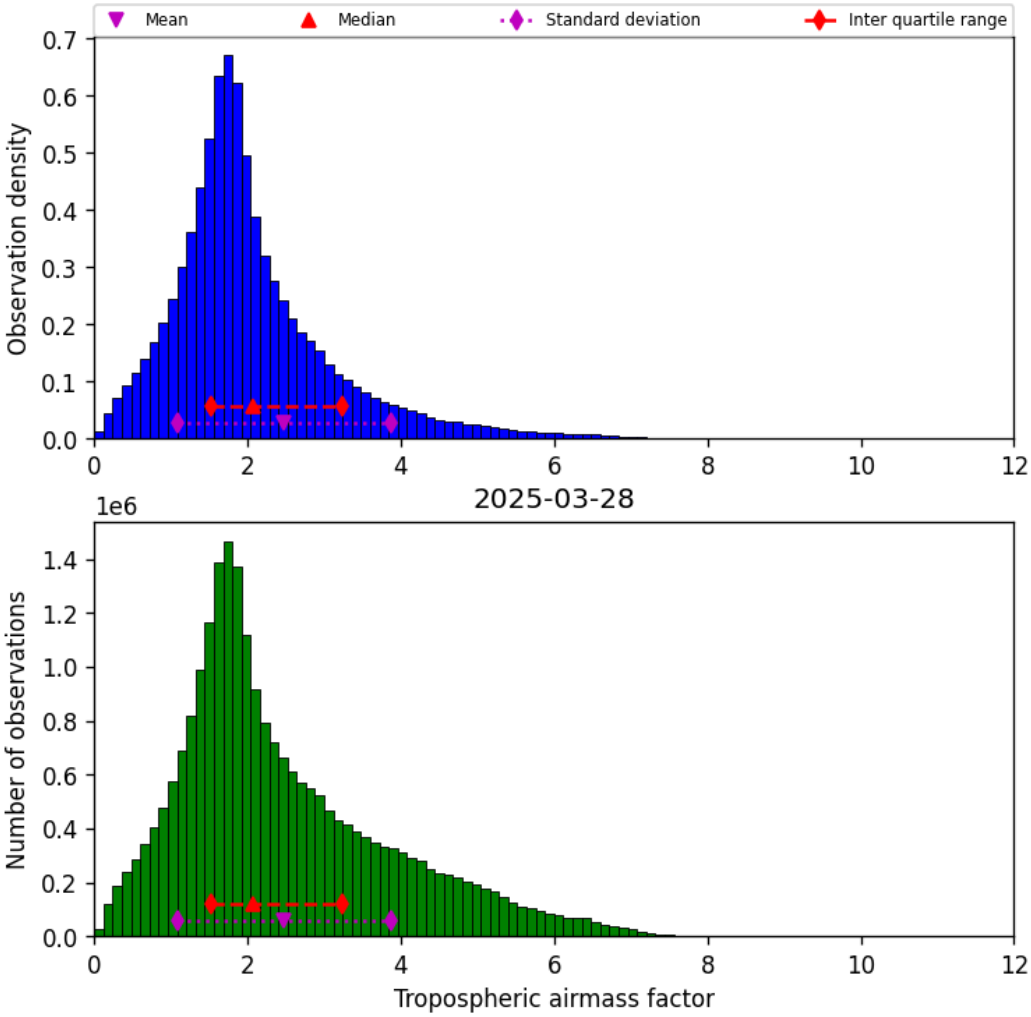

Figure 29: Histogram of “Tropospheric airmass factor” for 2025-03-28 to 2025-03-29

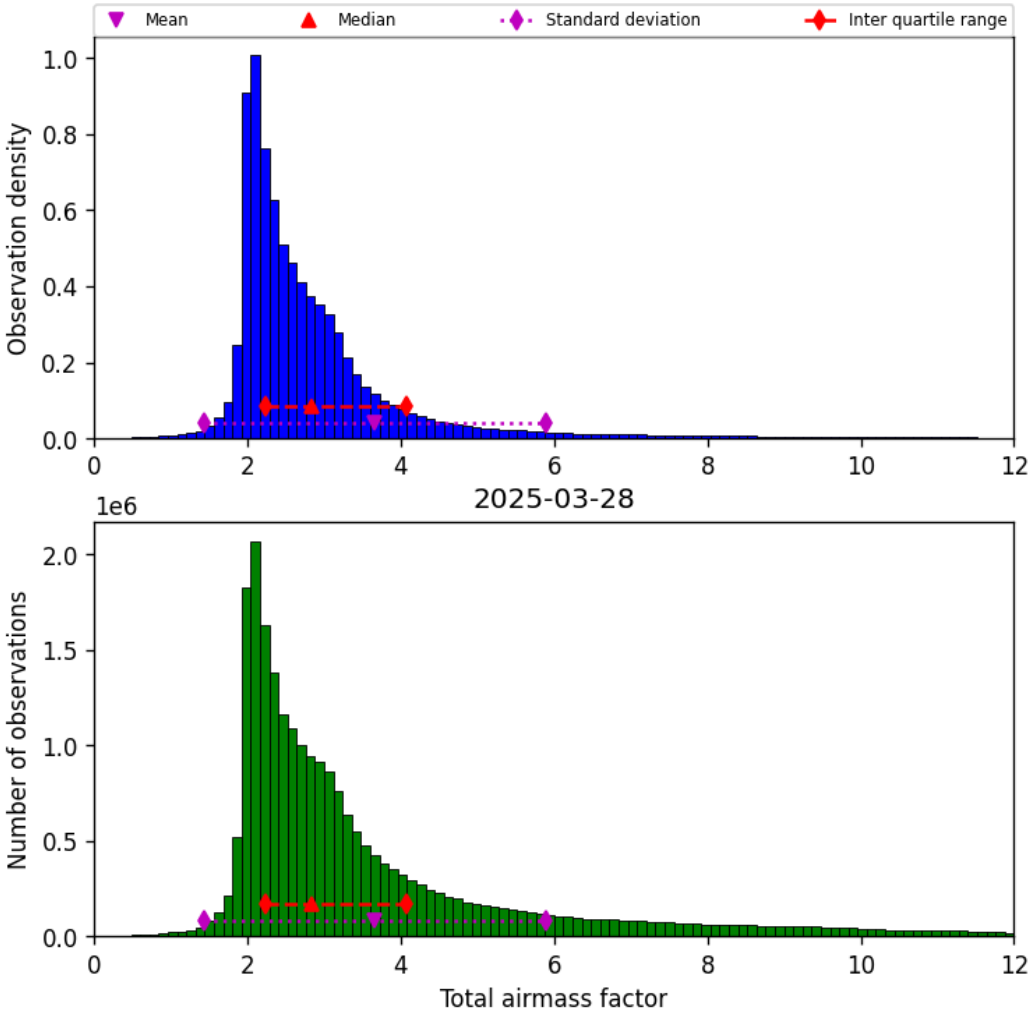

Figure 30: Histogram of “Total airmass factor” for 2025-03-28 to 2025-03-29

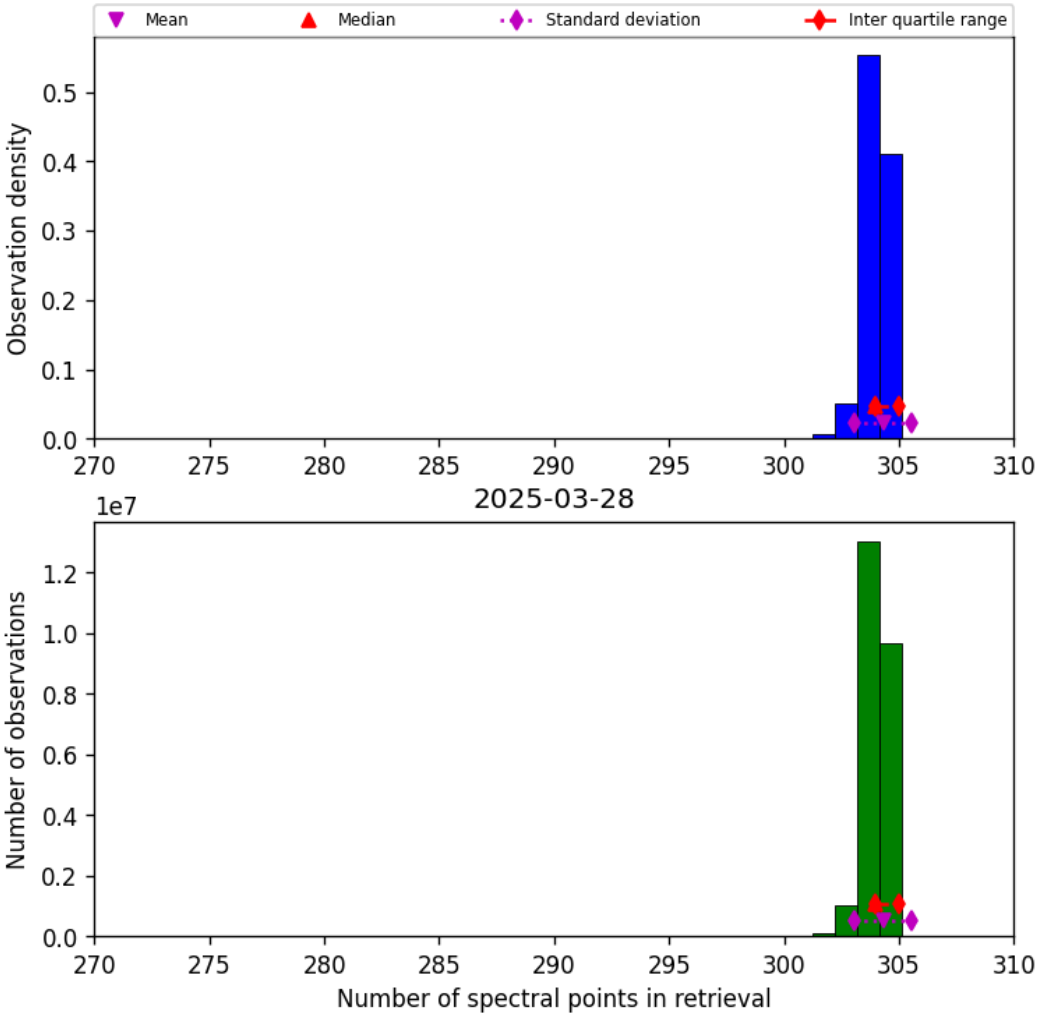

Figure 31: Histogram of “Number of spectral points in retrieval” for 2025-03-28 to 2025-03-29

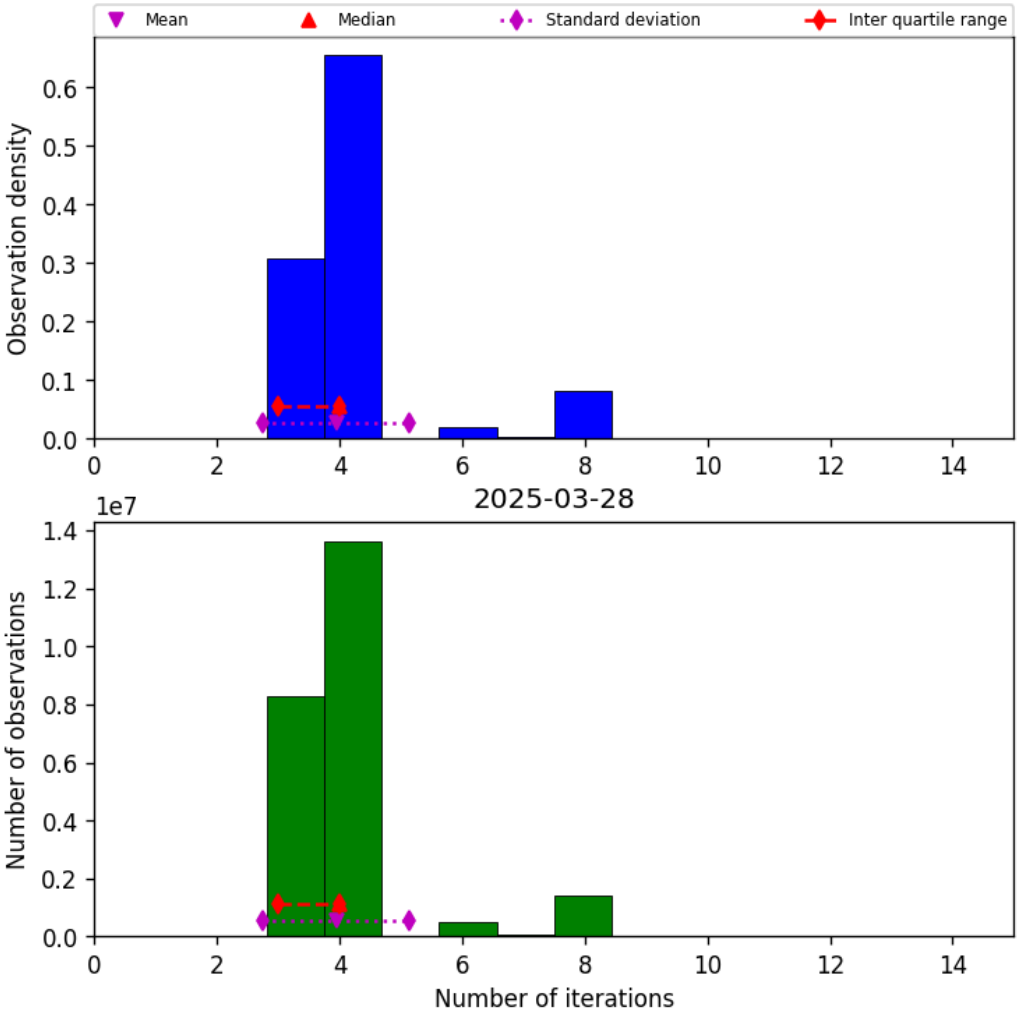

Figure 32: Histogram of “Number of iterations” for 2025-03-28 to 2025-03-29

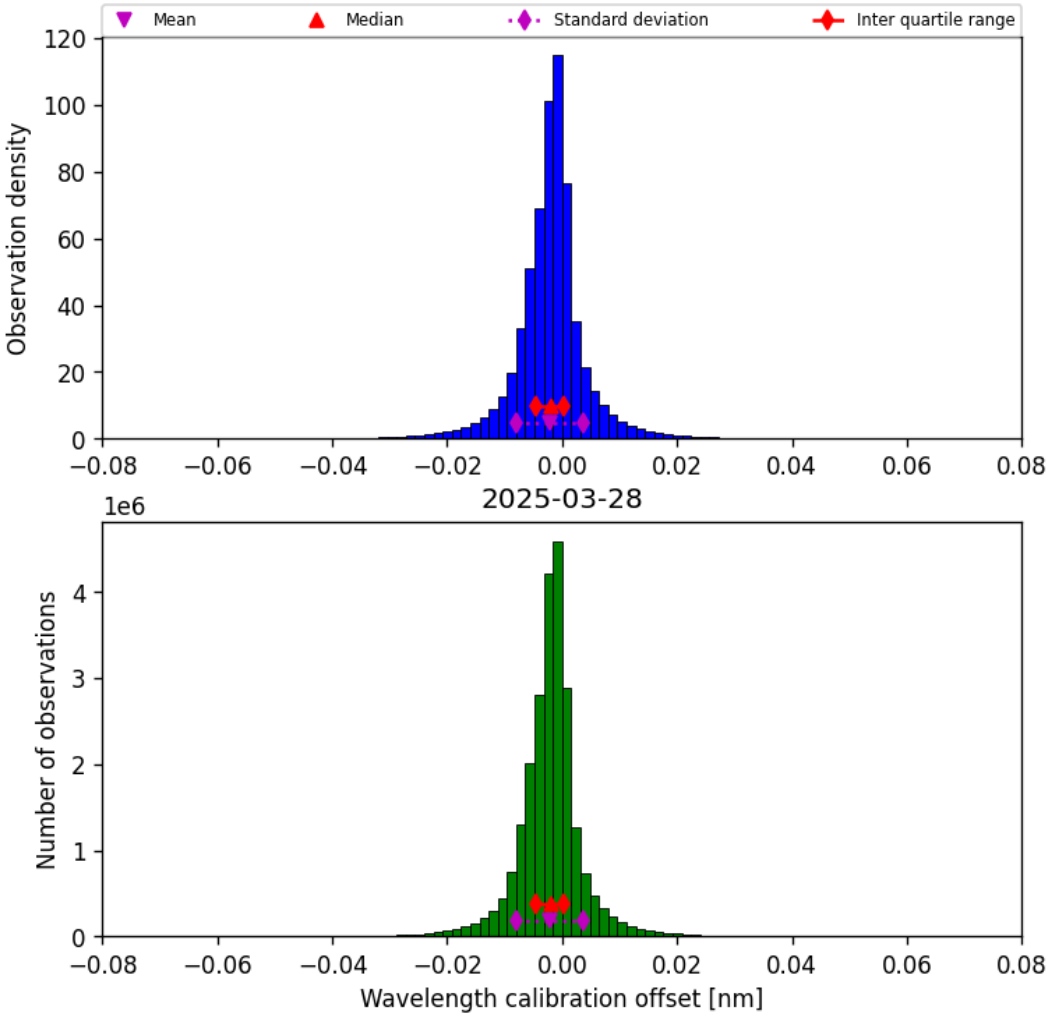

Figure 33: Histogram of “Wavelength calibration offset” for 2025-03-28 to 2025-03-29

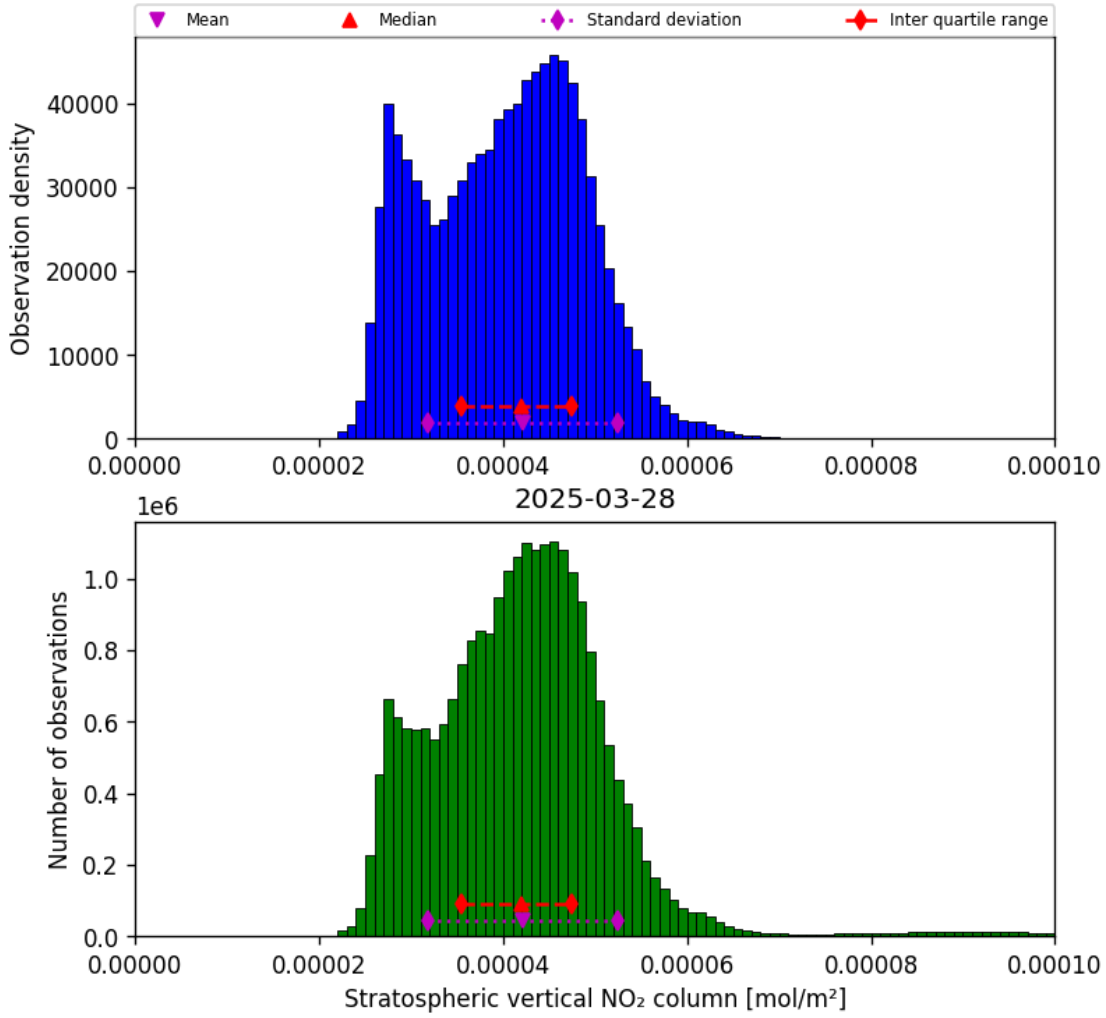

Figure 34: Histogram of “Stratospheric vertical NO_2 column” for 2025-03-28 to 2025-03-29

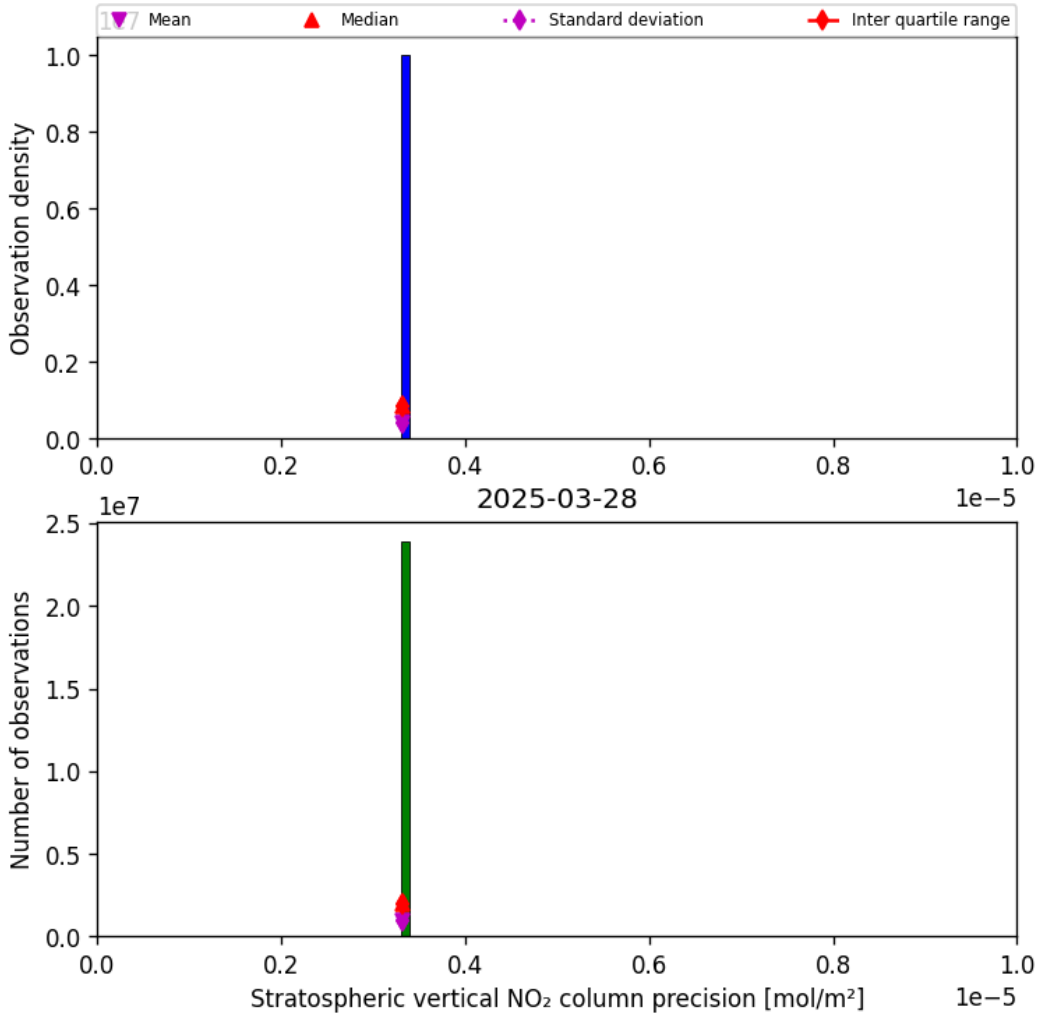

Figure 35: Histogram of “Stratospheric vertical NO_2 column precision” for 2025-03-28 to 2025-03-29

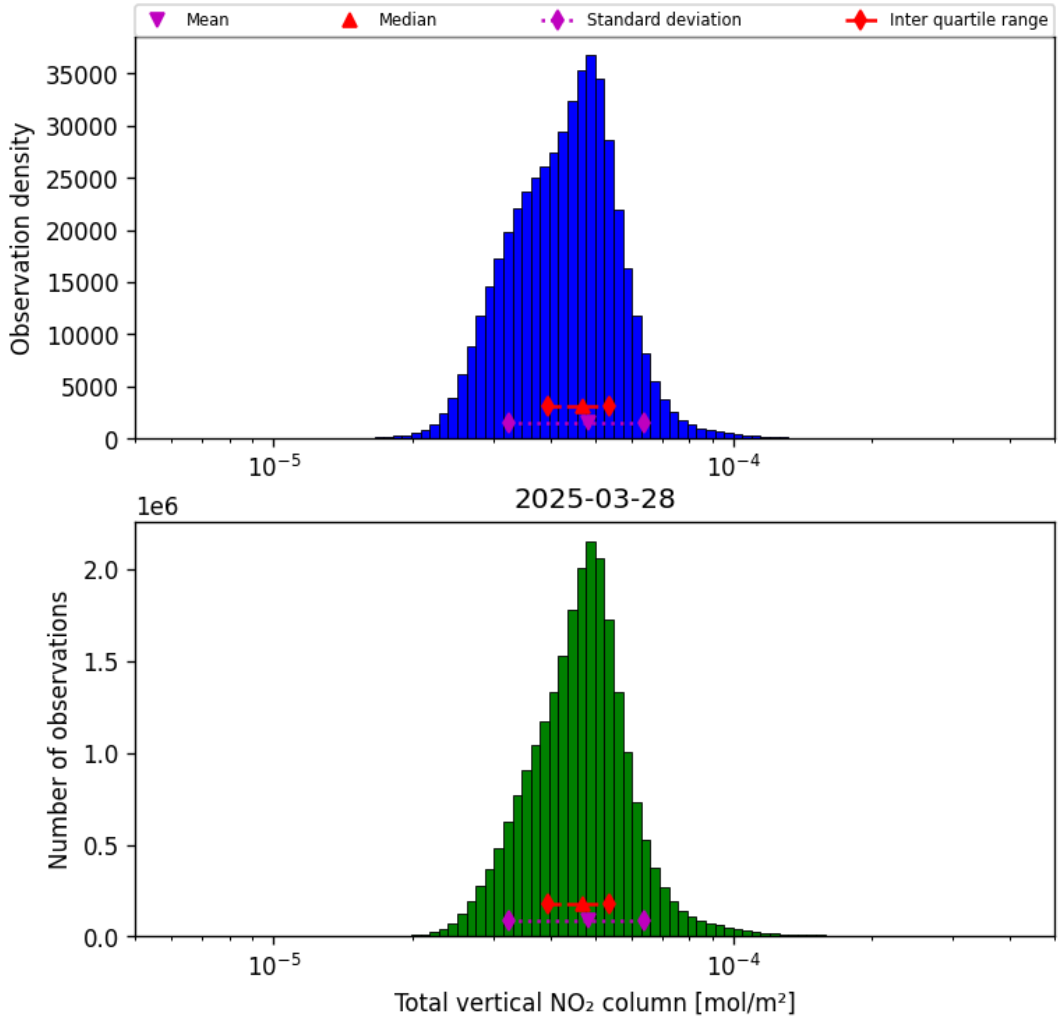

Figure 36: Histogram of "Total vertical NO_2 column" for 2025-03-28 to 2025-03-29

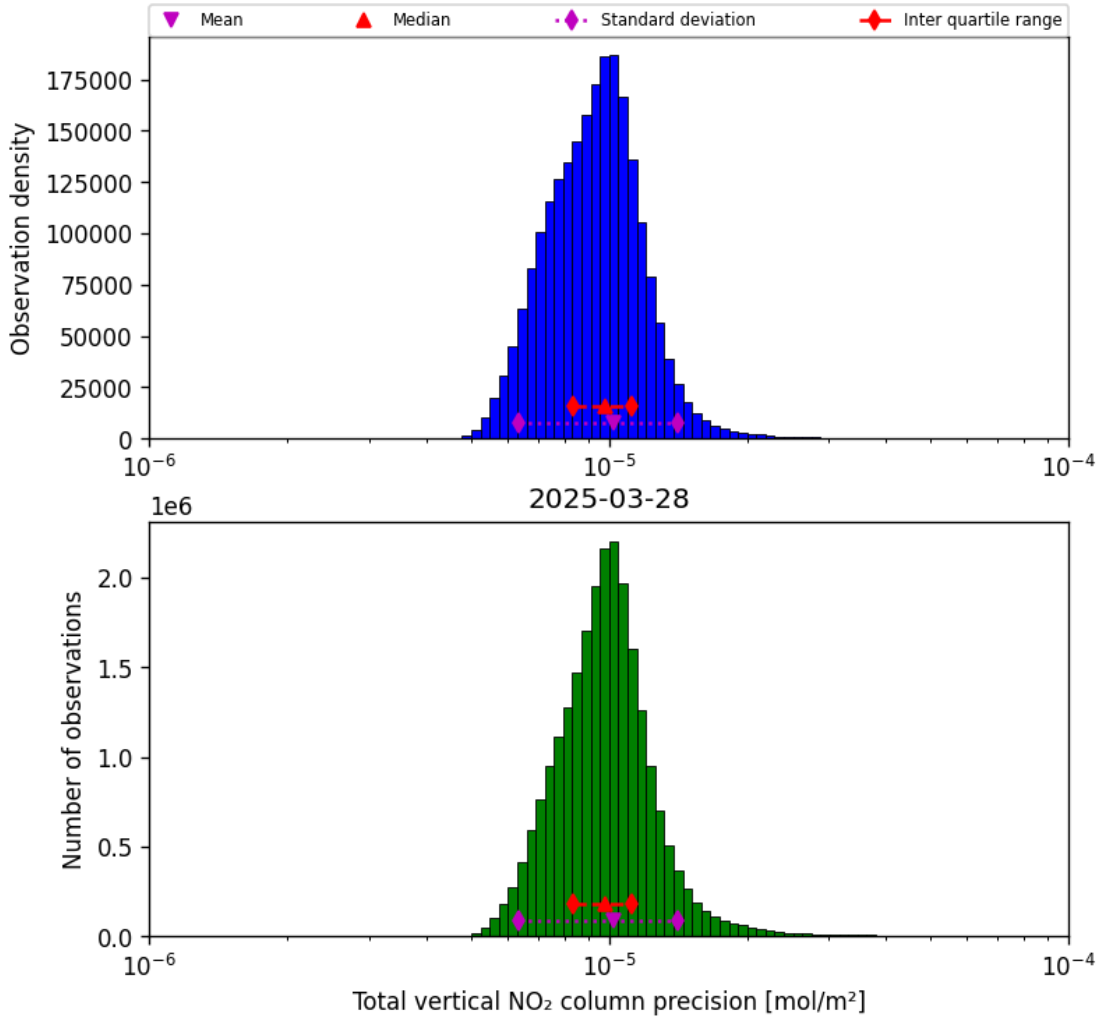

Figure 37: Histogram of "Total vertical NO_2 column precision" for 2025-03-28 to 2025-03-29

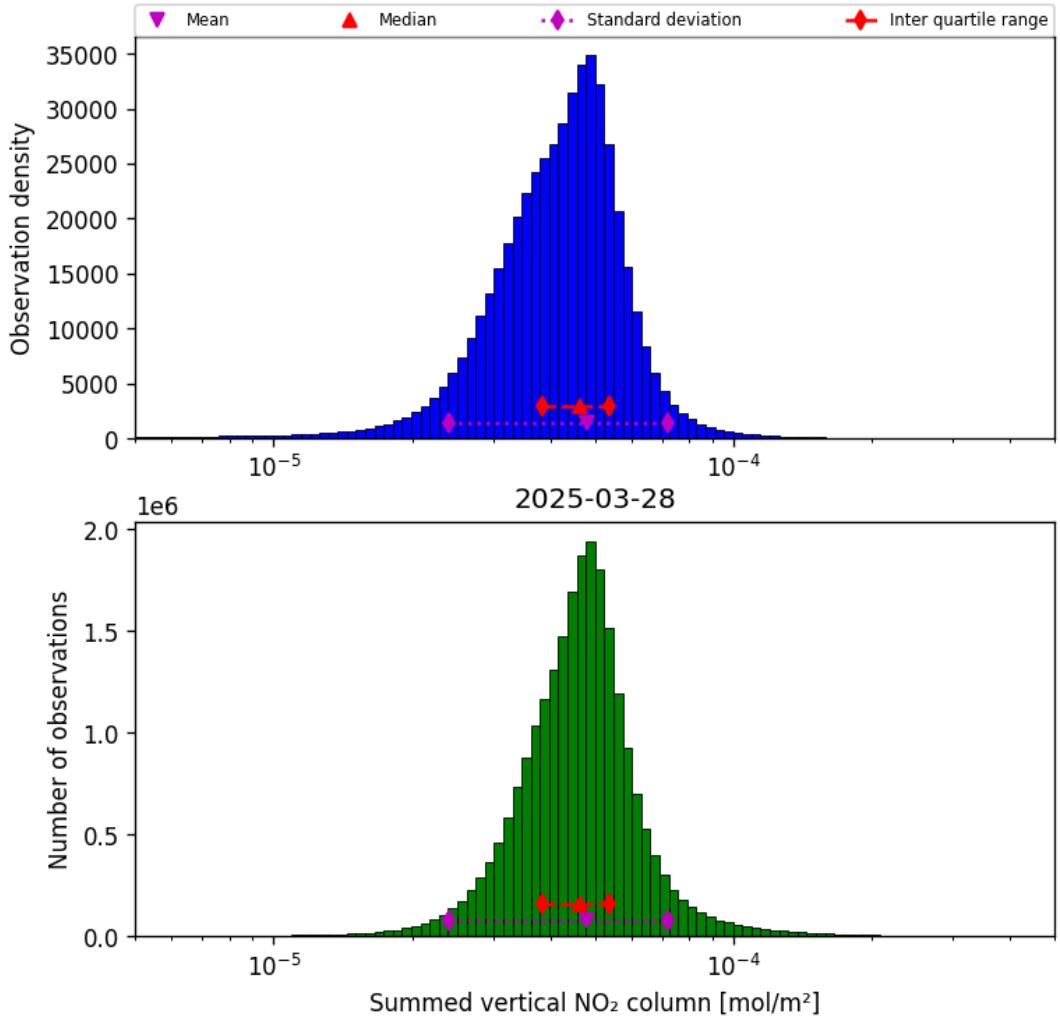

Figure 38: Histogram of "Summed vertical NO_2 column" for 2025-03-28 to 2025-03-29

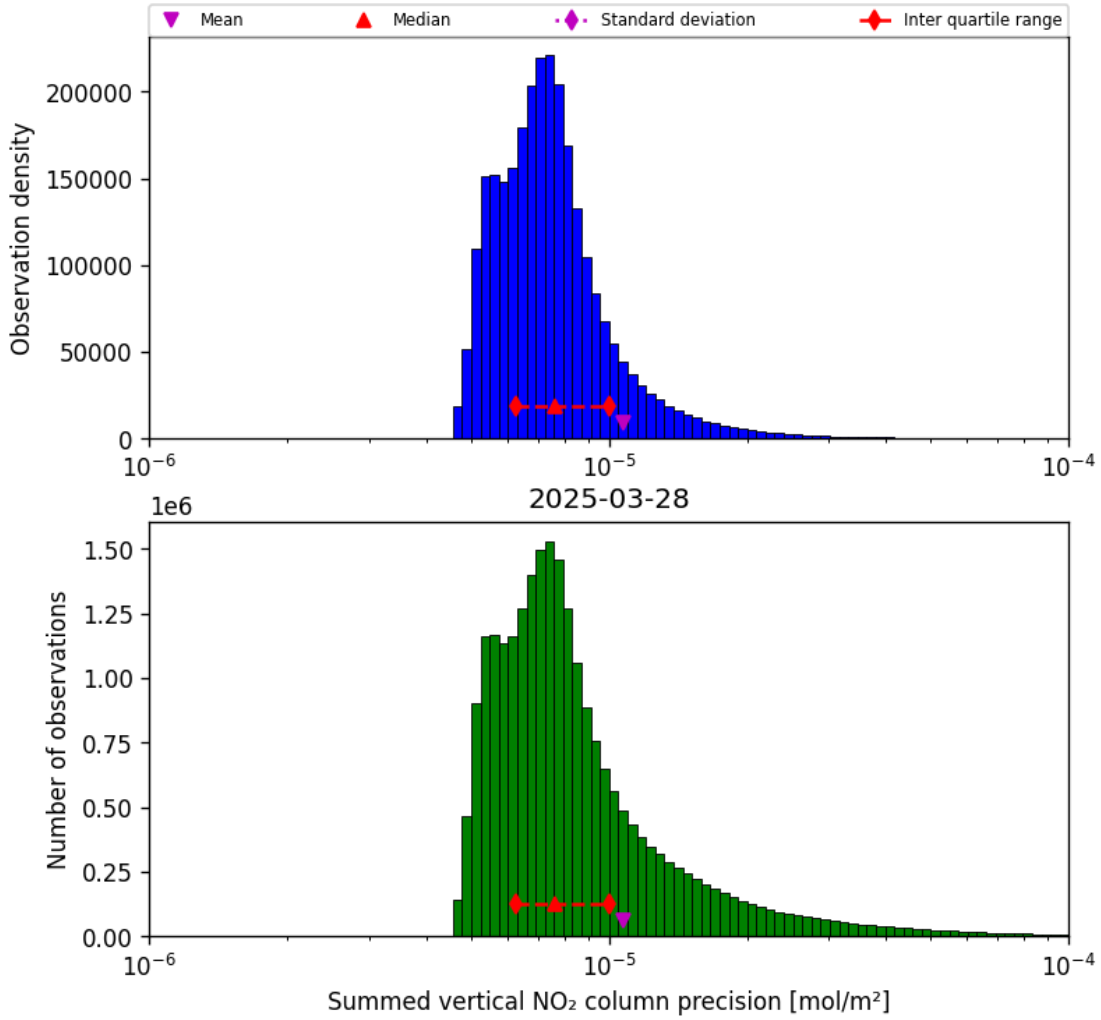

Figure 39: Histogram of "Summed vertical NO_2 column precision" for 2025-03-28 to 2025-03-29

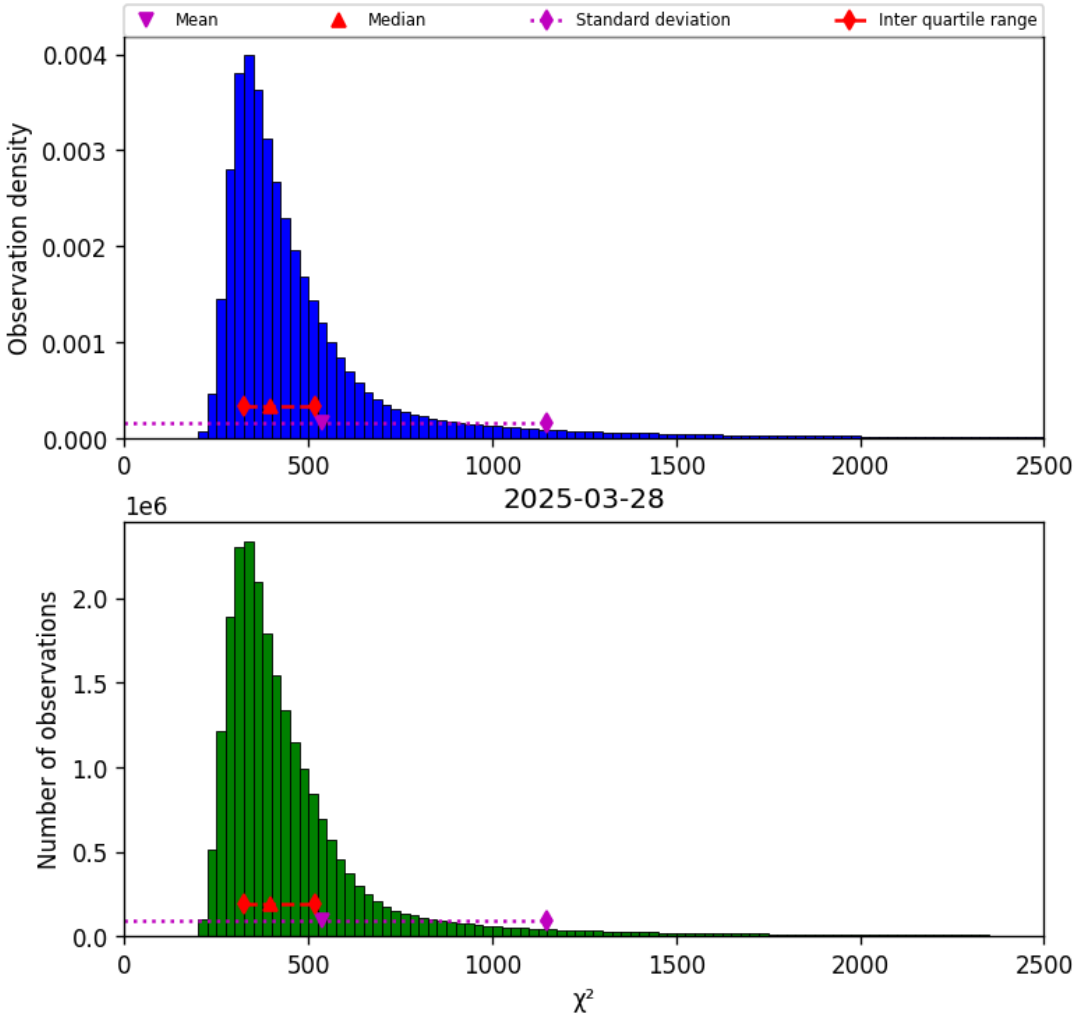

Figure 40: Histogram of "χ^2" for 2025-03-28 to 2025-03-29

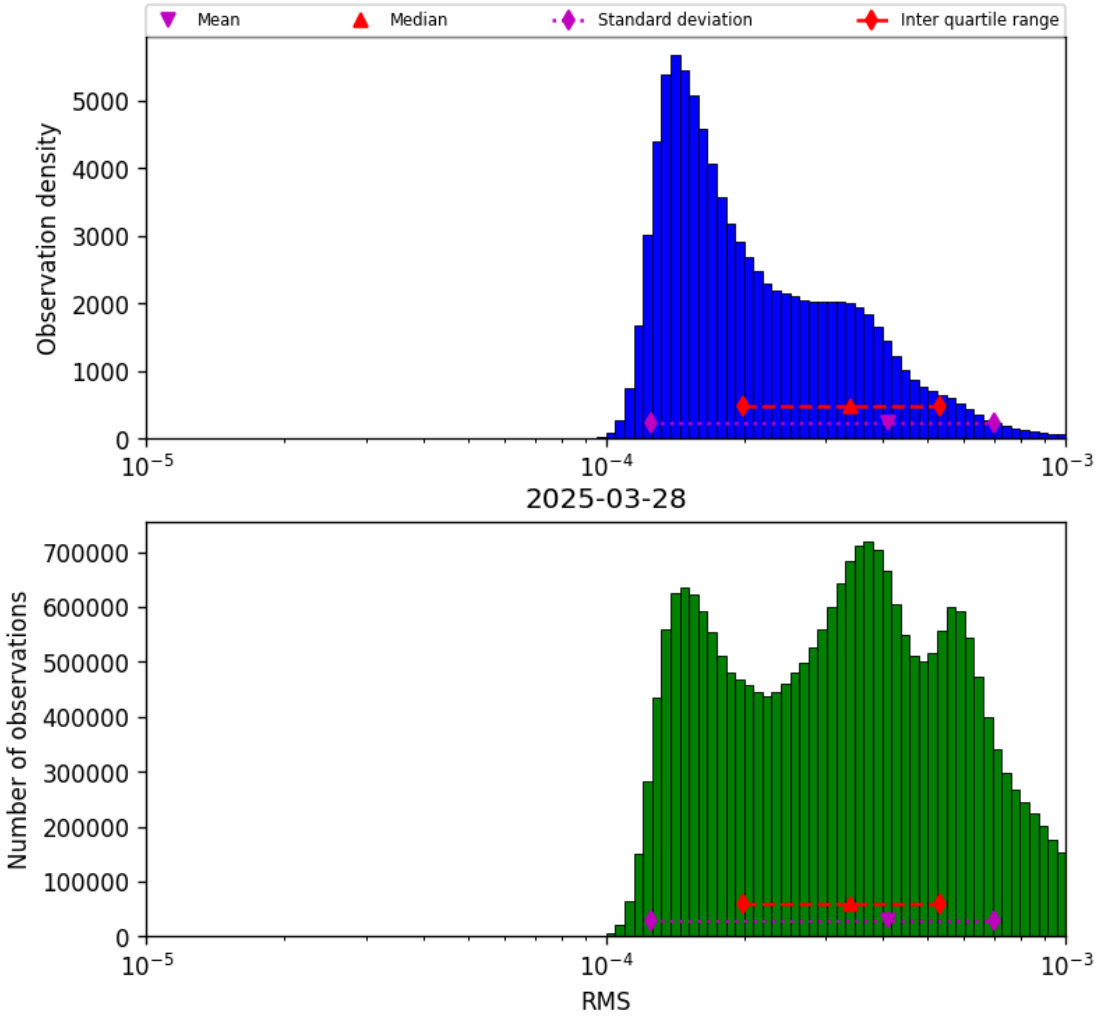

Figure 41: Histogram of “RMS” for 2025-03-28 to 2025-03-29

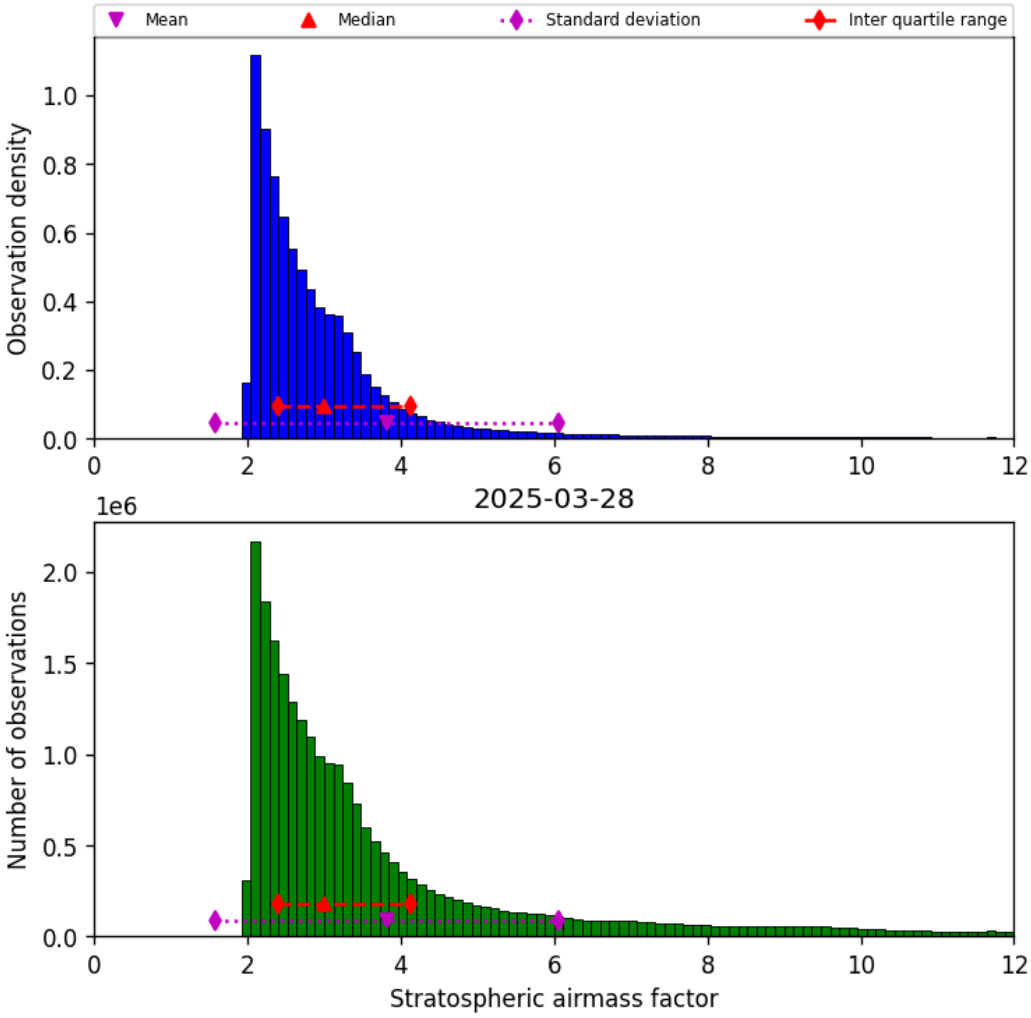

Figure 42: Histogram of “Stratospheric airmass factor” for 2025-03-28 to 2025-03-29

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.

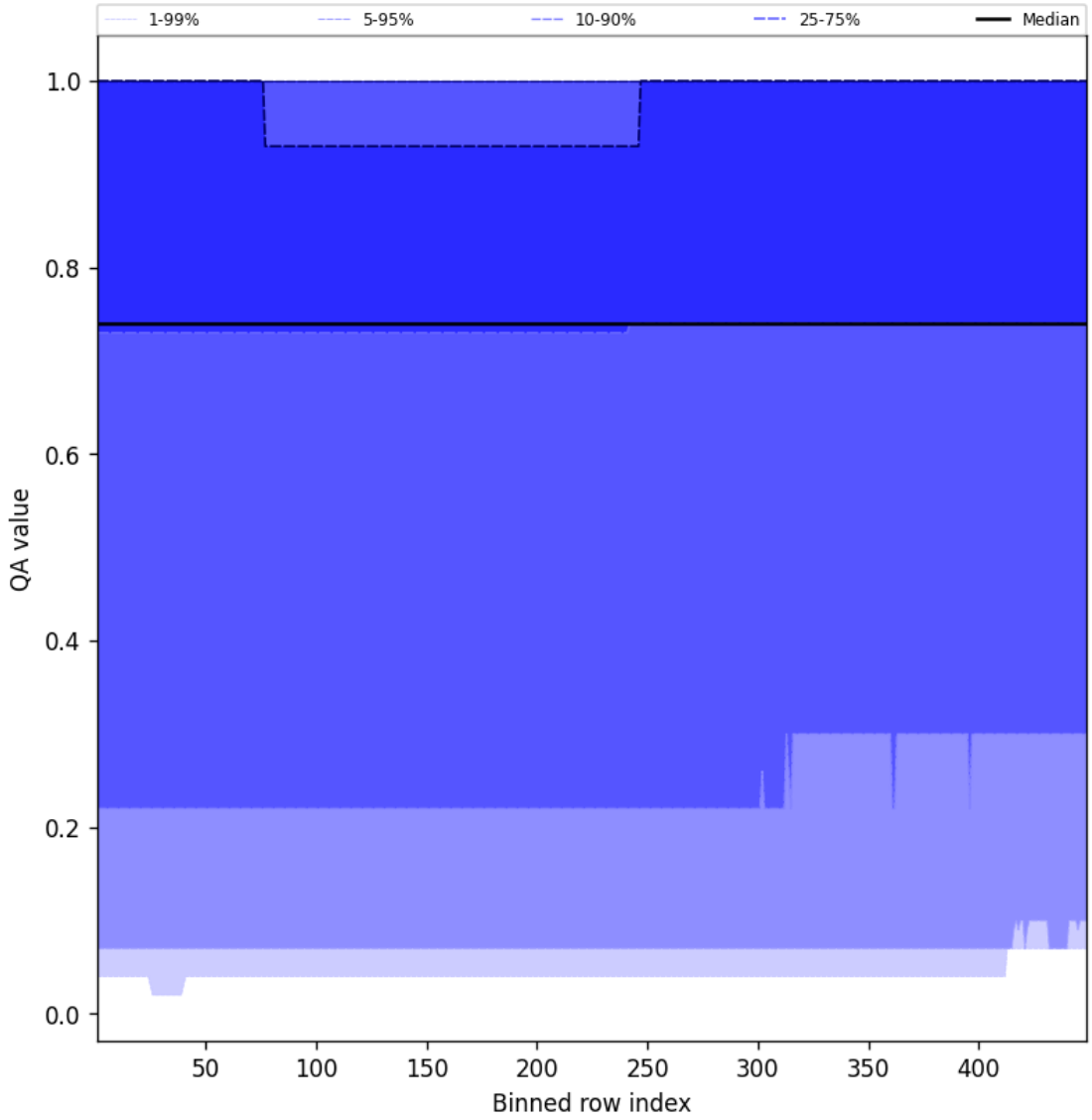

Figure 43: Along track statistics of “QA value” for 2025-03-28 to 2025-03-29

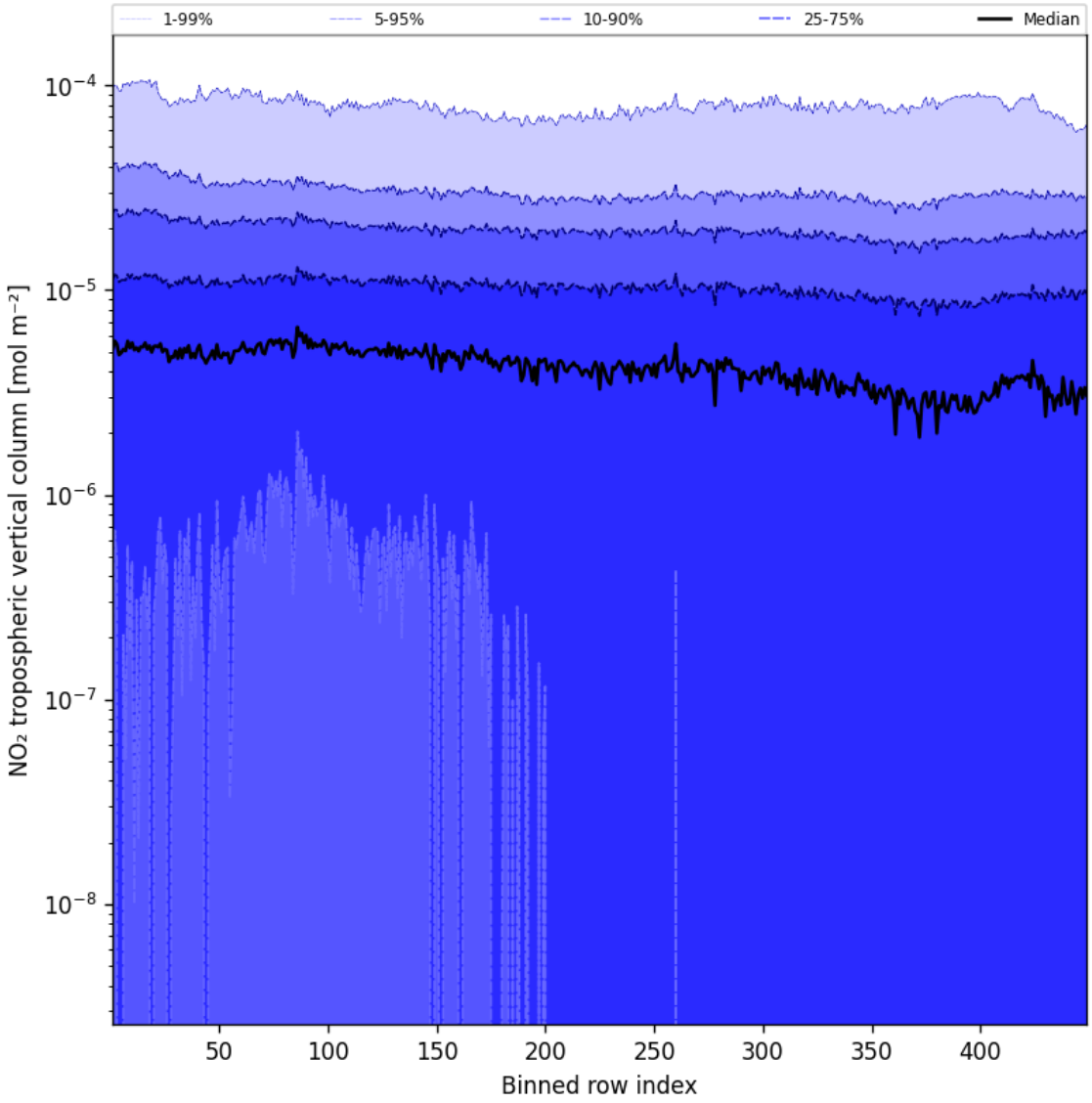

Figure 44: Along track statistics of "NO_2 tropospheric vertical column" for 2025-03-28 to 2025-03-29

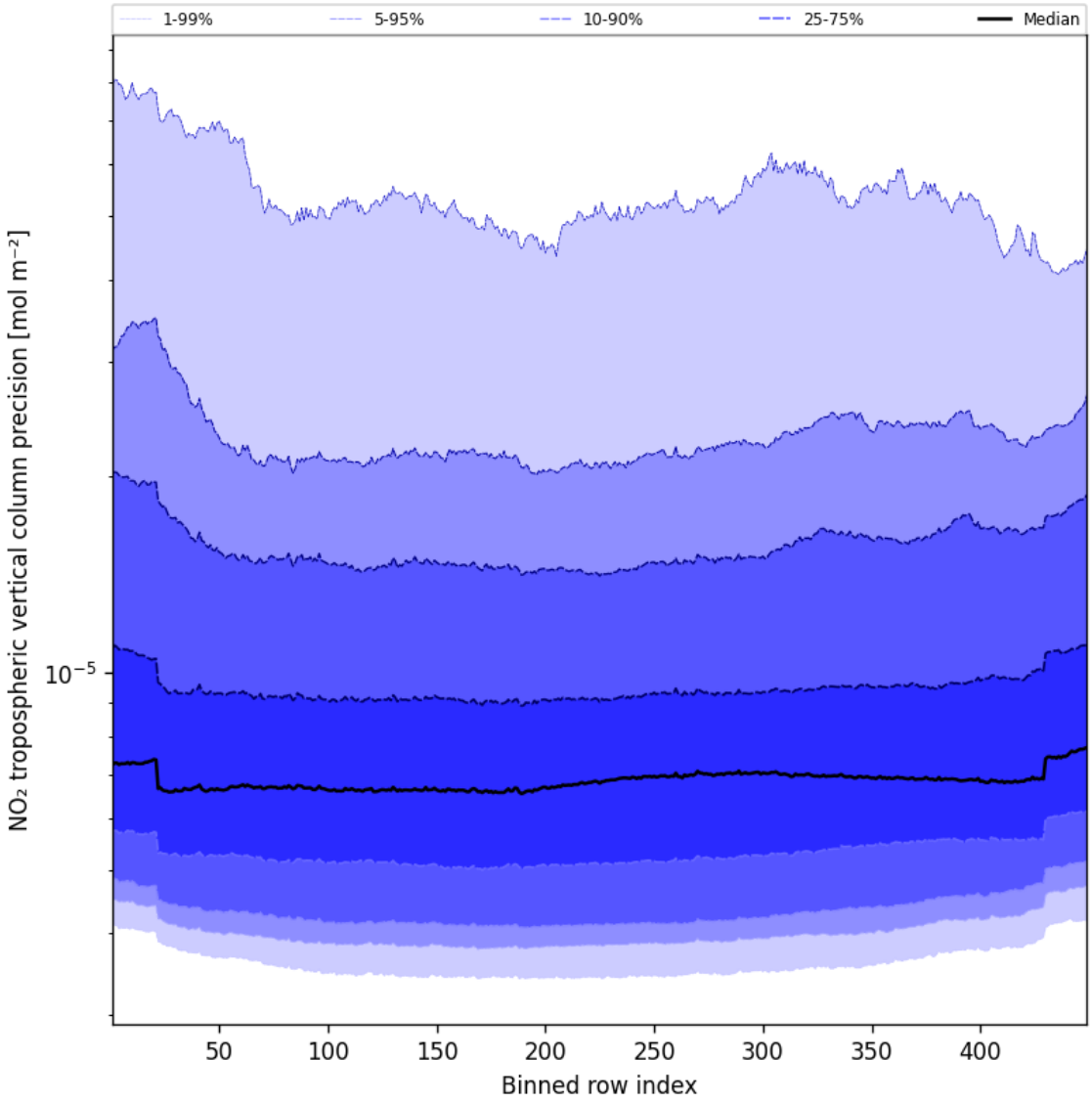

Figure 45: Along track statistics of "NO_2 tropospheric vertical column precision" for 2025-03-28 to 2025-03-29

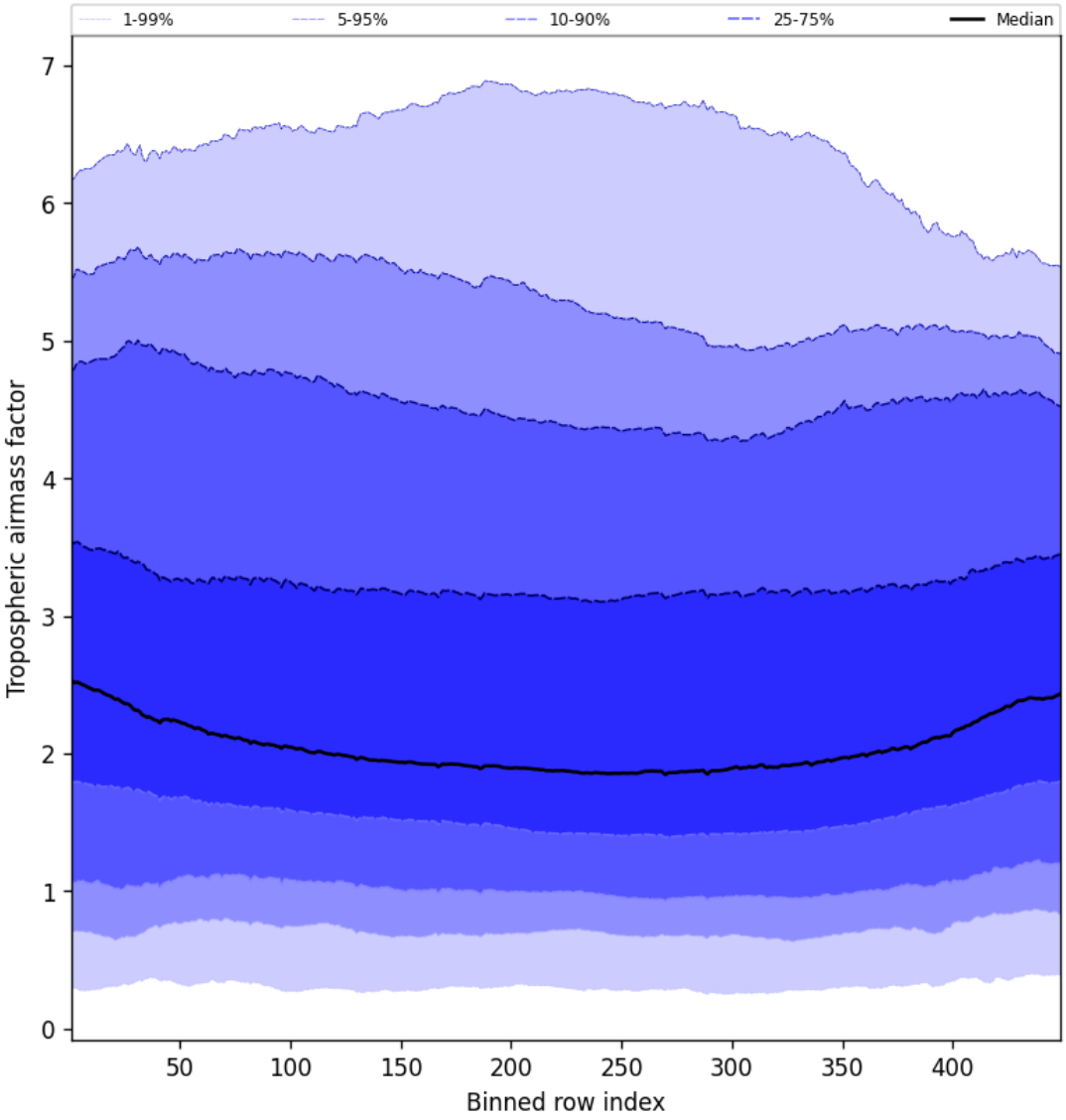

Figure 46: Along track statistics of “Tropospheric airmass factor” for 2025-03-28 to 2025-03-29

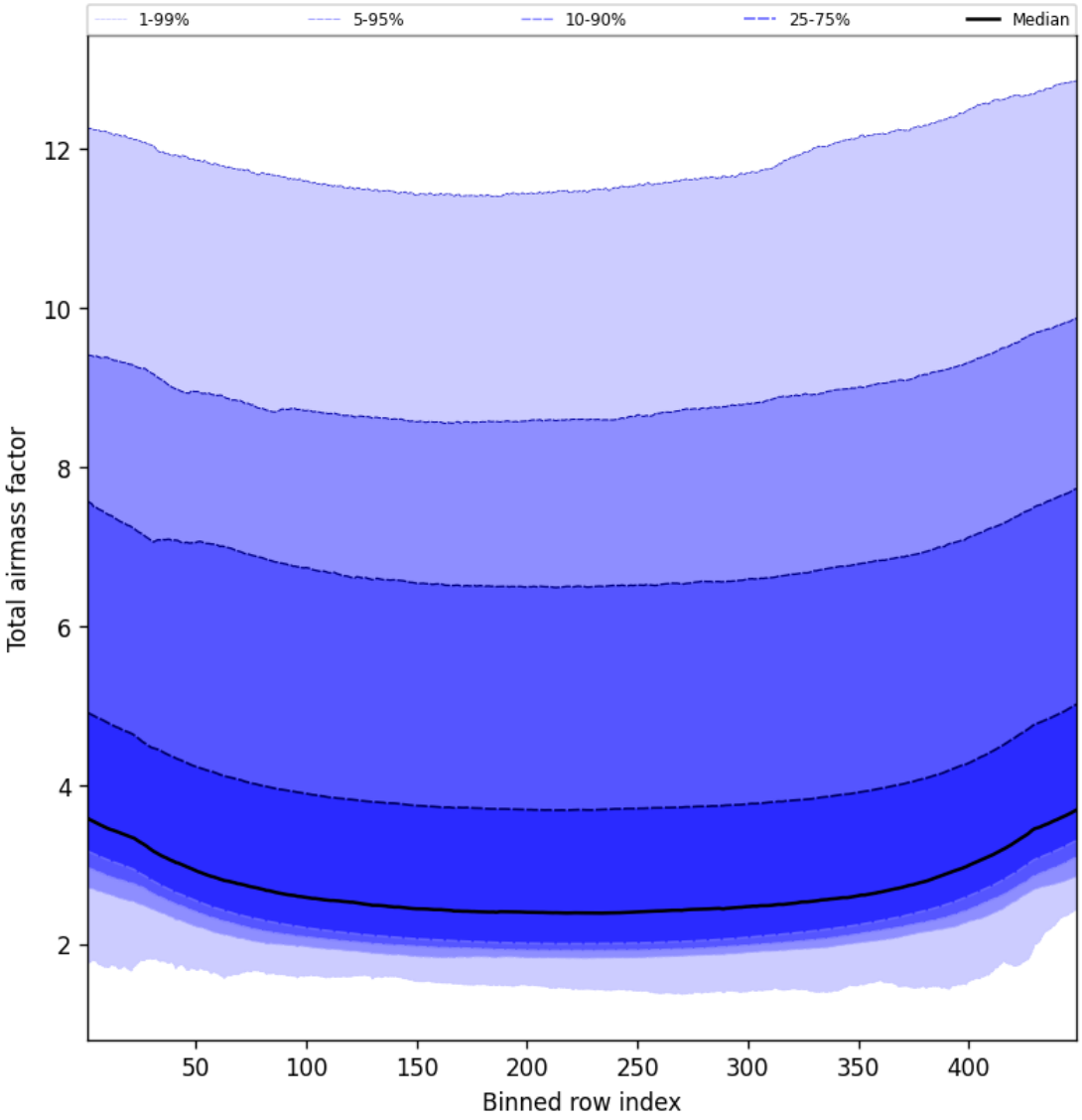

Figure 47: Along track statistics of “Total airmass factor” for 2025-03-28 to 2025-03-29

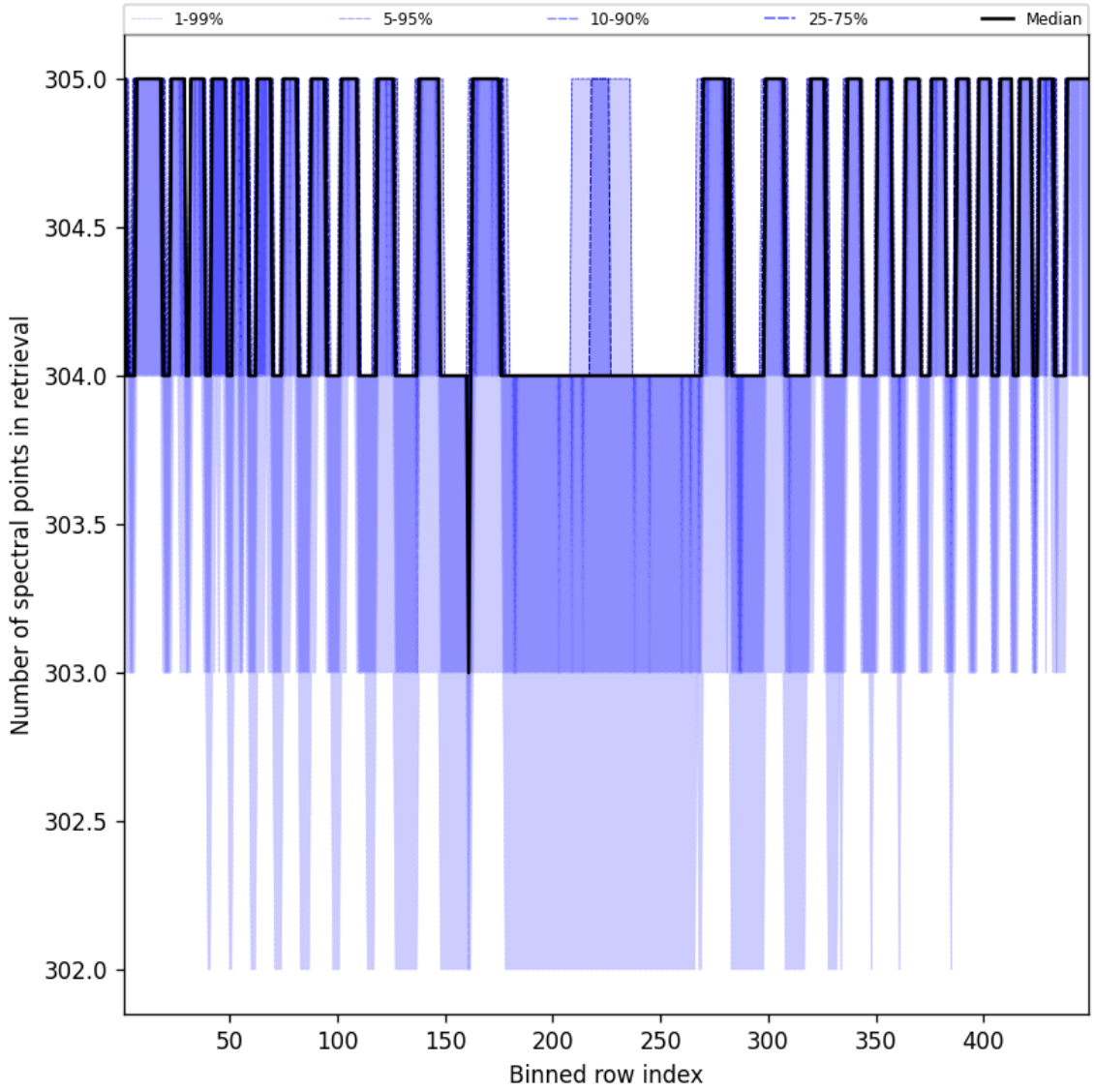

Figure 48: Along track statistics of “Number of spectral points in retrieval” for 2025-03-28 to 2025-03-29

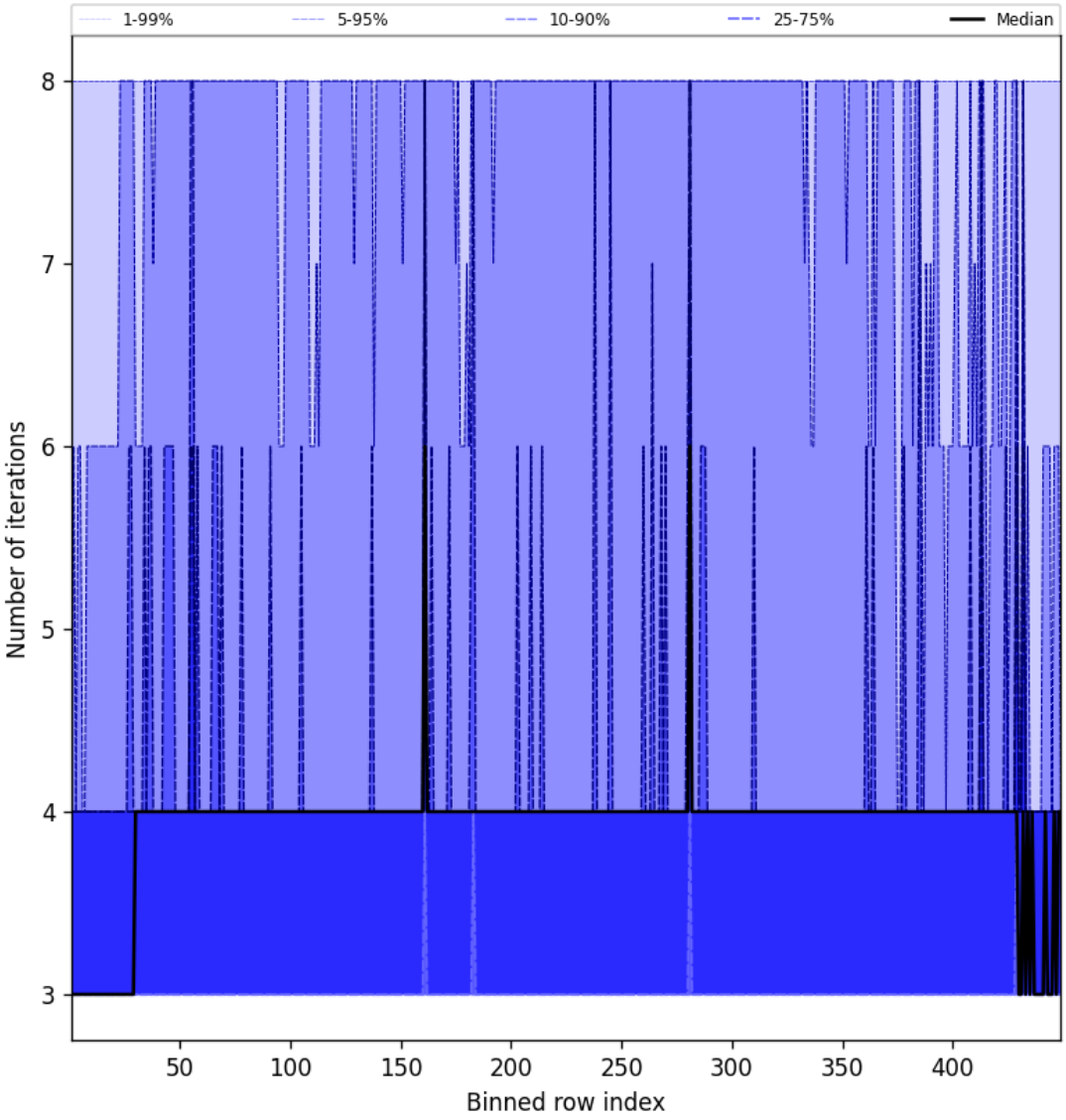

Figure 49: Along track statistics of “Number of iterations” for 2025-03-28 to 2025-03-29

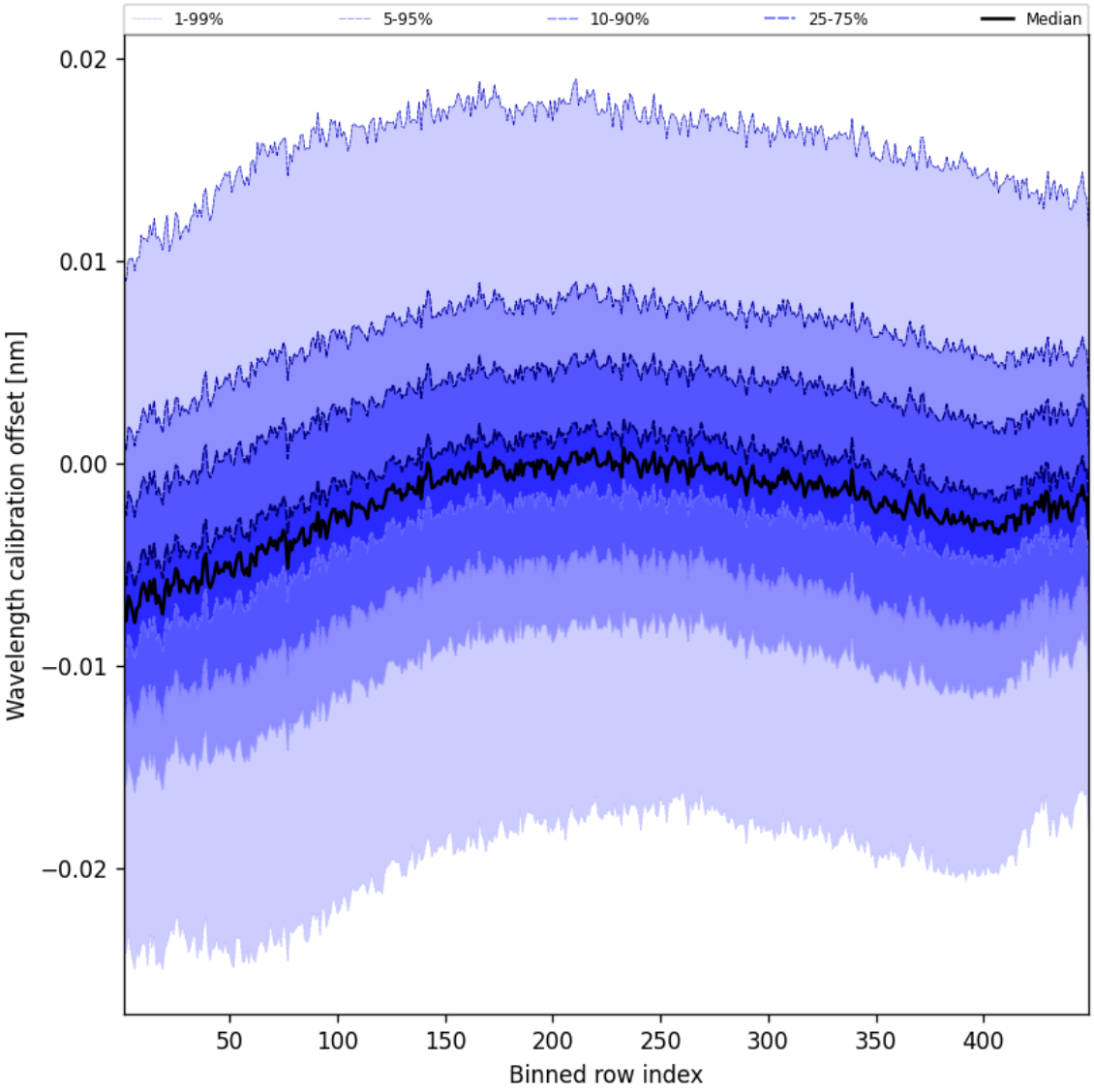

Figure 50: Along track statistics of “Wavelength calibration offset” for 2025-03-28 to 2025-03-29

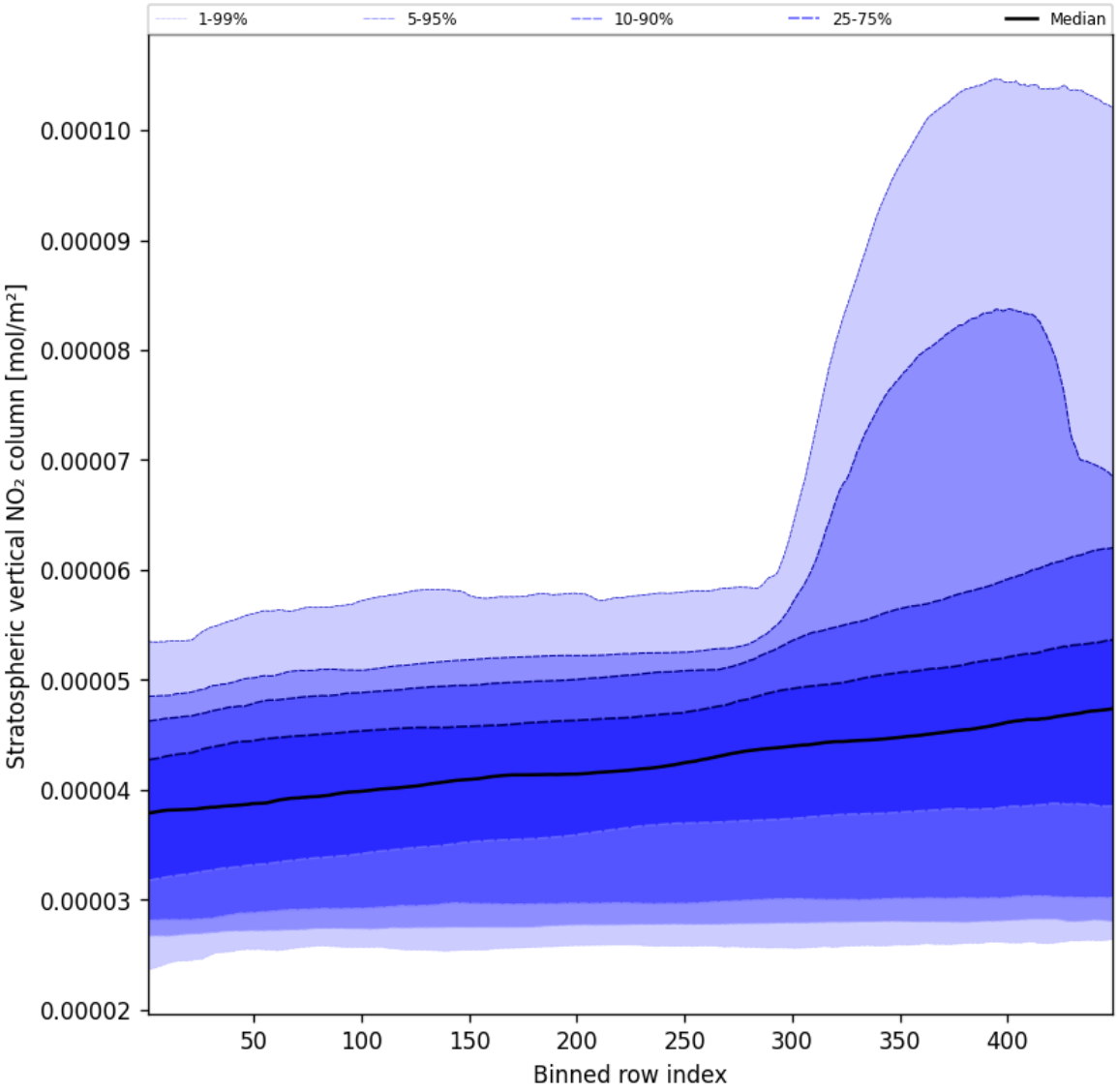

Figure 51: Along track statistics of “Stratospheric vertical NO_2 column” for 2025-03-28 to 2025-03-29

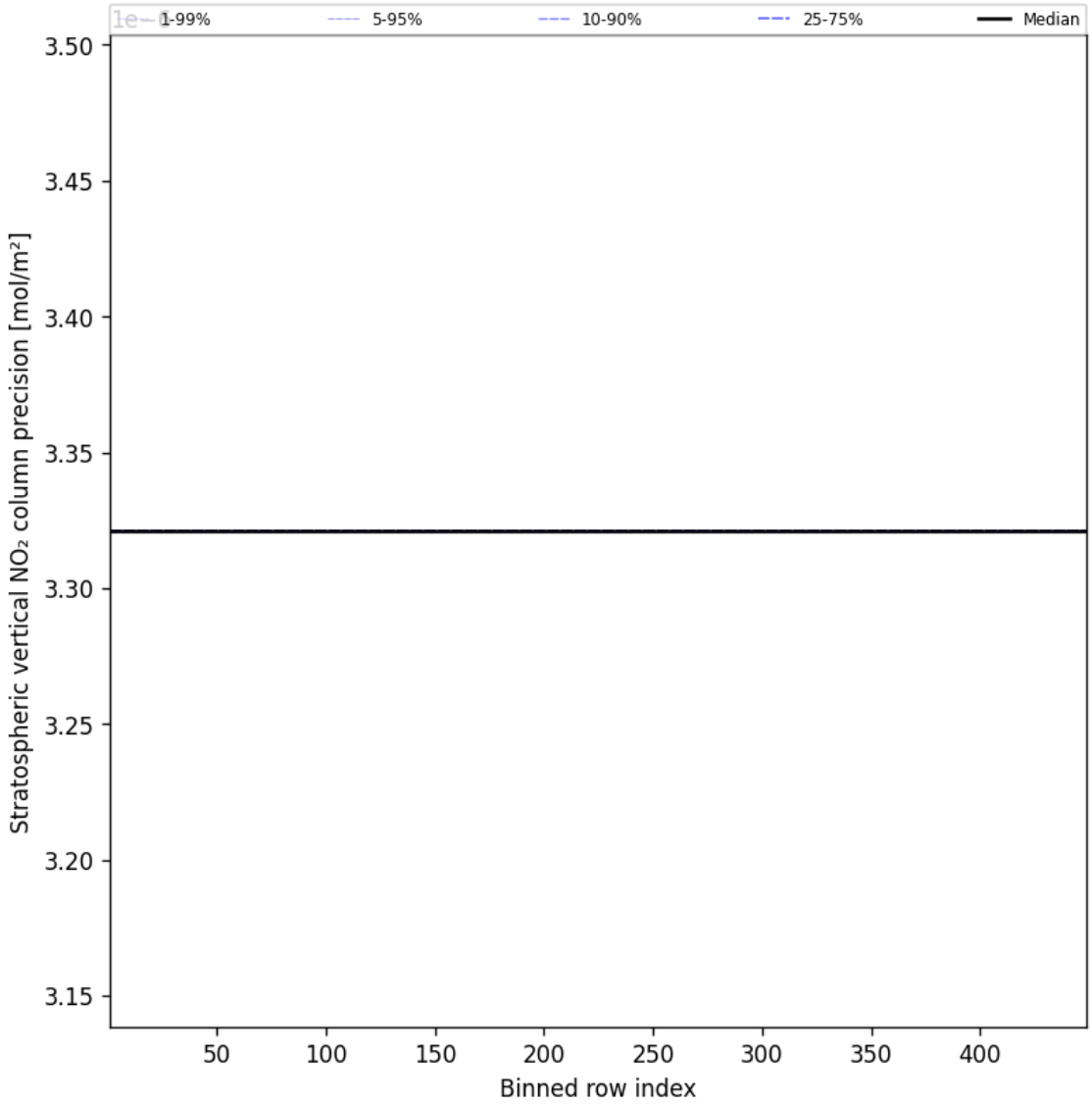

Figure 52: Along track statistics of “Stratospheric vertical NO_2 column precision” for 2025-03-28 to 2025-03-29

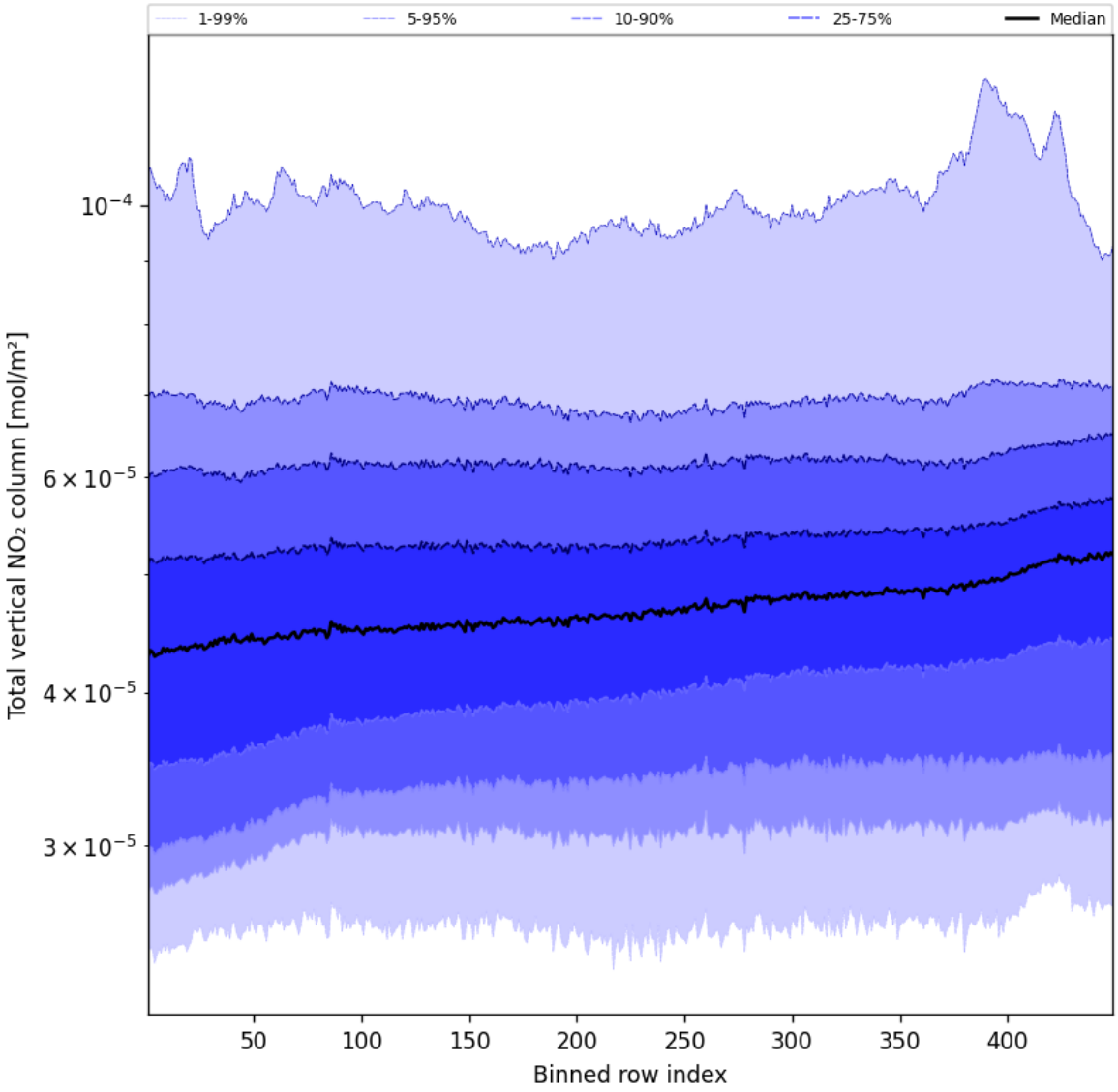

Figure 53: Along track statistics of "Total vertical NO_2 column" for 2025-03-28 to 2025-03-29

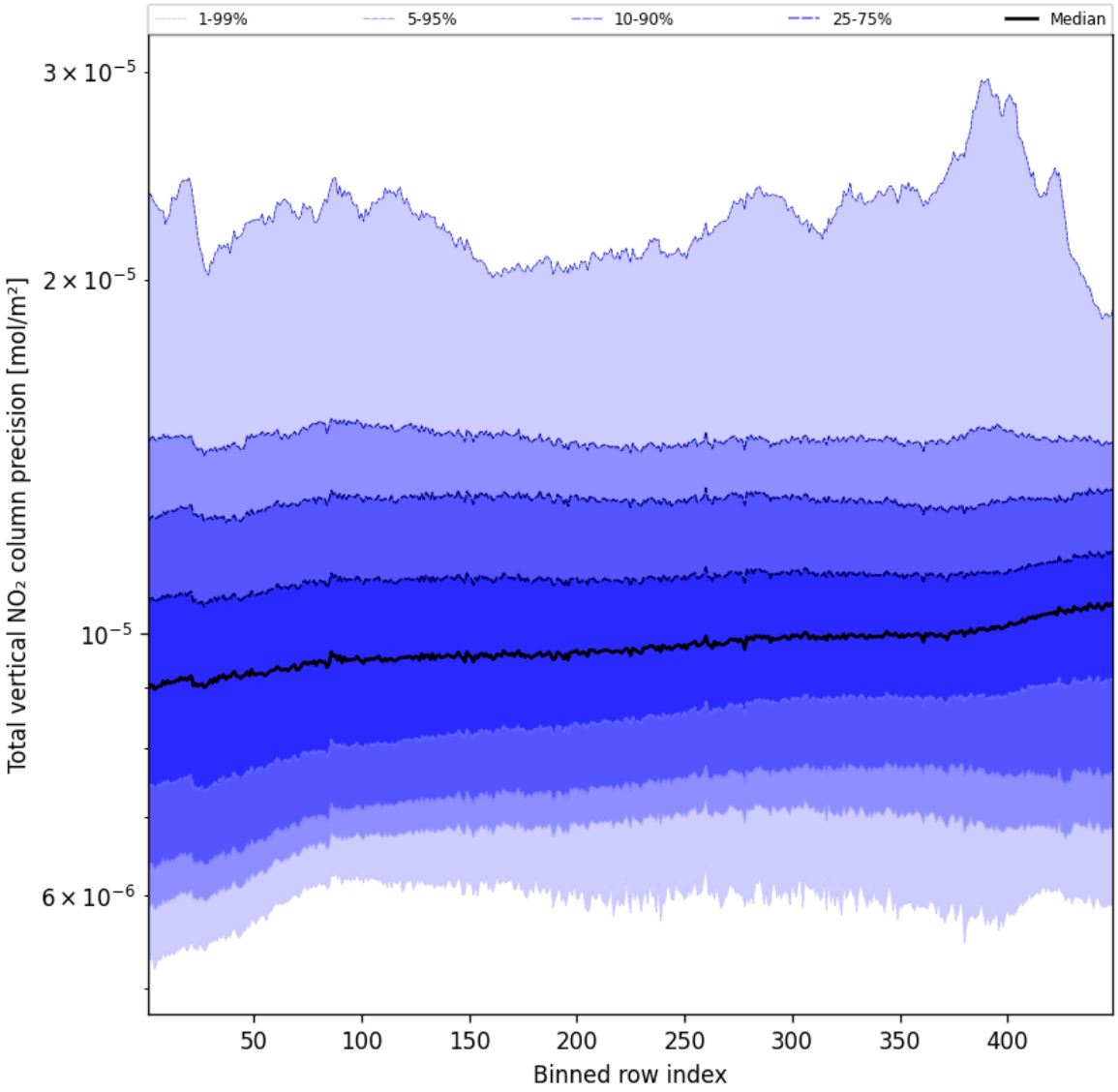

Figure 54: Along track statistics of "Total vertical NO_2 column precision" for 2025-03-28 to 2025-03-29

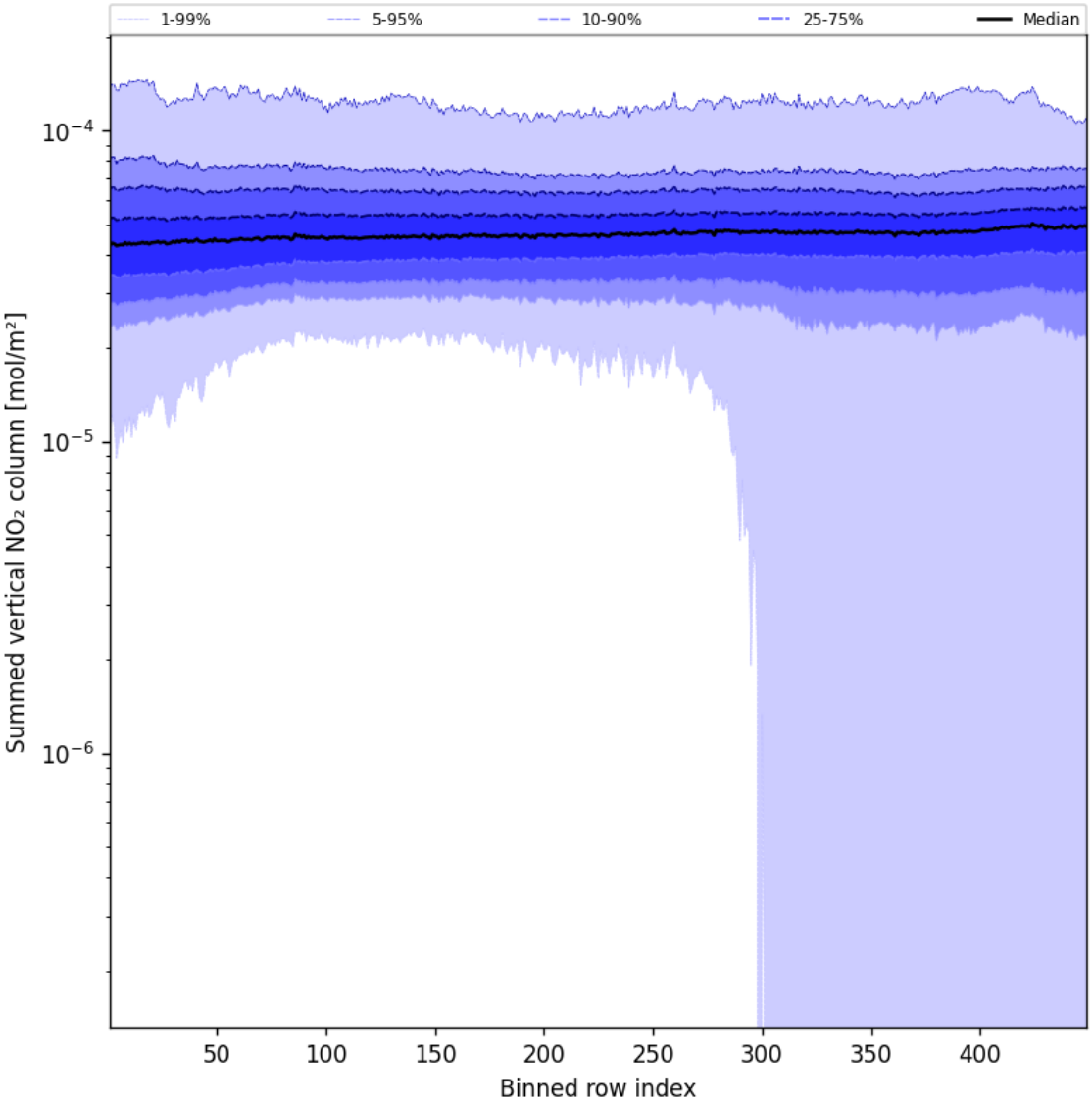

Figure 55: Along track statistics of "Summed vertical NO_2 column" for 2025-03-28 to 2025-03-29

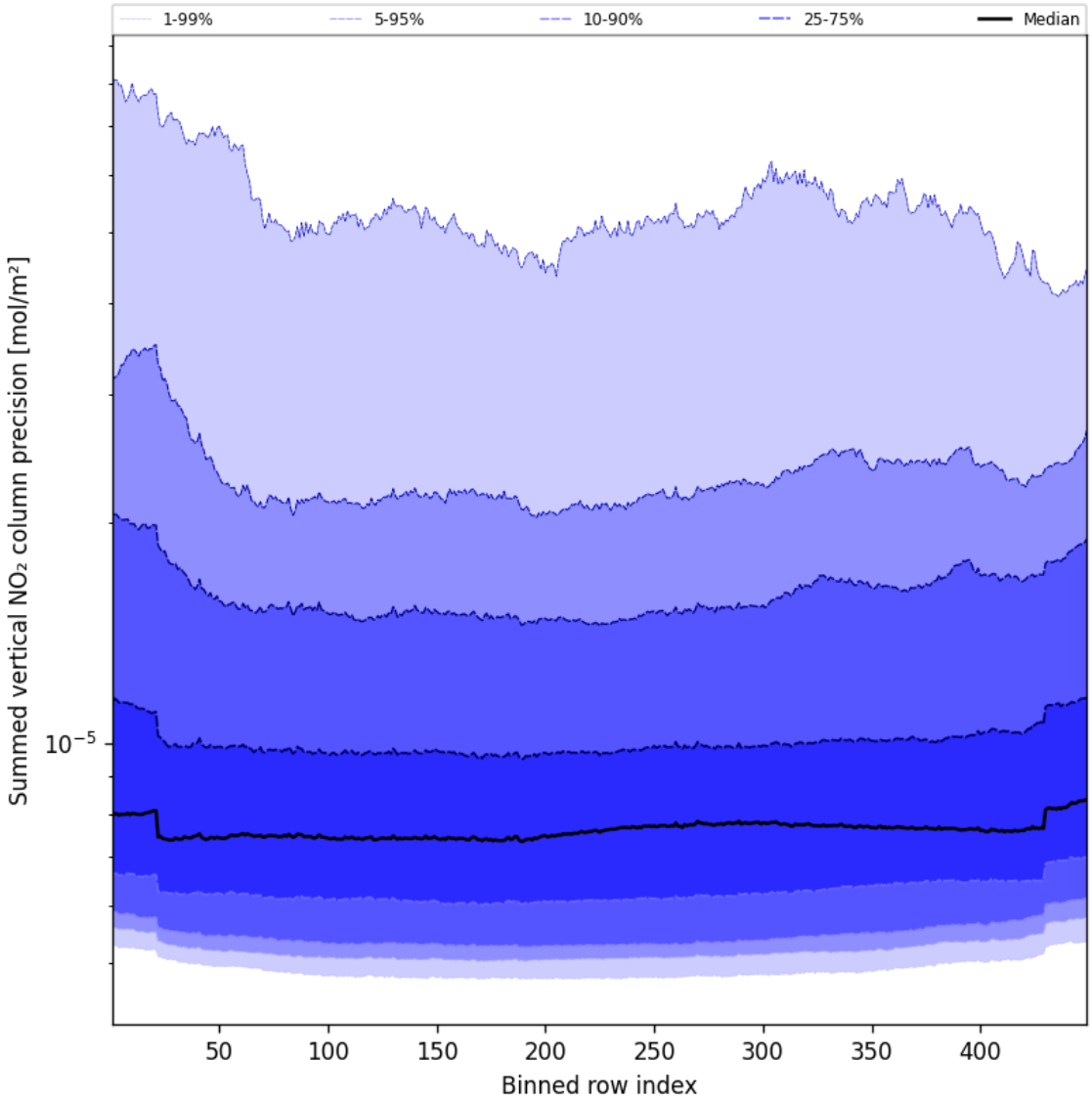

Figure 56: Along track statistics of “Summed vertical NO_2 column precision” for 2025-03-28 to 2025-03-29

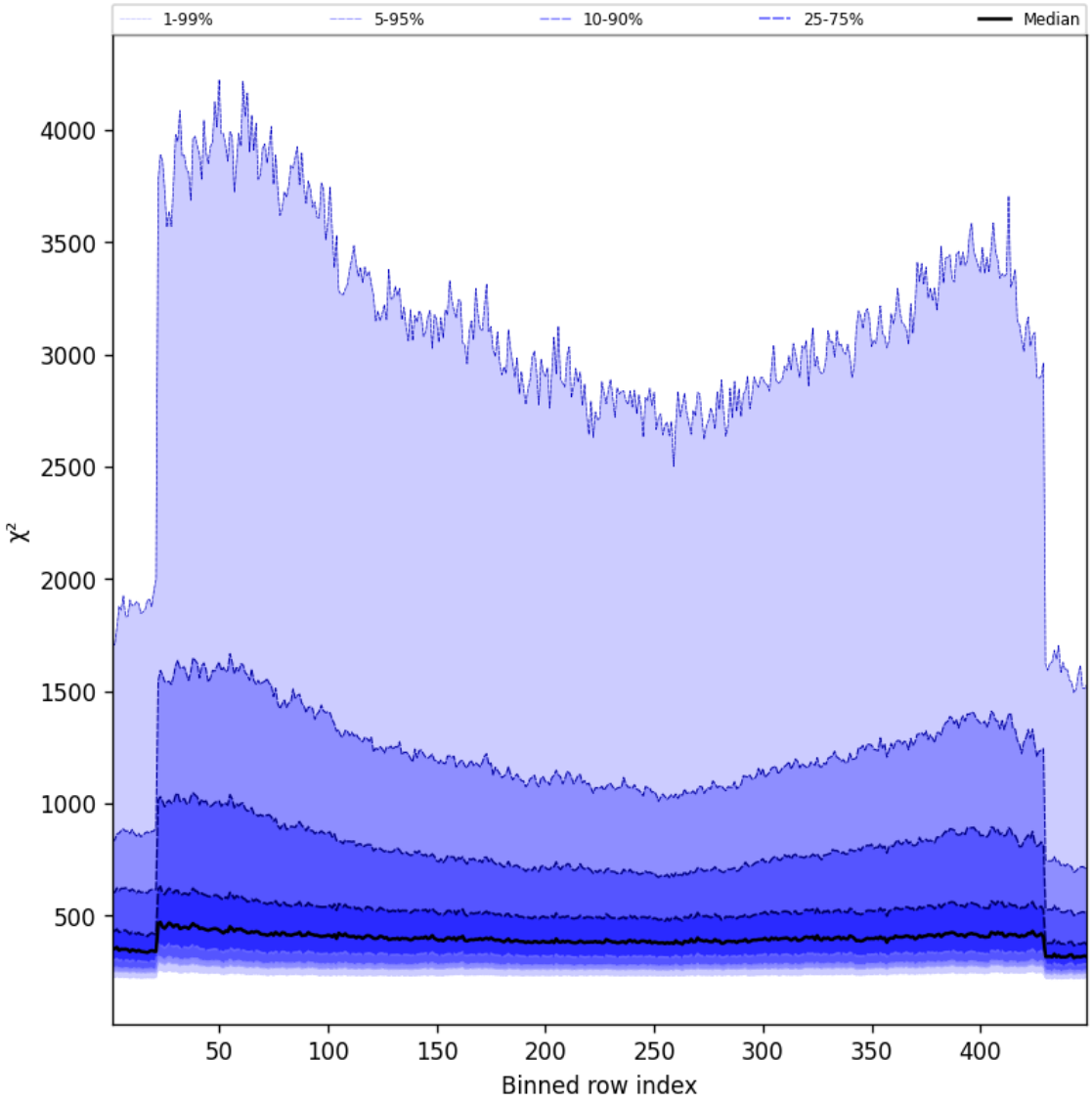

Figure 57: Along track statistics of "χ^2" for 2025-03-28 to 2025-03-29

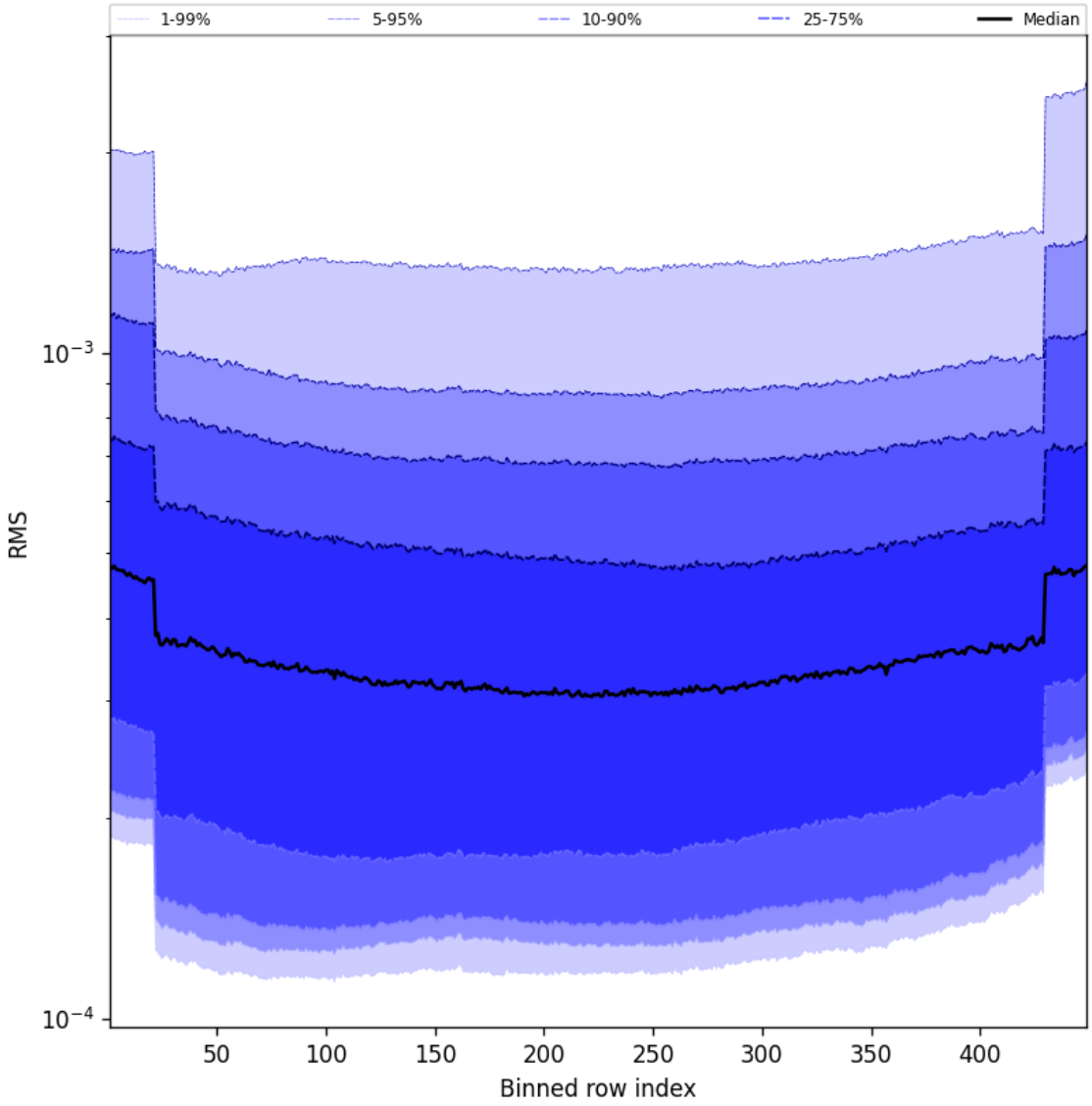

Figure 58: Along track statistics of “RMS” for 2025-03-28 to 2025-03-29

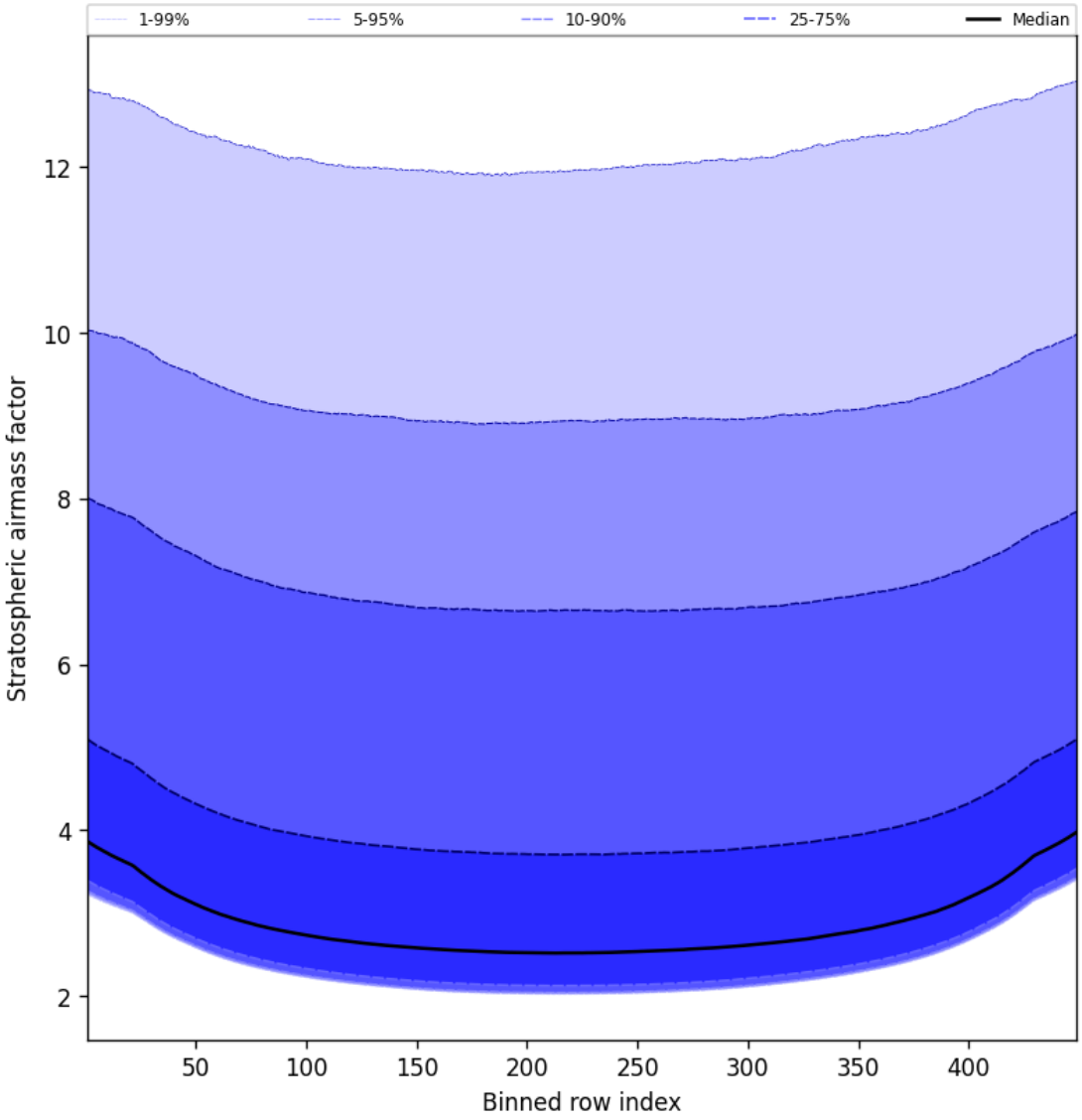

Figure 59: Along track statistics of “Stratospheric airmass factor” for 2025-03-28 to 2025-03-29

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.

Contents

List of Figures

List of Tables

11 Copyright information of ‘PyCAMA’

profits; or business interruption) however caused and on any theory of liability, whether in contract, strict liability, or tort (including negligence or otherwise) arising in any way out of the use of this software, even if advised of the possibility of such damage.

Maarten Sneep (maarten.sneep@knmi.nl).