

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 $\frac{1}{2}$ 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]	0.668 ± 0.405	16951460	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.176 \pm 113.389) \times 10^{-2}$	16951460	0.263	0.468	9.742×10^{-3}	-82.5	421
sulfurdioxide total vertical column precision [DU]	0.571 ± 0.835	16951460	0.222	0.366	0.340	2.469×10^{-2}	57.6
sulfurdioxide slant column density corrected [DU]	$(1.581 \pm 36.653) \times 10^{-2}$	16951460	0.258	0.374	8.690×10^{-3}	-36.4	460
sulfurdioxide slant column density cobra [DU]	$(1.575 \pm 34.766) \times 10^{-2}$	16951460	0.258	0.374	8.690×10^{-3}	-36.4	31.8
sulfurdioxide slant column density cobra precision [DU]	0.296 ± 0.120	16951460	0.213	0.128	0.262	6.262×10^{-2}	29.6
sulfurdioxide slant column density window1 [DU]	0.170 ± 0.669	16951460	0.175	0.751	0.176	-256	90.1
sulfurdioxide slant column density window1 precision [DU]	0.296 ± 0.120	16951460	0.213	0.128	0.262	6.262×10^{-2}	29.6
sulfurdioxide slant column density corrected win1 [DU]	$(5.223 \pm 66.335) \times 10^{-2}$	16951460	2.500×10^{-2}	0.739	3.652×10^{-2}	-256	90.4
background so2 slant column offset window1 [DU]	-0.118 ± 0.135	16951460	-0.140	0.145	-0.130	-0.788	3.07
sulfurdioxide slant column density window2 [DU]	2.78 ± 9.22	16951460	2.25	11.8	2.64	-1.939×10^3	903
sulfurdioxide slant column density window2 precision [DU]	8.30 ± 2.23	16951460	7.43	2.58	7.96	2.35	570
sulfurdioxide slant column density corrected win2 [DU]	-0.221 ± 8.965	16951460	-0.250	11.4	-0.228	-1.941×10^3	902
background so2 slant column offset window2 [DU]	-3.01 ± 2.41	16951460	-0.750	3.83	-2.37	-13.0	4.28
sulfurdioxide slant column density window3 [DU]	-10.9 ± 24.5	16951460	-11.8	30.9	-10.9	-710	693
sulfurdioxide slant column density window3 precision [DU]	28.7 ± 13.5	16951460	23.7	10.1	25.2	9.24	304
sulfurdioxide slant column density corrected win3 [DU]	3.29 ± 23.82	16951460	3.92	29.9	3.36	-701	704
background so2 slant column offset window3 [DU]	14.2 ± 6.1	16951460	8.40	9.92	13.5	-5.68	34.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	16951460	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.373 \pm 6.957) \times 10^{-2}$	16951460	1.423×10^{-2}	2.010×10^{-2}	1.409×10^{-2}	4.505×10^{-4}	2.06
fitted radiance shift [nm]	$(-5.462 \pm 26.507) \times 10^{-4}$	16951460	-5.000×10^{-4}	1.891×10^{-3}	-5.513×10^{-4}	-4.753×10^{-2}	9.327×10^{-2}
fitted radiance squeeze [1]	$(-6.733 \pm 178.871) \times 10^{-6}$	16951460	1.000×10^{-5}	2.083×10^{-4}	-1.389×10^{-6}	-1.802×10^{-2}	1.742×10^{-2}
fitted root mean square [1]	$(1.298 \pm 0.497) \times 10^{-3}$	16951460	1.025×10^{-3}	5.175×10^{-4}	1.165×10^{-3}	3.140×10^{-4}	0.125
sulfurdioxide total air mass factor polluted [1]	0.871 ± 0.495	16951460	0.660	0.574	0.781	5.000×10^{-2}	3.46
sulfurdioxide total air mass factor polluted precision [1]	0.106 ± 0.100	16951460	3.500×10^{-2}	0.112	7.031×10^{-2}	3.157×10^{-3}	1.68
sulfurdioxide clear air mass factor polluted [1]	0.745 ± 0.408	16951460	0.660	0.384	0.687	5.966×10^{-2}	3.49
number of spectral points in retrieval [1]	73.4 ± 0.5	16951460	73.0	1.000	73.0	70.0	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}	0.110	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.72	-0.946	-0.567	-0.378	-0.220	0.247	0.416	0.624	1.05	3.14
sulfurdioxide total vertical column precision [DU]	8.464×10^{-2}	0.129	0.160	0.188	0.223	0.590	0.795	1.07	1.70	4.33
sulfurdioxide slant column density corrected [DU]	-0.841	-0.498	-0.364	-0.273	-0.177	0.197	0.298	0.396	0.546	0.969
sulfurdioxide slant column density cobra [DU]	-0.841	-0.498	-0.364	-0.273	-0.177	0.197	0.298	0.396	0.546	0.969
sulfurdioxide slant column density cobra precision [DU]	0.148	0.175	0.189	0.201	0.217	0.344	0.396	0.443	0.520	0.733
sulfurdioxide slant column density window1 [DU]	-1.60	-0.875	-0.593	-0.402	-0.202	0.548	0.741	0.923	1.19	1.90
sulfurdioxide slant column density window1 precision [DU]	0.148	0.175	0.189	0.201	0.217	0.344	0.396	0.443	0.520	0.733
sulfurdioxide slant column density corrected win1 [DU]	-1.58	-0.945	-0.691	-0.516	-0.329	0.411	0.611	0.805	1.10	1.89
background so2 slant column offset window1 [DU]	-0.376	-0.299	-0.266	-0.240	-0.204	-5.895×10^{-2}	-1.614×10^{-2}	3.998×10^{-2}	0.130	0.314
sulfurdioxide slant column density window2 [DU]	-18.8	-11.9	-8.57	-6.04	-3.19	8.59	11.6	14.3	18.0	25.7
sulfurdioxide slant column density window2 precision [DU]	4.50	5.40	5.92	6.33	6.82	9.40	10.3	11.1	12.3	15.0
sulfurdioxide slant column density corrected win2 [DU]	-21.8	-14.8	-11.3	-8.78	-5.94	5.48	8.32	10.9	14.3	21.5
background so2 slant column offset window2 [DU]	-8.79	-7.34	-6.55	-5.82	-4.85	-1.03	-0.708	-0.457	-0.146	0.902
sulfurdioxide slant column density window3 [DU]	-72.4	-51.0	-41.2	-34.1	-26.3	4.65	12.6	19.7	29.3	48.2
sulfurdioxide slant column density window3 precision [DU]	13.7	16.5	18.2	19.6	21.3	31.3	36.1	42.0	54.1	86.5
sulfurdioxide slant column density corrected win3 [DU]	-56.7	-35.8	-26.1	-19.1	-11.5	18.4	26.0	32.8	42.1	60.8
background so2 slant column offset window3 [DU]	2.66	6.26	7.28	8.04	9.08	19.0	21.0	22.6	24.5	27.7
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	1.857×10^{-3}	3.634×10^{-3}	4.837×10^{-3}	6.064×10^{-3}	8.026×10^{-3}	2.813×10^{-2}	4.362×10^{-2}	6.859×10^{-2}	0.131	0.359
fitted radiance shift [nm]	-8.441×10^{-3}	-4.388×10^{-3}	-3.013×10^{-3}	-2.230×10^{-3}	-1.541×10^{-3}	3.506×10^{-4}	1.046×10^{-3}	1.933×10^{-3}	3.489×10^{-3}	7.833×10^{-3}
fitted radiance squeeze [1]	-4.980×10^{-4}	-2.994×10^{-4}	-2.183×10^{-4}	-1.639×10^{-4}	-1.072×10^{-4}	1.011×10^{-4}	1.529×10^{-4}	2.006×10^{-4}	2.674×10^{-4}	4.215×10^{-4}
fitted root mean square [1]	6.241×10^{-4}	7.697×10^{-4}	8.450×10^{-4}	9.034×10^{-4}	9.754×10^{-4}	1.493×10^{-3}	1.712×10^{-3}	1.924×10^{-3}	2.239×10^{-3}	3.076×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.995×10^{-2}	0.217	0.331	0.422	0.534	1.11	1.31	1.52	1.83	2.50
sulfurdioxide total air mass factor polluted precision [1]	8.865×10^{-3}	1.737×10^{-2}	2.375×10^{-2}	2.950×10^{-2}	3.673×10^{-2}	0.148	0.189	0.228	0.291	0.470
sulfurdioxide clear air mass factor polluted [1]	0.186	0.280	0.357	0.421	0.501	0.885	0.997	1.10	1.31	2.68
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]	0.712 ± 0.393	7683930	0.680	1.000	0.0	1.000	0.320	1.000
sulfurdioxide total vertical column [DU]	$(4.489 \pm 144.183) \times 10^{-2}$	7683930	0.540	1.256×10^{-2}	-82.5	101	-0.253	0.287
sulfurdioxide total vertical column precision [DU]	0.712 ± 1.064	7683930	0.479	0.388	5.177×10^{-2}	57.6	0.242	0.721
sulfurdioxide slant column density corrected [DU]	$(1.876 \pm 36.004) \times 10^{-2}$	7683930	0.378	9.715×10^{-3}	-10.1	39.7	-0.178	0.200
sulfurdioxide slant column density cobra [DU]	$(1.872 \pm 35.778) \times 10^{-2}$	7683930	0.378	9.715×10^{-3}	-10.1	25.7	-0.178	0.200
sulfurdioxide slant column density cobra precision [DU]	0.299 ± 0.121	7683930	0.131	0.264	9.046×10^{-2}	16.0	0.218	0.349
sulfurdioxide slant column density window1 [DU]	0.206 ± 0.670	7683930	0.757	0.207	-14.6	70.8	-0.172	0.585
sulfurdioxide slant column density window1 precision [DU]	0.299 ± 0.121	7683930	0.131	0.264	9.046×10^{-2}	16.0	0.218	0.349
sulfurdioxide slant column density corrected win1 [DU]	$(6.190 \pm 66.756) \times 10^{-2}$	7683930	0.749	4.407×10^{-2}	-14.6	70.6	-0.324	0.425
background so2 slant column offset window1 [DU]	-0.144 ± 0.118	7683930	0.136	-0.148	-0.758	1.40	-0.221	-8.464×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.40 ± 9.50	7683930	12.1	2.18	-115	203	-3.78	8.33
sulfurdioxide slant column density window2 precision [DU]	8.68 ± 2.31	7683930	2.81	8.34	2.35	570	7.11	9.91
sulfurdioxide slant column density corrected win2 [DU]	$(-9.815 \pm 928.924) \times 10^{-2}$	7683930	11.9	-0.112	-122	202	-6.04	5.83
background so2 slant column offset window2 [DU]	-2.50 ± 2.11	7683930	2.69	-1.86	-13.0	4.24	-3.67	-0.979
sulfurdioxide slant column density window3 [DU]	-11.0 ± 26.1	7683930	32.9	-10.5	-218	168	-27.1	5.75
sulfurdioxide slant column density window3 precision [DU]	30.4 ± 13.8	7683930	10.9	26.8	9.61	259	22.6	33.5
sulfurdioxide slant column density corrected win3 [DU]	2.96 ± 25.47	7683930	32.2	3.19	-211	175	-12.9	19.3
background so2 slant column offset window3 [DU]	14.0 ± 5.9	7683930	9.47	12.9	-5.10	34.1	9.15	18.6
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	7683930	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.424 \pm 9.552) \times 10^{-2}$	7683930	3.771×10^{-2}	2.078×10^{-2}	4.505×10^{-4}	2.06	1.242×10^{-2}	5.012×10^{-2}
fitted radiance shift [nm]	$(-1.797 \pm 27.516) \times 10^{-4}$	7683930	1.771×10^{-3}	-2.260×10^{-4}	-4.492×10^{-2}	9.327×10^{-2}	-1.086×10^{-3}	6.847×10^{-4}
fitted radiance squeeze [1]	$(1.014 \pm 17.447) \times 10^{-5}$	7683930	2.076×10^{-4}	9.318×10^{-6}	-1.514×10^{-2}	1.167×10^{-2}	-9.397×10^{-5}	1.136×10^{-4}
fitted root mean square [1]	$(1.321 \pm 0.504) \times 10^{-3}$	7683930	5.513×10^{-4}	1.183×10^{-3}	3.434×10^{-4}	5.144×10^{-2}	9.840×10^{-4}	1.535×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.742 ± 0.390	7683930	0.530	0.709	5.000×10^{-2}	2.87	0.453	0.983
sulfurdioxide total air mass factor polluted precision [1]	$(9.590 \pm 11.014) \times 10^{-2}$	7683930	8.918×10^{-2}	5.541×10^{-2}	3.157×10^{-3}	1.68	3.193×10^{-2}	0.121
sulfurdioxide clear air mass factor polluted [1]	0.668 ± 0.291	7683930	0.442	0.658	5.966×10^{-2}	2.81	0.438	0.880
number of spectral points in retrieval [1]	73.4 ± 0.5	7683930	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]	0.631 ± 0.411	9267530	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(2.087 \pm 79.234) \times 10^{-2}$	9267530	0.417	7.945×10^{-3}	-64.6	421	-0.198	0.220
sulfurdioxide total vertical column precision [DU]	0.454 ± 0.552	9267530	0.297	0.312	2.469×10^{-2}	42.9	0.207	0.503
sulfurdioxide slant column density corrected [DU]	$(1.336 \pm 37.181) \times 10^{-2}$	9267530	0.371	7.876×10^{-3}	-36.4	460	-0.177	0.195
sulfurdioxide slant column density cobra [DU]	$(1.329 \pm 33.902) \times 10^{-2}$	9267530	0.371	7.876×10^{-3}	-36.4	31.8	-0.177	0.195
sulfurdioxide slant column density cobra precision [DU]	0.294 ± 0.119	9267530	0.125	0.261	6.262×10^{-2}	29.6	0.215	0.340
sulfurdioxide slant column density window1 [DU]	0.140 ± 0.666	9267530	0.745	0.151	-256	90.1	-0.227	0.518
sulfurdioxide slant column density window1 precision [DU]	0.294 ± 0.119	9267530	0.125	0.261	6.262×10^{-2}	29.6	0.215	0.340
sulfurdioxide slant column density corrected win1 [DU]	$(4.421 \pm 65.972) \times 10^{-2}$	9267530	0.731	3.038×10^{-2}	-256	90.4	-0.332	0.399
background so2 slant column offset window1 [DU]	$(-9.624 \pm 14.499) \times 10^{-2}$	9267530	0.152	-0.114	-0.788	3.07	-0.188	-3.603×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.10 ± 8.97	9267530	11.5	2.99	-1.939×10^3	903	-2.70	8.79
sulfurdioxide slant column density window2 precision [DU]	7.99 ± 2.11	9267530	2.33	7.68	2.41	407	6.64	8.97
sulfurdioxide slant column density corrected win2 [DU]	-0.323 ± 8.687	9267530	11.1	-0.317	-1.941×10^3	902	-5.86	5.21
background so2 slant column offset window2 [DU]	-3.42 ± 2.55	9267530	4.42	-3.19	-12.3	4.28	-5.51	-1.09
sulfurdioxide slant column density window3 [DU]	-10.8 ± 23.1	9267530	29.4	-11.2	-710	693	-25.7	3.76
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 13.1	9267530	8.79	24.0	9.24	304	20.4	29.2
sulfurdioxide slant column density corrected win3 [DU]	3.57 ± 22.36	9267530	28.2	3.48	-701	704	-10.5	17.7
background so2 slant column offset window3 [DU]	14.4 ± 6.2	9267530	10.3	14.0	-5.68	34.9	9.01	19.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	9267530	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.674 \pm 2.550) \times 10^{-2}$	9267530	1.178×10^{-2}	1.023×10^{-2}	7.692×10^{-4}	1.19	6.397×10^{-3}	1.818×10^{-2}
fitted radiance shift [nm]	$(-8.501 \pm 25.241) \times 10^{-4}$	9267530	1.837×10^{-3}	-8.366×10^{-4}	-4.753×10^{-2}	4.350×10^{-2}	-1.819×10^{-3}	1.769×10^{-5}
fitted radiance squeeze [1]	$(-2.072 \pm 18.125) \times 10^{-5}$	9267530	2.093×10^{-4}	-1.032×10^{-5}	-1.802×10^{-2}	1.742×10^{-2}	-1.185×10^{-4}	9.081×10^{-5}
fitted root mean square [1]	$(1.279 \pm 0.490) \times 10^{-3}$	9267530	4.902×10^{-4}	1.150×10^{-3}	3.140×10^{-4}	0.125	9.688×10^{-4}	1.459×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.978 ± 0.544	9267530	0.654	0.843	5.000×10^{-2}	3.46	0.604	1.26
sulfurdioxide total air mass factor polluted precision [1]	0.115 ± 0.090	9267530	0.125	9.105×10^{-2}	3.414×10^{-3}	1.44	4.119×10^{-2}	0.166
sulfurdioxide clear air mass factor polluted [1]	0.809 ± 0.474	9267530	0.342	0.704	7.610×10^{-2}	3.49	0.549	0.891
number of spectral points in retrieval [1]	73.4 ± 0.5	9267530	1.000	73.0	70.0	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]	0.674 ± 0.402	12339803	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(2.666 \pm 98.074) \times 10^{-2}$	12339803	0.443	9.452×10^{-3}	-64.6	421	-0.209	0.234
sulfurdioxide total vertical column precision [DU]	0.508 ± 0.707	12339803	0.315	0.317	3.571×10^{-2}	42.9	0.218	0.534
sulfurdioxide slant column density corrected [DU]	$(1.511 \pm 36.430) \times 10^{-2}$	12339803	0.367	8.540×10^{-3}	-11.7	460	-0.174	0.194
sulfurdioxide slant column density cobra [DU]	$(1.505 \pm 33.854) \times 10^{-2}$	12339803	0.367	8.540×10^{-3}	-11.7	31.8	-0.174	0.194
sulfurdioxide slant column density cobra precision [DU]	0.291 ± 0.118	12339803	0.124	0.257	7.655×10^{-2}	14.3	0.213	0.337
sulfurdioxide slant column density window1 [DU]	0.166 ± 0.653	12339803	0.736	0.174	-29.7	90.1	-0.198	0.538
sulfurdioxide slant column density window1 precision [DU]	0.291 ± 0.118	12339803	0.124	0.257	7.655×10^{-2}	14.3	0.213	0.337
sulfurdioxide slant column density corrected win1 [DU]	$(5.332 \pm 64.785) \times 10^{-2}$	12339803	0.725	3.783×10^{-2}	-29.7	90.4	-0.321	0.404
background so2 slant column offset window1 [DU]	-0.113 ± 0.140	12339803	0.149	-0.128	-0.788	3.07	-0.202	-5.305×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.87 ± 8.99	12339803	11.5	2.73	-1.939×10^3	746	-2.98	8.56
sulfurdioxide slant column density window2 precision [DU]	8.07 ± 2.07	12339803	2.40	7.77	2.35	407	6.70	9.09
sulfurdioxide slant column density corrected win2 [DU]	-0.212 ± 8.721	12339803	11.2	-0.217	-1.941×10^3	742	-5.80	5.36
background so2 slant column offset window2 [DU]	-3.09 ± 2.46	12339803	4.04	-2.45	-12.9	4.28	-5.06	-1.02
sulfurdioxide slant column density window3 [DU]	-8.51 ± 23.69	12339803	30.2	-8.89	-710	693	-23.7	6.51
sulfurdioxide slant column density window3 precision [DU]	27.6 ± 12.3	12339803	8.96	24.5	9.24	304	20.9	29.9
sulfurdioxide slant column density corrected win3 [DU]	5.49 ± 22.76	12339803	28.9	5.16	-701	704	-9.06	19.9
background so2 slant column offset window3 [DU]	14.0 ± 5.9	12339803	9.63	13.3	-5.68	34.9	9.01	18.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	12339803	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.959 \pm 3.326) \times 10^{-2}$	12339803	1.286×10^{-2}	1.233×10^{-2}	6.574×10^{-4}	2.06	7.628×10^{-3}	2.048×10^{-2}
fitted radiance shift [nm]	$(-5.942 \pm 24.833) \times 10^{-4}$	12339803	1.917×10^{-3}	-5.781×10^{-4}	-4.492×10^{-2}	9.327×10^{-2}	-1.604×10^{-3}	3.129×10^{-4}
fitted radiance squeeze [1]	$(-1.065 \pm 17.567) \times 10^{-5}$	12339803	2.038×10^{-4}	-3.195×10^{-6}	-1.514×10^{-2}	1.340×10^{-2}	-1.074×10^{-4}	9.639×10^{-5}
fitted root mean square [1]	$(1.272 \pm 0.490) \times 10^{-3}$	12339803	4.906×10^{-4}	1.138×10^{-3}	3.175×10^{-4}	6.289×10^{-2}	9.596×10^{-4}	1.450×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.886 ± 0.454	12339803	0.545	0.817	5.000×10^{-2}	3.01	0.575	1.12
sulfurdioxide total air mass factor polluted precision [1]	0.102 ± 0.086	12339803	0.104	7.130×10^{-2}	3.414×10^{-3}	1.09	3.968×10^{-2}	0.144
sulfurdioxide clear air mass factor polluted [1]	0.747 ± 0.318	12339803	0.356	0.711	6.721×10^{-2}	3.07	0.539	0.895
number of spectral points in retrieval [1]	73.4 ± 0.5	12339803	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]	0.674 ± 0.406	3664634	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(4.020 \pm 134.153) \times 10^{-2}$	3664634	0.525	9.157×10^{-3}	-82.5	86.7	-0.247	0.278
sulfurdioxide total vertical column precision [DU]	0.679 ± 0.993	3664634	0.467	0.397	2.469×10^{-2}	40.1	0.241	0.708
sulfurdioxide slant column density corrected [DU]	$(1.567 \pm 35.883) \times 10^{-2}$	3664634	0.387	8.114×10^{-3}	-36.4	37.0	-0.184	0.203
sulfurdioxide slant column density cobra [DU]	$(1.566 \pm 35.815) \times 10^{-2}$	3664634	0.387	8.114×10^{-3}	-36.4	20.3	-0.184	0.203
sulfurdioxide slant column density cobra precision [DU]	0.304 ± 0.118	3664634	0.126	0.273	6.262×10^{-2}	29.6	0.225	0.351
sulfurdioxide slant column density window1 [DU]	0.179 ± 0.696	3664634	0.777	0.180	-256	85.5	-0.209	0.568
sulfurdioxide slant column density window1 precision [DU]	0.304 ± 0.118	3664634	0.126	0.273	6.262×10^{-2}	29.6	0.225	0.351
sulfurdioxide slant column density corrected win1 [DU]	$(4.225 \pm 68.831) \times 10^{-2}$	3664634	0.764	2.788×10^{-2}	-256	85.6	-0.349	0.415
background so2 slant column offset window1 [DU]	-0.137 ± 0.121	3664634	0.137	-0.140	-0.597	1.05	-0.215	-7.744×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.34 ± 9.72	3664634	12.4	2.20	-521	903	-3.91	8.45
sulfurdioxide slant column density window2 precision [DU]	8.86 ± 2.52	3664634	2.85	8.50	2.42	570	7.24	10.1
sulfurdioxide slant column density corrected win2 [DU]	-0.219 ± 9.515	3664634	12.1	-0.239	-523	902	-6.28	5.81
background so2 slant column offset window2 [DU]	-2.56 ± 2.13	3664634	2.78	-2.00	-13.0	4.28	-3.77	-0.989
sulfurdioxide slant column density window3 [DU]	-17.4 ± 25.4	3664634	31.9	-16.9	-583	259	-33.0	-1.18
sulfurdioxide slant column density window3 precision [DU]	31.8 ± 16.3	3664634	11.8	27.5	9.68	261	22.8	34.6
sulfurdioxide slant column density corrected win3 [DU]	-3.10 ± 25.37	3664634	31.9	-2.55	-574	268	-18.8	13.1
background so2 slant column offset window3 [DU]	14.3 ± 6.4	3664634	10.4	12.9	-5.68	34.9	9.04	19.4
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.26	3664634	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.940 \pm 10.909) \times 10^{-2}$	3664634	6.360×10^{-2}	2.941×10^{-2}	4.695×10^{-4}	1.81	1.132×10^{-2}	7.492×10^{-2}
fitted radiance shift [nm]	$(-4.488 \pm 31.160) \times 10^{-4}$	3664634	1.780×10^{-3}	-5.184×10^{-4}	-4.753×10^{-2}	4.350×10^{-2}	-1.387×10^{-3}	3.928×10^{-4}
fitted radiance squeeze [1]	$(-1.743 \pm 183.496) \times 10^{-6}$	3664634	2.185×10^{-4}	-4.633×10^{-7}	-1.802×10^{-2}	1.742×10^{-2}	-1.101×10^{-4}	1.084×10^{-4}
fitted root mean square [1]	$(1.338 \pm 0.489) \times 10^{-3}$	3664634	5.245×10^{-4}	1.218×10^{-3}	3.140×10^{-4}	0.125	1.019×10^{-3}	1.544×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.856 ± 0.604	3664634	0.622	0.692	5.000×10^{-2}	3.46	0.455	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.116 ± 0.128	3664634	0.132	6.610×10^{-2}	3.157×10^{-3}	1.68	3.110×10^{-2}	0.163
sulfurdioxide clear air mass factor polluted [1]	0.777 ± 0.619	3664634	0.429	0.631	5.966×10^{-2}	3.49	0.422	0.852
number of spectral points in retrieval [1]	73.4 ± 0.5	3664634	1.000	73.0	71.0	74.0	73.0	74.0

3 Granule outlines

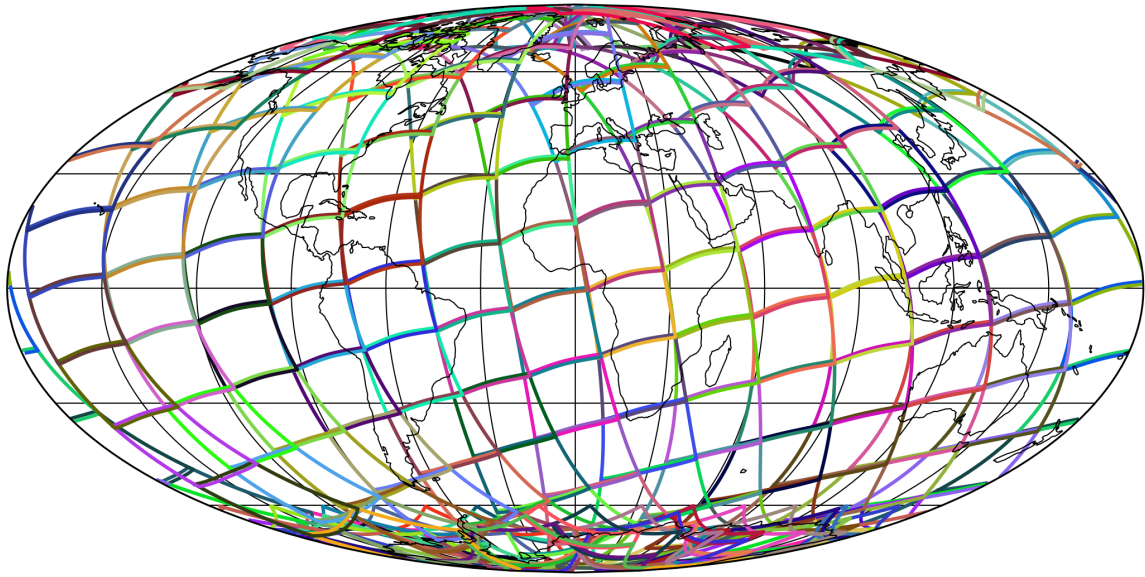


Figure 1: Outline of the granules.

4 Input data monitoring

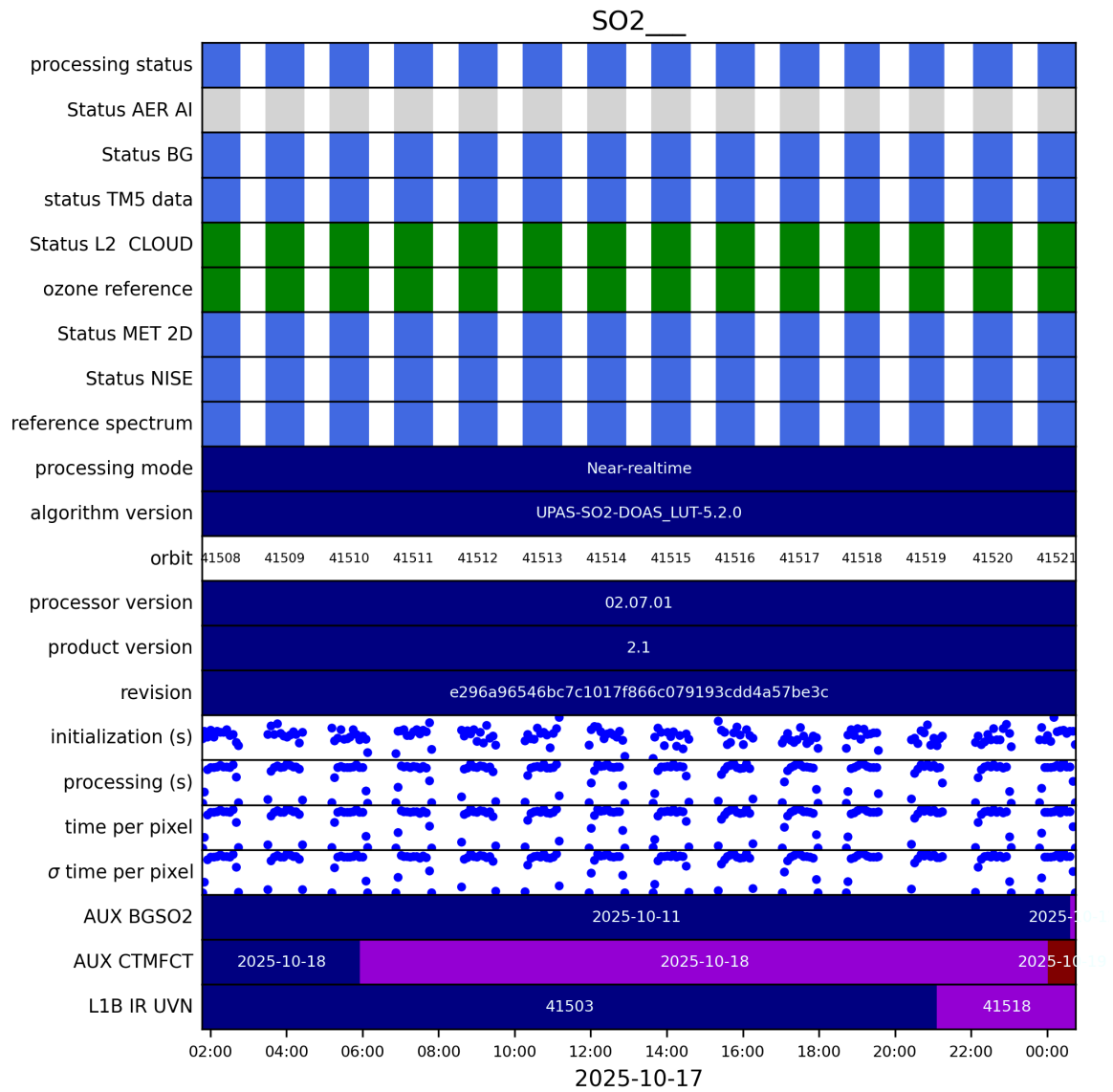


Figure 2: Input data per granule

5 Warnings and errors

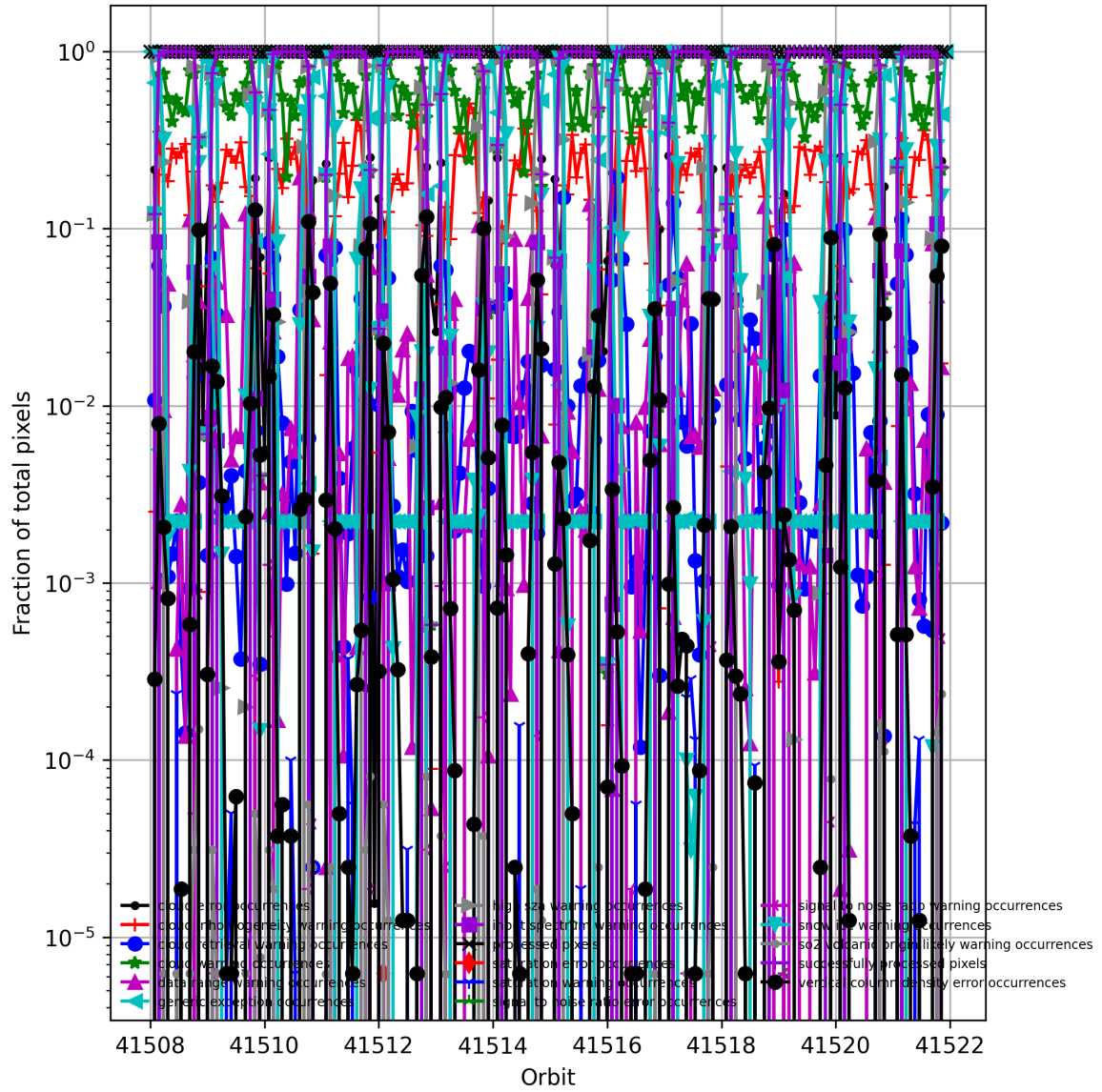


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

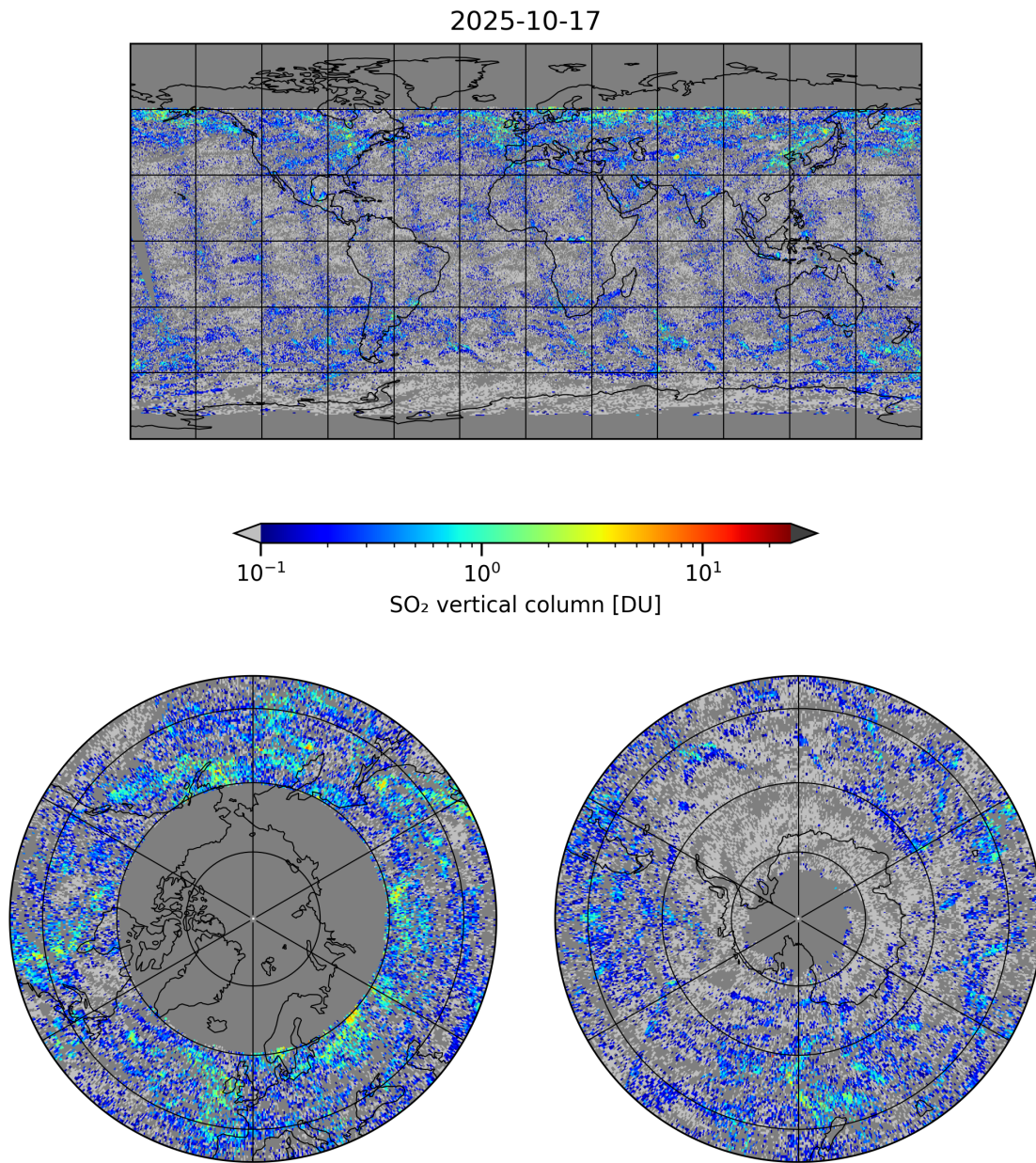


Figure 4: Map of “SO₂ vertical column” for 2025-10-17 to 2025-10-18

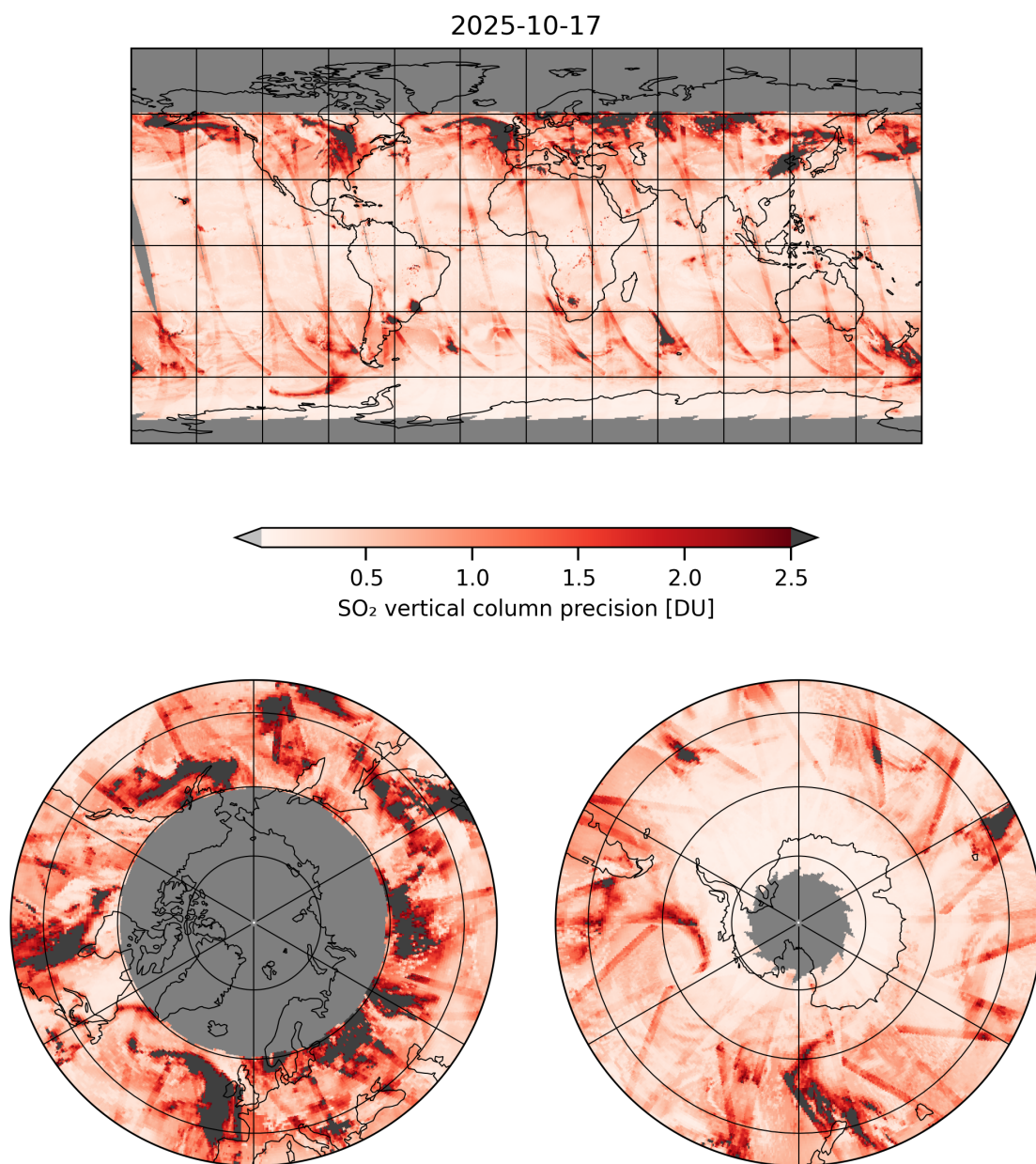


Figure 5: Map of “SO₂ vertical column precision” for 2025-10-17 to 2025-10-18

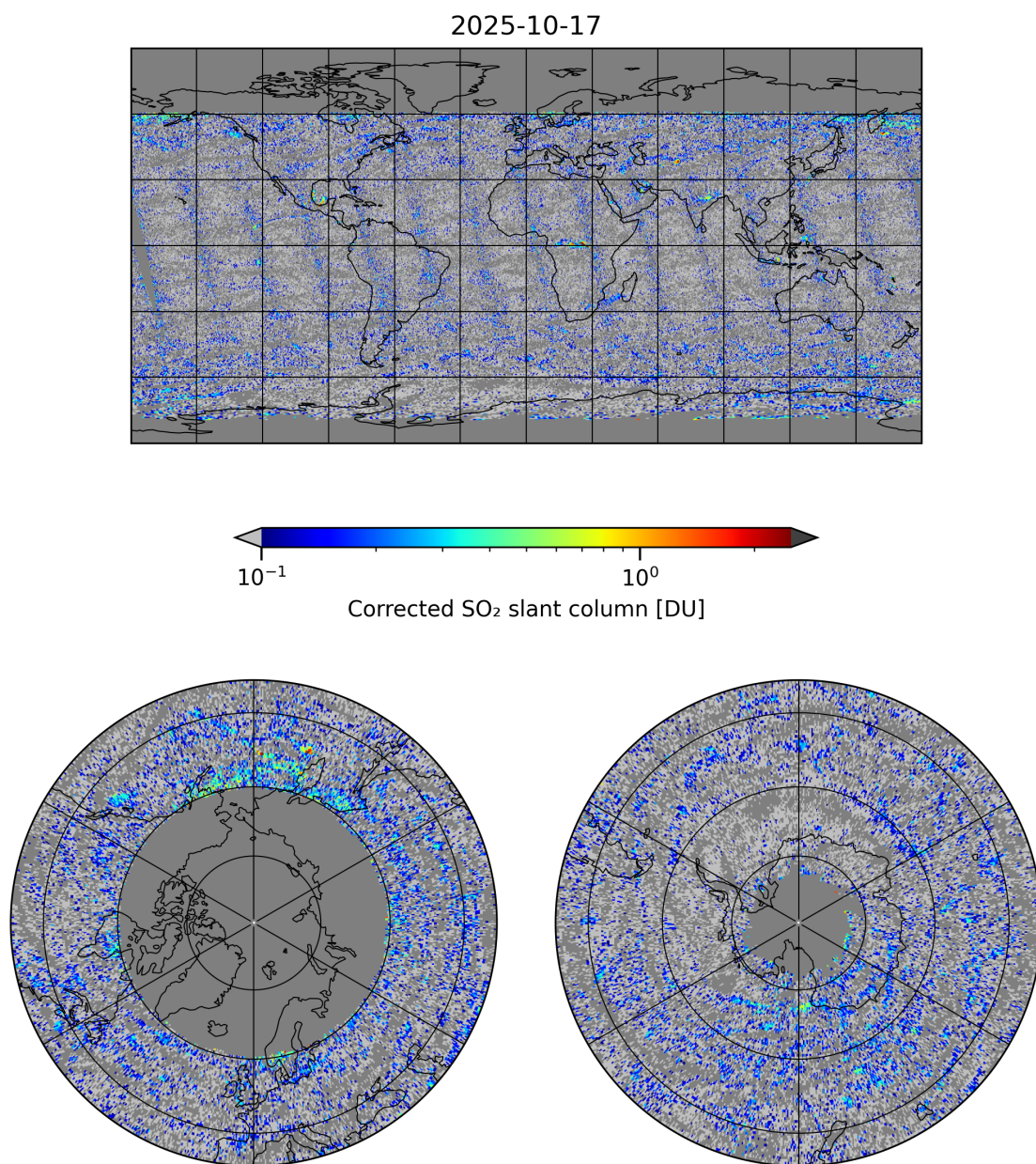


Figure 6: Map of “Corrected SO₂ slant column” for 2025-10-17 to 2025-10-18

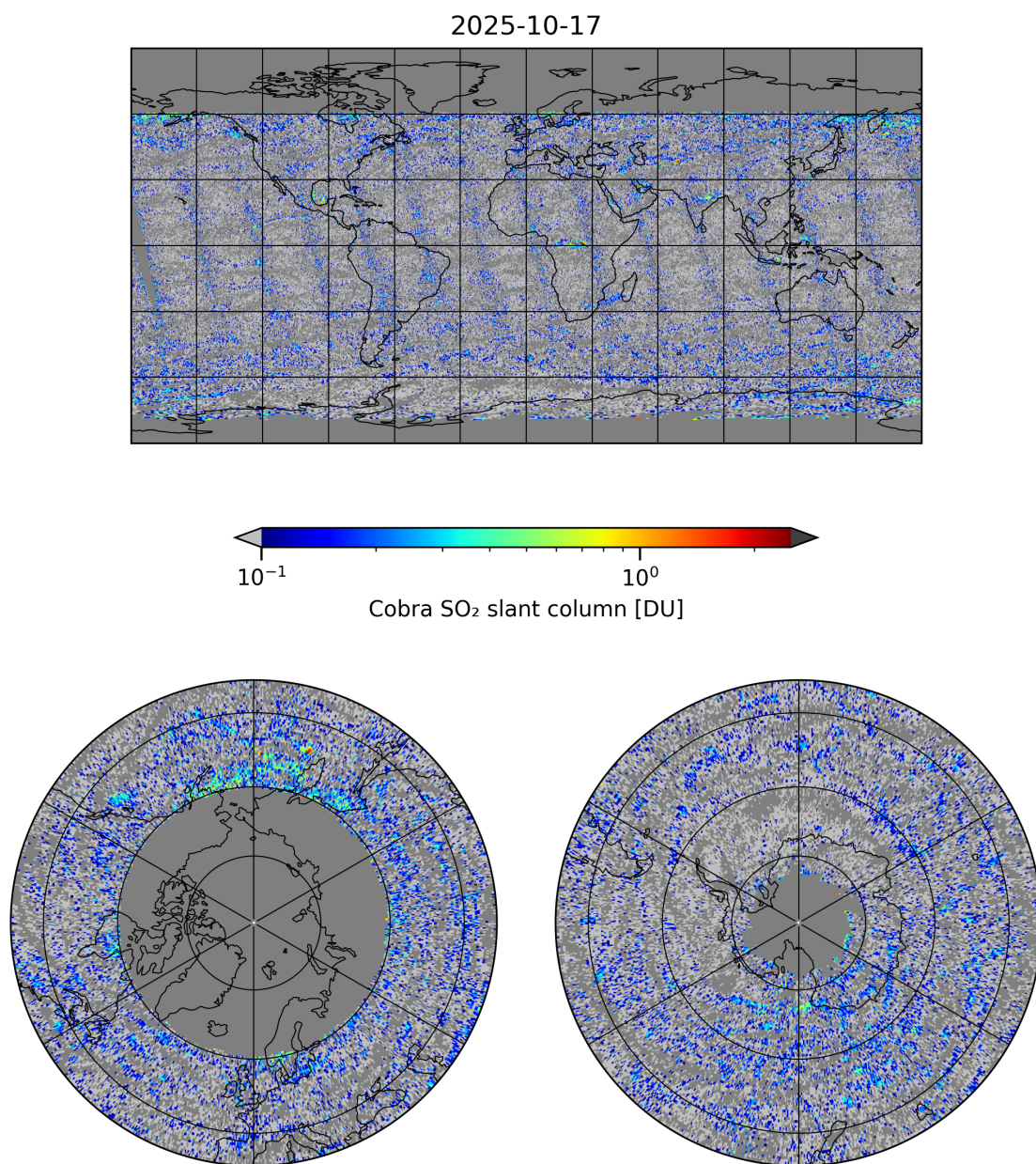


Figure 7: Map of “Cobra SO₂ slant column” for 2025-10-17 to 2025-10-18

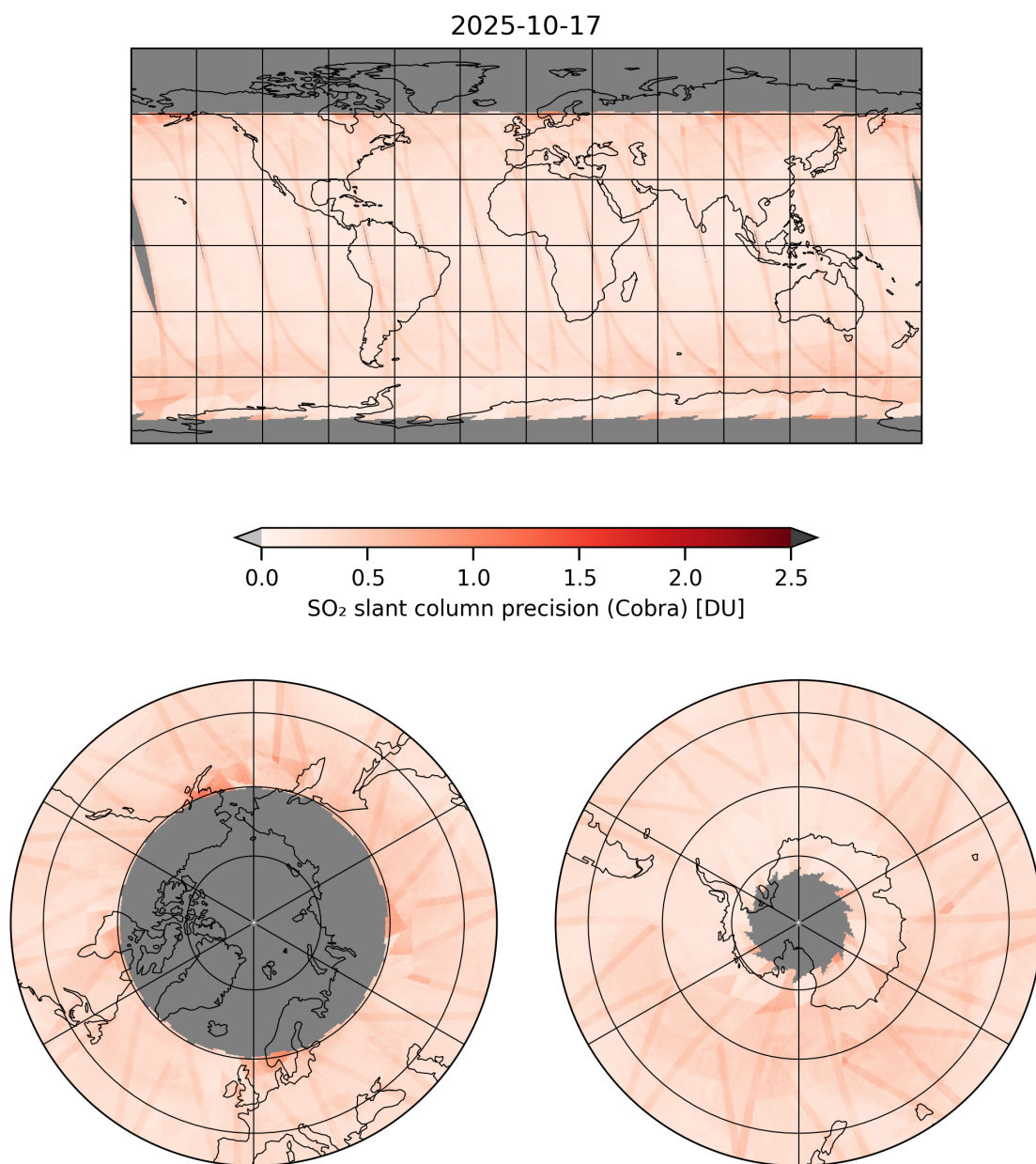


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-10-17 to 2025-10-18

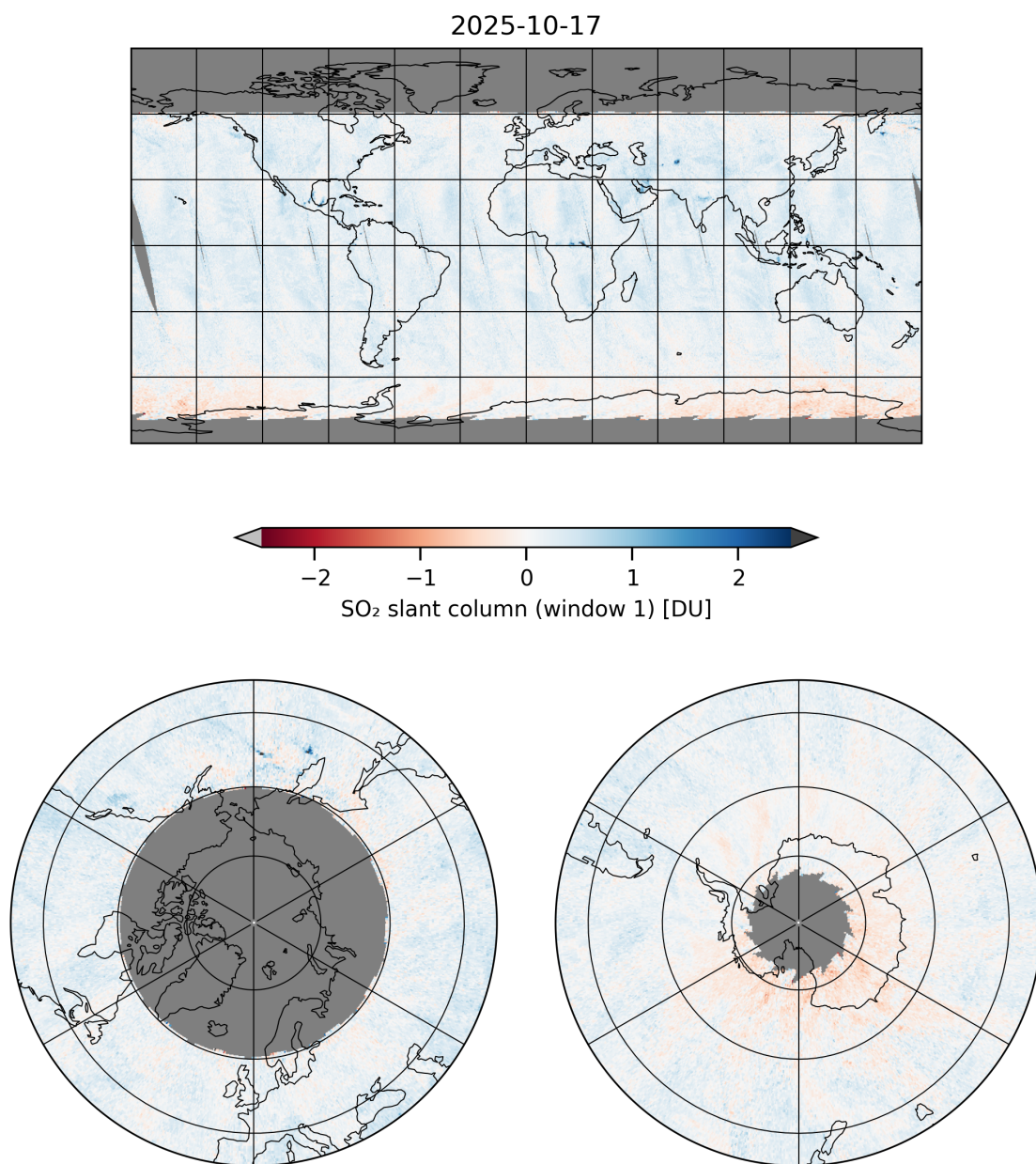


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-10-17 to 2025-10-18

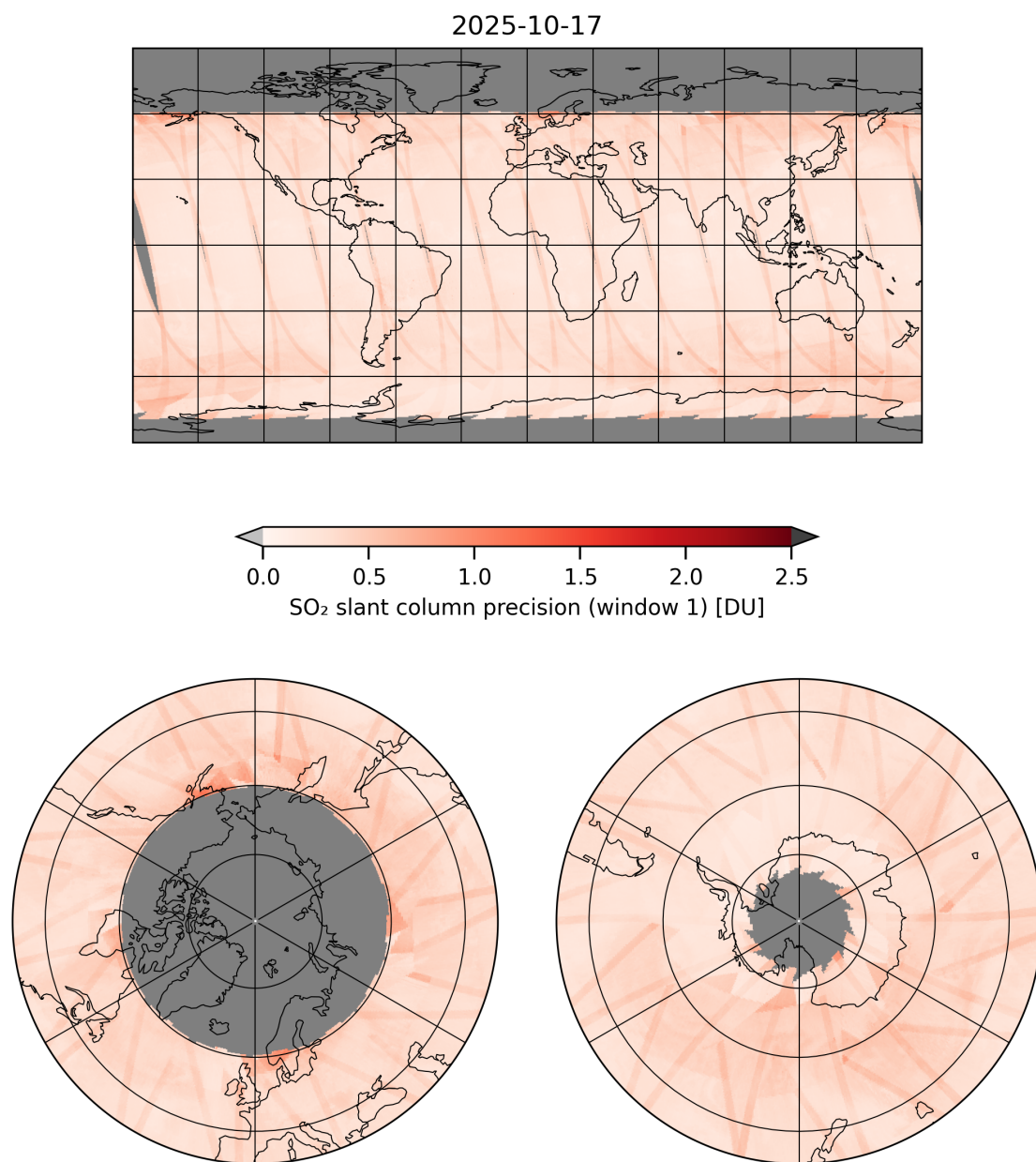


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-10-17 to 2025-10-18

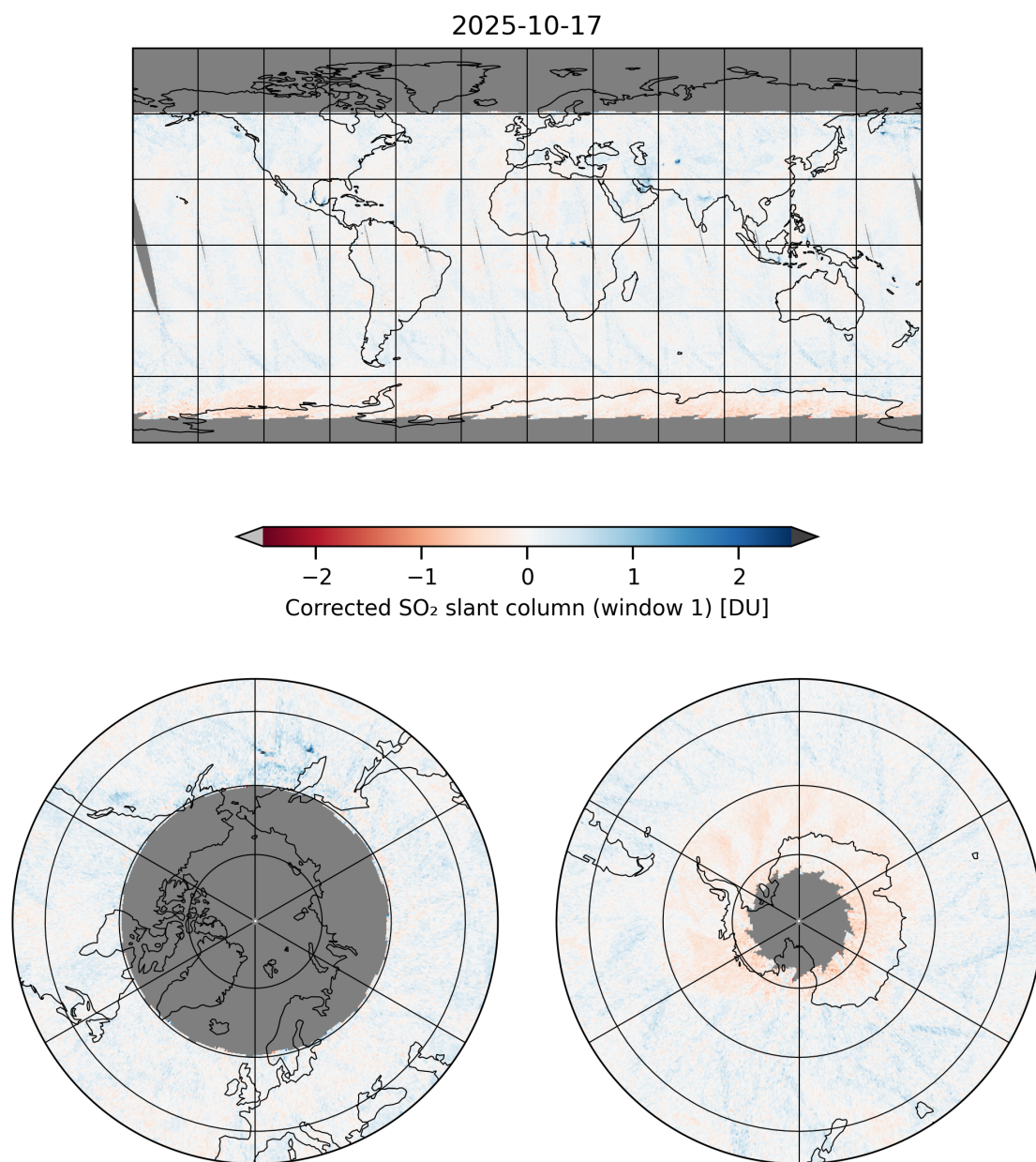


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-10-17 to 2025-10-18

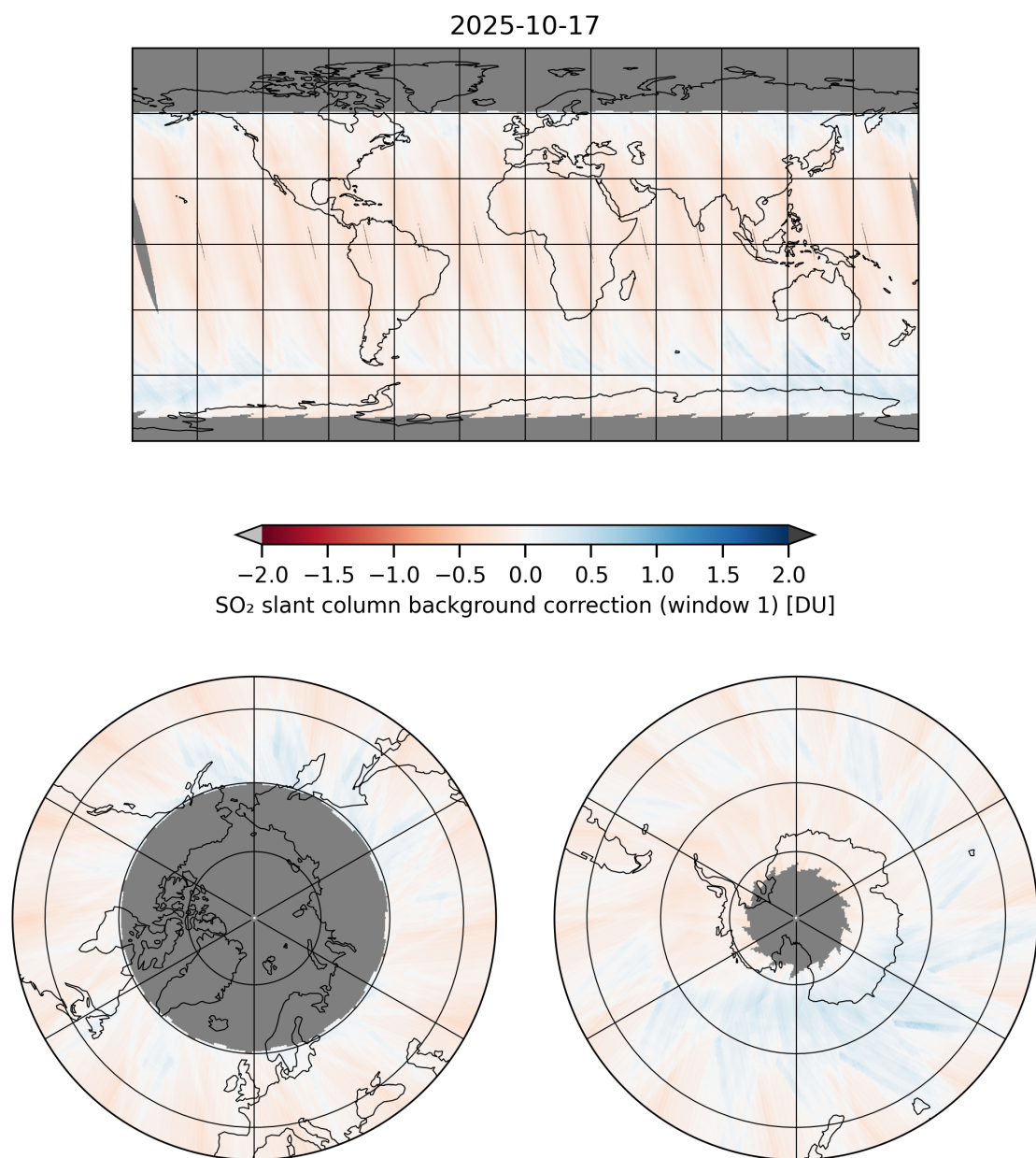


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-10-17 to 2025-10-18

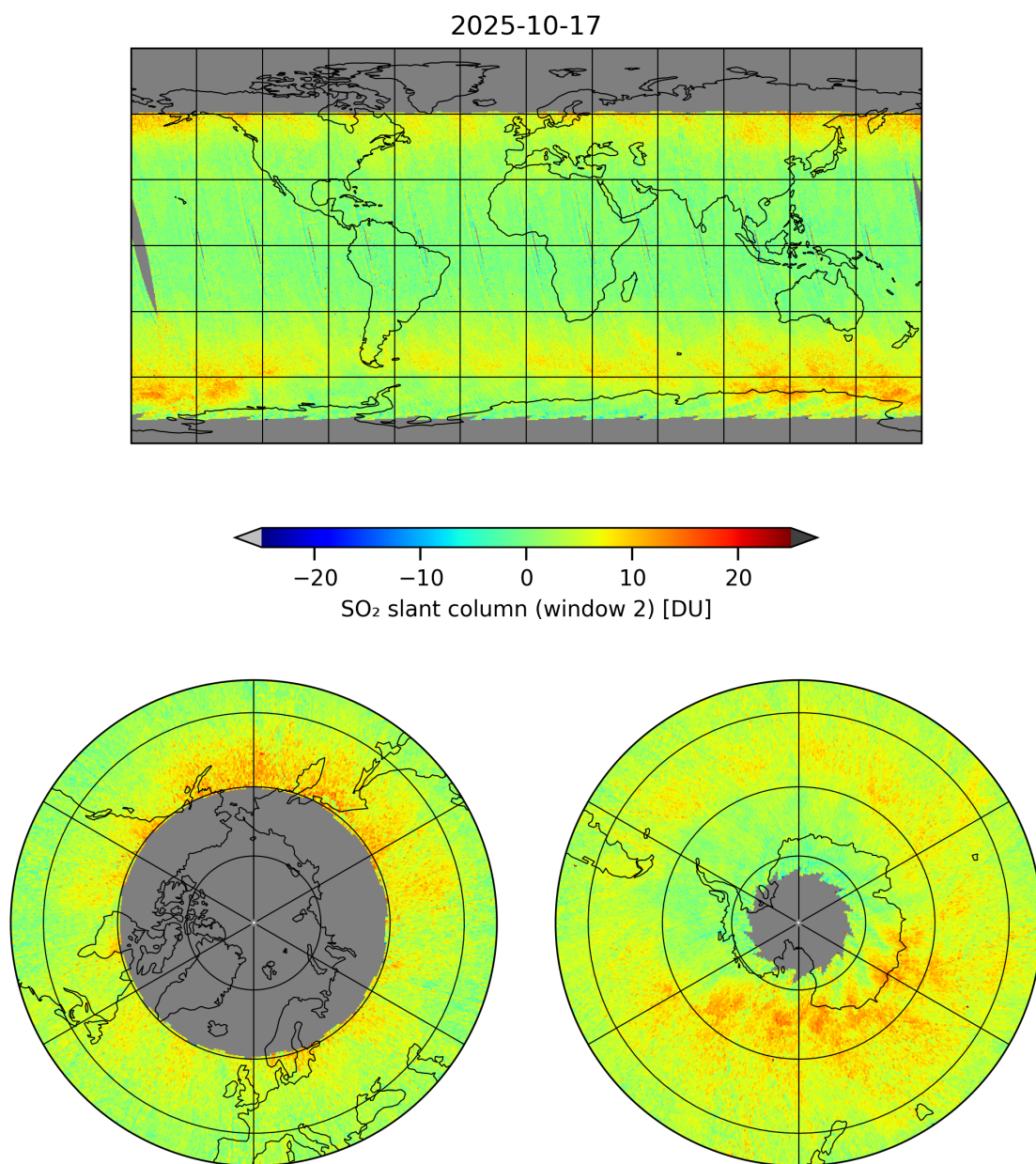


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-10-17 to 2025-10-18

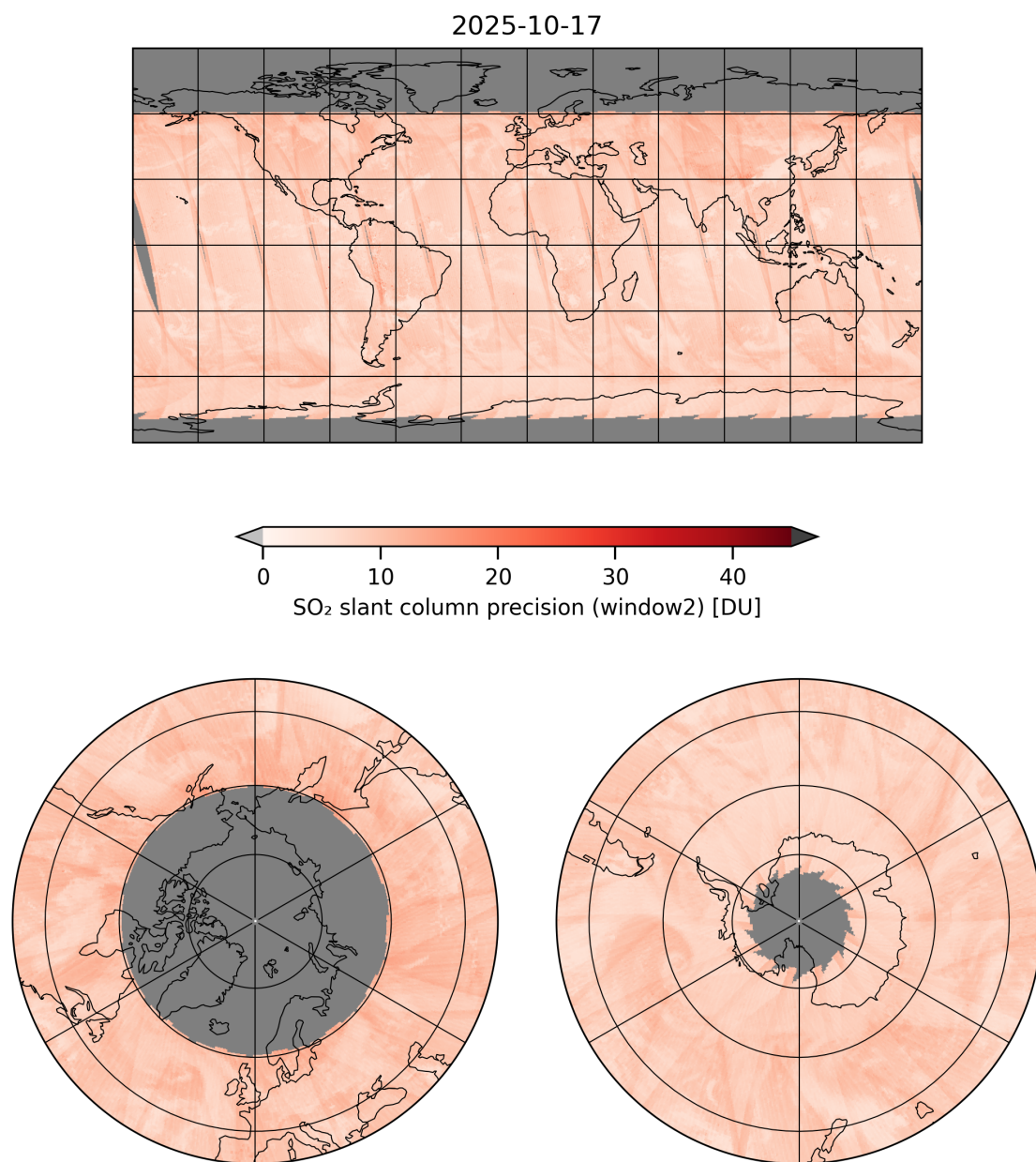


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-10-17 to 2025-10-18

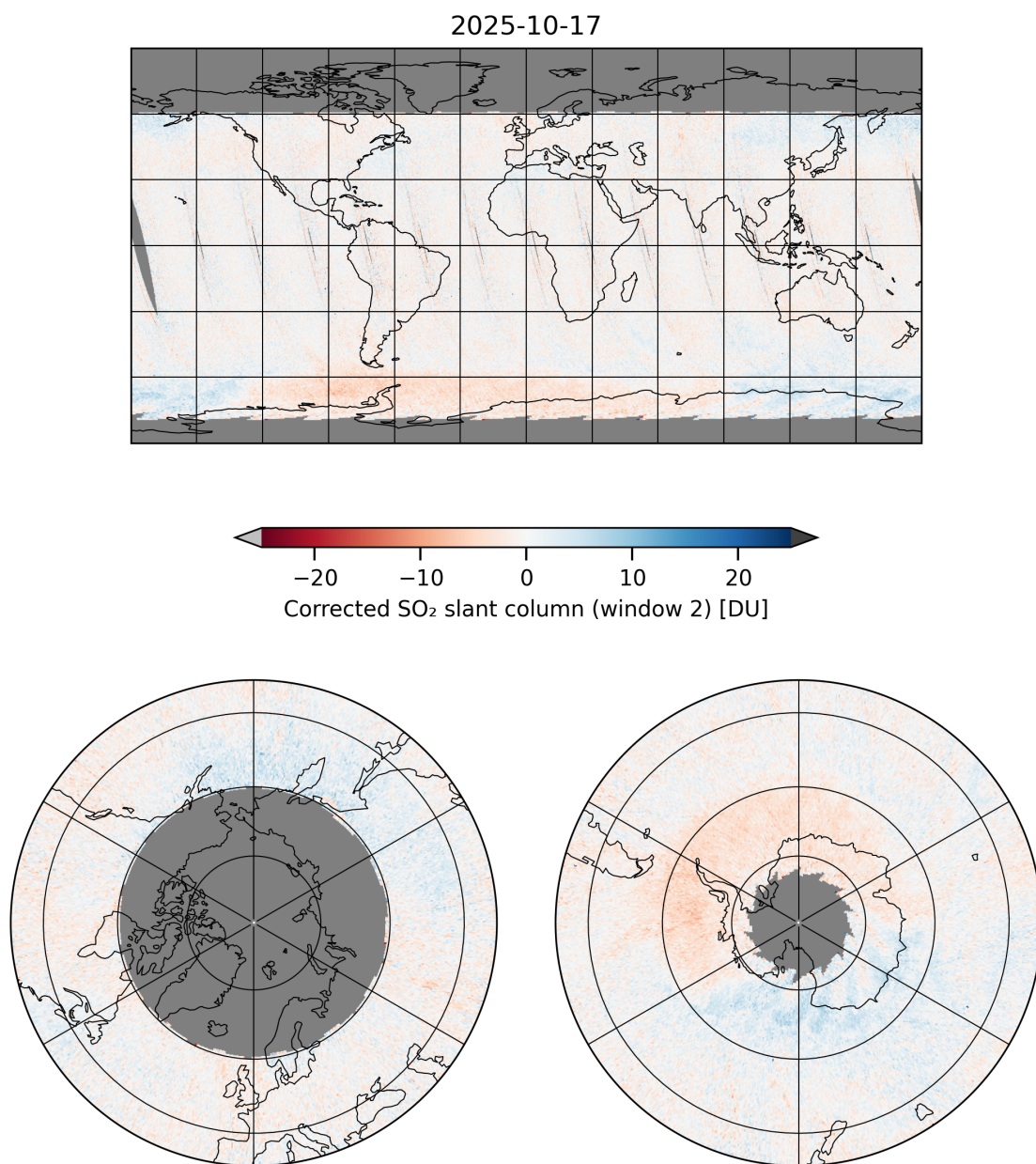


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-10-17 to 2025-10-18

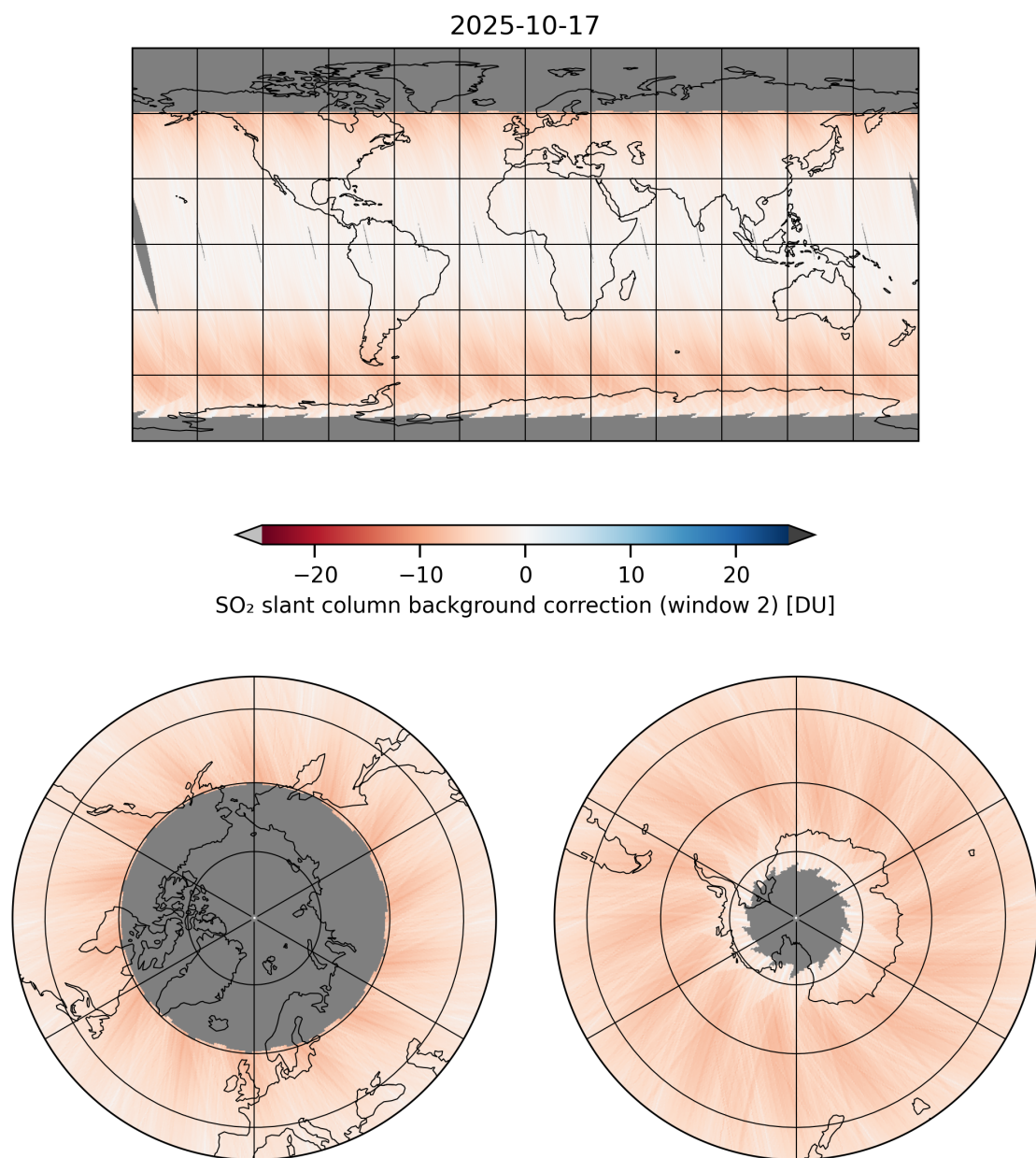


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-10-17 to 2025-10-18

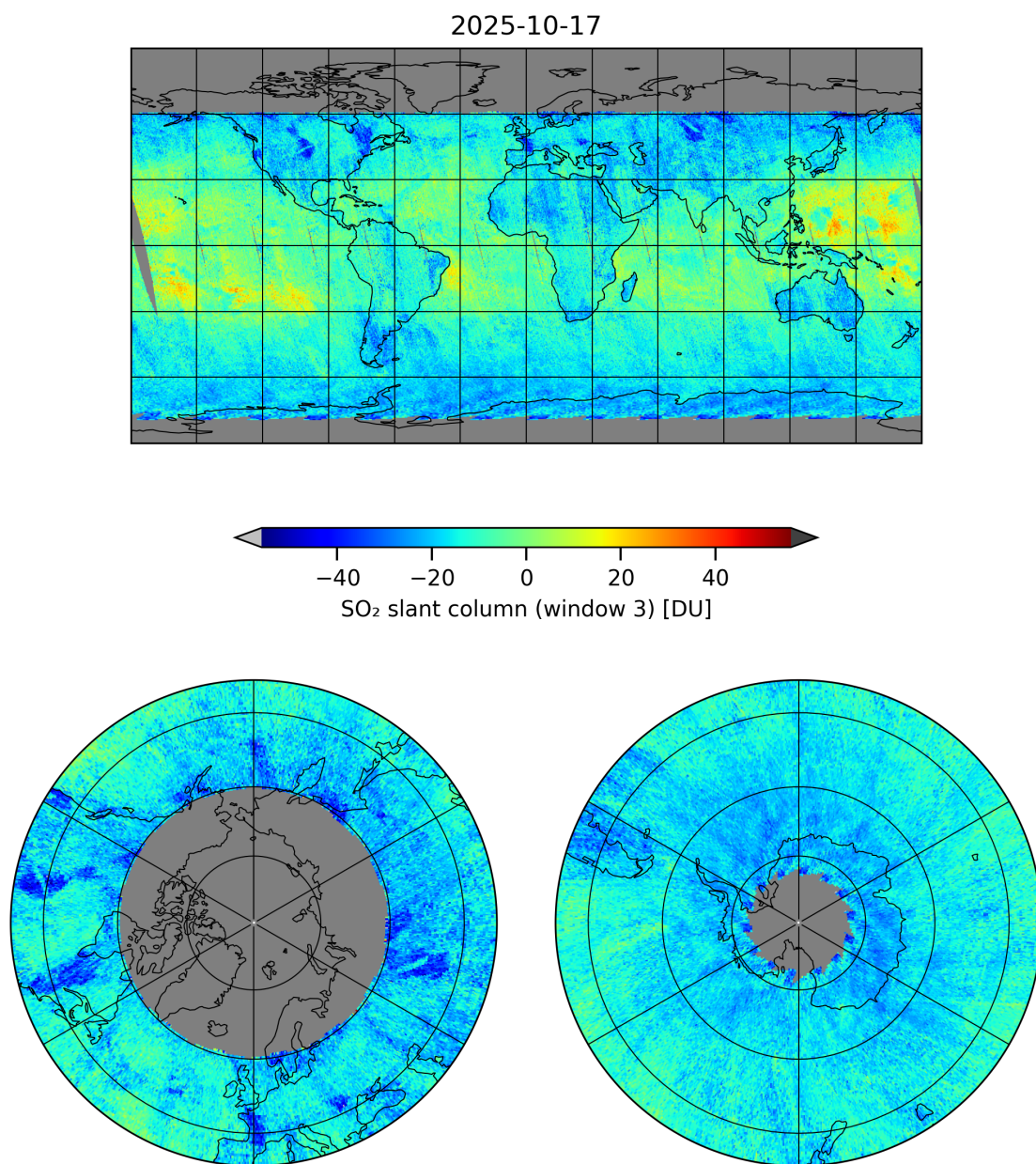


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-10-17 to 2025-10-18

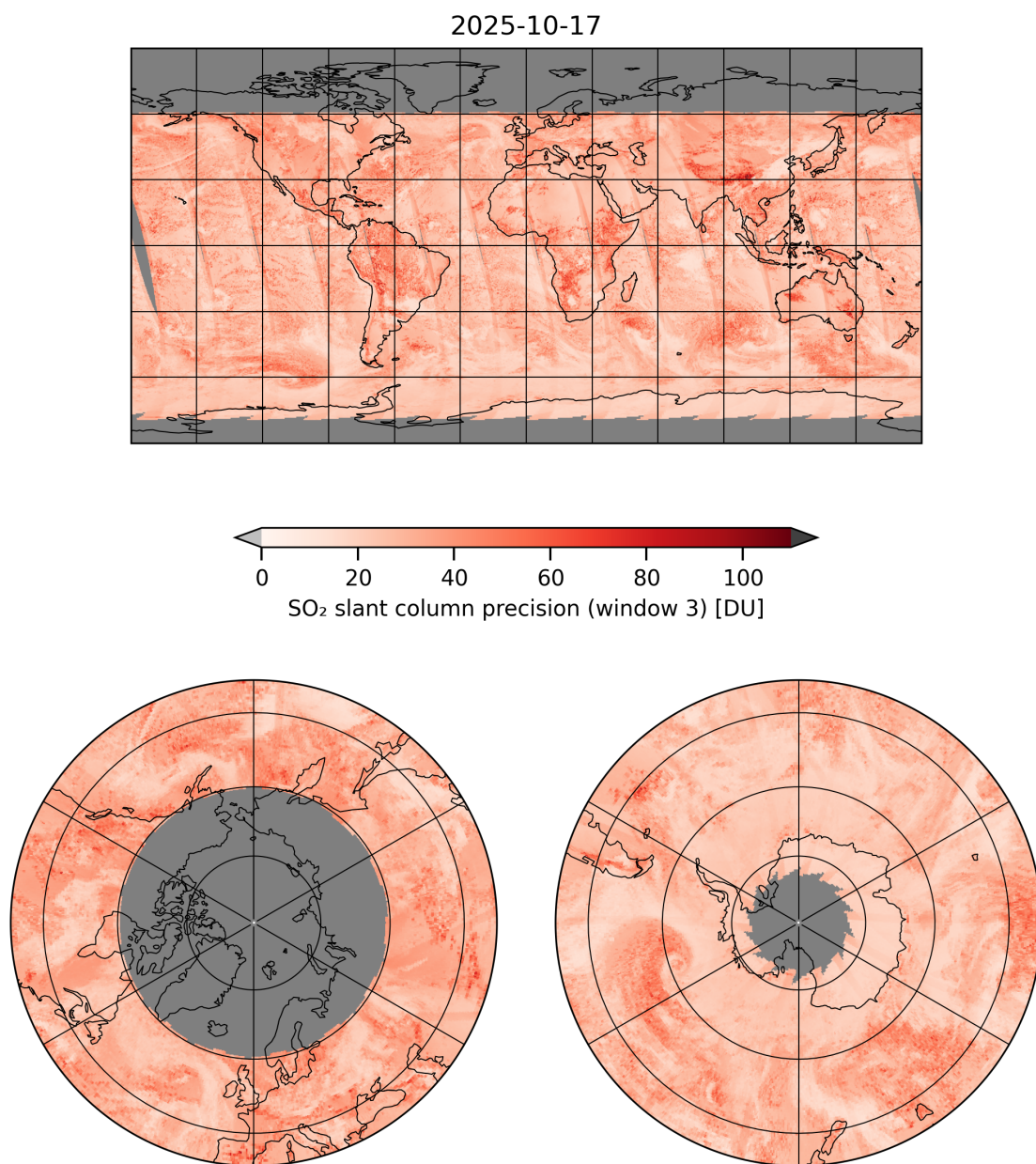


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-10-17 to 2025-10-18

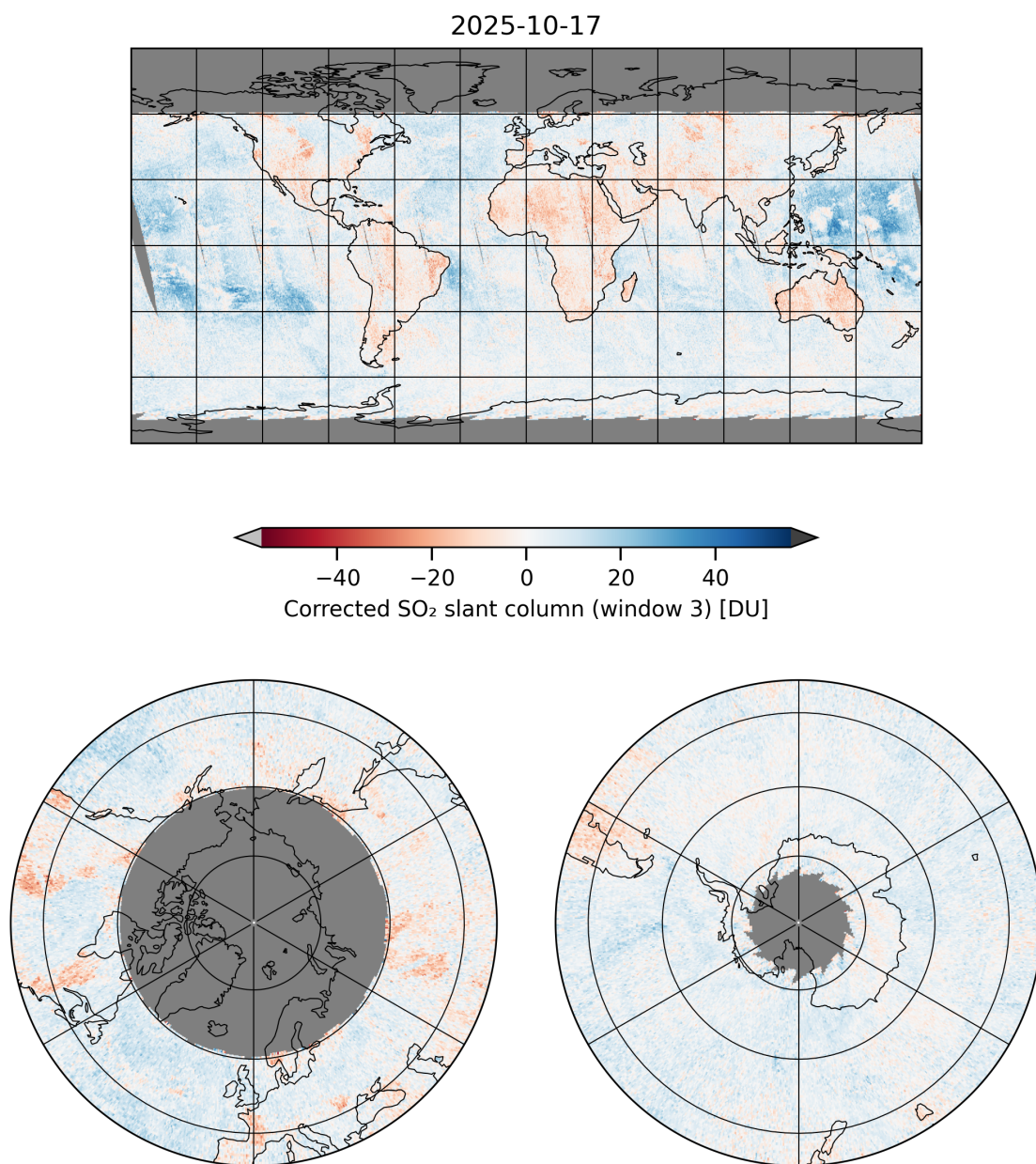


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-10-17 to 2025-10-18

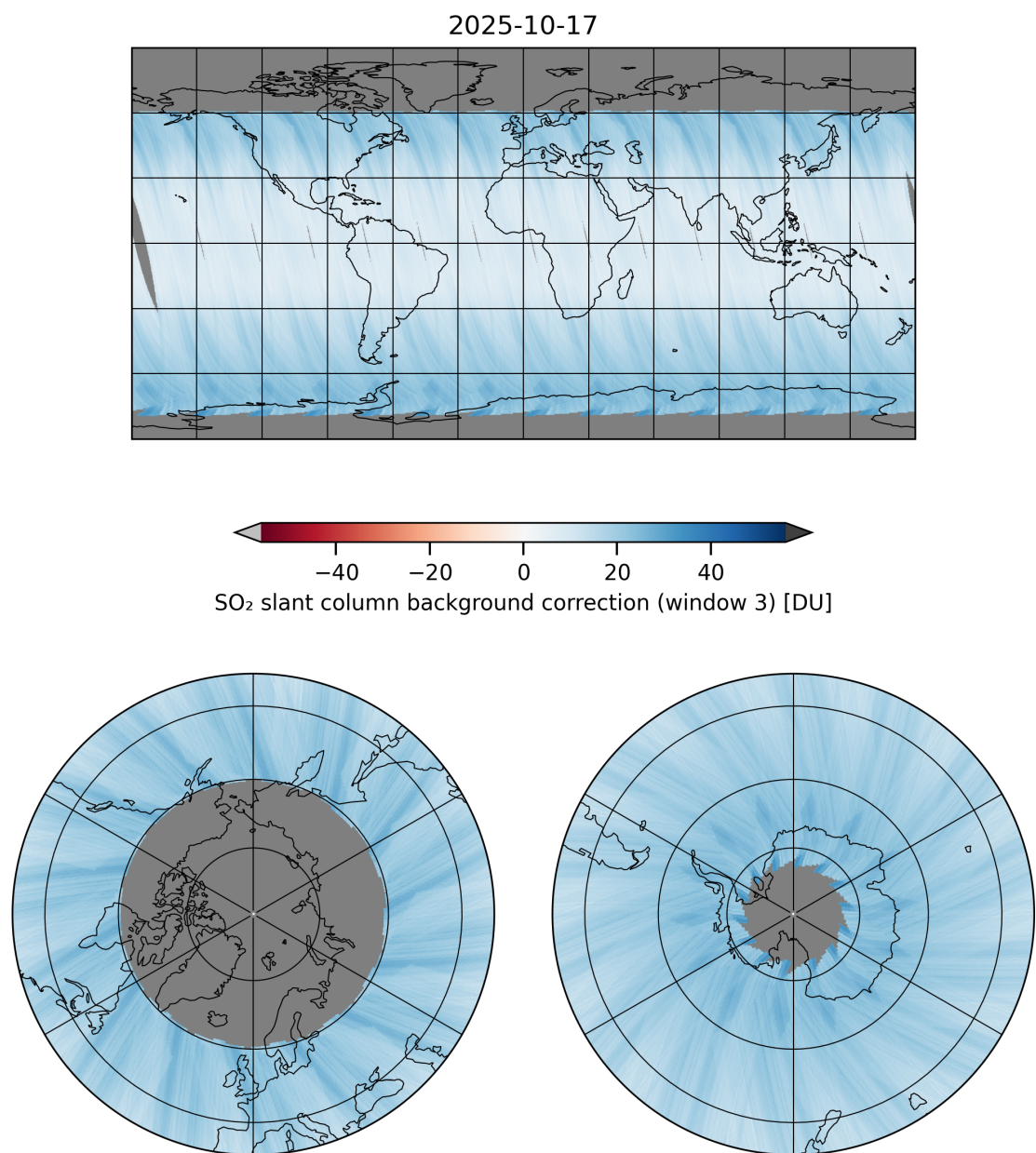


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-10-17 to 2025-10-18

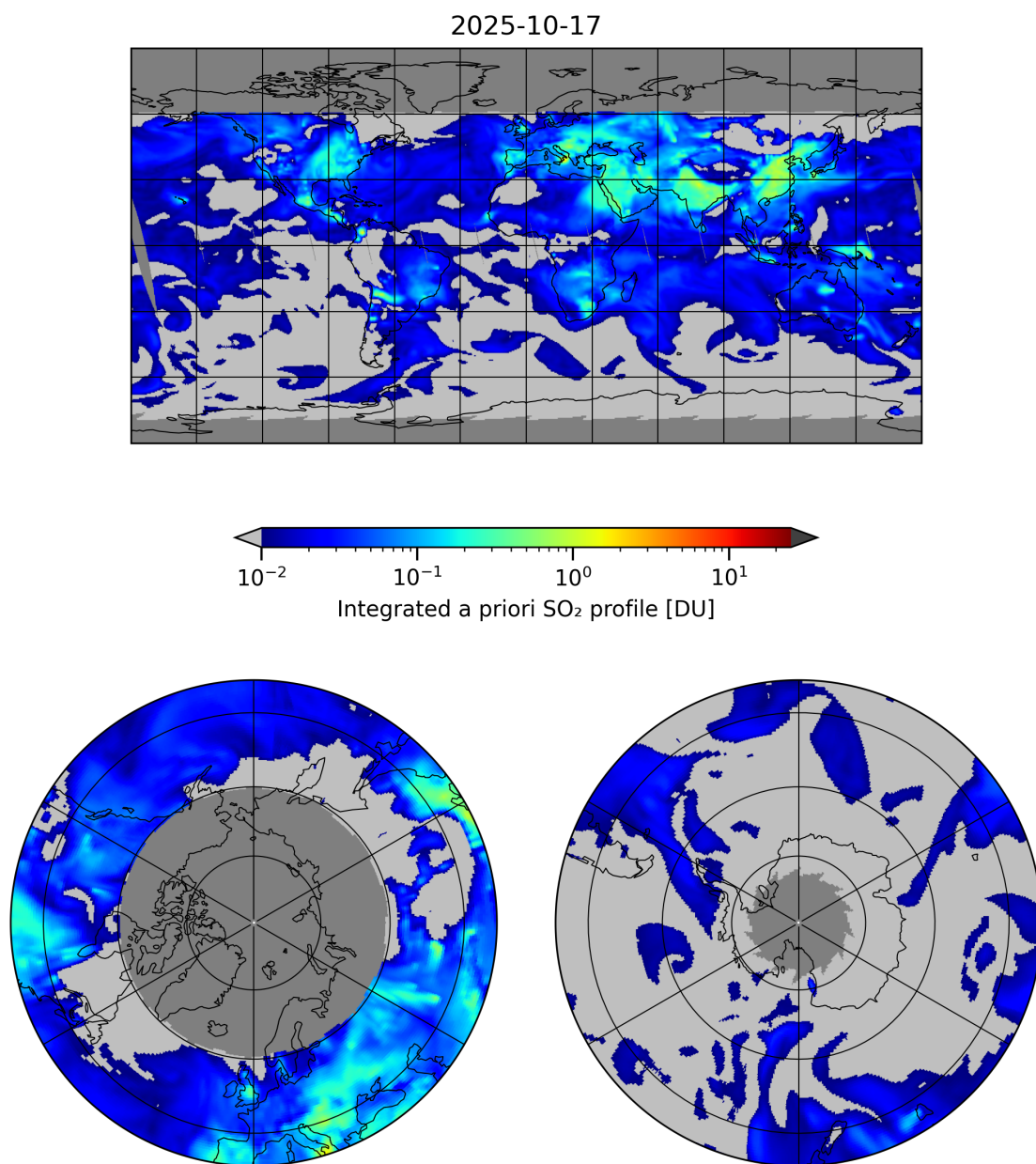


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-10-17 to 2025-10-18

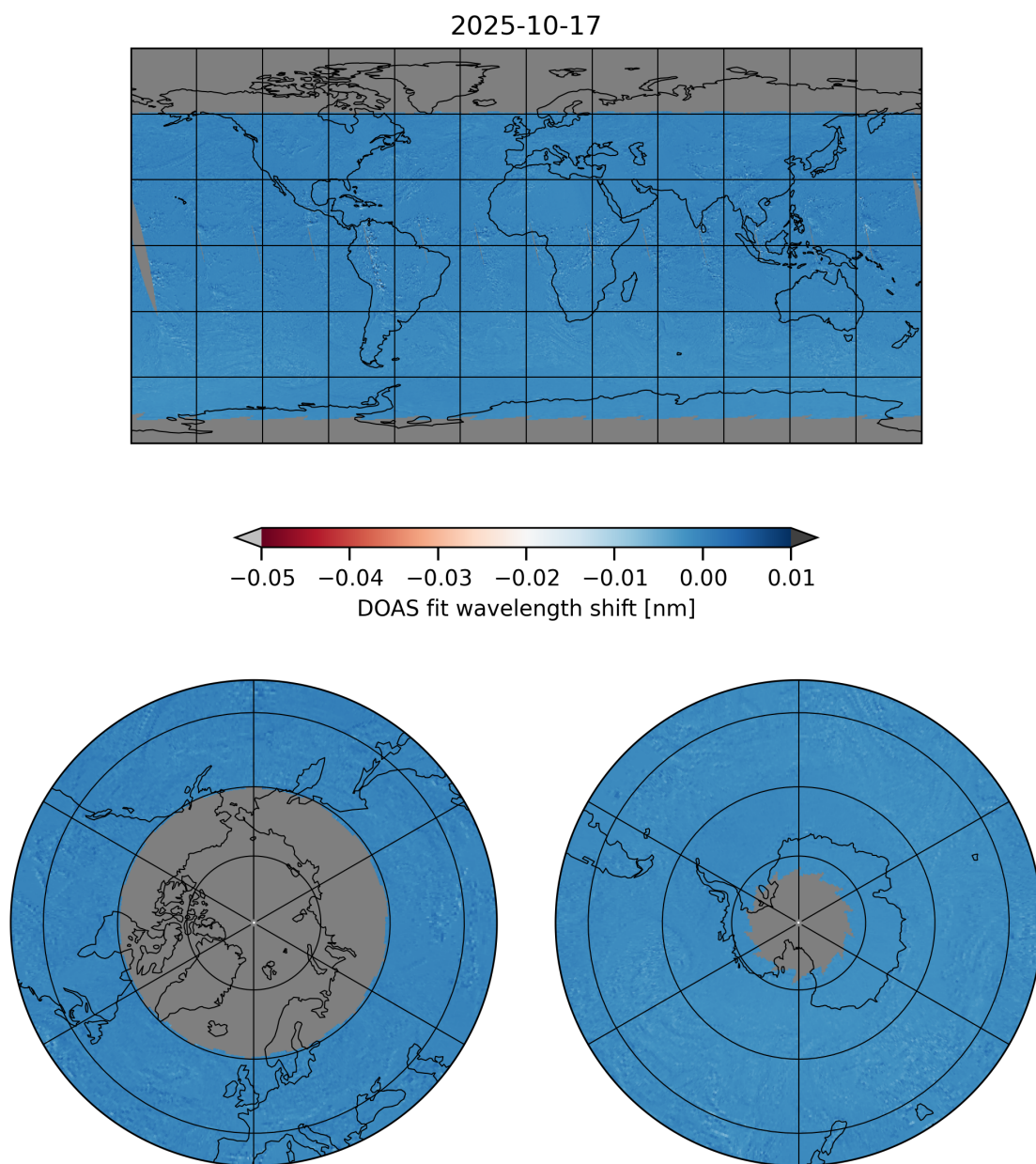


Figure 22: Map of “DOAS fit wavelength shift” for 2025-10-17 to 2025-10-18

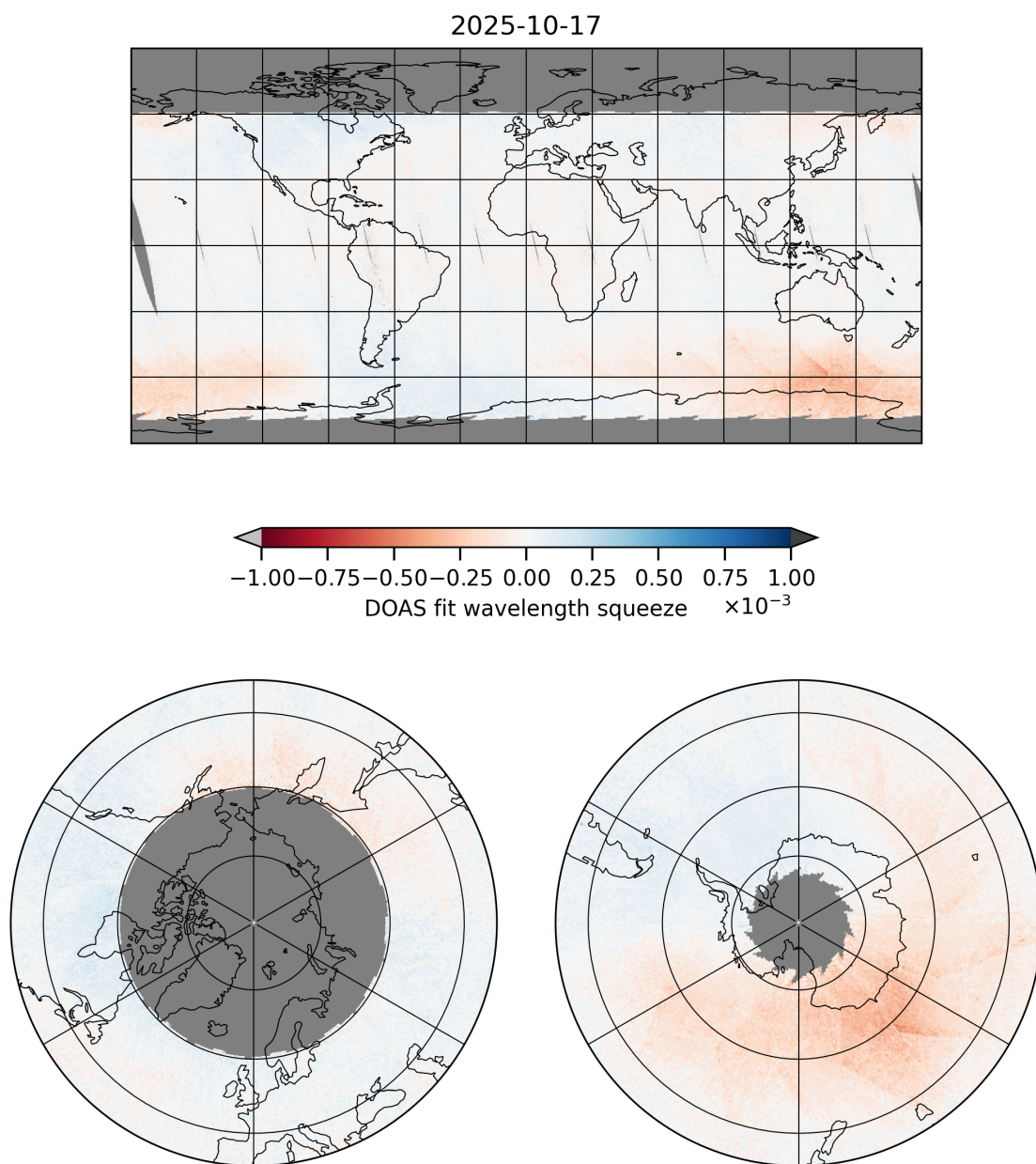


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-10-17 to 2025-10-18

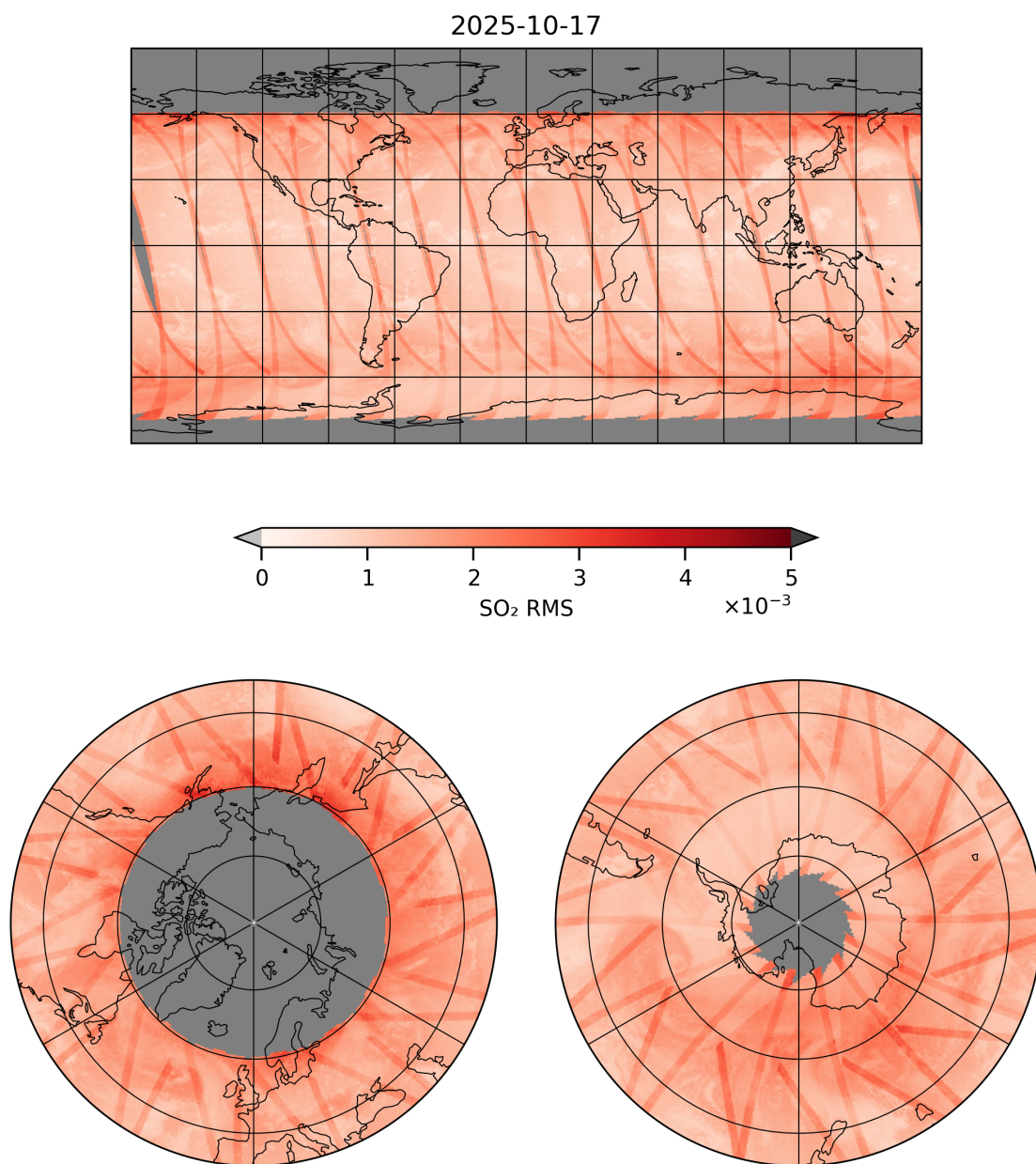


Figure 24: Map of “SO₂ RMS” for 2025-10-17 to 2025-10-18

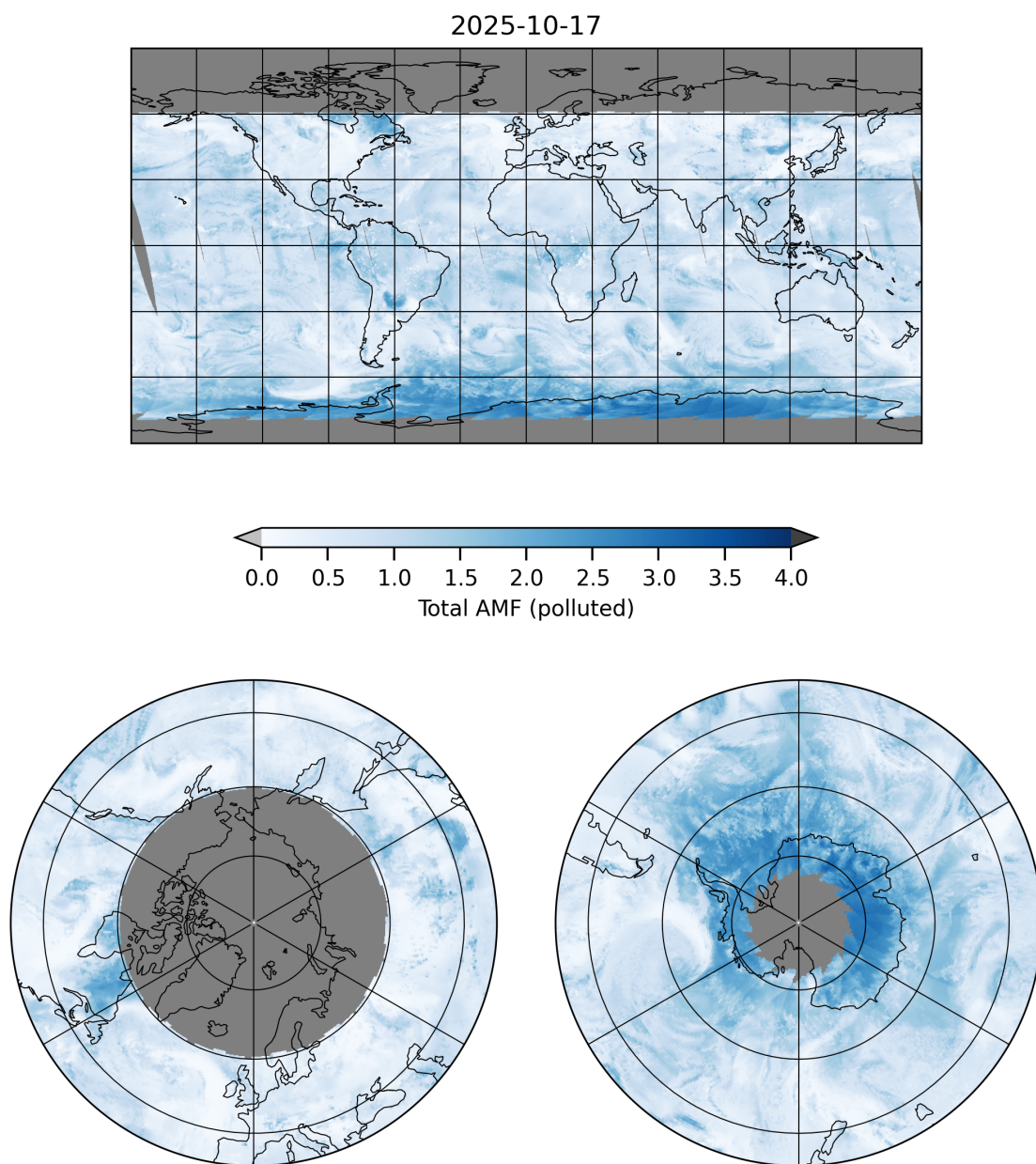


Figure 25: Map of “Total AMF (polluted)” for 2025-10-17 to 2025-10-18

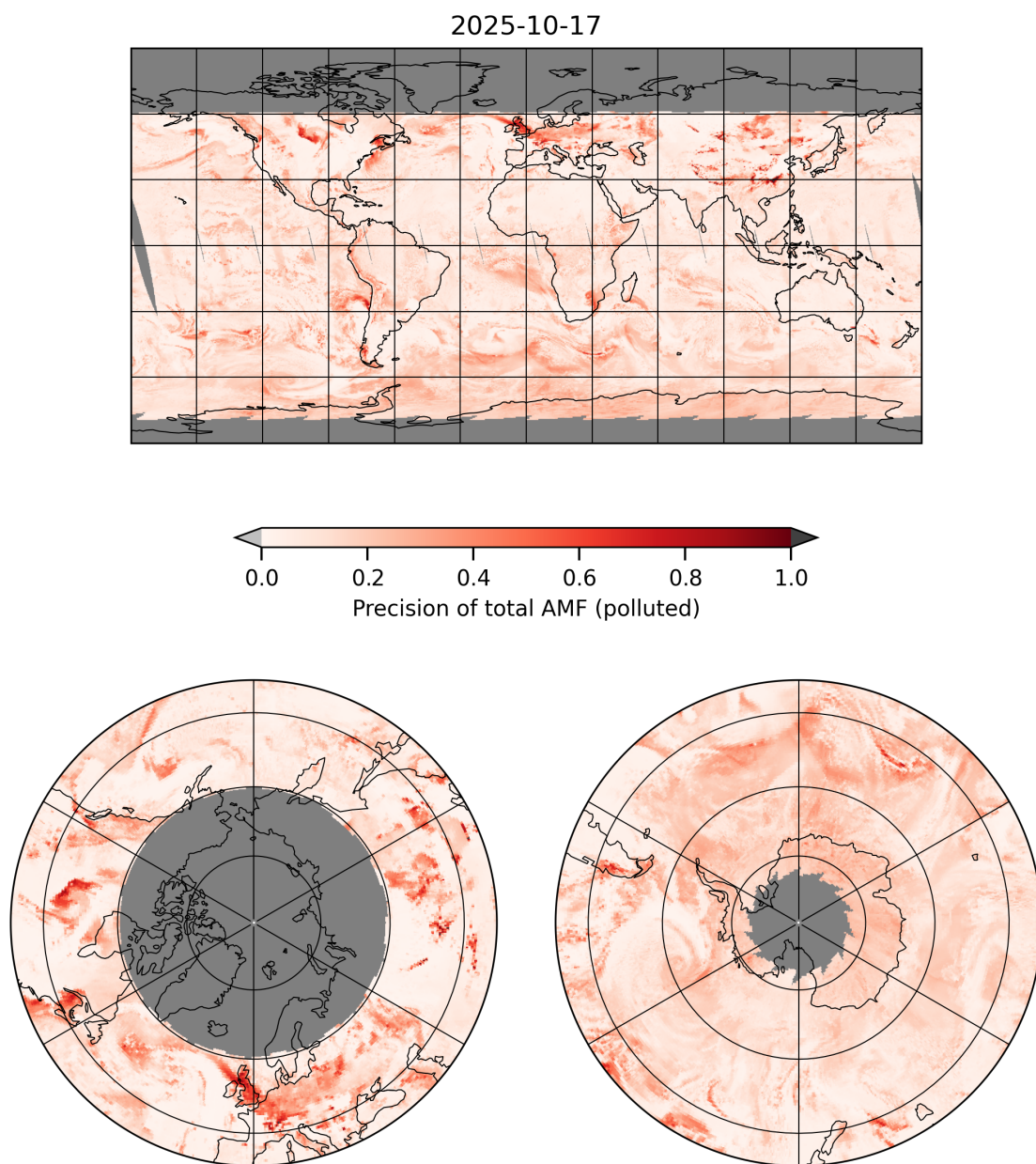


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-10-17 to 2025-10-18

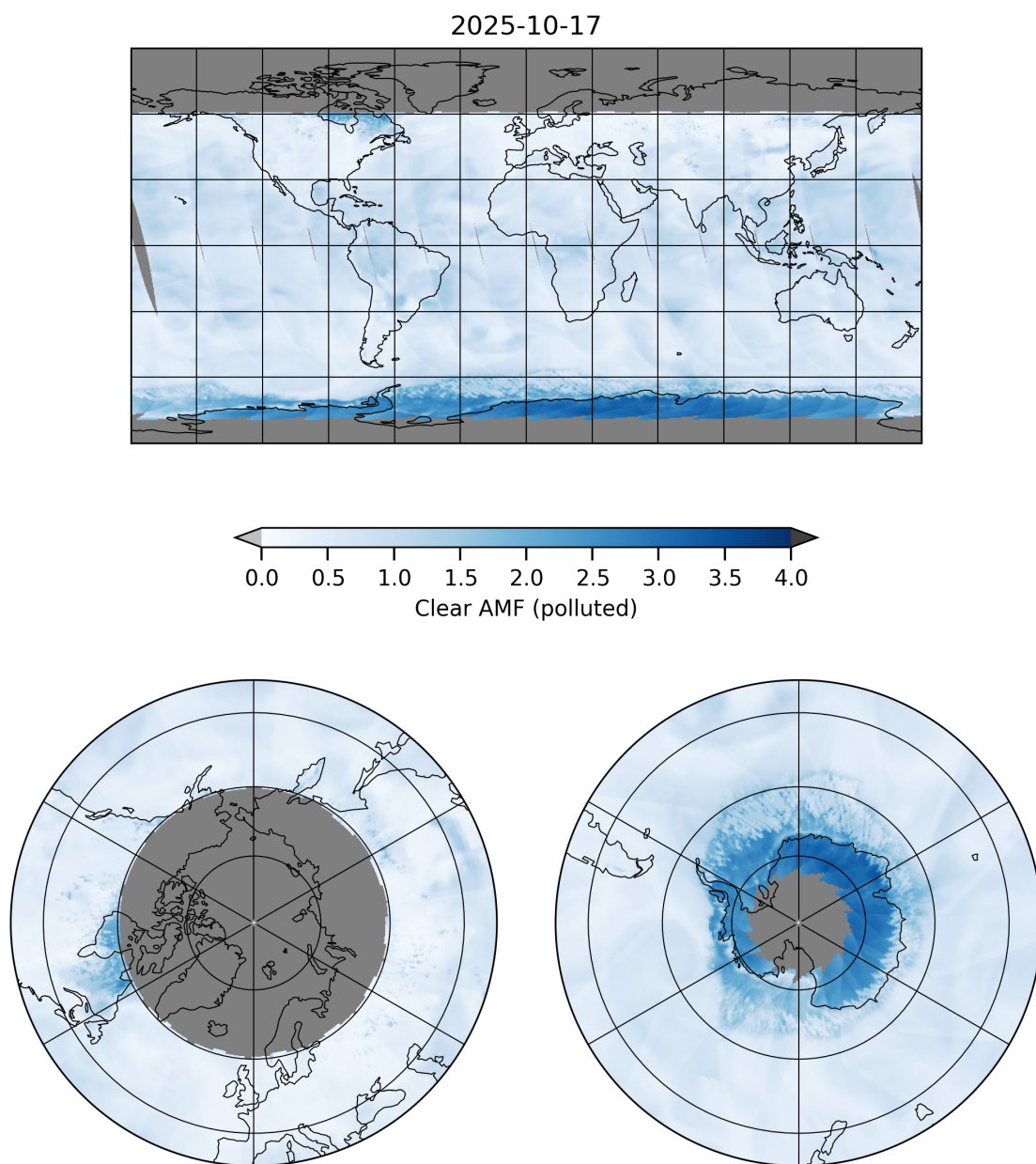


Figure 27: Map of “Clear AMF (polluted)” for 2025-10-17 to 2025-10-18

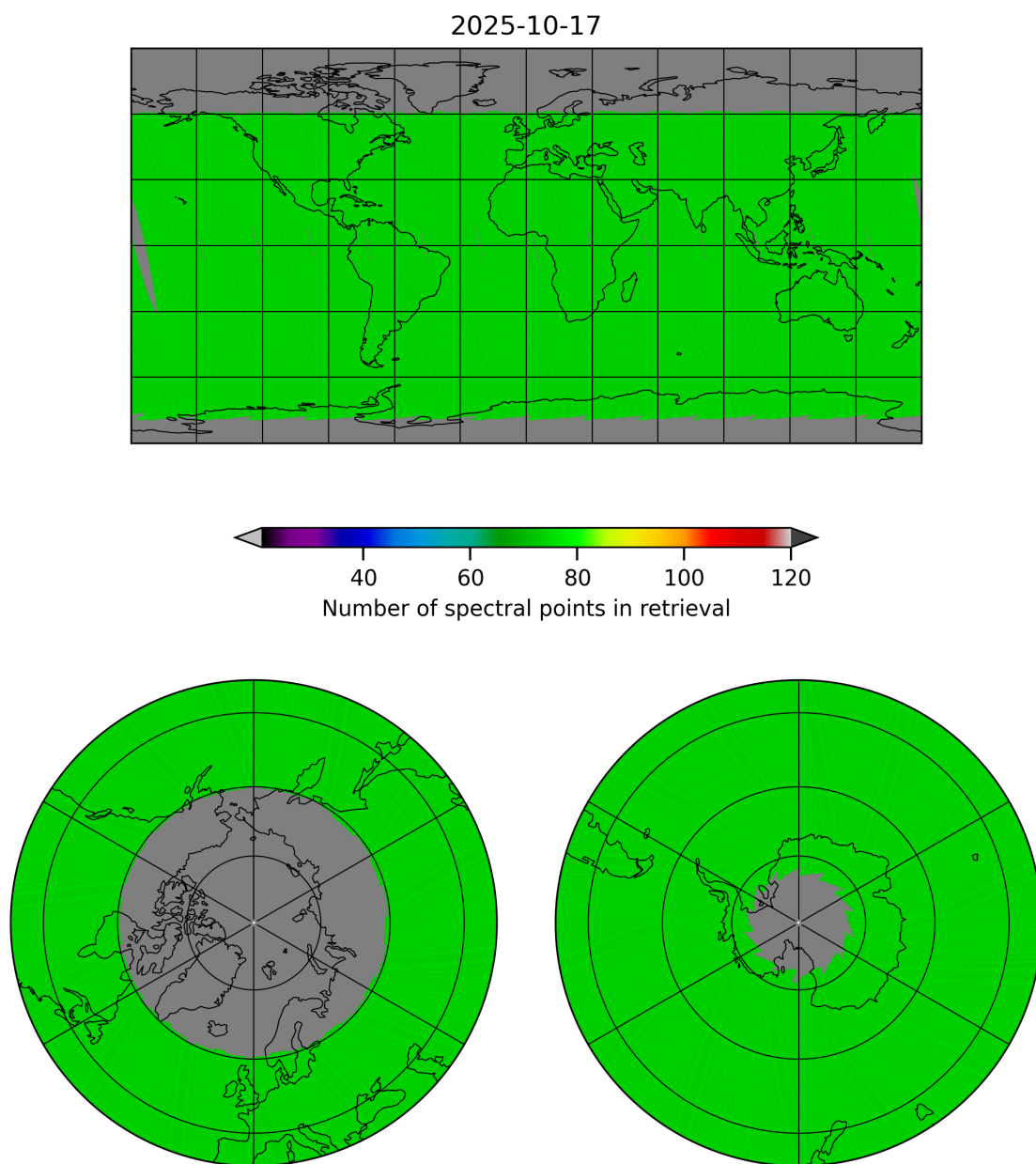
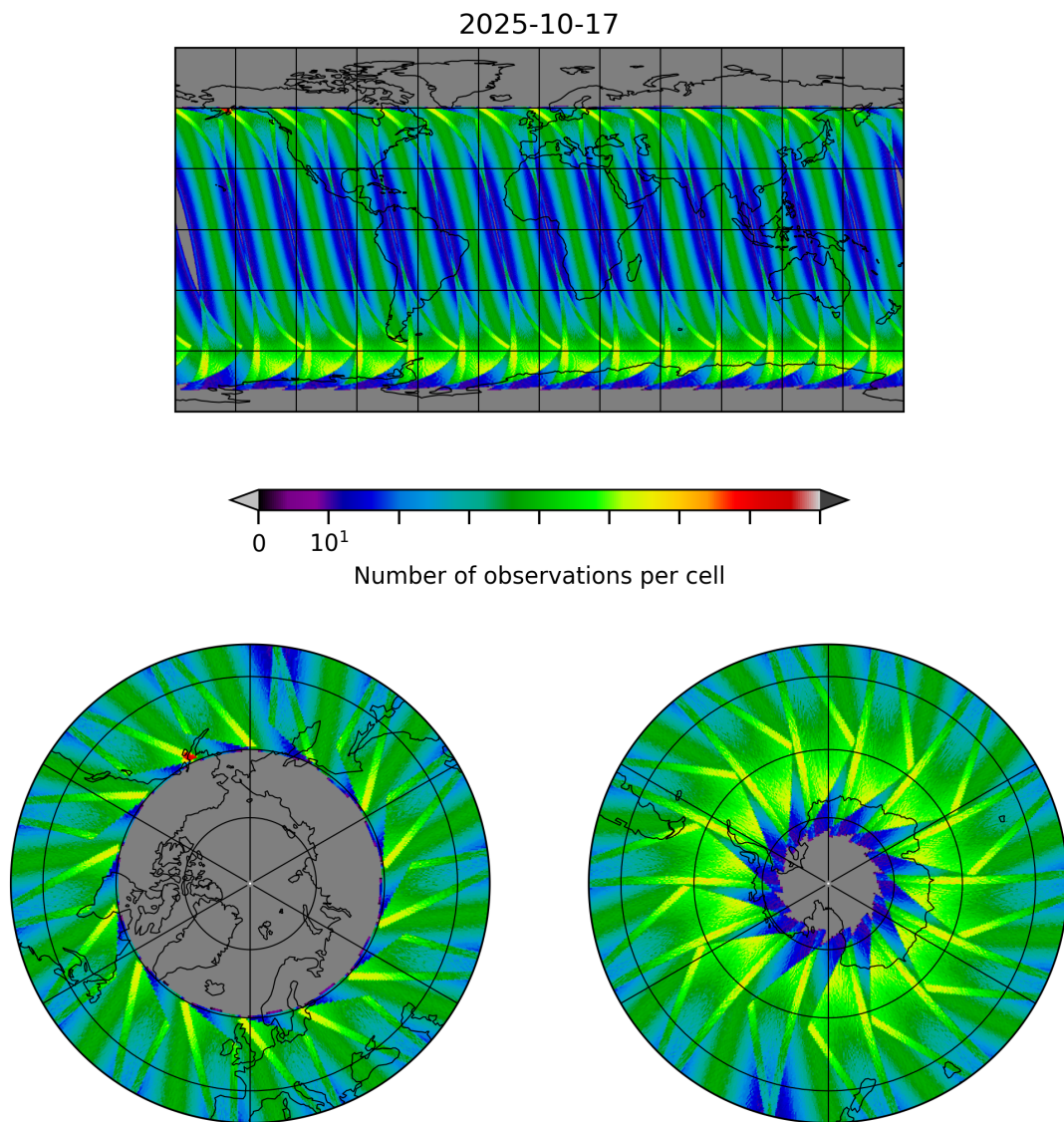


Figure 28: Map of “Number of spectral points in retrieval” for 2025-10-17 to 2025-10-18



7 Zonal average

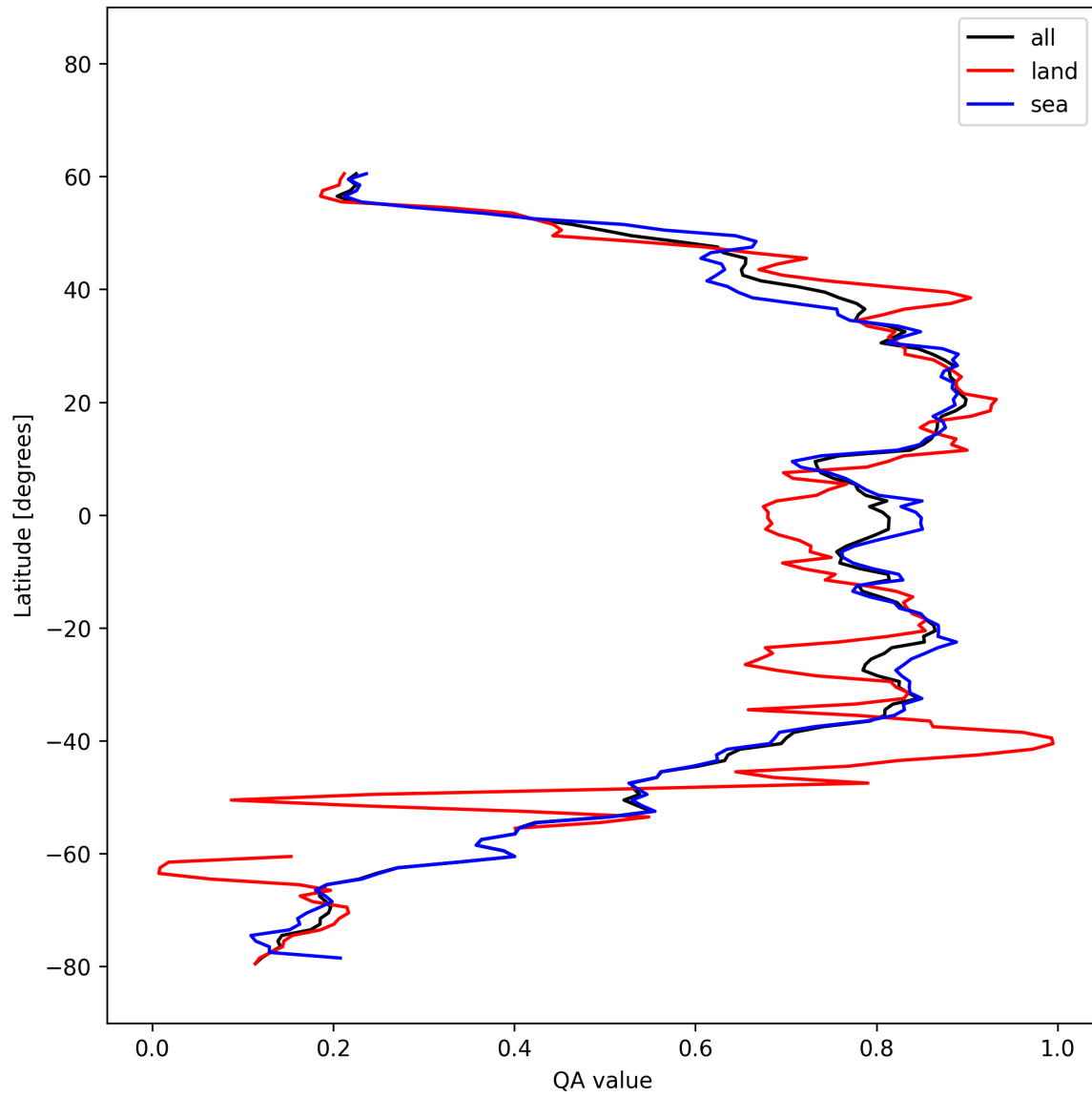


Figure 30: Zonal average of “QA value” for 2025-10-17 to 2025-10-18.

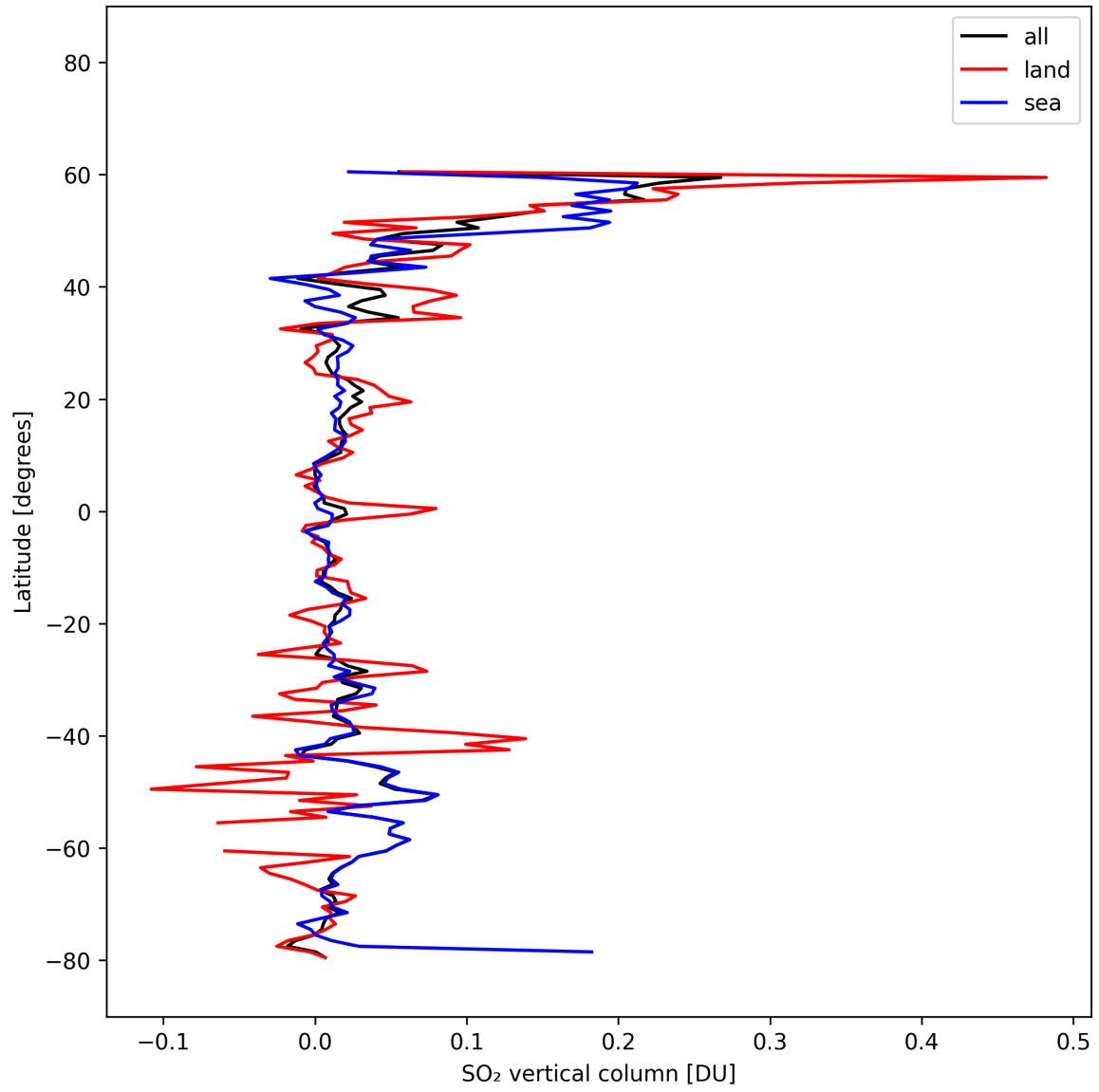


Figure 31: Zonal average of “SO₂ vertical column” for 2025-10-17 to 2025-10-18.

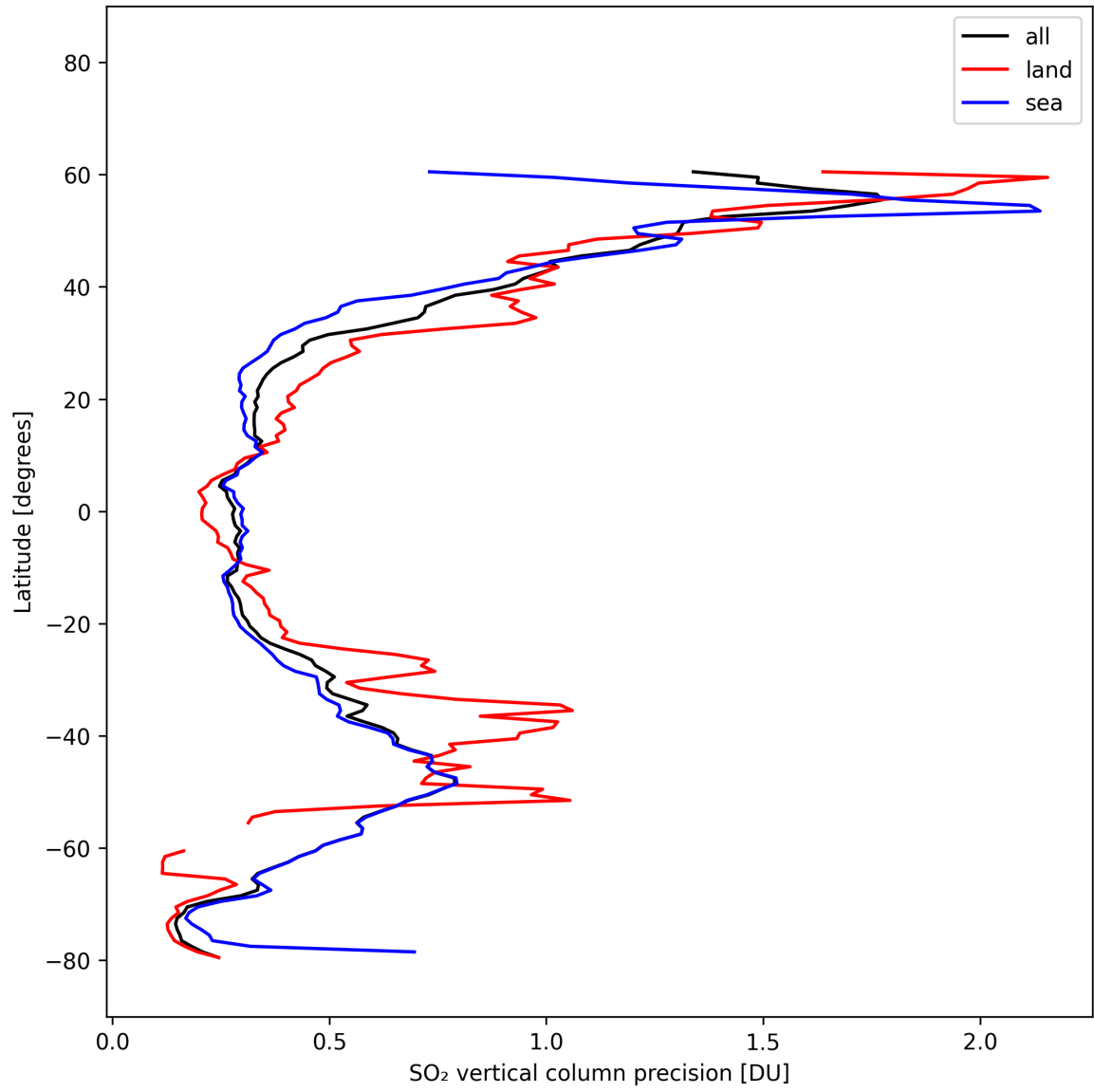


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-10-17 to 2025-10-18.

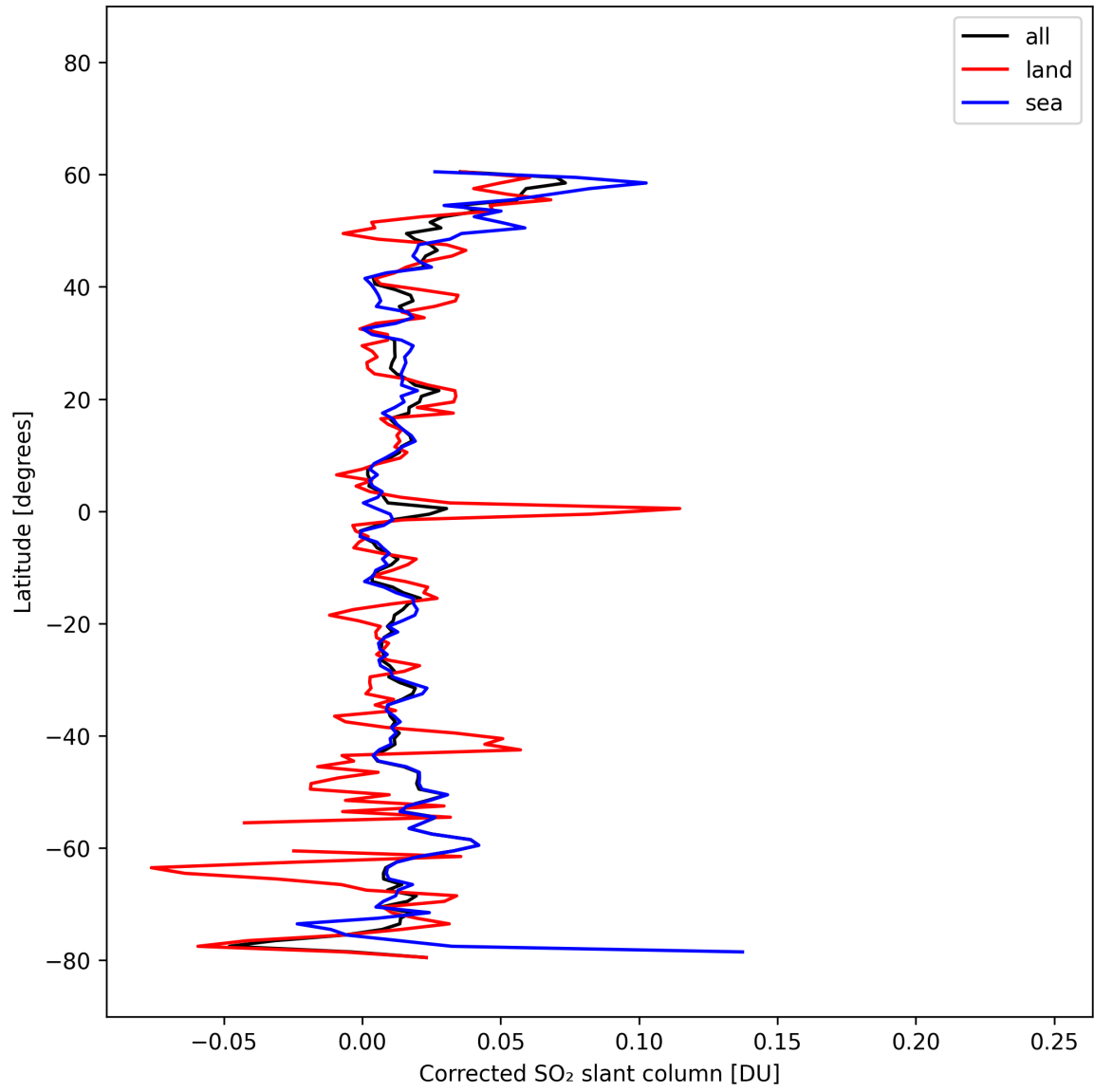


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-10-17 to 2025-10-18.

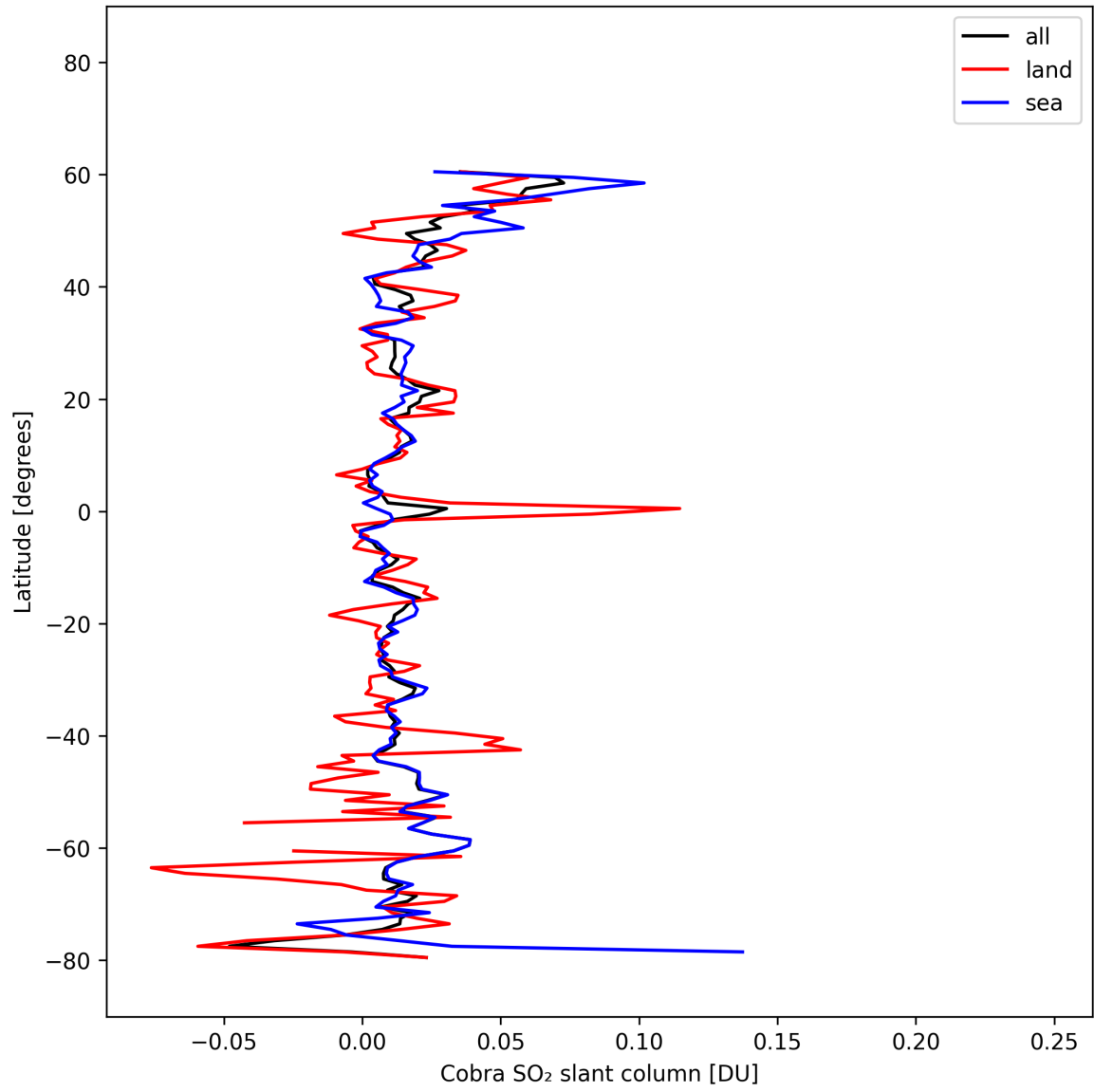


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-10-17 to 2025-10-18.

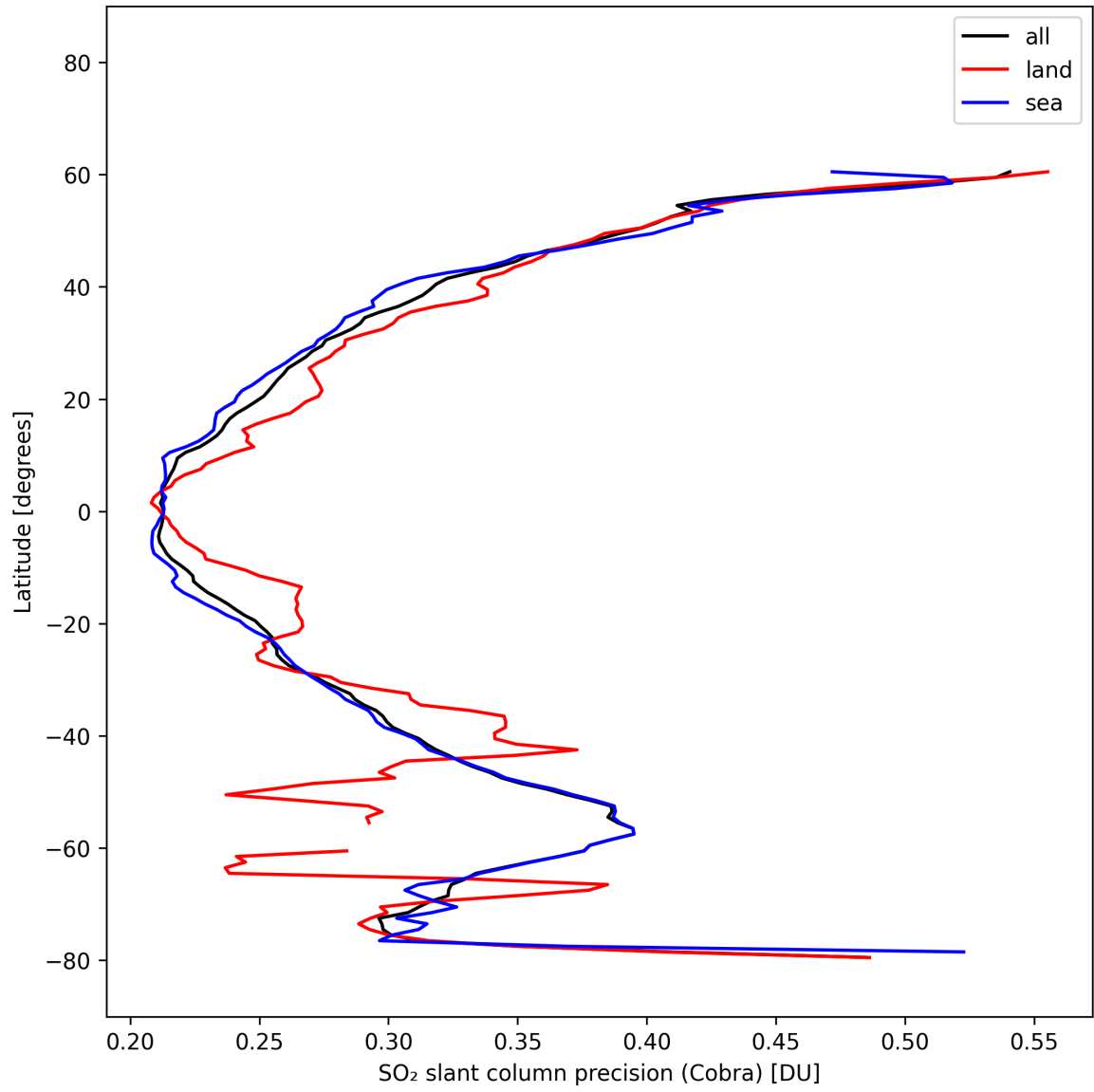


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-10-17 to 2025-10-18.

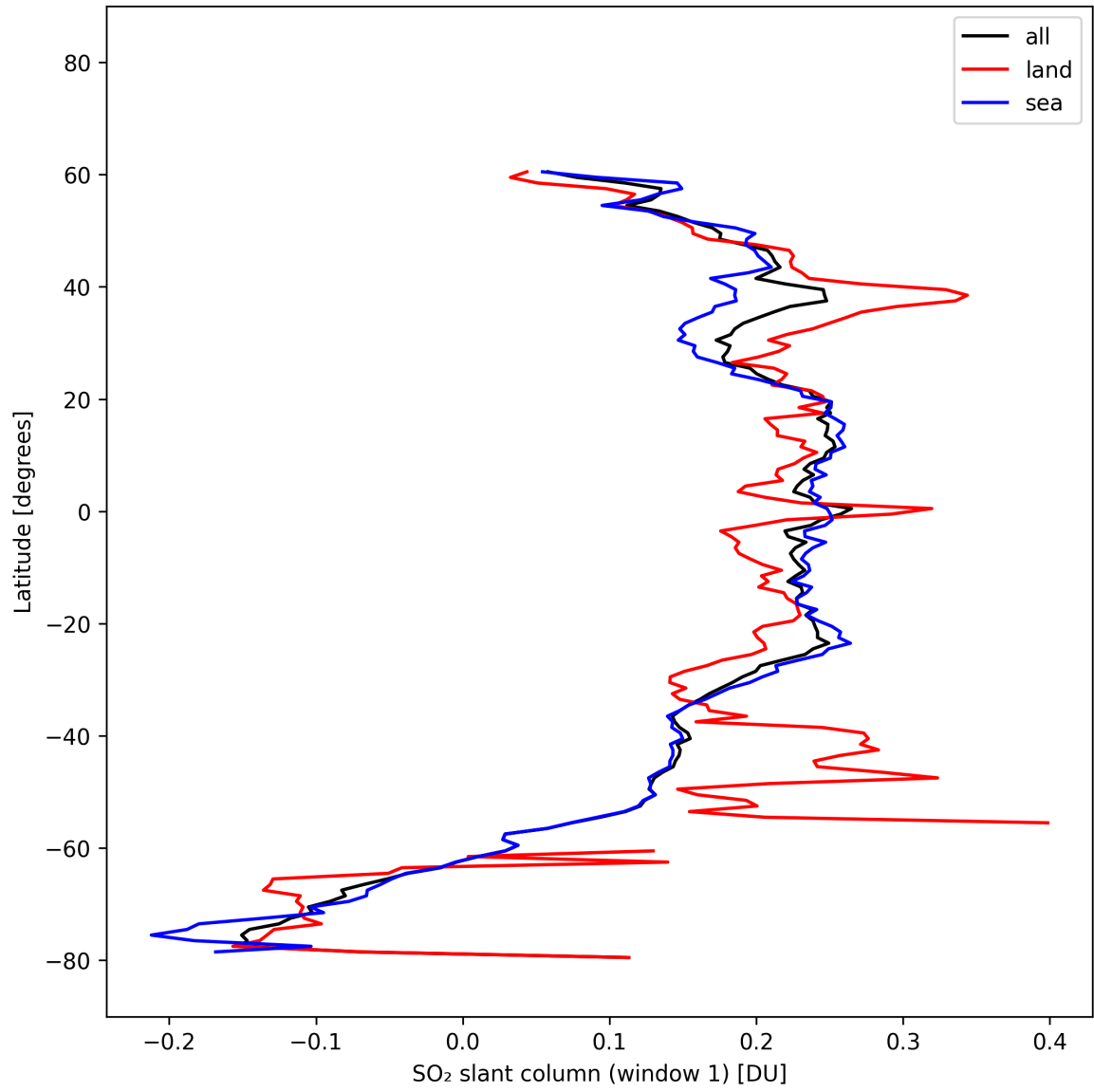


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-10-17 to 2025-10-18.

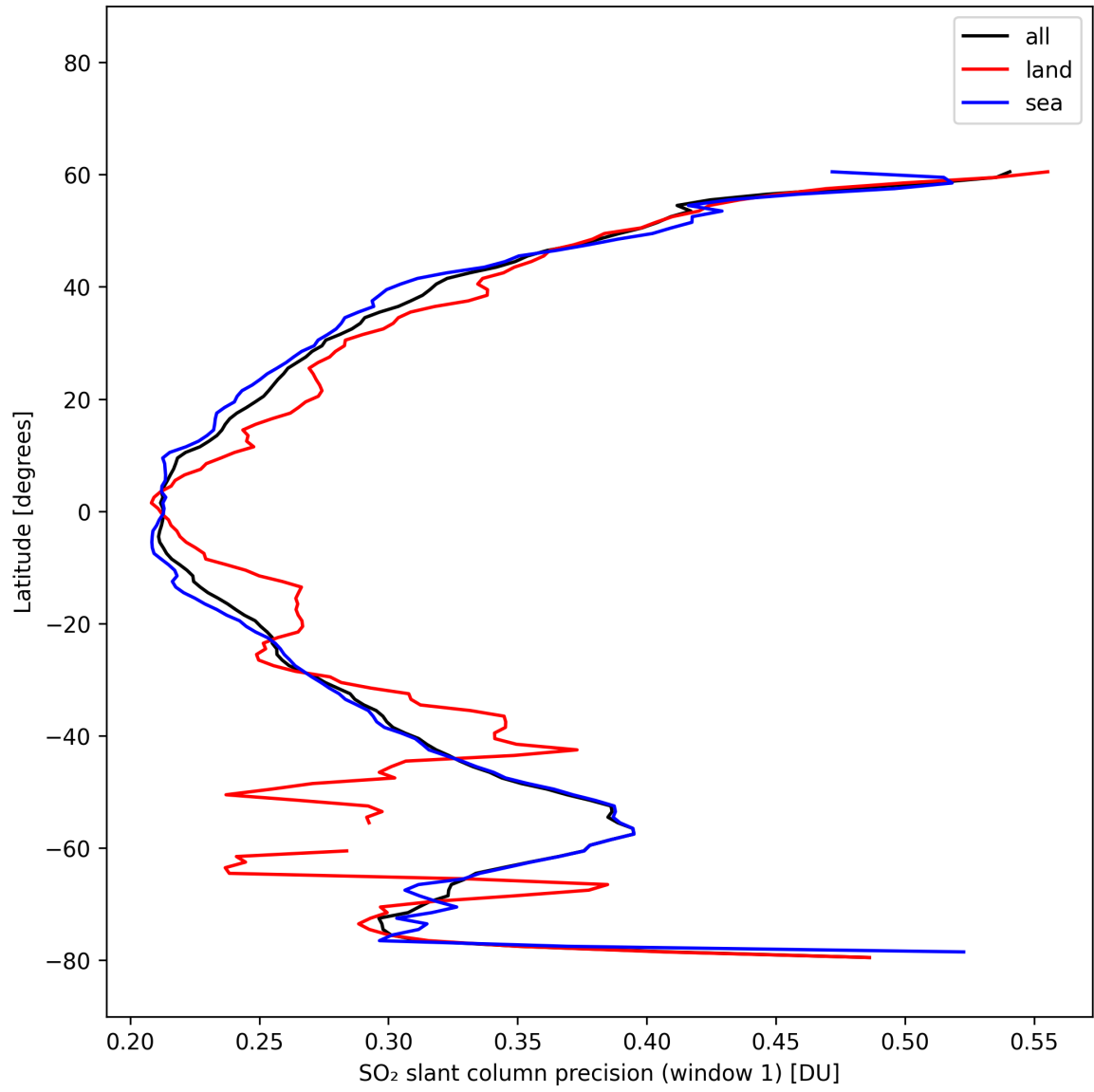


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-10-17 to 2025-10-18.

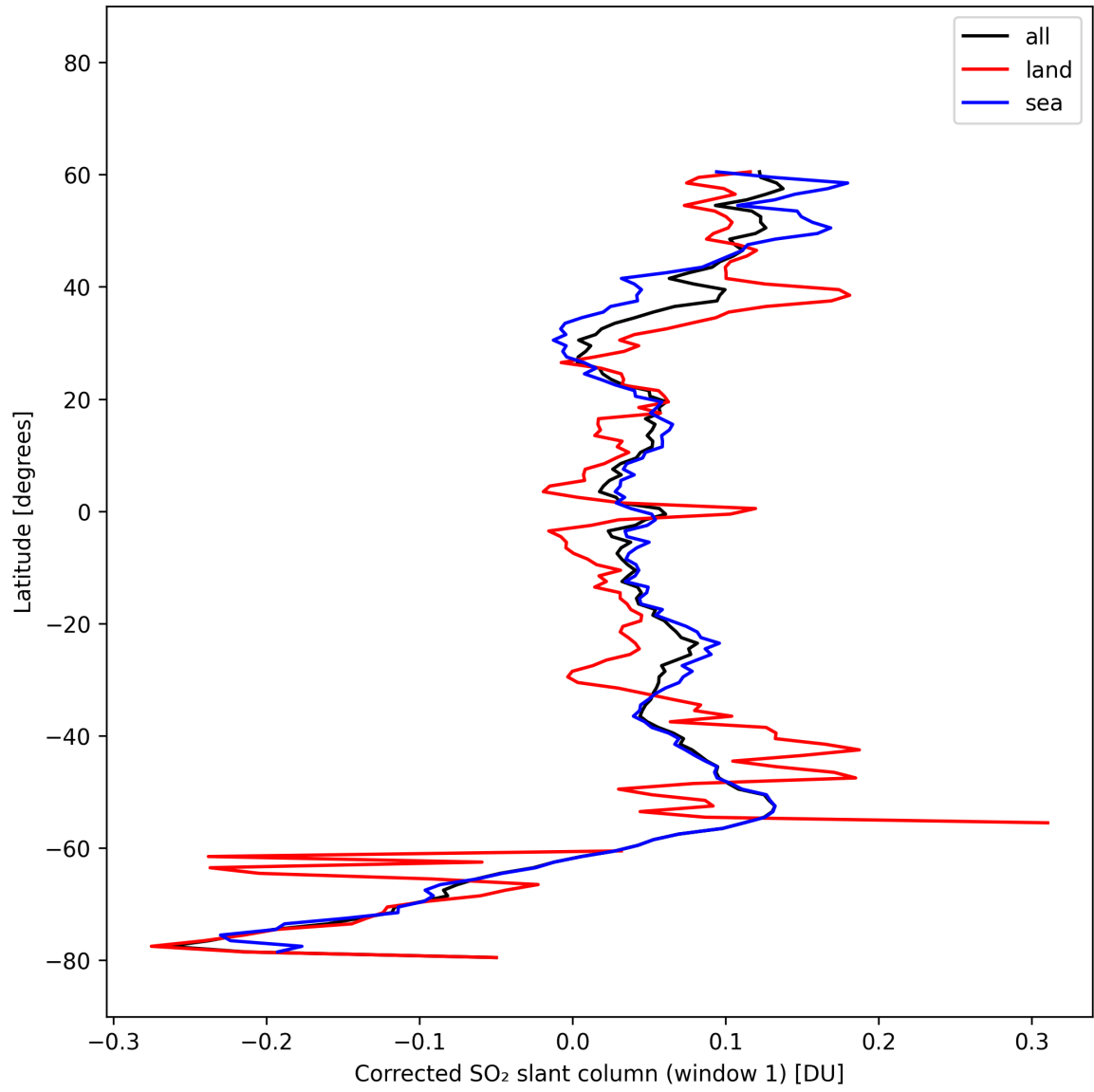


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-10-17 to 2025-10-18.

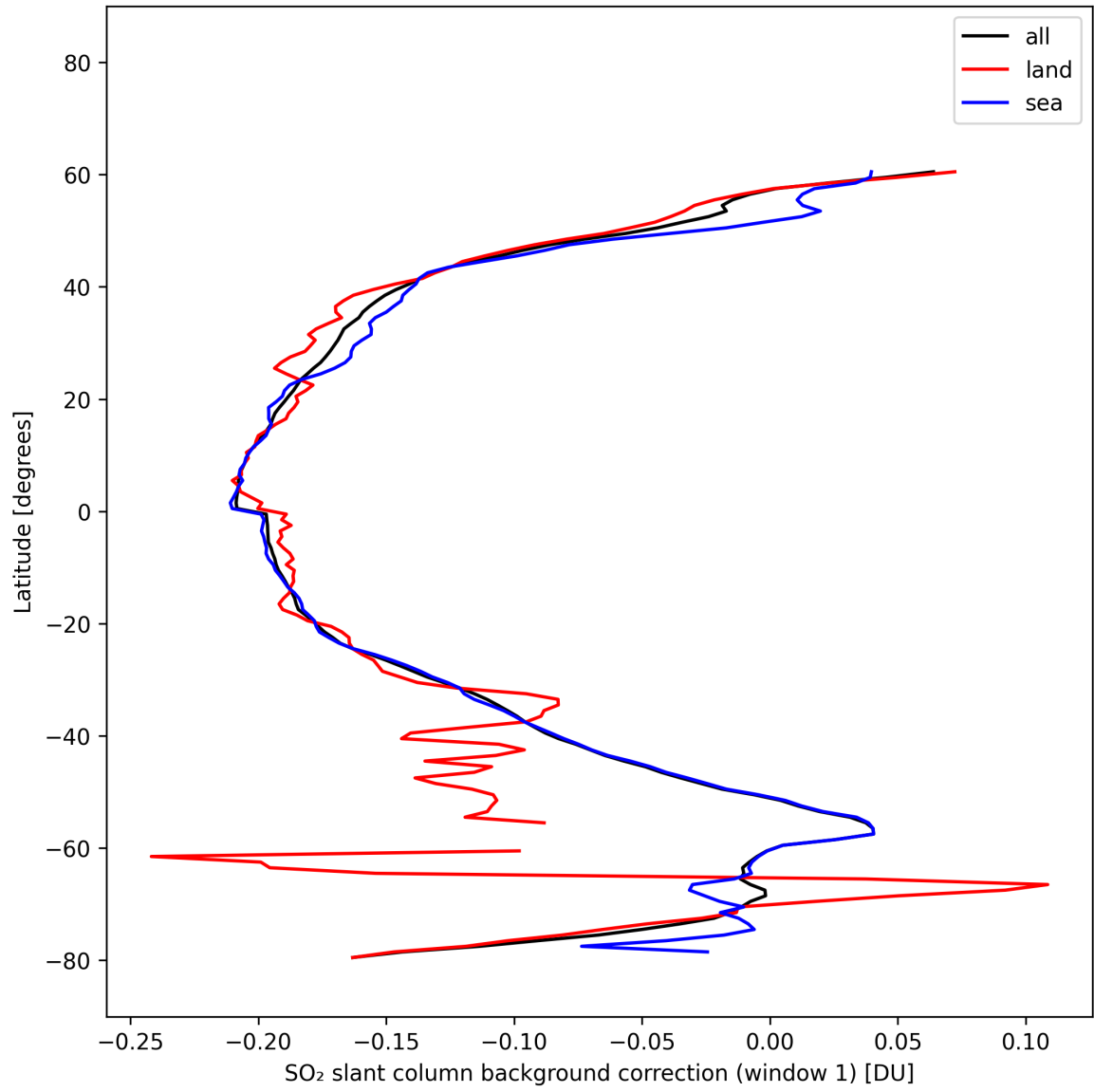


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-10-17 to 2025-10-18.

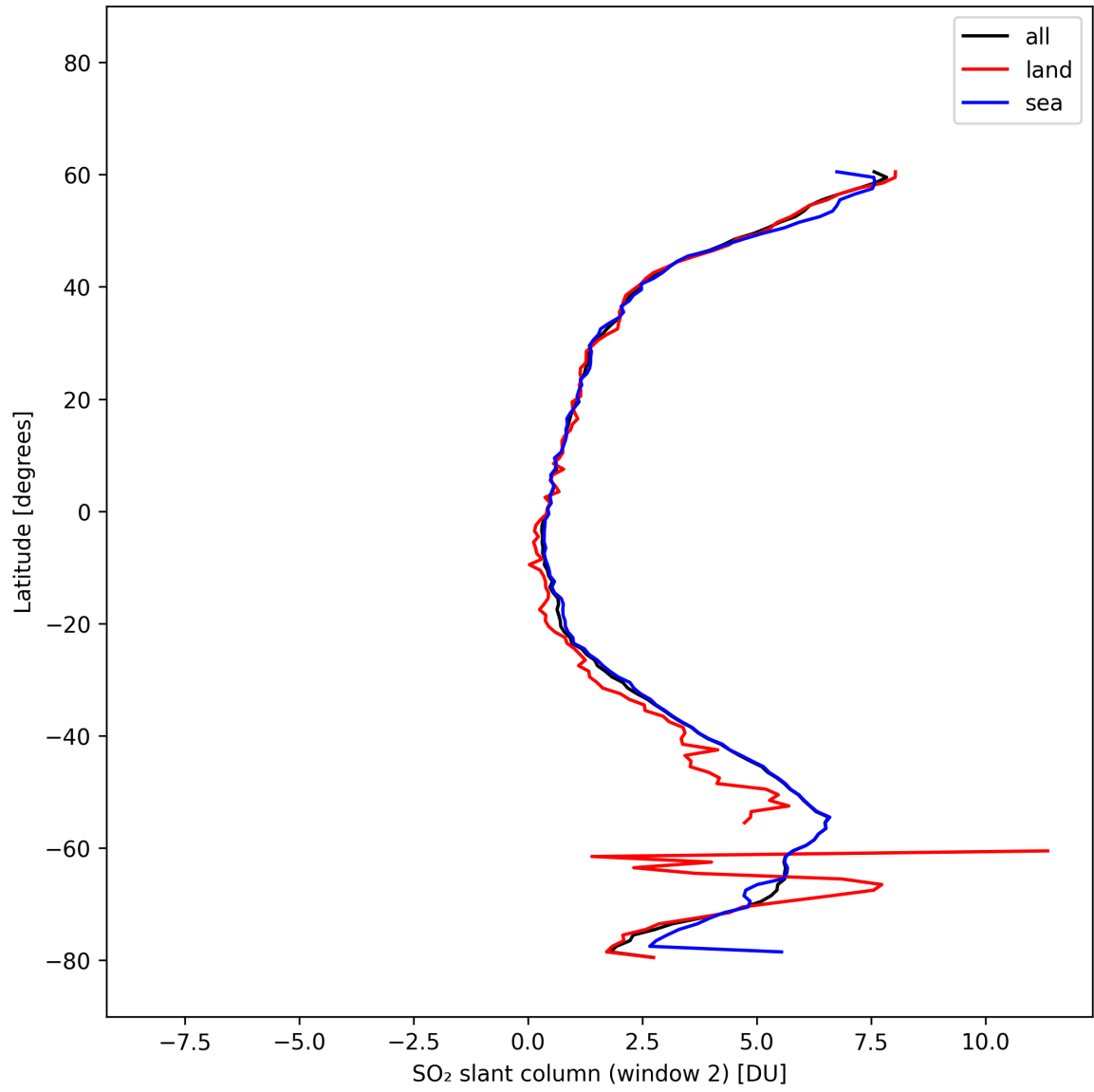


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-10-17 to 2025-10-18.

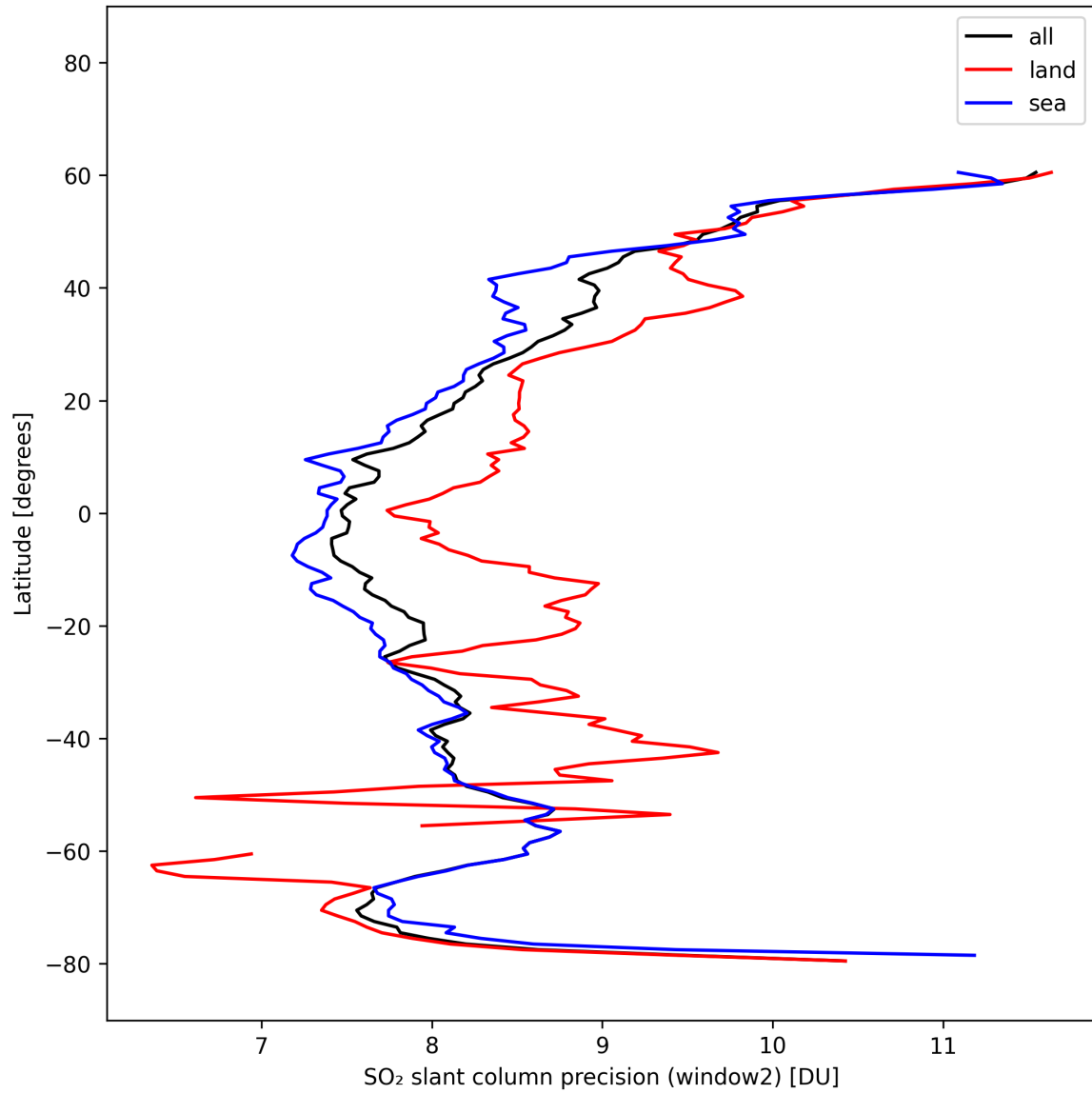


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-10-17 to 2025-10-18.

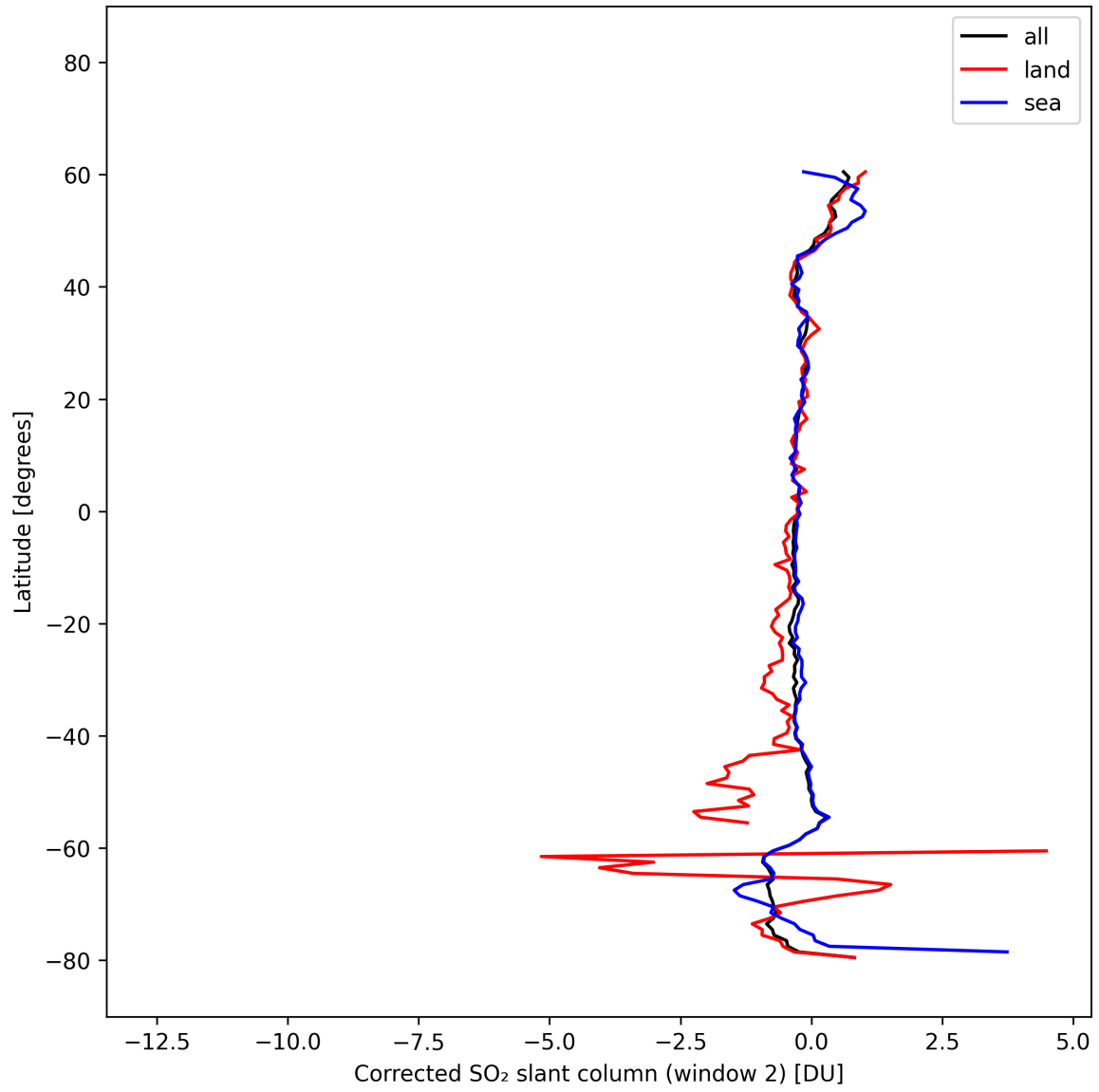


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-10-17 to 2025-10-18.

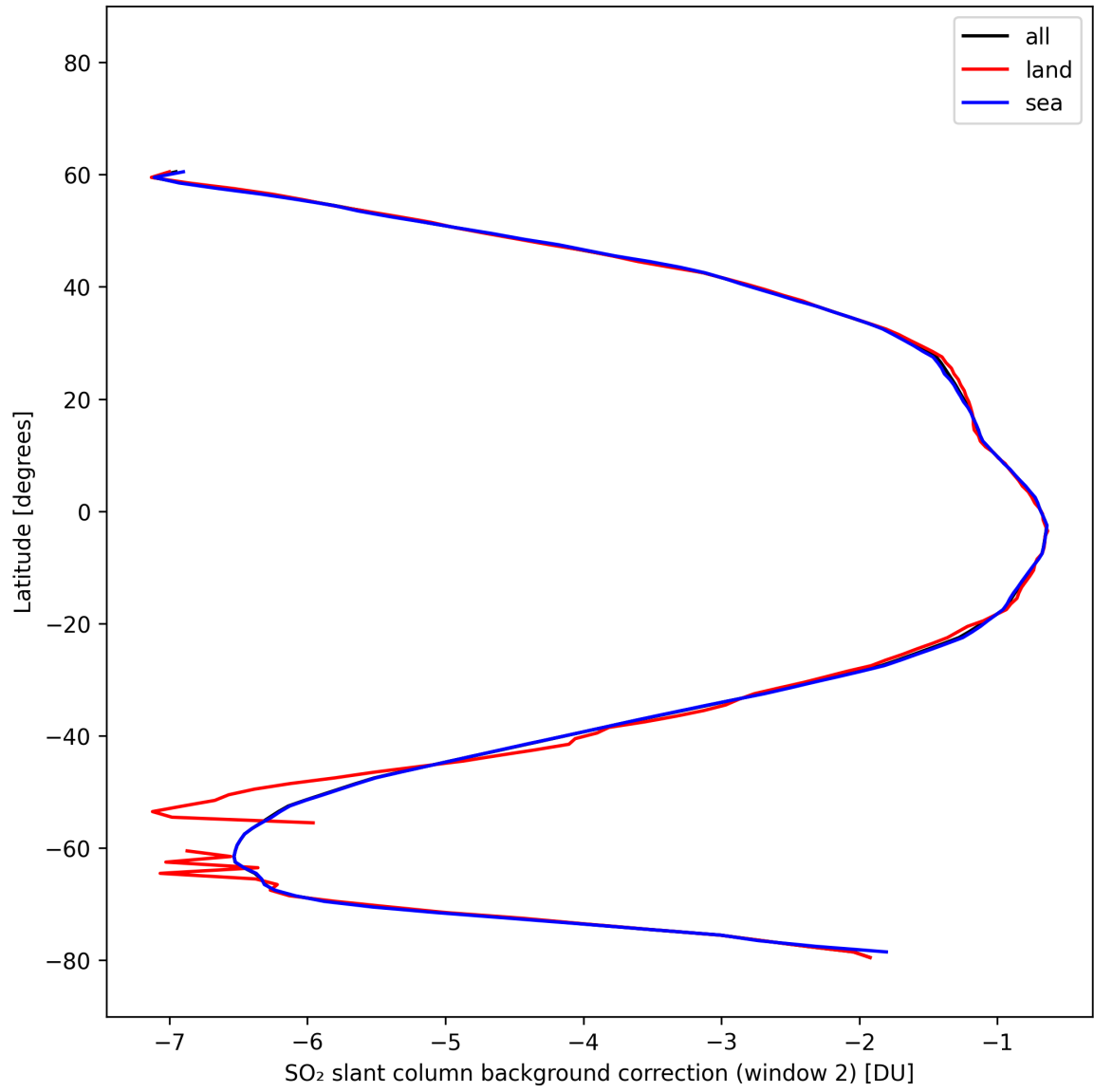


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-10-17 to 2025-10-18.

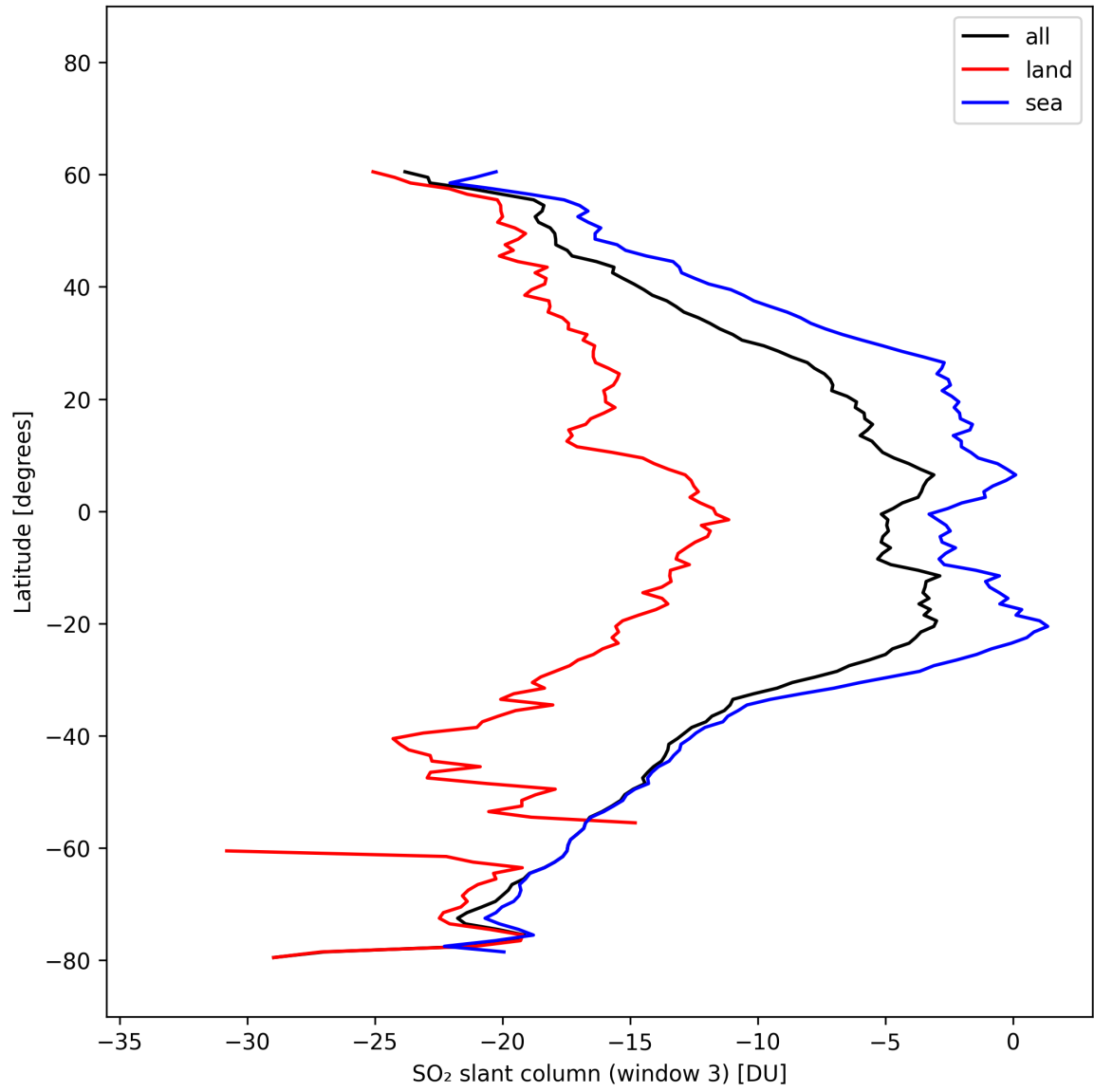


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-10-17 to 2025-10-18.

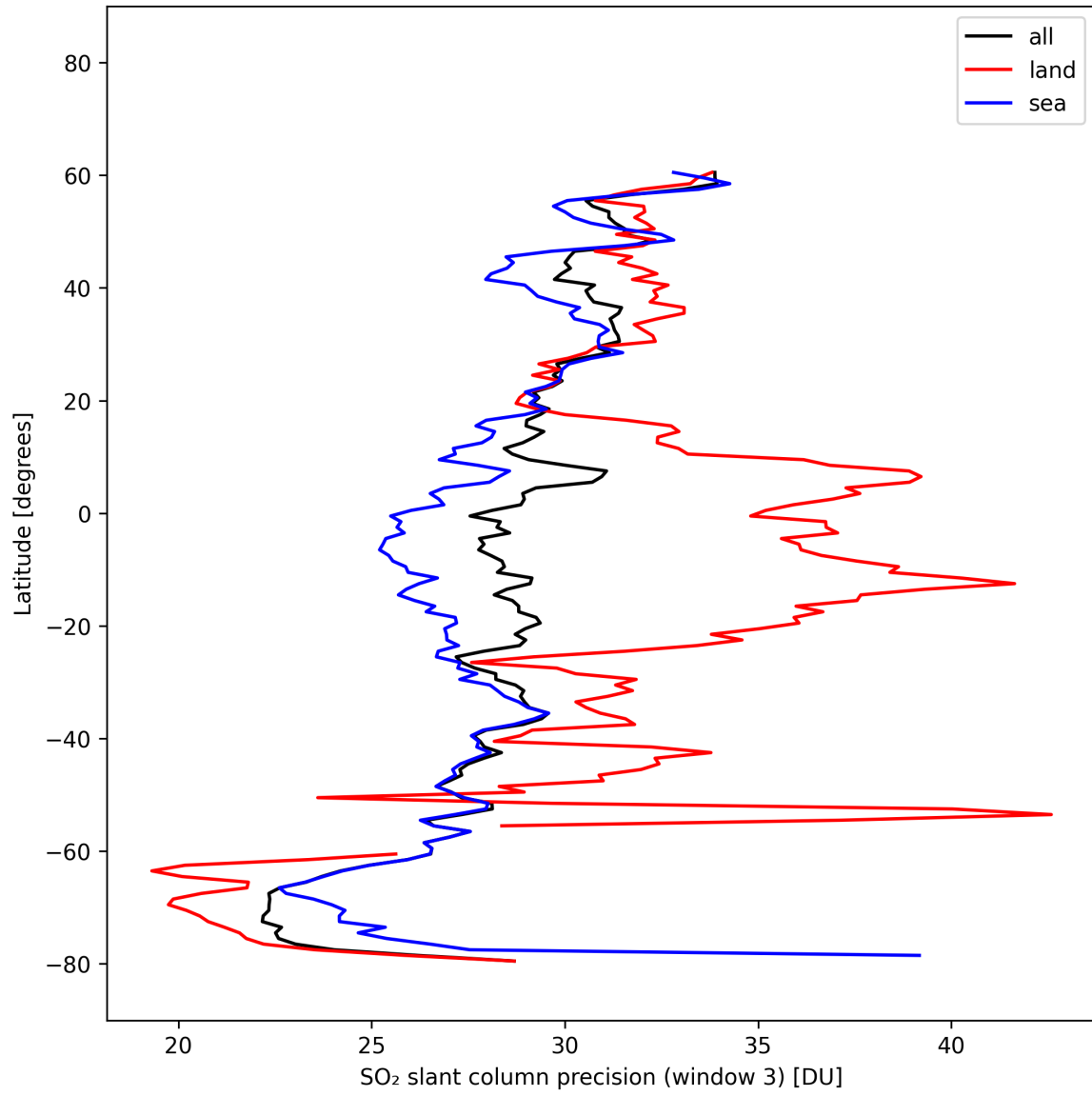


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-10-17 to 2025-10-18.

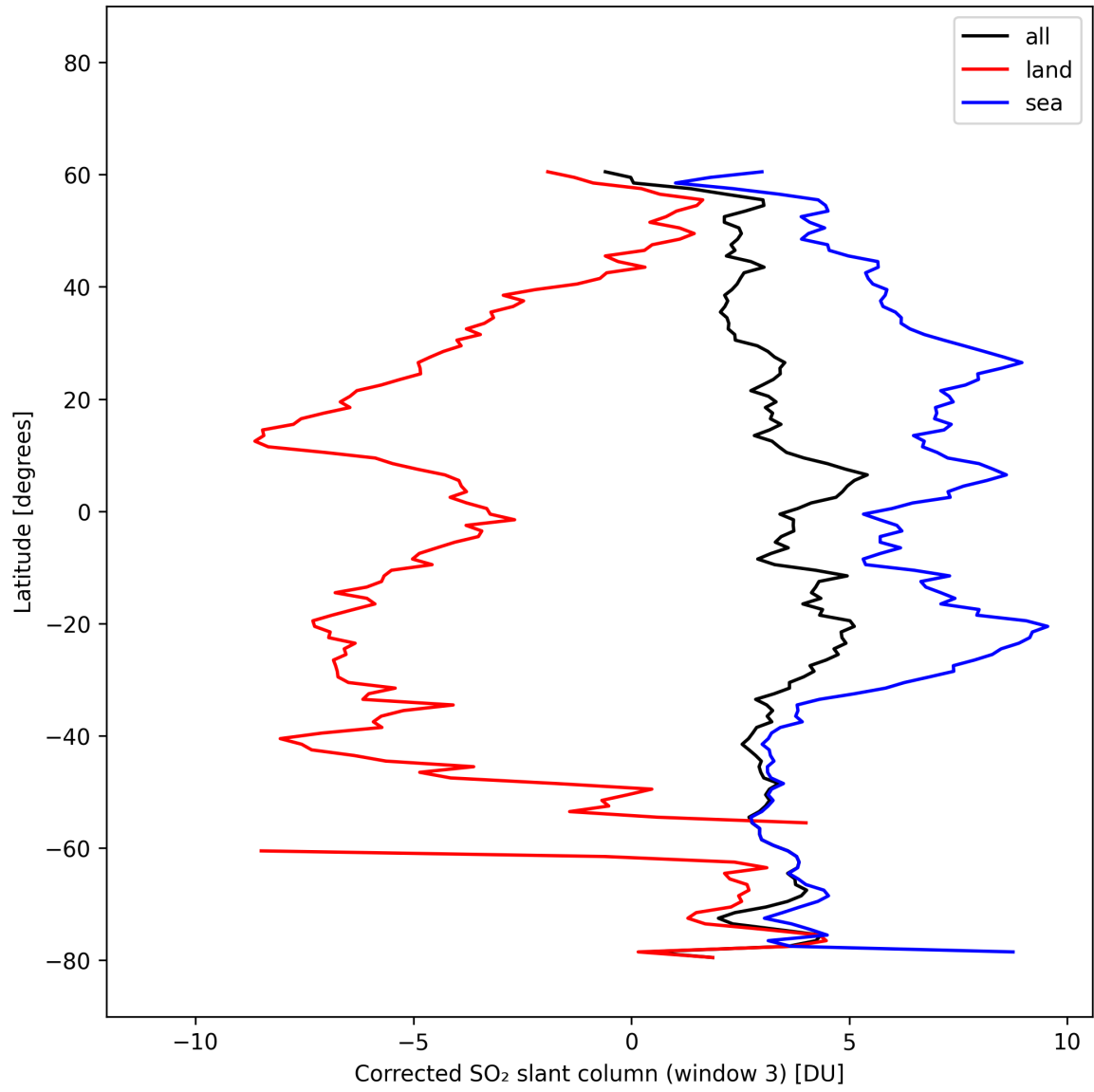


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-10-17 to 2025-10-18.

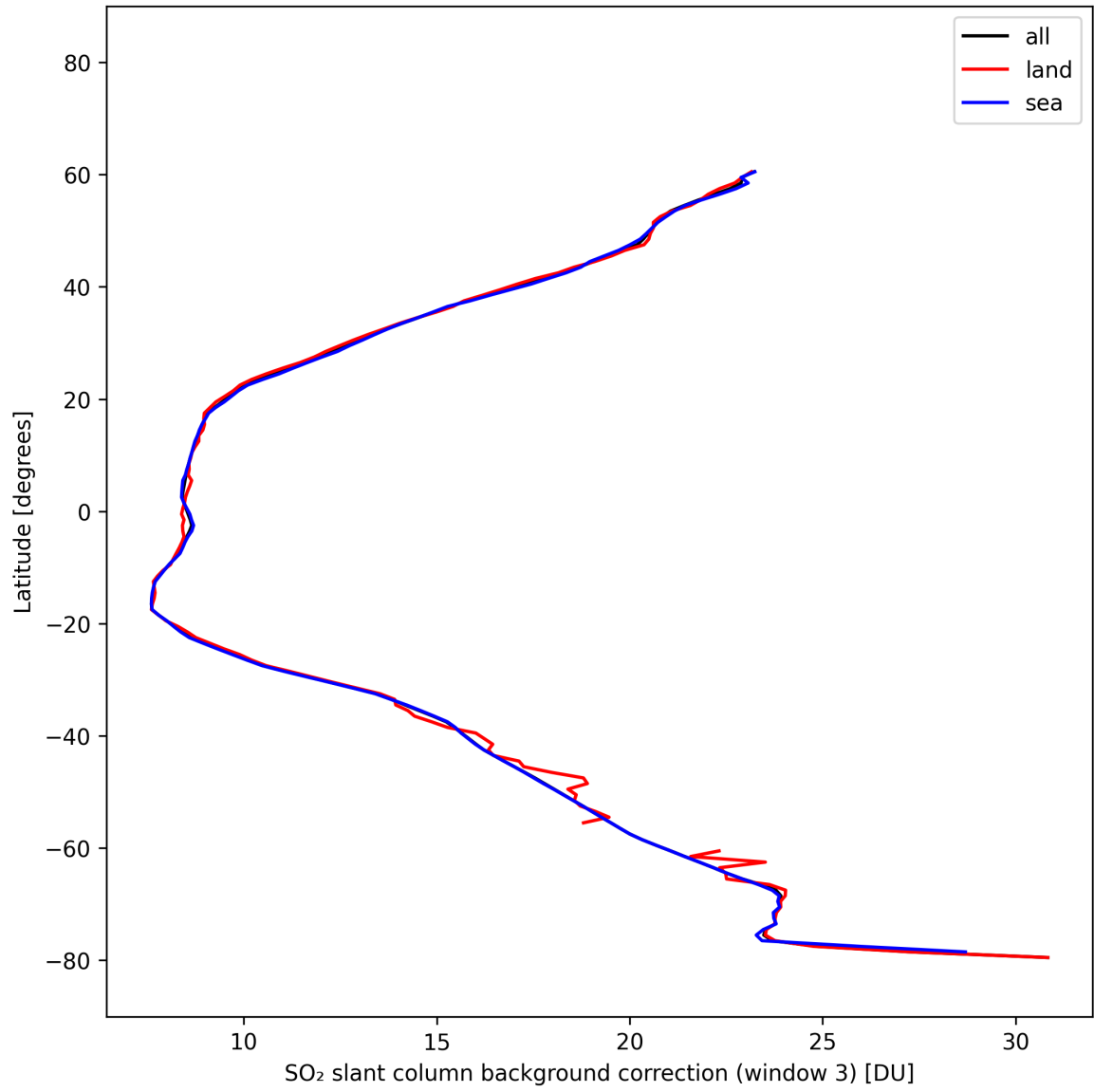


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-10-17 to 2025-10-18.

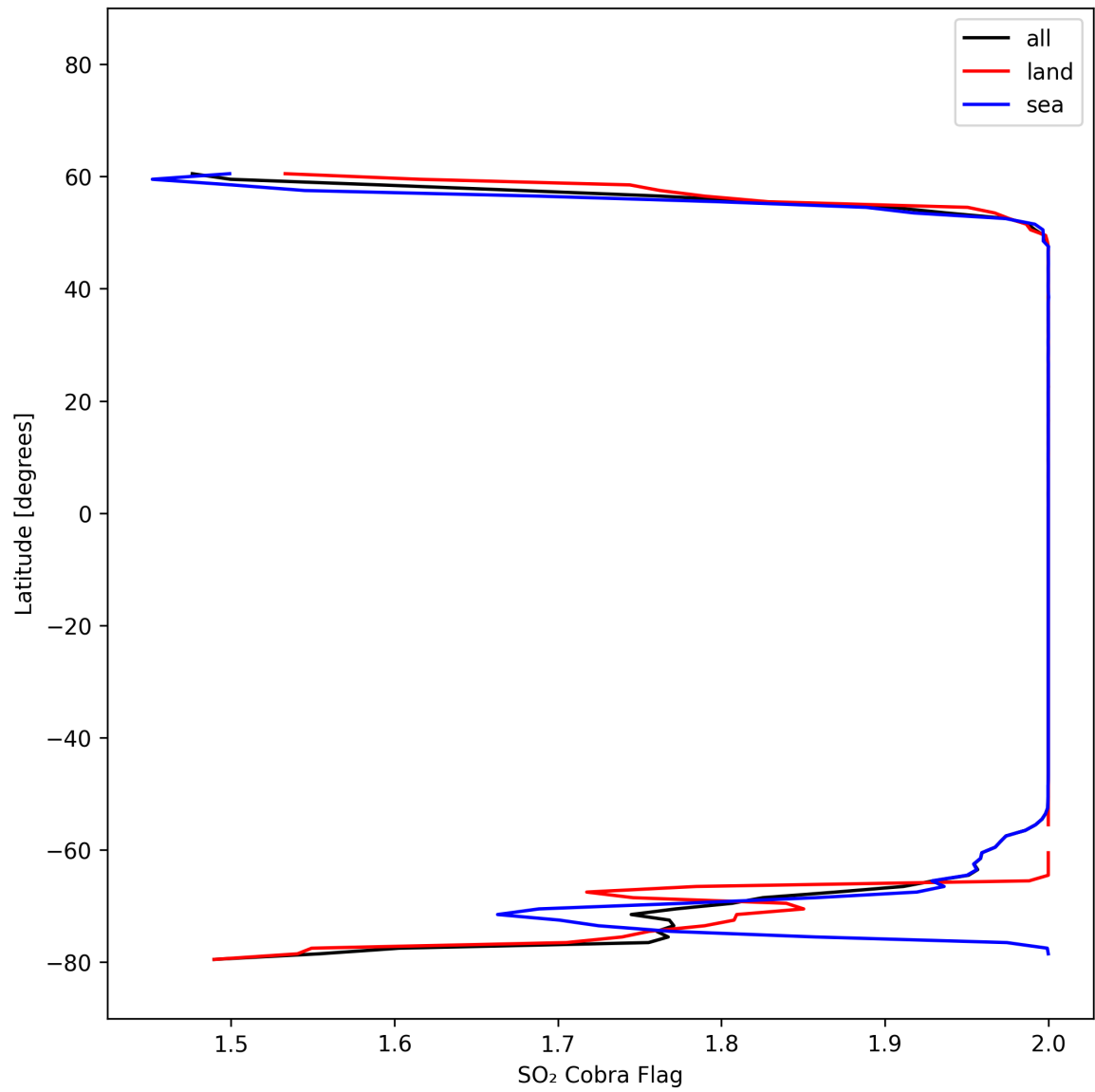


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-10-17 to 2025-10-18.

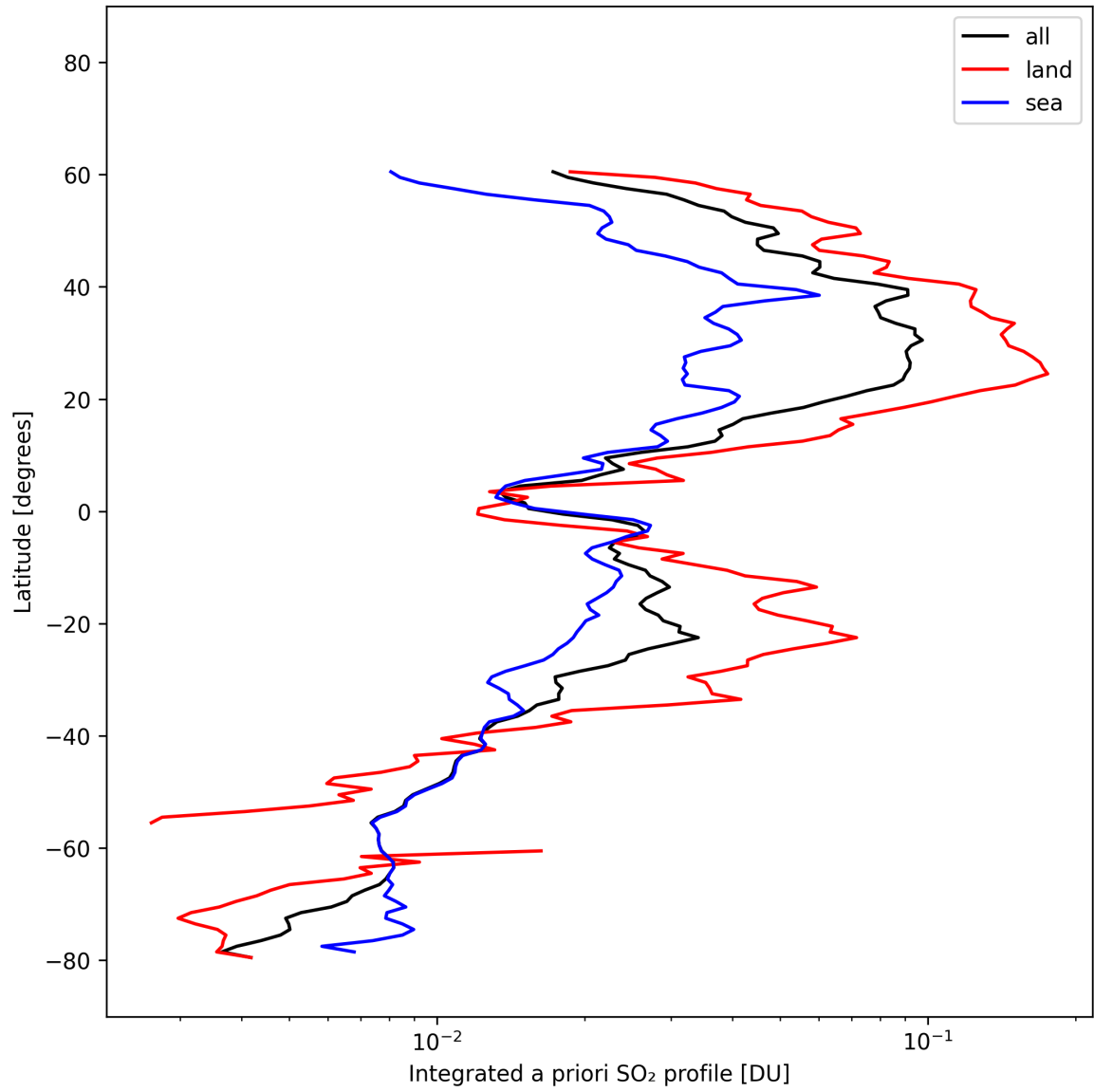


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-10-17 to 2025-10-18.

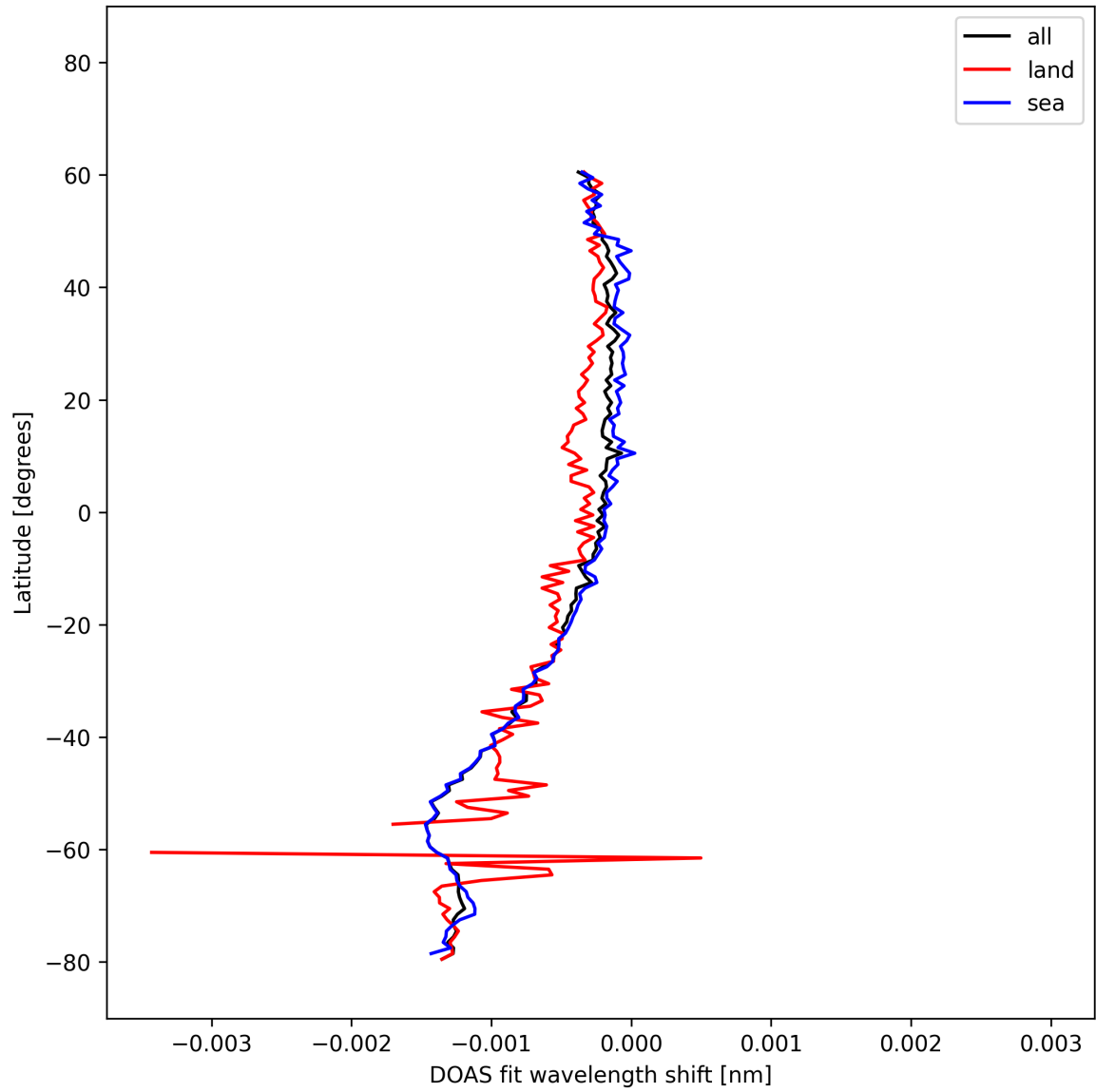


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-10-17 to 2025-10-18.

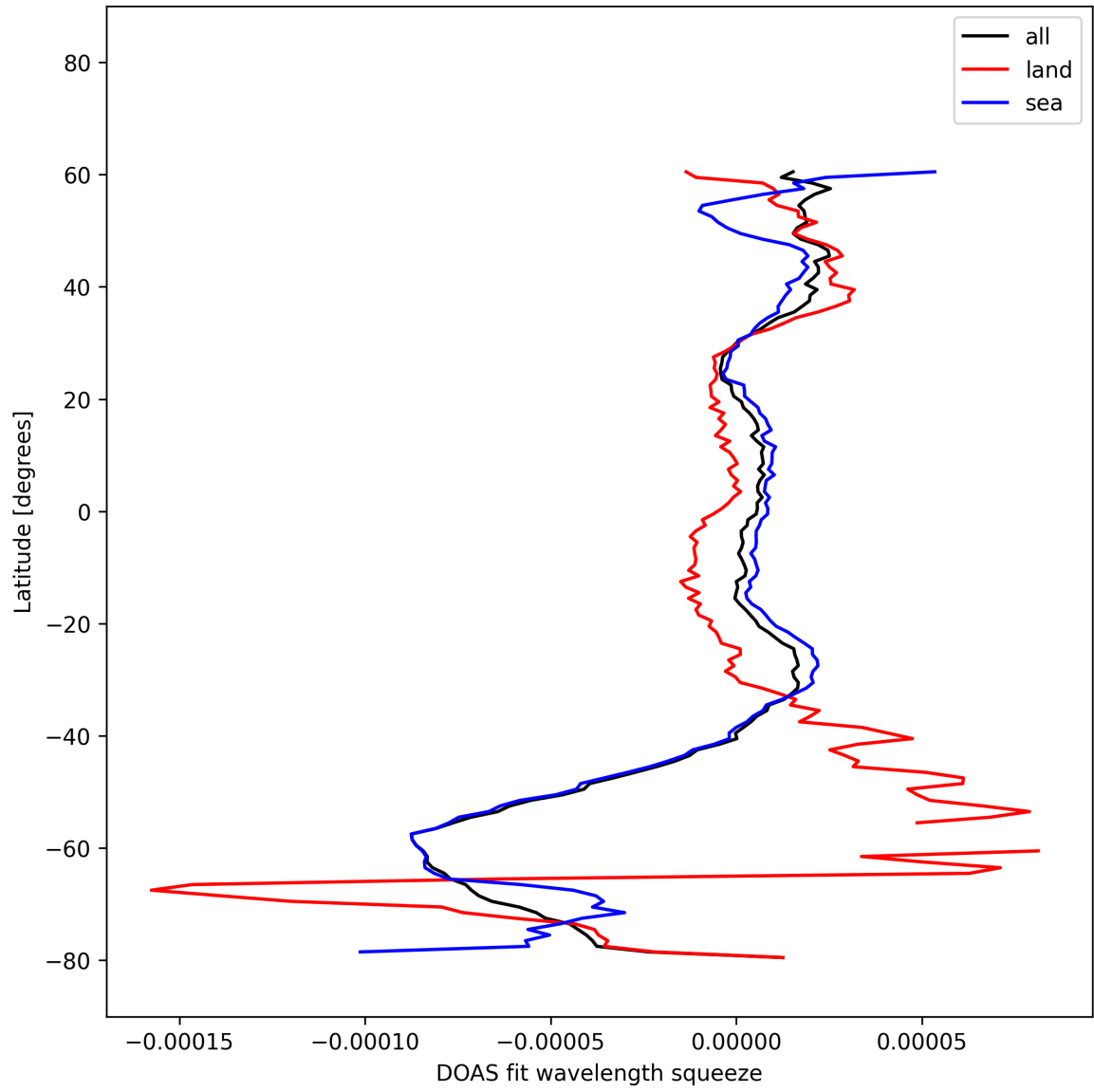


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-10-17 to 2025-10-18.

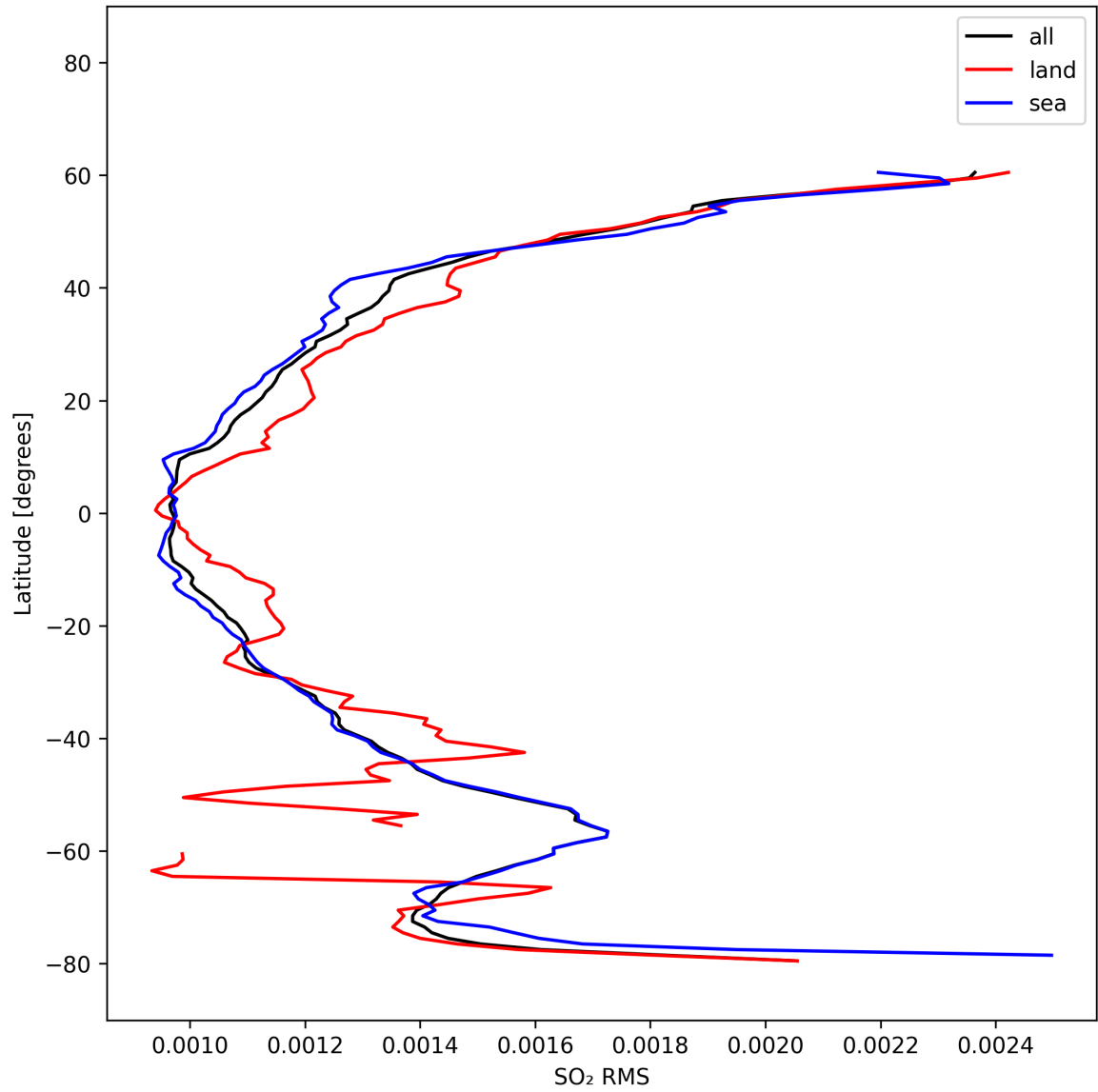


Figure 52: Zonal average of “SO₂ RMS” for 2025-10-17 to 2025-10-18.

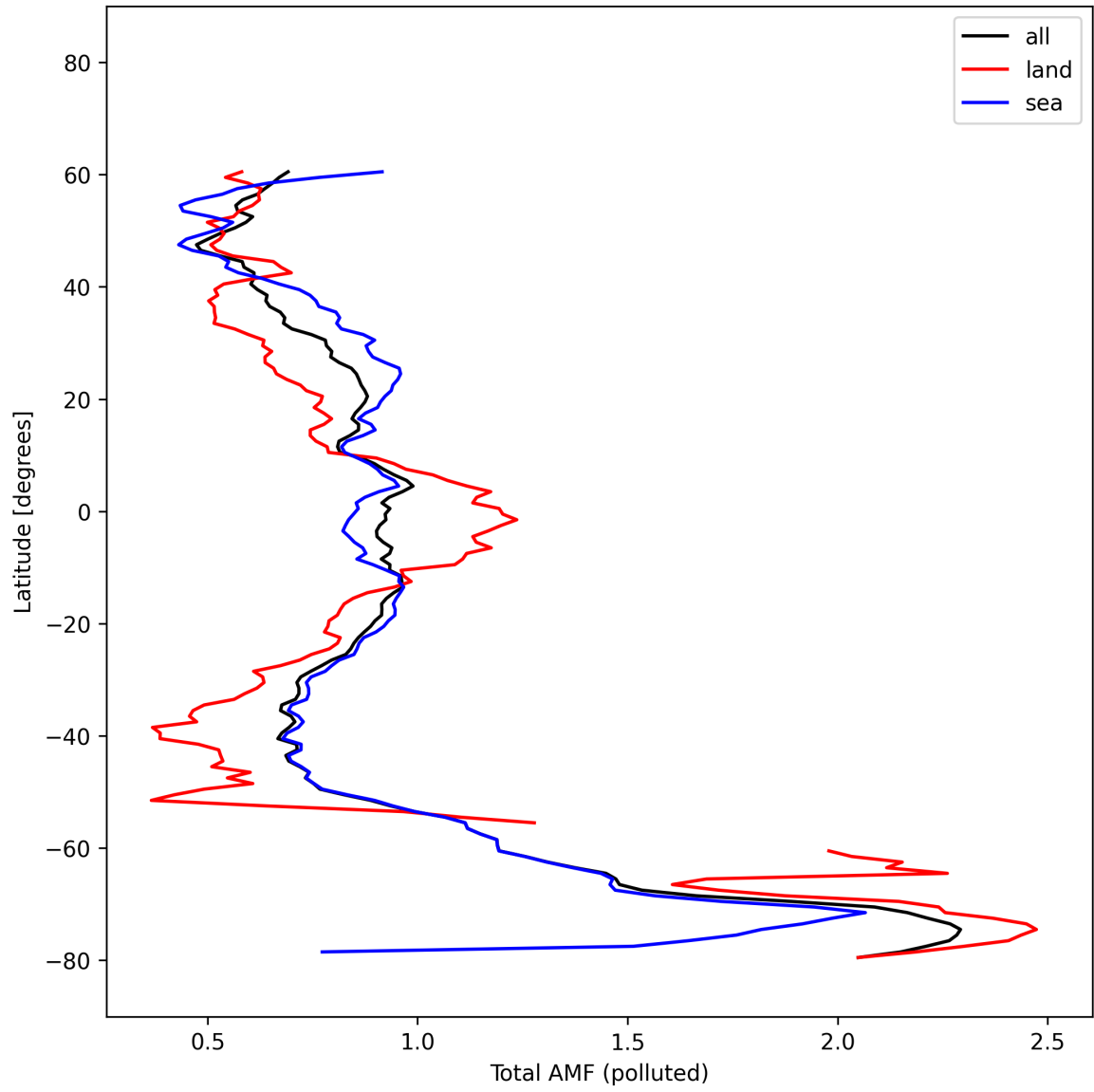


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-10-17 to 2025-10-18.

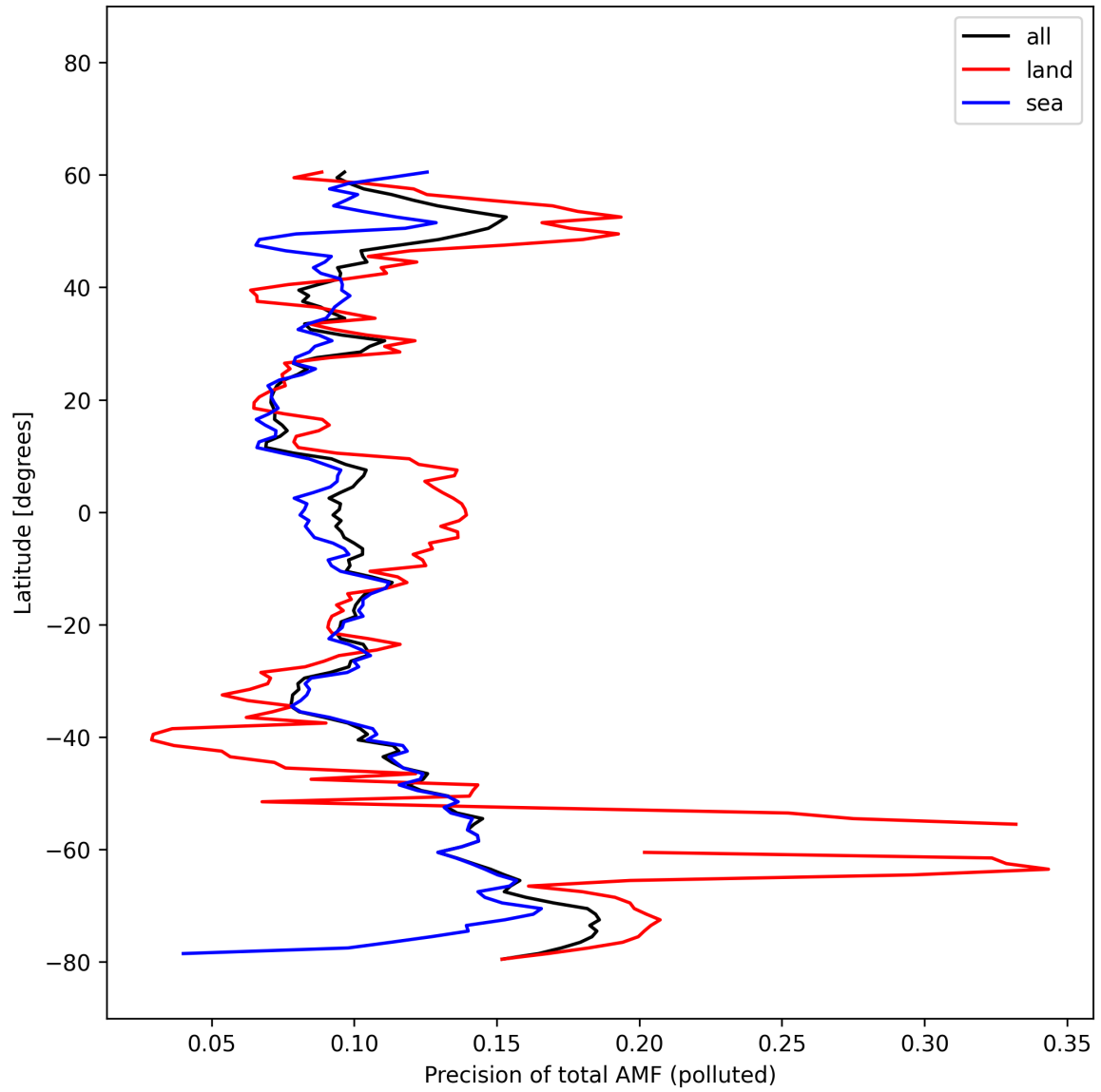


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-10-17 to 2025-10-18.

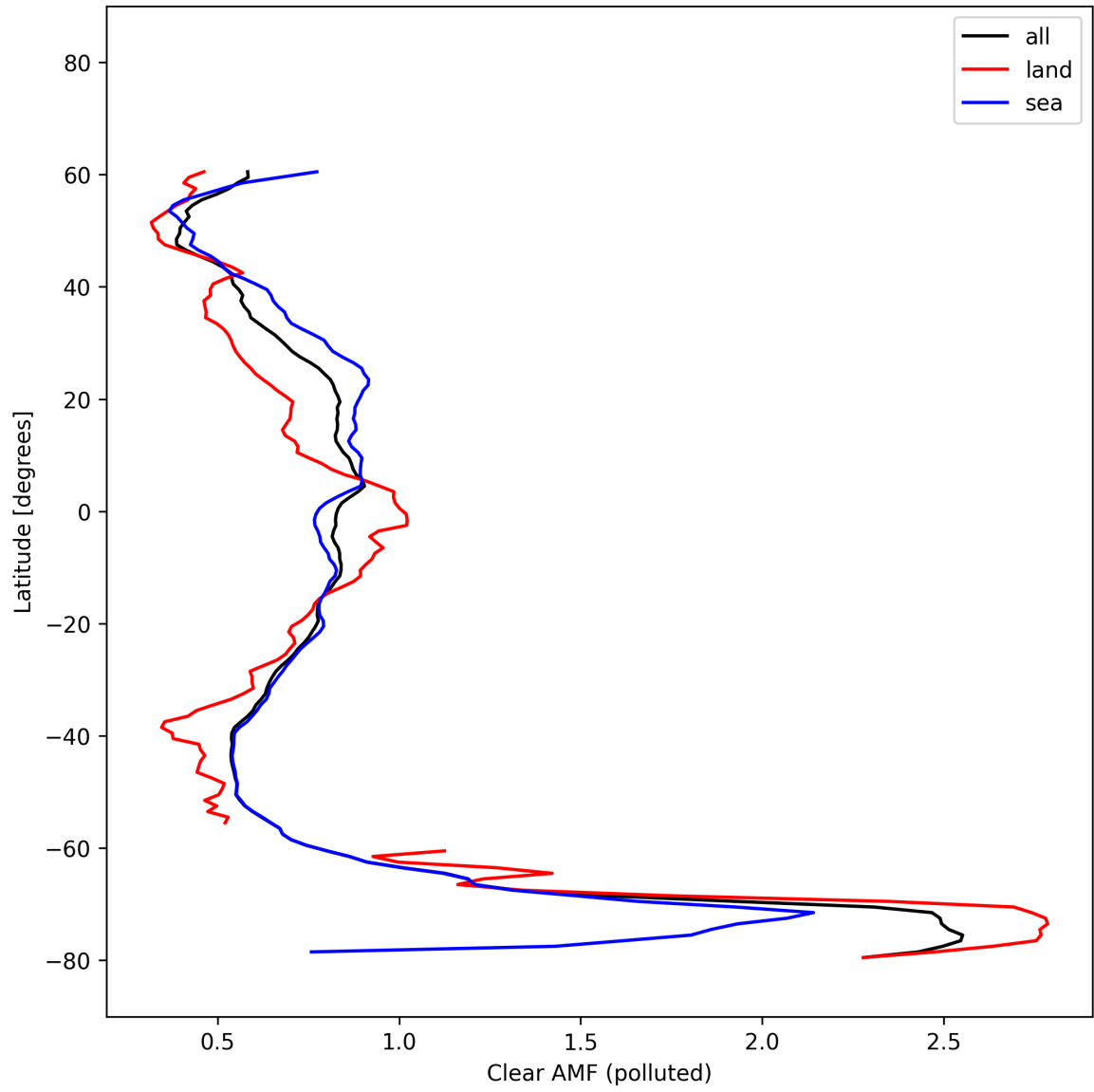


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-10-17 to 2025-10-18.

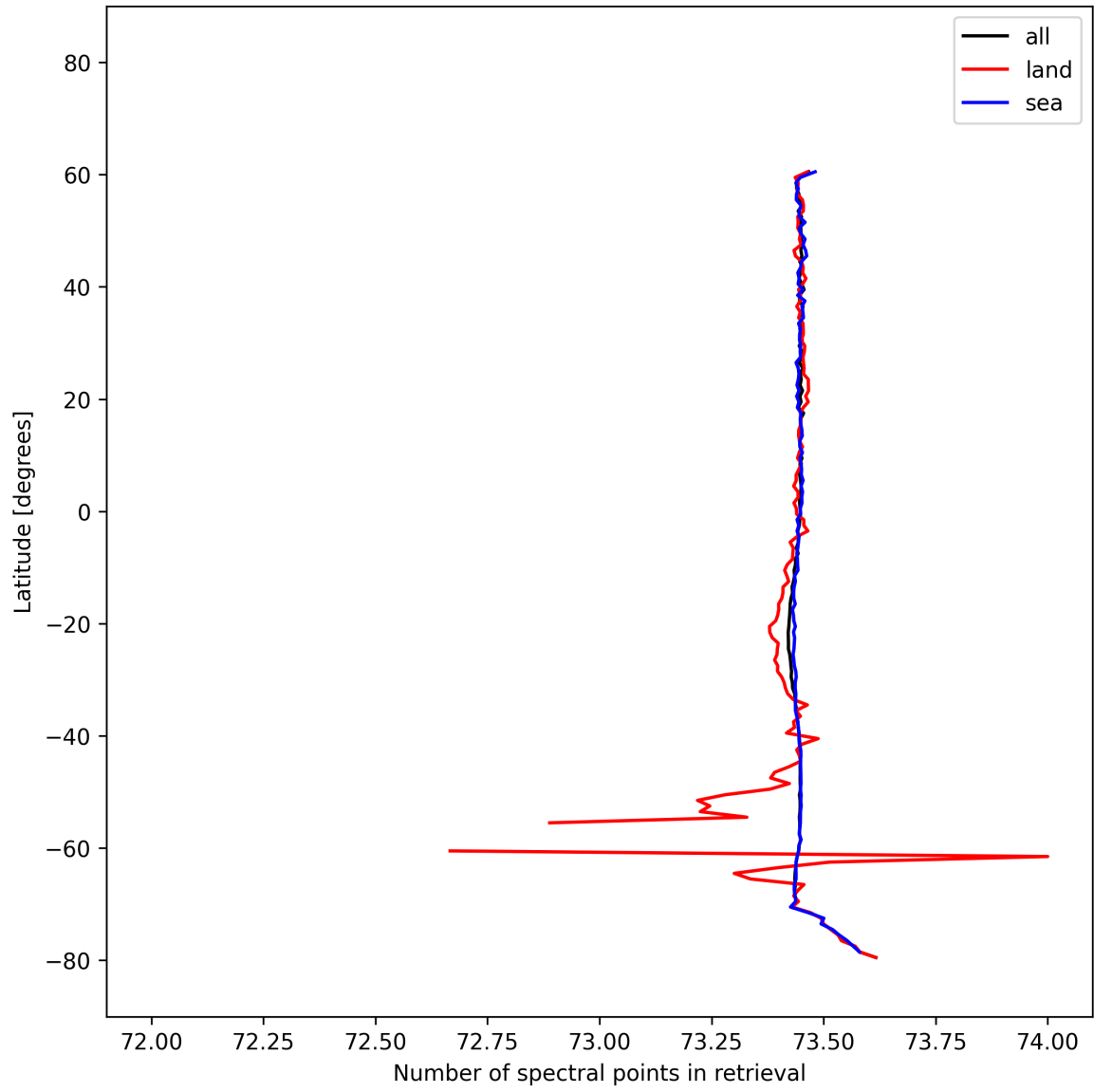


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-10-17 to 2025-10-18.

8 Histograms

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

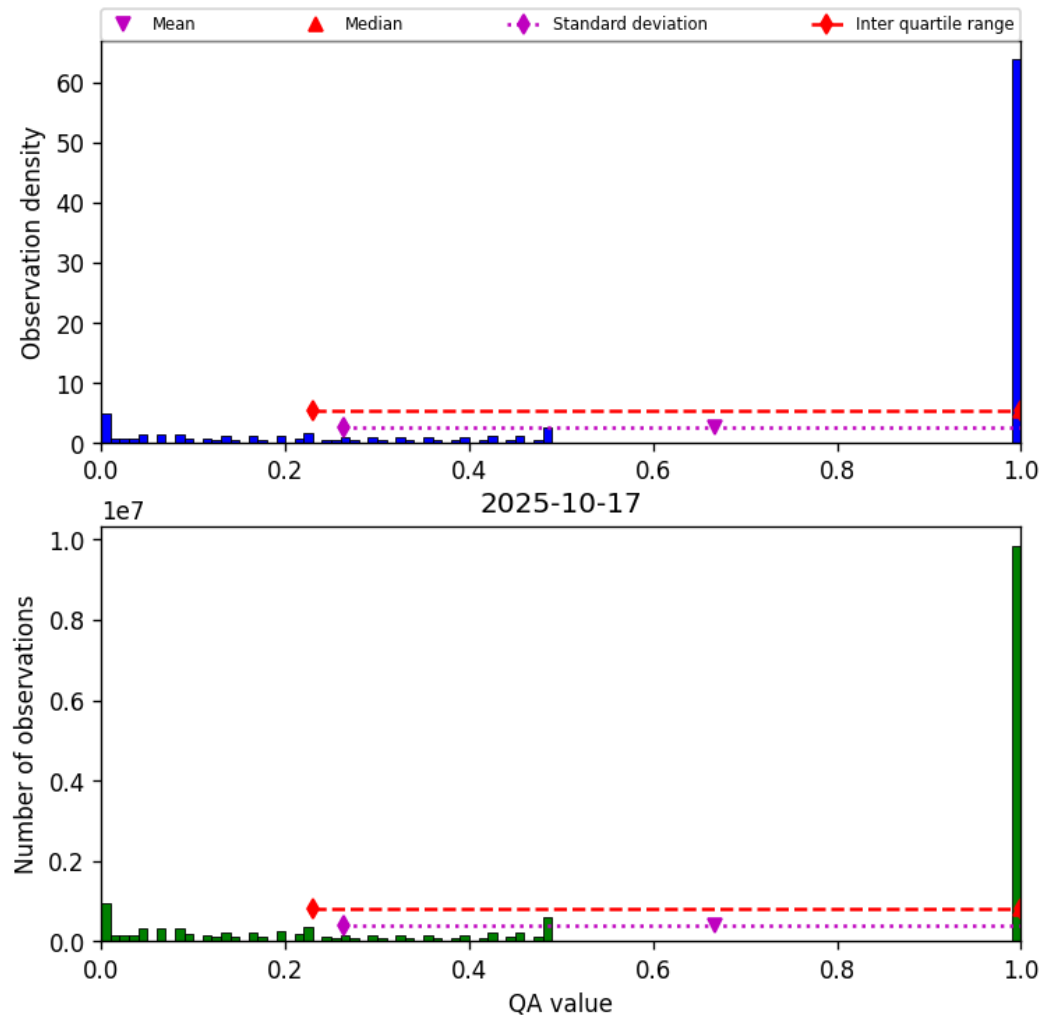


Figure 57: Histogram of “QA value” for 2025-10-17 to 2025-10-18

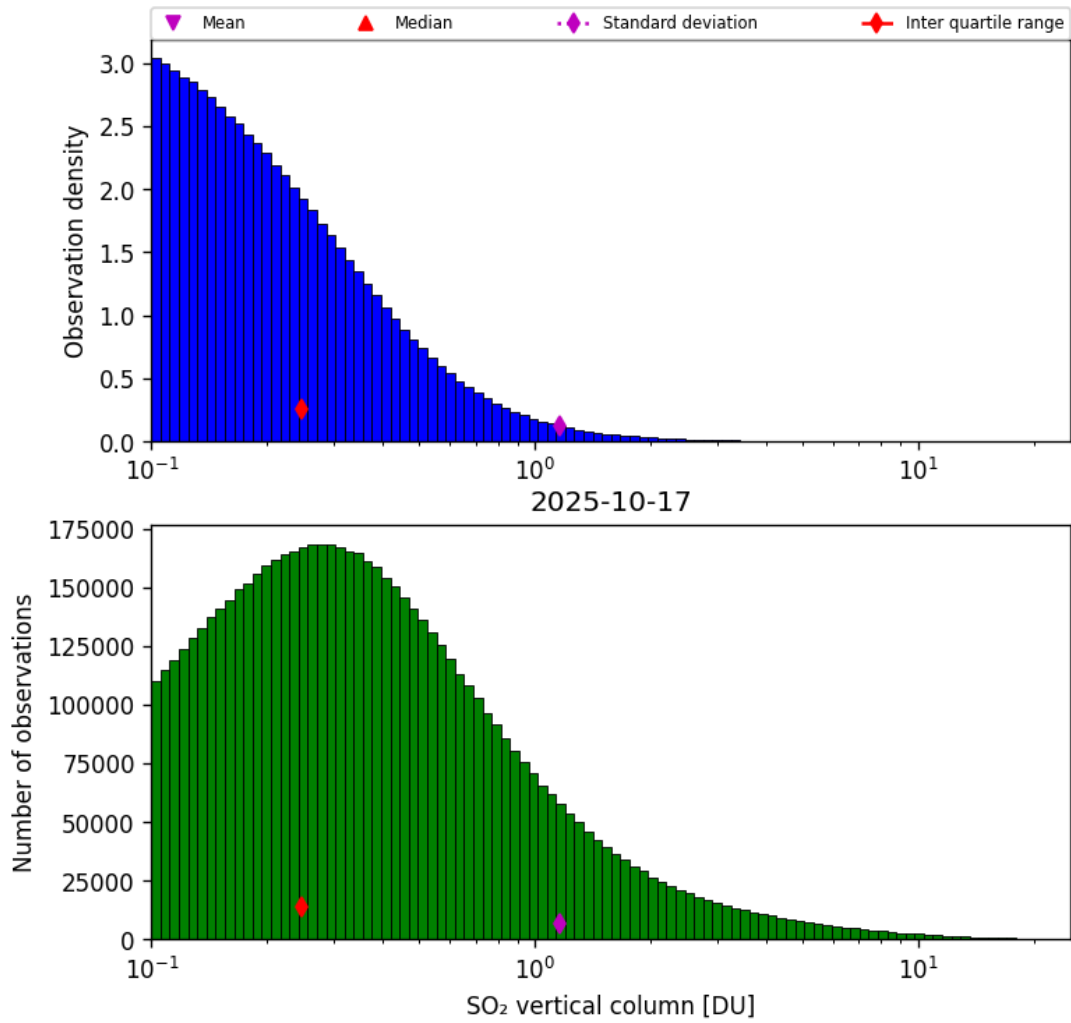


Figure 58: Histogram of “SO₂ vertical column” for 2025-10-17 to 2025-10-18

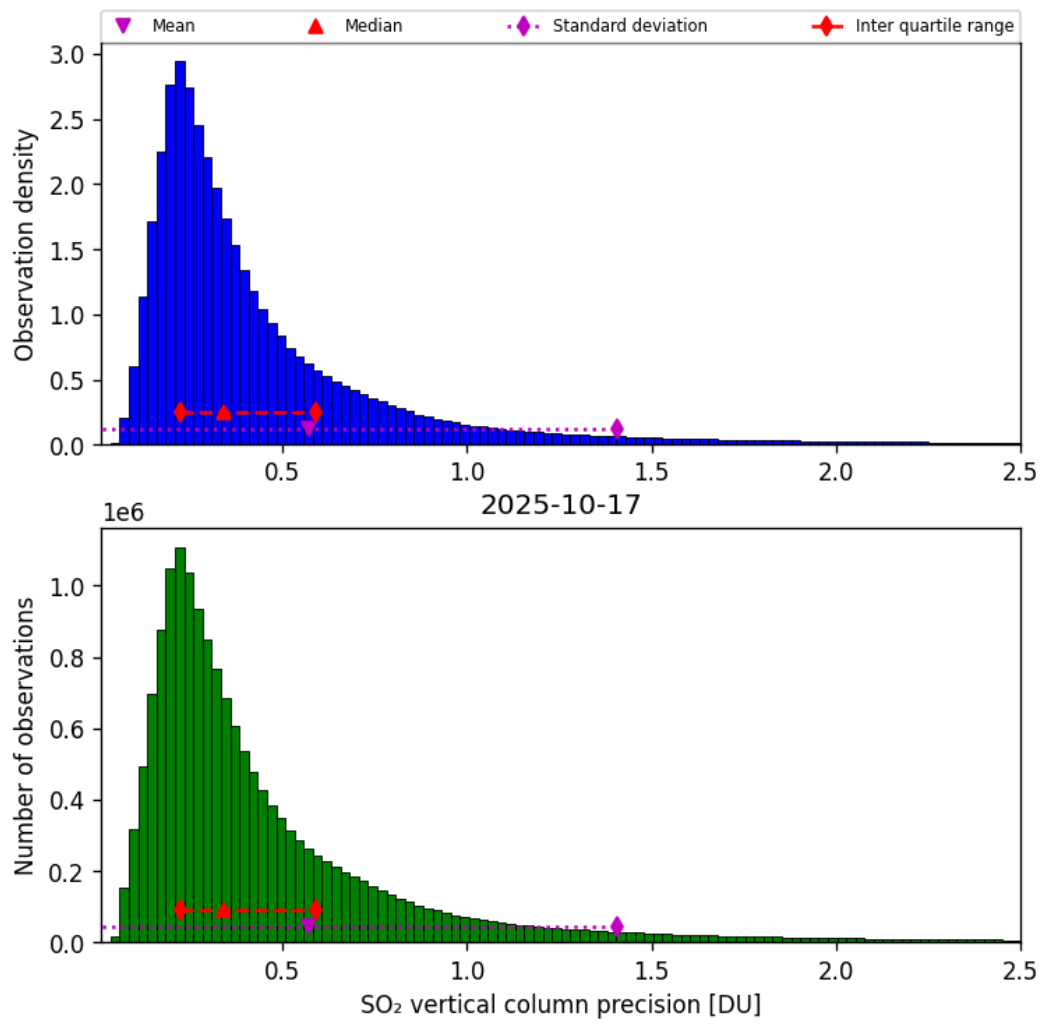


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-10-17 to 2025-10-18

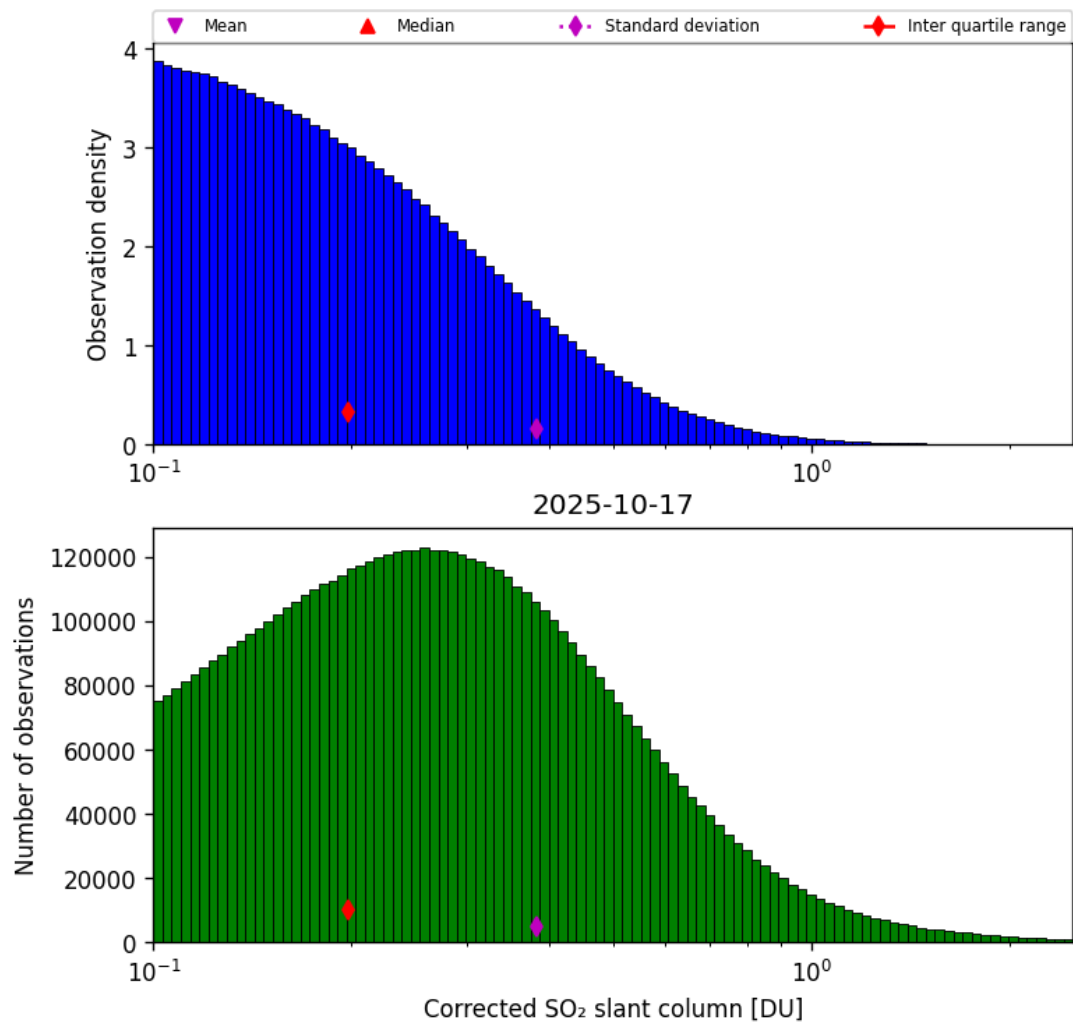


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-10-17 to 2025-10-18

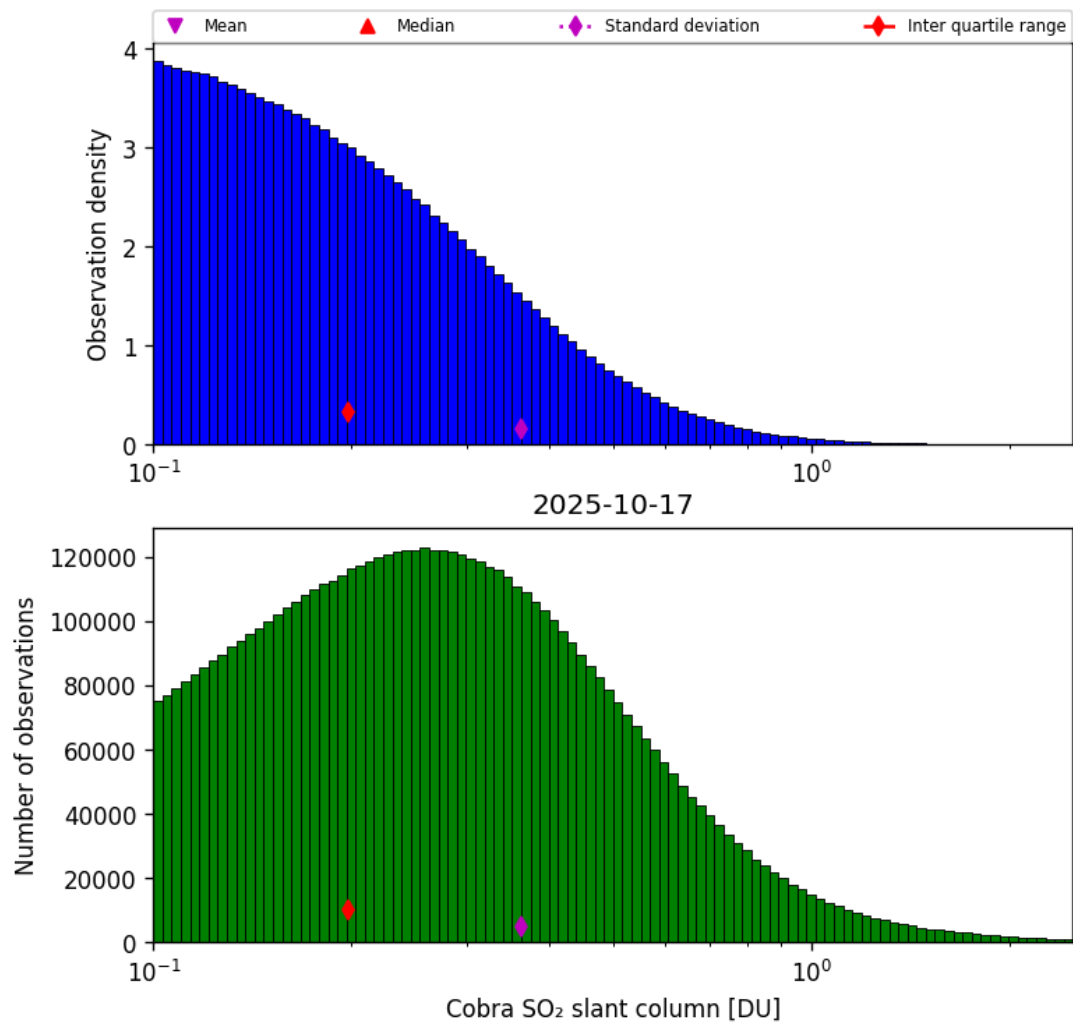


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-10-17 to 2025-10-18

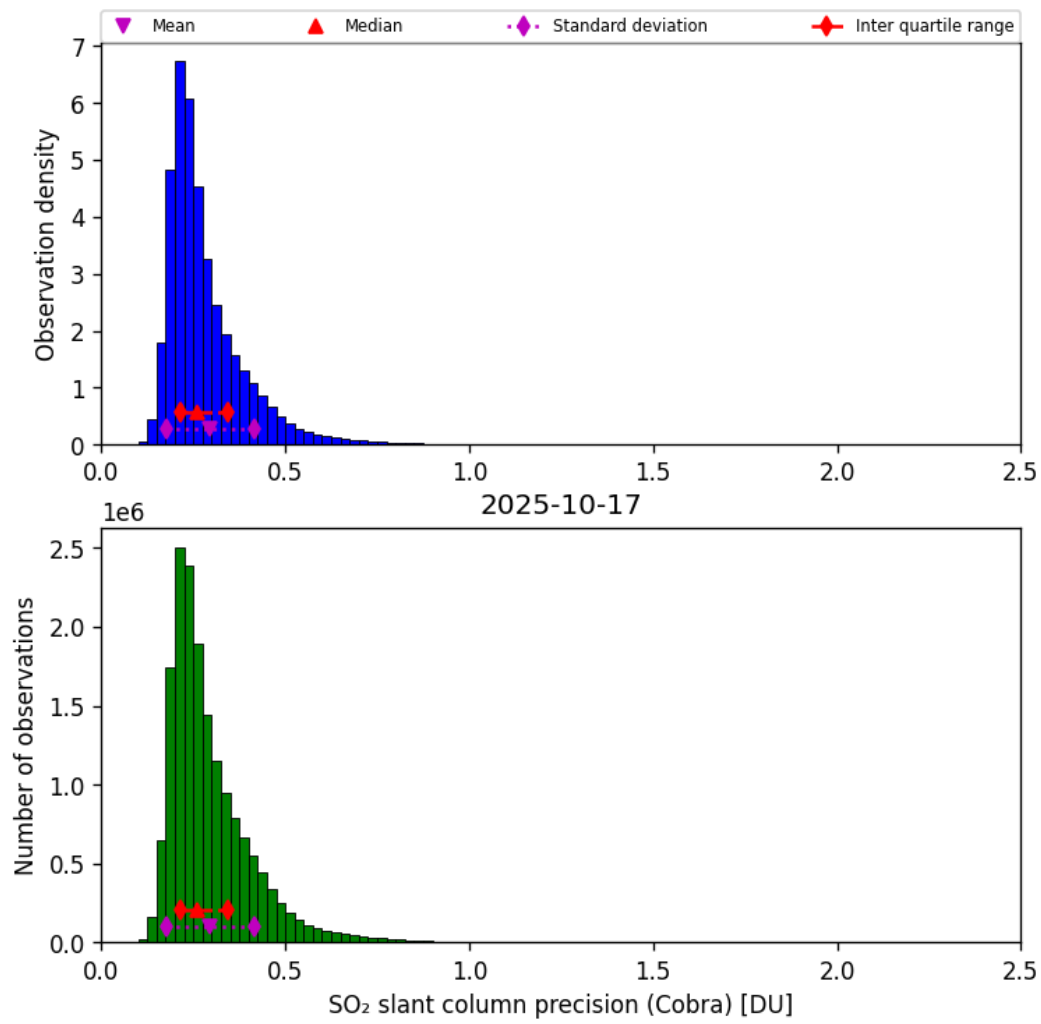


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-10-17 to 2025-10-18

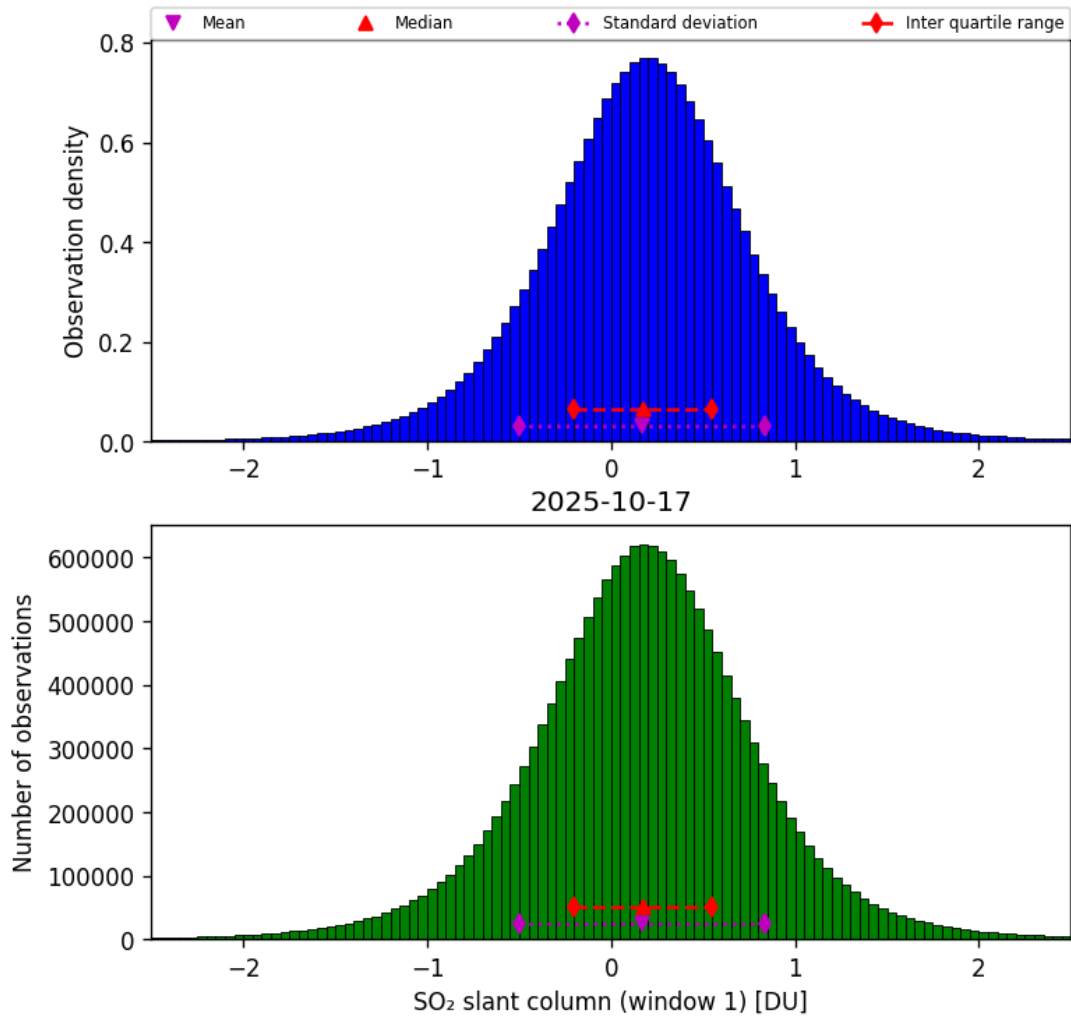


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-10-17 to 2025-10-18

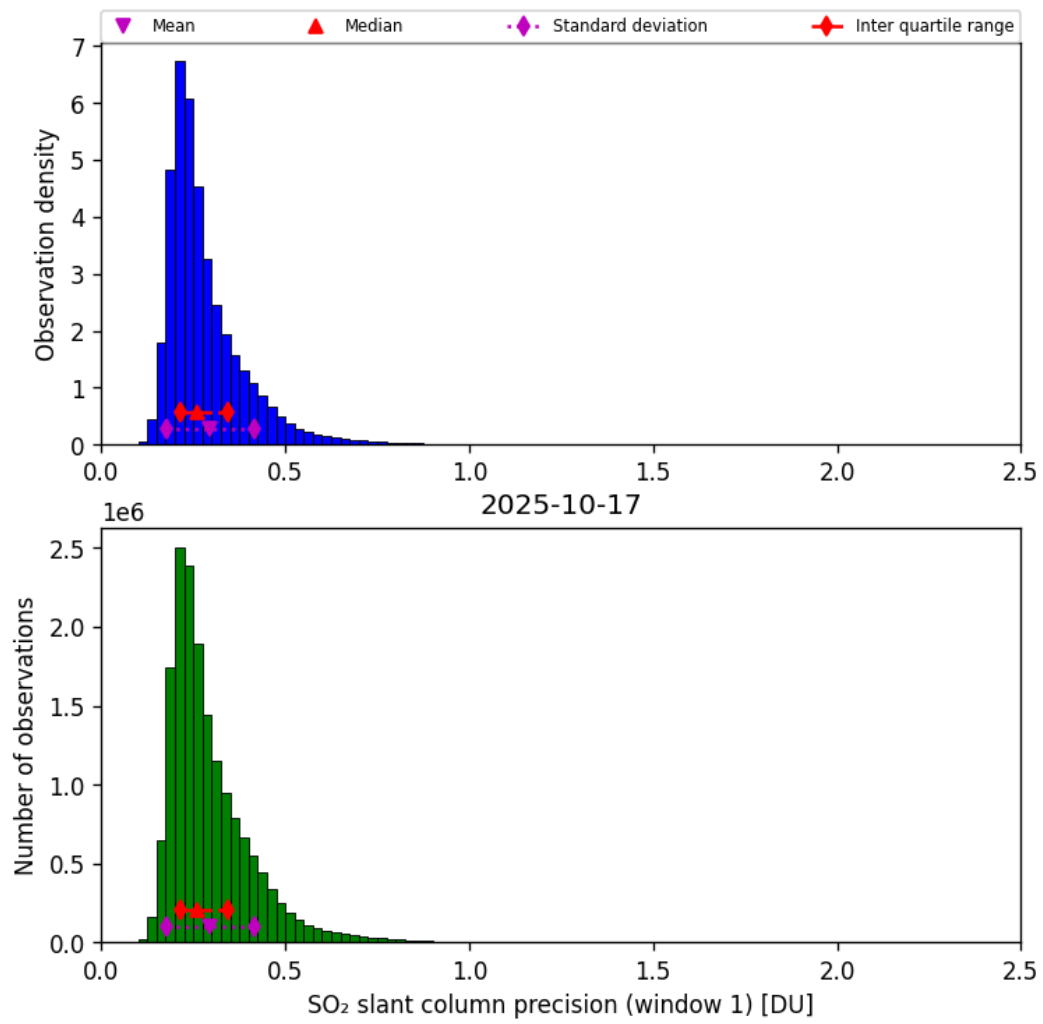


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-10-17 to 2025-10-18

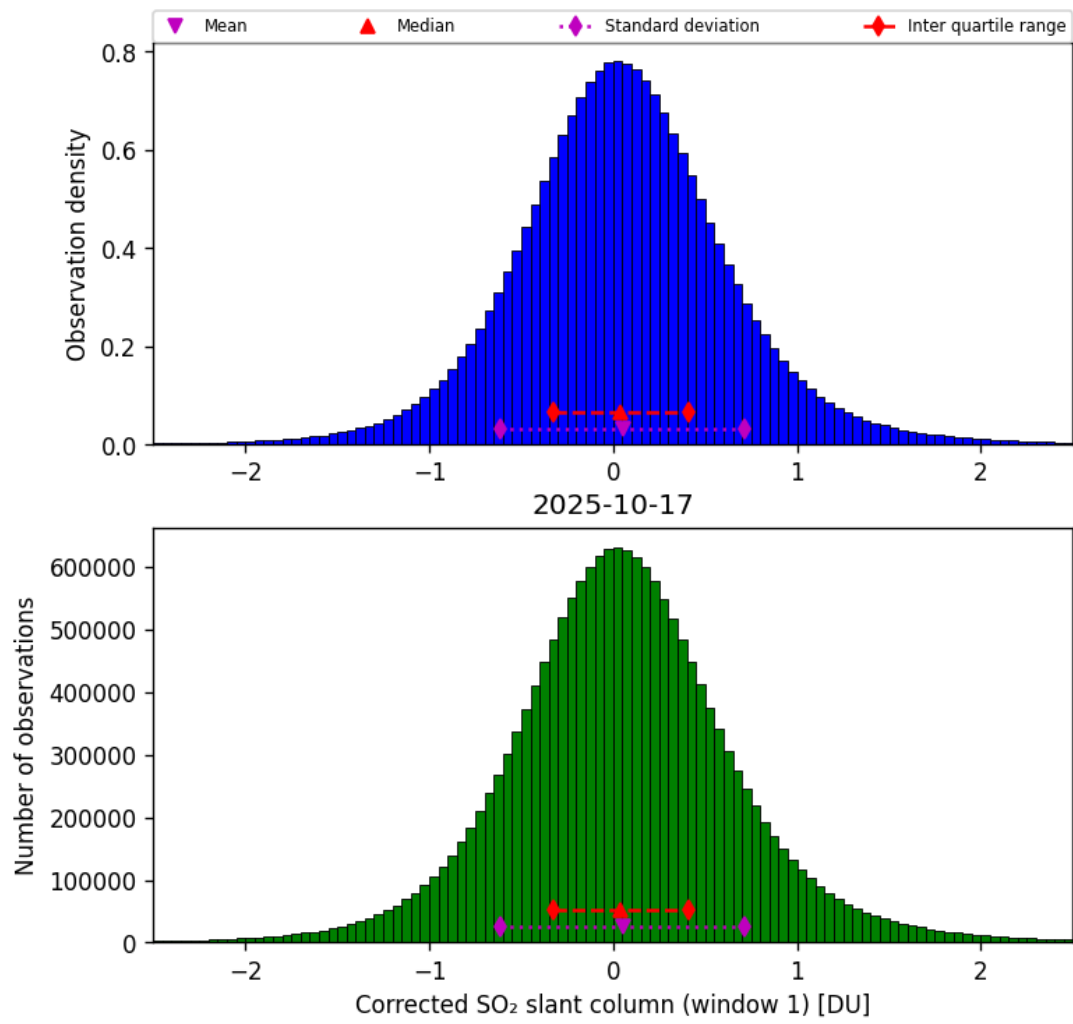


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-10-17 to 2025-10-18

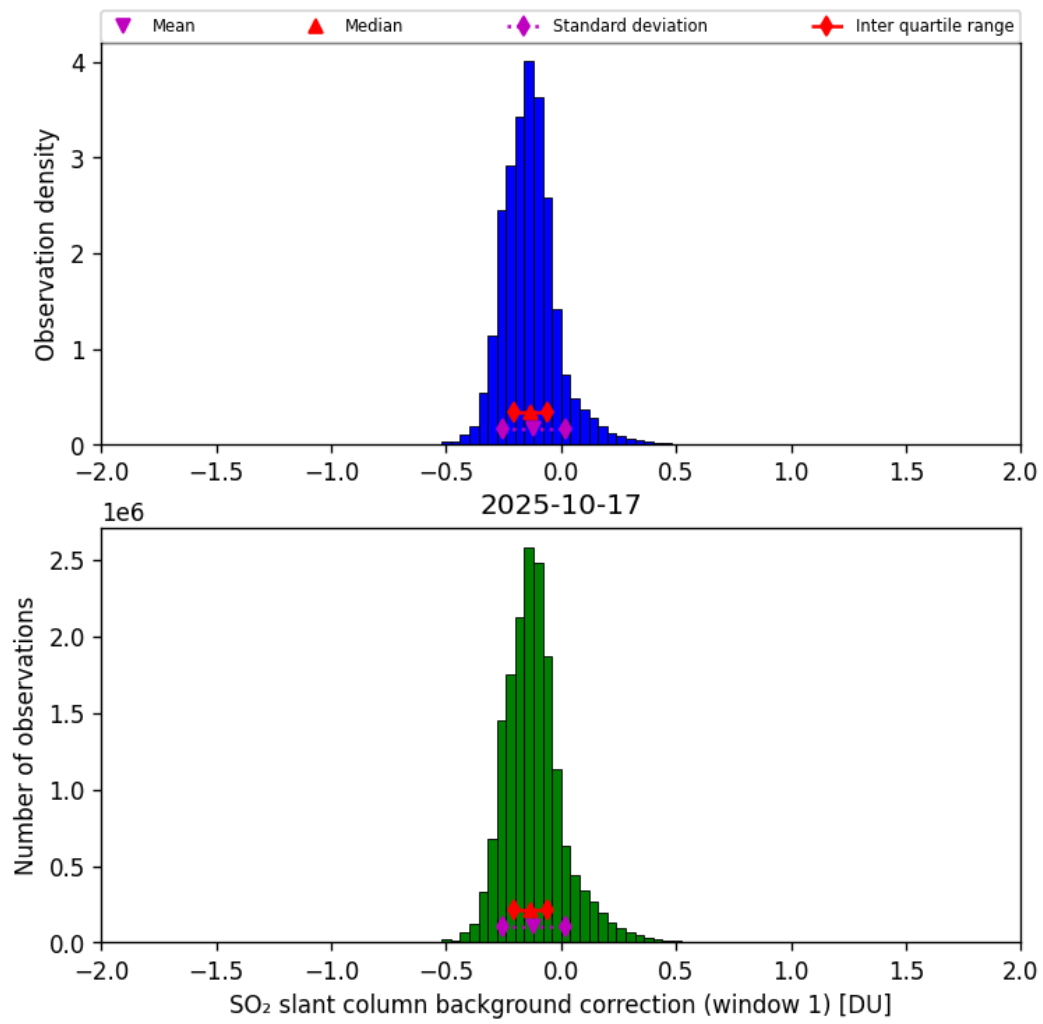


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-10-17 to 2025-10-18

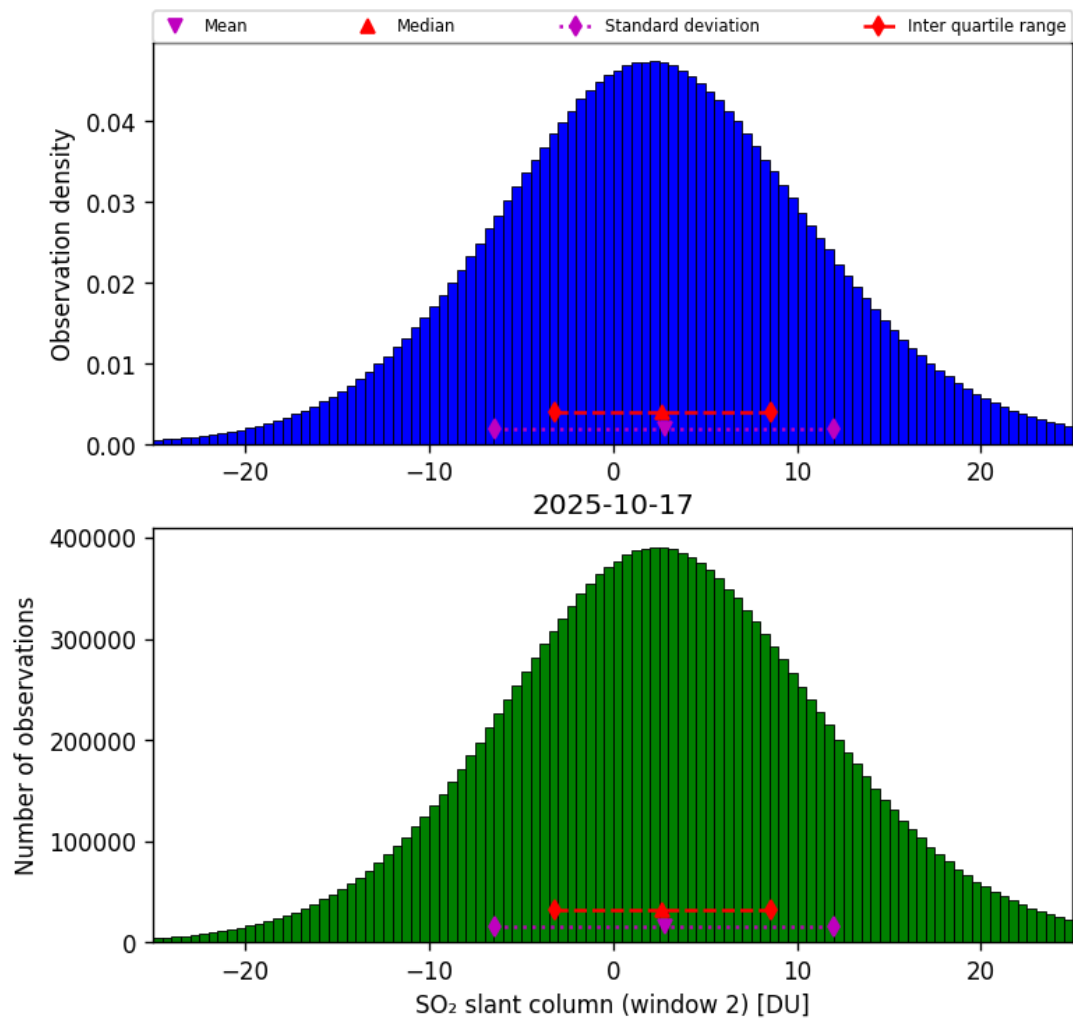


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-10-17 to 2025-10-18

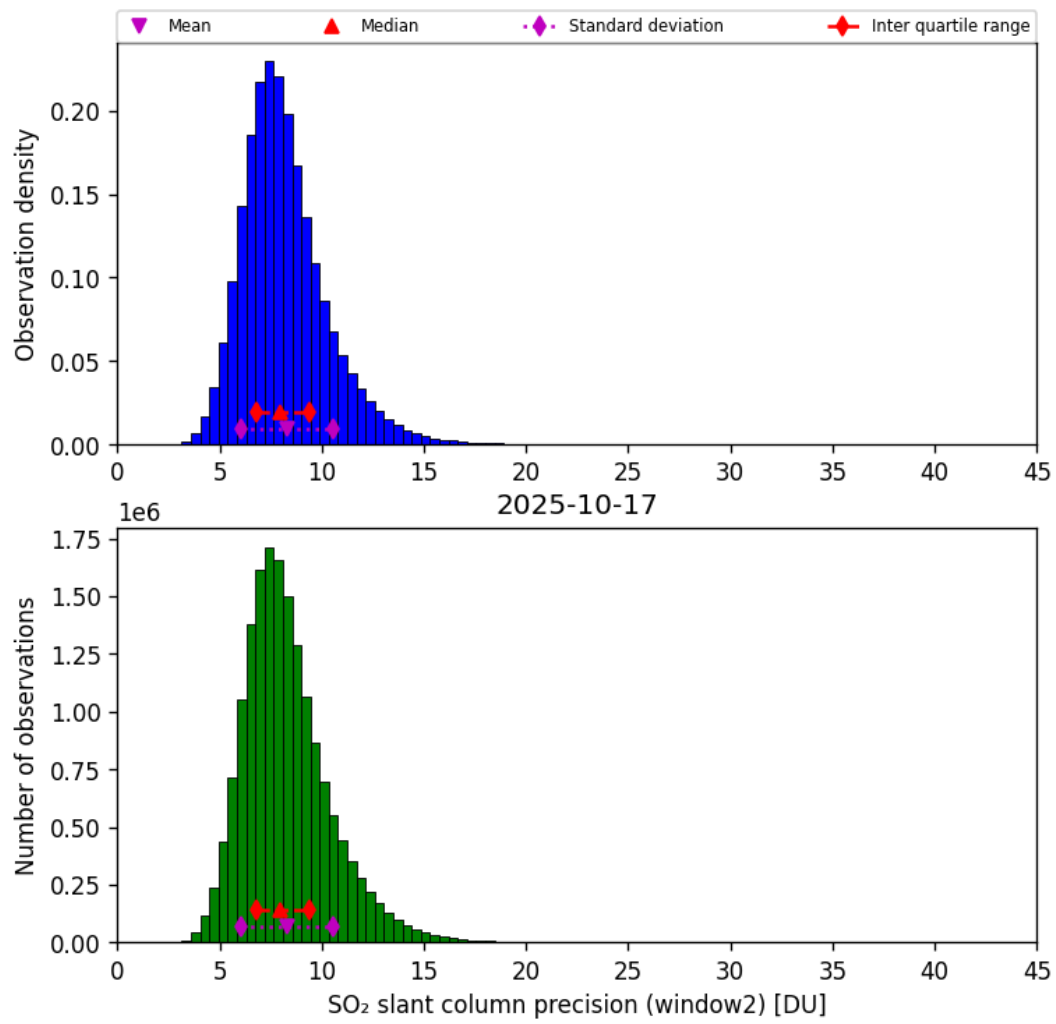


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-10-17 to 2025-10-18

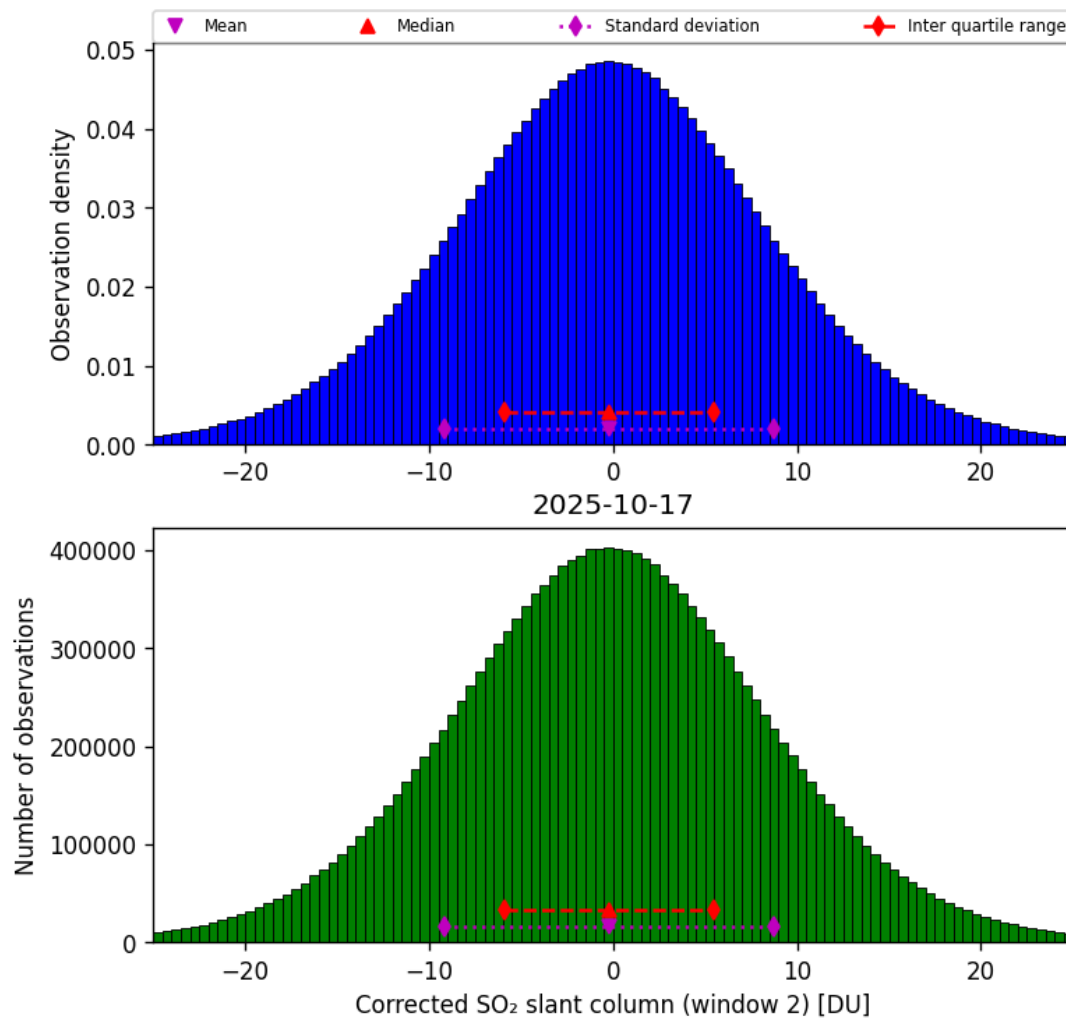


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-10-17 to 2025-10-18

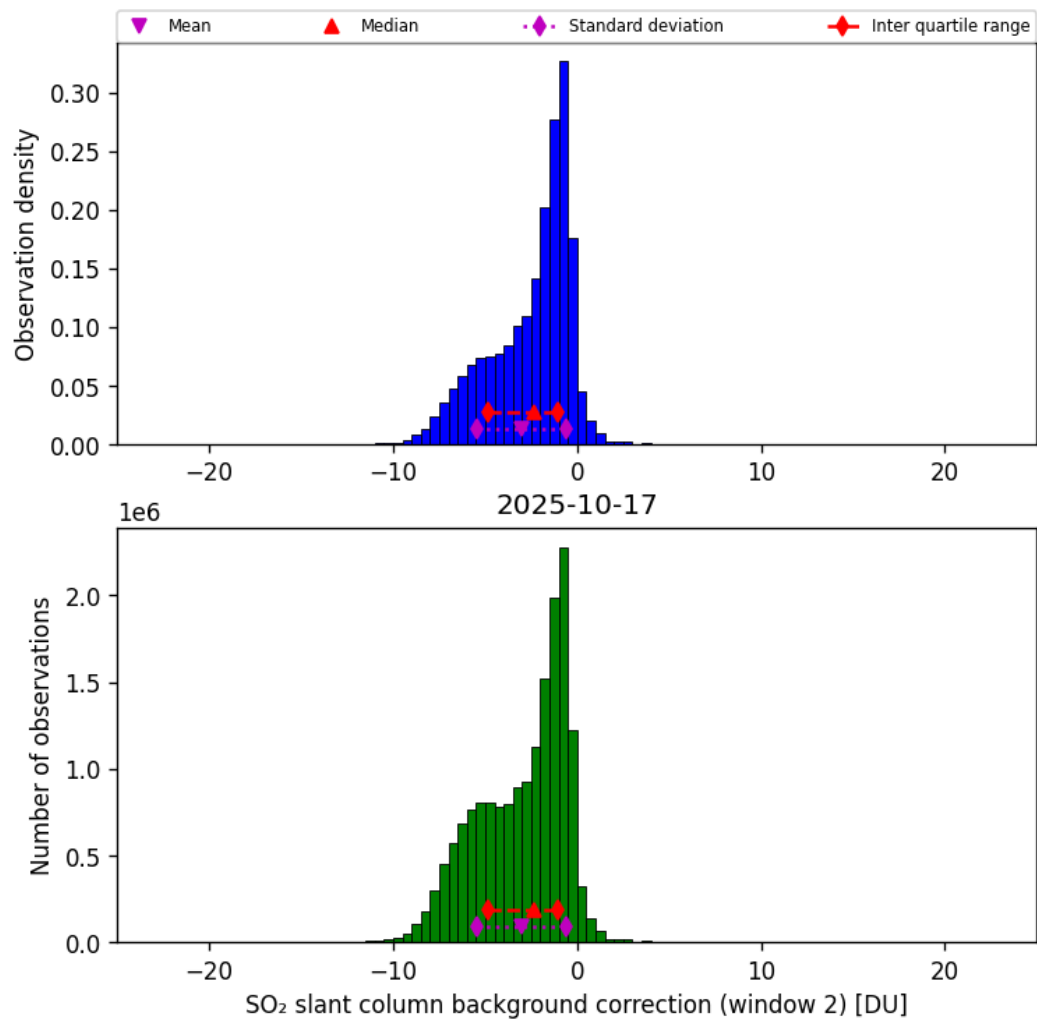


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-10-17 to 2025-10-18

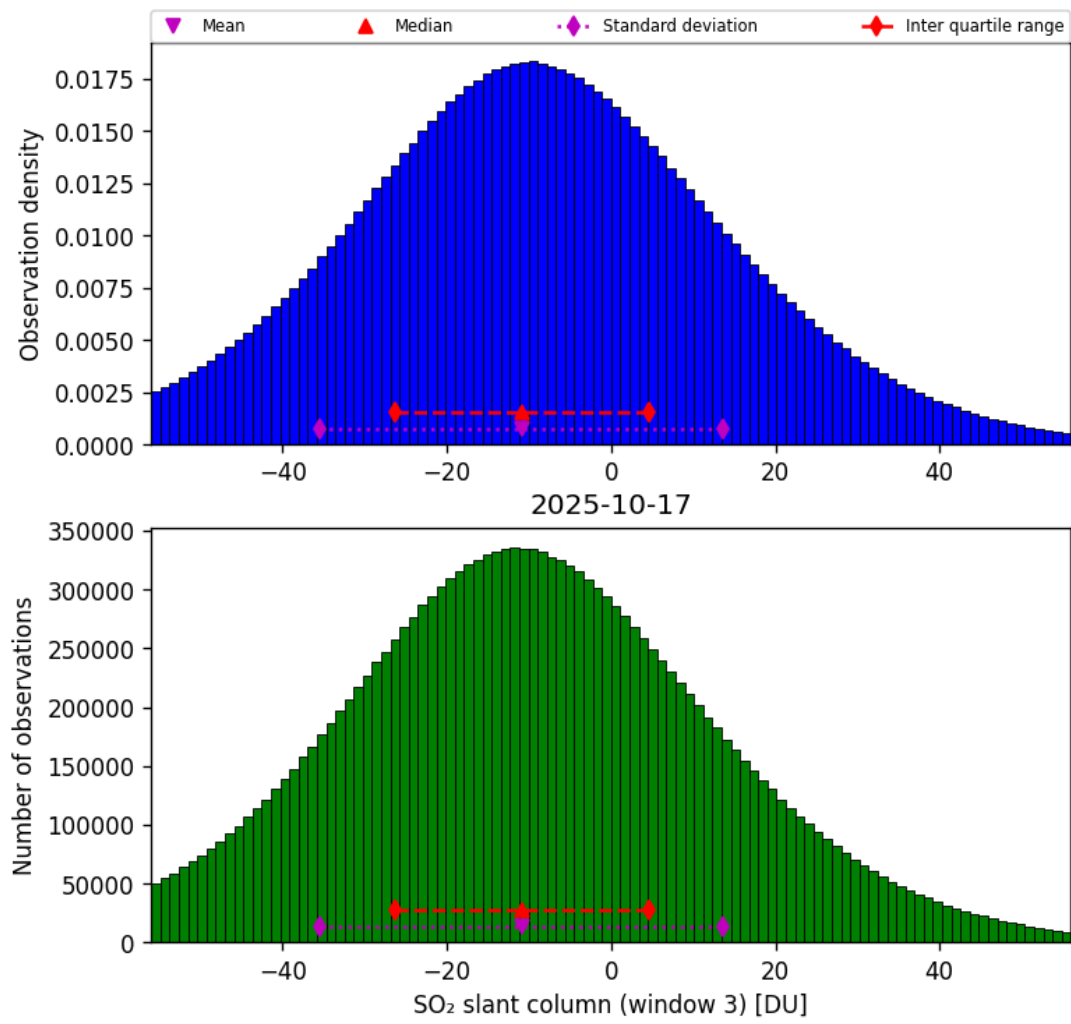


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-10-17 to 2025-10-18

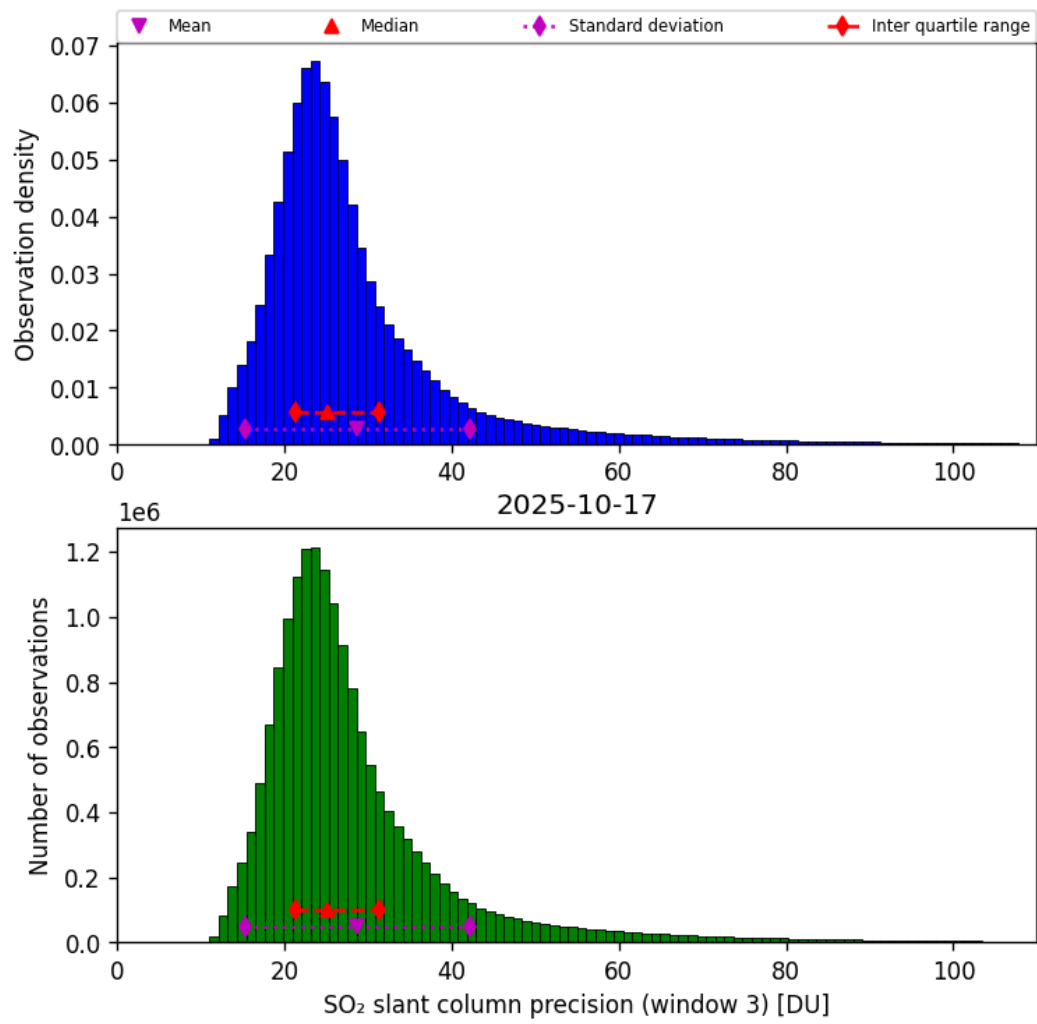


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-10-17 to 2025-10-18

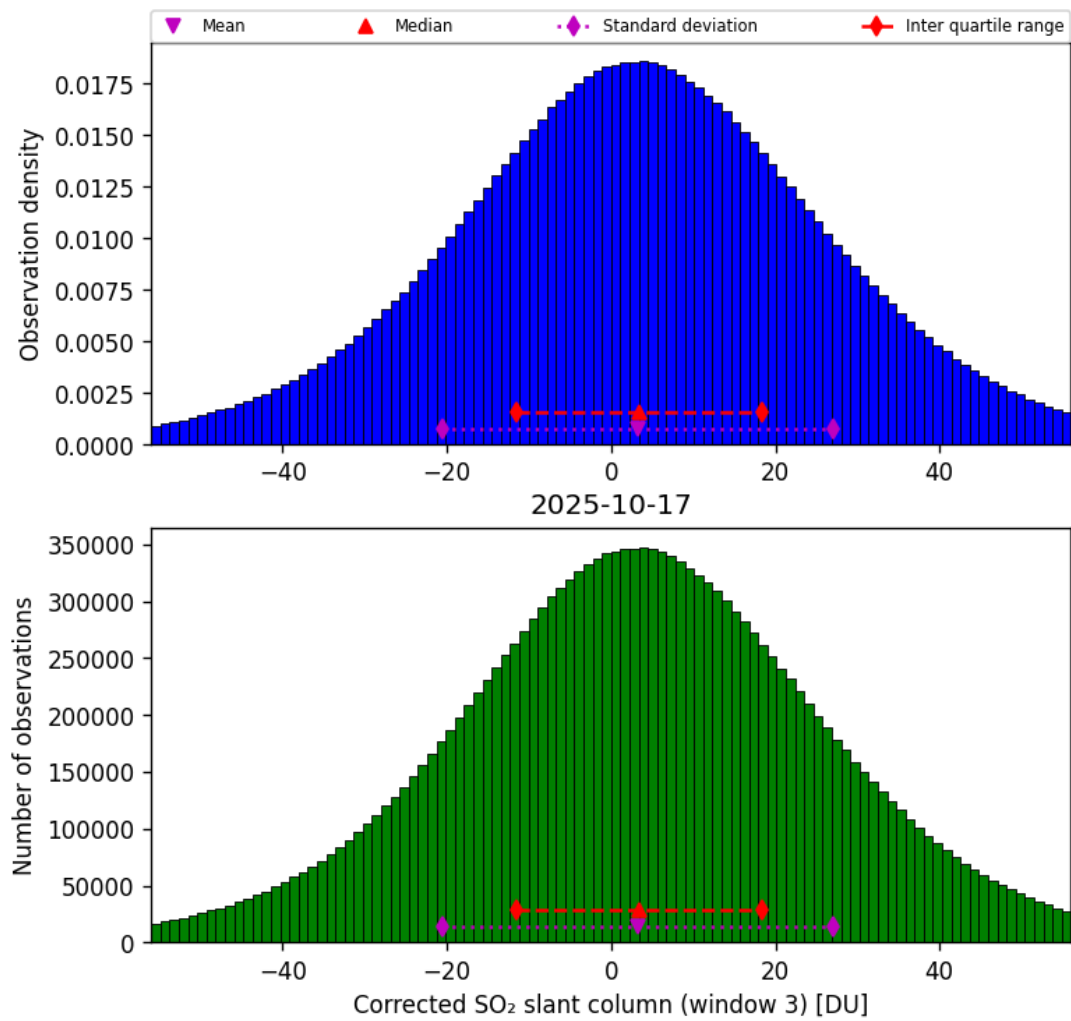


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-10-17 to 2025-10-18

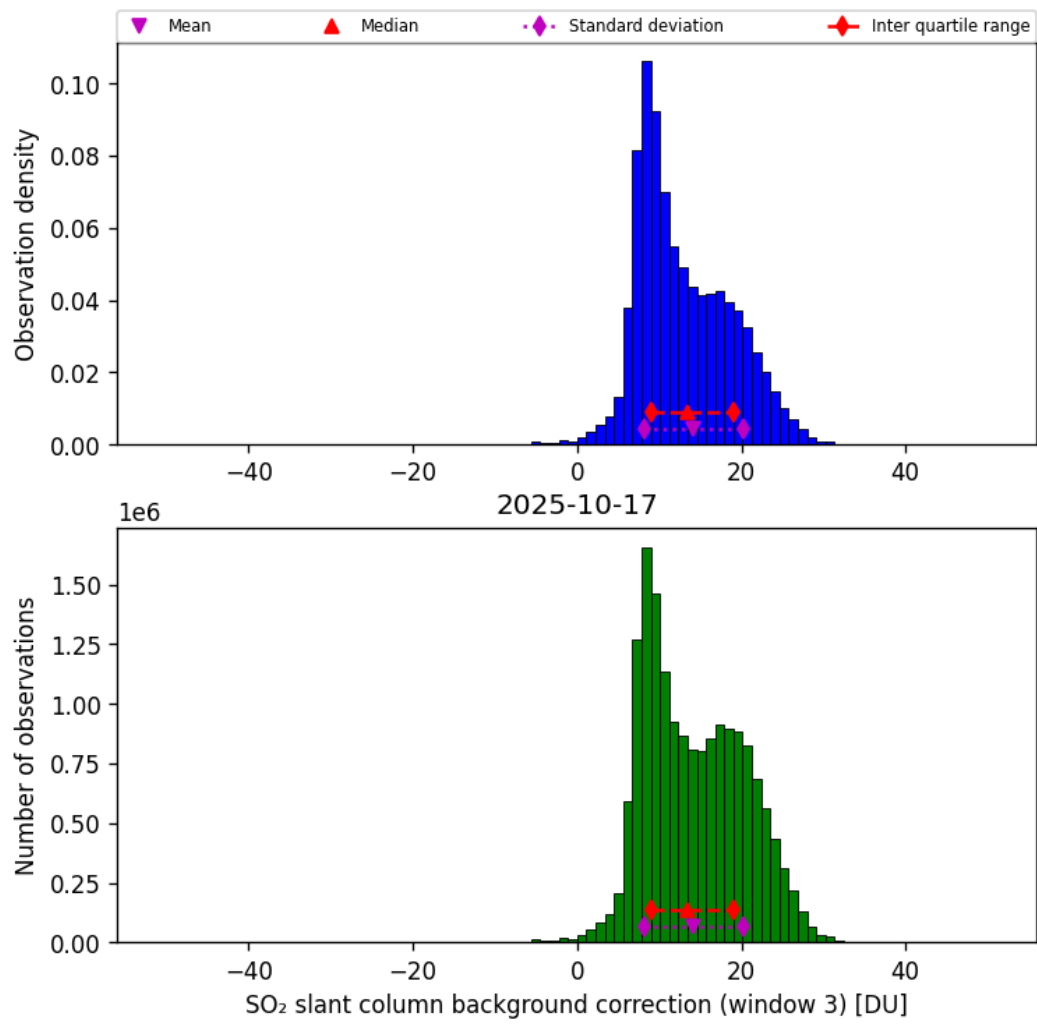


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-10-17 to 2025-10-18

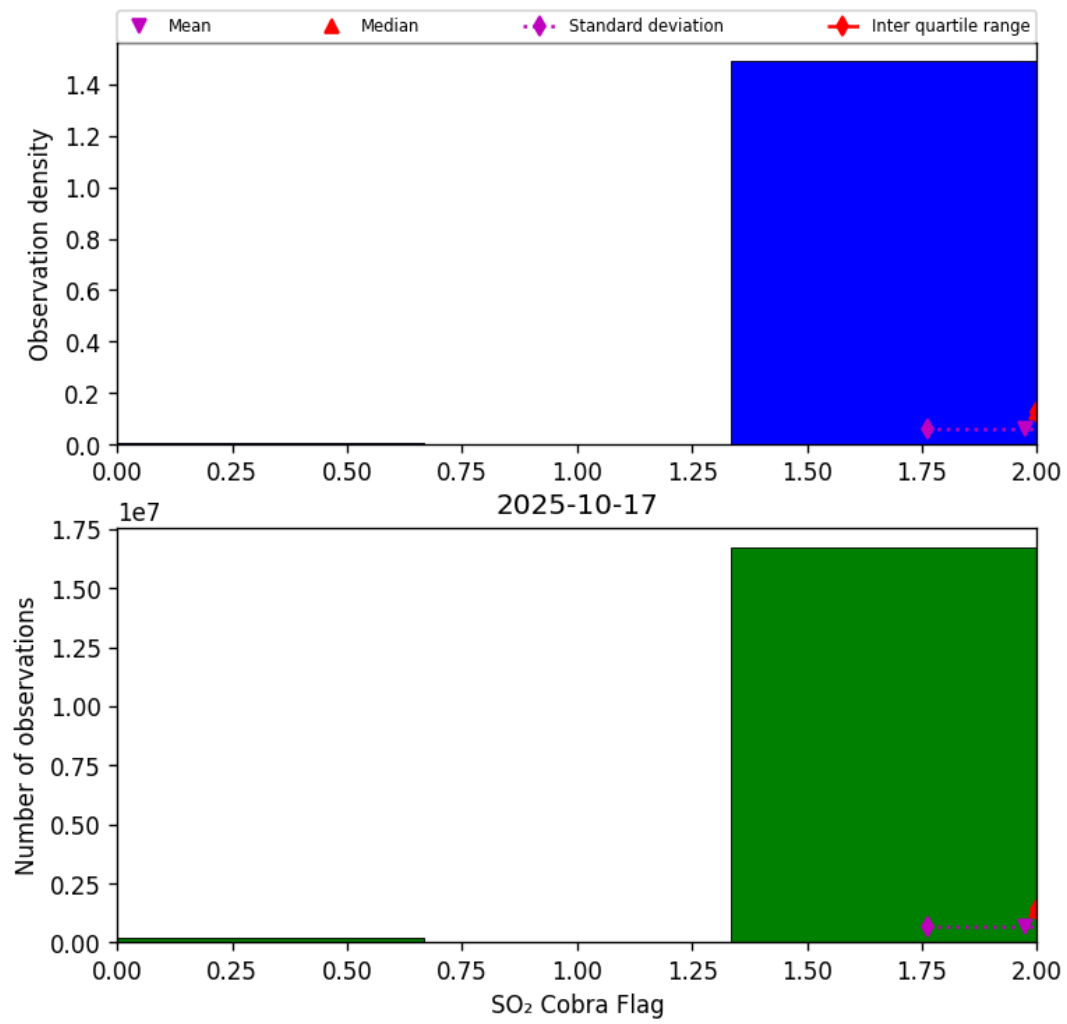


Figure 75: Histogram of "SO₂ Cobra Flag" for 2025-10-17 to 2025-10-18

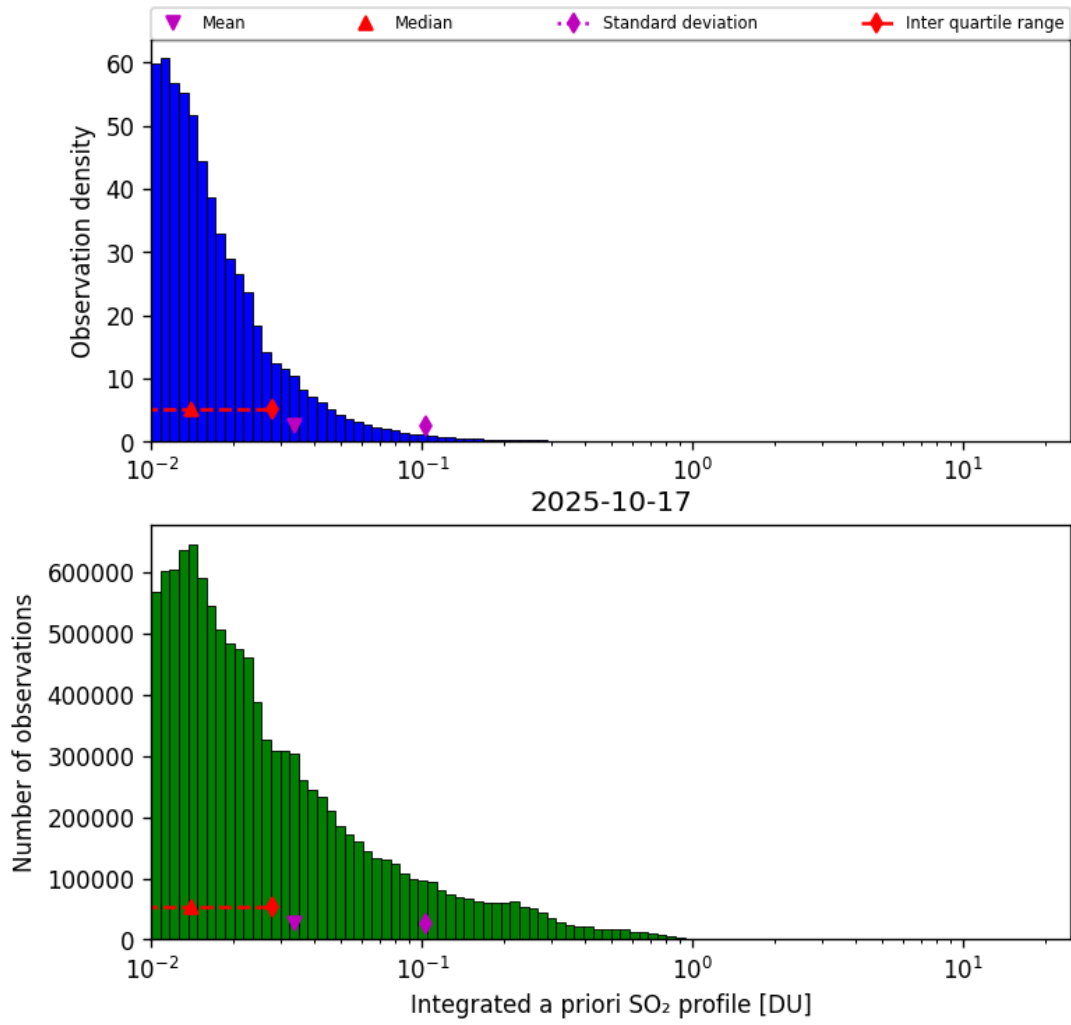


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-10-17 to 2025-10-18

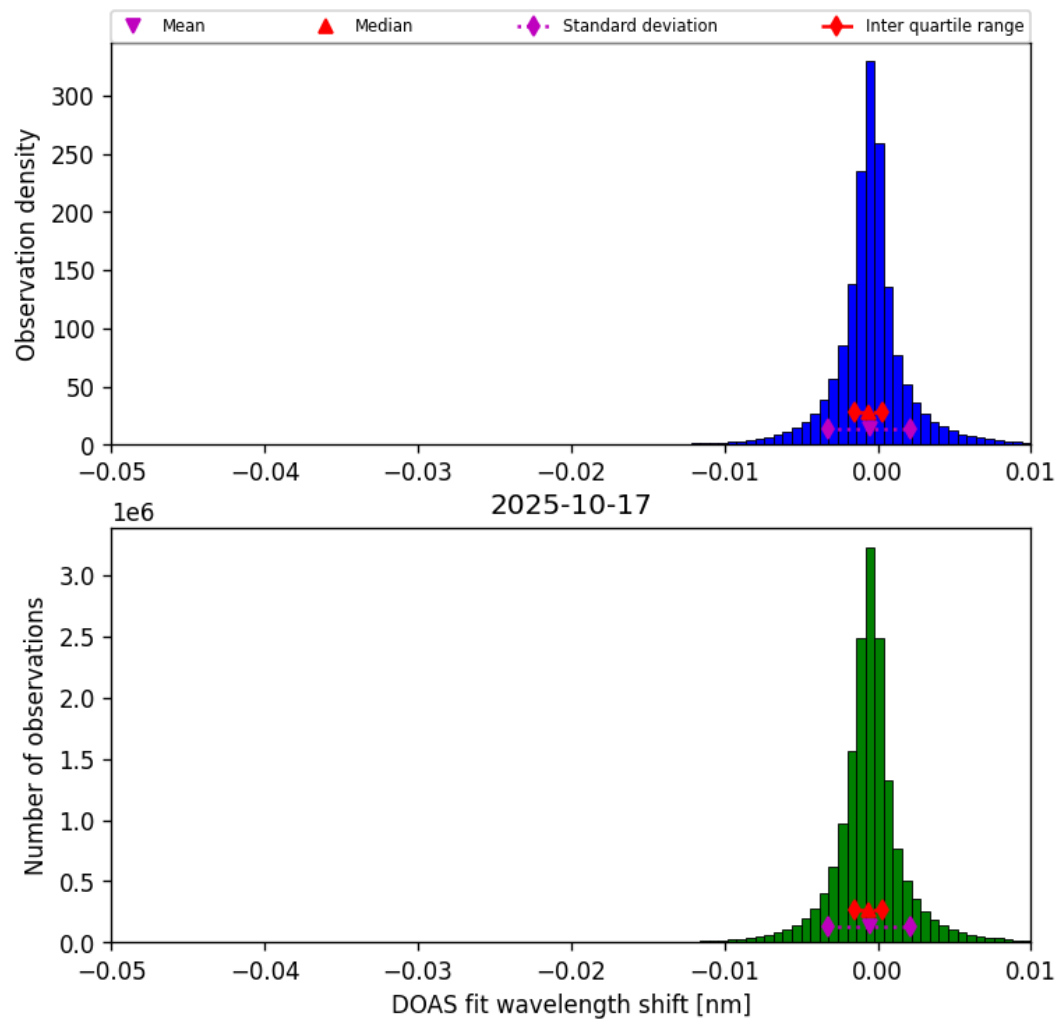


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-10-17 to 2025-10-18

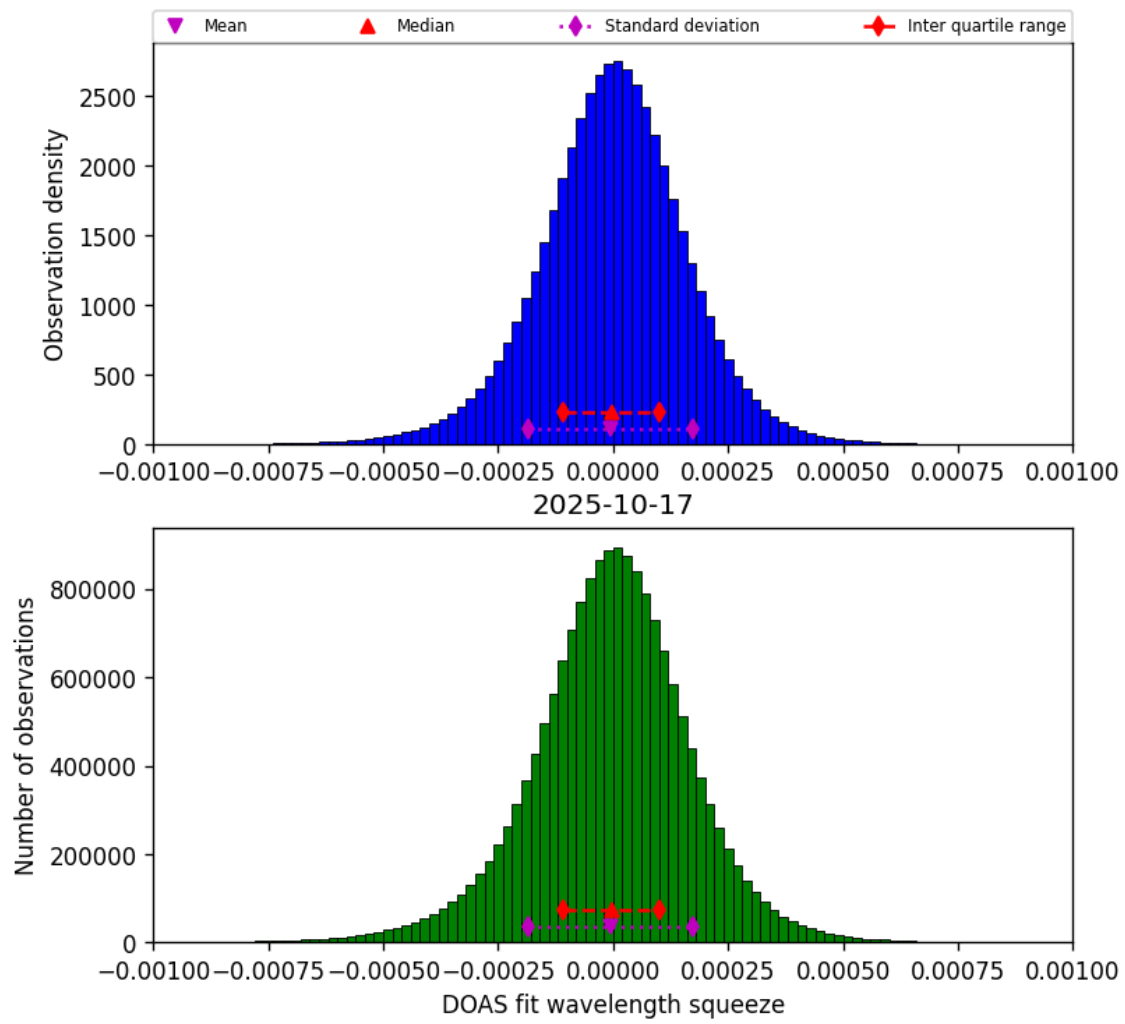


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-10-17 to 2025-10-18

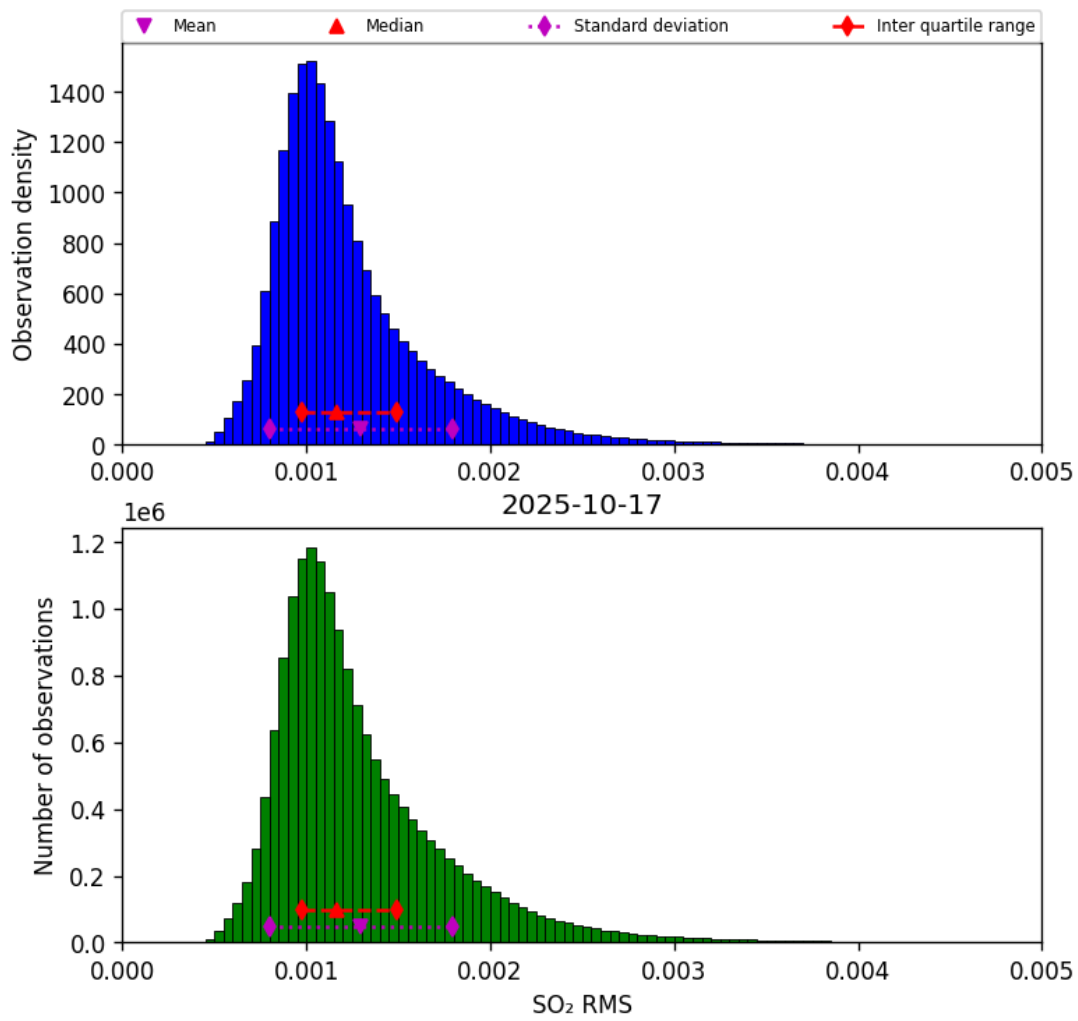


Figure 79: Histogram of "SO₂ RMS" for 2025-10-17 to 2025-10-18

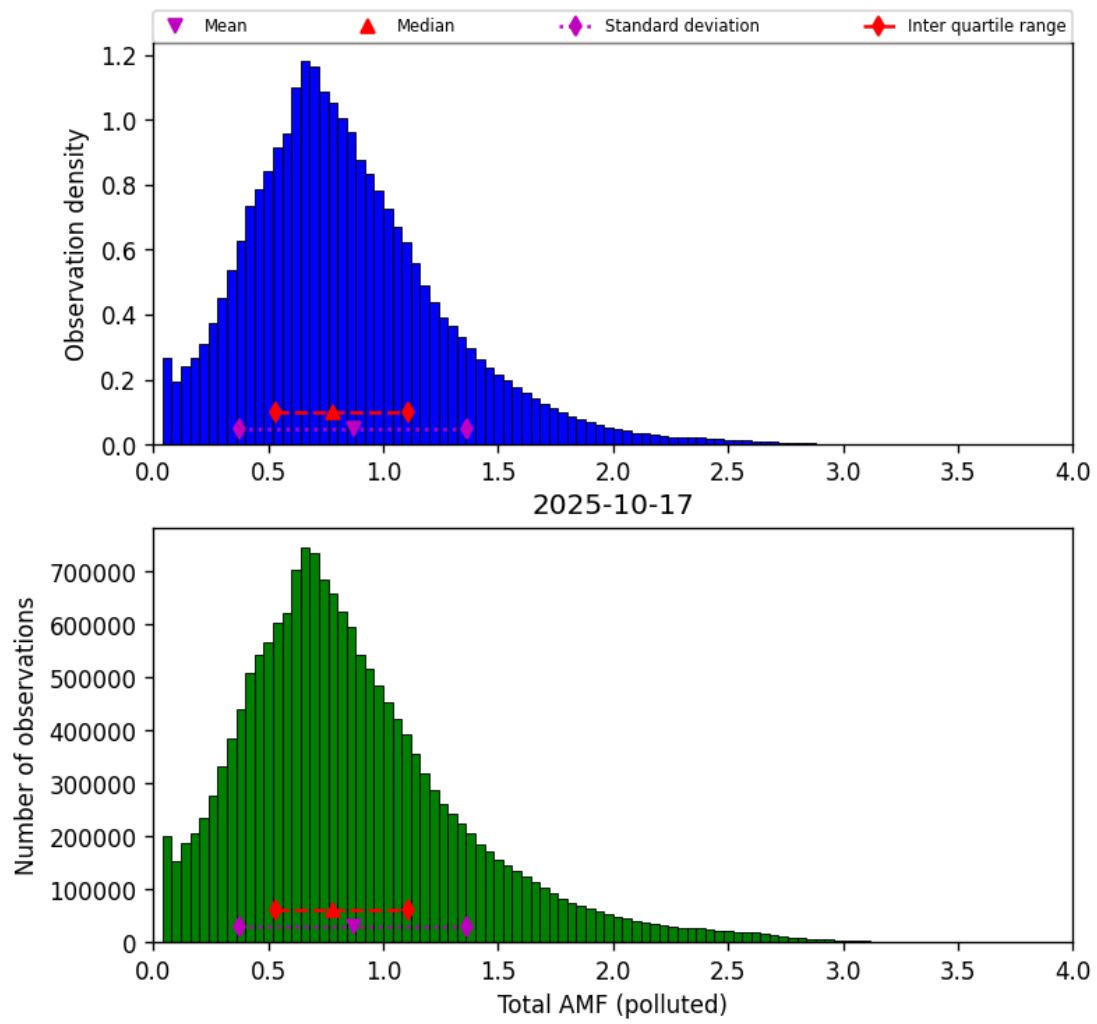


Figure 80: Histogram of “Total AMF (polluted)” for 2025-10-17 to 2025-10-18

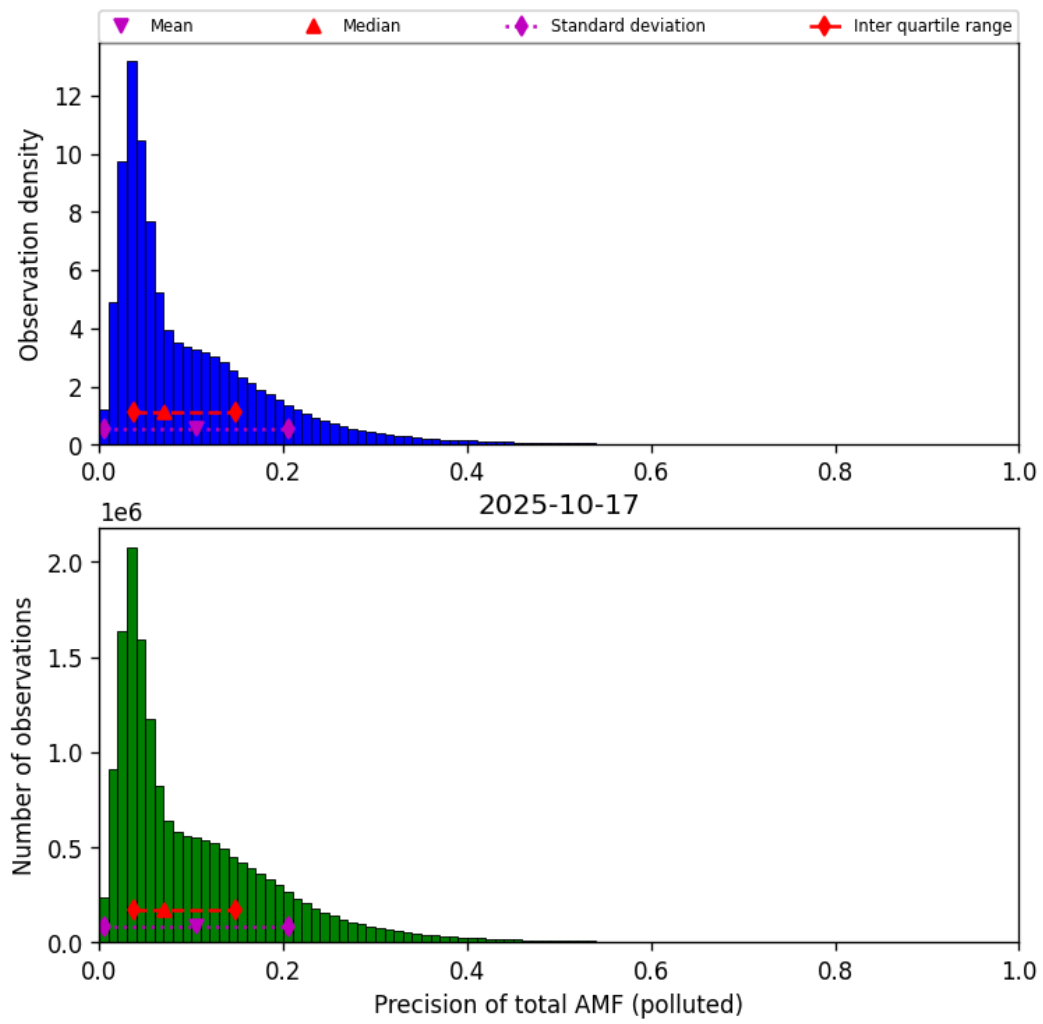


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-10-17 to 2025-10-18

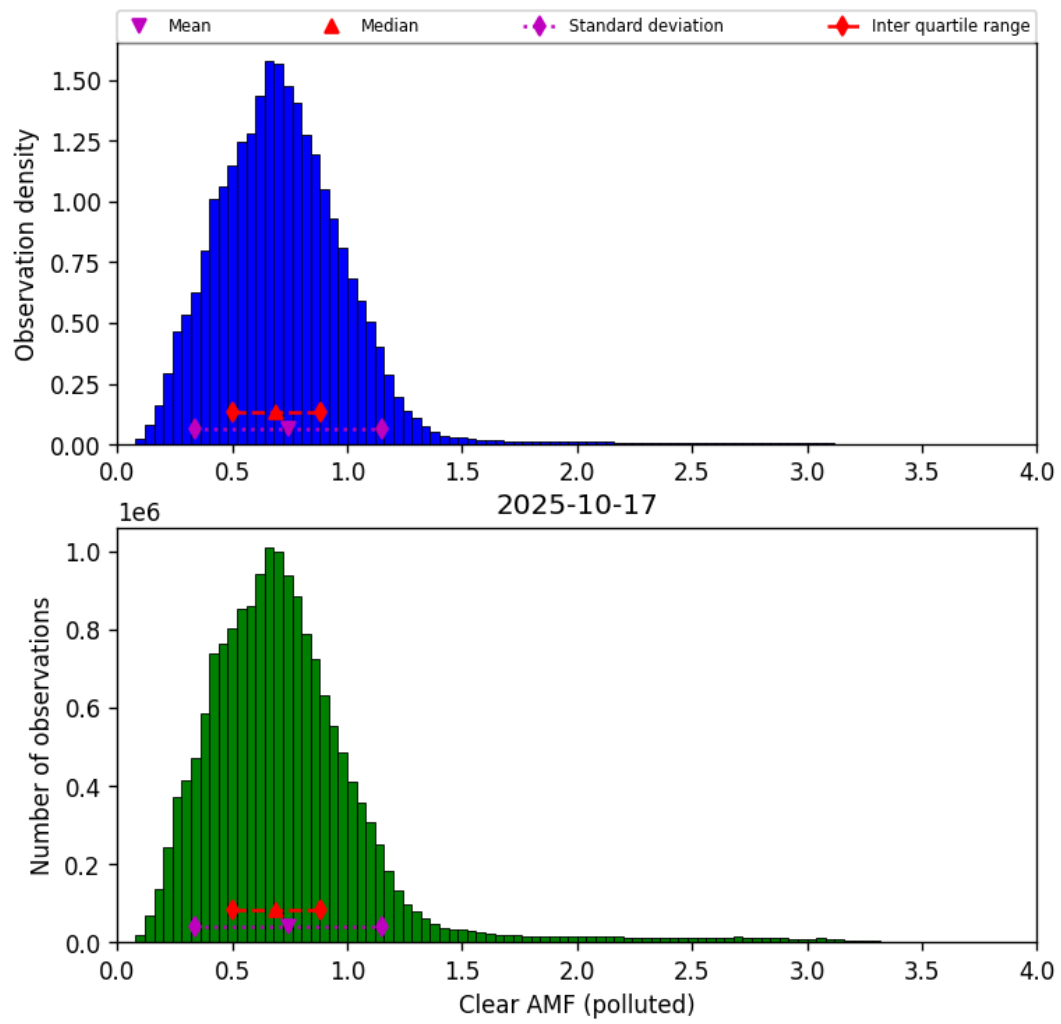


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-10-17 to 2025-10-18

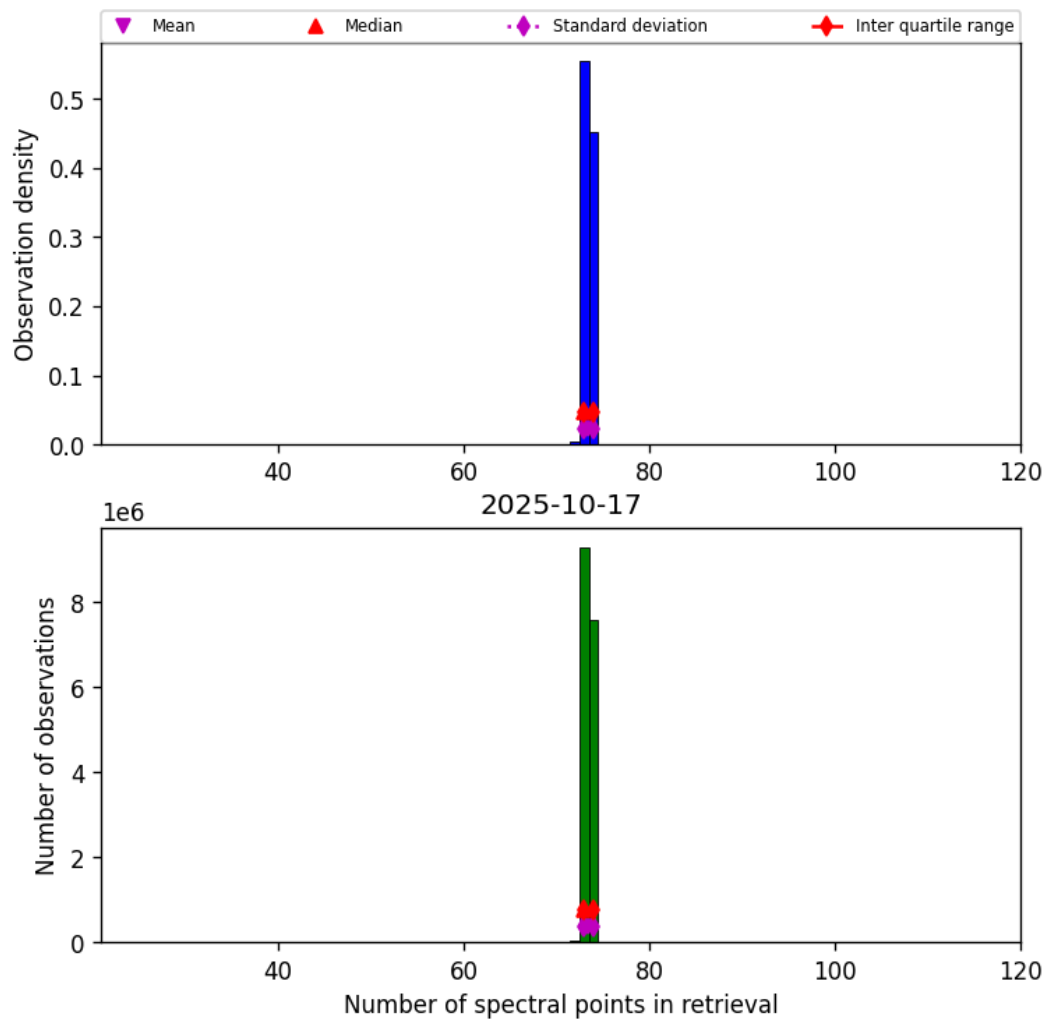


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-10-17 to 2025-10-18

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.

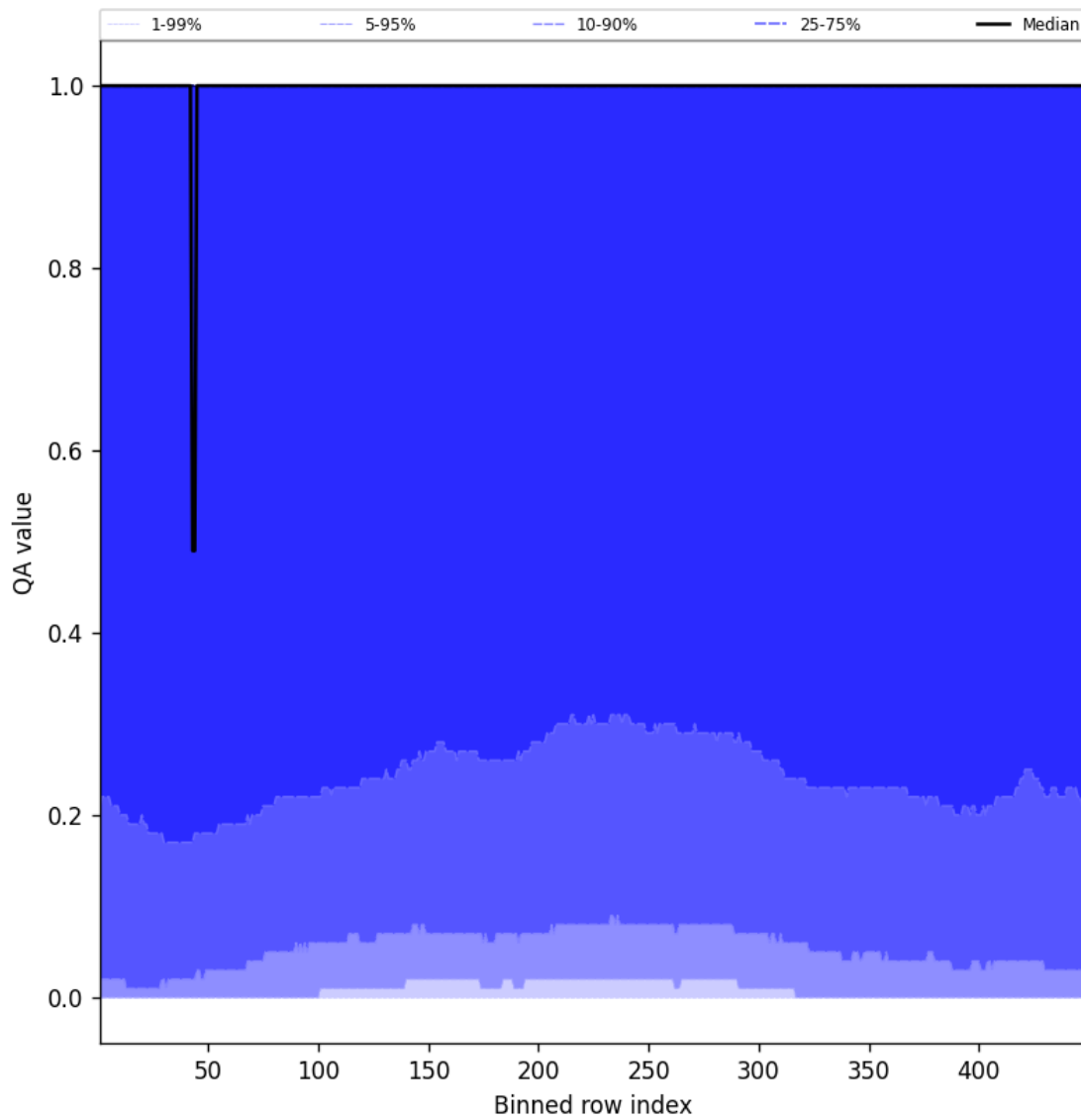


Figure 84: Along track statistics of “QA value” for 2025-10-17 to 2025-10-18

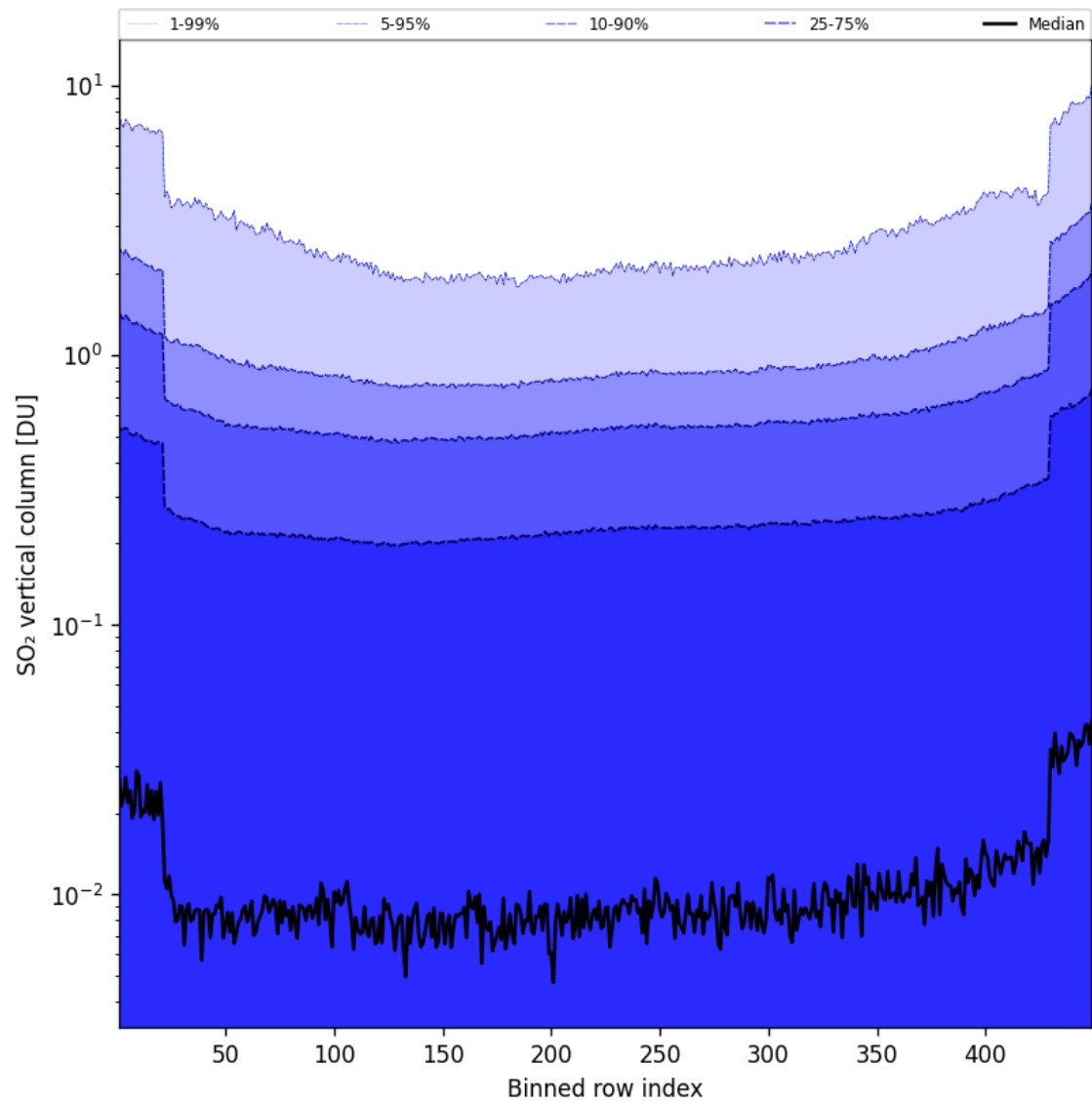


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-10-17 to 2025-10-18

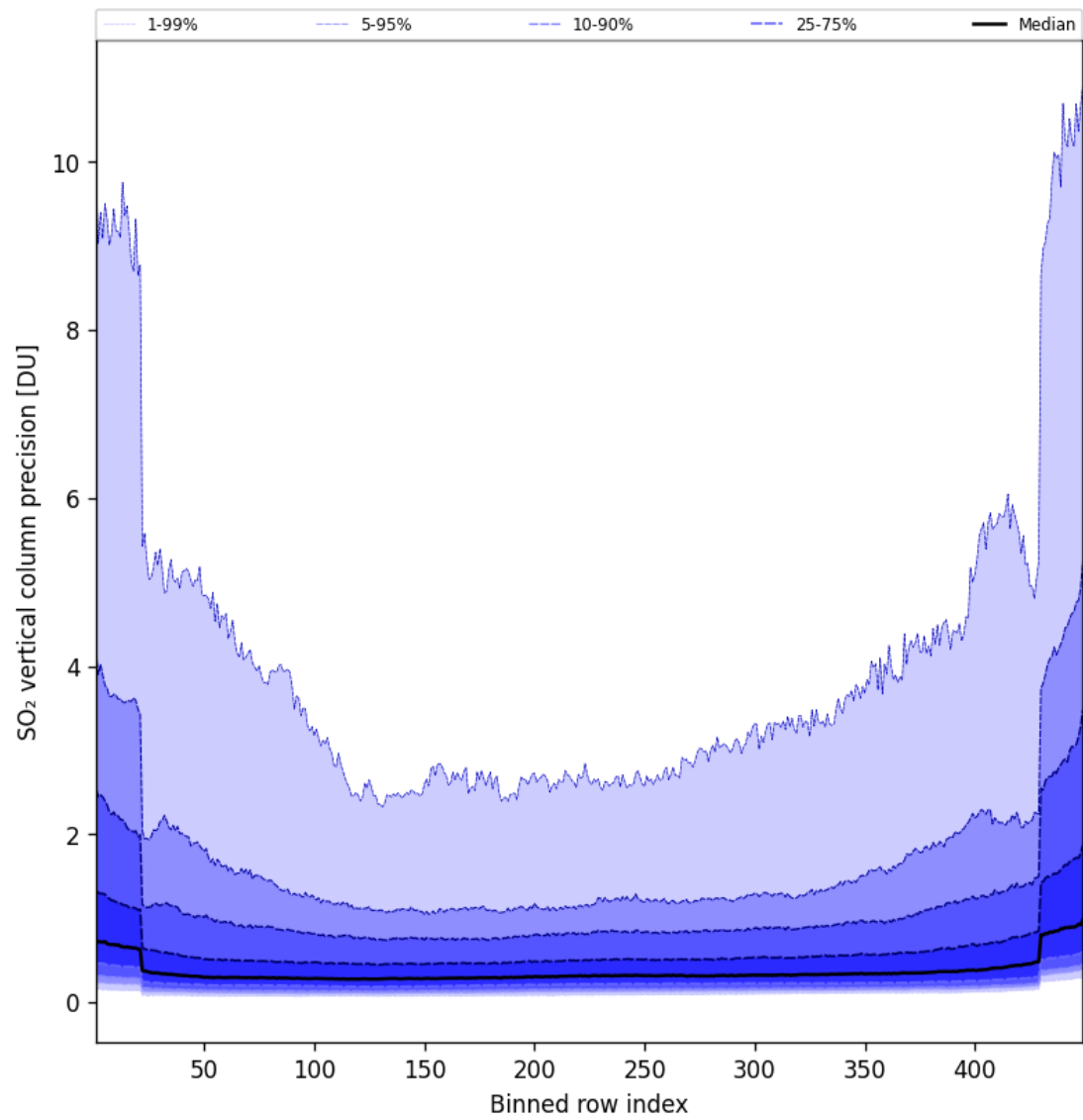


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-10-17 to 2025-10-18

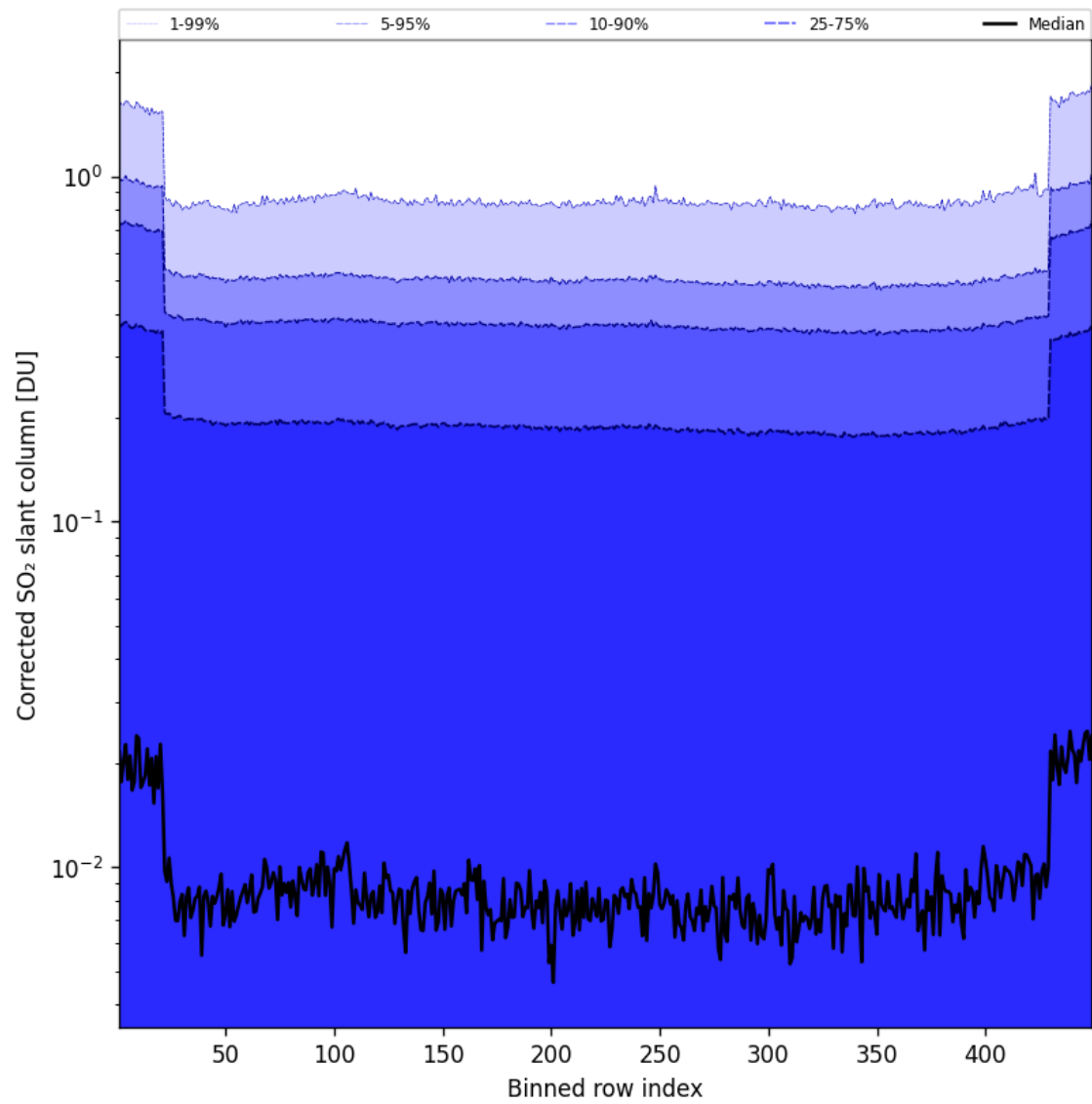


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-10-17 to 2025-10-18

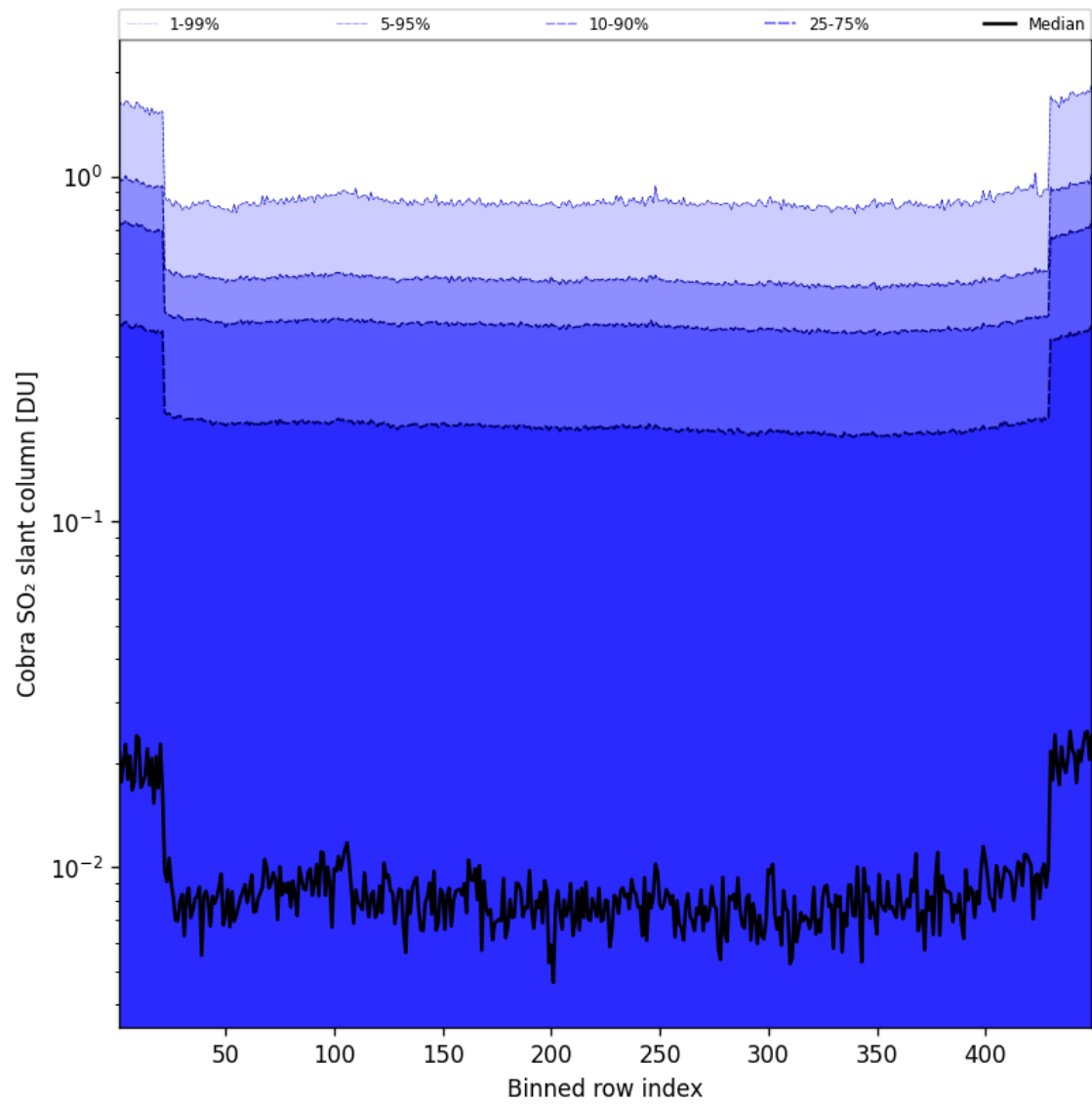


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-10-17 to 2025-10-18

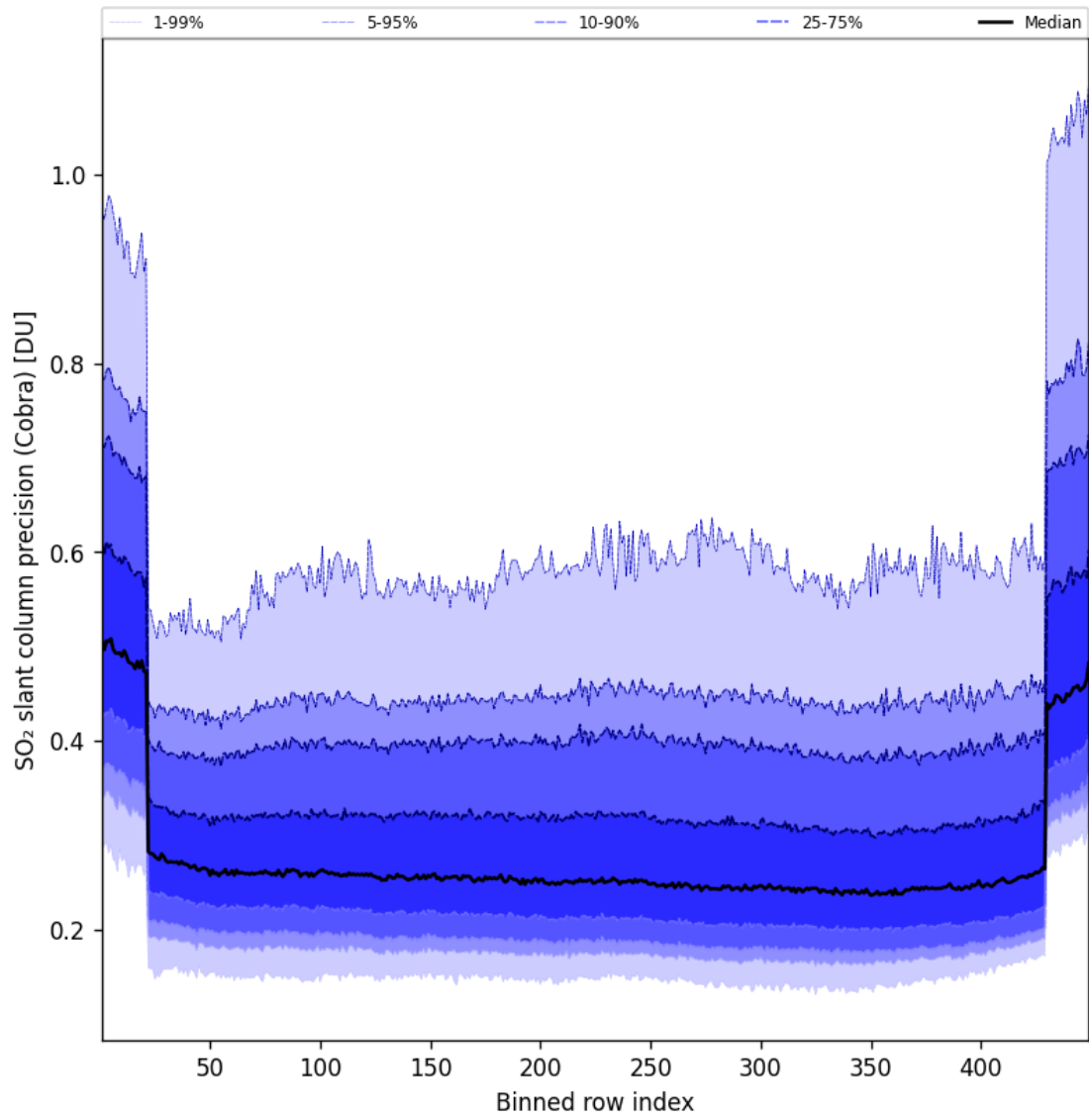


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-10-17 to 2025-10-18

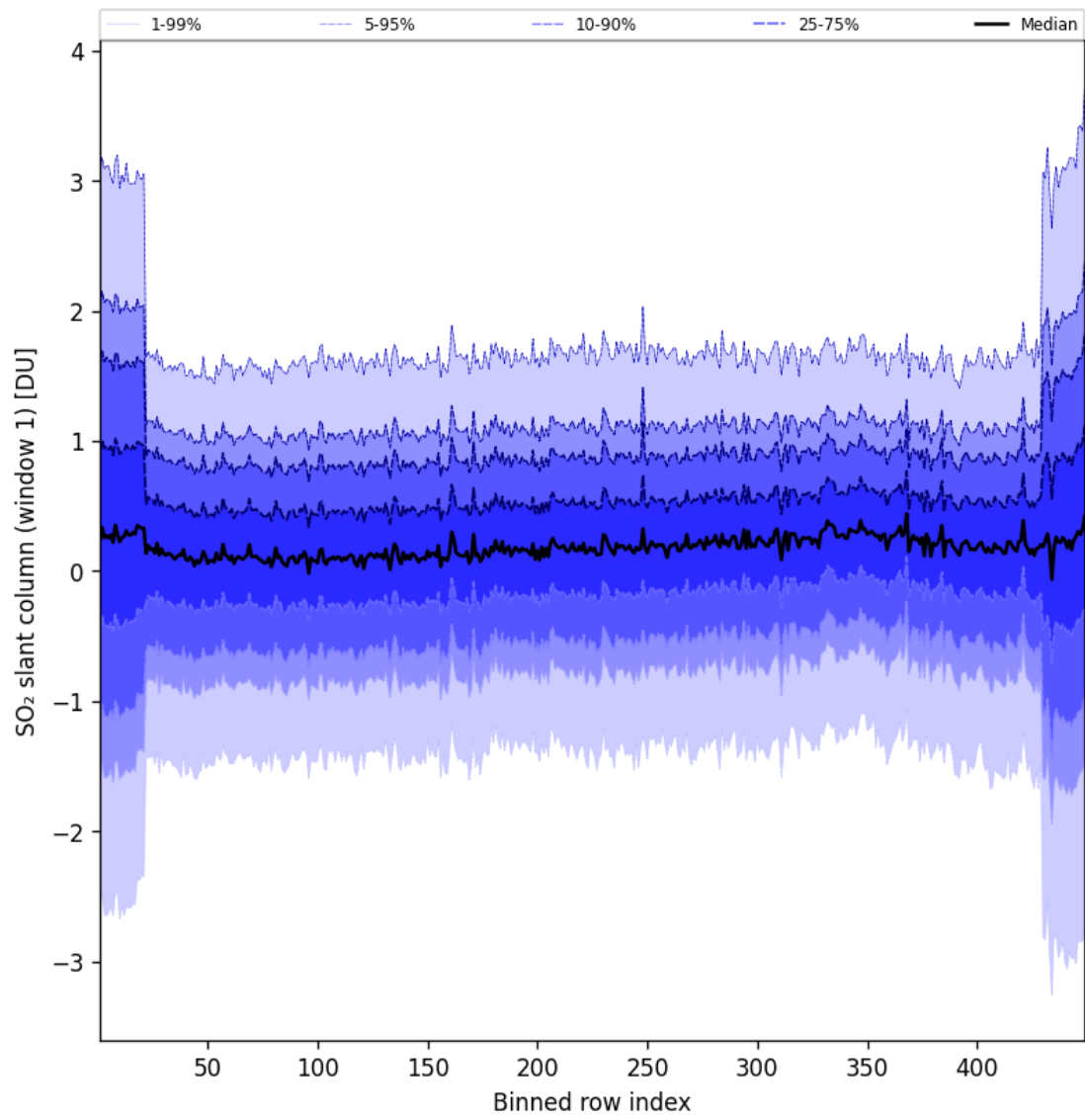


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-10-17 to 2025-10-18

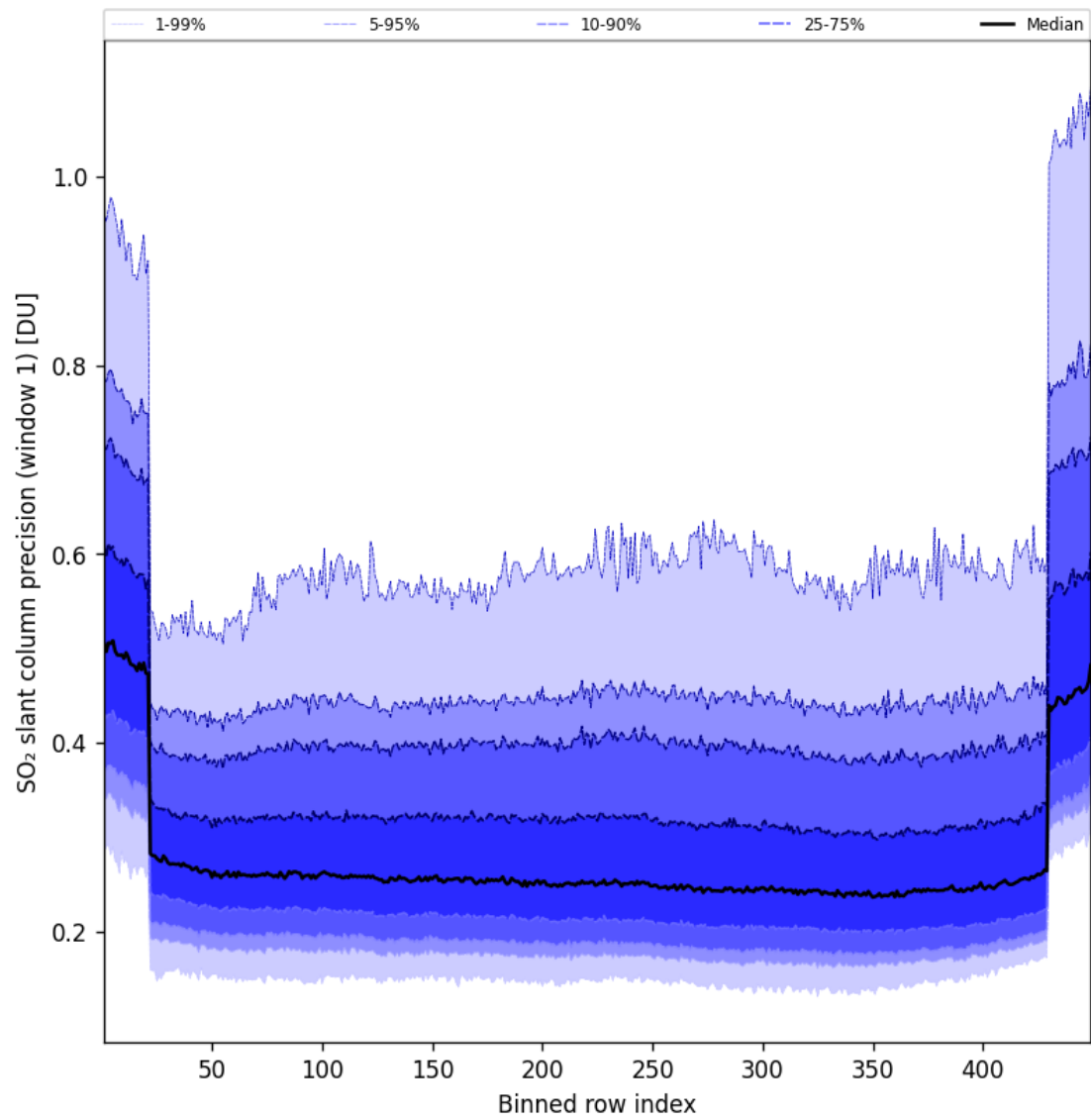


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-10-17 to 2025-10-18

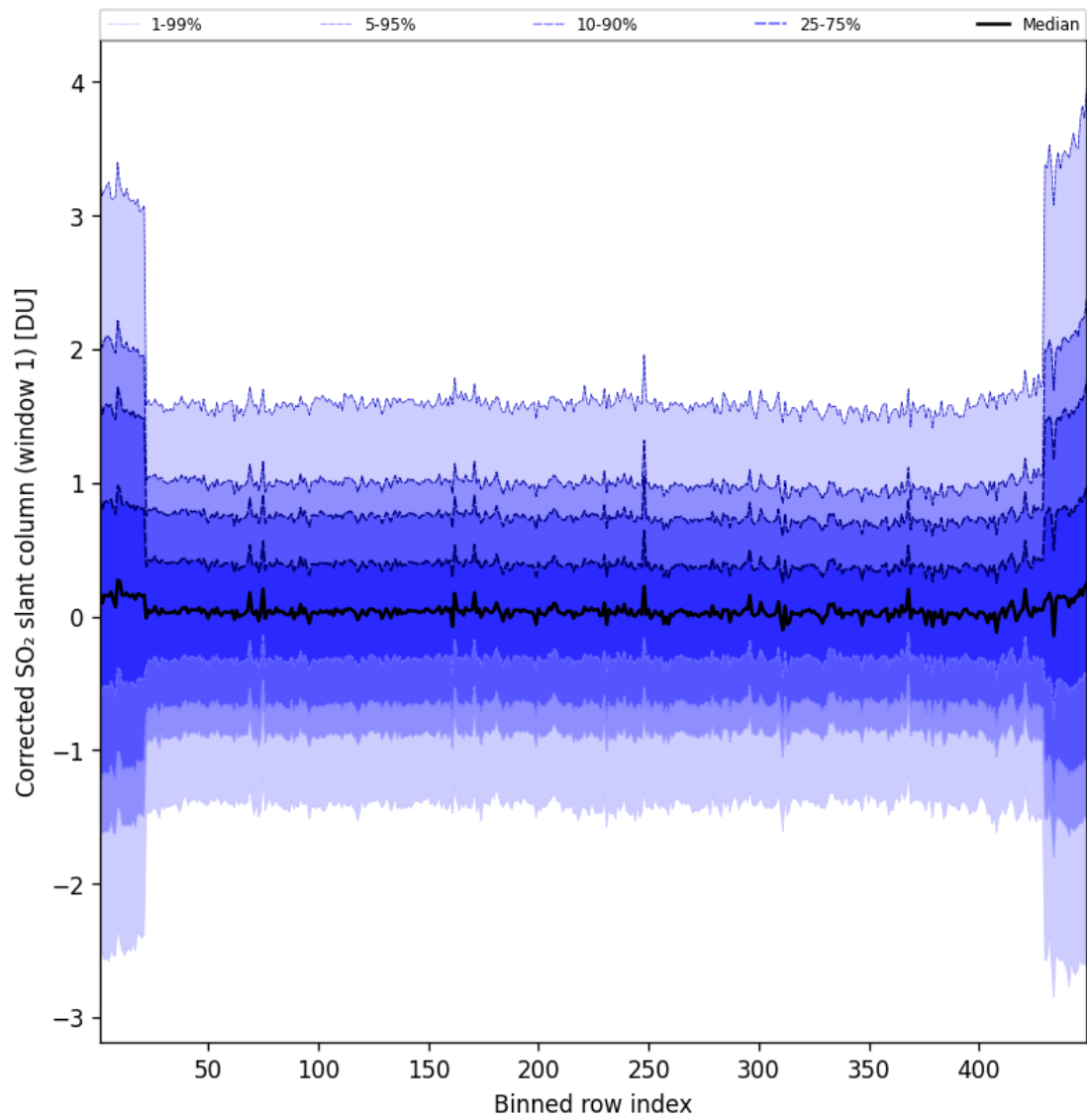


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-10-17 to 2025-10-18

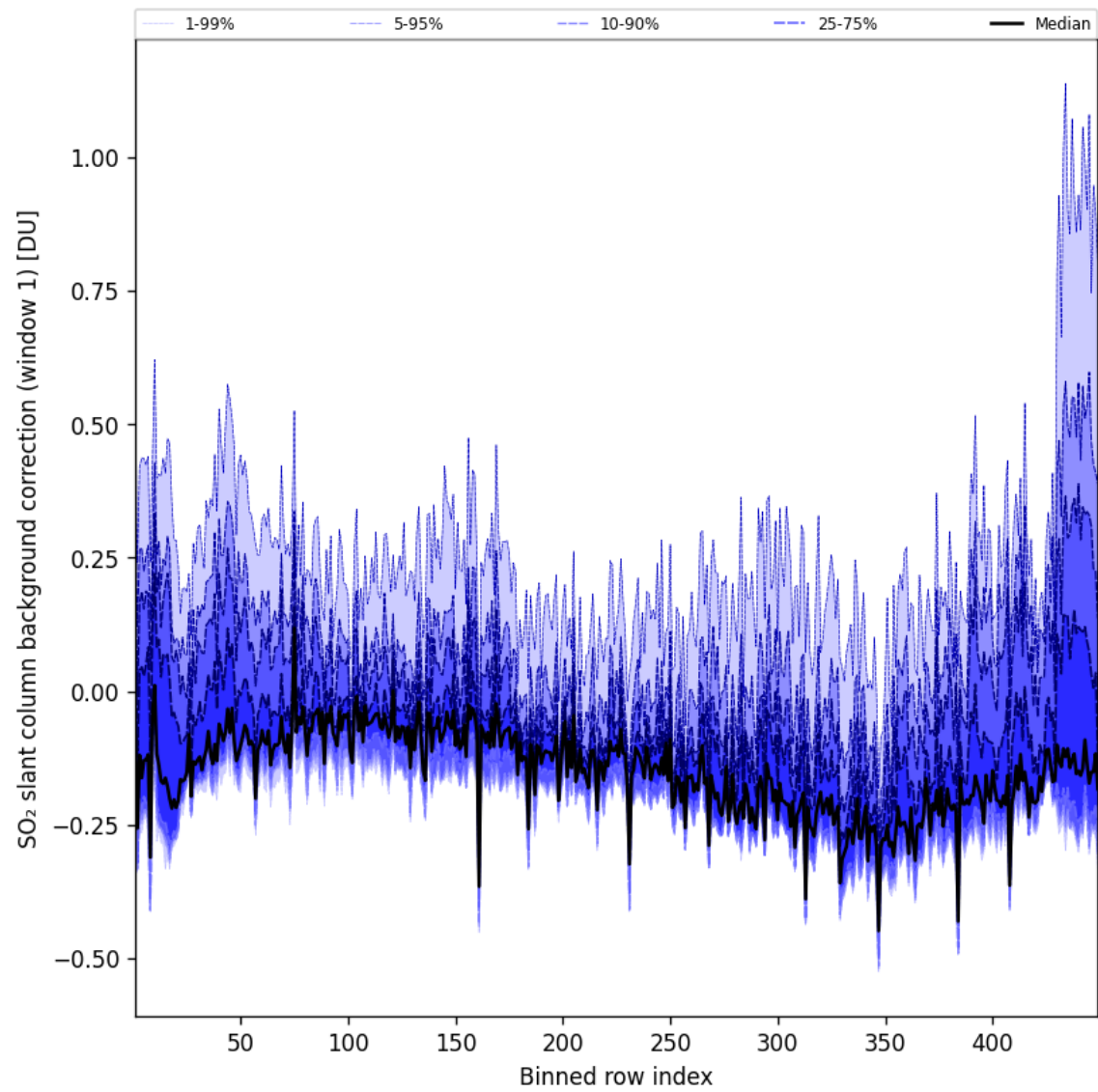


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-10-17 to 2025-10-18

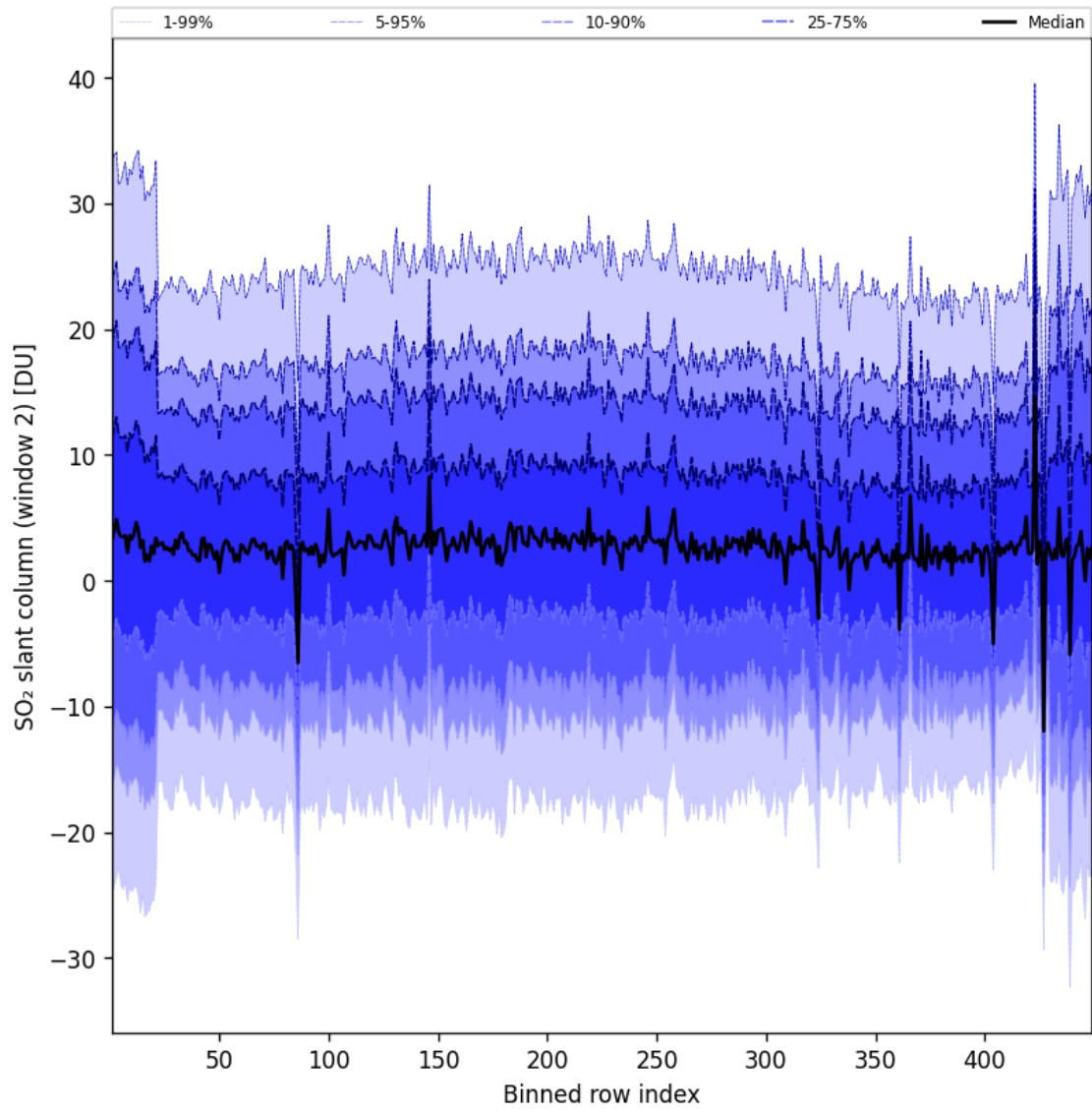


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-10-17 to 2025-10-18

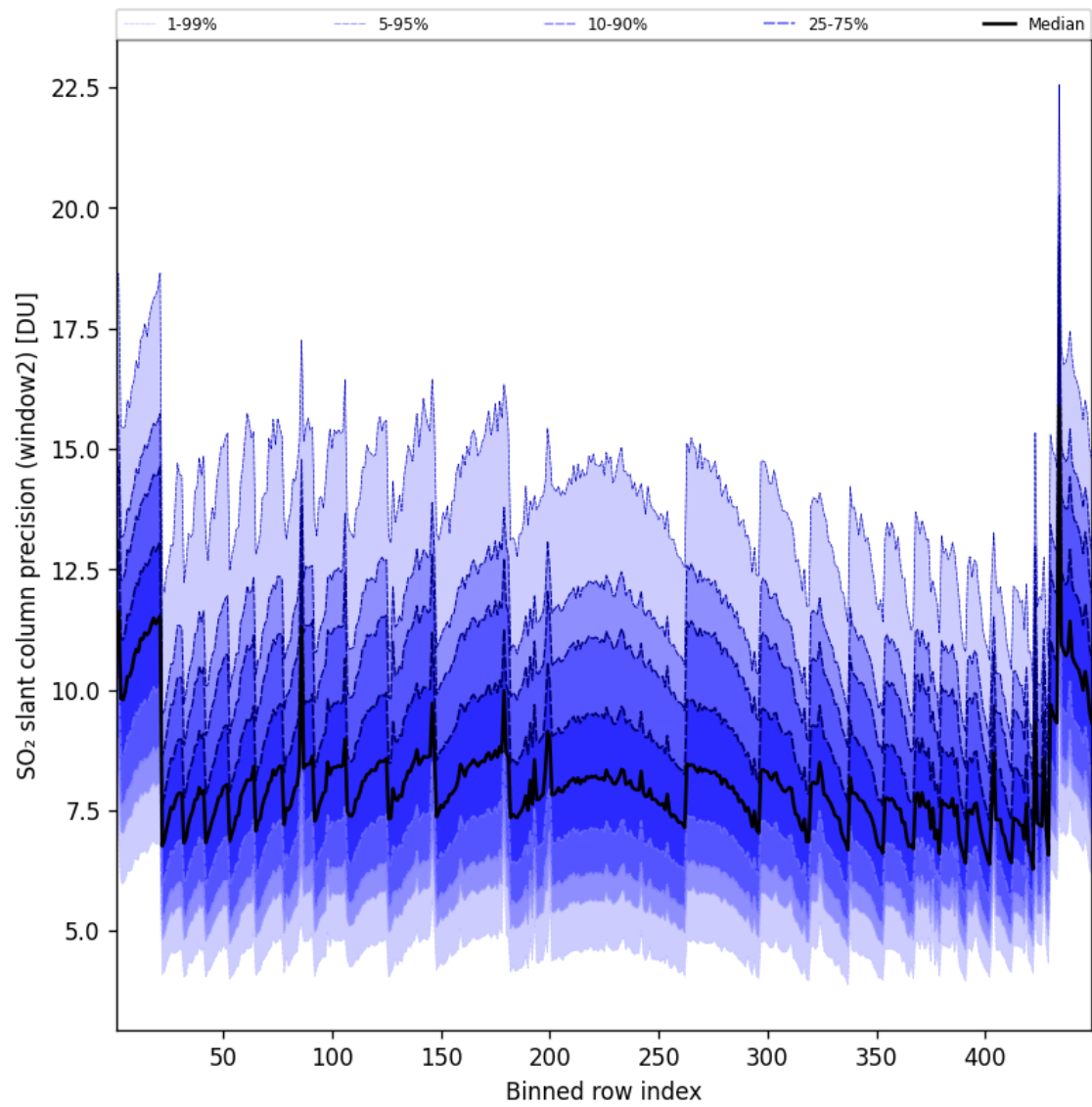


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-10-17 to 2025-10-18

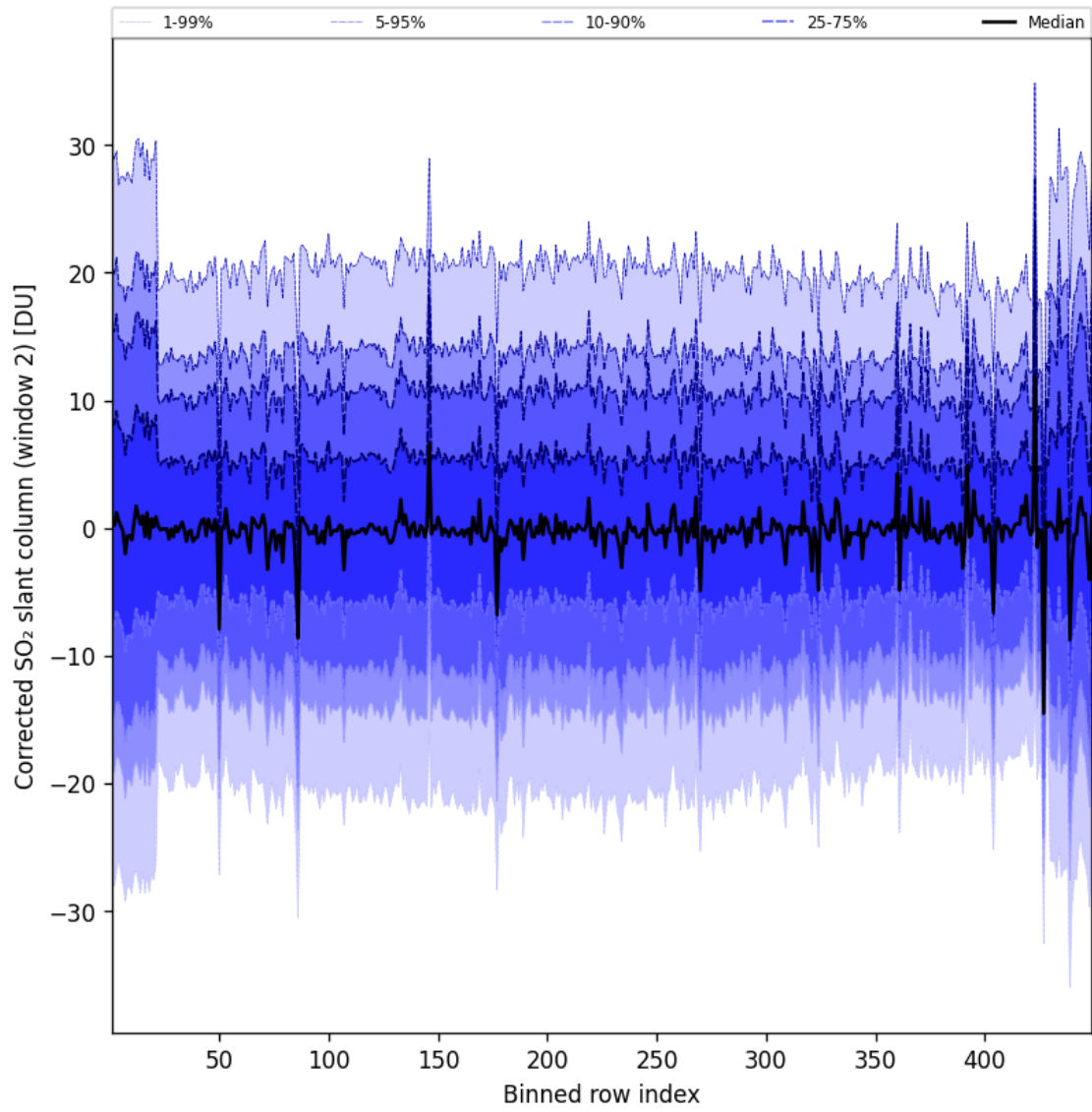


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-10-17 to 2025-10-18

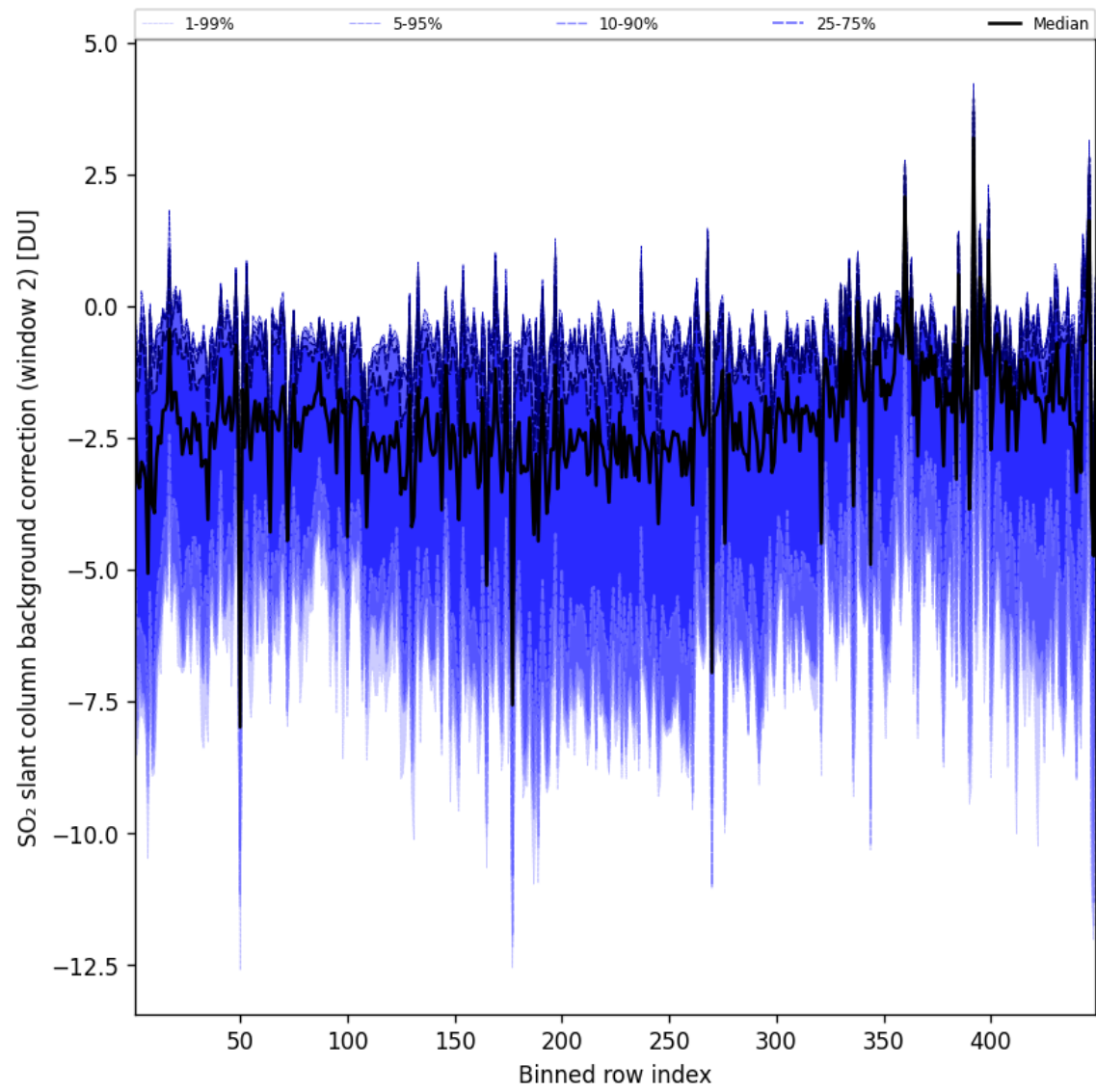


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-10-17 to 2025-10-18

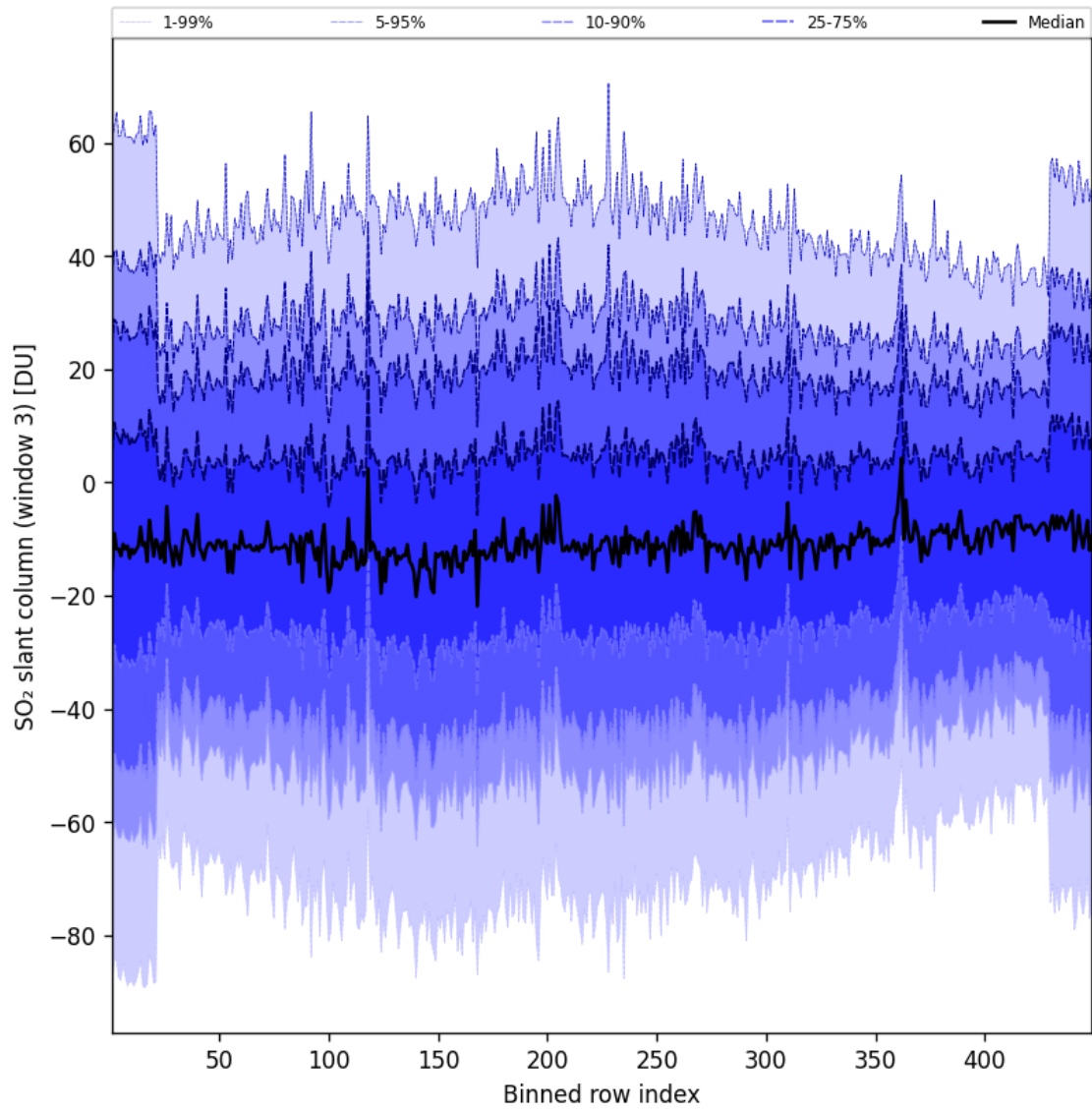


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-10-17 to 2025-10-18

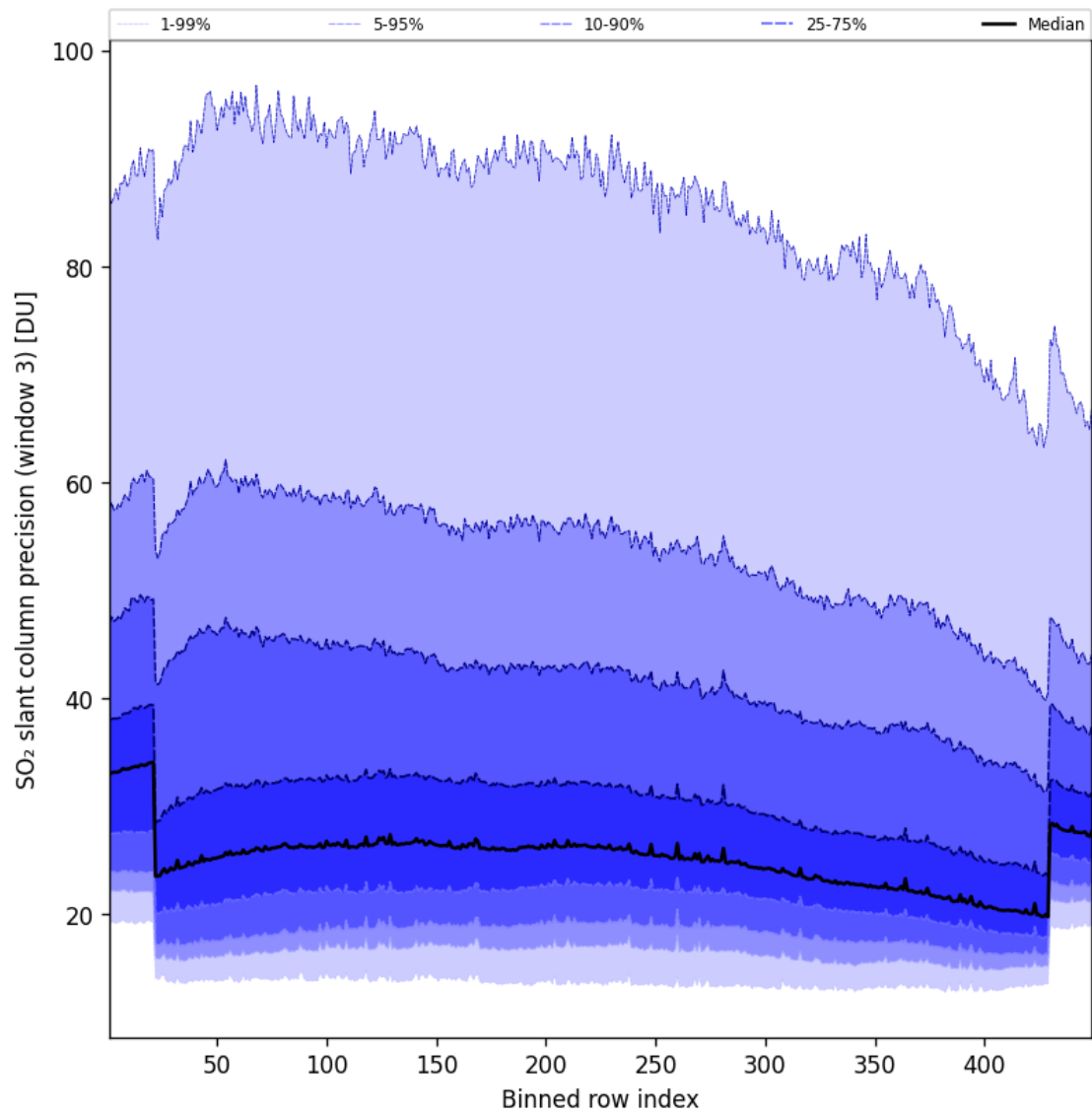


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-10-17 to 2025-10-18

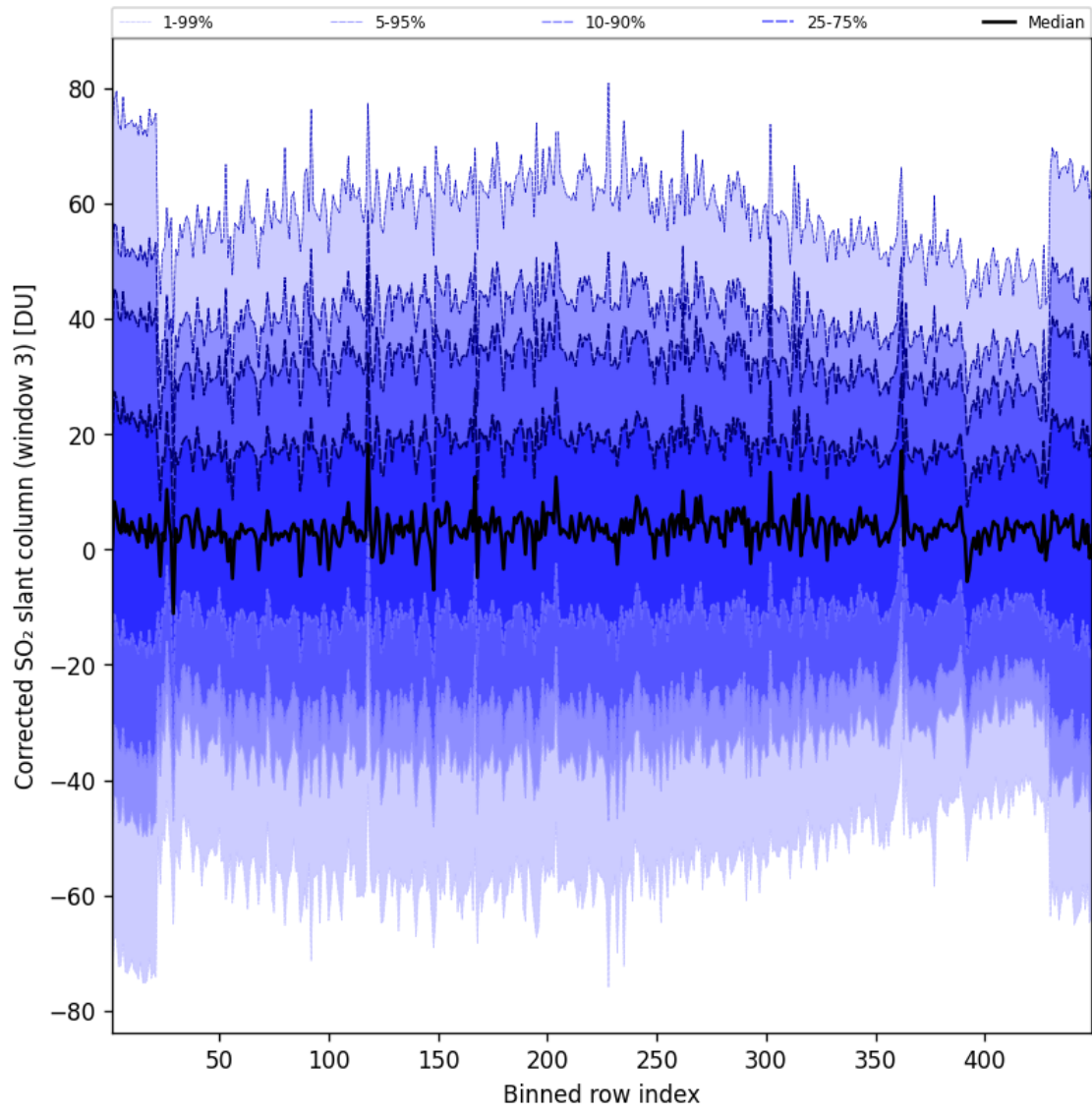


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-10-17 to 2025-10-18

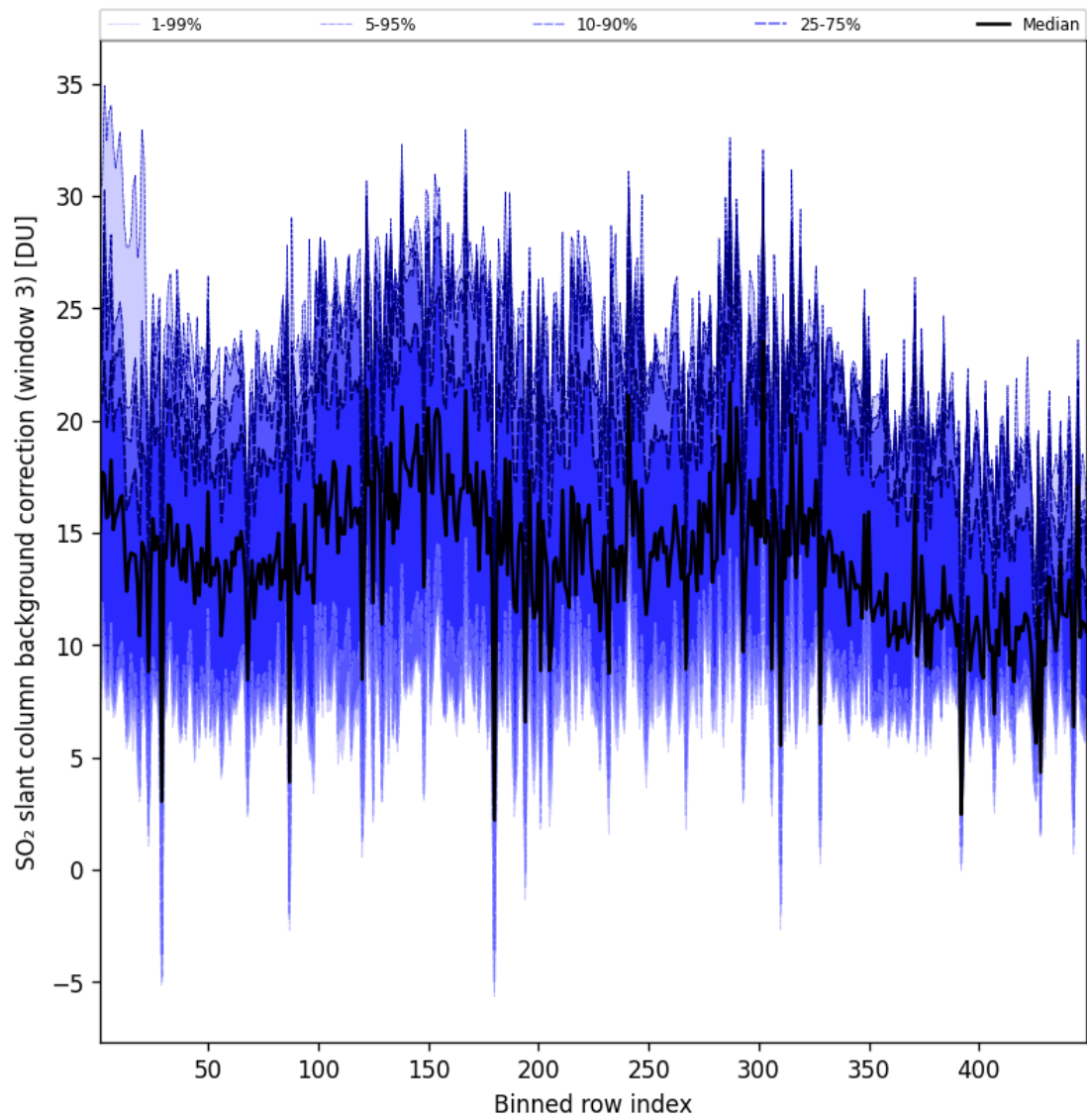


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-10-17 to 2025-10-18

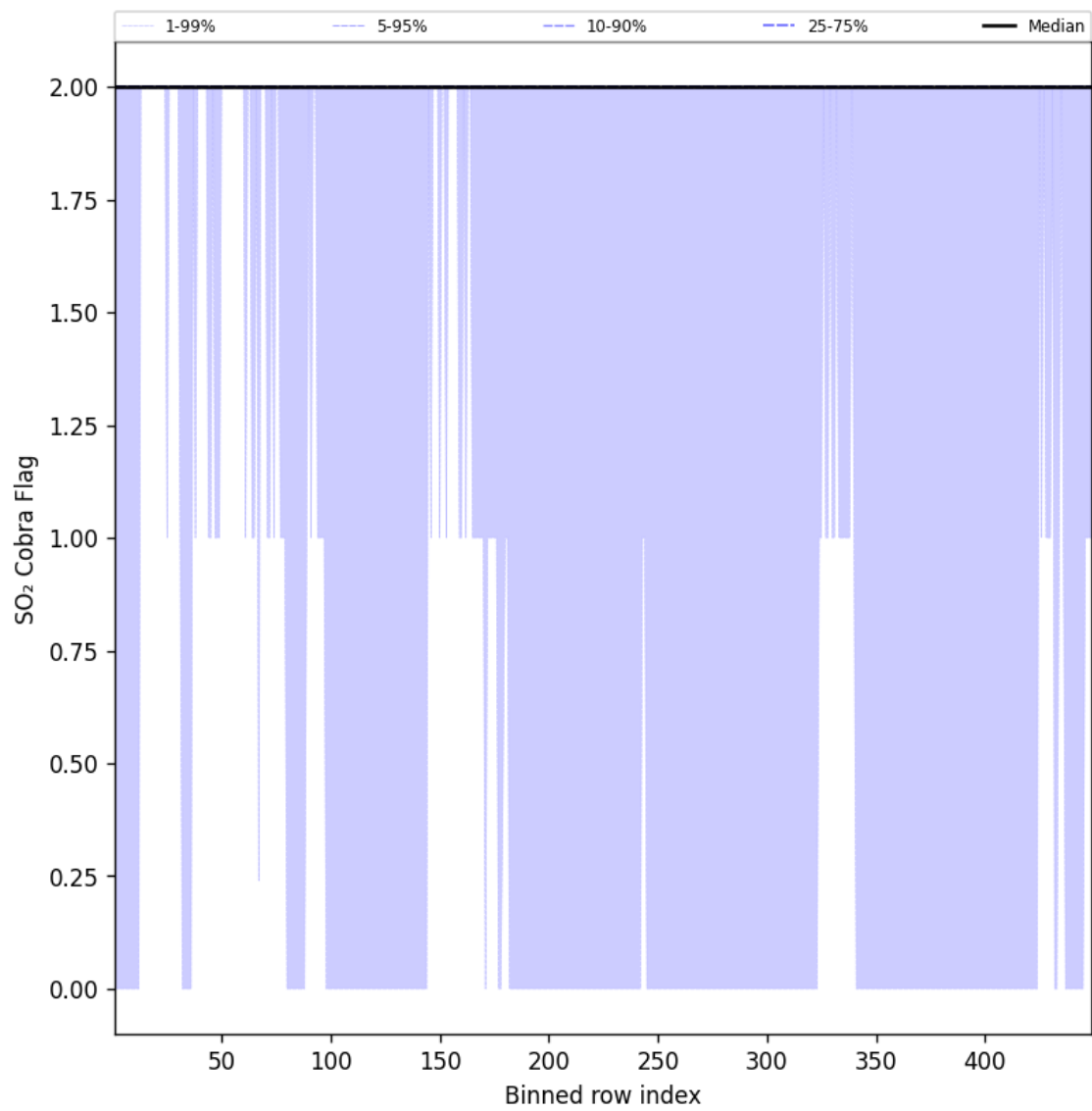


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-10-17 to 2025-10-18

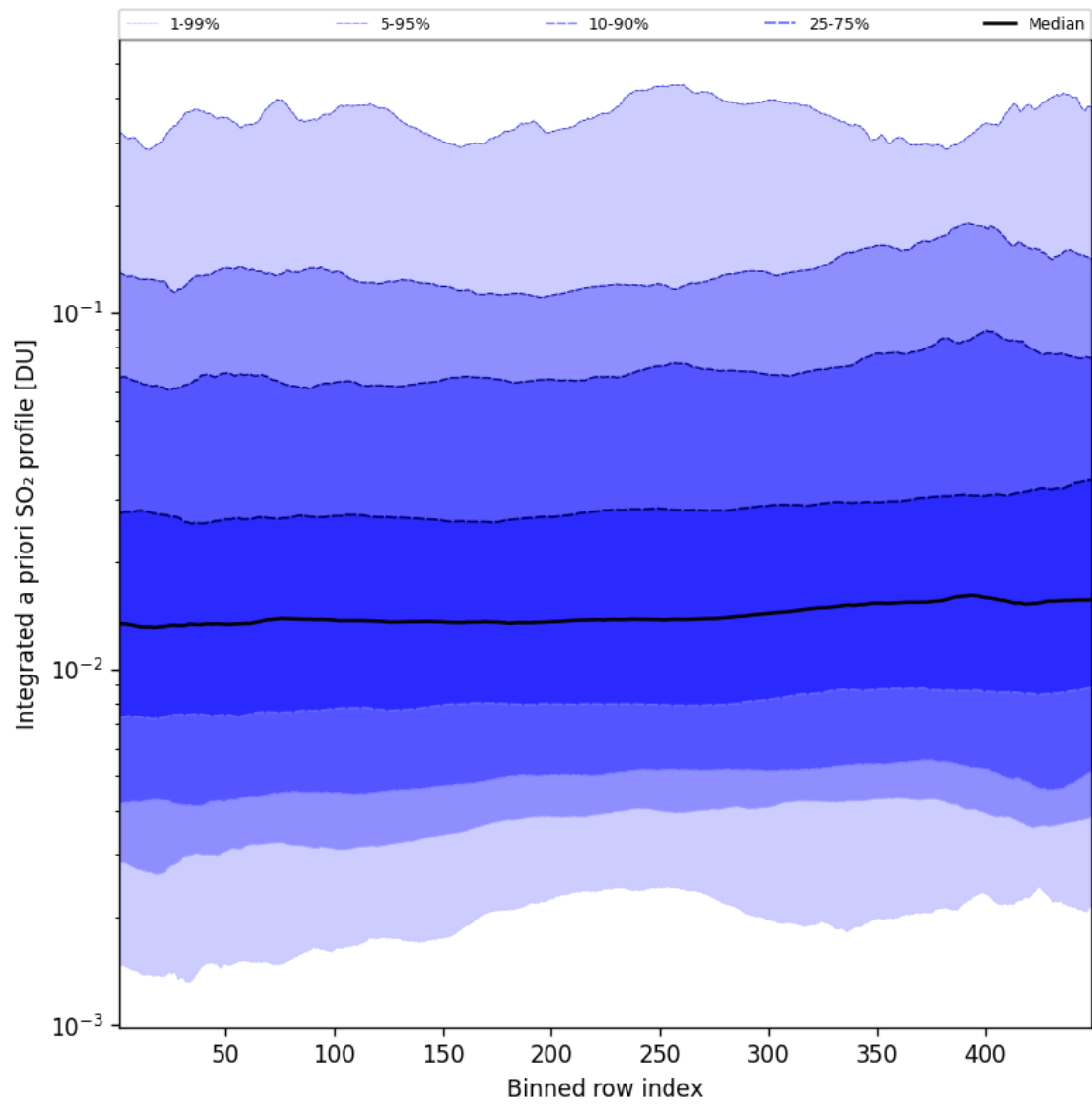


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-10-17 to 2025-10-18

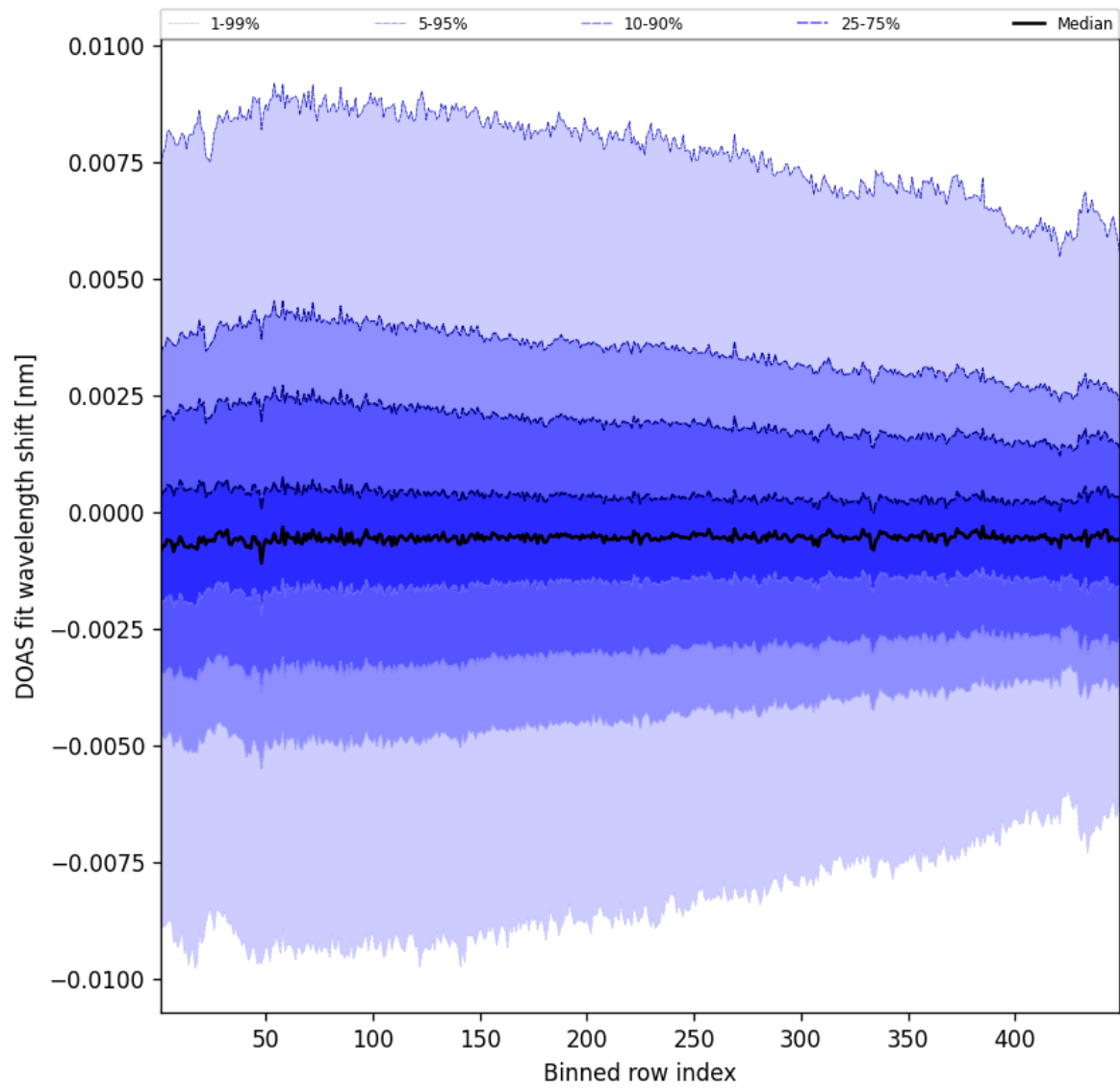


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-10-17 to 2025-10-18

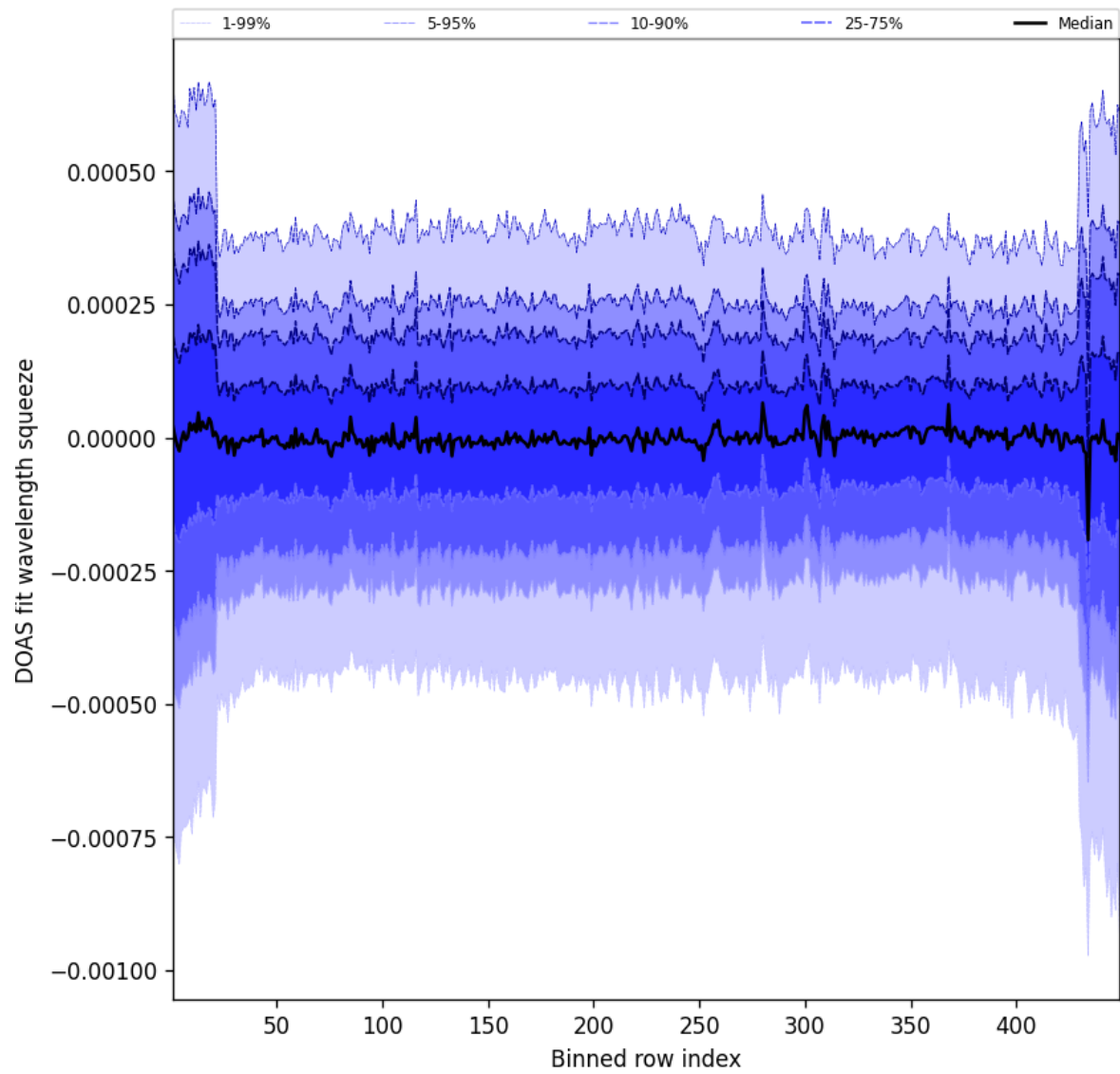


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-10-17 to 2025-10-18

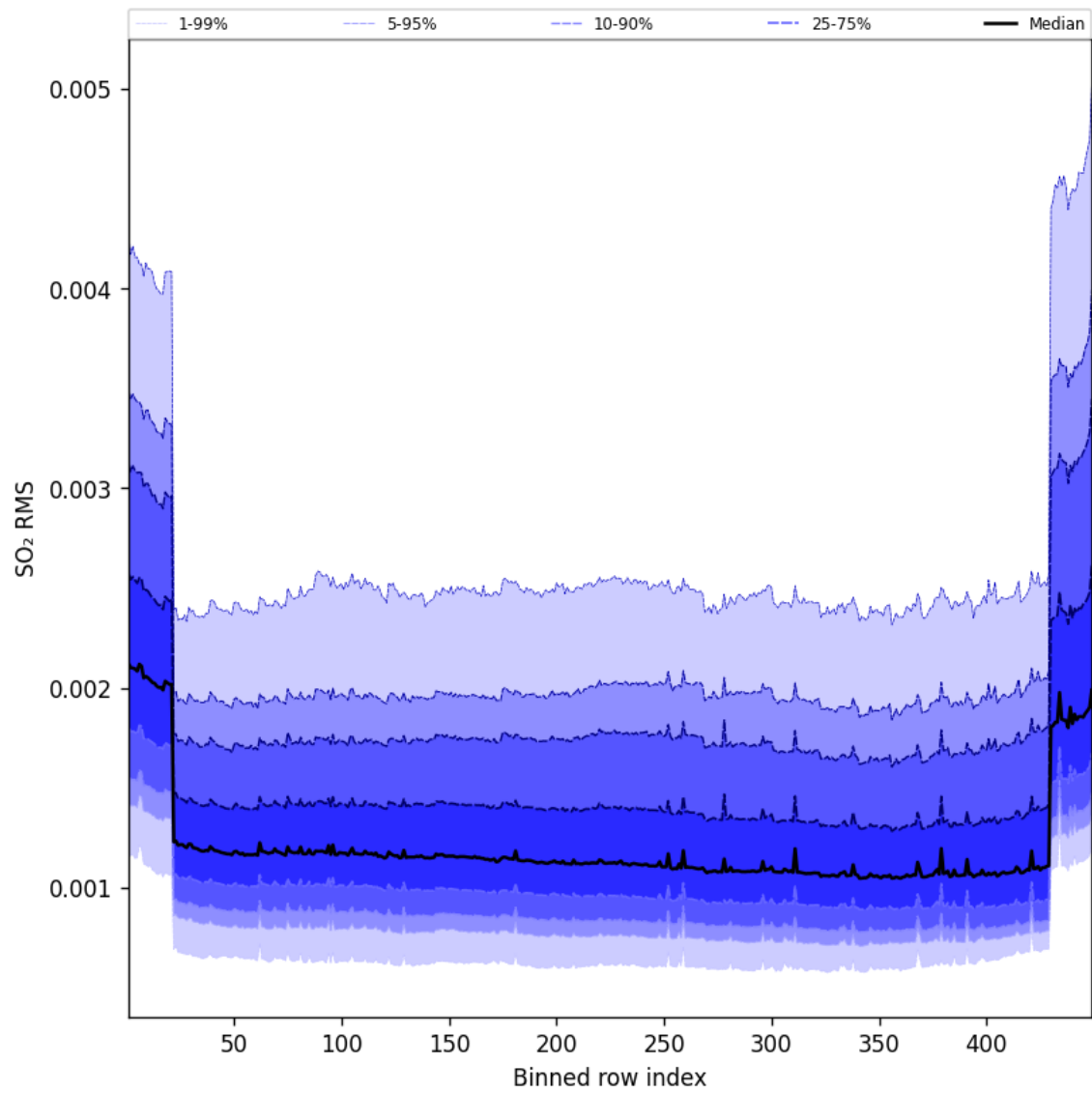


Figure 106: Along track statistics of “SO₂ RMS” for 2025-10-17 to 2025-10-18

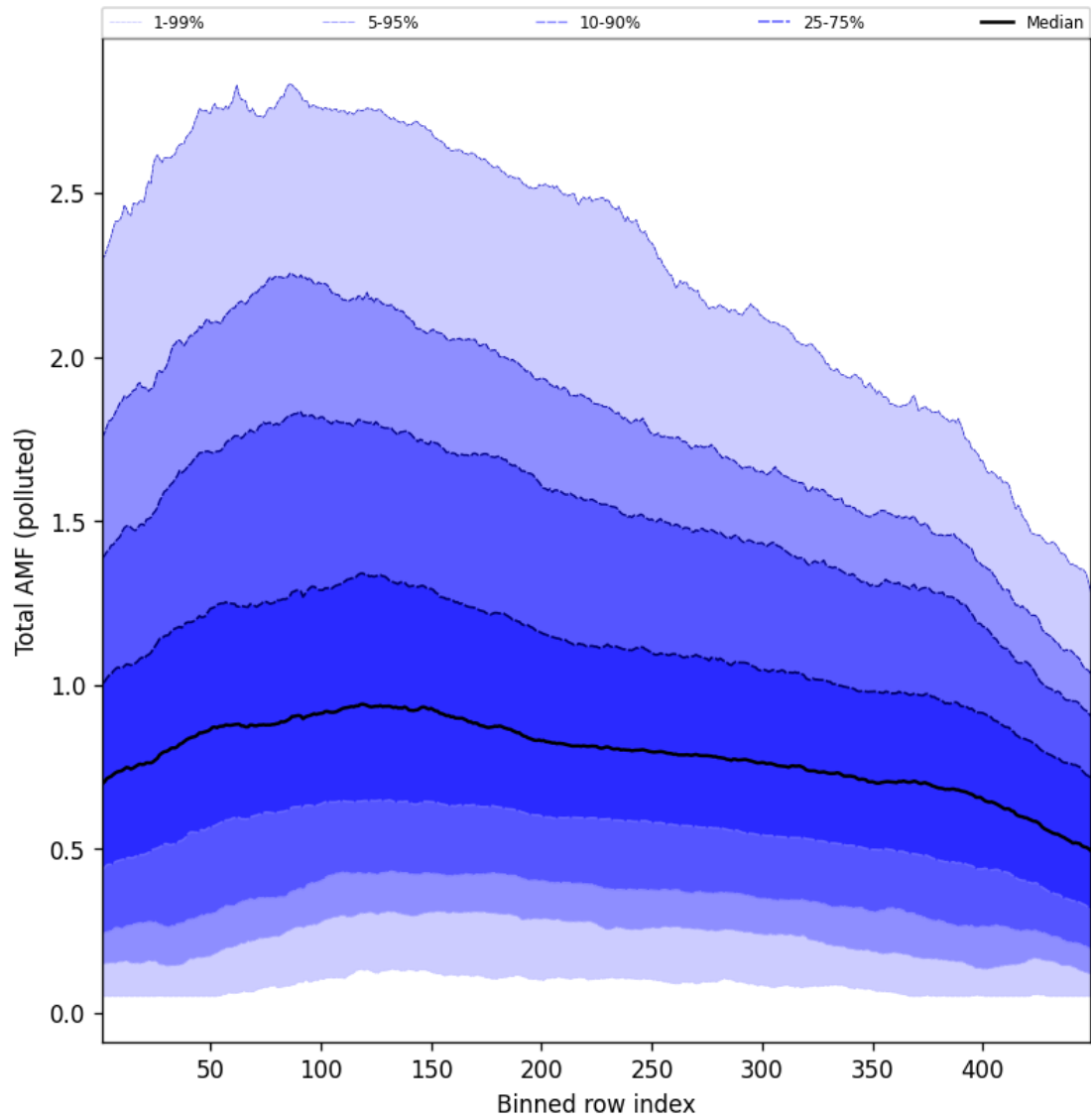


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-10-17 to 2025-10-18

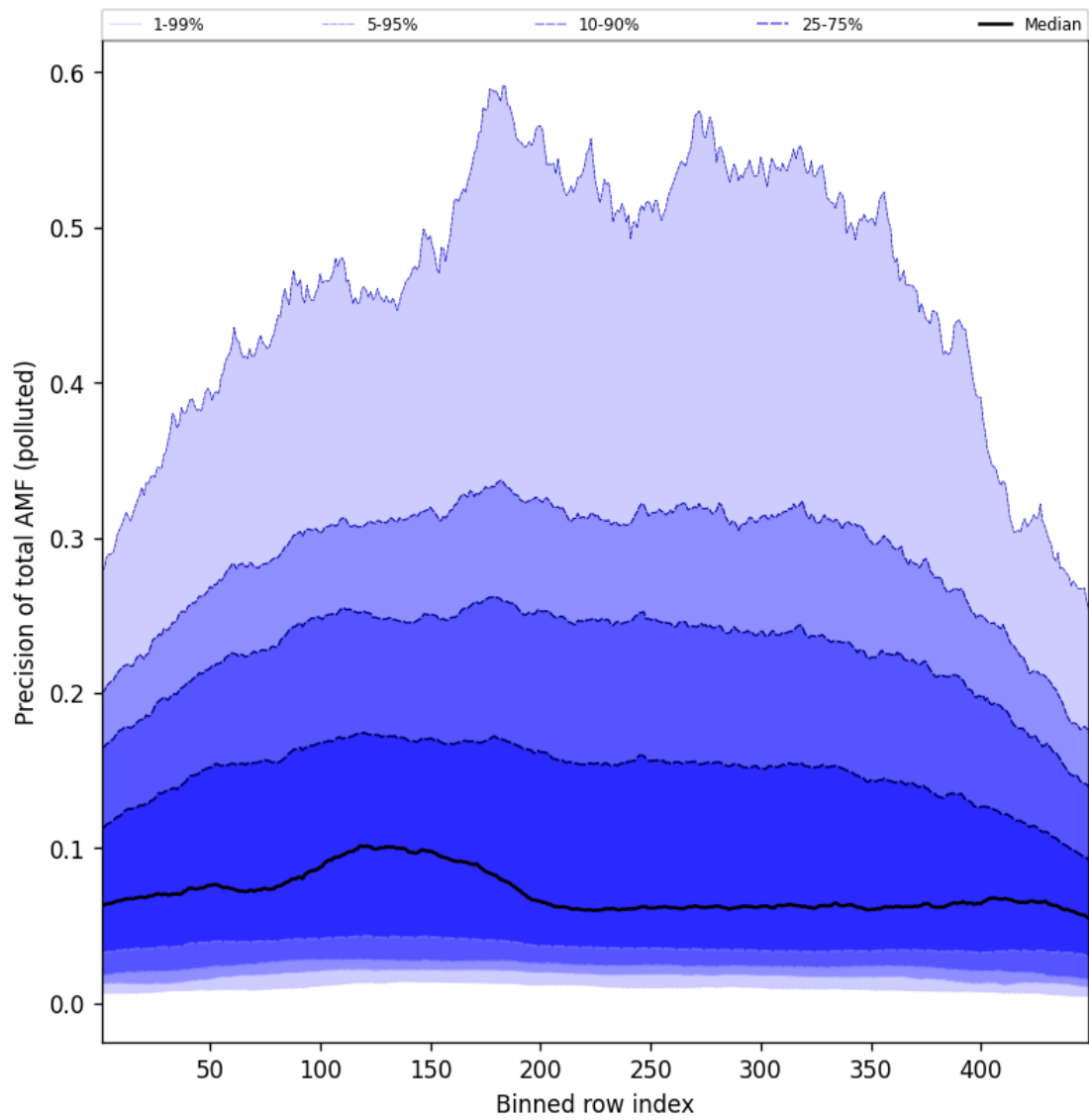


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-10-17 to 2025-10-18

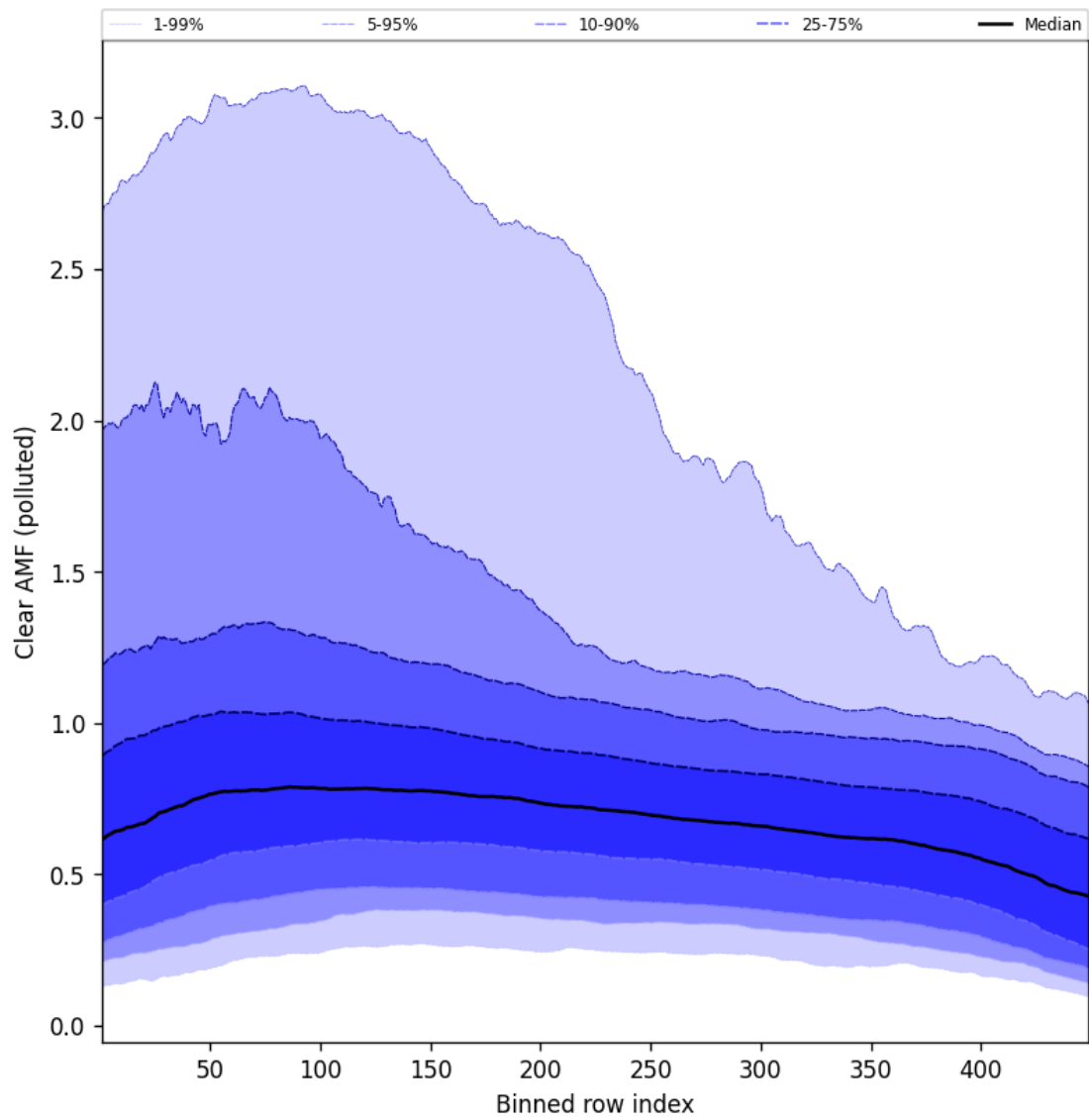


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-10-17 to 2025-10-18

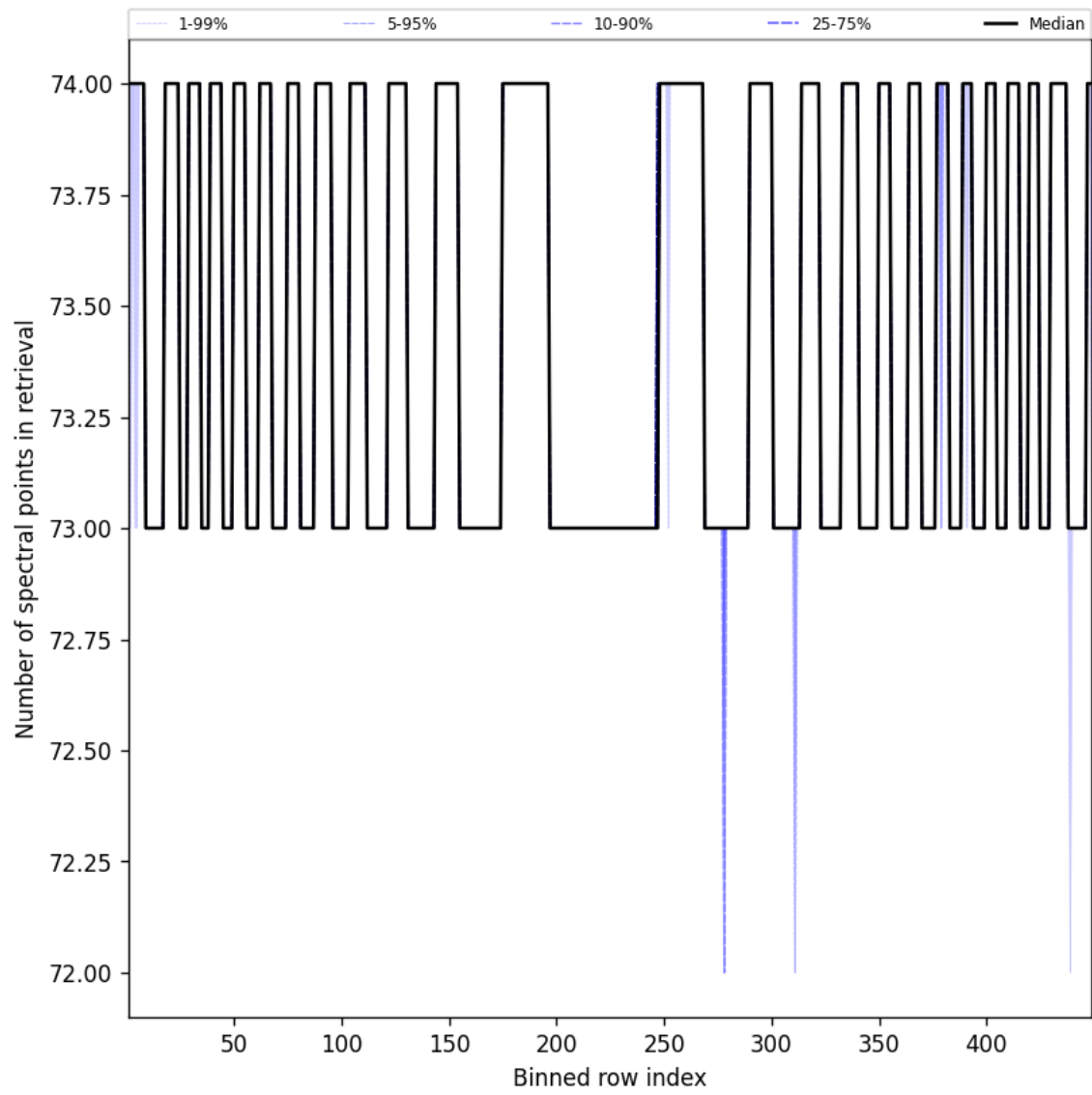


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-10-17 to 2025-10-18

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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