

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]	0.639 ± 0.409	17420547	0.995	0.790	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.008 \pm 100.461) \times 10^{-2}$	17420547	0.263	0.432	9.855×10^{-3}	-88.3	467
sulfurdioxide total vertical column precision [DU]	0.499 ± 0.720	17420547	0.222	0.326	0.317	4.705×10^{-2}	119
sulfurdioxide slant column density corrected [DU]	$(1.832 \pm 39.446) \times 10^{-2}$	17420547	0.258	0.372	9.243×10^{-3}	-23.8	316
sulfurdioxide slant column density cobra [DU]	$(1.812 \pm 36.477) \times 10^{-2}$	17420547	0.258	0.372	9.243×10^{-3}	-23.8	60.1
sulfurdioxide slant column density cobra precision [DU]	0.298 ± 0.134	17420547	0.213	0.130	0.258	8.060×10^{-2}	30.1
sulfurdioxide slant column density window1 [DU]	0.123 ± 0.684	17420547	0.125	0.748	0.126	-81.8	99.1
sulfurdioxide slant column density window1 precision [DU]	0.298 ± 0.134	17420547	0.213	0.130	0.258	8.060×10^{-2}	30.1
sulfurdioxide slant column density corrected win1 [DU]	$(3.962 \pm 67.417) \times 10^{-2}$	17420547	-2.500×10^{-2}	0.732	2.155×10^{-2}	-81.8	99.4
background so2 slant column offset window1 [DU]	$(-8.320 \pm 14.227) \times 10^{-2}$	17420547	-0.140	0.168	-0.116	-1.44	4.26
sulfurdioxide slant column density window2 [DU]	1.55 ± 9.03	17420547	1.25	11.3	1.45	-1.017×10^3	1.817×10^3
sulfurdioxide slant column density window2 precision [DU]	8.14 ± 2.40	17420547	7.43	2.65	7.78	2.19	752
sulfurdioxide slant column density corrected win2 [DU]	0.133 ± 8.908	17420547	0.250	11.1	0.139	-1.017×10^3	1.812×10^3
background so2 slant column offset window2 [DU]	-1.42 ± 1.92	17420547	0.250	2.61	-1.06	-11.1	7.46
sulfurdioxide slant column density window3 [DU]	-7.41 ± 23.95	17420547	-7.28	29.4	-7.43	-663	532
sulfurdioxide slant column density window3 precision [DU]	28.0 ± 13.4	17420547	22.5	10.3	24.6	9.16	638
sulfurdioxide slant column density corrected win3 [DU]	-0.136 ± 23.589	17420547	-0.560	29.1	-1.358×10^{-2}	-662	545
background so2 slant column offset window3 [DU]	7.28 ± 4.72	17420547	10.6	7.13	7.81	-14.3	28.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17420547	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.088 \pm 6.783) \times 10^{-2}$	17420547	1.800×10^{-2}	2.355×10^{-2}	1.501×10^{-2}	2.286×10^{-4}	2.59
fitted radiance shift [nm]	$(-1.192 \pm 25.642) \times 10^{-4}$	17420547	1.000×10^{-4}	1.662×10^{-3}	-1.309×10^{-4}	-4.628×10^{-2}	6.431×10^{-2}
fitted radiance squeeze [1]	$(-5.062 \pm 19.185) \times 10^{-5}$	17420547	-3.000×10^{-5}	2.223×10^{-4}	-4.349×10^{-5}	-1.715×10^{-2}	1.609×10^{-2}
fitted root mean square [1]	$(1.297 \pm 0.532) \times 10^{-3}$	17420547	1.025×10^{-3}	5.170×10^{-4}	1.148×10^{-3}	2.707×10^{-4}	0.102
sulfurdioxide total air mass factor polluted [1]	0.940 ± 0.516	17420547	0.660	0.637	0.823	5.000×10^{-2}	2.93
sulfurdioxide total air mass factor polluted precision [1]	0.122 ± 0.149	17420547	3.500×10^{-2}	0.115	7.365×10^{-2}	2.500×10^{-3}	2.30
sulfurdioxide clear air mass factor polluted [1]	0.784 ± 0.370	17420547	0.660	0.418	0.722	4.608×10^{-2}	2.76
number of spectral points in retrieval [1]	73.4 ± 0.5	17420547	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	4.000×10^{-2}	0.1000	0.210	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.17	-0.831	-0.512	-0.345	-0.203	0.229	0.382	0.566	0.929	2.52
sulfurdioxide total vertical column precision [DU]	9.385×10^{-2}	0.123	0.147	0.173	0.208	0.534	0.707	0.909	1.35	3.41
sulfurdioxide slant column density corrected [DU]	-0.864	-0.499	-0.362	-0.271	-0.175	0.197	0.298	0.397	0.553	1.03
sulfurdioxide slant column density cobra [DU]	-0.864	-0.499	-0.362	-0.271	-0.175	0.197	0.298	0.397	0.553	1.03
sulfurdioxide slant column density cobra precision [DU]	0.143	0.172	0.187	0.199	0.214	0.344	0.403	0.458	0.545	0.787
sulfurdioxide slant column density window1 [DU]	-1.69	-0.931	-0.643	-0.451	-0.250	0.497	0.692	0.878	1.16	1.94
sulfurdioxide slant column density window1 precision [DU]	0.143	0.172	0.187	0.199	0.214	0.344	0.403	0.458	0.545	0.787
sulfurdioxide slant column density corrected win1 [DU]	-1.63	-0.958	-0.700	-0.525	-0.339	0.393	0.594	0.790	1.09	1.94
background so2 slant column offset window1 [DU]	-0.333	-0.254	-0.223	-0.203	-0.179	-1.096×10^{-2}	4.747×10^{-2}	0.103	0.183	0.358
sulfurdioxide slant column density window2 [DU]	-19.7	-12.8	-9.42	-6.93	-4.15	7.12	9.99	12.6	16.2	24.0
sulfurdioxide slant column density window2 precision [DU]	4.27	5.13	5.67	6.10	6.61	9.27	10.2	11.1	12.4	15.1
sulfurdioxide slant column density corrected win2 [DU]	-21.4	-14.2	-10.7	-8.22	-5.43	5.69	8.46	11.0	14.4	21.7
background so2 slant column offset window2 [DU]	-6.44	-4.99	-4.14	-3.39	-2.62	-1.333×10^{-2}	0.269	0.486	0.797	2.98
sulfurdioxide slant column density window3 [DU]	-68.1	-46.6	-36.7	-29.6	-22.1	7.39	15.1	22.2	31.9	51.4
sulfurdioxide slant column density window3 precision [DU]	13.3	15.5	17.4	18.8	20.5	30.9	35.4	41.0	52.7	85.0
sulfurdioxide slant column density corrected win3 [DU]	-59.8	-39.0	-29.1	-22.1	-14.6	14.5	22.0	28.8	38.2	57.7
background so2 slant column offset window3 [DU]	-3.48	-0.666	0.963	2.24	3.70	10.8	11.9	12.9	14.3	16.9
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]	4.062×10^{-4}	5.592×10^{-4}	9.097×10^{-4}	2.386×10^{-3}	6.192×10^{-3}	2.974×10^{-2}	4.380×10^{-2}	6.245×10^{-2}	0.110	0.294
fitted radiance shift [nm]	-7.957×10^{-3}	-3.839×10^{-3}	-2.411×10^{-3}	-1.618×10^{-3}	-9.758×10^{-4}	6.866×10^{-4}	1.348×10^{-3}	2.195×10^{-3}	3.709×10^{-3}	8.004×10^{-3}
fitted radiance squeeze [1]	-5.686×10^{-4}	-3.647×10^{-4}	-2.789×10^{-4}	-2.201×10^{-4}	-1.583×10^{-4}	6.408×10^{-5}	1.181×10^{-4}	1.680×10^{-4}	2.393×10^{-4}	4.113×10^{-4}
fitted root mean square [1]	5.954×10^{-4}	7.424×10^{-4}	8.275×10^{-4}	8.902×10^{-4}	9.629×10^{-4}	1.480×10^{-3}	1.734×10^{-3}	1.979×10^{-3}	2.320×10^{-3}	3.203×10^{-3}
sulfurdioxide total air mass factor polluted [1]	9.536×10^{-2}	0.261	0.369	0.460	0.577	1.21	1.50	1.74	2.00	2.30
sulfurdioxide total air mass factor polluted precision [1]	1.032×10^{-2}	1.884×10^{-2}	2.497×10^{-2}	3.075×10^{-2}	3.795×10^{-2}	0.152	0.196	0.250	0.368	0.785
sulfurdioxide clear air mass factor polluted [1]	0.215	0.313	0.377	0.440	0.533	0.951	1.09	1.24	1.56	2.01
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]	0.586 ± 0.418	12221228	0.850	0.490	0.0	1.000	0.150	1.000
sulfurdioxide total vertical column [DU]	$(2.128 \pm 88.351) \times 10^{-2}$	12221228	0.389	7.924×10^{-3}	-68.8	106	-0.184	0.204
sulfurdioxide total vertical column precision [DU]	0.455 ± 0.685	12221228	0.282	0.279	4.705×10^{-2}	25.7	0.190	0.472
sulfurdioxide slant column density corrected [DU]	$(1.399 \pm 32.977) \times 10^{-2}$	12221228	0.350	7.677×10^{-3}	-6.97	65.7	-0.166	0.184
sulfurdioxide slant column density cobra [DU]	$(1.394 \pm 32.596) \times 10^{-2}$	12221228	0.350	7.677×10^{-3}	-6.97	22.7	-0.166	0.184
sulfurdioxide slant column density cobra precision [DU]	0.277 ± 0.117	12221228	0.106	0.242	8.060×10^{-2}	7.19	0.205	0.311
sulfurdioxide slant column density window1 [DU]	0.110 ± 0.634	12221228	0.710	0.119	-79.4	27.8	-0.241	0.469
sulfurdioxide slant column density window1 precision [DU]	0.277 ± 0.117	12221228	0.106	0.242	8.060×10^{-2}	7.19	0.205	0.311
sulfurdioxide slant column density corrected win1 [DU]	$(3.286 \pm 61.924) \times 10^{-2}$	12221228	0.691	1.857×10^{-2}	-79.4	27.6	-0.322	0.369
background so2 slant column offset window1 [DU]	$(-7.713 \pm 15.011) \times 10^{-2}$	12221228	0.199	-0.108	-0.649	3.80	-0.189	1.025×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.40 ± 8.29	12221228	10.6	1.38	-614	640	-3.93	6.71
sulfurdioxide slant column density window2 precision [DU]	7.64 ± 2.04	12221228	2.26	7.35	2.19	338	6.32	8.58
sulfurdioxide slant column density corrected win2 [DU]	$(9.545 \pm 818.492) \times 10^{-2}$	12221228	10.5	0.120	-616	636	-5.13	5.35
background so2 slant column offset window2 [DU]	-1.31 ± 1.88	12221228	2.65	-0.994	-10.7	7.46	-2.54	0.114
sulfurdioxide slant column density window3 [DU]	-7.03 ± 22.23	12221228	27.5	-7.28	-663	405	-20.8	6.62
sulfurdioxide slant column density window3 precision [DU]	26.2 ± 13.1	12221228	8.37	22.8	9.16	638	19.5	27.9
sulfurdioxide slant column density corrected win3 [DU]	$(-5.376 \pm 2181.110) \times 10^{-2}$	12221228	27.1	2.211×10^{-2}	-662	403	-13.5	13.6
background so2 slant column offset window3 [DU]	6.98 ± 4.79	12221228	7.79	8.08	-14.3	19.7	3.00	10.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	12221228	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.298 \pm 7.690) \times 10^{-2}$	12221228	2.816×10^{-2}	1.167×10^{-2}	2.286×10^{-4}	2.59	3.132×10^{-3}	3.129×10^{-2}
fitted radiance shift [nm]	$(1.364 \pm 258.548) \times 10^{-5}$	12221228	1.581×10^{-3}	-2.439×10^{-5}	-4.628×10^{-2}	4.211×10^{-2}	-8.002×10^{-4}	7.806×10^{-4}
fitted radiance squeeze [1]	$(-7.850 \pm 17.981) \times 10^{-5}$	12221228	2.154×10^{-4}	-6.466×10^{-5}	-1.681×10^{-2}	6.460×10^{-3}	-1.785×10^{-4}	3.688×10^{-5}
fitted root mean square [1]	$(1.222 \pm 0.483) \times 10^{-3}$	12221228	4.375×10^{-4}	1.092×10^{-3}	2.707×10^{-4}	0.101	9.279×10^{-4}	1.365×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.996 ± 0.560	12221228	0.785	0.882	5.000×10^{-2}	2.93	0.571	1.36
sulfurdioxide total air mass factor polluted precision [1]	0.138 ± 0.168	12221228	0.126	8.693×10^{-2}	3.162×10^{-3}	2.30	4.145×10^{-2}	0.168
sulfurdioxide clear air mass factor polluted [1]	0.819 ± 0.416	12221228	0.517	0.753	6.917×10^{-2}	2.76	0.505	1.02
number of spectral points in retrieval [1]	73.5 ± 0.5	12221228	1.000	73.0	52.0	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]	0.766 ± 0.354	5199319	0.550	1.000	0.0	1.000	0.450	1.000
sulfurdioxide total vertical column [DU]	$(5.077 \pm 124.342) \times 10^{-2}$	5199319	0.558	1.636×10^{-2}	-88.3	467	-0.257	0.301
sulfurdioxide total vertical column precision [DU]	0.603 ± 0.788	5199319	0.373	0.405	5.796×10^{-2}	119	0.281	0.654
sulfurdioxide slant column density corrected [DU]	$(2.850 \pm 51.534) \times 10^{-2}$	5199319	0.434	1.380×10^{-2}	-23.8	316	-0.201	0.233
sulfurdioxide slant column density cobra [DU]	$(2.794 \pm 44.263) \times 10^{-2}$	5199319	0.434	1.380×10^{-2}	-23.8	60.1	-0.201	0.233
sulfurdioxide slant column density cobra precision [DU]	0.347 ± 0.157	5199319	0.164	0.305	8.800×10^{-2}	30.1	0.245	0.409
sulfurdioxide slant column density window1 [DU]	0.153 ± 0.788	5199319	0.848	0.148	-81.8	99.1	-0.275	0.573
sulfurdioxide slant column density window1 precision [DU]	0.347 ± 0.157	5199319	0.164	0.305	8.800×10^{-2}	30.1	0.245	0.409
sulfurdioxide slant column density corrected win1 [DU]	$(5.552 \pm 78.813) \times 10^{-2}$	5199319	0.845	3.015×10^{-2}	-81.8	99.4	-0.385	0.461
background so2 slant column offset window1 [DU]	$(-9.746 \pm 12.070) \times 10^{-2}$	5199319	0.101	-0.124	-1.44	4.26	-0.160	-5.872×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.90 ± 10.54	5199319	13.0	1.66	-1.017×10^3	1.817×10^3	-4.73	8.26
sulfurdioxide slant column density window2 precision [DU]	9.32 ± 2.73	5199319	2.91	8.98	2.25	752	7.69	10.6
sulfurdioxide slant column density corrected win2 [DU]	0.220 ± 10.412	5199319	12.8	0.193	-1.017×10^3	1.812×10^3	-6.22	6.62
background so2 slant column offset window2 [DU]	-1.68 ± 2.01	5199319	2.58	-1.15	-11.1	7.14	-2.87	-0.287
sulfurdioxide slant column density window3 [DU]	-8.31 ± 27.55	5199319	35.0	-7.85	-380	532	-25.5	9.48
sulfurdioxide slant column density window3 precision [DU]	32.2 ± 13.1	5199319	10.1	29.1	10.4	228	24.9	35.1
sulfurdioxide slant column density corrected win3 [DU]	-0.328 ± 27.315	5199319	34.8	-0.119	-369	545	-17.6	17.2
background so2 slant column offset window3 [DU]	7.98 ± 4.47	5199319	6.12	7.30	-10.1	28.5	4.89	11.0
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.28	5199319	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.593 \pm 3.847) \times 10^{-2}$	5199319	1.557×10^{-2}	1.957×10^{-2}	1.577×10^{-3}	1.44	1.260×10^{-2}	2.817×10^{-2}
fitted radiance shift [nm]	$(-4.316 \pm 24.858) \times 10^{-4}$	5199319	1.770×10^{-3}	-4.167×10^{-4}	-4.141×10^{-2}	6.431×10^{-2}	-1.352×10^{-3}	4.184×10^{-4}
fitted radiance squeeze [1]	$(1.489 \pm 20.299) \times 10^{-5}$	5199319	2.326×10^{-4}	1.132×10^{-5}	-1.715×10^{-2}	1.609×10^{-2}	-1.033×10^{-4}	1.293×10^{-4}
fitted root mean square [1]	$(1.473 \pm 0.597) \times 10^{-3}$	5199319	6.443×10^{-4}	1.310×10^{-3}	3.685×10^{-4}	0.102	1.078×10^{-3}	1.723×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.809 ± 0.360	5199319	0.398	0.738	5.000×10^{-2}	2.66	0.587	0.985
sulfurdioxide total air mass factor polluted precision [1]	$(8.401 \pm 7.572) \times 10^{-2}$	5199319	8.081×10^{-2}	5.237×10^{-2}	2.500×10^{-3}	1.43	3.409×10^{-2}	0.115
sulfurdioxide clear air mass factor polluted [1]	0.703 ± 0.207	5199319	0.240	0.688	4.608×10^{-2}	1.67	0.577	0.817
number of spectral points in retrieval [1]	73.4 ± 0.5	5199319	1.000	73.0	52.0	74.0	73.0	74.0

Table 5: Parameterlist and basic statistics for the analysis for observations over water

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.655 ± 0.398	11248066	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(3.074 \pm 95.677) \times 10^{-2}$	11248066	0.442	1.050×10^{-2}	-72.1	249	-0.208	0.234
sulfurdioxide total vertical column precision [DU]	0.497 ± 0.684	11248066	0.319	0.320	5.374×10^{-2}	80.8	0.215	0.534
sulfurdioxide slant column density corrected [DU]	$(1.843 \pm 37.571) \times 10^{-2}$	11248066	0.376	9.582×10^{-3}	-23.8	125	-0.177	0.199
sulfurdioxide slant column density cobra [DU]	$(1.835 \pm 37.052) \times 10^{-2}$	11248066	0.376	9.582×10^{-3}	-23.8	60.1	-0.177	0.199
sulfurdioxide slant column density cobra precision [DU]	0.303 ± 0.138	11248066	0.145	0.261	8.287×10^{-2}	30.1	0.213	0.358
sulfurdioxide slant column density window1 [DU]	0.122 ± 0.697	11248066	0.762	0.131	-80.1	99.1	-0.255	0.507
sulfurdioxide slant column density window1 precision [DU]	0.303 ± 0.138	11248066	0.145	0.261	8.287×10^{-2}	30.1	0.213	0.358
sulfurdioxide slant column density corrected win1 [DU]	$(4.530 \pm 68.678) \times 10^{-2}$	11248066	0.745	2.816×10^{-2}	-80.1	99.4	-0.339	0.406
background so2 slant column offset window1 [DU]	$(-7.667 \pm 15.172) \times 10^{-2}$	11248066	0.180	-0.118	-1.44	4.21	-0.179	1.208×10^{-3}
sulfurdioxide slant column density window2 [DU]	1.66 ± 9.02	11248066	11.3	1.52	-648	1.817×10^3	-4.08	7.22
sulfurdioxide slant column density window2 precision [DU]	8.11 ± 2.26	11248066	2.63	7.74	2.19	752	6.61	9.24
sulfurdioxide slant column density corrected win2 [DU]	0.174 ± 8.887	11248066	11.1	0.175	-649	1.812×10^3	-5.40	5.74
background so2 slant column offset window2 [DU]	-1.48 ± 2.03	11248066	2.87	-0.988	-11.1	7.46	-2.85	1.637×10^{-2}
sulfurdioxide slant column density window3 [DU]	-4.95 ± 23.89	11248066	29.6	-5.21	-355	228	-19.8	9.86
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 11.5	11248066	9.48	24.0	9.16	638	20.4	29.9
sulfurdioxide slant column density corrected win3 [DU]	2.15 ± 23.29	11248066	29.0	1.96	-343	235	-12.4	16.6
background so2 slant column offset window3 [DU]	7.10 ± 4.75	11248066	7.10	7.31	-14.3	28.5	3.51	10.6
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	11248066	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.048 \pm 3.995) \times 10^{-2}$	11248066	1.603×10^{-2}	1.345×10^{-2}	2.597×10^{-4}	2.04	7.015×10^{-3}	2.305×10^{-2}
fitted radiance shift [nm]	$(-1.411 \pm 21.753) \times 10^{-4}$	11248066	1.569×10^{-3}	-1.291×10^{-4}	-4.141×10^{-2}	6.431×10^{-2}	-9.411×10^{-4}	6.275×10^{-4}
fitted radiance squeeze [1]	$(-4.418 \pm 19.562) \times 10^{-5}$	11248066	2.251×10^{-4}	-3.594×10^{-5}	-1.681×10^{-2}	1.609×10^{-2}	-1.527×10^{-4}	7.239×10^{-5}
fitted root mean square [1]	$(1.320 \pm 0.550) \times 10^{-3}$	11248066	5.821×10^{-4}	1.159×10^{-3}	3.412×10^{-4}	0.102	9.616×10^{-4}	1.544×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.917 ± 0.470	11248066	0.553	0.825	5.000×10^{-2}	2.69	0.602	1.15
sulfurdioxide total air mass factor polluted precision [1]	0.118 ± 0.158	11248066	9.676×10^{-2}	6.808×10^{-2}	3.280×10^{-3}	2.26	3.918×10^{-2}	0.136
sulfurdioxide clear air mass factor polluted [1]	0.795 ± 0.375	11248066	0.399	0.734	7.431×10^{-2}	2.46	0.553	0.952
number of spectral points in retrieval [1]	73.4 ± 0.5	11248066	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]	0.642 ± 0.422	4278941	0.830	1.000	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(2.718 \pm 99.955) \times 10^{-2}$	4278941	0.403	8.685×10^{-3}	-88.3	467	-0.189	0.214
sulfurdioxide total vertical column precision [DU]	0.474 ± 0.704	4278941	0.308	0.305	4.705×10^{-2}	92.3	0.191	0.498
sulfurdioxide slant column density corrected [DU]	$(1.835 \pm 41.262) \times 10^{-2}$	4278941	0.357	8.547×10^{-3}	-23.0	312	-0.168	0.189
sulfurdioxide slant column density cobra [DU]	$(1.793 \pm 34.636) \times 10^{-2}$	4278941	0.357	8.547×10^{-3}	-23.0	28.4	-0.168	0.189
sulfurdioxide slant column density cobra precision [DU]	0.282 ± 0.121	4278941	9.541×10^{-2}	0.246	8.622×10^{-2}	17.6	0.211	0.307
sulfurdioxide slant column density window1 [DU]	0.143 ± 0.642	4278941	0.709	0.136	-81.8	54.4	-0.217	0.492
sulfurdioxide slant column density window1 precision [DU]	0.282 ± 0.121	4278941	9.541×10^{-2}	0.246	8.622×10^{-2}	17.6	0.211	0.307
sulfurdioxide slant column density corrected win1 [DU]	$(2.916 \pm 63.409) \times 10^{-2}$	4278941	0.696	1.071×10^{-2}	-81.8	54.2	-0.331	0.364
background so2 slant column offset window1 [DU]	-0.114 ± 0.117	4278941	0.136	-0.136	-0.649	4.26	-0.192	-5.594×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.16 ± 9.09	4278941	11.2	1.14	-1.017×10^3	1.041×10^3	-4.49	6.76
sulfurdioxide slant column density window2 precision [DU]	8.25 ± 2.70	4278941	2.72	7.86	2.43	561	6.63	9.36
sulfurdioxide slant column density corrected win2 [DU]	$(8.738 \pm 900.111) \times 10^{-2}$	4278941	11.1	9.991×10^{-2}	-1.017×10^3	1.039×10^3	-5.46	5.63
background so2 slant column offset window2 [DU]	-1.07 ± 1.68	4278941	2.10	-0.785	-10.7	7.46	-2.03	7.239×10^{-2}
sulfurdioxide slant column density window3 [DU]	-12.0 ± 23.7	4278941	28.9	-11.4	-663	532	-26.1	2.77
sulfurdioxide slant column density window3 precision [DU]	30.4 ± 16.6	4278941	12.2	25.9	9.46	322	21.2	33.4
sulfurdioxide slant column density corrected win3 [DU]	-5.12 ± 23.87	4278941	29.4	-4.39	-662	545	-19.5	9.92
background so2 slant column offset window3 [DU]	6.87 ± 4.75	4278941	7.33	7.47	-14.3	24.8	3.27	10.6
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.12	4278941	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.544 \pm 10.164) \times 10^{-2}$	4278941	5.206×10^{-2}	2.757×10^{-2}	2.286×10^{-4}	2.58	7.292×10^{-3}	5.935×10^{-2}
fitted radiance shift [nm]	$(-8.392 \pm 324.359) \times 10^{-5}$	4278941	1.790×10^{-3}	-1.424×10^{-4}	-4.628×10^{-2}	4.211×10^{-2}	-1.017×10^{-3}	7.735×10^{-4}
fitted radiance squeeze [1]	$(-4.816 \pm 18.058) \times 10^{-5}$	4278941	2.110×10^{-4}	-4.409×10^{-5}	-1.715×10^{-2}	1.527×10^{-2}	-1.516×10^{-4}	5.942×10^{-5}
fitted root mean square [1]	$(1.225 \pm 0.471) \times 10^{-3}$	4278941	3.957×10^{-4}	1.109×10^{-3}	2.707×10^{-4}	5.448×10^{-2}	9.503×10^{-4}	1.346×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.979 ± 0.579	4278941	0.748	0.806	5.000×10^{-2}	2.92	0.556	1.30
sulfurdioxide total air mass factor polluted precision [1]	0.127 ± 0.130	4278941	0.147	8.797×10^{-2}	2.500×10^{-3}	2.30	3.405×10^{-2}	0.181
sulfurdioxide clear air mass factor polluted [1]	0.773 ± 0.357	4278941	0.388	0.702	4.608×10^{-2}	2.76	0.534	0.922
number of spectral points in retrieval [1]	73.4 ± 0.5	4278941	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

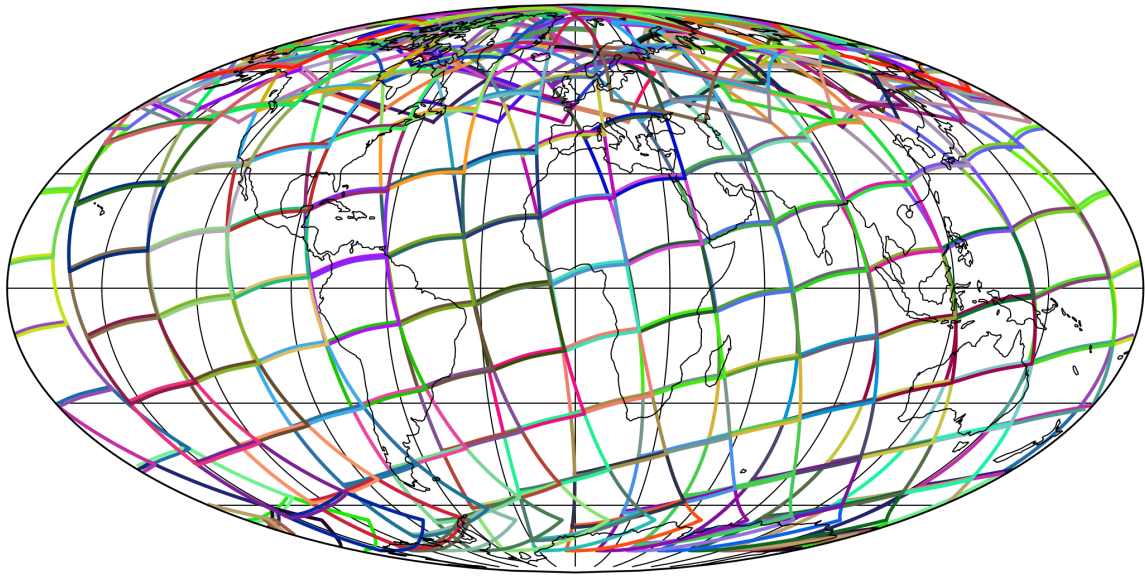


Figure 1: Outline of the granules.

4 Input data monitoring

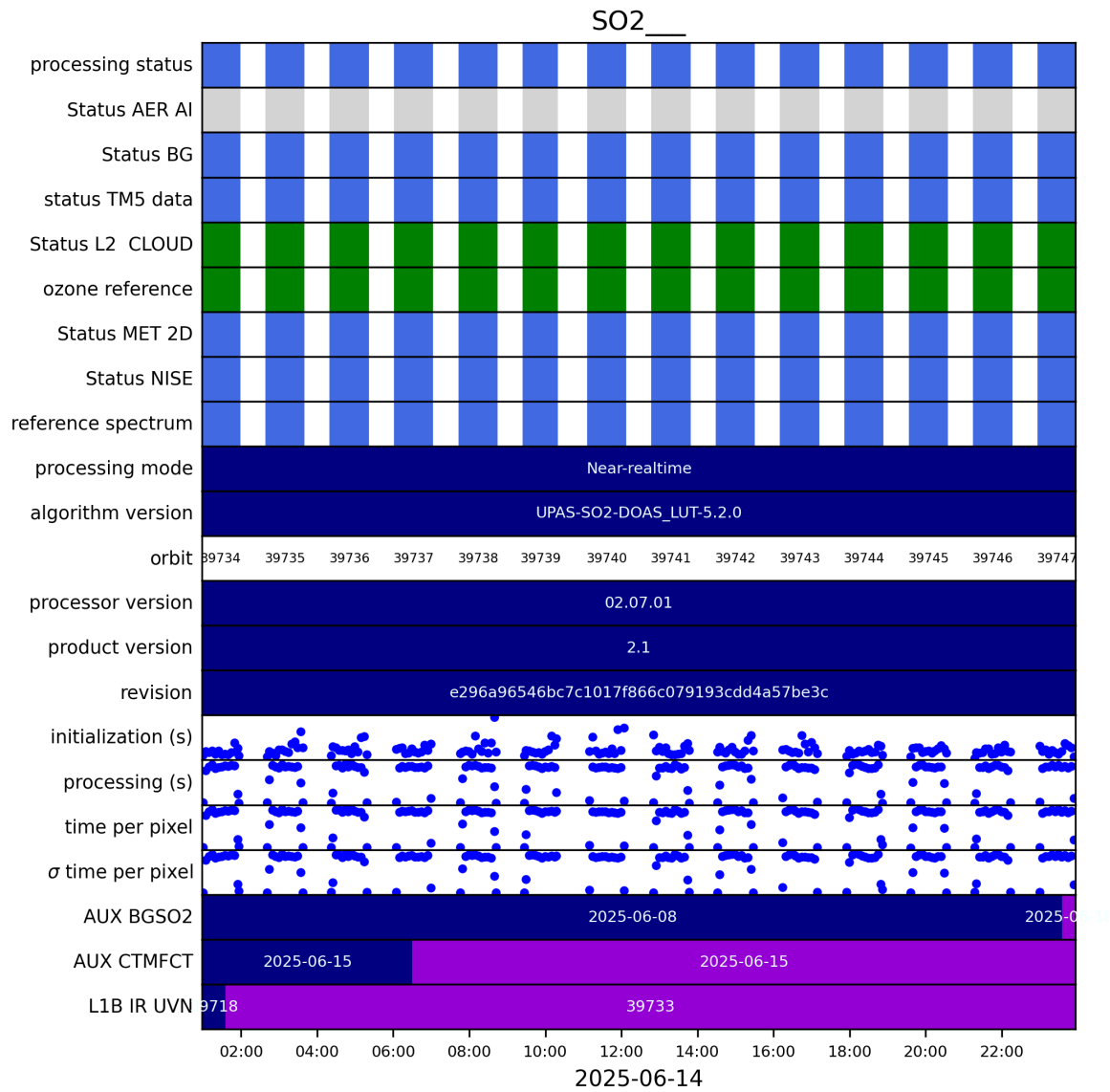


Figure 2: Input data per granule

5 Warnings and errors

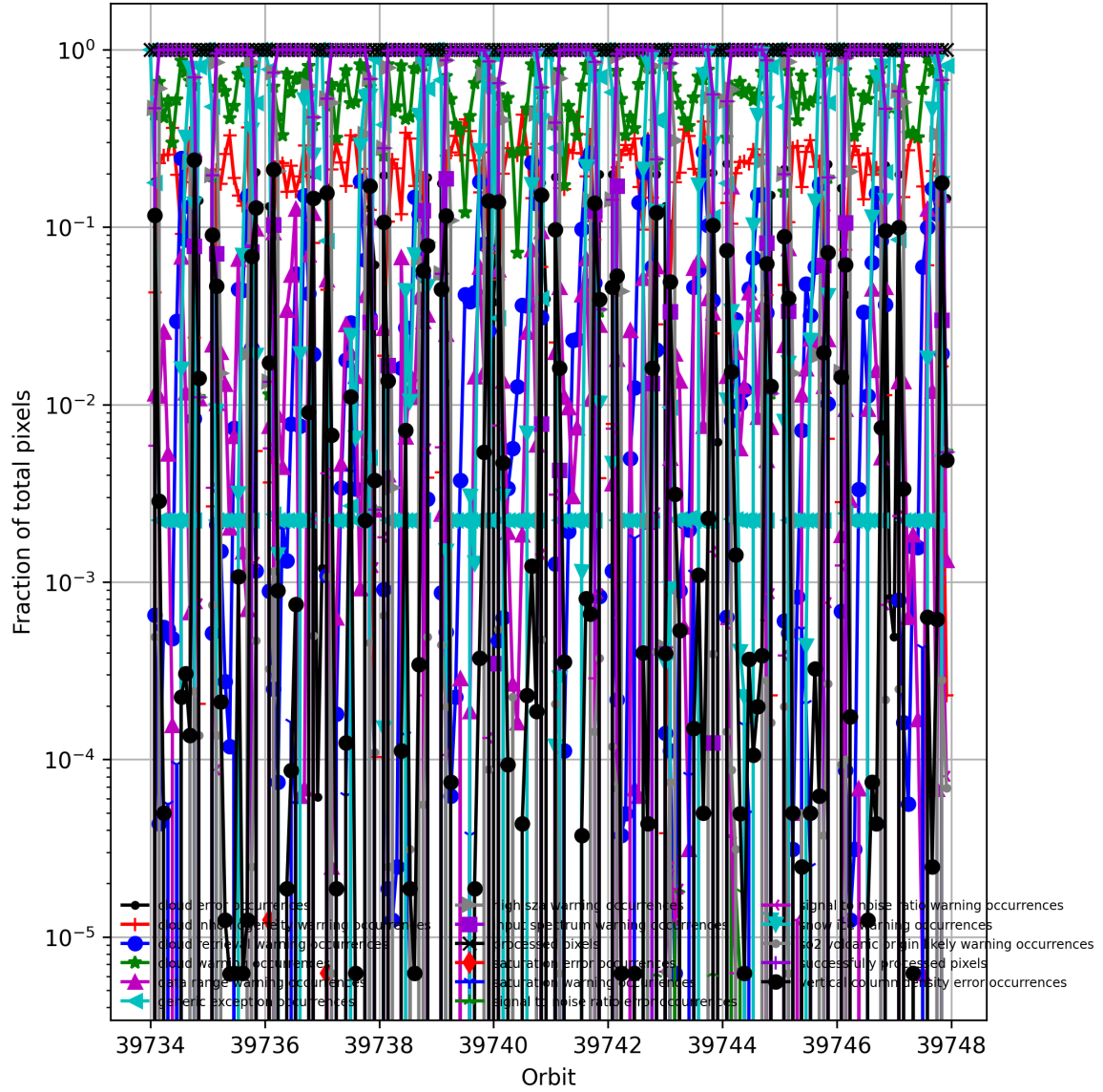


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

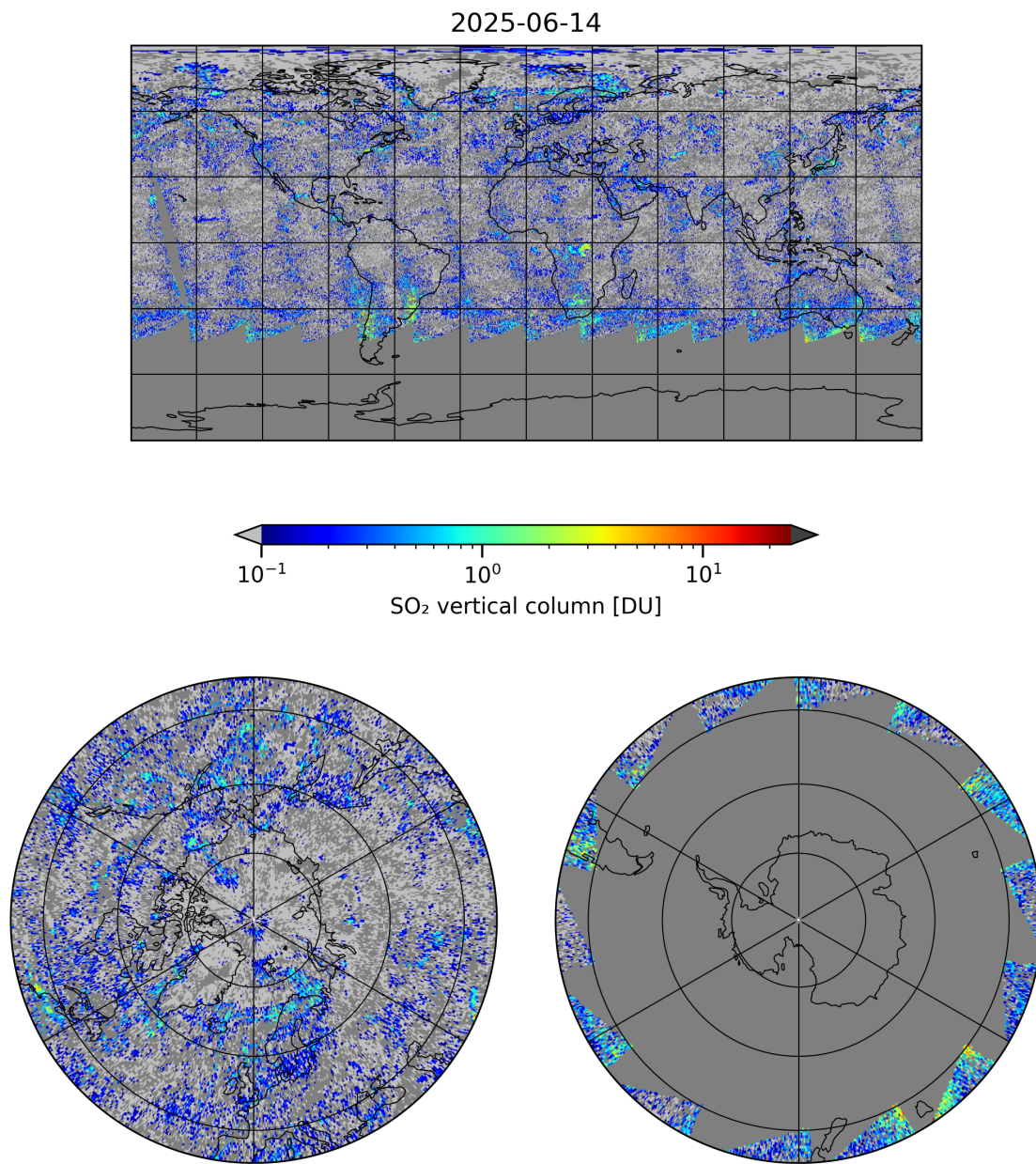


Figure 4: Map of “SO₂ vertical column” for 2025-06-14 to 2025-06-14

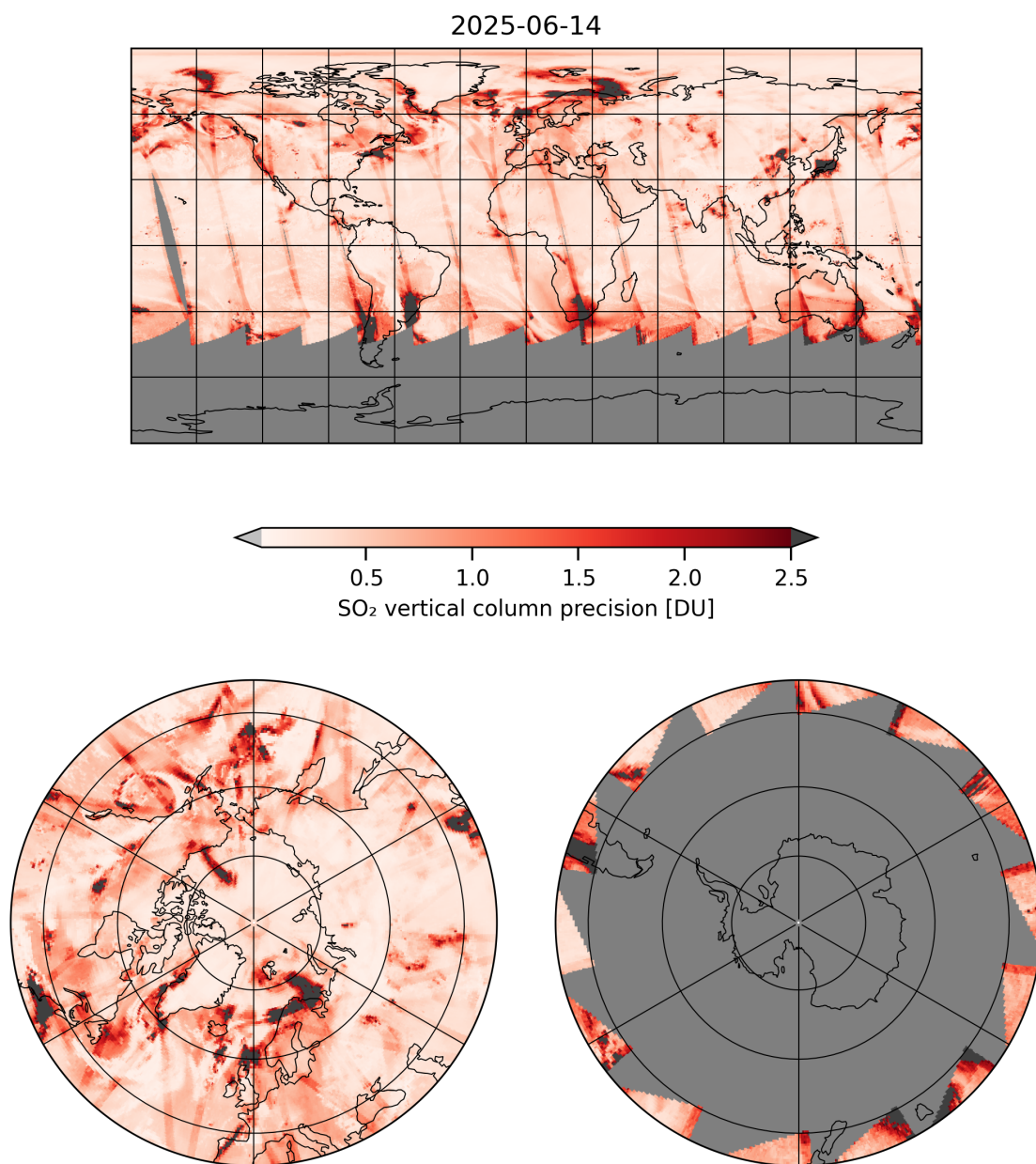


Figure 5: Map of “SO₂ vertical column precision” for 2025-06-14 to 2025-06-14

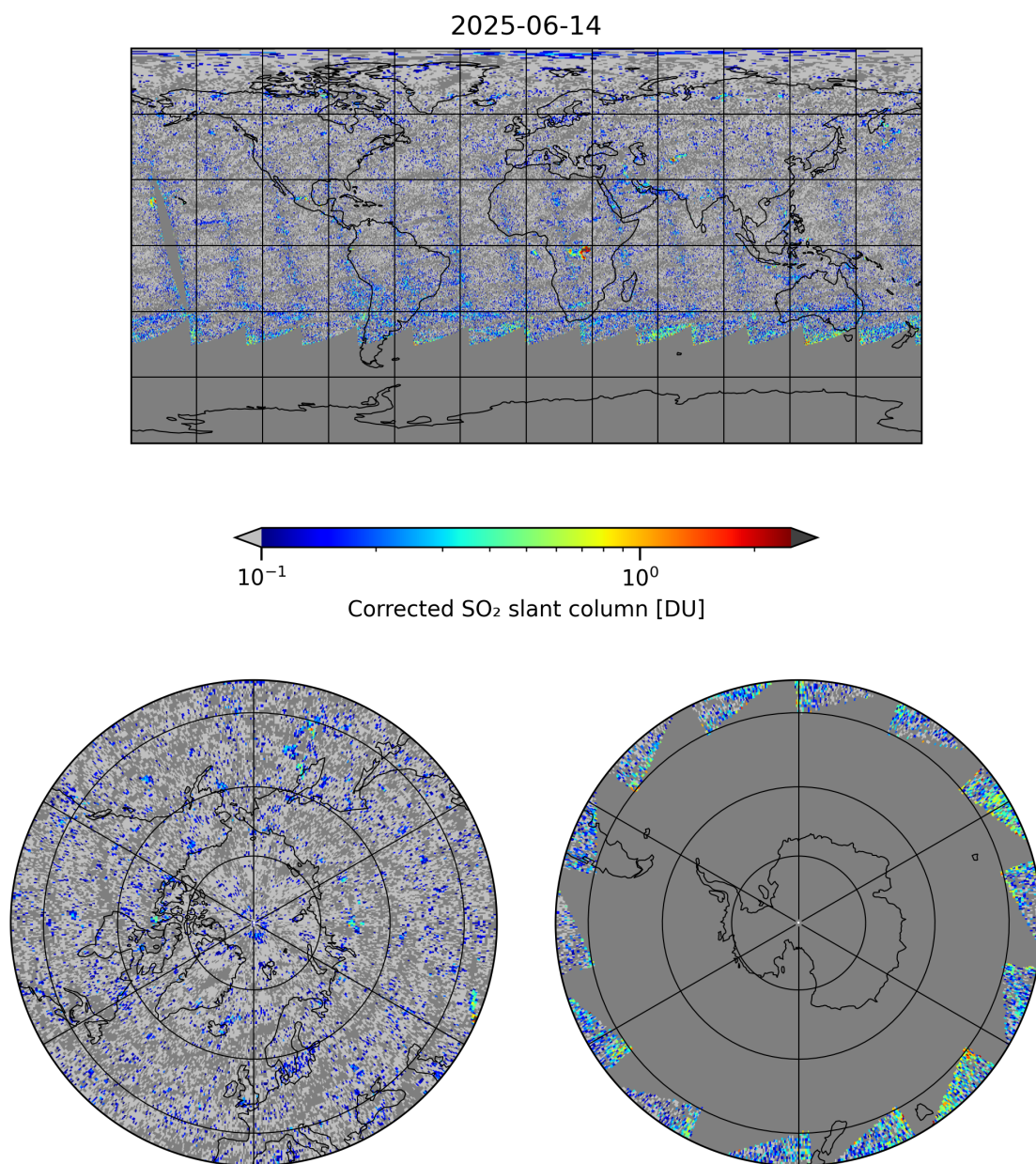


Figure 6: Map of “Corrected SO₂ slant column” for 2025-06-14 to 2025-06-14

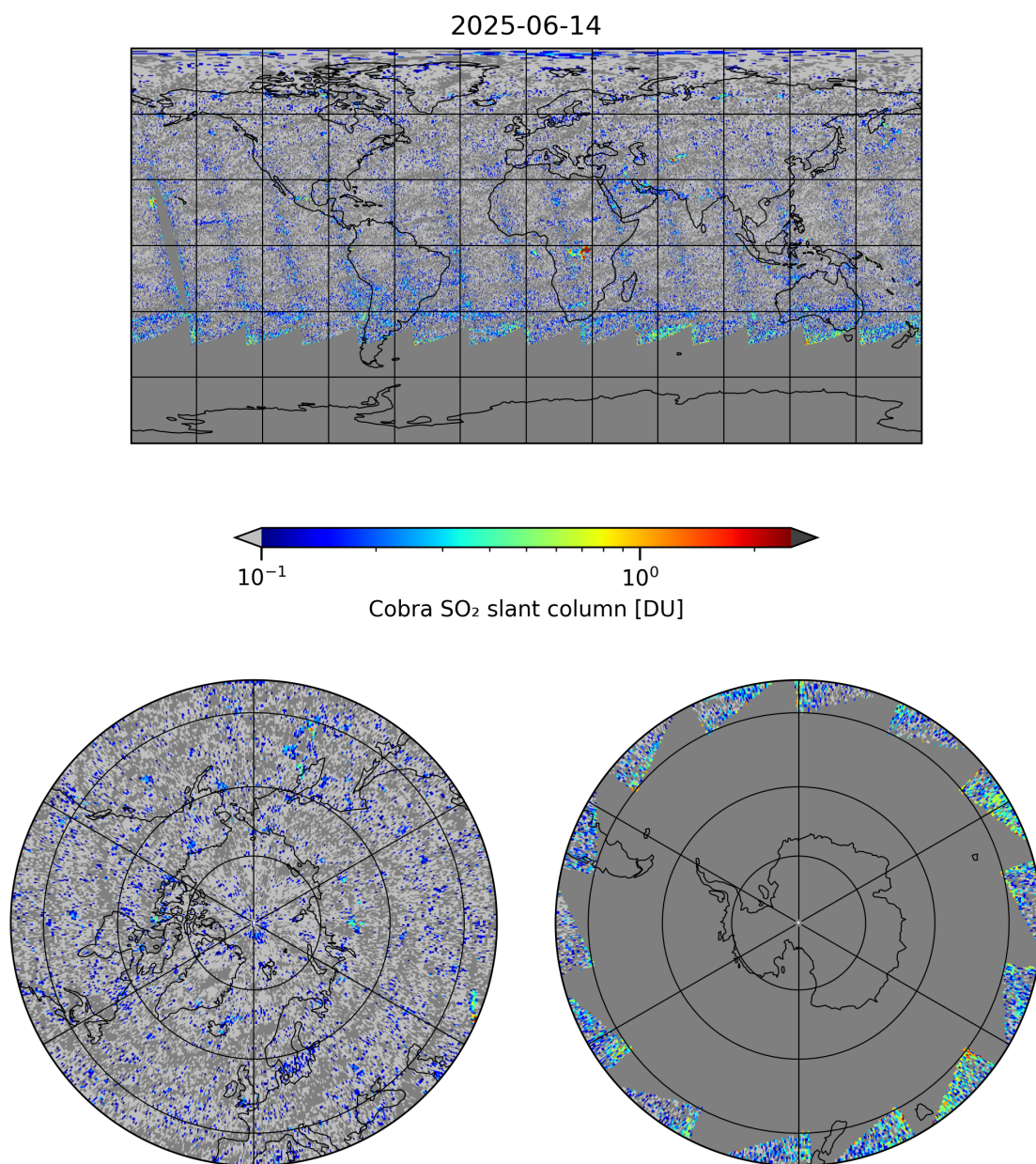


Figure 7: Map of “Cobra SO₂ slant column” for 2025-06-14 to 2025-06-14

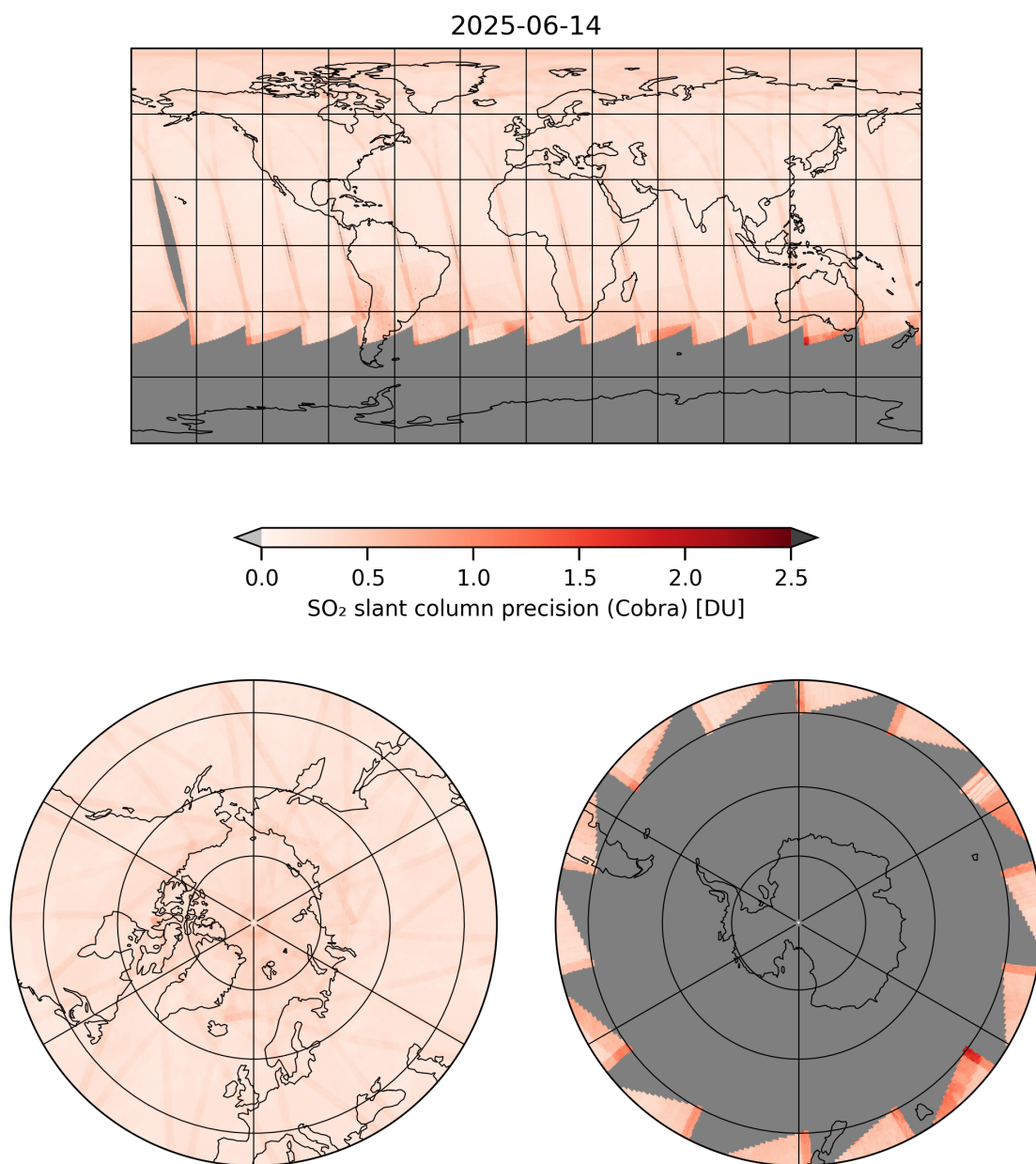


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-06-14 to 2025-06-14

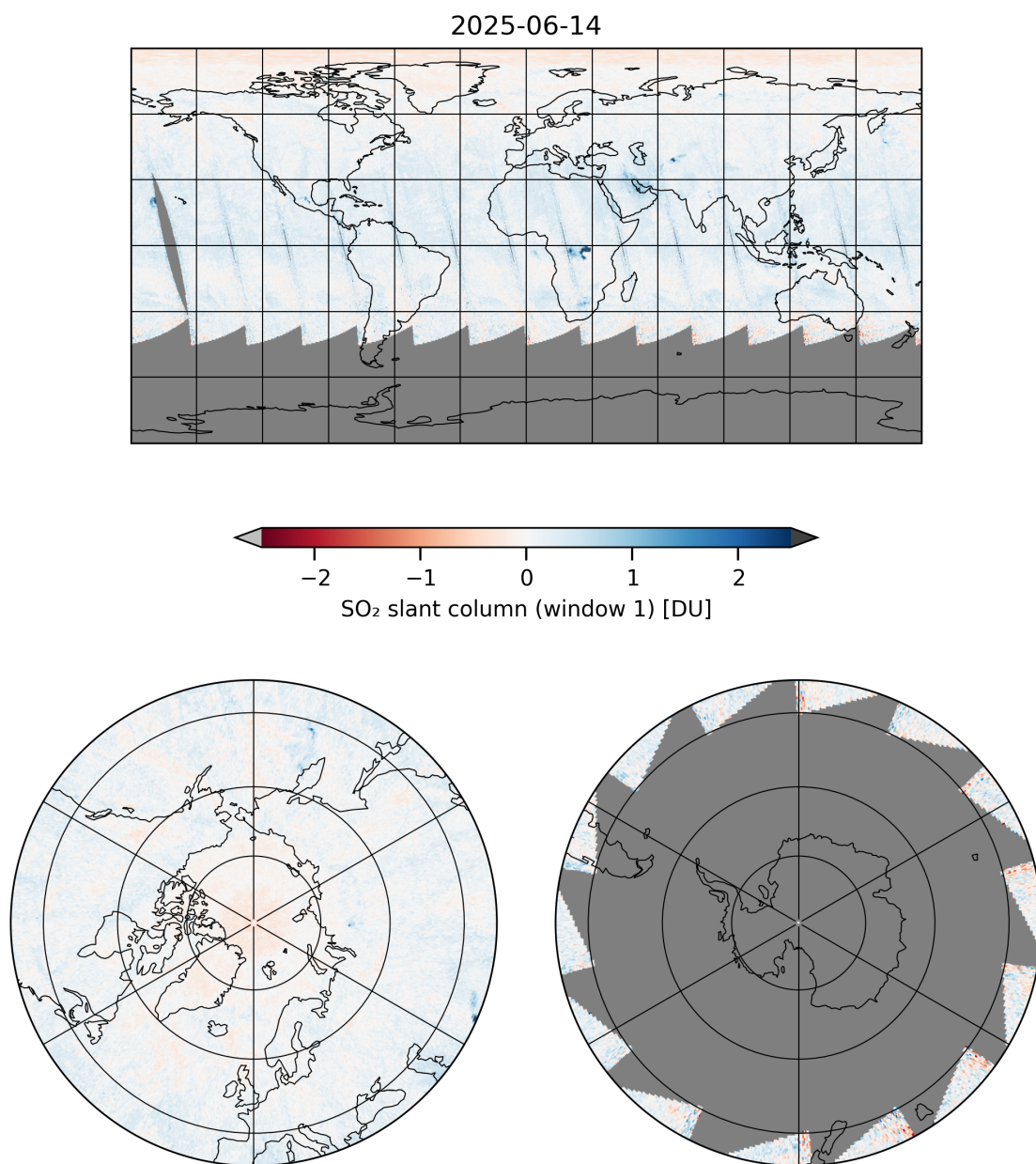


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-06-14 to 2025-06-14

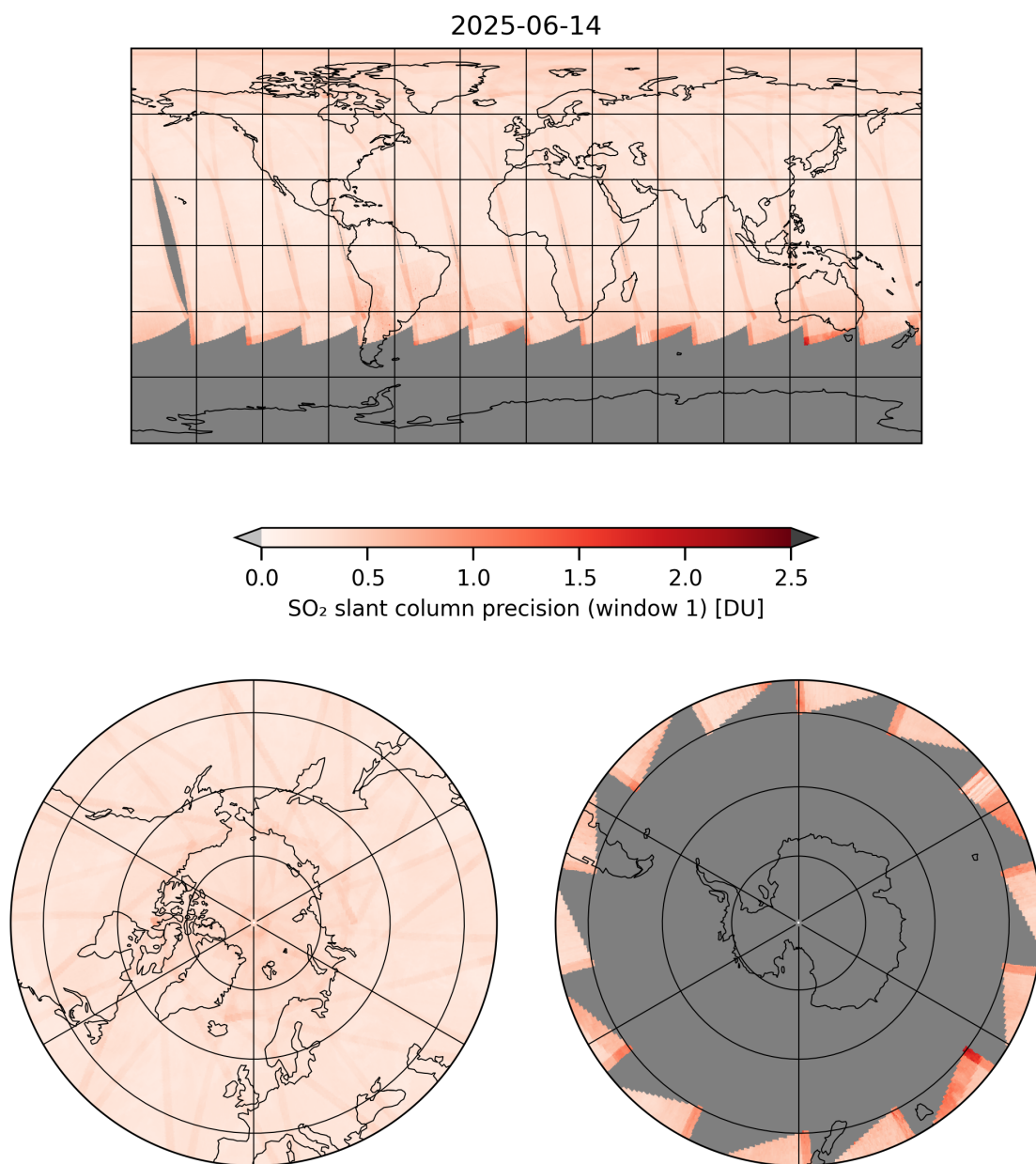


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-06-14 to 2025-06-14

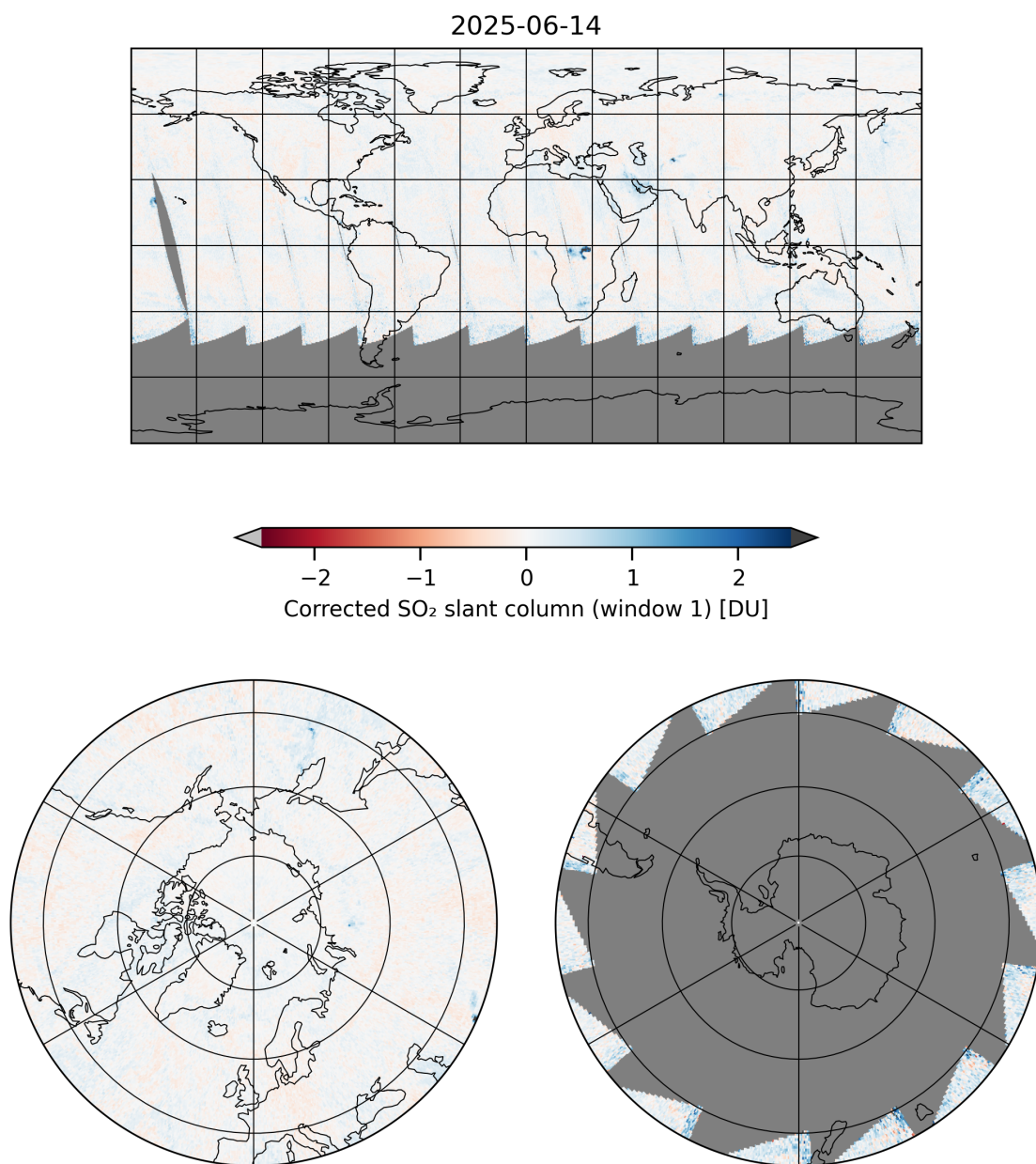


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-06-14 to 2025-06-14

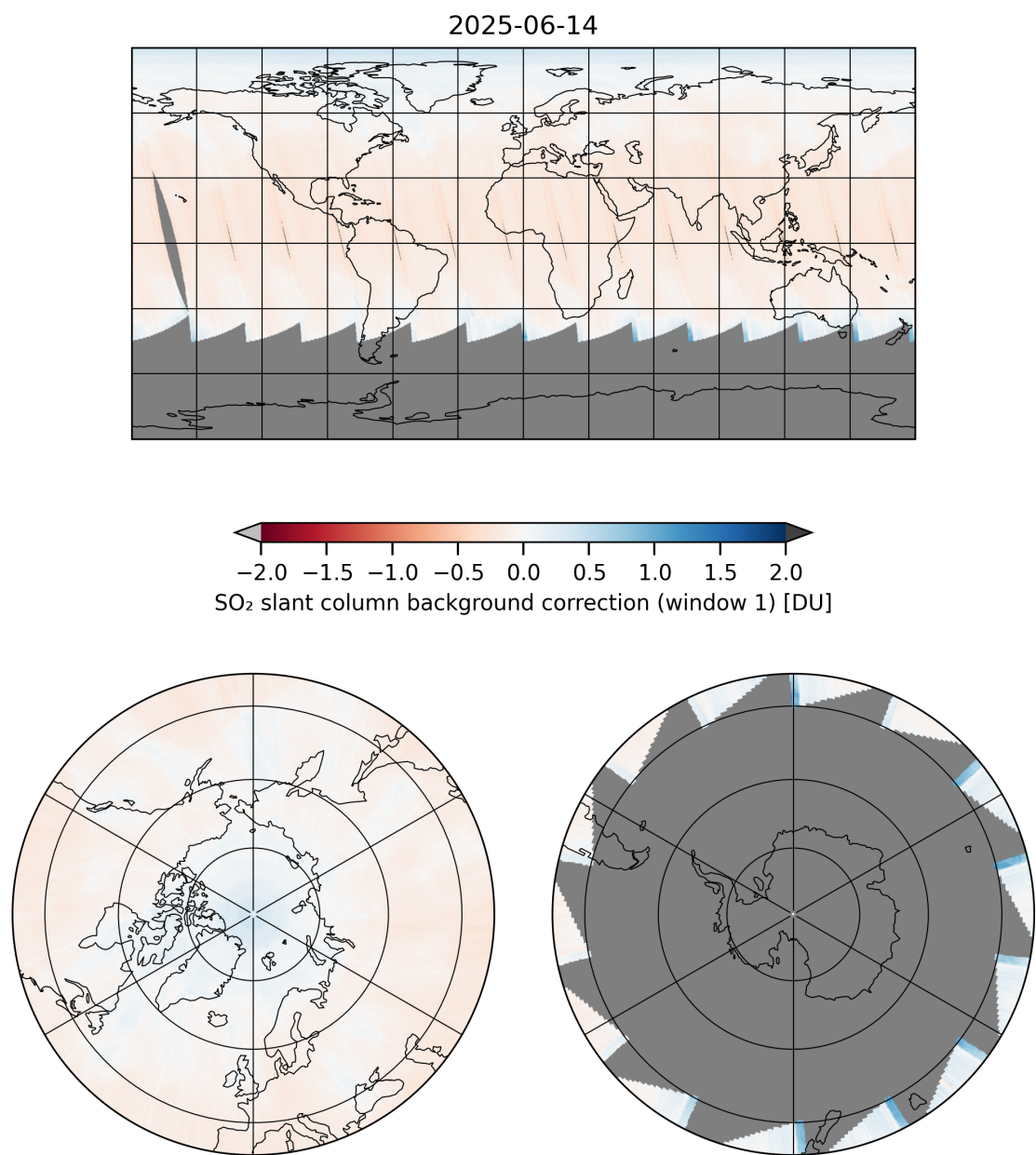


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-06-14 to 2025-06-14

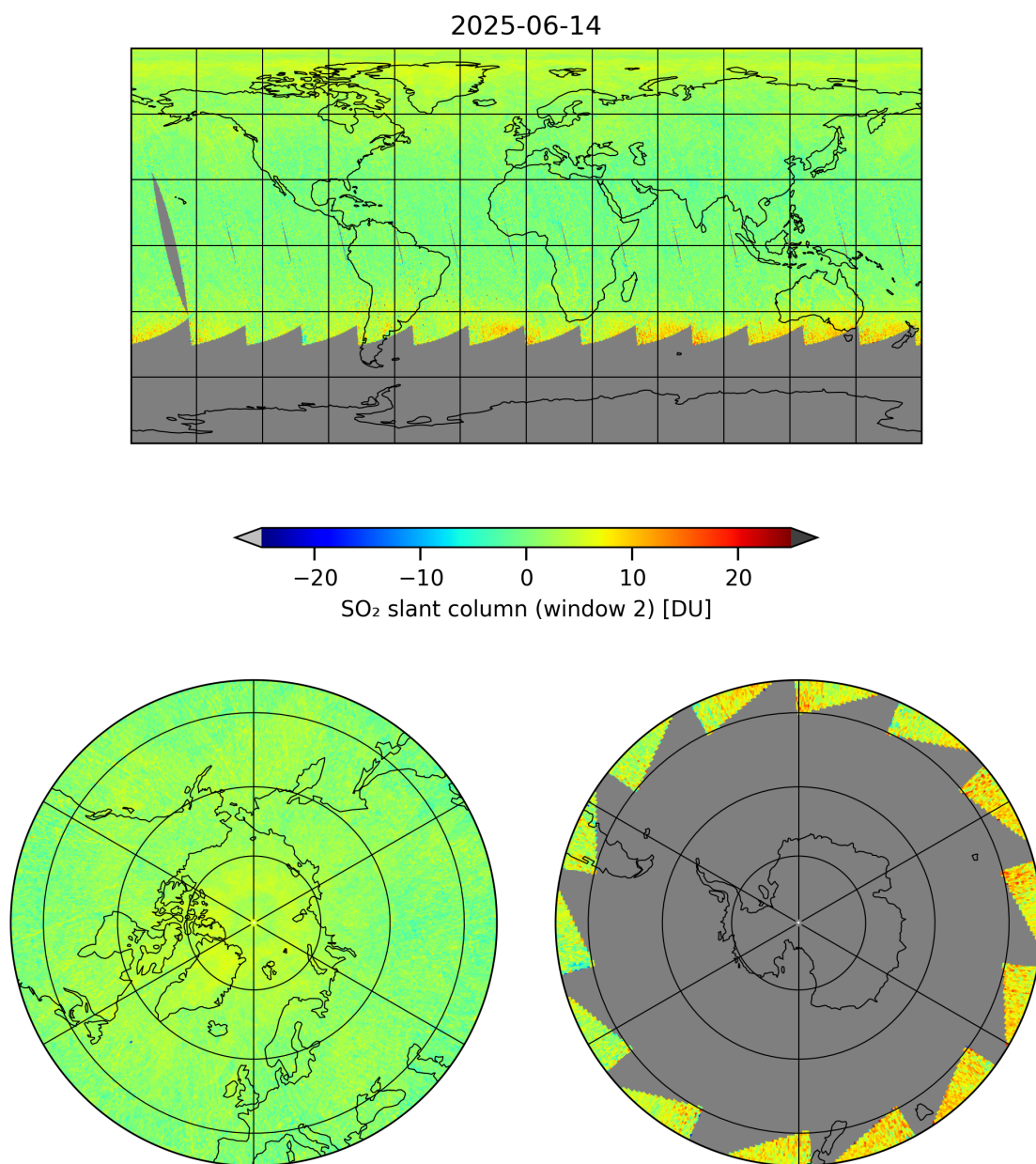


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-06-14 to 2025-06-14

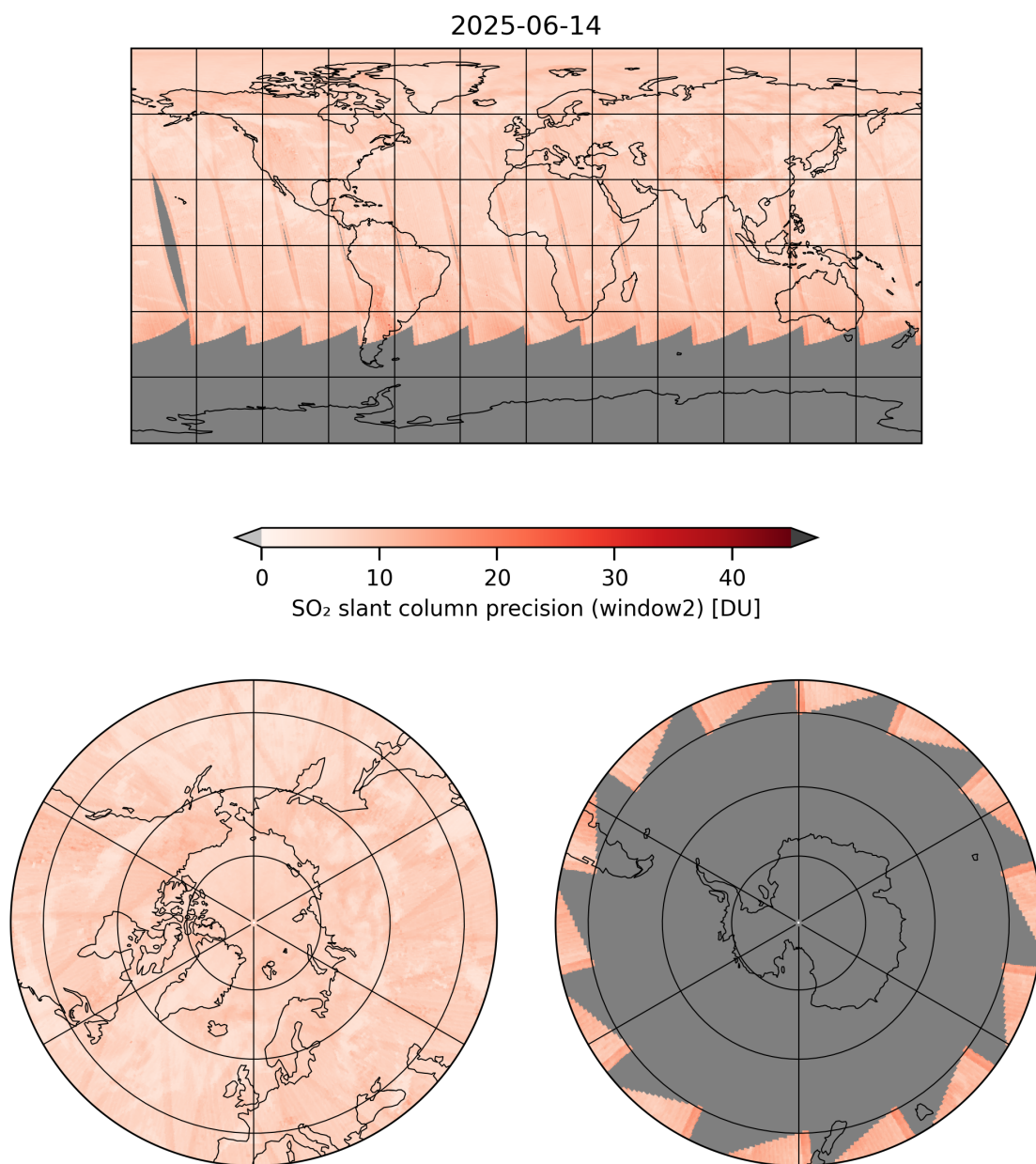


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-06-14 to 2025-06-14

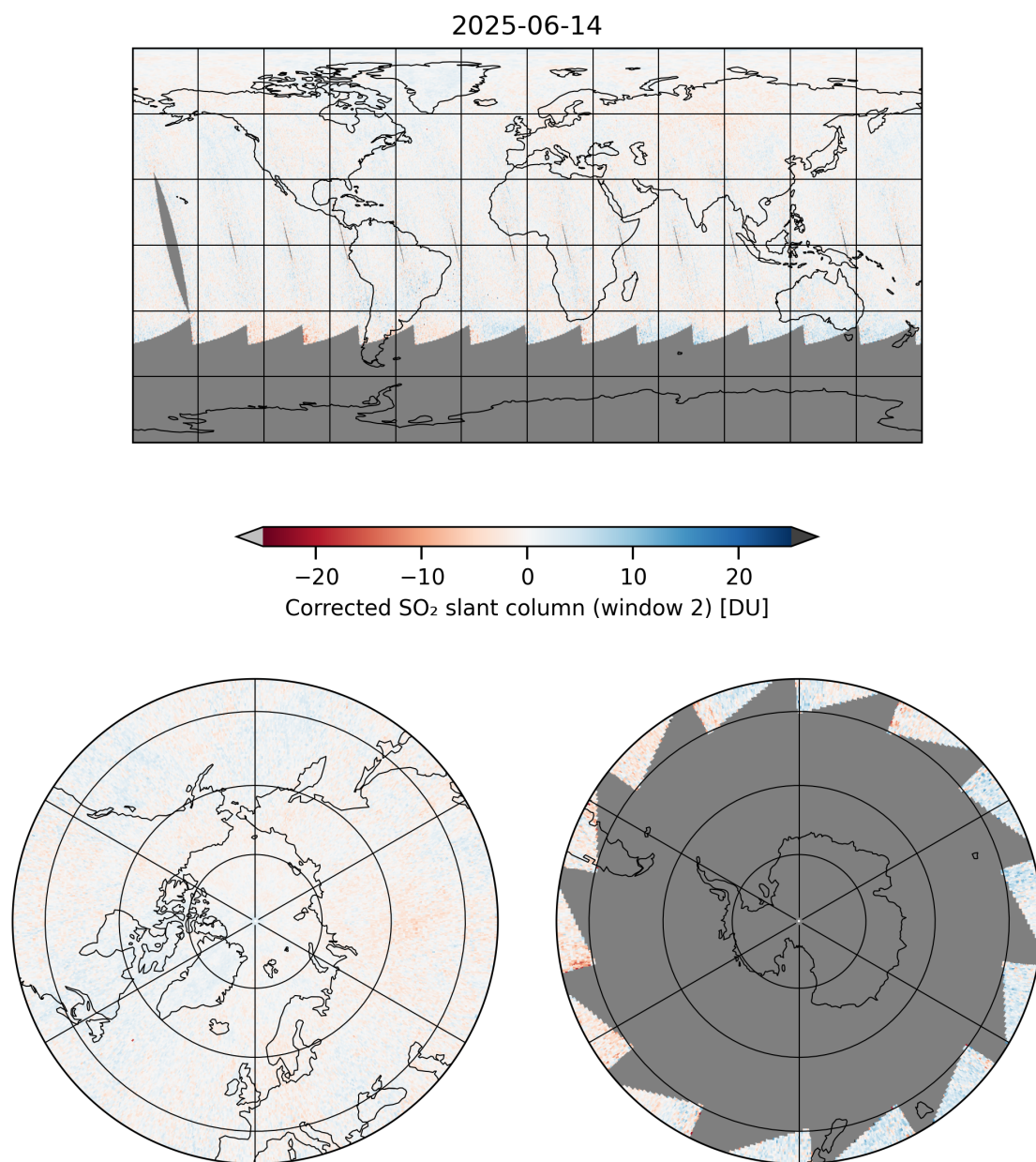


Figure 15: Map of "Corrected SO₂ slant column (window 2)" for 2025-06-14 to 2025-06-14

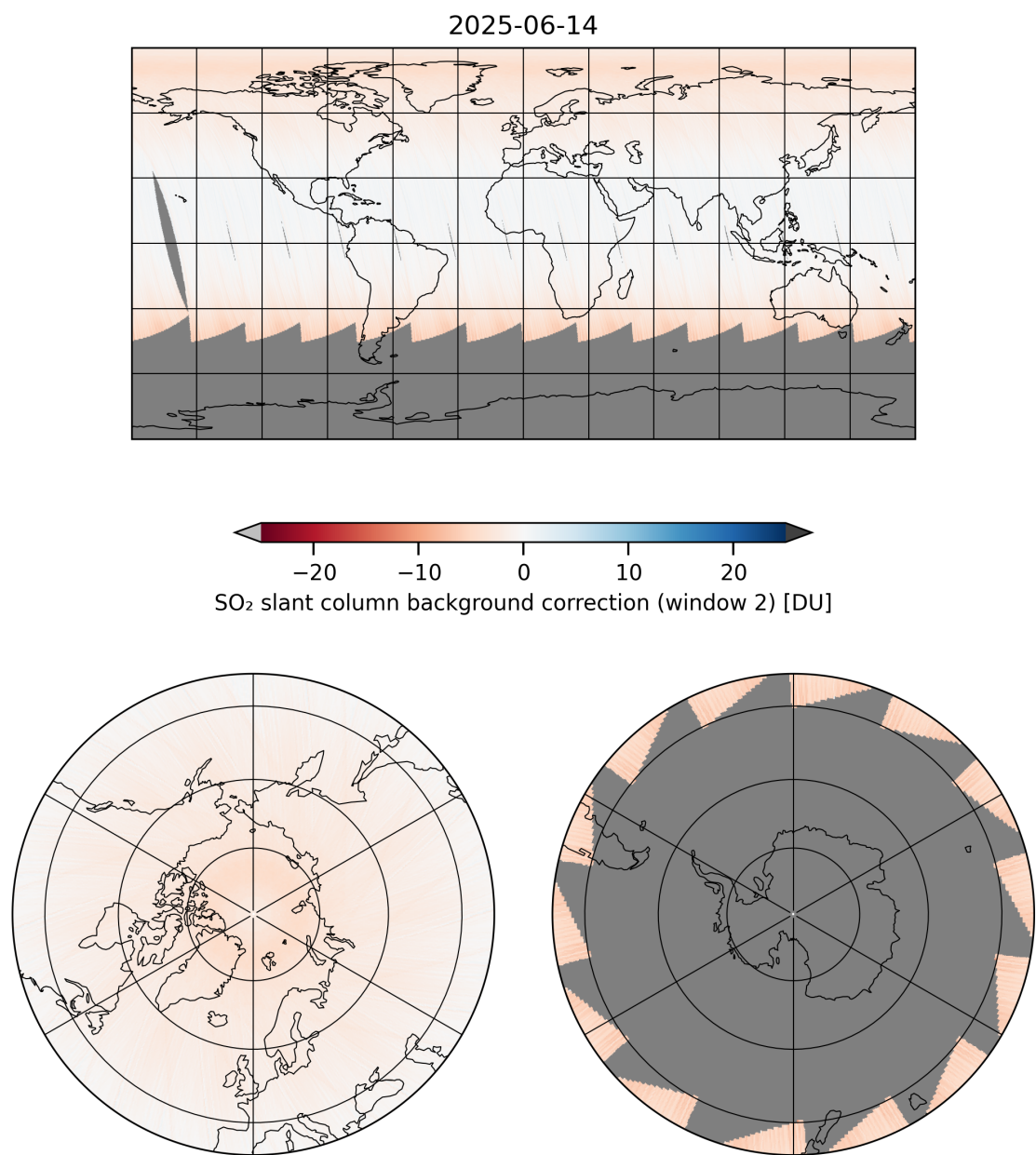


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-06-14 to 2025-06-14

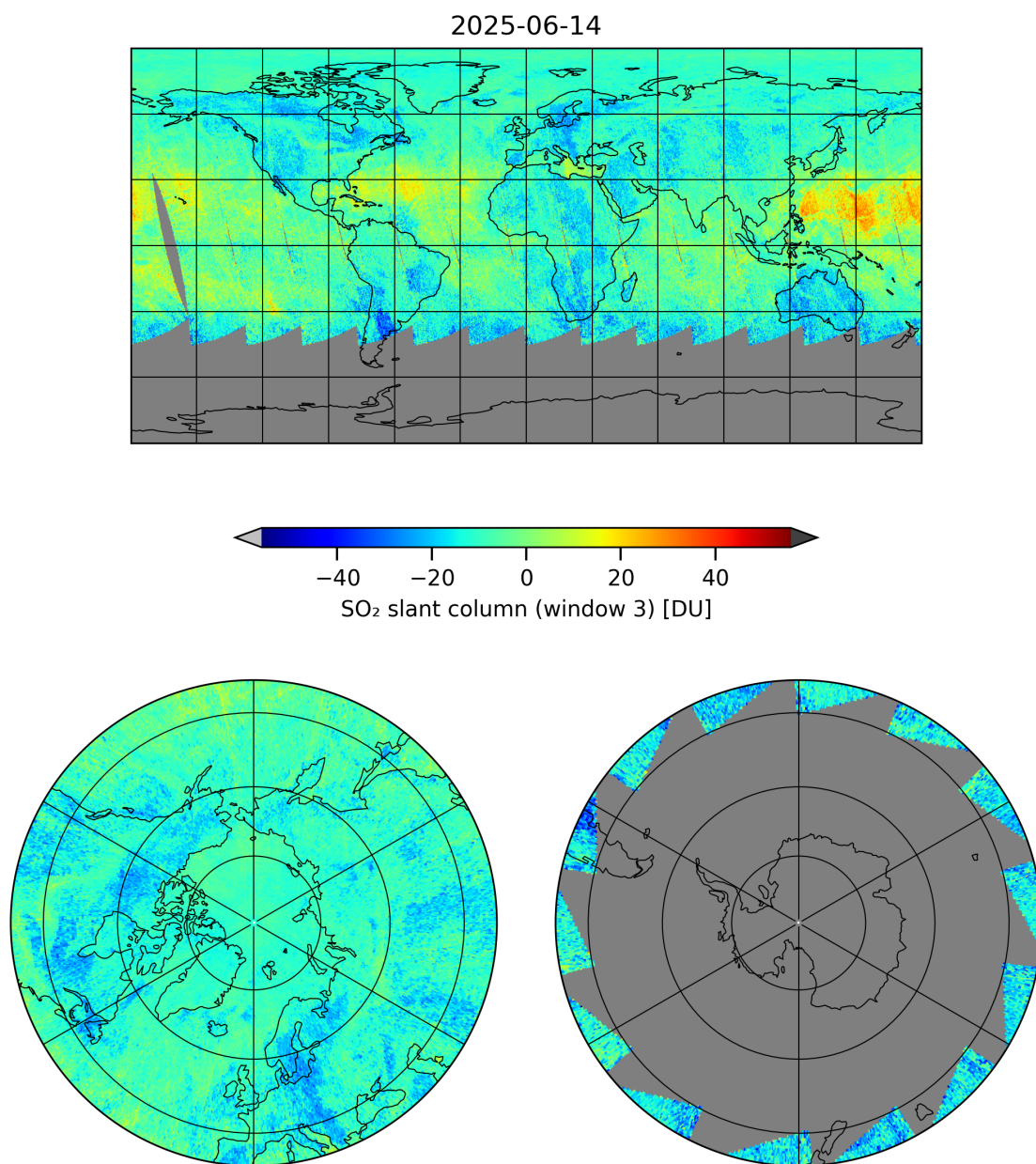


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-06-14 to 2025-06-14

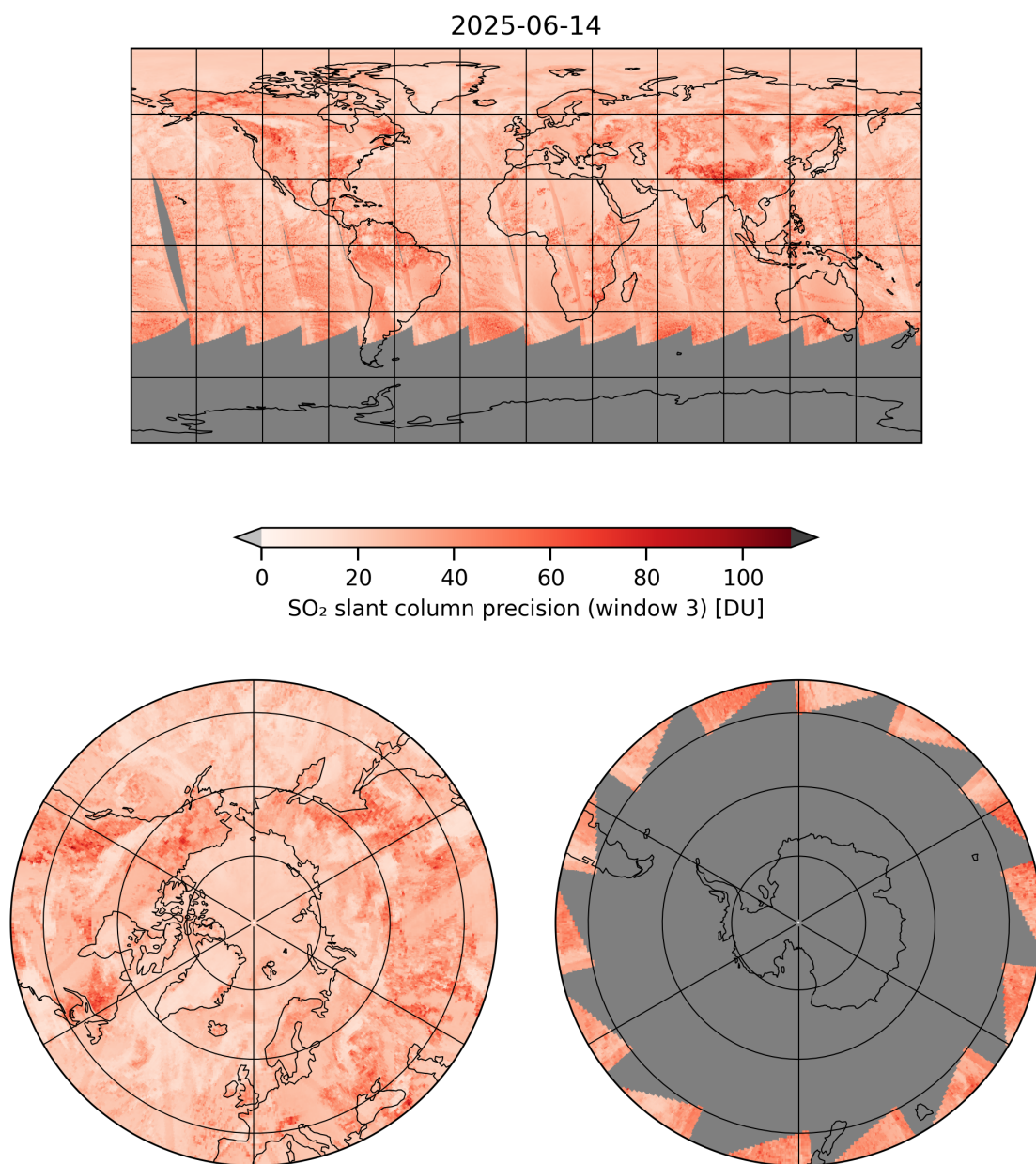


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-06-14 to 2025-06-14

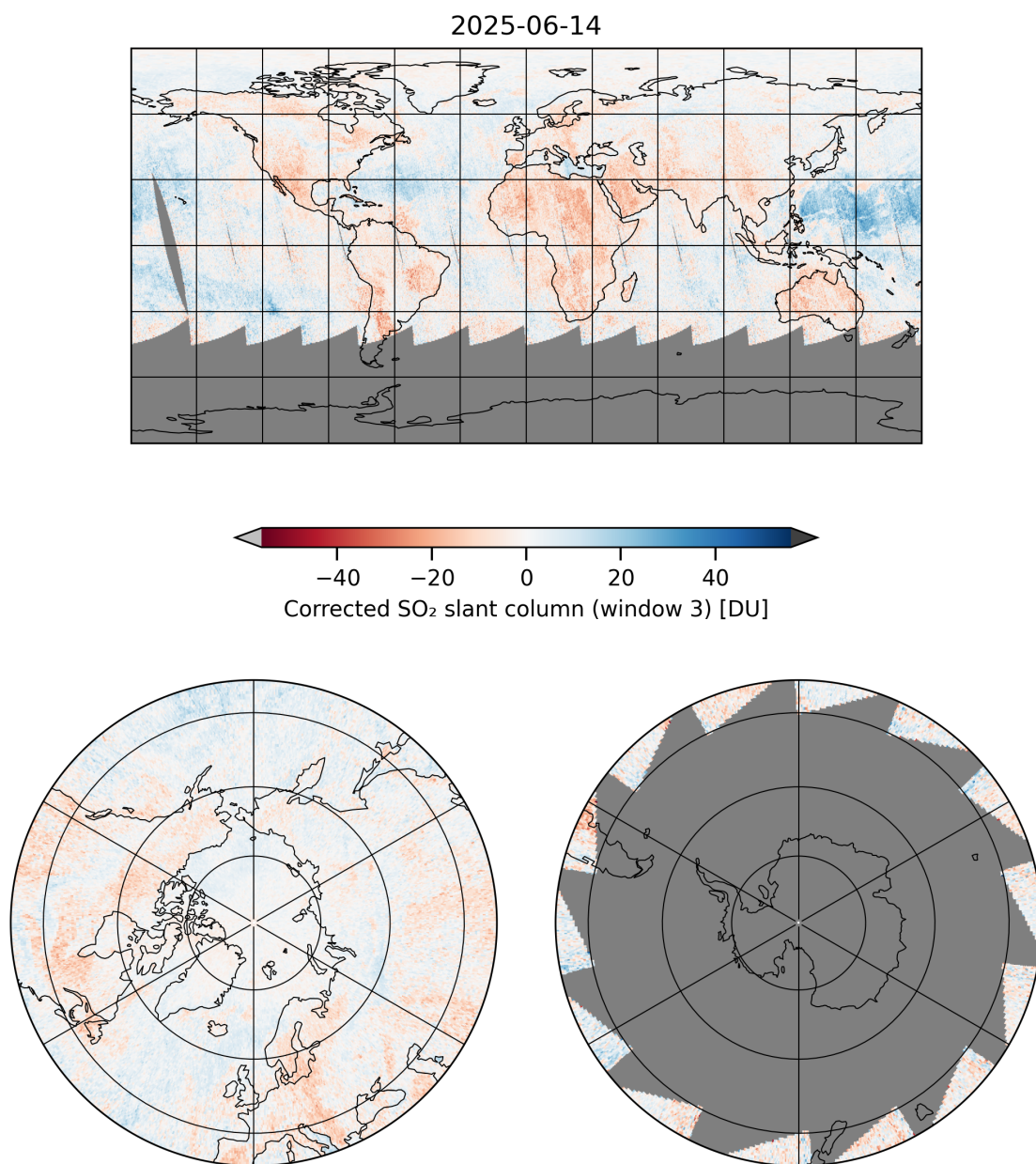


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-06-14 to 2025-06-14

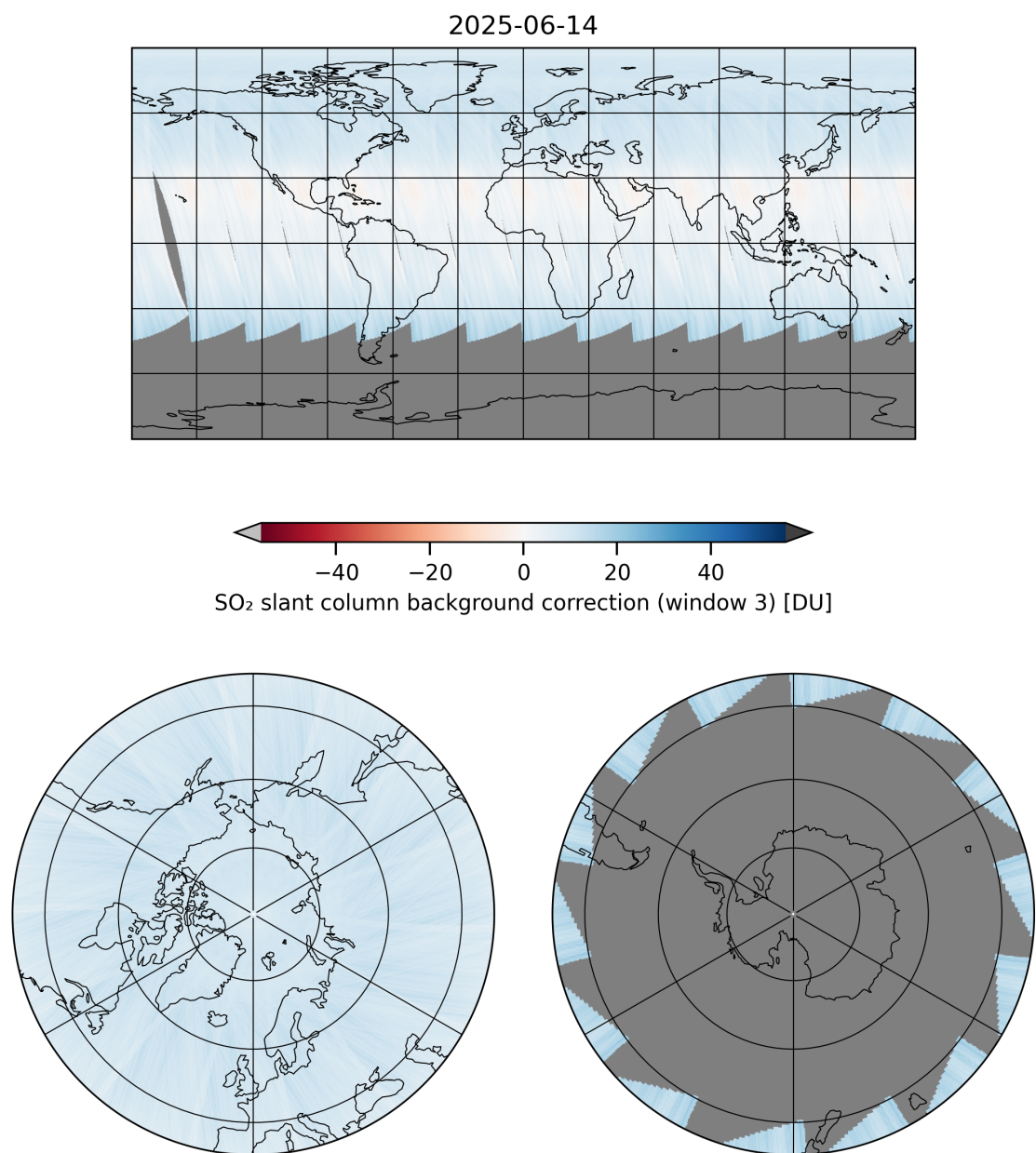


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-06-14 to 2025-06-14

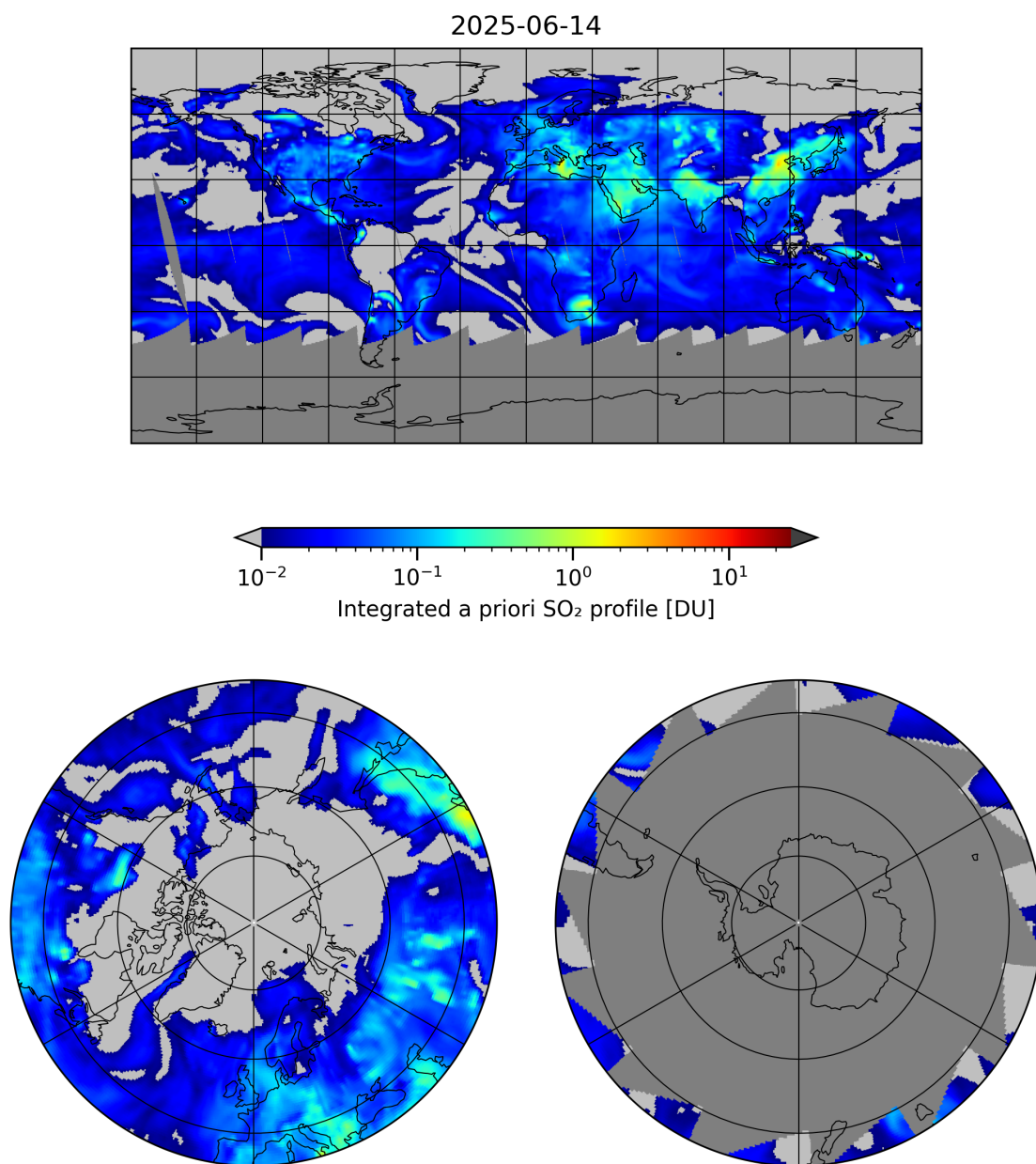


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-06-14 to 2025-06-14

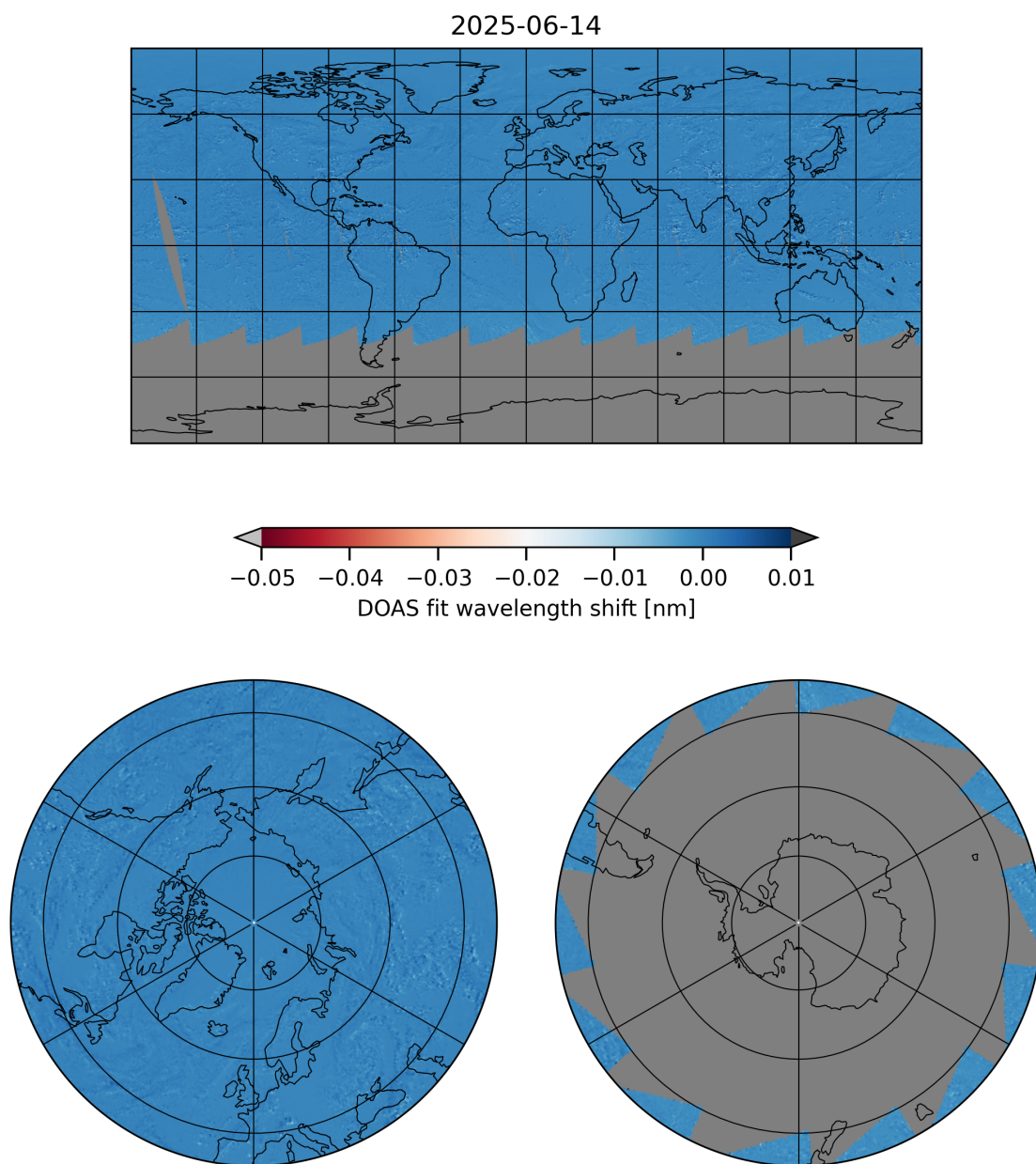


Figure 22: Map of “DOAS fit wavelength shift” for 2025-06-14 to 2025-06-14

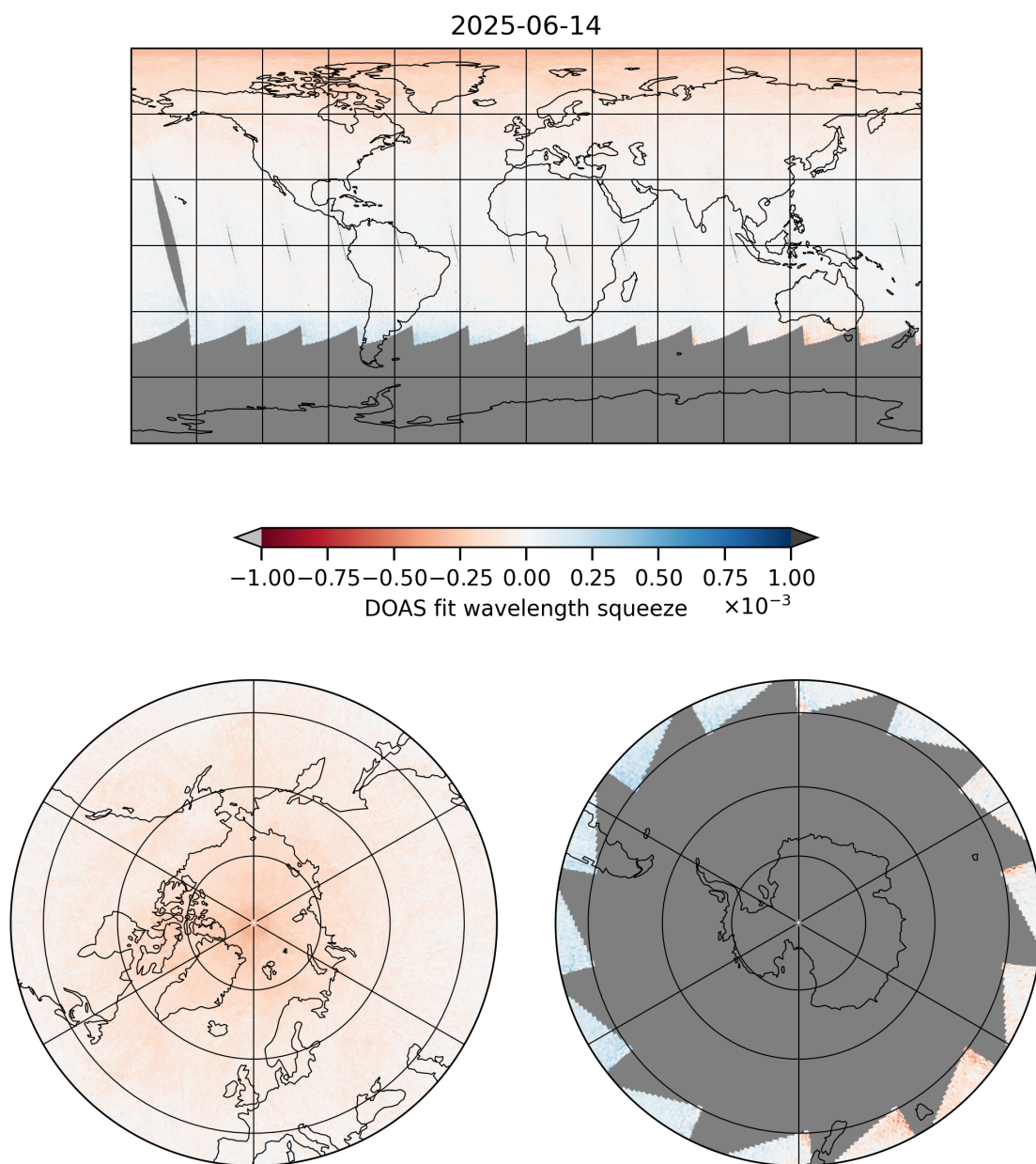


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-06-14 to 2025-06-14

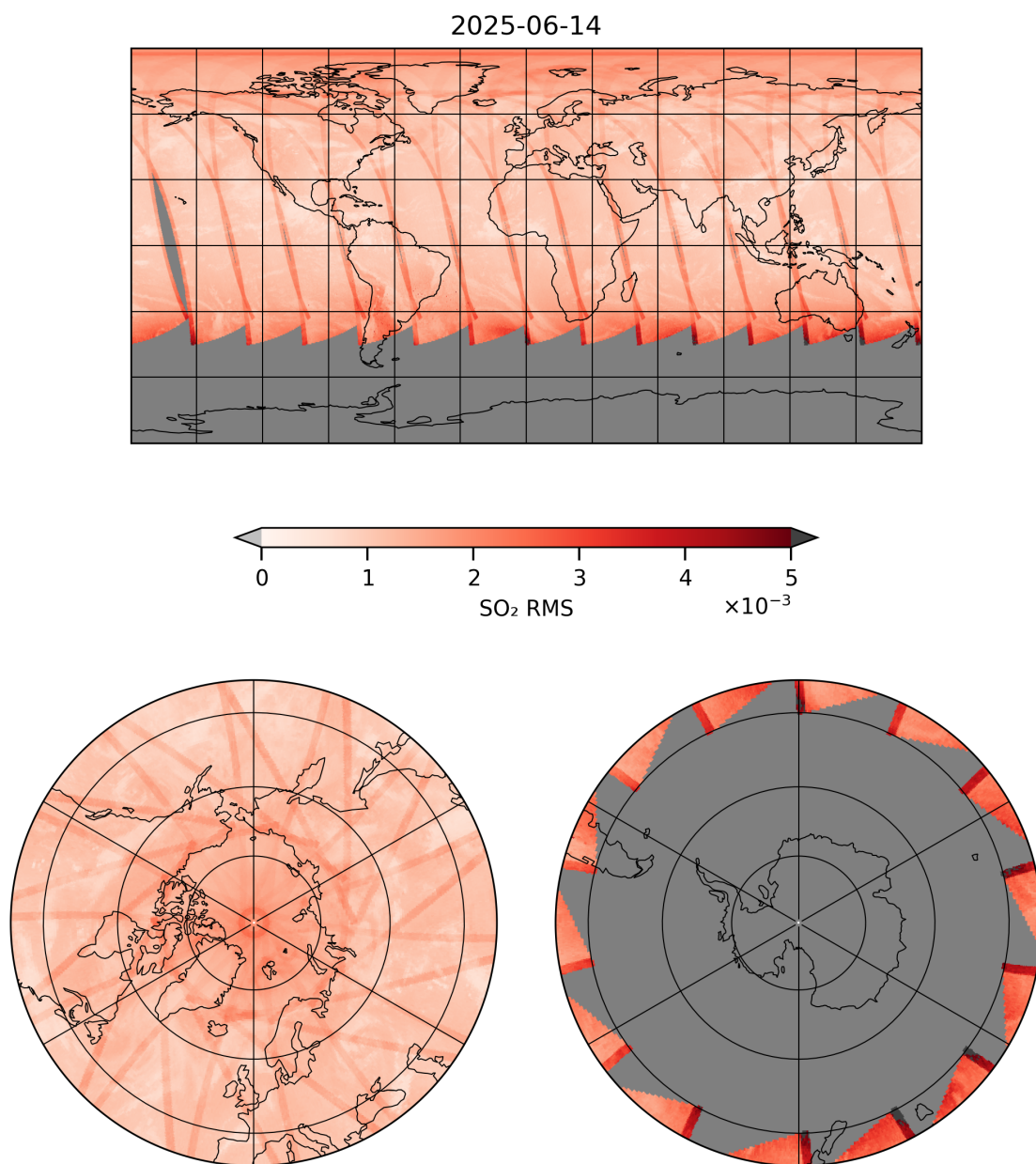


Figure 24: Map of “SO₂ RMS” for 2025-06-14 to 2025-06-14

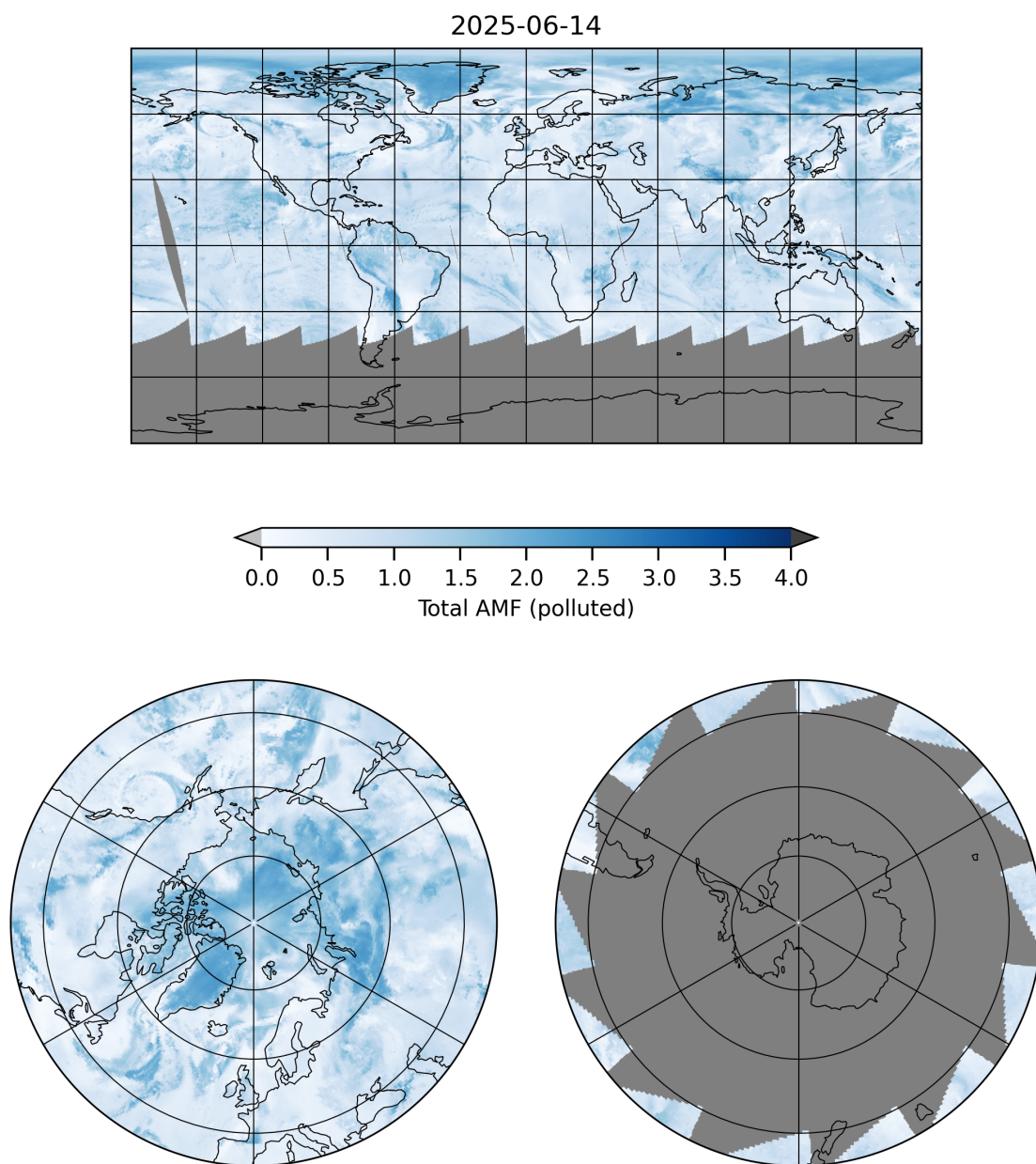


Figure 25: Map of “Total AMF (polluted)” for 2025-06-14 to 2025-06-14

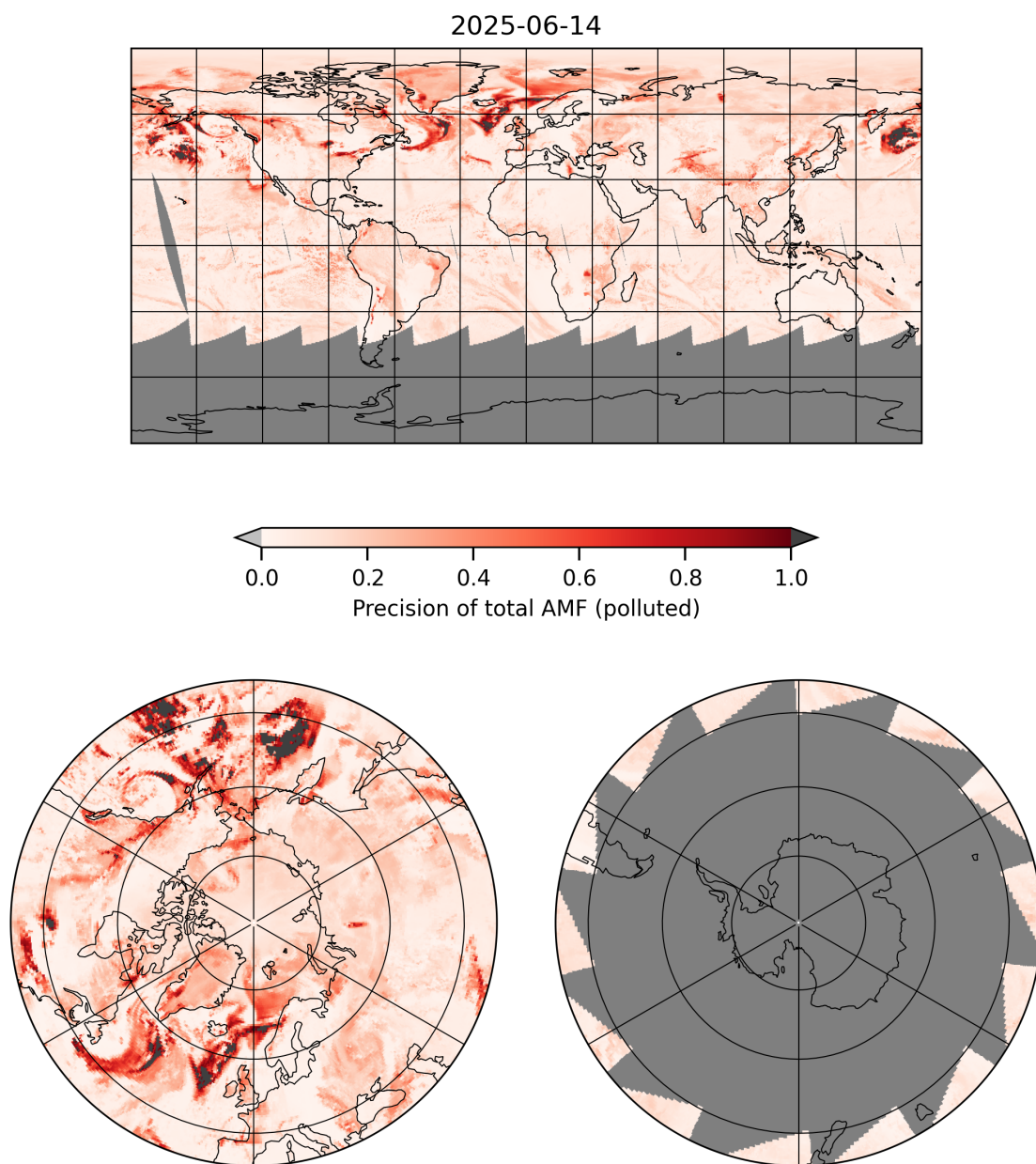


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-06-14 to 2025-06-14

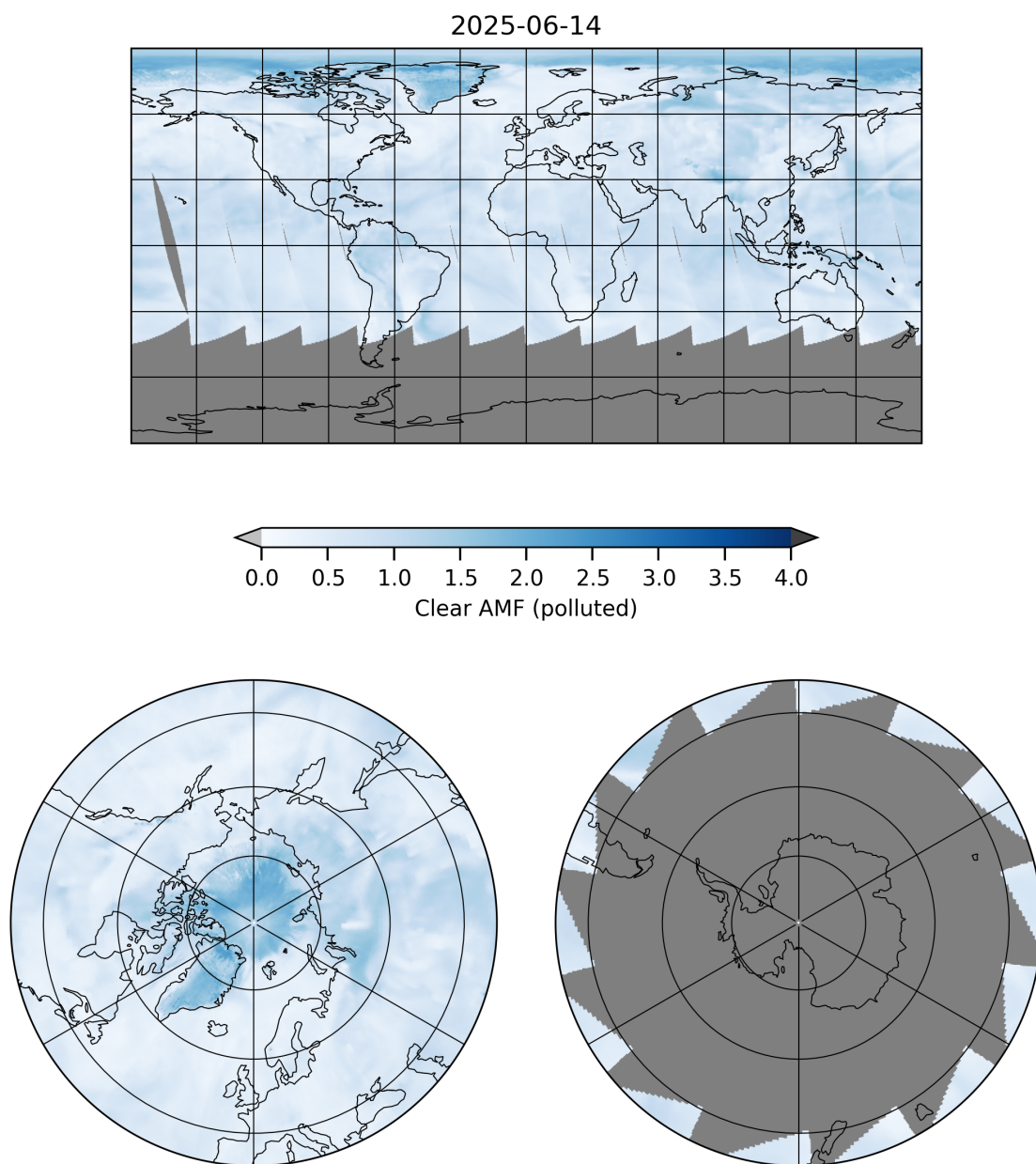


Figure 27: Map of “Clear AMF (polluted)” for 2025-06-14 to 2025-06-14

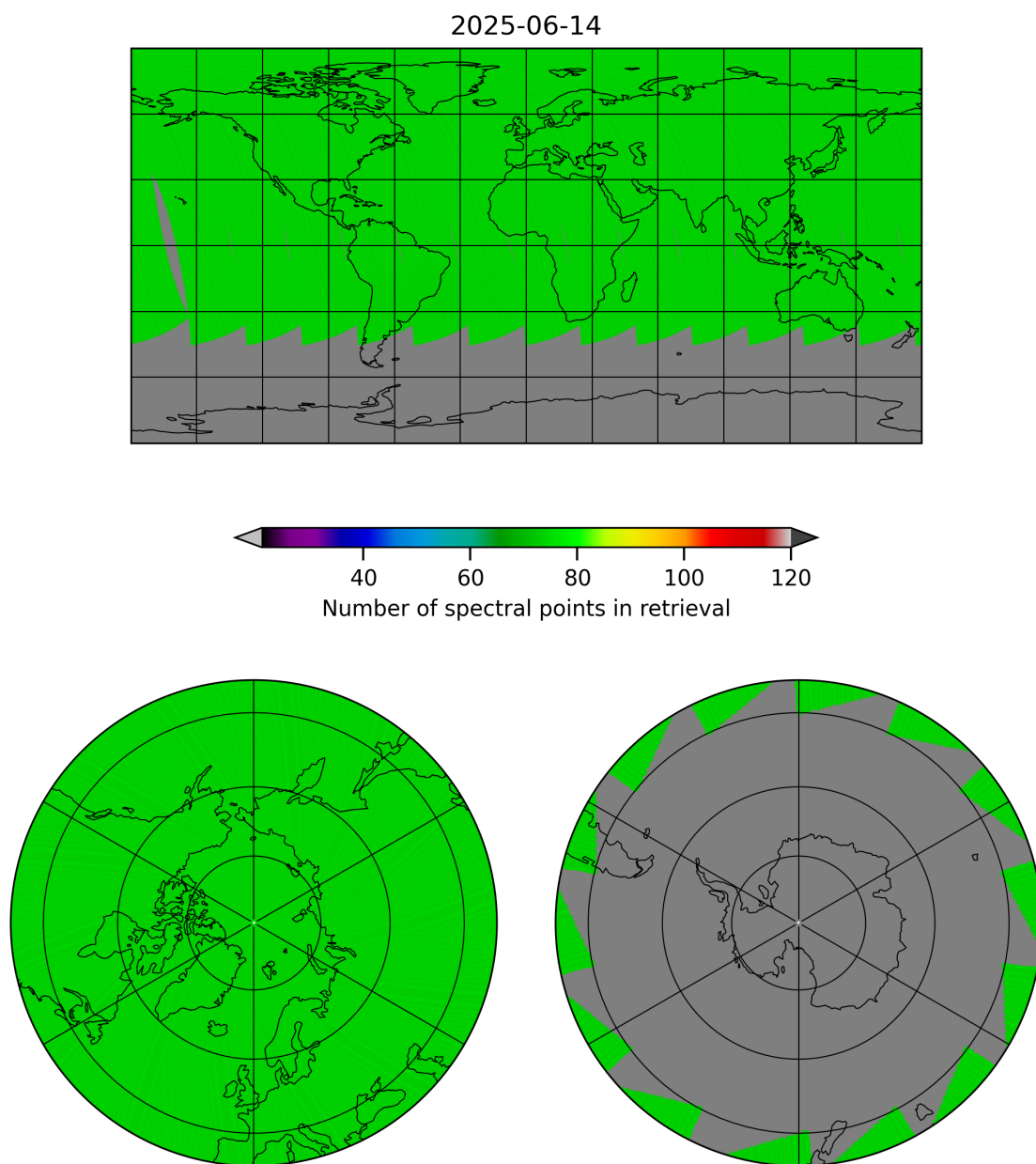


Figure 28: Map of “Number of spectral points in retrieval” for 2025-06-14 to 2025-06-14

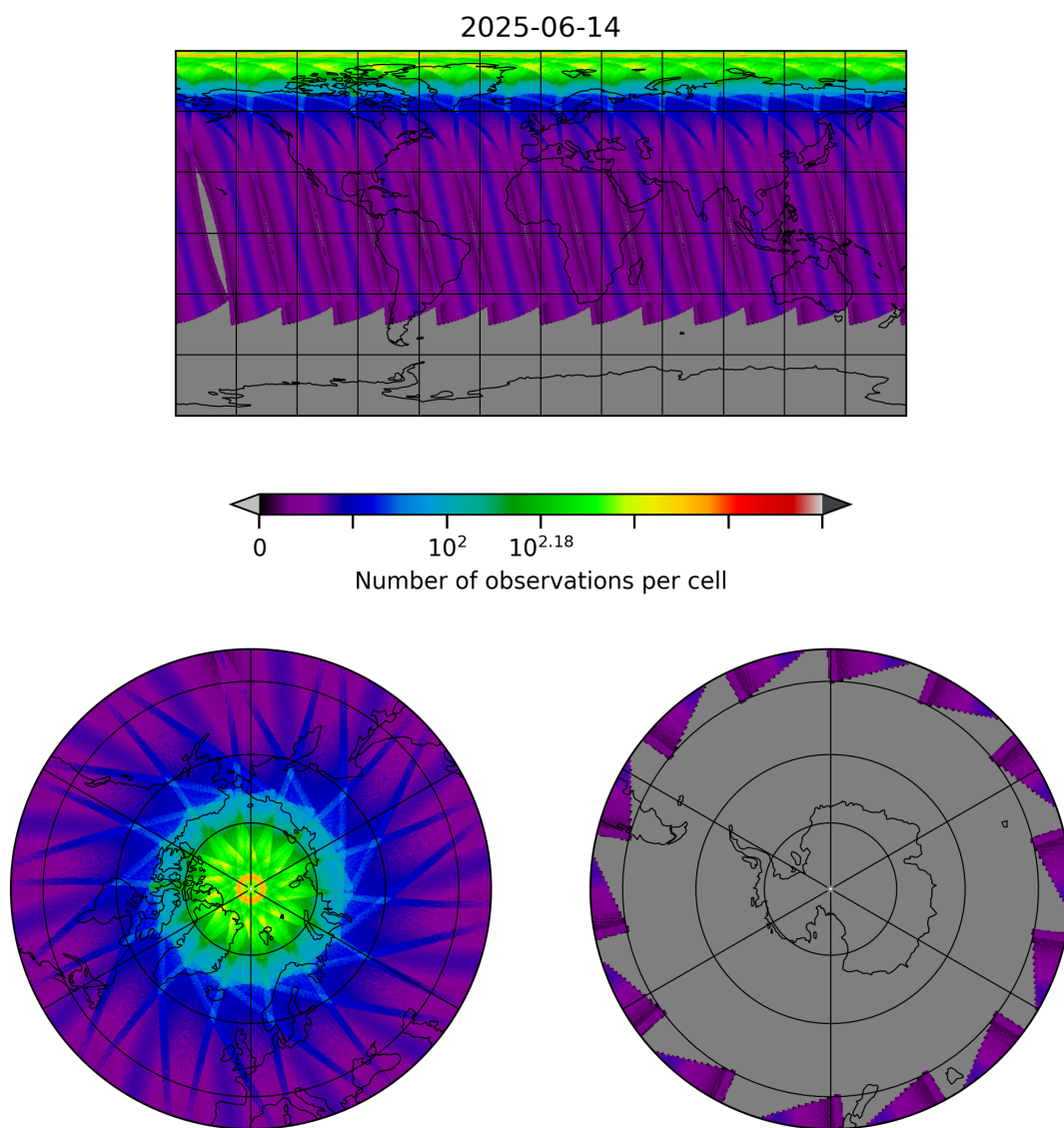


Figure 29: Map of the number of observations for 2025-06-14 to 2025-06-14

7 Zonal average

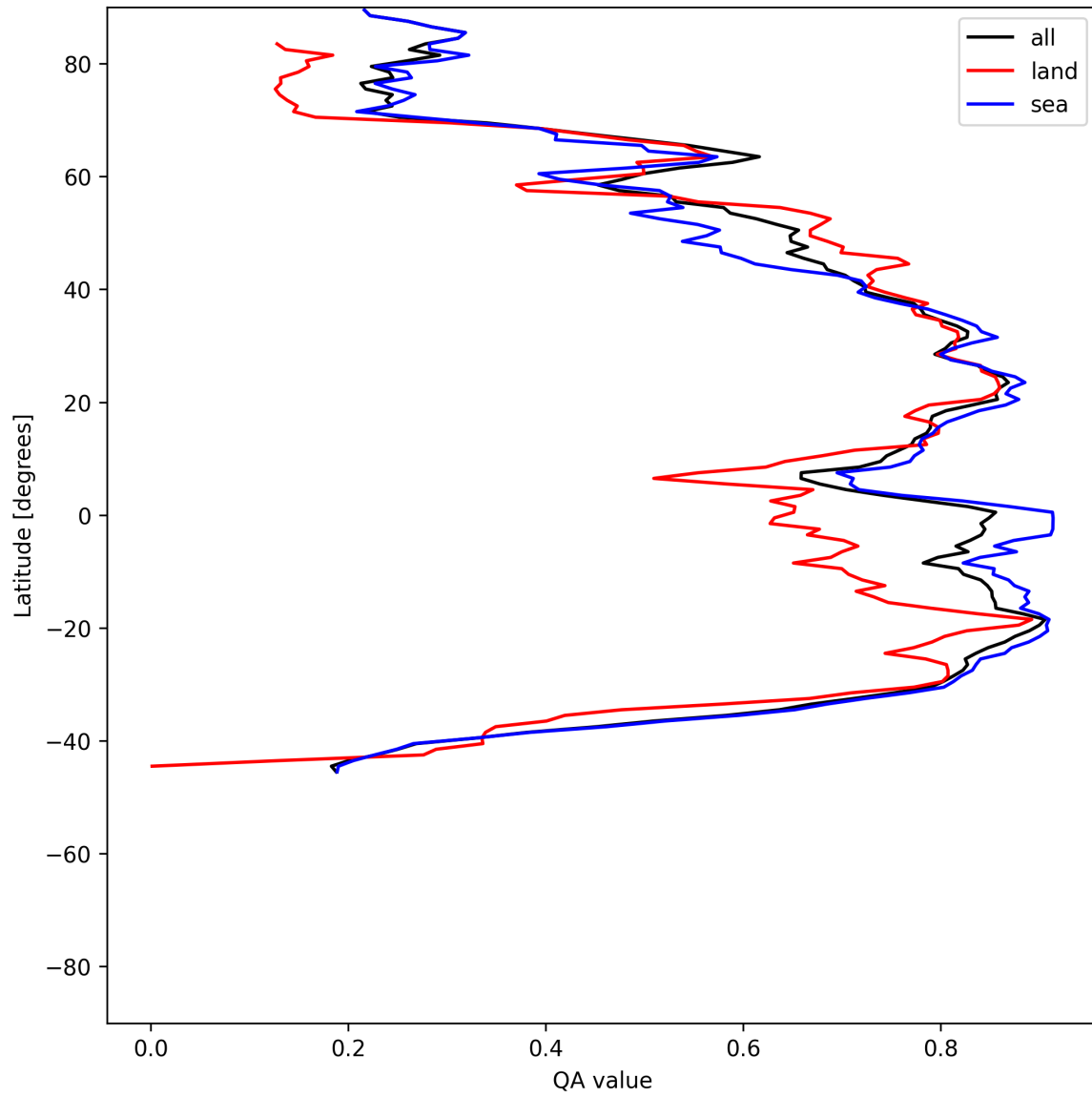


Figure 30: Zonal average of “QA value” for 2025-06-14 to 2025-06-14.

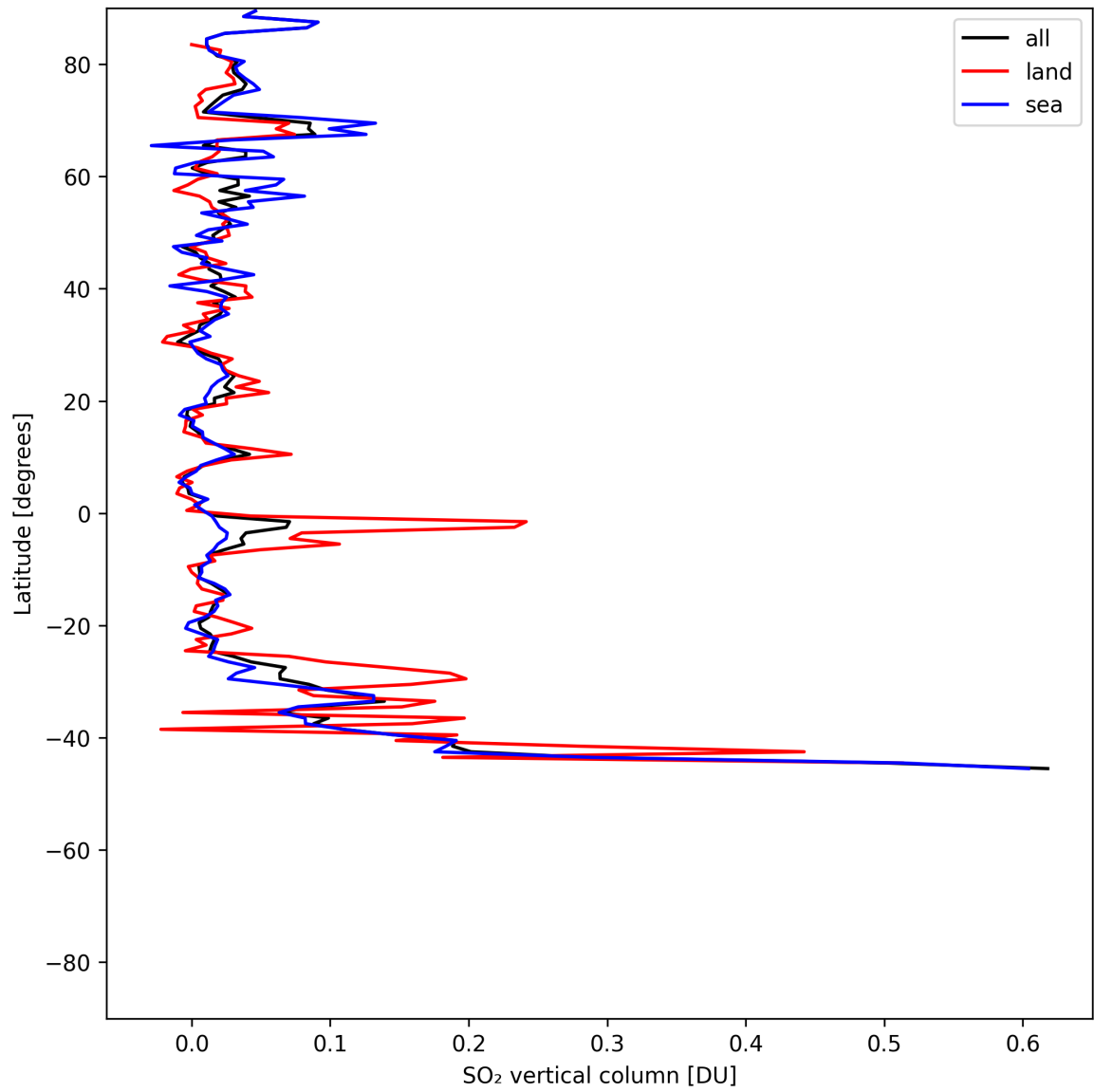


Figure 31: Zonal average of “SO₂ vertical column” for 2025-06-14 to 2025-06-14.

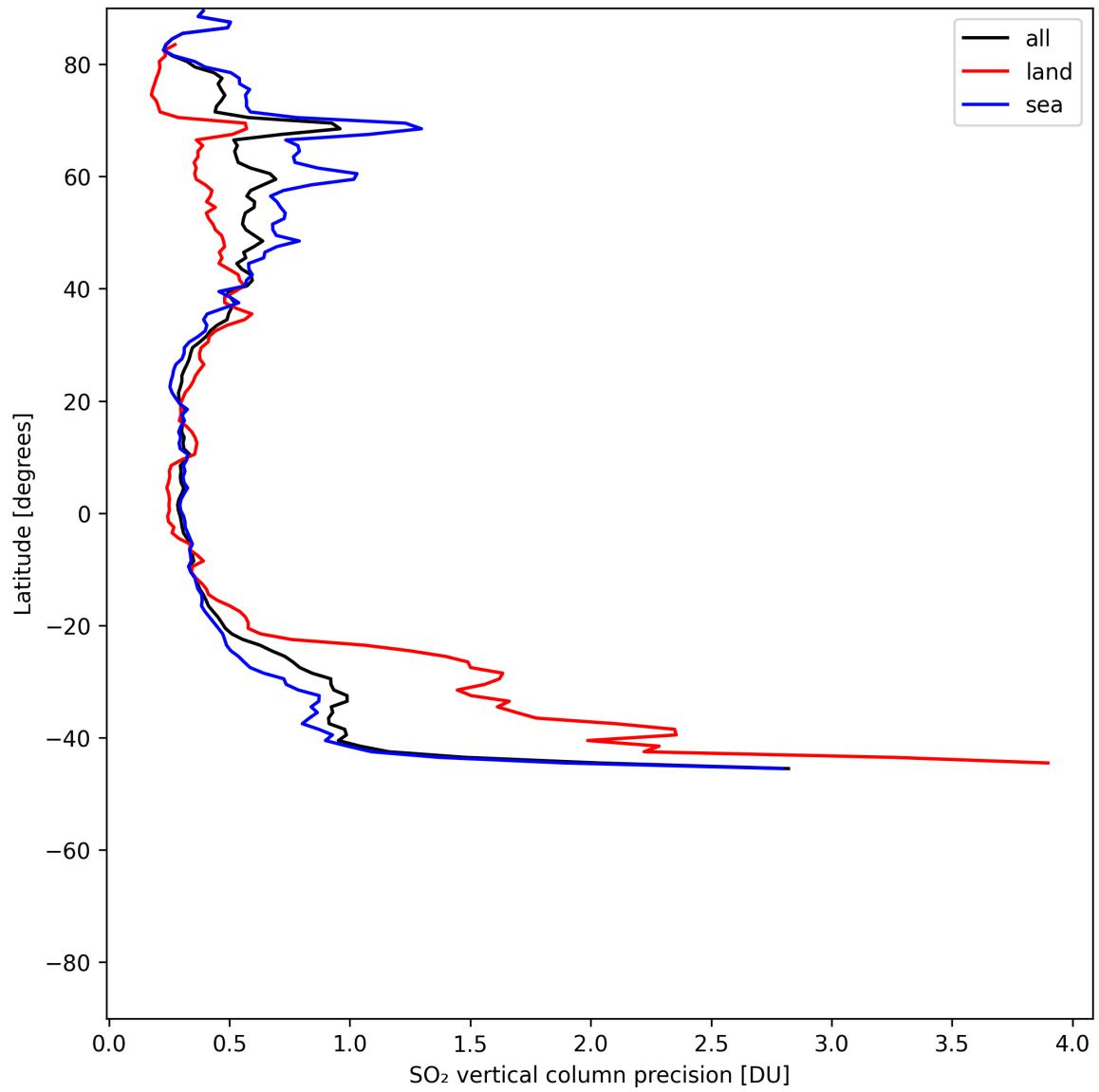


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-06-14 to 2025-06-14.

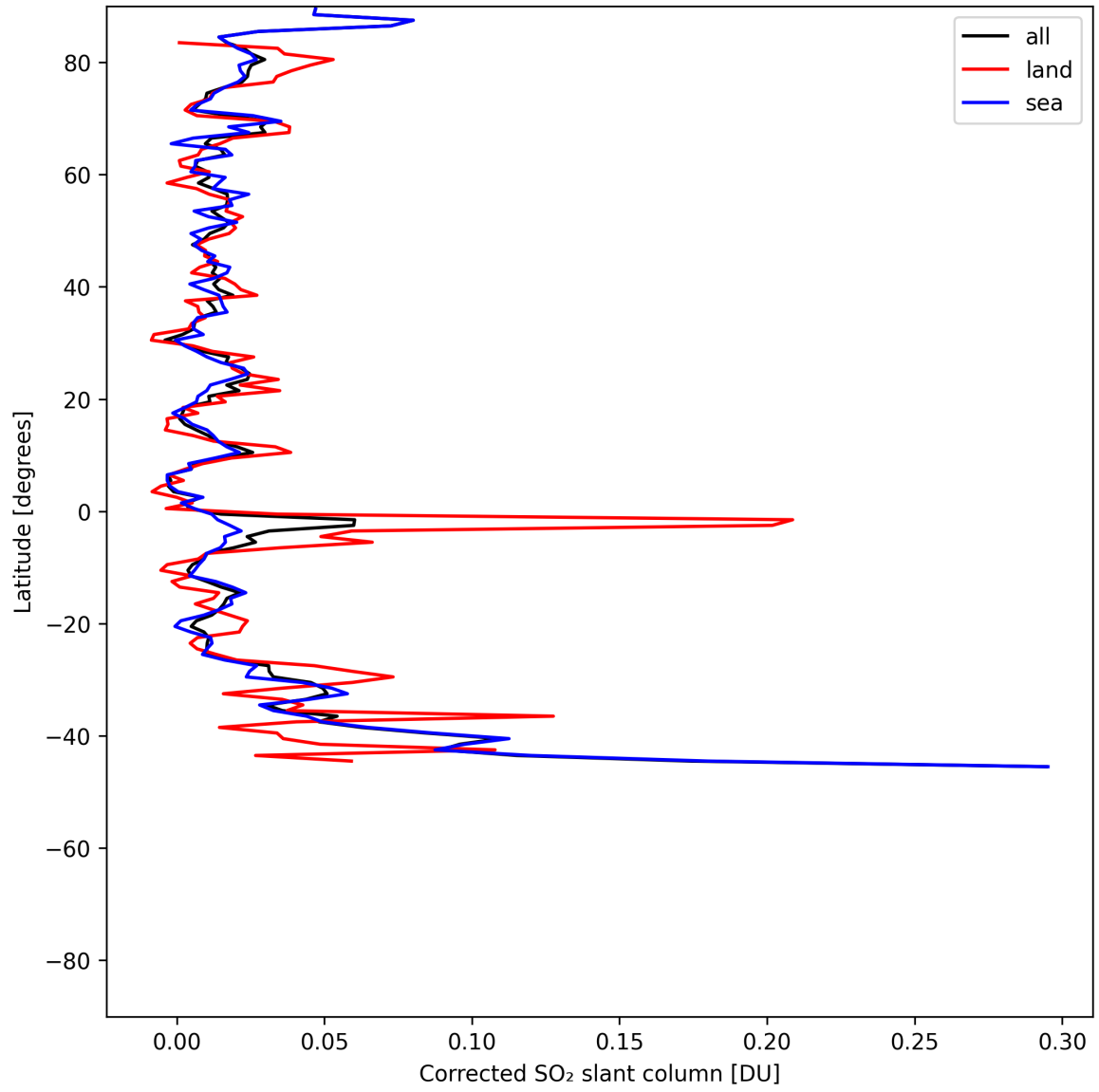


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-06-14 to 2025-06-14.

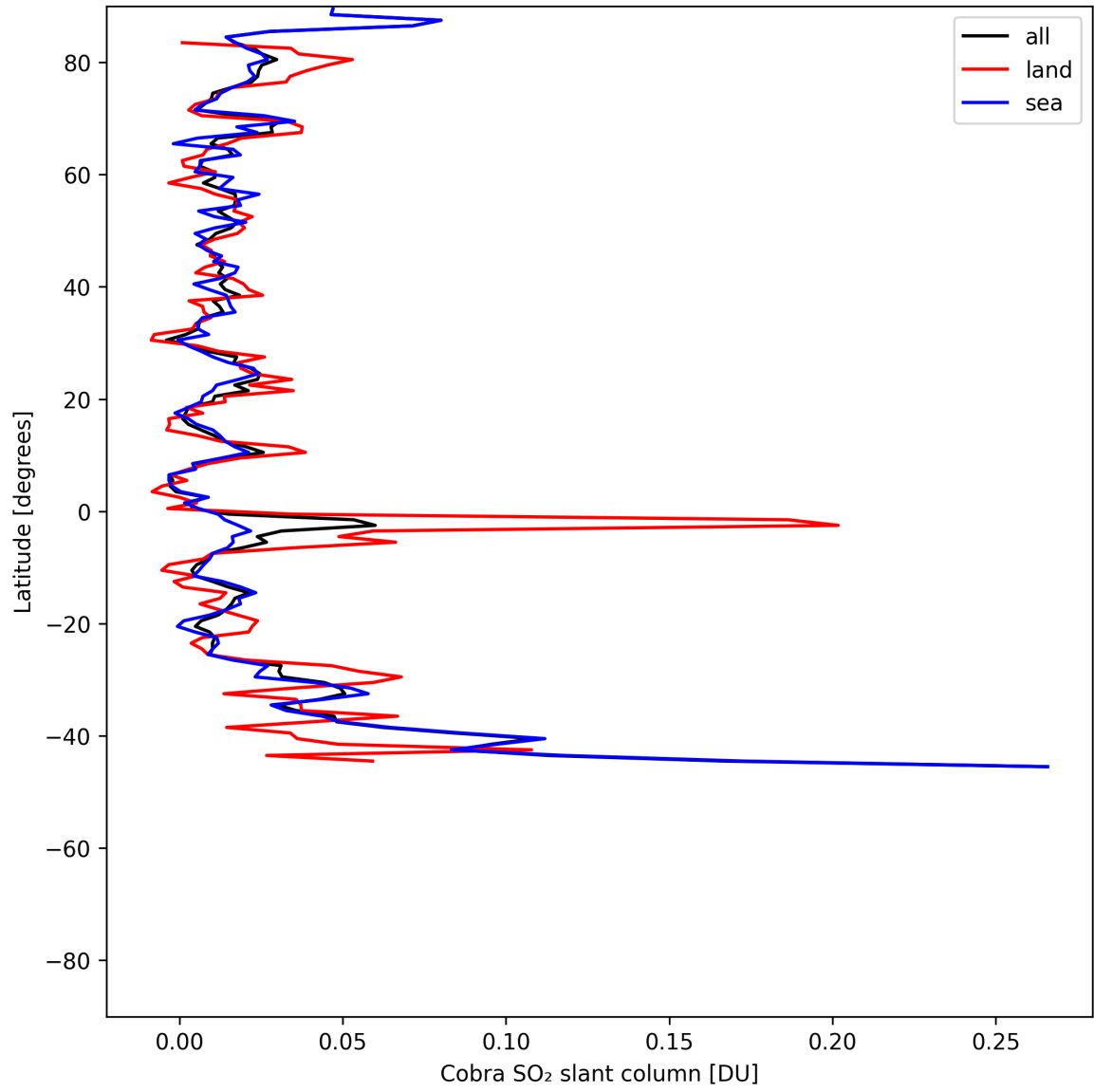


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-06-14 to 2025-06-14.

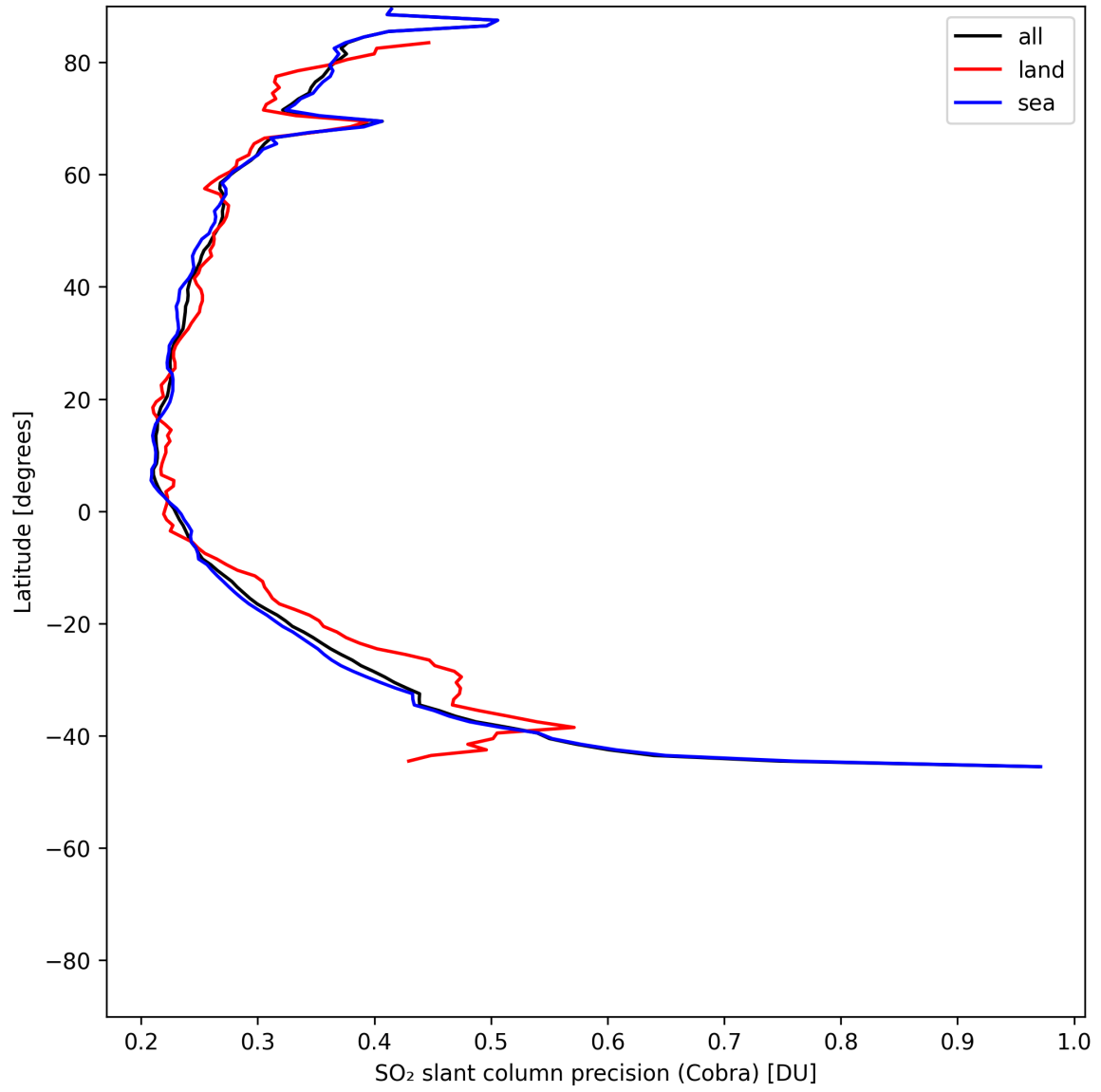


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-06-14 to 2025-06-14.

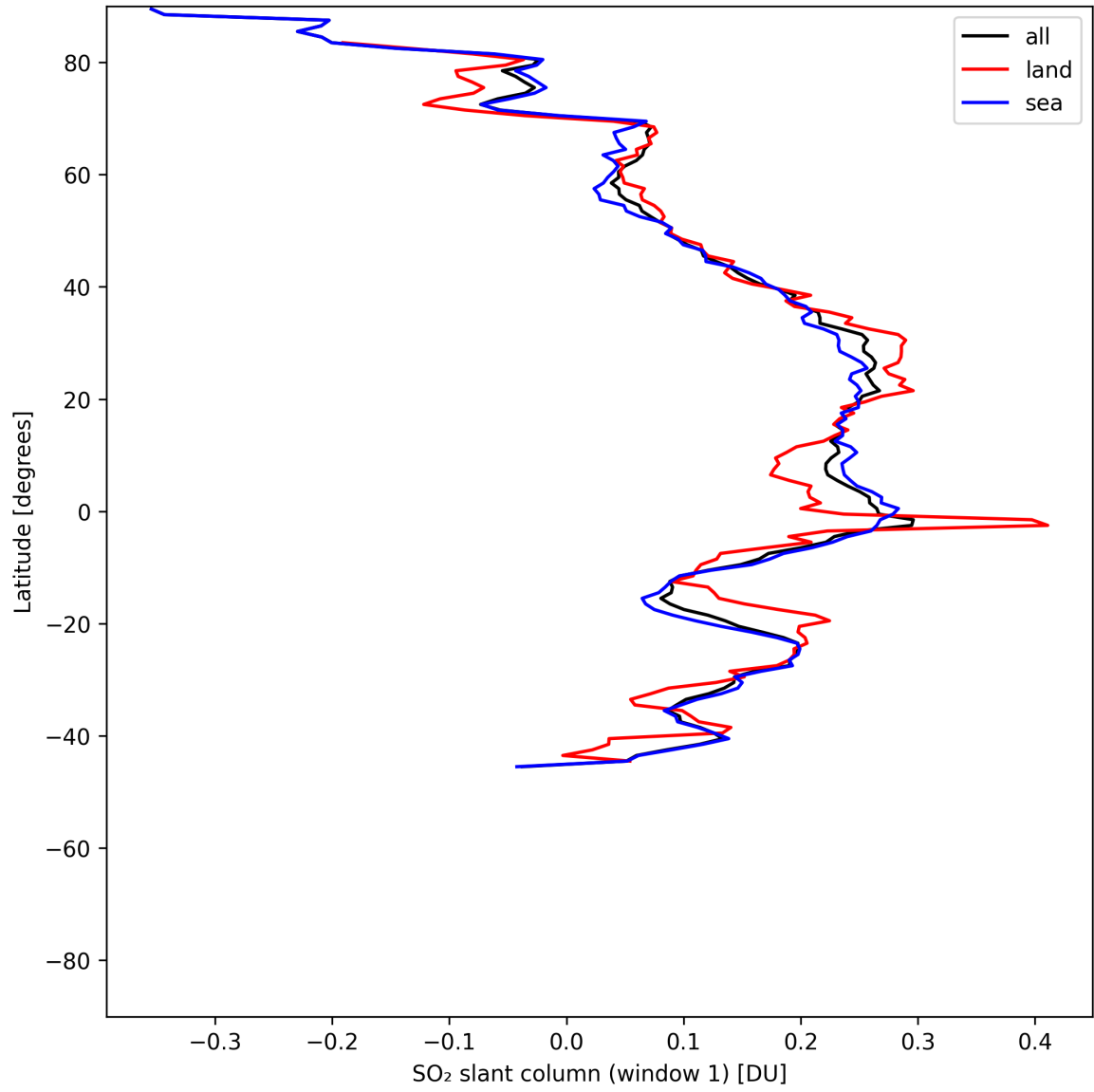


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-06-14 to 2025-06-14.

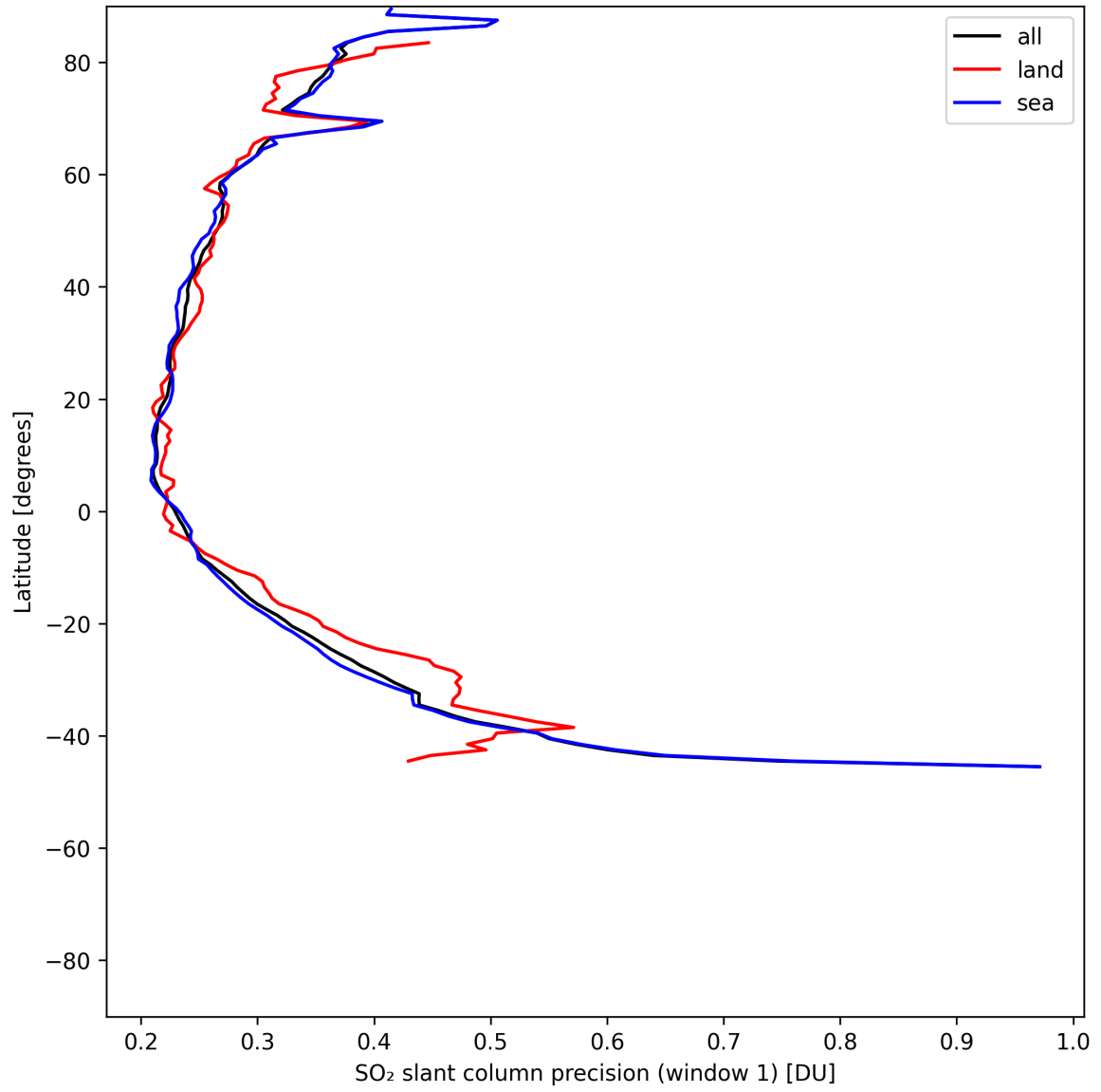


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-06-14 to 2025-06-14.

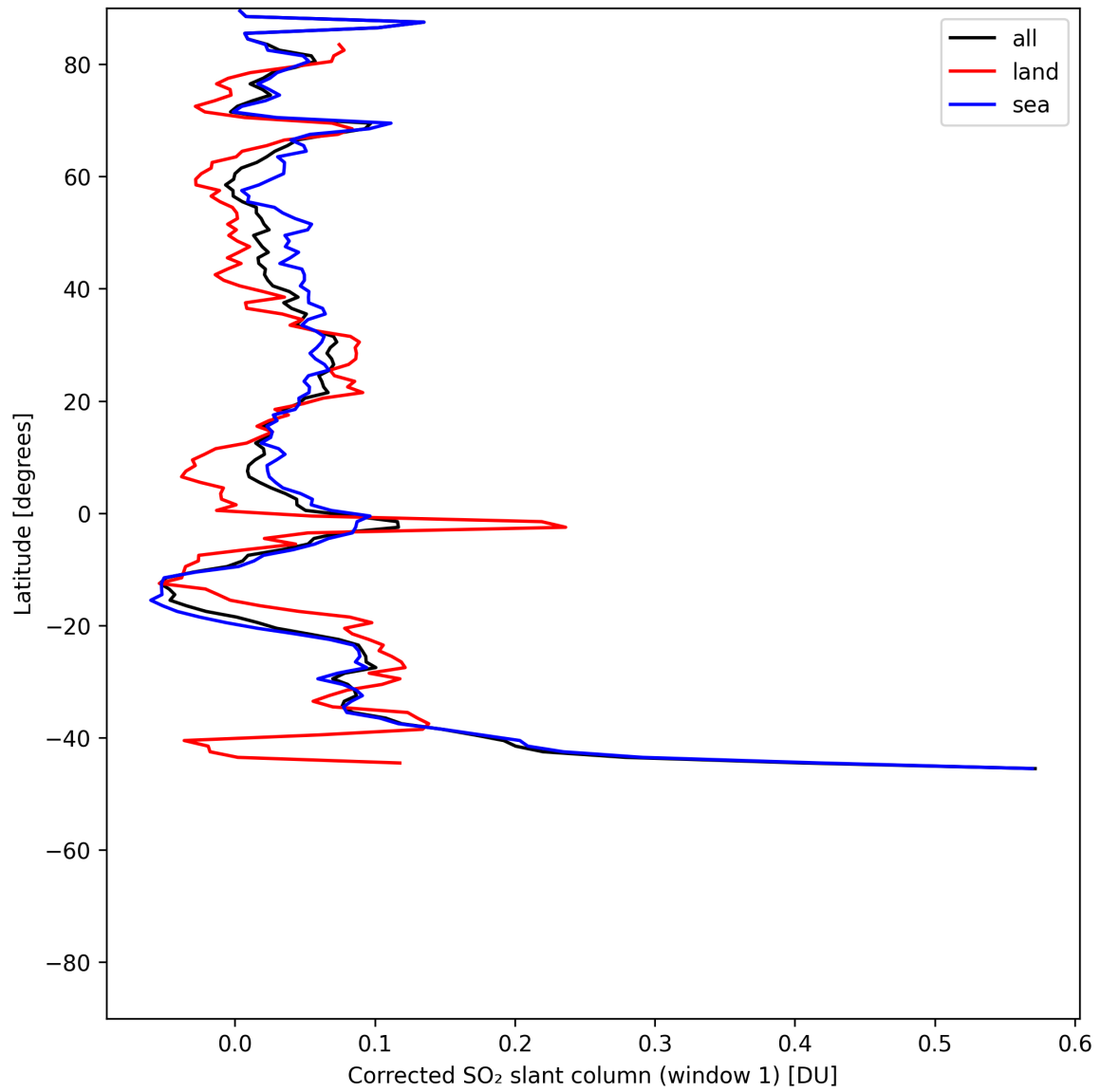


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-06-14 to 2025-06-14.

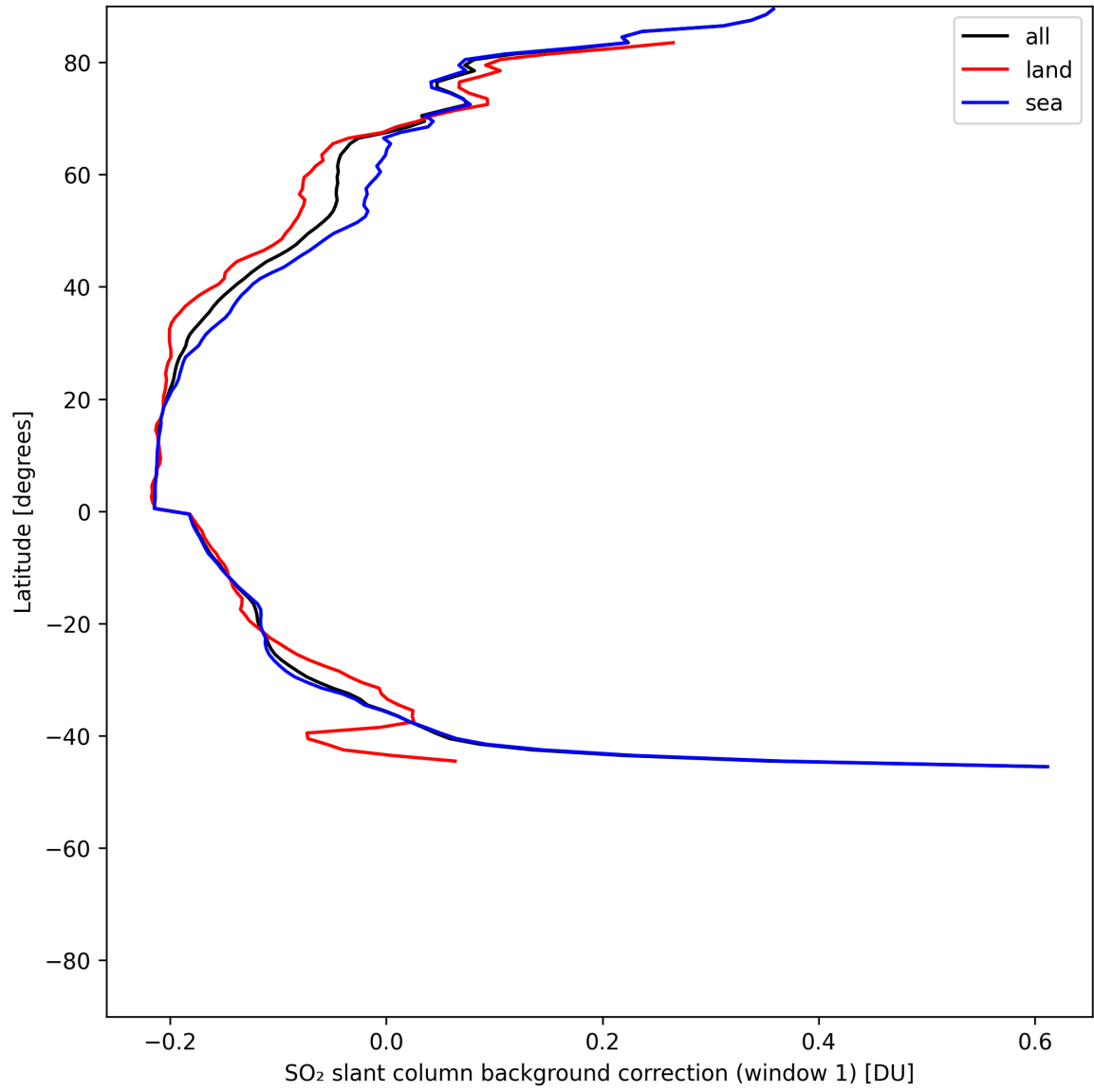


Figure 39: Zonal average of "SO₂ slant column background correction (window 1)" for 2025-06-14 to 2025-06-14.

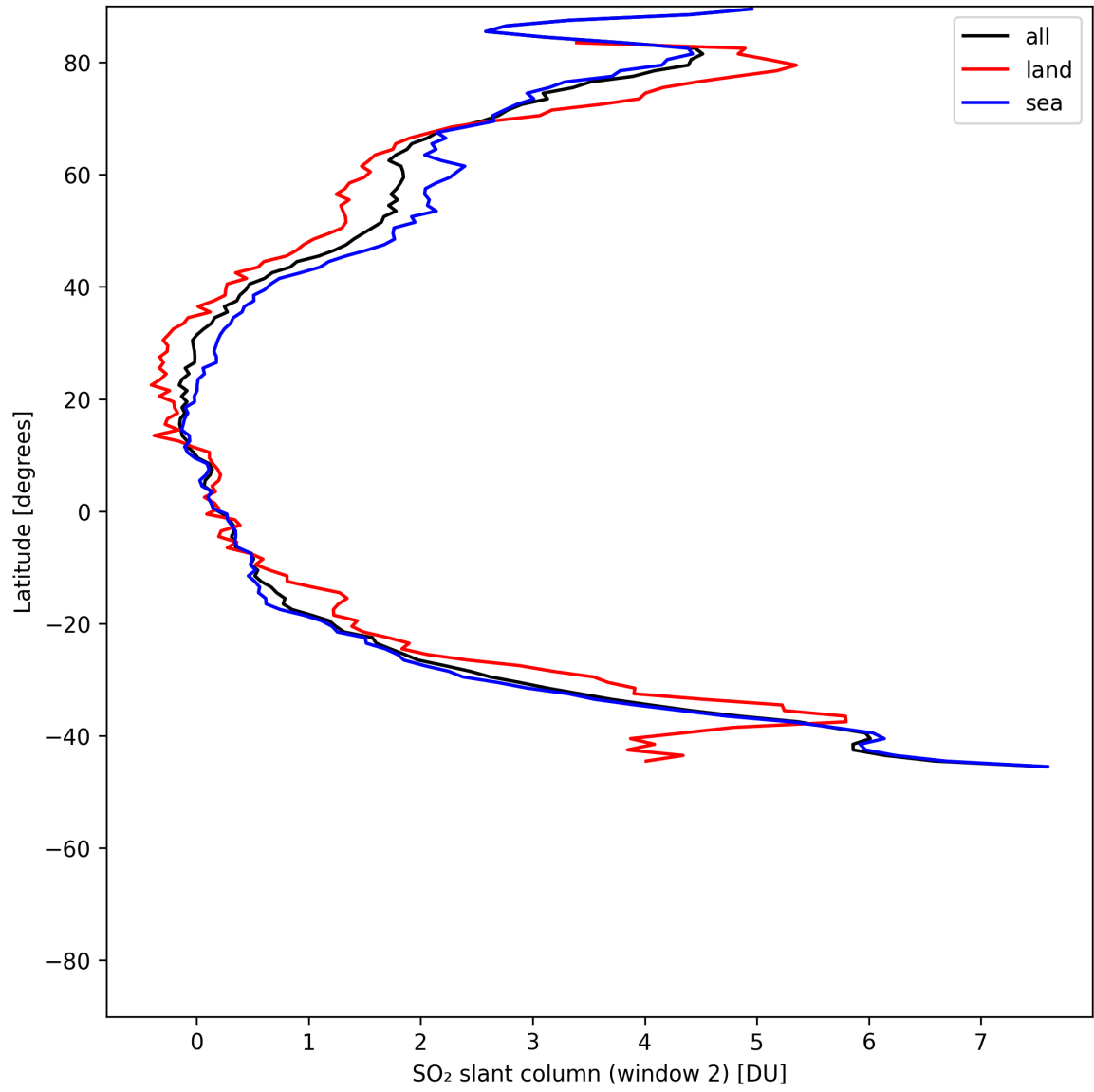


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-06-14 to 2025-06-14.

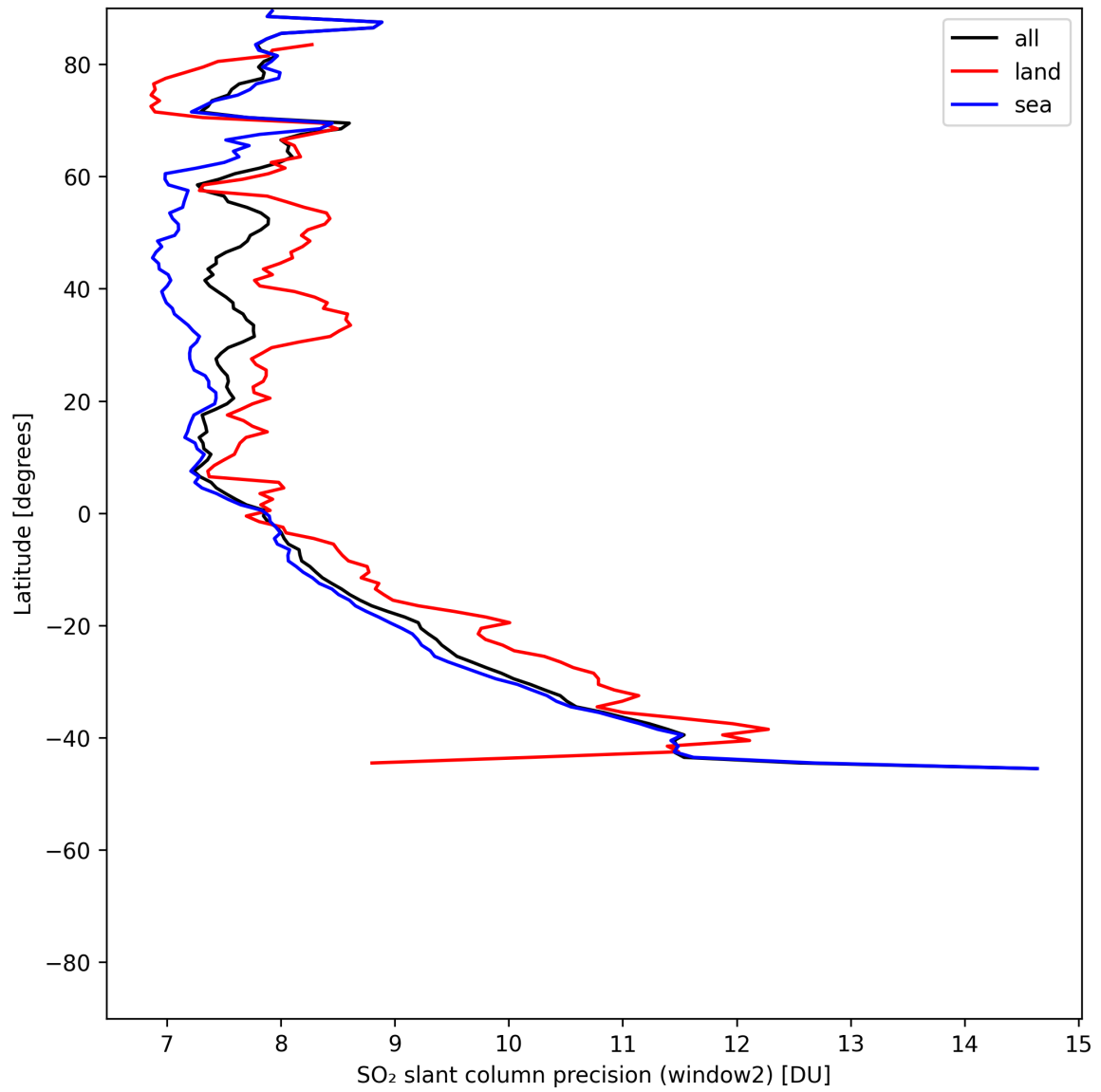


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-06-14 to 2025-06-14.

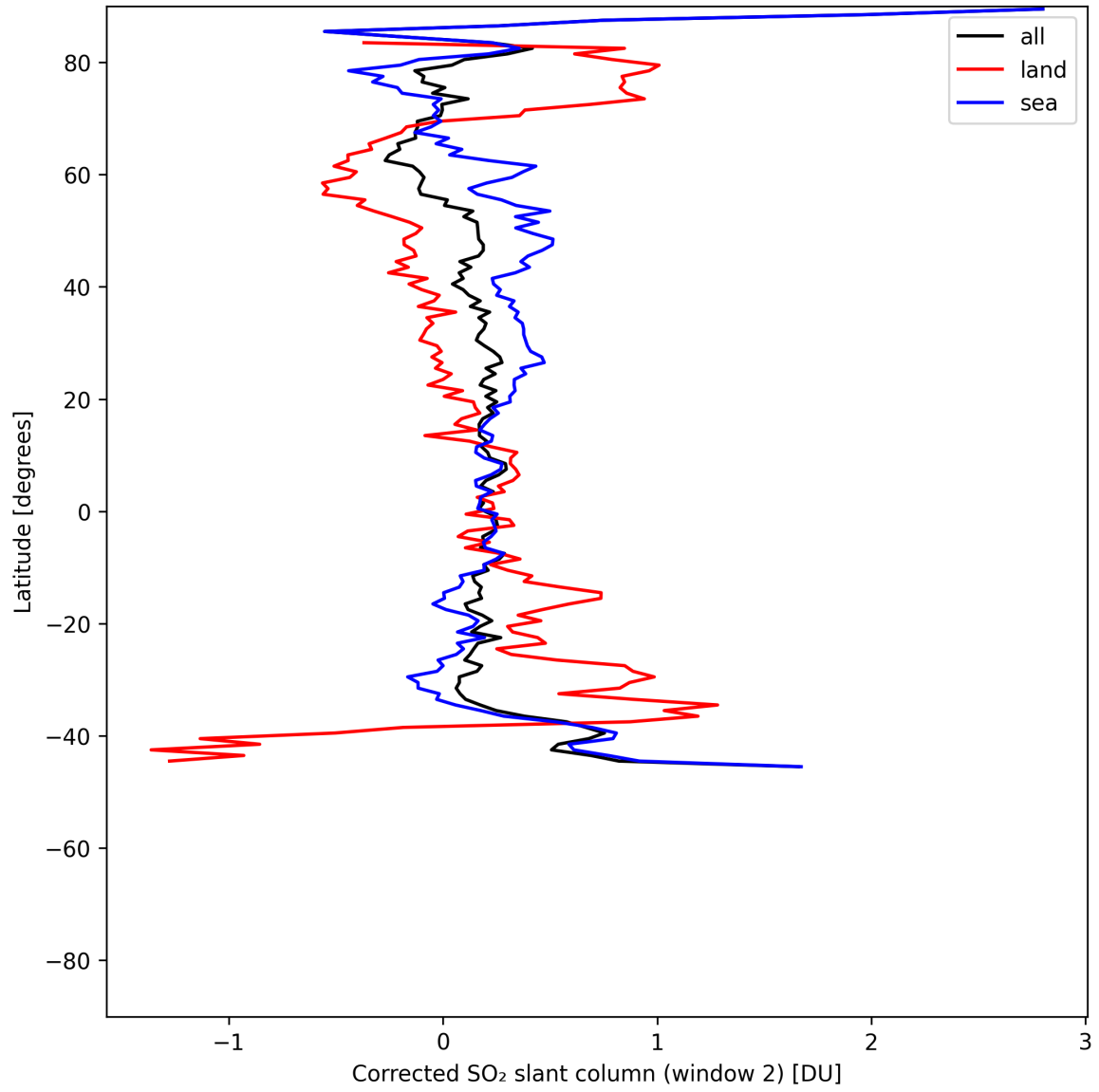


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-06-14 to 2025-06-14.

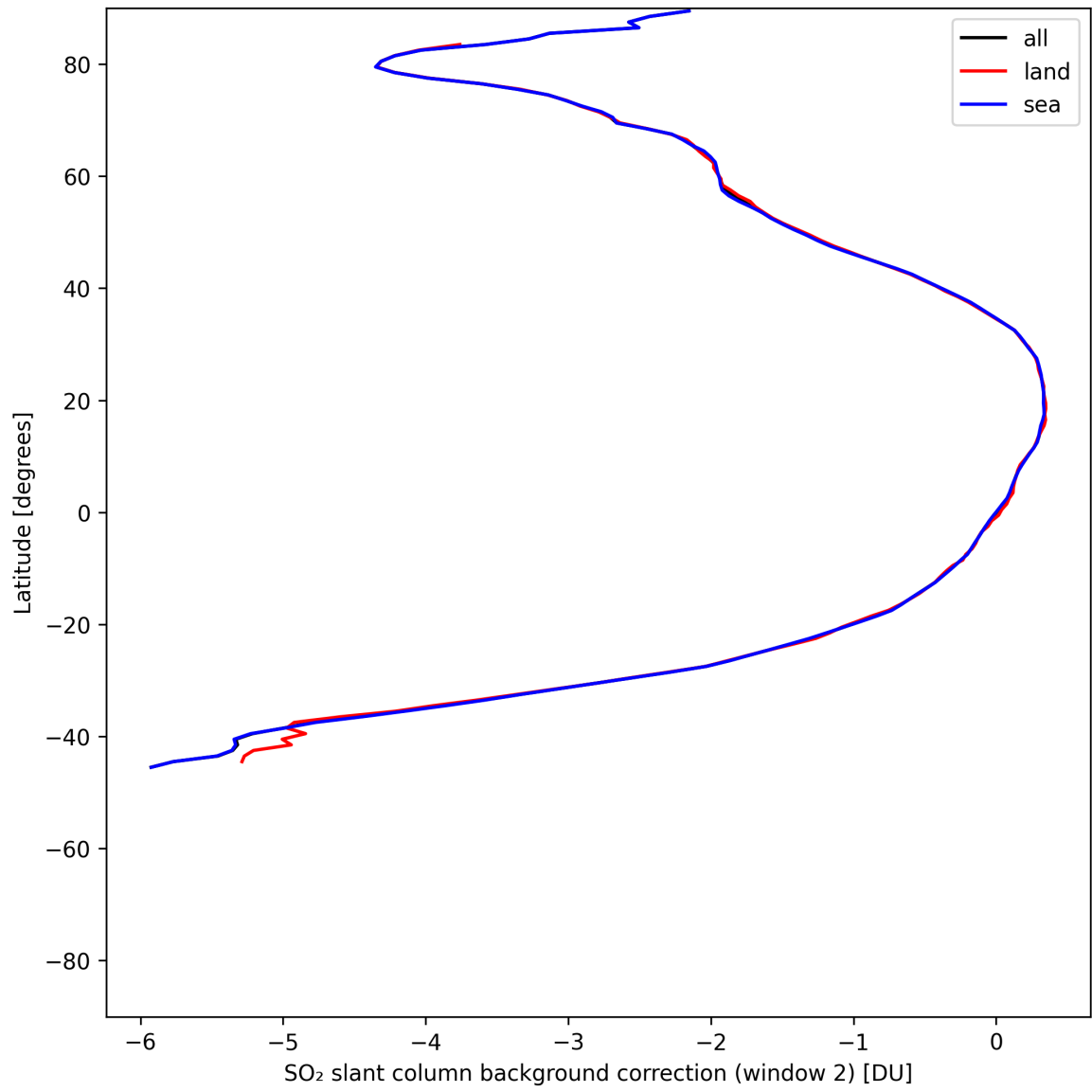


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-06-14 to 2025-06-14.

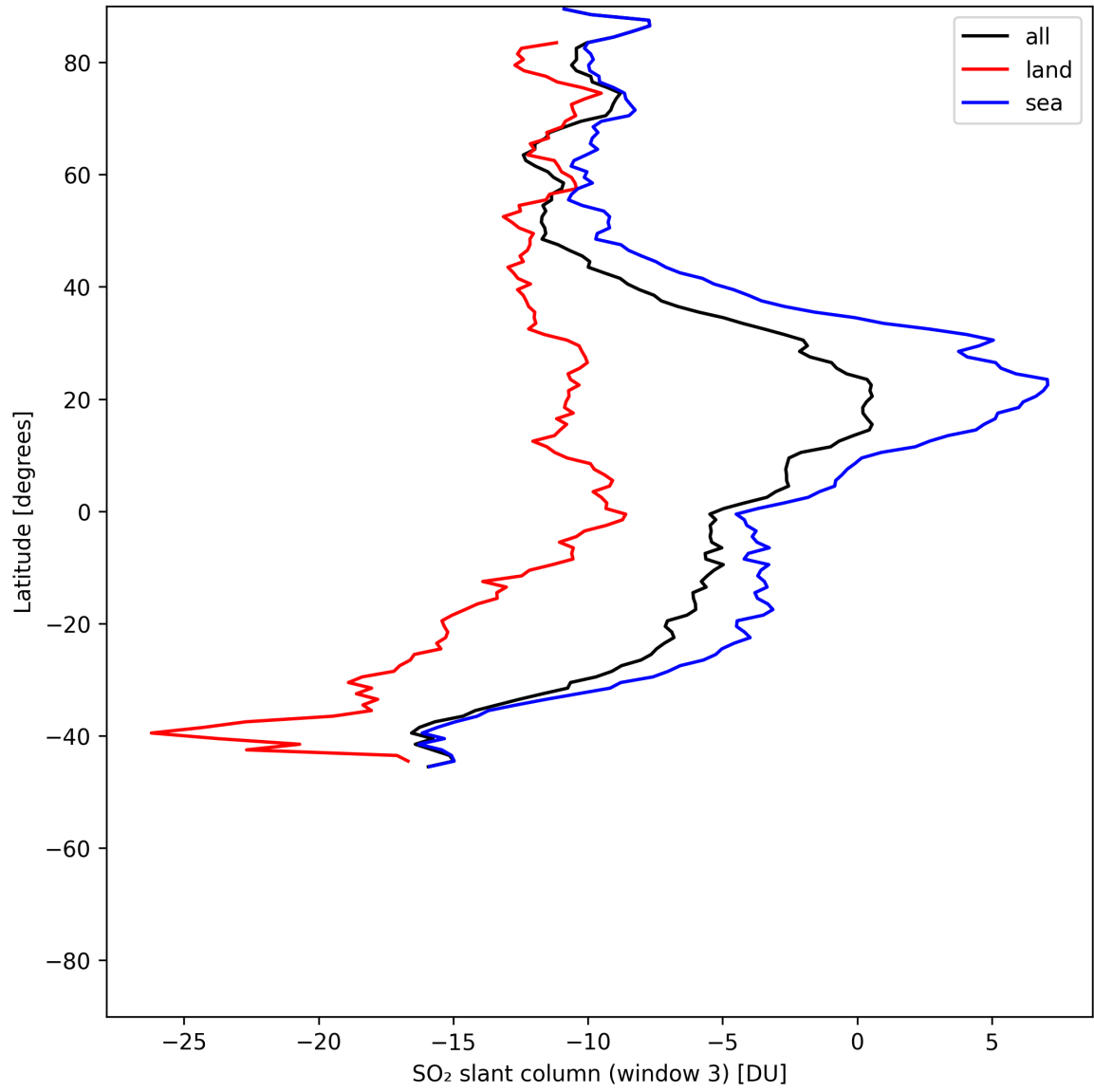


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-06-14 to 2025-06-14.

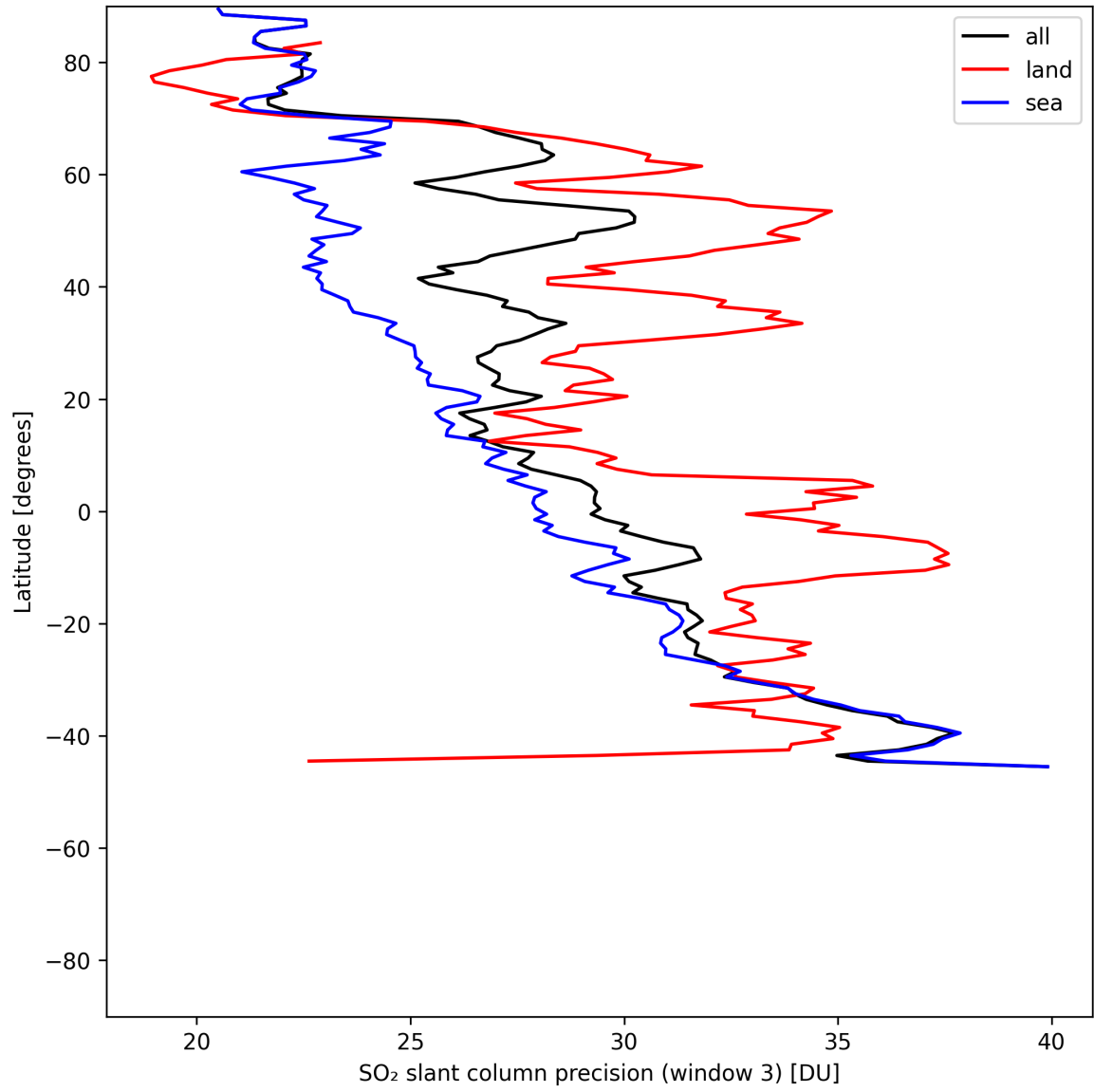


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-06-14 to 2025-06-14.

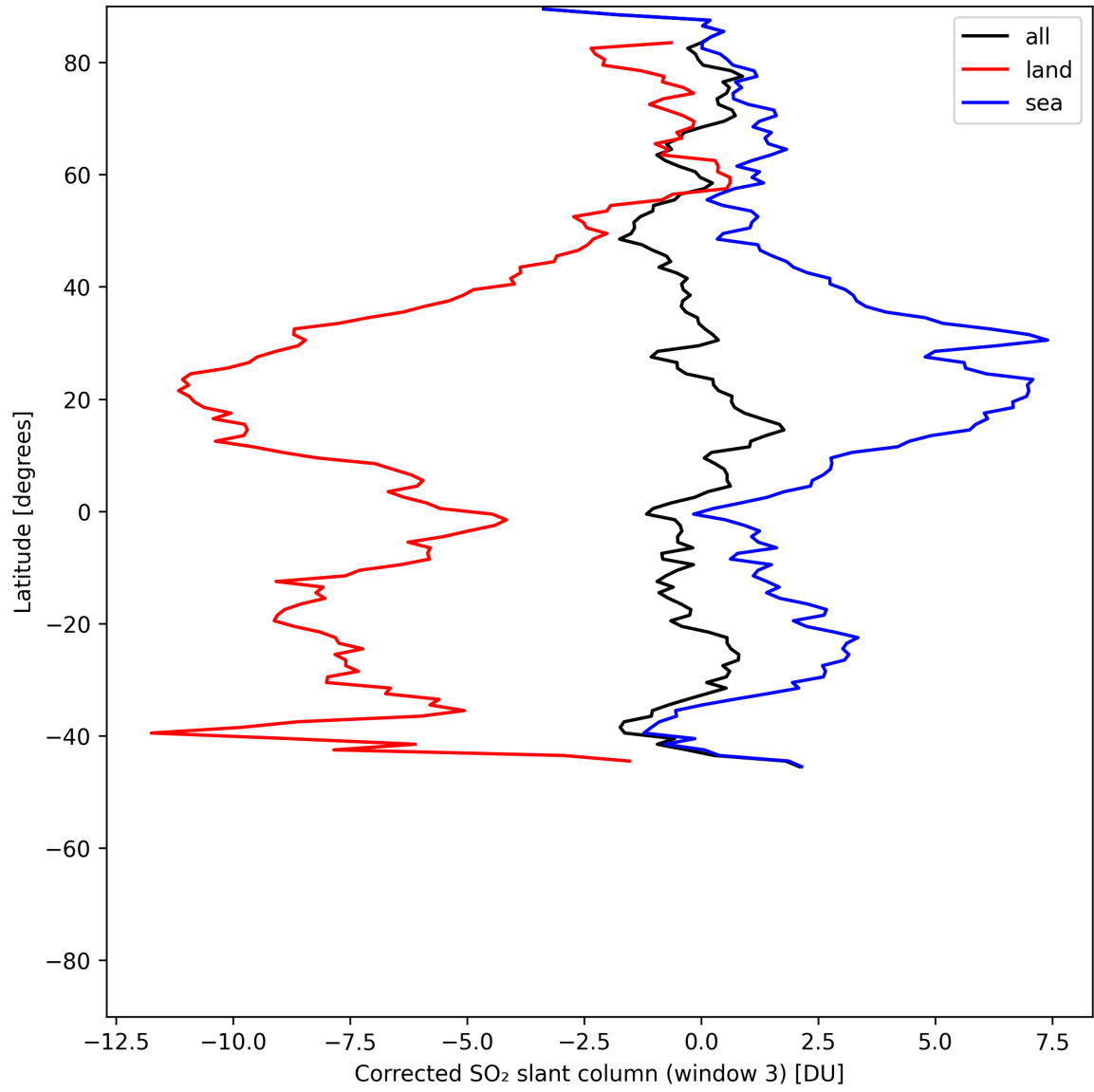


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-06-14 to 2025-06-14.

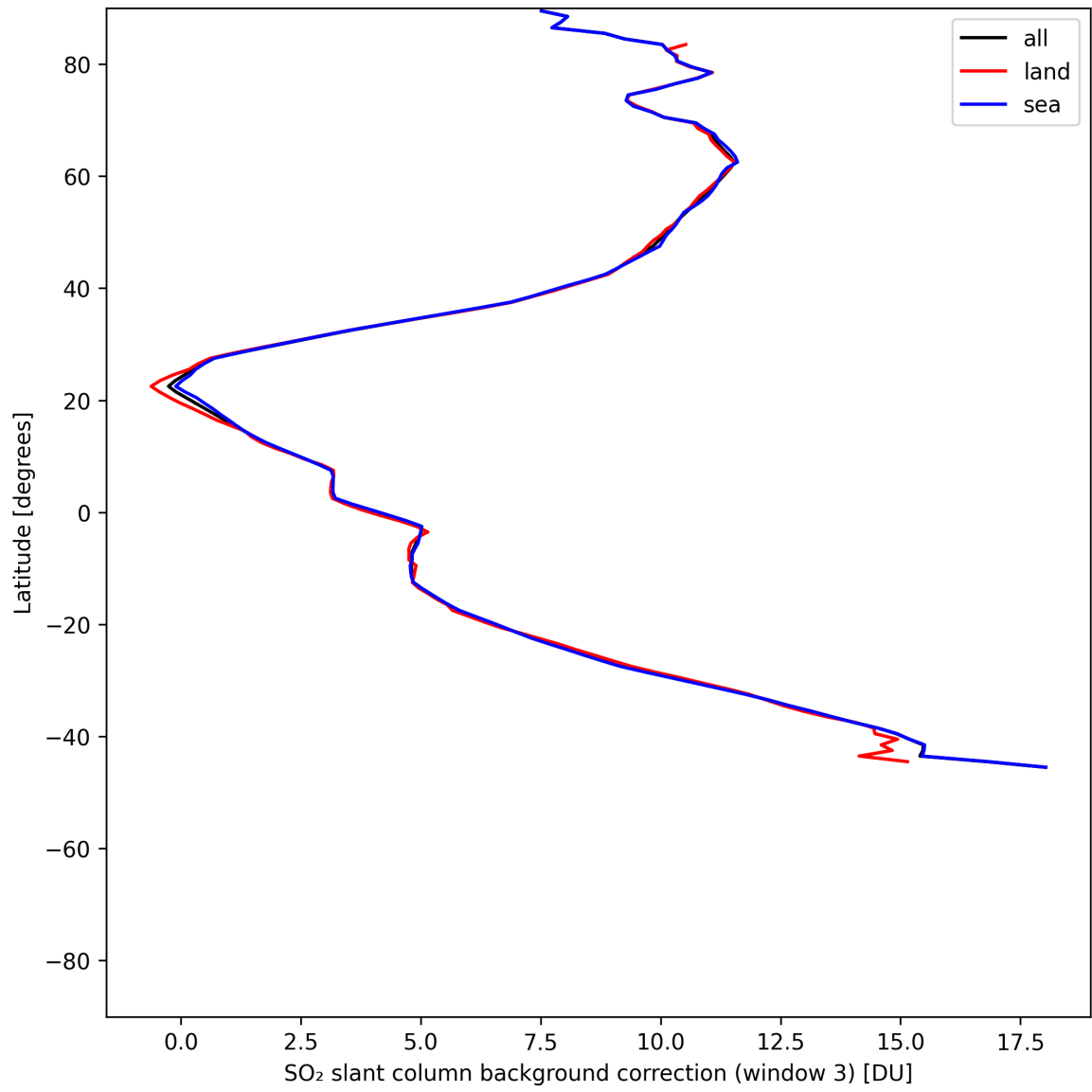


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-06-14 to 2025-06-14.

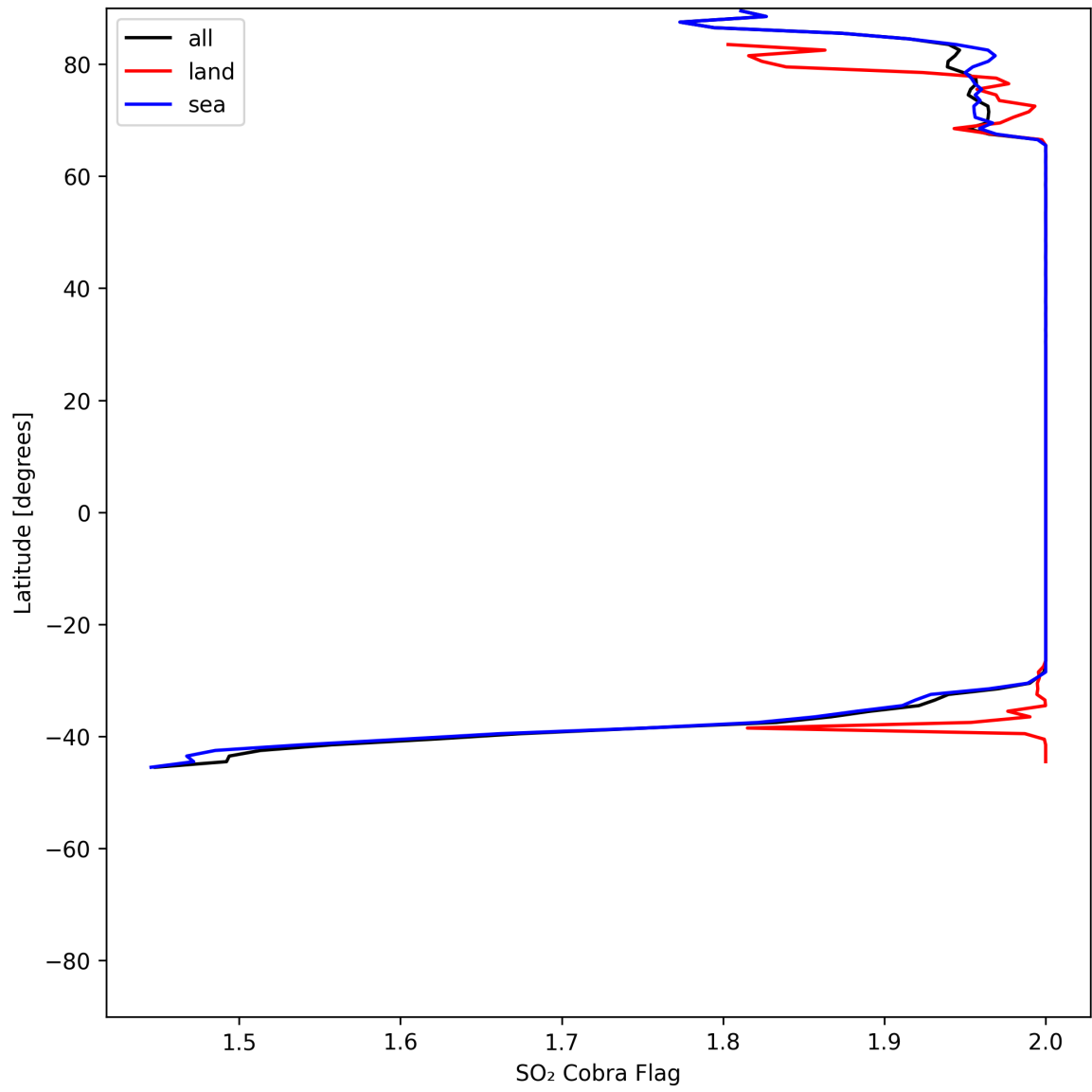


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-06-14 to 2025-06-14.

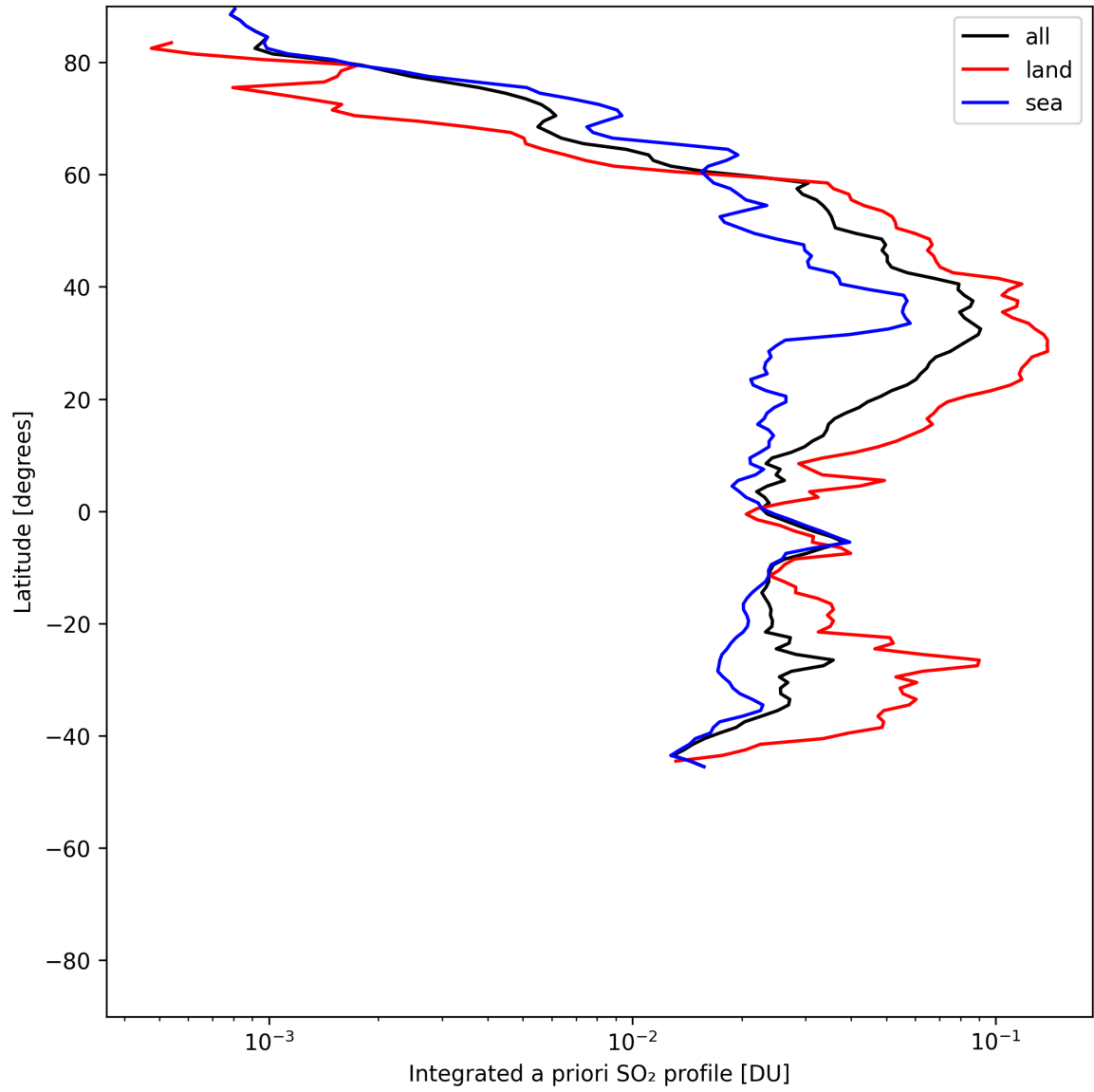


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-06-14 to 2025-06-14.

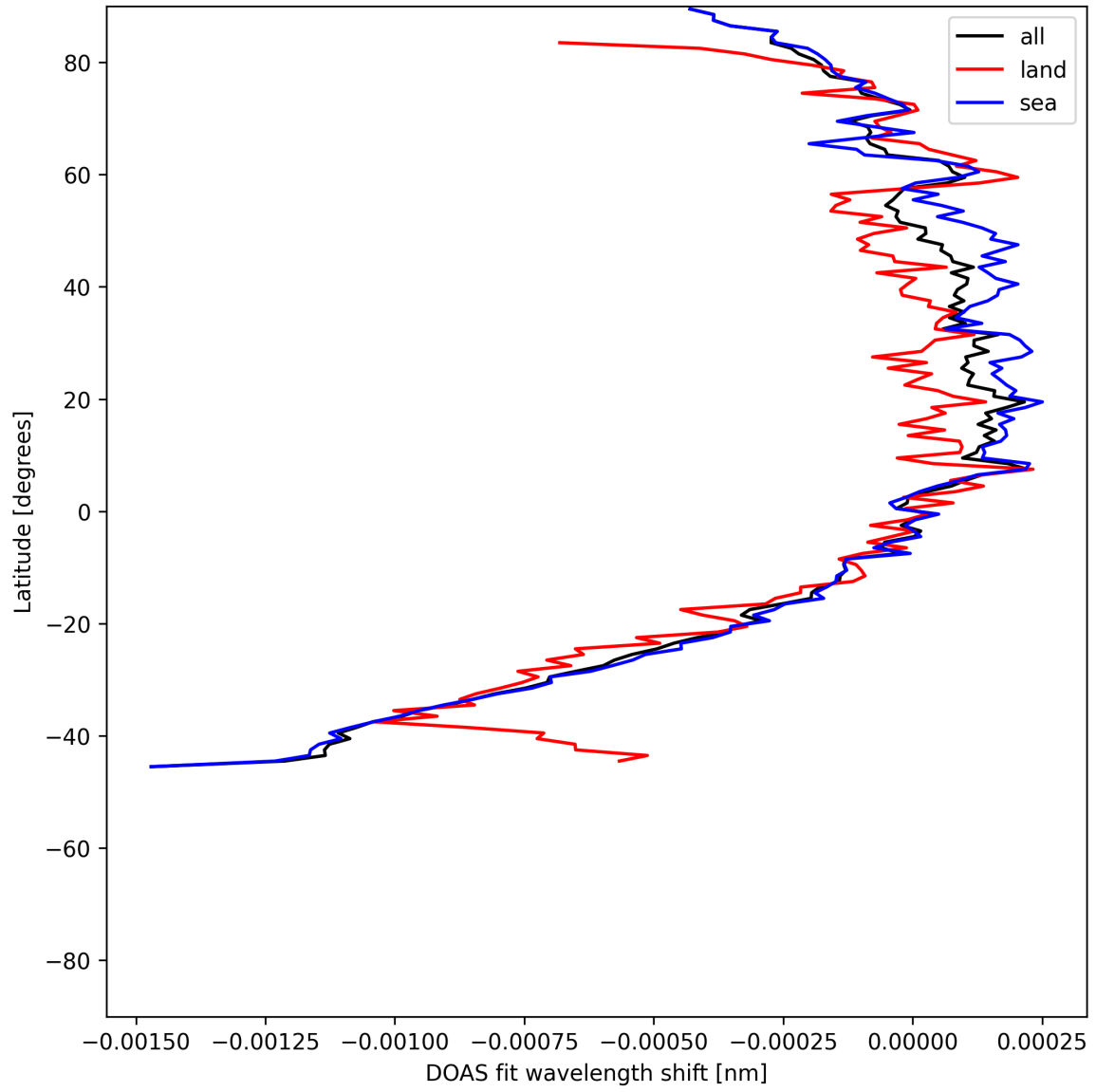


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-06-14 to 2025-06-14.

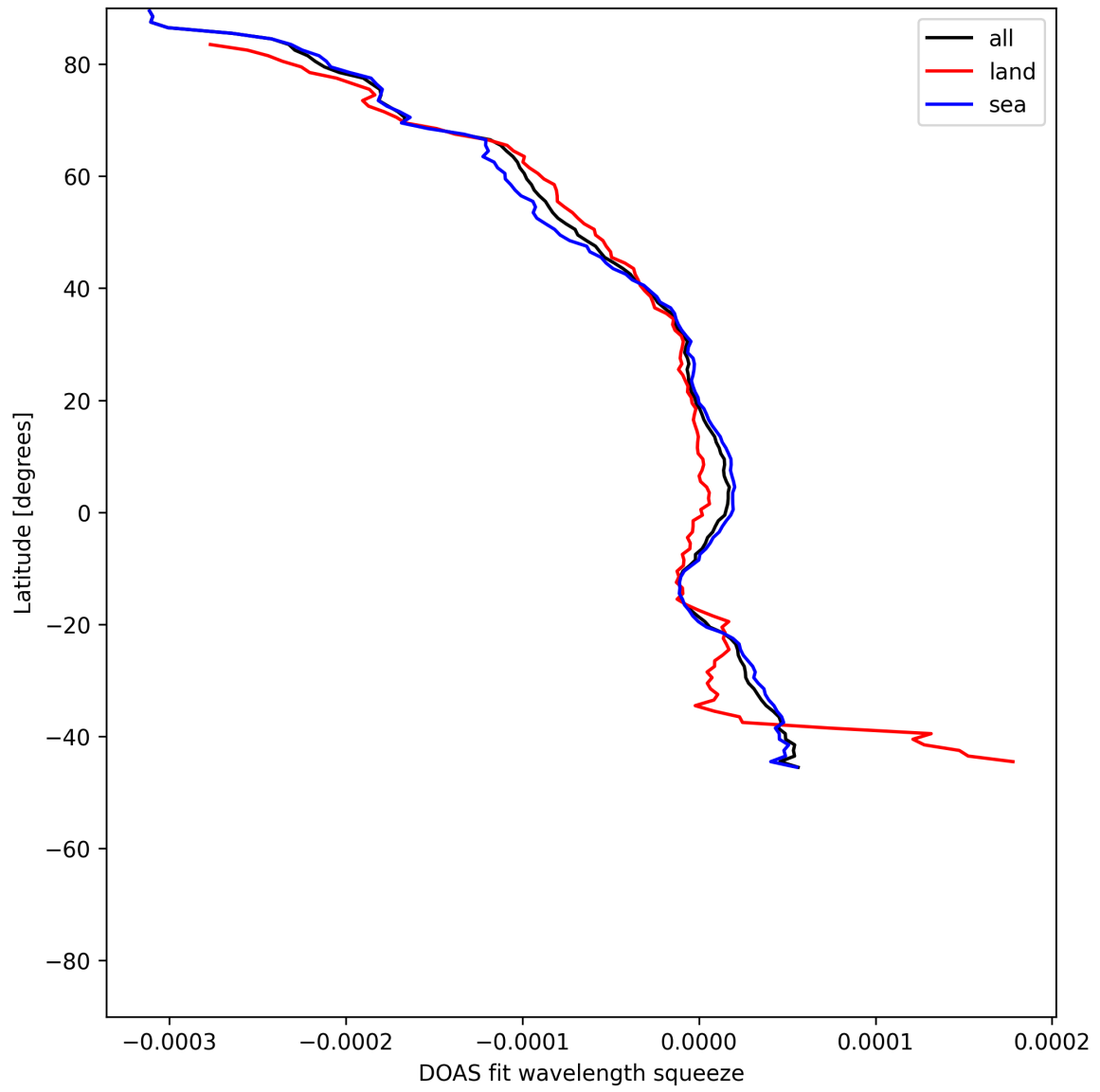


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-06-14 to 2025-06-14.

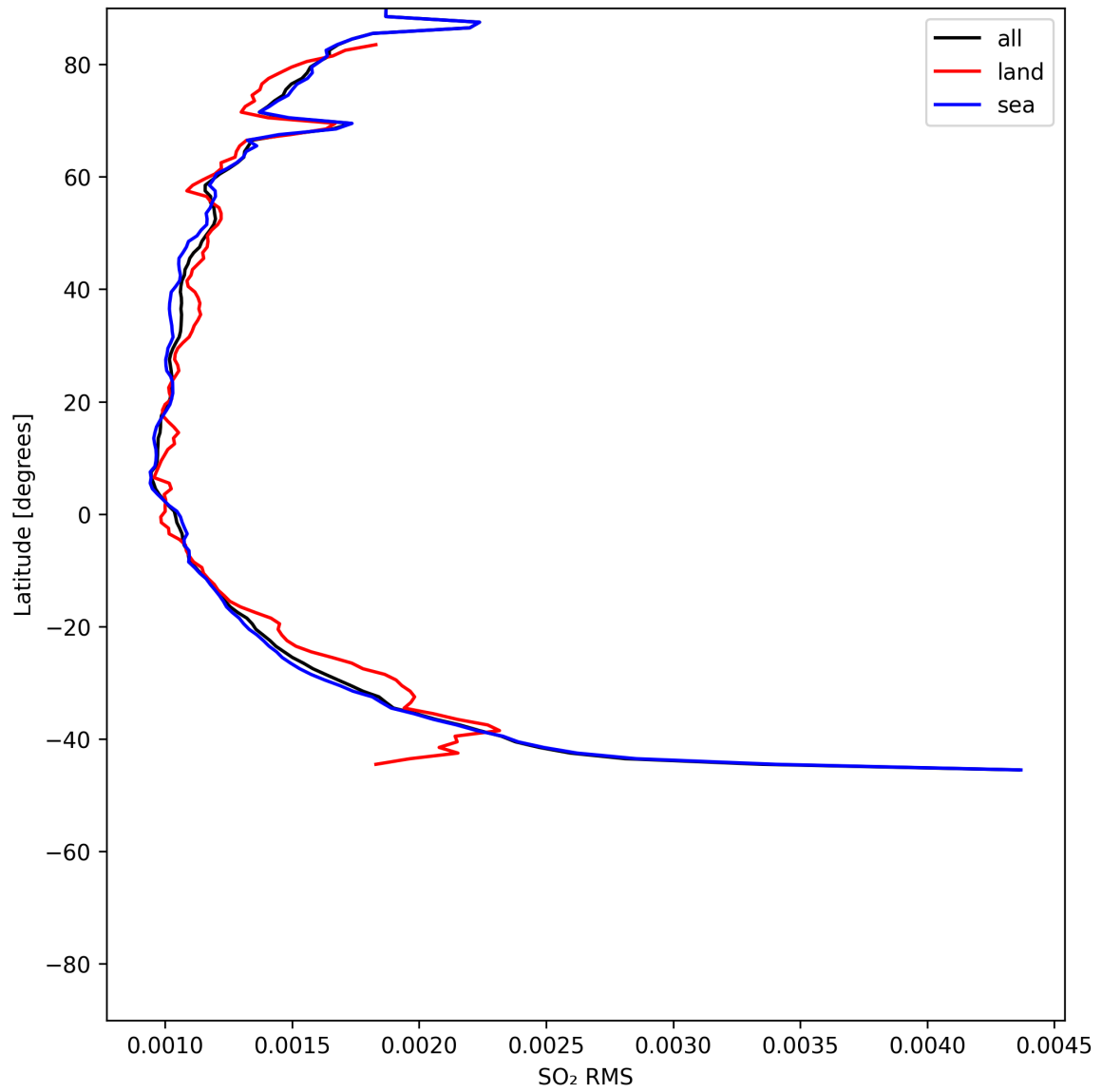


Figure 52: Zonal average of “SO₂ RMS” for 2025-06-14 to 2025-06-14.

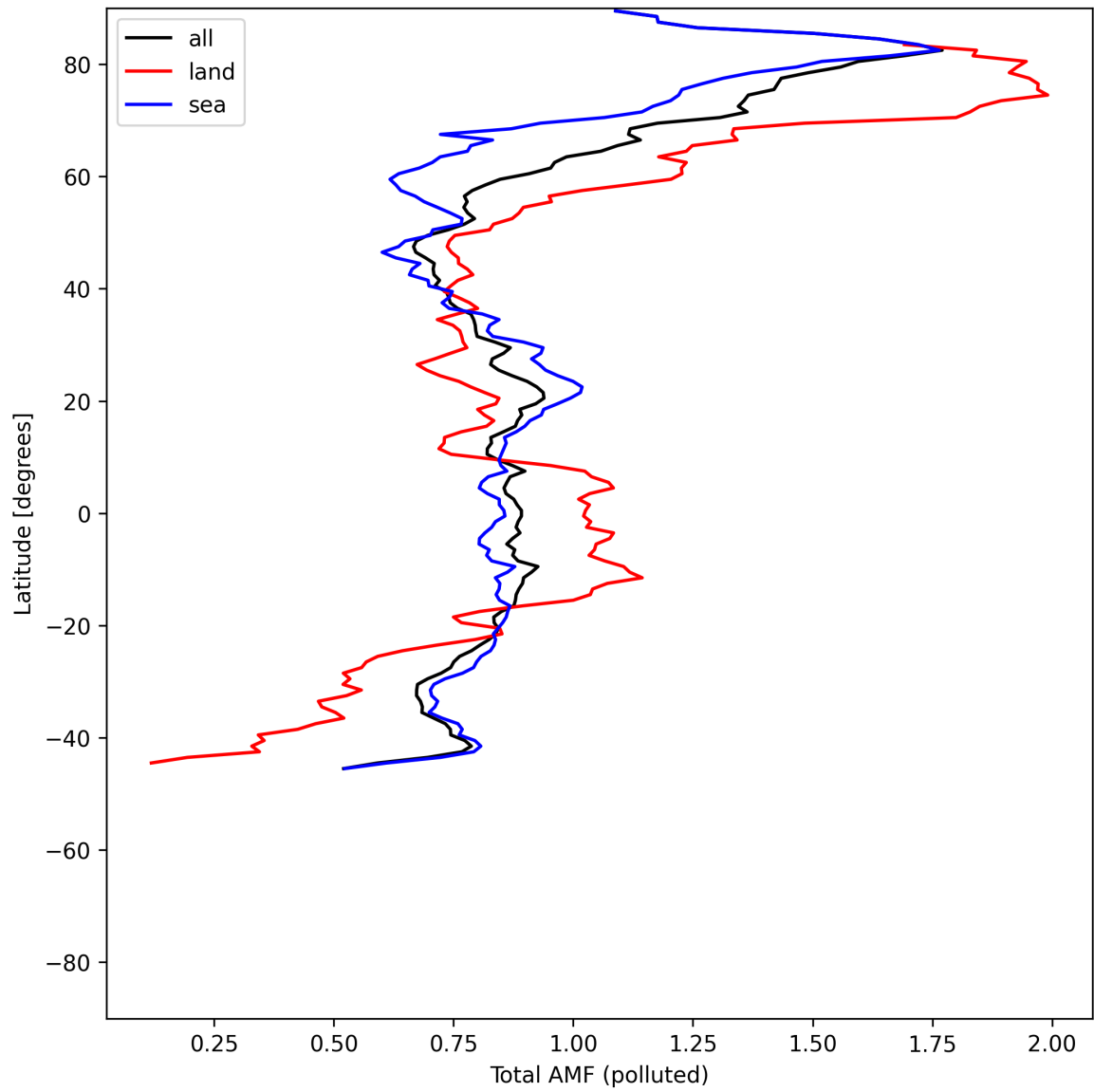


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-06-14 to 2025-06-14.

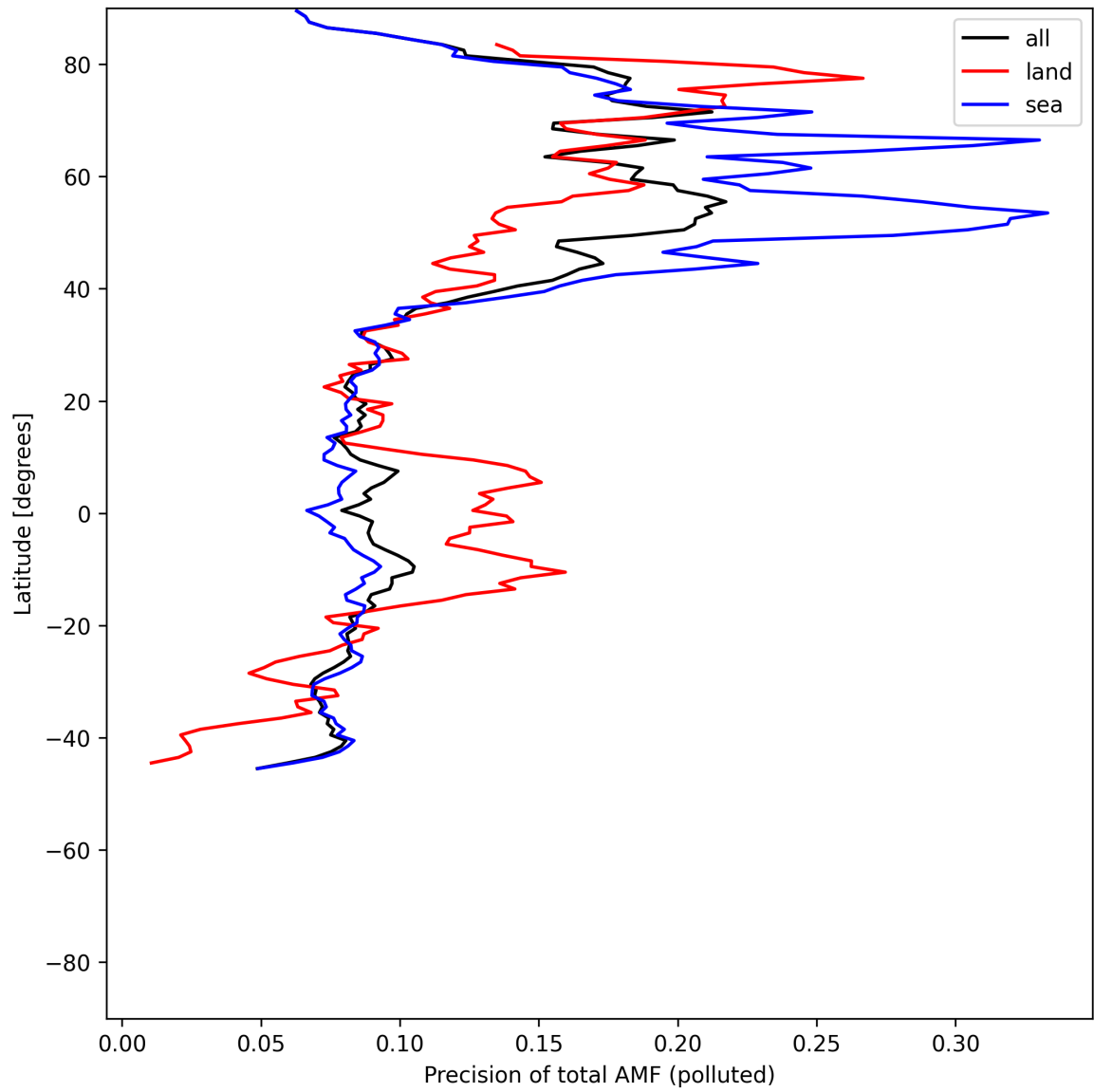


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-06-14 to 2025-06-14.

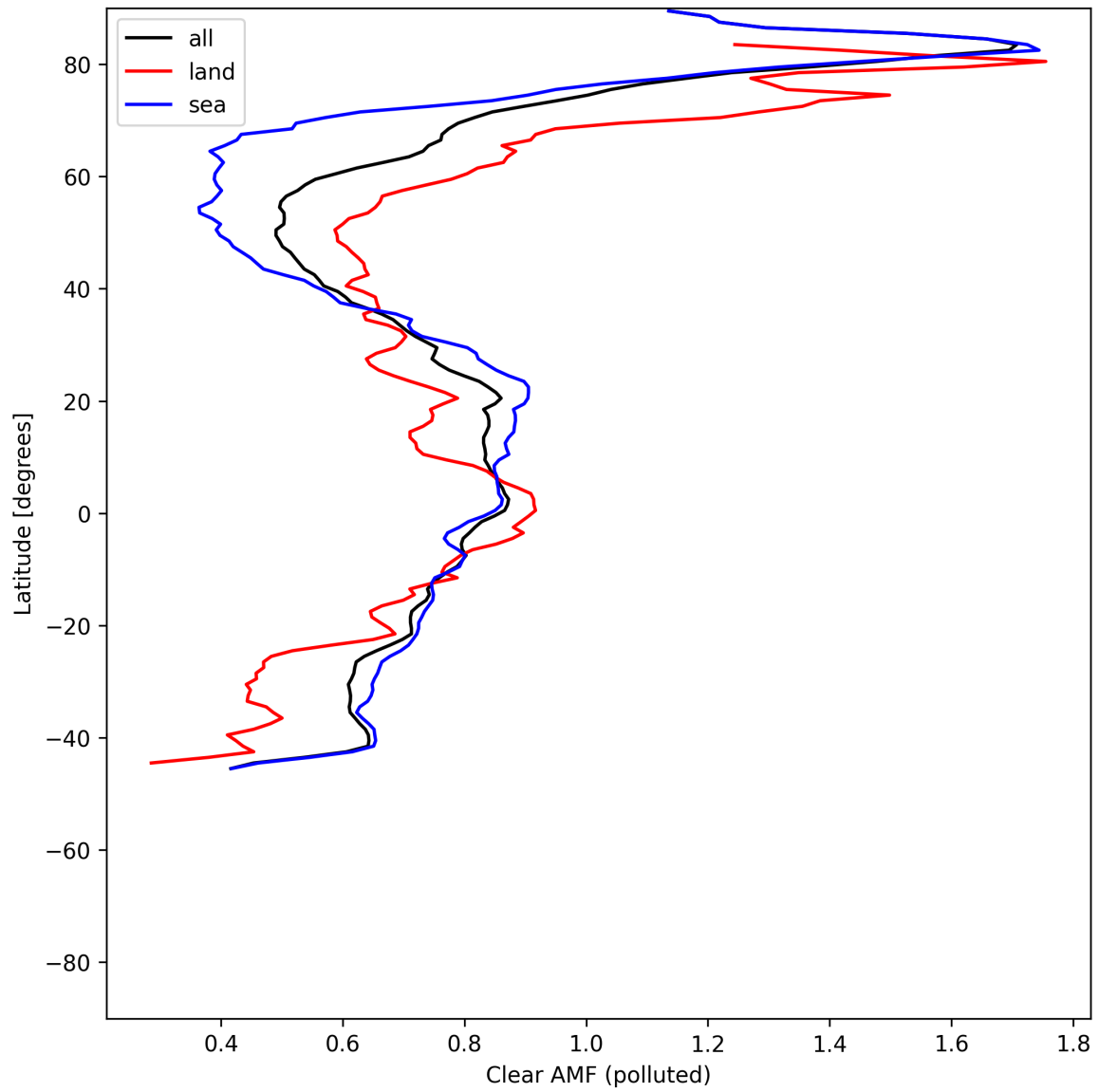


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-06-14 to 2025-06-14.

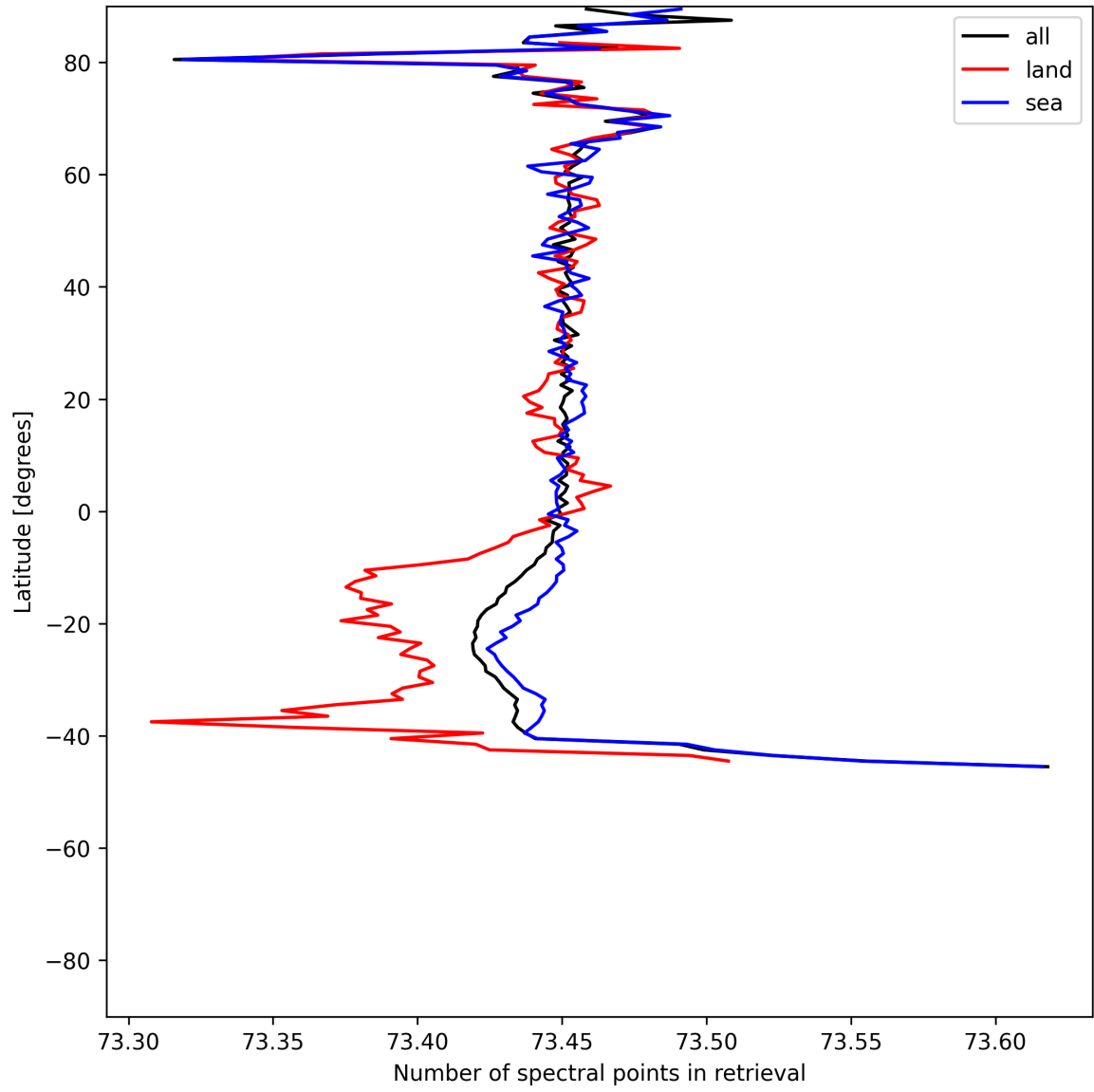


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-06-14 to 2025-06-14.

8 Histograms

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

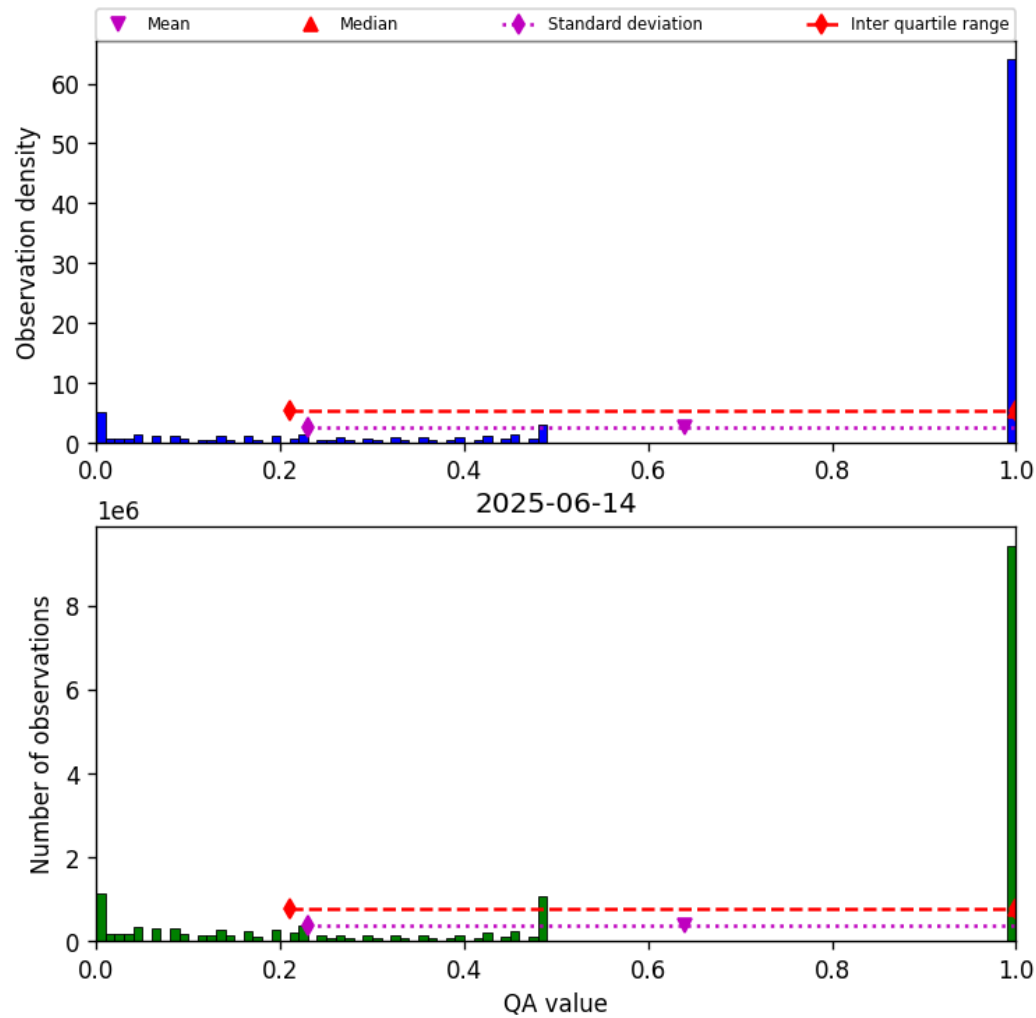


Figure 57: Histogram of “QA value” for 2025-06-14 to 2025-06-14

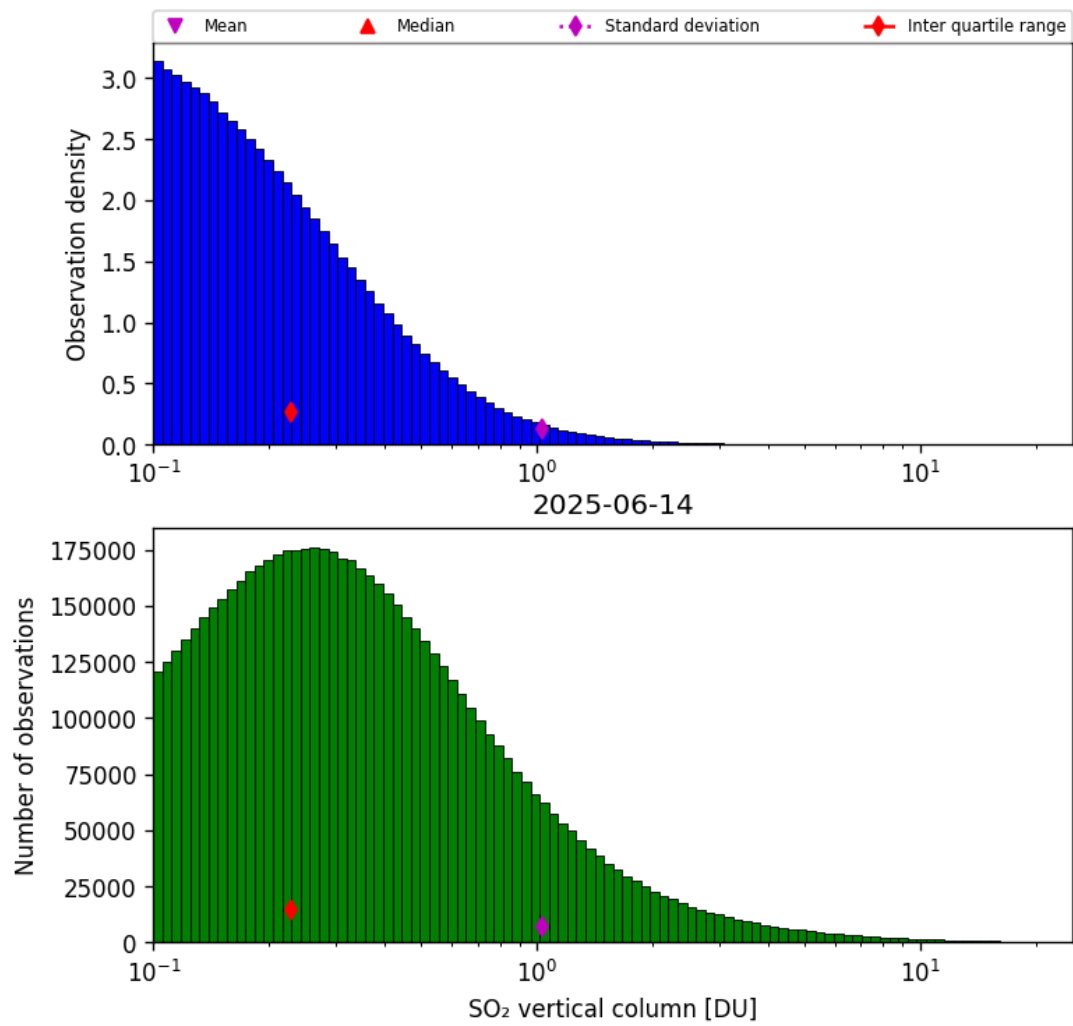


Figure 58: Histogram of “SO₂ vertical column” for 2025-06-14 to 2025-06-14

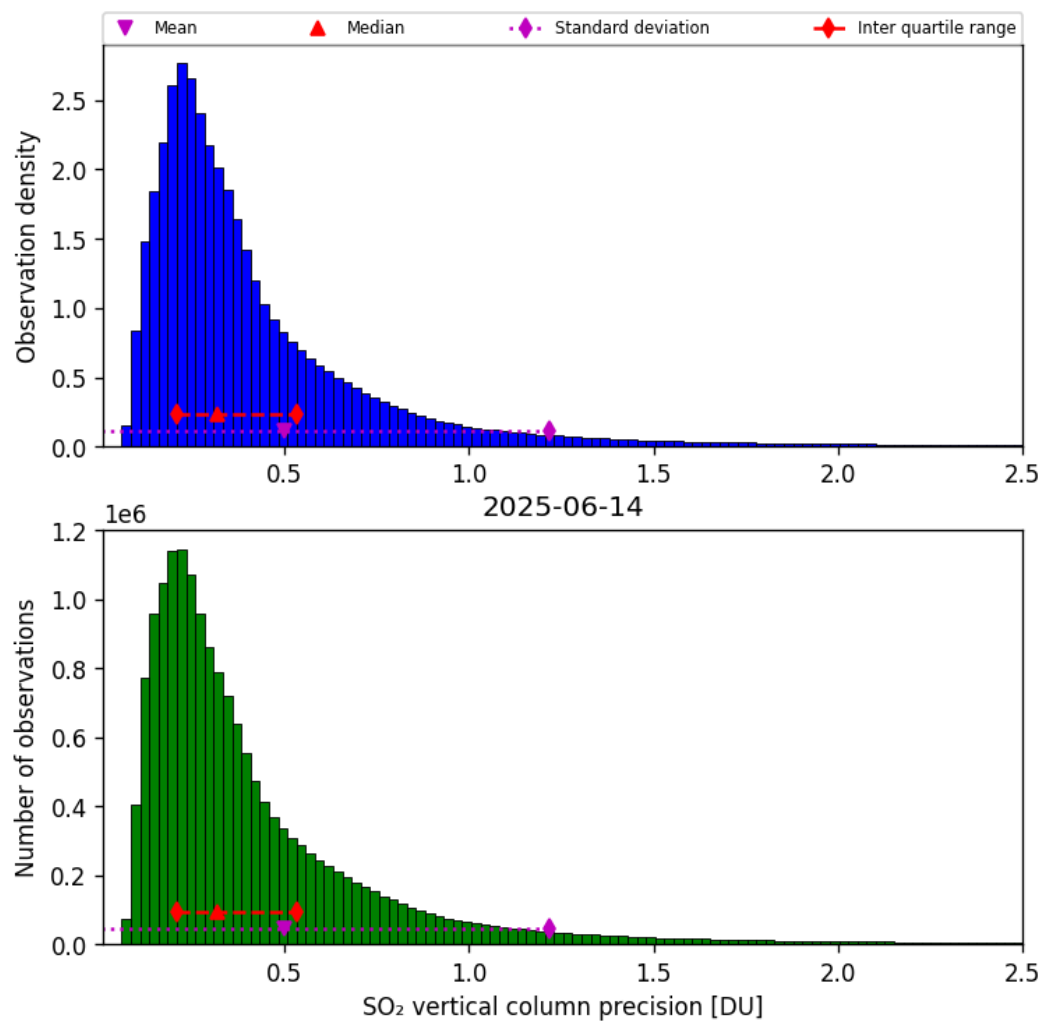


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-06-14 to 2025-06-14

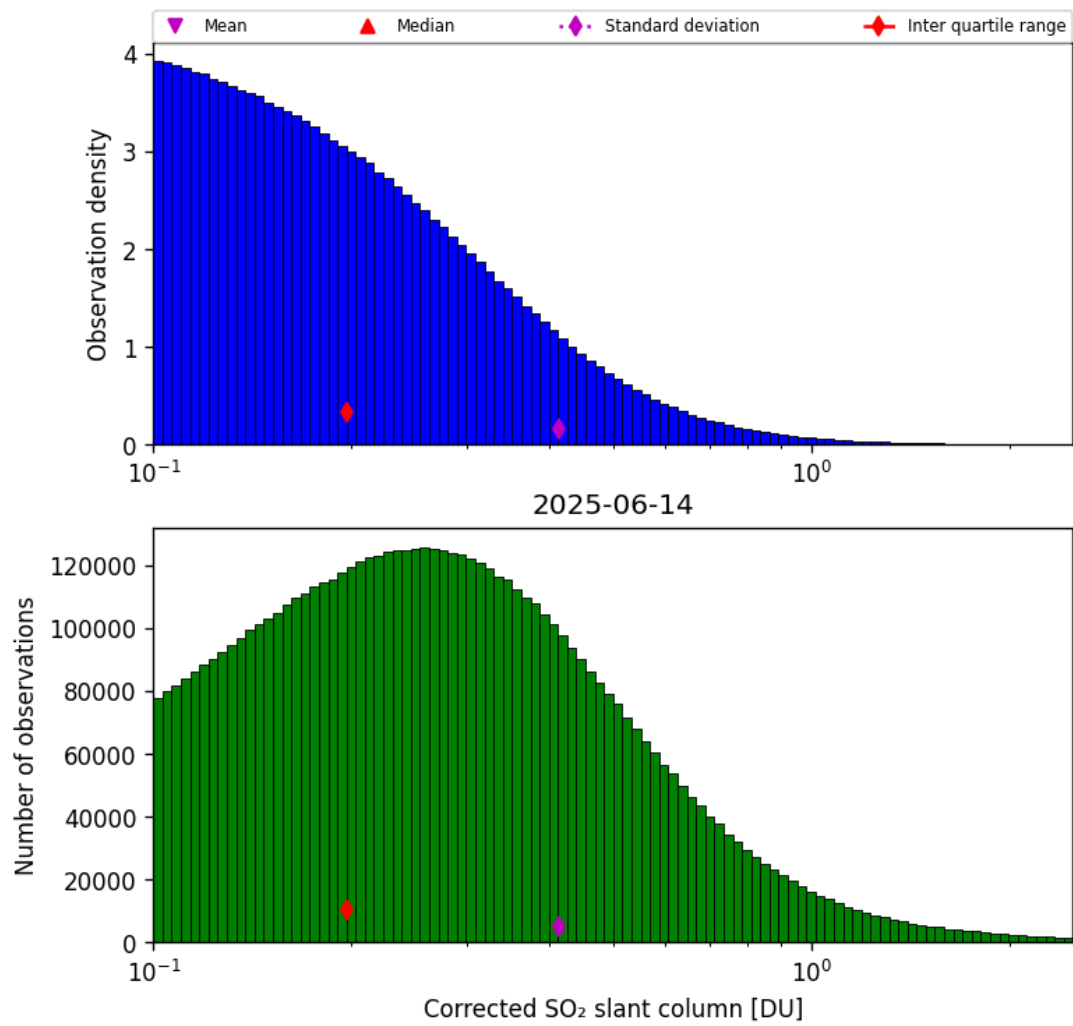


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-06-14 to 2025-06-14

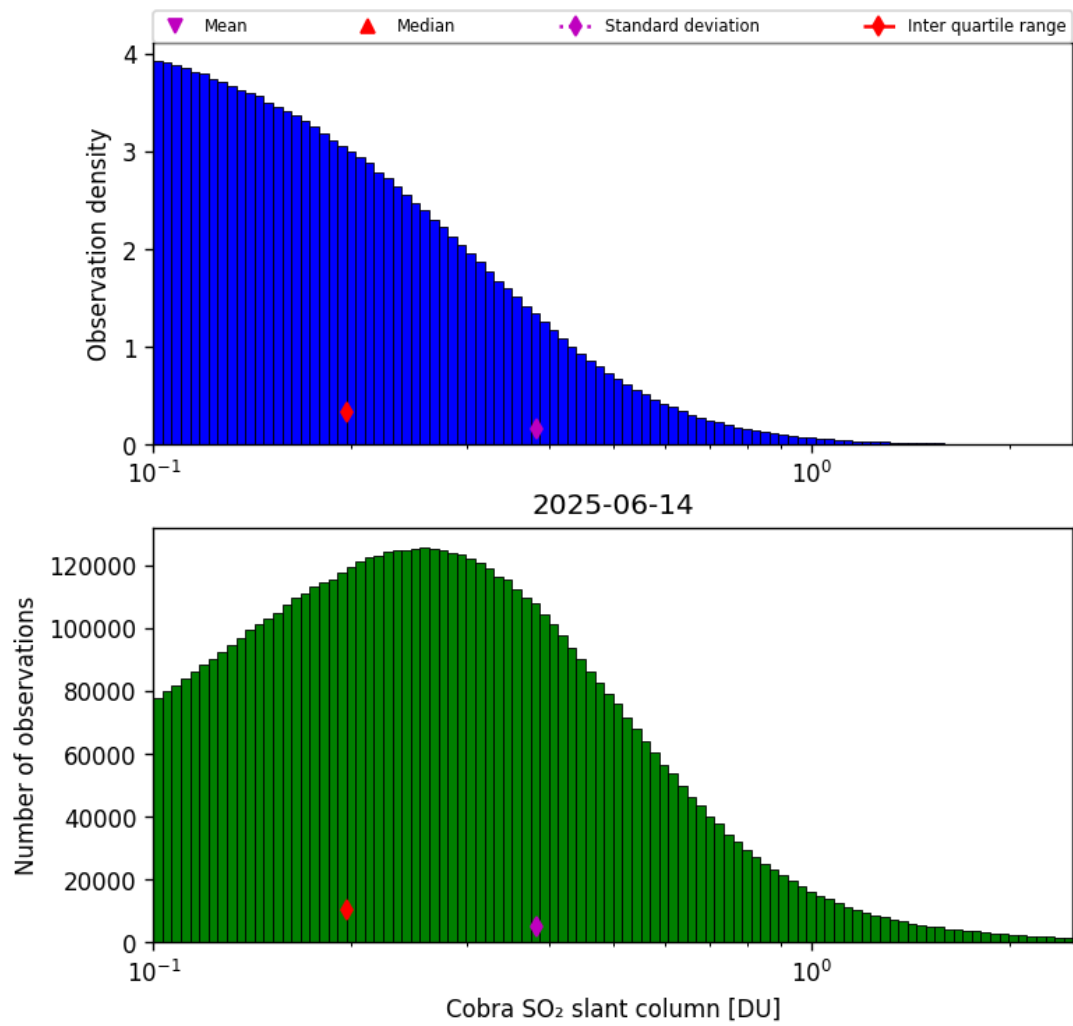


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-06-14 to 2025-06-14

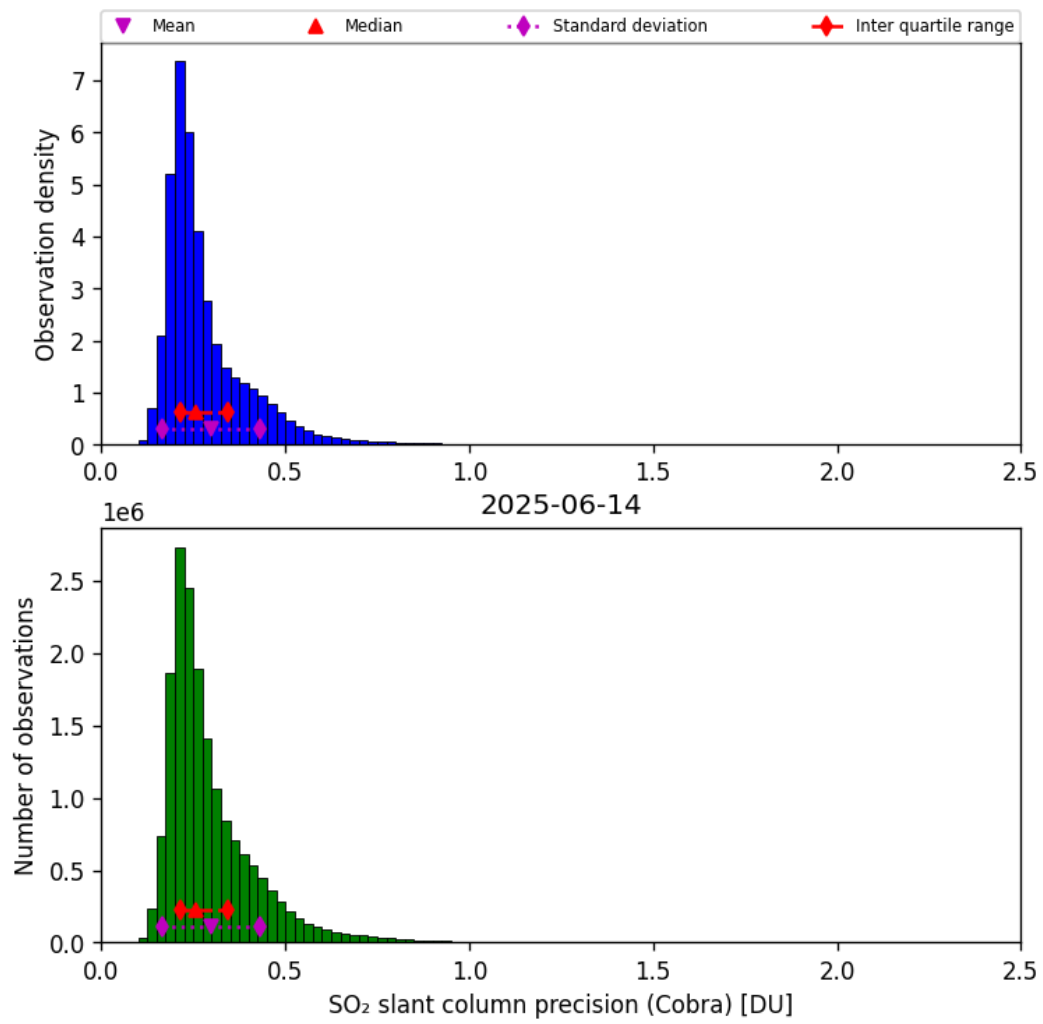


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-06-14 to 2025-06-14

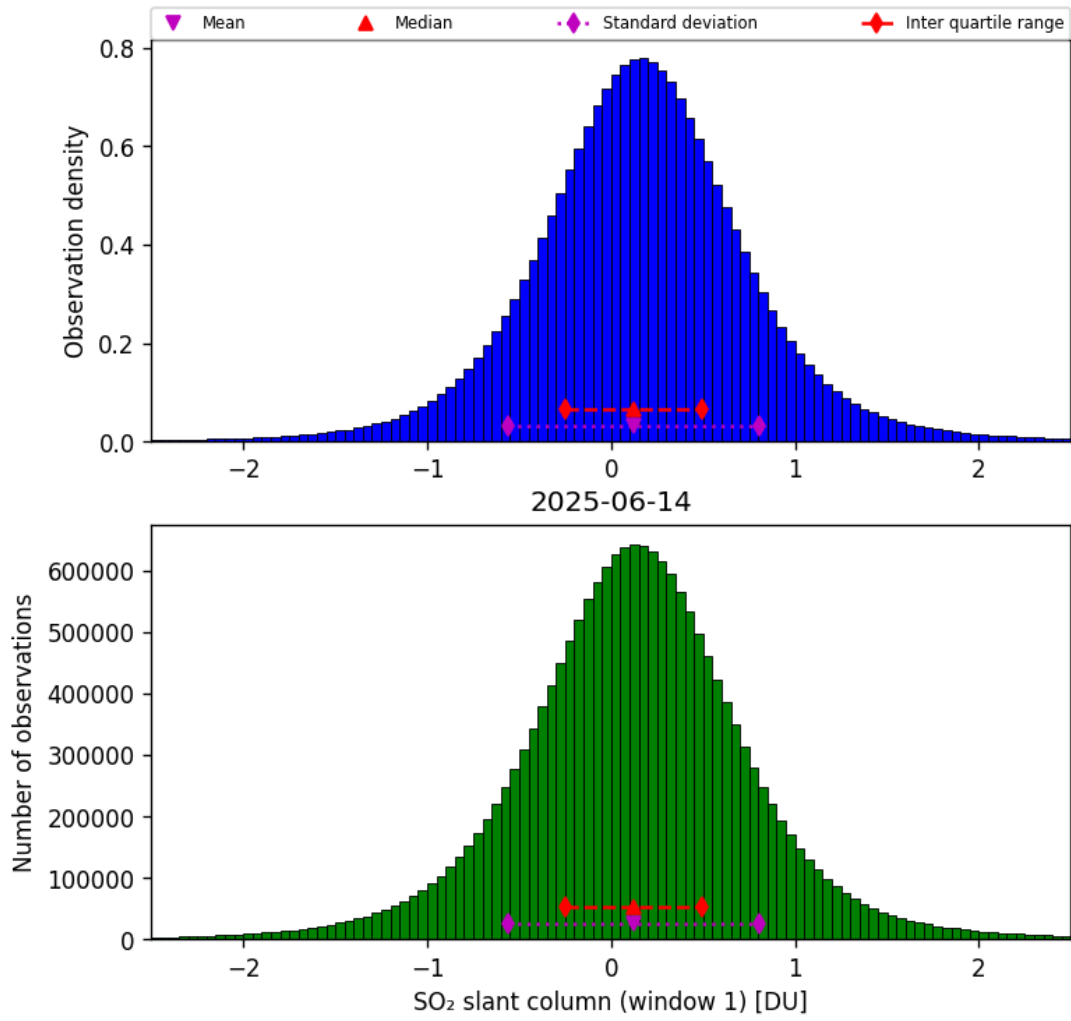


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-06-14 to 2025-06-14

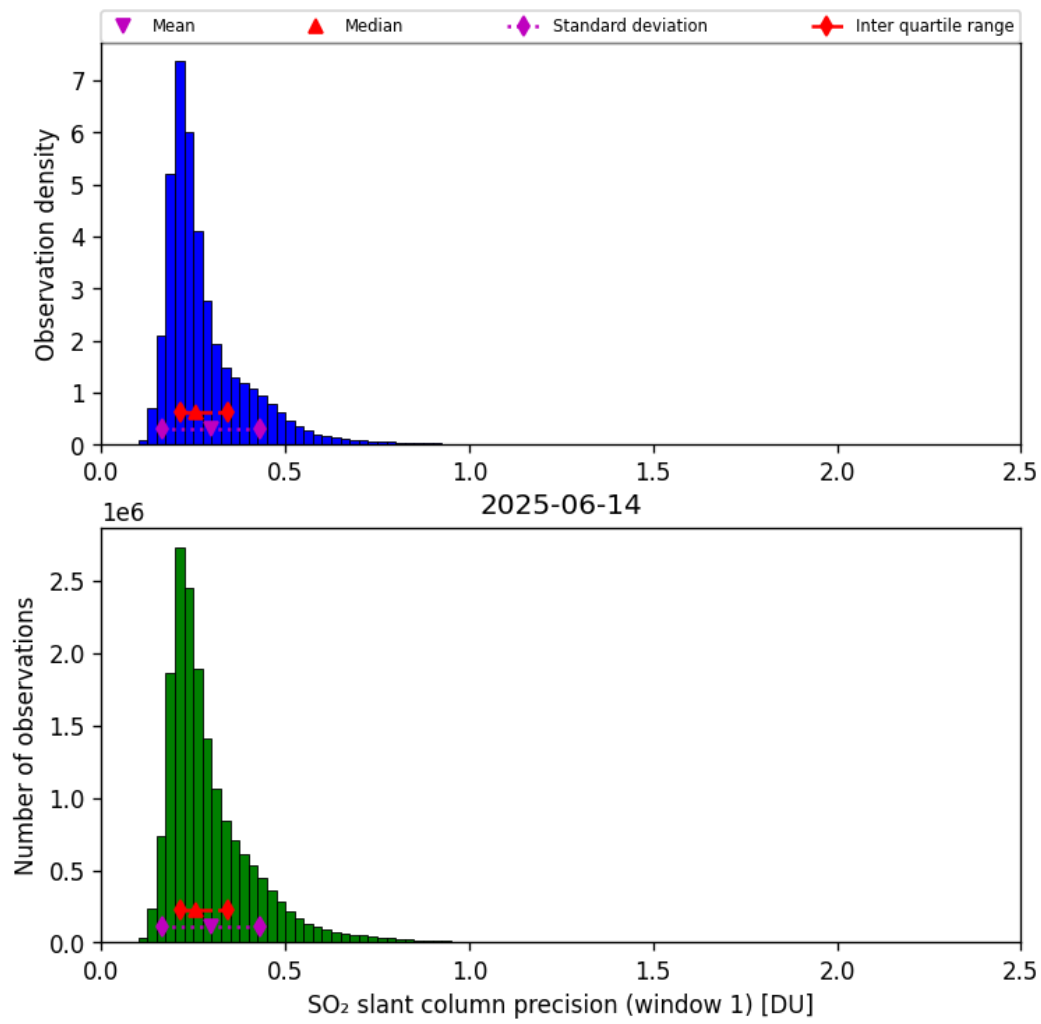


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-06-14 to 2025-06-14

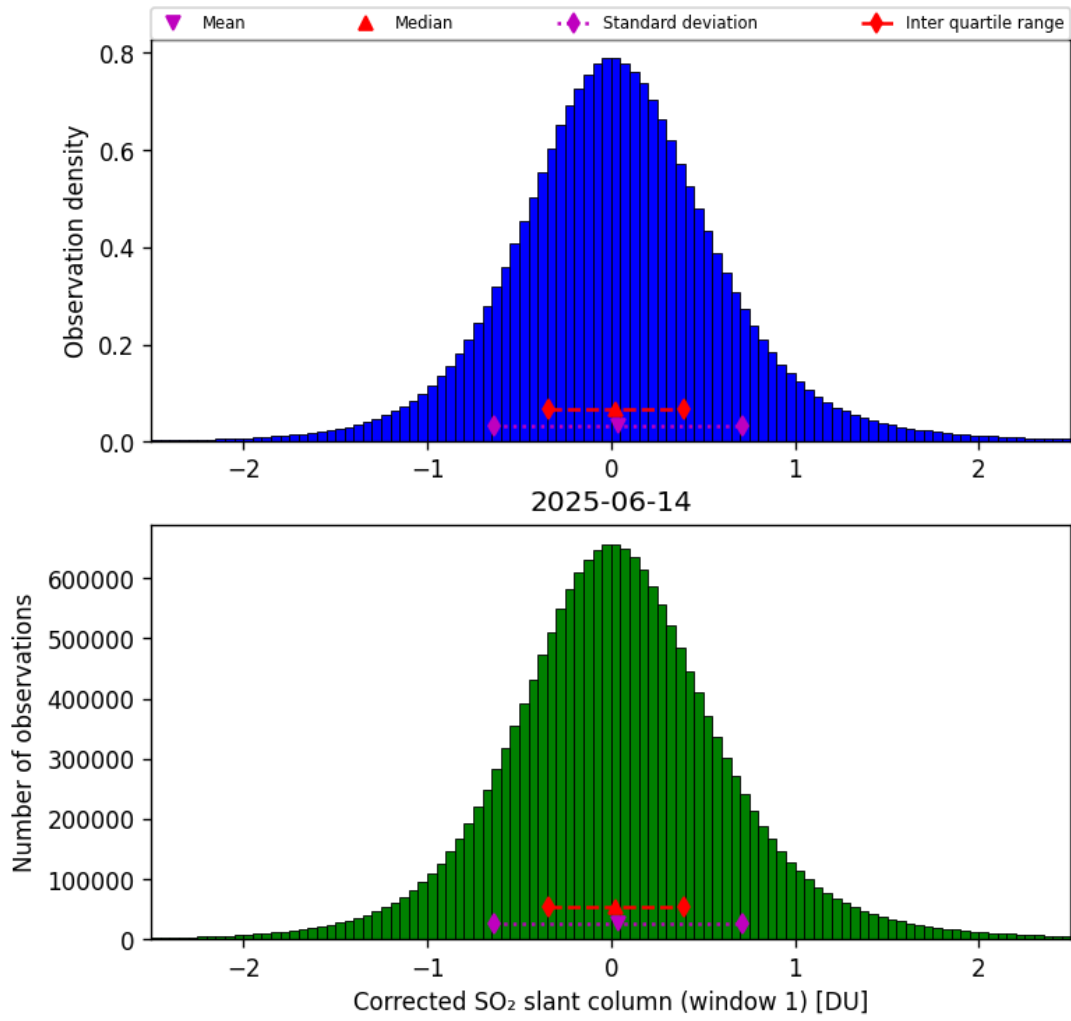


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-06-14 to 2025-06-14

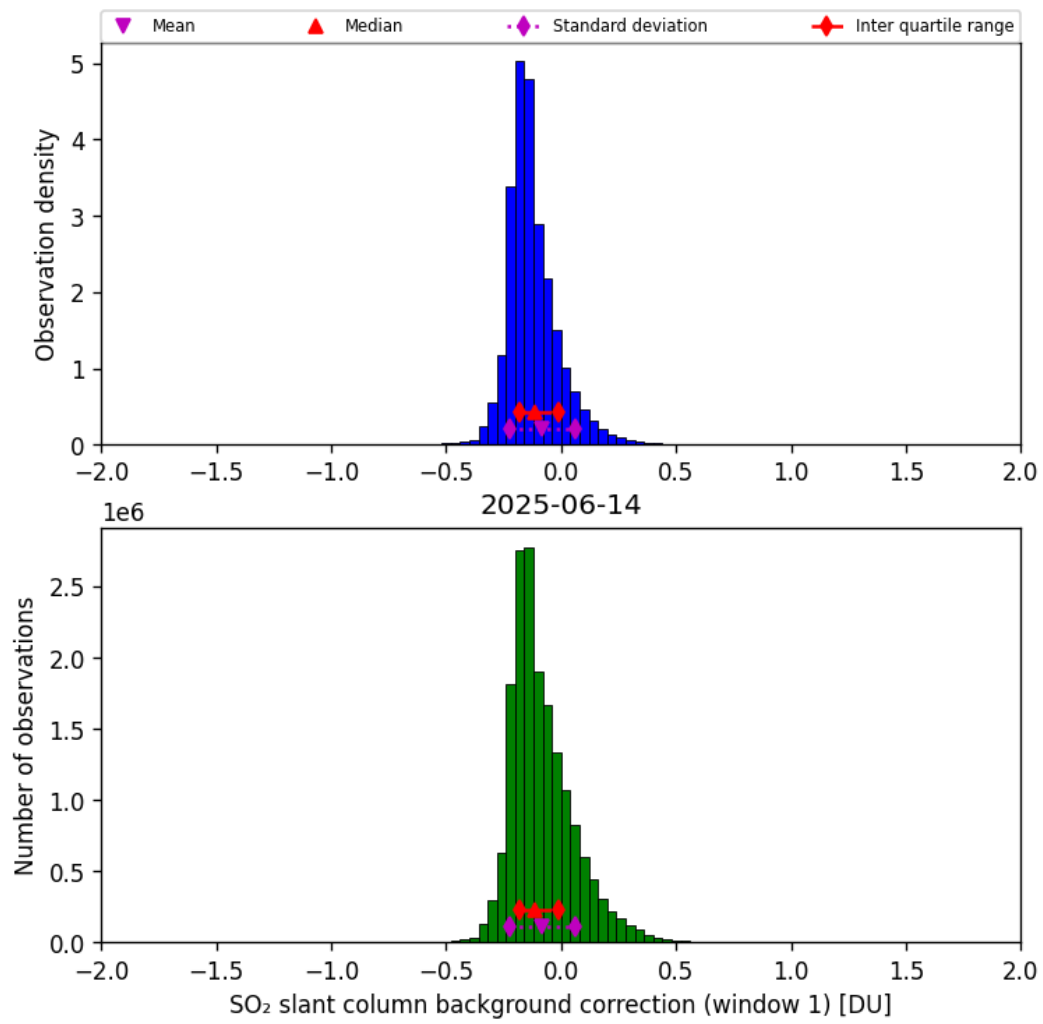


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-06-14 to 2025-06-14

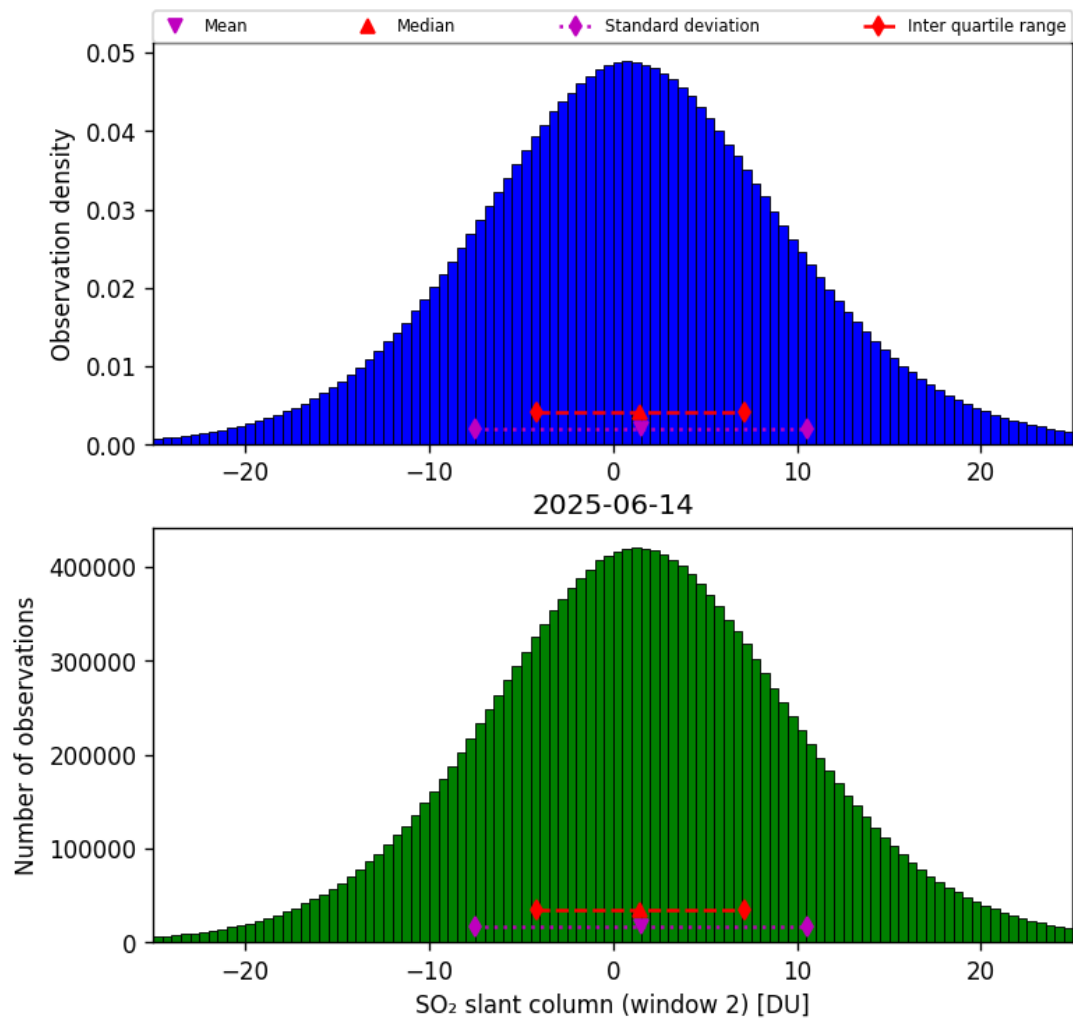


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-06-14 to 2025-06-14

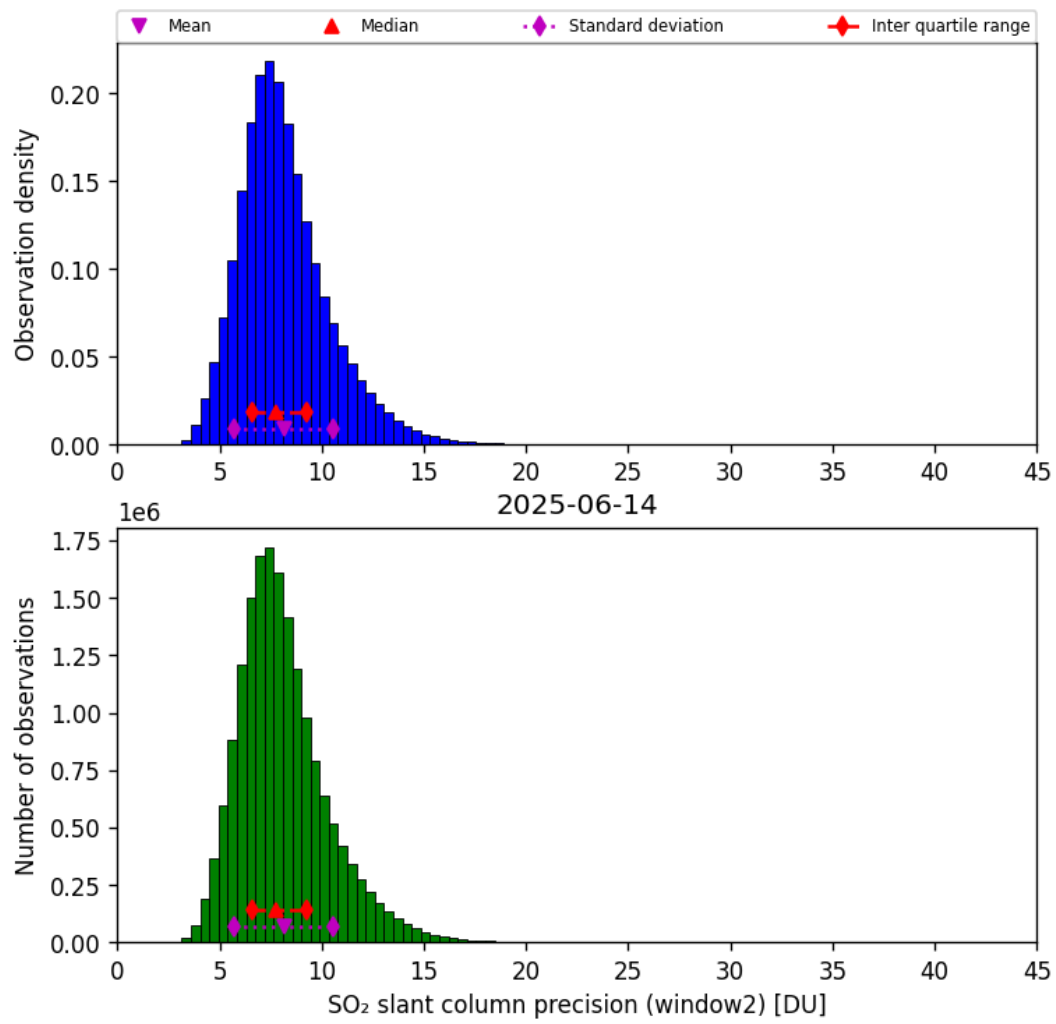


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-06-14 to 2025-06-14

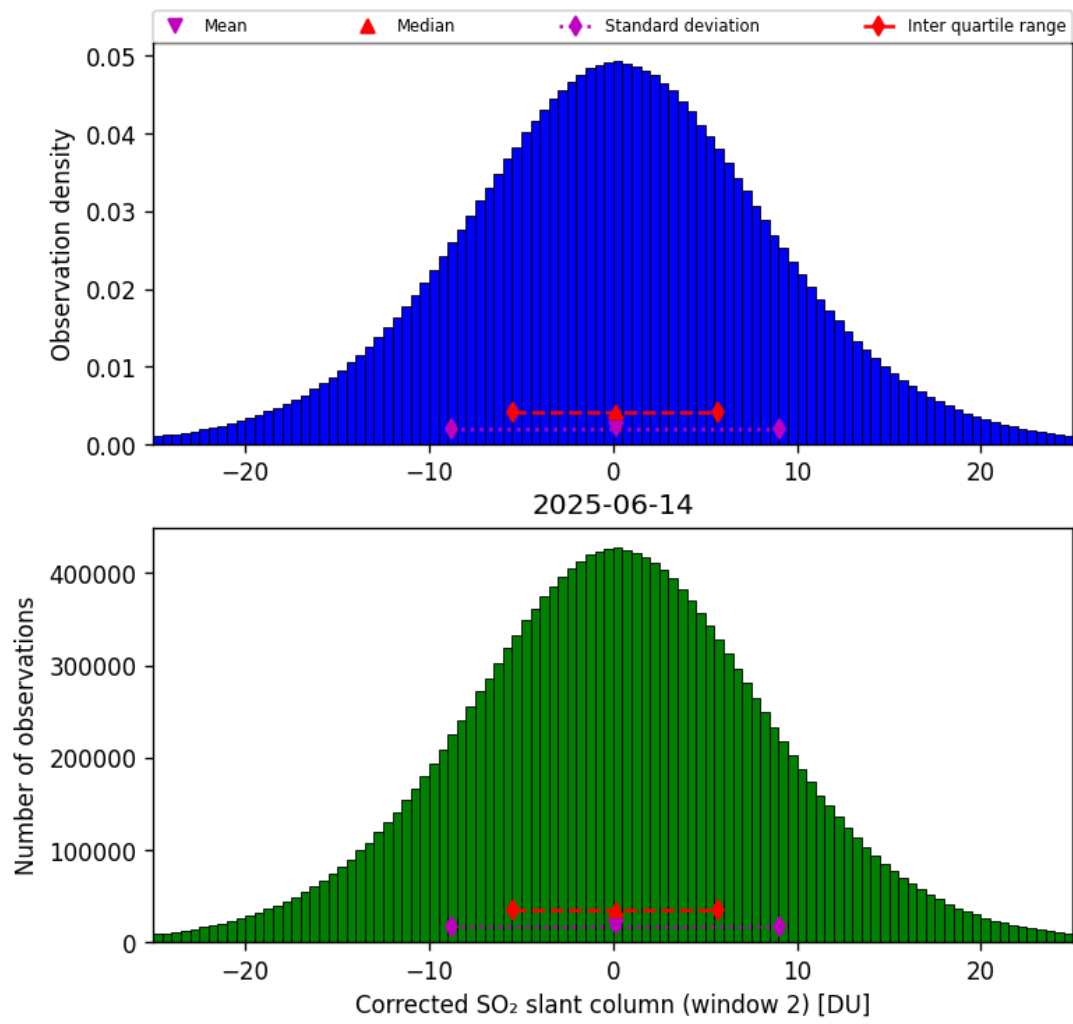


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-06-14 to 2025-06-14

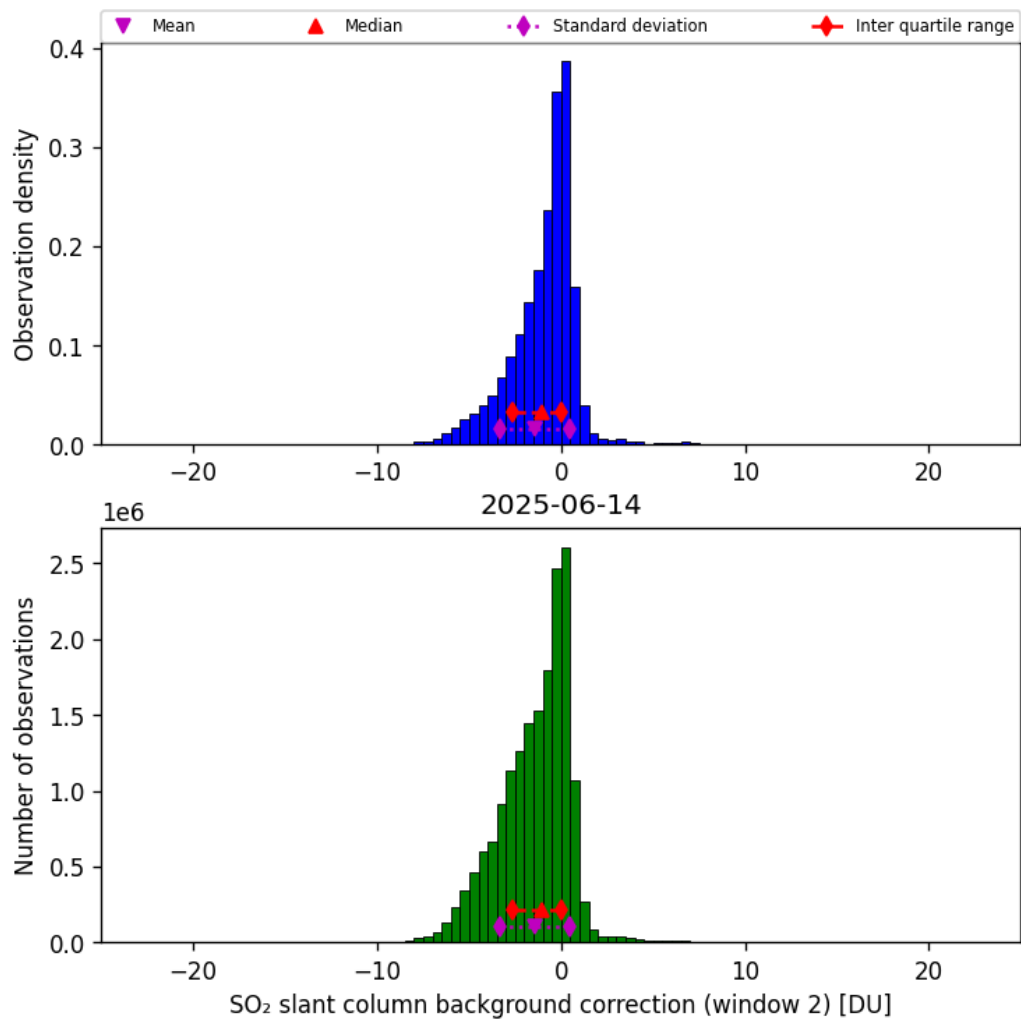


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-06-14 to 2025-06-14

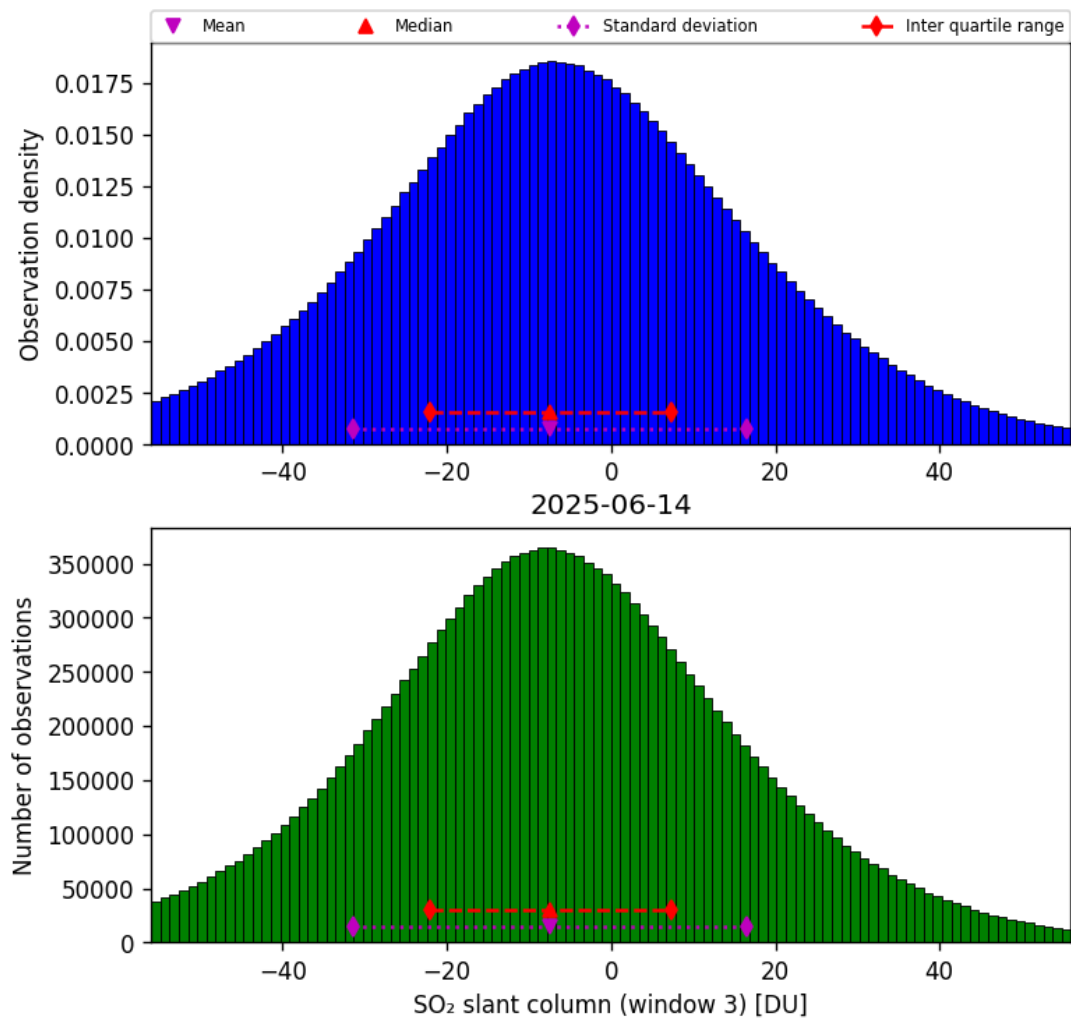


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-06-14 to 2025-06-14

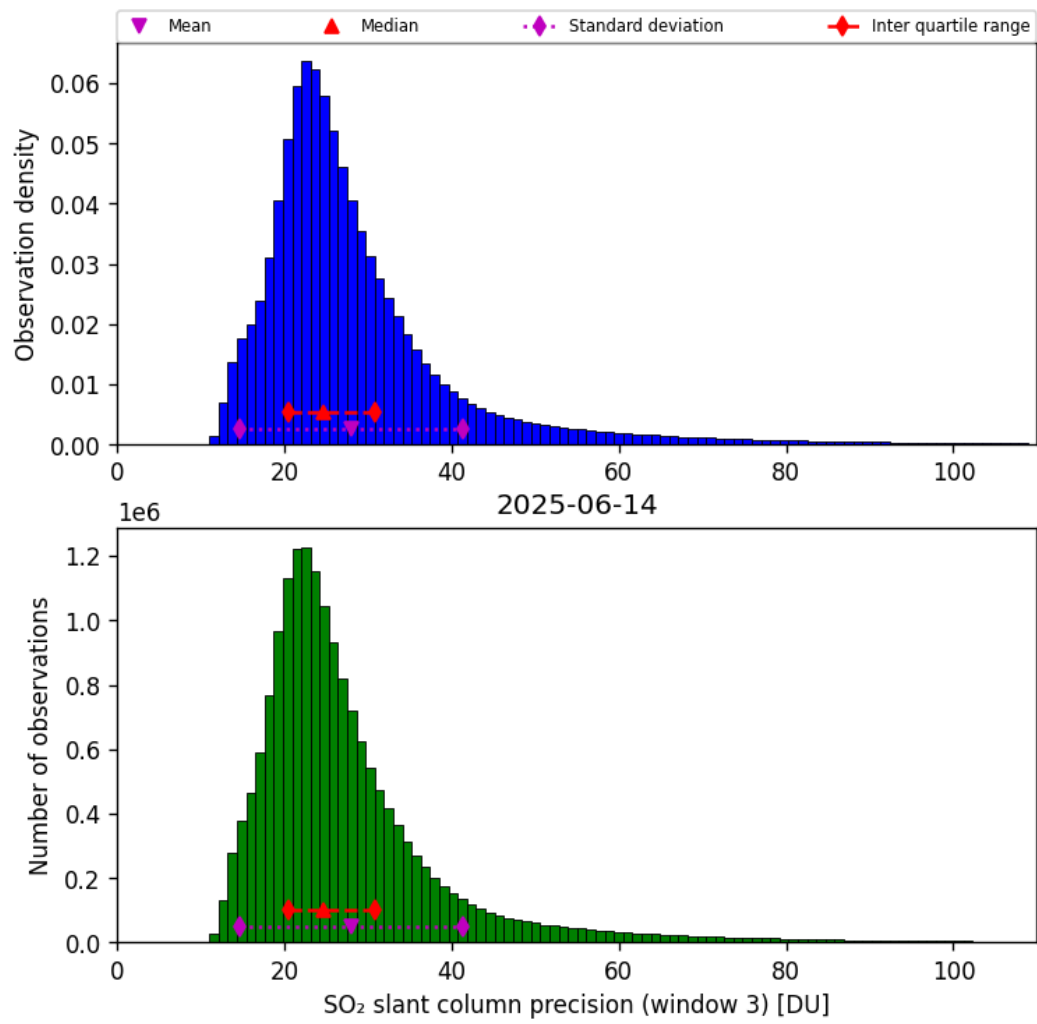


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-06-14 to 2025-06-14

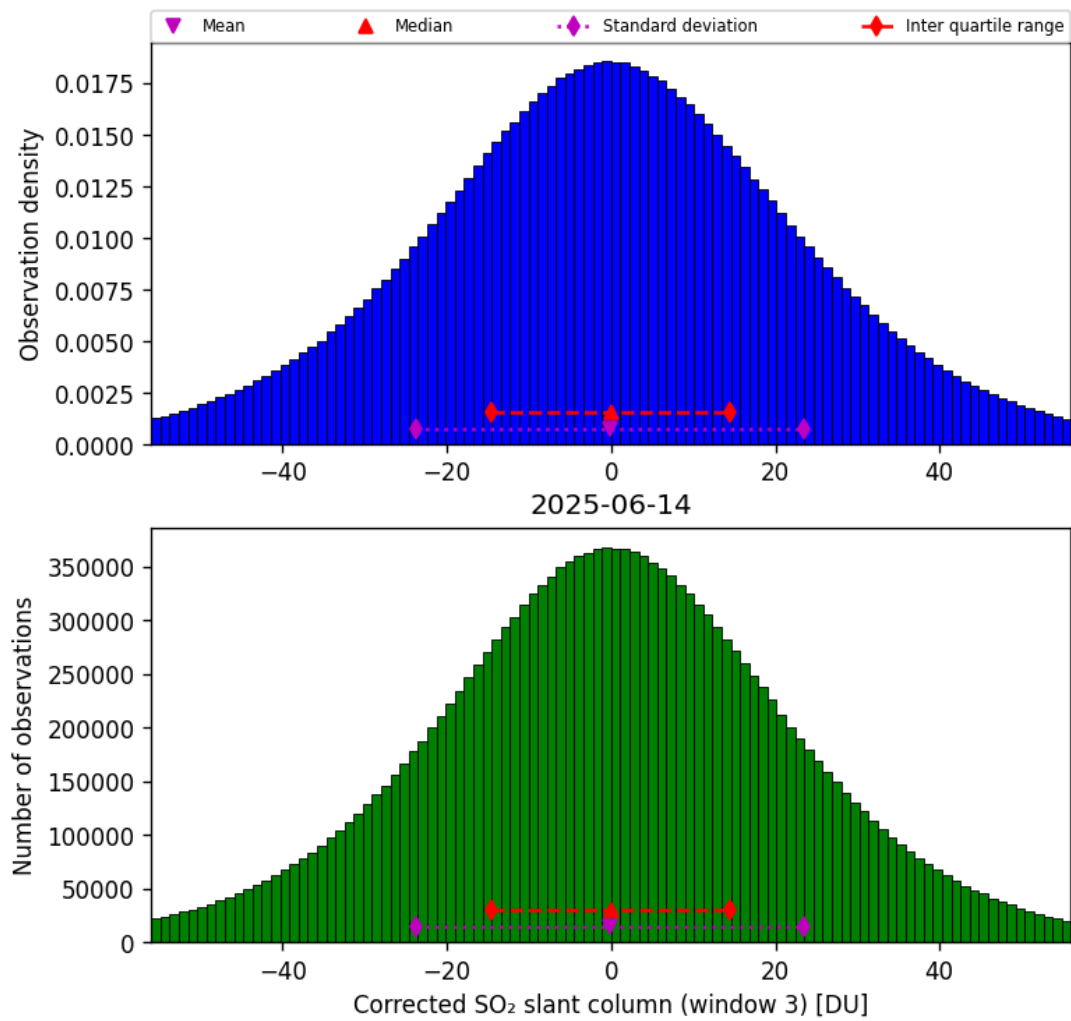


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-06-14 to 2025-06-14

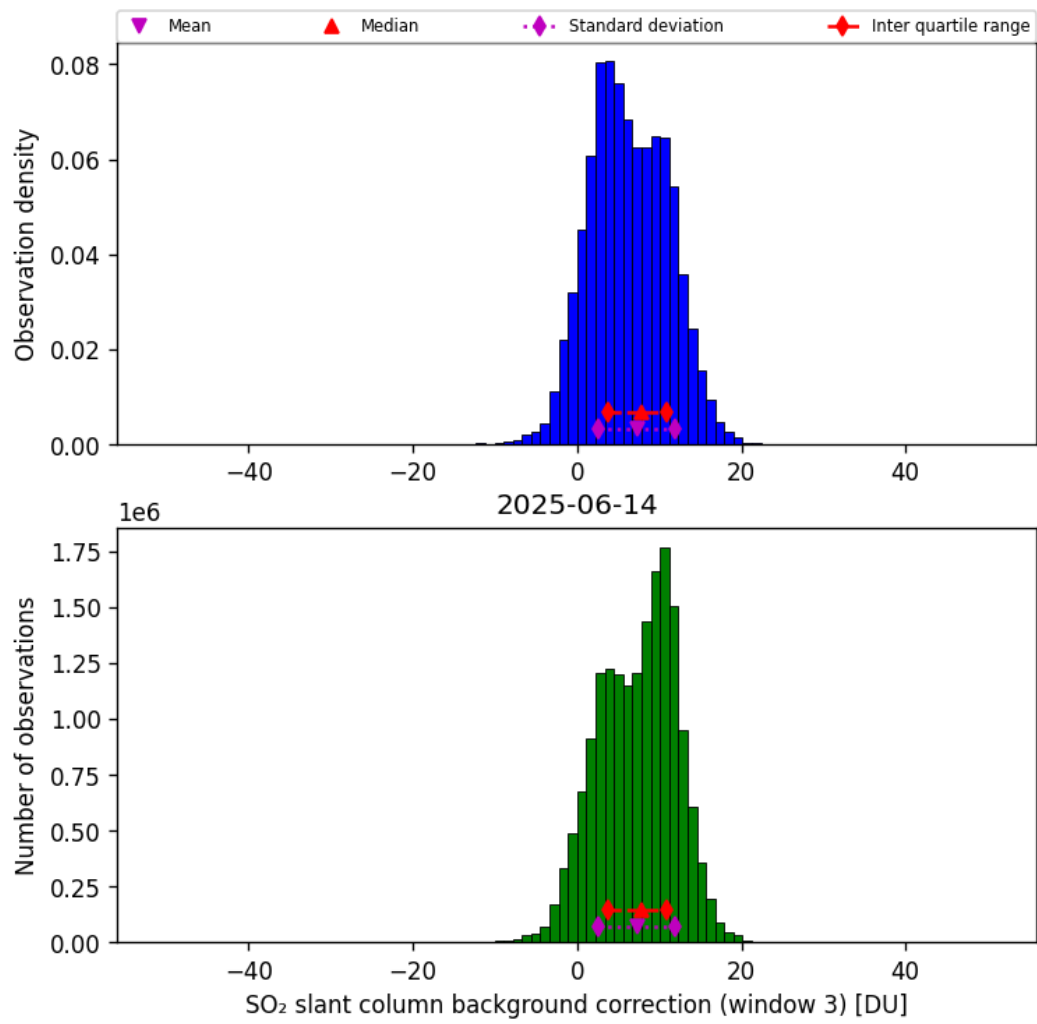


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-06-14 to 2025-06-14

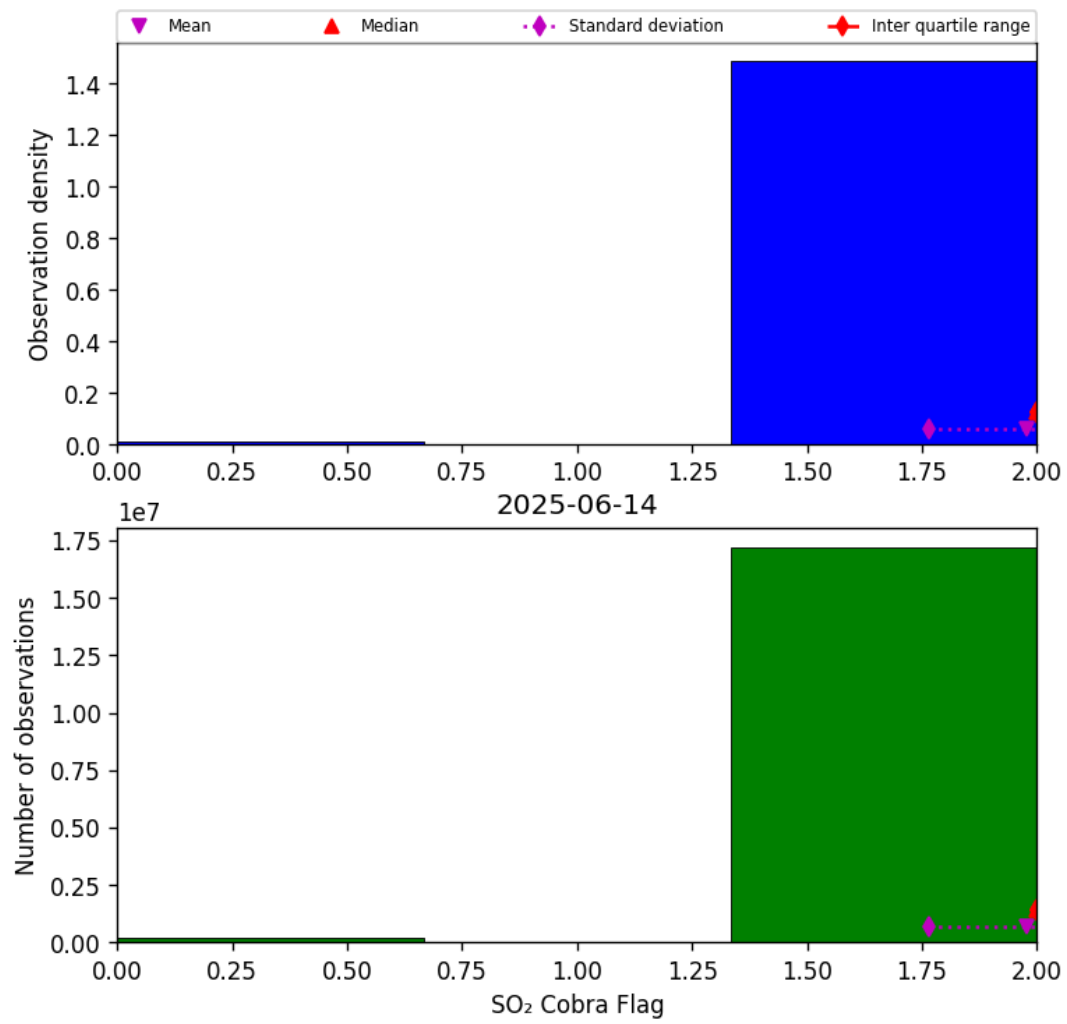


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-06-14 to 2025-06-14

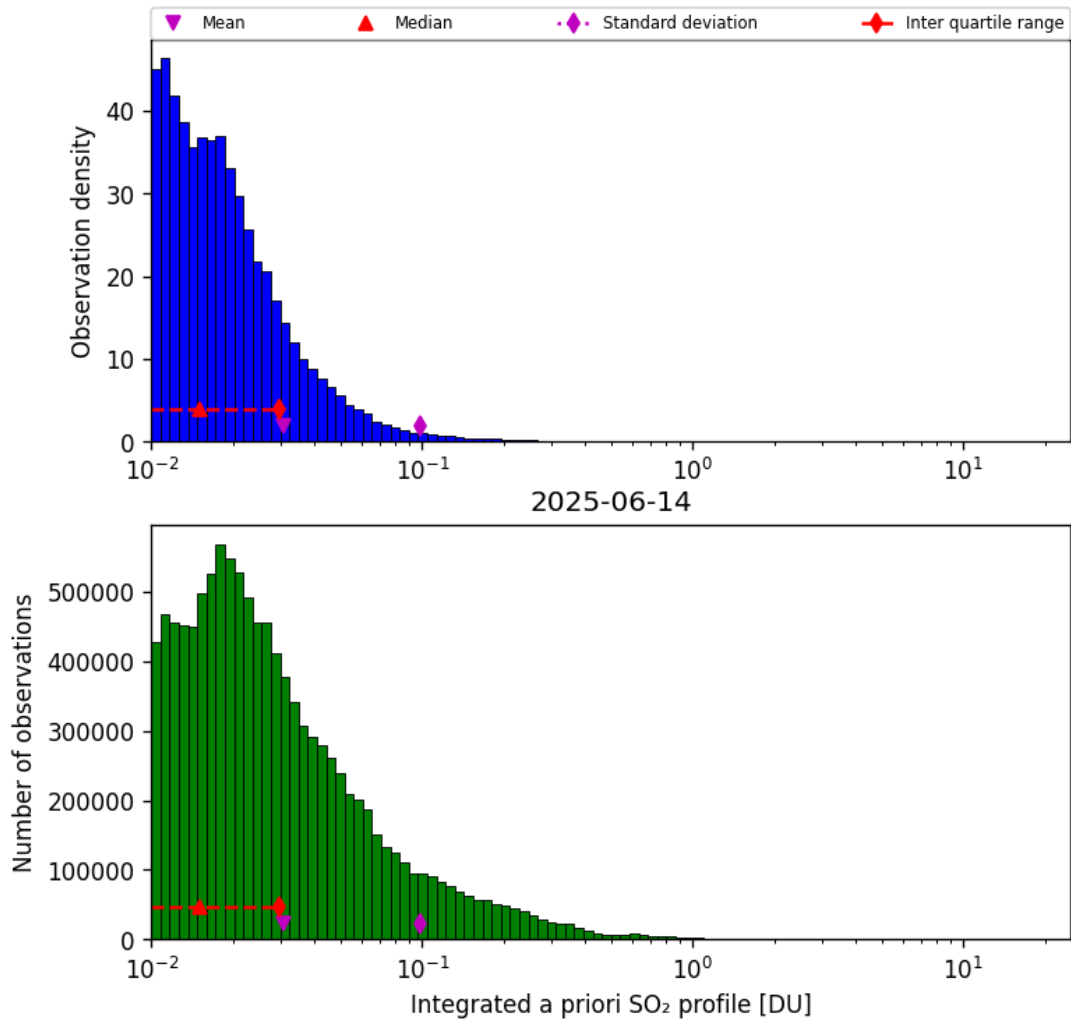


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-06-14 to 2025-06-14

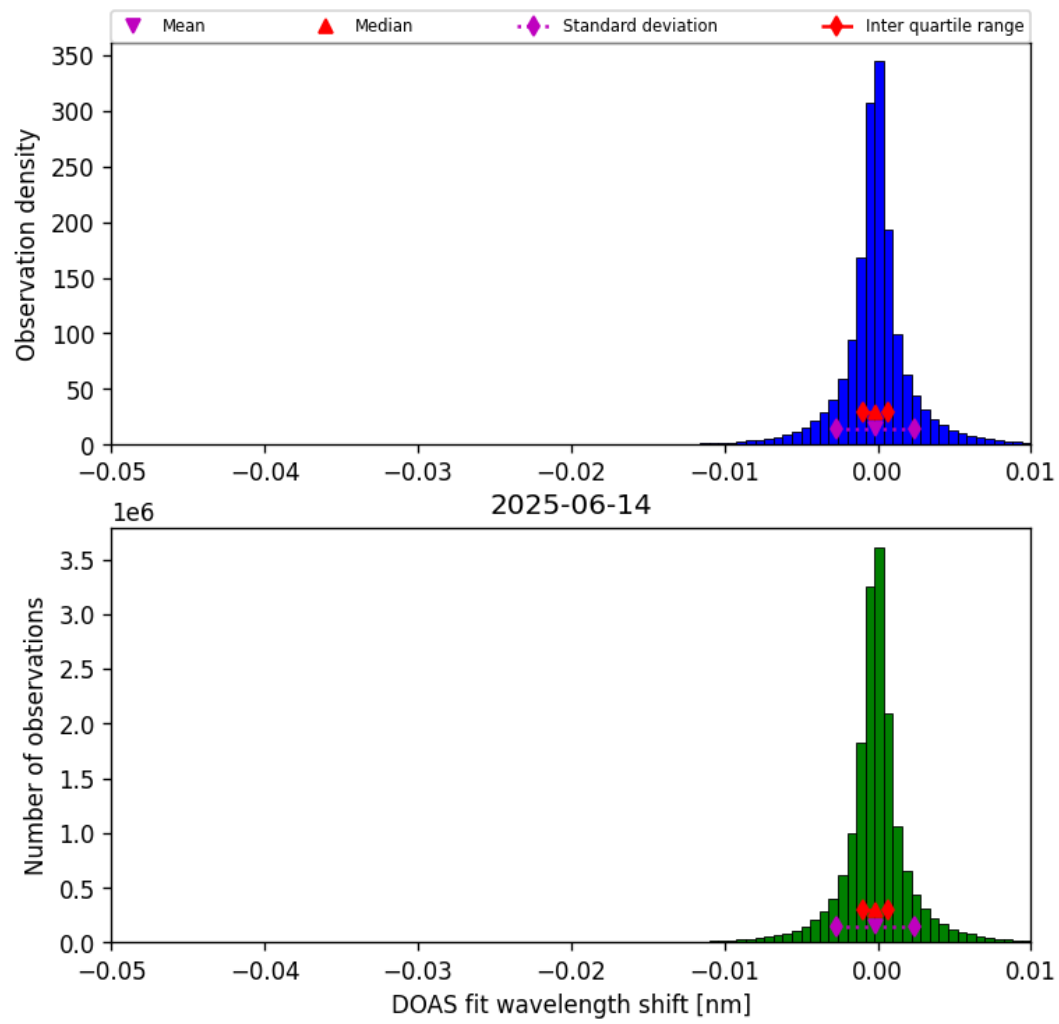


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-06-14 to 2025-06-14

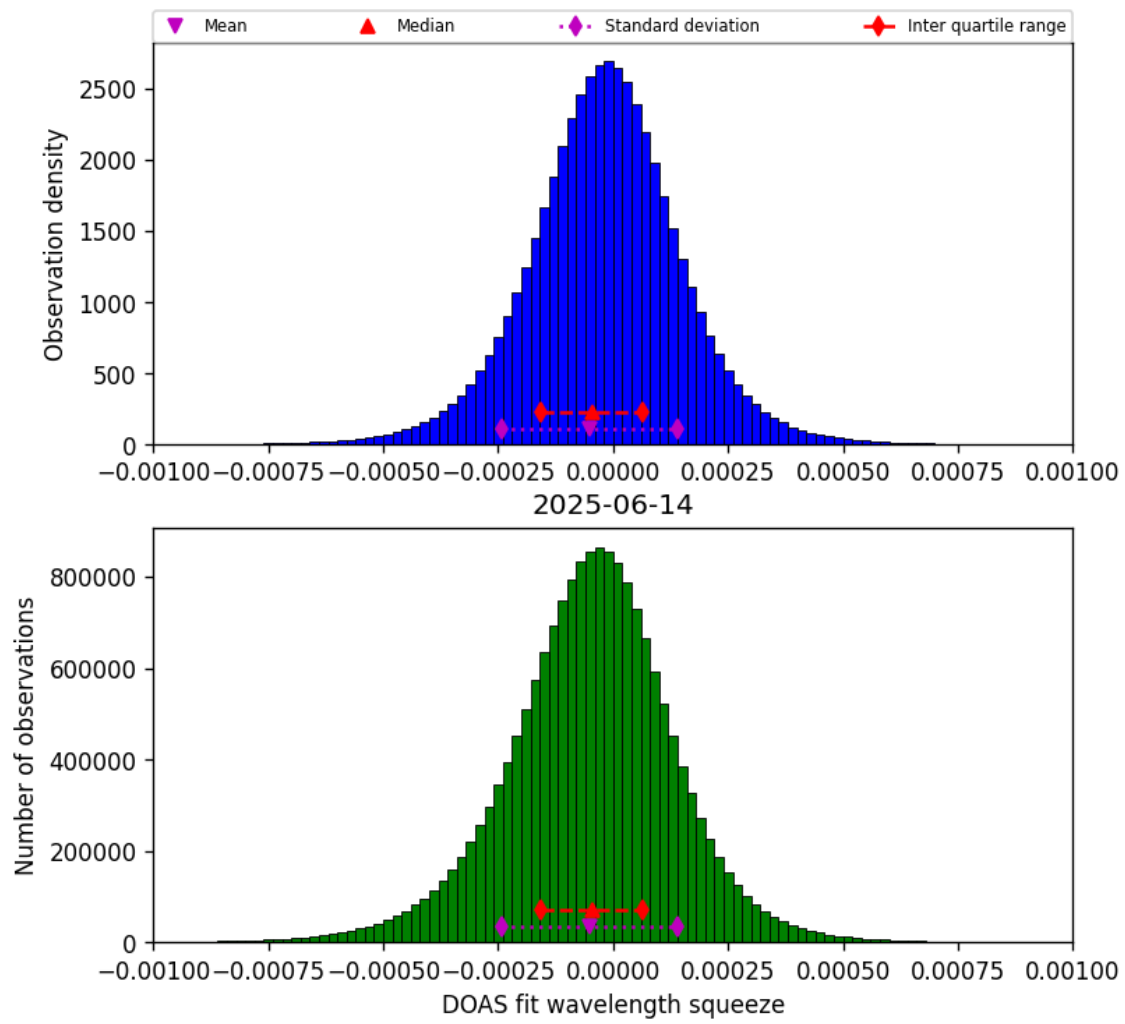


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-06-14 to 2025-06-14

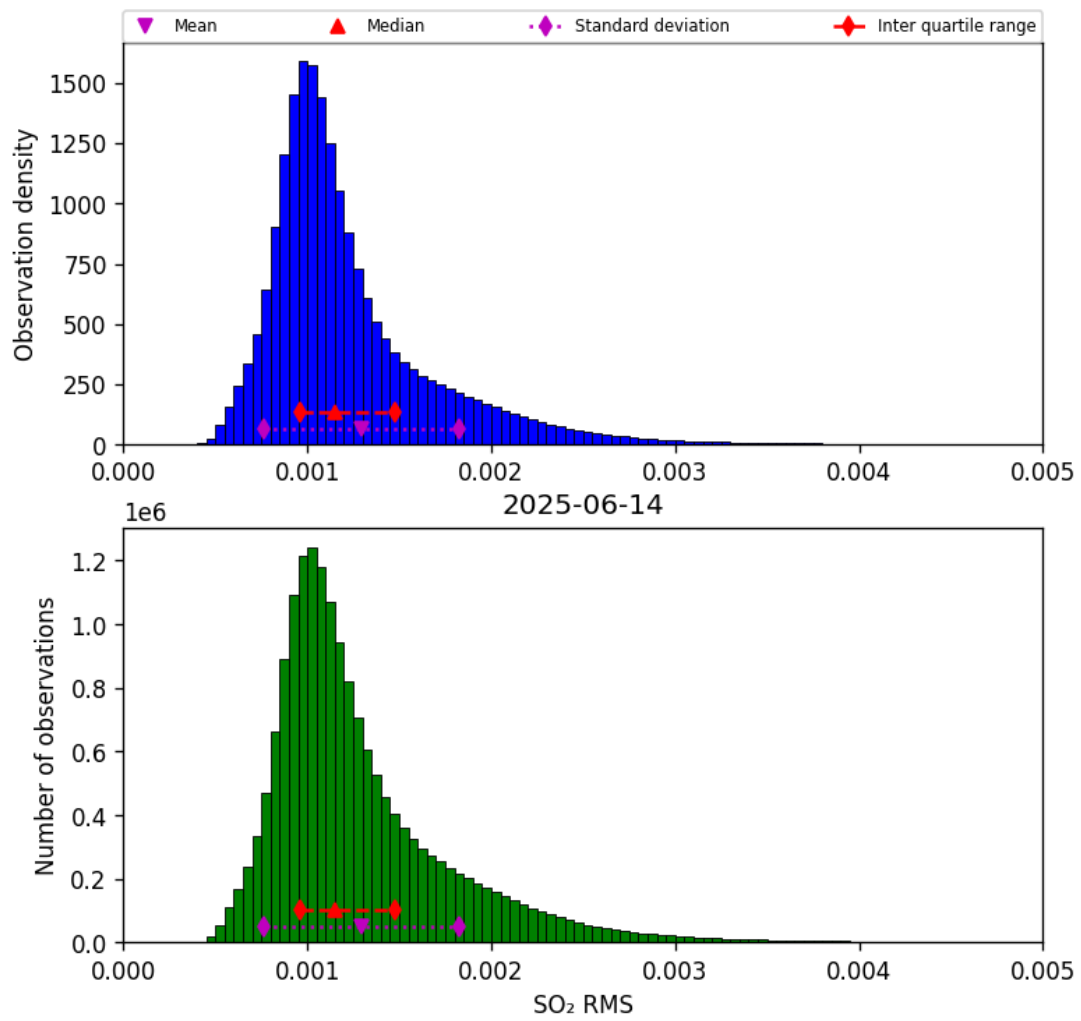


Figure 79: Histogram of “SO₂ RMS” for 2025-06-14 to 2025-06-14

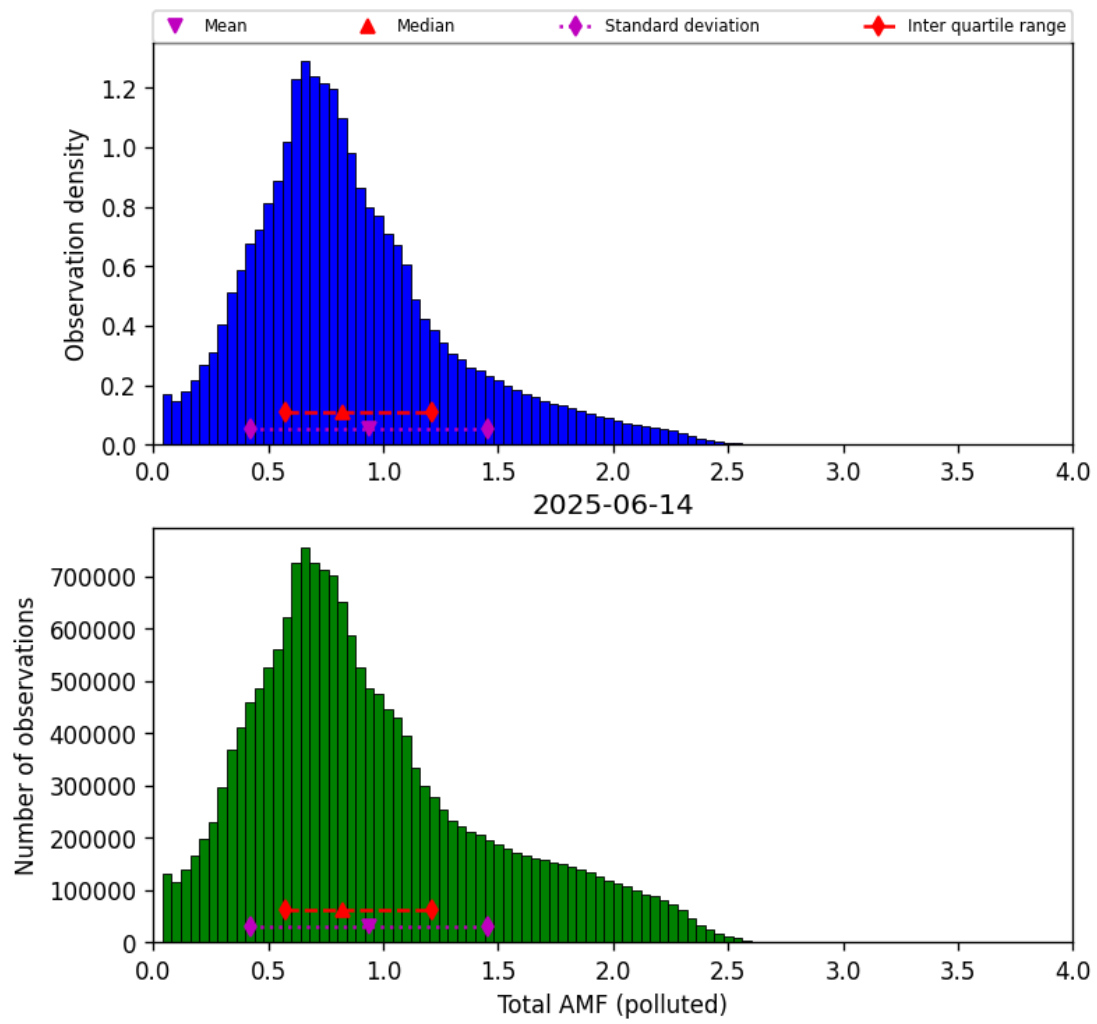


Figure 80: Histogram of “Total AMF (polluted)” for 2025-06-14 to 2025-06-14

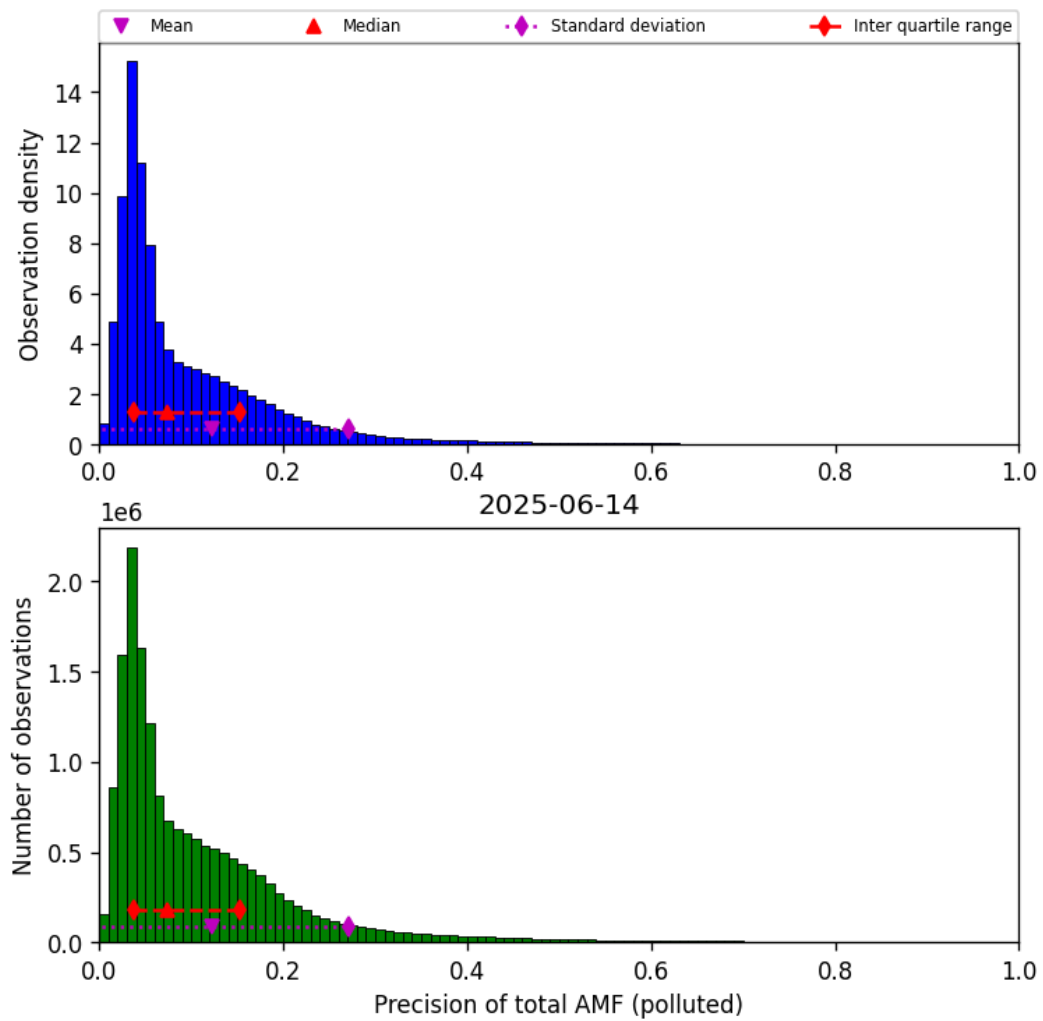


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-06-14 to 2025-06-14

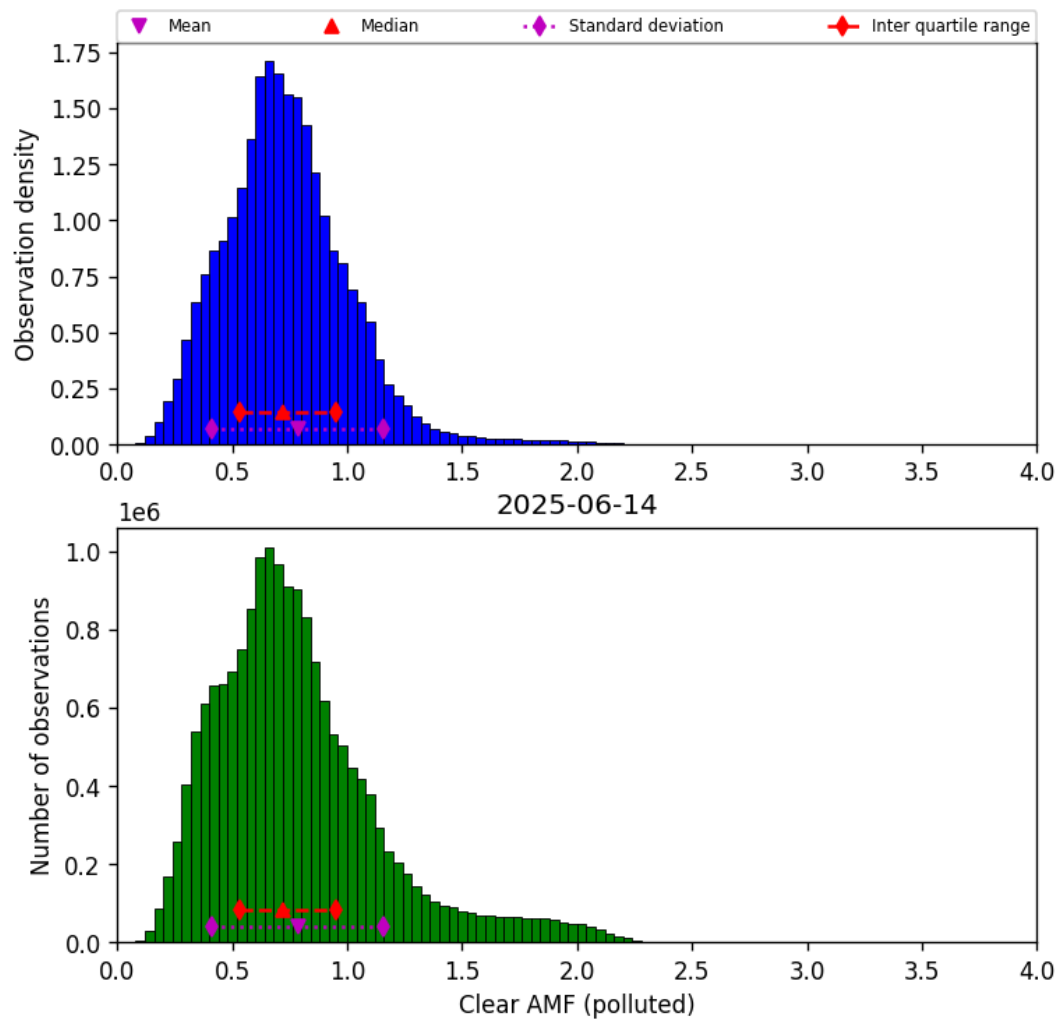


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-06-14 to 2025-06-14

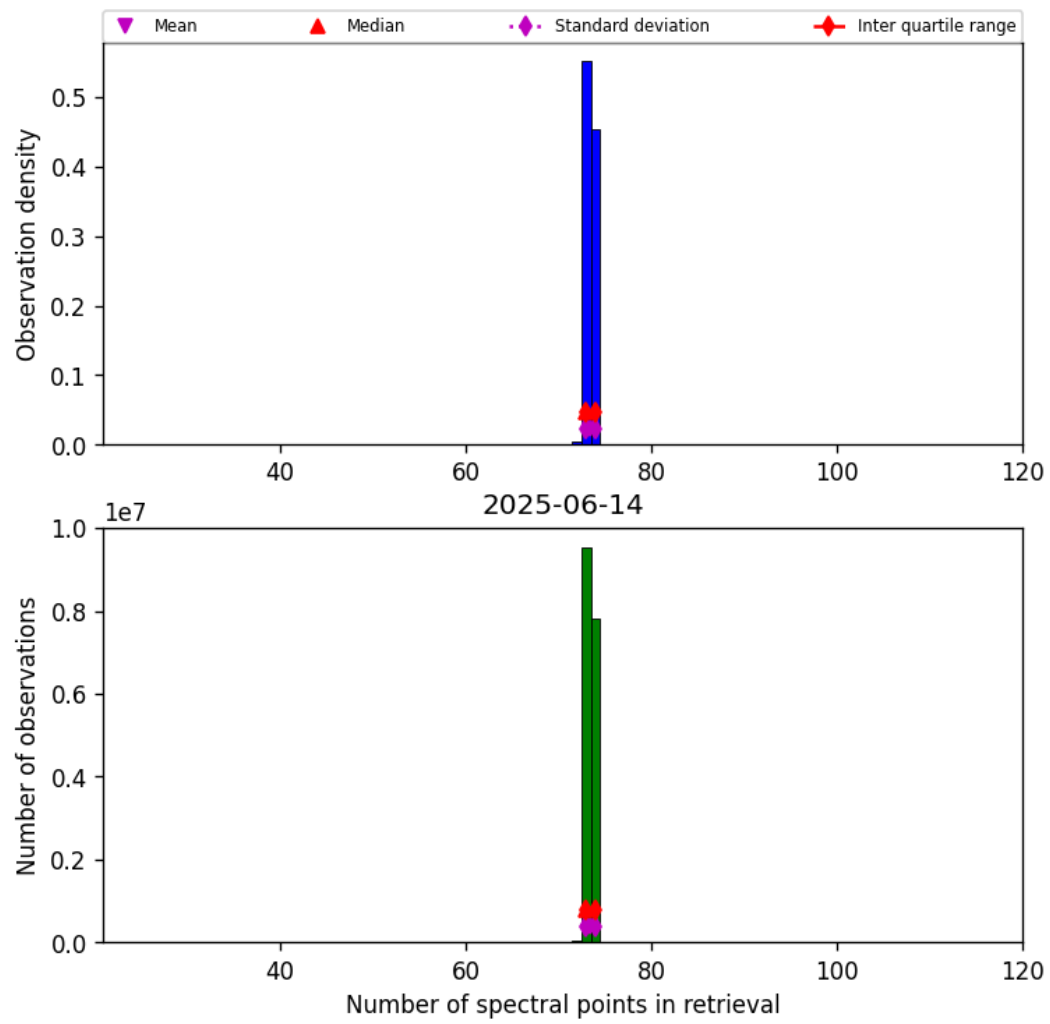


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-06-14 to 2025-06-14

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.

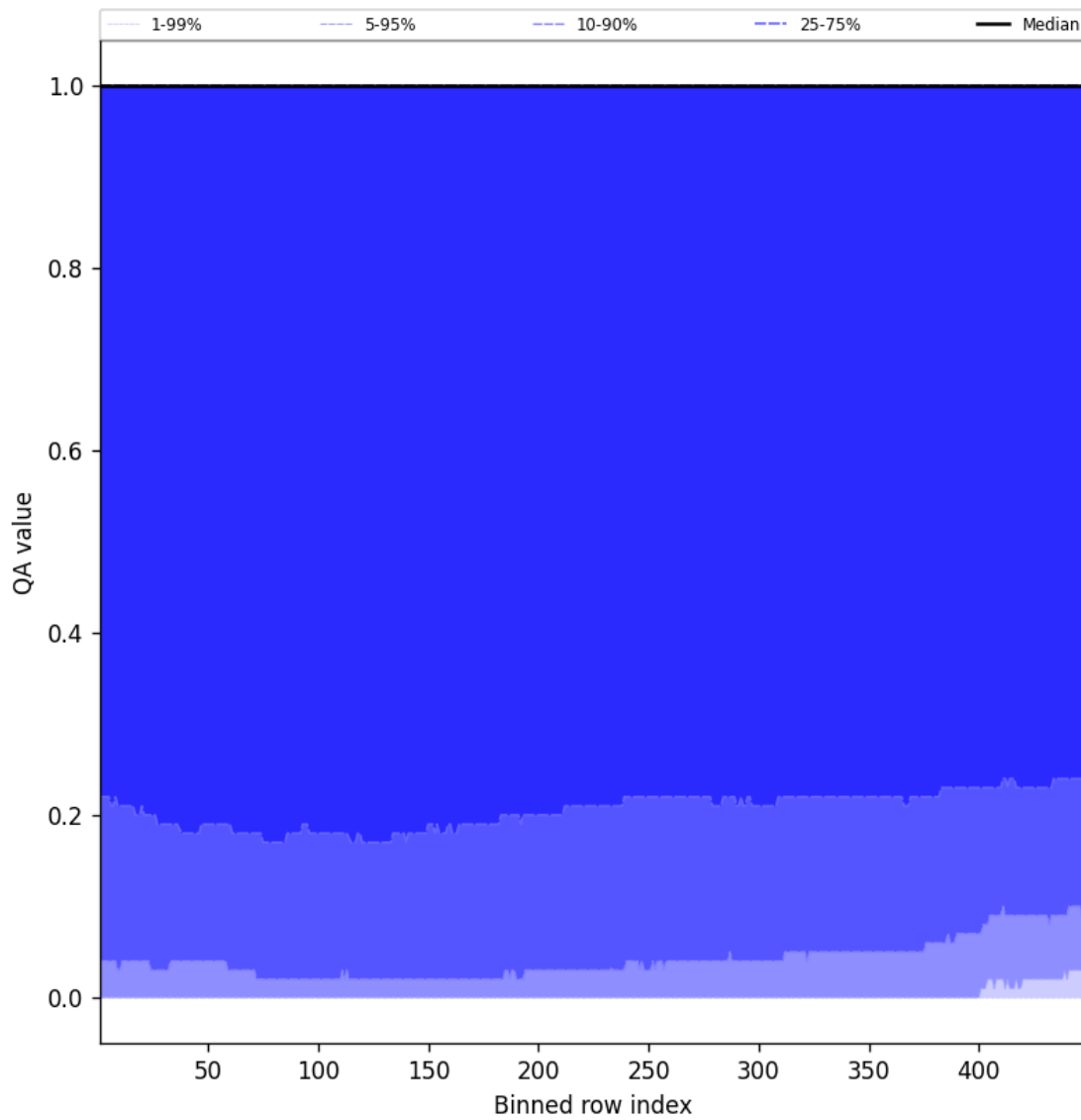


Figure 84: Along track statistics of “QA value” for 2025-06-14 to 2025-06-14

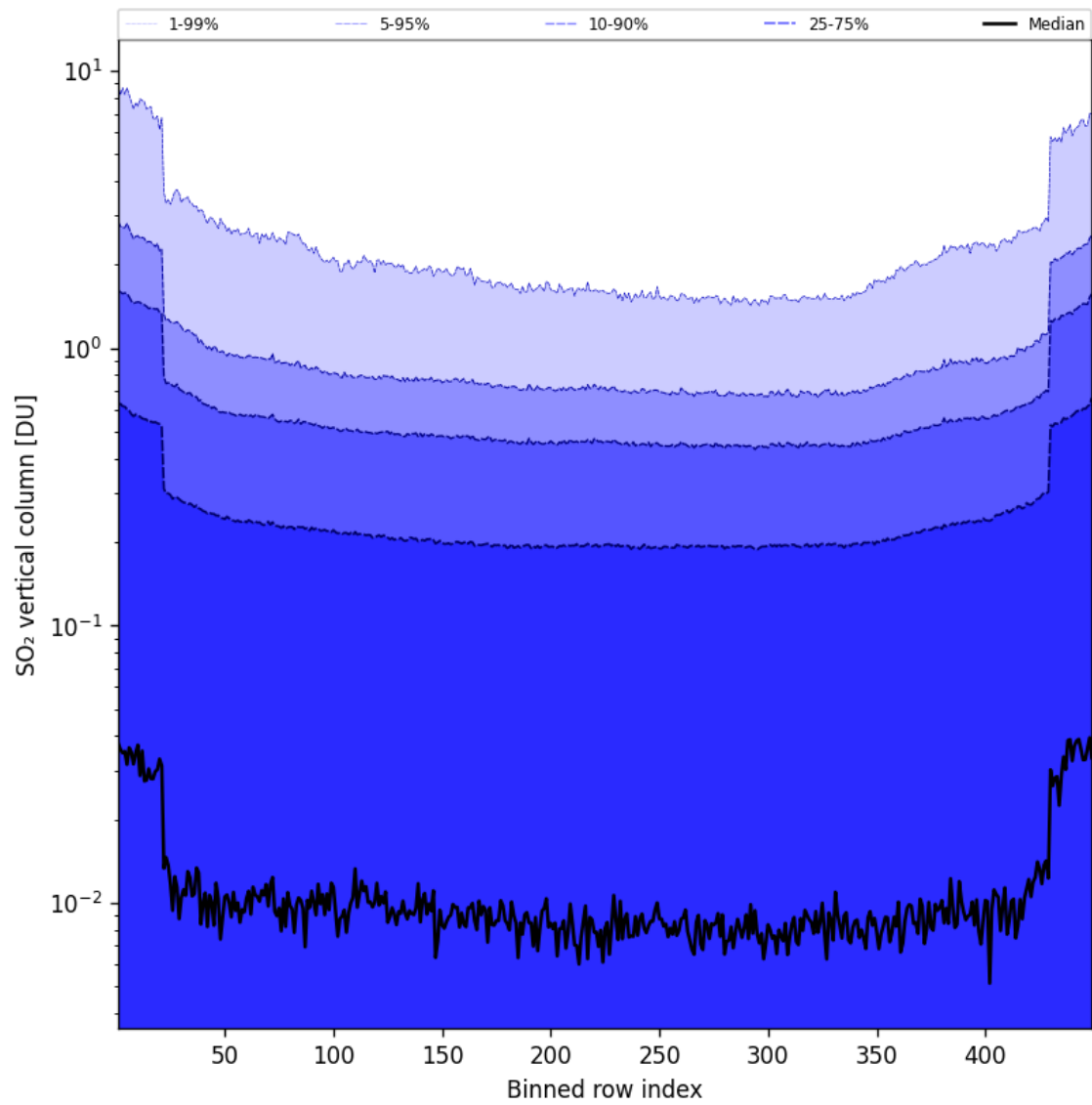


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-06-14 to 2025-06-14

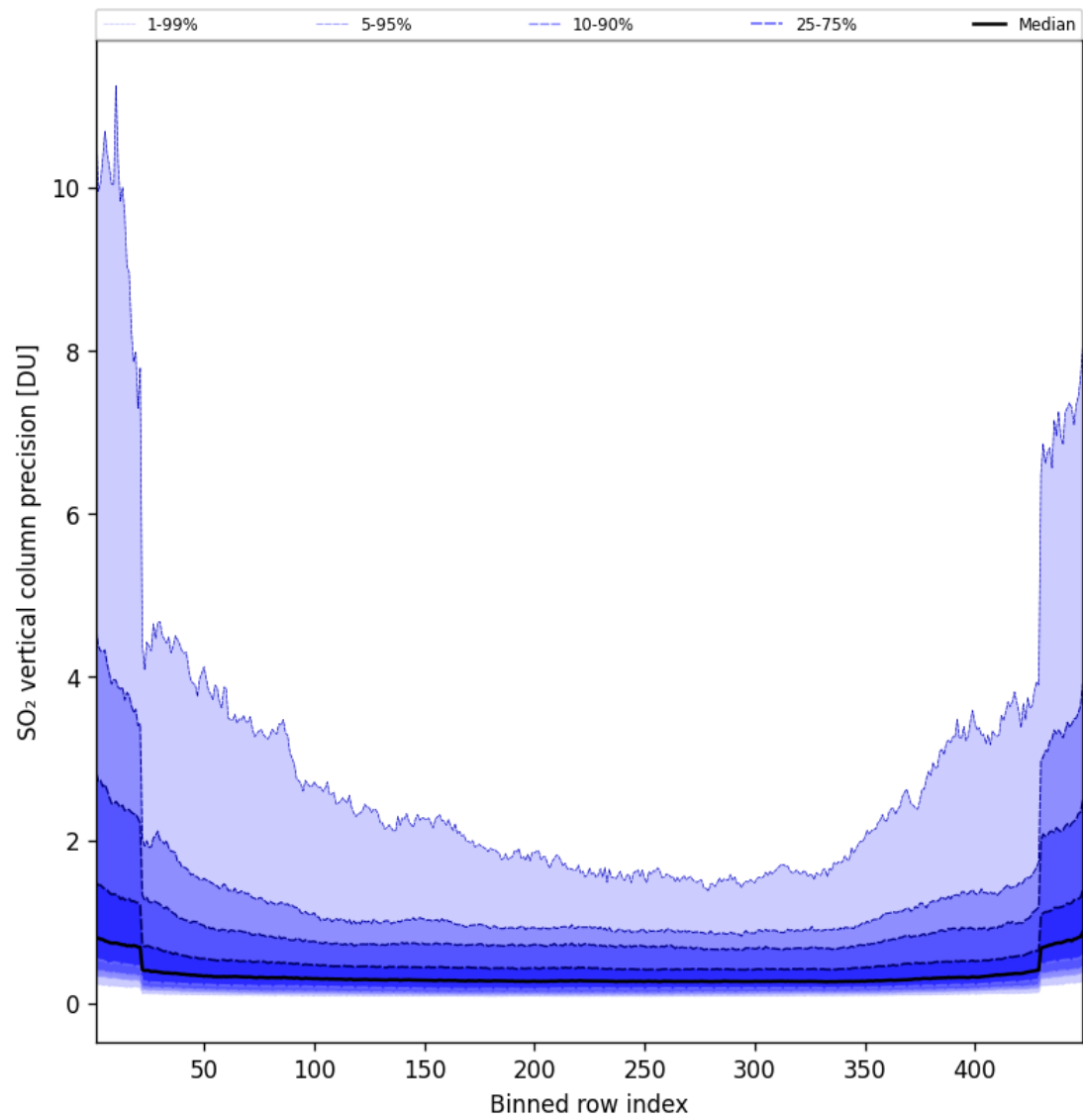


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-06-14 to 2025-06-14

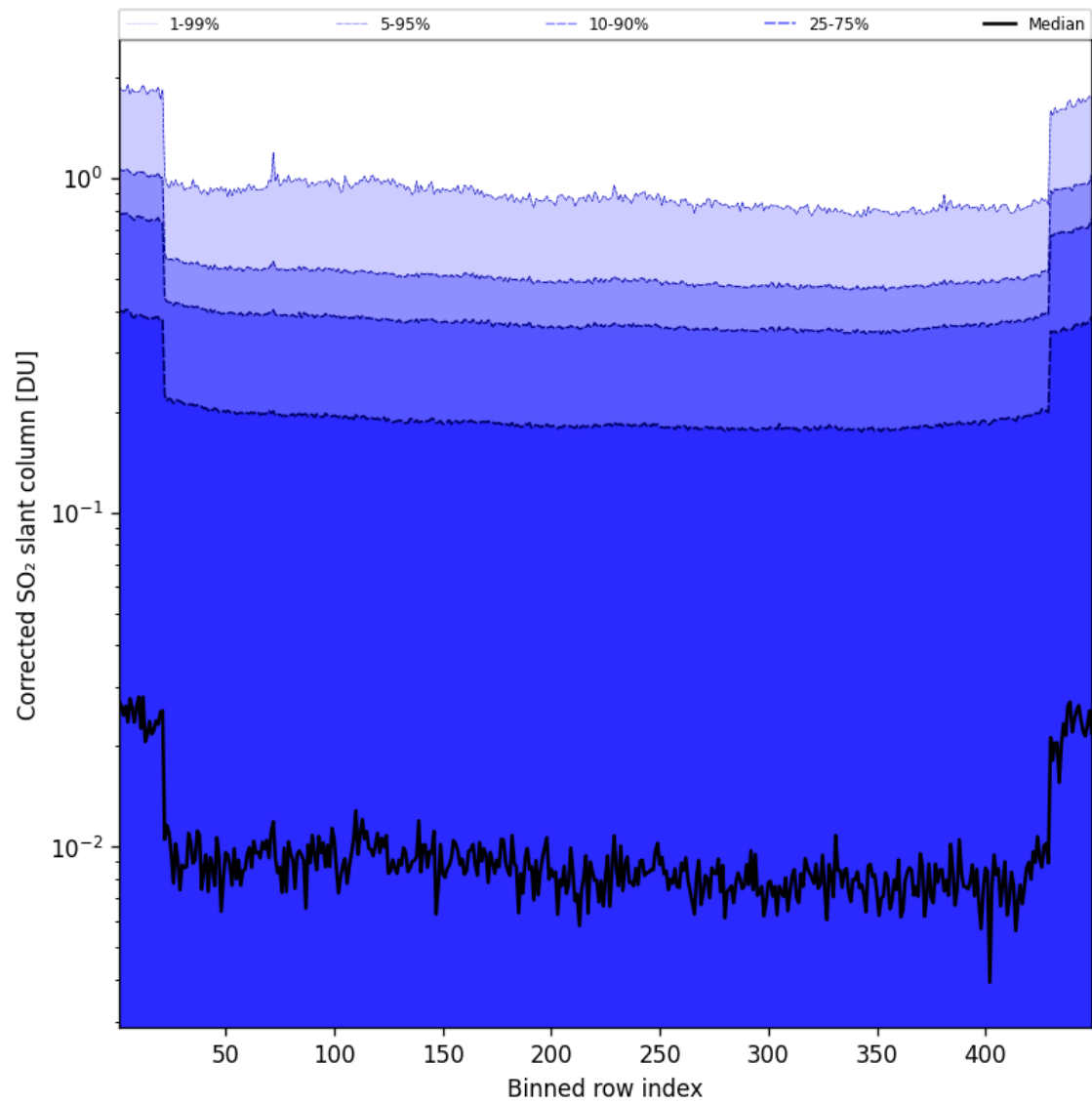


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-06-14 to 2025-06-14

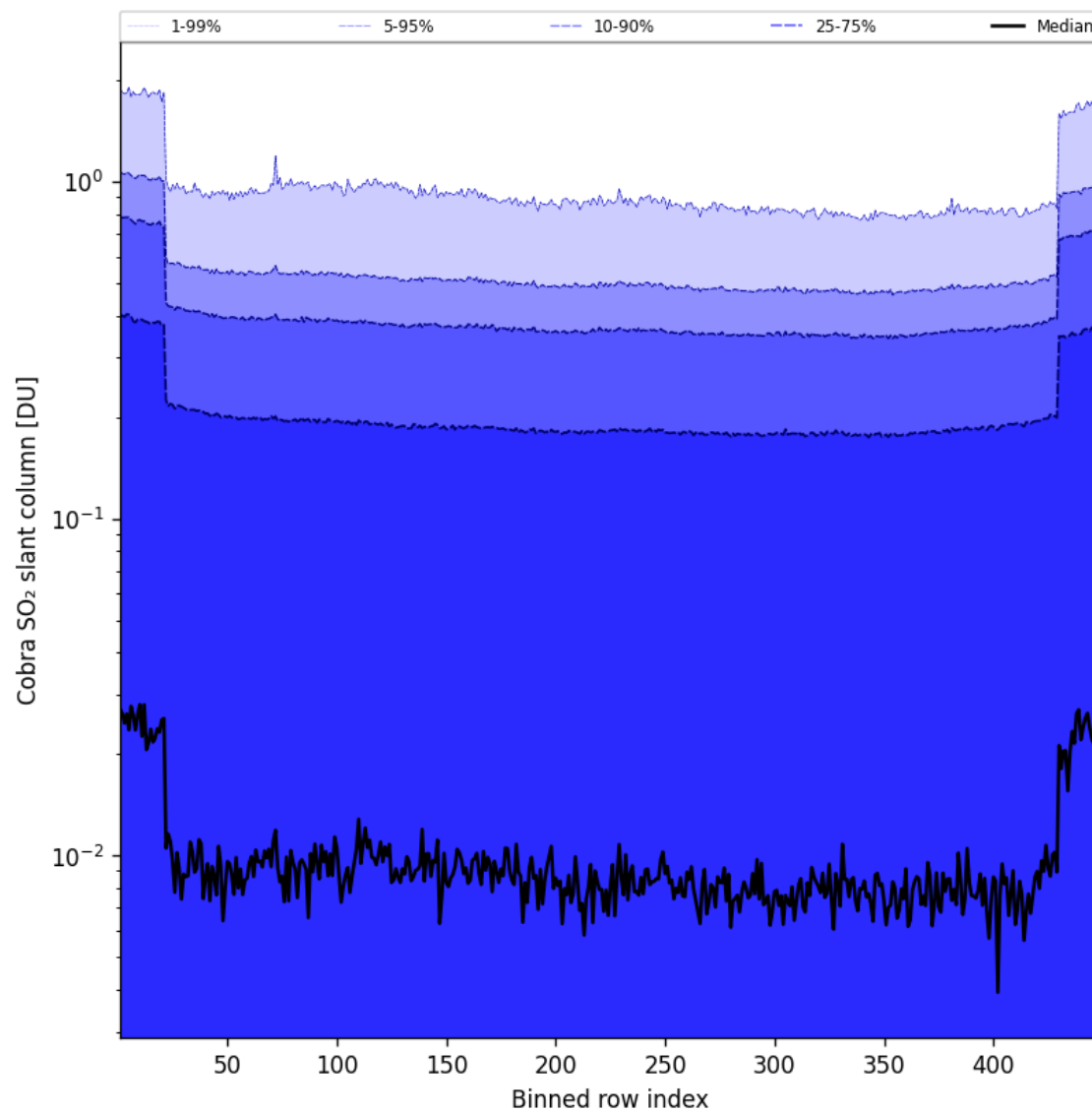


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-06-14 to 2025-06-14

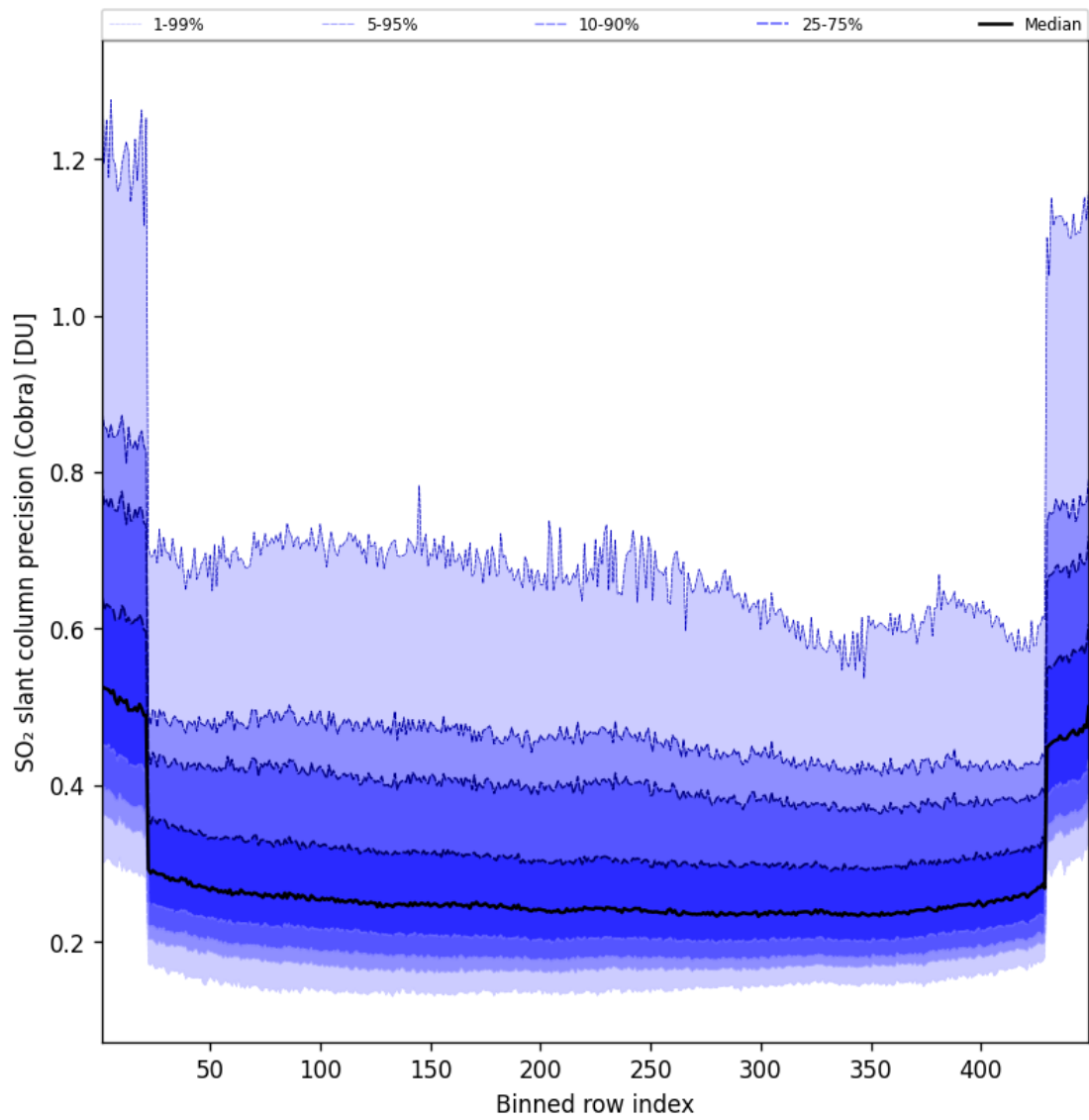


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-06-14 to 2025-06-14

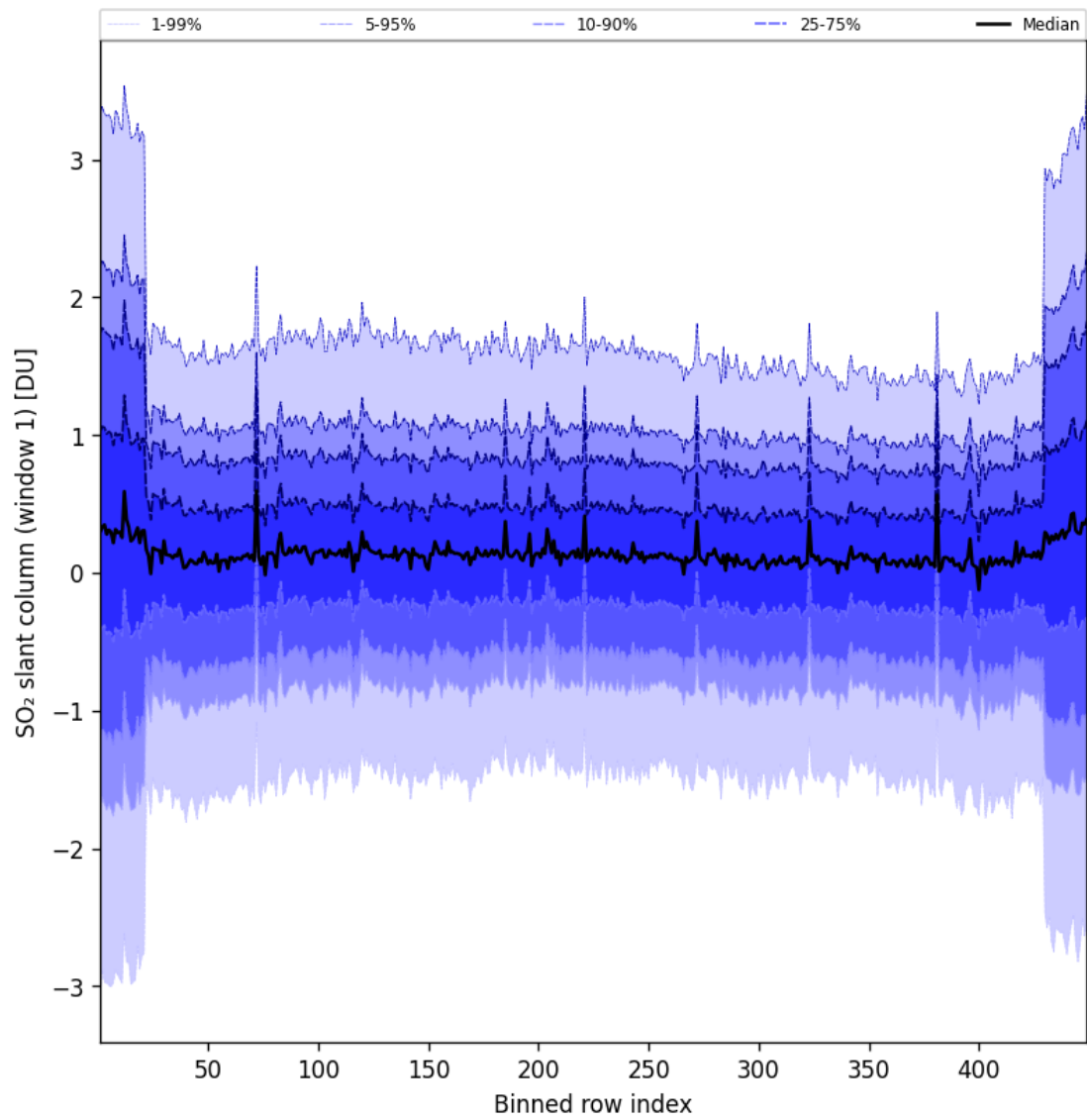


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-06-14 to 2025-06-14

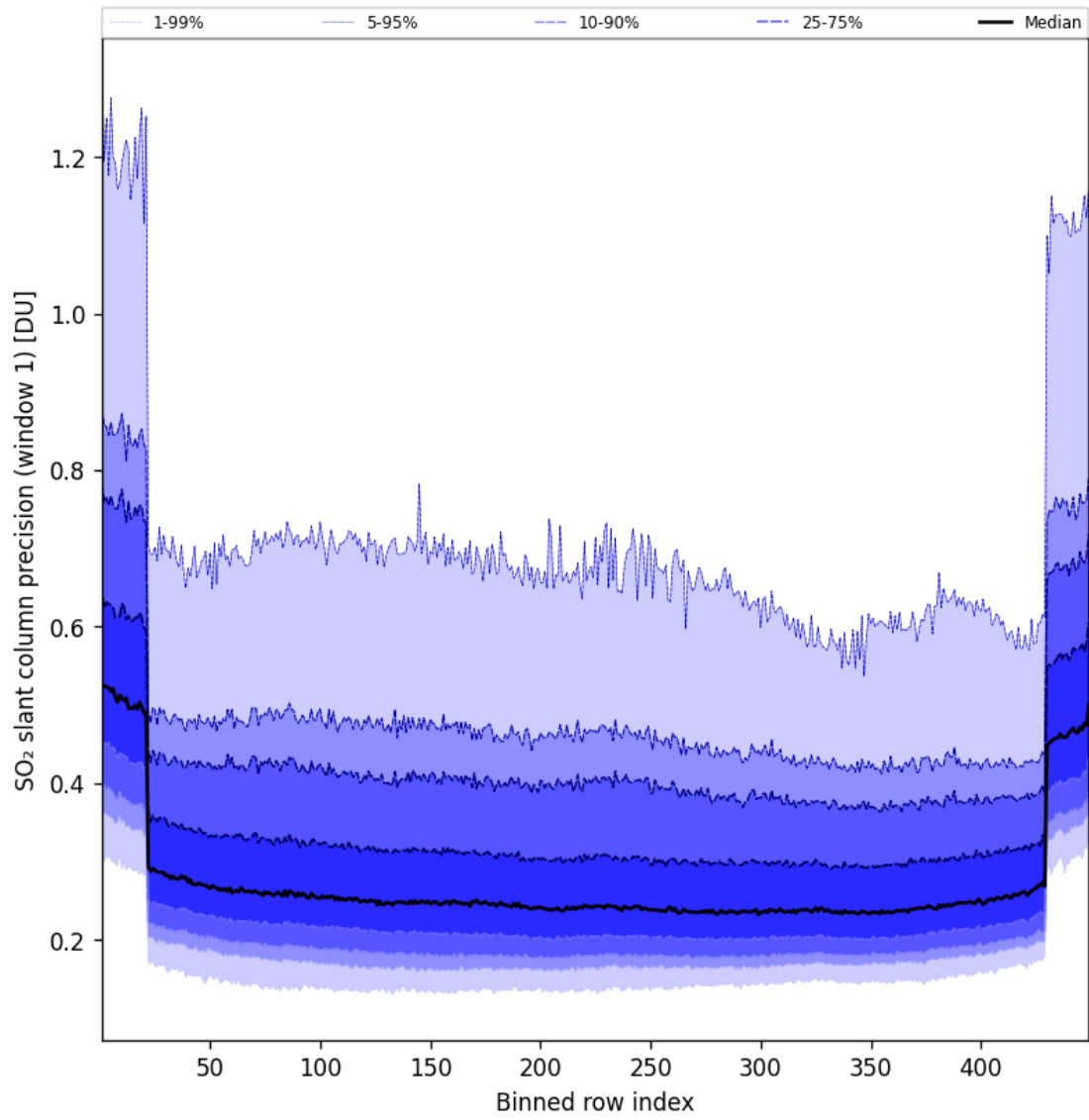


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-06-14 to 2025-06-14

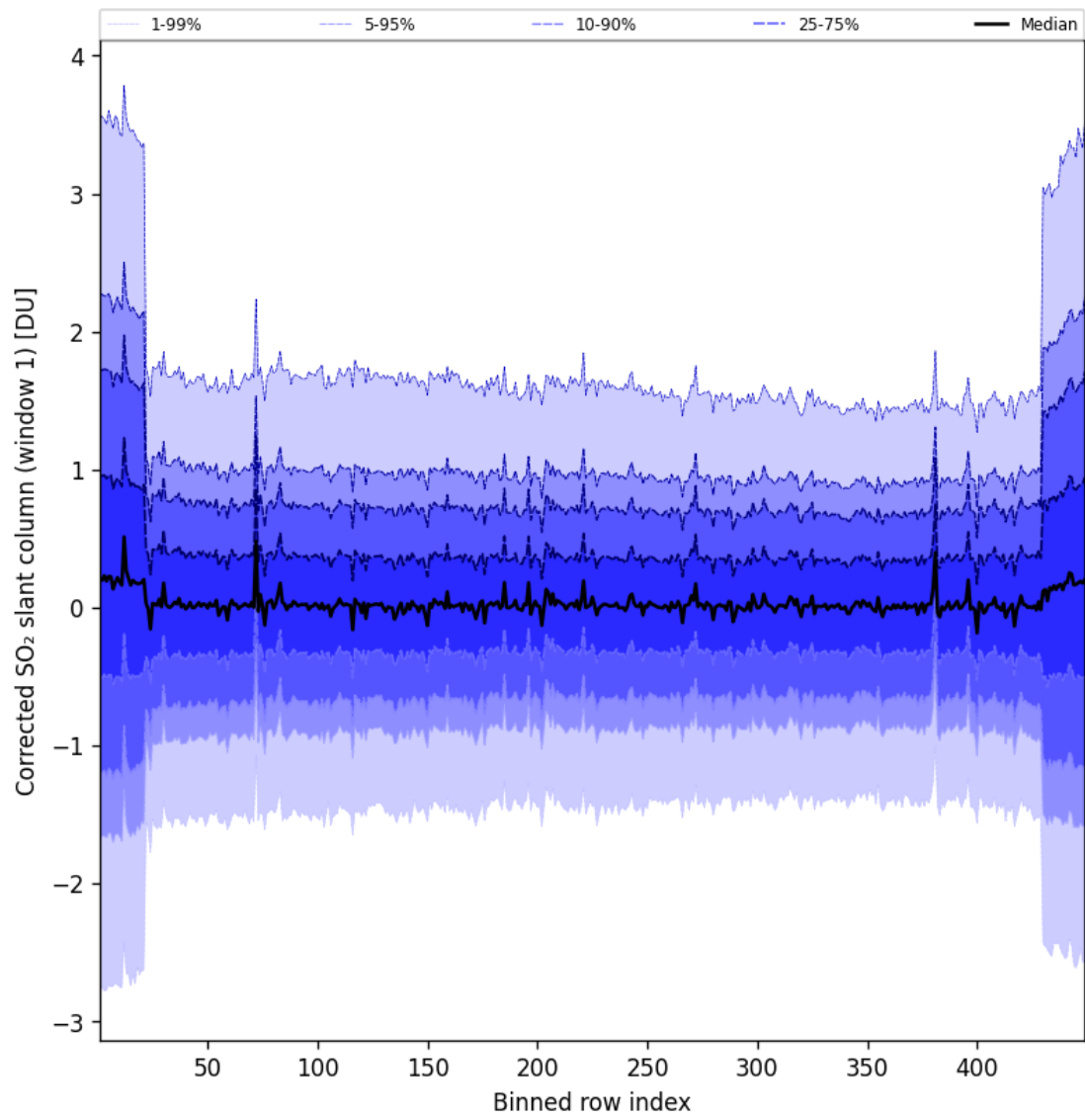


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-06-14 to 2025-06-14

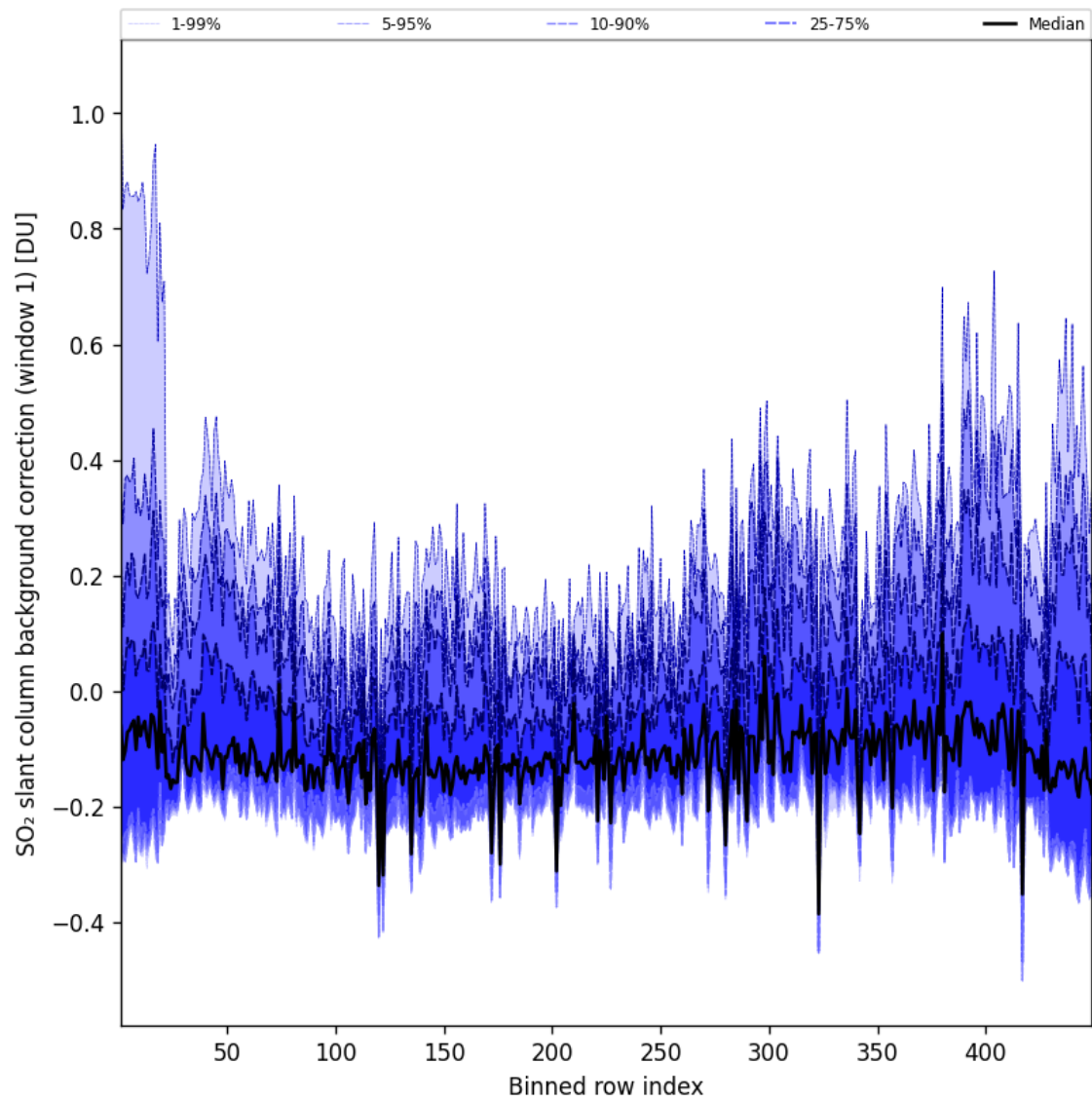


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-06-14 to 2025-06-14

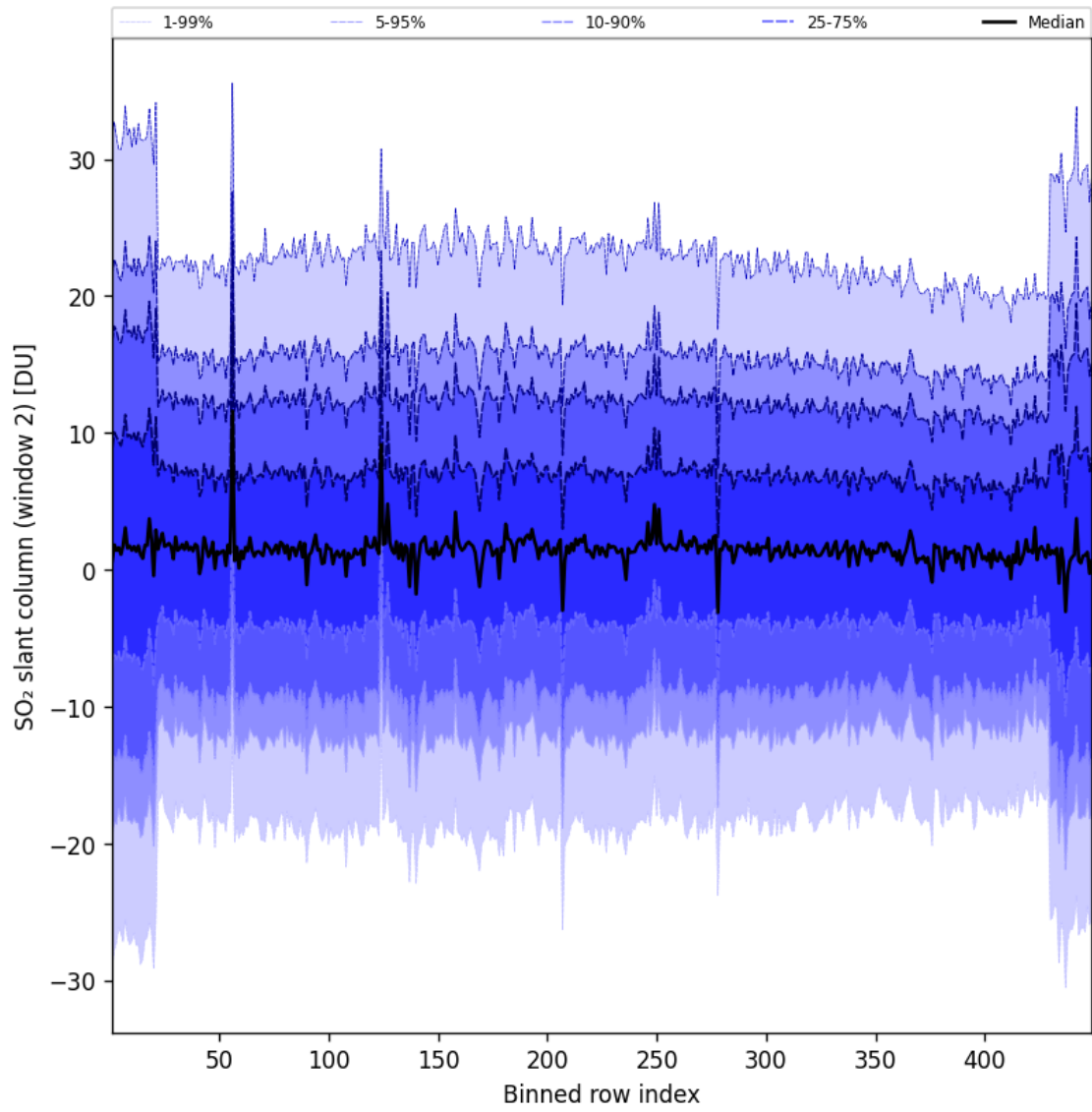


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-06-14 to 2025-06-14

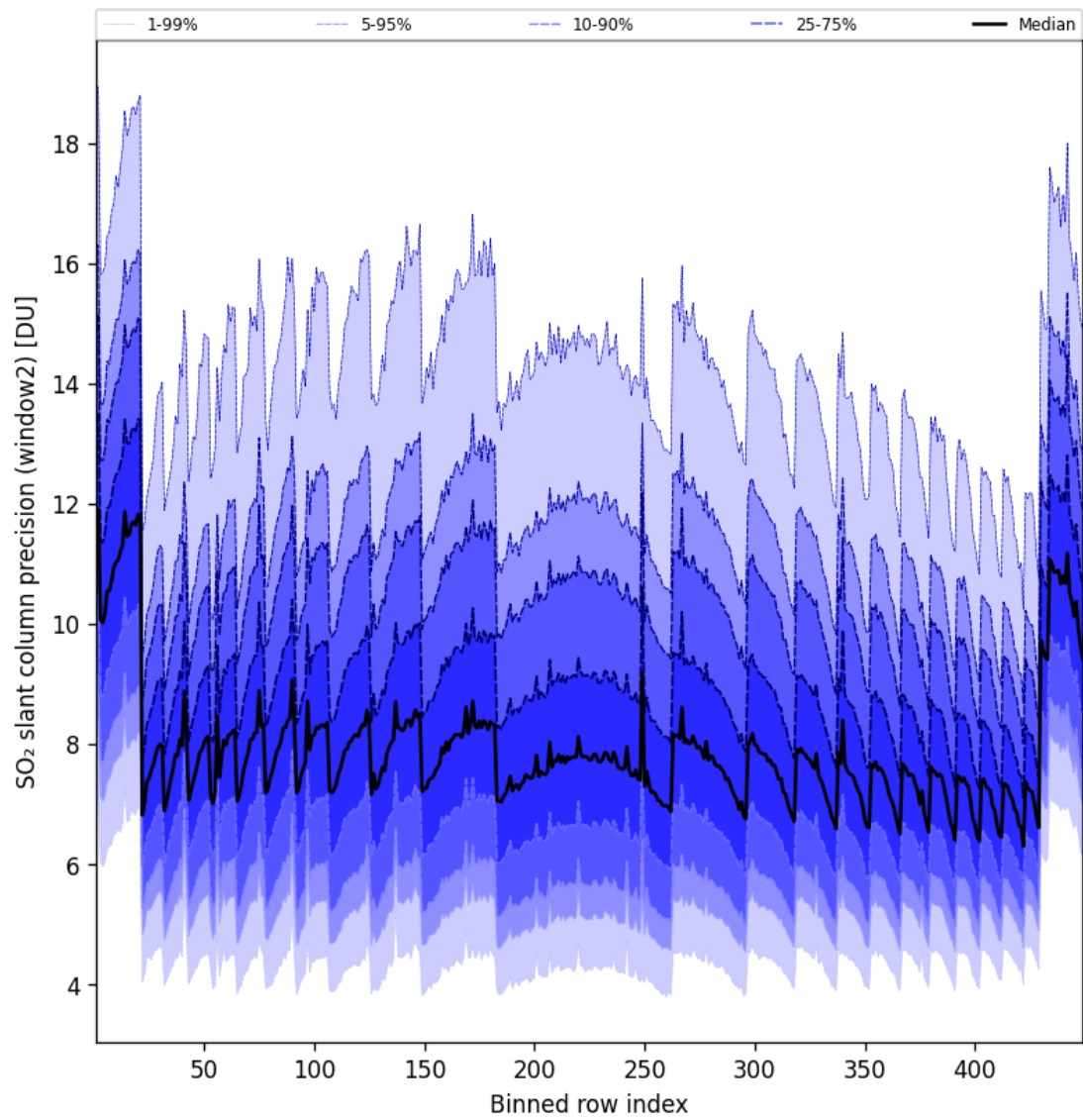


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-06-14 to 2025-06-14

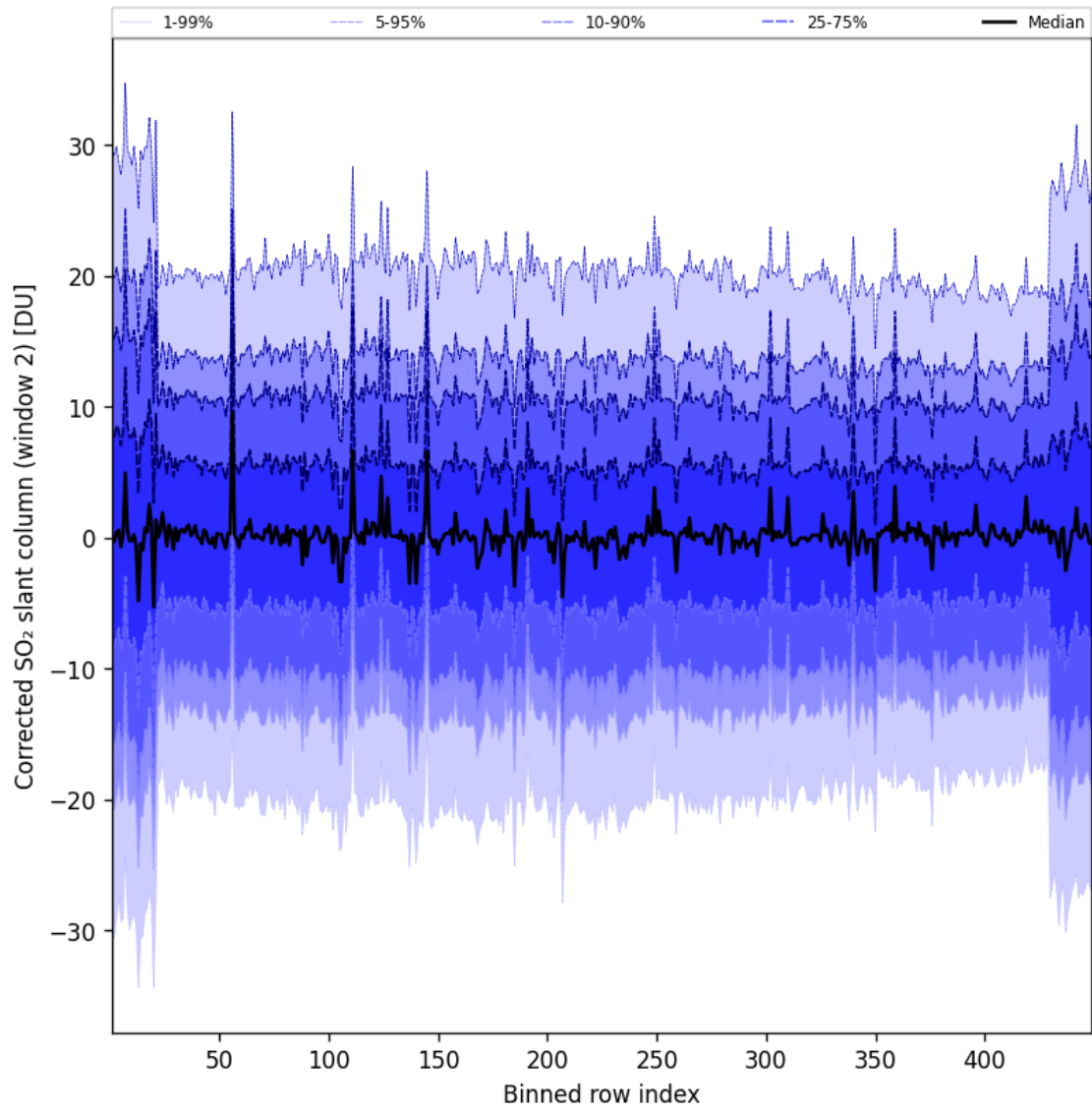


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-06-14 to 2025-06-14

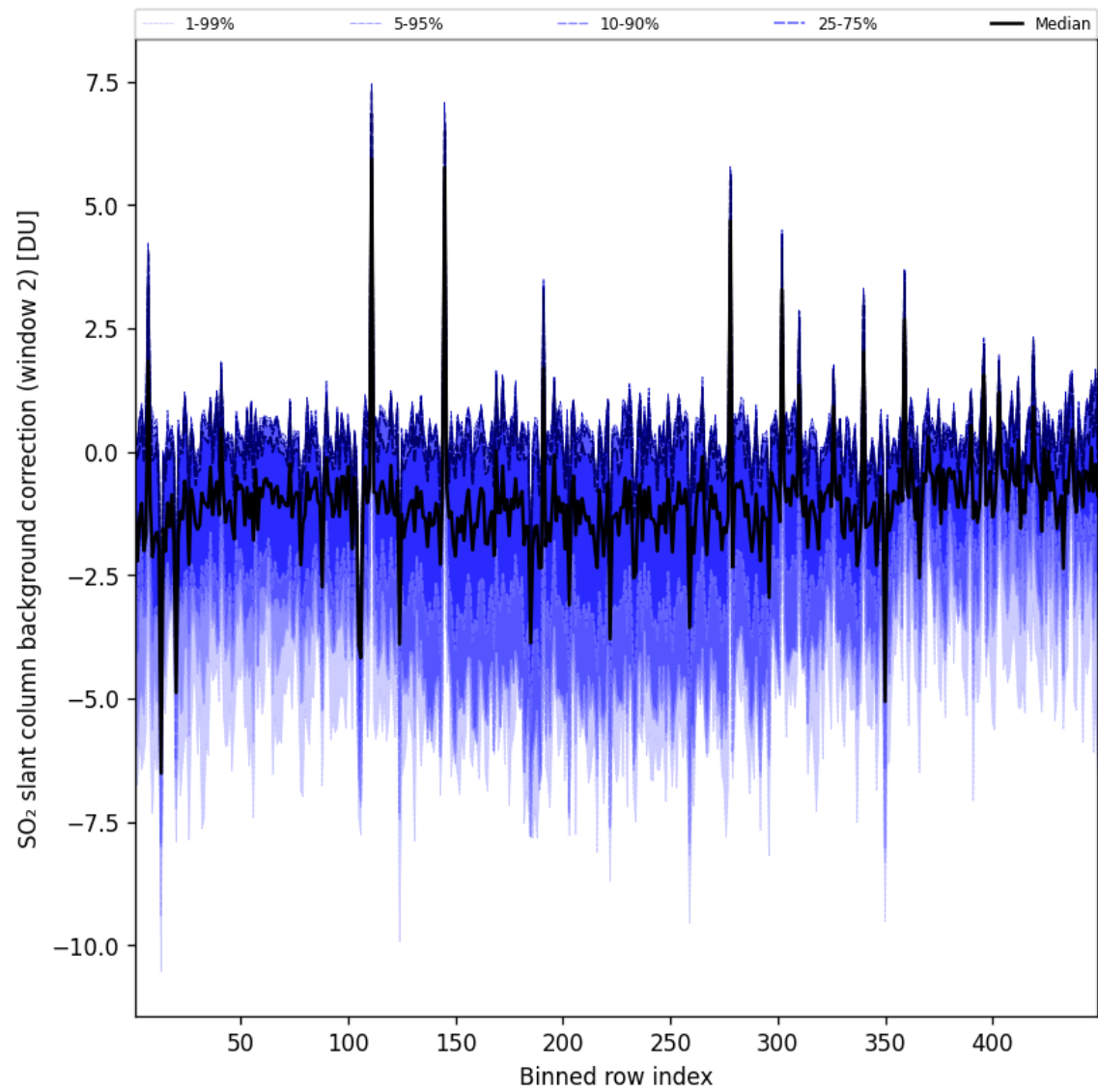


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-06-14 to 2025-06-14

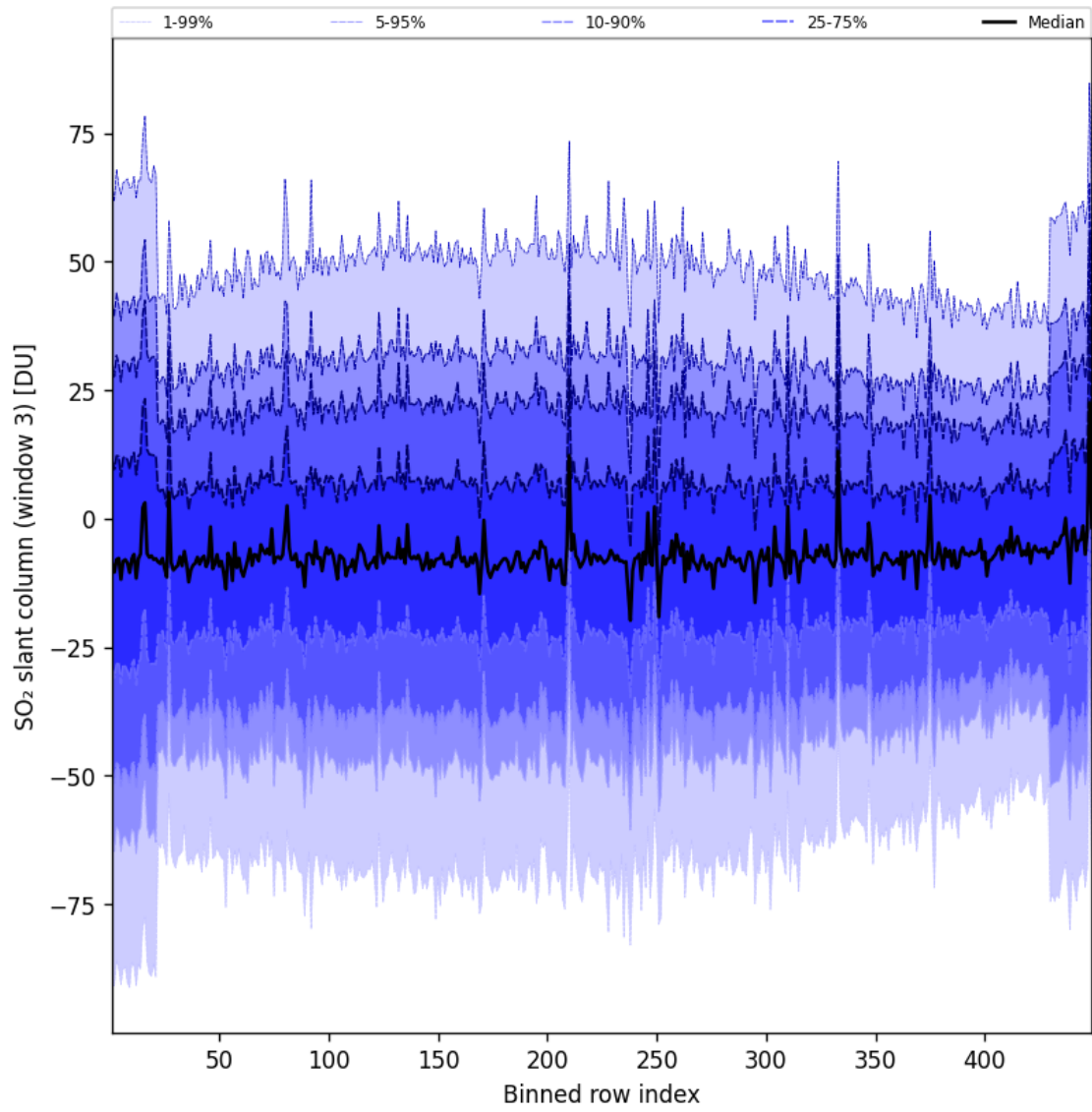


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-06-14 to 2025-06-14

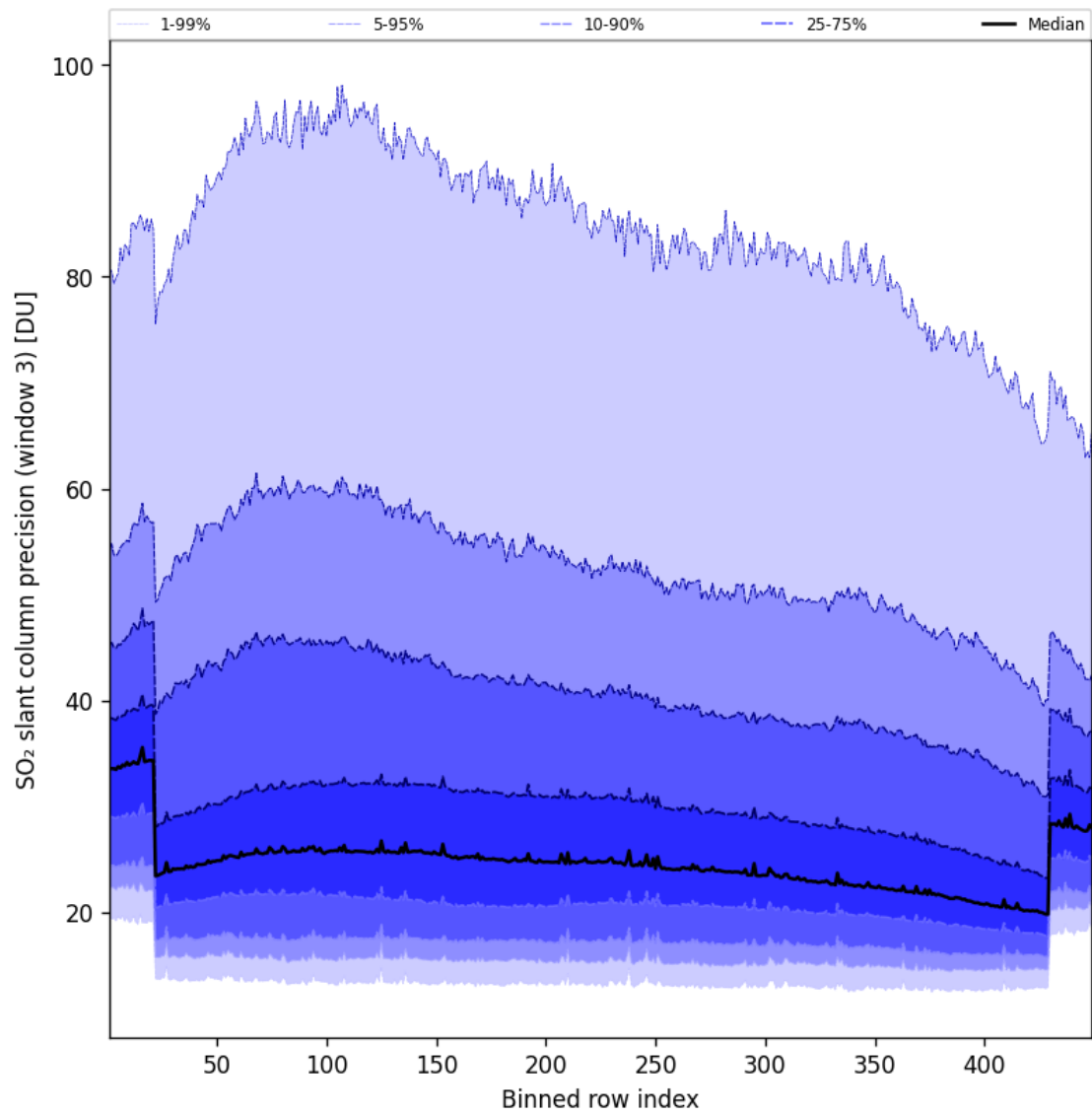


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-06-14 to 2025-06-14

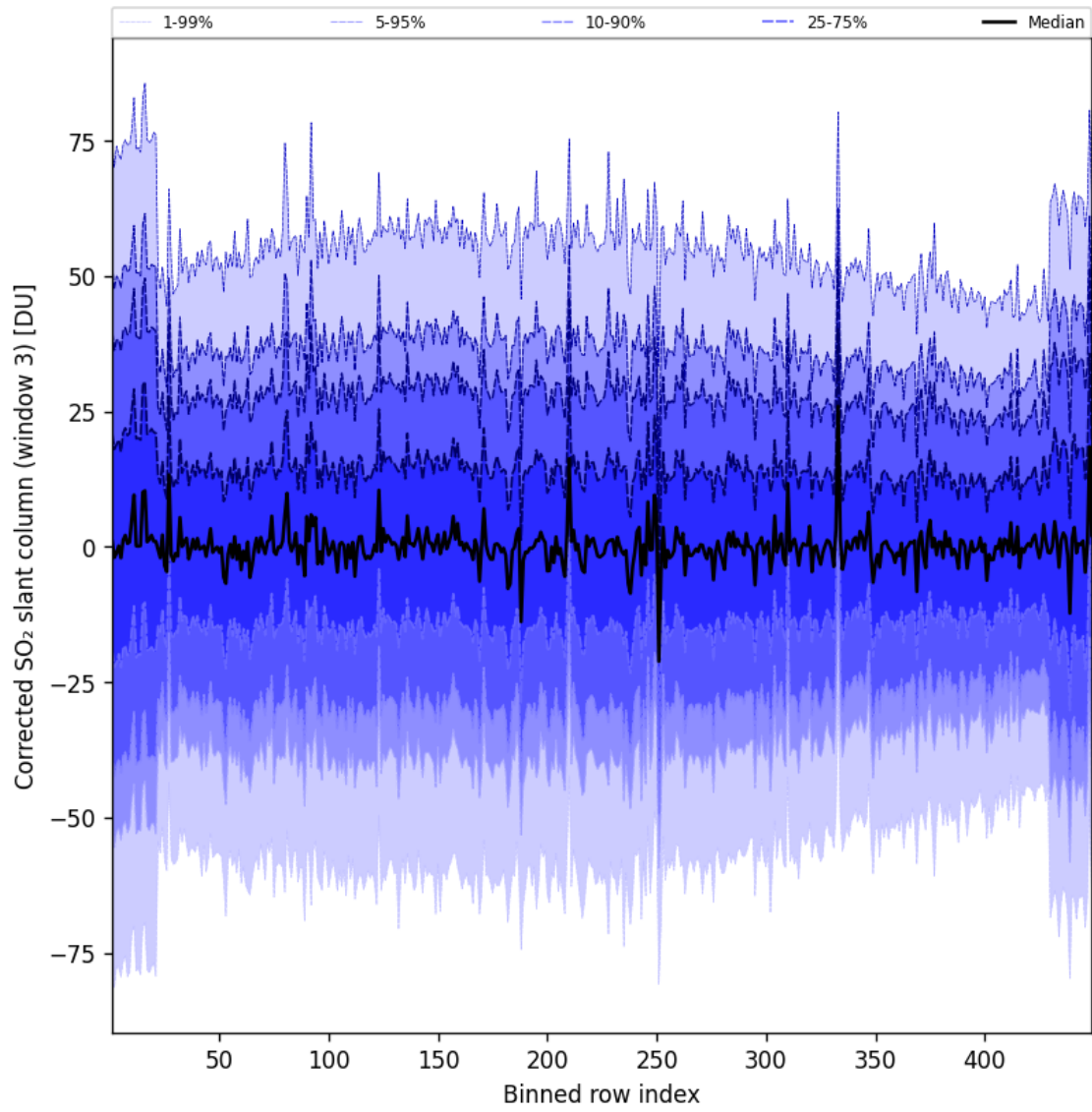


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-06-14 to 2025-06-14

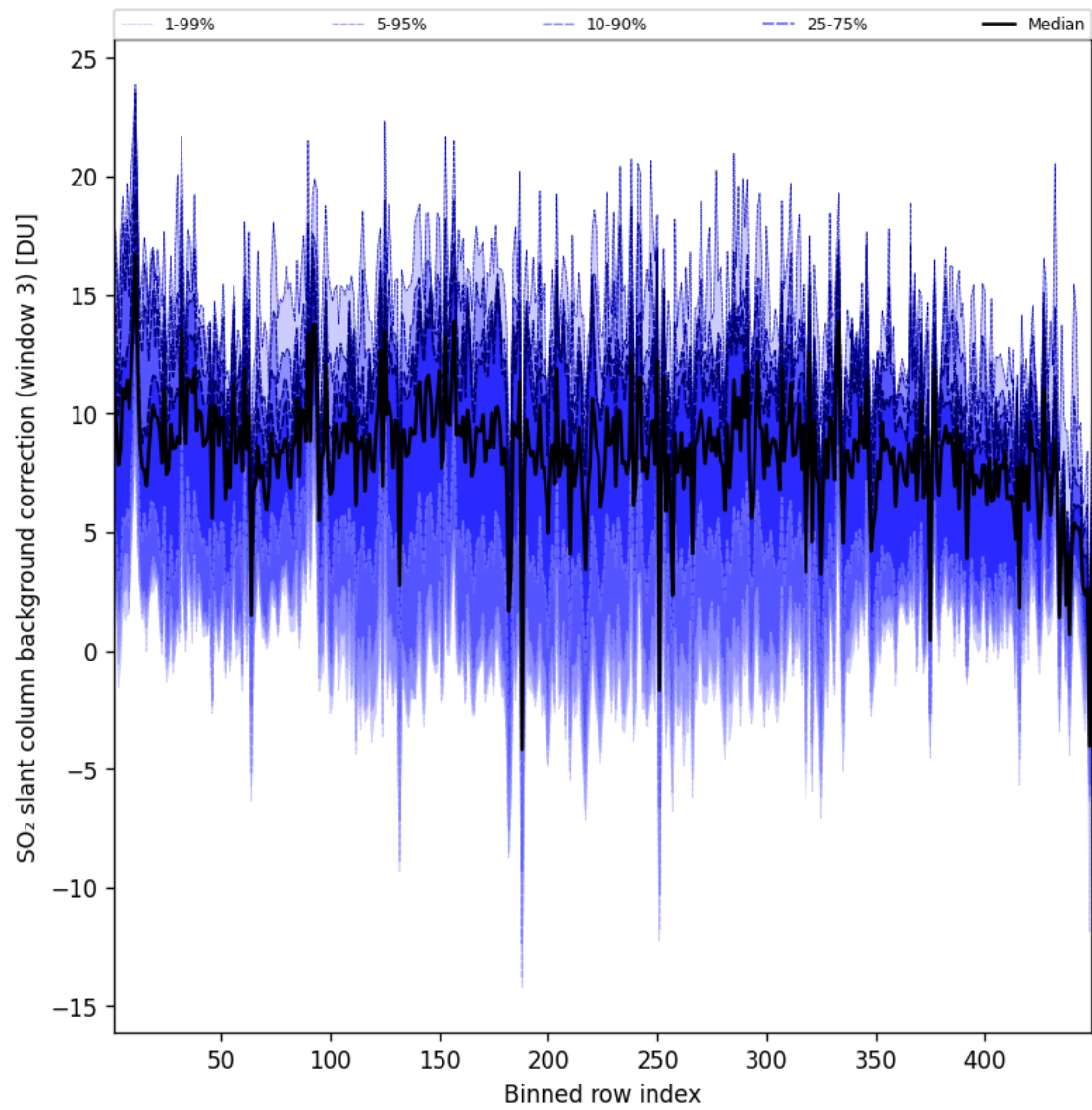


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-06-14 to 2025-06-14

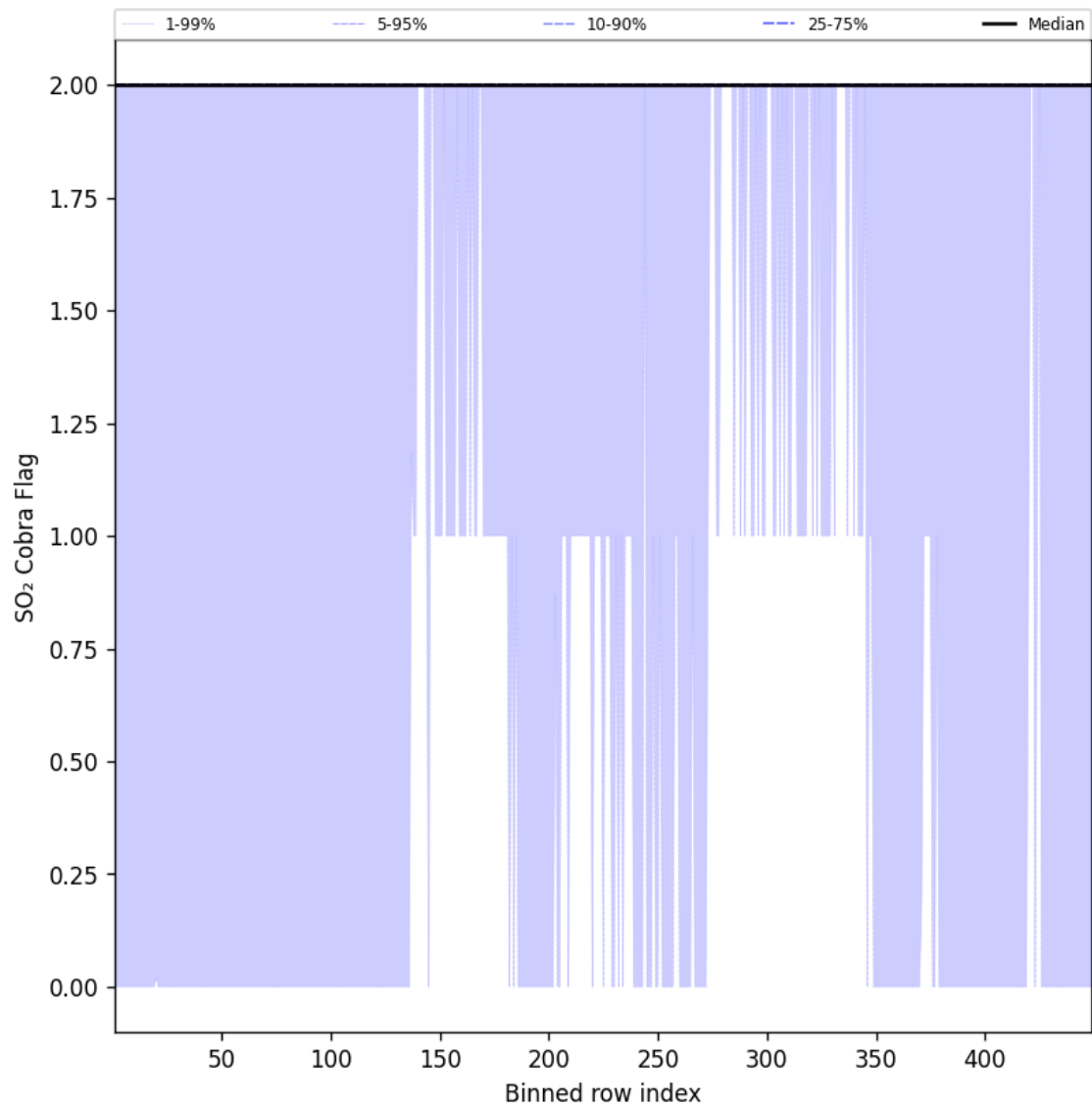


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-06-14 to 2025-06-14

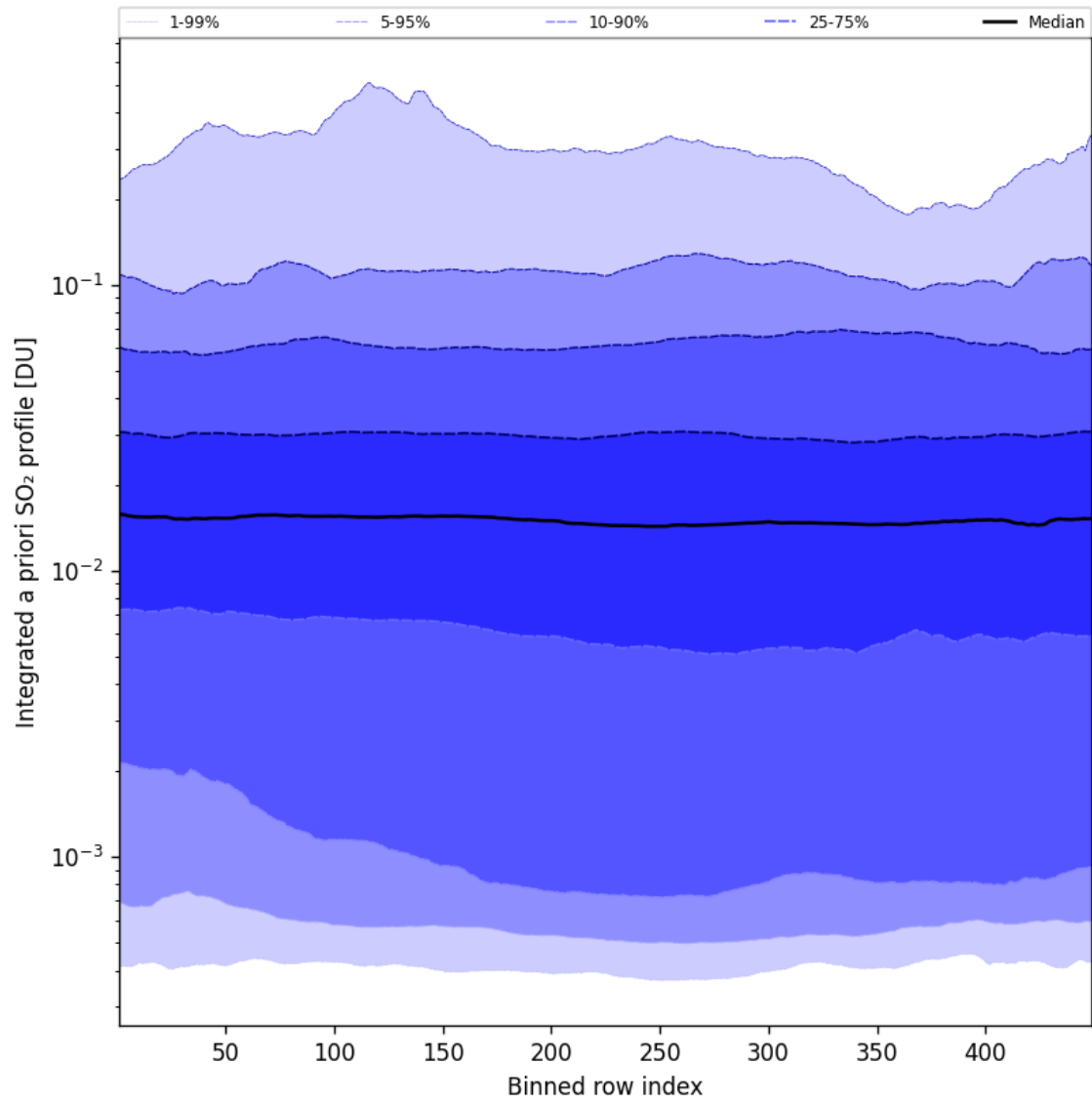


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-06-14 to 2025-06-14

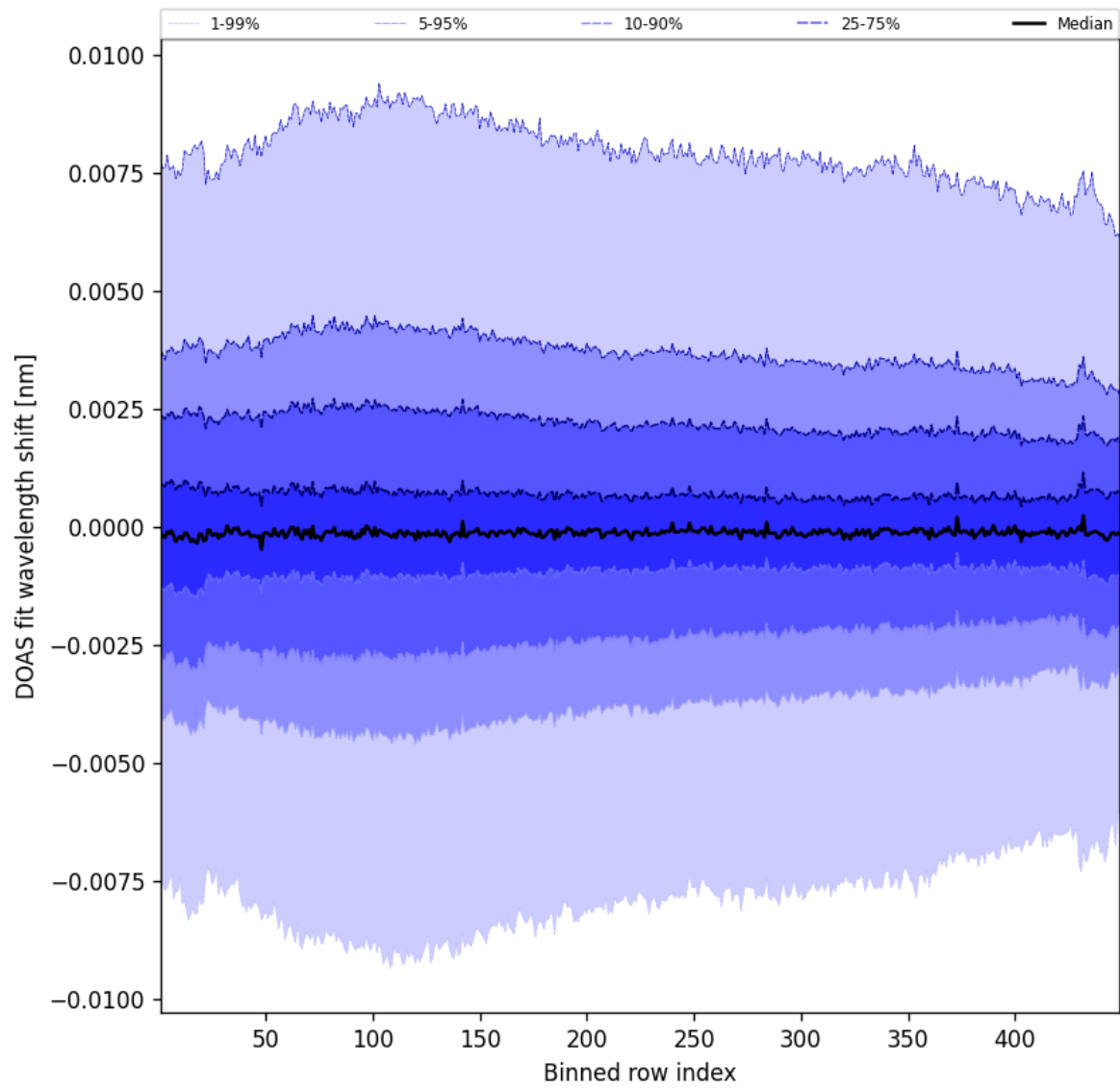


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-06-14 to 2025-06-14

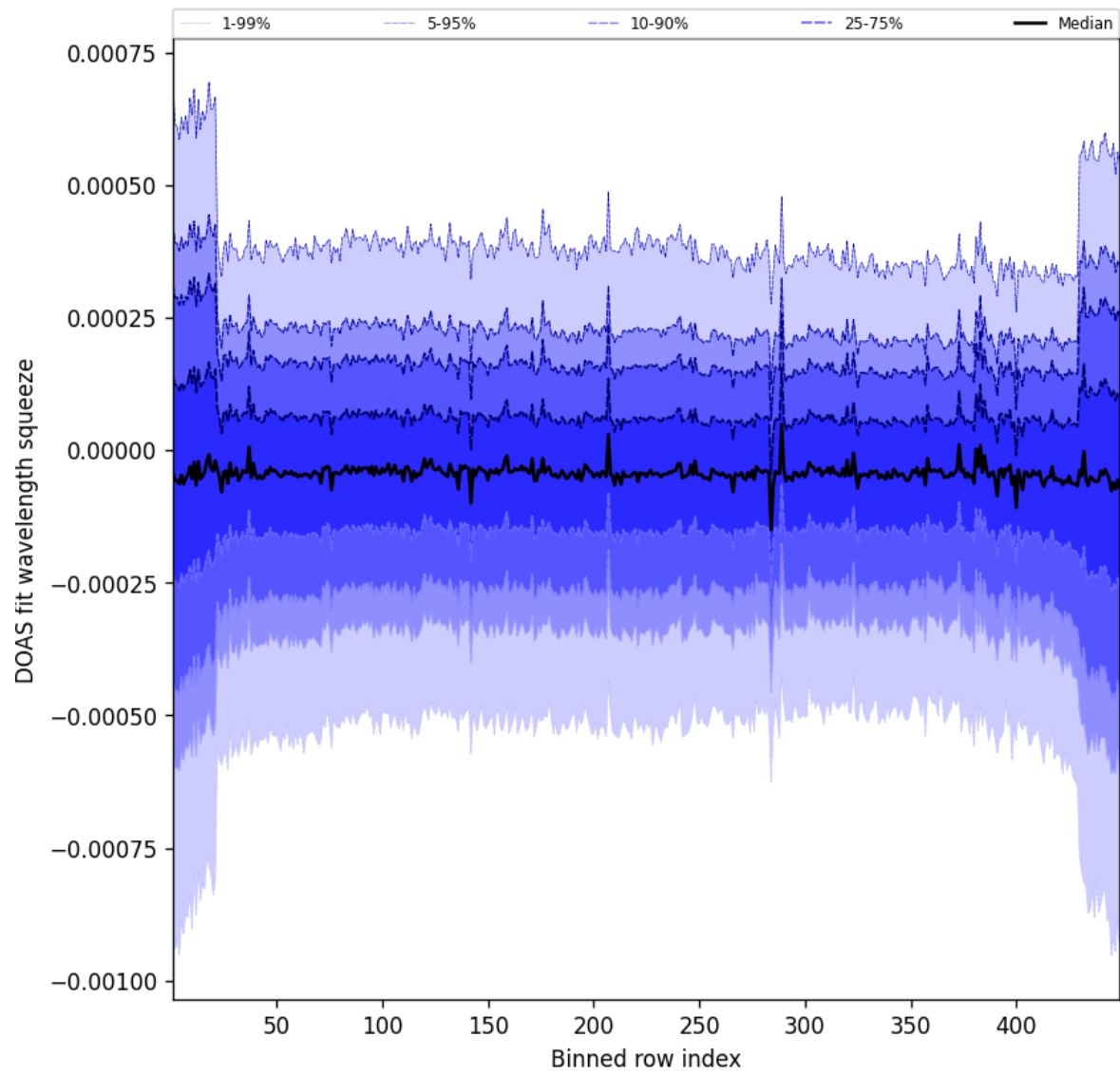


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-06-14 to 2025-06-14

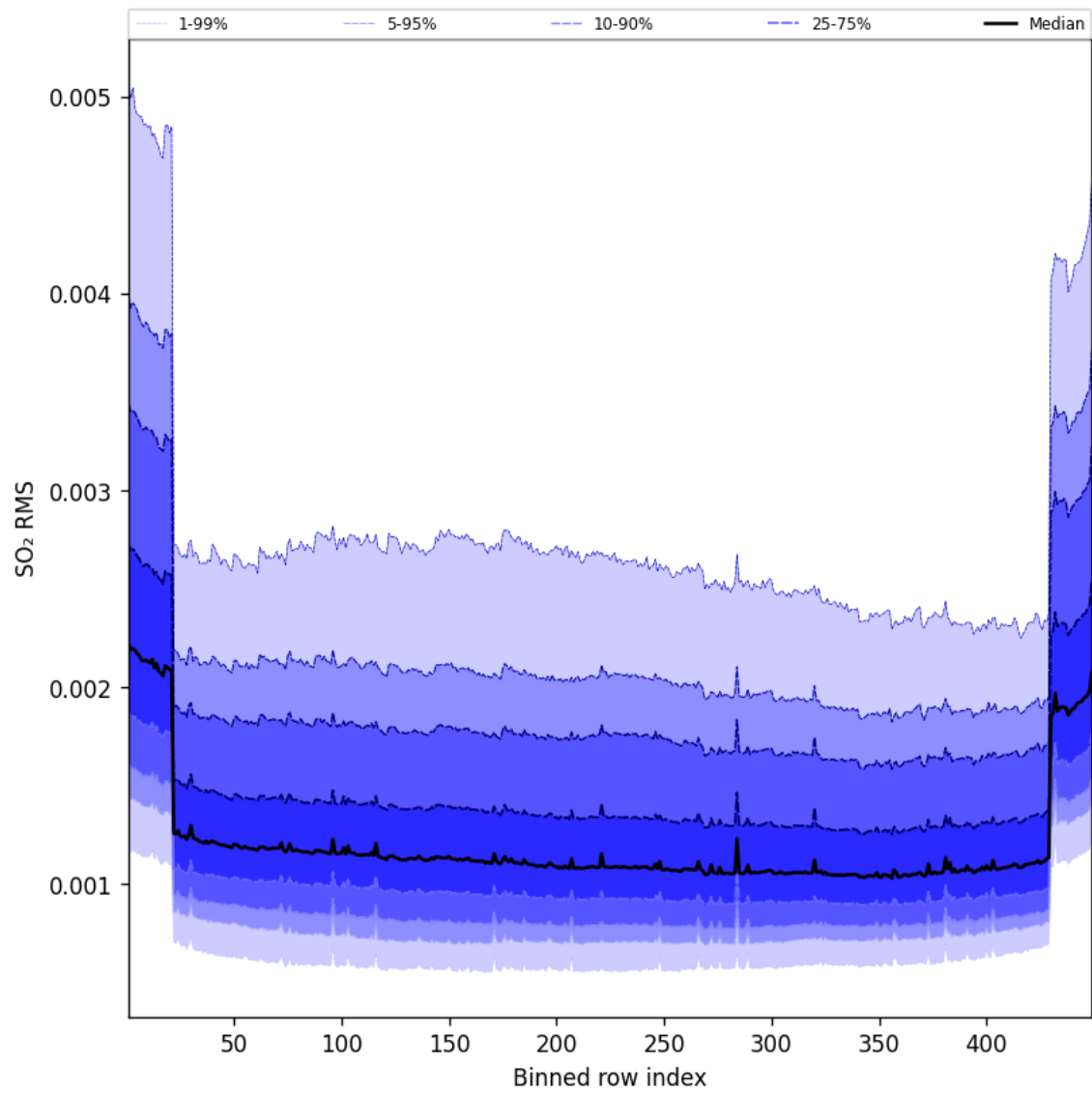


Figure 106: Along track statistics of “SO₂ RMS” for 2025-06-14 to 2025-06-14

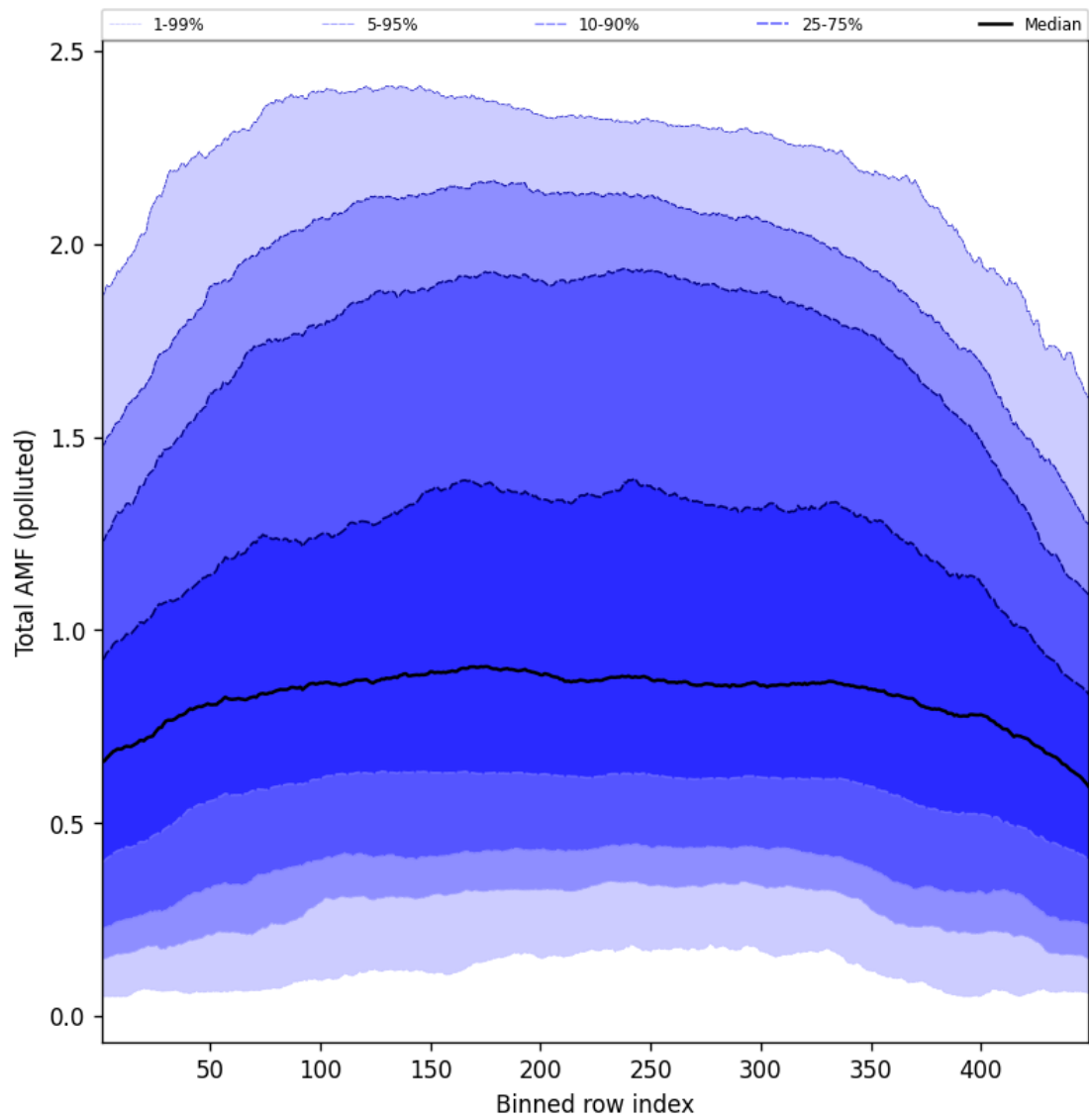


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-06-14 to 2025-06-14

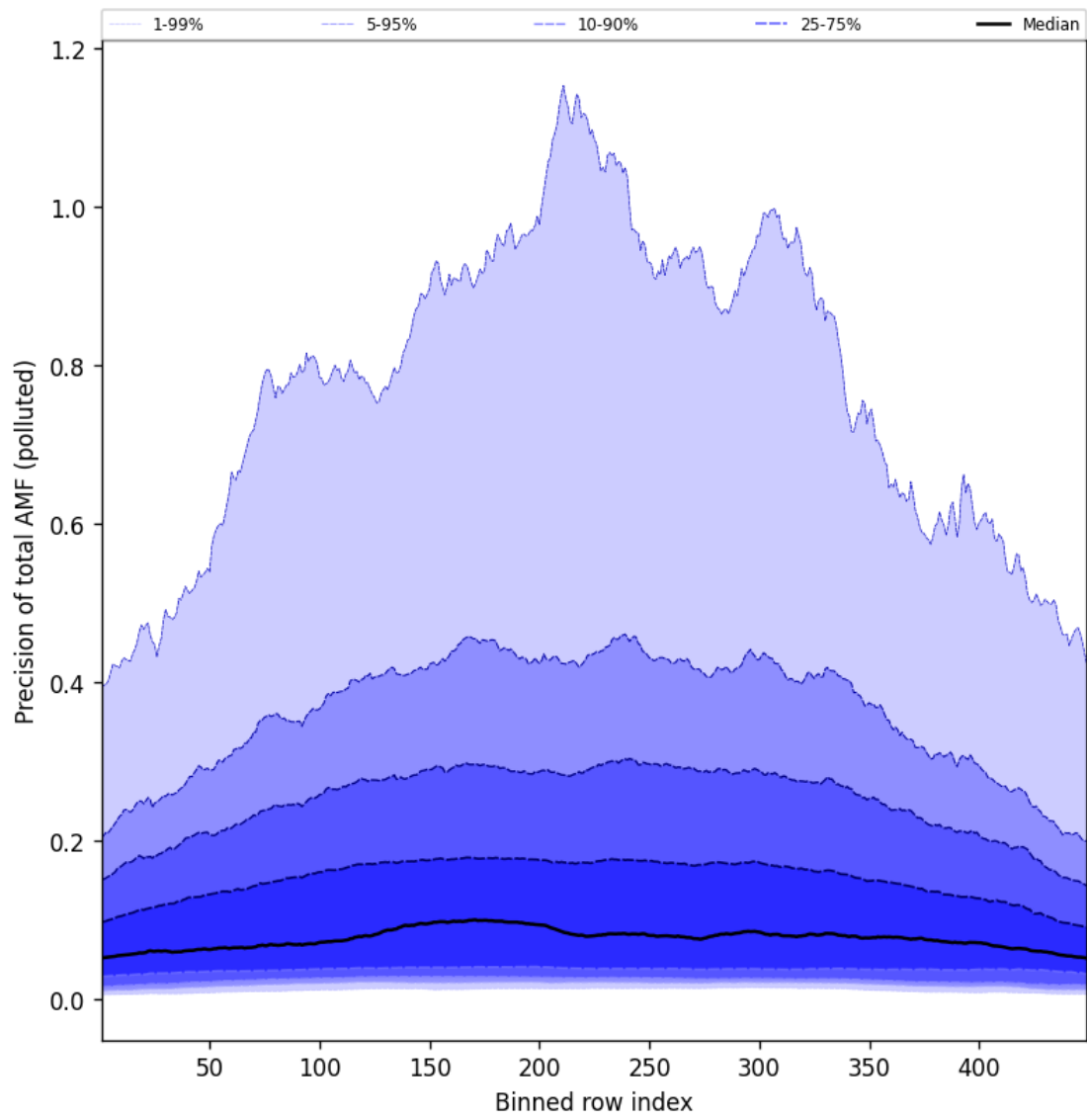


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-06-14 to 2025-06-14

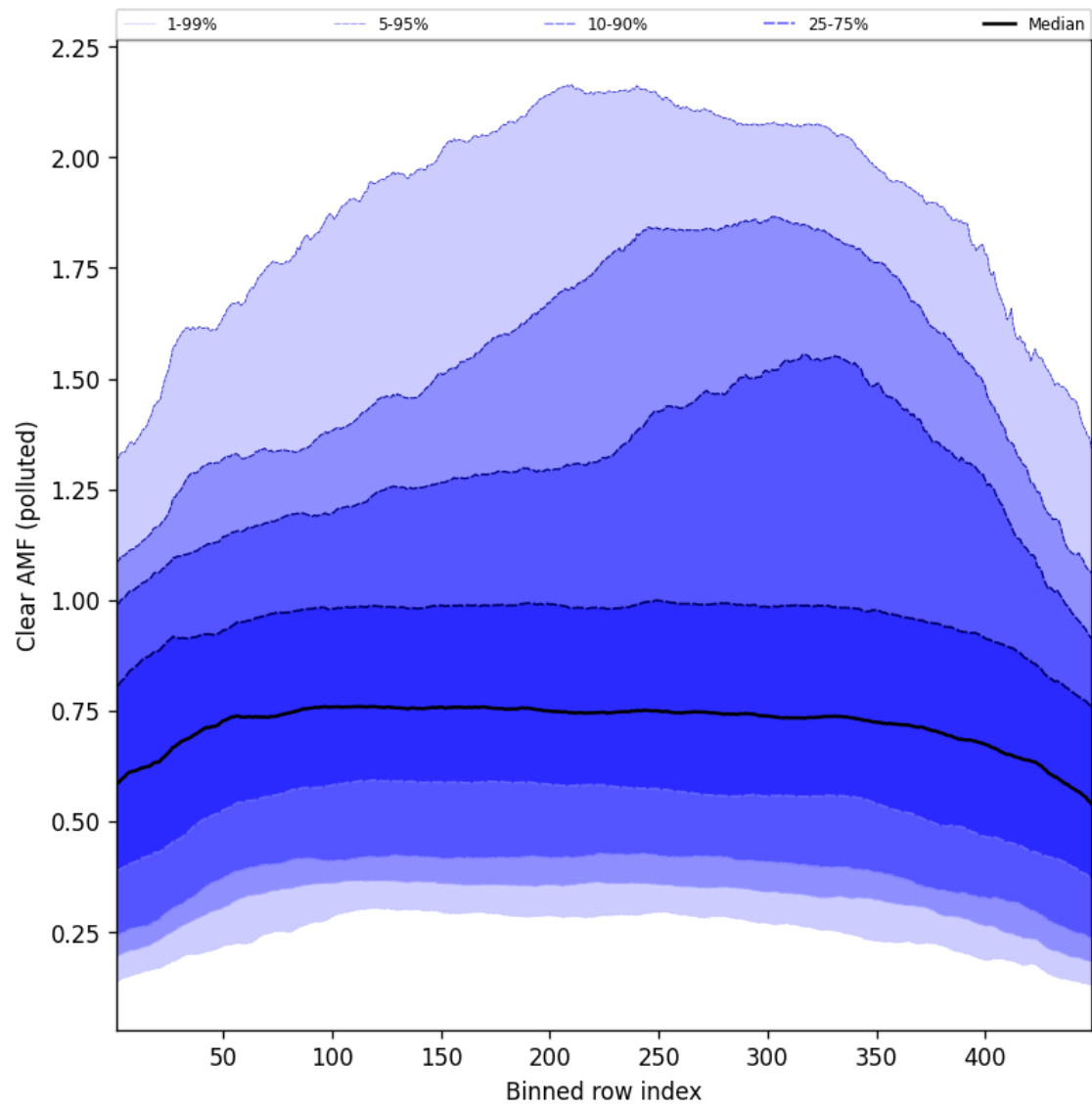


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-06-14 to 2025-06-14

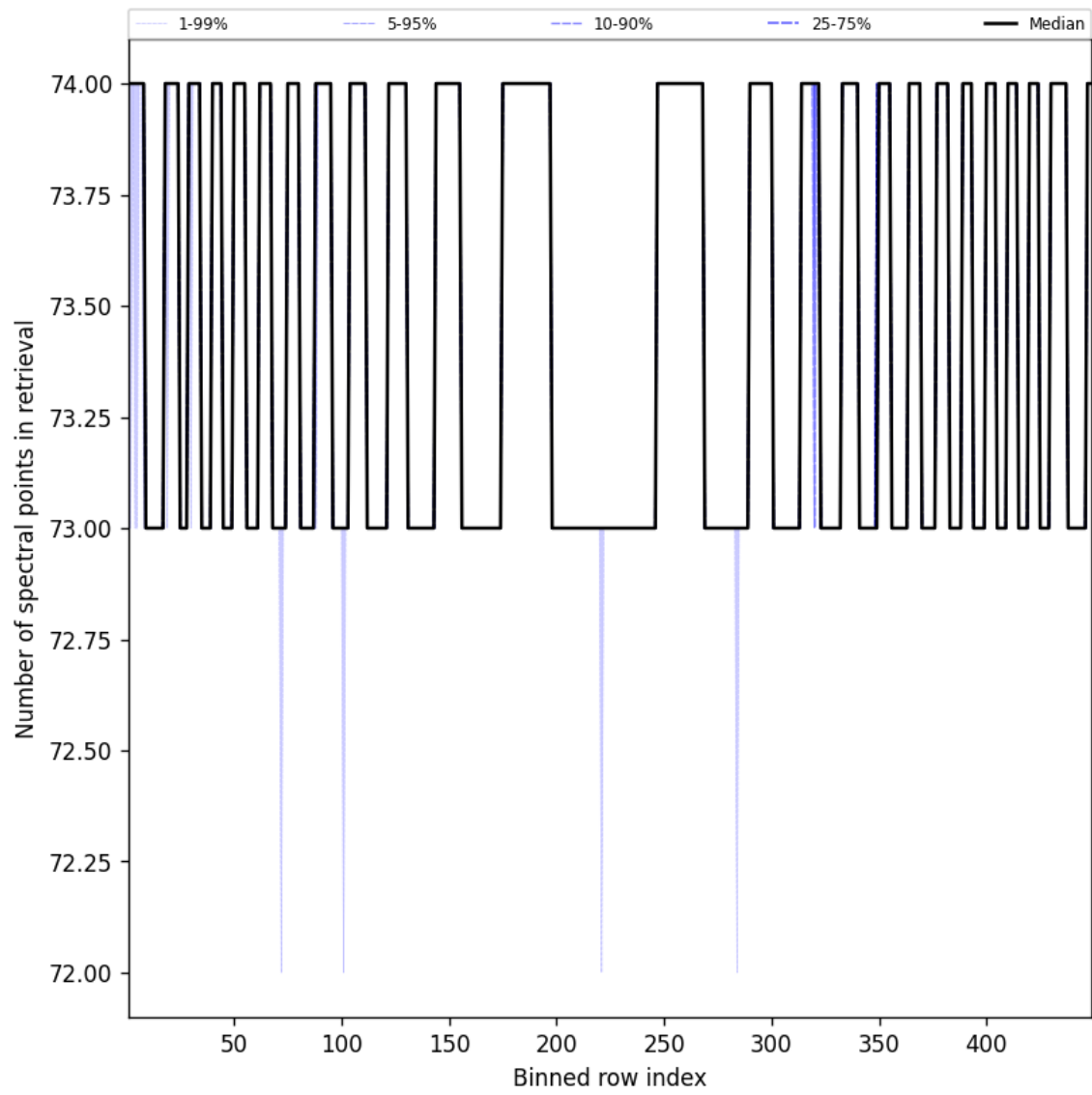


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-06-14 to 2025-06-14

10 Coincidence density

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

Contents

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

List of Figures

1	Outline of the granules.	8
2	Input data per granule	9
3	Fraction of pixels with specific warnings and errors during processing	10
4	Map of “SO ₂ vertical column” for 2025-06-14 to 2025-06-14	11
5	Map of “SO ₂ vertical column precision” for 2025-06-14 to 2025-06-14	12
6	Map of “Corrected SO ₂ slant column” for 2025-06-14 to 2025-06-14	13
7	Map of “Cobra SO ₂ slant column” for 2025-06-14 to 2025-06-14	14
8	Map of “SO ₂ slant column precision (Cobra)” for 2025-06-14 to 2025-06-14	15
9	Map of “SO ₂ slant column (window 1)” for 2025-06-14 to 2025-06-14	16
10	Map of “SO ₂ slant column precision (window 1)” for 2025-06-14 to 2025-06-14	17
11	Map of “Corrected SO ₂ slant column (window 1)” for 2025-06-14 to 2025-06-14	18
12	Map of “SO ₂ slant column background correction (window 1)” for 2025-06-14 to 2025-06-14	19
13	Map of “SO ₂ slant column (window 2)” for 2025-06-14 to 2025-06-14	20
14	Map of “SO ₂ slant column precision (window2)” for 2025-06-14 to 2025-06-14	21
15	Map of “Corrected SO ₂ slant column (window 2)” for 2025-06-14 to 2025-06-14	22
16	Map of “SO ₂ slant column background correction (window 2)” for 2025-06-14 to 2025-06-14	23
17	Map of “SO ₂ slant column (window 3)” for 2025-06-14 to 2025-06-14	24
18	Map of “SO ₂ slant column precision (window 3)” for 2025-06-14 to 2025-06-14	25
19	Map of “Corrected SO ₂ slant column (window 3)” for 2025-06-14 to 2025-06-14	26
20	Map of “SO ₂ slant column background correction (window 3)” for 2025-06-14 to 2025-06-14	27
21	Map of “Integrated a priori SO ₂ profile” for 2025-06-14 to 2025-06-14	28
22	Map of “DOAS fit wavelength shift” for 2025-06-14 to 2025-06-14	29
23	Map of “DOAS fit wavelength squeeze” for 2025-06-14 to 2025-06-14	30
24	Map of “SO ₂ RMS” for 2025-06-14 to 2025-06-14	31
25	Map of “Total AMF (polluted)” for 2025-06-14 to 2025-06-14	32
26	Map of “Precision of total AMF (polluted)” for 2025-06-14 to 2025-06-14	33
27	Map of “Clear AMF (polluted)” for 2025-06-14 to 2025-06-14	34
28	Map of “Number of spectral points in retrieval” for 2025-06-14 to 2025-06-14	35
29	Map of the number of observations for 2025-06-14 to 2025-06-14	36

30	Zonal average of “QA value” for 2025-06-14 to 2025-06-14.	37
31	Zonal average of “SO ₂ vertical column” for 2025-06-14 to 2025-06-14.	38
32	Zonal average of “SO ₂ vertical column precision” for 2025-06-14 to 2025-06-14.	39
33	Zonal average of “Corrected SO ₂ slant column” for 2025-06-14 to 2025-06-14.	40
34	Zonal average of “Cobra SO ₂ slant column” for 2025-06-14 to 2025-06-14.	41
35	Zonal average of “SO ₂ slant column precision (Cobra)” for 2025-06-14 to 2025-06-14.	42
36	Zonal average of “SO ₂ slant column (window 1)” for 2025-06-14 to 2025-06-14.	43
37	Zonal average of “SO ₂ slant column precision (window 1)” for 2025-06-14 to 2025-06-14.	44
38	Zonal average of “Corrected SO ₂ slant column (window 1)” for 2025-06-14 to 2025-06-14.	45
39	Zonal average of “SO ₂ slant column background correction (window 1)” for 2025-06-14 to 2025-06-14.	46
40	Zonal average of “SO ₂ slant column (window 2)” for 2025-06-14 to 2025-06-14.	47
41	Zonal average of “SO ₂ slant column precision (window2)” for 2025-06-14 to 2025-06-14.	48
42	Zonal average of “Corrected SO ₂ slant column (window 2)” for 2025-06-14 to 2025-06-14.	49
43	Zonal average of “SO ₂ slant column background correction (window 2)” for 2025-06-14 to 2025-06-14.	50
44	Zonal average of “SO ₂ slant column (window 3)” for 2025-06-14 to 2025-06-14.	51
45	Zonal average of “SO ₂ slant column precision (window 3)” for 2025-06-14 to 2025-06-14.	52
46	Zonal average of “Corrected SO ₂ slant column (window 3)” for 2025-06-14 to 2025-06-14.	53
47	Zonal average of “SO ₂ slant column background correction (window 3)” for 2025-06-14 to 2025-06-14.	54
48	Zonal average of “SO ₂ Cobra Flag” for 2025-06-14 to 2025-06-14.	55
49	Zonal average of “Integrated a priori SO ₂ profile” for 2025-06-14 to 2025-06-14.	56
50	Zonal average of “DOAS fit wavelength shift” for 2025-06-14 to 2025-06-14.	57
51	Zonal average of “DOAS fit wavelength squeeze” for 2025-06-14 to 2025-06-14.	58
52	Zonal average of “SO ₂ RMS” for 2025-06-14 to 2025-06-14.	59
53	Zonal average of “Total AMF (polluted)” for 2025-06-14 to 2025-06-14.	60
54	Zonal average of “Precision of total AMF (polluted)” for 2025-06-14 to 2025-06-14.	61
55	Zonal average of “Clear AMF (polluted)” for 2025-06-14 to 2025-06-14.	62
56	Zonal average of “Number of spectral points in retrieval” for 2025-06-14 to 2025-06-14.	63
57	Histogram of “QA value” for 2025-06-14 to 2025-06-14	64
58	Histogram of “SO ₂ vertical column” for 2025-06-14 to 2025-06-14	65
59	Histogram of “SO ₂ vertical column precision” for 2025-06-14 to 2025-06-14	66
60	Histogram of “Corrected SO ₂ slant column” for 2025-06-14 to 2025-06-14	67
61	Histogram of “Cobra SO ₂ slant column” for 2025-06-14 to 2025-06-14	68
62	Histogram of “SO ₂ slant column precision (Cobra)” for 2025-06-14 to 2025-06-14	69
63	Histogram of “SO ₂ slant column (window 1)” for 2025-06-14 to 2025-06-14	70
64	Histogram of “SO ₂ slant column precision (window 1)” for 2025-06-14 to 2025-06-14	71
65	Histogram of “Corrected SO ₂ slant column (window 1)” for 2025-06-14 to 2025-06-14	72
66	Histogram of “SO ₂ slant column background correction (window 1)” for 2025-06-14 to 2025-06-14	73
67	Histogram of “SO ₂ slant column (window 2)” for 2025-06-14 to 2025-06-14	74
68	Histogram of “SO ₂ slant column precision (window2)” for 2025-06-14 to 2025-06-14	75
69	Histogram of “Corrected SO ₂ slant column (window 2)” for 2025-06-14 to 2025-06-14	76
70	Histogram of “SO ₂ slant column background correction (window 2)” for 2025-06-14 to 2025-06-14	77
71	Histogram of “SO ₂ slant column (window 3)” for 2025-06-14 to 2025-06-14	78
72	Histogram of “SO ₂ slant column precision (window 3)” for 2025-06-14 to 2025-06-14	79
73	Histogram of “Corrected SO ₂ slant column (window 3)” for 2025-06-14 to 2025-06-14	80
74	Histogram of “SO ₂ slant column background correction (window 3)” for 2025-06-14 to 2025-06-14	81
75	Histogram of “SO ₂ Cobra Flag” for 2025-06-14 to 2025-06-14	82
76	Histogram of “Integrated a priori SO ₂ profile” for 2025-06-14 to 2025-06-14	83
77	Histogram of “DOAS fit wavelength shift” for 2025-06-14 to 2025-06-14	84
78	Histogram of “DOAS fit wavelength squeeze” for 2025-06-14 to 2025-06-14	85
79	Histogram of “SO ₂ RMS” for 2025-06-14 to 2025-06-14	86
80	Histogram of “Total AMF (polluted)” for 2025-06-14 to 2025-06-14	87
81	Histogram of “Precision of total AMF (polluted)” for 2025-06-14 to 2025-06-14	88
82	Histogram of “Clear AMF (polluted)” for 2025-06-14 to 2025-06-14	89
83	Histogram of “Number of spectral points in retrieval” for 2025-06-14 to 2025-06-14	90
84	Along track statistics of “QA value” for 2025-06-14 to 2025-06-14	91
85	Along track statistics of “SO ₂ vertical column” for 2025-06-14 to 2025-06-14	92
86	Along track statistics of “SO ₂ vertical column precision” for 2025-06-14 to 2025-06-14	93
87	Along track statistics of “Corrected SO ₂ slant column” for 2025-06-14 to 2025-06-14	94
88	Along track statistics of “Cobra SO ₂ slant column” for 2025-06-14 to 2025-06-14	95
89	Along track statistics of “SO ₂ slant column precision (Cobra)” for 2025-06-14 to 2025-06-14	96
90	Along track statistics of “SO ₂ slant column (window 1)” for 2025-06-14 to 2025-06-14	97
91	Along track statistics of “SO ₂ slant column precision (window 1)” for 2025-06-14 to 2025-06-14	98

92	Along track statistics of “Corrected SO ₂ slant column (window 1)” for 2025-06-14 to 2025-06-14	99
93	Along track statistics of “SO ₂ slant column background correction (window 1)” for 2025-06-14 to 2025-06-14	100
94	Along track statistics of “SO ₂ slant column (window 2)” for 2025-06-14 to 2025-06-14	101
95	Along track statistics of “SO ₂ slant column precision (window 2)” for 2025-06-14 to 2025-06-14	102
96	Along track statistics of “Corrected SO ₂ slant column (window 2)” for 2025-06-14 to 2025-06-14	103
97	Along track statistics of “SO ₂ slant column background correction (window 2)” for 2025-06-14 to 2025-06-14	104
98	Along track statistics of “SO ₂ slant column (window 3)” for 2025-06-14 to 2025-06-14	105
99	Along track statistics of “SO ₂ slant column precision (window 3)” for 2025-06-14 to 2025-06-14	106
100	Along track statistics of “Corrected SO ₂ slant column (window 3)” for 2025-06-14 to 2025-06-14	107
101	Along track statistics of “SO ₂ slant column background correction (window 3)” for 2025-06-14 to 2025-06-14	108
102	Along track statistics of “SO ₂ Cobra Flag” for 2025-06-14 to 2025-06-14	109
103	Along track statistics of “Integrated a priori SO ₂ profile” for 2025-06-14 to 2025-06-14	110
104	Along track statistics of “DOAS fit wavelength shift” for 2025-06-14 to 2025-06-14	111
105	Along track statistics of “DOAS fit wavelength squeeze” for 2025-06-14 to 2025-06-14	112
106	Along track statistics of “SO ₂ RMS” for 2025-06-14 to 2025-06-14	113
107	Along track statistics of “Total AMF (polluted)” for 2025-06-14 to 2025-06-14	114
108	Along track statistics of “Precision of total AMF (polluted)” for 2025-06-14 to 2025-06-14	115
109	Along track statistics of “Clear AMF (polluted)” for 2025-06-14 to 2025-06-14	116
110	Along track statistics of “Number of spectral points in retrieval” for 2025-06-14 to 2025-06-14	117

List of Tables

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

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