

PyCAMA report generated by tropl2-proc

tropl2-proc

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1 Short Introduction

1.1 The list of parameters

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

2 Definitions

The averages shown here are *unweighed* averages:

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

with N the number of observations in the dataset.

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

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

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

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

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

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

The median is a special case of a percentile. Instead of 1/2 in equation 3, other threshold values can be used. We report results for 1 %, 5 %, 10 %, 15.9 %, 25 %, 75 %, 84.1 %, 90 %, 95 % and 99 %. The inter quartile range is the difference between the 75 % and 25 % percentiles. Similarly the minimum and maximum values correspond to the 0 % and 100 % percentiles respectively.

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

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

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

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

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

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

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm \sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.689 ± 0.395	17227984	0.995	0.720	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.178 \pm 105.153) \times 10^{-2}$	17227984	0.263	0.459	1.059×10^{-2}	-193	383
sulfurdioxide total vertical column precision [DU]	0.502 ± 0.705	17227984	0.222	0.322	0.336	4.634×10^{-2}	384
sulfurdioxide slant column density corrected [DU]	$(1.921 \pm 39.052) \times 10^{-2}$	17227984	0.276	0.377	9.389×10^{-3}	-24.7	217
sulfurdioxide slant column density cobra [DU]	$(1.904 \pm 37.685) \times 10^{-2}$	17227984	0.276	0.377	9.389×10^{-3}	-24.7	68.5
sulfurdioxide slant column density cobra precision [DU]	0.306 ± 0.142	17227984	0.213	0.151	0.264	8.964×10^{-2}	33.7
sulfurdioxide slant column density window1 [DU]	0.117 ± 0.702	17227984	0.125	0.751	0.123	-75.8	160
sulfurdioxide slant column density window1 precision [DU]	0.306 ± 0.142	17227984	0.213	0.151	0.264	8.964×10^{-2}	33.7
sulfurdioxide slant column density corrected win1 [DU]	$(1.521 \pm 69.996) \times 10^{-2}$	17227984	-2.500×10^{-2}	0.744	-5.261×10^{-3}	-75.8	160
background so2 slant column offset window1 [DU]	-0.102 ± 0.141	17227984	-0.180	0.137	-0.125	-1.23	3.29
sulfurdioxide slant column density window2 [DU]	0.626 ± 9.422	17227984	-0.250	11.9	0.362	-709	1.148×10^3
sulfurdioxide slant column density window2 precision [DU]	8.51 ± 2.40	17227984	7.43	2.83	8.15	1.92	689
sulfurdioxide slant column density corrected win2 [DU]	0.567 ± 9.197	17227984	0.250	11.6	0.531	-708	1.150×10^3
background so2 slant column offset window2 [DU]	$(-5.915 \pm 220.939) \times 10^{-2}$	17227984	1.75	3.06	0.564	-10.5	8.38
sulfurdioxide slant column density window3 [DU]	-3.98 ± 25.13	17227984	-5.04	31.6	-3.69	-1.680×10^3	910
sulfurdioxide slant column density window3 precision [DU]	30.4 ± 14.2	17227984	23.7	11.0	26.6	10.3	927
sulfurdioxide slant column density corrected win3 [DU]	-3.41 ± 24.53	17227984	-2.80	30.9	-3.27	-1.684×10^3	903
background so2 slant column offset window3 [DU]	0.570 ± 5.987	17227984	-3.92	9.67	0.254	-21.0	22.6
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	17227984	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.262 \pm 6.867) \times 10^{-2}$	17227984	1.125×10^{-2}	2.237×10^{-2}	1.410×10^{-2}	1.917×10^{-4}	3.93
fitted radiance shift [nm]	$(-3.572 \pm 28.019) \times 10^{-4}$	17227984	-5.000×10^{-4}	1.970×10^{-3}	-3.475×10^{-4}	-6.550×10^{-2}	7.875×10^{-2}
fitted radiance squeeze [1]	$(-1.319 \pm 19.016) \times 10^{-5}$	17227984	-1.000×10^{-5}	2.125×10^{-4}	-7.814×10^{-6}	-1.573×10^{-2}	4.235×10^{-2}
fitted root mean square [1]	$(1.331 \pm 0.576) \times 10^{-3}$	17227984	9.750×10^{-4}	5.990×10^{-4}	1.167×10^{-3}	3.139×10^{-4}	0.118
sulfurdioxide total air mass factor polluted [1]	0.877 ± 0.421	17227984	0.700	0.514	0.804	5.000×10^{-2}	2.89
sulfurdioxide total air mass factor polluted precision [1]	0.106 ± 0.099	17227984	3.500×10^{-2}	0.103	7.256×10^{-2}	3.251×10^{-3}	1.98
sulfurdioxide clear air mass factor polluted [1]	0.736 ± 0.274	17227984	0.700	0.325	0.709	6.181×10^{-2}	2.75
number of spectral points in retrieval [1]	73.4 ± 0.5	17227984	73.0	1.000	73.0	51.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	1.000×10^{-2}	8.000×10^{-2}	0.150	0.280	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.05	-0.838	-0.529	-0.362	-0.216	0.243	0.402	0.586	0.937	2.41
sulfurdioxide total vertical column precision [DU]	9.840×10^{-2}	0.134	0.164	0.191	0.227	0.549	0.709	0.896	1.27	3.12
sulfurdioxide slant column density corrected [DU]	-0.902	-0.515	-0.371	-0.276	-0.177	0.200	0.304	0.408	0.573	1.08
sulfurdioxide slant column density cobra [DU]	-0.902	-0.515	-0.371	-0.276	-0.177	0.200	0.304	0.408	0.573	1.08
sulfurdioxide slant column density cobra precision [DU]	0.143	0.169	0.184	0.196	0.211	0.362	0.419	0.475	0.567	0.814
sulfurdioxide slant column density window1 [DU]	-1.79	-0.965	-0.658	-0.459	-0.255	0.496	0.694	0.885	1.18	1.98
sulfurdioxide slant column density window1 precision [DU]	0.143	0.169	0.184	0.196	0.211	0.362	0.419	0.475	0.567	0.814
sulfurdioxide slant column density corrected win1 [DU]	-1.74	-1.02	-0.744	-0.562	-0.371	0.373	0.581	0.787	1.11	2.02
background so2 slant column offset window1 [DU]	-0.338	-0.260	-0.230	-0.210	-0.187	-4.978×10^{-2}	-1.564×10^{-4}	5.522×10^{-2}	0.143	0.346
sulfurdioxide slant column density window2 [DU]	-21.1	-14.2	-10.8	-8.30	-5.46	6.42	9.55	12.4	16.4	24.7
sulfurdioxide slant column density window2 precision [DU]	4.43	5.38	5.94	6.38	6.91	9.74	10.7	11.5	12.7	15.4
sulfurdioxide slant column density corrected win2 [DU]	-21.6	-14.3	-10.8	-8.16	-5.26	6.35	9.28	11.9	15.5	23.1
background so2 slant column offset window2 [DU]	-6.02	-4.25	-3.26	-2.48	-1.48	1.59	1.86	2.08	2.40	4.29
sulfurdioxide slant column density window3 [DU]	-67.5	-45.8	-35.3	-27.8	-19.6	12.0	20.0	27.1	36.7	55.8
sulfurdioxide slant column density window3 precision [DU]	14.6	17.4	19.2	20.6	22.3	33.4	38.1	44.6	57.4	90.5
sulfurdioxide slant column density corrected win3 [DU]	-64.8	-43.9	-33.9	-26.6	-18.7	12.2	20.0	27.0	36.4	55.5
background so2 slant column offset window3 [DU]	-11.1	-8.06	-6.77	-5.74	-4.35	5.32	7.09	8.46	10.3	13.5
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]	9.670×10^{-4}	1.994×10^{-3}	3.521×10^{-3}	5.183×10^{-3}	7.351×10^{-3}	2.972×10^{-2}	4.749×10^{-2}	7.353×10^{-2}	0.122	0.301
fitted radiance shift [nm]	-8.693×10^{-3}	-4.503×10^{-3}	-3.035×10^{-3}	-2.165×10^{-3}	-1.385×10^{-3}	5.847×10^{-4}	1.359×10^{-3}	2.308×10^{-3}	3.927×10^{-3}	8.367×10^{-3}
fitted radiance squeeze [1]	-5.433×10^{-4}	-3.180×10^{-4}	-2.314×10^{-4}	-1.745×10^{-4}	-1.159×10^{-4}	9.662×10^{-5}	1.506×10^{-4}	2.015×10^{-4}	2.757×10^{-4}	4.525×10^{-4}
fitted root mean square [1]	6.000×10^{-4}	7.401×10^{-4}	8.180×10^{-4}	8.783×10^{-4}	9.535×10^{-4}	1.553×10^{-3}	1.808×10^{-3}	2.058×10^{-3}	2.430×10^{-3}	3.369×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.112	0.296	0.402	0.489	0.588	1.10	1.30	1.47	1.69	2.09
sulfurdioxide total air mass factor polluted precision [1]	1.213×10^{-2}	2.140×10^{-2}	2.755×10^{-2}	3.223×10^{-2}	3.900×10^{-2}	0.142	0.181	0.222	0.291	0.482
sulfurdioxide clear air mass factor polluted [1]	0.244	0.355	0.421	0.482	0.558	0.883	0.974	1.05	1.17	1.68
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]	0.687 ± 0.397	9840385	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(2.257 \pm 85.885) \times 10^{-2}$	9840385	0.435	9.252×10^{-3}	-44.0	69.9	-0.206	0.229
sulfurdioxide total vertical column precision [DU]	0.482 ± 0.636	9840385	0.313	0.314	4.634×10^{-2}	82.5	0.214	0.526
sulfurdioxide slant column density corrected [DU]	$(1.429 \pm 33.257) \times 10^{-2}$	9840385	0.355	8.160×10^{-3}	-7.11	44.8	-0.168	0.187
sulfurdioxide slant column density cobra [DU]	$(1.427 \pm 33.083) \times 10^{-2}$	9840385	0.355	8.160×10^{-3}	-7.11	17.8	-0.168	0.187
sulfurdioxide slant column density cobra precision [DU]	0.282 ± 0.115	9840385	0.122	0.248	8.964×10^{-2}	18.5	0.205	0.327
sulfurdioxide slant column density window1 [DU]	0.121 ± 0.629	9840385	0.713	0.125	-28.6	20.4	-0.234	0.479
sulfurdioxide slant column density window1 precision [DU]	0.282 ± 0.115	9840385	0.122	0.248	8.964×10^{-2}	18.5	0.205	0.327
sulfurdioxide slant column density corrected win1 [DU]	$(6.729 \pm 623.546) \times 10^{-3}$	9840385	0.705	-7.307×10^{-3}	-28.6	20.2	-0.355	0.350
background so2 slant column offset window1 [DU]	-0.114 ± 0.112	9840385	0.137	-0.128	-0.743	2.95	-0.190	-5.320×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.151 ± 9.059	9840385	11.5	-2.138×10^{-2}	-271	532	-5.71	5.82
sulfurdioxide slant column density window2 precision [DU]	8.37 ± 2.31	9840385	2.77	7.99	1.92	177	6.79	9.56
sulfurdioxide slant column density corrected win2 [DU]	0.506 ± 8.943	9840385	11.4	0.496	-273	529	-5.20	6.19
background so2 slant column offset window2 [DU]	0.355 ± 1.829	9840385	2.44	0.847	-9.17	8.38	-0.799	1.64
sulfurdioxide slant column density window3 [DU]	-3.15 ± 25.30	9840385	31.7	-2.90	-1.680×10^3	910	-18.8	12.9
sulfurdioxide slant column density window3 precision [DU]	30.5 ± 14.9	9840385	11.6	26.3	10.3	927	22.0	33.6
sulfurdioxide slant column density corrected win3 [DU]	-3.37 ± 24.57	9840385	31.0	-3.22	-1.684×10^3	903	-18.7	12.3
background so2 slant column offset window3 [DU]	-0.219 ± 6.239	9840385	10.7	-0.679	-21.0	17.1	-5.62	5.06
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	9840385	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.984 \pm 8.302) \times 10^{-2}$	9840385	3.343×10^{-2}	1.650×10^{-2}	1.917×10^{-4}	3.93	7.081×10^{-3}	4.051×10^{-2}
fitted radiance shift [nm]	$(-8.600 \pm 297.130) \times 10^{-5}$	9840385	1.882×10^{-3}	-1.226×10^{-4}	-4.570×10^{-2}	4.783×10^{-2}	-1.043×10^{-3}	8.395×10^{-4}
fitted radiance squeeze [1]	$(-2.257 \pm 16.845) \times 10^{-5}$	9840385	2.011×10^{-4}	-1.692×10^{-5}	-3.167×10^{-3}	8.220×10^{-3}	-1.200×10^{-4}	8.117×10^{-5}
fitted root mean square [1]	$(1.244 \pm 0.470) \times 10^{-3}$	9840385	5.084×10^{-4}	1.117×10^{-3}	3.347×10^{-4}	3.649×10^{-2}	9.292×10^{-4}	1.438×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.875 ± 0.443	9840385	0.549	0.812	5.000×10^{-2}	2.89	0.559	1.11
sulfurdioxide total air mass factor polluted precision [1]	0.112 ± 0.113	9840385	0.109	7.140×10^{-2}	3.251×10^{-3}	1.98	3.880×10^{-2}	0.147
sulfurdioxide clear air mass factor polluted [1]	0.753 ± 0.314	9840385	0.415	0.716	6.181×10^{-2}	2.64	0.526	0.940
number of spectral points in retrieval [1]	73.5 ± 0.5	9840385	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]	0.693 ± 0.391	7387599	0.710	1.000	0.0	1.000	0.290	1.000
sulfurdioxide total vertical column [DU]	$(4.404 \pm 126.324) \times 10^{-2}$	7387599	0.494	1.259×10^{-2}	-193	383	-0.230	0.264
sulfurdioxide total vertical column precision [DU]	0.530 ± 0.786	7387599	0.323	0.364	5.138×10^{-2}	384	0.251	0.574
sulfurdioxide slant column density corrected [DU]	$(2.575 \pm 45.635) \times 10^{-2}$	7387599	0.410	1.125×10^{-2}	-24.7	217	-0.191	0.219
sulfurdioxide slant column density cobra [DU]	$(2.541 \pm 43.050) \times 10^{-2}$	7387599	0.410	1.125×10^{-2}	-24.7	68.5	-0.191	0.219
sulfurdioxide slant column density cobra precision [DU]	0.337 ± 0.166	7387599	0.182	0.296	9.287×10^{-2}	33.7	0.223	0.405
sulfurdioxide slant column density window1 [DU]	0.112 ± 0.789	7387599	0.808	0.121	-75.8	160	-0.286	0.521
sulfurdioxide slant column density window1 precision [DU]	0.337 ± 0.166	7387599	0.182	0.296	9.287×10^{-2}	33.7	0.223	0.405
sulfurdioxide slant column density corrected win1 [DU]	$(2.650 \pm 79.022) \times 10^{-2}$	7387599	0.802	-2.158×10^{-3}	-75.8	160	-0.395	0.407
background so2 slant column offset window1 [DU]	$(-8.571 \pm 17.013) \times 10^{-2}$	7387599	0.138	-0.121	-1.23	3.29	-0.181	-4.369×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.26 ± 9.85	7387599	12.3	0.908	-709	1.148×10^3	-5.10	7.24
sulfurdioxide slant column density window2 precision [DU]	8.69 ± 2.51	7387599	2.87	8.37	2.11	689	7.09	9.96
sulfurdioxide slant column density corrected win2 [DU]	0.647 ± 9.524	7387599	11.9	0.581	-708	1.150×10^3	-5.35	6.57
background so2 slant column offset window2 [DU]	-0.611 ± 2.529	7387599	4.05	-4.354×10^{-2}	-10.5	8.23	-2.56	1.48
sulfurdioxide slant column density window3 [DU]	-5.08 ± 24.87	7387599	31.5	-4.74	-944	288	-20.6	10.9
sulfurdioxide slant column density window3 precision [DU]	30.2 ± 13.2	7387599	10.3	26.8	10.4	379	22.8	33.1
sulfurdioxide slant column density corrected win3 [DU]	-3.46 ± 24.46	7387599	30.9	-3.34	-949	284	-18.8	12.1
background so2 slant column offset window3 [DU]	1.62 ± 5.46	7387599	8.48	1.02	-18.0	22.6	-2.77	5.70
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	7387599	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.300 \pm 4.068) \times 10^{-2}$	7387599	1.385×10^{-2}	1.203×10^{-2}	2.496×10^{-4}	1.00	7.501×10^{-3}	2.135×10^{-2}
fitted radiance shift [nm]	$(-7.185 \pm 25.138) \times 10^{-4}$	7387599	1.951×10^{-3}	-6.689×10^{-4}	-6.550×10^{-2}	7.875×10^{-2}	-1.744×10^{-3}	2.075×10^{-4}
fitted radiance squeeze [1]	$(-6.965 \pm 2150.757) \times 10^{-7}$	7387599	2.285×10^{-4}	5.875×10^{-6}	-1.573×10^{-2}	4.235×10^{-2}	-1.095×10^{-4}	1.190×10^{-4}
fitted root mean square [1]	$(1.446 \pm 0.676) \times 10^{-3}$	7387599	7.199×10^{-4}	1.252×10^{-3}	3.139×10^{-4}	0.118	9.954×10^{-4}	1.715×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.879 ± 0.390	7387599	0.478	0.795	5.000×10^{-2}	2.75	0.615	1.09
sulfurdioxide total air mass factor polluted precision [1]	$(9.833 \pm 7.662) \times 10^{-2}$	7387599	9.766×10^{-2}	7.405×10^{-2}	3.564×10^{-3}	1.54	3.918×10^{-2}	0.137
sulfurdioxide clear air mass factor polluted [1]	0.714 ± 0.208	7387599	0.236	0.703	9.969×10^{-2}	2.75	0.590	0.826
number of spectral points in retrieval [1]	73.4 ± 0.5	7387599	1.000	73.0	51.0	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]	0.693 ± 0.391	11587045	0.710	1.000	0.0	1.000	0.290	1.000
sulfurdioxide total vertical column [DU]	$(3.479 \pm 112.119) \times 10^{-2}$	11587045	0.448	1.096×10^{-2}	-193	307	-0.210	0.238
sulfurdioxide total vertical column precision [DU]	0.495 ± 0.736	11587045	0.304	0.322	5.137×10^{-2}	82.5	0.223	0.527
sulfurdioxide slant column density corrected [DU]	$(2.076 \pm 39.653) \times 10^{-2}$	11587045	0.374	9.754×10^{-3}	-24.7	59.3	-0.175	0.199
sulfurdioxide slant column density cobra [DU]	$(2.060 \pm 38.791) \times 10^{-2}$	11587045	0.374	9.754×10^{-3}	-24.7	22.0	-0.175	0.199
sulfurdioxide slant column density cobra precision [DU]	0.308 ± 0.151	11587045	0.165	0.257	9.266×10^{-2}	33.7	0.206	0.371
sulfurdioxide slant column density window1 [DU]	0.119 ± 0.718	11587045	0.748	0.128	-63.0	58.5	-0.250	0.499
sulfurdioxide slant column density window1 precision [DU]	0.308 ± 0.151	11587045	0.165	0.257	9.266×10^{-2}	33.7	0.206	0.371
sulfurdioxide slant column density corrected win1 [DU]	$(1.997 \pm 71.612) \times 10^{-2}$	11587045	0.742	-3.009×10^{-3}	-63.0	58.4	-0.368	0.374
background so2 slant column offset window1 [DU]	$(-9.922 \pm 15.373) \times 10^{-2}$	11587045	0.138	-0.129	-1.23	3.29	-0.189	-5.081×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.762 ± 9.317	11587045	11.7	0.436	-709	594	-5.30	6.45
sulfurdioxide slant column density window2 precision [DU]	8.33 ± 2.28	11587045	2.77	7.97	1.92	689	6.78	9.55
sulfurdioxide slant column density corrected win2 [DU]	0.606 ± 9.036	11587045	11.4	0.553	-708	595	-5.14	6.29
background so2 slant column offset window2 [DU]	-0.156 ± 2.362	11587045	3.40	0.626	-10.5	8.38	-1.78	1.62
sulfurdioxide slant column density window3 [DU]	-1.46 ± 24.68	11587045	31.2	-1.38	-997	233	-16.9	14.3
sulfurdioxide slant column density window3 precision [DU]	28.7 ± 12.3	11587045	10.0	25.6	10.3	927	21.7	31.8
sulfurdioxide slant column density corrected win3 [DU]	-1.03 ± 23.75	11587045	30.2	-1.15	-1.003×10^3	227	-16.1	14.1
background so2 slant column offset window3 [DU]	0.433 ± 6.025	11587045	9.69	-0.234	-21.0	22.6	-4.47	5.22
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	11587045	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.040 \pm 3.616) \times 10^{-2}$	11587045	1.405×10^{-2}	1.266×10^{-2}	2.496×10^{-4}	3.68	7.688×10^{-3}	2.174×10^{-2}
fitted radiance shift [nm]	$(-4.379 \pm 24.852) \times 10^{-4}$	11587045	1.937×10^{-3}	-3.943×10^{-4}	-4.570×10^{-2}	7.284×10^{-2}	-1.449×10^{-3}	4.875×10^{-4}
fitted radiance squeeze [1]	$(-7.540 \pm 193.513) \times 10^{-6}$	11587045	2.099×10^{-4}	-1.360×10^{-6}	-1.573×10^{-2}	1.422×10^{-2}	-1.079×10^{-4}	1.020×10^{-4}
fitted root mean square [1]	$(1.339 \pm 0.618) \times 10^{-3}$	11587045	6.553×10^{-4}	1.138×10^{-3}	3.139×10^{-4}	7.721×10^{-2}	9.324×10^{-4}	1.588×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.880 ± 0.389	11587045	0.471	0.826	5.000×10^{-2}	2.75	0.621	1.09
sulfurdioxide total air mass factor polluted precision [1]	$(9.932 \pm 8.802) \times 10^{-2}$	11587045	9.082×10^{-2}	7.046×10^{-2}	3.280×10^{-3}	1.98	4.094×10^{-2}	0.132
sulfurdioxide clear air mass factor polluted [1]	0.743 ± 0.232	11587045	0.293	0.730	6.181×10^{-2}	2.75	0.596	0.889
number of spectral points in retrieval [1]	73.4 ± 0.5	11587045	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]	0.718 ± 0.394	3983594	0.700	1.000	0.0	1.000	0.300	1.000
sulfurdioxide total vertical column [DU]	$(2.190 \pm 82.631) \times 10^{-2}$	3983594	0.470	9.340×10^{-3}	-30.8	383	-0.222	0.248
sulfurdioxide total vertical column precision [DU]	0.491 ± 0.574	3983594	0.329	0.363	4.634×10^{-2}	384	0.234	0.562
sulfurdioxide slant column density corrected [DU]	$(1.542 \pm 37.158) \times 10^{-2}$	3983594	0.368	8.162×10^{-3}	-9.55	217	-0.174	0.194
sulfurdioxide slant column density cobra [DU]	$(1.523 \pm 33.852) \times 10^{-2}$	3983594	0.368	8.162×10^{-3}	-9.55	68.5	-0.174	0.194
sulfurdioxide slant column density cobra precision [DU]	0.288 ± 0.113	3983594	0.108	0.261	8.964×10^{-2}	28.9	0.218	0.326
sulfurdioxide slant column density window1 [DU]	0.128 ± 0.642	3983594	0.727	0.125	-75.8	160	-0.239	0.489
sulfurdioxide slant column density window1 precision [DU]	0.288 ± 0.113	3983594	0.108	0.261	8.964×10^{-2}	28.9	0.218	0.326
sulfurdioxide slant column density corrected win1 [DU]	$(3.087 \pm 637.860) \times 10^{-3}$	3983594	0.721	-1.117×10^{-2}	-75.8	160	-0.367	0.354
background so2 slant column offset window1 [DU]	-0.125 ± 0.104	3983594	0.120	-0.135	-0.732	2.95	-0.191	-7.065×10^{-2}
sulfurdioxide slant column density window2 [DU]	$(2.480 \pm 951.810) \times 10^{-2}$	3983594	12.0	-9.452×10^{-2}	-616	1.148×10^3	-6.03	5.95
sulfurdioxide slant column density window2 precision [DU]	8.77 ± 2.64	3983594	2.77	8.39	2.22	626	7.16	9.93
sulfurdioxide slant column density corrected win2 [DU]	0.495 ± 9.423	3983594	11.8	0.488	-615	1.150×10^3	-5.43	6.41
background so2 slant column offset window2 [DU]	0.470 ± 1.715	3983594	2.18	0.875	-9.34	8.38	-0.550	1.63
sulfurdioxide slant column density window3 [DU]	-9.11 ± 25.15	3983594	31.6	-8.51	-1.680×10^3	238	-24.6	6.96
sulfurdioxide slant column density window3 precision [DU]	33.8 ± 17.8	3983594	12.6	28.5	10.7	884	23.9	36.5
sulfurdioxide slant column density corrected win3 [DU]	-9.35 ± 25.23	3983594	31.7	-8.92	-1.684×10^3	231	-25.0	6.72
background so2 slant column offset window3 [DU]	-0.240 ± 5.708	3983594	9.14	-0.757	-21.0	16.5	-4.82	4.32
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.11	3983594	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.369 \pm 10.708) \times 10^{-2}$	3983594	6.955×10^{-2}	2.949×10^{-2}	1.917×10^{-4}	3.93	8.379×10^{-3}	7.793×10^{-2}
fitted radiance shift [nm]	$(-1.993 \pm 34.811) \times 10^{-4}$	3983594	1.953×10^{-3}	-2.624×10^{-4}	-6.550×10^{-2}	7.875×10^{-2}	-1.198×10^{-3}	7.552×10^{-4}
fitted radiance squeeze [1]	$(-1.853 \pm 17.678) \times 10^{-5}$	3983594	2.093×10^{-4}	-1.629×10^{-5}	-1.378×10^{-2}	4.235×10^{-2}	-1.221×10^{-4}	8.721×10^{-5}
fitted root mean square [1]	$(1.261 \pm 0.448) \times 10^{-3}$	3983594	4.394×10^{-4}	1.169×10^{-3}	3.278×10^{-4}	0.118	9.839×10^{-4}	1.423×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.854 ± 0.466	3983594	0.544	0.731	5.000×10^{-2}	2.89	0.533	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.120 ± 0.121	3983594	0.135	7.109×10^{-2}	3.882×10^{-3}	1.54	3.359×10^{-2}	0.169
sulfurdioxide clear air mass factor polluted [1]	0.716 ± 0.333	3983594	0.348	0.641	0.102	2.64	0.498	0.846
number of spectral points in retrieval [1]	73.4 ± 0.5	3983594	1.000	73.0	51.0	74.0	73.0	74.0

3 Granule outlines

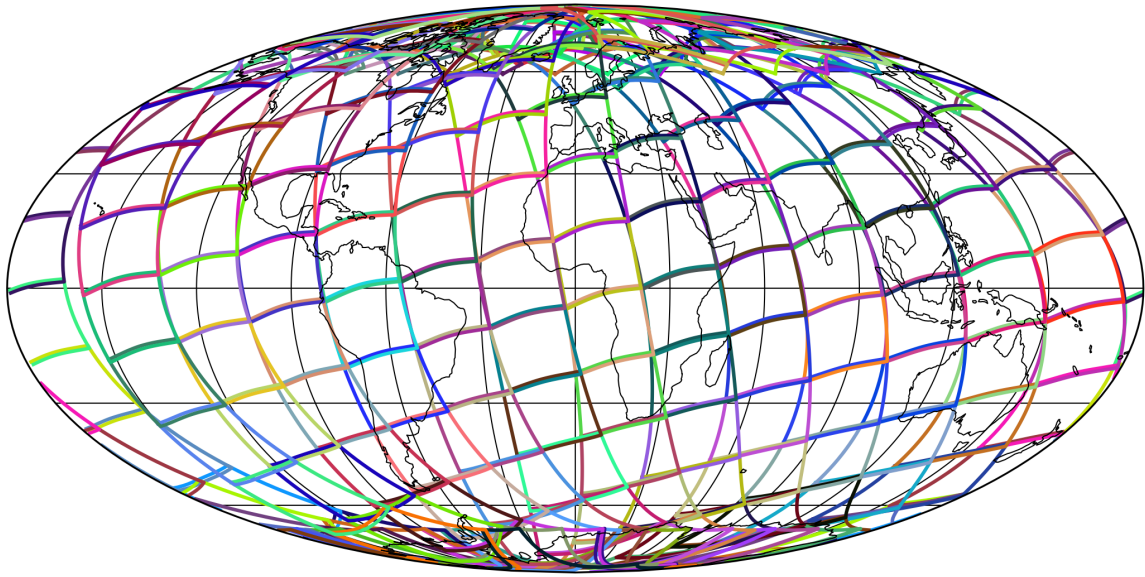


Figure 1: Outline of the granules.

4 Input data monitoring

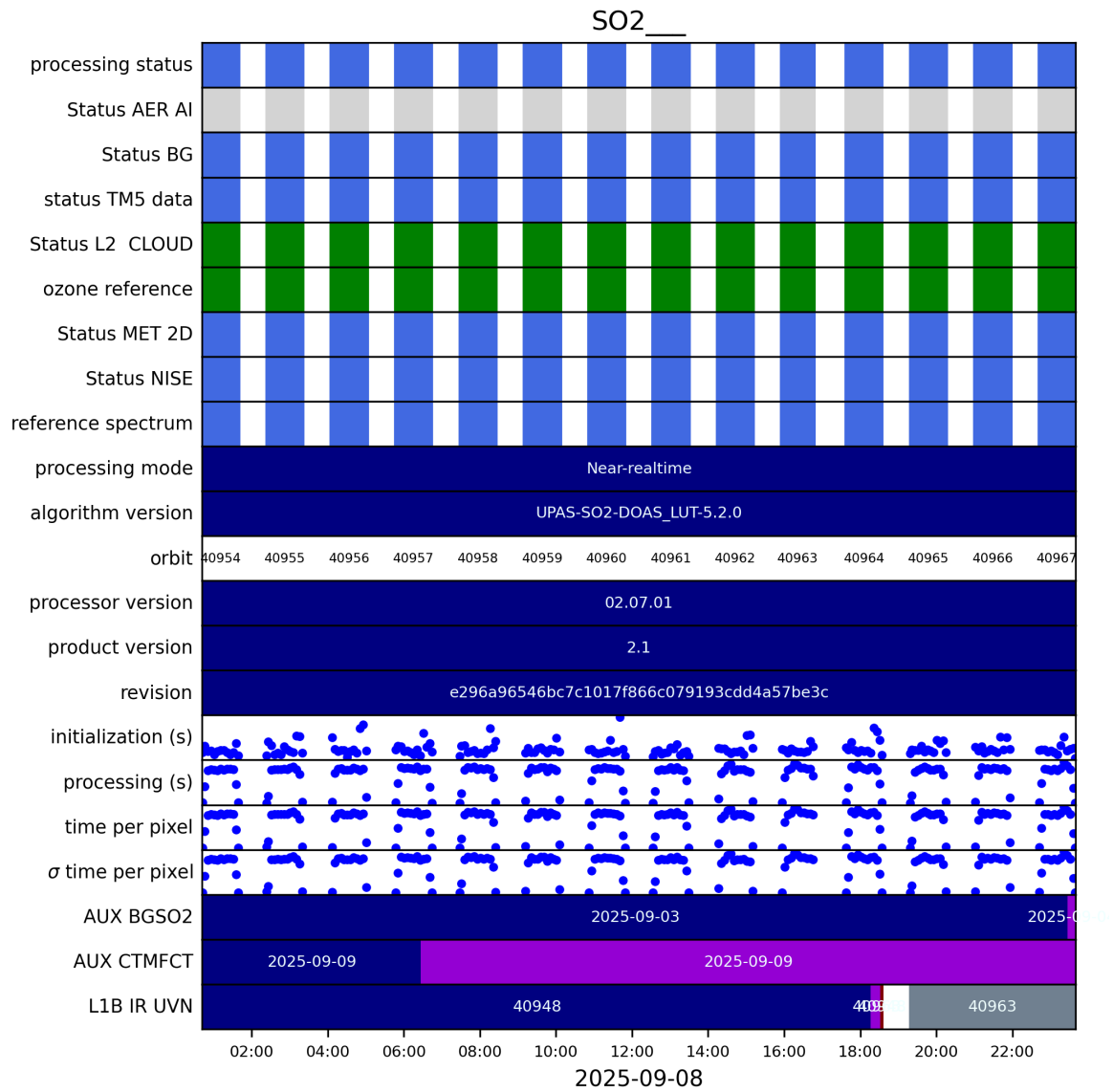


Figure 2: Input data per granule

5 Warnings and errors

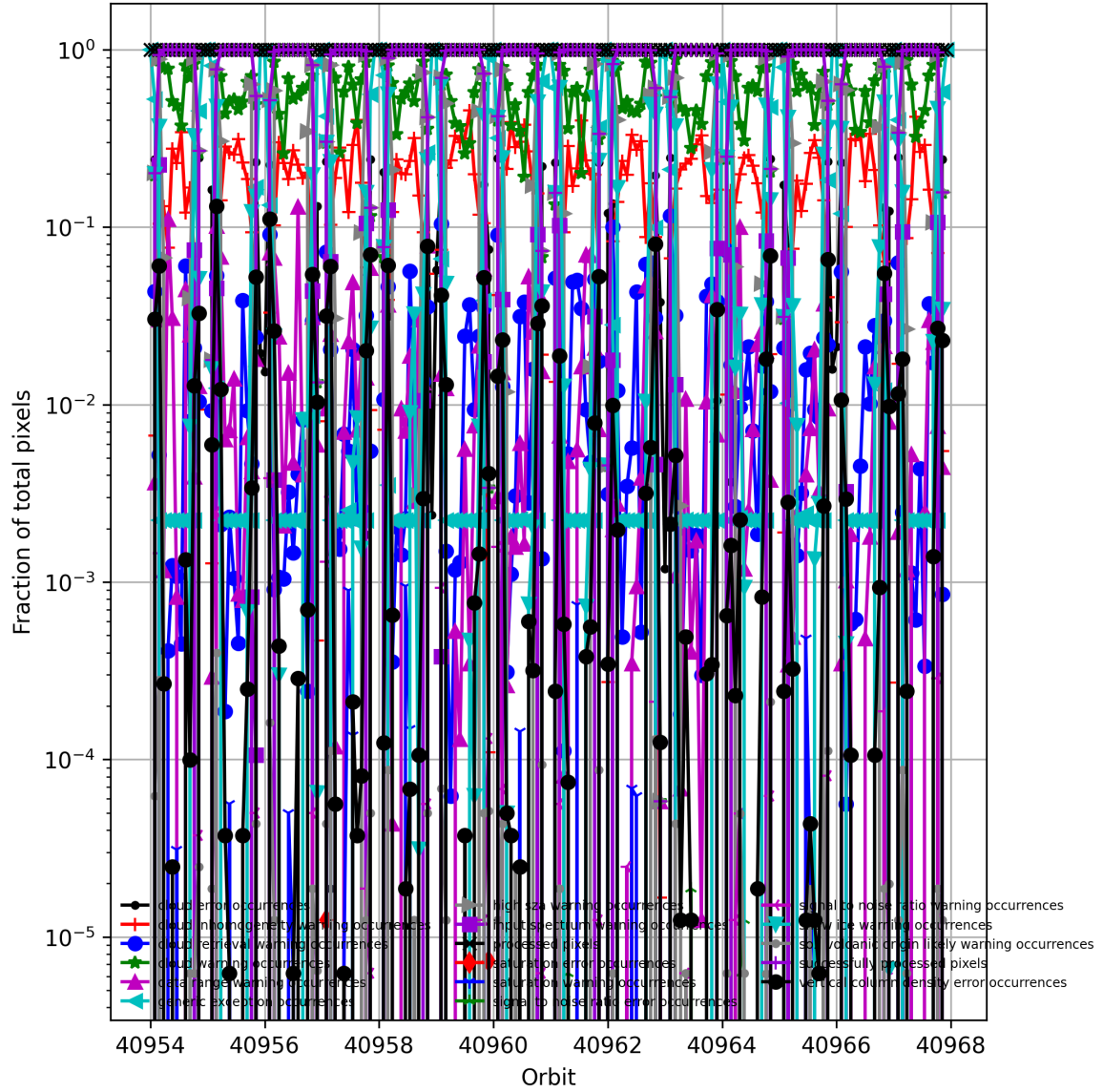


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

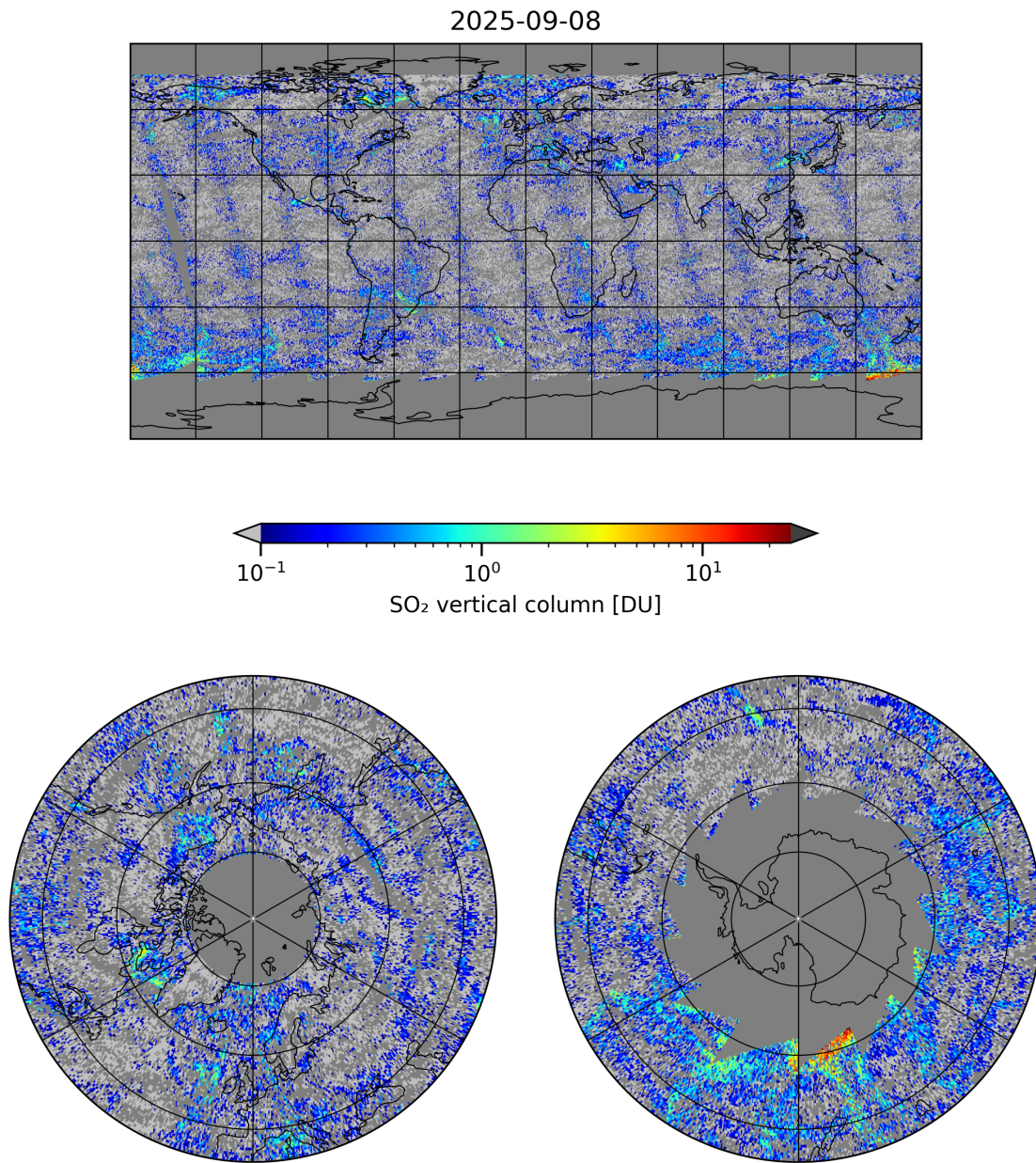


Figure 4: Map of “SO₂ vertical column” for 2025-09-08 to 2025-09-08

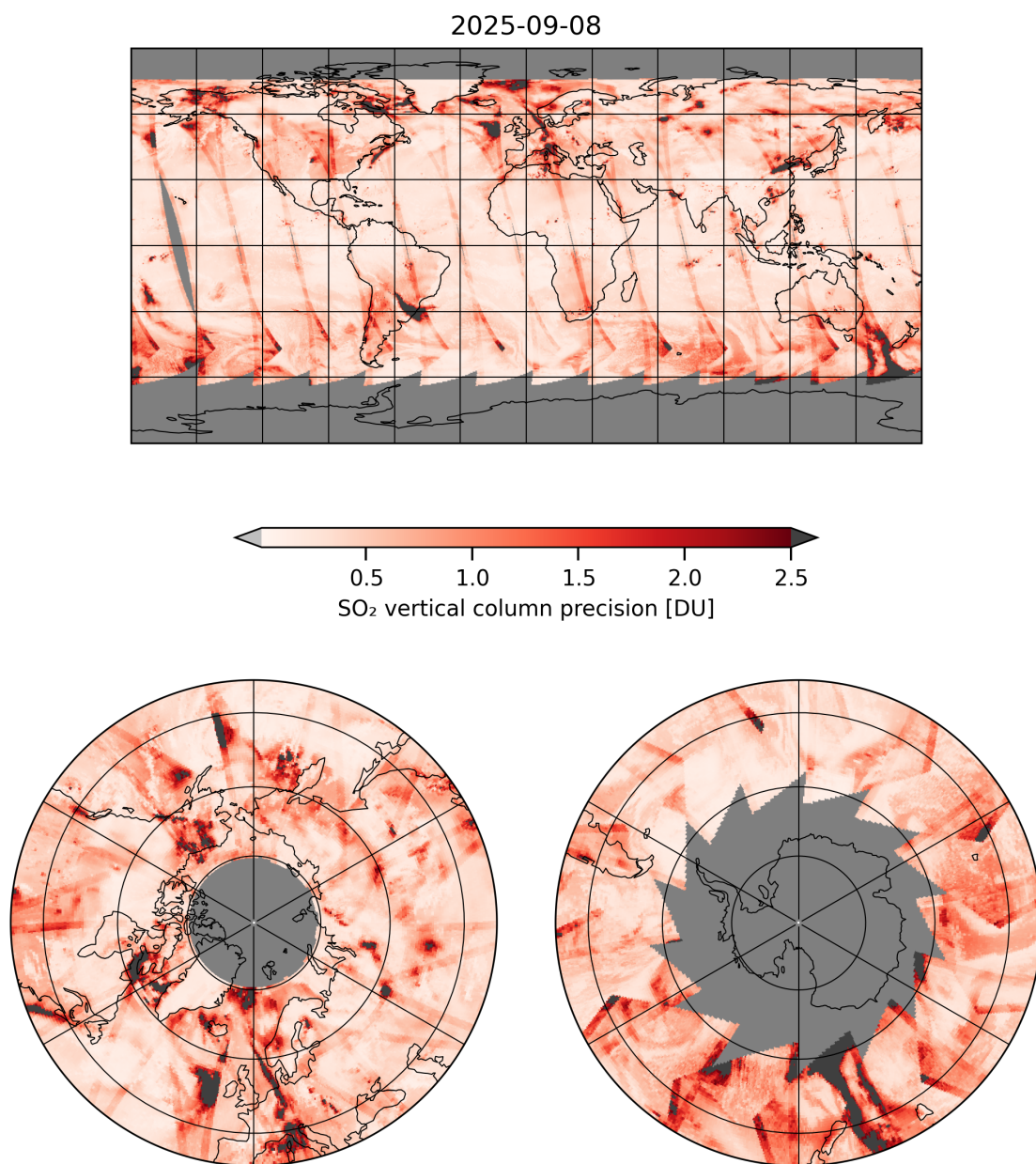


Figure 5: Map of “SO₂ vertical column precision” for 2025-09-08 to 2025-09-08

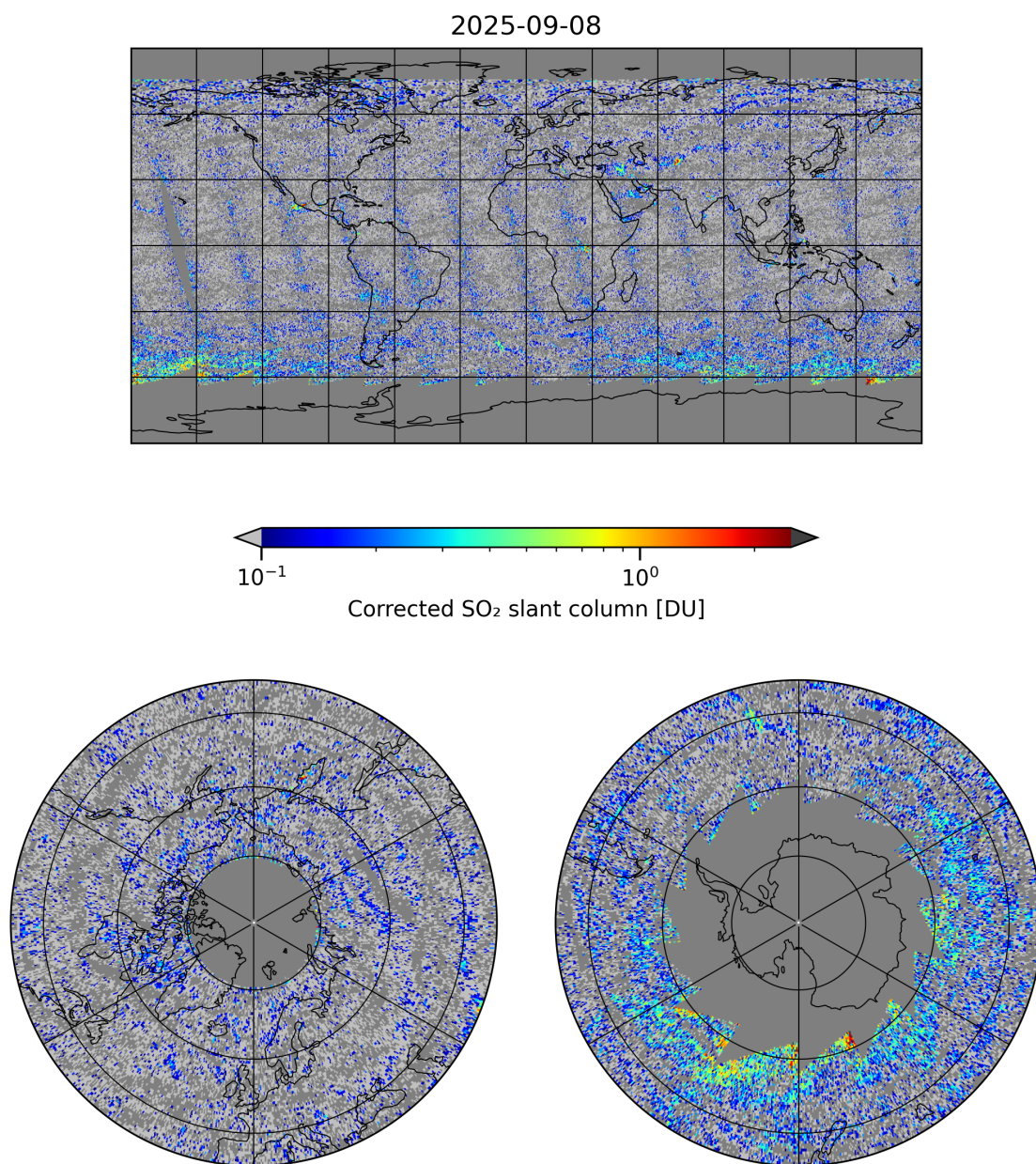


Figure 6: Map of “Corrected SO₂ slant column” for 2025-09-08 to 2025-09-08

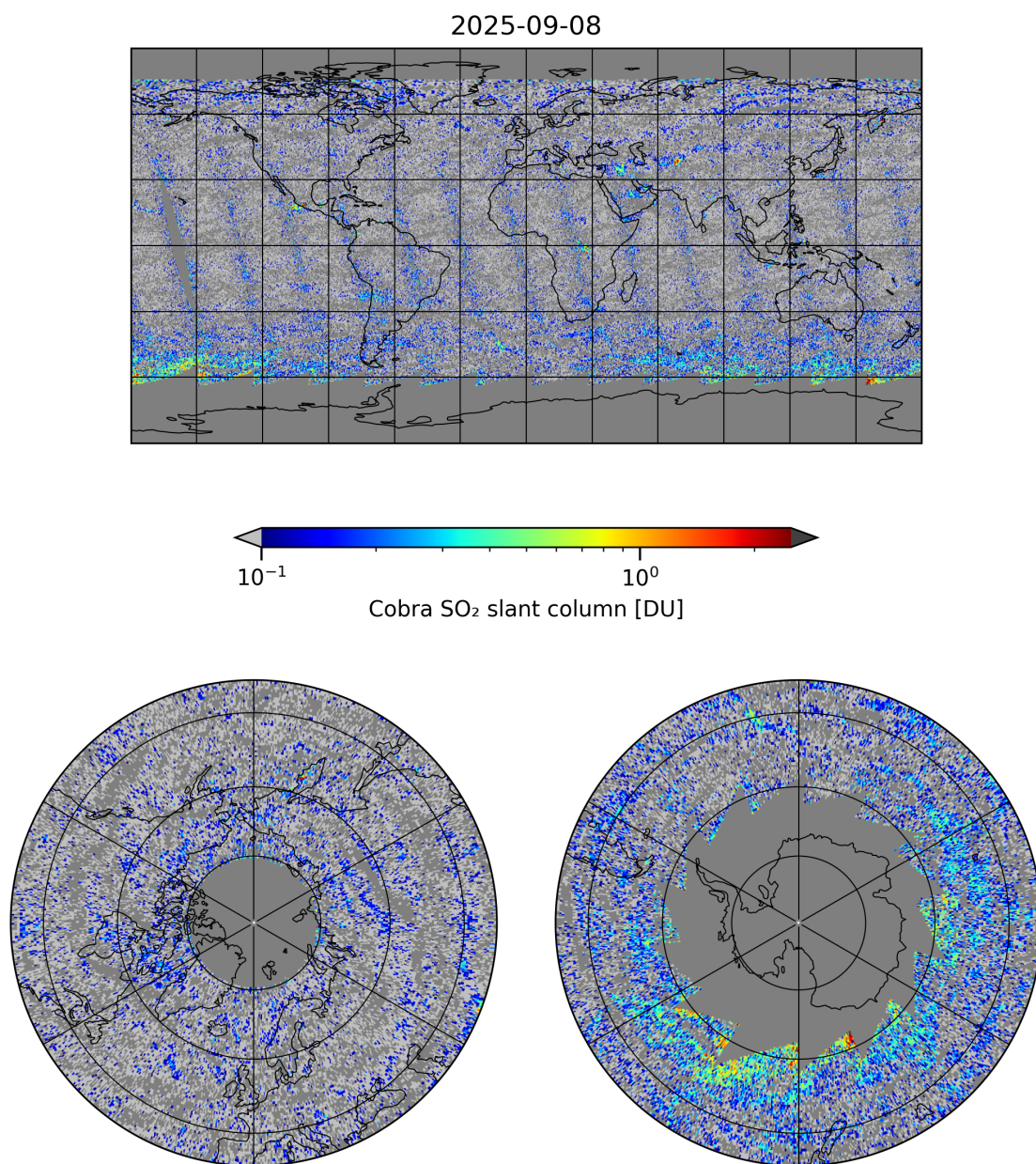


Figure 7: Map of “Cobra SO₂ slant column” for 2025-09-08 to 2025-09-08

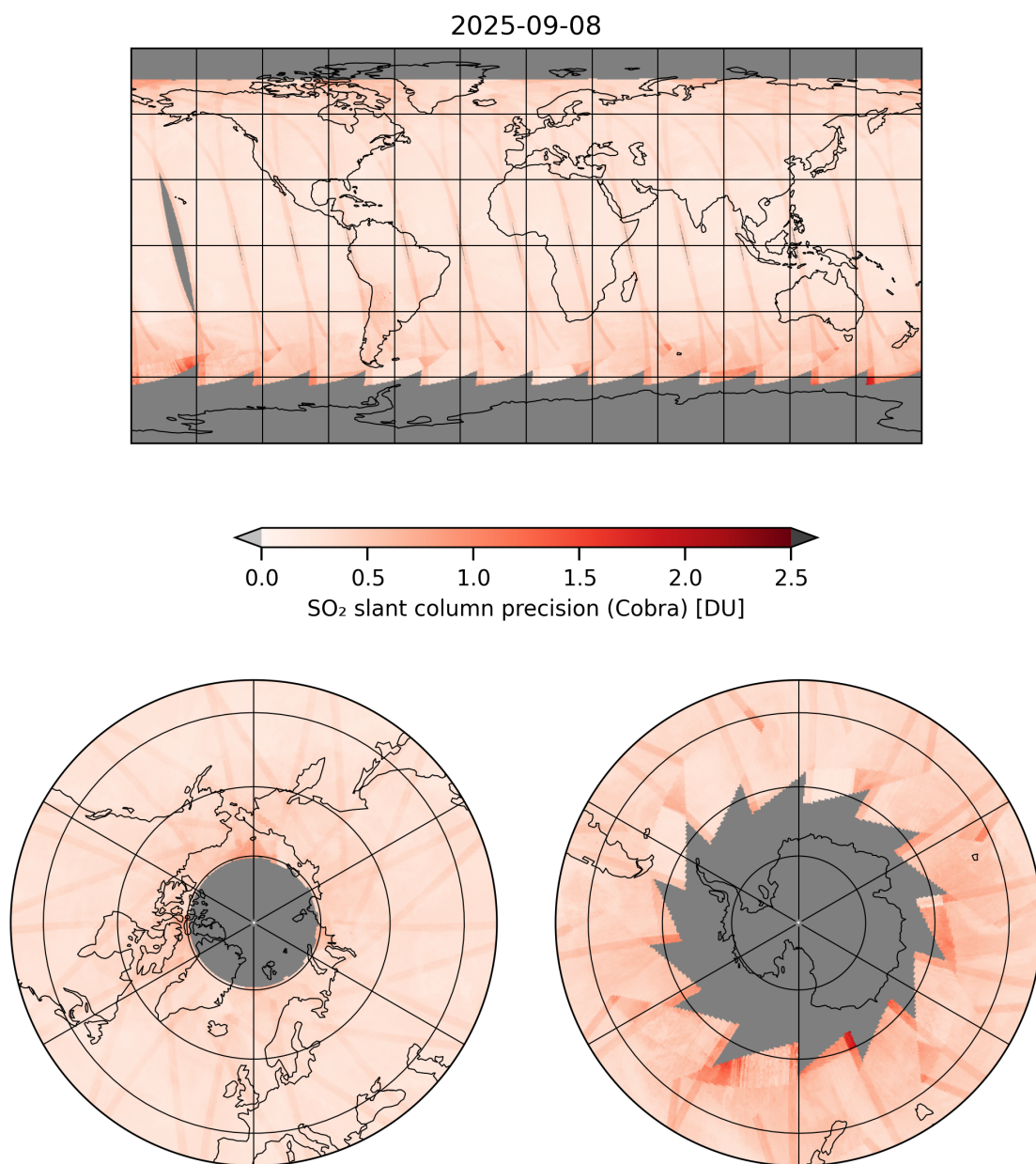


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-09-08 to 2025-09-08

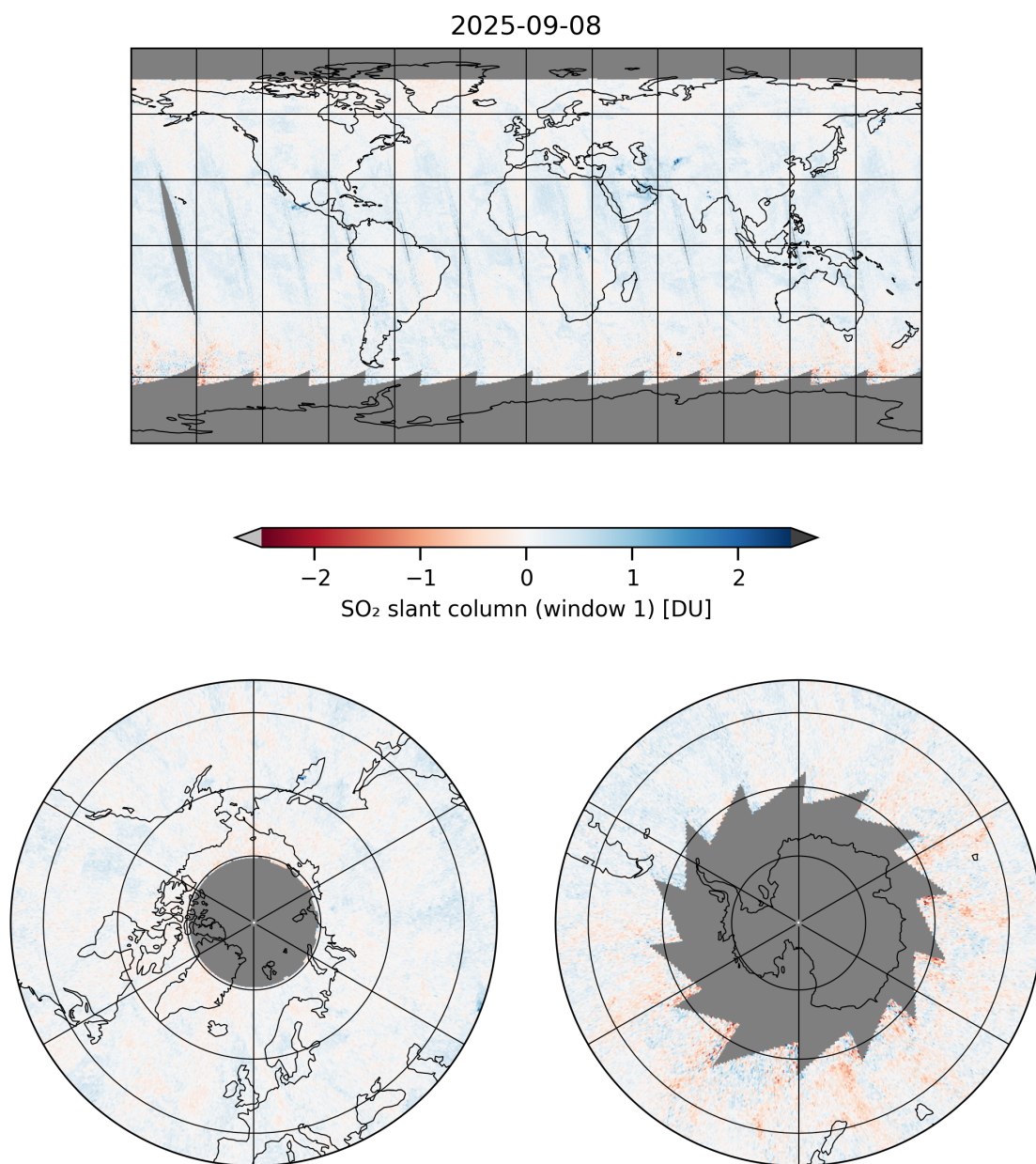


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-09-08 to 2025-09-08

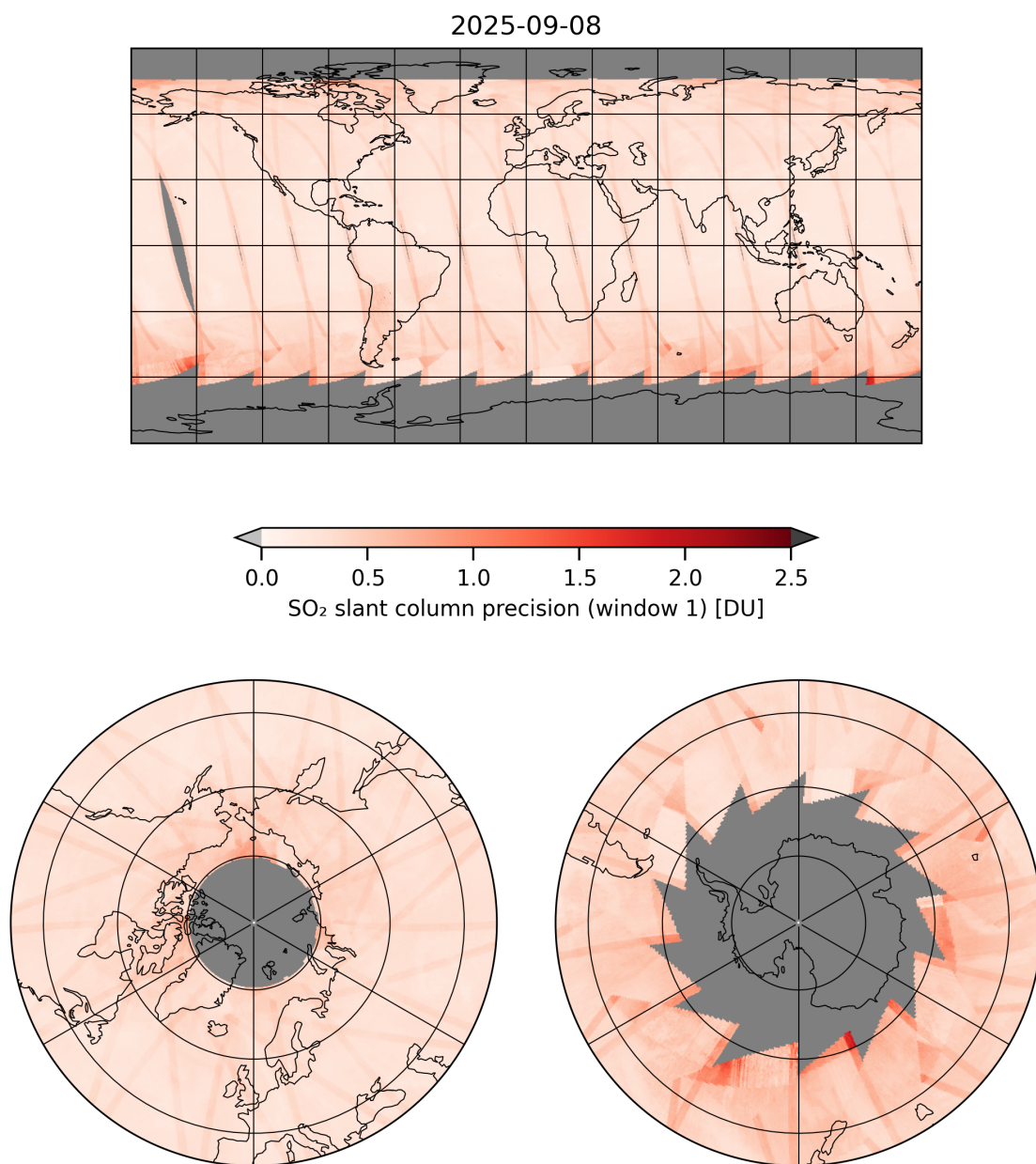


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-09-08 to 2025-09-08

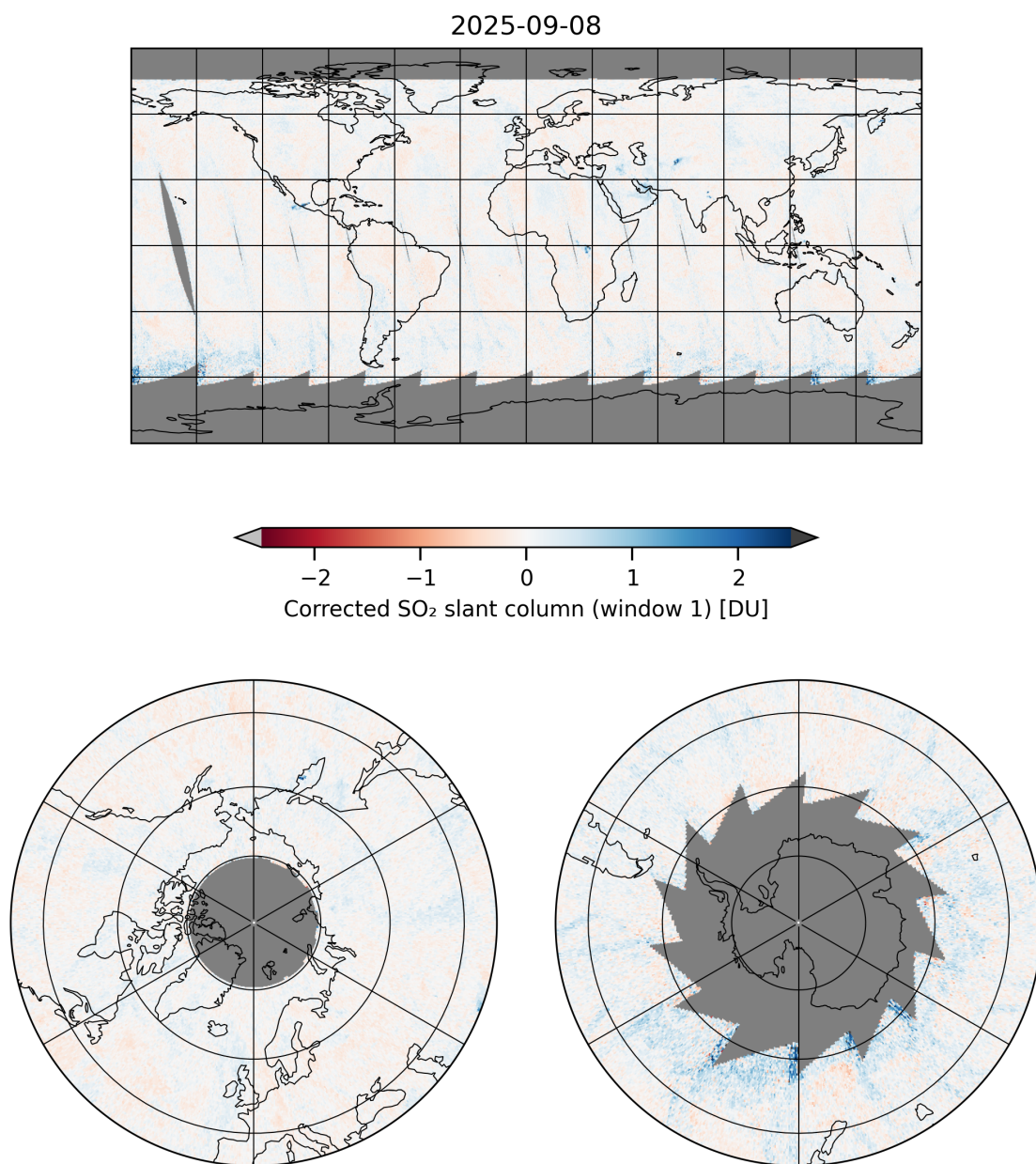


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-09-08 to 2025-09-08

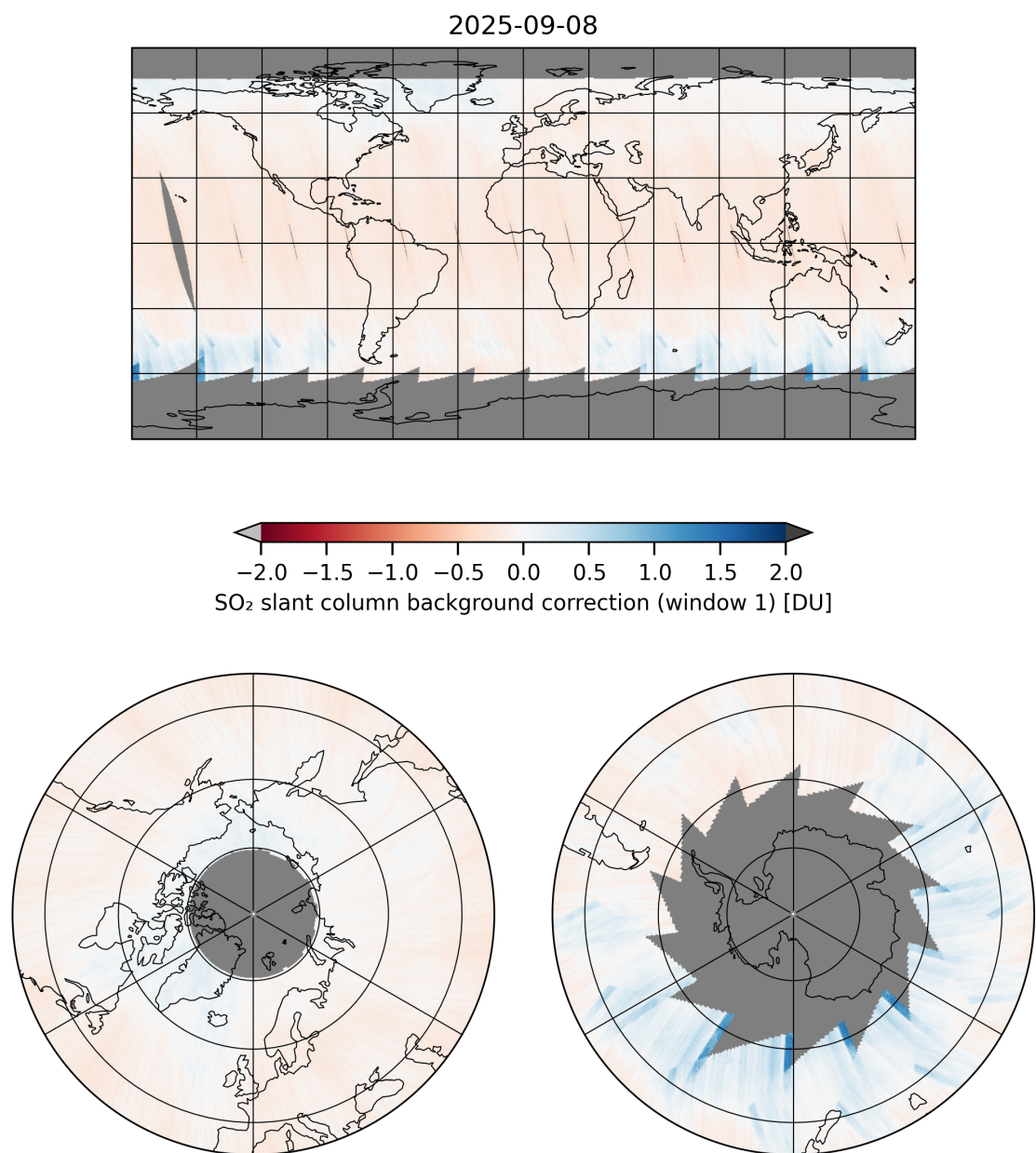


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-09-08 to 2025-09-08

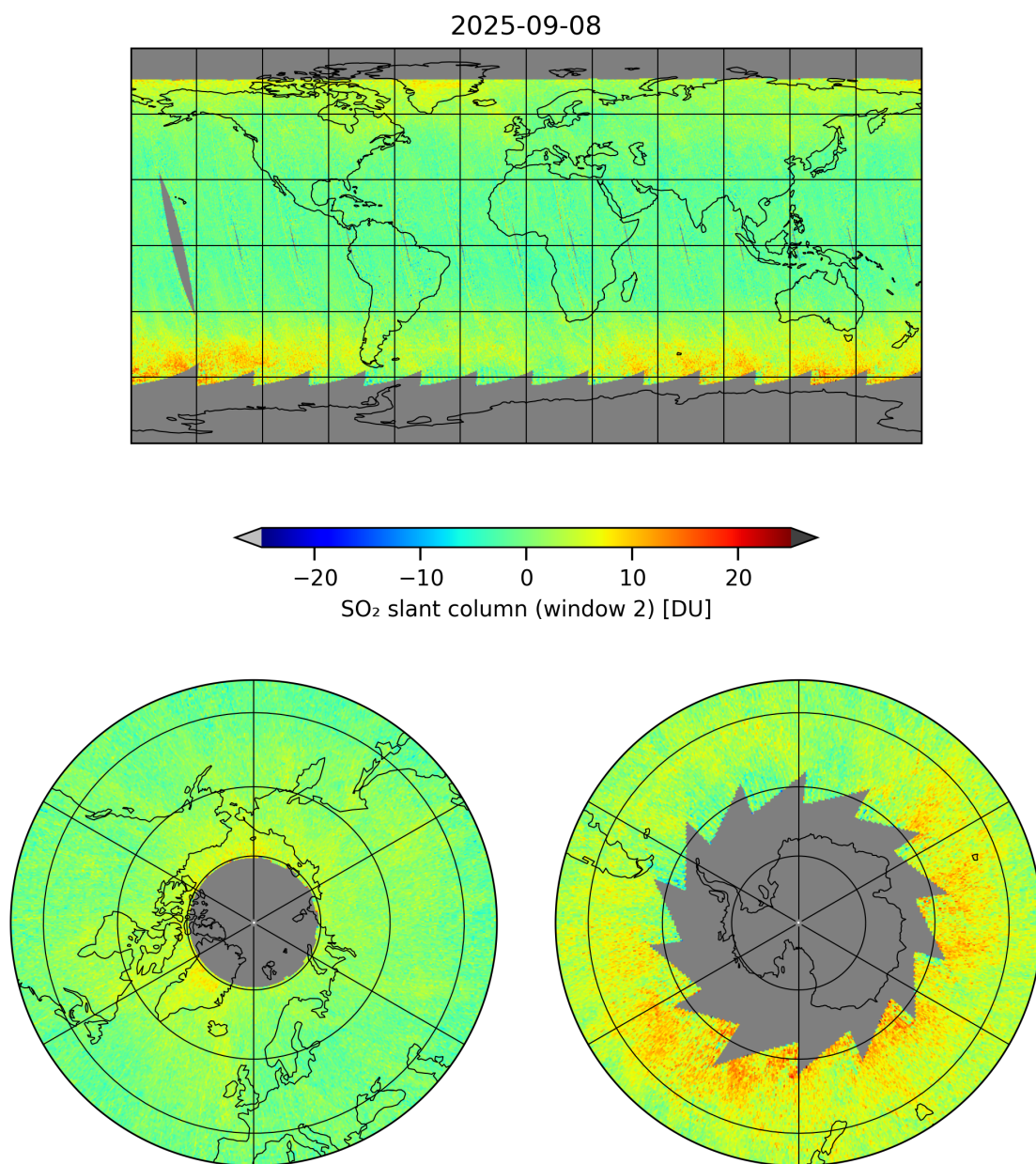


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-09-08 to 2025-09-08

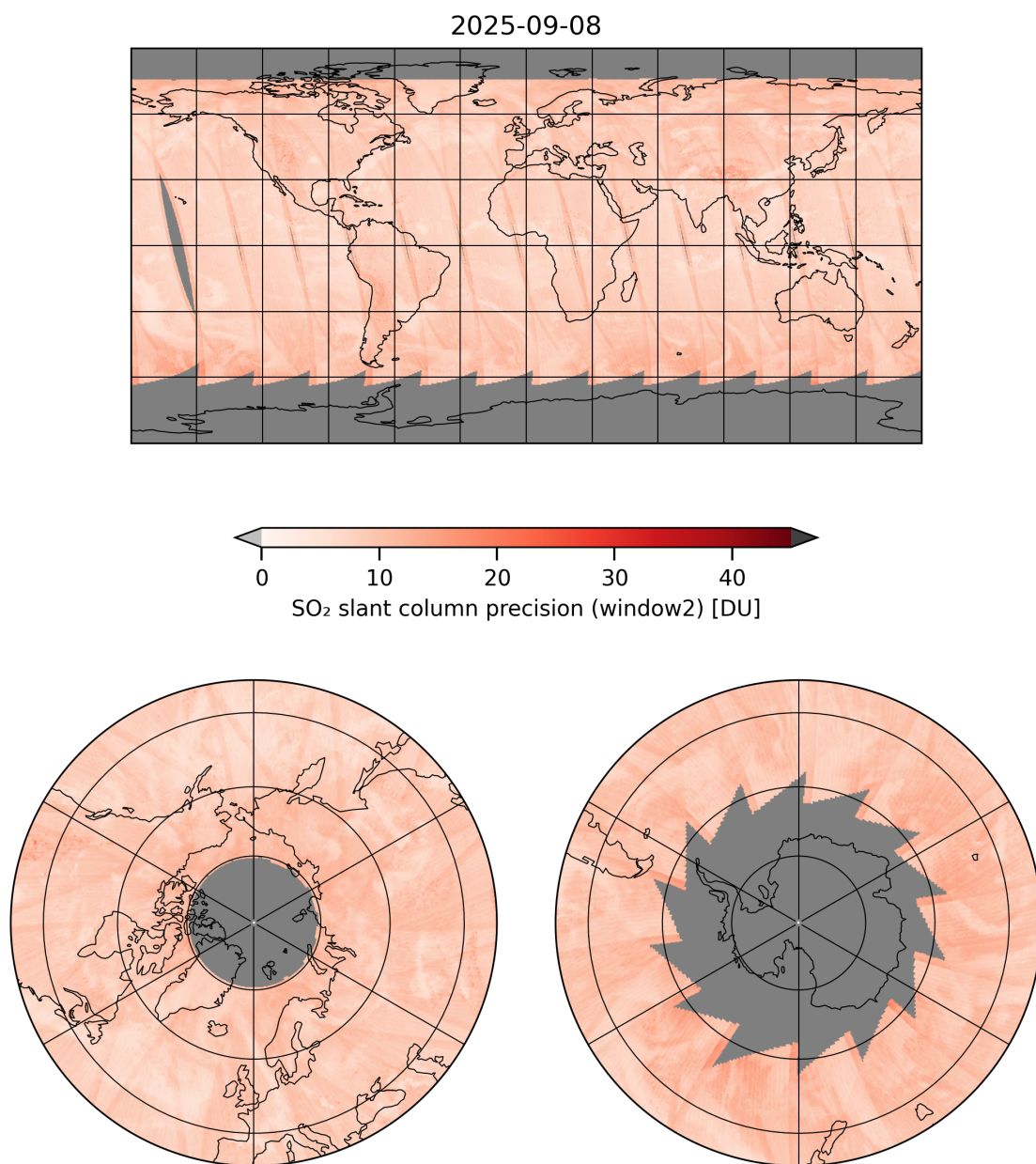


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-09-08 to 2025-09-08

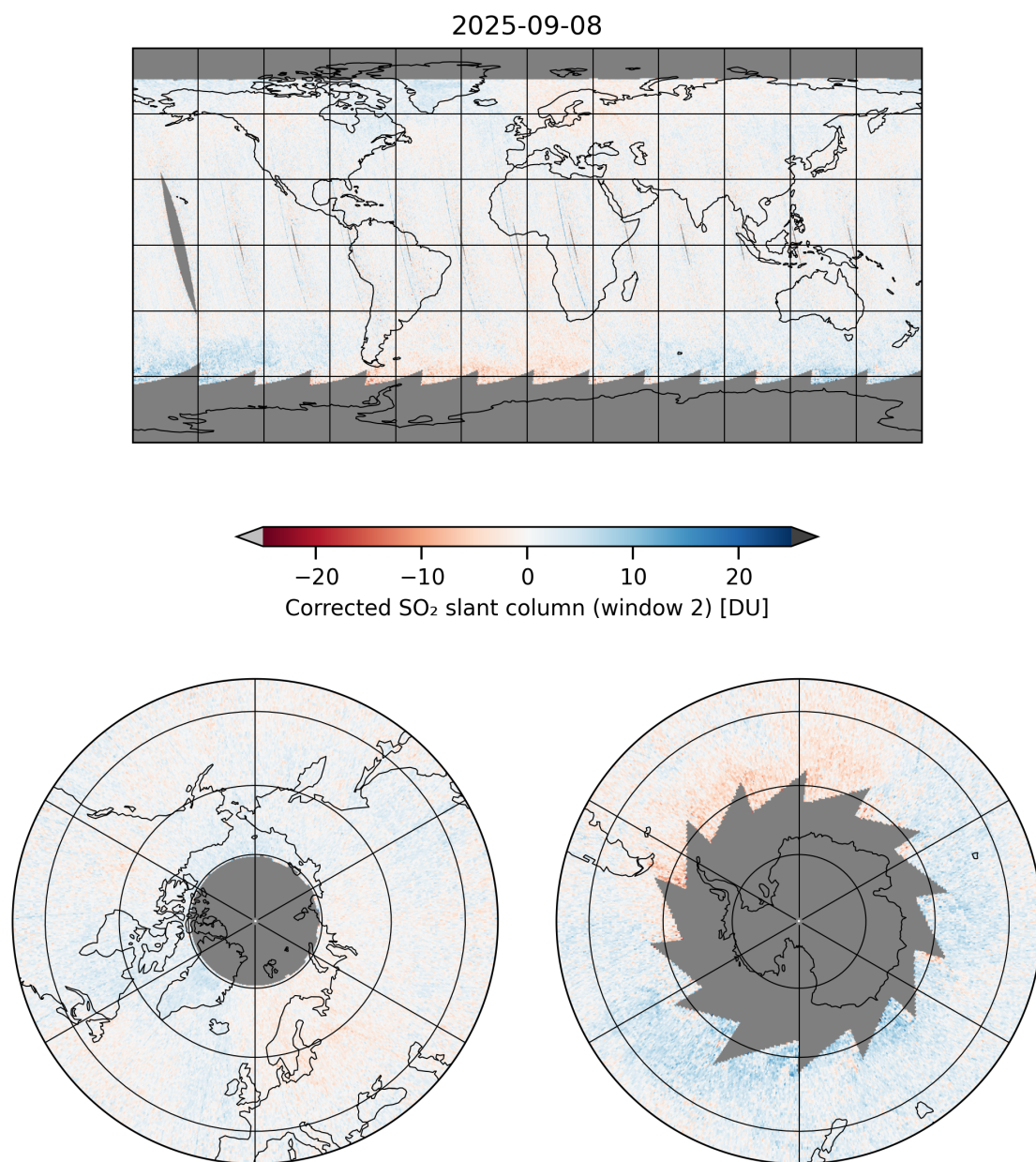


Figure 15: Map of "Corrected SO₂ slant column (window 2)" for 2025-09-08 to 2025-09-08

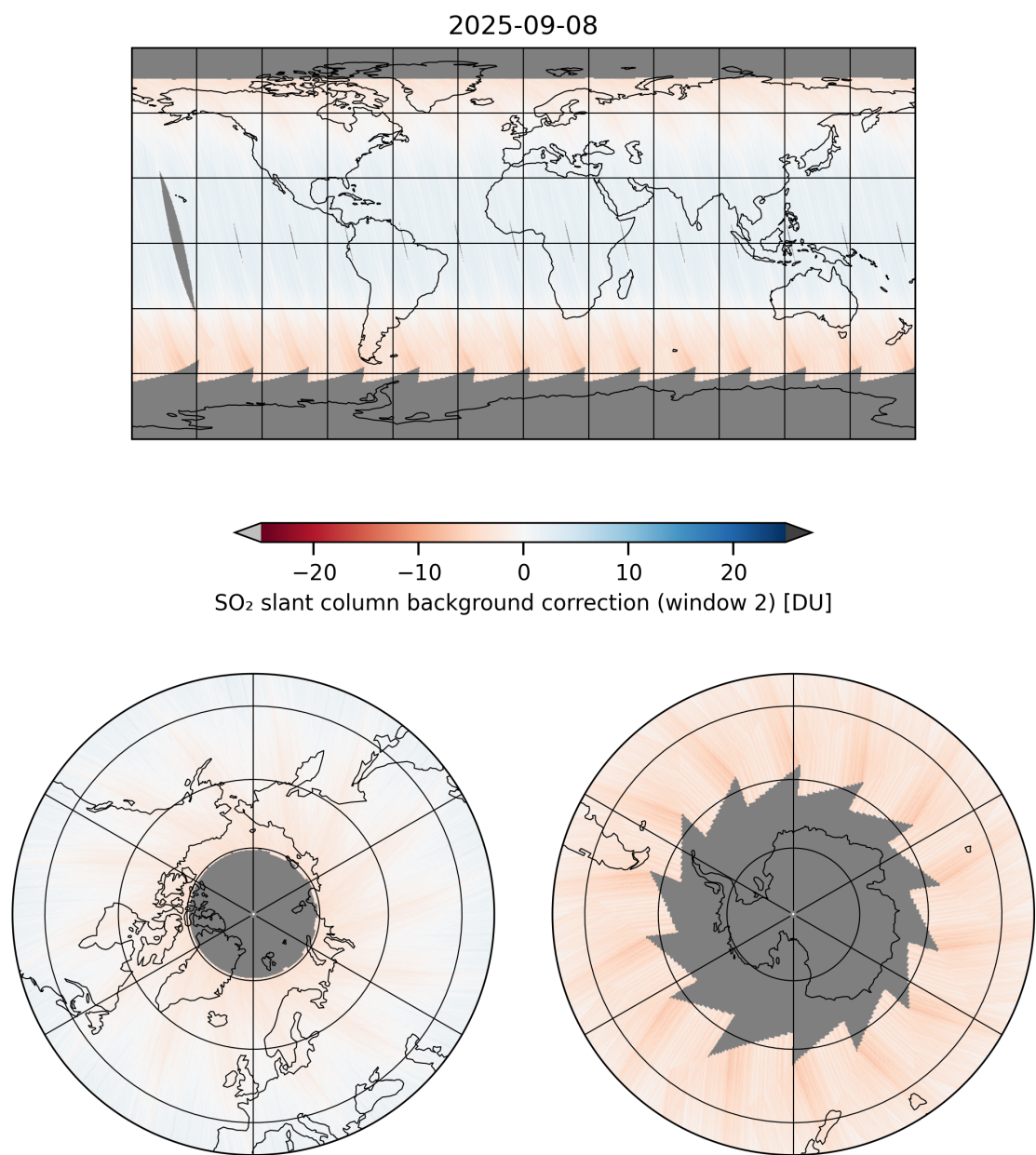


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-09-08 to 2025-09-08

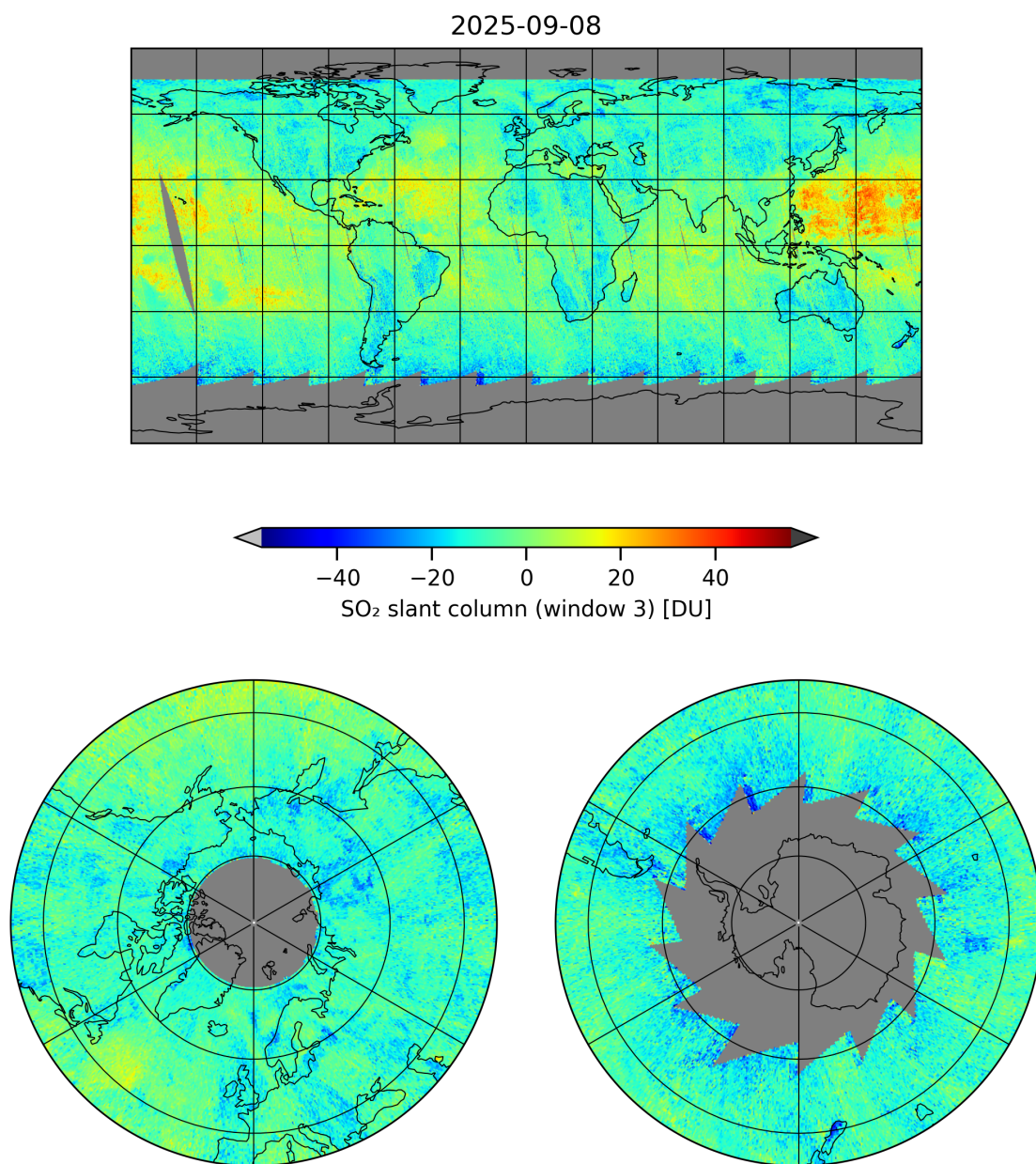


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-09-08 to 2025-09-08

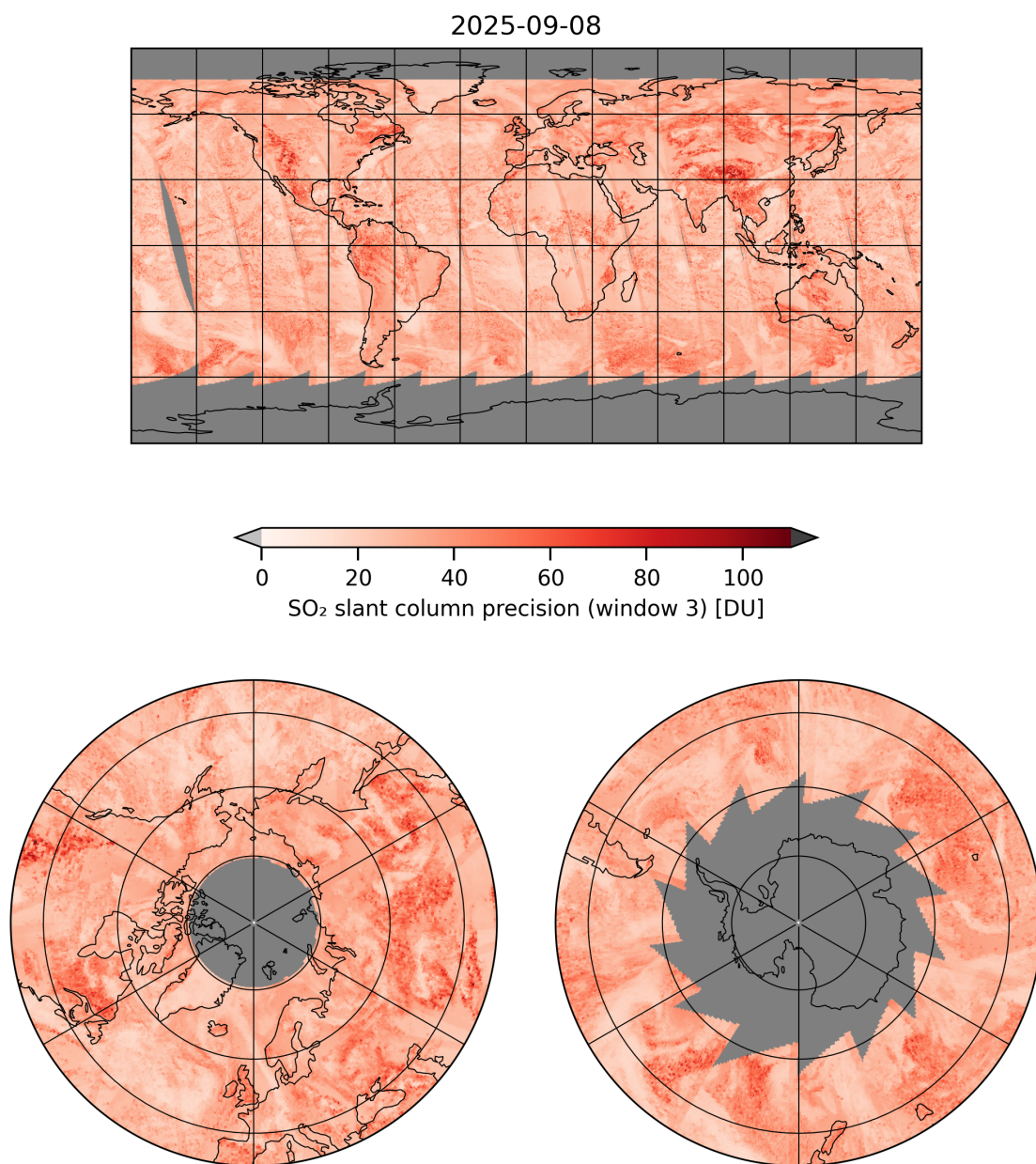


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-09-08 to 2025-09-08

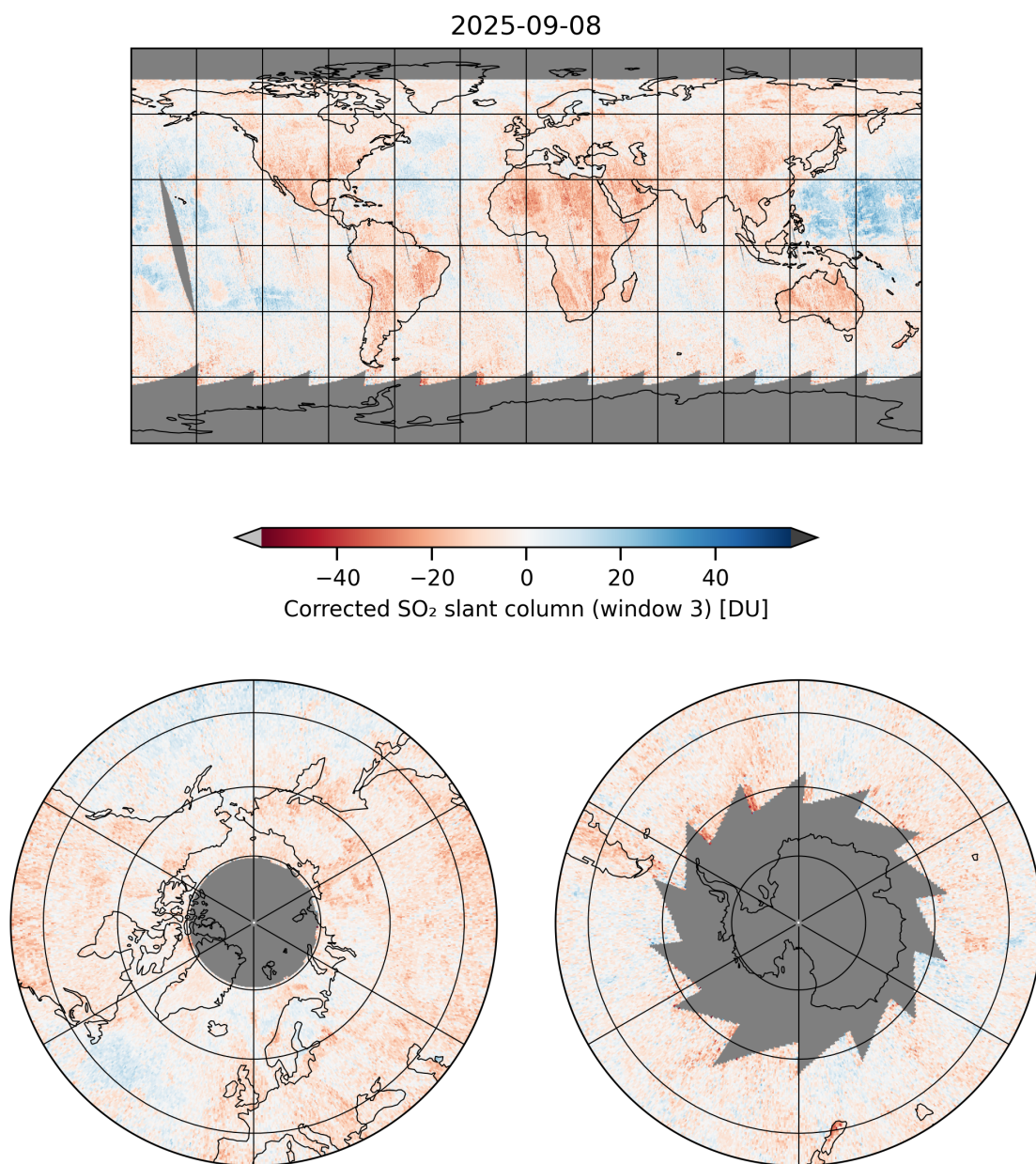


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-09-08 to 2025-09-08

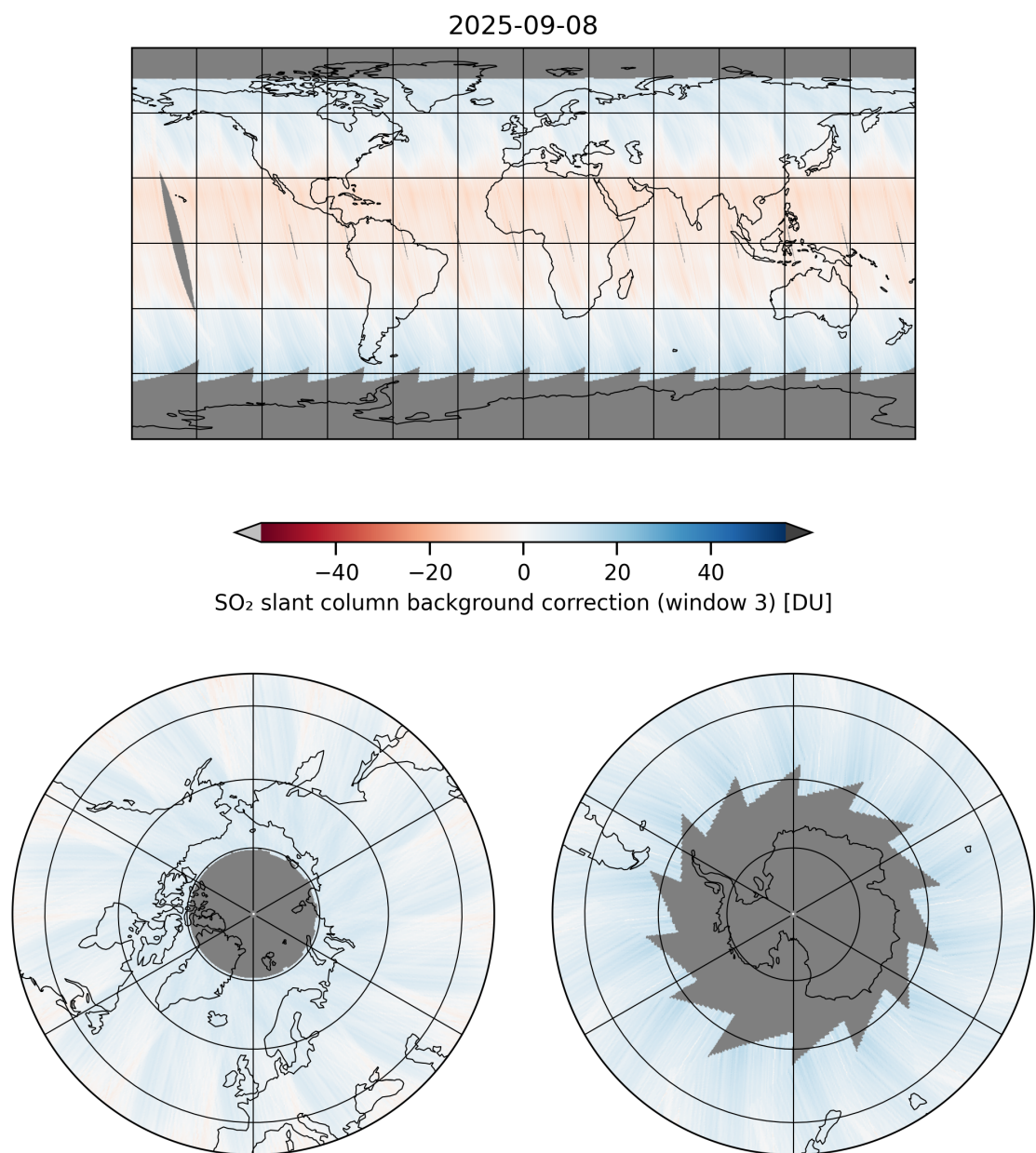


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-09-08 to 2025-09-08

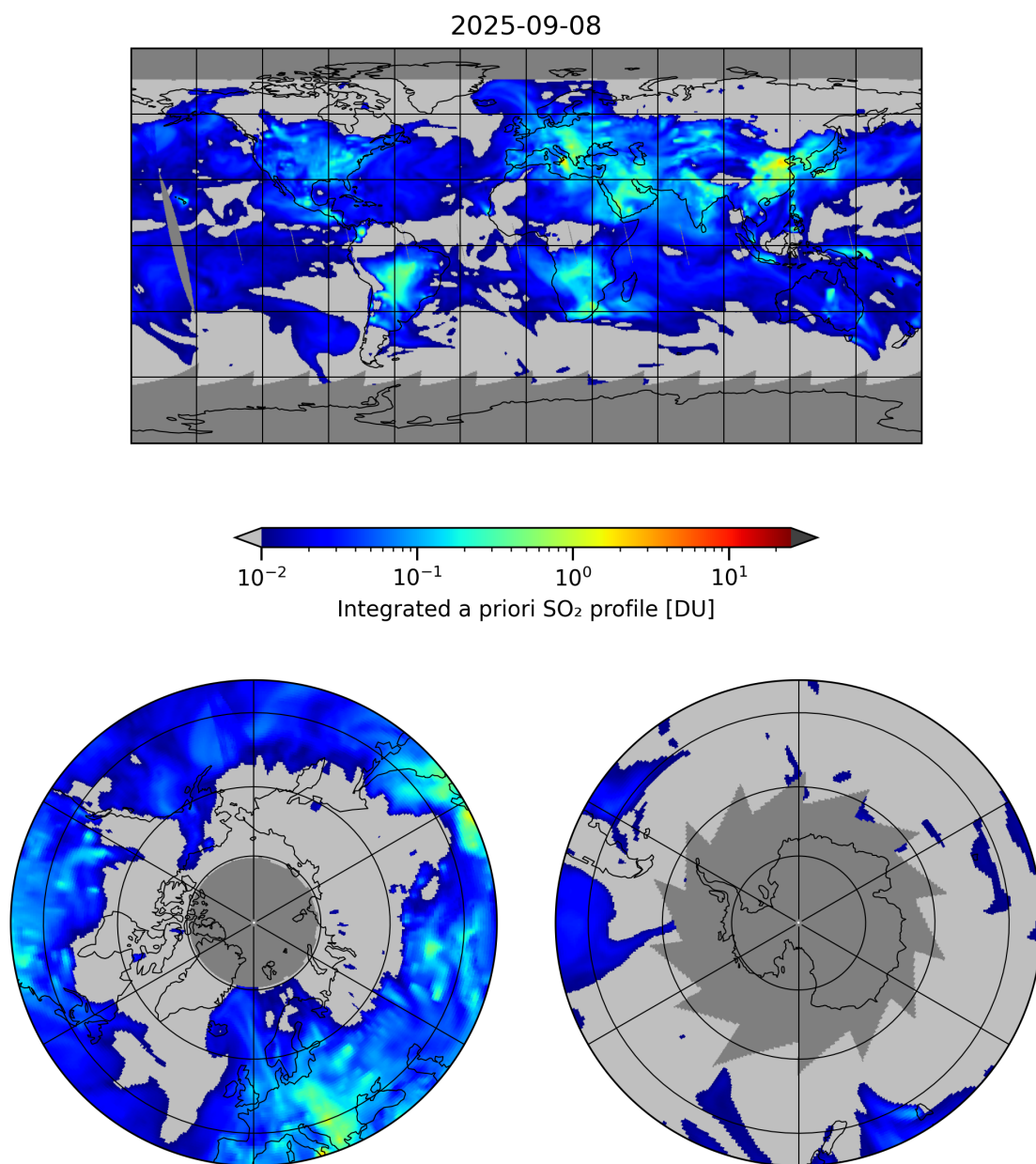


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-09-08 to 2025-09-08

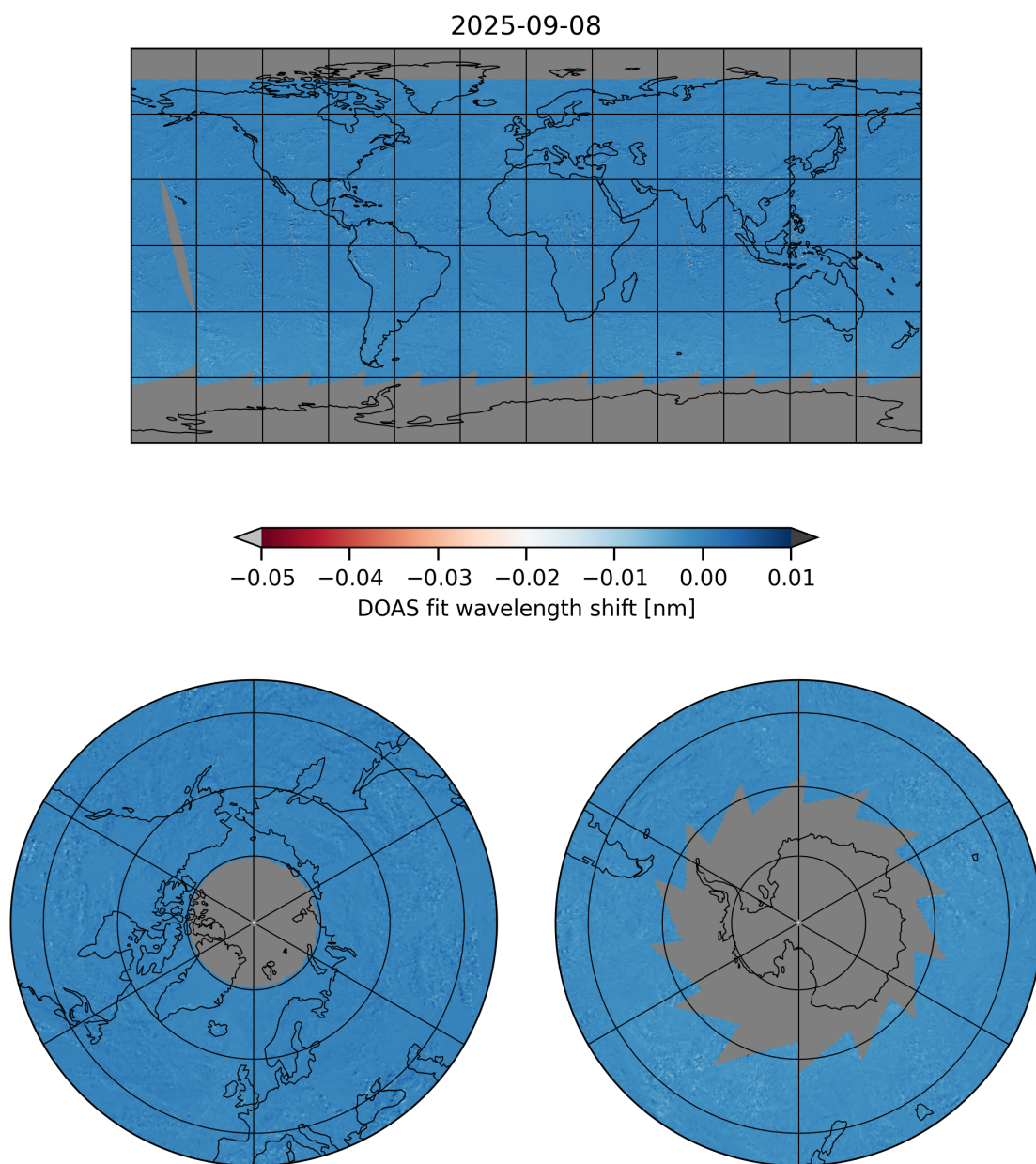


Figure 22: Map of “DOAS fit wavelength shift” for 2025-09-08 to 2025-09-08

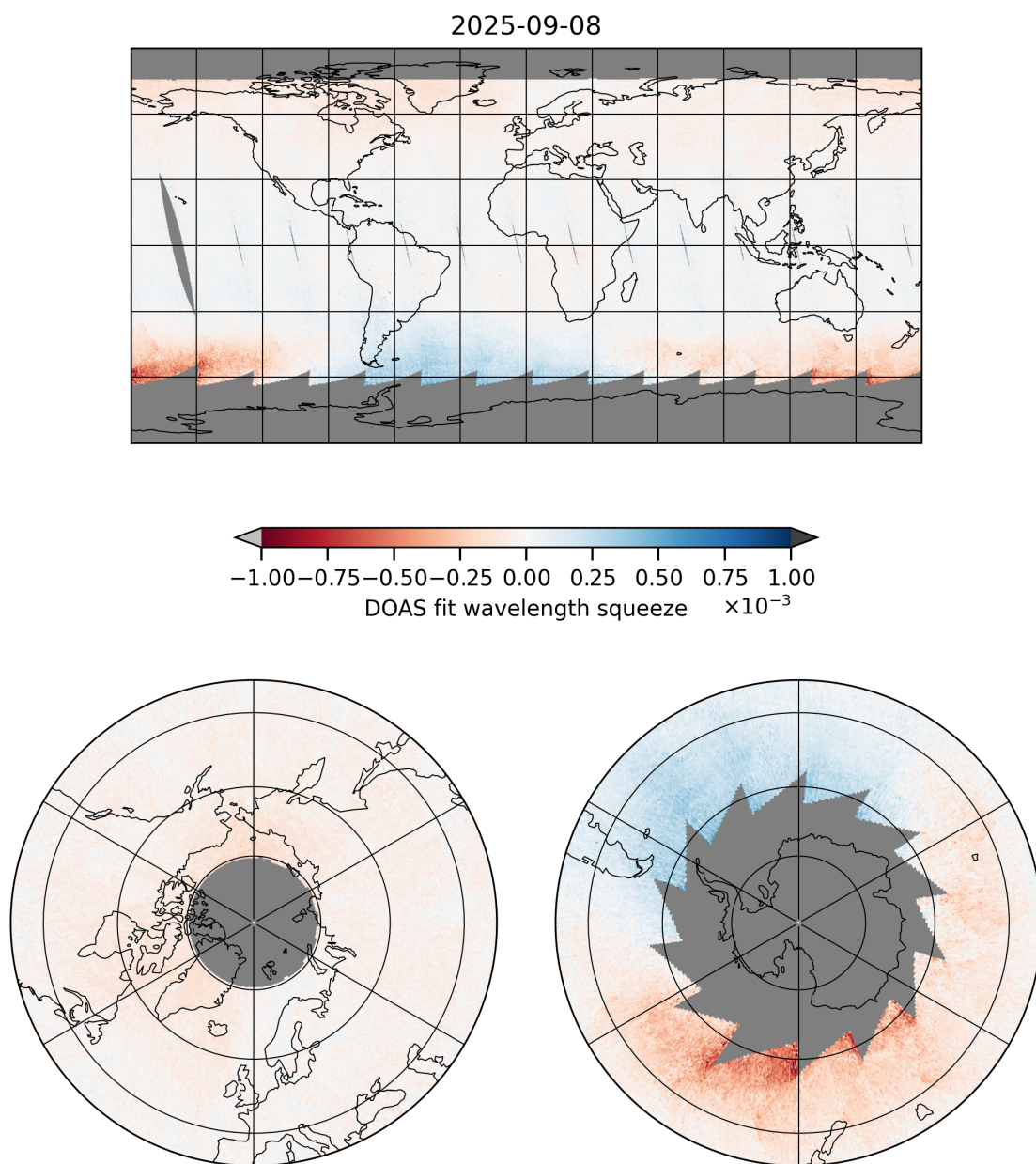


Figure 23: Map of "DOAS fit wavelength squeeze" for 2025-09-08 to 2025-09-08

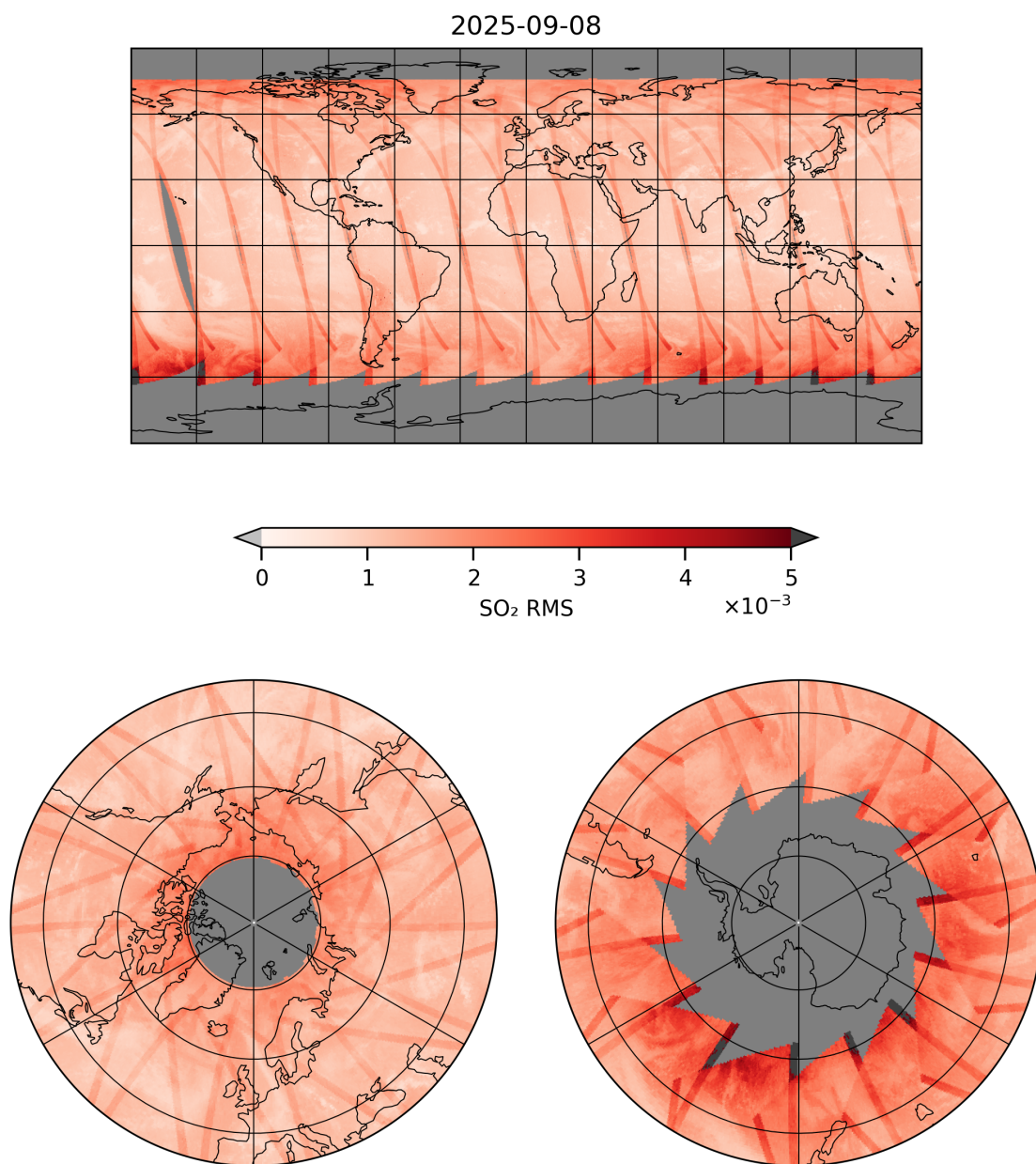


Figure 24: Map of “SO₂ RMS” for 2025-09-08 to 2025-09-08

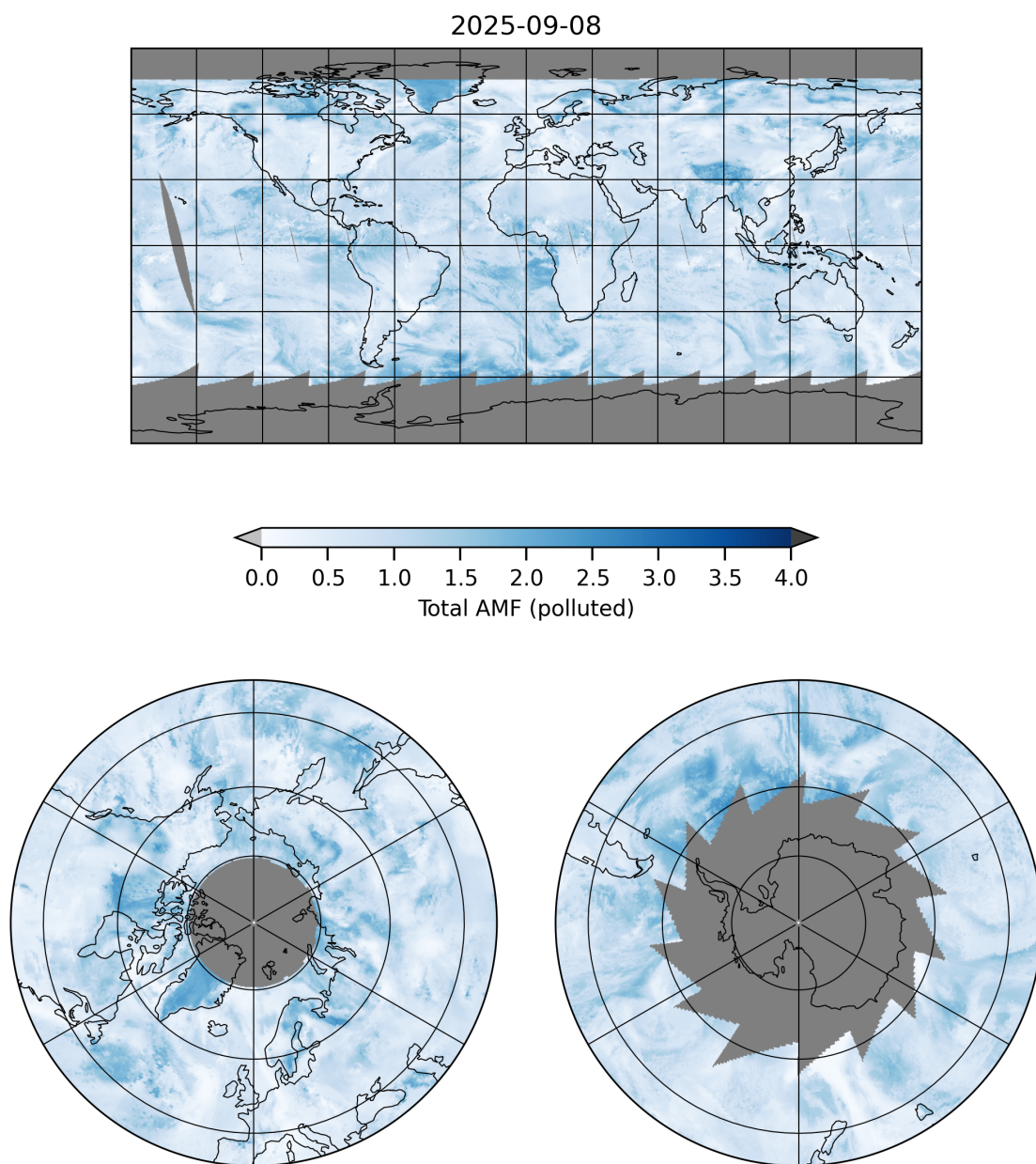


Figure 25: Map of “Total AMF (polluted)” for 2025-09-08 to 2025-09-08

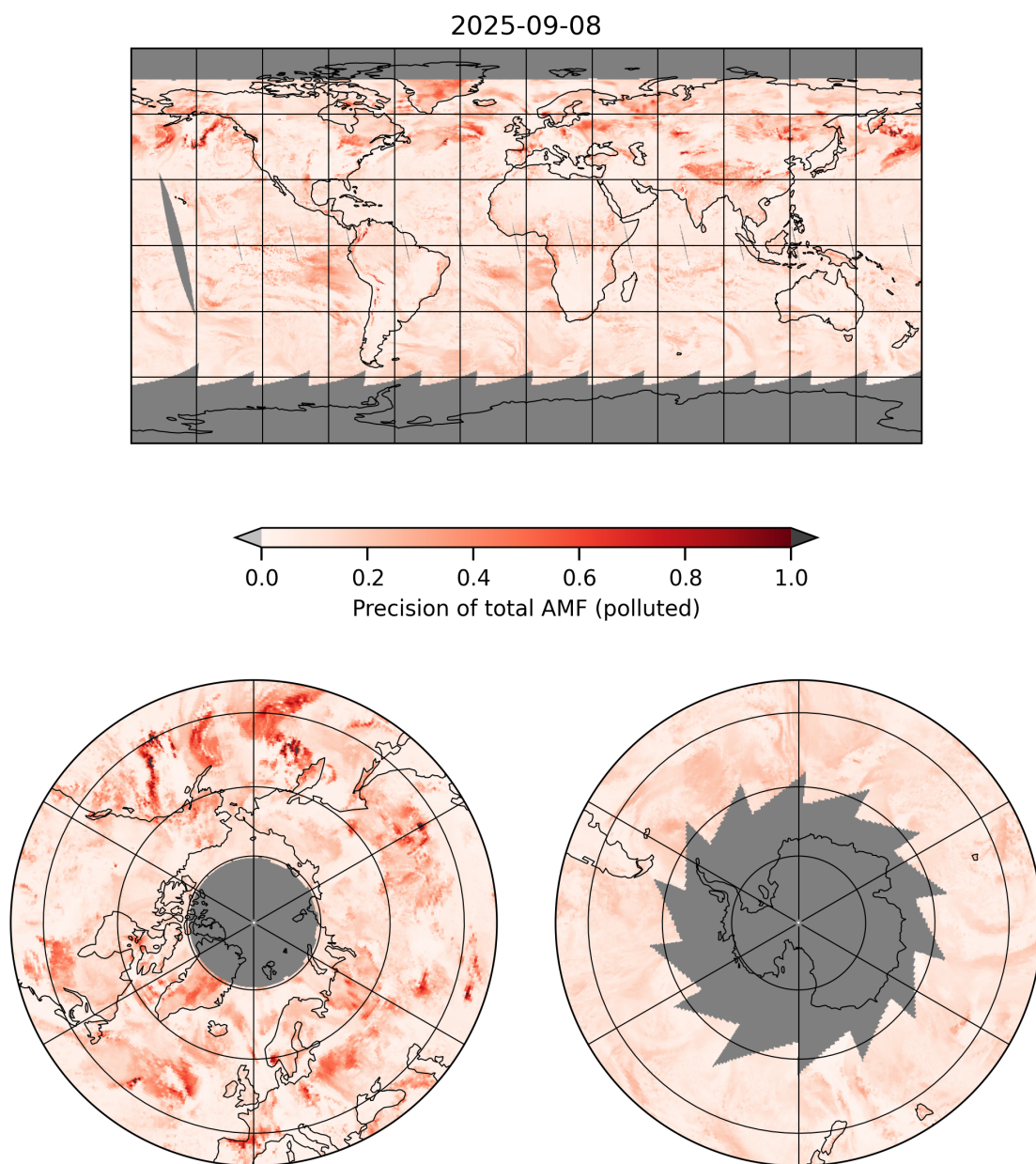


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-09-08 to 2025-09-08

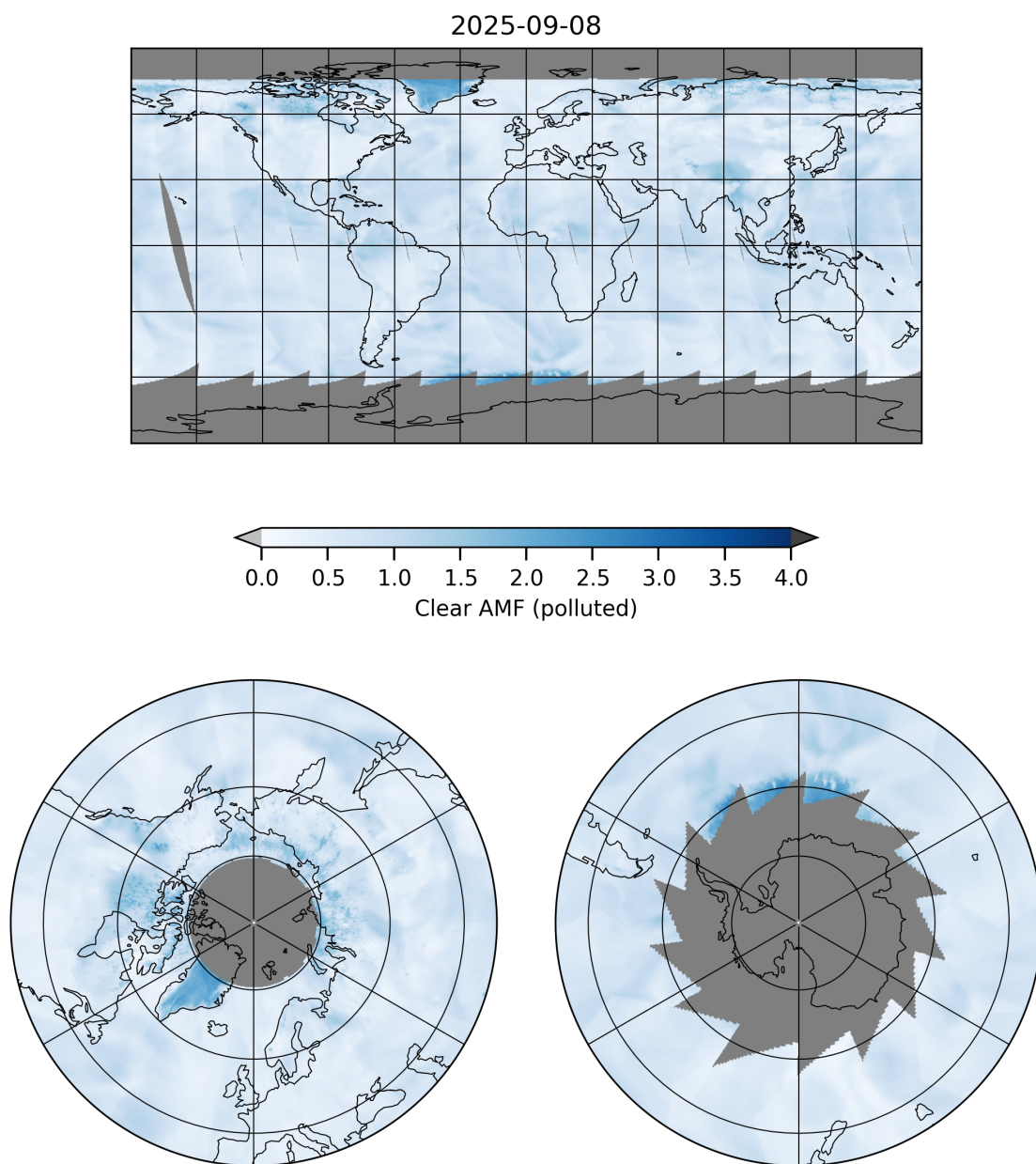


Figure 27: Map of “Clear AMF (polluted)” for 2025-09-08 to 2025-09-08

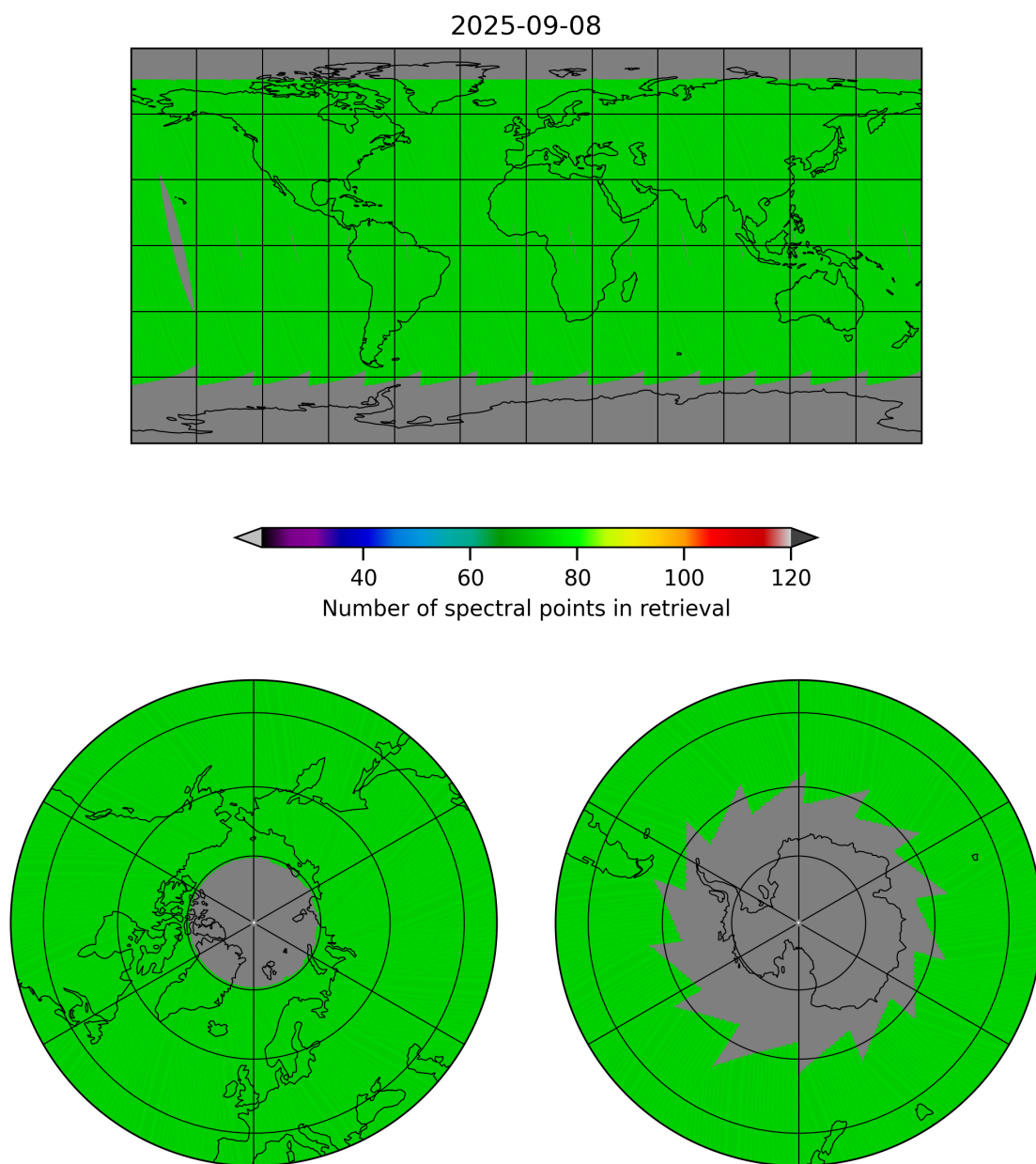


Figure 28: Map of “Number of spectral points in retrieval” for 2025-09-08 to 2025-09-08

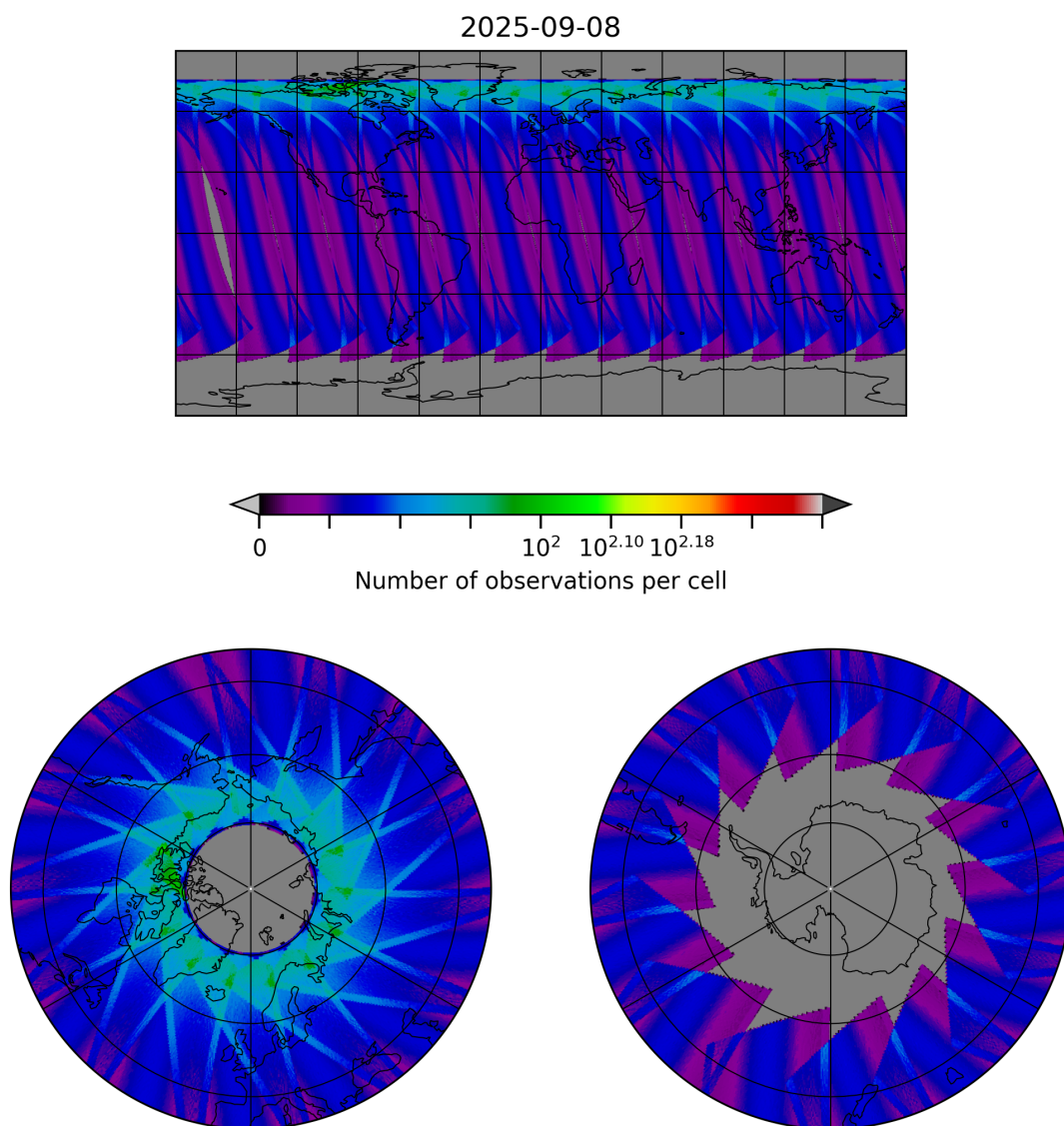


Figure 29: Map of the number of observations for 2025-09-08 to 2025-09-08

7 Zonal average

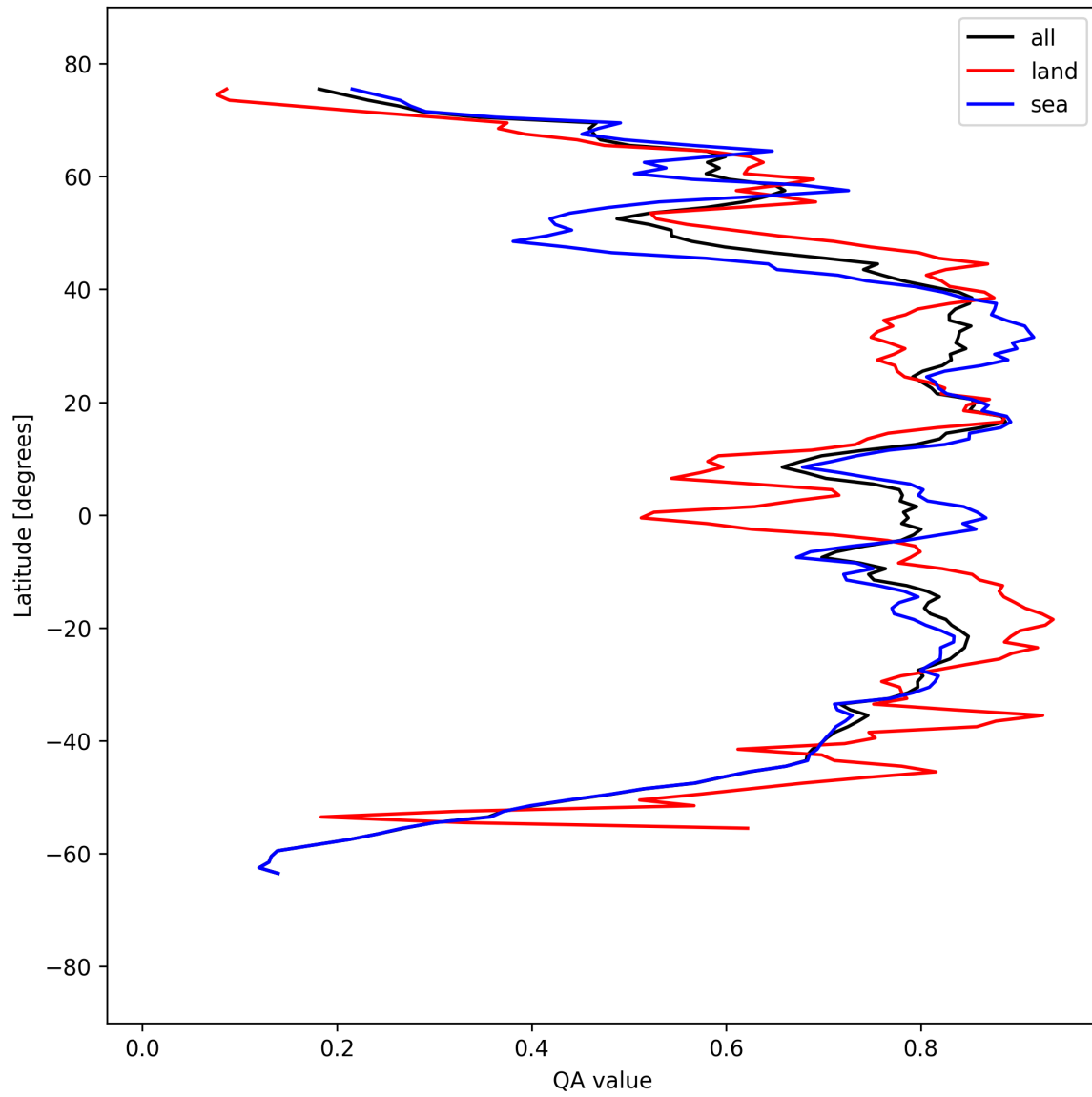


Figure 30: Zonal average of “QA value” for 2025-09-08 to 2025-09-08.

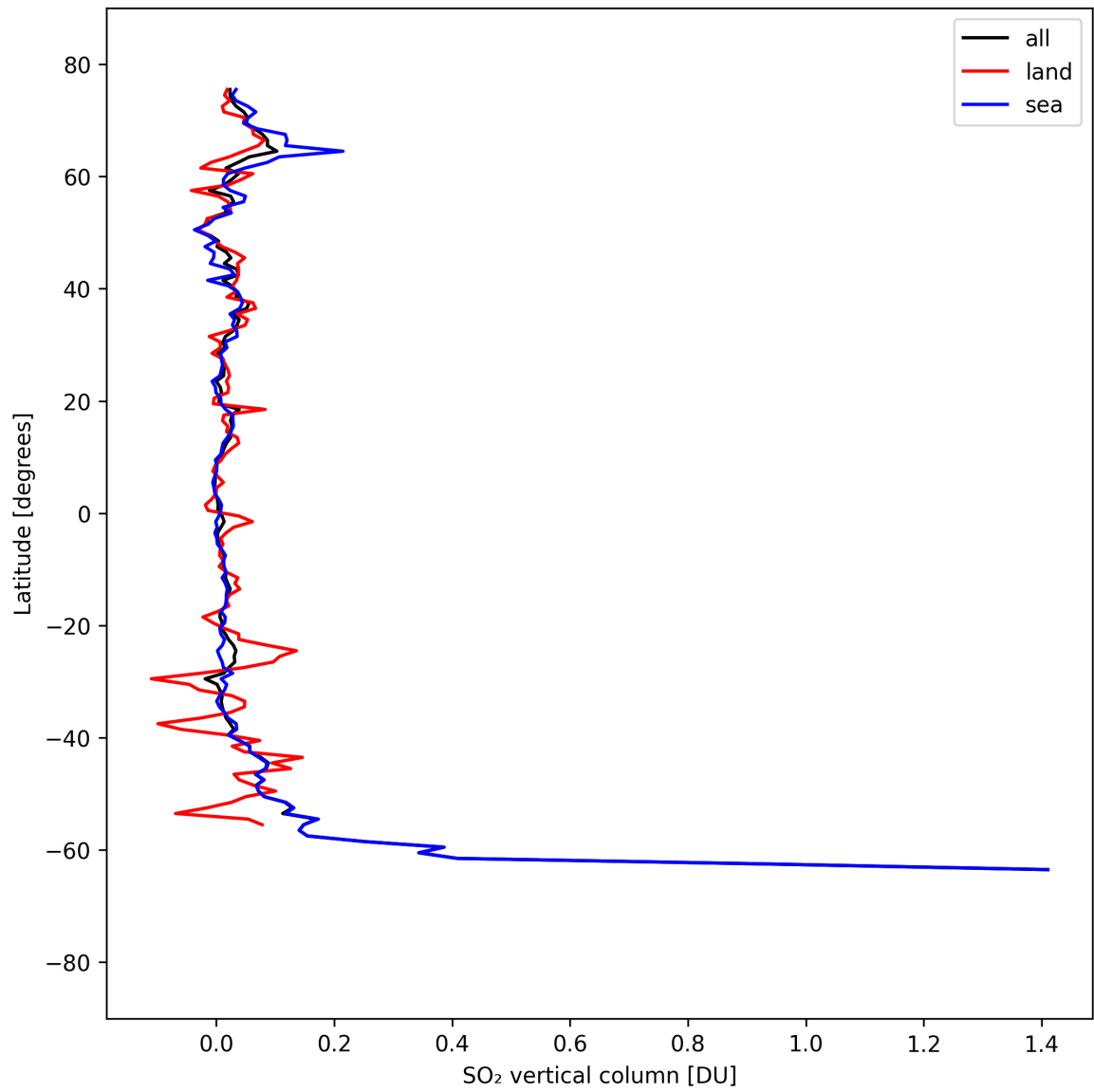


Figure 31: Zonal average of “SO₂ vertical column” for 2025-09-08 to 2025-09-08.

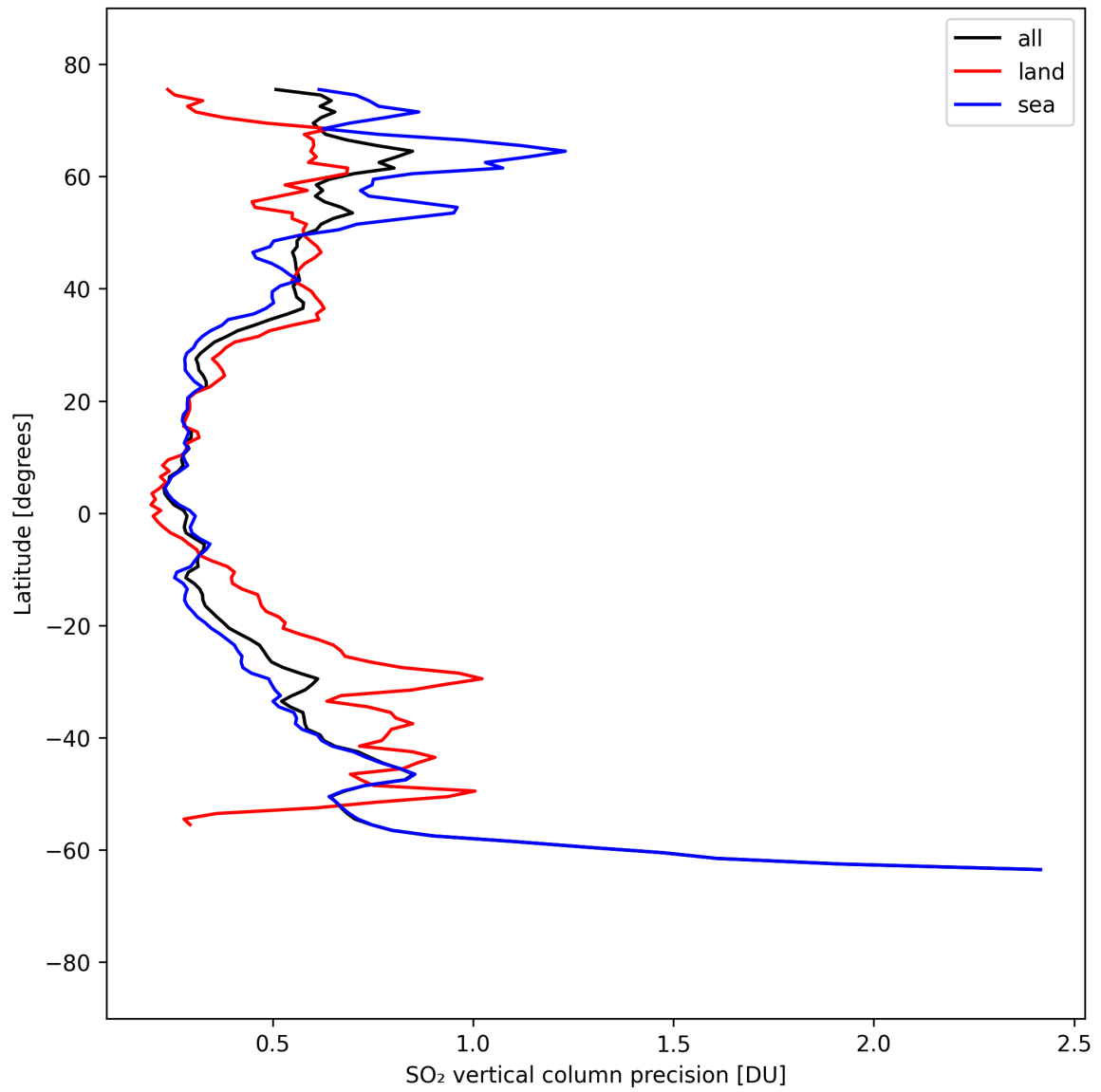


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-09-08 to 2025-09-08.

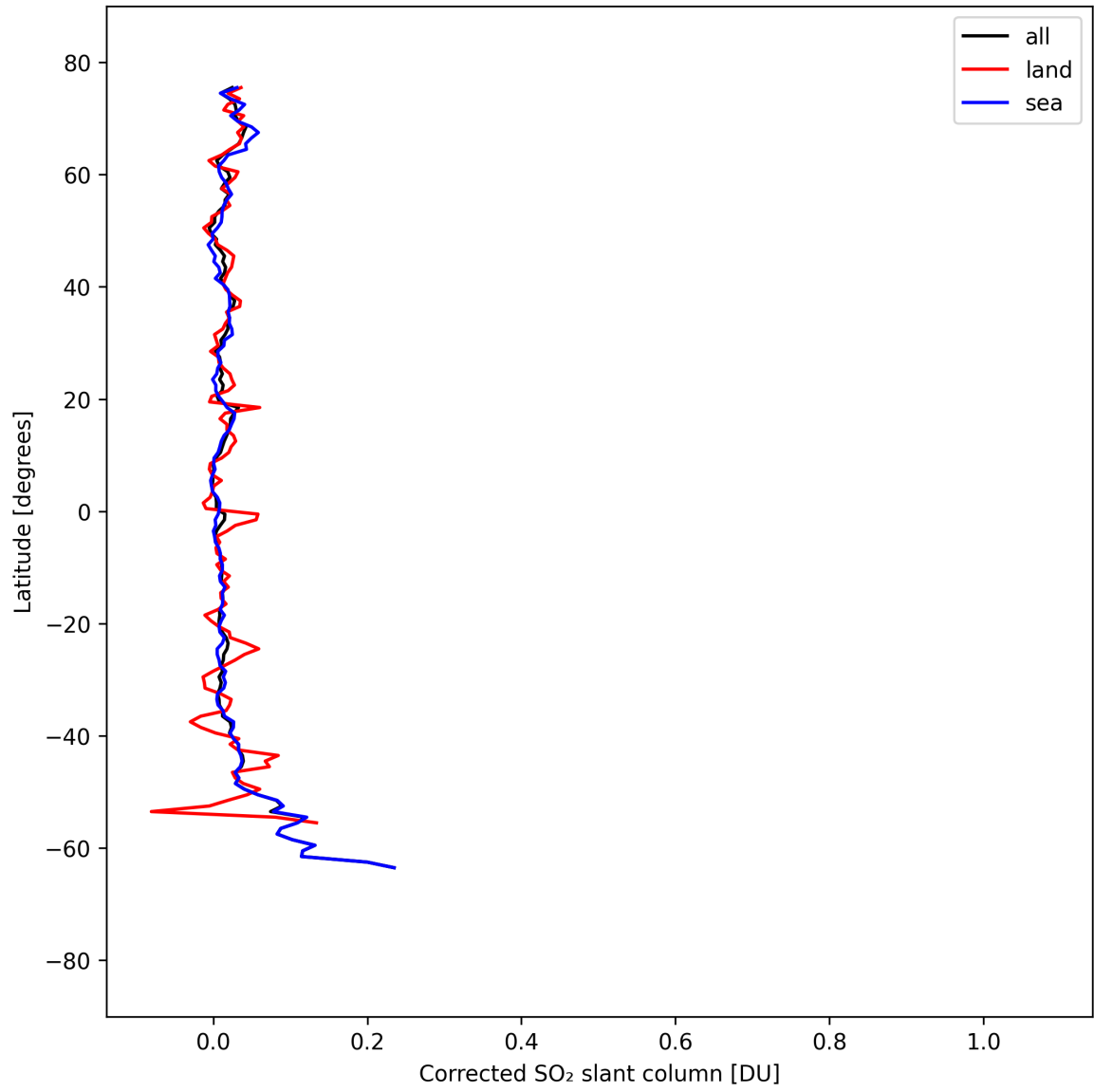


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-09-08 to 2025-09-08.

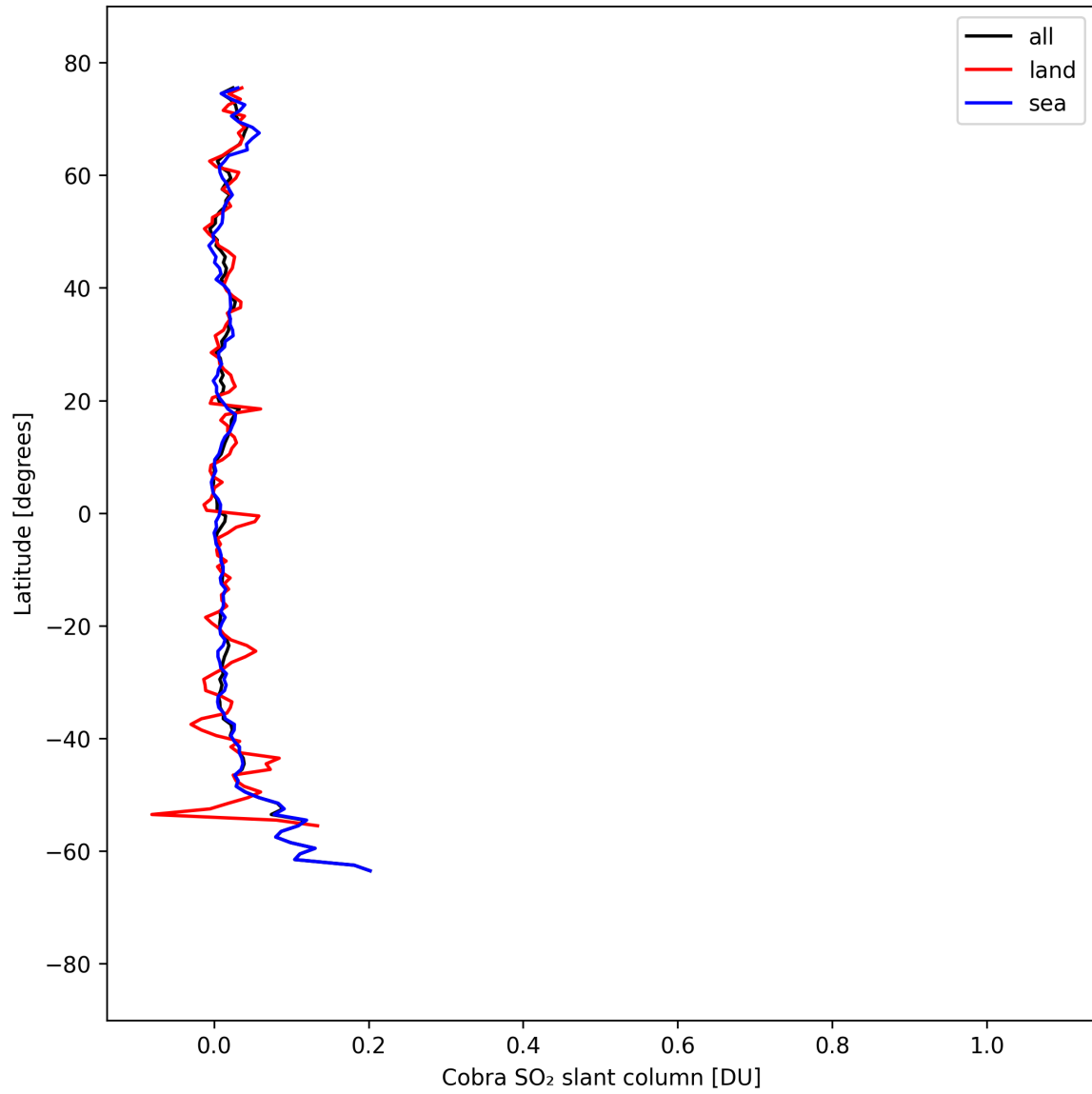


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-09-08 to 2025-09-08.

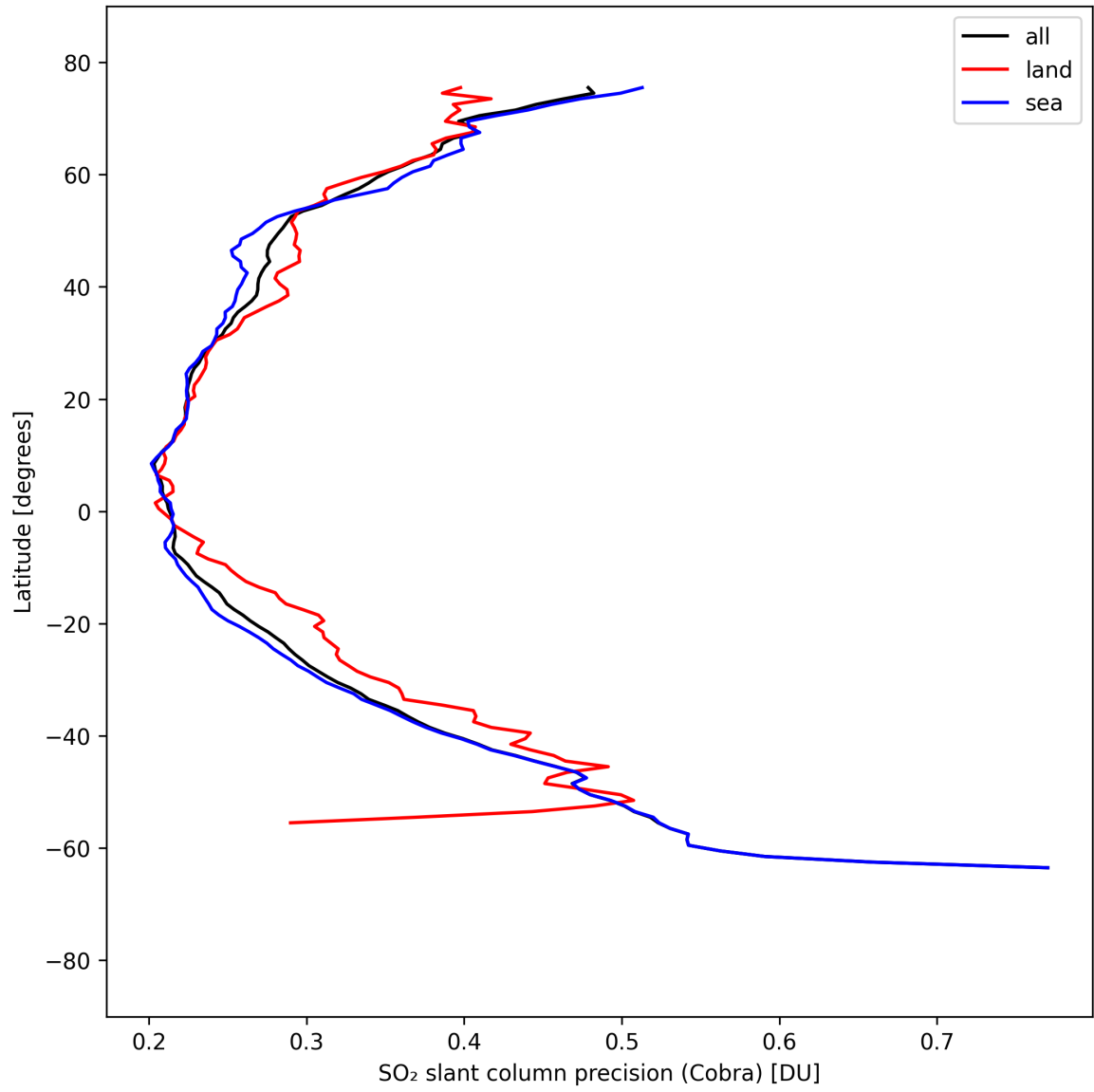


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-09-08 to 2025-09-08.

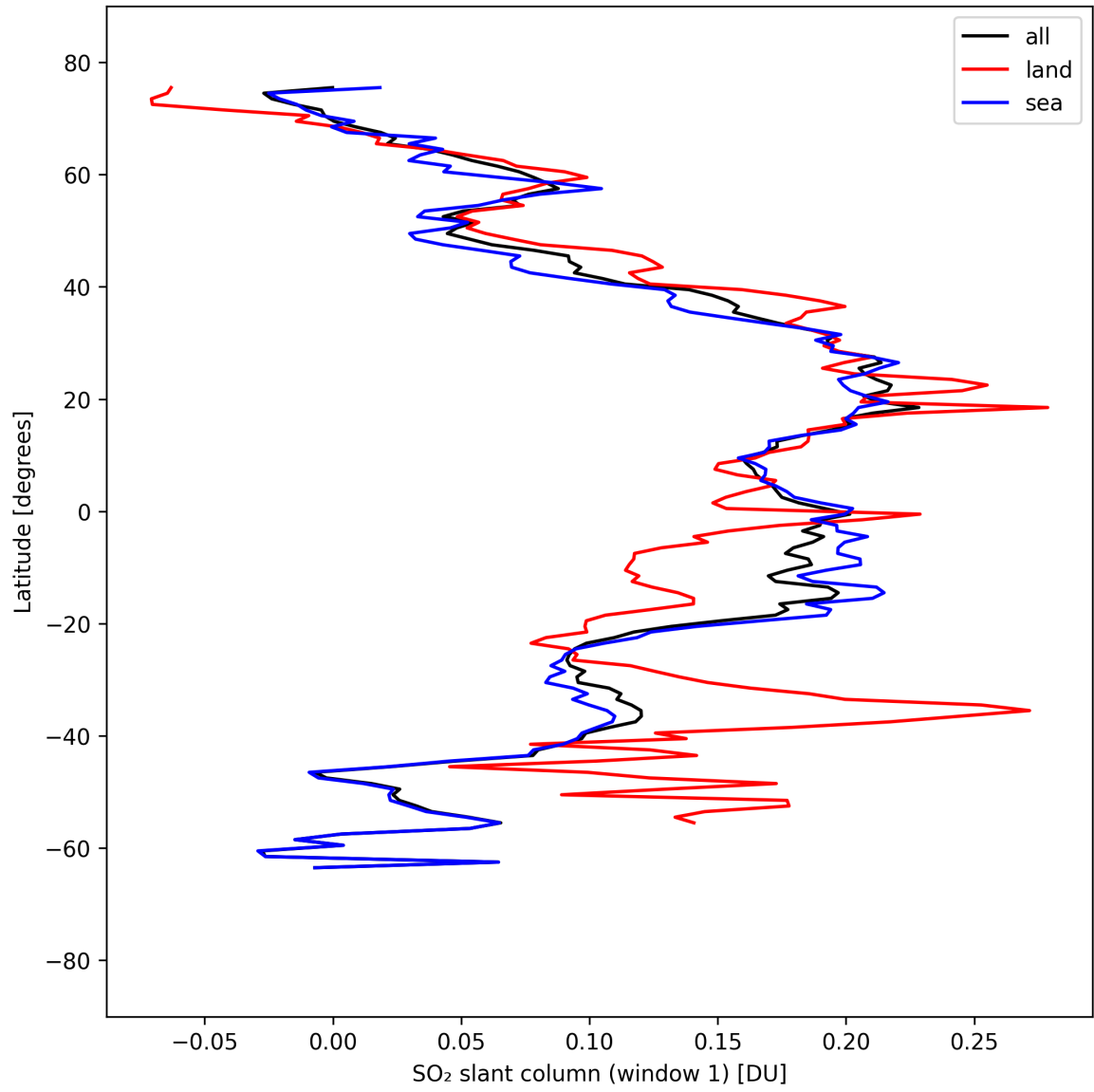


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-09-08 to 2025-09-08.

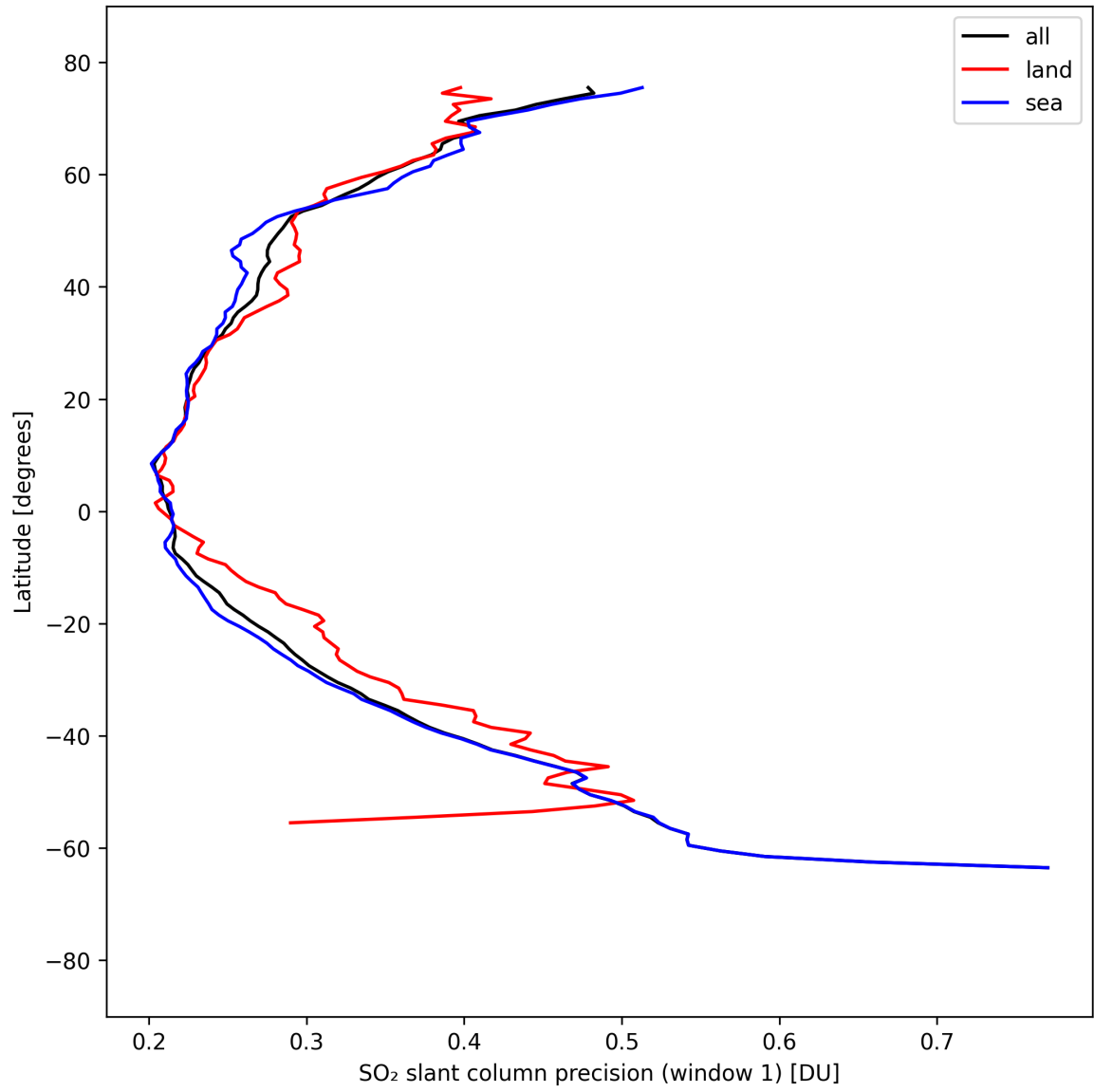


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-09-08 to 2025-09-08.

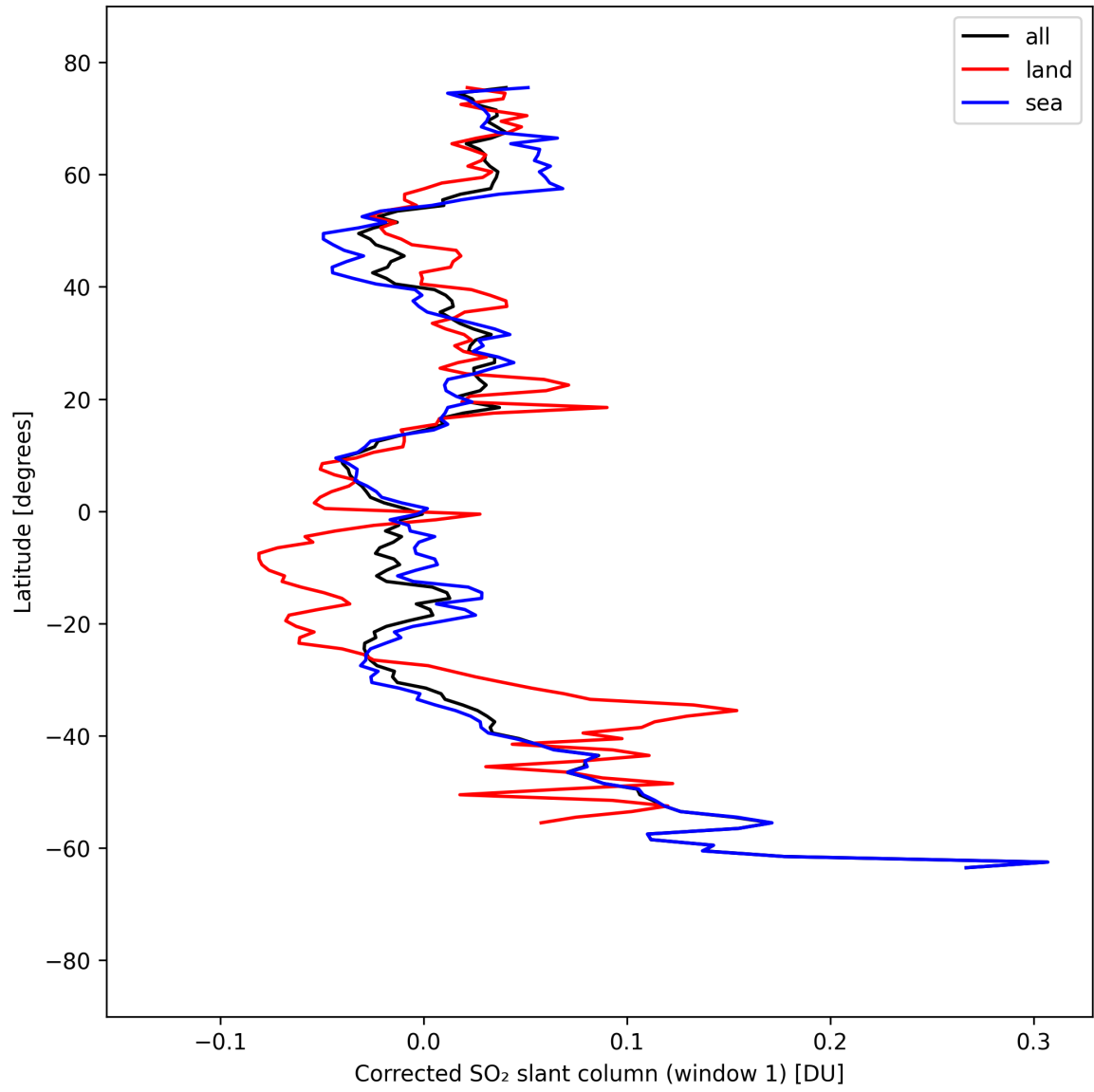


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-09-08 to 2025-09-08.

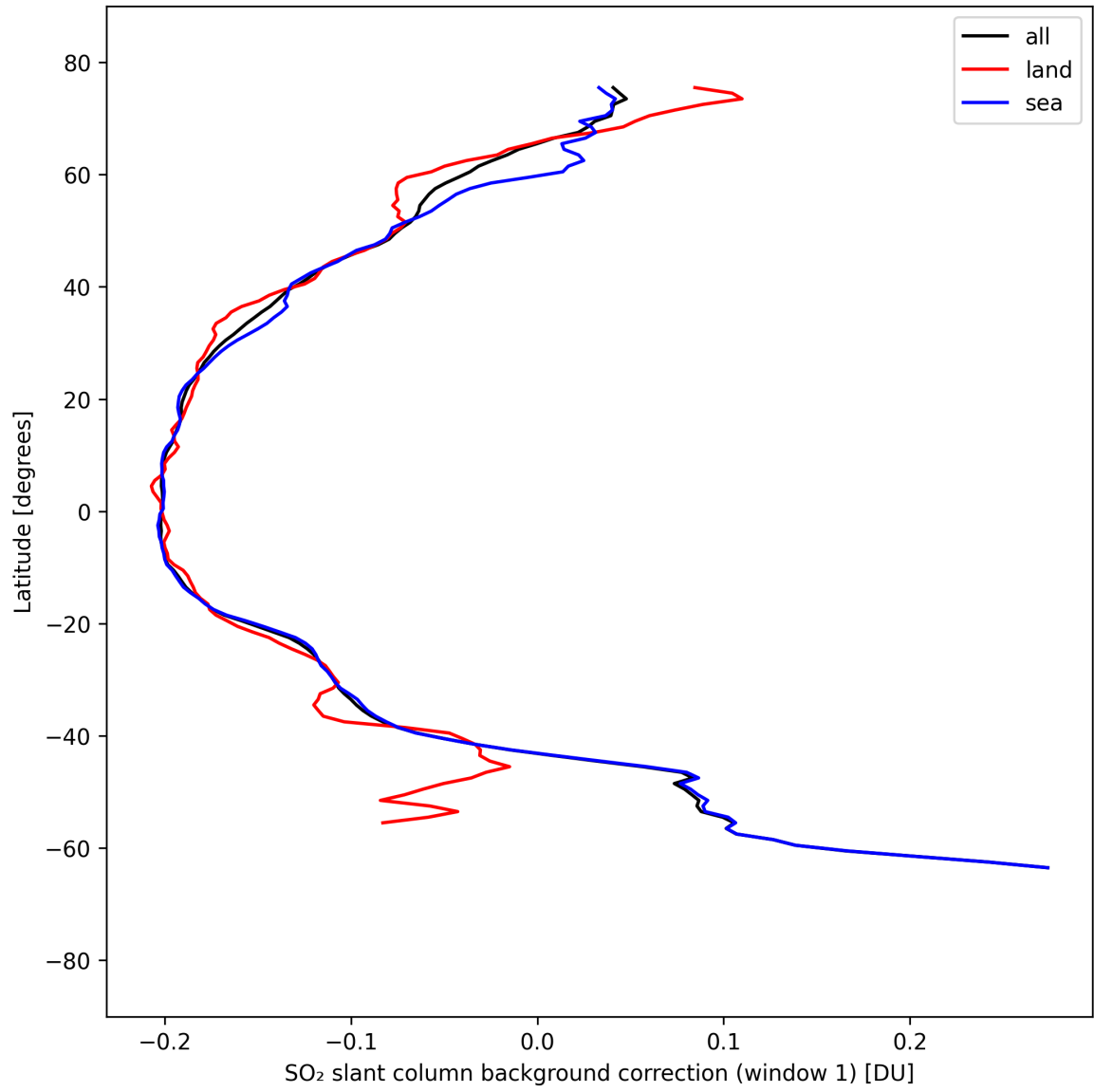


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-09-08 to 2025-09-08.

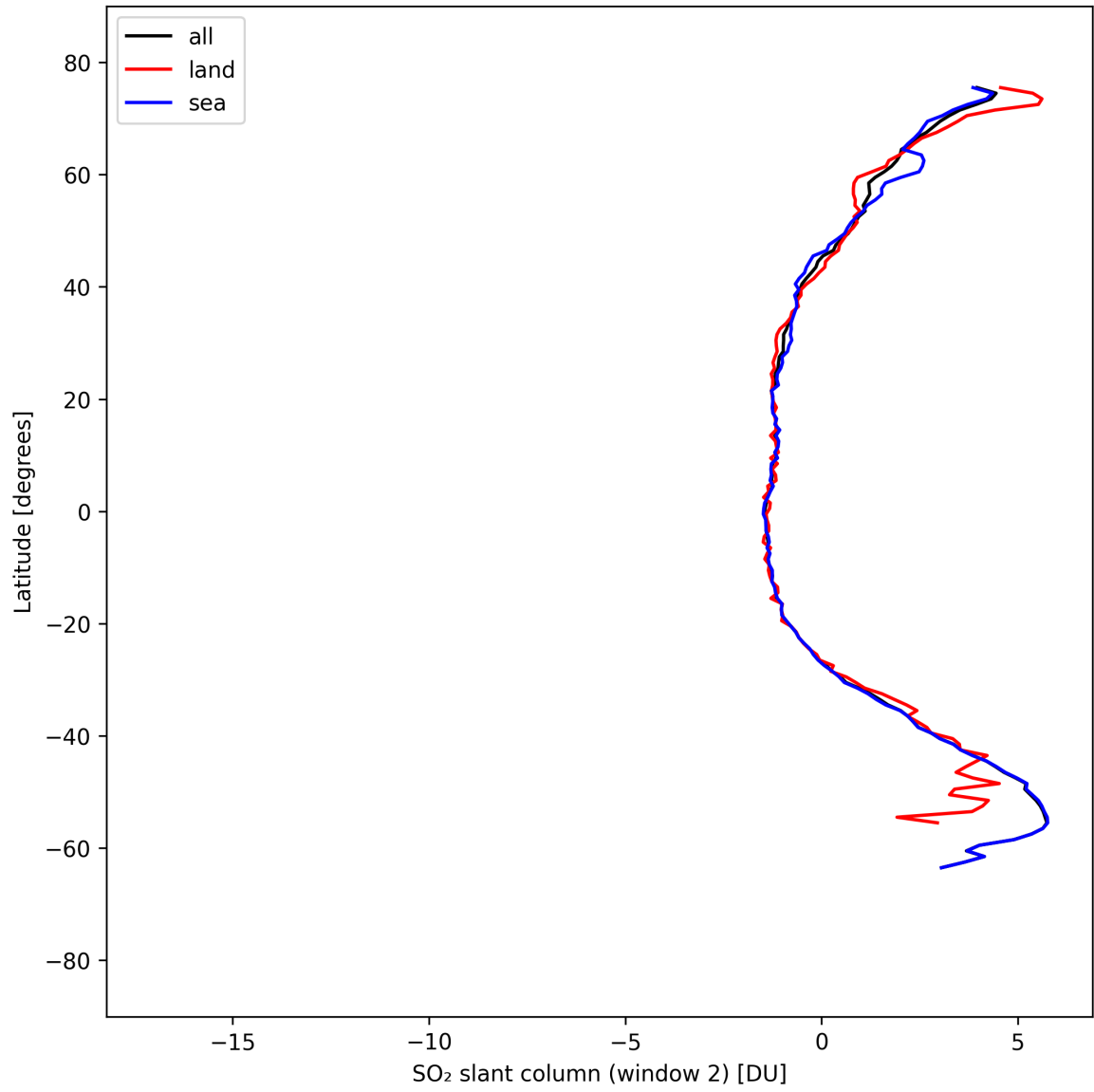


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-09-08 to 2025-09-08.

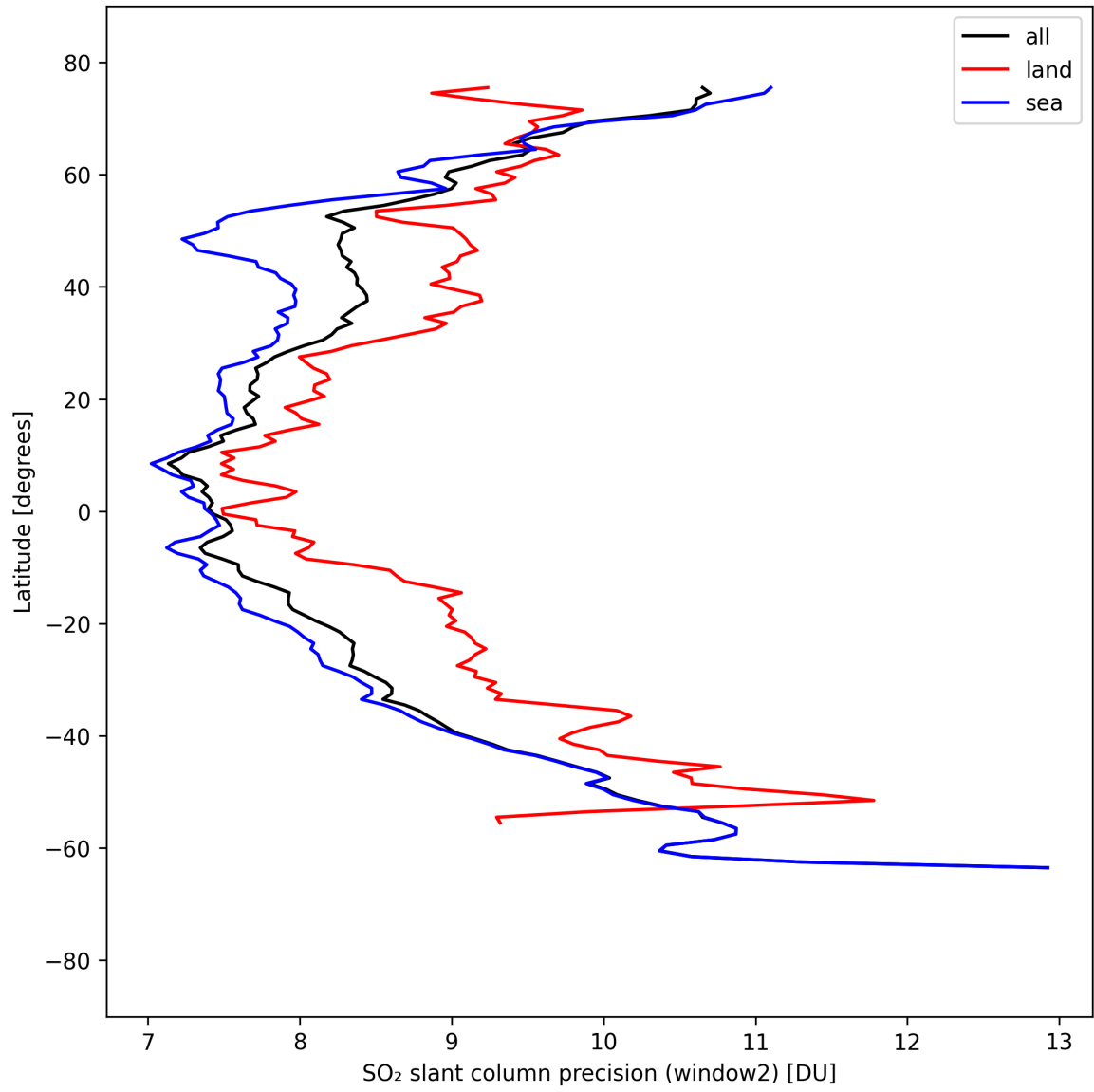


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-09-08 to 2025-09-08.

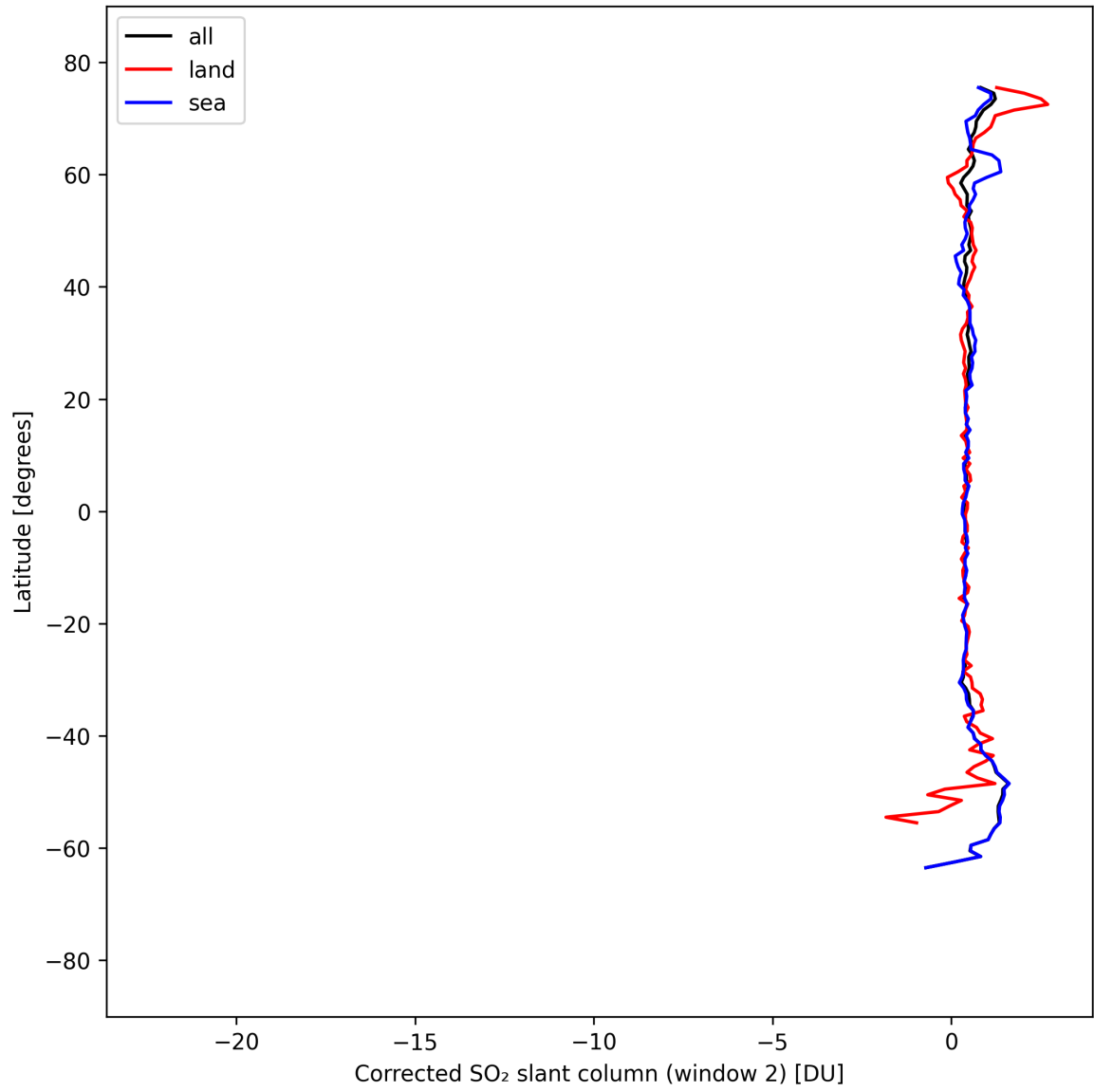


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-09-08 to 2025-09-08.

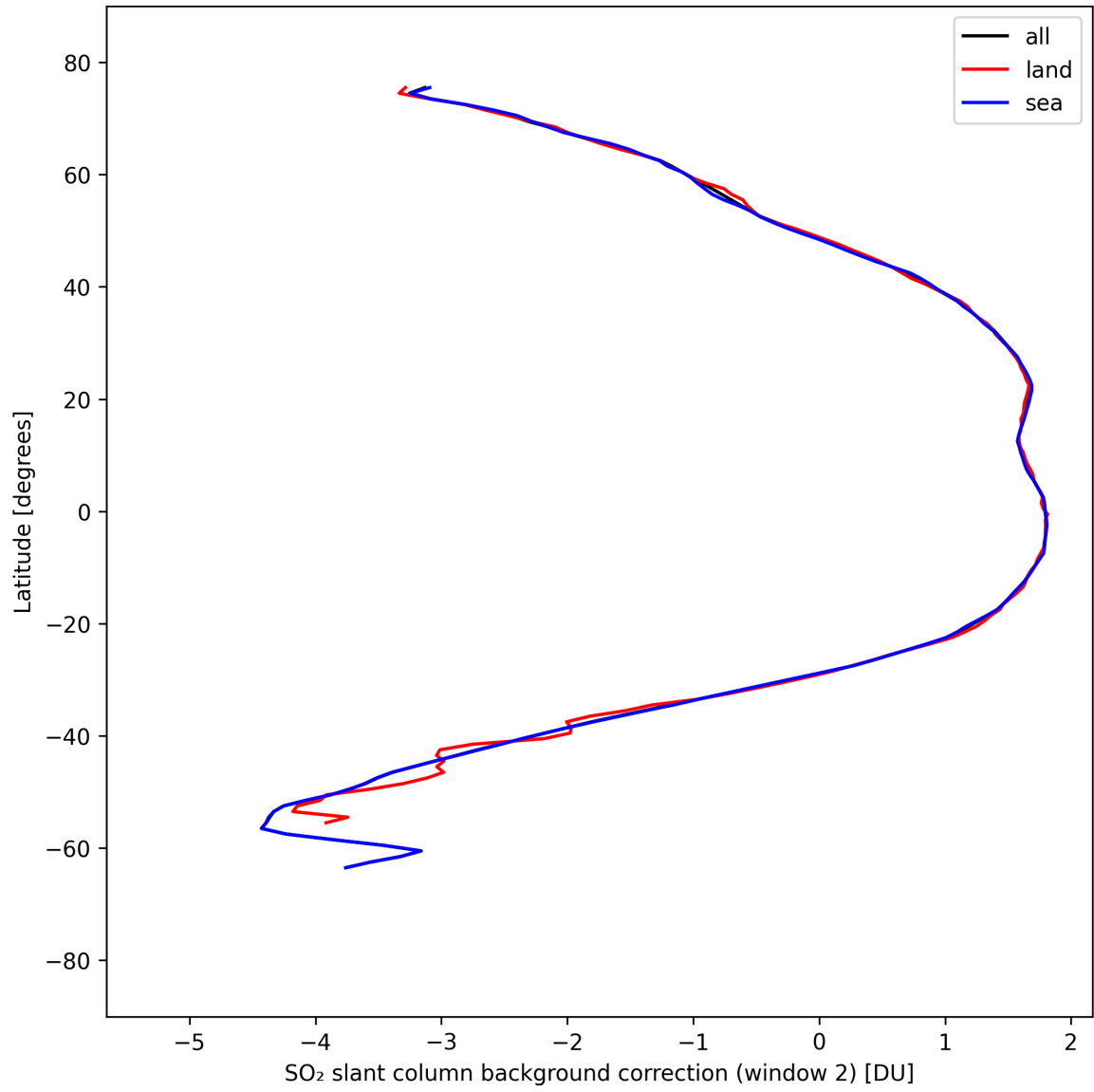


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-09-08 to 2025-09-08.

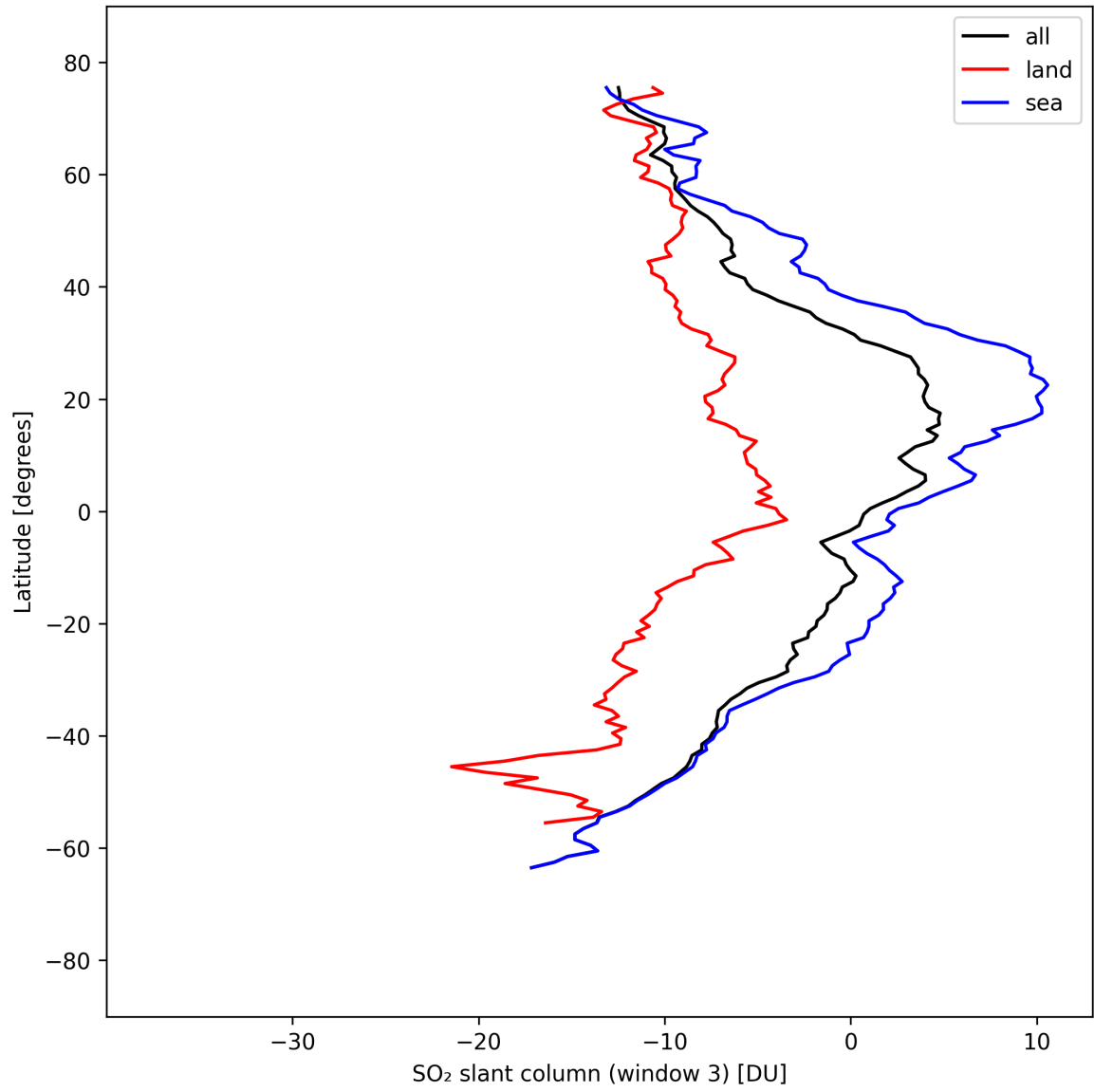


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-09-08 to 2025-09-08.

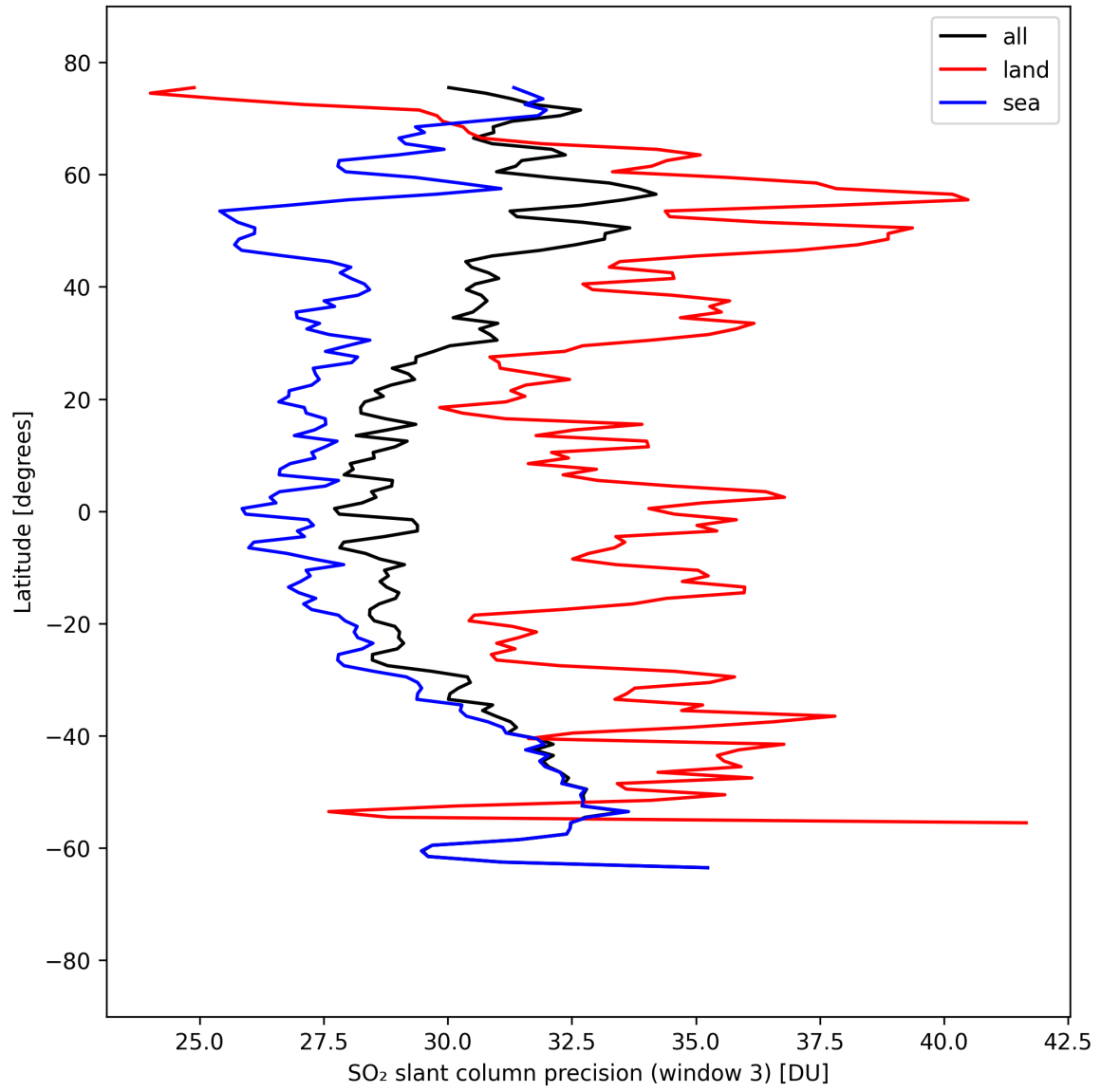


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-09-08 to 2025-09-08.

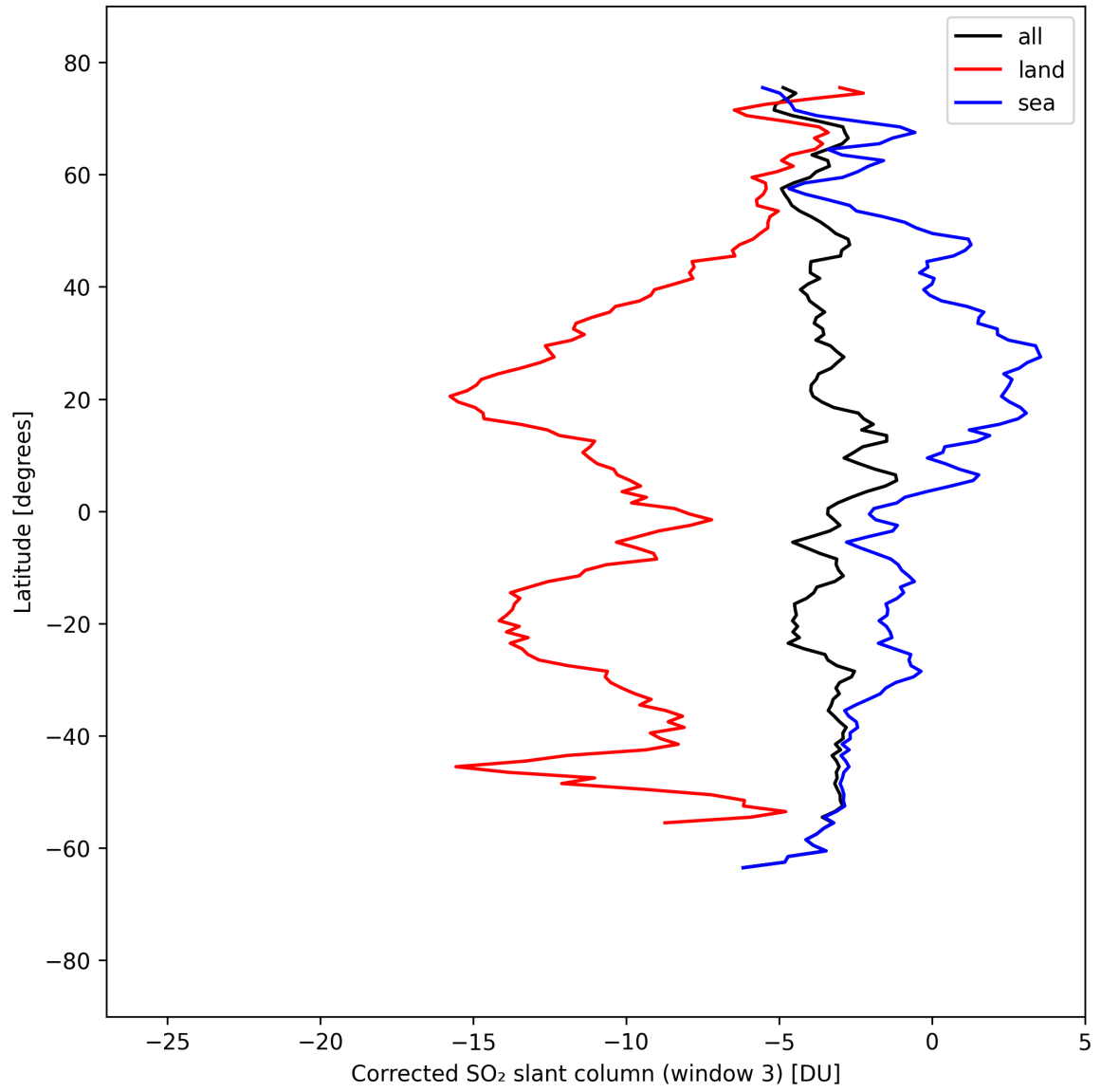


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-09-08 to 2025-09-08.

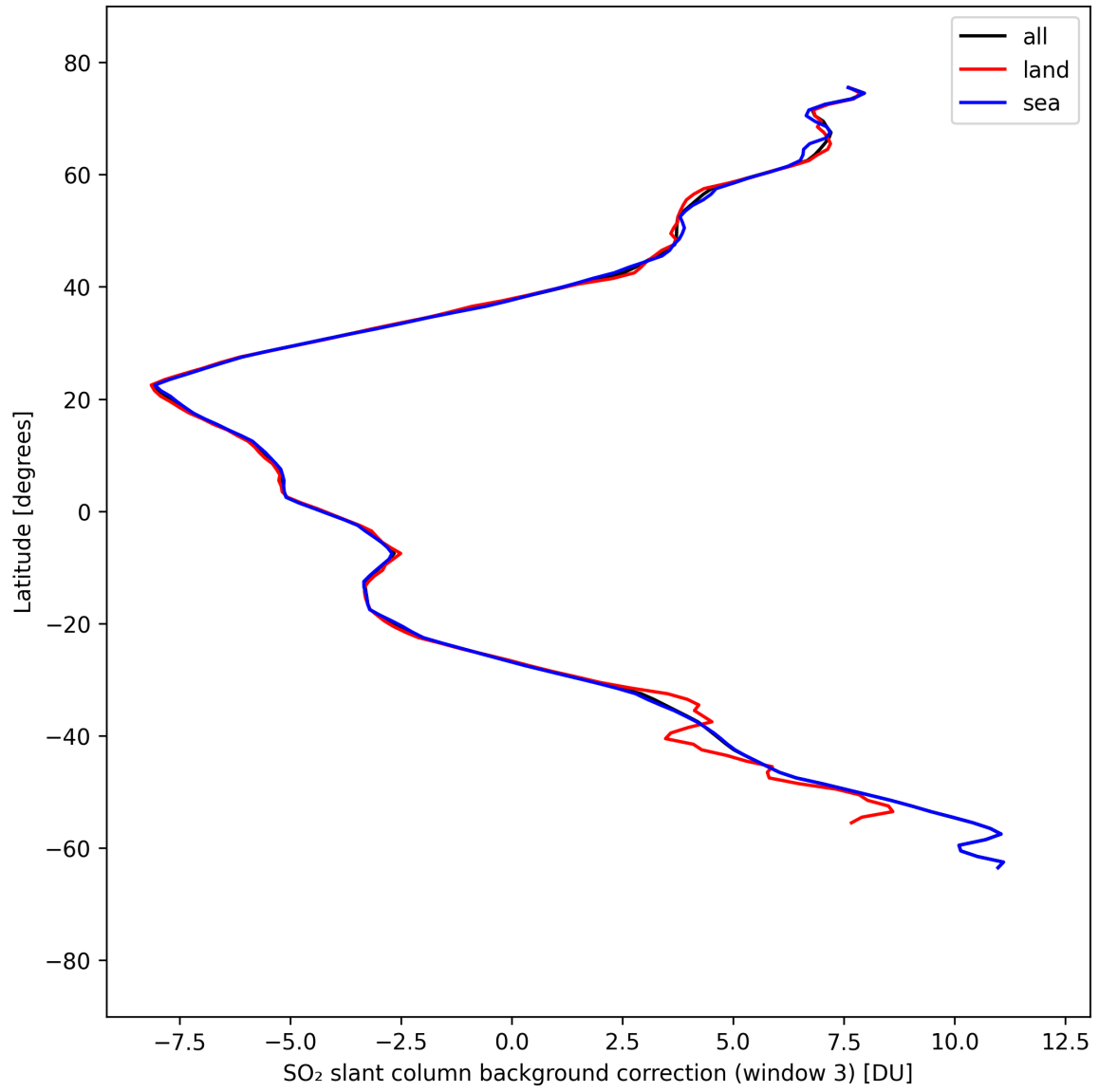


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-09-08 to 2025-09-08.

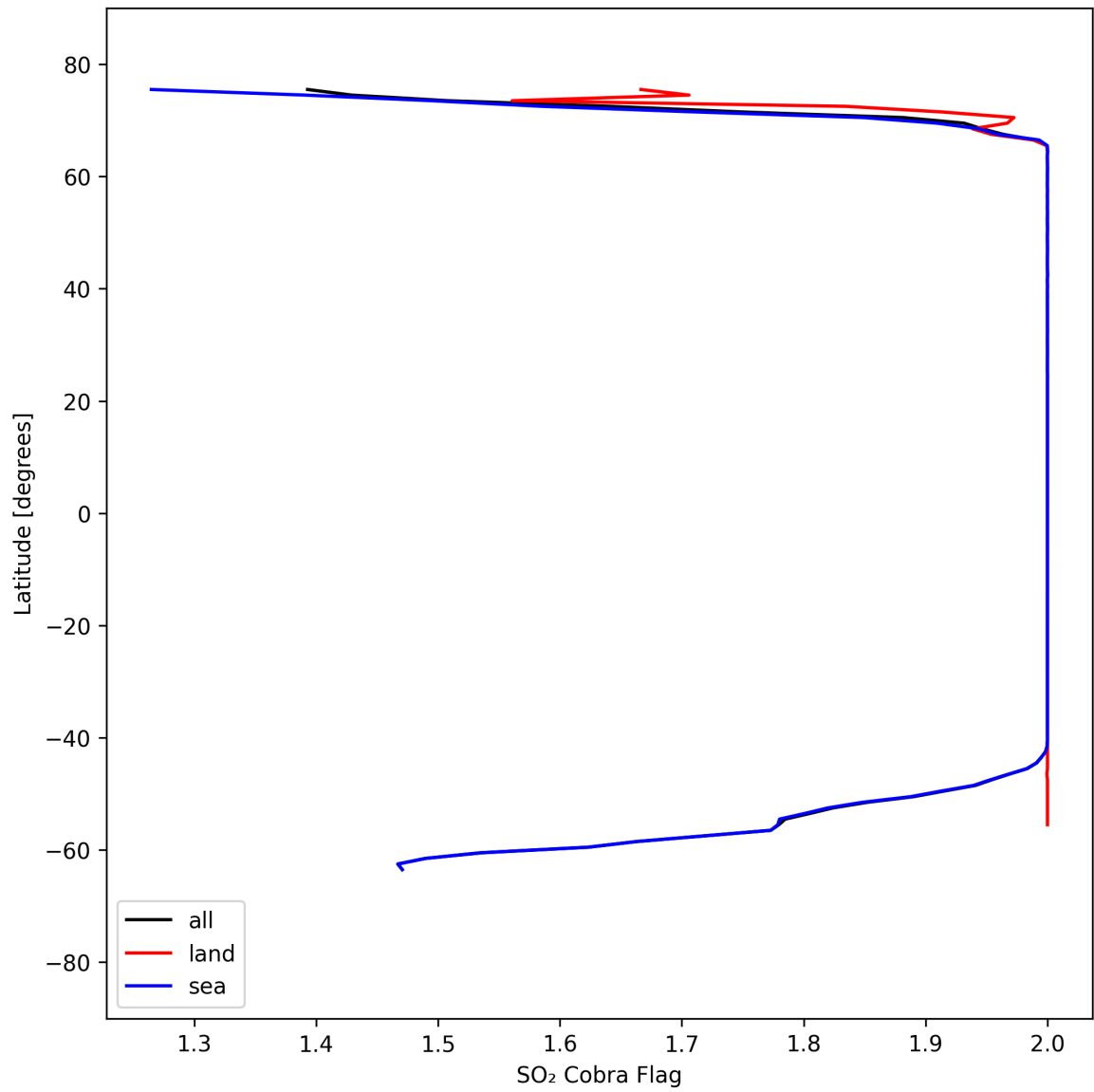


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-09-08 to 2025-09-08.

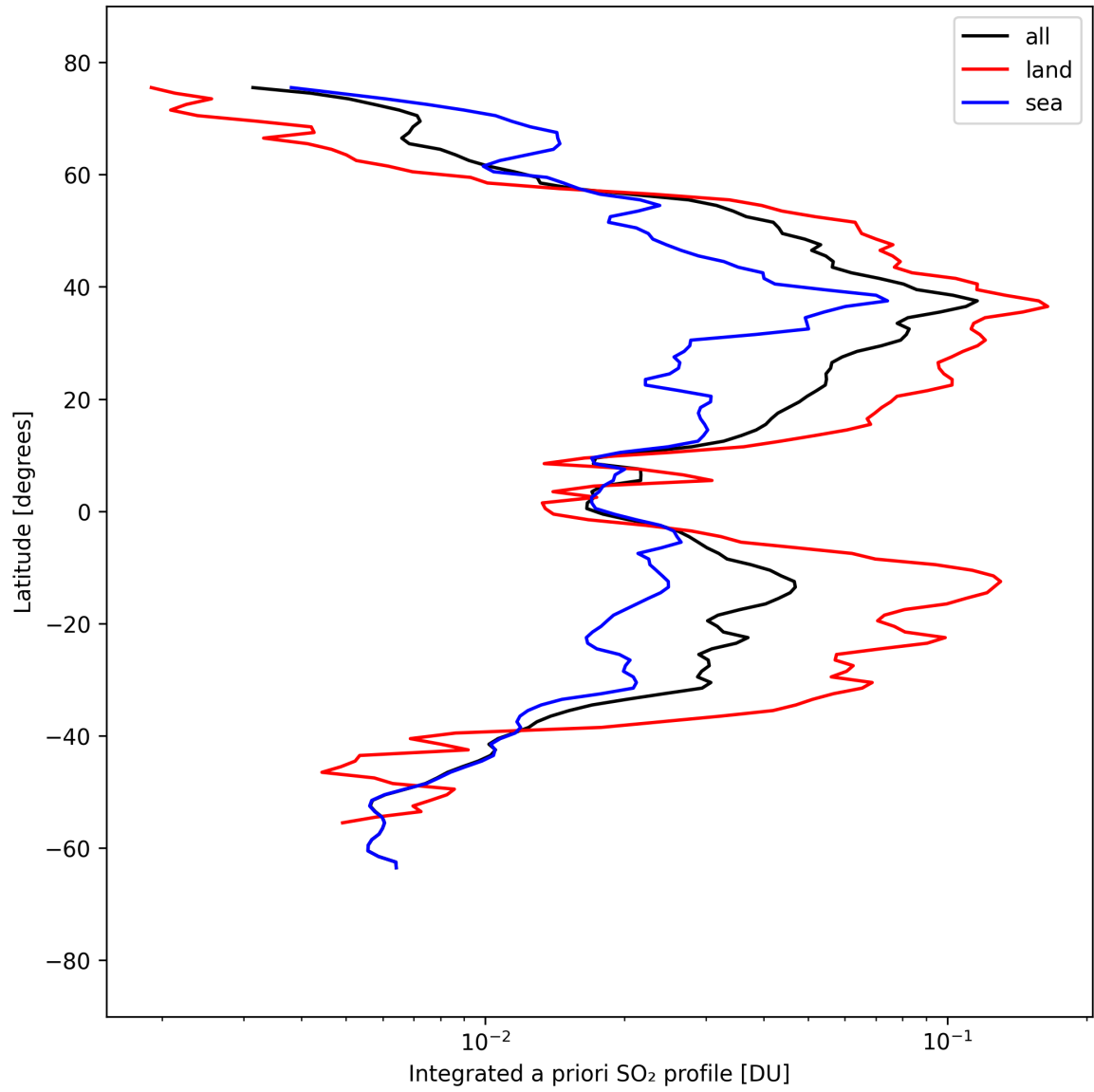


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-09-08 to 2025-09-08.

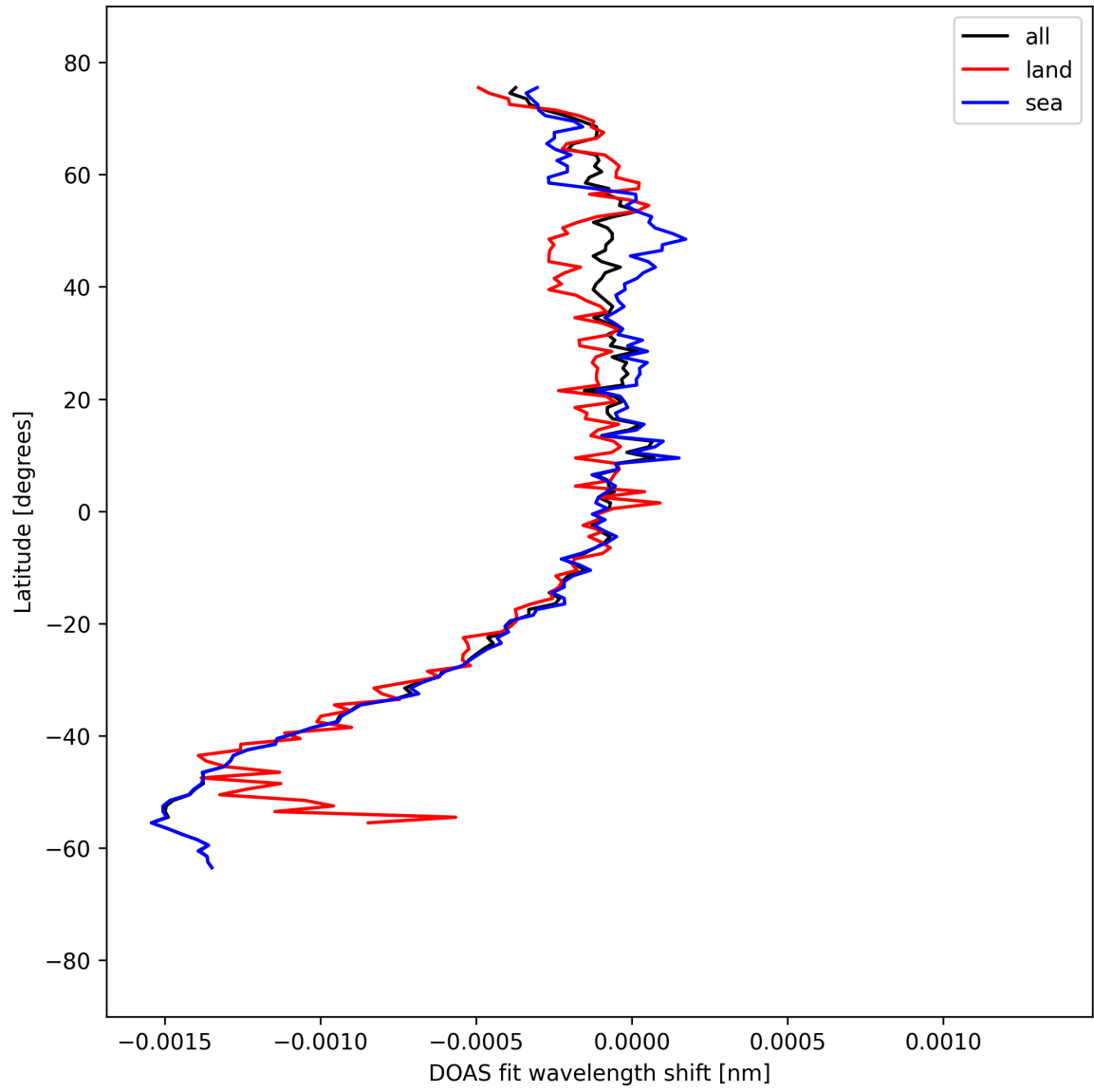


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-09-08 to 2025-09-08.

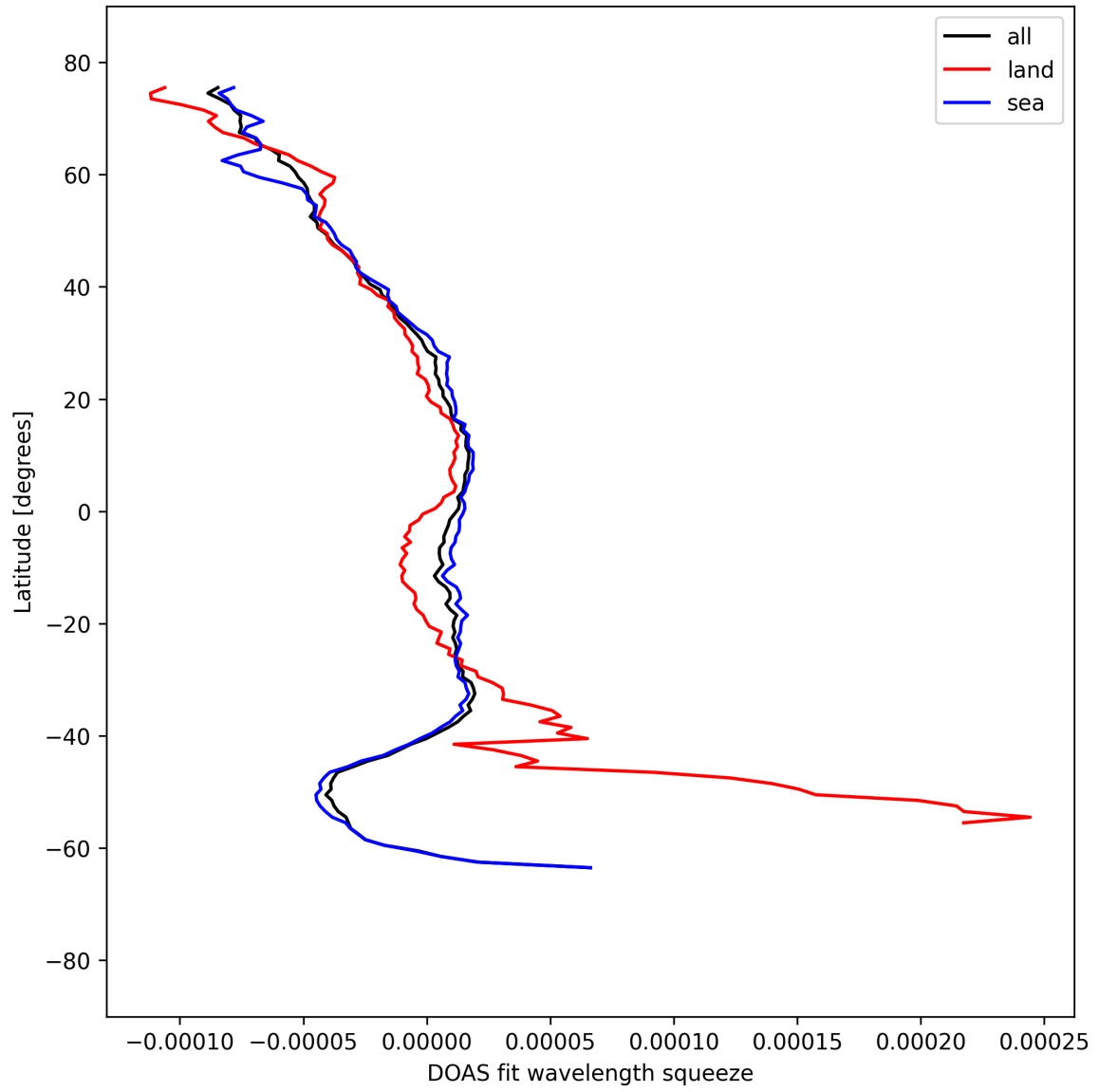


Figure 51: Zonal average of "DOAS fit wavelength squeeze" for 2025-09-08 to 2025-09-08.

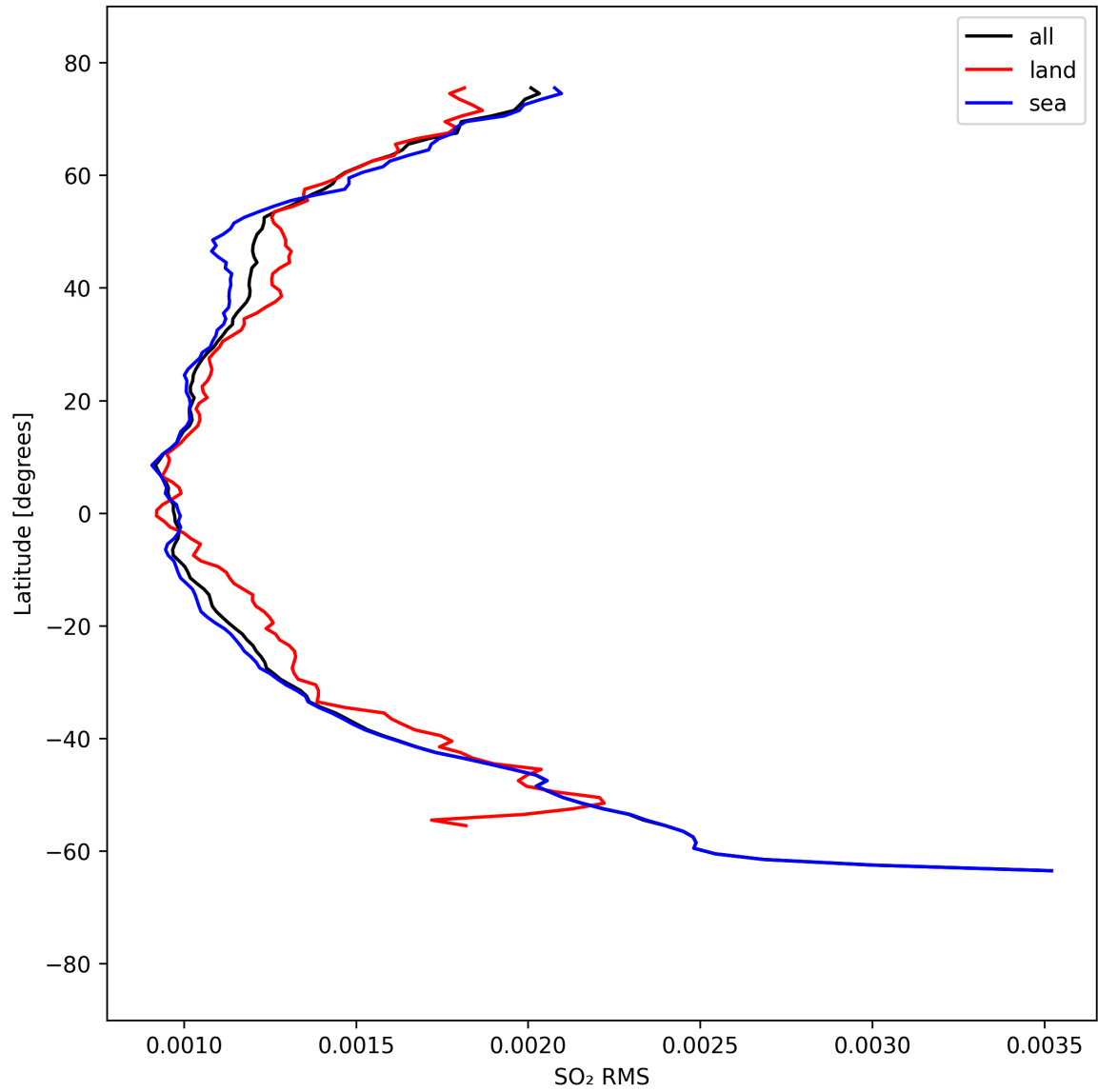


Figure 52: Zonal average of “SO₂ RMS” for 2025-09-08 to 2025-09-08.

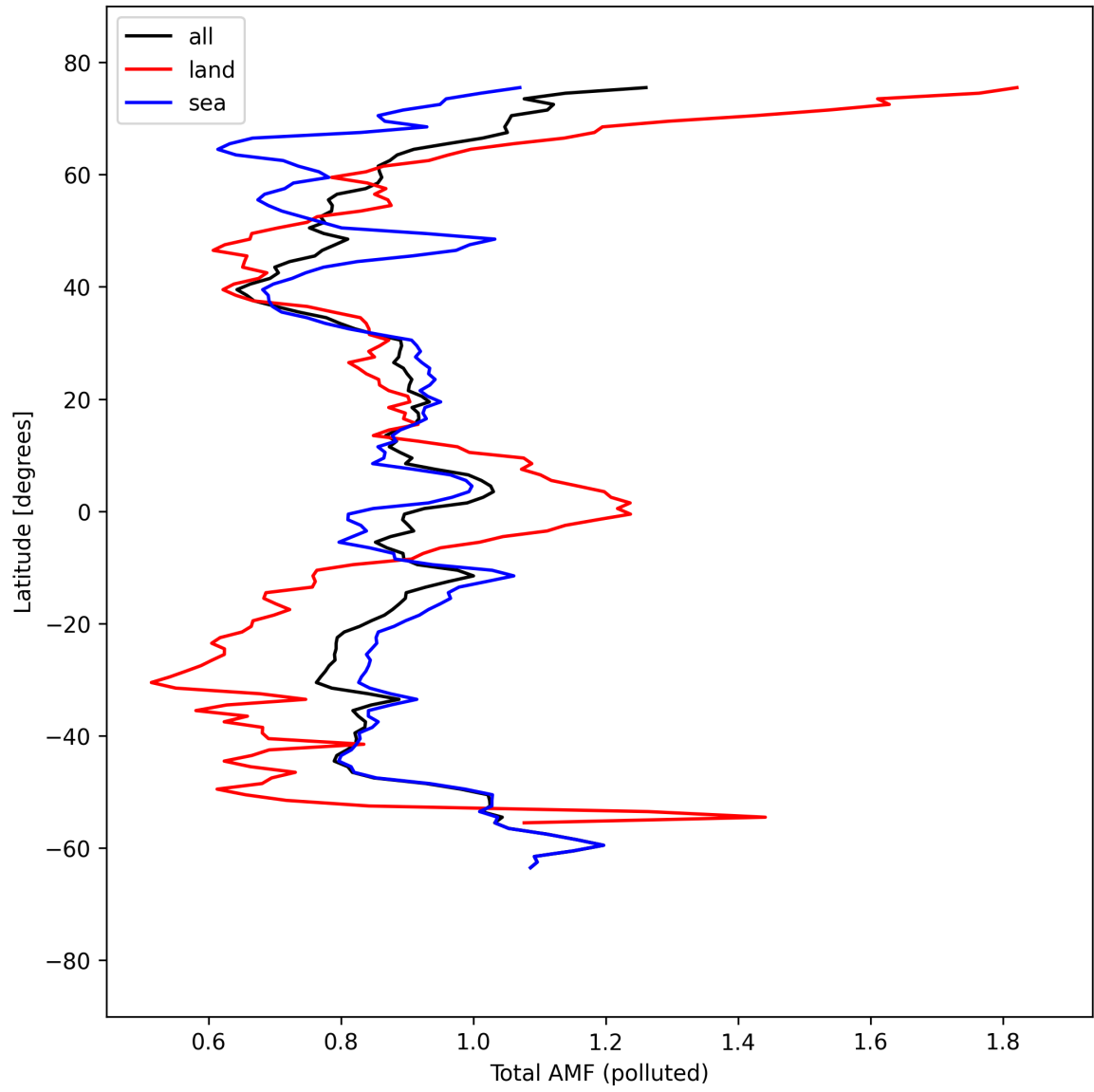


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-09-08 to 2025-09-08.

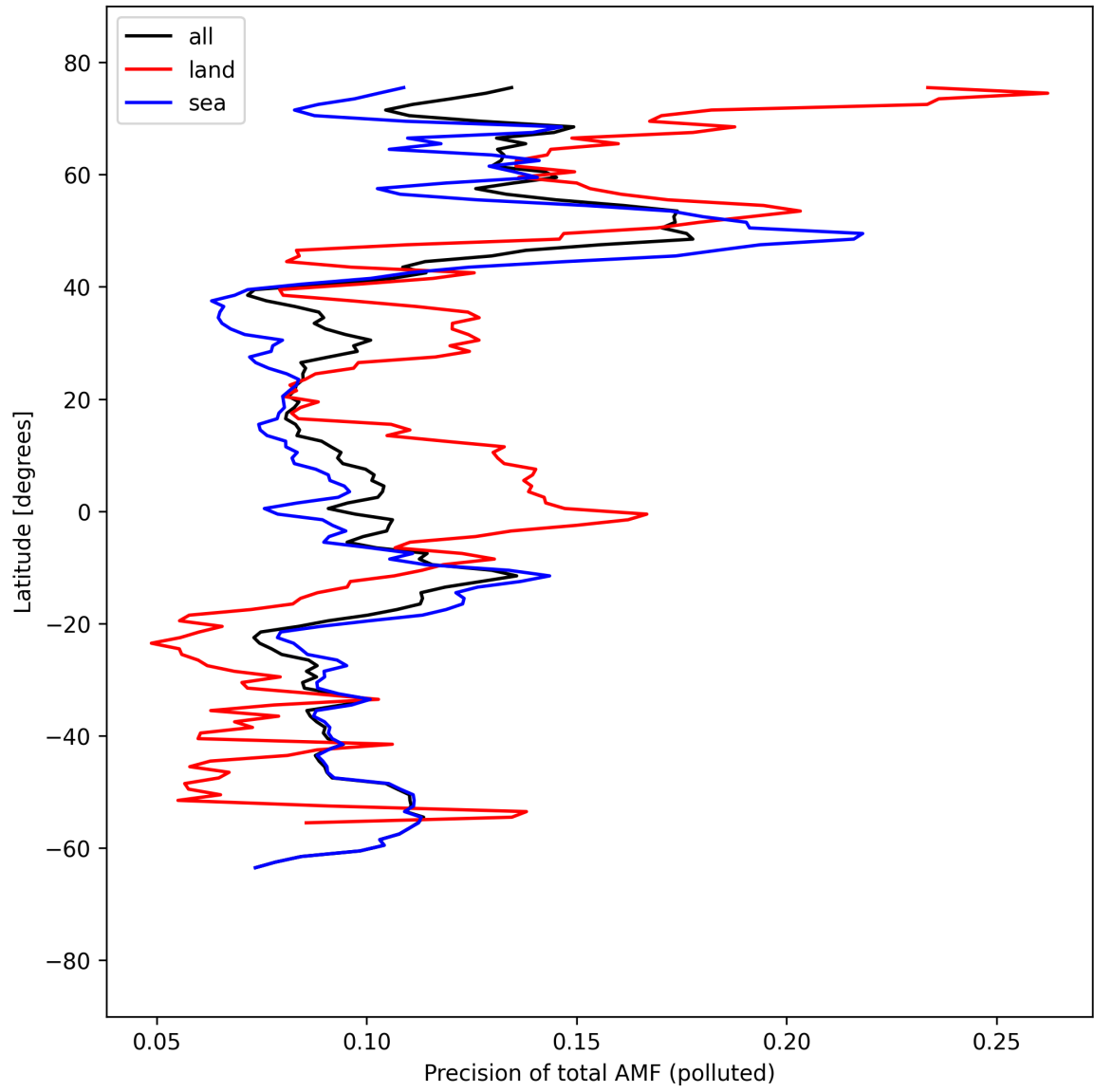


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-09-08 to 2025-09-08.

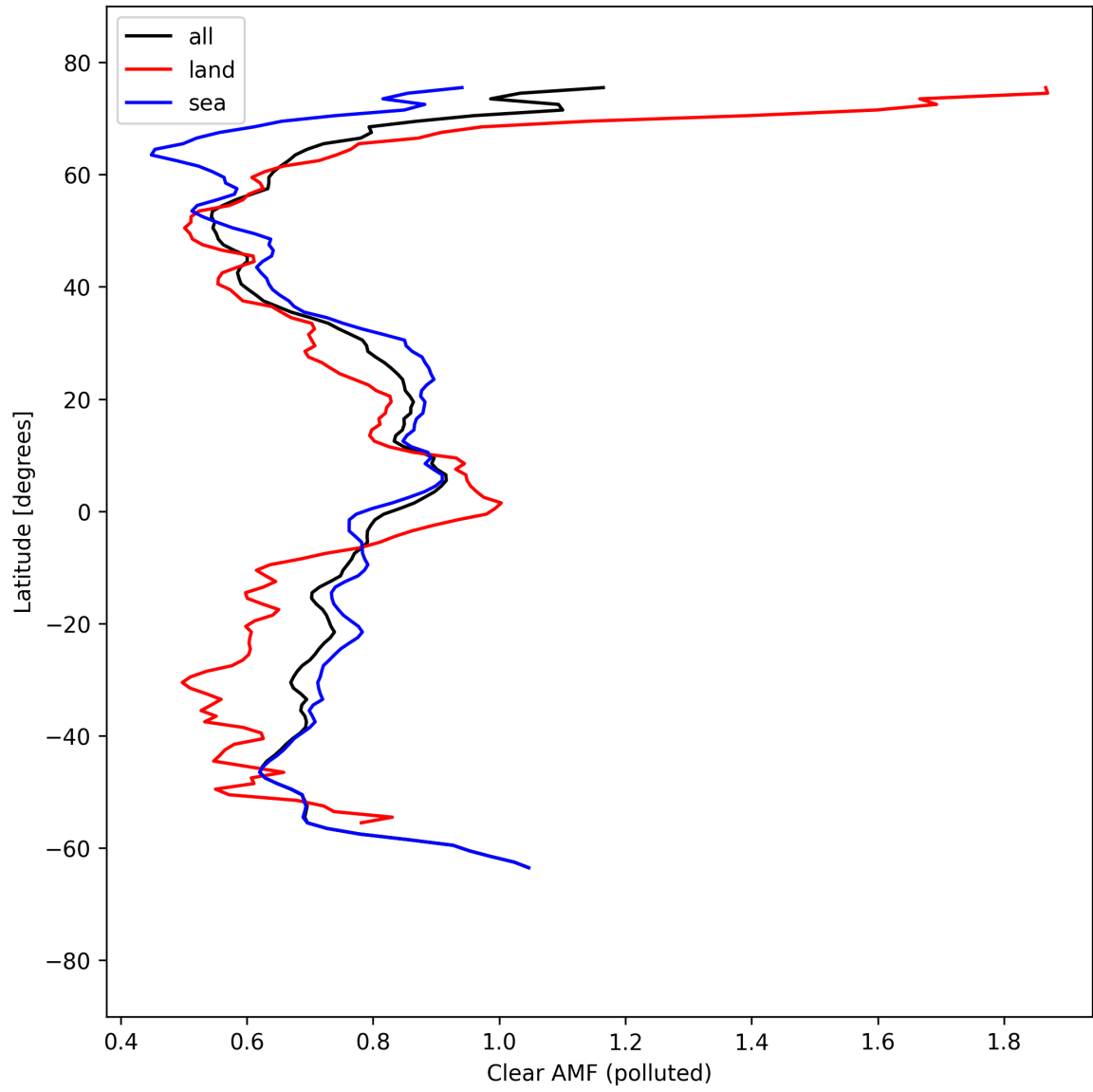


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-09-08 to 2025-09-08.

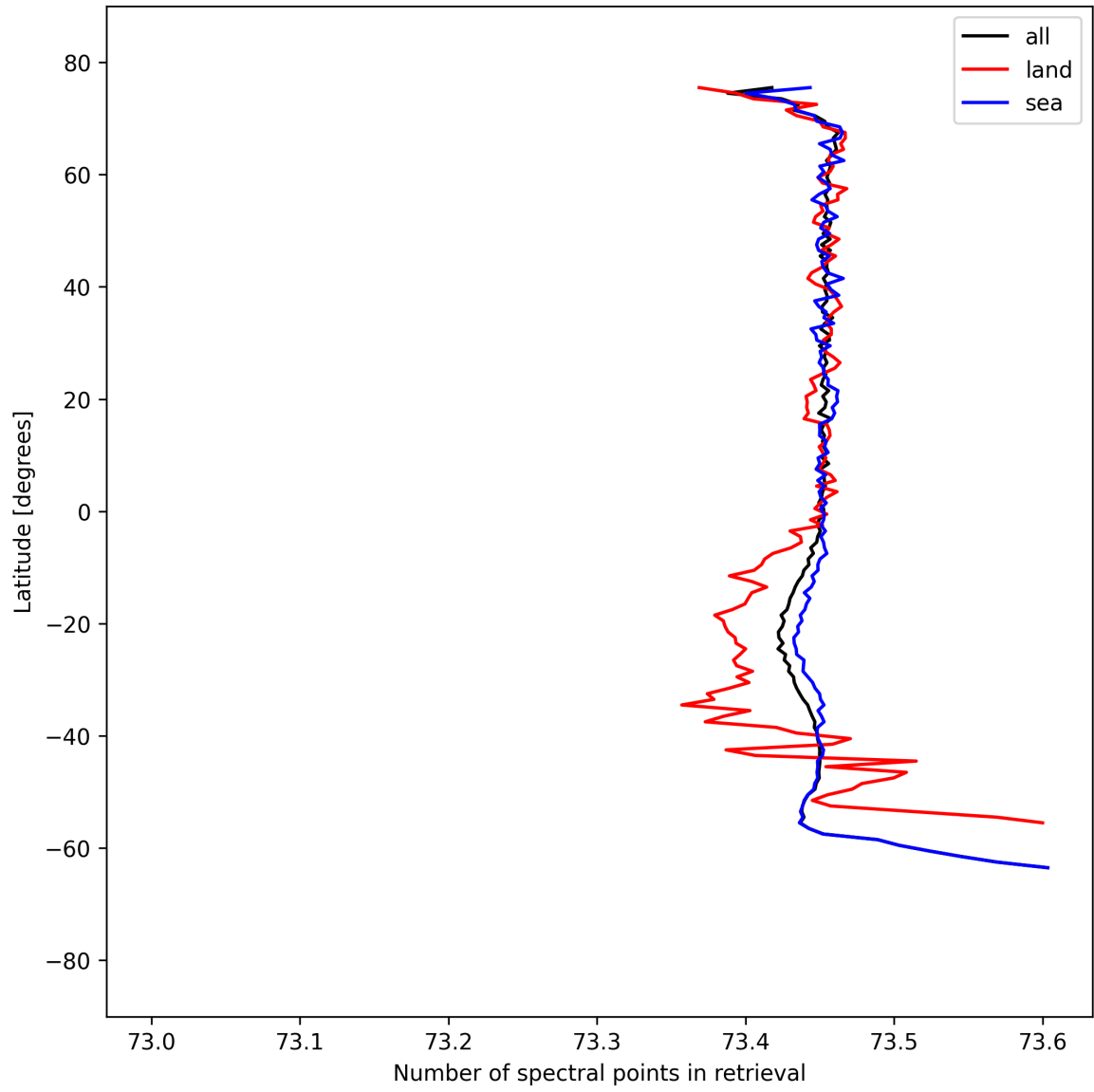


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-09-08 to 2025-09-08.

8 Histograms

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

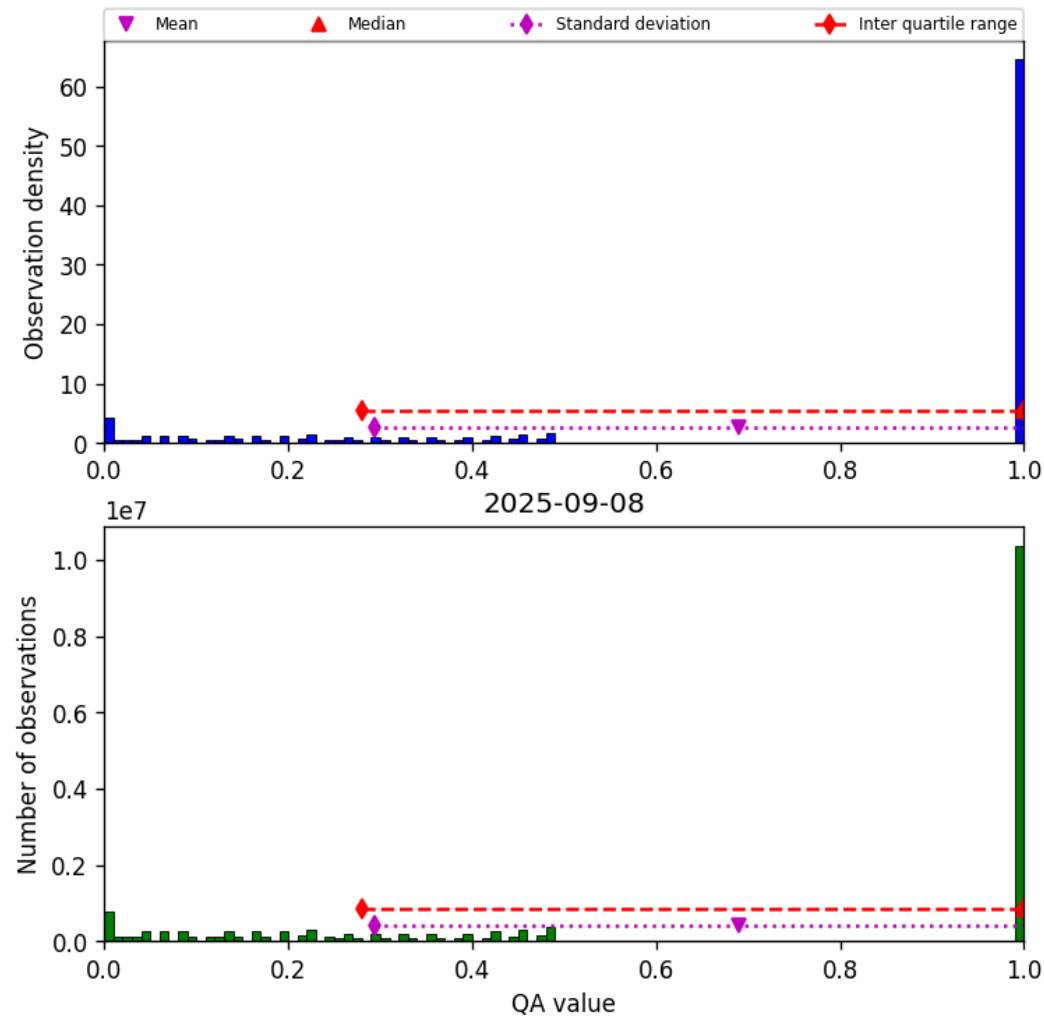


Figure 57: Histogram of “QA value” for 2025-09-08 to 2025-09-08

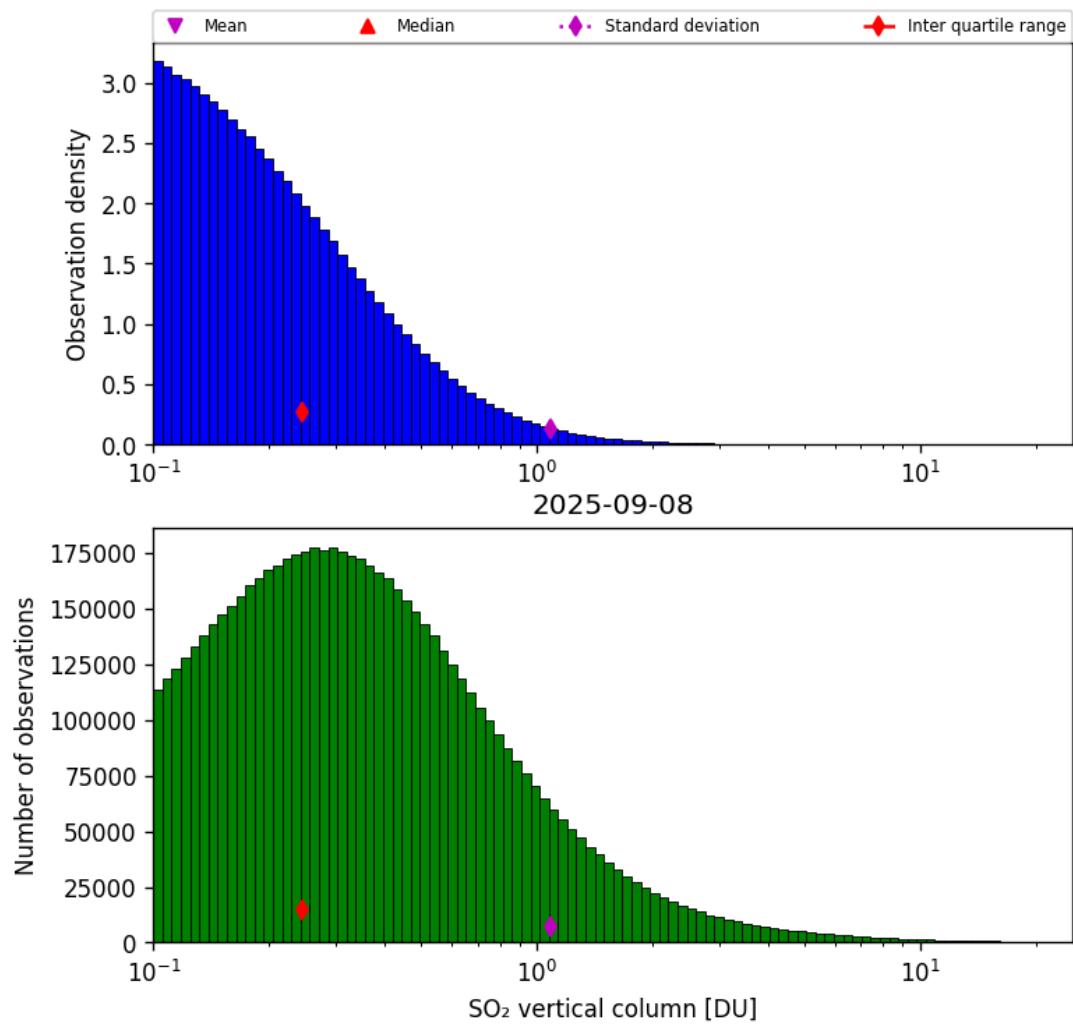


Figure 58: Histogram of “SO₂ vertical column” for 2025-09-08 to 2025-09-08

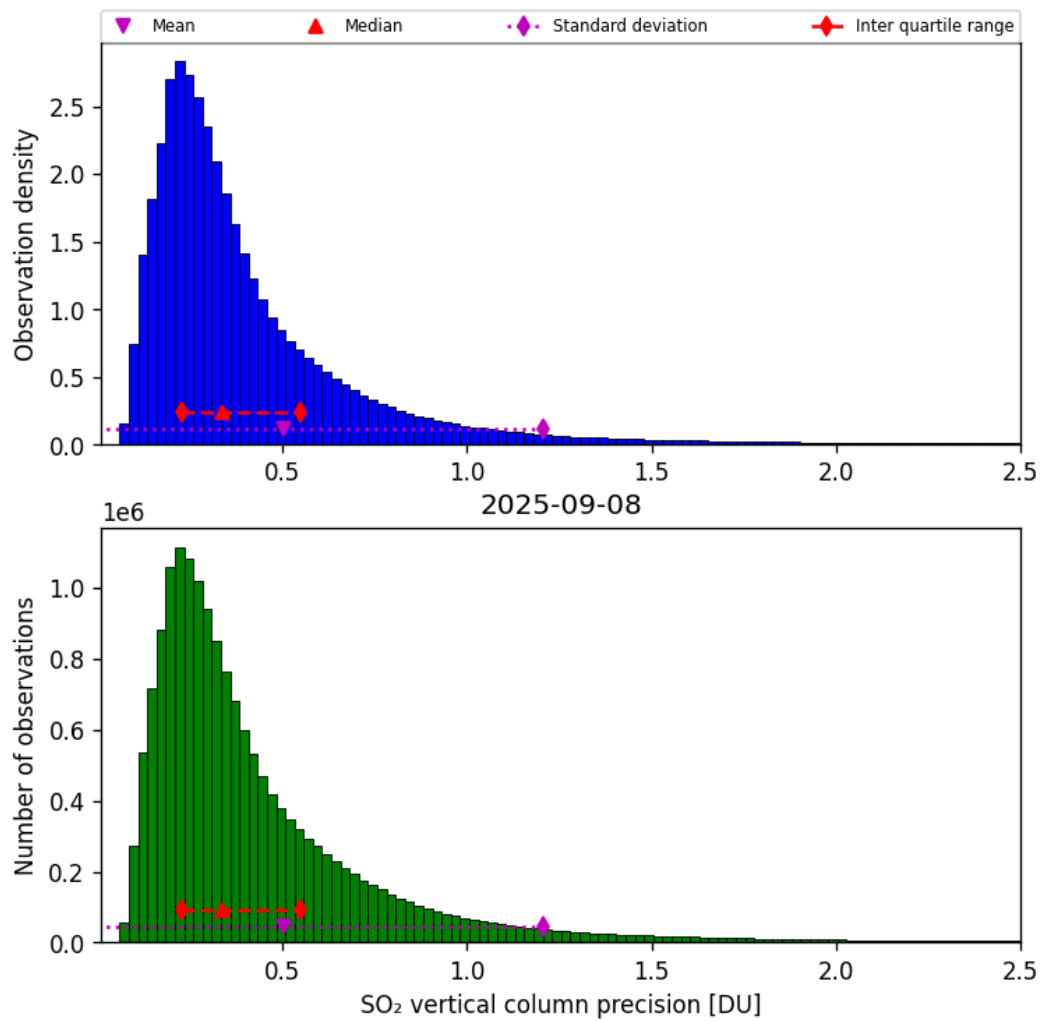


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-09-08 to 2025-09-08

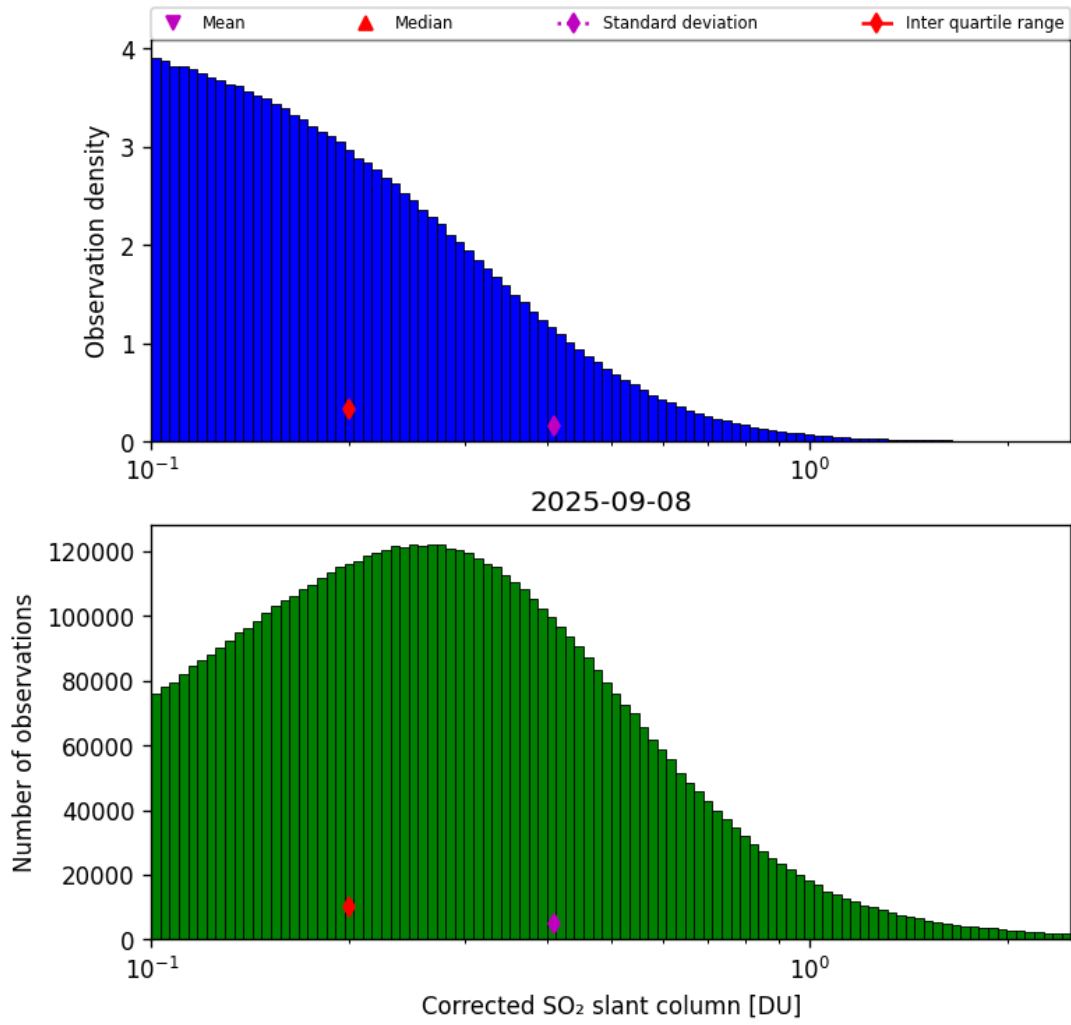


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-09-08 to 2025-09-08

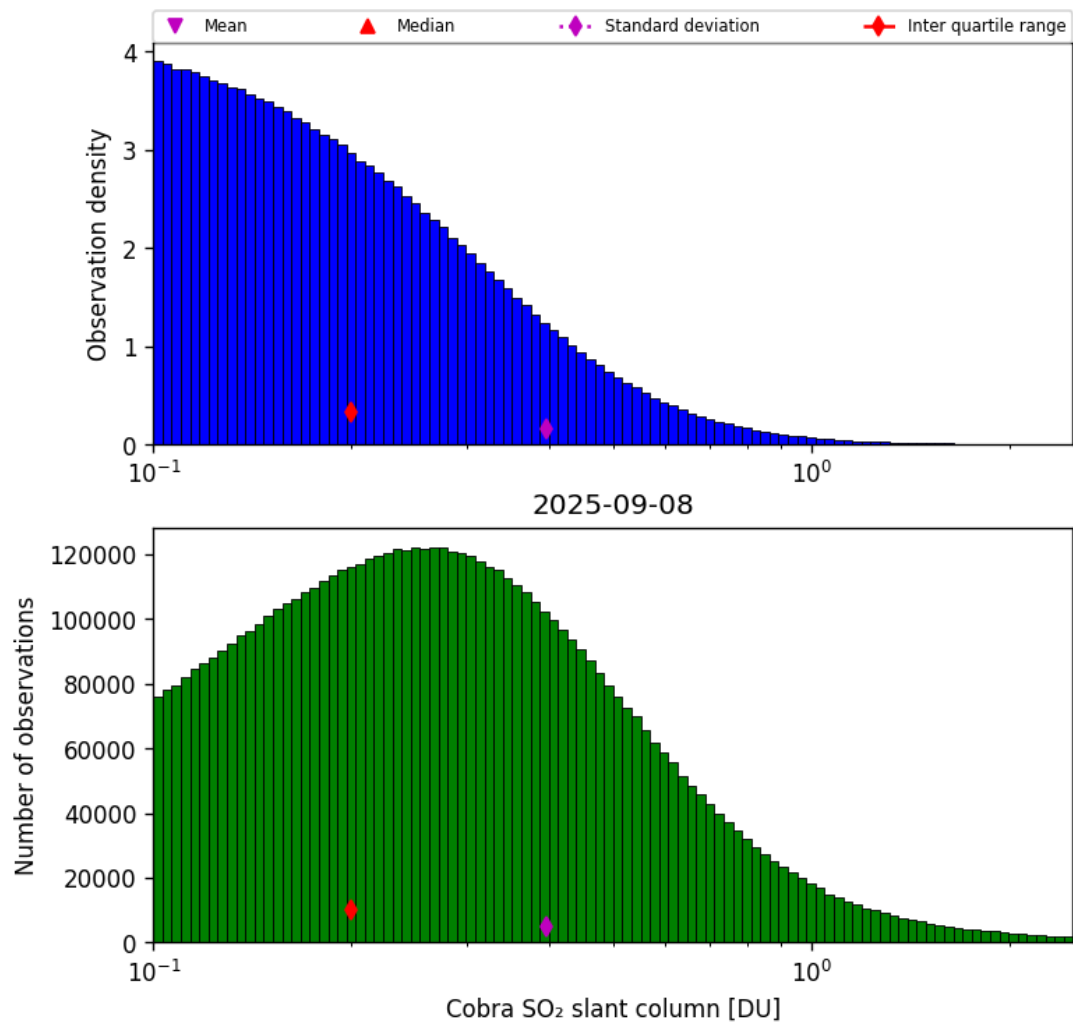


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-09-08 to 2025-09-08

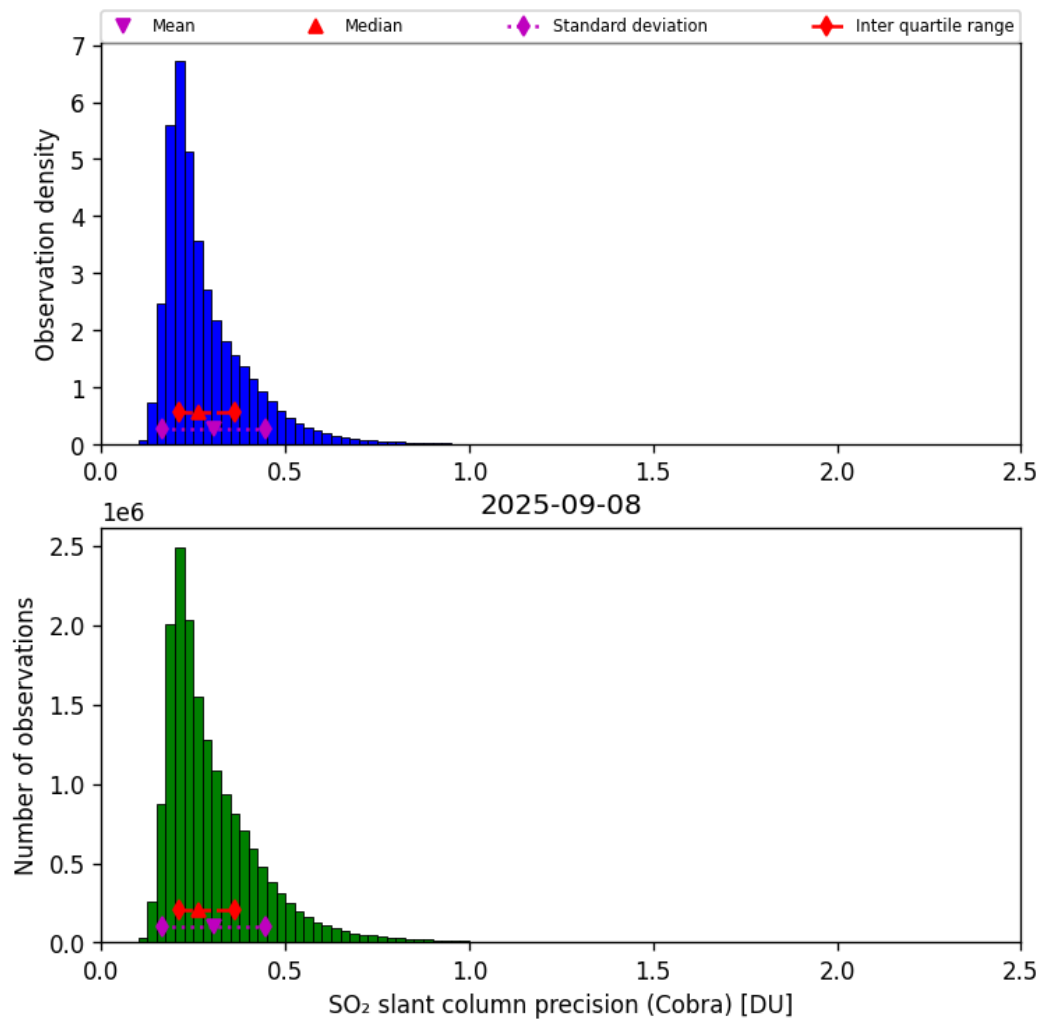


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-09-08 to 2025-09-08

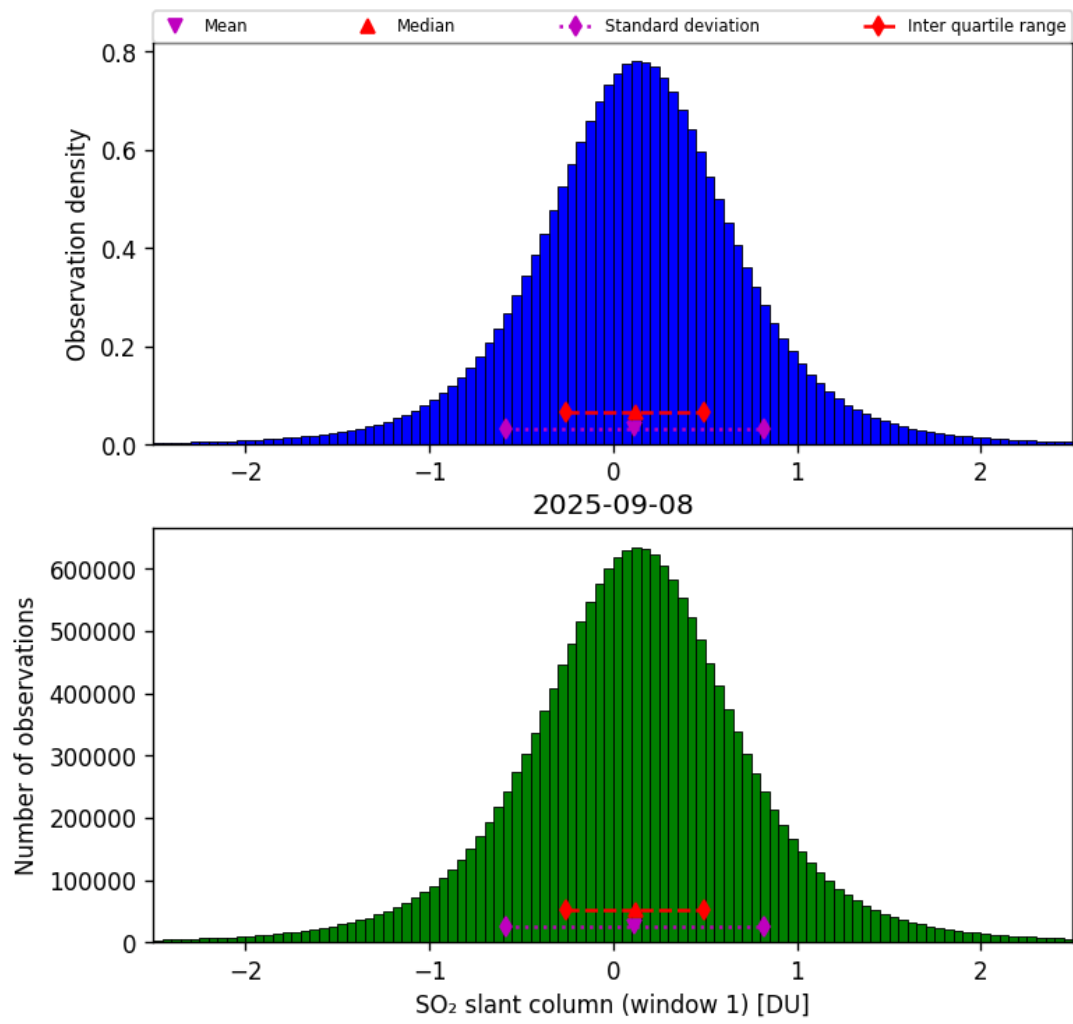


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-09-08 to 2025-09-08

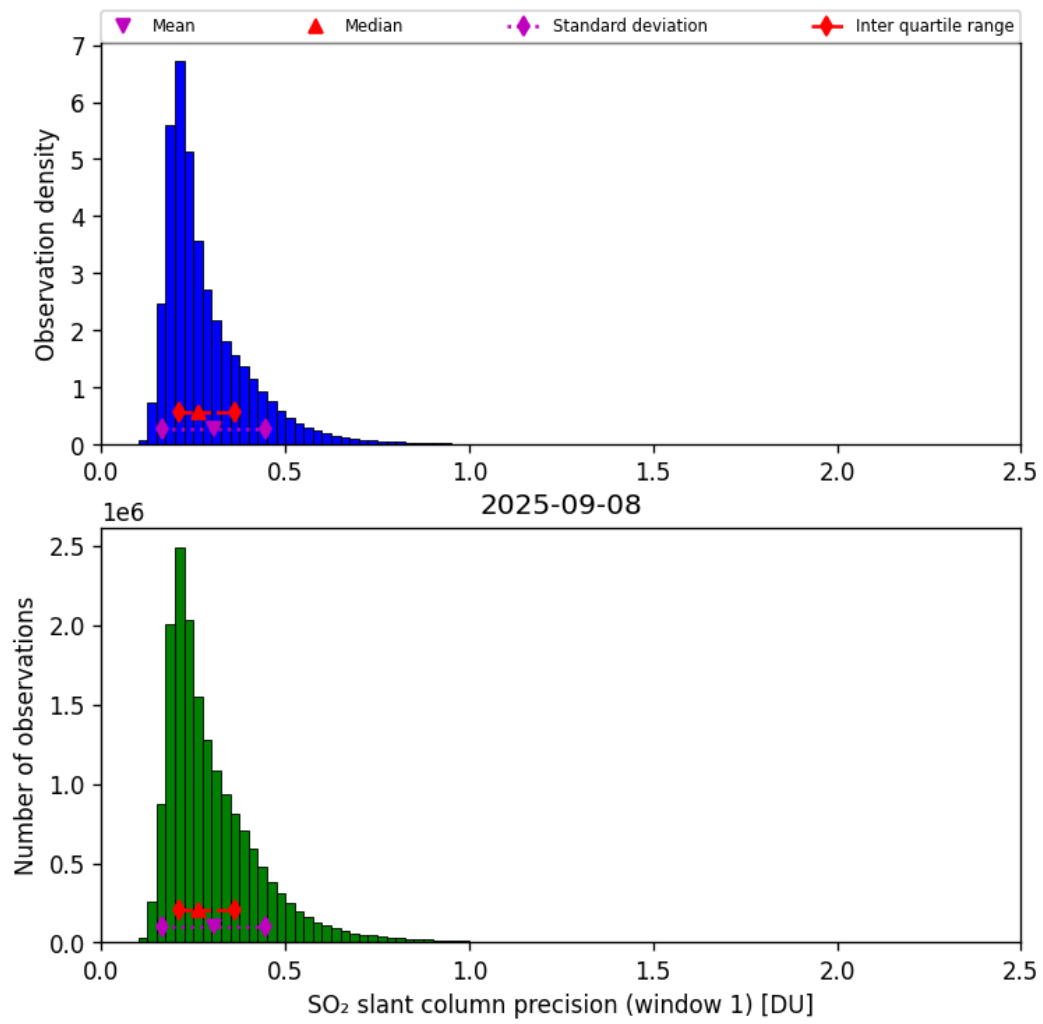


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-09-08 to 2025-09-08

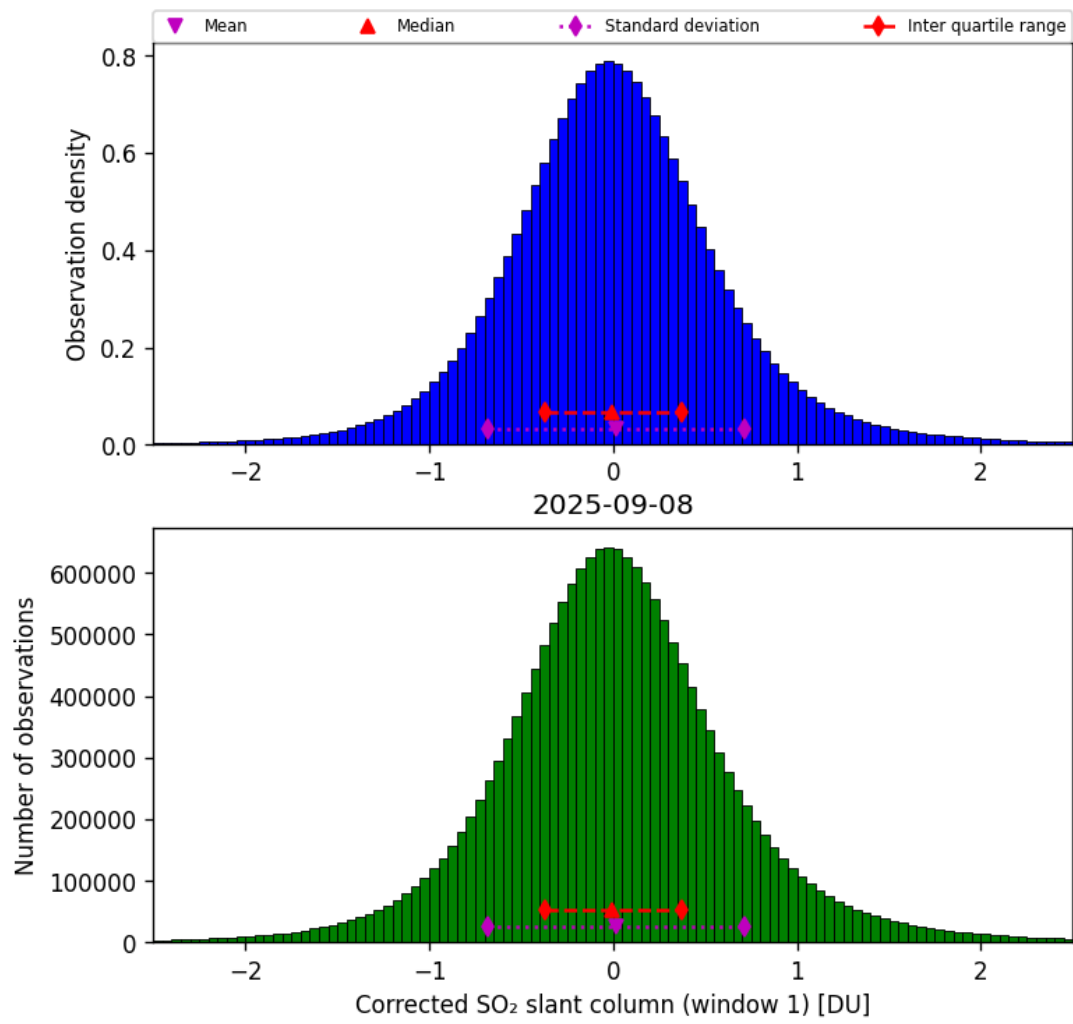


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-09-08 to 2025-09-08

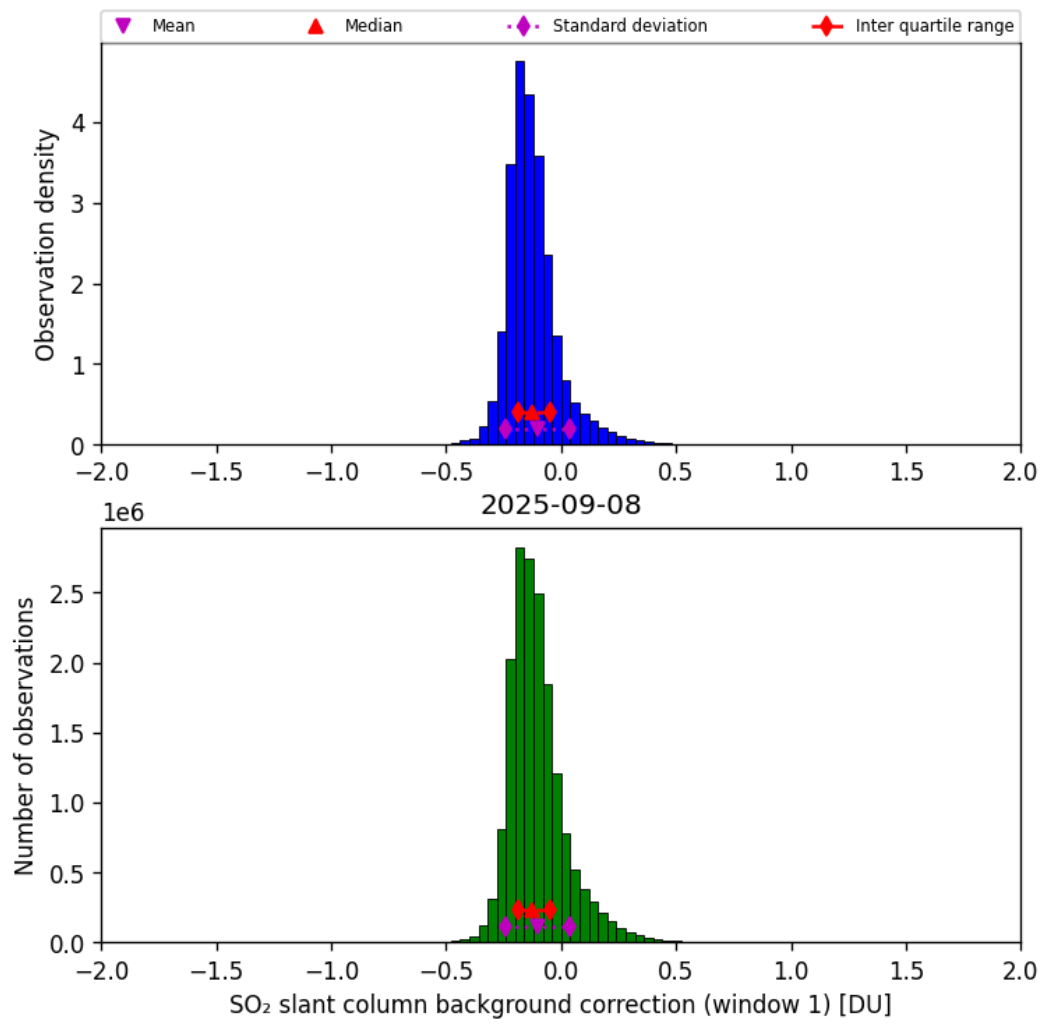


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-09-08 to 2025-09-08

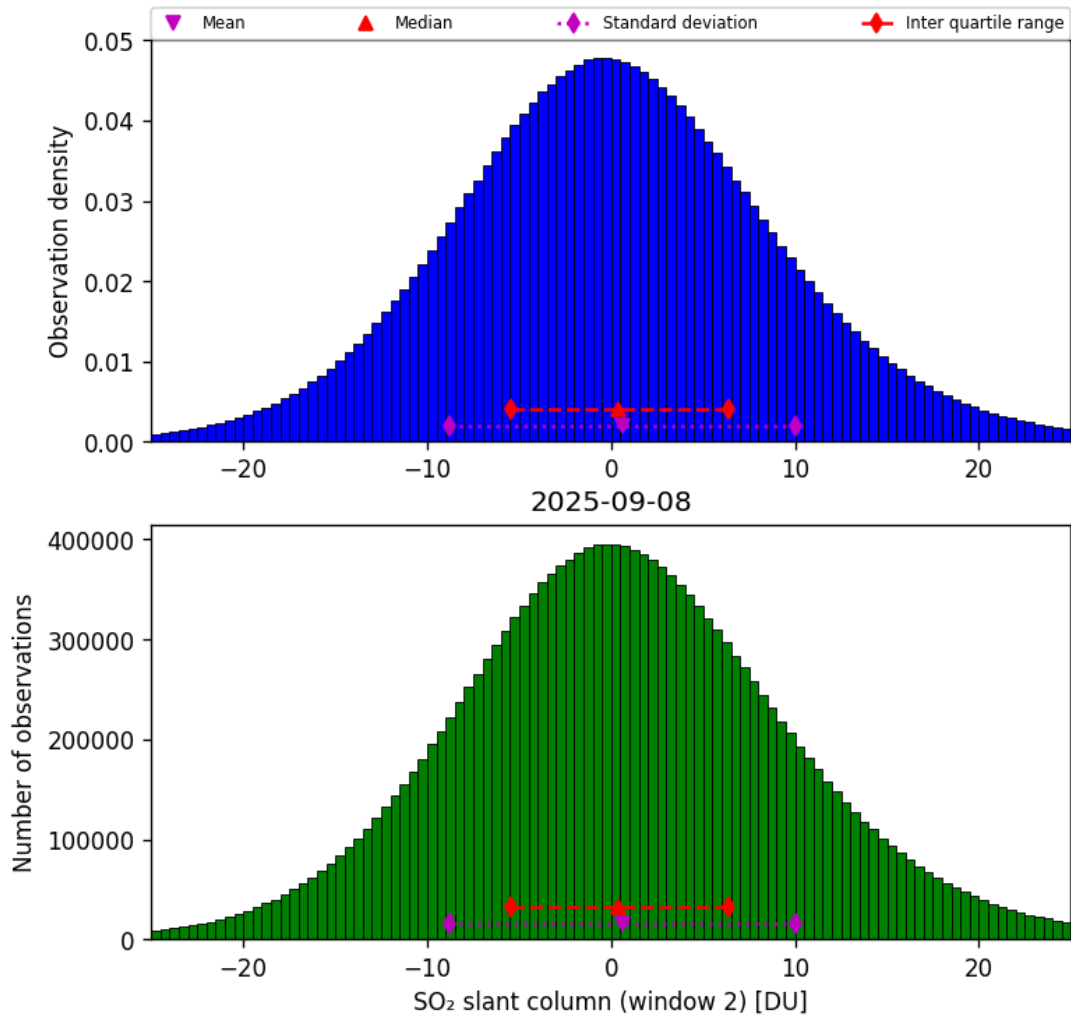


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-09-08 to 2025-09-08

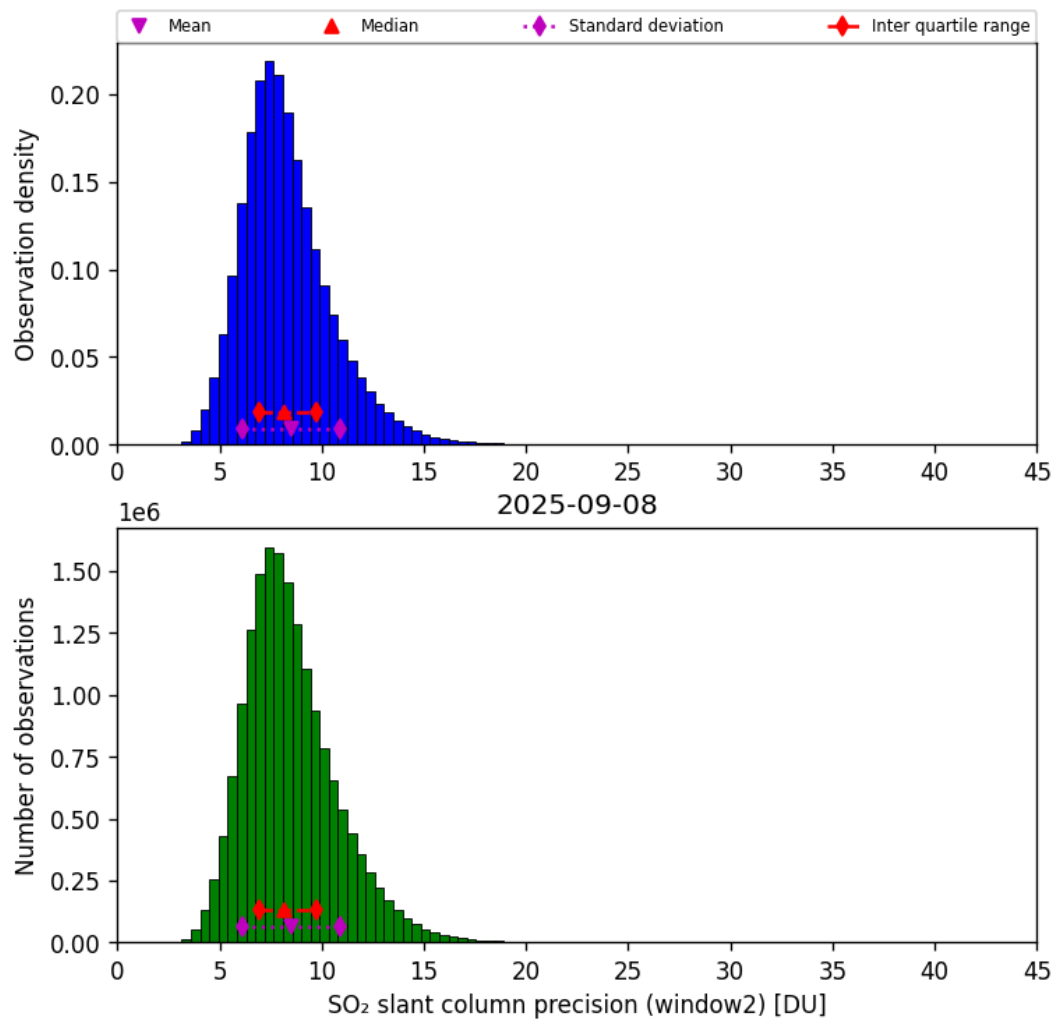


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-09-08 to 2025-09-08

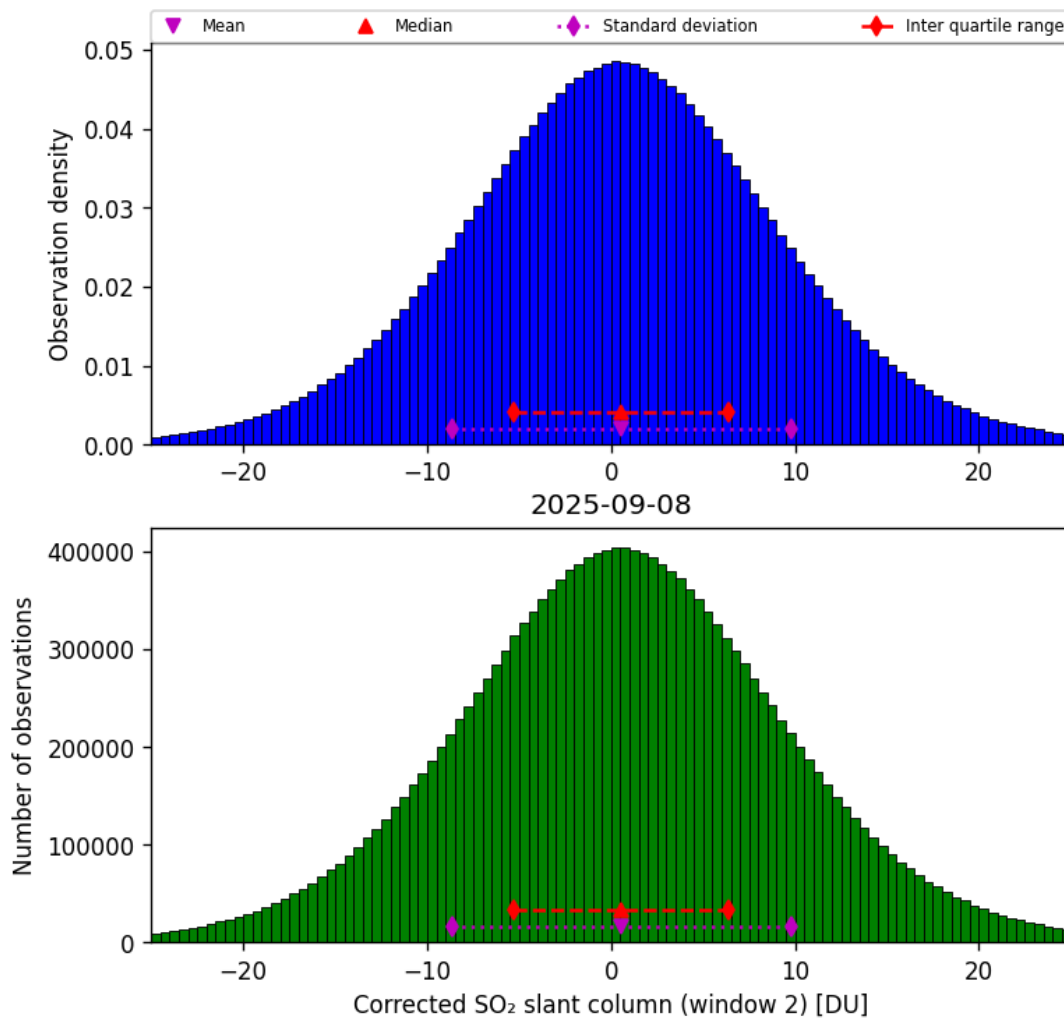


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-09-08 to 2025-09-08

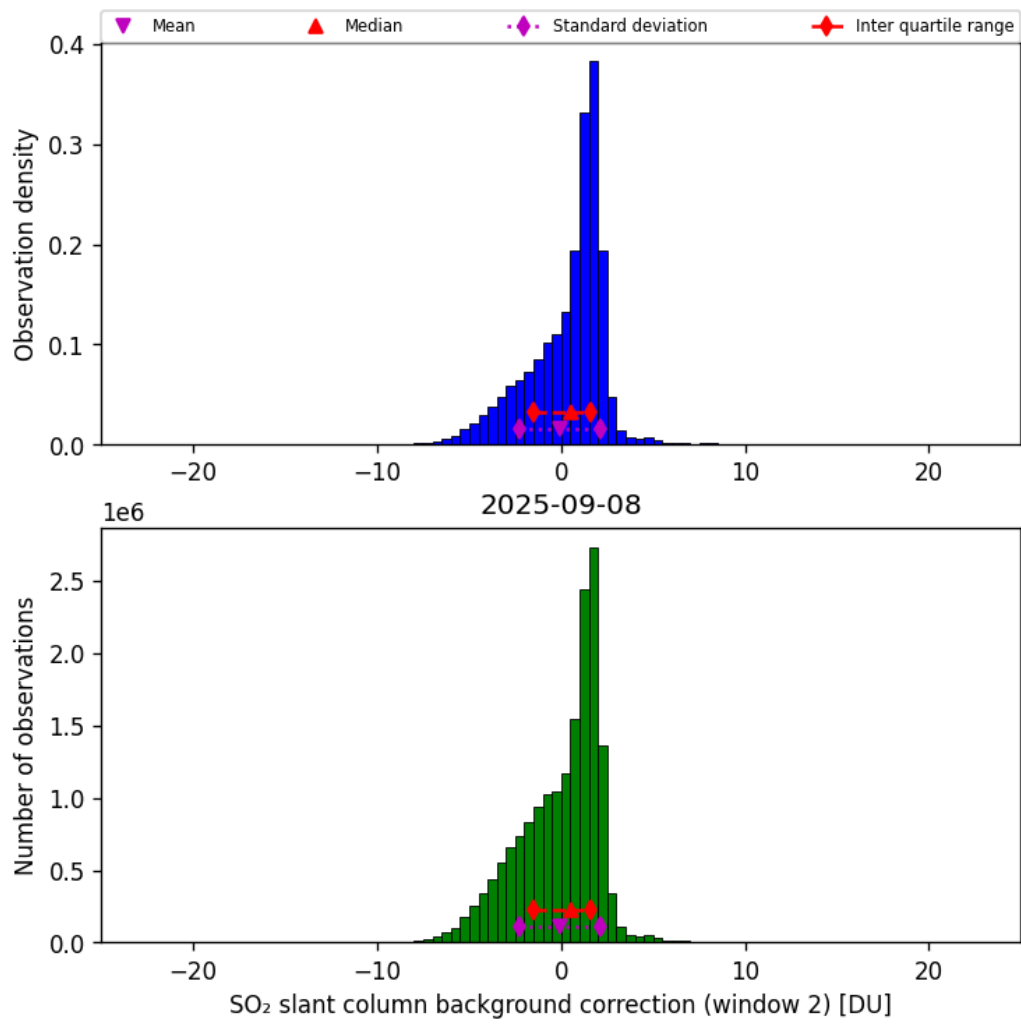


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-09-08 to 2025-09-08

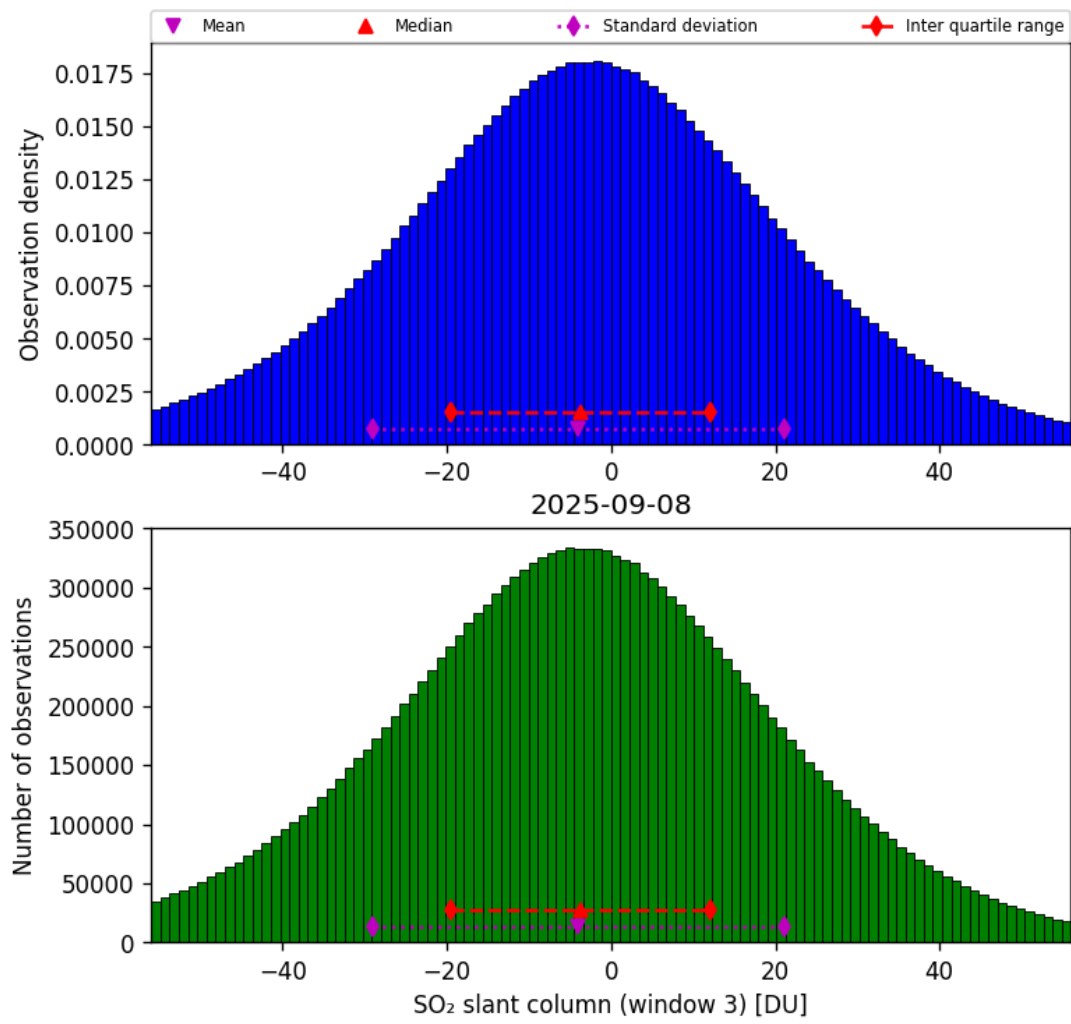


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-09-08 to 2025-09-08

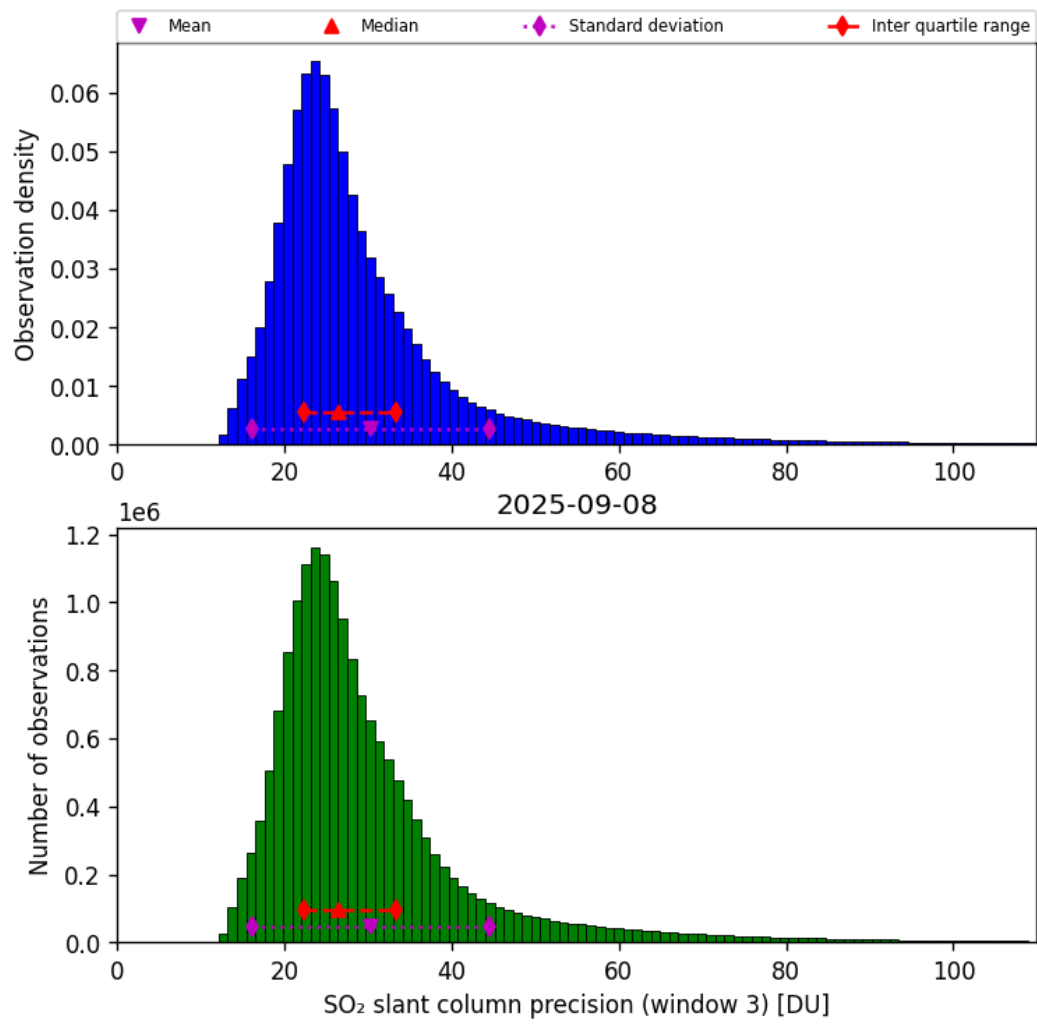


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-09-08 to 2025-09-08

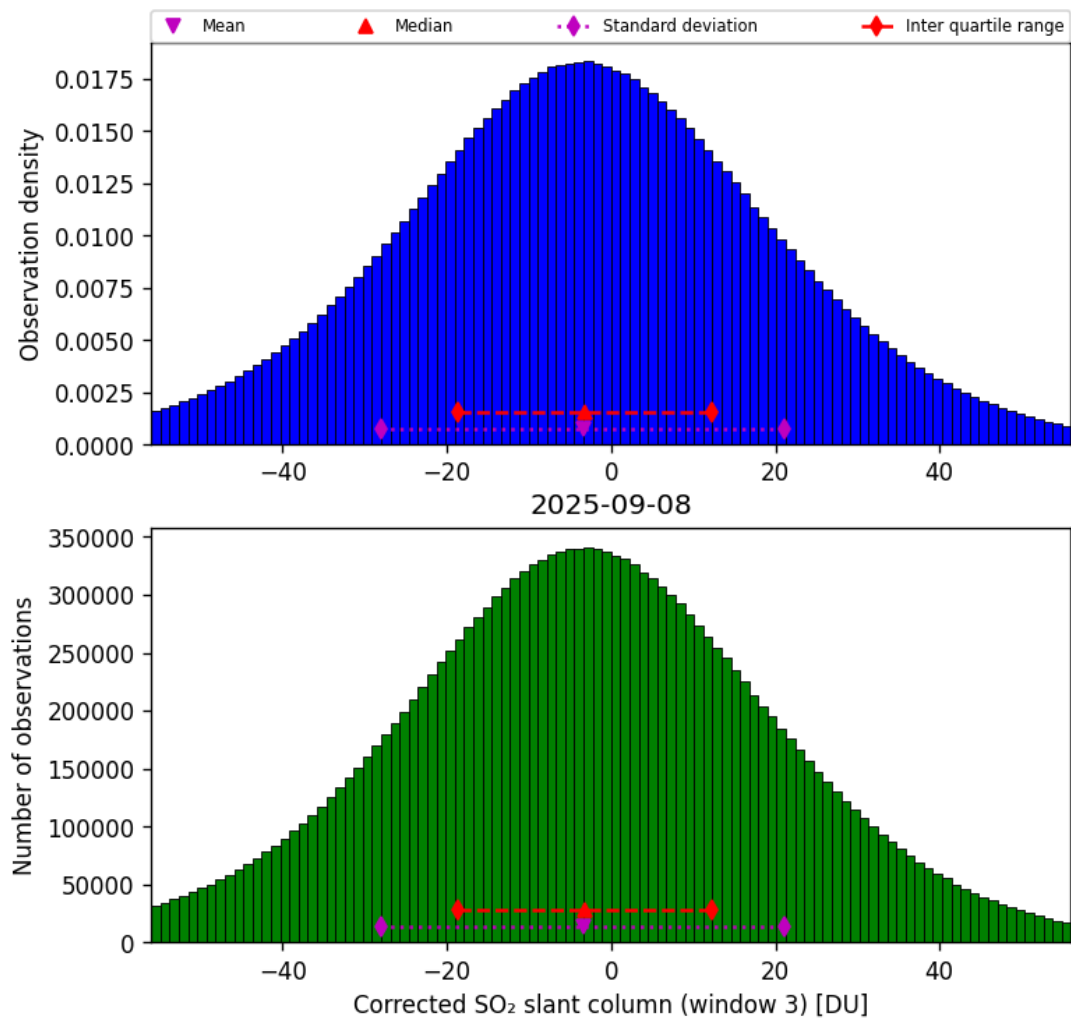


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-09-08 to 2025-09-08

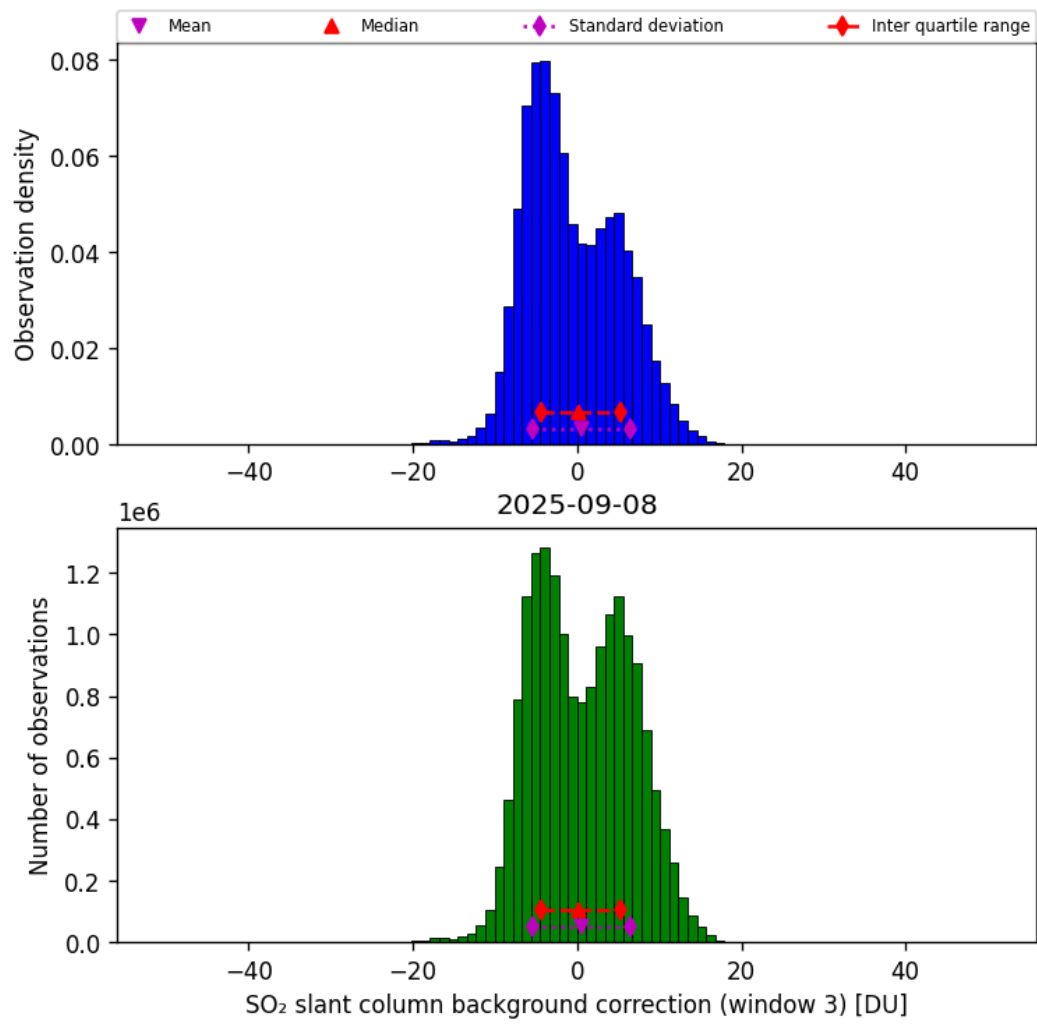


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-09-08 to 2025-09-08

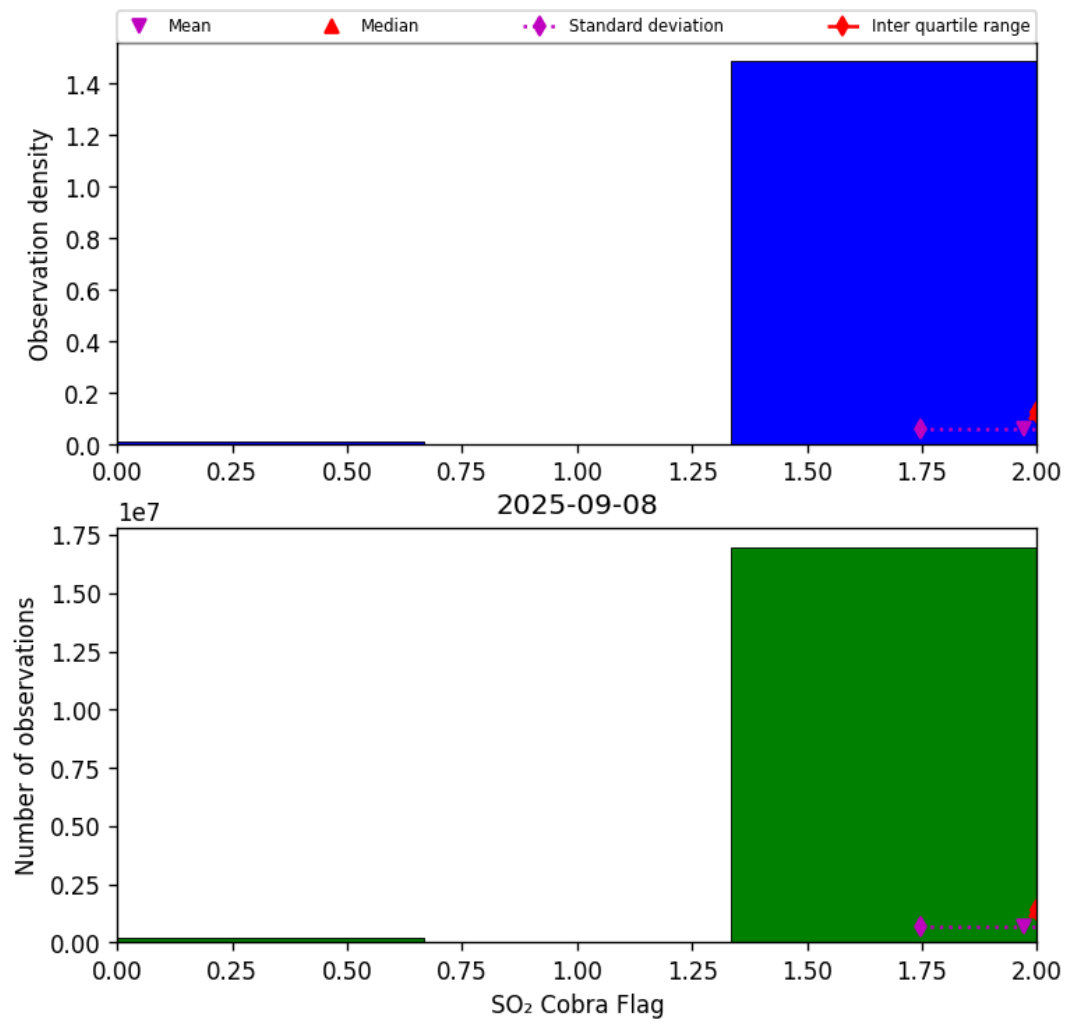


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-09-08 to 2025-09-08

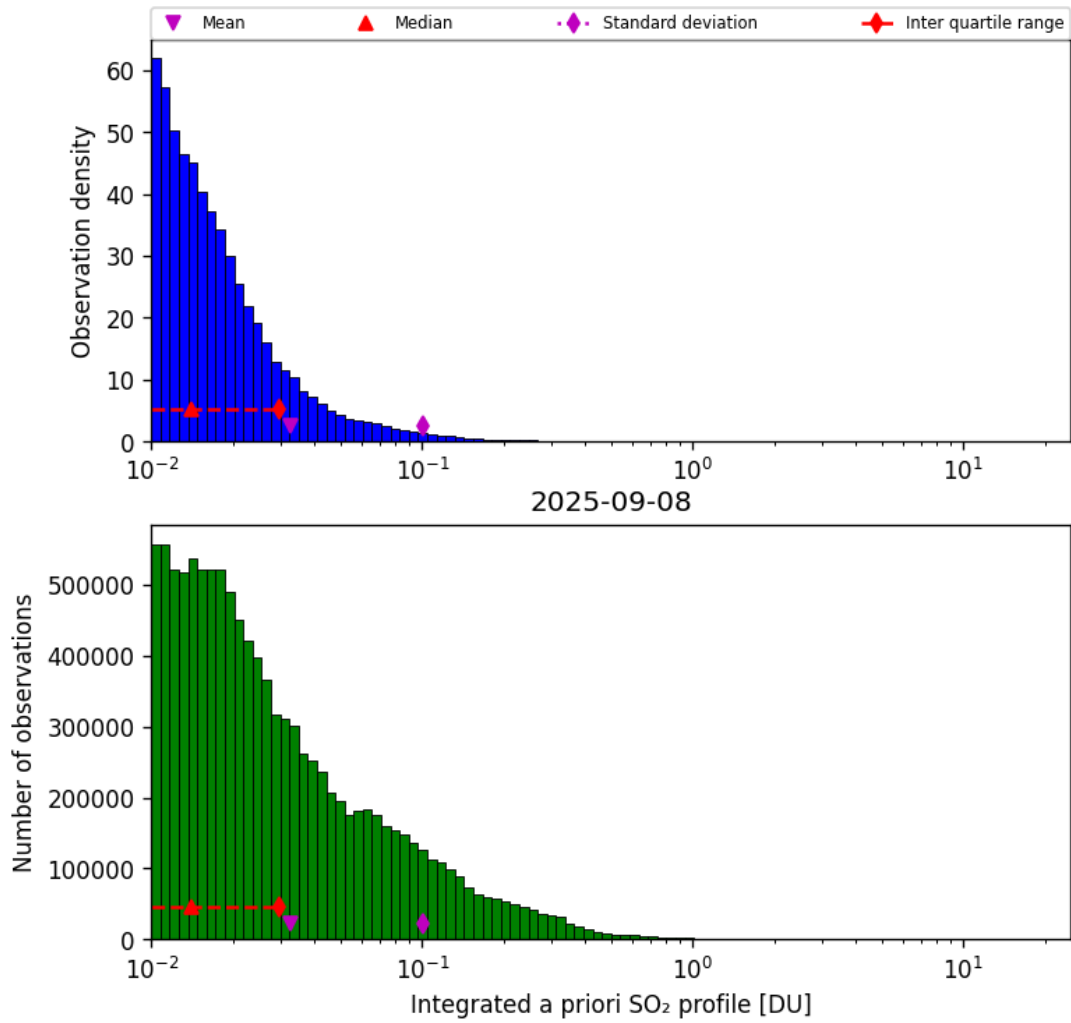


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-09-08 to 2025-09-08

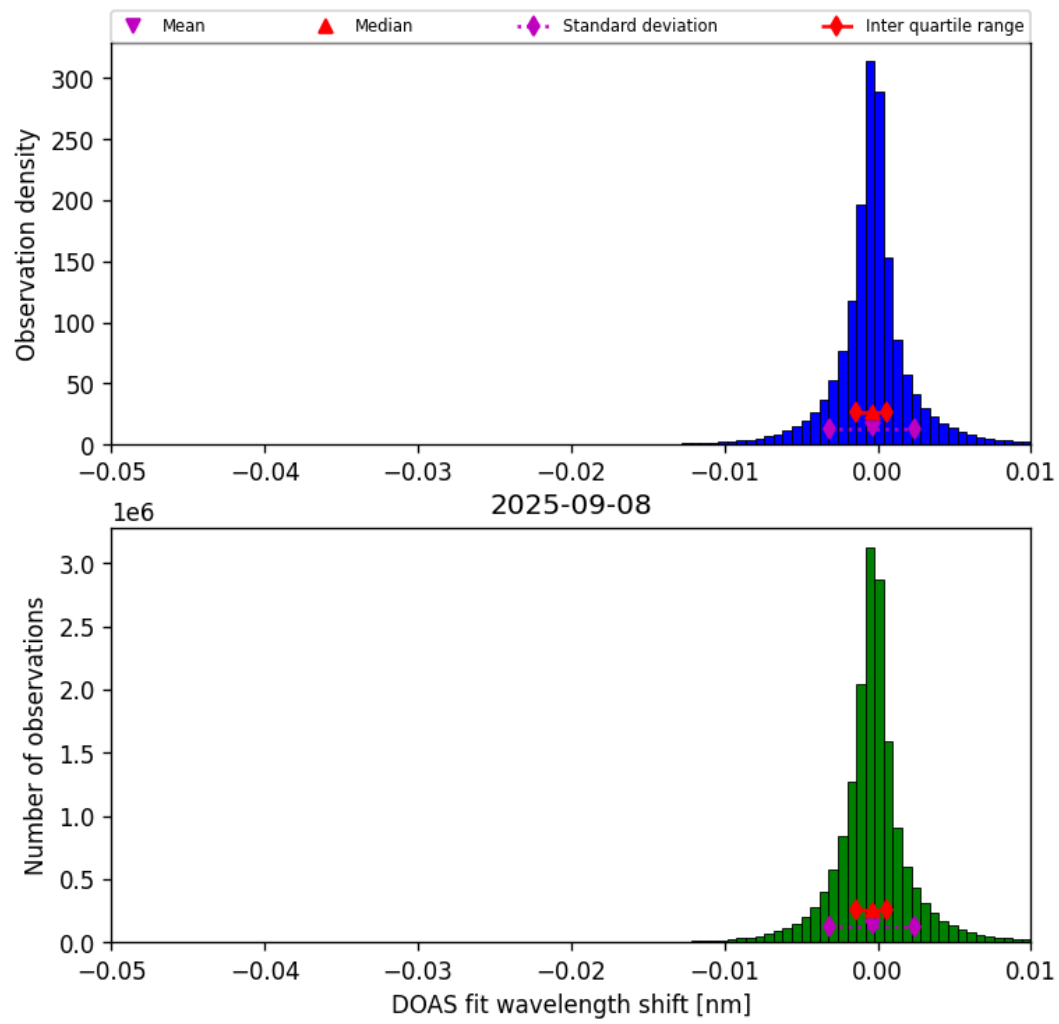


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-09-08 to 2025-09-08

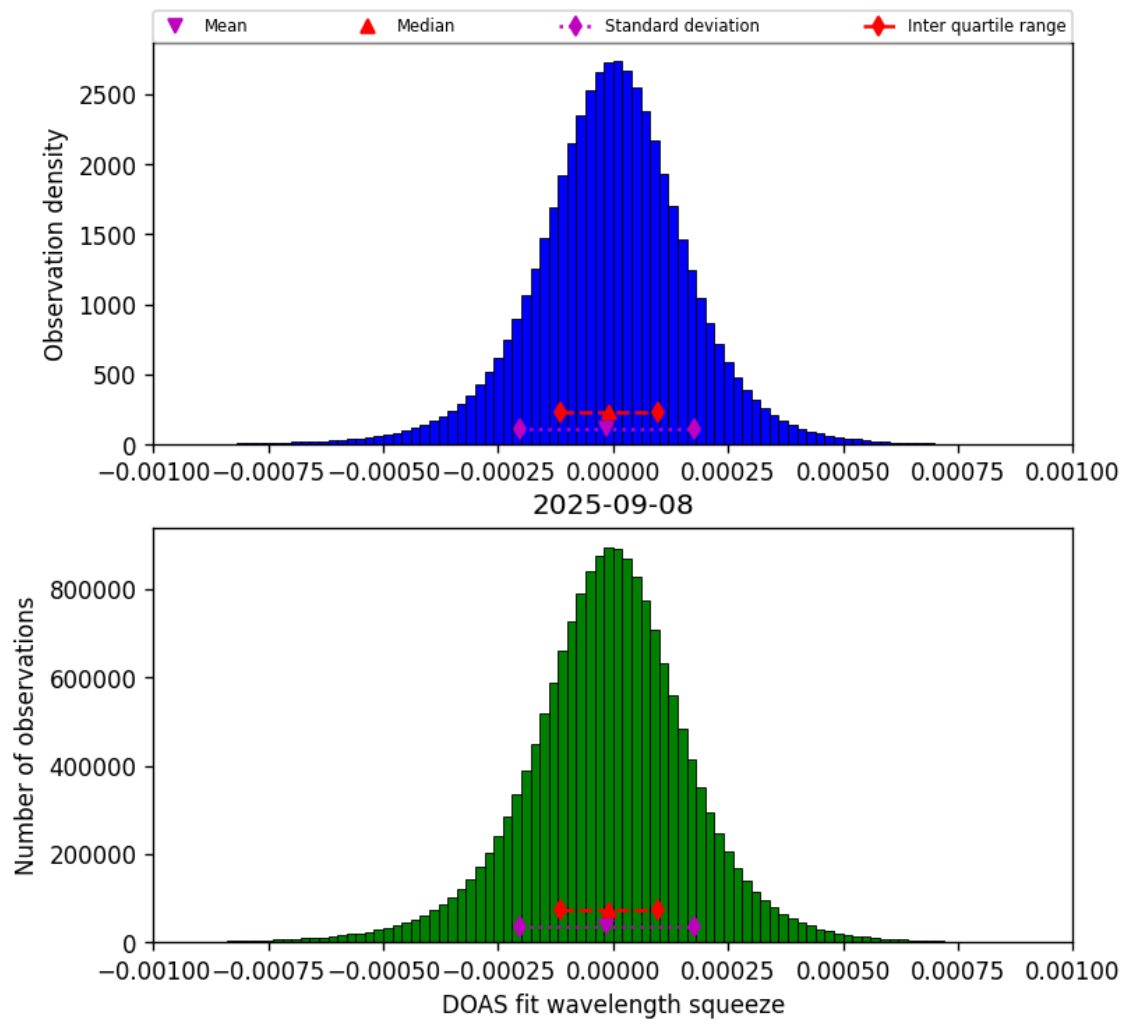


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-09-08 to 2025-09-08

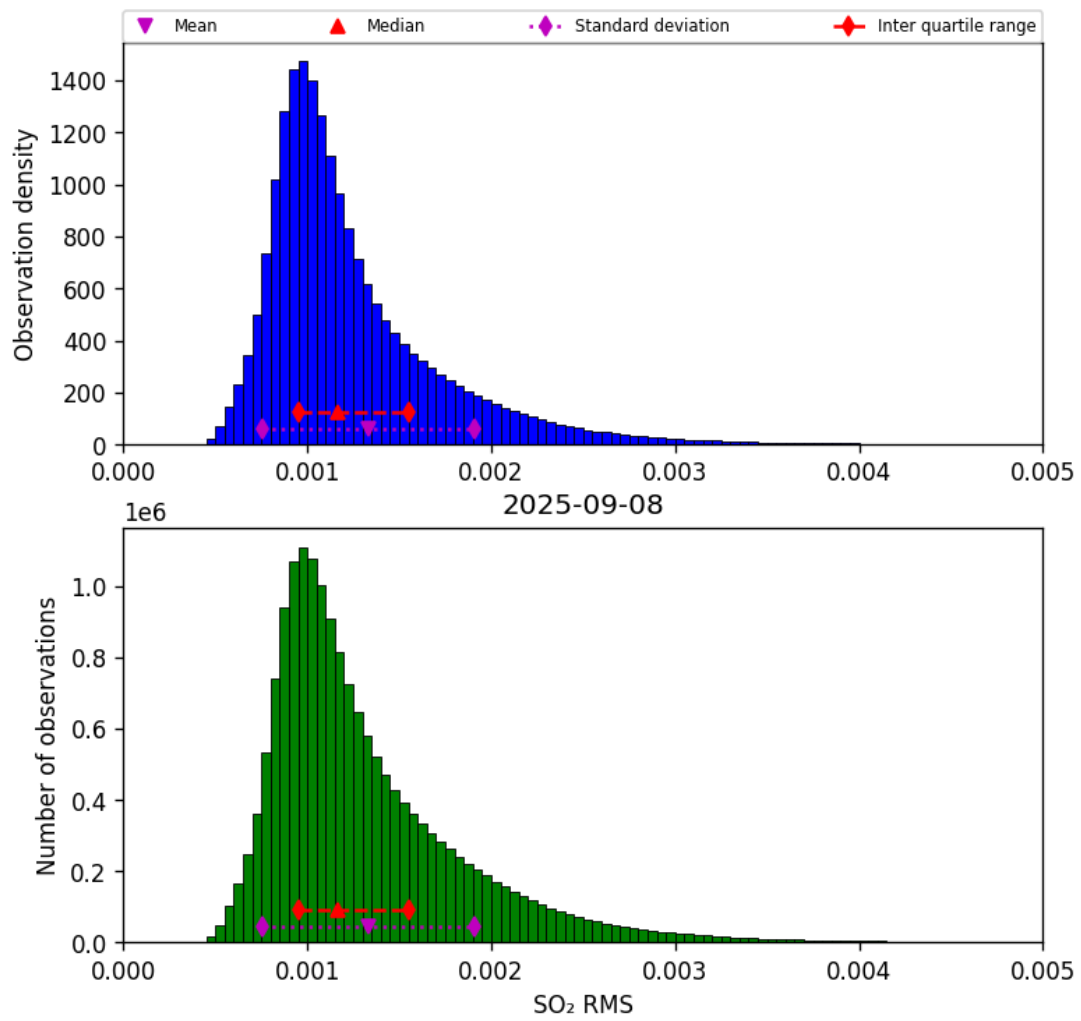


Figure 79: Histogram of “SO₂ RMS” for 2025-09-08 to 2025-09-08

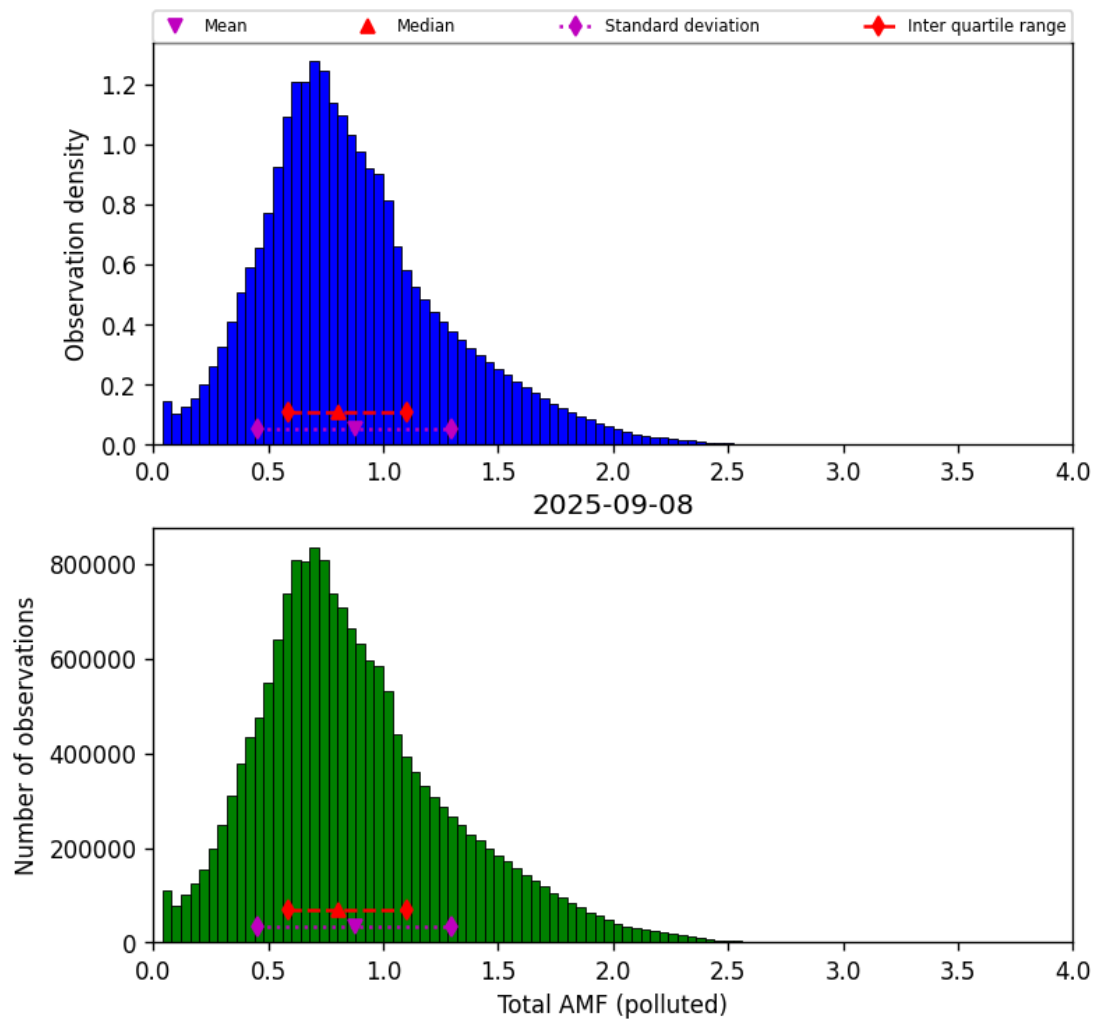


Figure 80: Histogram of “Total AMF (polluted)” for 2025-09-08 to 2025-09-08

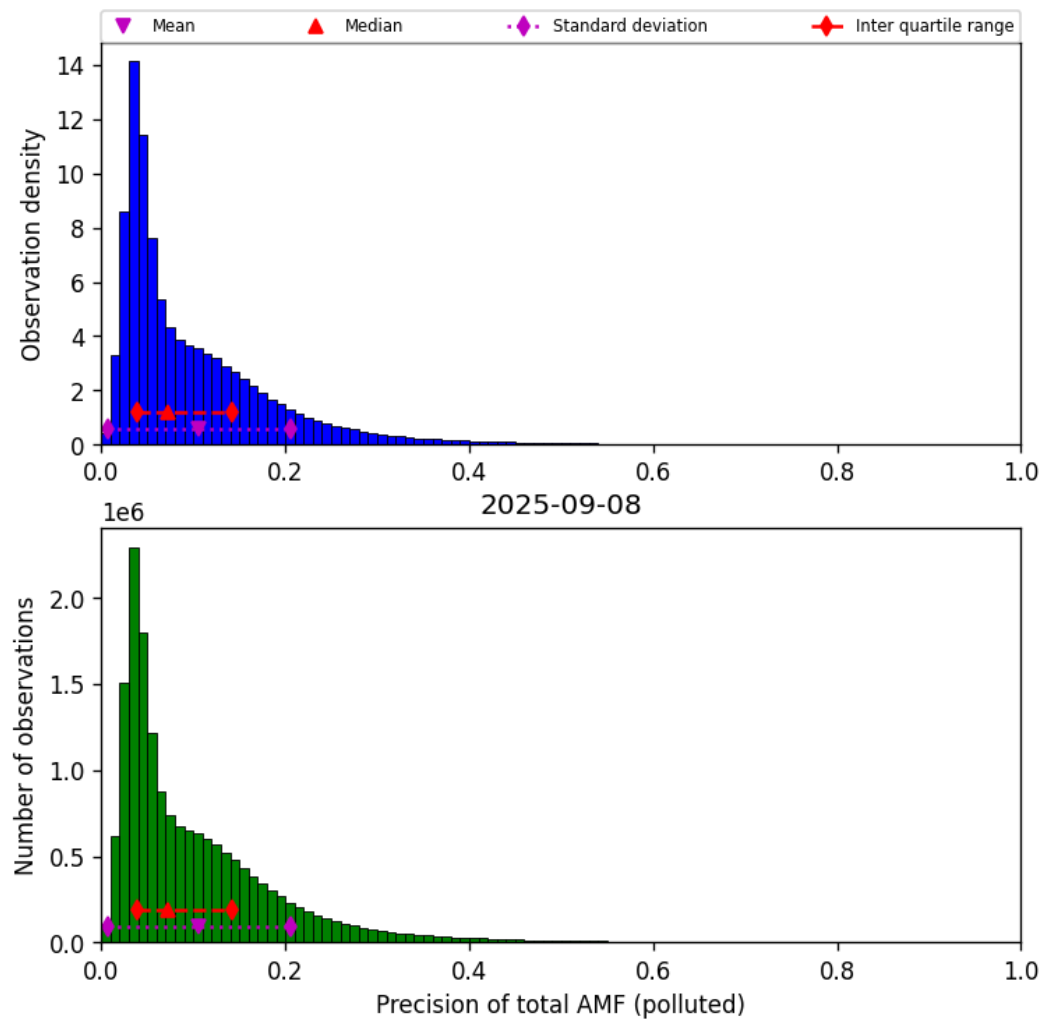


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-09-08 to 2025-09-08

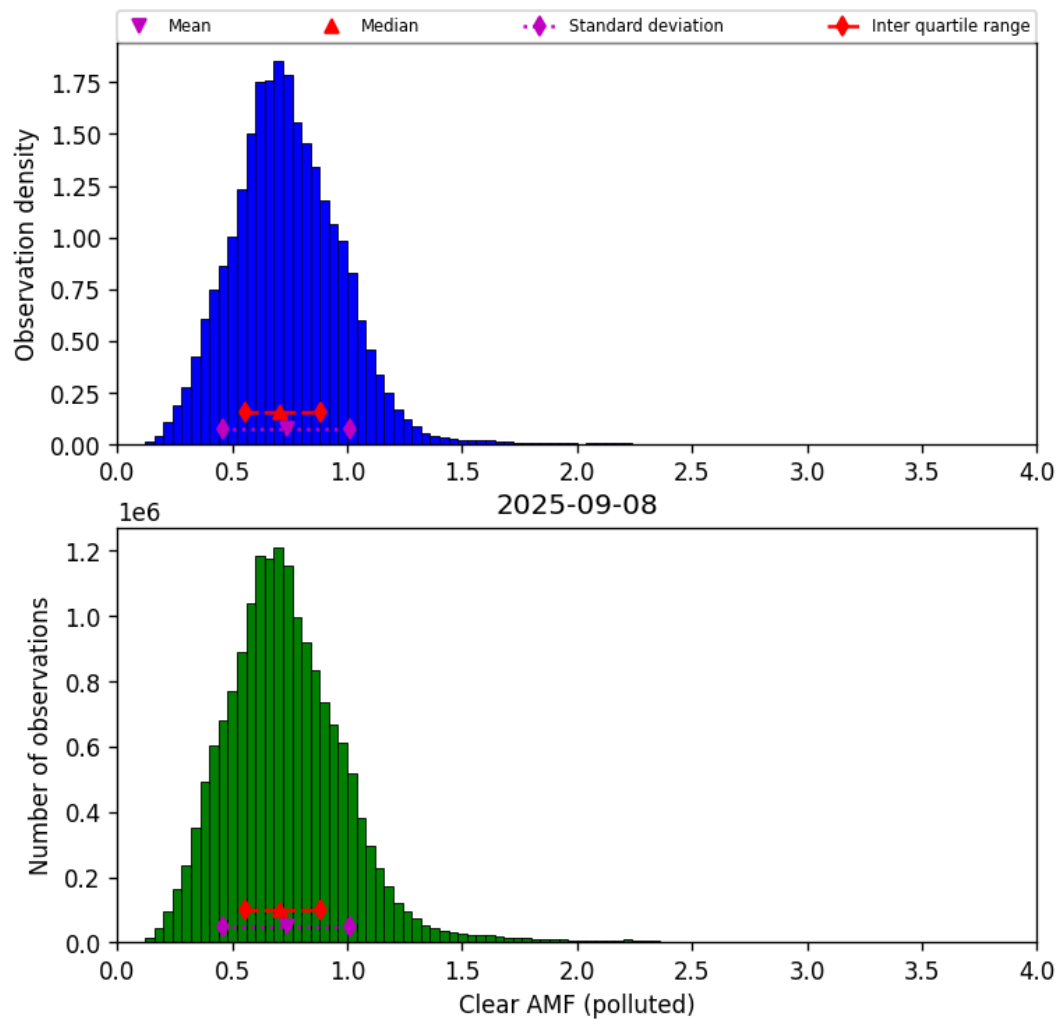


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-09-08 to 2025-09-08

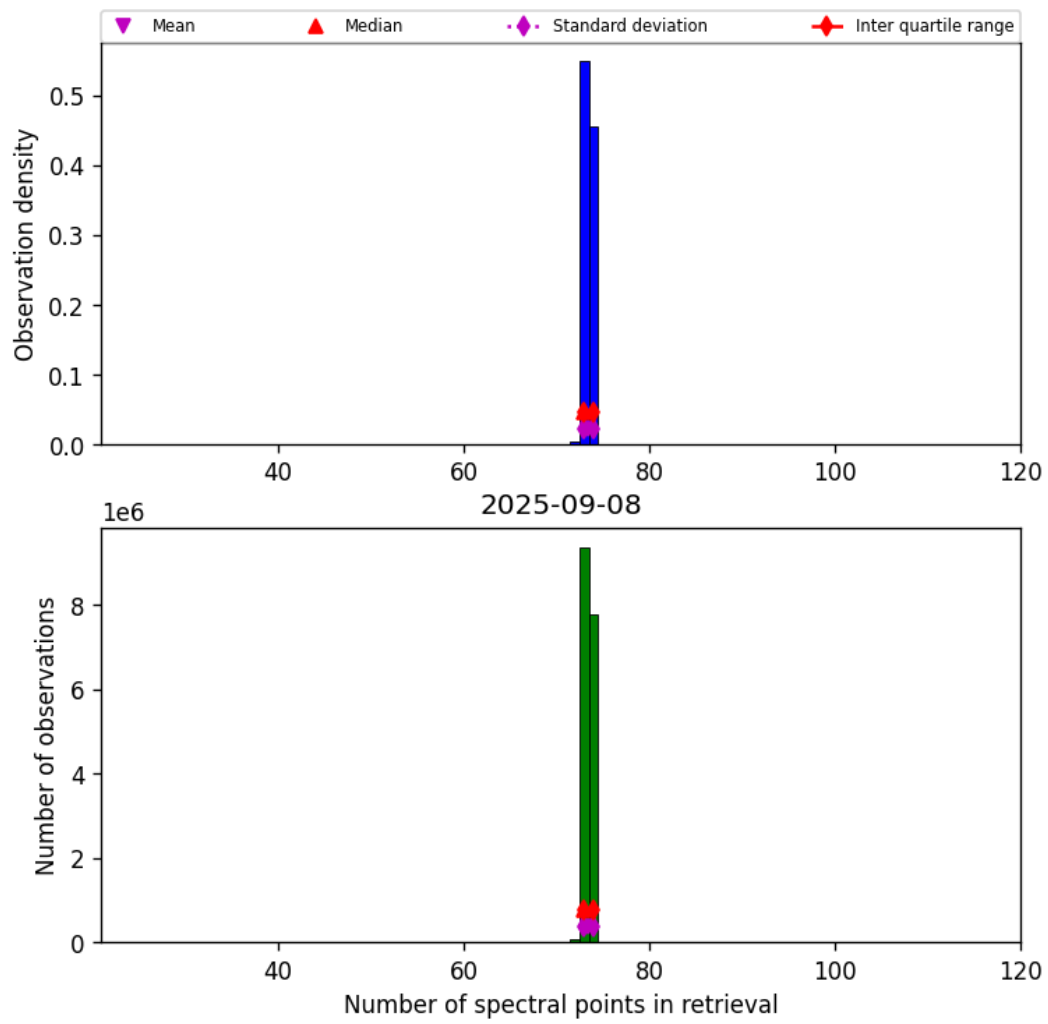


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-09-08 to 2025-09-08

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.

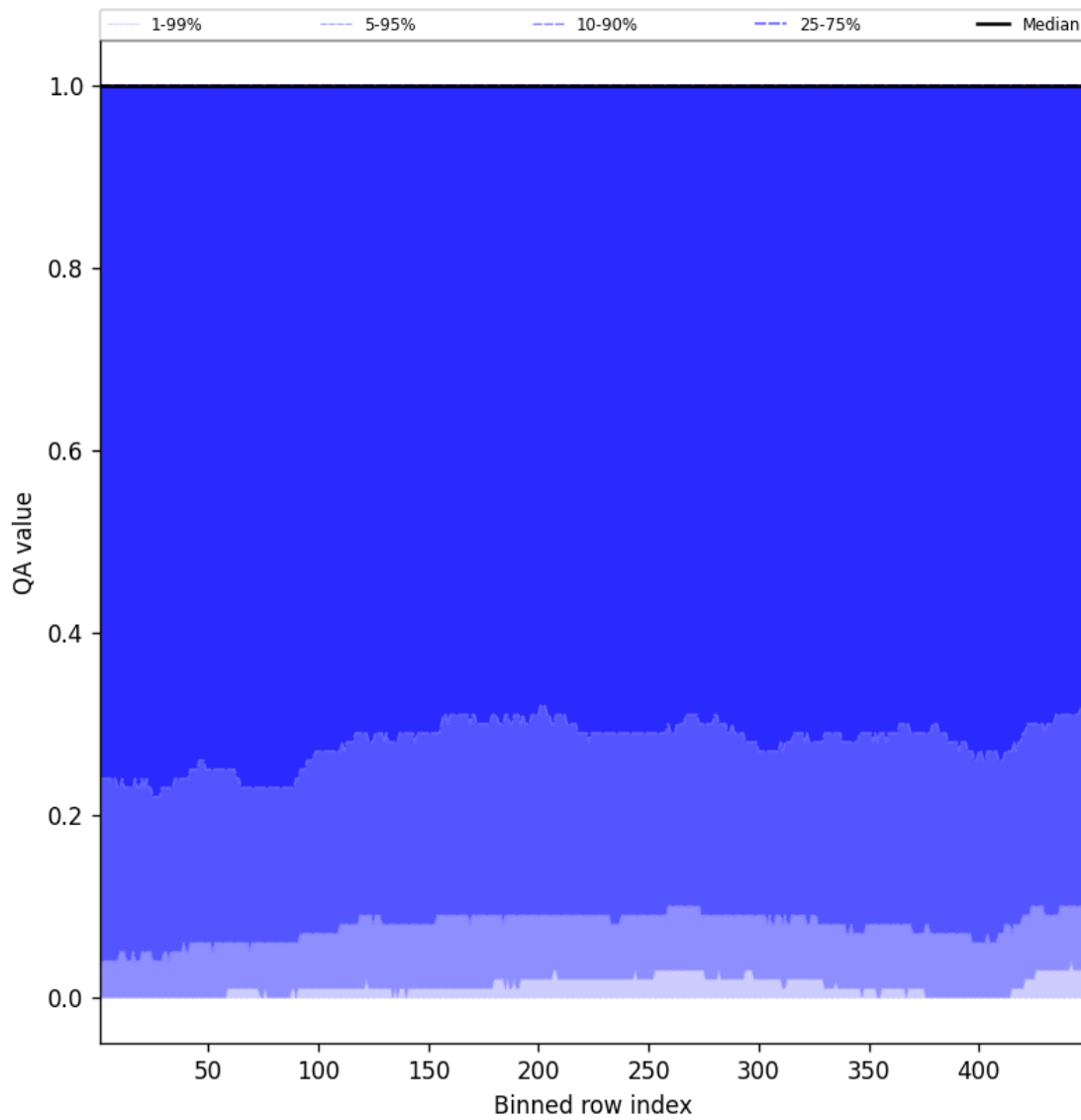


Figure 84: Along track statistics of “QA value” for 2025-09-08 to 2025-09-08

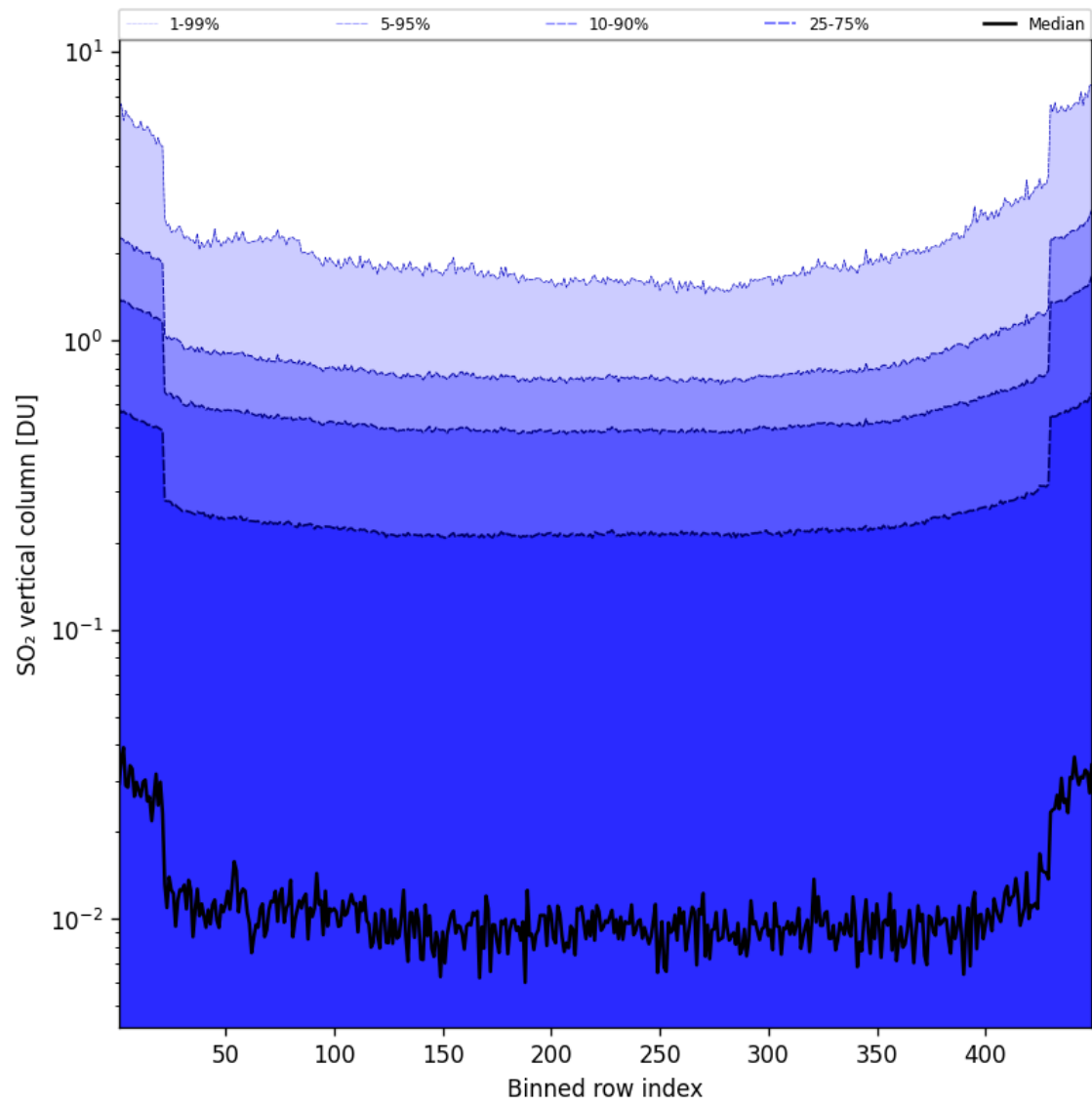


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-09-08 to 2025-09-08

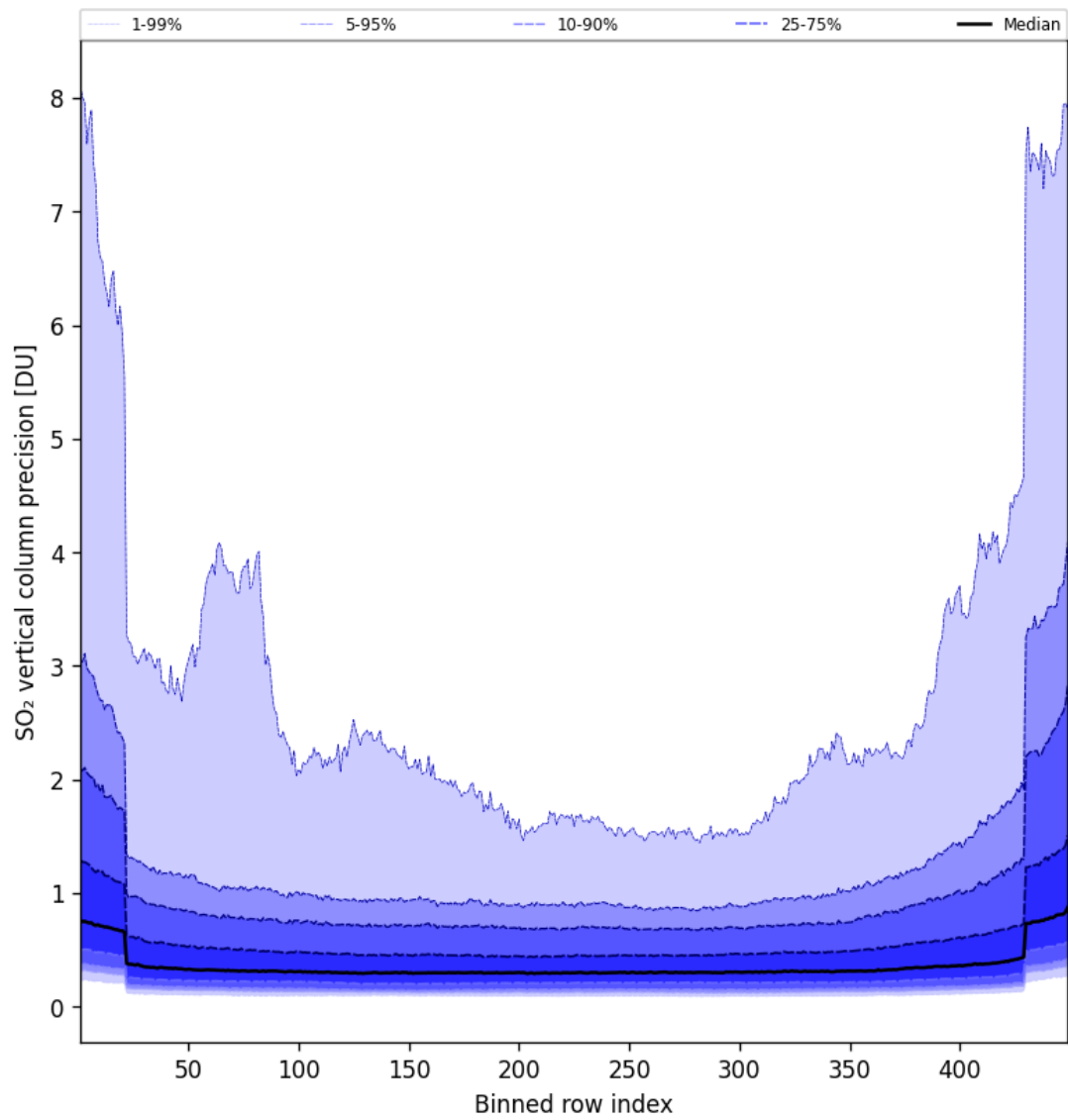


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-09-08 to 2025-09-08

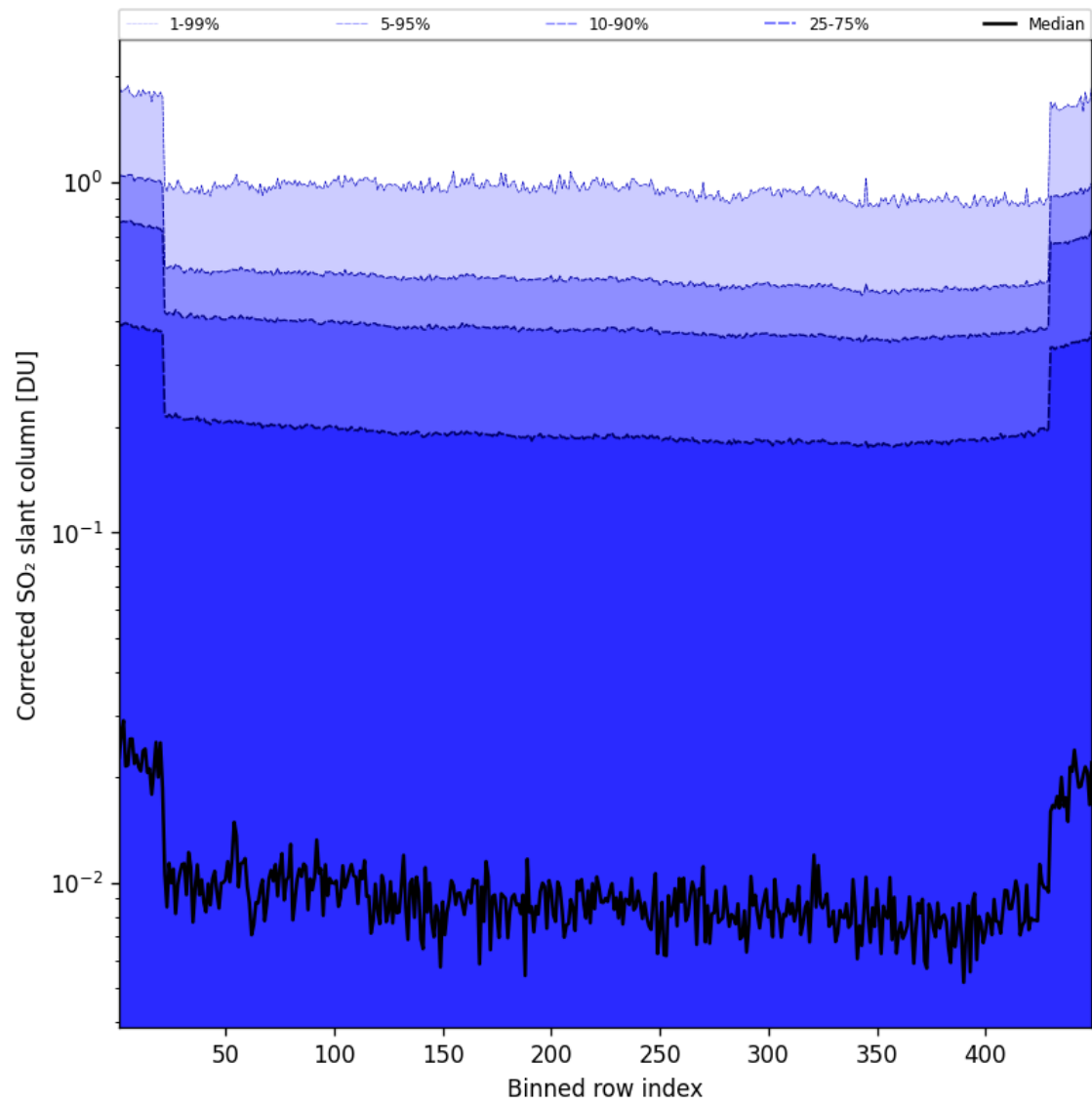


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-09-08 to 2025-09-08

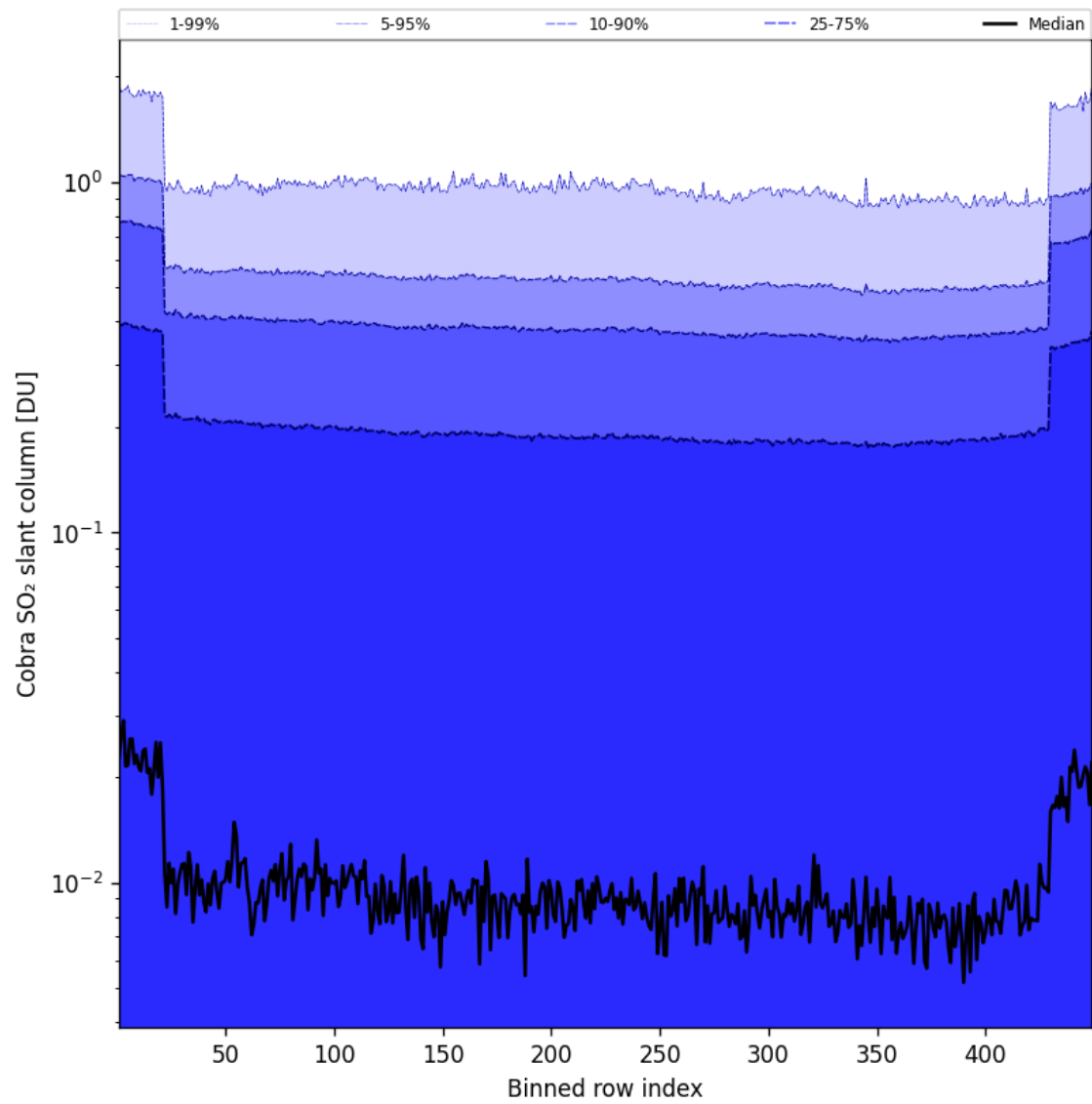


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-09-08 to 2025-09-08

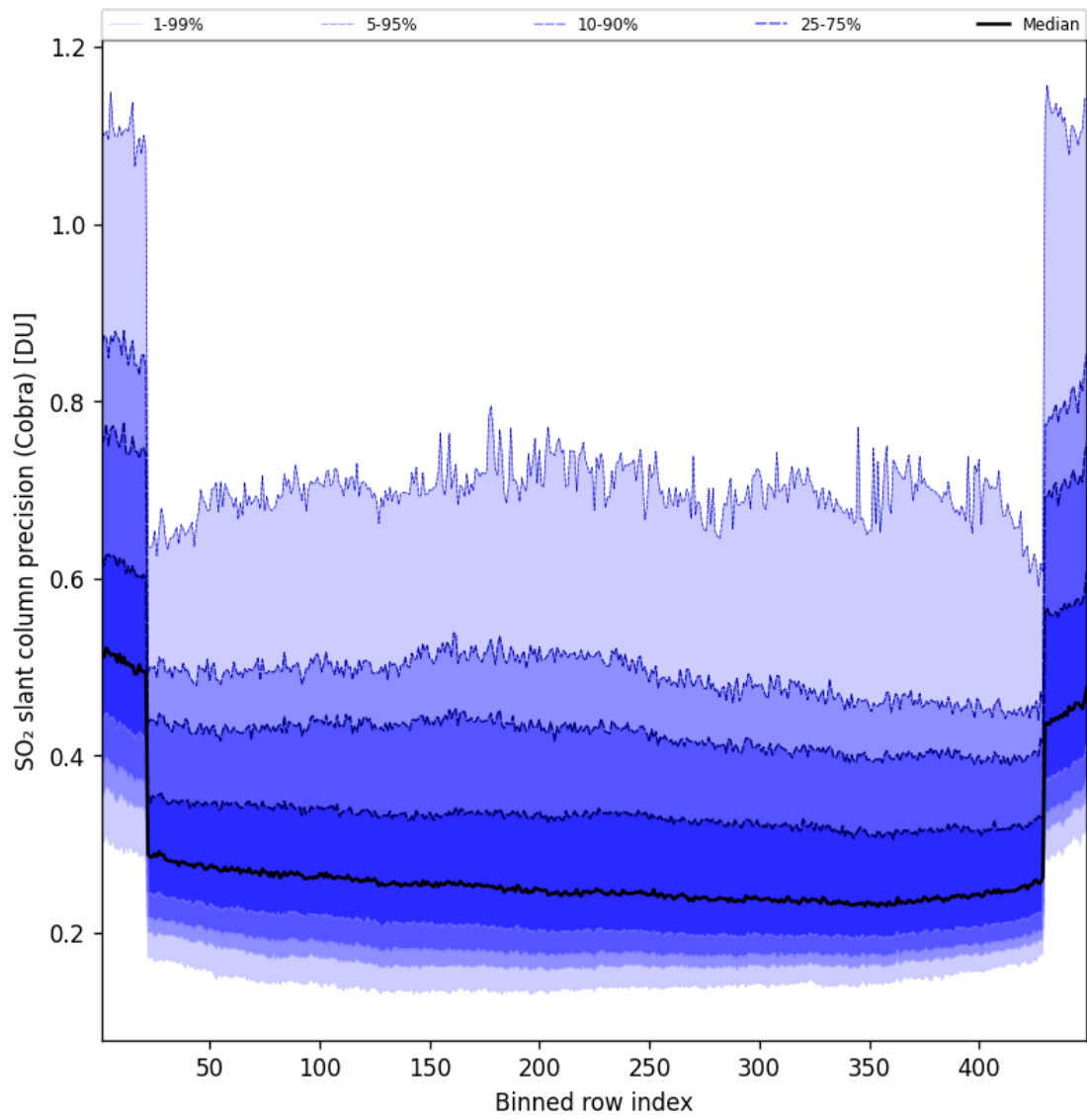


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-09-08 to 2025-09-08

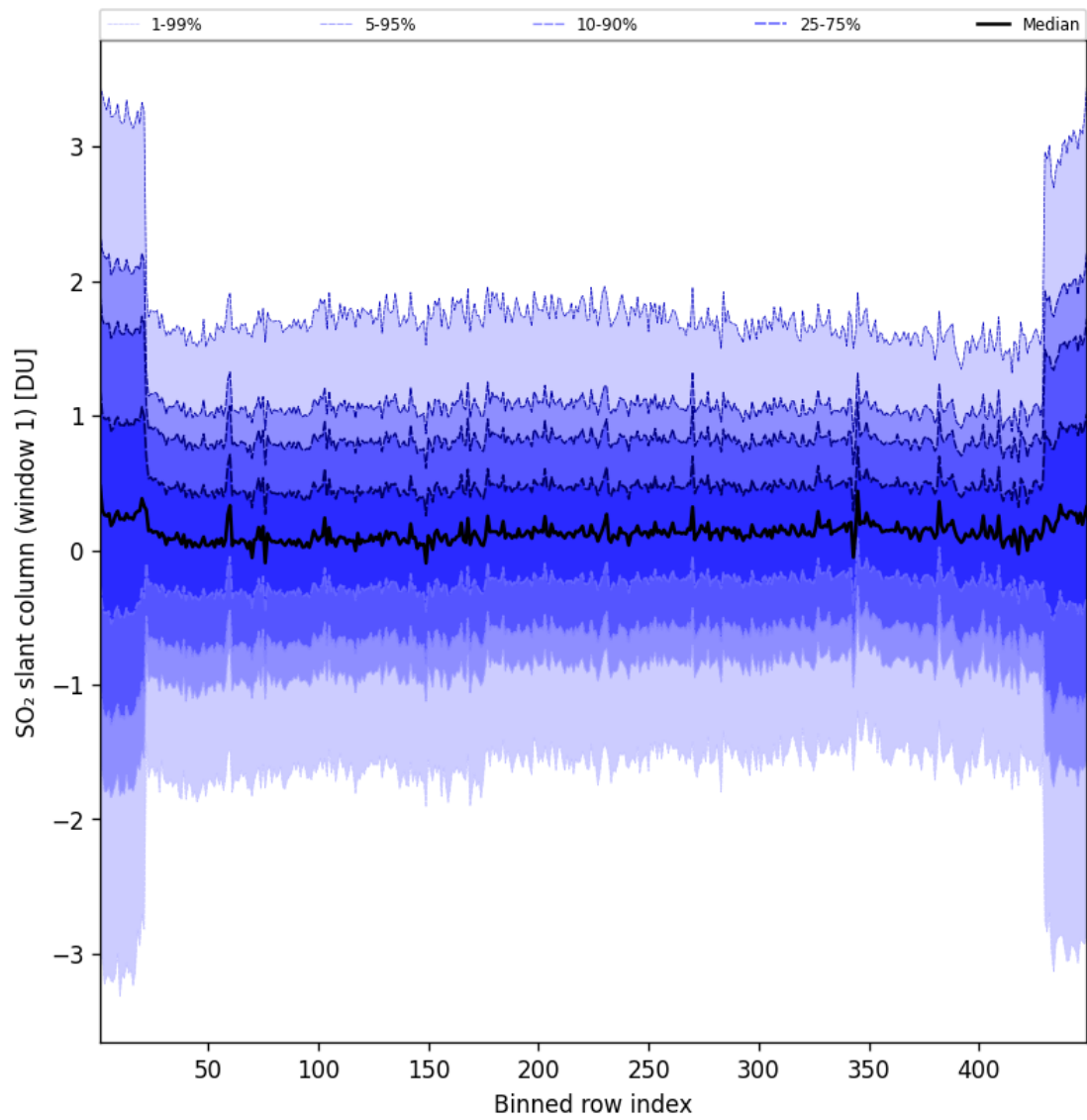


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-09-08 to 2025-09-08

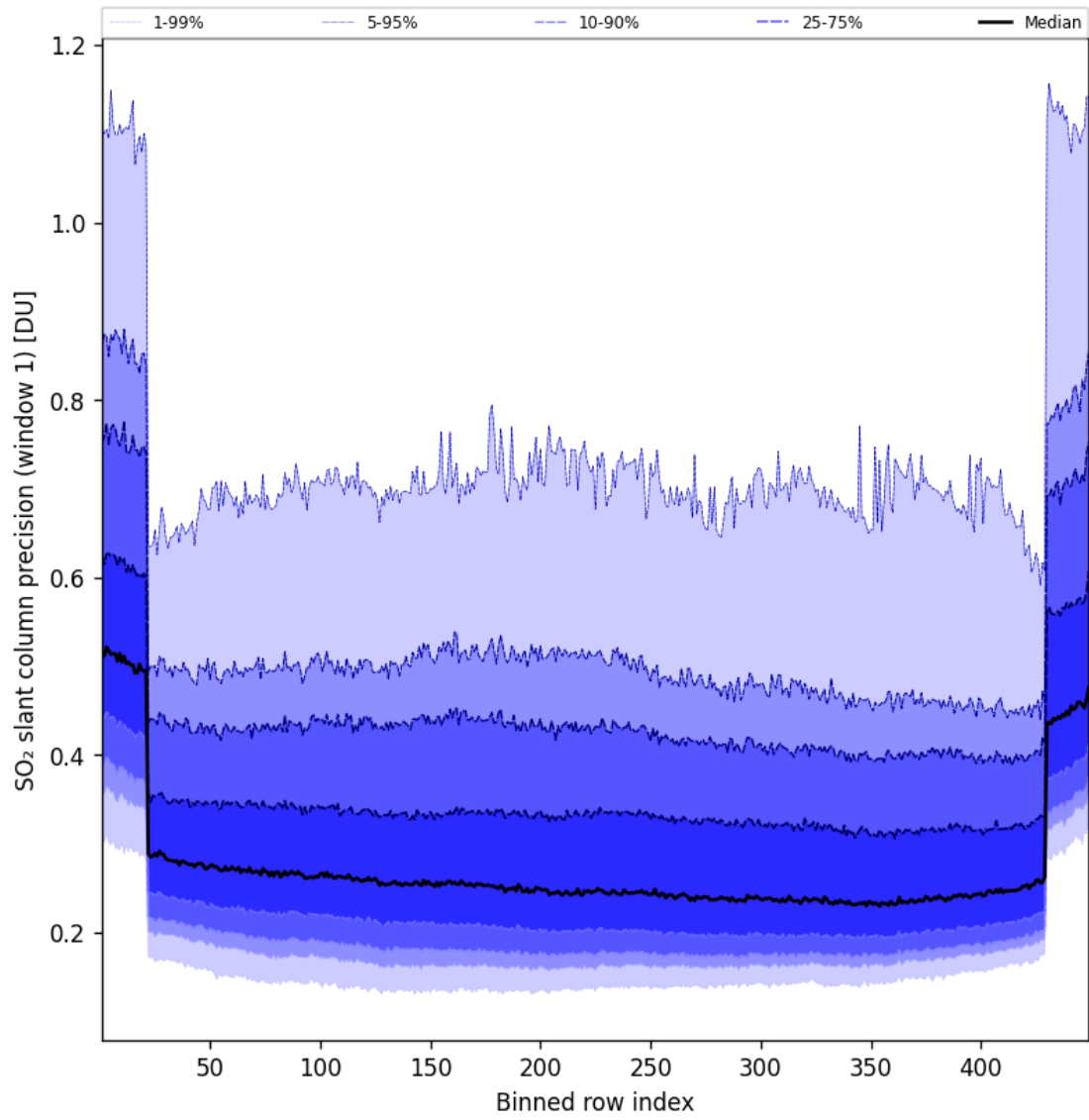


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-09-08 to 2025-09-08

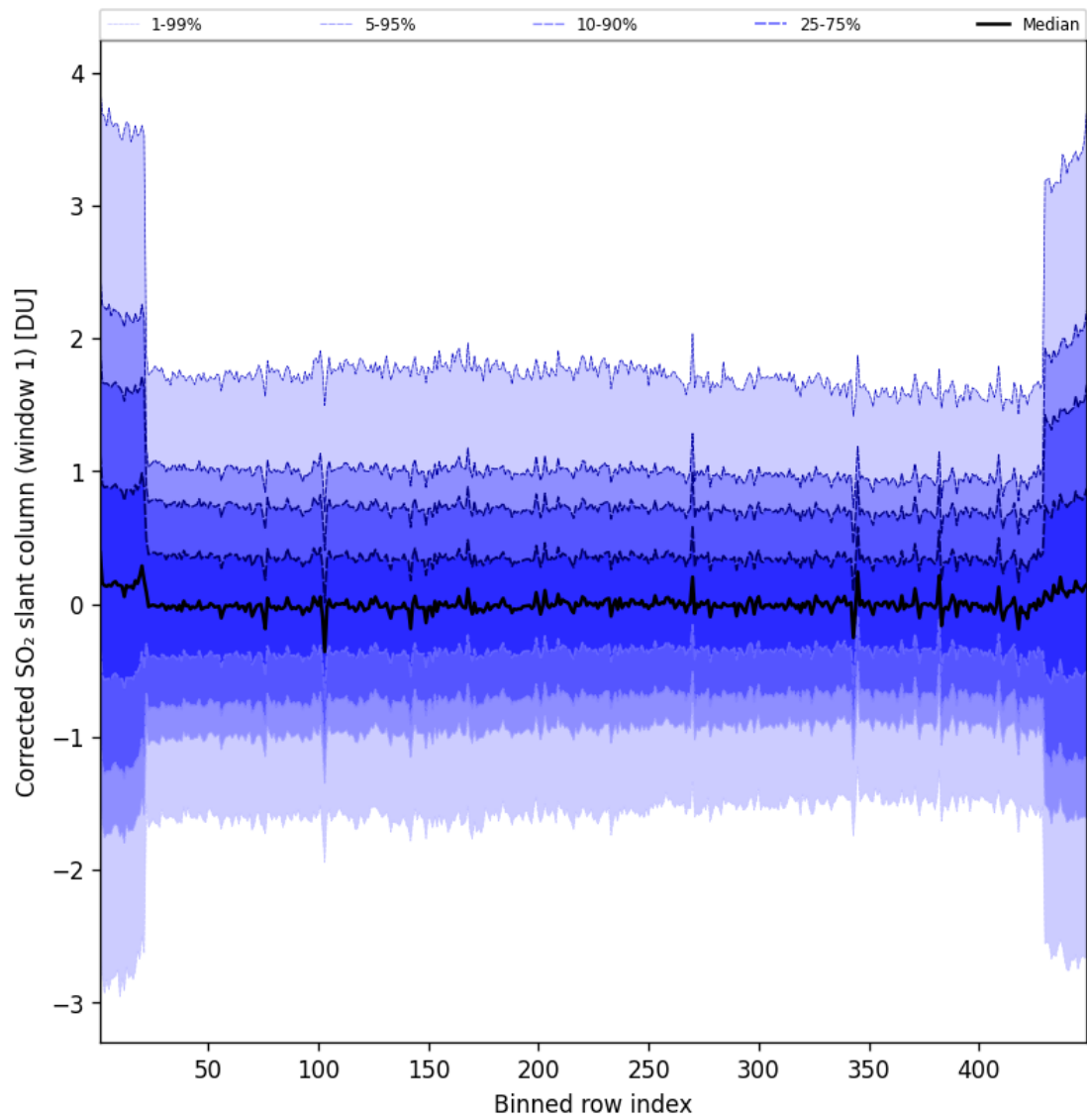


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-09-08 to 2025-09-08

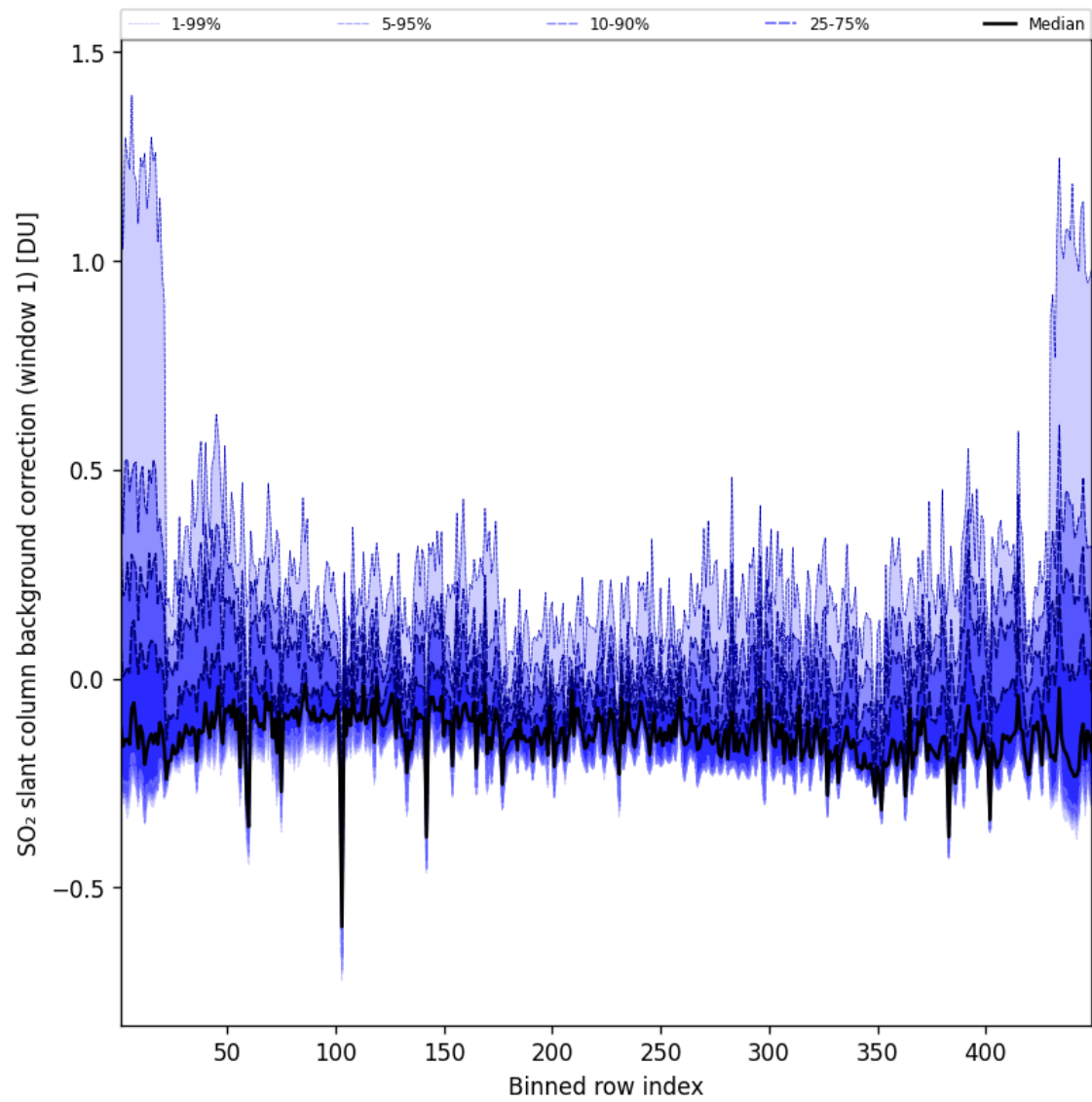


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-09-08 to 2025-09-08

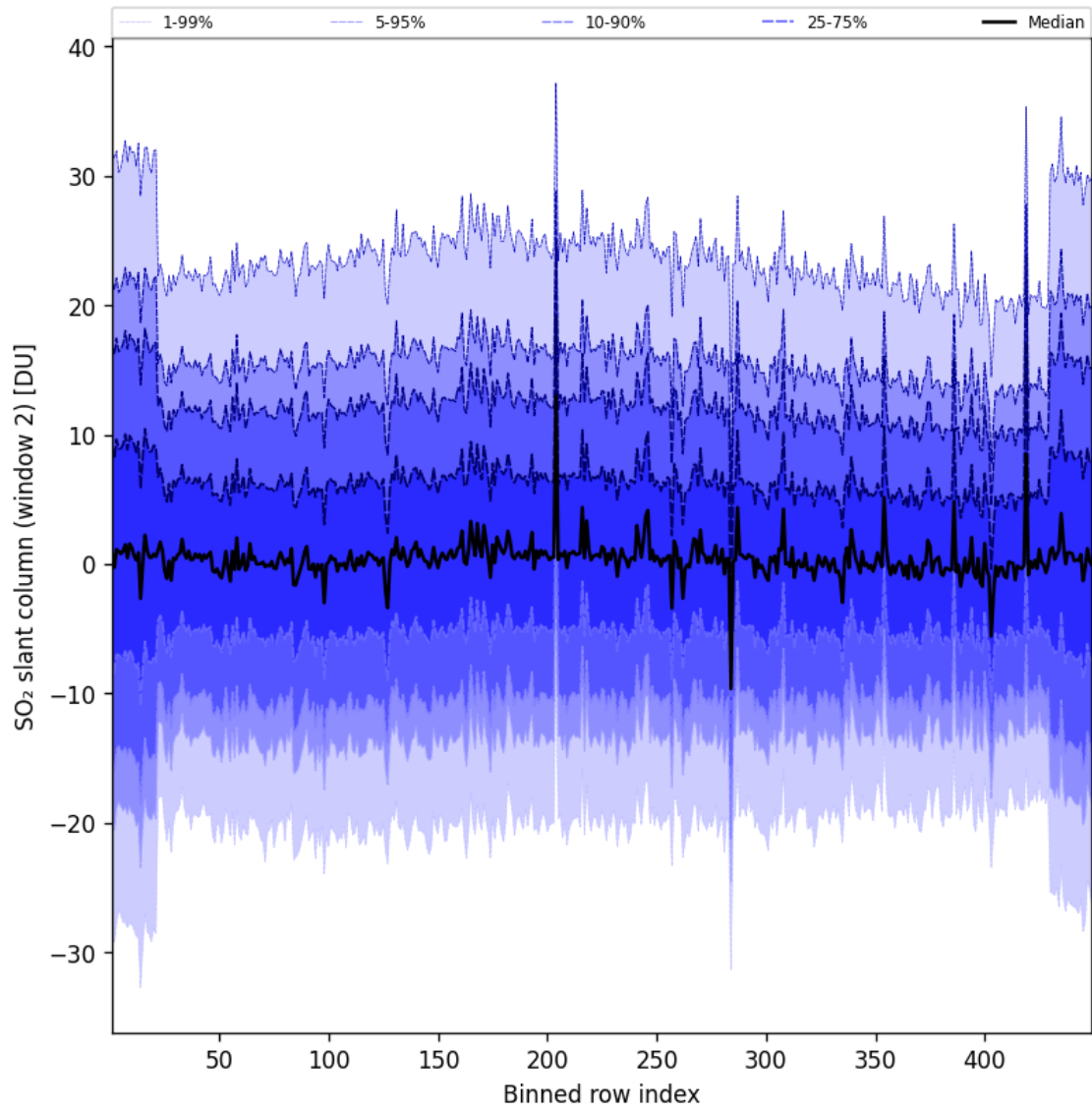


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-09-08 to 2025-09-08

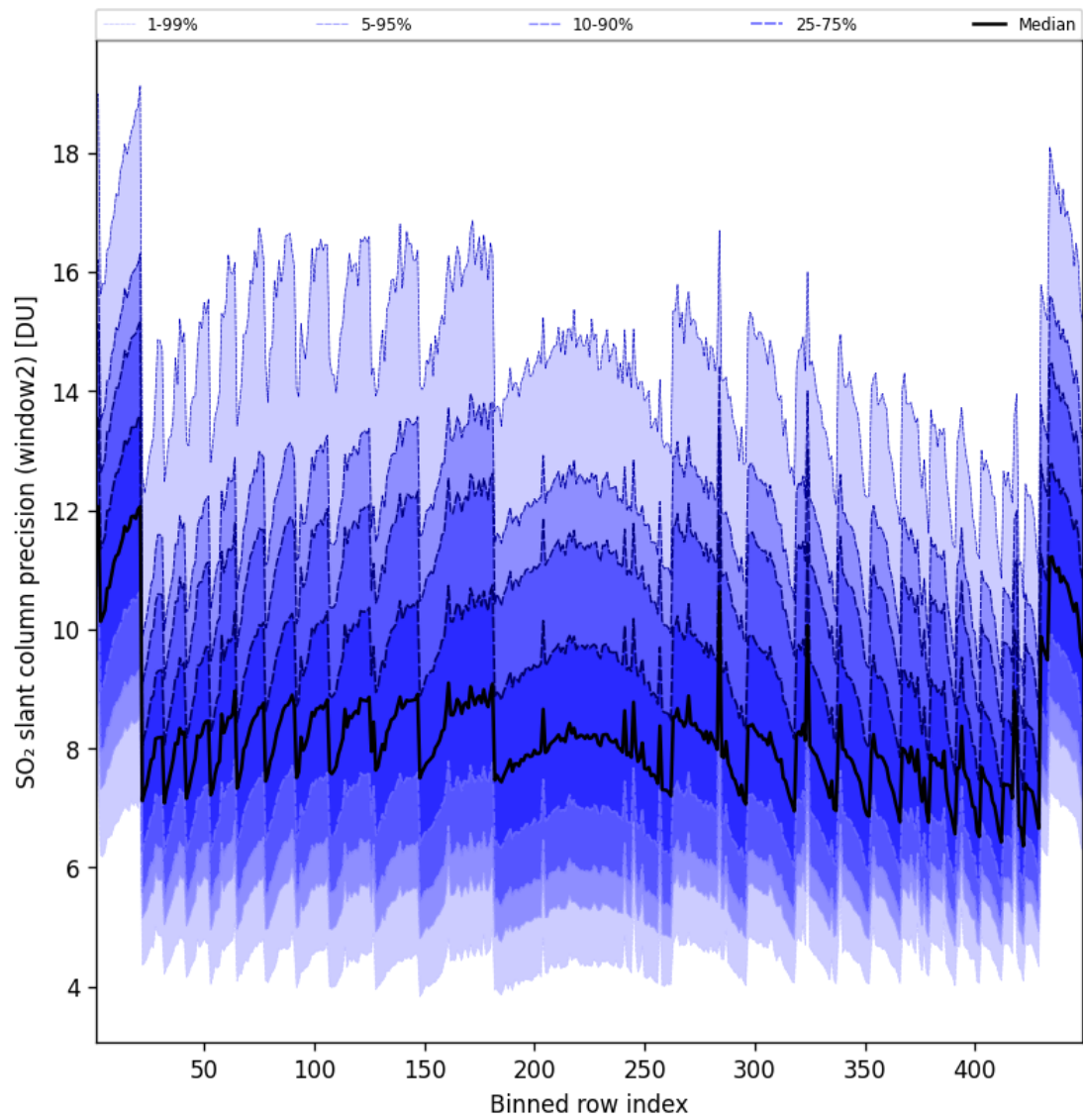


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-09-08 to 2025-09-08

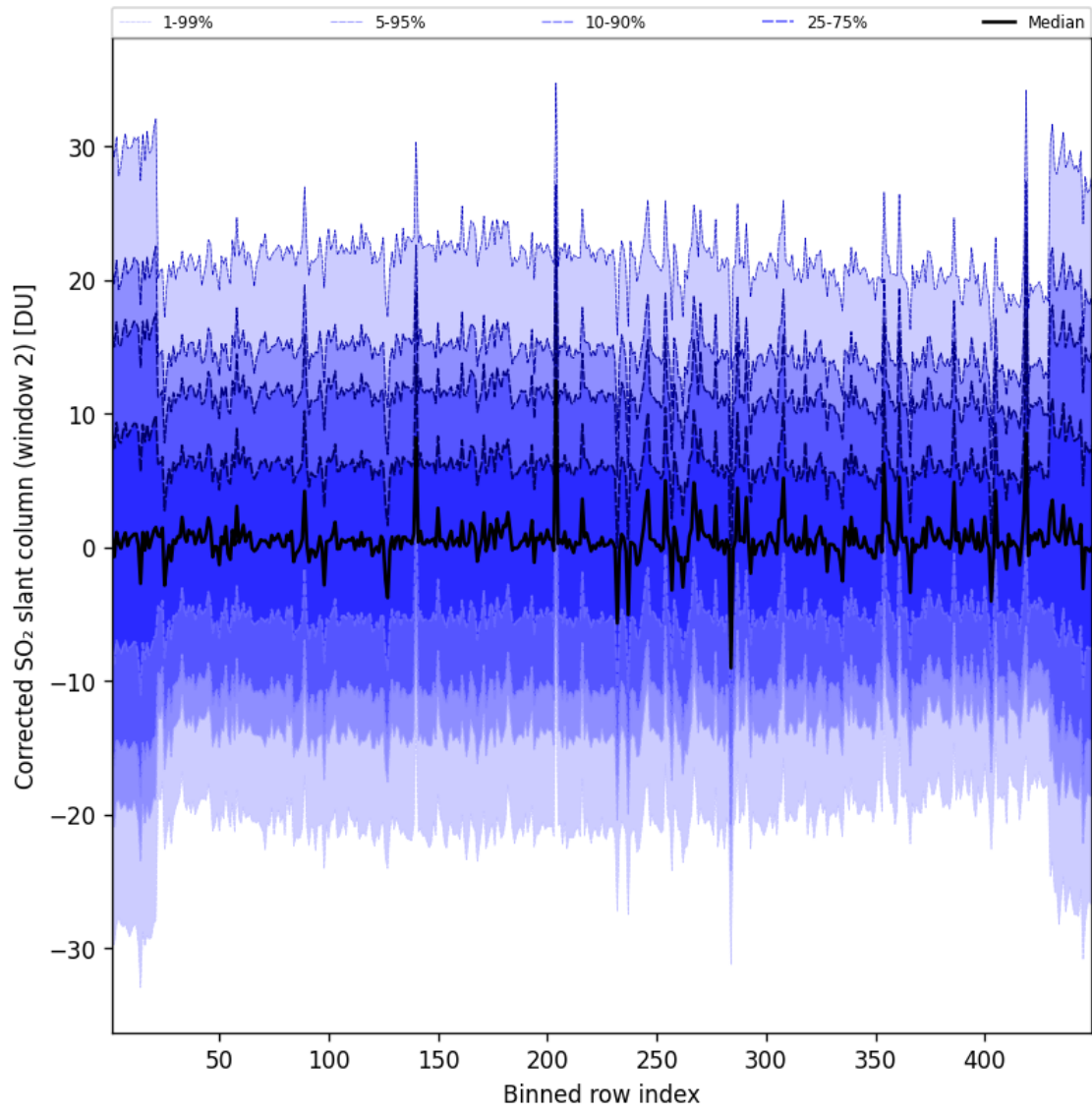


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-09-08 to 2025-09-08

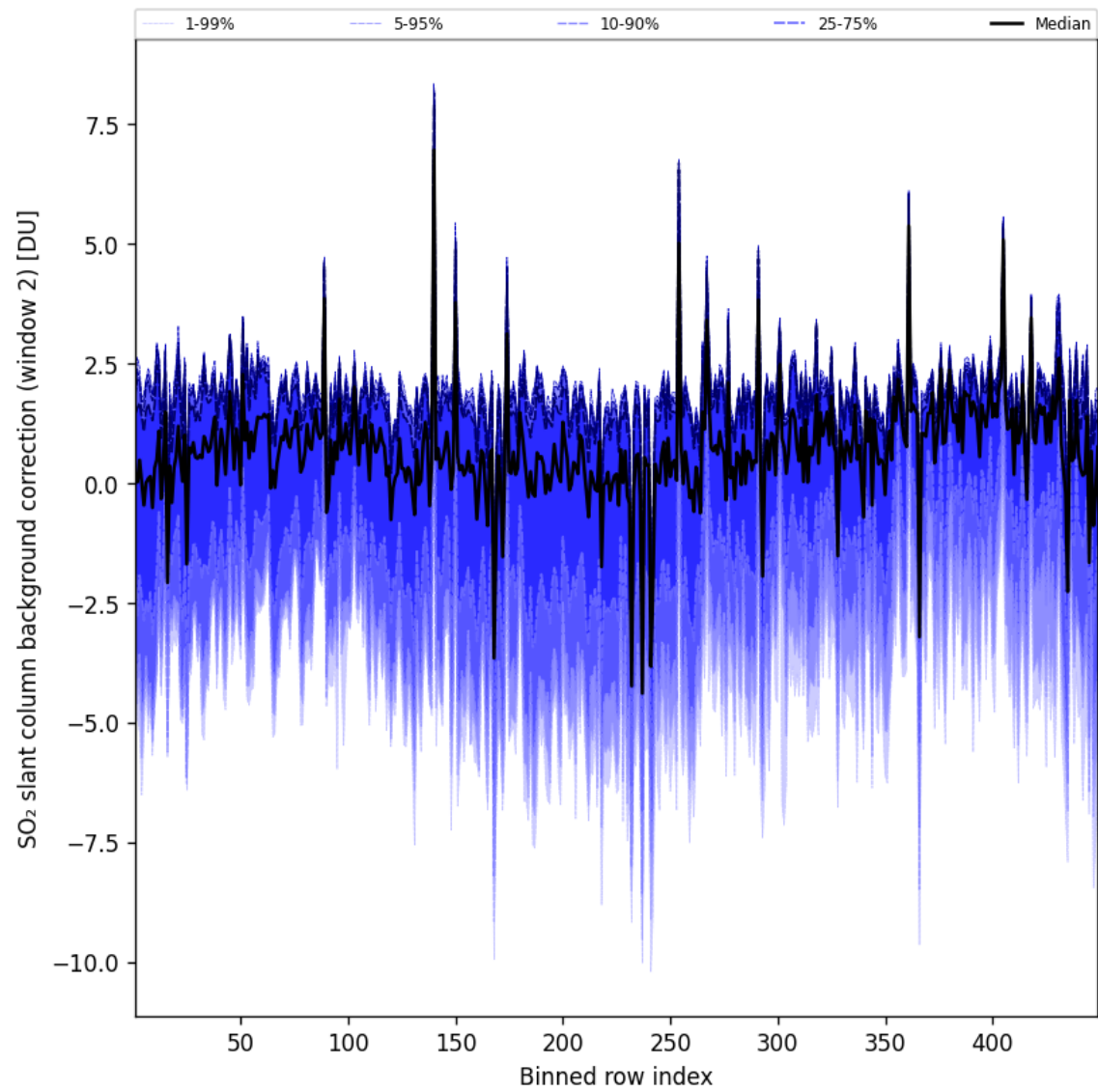


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-09-08 to 2025-09-08

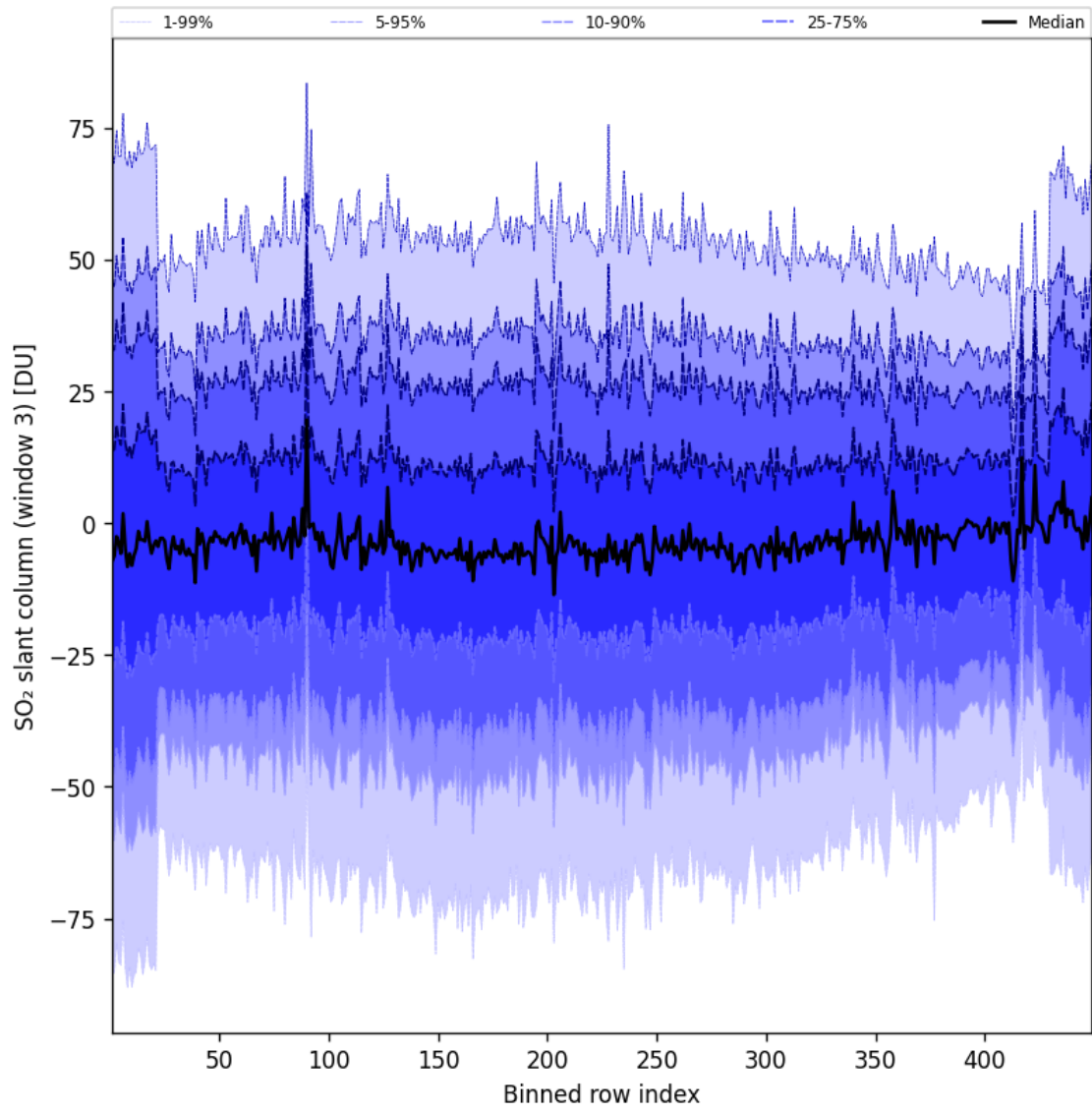


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-09-08 to 2025-09-08

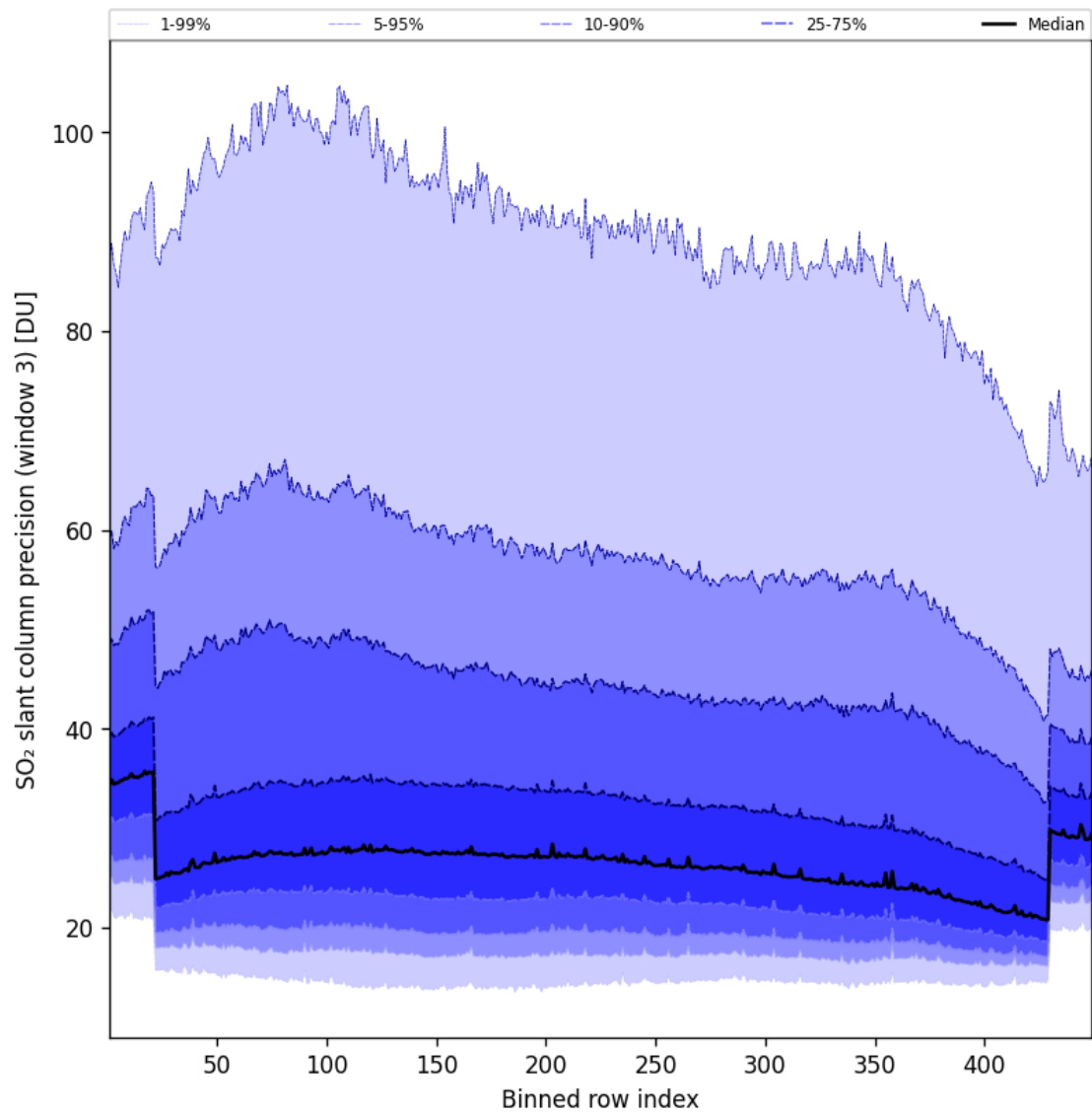


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-09-08 to 2025-09-08

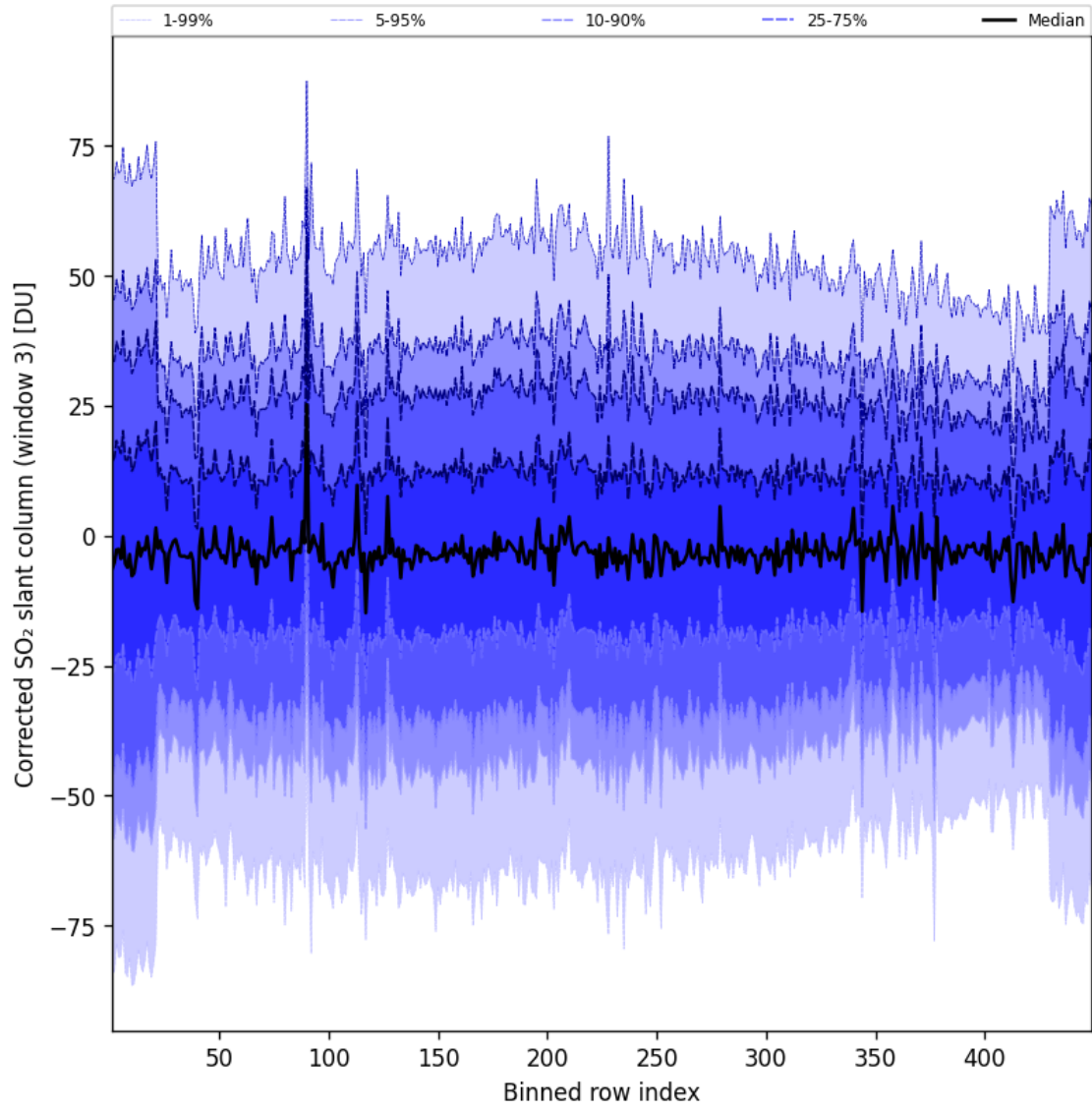


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-09-08 to 2025-09-08

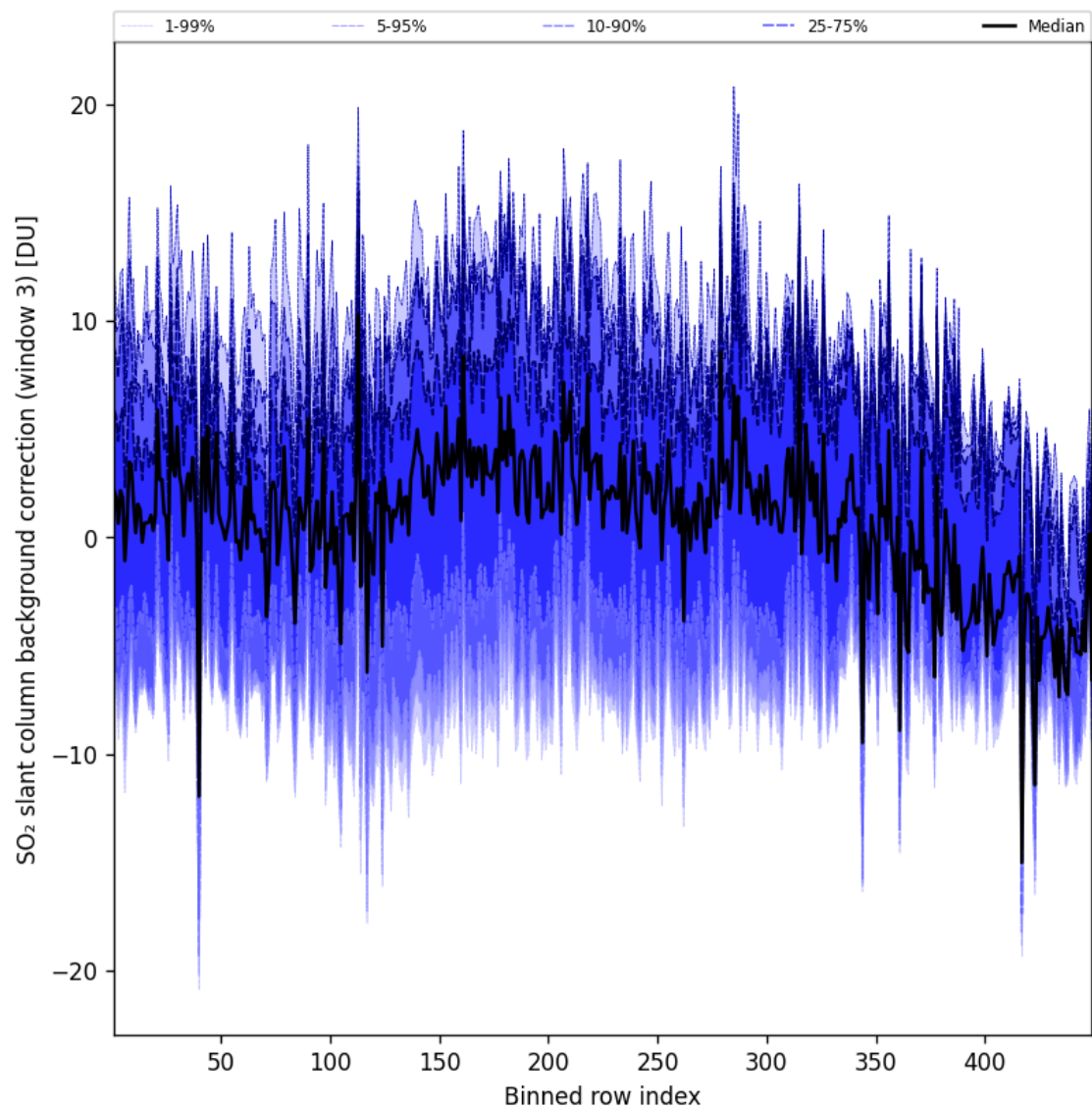


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-09-08 to 2025-09-08

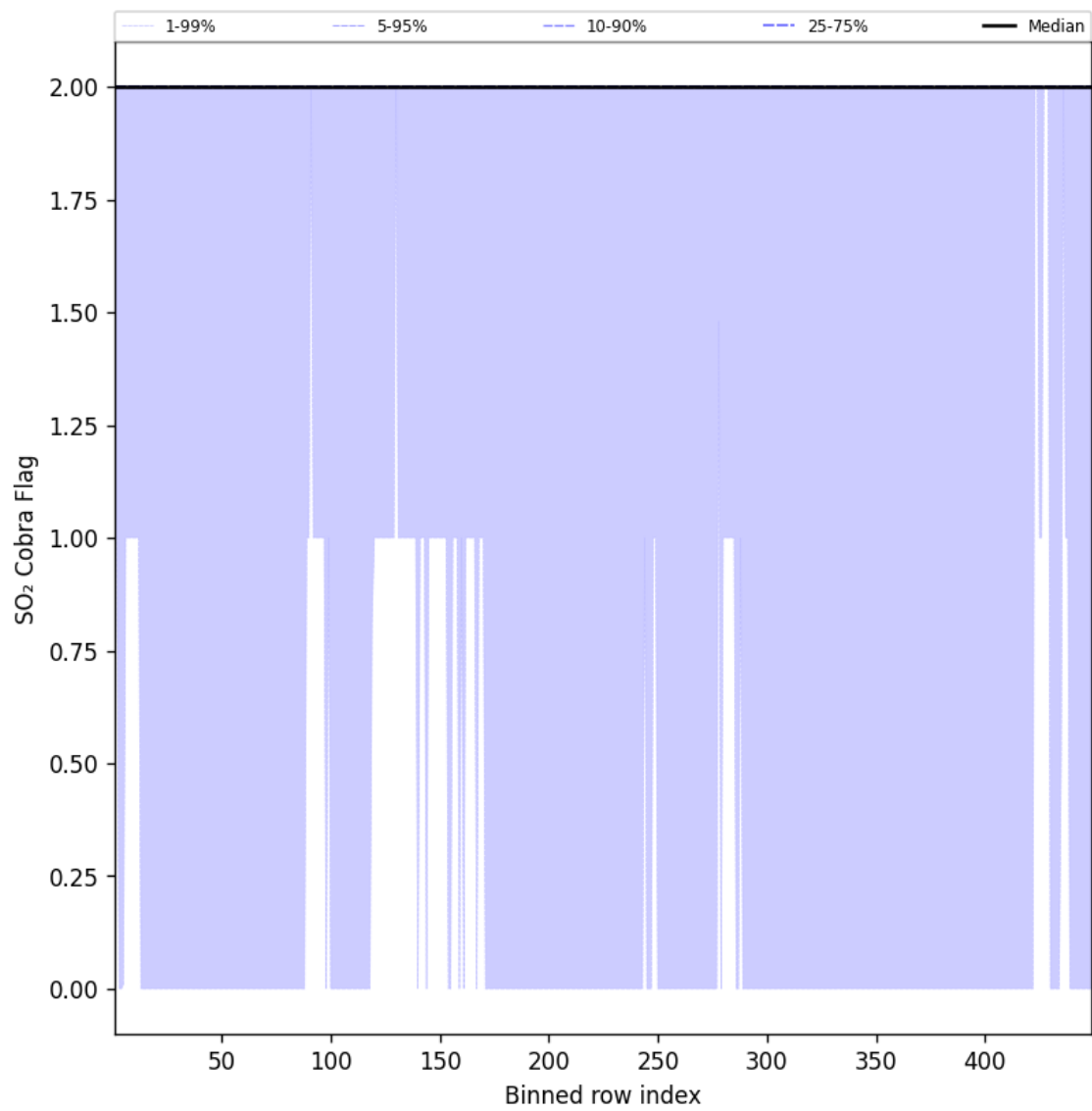


Figure 102: Along track statistics of "SO₂ Cobra Flag" for 2025-09-08 to 2025-09-08

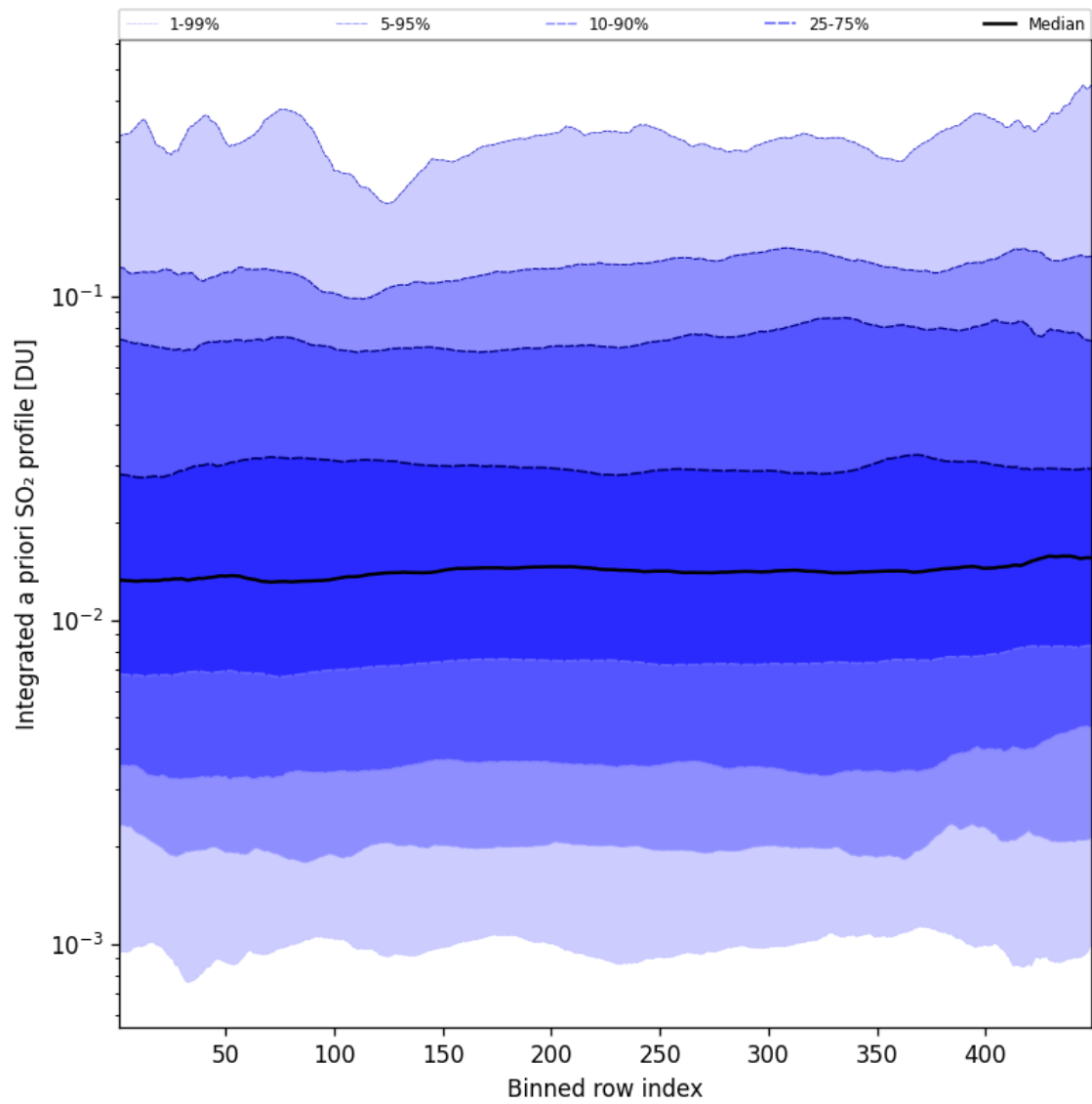


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-09-08 to 2025-09-08

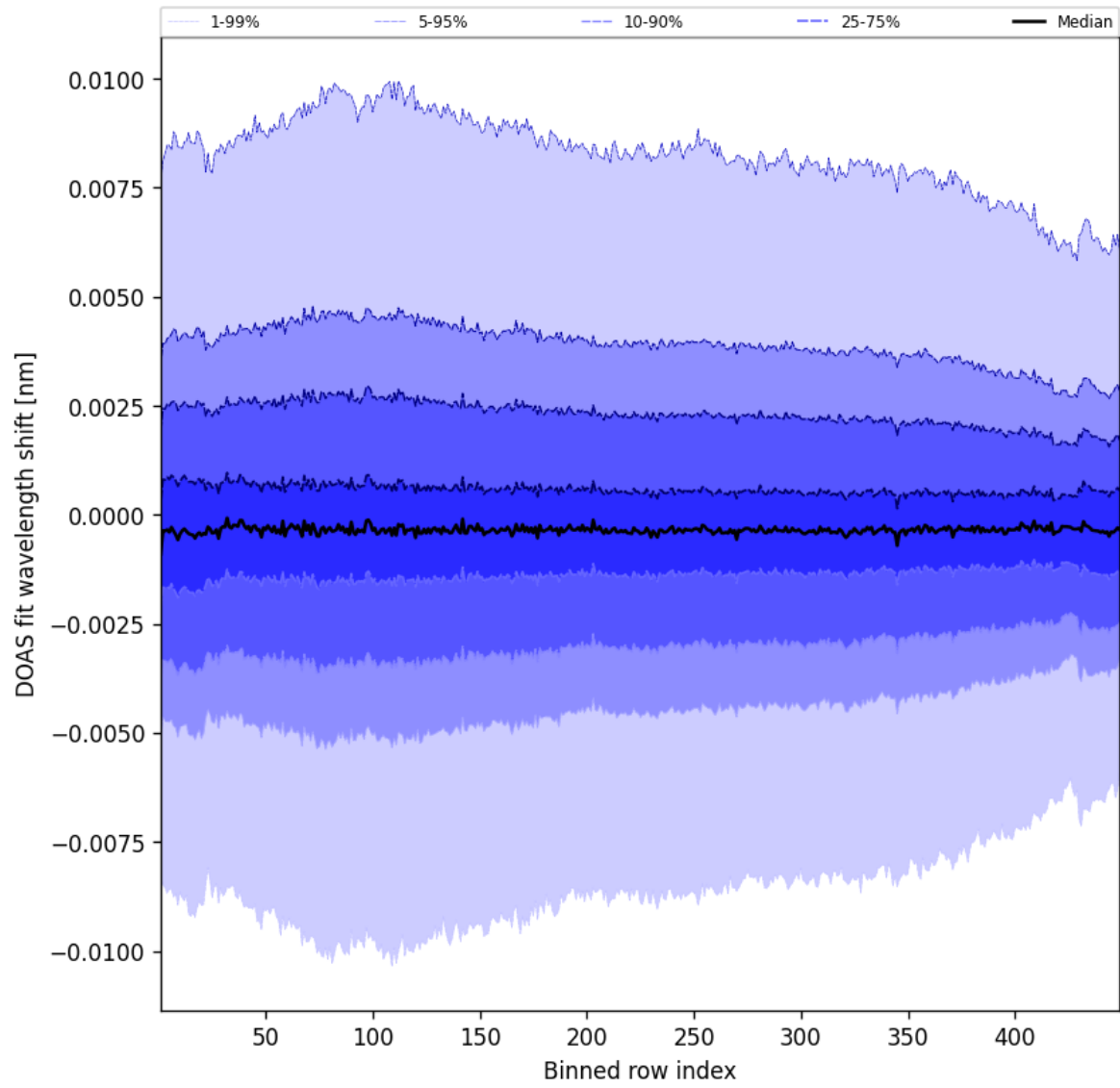


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-09-08 to 2025-09-08

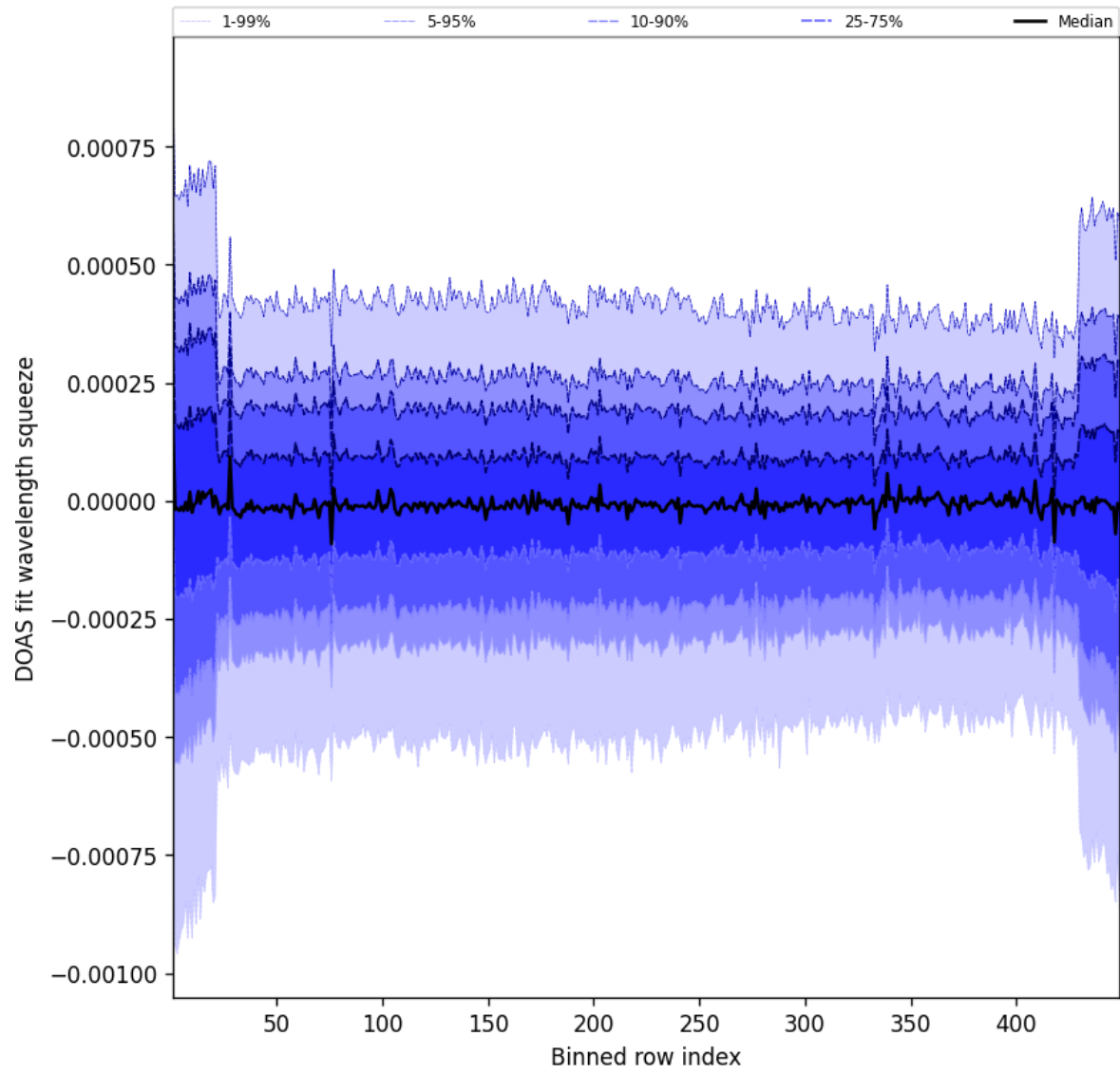


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-09-08 to 2025-09-08

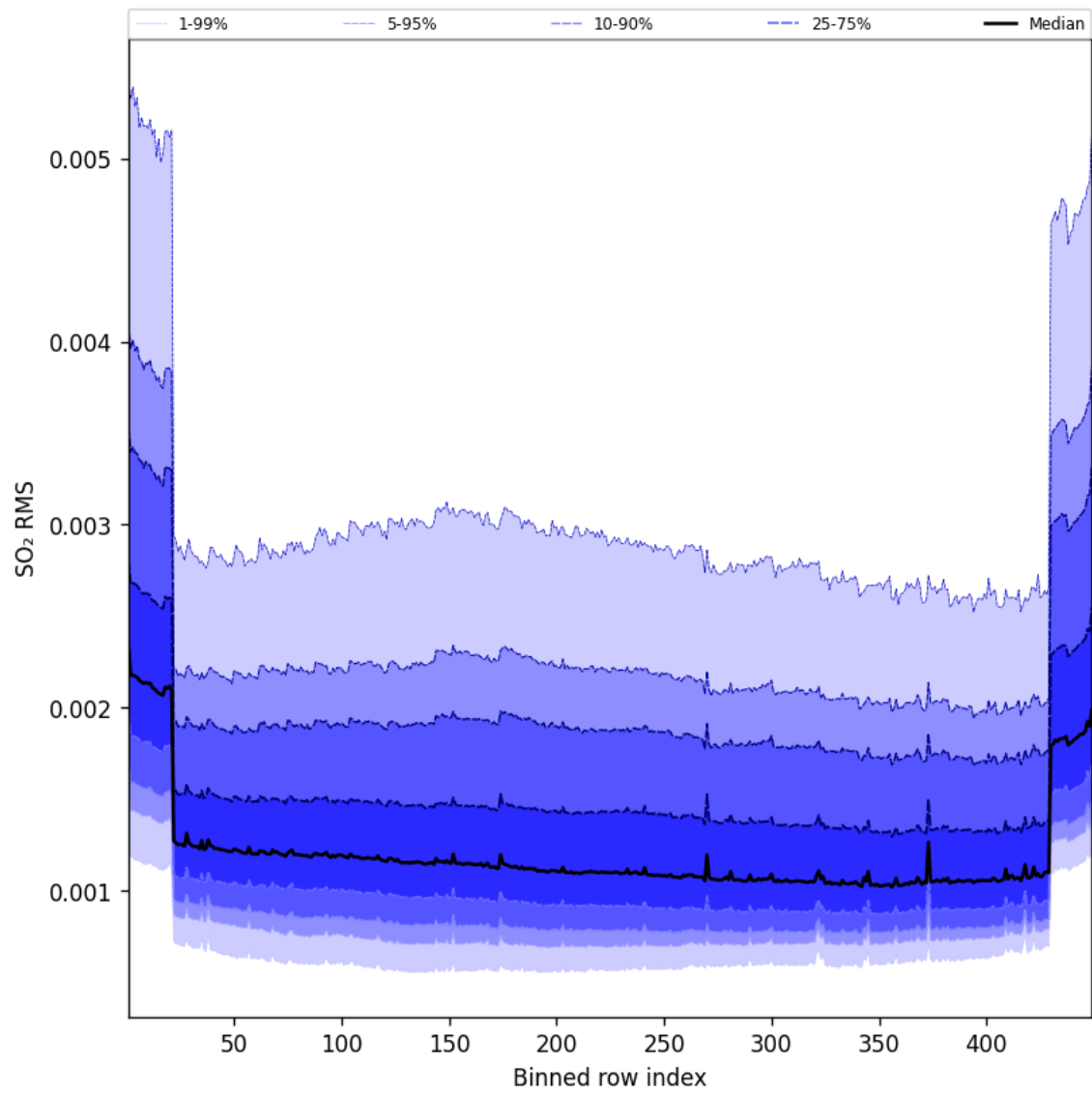


Figure 106: Along track statistics of “SO₂ RMS” for 2025-09-08 to 2025-09-08

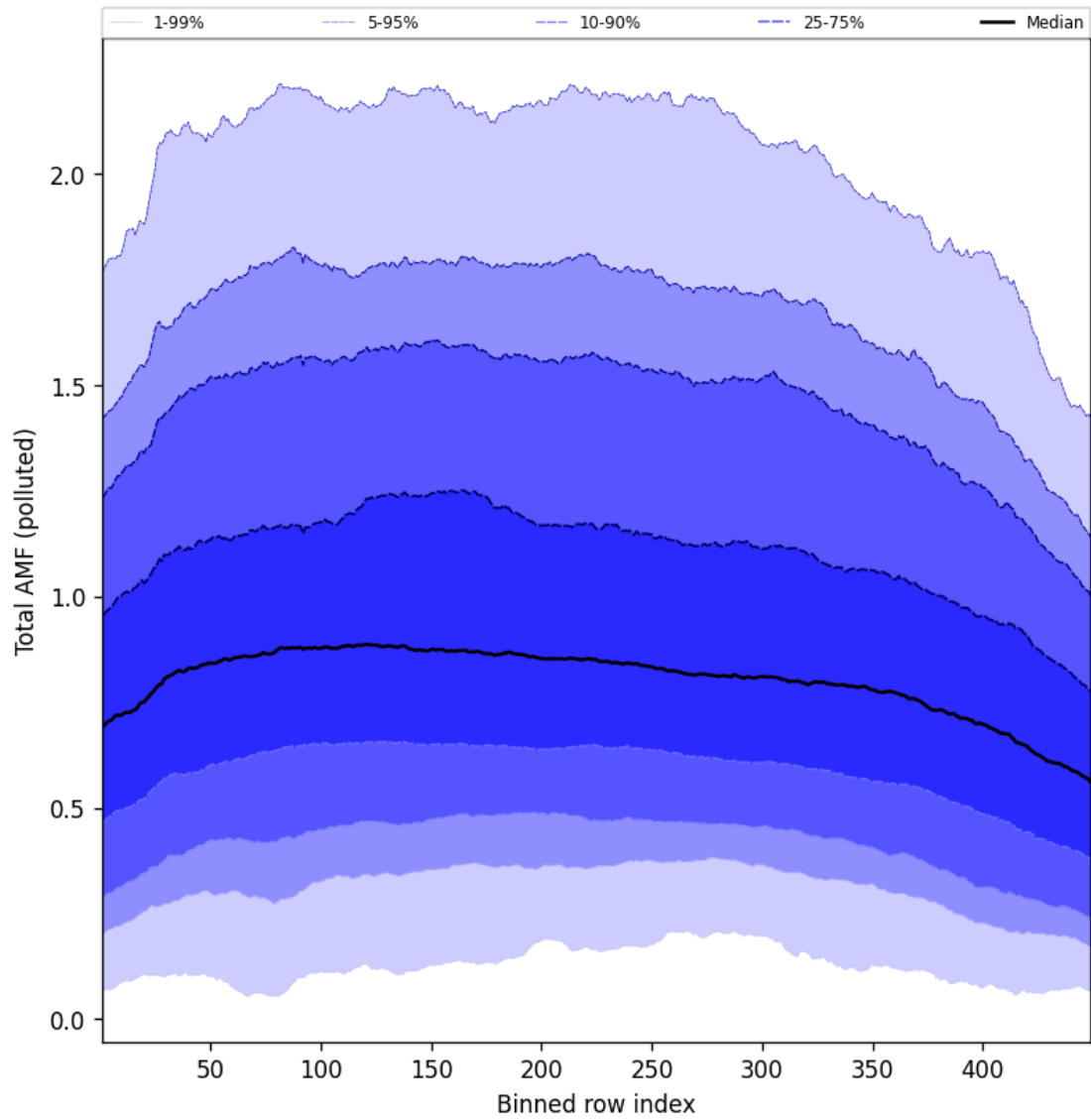


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-09-08 to 2025-09-08

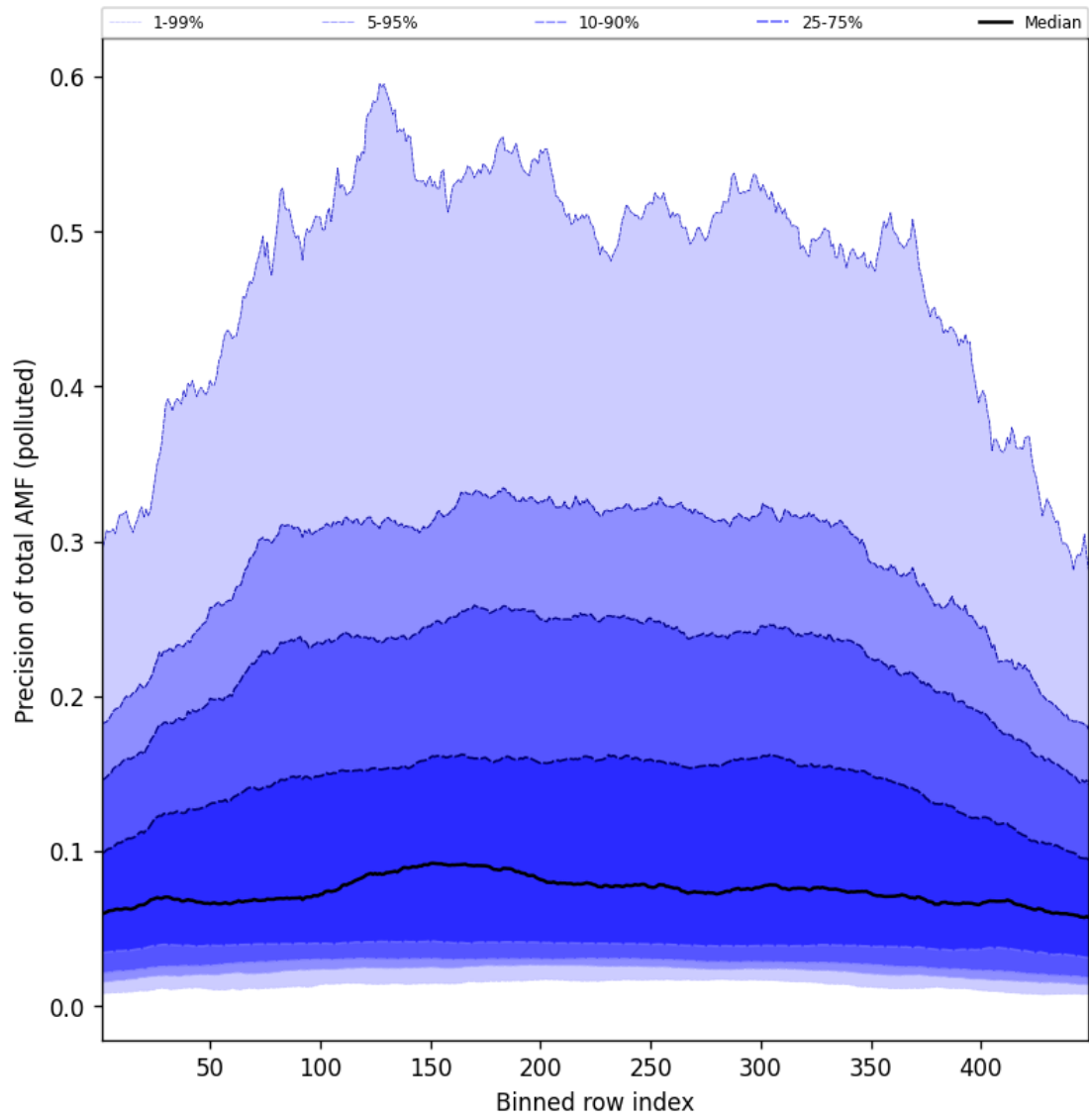


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-09-08 to 2025-09-08

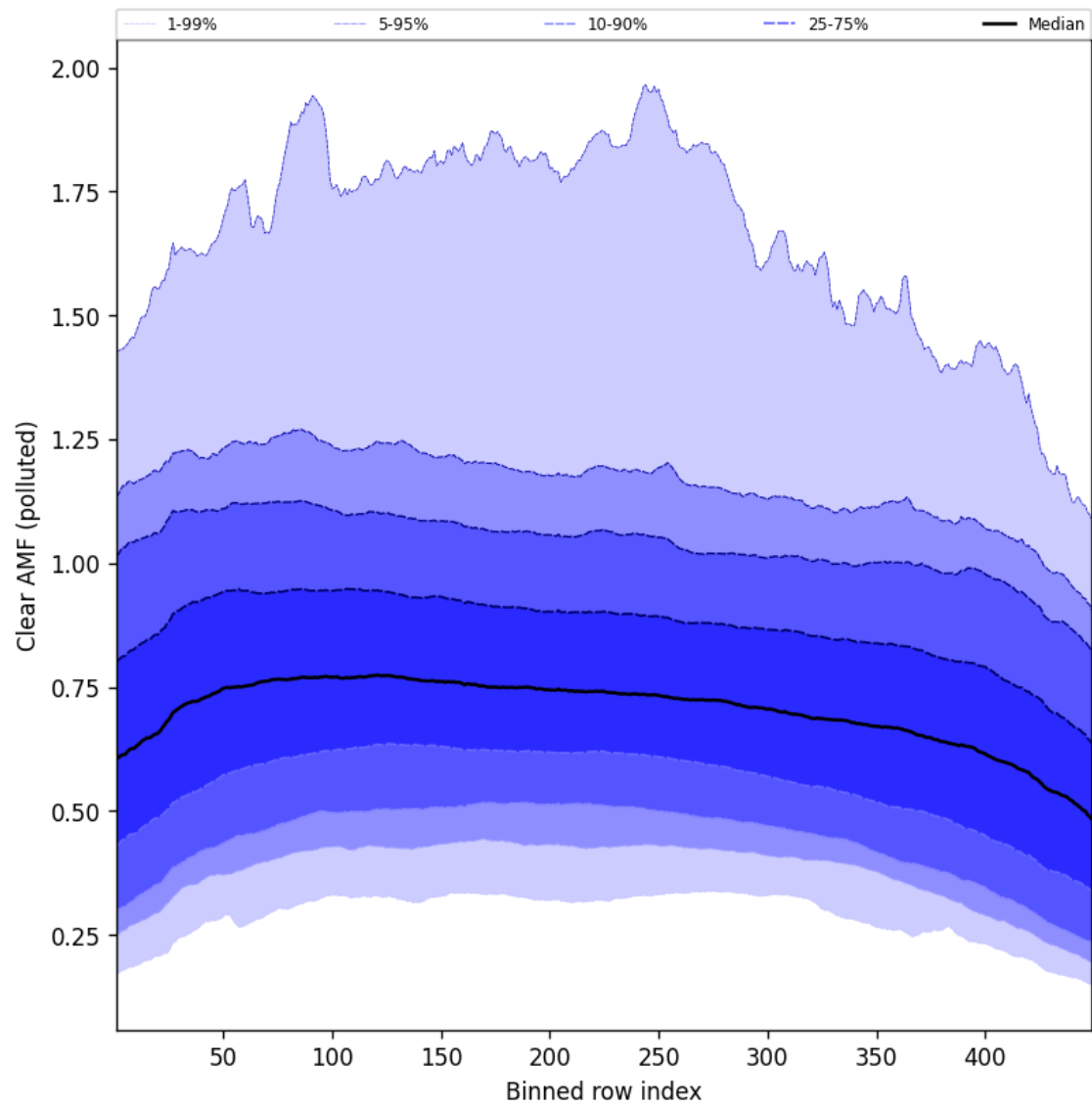


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-09-08 to 2025-09-08

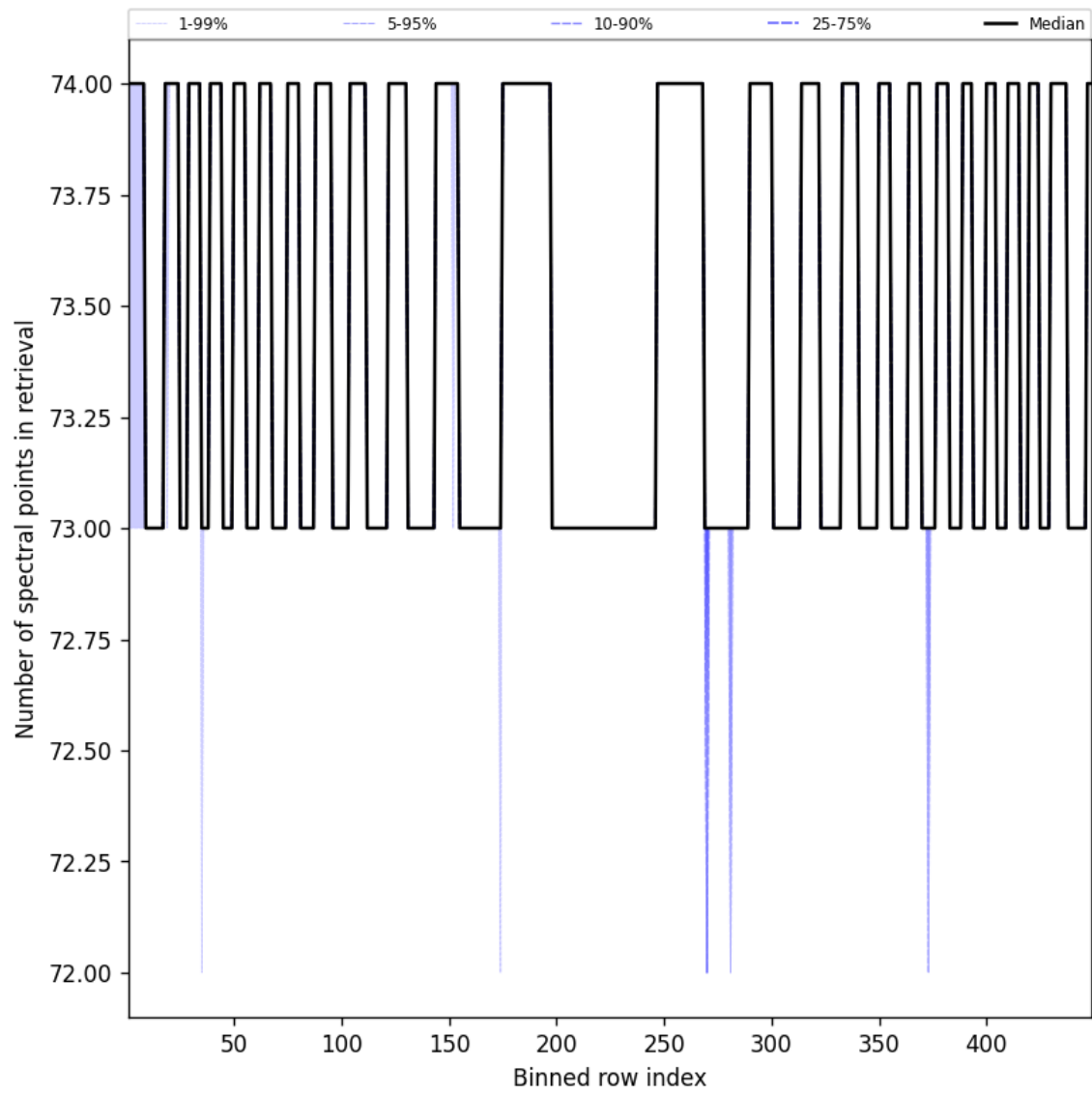


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-09-08 to 2025-09-08

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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