

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]	0.626 $\pm$ 0.415	18670739	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	(2.874 $\pm$ 108.664) $\times 10^{-2}$	18670739	0.249	0.436	1.003 $\times 10^{-2}$	-143	2.302 $\times 10^3$
sulfurdioxide total vertical column precision [DU]	0.491 $\pm$ 0.630	18670739	0.222	0.325	0.320	4.046 $\times 10^{-2}$	55.6
sulfurdioxide slant column density corrected [DU]	(1.929 $\pm$ 43.117) $\times 10^{-2}$	18670739	0.258	0.373	9.382 $\times 10^{-3}$	-55.6	427
sulfurdioxide slant column density cobra [DU]	(1.894 $\pm$ 36.961) $\times 10^{-2}$	18670739	0.258	0.373	9.382 $\times 10^{-3}$	-55.6	53.4
sulfurdioxide slant column density cobra precision [DU]	0.298 $\pm$ 0.131	18670739	0.213	0.126	0.260	8.303 $\times 10^{-2}$	49.2
sulfurdioxide slant column density window1 [DU]	0.106 $\pm$ 0.685	18670739	0.125	0.749	0.109	-188	62.0
sulfurdioxide slant column density window1 precision [DU]	0.298 $\pm$ 0.131	18670739	0.213	0.126	0.260	8.303 $\times 10^{-2}$	49.2
sulfurdioxide slant column density corrected win1 [DU]	(2.450 $\pm$ 67.647) $\times 10^{-2}$	18670739	-2.500 $\times 10^{-2}$	0.734	6.282 $\times 10^{-3}$	-188	61.9
background so2 slant column offset window1 [DU]	(-8.176 $\pm$ 13.415) $\times 10^{-2}$	18670739	-0.180	0.163	-0.111	-1.30	1.98
sulfurdioxide slant column density window2 [DU]	1.48 $\pm$ 9.00	18670739	1.25	11.2	1.44	-1.564 $\times 10^3$	1.659 $\times 10^3$
sulfurdioxide slant column density window2 precision [DU]	8.10 $\pm$ 2.44	18670739	7.43	2.70	7.74	2.23	720
sulfurdioxide slant column density corrected win2 [DU]	(9.682 $\pm$ 88719.199) $\times 10^{-4}$	18670739	-0.250	11.0	2.768 $\times 10^{-2}$	-1.567 $\times 10^3$	1.661 $\times 10^3$
background so2 slant column offset window2 [DU]	-1.48 $\pm$ 2.06	18670739	0.250	3.01	-1.09	-10.4	7.95
sulfurdioxide slant column density window3 [DU]	-9.98 $\pm$ 23.71	18670739	-9.52	29.1	-10.1	-494	618
sulfurdioxide slant column density window3 precision [DU]	27.7 $\pm$ 13.0	18670739	22.5	10.1	24.4	9.27	428
sulfurdioxide slant column density corrected win3 [DU]	-3.37 $\pm$ 23.23	18670739	-3.92	28.5	-3.15	-480	620
background so2 slant column offset window3 [DU]	6.61 $\pm$ 5.08	18670739	10.6	8.50	6.73	-10.5	32.5
sulfurdioxide slant column cobra flag [1]	1.98 $\pm$ 0.22	18670739	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	(3.108 $\pm$ 7.054) $\times 10^{-2}$	18670739	1.539 $\times 10^{-2}$	2.192 $\times 10^{-2}$	1.415 $\times 10^{-2}$	2.574 $\times 10^{-4}$	1.62
fitted radiance shift [nm]	(-2.475 $\pm$ 24.701) $\times 10^{-4}$	18670739	1.000 $\times 10^{-4}$	1.639 $\times 10^{-3}$	-2.352 $\times 10^{-4}$	-4.176 $\times 10^{-2}$	4.951 $\times 10^{-2}$
fitted radiance squeeze [1]	(-3.755 $\pm$ 18.559) $\times 10^{-5}$	18670739	-3.000 $\times 10^{-5}$	2.143 $\times 10^{-4}$	-3.240 $\times 10^{-5}$	-1.656 $\times 10^{-2}$	1.515 $\times 10^{-2}$
fitted root mean square [1]	(1.294 $\pm$ 0.519) $\times 10^{-3}$	18670739	1.025 $\times 10^{-3}$	5.182 $\times 10^{-4}$	1.155 $\times 10^{-3}$	3.391 $\times 10^{-4}$	5.906 $\times 10^{-2}$
sulfurdioxide total air mass factor polluted [1]	0.939 $\pm$ 0.529	18670739	0.660	0.616	0.824	5.000 $\times 10^{-2}$	2.88
sulfurdioxide total air mass factor polluted precision [1]	0.121 $\pm$ 0.138	18670739	3.500 $\times 10^{-2}$	0.117	7.350 $\times 10^{-2}$	2.546 $\times 10^{-3}$	1.92
sulfurdioxide clear air mass factor polluted [1]	0.792 $\pm$ 0.393	18670739	0.620	0.419	0.715	4.353 $\times 10^{-2}$	2.76
number of spectral points in retrieval [1]	73.4 $\pm$ 0.5	18670739	73.0	1.000	73.0	52.0	155

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	2.000×10^{-2}	8.000×10^{-2}	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.14	-0.837	-0.517	-0.349	-0.205	0.231	0.386	0.571	0.933	2.46
sulfurdioxide total vertical column precision [DU]	9.212×10^{-2}	0.121	0.147	0.175	0.212	0.537	0.710	0.922	1.35	3.08
sulfurdioxide slant column density corrected [DU]	-0.858	-0.498	-0.363	-0.272	-0.175	0.198	0.299	0.398	0.553	1.02
sulfurdioxide slant column density cobra [DU]	-0.858	-0.498	-0.363	-0.272	-0.175	0.198	0.299	0.398	0.553	1.02
sulfurdioxide slant column density cobra precision [DU]	0.142	0.171	0.188	0.200	0.215	0.342	0.396	0.451	0.546	0.770
sulfurdioxide slant column density window1 [DU]	-1.68	-0.949	-0.663	-0.470	-0.269	0.480	0.675	0.862	1.14	1.92
sulfurdioxide slant column density window1 precision [DU]	0.142	0.171	0.188	0.200	0.215	0.342	0.396	0.451	0.546	0.770
sulfurdioxide slant column density corrected win1 [DU]	-1.64	-0.976	-0.718	-0.542	-0.355	0.379	0.581	0.777	1.08	1.91
background so2 slant column offset window1 [DU]	-0.314	-0.244	-0.216	-0.199	-0.177	-1.408×10^{-2}	4.643×10^{-2}	0.100	0.177	0.338
sulfurdioxide slant column density window2 [DU]	-20.0	-12.9	-9.46	-6.95	-4.15	7.06	9.88	12.4	15.9	23.5
sulfurdioxide slant column density window2 precision [DU]	4.20	5.03	5.57	6.01	6.54	9.24	10.2	11.1	12.4	15.2
sulfurdioxide slant column density corrected win2 [DU]	-21.5	-14.2	-10.8	-8.29	-5.50	5.52	8.27	10.8	14.1	21.4
background so2 slant column offset window2 [DU]	-6.57	-5.32	-4.46	-3.73	-2.87	0.137	0.443	0.680	1.03	2.54
sulfurdioxide slant column density window3 [DU]	-70.2	-48.6	-38.8	-31.9	-24.5	4.63	12.3	19.4	29.1	48.3
sulfurdioxide slant column density window3 precision [DU]	13.2	15.4	17.3	18.8	20.5	30.6	35.0	40.3	51.3	83.0
sulfurdioxide slant column density corrected win3 [DU]	-63.1	-41.8	-31.9	-24.9	-17.4	11.1	18.4	25.0	34.2	53.2
background so2 slant column offset window3 [DU]	-3.92	-1.43	8.758×10^{-2}	1.15	2.41	10.9	12.1	13.0	14.2	16.4
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]	4.745×10^{-4}	8.061×10^{-4}	1.337×10^{-3}	2.435×10^{-3}	5.853×10^{-3}	2.777×10^{-2}	3.969×10^{-2}	6.410×10^{-2}	0.111	0.344
fitted radiance shift [nm]	-7.874×10^{-3}	-3.876×10^{-3}	-2.477×10^{-3}	-1.705×10^{-3}	-1.080×10^{-3}	5.591×10^{-4}	1.177×10^{-3}	1.972×10^{-3}	3.403×10^{-3}	7.474×10^{-3}
fitted radiance squeeze [1]	-5.352×10^{-4}	-3.380×10^{-4}	-2.565×10^{-4}	-2.008×10^{-4}	-1.421×10^{-4}	7.225×10^{-5}	1.255×10^{-4}	1.751×10^{-4}	2.461×10^{-4}	4.170×10^{-4}
fitted root mean square [1]	5.871×10^{-4}	7.344×10^{-4}	8.243×10^{-4}	8.898×10^{-4}	9.650×10^{-4}	1.483×10^{-3}	1.720×10^{-3}	1.950×10^{-3}	2.281×10^{-3}	3.150×10^{-3}
sulfurdioxide total air mass factor polluted [1]	9.537×10^{-2}	0.261	0.366	0.459	0.570	1.19	1.48	1.76	2.07	2.39
sulfurdioxide total air mass factor polluted precision [1]	1.119×10^{-2}	1.954×10^{-2}	2.567×10^{-2}	3.096×10^{-2}	3.860×10^{-2}	0.156	0.197	0.251	0.368	0.728
sulfurdioxide clear air mass factor polluted [1]	0.227	0.317	0.378	0.444	0.526	0.945	1.09	1.32	1.65	2.11
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]	0.563 ± 0.424	12947532	0.880	0.490	0.0	1.000	0.120	1.000
sulfurdioxide total vertical column [DU]	$(2.382 \pm 91.997) \times 10^{-2}$	12947532	0.397	8.159×10^{-3}	-66.8	180	-0.188	0.209
sulfurdioxide total vertical column precision [DU]	0.462 ± 0.658	12947532	0.295	0.288	4.046×10^{-2}	29.5	0.192	0.487
sulfurdioxide slant column density corrected [DU]	$(1.718 \pm 37.517) \times 10^{-2}$	12947532	0.353	7.882×10^{-3}	-7.66	151	-0.167	0.186
sulfurdioxide slant column density cobra [DU]	$(1.691 \pm 34.800) \times 10^{-2}$	12947532	0.353	7.882×10^{-3}	-7.66	44.0	-0.167	0.186
sulfurdioxide slant column density cobra precision [DU]	0.280 ± 0.119	12947532	0.107	0.245	8.303×10^{-2}	11.0	0.207	0.314
sulfurdioxide slant column density window1 [DU]	$(9.278 \pm 65.302) \times 10^{-2}$	12947532	0.716	0.100	-113	25.5	-0.263	0.453
sulfurdioxide slant column density window1 precision [DU]	0.280 ± 0.119	12947532	0.107	0.245	8.303×10^{-2}	11.0	0.207	0.314
sulfurdioxide slant column density corrected win1 [DU]	$(1.684 \pm 63.933) \times 10^{-2}$	12947532	0.696	1.221×10^{-3}	-113	25.3	-0.342	0.354
background so2 slant column offset window1 [DU]	$(-7.594 \pm 14.502) \times 10^{-2}$	12947532	0.194	-0.111	-0.549	1.98	-0.185	9.560×10^{-3}
sulfurdioxide slant column density window2 [DU]	1.46 ± 8.28	12947532	10.6	1.47	-612	341	-3.83	6.76
sulfurdioxide slant column density window2 precision [DU]	7.58 ± 2.09	12947532	2.33	7.28	2.23	406	6.21	8.54
sulfurdioxide slant column density corrected win2 [DU]	-0.112 ± 8.137	12947532	10.4	-5.188×10^{-2}	-614	339	-5.27	5.11
background so2 slant column offset window2 [DU]	-1.57 ± 2.16	12947532	3.34	-1.31	-9.97	7.95	-3.10	0.240
sulfurdioxide slant column density window3 [DU]	-10.1 ± 21.9	12947532	27.0	-10.4	-314	224	-23.7	3.31
sulfurdioxide slant column density window3 precision [DU]	25.8 ± 12.7	12947532	8.02	22.6	9.27	284	19.4	27.4
sulfurdioxide slant column density corrected win3 [DU]	-3.20 ± 21.30	12947532	26.3	-3.09	-316	224	-16.3	10.1
background so2 slant column offset window3 [DU]	6.86 ± 5.33	12947532	9.26	8.16	-10.5	19.7	2.04	11.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	12947532	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.353 \pm 7.975) \times 10^{-2}$	12947532	2.636×10^{-2}	1.146×10^{-2}	2.574×10^{-4}	1.62	2.845×10^{-3}	2.921×10^{-2}
fitted radiance shift [nm]	$(-1.113 \pm 24.371) \times 10^{-4}$	12947532	1.532×10^{-3}	-1.220×10^{-4}	-4.176×10^{-2}	3.998×10^{-2}	-8.888×10^{-4}	6.428×10^{-4}
fitted radiance squeeze [1]	$(-6.392 \pm 17.495) \times 10^{-5}$	12947532	2.068×10^{-4}	-5.175×10^{-5}	-1.400×10^{-2}	7.442×10^{-3}	-1.604×10^{-4}	4.642×10^{-5}
fitted root mean square [1]	$(1.229 \pm 0.494) \times 10^{-3}$	12947532	4.525×10^{-4}	1.098×10^{-3}	3.391×10^{-4}	4.532×10^{-2}	9.282×10^{-4}	1.381×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.995 ± 0.585	12947532	0.788	0.859	5.000×10^{-2}	2.88	0.561	1.35
sulfurdioxide total air mass factor polluted precision [1]	0.136 ± 0.154	12947532	0.132	8.625×10^{-2}	3.393×10^{-3}	1.92	4.109×10^{-2}	0.173
sulfurdioxide clear air mass factor polluted [1]	0.825 ± 0.447	12947532	0.504	0.726	7.864×10^{-2}	2.76	0.501	1.01
number of spectral points in retrieval [1]	73.5 ± 0.5	12947532	1.000	73.0	52.0	155	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]	0.769 ± 0.355	5723207	0.550	1.000	0.0	1.000	0.450	1.000
sulfurdioxide total vertical column [DU]	$(3.987 \pm 139.183) \times 10^{-2}$	5723207	0.542	1.575×10^{-2}	-143	2.302×10^3	-0.251	0.291
sulfurdioxide total vertical column precision [DU]	0.556 ± 0.557	5723207	0.359	0.394	4.537×10^{-2}	55.6	0.269	0.628
sulfurdioxide slant column density corrected [DU]	$(2.405 \pm 53.667) \times 10^{-2}$	5723207	0.426	1.341×10^{-2}	-55.6	427	-0.198	0.228
sulfurdioxide slant column density cobra [DU]	$(2.352 \pm 41.433) \times 10^{-2}$	5723207	0.426	1.341×10^{-2}	-55.6	53.4	-0.198	0.228
sulfurdioxide slant column density cobra precision [DU]	0.338 ± 0.147	5723207	0.150	0.301	9.587×10^{-2}	49.2	0.243	0.394
sulfurdioxide slant column density window1 [DU]	0.137 ± 0.753	5723207	0.833	0.132	-188	62.0	-0.284	0.549
sulfurdioxide slant column density window1 precision [DU]	0.338 ± 0.147	5723207	0.150	0.301	9.587×10^{-2}	49.2	0.243	0.394
sulfurdioxide slant column density corrected win1 [DU]	$(4.185 \pm 75.348) \times 10^{-2}$	5723207	0.831	1.987×10^{-2}	-188	61.9	-0.388	0.443
background so2 slant column offset window1 [DU]	$(-9.493 \pm 10.432) \times 10^{-2}$	5723207	0.102	-0.110	-1.30	1.88	-0.155	-5.349×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.52 ± 10.45	5723207	12.8	1.36	-1.564×10^3	1.659×10^3	-4.98	7.85
sulfurdioxide slant column density window2 precision [DU]	9.27 ± 2.76	5723207	2.83	8.92	2.57	720	7.67	10.5
sulfurdioxide slant column density corrected win2 [DU]	0.257 ± 10.339	5723207	12.7	0.247	-1.567×10^3	1.661×10^3	-6.10	6.60
background so2 slant column offset window2 [DU]	-1.27 ± 1.80	5723207	2.23	-0.822	-10.4	7.58	-2.26	-3.596×10^{-2}
sulfurdioxide slant column density window3 [DU]	-9.79 ± 27.39	5723207	34.8	-9.21	-494	618	-26.8	7.95
sulfurdioxide slant column density window3 precision [DU]	32.0 ± 12.6	5723207	10.2	28.9	10.1	428	24.8	35.0
sulfurdioxide slant column density corrected win3 [DU]	-3.73 ± 27.11	5723207	34.4	-3.33	-480	620	-20.7	13.8
background so2 slant column offset window3 [DU]	6.06 ± 4.41	5723207	5.94	5.13	-8.31	32.5	2.95	8.89
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.27	5723207	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.555 \pm 4.245) \times 10^{-2}$	5723207	1.435×10^{-2}	1.675×10^{-2}	1.462×10^{-3}	1.27	1.198×10^{-2}	2.632×10^{-2}
fitted radiance shift [nm]	$(-5.557 \pm 25.162) \times 10^{-4}$	5723207	1.785×10^{-3}	-5.359×10^{-4}	-4.155×10^{-2}	4.951×10^{-2}	-1.474×10^{-3}	3.116×10^{-4}
fitted radiance squeeze [1]	$(2.209 \pm 19.491) \times 10^{-5}$	5723207	2.276×10^{-4}	1.664×10^{-5}	-1.656×10^{-2}	1.515×10^{-2}	-9.499×10^{-5}	1.326×10^{-4}
fitted root mean square [1]	$(1.439 \pm 0.545) \times 10^{-3}$	5723207	6.017×10^{-4}	1.304×10^{-3}	3.762×10^{-4}	5.906×10^{-2}	1.077×10^{-3}	1.678×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.814 ± 0.344	5723207	0.415	0.774	5.000×10^{-2}	2.58	0.584	0.999
sulfurdioxide total air mass factor polluted precision [1]	$(8.694 \pm 8.179) \times 10^{-2}$	5723207	7.666×10^{-2}	5.437×10^{-2}	2.546×10^{-3}	1.11	3.549×10^{-2}	0.112
sulfurdioxide clear air mass factor polluted [1]	0.717 ± 0.213	5723207	0.292	0.700	4.353×10^{-2}	1.58	0.569	0.861
number of spectral points in retrieval [1]	73.4 ± 0.5	5723207	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]	0.644 ± 0.403	12417503	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(2.533 \pm 85.143) \times 10^{-2}$	12417503	0.435	1.005×10^{-2}	-143	559	-0.205	0.230
sulfurdioxide total vertical column precision [DU]	0.475 ± 0.581	12417503	0.304	0.310	5.528×10^{-2}	47.7	0.216	0.519
sulfurdioxide slant column density corrected [DU]	$(1.694 \pm 37.547) \times 10^{-2}$	12417503	0.375	9.245×10^{-3}	-55.6	330	-0.177	0.198
sulfurdioxide slant column density cobra [DU]	$(1.686 \pm 35.677) \times 10^{-2}$	12417503	0.375	9.245×10^{-3}	-55.6	36.7	-0.177	0.198
sulfurdioxide slant column density cobra precision [DU]	0.299 ± 0.128	12417503	0.137	0.262	8.564×10^{-2}	19.3	0.214	0.351
sulfurdioxide slant column density window1 [DU]	0.104 ± 0.684	12417503	0.756	0.113	-188	62.0	-0.270	0.486
sulfurdioxide slant column density window1 precision [DU]	0.299 ± 0.128	12417503	0.137	0.262	8.564×10^{-2}	19.3	0.214	0.351
sulfurdioxide slant column density corrected win1 [DU]	$(2.766 \pm 67.307) \times 10^{-2}$	12417503	0.740	1.222×10^{-2}	-188	61.9	-0.353	0.387
background so2 slant column offset window1 [DU]	$(-7.636 \pm 14.032) \times 10^{-2}$	12417503	0.173	-0.109	-1.30	1.98	-0.176	-3.135×10^{-3}
sulfurdioxide slant column density window2 [DU]	1.51 ± 8.90	12417503	11.2	1.43	-1.564×10^3	1.435×10^3	-4.14	7.08
sulfurdioxide slant column density window2 precision [DU]	8.05 ± 2.23	12417503	2.61	7.72	2.23	525	6.57	9.18
sulfurdioxide slant column density corrected win2 [DU]	$(6.825 \pm 875.453) \times 10^{-2}$	12417503	11.0	8.886×10^{-2}	-1.567×10^3	1.435×10^3	-5.43	5.59
background so2 slant column offset window2 [DU]	-1.44 ± 2.14	12417503	3.11	-0.889	-10.4	7.95	-2.92	0.192
sulfurdioxide slant column density window3 [DU]	-7.41 ± 23.46	12417503	29.3	-7.86	-378	189	-22.1	7.14
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 11.4	12417503	9.15	24.0	9.36	202	20.6	29.7
sulfurdioxide slant column density corrected win3 [DU]	-1.11 ± 22.75	12417503	28.3	-1.26	-377	198	-15.3	13.0
background so2 slant column offset window3 [DU]	6.31 ± 5.12	12417503	8.52	5.85	-10.5	32.5	2.17	10.7
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	12417503	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.072 \pm 3.474) \times 10^{-2}$	12417503	1.593×10^{-2}	1.328×10^{-2}	2.692×10^{-4}	1.27	6.891×10^{-3}	2.282×10^{-2}
fitted radiance shift [nm]	$(-2.671 \pm 22.232) \times 10^{-4}$	12417503	1.622×10^{-3}	-2.372×10^{-4}	-3.908×10^{-2}	4.049×10^{-2}	-1.085×10^{-3}	5.372×10^{-4}
fitted radiance squeeze [1]	$(-3.095 \pm 18.661) \times 10^{-5}$	12417503	2.152×10^{-4}	-2.515×10^{-5}	-1.641×10^{-2}	1.340×10^{-2}	-1.356×10^{-4}	7.959×10^{-5}
fitted root mean square [1]	$(1.304 \pm 0.520) \times 10^{-3}$	12417503	5.616×10^{-4}	1.159×10^{-3}	3.391×10^{-4}	5.906×10^{-2}	9.614×10^{-4}	1.523×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.929 ± 0.484	12417503	0.542	0.845	5.000×10^{-2}	2.71	0.606	1.15
sulfurdioxide total air mass factor polluted precision [1]	0.113 ± 0.128	12417503	9.792×10^{-2}	7.059×10^{-2}	3.924×10^{-3}	1.92	4.138×10^{-2}	0.139
sulfurdioxide clear air mass factor polluted [1]	0.813 ± 0.389	12417503	0.394	0.751	9.372×10^{-2}	2.73	0.561	0.955
number of spectral points in retrieval [1]	73.4 ± 0.5	12417503	1.000	73.0	52.0	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 ± 0.429	4320642	0.850	1.000	0.0	1.000	0.150	1.000
sulfurdioxide total vertical column [DU]	$(2.704 \pm 148.774) \times 10^{-2}$	4320642	0.450	9.589×10^{-3}	-58.2	2.302×10^3	-0.211	0.239
sulfurdioxide total vertical column precision [DU]	0.519 ± 0.657	4320642	0.361	0.355	4.046×10^{-2}	55.6	0.210	0.571
sulfurdioxide slant column density corrected [DU]	$(1.947 \pm 48.771) \times 10^{-2}$	4320642	0.362	8.899×10^{-3}	-42.8	427	-0.170	0.192
sulfurdioxide slant column density cobra [DU]	$(1.894 \pm 36.325) \times 10^{-2}$	4320642	0.362	8.899×10^{-3}	-42.8	53.4	-0.170	0.192
sulfurdioxide slant column density cobra precision [DU]	0.288 ± 0.133	4320642	0.103	0.253	8.303×10^{-2}	49.2	0.214	0.317
sulfurdioxide slant column density window1 [DU]	0.131 ± 0.660	4320642	0.721	0.122	-77.7	46.2	-0.237	0.484
sulfurdioxide slant column density window1 precision [DU]	0.288 ± 0.133	4320642	0.103	0.253	8.303×10^{-2}	49.2	0.214	0.317
sulfurdioxide slant column density corrected win1 [DU]	$(2.318 \pm 65.400) \times 10^{-2}$	4320642	0.710	2.388×10^{-3}	-77.7	46.6	-0.346	0.364
background so2 slant column offset window1 [DU]	-0.108 ± 0.117	4320642	0.130	-0.128	-0.456	1.79	-0.187	-5.697×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.23 ± 9.30	4320642	11.3	1.24	-930	1.659×10^3	-4.43	6.88
sulfurdioxide slant column density window2 precision [DU]	8.28 ± 2.85	4320642	2.88	7.88	2.28	659	6.58	9.46
sulfurdioxide slant column density corrected win2 [DU]	$(1.488 \pm 919.273) \times 10^{-2}$	4320642	11.1	3.484×10^{-2}	-933	1.661×10^3	-5.53	5.57
background so2 slant column offset window2 [DU]	-1.21 ± 1.85	4320642	2.55	-0.901	-9.50	6.02	-2.38	0.174
sulfurdioxide slant column density window3 [DU]	-15.3 ± 23.9	4320642	29.0	-14.6	-451	387	-29.4	-0.412
sulfurdioxide slant column density window3 precision [DU]	29.8 ± 16.0	4320642	12.1	25.7	9.27	284	20.8	33.0
sulfurdioxide slant column density corrected win3 [DU]	-8.93 ± 24.05	4320642	29.2	-7.94	-446	393	-23.1	6.16
background so2 slant column offset window3 [DU]	6.38 ± 4.99	4320642	8.28	6.62	-9.60	31.9	2.33	10.6
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.14	4320642	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.714 \pm 11.420) \times 10^{-2}$	4320642	5.140×10^{-2}	2.273×10^{-2}	2.574×10^{-4}	1.62	5.754×10^{-3}	5.715×10^{-2}
fitted radiance shift [nm]	$(-2.186 \pm 29.782) \times 10^{-4}$	4320642	1.595×10^{-3}	-2.491×10^{-4}	-4.176×10^{-2}	4.951×10^{-2}	-1.050×10^{-3}	5.447×10^{-4}
fitted radiance squeeze [1]	$(-3.780 \pm 17.981) \times 10^{-5}$	4320642	2.074×10^{-4}	-3.487×10^{-5}	-1.656×10^{-2}	1.515×10^{-2}	-1.400×10^{-4}	6.732×10^{-5}
fitted root mean square [1]	$(1.250 \pm 0.492) \times 10^{-3}$	4320642	4.312×10^{-4}	1.136×10^{-3}	3.432×10^{-4}	5.727×10^{-2}	9.621×10^{-4}	1.393×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.919 ± 0.589	4320642	0.683	0.718	5.000×10^{-2}	2.85	0.507	1.19
sulfurdioxide total air mass factor polluted precision [1]	0.131 ± 0.156	4320642	0.153	6.918×10^{-2}	2.546×10^{-3}	1.70	3.065×10^{-2}	0.183
sulfurdioxide clear air mass factor polluted [1]	0.728 ± 0.373	4320642	0.371	0.636	4.353×10^{-2}	2.66	0.483	0.854
number of spectral points in retrieval [1]	73.4 ± 0.5	4320642	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

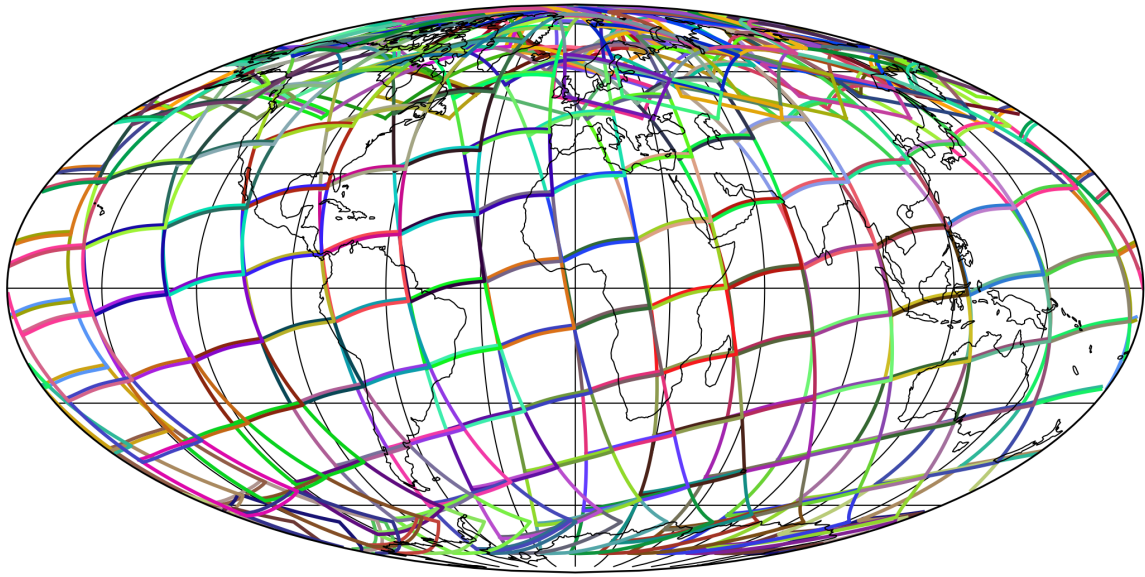


Figure 1: Outline of the granules.

4 Input data monitoring

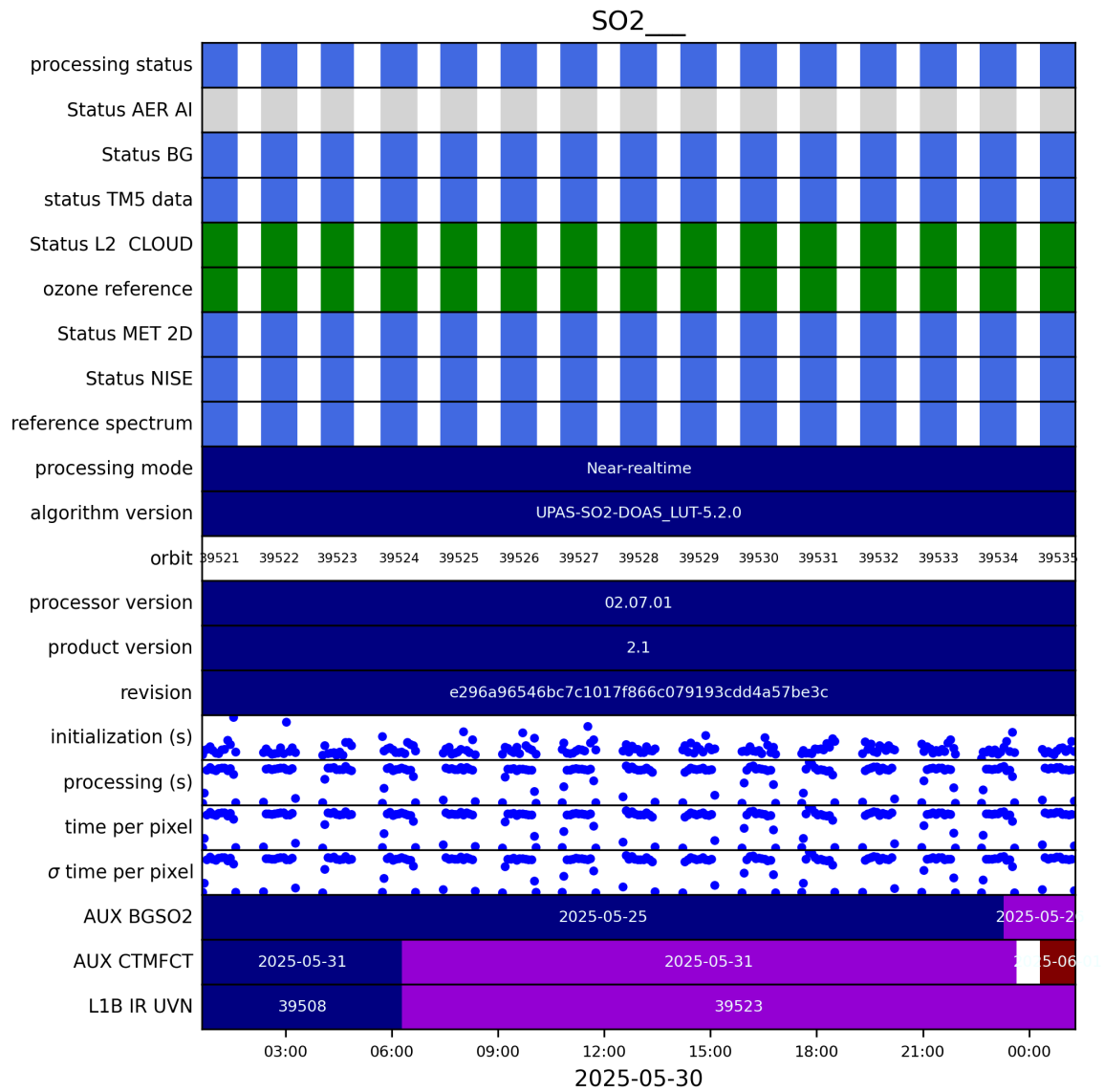


Figure 2: Input data per granule

5 Warnings and errors

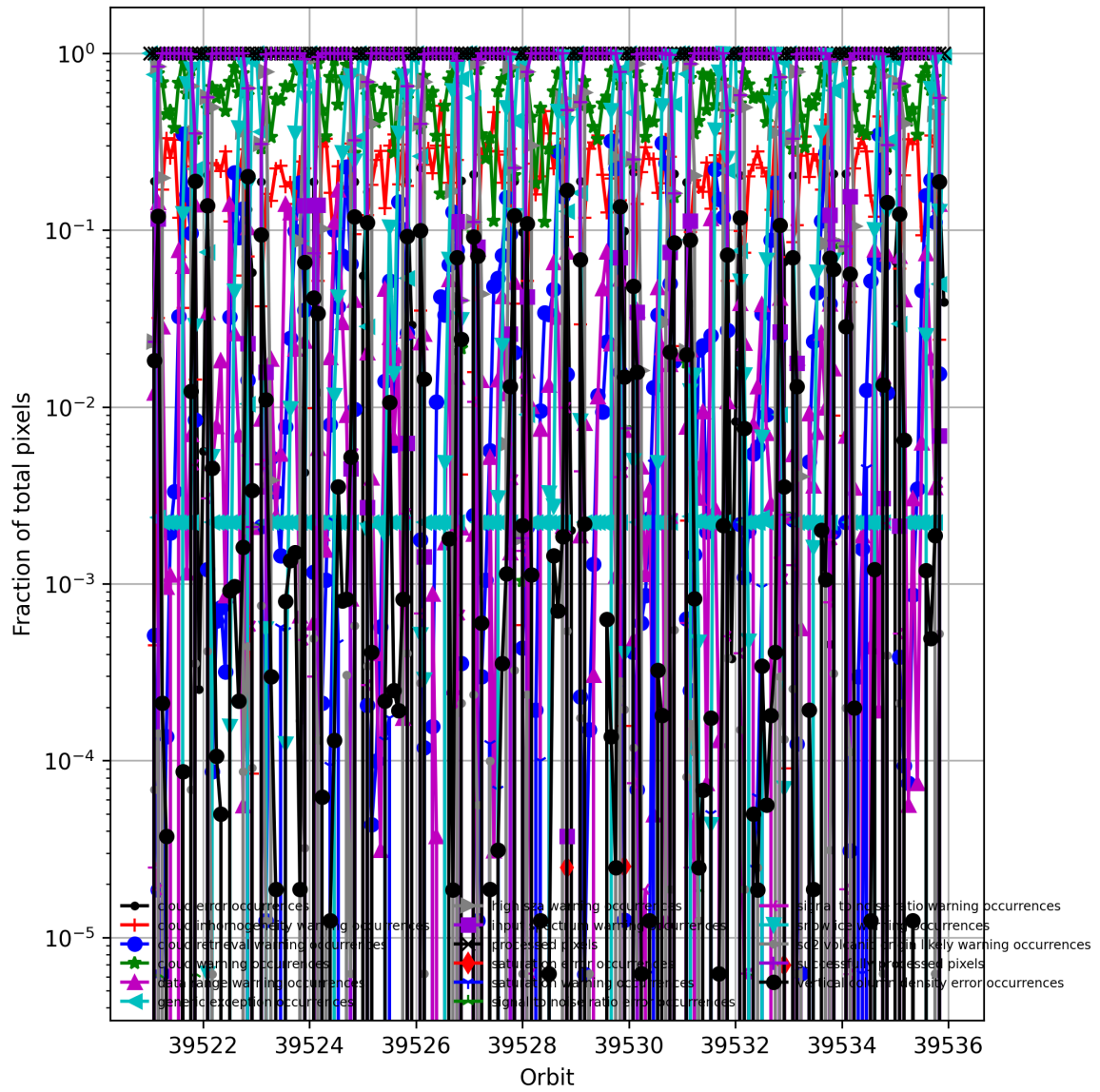


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

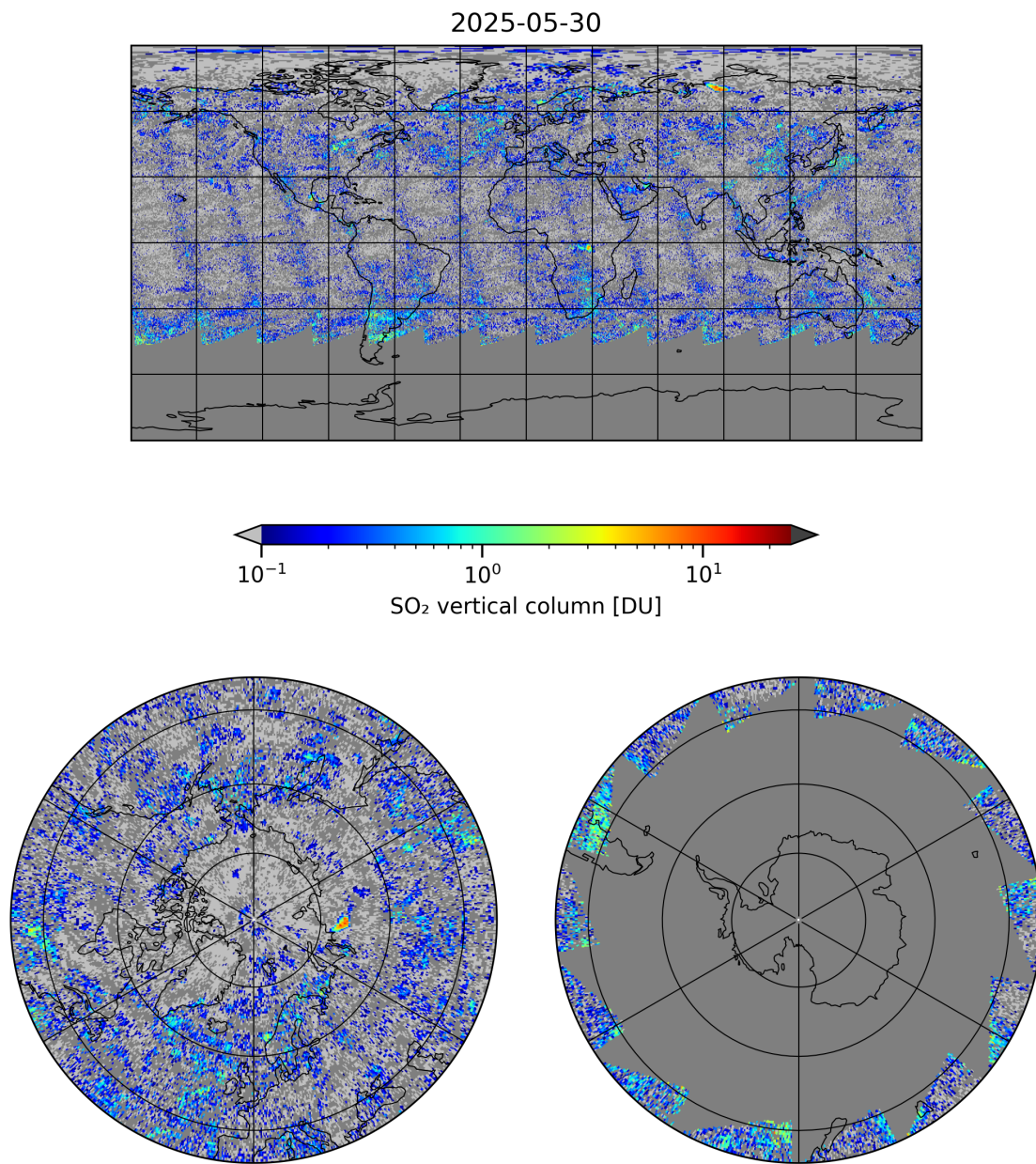


Figure 4: Map of “SO₂ vertical column” for 2025-05-30 to 2025-05-31

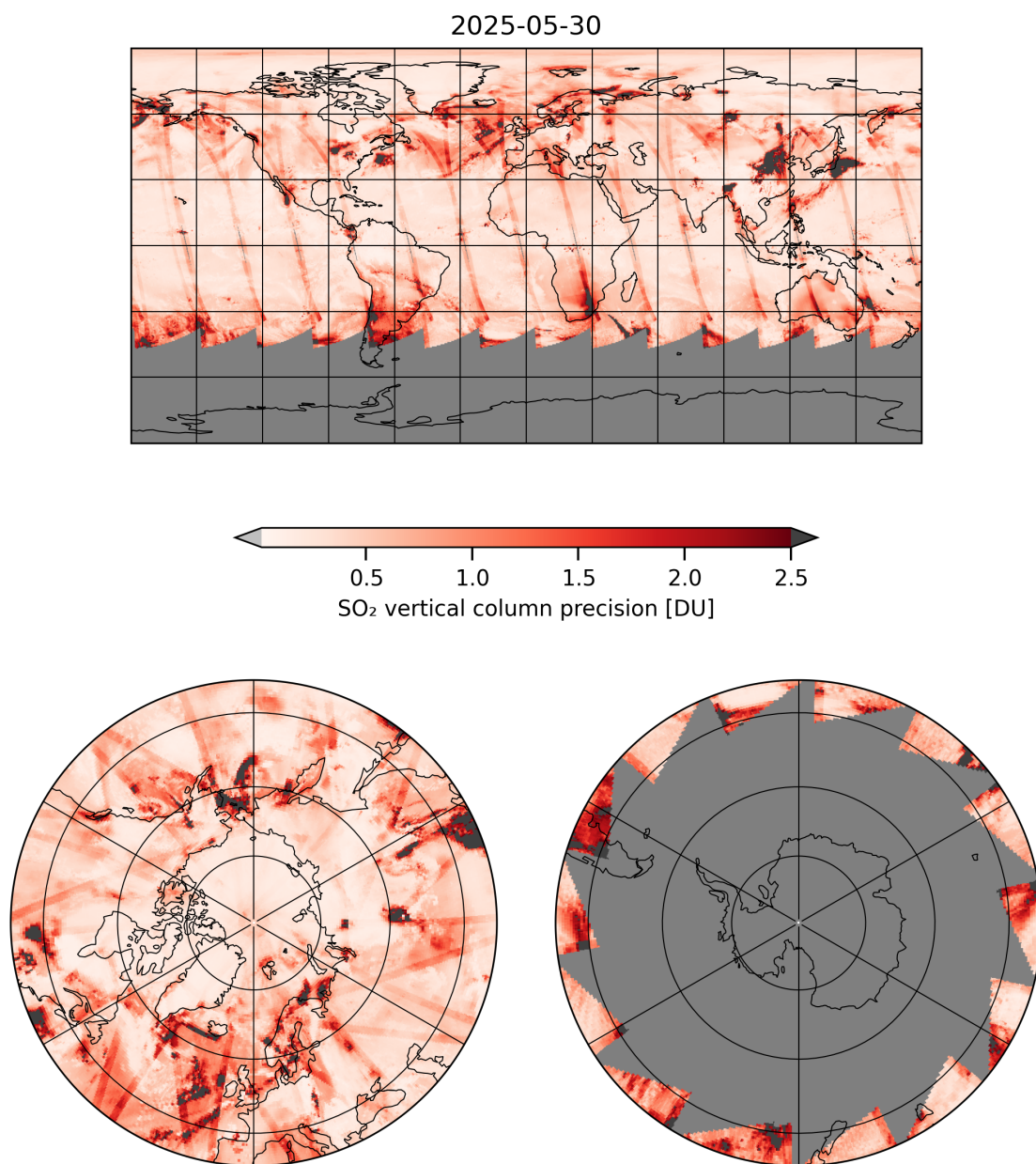


Figure 5: Map of “SO₂ vertical column precision” for 2025-05-30 to 2025-05-31

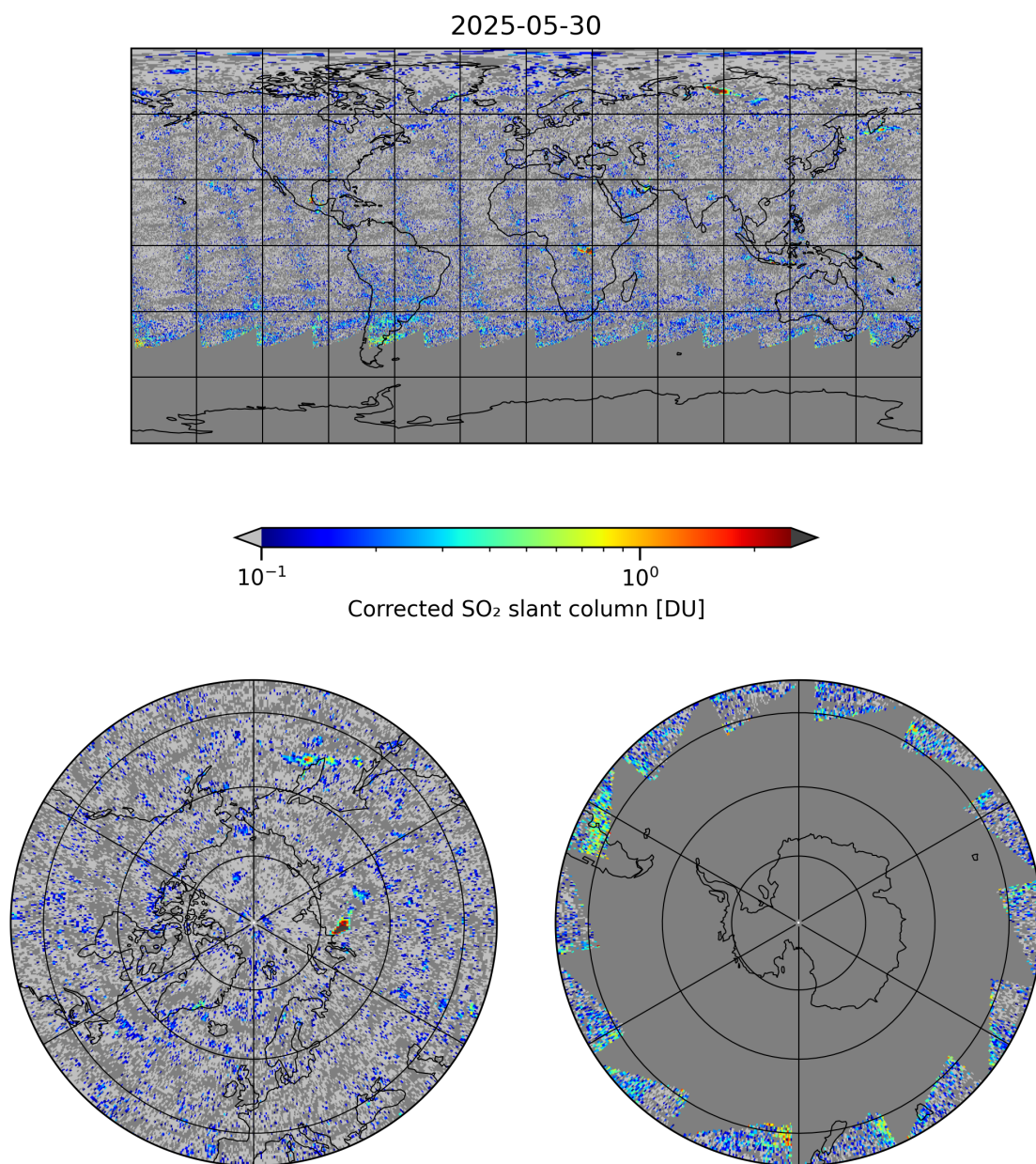


Figure 6: Map of “Corrected SO₂ slant column” for 2025-05-30 to 2025-05-31

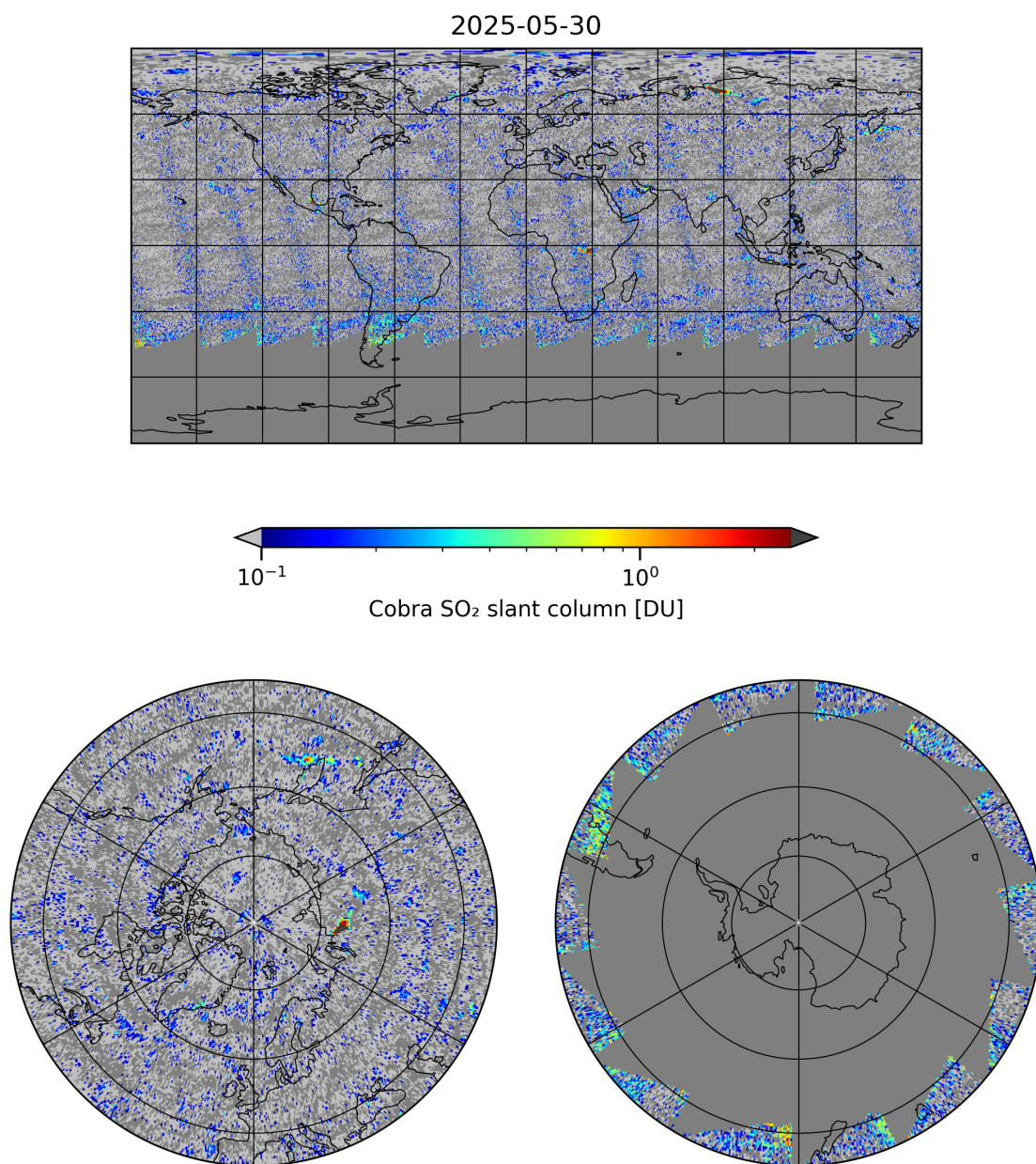


Figure 7: Map of “Cobra SO₂ slant column” for 2025-05-30 to 2025-05-31

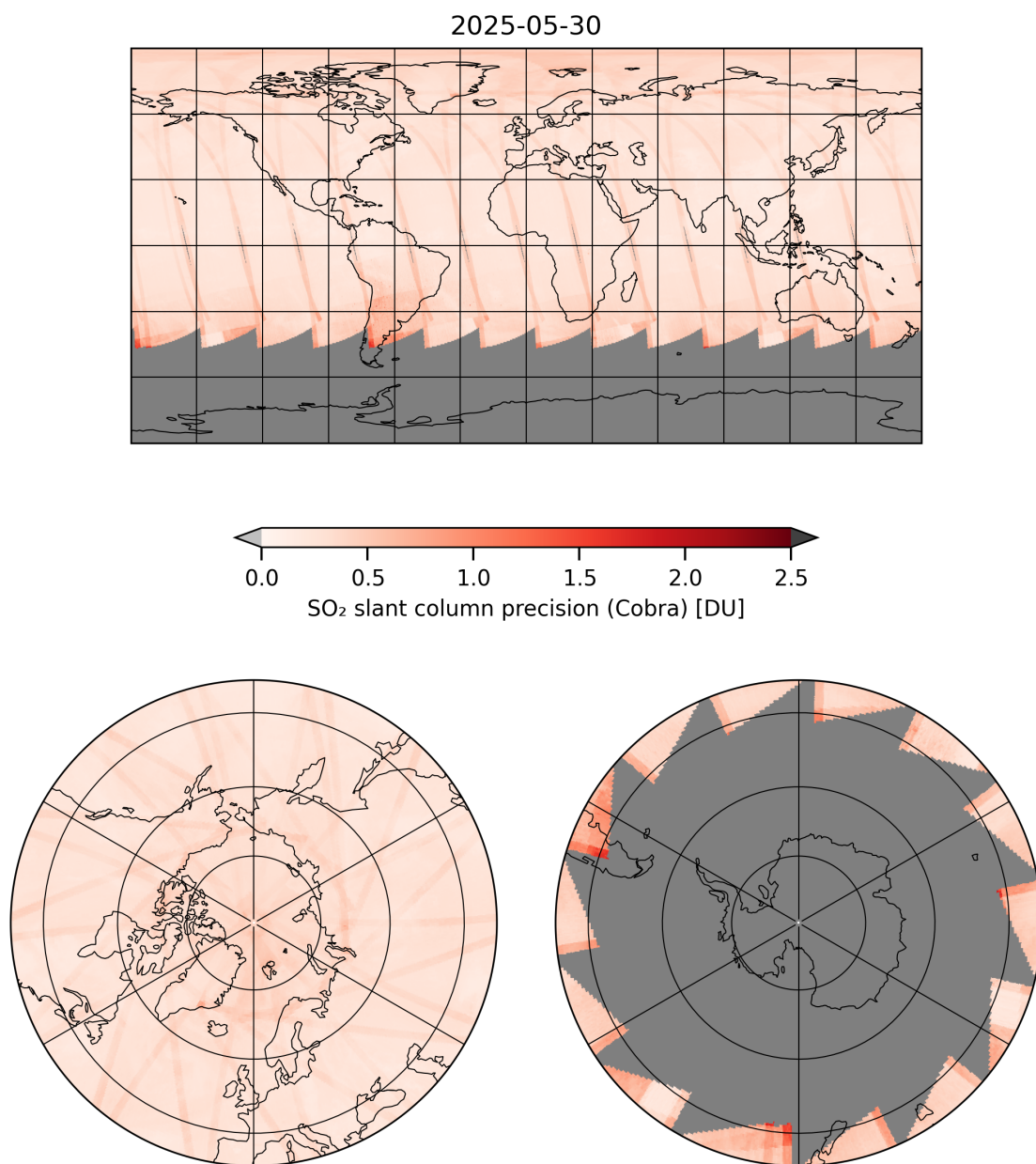


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-05-30 to 2025-05-31

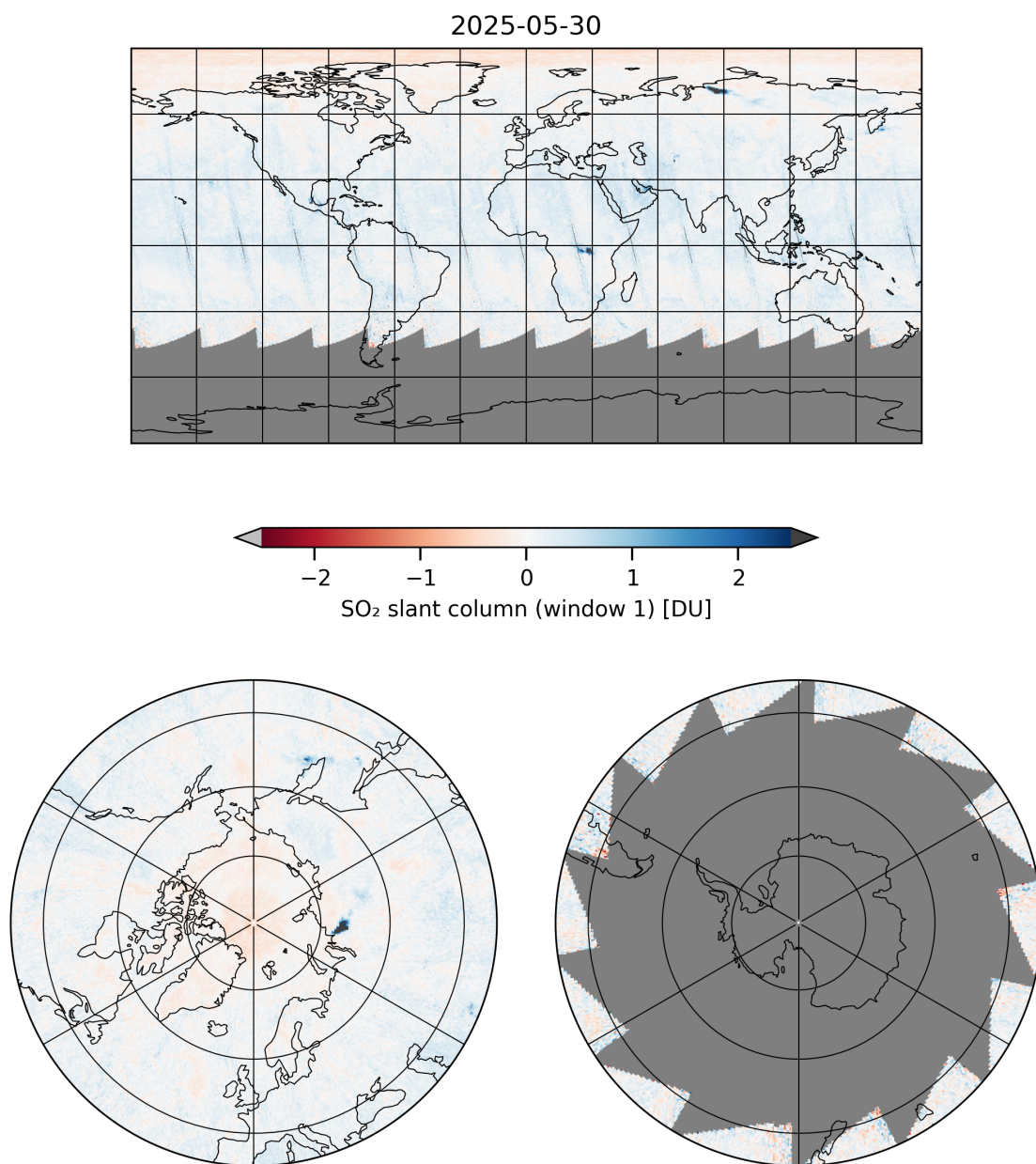


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-05-30 to 2025-05-31

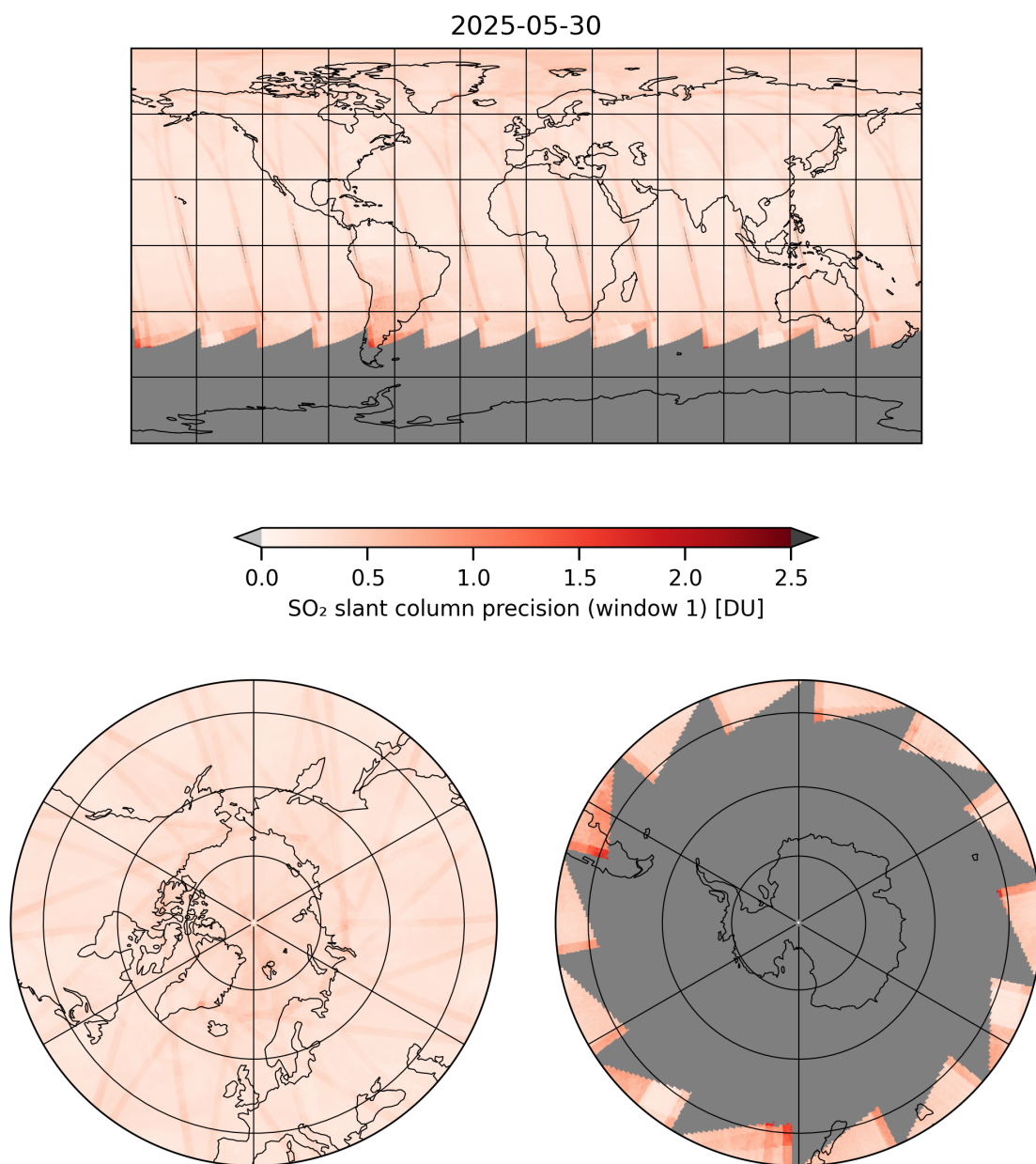


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-05-30 to 2025-05-31

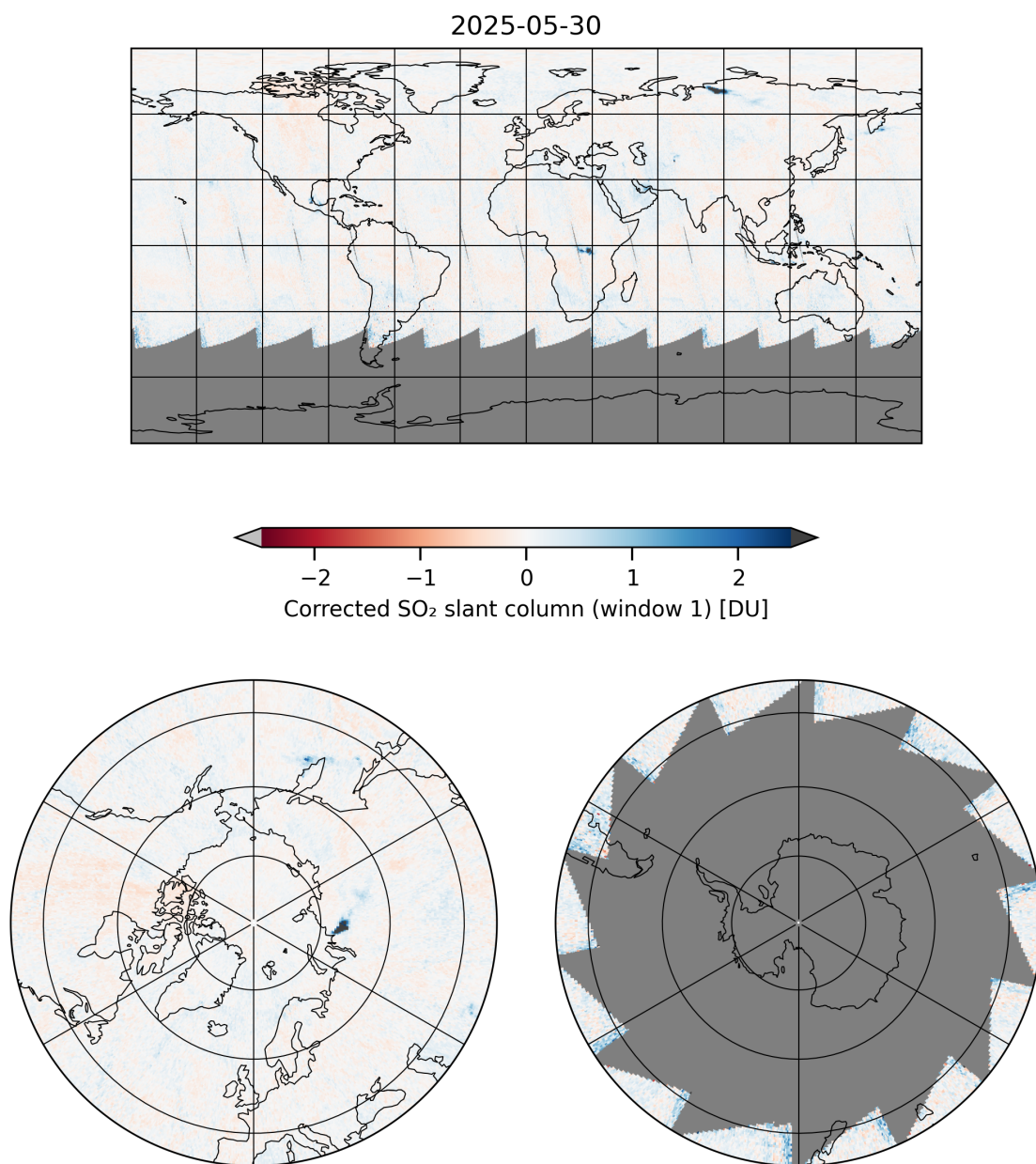


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-05-30 to 2025-05-31

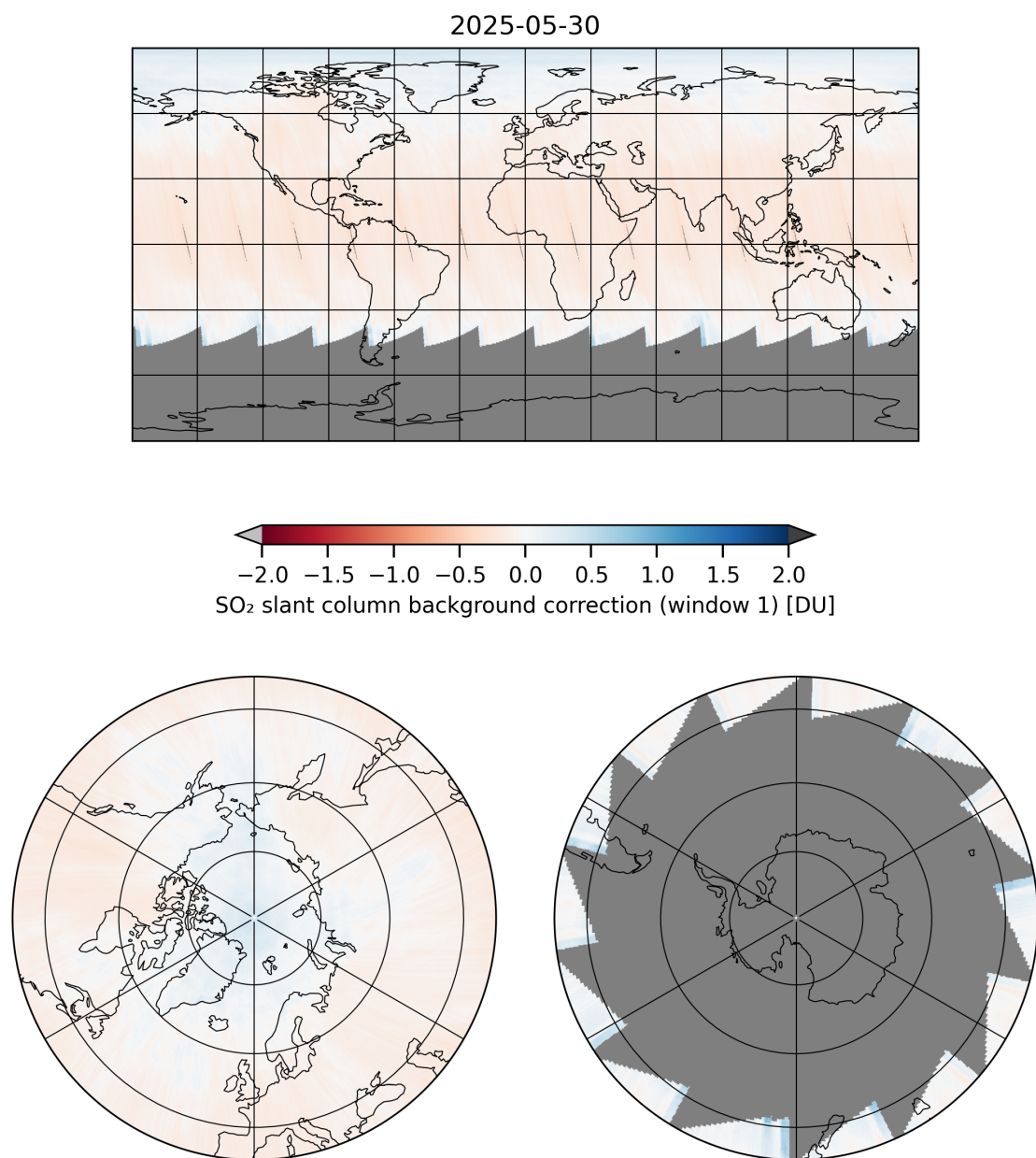


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-05-30 to 2025-05-31

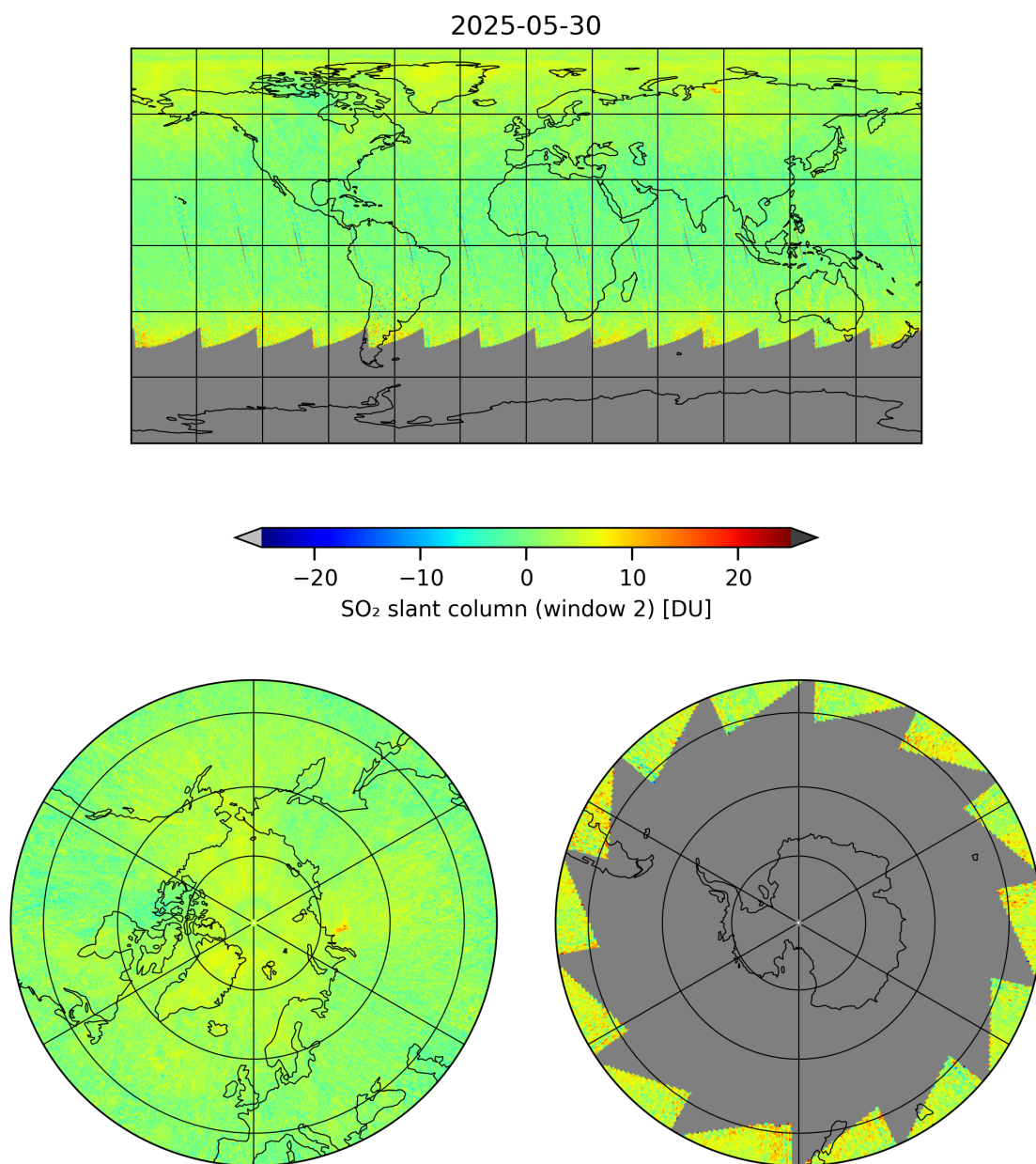


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-05-30 to 2025-05-31

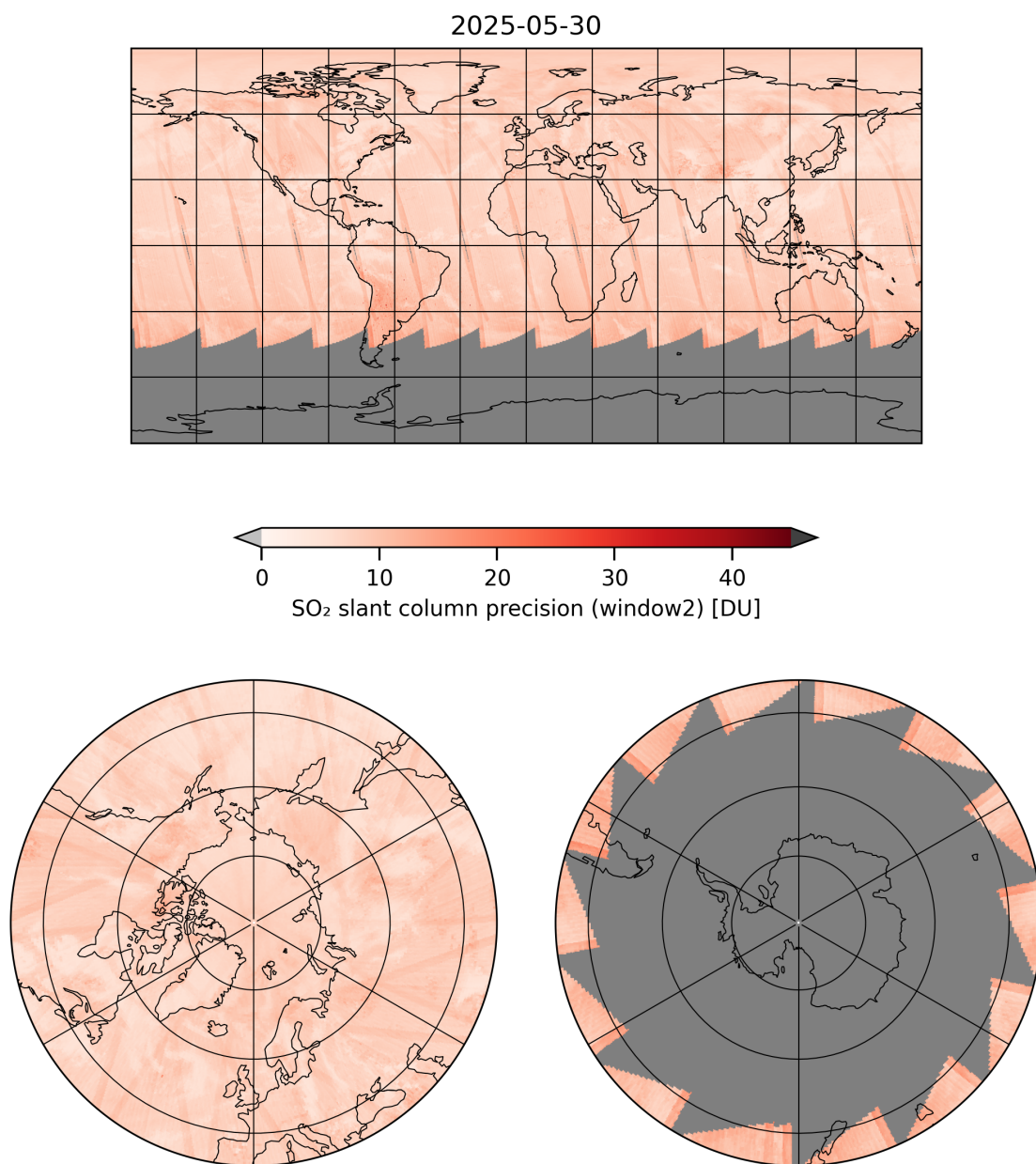


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-05-30 to 2025-05-31

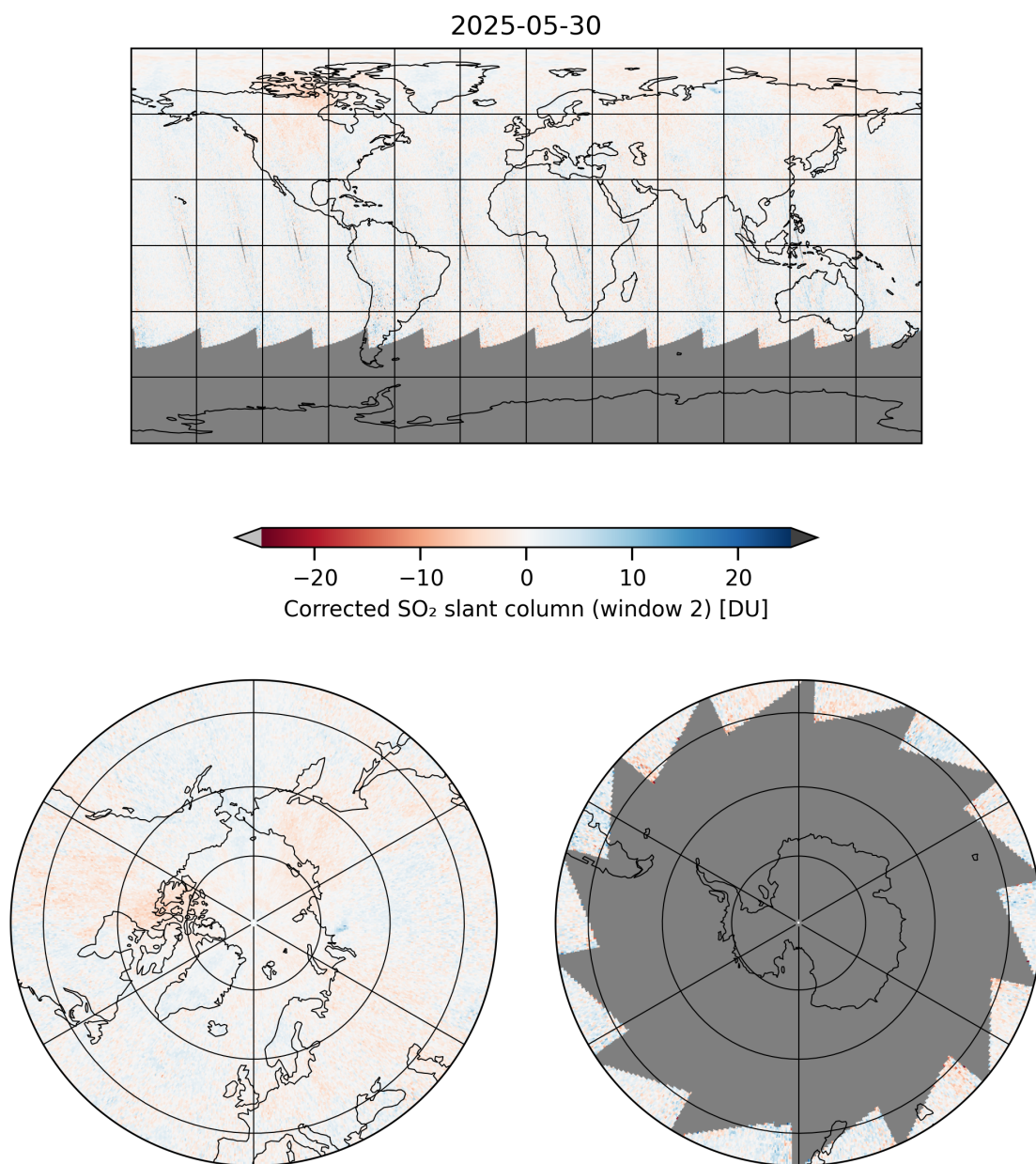


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-05-30 to 2025-05-31

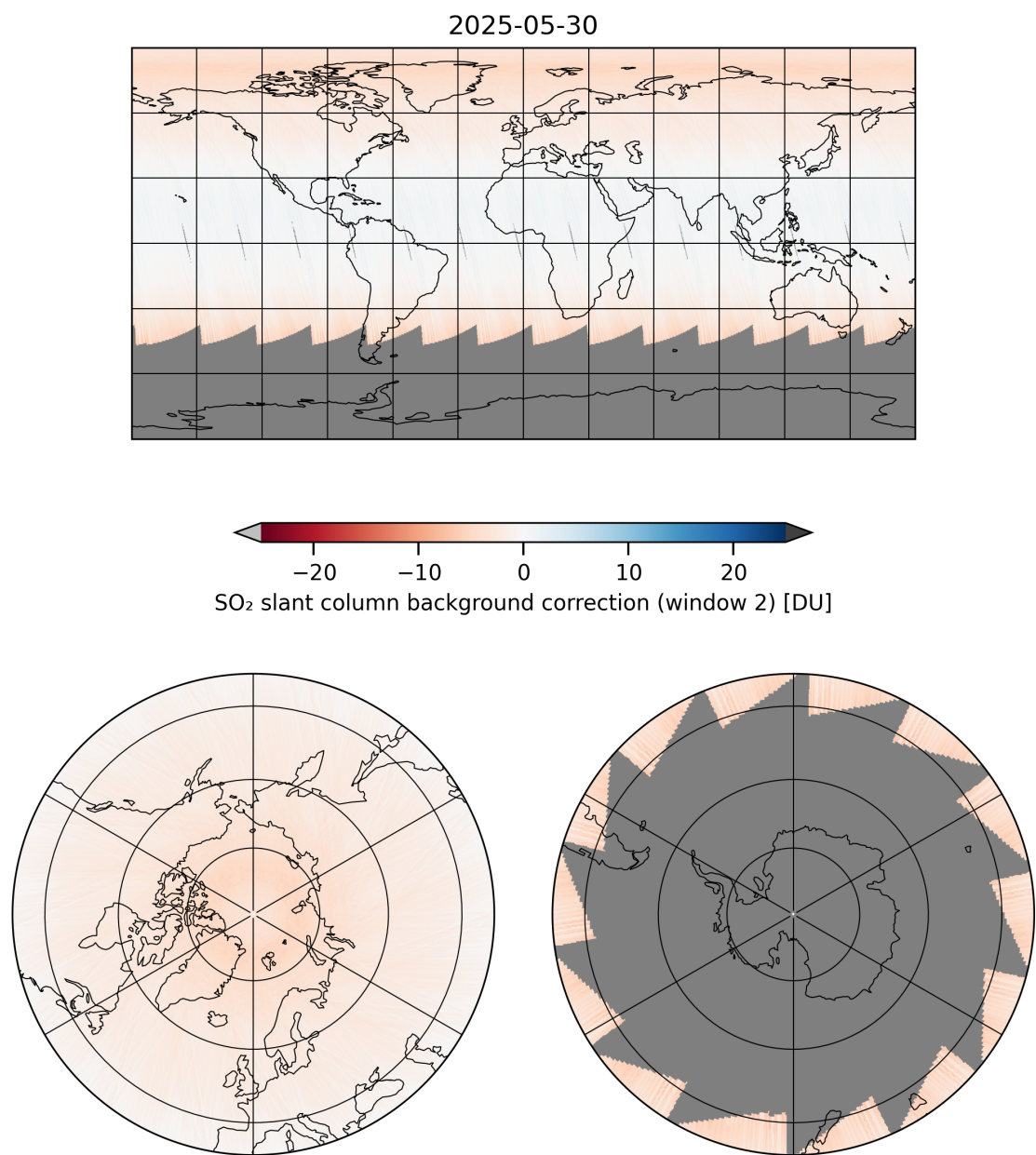


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-05-30 to 2025-05-31

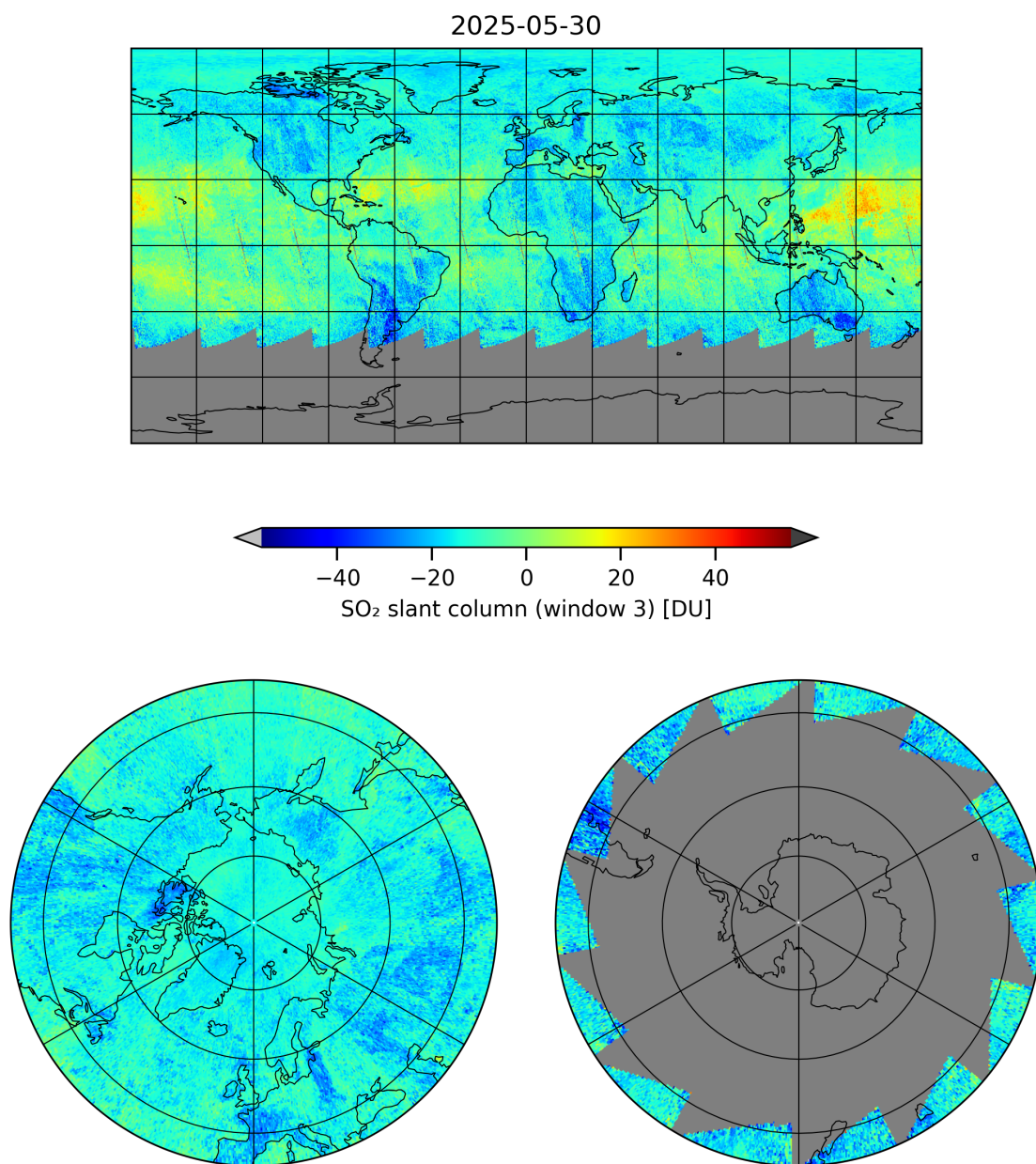


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-05-30 to 2025-05-31

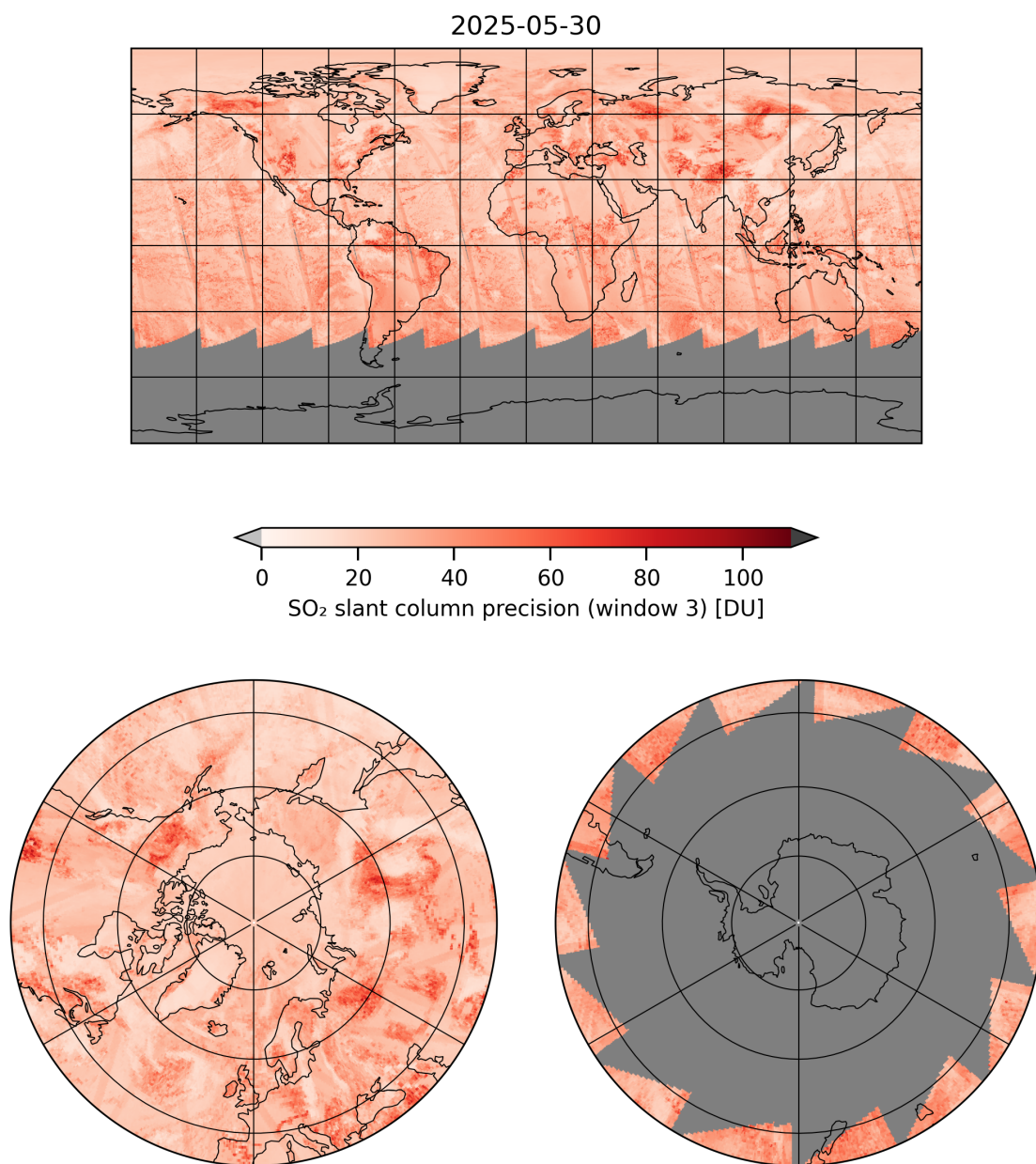


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-05-30 to 2025-05-31

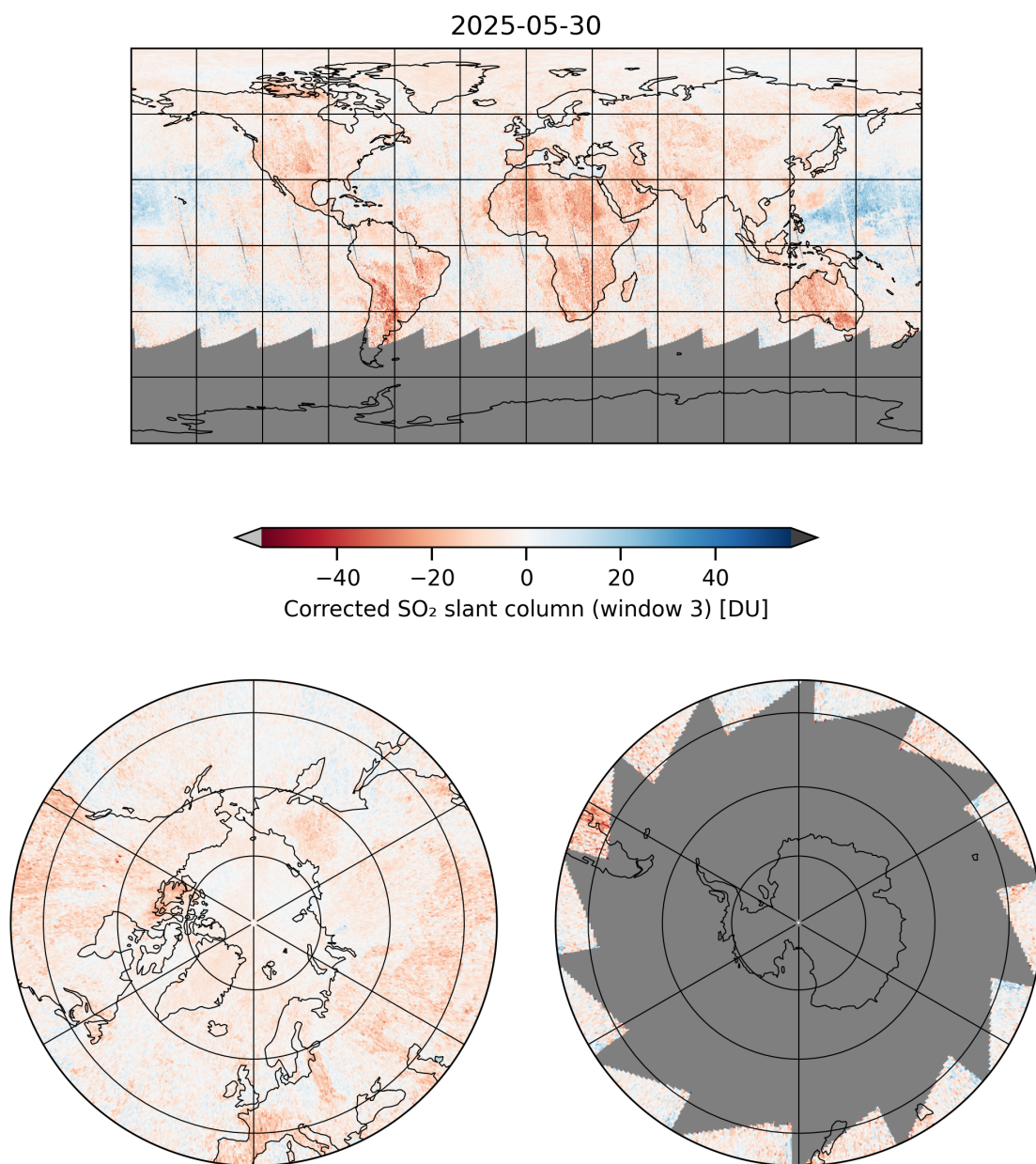


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-05-30 to 2025-05-31

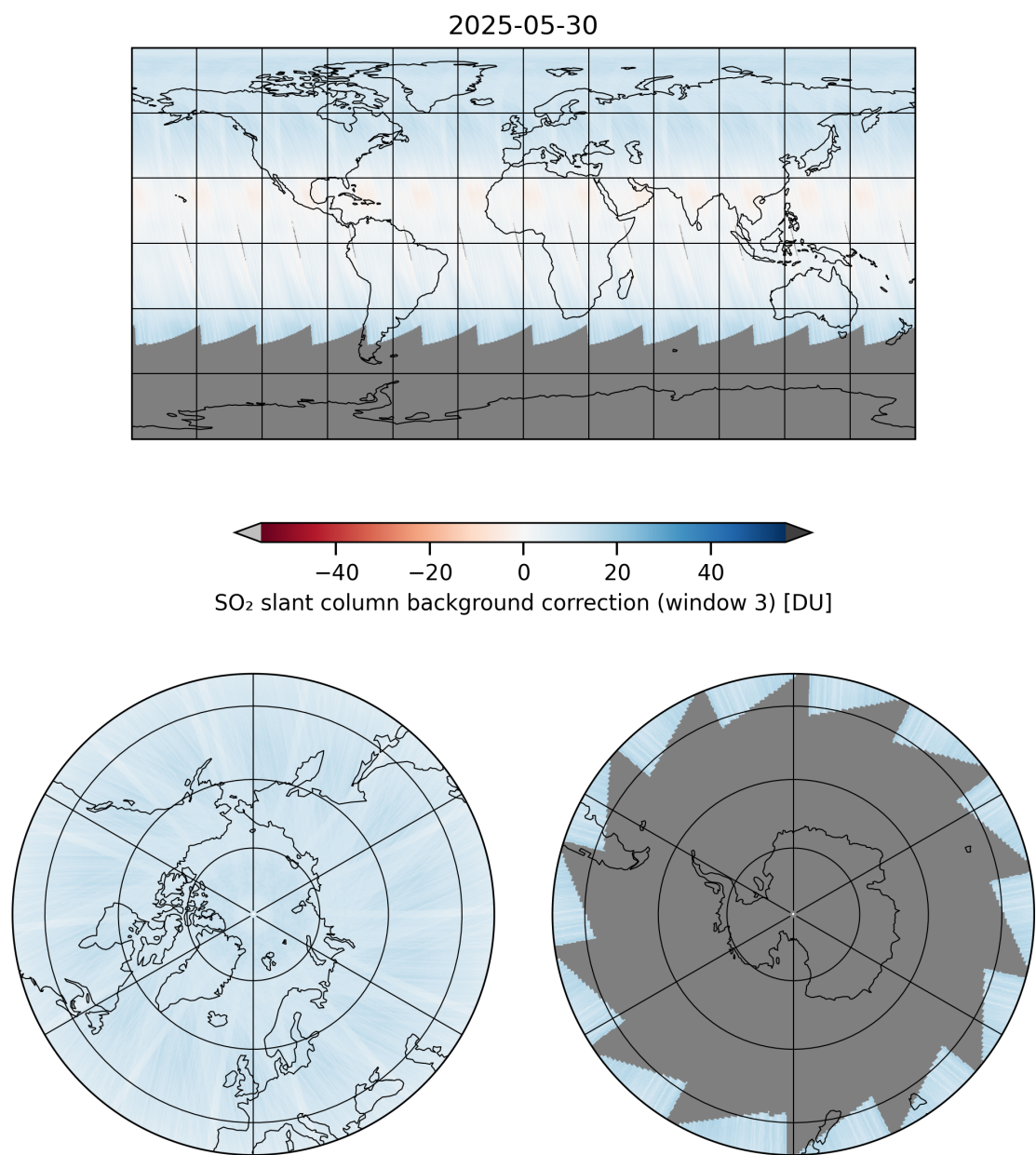


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-05-30 to 2025-05-31

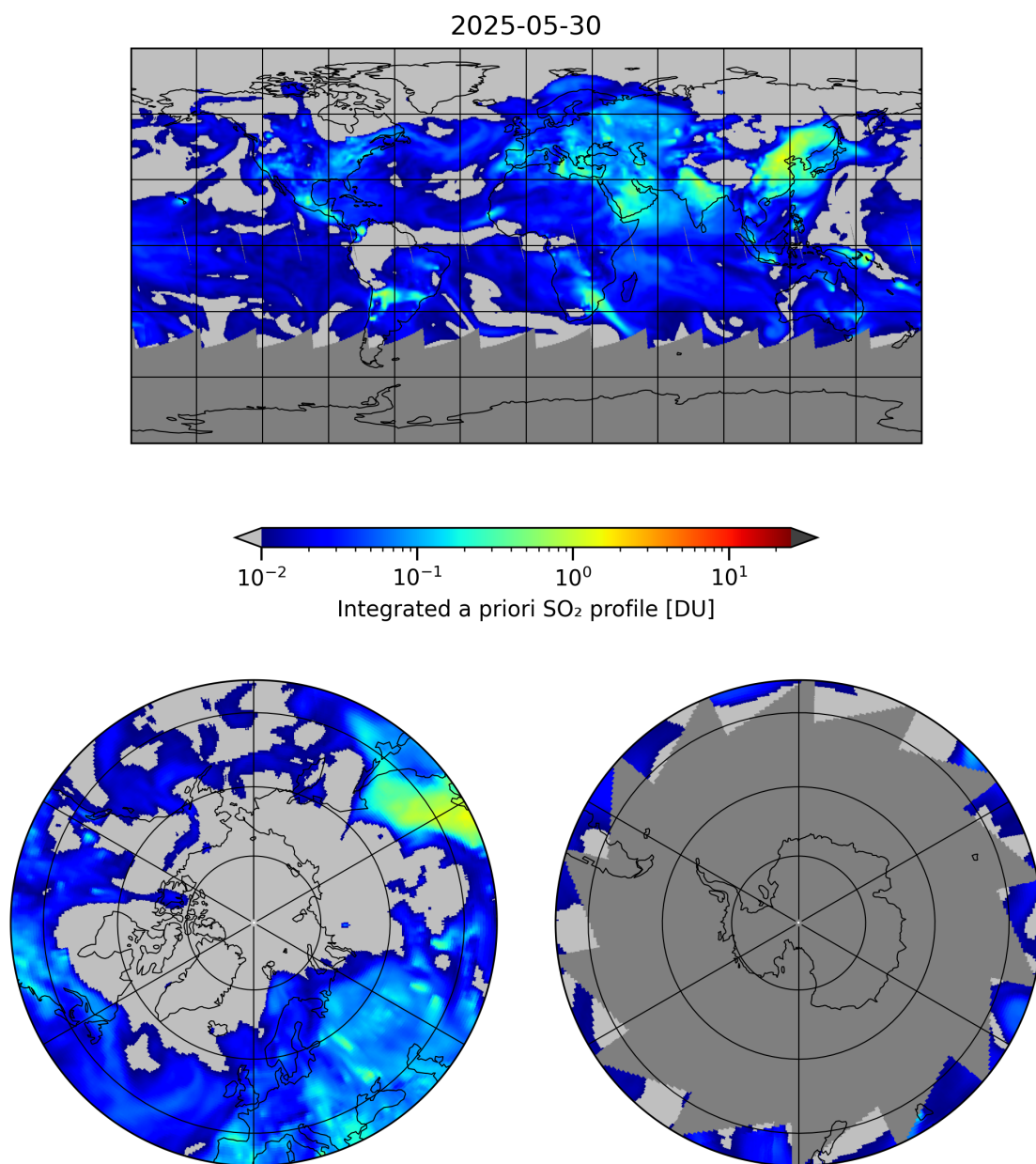


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-05-30 to 2025-05-31

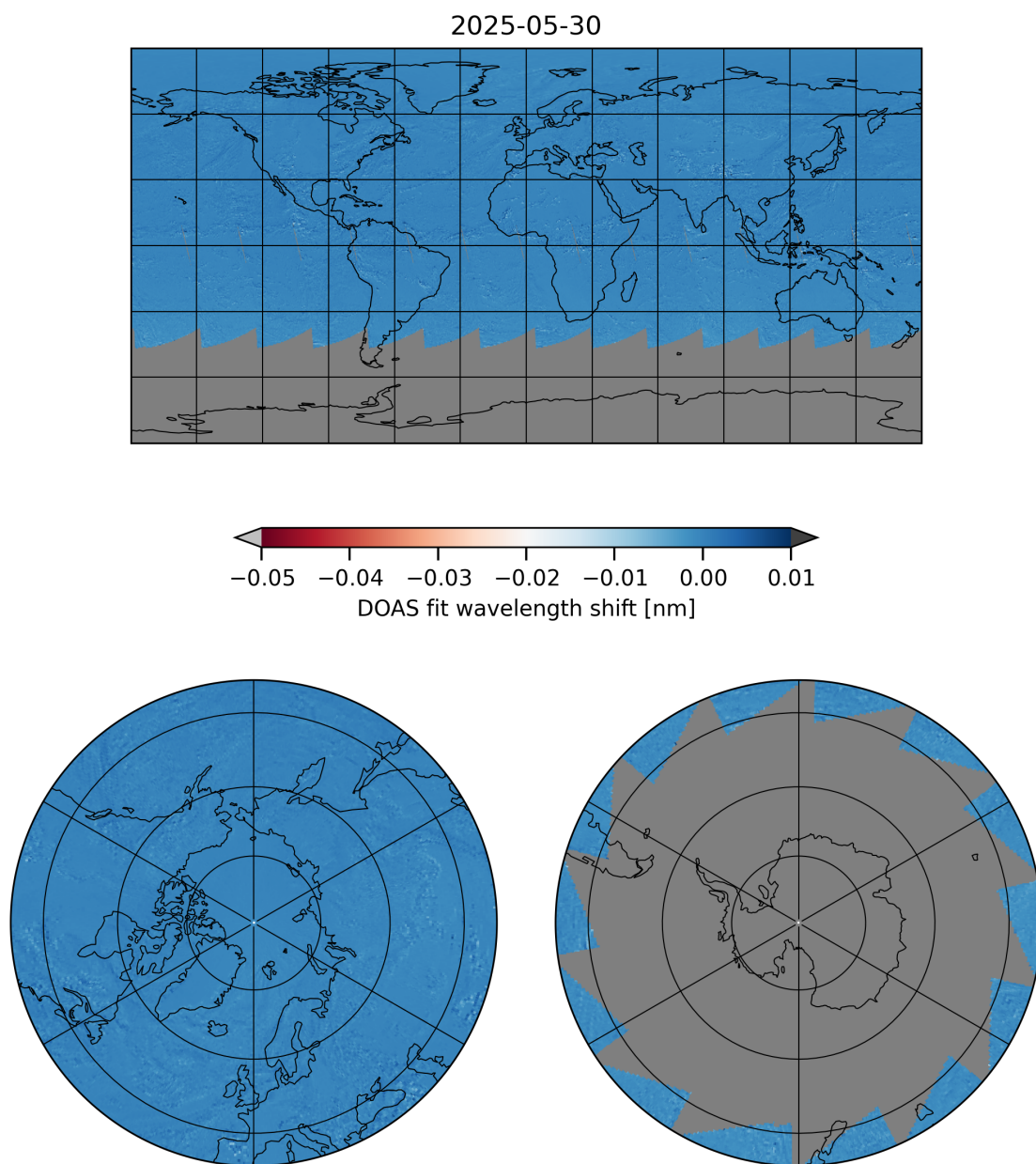


Figure 22: Map of “DOAS fit wavelength shift” for 2025-05-30 to 2025-05-31

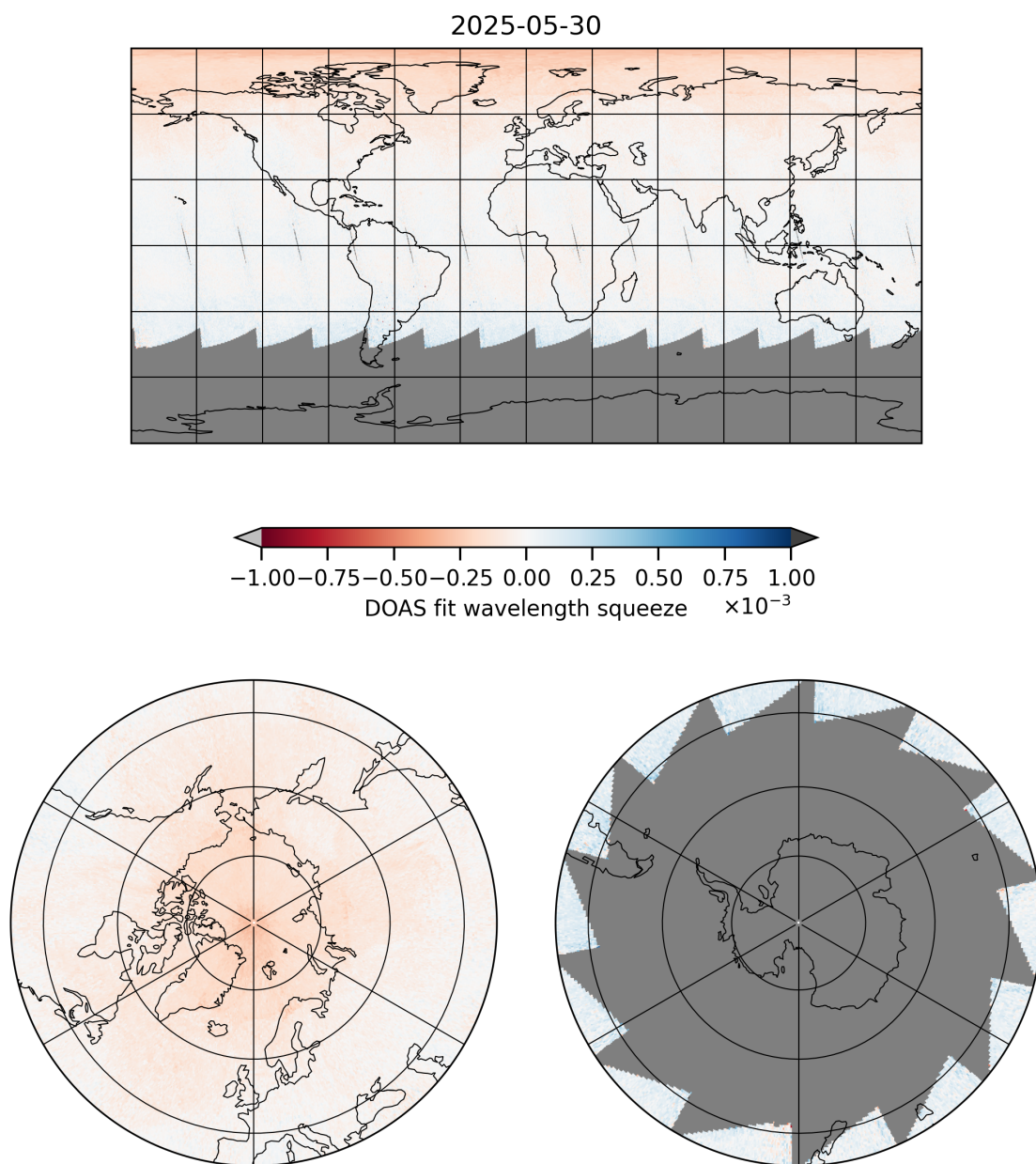


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-05-30 to 2025-05-31

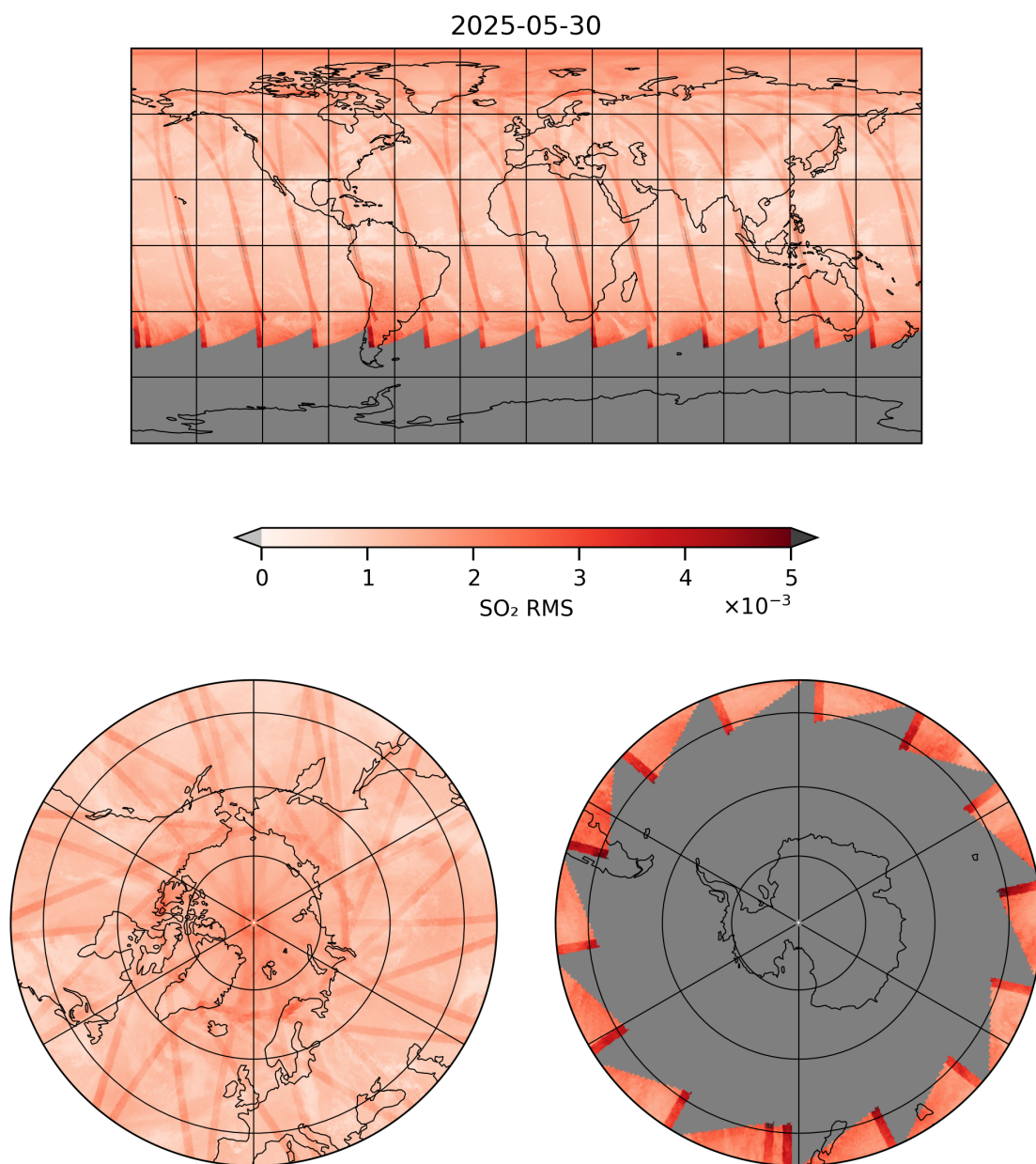


Figure 24: Map of “SO₂ RMS” for 2025-05-30 to 2025-05-31

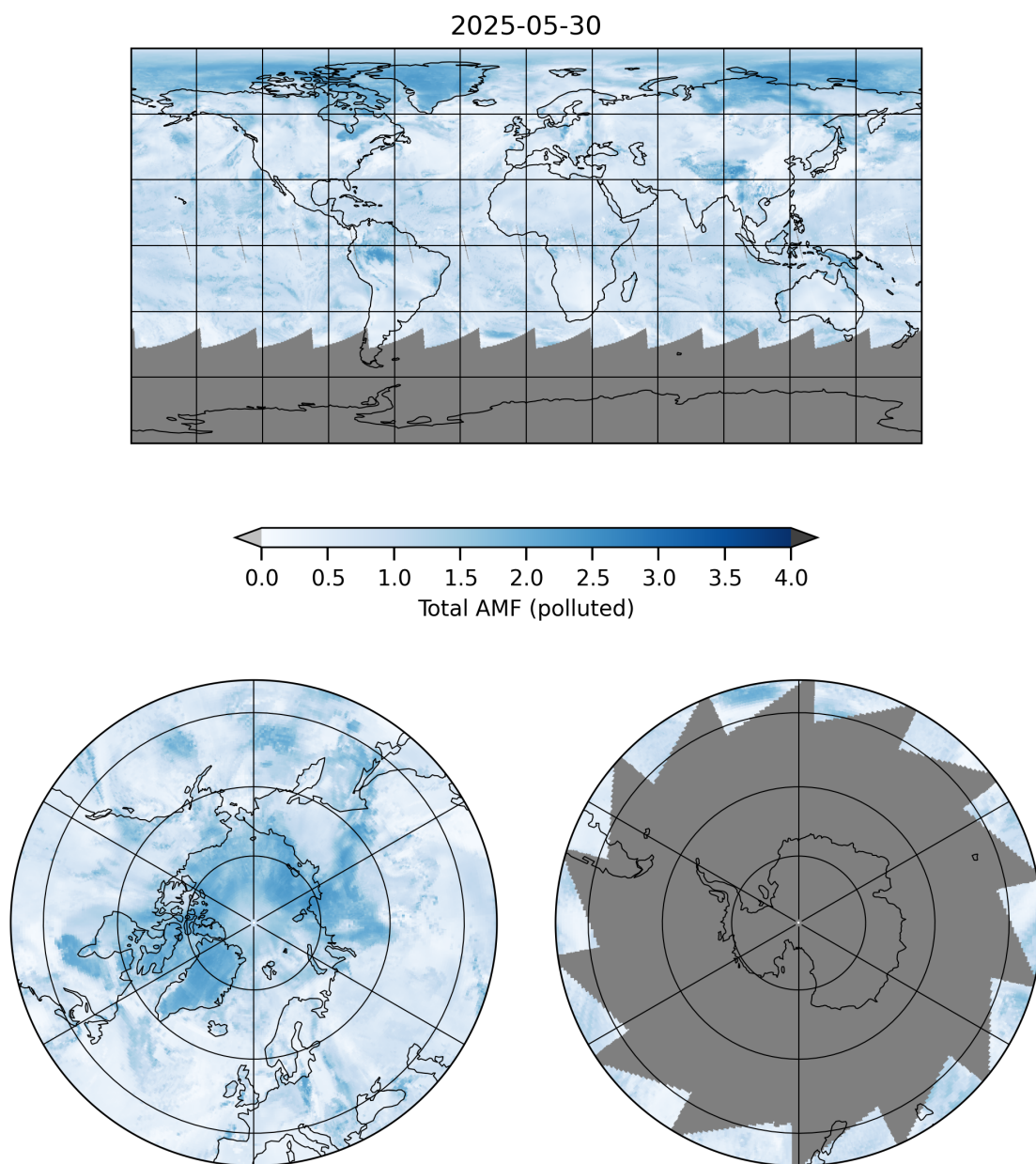


Figure 25: Map of “Total AMF (polluted)” for 2025-05-30 to 2025-05-31

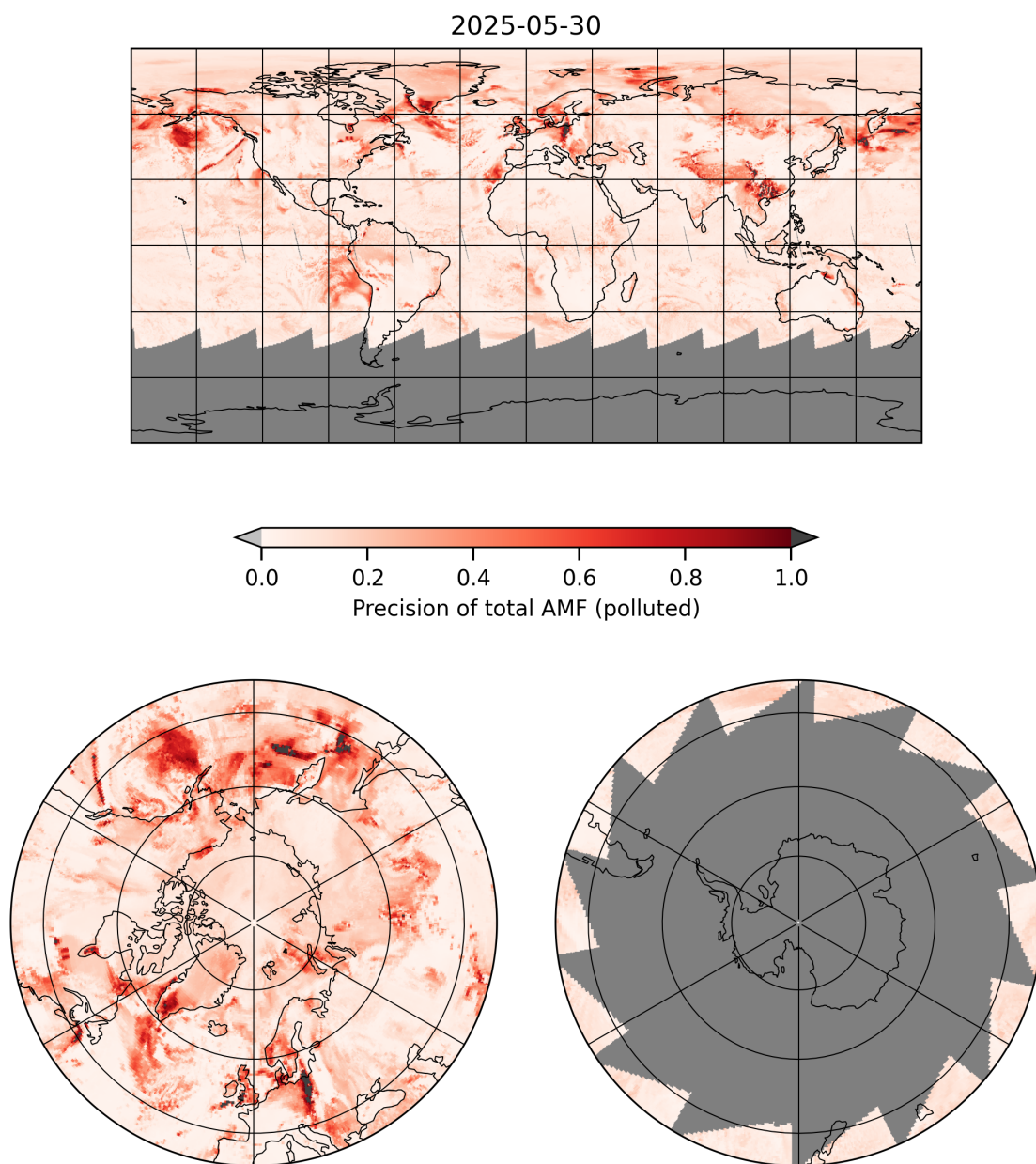


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-05-30 to 2025-05-31

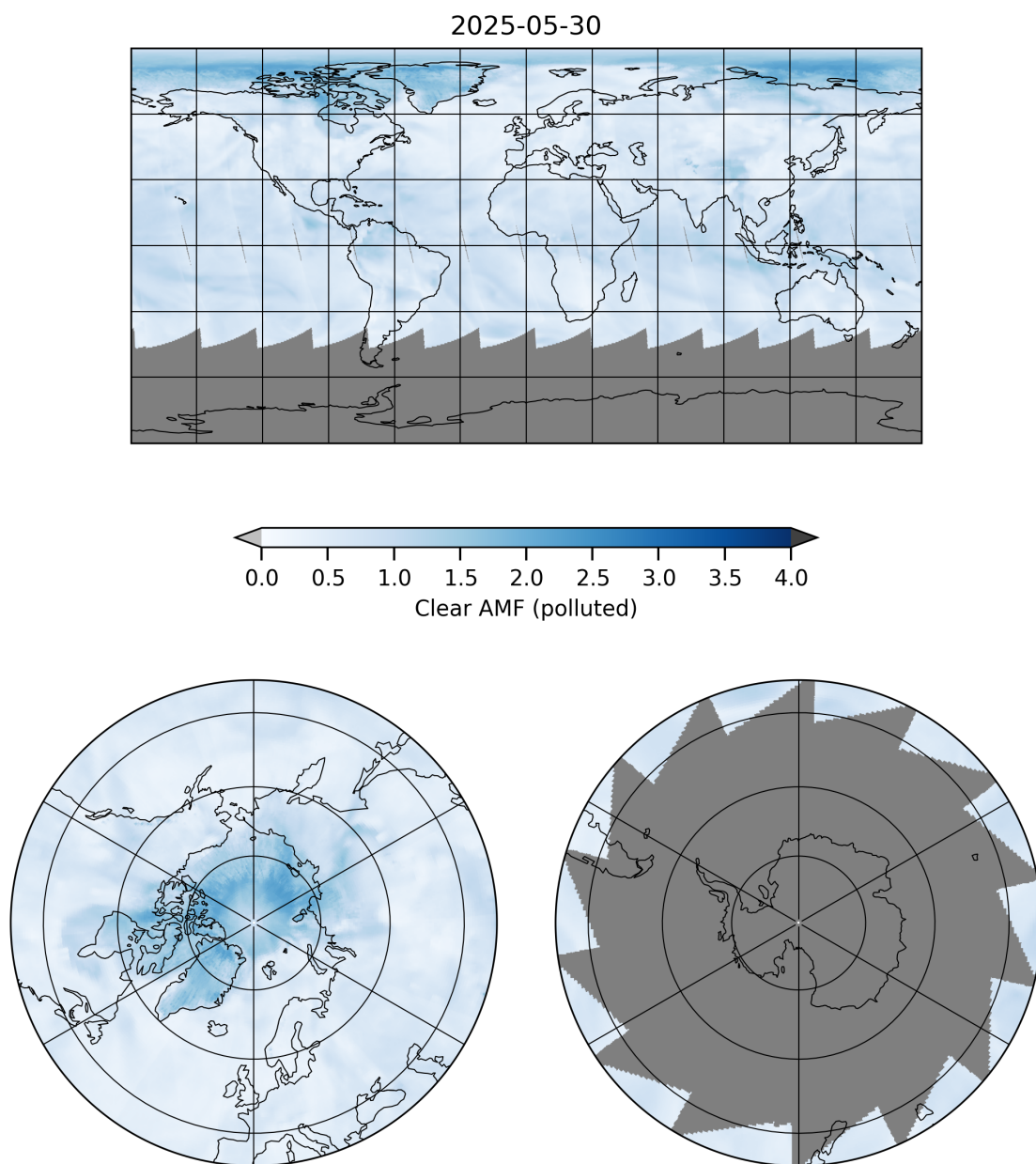


Figure 27: Map of “Clear AMF (polluted)” for 2025-05-30 to 2025-05-31

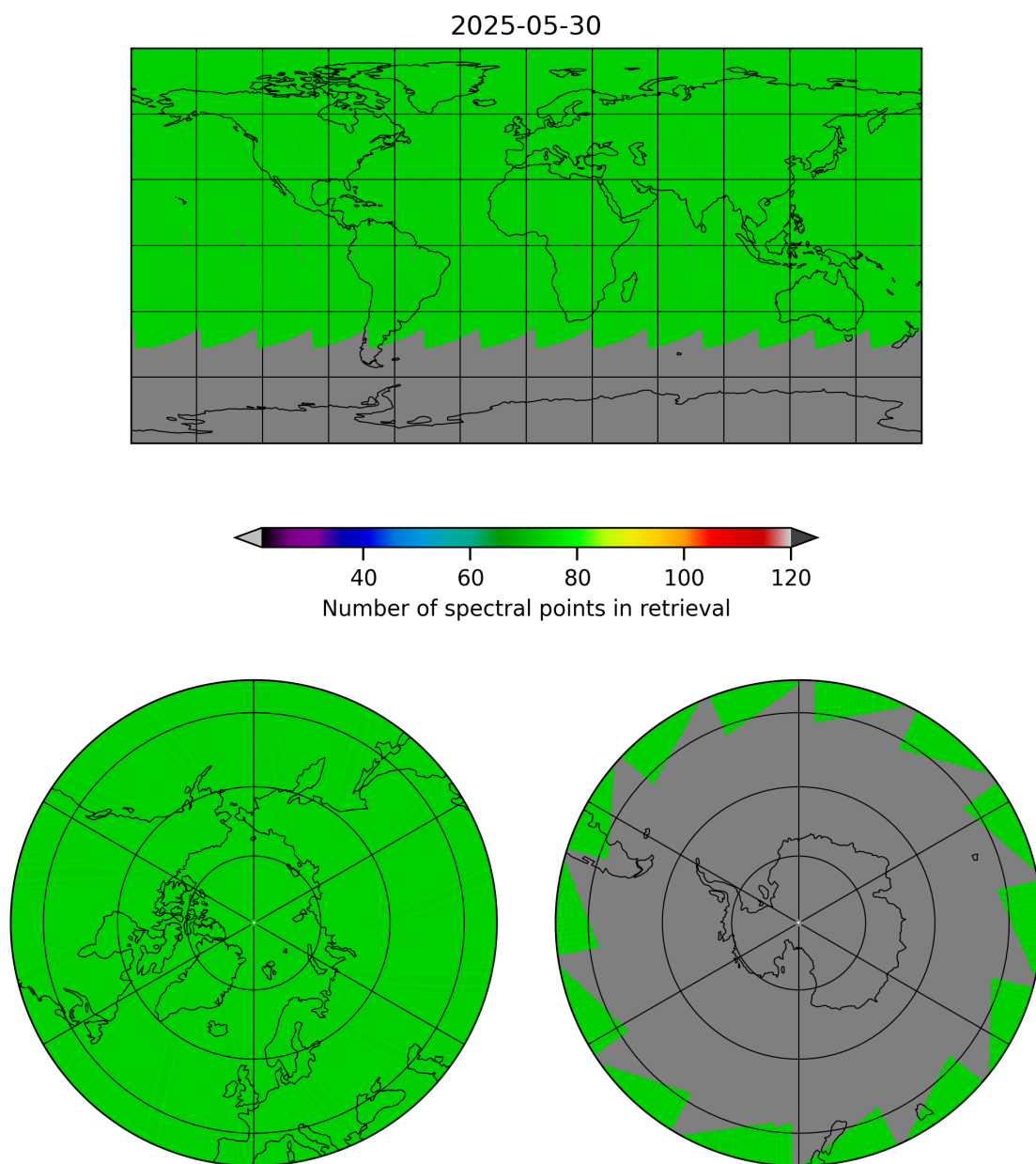


Figure 28: Map of “Number of spectral points in retrieval” for 2025-05-30 to 2025-05-31

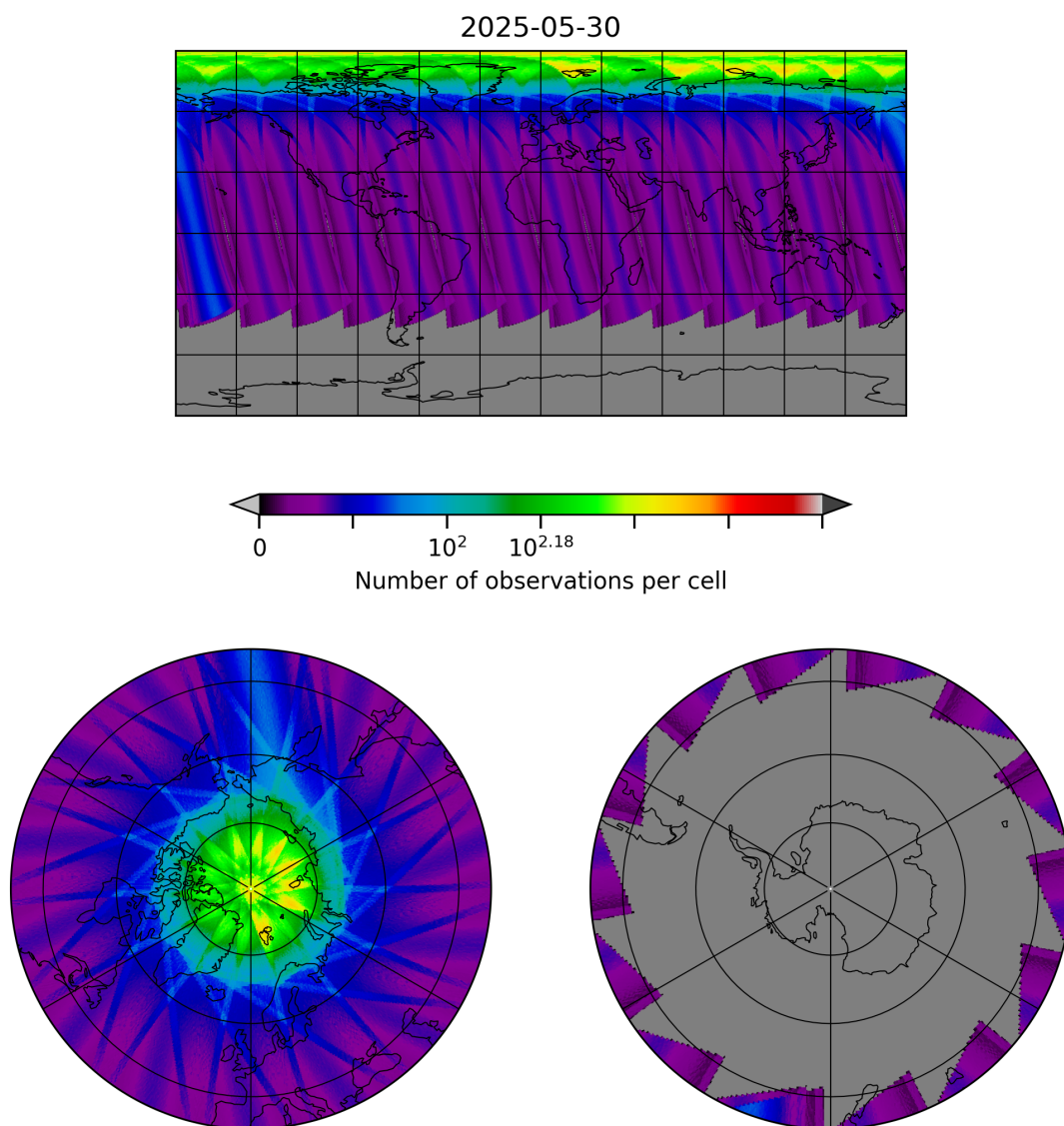


Figure 29: Map of the number of observations for 2025-05-30 to 2025-05-31

7 Zonal average

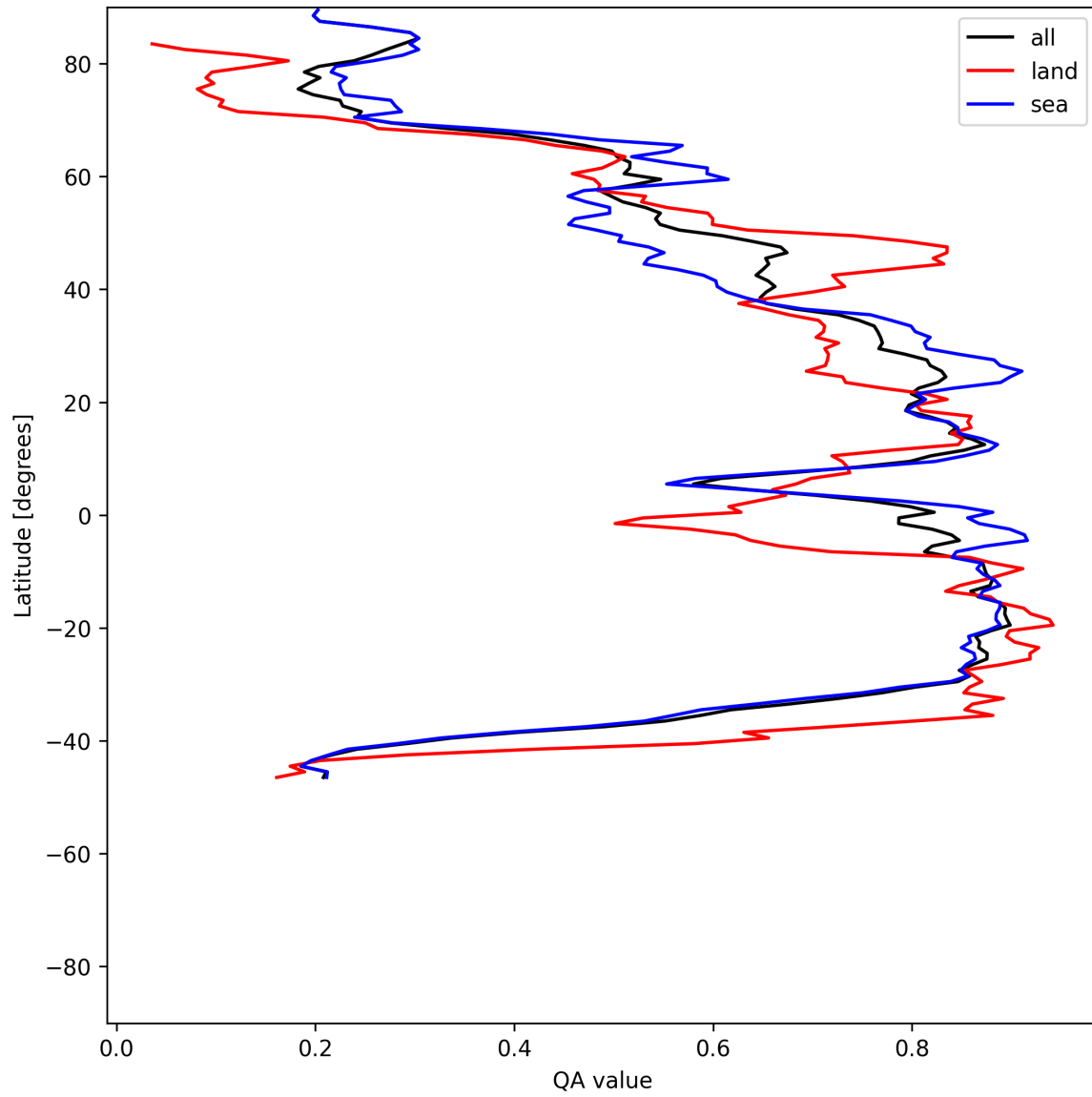


Figure 30: Zonal average of “QA value” for 2025-05-30 to 2025-05-31.

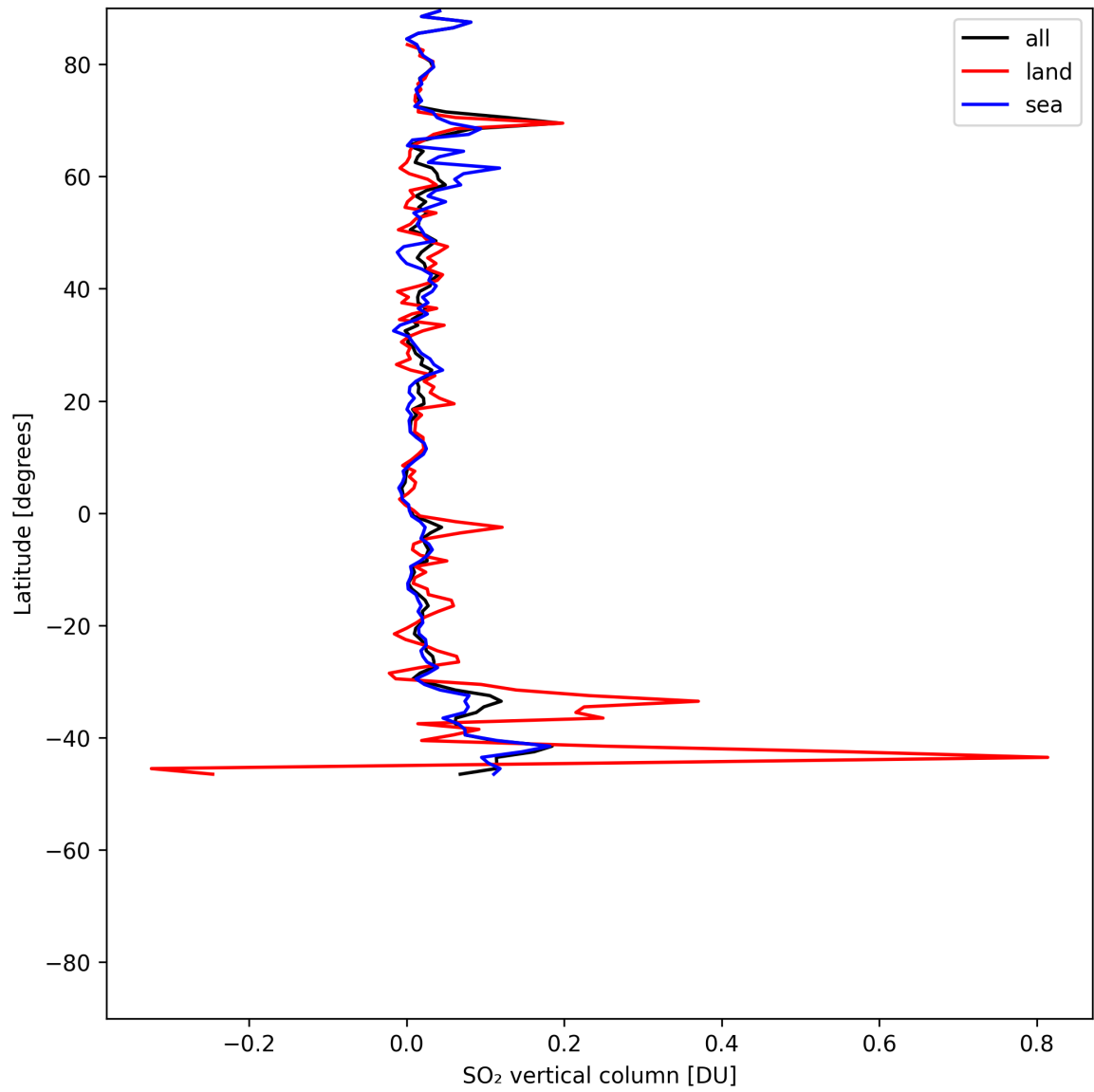


Figure 31: Zonal average of “SO₂ vertical column” for 2025-05-30 to 2025-05-31.

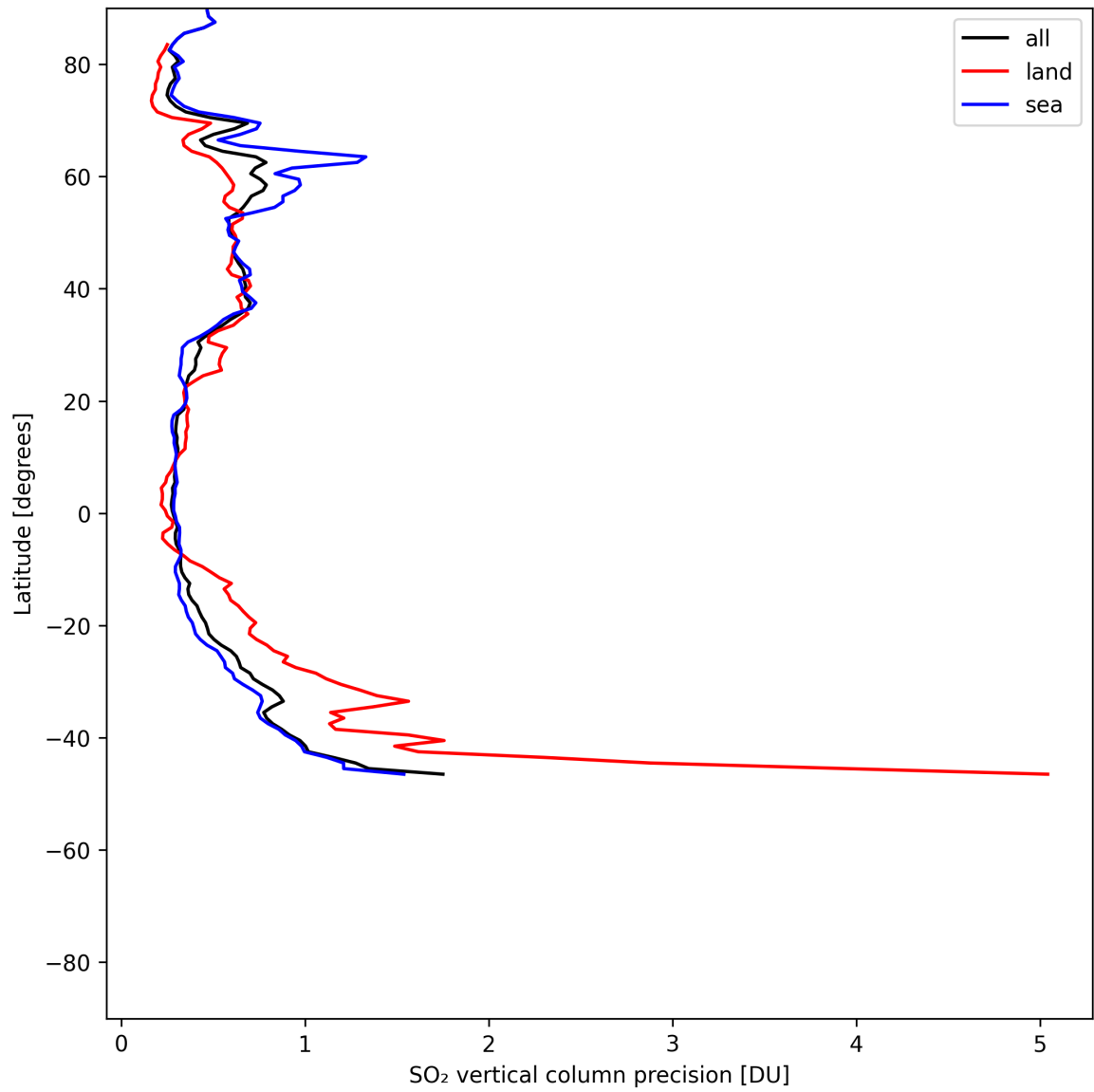


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-05-30 to 2025-05-31.

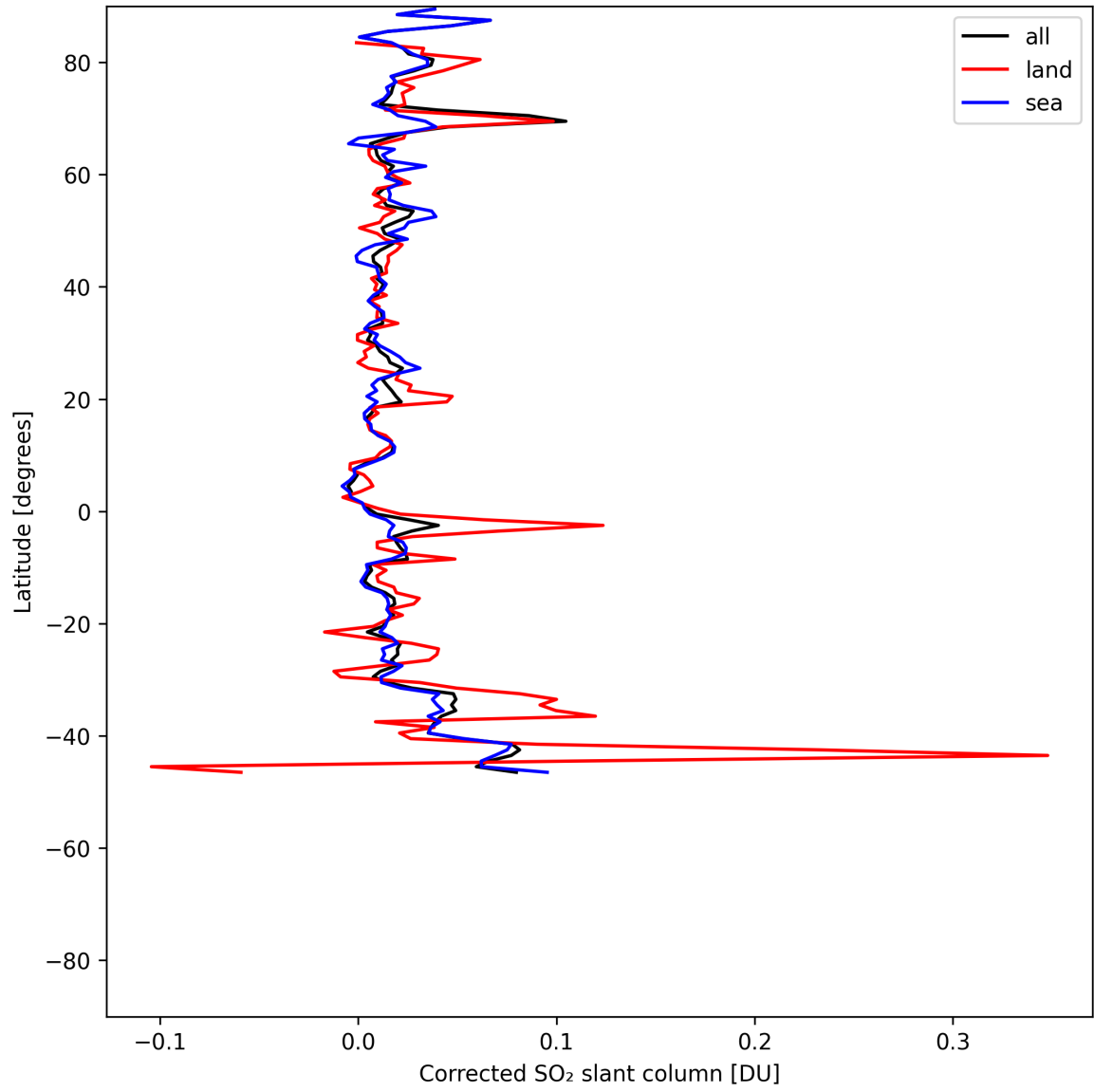


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-05-30 to 2025-05-31.

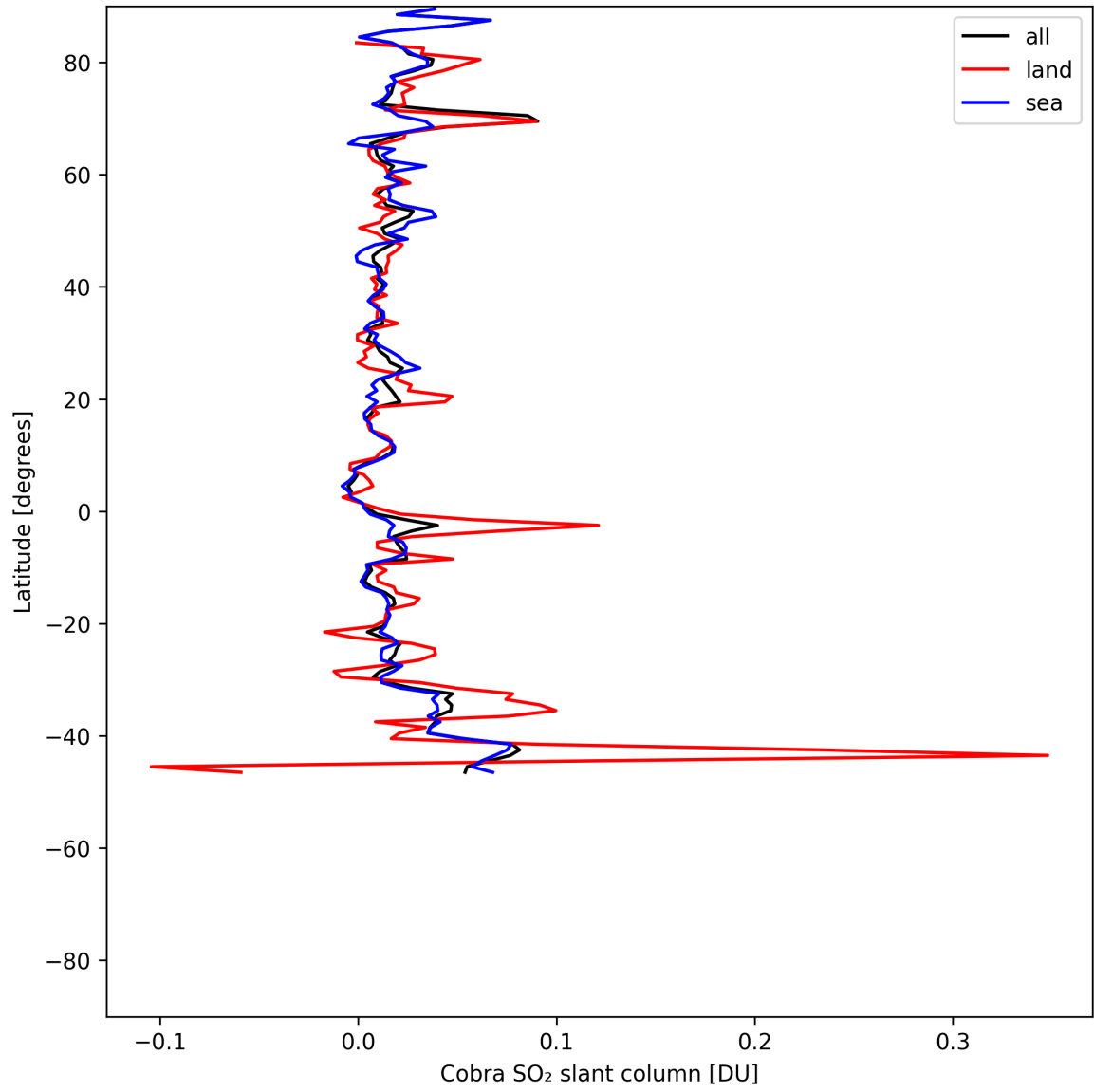


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-05-30 to 2025-05-31.

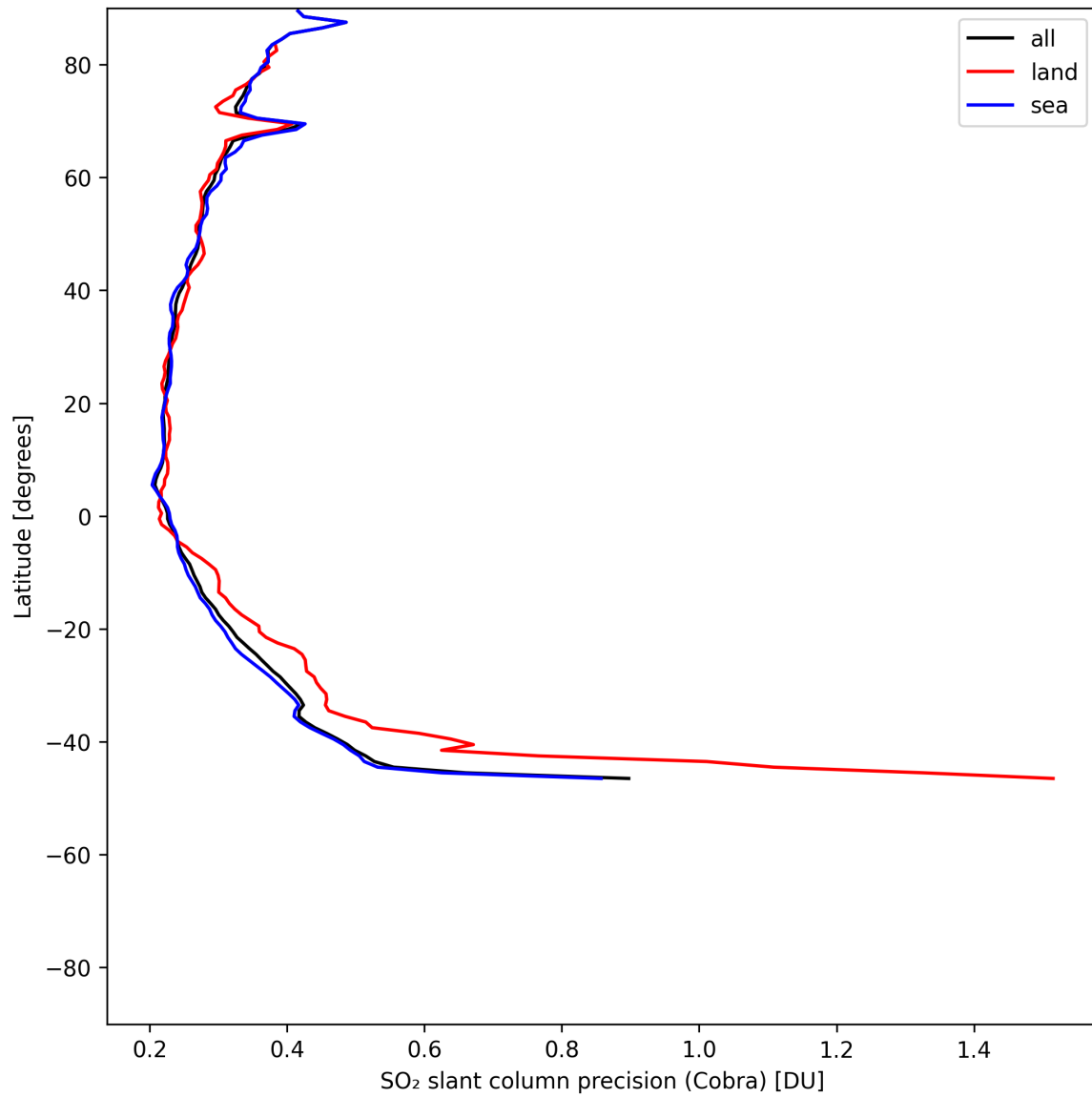


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-05-30 to 2025-05-31.

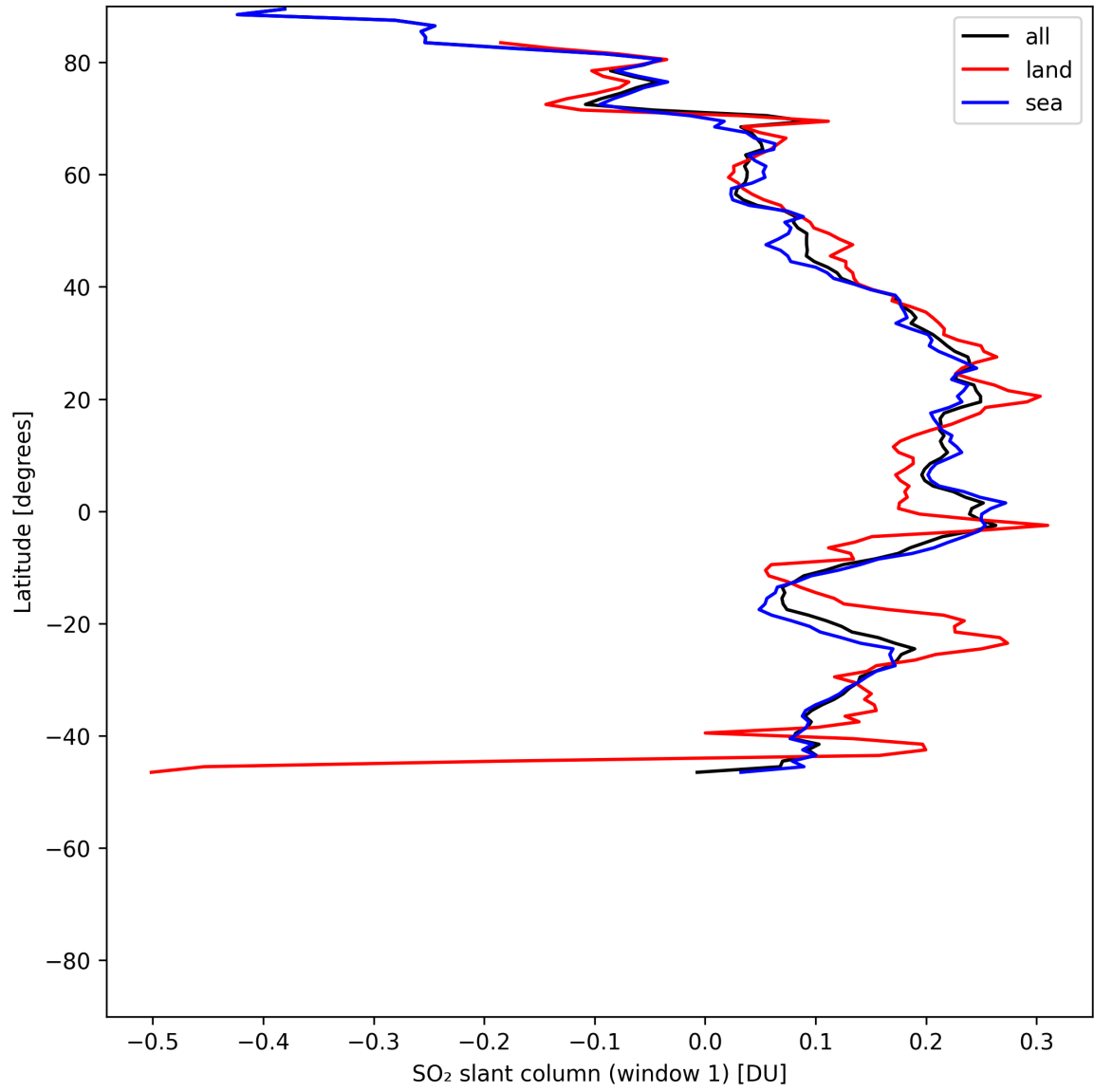


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-05-30 to 2025-05-31.

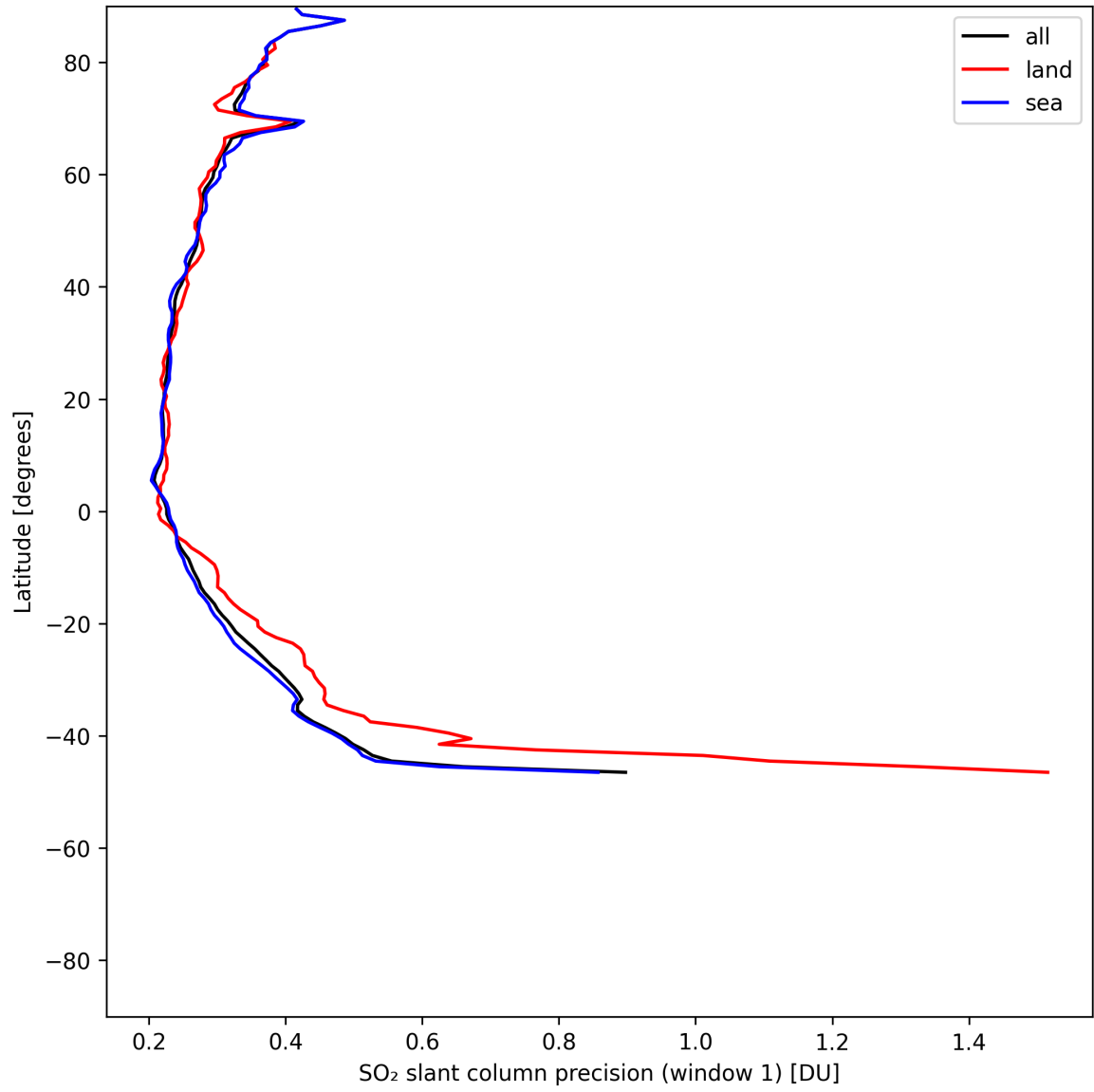


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-05-30 to 2025-05-31.

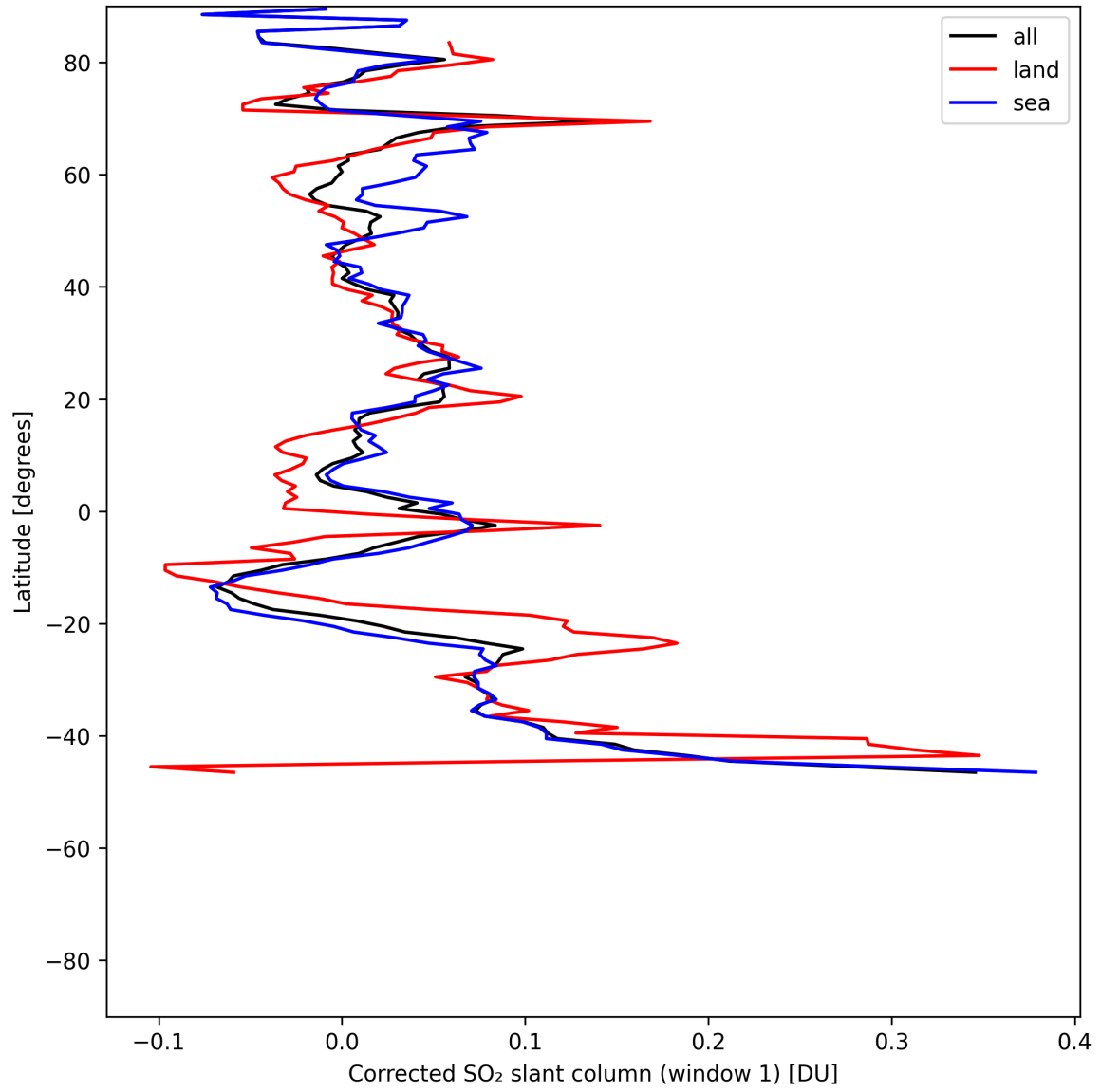


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-05-30 to 2025-05-31.

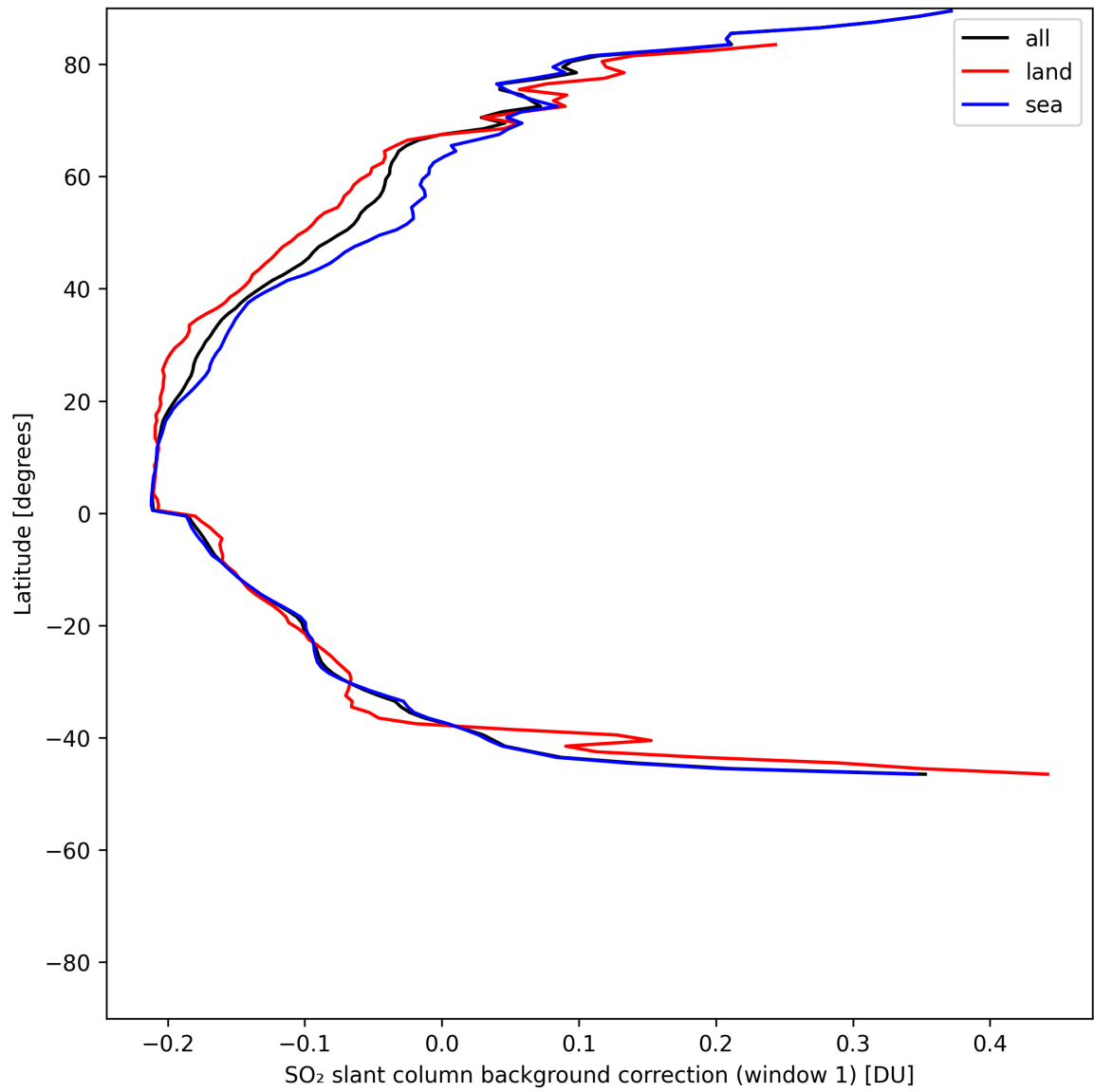


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-05-30 to 2025-05-31.

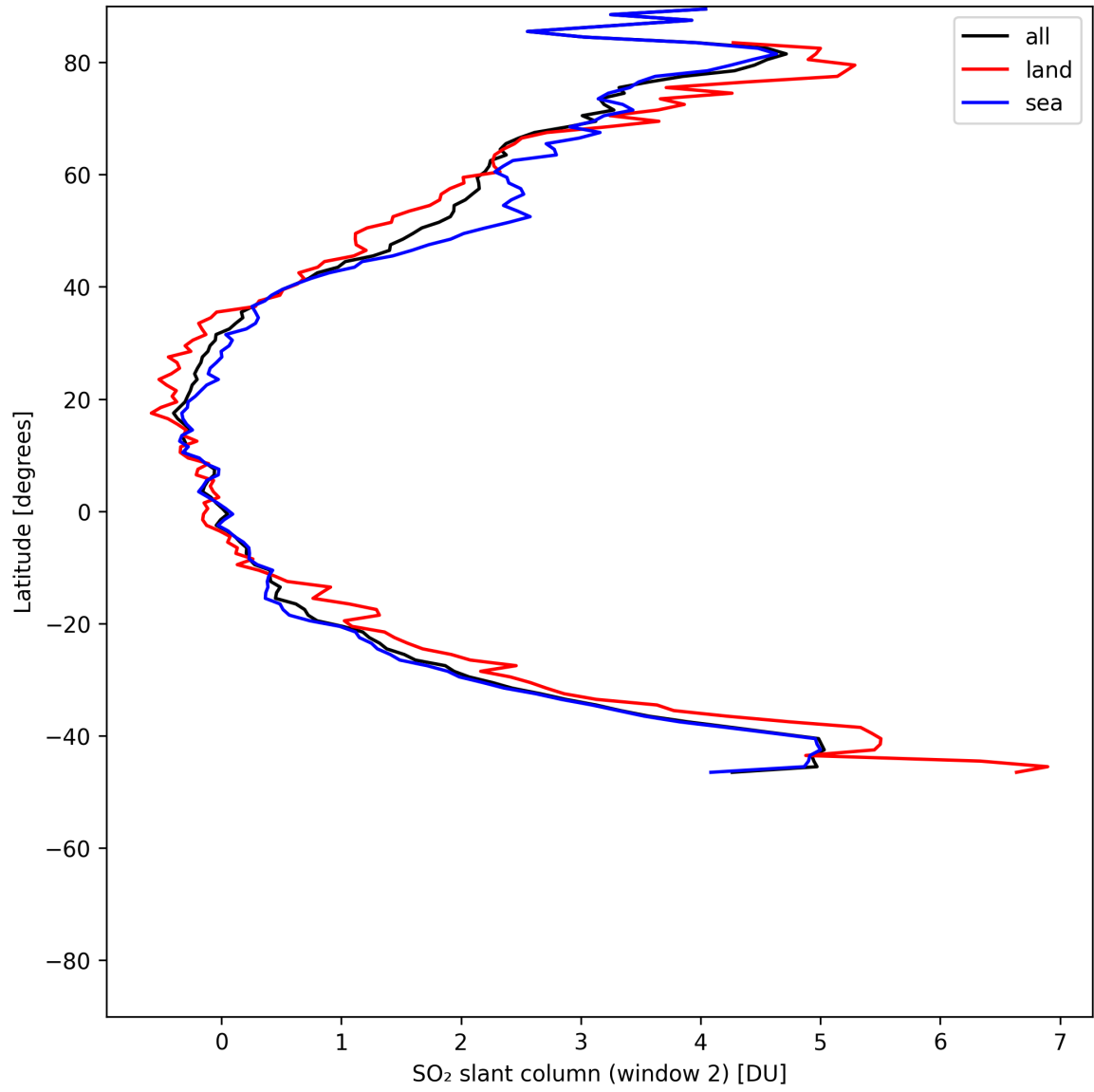


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-05-30 to 2025-05-31.

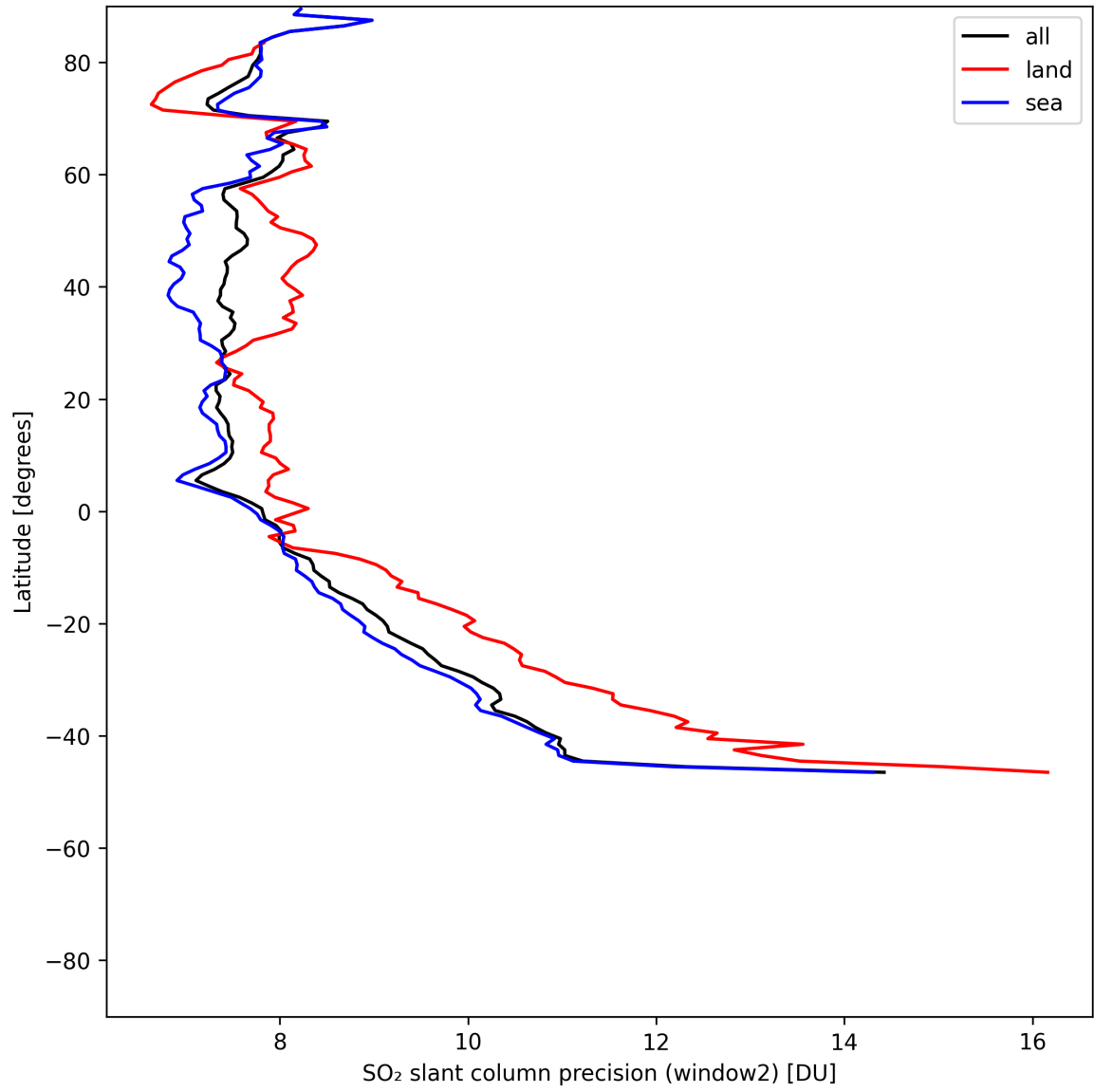


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-05-30 to 2025-05-31.

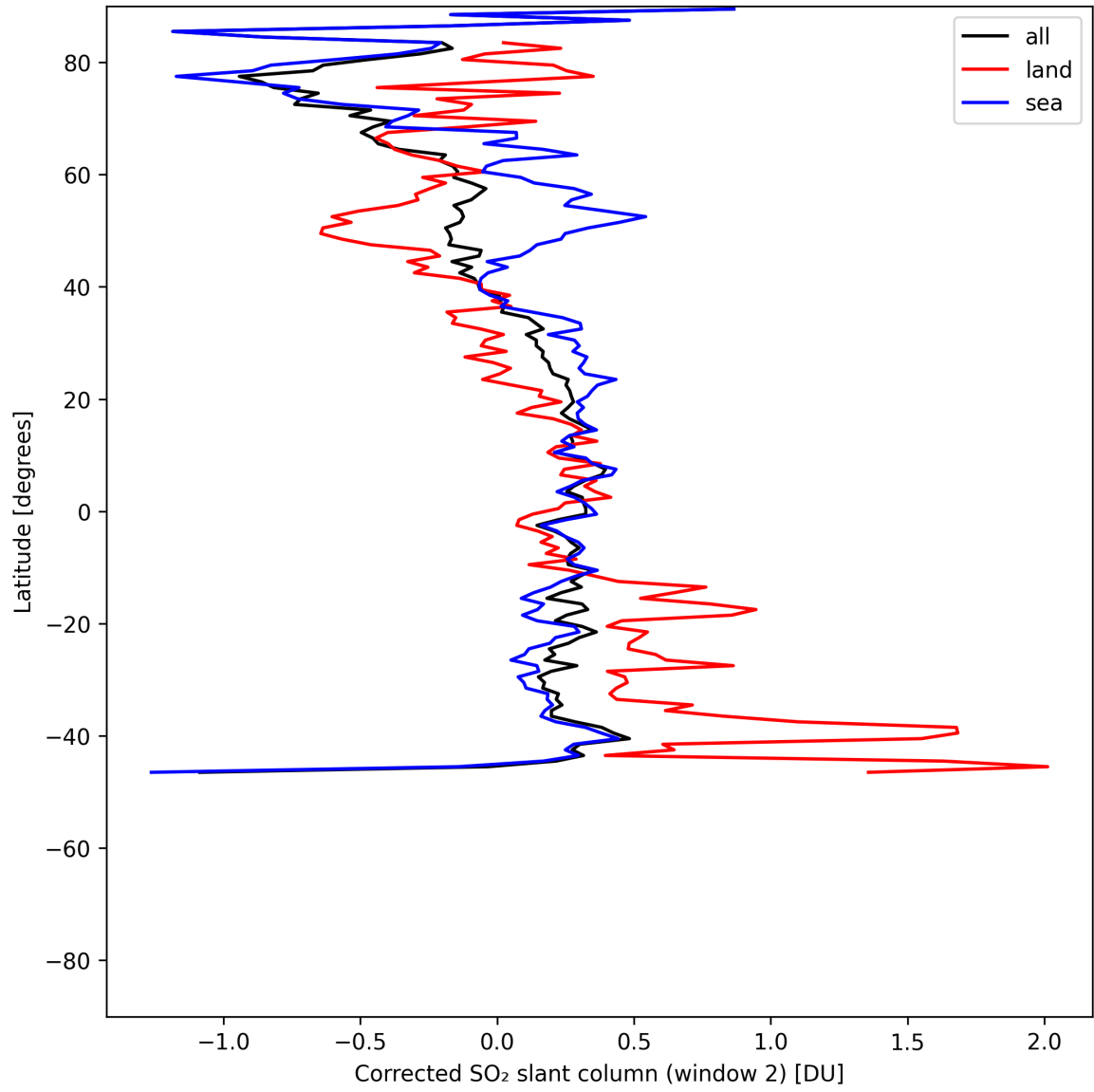


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-05-30 to 2025-05-31.

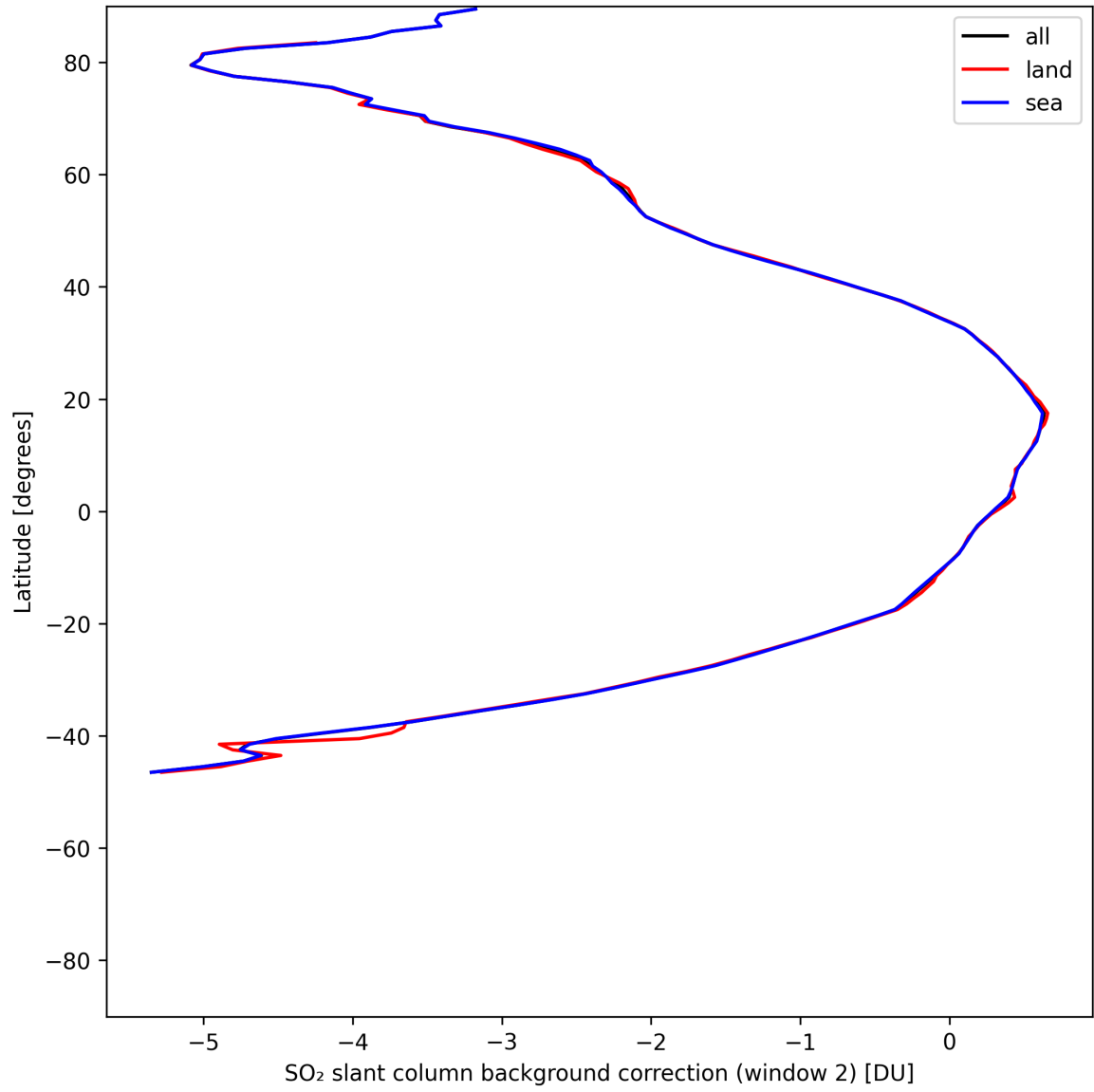


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-05-30 to 2025-05-31.

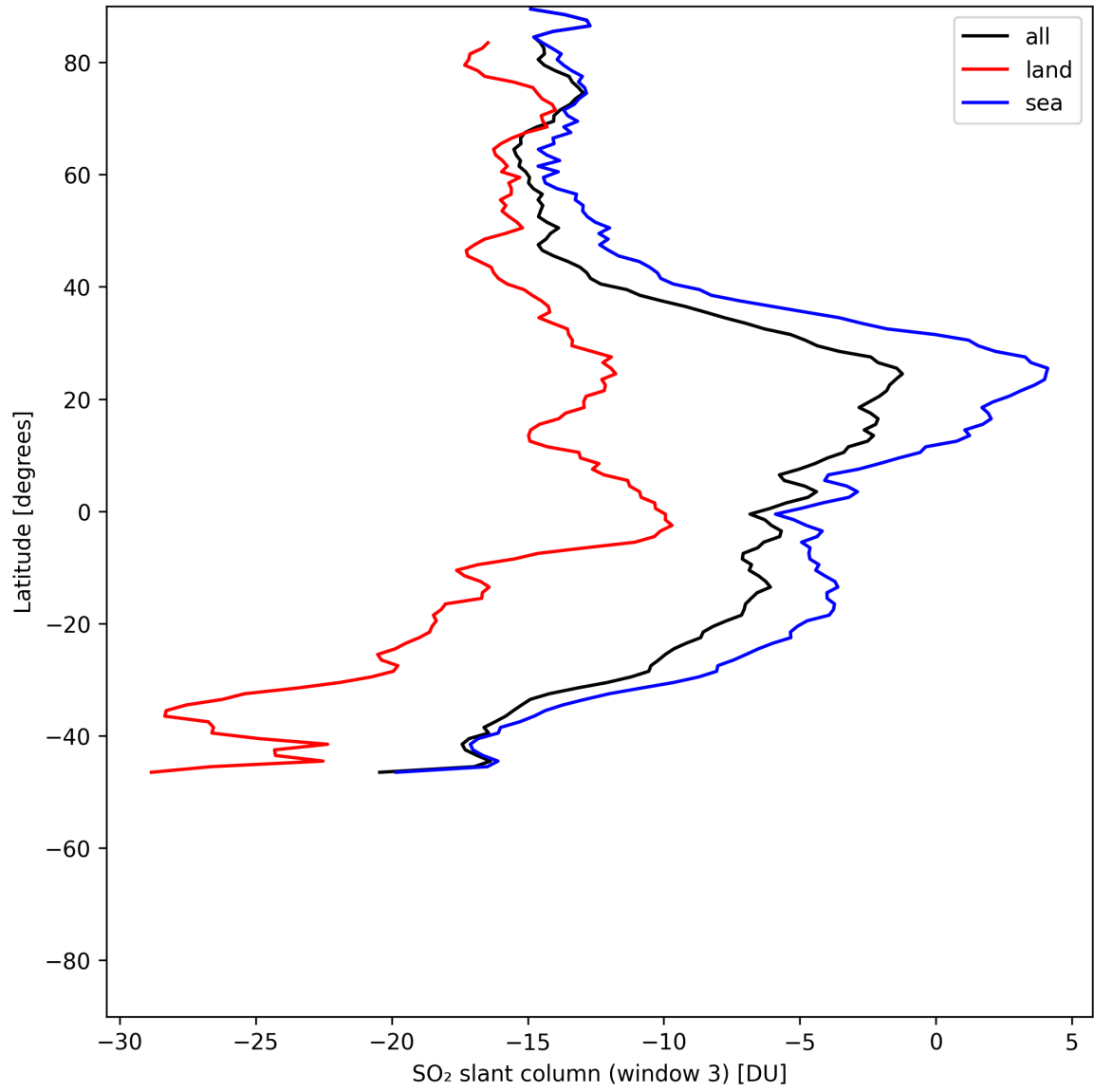


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-05-30 to 2025-05-31.

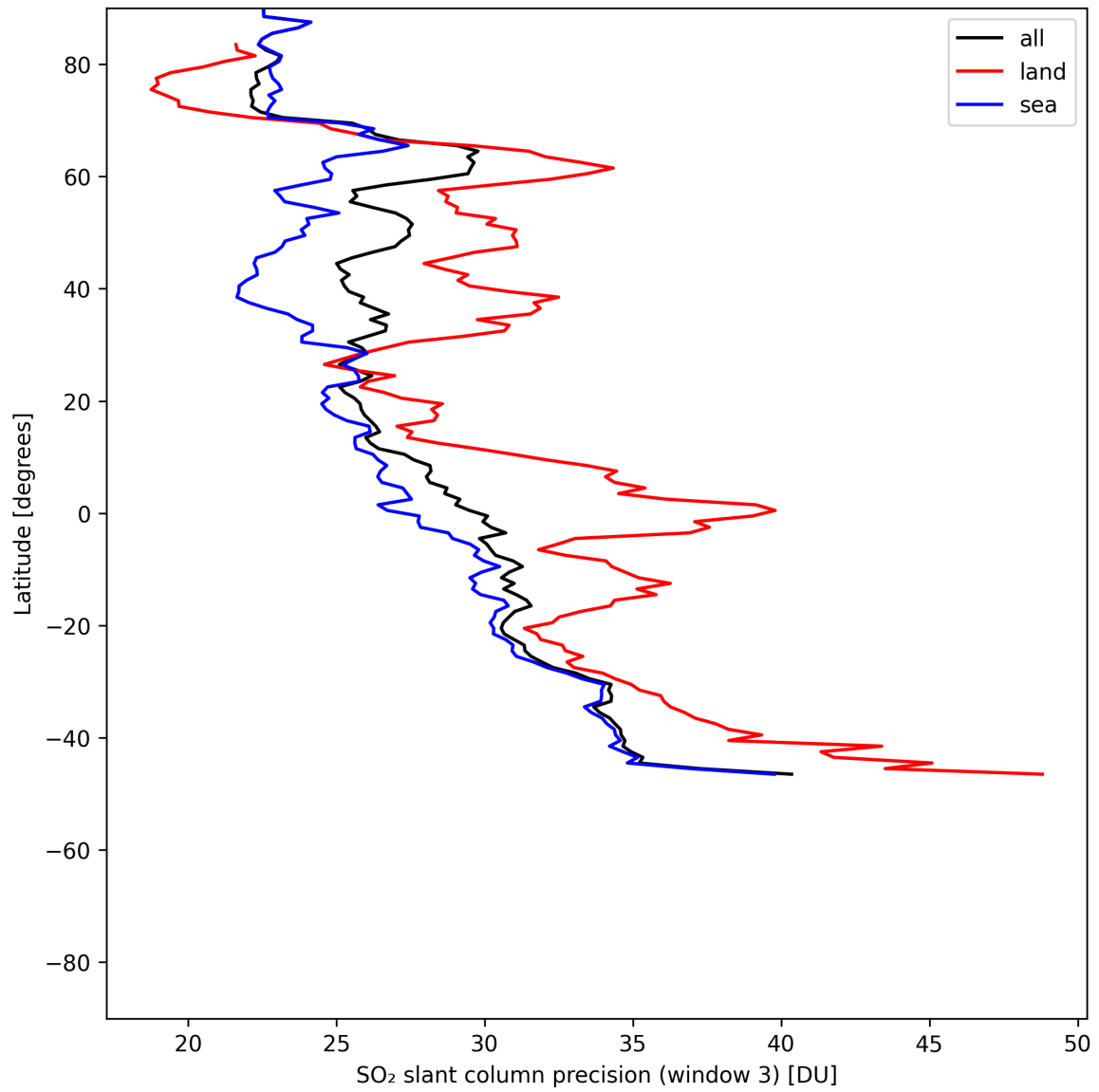


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-05-30 to 2025-05-31.

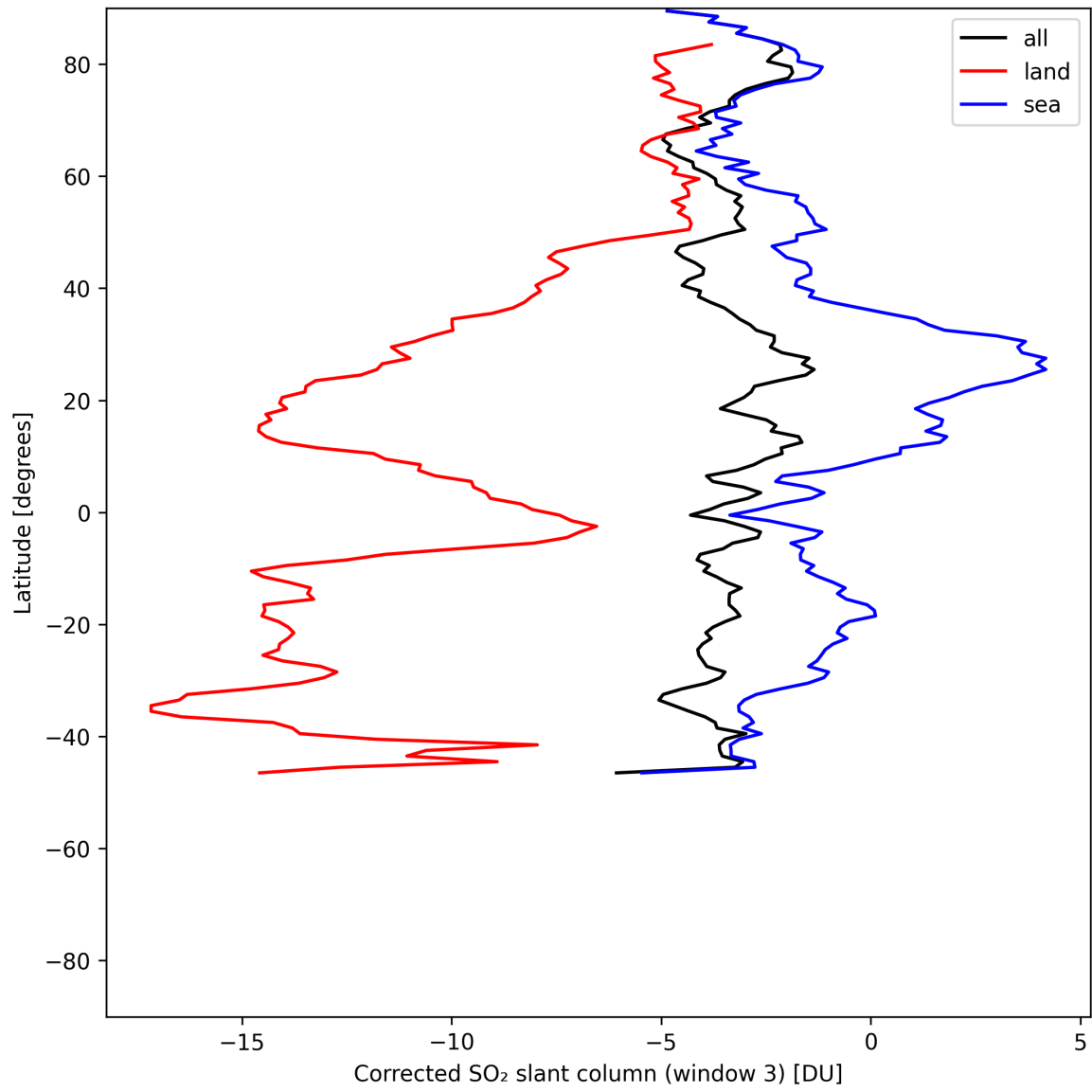


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-05-30 to 2025-05-31.

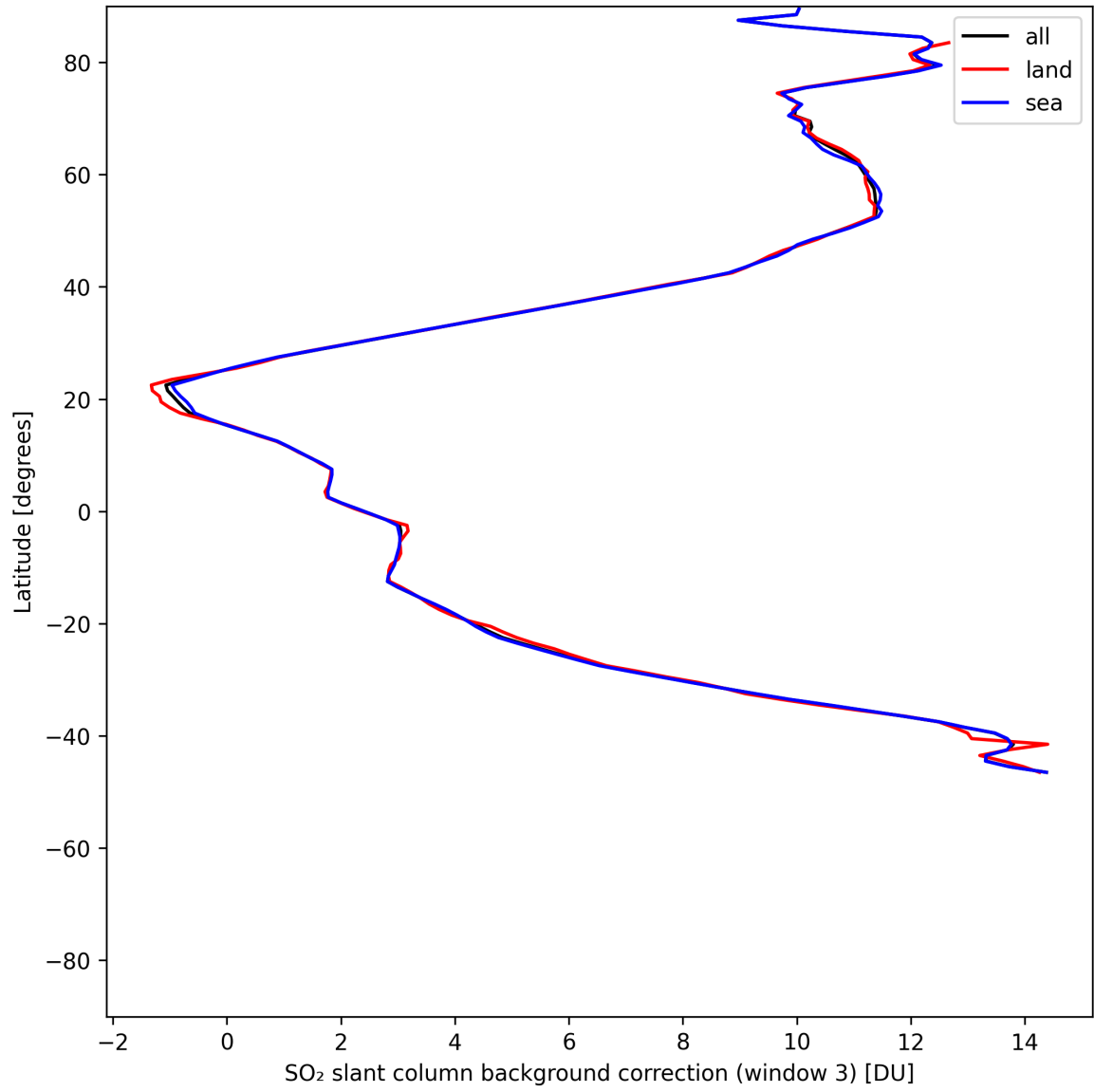


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-05-30 to 2025-05-31.

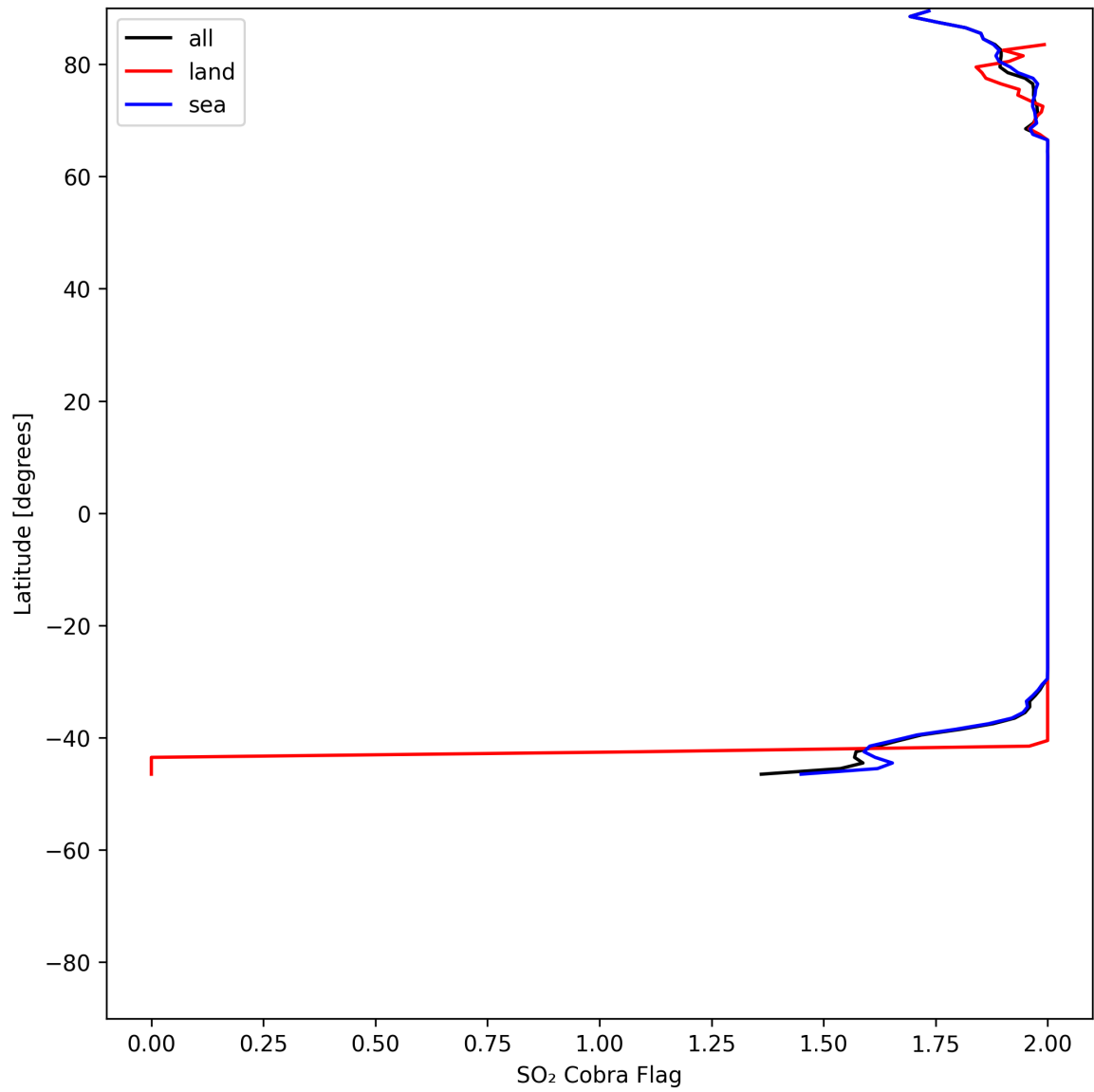


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-05-30 to 2025-05-31.

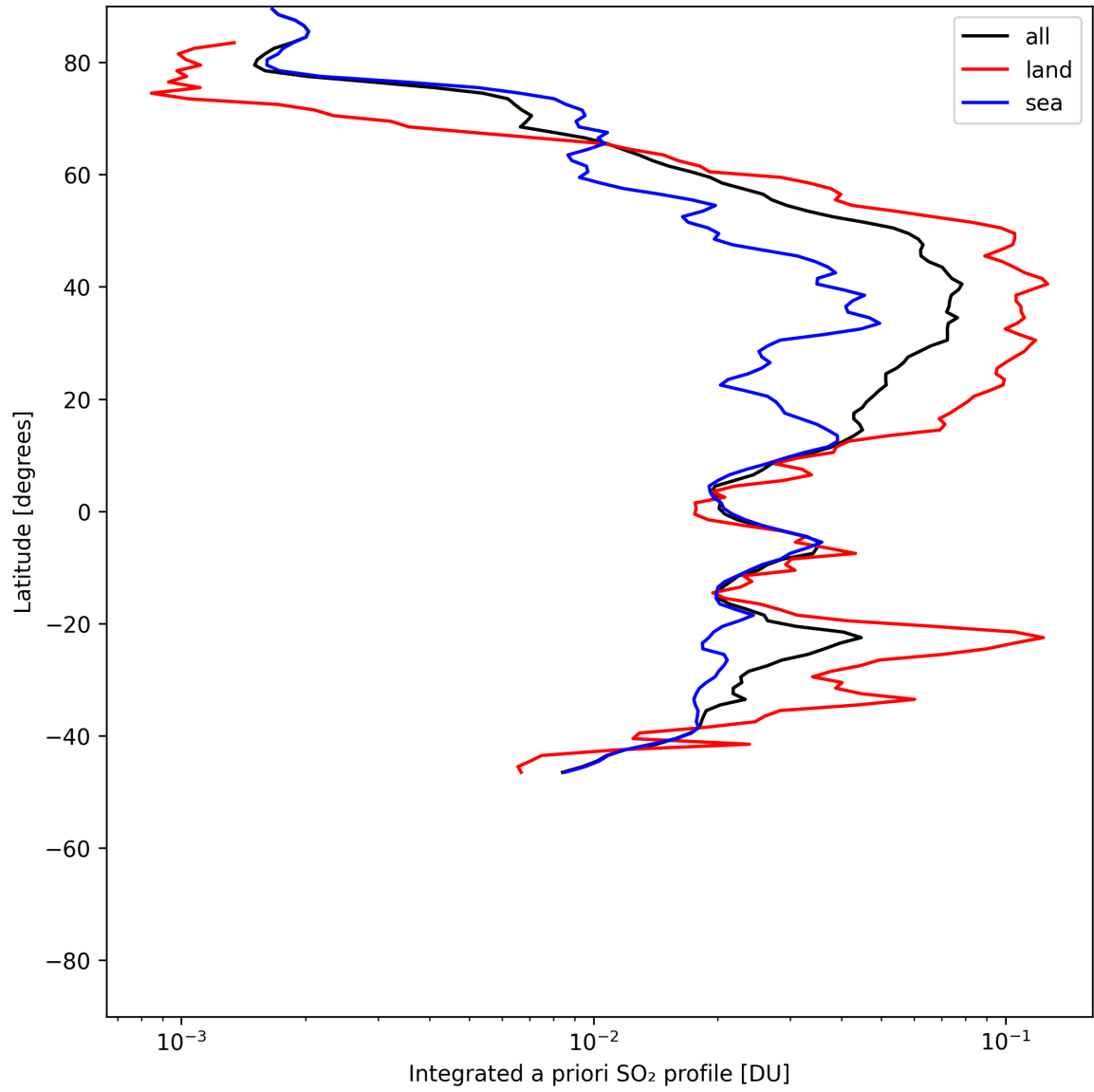


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-05-30 to 2025-05-31.

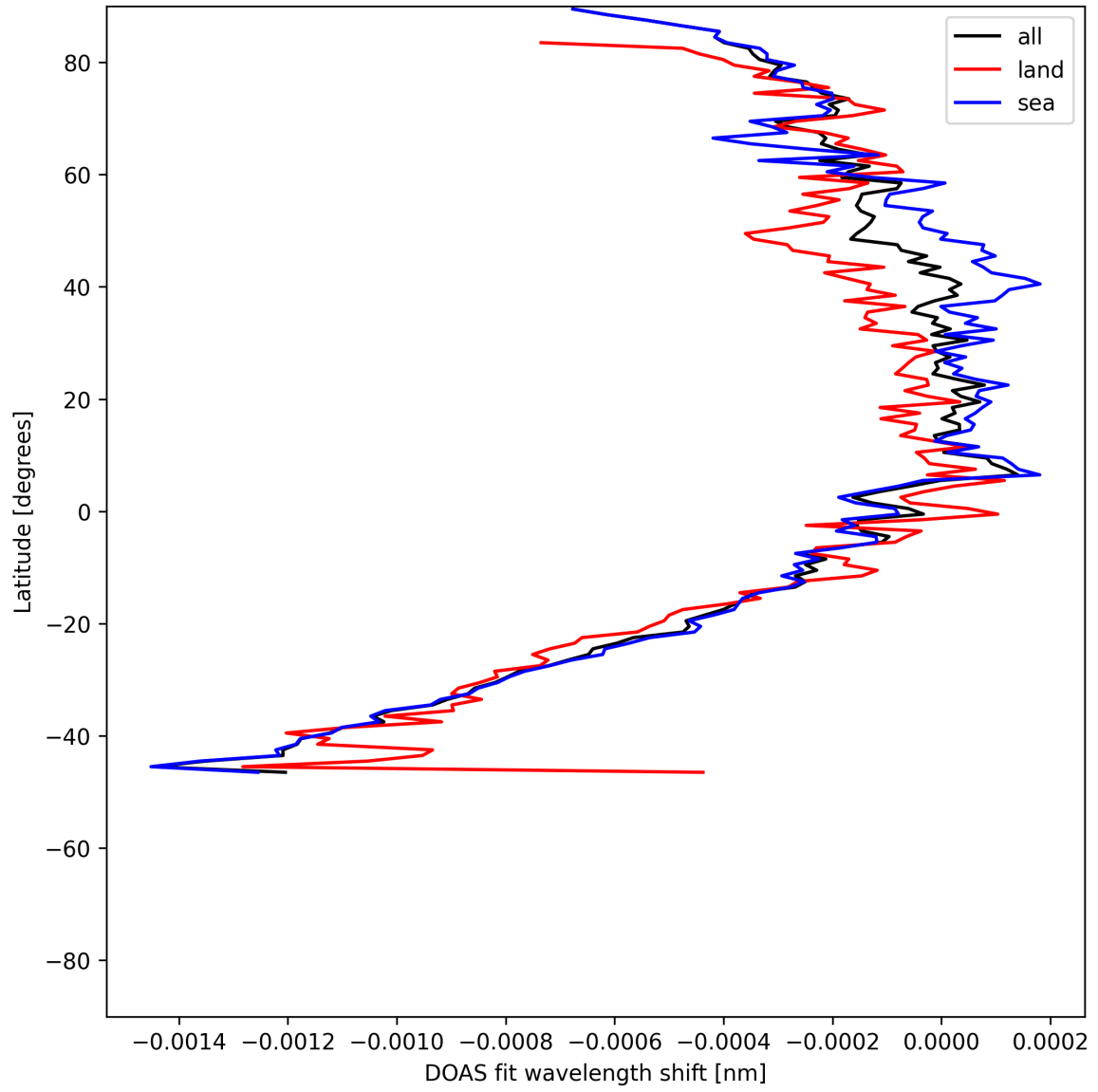


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-05-30 to 2025-05-31.

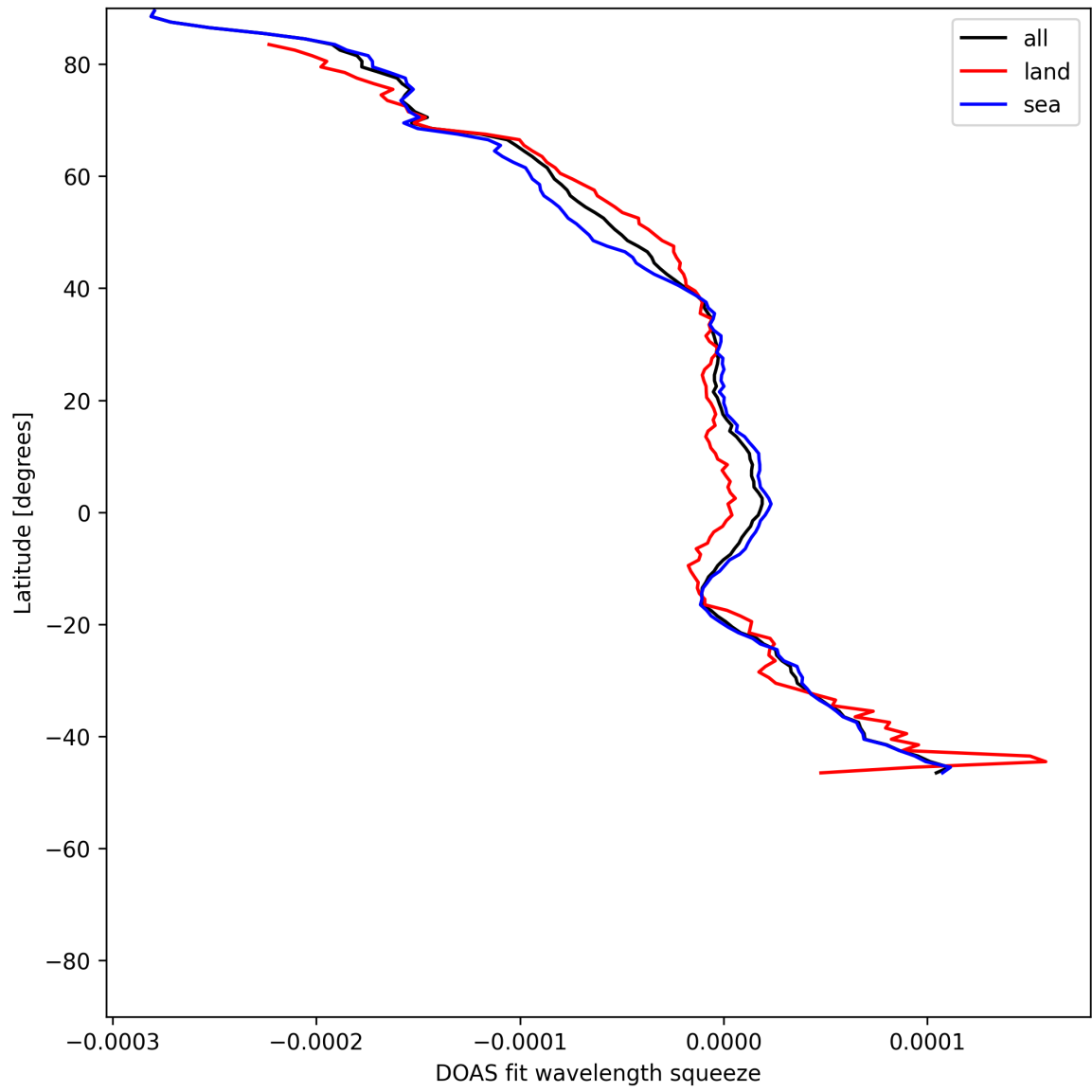


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-05-30 to 2025-05-31.

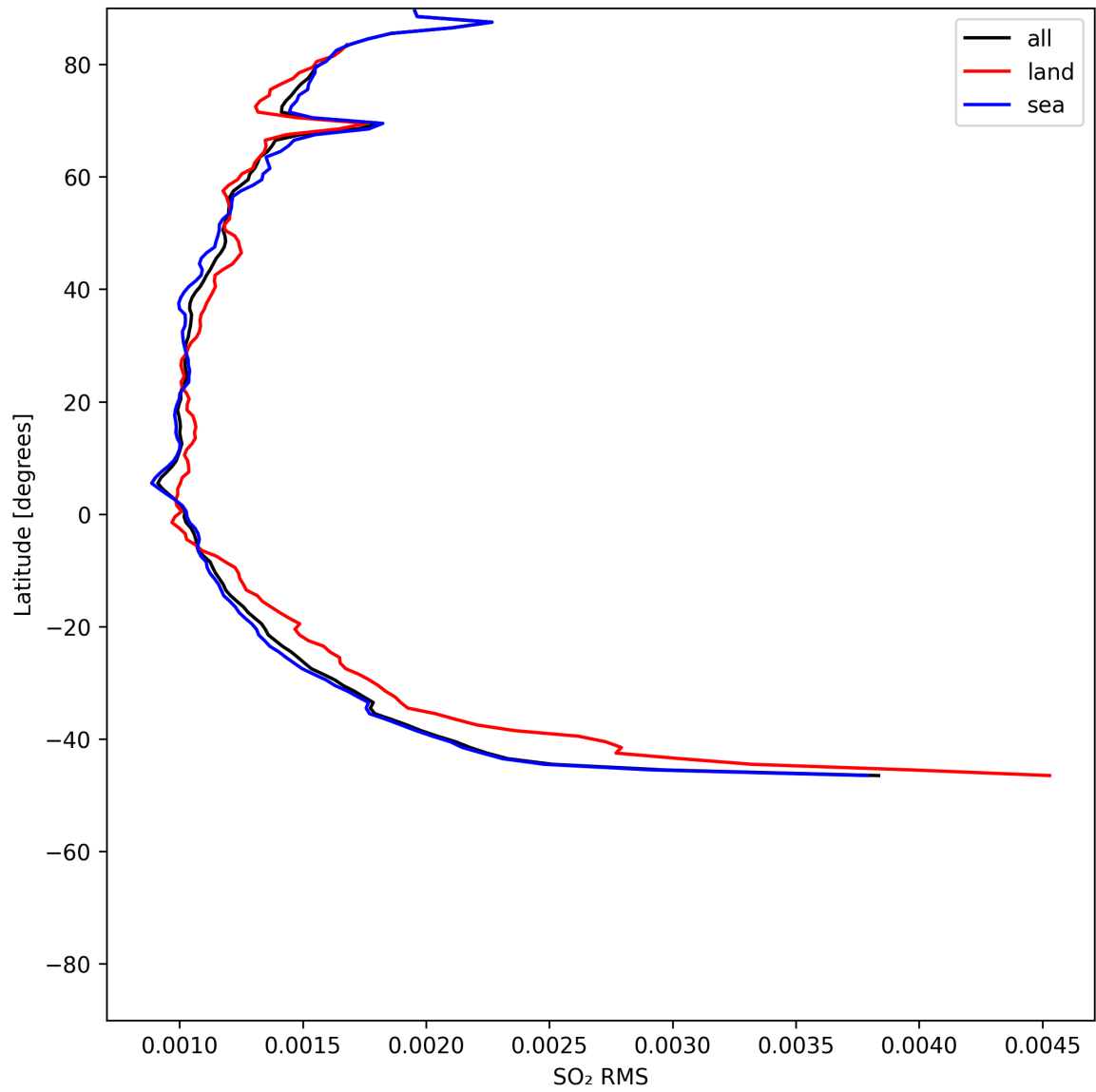


Figure 52: Zonal average of “SO₂ RMS” for 2025-05-30 to 2025-05-31.

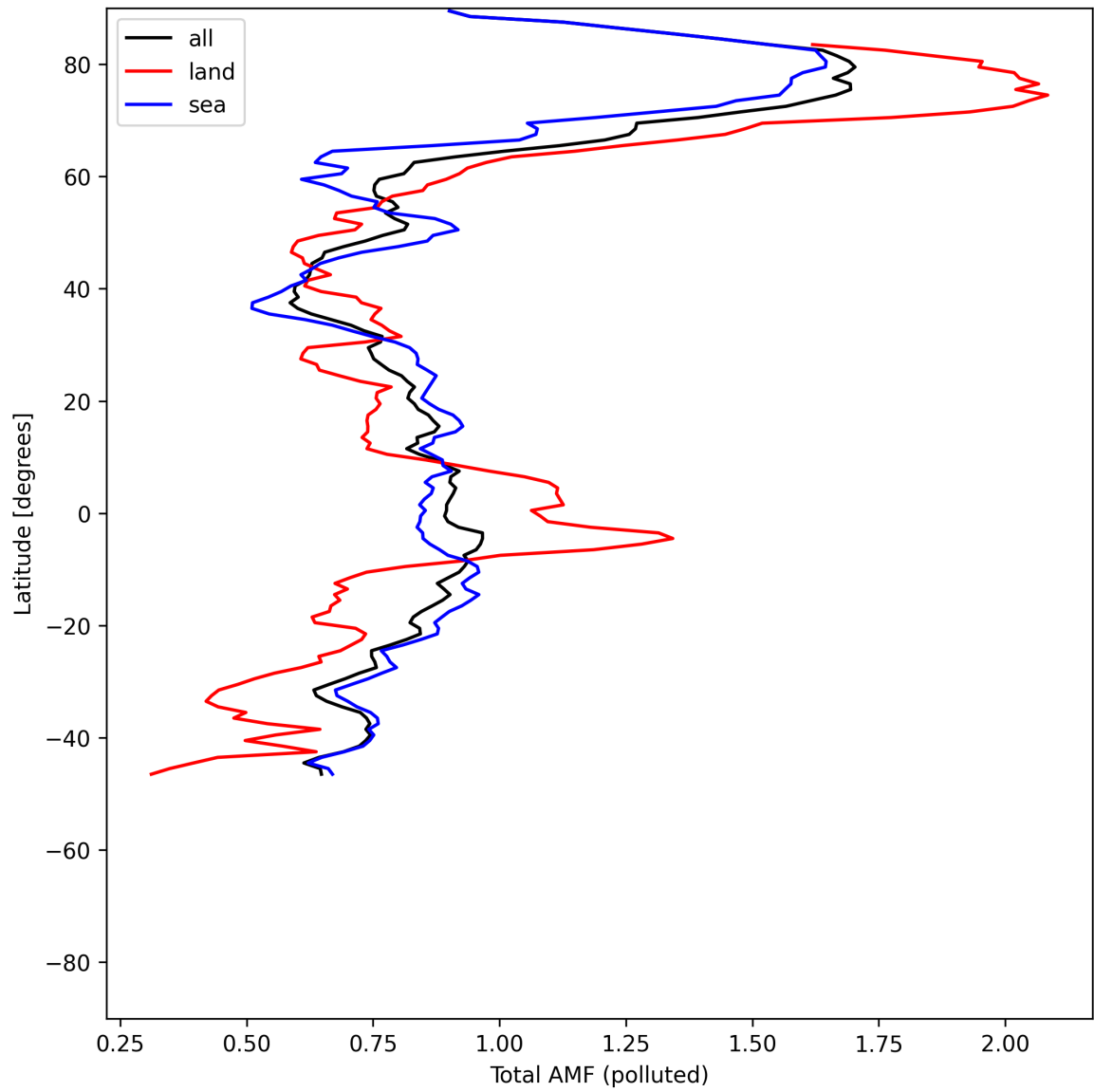


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-05-30 to 2025-05-31.

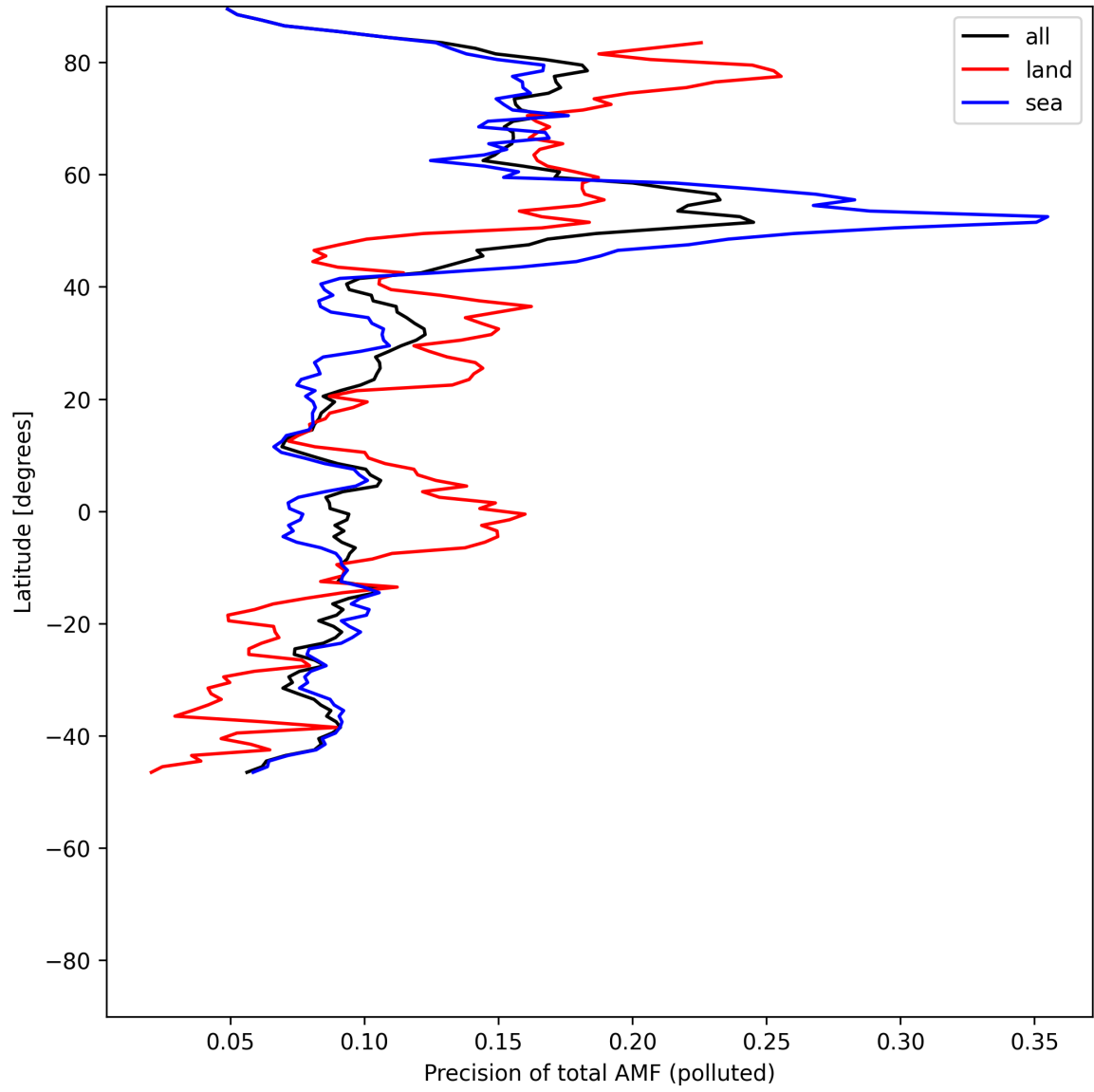


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-05-30 to 2025-05-31.

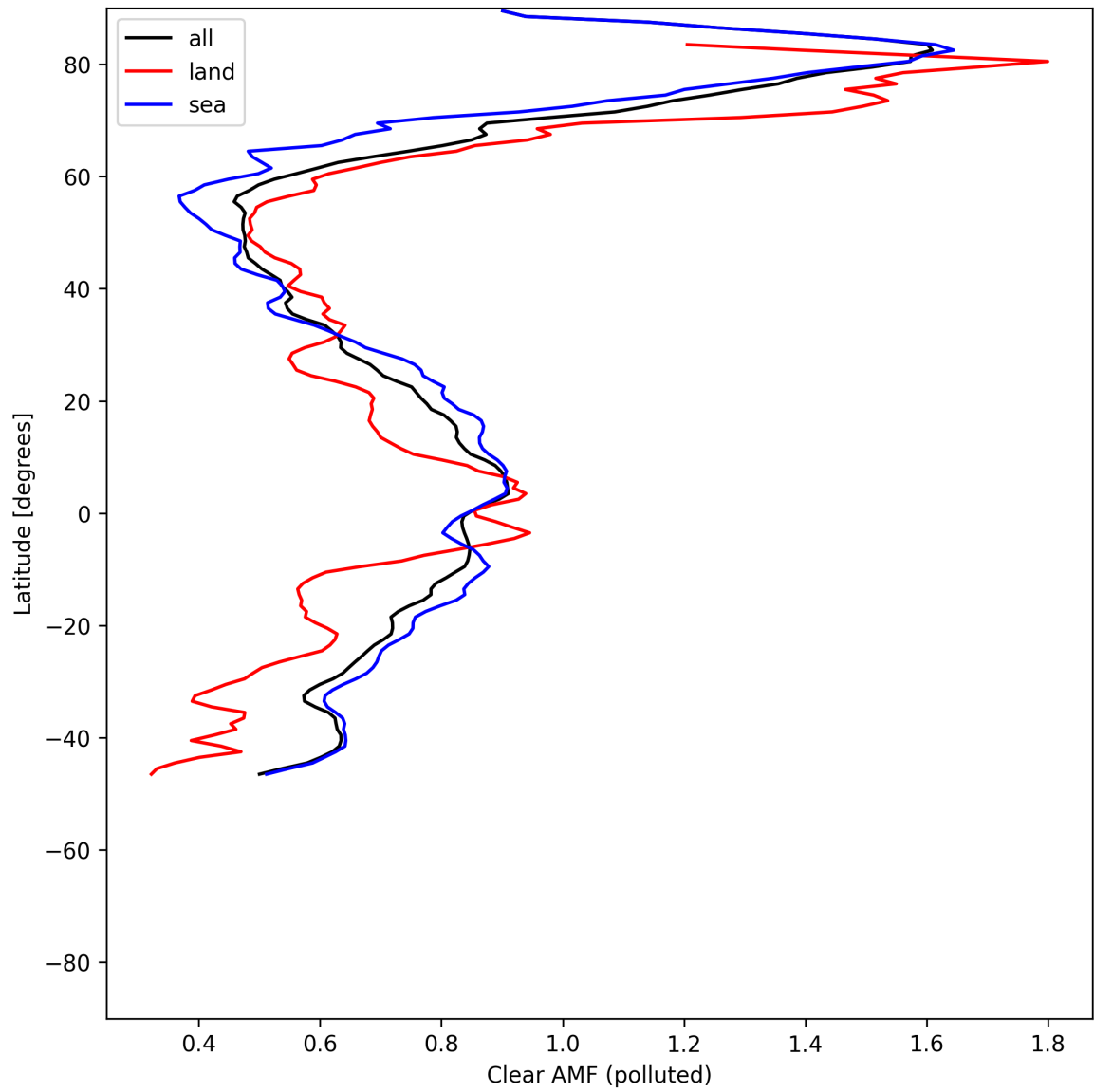


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-05-30 to 2025-05-31.

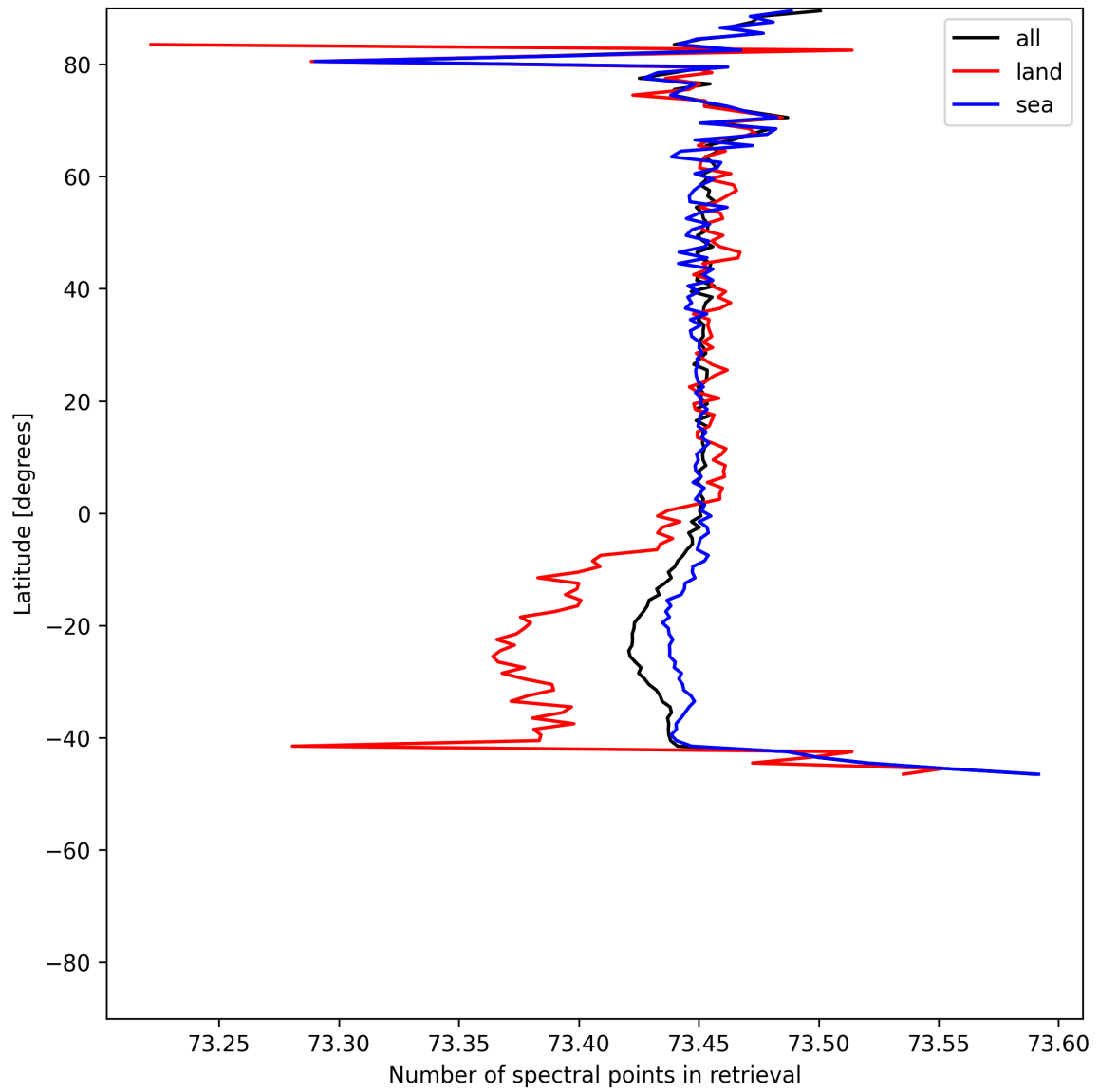


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-05-30 to 2025-05-31.

8 Histograms

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

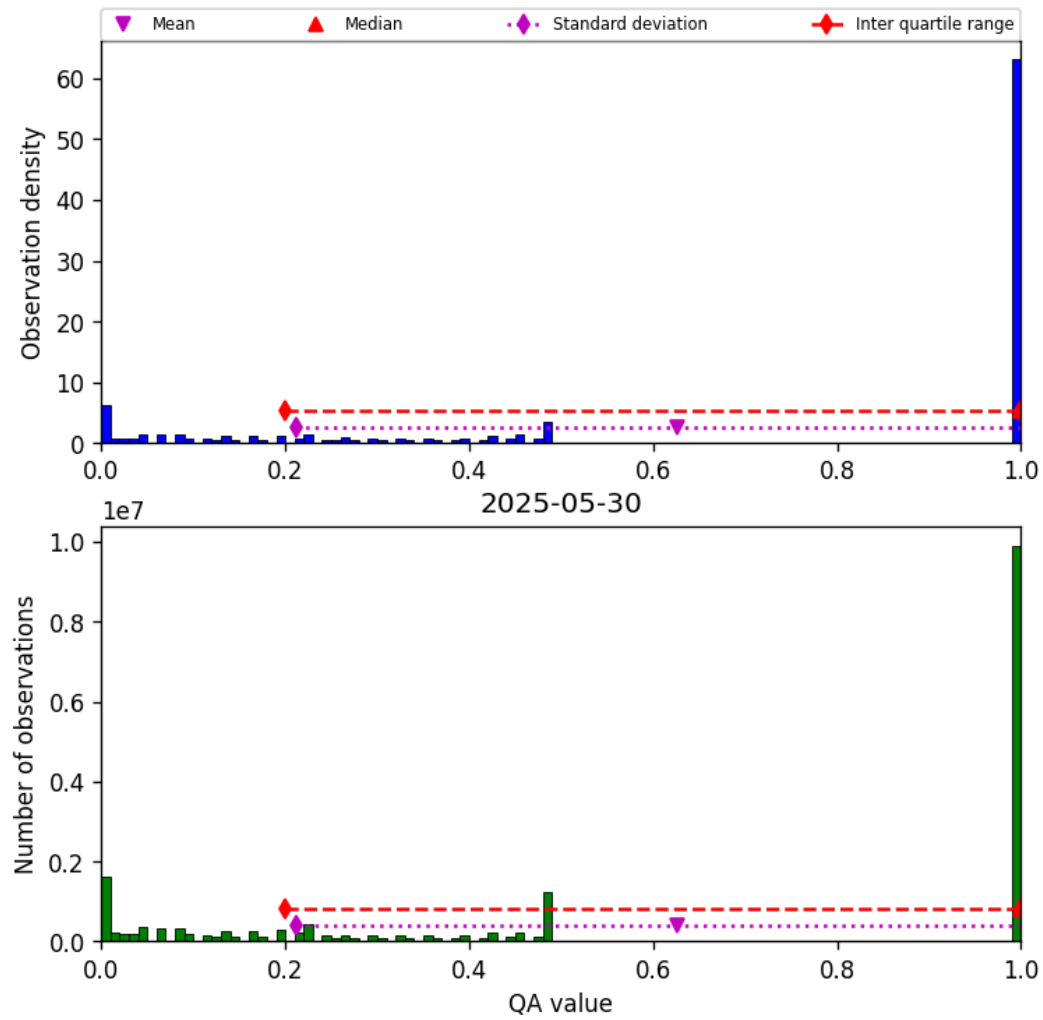


Figure 57: Histogram of “QA value” for 2025-05-30 to 2025-05-31

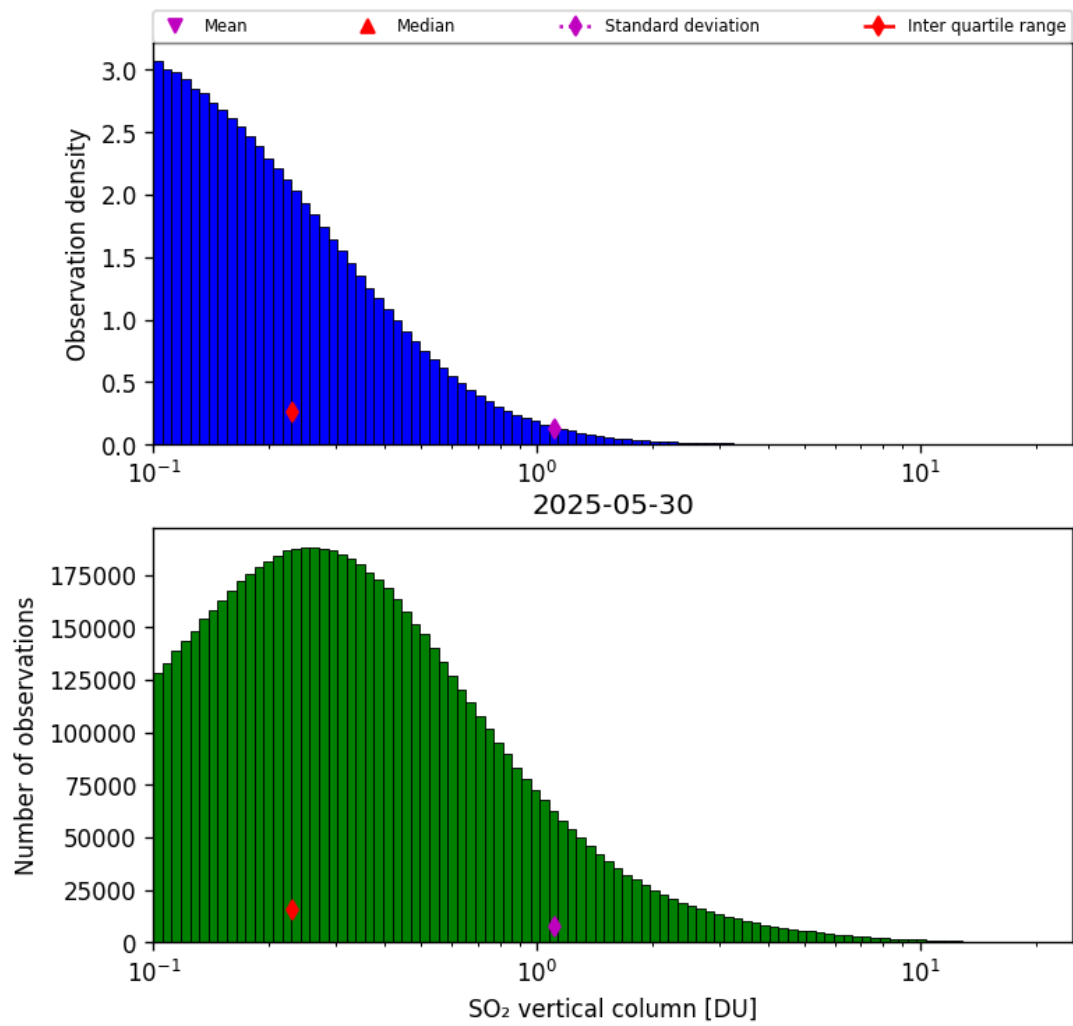


Figure 58: Histogram of “SO₂ vertical column” for 2025-05-30 to 2025-05-31

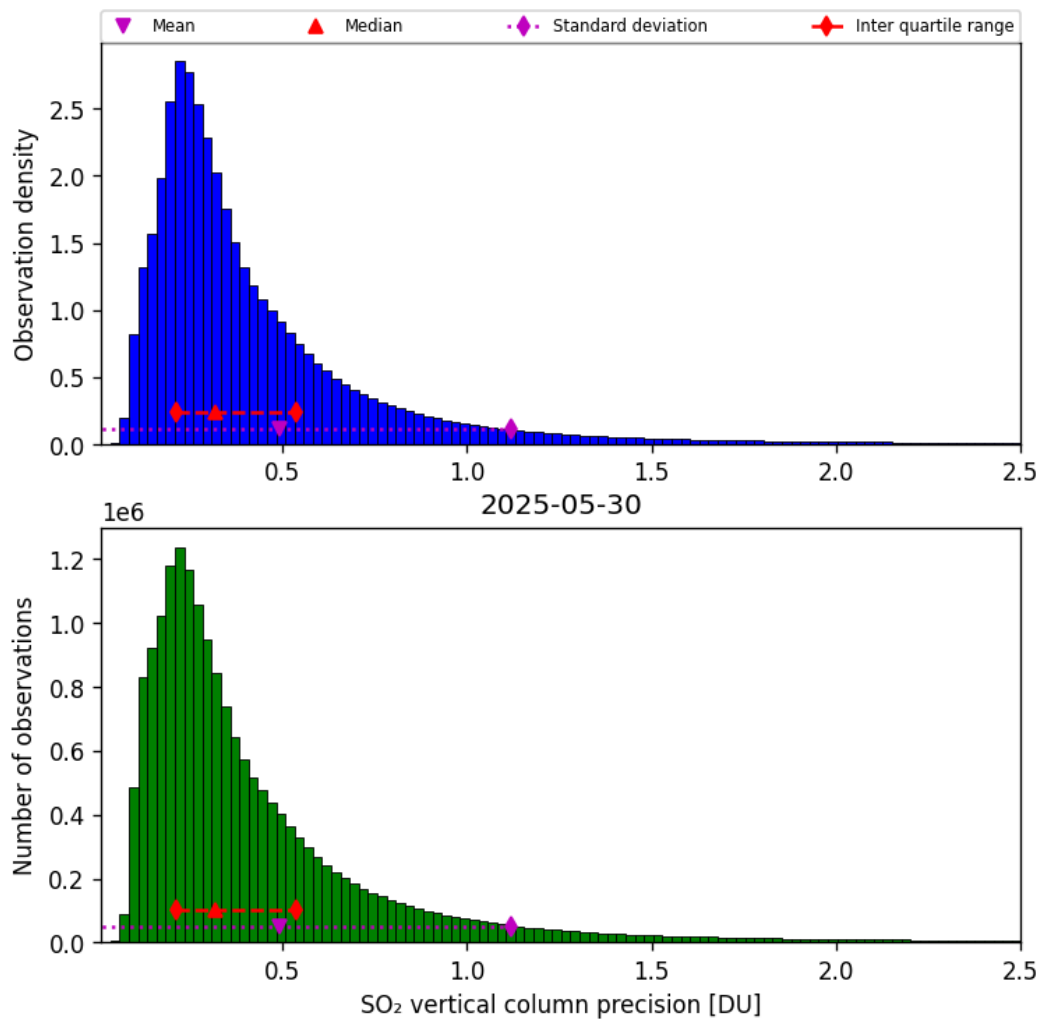


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-05-30 to 2025-05-31

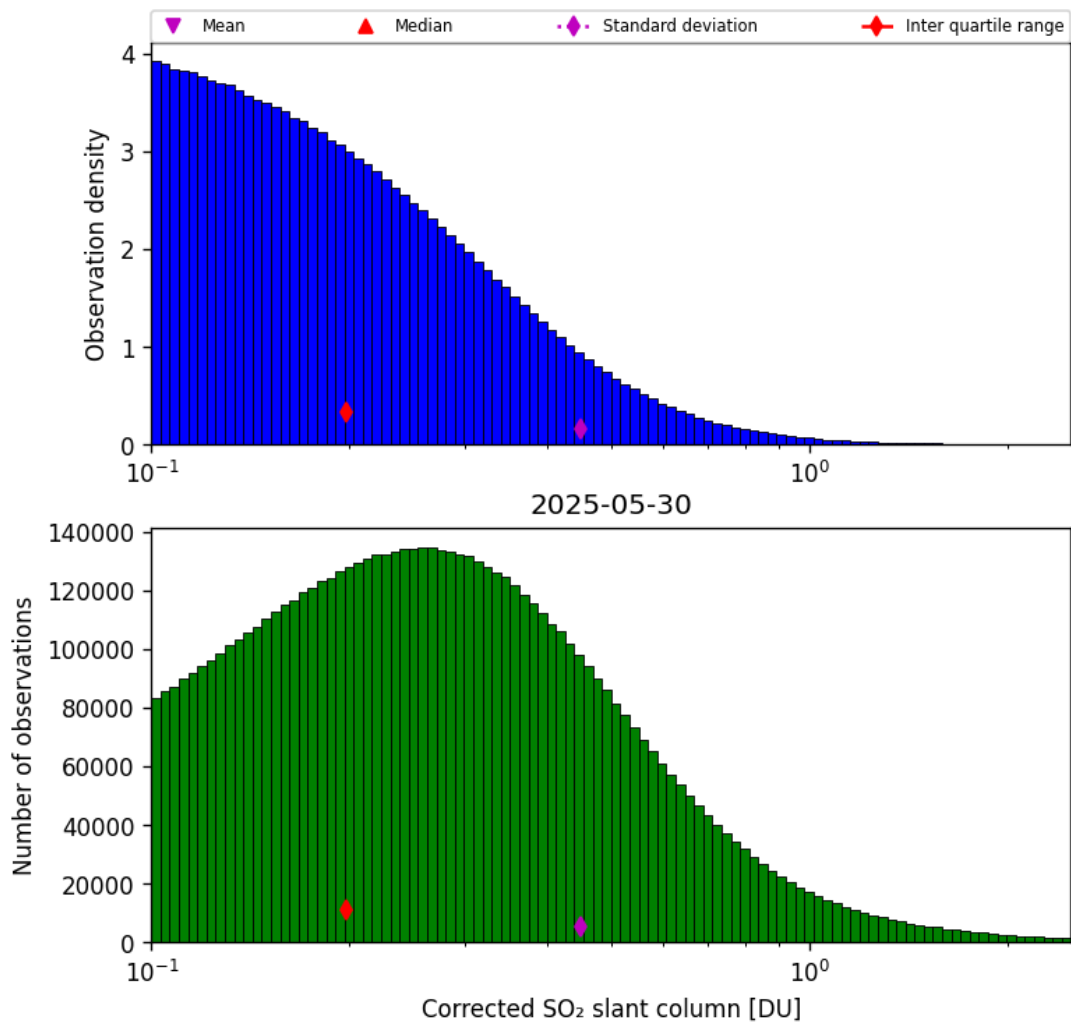


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-05-30 to 2025-05-31

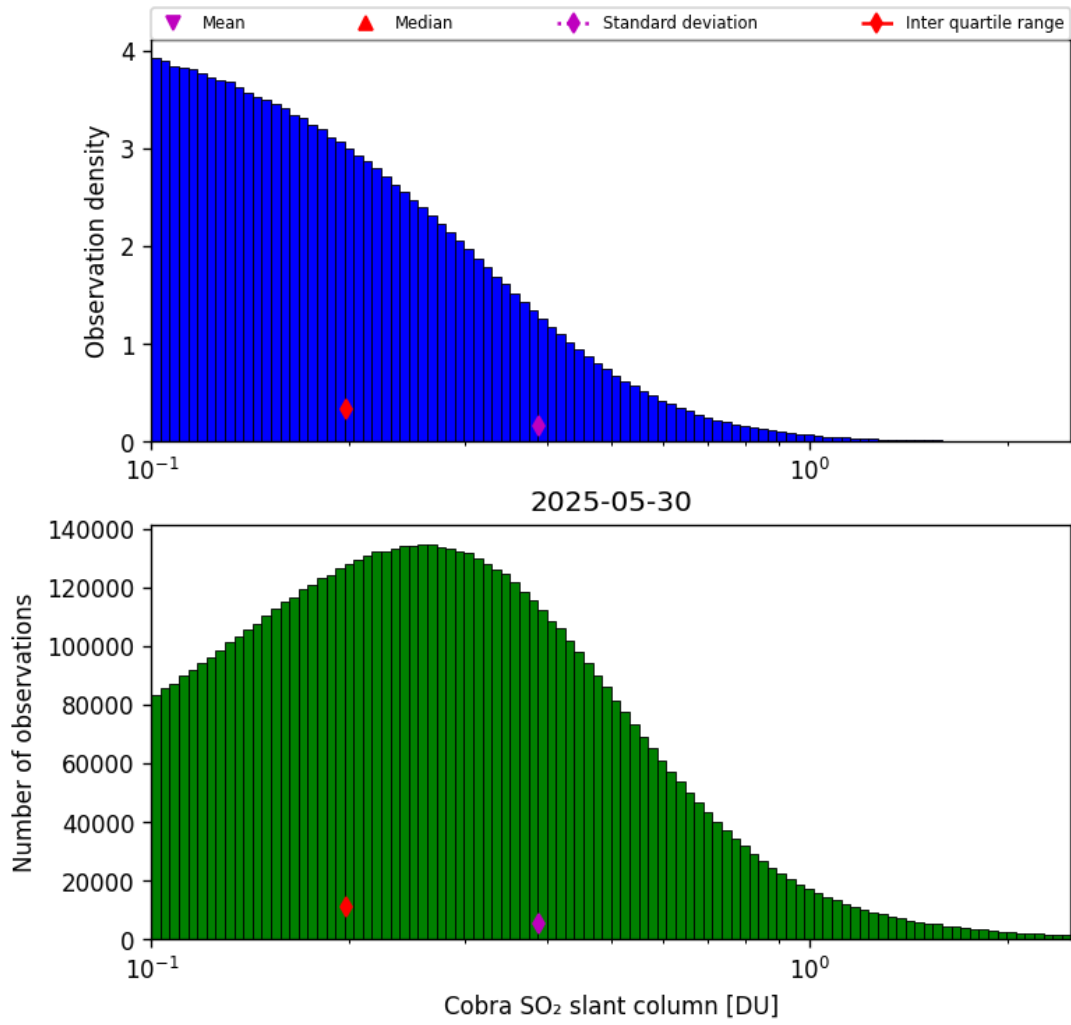


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-05-30 to 2025-05-31

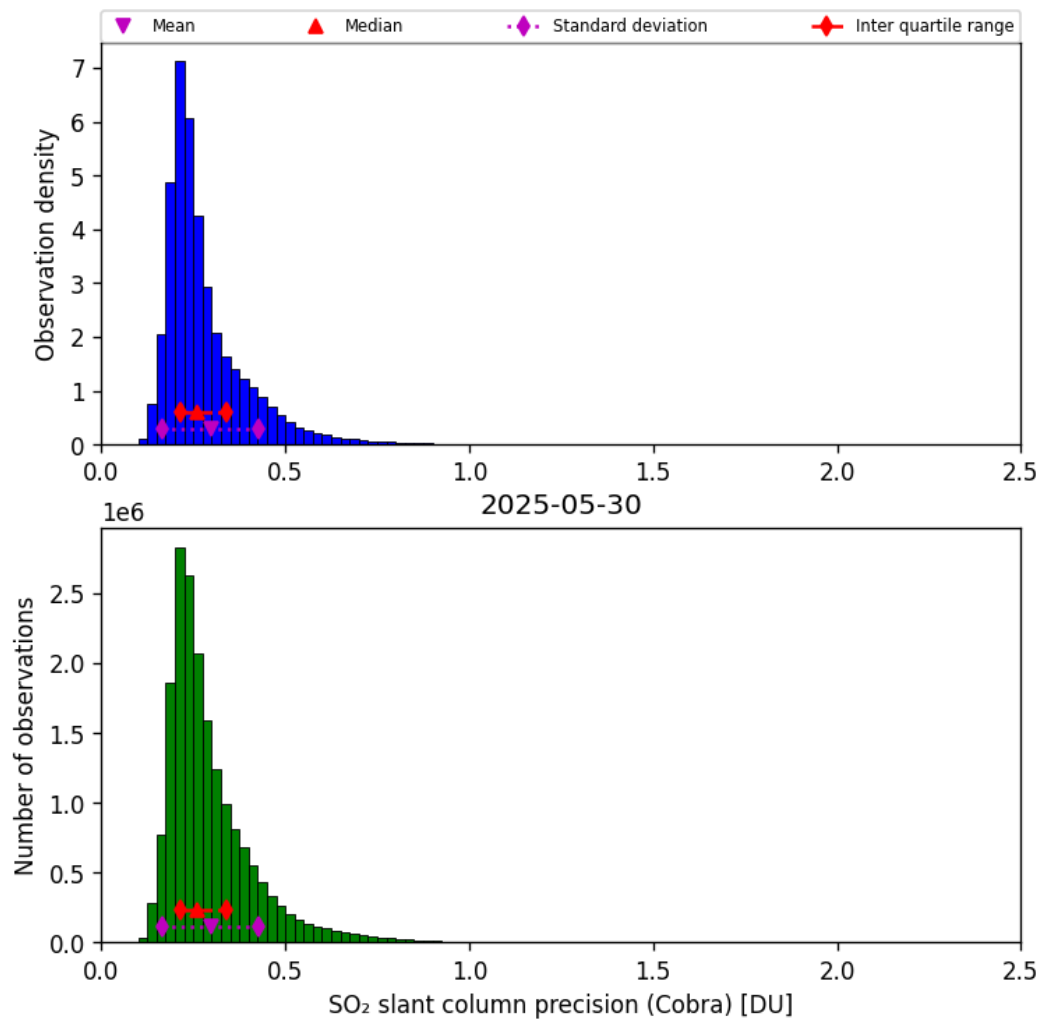


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-05-30 to 2025-05-31

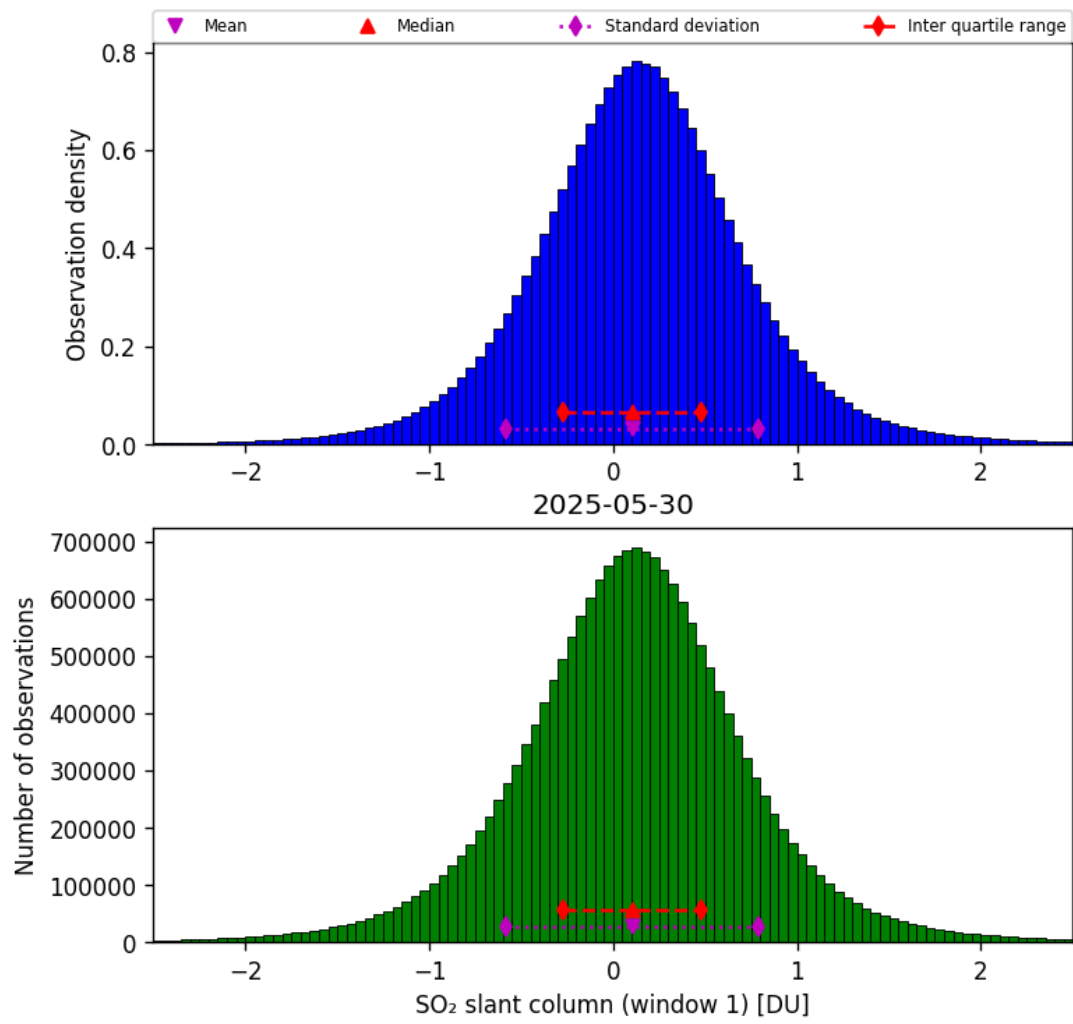


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-05-30 to 2025-05-31

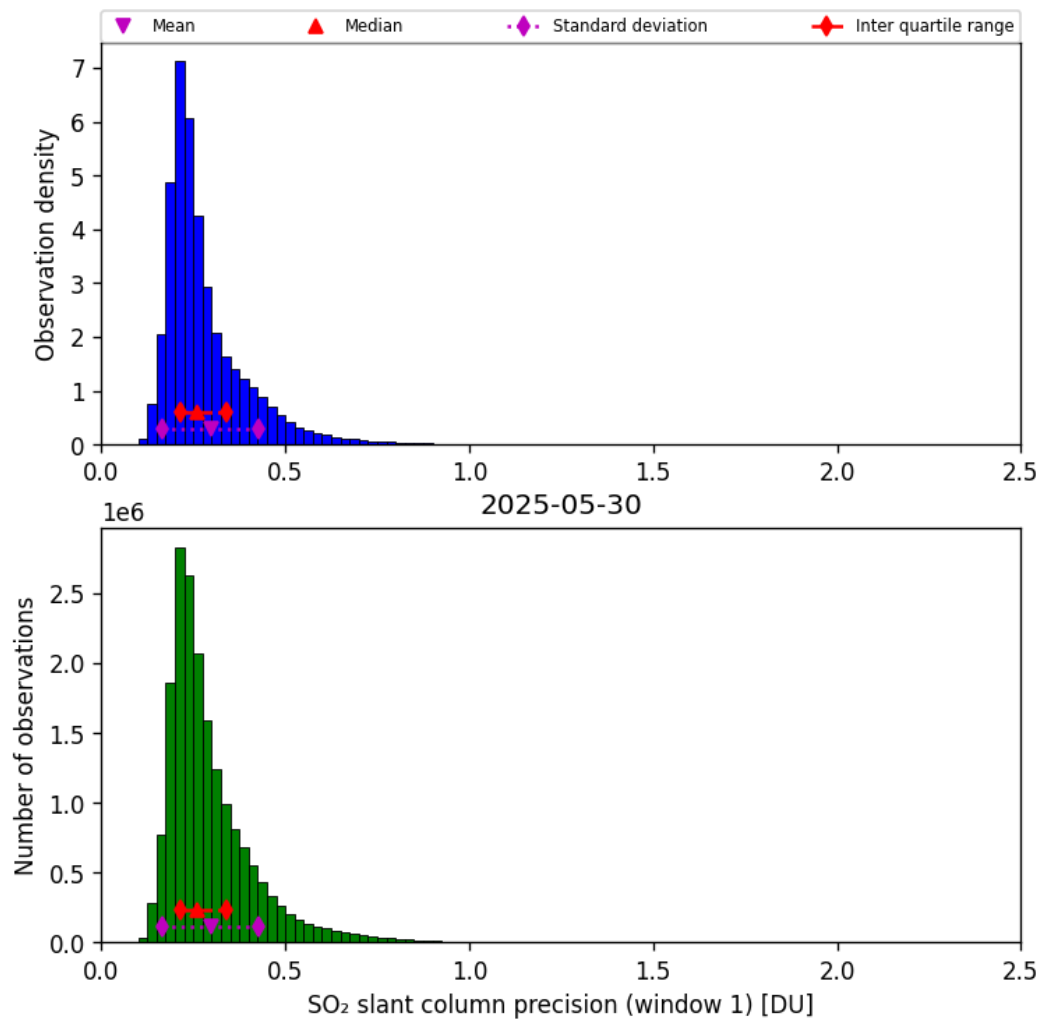


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-05-30 to 2025-05-31

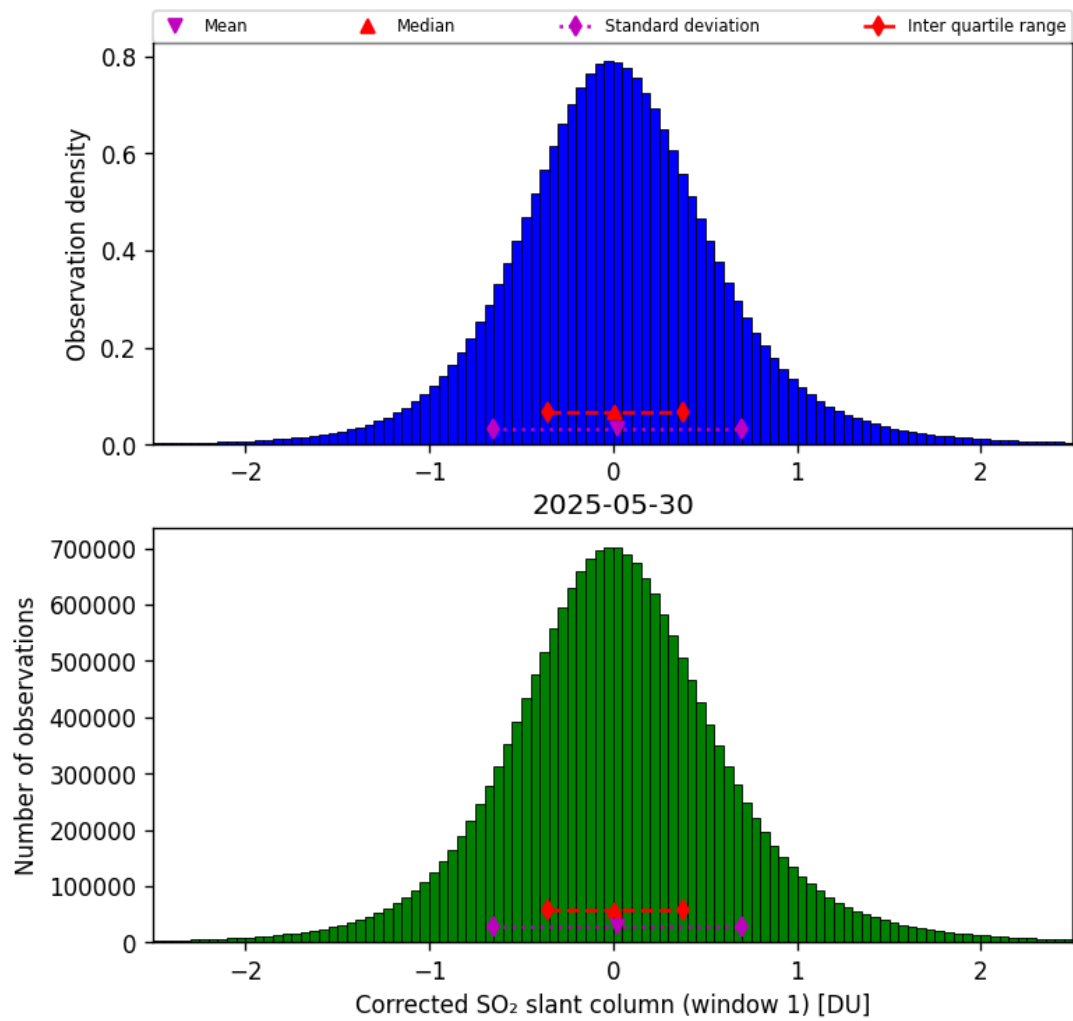


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-05-30 to 2025-05-31

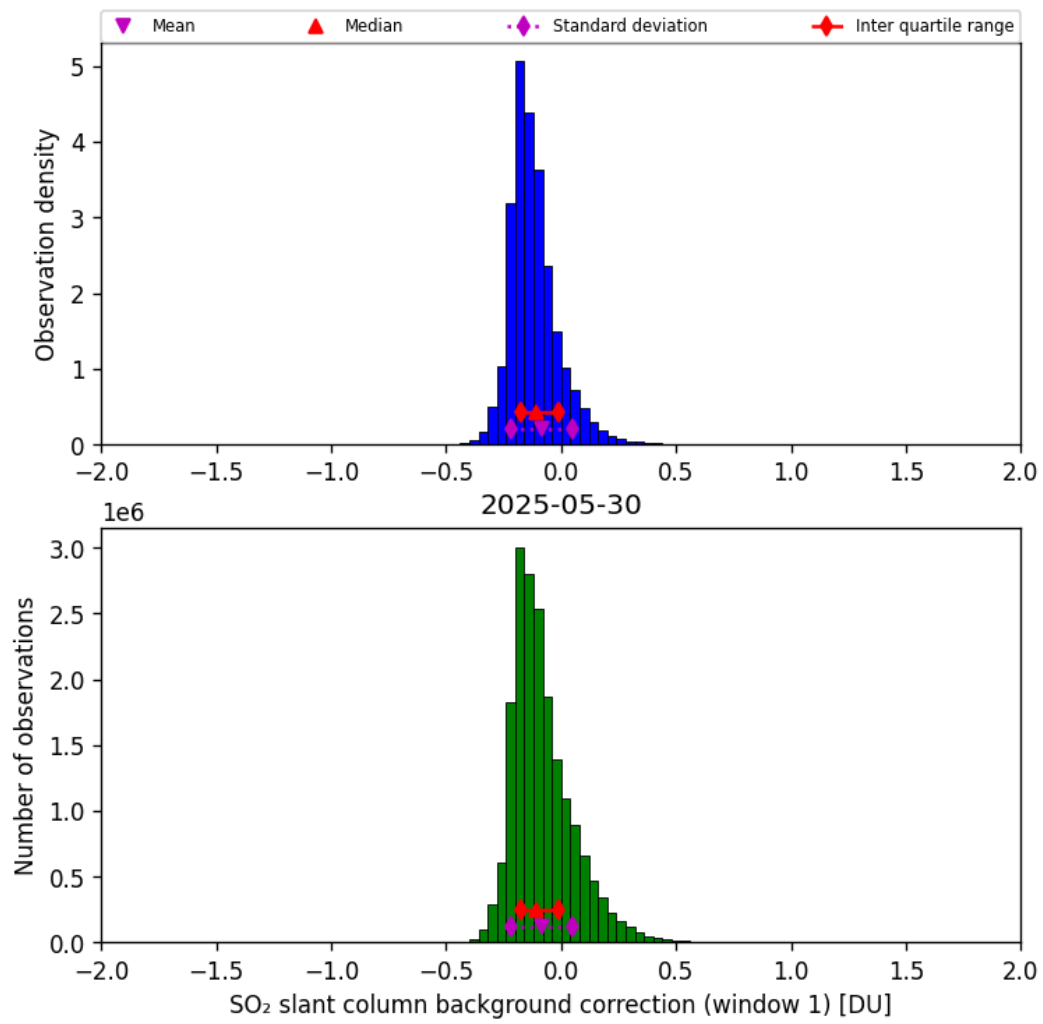


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-05-30 to 2025-05-31

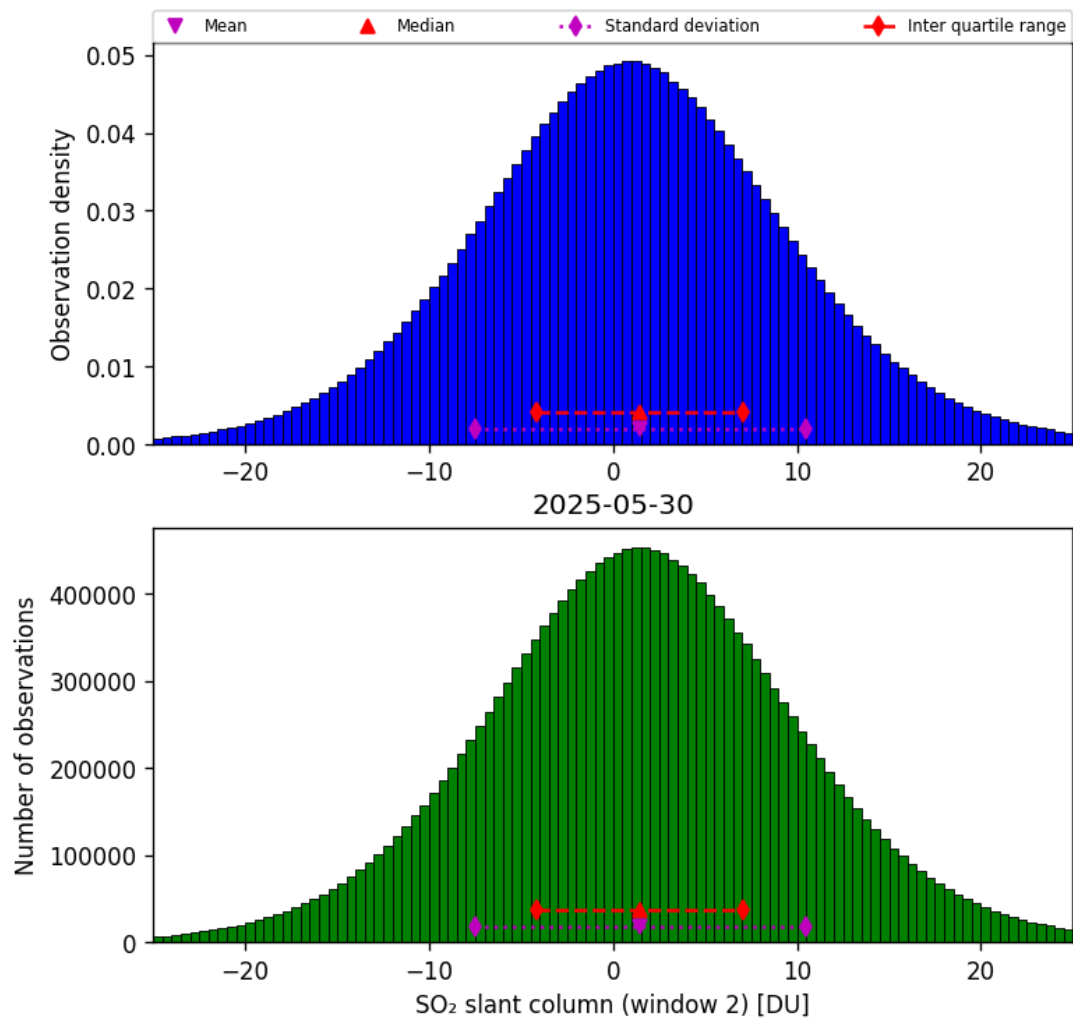


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-05-30 to 2025-05-31

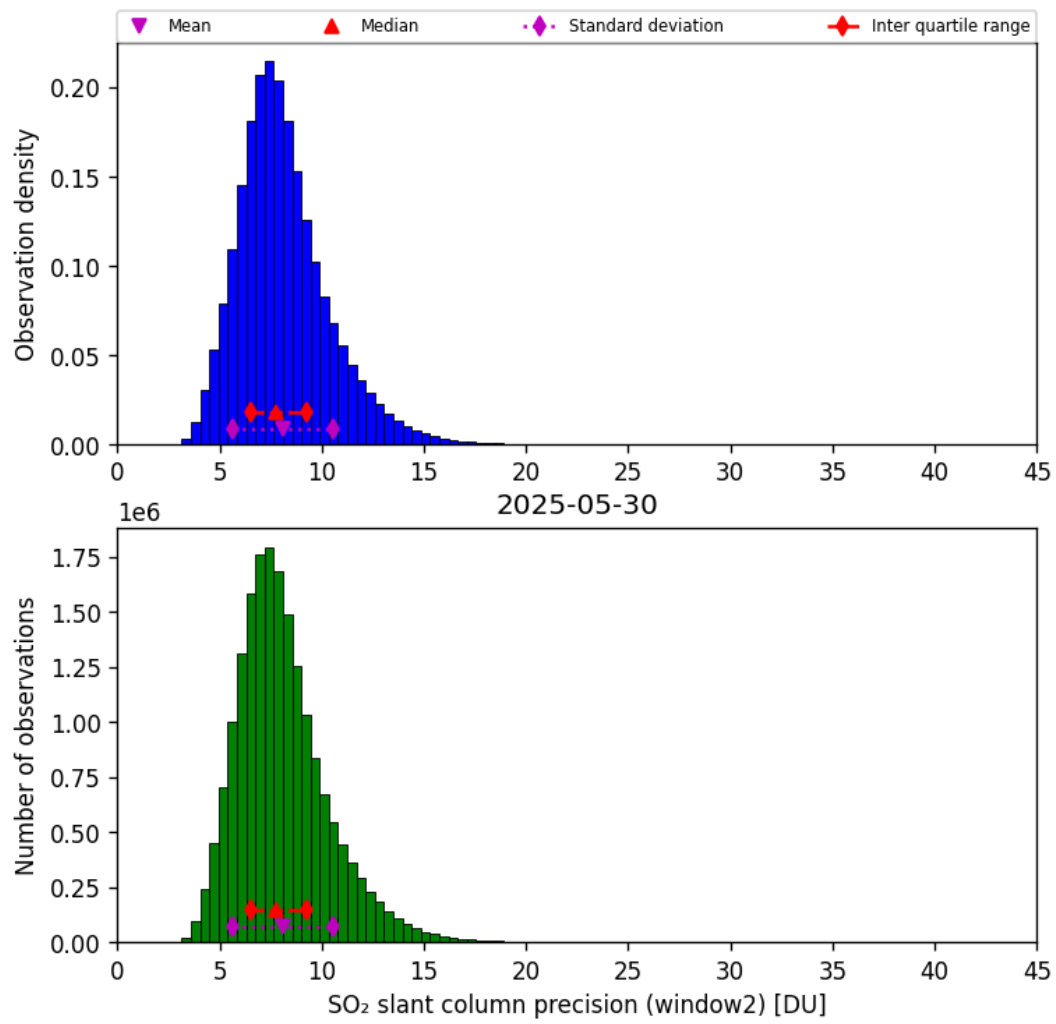


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-05-30 to 2025-05-31

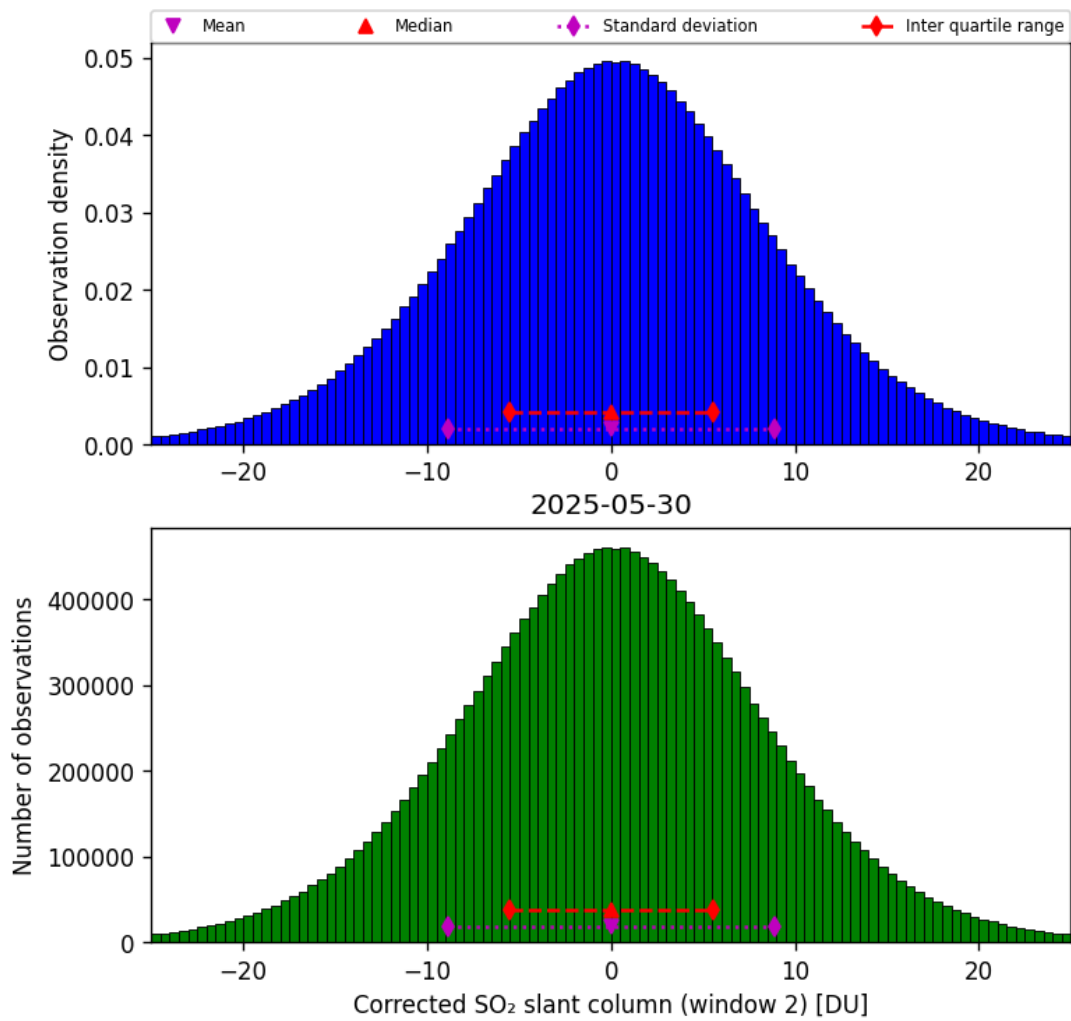


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-05-30 to 2025-05-31

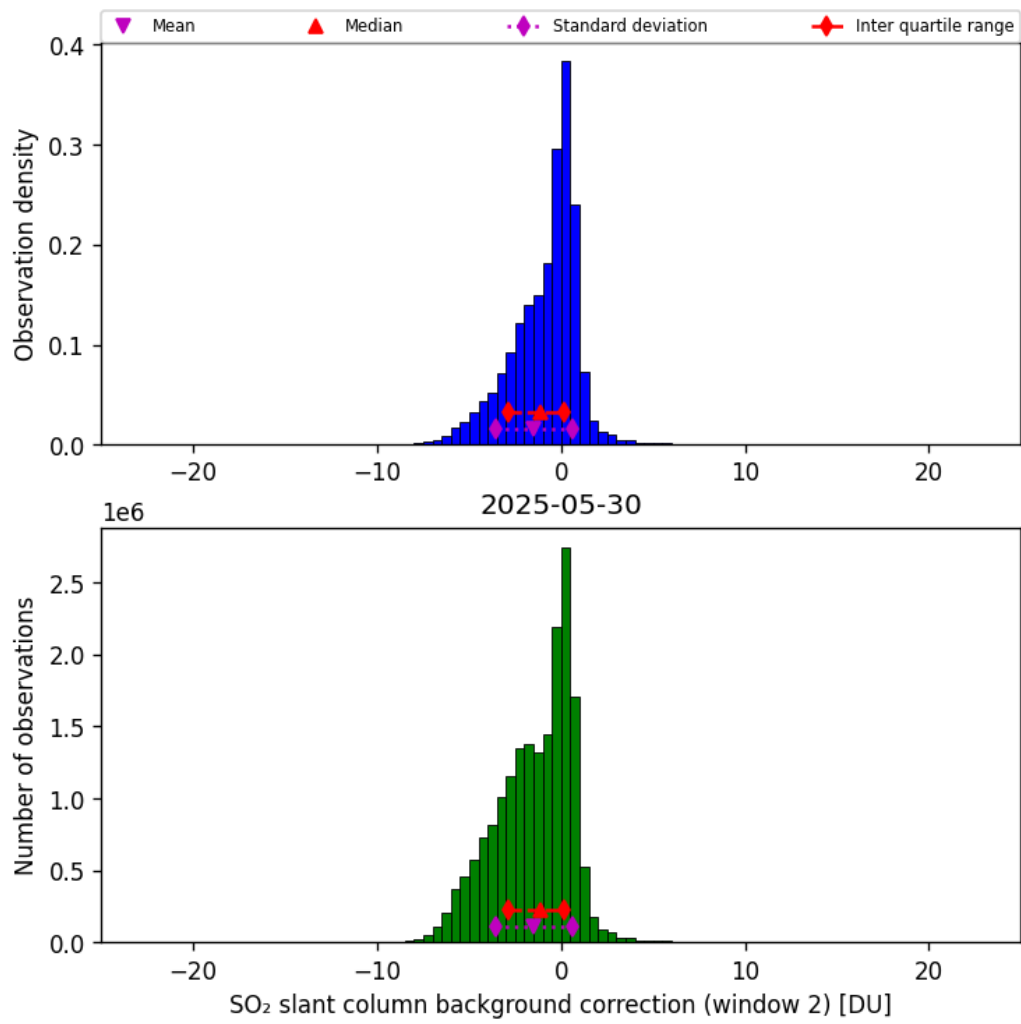


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-05-30 to 2025-05-31

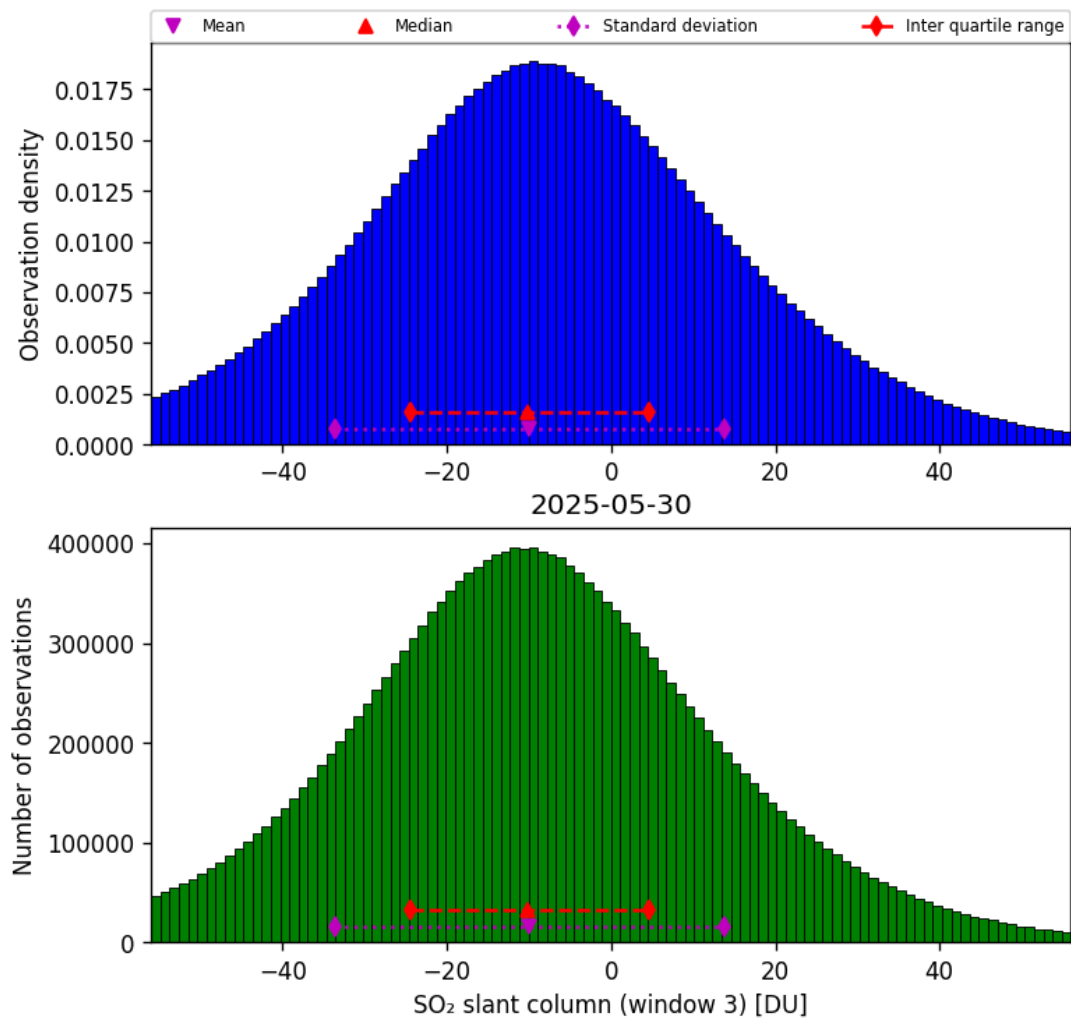


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-05-30 to 2025-05-31

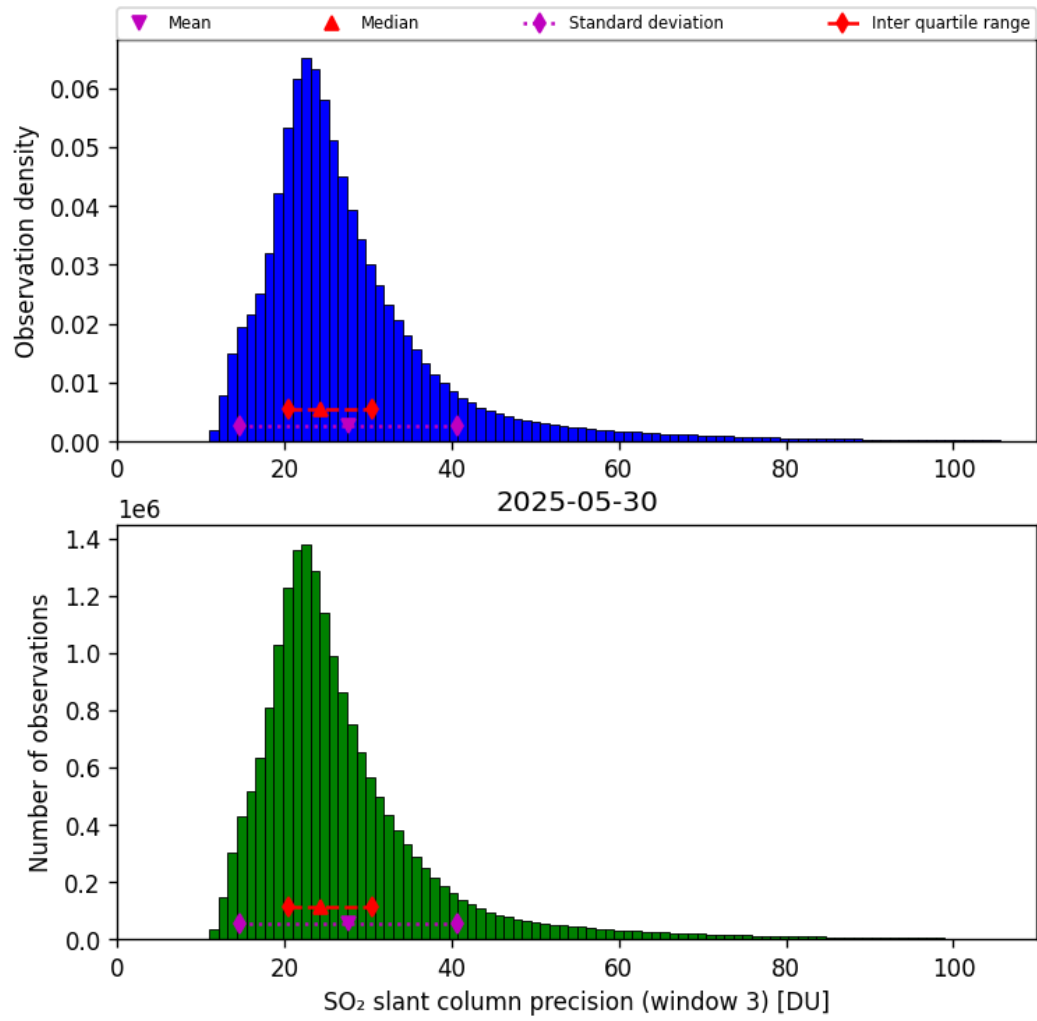


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-05-30 to 2025-05-31

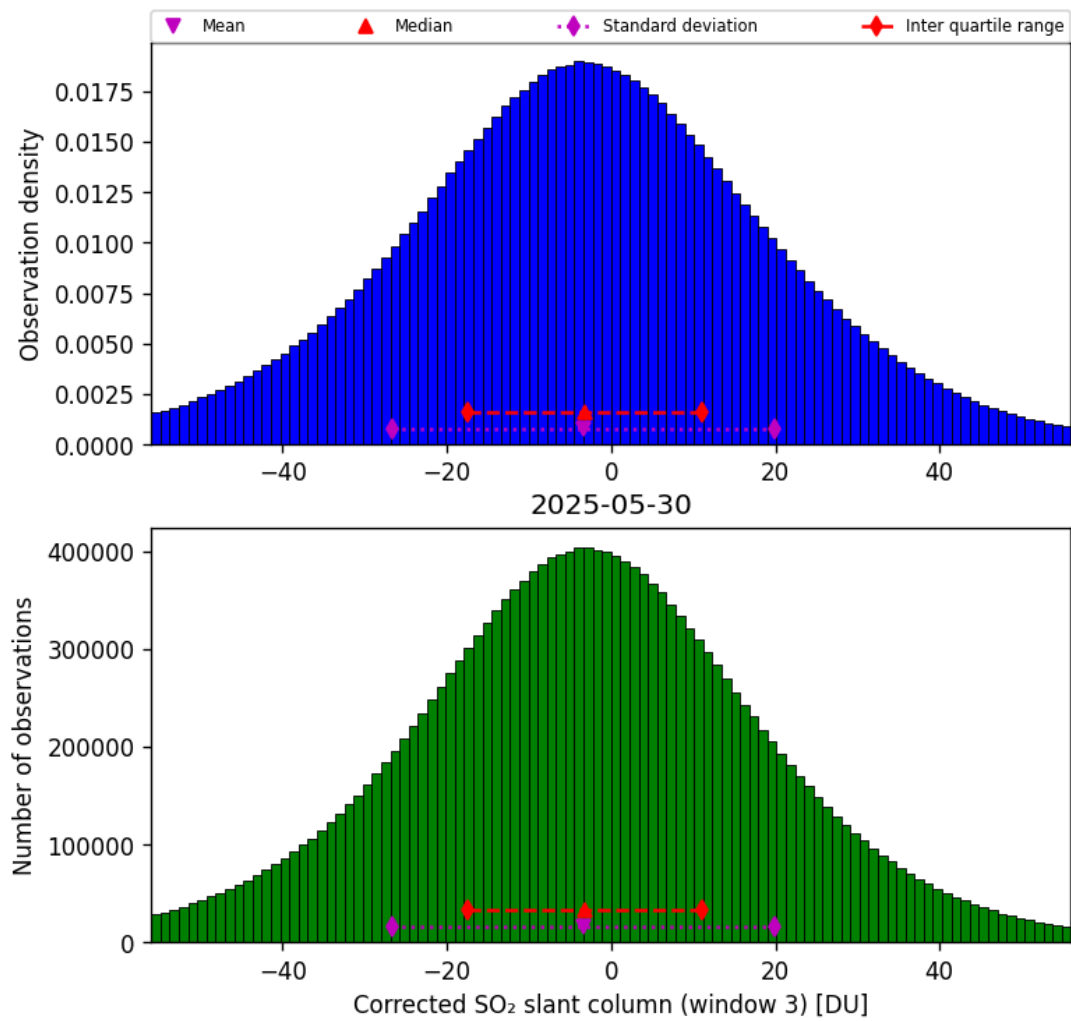


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-05-30 to 2025-05-31

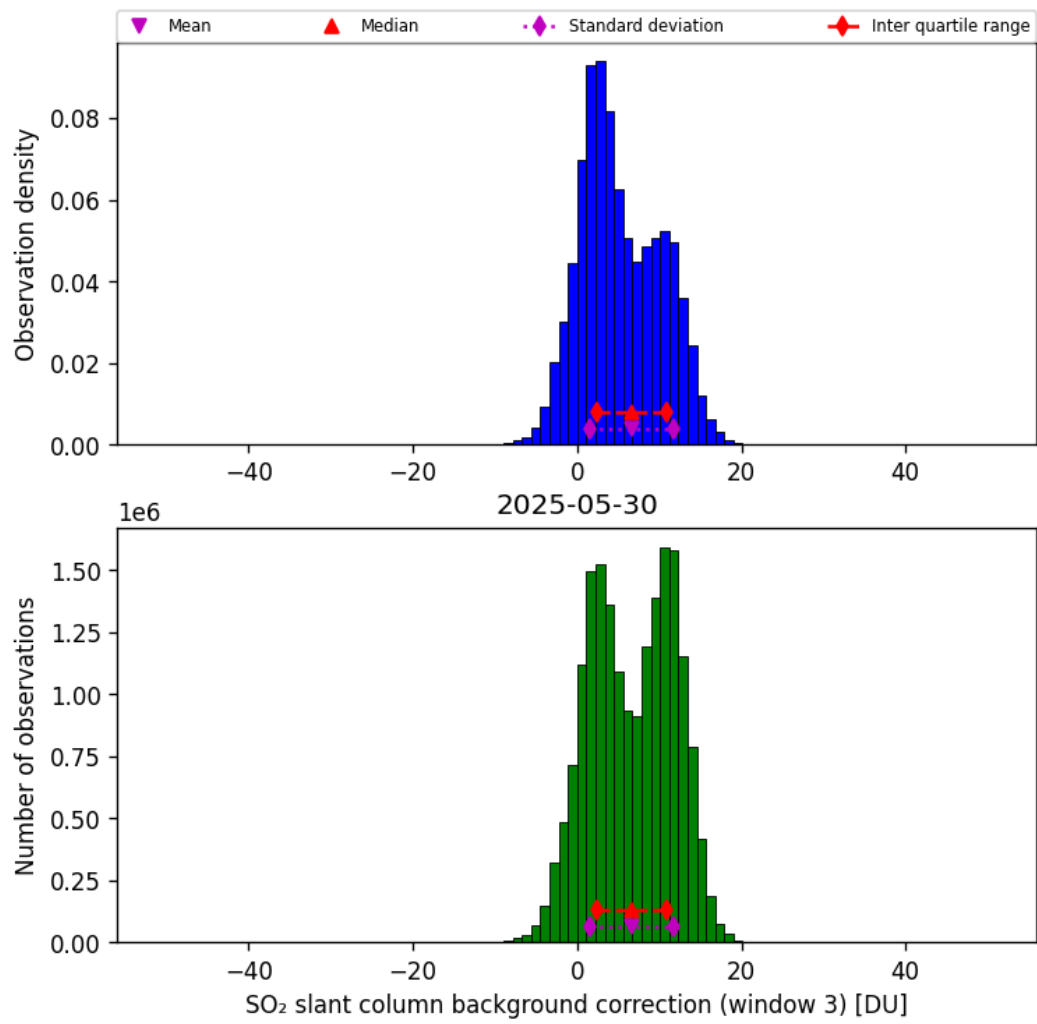


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-05-30 to 2025-05-31

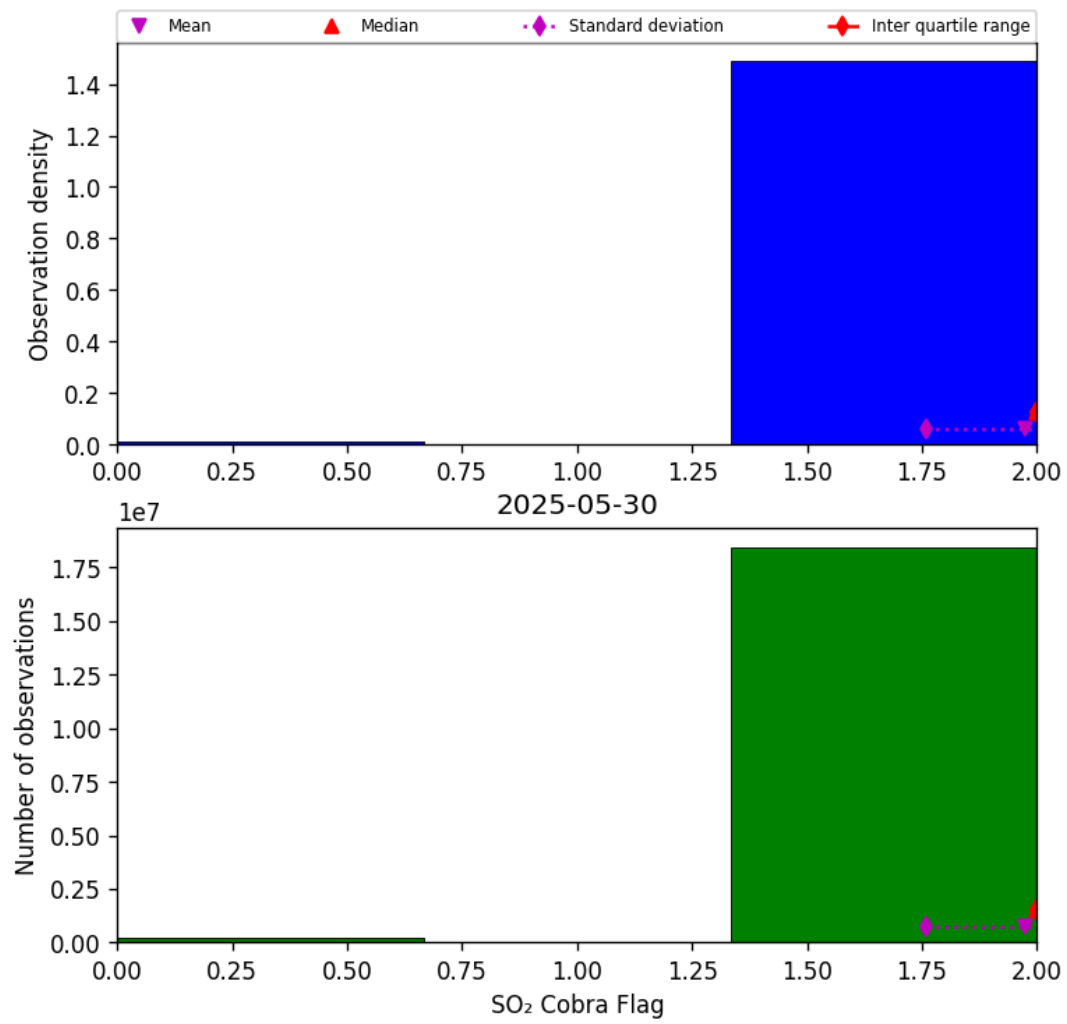


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-05-30 to 2025-05-31

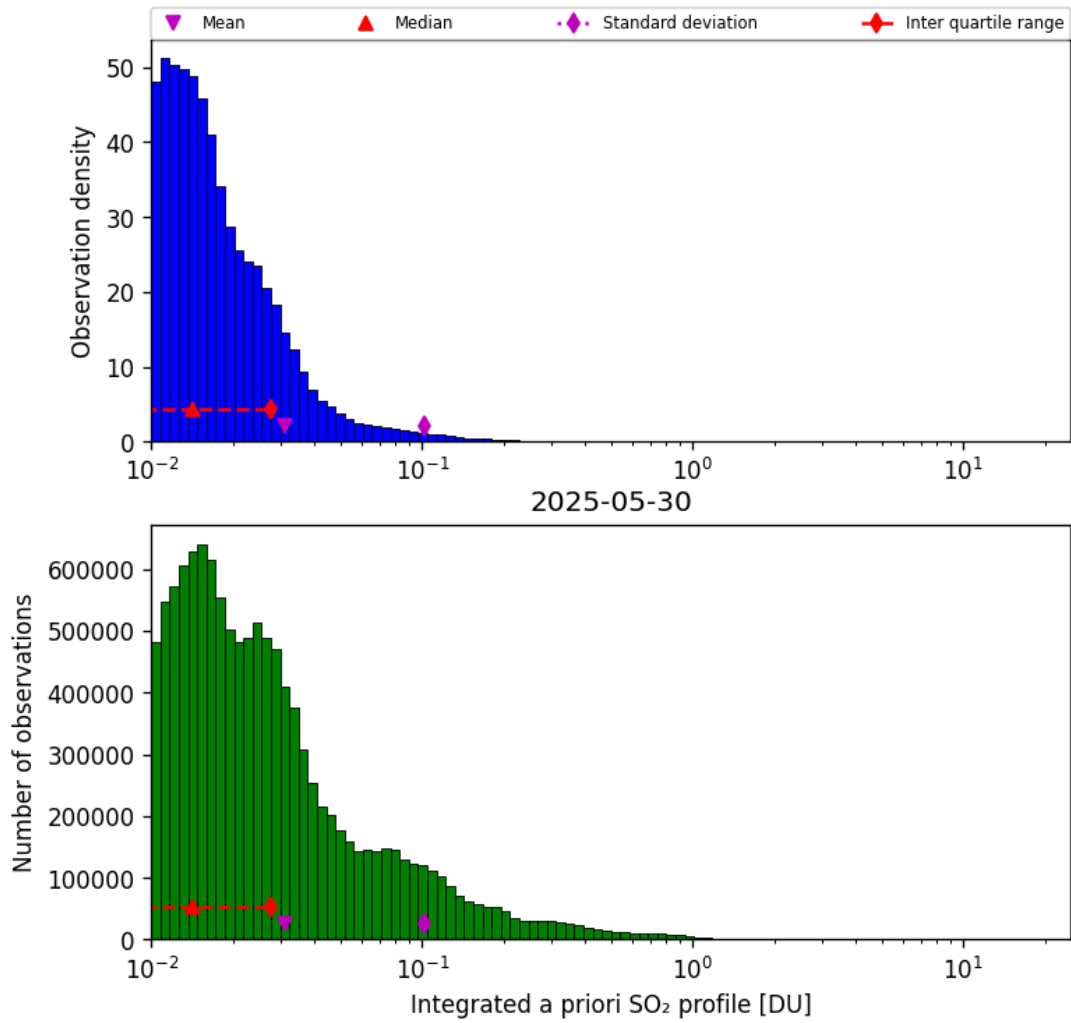


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-05-30 to 2025-05-31

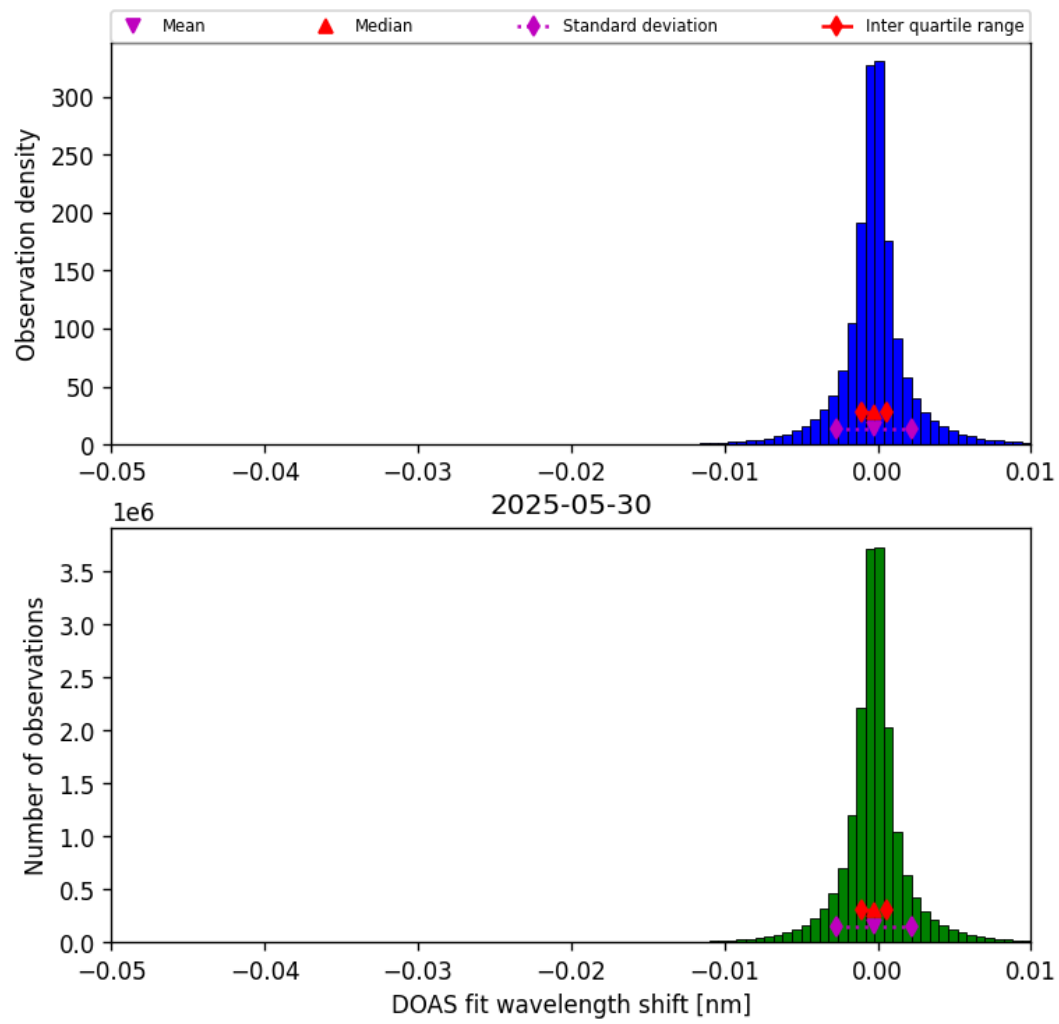


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-05-30 to 2025-05-31

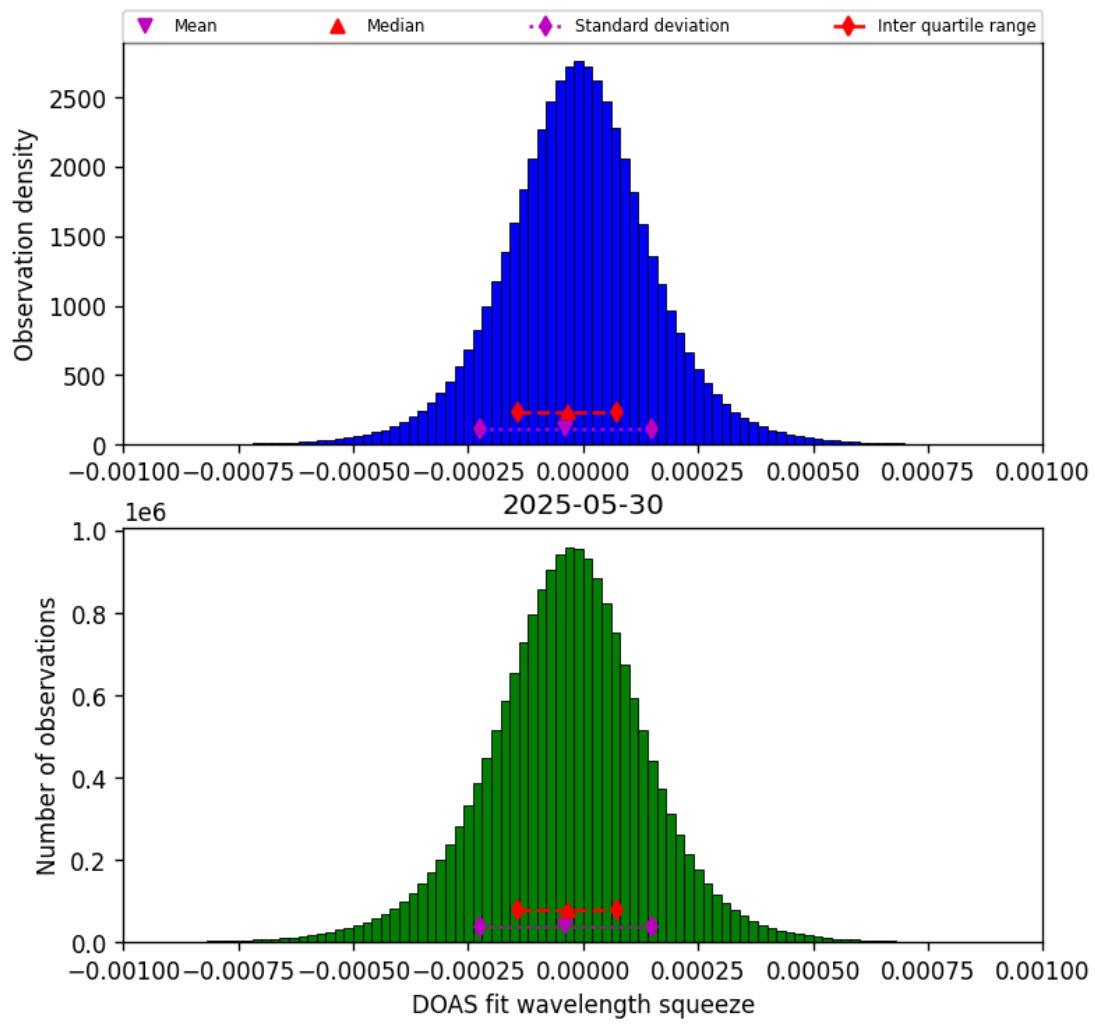


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-05-30 to 2025-05-31

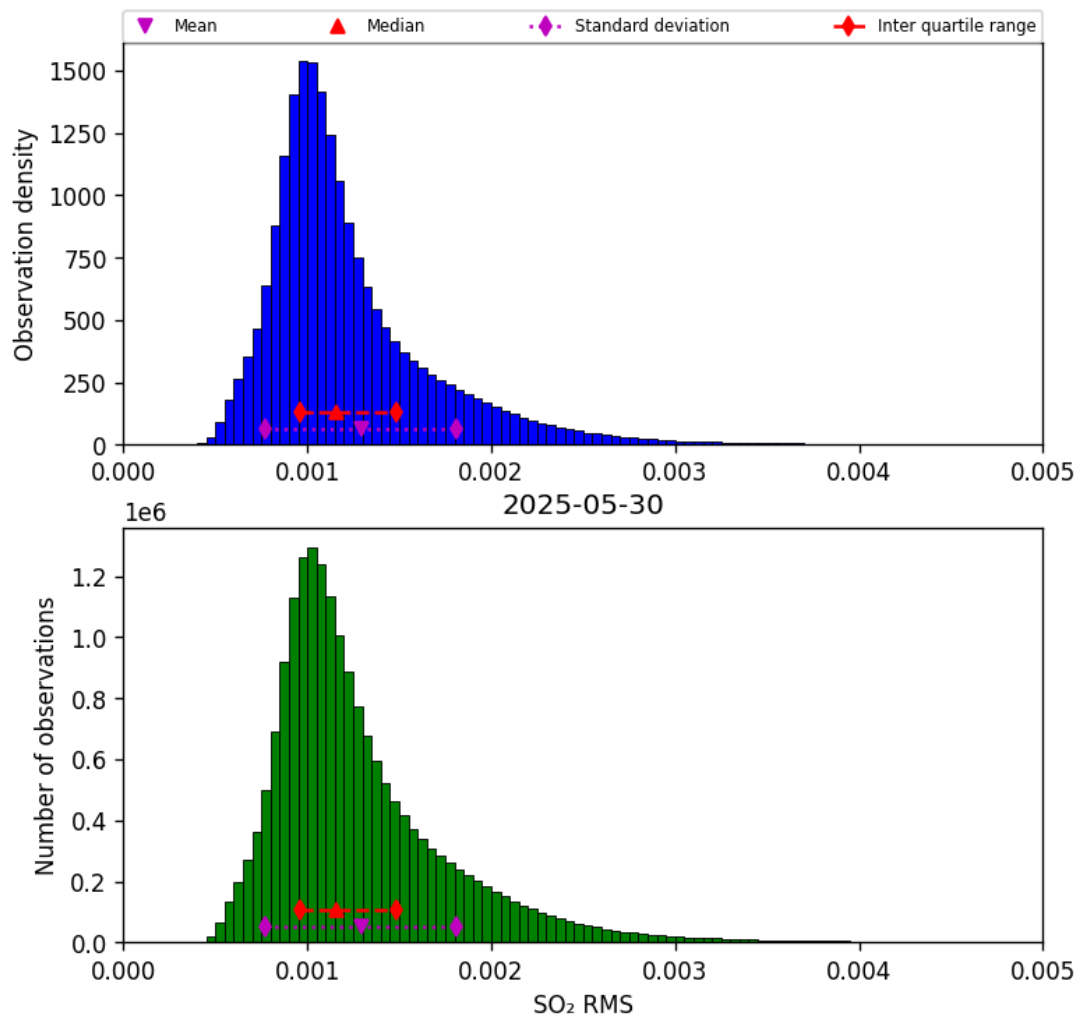


Figure 79: Histogram of “SO₂ RMS” for 2025-05-30 to 2025-05-31

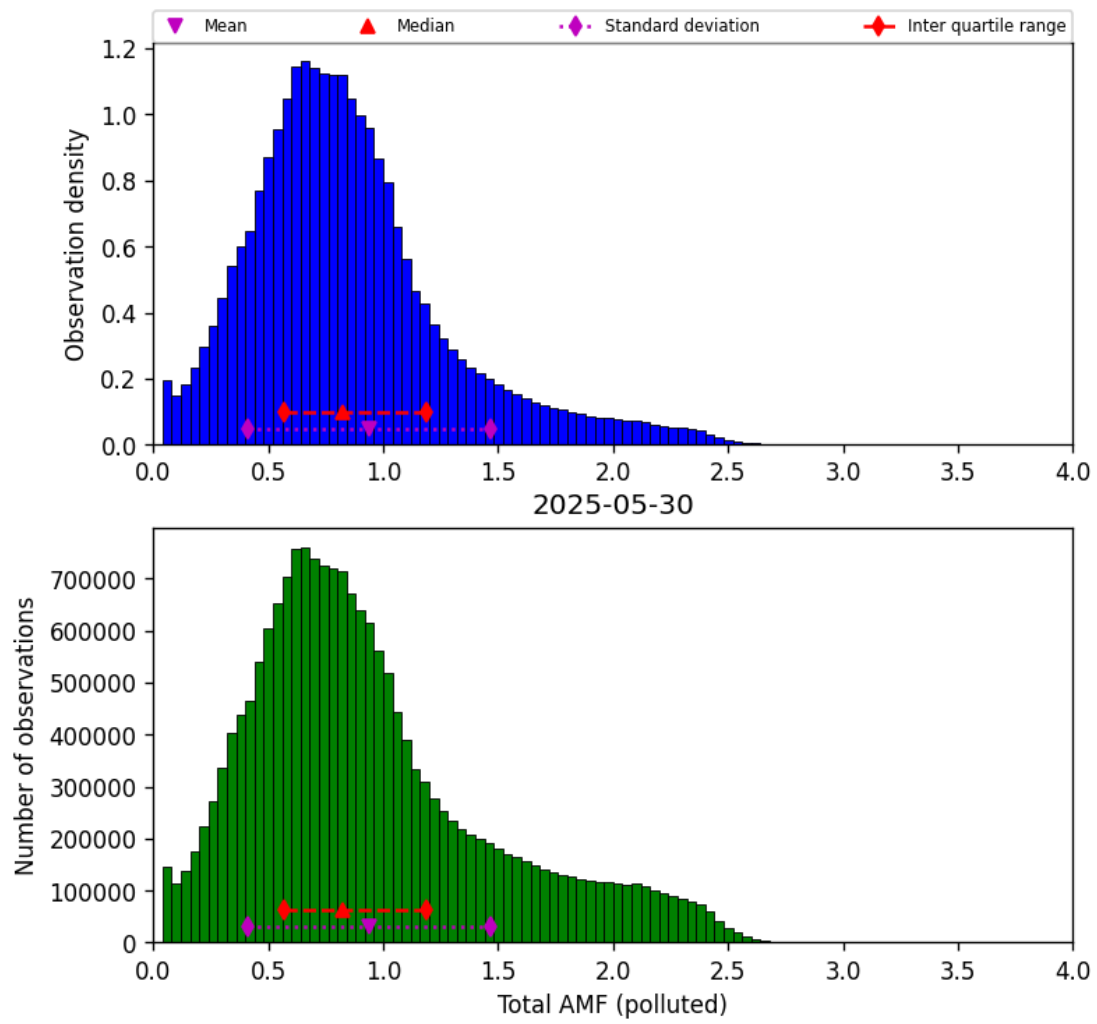


Figure 80: Histogram of “Total AMF (polluted)” for 2025-05-30 to 2025-05-31

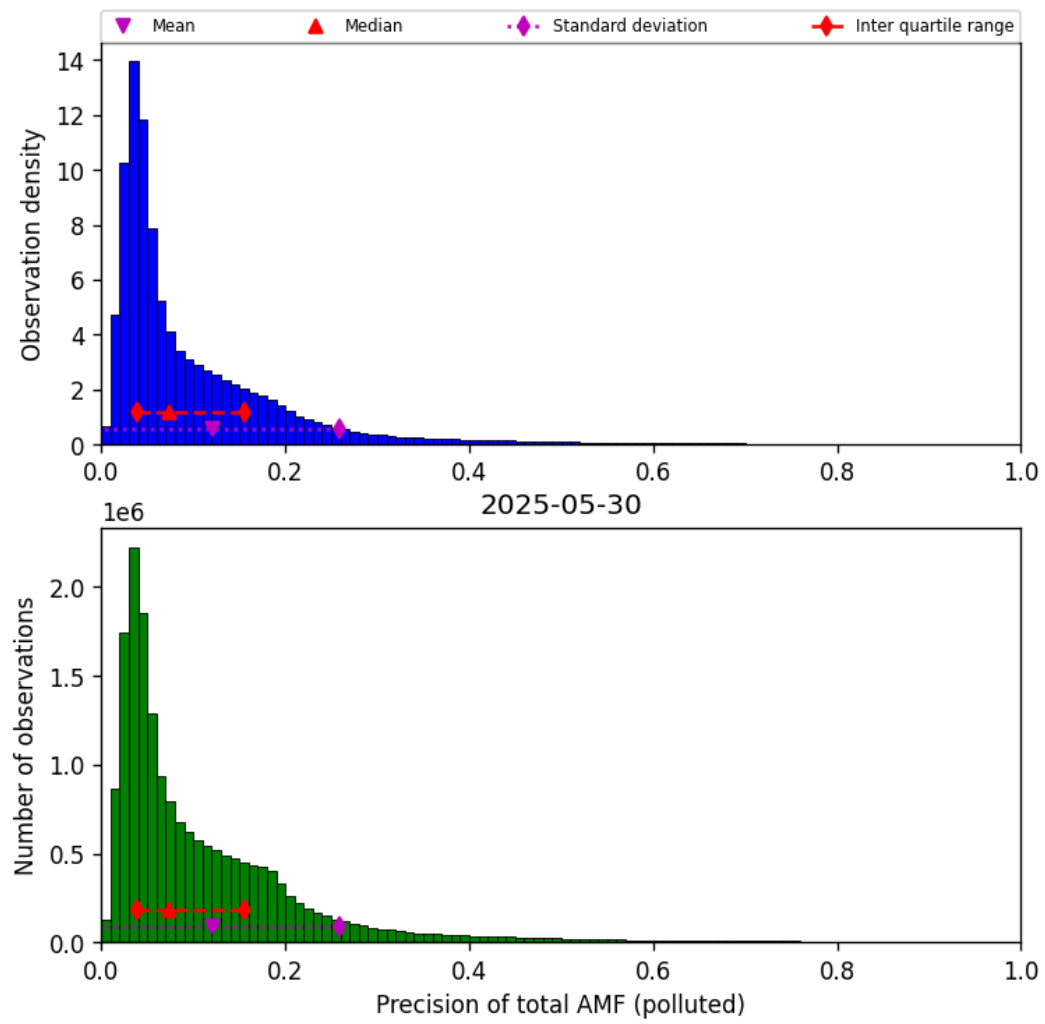


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-05-30 to 2025-05-31

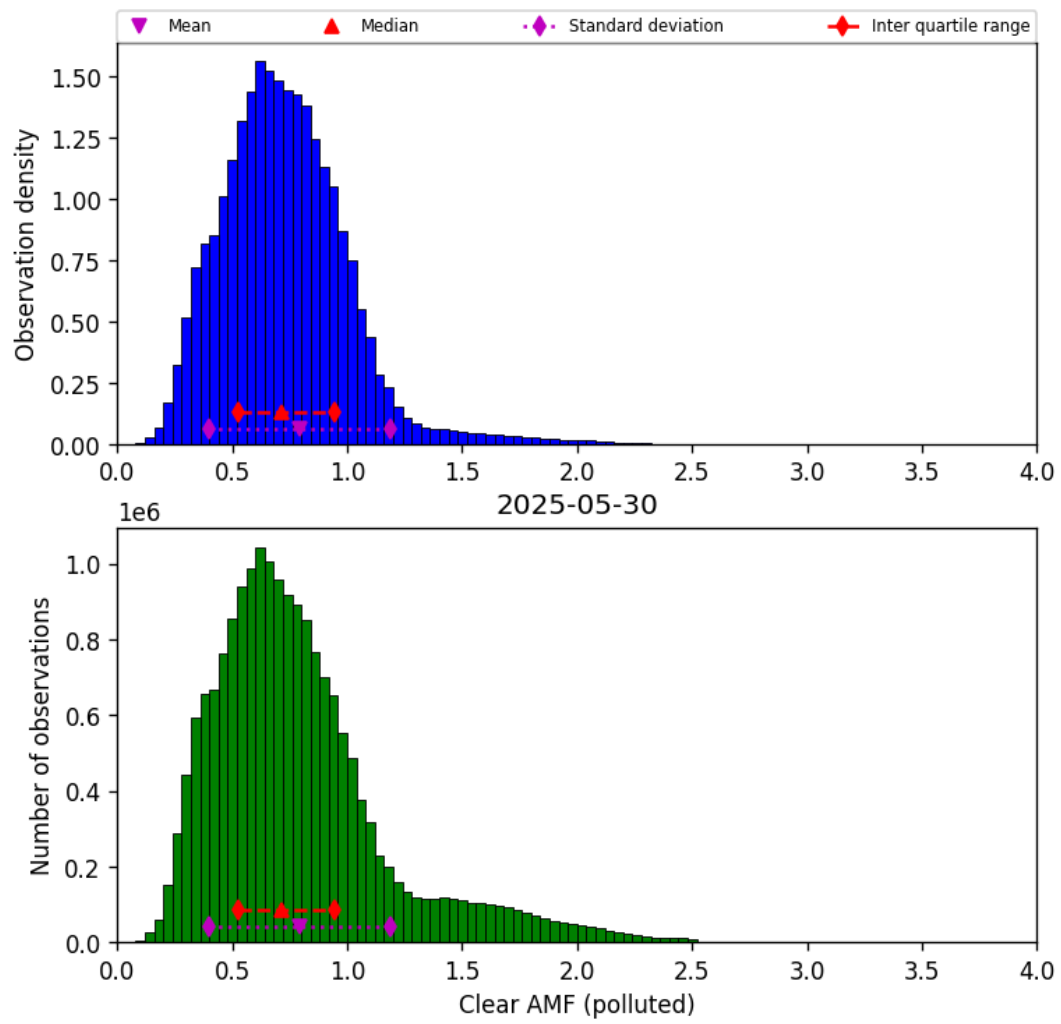


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-05-30 to 2025-05-31

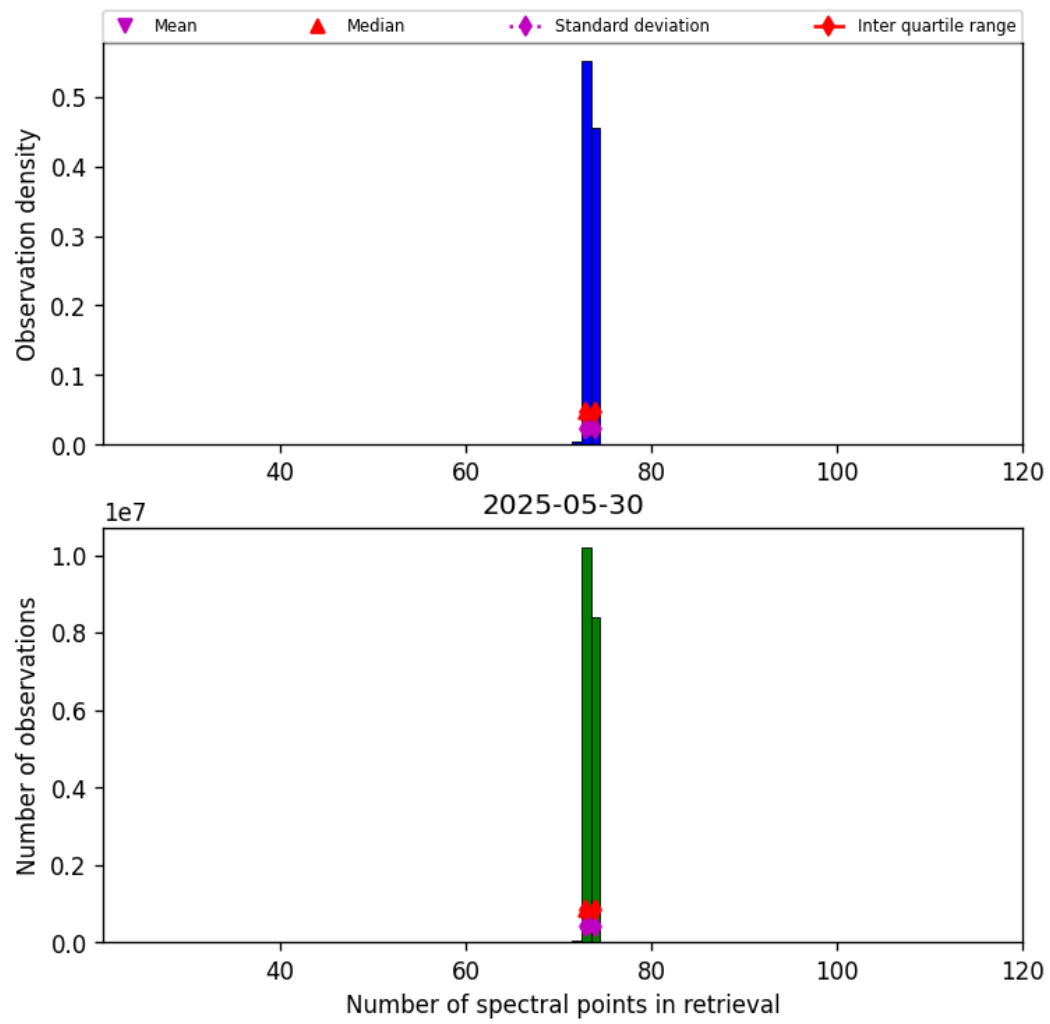


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-05-30 to 2025-05-31

9 Along track statistics

The TROPOMI instrument uses different binned detector rows for different viewing directions. In this section statistics are presented for each of the binned rows in the instrument.

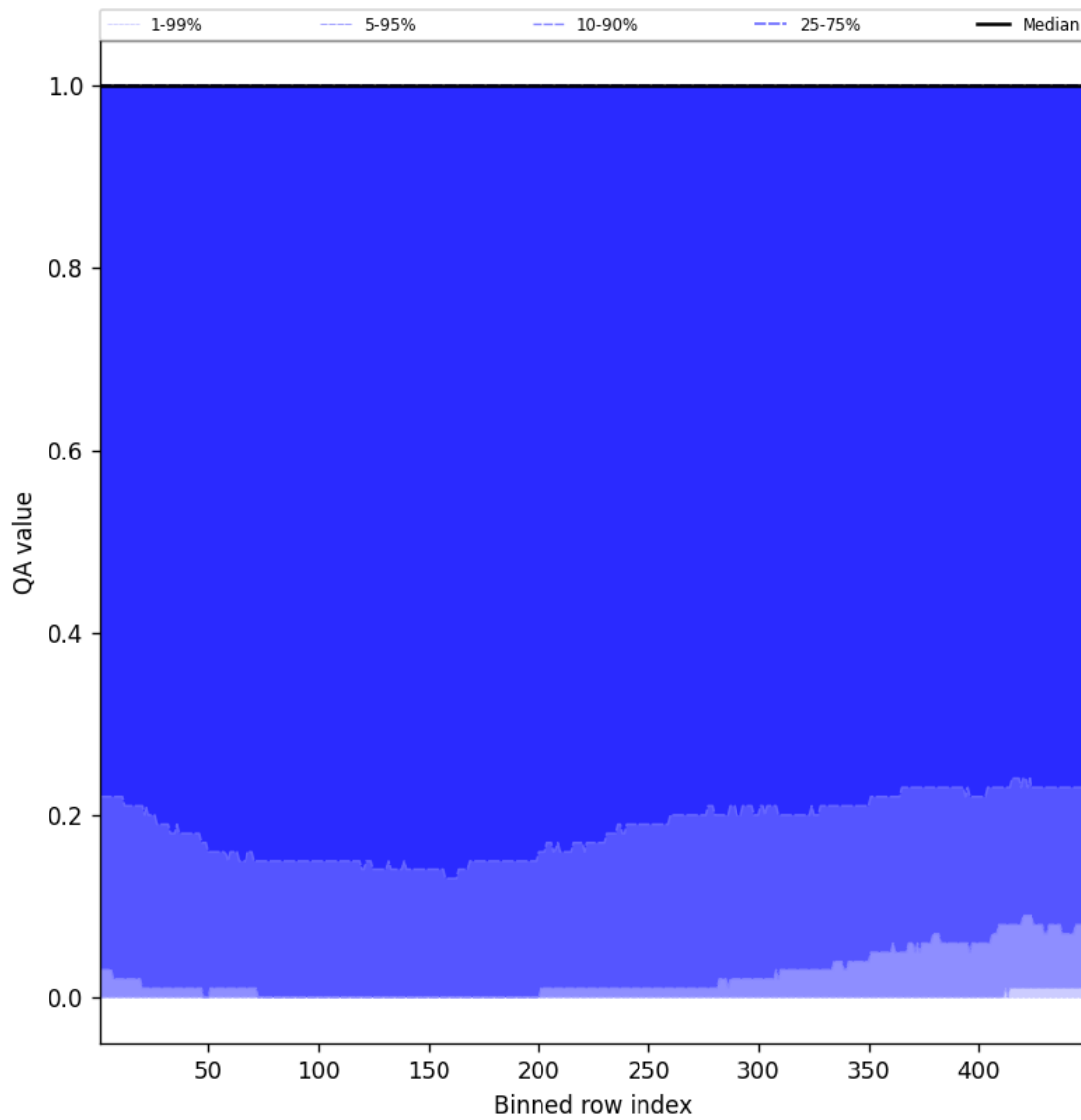


Figure 84: Along track statistics of “QA value” for 2025-05-30 to 2025-05-31

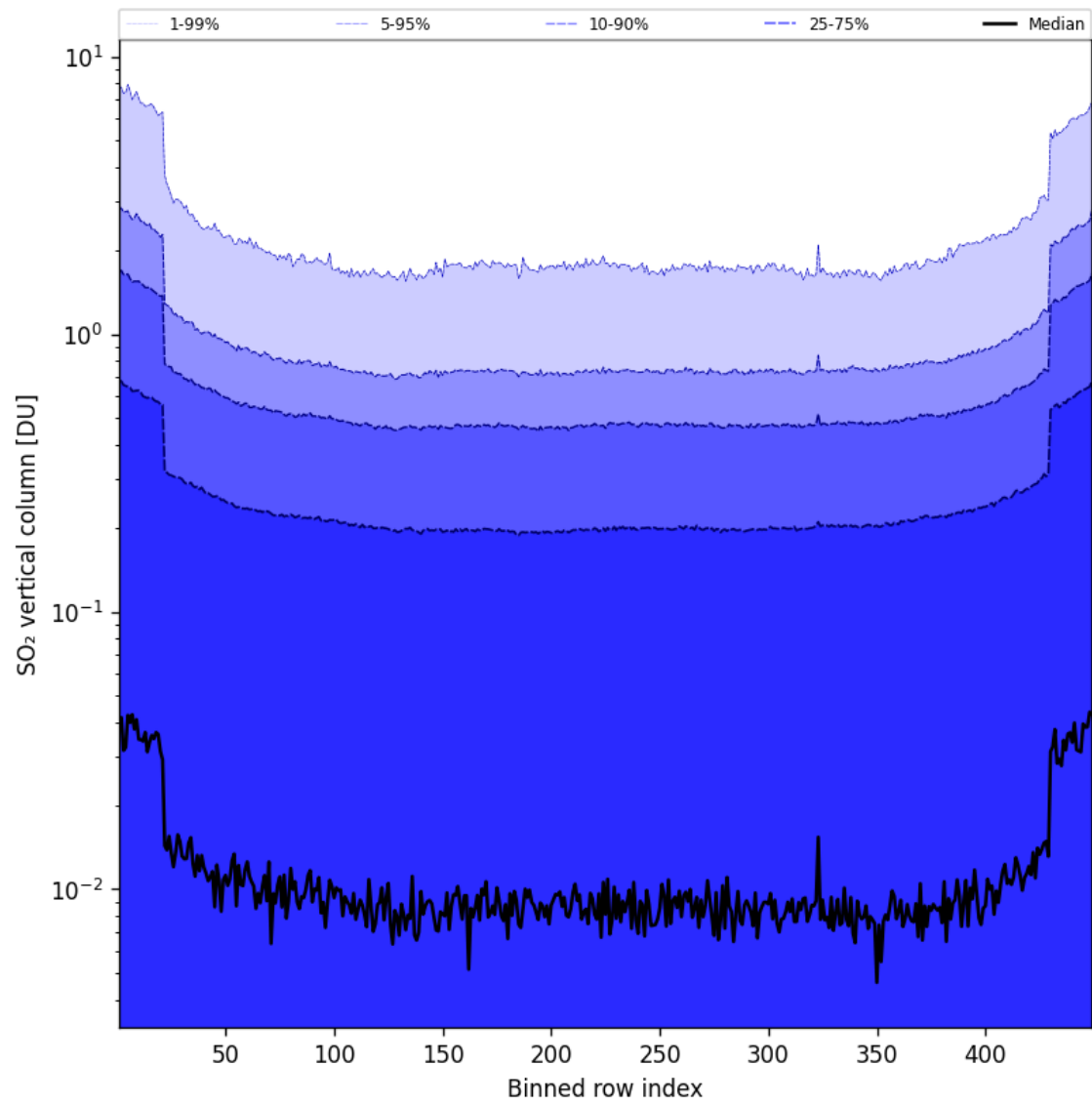


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-05-30 to 2025-05-31

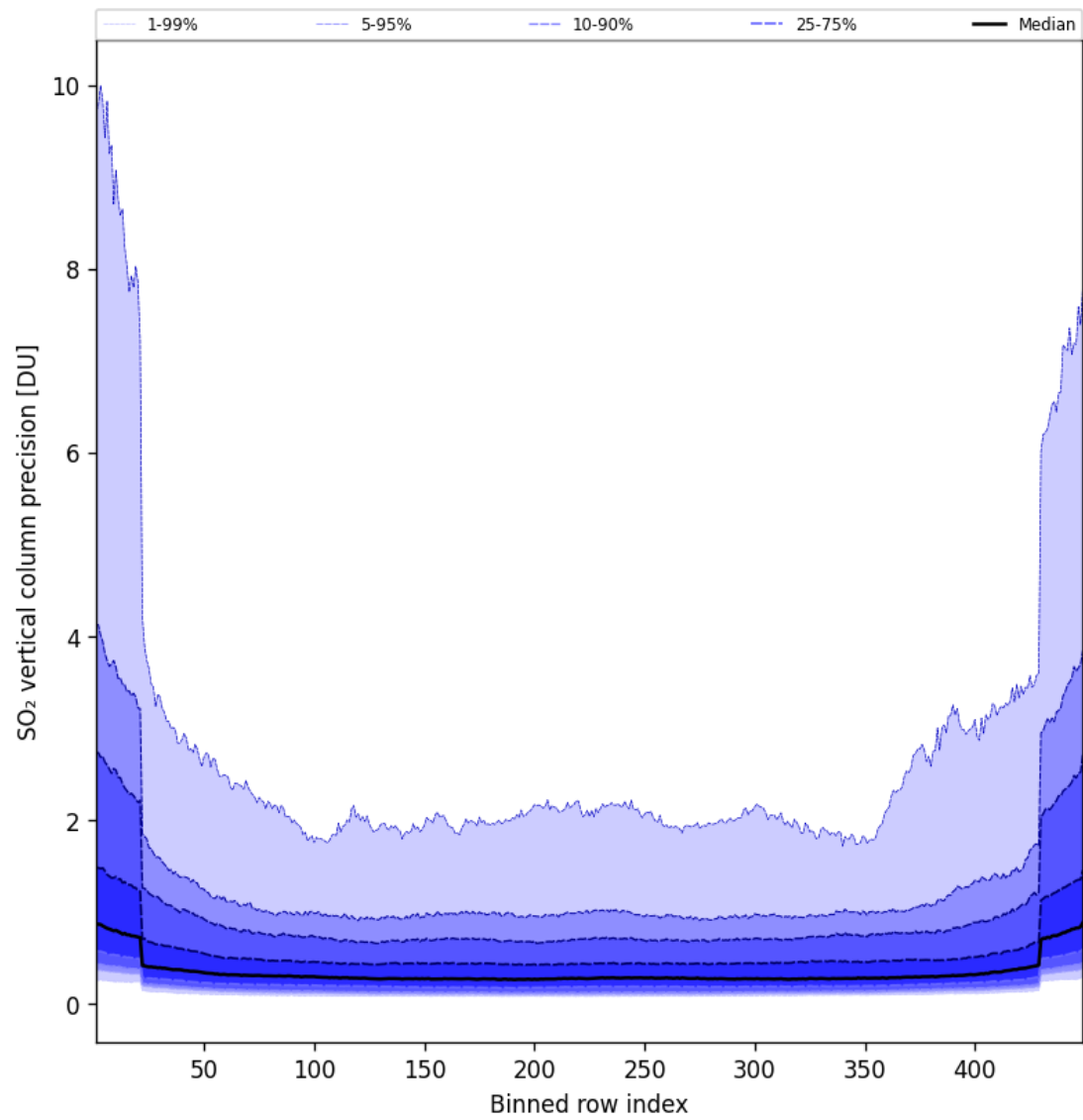


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-05-30 to 2025-05-31

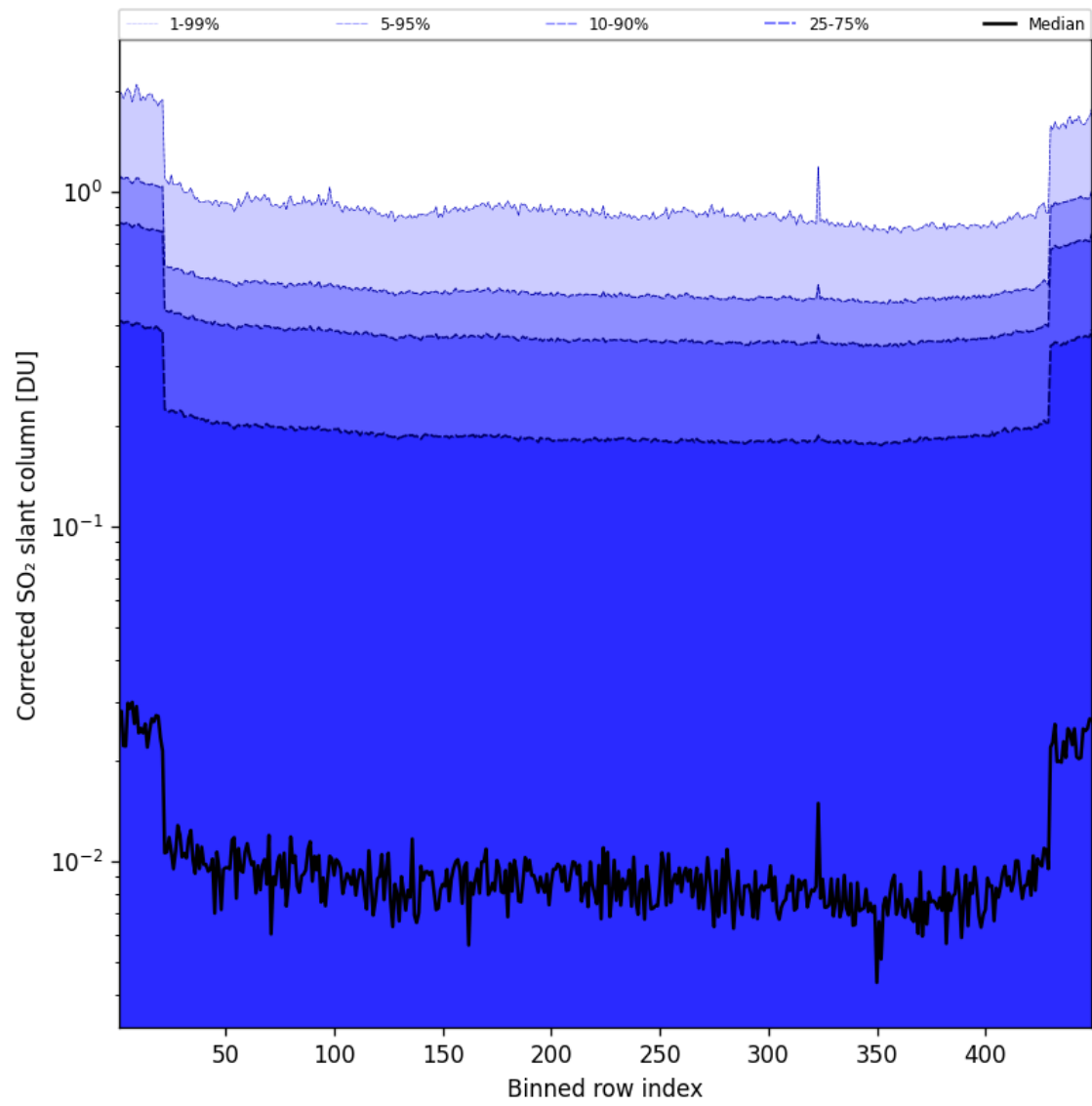


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-05-30 to 2025-05-31

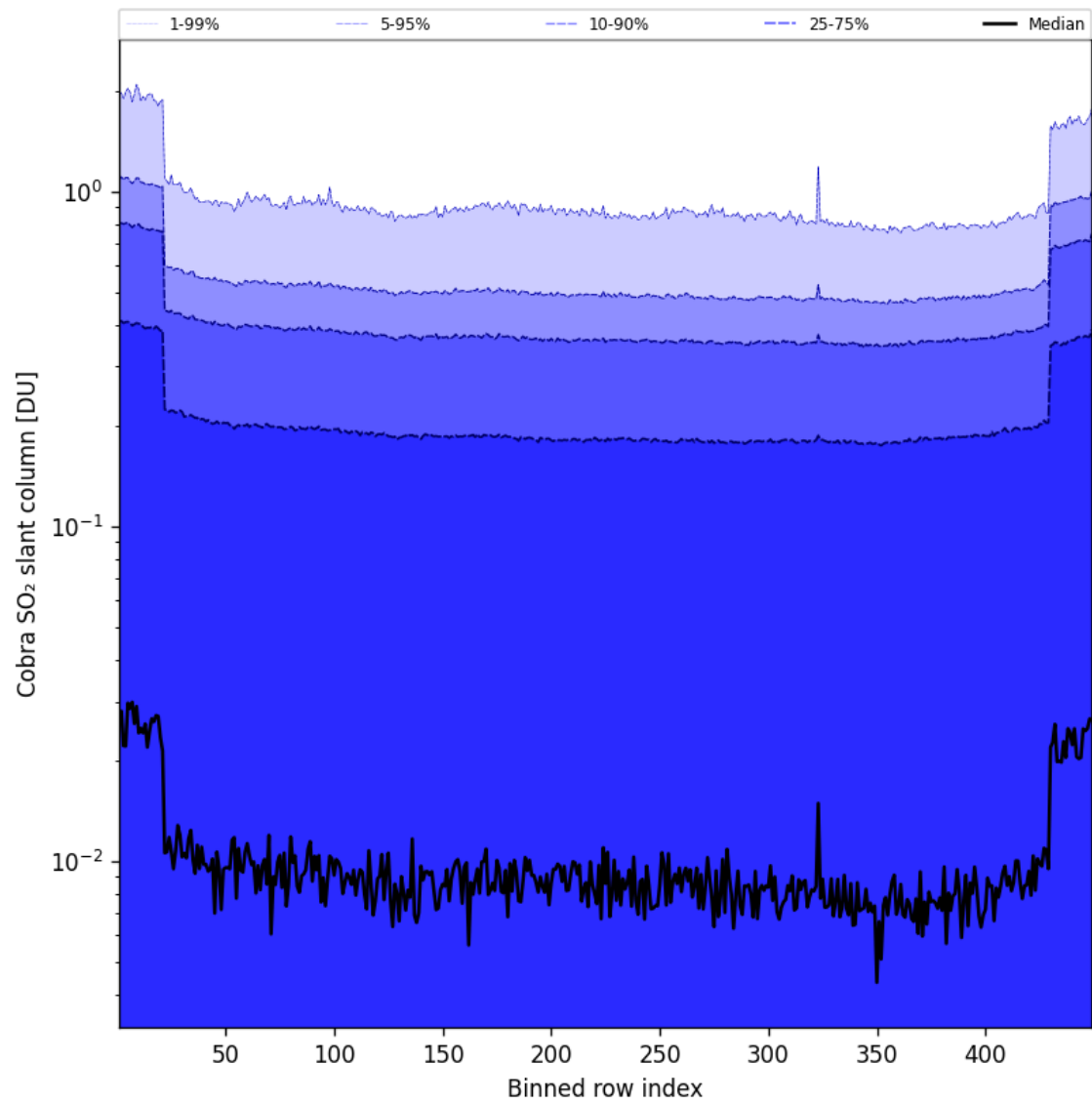


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-05-30 to 2025-05-31

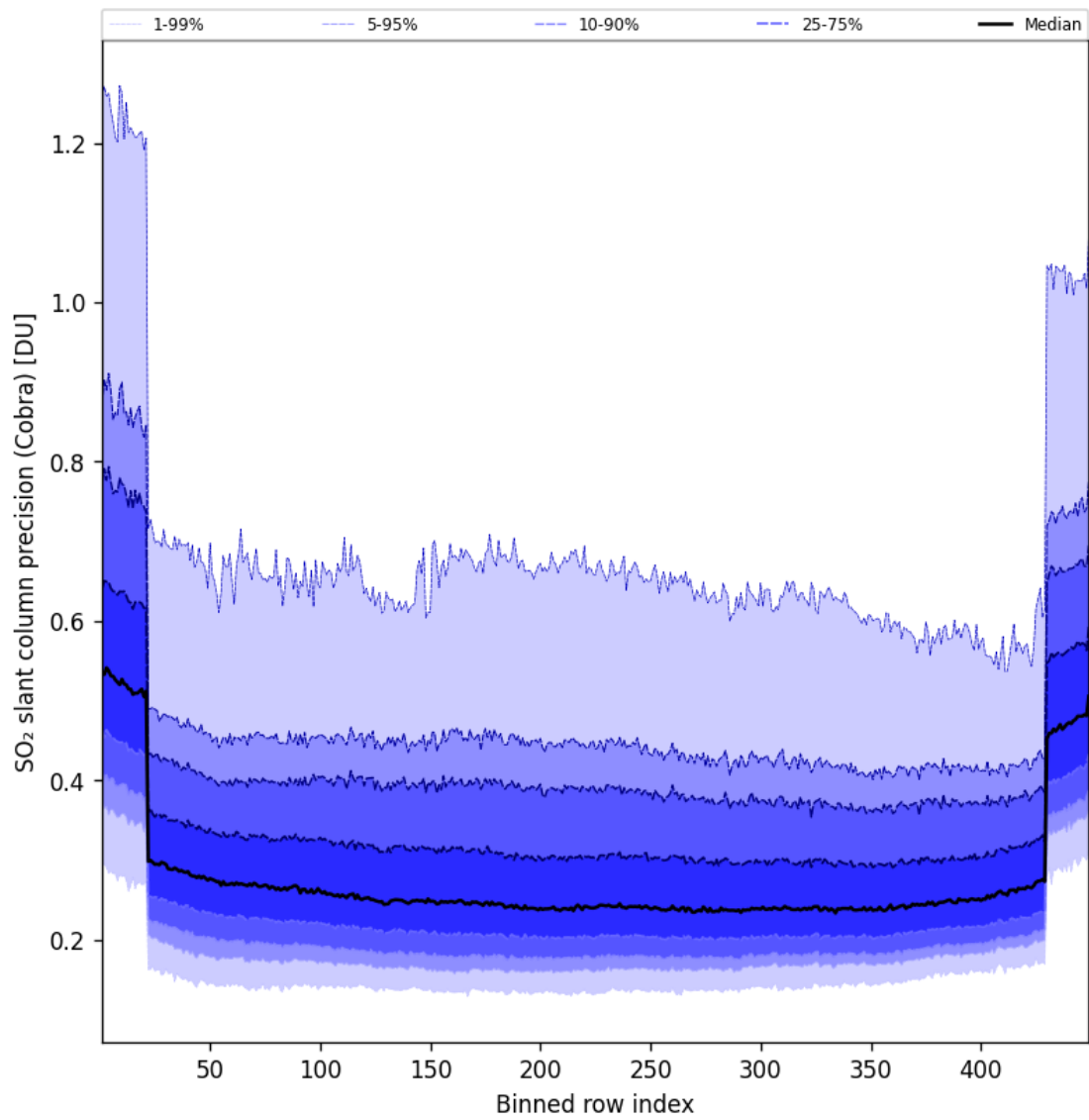


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-05-30 to 2025-05-31

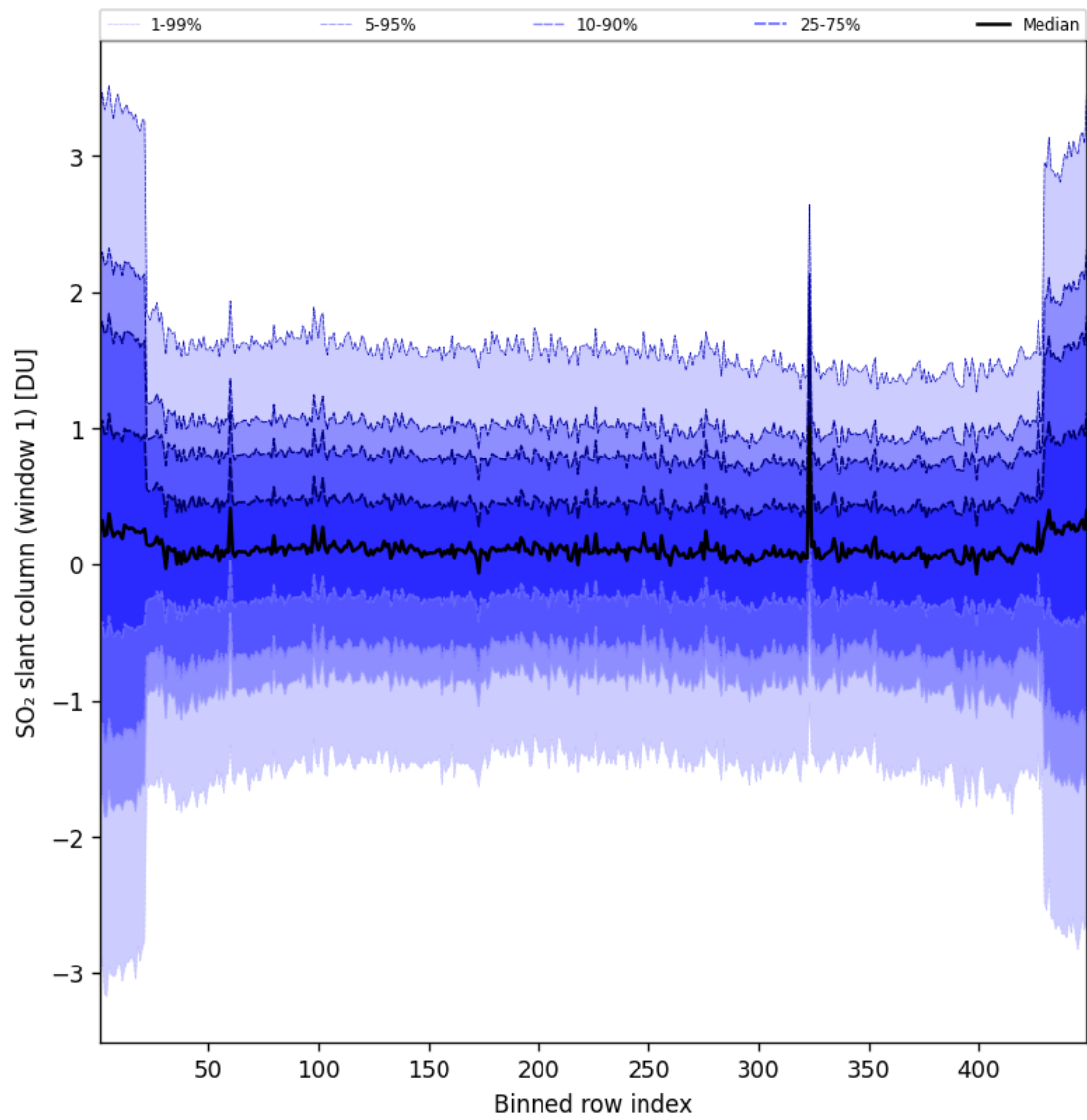


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-05-30 to 2025-05-31

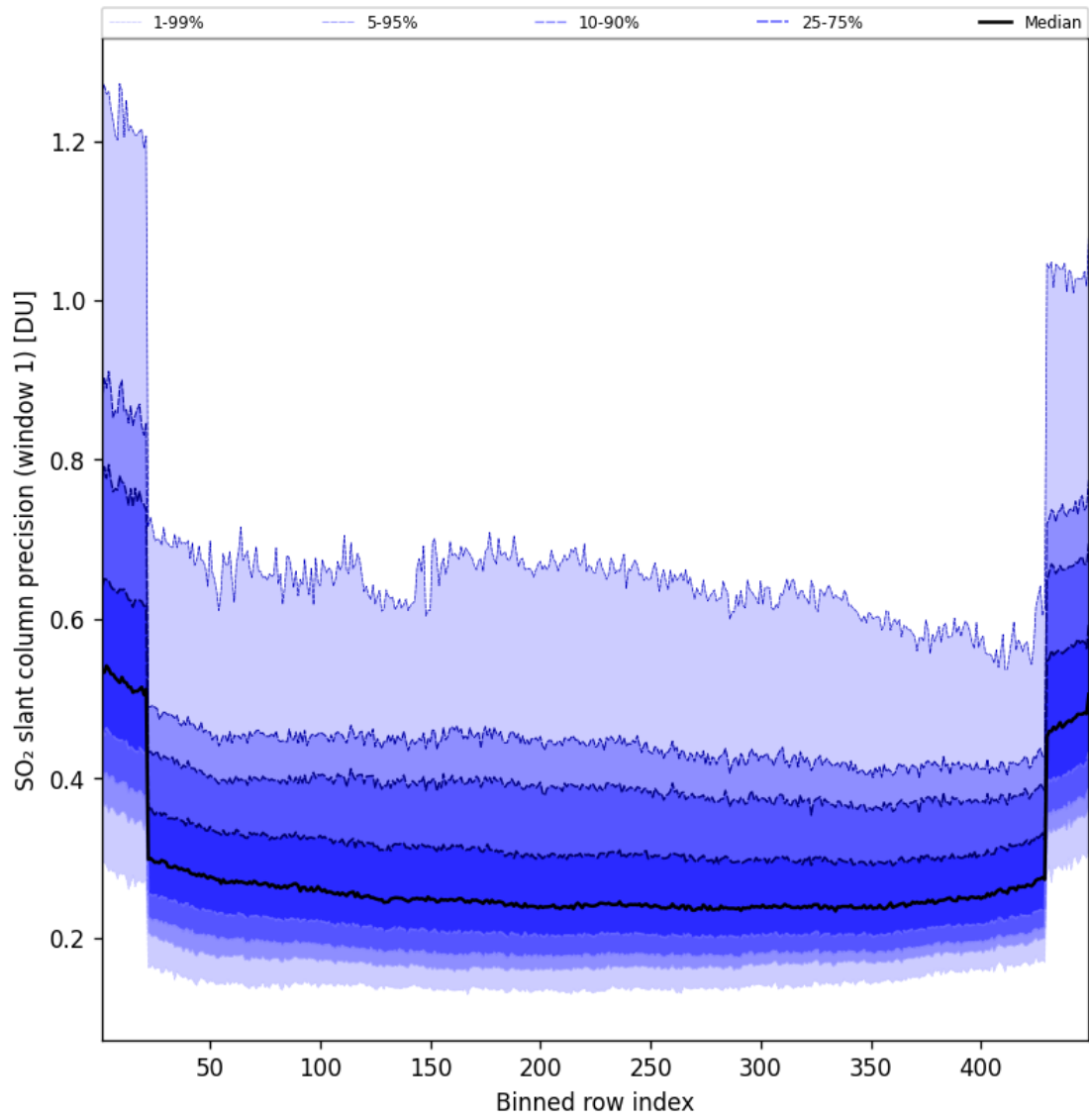


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-05-30 to 2025-05-31

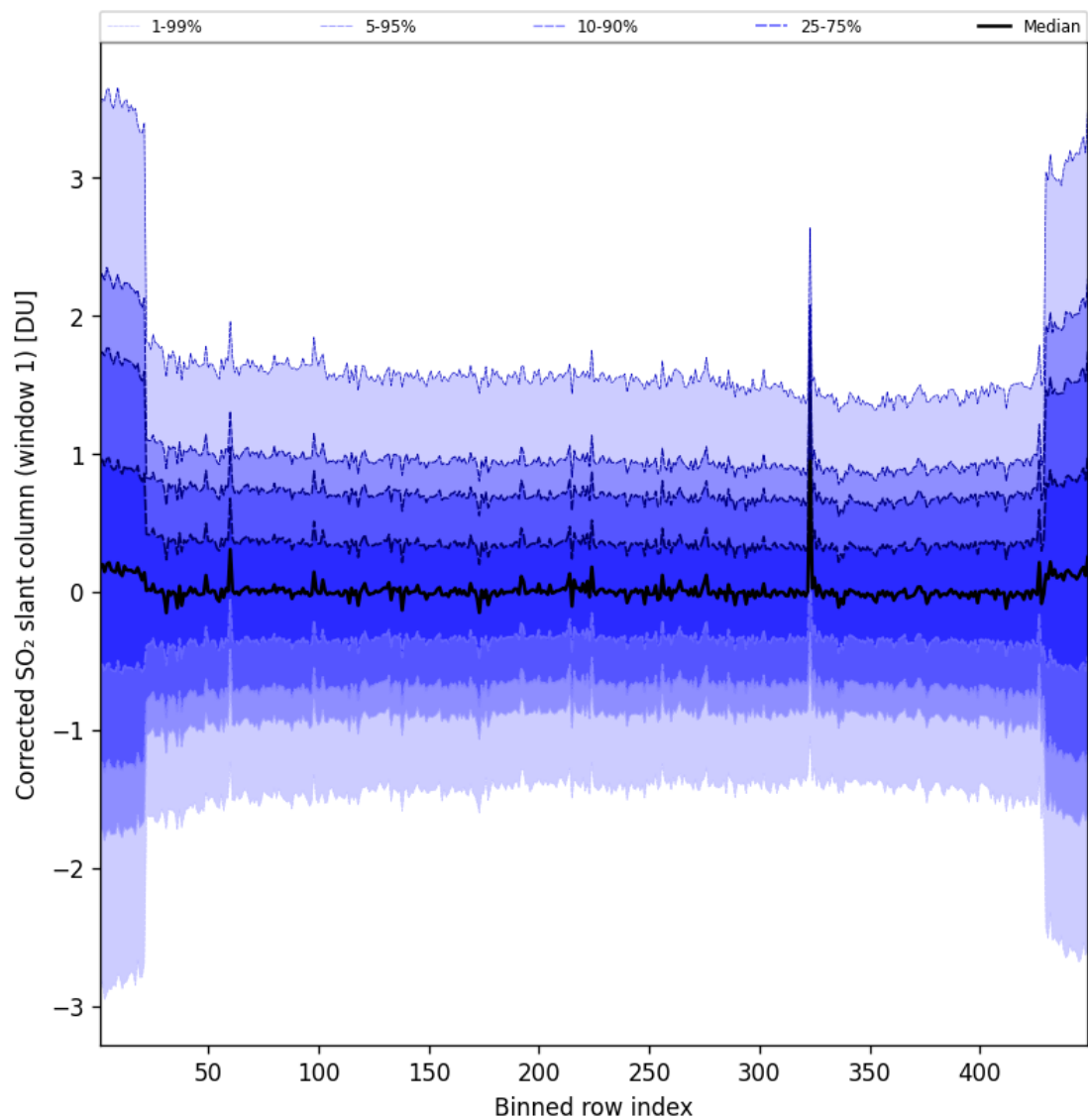


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-05-30 to 2025-05-31

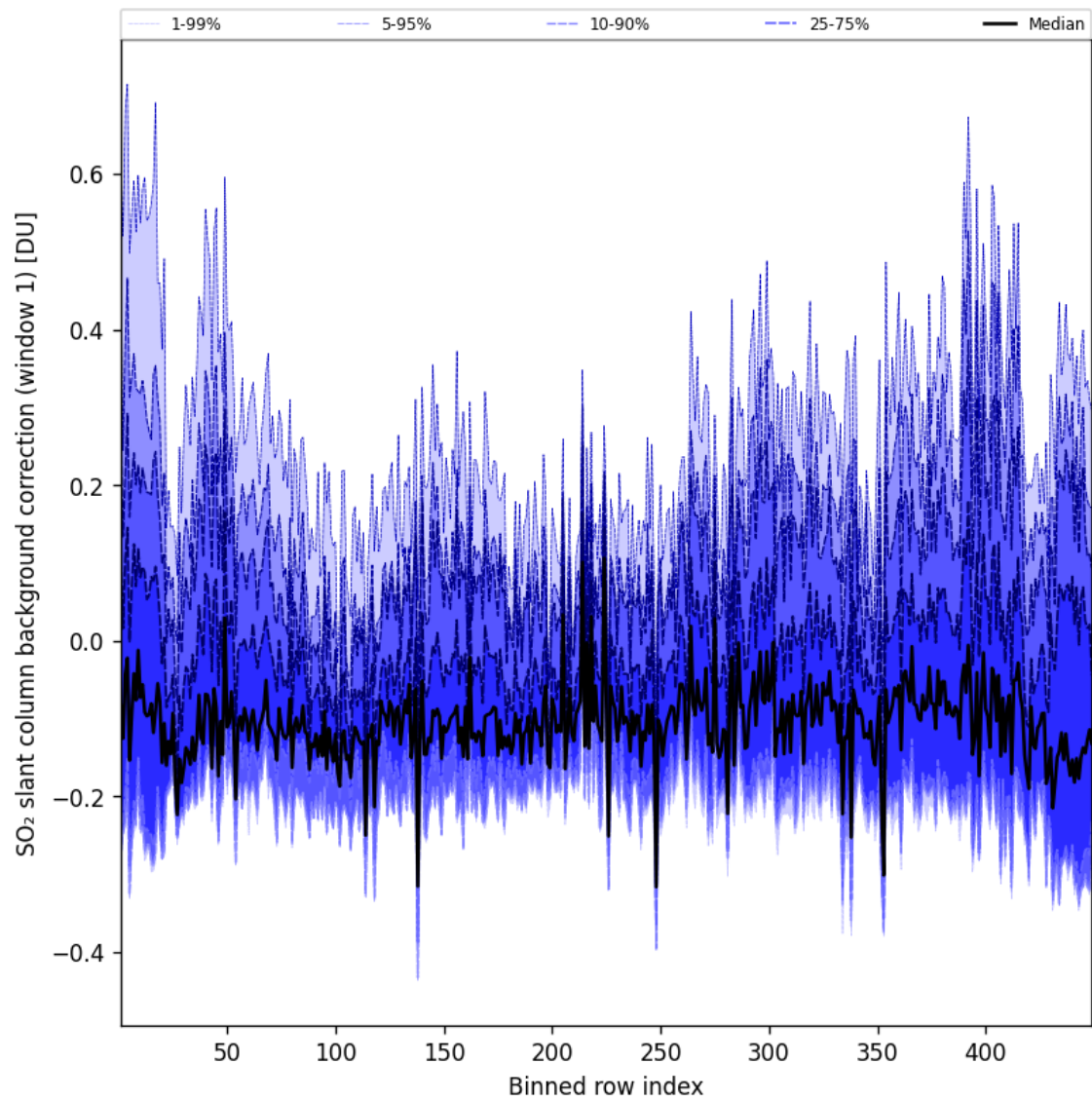


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-05-30 to 2025-05-31

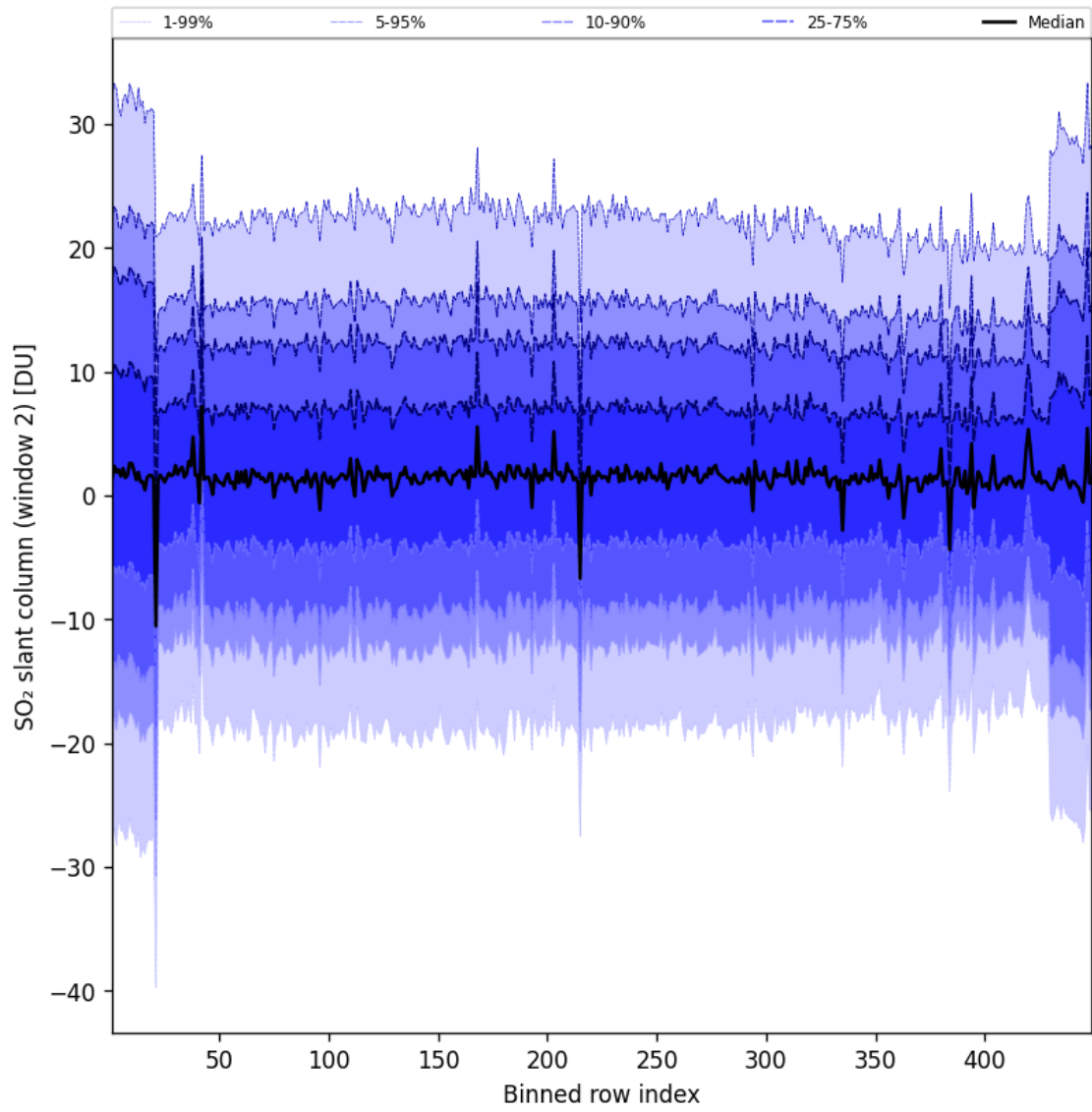


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-05-30 to 2025-05-31

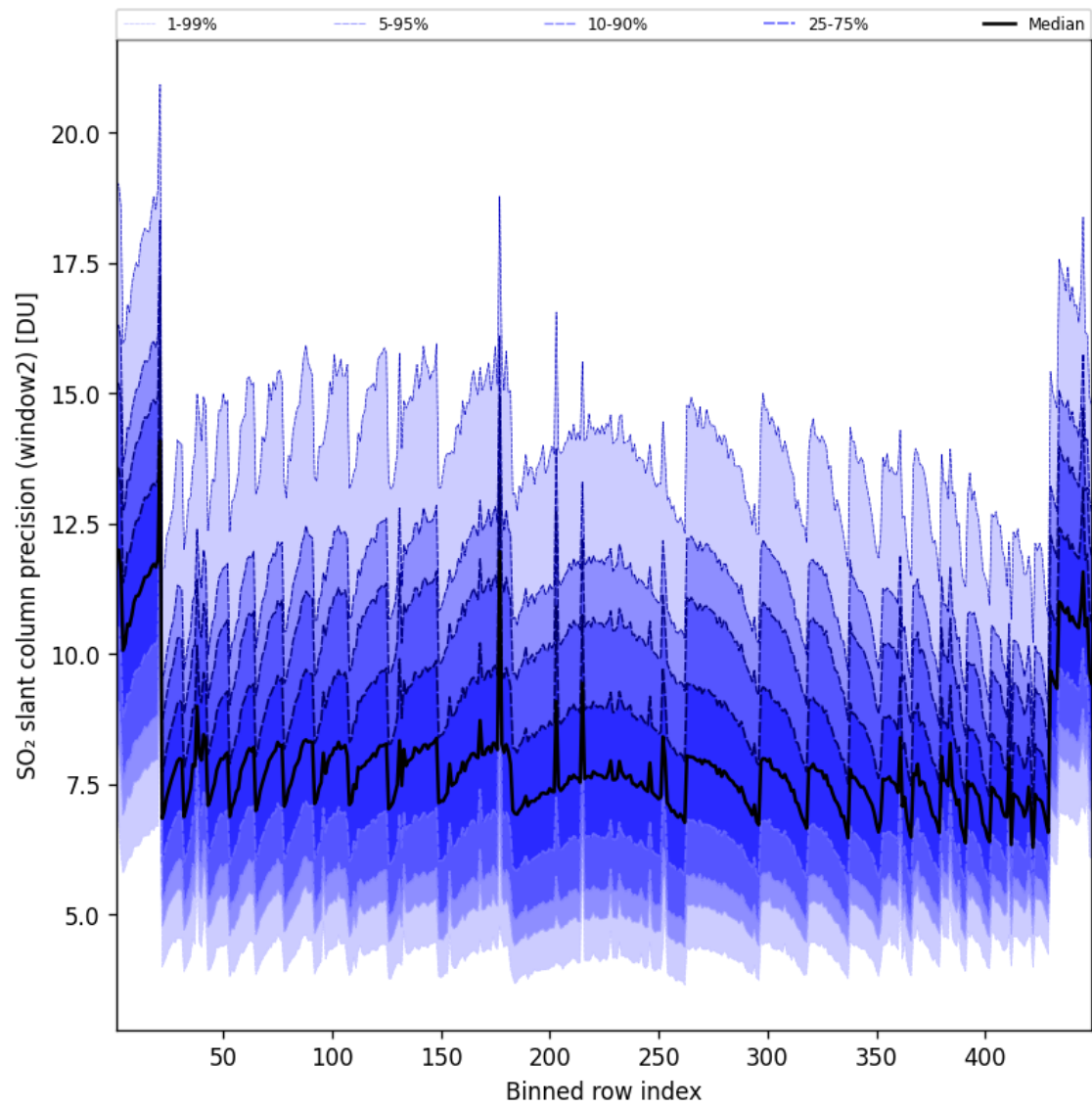


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-05-30 to 2025-05-31

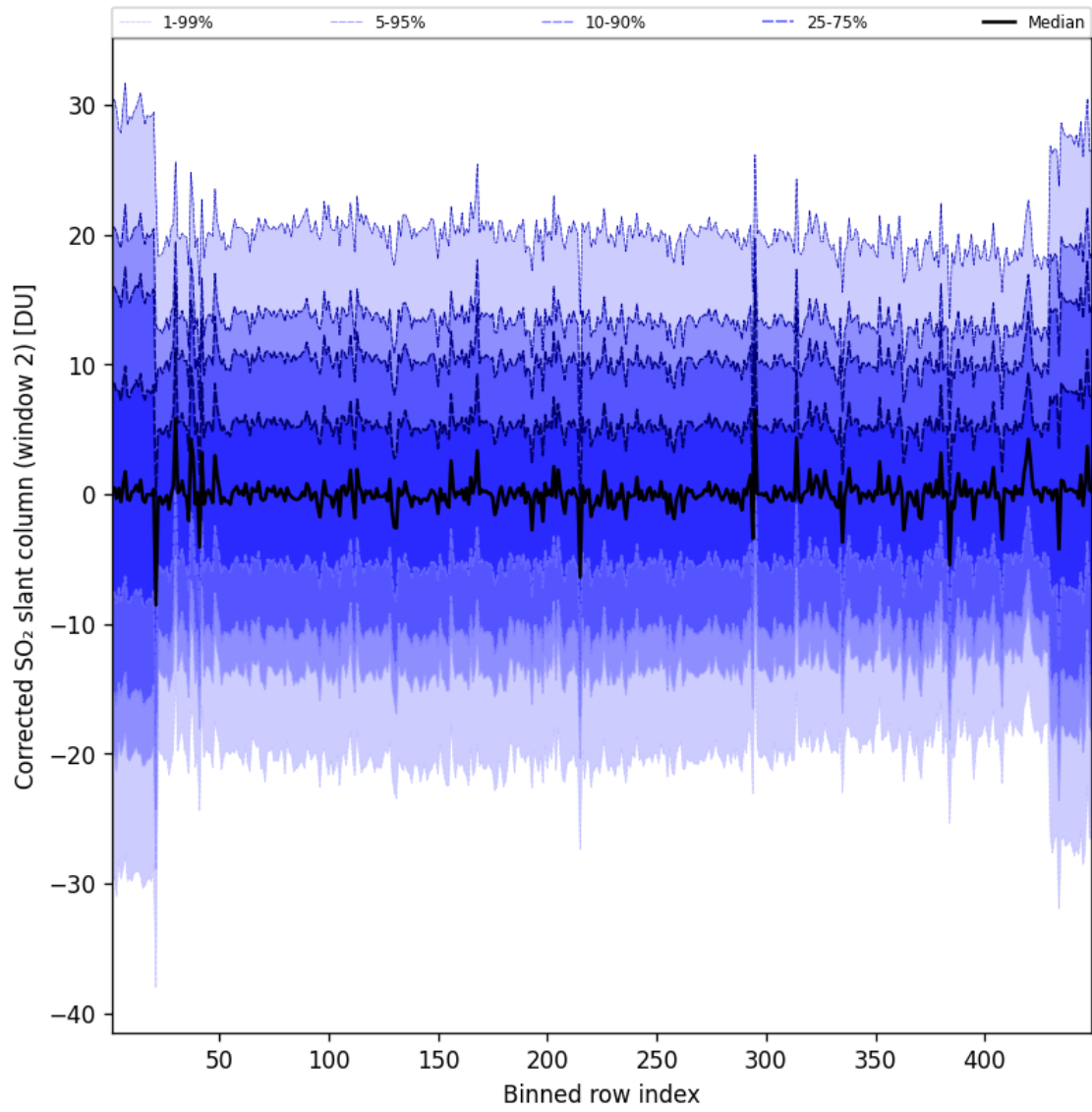


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-05-30 to 2025-05-31

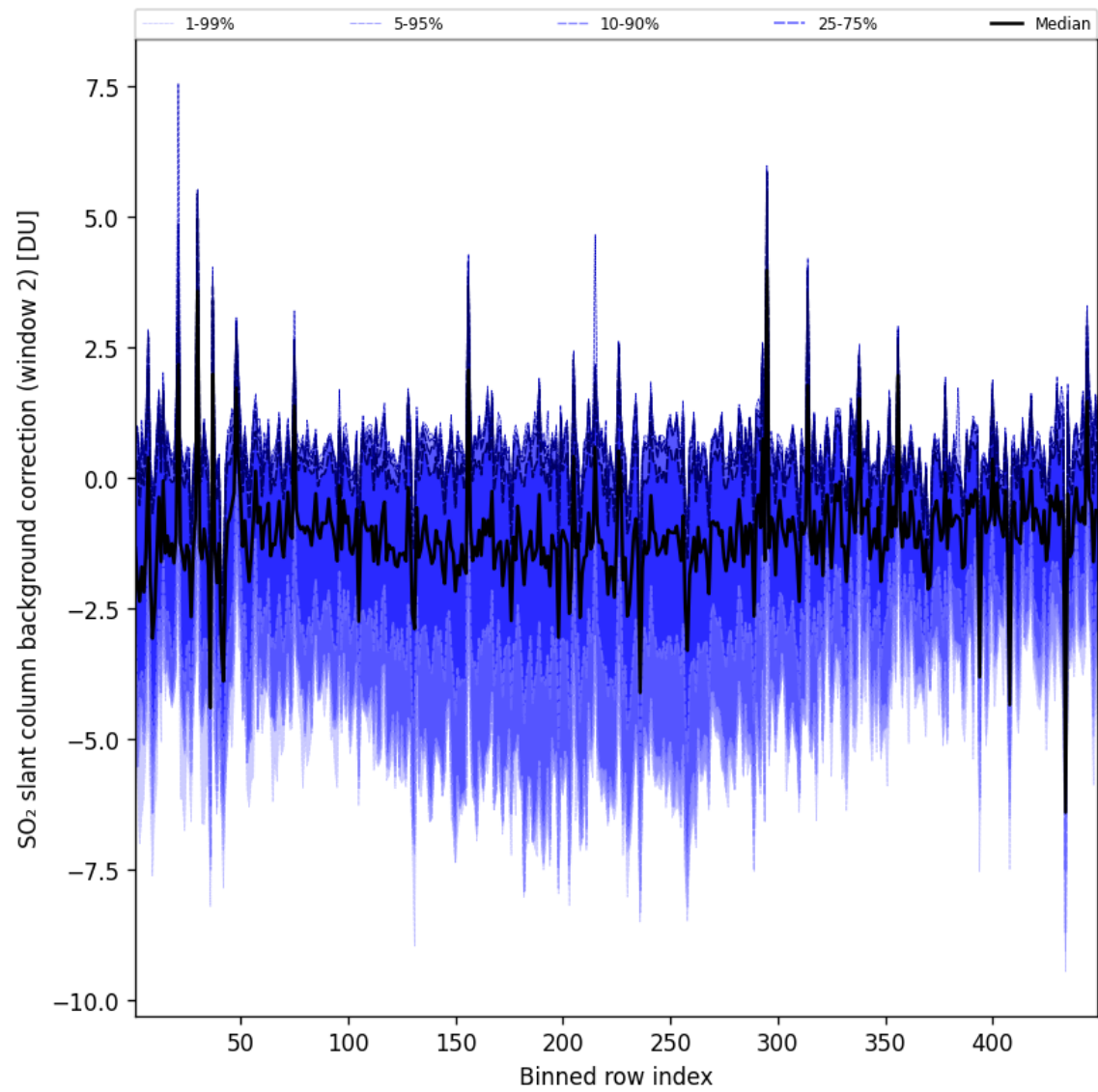


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-05-30 to 2025-05-31

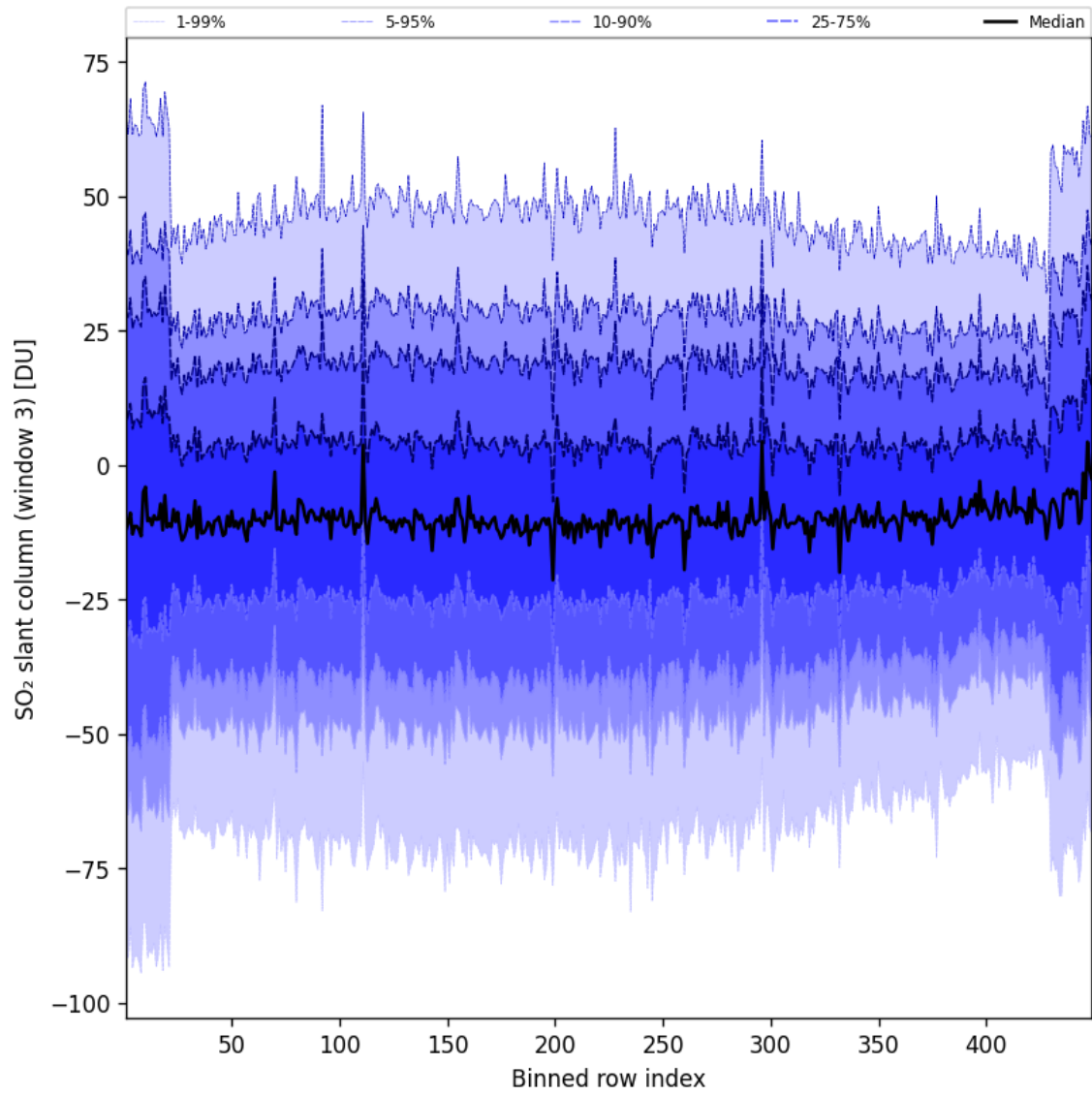


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-05-30 to 2025-05-31

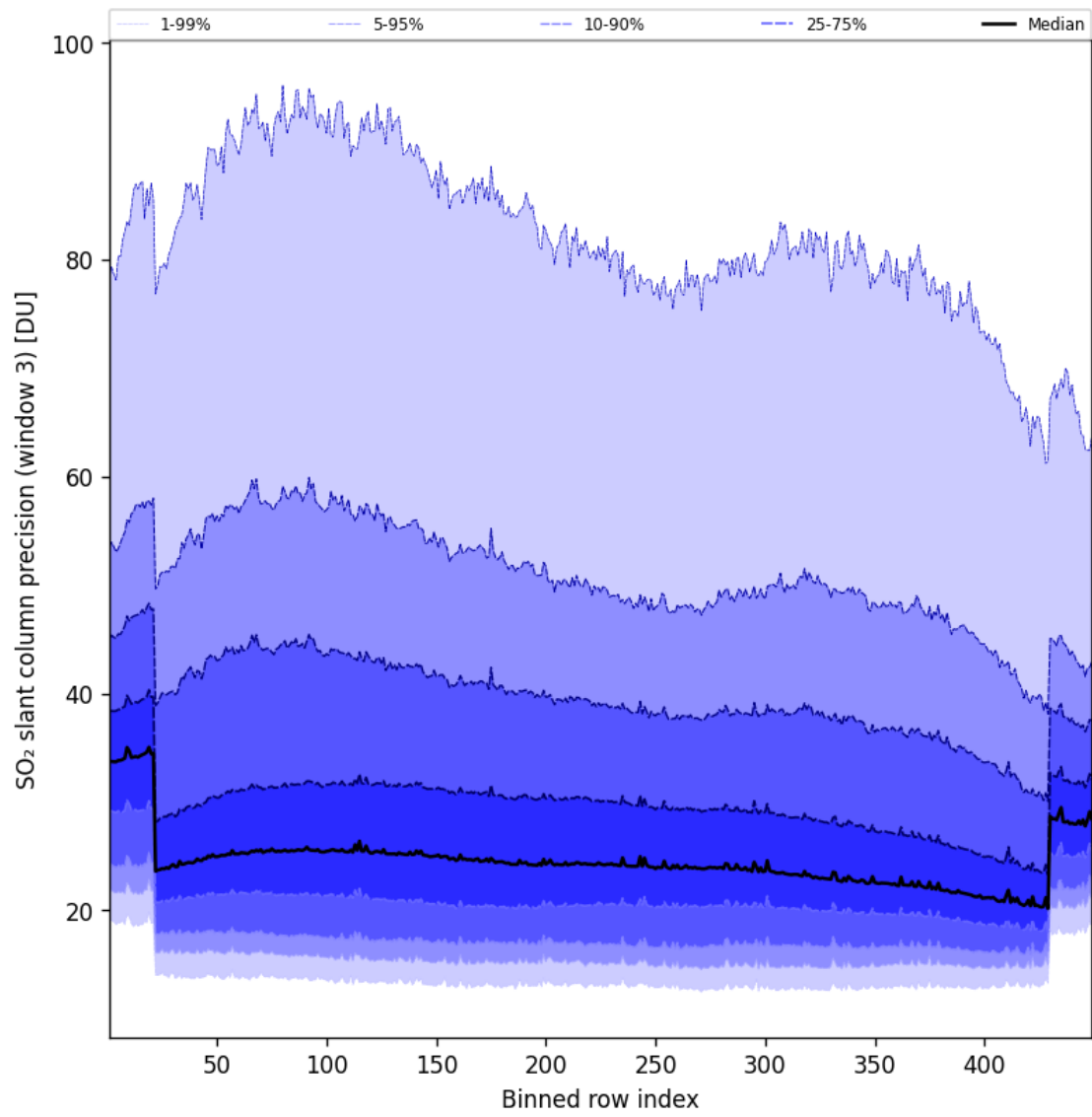


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-05-30 to 2025-05-31

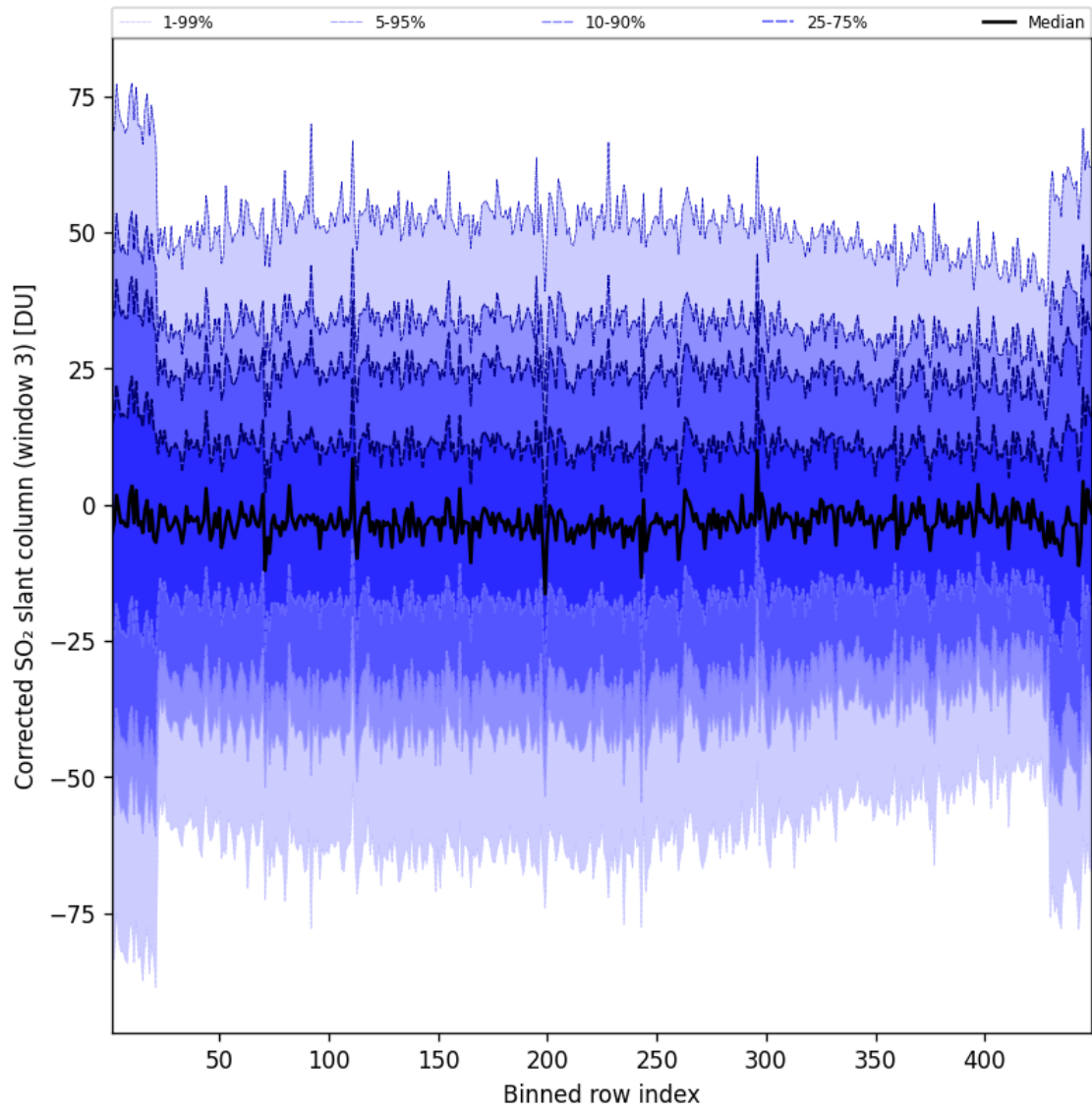


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-05-30 to 2025-05-31

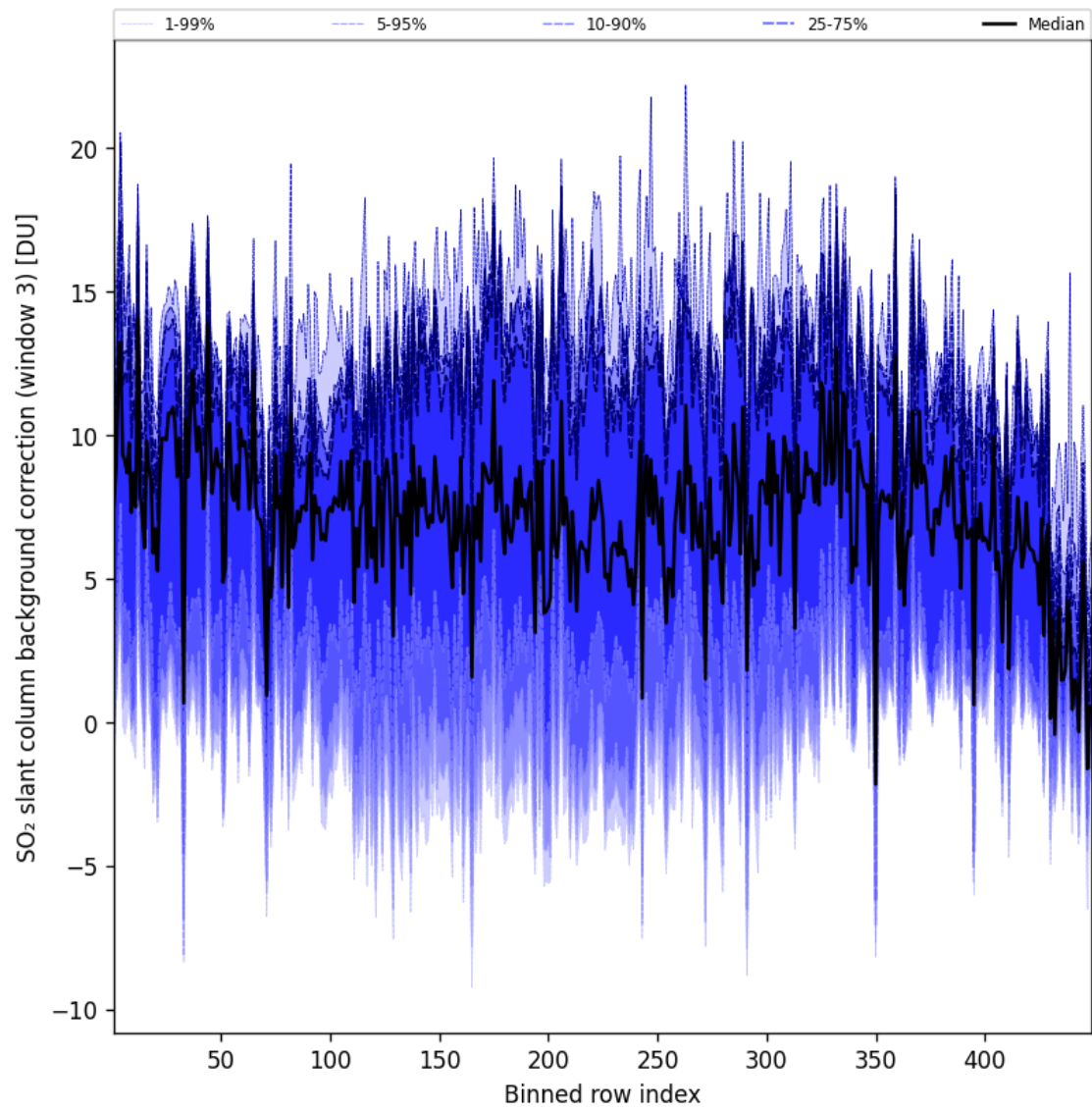


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-05-30 to 2025-05-31

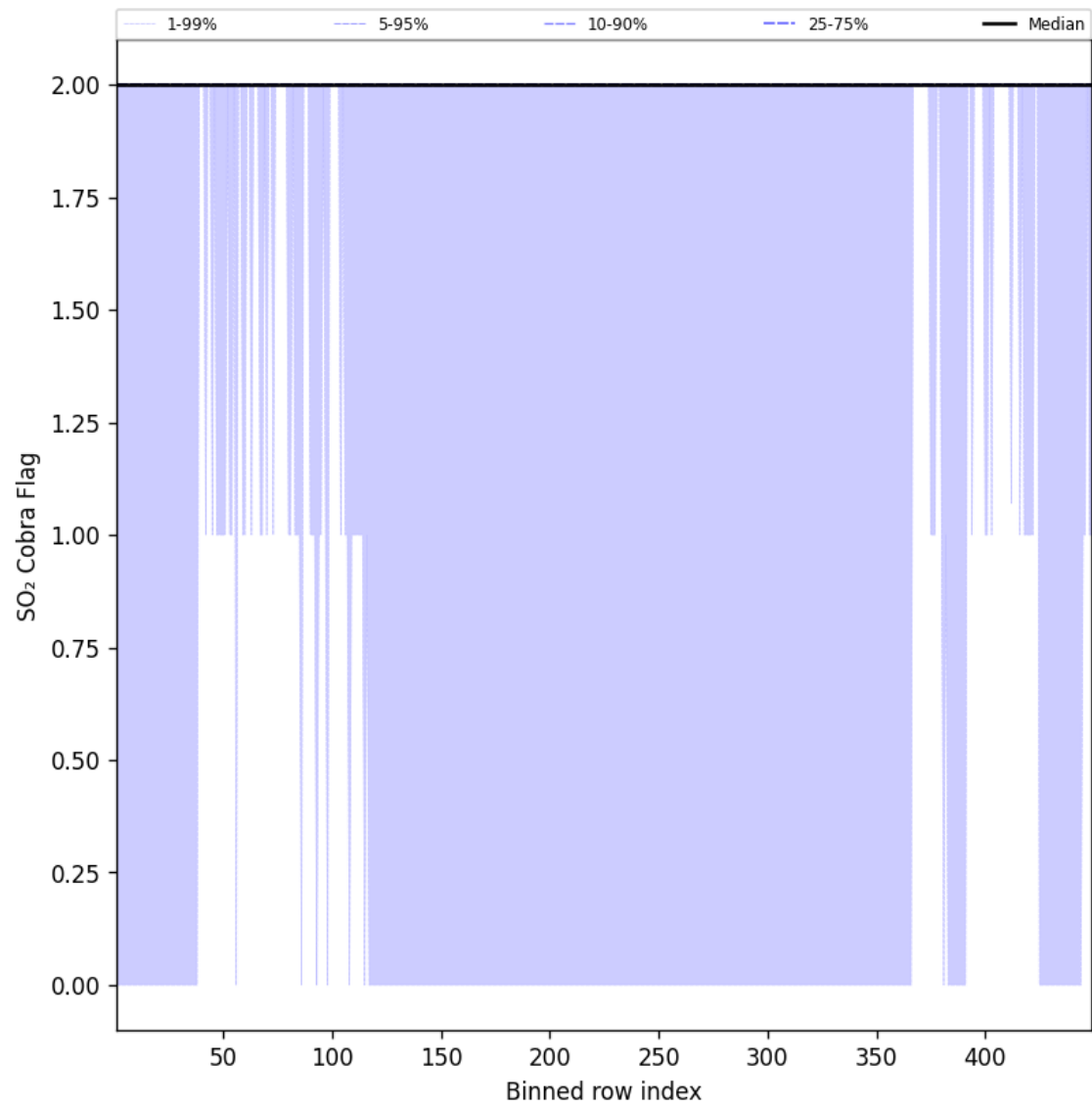


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-05-30 to 2025-05-31

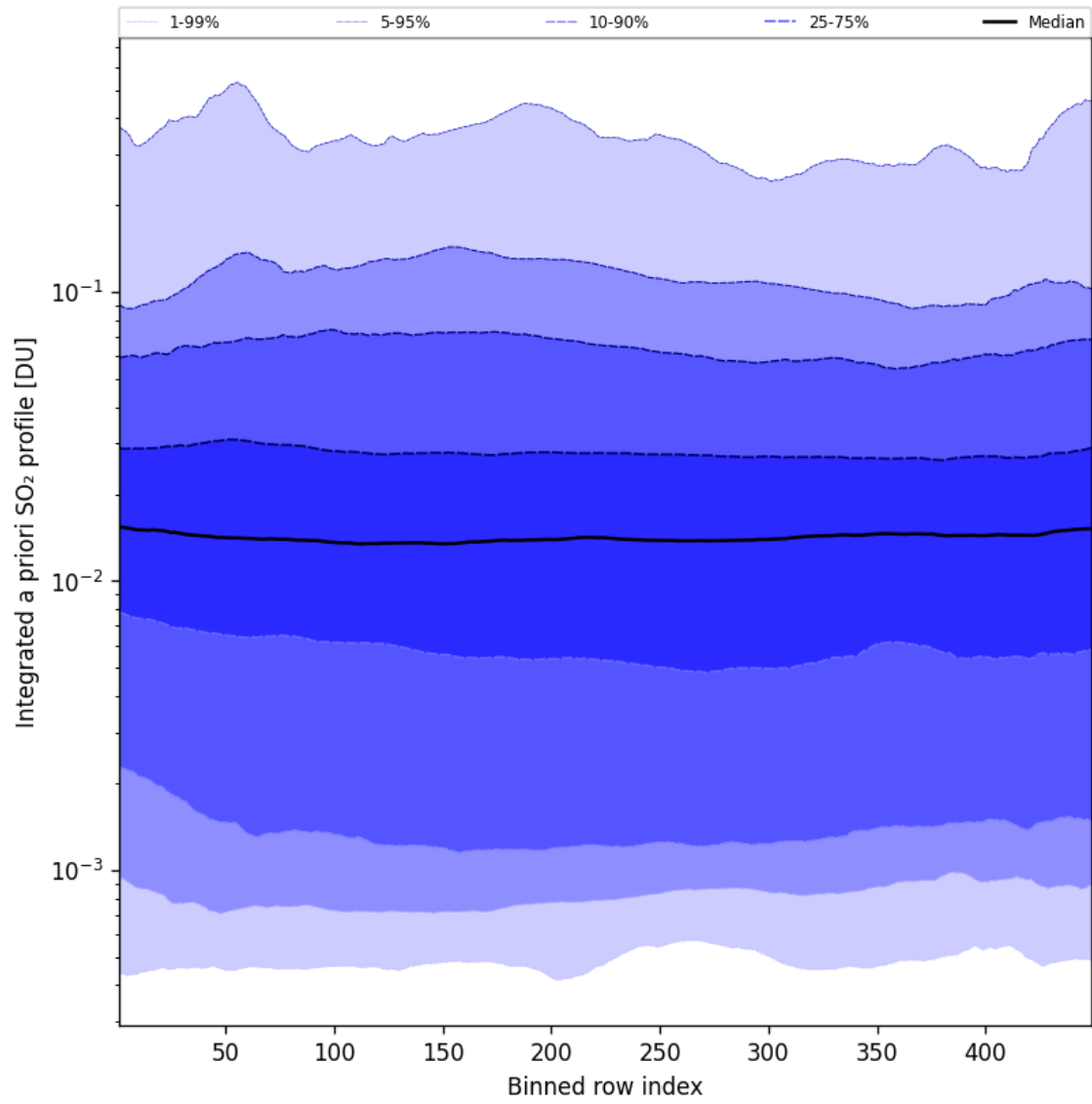


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-05-30 to 2025-05-31

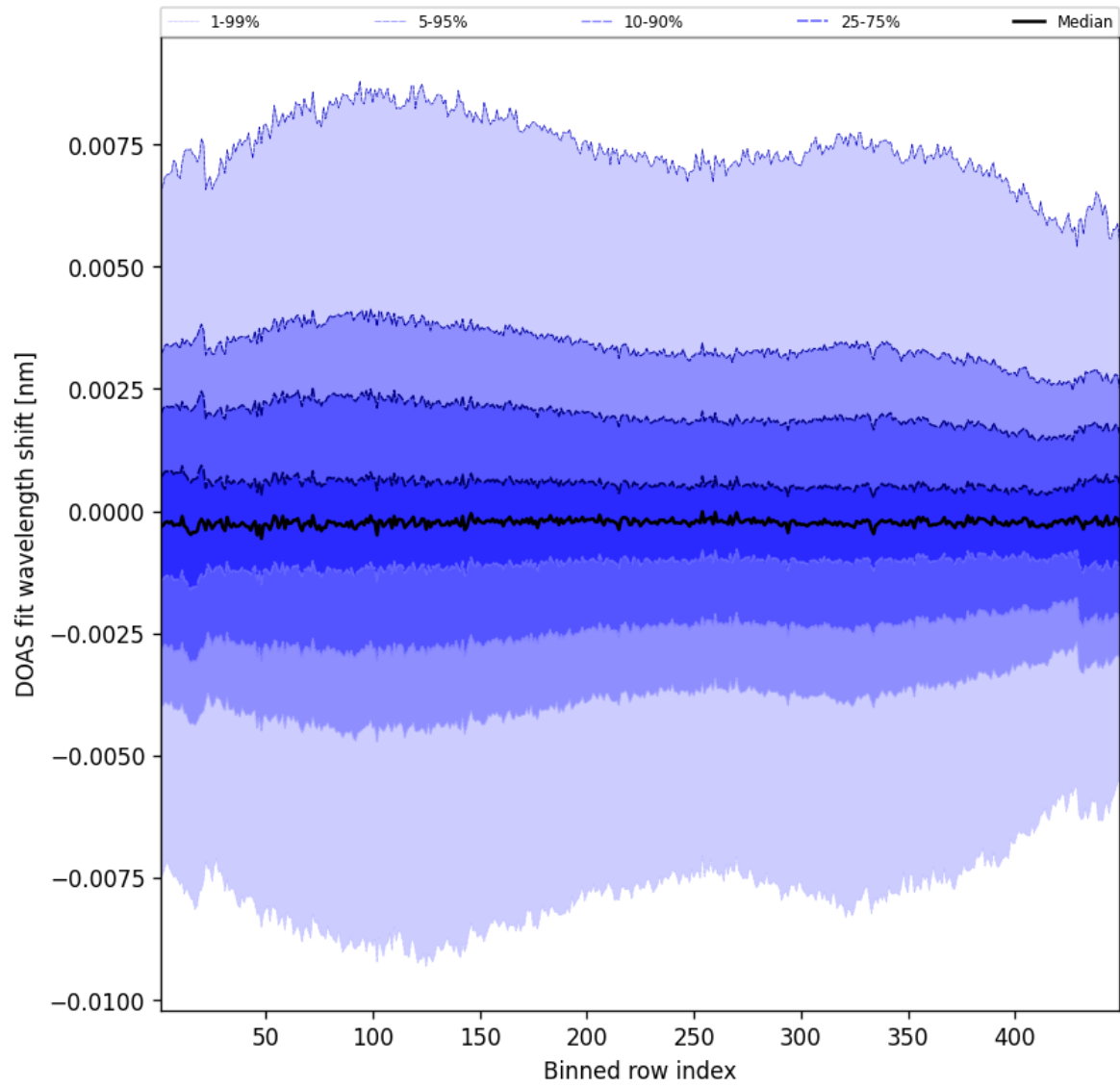


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-05-30 to 2025-05-31

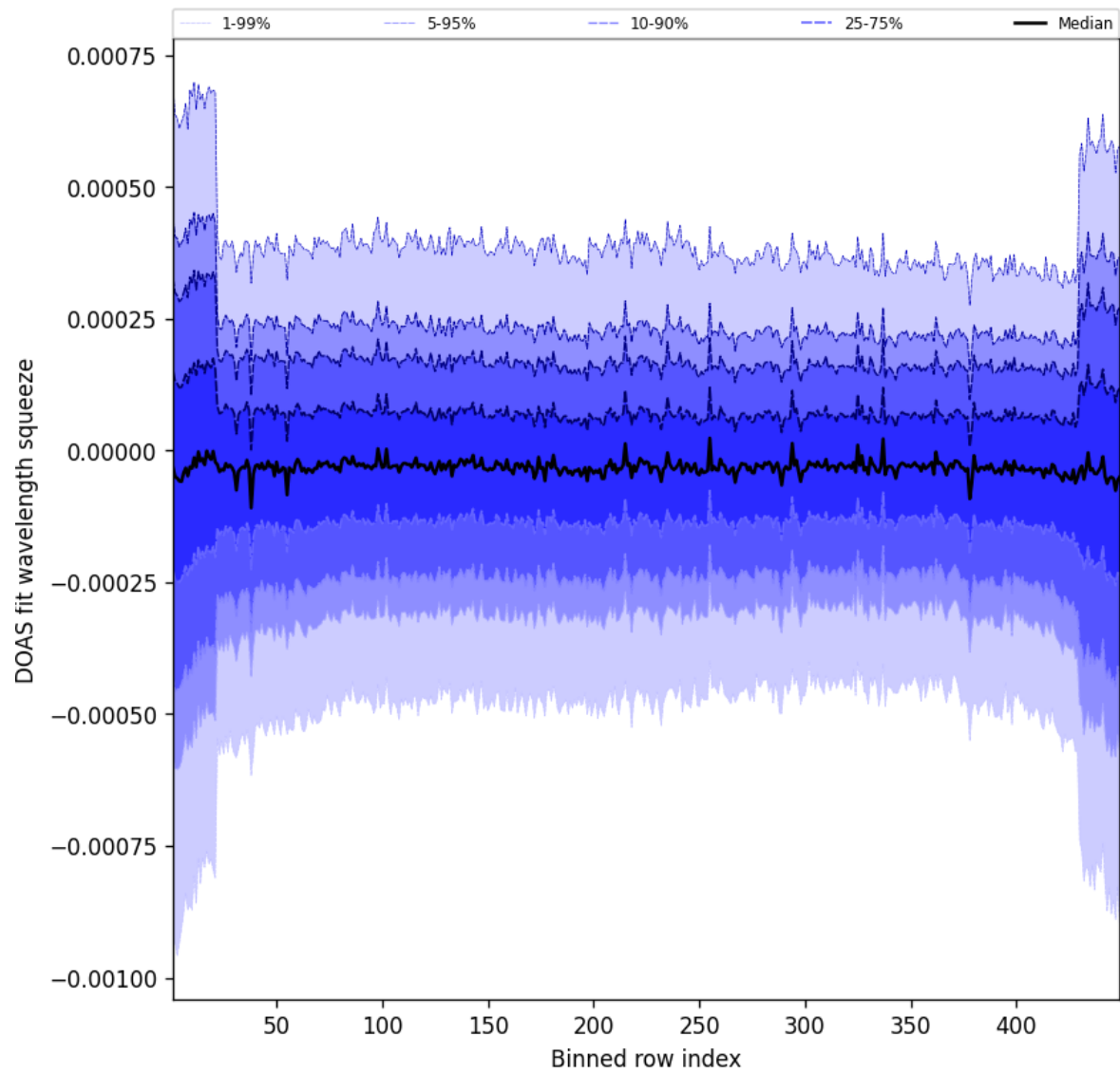


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-05-30 to 2025-05-31

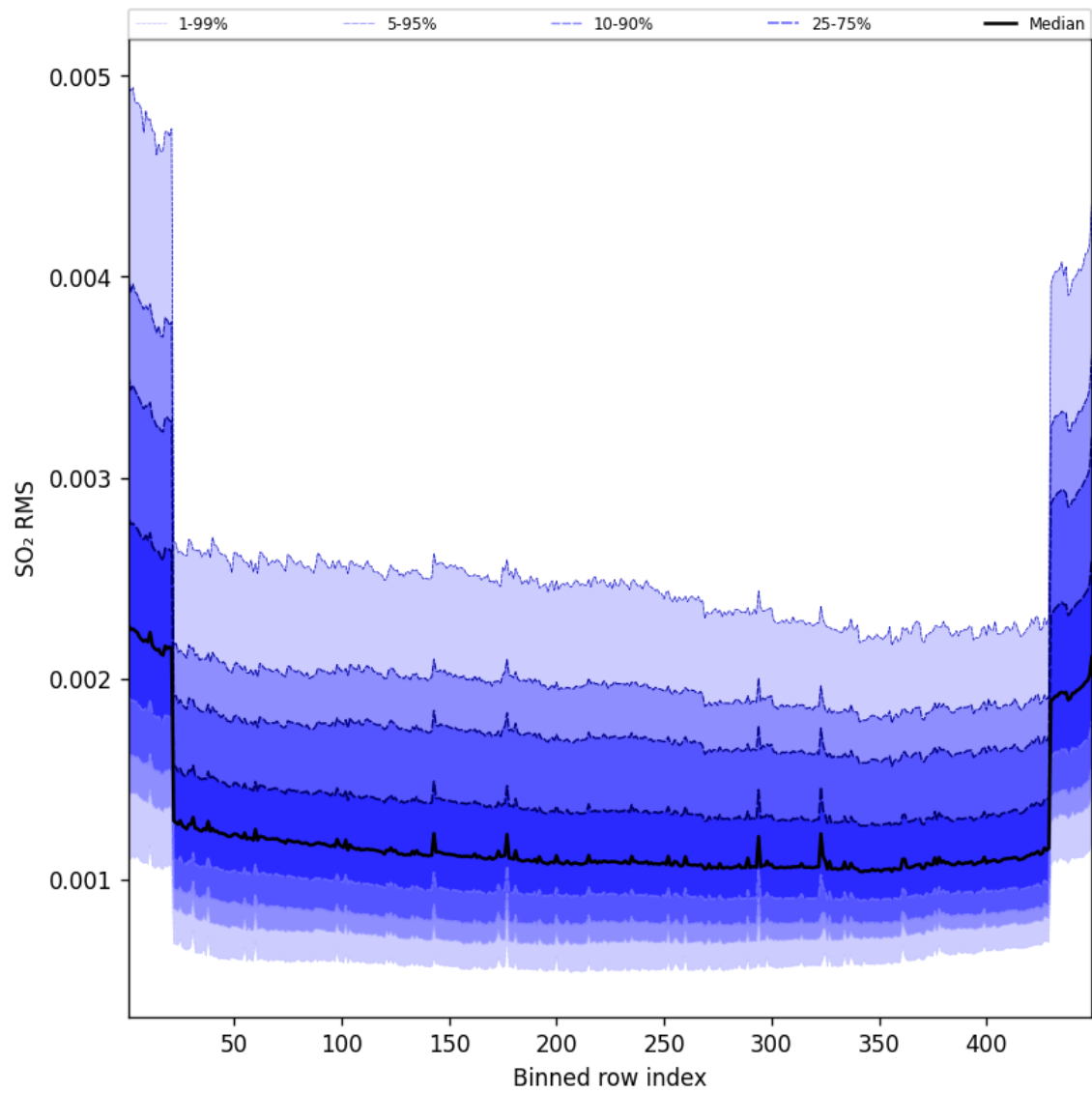


Figure 106: Along track statistics of “SO₂ RMS” for 2025-05-30 to 2025-05-31

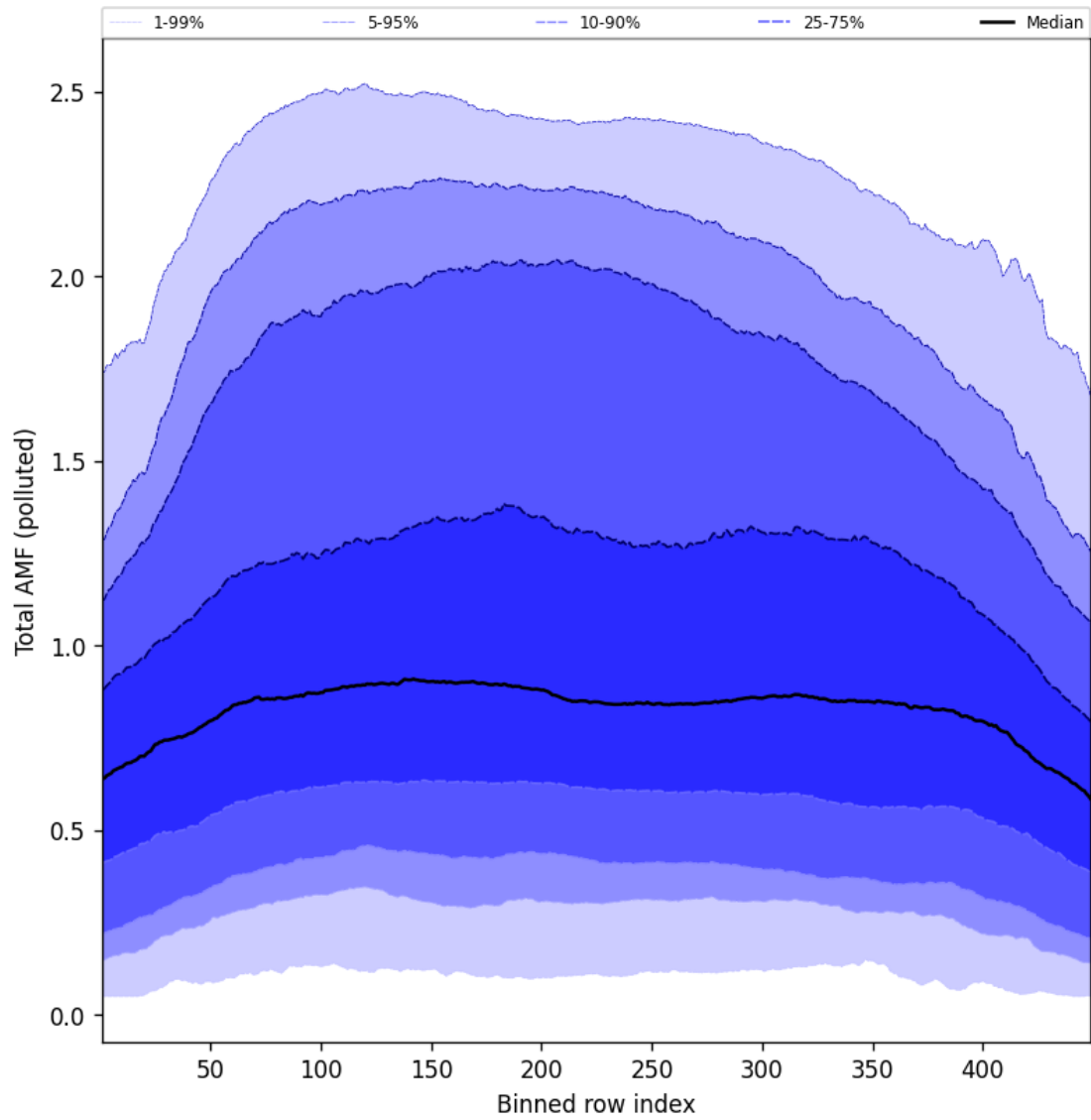


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-05-30 to 2025-05-31

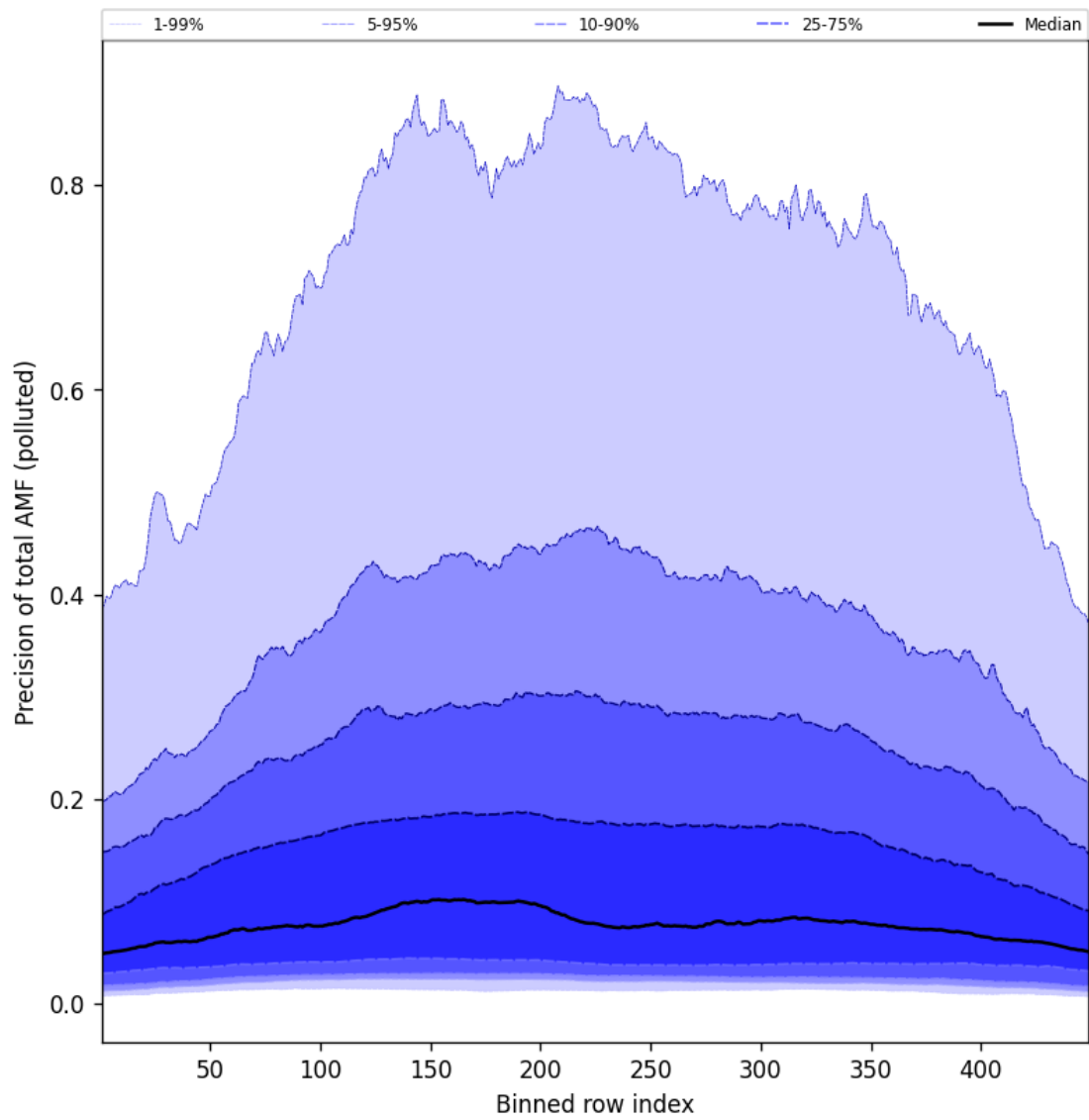


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-05-30 to 2025-05-31

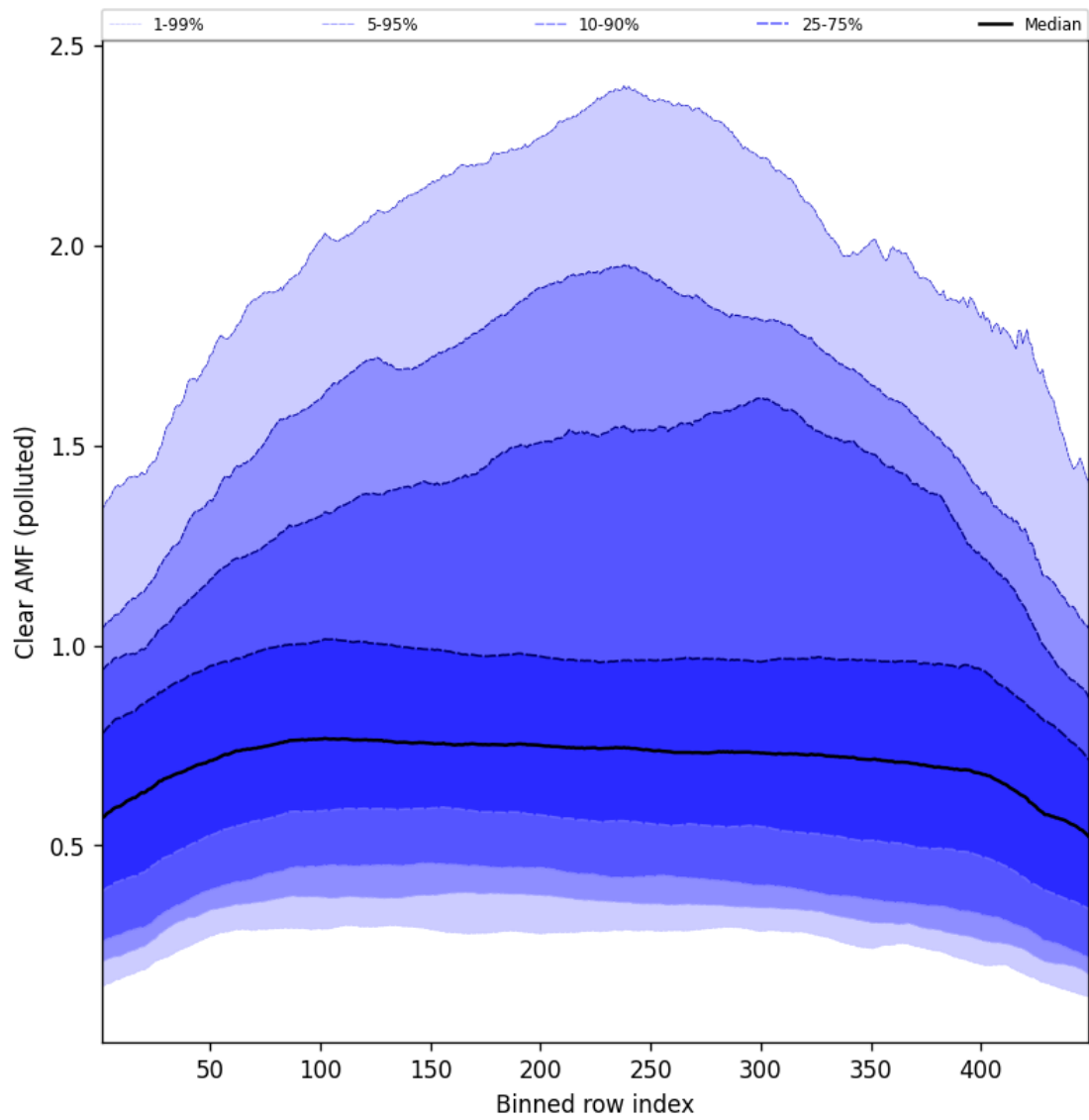


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-05-30 to 2025-05-31

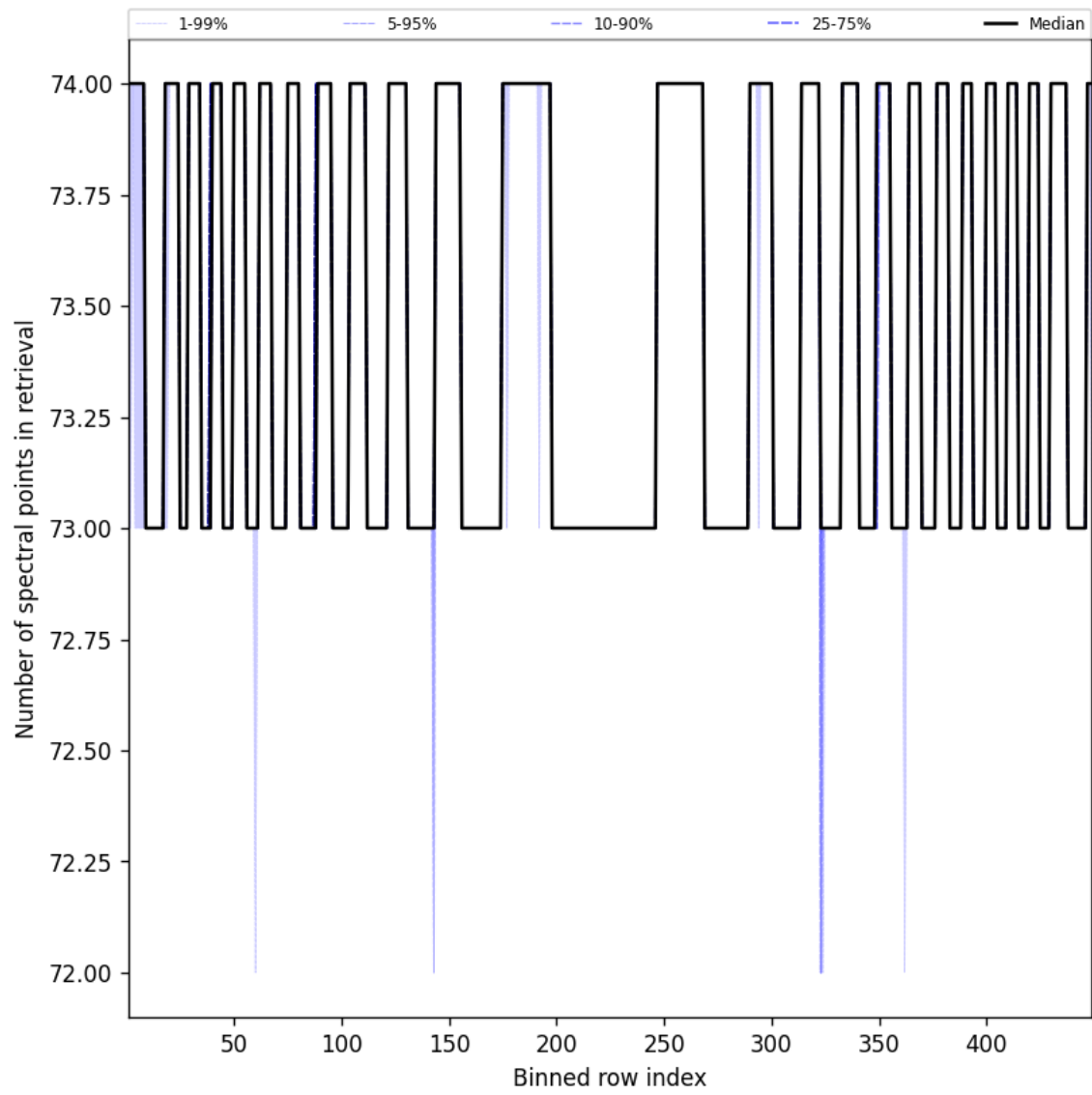


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-05-30 to 2025-05-31

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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