

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:

$$\bar{x} = \frac{1}{N} \sum_{i=1}^N x_i \quad (1)$$

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 $\sigma(x) = \sqrt{V(x)}$.

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

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 :

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^m f(x) dx = \frac{1}{2} \quad (3)$$

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

The median is a special case of a percentile. Instead of 1/2 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} .

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1} \sum_{i=1}^N (x_{(k),i} - \bar{x}_{(k)})(x_{(l),i} - \bar{x}_{(l)}) \quad (4)$$

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

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

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]	0.678 ± 0.399	11222685	0.995	0.750	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.931 \pm 137.293) \times 10^{-2}$	11222685	0.278	0.465	1.152×10^{-2}	-136	1.673×10^3
sulfurdioxide total vertical column precision [DU]	0.582 ± 0.933	11222685	0.222	0.373	0.331	4.344×10^{-2}	719
sulfurdioxide slant column density corrected [DU]	$(2.060 \pm 47.728) \times 10^{-2}$	11222685	0.227	0.350	9.527×10^{-3}	-11.0	665
sulfurdioxide slant column density cobra [DU]	$(2.010 \pm 35.856) \times 10^{-2}$	11222685	0.227	0.350	9.527×10^{-3}	-11.0	39.1
sulfurdioxide slant column density cobra precision [DU]	0.280 ± 0.128	11222685	0.213	0.127	0.241	8.416×10^{-2}	22.4
sulfurdioxide slant column density window1 [DU]	0.191 ± 0.656	11222685	0.225	0.710	0.204	-59.8	51.7
sulfurdioxide slant column density window1 precision [DU]	0.280 ± 0.128	11222685	0.213	0.127	0.241	8.416×10^{-2}	22.4
sulfurdioxide slant column density corrected win1 [DU]	$(-1.523 \pm 644.935) \times 10^{-3}$	11222685	-2.500×10^{-2}	0.692	-1.966×10^{-2}	-59.8	51.7
background so2 slant column offset window1 [DU]	-0.192 ± 0.178	11222685	-0.300	0.192	-0.235	-0.630	3.04
sulfurdioxide slant column density window2 [DU]	0.157 ± 8.899	11222685	-0.250	11.3	-1.062×10^{-2}	-899	833
sulfurdioxide slant column density window2 precision [DU]	8.11 ± 2.24	11222685	7.43	2.53	7.79	2.24	552
sulfurdioxide slant column density corrected win2 [DU]	-1.36 ± 8.71	11222685	-0.750	11.1	-1.34	-899	832
background so2 slant column offset window2 [DU]	-1.52 ± 2.41	11222685	-0.250	2.75	-0.827	-20.2	4.77
sulfurdioxide slant column density window3 [DU]	-4.73 ± 24.10	11222685	-5.04	30.5	-4.68	-1.481×10^3	517
sulfurdioxide slant column density window3 precision [DU]	29.3 ± 13.7	11222685	23.7	9.71	25.6	10.5	1.400×10^3
sulfurdioxide slant column density corrected win3 [DU]	6.13 ± 23.55	11222685	6.16	29.8	6.17	-1.478×10^3	520
background so2 slant column offset window3 [DU]	10.9 ± 6.8	11222685	5.04	11.1	10.0	-5.93	38.0
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	11222685	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.416 \pm 10.936) \times 10^{-2}$	11222685	1.423×10^{-2}	1.878×10^{-2}	1.620×10^{-2}	2.133×10^{-4}	2.27
fitted radiance shift [nm]	$(-3.512 \pm 27.097) \times 10^{-4}$	11222685	-5.000×10^{-4}	1.786×10^{-3}	-3.364×10^{-4}	-6.877×10^{-2}	5.114×10^{-2}
fitted radiance squeeze [1]	$(-9.167 \pm 174.806) \times 10^{-6}$	11222685	1.000×10^{-5}	1.952×10^{-4}	-2.935×10^{-6}	-1.719×10^{-2}	1.639×10^{-2}
fitted root mean square [1]	$(1.230 \pm 0.516) \times 10^{-3}$	11222685	9.750×10^{-4}	4.986×10^{-4}	1.082×10^{-3}	3.339×10^{-4}	7.805×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.809 ± 0.434	11222685	0.820	0.565	0.754	5.000×10^{-2}	3.20
sulfurdioxide total air mass factor polluted precision [1]	0.109 ± 0.120	11222685	3.500×10^{-2}	0.113	6.194×10^{-2}	2.734×10^{-3}	1.84
sulfurdioxide clear air mass factor polluted [1]	0.695 ± 0.289	11222685	0.580	0.359	0.666	5.638×10^{-2}	3.20
number of spectral points in retrieval [1]	73.4 ± 0.5	11222685	73.0	1.000	73.0	52.0	156

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	1.000×10^{-2}	7.000×10^{-2}	0.130	0.250	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.77	-0.970	-0.567	-0.373	-0.217	0.248	0.420	0.641	1.11	3.23
sulfurdioxide total vertical column precision [DU]	9.709×10^{-2}	0.132	0.158	0.183	0.218	0.591	0.815	1.15	1.73	4.57
sulfurdioxide slant column density corrected [DU]	-0.813	-0.468	-0.340	-0.254	-0.164	0.186	0.282	0.376	0.525	1.01
sulfurdioxide slant column density cobra [DU]	-0.813	-0.468	-0.340	-0.254	-0.164	0.186	0.282	0.376	0.525	1.01
sulfurdioxide slant column density cobra precision [DU]	0.134	0.161	0.175	0.186	0.200	0.327	0.379	0.424	0.499	0.760
sulfurdioxide slant column density window1 [DU]	-1.60	-0.825	-0.539	-0.351	-0.157	0.553	0.733	0.903	1.16	1.87
sulfurdioxide slant column density window1 precision [DU]	0.134	0.161	0.175	0.186	0.200	0.327	0.379	0.424	0.499	0.760
sulfurdioxide slant column density corrected win1 [DU]	-1.58	-0.946	-0.703	-0.538	-0.362	0.331	0.521	0.707	0.998	1.83
background so2 slant column offset window1 [DU]	-0.428	-0.373	-0.351	-0.334	-0.312	-0.121	-4.760×10^{-2}	2.055×10^{-2}	0.124	0.389
sulfurdioxide slant column density window2 [DU]	-20.5	-14.0	-10.7	-8.32	-5.59	5.71	8.63	11.3	14.9	22.4
sulfurdioxide slant column density window2 precision [DU]	4.33	5.23	5.76	6.17	6.67	9.20	10.0	10.9	12.1	14.7
sulfurdioxide slant column density corrected win2 [DU]	-22.5	-15.5	-12.1	-9.66	-6.88	4.18	6.93	9.38	12.7	19.6
background so2 slant column offset window2 [DU]	-9.33	-6.45	-4.90	-3.79	-2.62	0.128	0.459	0.711	1.10	2.33
sulfurdioxide slant column density window3 [DU]	-64.7	-44.4	-34.7	-27.6	-19.9	10.6	18.4	25.3	34.6	53.3
sulfurdioxide slant column density window3 precision [DU]	15.0	17.4	19.1	20.3	21.9	31.6	36.3	42.8	55.5	88.3
sulfurdioxide slant column density corrected win3 [DU]	-52.5	-32.6	-23.1	-16.2	-8.66	21.1	28.6	35.4	44.5	63.0
background so2 slant column offset window3 [DU]	-0.821	1.41	2.64	3.73	5.16	16.3	18.5	20.2	22.2	25.8
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	1.884×10^{-3}	3.815×10^{-3}	6.003×10^{-3}	7.845×10^{-3}	9.947×10^{-3}	2.873×10^{-2}	4.784×10^{-2}	7.834×10^{-2}	0.176	0.618
fitted radiance shift [nm]	-8.605×10^{-3}	-4.351×10^{-3}	-2.866×10^{-3}	-2.014×10^{-3}	-1.281×10^{-3}	5.050×10^{-4}	1.217×10^{-3}	2.148×10^{-3}	3.763×10^{-3}	8.223×10^{-3}
fitted radiance squeeze [1]	-5.124×10^{-4}	-2.855×10^{-4}	-2.066×10^{-4}	-1.551×10^{-4}	-1.020×10^{-4}	9.325×10^{-5}	1.423×10^{-4}	1.876×10^{-4}	2.516×10^{-4}	3.998×10^{-4}
fitted root mean square [1]	5.785×10^{-4}	7.112×10^{-4}	7.874×10^{-4}	8.438×10^{-4}	9.107×10^{-4}	1.409×10^{-3}	1.645×10^{-3}	1.859×10^{-3}	2.183×10^{-3}	3.082×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.188×10^{-2}	0.203	0.289	0.379	0.493	1.06	1.25	1.42	1.64	1.99
sulfurdioxide total air mass factor polluted precision [1]	8.626×10^{-3}	1.515×10^{-2}	2.133×10^{-2}	2.684×10^{-2}	3.384×10^{-2}	0.147	0.197	0.251	0.341	0.551
sulfurdioxide clear air mass factor polluted [1]	0.173	0.270	0.342	0.413	0.500	0.859	0.958	1.05	1.19	1.55
number of spectral points in retrieval [1]	73.0	73.0	73.0	73.0	73.0	74.0	74.0	74.0	74.0	74.0

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]	0.718 ± 0.386	5419086	0.640	1.000	0.0	1.000	0.360	1.000
sulfurdioxide total vertical column [DU]	$(5.138 \pm 178.897) \times 10^{-2}$	5419086	0.560	1.104×10^{-2}	-136	1.673×10^3	-0.262	0.298
sulfurdioxide total vertical column precision [DU]	0.767 ± 1.221	5419086	0.557	0.412	4.607×10^{-2}	719	0.247	0.804
sulfurdioxide slant column density corrected [DU]	$(1.925 \pm 43.343) \times 10^{-2}$	5419086	0.351	7.971×10^{-3}	-11.0	257	-0.166	0.185
sulfurdioxide slant column density cobra [DU]	$(1.851 \pm 37.039) \times 10^{-2}$	5419086	0.351	7.971×10^{-3}	-11.0	26.2	-0.166	0.185
sulfurdioxide slant column density cobra precision [DU]	0.285 ± 0.139	5419086	0.137	0.242	9.024×10^{-2}	8.72	0.200	0.337
sulfurdioxide slant column density window1 [DU]	0.205 ± 0.678	5419086	0.718	0.223	-22.3	26.0	-0.142	0.576
sulfurdioxide slant column density window1 precision [DU]	0.285 ± 0.139	5419086	0.137	0.242	9.024×10^{-2}	8.72	0.200	0.337
sulfurdioxide slant column density corrected win1 [DU]	$(2.063 \pm 667.978) \times 10^{-3}$	5419086	0.703	-1.733×10^{-2}	-22.3	26.2	-0.365	0.339
background so2 slant column offset window1 [DU]	-0.203 ± 0.200	5419086	0.191	-0.255	-0.630	3.04	-0.326	-0.136
sulfurdioxide slant column density window2 [DU]	0.383 ± 8.889	5419086	11.4	0.188	-71.2	199	-5.44	6.00
sulfurdioxide slant column density window2 precision [DU]	8.03 ± 2.06	5419086	2.39	7.72	2.33	105	6.66	9.05
sulfurdioxide slant column density corrected win2 [DU]	-1.54 ± 8.61	5419086	11.1	-1.49	-78.1	192	-7.04	4.02
background so2 slant column offset window2 [DU]	-1.93 ± 2.89	5419086	3.72	-0.989	-20.2	4.77	-3.52	0.198
sulfurdioxide slant column density window3 [DU]	-6.74 ± 23.86	5419086	30.4	-6.63	-1.481×10^3	263	-21.8	8.58
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 12.7	5419086	8.26	25.0	10.6	1.400×10^3	21.8	30.0
sulfurdioxide slant column density corrected win3 [DU]	5.95 ± 23.29	5419086	29.5	6.14	-1.478×10^3	270	-8.65	20.8
background so2 slant column offset window3 [DU]	12.7 ± 6.7	5419086	11.4	12.4	-3.02	38.0	6.85	18.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	5419086	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.140 \pm 14.948) \times 10^{-2}$	5419086	4.686×10^{-2}	2.180×10^{-2}	2.133×10^{-4}	2.27	1.055×10^{-2}	5.741×10^{-2}
fitted radiance shift [nm]	$(-1.835 \pm 25.430) \times 10^{-4}$	5419086	1.472×10^{-3}	-1.915×10^{-4}	-3.539×10^{-2}	3.716×10^{-2}	-9.399×10^{-4}	5.324×10^{-4}
fitted radiance squeeze [1]	$(-1.030 \pm 18.650) \times 10^{-5}$	5419086	1.988×10^{-4}	-2.832×10^{-7}	-5.685×10^{-3}	1.602×10^{-3}	-1.014×10^{-4}	9.732×10^{-5}
fitted root mean square [1]	$(1.257 \pm 0.561) \times 10^{-3}$	5419086	5.209×10^{-4}	1.090×10^{-3}	3.639×10^{-4}	3.794×10^{-2}	9.156×10^{-4}	1.436×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.687 ± 0.420	5419086	0.516	0.609	5.000×10^{-2}	3.20	0.380	0.896
sulfurdioxide total air mass factor polluted precision [1]	$(9.351 \pm 13.106) \times 10^{-2}$	5419086	8.128×10^{-2}	4.475×10^{-2}	2.734×10^{-3}	1.79	2.578×10^{-2}	0.107
sulfurdioxide clear air mass factor polluted [1]	0.613 ± 0.288	5419086	0.424	0.573	5.638×10^{-2}	3.20	0.386	0.810
number of spectral points in retrieval [1]	73.5 ± 0.5	5419086	1.000	73.0	52.0	156	73.0	74.0

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]	0.641 ± 0.408	5803599	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(2.805 \pm 81.017) \times 10^{-2}$	5803599	0.399	1.188×10^{-2}	-49.4	593	-0.185	0.214
sulfurdioxide total vertical column precision [DU]	0.409 ± 0.479	5803599	0.264	0.284	4.344×10^{-2}	48.7	0.199	0.462
sulfurdioxide slant column density corrected [DU]	$(2.186 \pm 51.487) \times 10^{-2}$	5803599	0.348	1.097×10^{-2}	-6.59	665	-0.161	0.187
sulfurdioxide slant column density cobra [DU]	$(2.158 \pm 34.715) \times 10^{-2}$	5803599	0.348	1.097×10^{-2}	-6.59	39.1	-0.161	0.187
sulfurdioxide slant column density cobra precision [DU]	0.275 ± 0.118	5803599	0.116	0.241	8.416×10^{-2}	22.4	0.201	0.317
sulfurdioxide slant column density window1 [DU]	0.177 ± 0.635	5803599	0.702	0.187	-59.8	51.7	-0.171	0.531
sulfurdioxide slant column density window1 precision [DU]	0.275 ± 0.118	5803599	0.116	0.241	8.416×10^{-2}	22.4	0.201	0.317
sulfurdioxide slant column density corrected win1 [DU]	$(-4.871 \pm 622.632) \times 10^{-3}$	5803599	0.683	-2.180×10^{-2}	-59.8	51.7	-0.359	0.323
background so2 slant column offset window1 [DU]	-0.182 ± 0.153	5803599	0.191	-0.217	-0.630	1.42	-0.297	-0.107
sulfurdioxide slant column density window2 [DU]	$(-5.448 \pm 890.333) \times 10^{-2}$	5803599	11.2	-0.191	-899	833	-5.72	5.44
sulfurdioxide slant column density window2 precision [DU]	8.19 ± 2.39	5803599	2.67	7.85	2.24	552	6.68	9.35
sulfurdioxide slant column density corrected win2 [DU]	-1.19 ± 8.80	5803599	11.1	-1.20	-899	832	-6.73	4.33
background so2 slant column offset window2 [DU]	-1.14 ± 1.79	5803599	2.10	-0.744	-11.4	4.60	-2.03	6.447×10^{-2}
sulfurdioxide slant column density window3 [DU]	-2.85 ± 24.17	5803599	30.4	-2.88	-638	517	-18.0	12.5
sulfurdioxide slant column density window3 precision [DU]	30.3 ± 14.5	5803599	11.0	26.2	10.5	282	22.0	33.0
sulfurdioxide slant column density corrected win3 [DU]	6.29 ± 23.80	5803599	30.1	6.19	-637	520	-8.67	21.4
background so2 slant column offset window3 [DU]	9.15 ± 6.34	5803599	10.4	7.97	-5.93	34.4	3.88	14.2
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	5803599	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.873 \pm 3.038) \times 10^{-2}$	5803599	1.085×10^{-2}	1.423×10^{-2}	1.297×10^{-3}	1.18	9.668×10^{-3}	2.052×10^{-2}
fitted radiance shift [nm]	$(-5.079 \pm 28.476) \times 10^{-4}$	5803599	2.070×10^{-3}	-5.189×10^{-4}	-6.877×10^{-2}	5.114×10^{-2}	-1.602×10^{-3}	4.677×10^{-4}
fitted radiance squeeze [1]	$(-8.108 \pm 163.119) \times 10^{-6}$	5803599	1.919×10^{-4}	-5.348×10^{-6}	-1.719×10^{-2}	1.639×10^{-2}	-1.025×10^{-4}	8.944×10^{-5}
fitted root mean square [1]	$(1.204 \pm 0.468) \times 10^{-3}$	5803599	4.755×10^{-4}	1.074×10^{-3}	3.339×10^{-4}	7.805×10^{-2}	9.061×10^{-4}	1.382×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.924 ± 0.416	5803599	0.550	0.867	5.000×10^{-2}	2.64	0.627	1.18
sulfurdioxide total air mass factor polluted precision [1]	0.124 ± 0.106	5803599	0.127	9.030×10^{-2}	5.056×10^{-3}	1.84	4.363×10^{-2}	0.171
sulfurdioxide clear air mass factor polluted [1]	0.771 ± 0.267	5803599	0.317	0.724	0.138	2.38	0.589	0.905
number of spectral points in retrieval [1]	73.4 ± 0.5	5803599	1.000	73.0	52.0	74.0	73.0	74.0

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]	0.690 ± 0.396	7274988	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(2.899 \pm 100.086) \times 10^{-2}$	7274988	0.428	1.083×10^{-2}	-74.5	593	-0.200	0.228
sulfurdioxide total vertical column precision [DU]	0.488 ± 0.724	7274988	0.298	0.300	4.896×10^{-2}	26.8	0.211	0.509
sulfurdioxide slant column density corrected [DU]	$(1.851 \pm 37.019) \times 10^{-2}$	7274988	0.346	9.332×10^{-3}	-9.89	404	-0.162	0.184
sulfurdioxide slant column density cobra [DU]	$(1.844 \pm 33.812) \times 10^{-2}$	7274988	0.346	9.332×10^{-3}	-9.89	31.4	-0.162	0.184
sulfurdioxide slant column density cobra precision [DU]	0.274 ± 0.118	7274988	0.114	0.239	8.416×10^{-2}	22.4	0.200	0.314
sulfurdioxide slant column density window1 [DU]	0.183 ± 0.629	7274988	0.703	0.194	-59.8	51.7	-0.163	0.540
sulfurdioxide slant column density window1 precision [DU]	0.274 ± 0.118	7274988	0.114	0.239	8.416×10^{-2}	22.4	0.200	0.314
sulfurdioxide slant column density corrected win1 [DU]	$(-8.109 \pm 617.498) \times 10^{-3}$	7274988	0.687	-2.401×10^{-2}	-59.8	51.7	-0.364	0.323
background so2 slant column offset window1 [DU]	-0.191 ± 0.160	7274988	0.194	-0.227	-0.630	2.17	-0.307	-0.113
sulfurdioxide slant column density window2 [DU]	$(-2.032 \pm 872.411) \times 10^{-2}$	7274988	11.1	-0.169	-661	833	-5.67	5.45
sulfurdioxide slant column density window2 precision [DU]	7.99 ± 2.12	7274988	2.44	7.66	2.24	552	6.60	9.04
sulfurdioxide slant column density corrected win2 [DU]	-1.37 ± 8.59	7274988	11.0	-1.36	-662	832	-6.85	4.11
background so2 slant column offset window2 [DU]	-1.35 ± 2.11	7274988	2.42	-0.809	-20.2	4.77	-2.35	7.000×10^{-2}
sulfurdioxide slant column density window3 [DU]	-1.77 ± 23.81	7274988	30.4	-1.84	-422	262	-16.9	13.5
sulfurdioxide slant column density window3 precision [DU]	28.0 ± 11.9	7274988	9.04	24.8	10.6	226	21.4	30.5
sulfurdioxide slant column density corrected win3 [DU]	8.72 ± 22.99	7274988	29.4	8.54	-416	262	-5.96	23.4
background so2 slant column offset window3 [DU]	10.5 ± 6.3	7274988	10.2	9.73	-5.93	38.0	5.31	15.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	7274988	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.744 \pm 6.234) \times 10^{-2}$	7274988	1.318×10^{-2}	1.521×10^{-2}	3.401×10^{-4}	1.40	1.011×10^{-2}	2.329×10^{-2}
fitted radiance shift [nm]	$(-4.073 \pm 23.669) \times 10^{-4}$	7274988	1.730×10^{-3}	-3.685×10^{-4}	-5.406×10^{-2}	3.705×10^{-2}	-1.302×10^{-3}	4.273×10^{-4}
fitted radiance squeeze [1]	$(-4.091 \pm 163.365) \times 10^{-6}$	7274988	1.900×10^{-4}	-6.036×10^{-7}	-1.719×10^{-2}	1.440×10^{-2}	-9.654×10^{-5}	9.348×10^{-5}
fitted root mean square [1]	$(1.202 \pm 0.467) \times 10^{-3}$	7274988	4.590×10^{-4}	1.065×10^{-3}	3.339×10^{-4}	5.860×10^{-2}	9.050×10^{-4}	1.364×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.855 ± 0.407	7274988	0.514	0.809	5.000×10^{-2}	2.68	0.573	1.09
sulfurdioxide total air mass factor polluted precision [1]	0.110 ± 0.104	7274988	0.113	6.772×10^{-2}	3.444×10^{-3}	1.53	3.834×10^{-2}	0.151
sulfurdioxide clear air mass factor polluted [1]	0.727 ± 0.268	7274988	0.313	0.696	6.705×10^{-2}	2.38	0.555	0.868
number of spectral points in retrieval [1]	73.4 ± 0.5	7274988	1.000	73.0	53.0	74.0	73.0	74.0

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]	0.691 ± 0.402	2973423	0.740	1.000	0.0	1.000	0.260	1.000
sulfurdioxide total vertical column [DU]	$(4.175 \pm 149.690) \times 10^{-2}$	2973423	0.505	1.045×10^{-2}	-136	503	-0.236	0.268
sulfurdioxide total vertical column precision [DU]	0.671 ± 1.048	2973423	0.465	0.377	4.344×10^{-2}	54.5	0.228	0.693
sulfurdioxide slant column density corrected [DU]	$(1.743 \pm 45.176) \times 10^{-2}$	2973423	0.338	8.137×10^{-3}	-11.0	476	-0.160	0.178
sulfurdioxide slant column density cobra [DU]	$(1.703 \pm 34.188) \times 10^{-2}$	2973423	0.338	8.137×10^{-3}	-11.0	24.5	-0.160	0.178
sulfurdioxide slant column density cobra precision [DU]	0.271 ± 0.126	2973423	0.120	0.233	8.686×10^{-2}	13.0	0.197	0.316
sulfurdioxide slant column density window1 [DU]	0.226 ± 0.629	2973423	0.681	0.235	-42.1	42.7	-0.110	0.572
sulfurdioxide slant column density window1 precision [DU]	0.271 ± 0.126	2973423	0.120	0.233	8.686×10^{-2}	13.0	0.197	0.316
sulfurdioxide slant column density corrected win1 [DU]	$(1.413 \pm 619.311) \times 10^{-3}$	2973423	0.664	-1.480×10^{-2}	-42.1	42.6	-0.343	0.321
background so2 slant column offset window1 [DU]	-0.225 ± 0.160	2973423	0.160	-0.266	-0.630	2.27	-0.324	-0.164
sulfurdioxide slant column density window2 [DU]	-0.115 ± 8.960	2973423	11.3	-0.248	-899	523	-5.84	5.45
sulfurdioxide slant column density window2 precision [DU]	8.29 ± 2.48	2973423	2.65	7.96	2.33	455	6.76	9.40
sulfurdioxide slant column density corrected win2 [DU]	-1.35 ± 8.80	2973423	11.1	-1.32	-899	523	-6.89	4.22
background so2 slant column offset window2 [DU]	-1.23 ± 2.37	2973423	2.59	-0.529	-19.6	4.77	-2.24	0.351
sulfurdioxide slant column density window3 [DU]	-9.81 ± 23.87	2973423	29.8	-9.34	-1.481×10^3	263	-24.5	5.32
sulfurdioxide slant column density window3 precision [DU]	32.3 ± 17.2	2973423	11.5	27.2	10.5	1.400×10^3	23.1	34.6
sulfurdioxide slant column density corrected win3 [DU]	0.530 ± 24.024	2973423	30.1	0.895	-1.478×10^3	270	-14.4	15.8
background so2 slant column offset window3 [DU]	10.3 ± 7.2	2973423	12.0	8.75	-5.93	37.9	4.30	16.3
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.16	2973423	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.246 \pm 14.928) \times 10^{-2}$	2973423	4.575×10^{-2}	2.082×10^{-2}	2.171×10^{-4}	2.26	1.034×10^{-2}	5.609×10^{-2}
fitted radiance shift [nm]	$(-2.209 \pm 34.403) \times 10^{-4}$	2973423	1.943×10^{-3}	-2.501×10^{-4}	-6.877×10^{-2}	5.114×10^{-2}	-1.222×10^{-3}	7.210×10^{-4}
fitted radiance squeeze [1]	$(-4.702 \pm 168.707) \times 10^{-6}$	2973423	1.930×10^{-4}	-1.428×10^{-6}	-1.130×10^{-2}	1.639×10^{-2}	-9.873×10^{-5}	9.429×10^{-5}
fitted root mean square [1]	$(1.196 \pm 0.498) \times 10^{-3}$	2973423	4.548×10^{-4}	1.070×10^{-3}	3.536×10^{-4}	7.805×10^{-2}	9.014×10^{-4}	1.356×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.745 ± 0.473	2973423	0.587	0.632	5.000×10^{-2}	2.84	0.405	0.992
sulfurdioxide total air mass factor polluted precision [1]	0.111 ± 0.147	2973423	0.117	5.263×10^{-2}	2.744×10^{-3}	1.84	2.724×10^{-2}	0.144
sulfurdioxide clear air mass factor polluted [1]	0.649 ± 0.300	2973423	0.410	0.600	5.638×10^{-2}	2.27	0.422	0.832
number of spectral points in retrieval [1]	73.4 ± 0.5	2973423	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

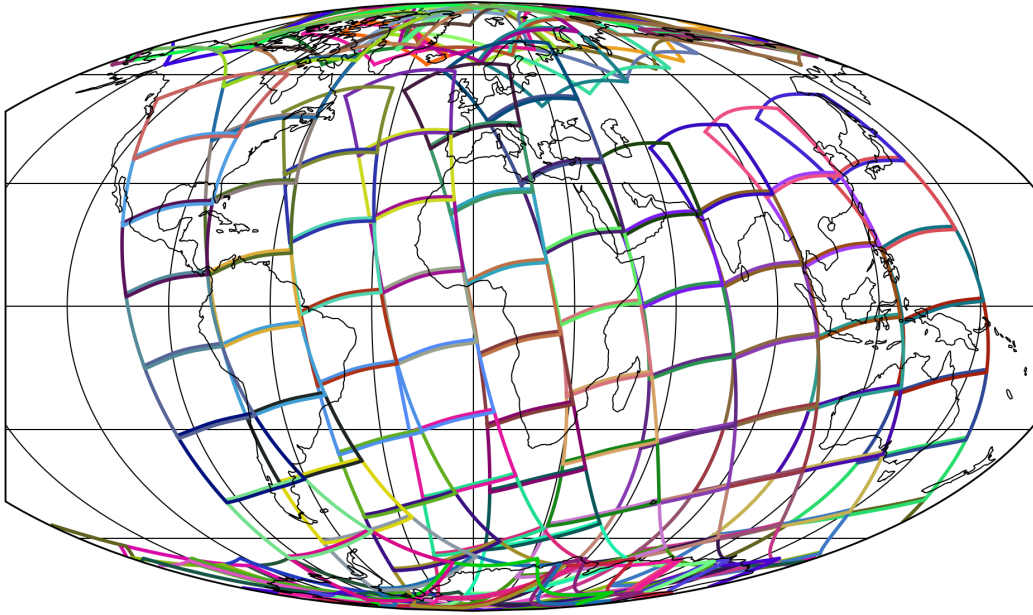


Figure 1: Outline of the granules.

4 Input data monitoring

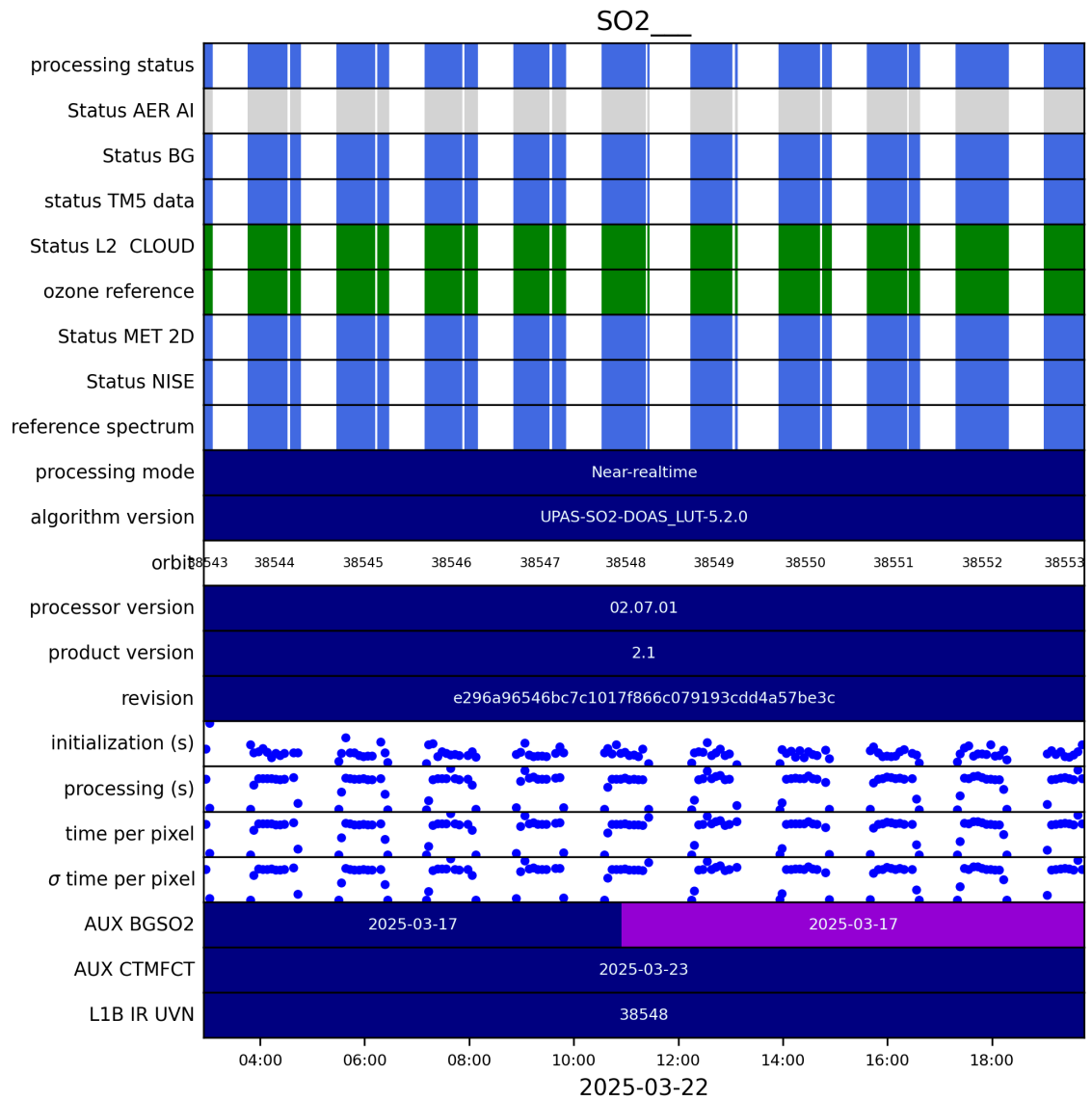


Figure 2: Input data per granule

5 Warnings and errors

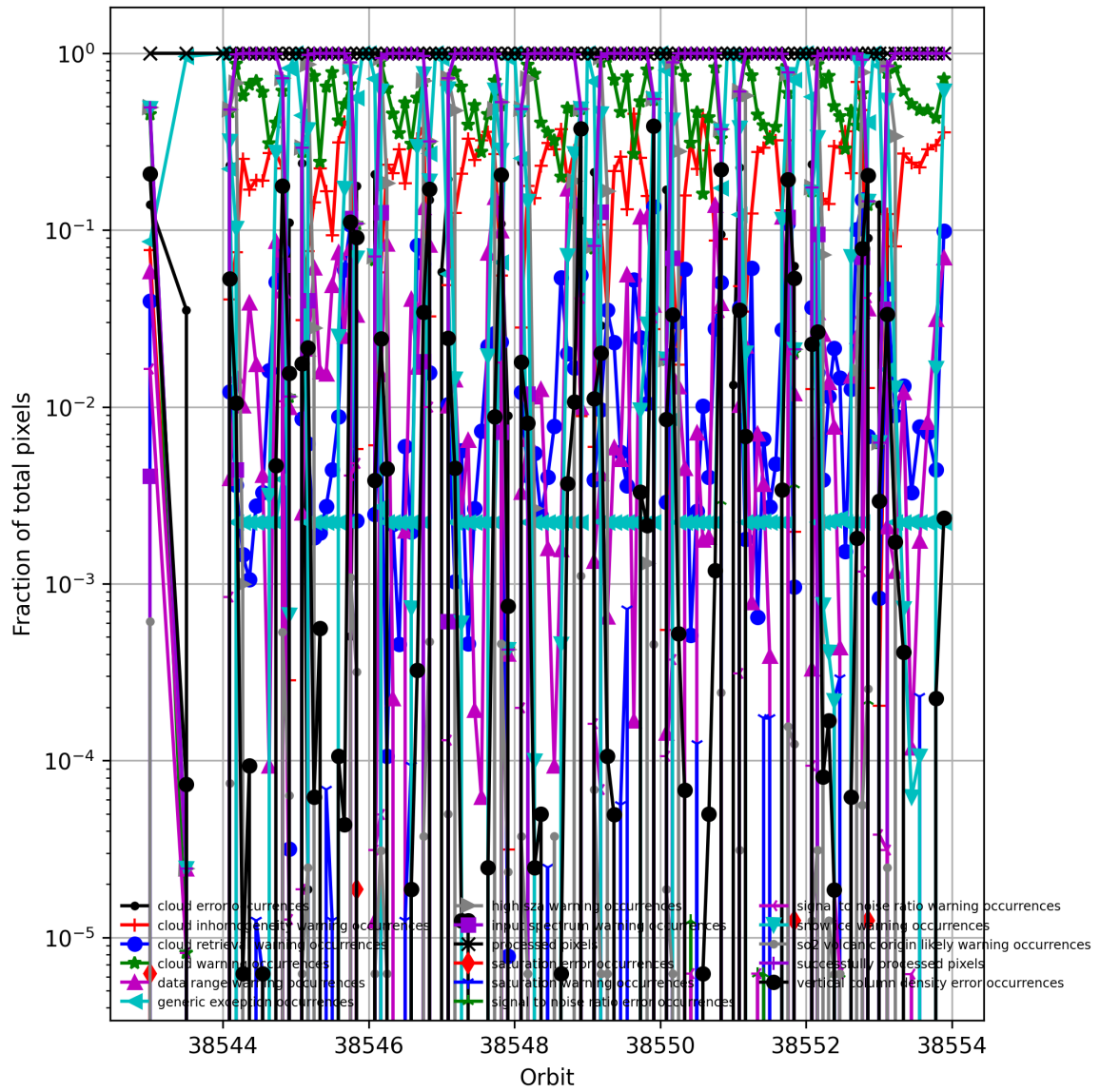


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

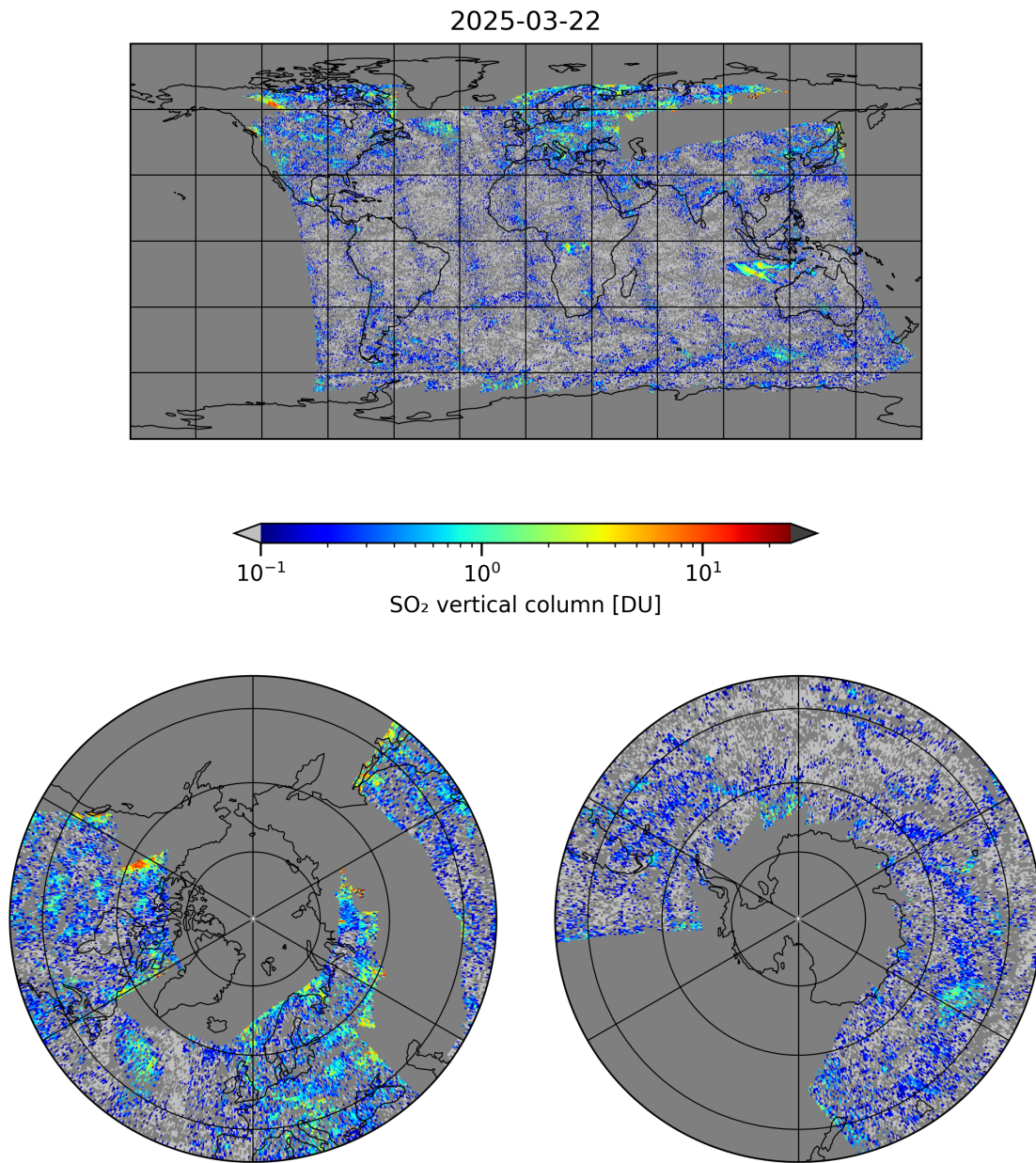


Figure 4: Map of “SO₂ vertical column” for 2025-03-22 to 2025-03-22

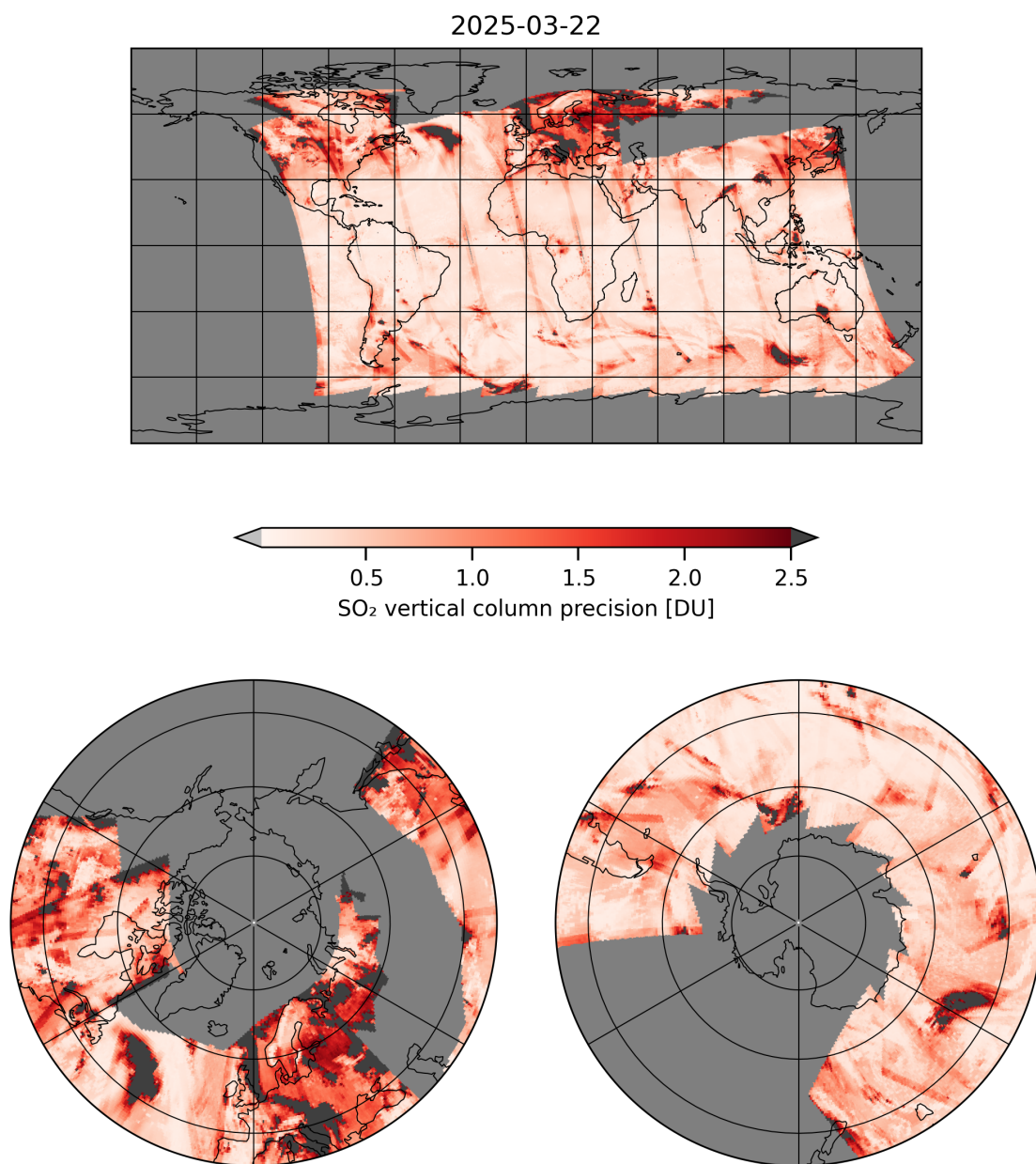


Figure 5: Map of “SO₂ vertical column precision” for 2025-03-22 to 2025-03-22

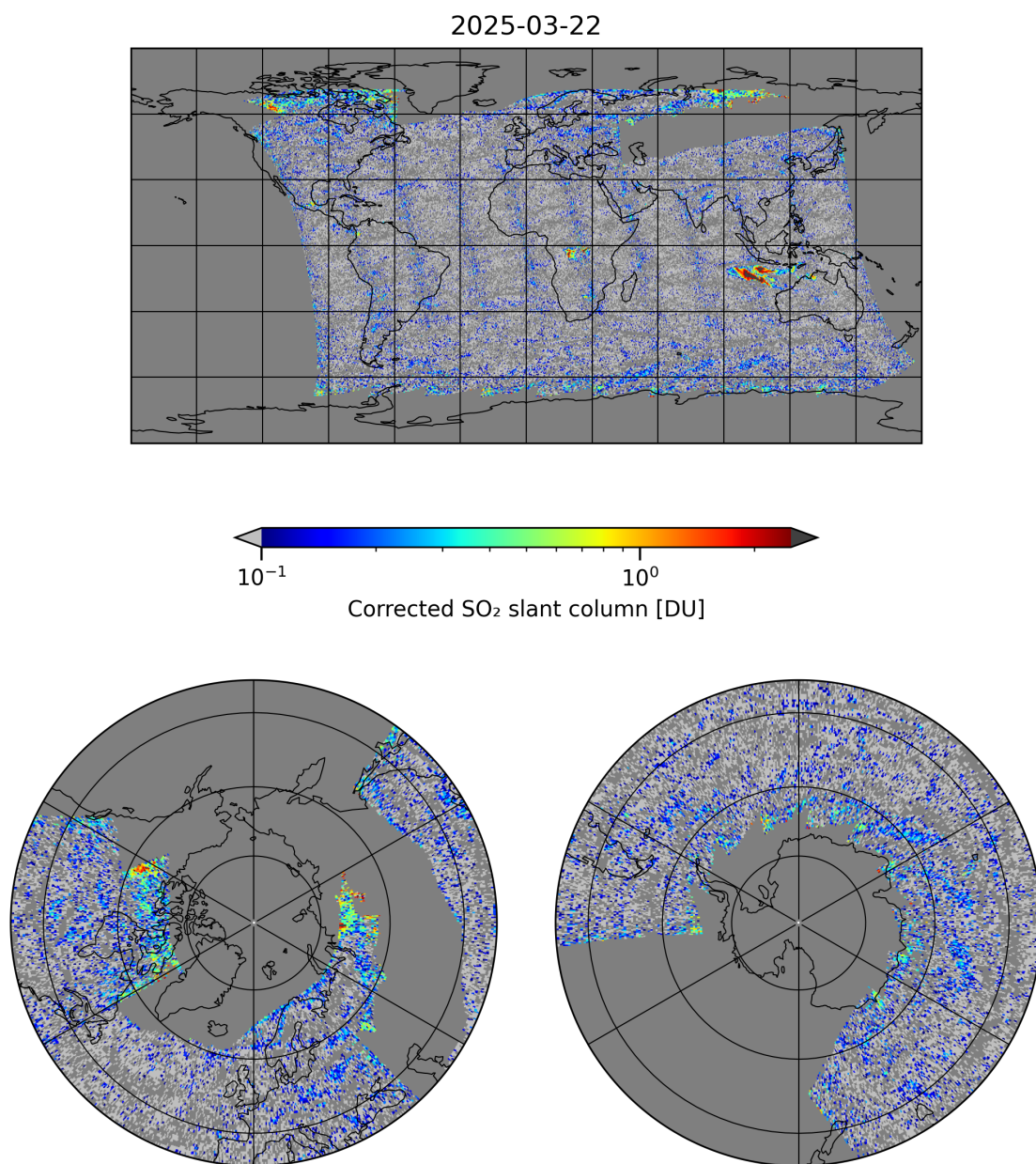


Figure 6: Map of “Corrected SO₂ slant column” for 2025-03-22 to 2025-03-22

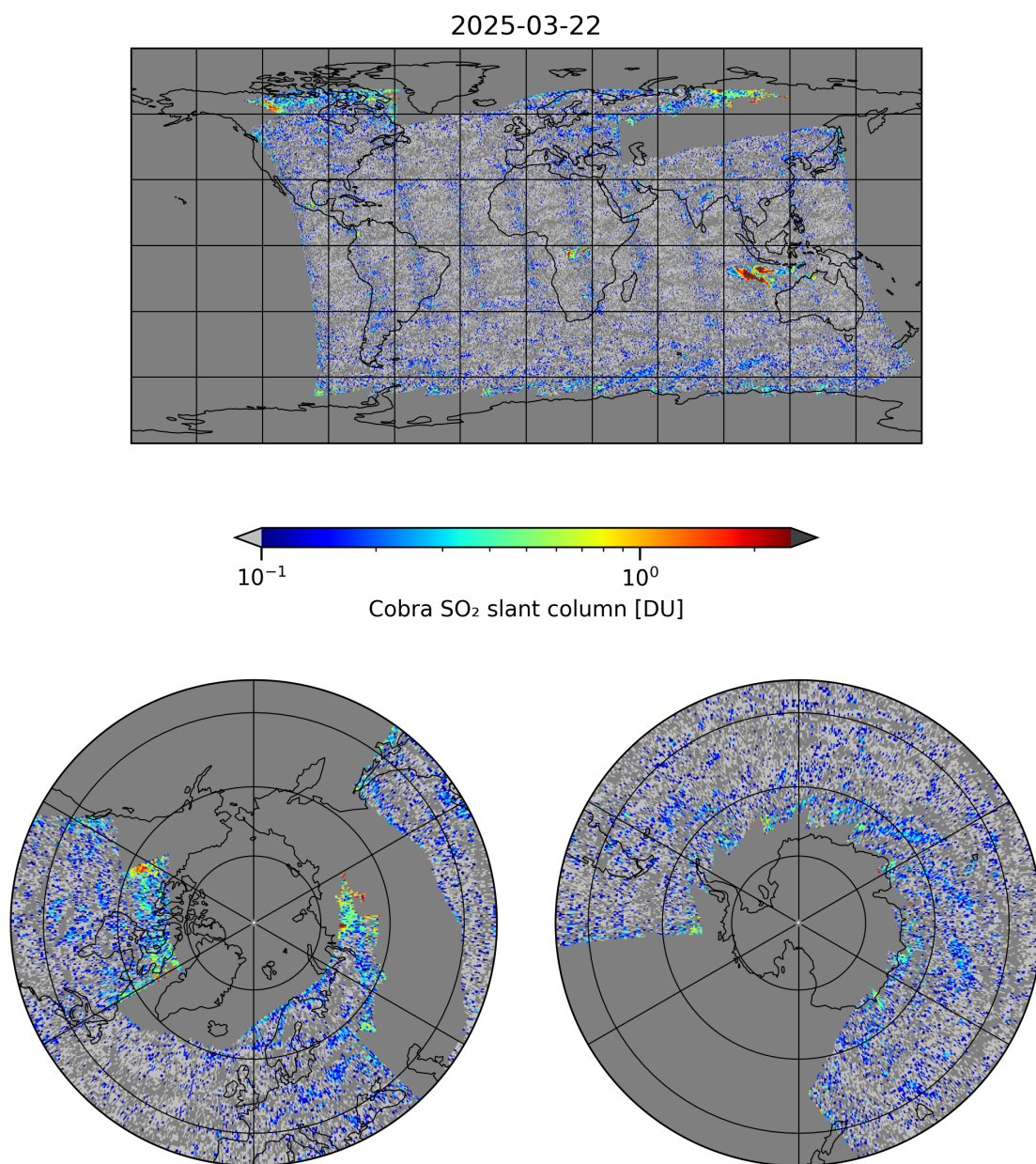


Figure 7: Map of “Cobra SO₂ slant column” for 2025-03-22 to 2025-03-22

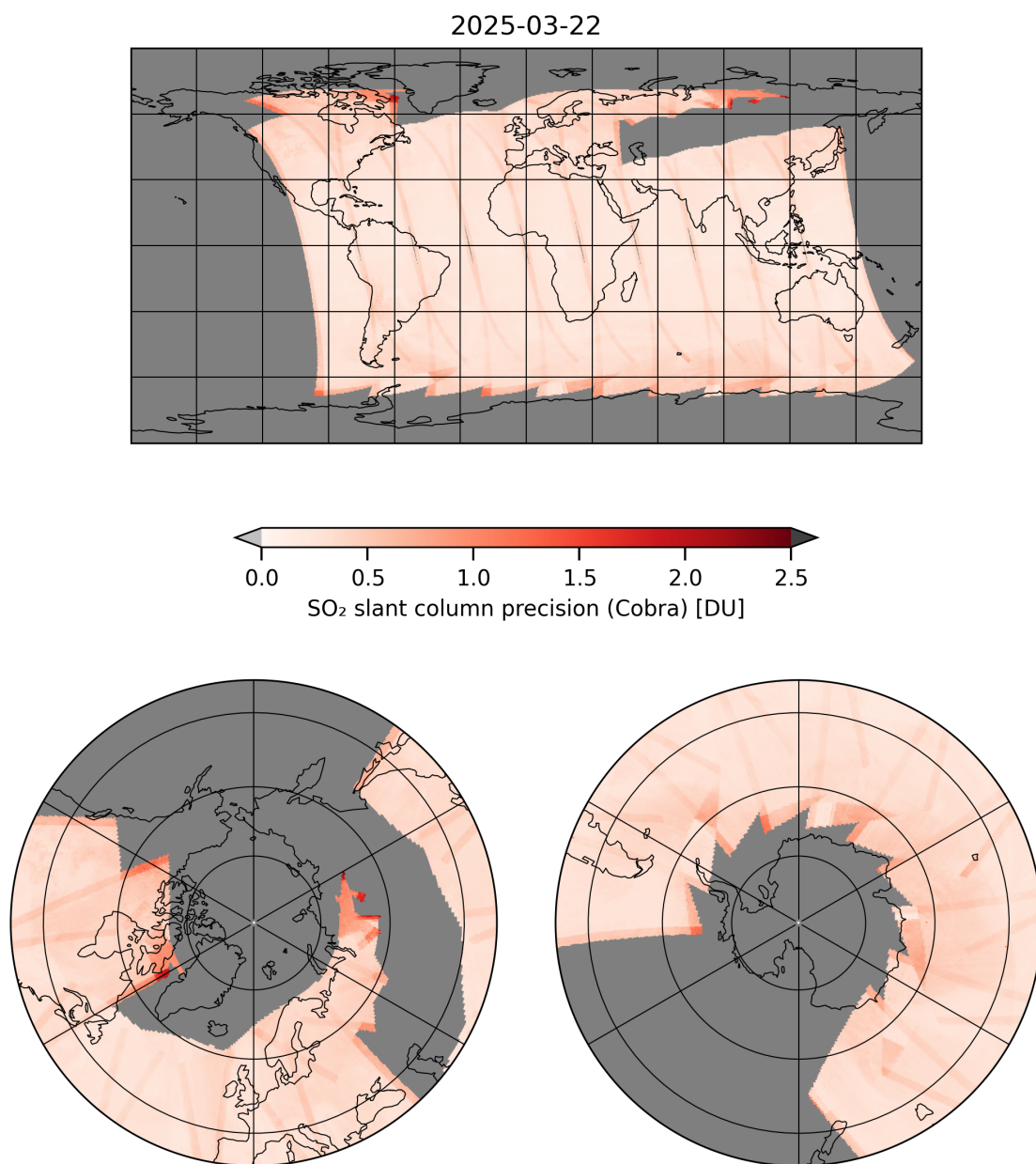


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-03-22 to 2025-03-22

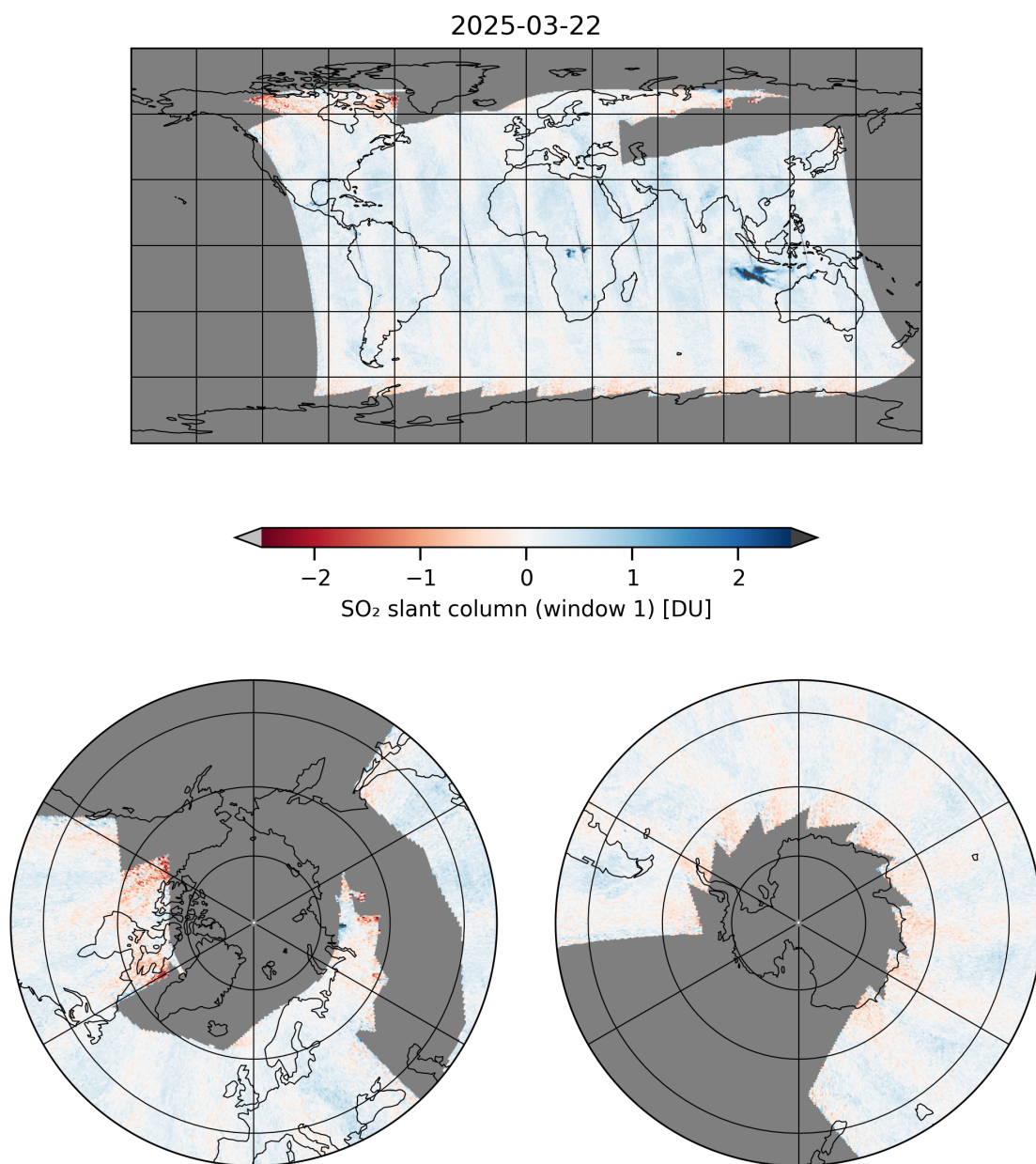


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-03-22 to 2025-03-22

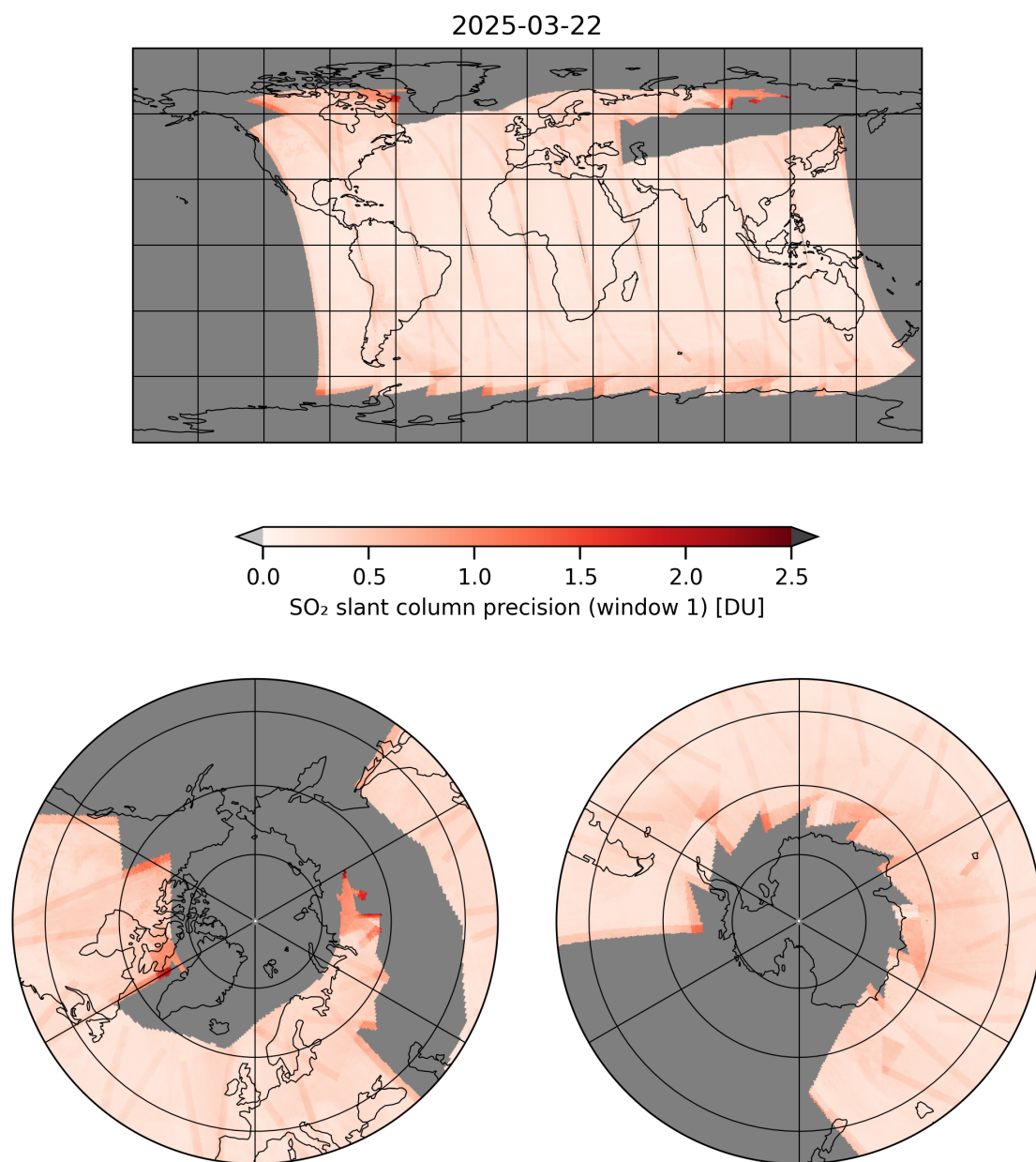


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-03-22 to 2025-03-22

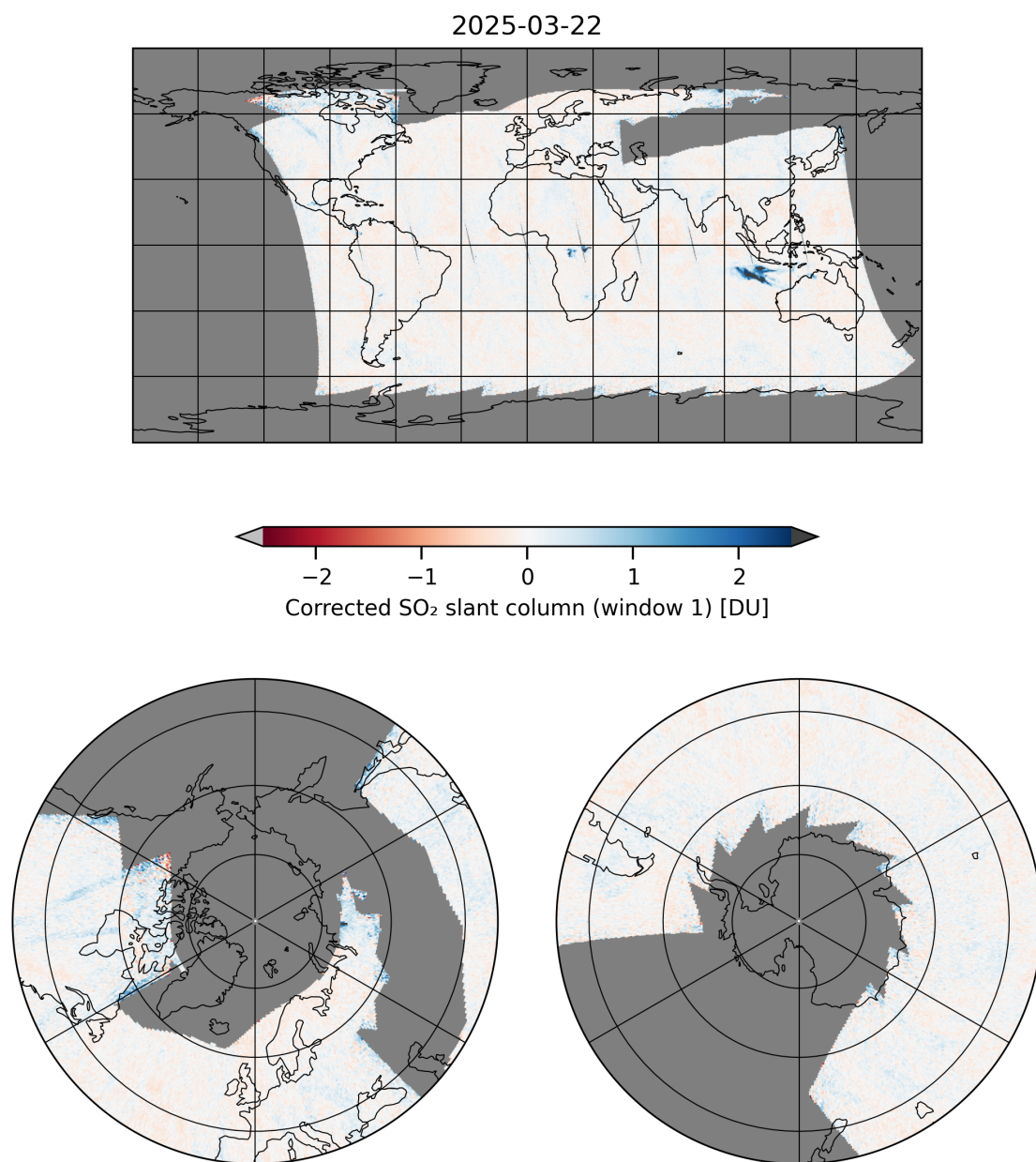


Figure 11: Map of "Corrected SO₂ slant column (window 1)" for 2025-03-22 to 2025-03-22

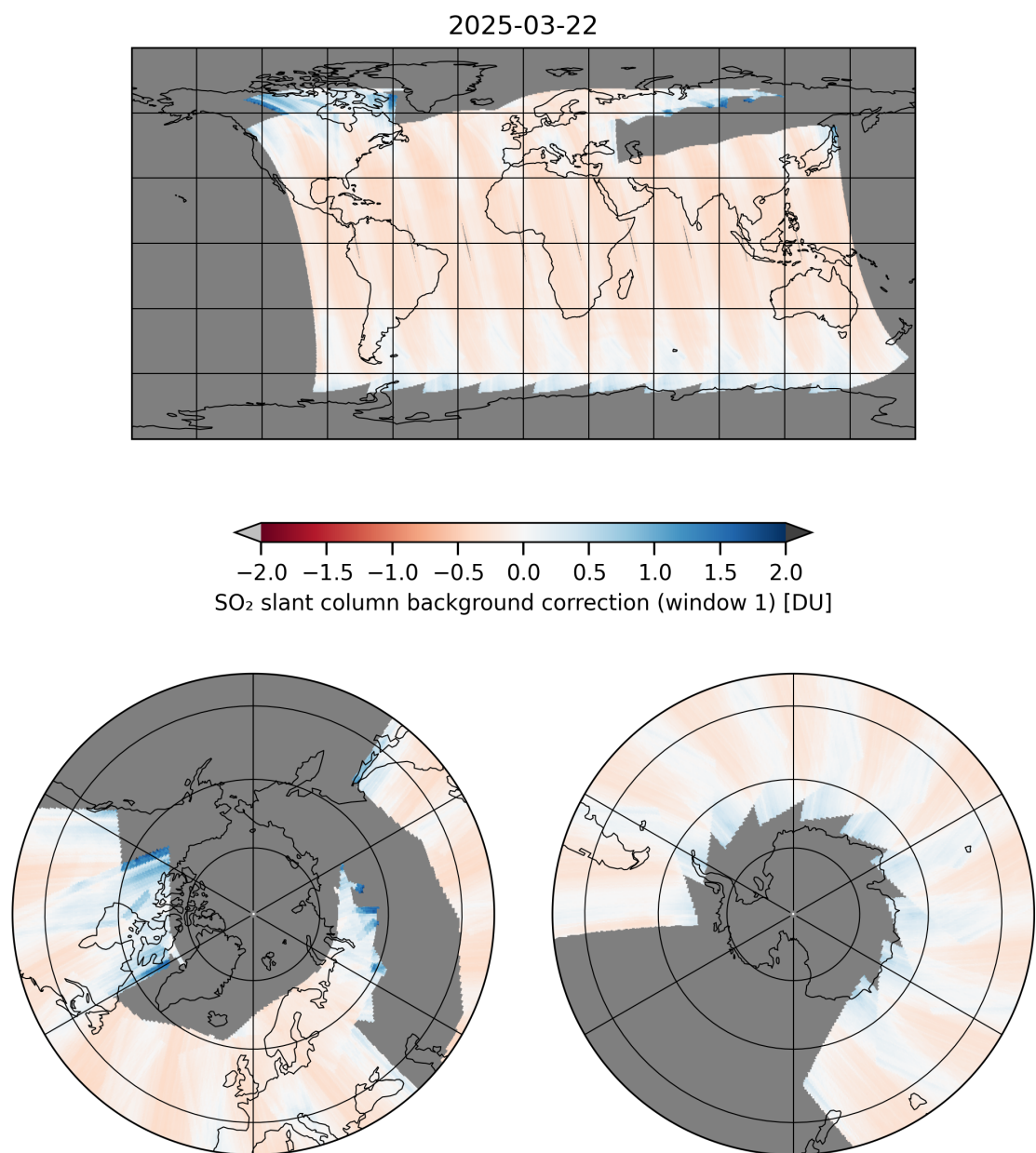


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-03-22 to 2025-03-22

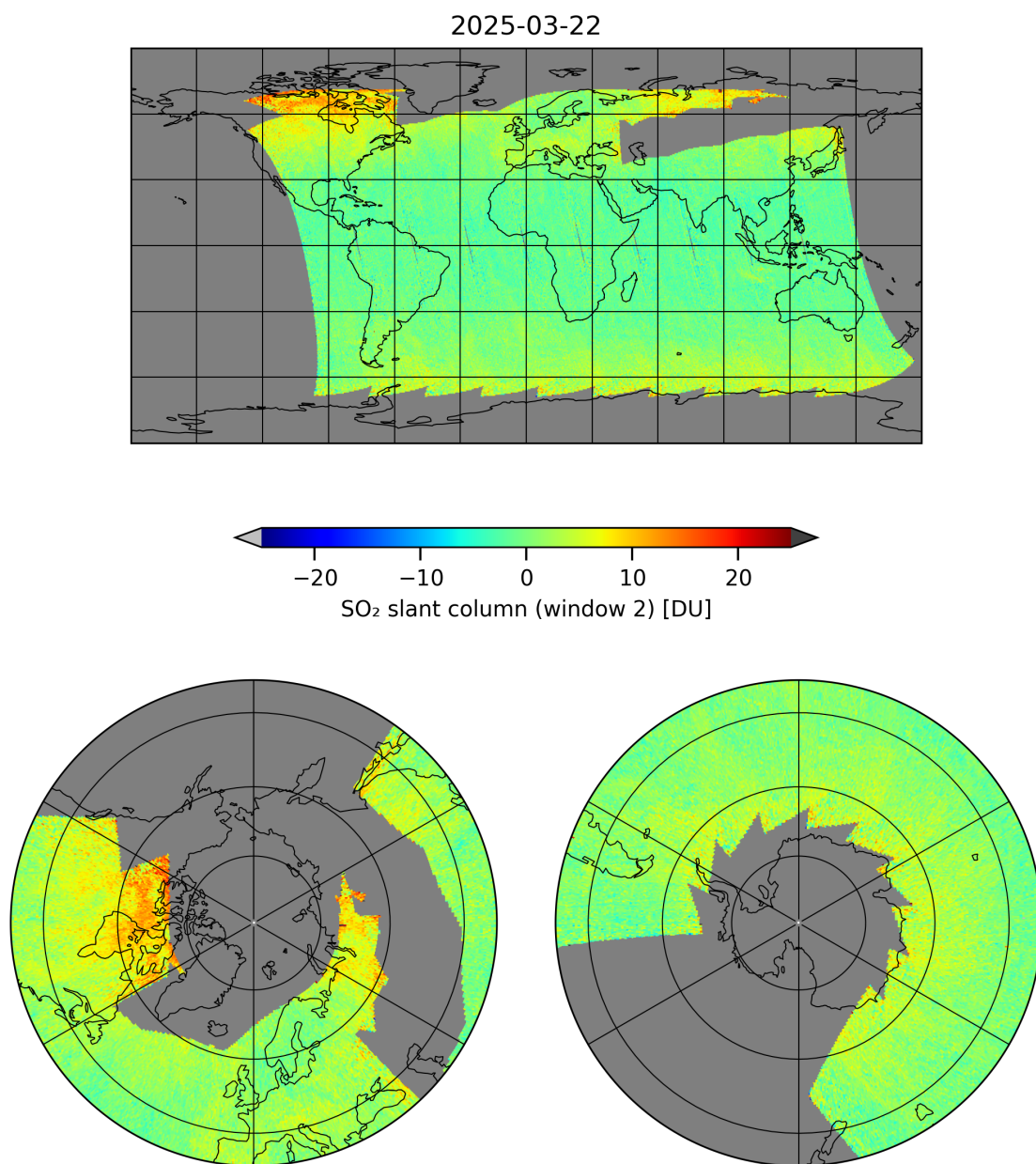


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-03-22 to 2025-03-22

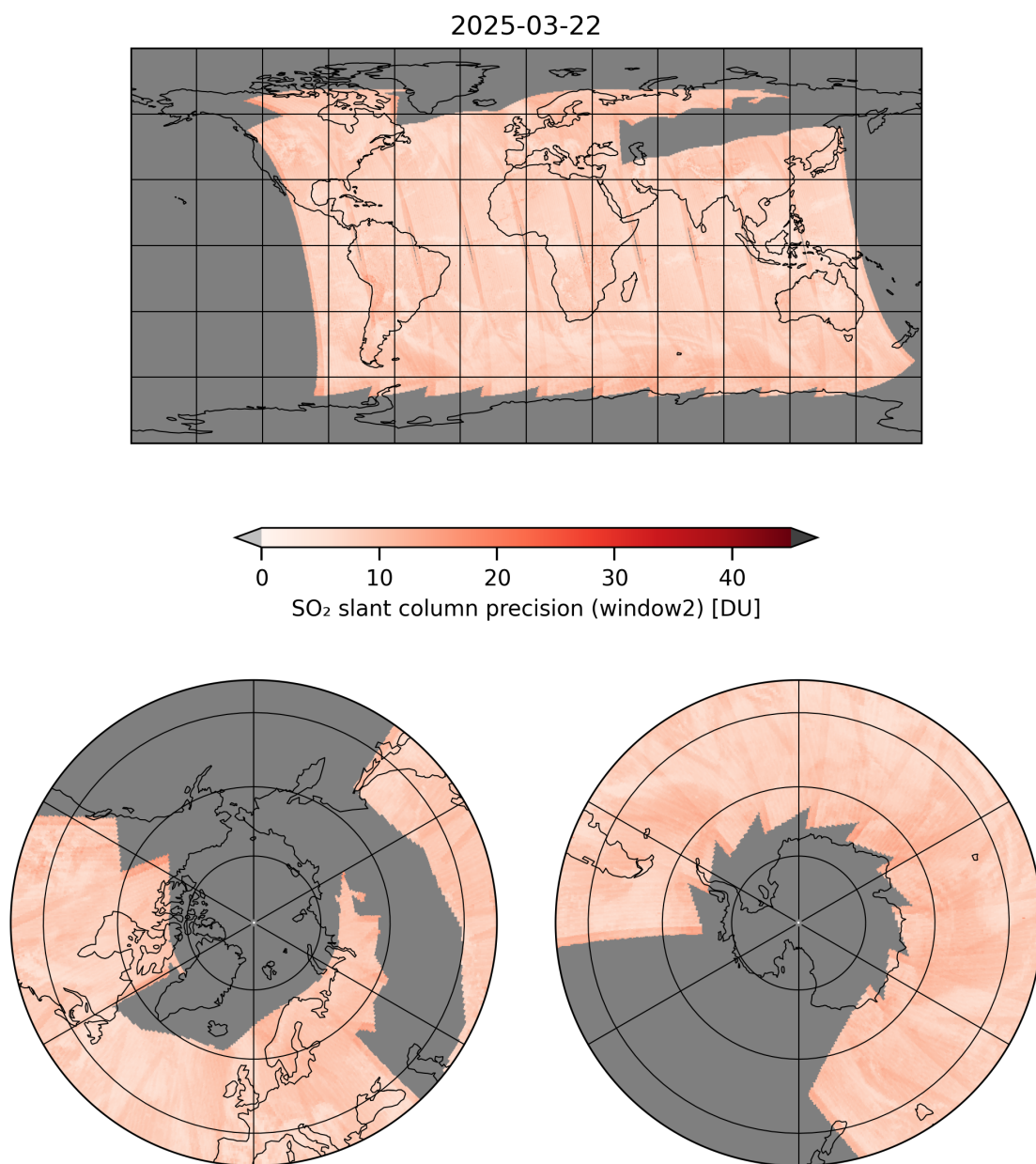


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-03-22 to 2025-03-22

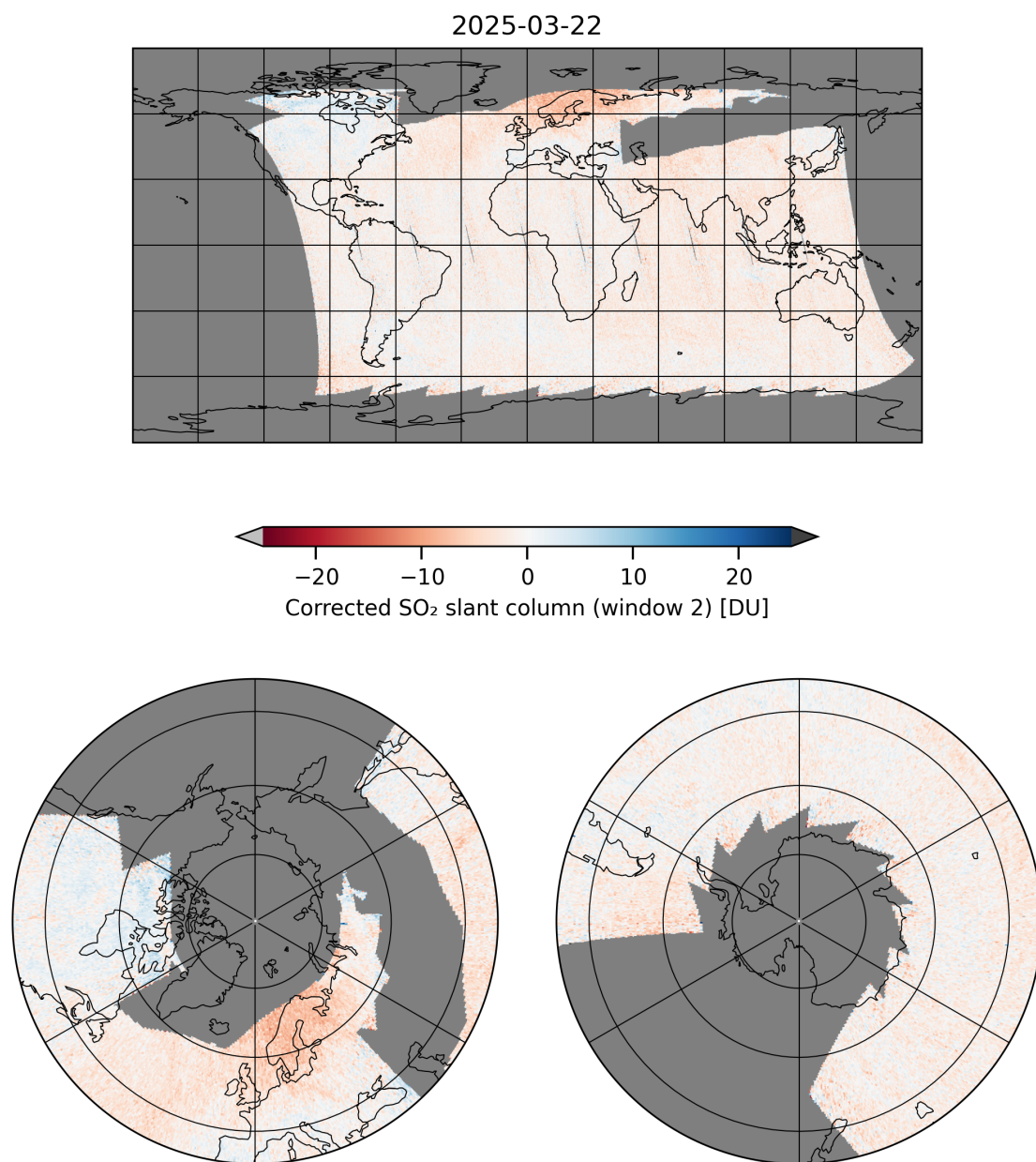


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-03-22 to 2025-03-22

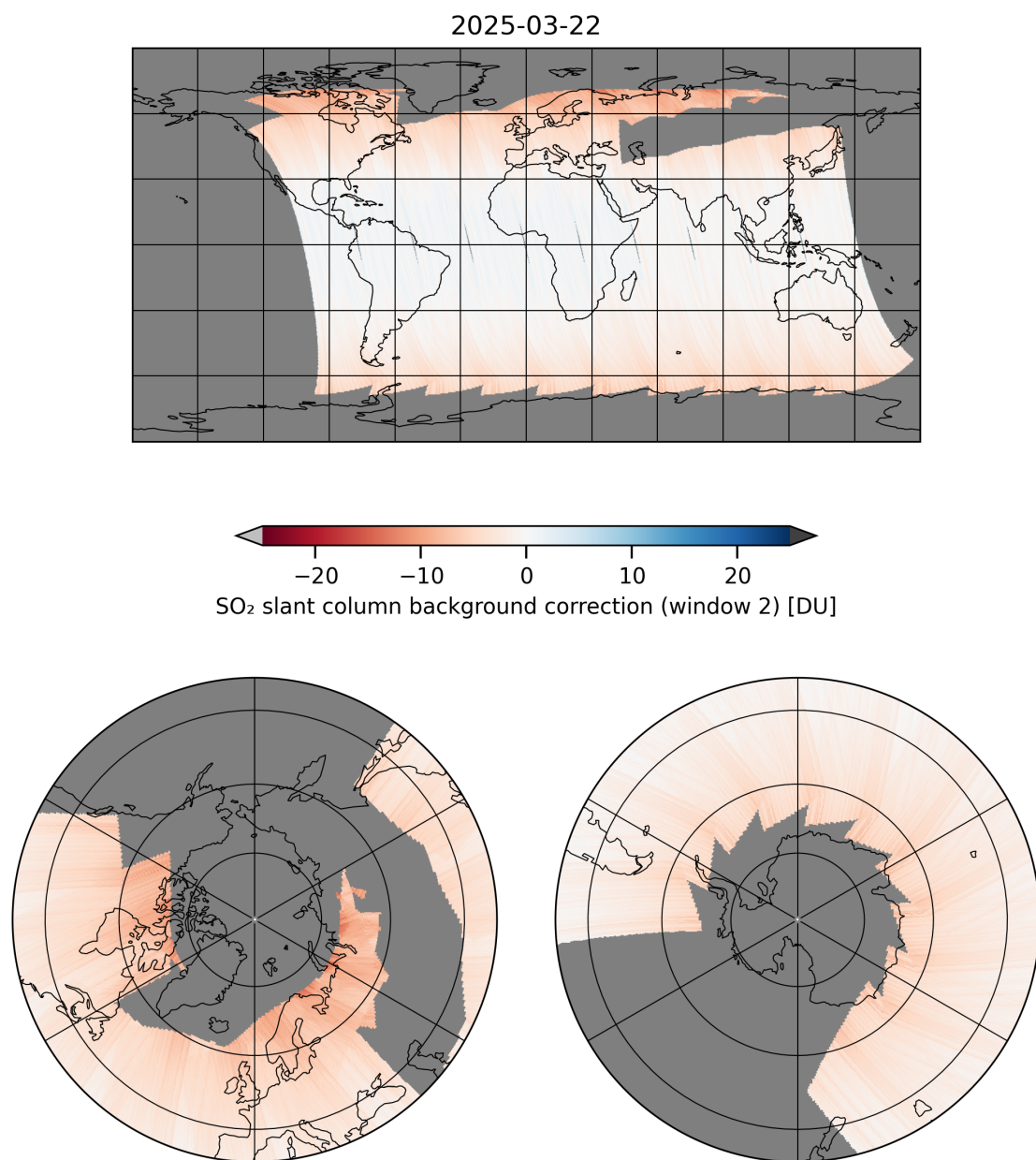


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-03-22 to 2025-03-22

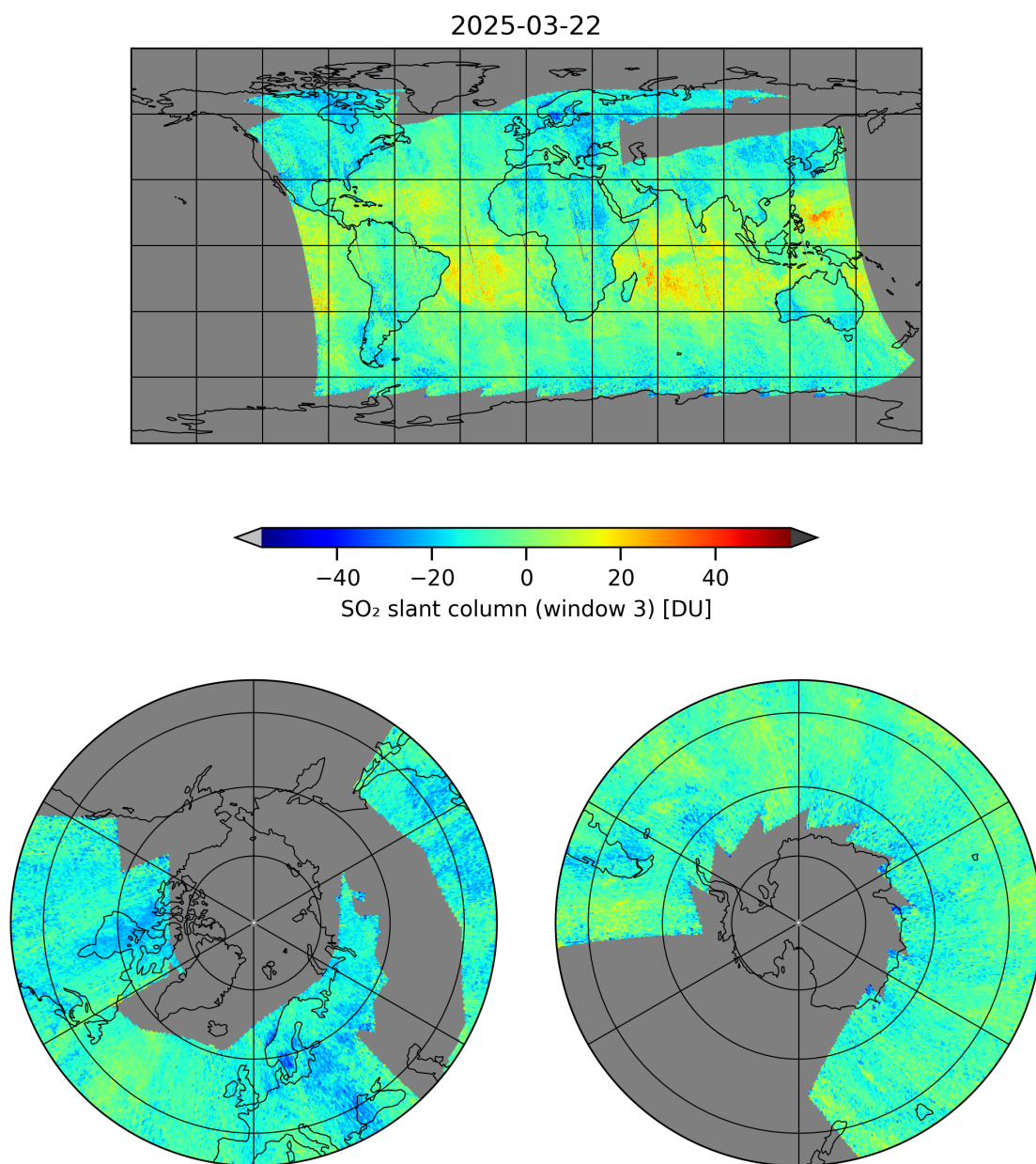


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-03-22 to 2025-03-22

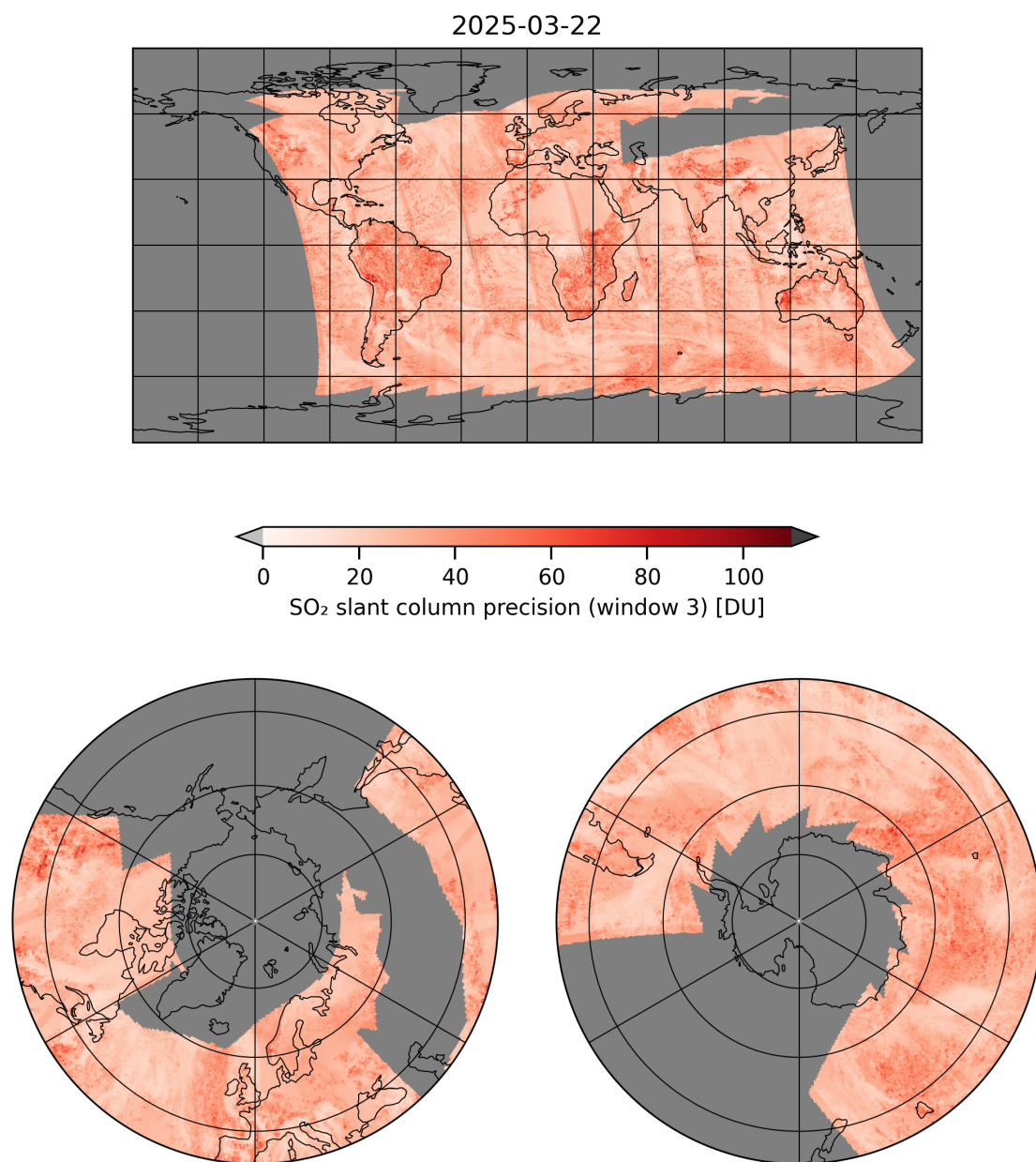


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-03-22 to 2025-03-22

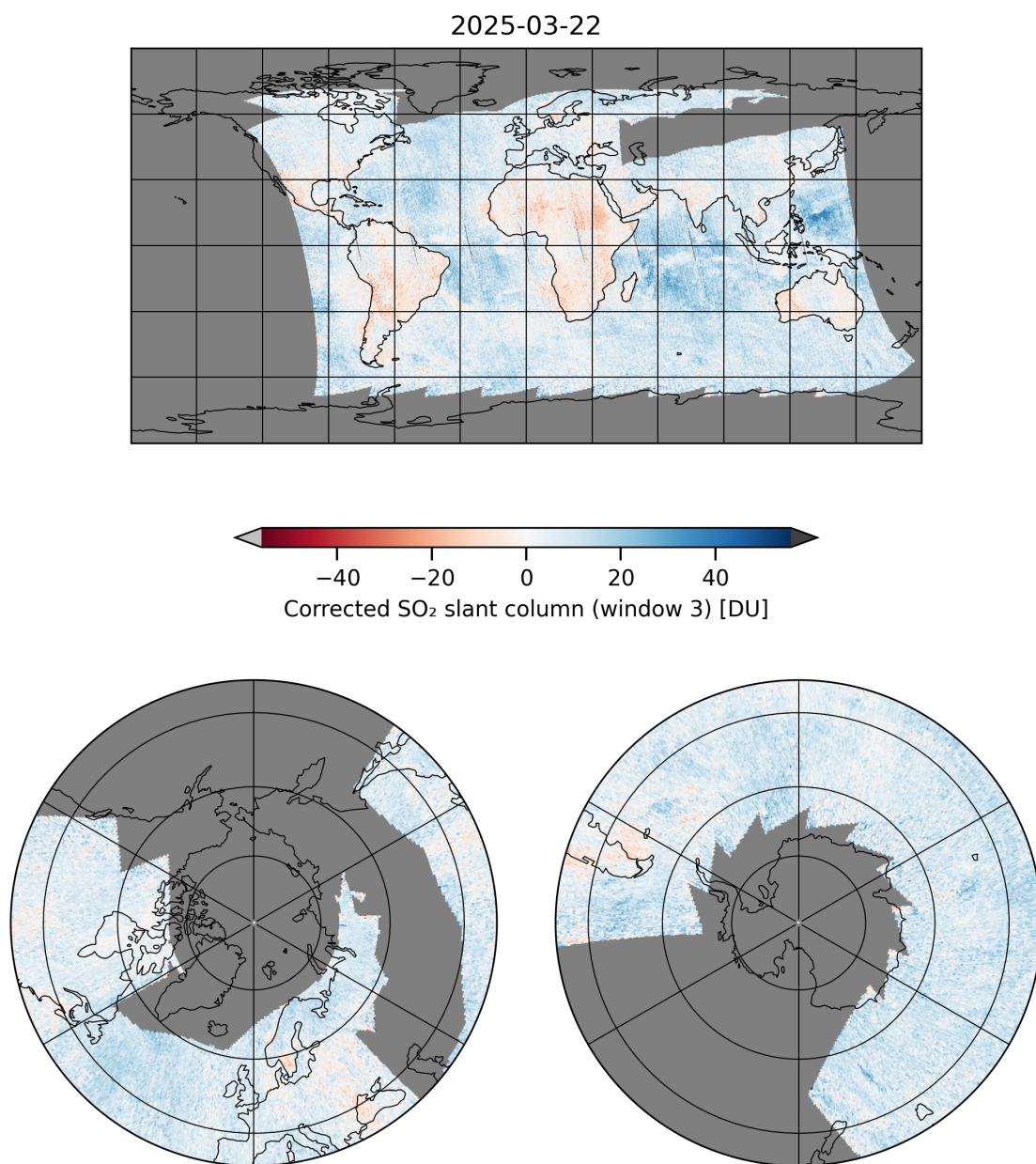


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-03-22 to 2025-03-22

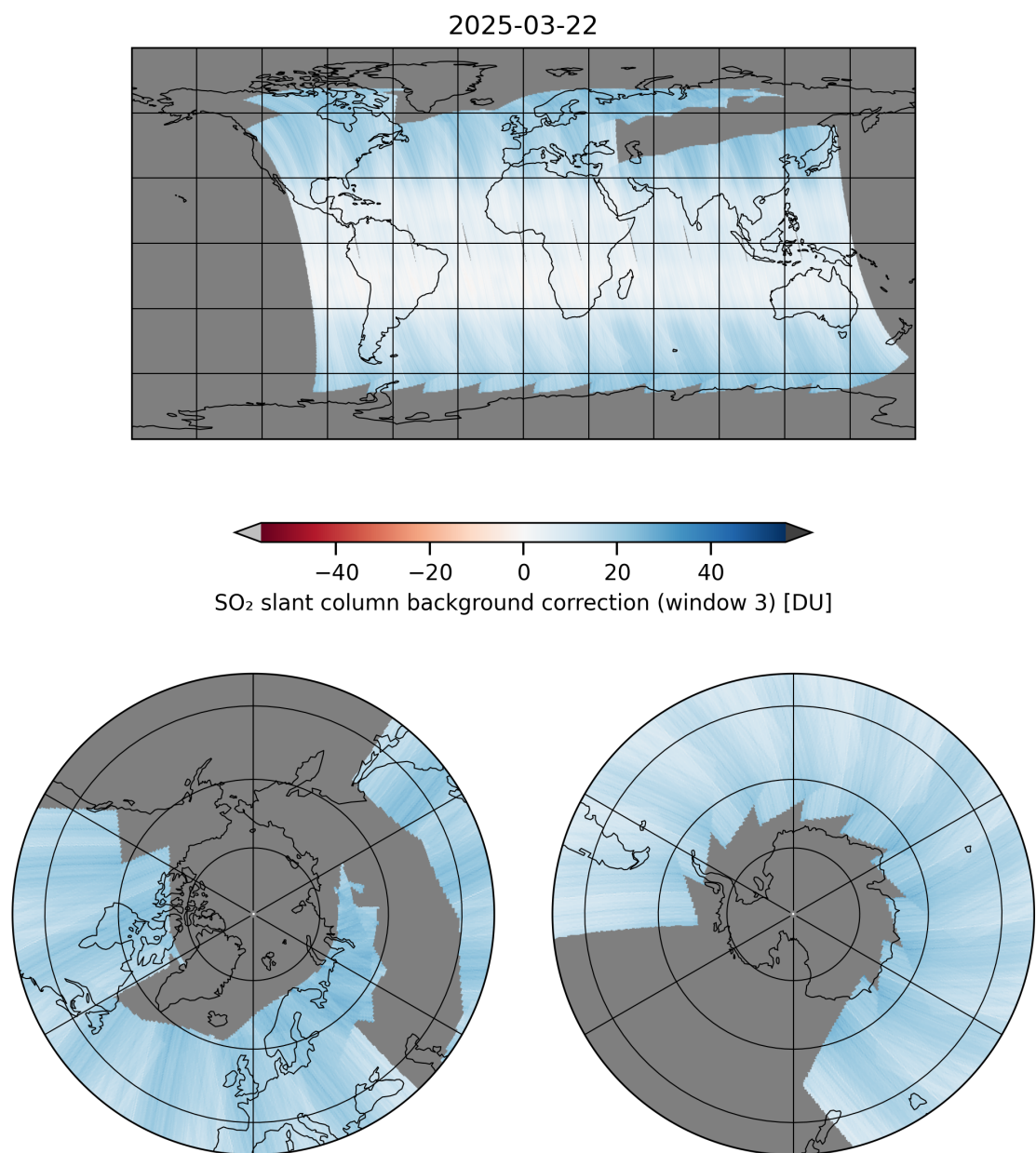


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-03-22 to 2025-03-22

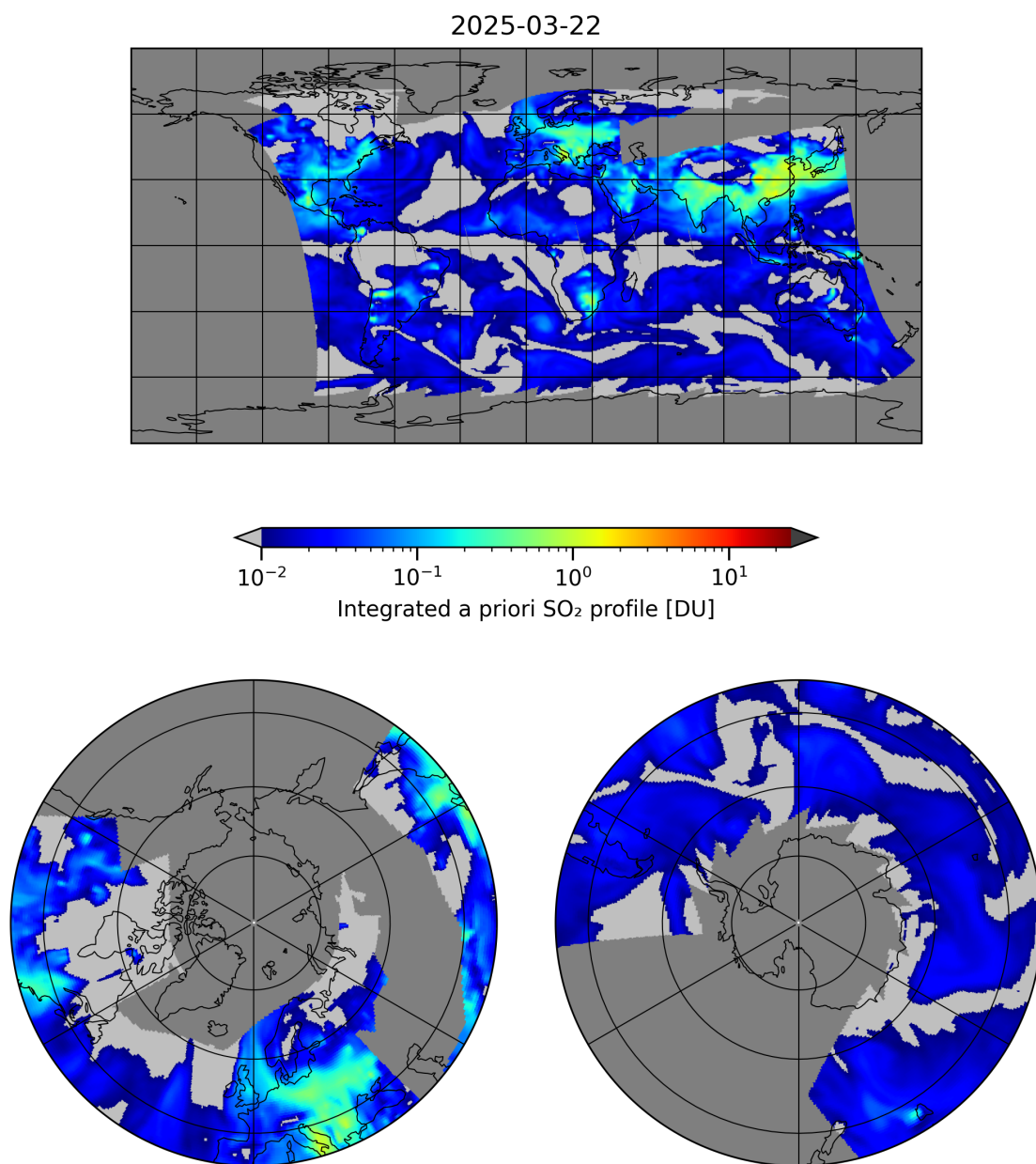


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-03-22 to 2025-03-22

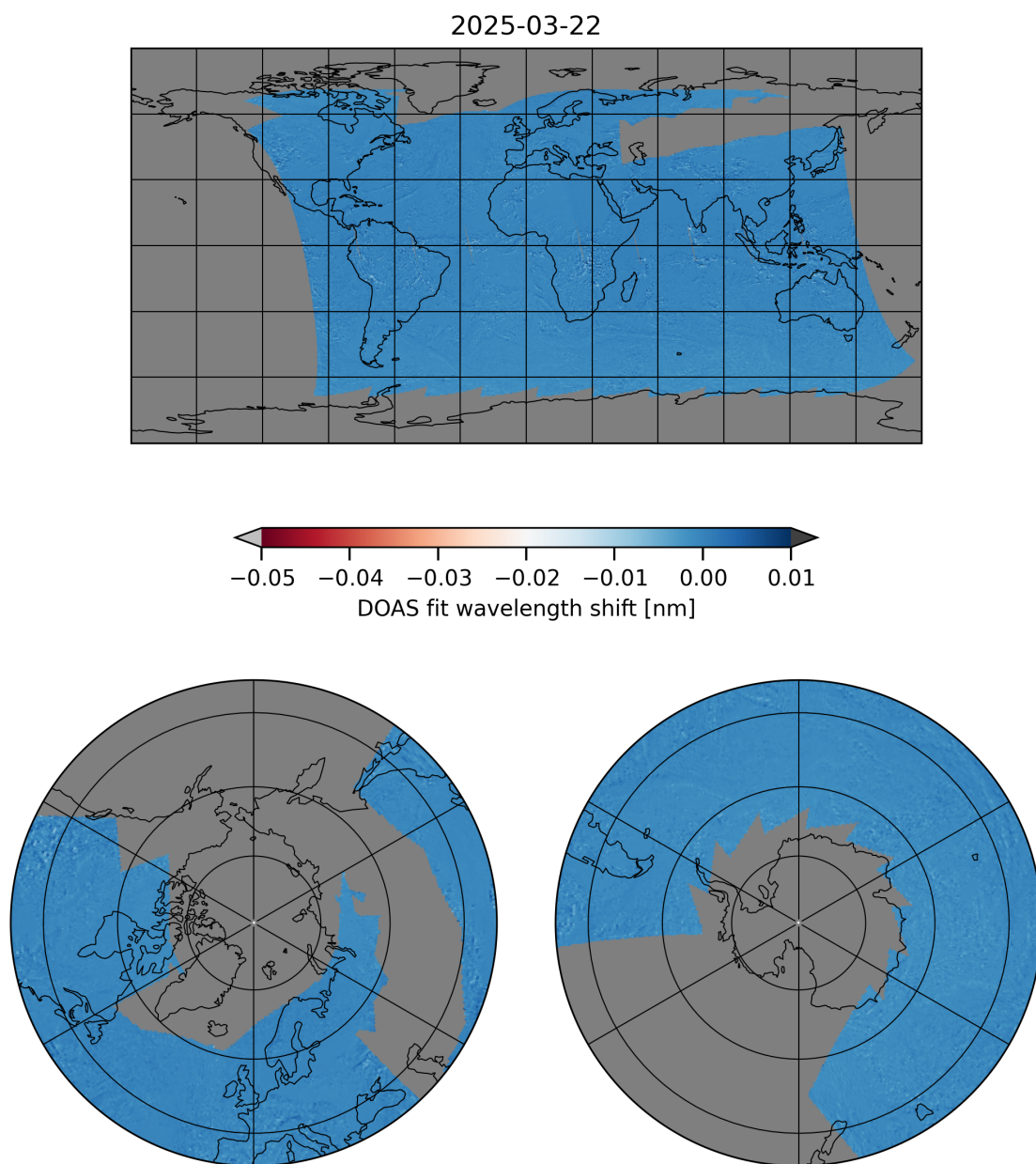


Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-22 to 2025-03-22

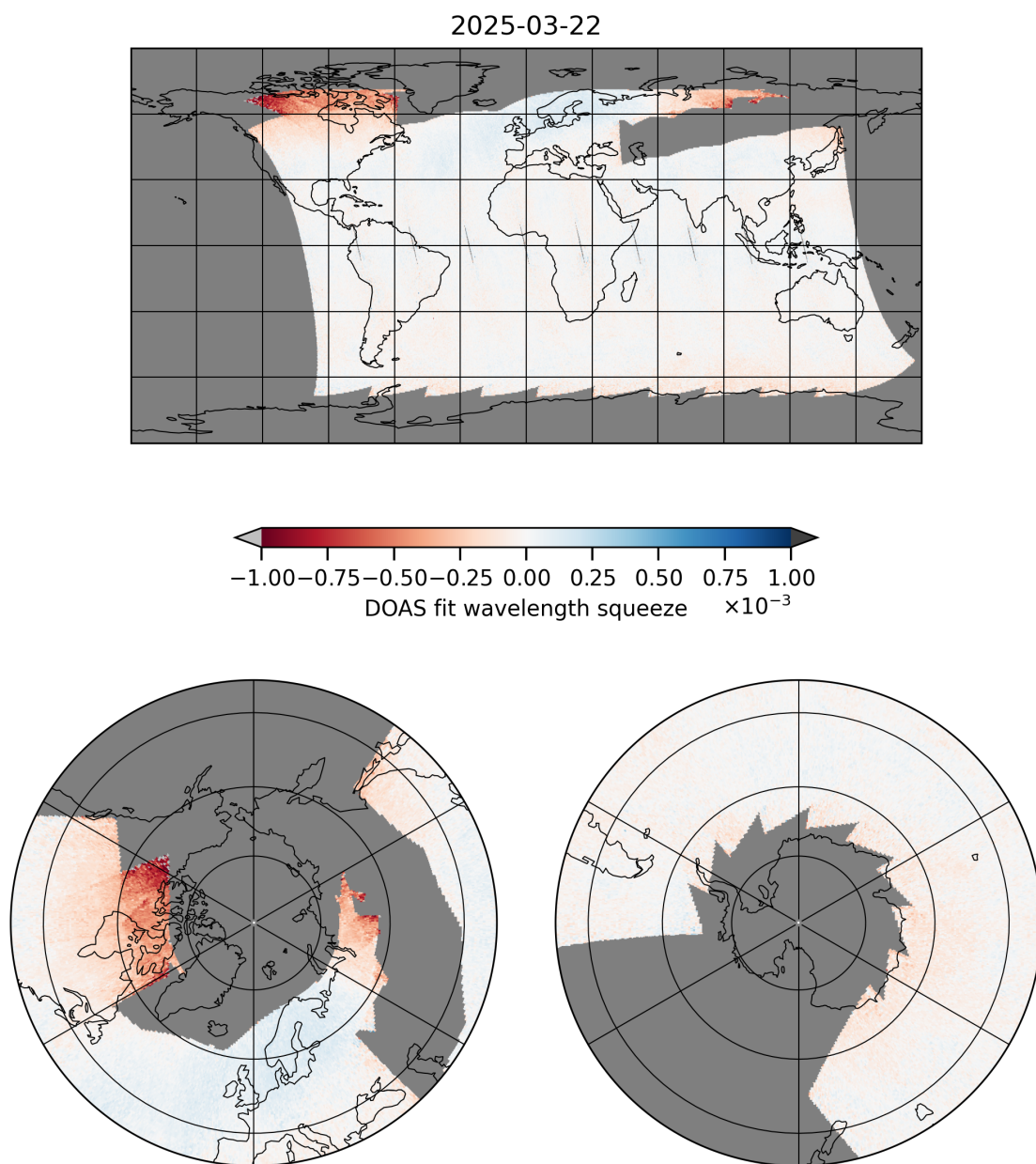


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-22 to 2025-03-22

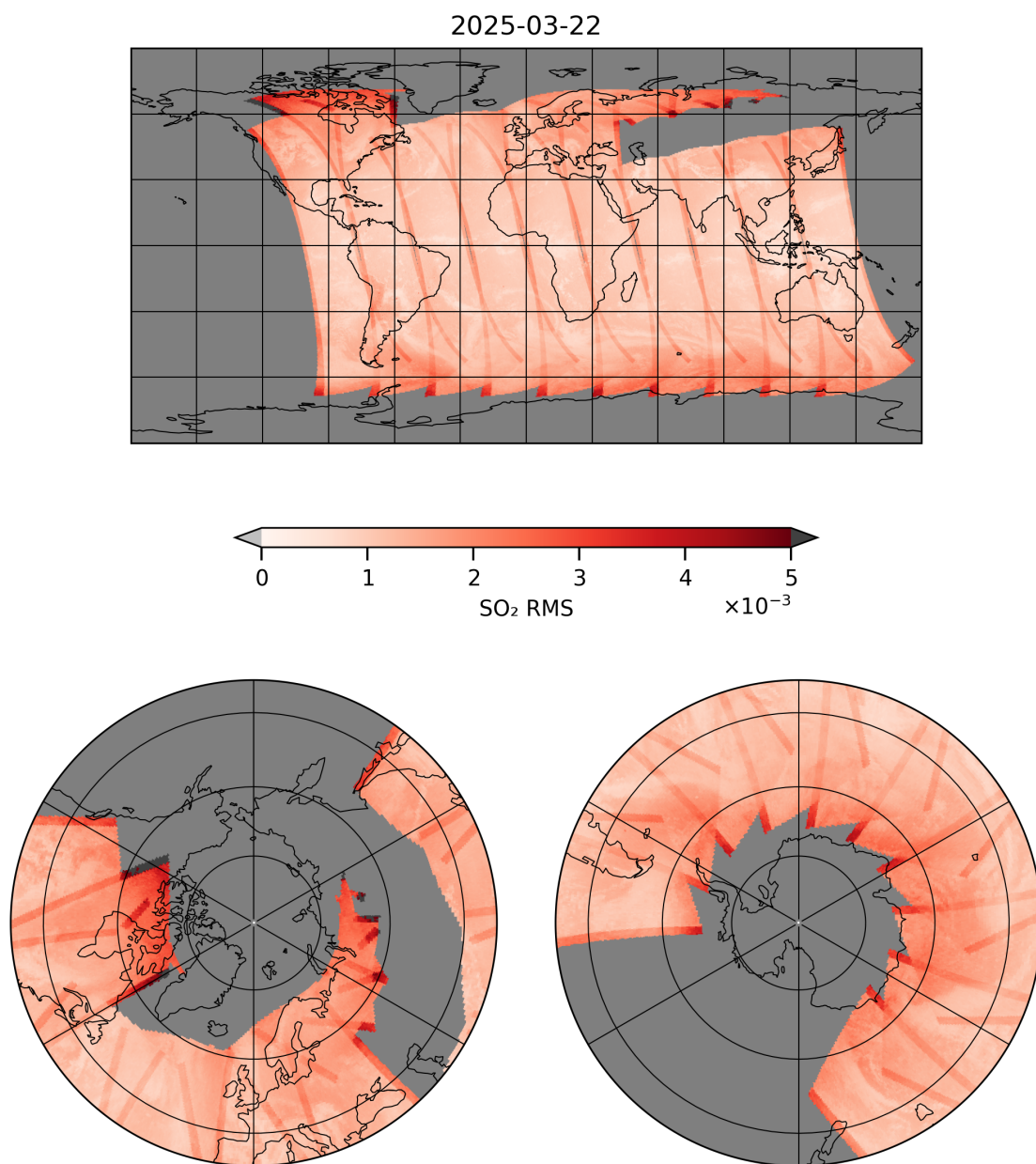


Figure 24: Map of “SO₂ RMS” for 2025-03-22 to 2025-03-22

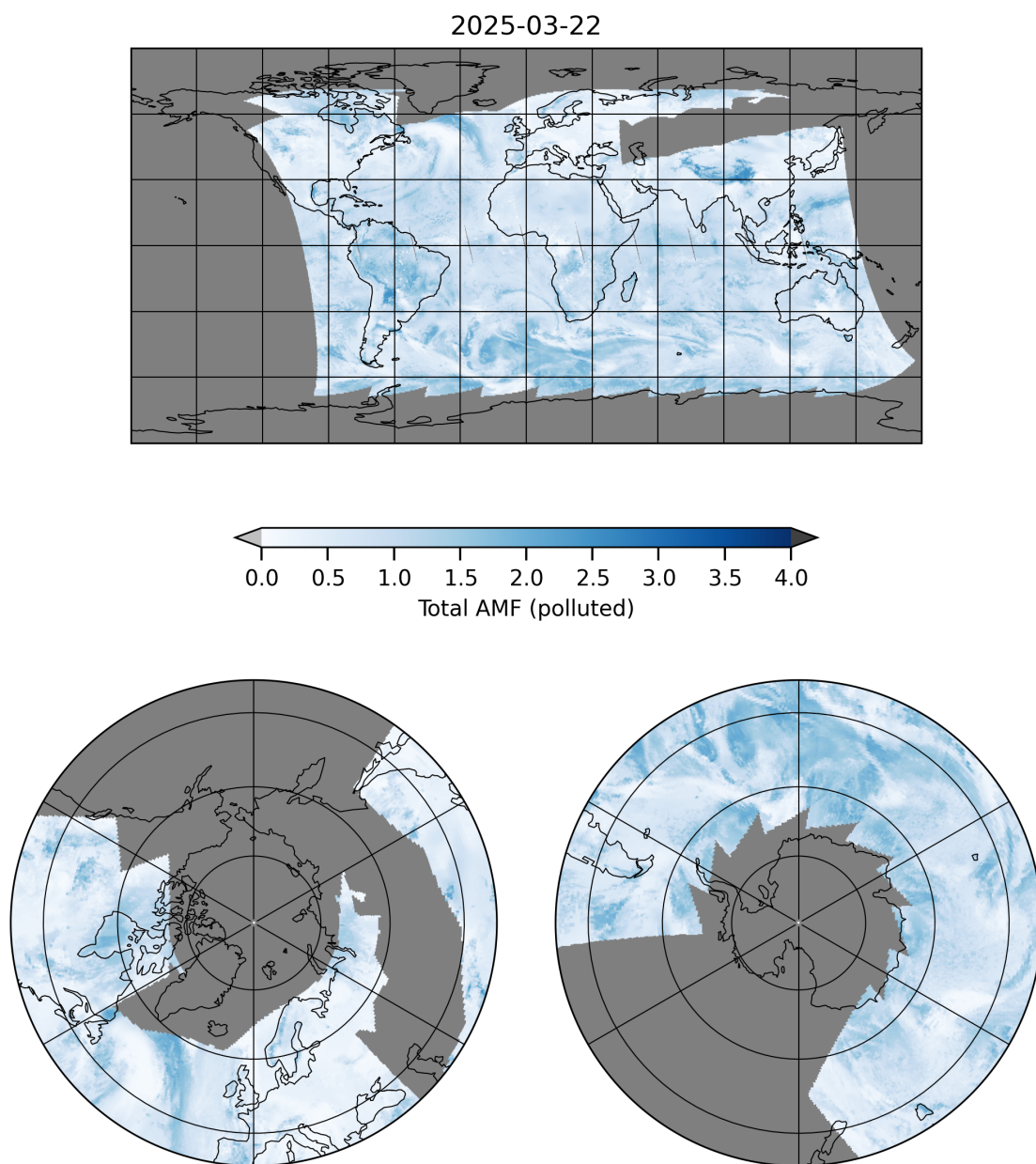


Figure 25: Map of “Total AMF (polluted)” for 2025-03-22 to 2025-03-22

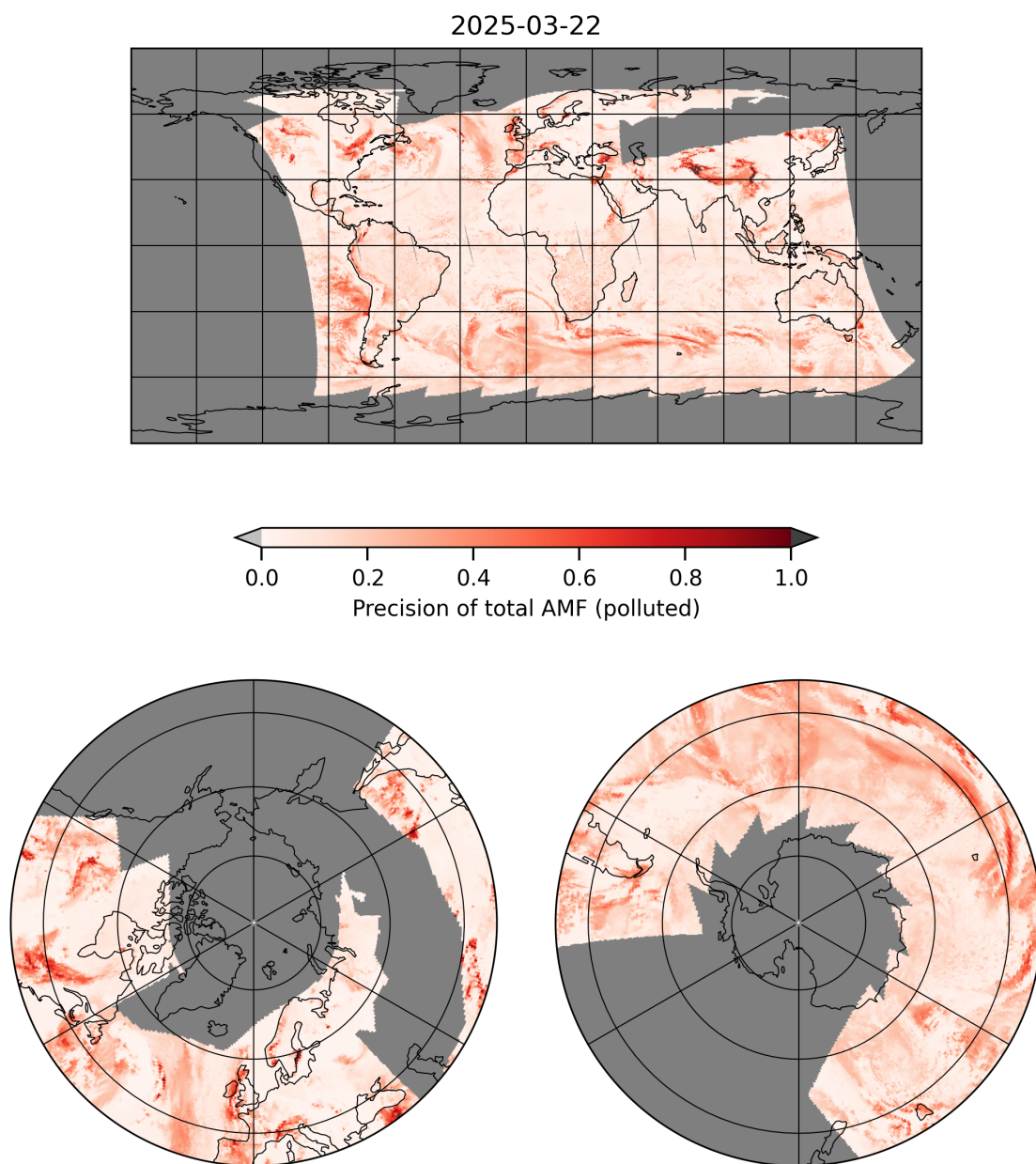


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-22 to 2025-03-22

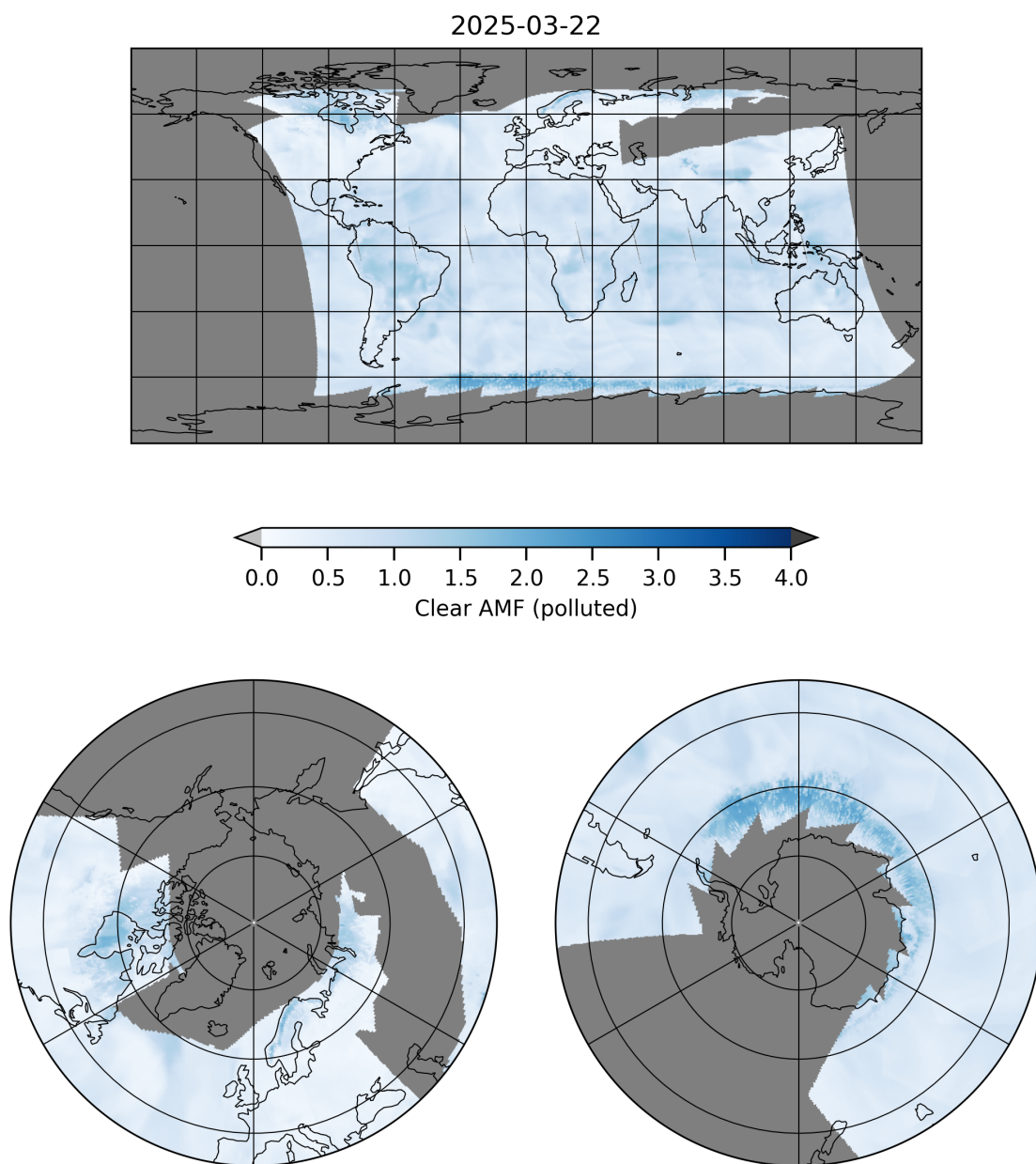


Figure 27: Map of “Clear AMF (polluted)” for 2025-03-22 to 2025-03-22

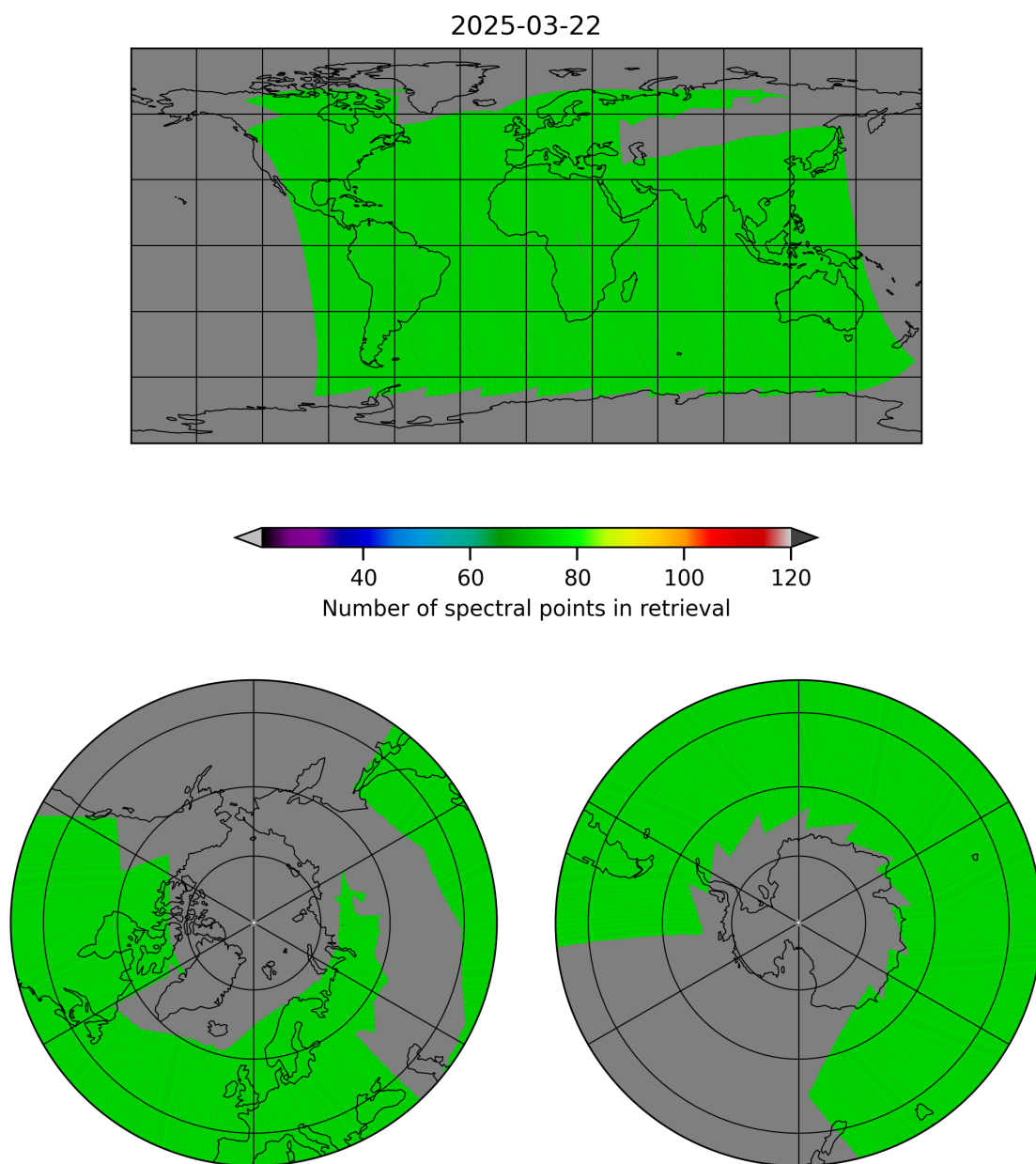


Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-22 to 2025-03-22

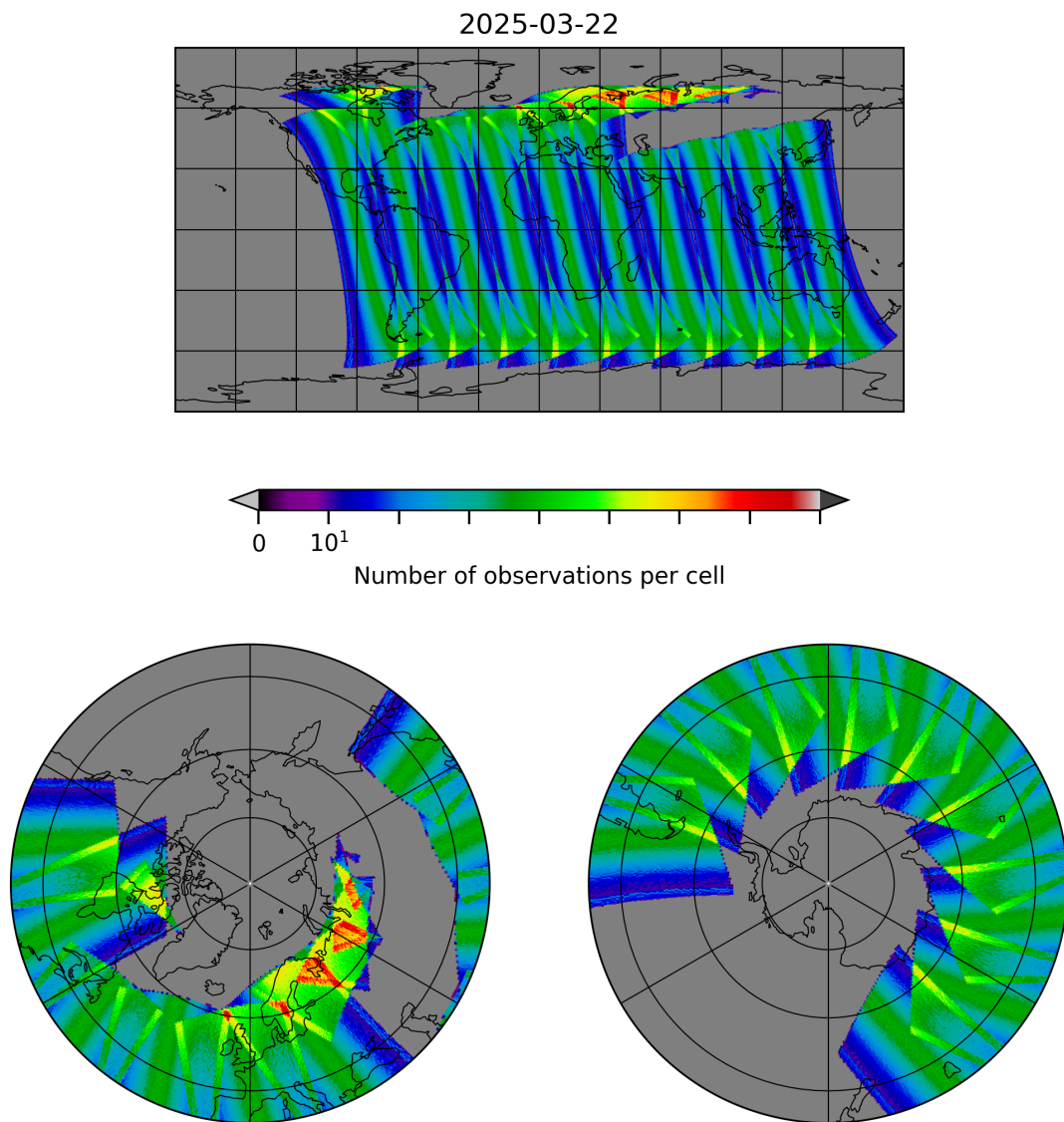


Figure 29: Map of the number of observations for 2025-03-22 to 2025-03-22

7 Zonal average

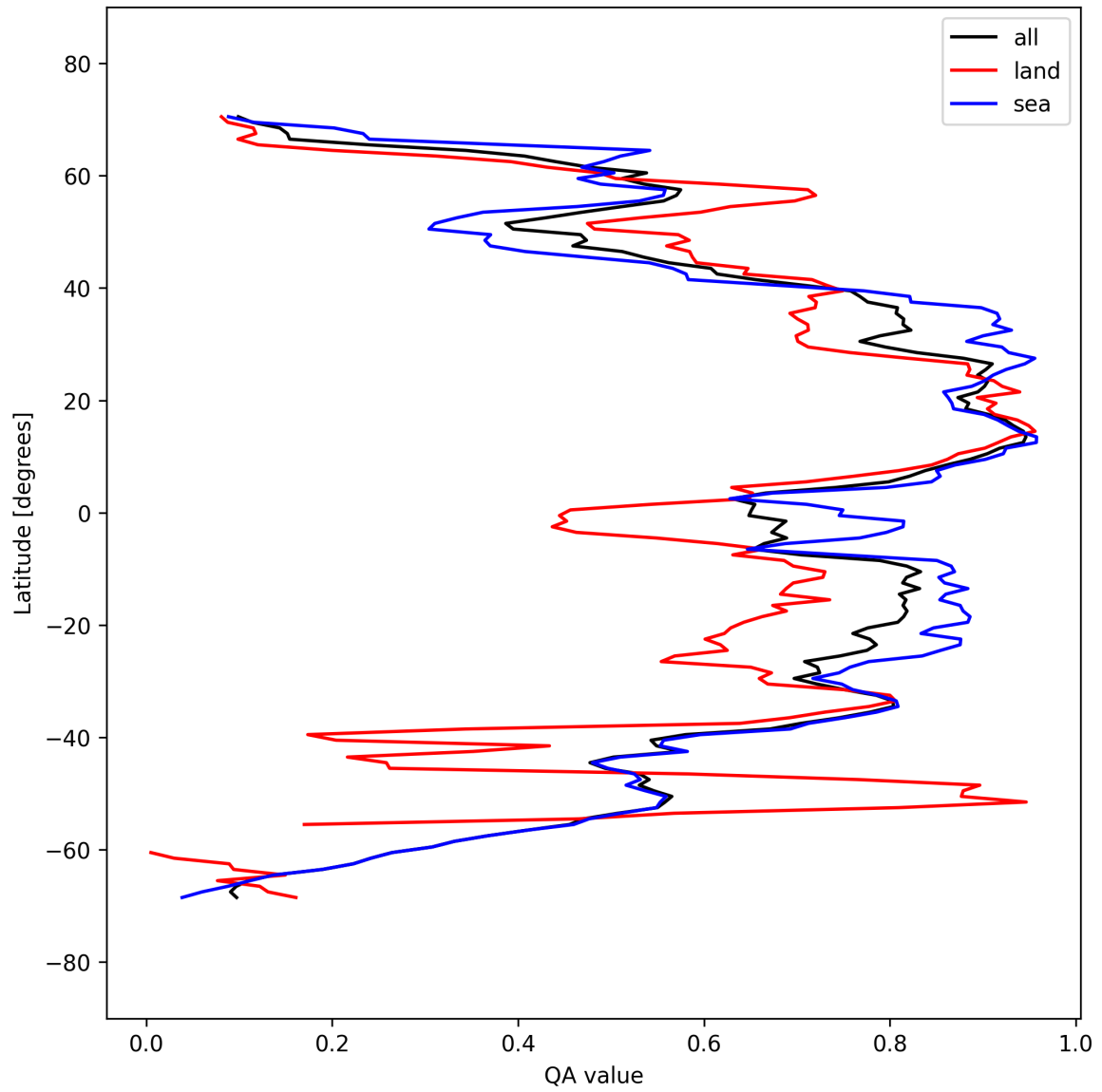


Figure 30: Zonal average of “QA value” for 2025-03-22 to 2025-03-22.

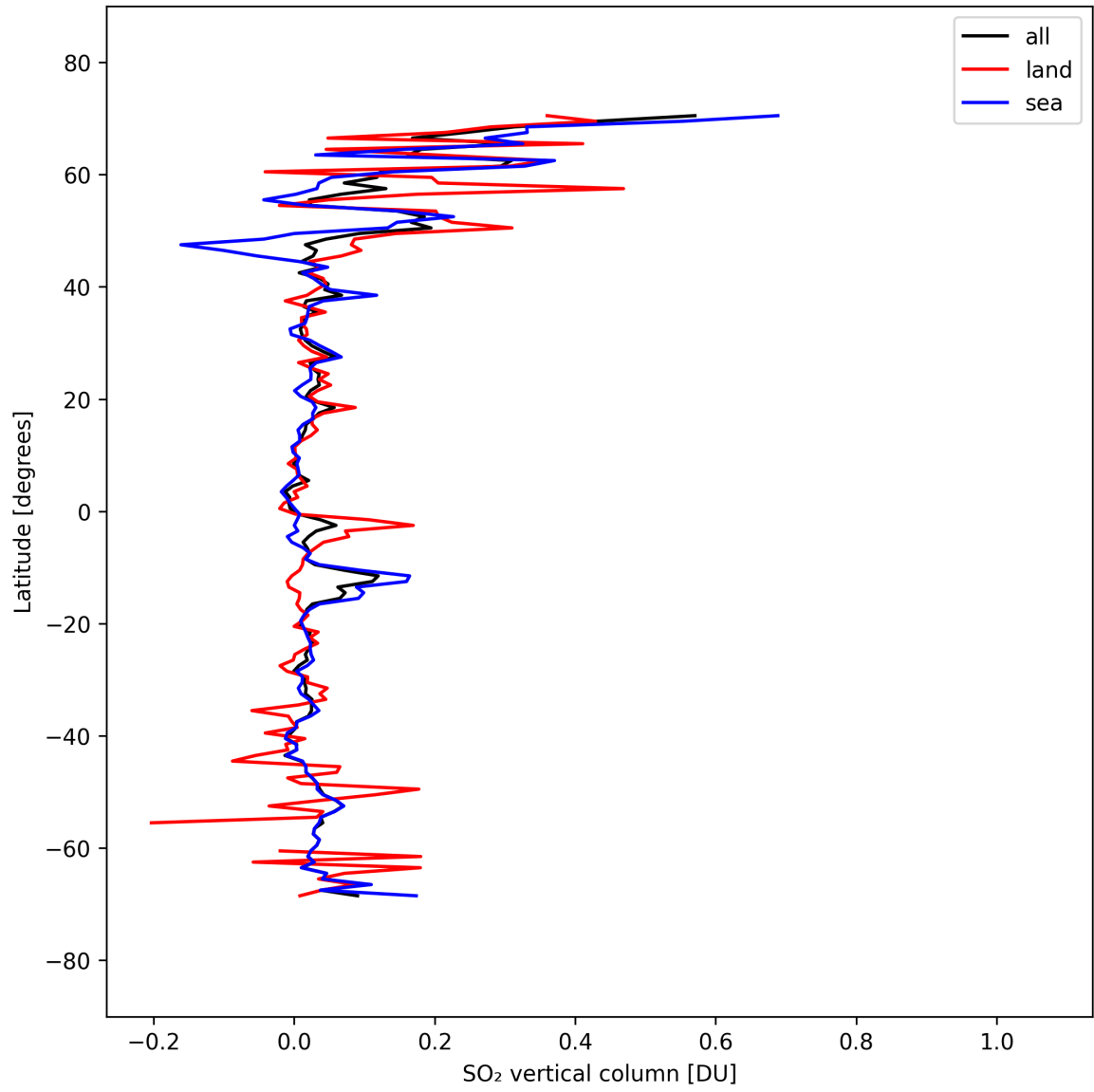


Figure 31: Zonal average of “SO₂ vertical column” for 2025-03-22 to 2025-03-22.

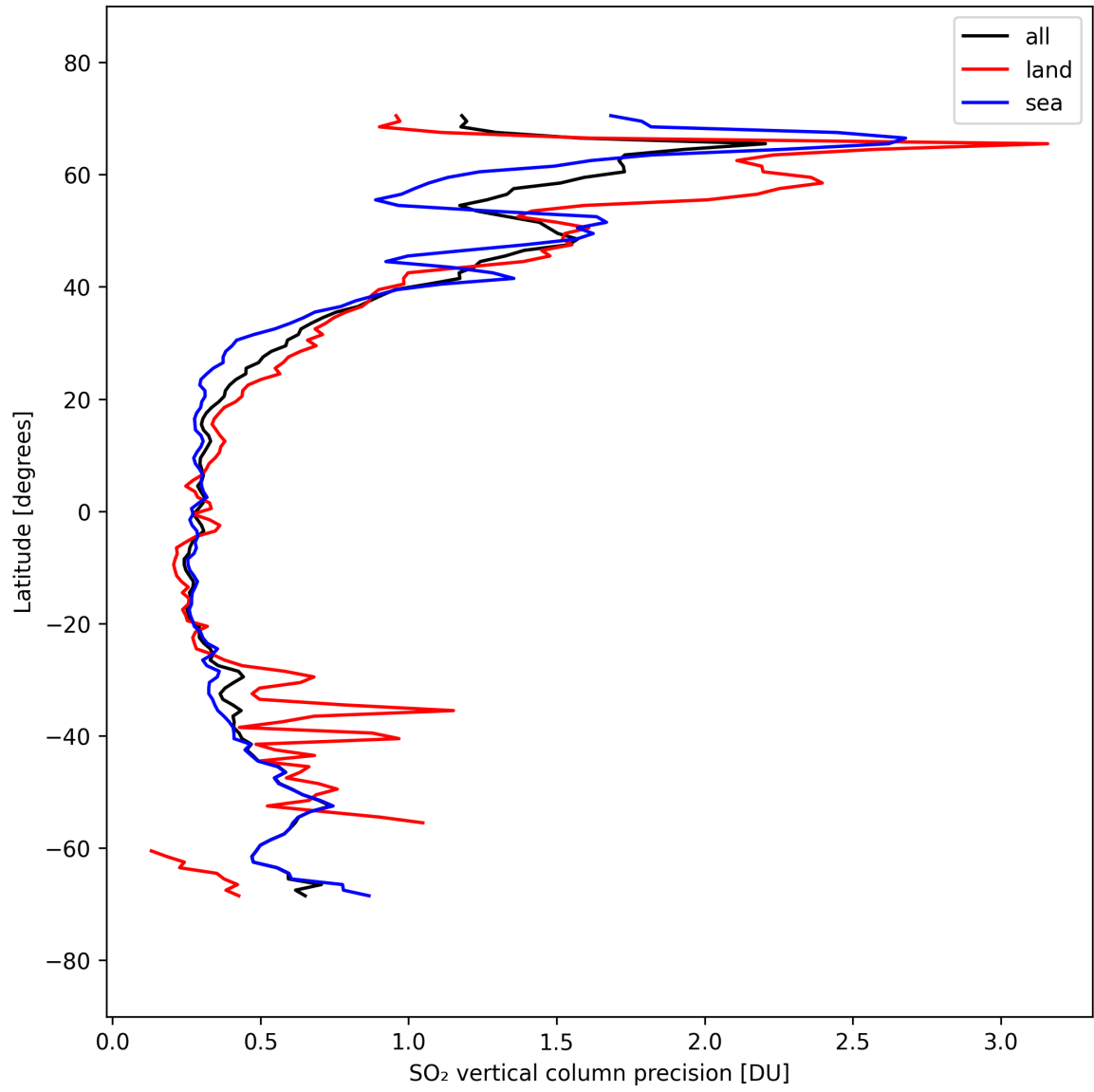


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-03-22 to 2025-03-22.

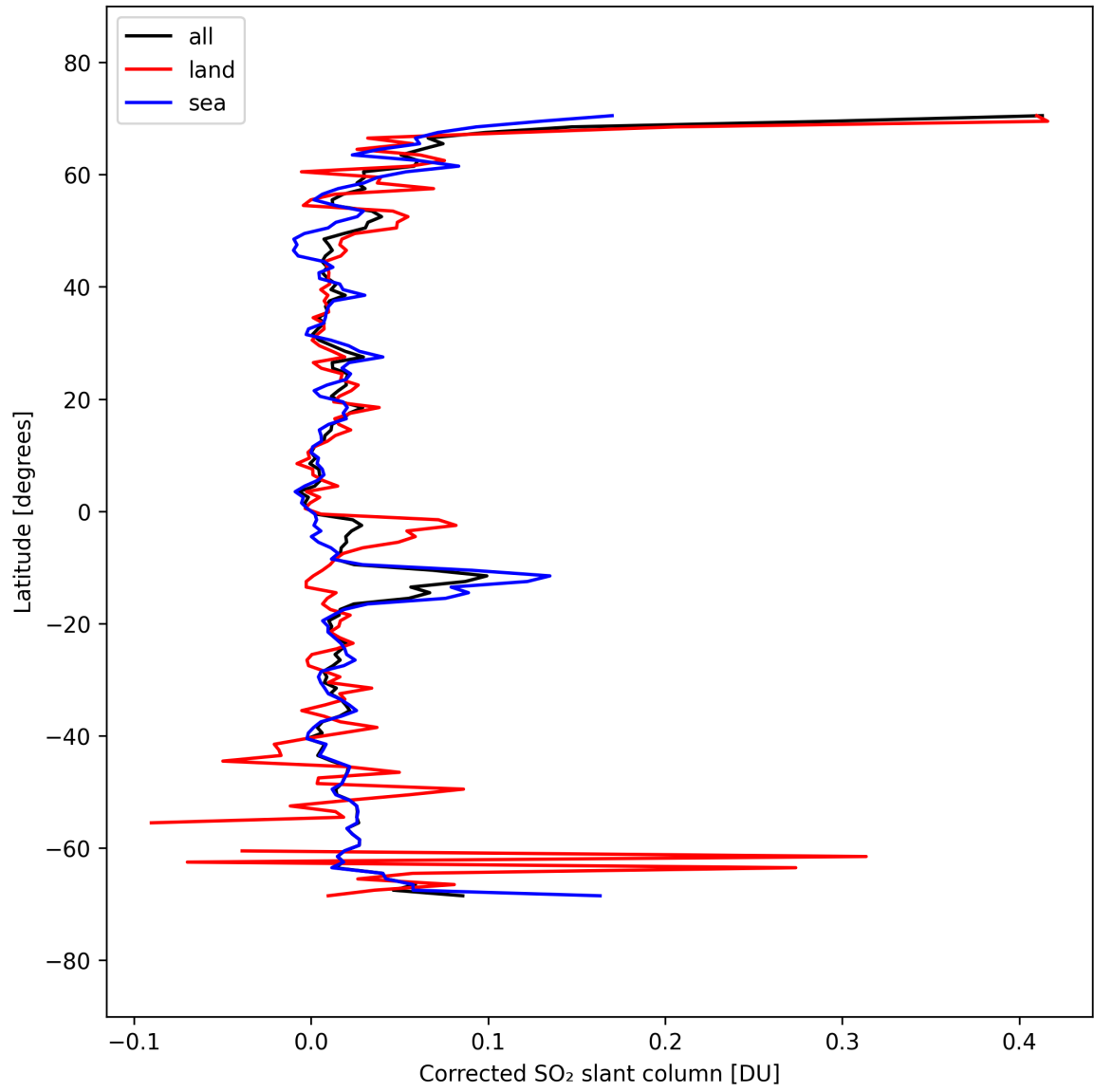


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-03-22 to 2025-03-22.

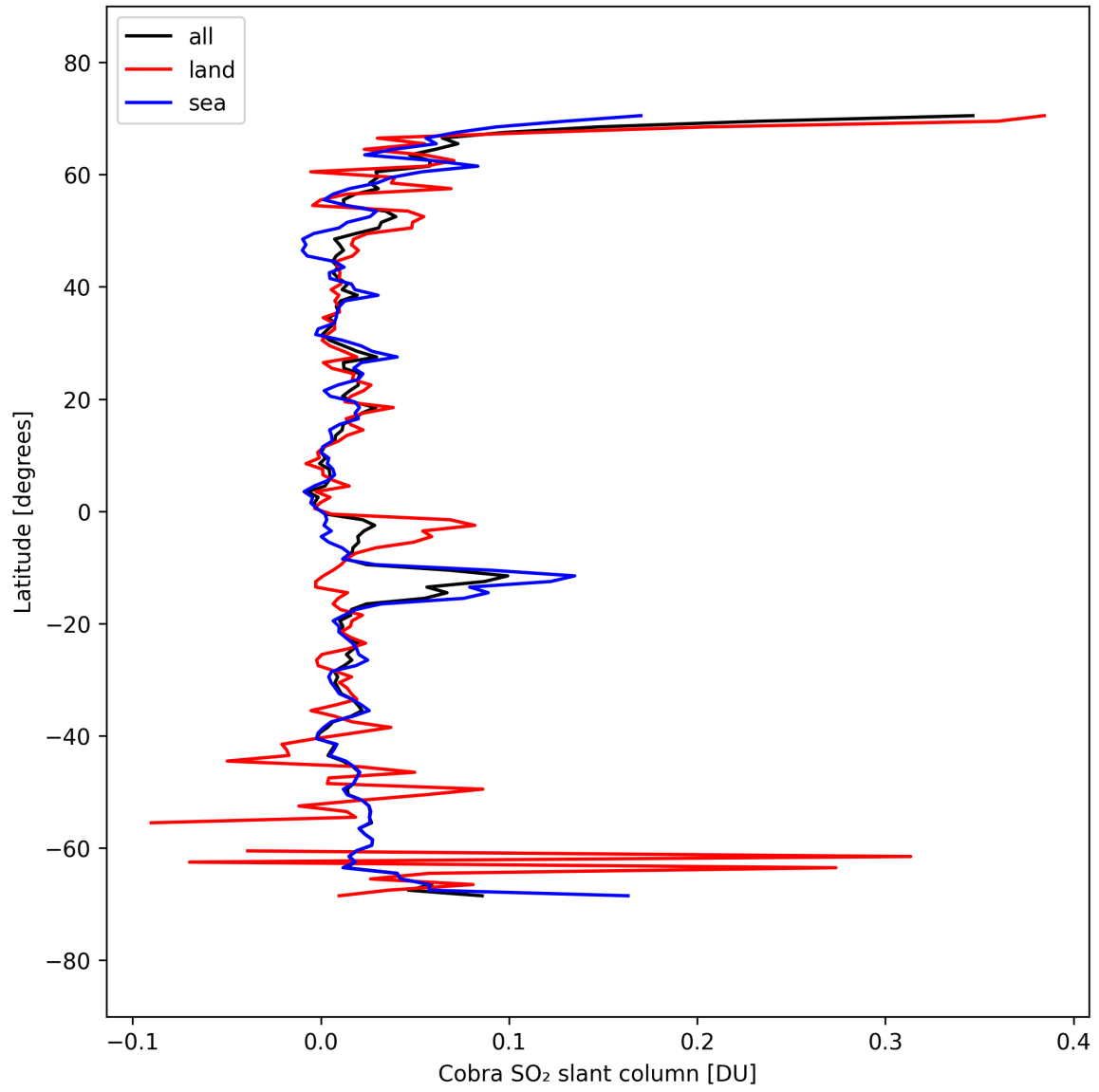


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-03-22 to 2025-03-22.

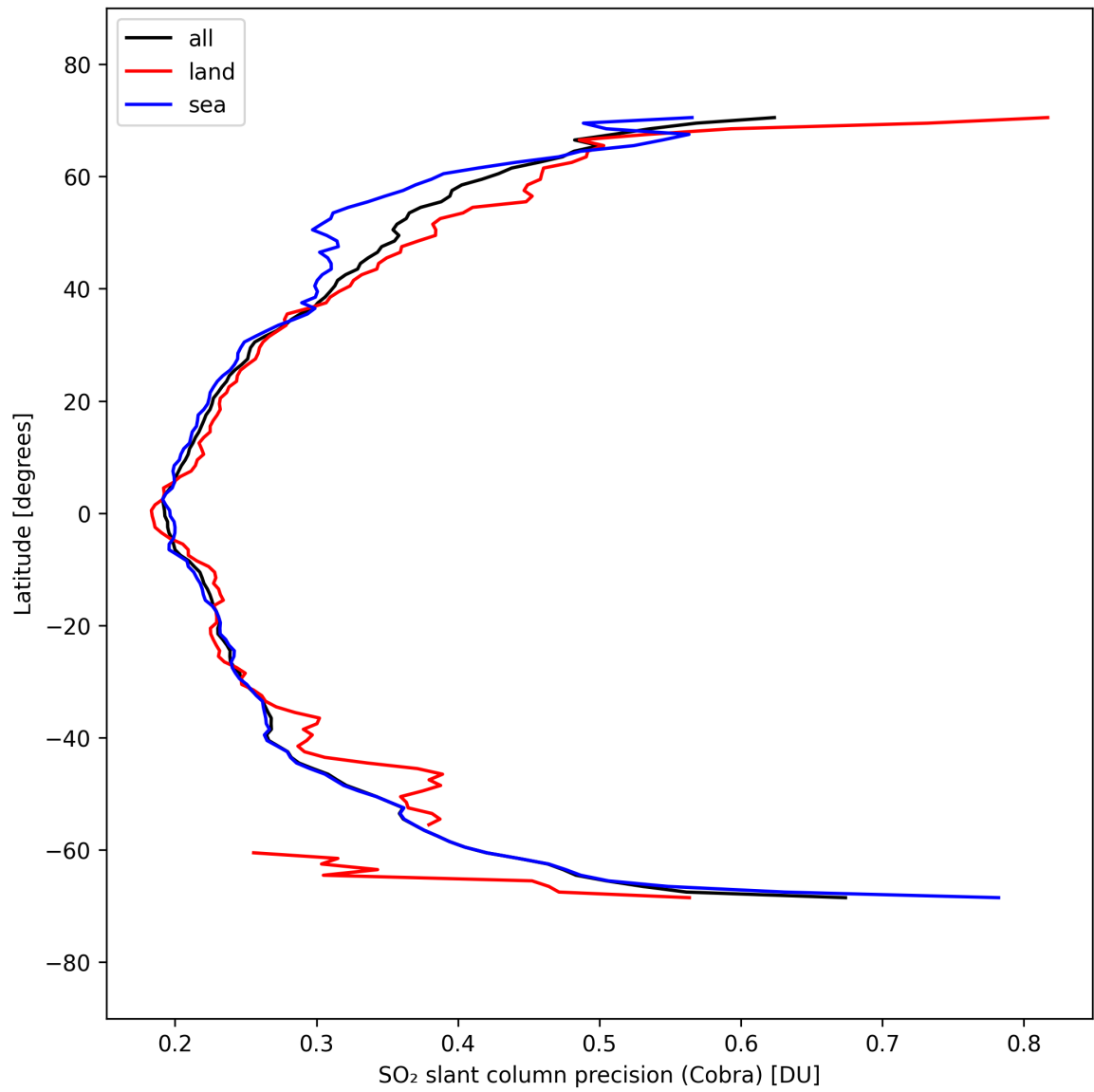


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-03-22 to 2025-03-22.

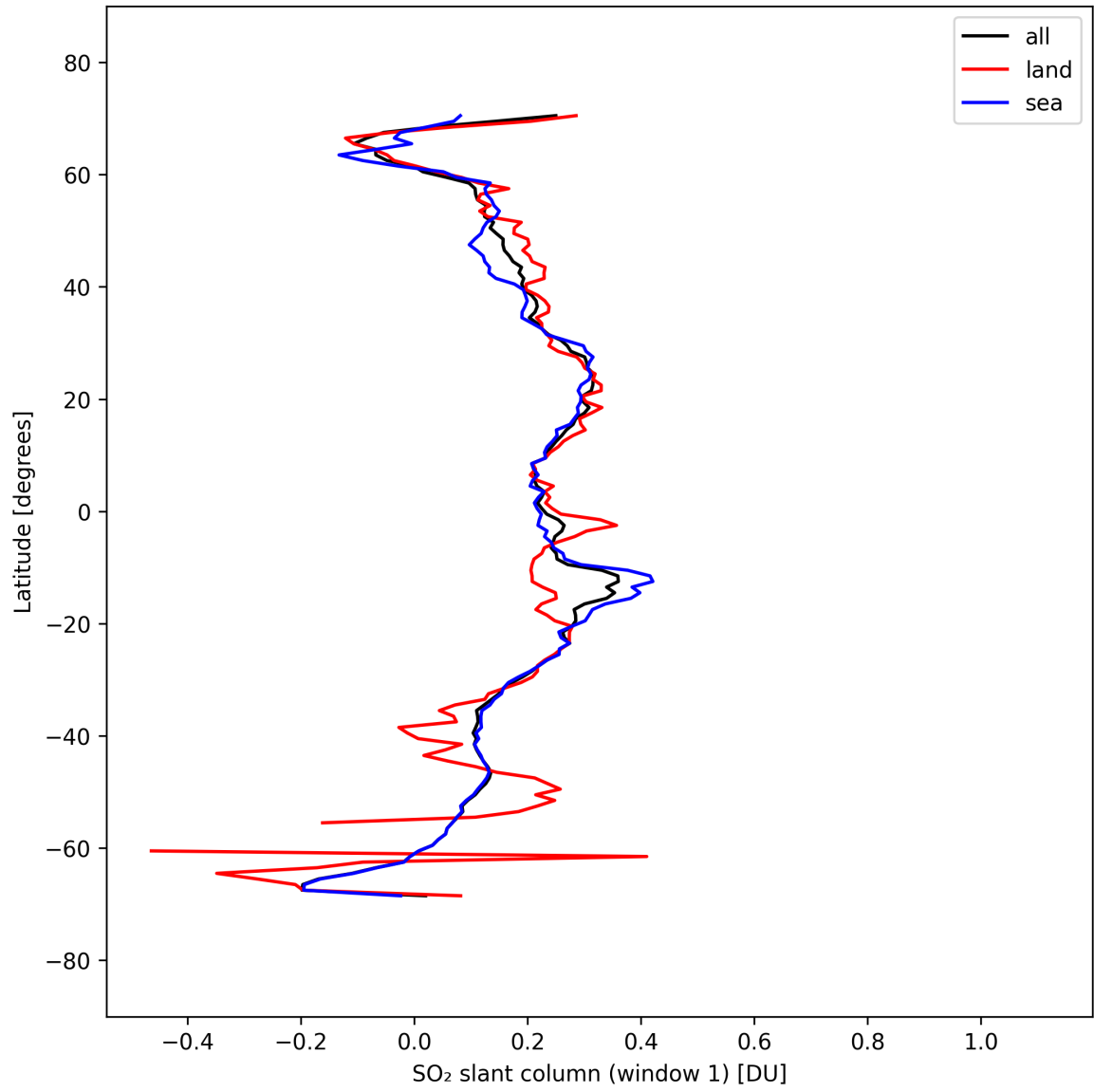


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-03-22 to 2025-03-22.

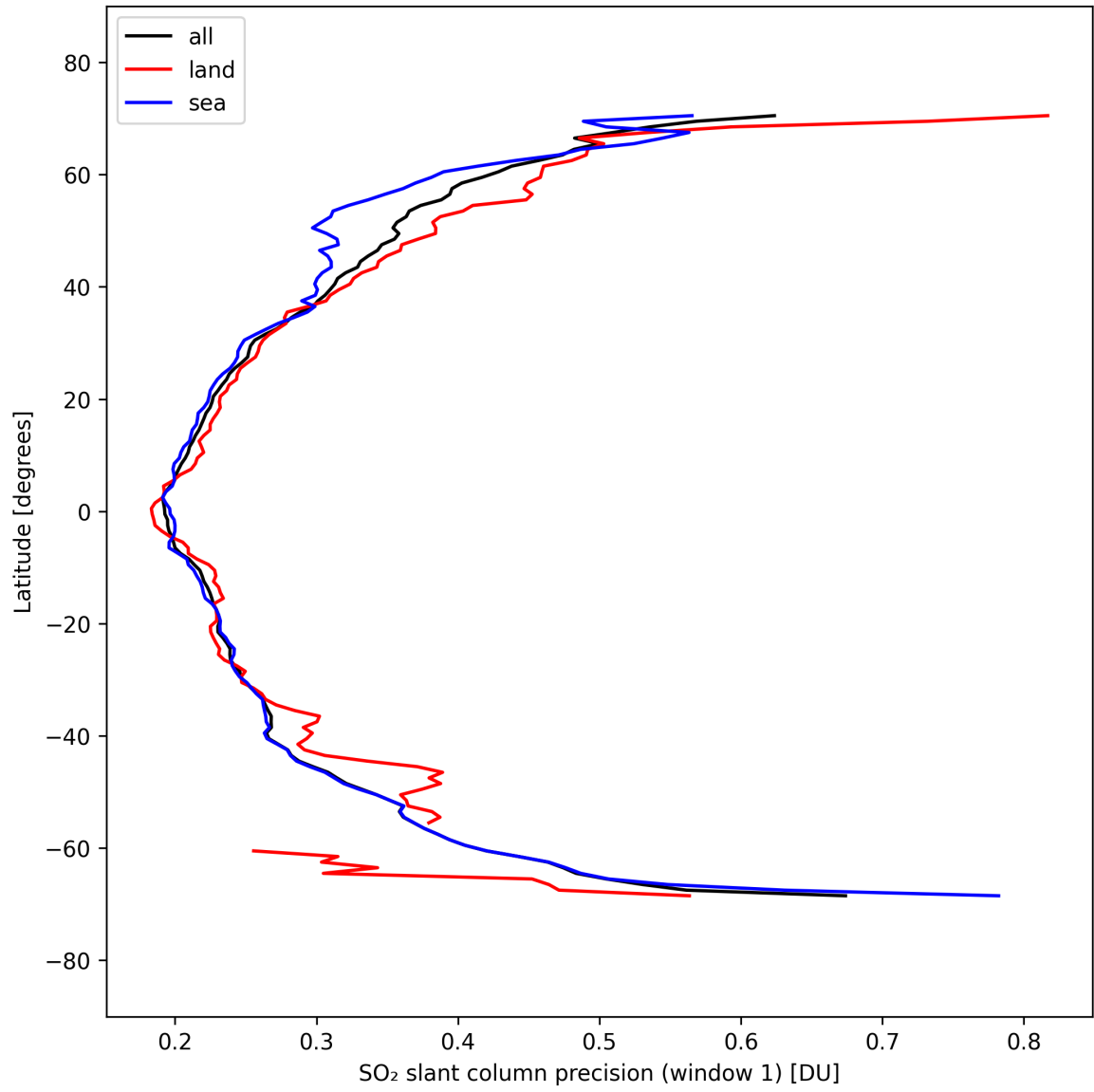


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-03-22 to 2025-03-22.

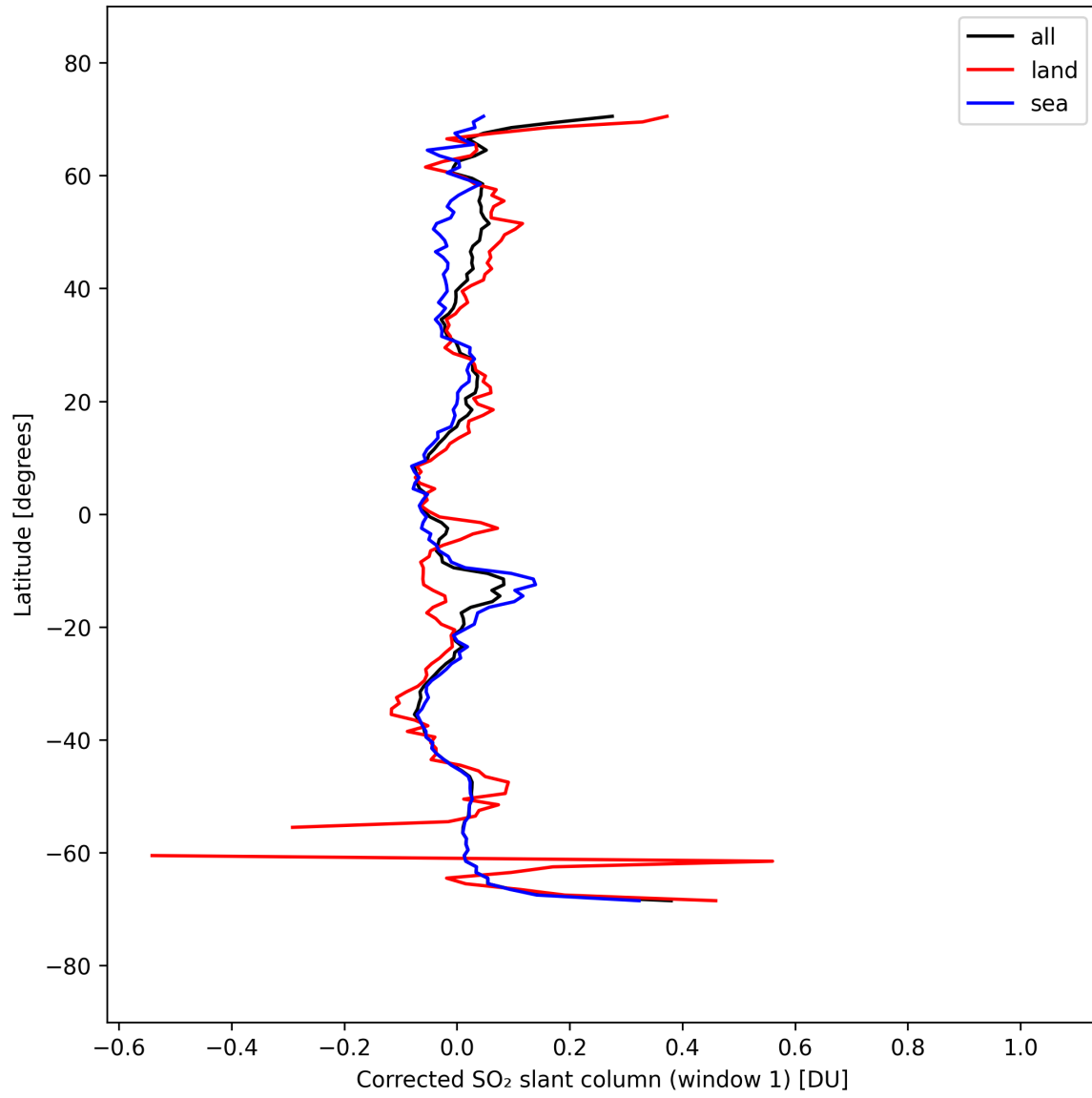


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-03-22 to 2025-03-22.

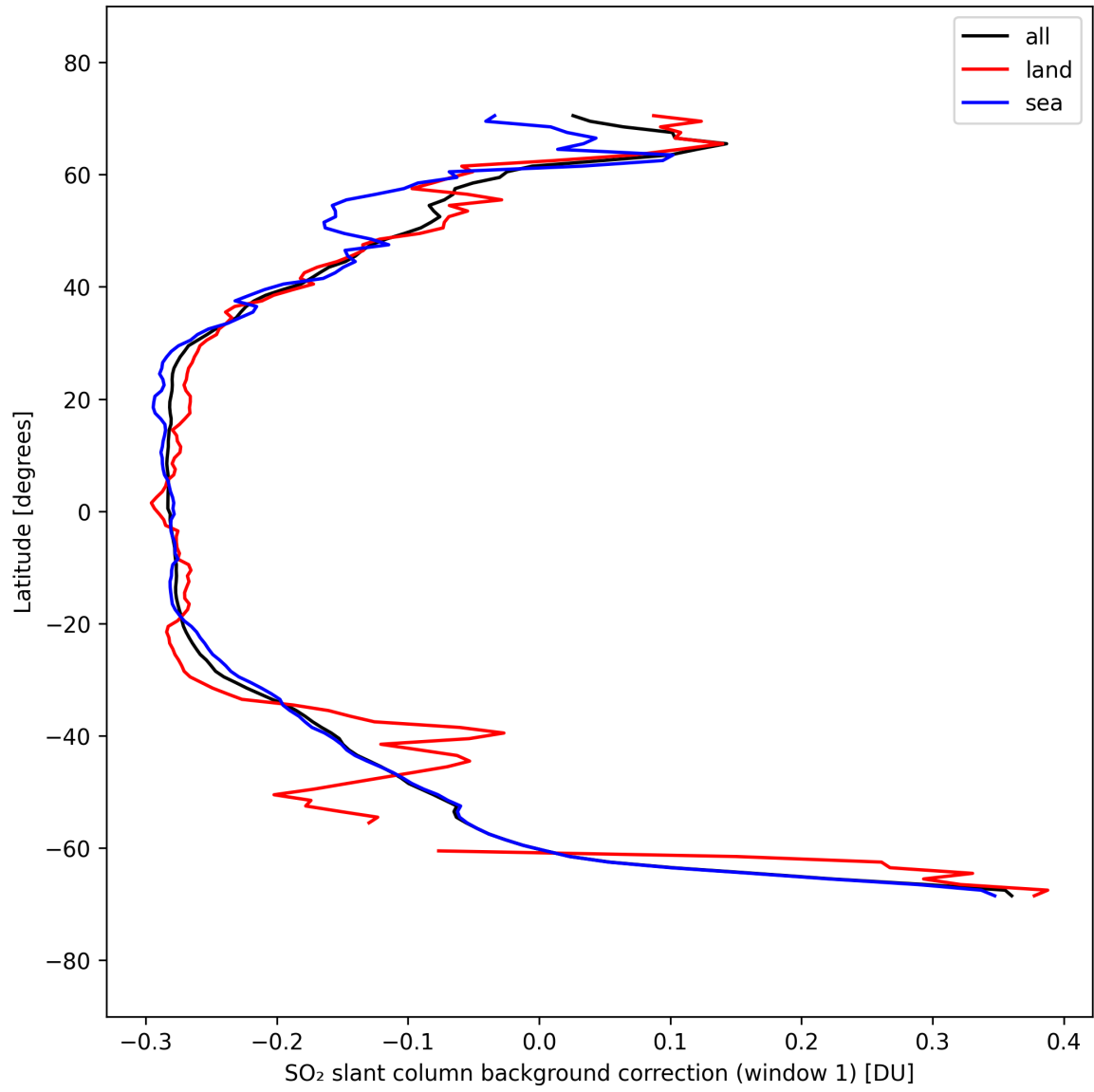


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-03-22 to 2025-03-22.

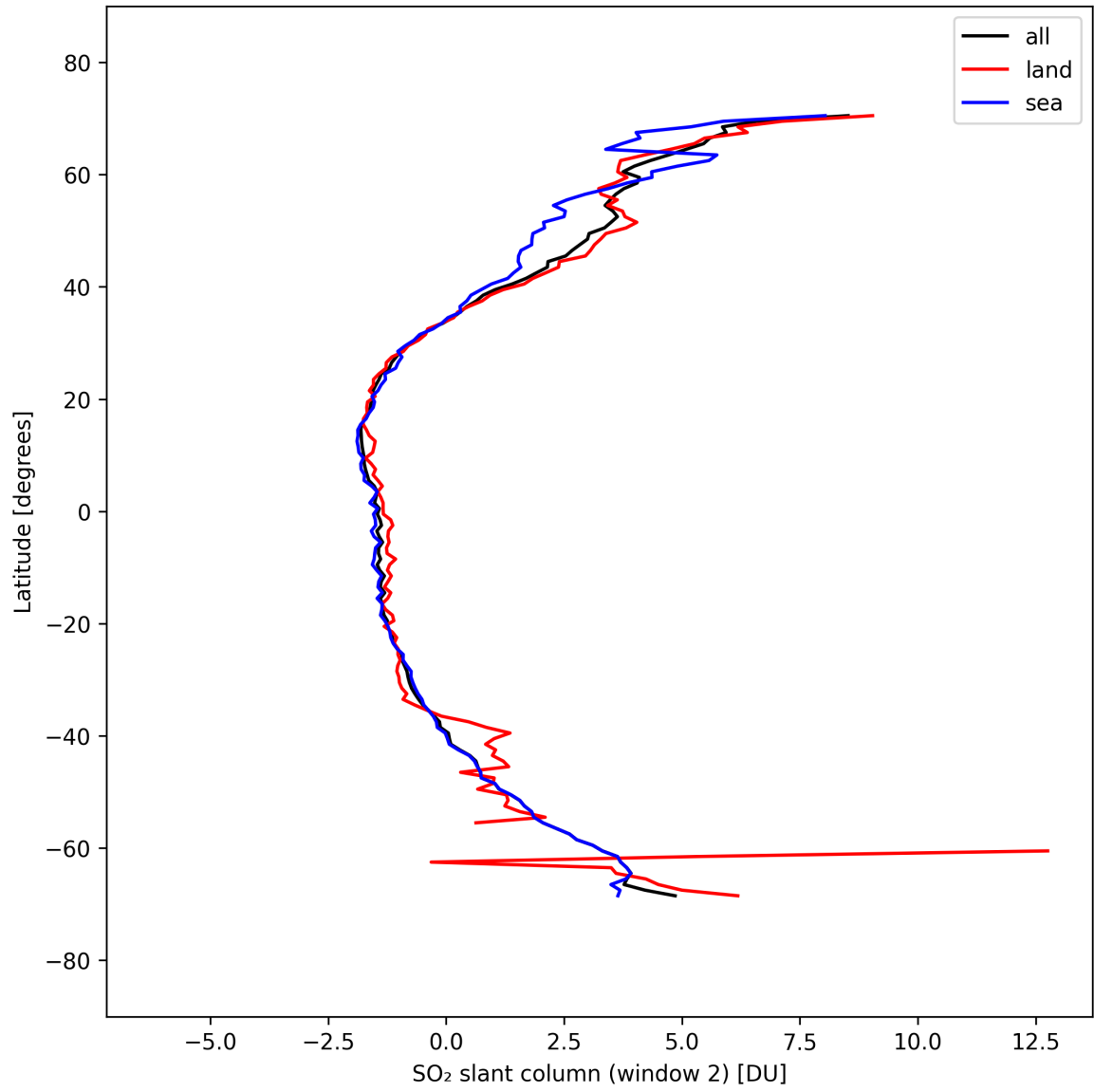


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-03-22 to 2025-03-22.

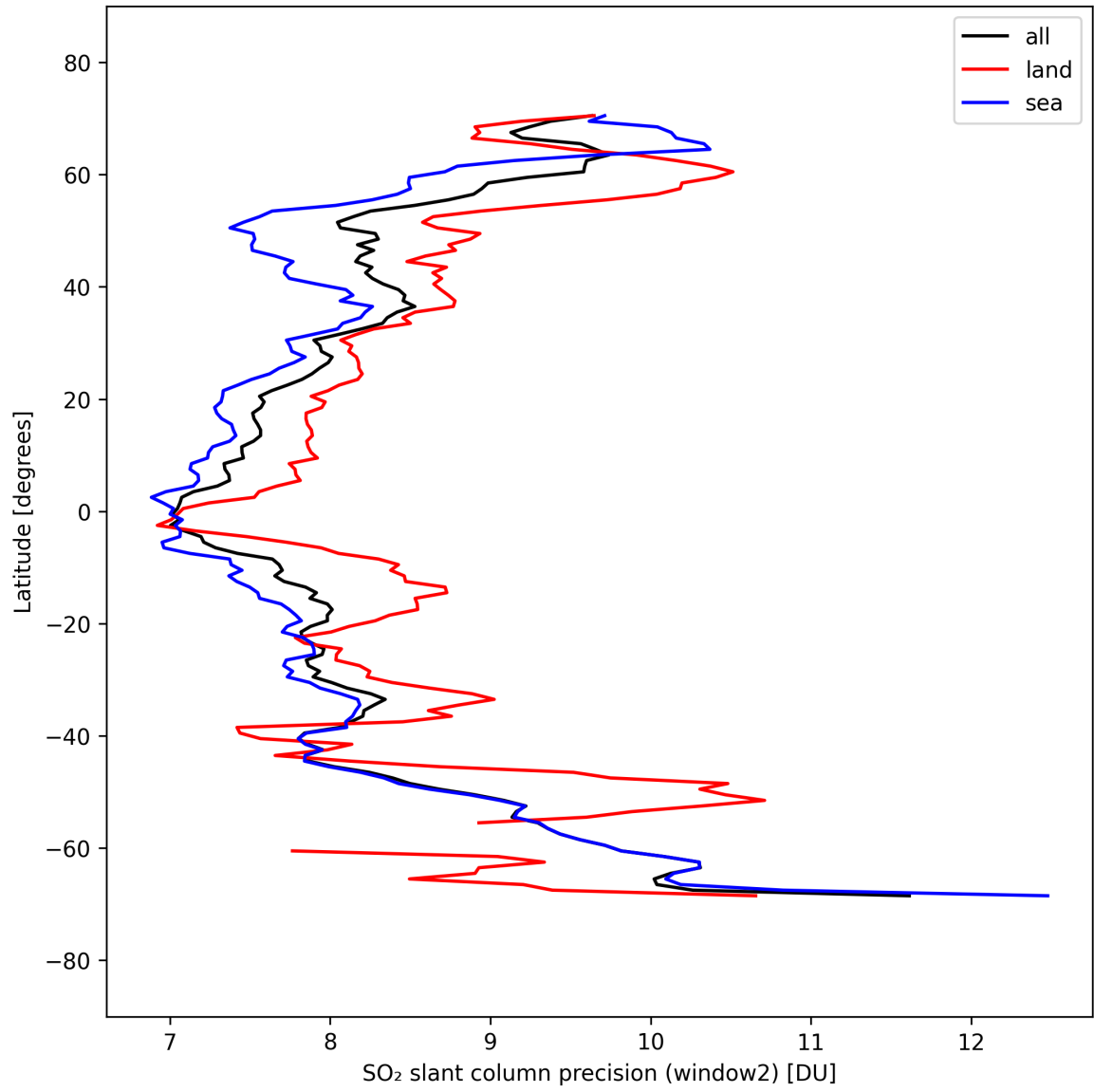


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-03-22 to 2025-03-22.

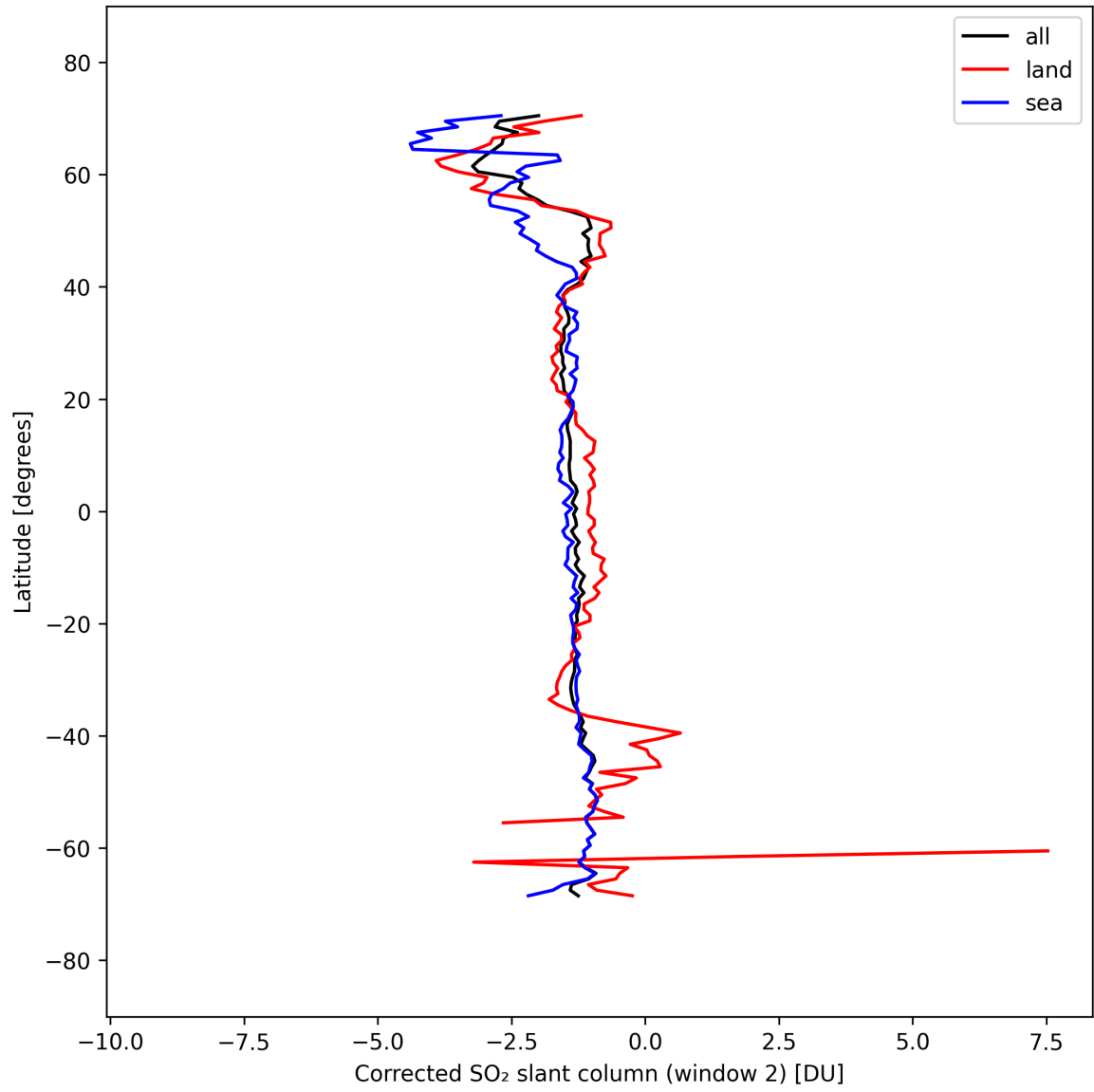


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-03-22 to 2025-03-22.

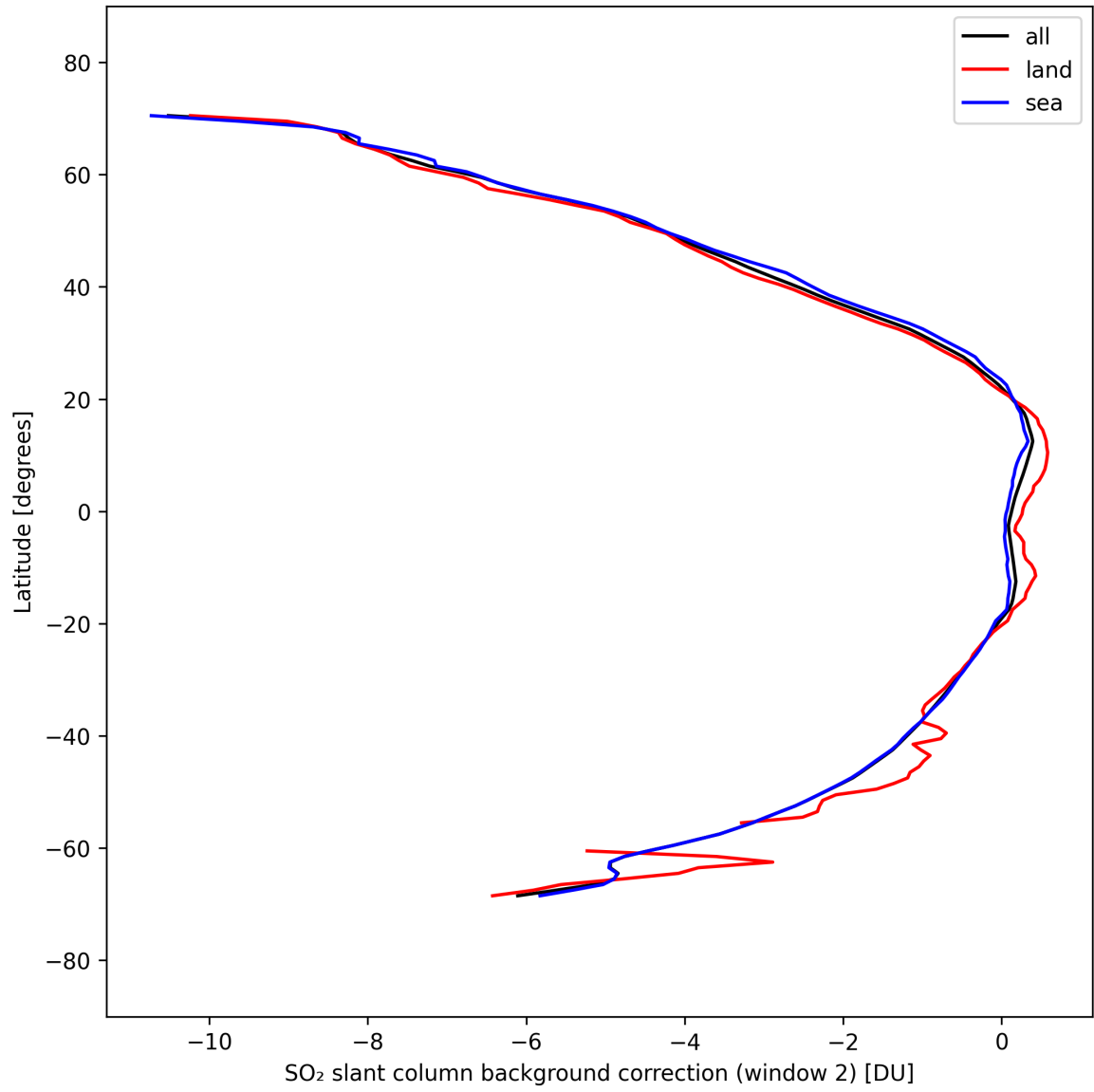


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-03-22 to 2025-03-22.

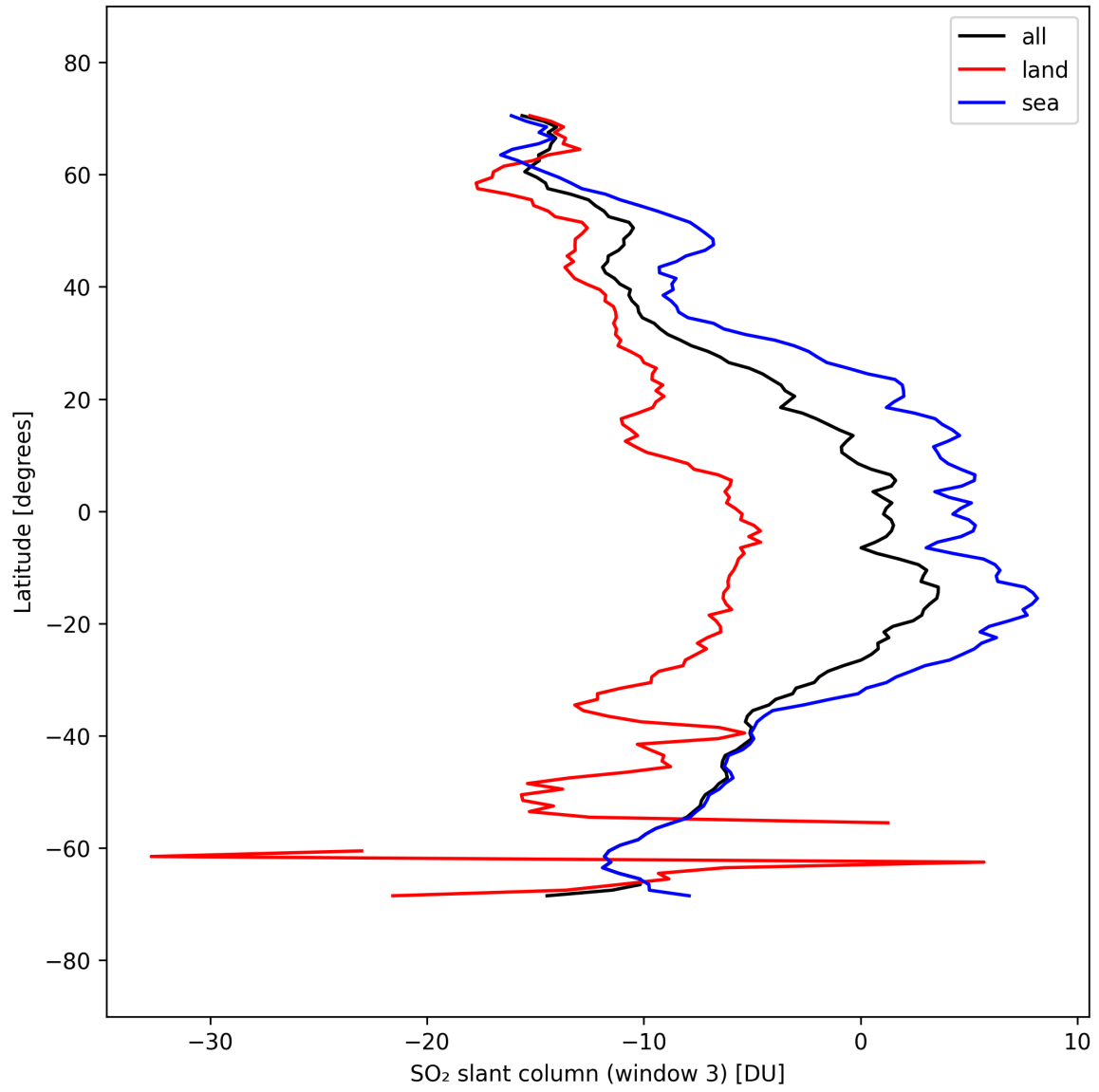


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-03-22 to 2025-03-22.

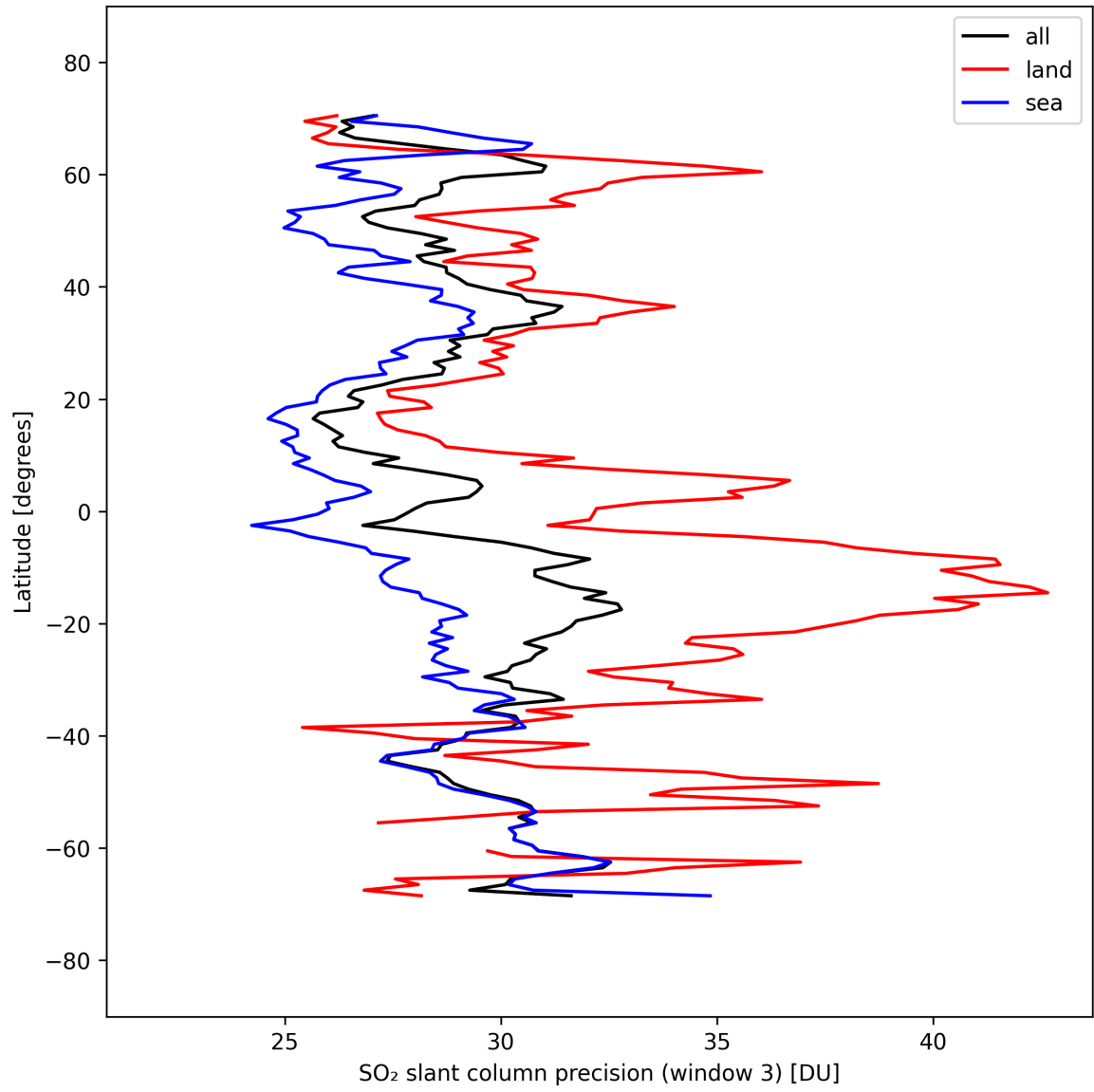


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-03-22 to 2025-03-22.

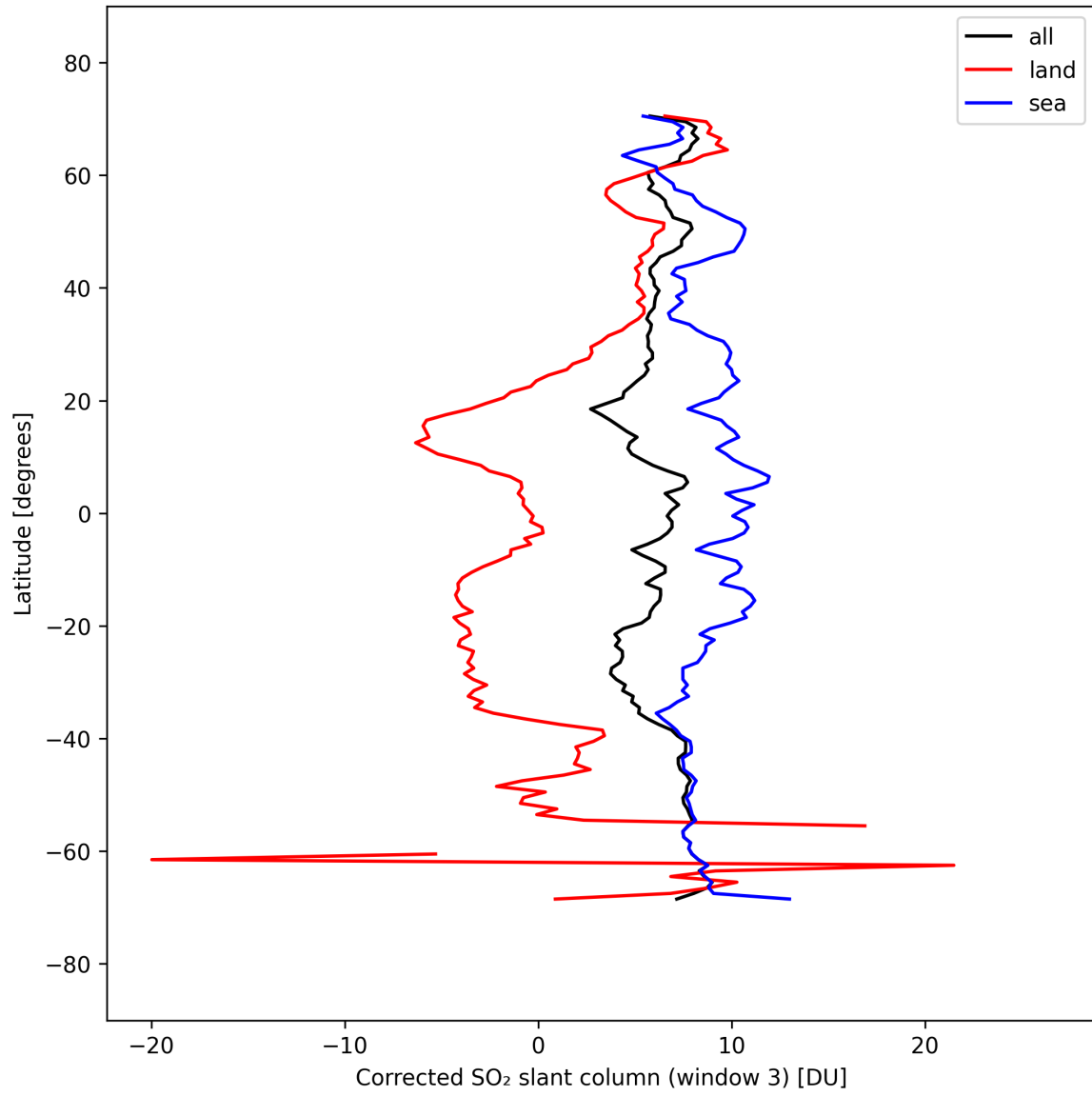


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-03-22 to 2025-03-22.

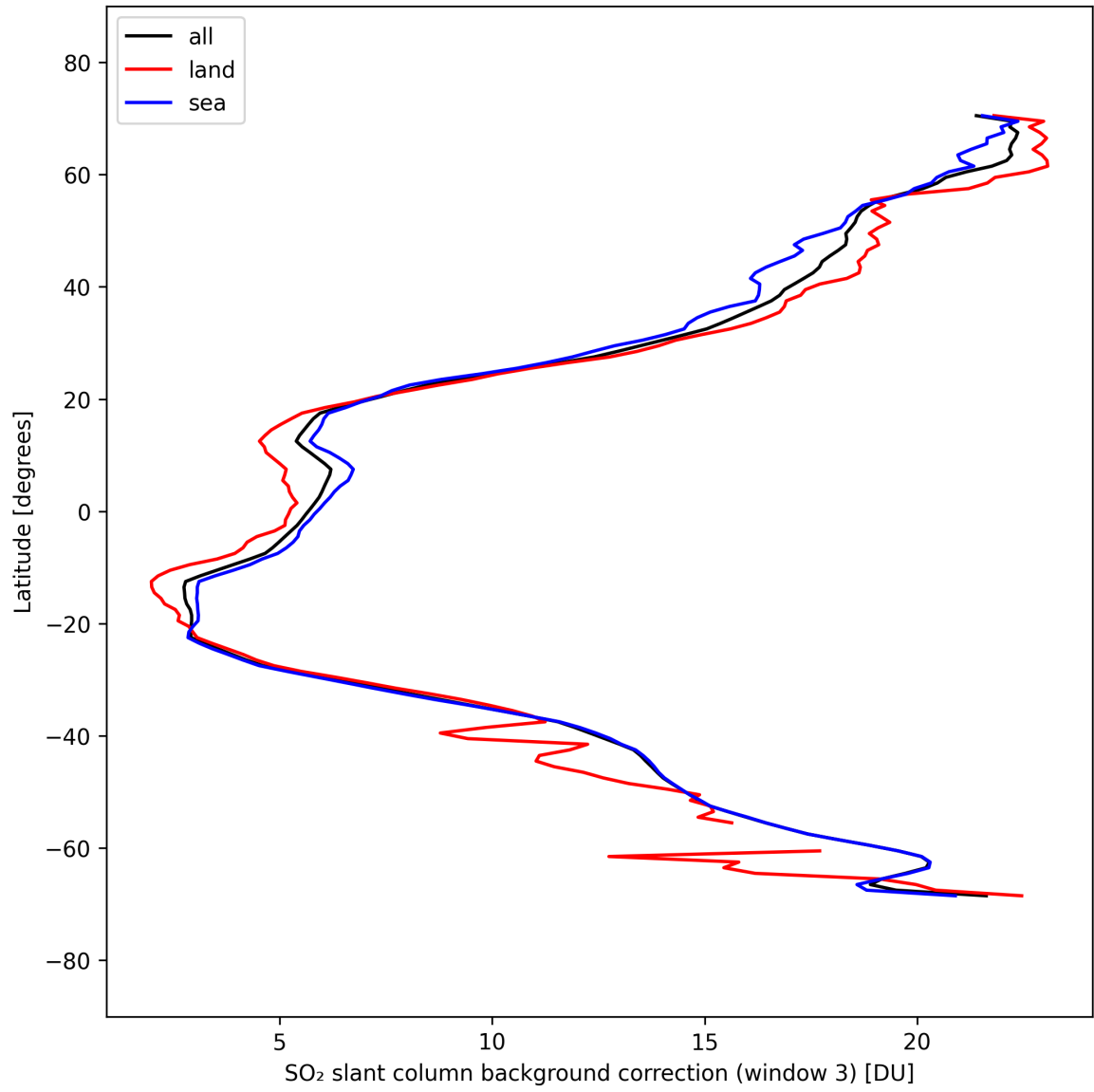


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-03-22 to 2025-03-22.

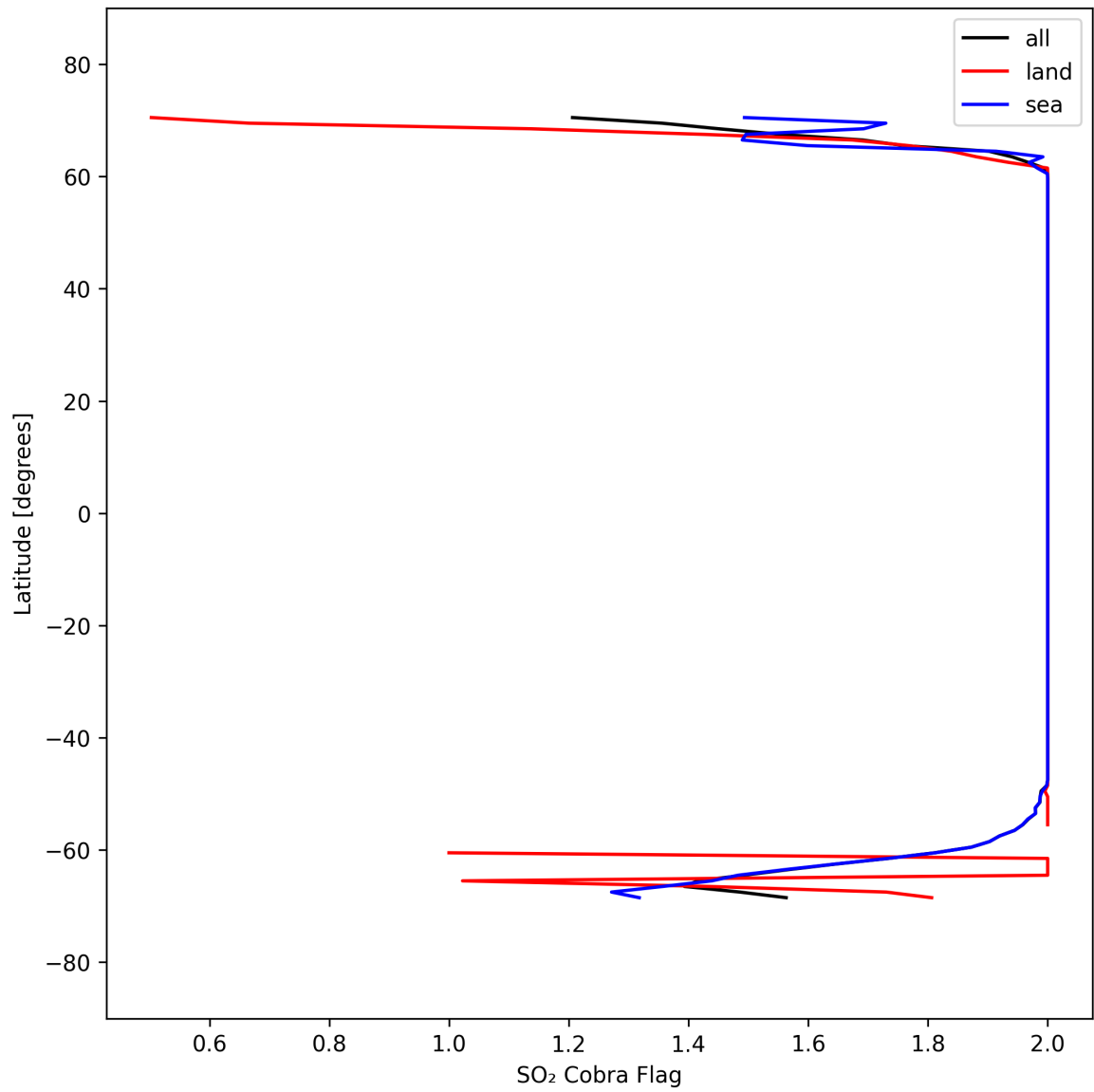


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-03-22 to 2025-03-22.

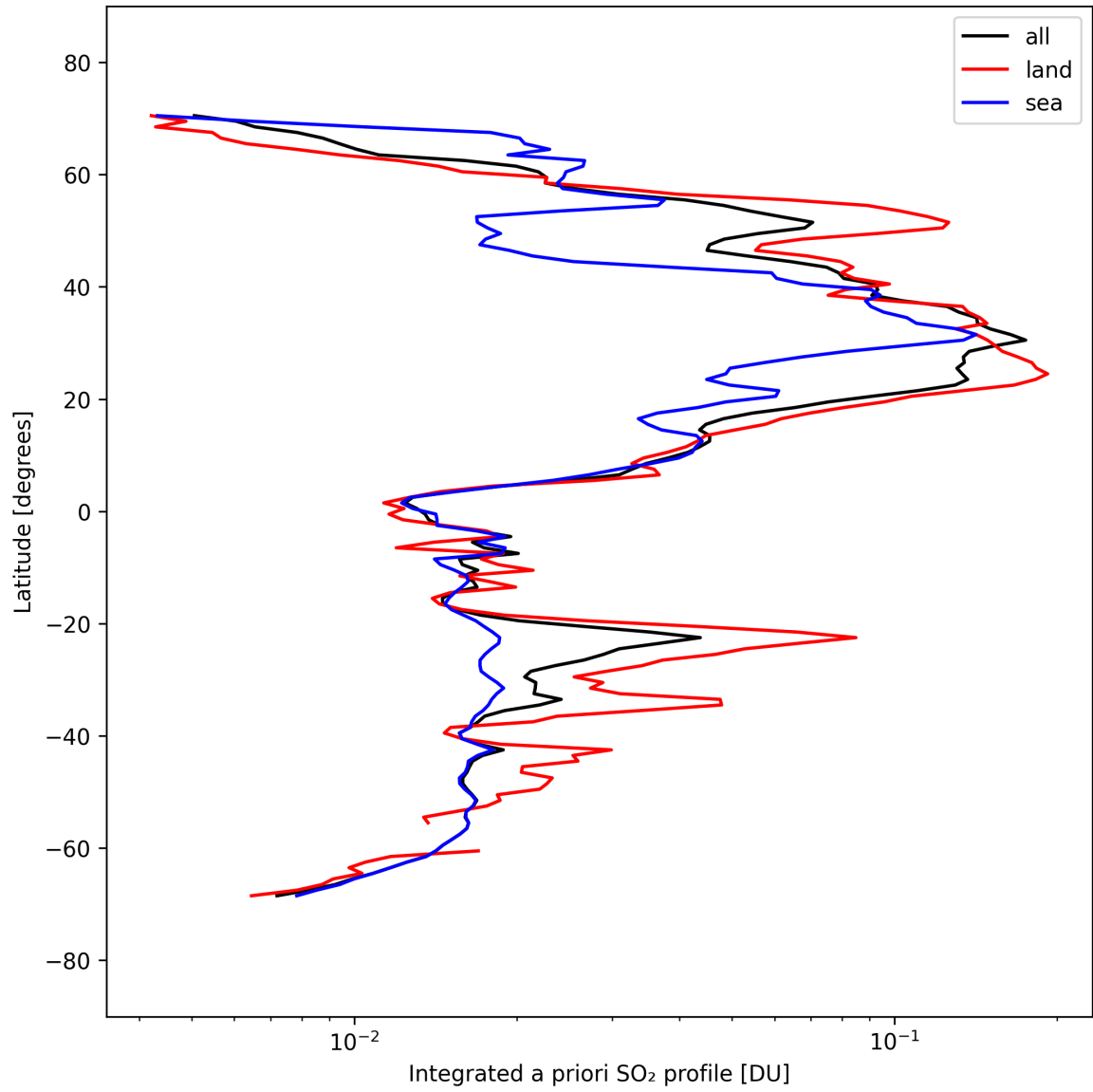


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-03-22 to 2025-03-22.

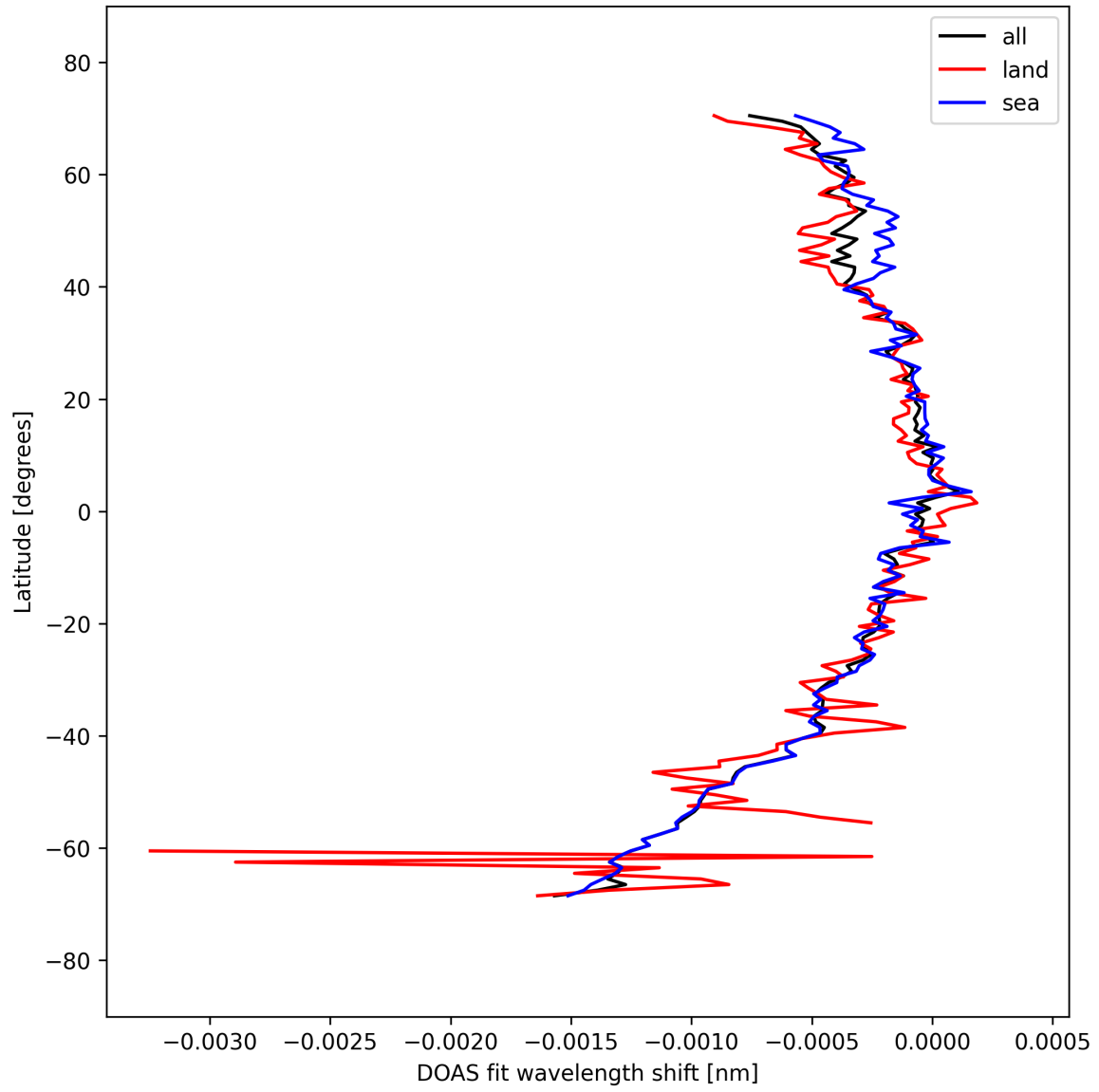


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-22 to 2025-03-22.

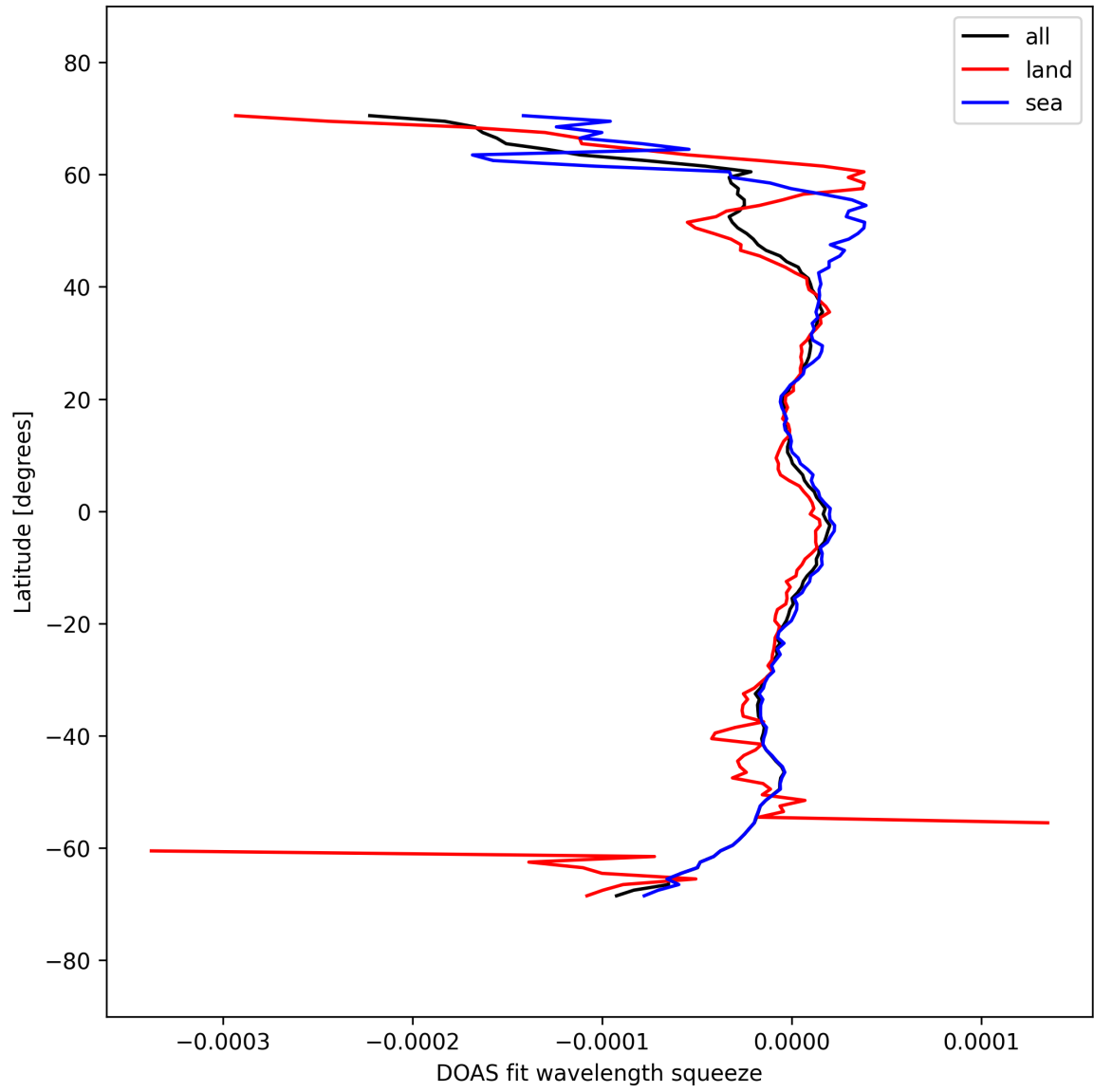


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-22 to 2025-03-22.

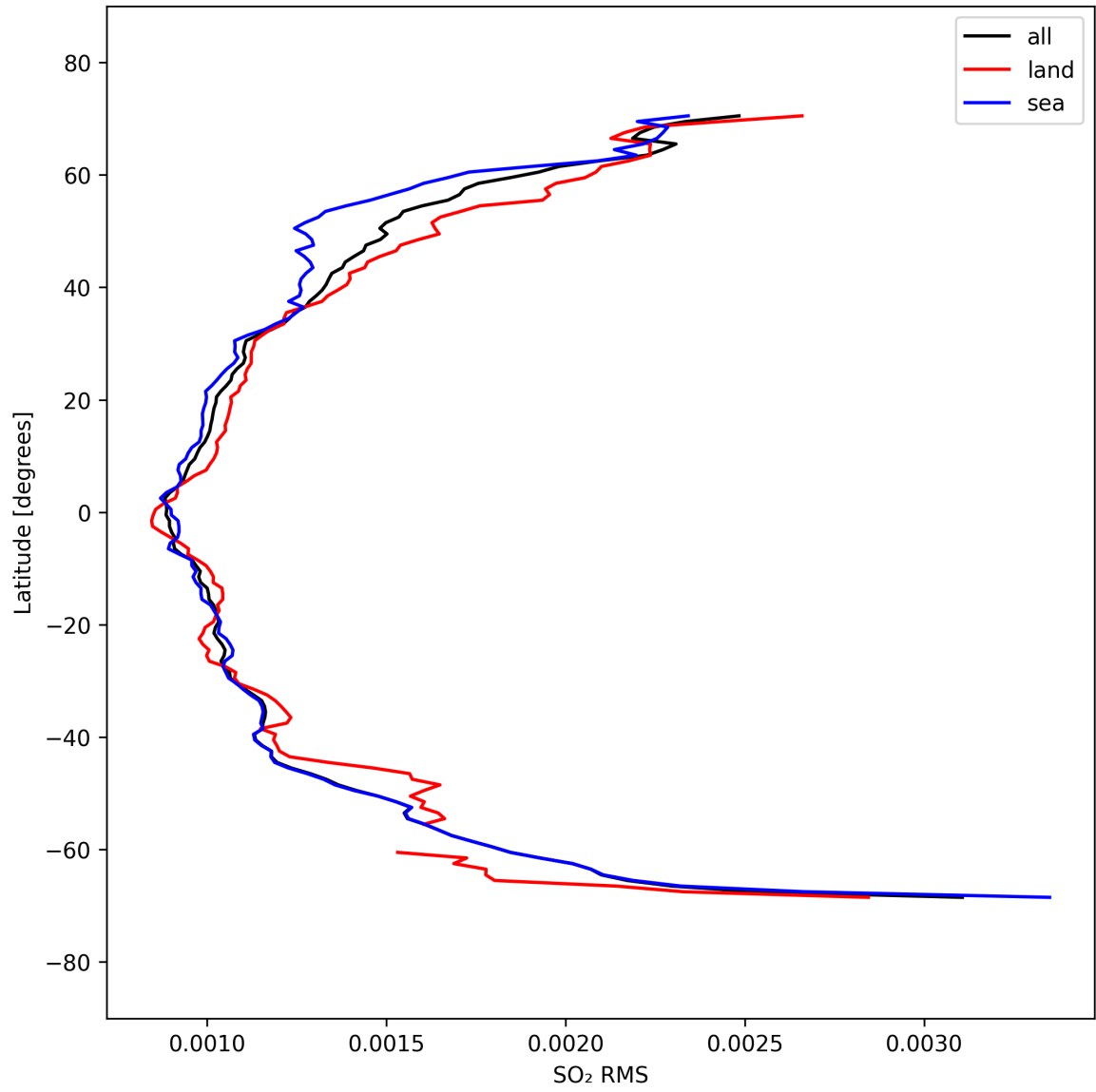


Figure 52: Zonal average of “SO₂ RMS” for 2025-03-22 to 2025-03-22.

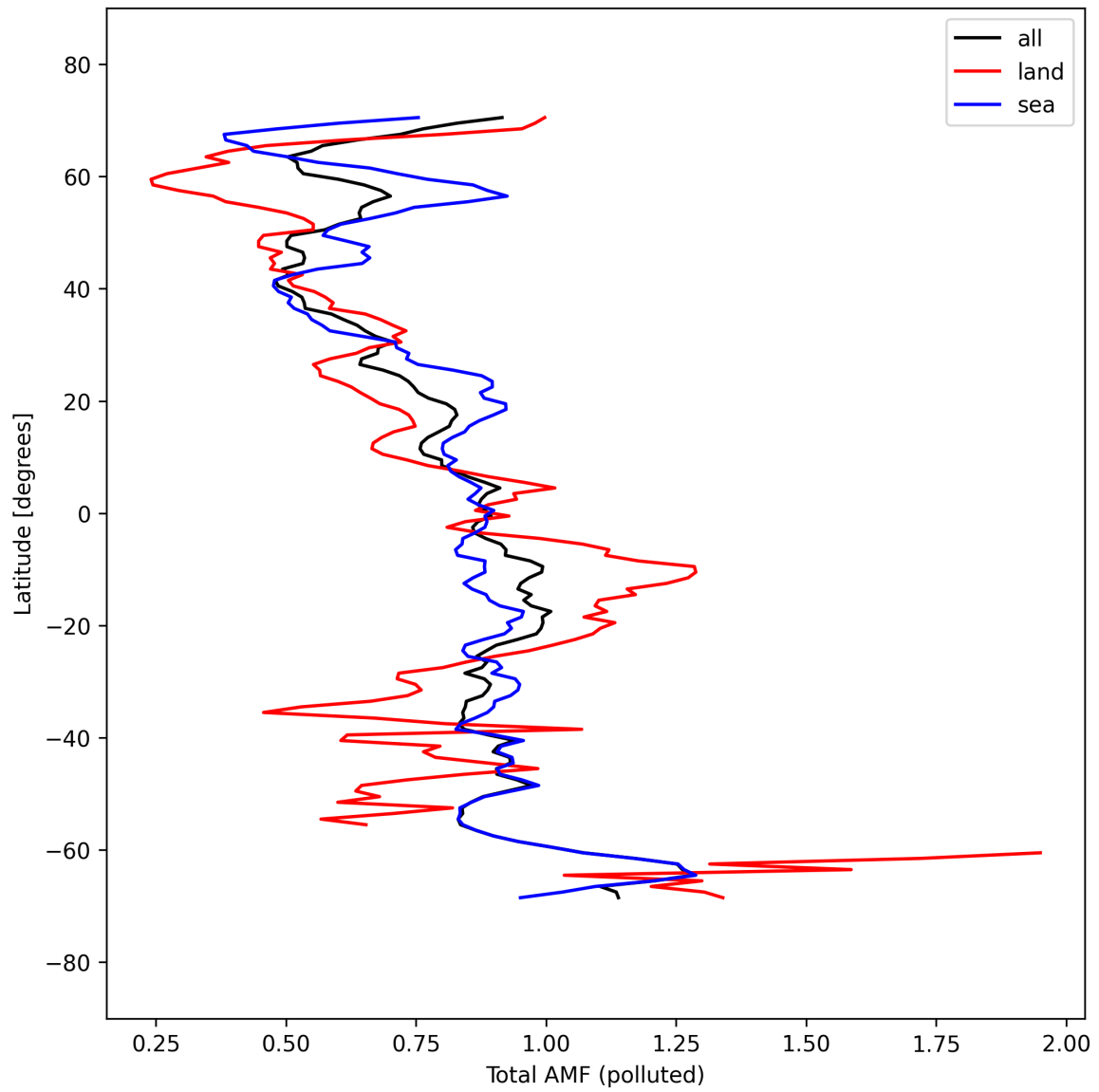


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-22 to 2025-03-22.

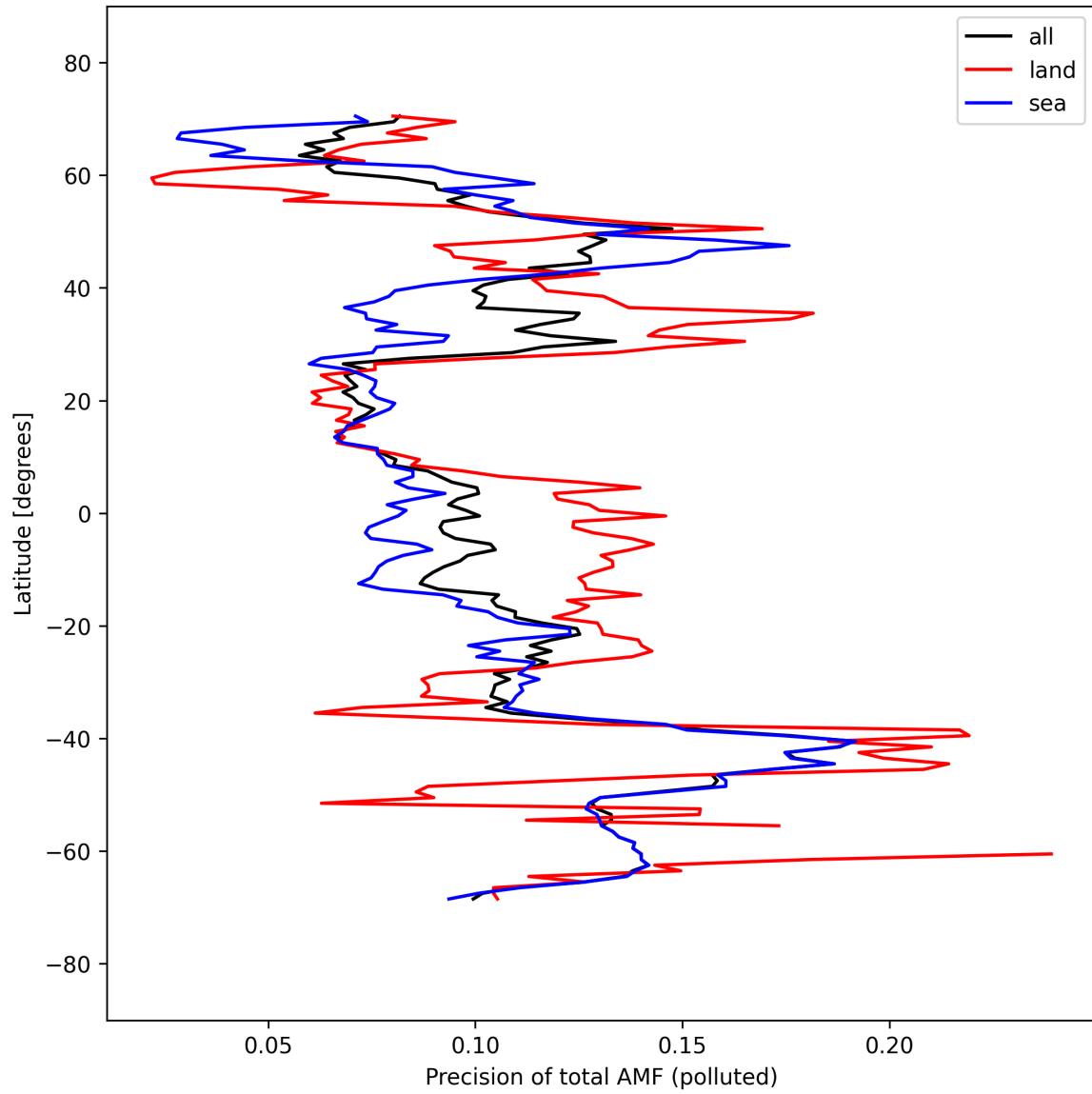


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-22 to 2025-03-22.

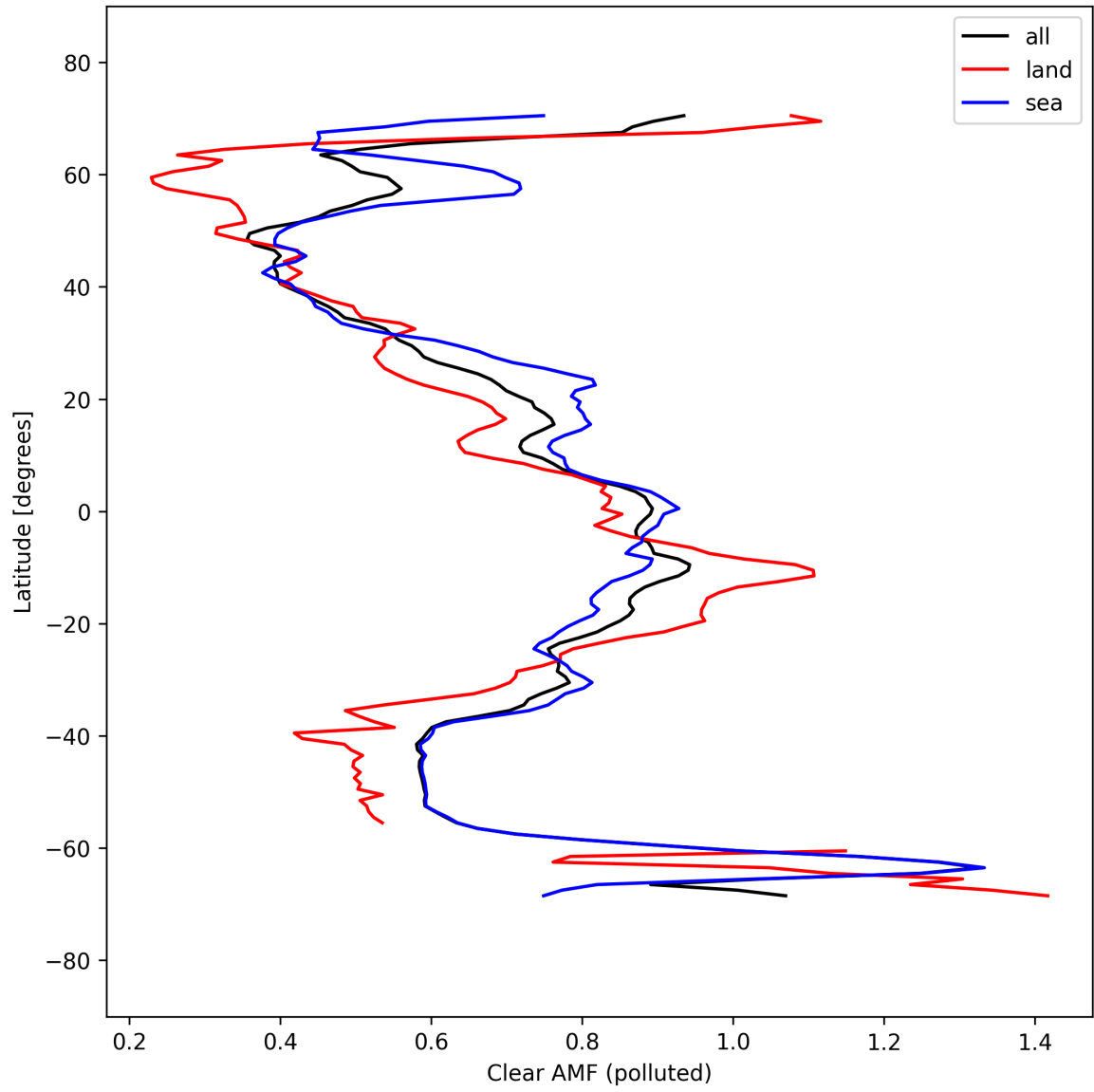


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-22 to 2025-03-22.

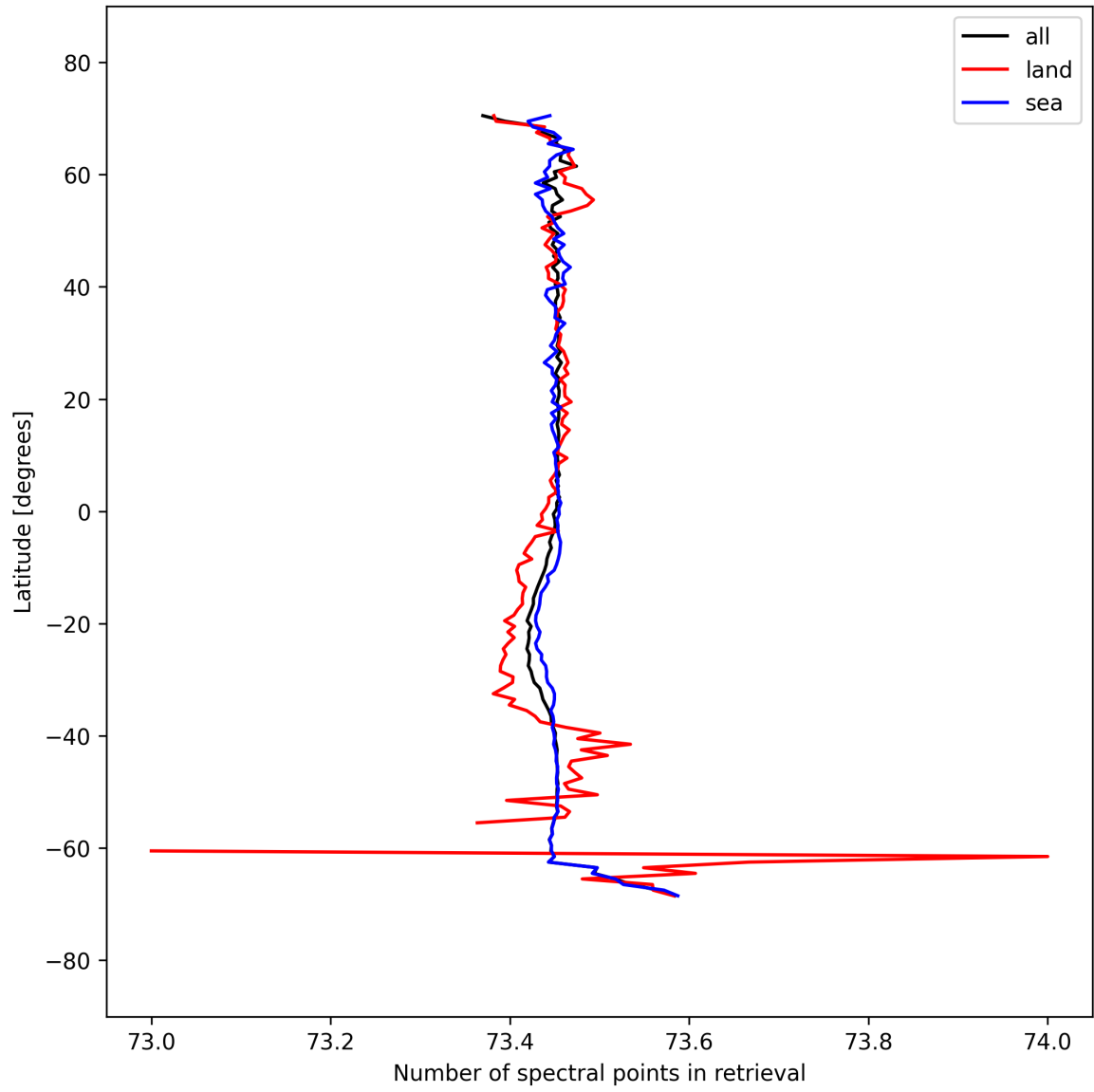


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-22 to 2025-03-22.

8 Histograms

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

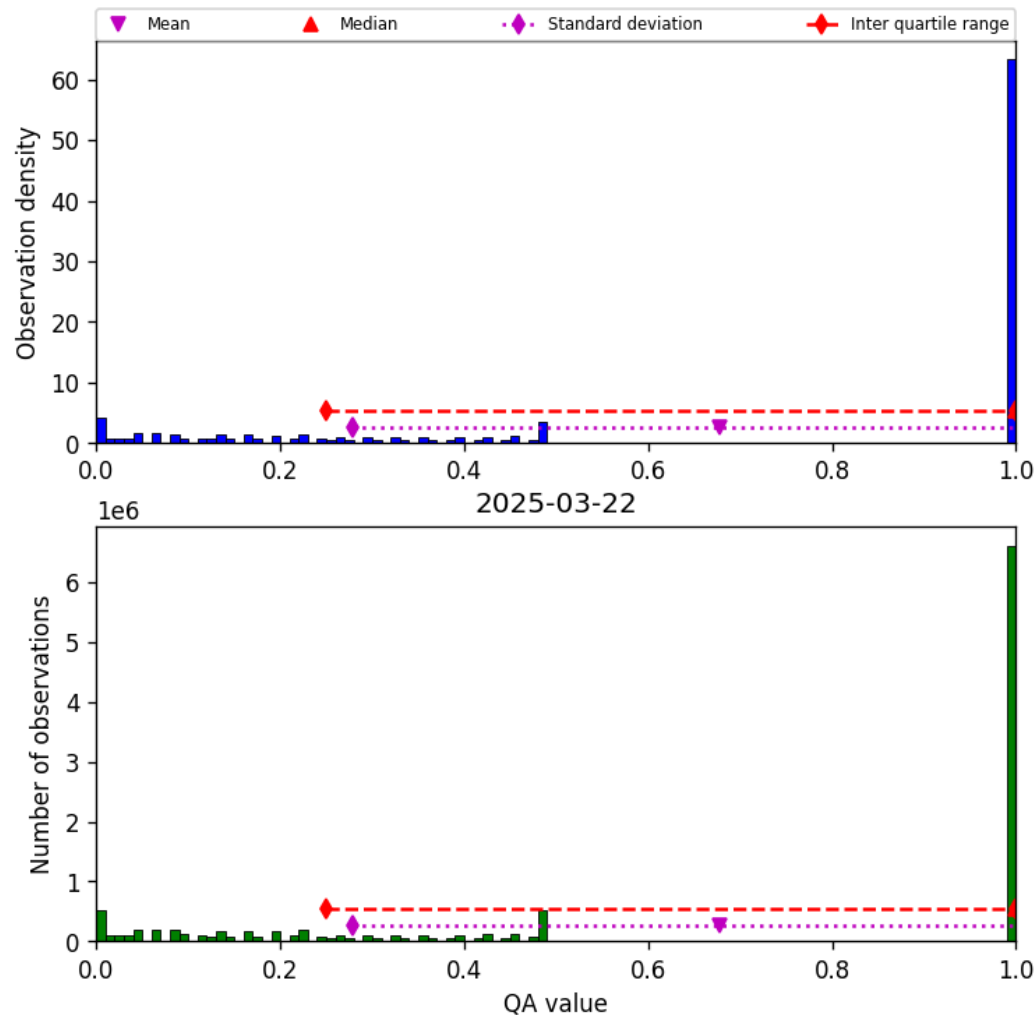


Figure 57: Histogram of “QA value” for 2025-03-22 to 2025-03-22

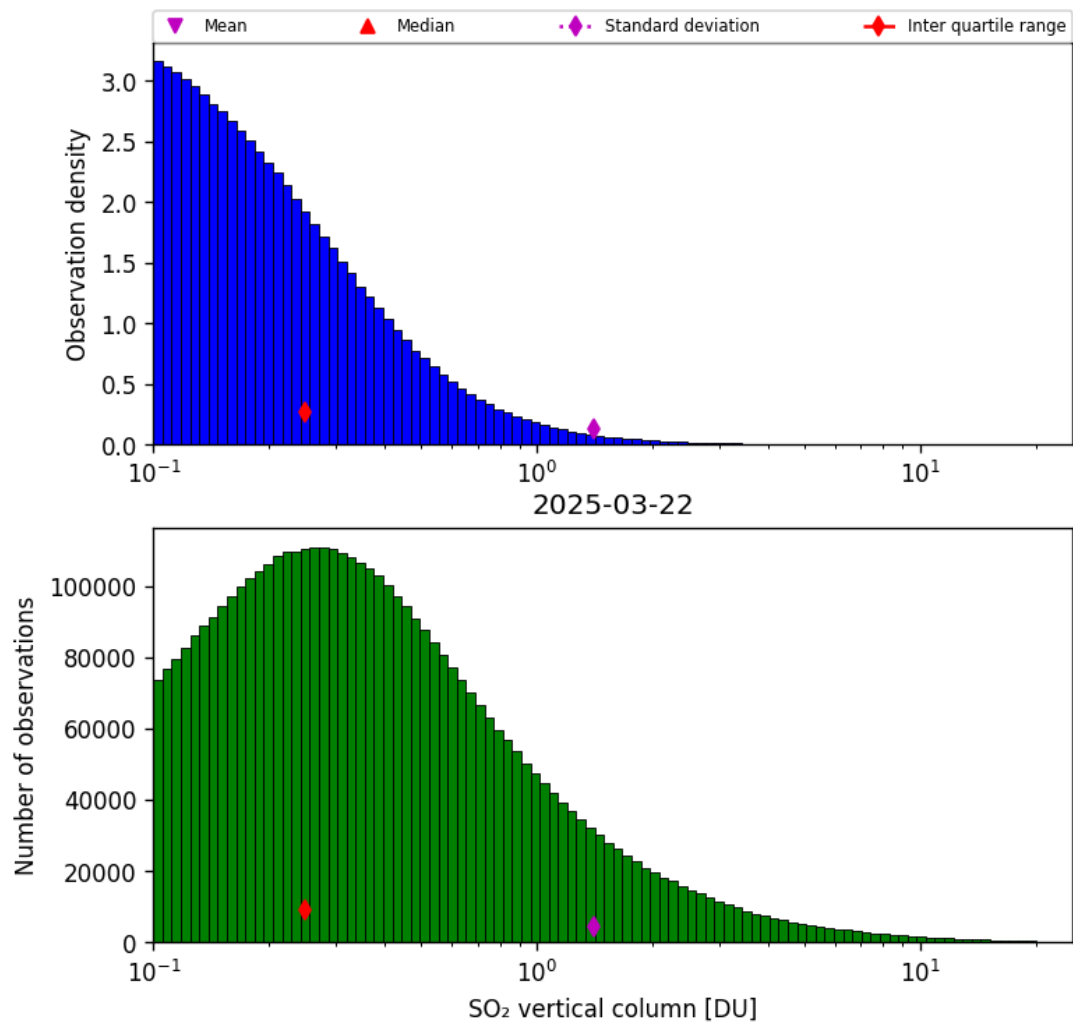


Figure 58: Histogram of “SO₂ vertical column” for 2025-03-22 to 2025-03-22

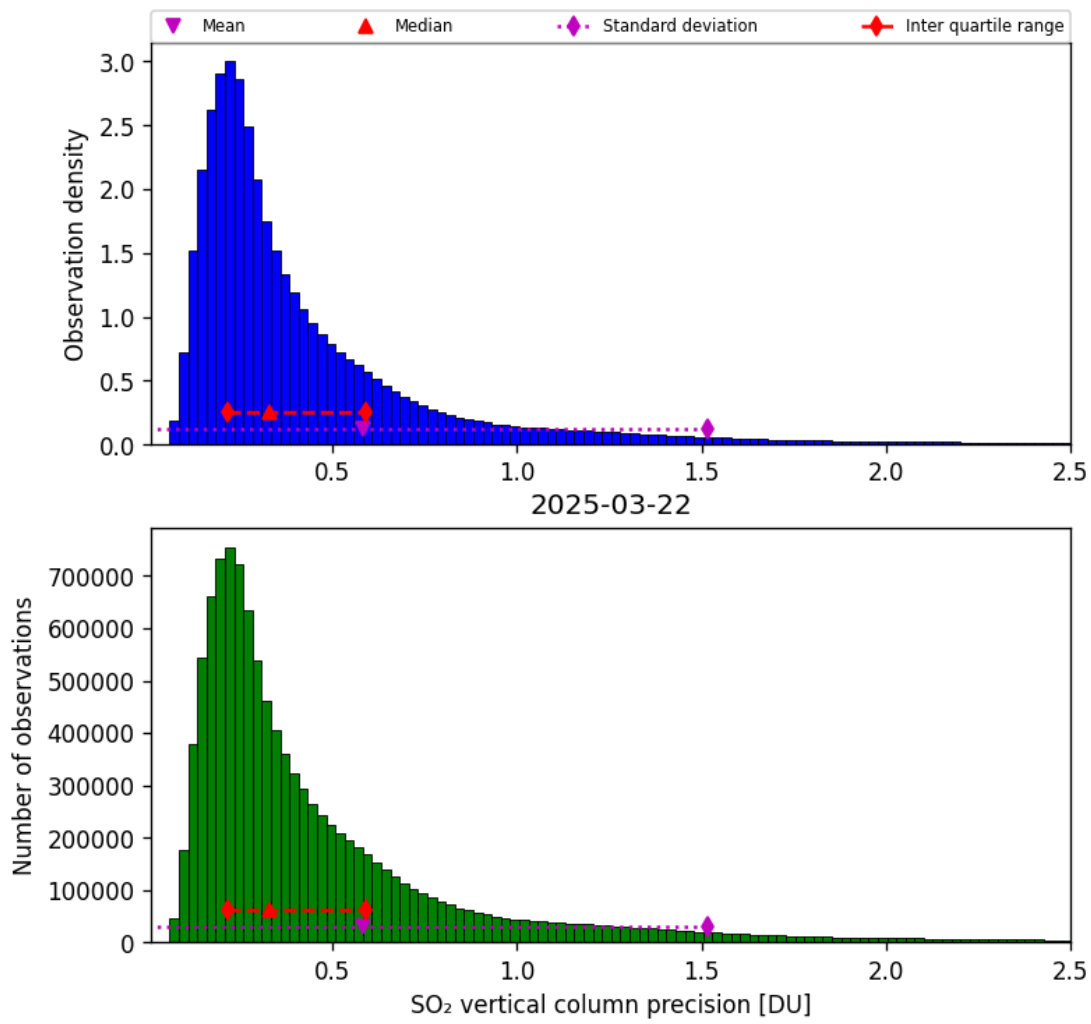


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-03-22 to 2025-03-22

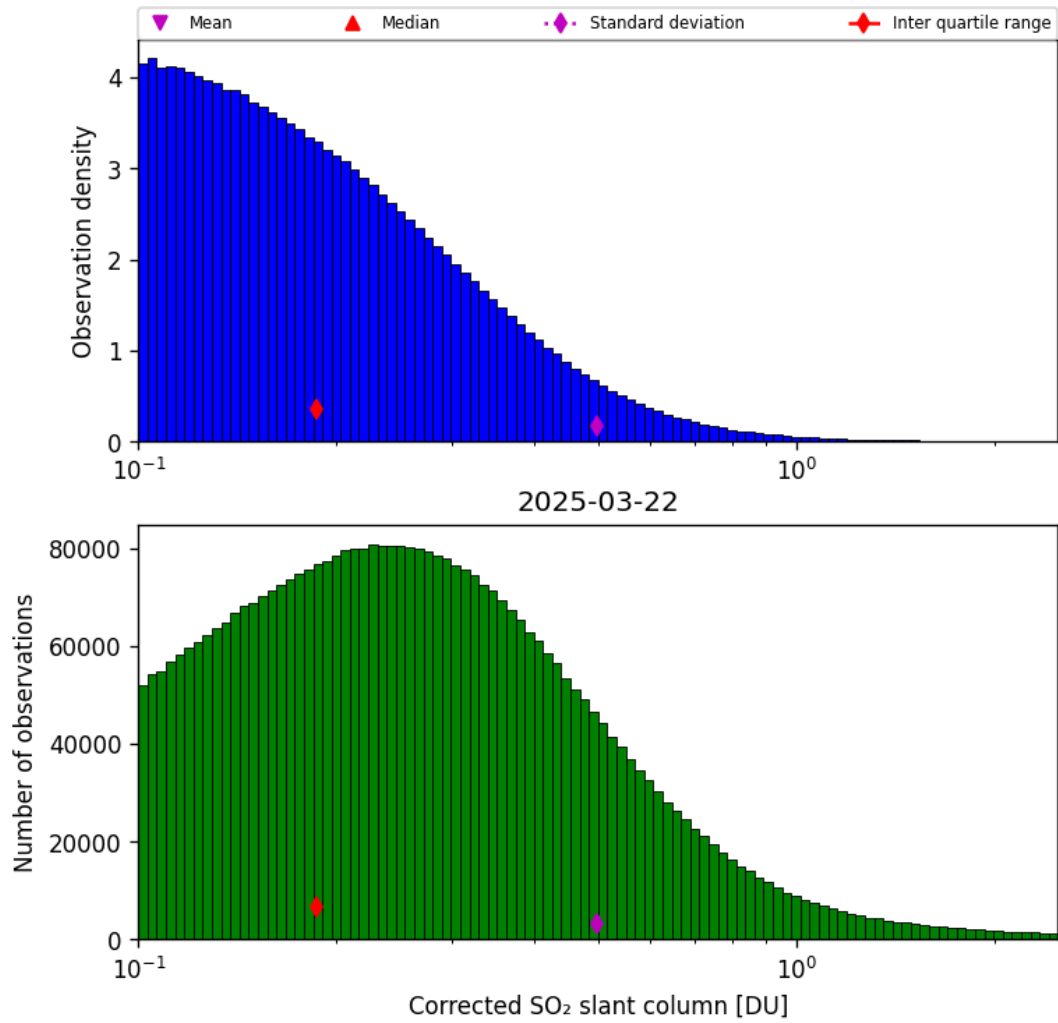


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-03-22 to 2025-03-22

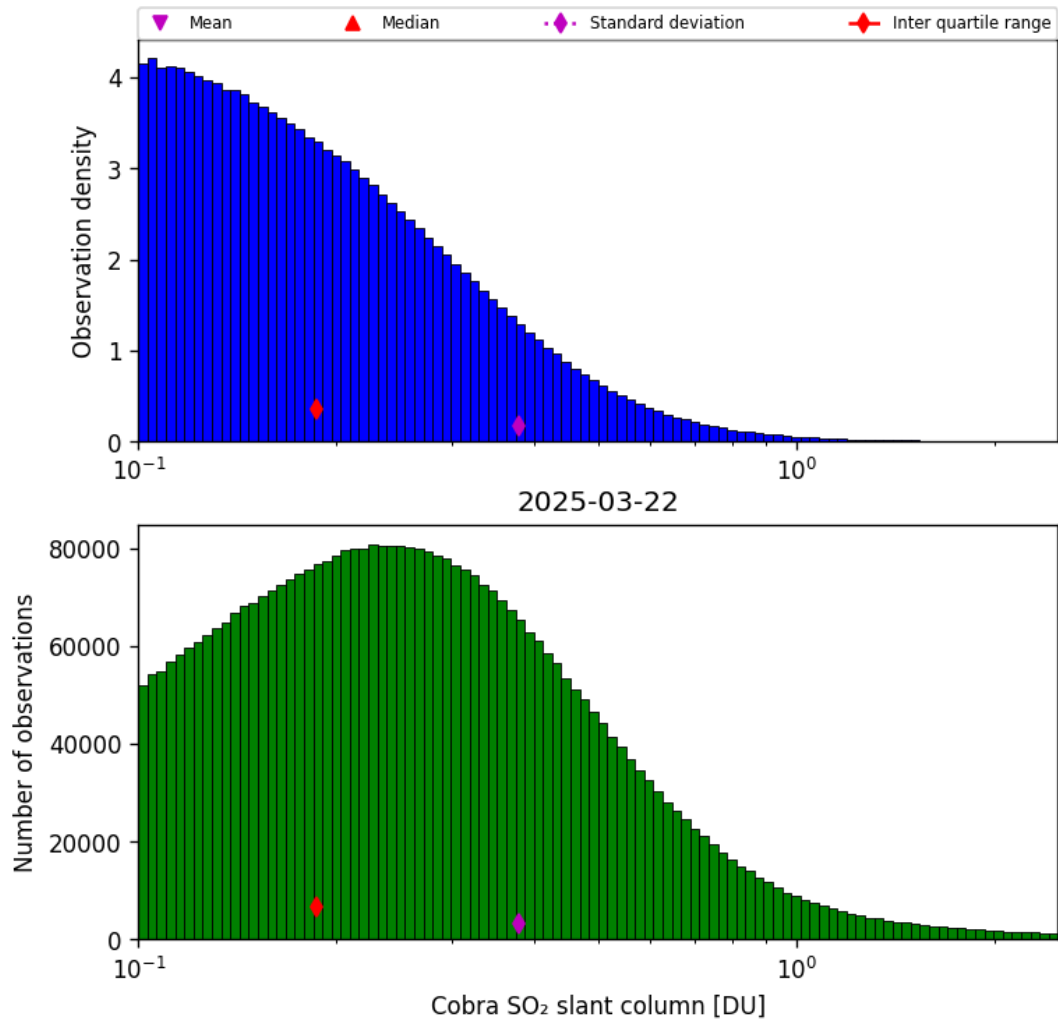


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-03-22 to 2025-03-22

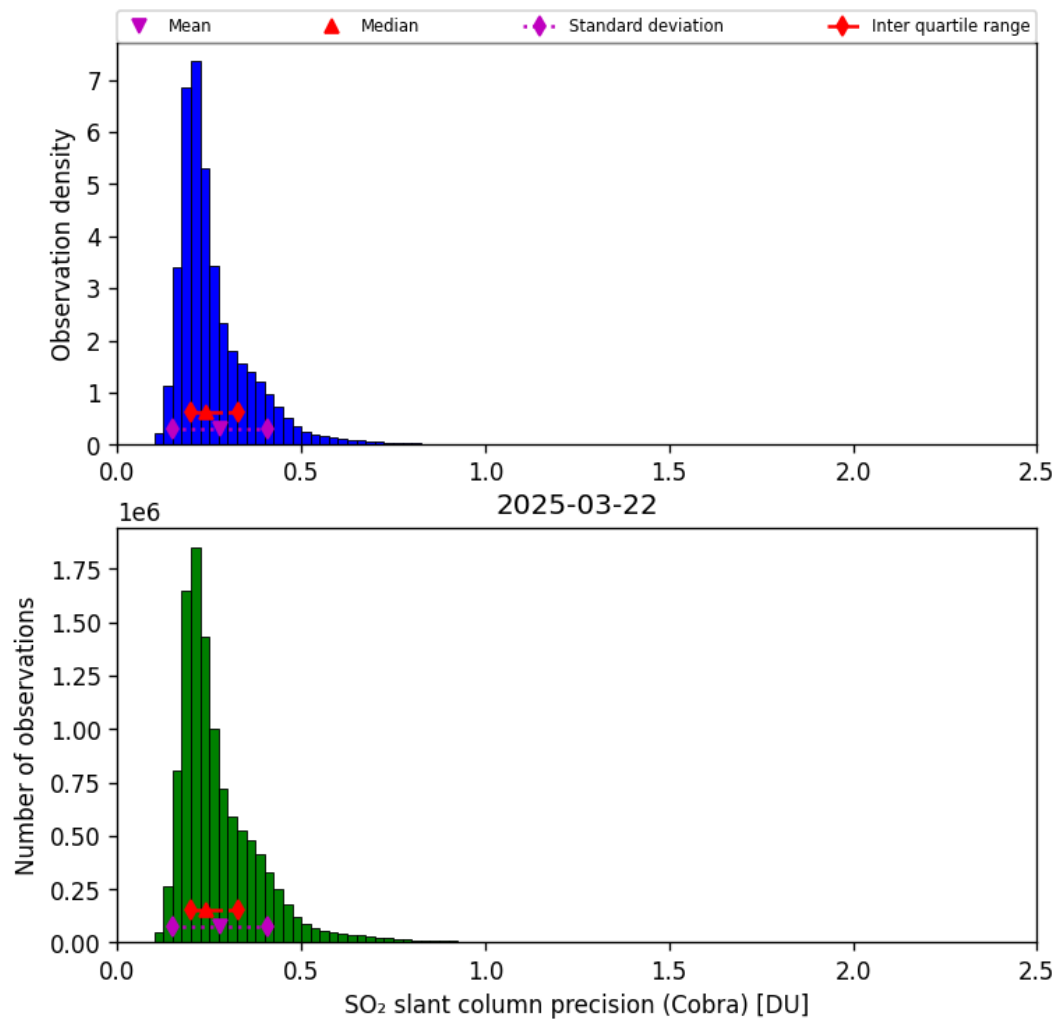


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-03-22 to 2025-03-22

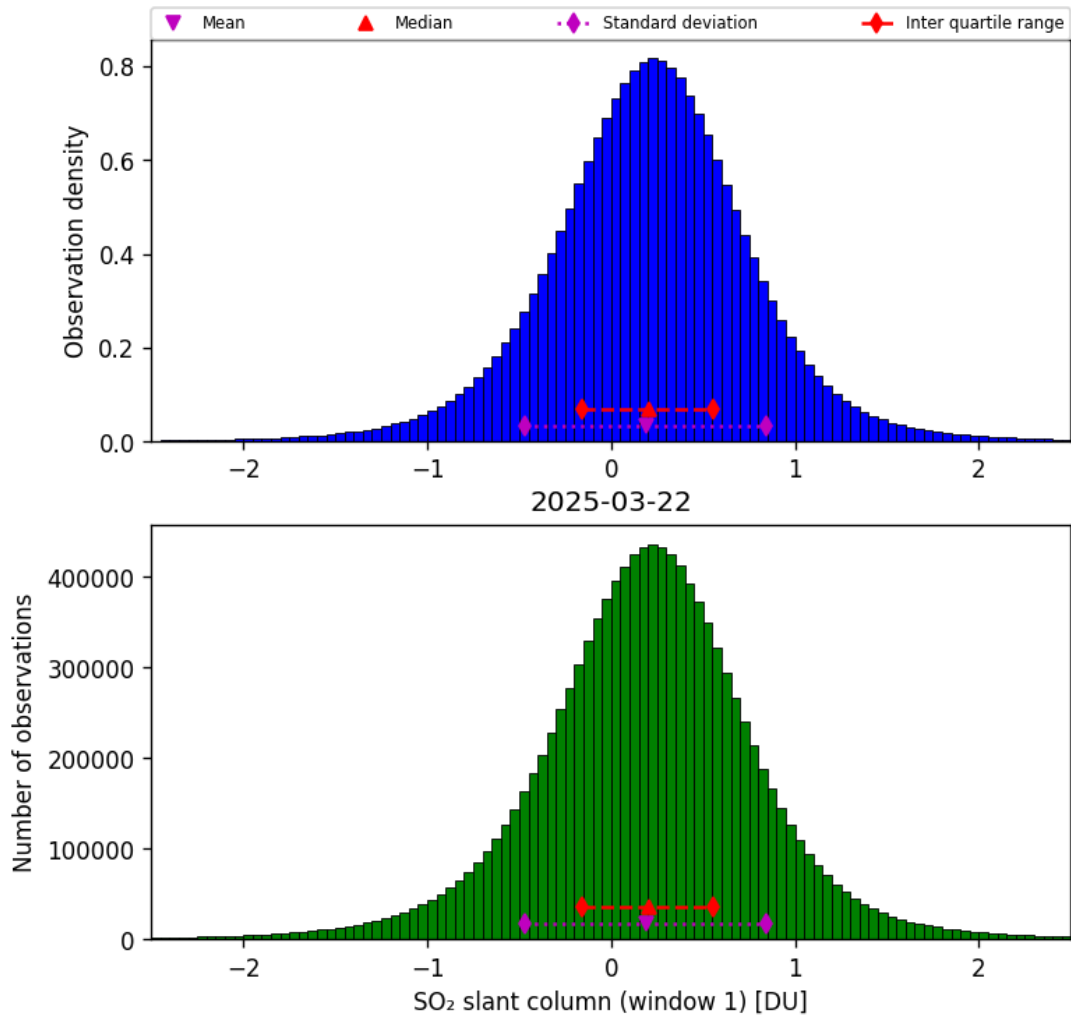


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-03-22 to 2025-03-22

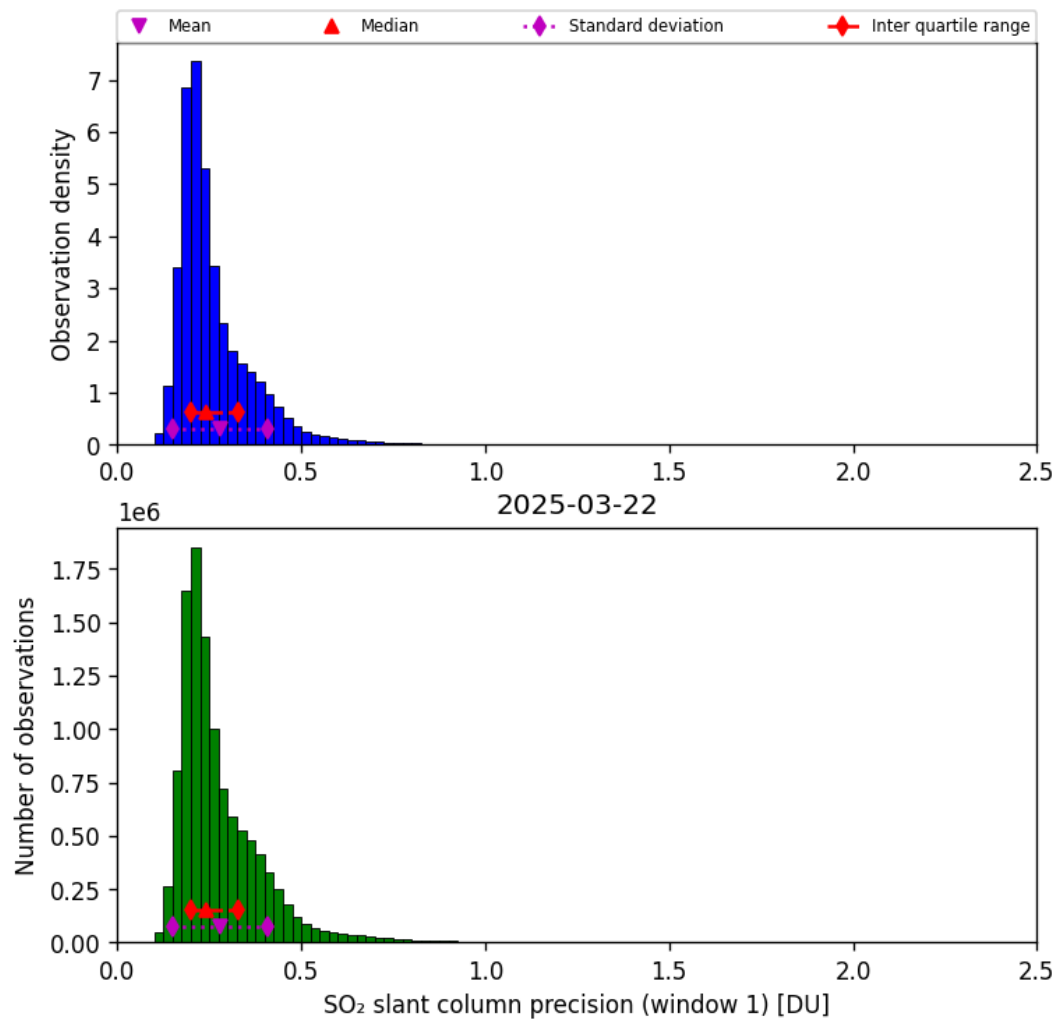


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-03-22 to 2025-03-22

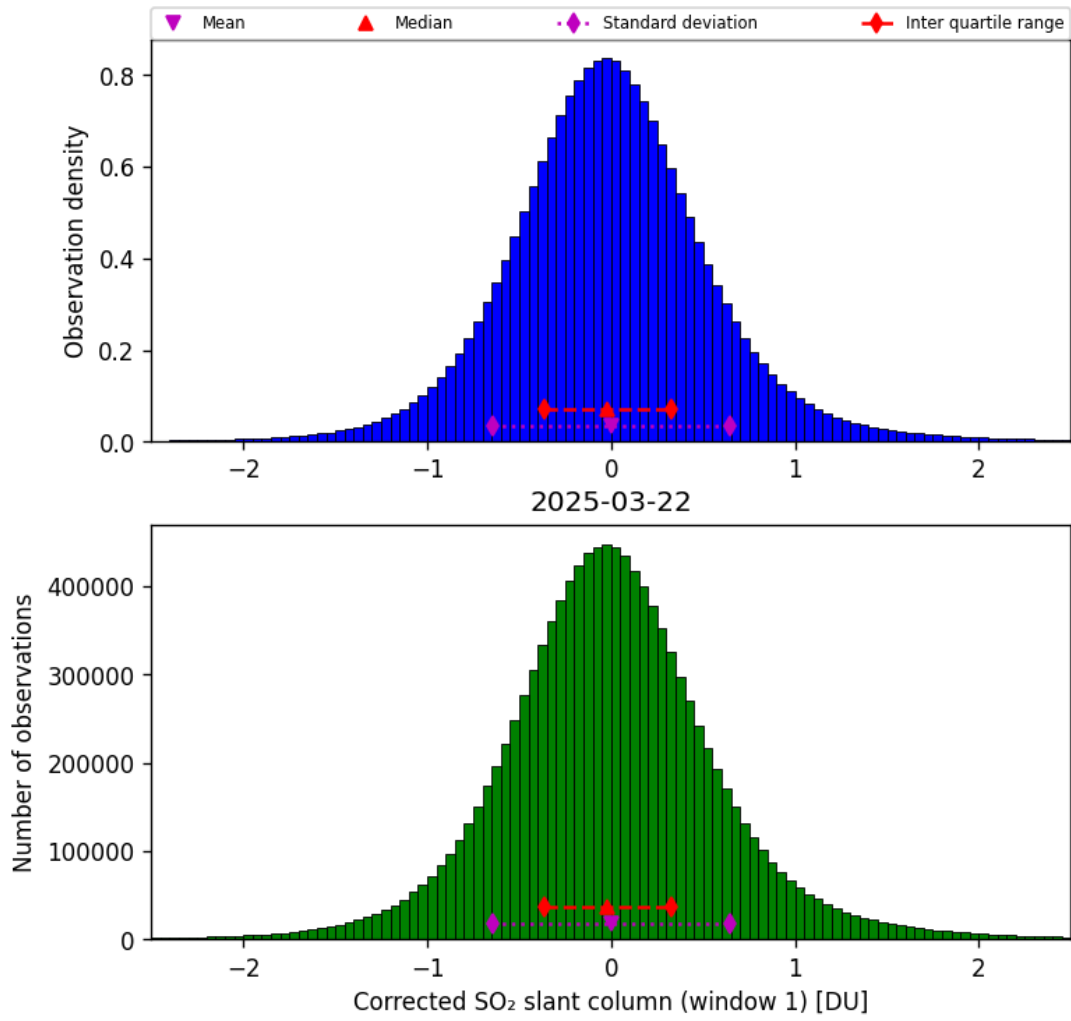


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-03-22 to 2025-03-22

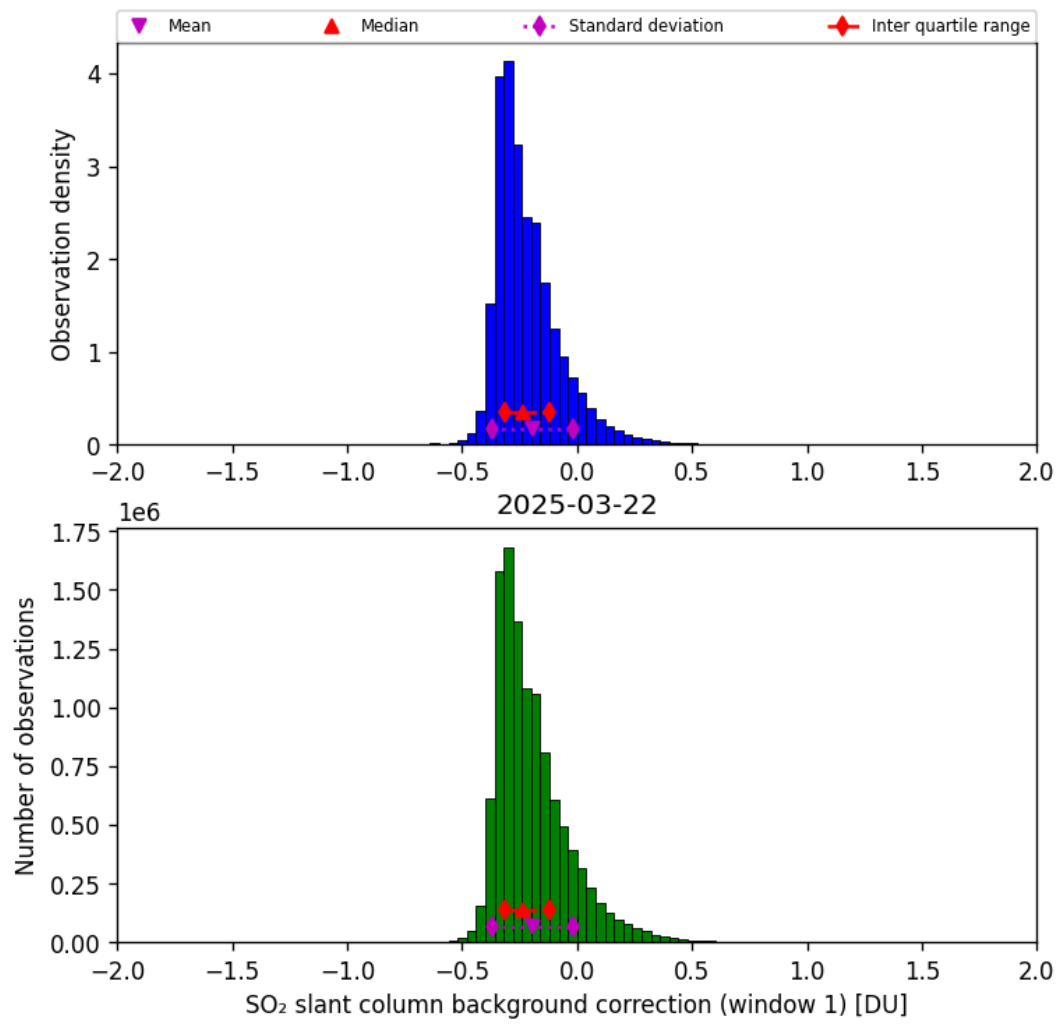


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-03-22 to 2025-03-22

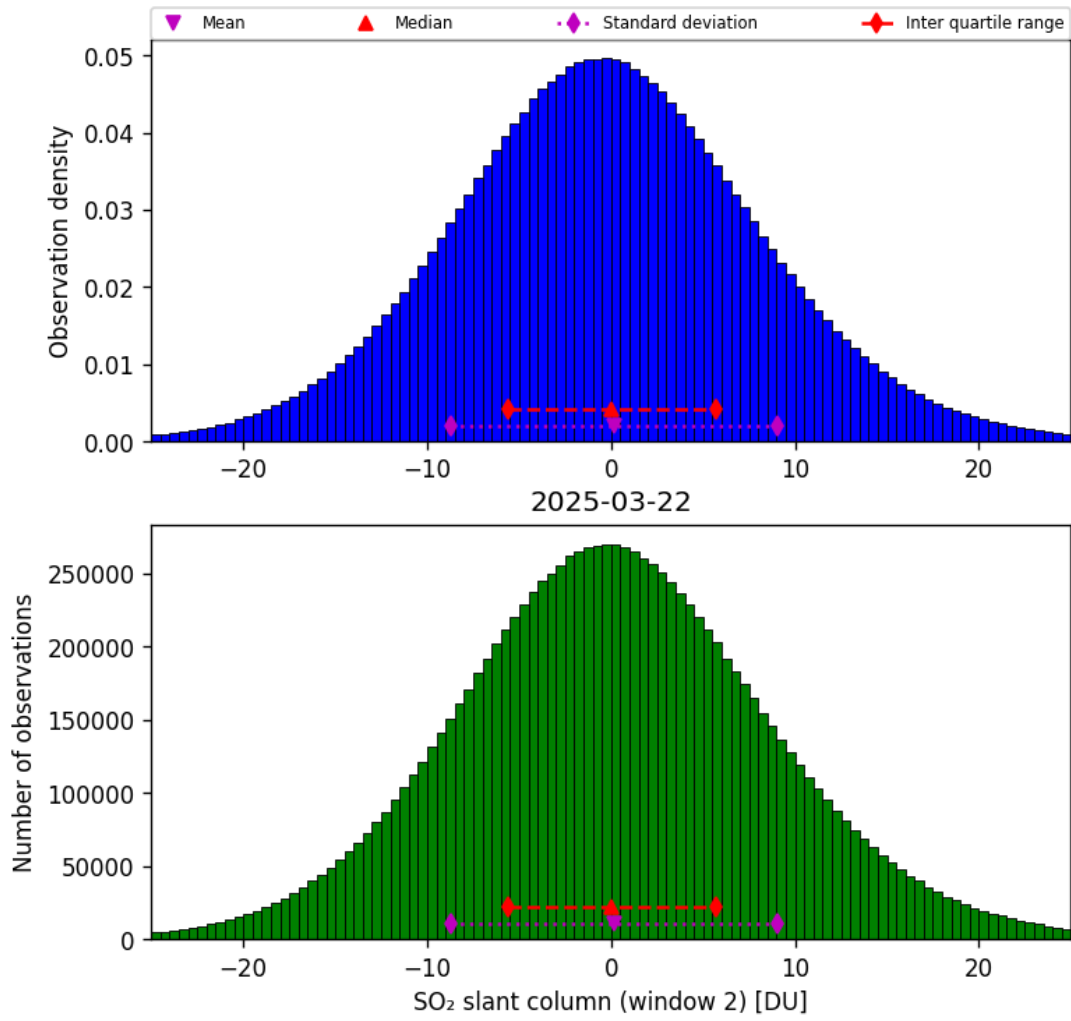


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-03-22 to 2025-03-22

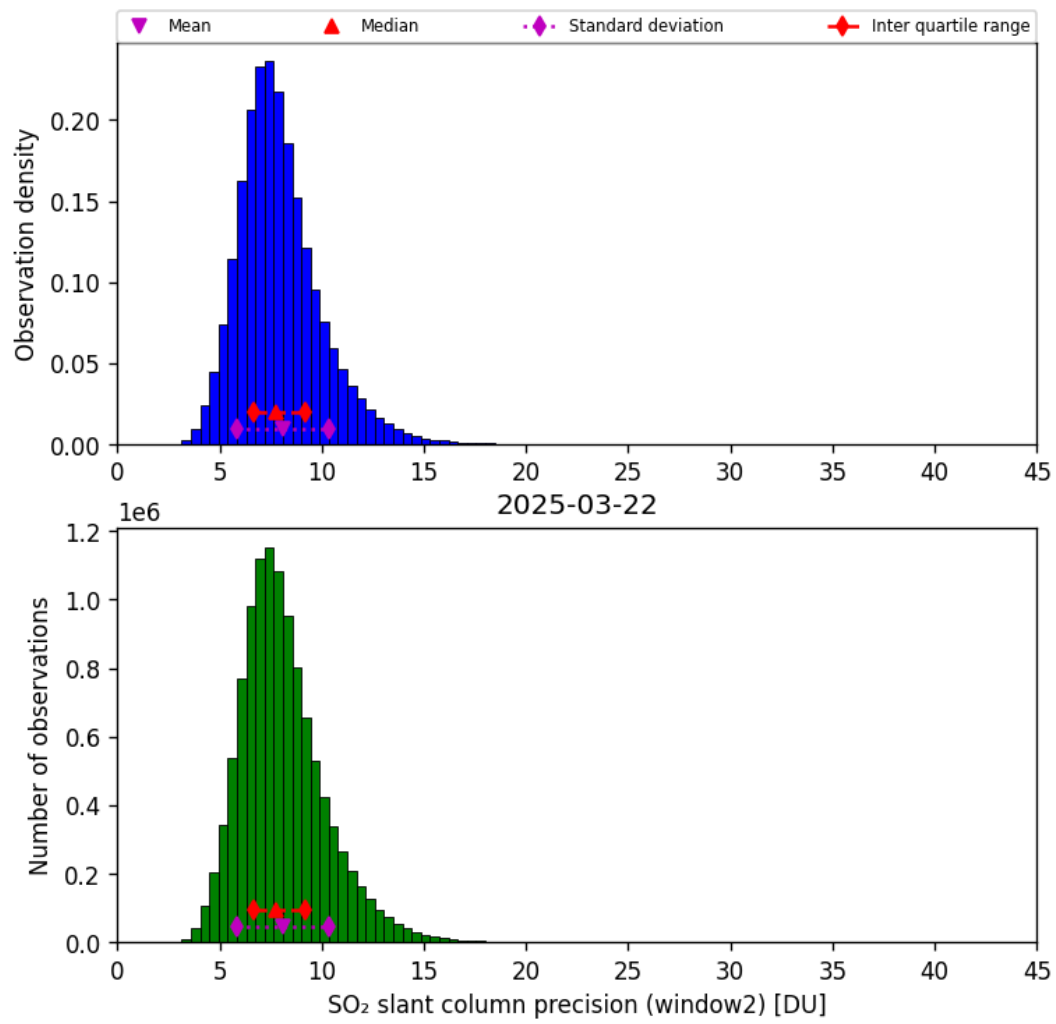


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-03-22 to 2025-03-22

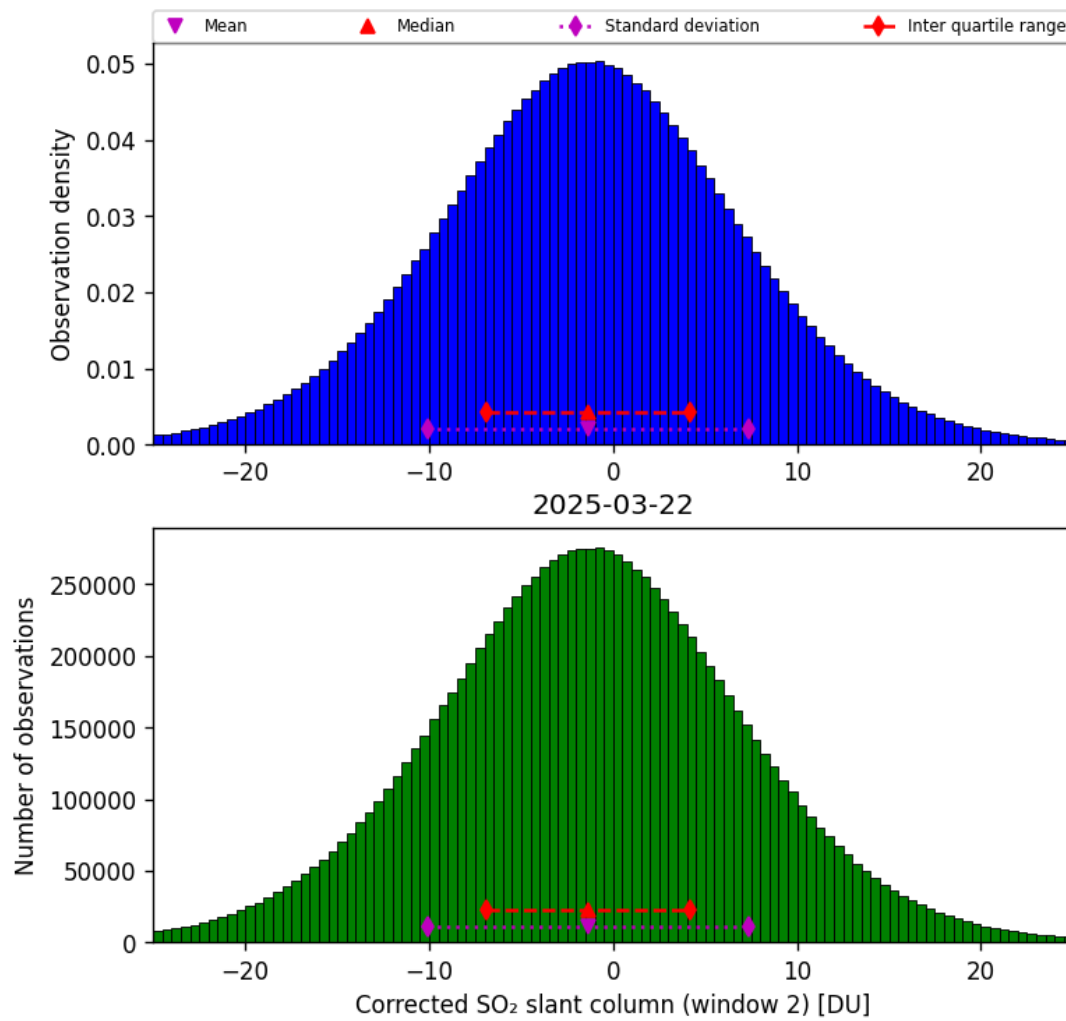


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-03-22 to 2025-03-22

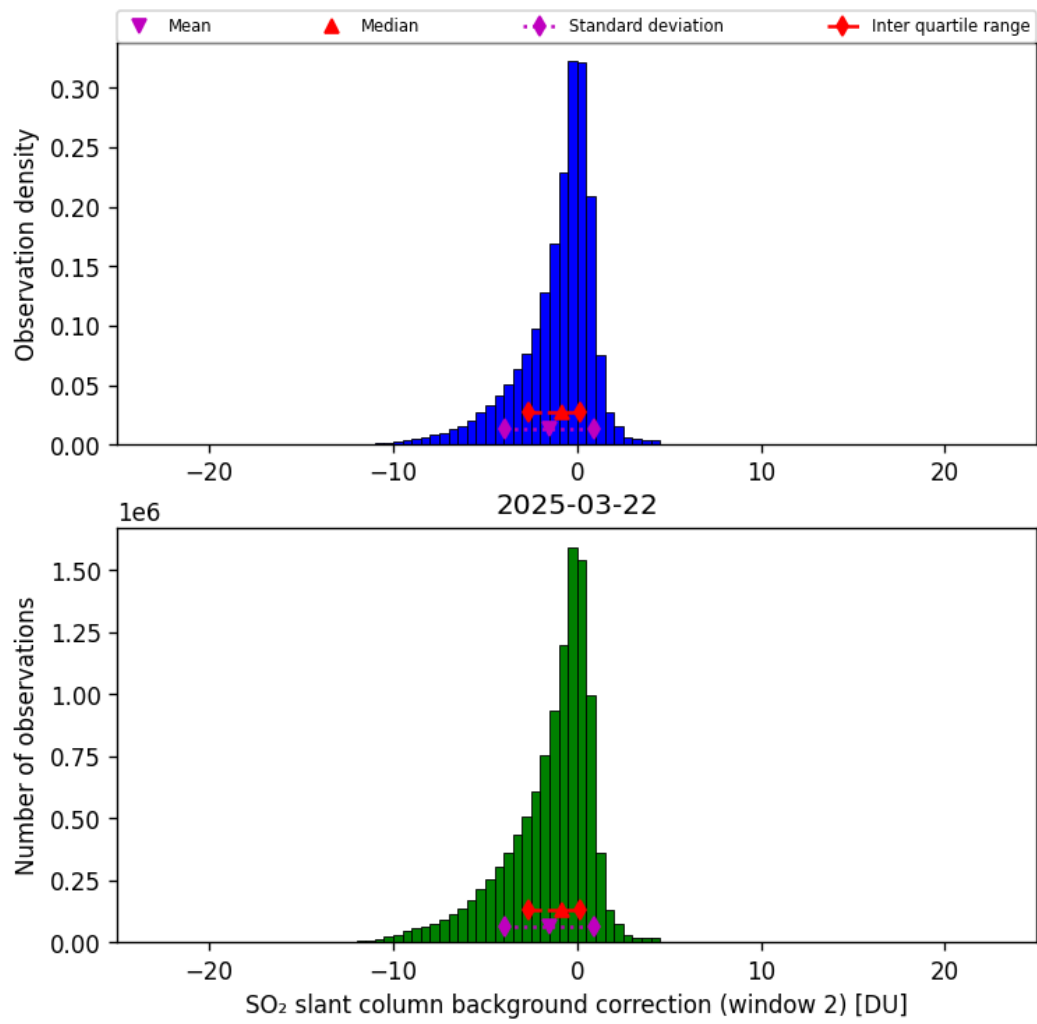


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-03-22 to 2025-03-22

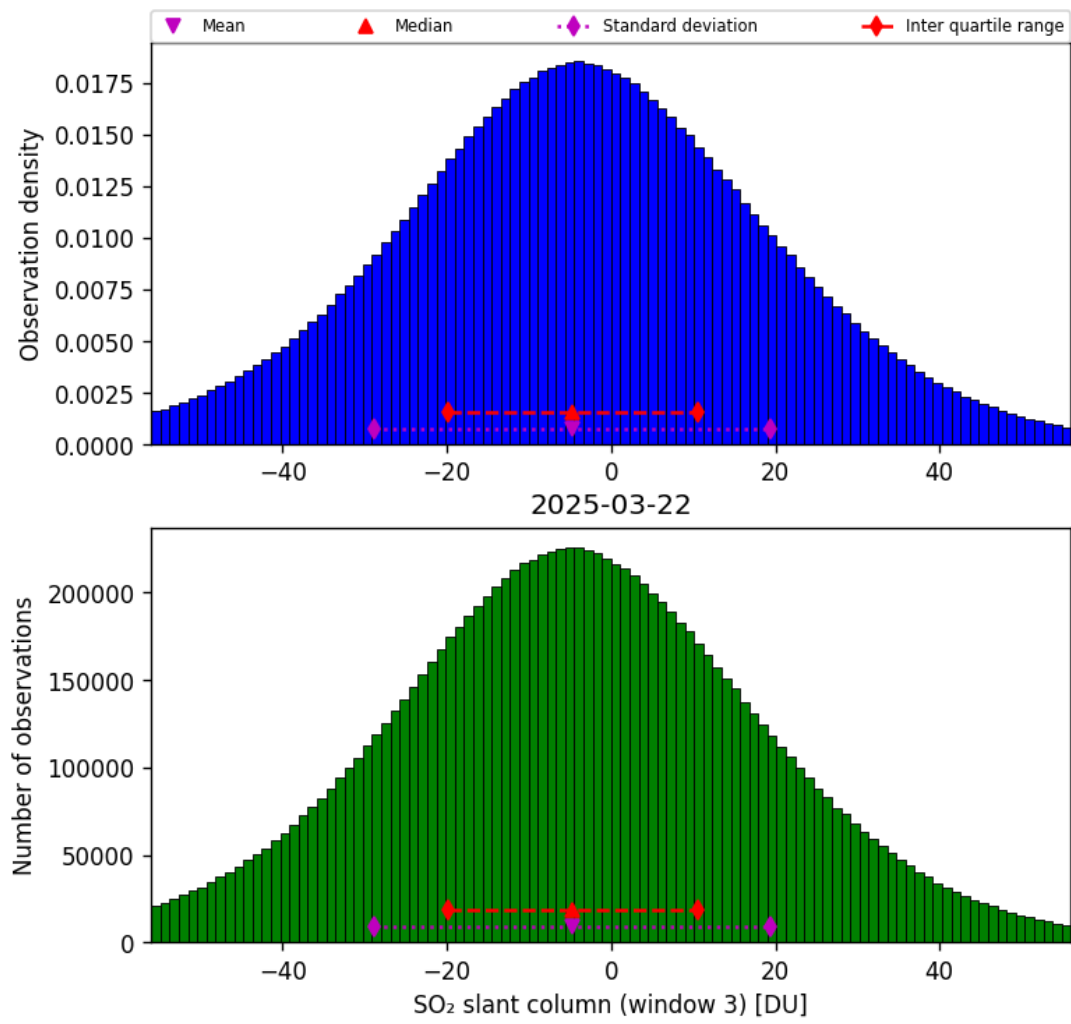


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-03-22 to 2025-03-22

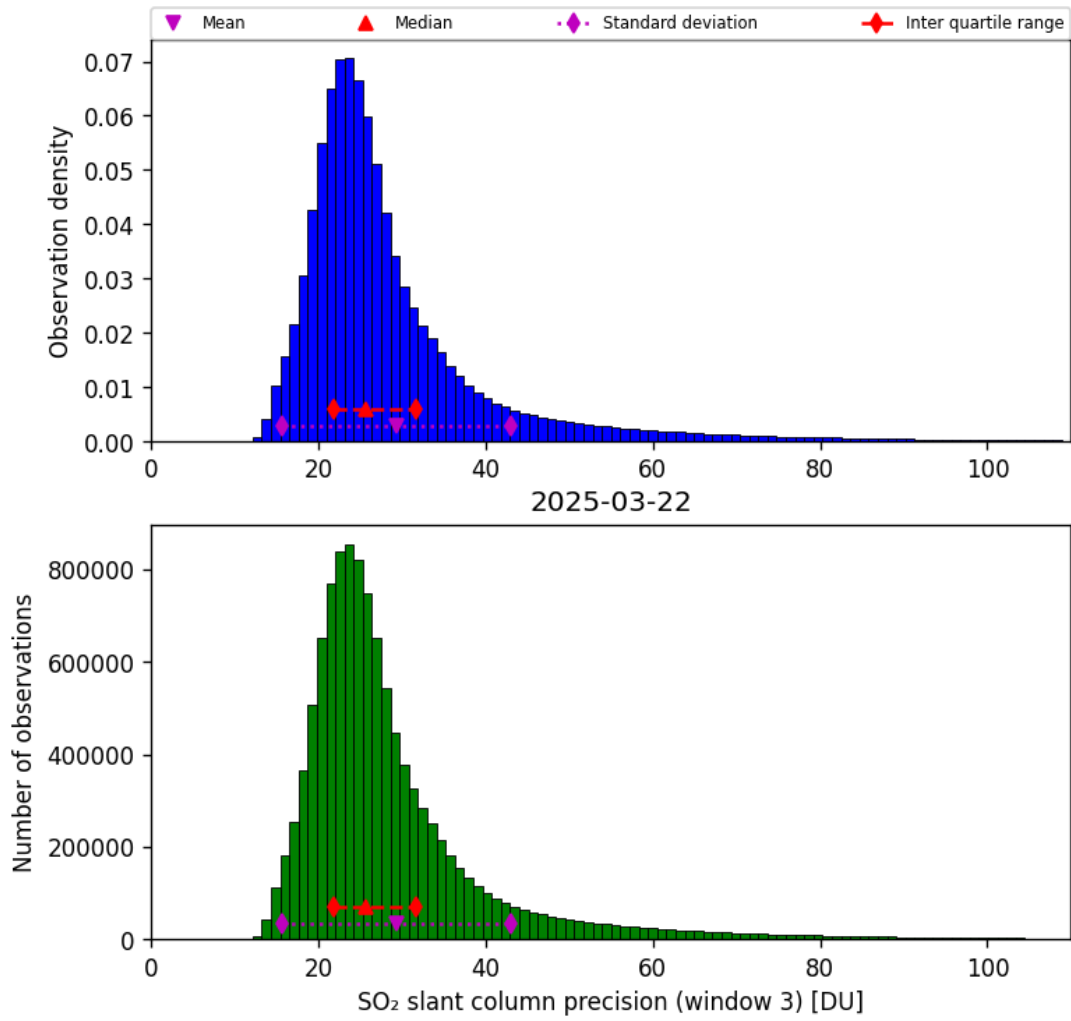


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-03-22 to 2025-03-22

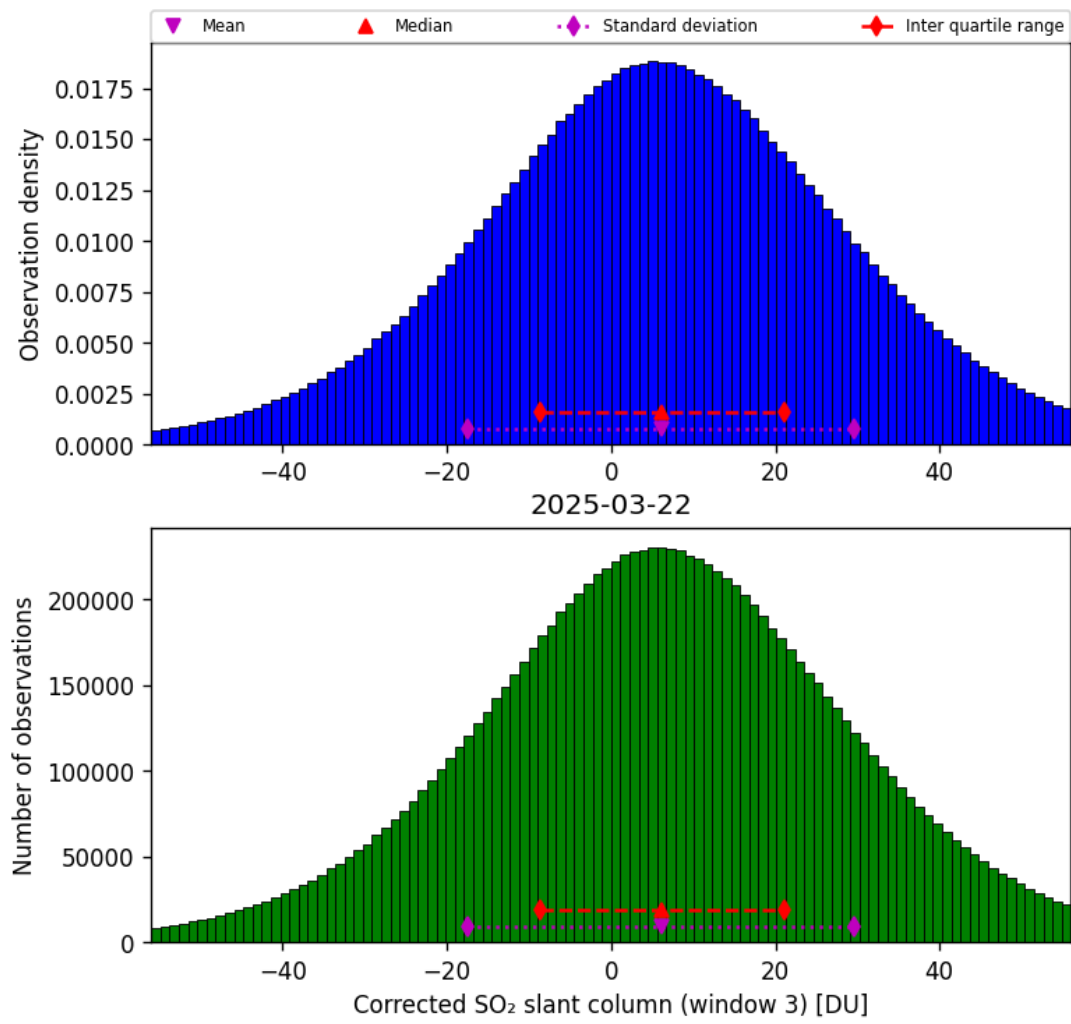


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-03-22 to 2025-03-22

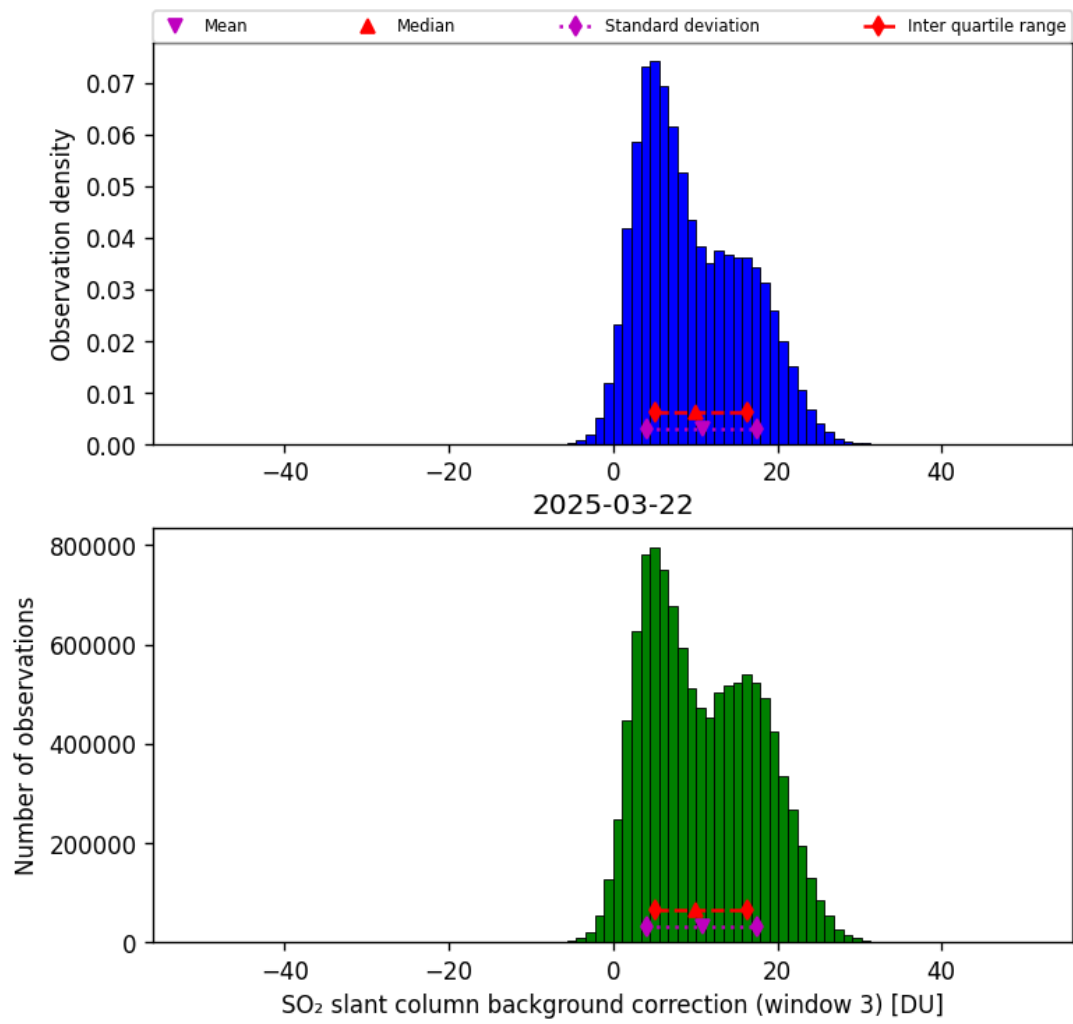


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-03-22 to 2025-03-22

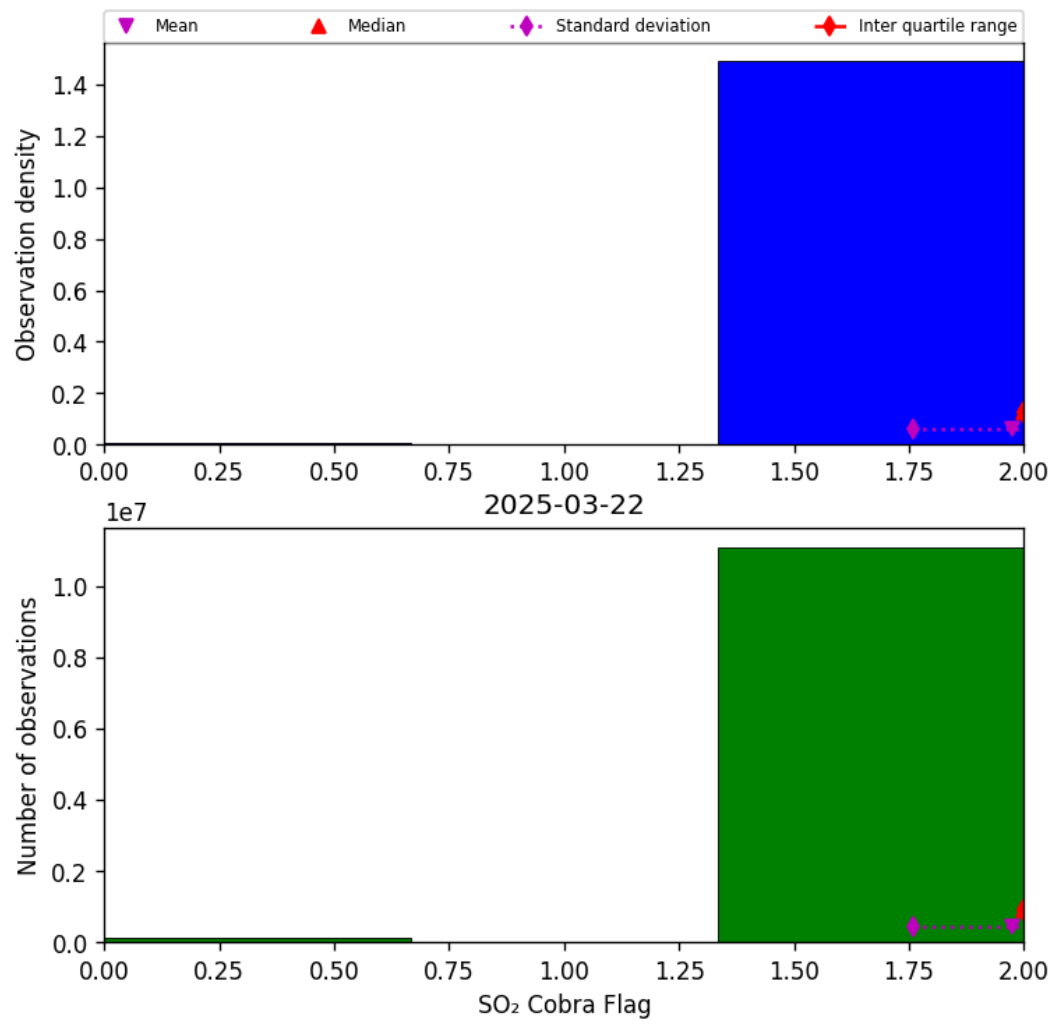


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-03-22 to 2025-03-22

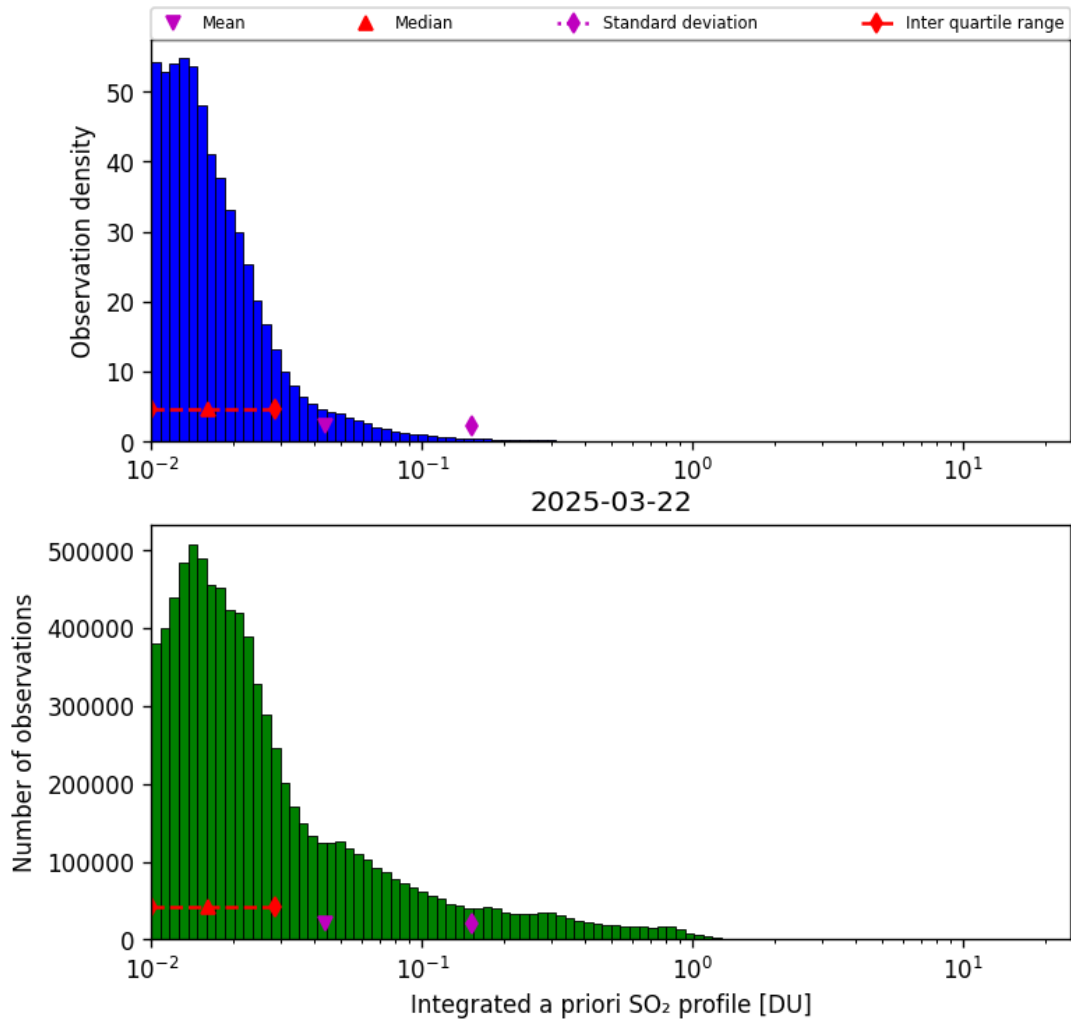


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-03-22 to 2025-03-22

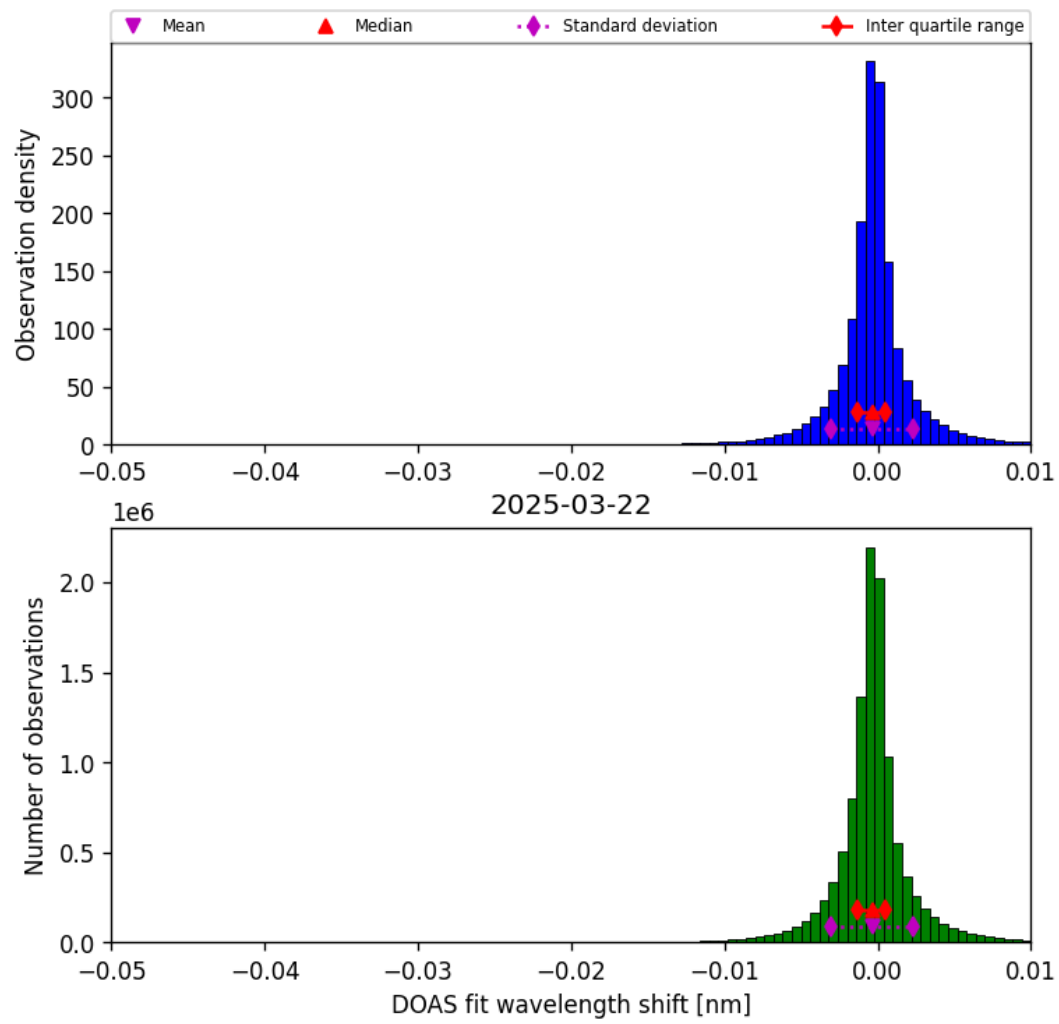


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-22 to 2025-03-22

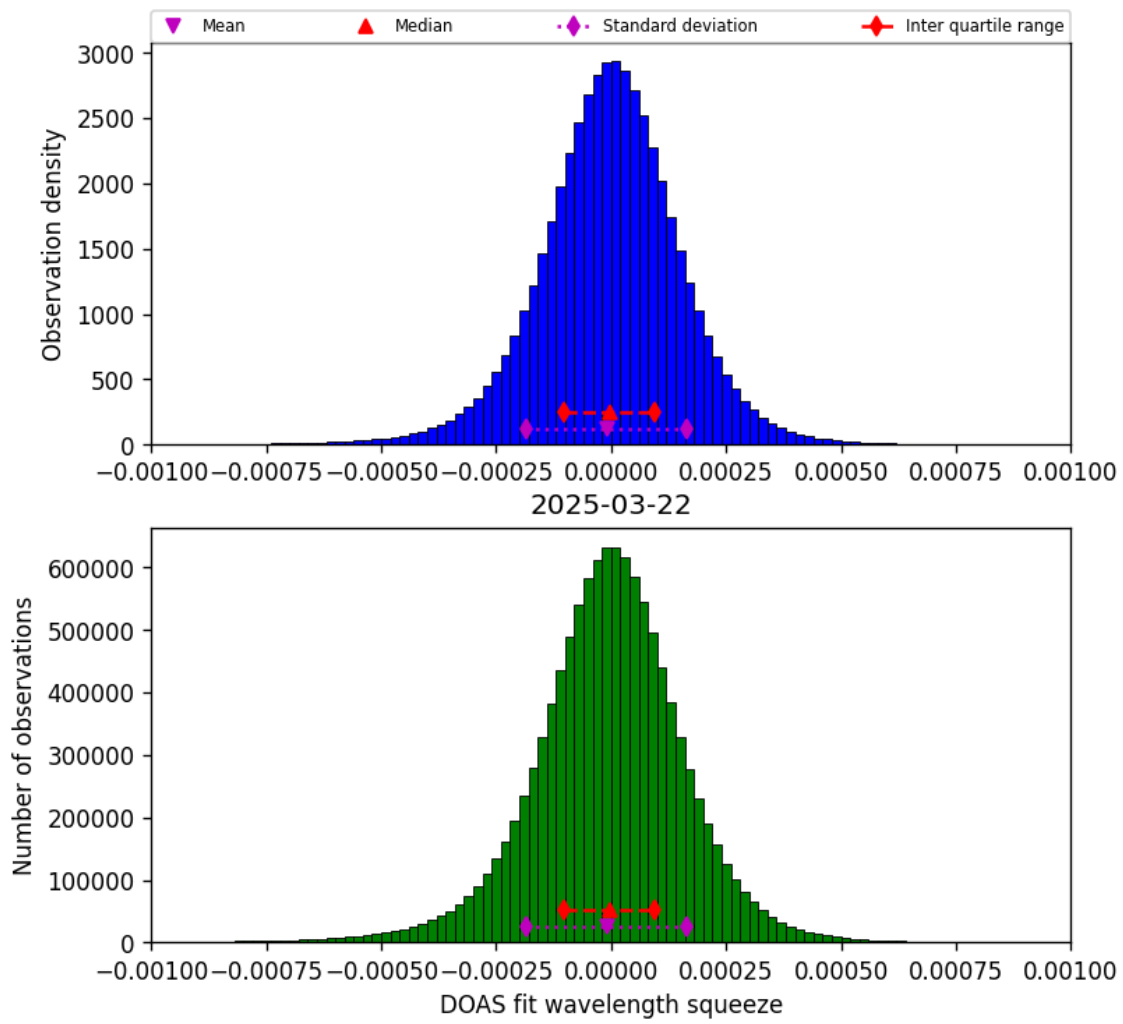


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-22 to 2025-03-22

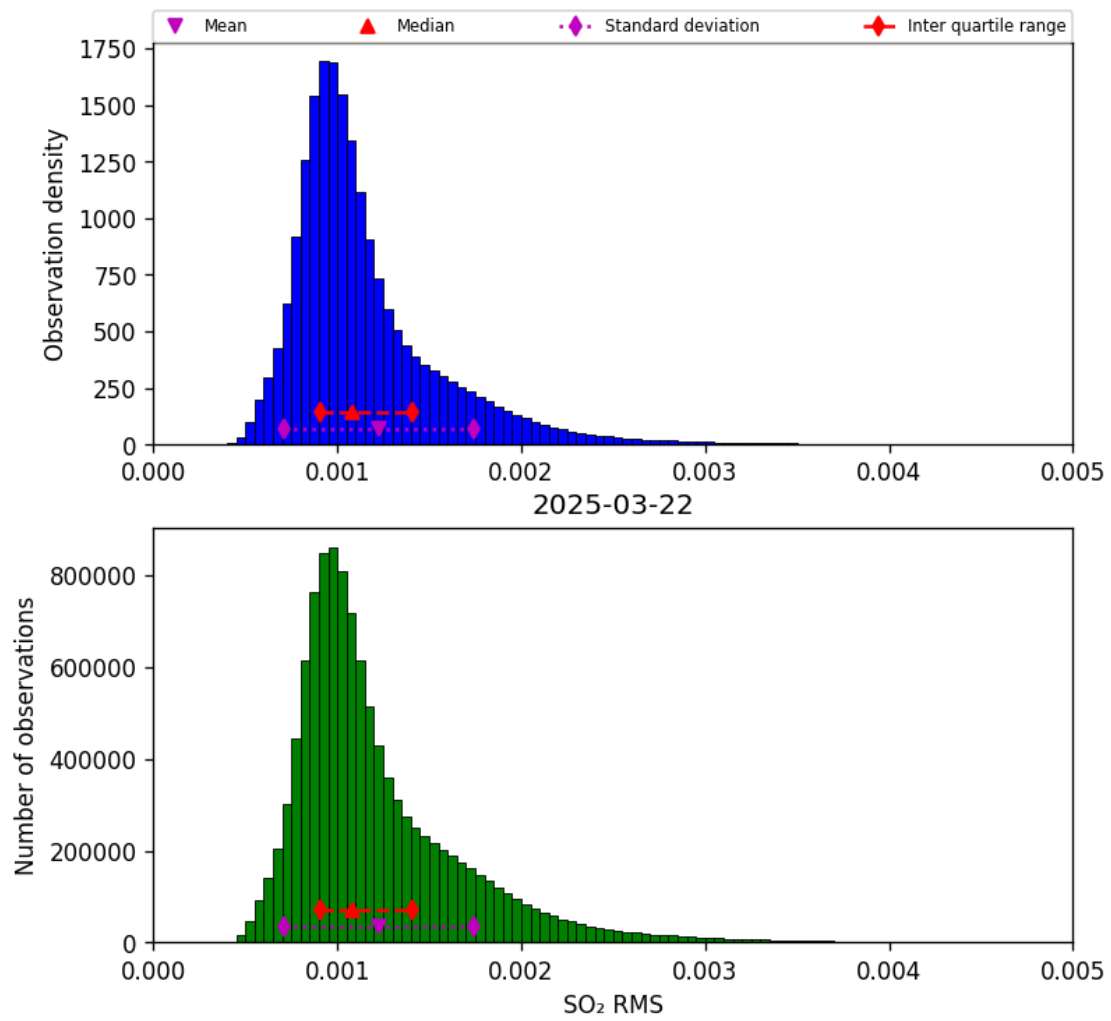


Figure 79: Histogram of “SO₂ RMS” for 2025-03-22 to 2025-03-22

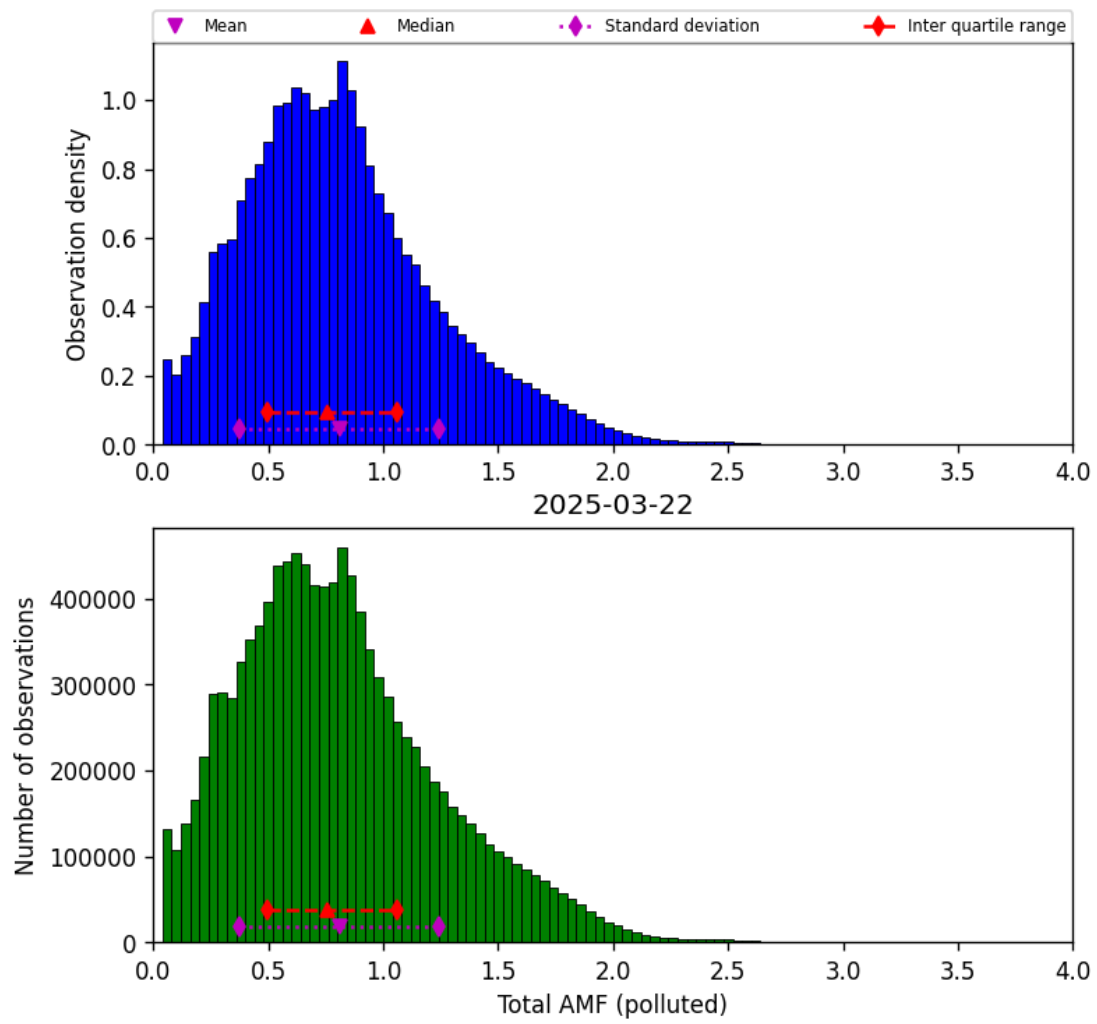


Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-22 to 2025-03-22

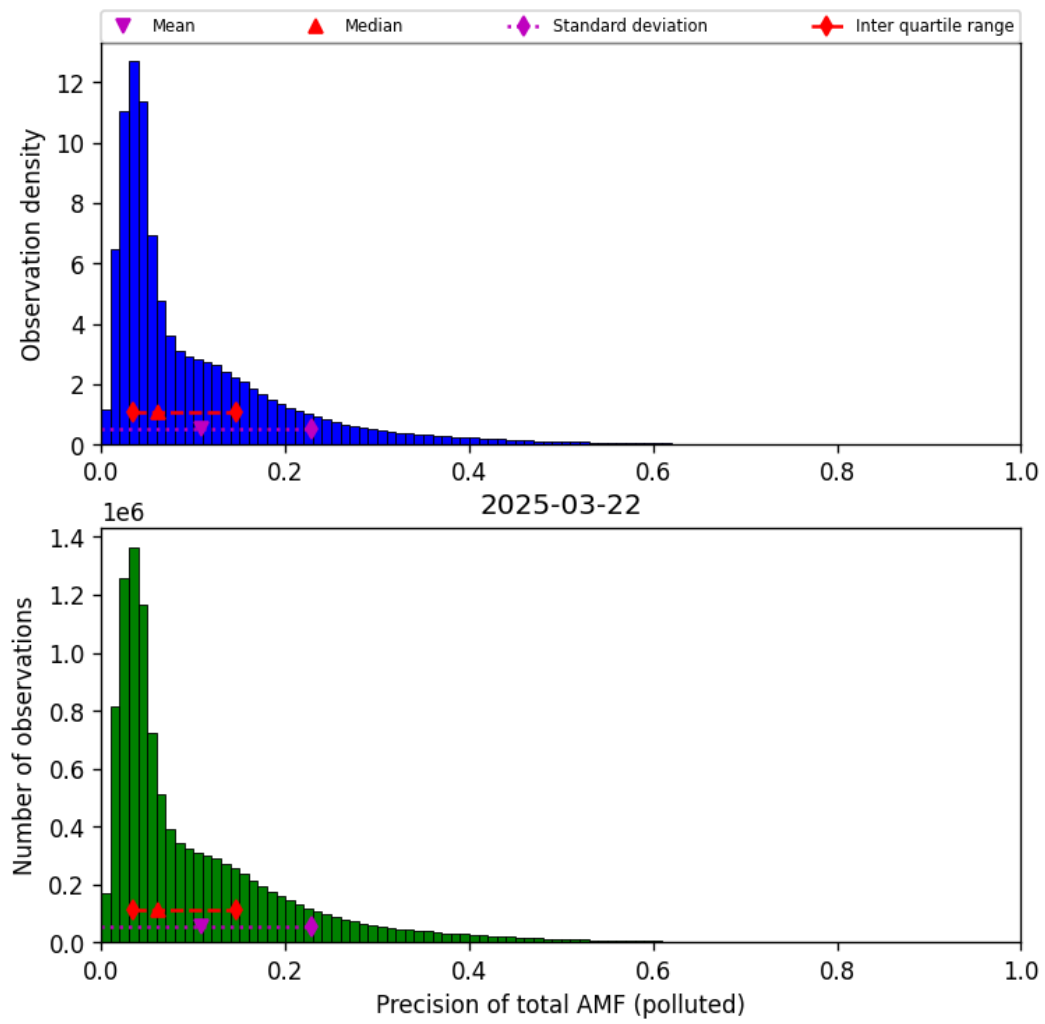


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-22 to 2025-03-22

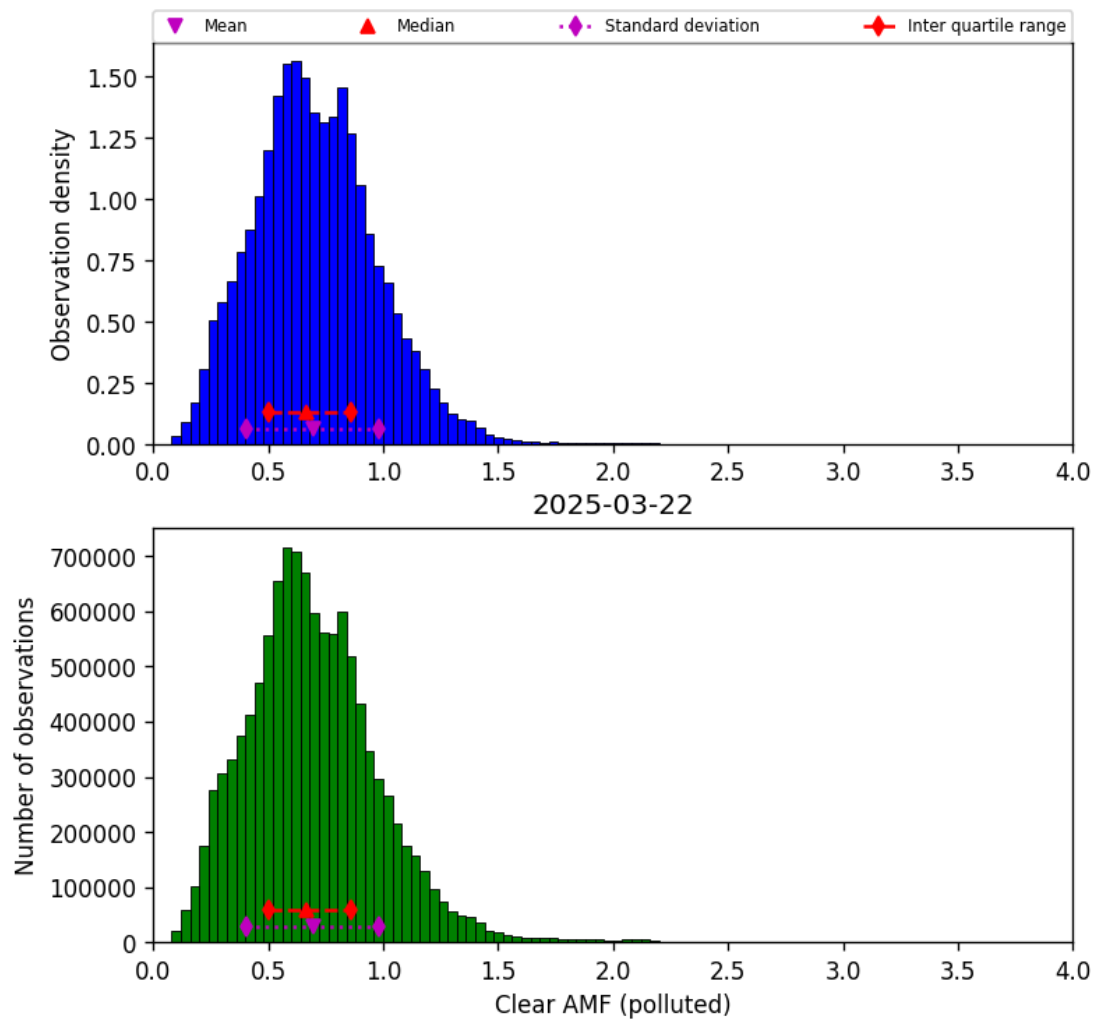


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-03-22 to 2025-03-22

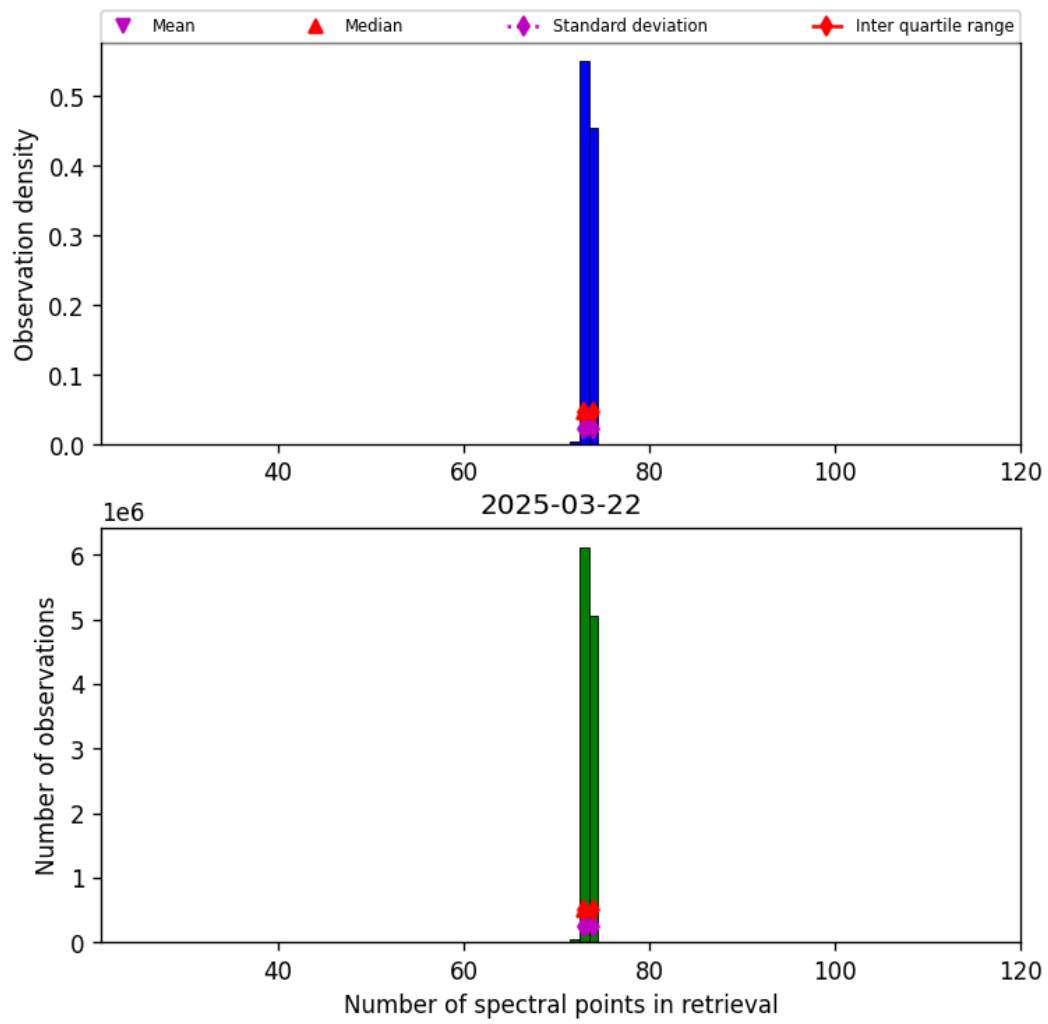


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-22 to 2025-03-22

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.

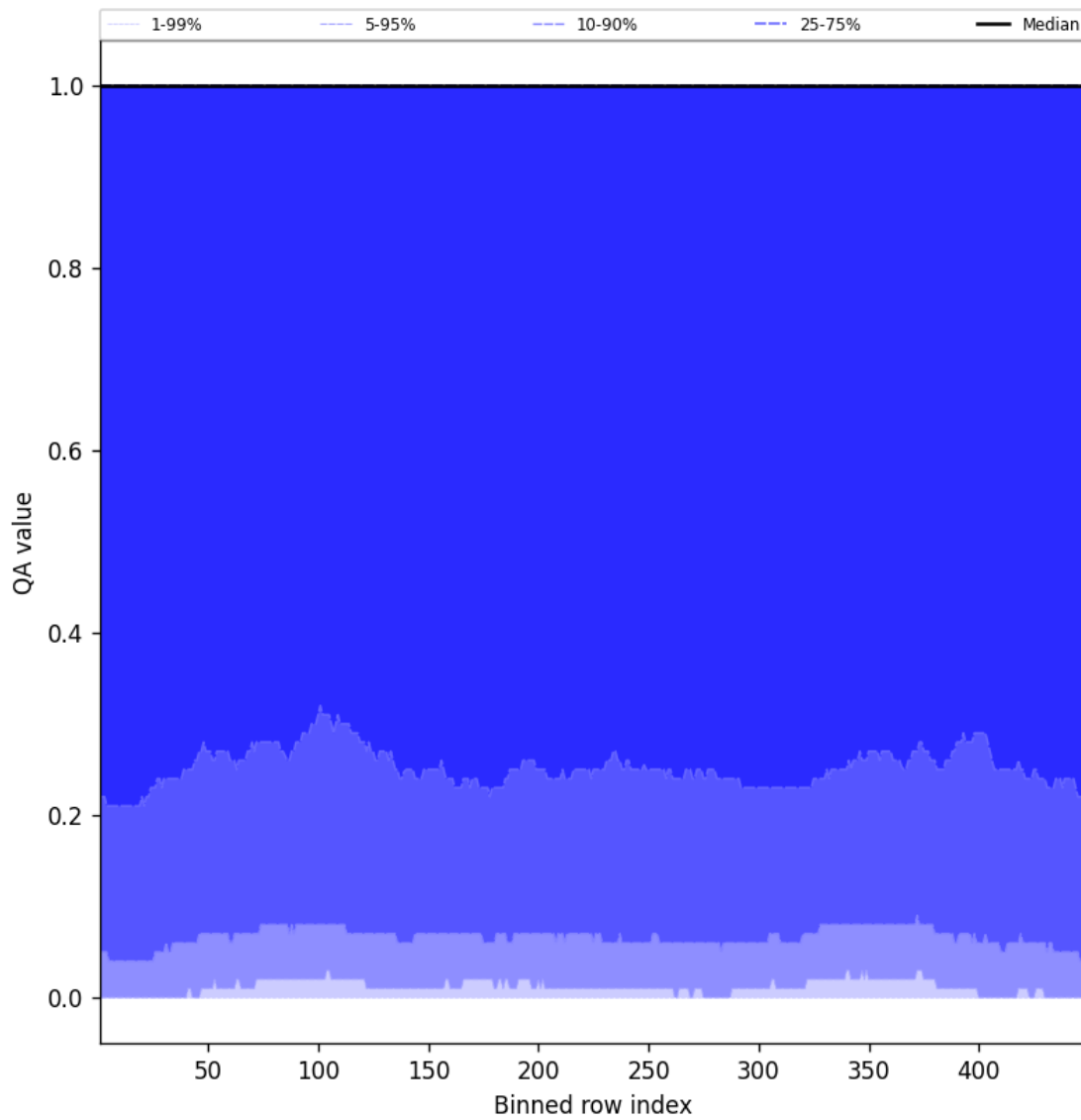


Figure 84: Along track statistics of “QA value” for 2025-03-22 to 2025-03-22

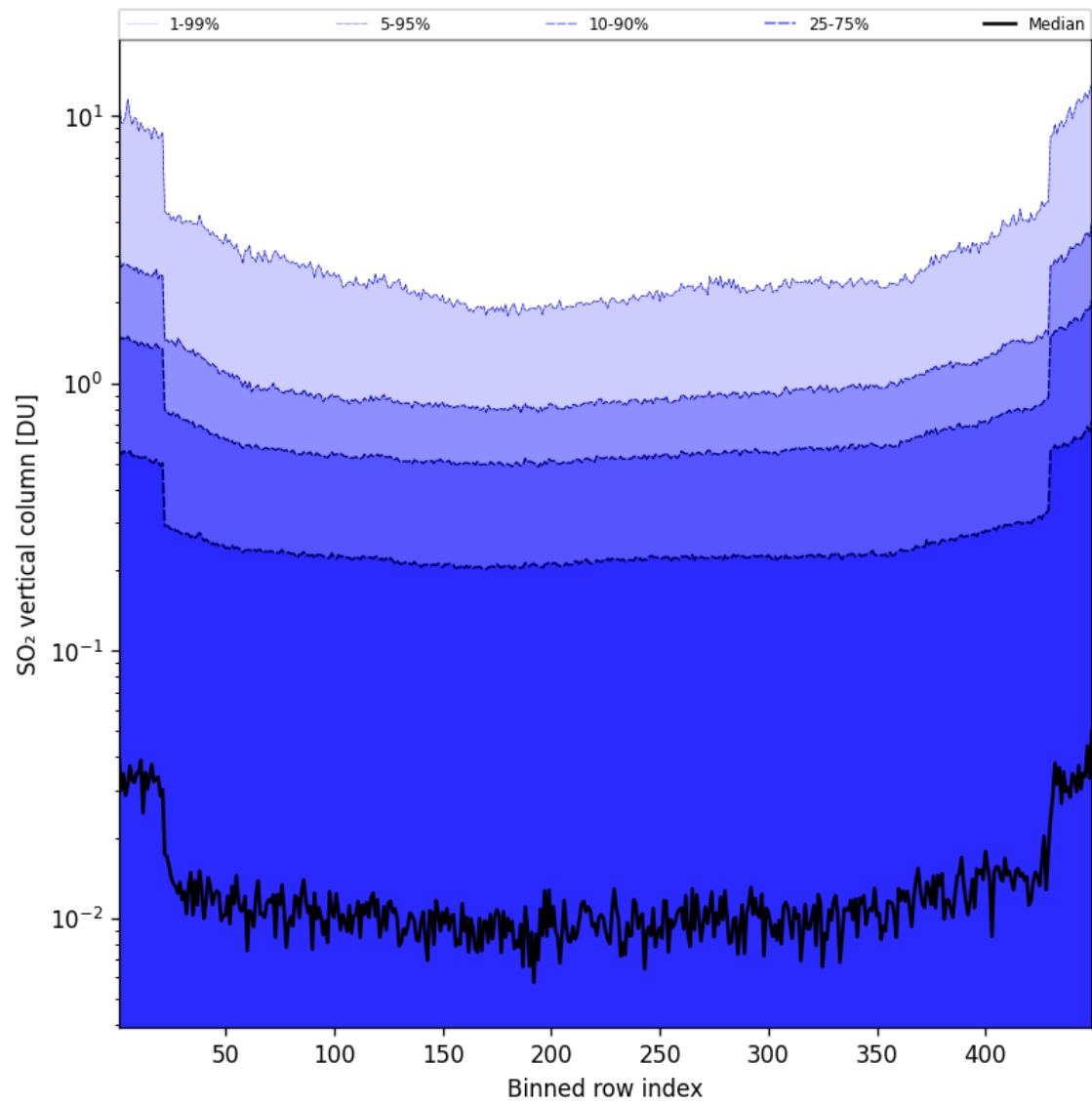


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-03-22 to 2025-03-22

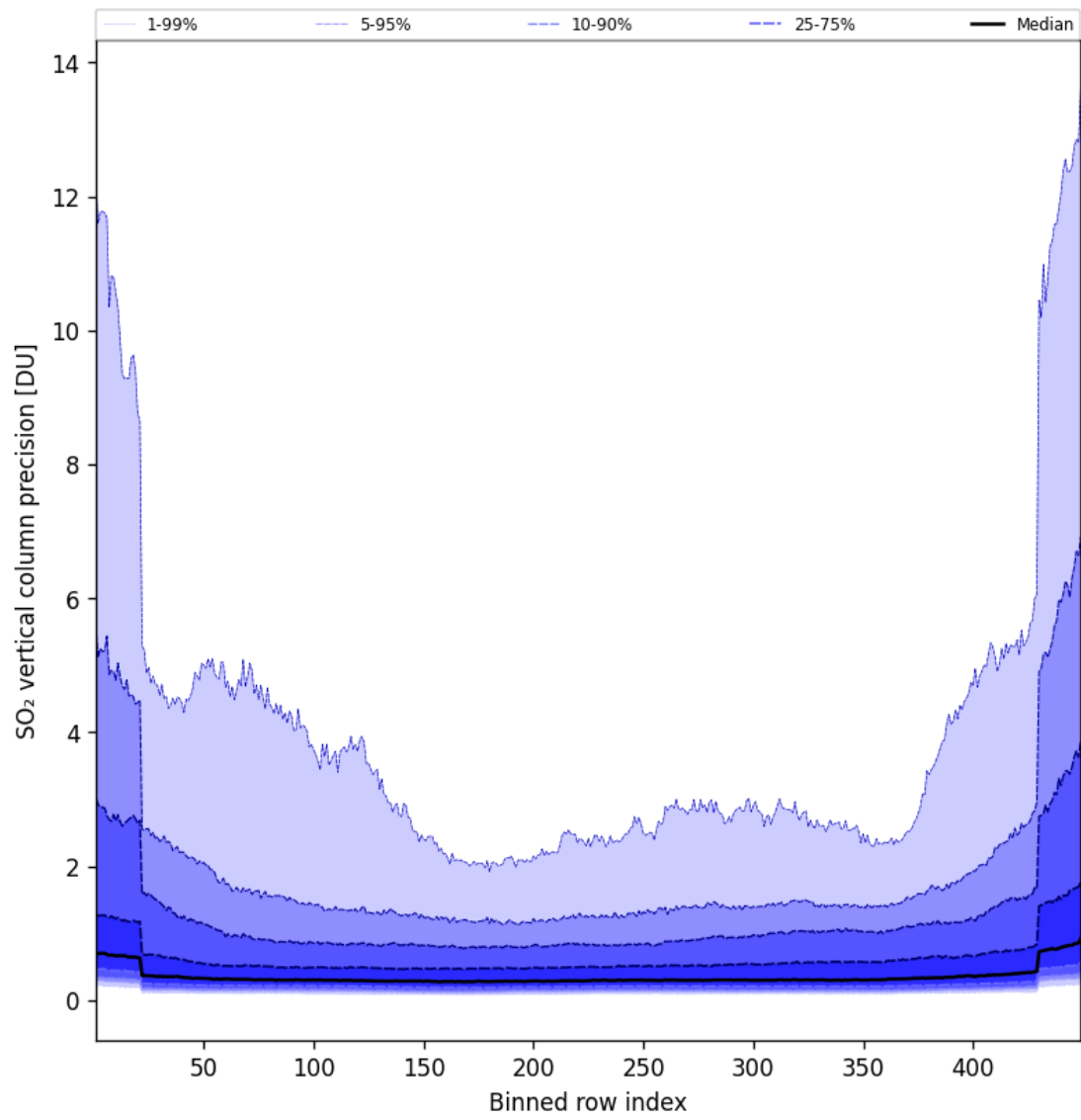


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-03-22 to 2025-03-22

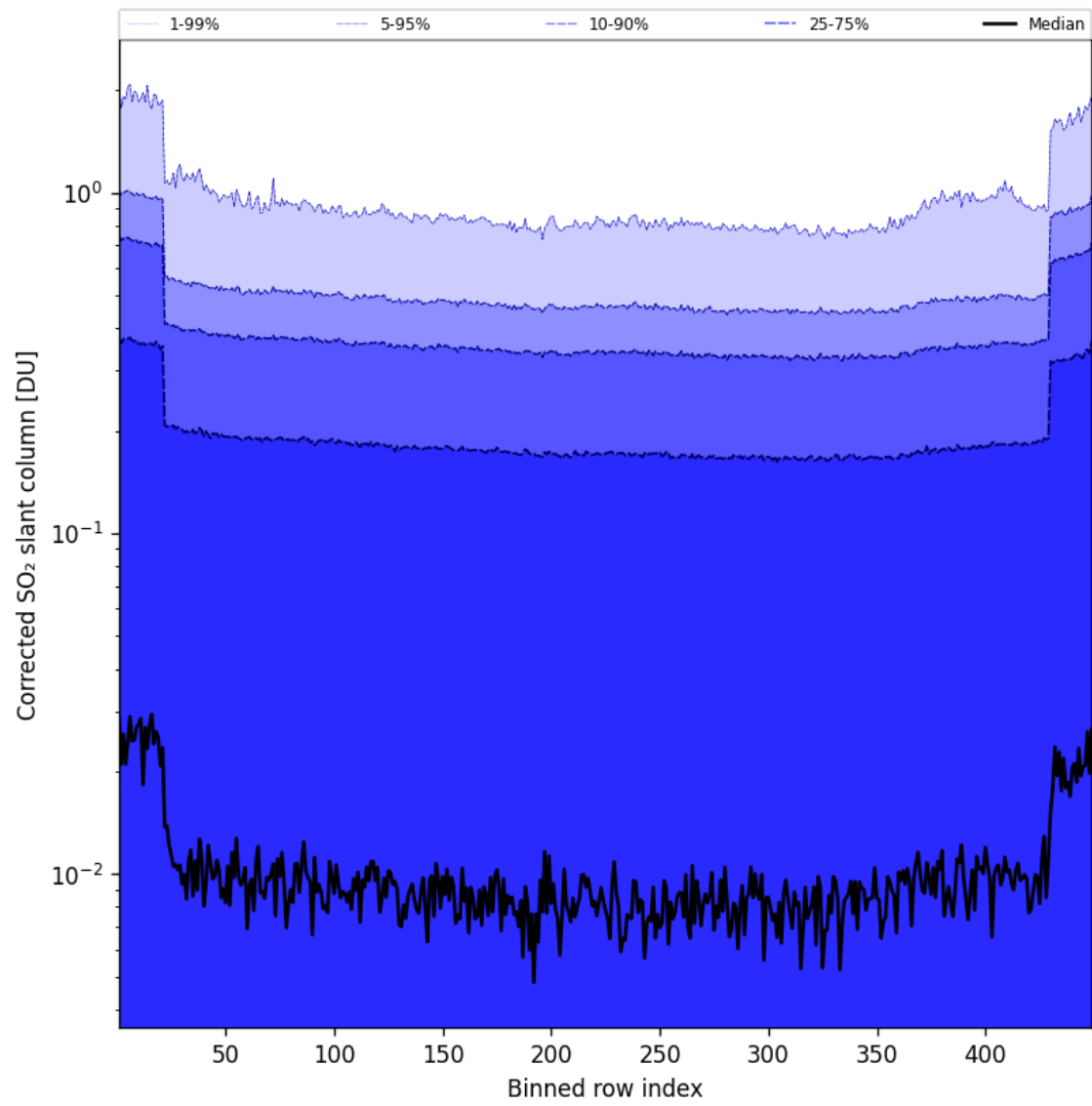


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-03-22 to 2025-03-22

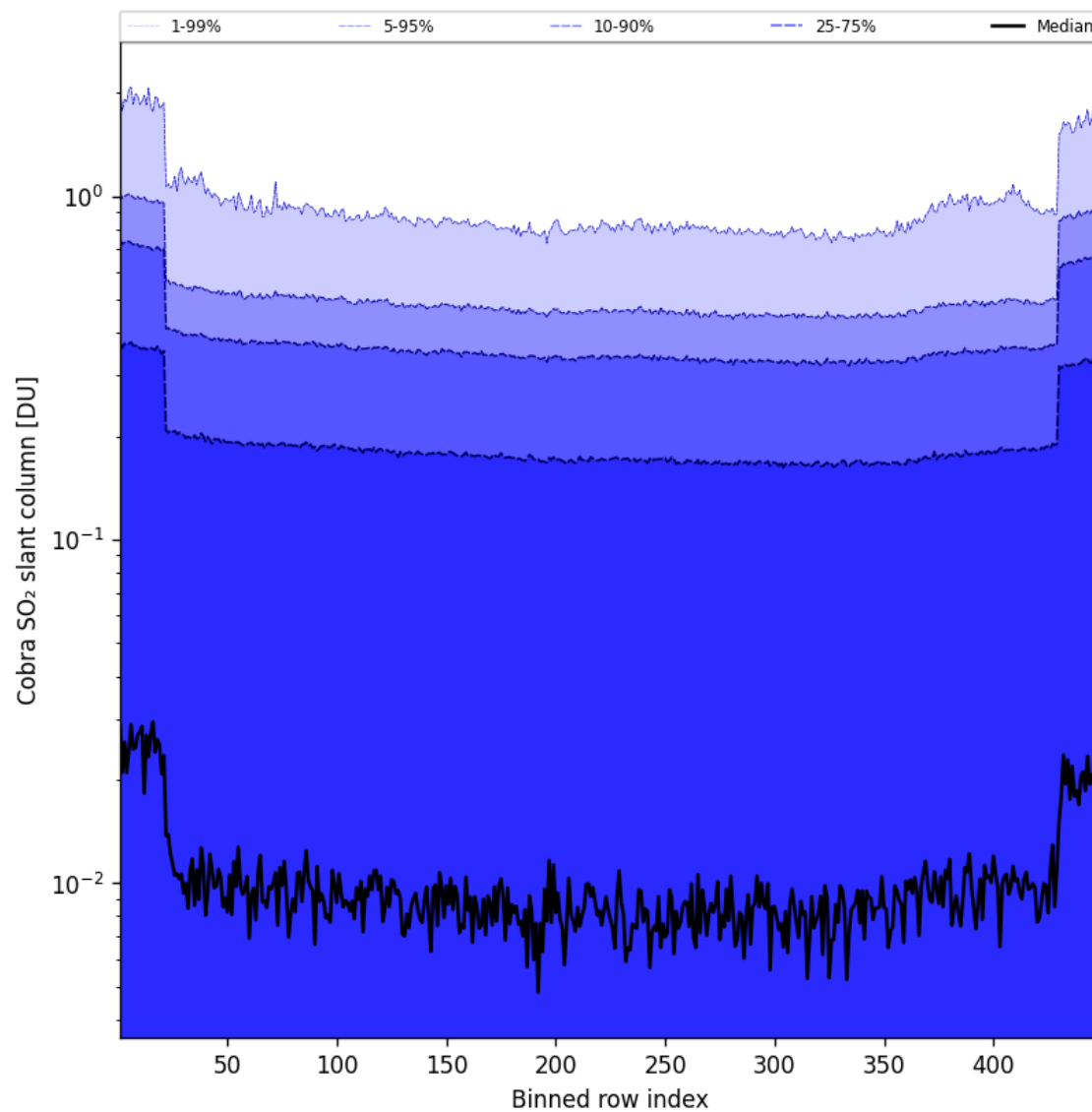


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-03-22 to 2025-03-22

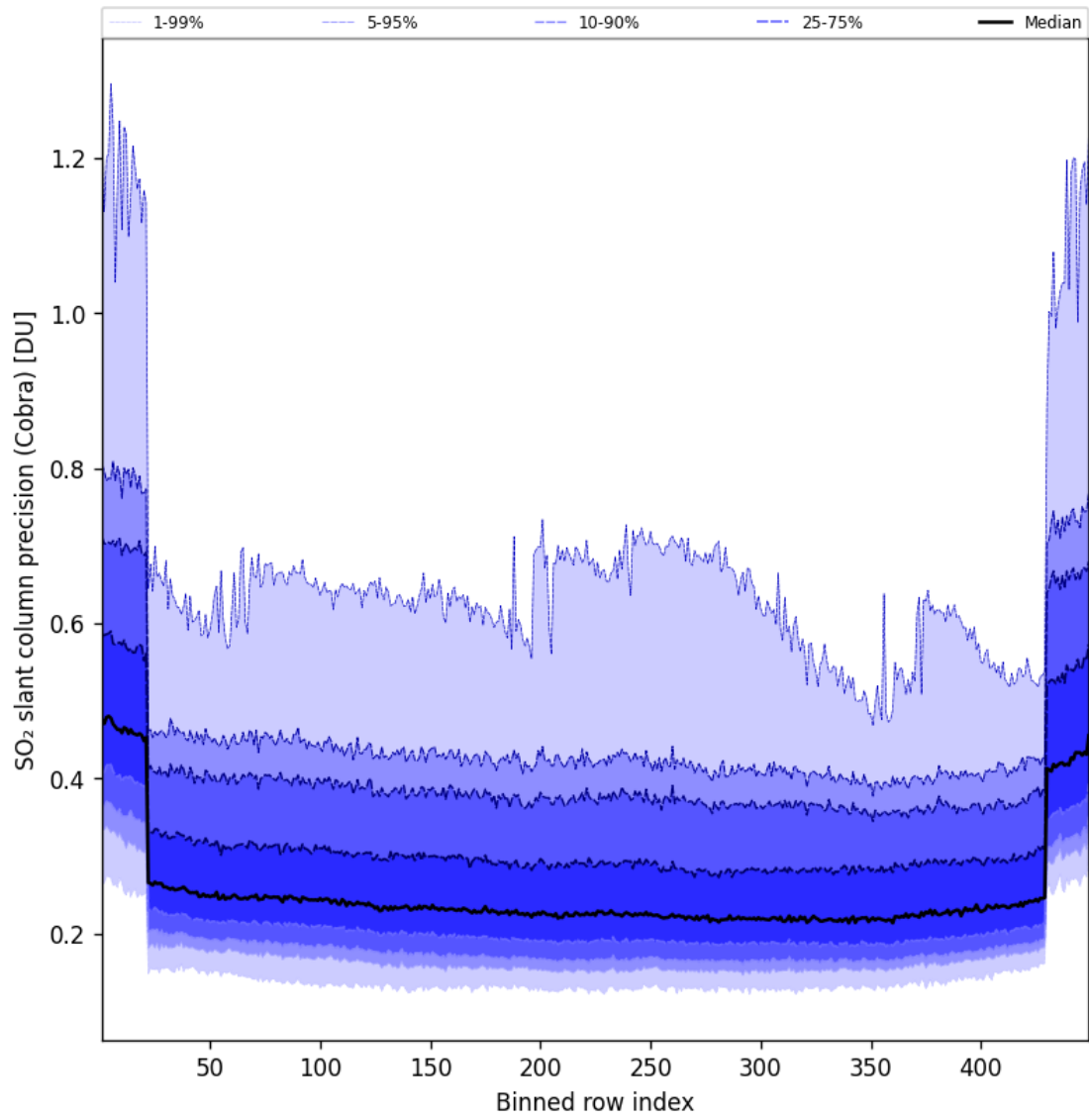


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-03-22 to 2025-03-22

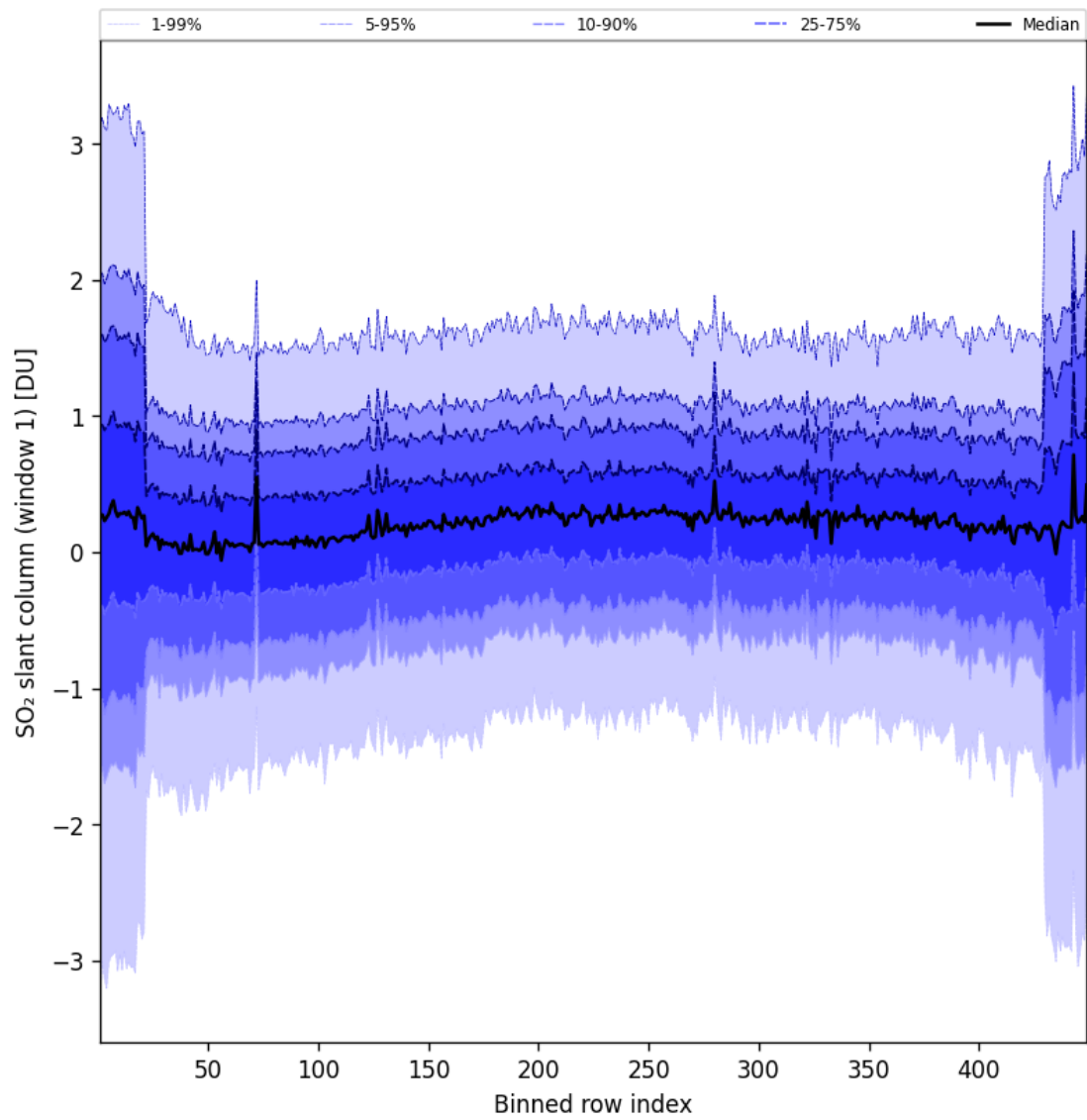


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-03-22 to 2025-03-22

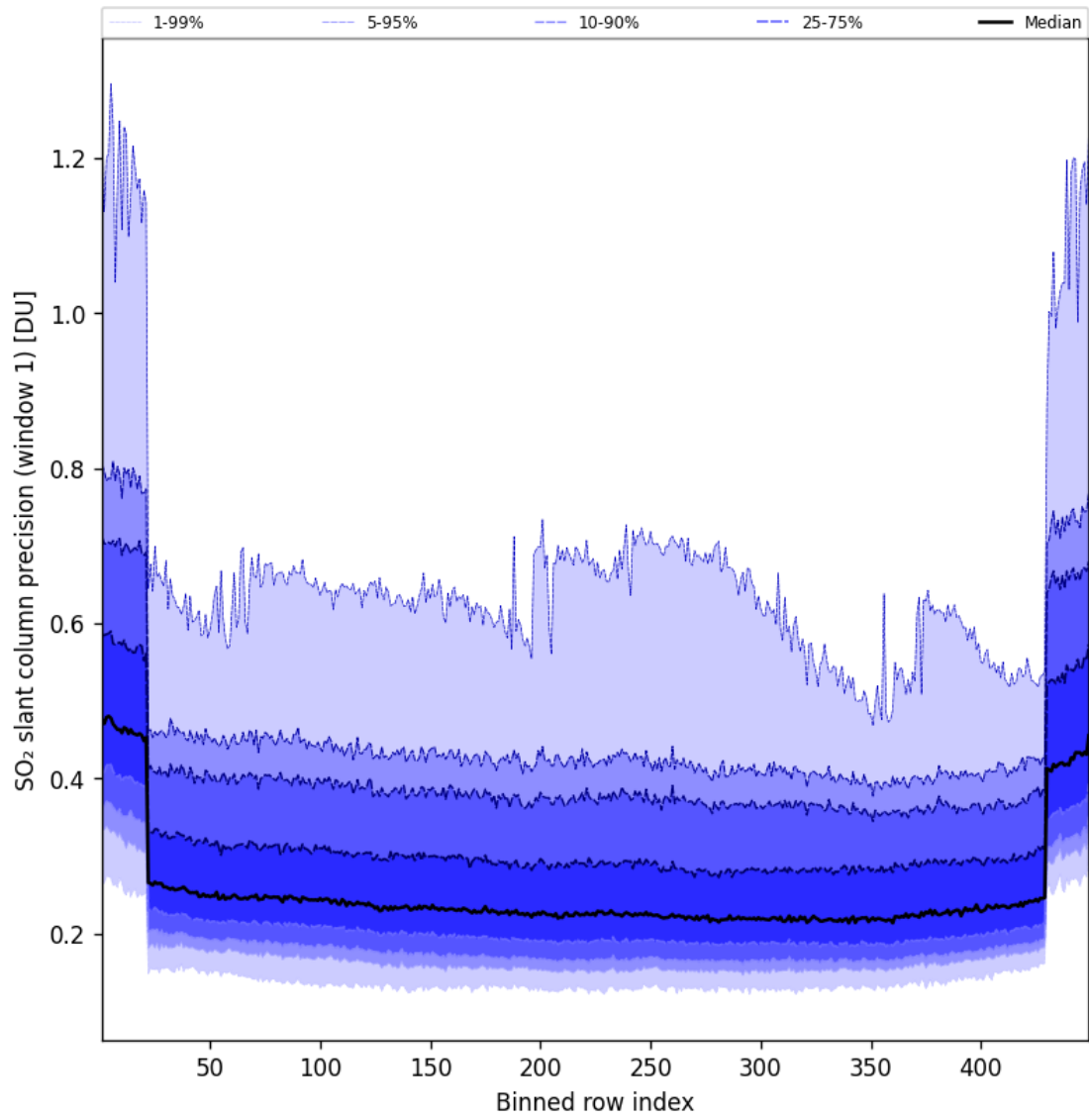


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-03-22 to 2025-03-22

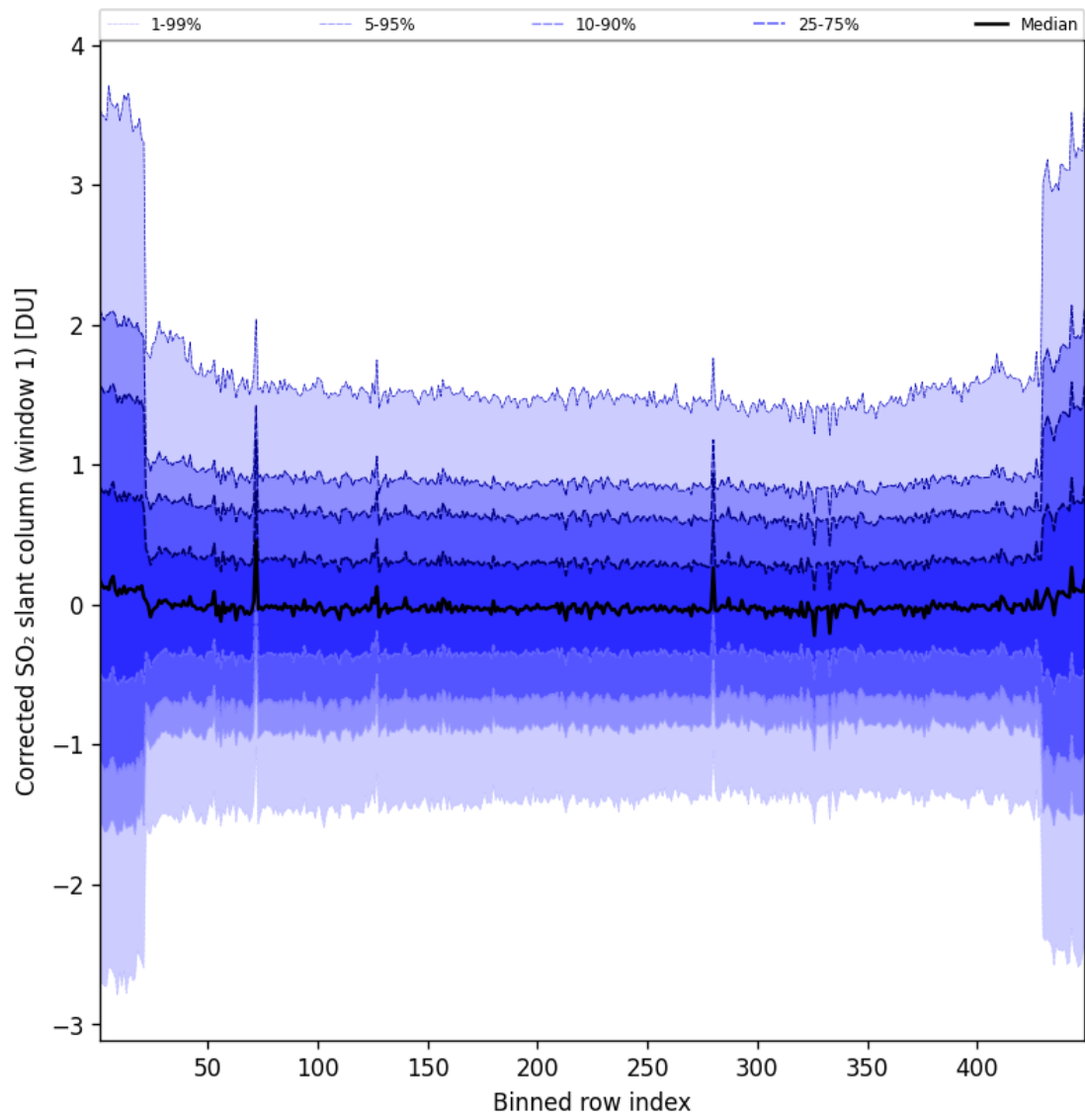


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-03-22 to 2025-03-22

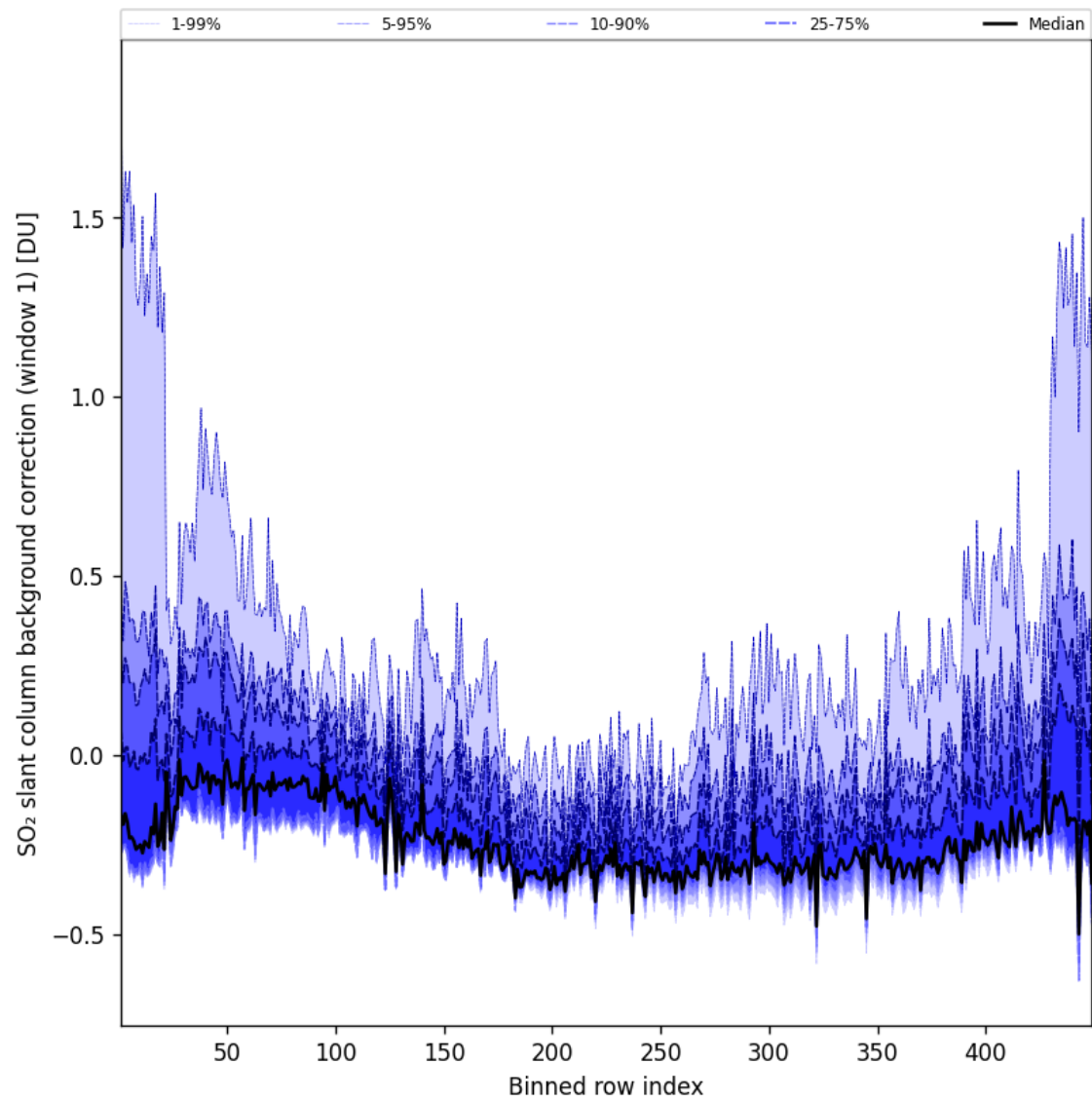


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-03-22 to 2025-03-22

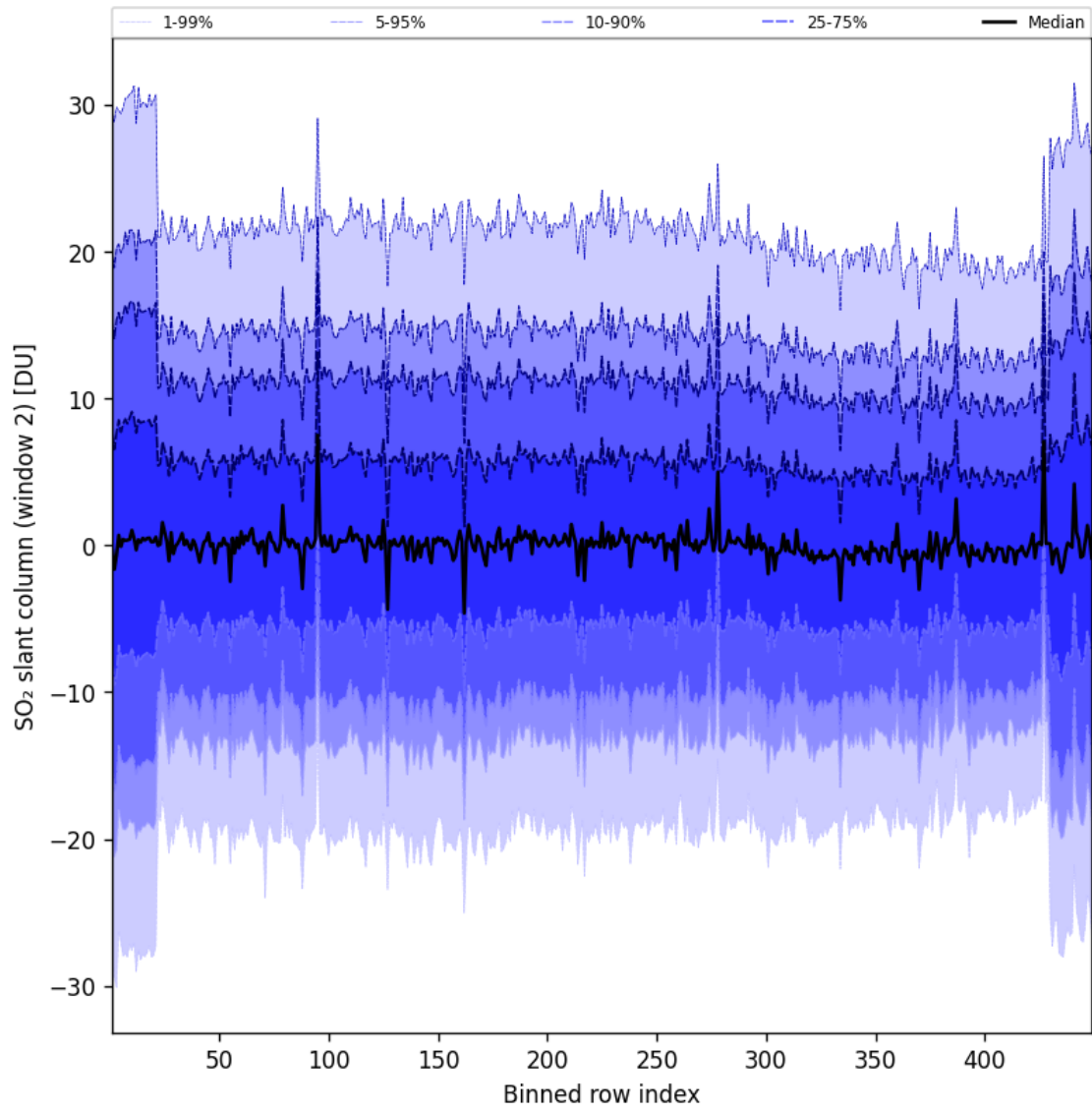


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-03-22 to 2025-03-22

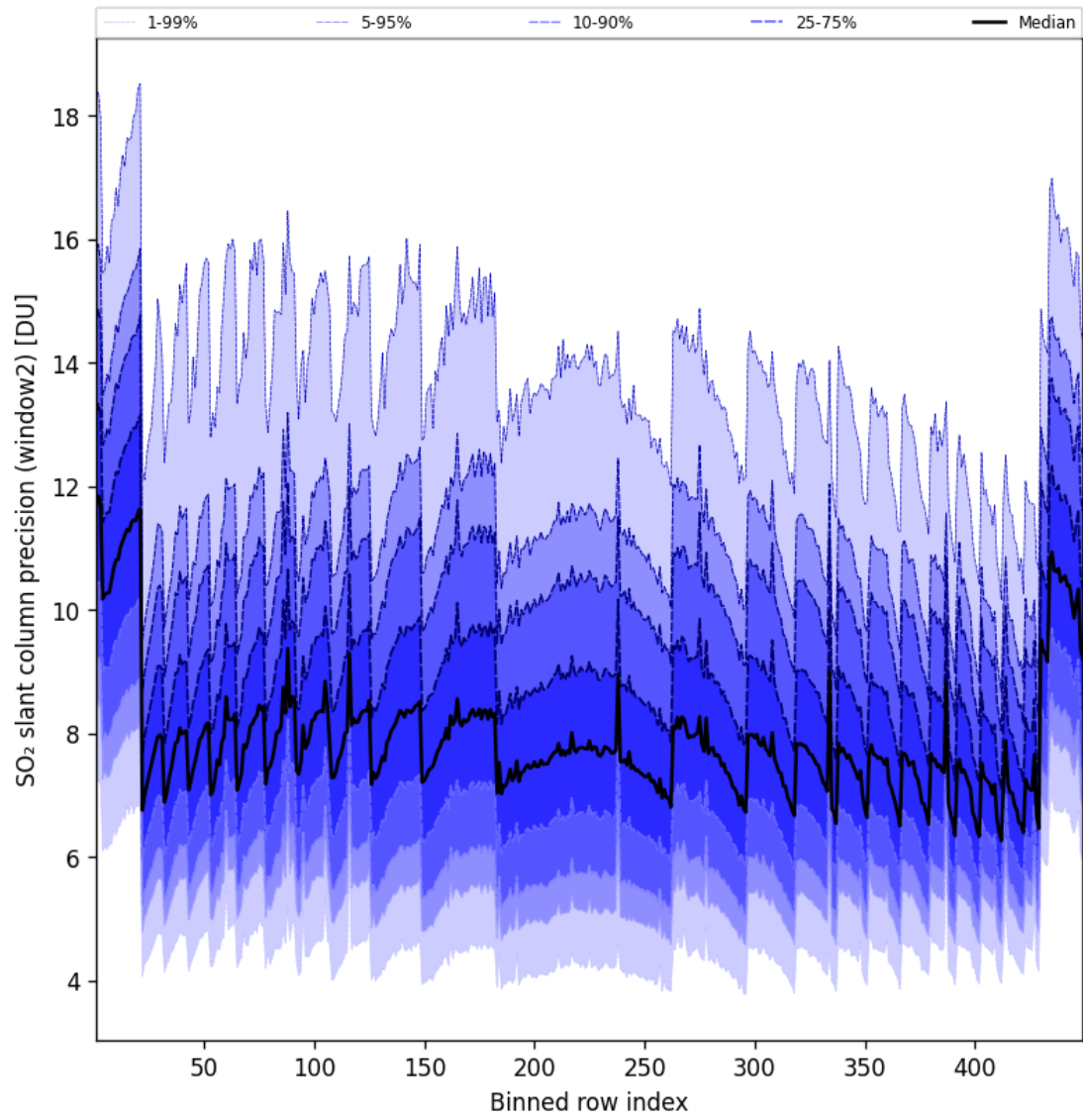


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-03-22 to 2025-03-22

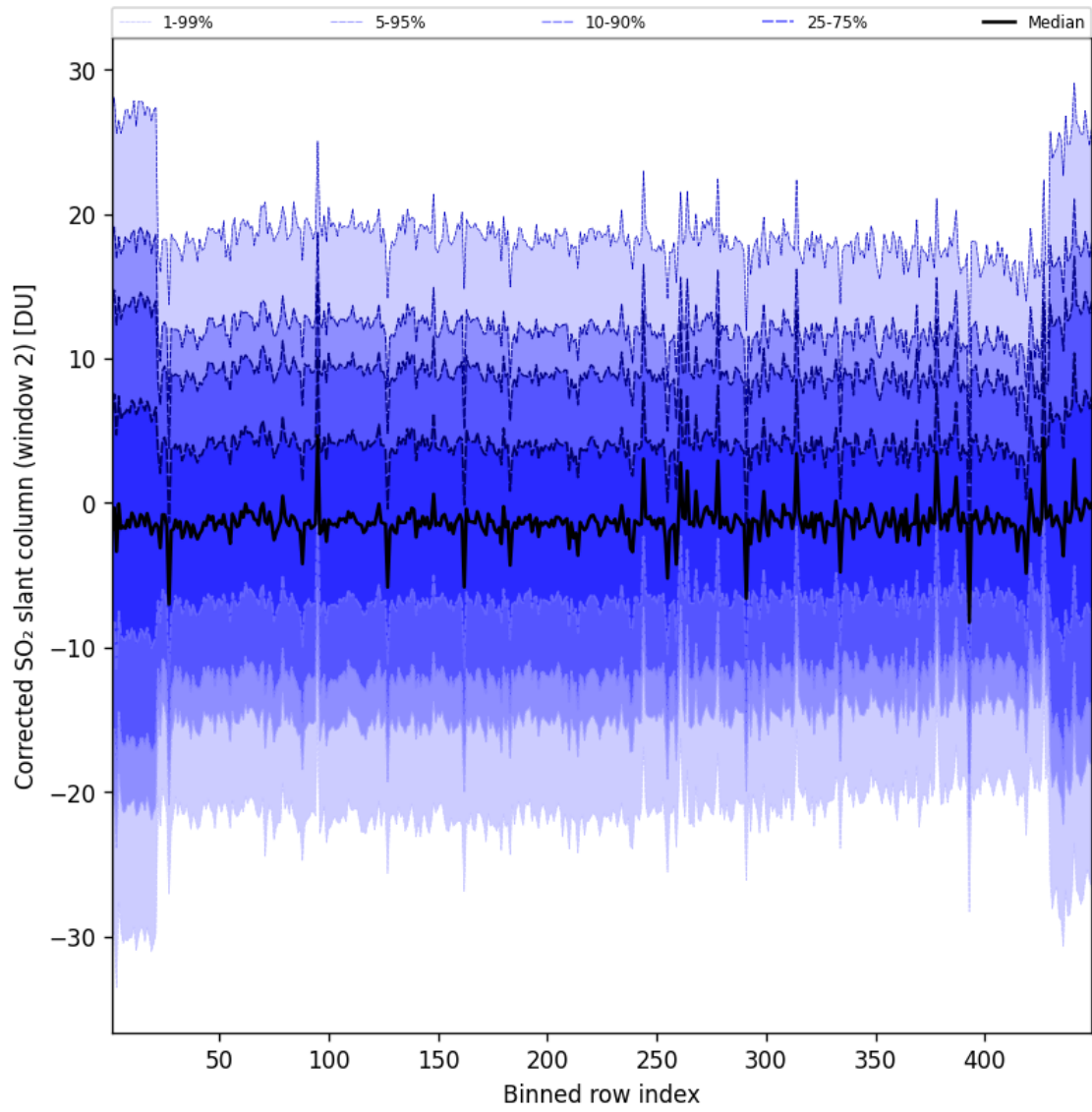


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-03-22 to 2025-03-22

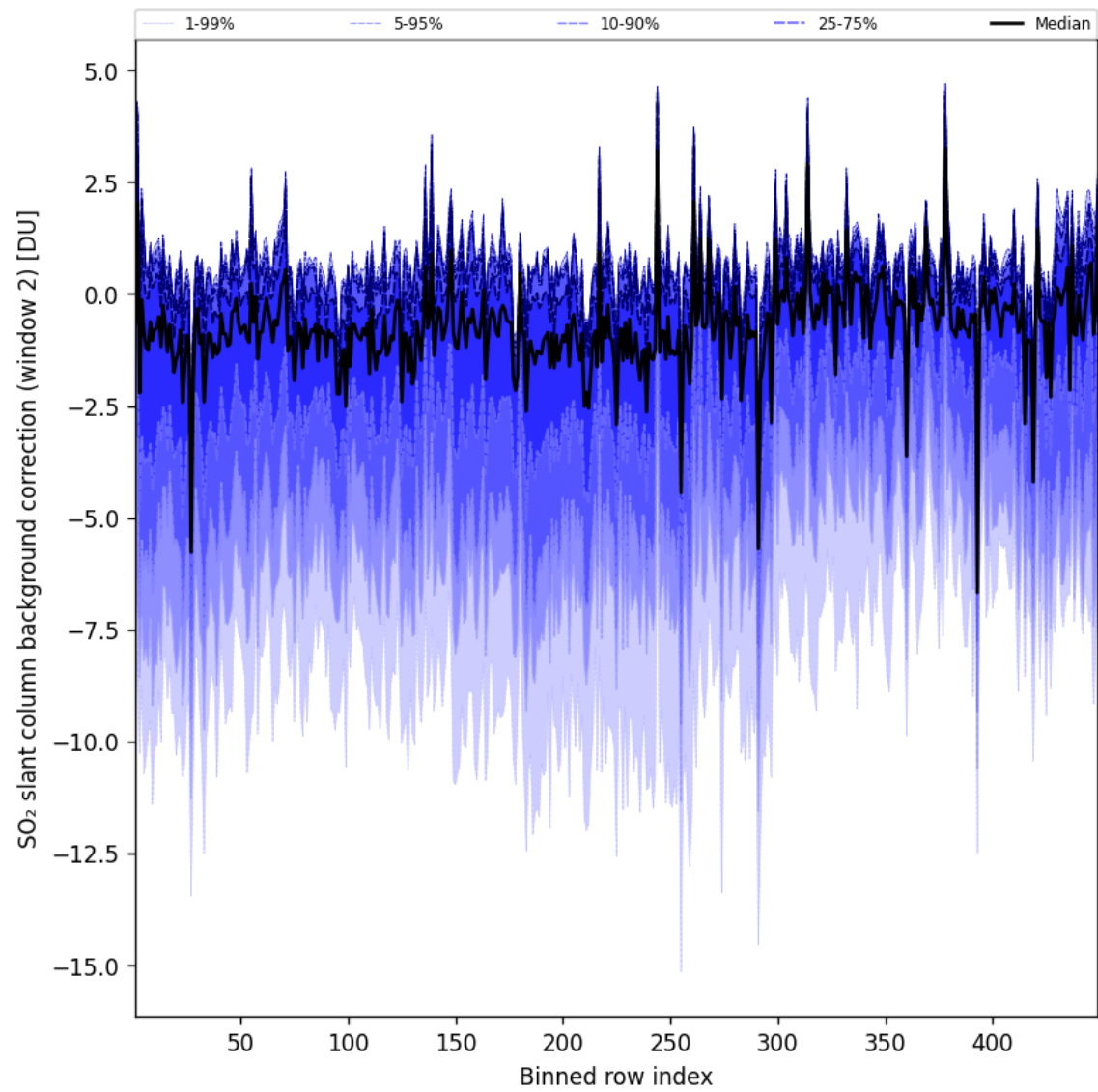


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-03-22 to 2025-03-22

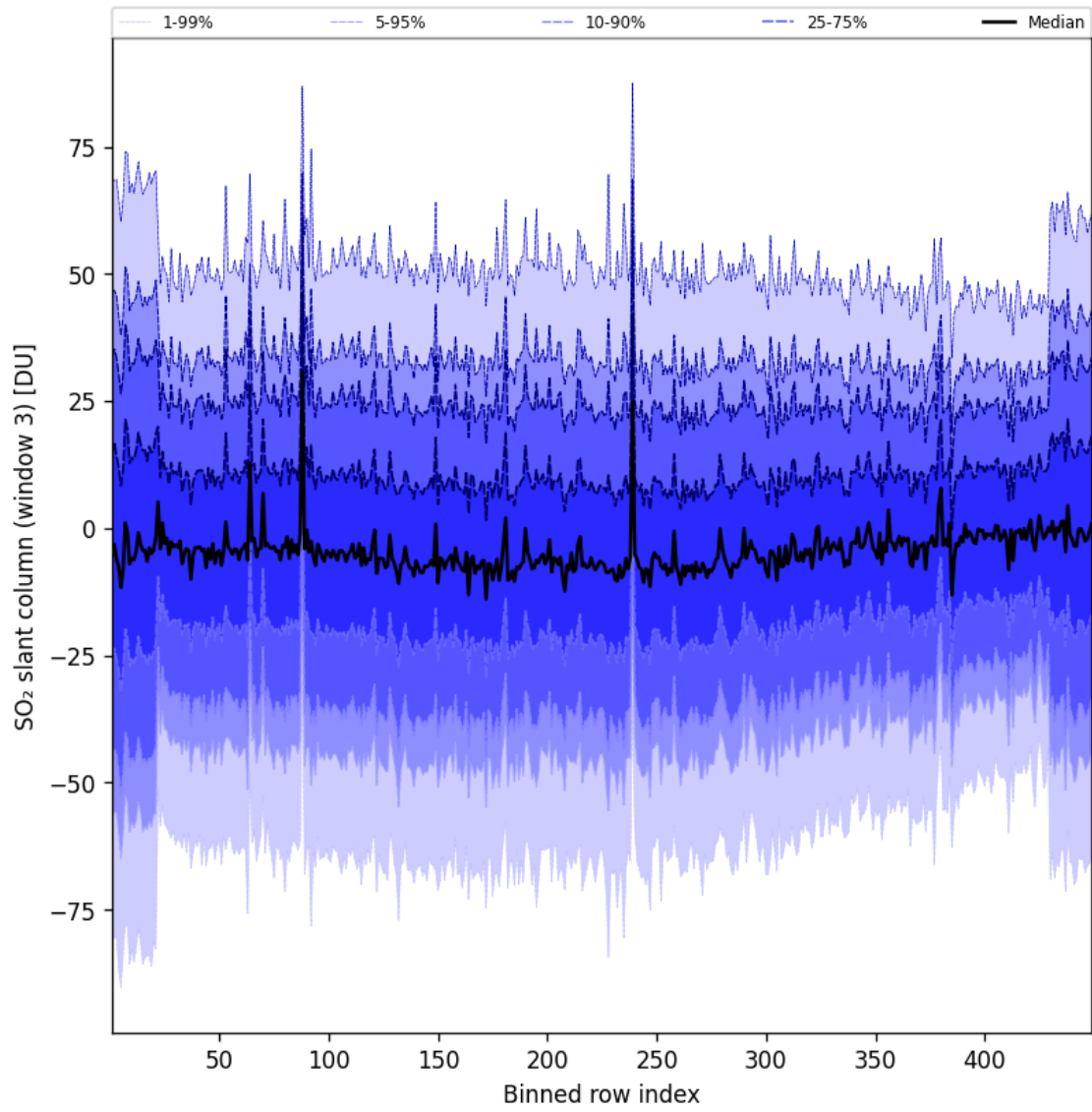


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-03-22 to 2025-03-22

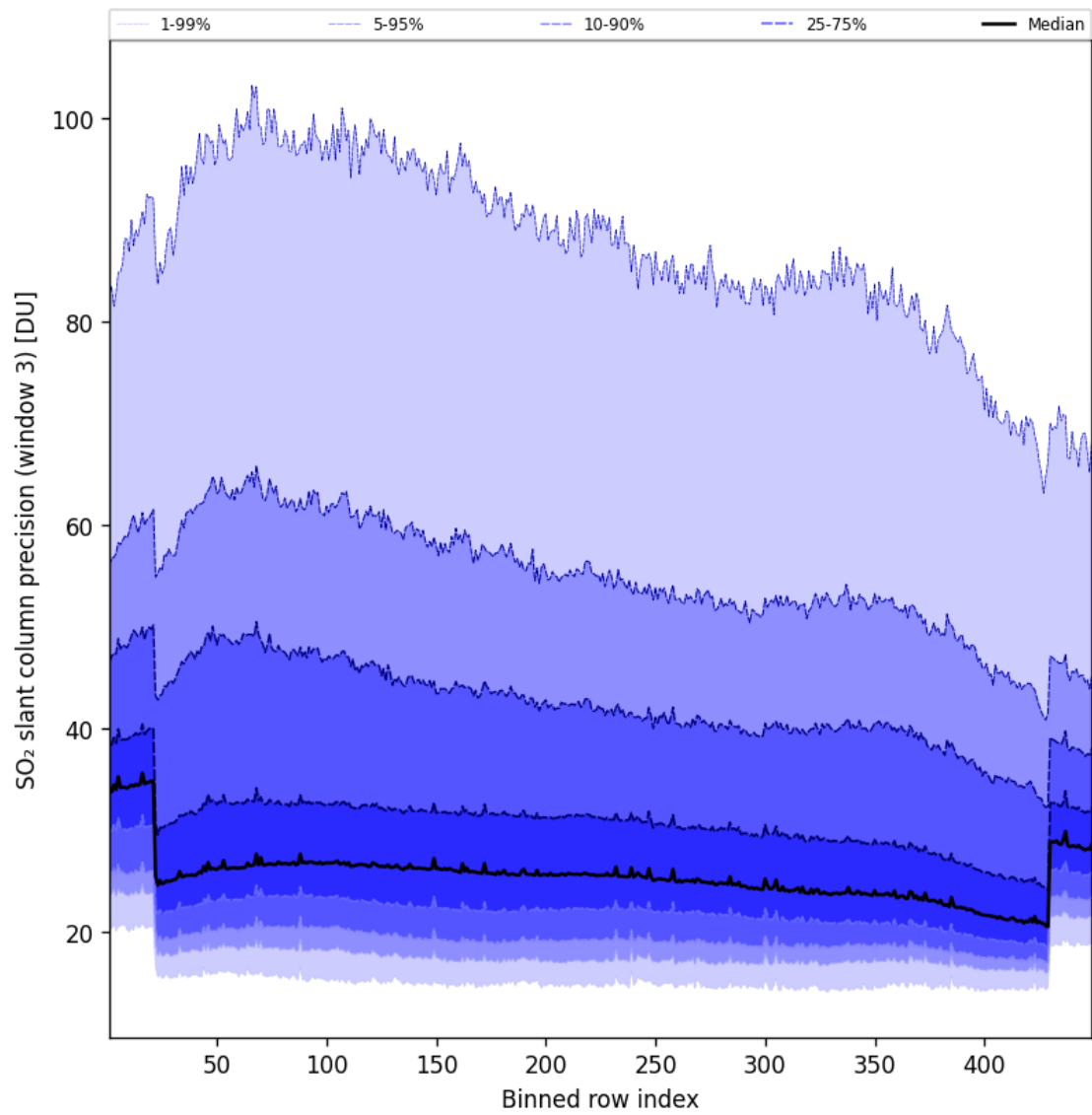


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-03-22 to 2025-03-22

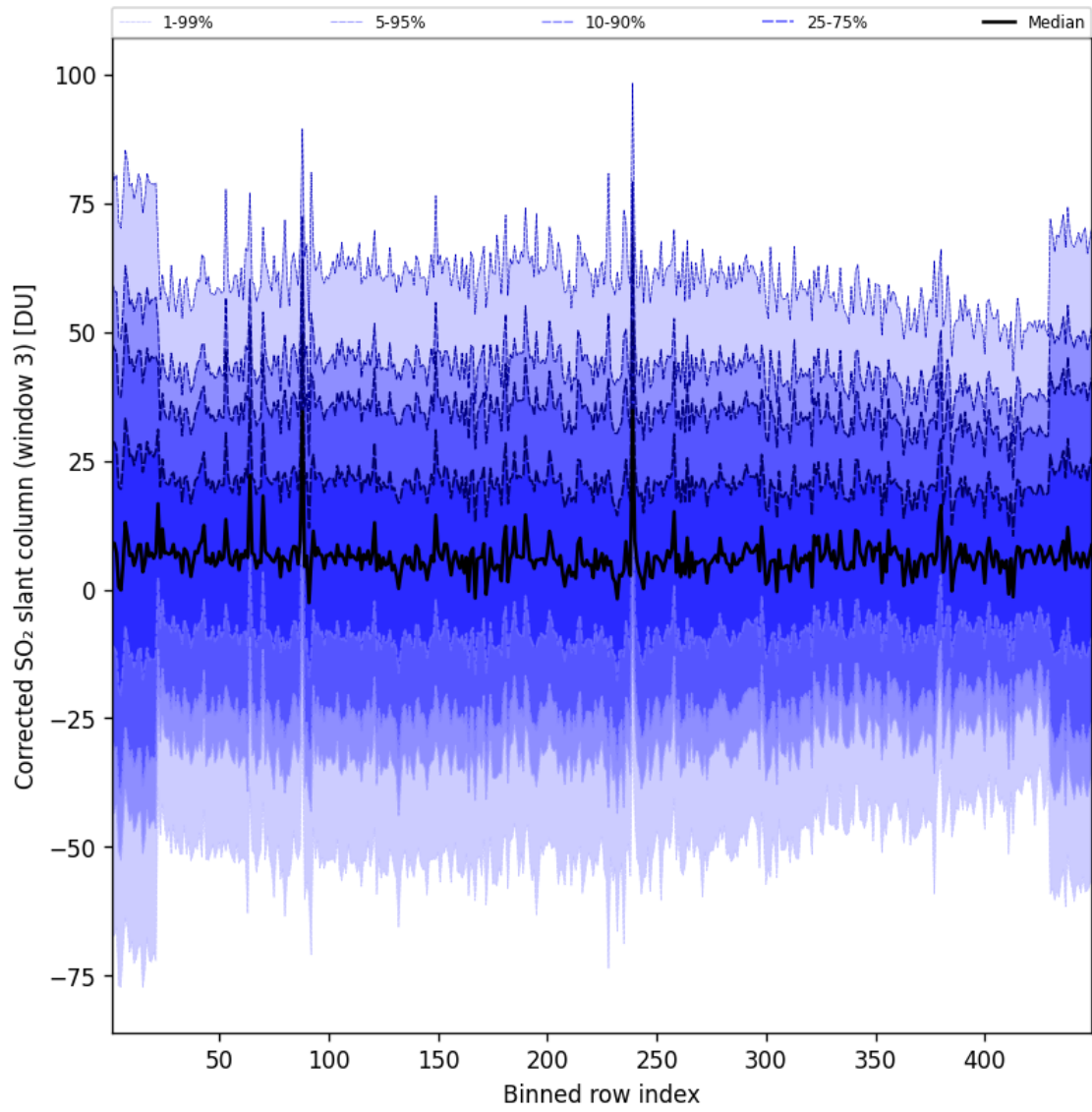


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-03-22 to 2025-03-22

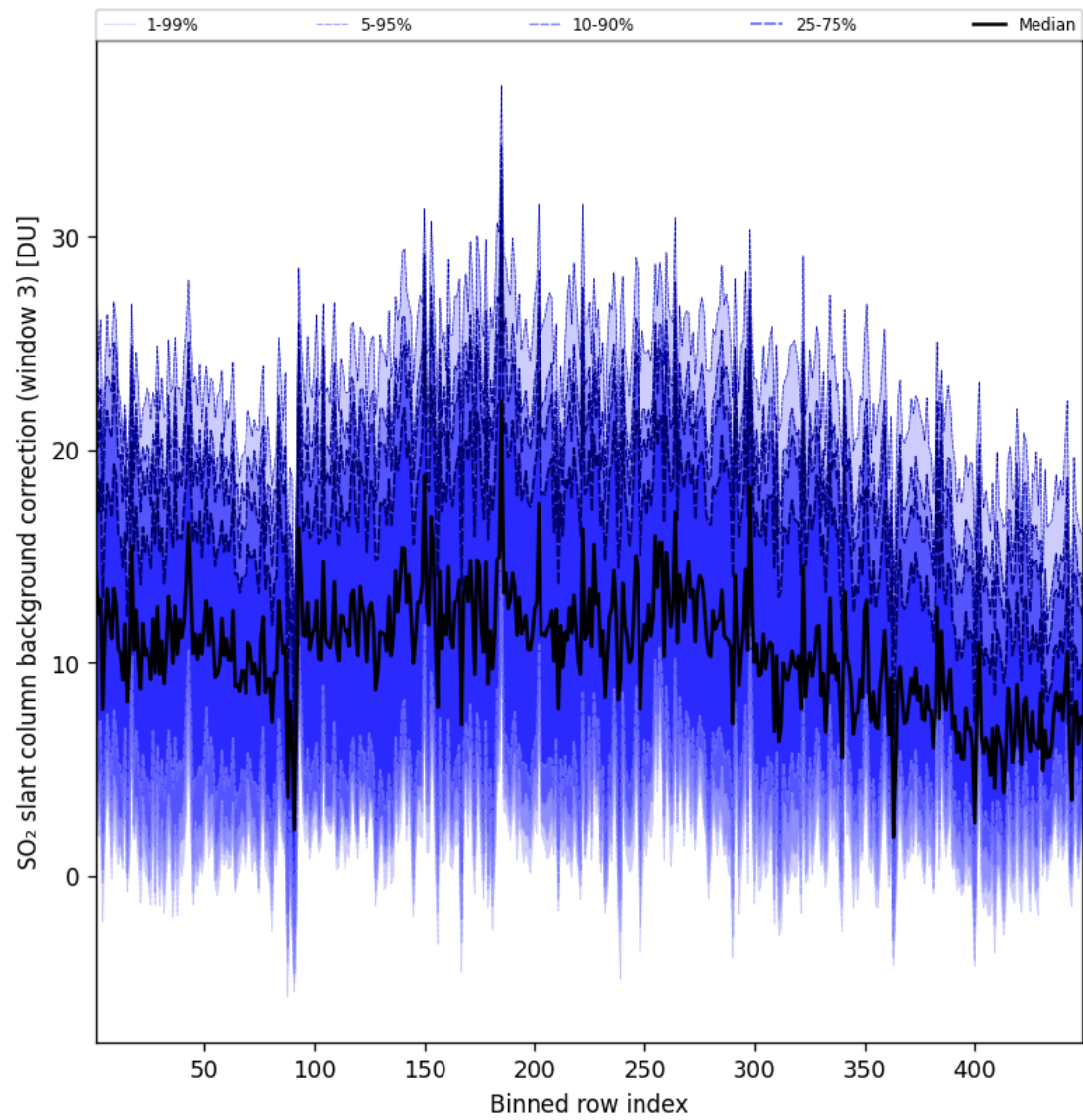


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-03-22 to 2025-03-22

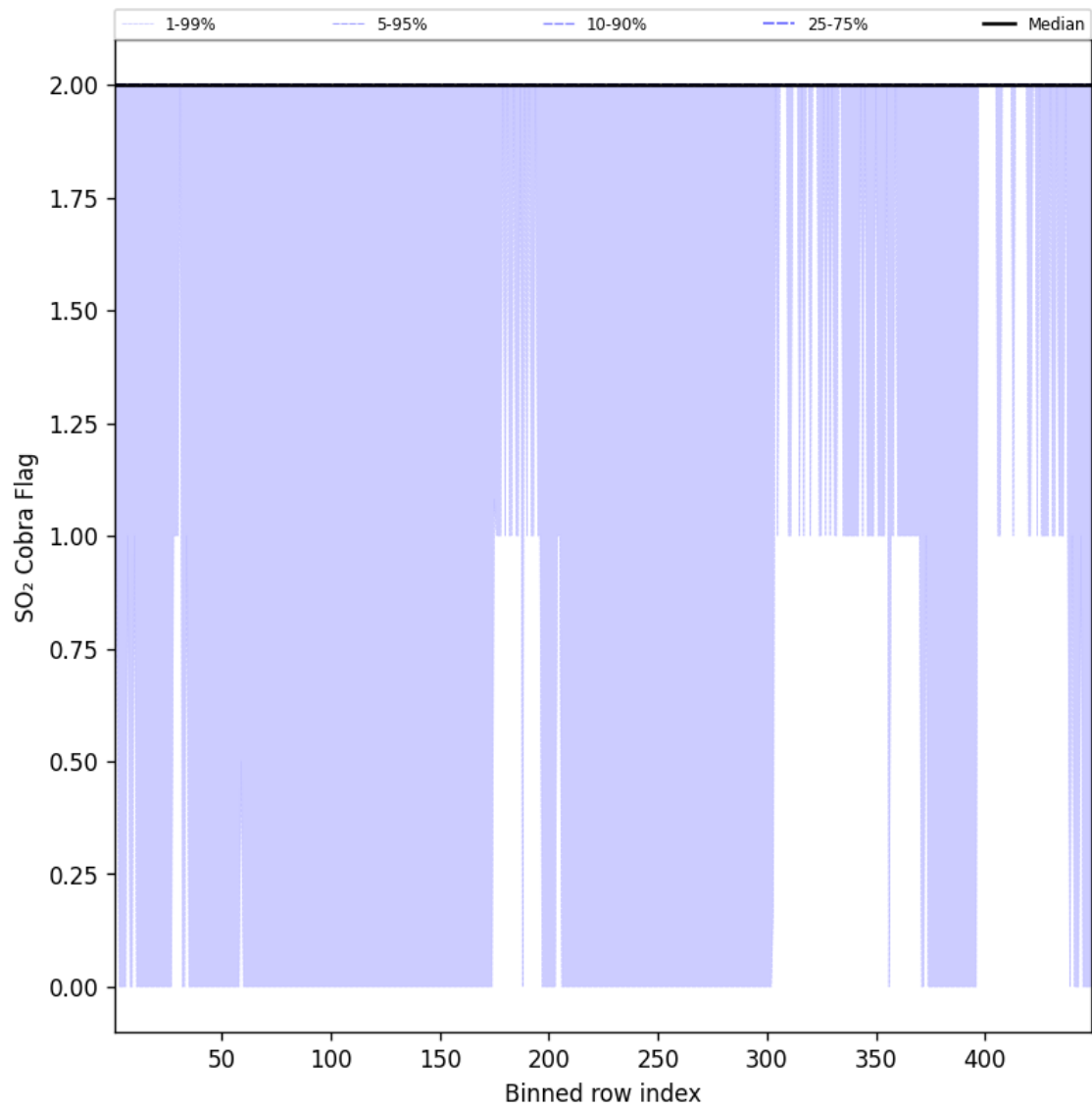


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-03-22 to 2025-03-22

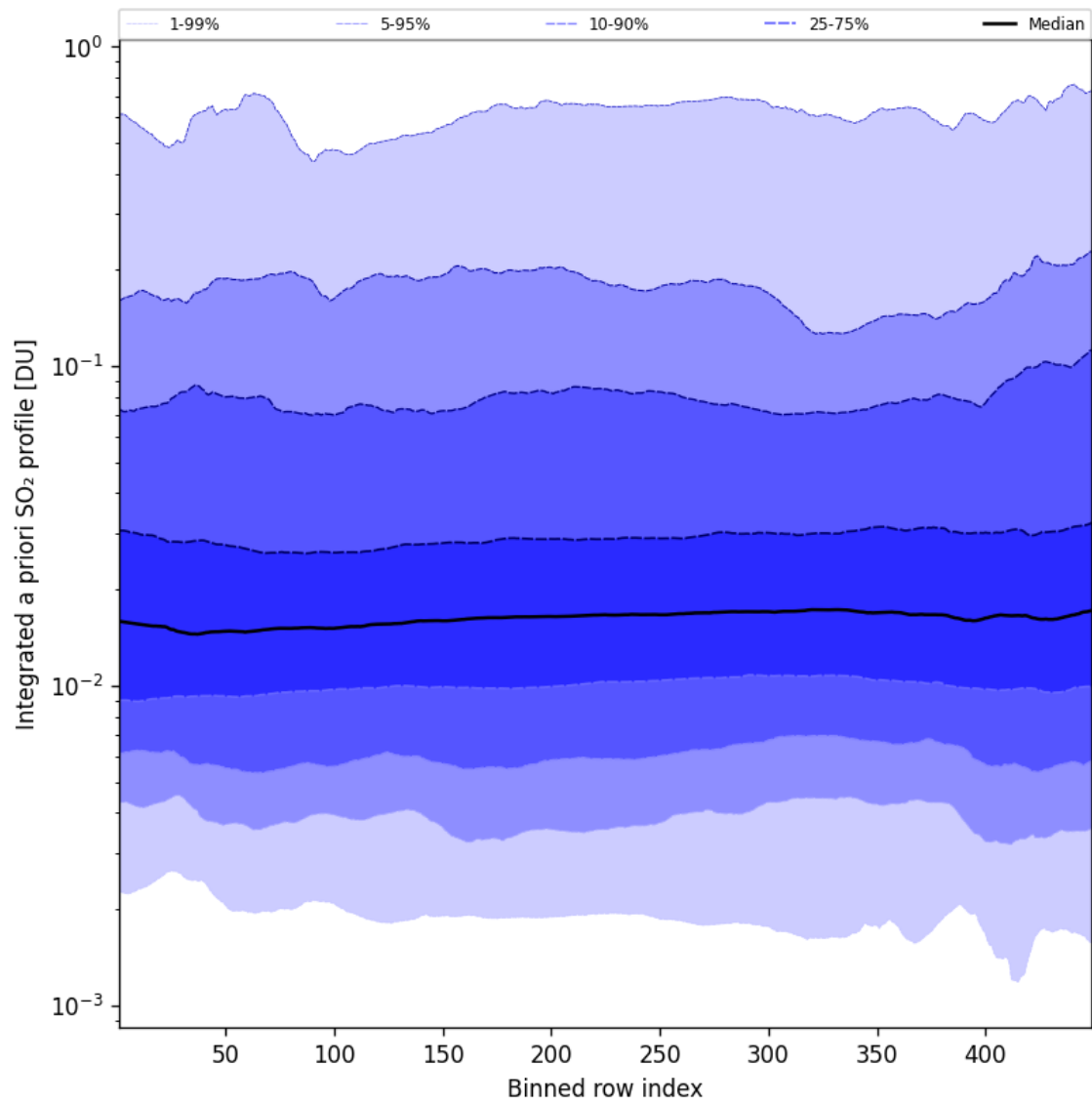


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-03-22 to 2025-03-22

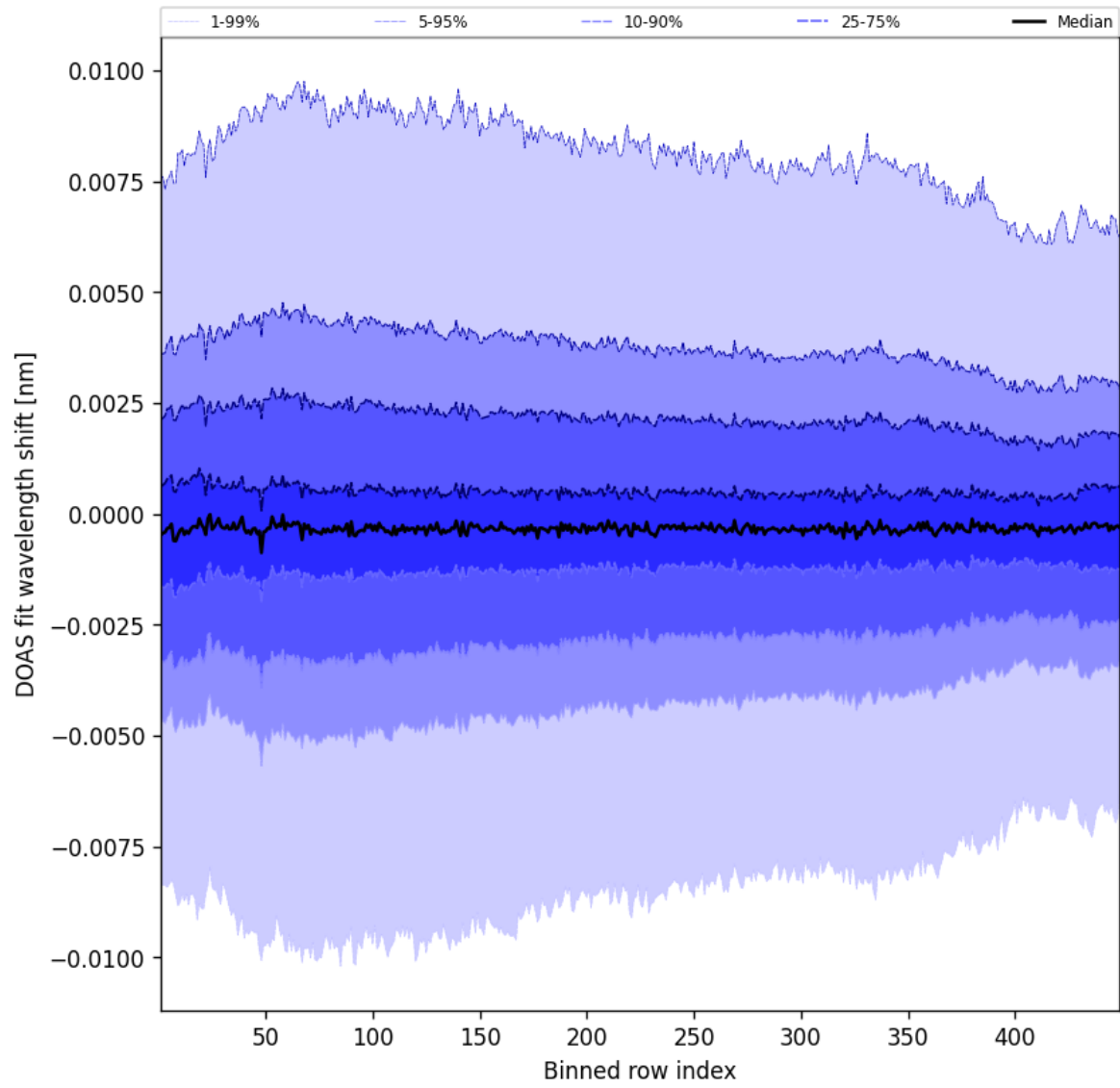


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-03-22 to 2025-03-22

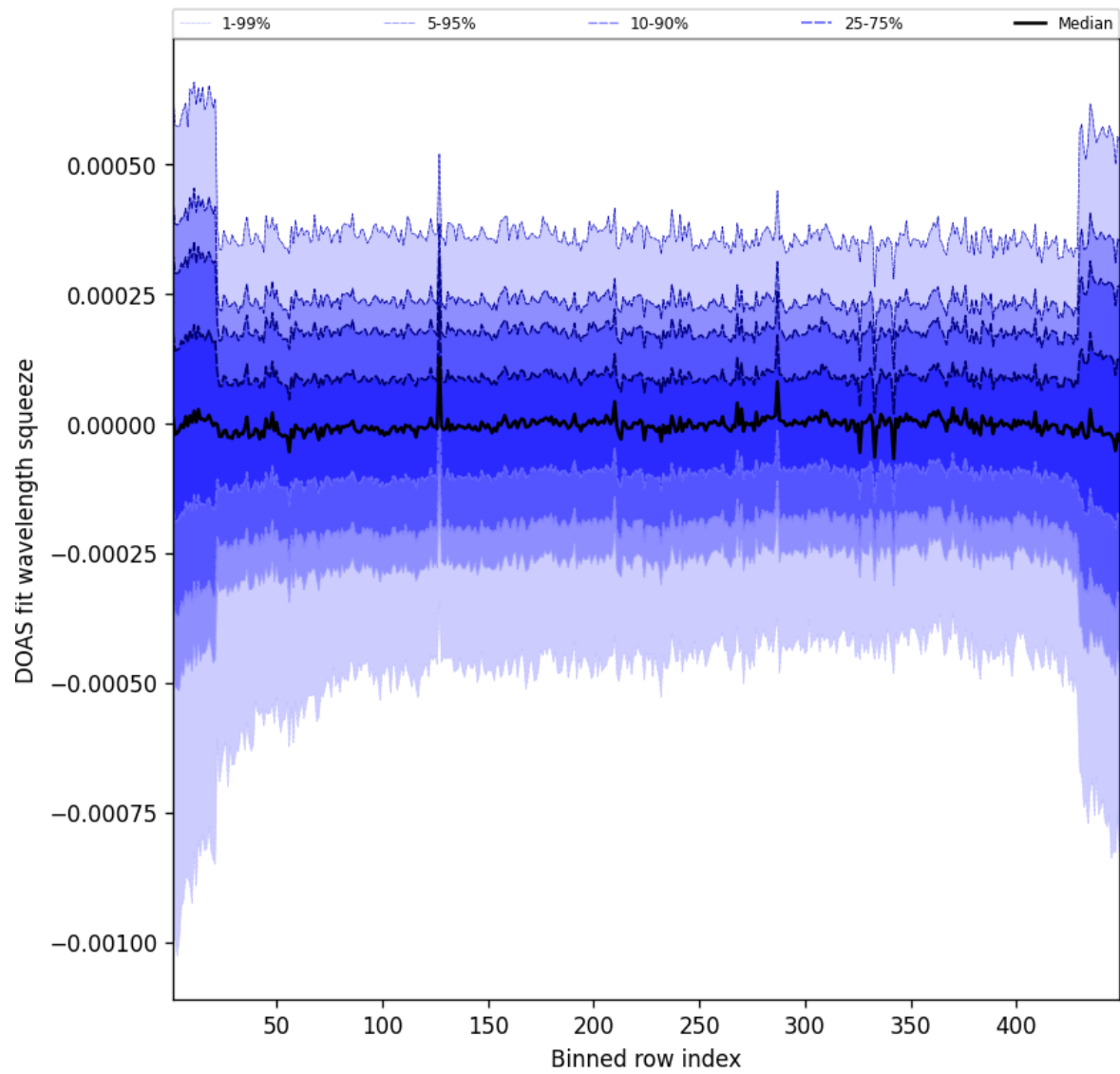


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-03-22 to 2025-03-22

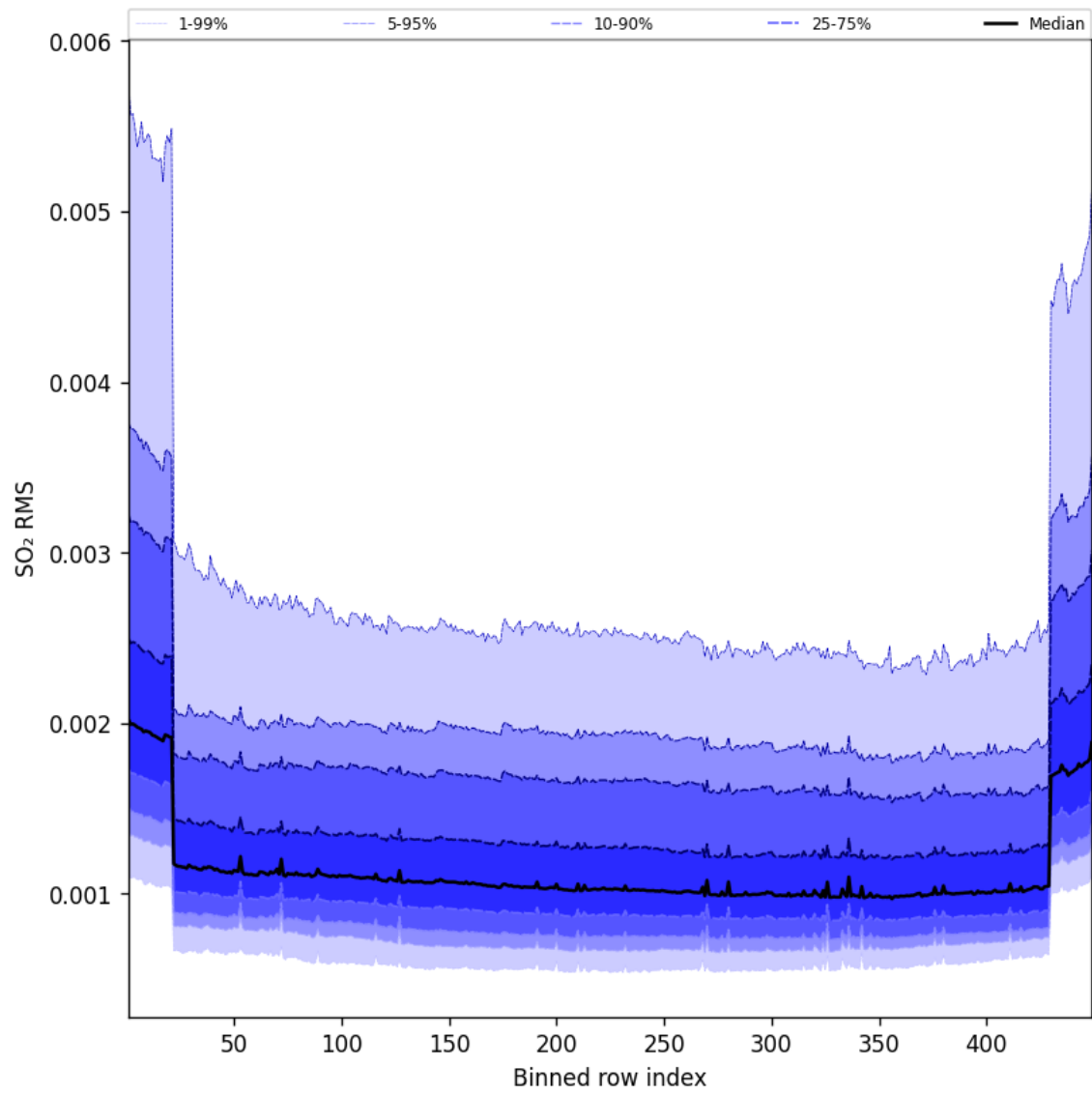


Figure 106: Along track statistics of “SO₂ RMS” for 2025-03-22 to 2025-03-22

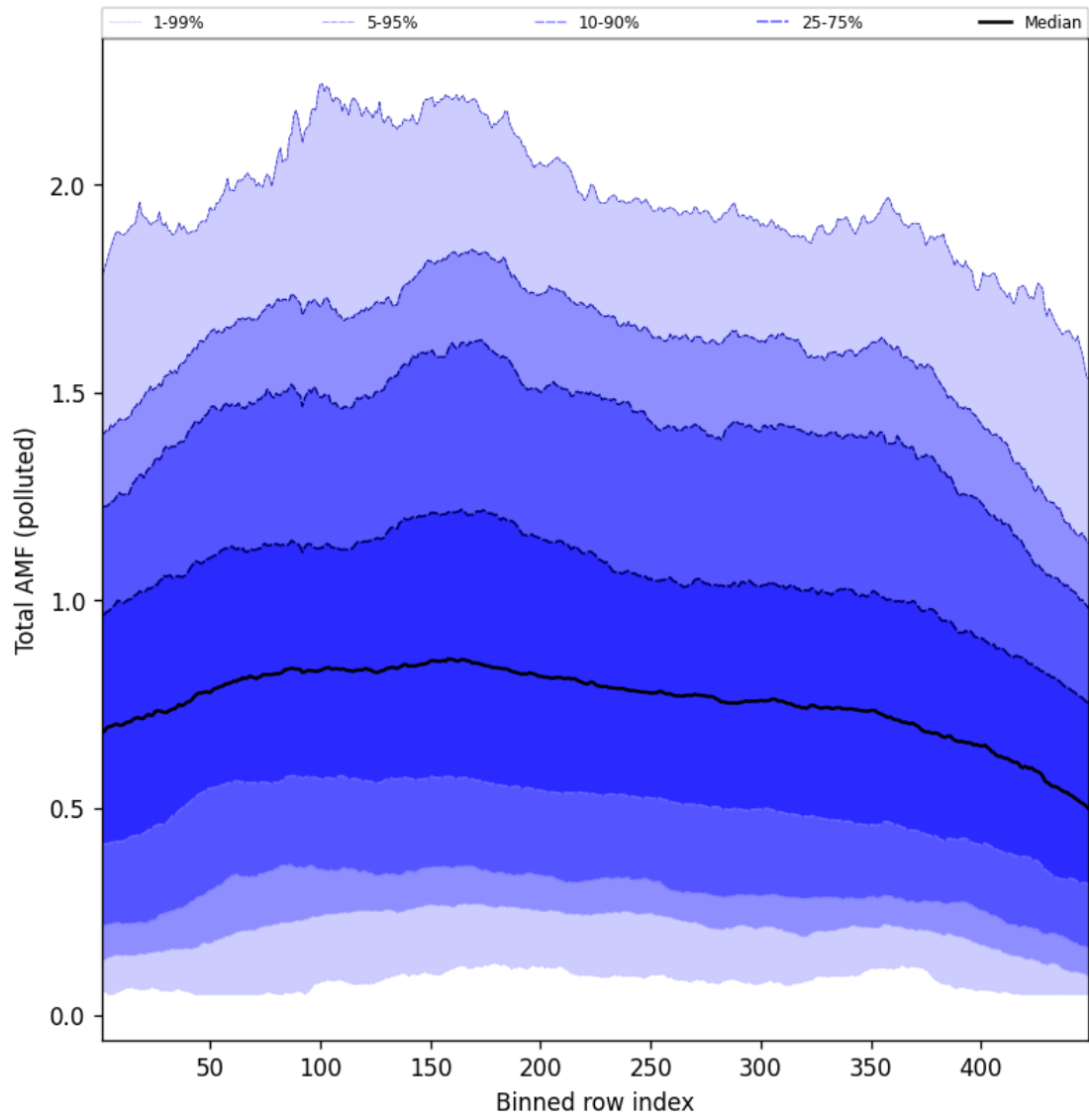


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-22 to 2025-03-22

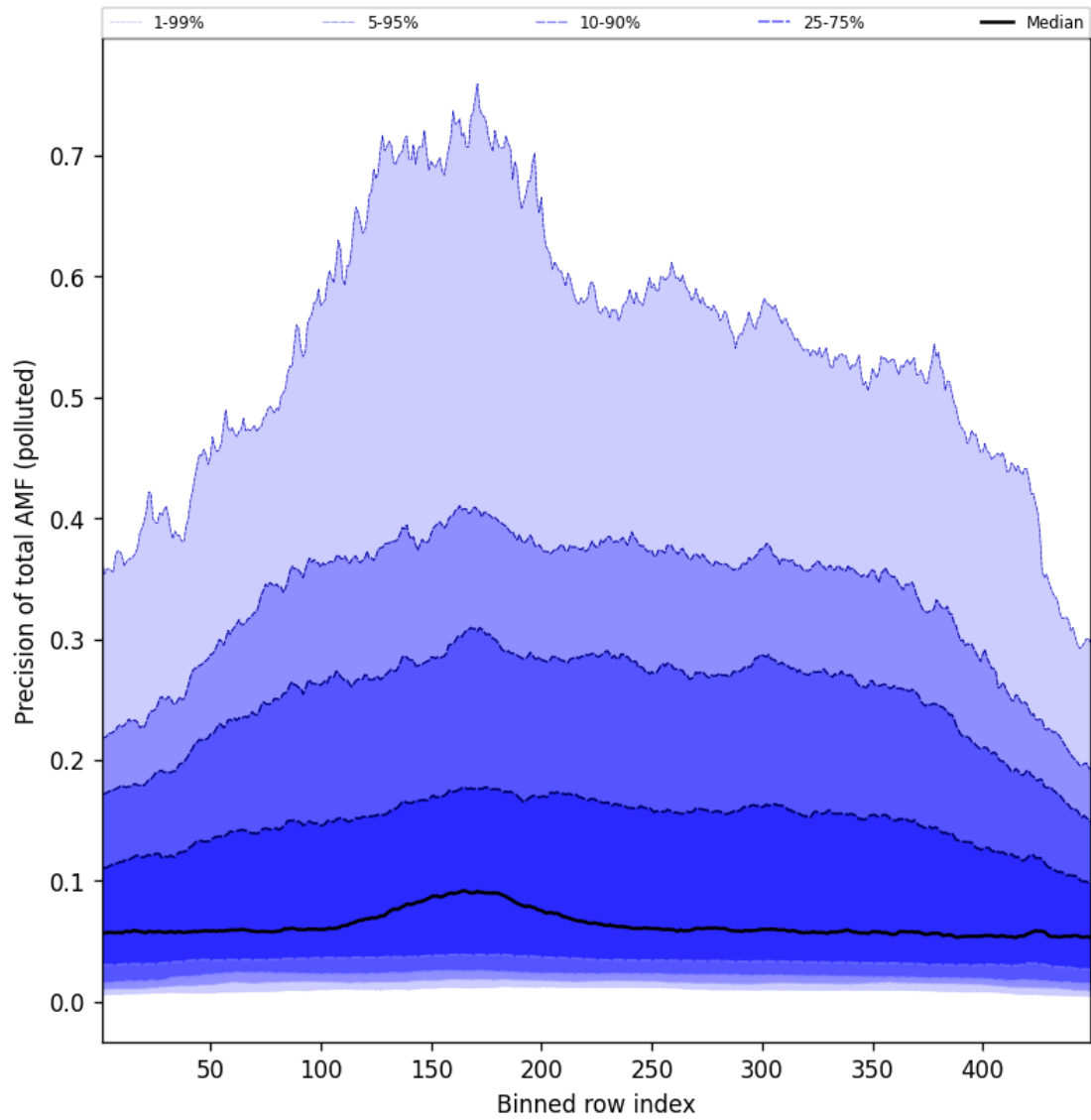


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-22 to 2025-03-22

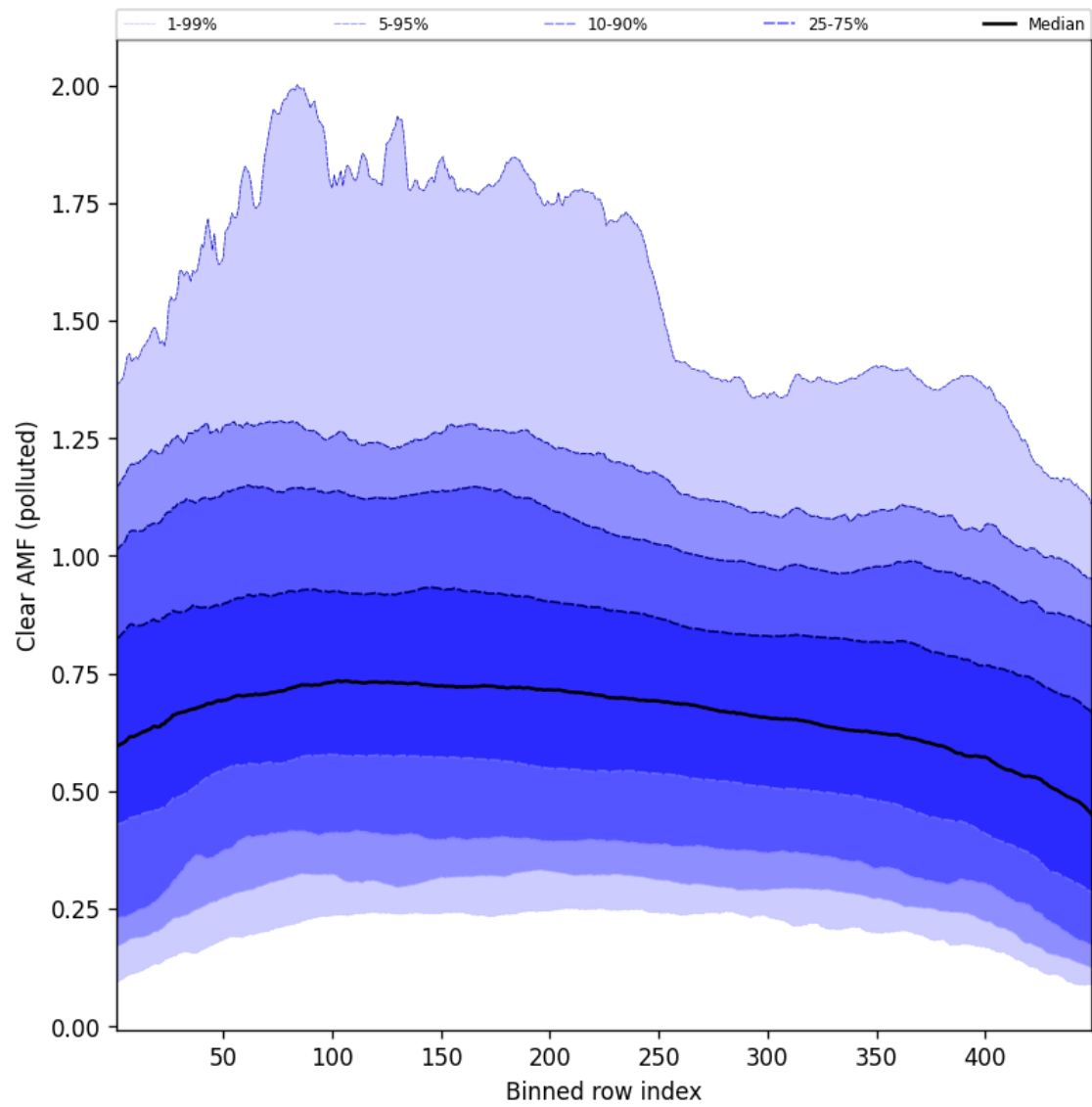


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-22 to 2025-03-22

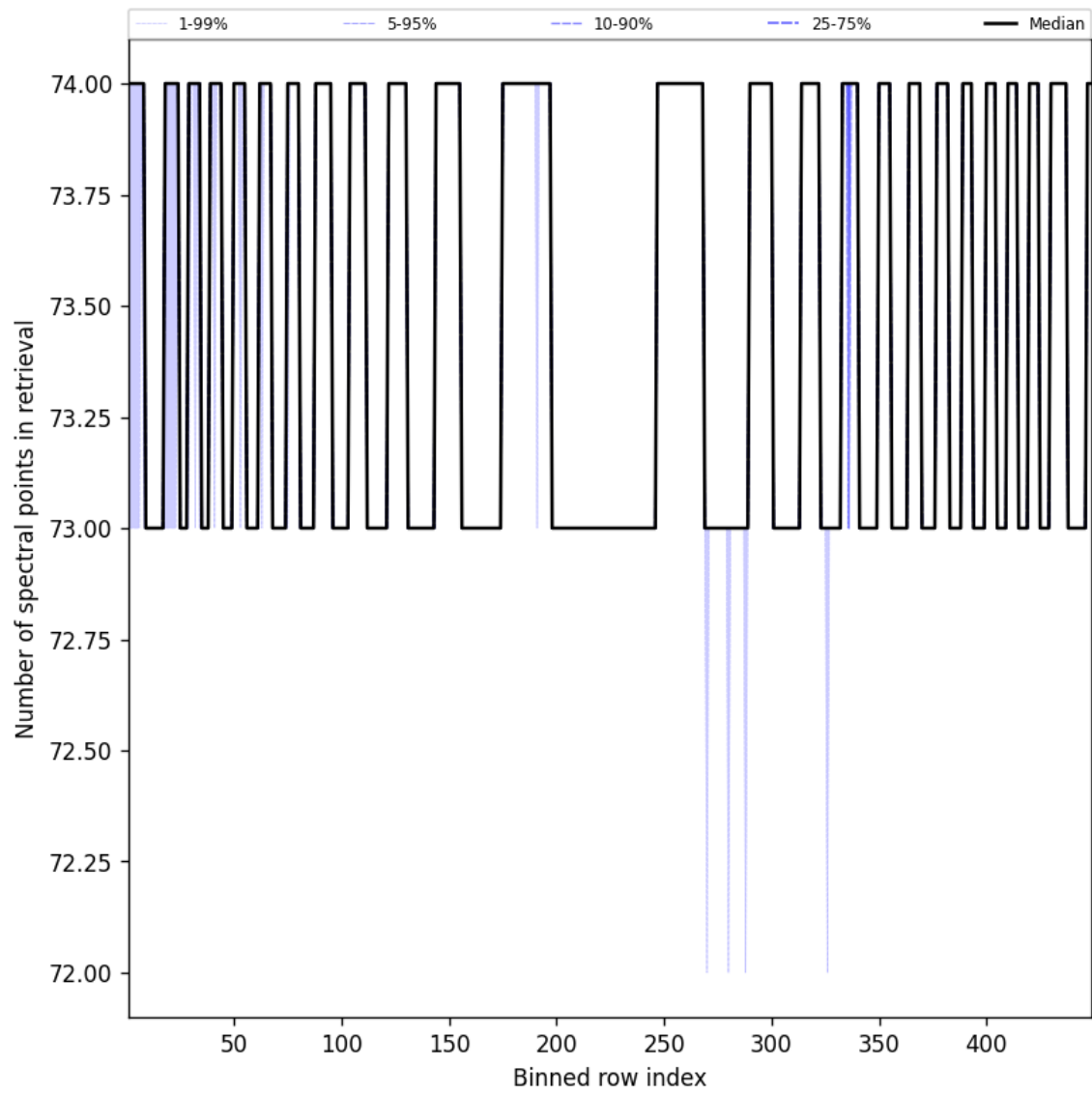


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-22 to 2025-03-22

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

1	Short Introduction	1
1.1	The list of parameters	1
2	Definitions	1
3	Granule outlines	8
4	Input data monitoring	9
5	Warnings and errors	10
6	World maps	11
7	Zonal average	37
8	Histograms	64
9	Along track statistics	91
10	Coincidence density	118
11	Copyright information of ‘PyCAMA’	118

List of Figures

1	Outline of the granules.	8
2	Input data per granule	9
3	Fraction of pixels with specific warnings and errors during processing	10
4	Map of “SO ₂ vertical column” for 2025-03-22 to 2025-03-22	11
5	Map of “SO ₂ vertical column precision” for 2025-03-22 to 2025-03-22	12
6	Map of “Corrected SO ₂ slant column” for 2025-03-22 to 2025-03-22	13
7	Map of “Cobra SO ₂ slant column” for 2025-03-22 to 2025-03-22	14
8	Map of “SO ₂ slant column precision (Cobra)” for 2025-03-22 to 2025-03-22	15
9	Map of “SO ₂ slant column (window 1)” for 2025-03-22 to 2025-03-22	16
10	Map of “SO ₂ slant column precision (window 1)” for 2025-03-22 to 2025-03-22	17
11	Map of “Corrected SO ₂ slant column (window 1)” for 2025-03-22 to 2025-03-22	18
12	Map of “SO ₂ slant column background correction (window 1)” for 2025-03-22 to 2025-03-22	19
13	Map of “SO ₂ slant column (window 2)” for 2025-03-22 to 2025-03-22	20
14	Map of “SO ₂ slant column precision (window2)” for 2025-03-22 to 2025-03-22	21
15	Map of “Corrected SO ₂ slant column (window 2)” for 2025-03-22 to 2025-03-22	22
16	Map of “SO ₂ slant column background correction (window 2)” for 2025-03-22 to 2025-03-22	23
17	Map of “SO ₂ slant column (window 3)” for 2025-03-22 to 2025-03-22	24
18	Map of “SO ₂ slant column precision (window 3)” for 2025-03-22 to 2025-03-22	25
19	Map of “Corrected SO ₂ slant column (window 3)” for 2025-03-22 to 2025-03-22	26
20	Map of “SO ₂ slant column background correction (window 3)” for 2025-03-22 to 2025-03-22	27
21	Map of “Integrated a priori SO ₂ profile” for 2025-03-22 to 2025-03-22	28
22	Map of “DOAS fit wavelength shift” for 2025-03-22 to 2025-03-22	29
23	Map of “DOAS fit wavelength squeeze” for 2025-03-22 to 2025-03-22	30
24	Map of “SO ₂ RMS” for 2025-03-22 to 2025-03-22	31
25	Map of “Total AMF (polluted)” for 2025-03-22 to 2025-03-22	32
26	Map of “Precision of total AMF (polluted)” for 2025-03-22 to 2025-03-22	33
27	Map of “Clear AMF (polluted)” for 2025-03-22 to 2025-03-22	34
28	Map of “Number of spectral points in retrieval” for 2025-03-22 to 2025-03-22	35
29	Map of the number of observations for 2025-03-22 to 2025-03-22	36

30	Zonal average of “QA value” for 2025-03-22 to 2025-03-22.	37
31	Zonal average of “SO ₂ vertical column” for 2025-03-22 to 2025-03-22.	38
32	Zonal average of “SO ₂ vertical column precision” for 2025-03-22 to 2025-03-22.	39
33	Zonal average of “Corrected SO ₂ slant column” for 2025-03-22 to 2025-03-22.	40
34	Zonal average of “Cobra SO ₂ slant column” for 2025-03-22 to 2025-03-22.	41
35	Zonal average of “SO ₂ slant column precision (Cobra)” for 2025-03-22 to 2025-03-22.	42
36	Zonal average of “SO ₂ slant column (window 1)” for 2025-03-22 to 2025-03-22.	43
37	Zonal average of “SO ₂ slant column precision (window 1)” for 2025-03-22 to 2025-03-22.	44
38	Zonal average of “Corrected SO ₂ slant column (window 1)” for 2025-03-22 to 2025-03-22.	45
39	Zonal average of “SO ₂ slant column background correction (window 1)” for 2025-03-22 to 2025-03-22. . .	46
40	Zonal average of “SO ₂ slant column (window 2)” for 2025-03-22 to 2025-03-22.	47
41	Zonal average of “SO ₂ slant column precision (window2)” for 2025-03-22 to 2025-03-22.	48
42	Zonal average of “Corrected SO ₂ slant column (window 2)” for 2025-03-22 to 2025-03-22.	49
43	Zonal average of “SO ₂ slant column background correction (window 2)” for 2025-03-22 to 2025-03-22. . .	50
44	Zonal average of “SO ₂ slant column (window 3)” for 2025-03-22 to 2025-03-22.	51
45	Zonal average of “SO ₂ slant column precision (window 3)” for 2025-03-22 to 2025-03-22.	52
46	Zonal average of “Corrected SO ₂ slant column (window 3)” for 2025-03-22 to 2025-03-22.	53
47	Zonal average of “SO ₂ slant column background correction (window 3)” for 2025-03-22 to 2025-03-22. . .	54
48	Zonal average of “SO ₂ Cobra Flag” for 2025-03-22 to 2025-03-22.	55
49	Zonal average of “Integrated a priori SO ₂ profile” for 2025-03-22 to 2025-03-22.	56
50	Zonal average of “DOAS fit wavelength shift” for 2025-03-22 to 2025-03-22.	57
51	Zonal average of “DOAS fit wavelength squeeze” for 2025-03-22 to 2025-03-22.	58
52	Zonal average of “SO ₂ RMS” for 2025-03-22 to 2025-03-22.	59
53	Zonal average of “Total AMF (polluted)” for 2025-03-22 to 2025-03-22.	60
54	Zonal average of “Precision of total AMF (polluted)” for 2025-03-22 to 2025-03-22.	61
55	Zonal average of “Clear AMF (polluted)” for 2025-03-22 to 2025-03-22.	62
56	Zonal average of “Number of spectral points in retrieval” for 2025-03-22 to 2025-03-22.	63
57	Histogram of “QA value” for 2025-03-22 to 2025-03-22	64
58	Histogram of “SO ₂ vertical column” for 2025-03-22 to 2025-03-22	65
59	Histogram of “SO ₂ vertical column precision” for 2025-03-22 to 2025-03-22	66
60	Histogram of “Corrected SO ₂ slant column” for 2025-03-22 to 2025-03-22	67
61	Histogram of “Cobra SO ₂ slant column” for 2025-03-22 to 2025-03-22	68
62	Histogram of “SO ₂ slant column precision (Cobra)” for 2025-03-22 to 2025-03-22	69
63	Histogram of “SO ₂ slant column (window 1)” for 2025-03-22 to 2025-03-22	70
64	Histogram of “SO ₂ slant column precision (window 1)” for 2025-03-22 to 2025-03-22	71
65	Histogram of “Corrected SO ₂ slant column (window 1)” for 2025-03-22 to 2025-03-22	72
66	Histogram of “SO ₂ slant column background correction (window 1)” for 2025-03-22 to 2025-03-22	73
67	Histogram of “SO ₂ slant column (window 2)” for 2025-03-22 to 2025-03-22	74
68	Histogram of “SO ₂ slant column precision (window2)” for 2025-03-22 to 2025-03-22	75
69	Histogram of “Corrected SO ₂ slant column (window 2)” for 2025-03-22 to 2025-03-22	76
70	Histogram of “SO ₂ slant column background correction (window 2)” for 2025-03-22 to 2025-03-22	77
71	Histogram of “SO ₂ slant column (window 3)” for 2025-03-22 to 2025-03-22	78
72	Histogram of “SO ₂ slant column precision (window 3)” for 2025-03-22 to 2025-03-22	79
73	Histogram of “Corrected SO ₂ slant column (window 3)” for 2025-03-22 to 2025-03-22	80
74	Histogram of “SO ₂ slant column background correction (window 3)” for 2025-03-22 to 2025-03-22	81
75	Histogram of “SO ₂ Cobra Flag” for 2025-03-22 to 2025-03-22	82
76	Histogram of “Integrated a priori SO ₂ profile” for 2025-03-22 to 2025-03-22	83
77	Histogram of “DOAS fit wavelength shift” for 2025-03-22 to 2025-03-22	84
78	Histogram of “DOAS fit wavelength squeeze” for 2025-03-22 to 2025-03-22	85
79	Histogram of “SO ₂ RMS” for 2025-03-22 to 2025-03-22	86
80	Histogram of “Total AMF (polluted)” for 2025-03-22 to 2025-03-22	87
81	Histogram of “Precision of total AMF (polluted)” for 2025-03-22 to 2025-03-22	88
82	Histogram of “Clear AMF (polluted)” for 2025-03-22 to 2025-03-22	89
83	Histogram of “Number of spectral points in retrieval” for 2025-03-22 to 2025-03-22	90
84	Along track statistics of “QA value” for 2025-03-22 to 2025-03-22	91
85	Along track statistics of “SO ₂ vertical column” for 2025-03-22 to 2025-03-22	92
86	Along track statistics of “SO ₂ vertical column precision” for 2025-03-22 to 2025-03-22	93
87	Along track statistics of “Corrected SO ₂ slant column” for 2025-03-22 to 2025-03-22	94
88	Along track statistics of “Cobra SO ₂ slant column” for 2025-03-22 to 2025-03-22	95
89	Along track statistics of “SO ₂ slant column precision (Cobra)” for 2025-03-22 to 2025-03-22	96
90	Along track statistics of “SO ₂ slant column (window 1)” for 2025-03-22 to 2025-03-22	97
91	Along track statistics of “SO ₂ slant column precision (window 1)” for 2025-03-22 to 2025-03-22	98

92	Along track statistics of “Corrected SO ₂ slant column (window 1)” for 2025-03-22 to 2025-03-22	99
93	Along track statistics of “SO ₂ slant column background correction (window 1)” for 2025-03-22 to 2025-03-22100	
94	Along track statistics of “SO ₂ slant column (window 2)” for 2025-03-22 to 2025-03-22	101
95	Along track statistics of “SO ₂ slant column precision (window2)” for 2025-03-22 to 2025-03-22	102
96	Along track statistics of “Corrected SO ₂ slant column (window 2)” for 2025-03-22 to 2025-03-22	103
97	Along track statistics of “SO ₂ slant column background correction (window 2)” for 2025-03-22 to 2025-03-22104	
98	Along track statistics of “SO ₂ slant column (window 3)” for 2025-03-22 to 2025-03-22	105
99	Along track statistics of “SO ₂ slant column precision (window 3)” for 2025-03-22 to 2025-03-22	106
100	Along track statistics of “Corrected SO ₂ slant column (window 3)” for 2025-03-22 to 2025-03-22	107
101	Along track statistics of “SO ₂ slant column background correction (window 3)” for 2025-03-22 to 2025-03-22108	
102	Along track statistics of “SO ₂ Cobra Flag” for 2025-03-22 to 2025-03-22	109
103	Along track statistics of “Integrated a priori SO ₂ profile” for 2025-03-22 to 2025-03-22	110
104	Along track statistics of “DOAS fit wavelength shift” for 2025-03-22 to 2025-03-22	111
105	Along track statistics of “DOAS fit wavelength squeeze” for 2025-03-22 to 2025-03-22	112
106	Along track statistics of “SO ₂ RMS” for 2025-03-22 to 2025-03-22	113
107	Along track statistics of “Total AMF (polluted)” for 2025-03-22 to 2025-03-22	114
108	Along track statistics of “Precision of total AMF (polluted)” for 2025-03-22 to 2025-03-22	115
109	Along track statistics of “Clear AMF (polluted)” for 2025-03-22 to 2025-03-22	116
110	Along track statistics of “Number of spectral points in retrieval” for 2025-03-22 to 2025-03-22	117

List of Tables

1	Parameterlist and basic statistics for the analysis	2
2	Percentile ranges	3
3	Parameterlist and basic statistics for the analysis for observations in the northern hemisphere	4
4	Parameterlist and basic statistics for the analysis for observations in the southern hemisphere	5
5	Parameterlist and basic statistics for the analysis for observations over water	6
6	Parameterlist and basic statistics for the analysis for observations over land	7

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