PyCAMA report generated by tropl2-proc

tropl2-proc

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1 Short Introduction

1.1 The list of parameters

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

2 Definitions

The averages shown here are *unweighed* averages:

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

with N the number of observations in the dataset.

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

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

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

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

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

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

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

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

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

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

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

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

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

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm\sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.646 ± 0.400	17299805	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.120 \pm 100.500) \times 10^{-2}$	17299805	0.278	0.469	1.091×10^{-2}	-99.1	233
sulfurdioxide total vertical column precision [DU]	0.529 ± 0.737	17299805	0.222	0.351	0.336	4.884×10^{-2}	402
sulfurdioxide slant column density corrected [DU]	$(1.925 \pm 39.242) \times 10^{-2}$	17299805	0.258	0.376	9.391×10^{-3}	-41.5	175
sulfurdioxide slant column density cobra [DU]	$(1.899 \pm 37.539) \times 10^{-2}$	17299805	0.258	0.376	9.391×10^{-3}	-41.5	48.3
sulfurdioxide slant column density cobra precision [DU]	0.303 ± 0.137	17299805	0.213	0.144	0.264	7.605×10^{-2}	32.2
sulfurdioxide slant column density window1 [DU]	0.150 ± 0.703	17299805	0.175	0.752	0.161	-79.3	144
sulfurdioxide slant column density window1 precision [DU]	0.303 ± 0.137	17299805	0.213	0.144	0.264	7.605×10^{-2}	32.2
sulfurdioxide slant column density corrected win1 [DU]	$(2.163 \pm 69.672) \times 10^{-2}$	17299805	-2.500×10^{-2}	0.741	1.575×10^{-3}	-79.3	143
background so2 slant column offset window1 [DU]	-0.129 ± 0.158	17299805	-0.220	0.166	-0.163	-1.36	2.61
sulfurdioxide slant column density window2 [DU]	2.30 ± 9.17	17299805	2.25	11.7	2.15	-756	923
sulfurdioxide slant column density window2 precision [DU]	8.09 ± 2.21	17299805	7.43	2.51	7.76	2.19	639
sulfurdioxide slant column density corrected win2 [DU]	$(7.378 \pm 872.710) \times 10^{-2}$	17299805	0.250	11.1	8.544×10^{-2}	-756	923
background so2 slant column offset window2 [DU]	-2.23 ± 3.09	17299805	0.250	3.96	-1.22	-18.5	8.86
sulfurdioxide slant column density window3 [DU]	-8.36 ± 23.92	17299805	-10.6	30.1	-8.74	-405	345
sulfurdioxide slant column density window3 precision [DU]	28.0 ± 13.1	17299805	22.5	9.62	24.4	9.61	500
sulfurdioxide slant column density corrected win3 [DU]	1.86 ± 23.10	17299805	2.80	28.8	1.91	-401	353
background so2 slant column offset window3 [DU]	10.2 ± 6.7	17299805	3.92	11.5	10.0	-12.9	37.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17299805	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.304 \pm 8.634) \times 10^{-2}$	17299805	1.125×10^{-2}	1.937×10^{-2}	1.348×10^{-2}	3.282×10^{-4}	2.29
fitted radiance shift [nm]	$(-2.474 \pm 25.516) \times 10^{-4}$	17299805	1.000×10^{-4}	1.748×10^{-3}	-2.221×10^{-4}	-8.590×10^{-2}	4.321×10^{-2}
fitted radiance squeeze [1]	$(-1.802 \pm 18.002) \times 10^{-5}$	17299805	-1.000×10^{-5}	2.047×10^{-4}	-1.213×10^{-5}	-1.917×10^{-2}	3.612×10^{-2}
fitted root mean square [1]	$(1.314 \pm 0.557) \times 10^{-3}$	17299805	9.750×10^{-4}	5.610×10^{-4}	1.155×10^{-3}	3.412×10^{-4}	9.788×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.859 ± 0.426	17299805	0.660	0.553	0.804	5.000×10^{-2}	2.74
sulfurdioxide total air mass factor polluted precision [1]	0.106 ± 0.113	17299805	3.500×10^{-2}	9.920×10^{-2}	6.534×10^{-2}	2.964×10^{-3}	1.91
sulfurdioxide clear air mass factor polluted [1]	0.735 ± 0.295	17299805	0.660	0.392	0.711	6.915×10^{-2}	2.79
number of spectral points in retrieval [1]	73.4 ± 0.5	17299805	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	5.000×10^{-2}	0.120	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.28	−0.888	−0.547	−0.371	−0.220	0.249	0.411	0.606	0.994	2.63
sulfurdioxide total vertical column precision [DU]	0.108	0.145	0.171	0.195	0.227	0.578	0.757	0.968	1.42	3.48
sulfurdioxide slant column density corrected [DU]	−0.877	−0.508	−0.368	−0.275	−0.177	0.199	0.303	0.404	0.564	1.05
sulfurdioxide slant column density cobra [DU]	−0.877	−0.508	−0.368	−0.275	−0.177	0.199	0.303	0.404	0.564	1.05
sulfurdioxide slant column density cobra precision [DU]	0.148	0.174	0.187	0.198	0.212	0.356	0.407	0.456	0.549	0.810
sulfurdioxide slant column density window1 [DU]	−1.78	−0.938	−0.627	−0.426	−0.219	0.533	0.726	0.911	1.19	1.97
sulfurdioxide slant column density window1 precision [DU]	0.148	0.174	0.187	0.198	0.212	0.356	0.407	0.456	0.549	0.810
sulfurdioxide slant column density corrected win1 [DU]	−1.71	−0.999	−0.731	−0.552	−0.363	0.378	0.583	0.785	1.10	2.01
background so2 slant column offset window1 [DU]	−0.378	−0.302	−0.275	−0.256	−0.232	-6.522×10^{-2}	-6.258×10^{-3}	6.163×10^{-2}	0.174	0.433
sulfurdioxide slant column density window2 [DU]	−19.1	−12.3	−8.97	−6.47	−3.65	8.08	11.1	13.8	17.4	25.1
sulfurdioxide slant column density window2 precision [DU]	4.37	5.24	5.76	6.17	6.65	9.16	10.0	10.9	12.1	14.6
sulfurdioxide slant column density corrected win2 [DU]	−21.1	−14.1	−10.7	−8.23	−5.46	5.61	8.36	10.8	14.2	21.2
background so2 slant column offset window2 [DU]	−10.8	−8.73	−7.11	−5.58	−3.88	8.009×10^{-2}	0.391	0.620	0.979	2.37
sulfurdioxide slant column density window3 [DU]	−67.0	−46.9	−37.6	−30.9	−23.5	6.61	14.6	21.8	31.5	50.5
sulfurdioxide slant column density window3 precision [DU]	13.7	16.2	17.9	19.3	20.9	30.5	35.1	40.9	52.6	83.7
sulfurdioxide slant column density corrected win3 [DU]	−56.4	−36.1	−26.6	−19.8	−12.5	16.4	23.7	30.4	39.6	58.1
background so2 slant column offset window3 [DU]	−2.60	1.03	2.15	3.05	4.29	15.8	17.7	19.2	21.1	24.2
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]	7.767×10^{-4}	1.452×10^{-3}	2.385×10^{-3}	4.230×10^{-3}	6.938×10^{-3}	2.631×10^{-2}	3.830×10^{-2}	6.005×10^{-2}	0.123	0.391
fitted radiance shift [nm]	-8.016×10^{-3}	-4.052×10^{-3}	-2.650×10^{-3}	-1.840×10^{-3}	-1.145×10^{-3}	6.031×10^{-4}	1.266×10^{-3}	2.112×10^{-3}	3.596×10^{-3}	7.713×10^{-3}
fitted radiance squeeze [1]	-5.190×10^{-4}	-3.088×10^{-4}	-2.269×10^{-4}	-1.726×10^{-4}	-1.164×10^{-4}	8.826×10^{-5}	1.393×10^{-4}	1.865×10^{-4}	2.536×10^{-4}	4.129×10^{-4}
fitted root mean square [1]	6.098×10^{-4}	7.527×10^{-4}	8.264×10^{-4}	8.833×10^{-4}	9.543×10^{-4}	1.515×10^{-3}	1.764×10^{-3}	2.011×10^{-3}	2.377×10^{-3}	3.339×10^{-3}
sulfurdioxide total air mass factor polluted [1]	9.399×10^{-2}	0.256	0.356	0.438	0.551	1.10	1.29	1.46	1.67	2.01
sulfurdioxide total air mass factor polluted precision [1]	1.135×10^{-2}	1.865×10^{-2}	2.407×10^{-2}	3.008×10^{-2}	3.763×10^{-2}	0.137	0.179	0.225	0.306	0.587
sulfurdioxide clear air mass factor polluted [1]	0.224	0.314	0.376	0.435	0.516	0.908	0.998	1.10	1.26	1.63
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]	0.621 ± 0.402	10581504	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(3.458 \pm 113.278) \times 10^{-2}$	10581504	0.480	1.026×10^{-2}	-99.1	122	-0.226	0.255
sulfurdioxide total vertical column precision [DU]	0.572 ± 0.841	10581504	0.397	0.345	4.998×10^{-2}	66.5	0.225	0.622
sulfurdioxide slant column density corrected [DU]	$(2.015 \pm 39.474) \times 10^{-2}$	10581504	0.378	8.769×10^{-3}	-13.7	55.4	-0.178	0.200
sulfurdioxide slant column density cobra [DU]	$(1.991 \pm 38.268) \times 10^{-2}$	10581504	0.378	8.769×10^{-3}	-13.7	22.3	-0.178	0.200
sulfurdioxide slant column density cobra precision [DU]	0.307 ± 0.143	10581504	0.154	0.265	9.383×10^{-2}	32.2	0.210	0.364
sulfurdioxide slant column density window1 [DU]	0.146 ± 0.723	10581504	0.758	0.161	-39.9	68.7	-0.224	0.534
sulfurdioxide slant column density window1 precision [DU]	0.307 ± 0.143	10581504	0.154	0.265	9.383×10^{-2}	32.2	0.210	0.364
sulfurdioxide slant column density corrected win1 [DU]	$(2.666 \pm 71.550) \times 10^{-2}$	10581504	0.747	3.293×10^{-3}	-39.9	69.3	-0.364	0.383
background so2 slant column offset window1 [DU]	-0.119 ± 0.177	10581504	0.180	-0.164	-0.647	2.61	-0.235	-5.421×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.91 ± 8.95	10581504	11.6	2.74	-266	307	-2.97	8.61
sulfurdioxide slant column density window2 precision [DU]	7.79 ± 2.00	10581504	2.28	7.49	2.19	220	6.47	8.74
sulfurdioxide slant column density corrected win2 [DU]	$(-1.723 \pm 833.213) \times 10^{-2}$	10581504	10.7	2.268×10^{-2}	-271	305	-5.35	5.35
background so2 slant column offset window2 [DU]	-2.92 ± 3.53	10581504	5.68	-2.03	-18.5	8.86	-5.55	0.129
sulfurdioxide slant column density window3 [DU]	-9.77 ± 22.80	10581504	28.6	-10.3	-174	319	-24.3	4.34
sulfurdioxide slant column density window3 precision [DU]	26.4 ± 12.4	10581504	7.75	23.1	9.61	500	20.1	27.9
sulfurdioxide slant column density corrected win3 [DU]	1.94 ± 21.83	10581504	27.2	2.04	-163	320	-11.6	15.6
background so2 slant column offset window3 [DU]	11.7 ± 7.1	10581504	12.7	12.9	-12.9	37.1	4.75	17.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	10581504	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.289 \pm 10.737) \times 10^{-2}$	10581504	2.918×10^{-2}	1.499×10^{-2}	3.282×10^{-4}	2.29	4.699×10^{-3}	3.388×10^{-2}
fitted radiance shift [nm]	$(-1.111 \pm 23.972) \times 10^{-4}$	10581504	1.523×10^{-3}	-1.109×10^{-4}	-3.918×10^{-2}	3.987×10^{-2}	-8.935×10^{-4}	6.296×10^{-4}
fitted radiance squeeze [1]	$(-3.629 \pm 18.070) \times 10^{-5}$	10581504	2.045×10^{-4}	-2.483×10^{-5}	-1.361×10^{-2}	2.963×10^{-3}	-1.310×10^{-4}	7.347×10^{-5}
fitted root mean square [1]	$(1.333 \pm 0.595) \times 10^{-3}$	10581504	5.904×10^{-4}	1.153×10^{-3}	3.534×10^{-4}	9.187×10^{-2}	9.471×10^{-4}	1.538×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.856 ± 0.456	10581504	0.647	0.790	5.000×10^{-2}	2.74	0.497	1.14
sulfurdioxide total air mass factor polluted precision [1]	0.111 ± 0.130	10581504	0.101	6.414×10^{-2}	2.964×10^{-3}	1.91	3.492×10^{-2}	0.136
sulfurdioxide clear air mass factor polluted [1]	0.717 ± 0.335	10581504	0.461	0.672	6.915×10^{-2}	2.79	0.451	0.913
number of spectral points in retrieval [1]	73.5 ± 0.5	10581504	1.000	73.0	53.0	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]	0.685 ± 0.393	6718301	0.720	1.000	0.0	1.000	0.280	1.000
sulfurdioxide total vertical column [DU]	$(2.587 \pm 76.141) \times 10^{-2}$	6718301	0.454	1.191×10^{-2}	-56.7	233	-0.213	0.241
sulfurdioxide total vertical column precision [DU]	0.462 ± 0.529	6718301	0.283	0.325	4.884×10^{-2}	402	0.229	0.512
sulfurdioxide slant column density corrected [DU]	$(1.784 \pm 38.872) \times 10^{-2}$	6718301	0.374	1.033×10^{-2}	-41.5	175	-0.175	0.199
sulfurdioxide slant column density cobra [DU]	$(1.754 \pm 36.362) \times 10^{-2}$	6718301	0.374	1.033×10^{-2}	-41.5	48.3	-0.175	0.199
sulfurdioxide slant column density cobra precision [DU]	0.297 ± 0.126	6718301	0.129	0.262	7.605×10^{-2}	25.5	0.216	0.345
sulfurdioxide slant column density window1 [DU]	0.157 ± 0.671	6718301	0.742	0.162	-79.3	144	-0.212	0.530
sulfurdioxide slant column density window1 precision [DU]	0.297 ± 0.126	6718301	0.129	0.262	7.605×10^{-2}	25.5	0.216	0.345
sulfurdioxide slant column density corrected win1 [DU]	$(1.370 \pm 66.600) \times 10^{-2}$	6718301	0.731	-1.068×10^{-3}	-79.3	143	-0.362	0.369
background so2 slant column offset window1 [DU]	-0.144 ± 0.121	6718301	0.147	-0.161	-1.36	1.30	-0.226	-7.935×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.35 ± 9.43	6718301	11.8	1.18	-756	923	-4.66	7.17
sulfurdioxide slant column density window2 precision [DU]	8.57 ± 2.43	6718301	2.74	8.25	2.29	639	7.03	9.77
sulfurdioxide slant column density corrected win2 [DU]	0.217 ± 9.313	6718301	11.7	0.195	-756	923	-5.65	6.05
background so2 slant column offset window2 [DU]	-1.14 ± 1.74	6718301	2.10	-0.742	-11.9	8.71	-2.07	3.135×10^{-2}
sulfurdioxide slant column density window3 [DU]	-6.15 ± 25.42	6718301	32.0	-5.97	-405	345	-22.0	10.1
sulfurdioxide slant column density window3 precision [DU]	30.5 ± 13.7	6718301	10.9	27.0	9.95	305	22.7	33.6
sulfurdioxide slant column density corrected win3 [DU]	1.73 ± 24.97	6718301	31.6	1.68	-401	353	-14.0	17.6
background so2 slant column offset window3 [DU]	7.88 ± 5.30	6718301	8.12	6.63	-12.0	28.8	3.91	12.0
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	6718301	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.754 \pm 2.542) \times 10^{-2}$	6718301	1.085×10^{-2}	1.248×10^{-2}	1.014×10^{-3}	1.21	8.462×10^{-3}	1.932×10^{-2}
fitted radiance shift [nm]	$(-4.623 \pm 27.639) \times 10^{-4}$	6718301	2.103×10^{-3}	-4.547×10^{-4}	-8.590×10^{-2}	4.321×10^{-2}	-1.561×10^{-3}	5.418×10^{-4}
fitted radiance squeeze [1]	$(1.077 \pm 17.512) \times 10^{-5}$	6718301	2.047×10^{-4}	8.068×10^{-6}	-1.917×10^{-2}	3.612×10^{-2}	-9.327×10^{-5}	1.114×10^{-4}
fitted root mean square [1]	$(1.284 \pm 0.491) \times 10^{-3}$	6718301	5.179×10^{-4}	1.157×10^{-3}	3.412×10^{-4}	9.788×10^{-2}	9.659×10^{-4}	1.484×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.864 ± 0.373	6718301	0.436	0.822	5.000×10^{-2}	2.69	0.620	1.06
sulfurdioxide total air mass factor polluted precision [1]	$(9.850 \pm 7.982) \times 10^{-2}$	6718301	9.615×10^{-2}	6.727×10^{-2}	5.095×10^{-3}	1.32	4.119×10^{-2}	0.137
sulfurdioxide clear air mass factor polluted [1]	0.763 ± 0.214	6718301	0.286	0.746	0.119	2.52	0.618	0.904
number of spectral points in retrieval [1]	73.4 ± 0.5	6718301	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]	0.681 ± 0.392	11466651	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(2.524 \pm 83.170) \times 10^{-2}$	11466651	0.443	1.007×10^{-2}	-58.9	233	-0.209	0.234
sulfurdioxide total vertical column precision [DU]	0.471 ± 0.591	11466651	0.296	0.312	5.275×10^{-2}	32.9	0.222	0.518
sulfurdioxide slant column density corrected [DU]	$(1.659 \pm 36.644) \times 10^{-2}$	11466651	0.368	8.808×10^{-3}	-14.2	175	-0.174	0.194
sulfurdioxide slant column density cobra [DU]	$(1.652 \pm 35.964) \times 10^{-2}$	11466651	0.368	8.808×10^{-3}	-14.2	48.3	-0.174	0.194
sulfurdioxide slant column density cobra precision [DU]	0.297 ± 0.135	11466651	0.145	0.254	7.605×10^{-2}	24.4	0.208	0.353
sulfurdioxide slant column density window1 [DU]	0.149 ± 0.686	11466651	0.742	0.163	-68.6	144	-0.213	0.529
sulfurdioxide slant column density window1 precision [DU]	0.297 ± 0.135	11466651	0.145	0.254	7.605×10^{-2}	24.4	0.208	0.353
sulfurdioxide slant column density corrected win1 [DU]	$(1.485 \pm 67.880) \times 10^{-2}$	11466651	0.730	-5.401×10^{-4}	-68.6	143	-0.361	0.369
background so2 slant column offset window1 [DU]	-0.134 ± 0.149	11466651	0.163	-0.165	-1.36	2.40	-0.233	-6.963×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.97 ± 9.11	11466651	11.6	1.76	-756	923	-3.96	7.66
sulfurdioxide slant column density window2 precision [DU]	8.09 ± 2.11	11466651	2.48	7.76	2.19	483	6.68	9.16
sulfurdioxide slant column density corrected win2 [DU]	0.105 ± 8.735	11466651	11.1	0.113	-756	923	-5.45	5.66
background so2 slant column offset window2 [DU]	-1.86 ± 2.92	11466651	3.25	-0.910	-18.5	8.86	-3.08	0.164
sulfurdioxide slant column density window3 [DU]	-5.45 ± 24.13	11466651	30.8	-5.81	-288	339	-20.9	9.90
sulfurdioxide slant column density window3 precision [DU]	27.5 ± 11.7	11466651	8.99	24.3	9.61	241	21.0	30.0
sulfurdioxide slant column density corrected win3 [DU]	3.95 ± 23.04	11466651	29.2	3.72	-277	341	-10.7	18.5
background so2 slant column offset window3 [DU]	9.40 ± 6.55	11466651	10.7	8.54	-12.9	37.1	3.87	14.6
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	11466651	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.260 \pm 4.921) \times 10^{-2}$	11466651	1.393×10^{-2}	1.318×10^{-2}	3.676×10^{-4}	1.36	8.028×10^{-3}	2.195×10^{-2}
fitted radiance shift [nm]	$(-2.757 \pm 23.244) \times 10^{-4}$	11466651	1.736×10^{-3}	-2.289×10^{-4}	-8.590×10^{-2}	4.321×10^{-2}	-1.165×10^{-3}	5.712×10^{-4}
fitted radiance squeeze [1]	$(-9.984 \pm 177.101) \times 10^{-6}$	11466651	2.014×10^{-4}	-5.276×10^{-6}	-1.456×10^{-2}	1.542×10^{-2}	-1.073×10^{-4}	9.401×10^{-5}
fitted root mean square [1]	$(1.299 \pm 0.550) \times 10^{-3}$	11466651	5.817×10^{-4}	1.124×10^{-3}	3.412×10^{-4}	6.476×10^{-2}	9.372×10^{-4}	1.519×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.873 ± 0.381	11466651	0.470	0.837	5.000×10^{-2}	2.56	0.618	1.09
sulfurdioxide total air mass factor polluted precision [1]	$(9.927 \pm 9.852) \times 10^{-2}$	11466651	8.622×10^{-2}	6.505×10^{-2}	3.610×10^{-3}	1.79	4.103×10^{-2}	0.127
sulfurdioxide clear air mass factor polluted [1]	0.757 ± 0.259	11466651	0.330	0.750	8.077×10^{-2}	2.69	0.584	0.914
number of spectral points in retrieval [1]	73.4 ± 0.5	11466651	1.000	73.0	70.0	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]	0.622 ± 0.410	4091408	0.810	1.000	0.0	1.000	0.190	1.000
sulfurdioxide total vertical column [DU]	$(3.236 \pm 114.449) \times 10^{-2}$	4091408	0.513	1.098×10^{-2}	-99.1	122	-0.241	0.273
sulfurdioxide total vertical column precision [DU]	0.596 ± 0.843	4091408	0.422	0.385	4.884×10^{-2}	402	0.242	0.664
sulfurdioxide slant column density corrected [DU]	$(2.080 \pm 42.392) \times 10^{-2}$	4091408	0.376	9.034×10^{-3}	-18.2	84.8	-0.177	0.199
sulfurdioxide slant column density cobra [DU]	$(2.011 \pm 38.303) \times 10^{-2}$	4091408	0.376	9.034×10^{-3}	-18.2	32.3	-0.177	0.199
sulfurdioxide slant column density cobra precision [DU]	0.299 ± 0.131	4091408	0.127	0.263	9.383×10^{-2}	25.5	0.217	0.344
sulfurdioxide slant column density window1 [DU]	0.170 ± 0.695	4091408	0.740	0.172	-79.3	92.3	-0.199	0.540
sulfurdioxide slant column density window1 precision [DU]	0.299 ± 0.131	4091408	0.127	0.263	9.383×10^{-2}	25.5	0.217	0.344
sulfurdioxide slant column density corrected win1 [DU]	$(2.592 \pm 69.057) \times 10^{-2}$	4091408	0.730	1.973×10^{-3}	-79.3	93.6	-0.356	0.374
background so2 slant column offset window1 [DU]	-0.144 ± 0.154	4091408	0.150	-0.177	-0.584	2.61	-0.239	-8.964×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.27 ± 9.26	4091408	11.8	2.20	-508	654	-3.67	8.14
sulfurdioxide slant column density window2 precision [DU]	8.20 ± 2.46	4091408	2.58	7.86	2.41	639	6.69	9.28
sulfurdioxide slant column density corrected win2 [DU]	$(1.972 \pm 880.664) \times 10^{-2}$	4091408	11.1	2.962×10^{-2}	-508	654	-5.53	5.57
background so2 slant column offset window2 [DU]	-2.25 ± 3.04	4091408	4.10	-1.23	-17.6	5.94	-4.05	4.778×10^{-2}
sulfurdioxide slant column density window3 [DU]	-14.0 ± 23.1	4091408	28.5	-13.8	-405	345	-28.2	0.351
sulfurdioxide slant column density window3 precision [DU]	30.0 ± 16.2	4091408	11.5	25.5	9.95	500	20.9	32.5
sulfurdioxide slant column density corrected win3 [DU]	-3.49 ± 23.31	4091408	28.8	-2.76	-401	353	-17.6	11.3
background so2 slant column offset window3 [DU]	10.6 ± 6.7	4091408	11.5	10.6	-12.7	36.9	4.64	16.1
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.13	4091408	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.628 \pm 13.262) \times 10^{-2}$	4091408	4.058×10^{-2}	1.730×10^{-2}	3.282×10^{-4}	2.29	6.199×10^{-3}	4.678×10^{-2}
fitted radiance shift [nm]	$(-1.725 \pm 31.398) \times 10^{-4}$	4091408	1.841×10^{-3}	-1.972×10^{-4}	-6.846×10^{-2}	4.261×10^{-2}	-1.123×10^{-3}	7.182×10^{-4}
fitted radiance squeeze [1]	$(-2.458 \pm 17.856) \times 10^{-5}$	4091408	2.045×10^{-4}	-1.862×10^{-5}	-1.917×10^{-2}	3.612×10^{-2}	-1.229×10^{-4}	8.161×10^{-5}
fitted root mean square [1]	$(1.287 \pm 0.528) \times 10^{-3}$	4091408	4.700×10^{-4}	1.161×10^{-3}	3.665×10^{-4}	9.788×10^{-2}	9.705×10^{-4}	1.441×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.819 ± 0.494	4091408	0.657	0.679	5.000×10^{-2}	2.69	0.450	1.11
sulfurdioxide total air mass factor polluted precision [1]	0.119 ± 0.138	4091408	0.134	6.350×10^{-2}	3.062×10^{-3}	1.83	2.901×10^{-2}	0.163
sulfurdioxide clear air mass factor polluted [1]	0.684 ± 0.334	4091408	0.417	0.609	6.915×10^{-2}	2.61	0.437	0.853
number of spectral points in retrieval [1]	73.4 ± 0.5	4091408	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

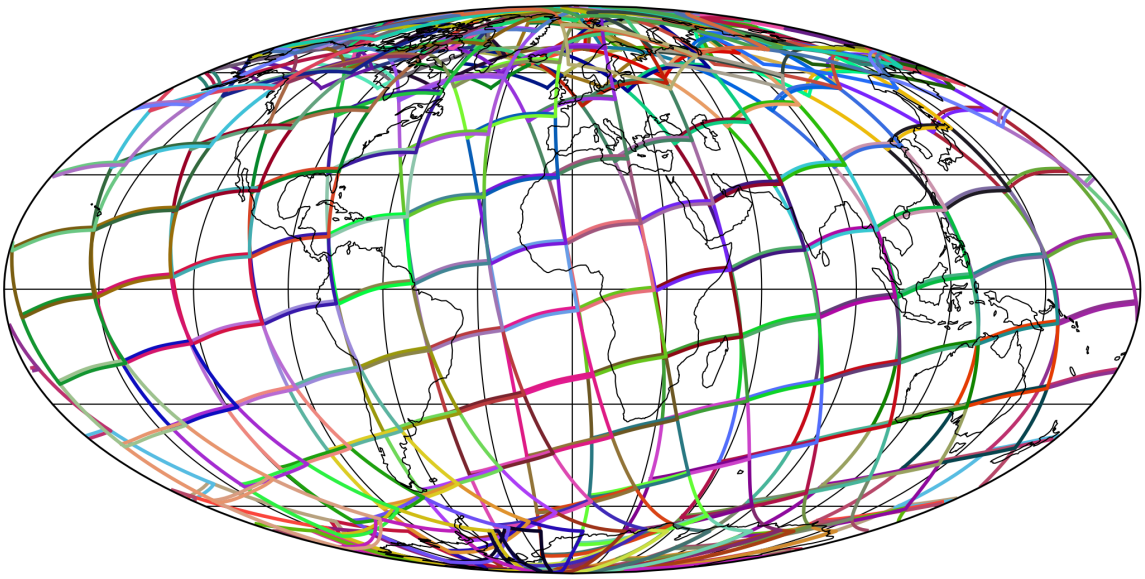


Figure 1: Outline of the granules.

4 Input data monitoring

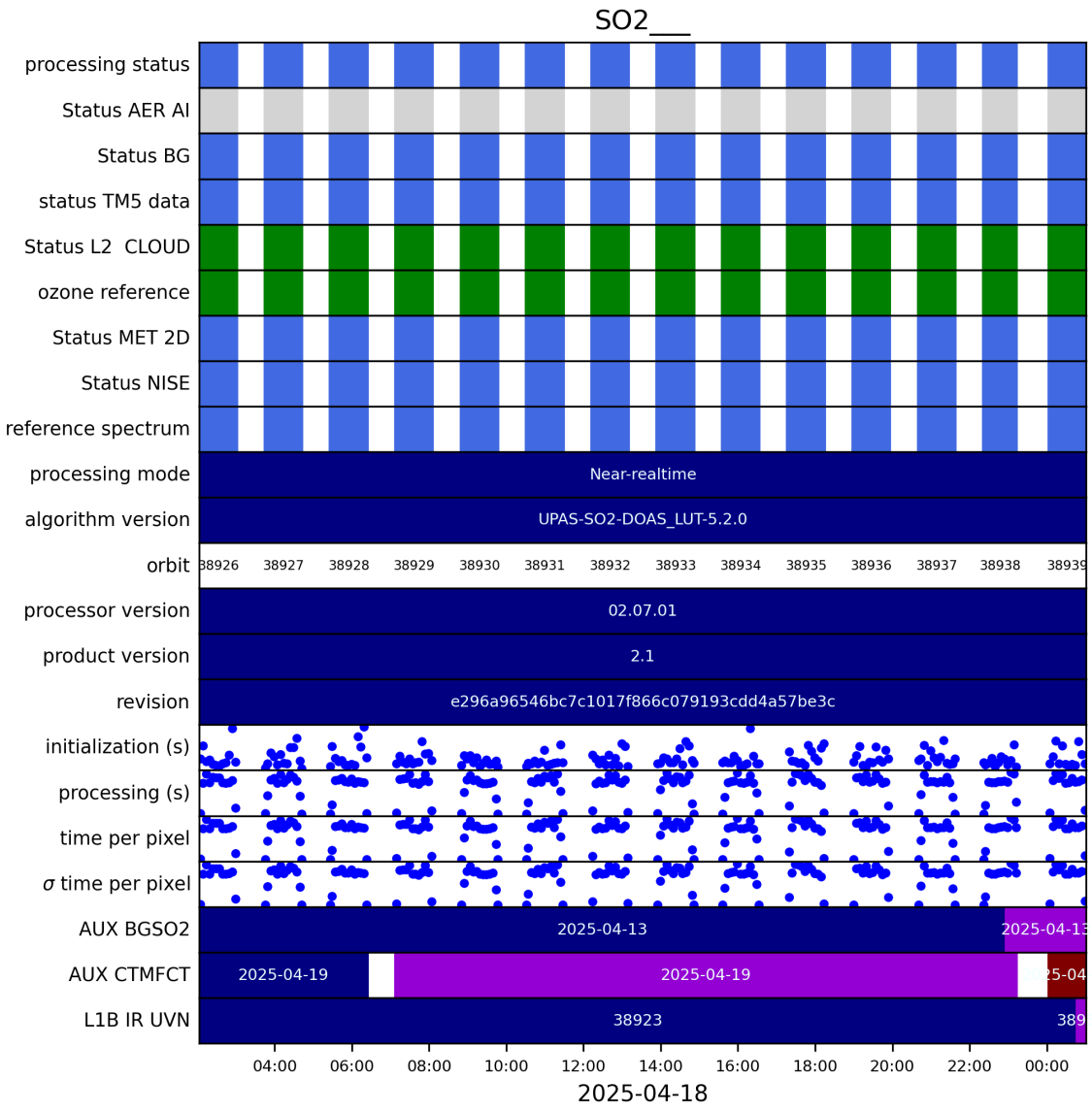


Figure 2: Input data per granule

5 Warnings and errors

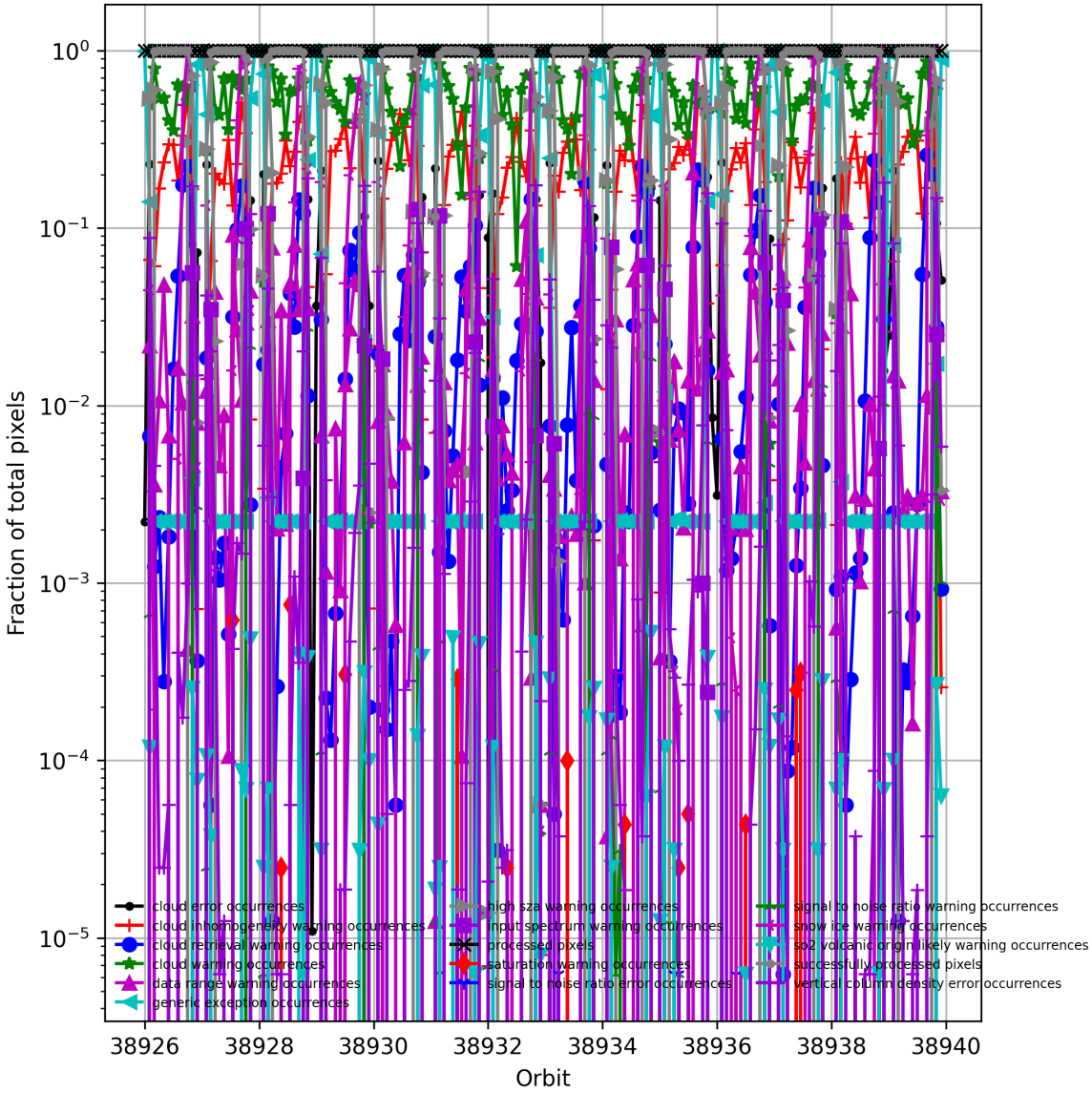


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

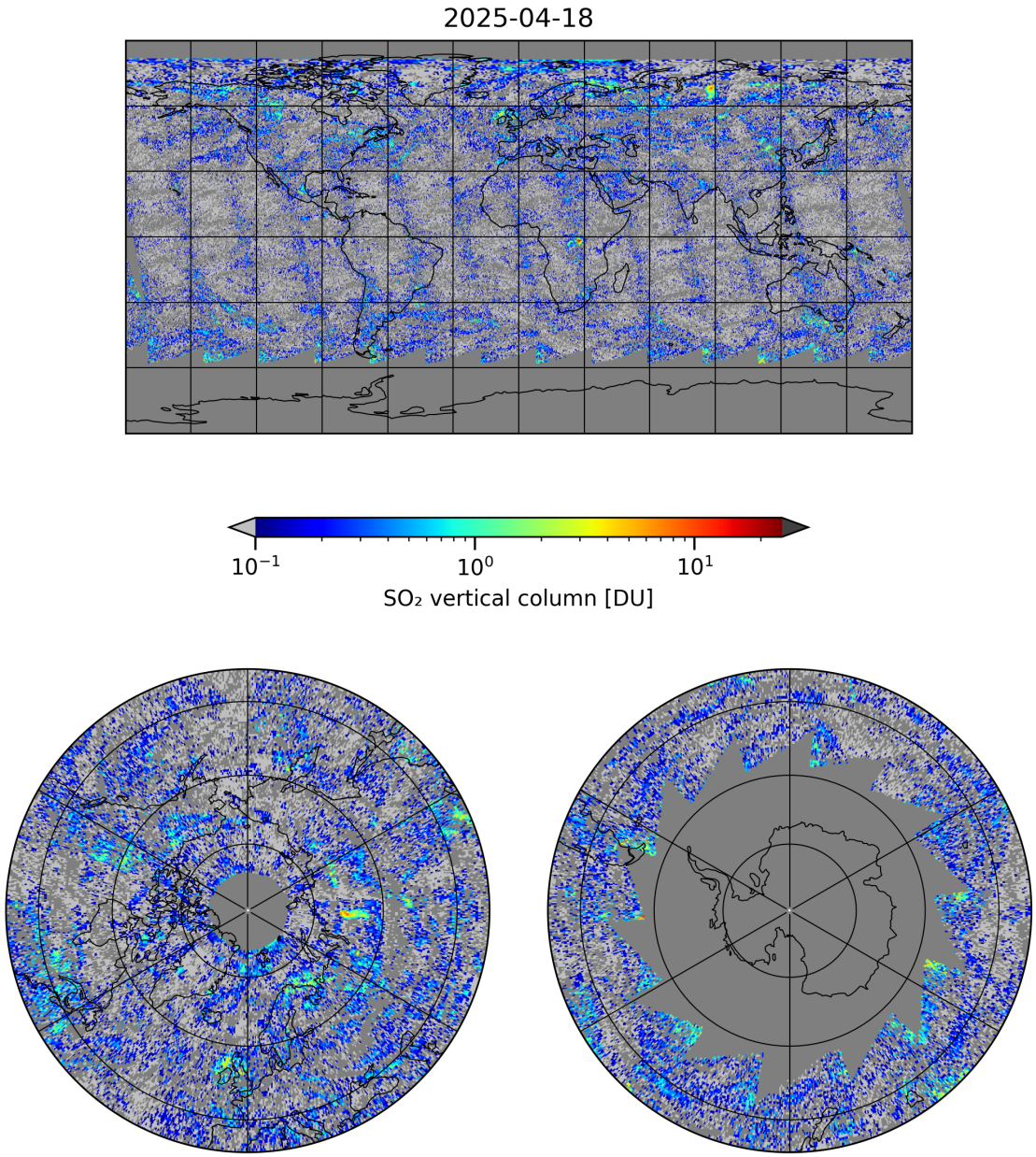


Figure 4: Map of "SO_2 vertical column" for 2025-04-18 to 2025-04-19

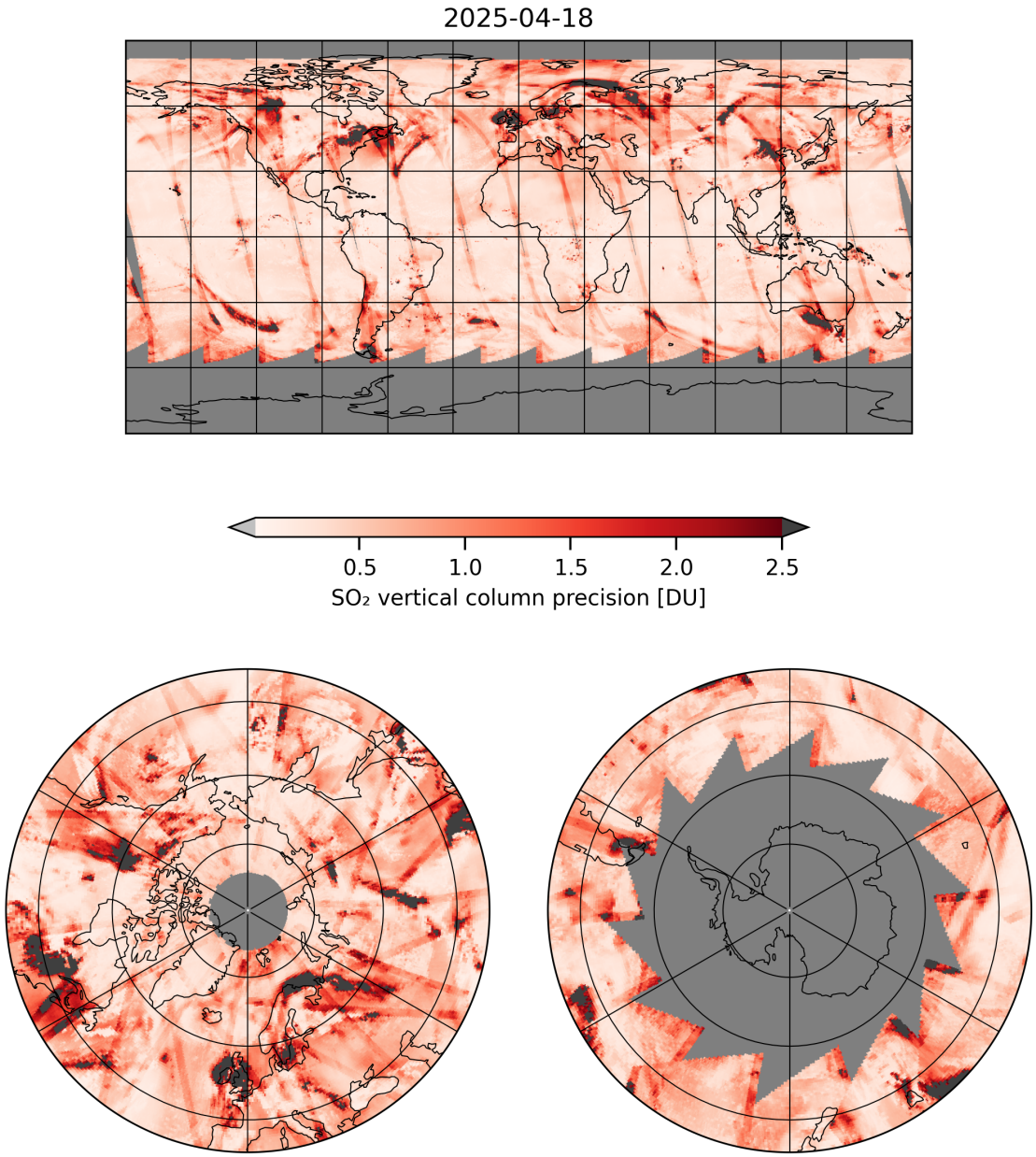


Figure 5: Map of "SO_2 vertical column precision" for 2025-04-18 to 2025-04-19

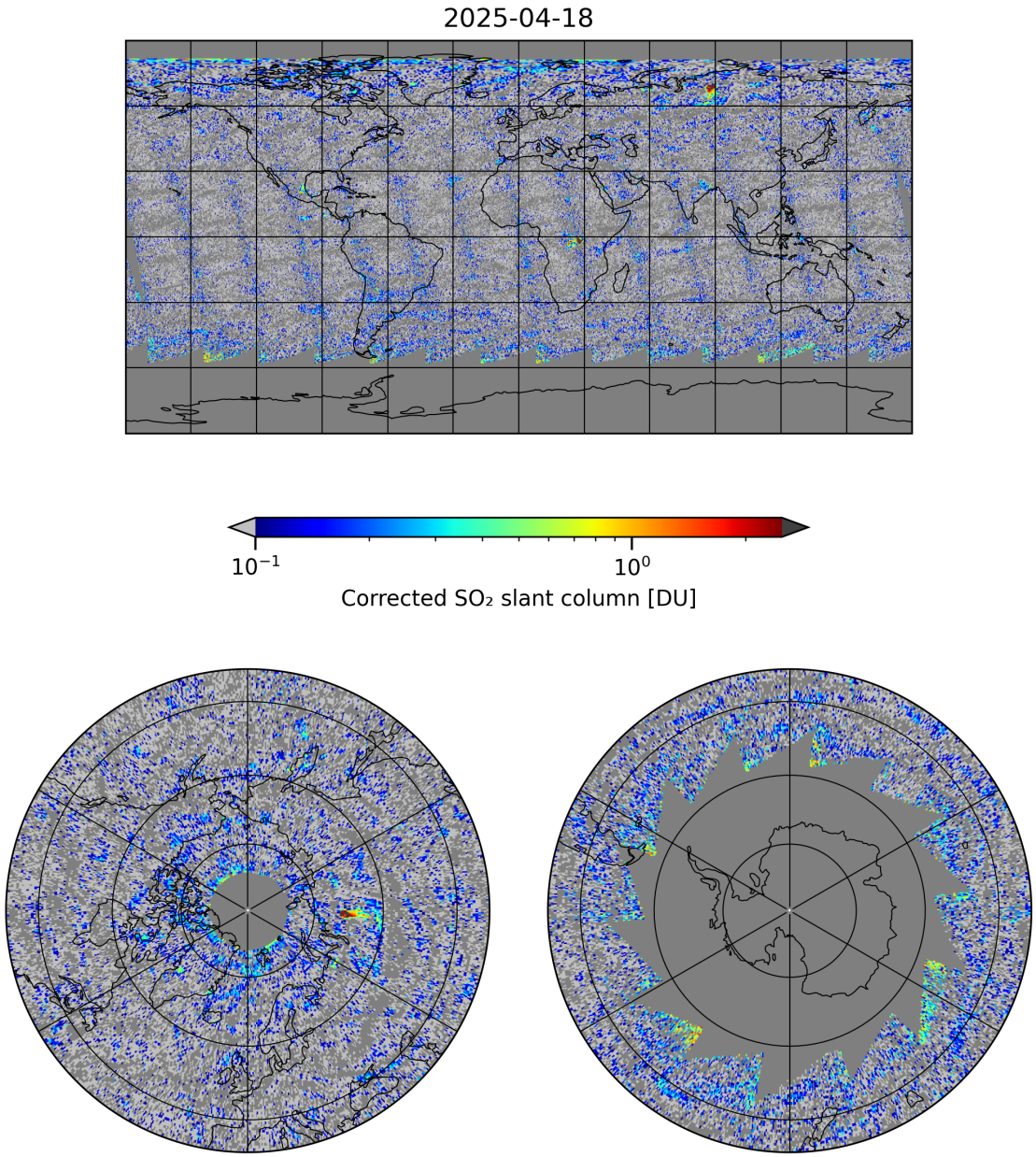


Figure 6: Map of "Corrected SO_2 slant column" for 2025-04-18 to 2025-04-19

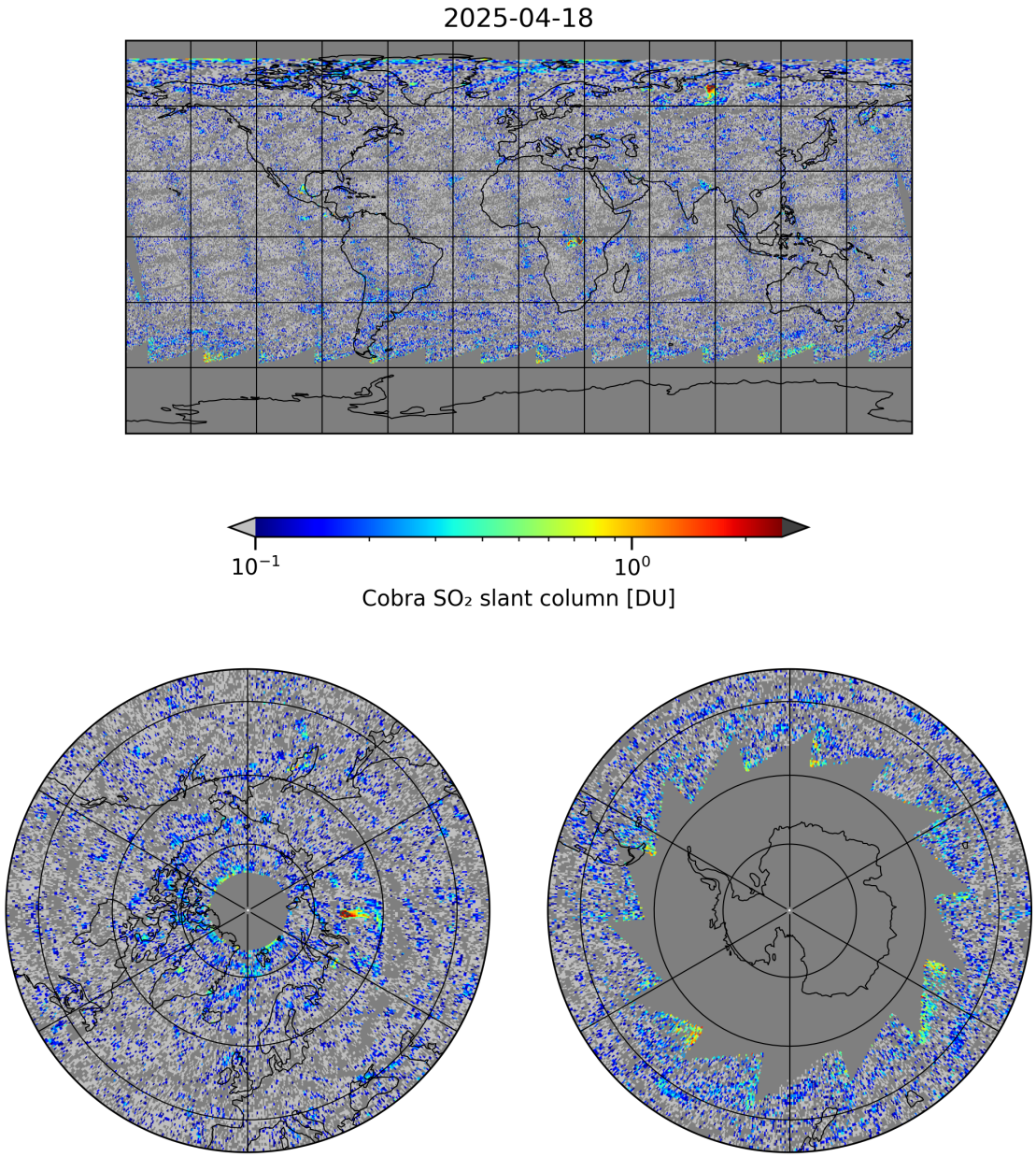


Figure 7: Map of "Cobra SO_2 slant column" for 2025-04-18 to 2025-04-19

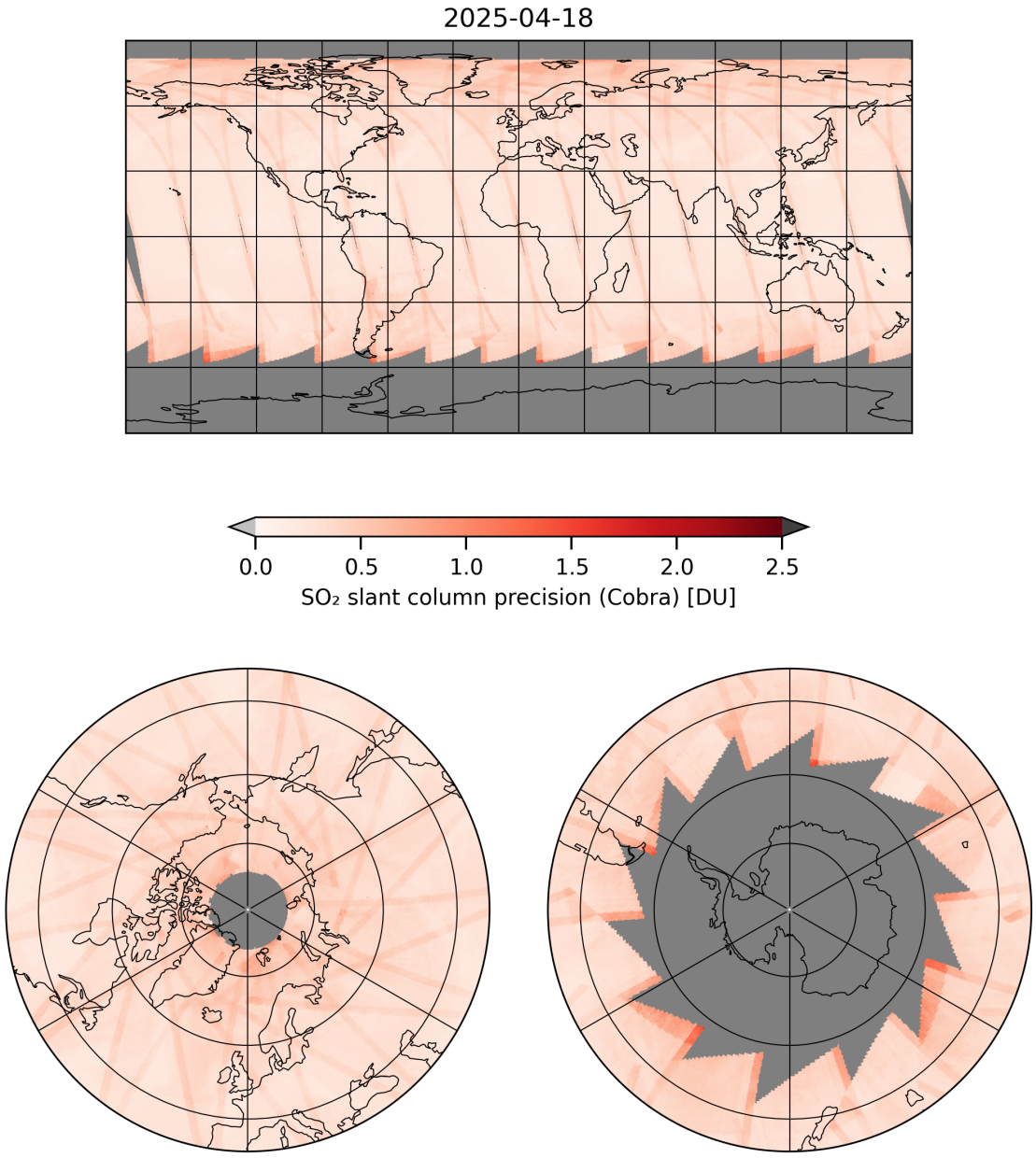


Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-04-18 to 2025-04-19

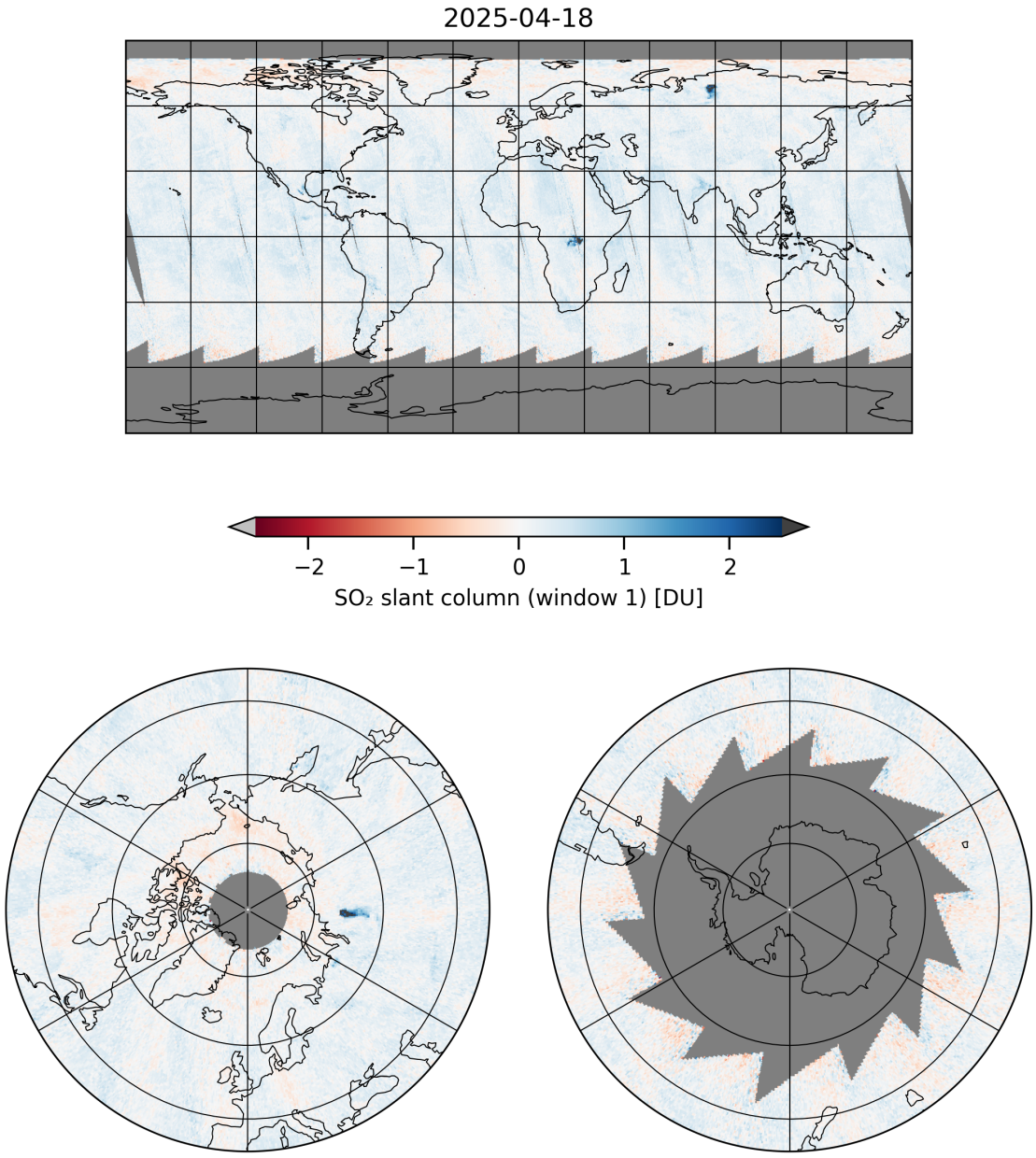


Figure 9: Map of "SO_2 slant column (window 1)" for 2025-04-18 to 2025-04-19

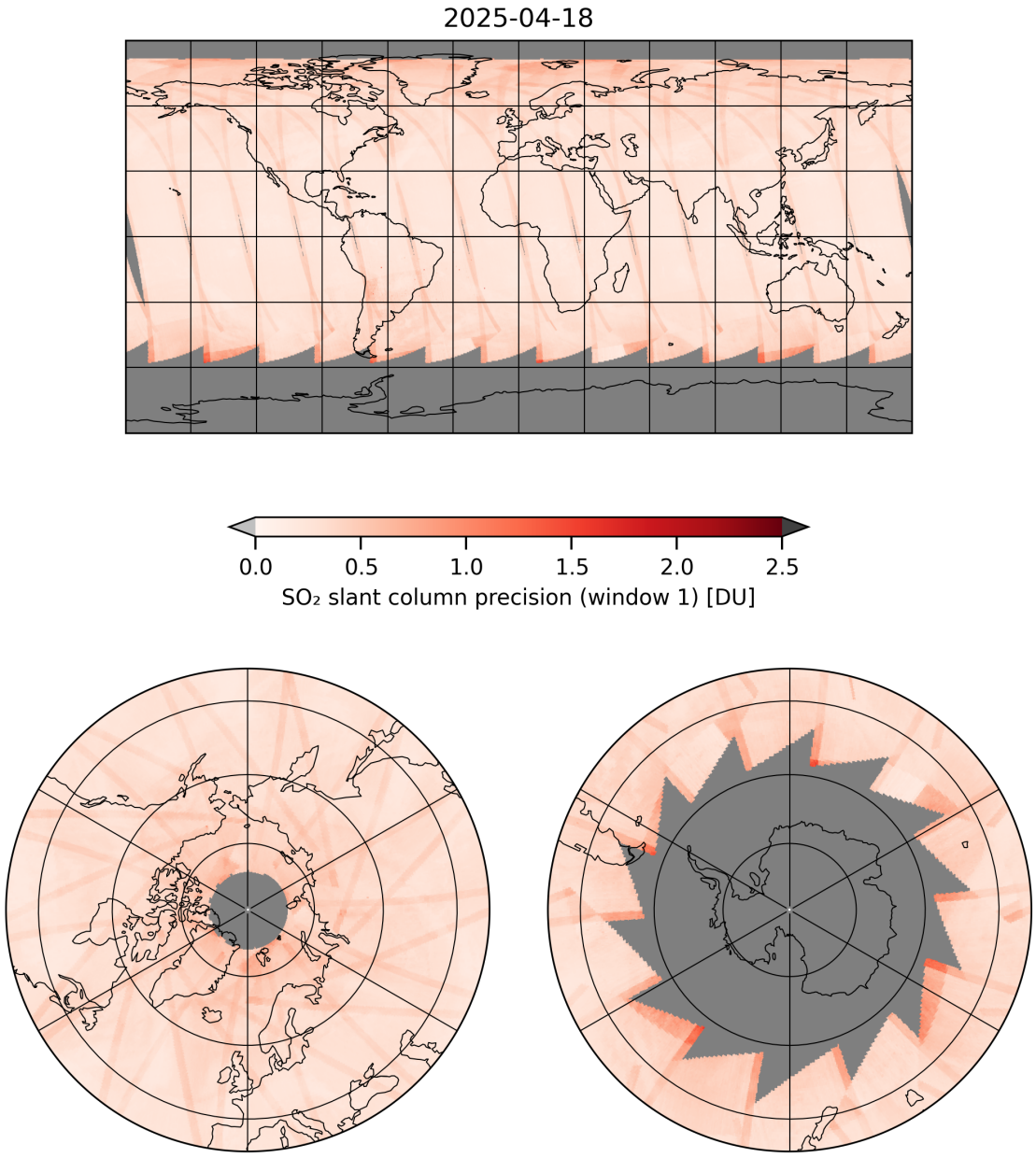


Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-04-18 to 2025-04-19

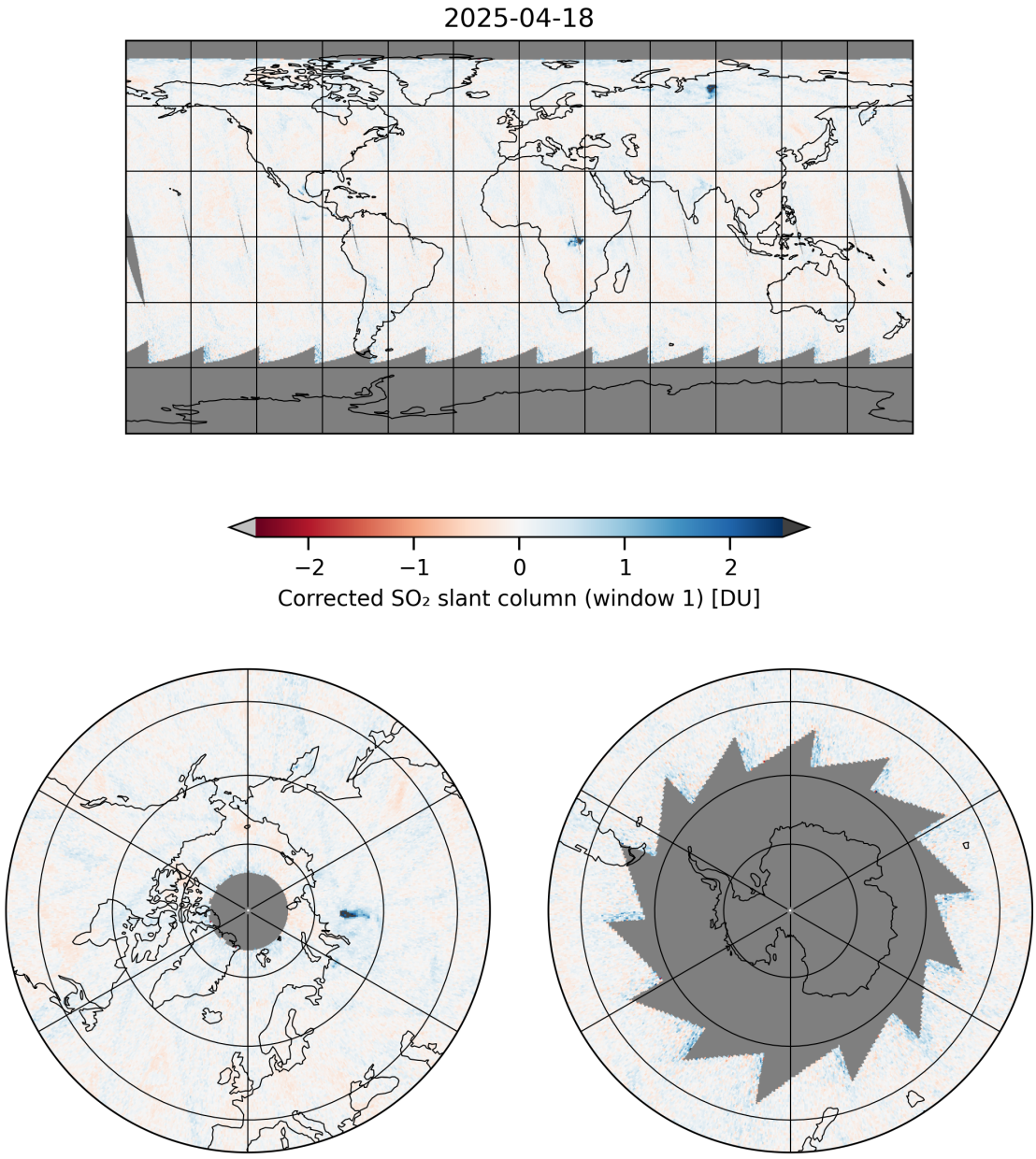


Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-04-18 to 2025-04-19

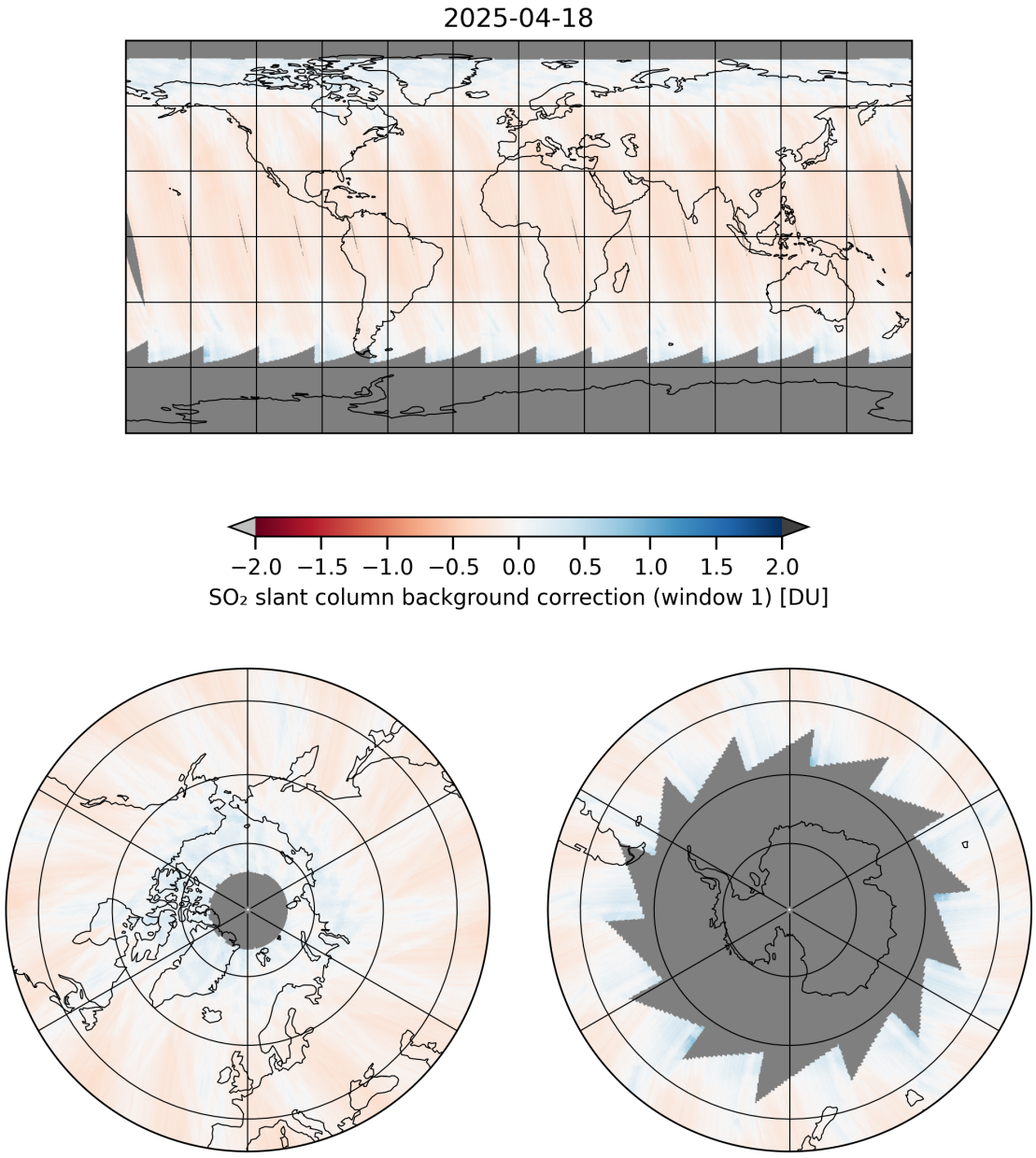


Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-04-18 to 2025-04-19

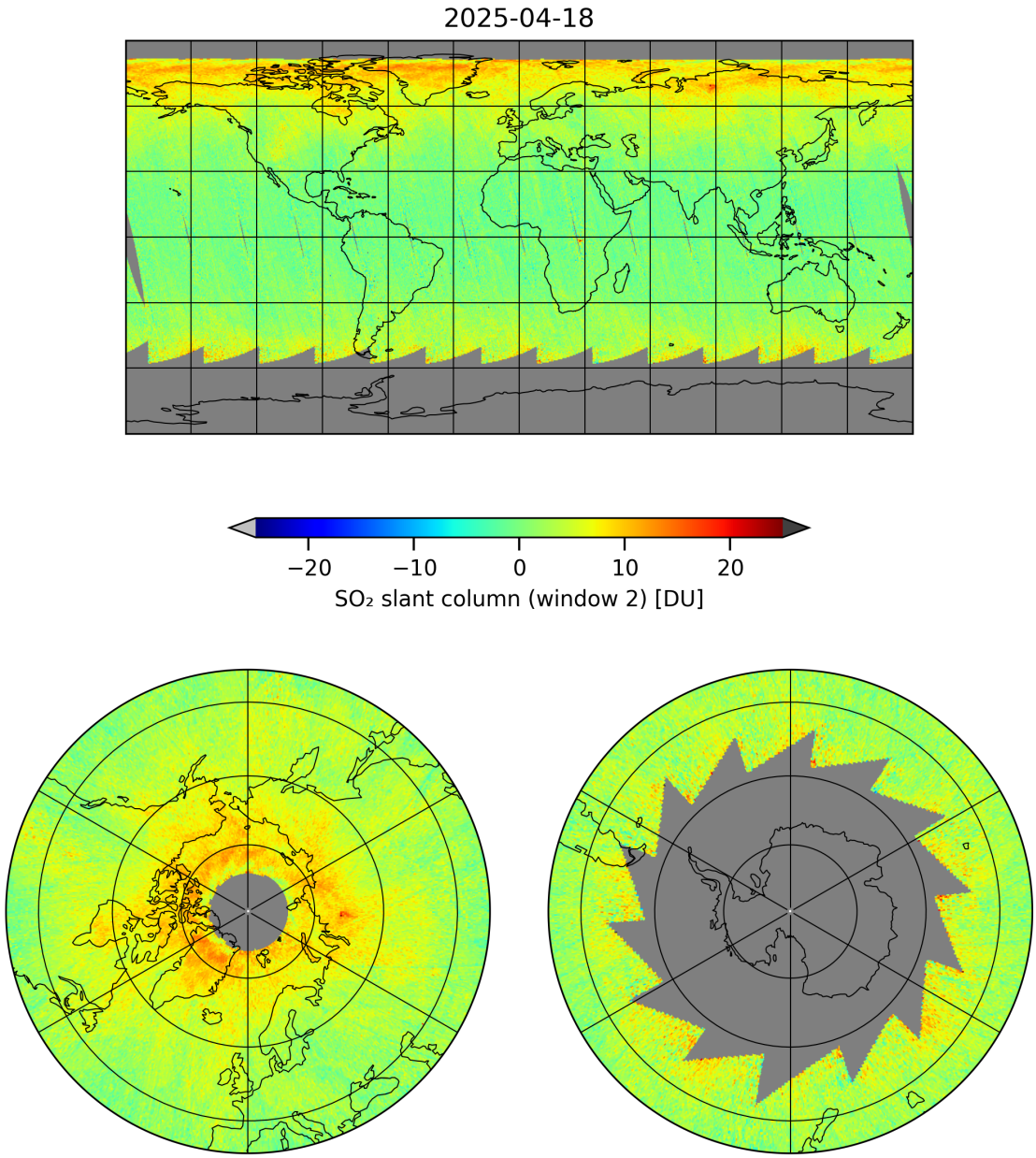


Figure 13: Map of "SO_2 slant column (window 2)" for 2025-04-18 to 2025-04-19

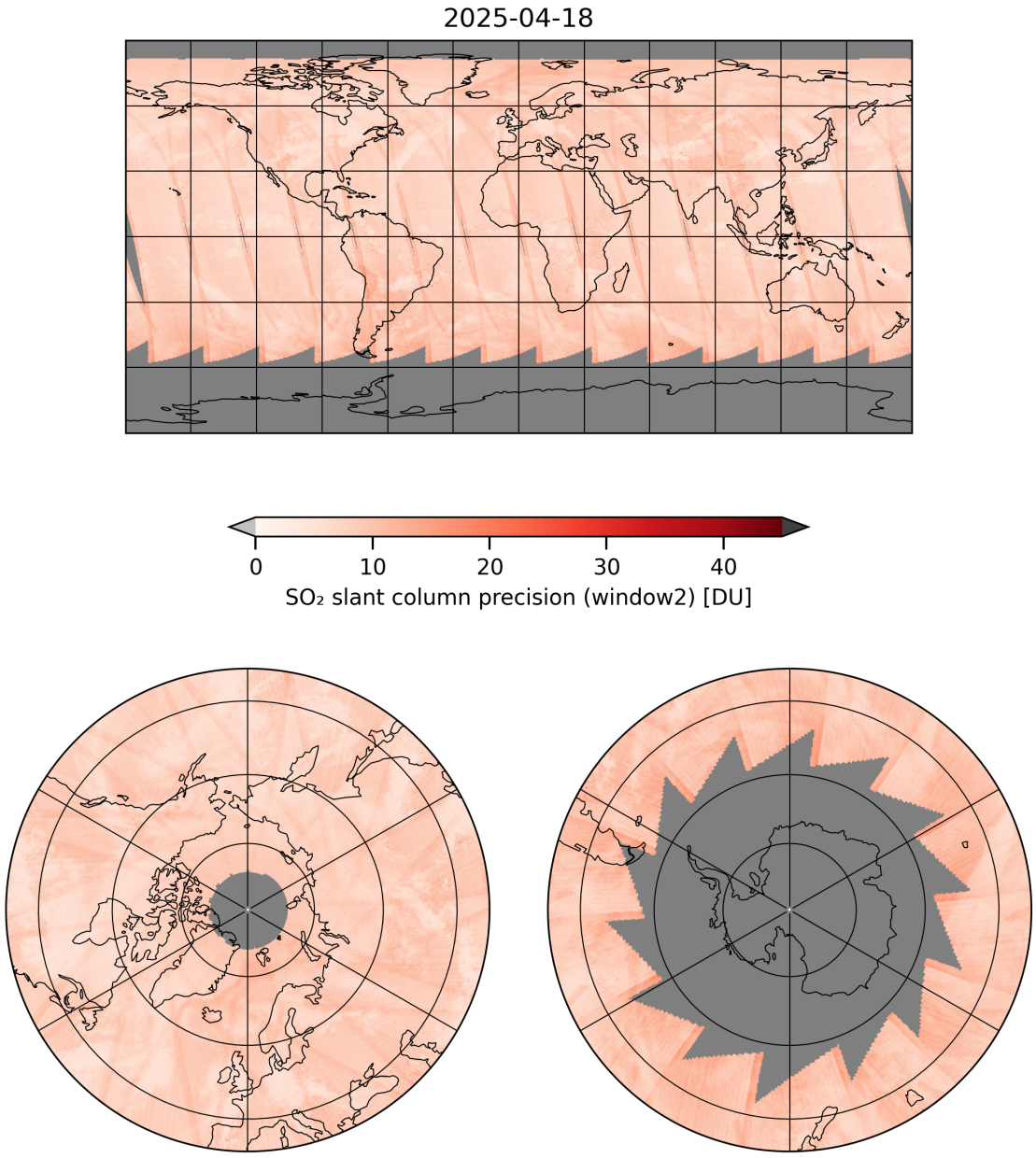


Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-04-18 to 2025-04-19

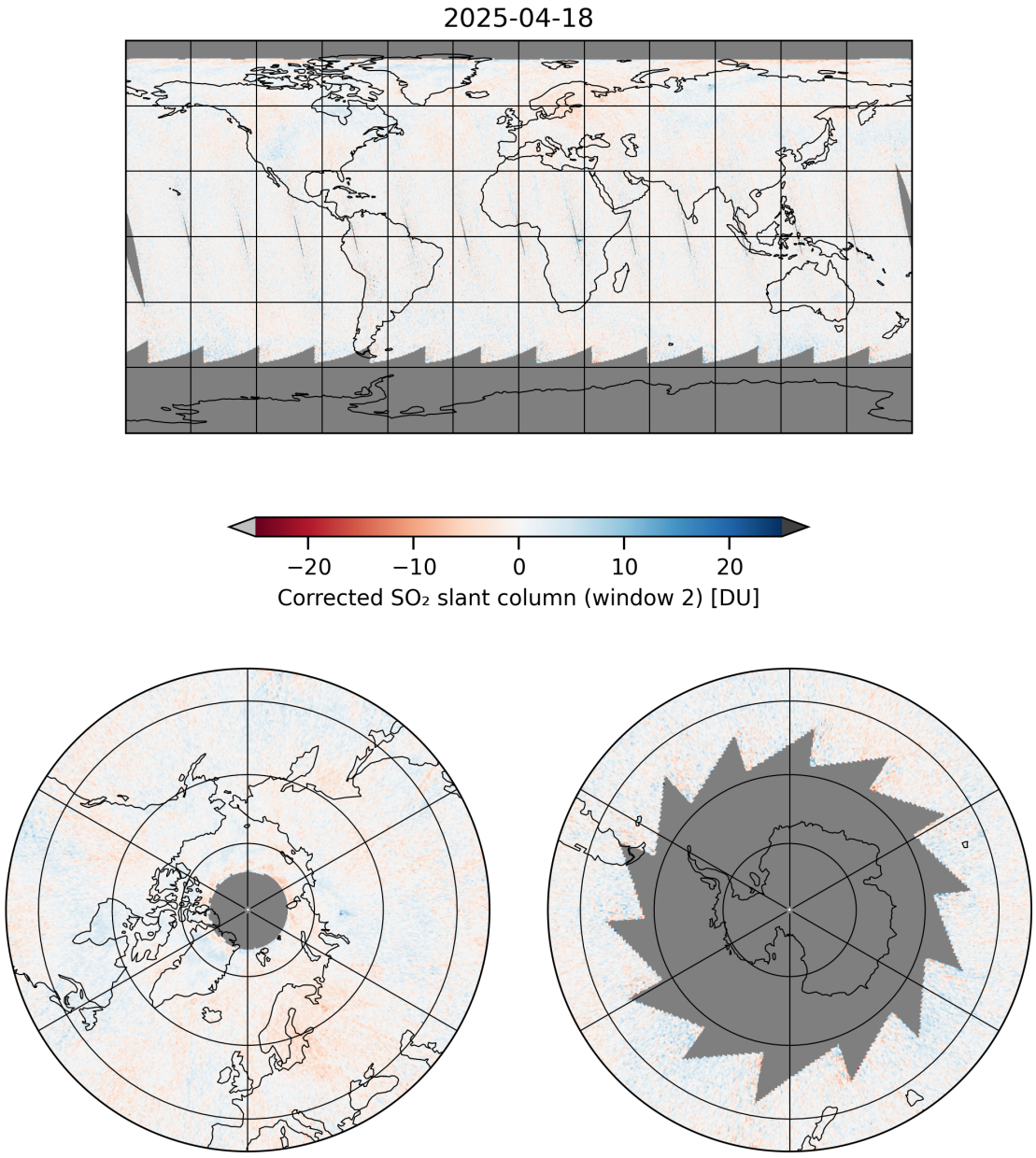


Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-04-18 to 2025-04-19

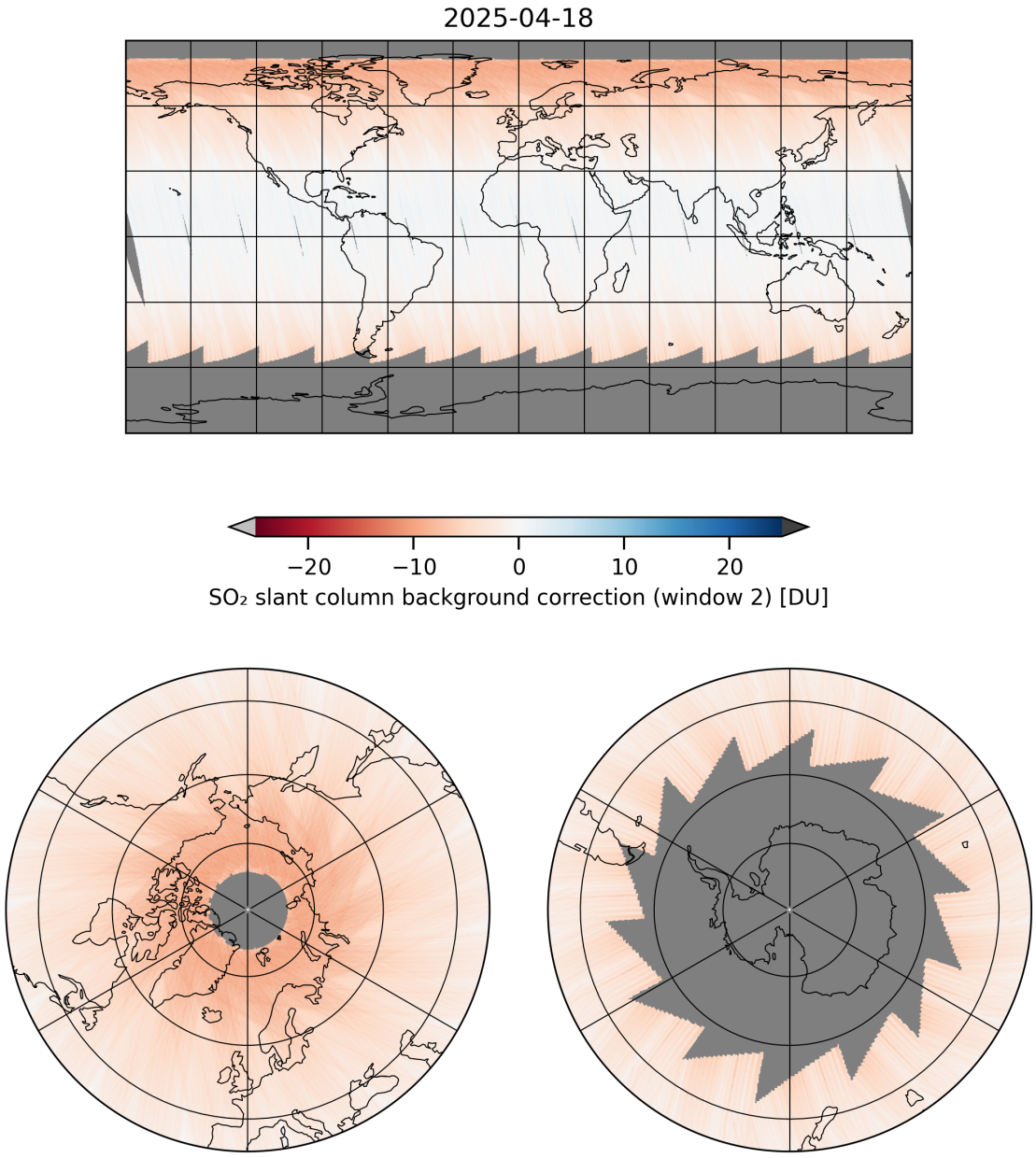


Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-04-18 to 2025-04-19

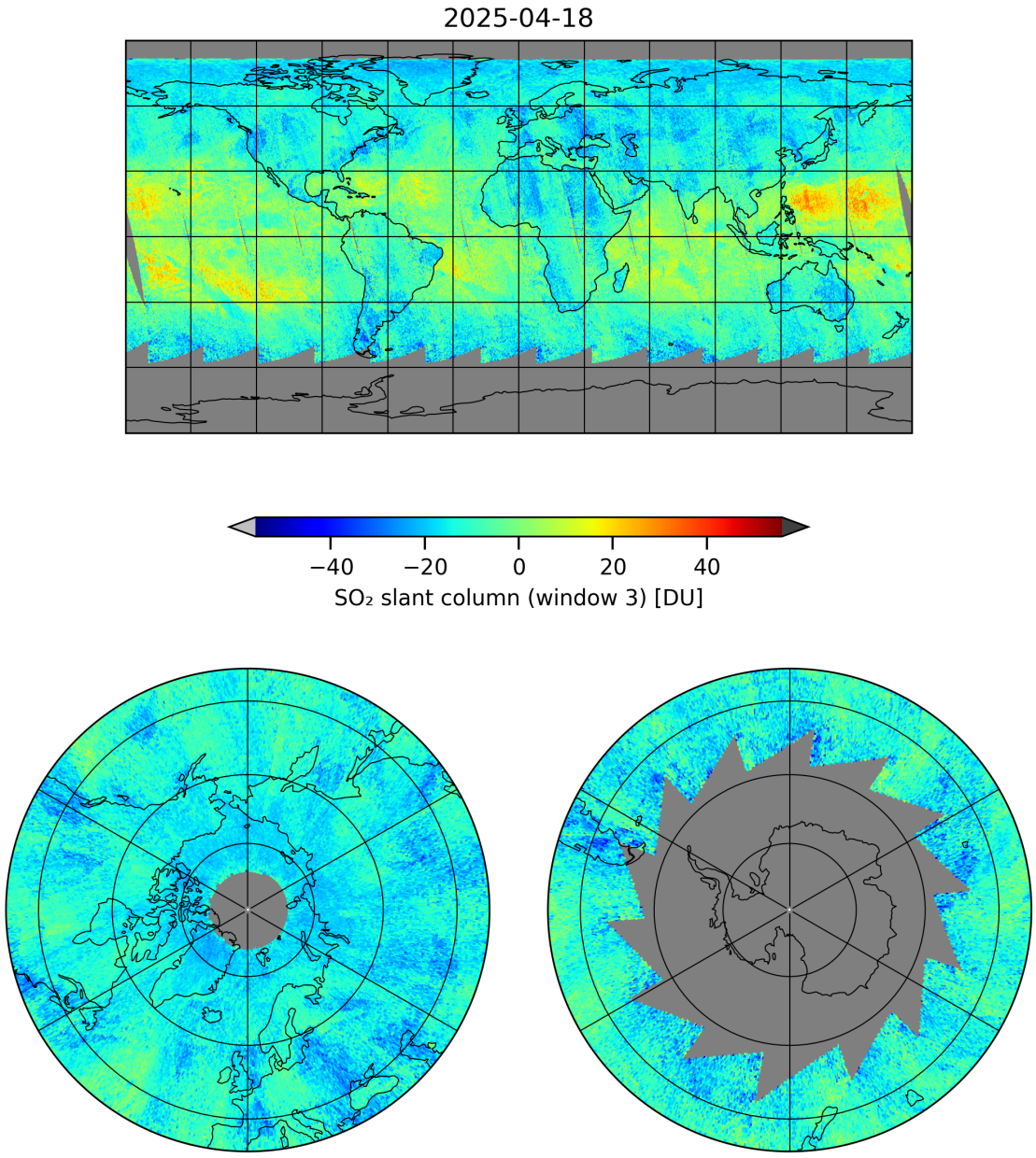


Figure 17: Map of "SO_2 slant column (window 3)" for 2025-04-18 to 2025-04-19

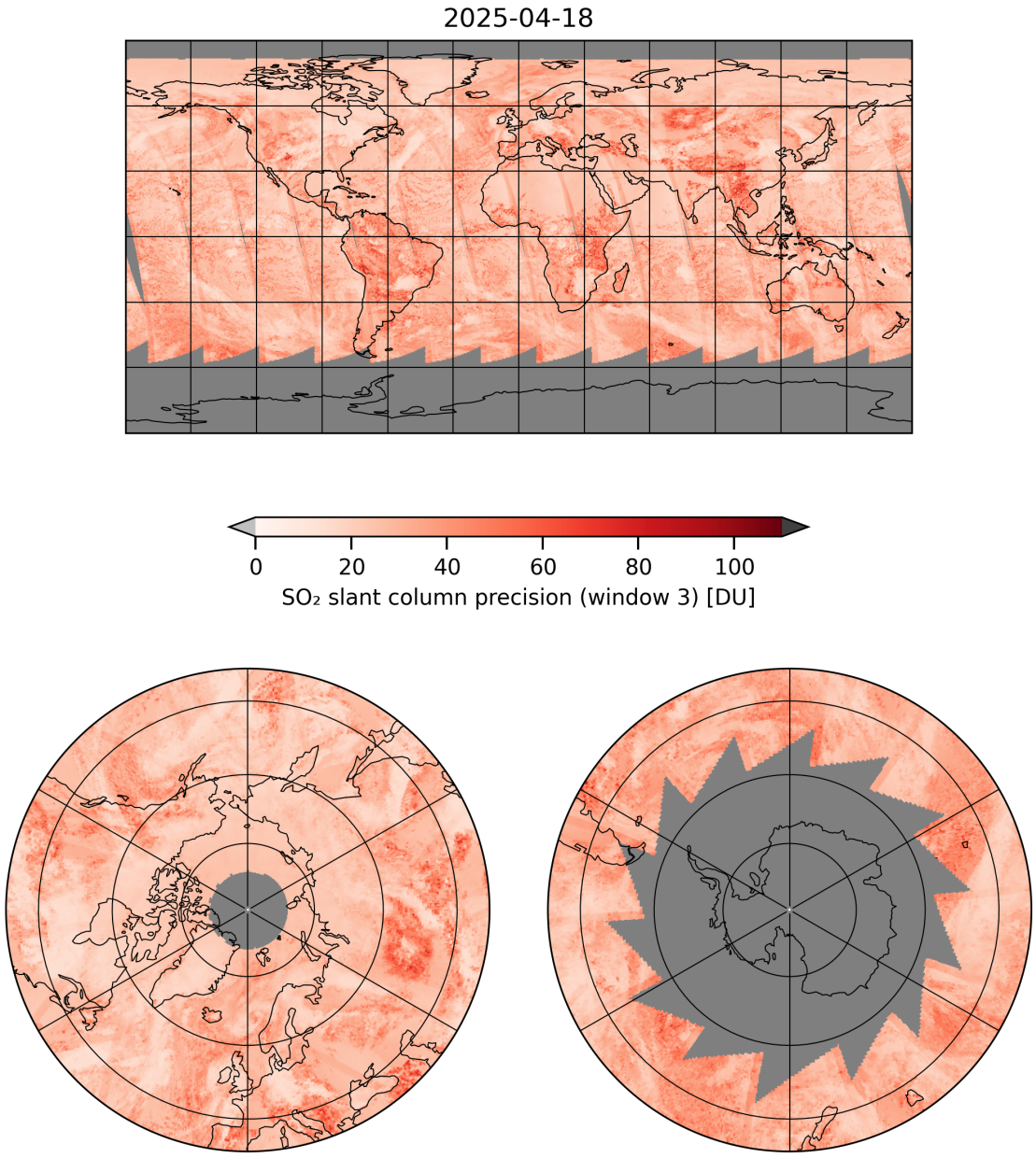


Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-04-18 to 2025-04-19

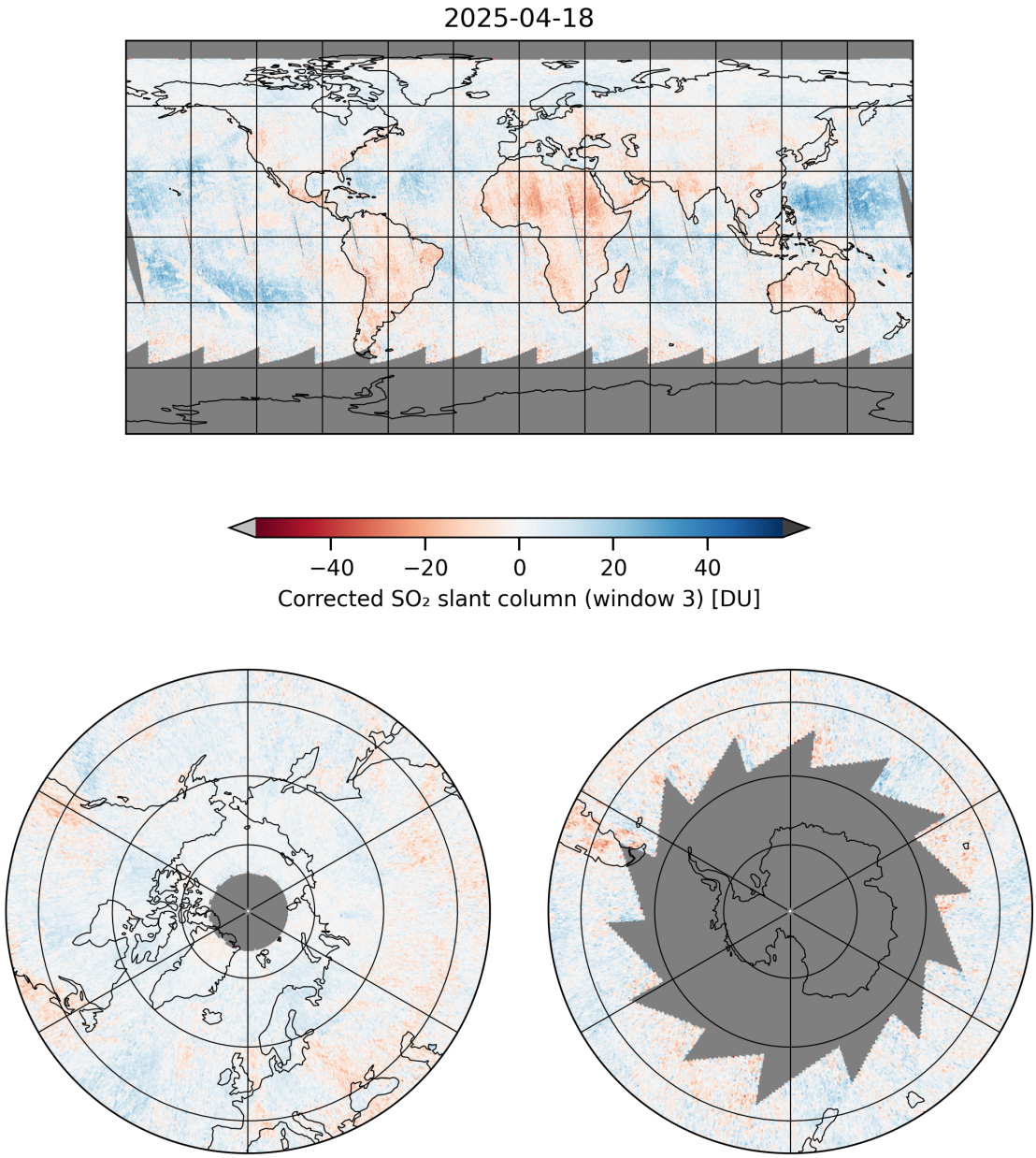


Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-04-18 to 2025-04-19

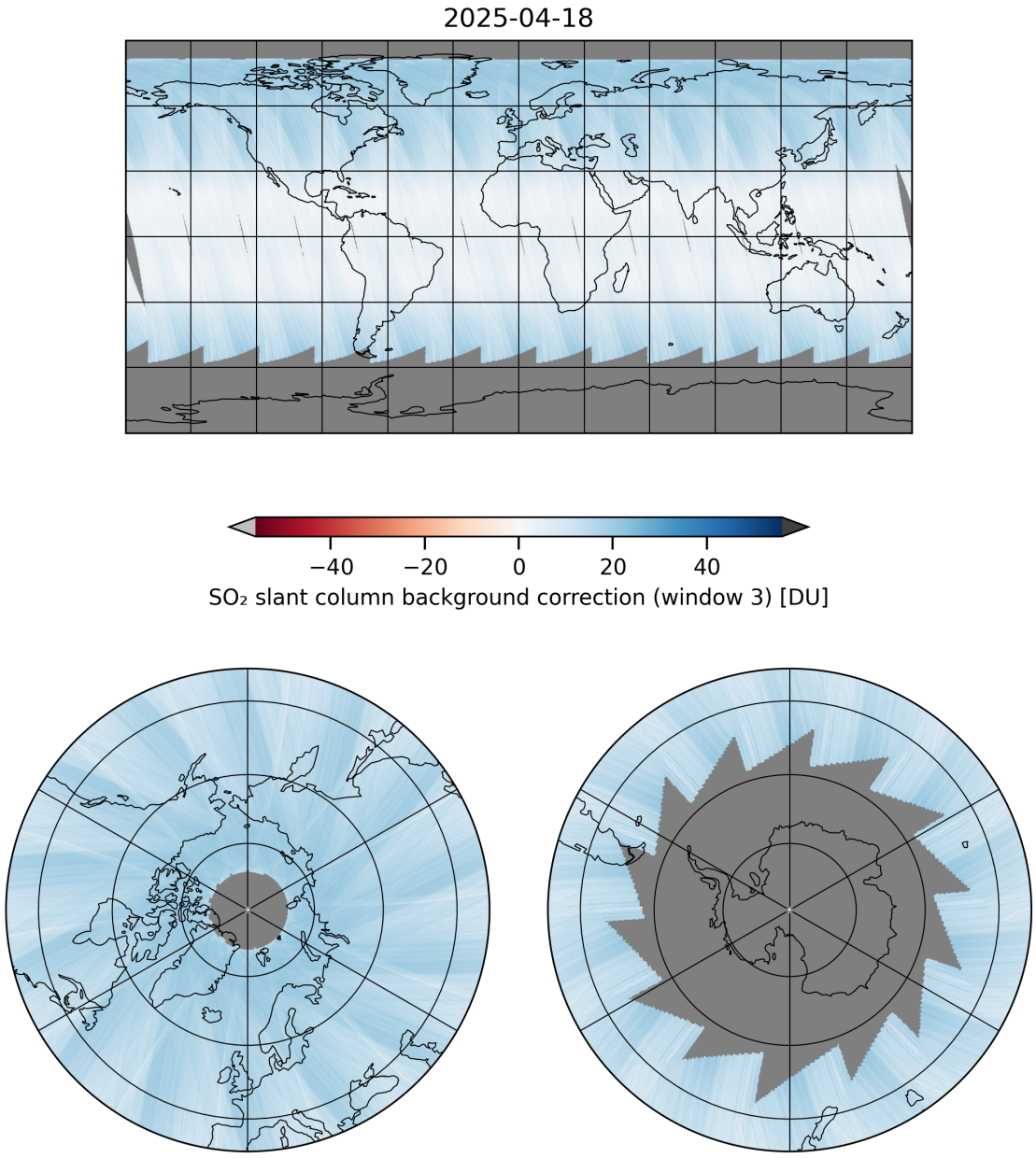


Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-04-18 to 2025-04-19

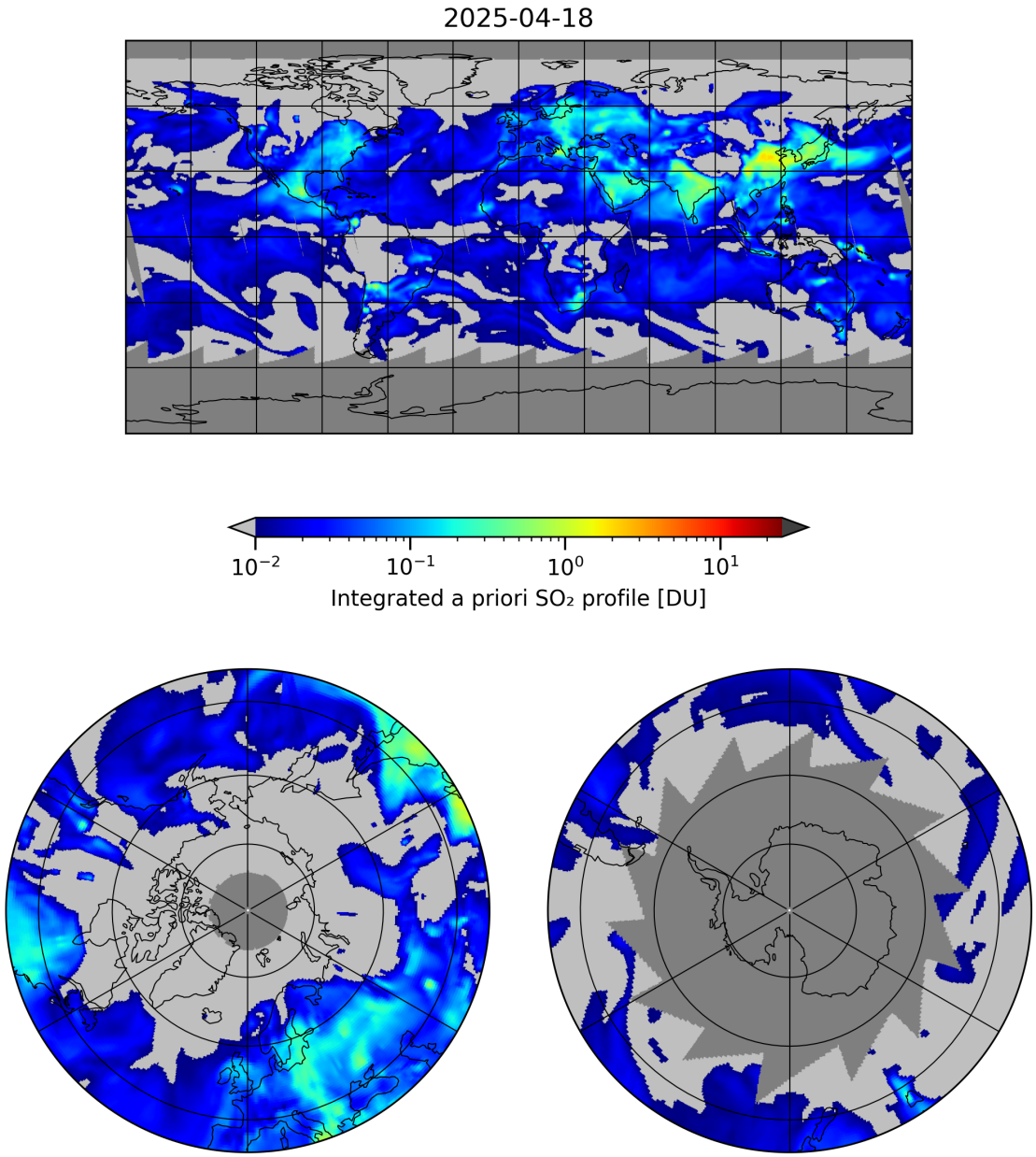


Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-04-18 to 2025-04-19

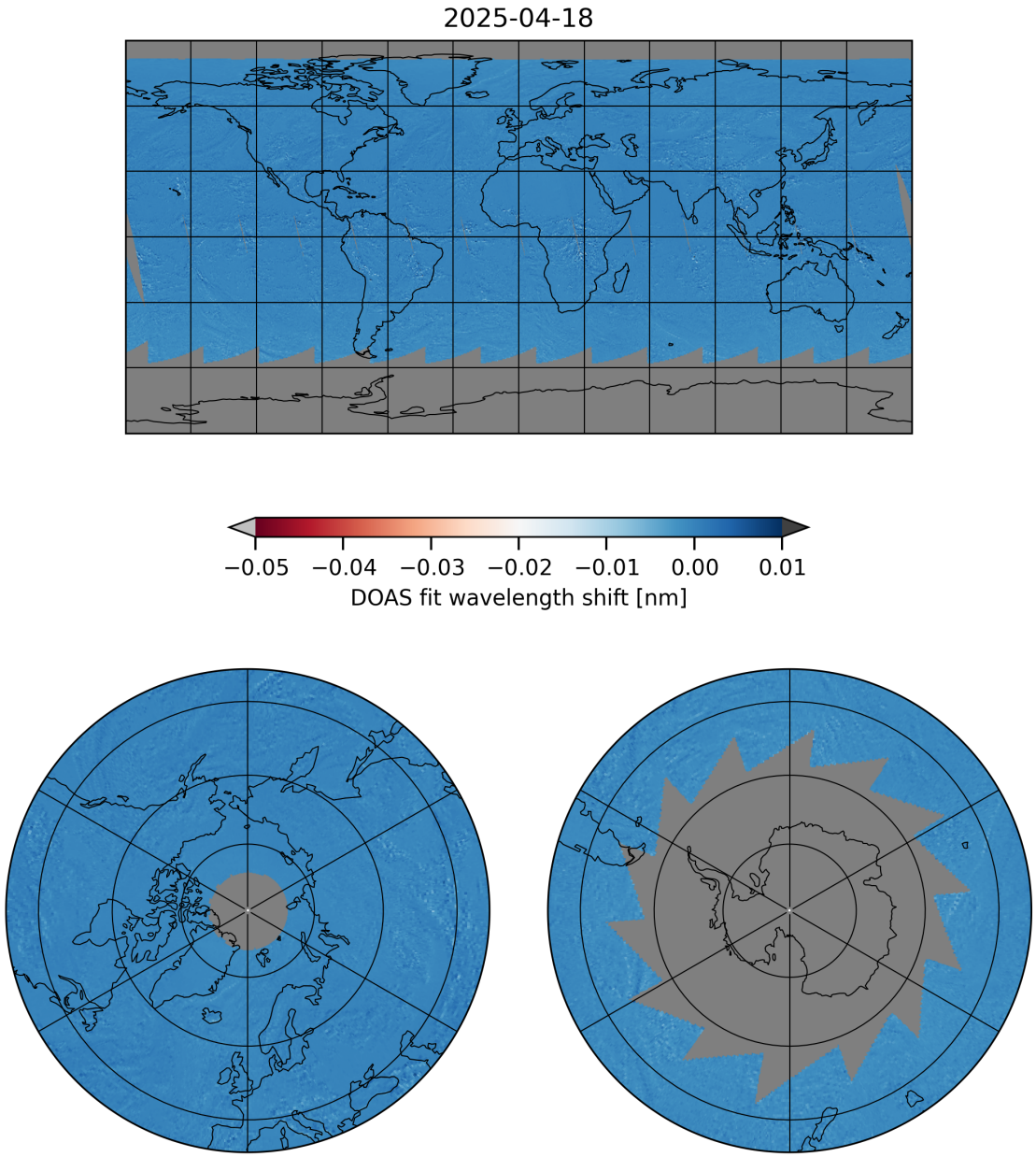


Figure 22: Map of “DOAS fit wavelength shift” for 2025-04-18 to 2025-04-19

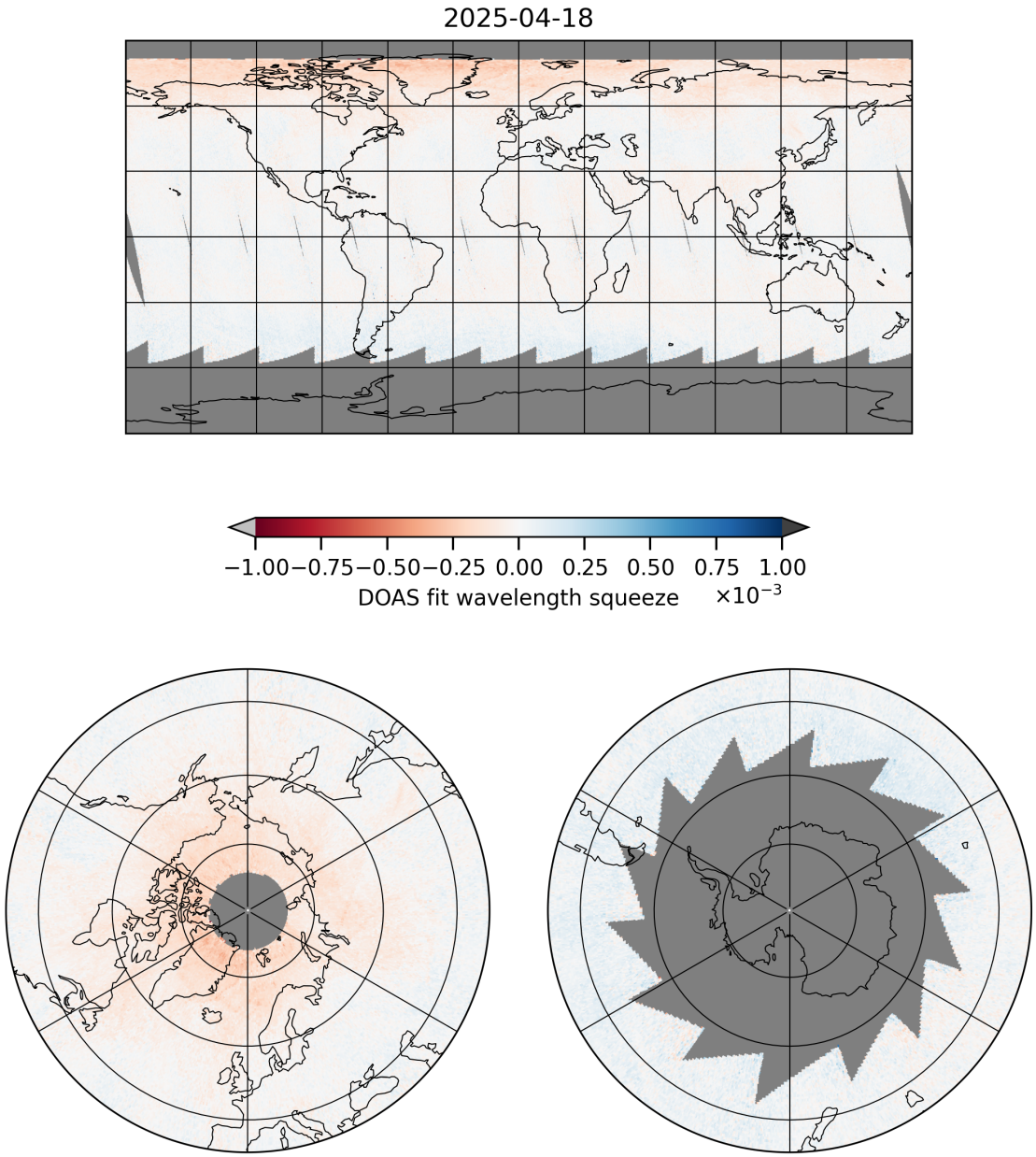


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-04-18 to 2025-04-19

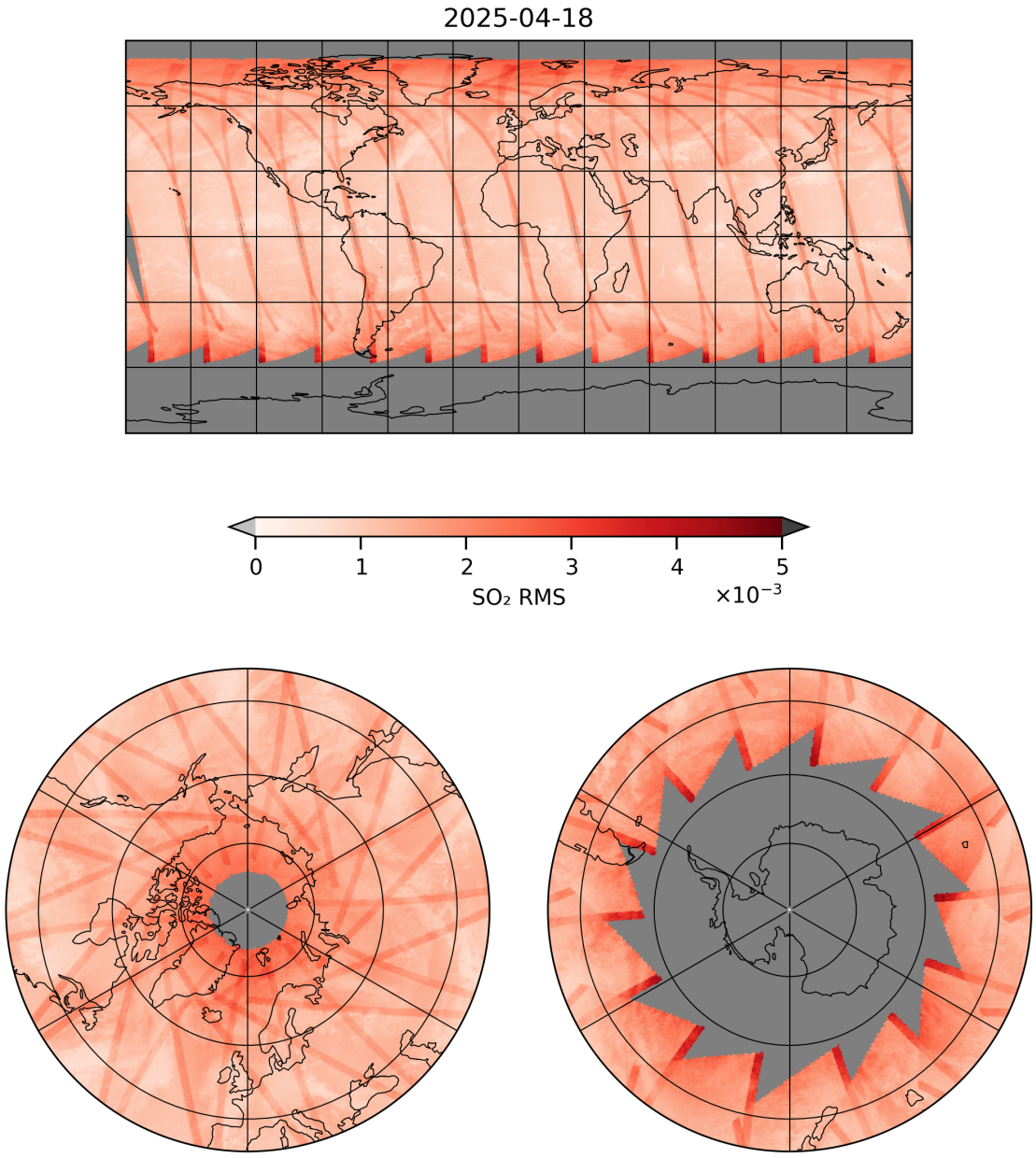


Figure 24: Map of "SO_2 RMS" for 2025-04-18 to 2025-04-19

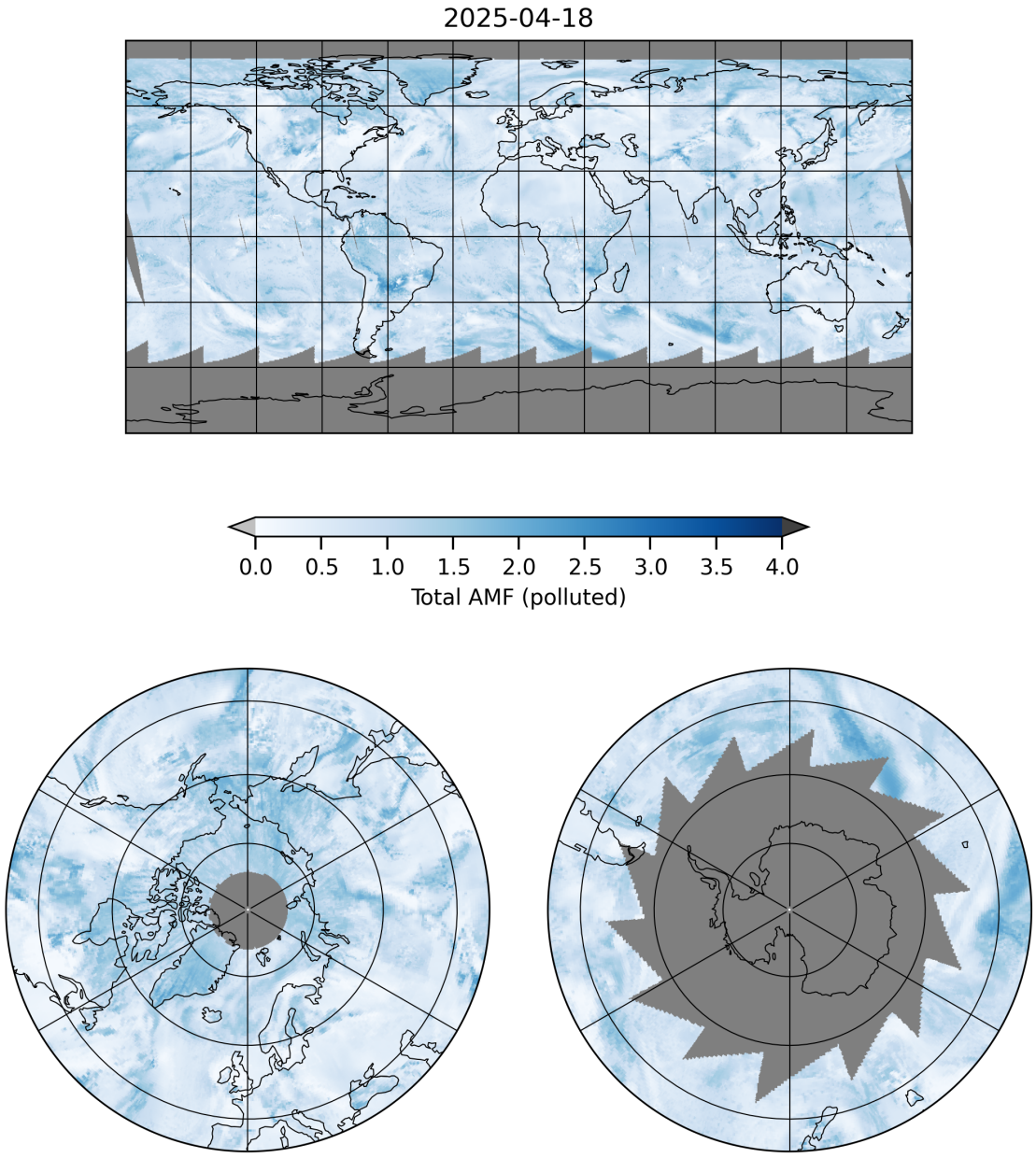


Figure 25: Map of “Total AMF (polluted)” for 2025-04-18 to 2025-04-19

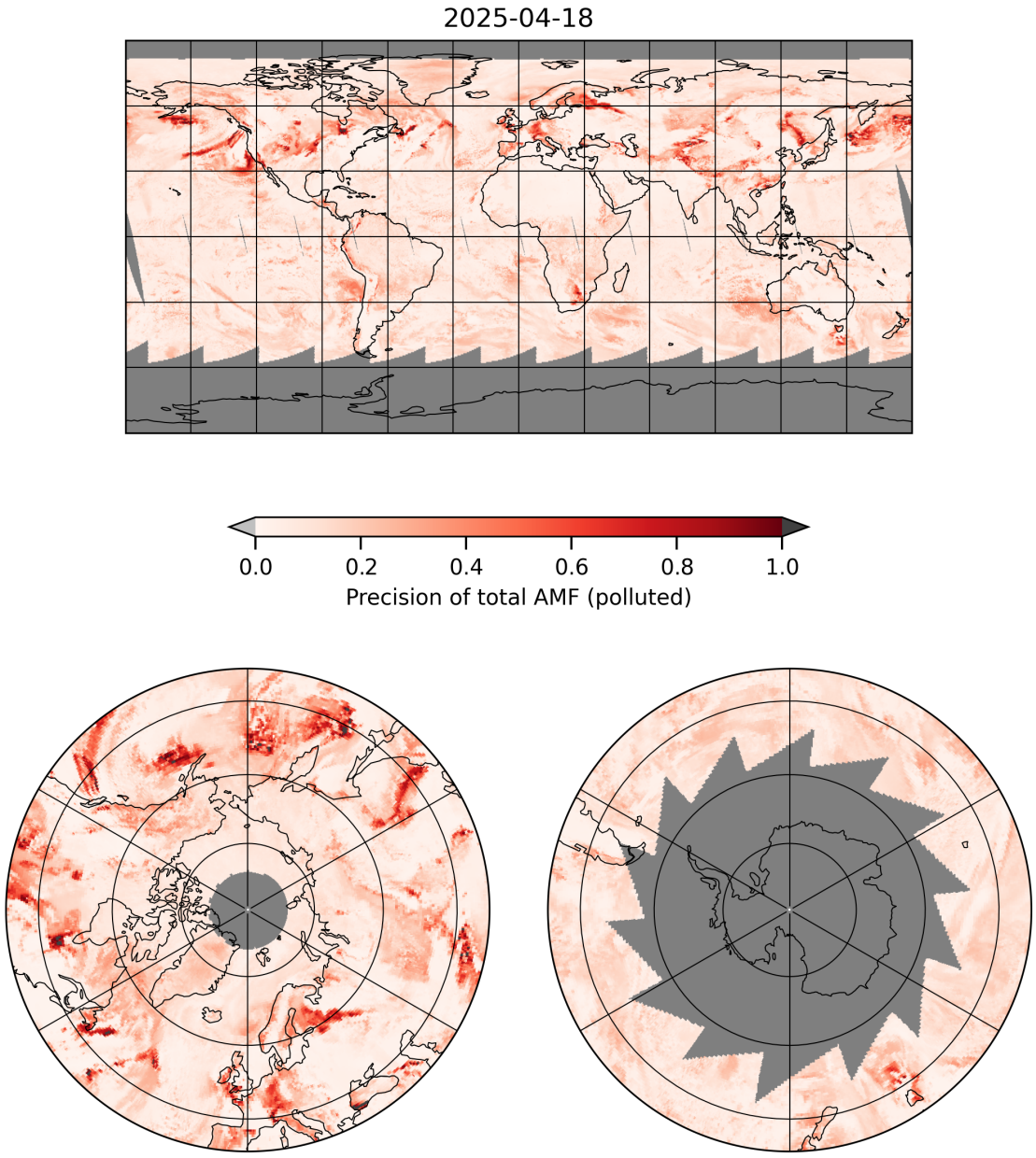


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-04-18 to 2025-04-19

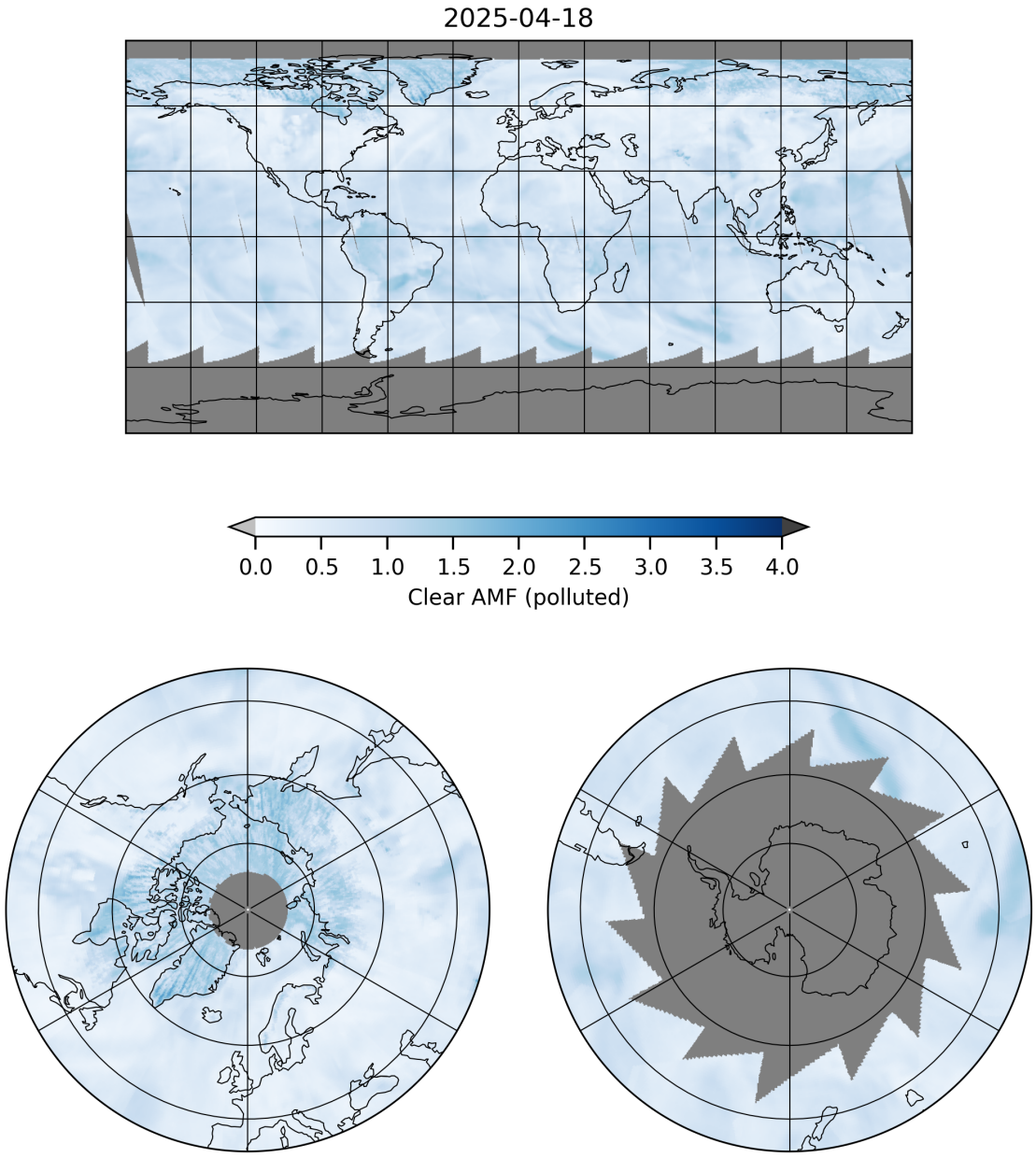


Figure 27: Map of “Clear AMF (polluted)” for 2025-04-18 to 2025-04-19

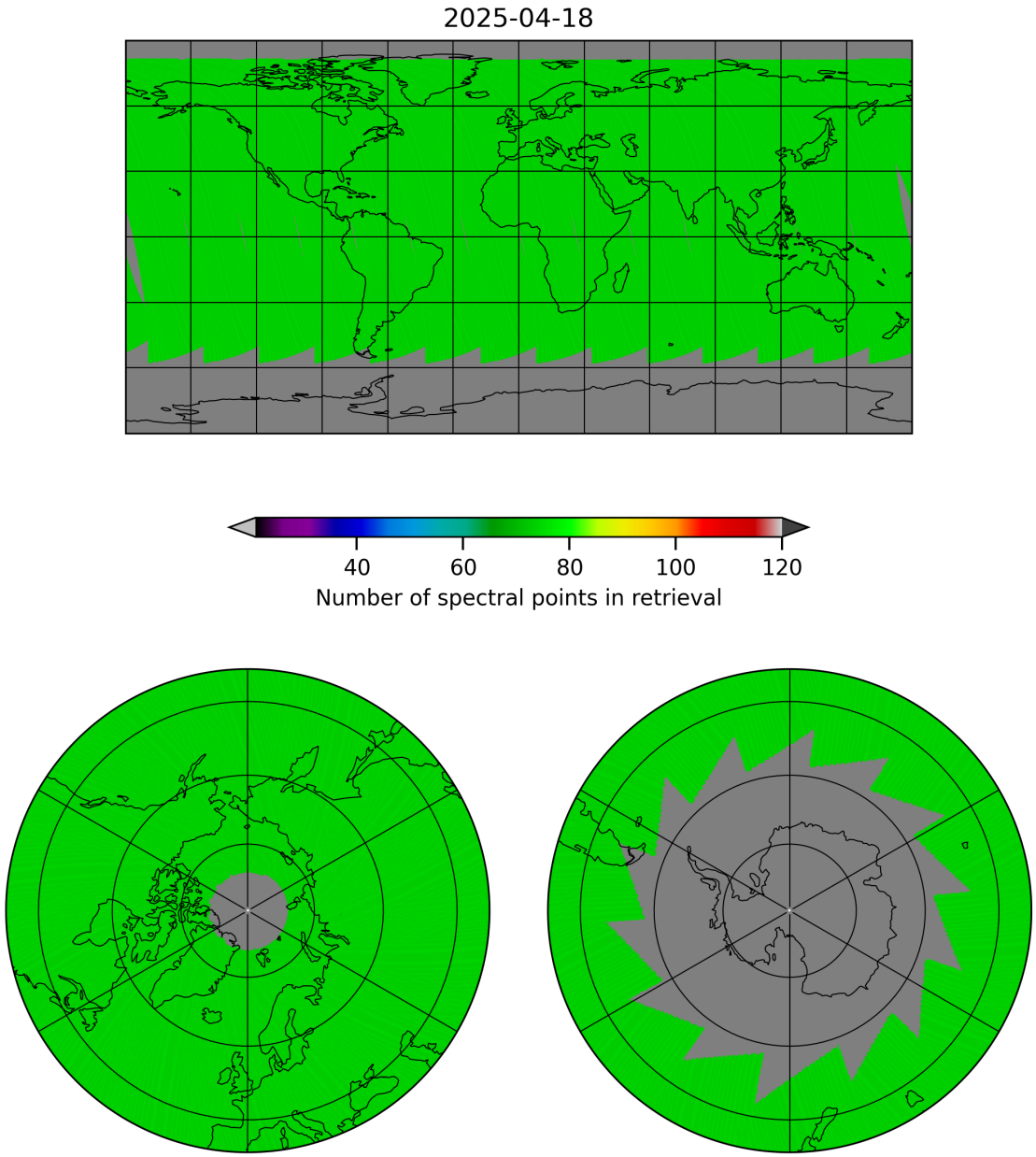


Figure 28: Map of “Number of spectral points in retrieval” for 2025-04-18 to 2025-04-19

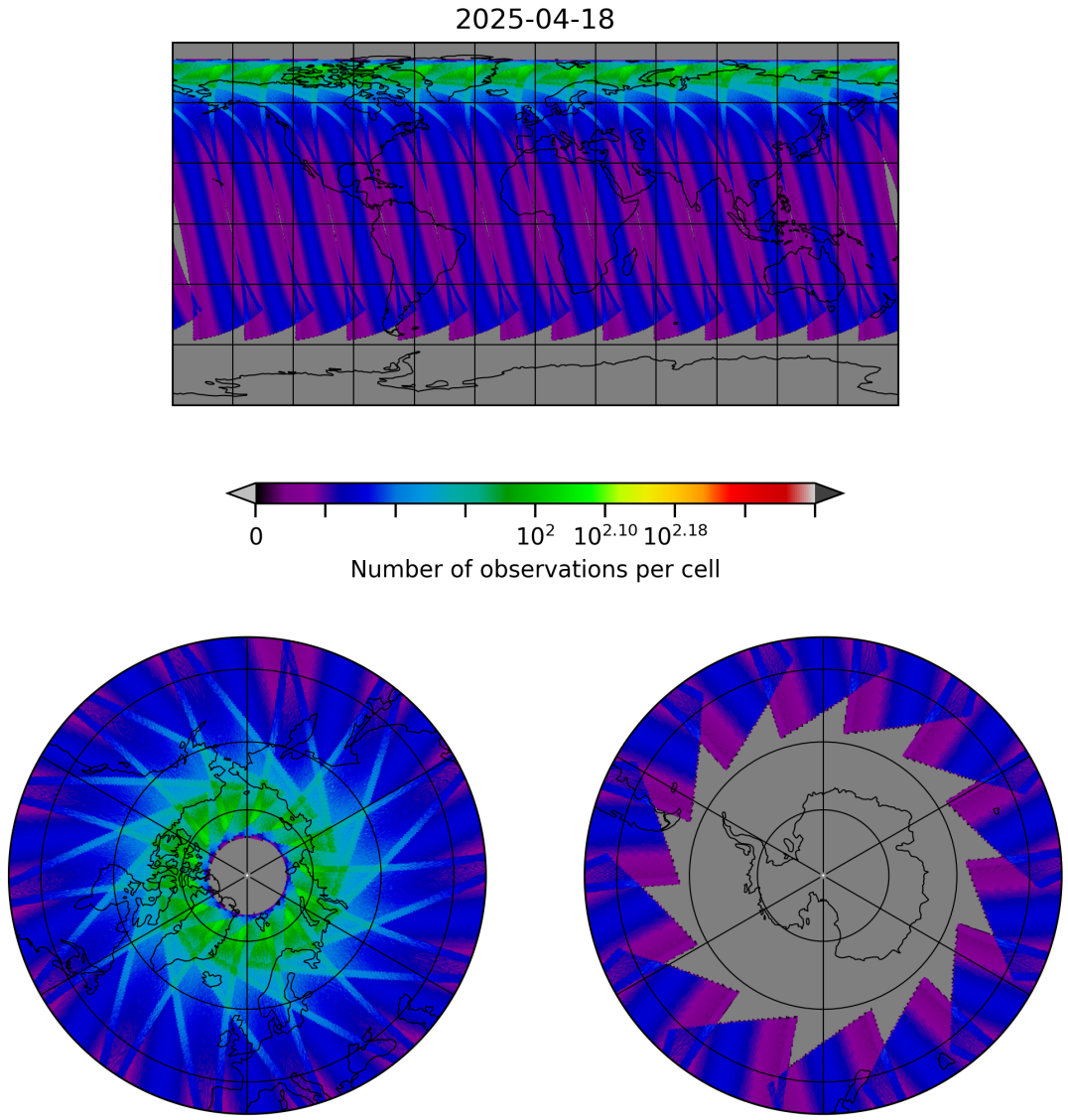


Figure 29: Map of the number of observations for 2025-04-18 to 2025-04-19

7 Zonal average

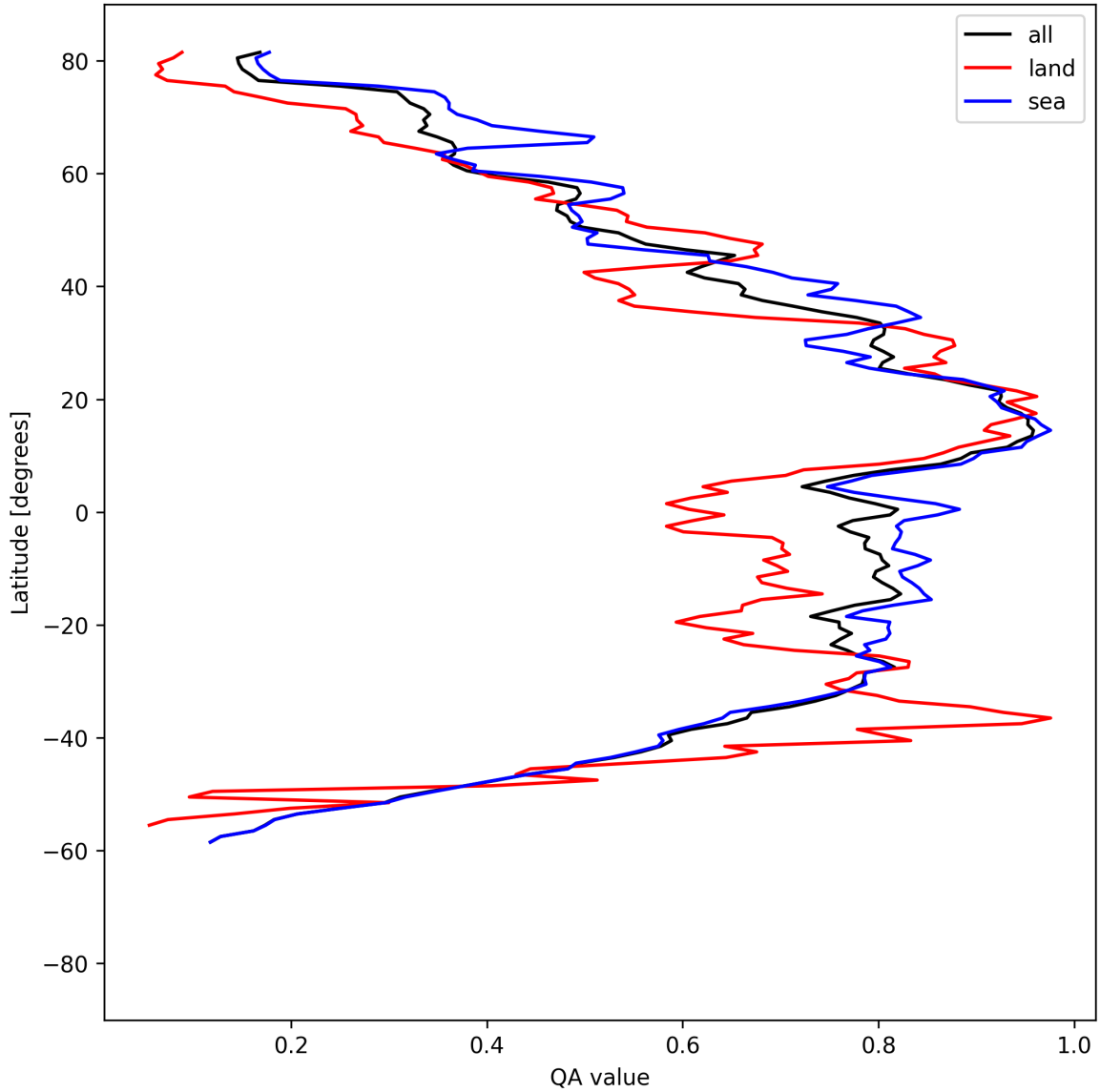


Figure 30: Zonal average of “QA value” for 2025-04-18 to 2025-04-19.

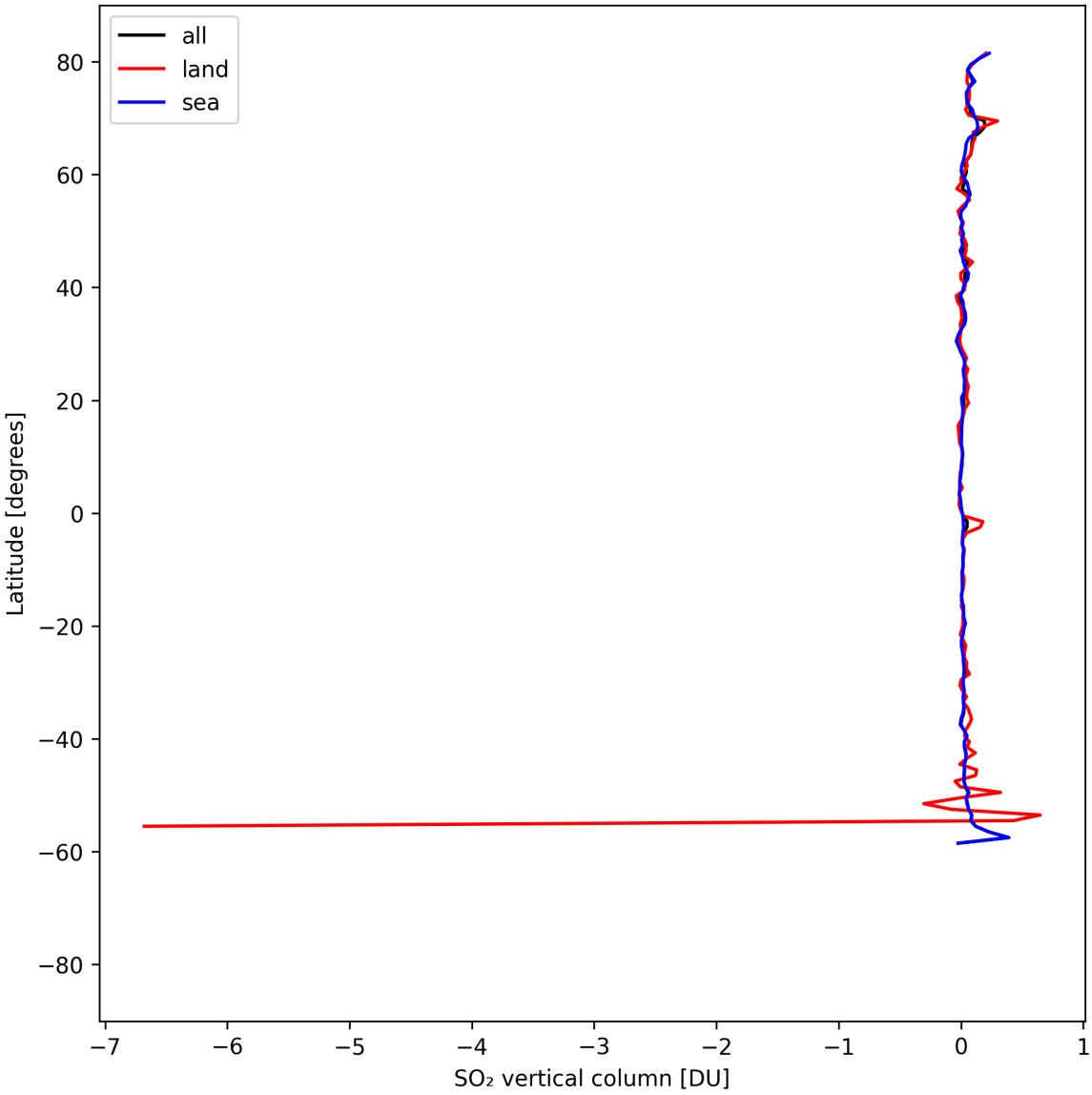


Figure 31: Zonal average of "SO_2 vertical column" for 2025-04-18 to 2025-04-19.

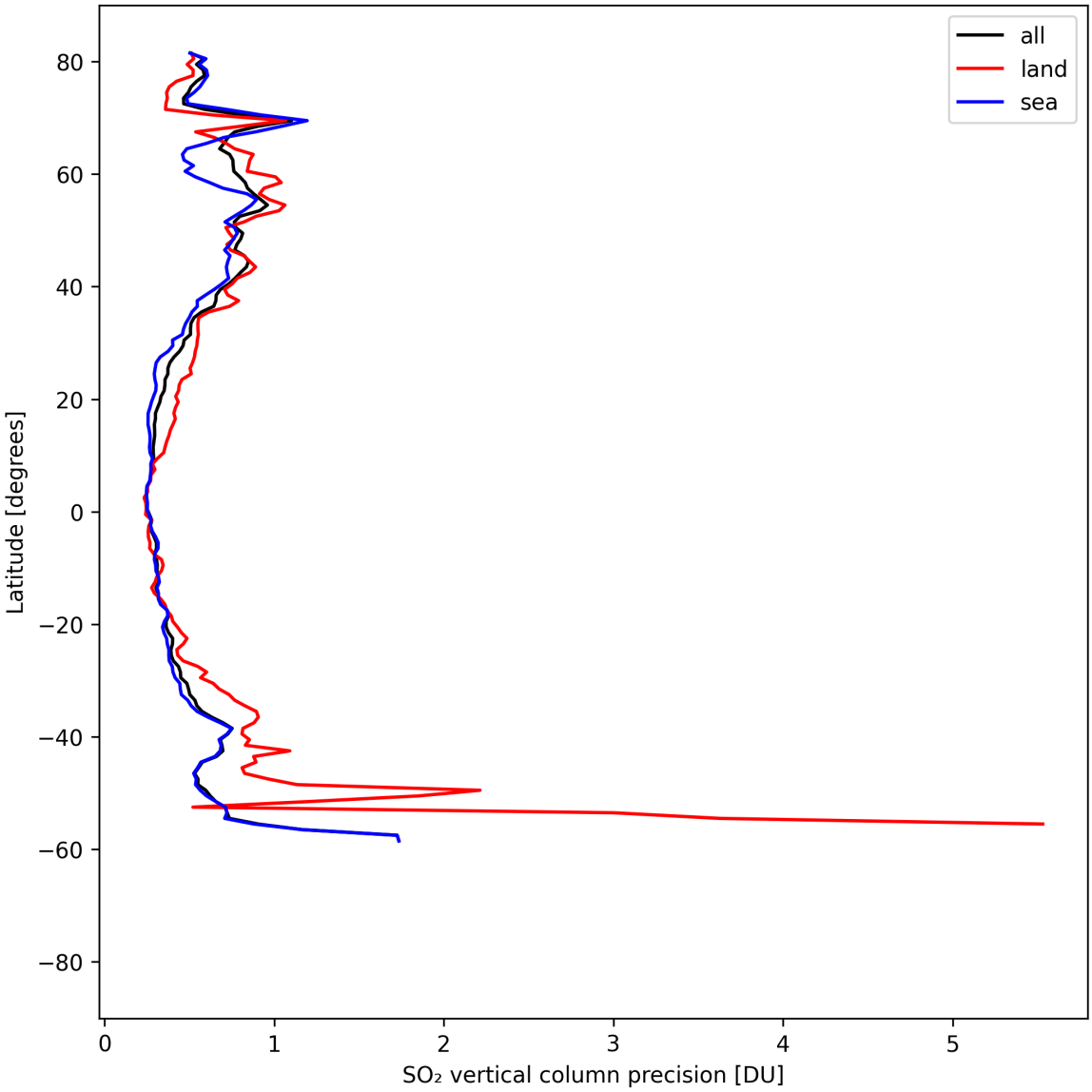


Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-04-18 to 2025-04-19.

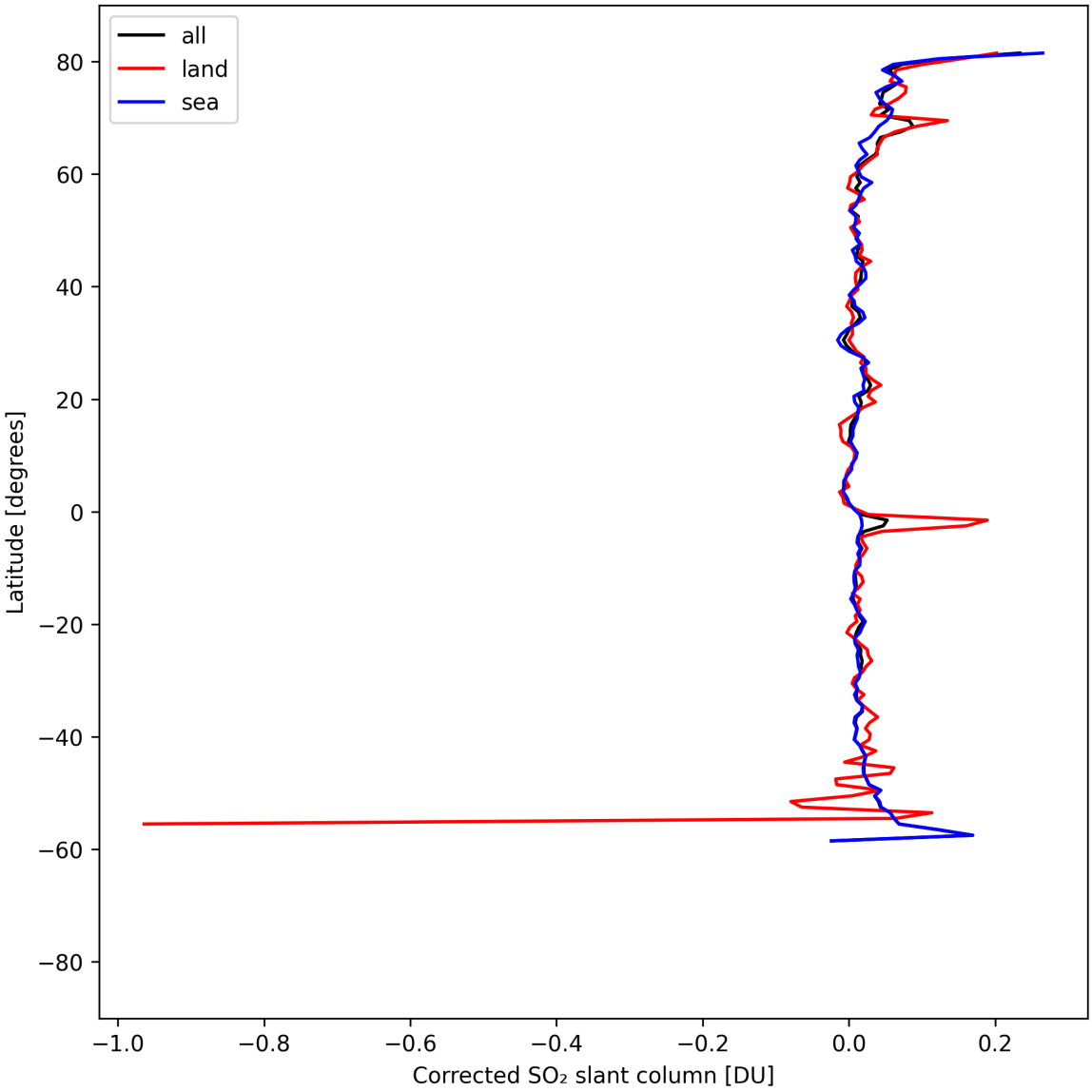


Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-04-18 to 2025-04-19.

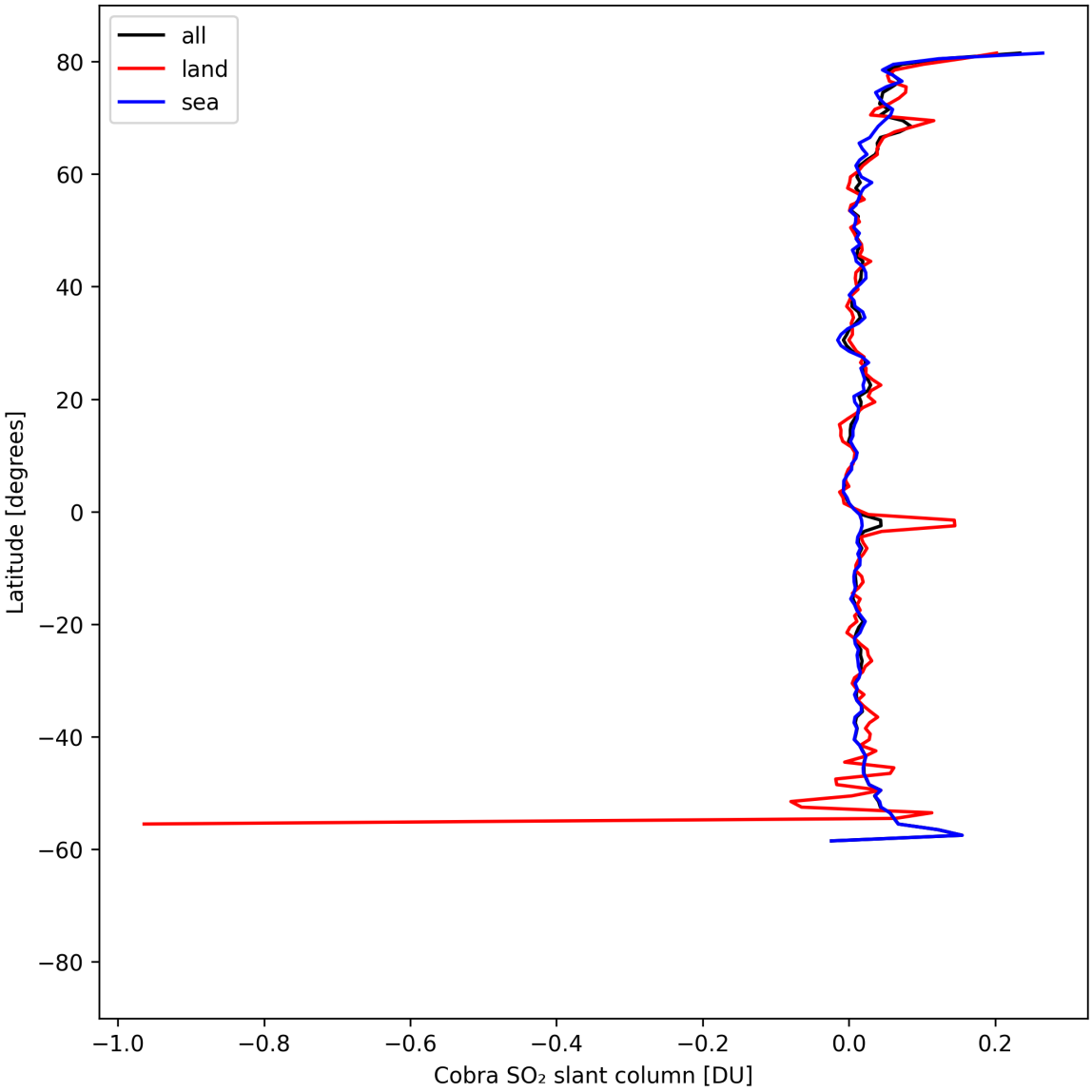


Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-04-18 to 2025-04-19.

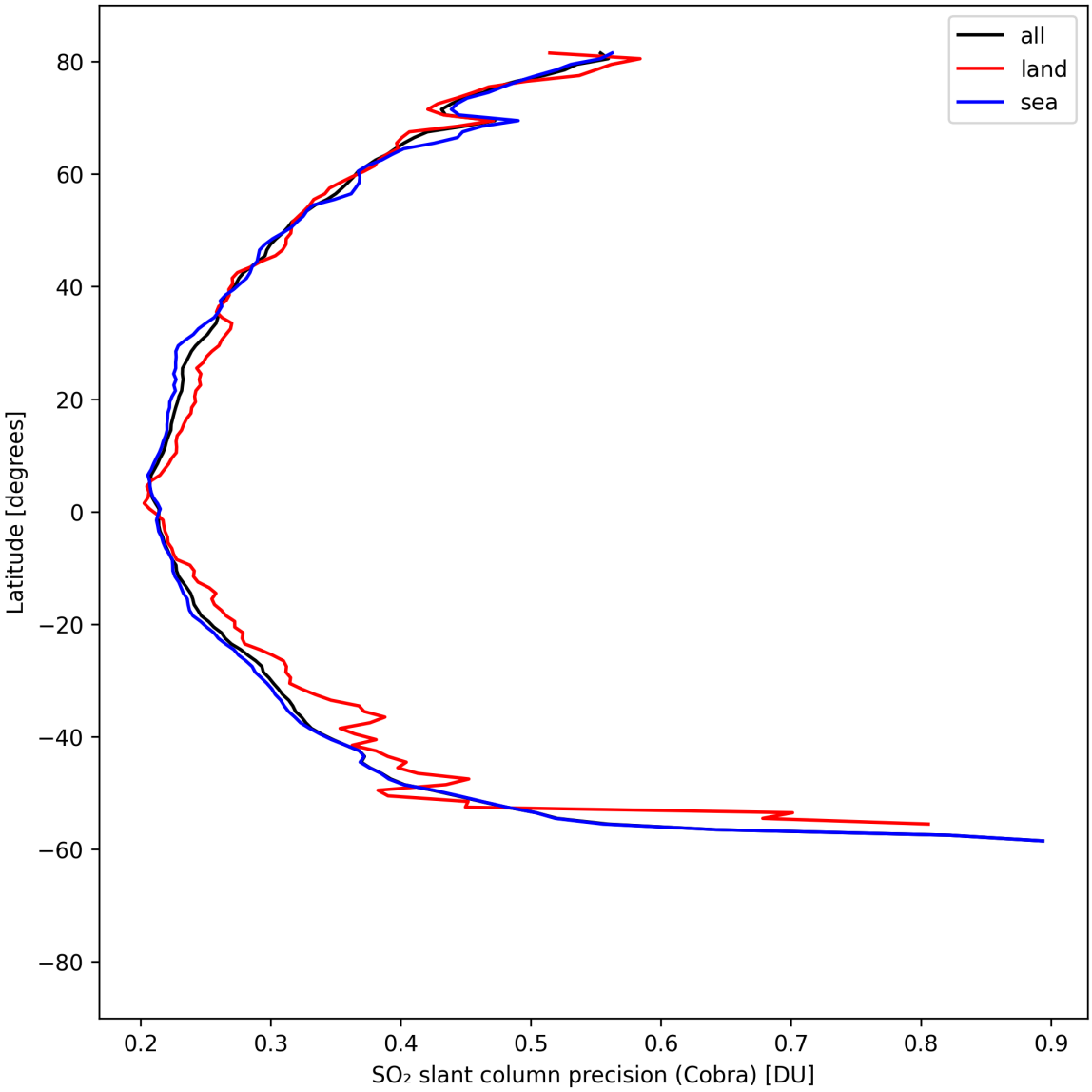


Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-04-18 to 2025-04-19.

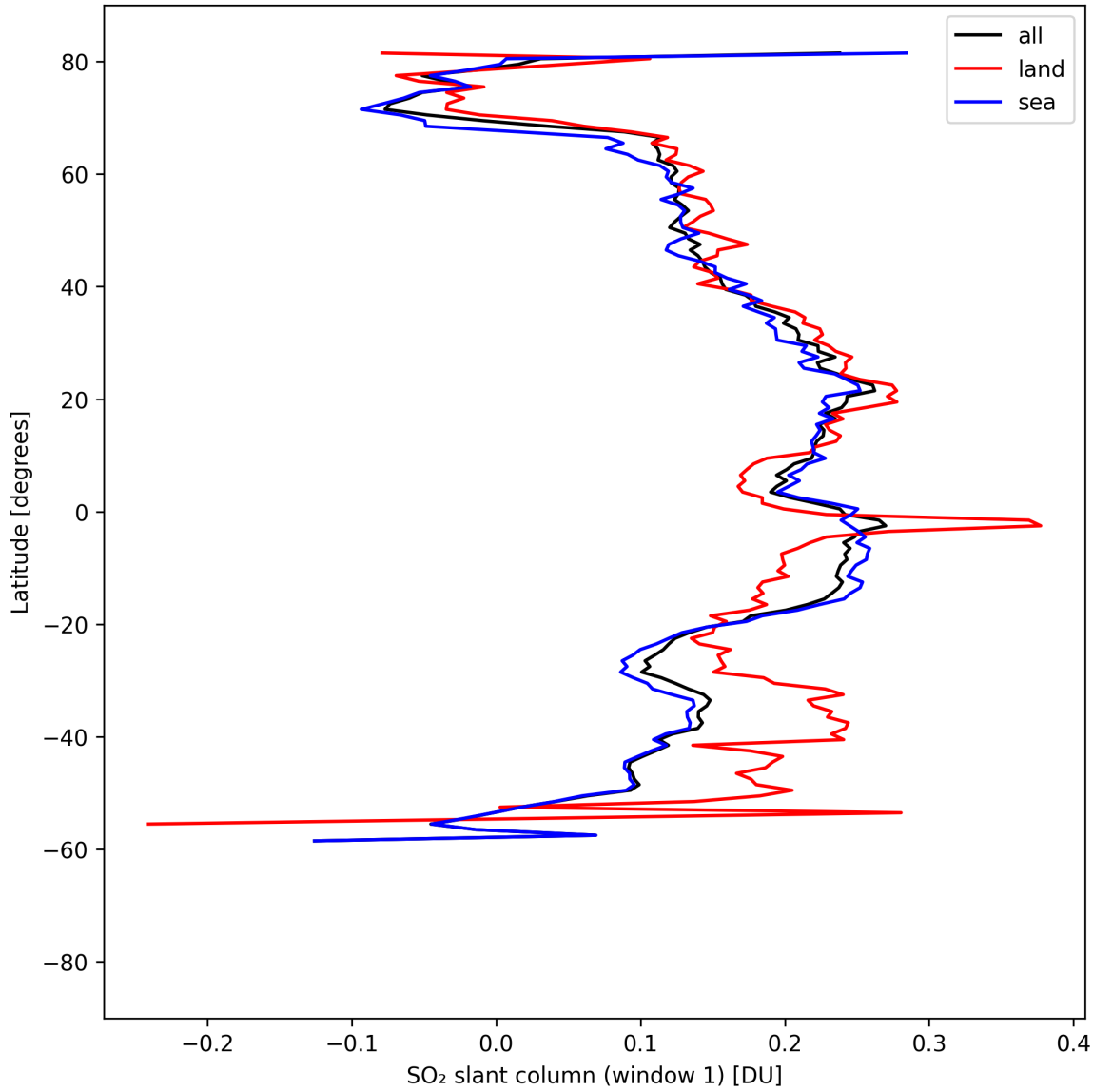


Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-04-18 to 2025-04-19.

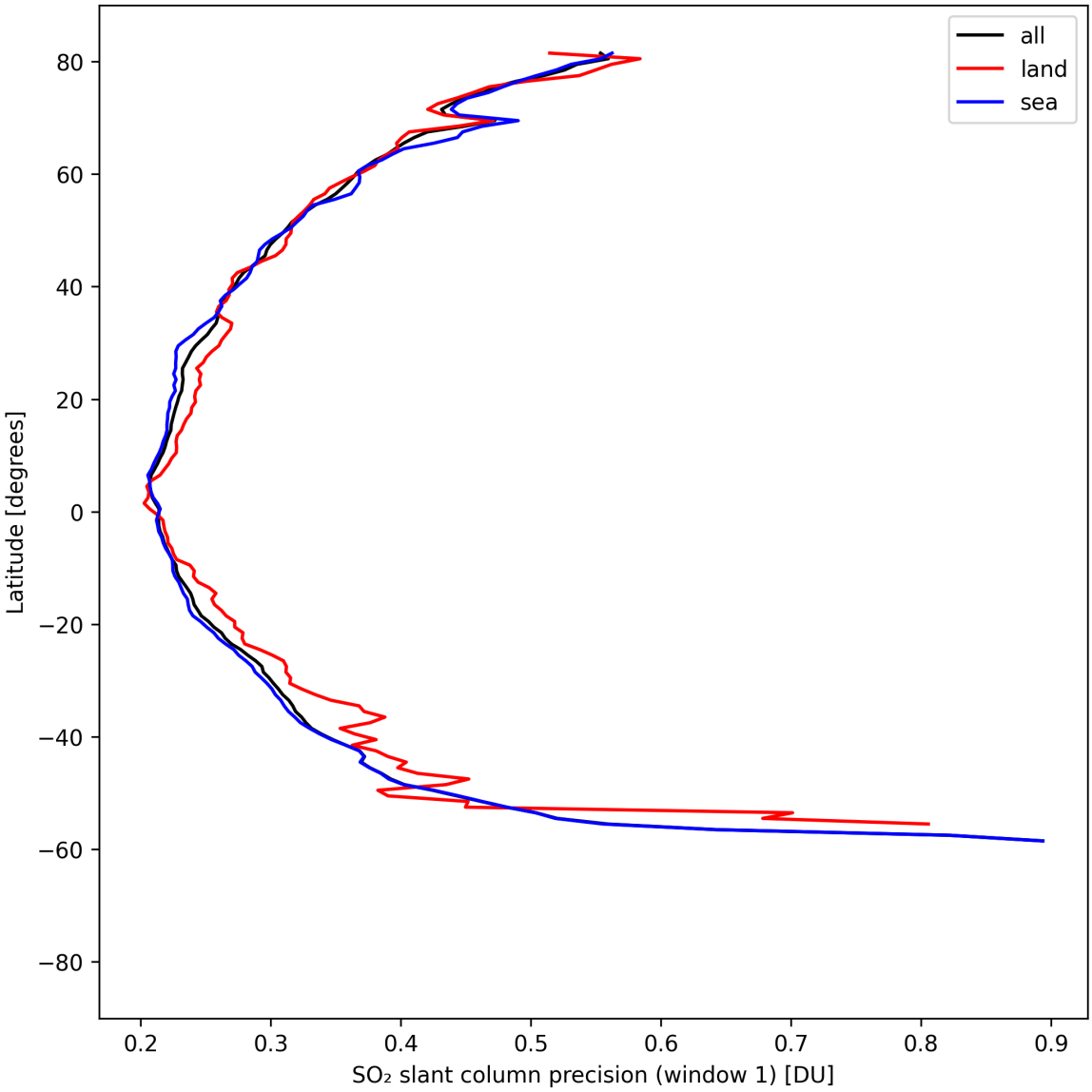


Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-04-18 to 2025-04-19.

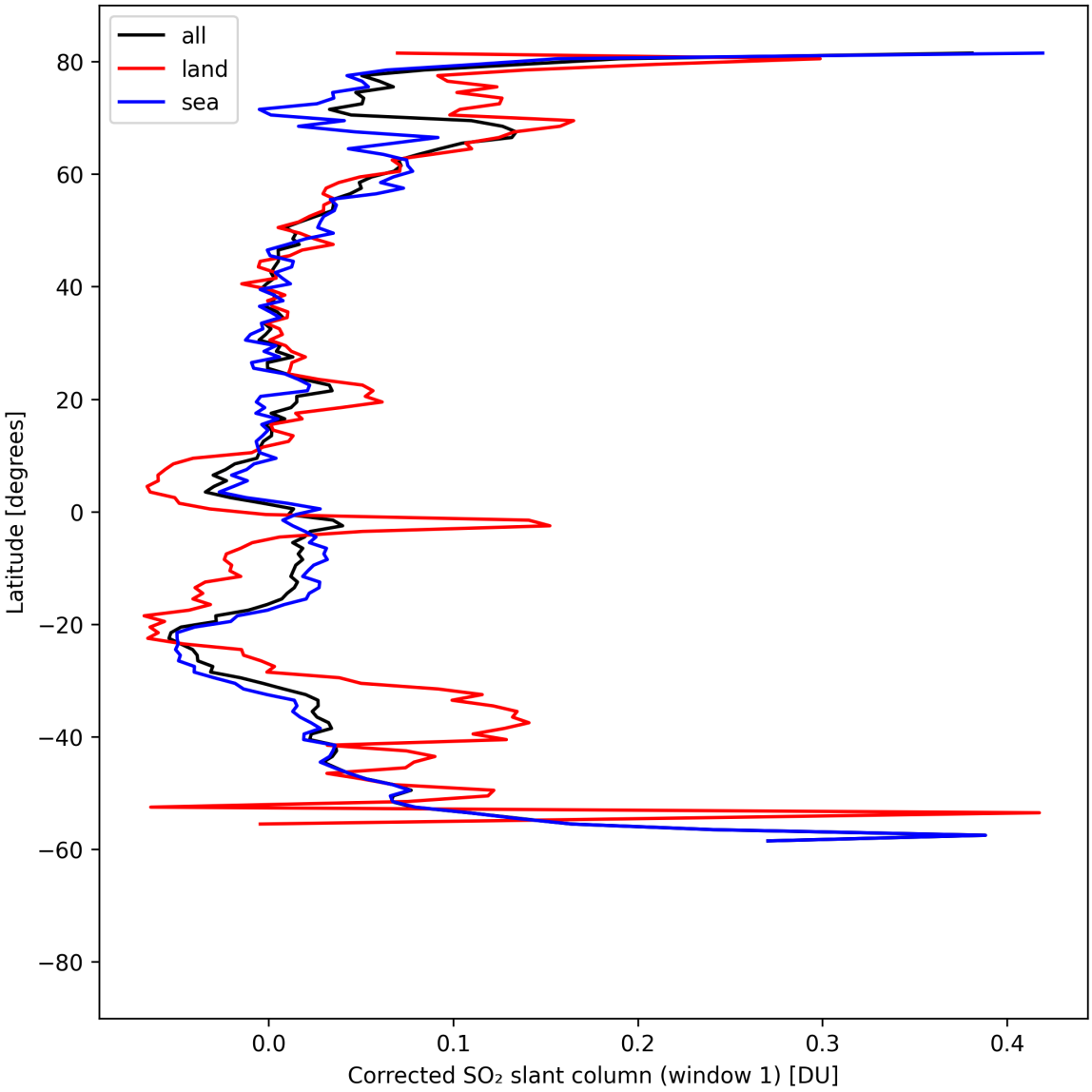


Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-04-18 to 2025-04-19.

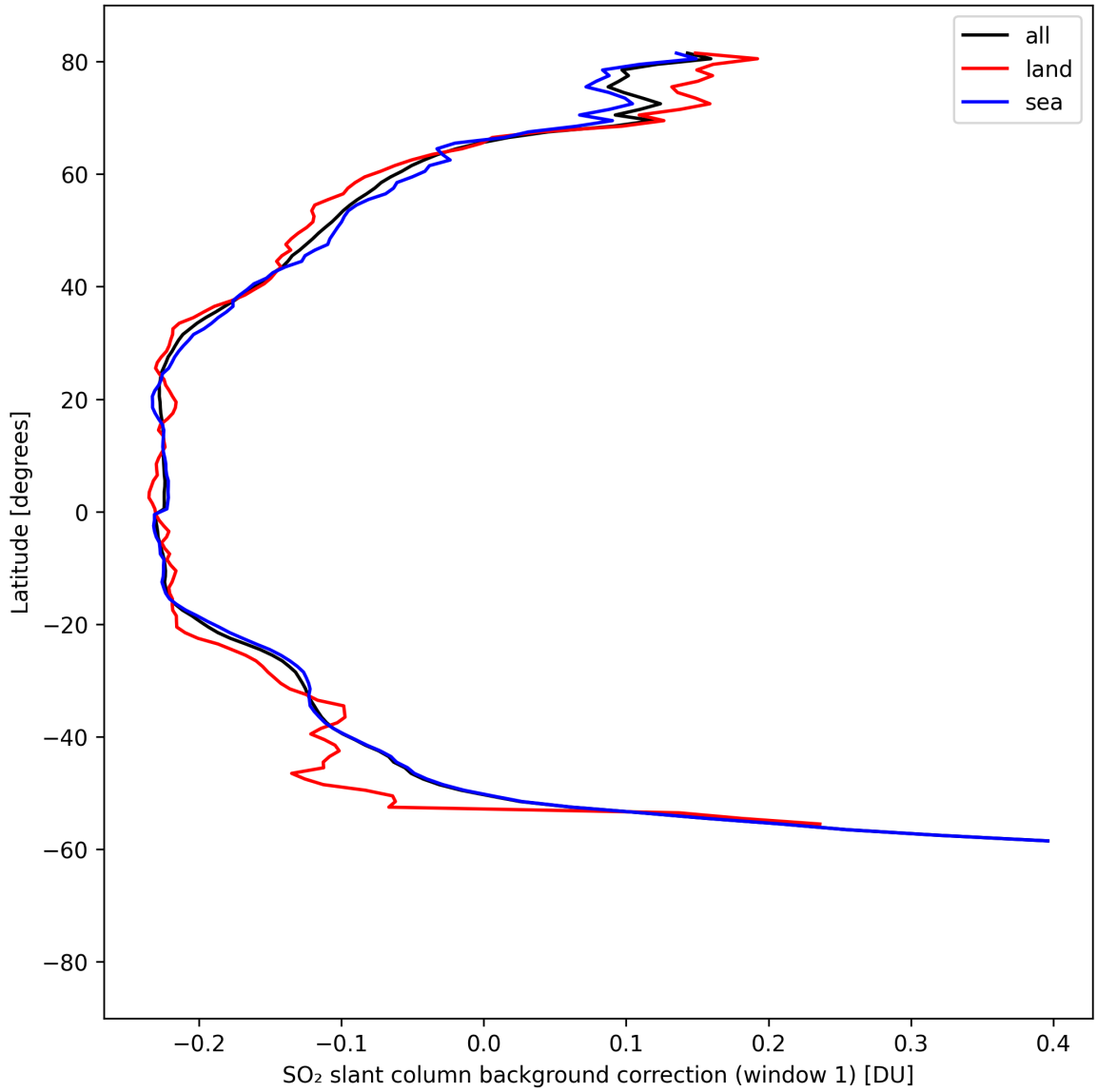


Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-04-18 to 2025-04-19.

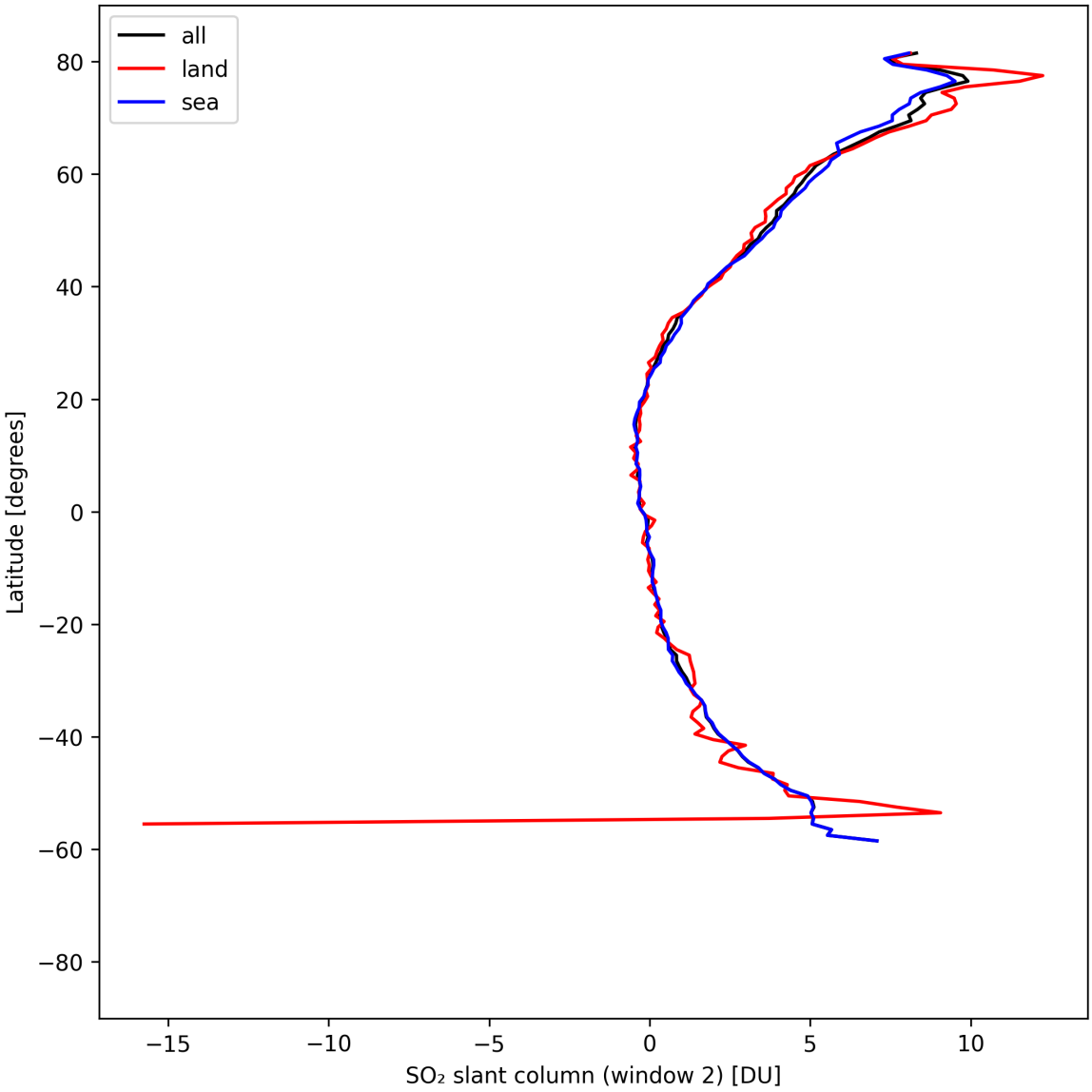


Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-04-18 to 2025-04-19.

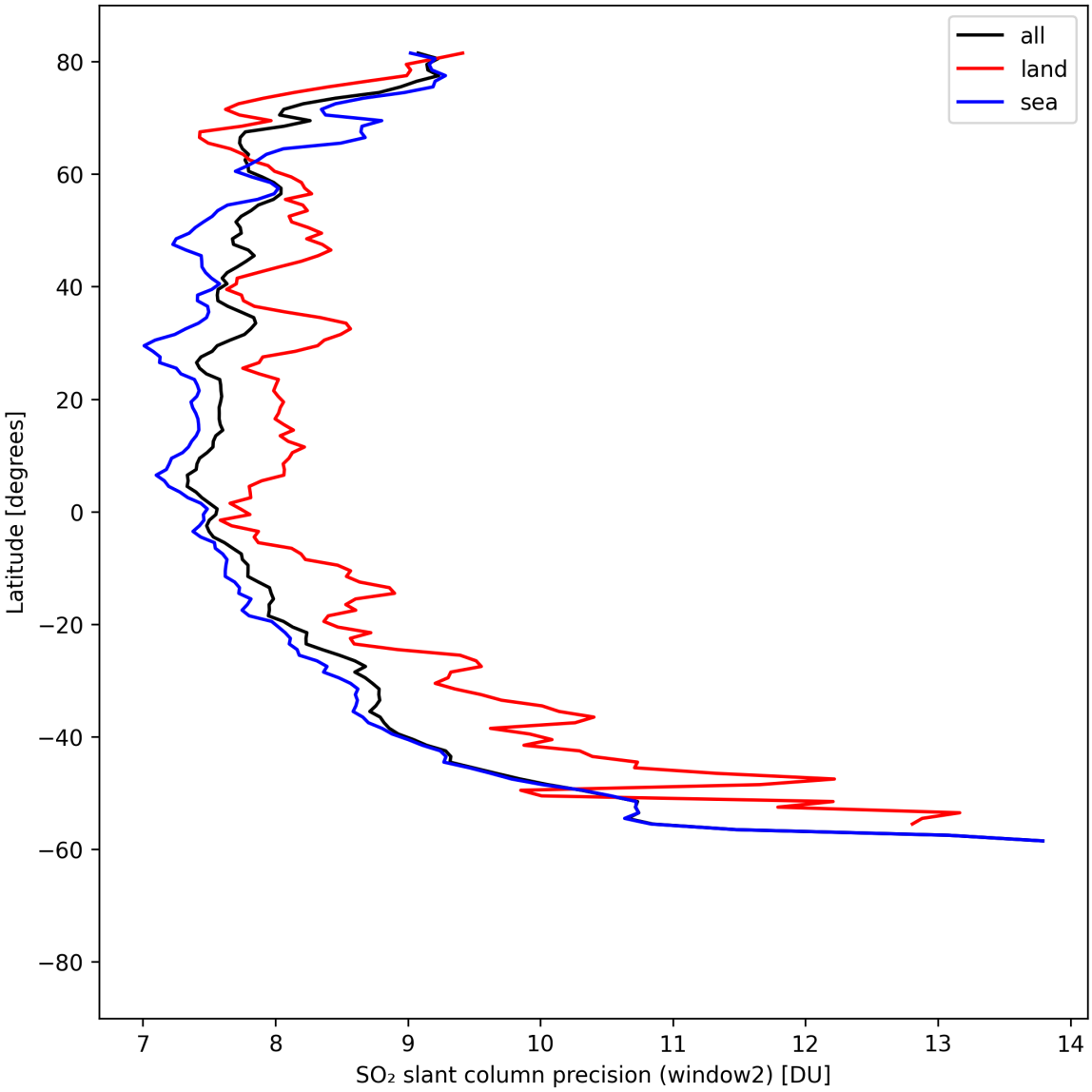


Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-04-18 to 2025-04-19.

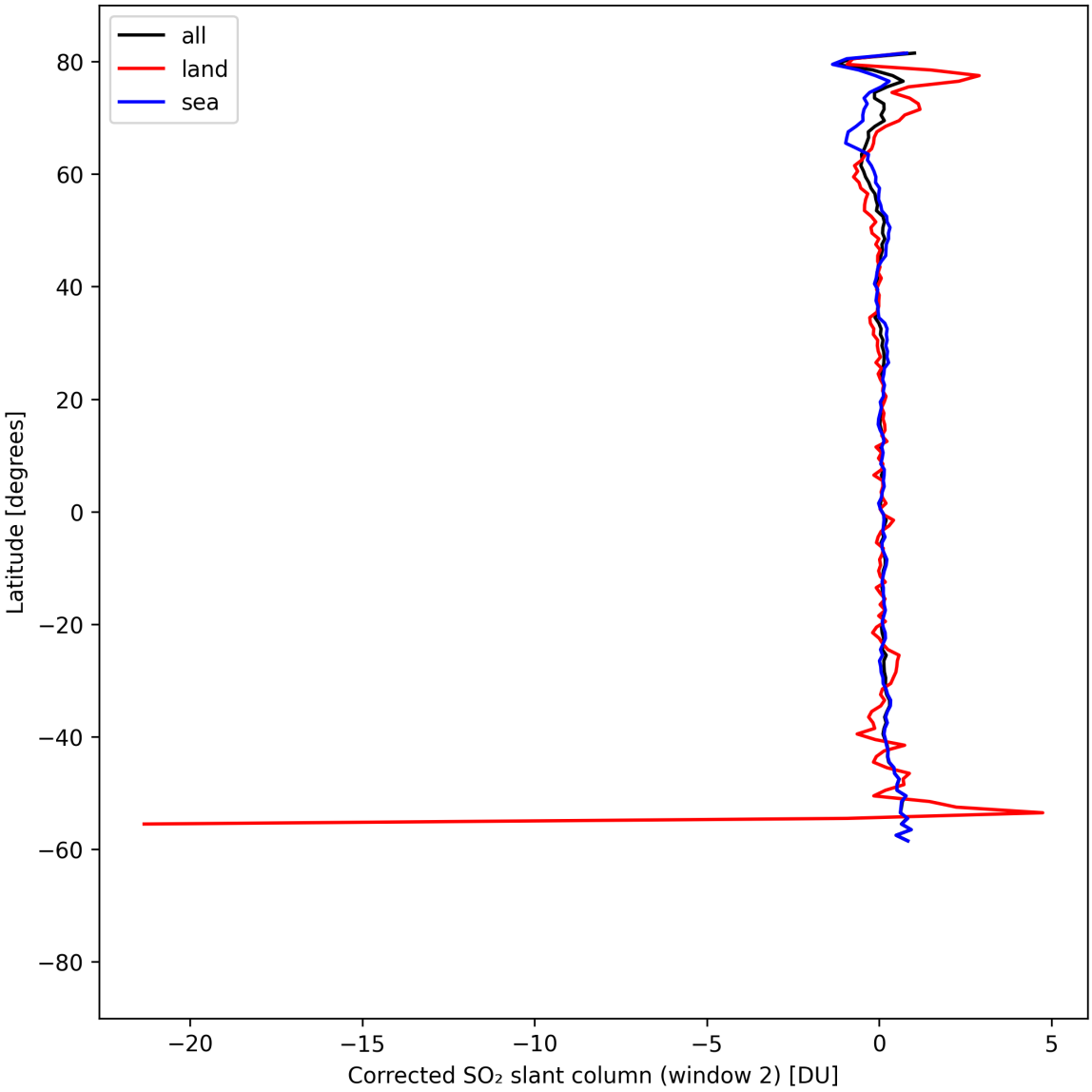


Figure 42: Zonal average of “Corrected SO_2 slant column (window 2)” for 2025-04-18 to 2025-04-19.

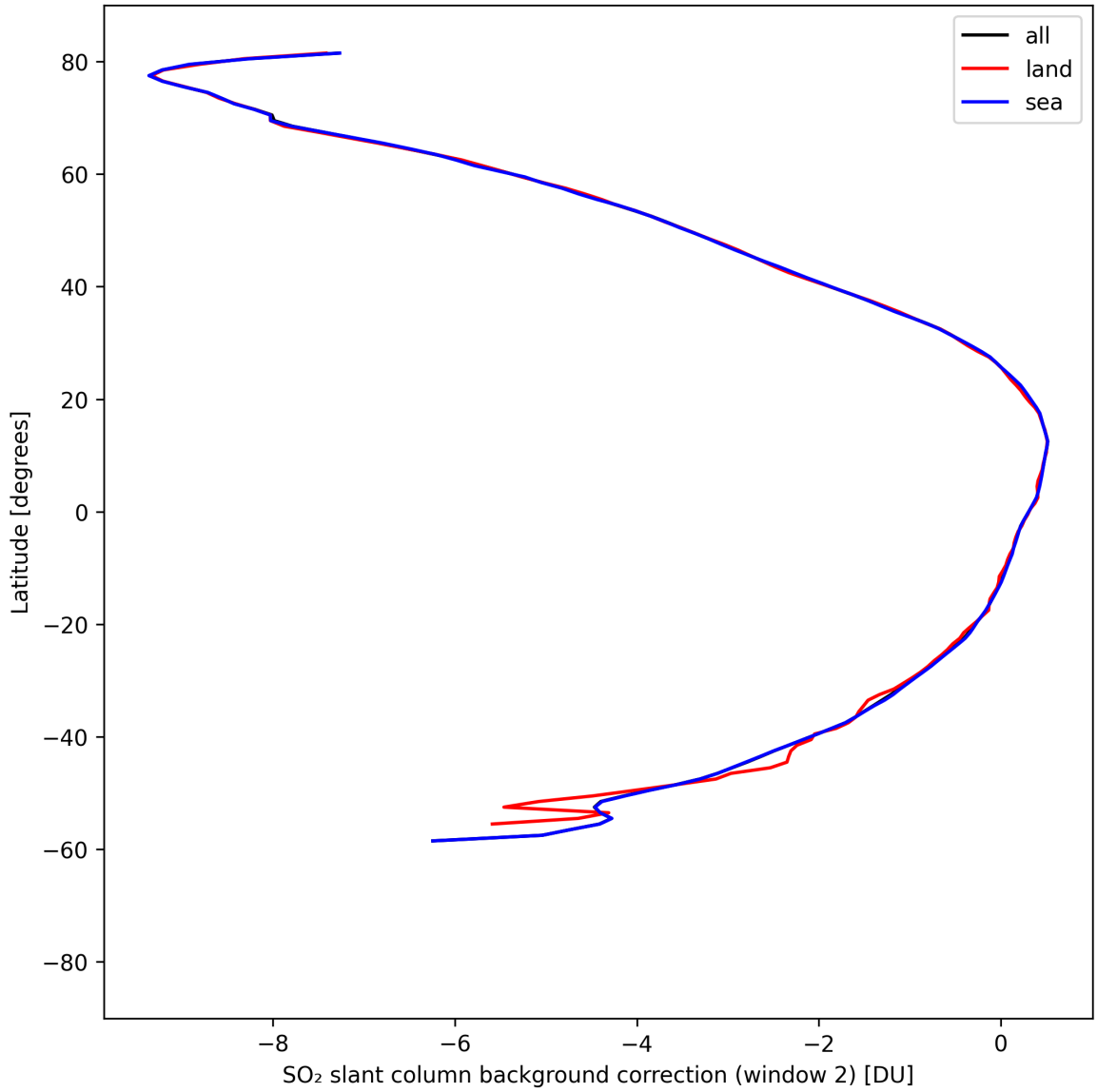


Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-04-18 to 2025-04-19.

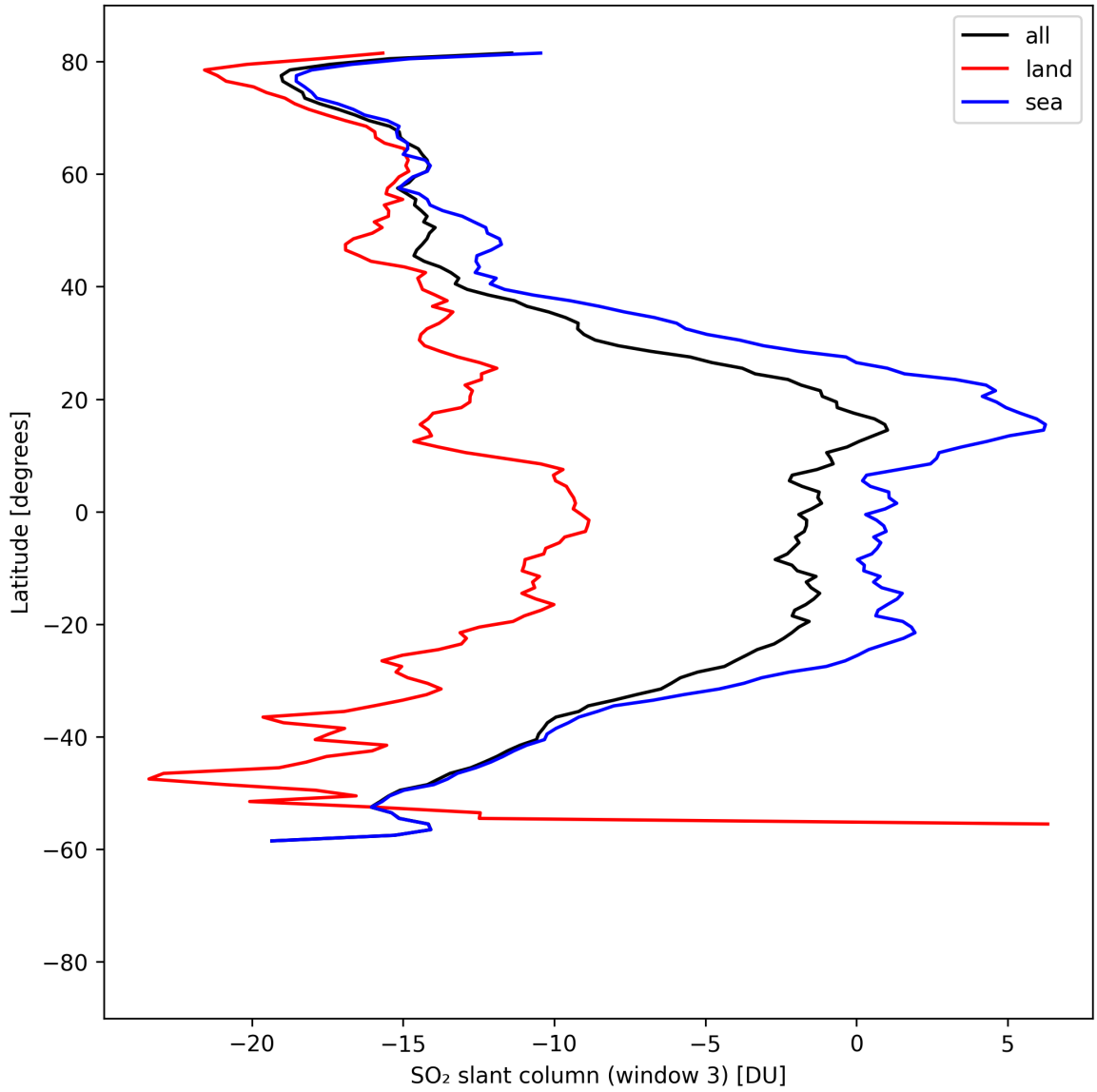


Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-04-18 to 2025-04-19.

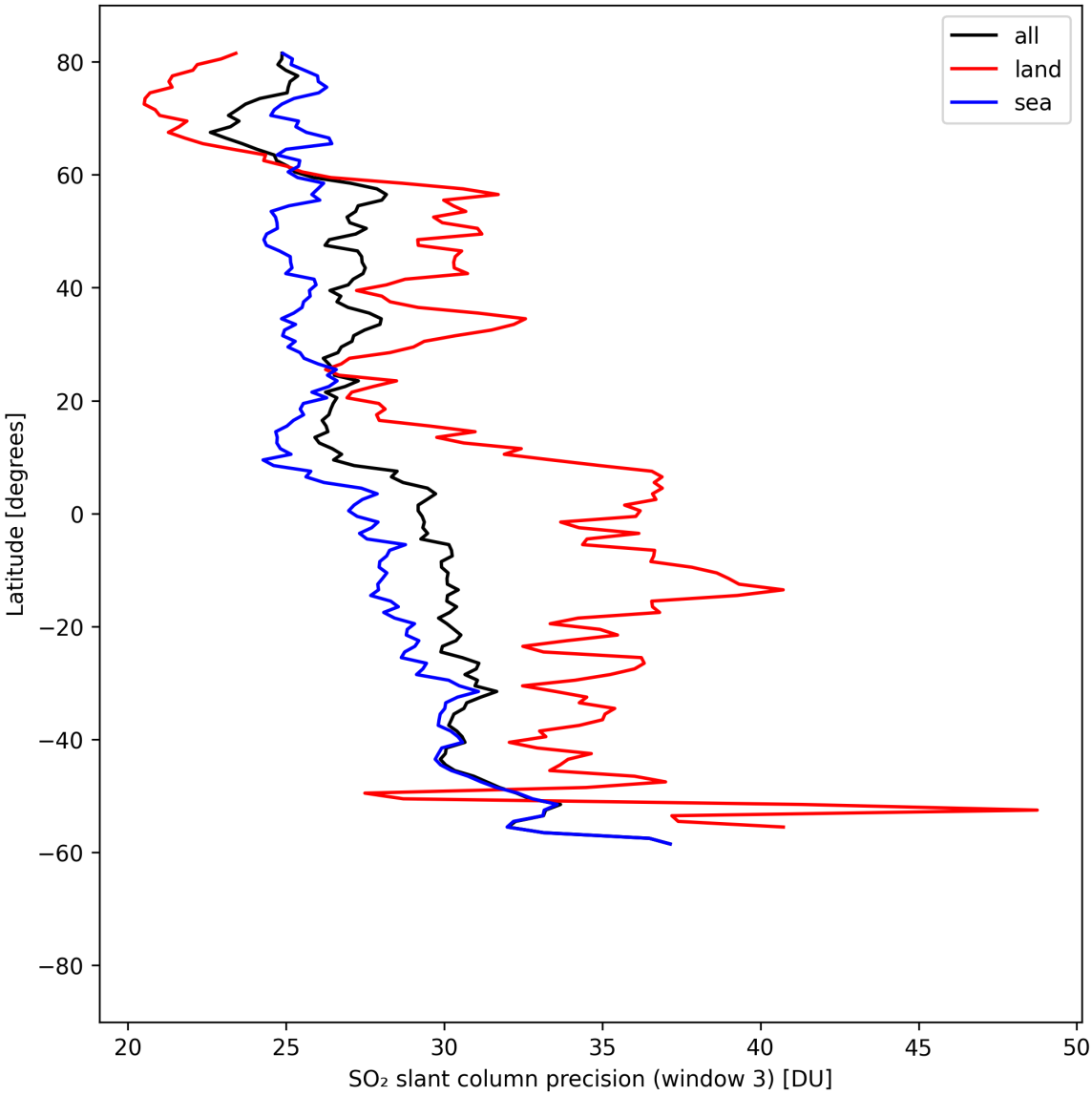


Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-04-18 to 2025-04-19.

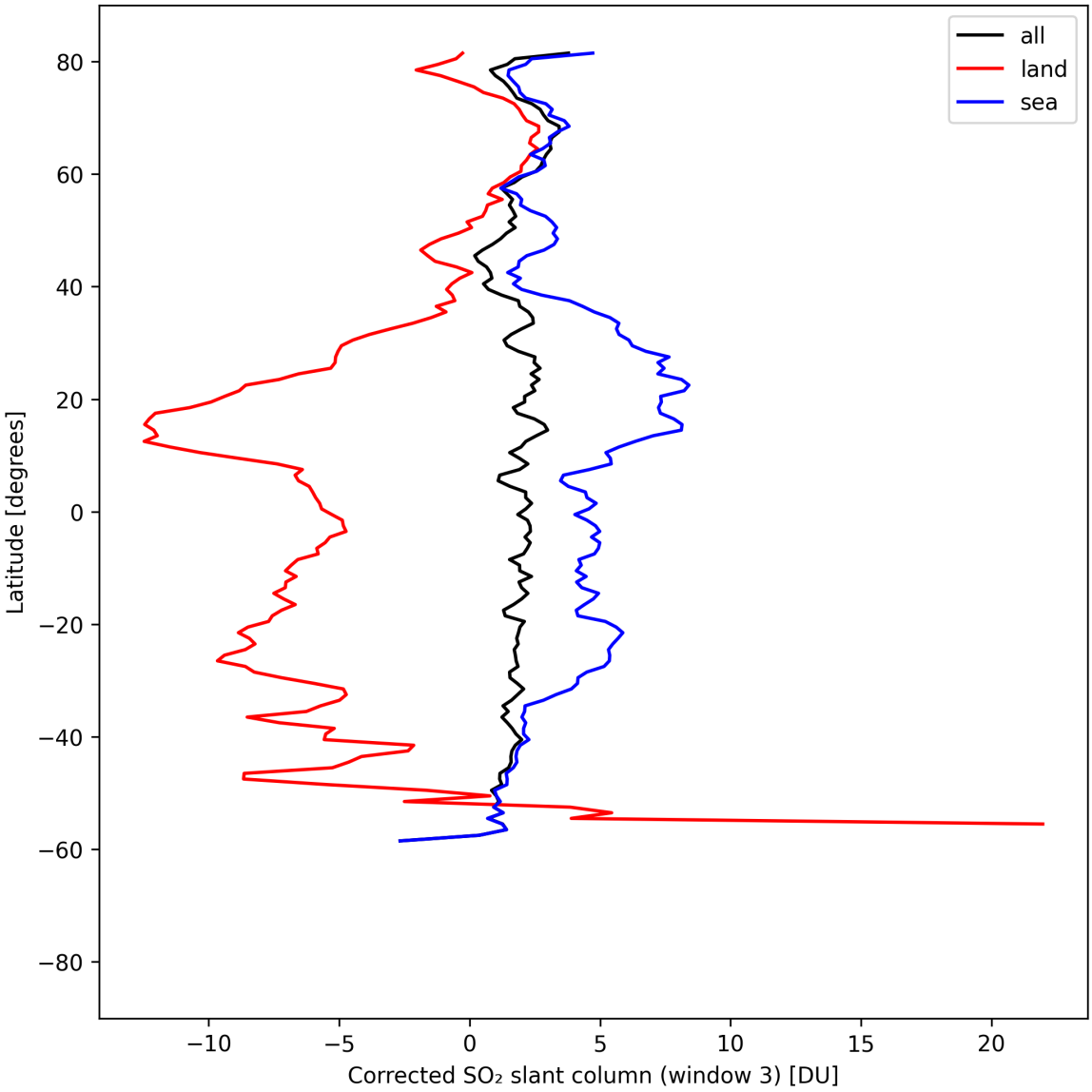


Figure 46: Zonal average of “Corrected SO_2 slant column (window 3)” for 2025-04-18 to 2025-04-19.

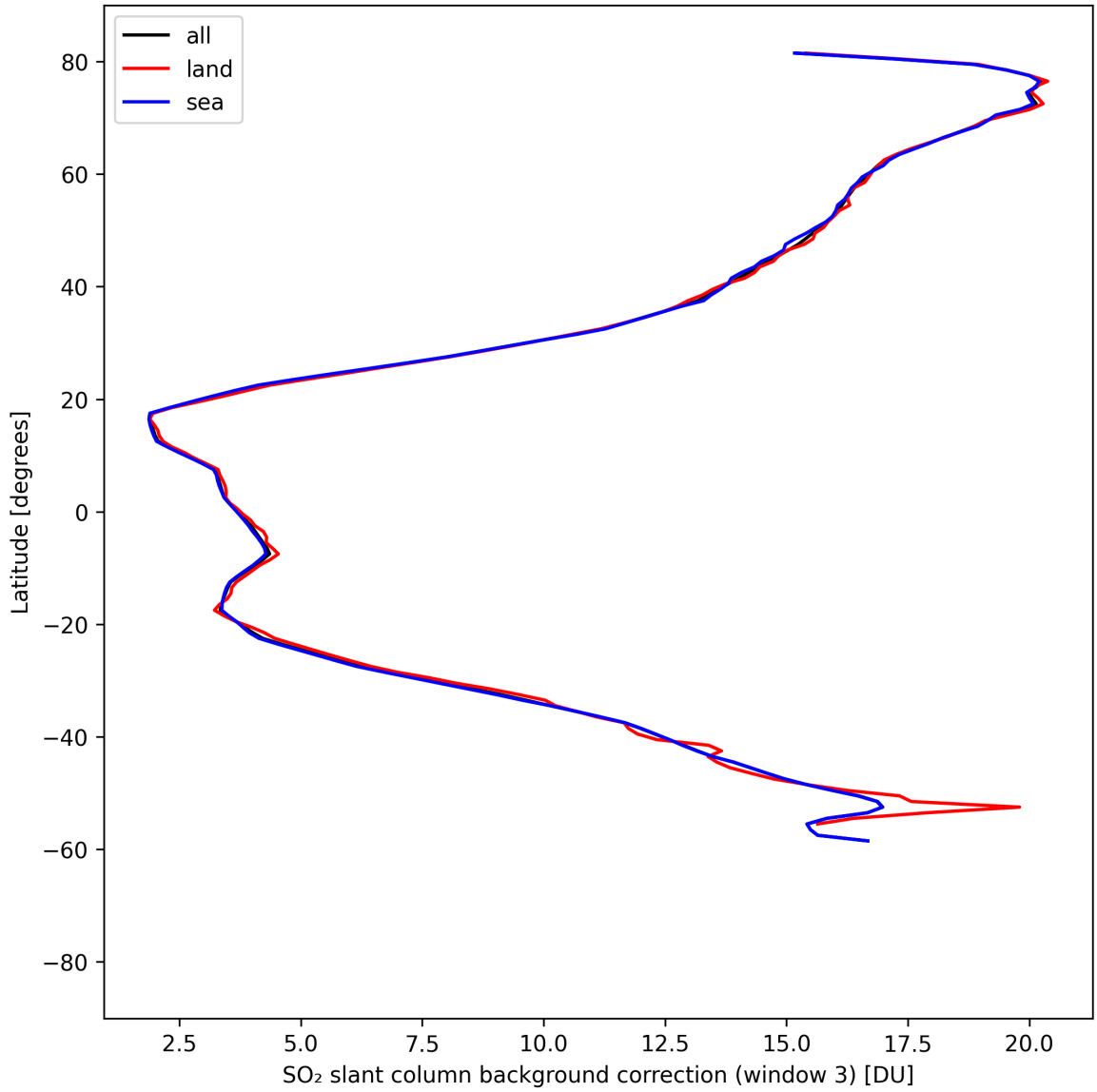


Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-04-18 to 2025-04-19.

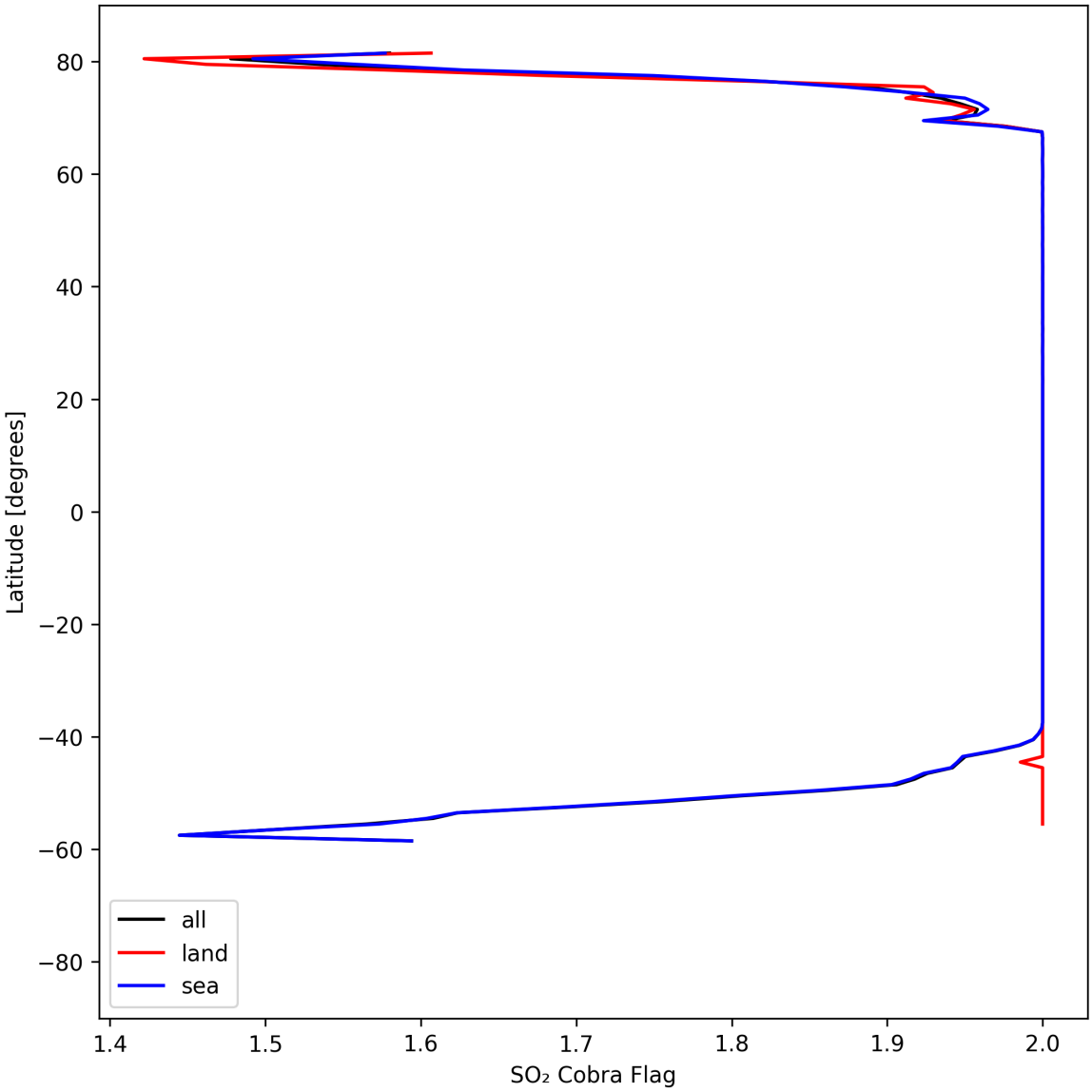


Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-04-18 to 2025-04-19.

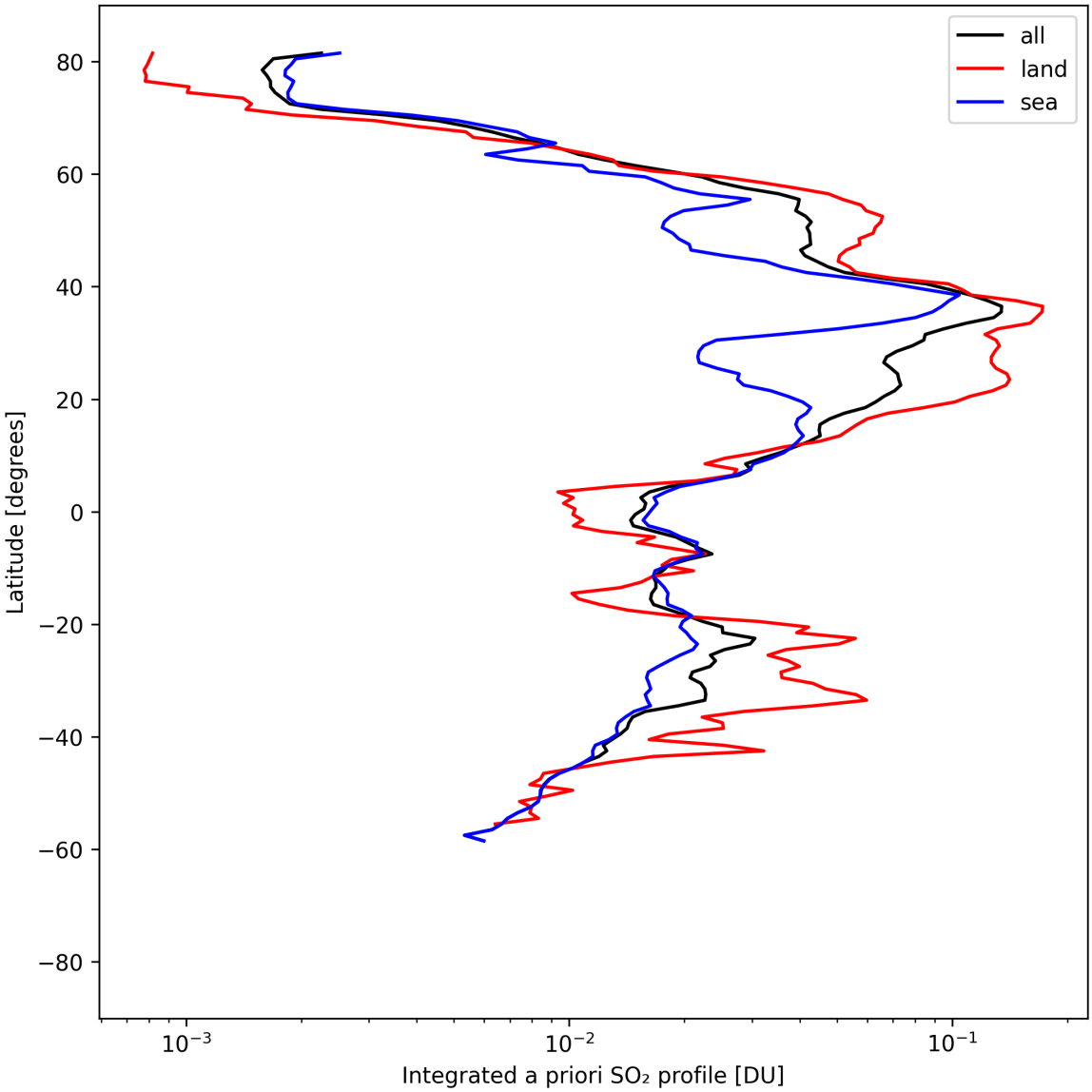


Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-04-18 to 2025-04-19.

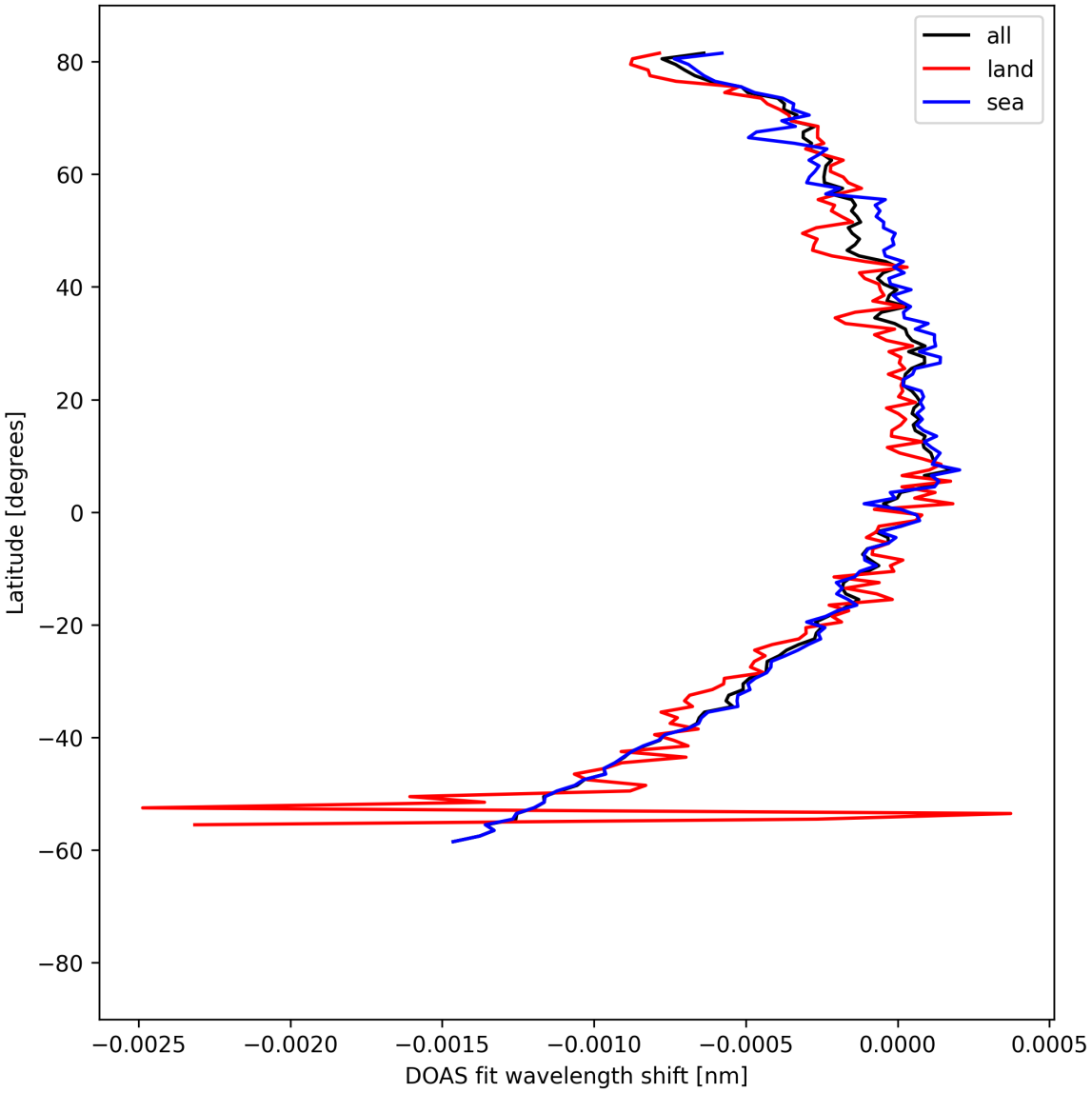


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-04-18 to 2025-04-19.

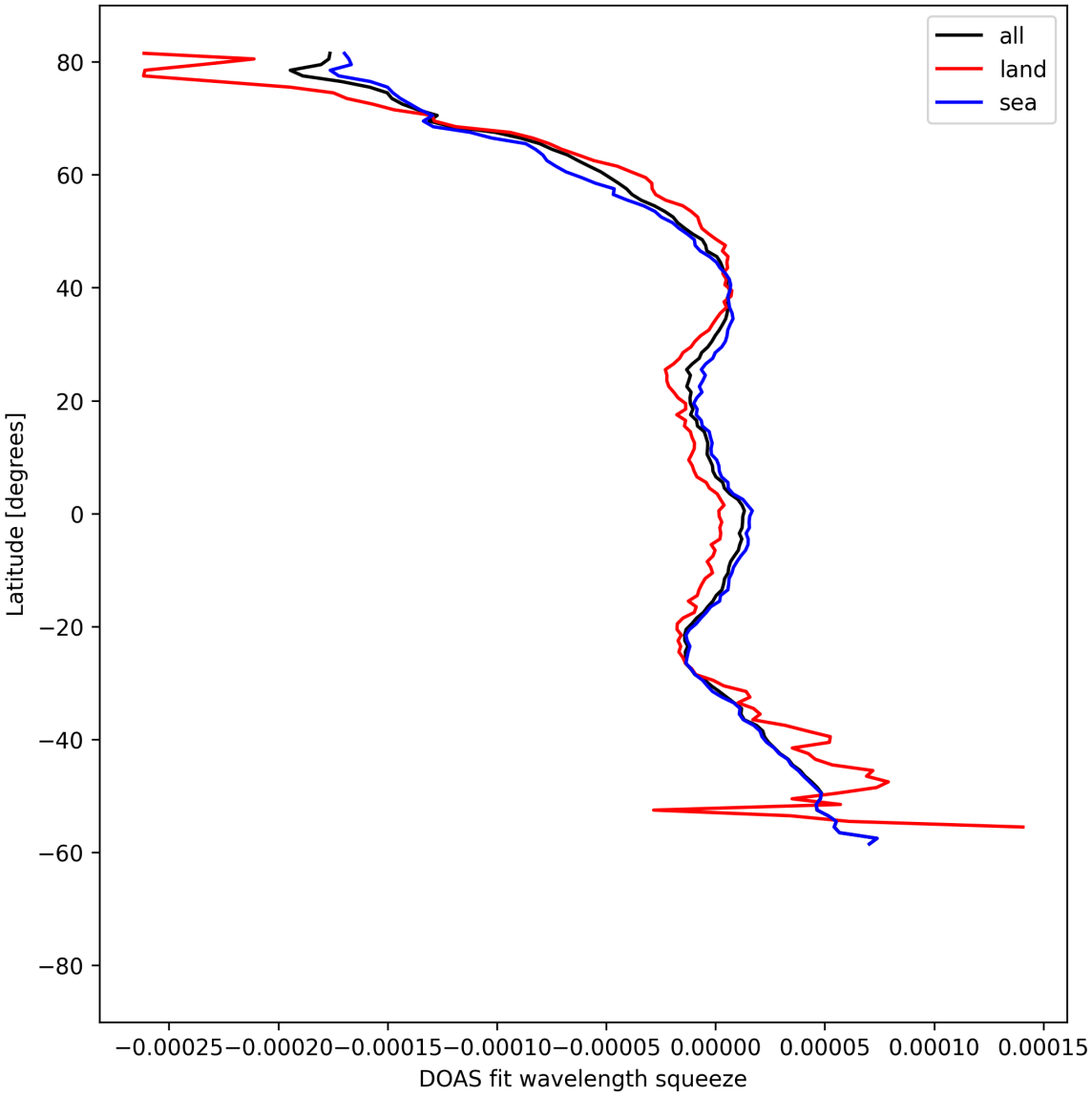


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-04-18 to 2025-04-19.

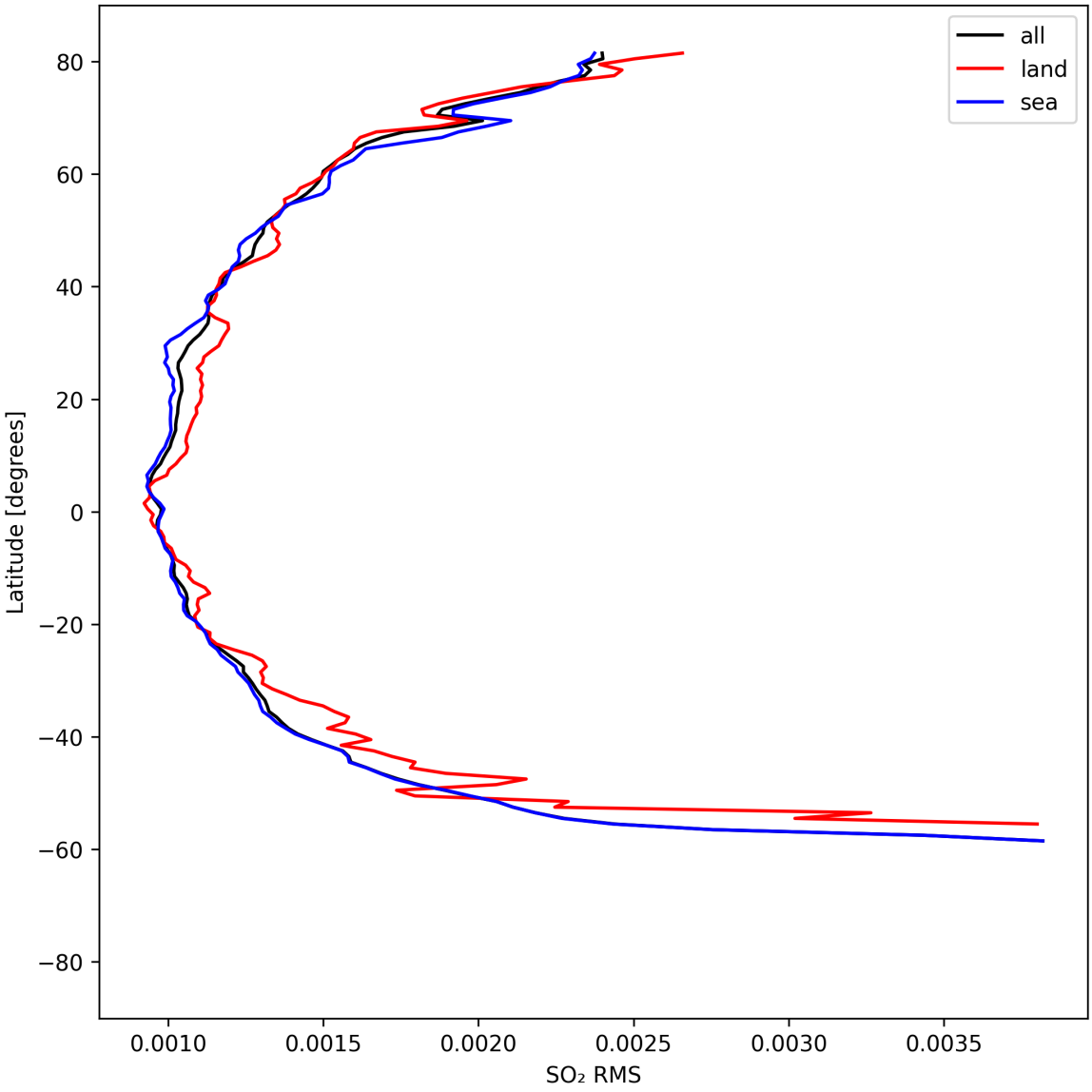


Figure 52: Zonal average of "SO_2 RMS" for 2025-04-18 to 2025-04-19.

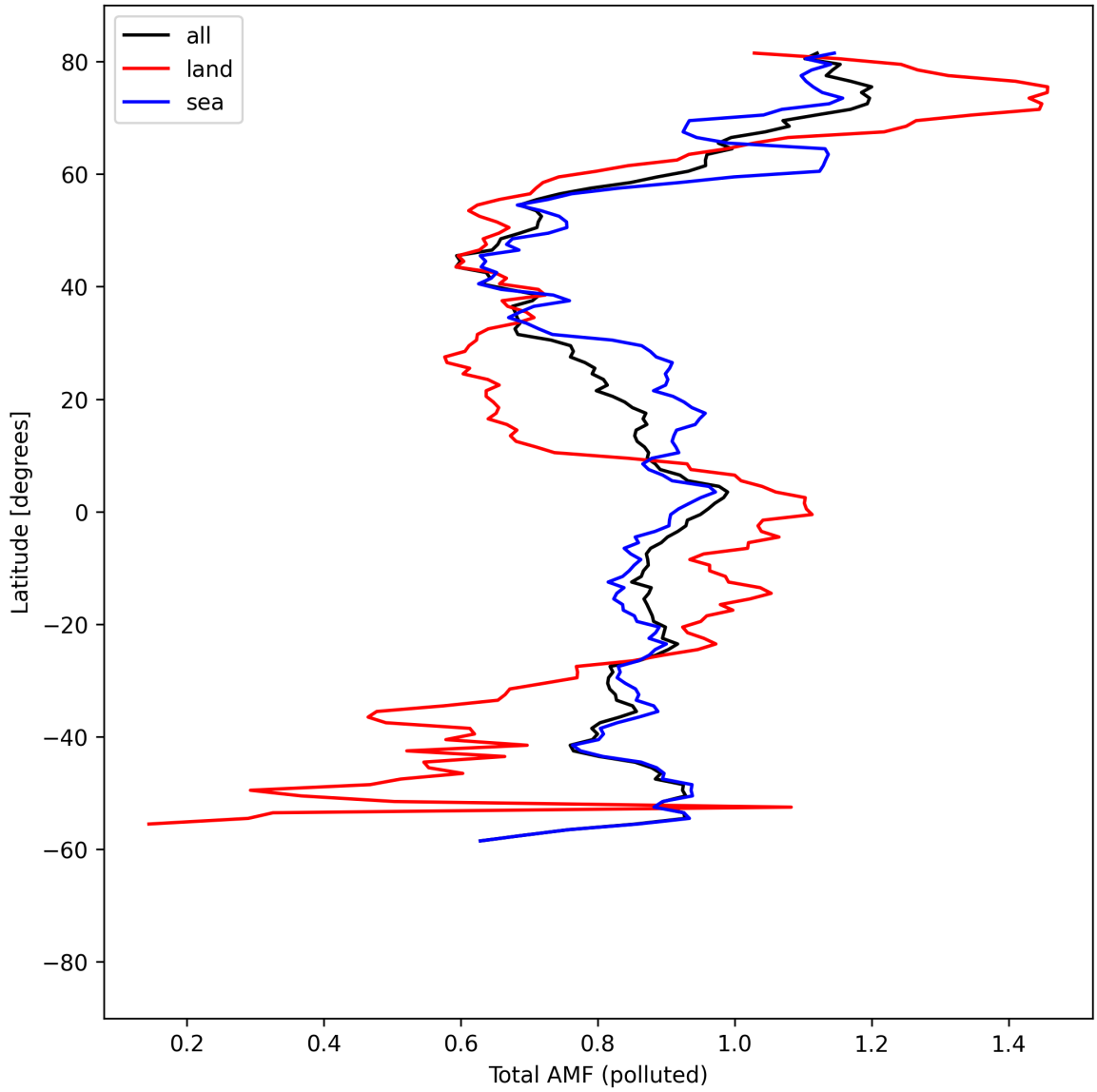


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-04-18 to 2025-04-19.

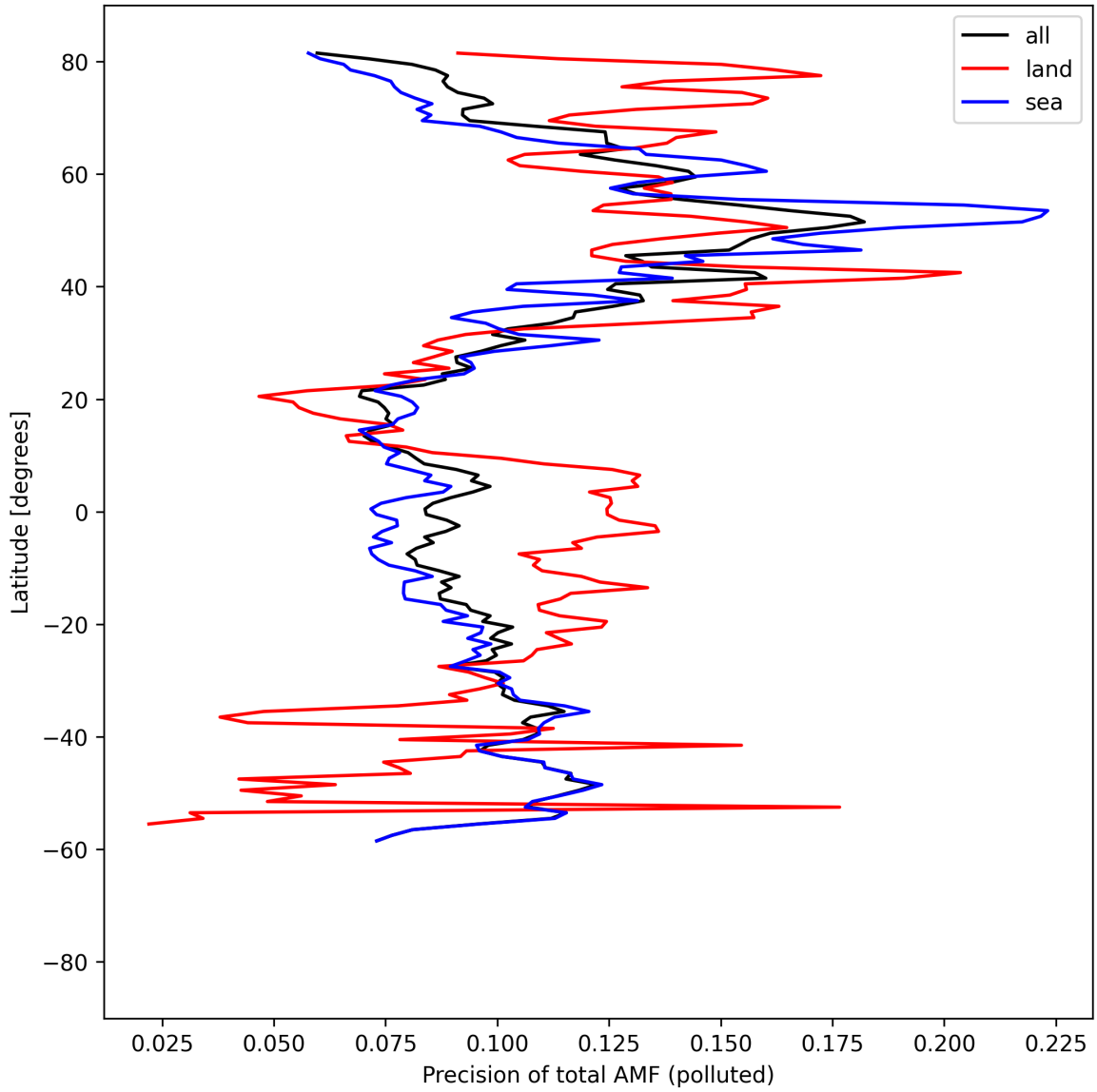


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-04-18 to 2025-04-19.

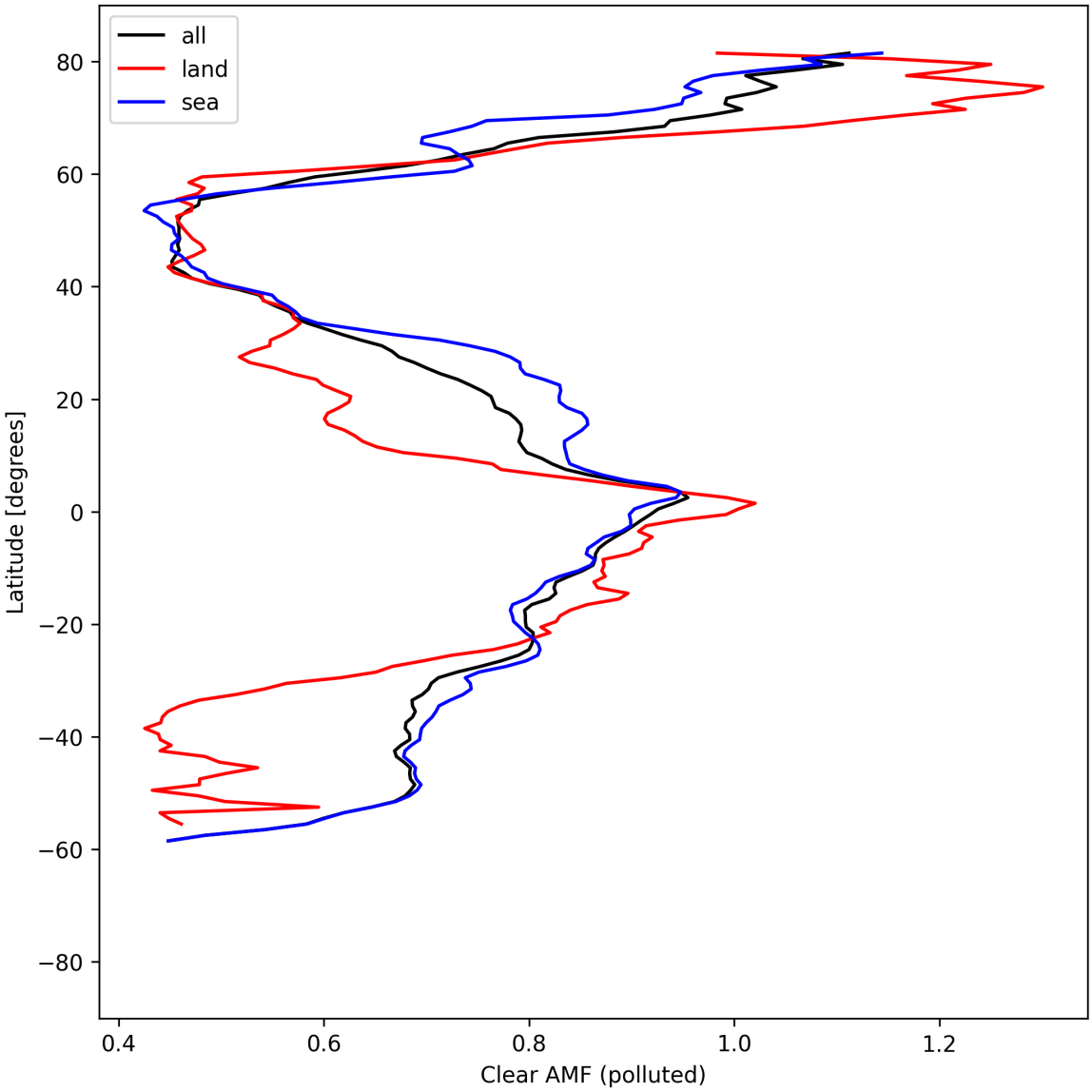


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-04-18 to 2025-04-19.

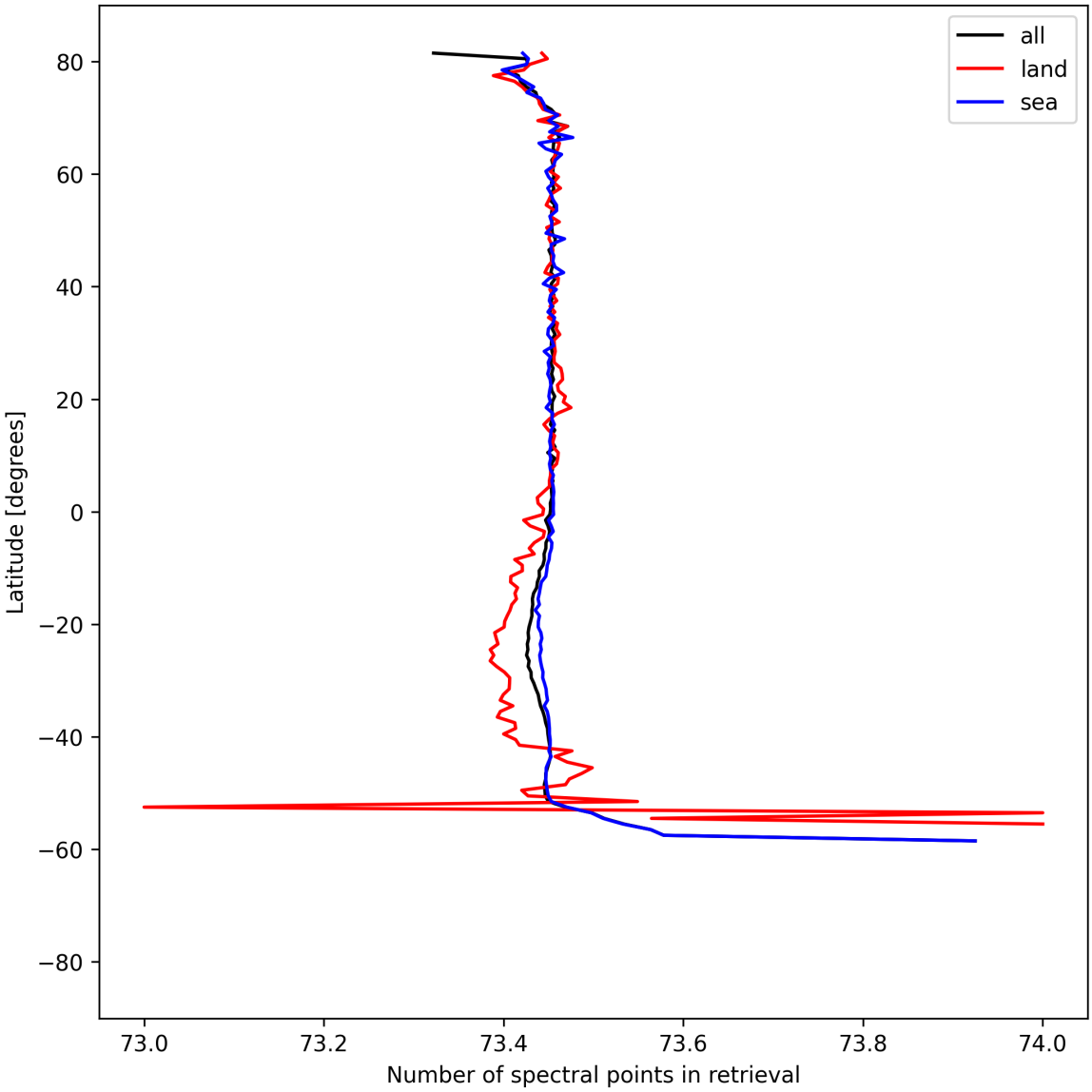


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-04-18 to 2025-04-19.

8 Histograms

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

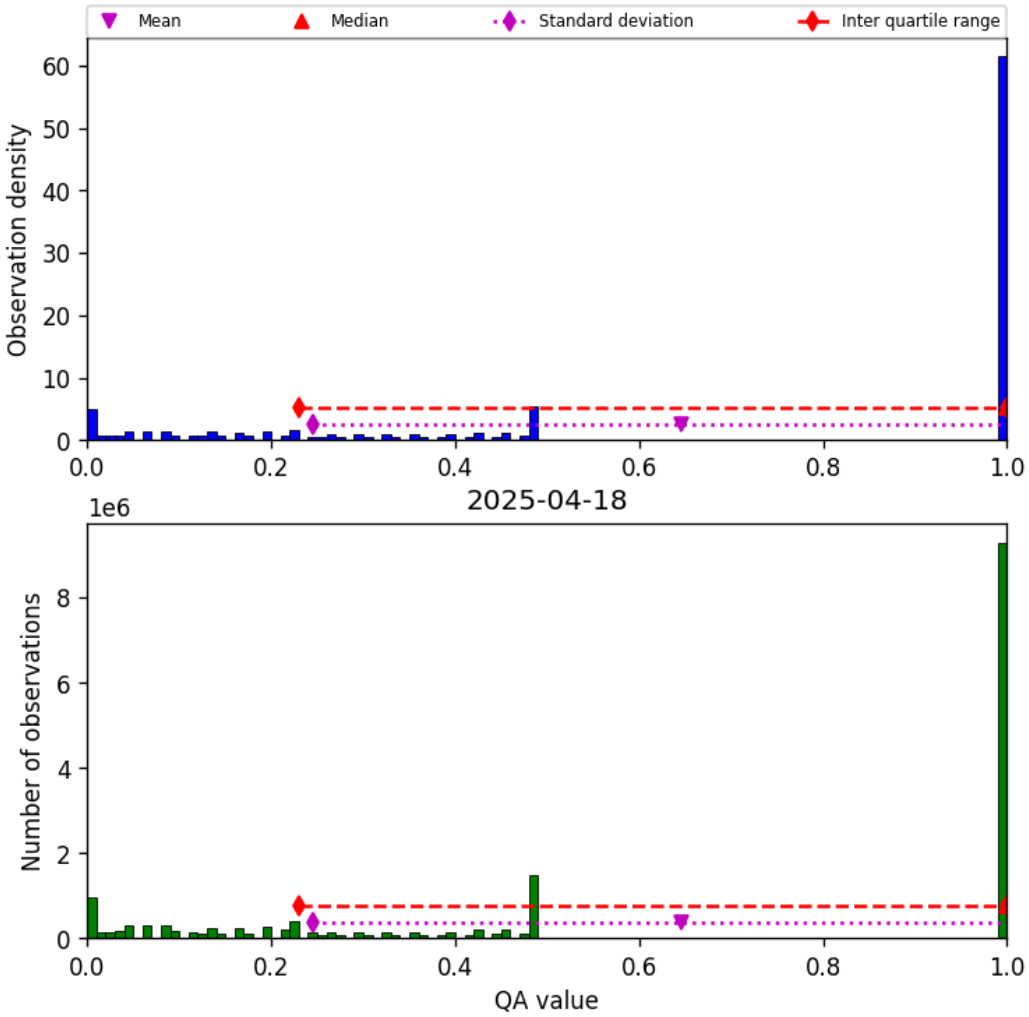


Figure 57: Histogram of “QA value” for 2025-04-18 to 2025-04-19

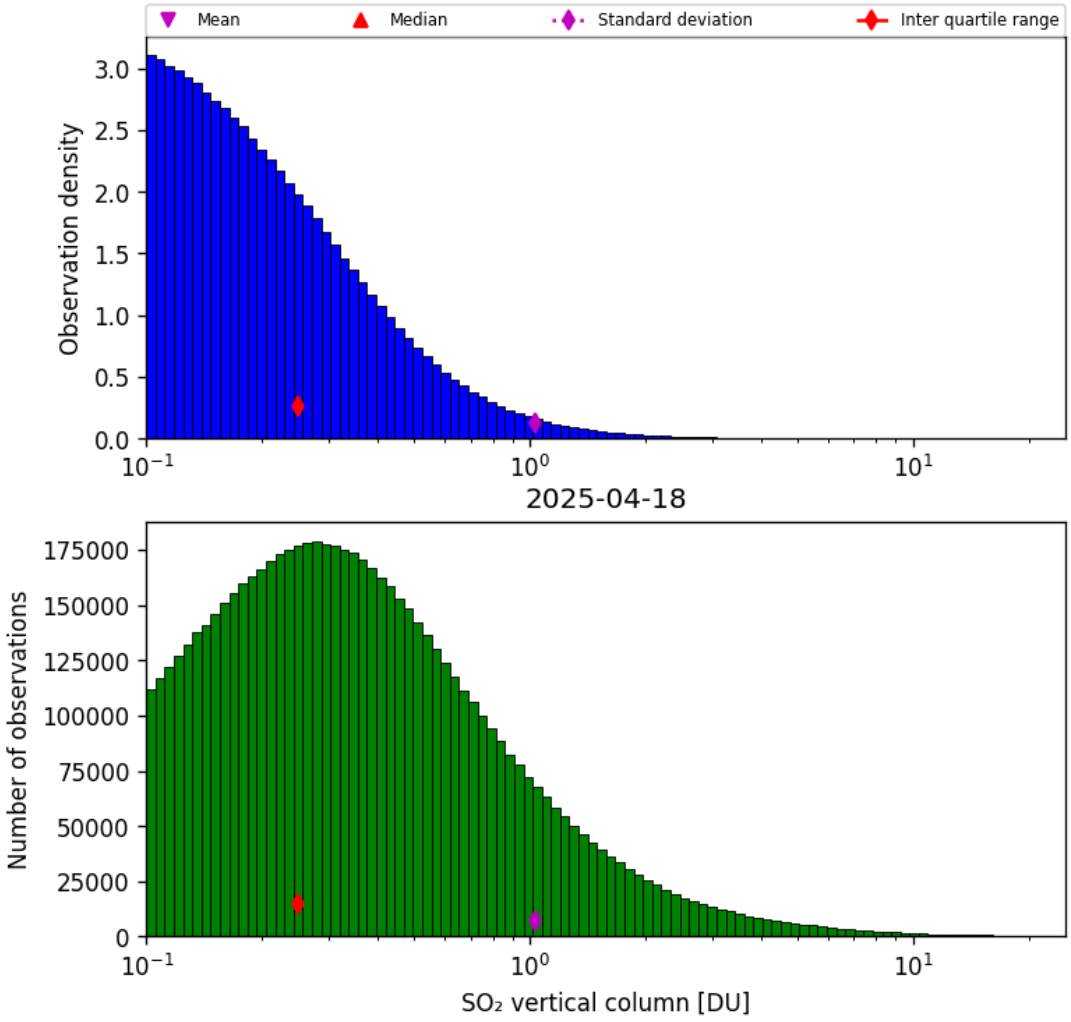


Figure 58: Histogram of "SO_2 vertical column" for 2025-04-18 to 2025-04-19

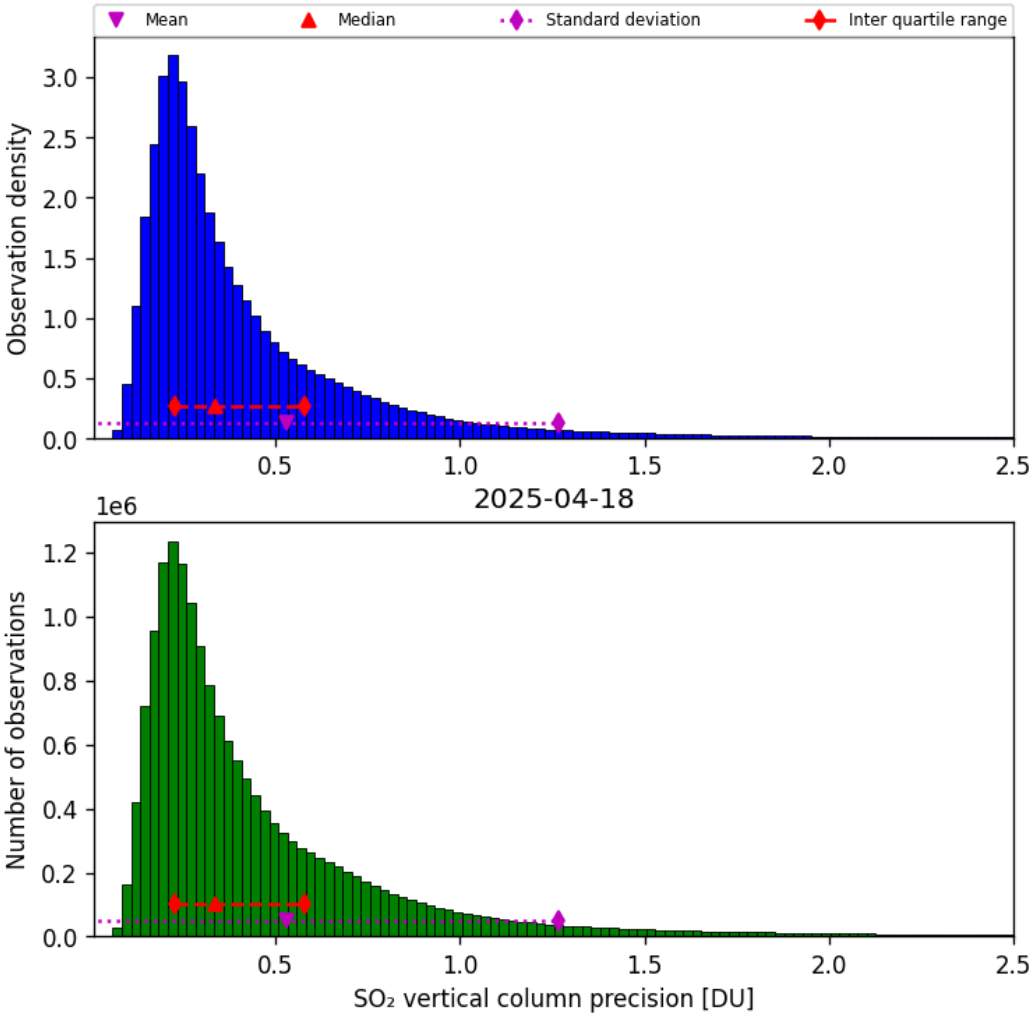


Figure 59: Histogram of "SO_2 vertical column precision" for 2025-04-18 to 2025-04-19

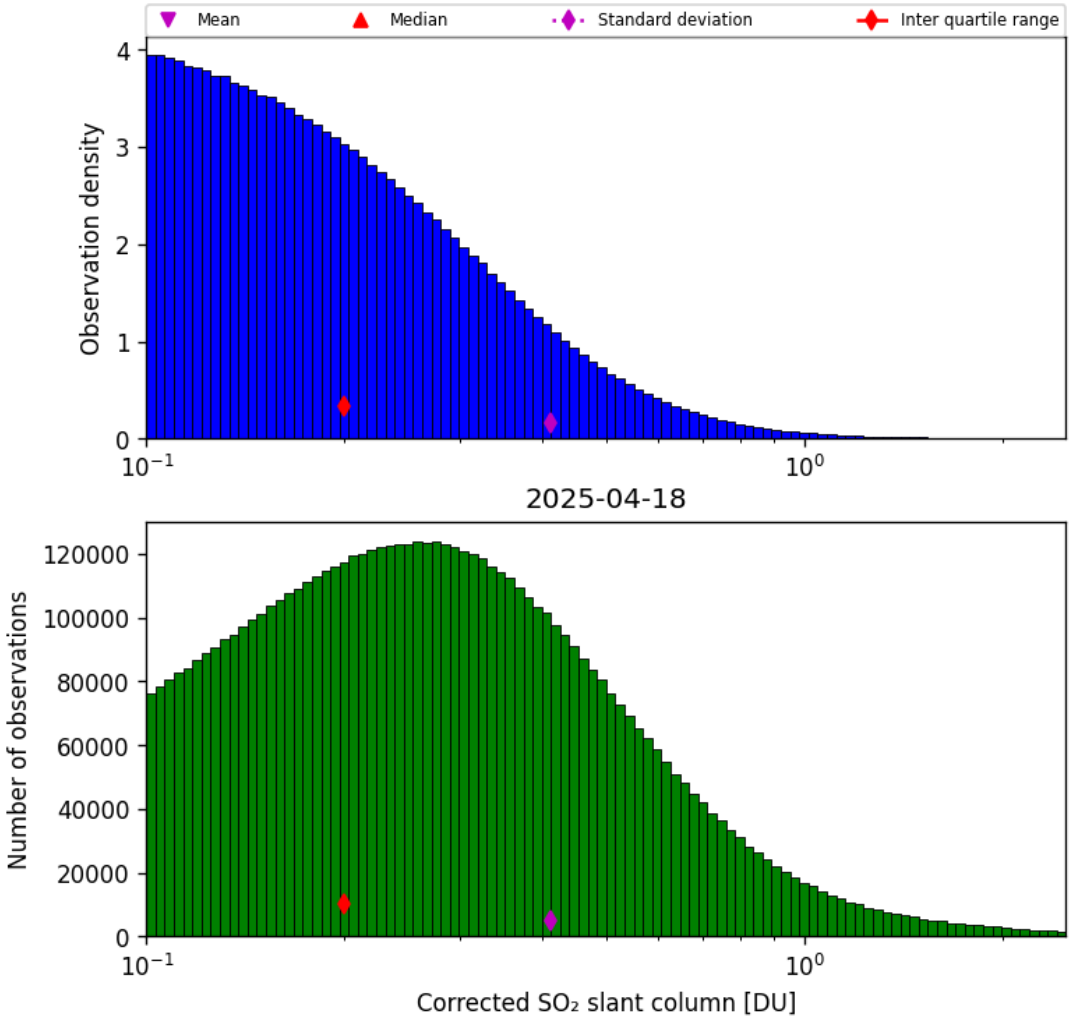


Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-04-18 to 2025-04-19

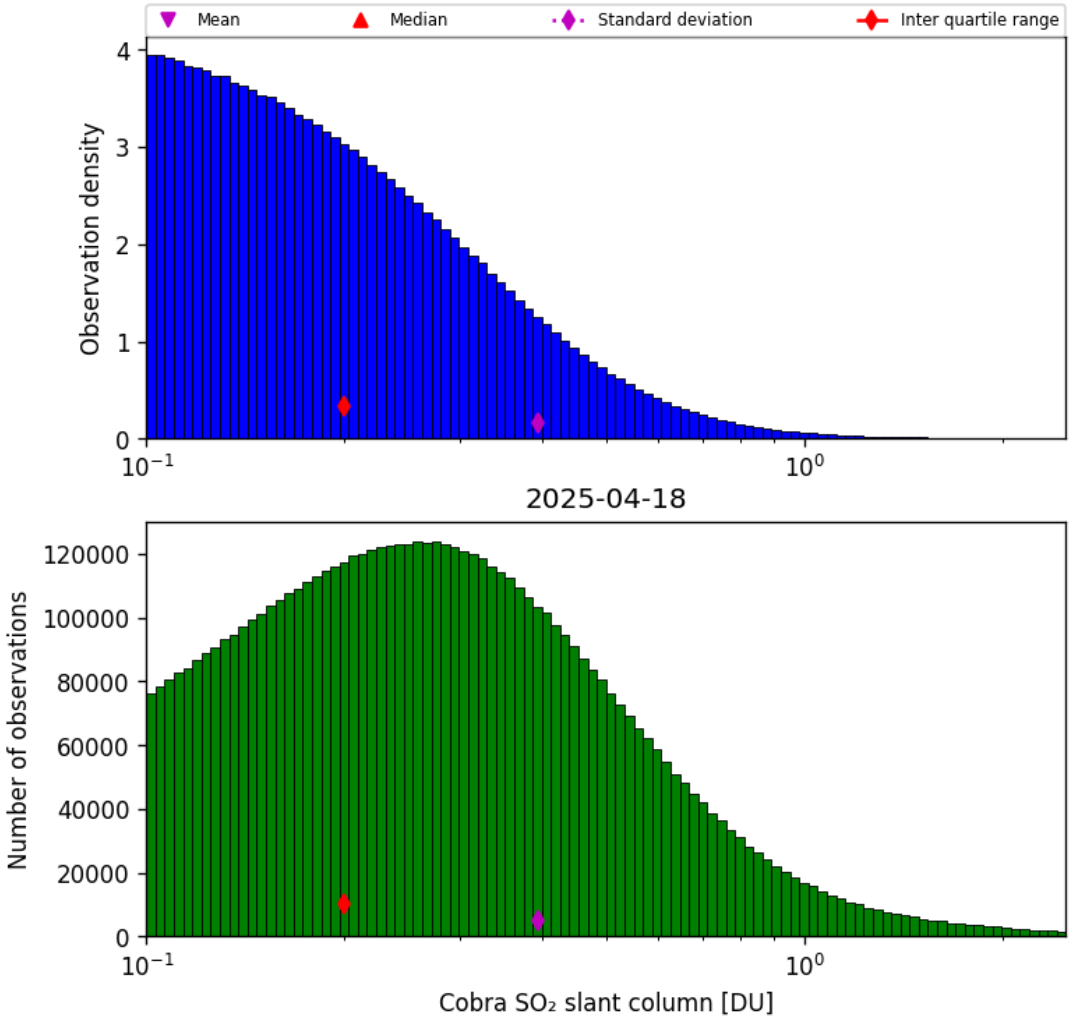


Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-04-18 to 2025-04-19

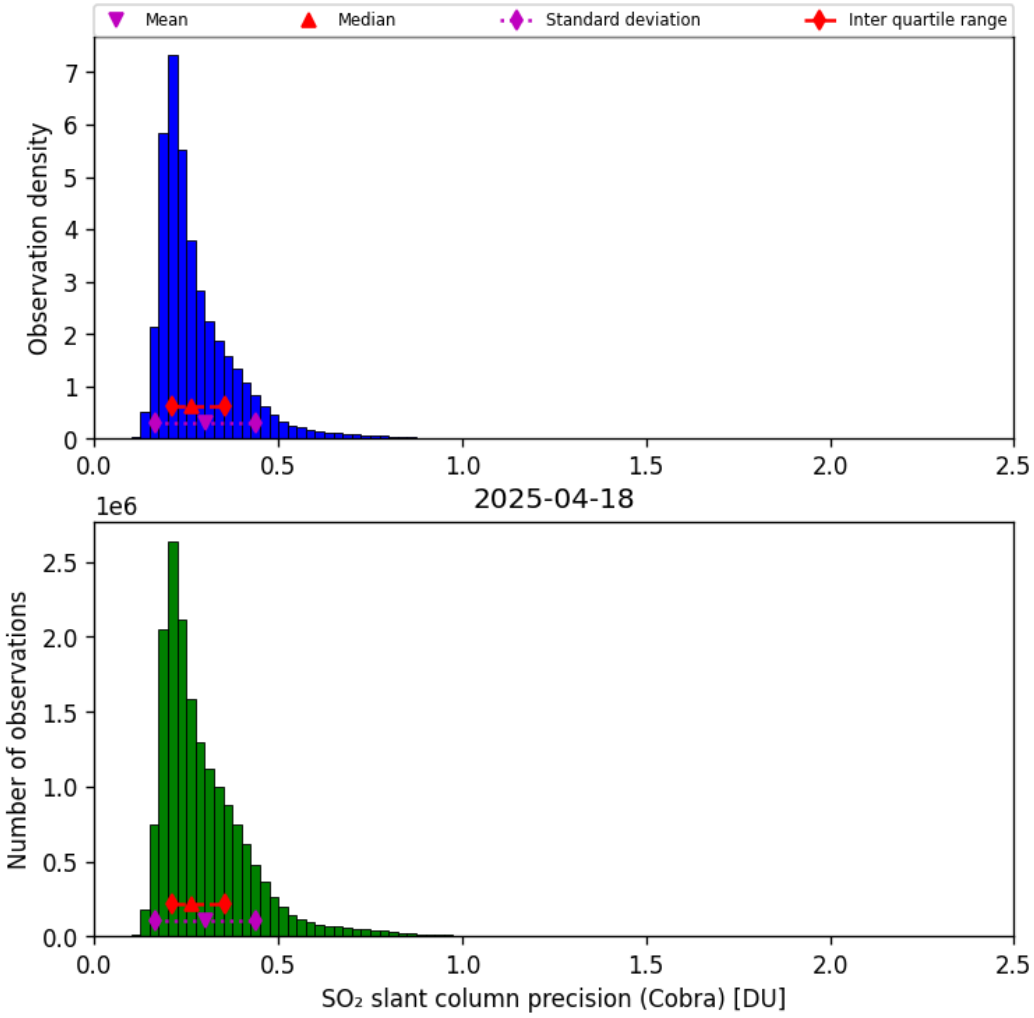


Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-04-18 to 2025-04-19

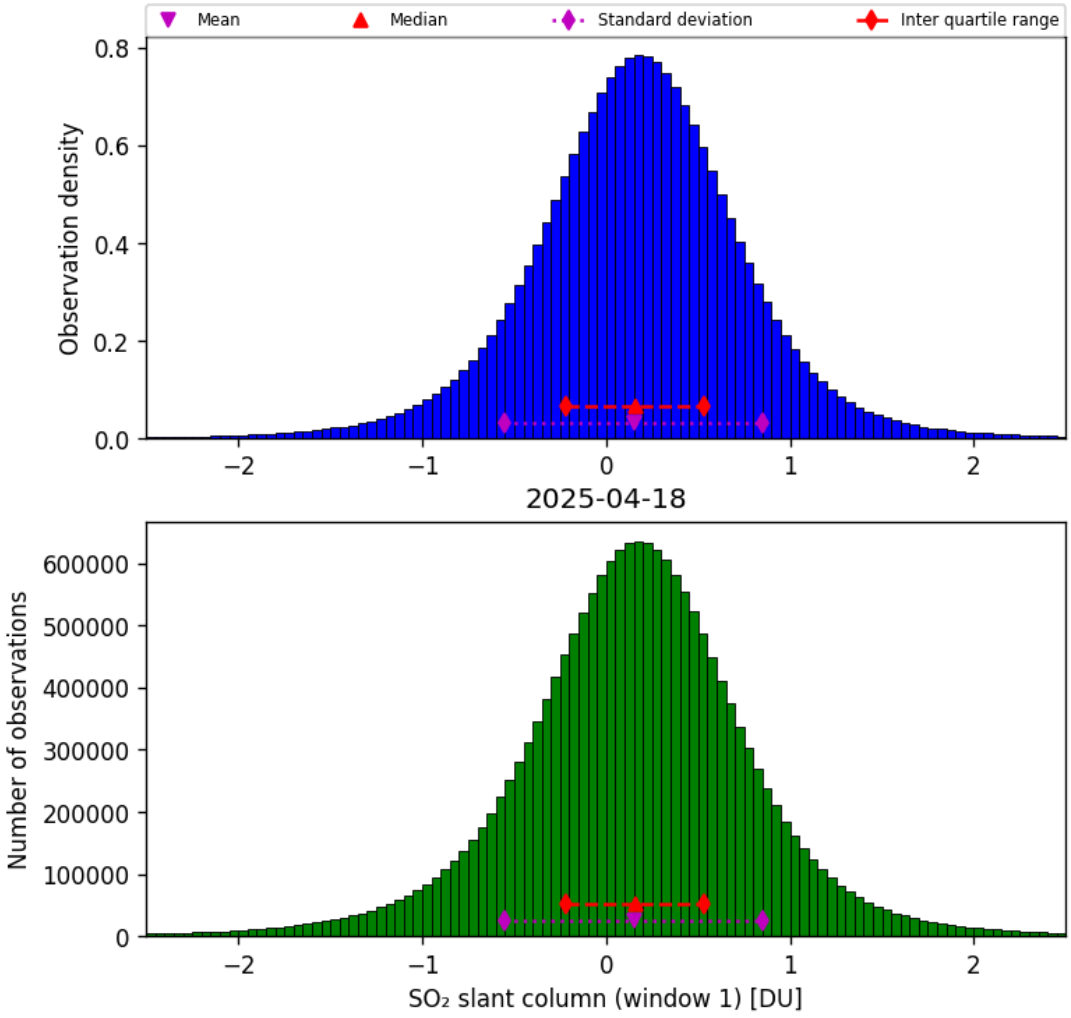


Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-04-18 to 2025-04-19

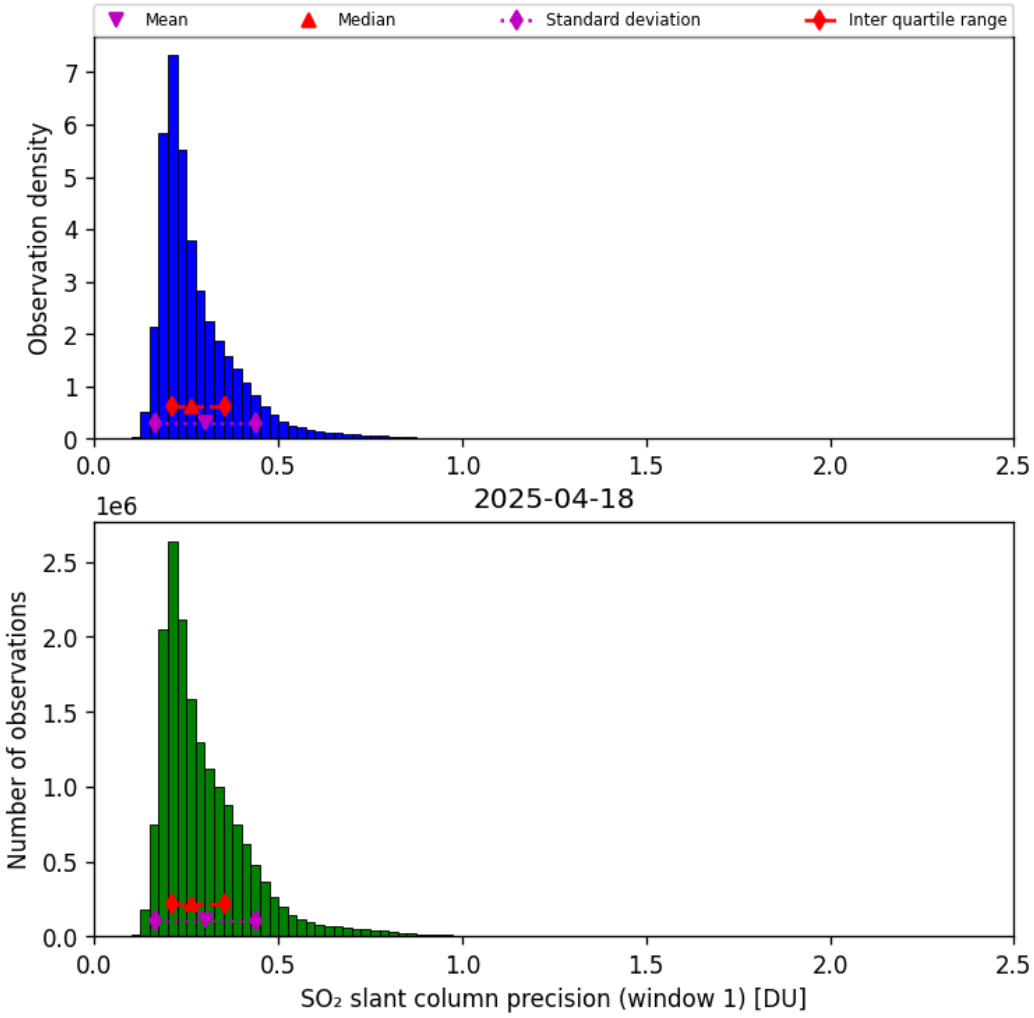


Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-04-18 to 2025-04-19

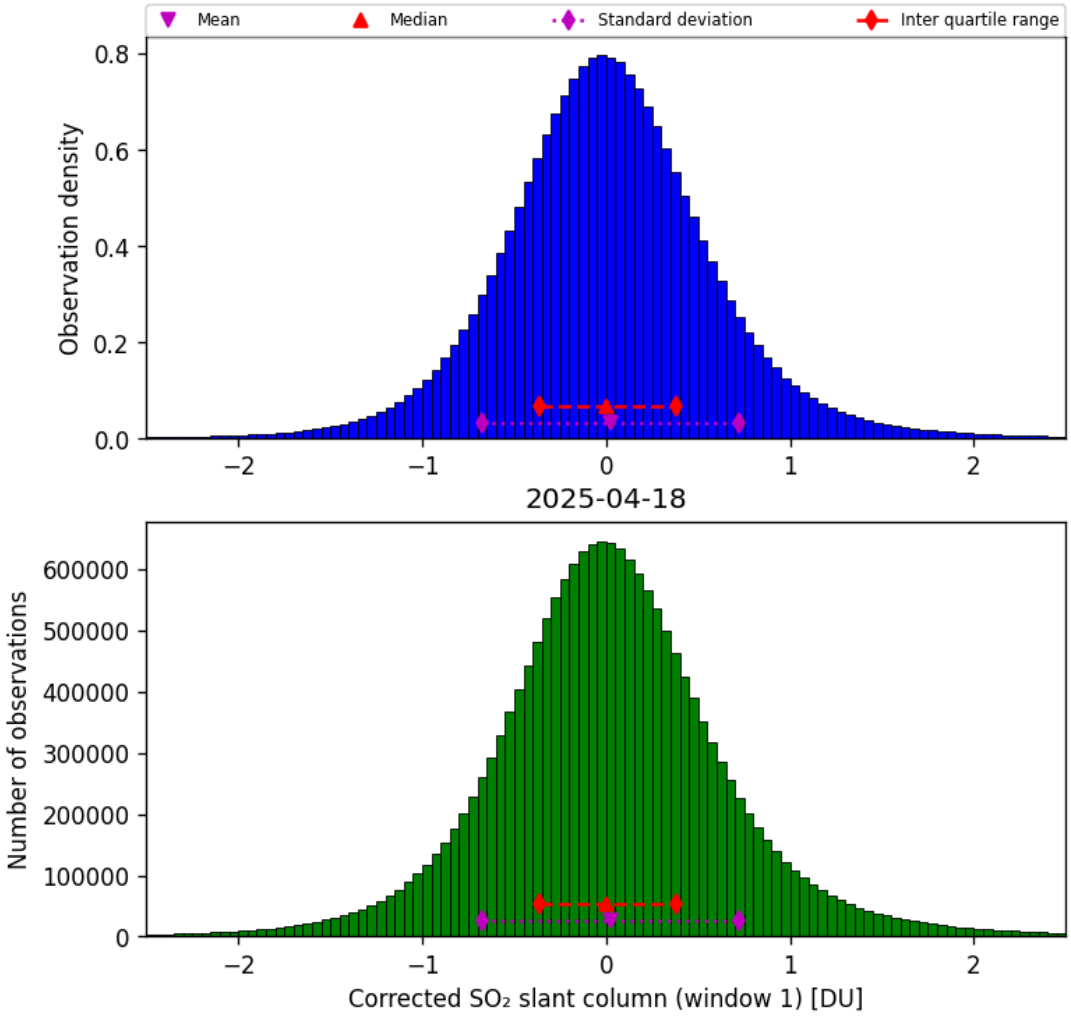


Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-04-18 to 2025-04-19

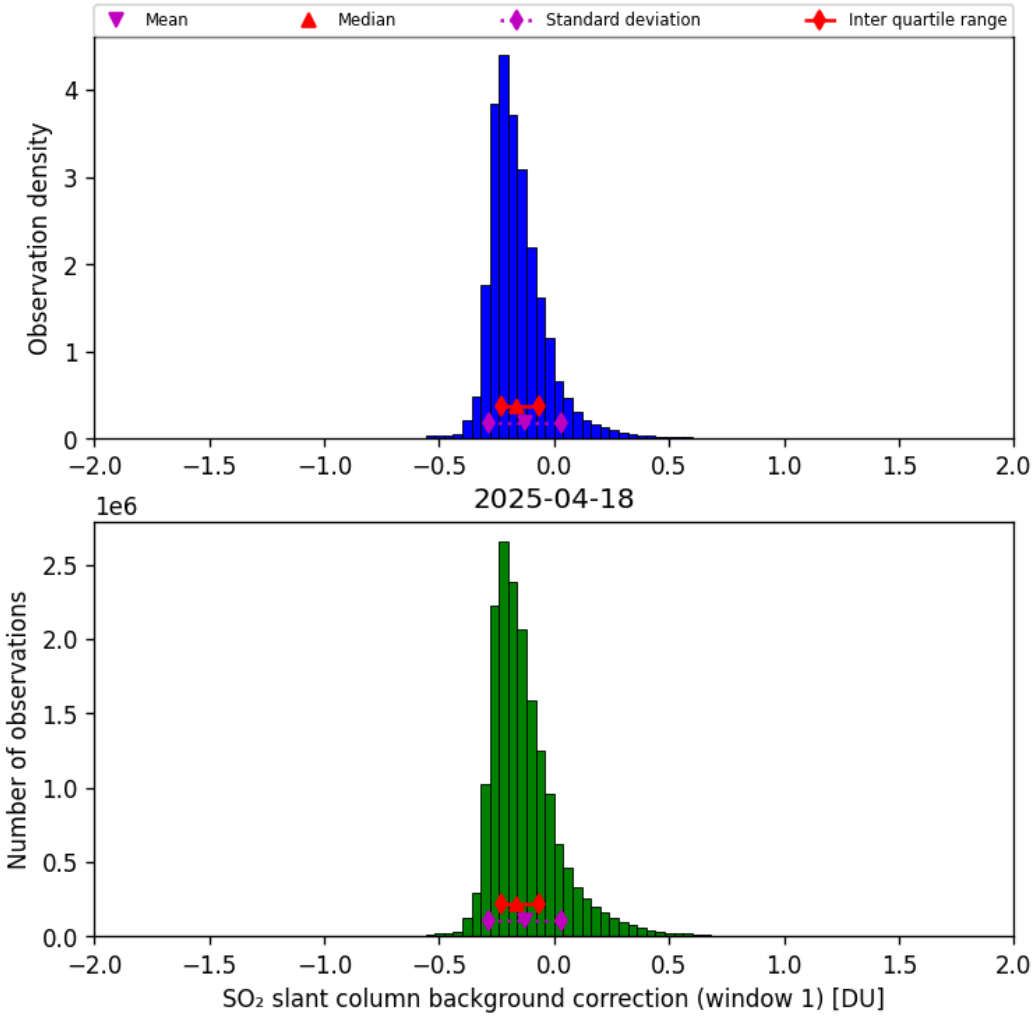


Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-04-18 to 2025-04-19

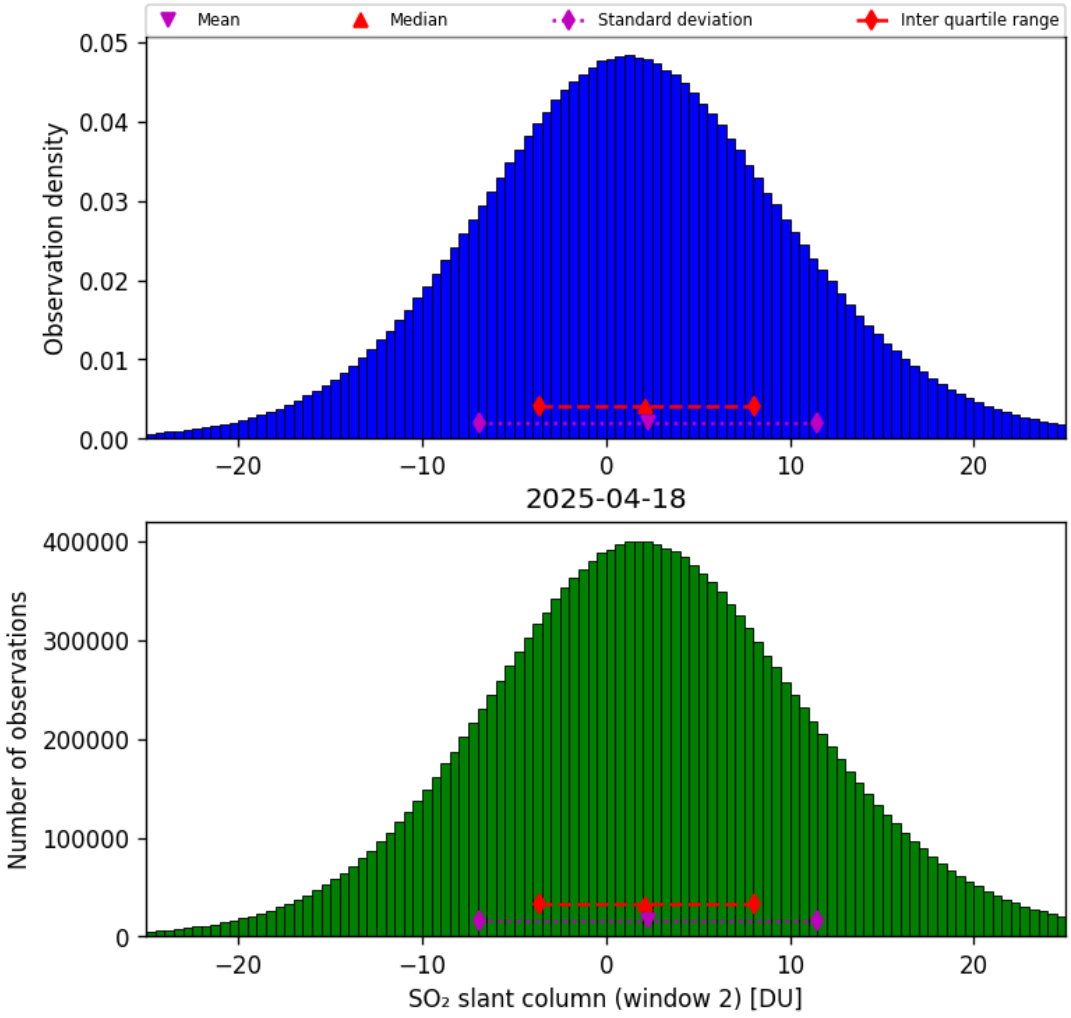


Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-04-18 to 2025-04-19

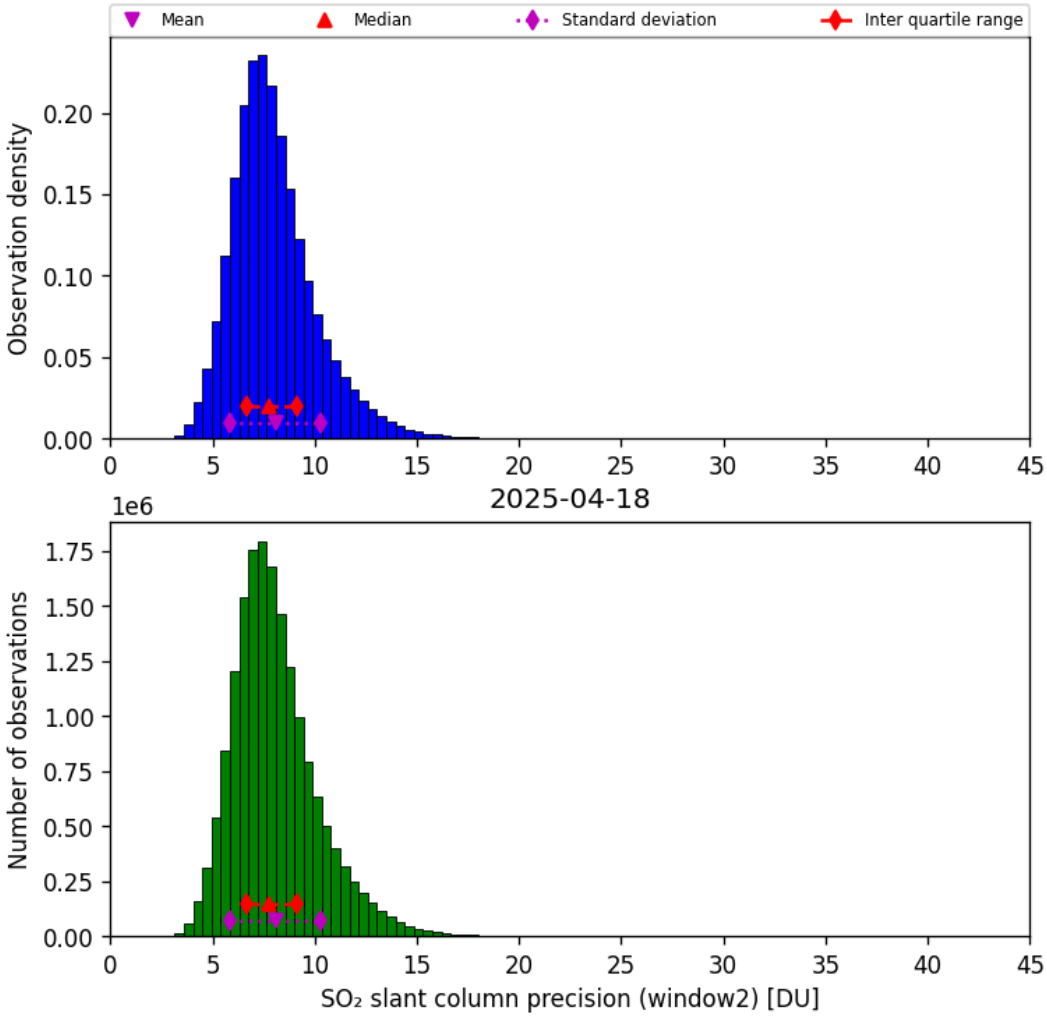


Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-04-18 to 2025-04-19

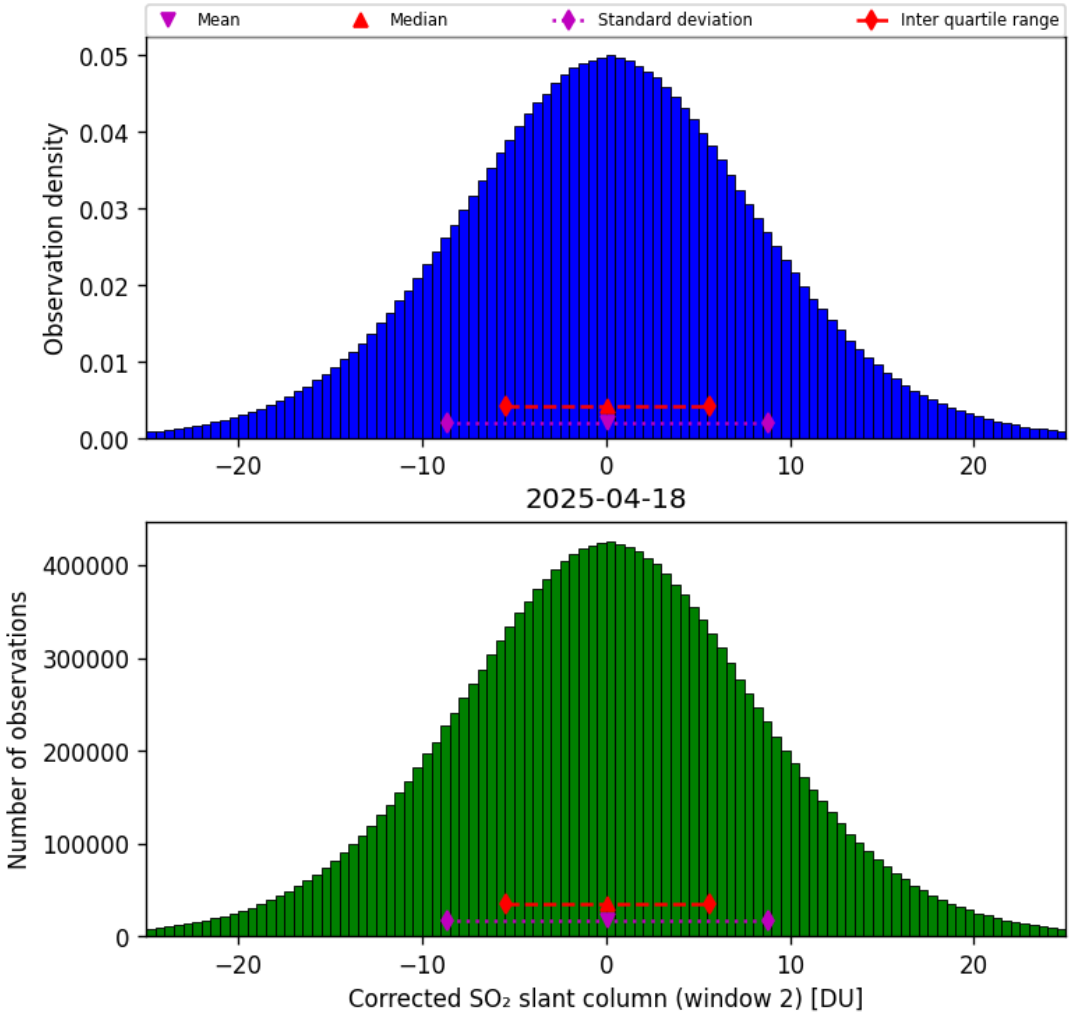


Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-04-18 to 2025-04-19

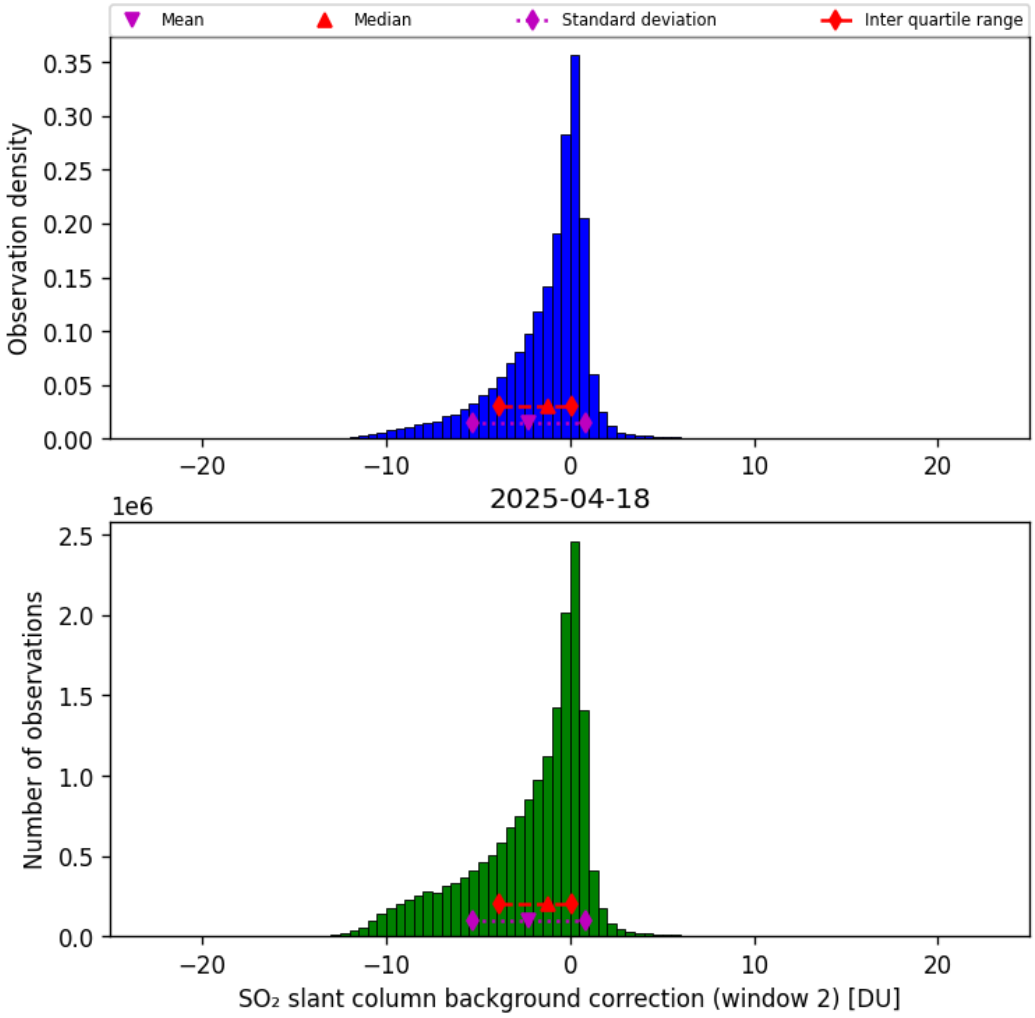


Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-04-18 to 2025-04-19

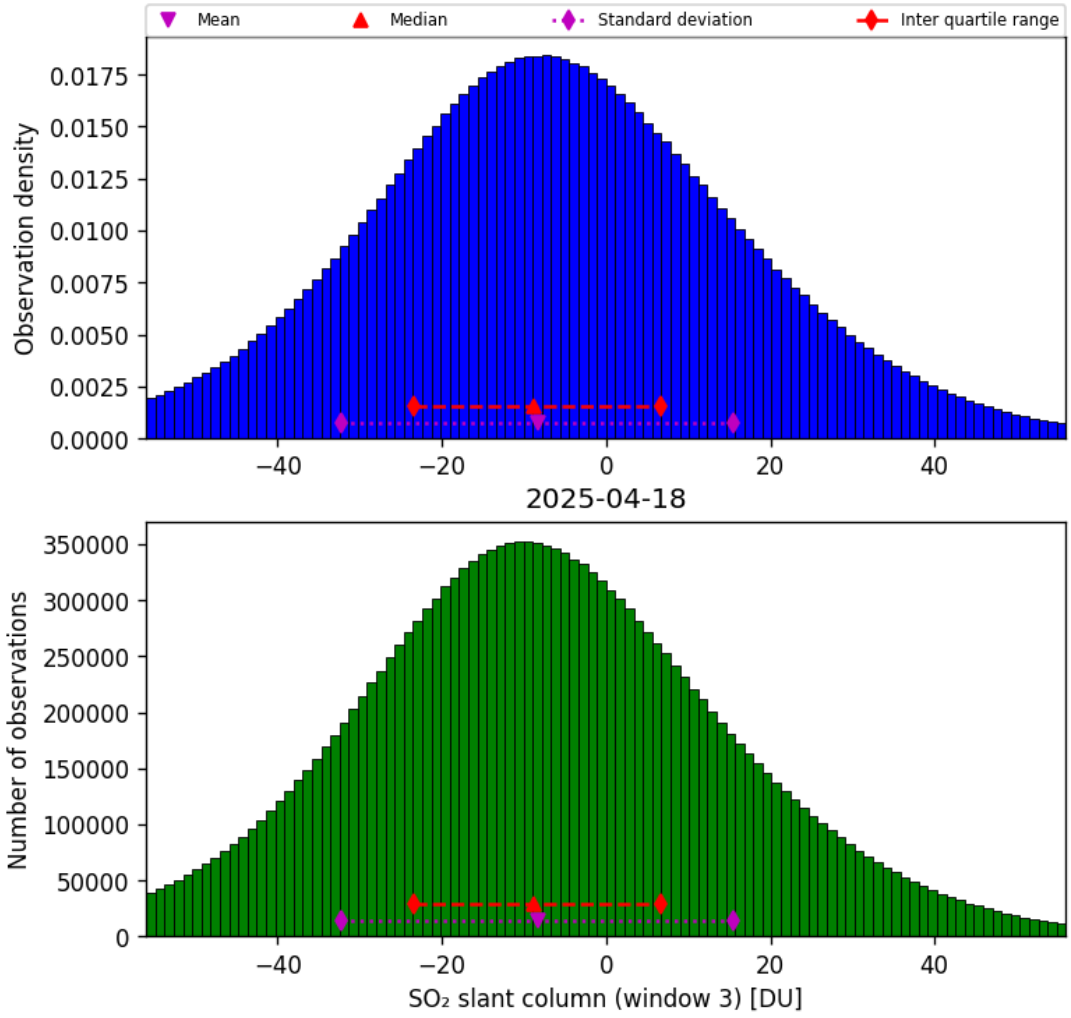


Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-04-18 to 2025-04-19

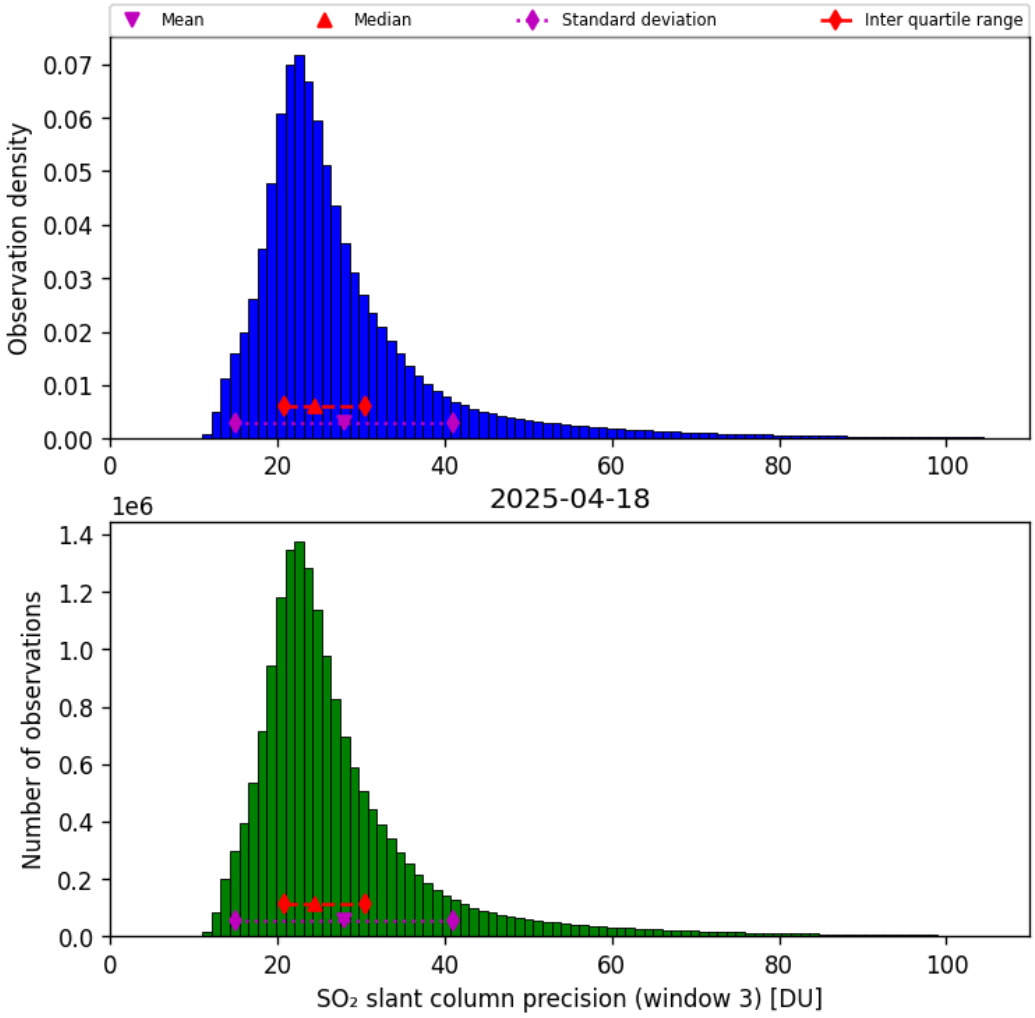


Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-04-18 to 2025-04-19

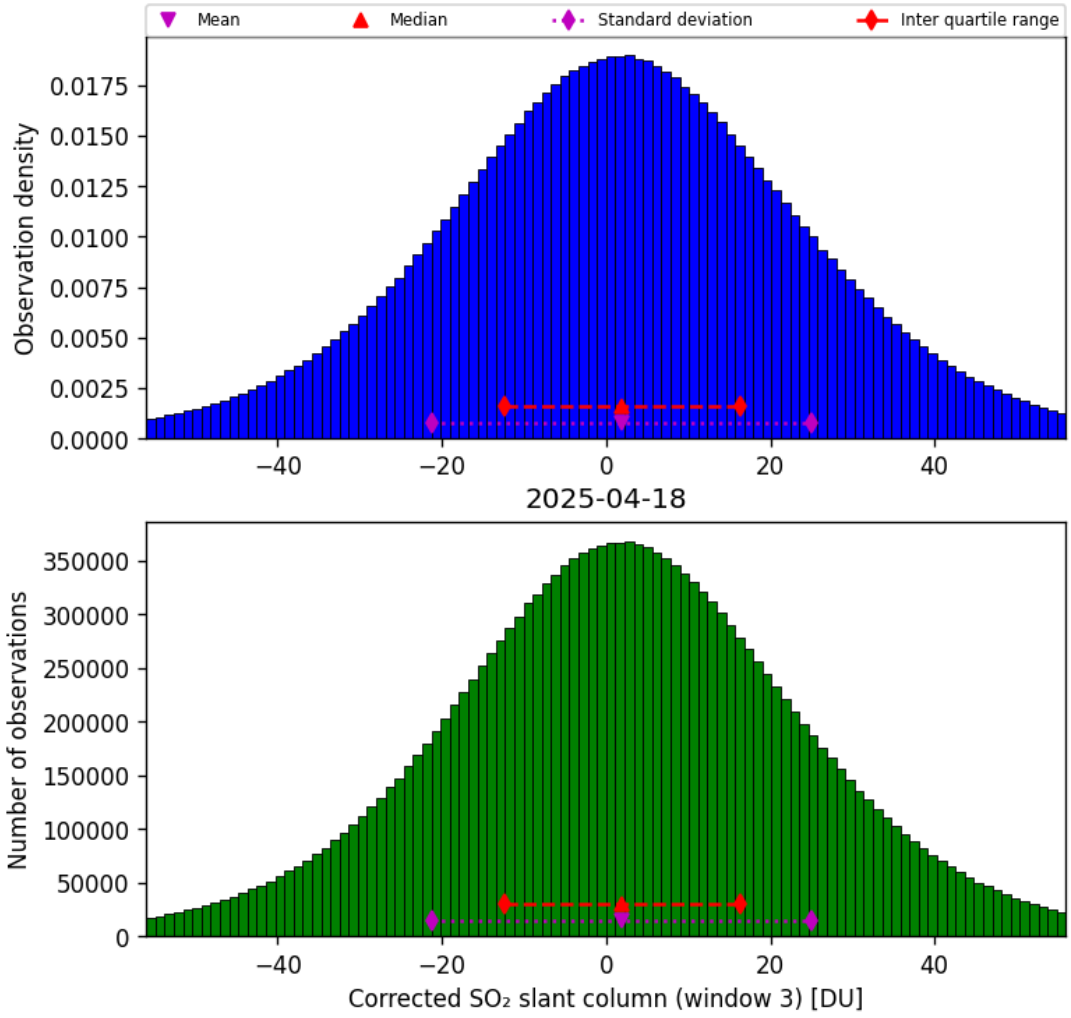


Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-04-18 to 2025-04-19

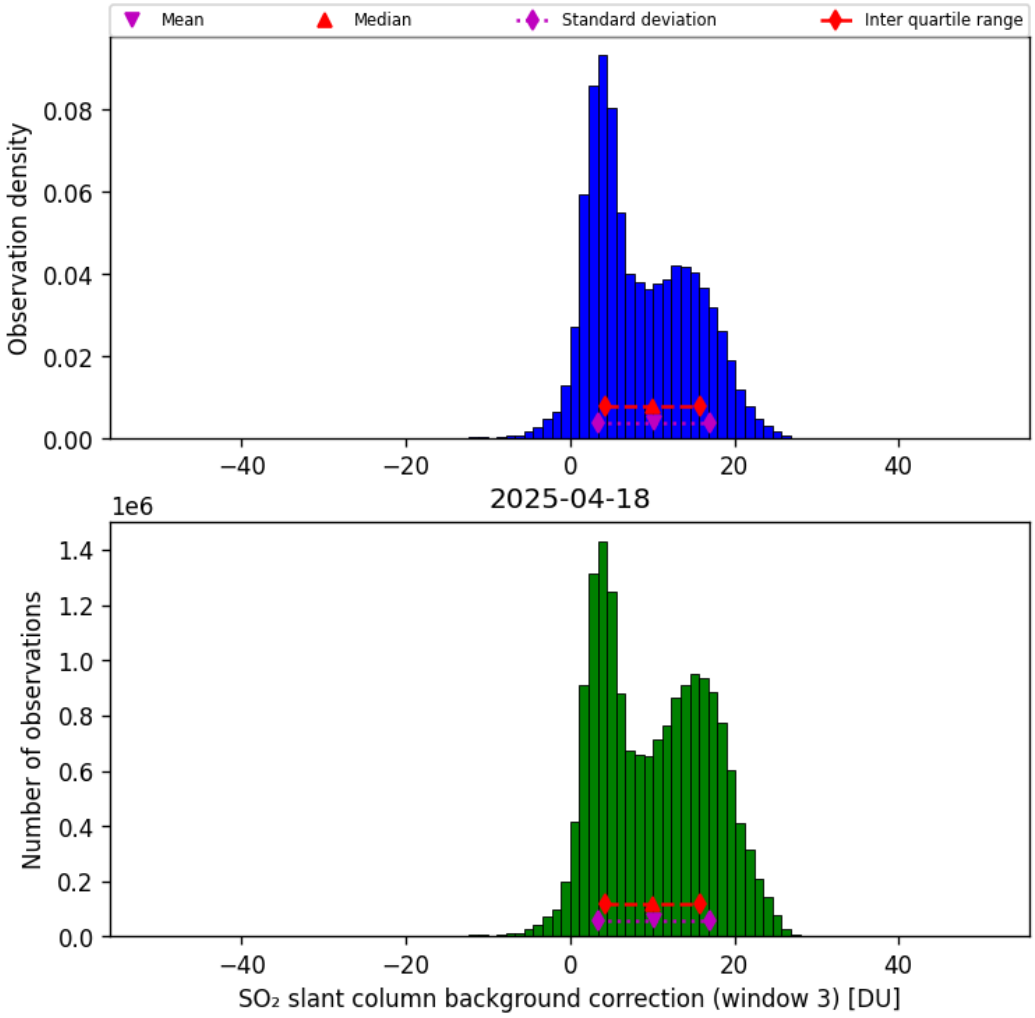


Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-04-18 to 2025-04-19

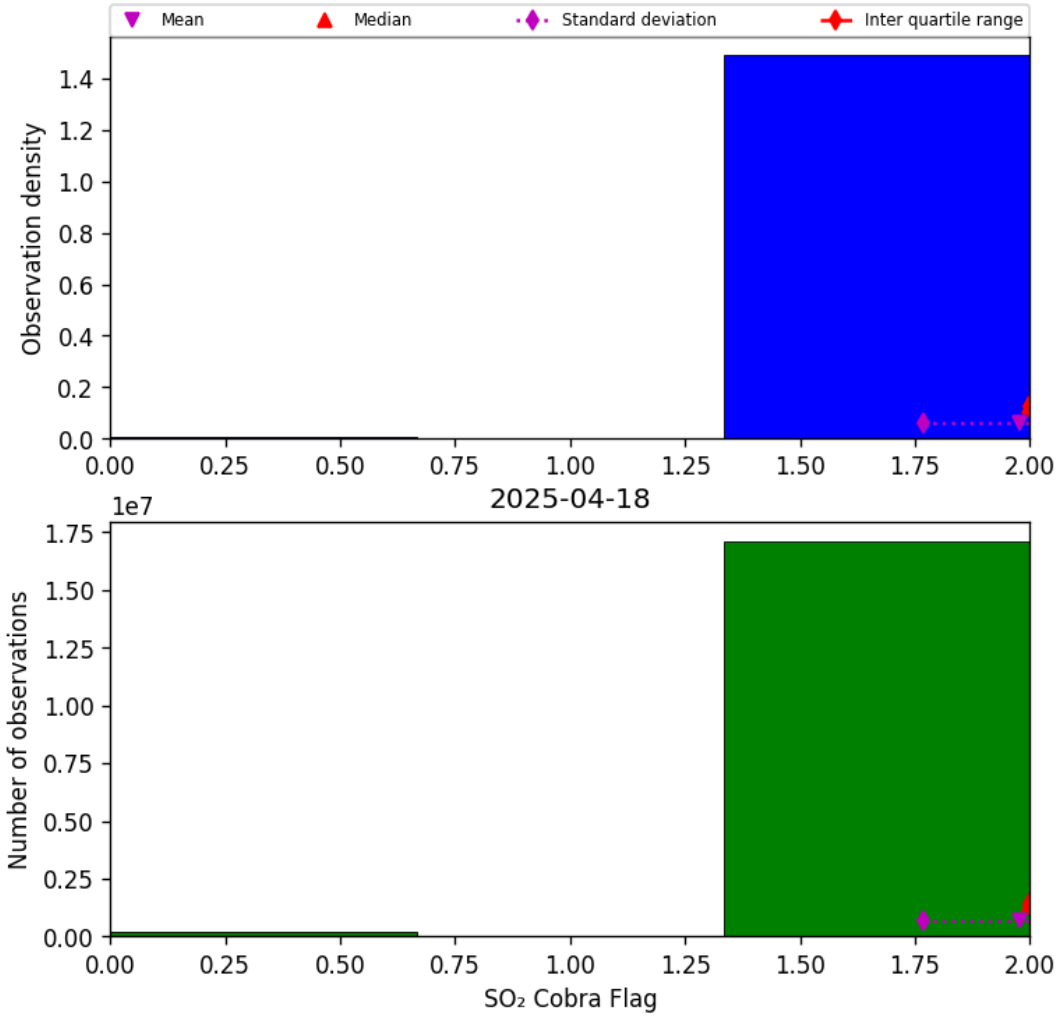


Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-04-18 to 2025-04-19

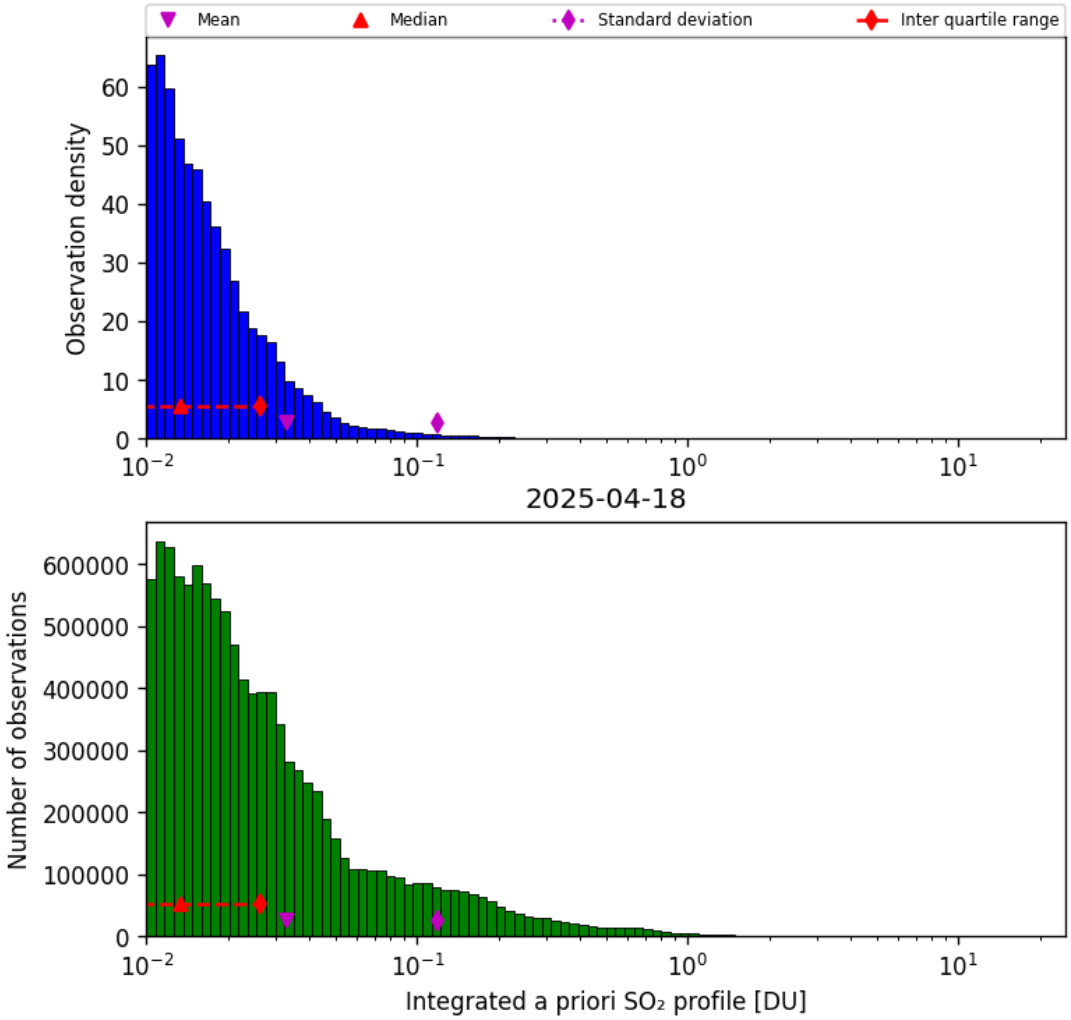


Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-04-18 to 2025-04-19

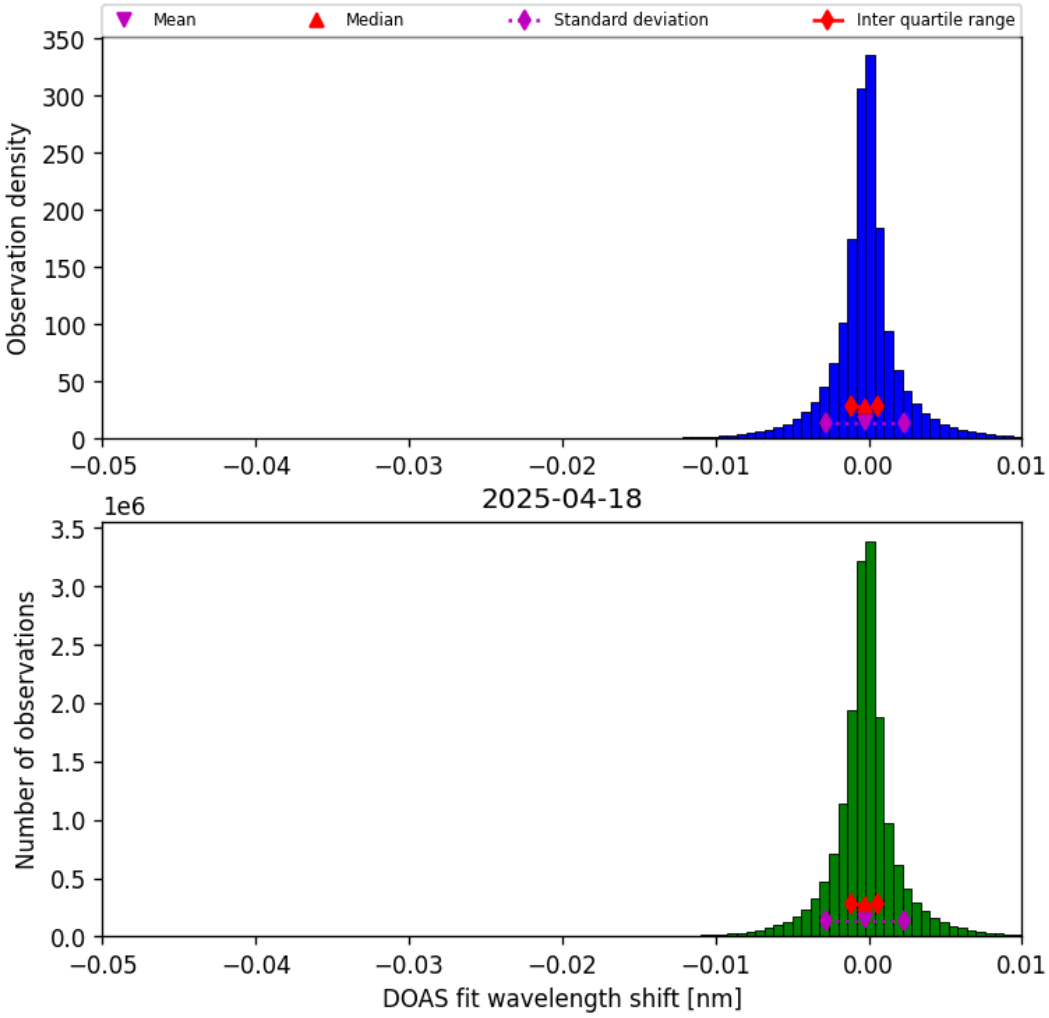


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-04-18 to 2025-04-19

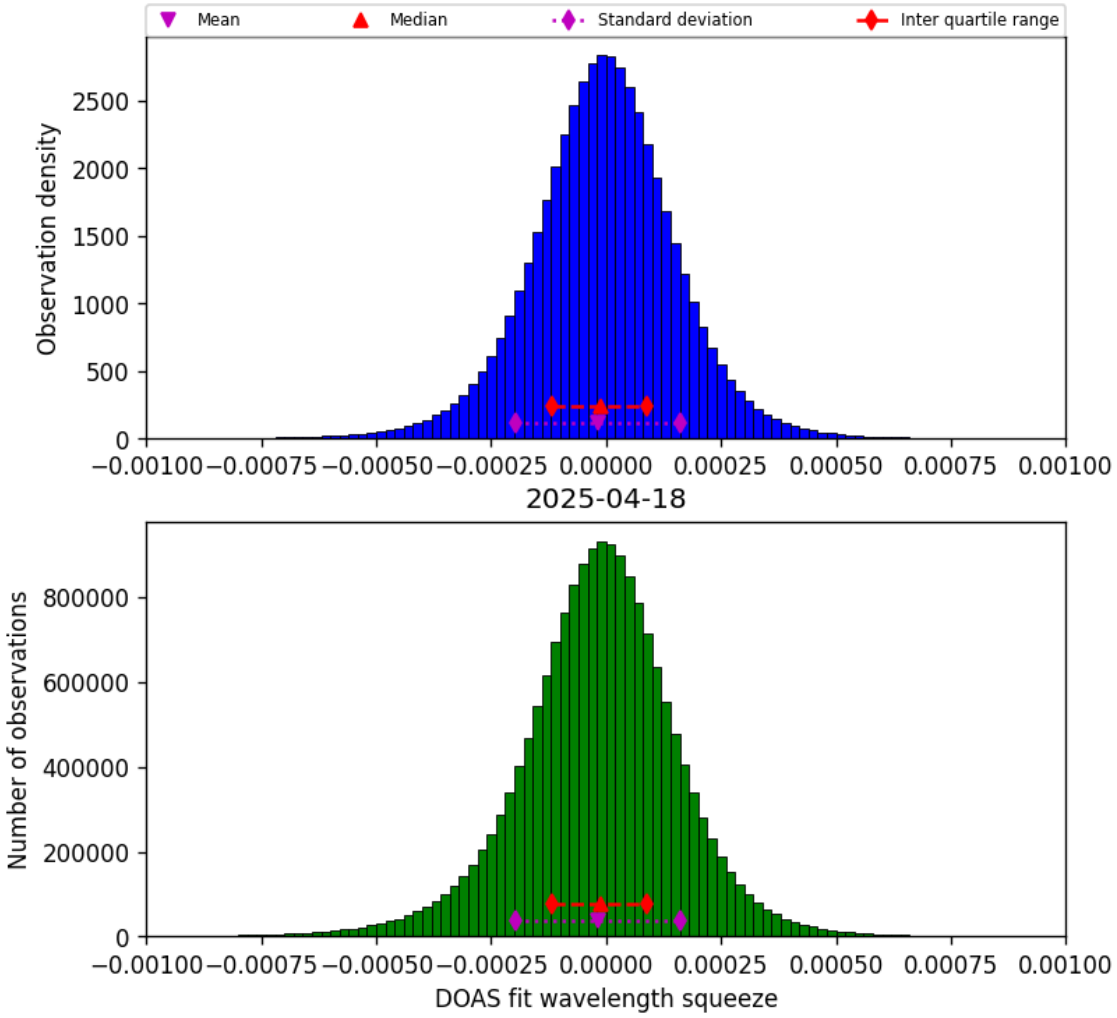


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-04-18 to 2025-04-19

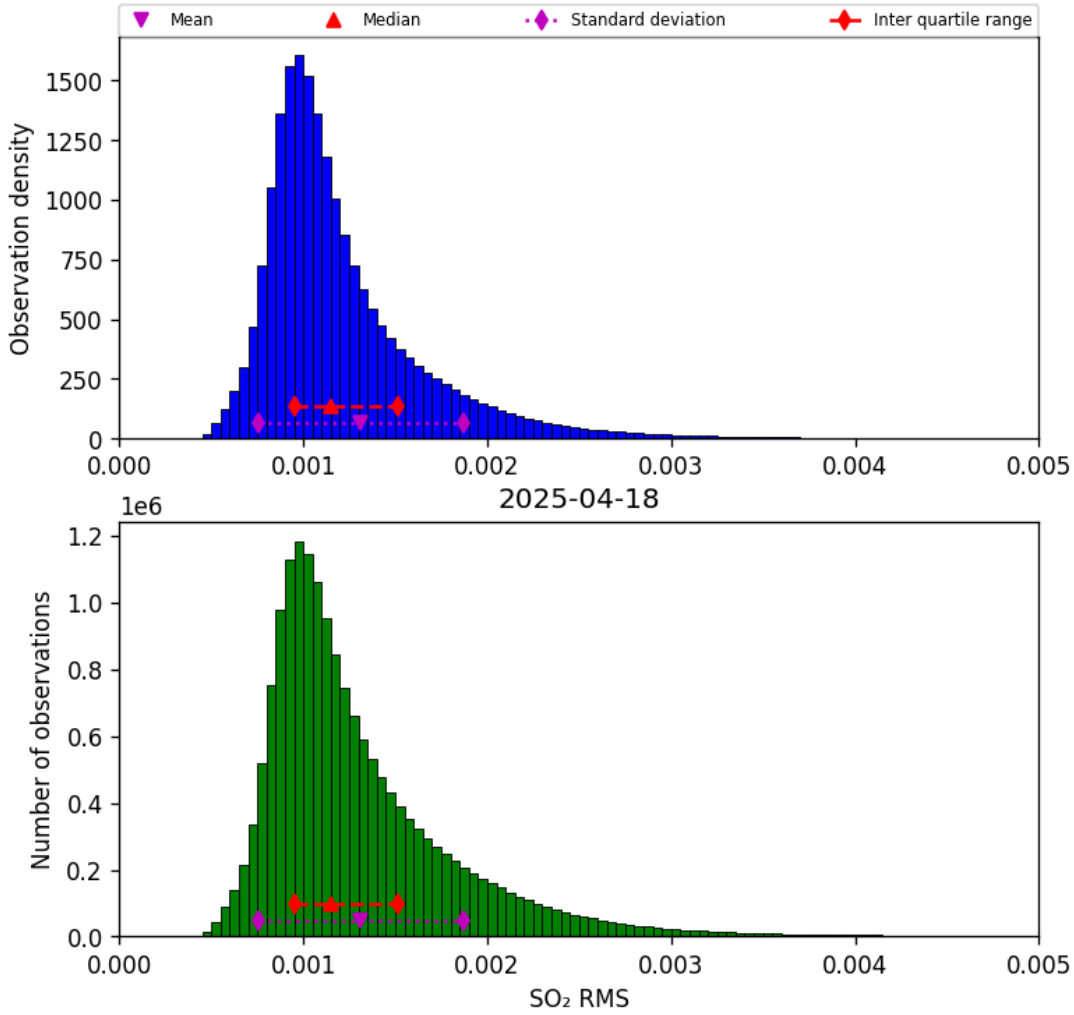


Figure 79: Histogram of "SO_2 RMS" for 2025-04-18 to 2025-04-19

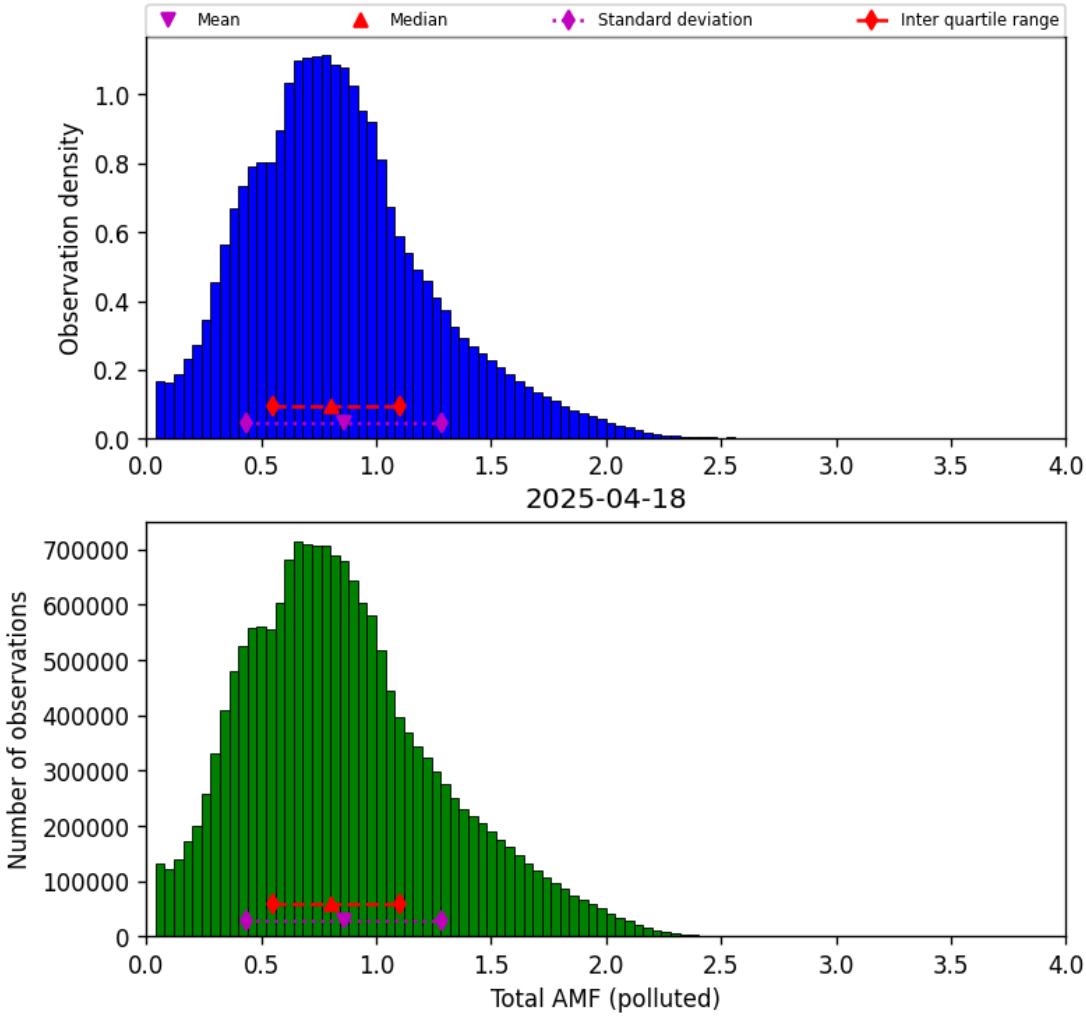


Figure 80: Histogram of “Total AMF (polluted)” for 2025-04-18 to 2025-04-19

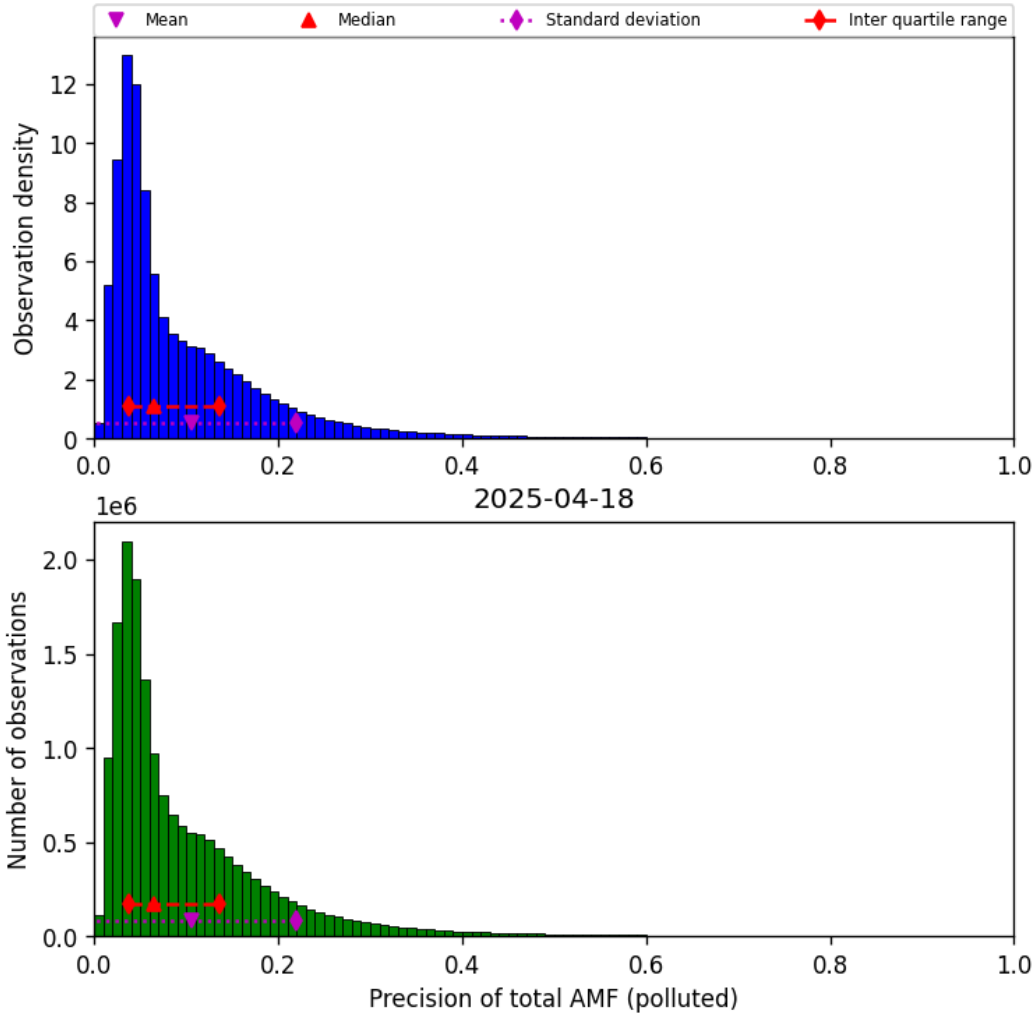


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-04-18 to 2025-04-19

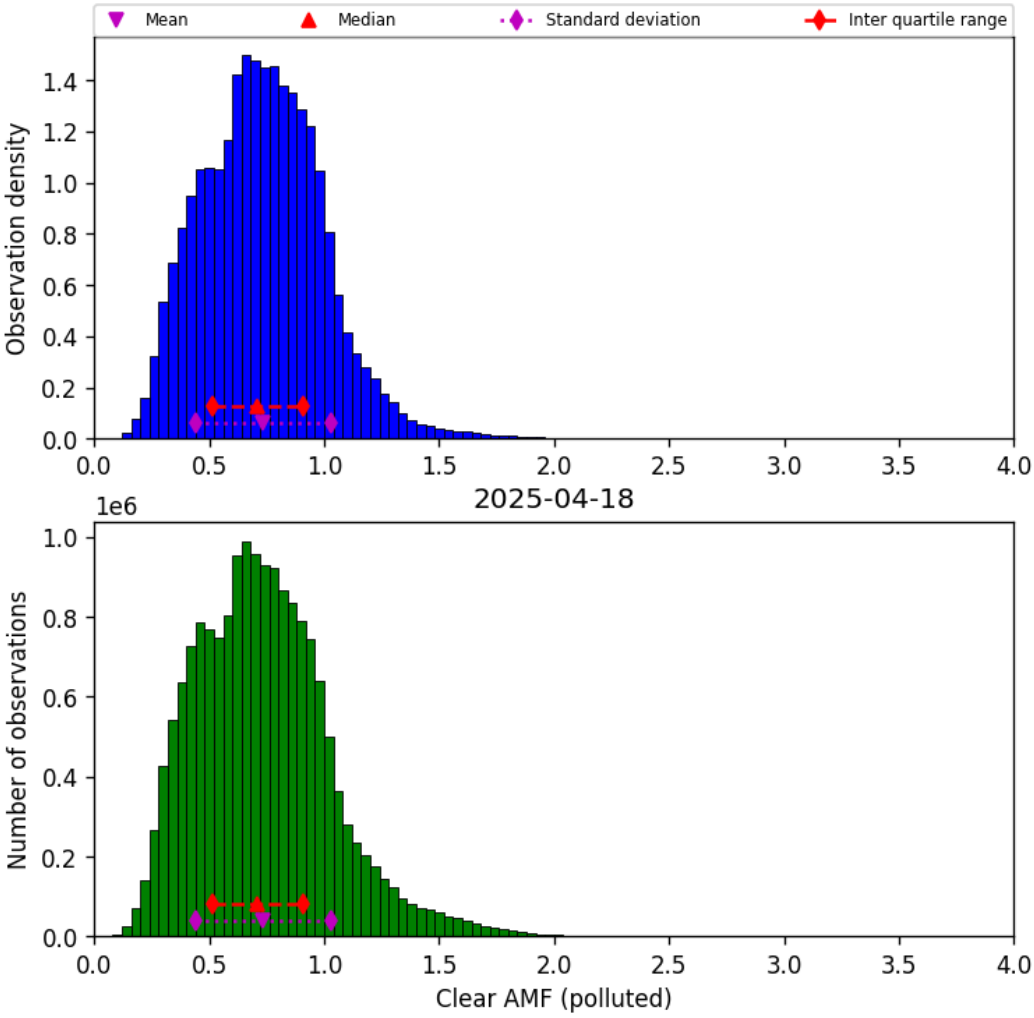


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-04-18 to 2025-04-19

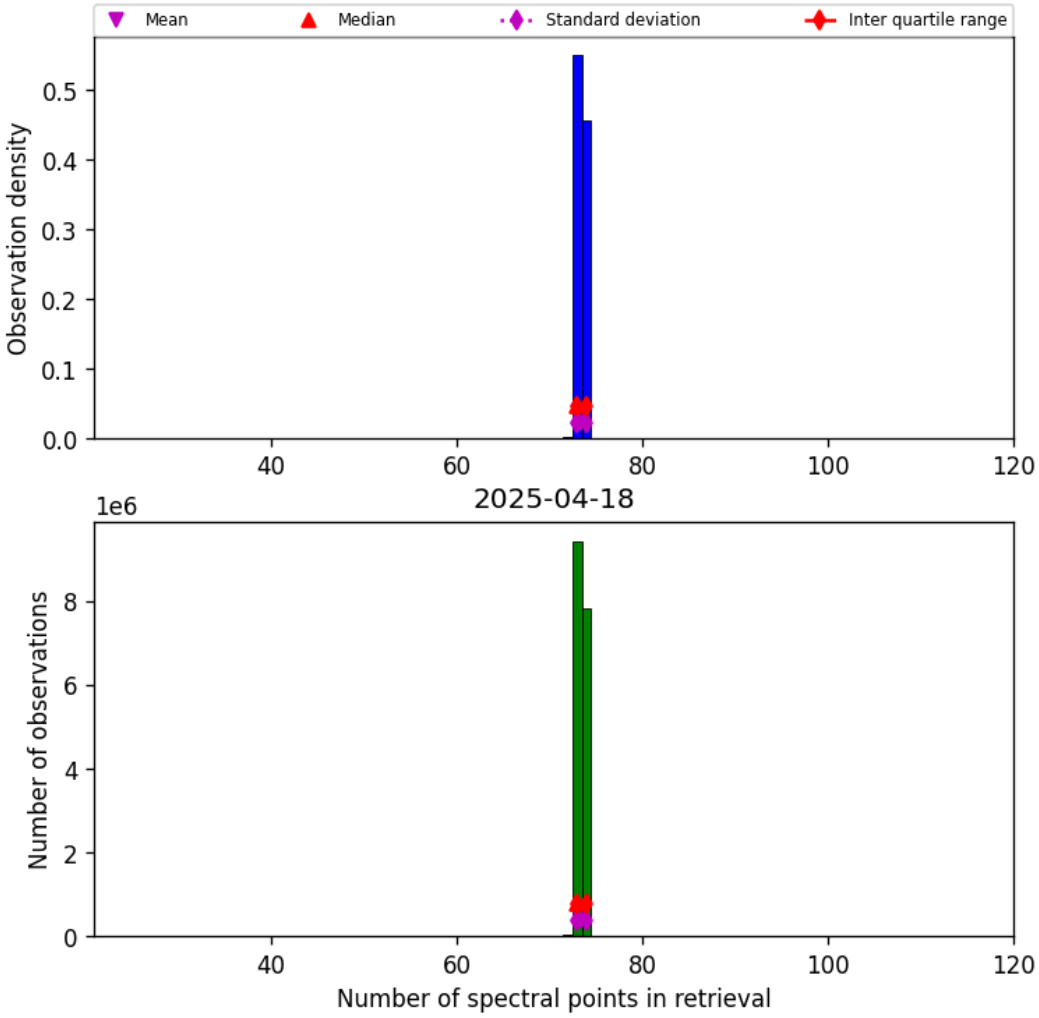


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-04-18 to 2025-04-19

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.

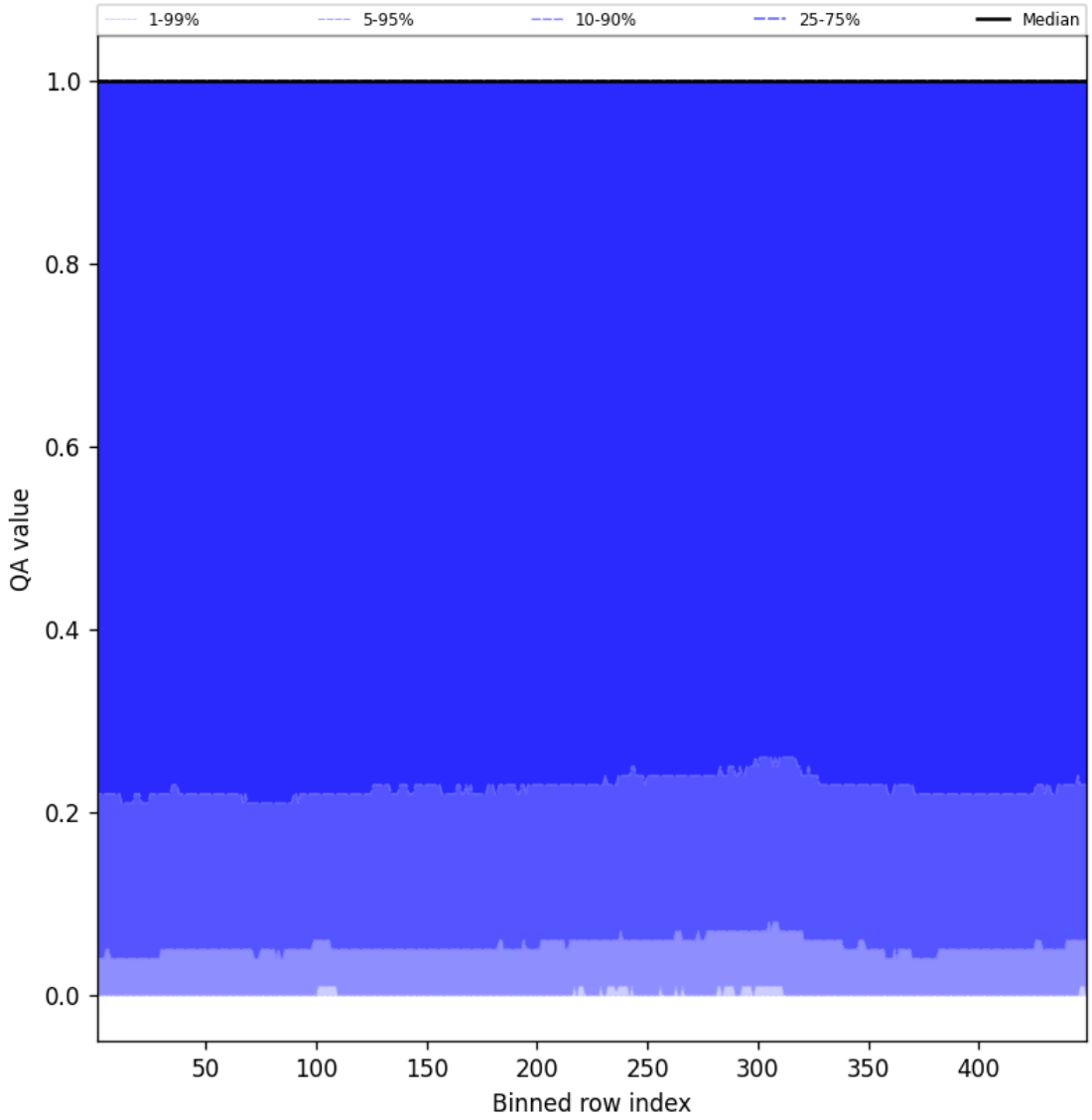


Figure 84: Along track statistics of “QA value” for 2025-04-18 to 2025-04-19

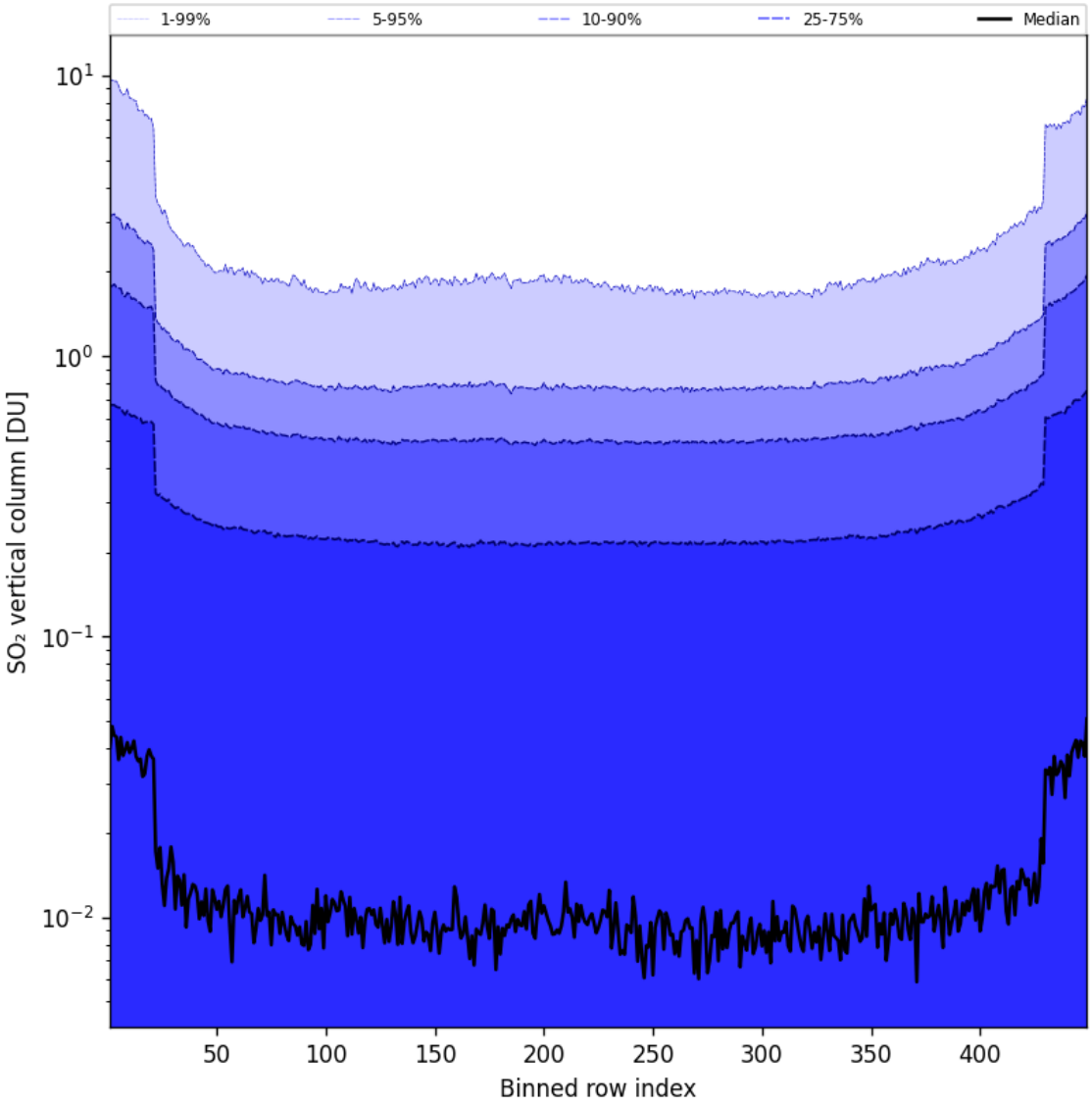


Figure 85: Along track statistics of "SO_2 vertical column" for 2025-04-18 to 2025-04-19

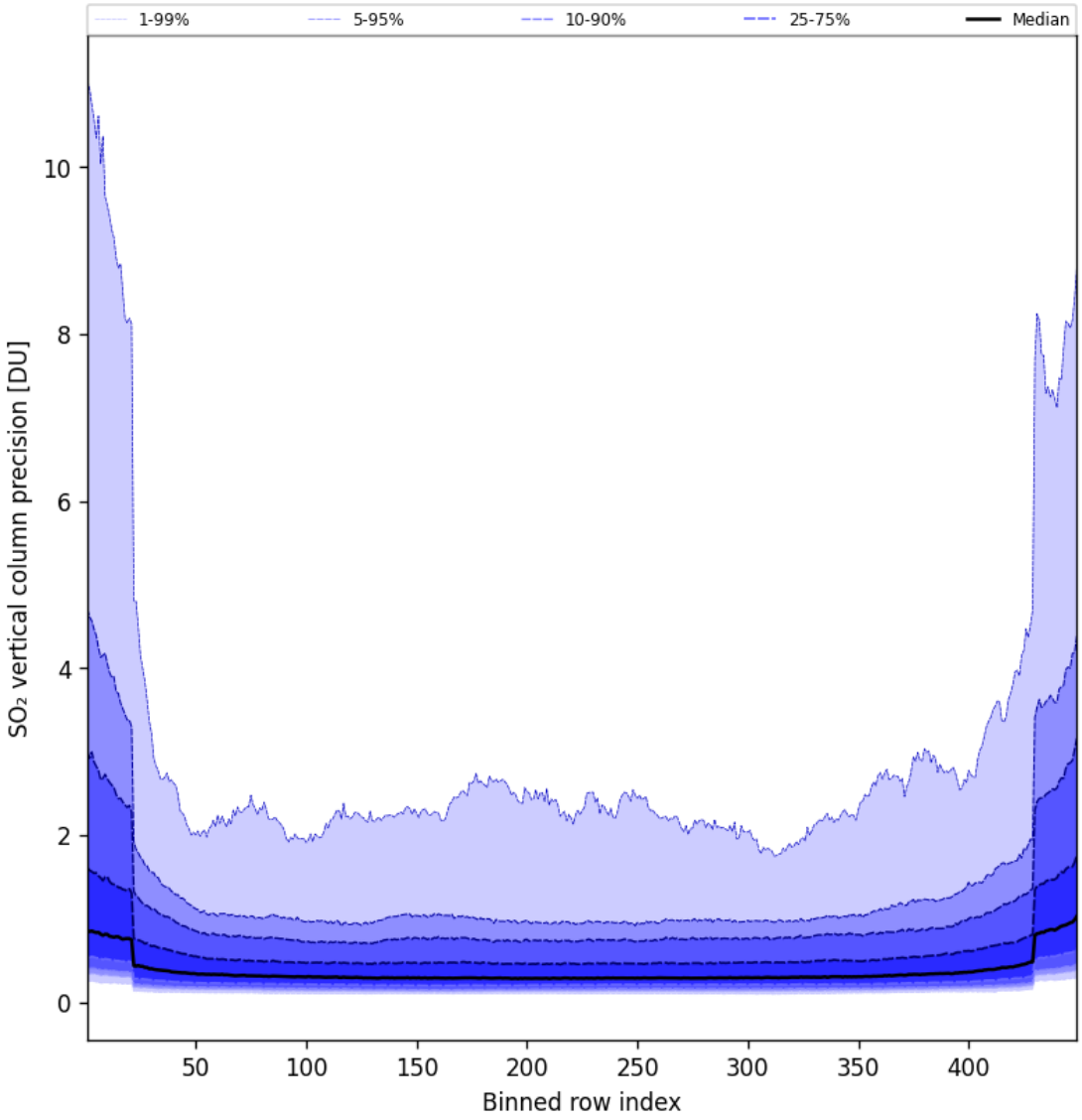


Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-04-18 to 2025-04-19

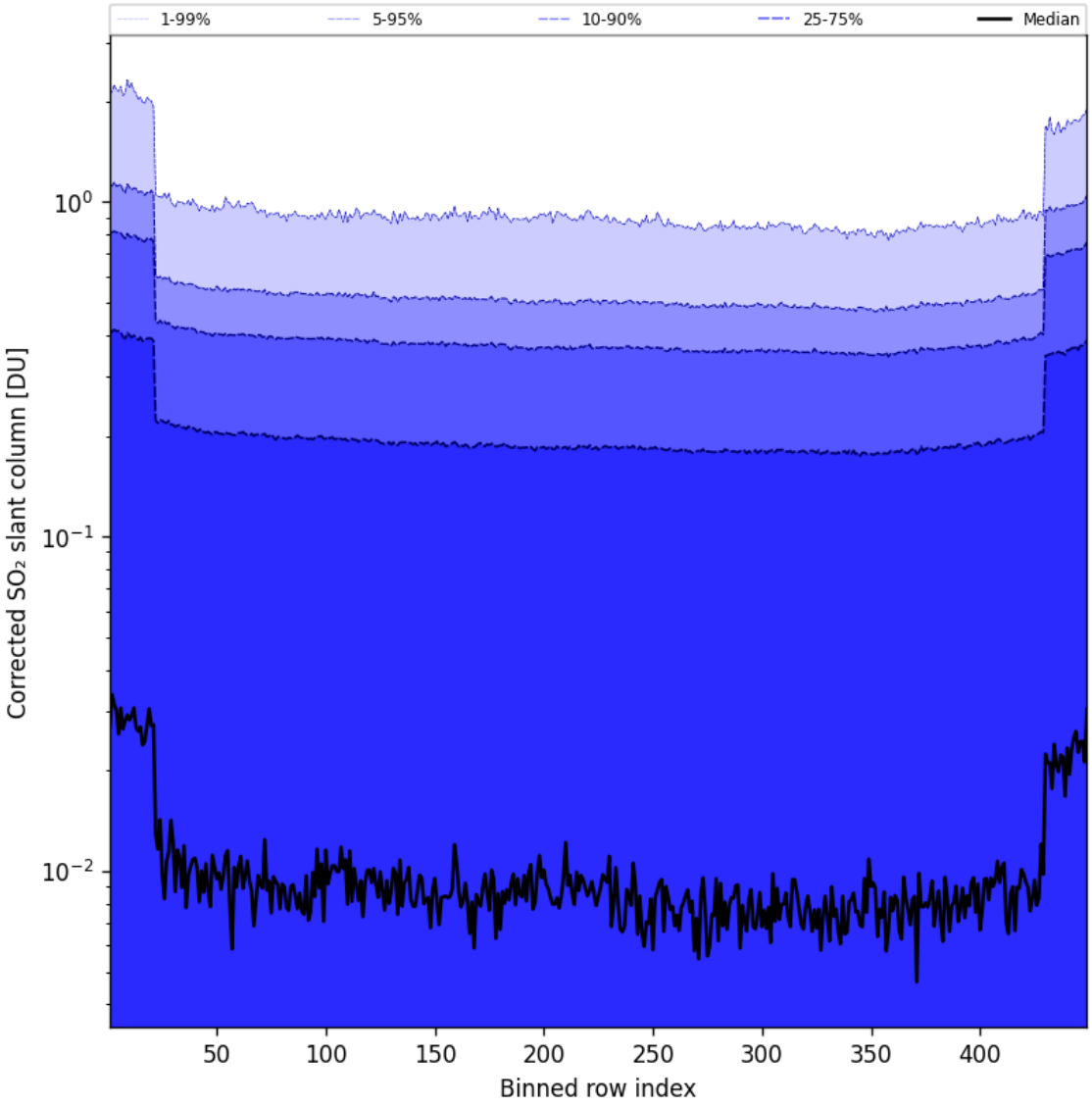


Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-04-18 to 2025-04-19

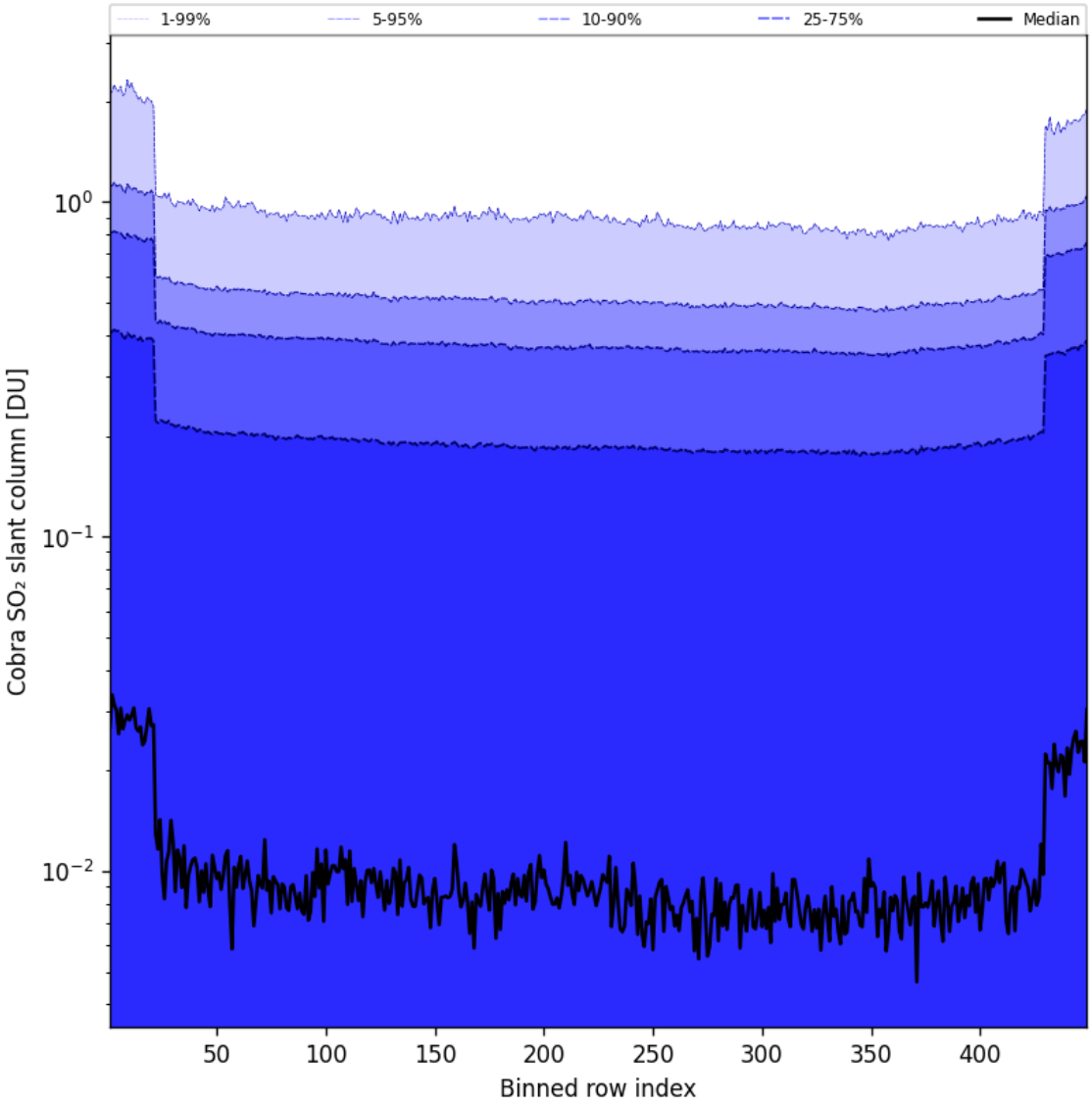


Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-04-18 to 2025-04-19

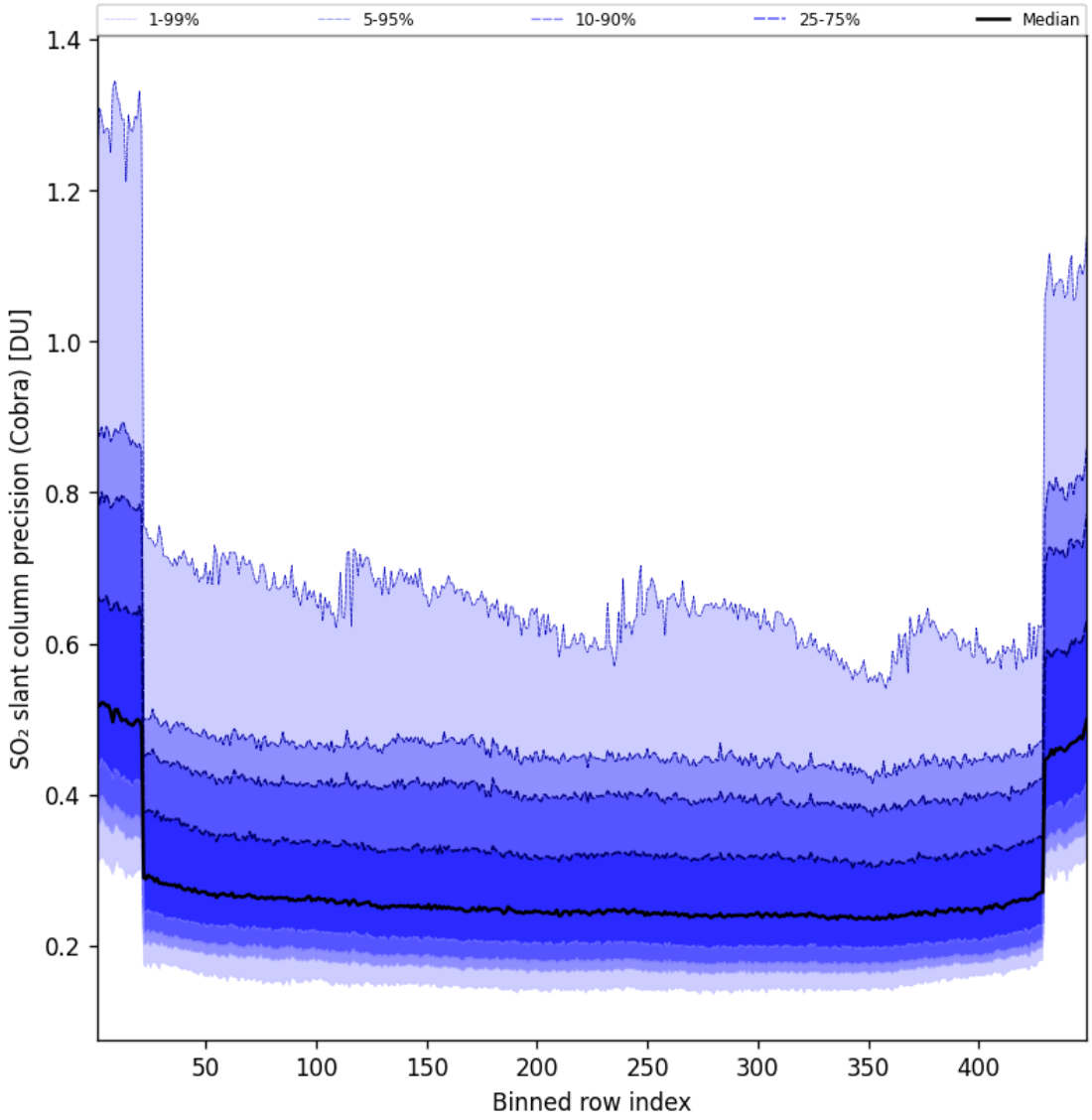


Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-04-18 to 2025-04-19

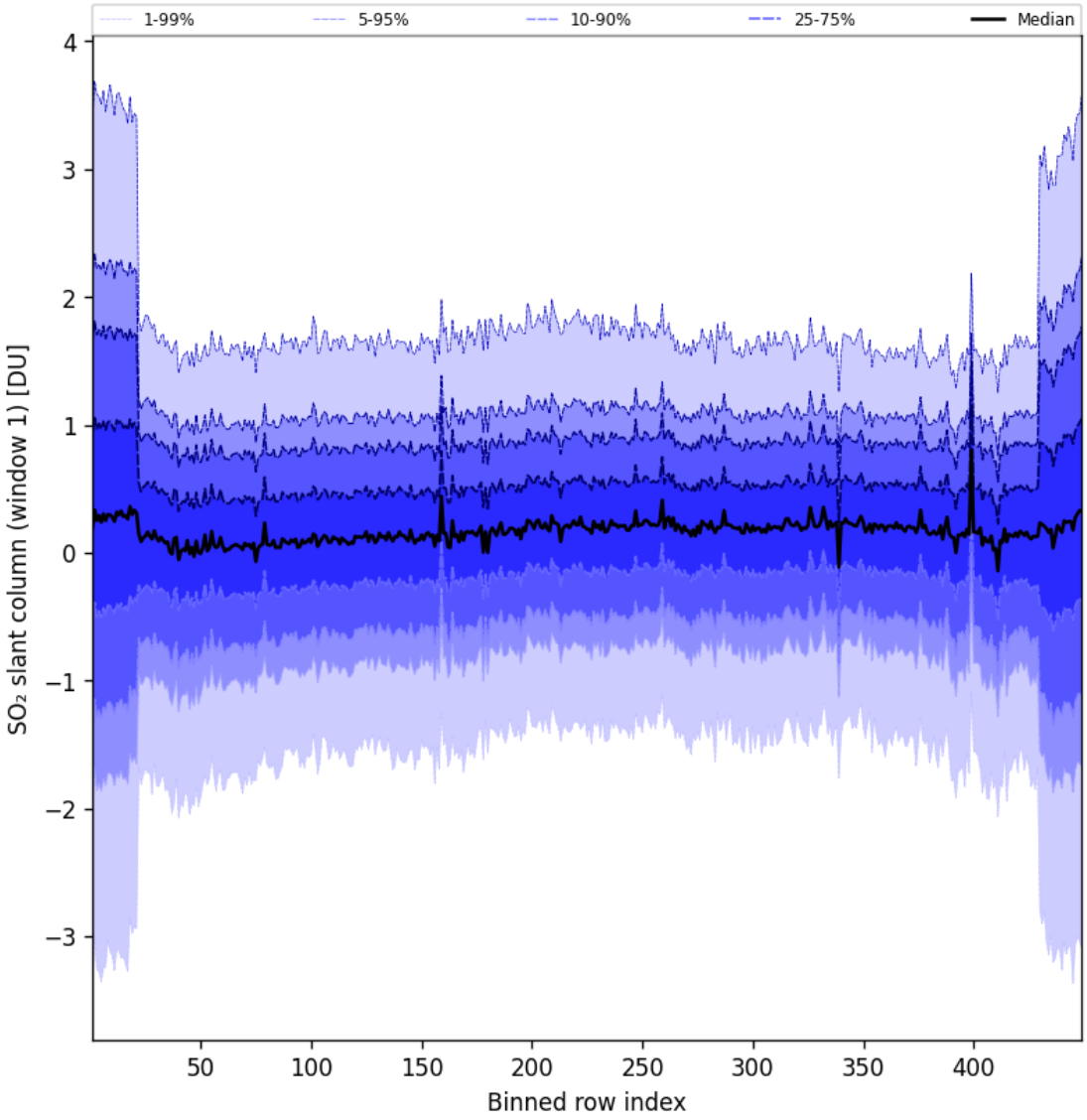


Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-04-18 to 2025-04-19

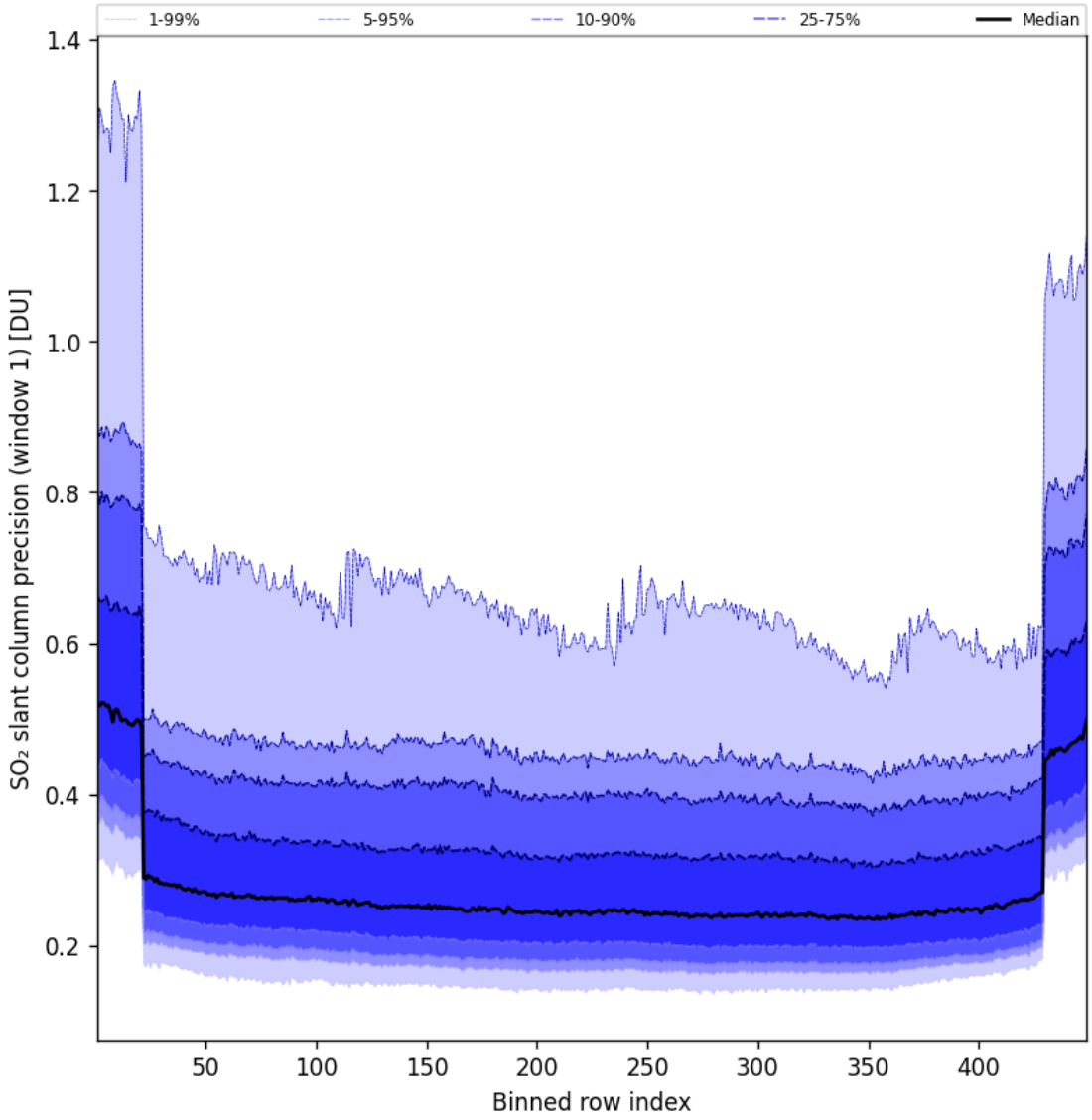


Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-04-18 to 2025-04-19

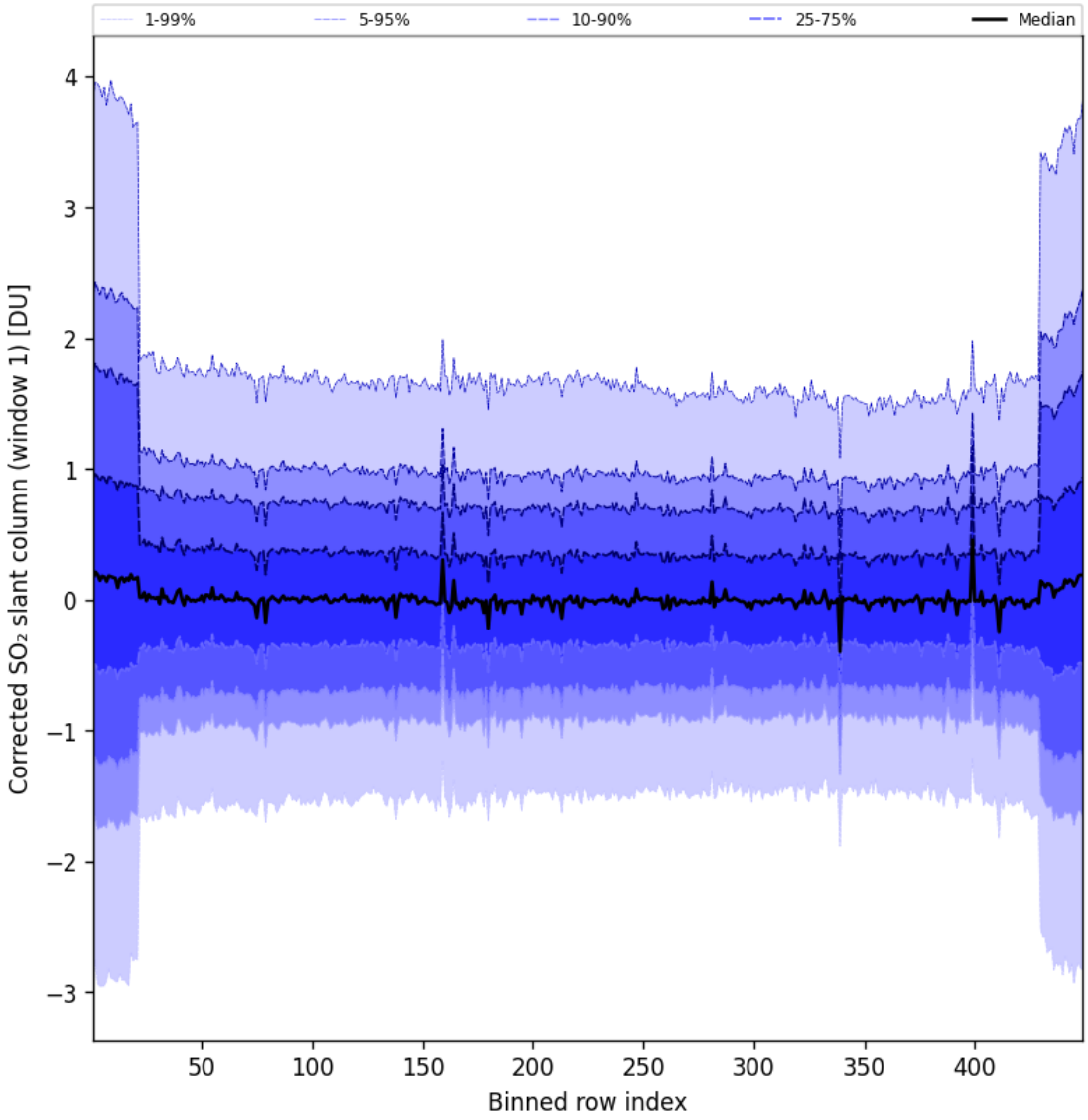


Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-04-18 to 2025-04-19

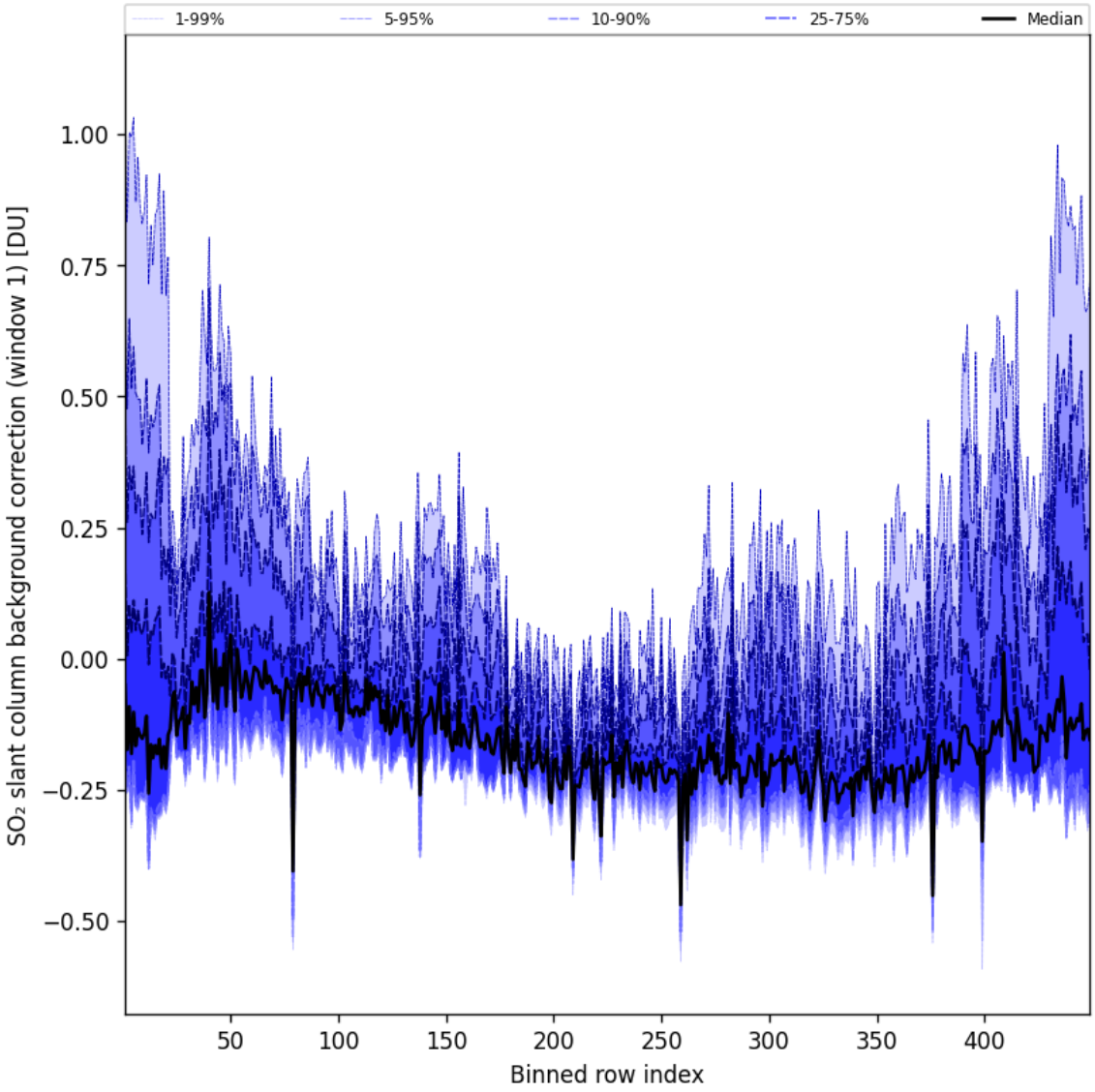


Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-04-18 to 2025-04-19

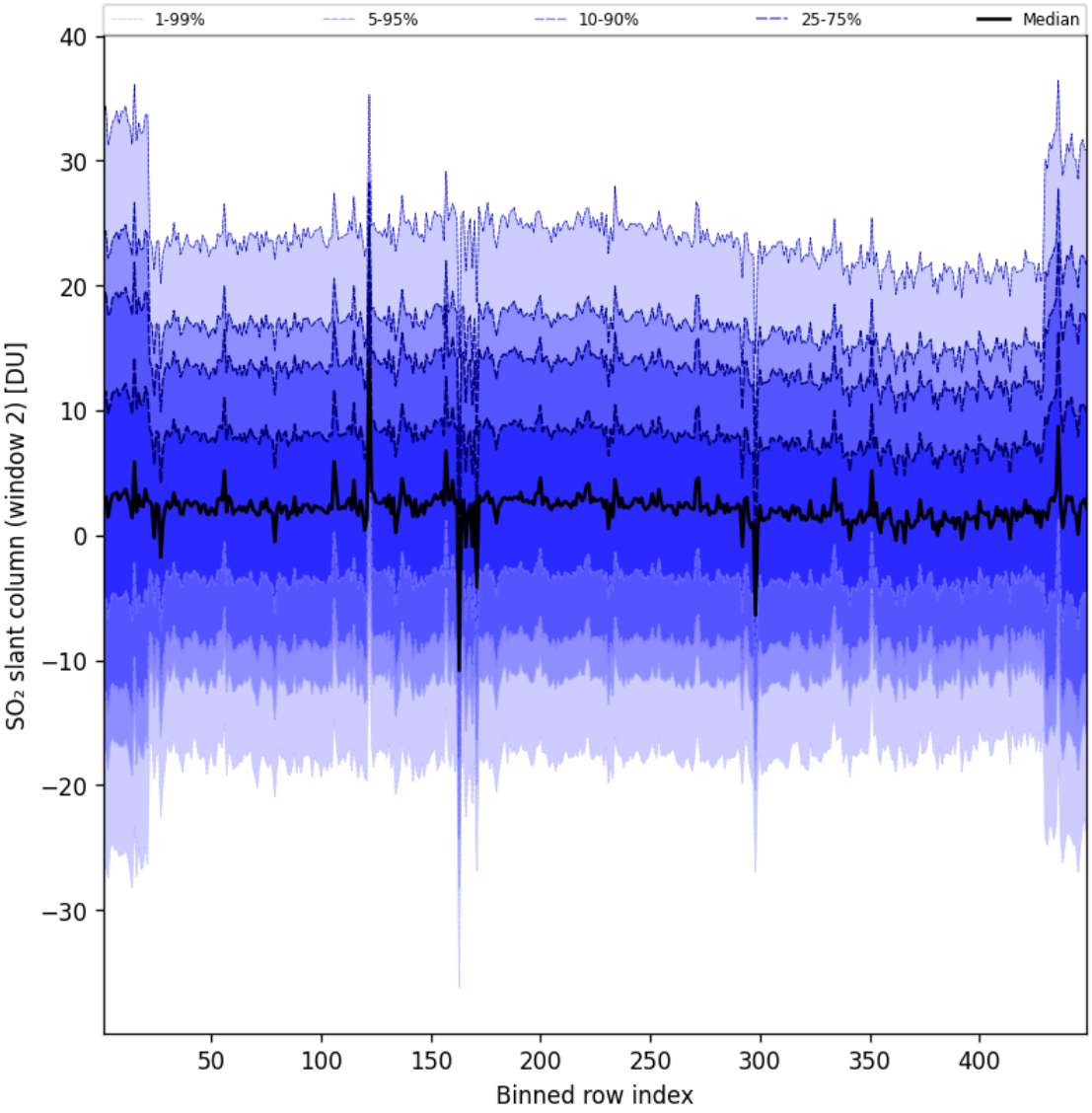


Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-04-18 to 2025-04-19

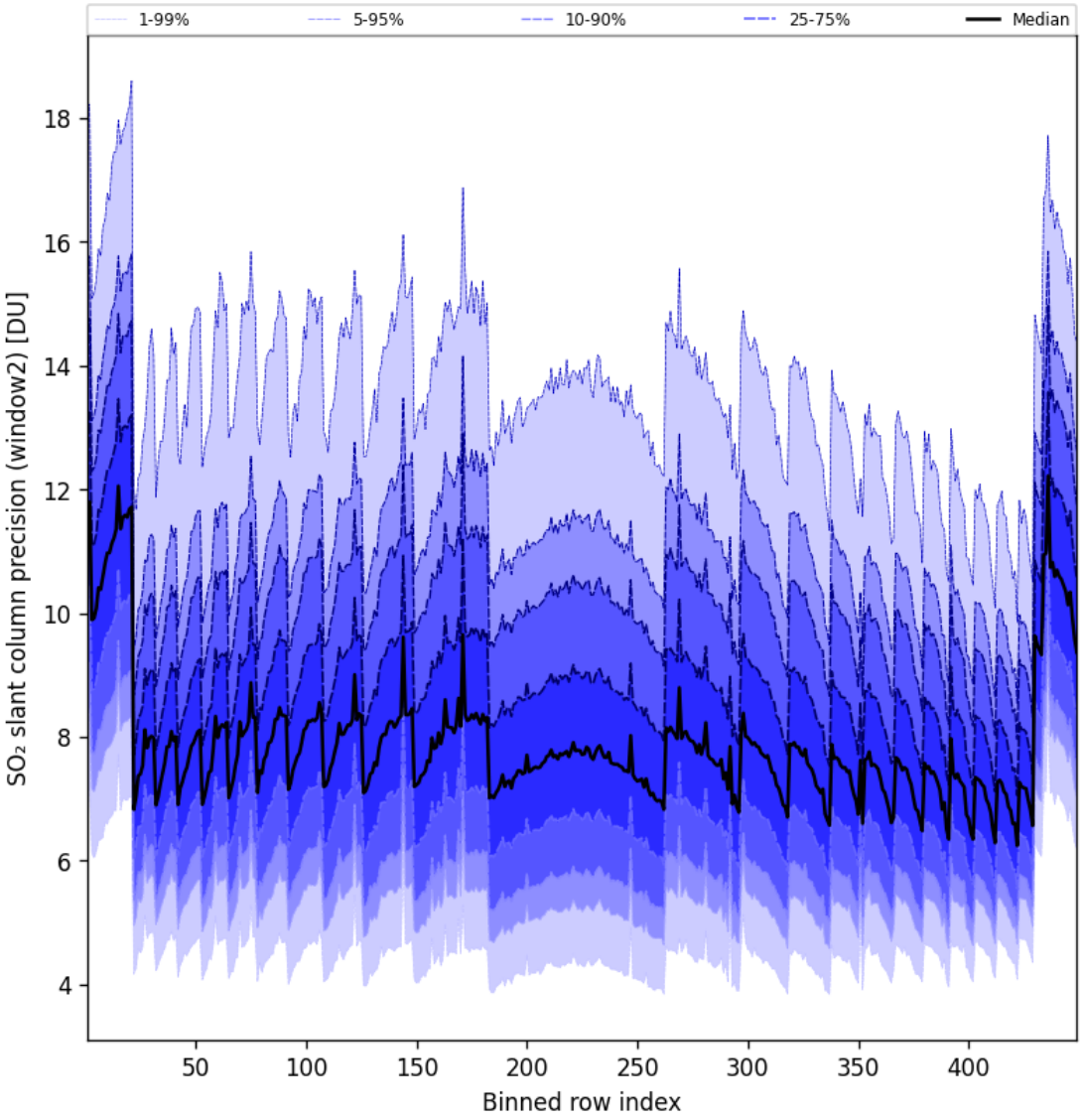


Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-04-18 to 2025-04-19

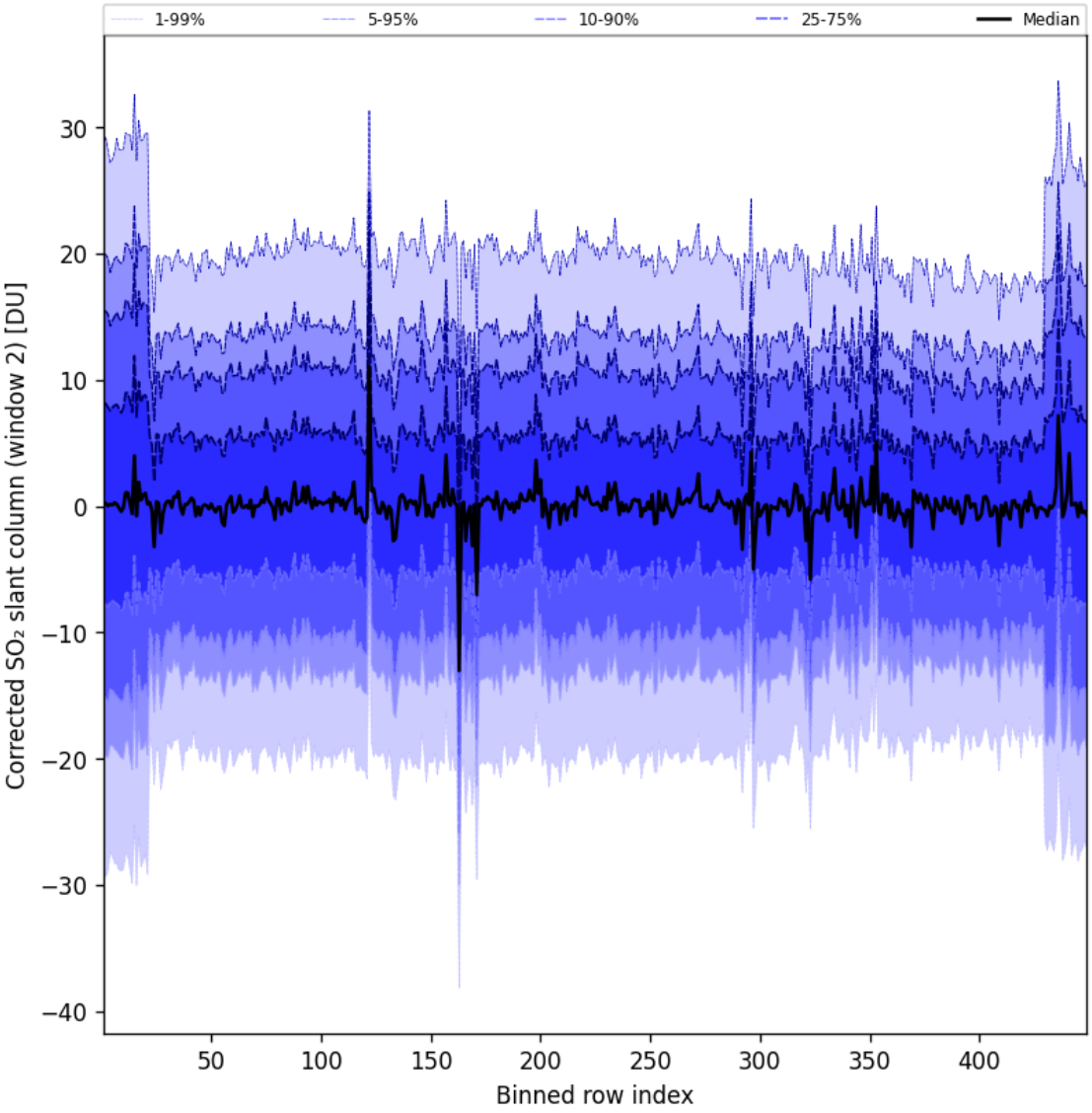


Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-04-18 to 2025-04-19

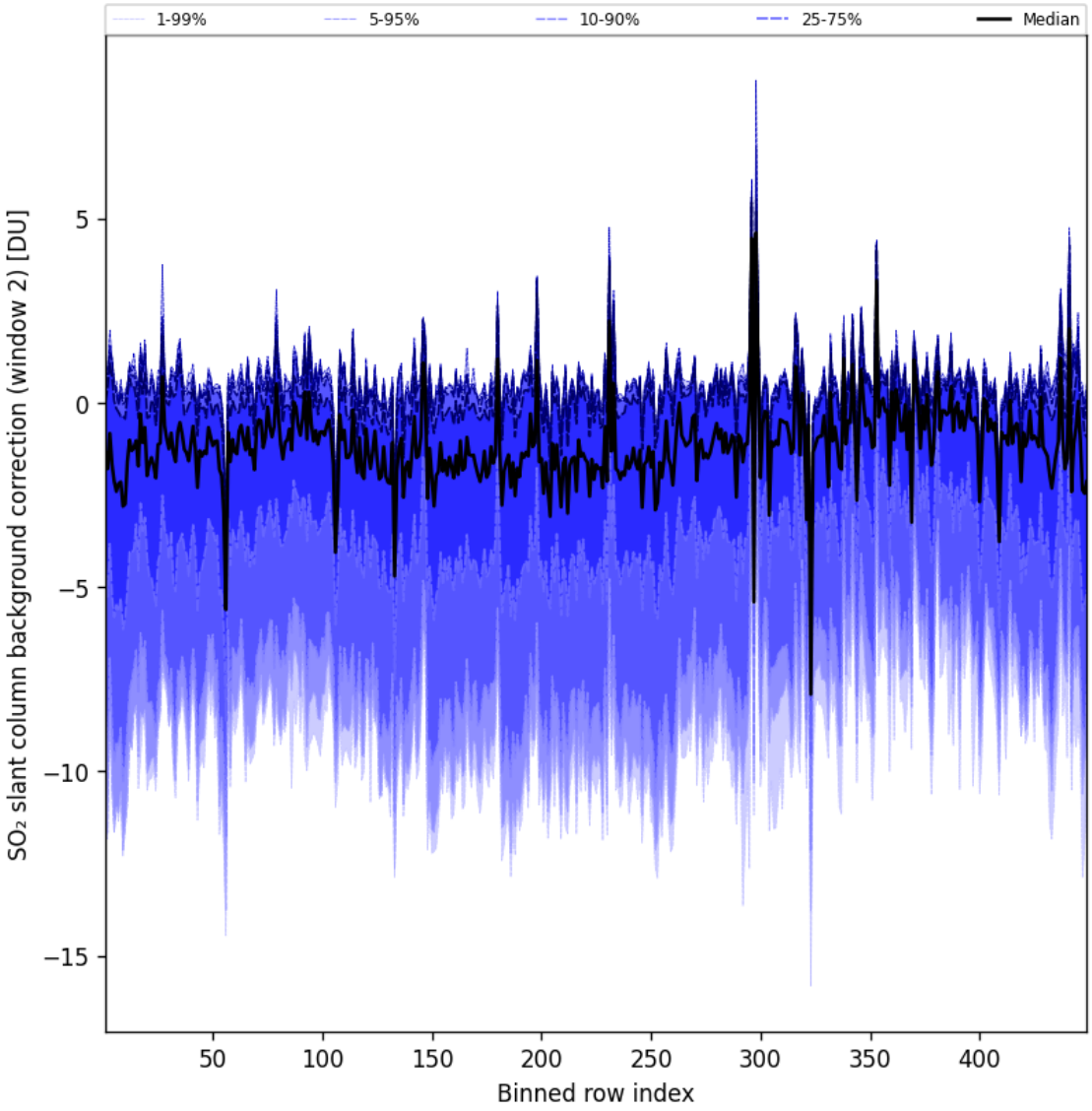


Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-04-18 to 2025-04-19

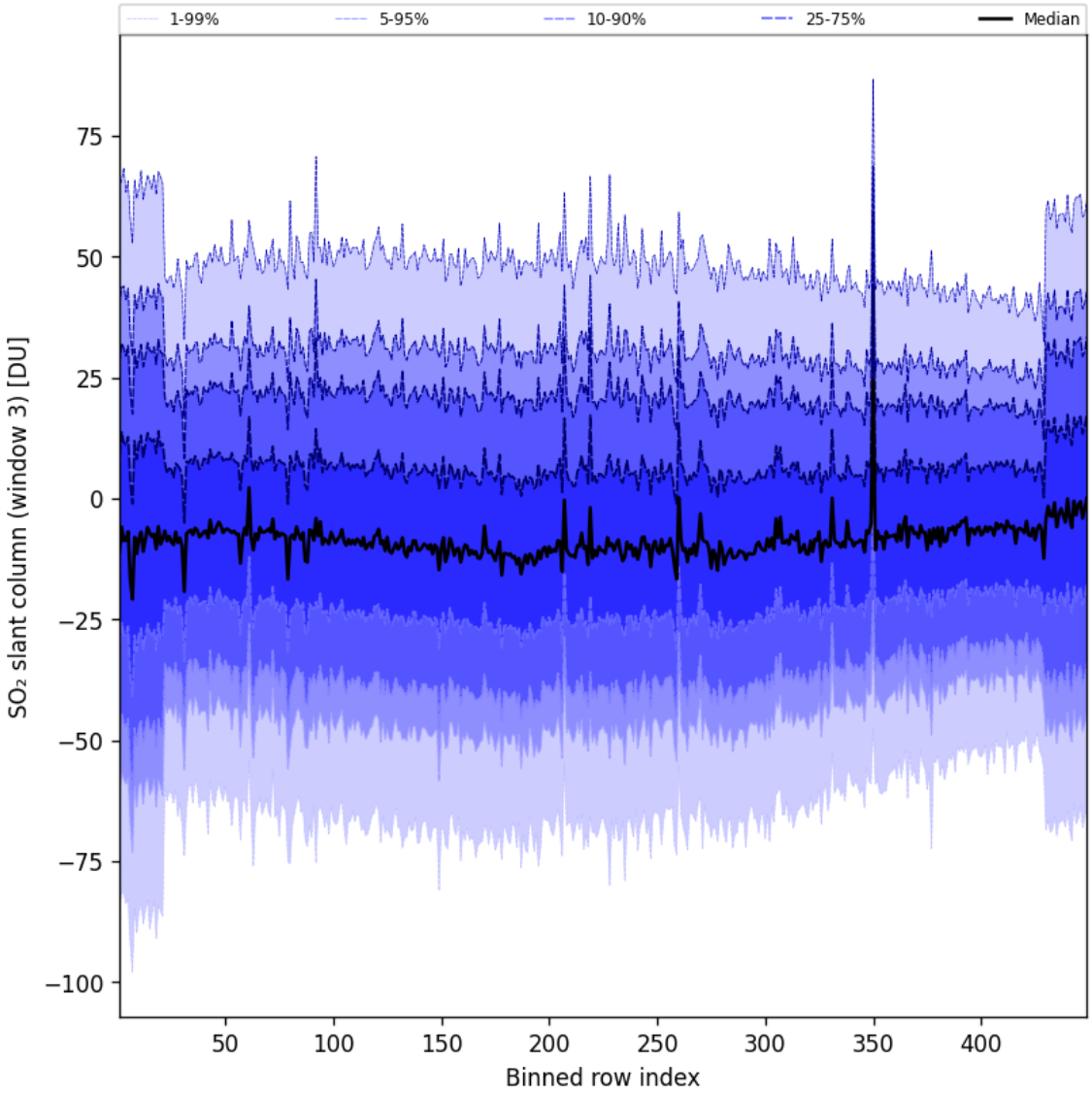


Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-04-18 to 2025-04-19

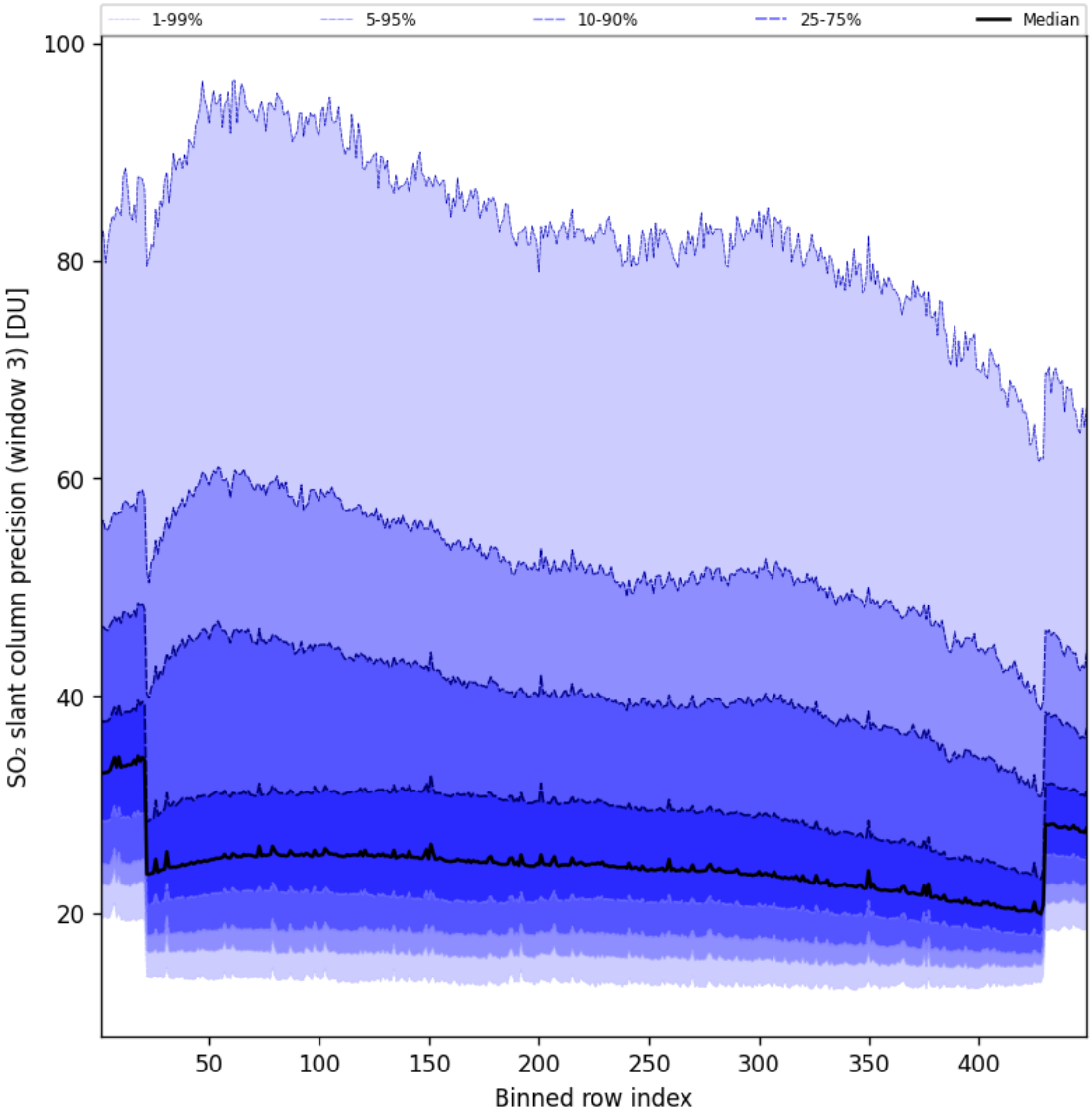


Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-04-18 to 2025-04-19

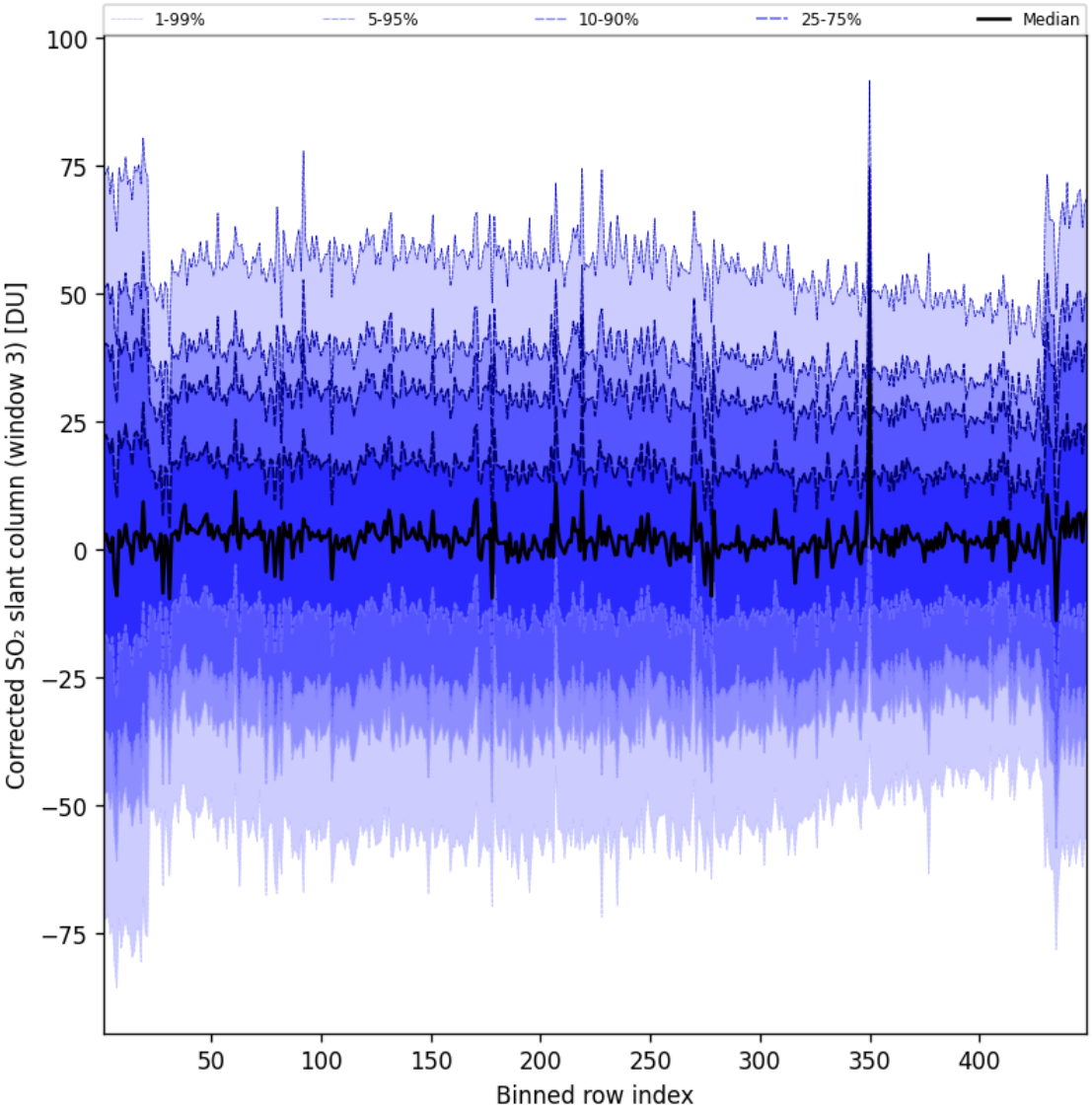


Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-04-18 to 2025-04-19

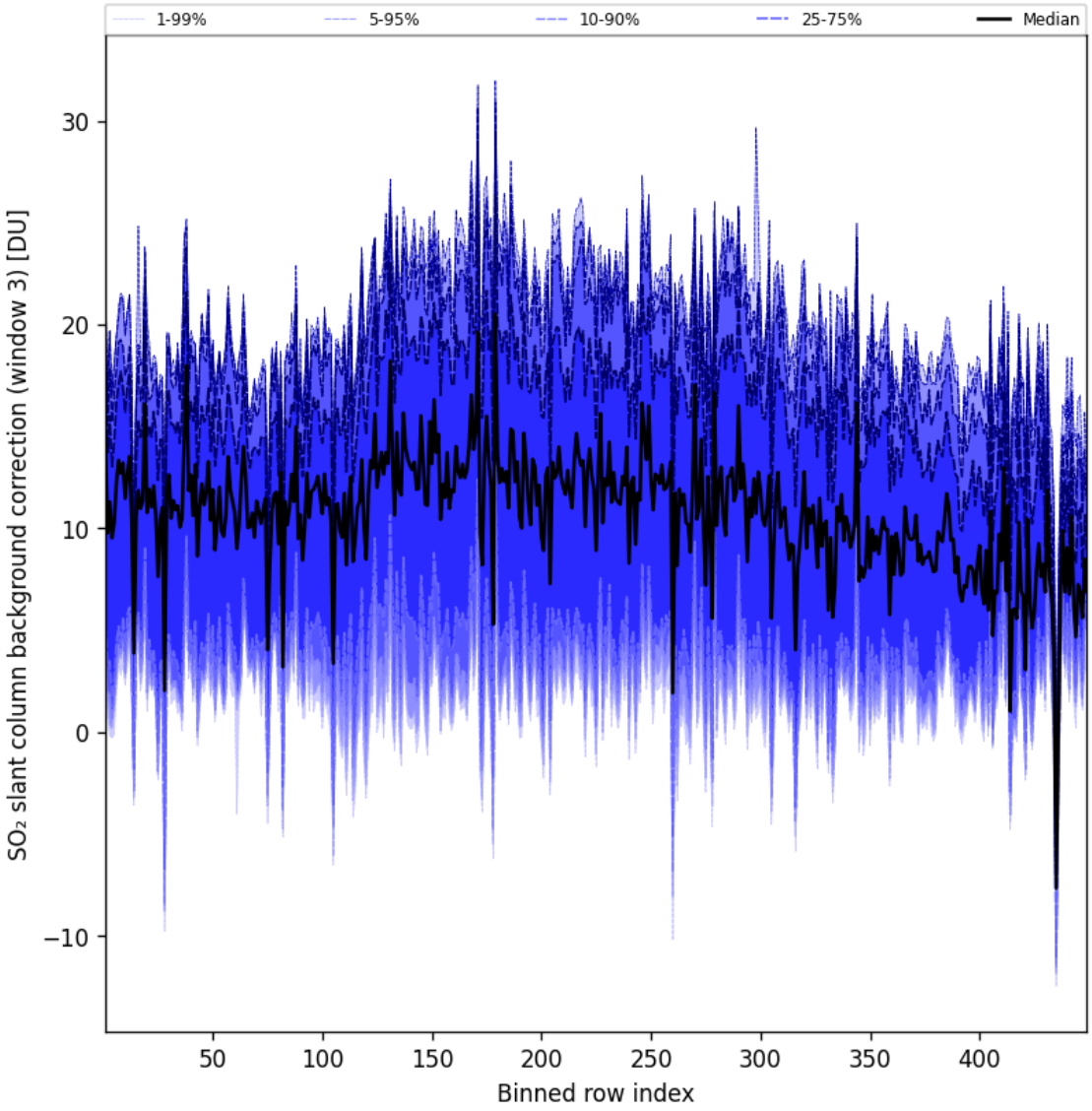
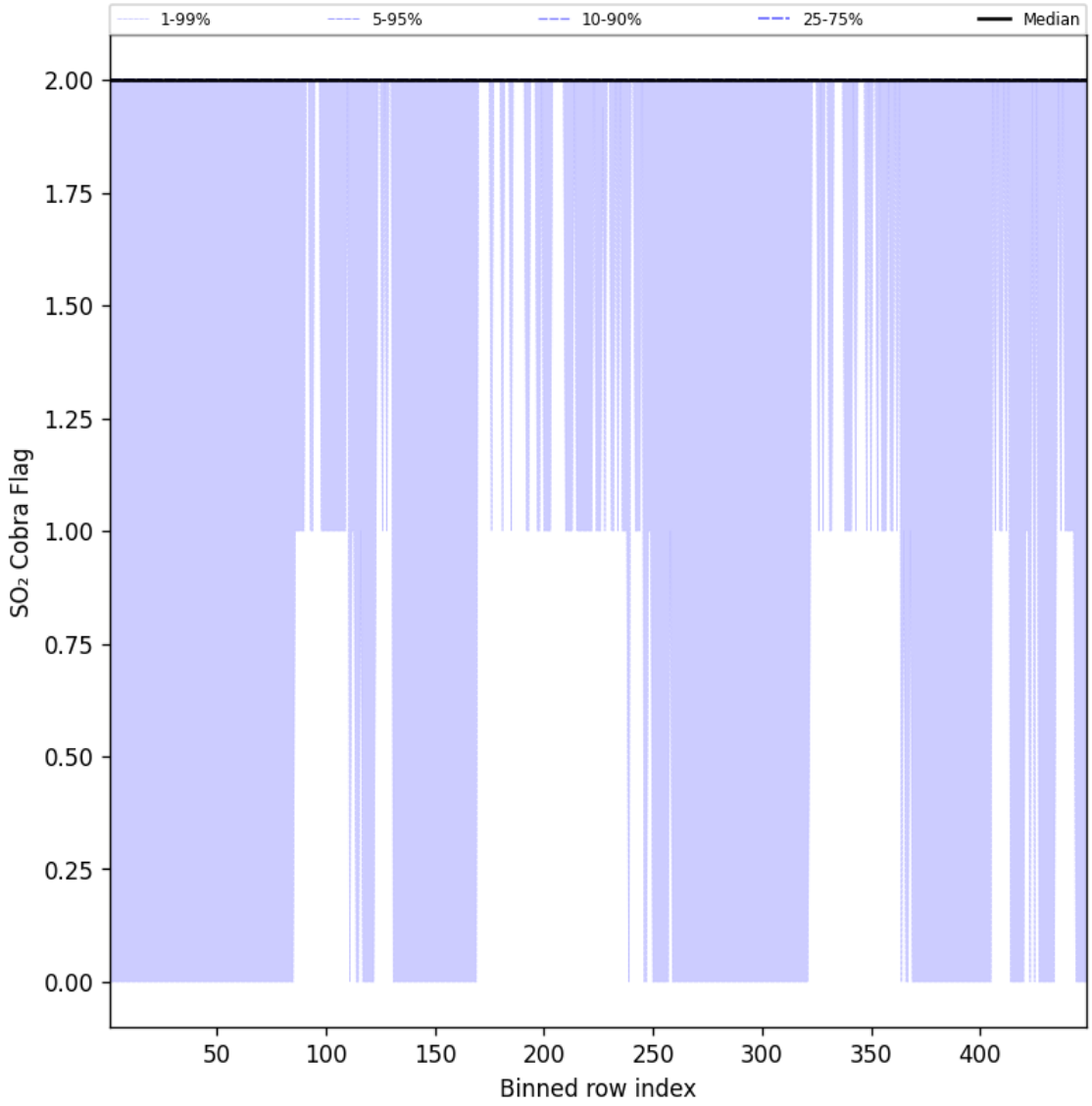


Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-04-18 to 2025-04-19



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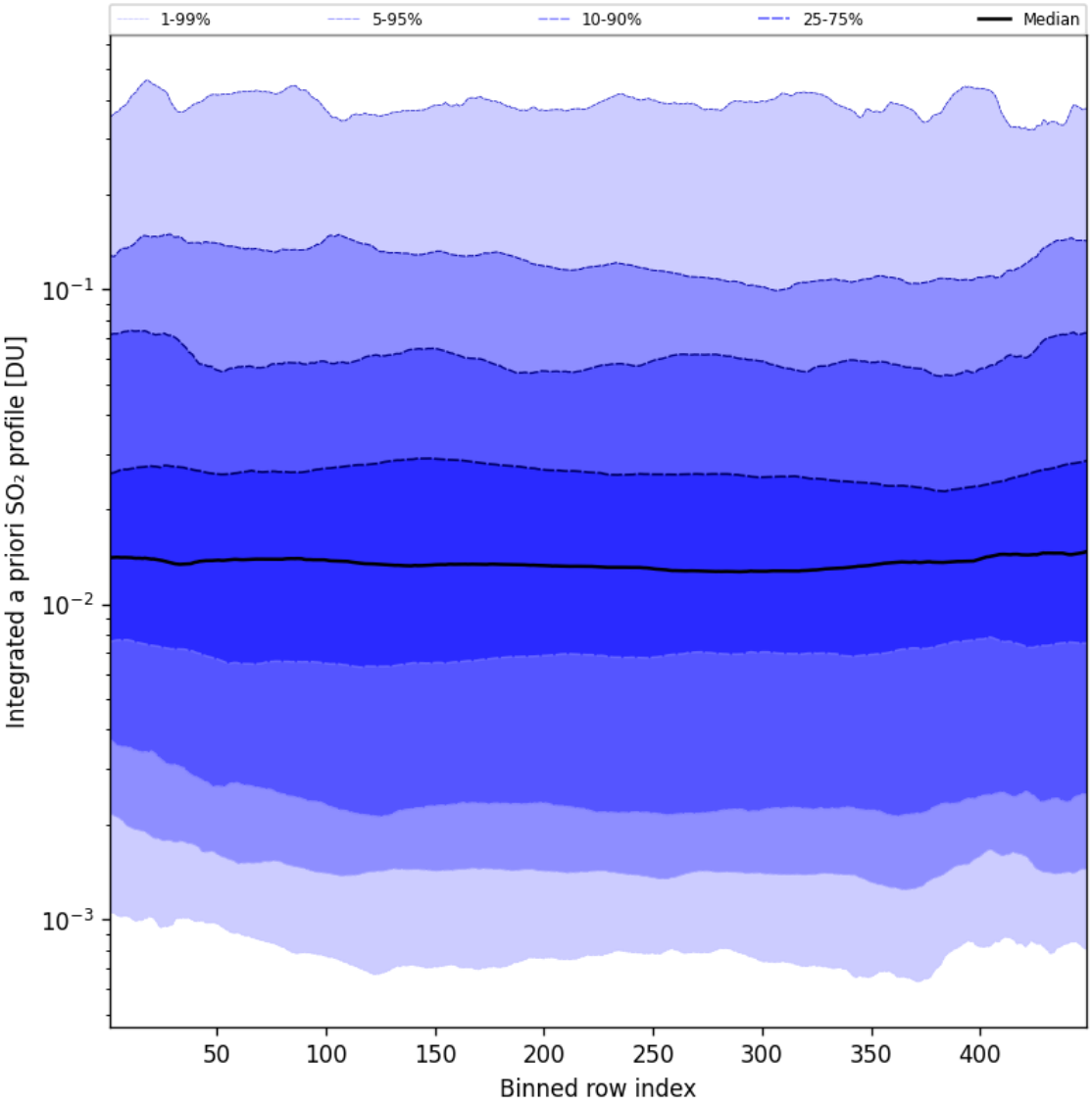
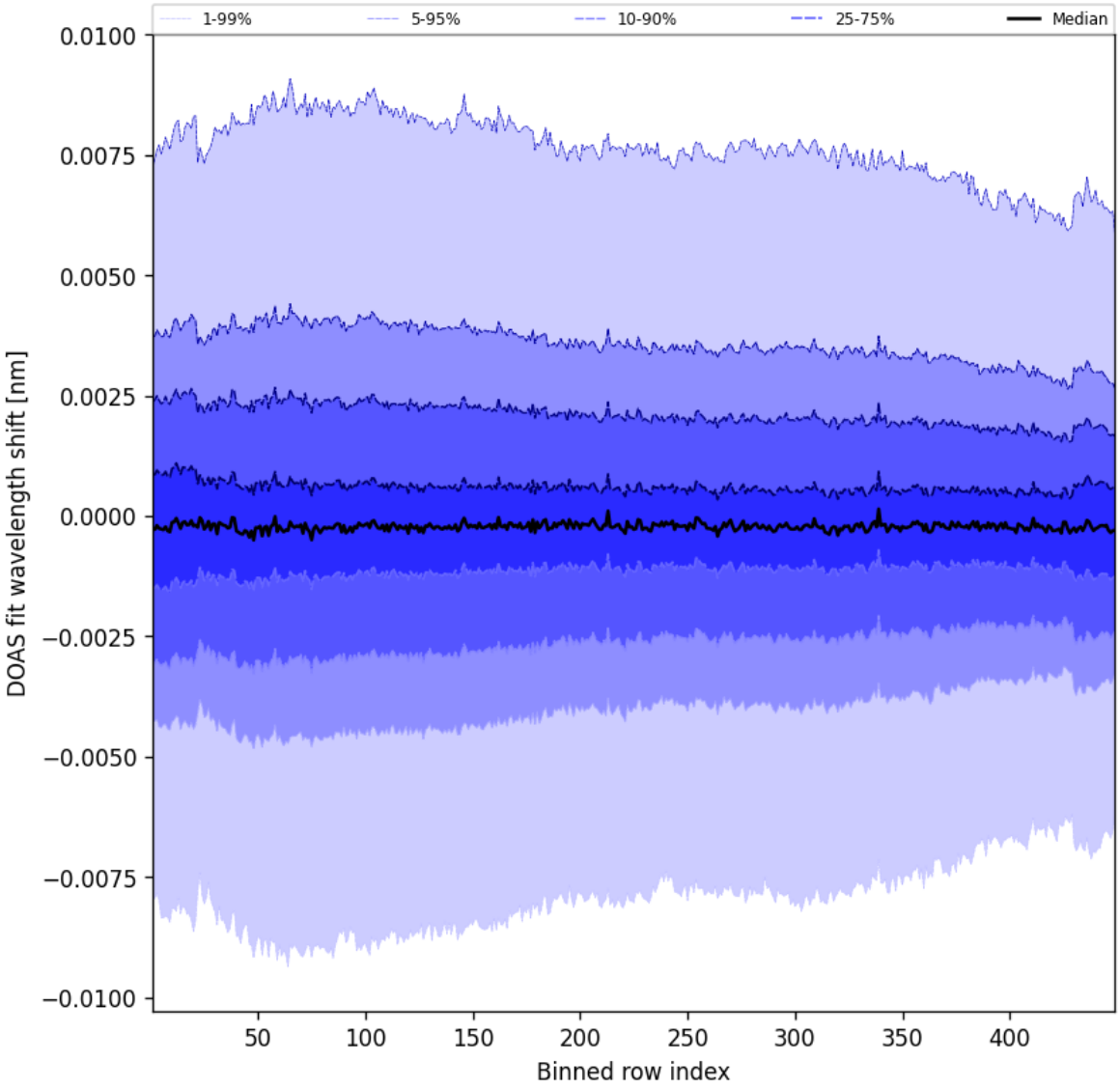


Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-04-18 to 2025-04-19



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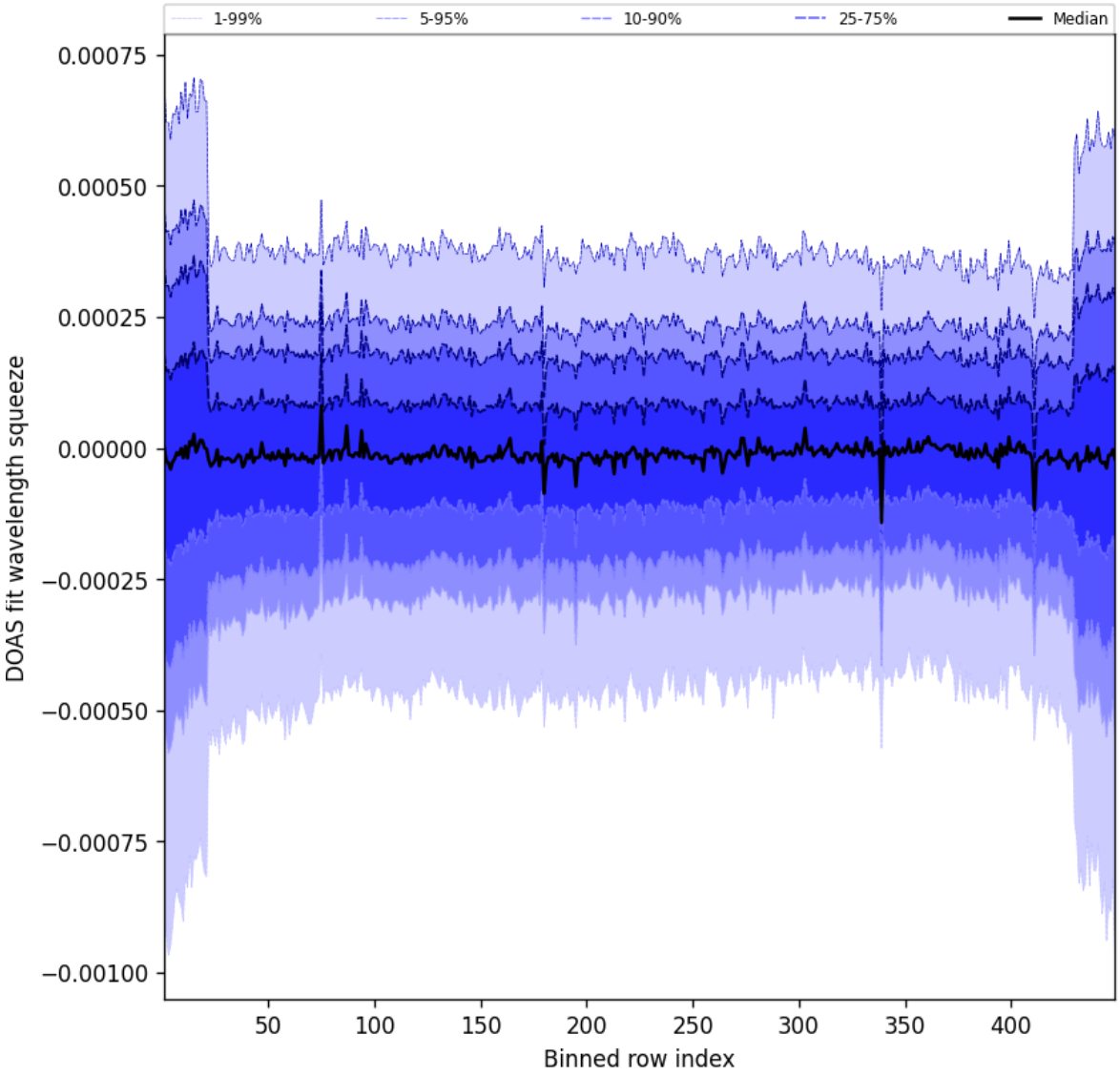

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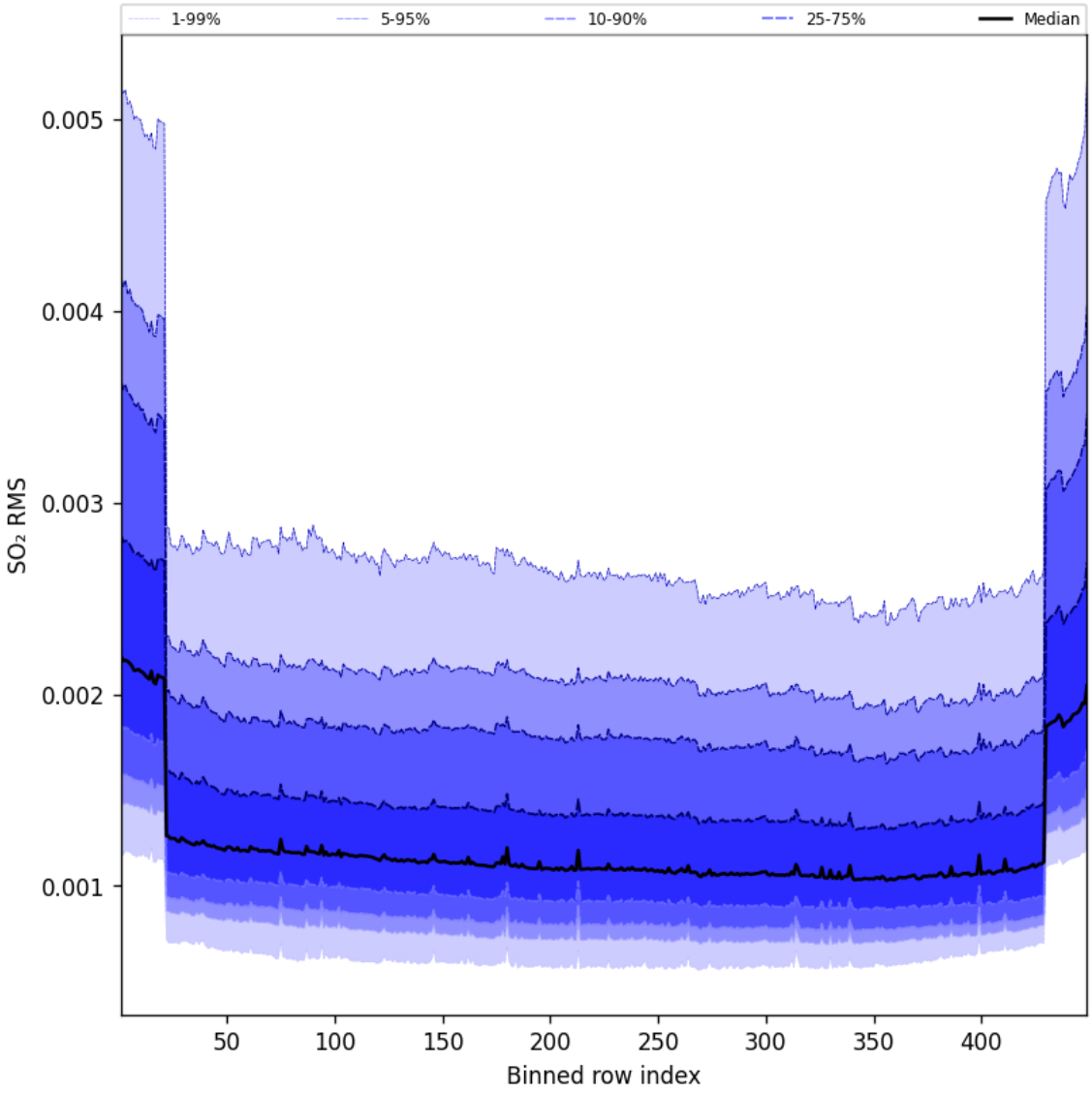


Figure 106: Along track statistics of "SO_2 RMS" for 2025-04-18 to 2025-04-19

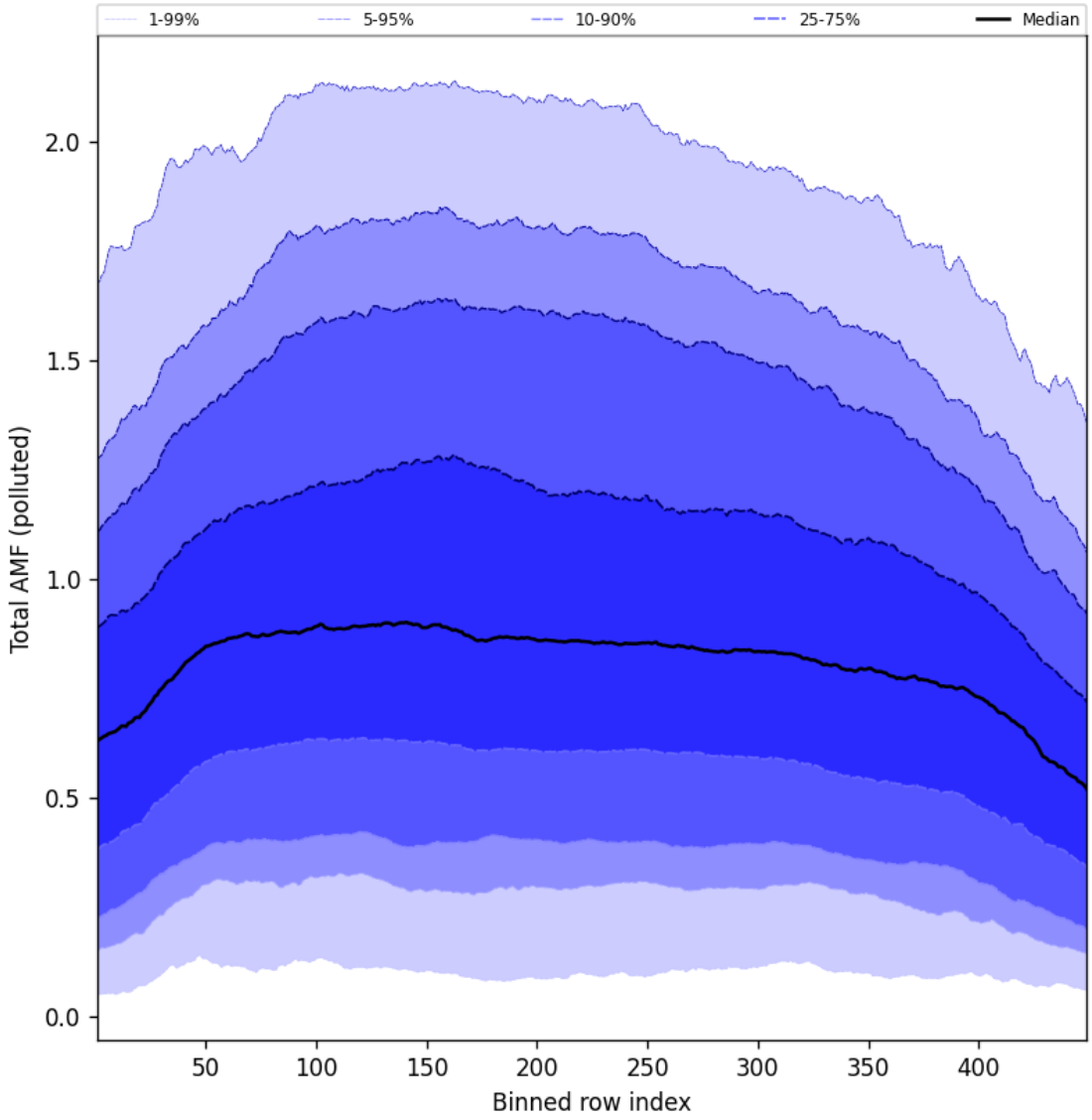
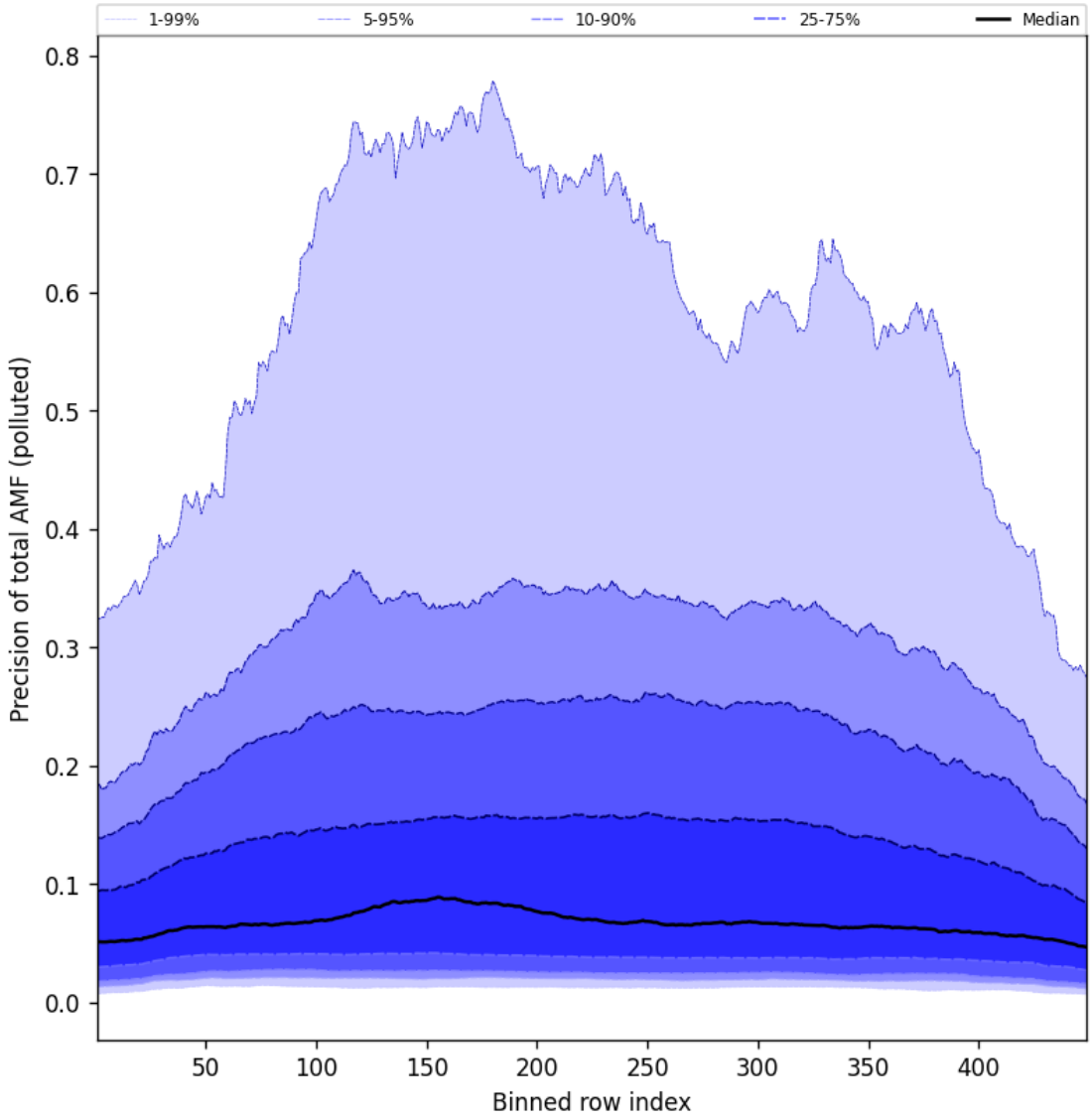


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-04-18 to 2025-04-19



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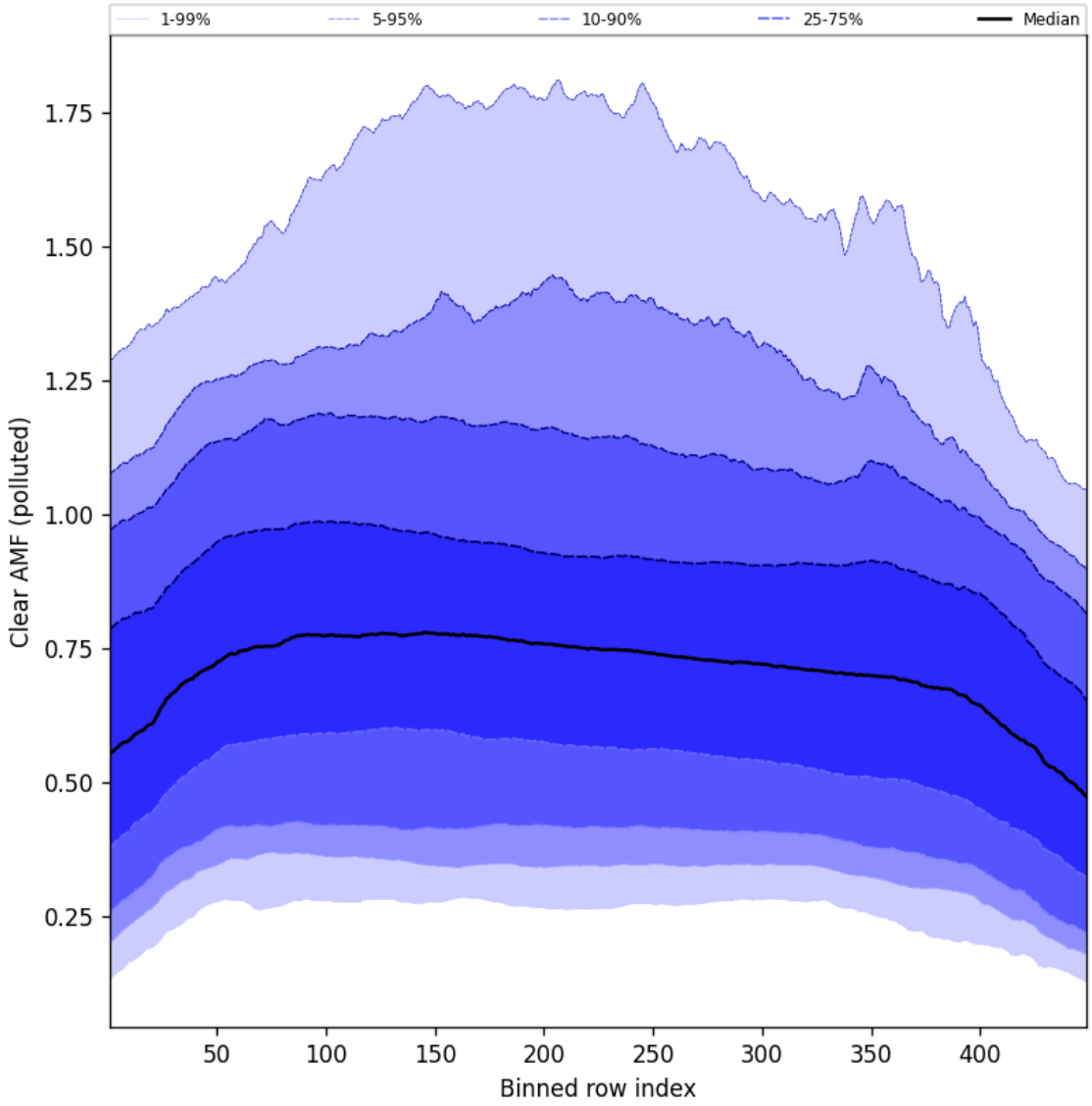

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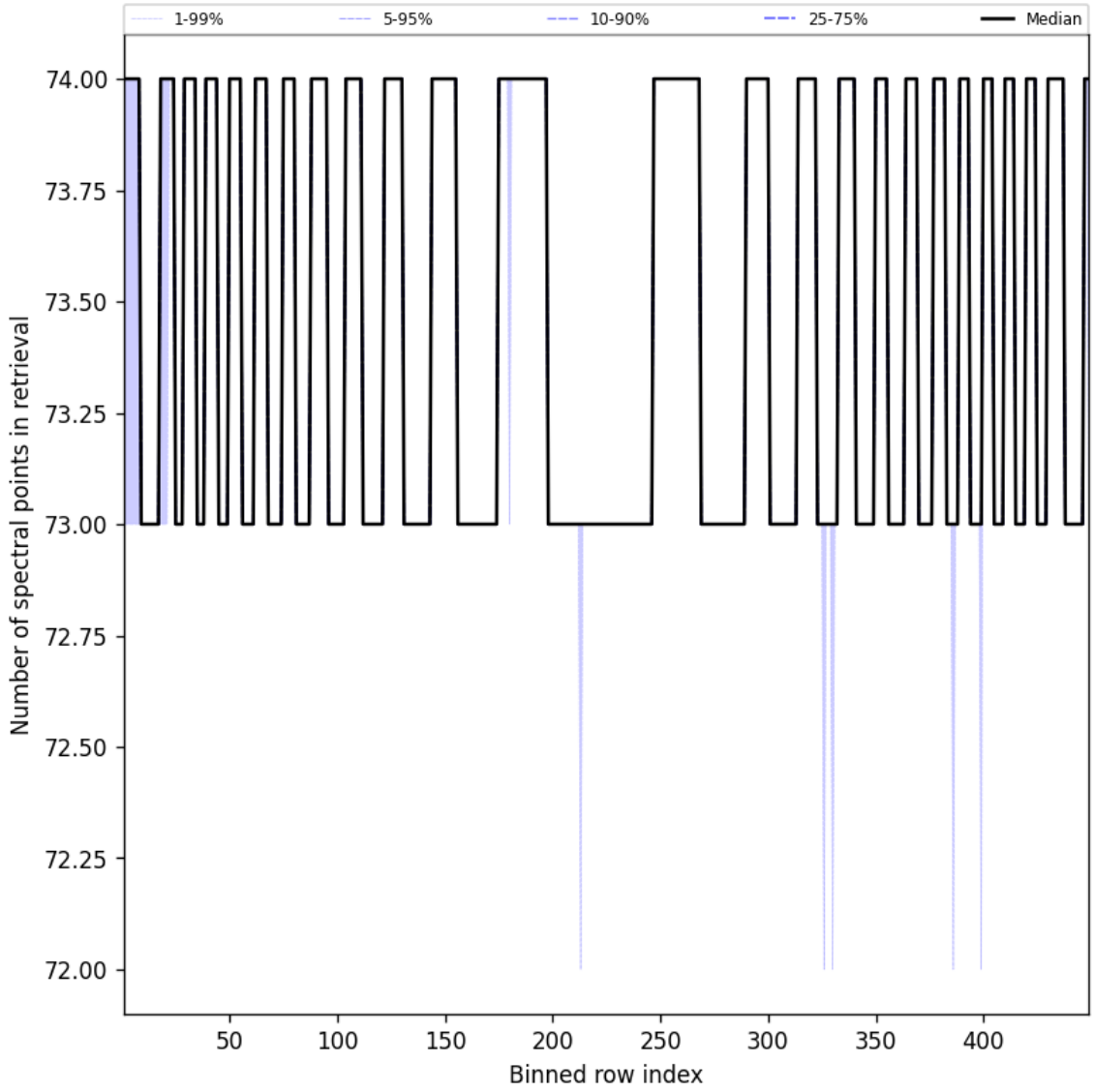

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-04-18 to 2025-04-19

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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