

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]	0.627 ± 0.411	17369368	0.995	0.790	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.047 \pm 86.455) \times 10^{-2}$	17369368	0.278	0.433	1.063×10^{-2}	-104	708
sulfurdioxide total vertical column precision [DU]	0.469 ± 0.589	17369368	0.222	0.310	0.312	4.050×10^{-2}	159
sulfurdioxide slant column density corrected [DU]	$(2.065 \pm 40.827) \times 10^{-2}$	17369368	0.258	0.374	9.893×10^{-3}	-44.9	479
sulfurdioxide slant column density cobra [DU]	$(2.048 \pm 36.900) \times 10^{-2}$	17369368	0.258	0.374	9.893×10^{-3}	-44.9	78.4
sulfurdioxide slant column density cobra precision [DU]	0.297 ± 0.128	17369368	0.213	0.131	0.260	8.753×10^{-2}	56.2
sulfurdioxide slant column density window1 [DU]	0.130 ± 0.685	17369368	0.125	0.747	0.133	-98.9	86.8
sulfurdioxide slant column density window1 precision [DU]	0.297 ± 0.128	17369368	0.213	0.131	0.260	8.753×10^{-2}	56.2
sulfurdioxide slant column density corrected win1 [DU]	$(5.147 \pm 67.598) \times 10^{-2}$	17369368	2.500×10^{-2}	0.734	3.228×10^{-2}	-98.9	86.7
background so2 slant column offset window1 [DU]	$(-7.878 \pm 13.744) \times 10^{-2}$	17369368	-0.180	0.157	-0.105	-1.31	4.22
sulfurdioxide slant column density window2 [DU]	1.99 ± 9.00	17369368	2.25	11.3	1.95	-1.017×10^3	1.240×10^3
sulfurdioxide slant column density window2 precision [DU]	8.10 ± 2.43	17369368	7.43	2.72	7.73	2.15	754
sulfurdioxide slant column density corrected win2 [DU]	0.529 ± 8.801	17369368	0.750	11.0	0.554	-1.018×10^3	1.239×10^3
background so2 slant column offset window2 [DU]	-1.46 ± 2.23	17369368	0.250	3.28	-0.950	-13.1	6.62
sulfurdioxide slant column density window3 [DU]	-10.6 ± 23.8	17369368	-11.8	29.2	-10.9	-1.151×10^3	942
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 13.8	17369368	22.5	10.6	24.6	8.49	922
sulfurdioxide slant column density corrected win3 [DU]	-4.45 ± 23.27	17369368	-3.92	28.5	-4.23	-1.147×10^3	940
background so2 slant column offset window3 [DU]	6.17 ± 5.40	17369368	10.6	9.04	6.37	-14.7	30.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17369368	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(2.980 \pm 6.797) \times 10^{-2}$	17369368	1.664×10^{-2}	2.111×10^{-2}	1.479×10^{-2}	2.130×10^{-4}	2.16
fitted radiance shift [nm]	$(-1.872 \pm 26.441) \times 10^{-4}$	17369368	1.000×10^{-4}	1.688×10^{-3}	-1.848×10^{-4}	-7.171×10^{-2}	5.763×10^{-2}
fitted radiance squeeze [1]	$(-2.767 \pm 18.274) \times 10^{-5}$	17369368	-1.000×10^{-5}	2.094×10^{-4}	-2.374×10^{-5}	-1.738×10^{-2}	1.835×10^{-2}
fitted root mean square [1]	$(1.293 \pm 0.516) \times 10^{-3}$	17369368	1.025×10^{-3}	5.241×10^{-4}	1.148×10^{-3}	3.345×10^{-4}	8.004×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.937 ± 0.490	17369368	0.700	0.609	0.843	5.000×10^{-2}	2.89
sulfurdioxide total air mass factor polluted precision [1]	0.122 ± 0.137	17369368	3.500×10^{-2}	0.118	7.317×10^{-2}	2.885×10^{-3}	2.13
sulfurdioxide clear air mass factor polluted [1]	0.763 ± 0.330	17369368	0.700	0.390	0.721	5.239×10^{-2}	2.61
number of spectral points in retrieval [1]	73.4 ± 0.5	17369368	73.0	1.000	73.0	52.0	155

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	2.000×10^{-2}	9.000×10^{-2}	0.210	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-1.91	-0.796	-0.499	-0.341	-0.202	0.231	0.381	0.559	0.902	2.25
sulfurdioxide total vertical column precision [DU]	9.696×10^{-2}	0.127	0.153	0.179	0.213	0.523	0.684	0.866	1.21	2.80
sulfurdioxide slant column density corrected [DU]	-0.857	-0.498	-0.363	-0.271	-0.175	0.199	0.301	0.401	0.559	1.05
sulfurdioxide slant column density cobra [DU]	-0.857	-0.498	-0.363	-0.271	-0.175	0.199	0.301	0.401	0.559	1.05
sulfurdioxide slant column density cobra precision [DU]	0.150	0.175	0.188	0.199	0.214	0.345	0.400	0.451	0.540	0.757
sulfurdioxide slant column density window1 [DU]	-1.69	-0.927	-0.636	-0.443	-0.243	0.504	0.699	0.885	1.17	1.95
sulfurdioxide slant column density window1 precision [DU]	0.150	0.175	0.188	0.199	0.214	0.345	0.400	0.451	0.540	0.757
sulfurdioxide slant column density corrected win1 [DU]	-1.62	-0.949	-0.690	-0.515	-0.329	0.405	0.607	0.804	1.11	1.96
background so2 slant column offset window1 [DU]	-0.312	-0.246	-0.212	-0.194	-0.172	-1.536×10^{-2}	4.090×10^{-2}	9.509×10^{-2}	0.179	0.390
sulfurdioxide slant column density window2 [DU]	-19.4	-12.4	-9.06	-6.54	-3.71	7.62	10.5	13.0	16.5	24.1
sulfurdioxide slant column density window2 precision [DU]	4.23	5.04	5.56	6.00	6.53	9.25	10.2	11.1	12.4	15.1
sulfurdioxide slant column density corrected win2 [DU]	-20.9	-13.7	-10.3	-7.74	-4.96	6.03	8.78	11.2	14.6	21.9
background so2 slant column offset window2 [DU]	-6.99	-5.58	-4.72	-3.95	-2.99	0.284	0.601	0.835	1.22	2.74
sulfurdioxide slant column density window3 [DU]	-70.6	-49.1	-39.4	-32.6	-25.2	3.97	11.8	19.0	28.8	48.3
sulfurdioxide slant column density window3 precision [DU]	13.0	15.5	17.5	19.0	20.6	31.2	35.9	41.7	54.0	87.3
sulfurdioxide slant column density corrected win3 [DU]	-64.2	-42.9	-33.0	-26.0	-18.5	9.98	17.3	24.0	33.2	52.3
background so2 slant column offset window3 [DU]	-5.40	-2.50	-0.843	0.413	1.78	10.8	12.0	12.9	13.9	15.8
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]	7.996×10^{-4}	1.336×10^{-3}	2.080×10^{-3}	3.505×10^{-3}	6.314×10^{-3}	2.743×10^{-2}	3.995×10^{-2}	5.937×10^{-2}	0.103	0.282
fitted radiance shift [nm]	-8.341×10^{-3}	-4.018×10^{-3}	-2.529×10^{-3}	-1.715×10^{-3}	-1.061×10^{-3}	6.273×10^{-4}	1.283×10^{-3}	2.158×10^{-3}	3.747×10^{-3}	8.256×10^{-3}
fitted radiance squeeze [1]	-5.181×10^{-4}	-3.214×10^{-4}	-2.410×10^{-4}	-1.867×10^{-4}	-1.300×10^{-4}	7.941×10^{-5}	1.323×10^{-4}	1.816×10^{-4}	2.525×10^{-4}	4.231×10^{-4}
fitted root mean square [1]	6.078×10^{-4}	7.494×10^{-4}	8.293×10^{-4}	8.895×10^{-4}	9.612×10^{-4}	1.485×10^{-3}	1.731×10^{-3}	1.965×10^{-3}	2.286×10^{-3}	3.115×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.117	0.286	0.389	0.473	0.585	1.19	1.47	1.69	1.94	2.22
sulfurdioxide total air mass factor polluted precision [1]	1.190×10^{-2}	2.000×10^{-2}	2.580×10^{-2}	3.172×10^{-2}	3.954×10^{-2}	0.157	0.208	0.265	0.371	0.708
sulfurdioxide clear air mass factor polluted [1]	0.230	0.325	0.389	0.448	0.533	0.923	1.03	1.14	1.42	1.86
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]	0.562 ± 0.420	11773639	0.870	0.490	0.0	1.000	0.130	1.000
sulfurdioxide total vertical column [DU]	$(2.797 \pm 81.250) \times 10^{-2}$	11773639	0.399	8.936×10^{-3}	-104	77.9	-0.187	0.212
sulfurdioxide total vertical column precision [DU]	0.446 ± 0.606	11773639	0.284	0.286	4.050×10^{-2}	159	0.195	0.479
sulfurdioxide slant column density corrected [DU]	$(1.906 \pm 35.141) \times 10^{-2}$	11773639	0.357	8.603×10^{-3}	-7.87	78.4	-0.168	0.189
sulfurdioxide slant column density cobra [DU]	$(1.903 \pm 34.992) \times 10^{-2}$	11773639	0.357	8.603×10^{-3}	-7.87	78.4	-0.168	0.189
sulfurdioxide slant column density cobra precision [DU]	0.283 ± 0.121	11773639	0.114	0.245	8.753×10^{-2}	56.2	0.207	0.321
sulfurdioxide slant column density window1 [DU]	0.117 ± 0.658	11773639	0.718	0.123	-51.7	64.0	-0.239	0.479
sulfurdioxide slant column density window1 precision [DU]	0.283 ± 0.121	11773639	0.114	0.245	8.753×10^{-2}	56.2	0.207	0.321
sulfurdioxide slant column density corrected win1 [DU]	$(4.796 \pm 64.412) \times 10^{-2}$	11773639	0.702	2.915×10^{-2}	-51.7	64.1	-0.316	0.386
background so2 slant column offset window1 [DU]	$(-6.881 \pm 15.113) \times 10^{-2}$	11773639	0.190	-0.100	-0.675	1.29	-0.178	1.165×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.14 ± 8.34	11773639	10.7	2.14	-381	800	-3.24	7.51
sulfurdioxide slant column density window2 precision [DU]	7.57 ± 2.09	11773639	2.34	7.27	2.15	350	6.20	8.54
sulfurdioxide slant column density corrected win2 [DU]	0.447 ± 8.080	11773639	10.3	0.506	-384	796	-4.70	5.65
background so2 slant column offset window2 [DU]	-1.70 ± 2.42	11773639	3.91	-1.35	-10.1	6.62	-3.55	0.369
sulfurdioxide slant column density window3 [DU]	-10.8 ± 21.9	11773639	27.0	-11.3	-801	942	-24.5	2.45
sulfurdioxide slant column density window3 precision [DU]	26.4 ± 13.7	11773639	8.25	22.8	8.49	922	19.5	27.8
sulfurdioxide slant column density corrected win3 [DU]	-4.14 ± 21.27	11773639	26.3	-4.01	-800	940	-17.2	9.10
background so2 slant column offset window3 [DU]	6.71 ± 5.68	11773639	9.74	8.47	-14.7	22.4	1.62	11.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	11773639	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.170 \pm 7.506) \times 10^{-2}$	11773639	2.547×10^{-2}	1.251×10^{-2}	2.130×10^{-4}	2.16	3.942×10^{-3}	2.942×10^{-2}
fitted radiance shift [nm]	$(-4.870 \pm 266.123) \times 10^{-5}$	11773639	1.558×10^{-3}	-7.038×10^{-5}	-7.171×10^{-2}	5.763×10^{-2}	-8.542×10^{-4}	7.041×10^{-4}
fitted radiance squeeze [1]	$(-5.122 \pm 17.273) \times 10^{-5}$	11773639	2.011×10^{-4}	-4.076×10^{-5}	-1.738×10^{-2}	1.835×10^{-2}	-1.452×10^{-4}	5.589×10^{-5}
fitted root mean square [1]	$(1.238 \pm 0.499) \times 10^{-3}$	11773639	4.624×10^{-4}	1.097×10^{-3}	3.345×10^{-4}	8.004×10^{-2}	9.293×10^{-4}	1.392×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.984 ± 0.537	11773639	0.760	0.877	5.000×10^{-2}	2.89	0.575	1.34
sulfurdioxide total air mass factor polluted precision [1]	0.140 ± 0.156	11773639	0.141	8.593×10^{-2}	2.885×10^{-3}	2.13	4.157×10^{-2}	0.182
sulfurdioxide clear air mass factor polluted [1]	0.770 ± 0.370	11773639	0.450	0.716	5.239×10^{-2}	2.61	0.495	0.945
number of spectral points in retrieval [1]	73.5 ± 0.5	11773639	1.000	73.0	71.0	74.0	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]	0.763 ± 0.354	5595729	0.560	1.000	0.0	1.000	0.440	1.000
sulfurdioxide total vertical column [DU]	$(3.573 \pm 96.492) \times 10^{-2}$	5595729	0.516	1.522×10^{-2}	-100	708	-0.240	0.277
sulfurdioxide total vertical column precision [DU]	0.516 ± 0.549	5595729	0.337	0.373	5.800×10^{-2}	109	0.257	0.594
sulfurdioxide slant column density corrected [DU]	$(2.401 \pm 50.749) \times 10^{-2}$	5595729	0.416	1.304×10^{-2}	-44.9	479	-0.193	0.223
sulfurdioxide slant column density cobra [DU]	$(2.352 \pm 40.620) \times 10^{-2}$	5595729	0.416	1.304×10^{-2}	-44.9	42.3	-0.193	0.223
sulfurdioxide slant column density cobra precision [DU]	0.329 ± 0.137	5595729	0.151	0.294	9.915×10^{-2}	25.3	0.237	0.387
sulfurdioxide slant column density window1 [DU]	0.159 ± 0.740	5595729	0.814	0.155	-98.9	86.8	-0.252	0.562
sulfurdioxide slant column density window1 precision [DU]	0.329 ± 0.137	5595729	0.151	0.294	9.915×10^{-2}	25.3	0.237	0.387
sulfurdioxide slant column density corrected win1 [DU]	$(5.887 \pm 73.848) \times 10^{-2}$	5595729	0.810	3.981×10^{-2}	-98.9	86.7	-0.359	0.451
background so2 slant column offset window1 [DU]	$(-9.976 \pm 9.966) \times 10^{-2}$	5595729	9.411×10^{-2}	-0.108	-1.31	4.22	-0.156	-6.157×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.66 ± 10.24	5595729	12.7	1.47	-1.017×10^3	1.240×10^3	-4.79	7.90
sulfurdioxide slant column density window2 precision [DU]	9.21 ± 2.71	5595729	2.93	8.86	2.49	754	7.57	10.5
sulfurdioxide slant column density corrected win2 [DU]	0.700 ± 10.148	5595729	12.6	0.677	-1.018×10^3	1.239×10^3	-5.61	6.98
background so2 slant column offset window2 [DU]	-0.959 ± 1.647	5595729	2.02	-0.610	-13.1	6.25	-1.88	0.136
sulfurdioxide slant column density window3 [DU]	-10.1 ± 27.3	5595729	34.5	-9.61	-1.151×10^3	443	-27.0	7.48
sulfurdioxide slant column density window3 precision [DU]	32.2 ± 13.2	5595729	10.6	29.1	9.64	303	24.7	35.3
sulfurdioxide slant column density corrected win3 [DU]	-5.10 ± 26.98	5595729	34.2	-4.84	-1.147×10^3	443	-22.0	12.2
background so2 slant column offset window3 [DU]	5.04 ± 4.54	5595729	6.14	4.09	-11.4	30.6	1.94	8.09
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	5595729	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.581 \pm 4.960) \times 10^{-2}$	5595729	1.369×10^{-2}	1.704×10^{-2}	1.567×10^{-3}	1.55	1.177×10^{-2}	2.546×10^{-2}
fitted radiance shift [nm]	$(-4.785 \pm 25.834) \times 10^{-4}$	5595729	1.875×10^{-3}	-4.788×10^{-4}	-5.688×10^{-2}	5.539×10^{-2}	-1.458×10^{-3}	4.162×10^{-4}
fitted radiance squeeze [1]	$(2.188 \pm 19.301) \times 10^{-5}$	5595729	2.243×10^{-4}	1.663×10^{-5}	-1.661×10^{-2}	1.719×10^{-2}	-9.340×10^{-5}	1.309×10^{-4}
fitted root mean square [1]	$(1.409 \pm 0.533) \times 10^{-3}$	5595729	5.994×10^{-4}	1.272×10^{-3}	3.679×10^{-4}	7.330×10^{-2}	1.051×10^{-3}	1.651×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.836 ± 0.351	5595729	0.414	0.792	5.000×10^{-2}	2.68	0.599	1.01
sulfurdioxide total air mass factor polluted precision [1]	$(8.443 \pm 7.164) \times 10^{-2}$	5595729	7.527×10^{-2}	5.581×10^{-2}	3.354×10^{-3}	1.55	3.686×10^{-2}	0.112
sulfurdioxide clear air mass factor polluted [1]	0.747 ± 0.223	5595729	0.303	0.728	9.254×10^{-2}	1.80	0.592	0.894
number of spectral points in retrieval [1]	73.4 ± 0.5	5595729	1.000	73.0	52.0	155	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]	0.668 ± 0.393	11268330	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(2.940 \pm 83.761) \times 10^{-2}$	11268330	0.437	1.089×10^{-2}	-104	708	-0.205	0.232
sulfurdioxide total vertical column precision [DU]	0.460 ± 0.560	11268330	0.290	0.307	5.469×10^{-2}	159	0.219	0.509
sulfurdioxide slant column density corrected [DU]	$(2.073 \pm 38.301) \times 10^{-2}$	11268330	0.378	9.977×10^{-3}	-8.88	213	-0.177	0.201
sulfurdioxide slant column density cobra [DU]	$(2.065 \pm 37.360) \times 10^{-2}$	11268330	0.378	9.977×10^{-3}	-8.88	78.4	-0.177	0.201
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.130	11268330	0.144	0.263	8.753×10^{-2}	56.2	0.214	0.358
sulfurdioxide slant column density window1 [DU]	0.130 ± 0.698	11268330	0.762	0.137	-66.5	86.8	-0.248	0.514
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.130	11268330	0.144	0.263	8.753×10^{-2}	56.2	0.214	0.358
sulfurdioxide slant column density corrected win1 [DU]	$(5.288 \pm 68.776) \times 10^{-2}$	11268330	0.748	3.488×10^{-2}	-66.5	86.7	-0.334	0.415
background so2 slant column offset window1 [DU]	$(-7.668 \pm 14.397) \times 10^{-2}$	11268330	0.156	-0.107	-1.31	4.22	-0.172	-1.603×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.93 ± 9.05	11268330	11.5	1.83	-1.017×10^3	1.240×10^3	-3.86	7.60
sulfurdioxide slant column density window2 precision [DU]	8.14 ± 2.28	11268330	2.65	7.79	2.27	615	6.63	9.28
sulfurdioxide slant column density corrected win2 [DU]	0.568 ± 8.845	11268330	11.1	0.584	-1.018×10^3	1.239×10^3	-5.00	6.14
background so2 slant column offset window2 [DU]	-1.37 ± 2.26	11268330	3.21	-0.733	-13.1	6.62	-2.86	0.347
sulfurdioxide slant column density window3 [DU]	-8.18 ± 24.11	11268330	30.1	-8.59	-867	443	-23.3	6.84
sulfurdioxide slant column density window3 precision [DU]	27.5 ± 11.8	11268330	9.55	24.5	9.22	303	20.9	30.5
sulfurdioxide slant column density corrected win3 [DU]	-2.36 ± 23.24	11268330	28.9	-2.47	-861	443	-16.8	12.1
background so2 slant column offset window3 [DU]	5.82 ± 5.44	11268330	9.07	5.35	-14.7	30.6	1.53	10.6
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	11268330	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.107 \pm 3.673) \times 10^{-2}$	11268330	1.573×10^{-2}	1.442×10^{-2}	4.079×10^{-4}	1.64	7.638×10^{-3}	2.337×10^{-2}
fitted radiance shift [nm]	$(-2.310 \pm 23.012) \times 10^{-4}$	11268330	1.614×10^{-3}	-2.181×10^{-4}	-5.688×10^{-2}	4.348×10^{-2}	-1.062×10^{-3}	5.513×10^{-4}
fitted radiance squeeze [1]	$(-2.136 \pm 18.564) \times 10^{-5}$	11268330	2.116×10^{-4}	-1.674×10^{-5}	-1.738×10^{-2}	1.439×10^{-2}	-1.244×10^{-4}	8.718×10^{-5}
fitted root mean square [1]	$(1.318 \pm 0.531) \times 10^{-3}$	11268330	5.900×10^{-4}	1.163×10^{-3}	3.345×10^{-4}	8.004×10^{-2}	9.623×10^{-4}	1.552×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.926 ± 0.443	11268330	0.531	0.863	5.000×10^{-2}	2.68	0.622	1.15
sulfurdioxide total air mass factor polluted precision [1]	0.106 ± 0.119	11268330	8.779×10^{-2}	6.550×10^{-2}	3.082×10^{-3}	2.13	4.089×10^{-2}	0.129
sulfurdioxide clear air mass factor polluted [1]	0.792 ± 0.329	11268330	0.359	0.757	5.242×10^{-2}	2.56	0.581	0.940
number of spectral points in retrieval [1]	73.4 ± 0.5	11268330	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]	0.608 ± 0.427	4240069	0.860	1.000	0.0	1.000	0.140	1.000
sulfurdioxide total vertical column [DU]	$(2.989 \pm 87.083) \times 10^{-2}$	4240069	0.434	1.024×10^{-2}	-90.2	477	-0.203	0.232
sulfurdioxide total vertical column precision [DU]	0.472 ± 0.573	4240069	0.329	0.329	4.050×10^{-2}	109	0.207	0.536
sulfurdioxide slant column density corrected [DU]	$(1.926 \pm 47.643) \times 10^{-2}$	4240069	0.360	9.381×10^{-3}	-44.9	479	-0.169	0.191
sulfurdioxide slant column density cobra [DU]	$(1.879 \pm 35.128) \times 10^{-2}$	4240069	0.360	9.381×10^{-3}	-44.9	36.4	-0.169	0.191
sulfurdioxide slant column density cobra precision [DU]	0.283 ± 0.119	4240069	9.991×10^{-2}	0.249	9.173×10^{-2}	25.3	0.212	0.312
sulfurdioxide slant column density window1 [DU]	0.152 ± 0.641	4240069	0.707	0.144	-98.9	68.8	-0.208	0.499
sulfurdioxide slant column density window1 precision [DU]	0.283 ± 0.119	4240069	9.991×10^{-2}	0.249	9.173×10^{-2}	25.3	0.212	0.312
sulfurdioxide slant column density corrected win1 [DU]	$(4.722 \pm 63.430) \times 10^{-2}$	4240069	0.696	2.891×10^{-2}	-98.9	68.7	-0.313	0.383
background so2 slant column offset window1 [DU]	-0.104 ± 0.116	4240069	0.137	-0.125	-0.618	1.12	-0.183	-4.592×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.70 ± 9.06	4240069	11.3	1.75	-921	941	-3.93	7.34
sulfurdioxide slant column density window2 precision [DU]	8.20 ± 2.75	4240069	2.82	7.79	2.16	754	6.52	9.34
sulfurdioxide slant column density corrected win2 [DU]	0.480 ± 8.883	4240069	11.0	0.514	-921	942	-4.99	5.96
background so2 slant column offset window2 [DU]	-1.21 ± 2.05	4240069	2.87	-0.748	-10.1	6.62	-2.55	0.315
sulfurdioxide slant column density window3 [DU]	-15.3 ± 23.2	4240069	28.1	-14.9	-1.151×10^3	942	-29.1	-1.02
sulfurdioxide slant column density window3 precision [DU]	30.7 ± 17.5	4240069	13.4	25.7	8.49	746	20.6	34.0
sulfurdioxide slant column density corrected win3 [DU]	-9.46 ± 23.52	4240069	28.7	-8.54	-1.147×10^3	940	-23.4	5.35
background so2 slant column offset window3 [DU]	5.89 ± 5.29	4240069	8.86	6.23	-14.7	20.4	1.62	10.5
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.12	4240069	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.065 \pm 10.304) \times 10^{-2}$	4240069	4.710×10^{-2}	2.061×10^{-2}	2.130×10^{-4}	2.15	6.098×10^{-3}	5.320×10^{-2}
fitted radiance shift [nm]	$(-8.683 \pm 335.394) \times 10^{-5}$	4240069	1.901×10^{-3}	-1.047×10^{-4}	-4.242×10^{-2}	5.763×10^{-2}	-1.072×10^{-3}	8.285×10^{-4}
fitted radiance squeeze [1]	$(-2.805 \pm 17.373) \times 10^{-5}$	4240069	2.019×10^{-4}	-2.616×10^{-5}	-1.661×10^{-2}	1.719×10^{-2}	-1.277×10^{-4}	7.418×10^{-5}
fitted root mean square [1]	$(1.222 \pm 0.456) \times 10^{-3}$	4240069	4.034×10^{-4}	1.113×10^{-3}	3.521×10^{-4}	7.330×10^{-2}	9.500×10^{-4}	1.353×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.915 ± 0.534	4240069	0.672	0.762	5.000×10^{-2}	2.89	0.524	1.20
sulfurdioxide total air mass factor polluted precision [1]	0.149 ± 0.166	4240069	0.169	9.602×10^{-2}	3.354×10^{-3}	2.03	3.468×10^{-2}	0.204
sulfurdioxide clear air mass factor polluted [1]	0.699 ± 0.305	4240069	0.358	0.646	8.714×10^{-2}	2.61	0.482	0.840
number of spectral points in retrieval [1]	73.4 ± 0.5	4240069	1.000	73.0	53.0	155	73.0	74.0

3 Granule outlines

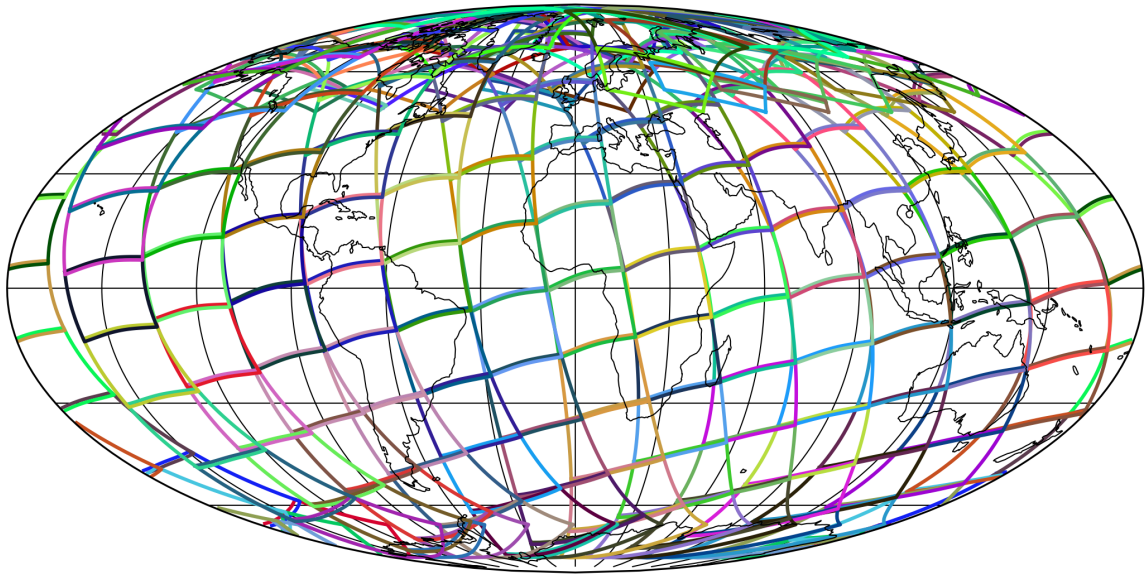


Figure 1: Outline of the granules.

4 Input data monitoring

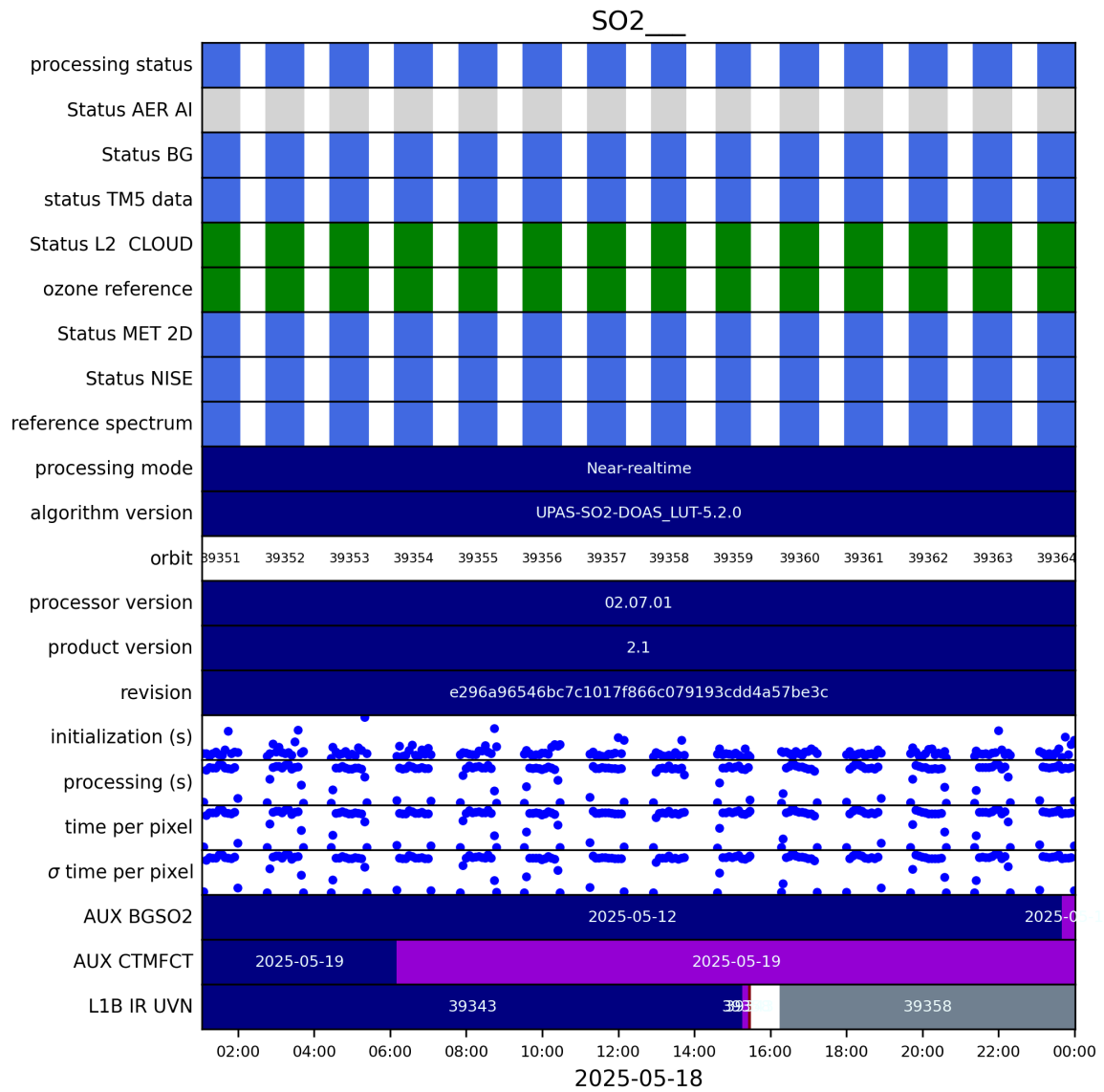


Figure 2: Input data per granule

5 Warnings and errors

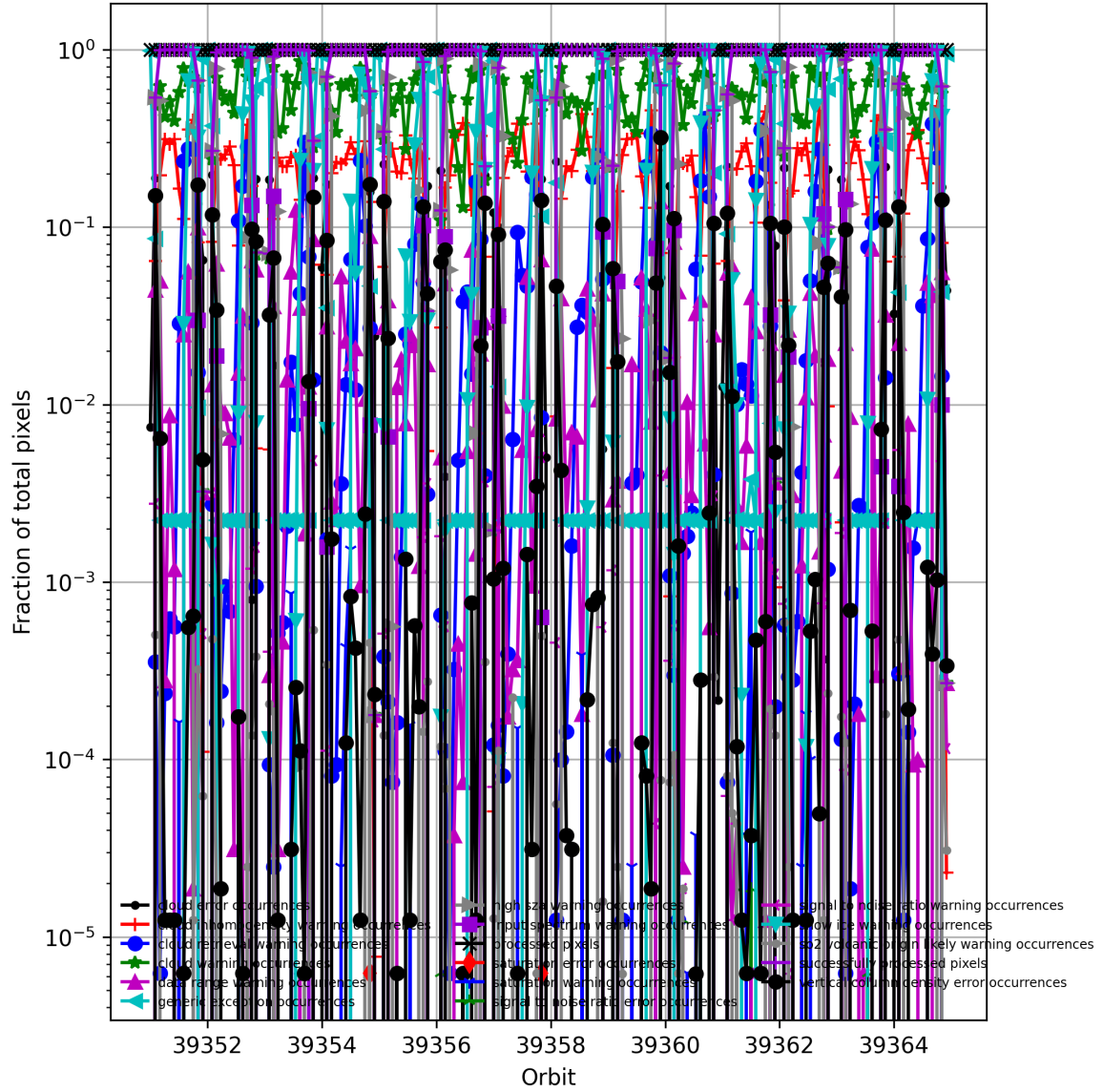


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

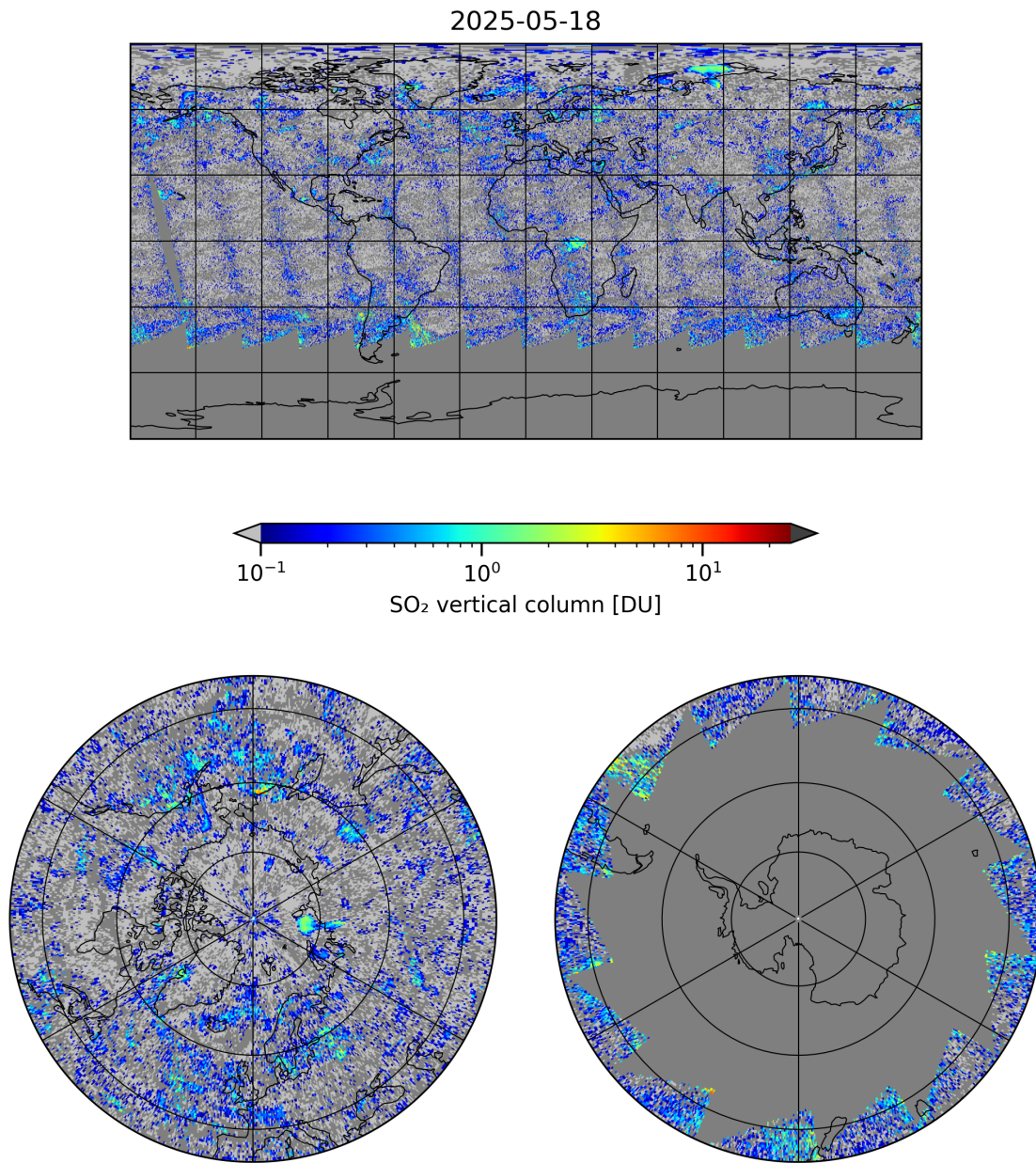


Figure 4: Map of “SO₂ vertical column” for 2025-05-18 to 2025-05-19

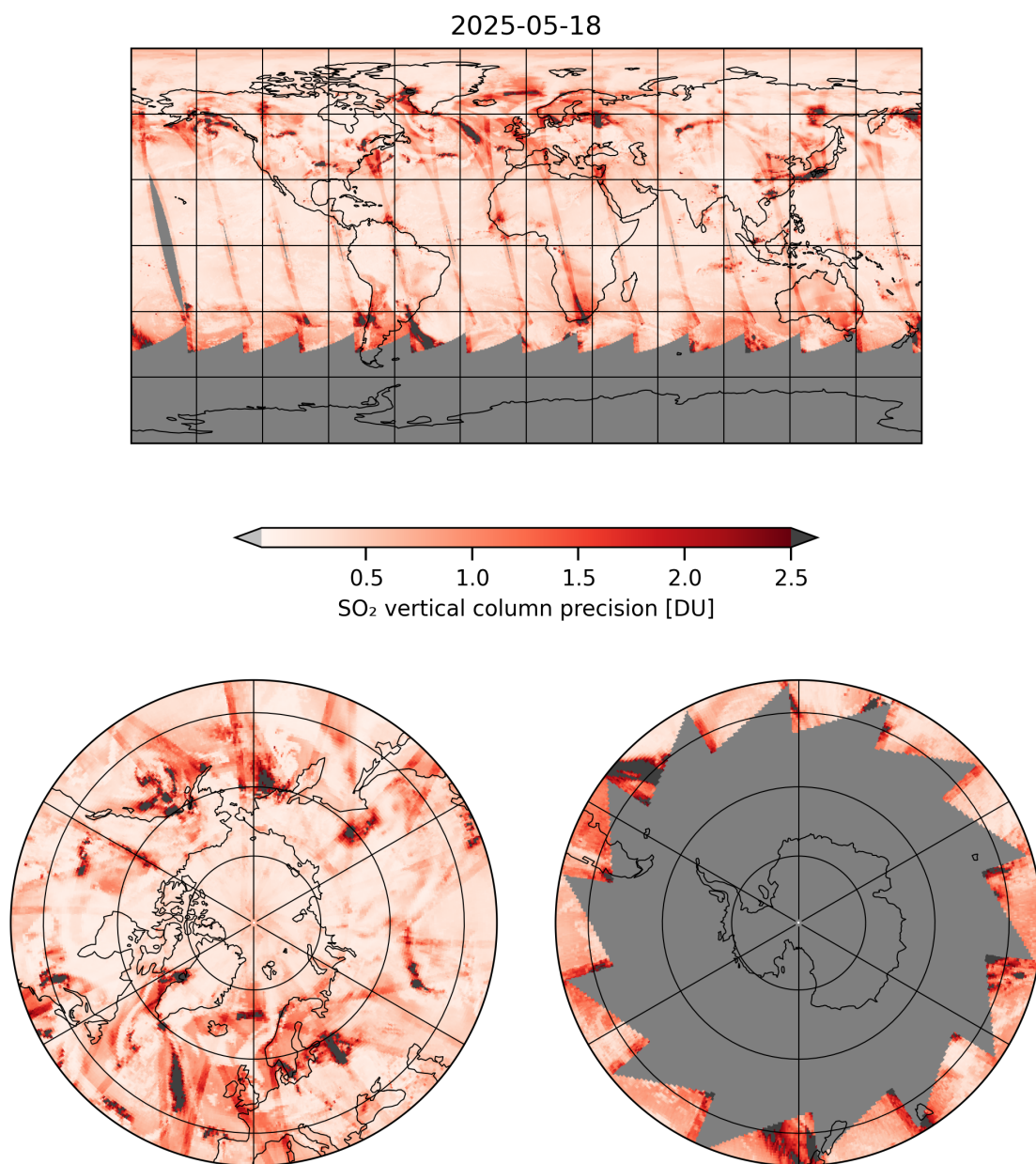


Figure 5: Map of “SO₂ vertical column precision” for 2025-05-18 to 2025-05-19

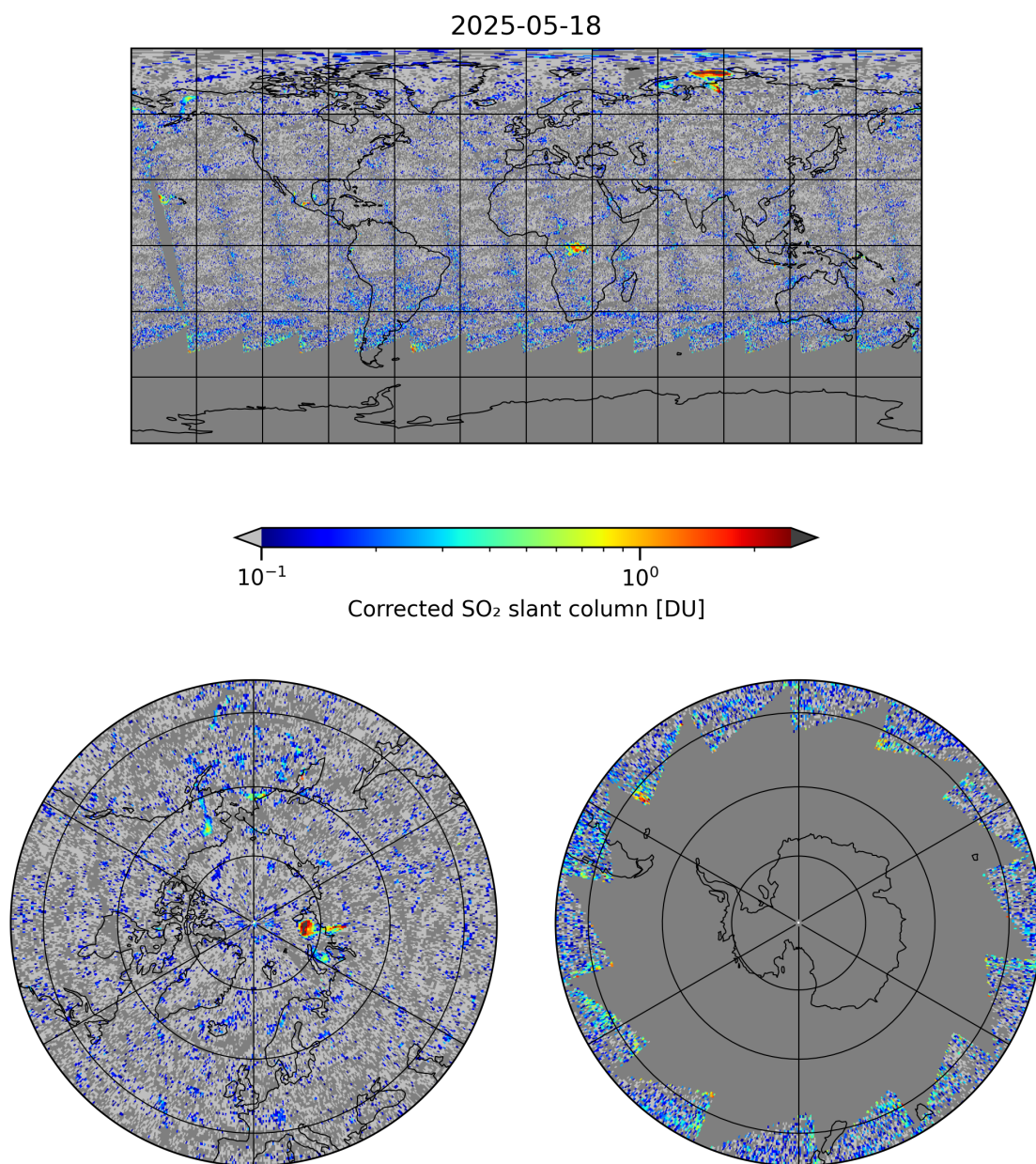


Figure 6: Map of “Corrected SO₂ slant column” for 2025-05-18 to 2025-05-19

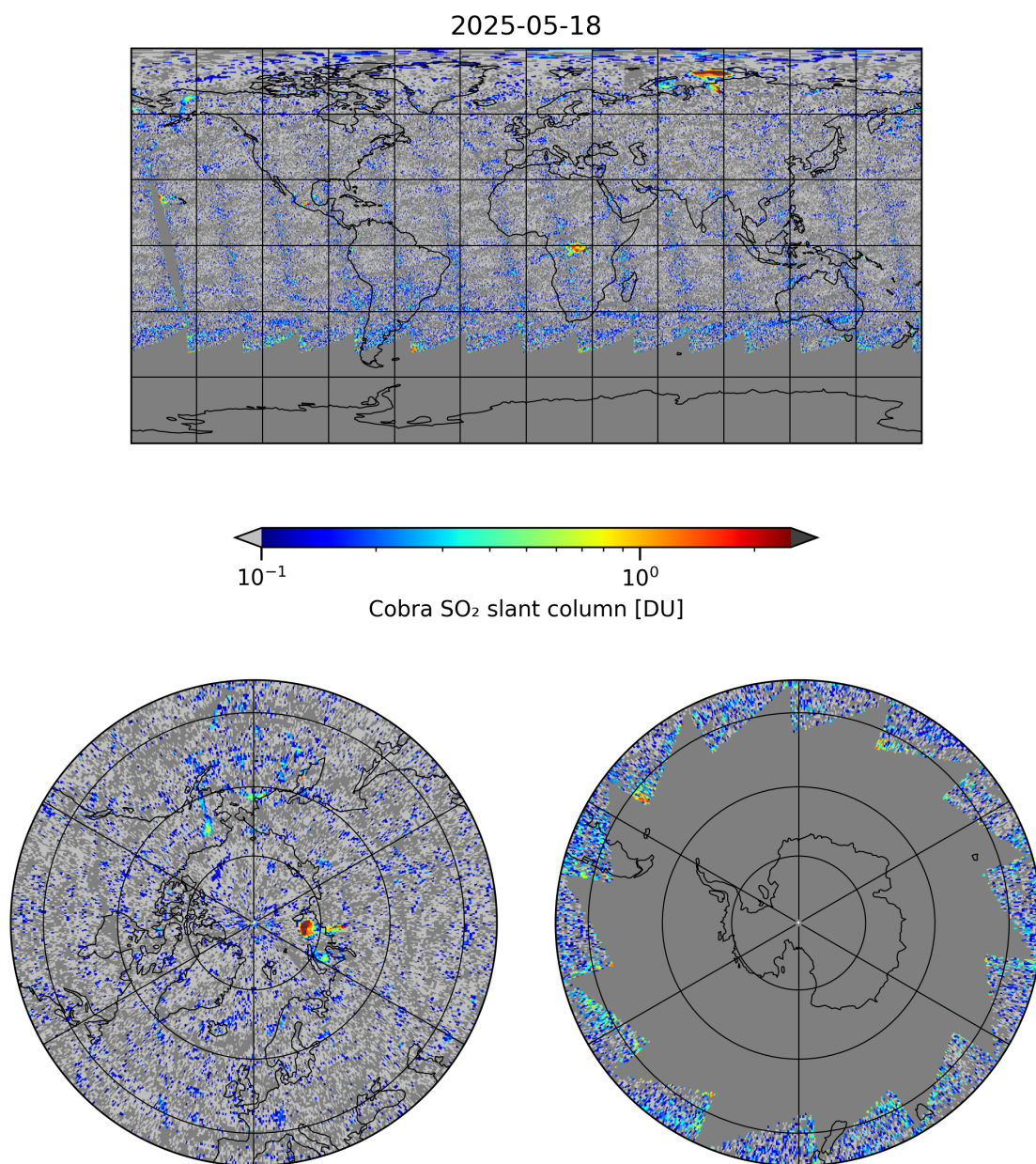


Figure 7: Map of “Cobra SO₂ slant column” for 2025-05-18 to 2025-05-19

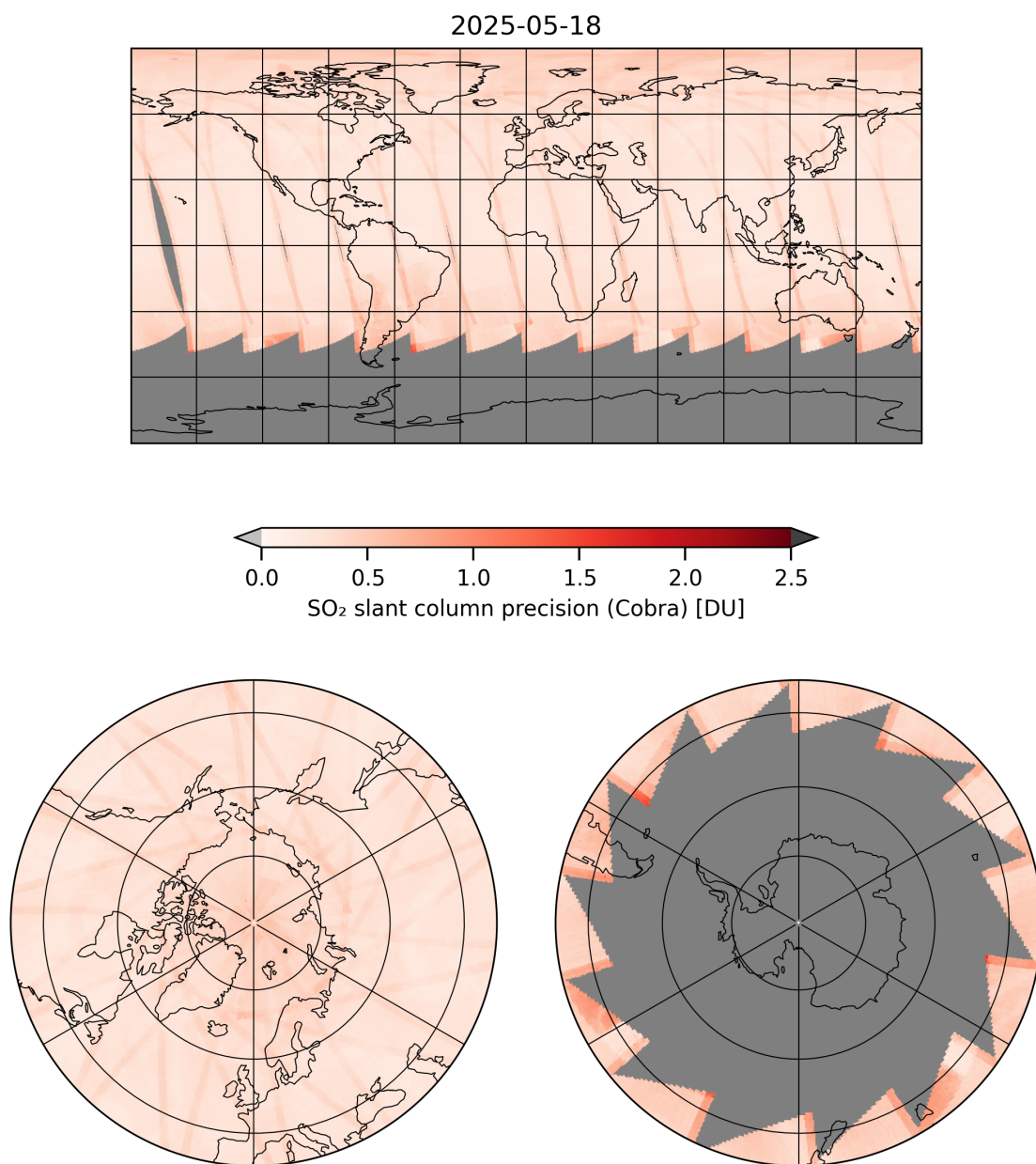


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-05-18 to 2025-05-19

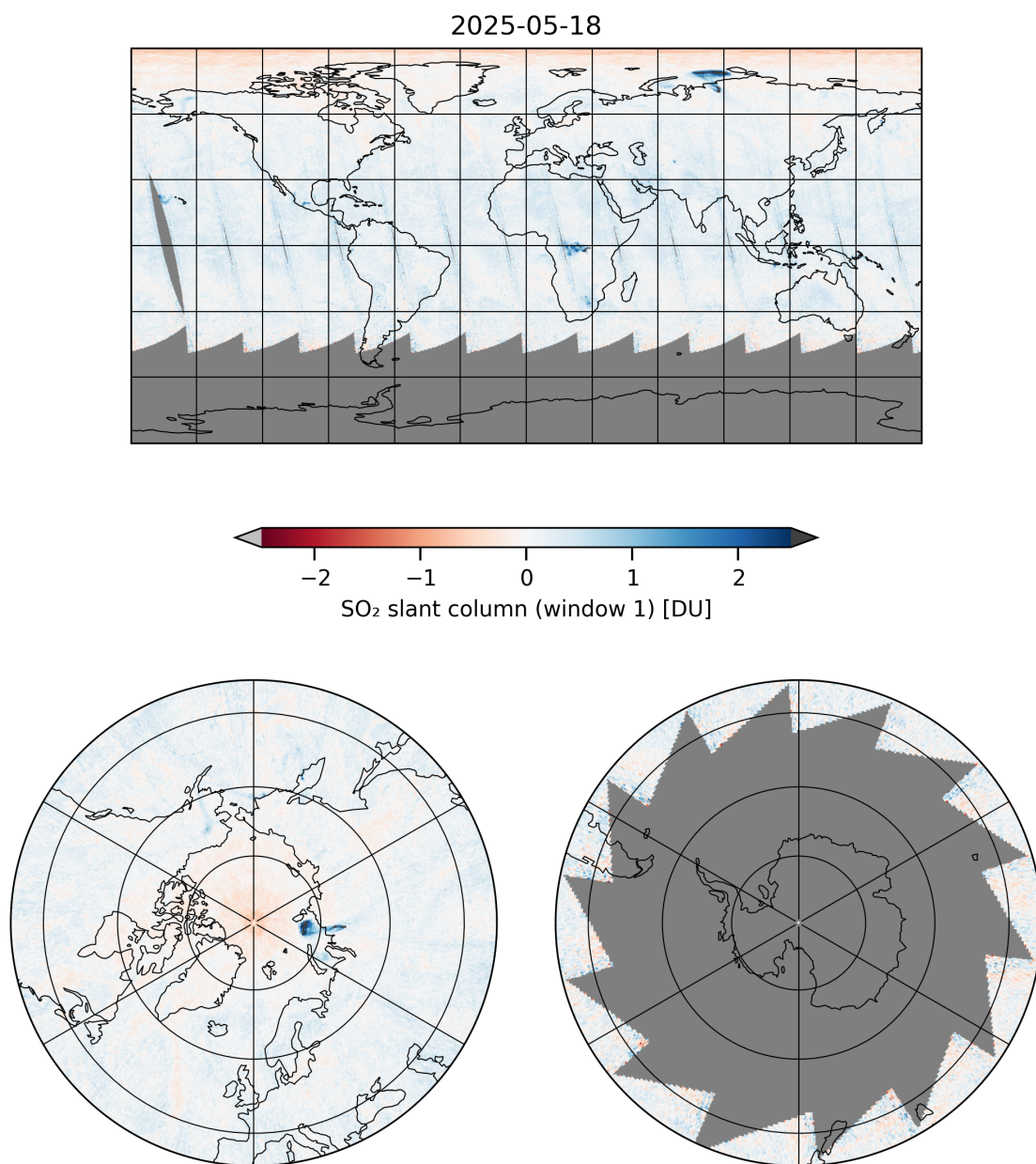


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-05-18 to 2025-05-19

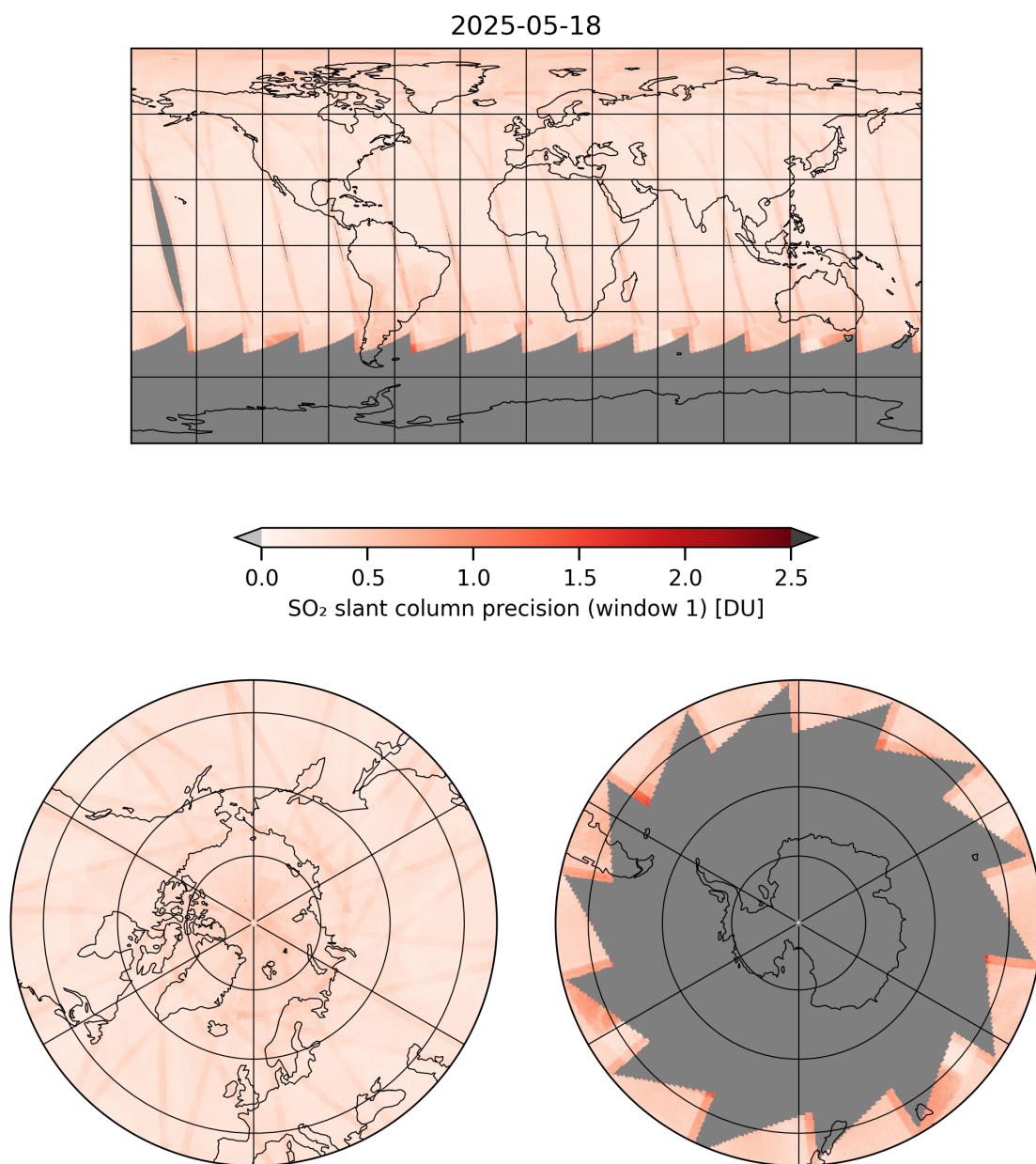


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-05-18 to 2025-05-19

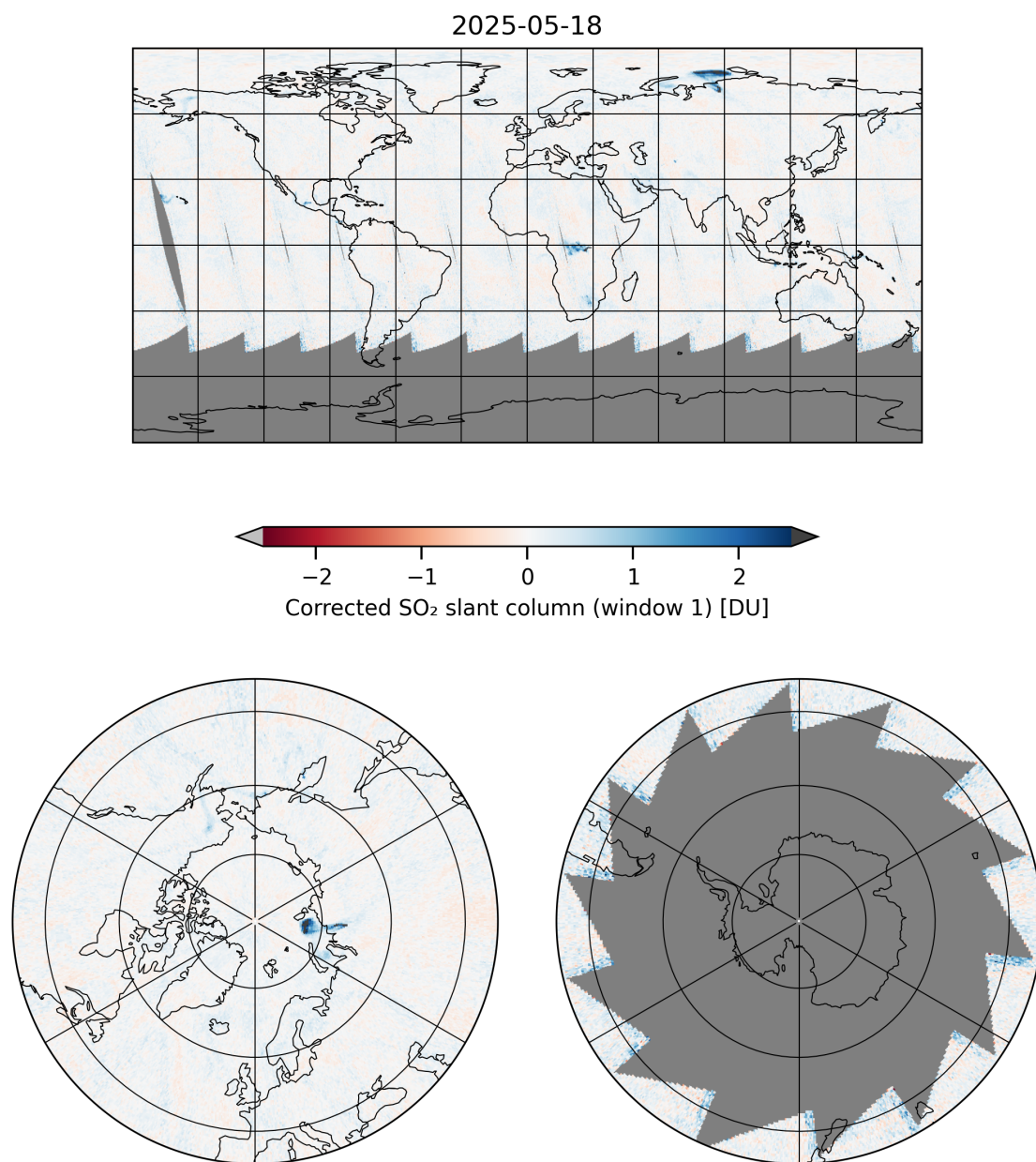


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-05-18 to 2025-05-19

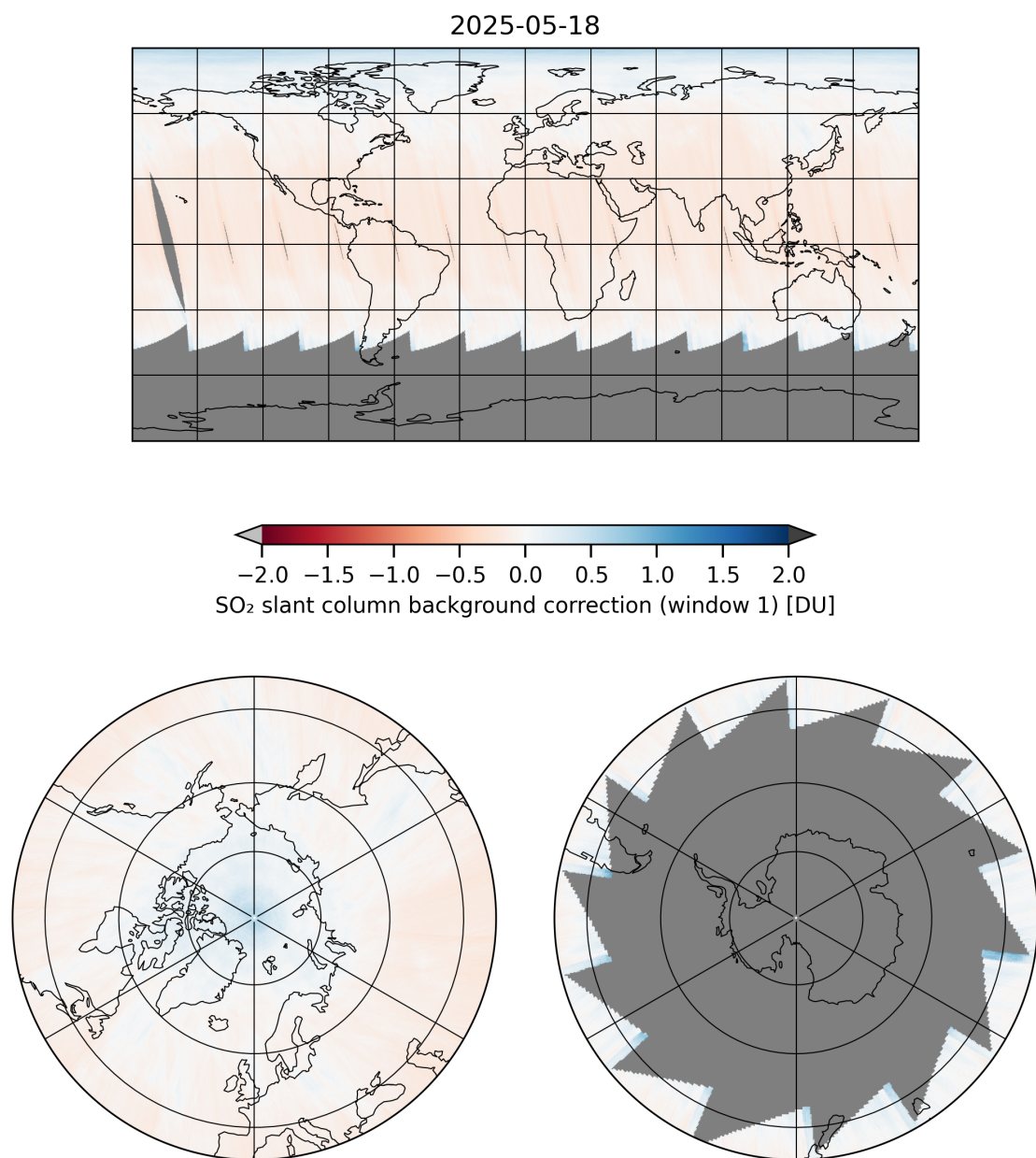


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-05-18 to 2025-05-19

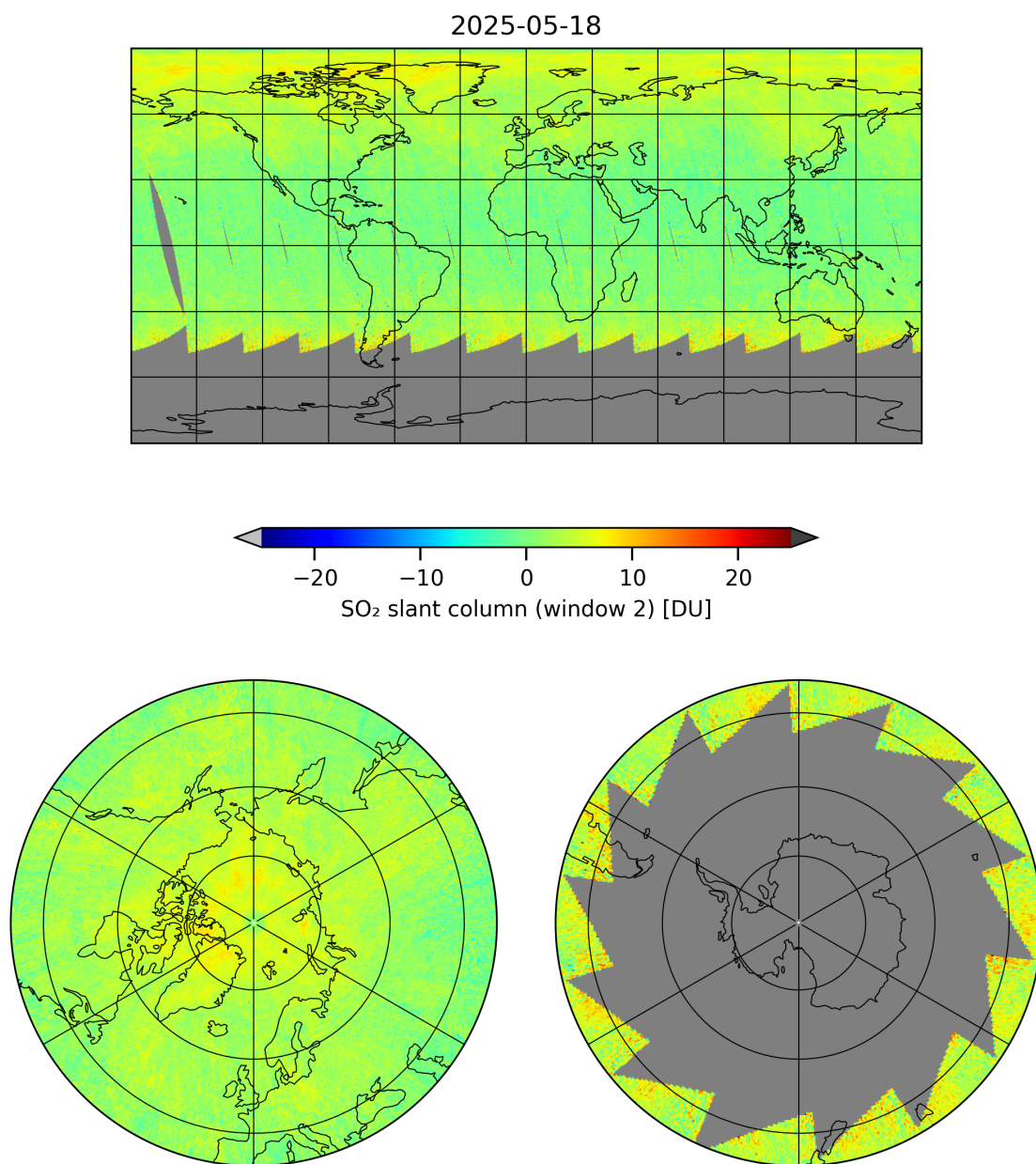


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-05-18 to 2025-05-19

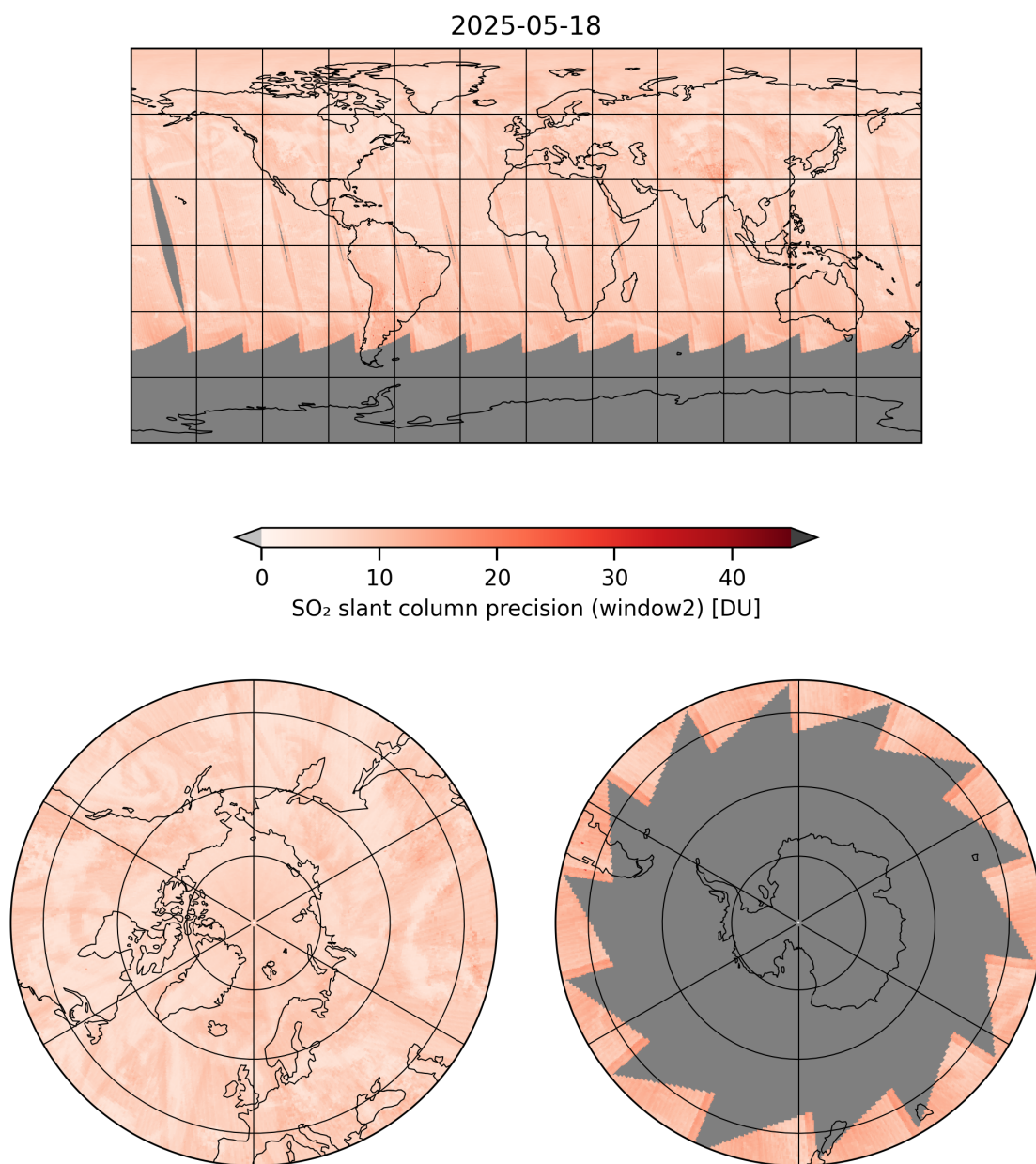


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-05-18 to 2025-05-19

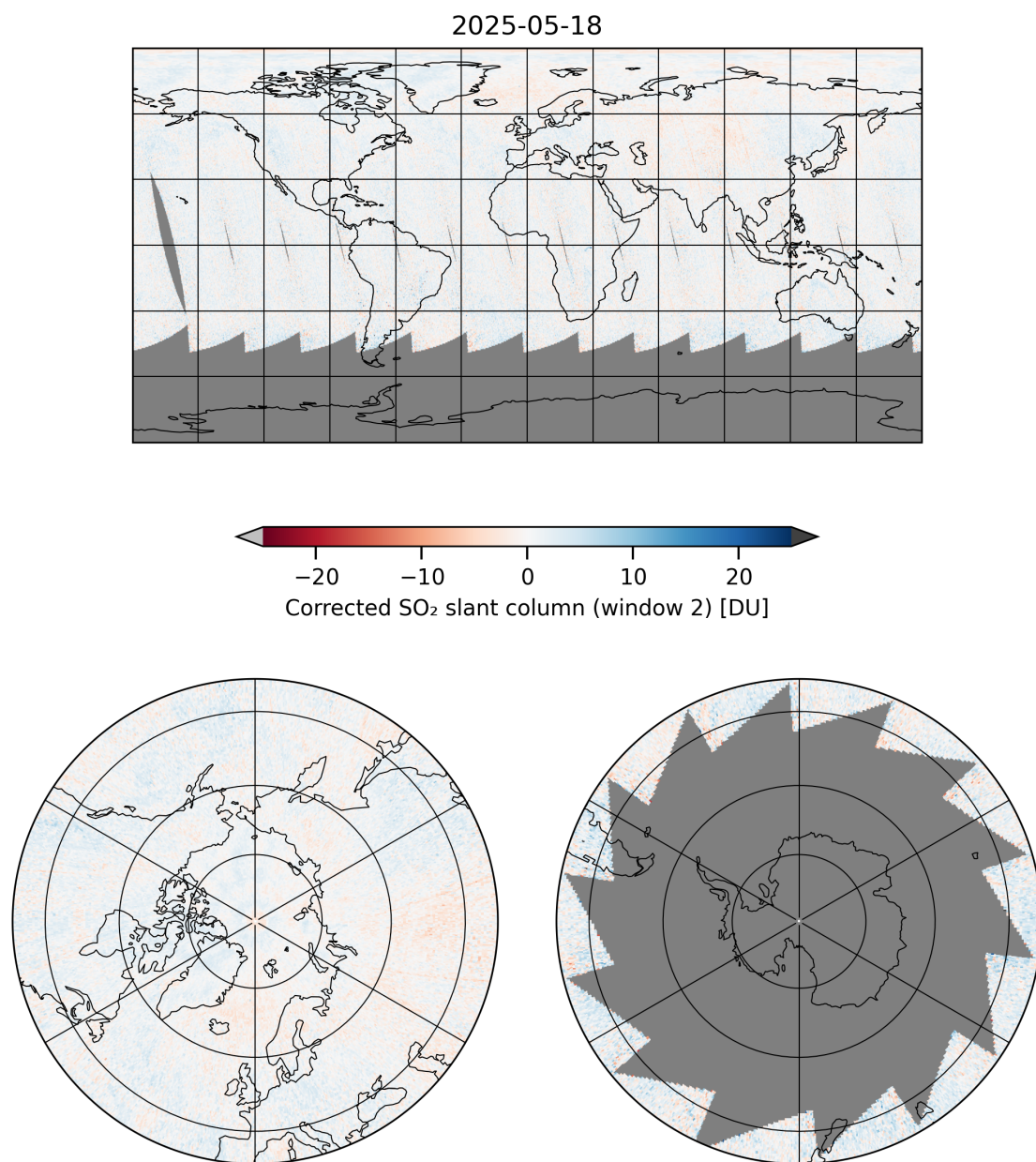


Figure 15: Map of "Corrected SO₂ slant column (window 2)" for 2025-05-18 to 2025-05-19

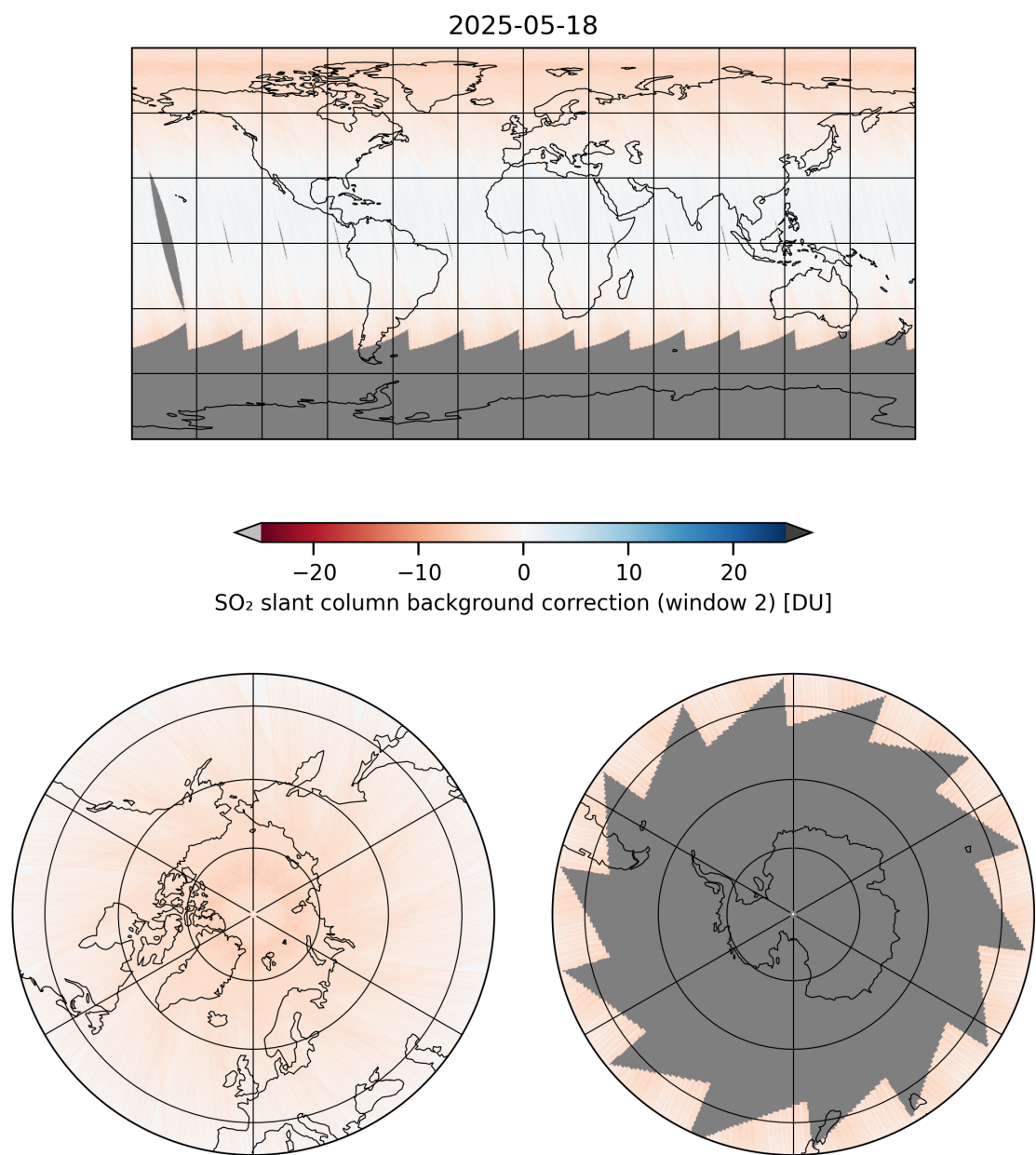


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-05-18 to 2025-05-19

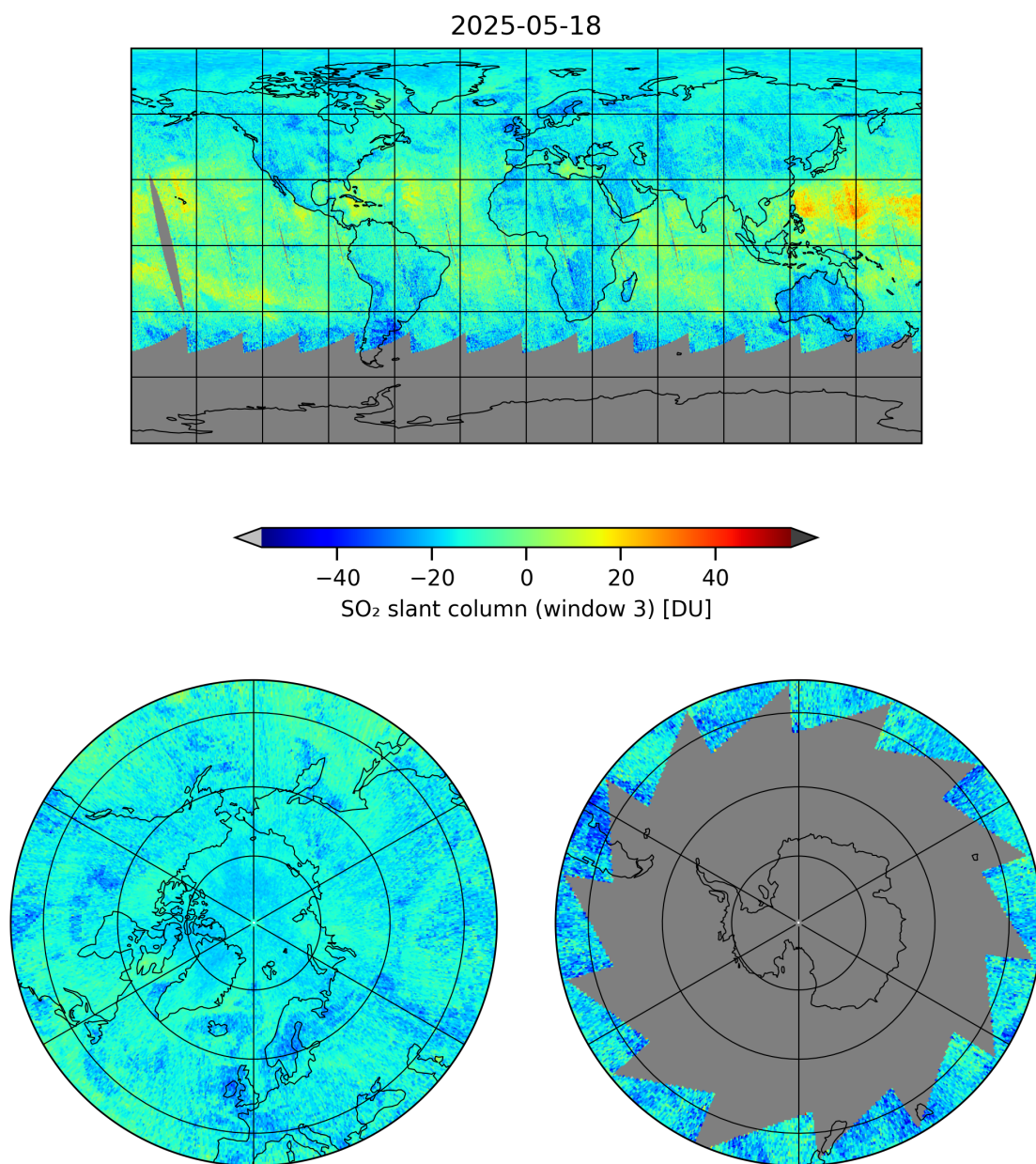


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-05-18 to 2025-05-19

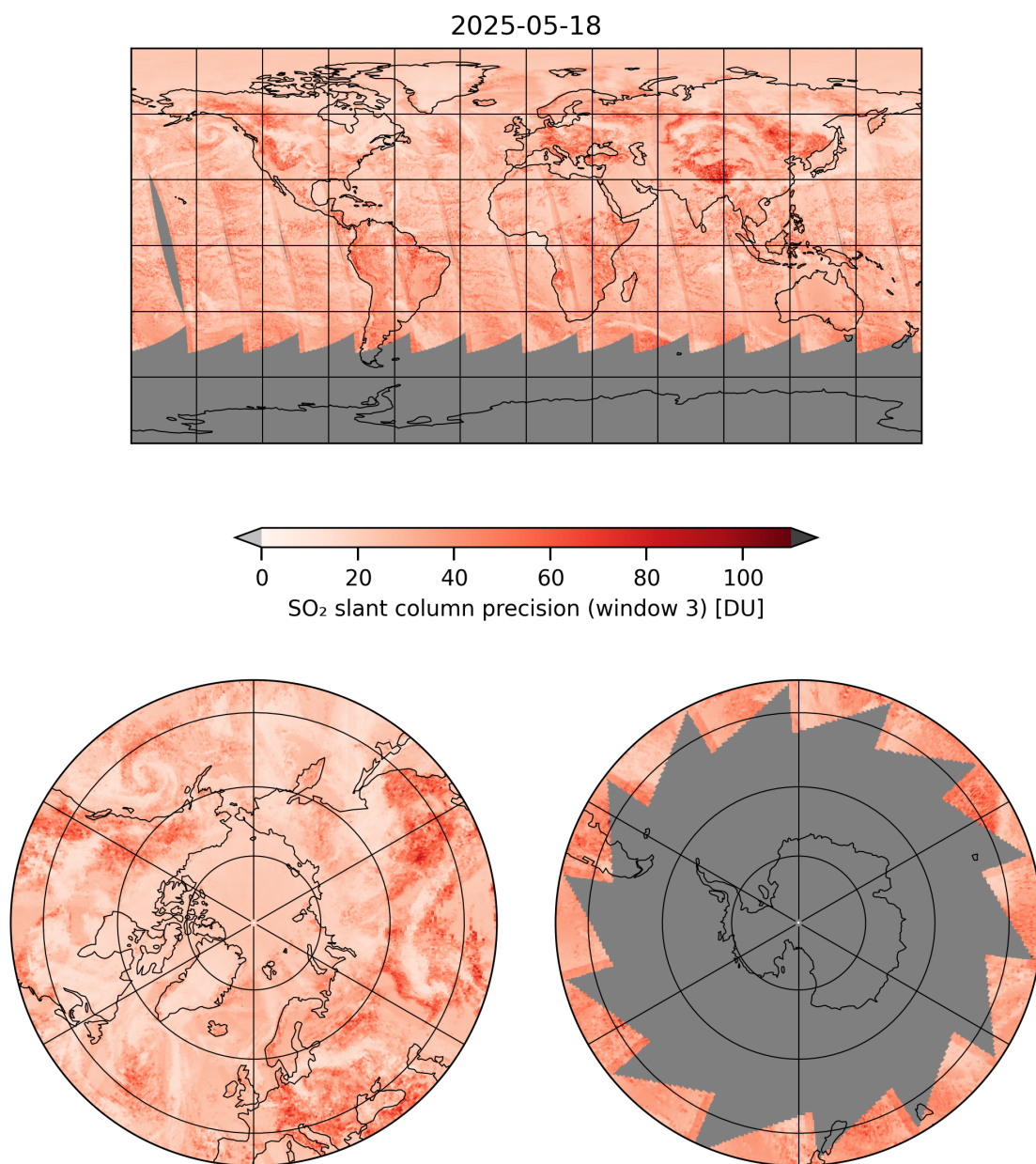


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-05-18 to 2025-05-19

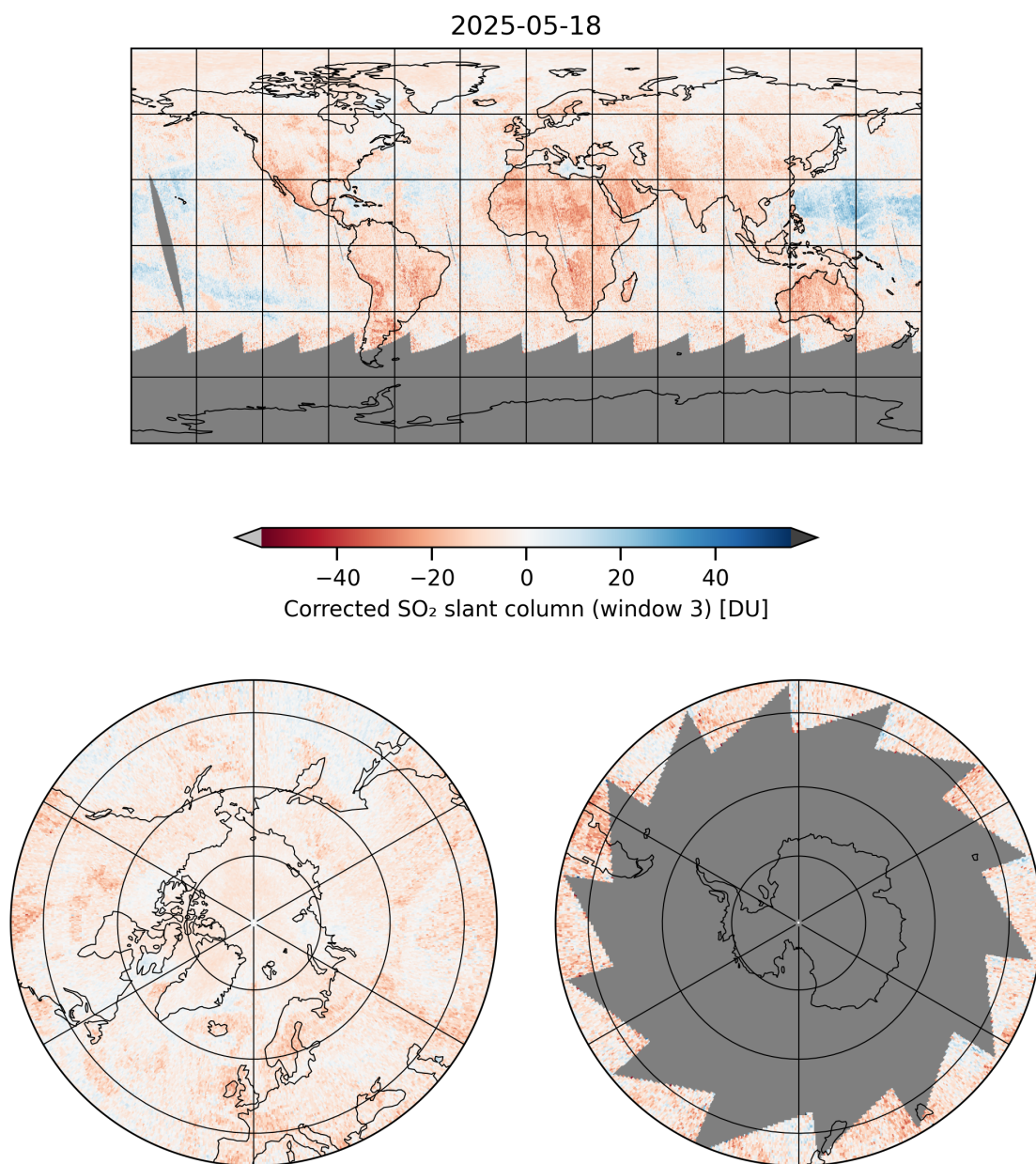


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-05-18 to 2025-05-19

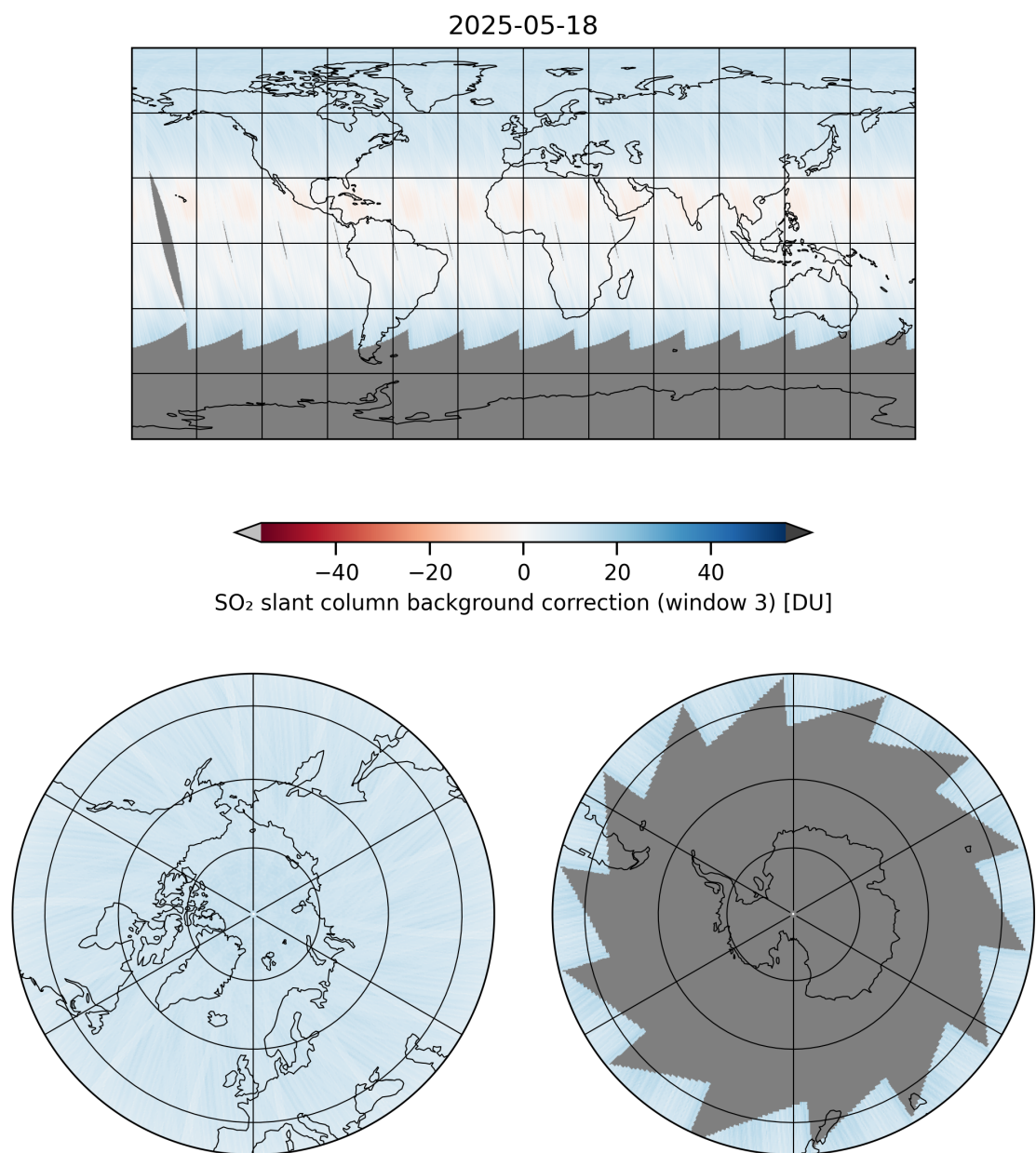


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-05-18 to 2025-05-19

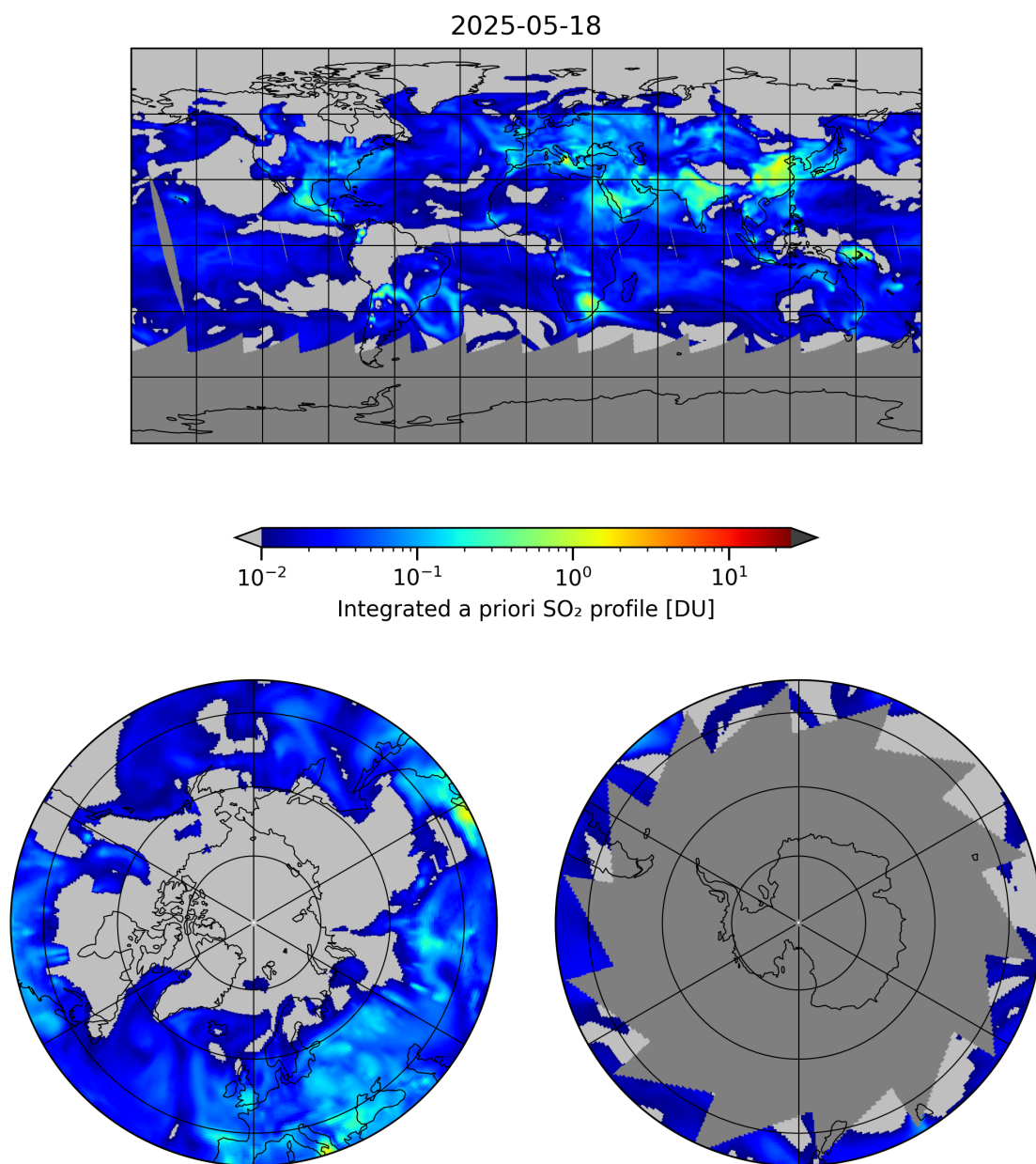


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-05-18 to 2025-05-19

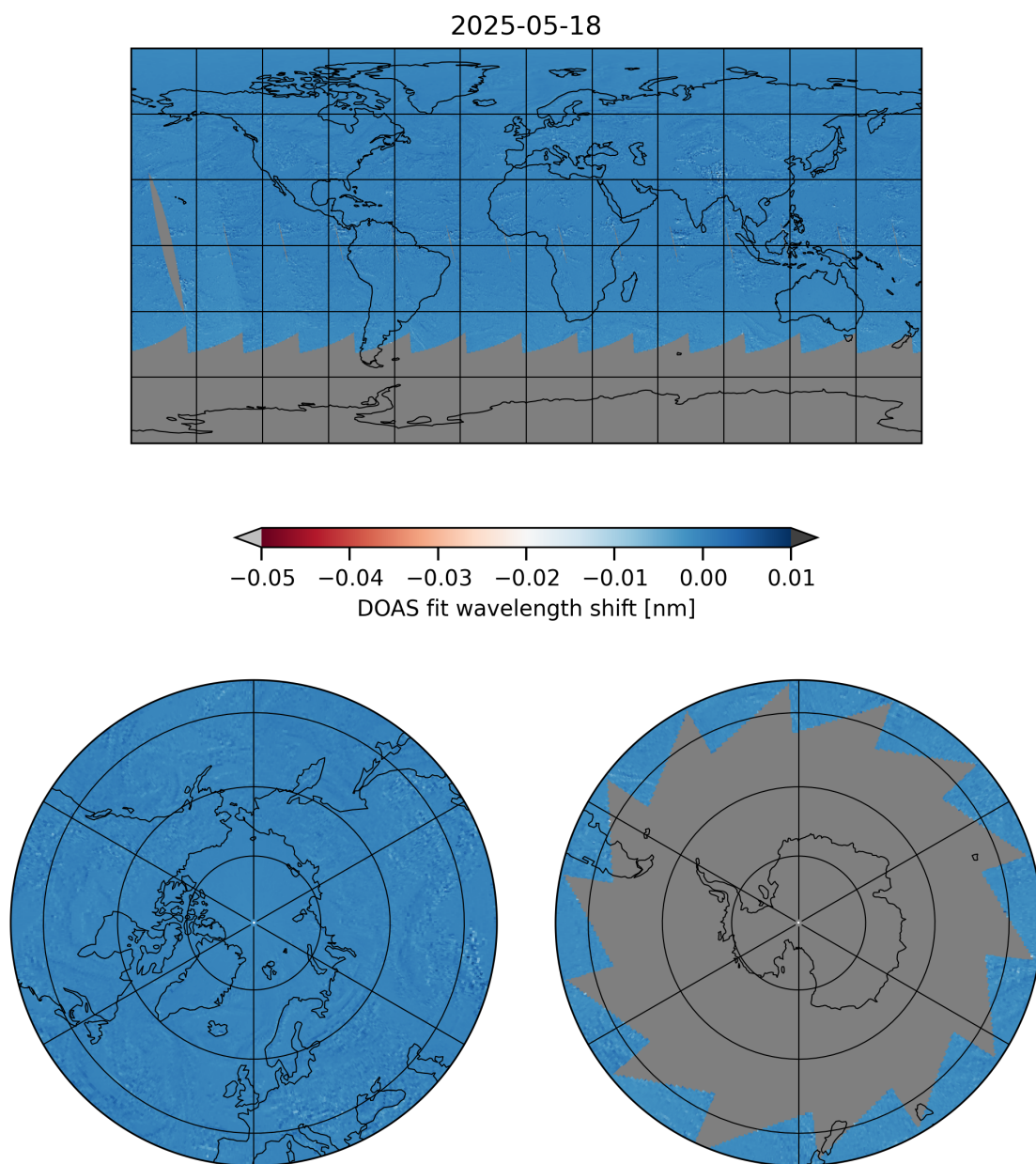


Figure 22: Map of “DOAS fit wavelength shift” for 2025-05-18 to 2025-05-19

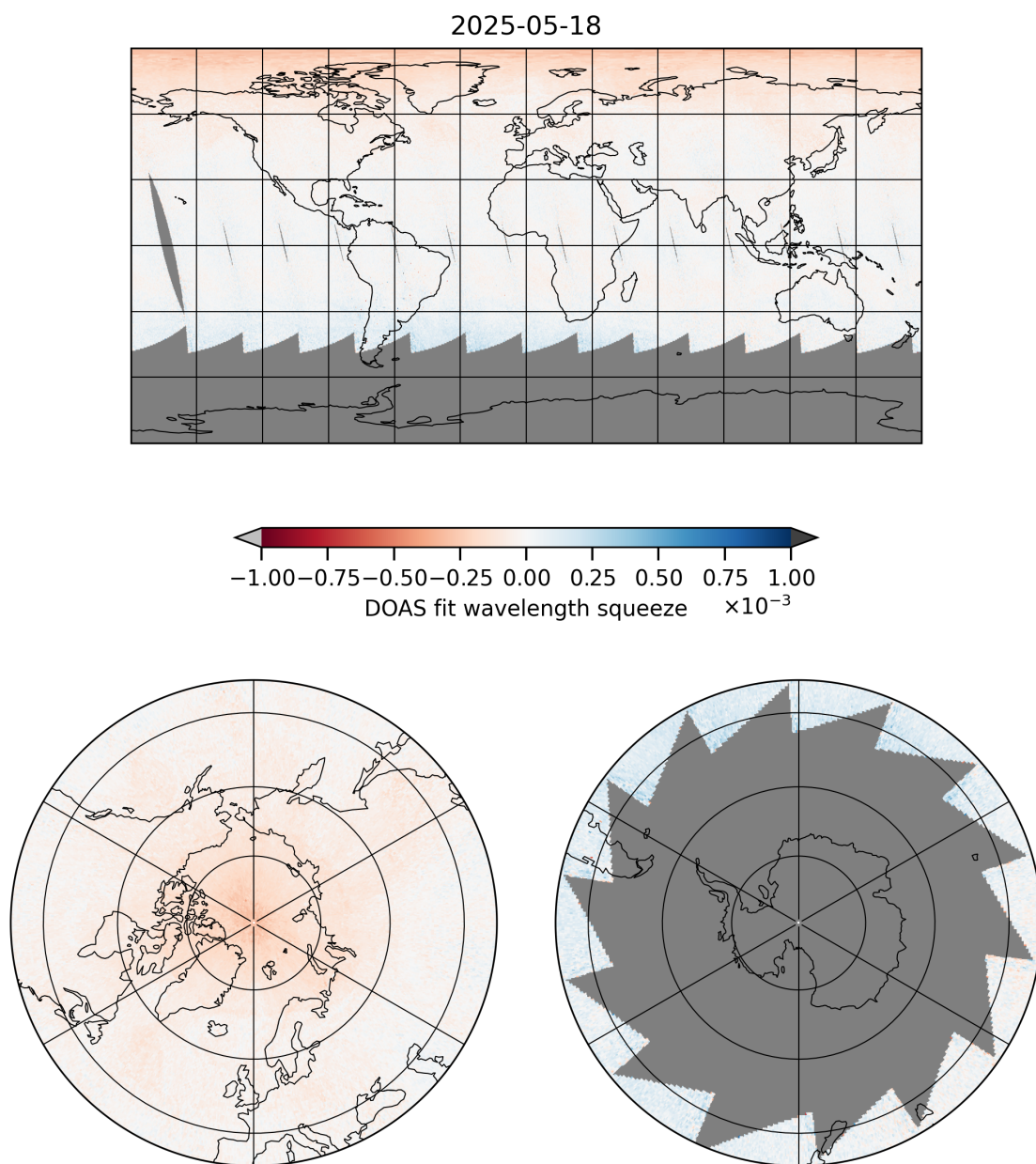


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-05-18 to 2025-05-19

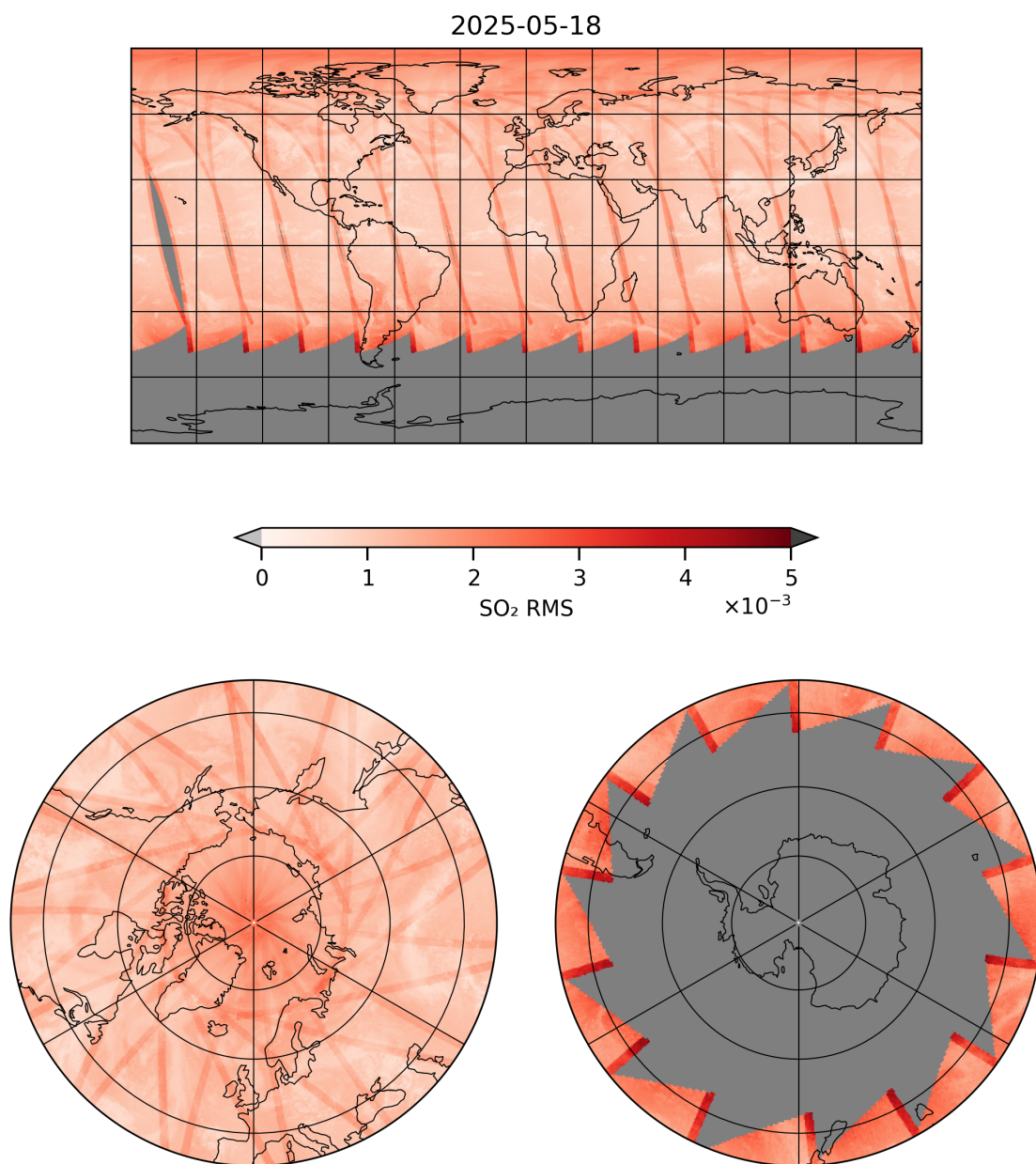


Figure 24: Map of “SO₂ RMS” for 2025-05-18 to 2025-05-19

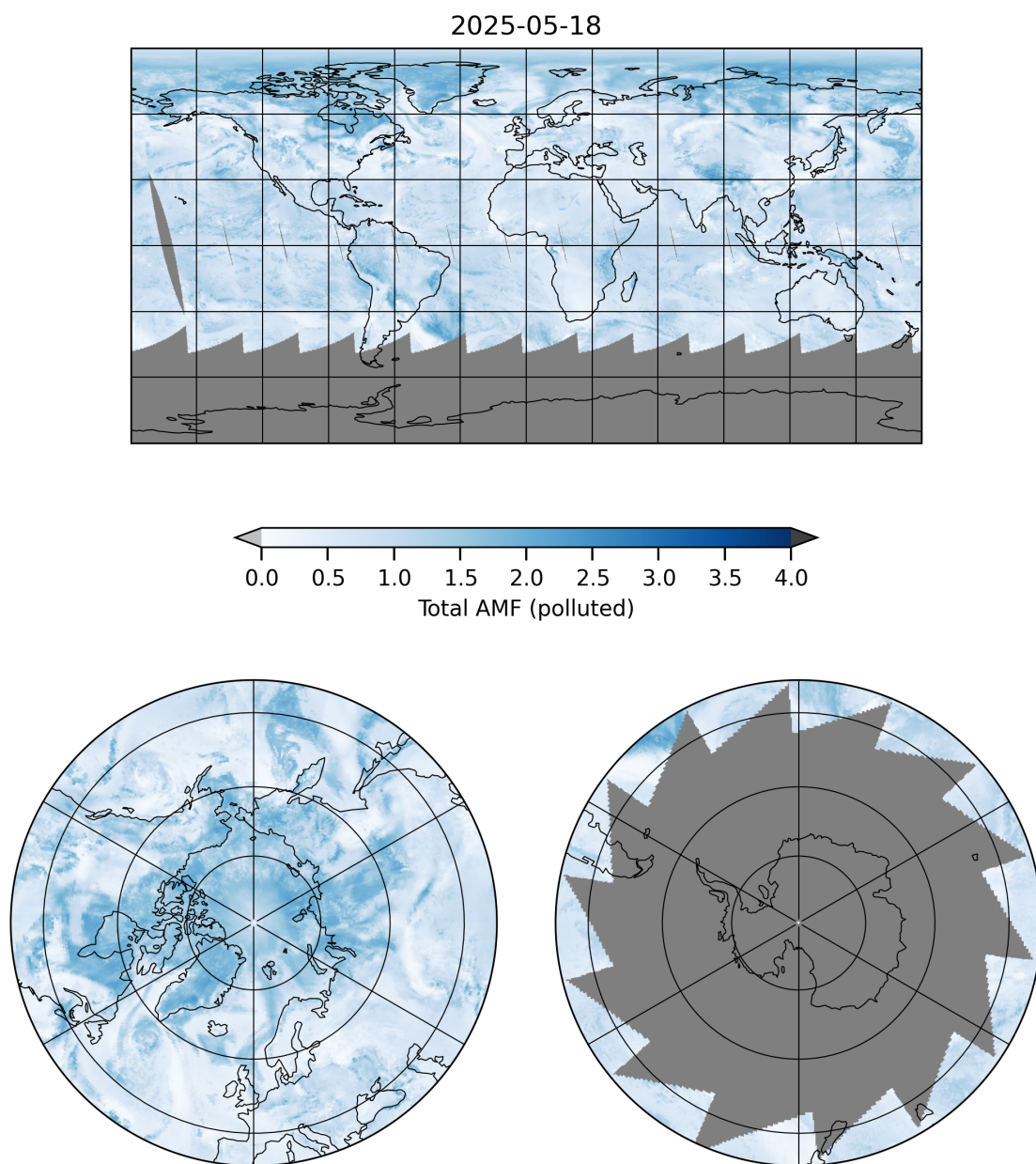


Figure 25: Map of “Total AMF (polluted)” for 2025-05-18 to 2025-05-19

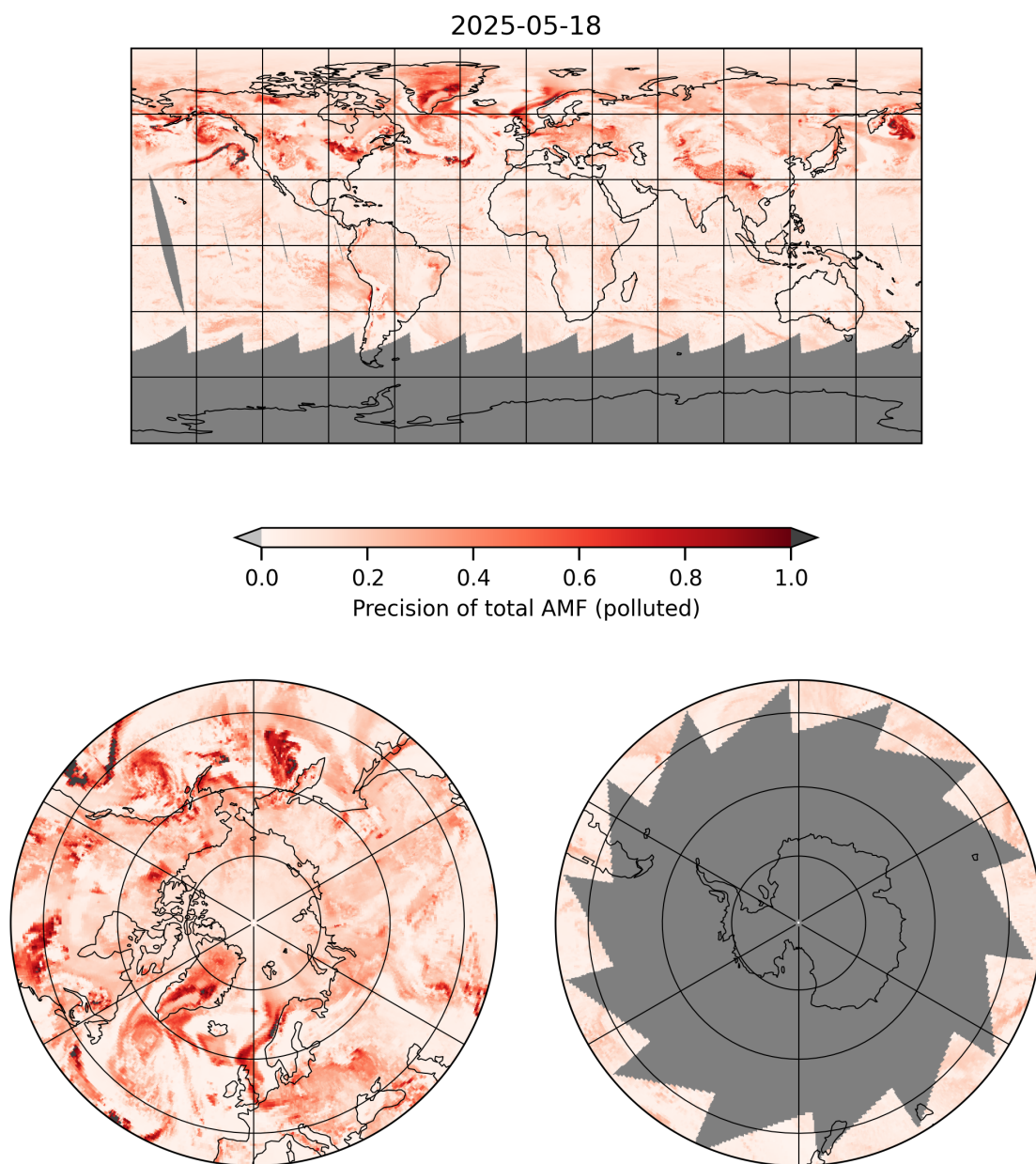


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-05-18 to 2025-05-19

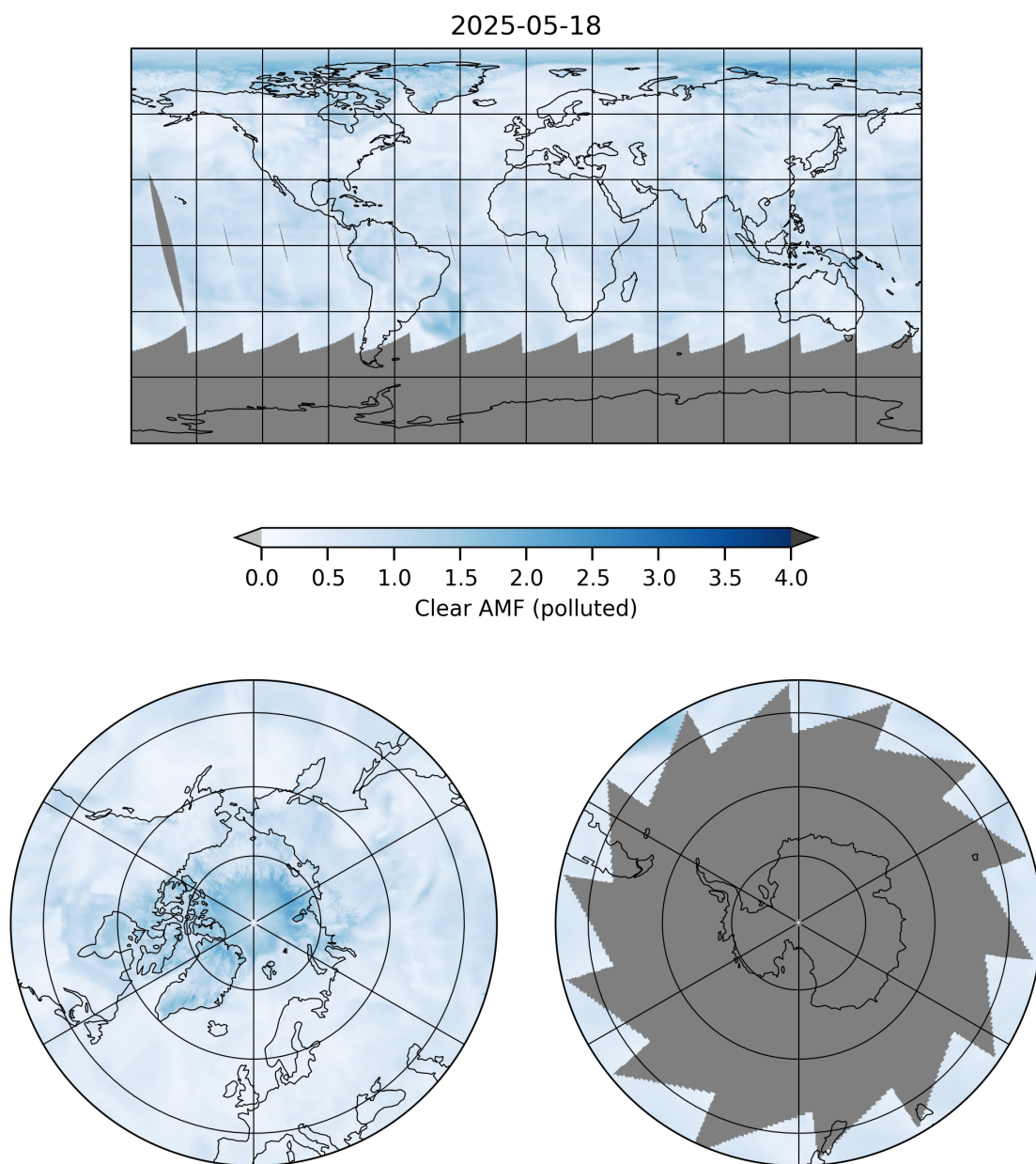


Figure 27: Map of “Clear AMF (polluted)” for 2025-05-18 to 2025-05-19

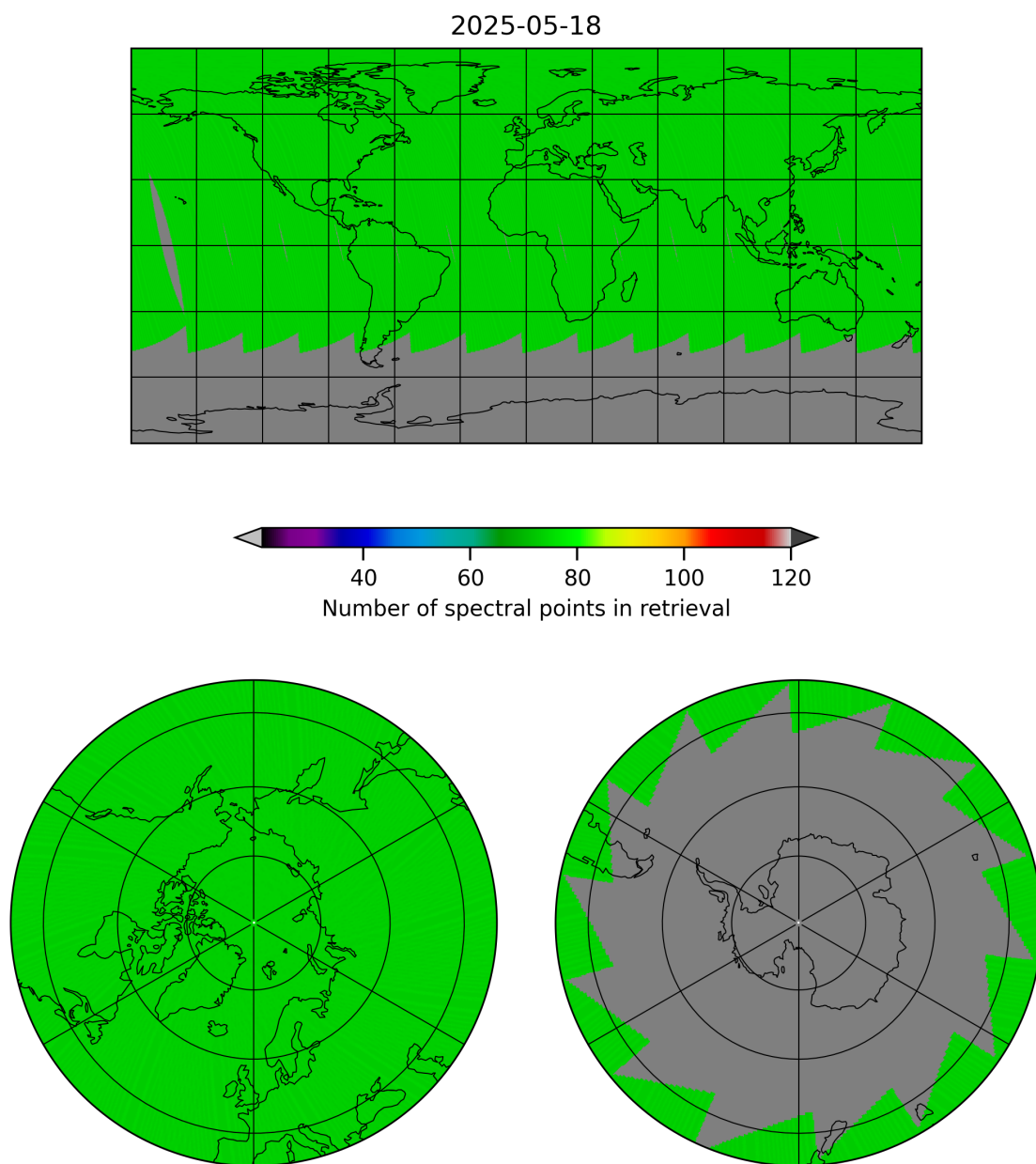


Figure 28: Map of “Number of spectral points in retrieval” for 2025-05-18 to 2025-05-19

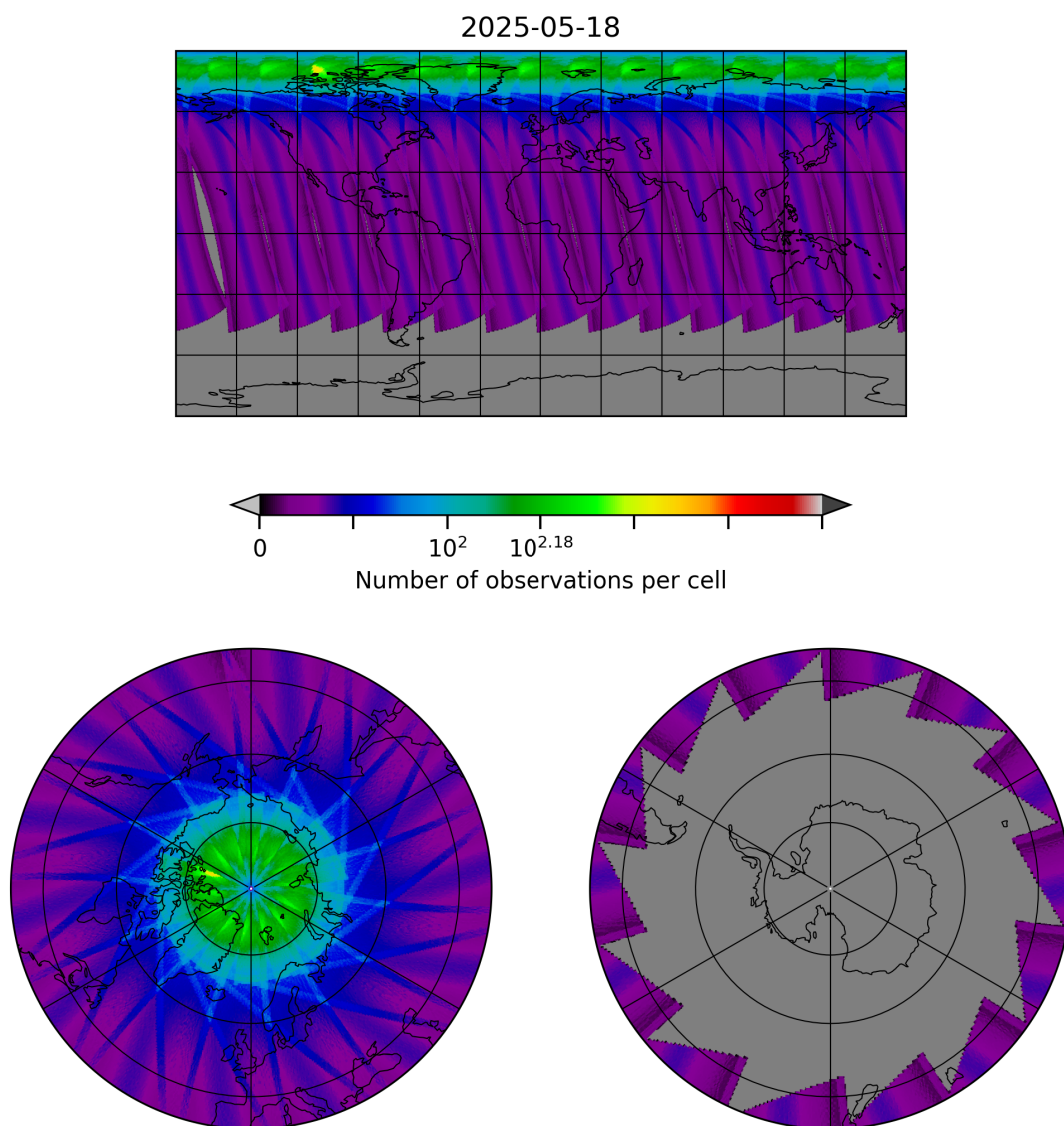


Figure 29: Map of the number of observations for 2025-05-18 to 2025-05-19

7 Zonal average

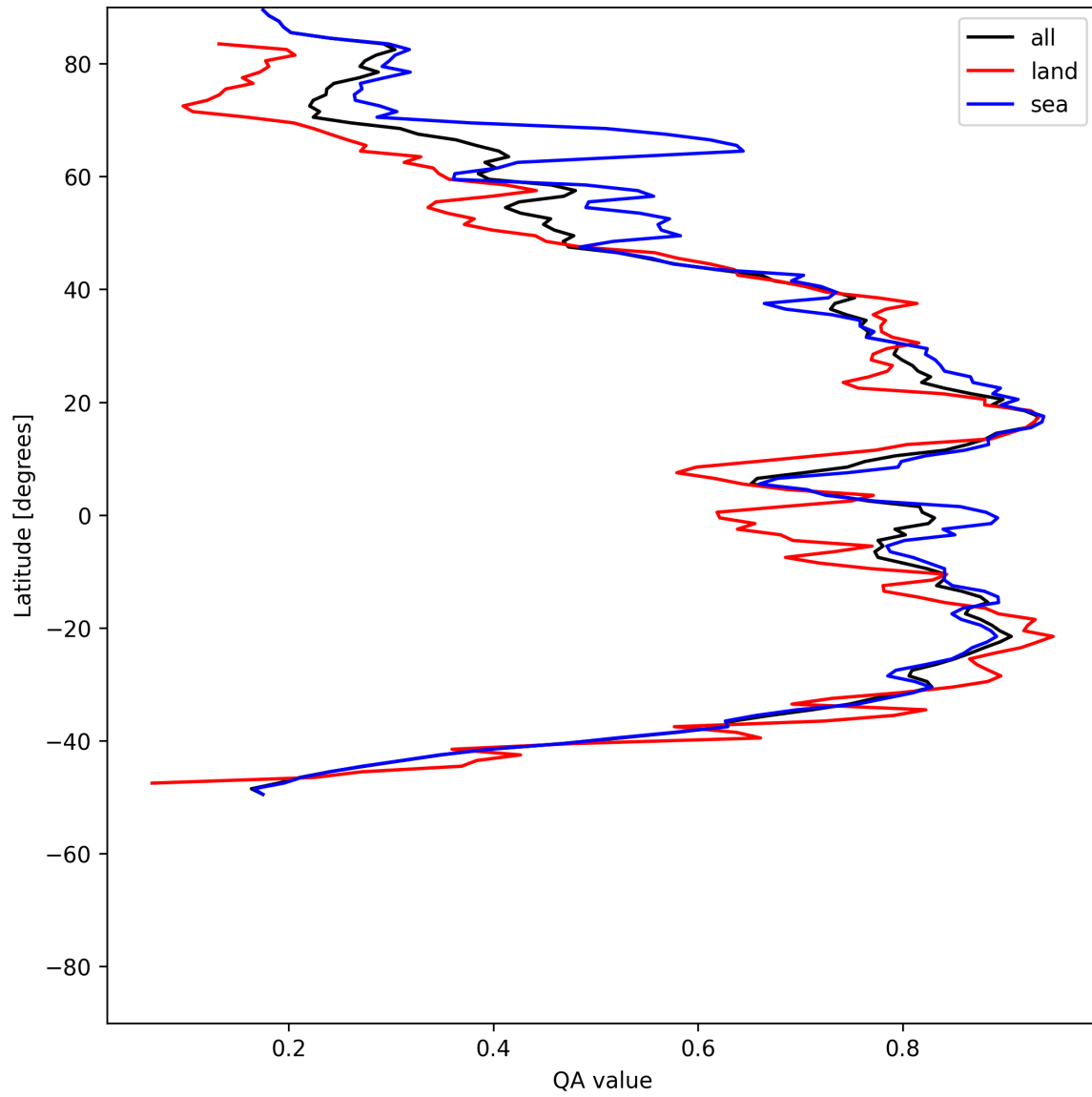


Figure 30: Zonal average of “QA value” for 2025-05-18 to 2025-05-19.

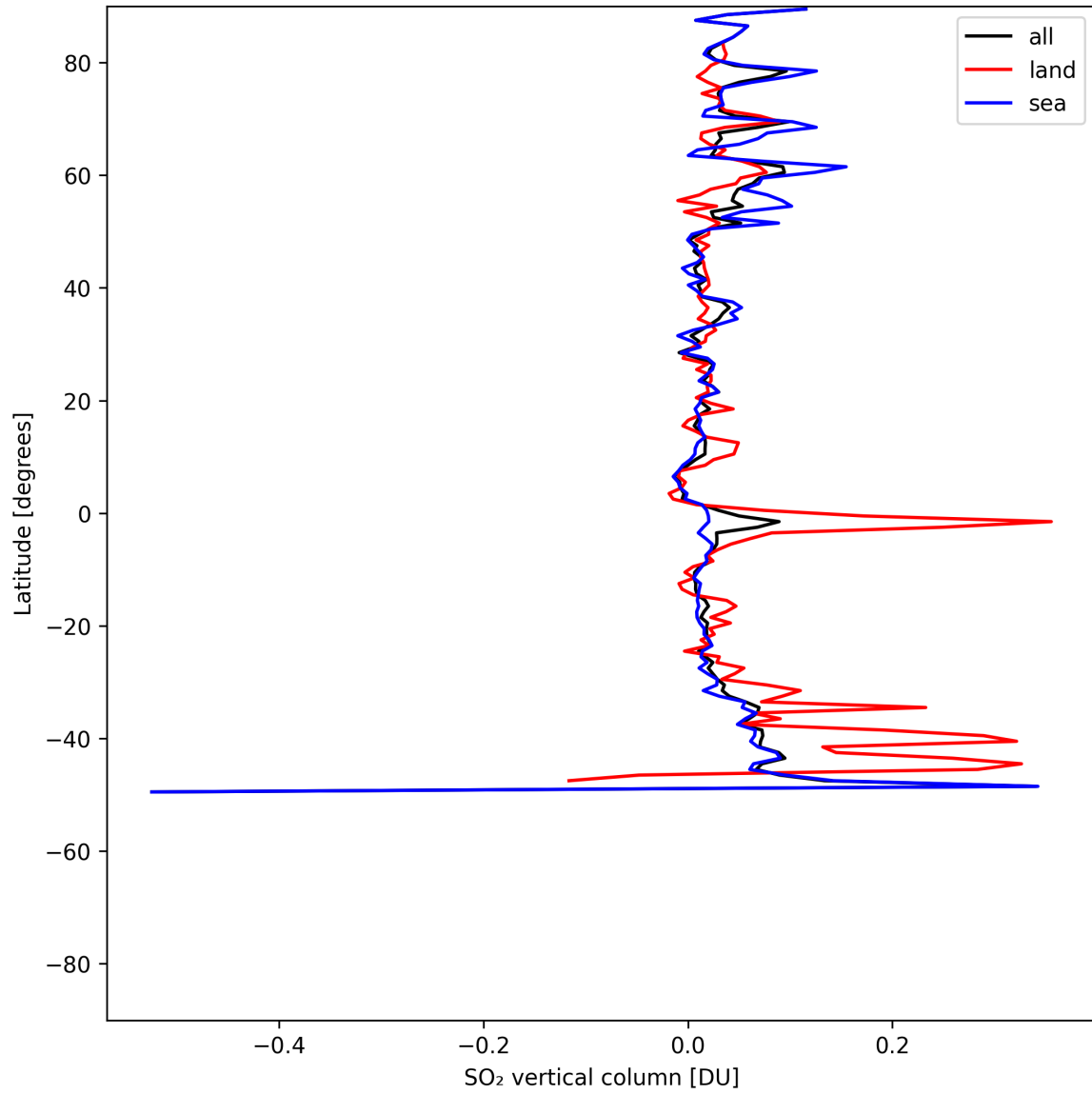


Figure 31: Zonal average of “SO₂ vertical column” for 2025-05-18 to 2025-05-19.

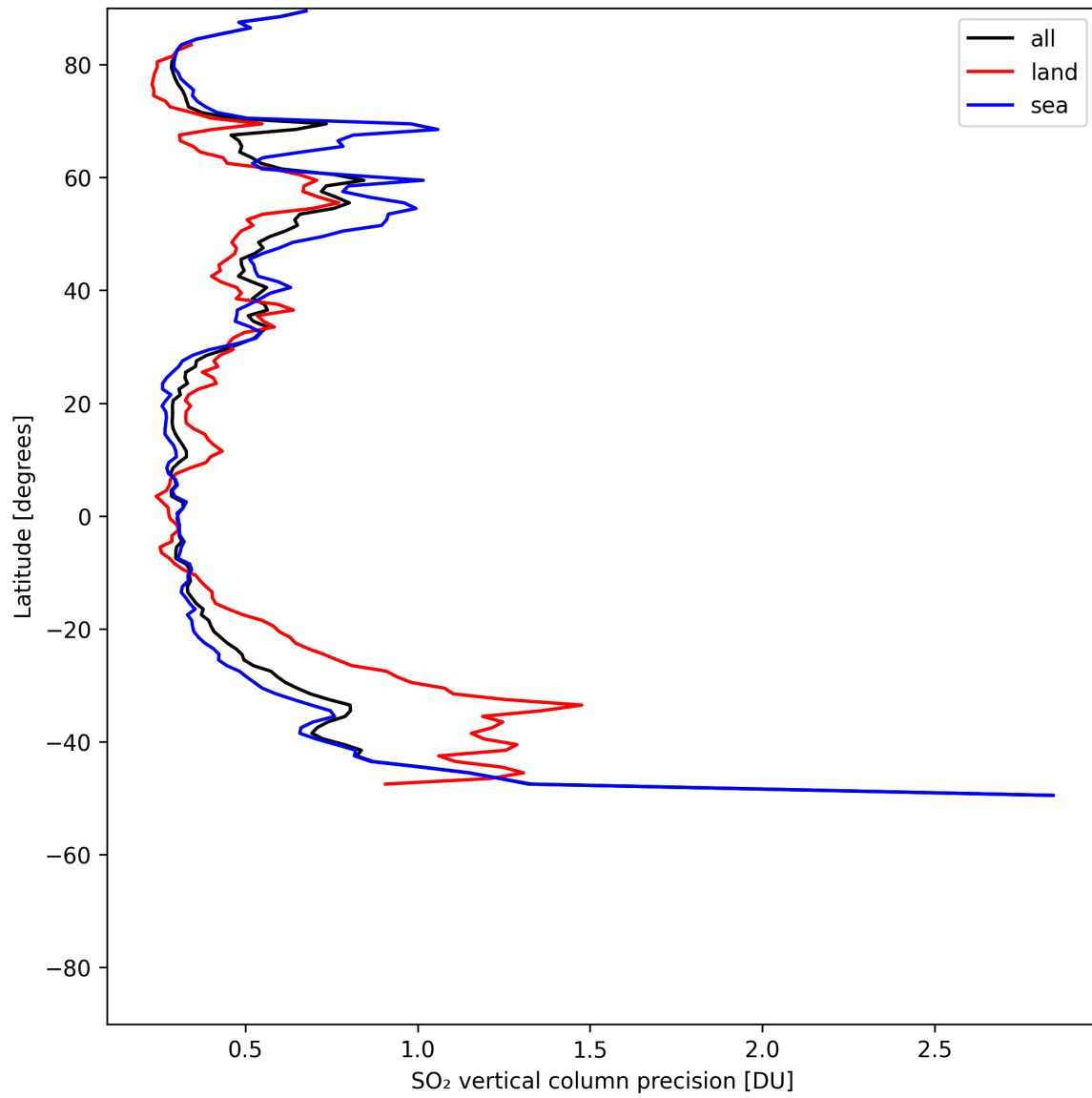


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-05-18 to 2025-05-19.

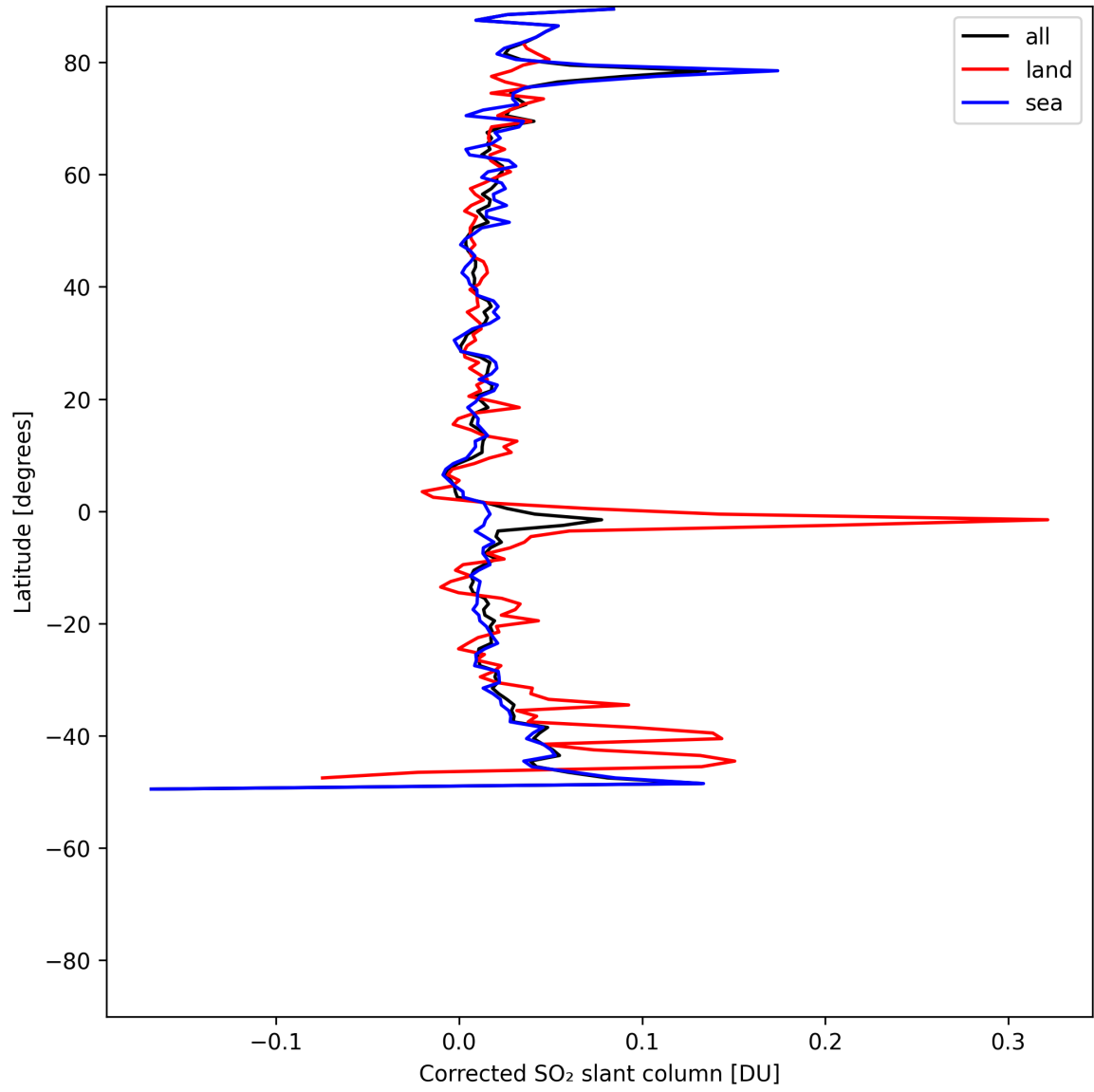


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-05-18 to 2025-05-19.

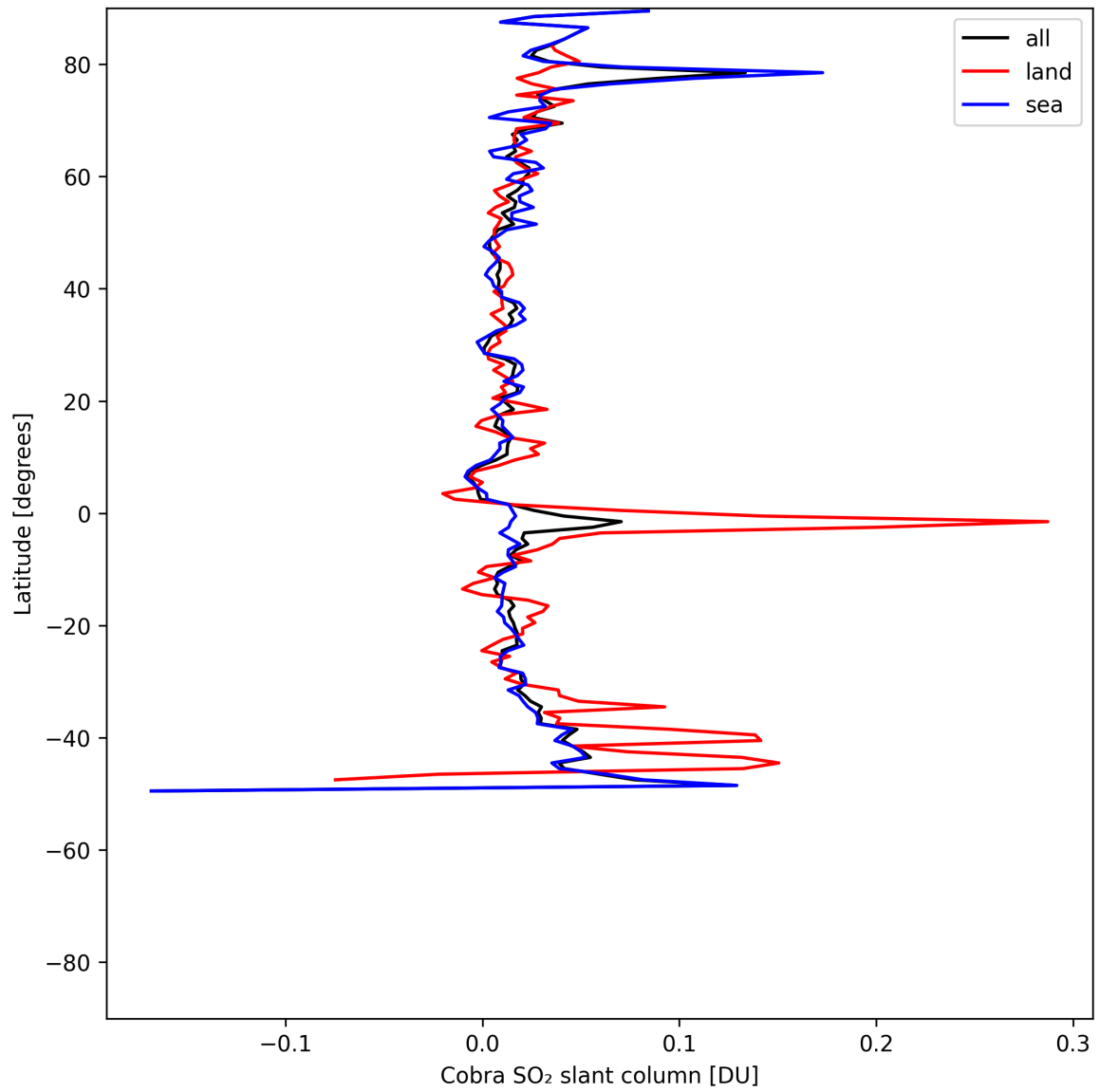


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-05-18 to 2025-05-19.

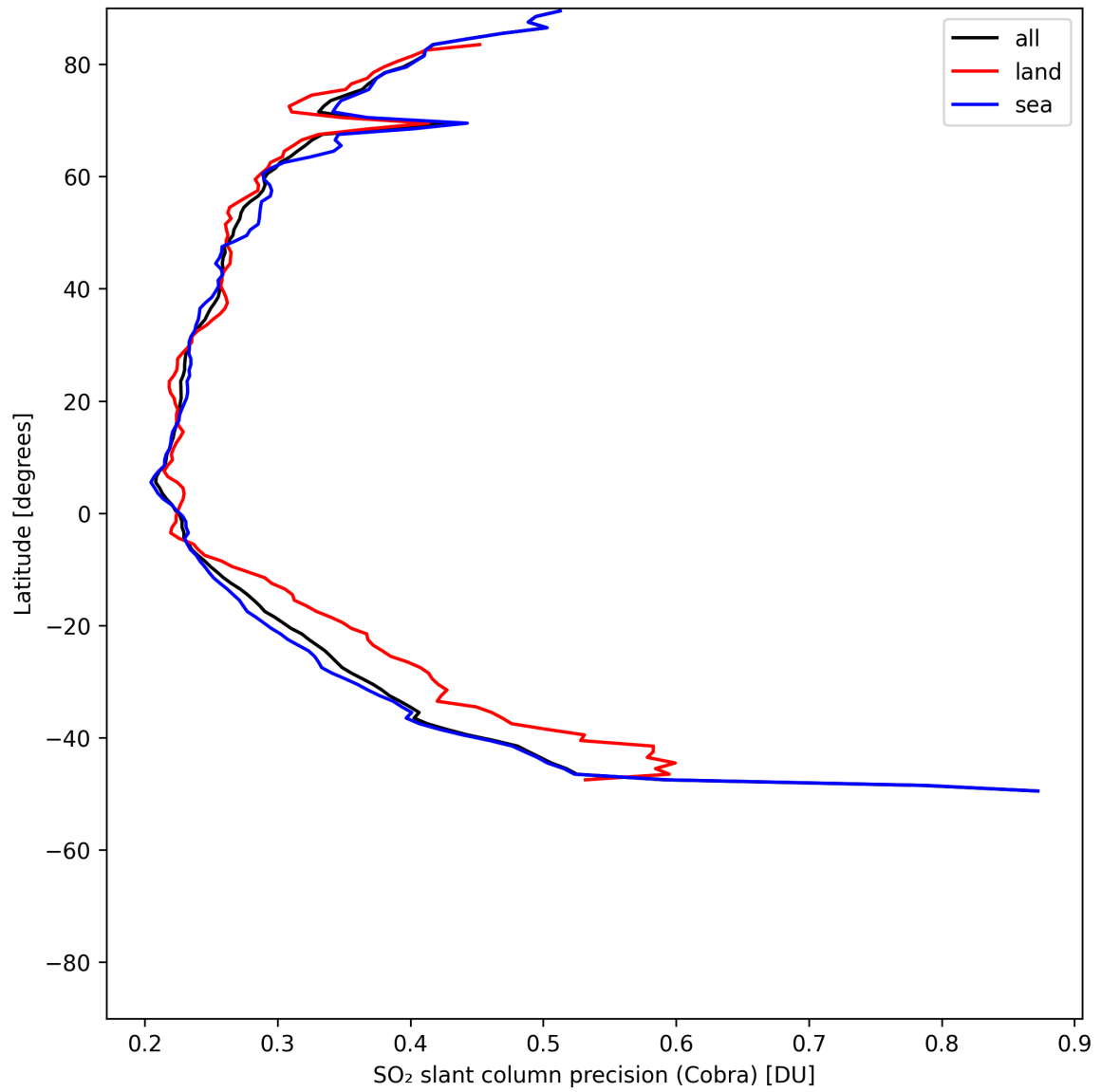


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-05-18 to 2025-05-19.

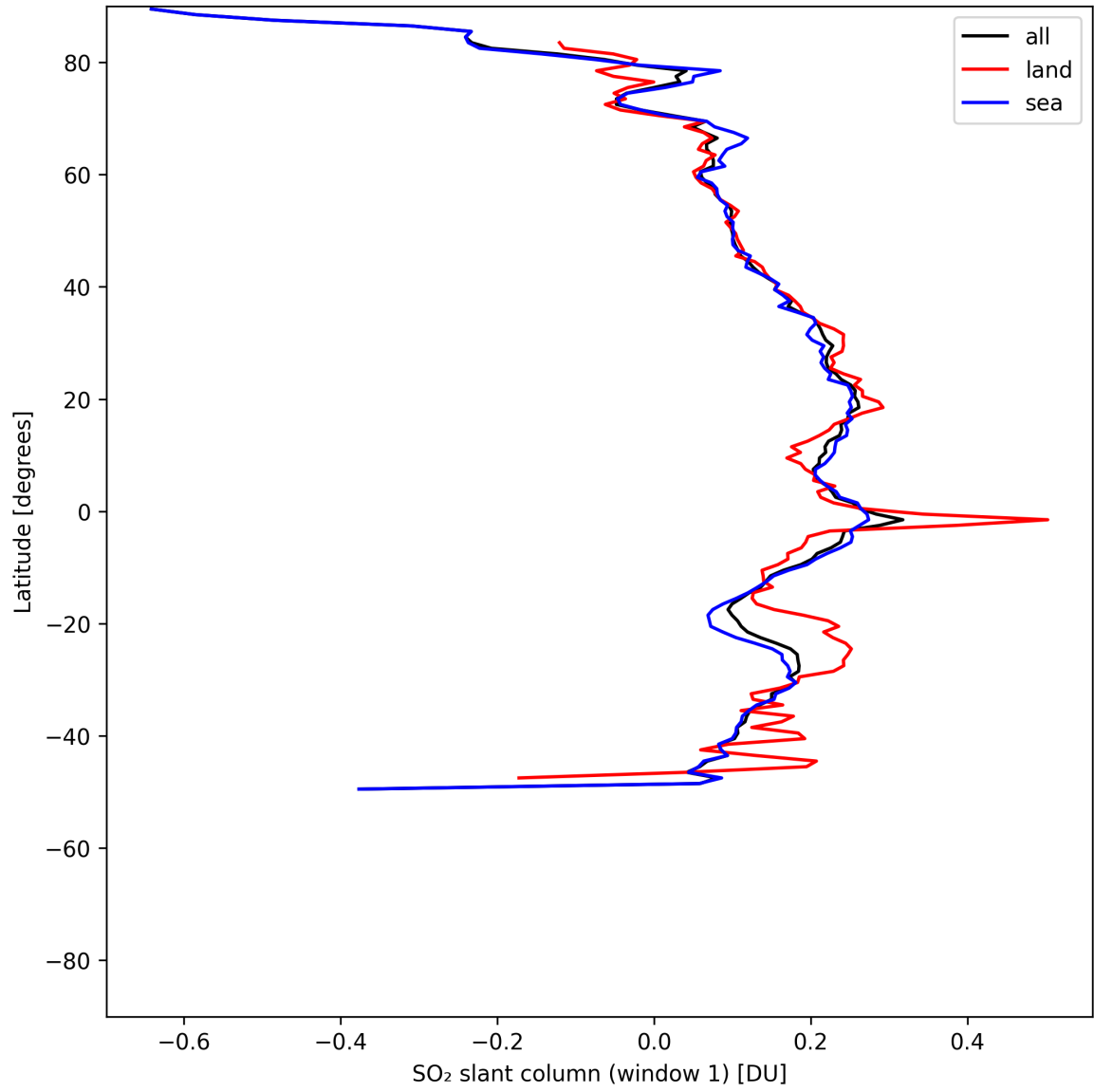


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-05-18 to 2025-05-19.

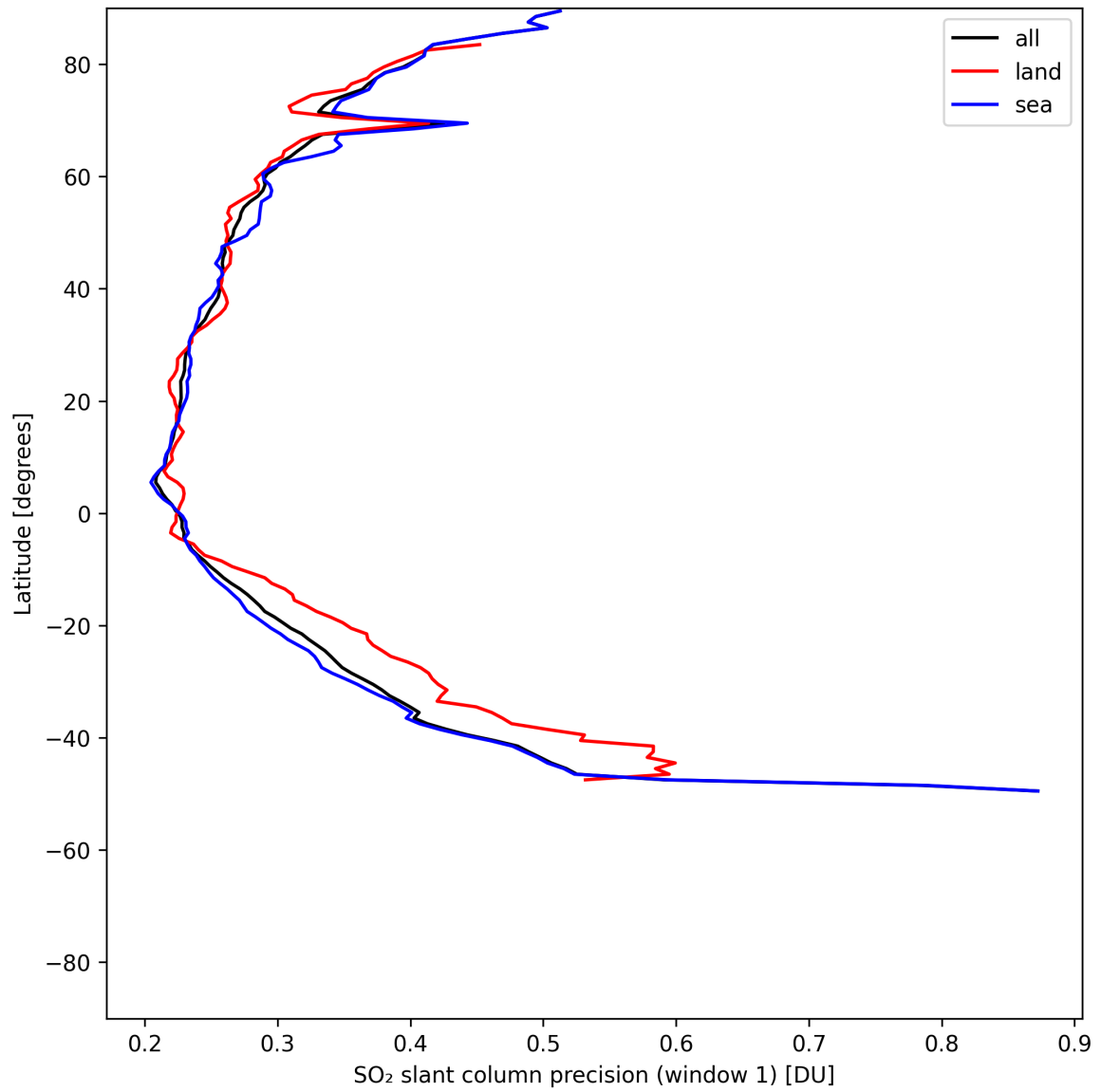


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-05-18 to 2025-05-19.

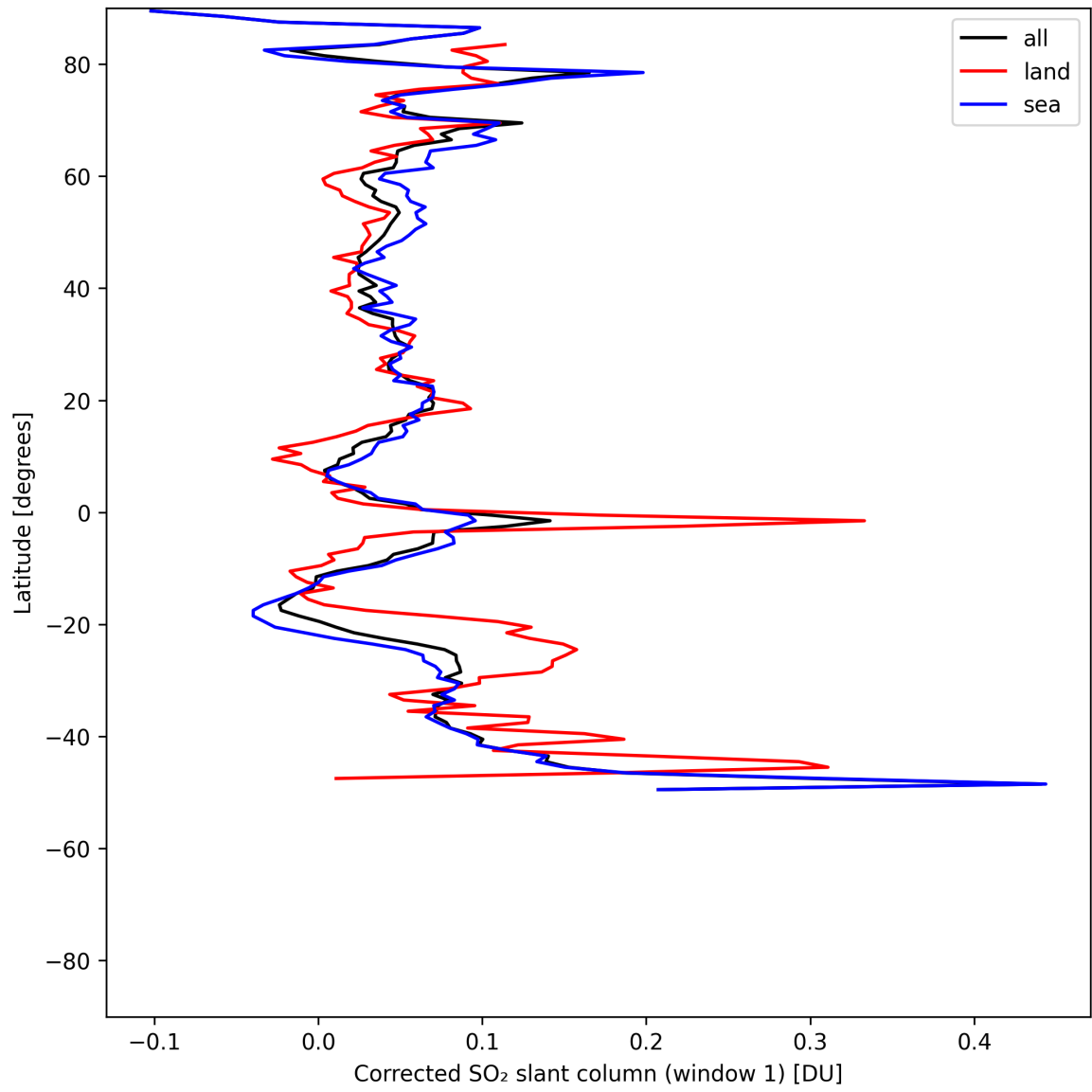


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-05-18 to 2025-05-19.

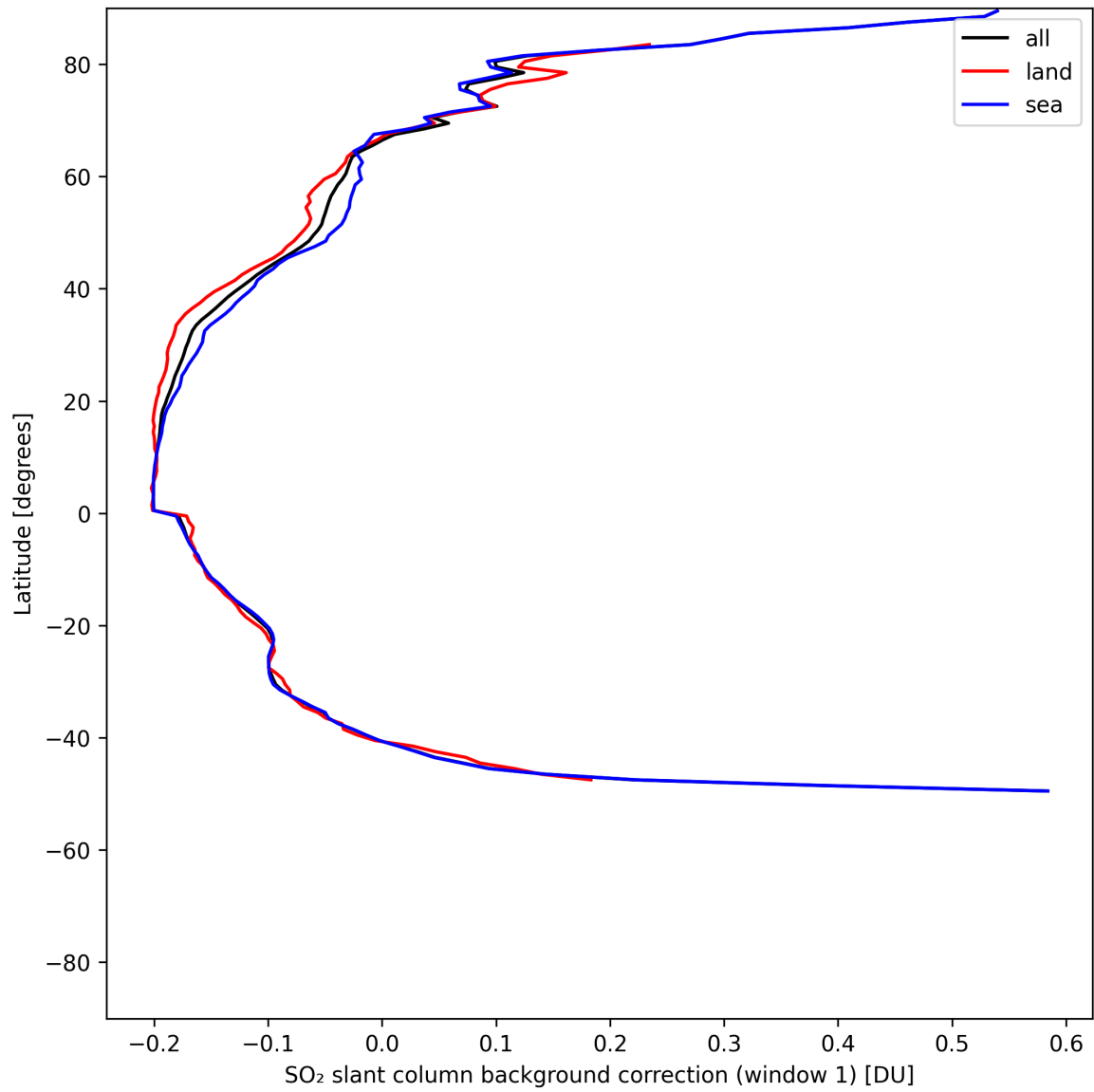


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-05-18 to 2025-05-19.

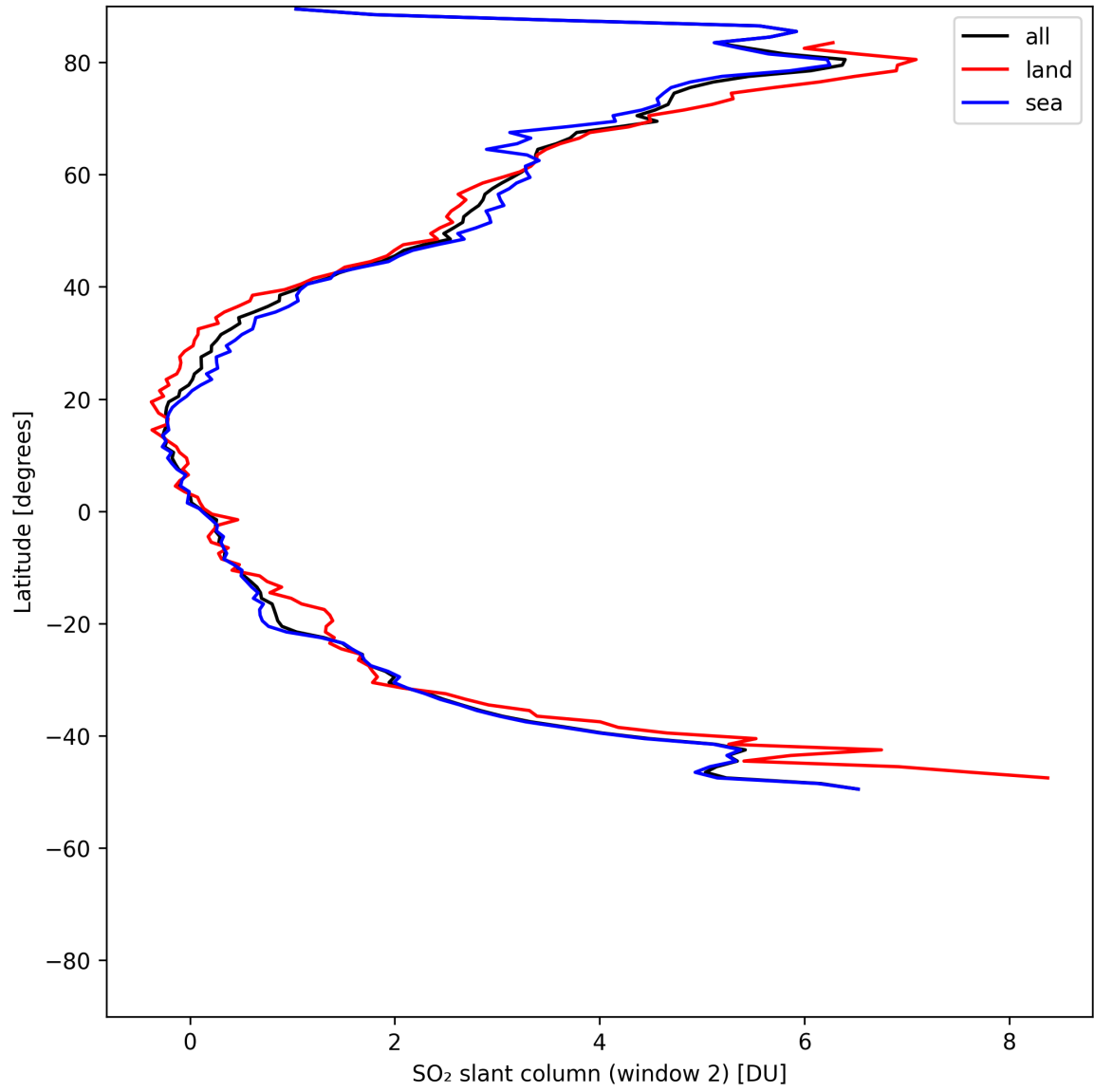


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-05-18 to 2025-05-19.

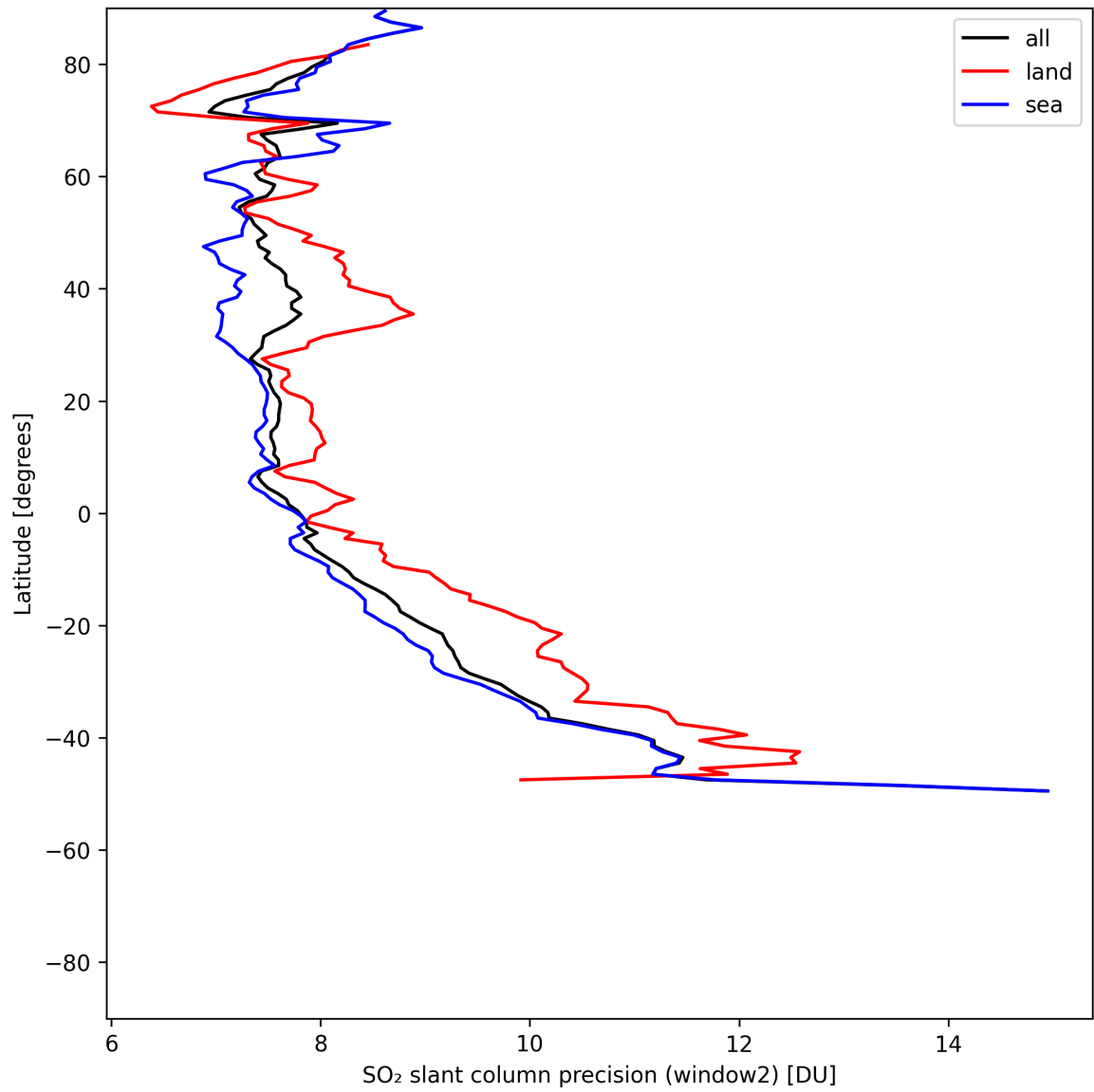


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-05-18 to 2025-05-19.

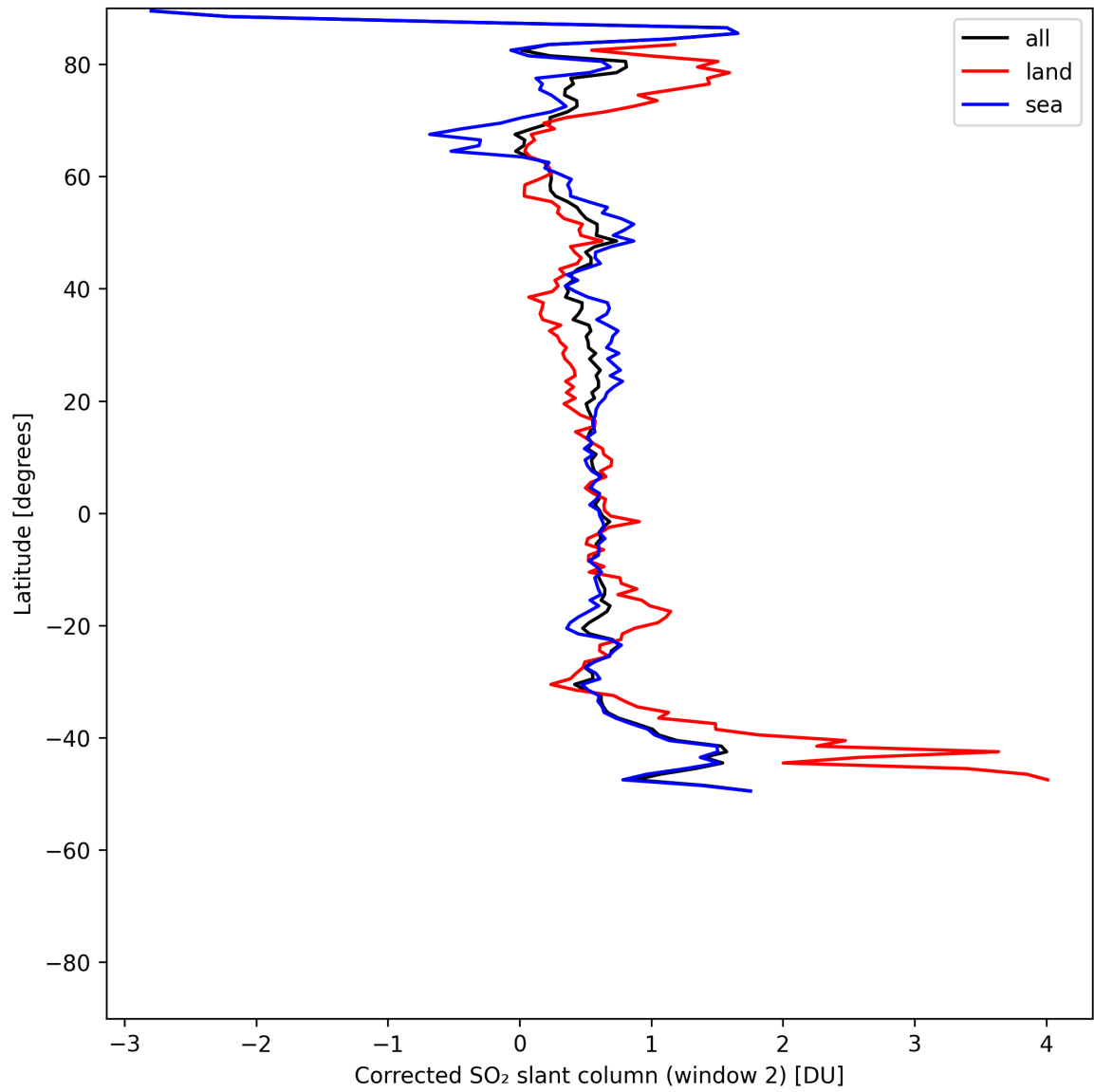


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-05-18 to 2025-05-19.

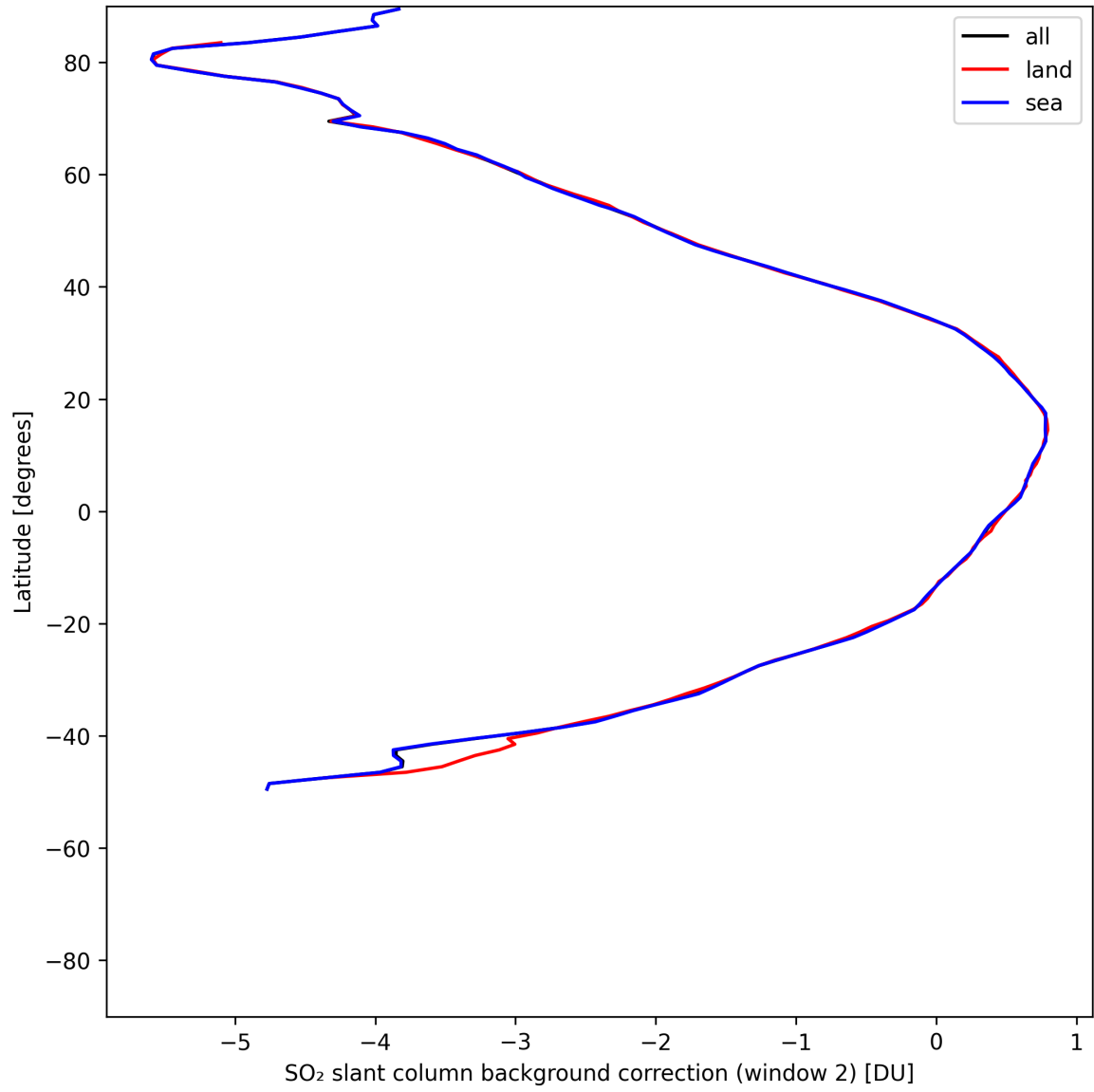


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-05-18 to 2025-05-19.

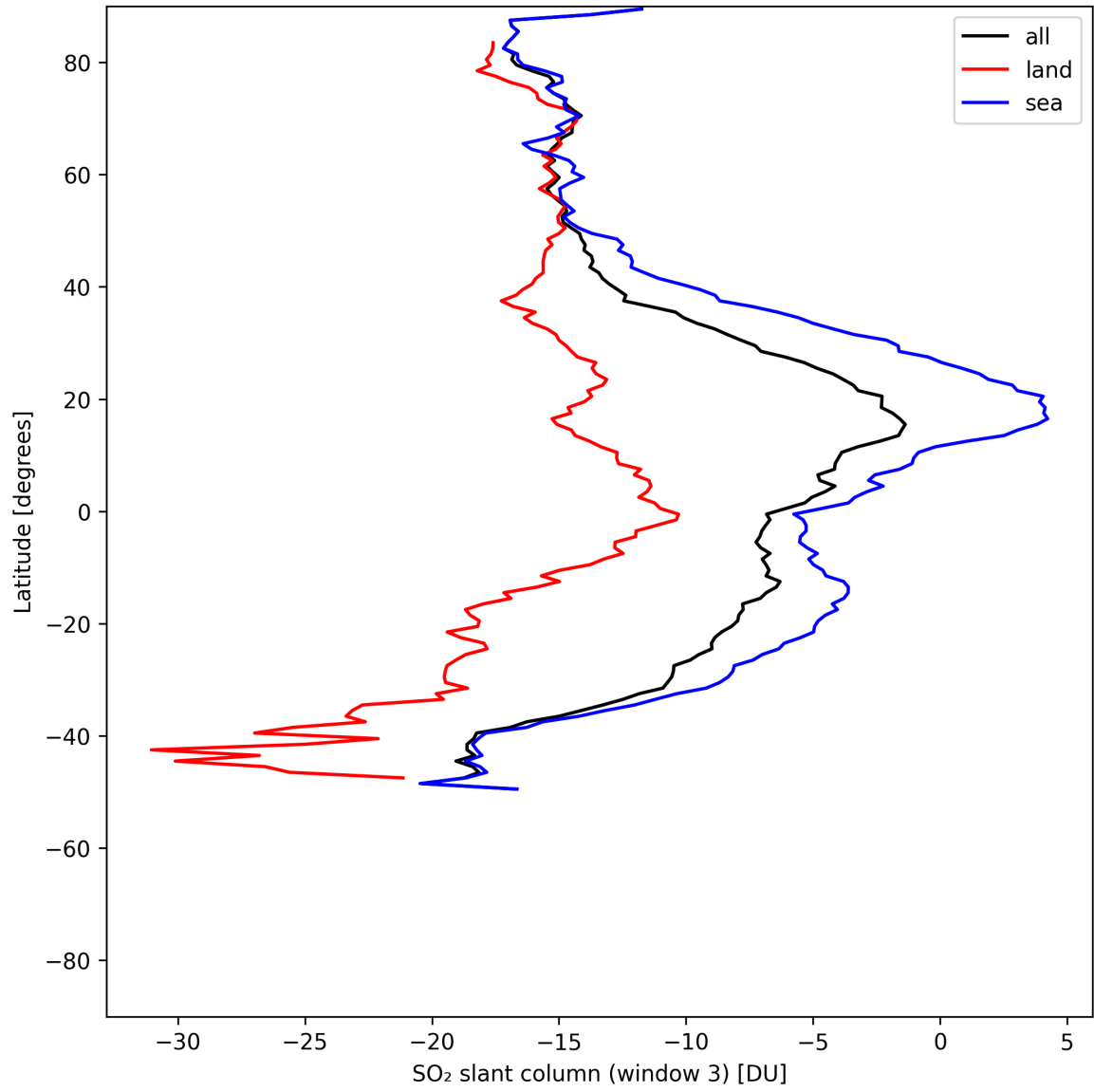


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-05-18 to 2025-05-19.

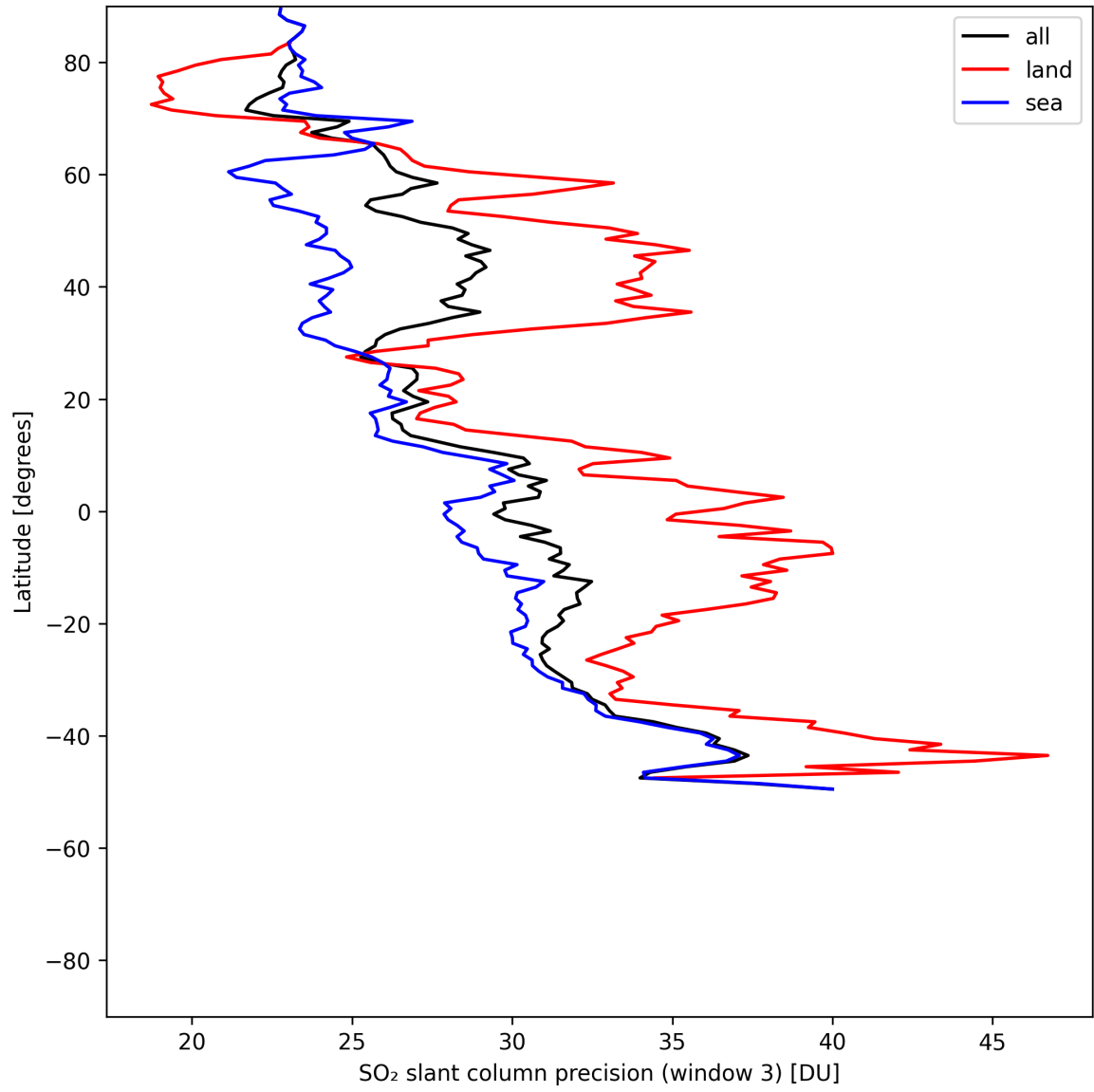


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-05-18 to 2025-05-19.

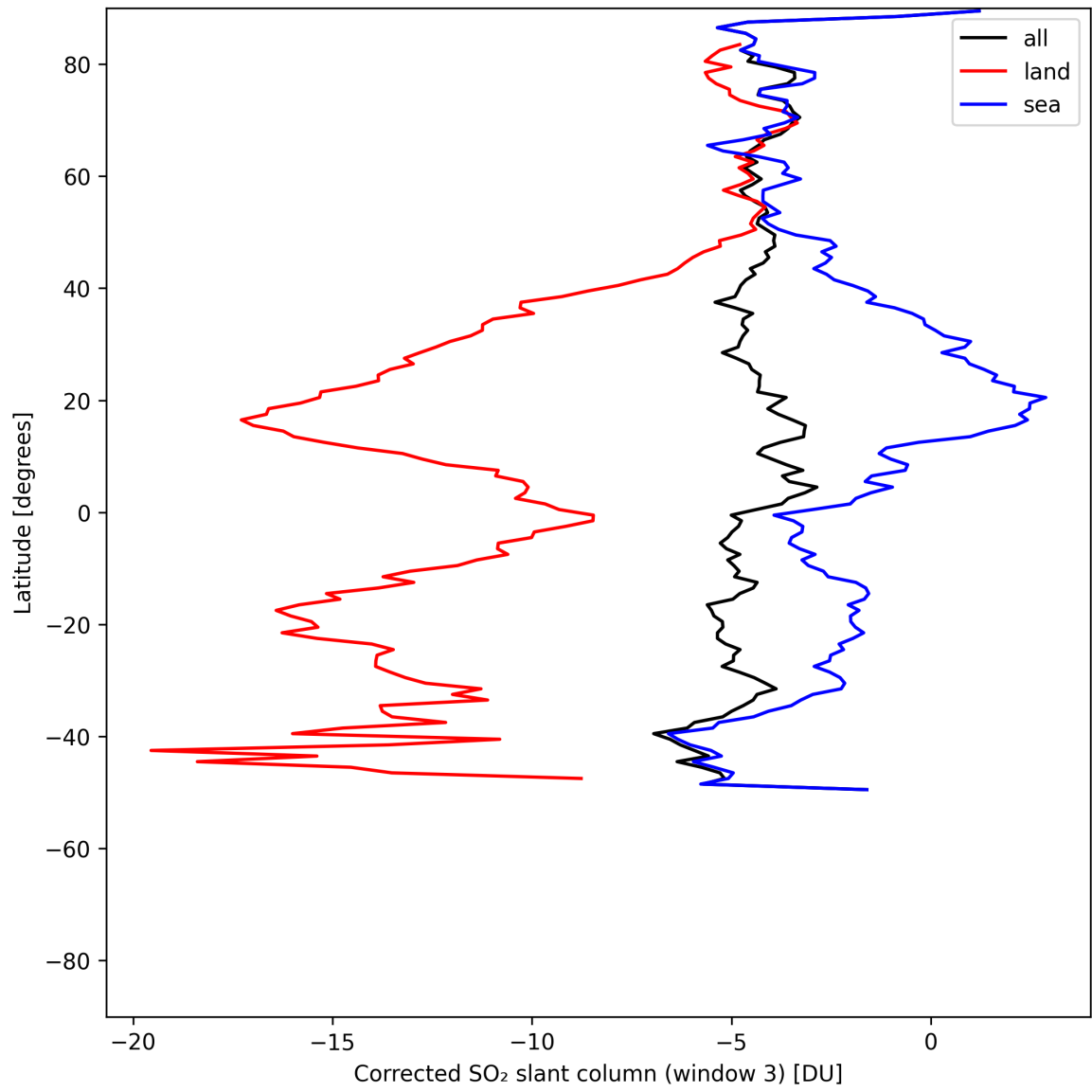


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-05-18 to 2025-05-19.

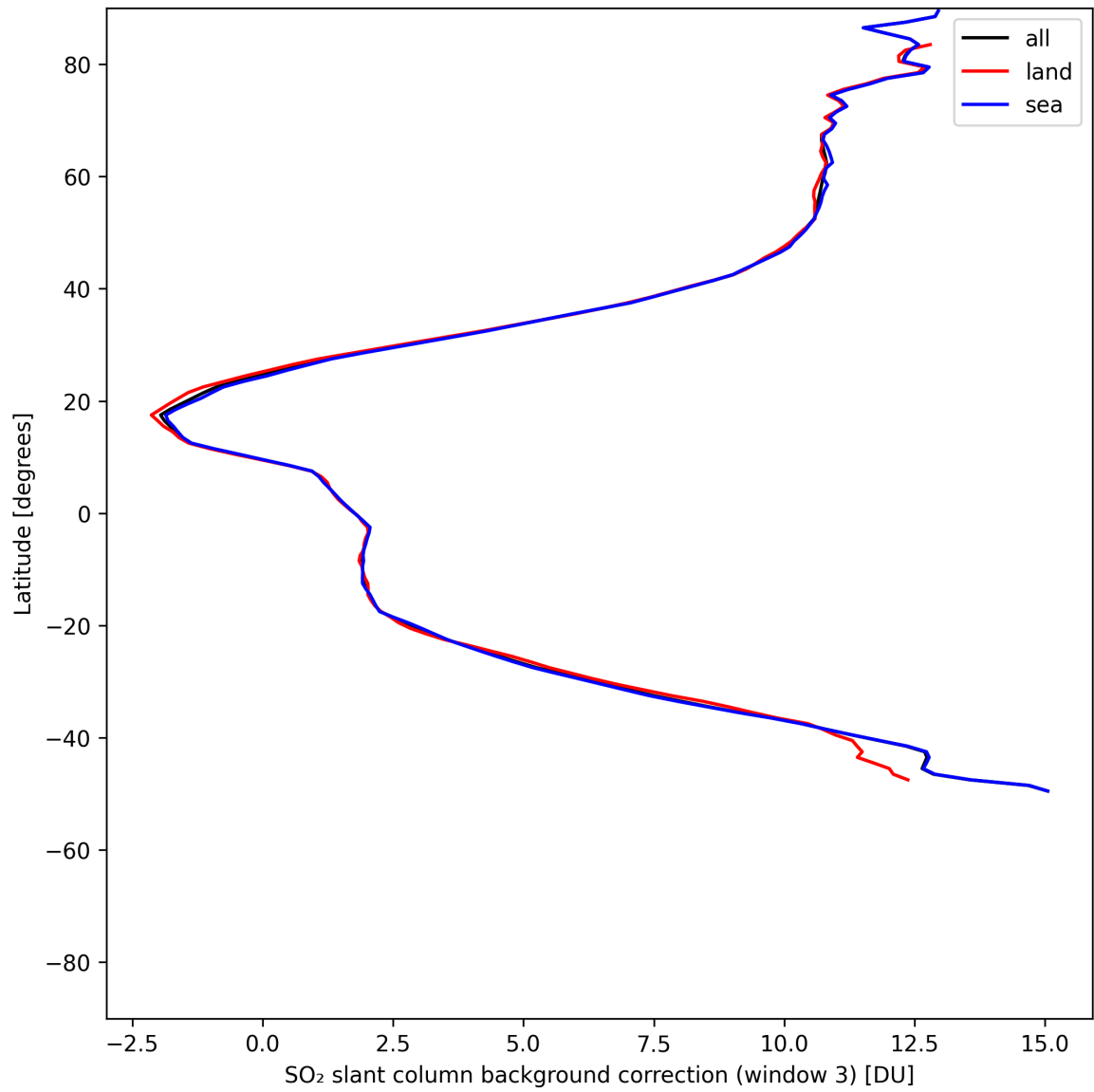


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-05-18 to 2025-05-19.

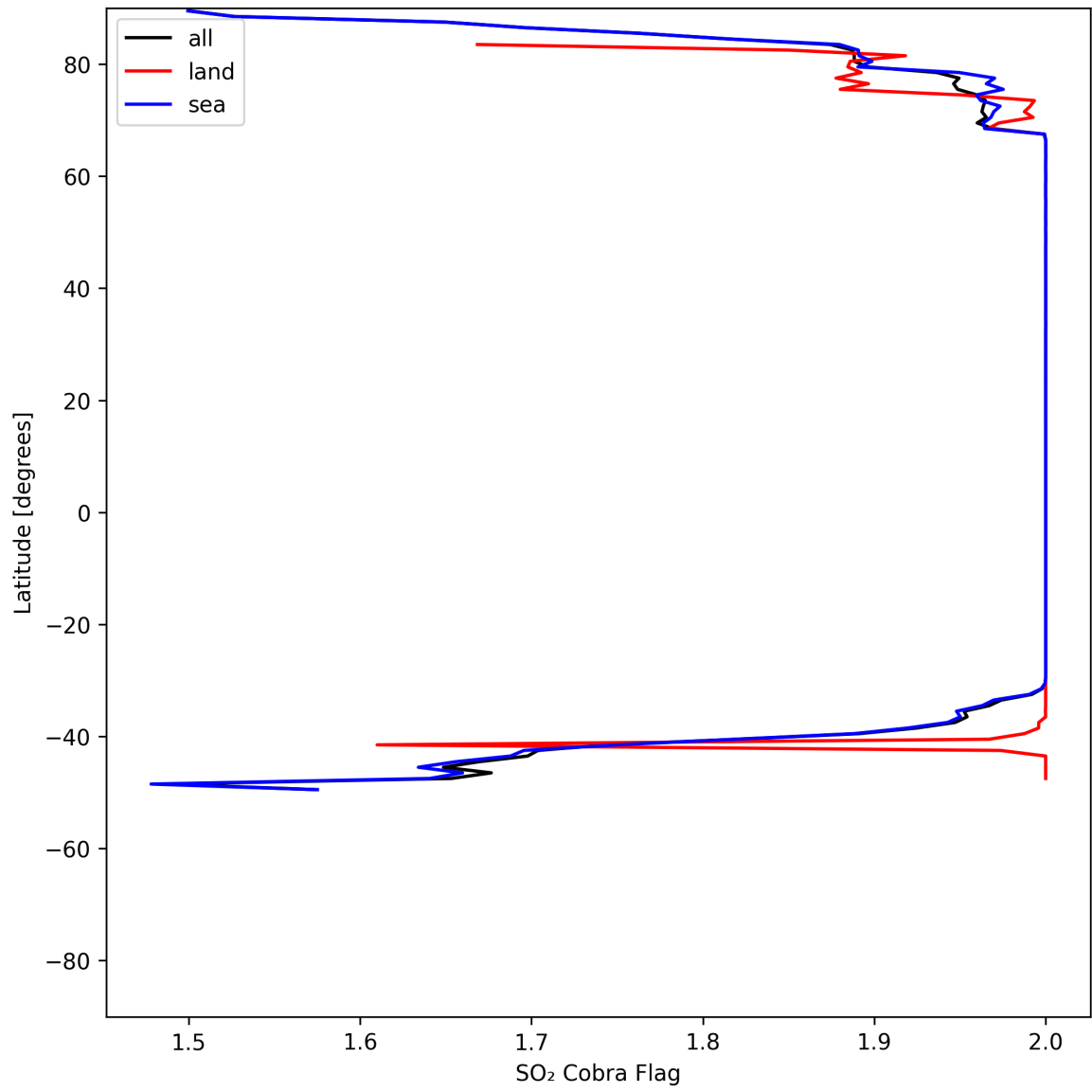


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-05-18 to 2025-05-19.

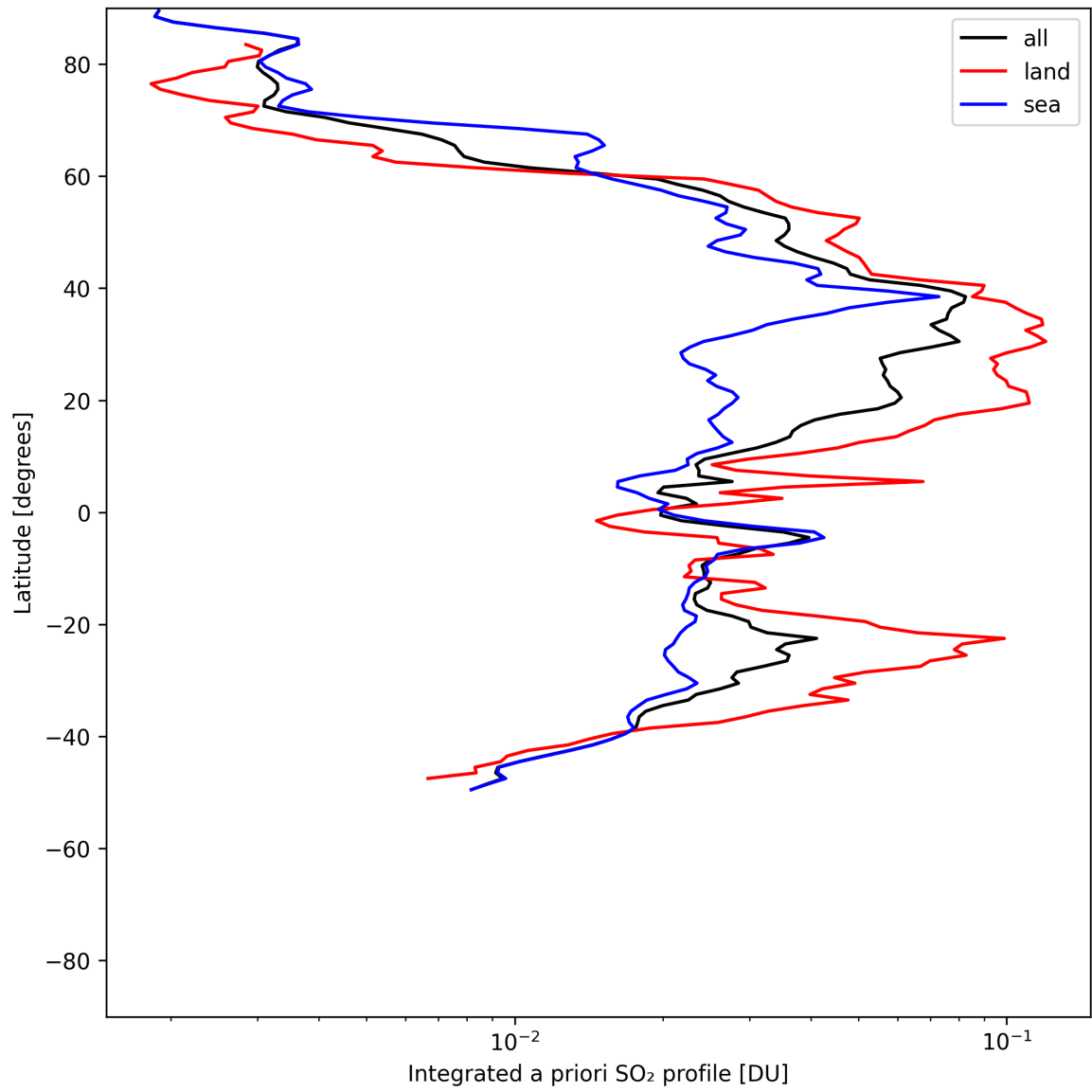


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-05-18 to 2025-05-19.

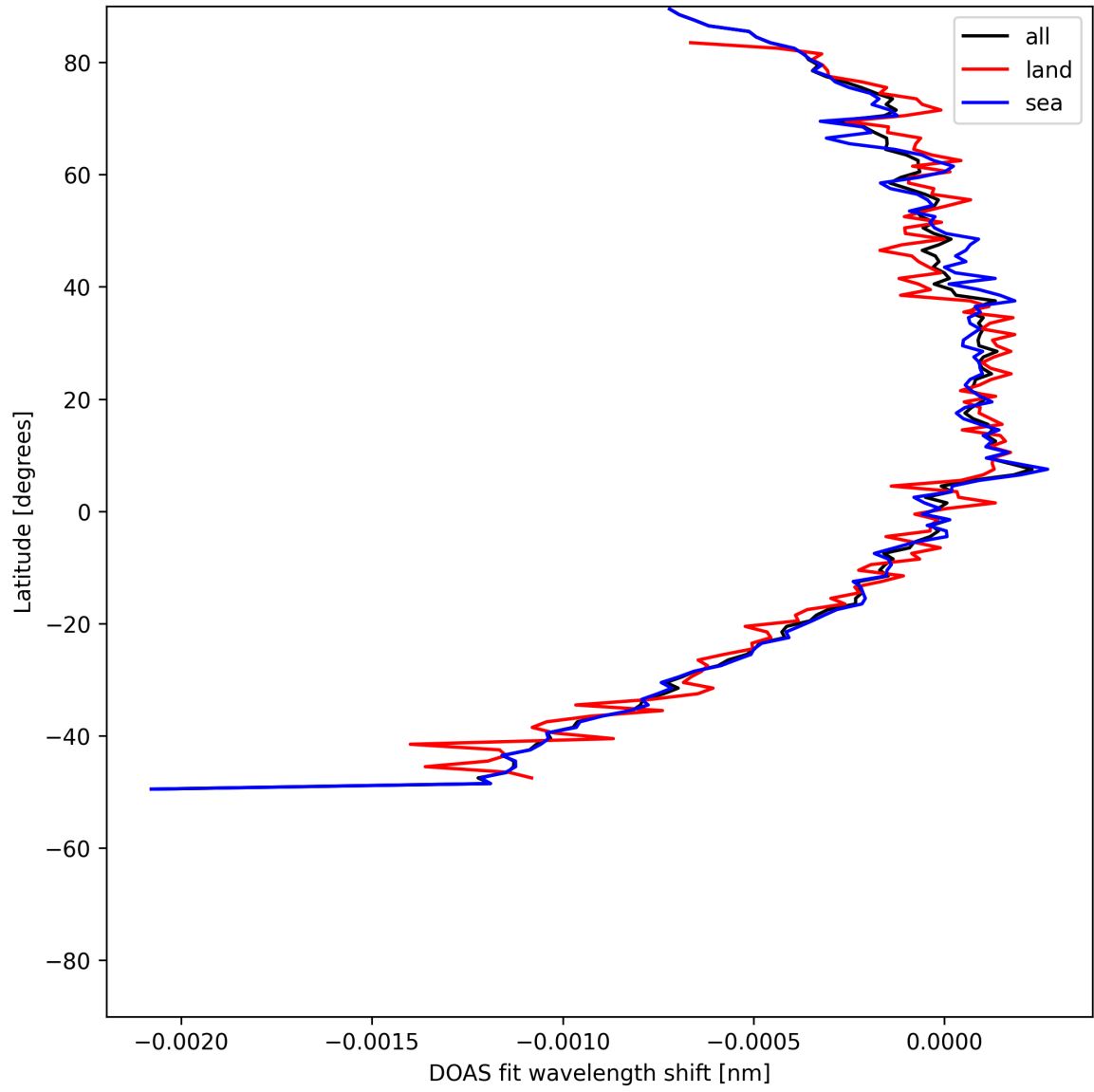


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-05-18 to 2025-05-19.

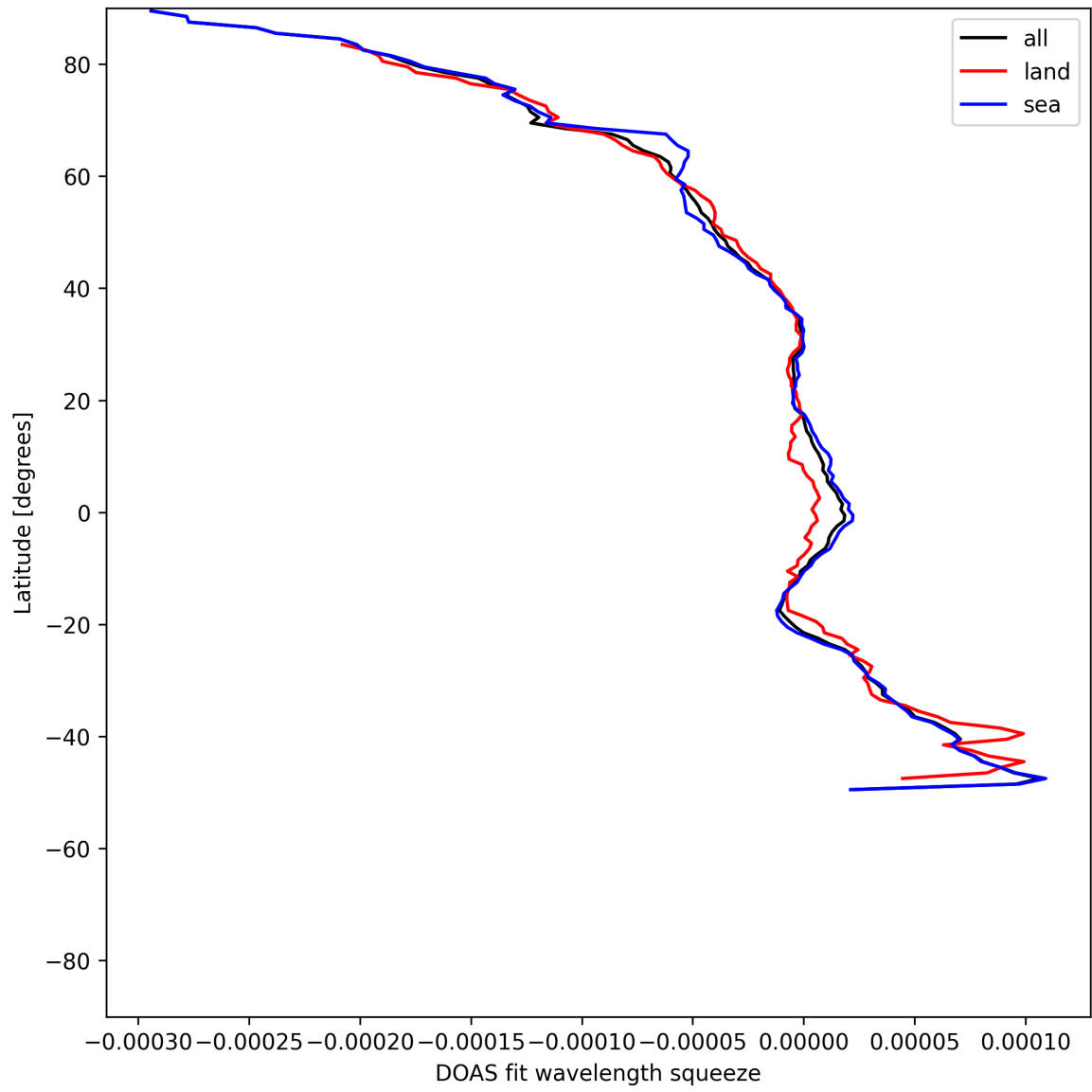


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-05-18 to 2025-05-19.

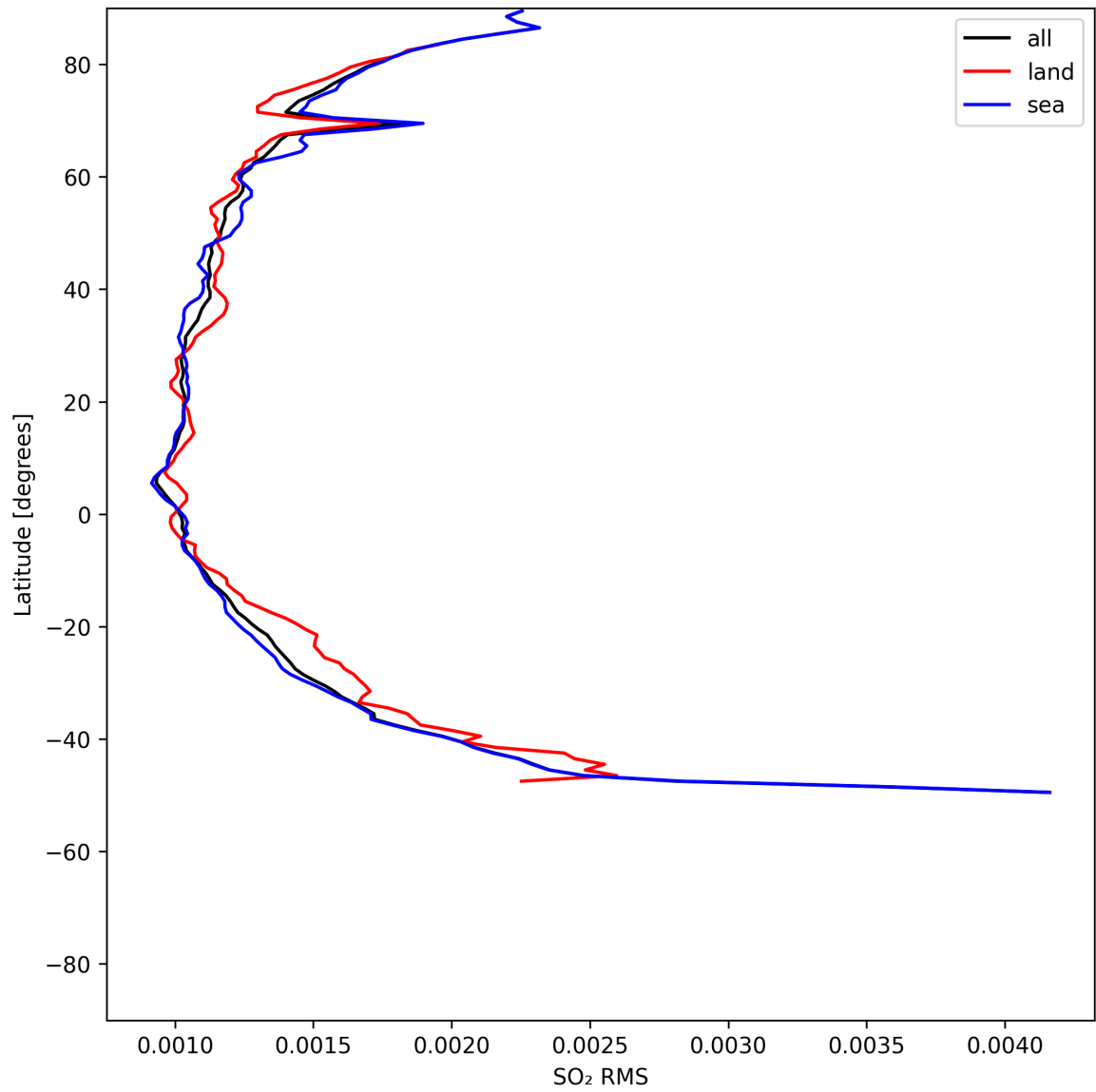


Figure 52: Zonal average of “SO₂ RMS” for 2025-05-18 to 2025-05-19.

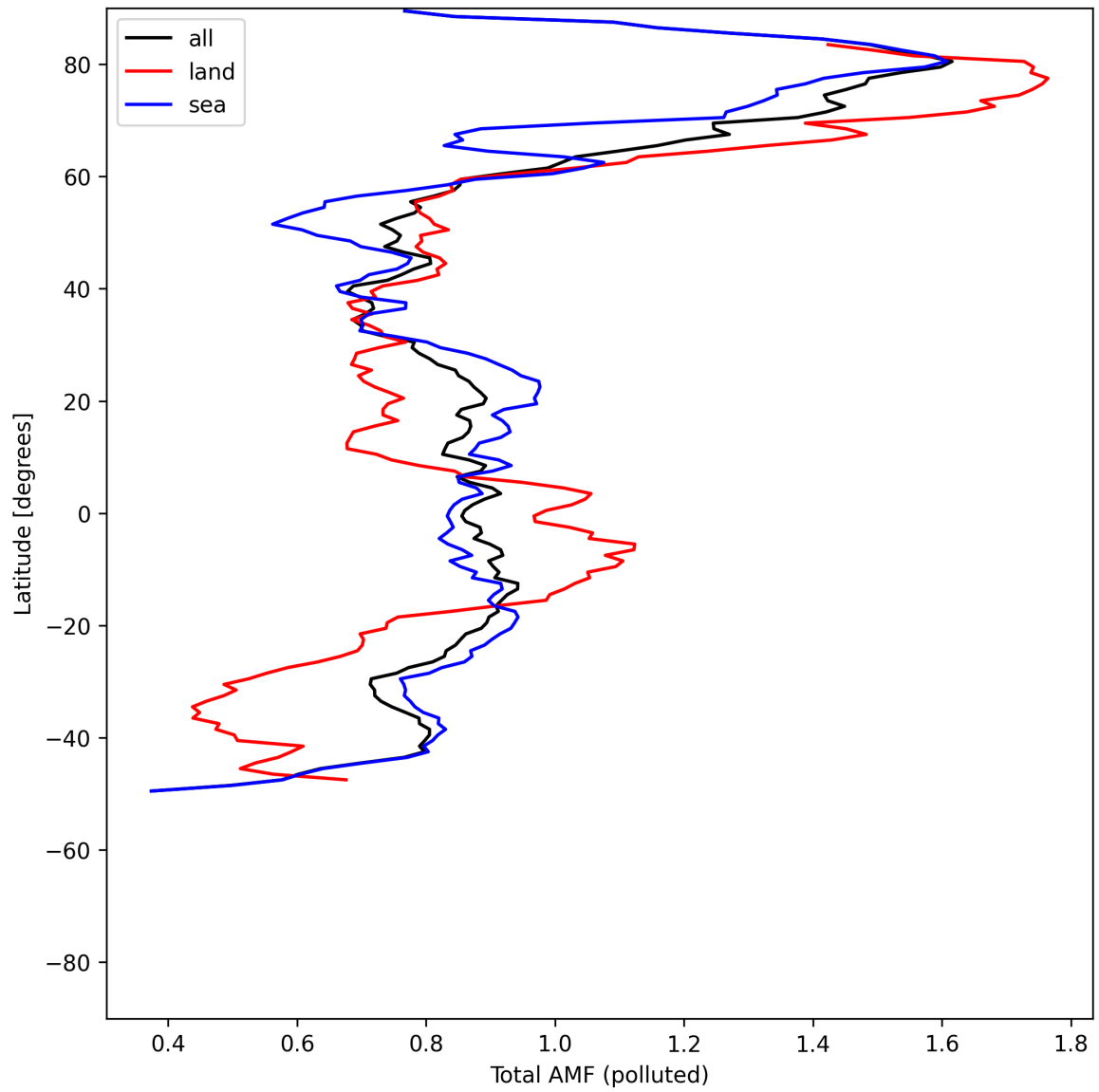


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-05-18 to 2025-05-19.

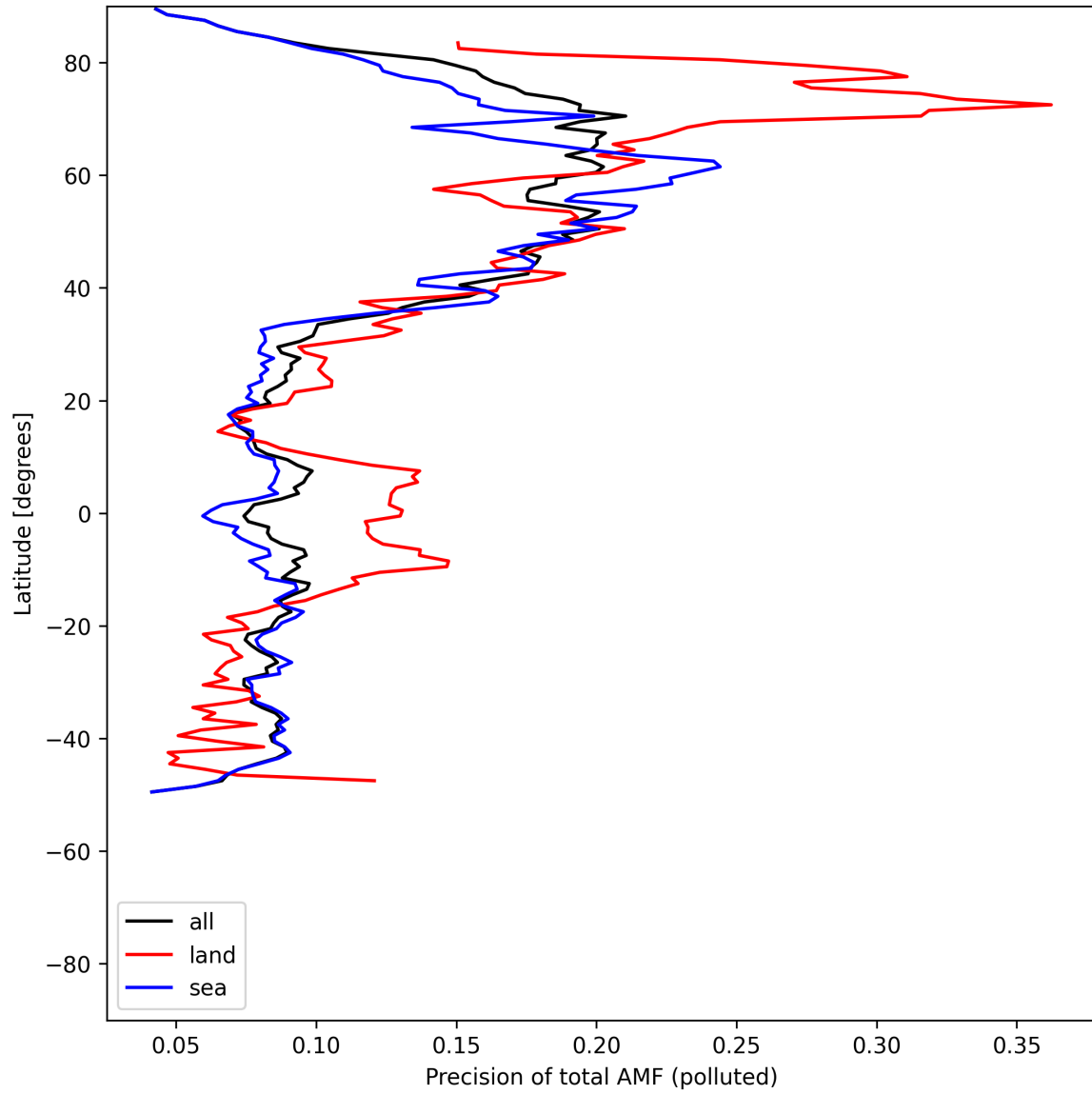


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-05-18 to 2025-05-19.

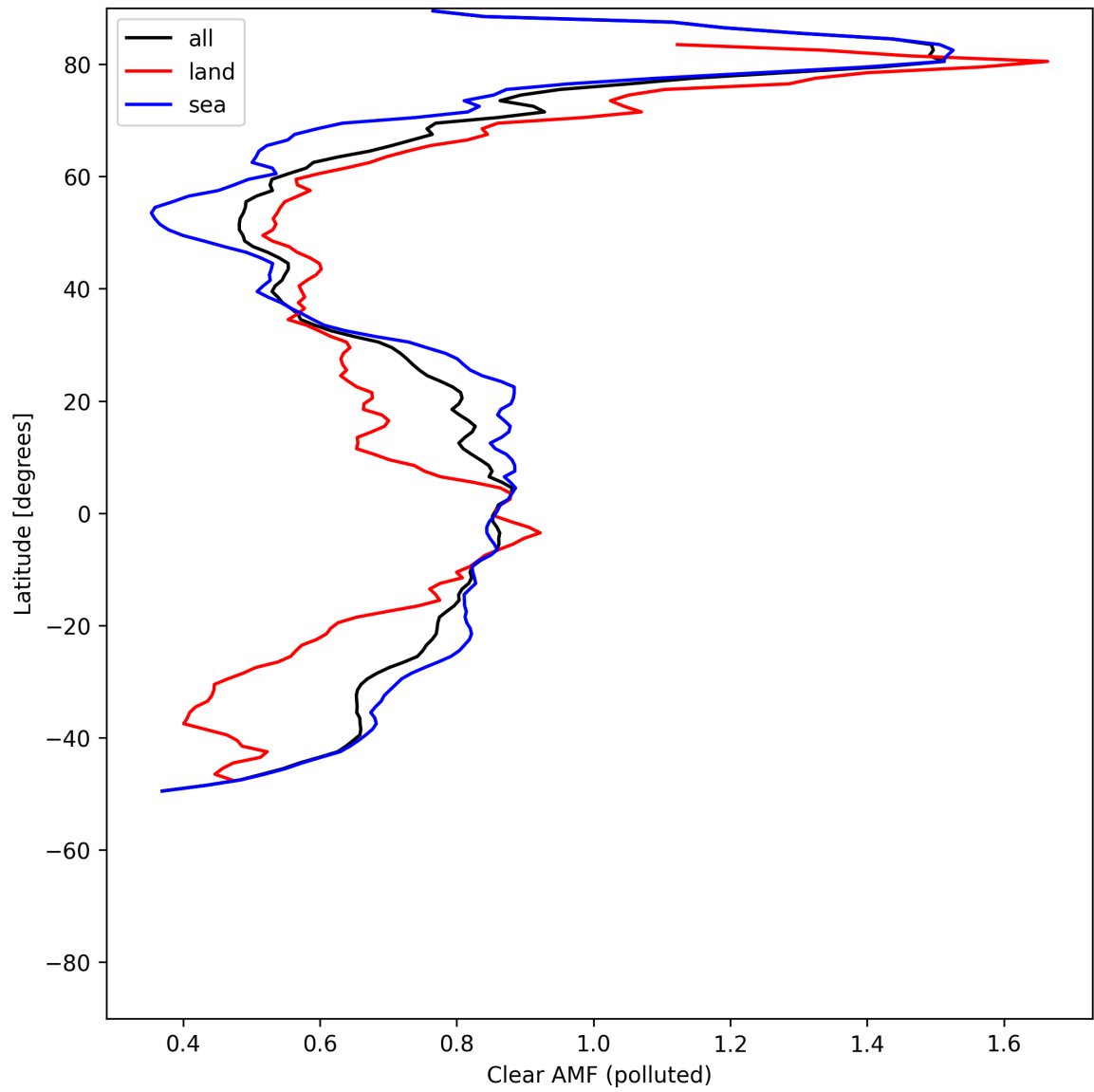


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-05-18 to 2025-05-19.

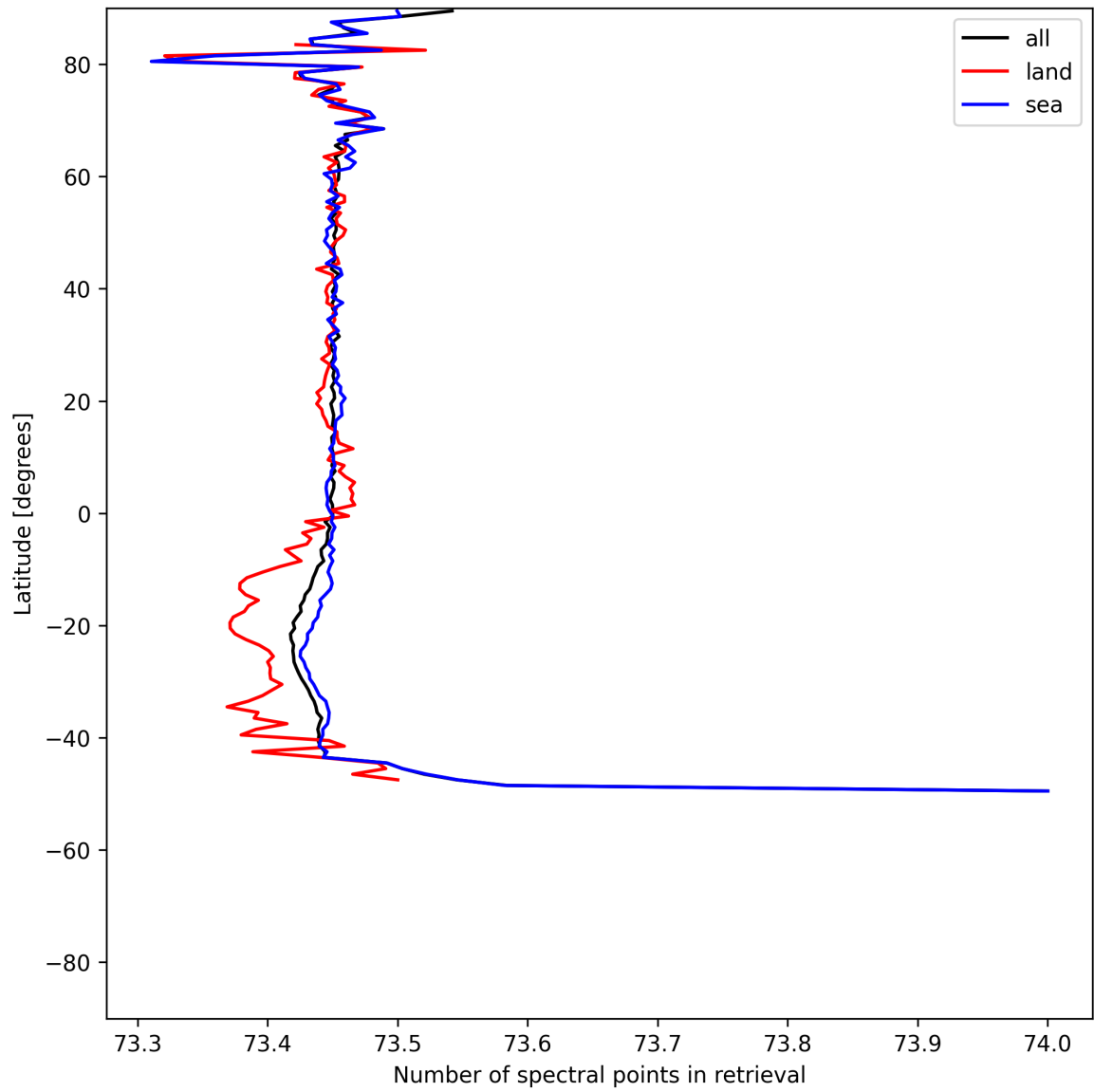


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-05-18 to 2025-05-19.

8 Histograms

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

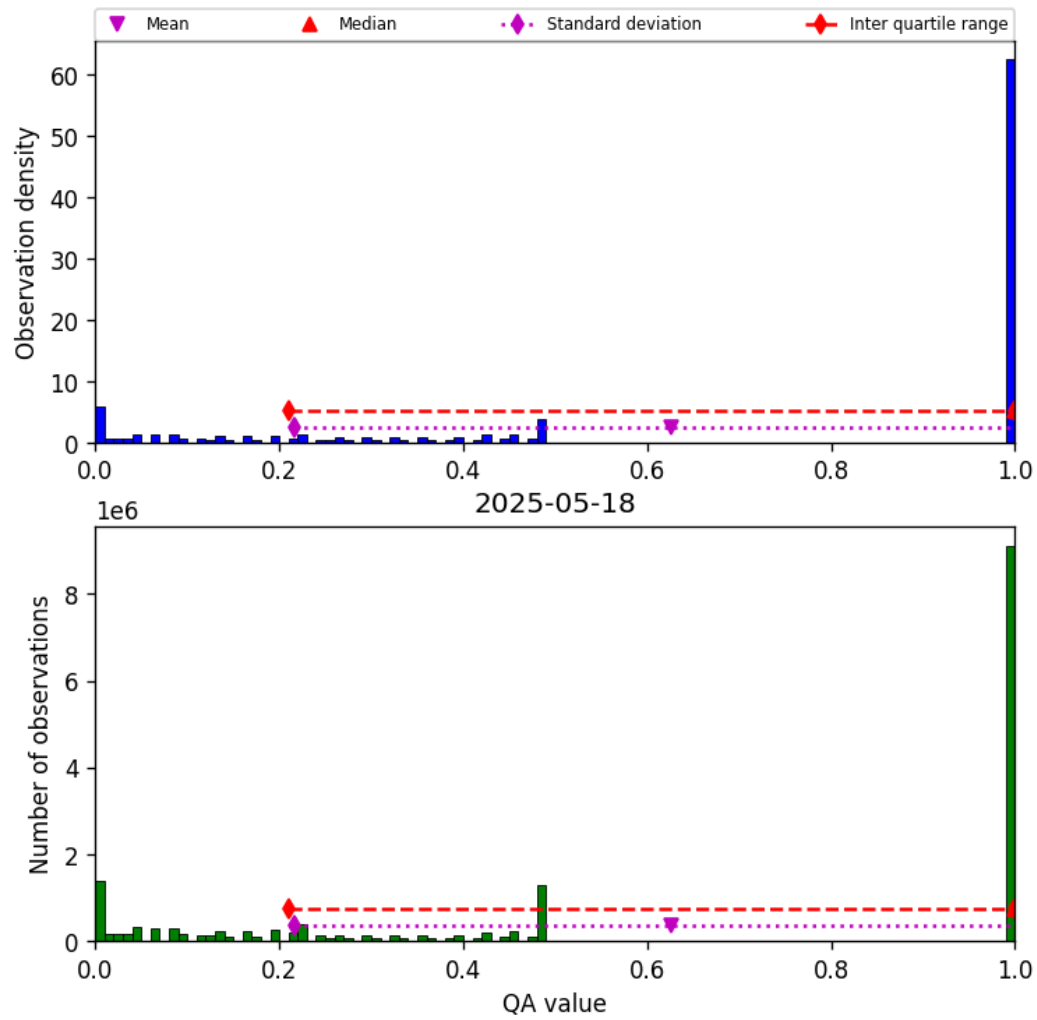


Figure 57: Histogram of “QA value” for 2025-05-18 to 2025-05-19

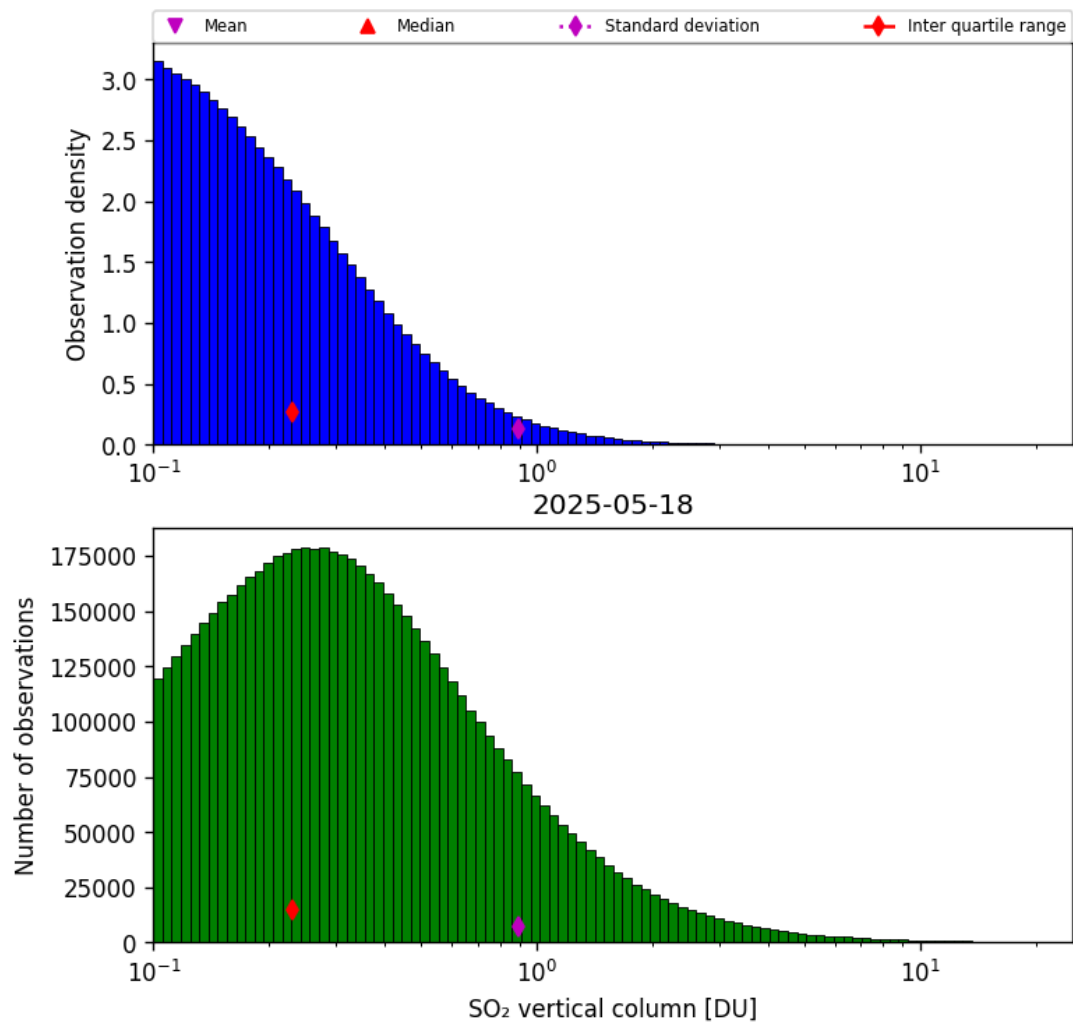


Figure 58: Histogram of “SO₂ vertical column” for 2025-05-18 to 2025-05-19

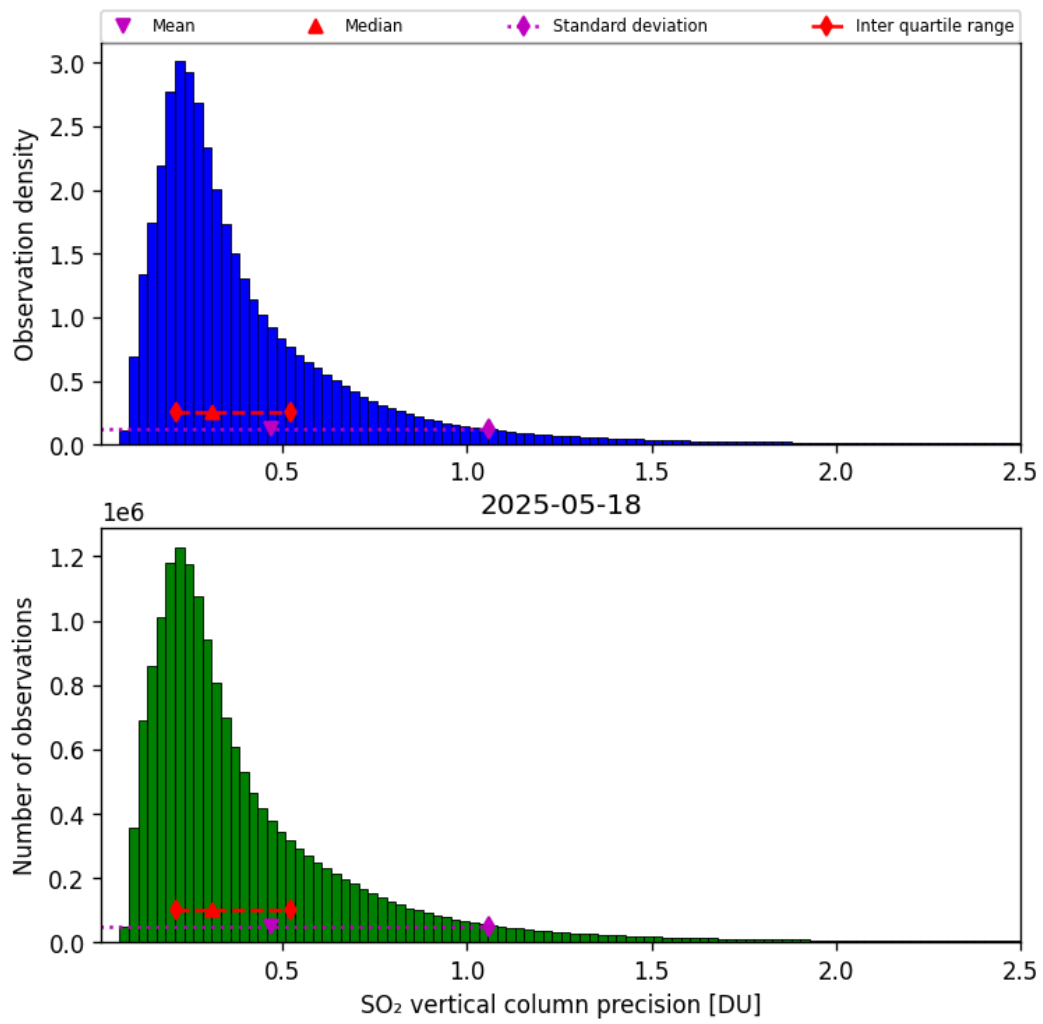


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-05-18 to 2025-05-19

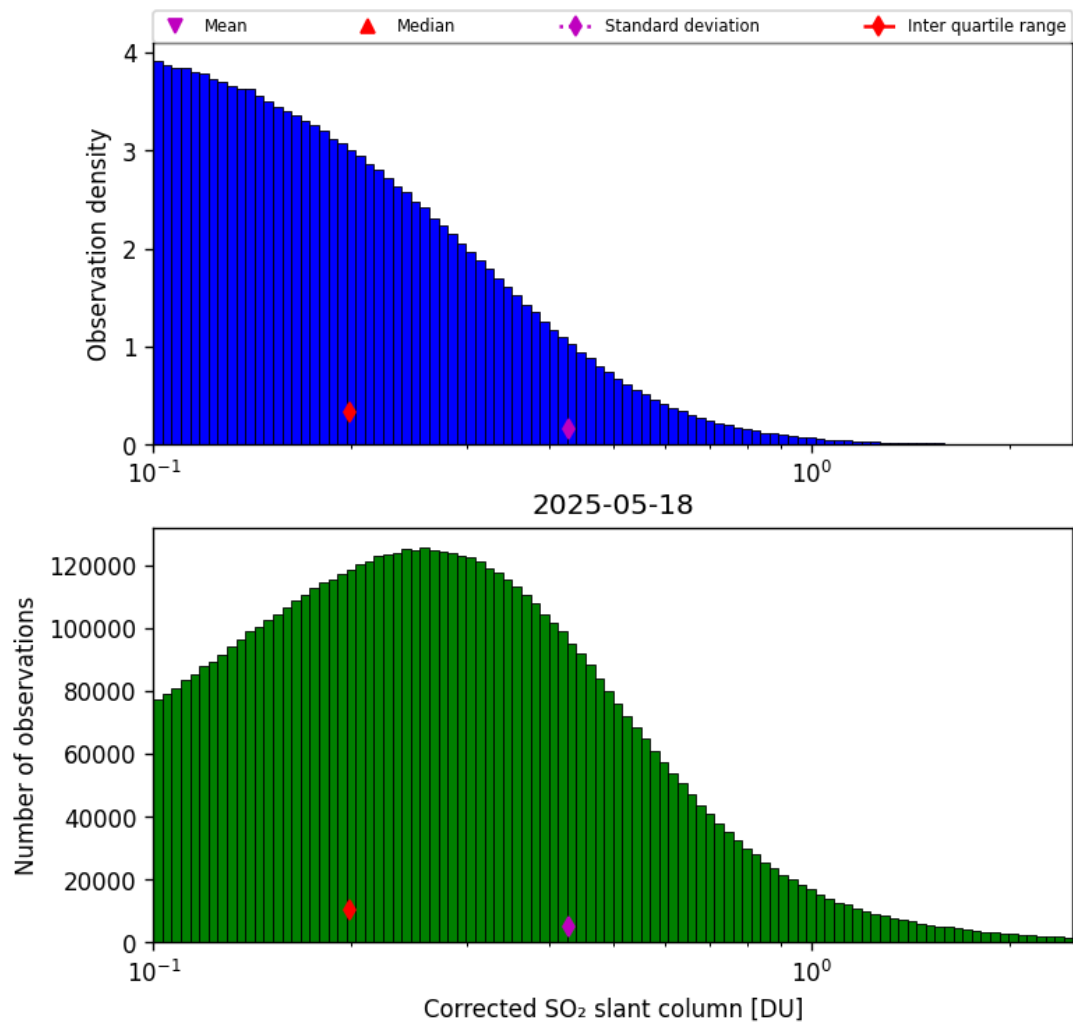


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-05-18 to 2025-05-19

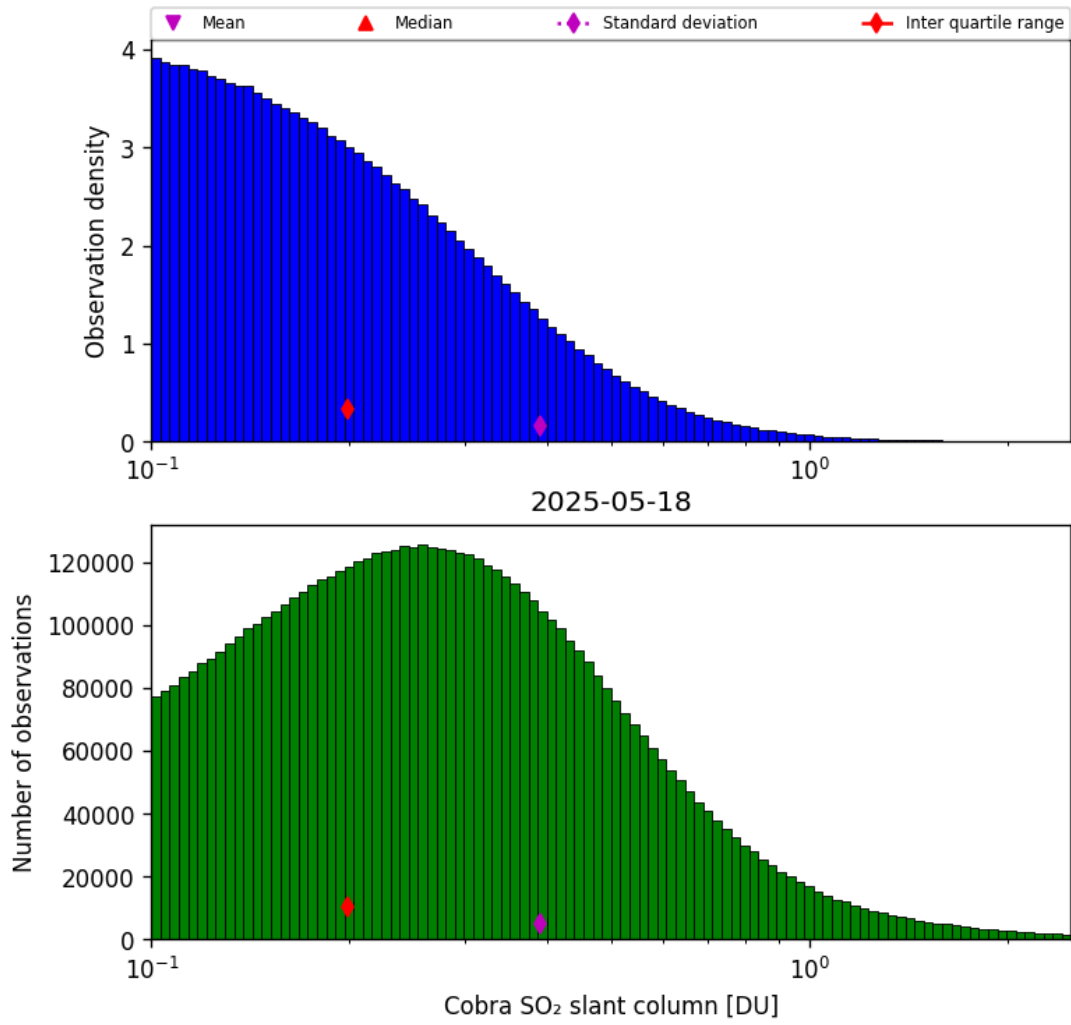


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-05-18 to 2025-05-19

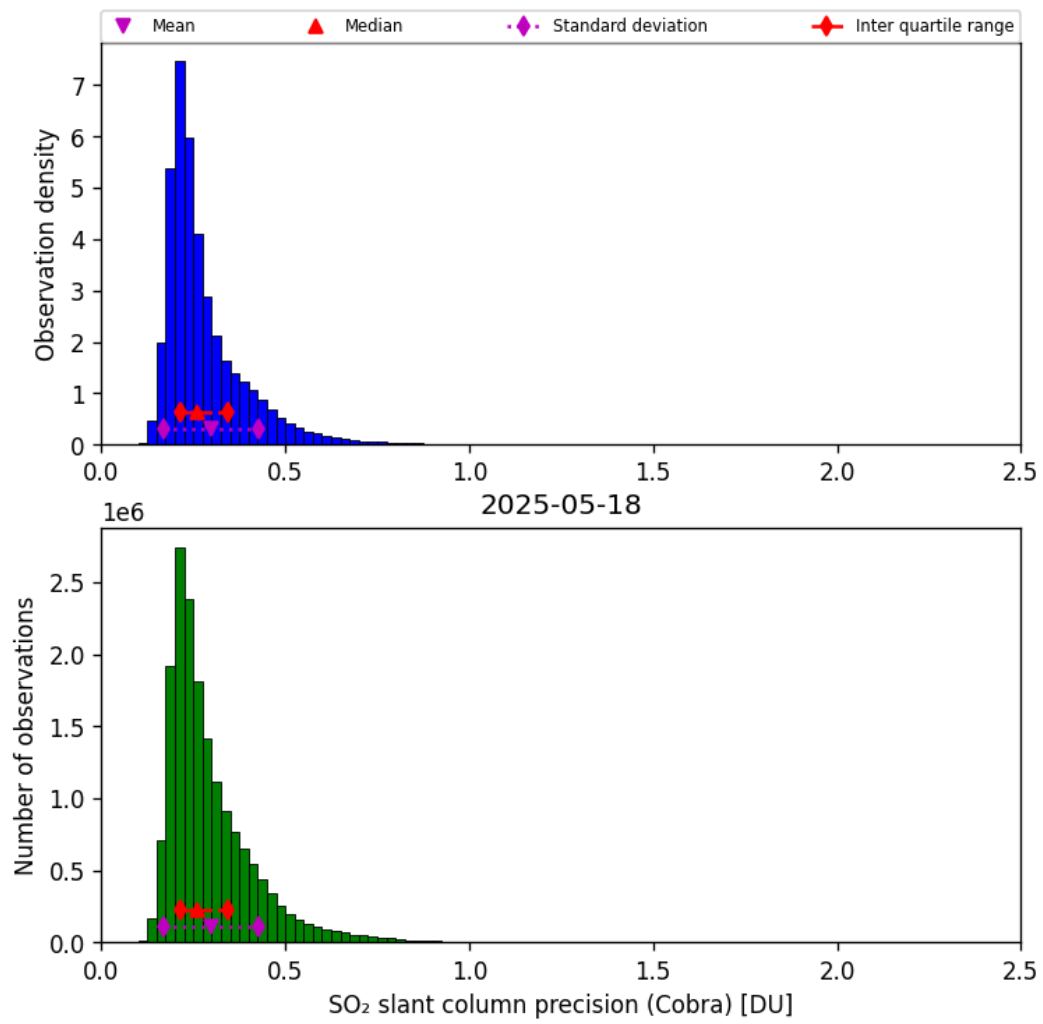


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-05-18 to 2025-05-19

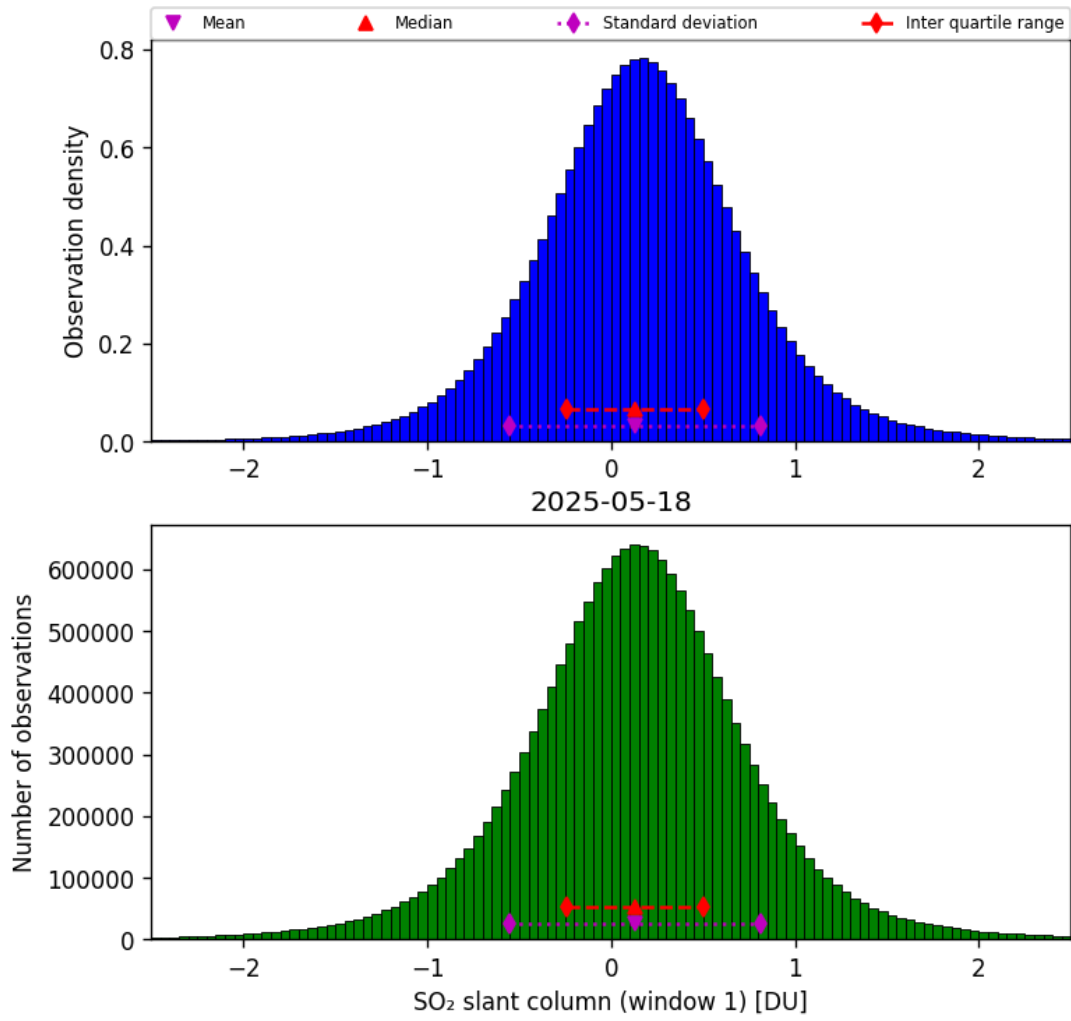


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-05-18 to 2025-05-19

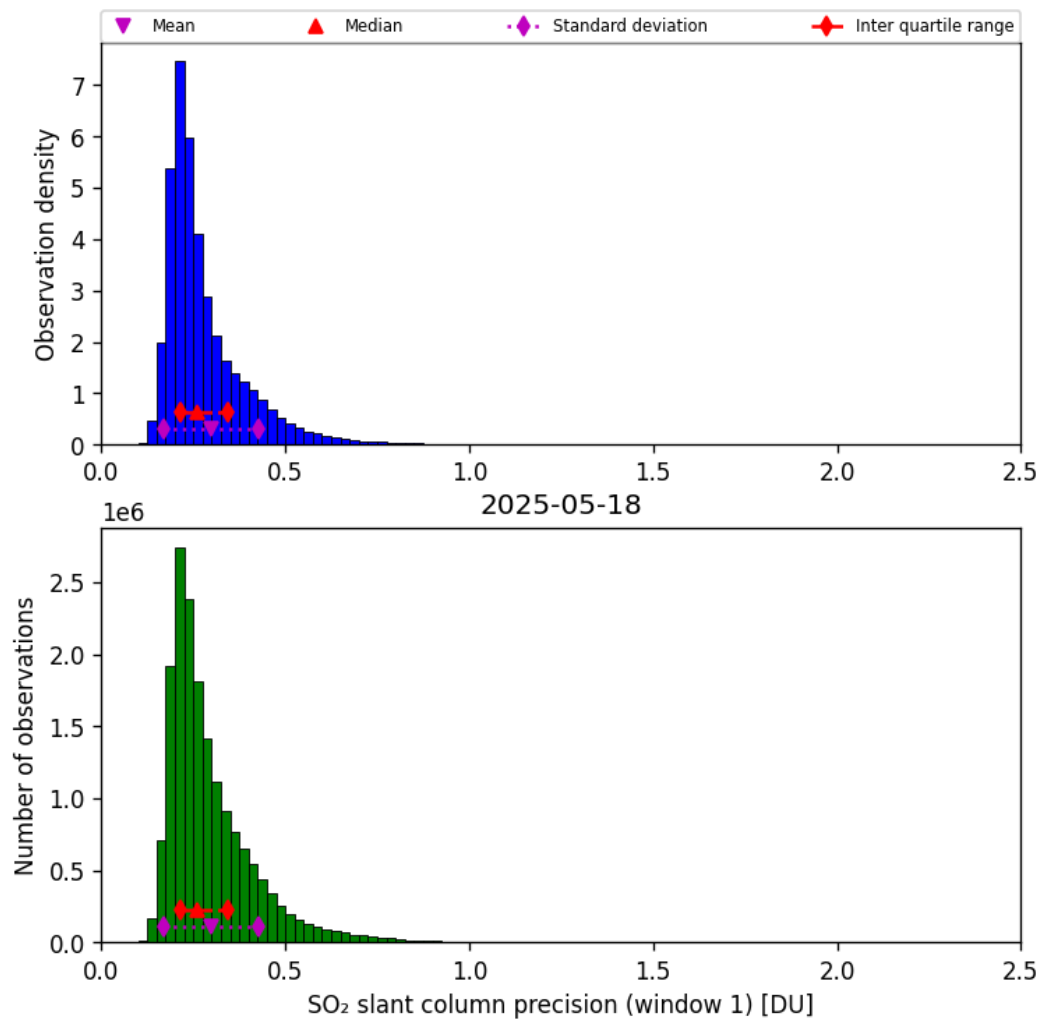


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-05-18 to 2025-05-19

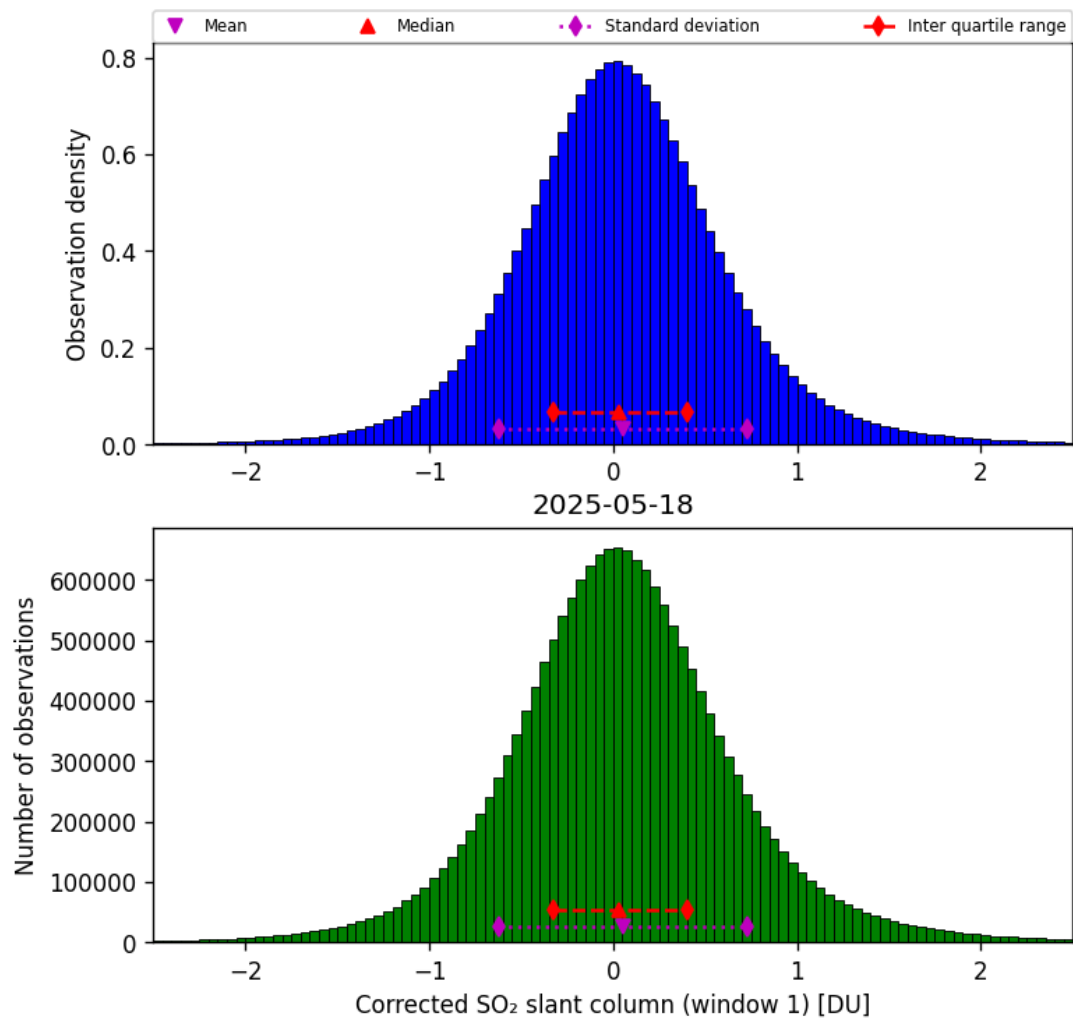


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-05-18 to 2025-05-19

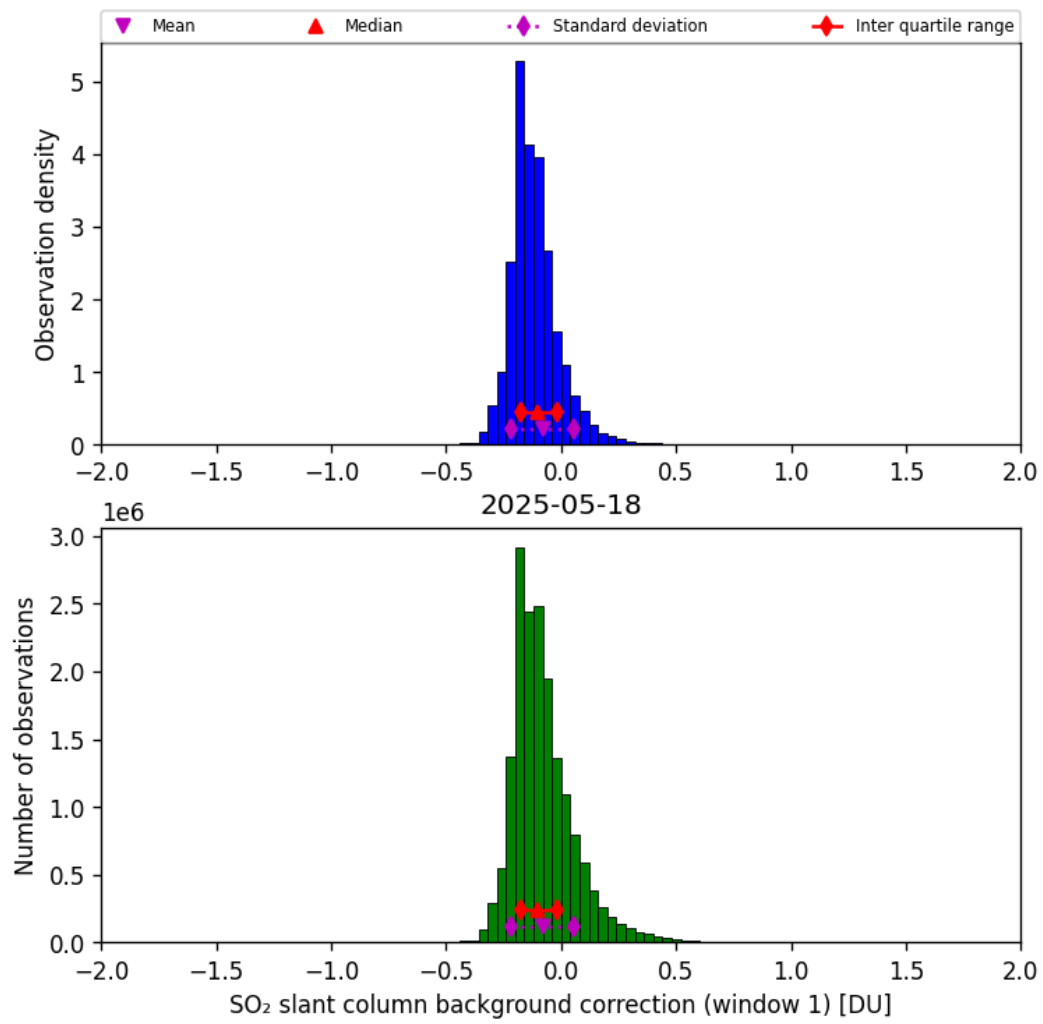


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-05-18 to 2025-05-19

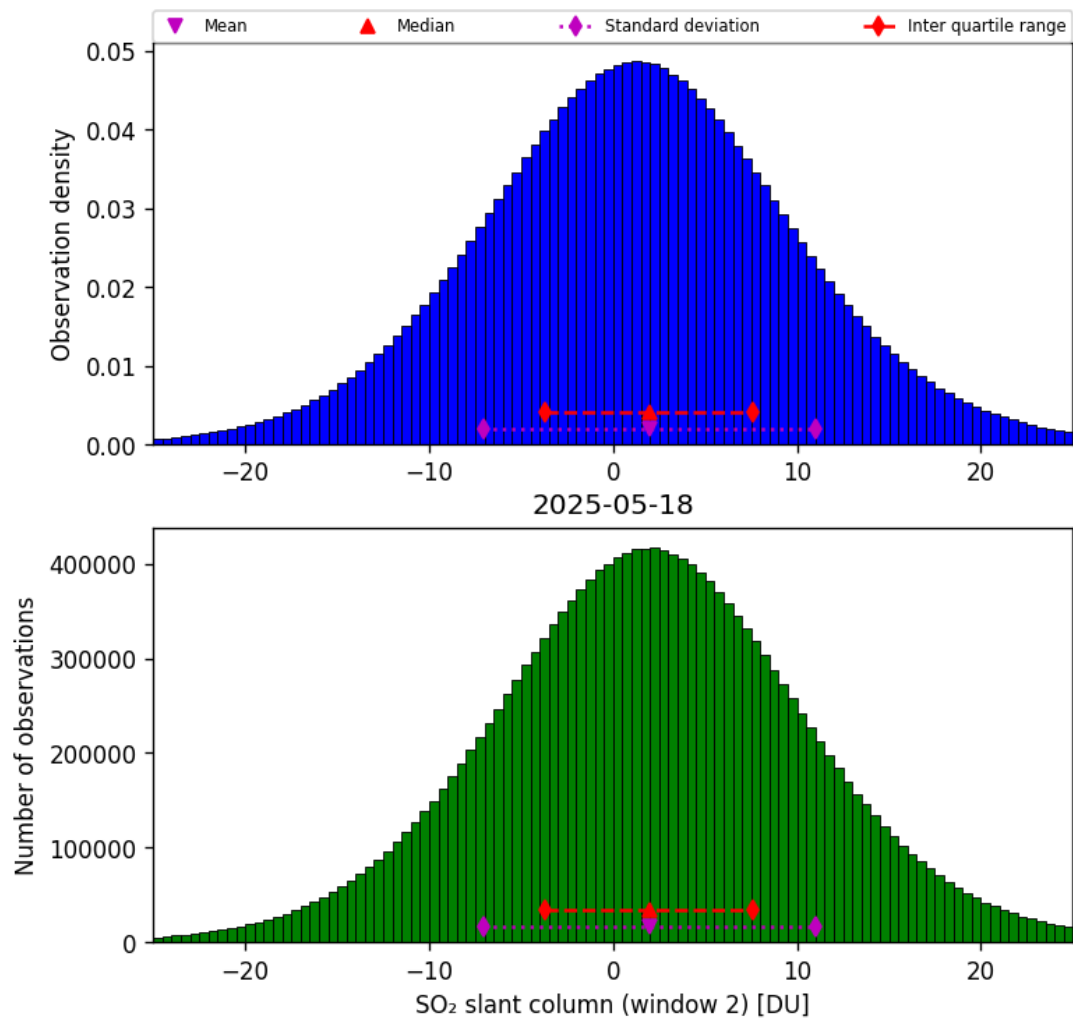


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-05-18 to 2025-05-19

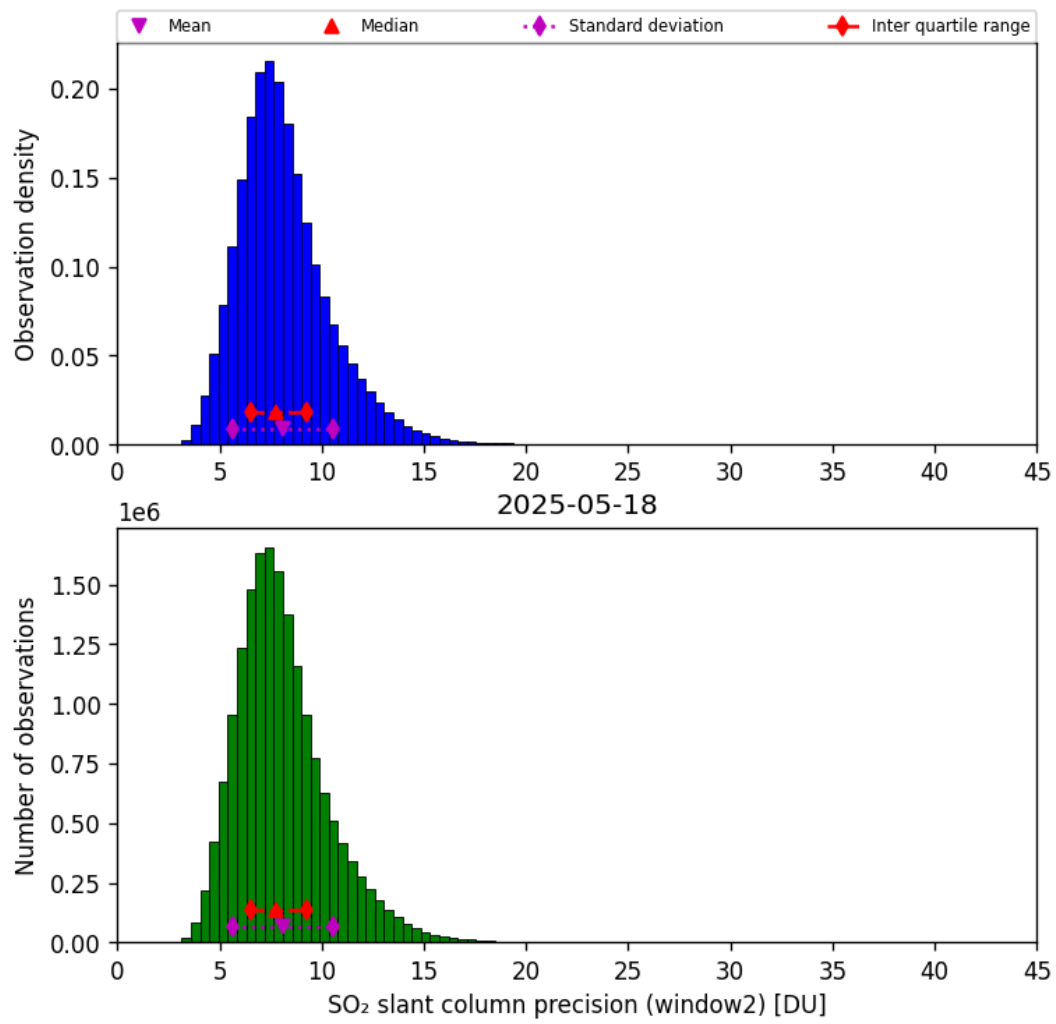


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-05-18 to 2025-05-19

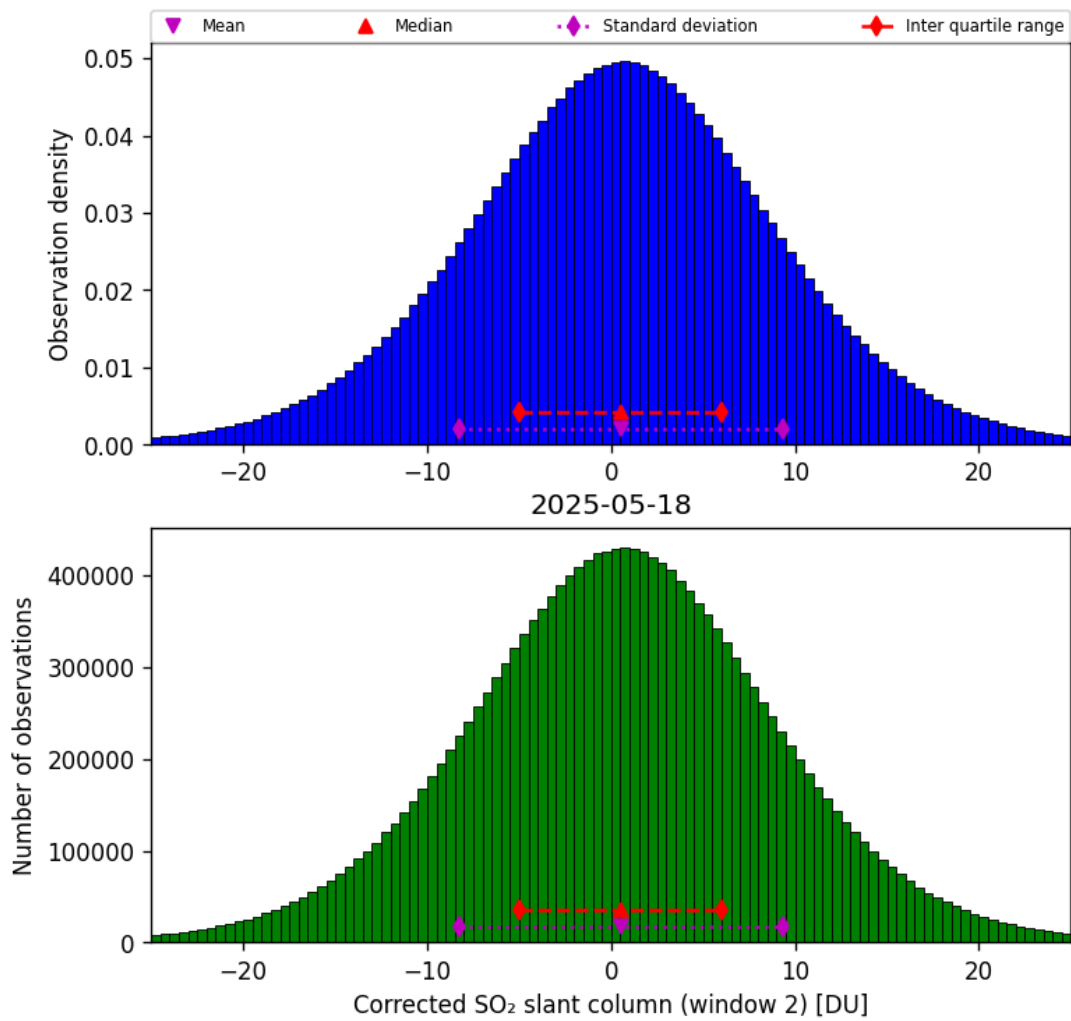


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-05-18 to 2025-05-19

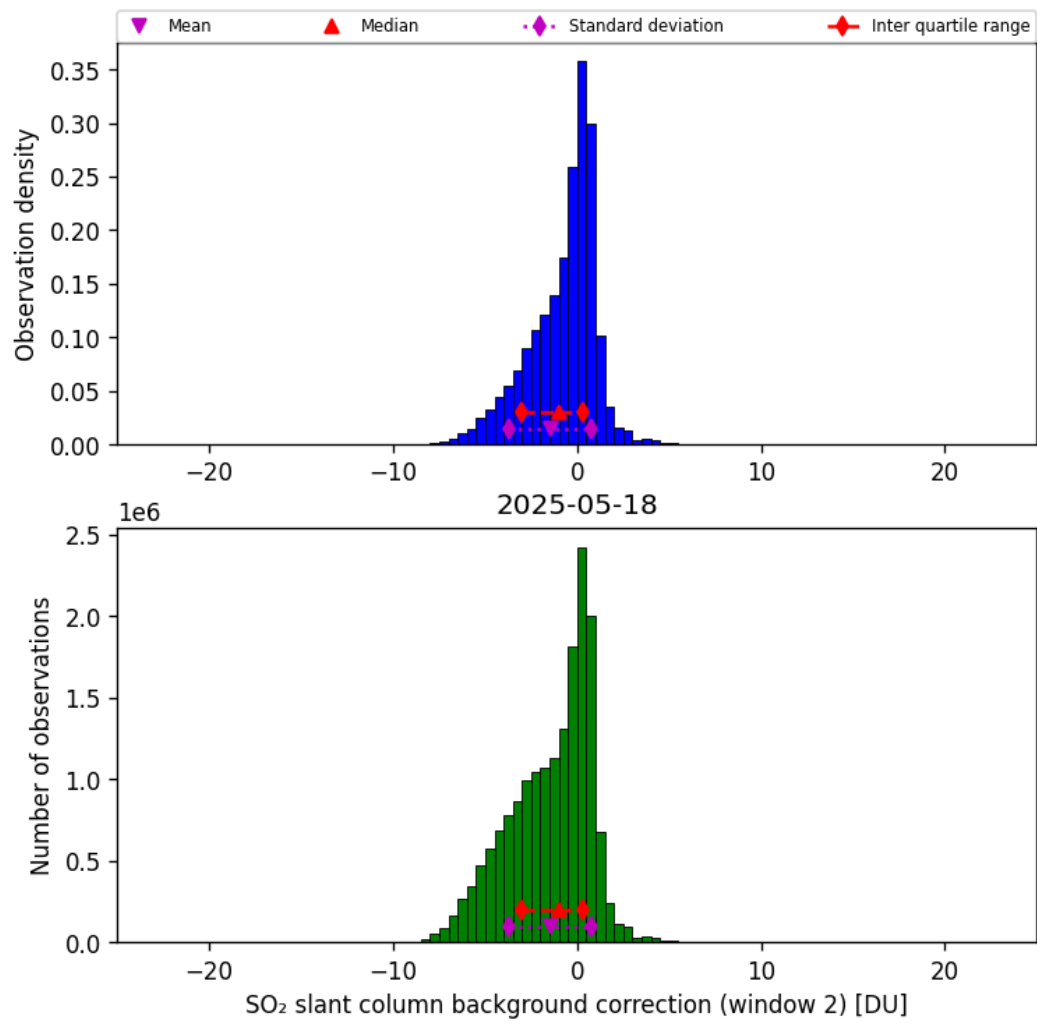


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-05-18 to 2025-05-19

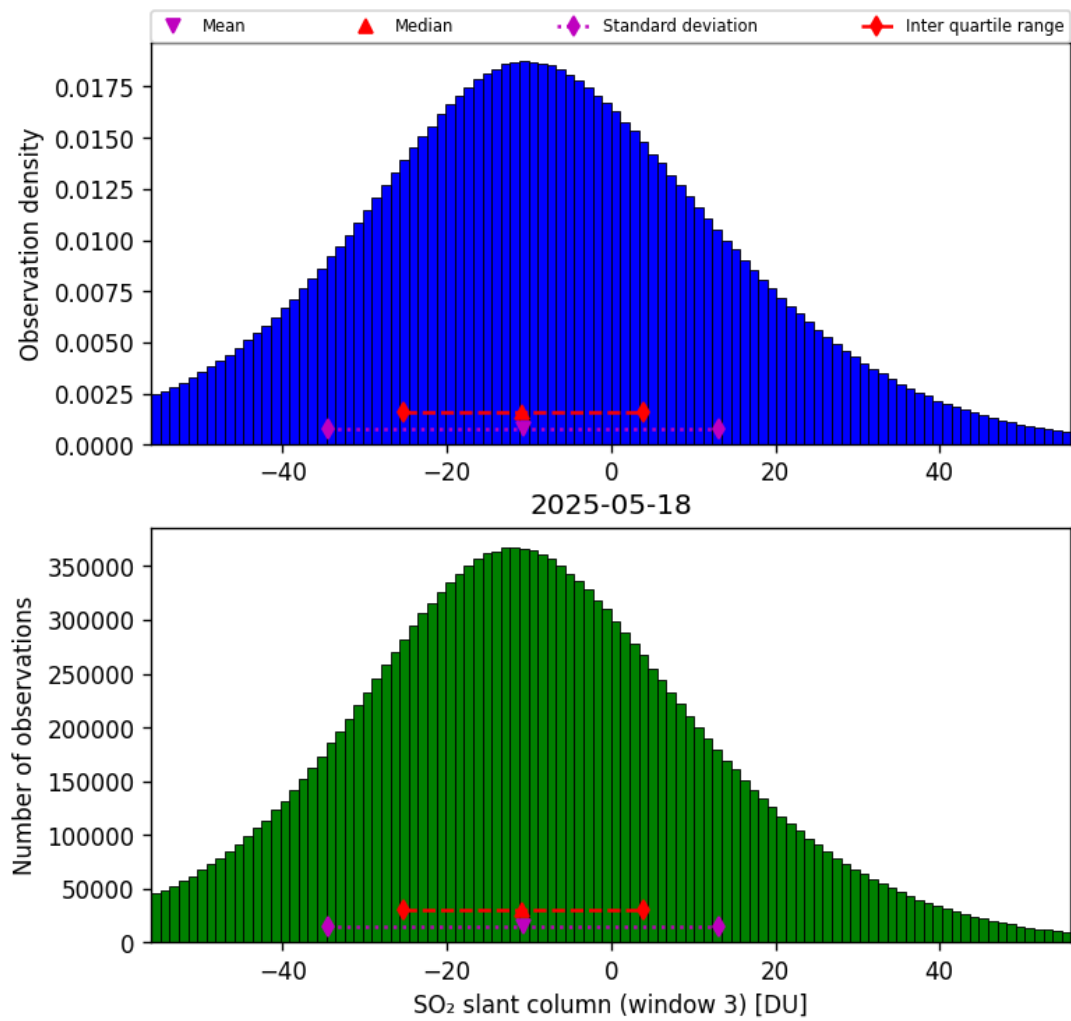


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-05-18 to 2025-05-19

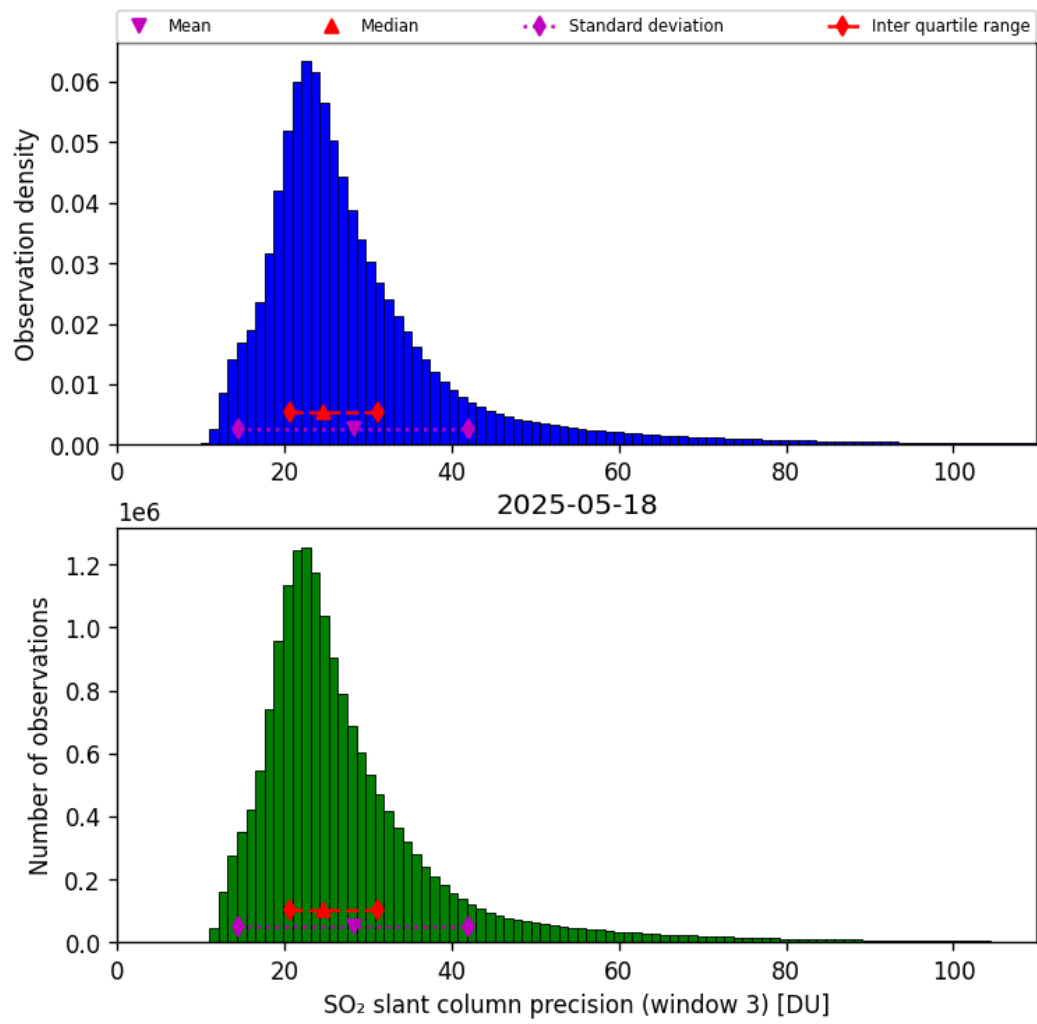


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-05-18 to 2025-05-19

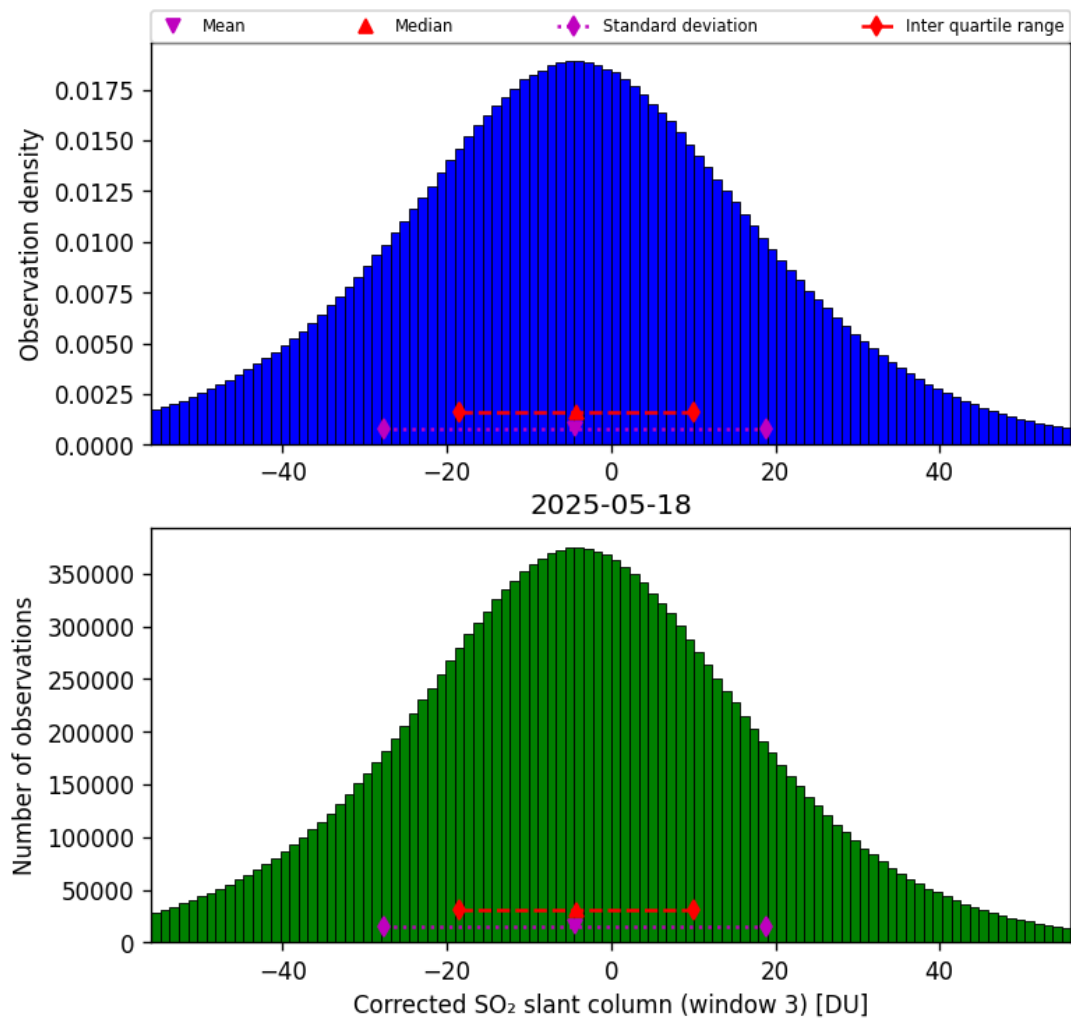


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-05-18 to 2025-05-19

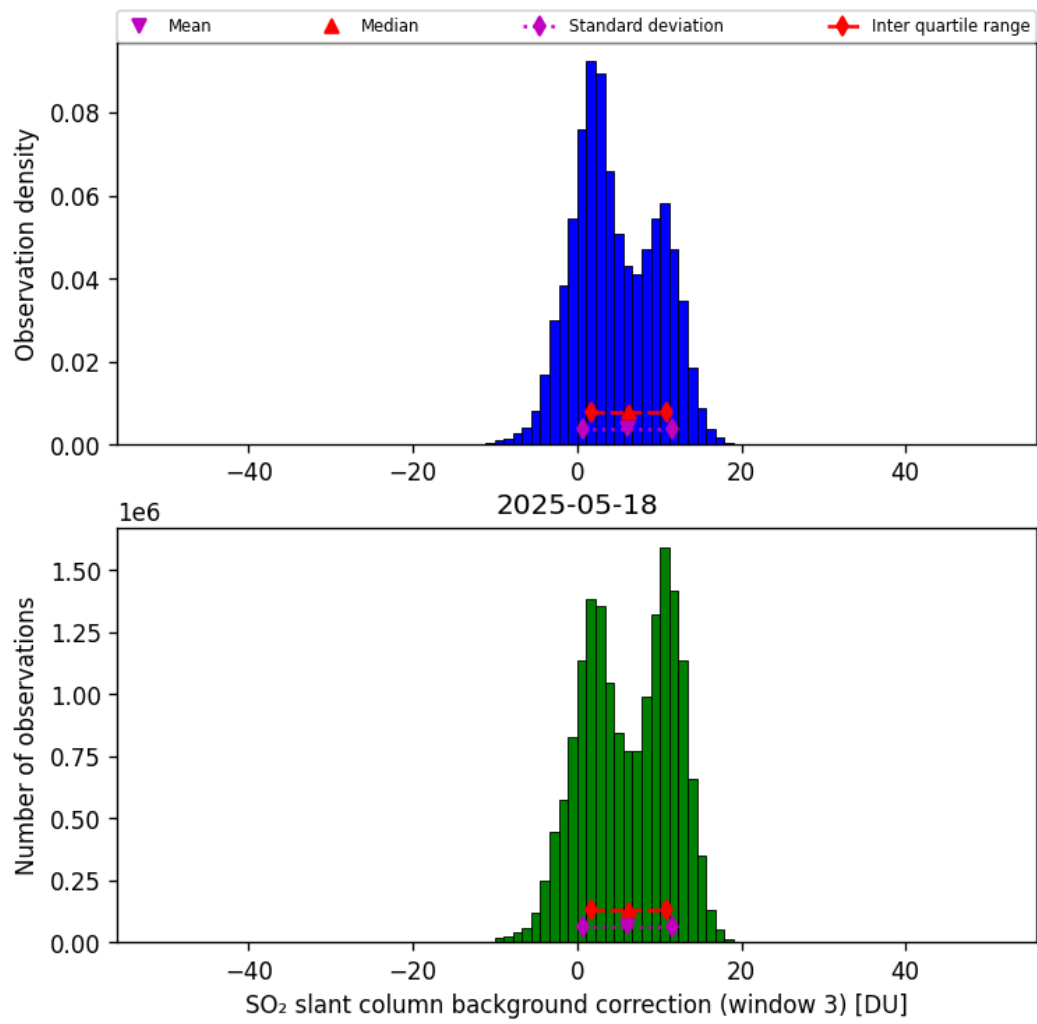


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-05-18 to 2025-05-19

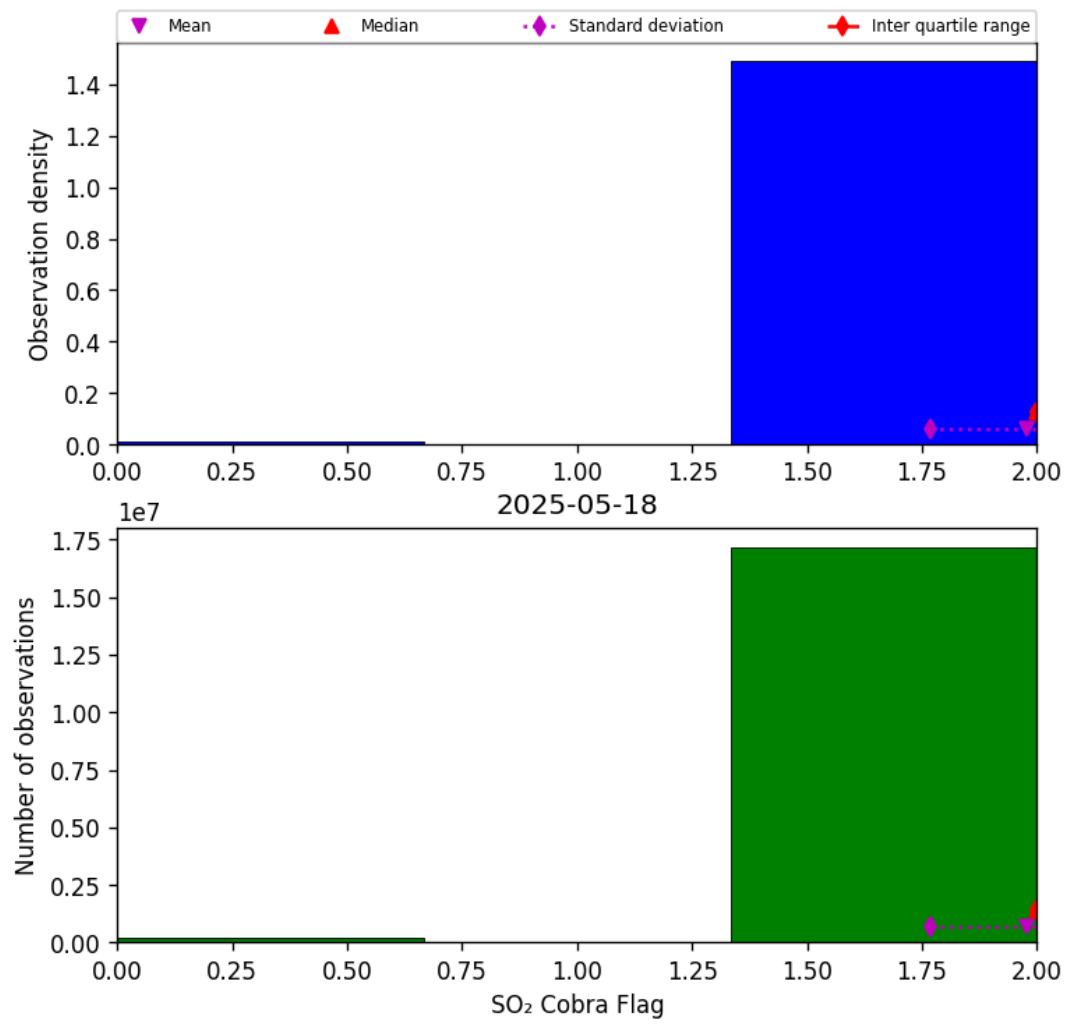


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-05-18 to 2025-05-19

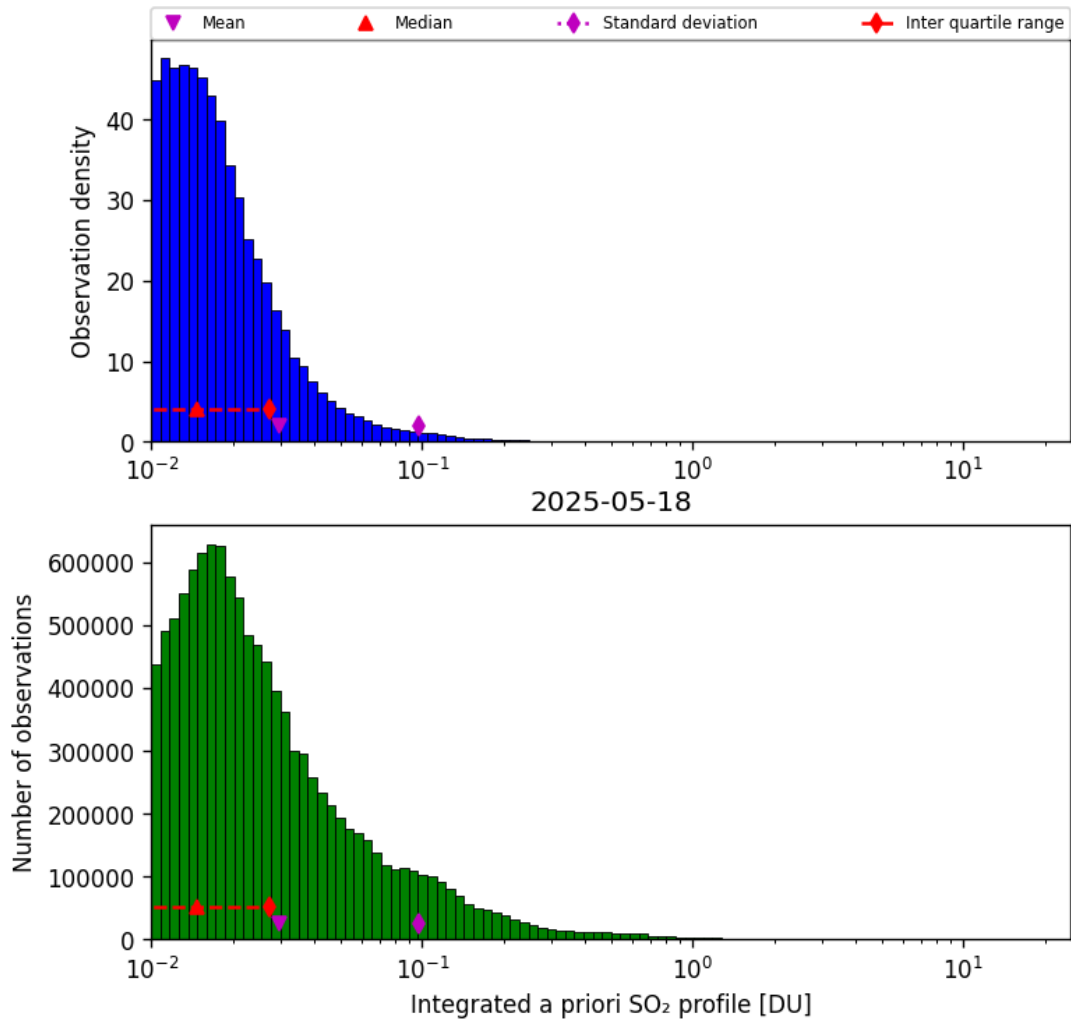


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-05-18 to 2025-05-19

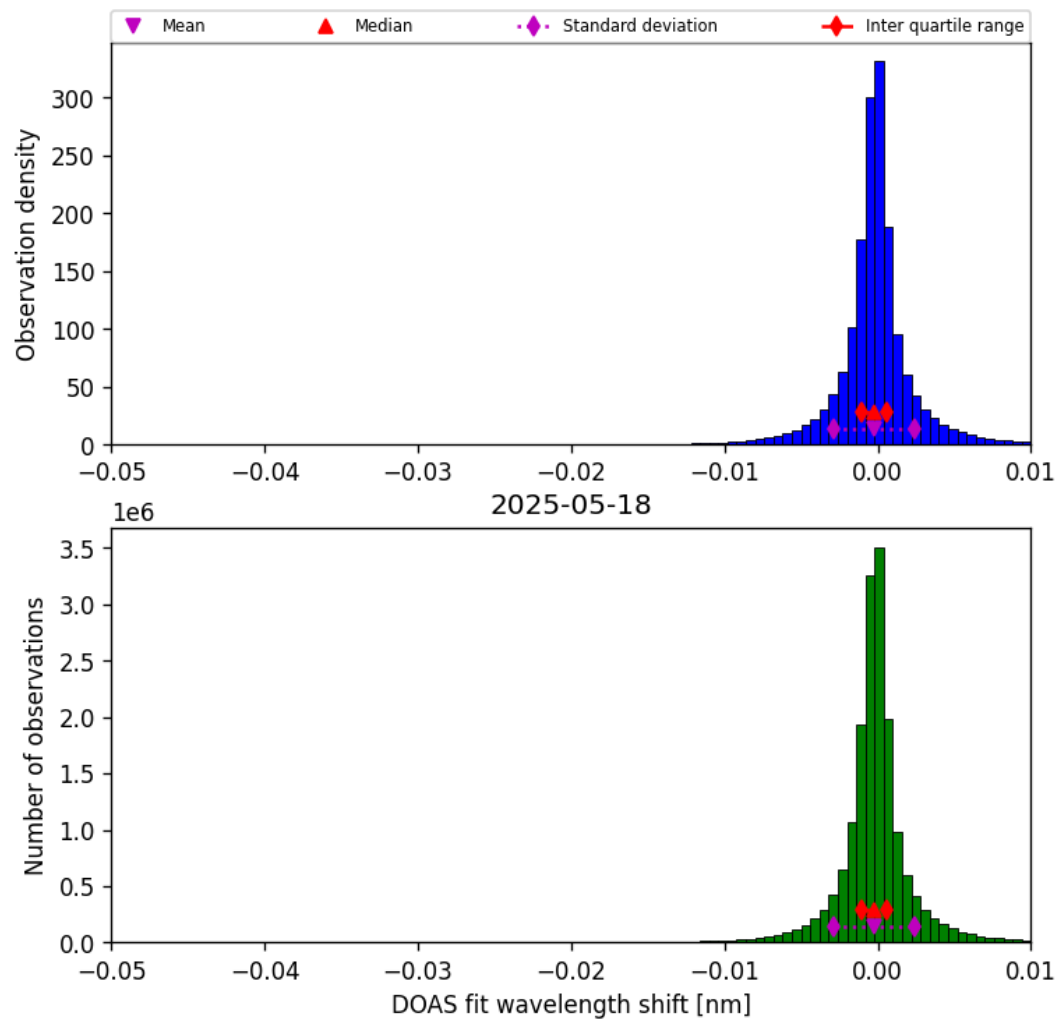


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-05-18 to 2025-05-19

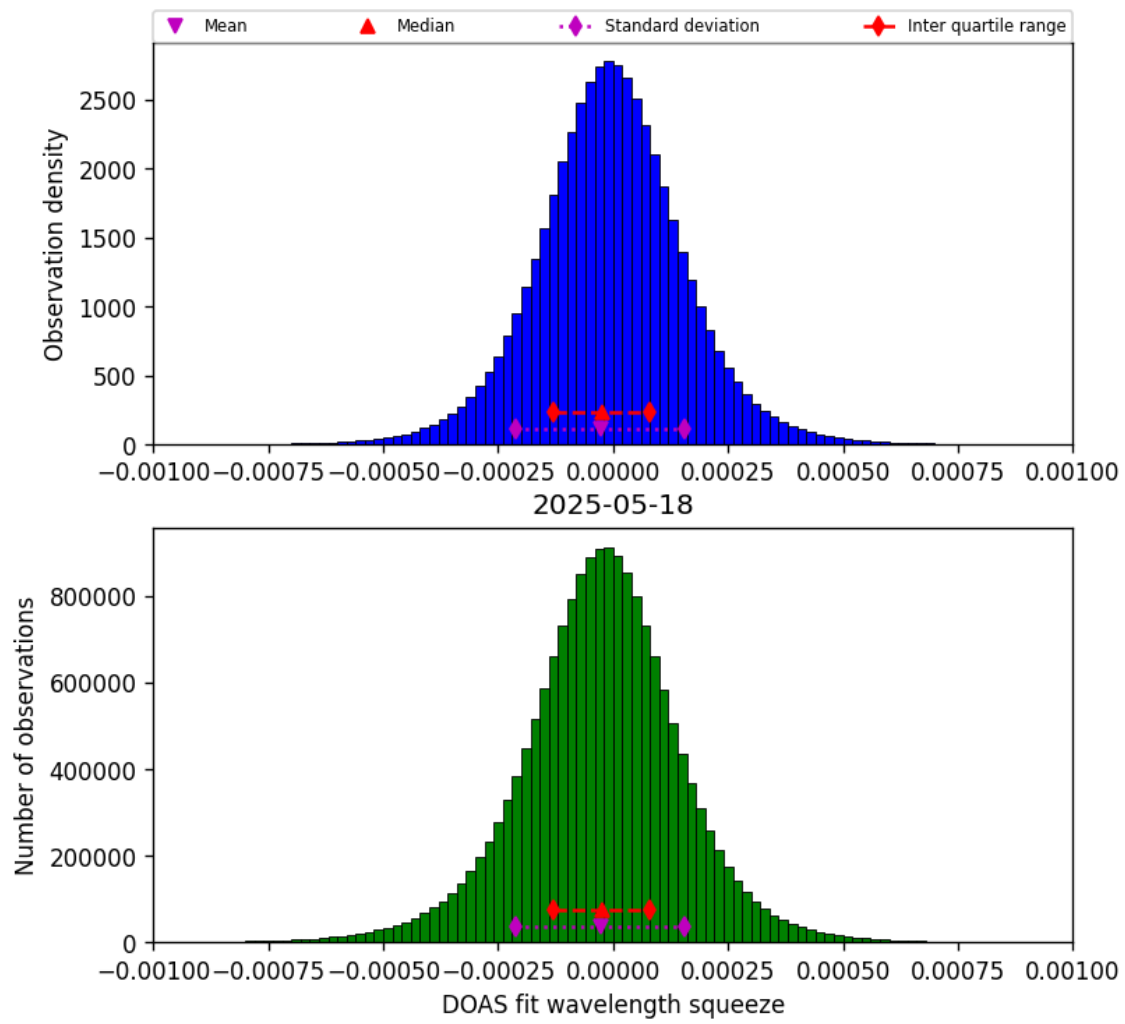


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-05-18 to 2025-05-19

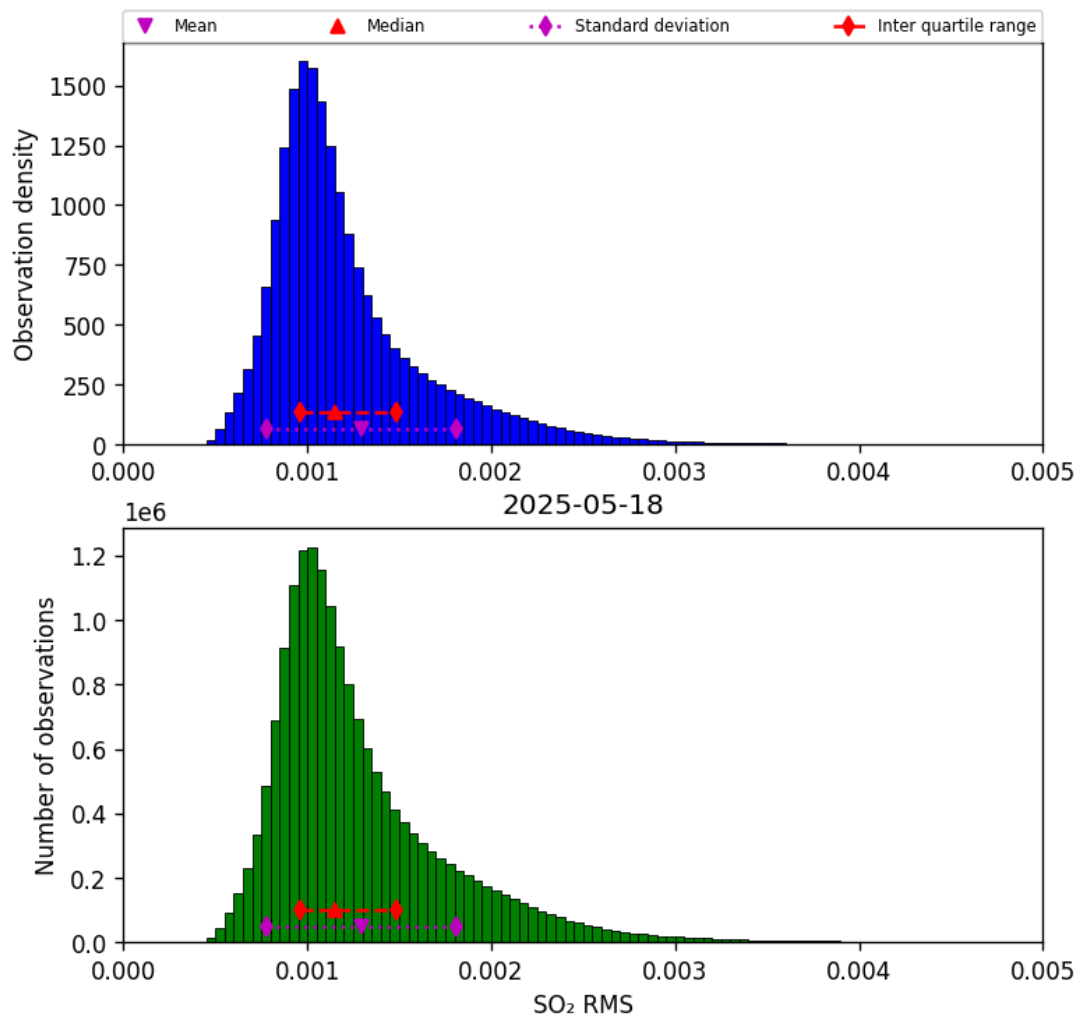


Figure 79: Histogram of “SO₂ RMS” for 2025-05-18 to 2025-05-19

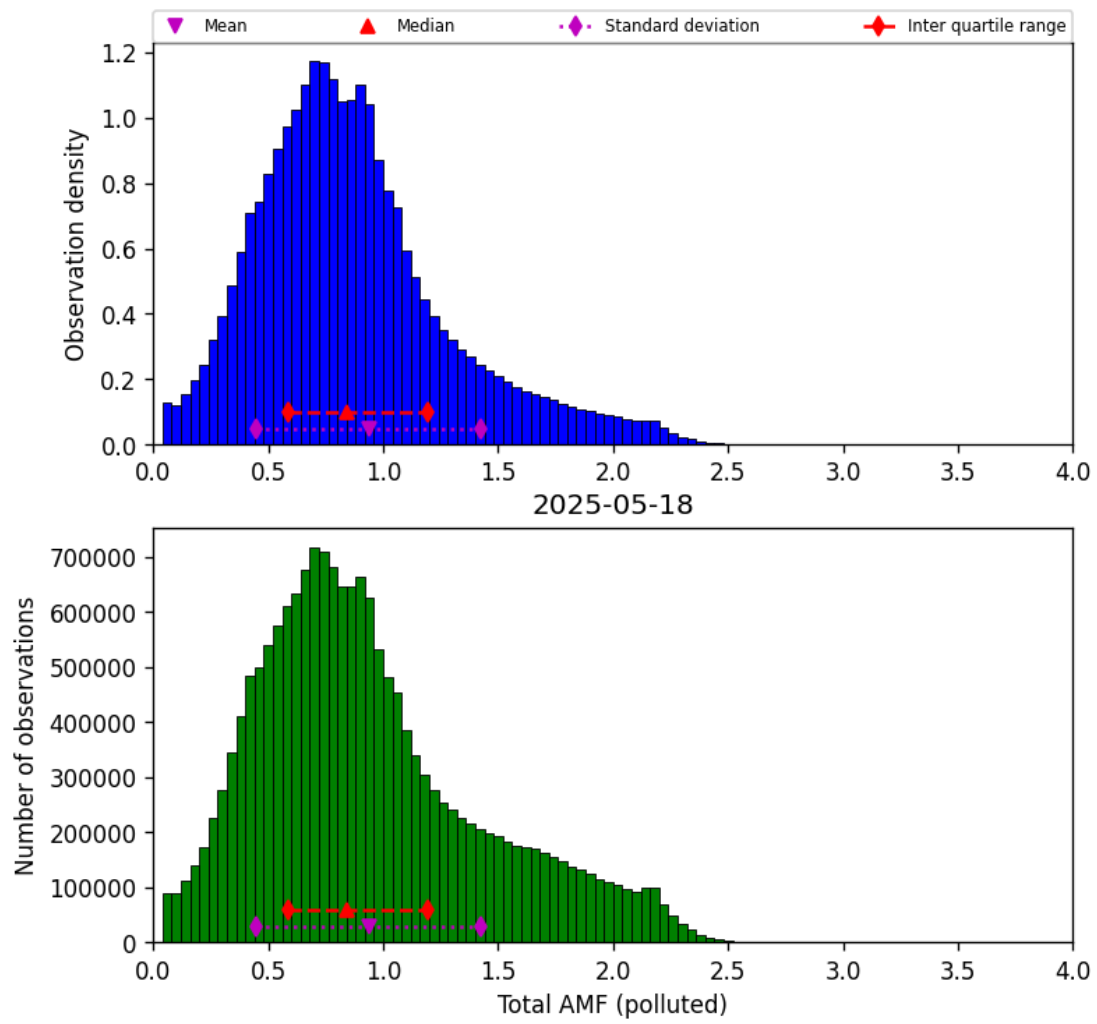


Figure 80: Histogram of “Total AMF (polluted)” for 2025-05-18 to 2025-05-19

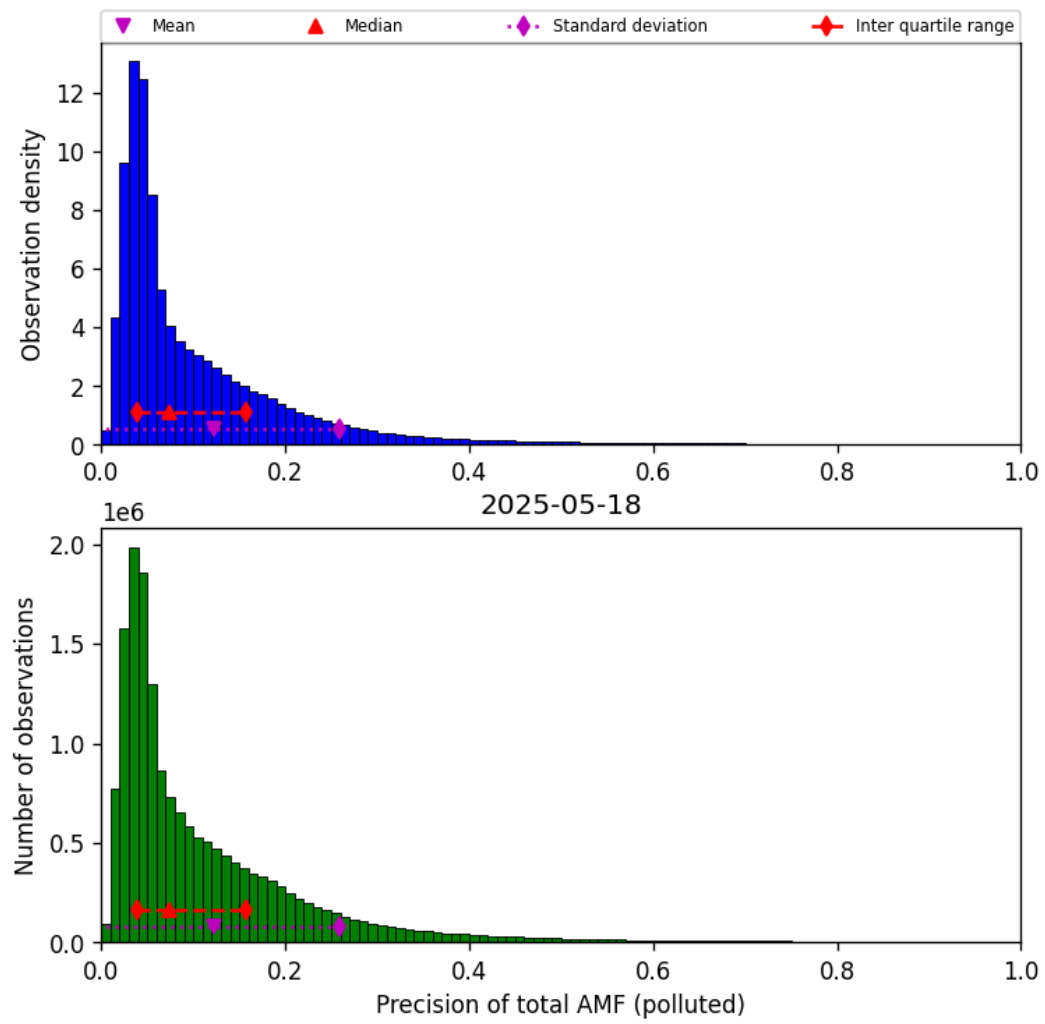


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-05-18 to 2025-05-19

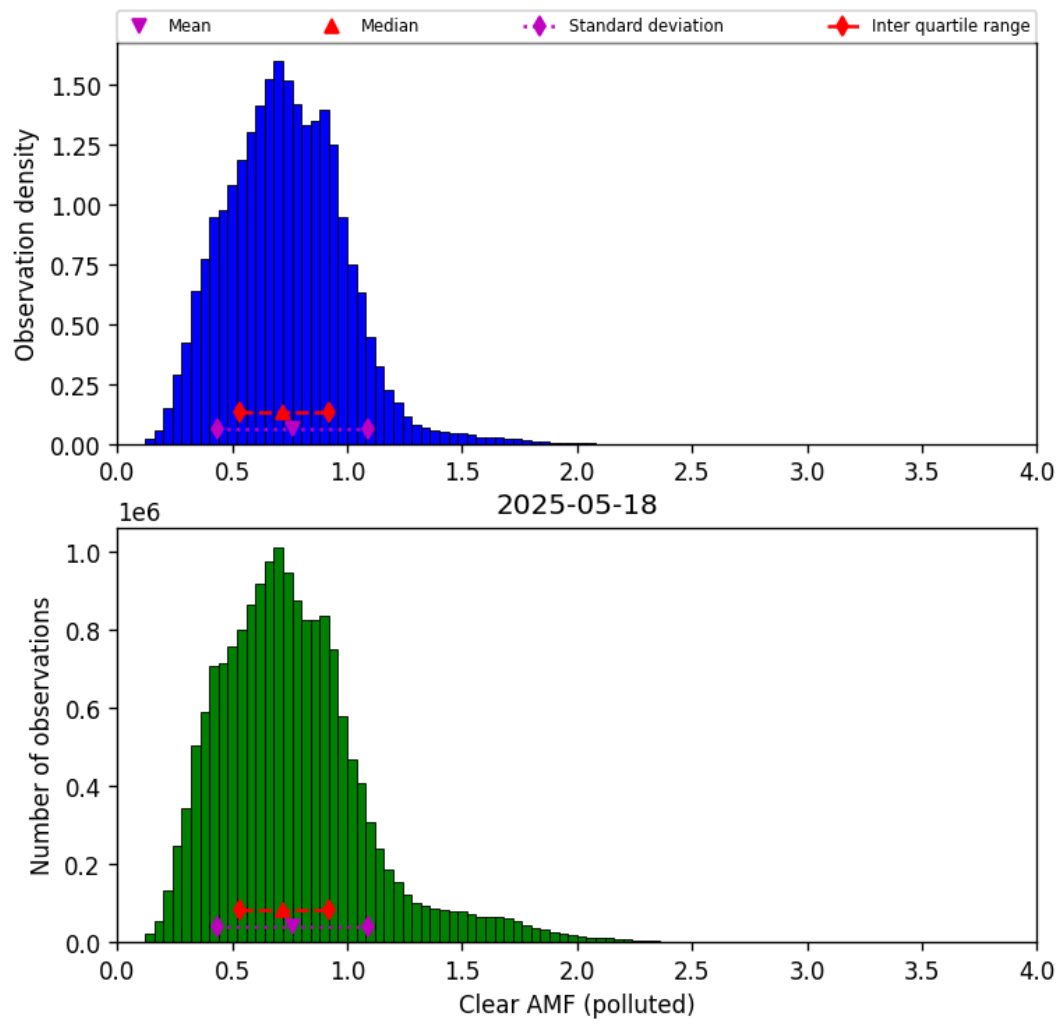


Figure 82: Histogram of "Clear AMF (polluted)" for 2025-05-18 to 2025-05-19

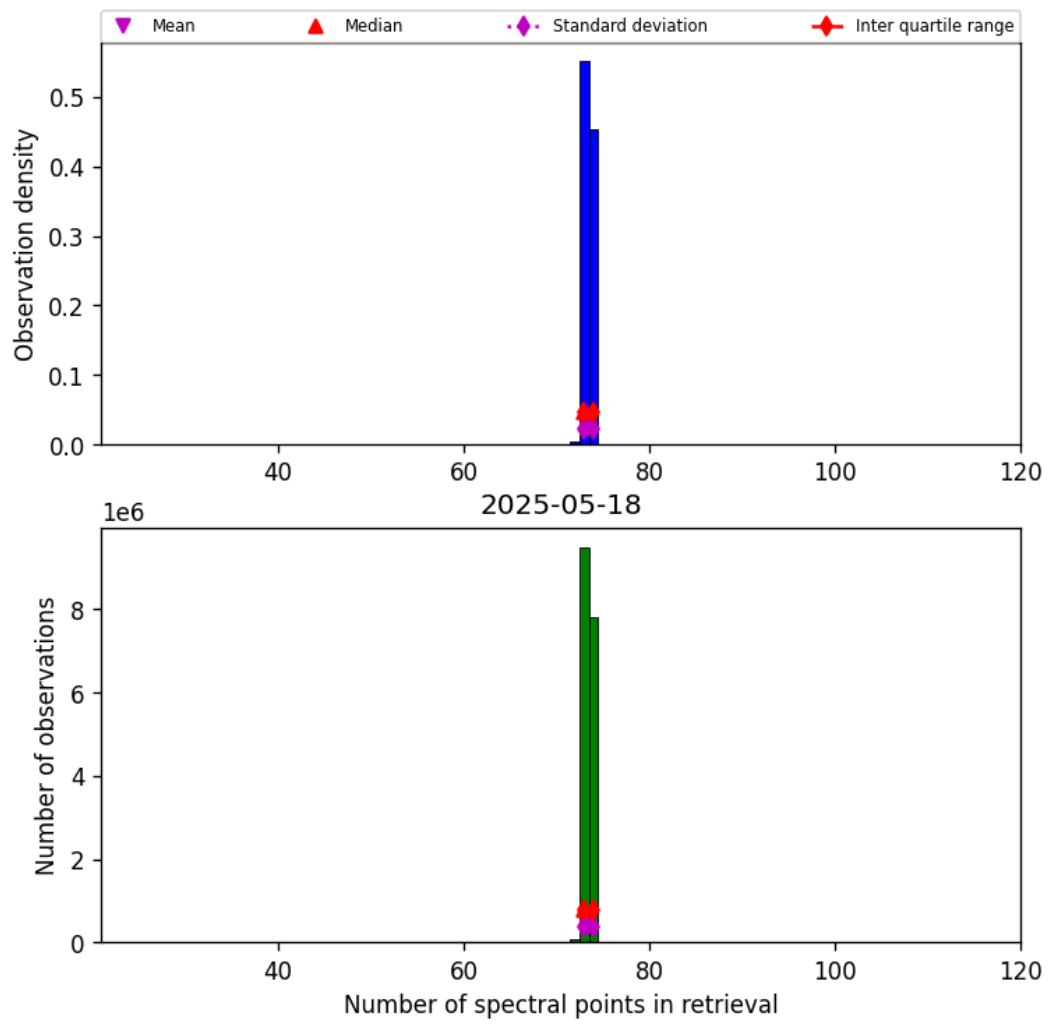


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-05-18 to 2025-05-19

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.

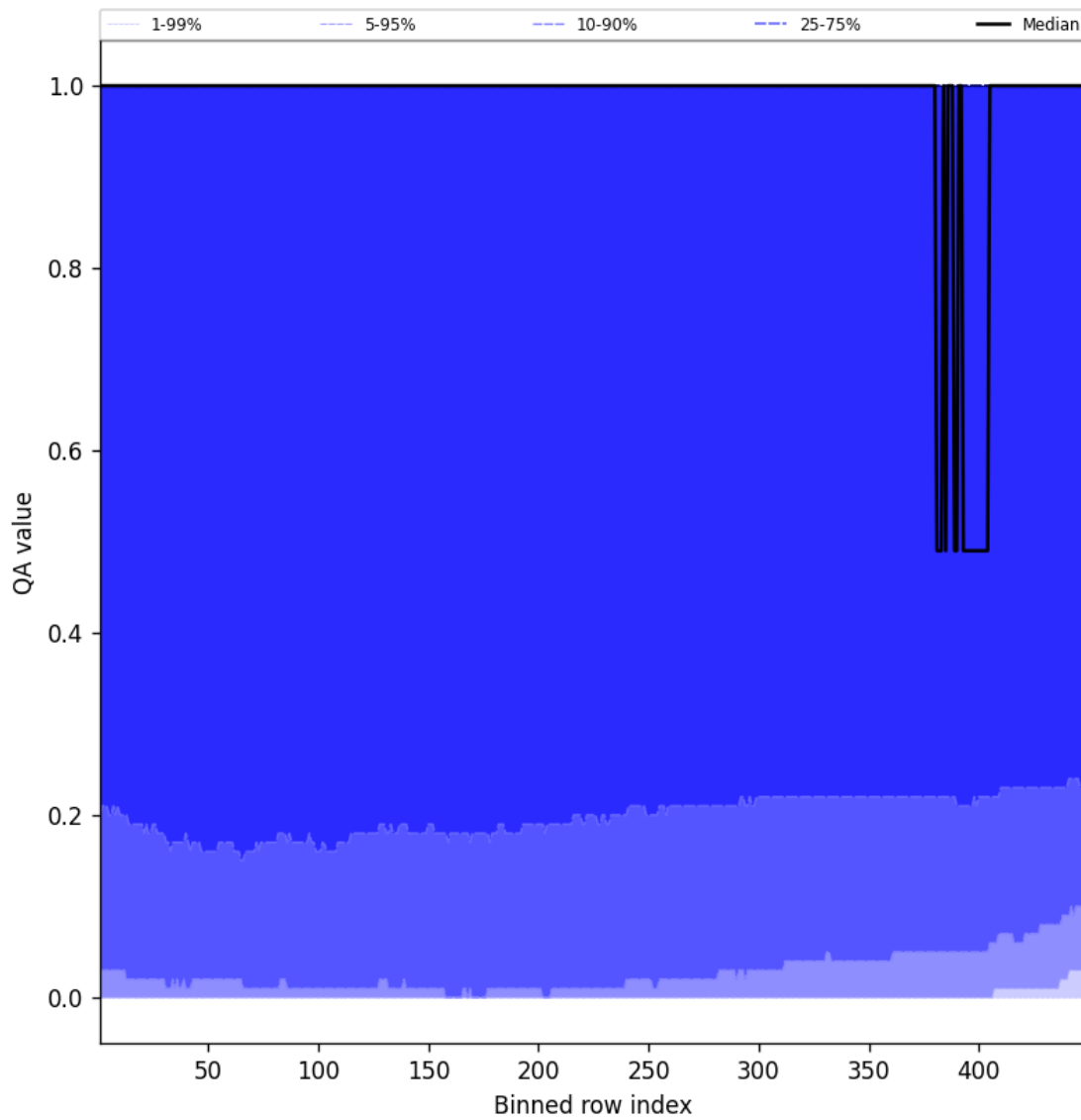


Figure 84: Along track statistics of “QA value” for 2025-05-18 to 2025-05-19

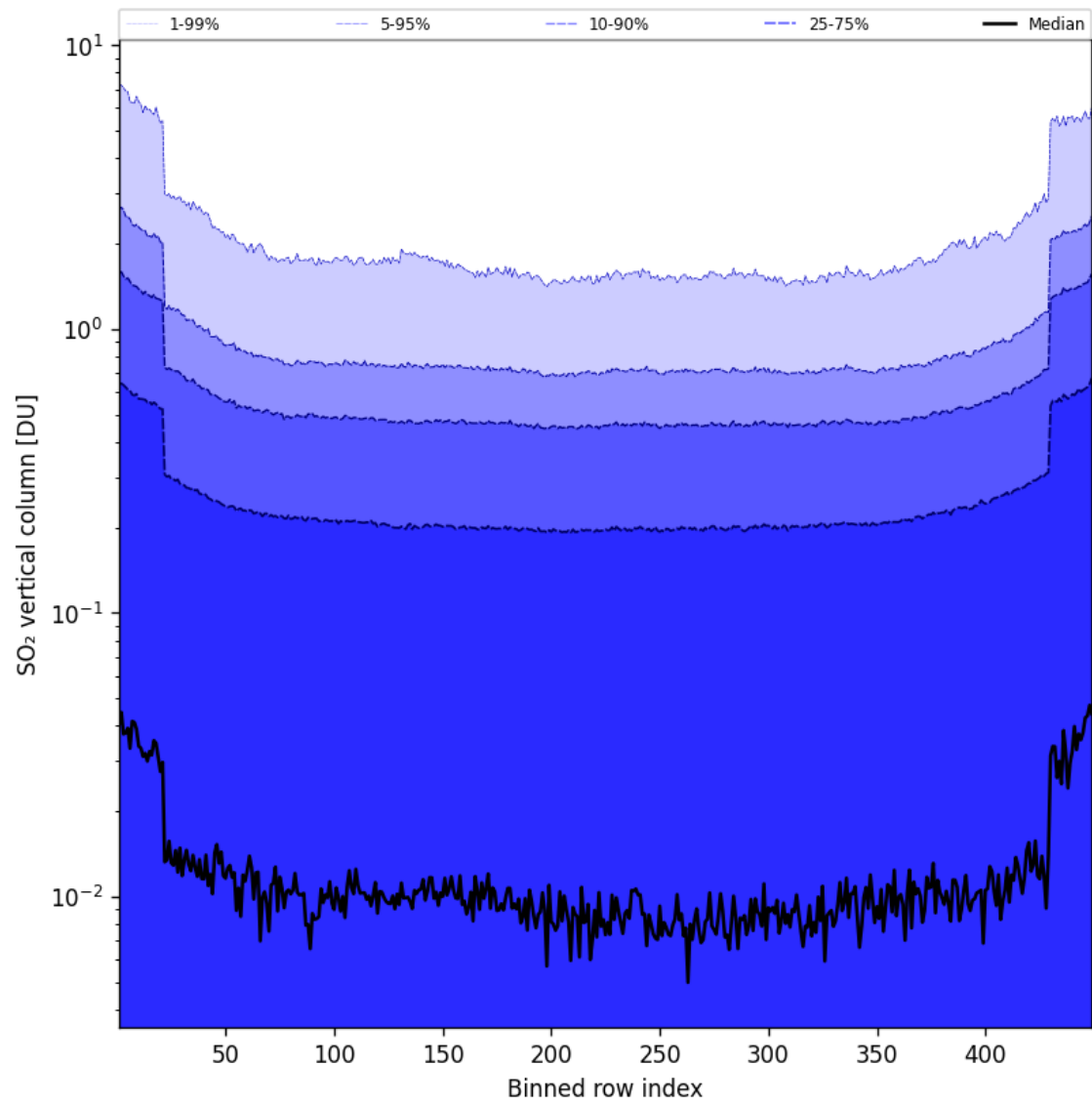


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-05-18 to 2025-05-19

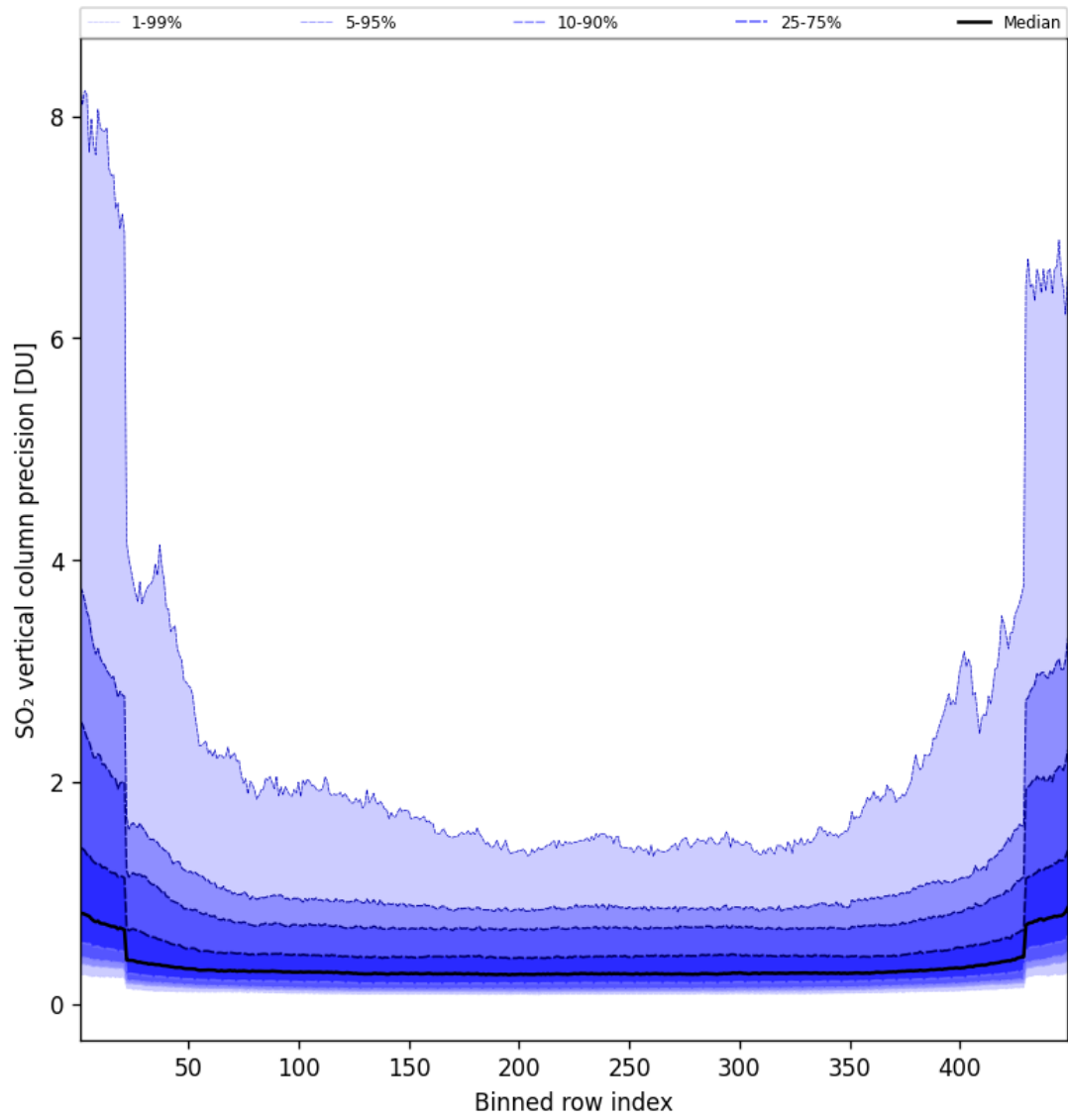


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-05-18 to 2025-05-19

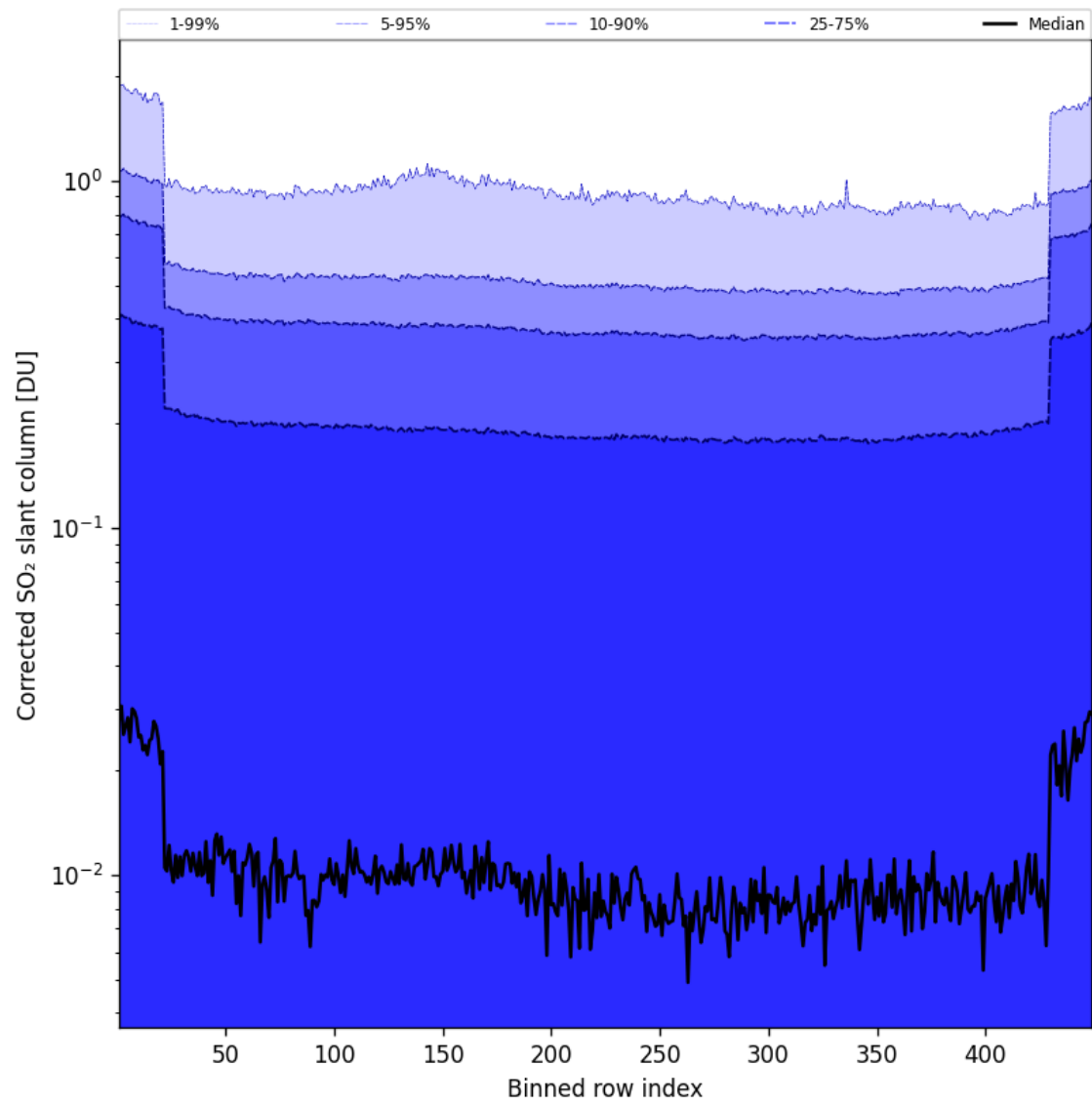


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-05-18 to 2025-05-19

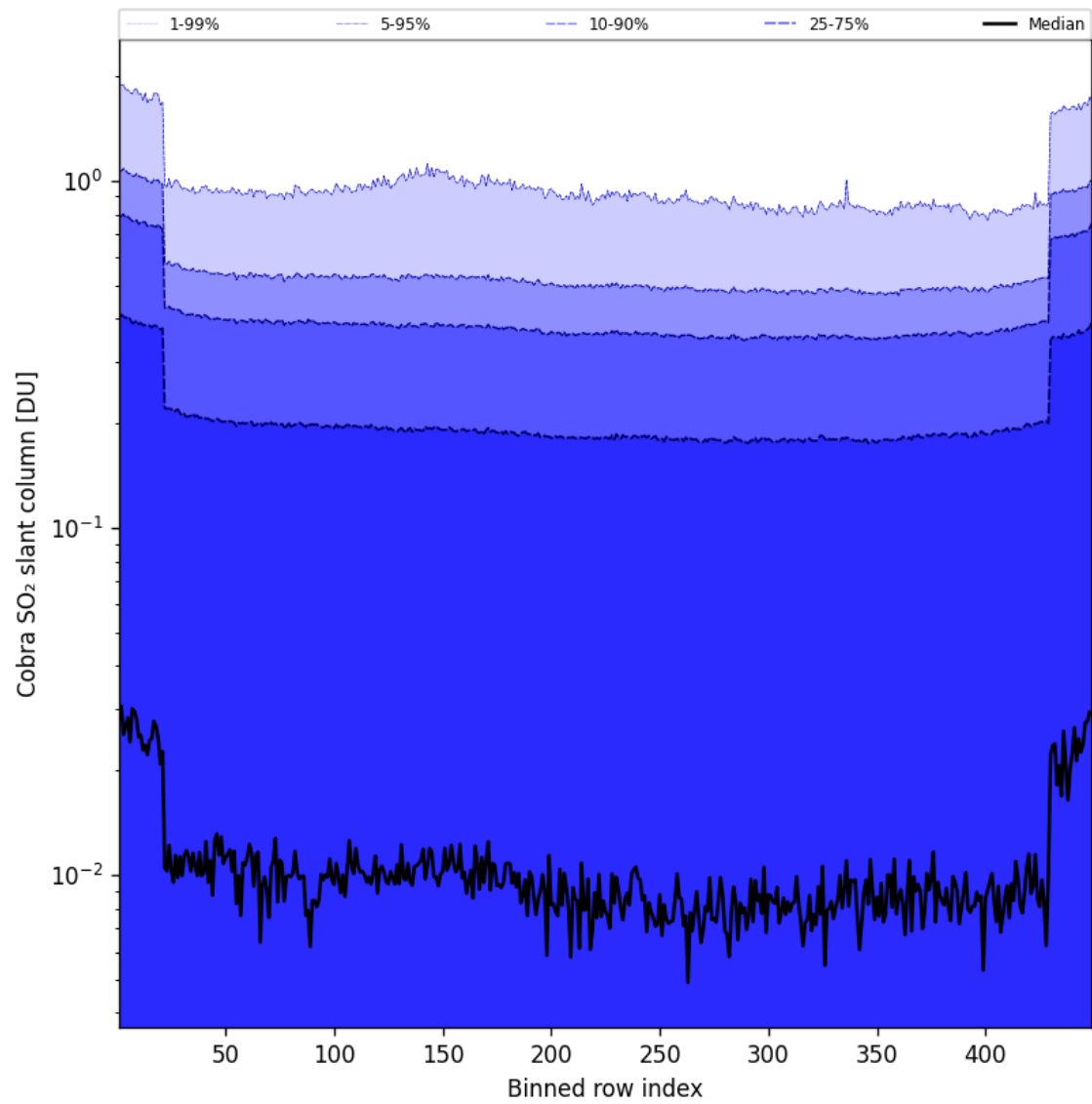


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-05-18 to 2025-05-19

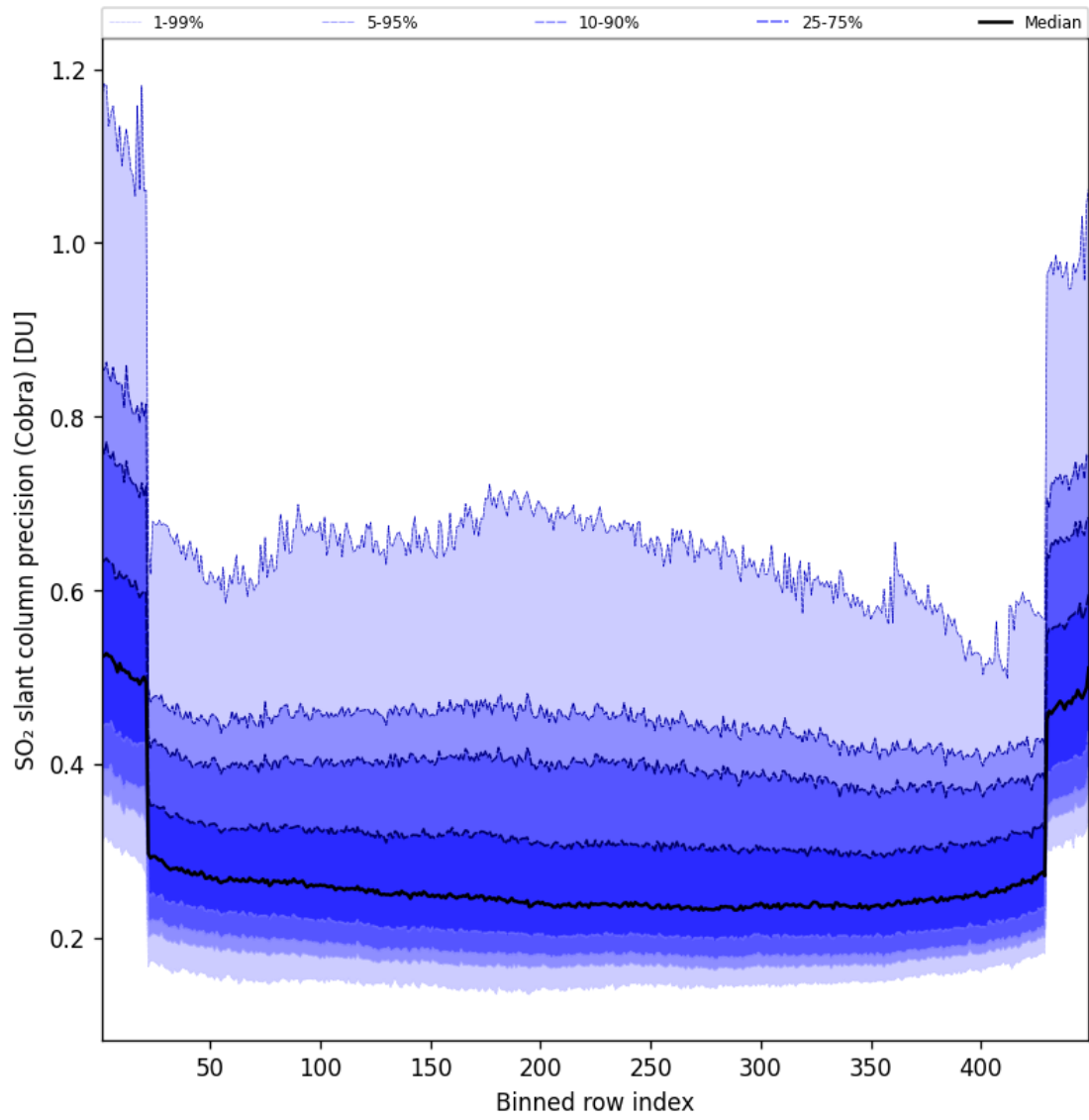


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-05-18 to 2025-05-19

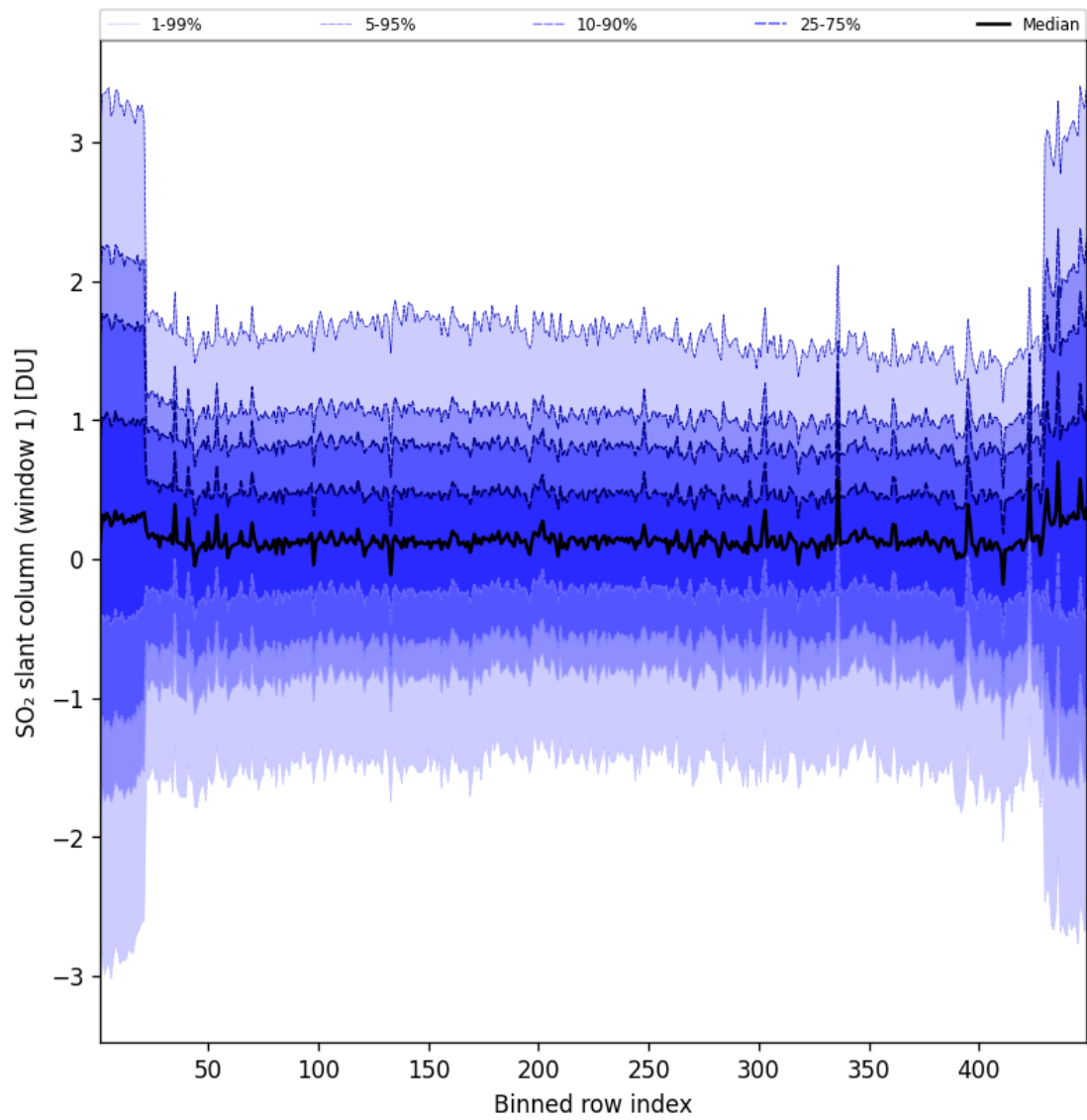


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-05-18 to 2025-05-19

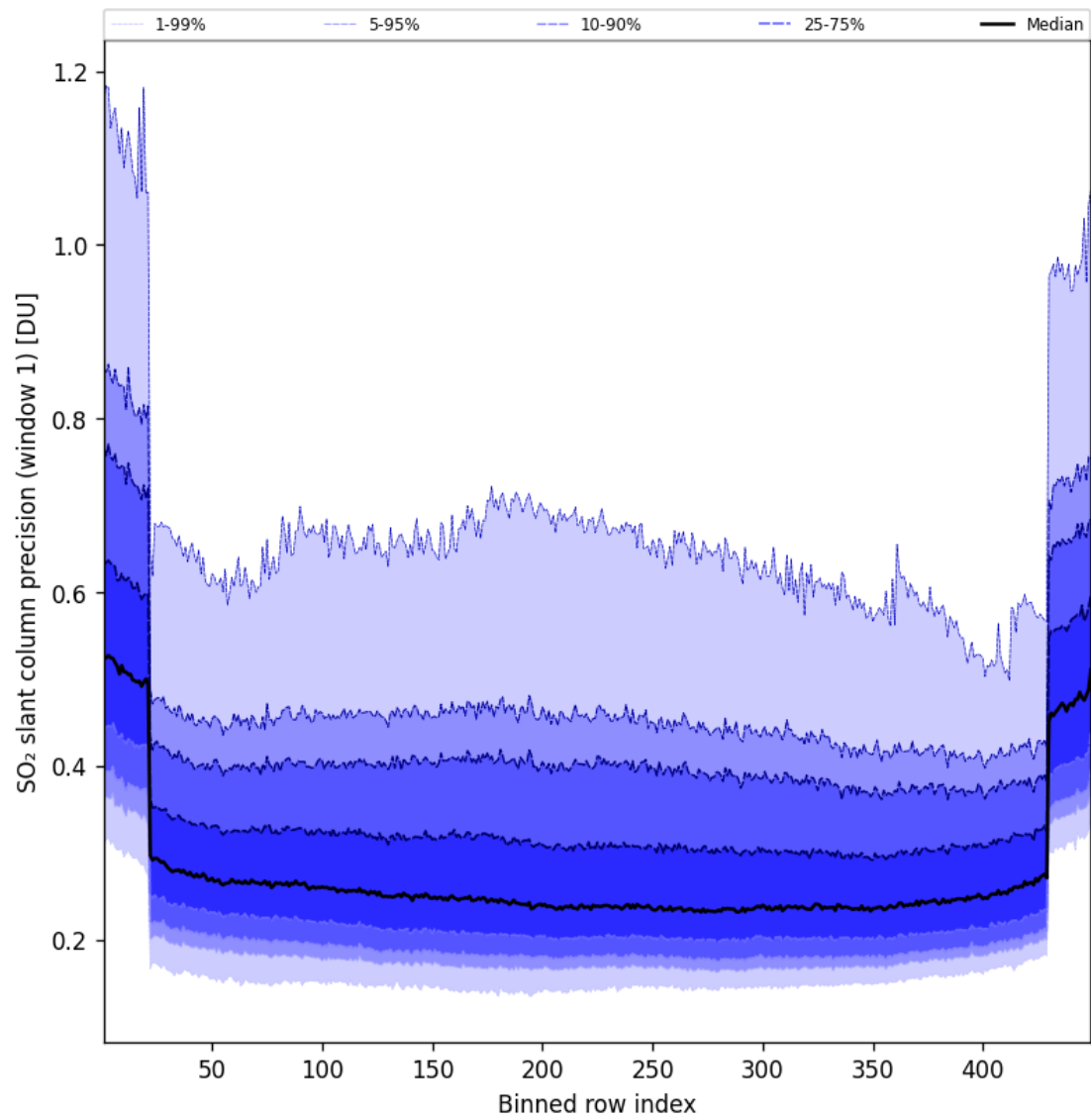


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-05-18 to 2025-05-19

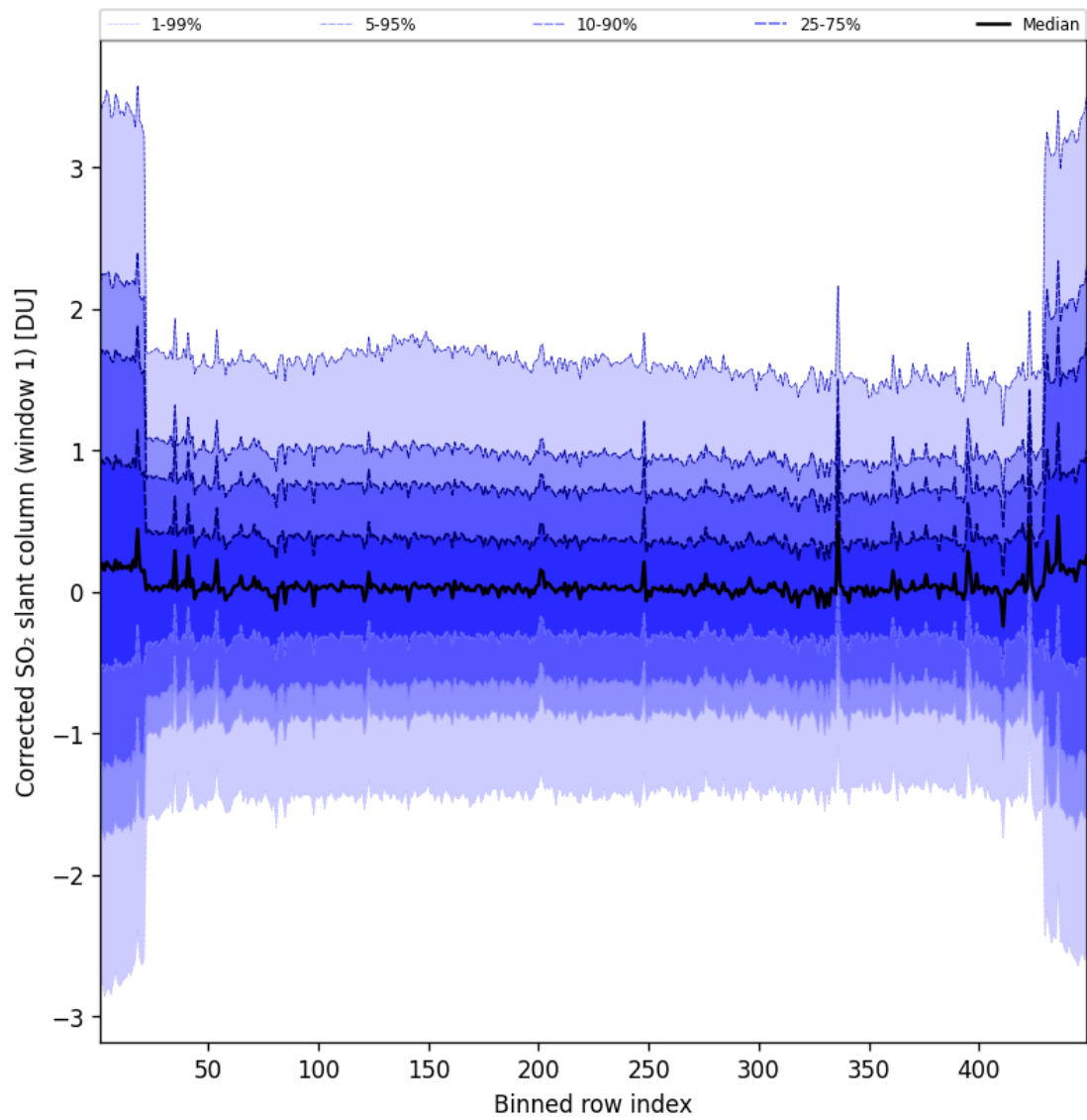


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-05-18 to 2025-05-19

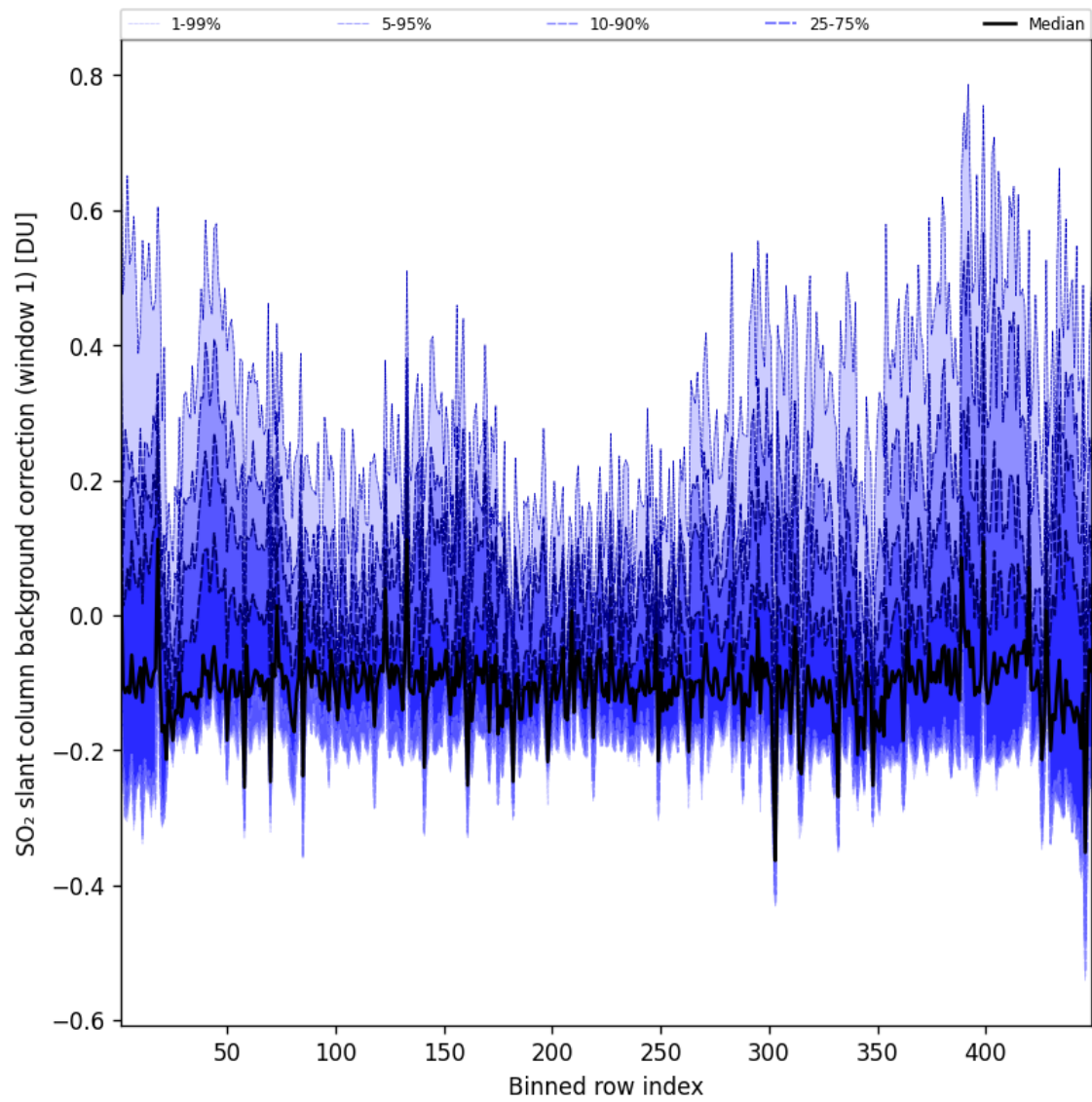


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-05-18 to 2025-05-19

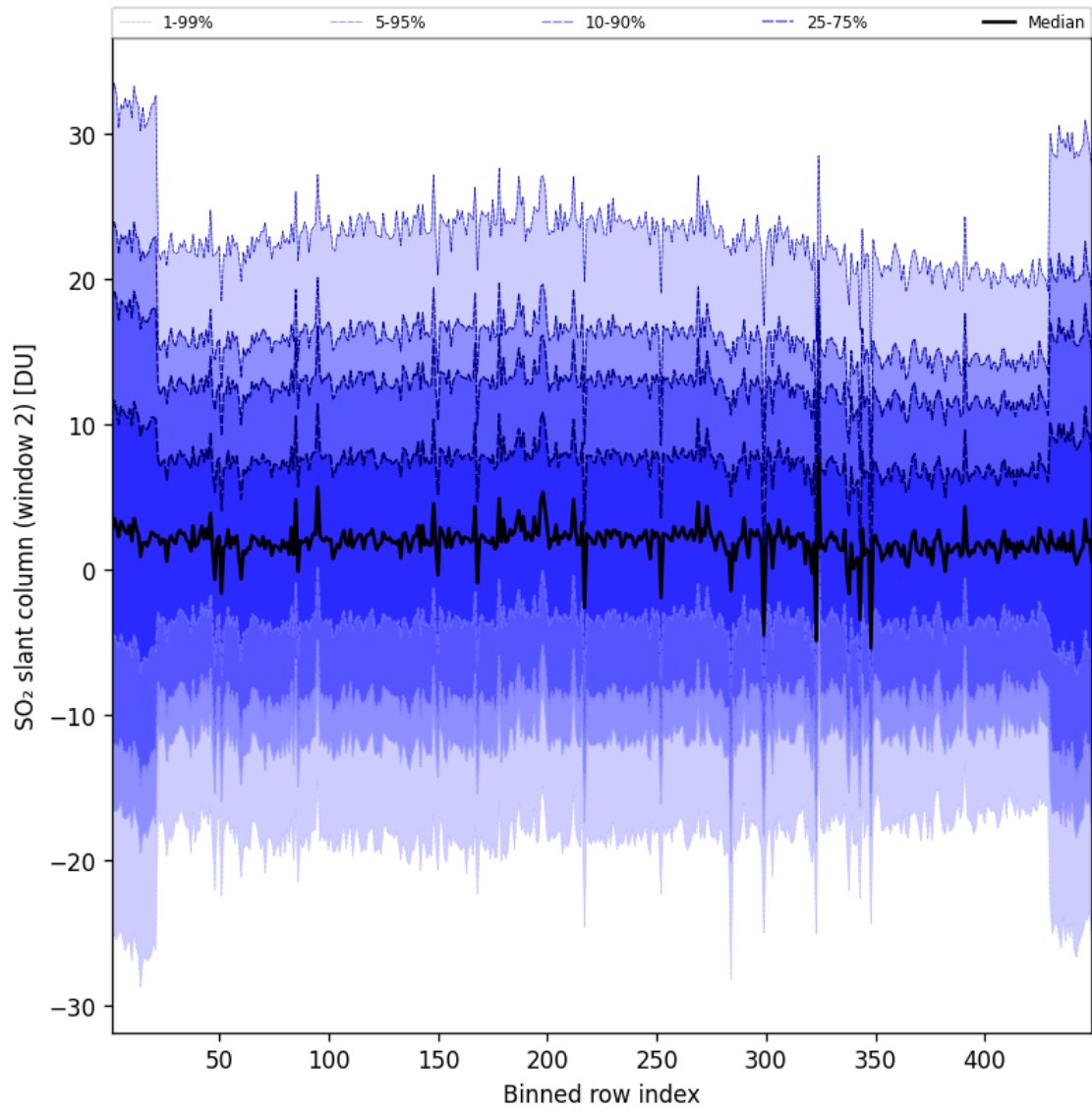


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-05-18 to 2025-05-19

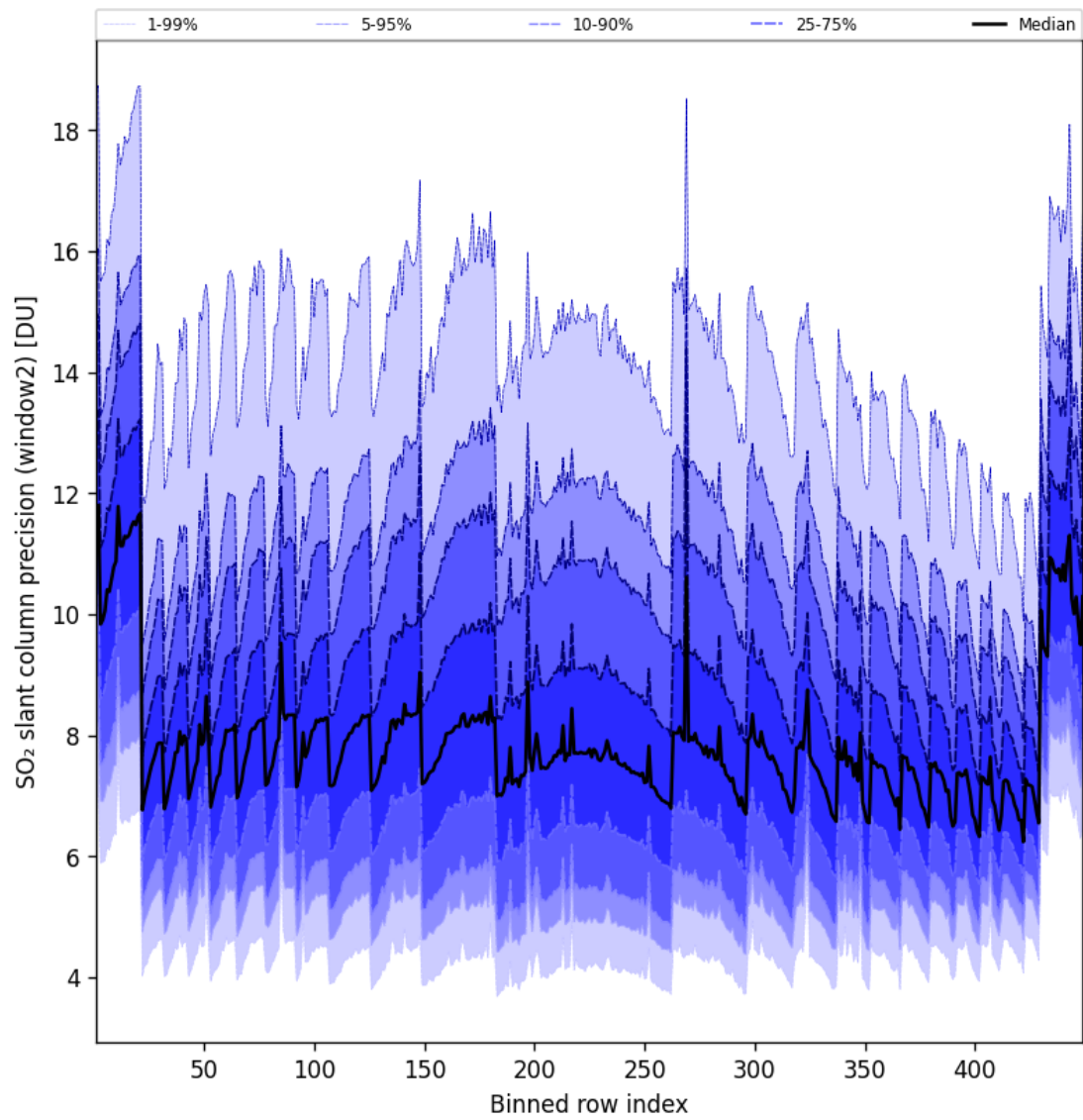


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-05-18 to 2025-05-19

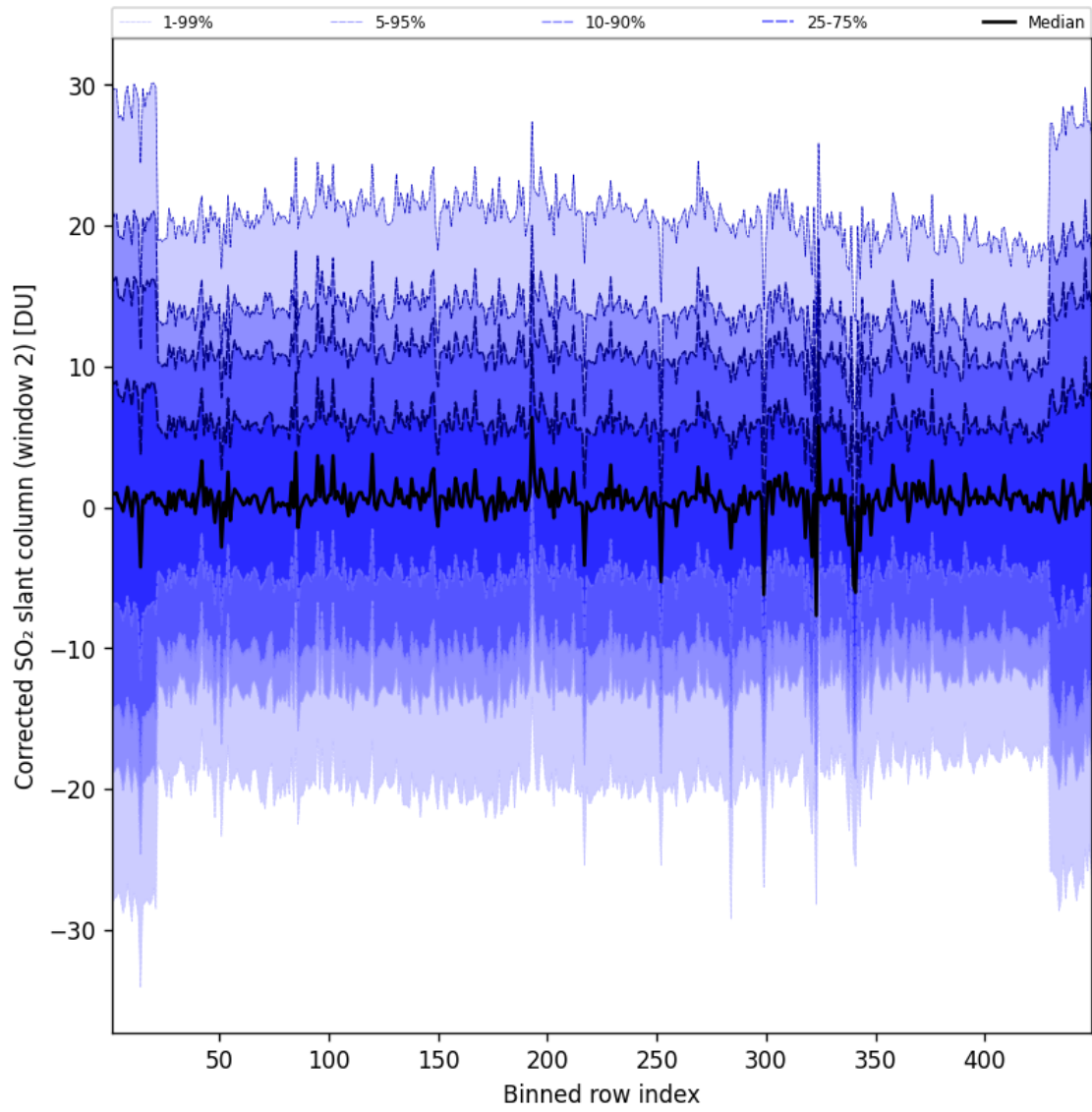


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-05-18 to 2025-05-19

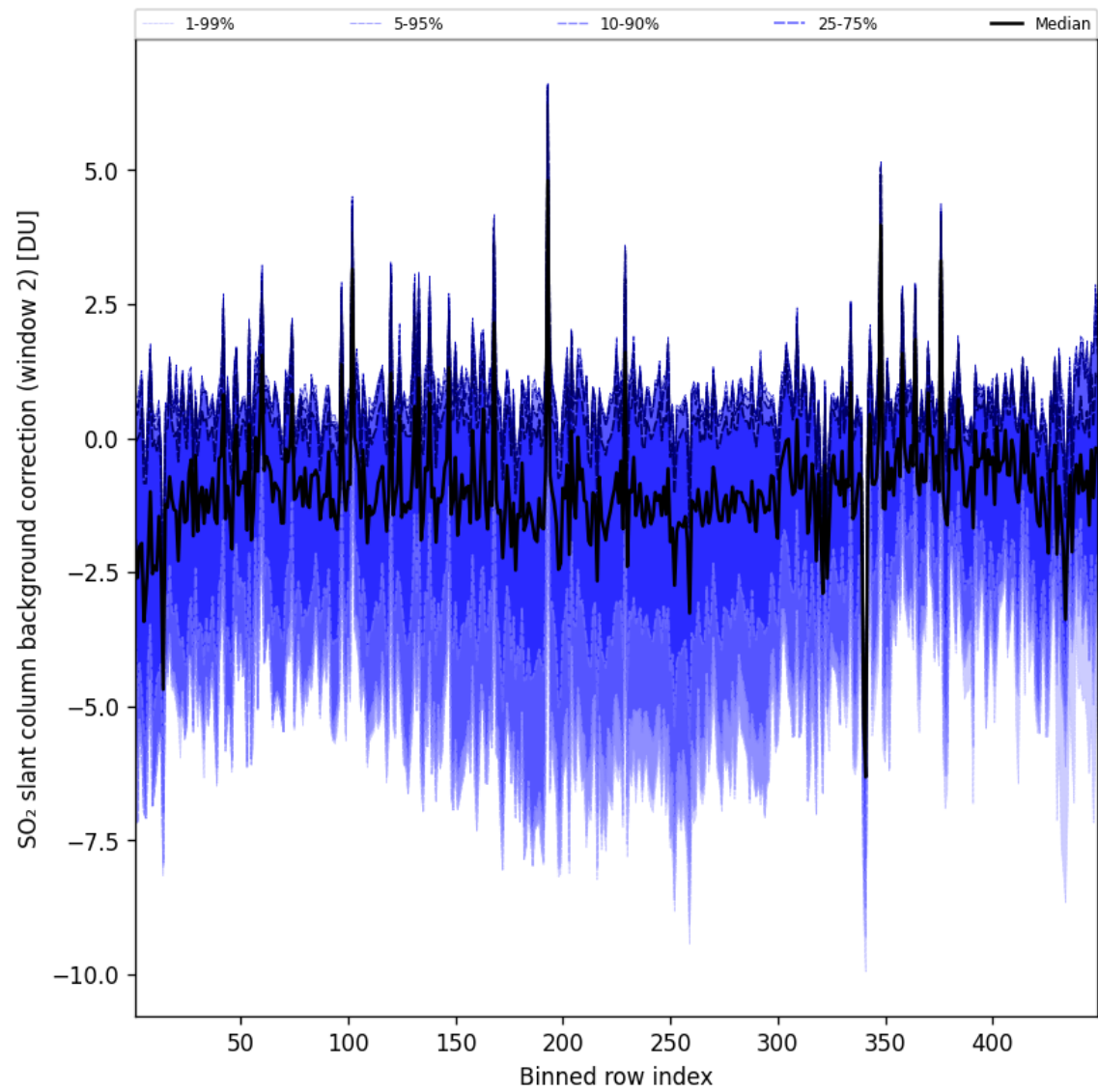


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-05-18 to 2025-05-19

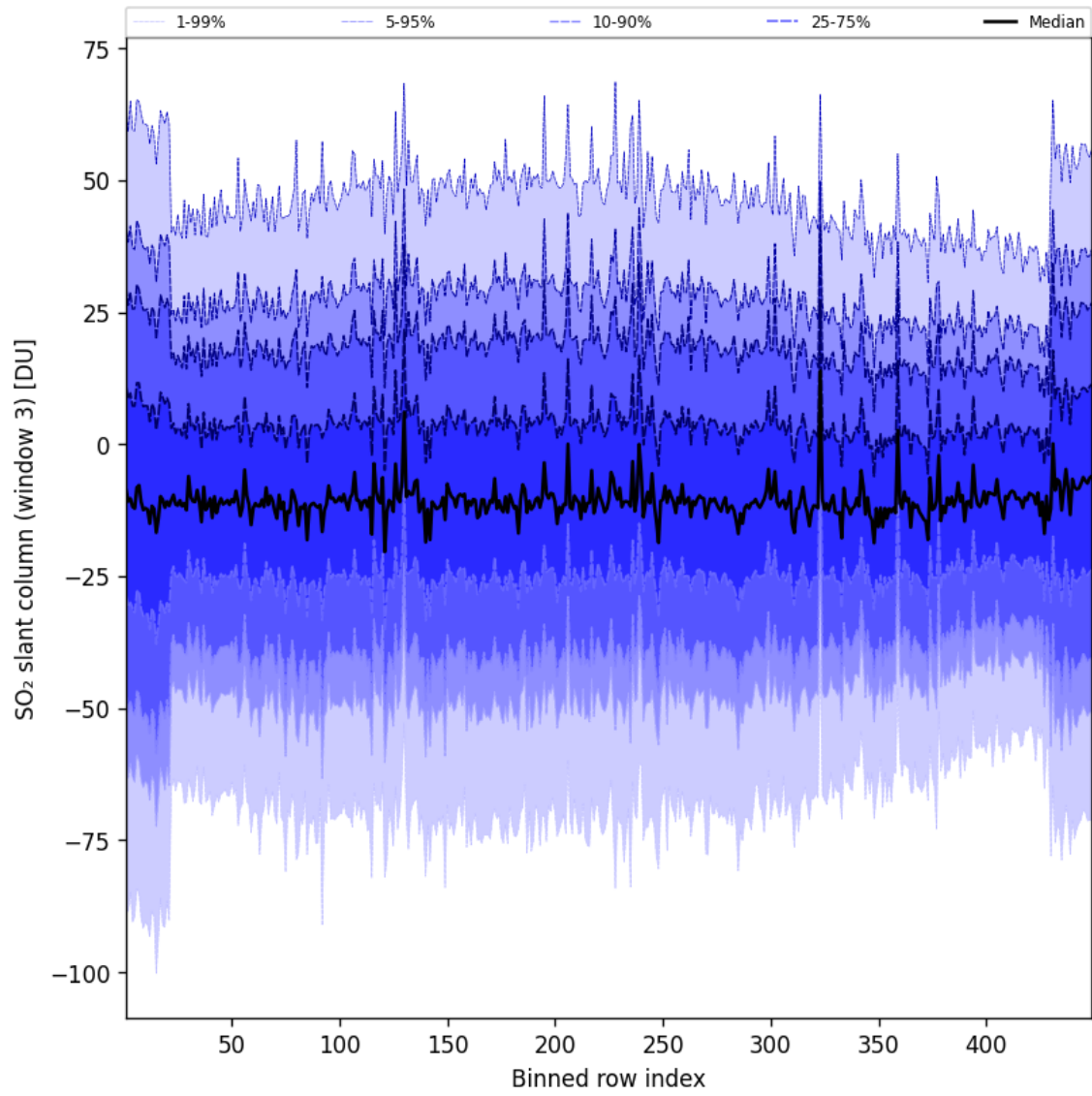


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-05-18 to 2025-05-19

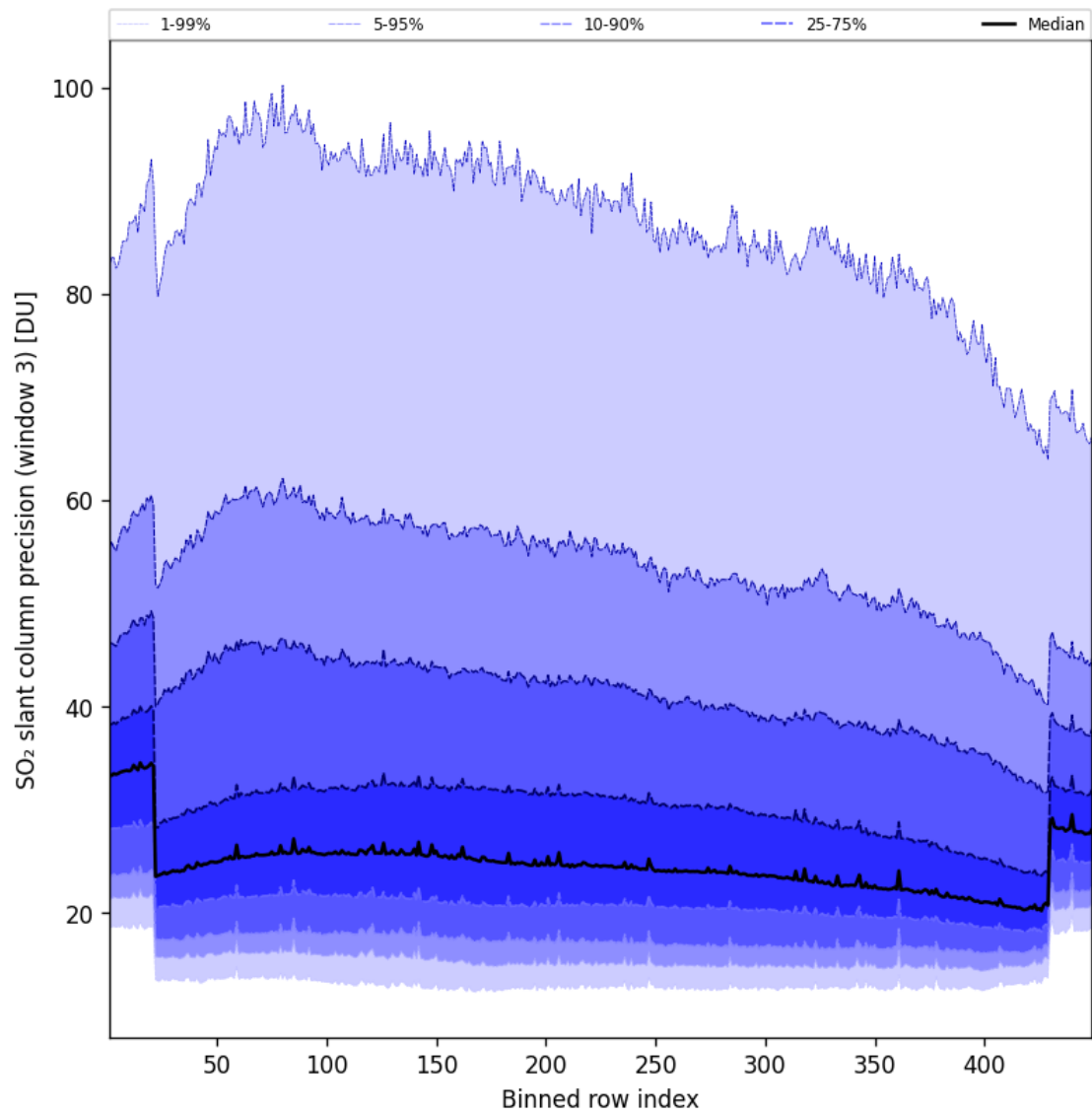


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-05-18 to 2025-05-19

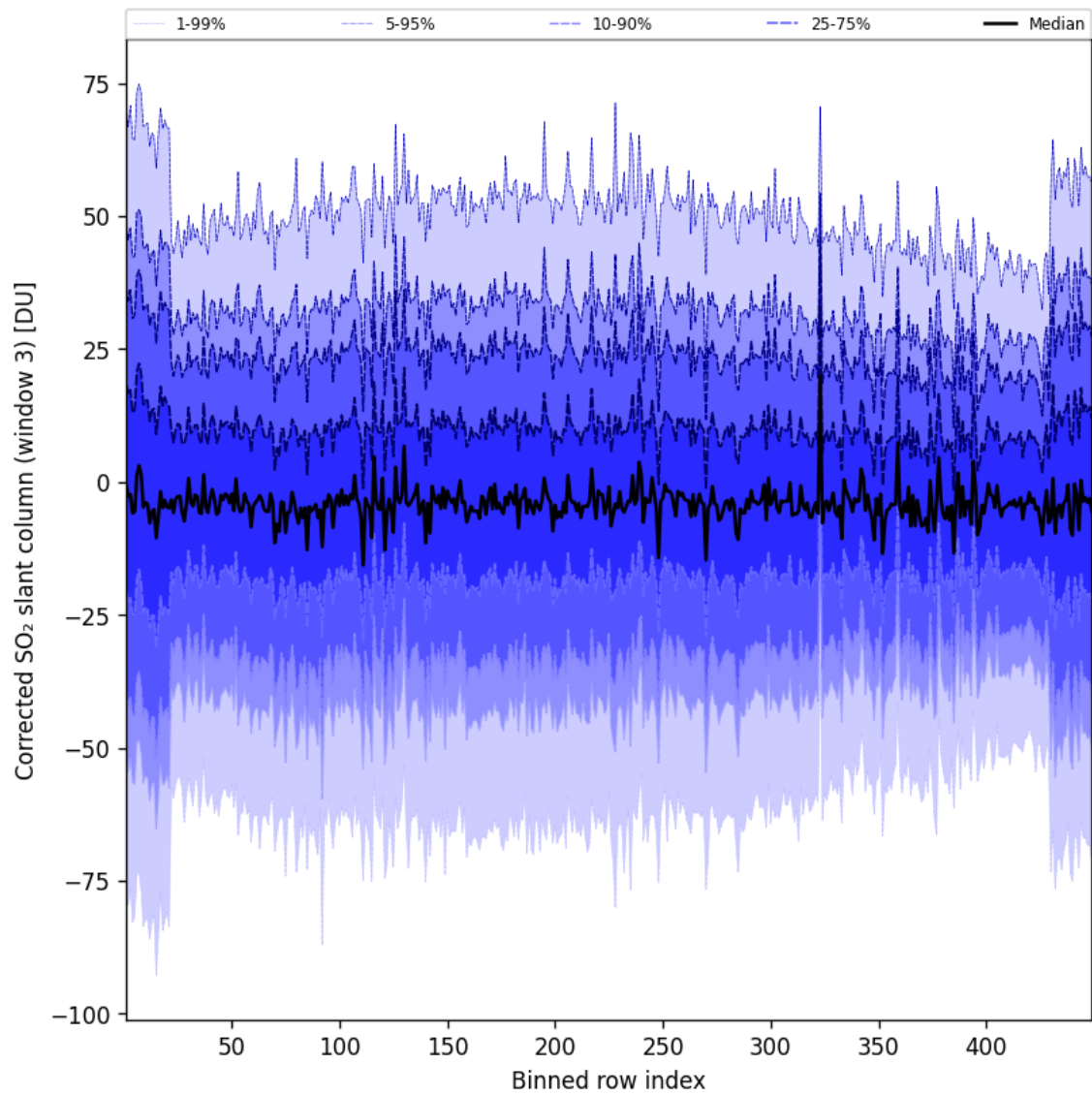


Figure 100: Along track statistics of "Corrected SO₂ slant column (window 3)" for 2025-05-18 to 2025-05-19

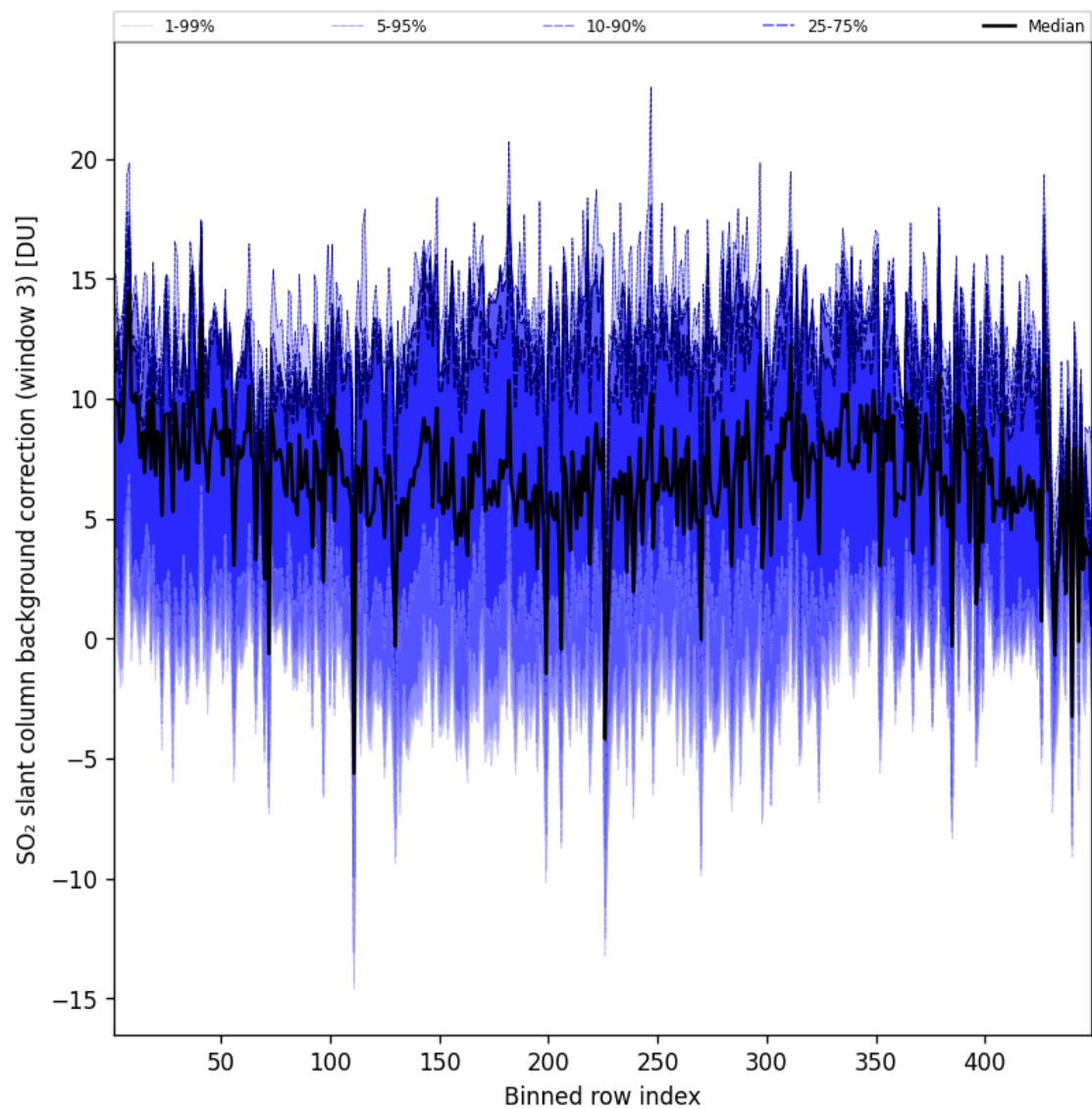


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-05-18 to 2025-05-19

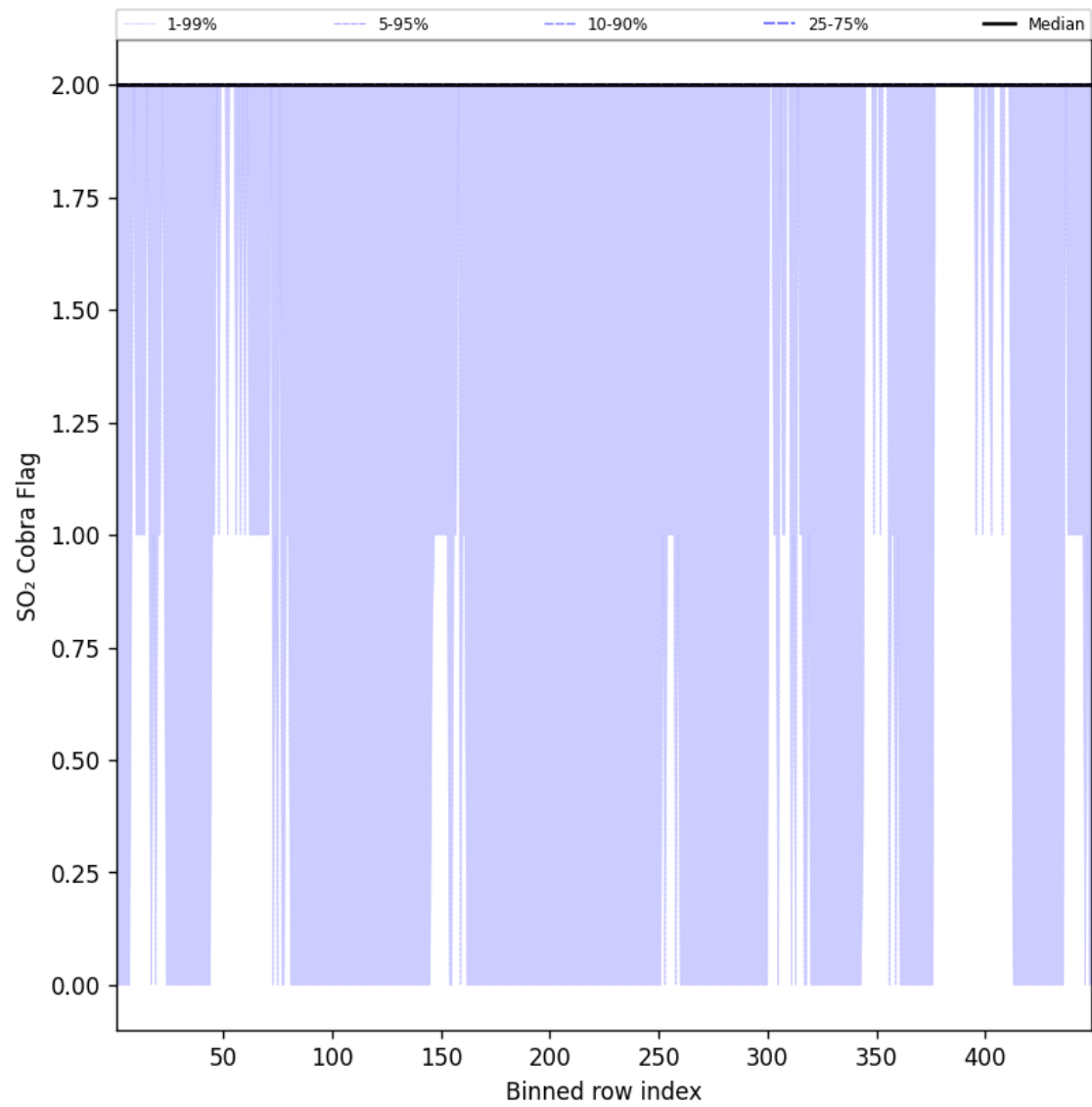


Figure 102: Along track statistics of "SO₂ Cobra Flag" for 2025-05-18 to 2025-05-19

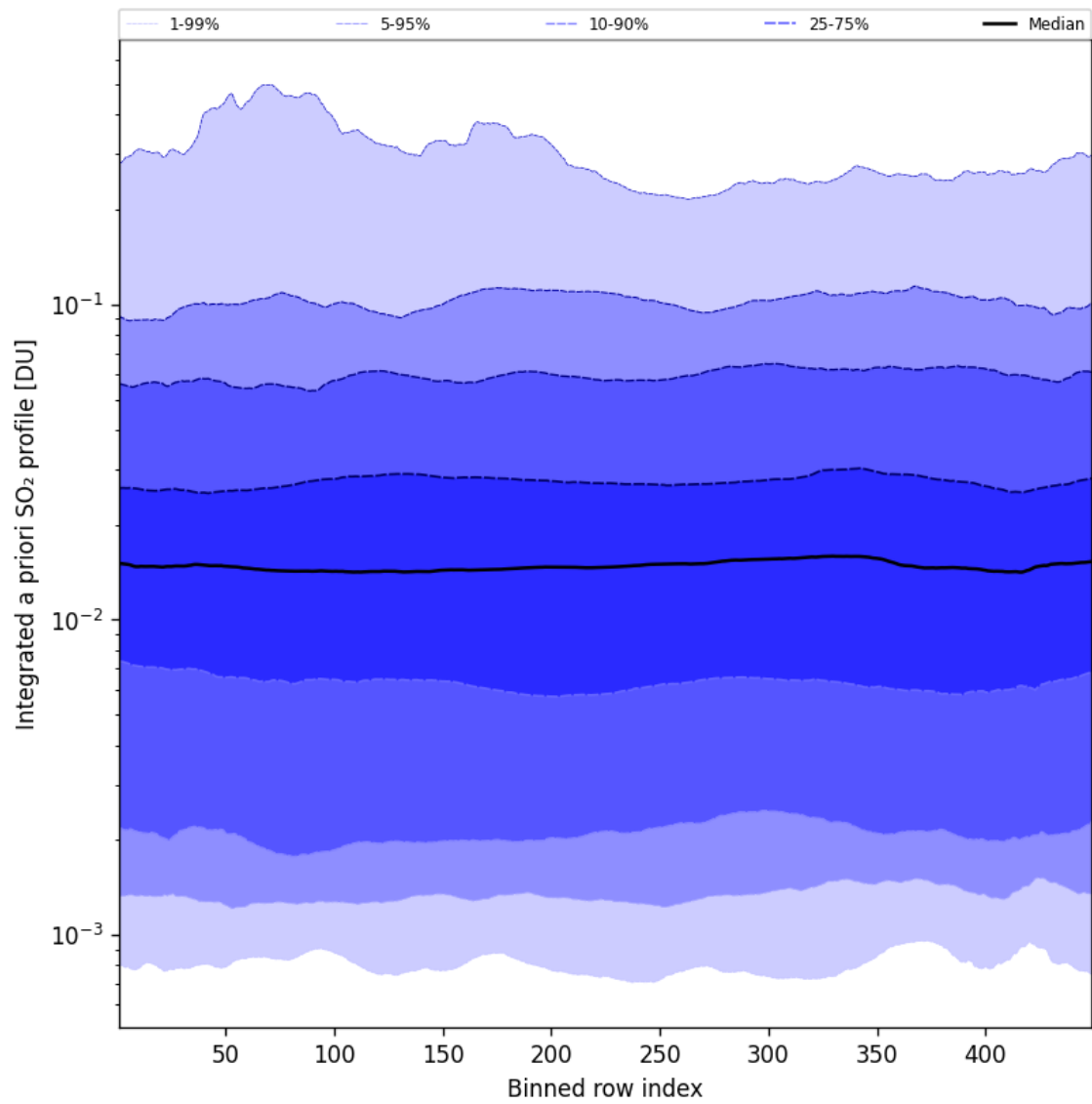


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-05-18 to 2025-05-19

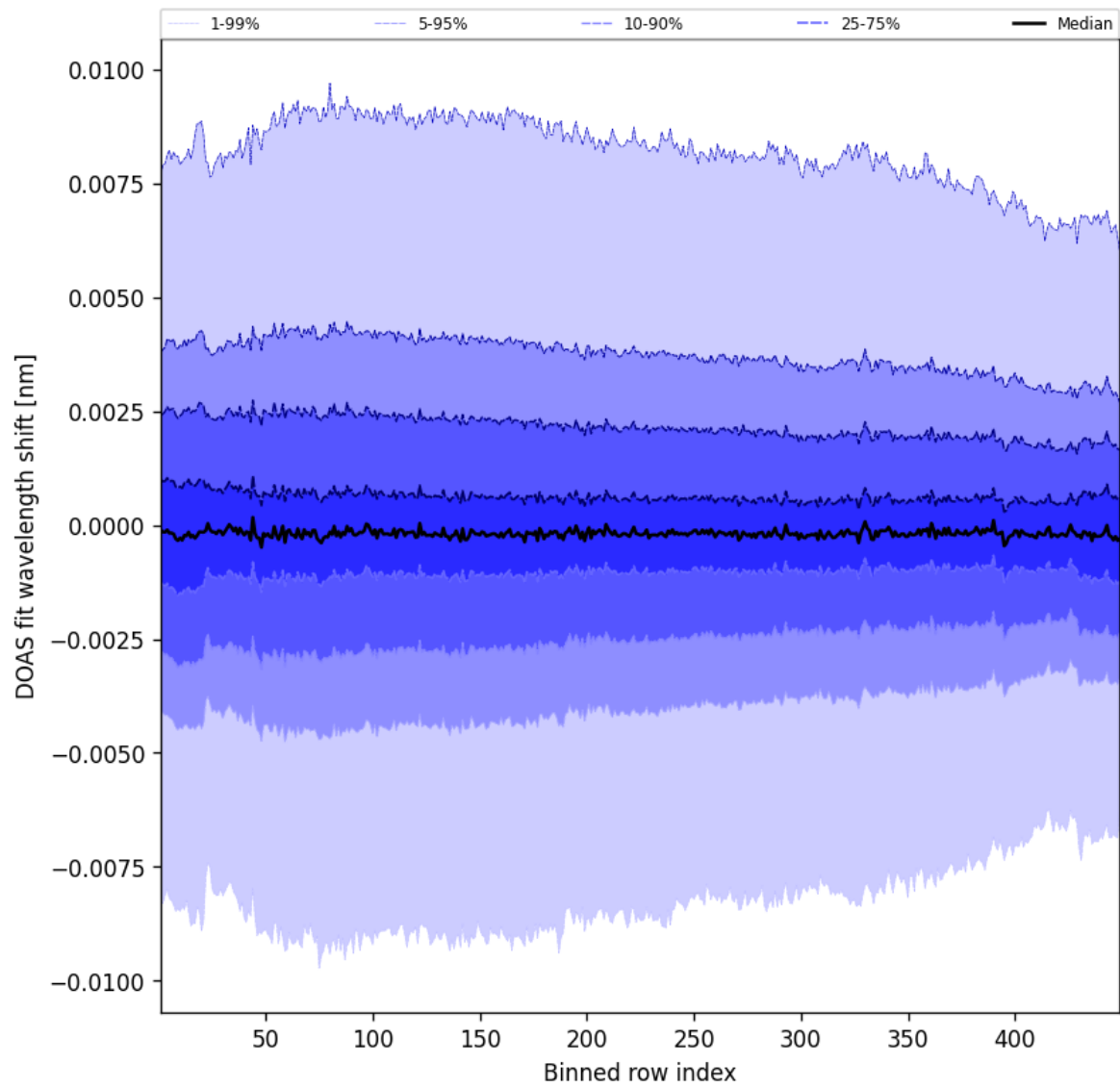


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-05-18 to 2025-05-19

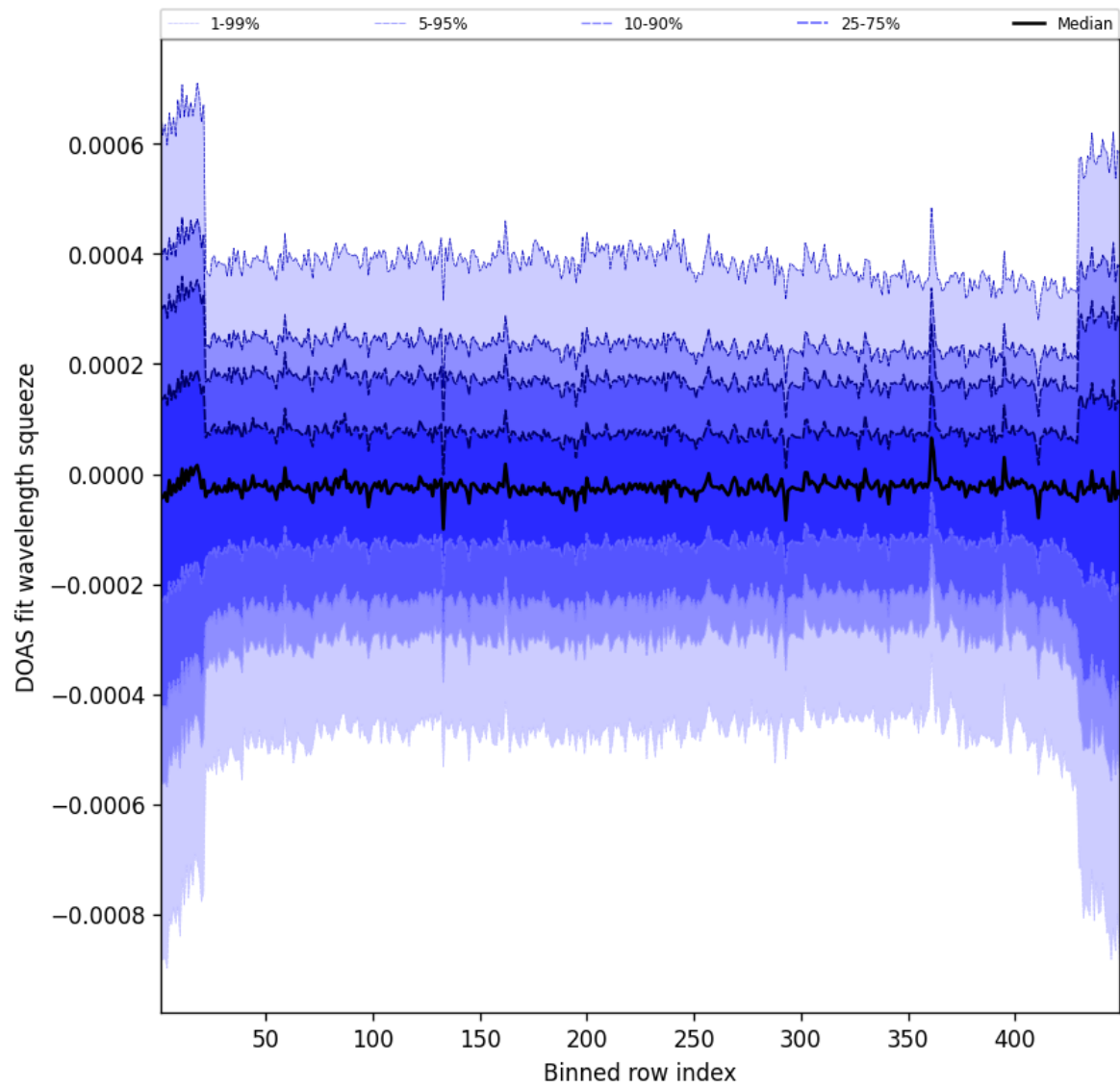


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-05-18 to 2025-05-19

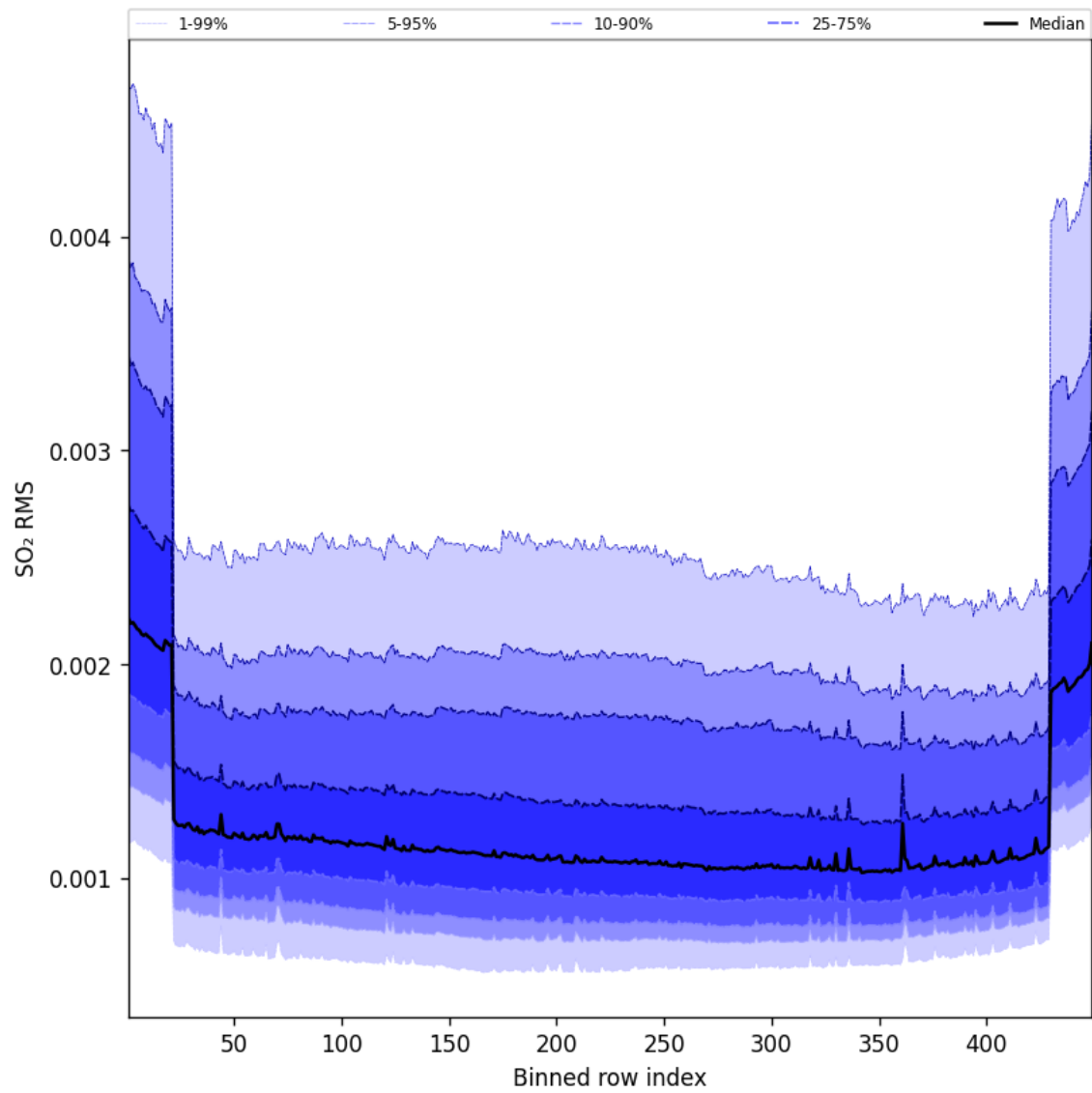


Figure 106: Along track statistics of “SO₂ RMS” for 2025-05-18 to 2025-05-19

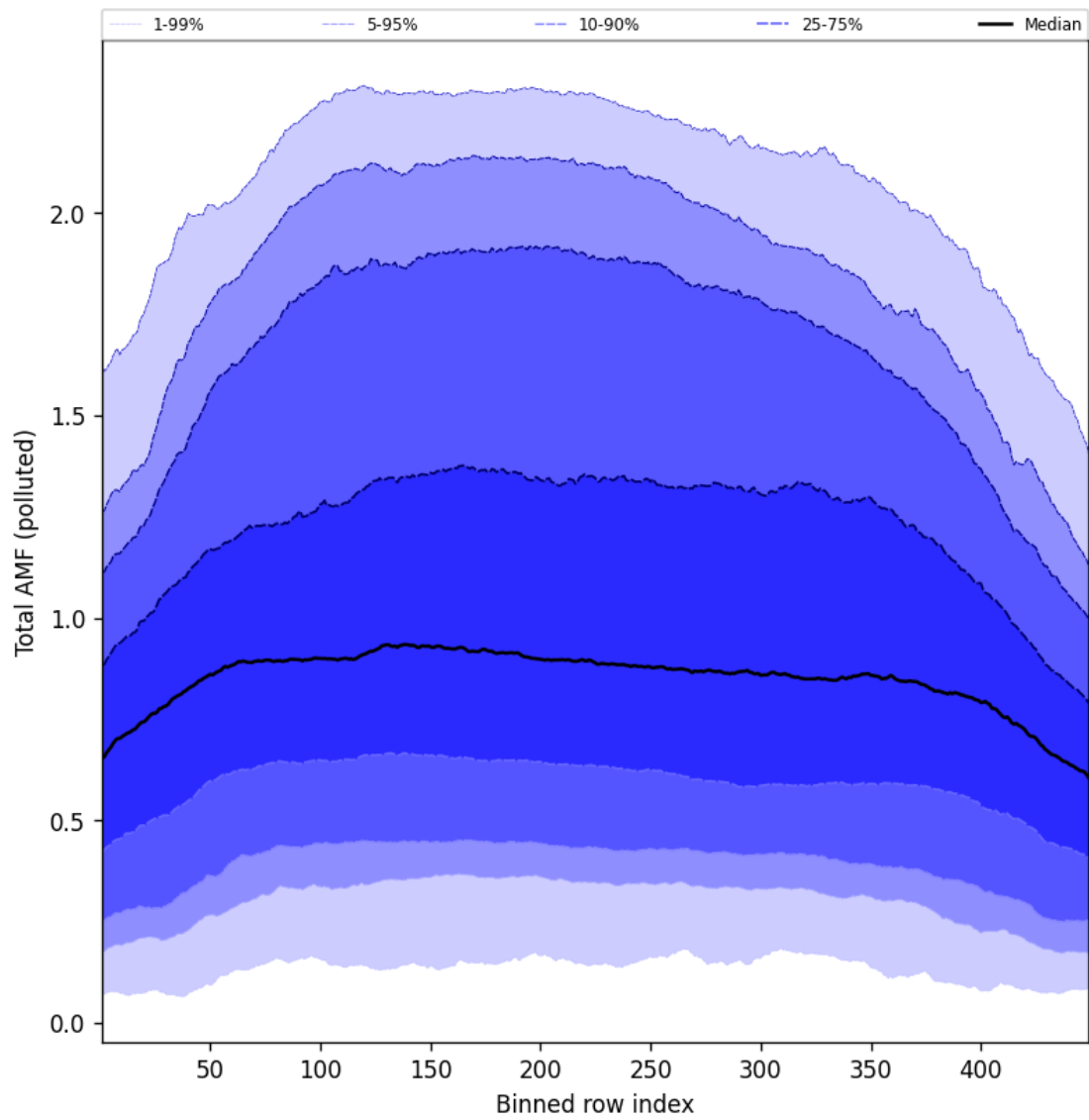


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-05-18 to 2025-05-19

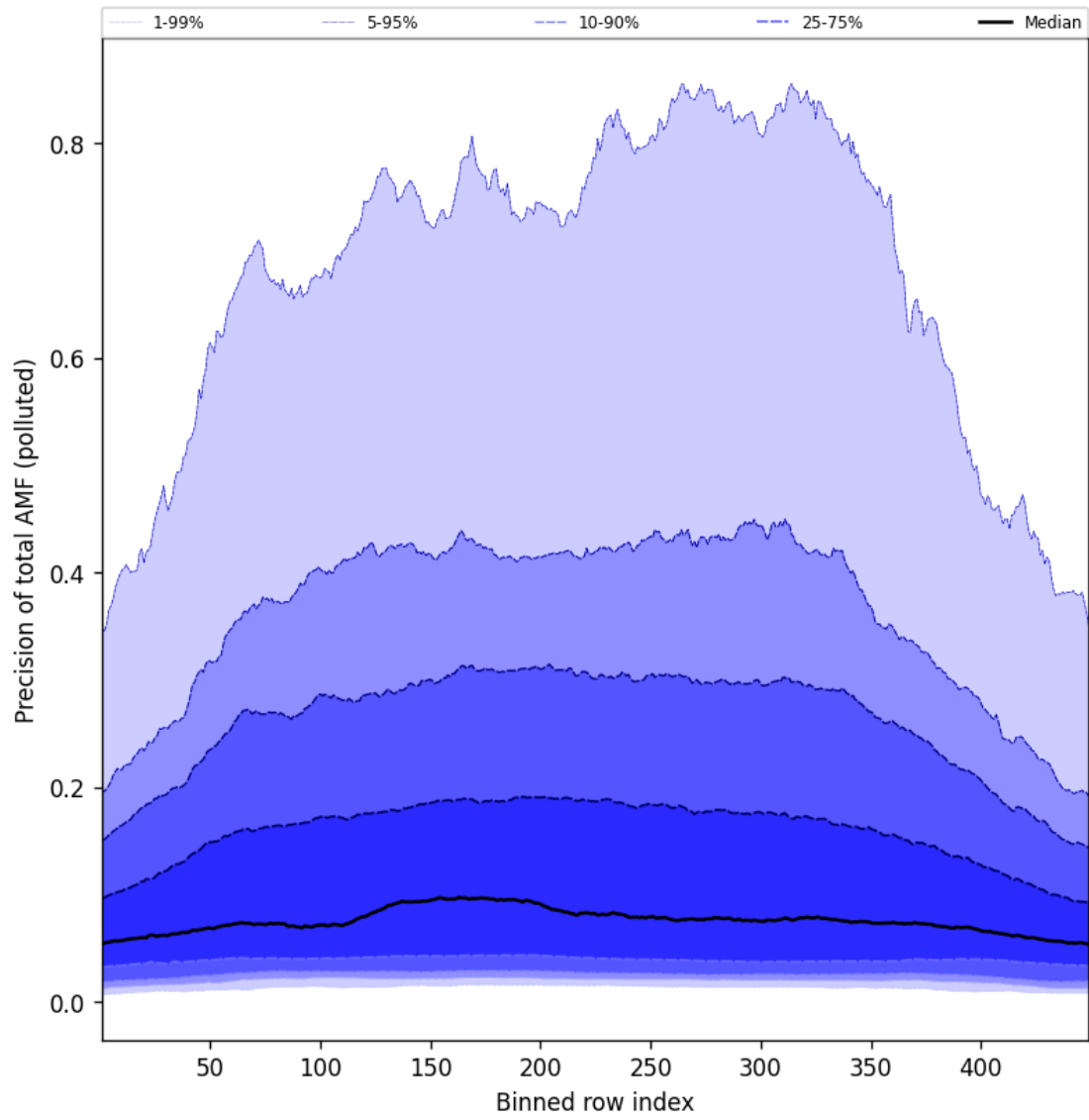


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-05-18 to 2025-05-19

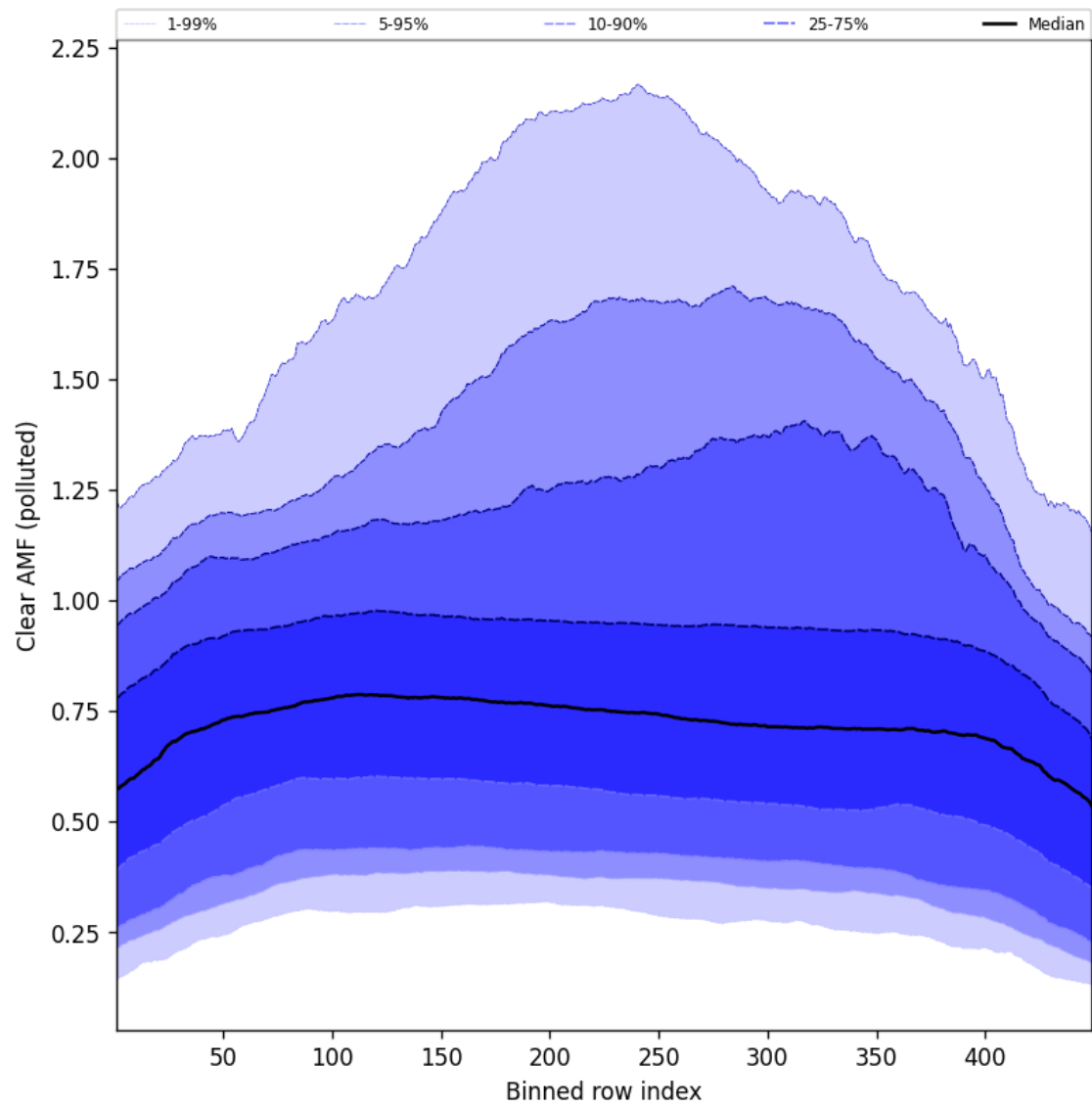


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-05-18 to 2025-05-19

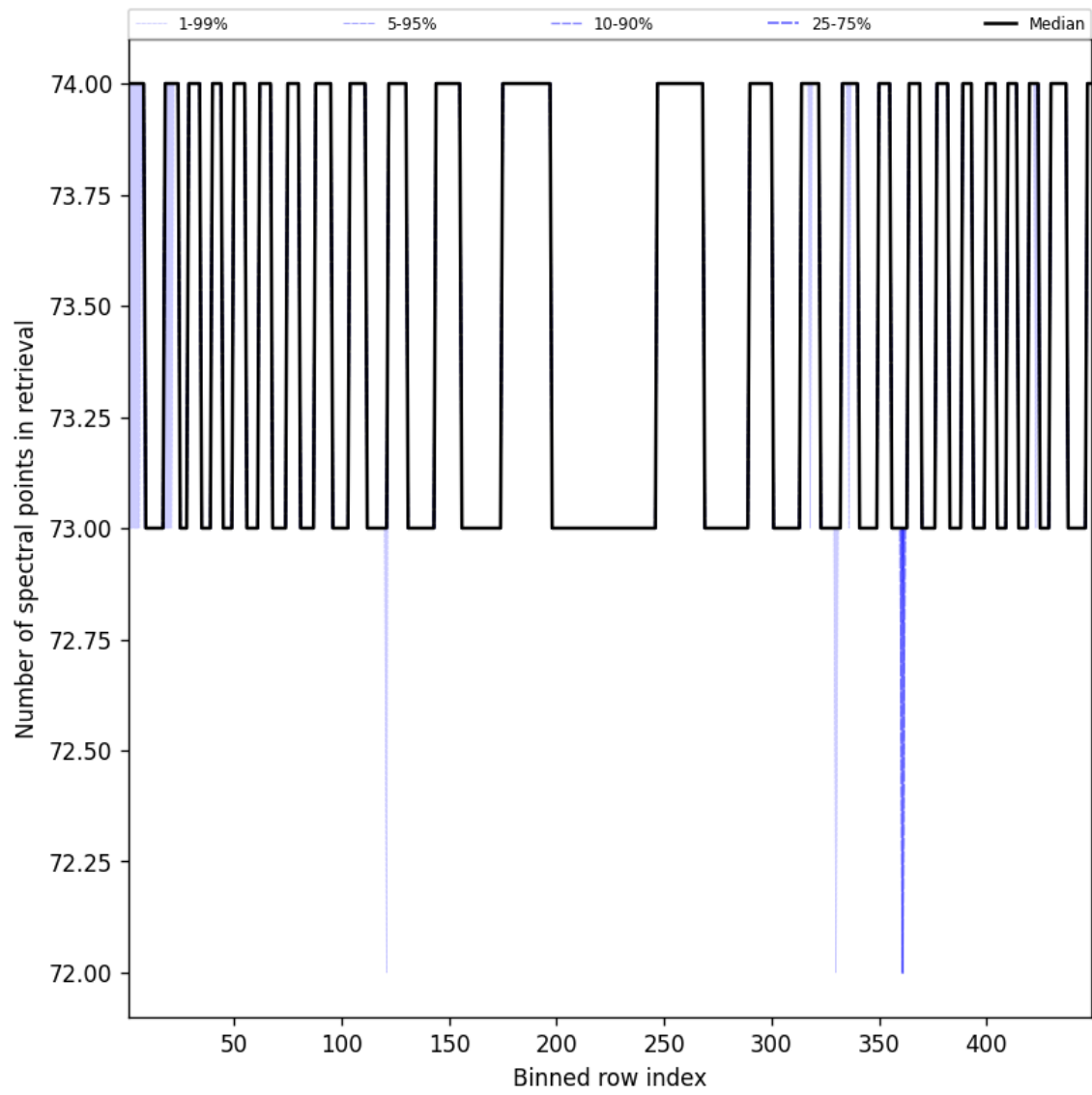


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-05-18 to 2025-05-19

10 Coincidence density

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

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