

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]	0.663 ± 0.403	17406507	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.758 \pm 93.150) \times 10^{-2}$	17406507	0.263	0.443	1.042×10^{-2}	-76.5	1.590×10^3
sulfurdioxide total vertical column precision [DU]	0.471 ± 0.556	17406507	0.222	0.302	0.326	4.482×10^{-2}	49.2
sulfurdioxide slant column density corrected [DU]	$(1.879 \pm 43.779) \times 10^{-2}$	17406507	0.242	0.365	9.313×10^{-3}	-53.9	557
sulfurdioxide slant column density cobra [DU]	$(1.851 \pm 36.448) \times 10^{-2}$	17406507	0.242	0.365	9.313×10^{-3}	-53.9	60.8
sulfurdioxide slant column density cobra precision [DU]	0.294 ± 0.136	17406507	0.213	0.134	0.252	8.540×10^{-2}	23.7
sulfurdioxide slant column density window1 [DU]	0.114 ± 0.681	17406507	0.125	0.739	0.117	-103	64.3
sulfurdioxide slant column density window1 precision [DU]	0.294 ± 0.136	17406507	0.213	0.134	0.252	8.540×10^{-2}	23.7
sulfurdioxide slant column density corrected win1 [DU]	$(1.694 \pm 67.450) \times 10^{-2}$	17406507	-2.500×10^{-2}	0.725	-3.252×10^{-3}	-103	64.3
background so2 slant column offset window1 [DU]	$(-9.674 \pm 15.069) \times 10^{-2}$	17406507	-0.180	0.177	-0.125	-1.42	6.92
sulfurdioxide slant column density window2 [DU]	0.933 ± 9.141	17406507	0.750	11.4	0.776	-752	1.436×10^3
sulfurdioxide slant column density window2 precision [DU]	8.34 ± 2.45	17406507	7.43	2.70	7.99	2.23	766
sulfurdioxide slant column density corrected win2 [DU]	-0.652 ± 8.983	17406507	-0.250	11.3	-0.629	-753	1.435×10^3
background so2 slant column offset window2 [DU]	-1.59 ± 1.99	17406507	-0.250	2.01	-1.07	-15.4	6.75
sulfurdioxide slant column density window3 [DU]	-4.37 ± 24.33	17406507	-3.92	30.4	-4.13	-1.477×10^3	2.663×10^3
sulfurdioxide slant column density window3 precision [DU]	29.4 ± 14.4	17406507	22.5	10.8	25.6	8.91	569
sulfurdioxide slant column density corrected win3 [DU]	4.30 ± 24.00	17406507	3.92	30.1	4.47	-1.475×10^3	2.665×10^3
background so2 slant column offset window3 [DU]	8.67 ± 4.55	17406507	10.6	6.66	8.77	-6.95	35.0
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17406507	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.156 \pm 5.781) \times 10^{-2}$	17406507	1.800×10^{-2}	2.424×10^{-2}	1.617×10^{-2}	1.304×10^{-4}	1.27
fitted radiance shift [nm]	$(-2.457 \pm 27.997) \times 10^{-4}$	17406507	-5.000×10^{-4}	1.910×10^{-3}	-2.562×10^{-4}	-7.472×10^{-2}	0.110
fitted radiance squeeze [1]	$(-5.273 \pm 18.655) \times 10^{-5}$	17406507	-3.000×10^{-5}	2.169×10^{-4}	-4.657×10^{-5}	-1.956×10^{-2}	1.419×10^{-2}
fitted root mean square [1]	$(1.290 \pm 0.542) \times 10^{-3}$	17406507	9.750×10^{-4}	5.360×10^{-4}	1.136×10^{-3}	3.149×10^{-4}	0.129
sulfurdioxide total air mass factor polluted [1]	0.885 ± 0.441	17406507	0.700	0.518	0.801	5.000×10^{-2}	2.89
sulfurdioxide total air mass factor polluted precision [1]	0.116 ± 0.120	17406507	3.500×10^{-2}	0.116	7.647×10^{-2}	3.582×10^{-3}	2.29
sulfurdioxide clear air mass factor polluted [1]	0.738 ± 0.297	17406507	0.700	0.315	0.698	5.087×10^{-2}	2.90
number of spectral points in retrieval [1]	73.4 ± 0.5	17406507	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	6.000×10^{-2}	0.130	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-1.93	-0.803	-0.510	-0.350	-0.208	0.235	0.387	0.562	0.893	2.23
sulfurdioxide total vertical column precision [DU]	9.195×10^{-2}	0.125	0.155	0.185	0.222	0.524	0.676	0.862	1.23	2.67
sulfurdioxide slant column density corrected [DU]	-0.860	-0.492	-0.356	-0.266	-0.171	0.194	0.294	0.392	0.548	1.02
sulfurdioxide slant column density cobra [DU]	-0.860	-0.492	-0.356	-0.266	-0.171	0.194	0.294	0.392	0.548	1.02
sulfurdioxide slant column density cobra precision [DU]	0.142	0.168	0.183	0.194	0.208	0.343	0.400	0.454	0.540	0.786
sulfurdioxide slant column density window1 [DU]	-1.70	-0.932	-0.644	-0.453	-0.255	0.484	0.677	0.863	1.15	1.92
sulfurdioxide slant column density window1 precision [DU]	0.142	0.168	0.183	0.194	0.208	0.343	0.400	0.454	0.540	0.786
sulfurdioxide slant column density corrected win1 [DU]	-1.65	-0.974	-0.717	-0.544	-0.360	0.365	0.567	0.764	1.07	1.93
background so2 slant column offset window1 [DU]	-0.397	-0.276	-0.234	-0.216	-0.194	-1.702×10^{-2}	4.069×10^{-2}	9.146×10^{-2}	0.159	0.317
sulfurdioxide slant column density window2 [DU]	-20.4	-13.5	-10.2	-7.68	-4.88	6.55	9.51	12.2	15.9	23.9
sulfurdioxide slant column density window2 precision [DU]	4.34	5.26	5.82	6.27	6.79	9.49	10.4	11.3	12.6	15.5
sulfurdioxide slant column density corrected win2 [DU]	-22.4	-15.2	-11.7	-9.13	-6.29	5.00	7.81	10.3	13.8	21.0
background so2 slant column offset window2 [DU]	-8.41	-5.90	-4.13	-3.13	-2.32	-0.308	-5.945×10^{-2}	0.165	0.484	1.67
sulfurdioxide slant column density window3 [DU]	-66.0	-44.7	-34.5	-27.3	-19.4	11.0	18.7	25.7	35.1	53.9
sulfurdioxide slant column density window3 precision [DU]	13.3	16.0	18.1	19.7	21.4	32.3	37.2	43.8	56.6	90.3
sulfurdioxide slant column density corrected win3 [DU]	-56.0	-35.3	-25.4	-18.3	-10.6	19.5	27.1	34.0	43.2	62.2
background so2 slant column offset window3 [DU]	-0.789	1.63	2.85	3.84	5.18	11.8	13.2	14.4	16.1	19.7
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	2.681×10^{-4}	6.771×10^{-4}	1.498×10^{-3}	3.638×10^{-3}	7.372×10^{-3}	3.161×10^{-2}	4.819×10^{-2}	6.842×10^{-2}	0.109	0.284
fitted radiance shift [nm]	-8.635×10^{-3}	-4.368×10^{-3}	-2.875×10^{-3}	-1.994×10^{-3}	-1.231×10^{-3}	6.792×10^{-4}	1.452×10^{-3}	2.388×10^{-3}	4.001×10^{-3}	8.521×10^{-3}
fitted radiance squeeze [1]	-5.482×10^{-4}	-3.573×10^{-4}	-2.753×10^{-4}	-2.183×10^{-4}	-1.582×10^{-4}	5.870×10^{-5}	1.116×10^{-4}	1.604×10^{-4}	2.300×10^{-4}	3.994×10^{-4}
fitted root mean square [1]	5.908×10^{-4}	7.341×10^{-4}	8.159×10^{-4}	8.764×10^{-4}	9.477×10^{-4}	1.484×10^{-3}	1.728×10^{-3}	1.964×10^{-3}	2.315×10^{-3}	3.242×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.124	0.293	0.404	0.490	0.586	1.10	1.31	1.50	1.75	2.26
sulfurdioxide total air mass factor polluted precision [1]	1.212×10^{-2}	2.140×10^{-2}	2.748×10^{-2}	3.237×10^{-2}	3.933×10^{-2}	0.156	0.199	0.244	0.327	0.572
sulfurdioxide clear air mass factor polluted [1]	0.255	0.355	0.423	0.482	0.554	0.869	0.963	1.05	1.24	1.88
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]	0.630 ± 0.412	11506735	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(1.731 \pm 69.977) \times 10^{-2}$	11506735	0.403	8.685×10^{-3}	-46.6	65.2	-0.191	0.212
sulfurdioxide total vertical column precision [DU]	0.423 ± 0.499	11506735	0.257	0.295	4.482×10^{-2}	22.0	0.205	0.463
sulfurdioxide slant column density corrected [DU]	$(1.423 \pm 31.525) \times 10^{-2}$	11506735	0.340	7.911×10^{-3}	-7.12	40.2	-0.161	0.179
sulfurdioxide slant column density cobra [DU]	$(1.421 \pm 31.401) \times 10^{-2}$	11506735	0.340	7.911×10^{-3}	-7.12	12.9	-0.161	0.179
sulfurdioxide slant column density cobra precision [DU]	0.267 ± 0.106	11506735	0.104	0.235	8.540×10^{-2}	4.64	0.200	0.304
sulfurdioxide slant column density window1 [DU]	0.107 ± 0.607	11506735	0.694	0.111	-23.6	24.4	-0.240	0.455
sulfurdioxide slant column density window1 precision [DU]	0.267 ± 0.106	11506735	0.104	0.235	8.540×10^{-2}	4.64	0.200	0.304
sulfurdioxide slant column density corrected win1 [DU]	$(5.698 \pm 594.722) \times 10^{-3}$	11506735	0.678	-7.586×10^{-3}	-23.6	24.7	-0.342	0.336
background so2 slant column offset window1 [DU]	-0.101 ± 0.136	11506735	0.185	-0.124	-1.34	1.45	-0.197	-1.224×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.471 ± 8.473	11506735	10.8	0.440	-469	523	-4.97	5.87
sulfurdioxide slant column density window2 precision [DU]	7.96 ± 2.21	11506735	2.48	7.64	2.23	691	6.53	9.00
sulfurdioxide slant column density corrected win2 [DU]	-0.623 ± 8.426	11506735	10.8	-0.589	-470	520	-5.99	4.77
background so2 slant column offset window2 [DU]	-1.09 ± 1.34	11506735	1.74	-0.858	-8.24	6.75	-1.94	-0.194
sulfurdioxide slant column density window3 [DU]	-3.60 ± 23.30	11506735	29.0	-3.52	-1.477×10^3	2.663×10^3	-18.0	11.0
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 14.7	11506735	10.2	24.1	8.91	569	20.5	30.7
sulfurdioxide slant column density corrected win3 [DU]	4.18 ± 22.96	11506735	28.7	4.34	-1.475×10^3	2.665×10^3	-10.0	18.7
background so2 slant column offset window3 [DU]	7.78 ± 4.30	11506735	7.08	8.11	-6.95	23.5	4.20	11.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	11506735	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.336 \pm 6.463) \times 10^{-2}$	11506735	2.975×10^{-2}	1.398×10^{-2}	1.304×10^{-4}	1.27	4.032×10^{-3}	3.378×10^{-2}
fitted radiance shift [nm]	$(-6.873 \pm 287.707) \times 10^{-5}$	11506735	1.831×10^{-3}	-1.150×10^{-4}	-4.510×10^{-2}	4.379×10^{-2}	-1.002×10^{-3}	8.291×10^{-4}
fitted radiance squeeze [1]	$(-7.803 \pm 17.183) \times 10^{-5}$	11506735	2.090×10^{-4}	-6.695×10^{-5}	-1.268×10^{-2}	8.929×10^{-3}	-1.766×10^{-4}	3.242×10^{-5}
fitted root mean square [1]	$(1.194 \pm 0.441) \times 10^{-3}$	11506735	4.481×10^{-4}	1.079×10^{-3}	3.149×10^{-4}	3.421×10^{-2}	9.126×10^{-4}	1.361×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.915 ± 0.476	11506735	0.570	0.826	5.000×10^{-2}	2.89	0.587	1.16
sulfurdioxide total air mass factor polluted precision [1]	0.128 ± 0.134	11506735	0.130	8.580×10^{-2}	3.582×10^{-3}	2.29	4.135×10^{-2}	0.172
sulfurdioxide clear air mass factor polluted [1]	0.763 ± 0.336	11506735	0.365	0.715	5.087×10^{-2}	2.90	0.543	0.908
number of spectral points in retrieval [1]	73.5 ± 0.5	11506735	1.000	73.0	53.0	74.0	73.0	74.0

Table 4: Parameterlist and basic statistics for the analysis for observations in the southern hemisphere

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.729 ± 0.374	5899772	0.630	1.000	0.0	1.000	0.370	1.000
sulfurdioxide total vertical column [DU]	$(4.761 \pm 126.663) \times 10^{-2}$	5899772	0.539	1.485×10^{-2}	-76.5	1.590×10^3	-0.249	0.290
sulfurdioxide total vertical column precision [DU]	0.565 ± 0.644	5899772	0.367	0.397	4.992×10^{-2}	49.2	0.270	0.637
sulfurdioxide slant column density corrected [DU]	$(2.769 \pm 60.952) \times 10^{-2}$	5899772	0.426	1.271×10^{-2}	-53.9	557	-0.197	0.228
sulfurdioxide slant column density cobra [DU]	$(2.690 \pm 44.668) \times 10^{-2}$	5899772	0.426	1.271×10^{-2}	-53.9	60.8	-0.197	0.228
sulfurdioxide slant column density cobra precision [DU]	0.347 ± 0.169	5899772	0.185	0.301	9.056×10^{-2}	23.7	0.233	0.418
sulfurdioxide slant column density window1 [DU]	0.127 ± 0.807	5899772	0.838	0.132	-103	64.3	-0.289	0.549
sulfurdioxide slant column density window1 precision [DU]	0.347 ± 0.169	5899772	0.185	0.301	9.056×10^{-2}	23.7	0.233	0.418
sulfurdioxide slant column density corrected win1 [DU]	$(3.886 \pm 80.730) \times 10^{-2}$	5899772	0.834	7.155×10^{-3}	-103	64.3	-0.400	0.434
background so2 slant column offset window1 [DU]	$(-8.797 \pm 17.513) \times 10^{-2}$	5899772	0.157	-0.126	-1.42	6.92	-0.186	-2.924×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.83 ± 10.26	5899772	12.7	1.55	-752	1.436×10^3	-4.70	8.04
sulfurdioxide slant column density window2 precision [DU]	9.08 ± 2.71	5899772	2.86	8.73	2.33	766	7.46	10.3
sulfurdioxide slant column density corrected win2 [DU]	-0.710 ± 9.981	5899772	12.4	-0.718	-753	1.435×10^3	-6.93	5.49
background so2 slant column offset window2 [DU]	-2.54 ± 2.62	5899772	3.61	-1.59	-15.4	6.32	-4.20	-0.588
sulfurdioxide slant column density window3 [DU]	-5.88 ± 26.14	5899772	33.2	-5.49	-1.369×10^3	501	-22.3	11.0
sulfurdioxide slant column density window3 precision [DU]	31.6 ± 13.5	5899772	10.5	28.2	9.46	370	24.0	34.4
sulfurdioxide slant column density corrected win3 [DU]	4.55 ± 25.93	5899772	32.9	4.76	-1.366×10^3	509	-11.8	21.2
background so2 slant column offset window3 [DU]	10.4 ± 4.5	5899772	6.48	9.53	-3.73	35.0	7.15	13.6
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	5899772	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.807 \pm 4.119) \times 10^{-2}$	5899772	1.792×10^{-2}	1.882×10^{-2}	1.179×10^{-3}	1.04	1.177×10^{-2}	2.969×10^{-2}
fitted radiance shift [nm]	$(-5.908 \pm 26.081) \times 10^{-4}$	5899772	1.970×10^{-3}	-5.582×10^{-4}	-7.472×10^{-2}	0.110	-1.622×10^{-3}	3.482×10^{-4}
fitted radiance squeeze [1]	$(-3.369 \pm 203.486) \times 10^{-6}$	5899772	2.267×10^{-4}	-2.757×10^{-6}	-1.956×10^{-2}	1.419×10^{-2}	-1.161×10^{-4}	1.106×10^{-4}
fitted root mean square [1]	$(1.476 \pm 0.659) \times 10^{-3}$	5899772	7.146×10^{-4}	1.277×10^{-3}	3.590×10^{-4}	0.129	1.037×10^{-3}	1.752×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.826 ± 0.355	5899772	0.433	0.765	5.000×10^{-2}	2.68	0.586	1.02
sulfurdioxide total air mass factor polluted precision [1]	$(9.351 \pm 8.234) \times 10^{-2}$	5899772	9.028×10^{-2}	6.448×10^{-2}	4.609×10^{-3}	1.57	3.690×10^{-2}	0.127
sulfurdioxide clear air mass factor polluted [1]	0.689 ± 0.189	5899772	0.224	0.680	7.873×10^{-2}	1.72	0.567	0.792
number of spectral points in retrieval [1]	73.4 ± 0.5	5899772	1.000	73.0	52.0	155	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]	0.665 ± 0.397	11359222	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.113 \pm 85.767) \times 10^{-2}$	11359222	0.455	1.162×10^{-2}	-73.4	457	-0.213	0.242
sulfurdioxide total vertical column precision [DU]	0.473 ± 0.548	11359222	0.299	0.327	5.111×10^{-2}	47.8	0.230	0.529
sulfurdioxide slant column density corrected [DU]	$(2.018 \pm 41.357) \times 10^{-2}$	11359222	0.369	1.003×10^{-2}	-53.9	496	-0.172	0.196
sulfurdioxide slant column density cobra [DU]	$(1.997 \pm 37.725) \times 10^{-2}$	11359222	0.369	1.003×10^{-2}	-53.9	60.8	-0.172	0.196
sulfurdioxide slant column density cobra precision [DU]	0.300 ± 0.145	11359222	0.154	0.251	8.540×10^{-2}	22.5	0.206	0.361
sulfurdioxide slant column density window1 [DU]	0.114 ± 0.701	11359222	0.749	0.123	-103	64.3	-0.256	0.493
sulfurdioxide slant column density window1 precision [DU]	0.300 ± 0.145	11359222	0.154	0.251	8.540×10^{-2}	22.5	0.206	0.361
sulfurdioxide slant column density corrected win1 [DU]	$(2.250 \pm 69.492) \times 10^{-2}$	11359222	0.736	7.349×10^{-4}	-103	64.3	-0.361	0.375
background so2 slant column offset window1 [DU]	$(-9.157 \pm 16.159) \times 10^{-2}$	11359222	0.190	-0.127	-1.42	6.92	-0.195	-5.420×10^{-3}
sulfurdioxide slant column density window2 [DU]	1.12 ± 9.12	11359222	11.4	0.892	-744	839	-4.74	6.70
sulfurdioxide slant column density window2 precision [DU]	8.25 ± 2.29	11359222	2.65	7.91	2.23	691	6.75	9.39
sulfurdioxide slant column density corrected win2 [DU]	-0.650 ± 8.910	11359222	11.2	-0.635	-753	833	-6.27	4.97
background so2 slant column offset window2 [DU]	-1.77 ± 2.23	11359222	2.34	-1.06	-15.4	6.75	-2.64	-0.301
sulfurdioxide slant column density window3 [DU]	-2.06 ± 24.04	11359222	30.3	-1.95	-316	243	-17.1	13.2
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 11.8	11359222	9.62	24.8	9.40	333	21.1	30.8
sulfurdioxide slant column density corrected win3 [DU]	6.65 ± 23.47	11359222	29.7	6.61	-303	248	-8.15	21.5
background so2 slant column offset window3 [DU]	8.71 ± 4.71	11359222	6.74	8.57	-6.95	35.0	5.12	11.9
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	11359222	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.214 \pm 3.347) \times 10^{-2}$	11359222	1.654×10^{-2}	1.466×10^{-2}	1.736×10^{-4}	1.26	8.020×10^{-3}	2.456×10^{-2}
fitted radiance shift [nm]	$(-2.830 \pm 23.516) \times 10^{-4}$	11359222	1.833×10^{-3}	-2.551×10^{-4}	-7.472×10^{-2}	0.110	-1.222×10^{-3}	6.113×10^{-4}
fitted radiance squeeze [1]	$(-4.287 \pm 18.866) \times 10^{-5}$	11359222	2.155×10^{-4}	-3.621×10^{-5}	-1.956×10^{-2}	1.418×10^{-2}	-1.473×10^{-4}	6.827×10^{-5}
fitted root mean square [1]	$(1.313 \pm 0.577) \times 10^{-3}$	11359222	6.106×10^{-4}	1.130×10^{-3}	3.149×10^{-4}	0.129	9.393×10^{-4}	1.550×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.858 ± 0.379	11359222	0.460	0.804	5.000×10^{-2}	2.58	0.604	1.06
sulfurdioxide total air mass factor polluted precision [1]	0.111 ± 0.119	11359222	0.101	7.078×10^{-2}	3.853×10^{-3}	2.29	4.074×10^{-2}	0.142
sulfurdioxide clear air mass factor polluted [1]	0.729 ± 0.245	11359222	0.287	0.709	5.966×10^{-2}	2.56	0.576	0.863
number of spectral points in retrieval [1]	73.4 ± 0.5	11359222	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]	0.675 ± 0.411	4207495	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(1.973 \pm 108.665) \times 10^{-2}$	4207495	0.398	7.817×10^{-3}	-76.5	1.590×10^3	-0.188	0.210
sulfurdioxide total vertical column precision [DU]	0.432 ± 0.489	4207495	0.292	0.308	4.482×10^{-2}	49.2	0.192	0.484
sulfurdioxide slant column density corrected [DU]	$(1.629 \pm 51.637) \times 10^{-2}$	4207495	0.350	7.625×10^{-3}	-20.1	557	-0.166	0.184
sulfurdioxide slant column density cobra [DU]	$(1.585 \pm 33.273) \times 10^{-2}$	4207495	0.350	7.625×10^{-3}	-20.1	41.4	-0.166	0.184
sulfurdioxide slant column density cobra precision [DU]	0.274 ± 0.114	4207495	9.428×10^{-2}	0.244	8.962×10^{-2}	23.7	0.208	0.303
sulfurdioxide slant column density window1 [DU]	0.132 ± 0.626	4207495	0.700	0.126	-71.8	53.1	-0.224	0.476
sulfurdioxide slant column density window1 precision [DU]	0.274 ± 0.114	4207495	9.428×10^{-2}	0.244	8.962×10^{-2}	23.7	0.208	0.303
sulfurdioxide slant column density corrected win1 [DU]	$(7.129 \pm 617.367) \times 10^{-3}$	4207495	0.687	-9.306×10^{-3}	-71.8	53.1	-0.348	0.339
background so2 slant column offset window1 [DU]	-0.125 ± 0.125	4207495	0.139	-0.148	-1.34	2.17	-0.201	-6.239×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.458 ± 9.165	4207495	11.4	0.432	-752	1.436×10^3	-5.26	6.12
sulfurdioxide slant column density window2 precision [DU]	8.47 ± 2.81	4207495	2.77	8.08	2.30	766	6.83	9.60
sulfurdioxide slant column density corrected win2 [DU]	-0.630 ± 9.103	4207495	11.3	-0.594	-753	1.435×10^3	-6.26	5.02
background so2 slant column offset window2 [DU]	-1.09 ± 1.40	4207495	1.58	-0.834	-11.9	6.75	-1.80	-0.222
sulfurdioxide slant column density window3 [DU]	-8.75 ± 24.23	4207495	29.8	-8.17	-1.477×10^3	2.663×10^3	-23.4	6.47
sulfurdioxide slant column density window3 precision [DU]	32.5 ± 18.5	4207495	13.5	27.3	9.44	569	22.1	35.6
sulfurdioxide slant column density corrected win3 [DU]	-0.809 ± 24.342	4207495	30.1	-0.273	-1.475×10^3	2.665×10^3	-15.6	14.5
background so2 slant column offset window3 [DU]	7.94 ± 4.25	4207495	6.62	8.17	-6.95	26.3	4.59	11.2
sulfurdioxide slant column cobra flag [1]	2.00 ± 0.09	4207495	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.296 \pm 8.546) \times 10^{-2}$	4207495	5.122×10^{-2}	2.639×10^{-2}	1.304×10^{-4}	1.25	8.464×10^{-3}	5.968×10^{-2}
fitted radiance shift [nm]	$(-1.934 \pm 36.004) \times 10^{-4}$	4207495	2.018×10^{-3}	-2.885×10^{-4}	-4.757×10^{-2}	4.226×10^{-2}	-1.234×10^{-3}	7.839×10^{-4}
fitted radiance squeeze [1]	$(-5.807 \pm 17.694) \times 10^{-5}$	4207495	2.101×10^{-4}	-5.405×10^{-5}	-1.615×10^{-2}	1.419×10^{-2}	-1.612×10^{-4}	4.891×10^{-5}
fitted root mean square [1]	$(1.211 \pm 0.444) \times 10^{-3}$	4207495	4.052×10^{-4}	1.114×10^{-3}	3.319×10^{-4}	5.853×10^{-2}	9.465×10^{-4}	1.352×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.961 ± 0.552	4207495	0.668	0.805	5.000×10^{-2}	2.89	0.568	1.24
sulfurdioxide total air mass factor polluted precision [1]	0.128 ± 0.124	4207495	0.147	9.308×10^{-2}	3.582×10^{-3}	1.85	3.555×10^{-2}	0.183
sulfurdioxide clear air mass factor polluted [1]	0.784 ± 0.394	4207495	0.378	0.689	5.399×10^{-2}	2.90	0.539	0.917
number of spectral points in retrieval [1]	73.4 ± 0.5	4207495	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

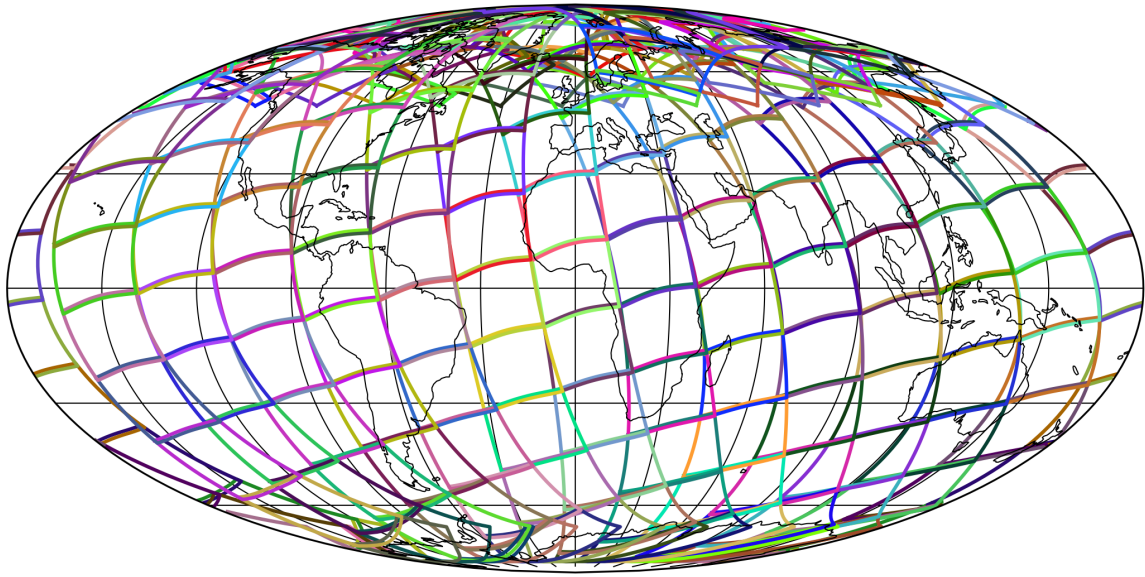


Figure 1: Outline of the granules.

4 Input data monitoring

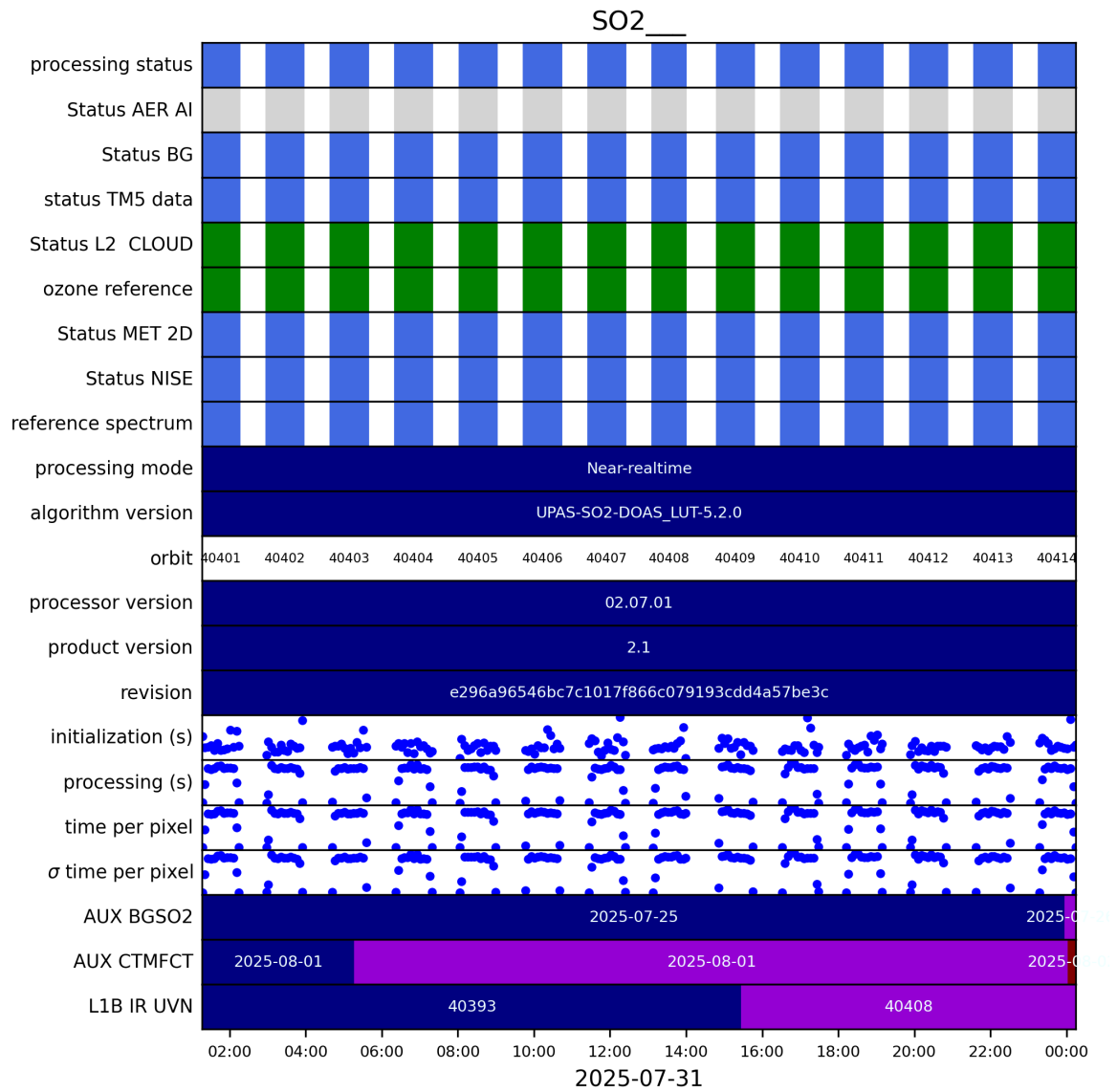


Figure 2: Input data per granule

5 Warnings and errors

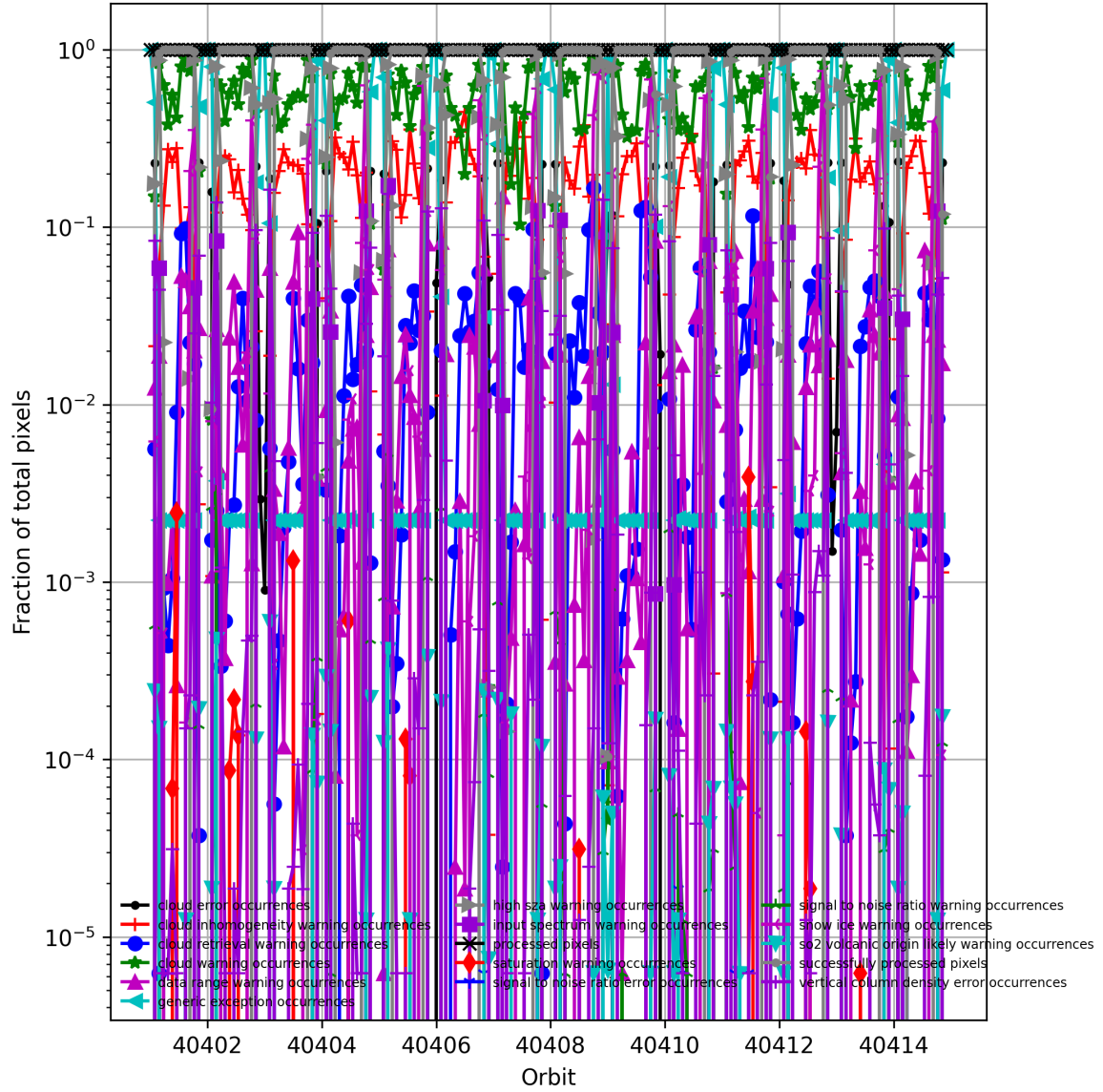


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

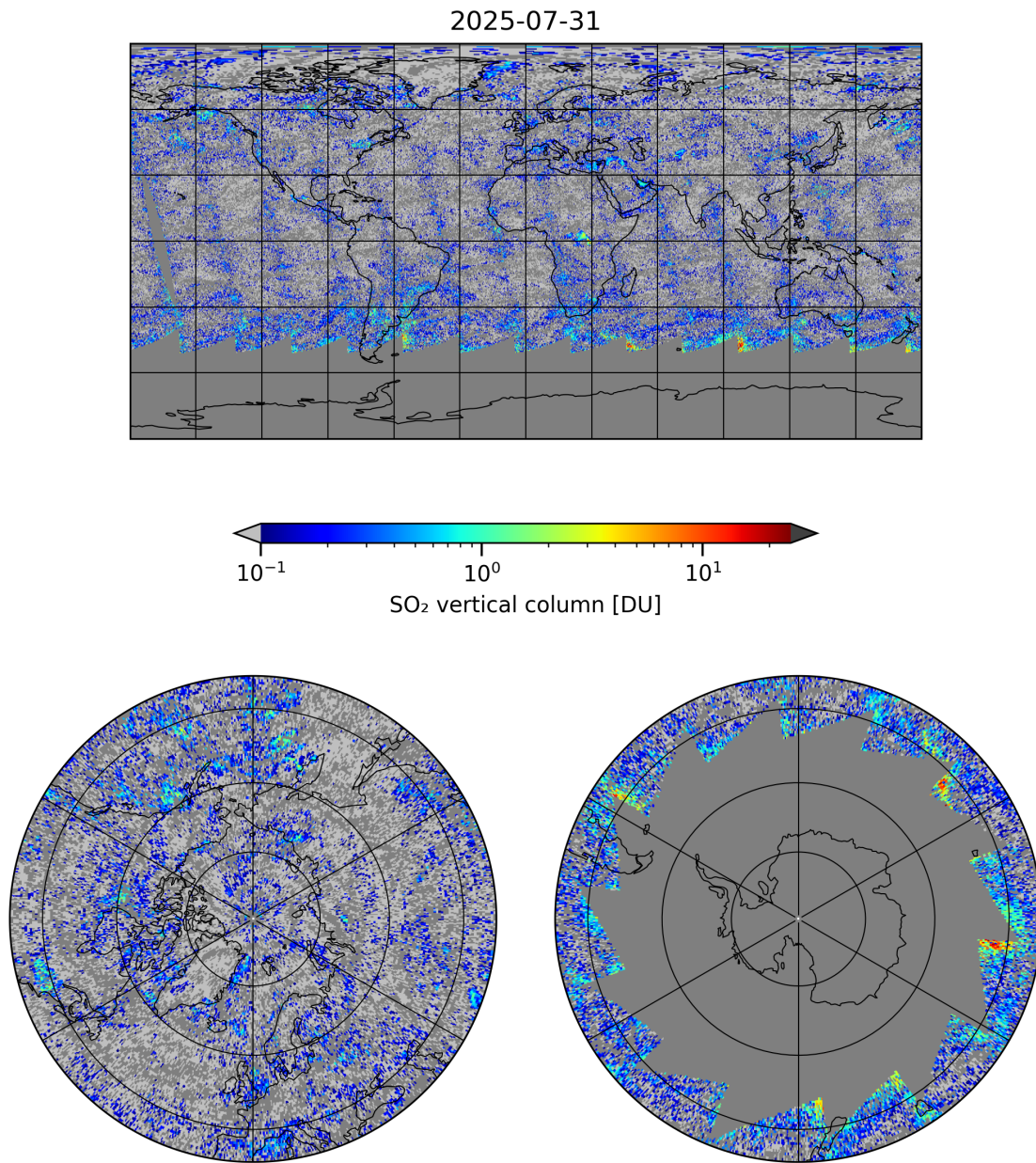


Figure 4: Map of “SO₂ vertical column” for 2025-07-31 to 2025-08-01

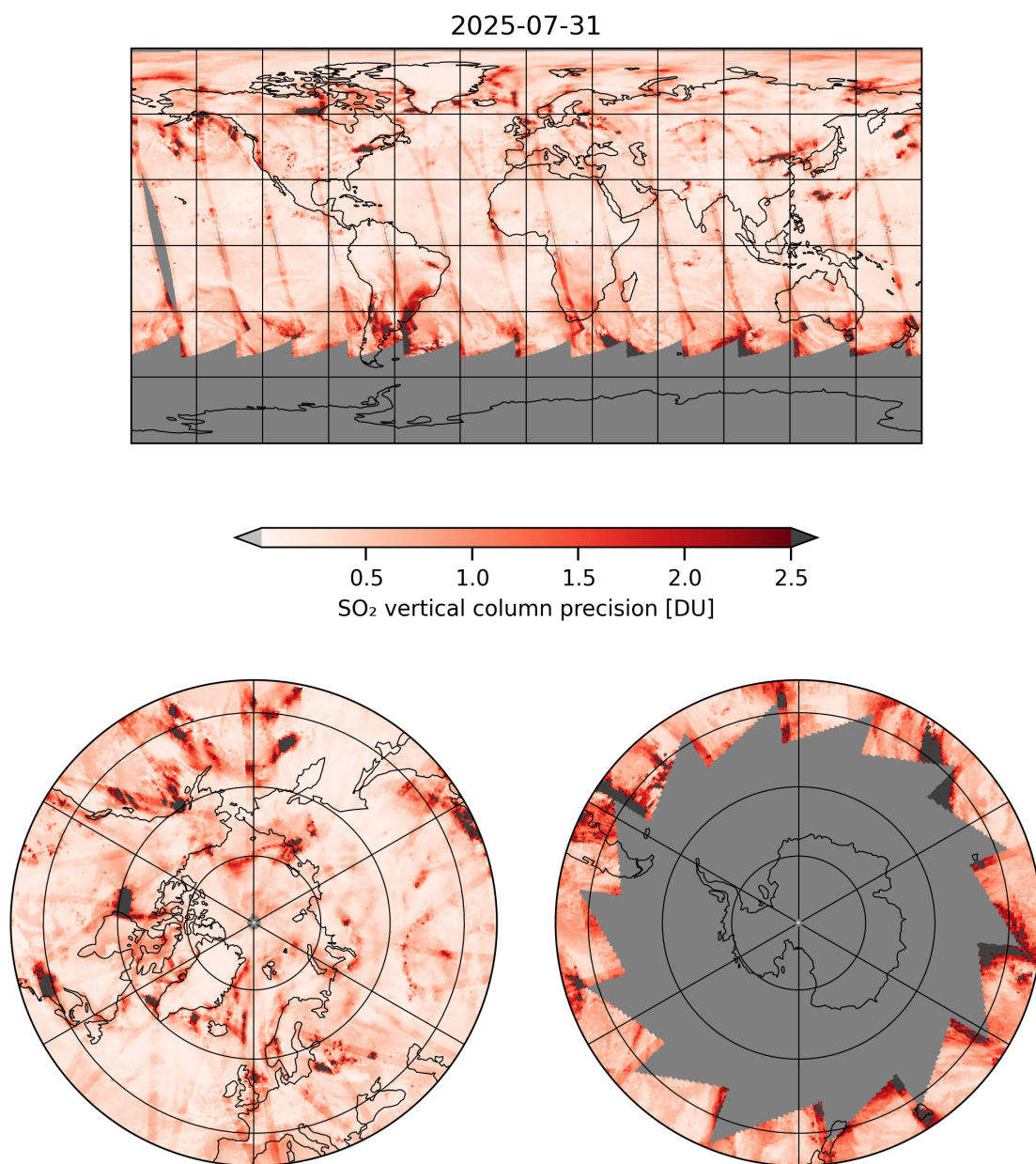


Figure 5: Map of “SO₂ vertical column precision” for 2025-07-31 to 2025-08-01

2025-07-31

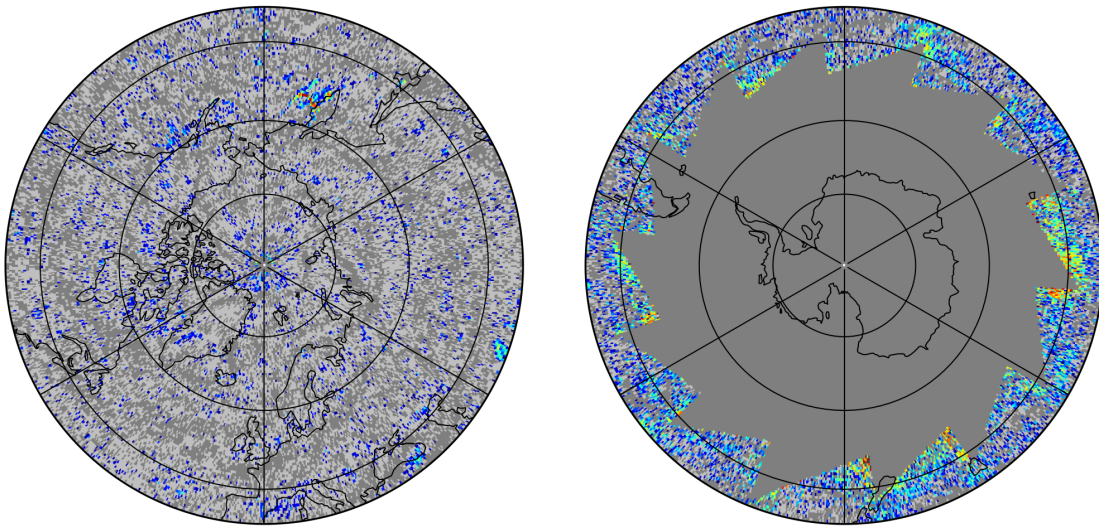
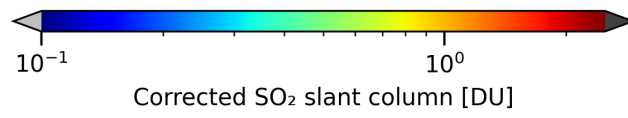
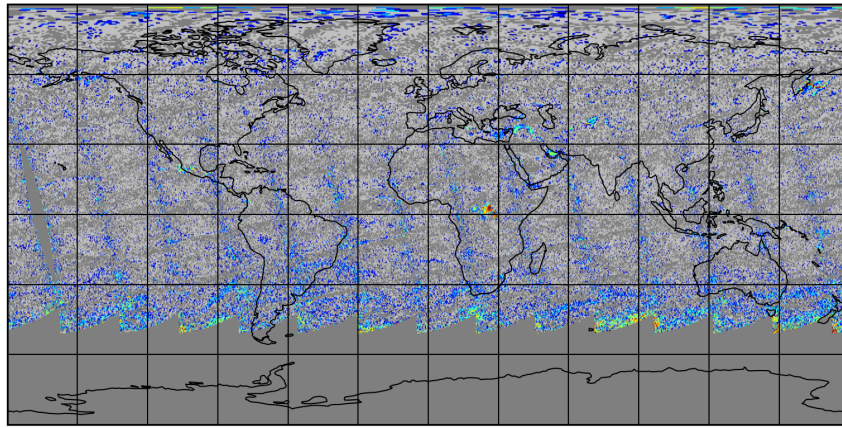


Figure 6: Map of “Corrected SO₂ slant column” for 2025-07-31 to 2025-08-01

2025-07-31

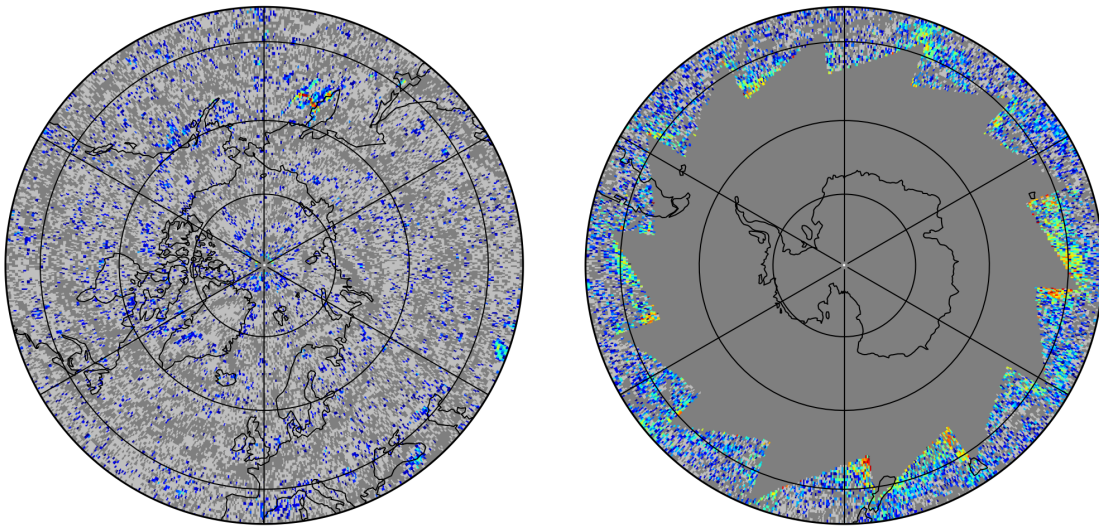
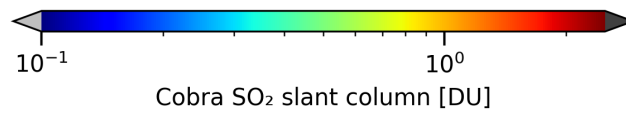
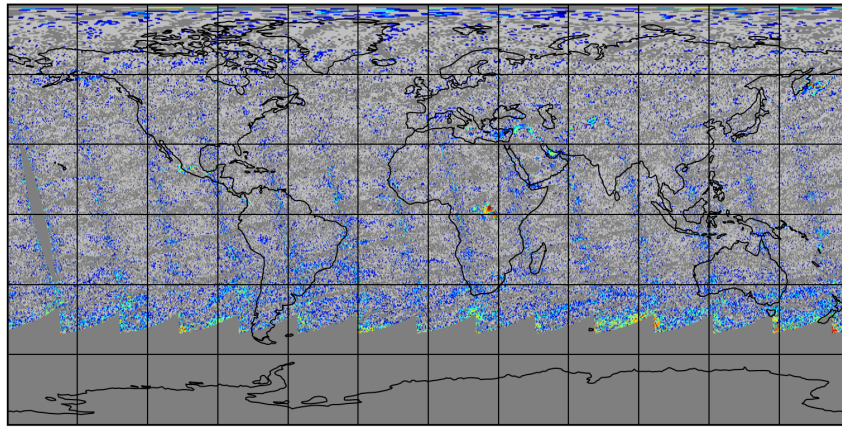


Figure 7: Map of “Cobra SO₂ slant column” for 2025-07-31 to 2025-08-01

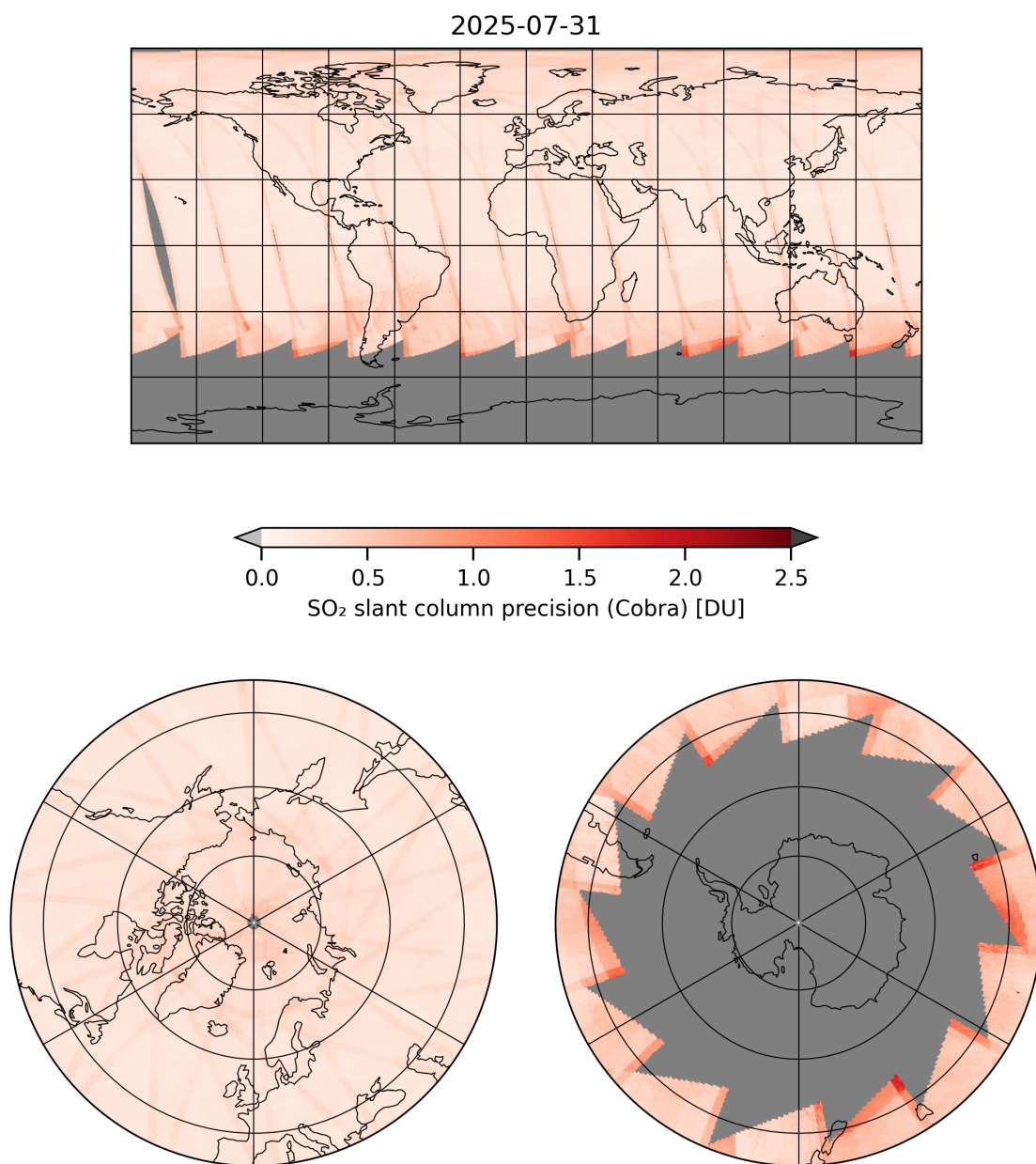


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-07-31 to 2025-08-01

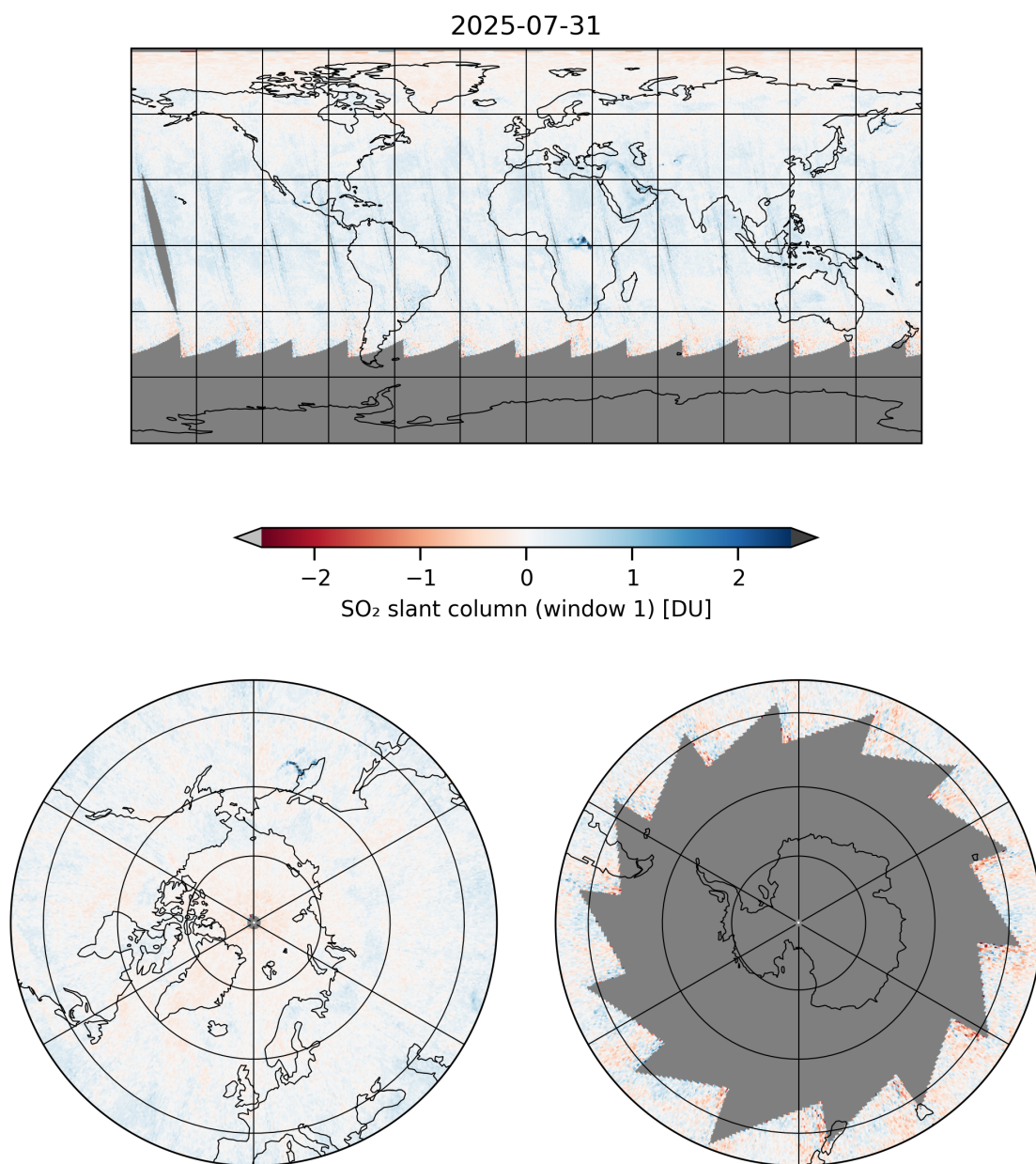


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-07-31 to 2025-08-01

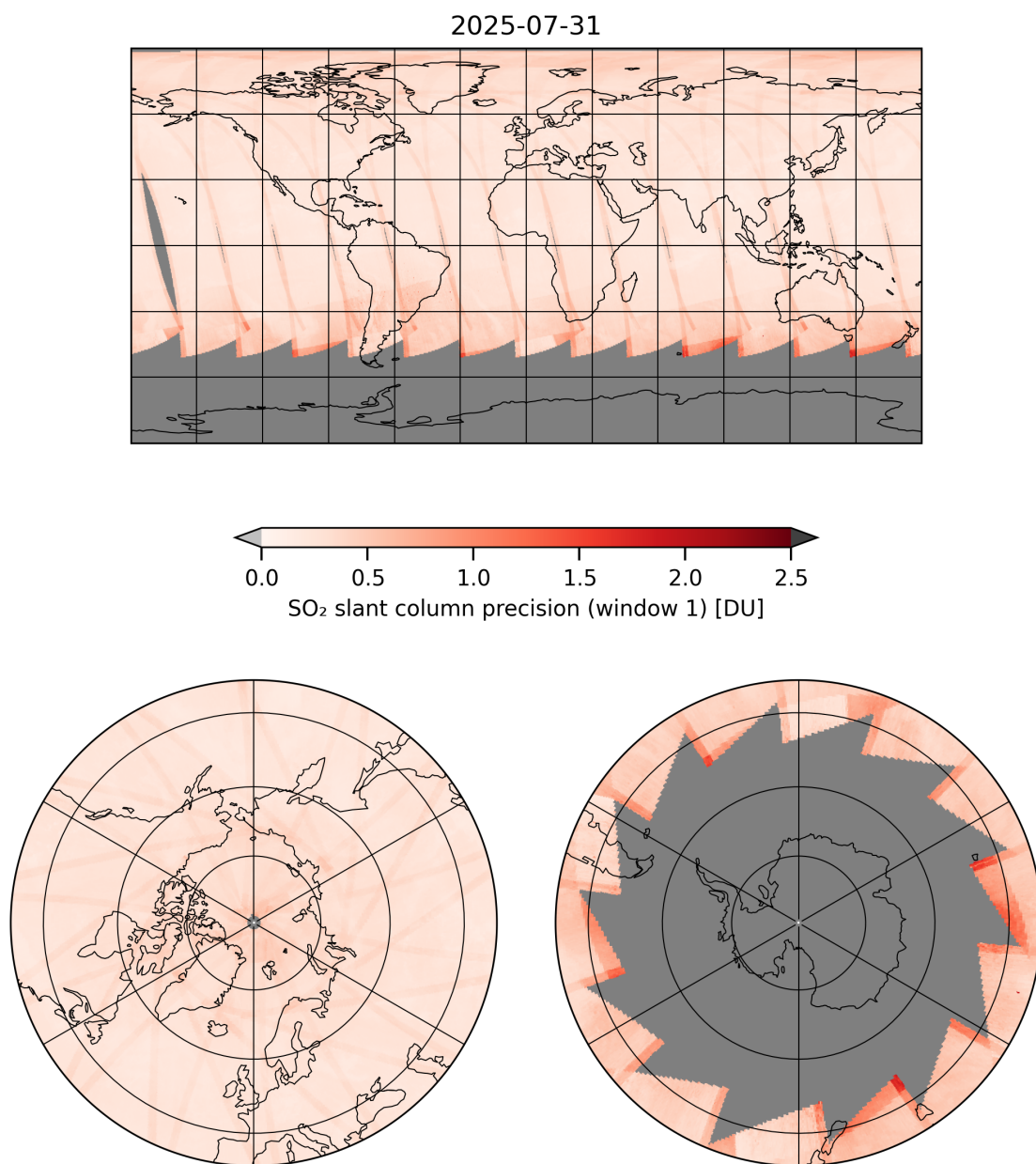


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-07-31 to 2025-08-01

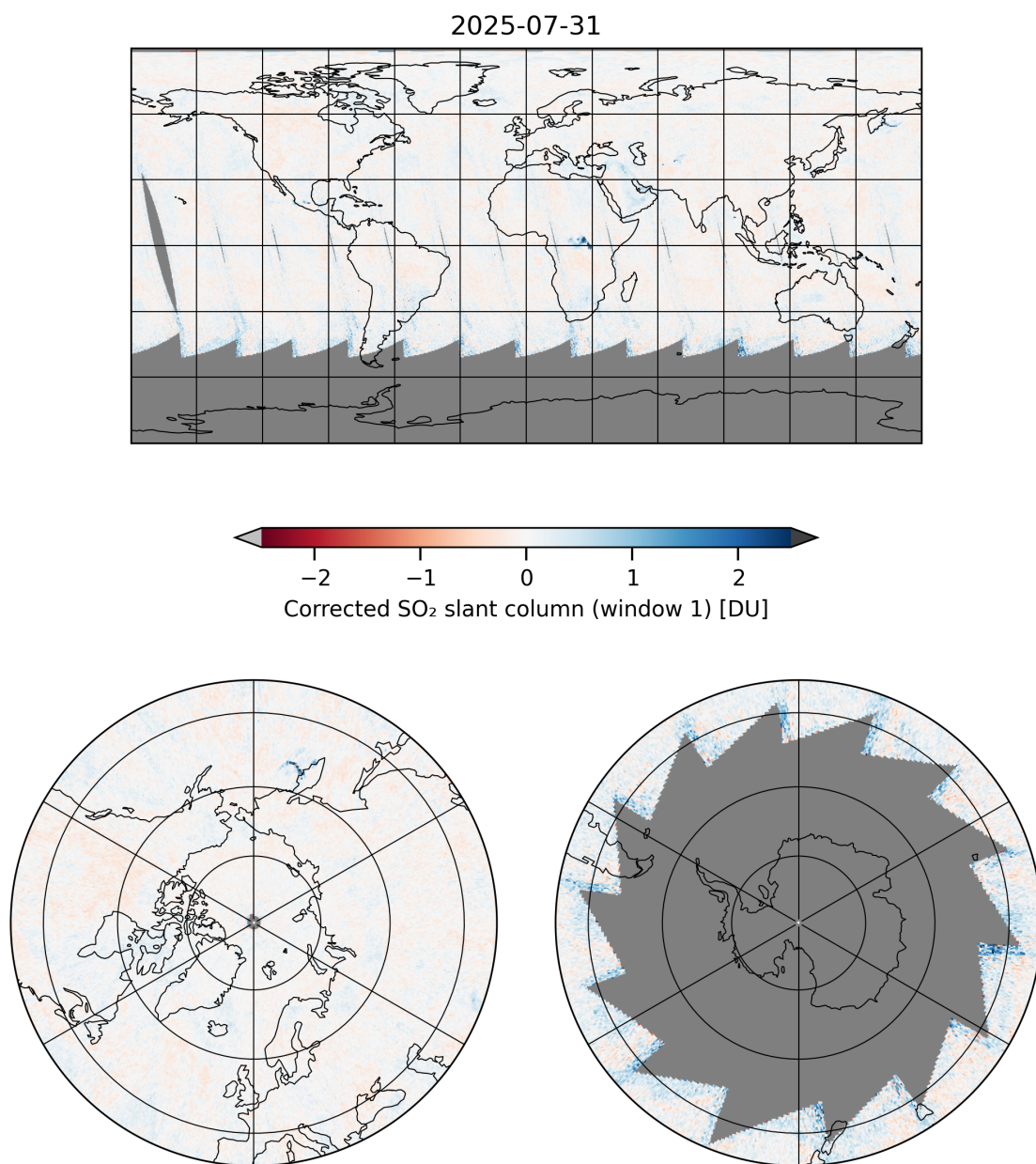


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-07-31 to 2025-08-01

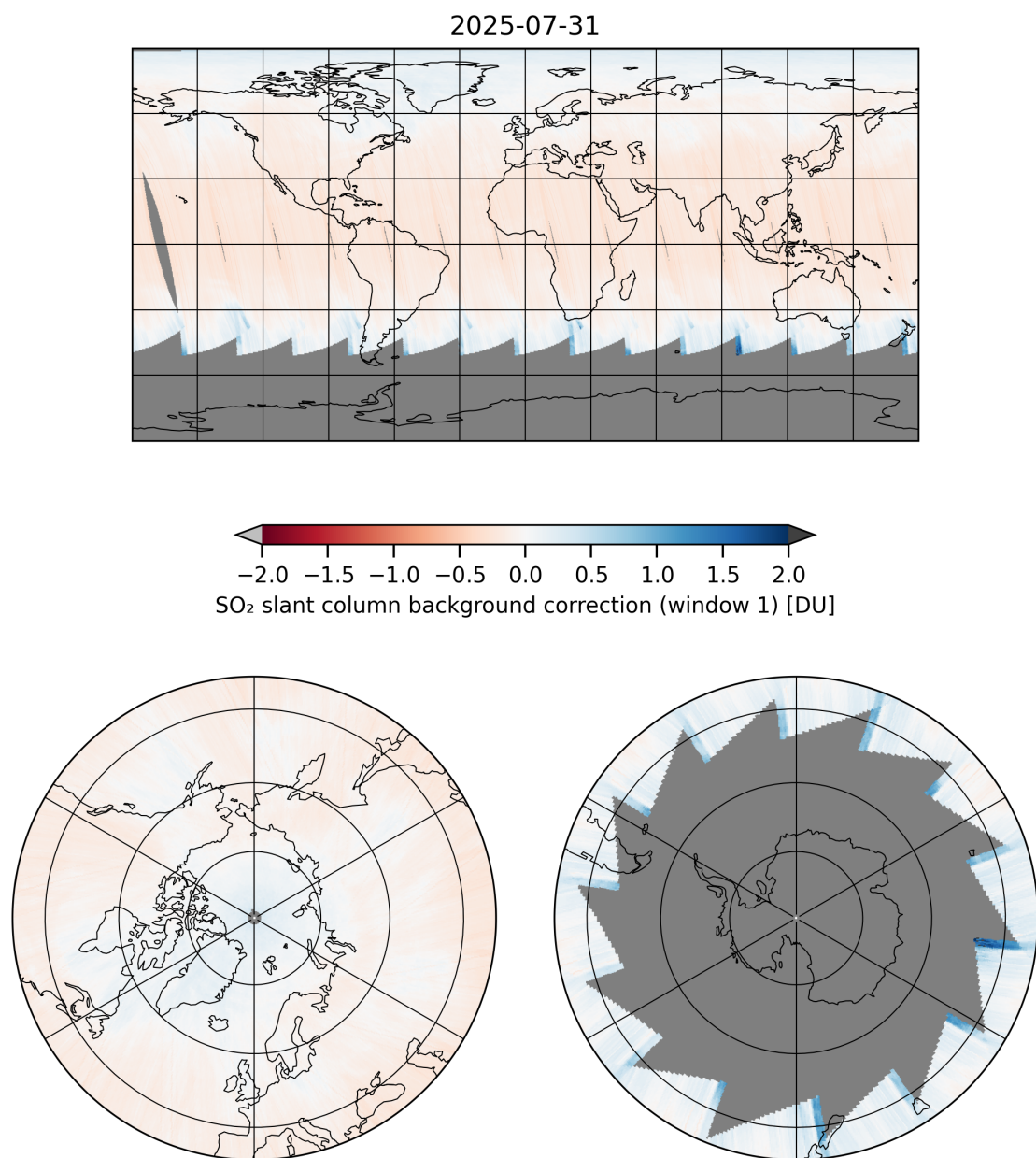


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-07-31 to 2025-08-01

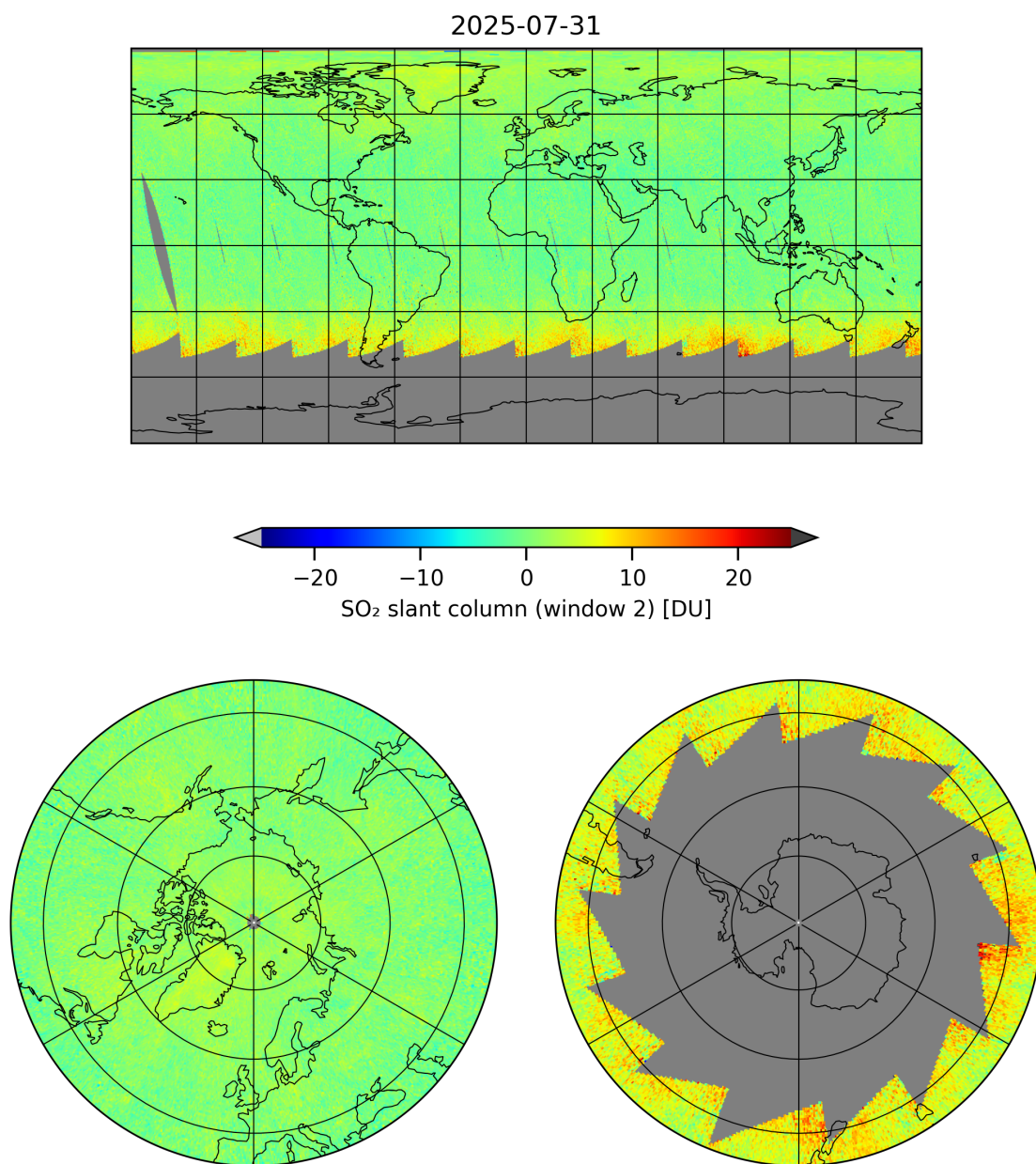


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-07-31 to 2025-08-01

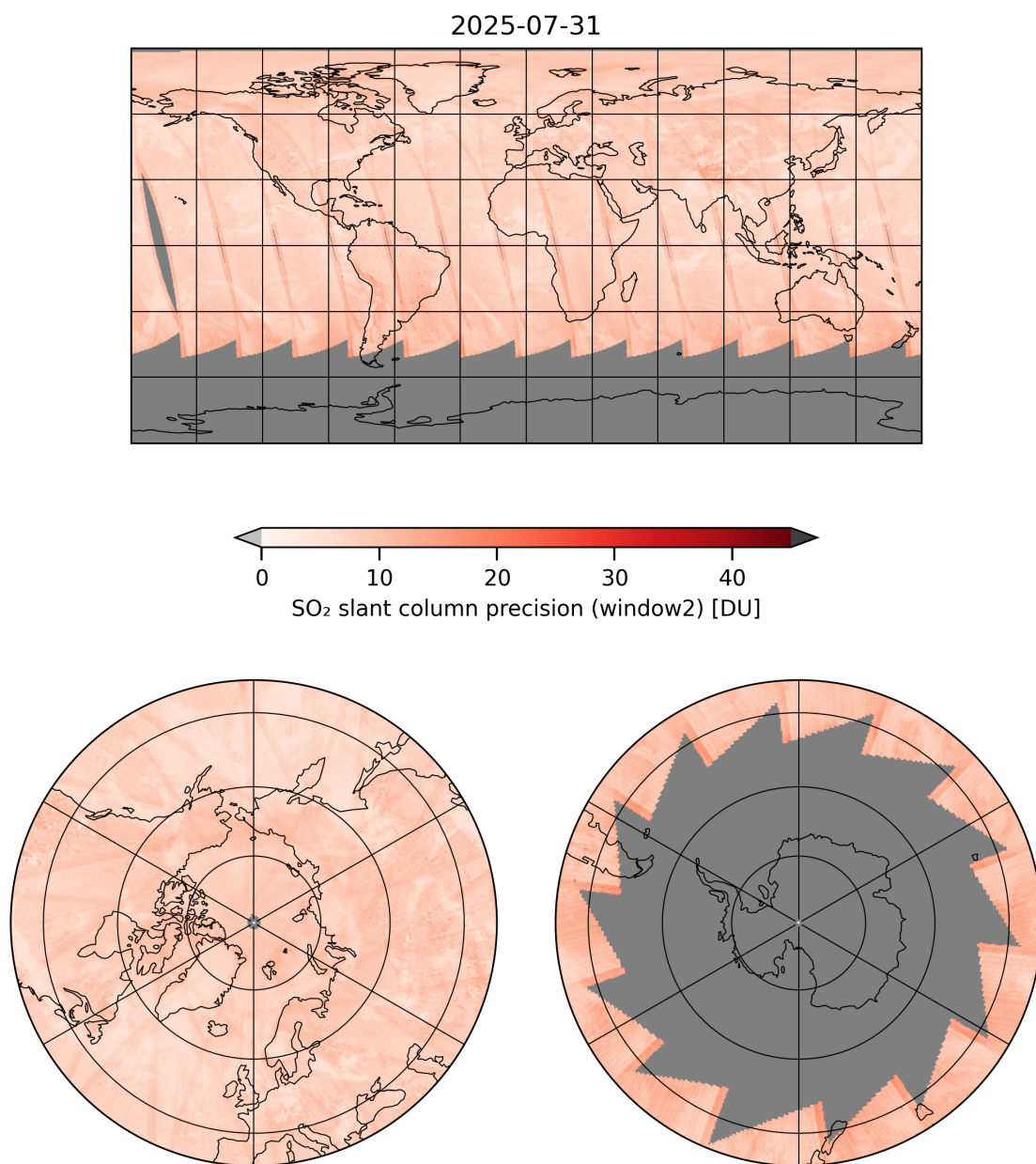


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-07-31 to 2025-08-01

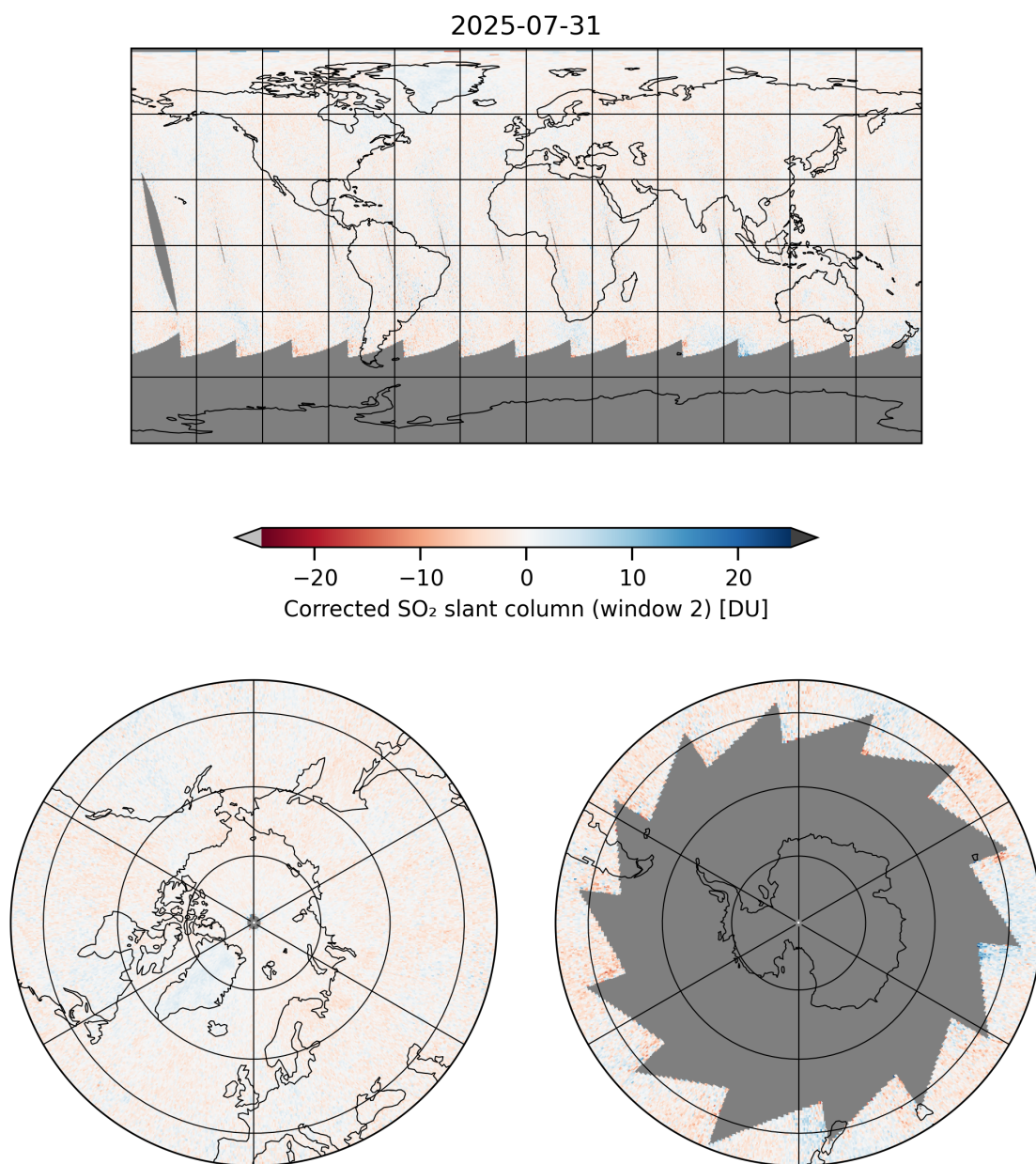


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-07-31 to 2025-08-01

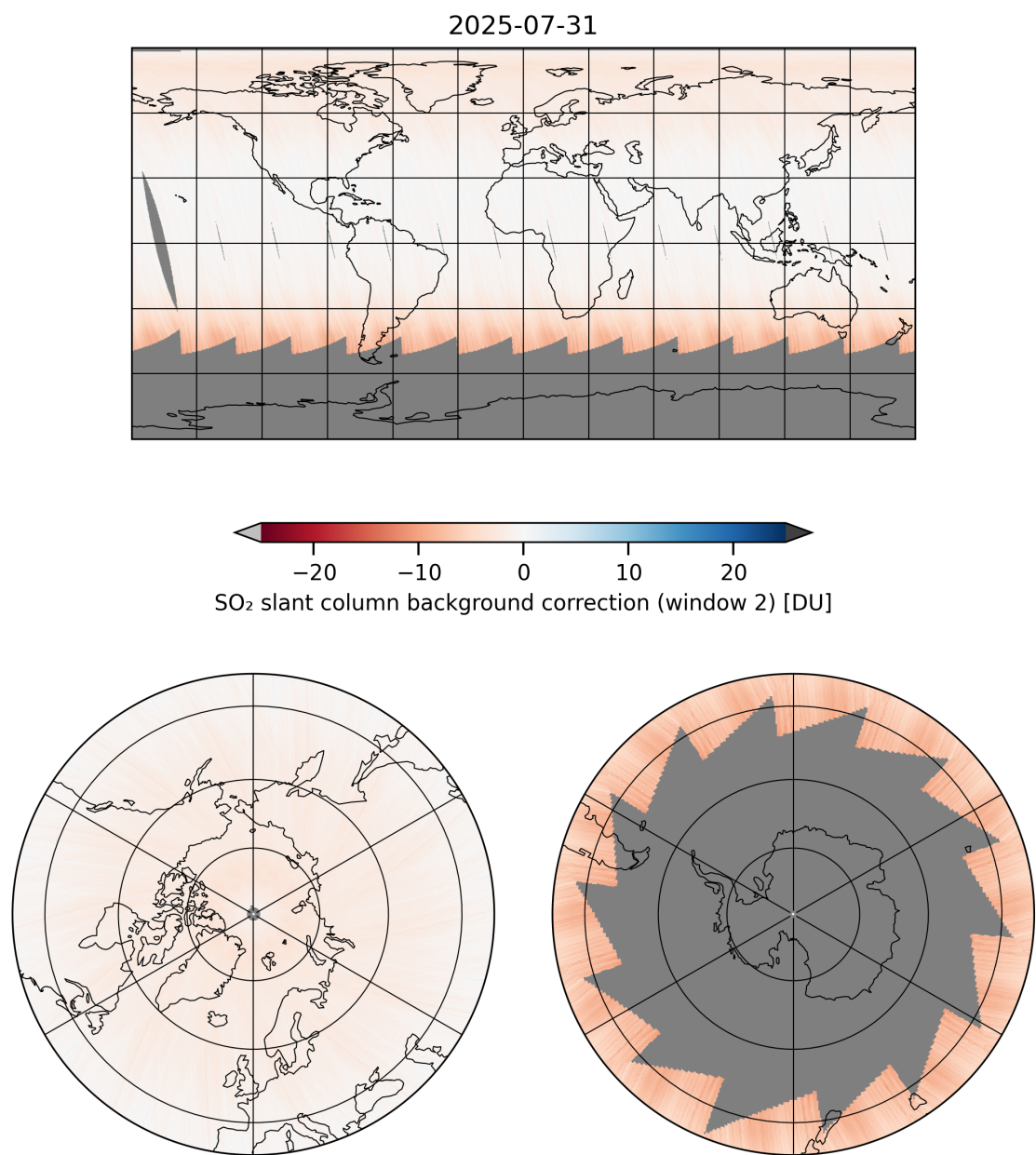


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-07-31 to 2025-08-01

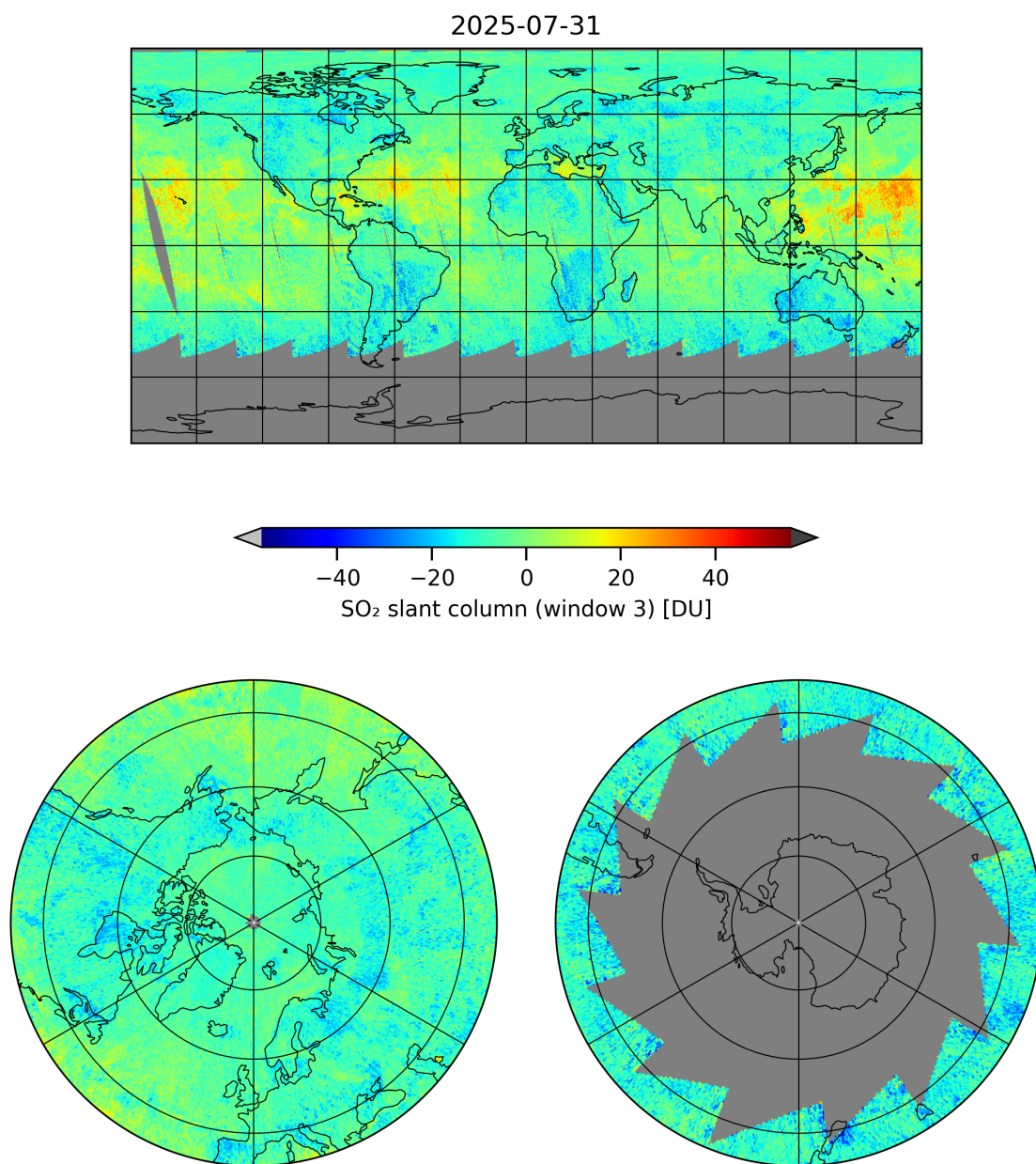


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-07-31 to 2025-08-01

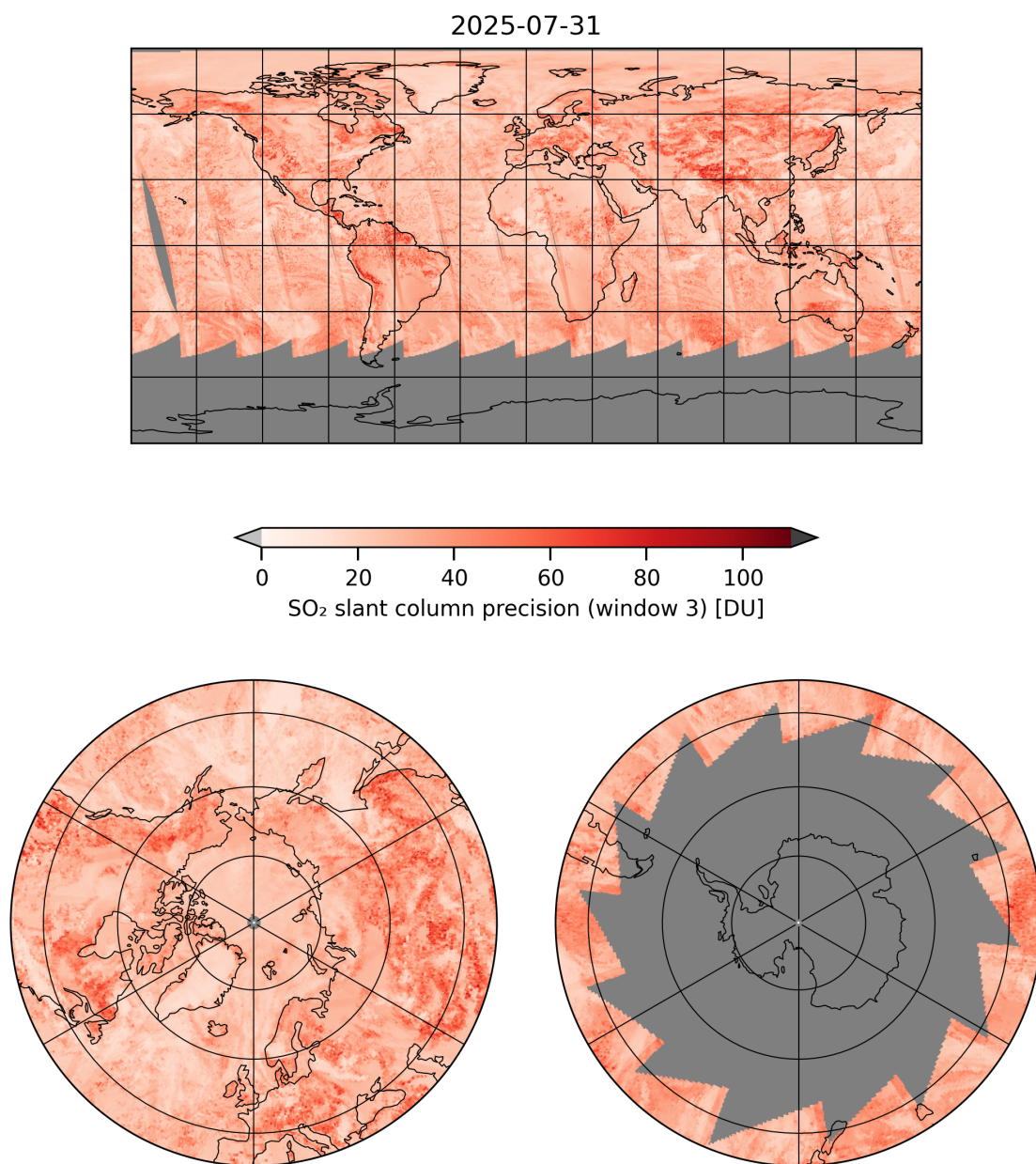


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-07-31 to 2025-08-01

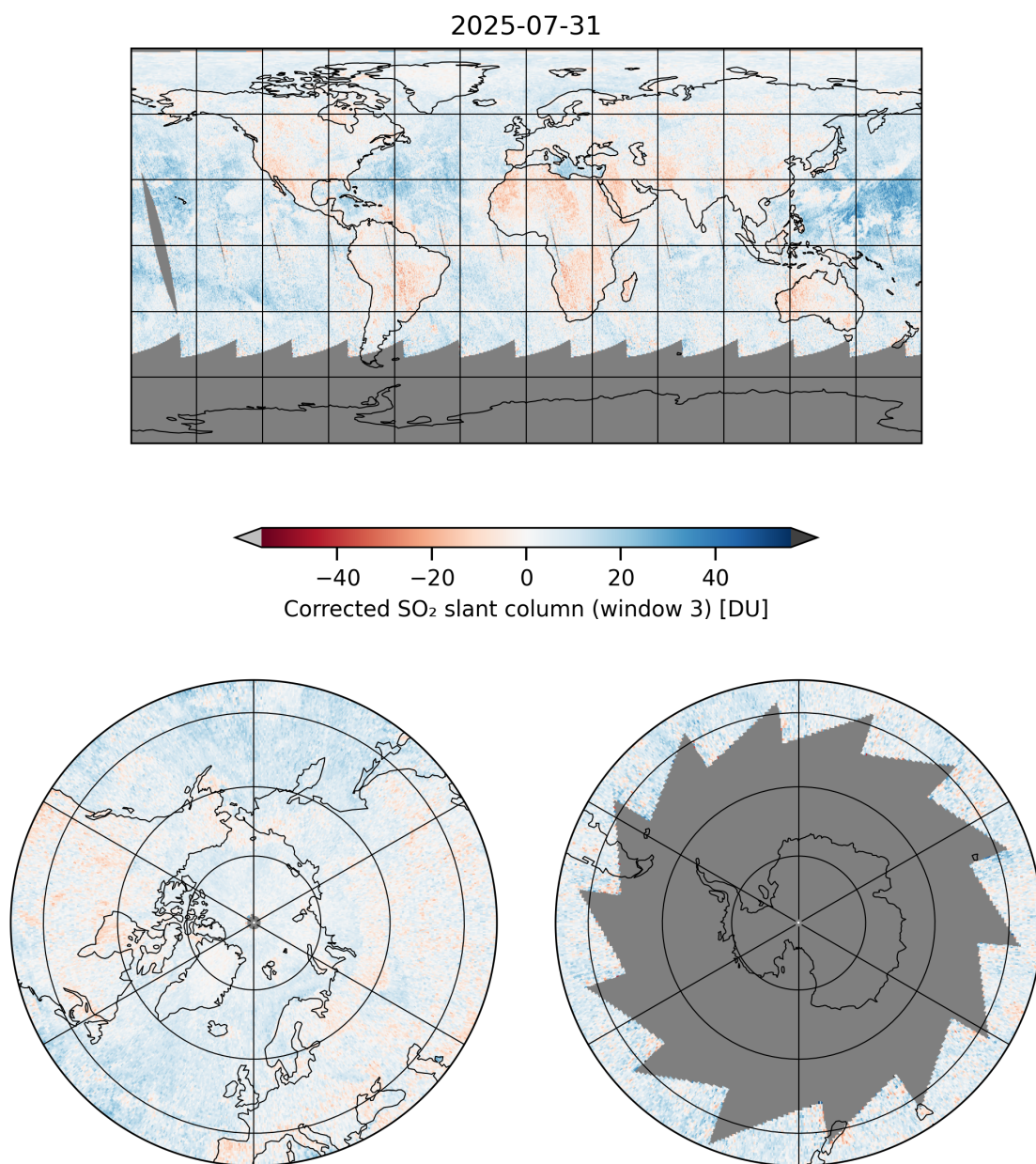


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-07-31 to 2025-08-01

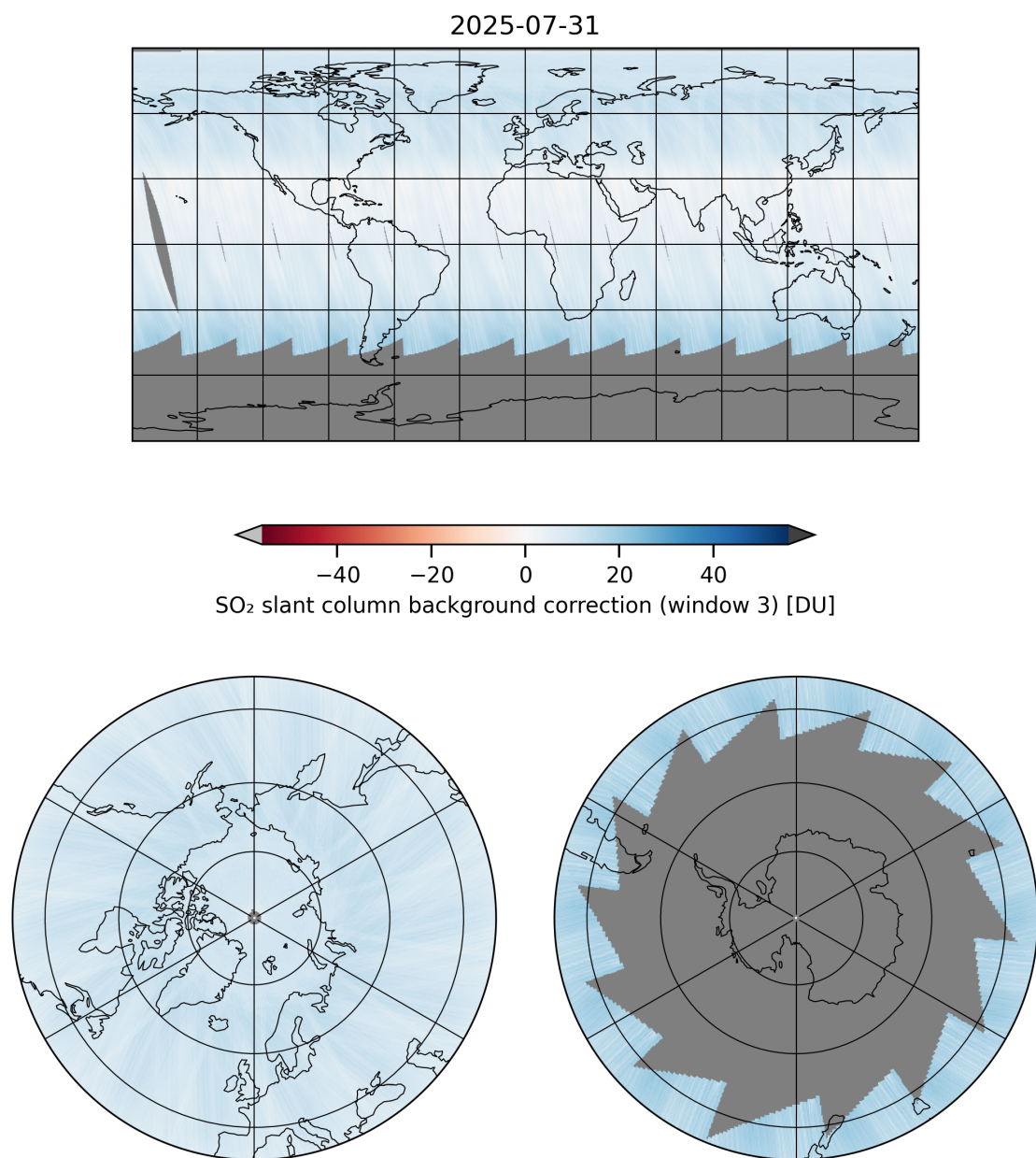


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-07-31 to 2025-08-01

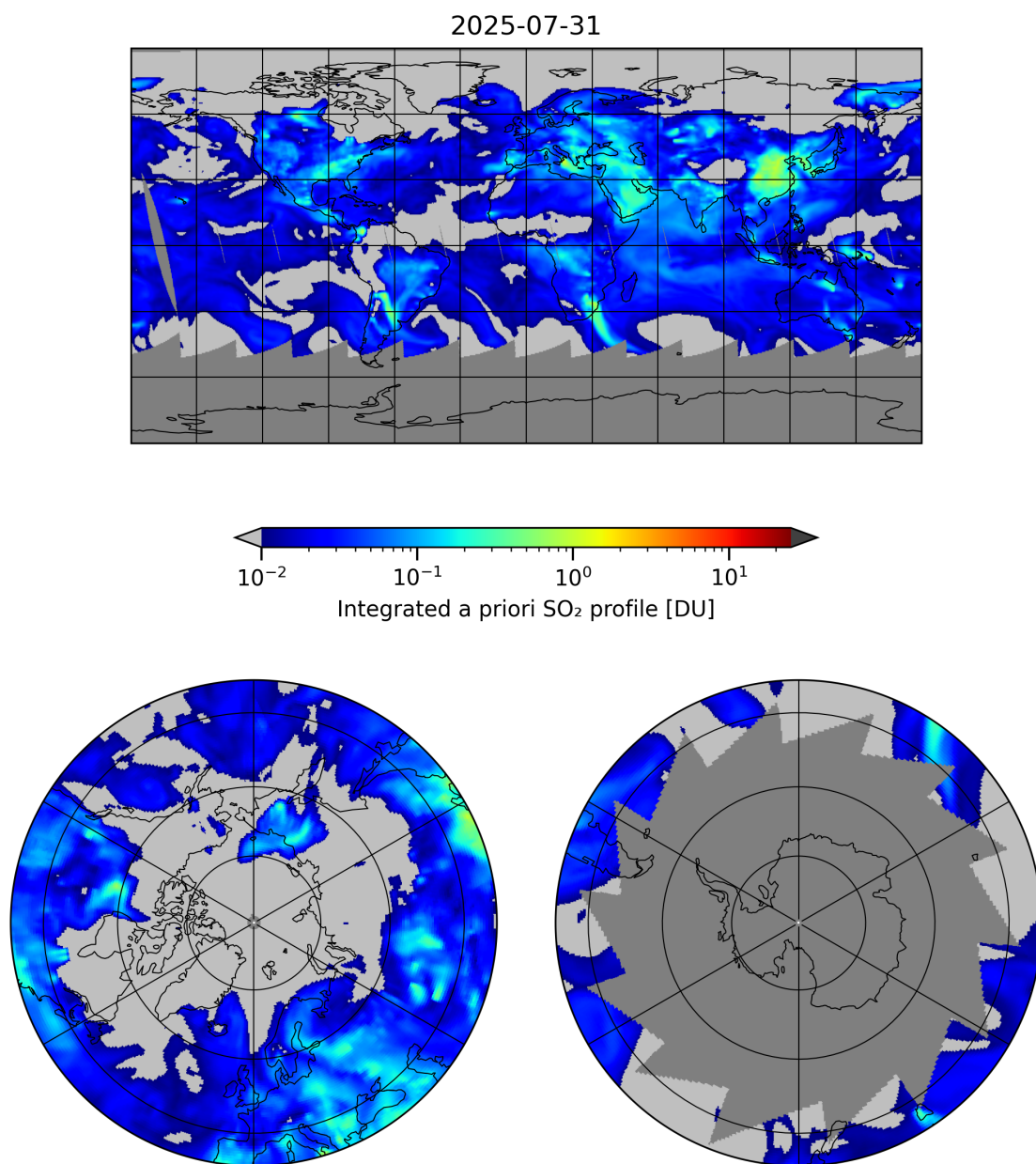


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-07-31 to 2025-08-01

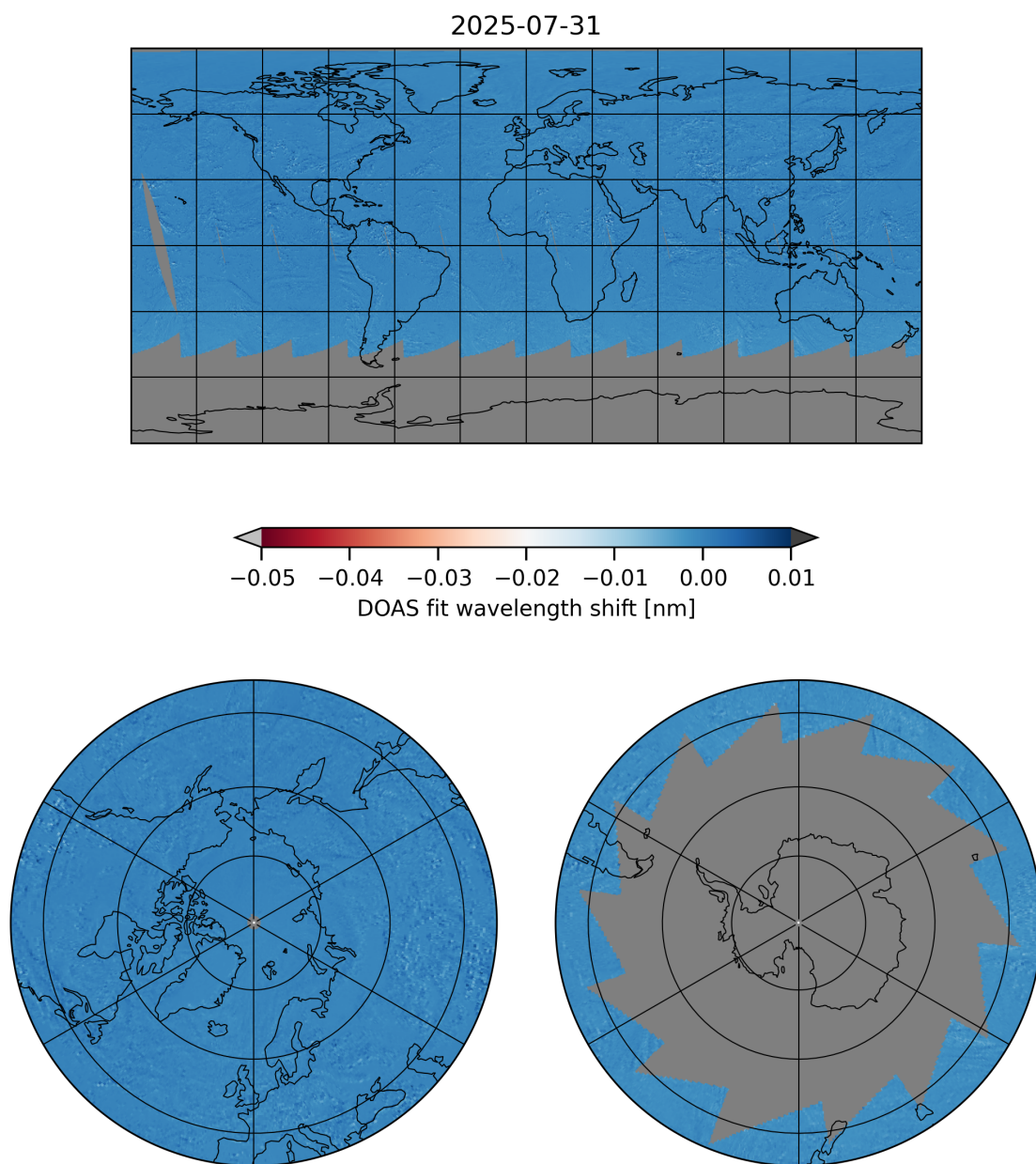


Figure 22: Map of “DOAS fit wavelength shift” for 2025-07-31 to 2025-08-01

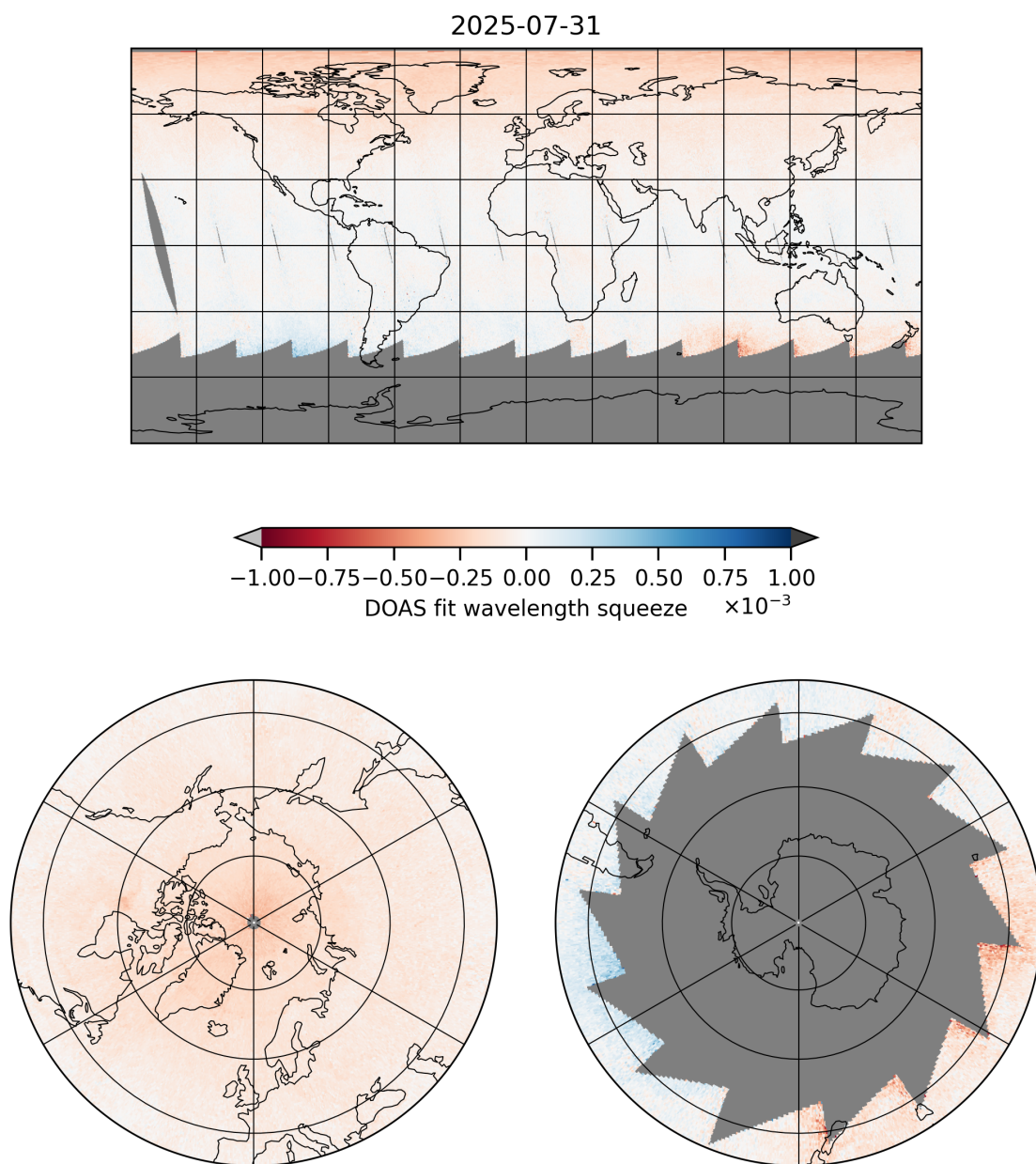


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-07-31 to 2025-08-01

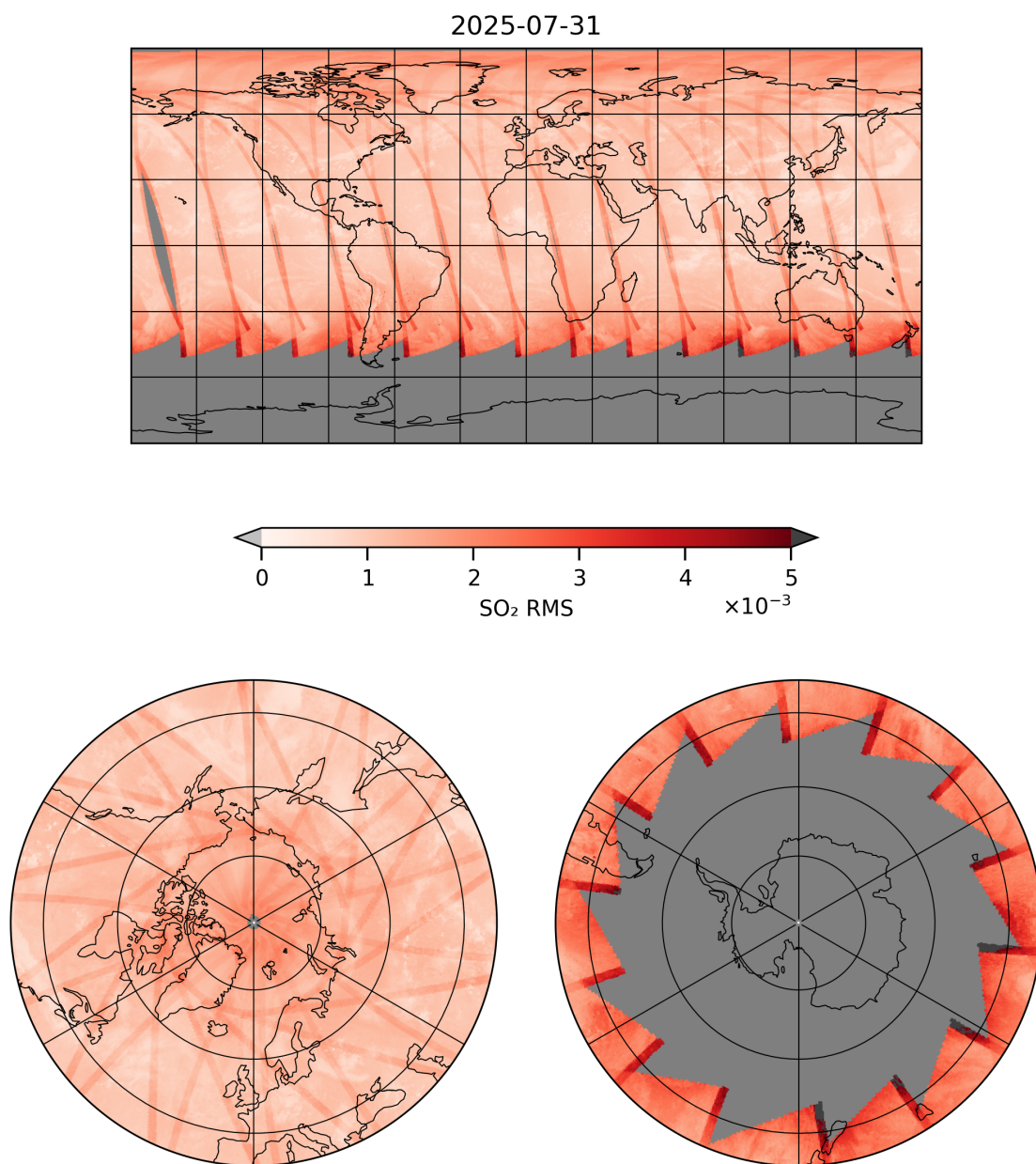


Figure 24: Map of “SO₂ RMS” for 2025-07-31 to 2025-08-01

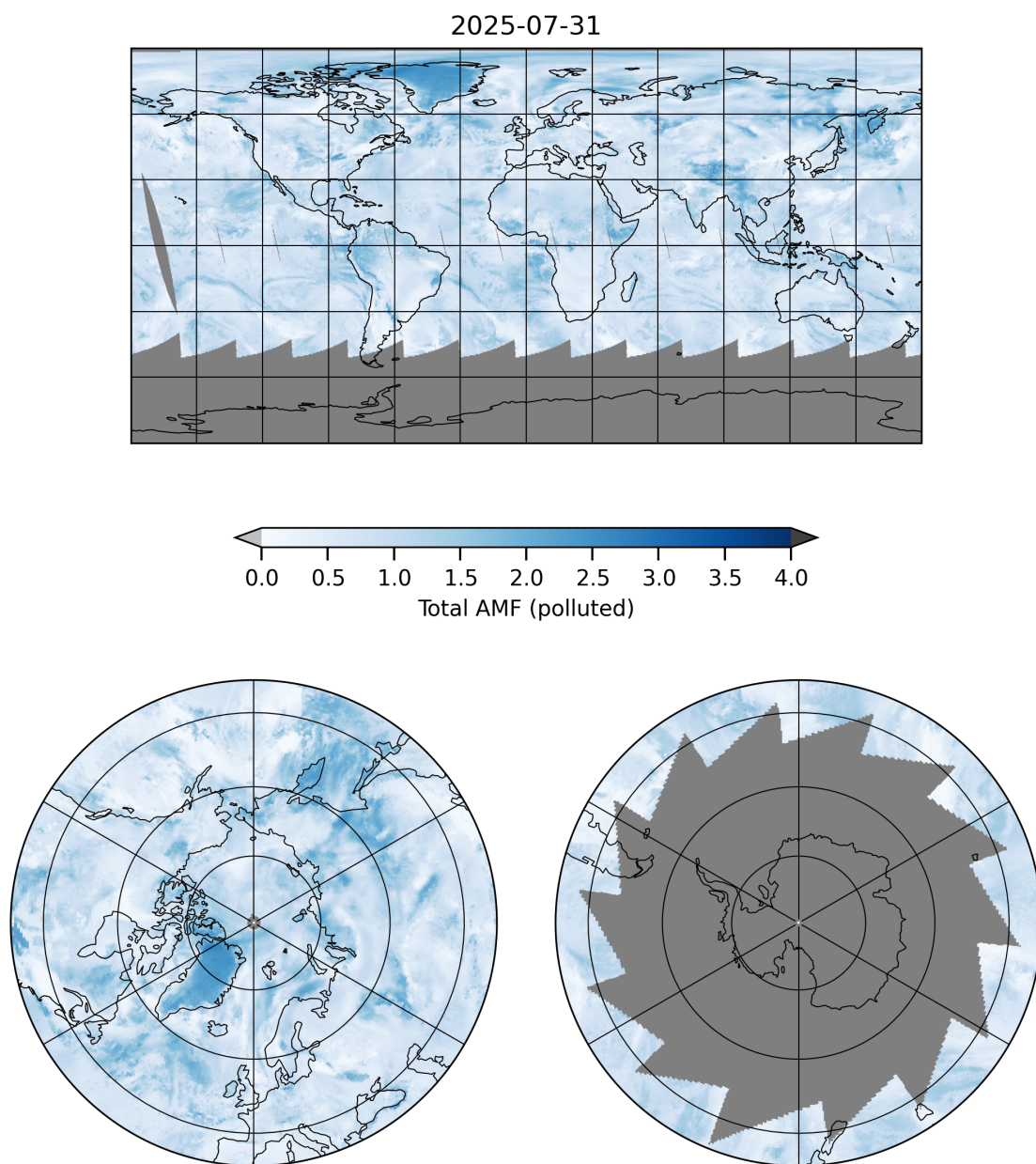


Figure 25: Map of “Total AMF (polluted)” for 2025-07-31 to 2025-08-01

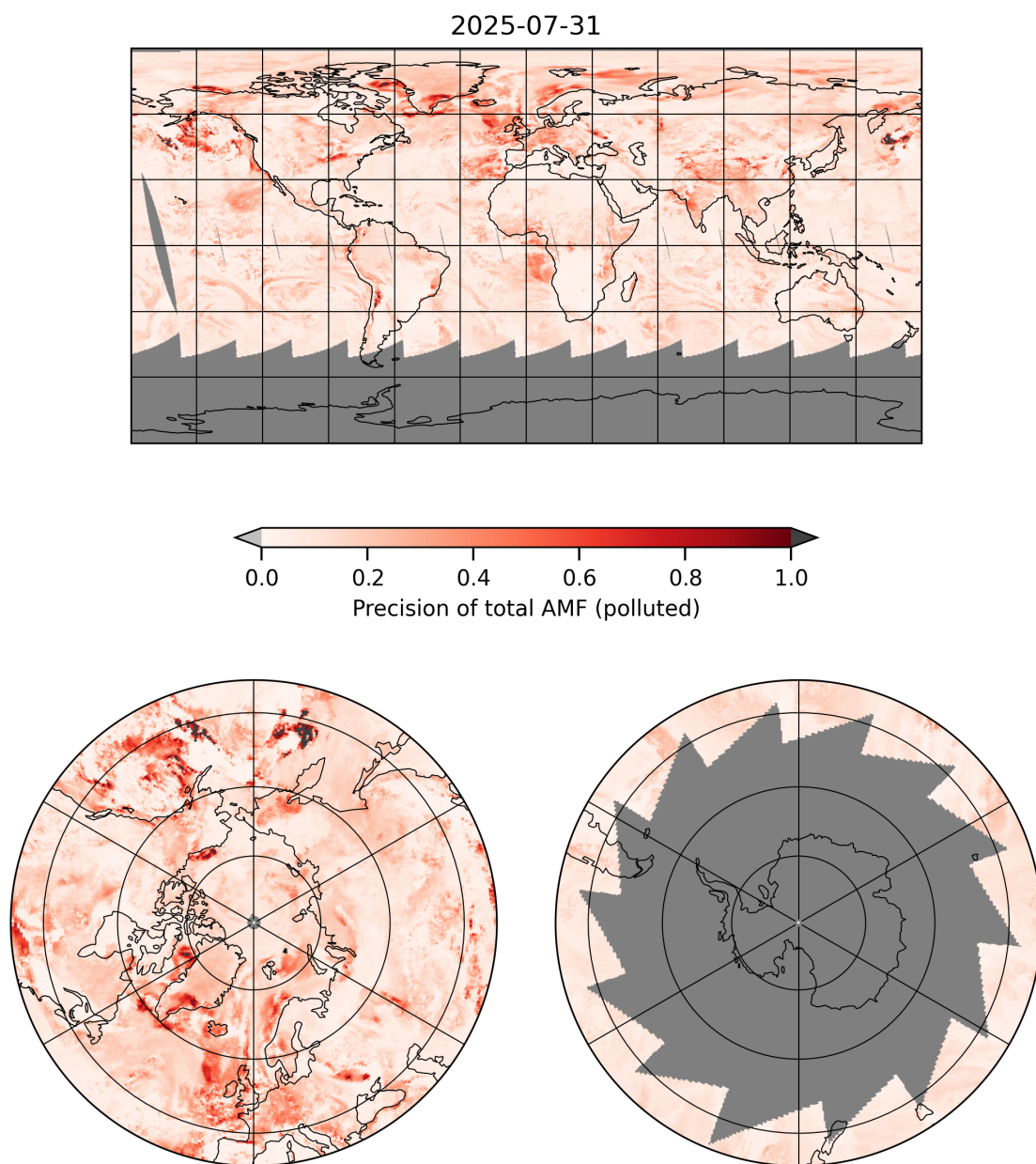


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-07-31 to 2025-08-01

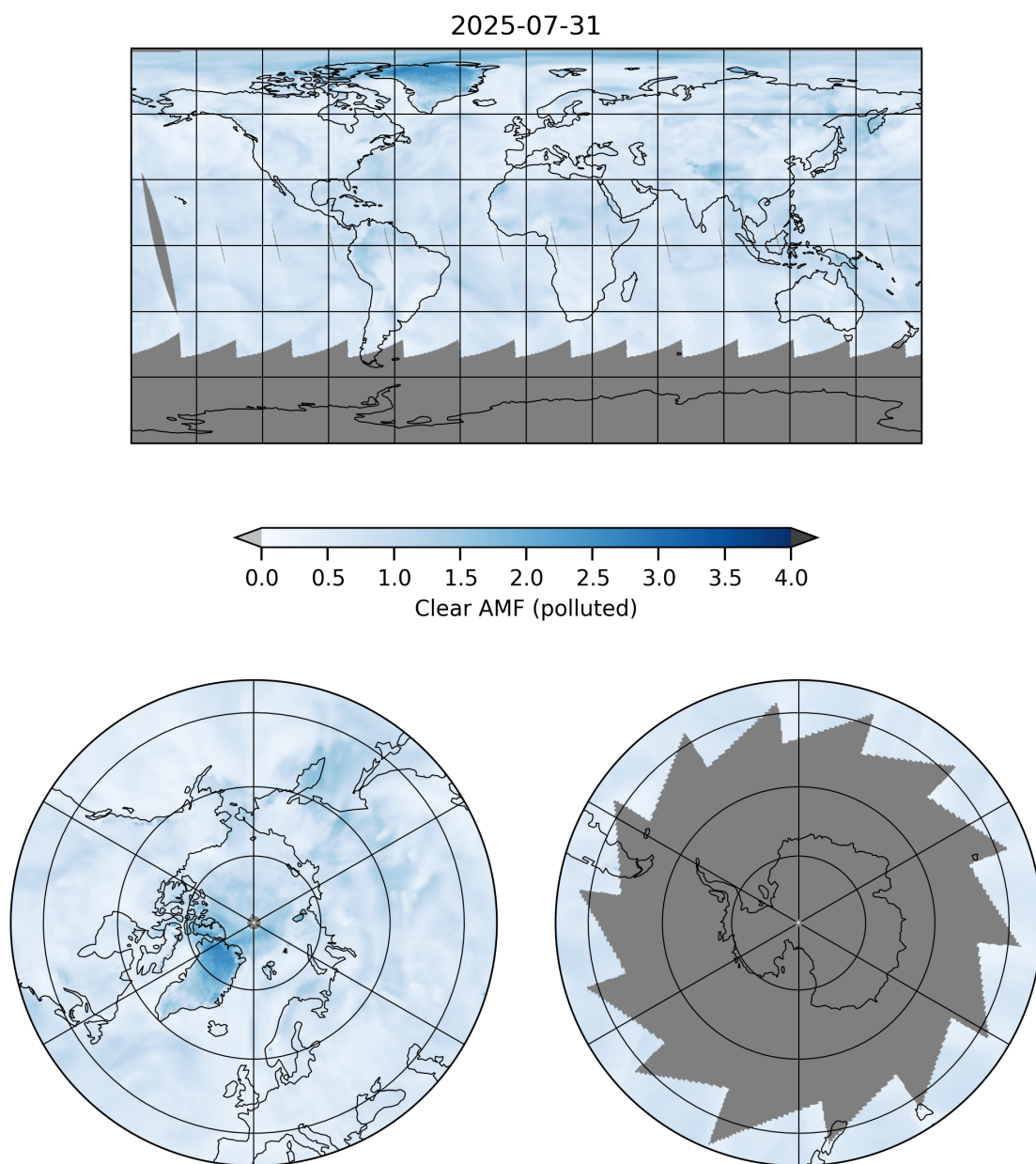


Figure 27: Map of “Clear AMF (polluted)” for 2025-07-31 to 2025-08-01

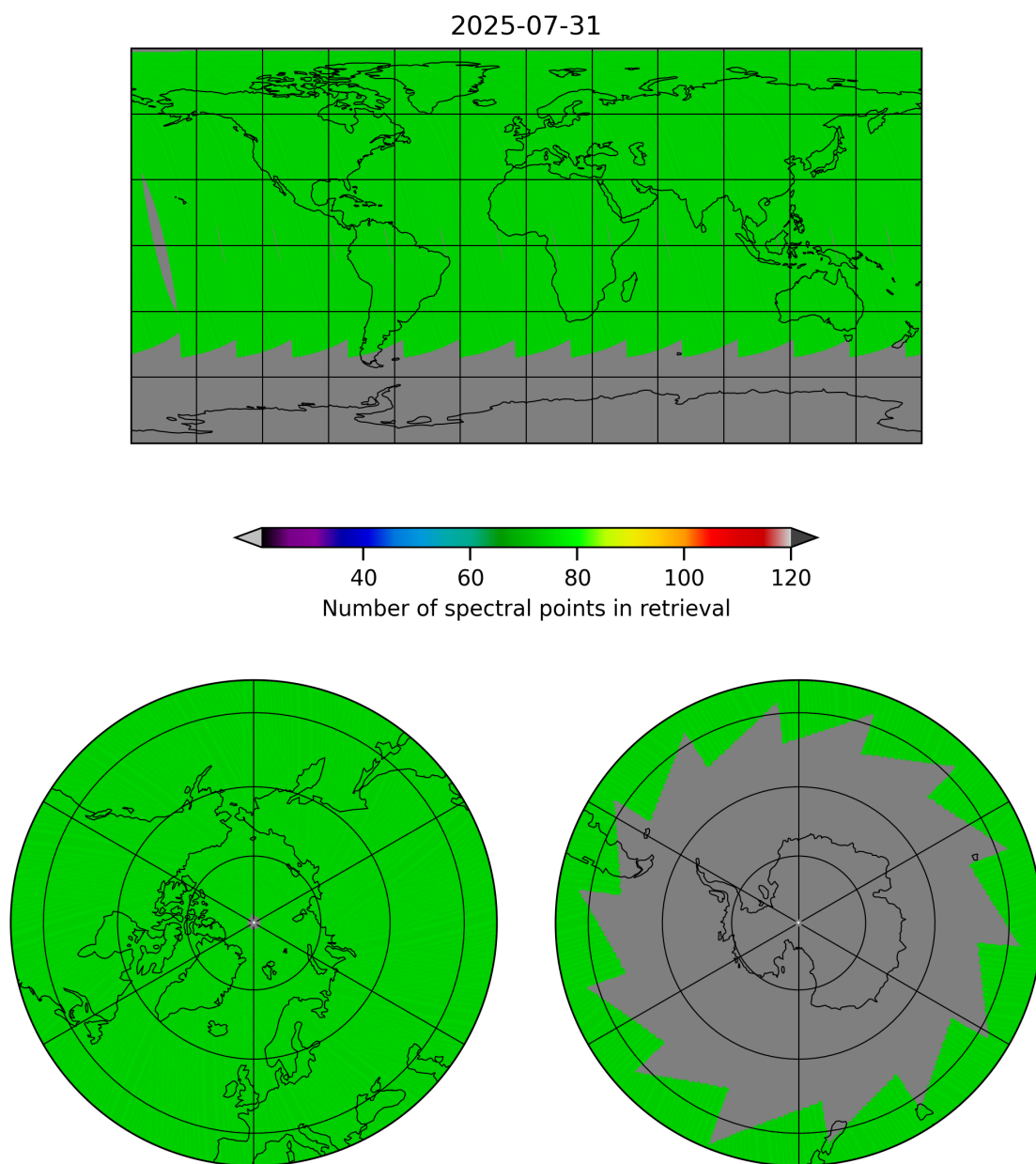


Figure 28: Map of “Number of spectral points in retrieval” for 2025-07-31 to 2025-08-01

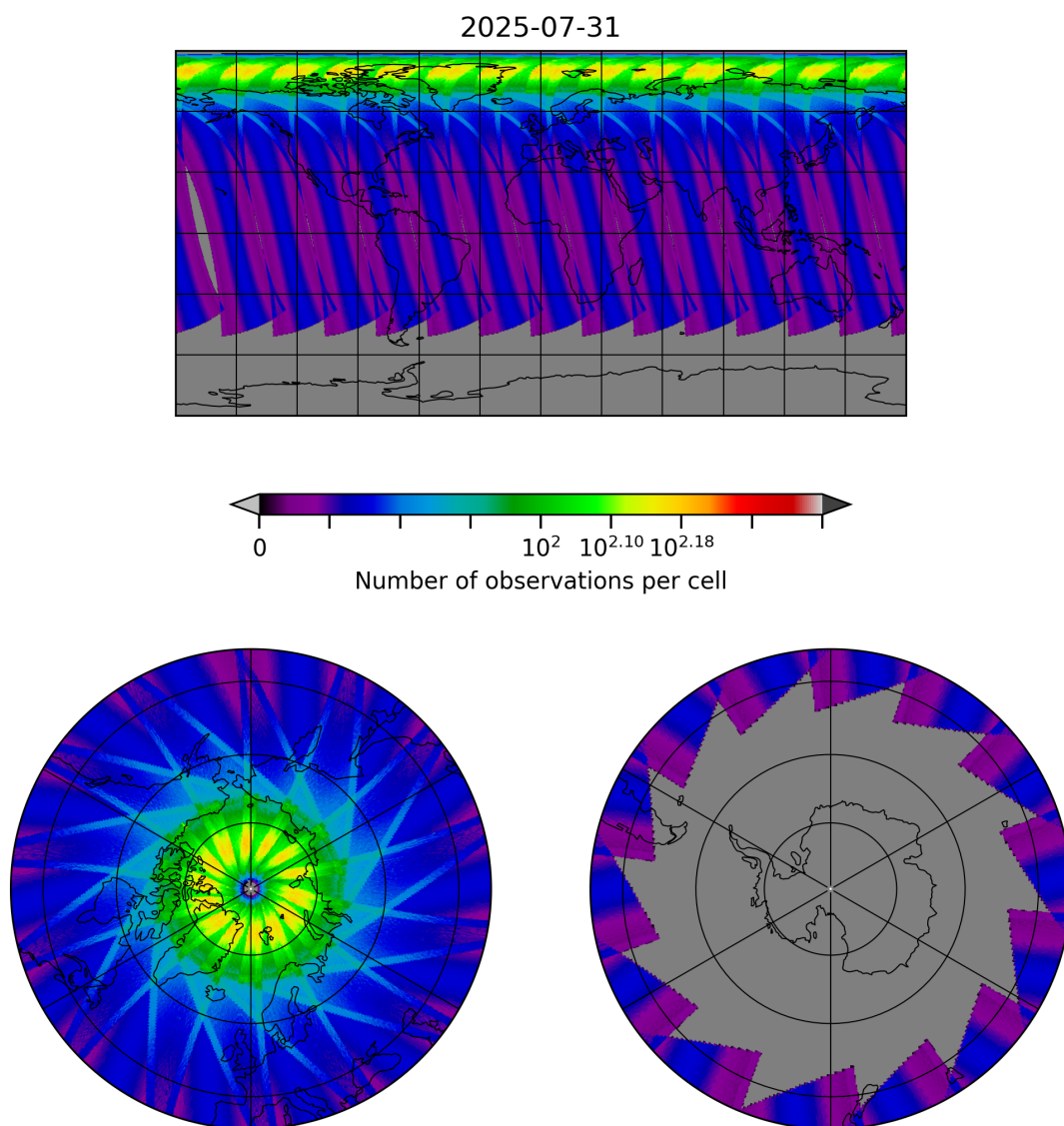


Figure 29: Map of the number of observations for 2025-07-31 to 2025-08-01

7 Zonal average

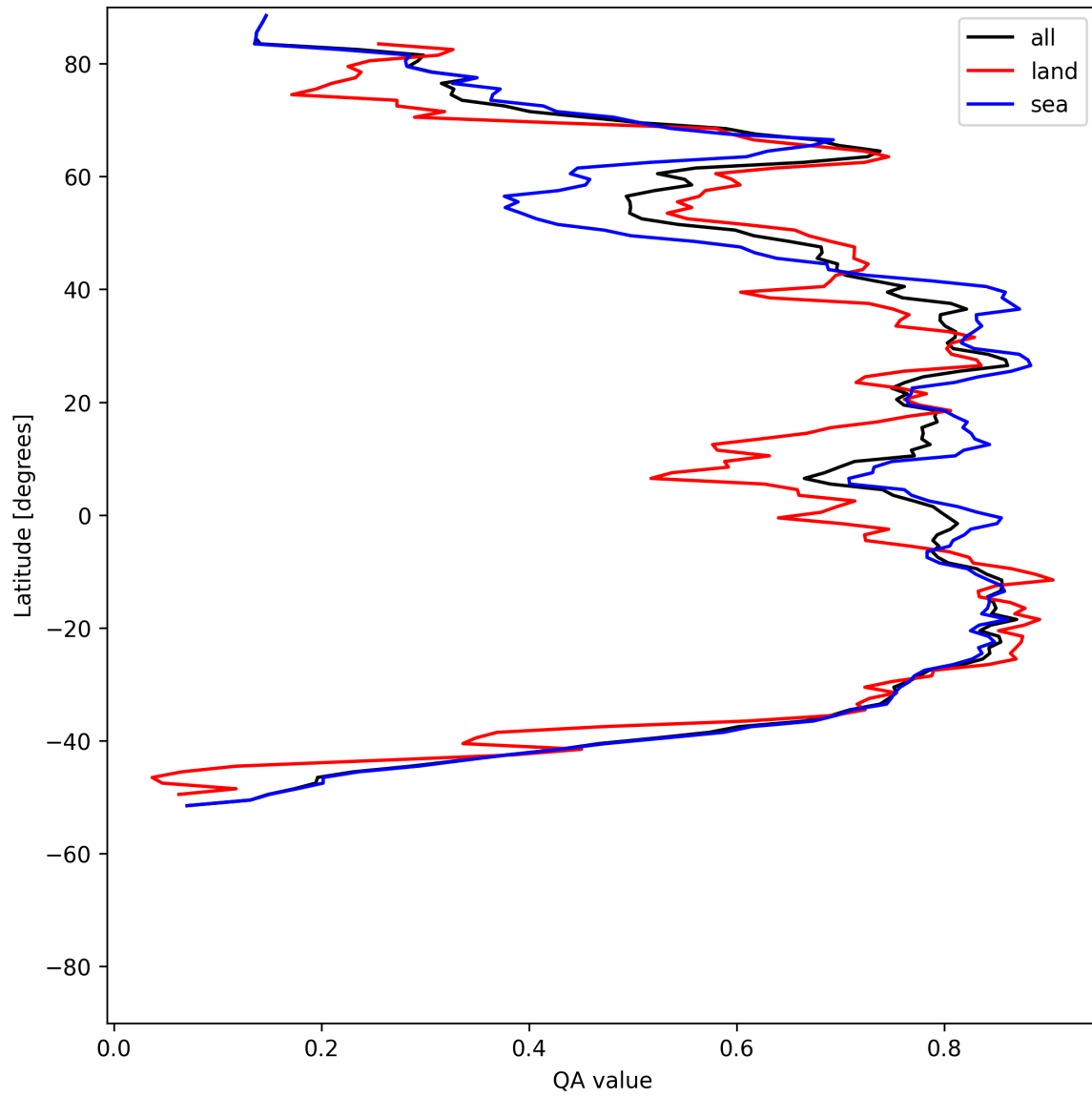


Figure 30: Zonal average of “QA value” for 2025-07-31 to 2025-08-01.

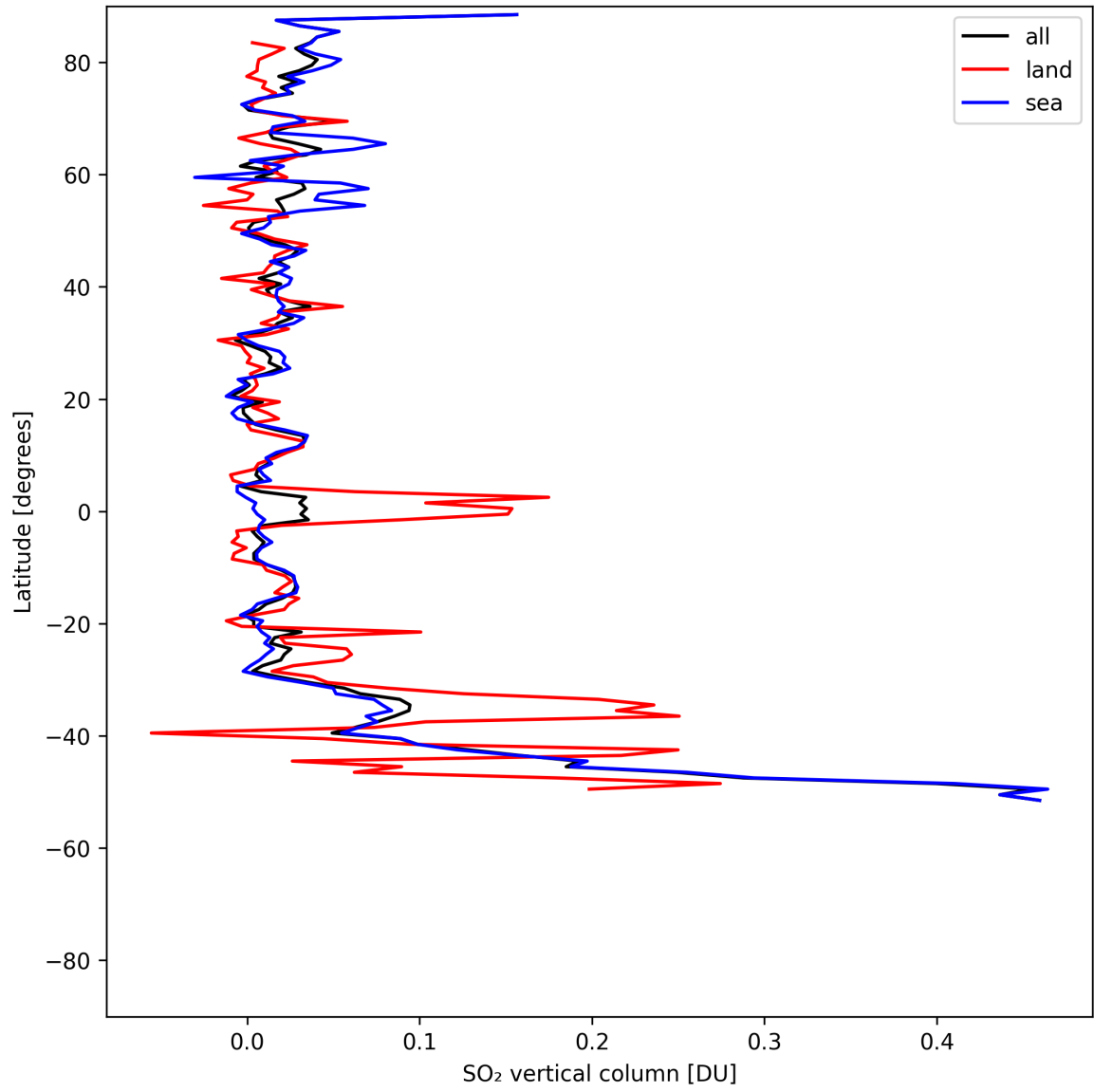


Figure 31: Zonal average of “SO₂ vertical column” for 2025-07-31 to 2025-08-01.

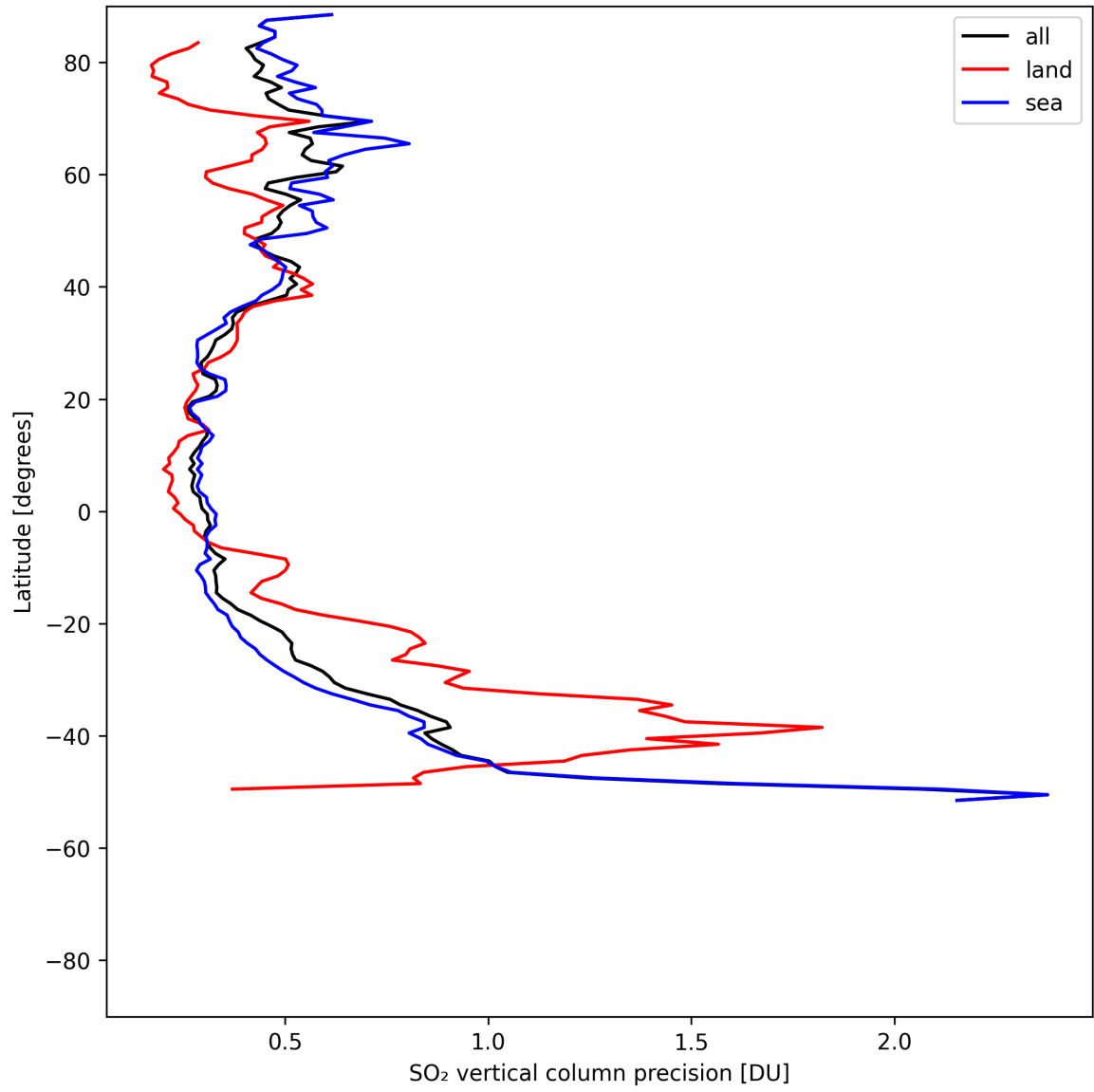


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-07-31 to 2025-08-01.

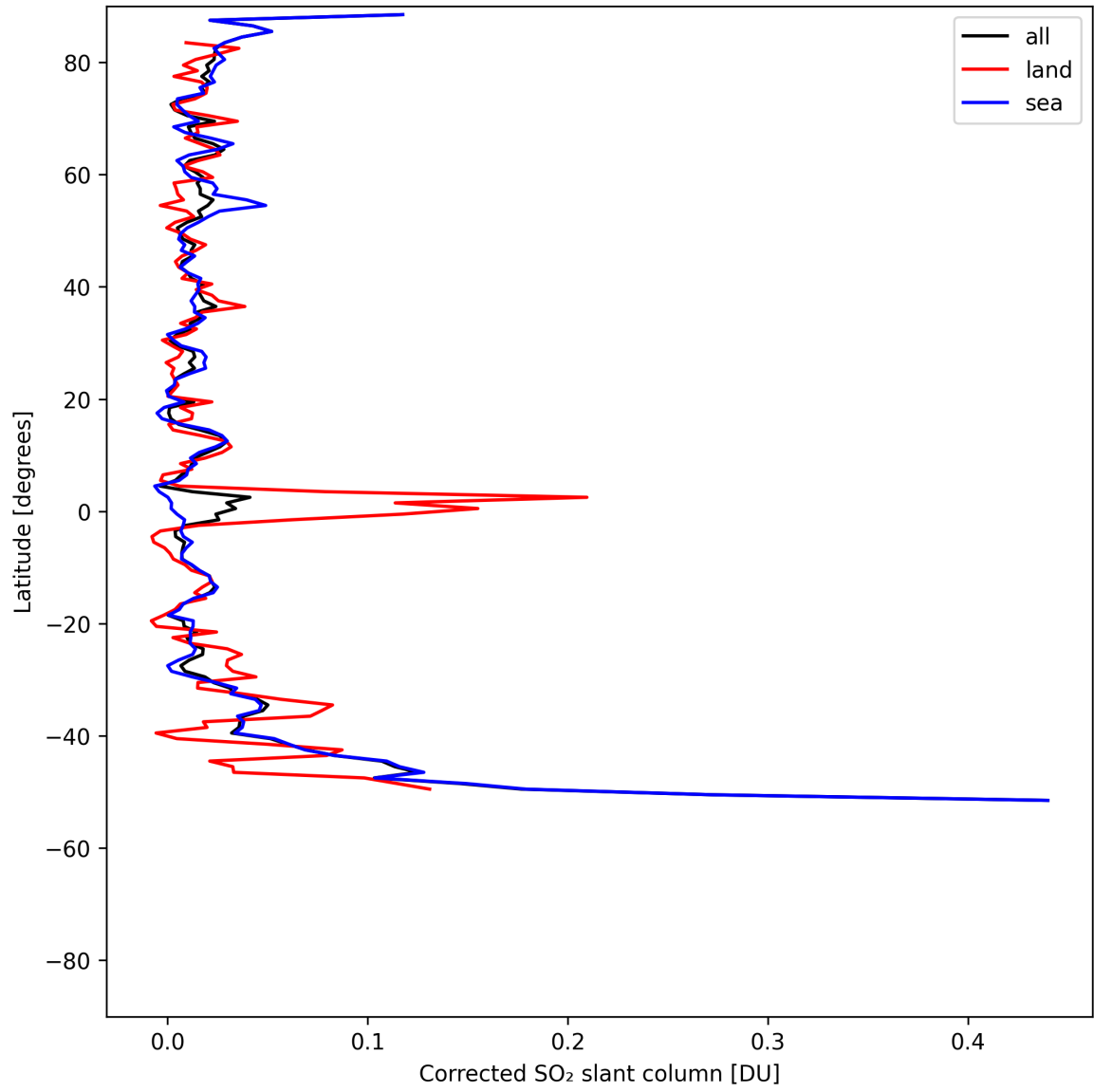


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-07-31 to 2025-08-01.

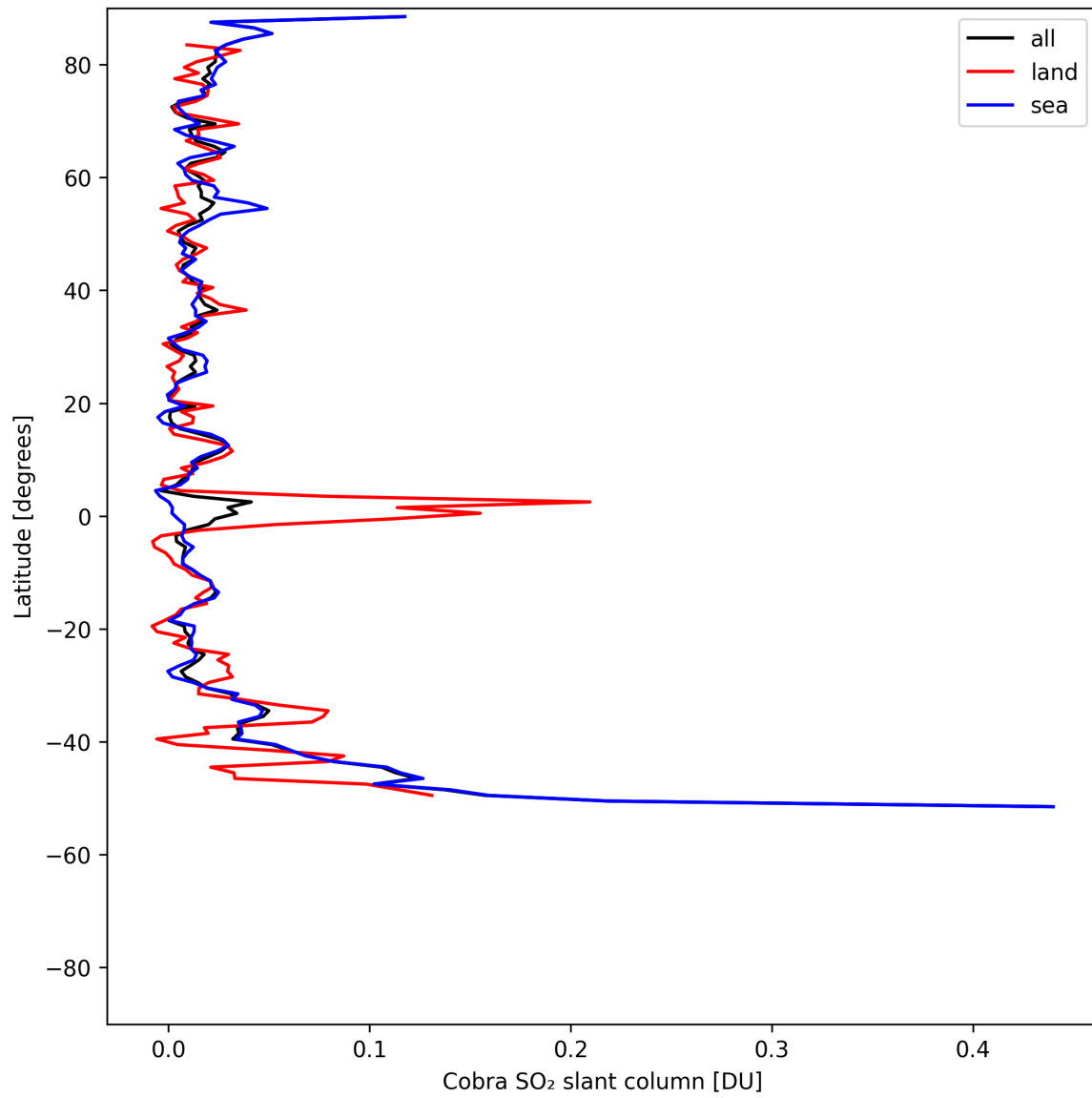


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-07-31 to 2025-08-01.

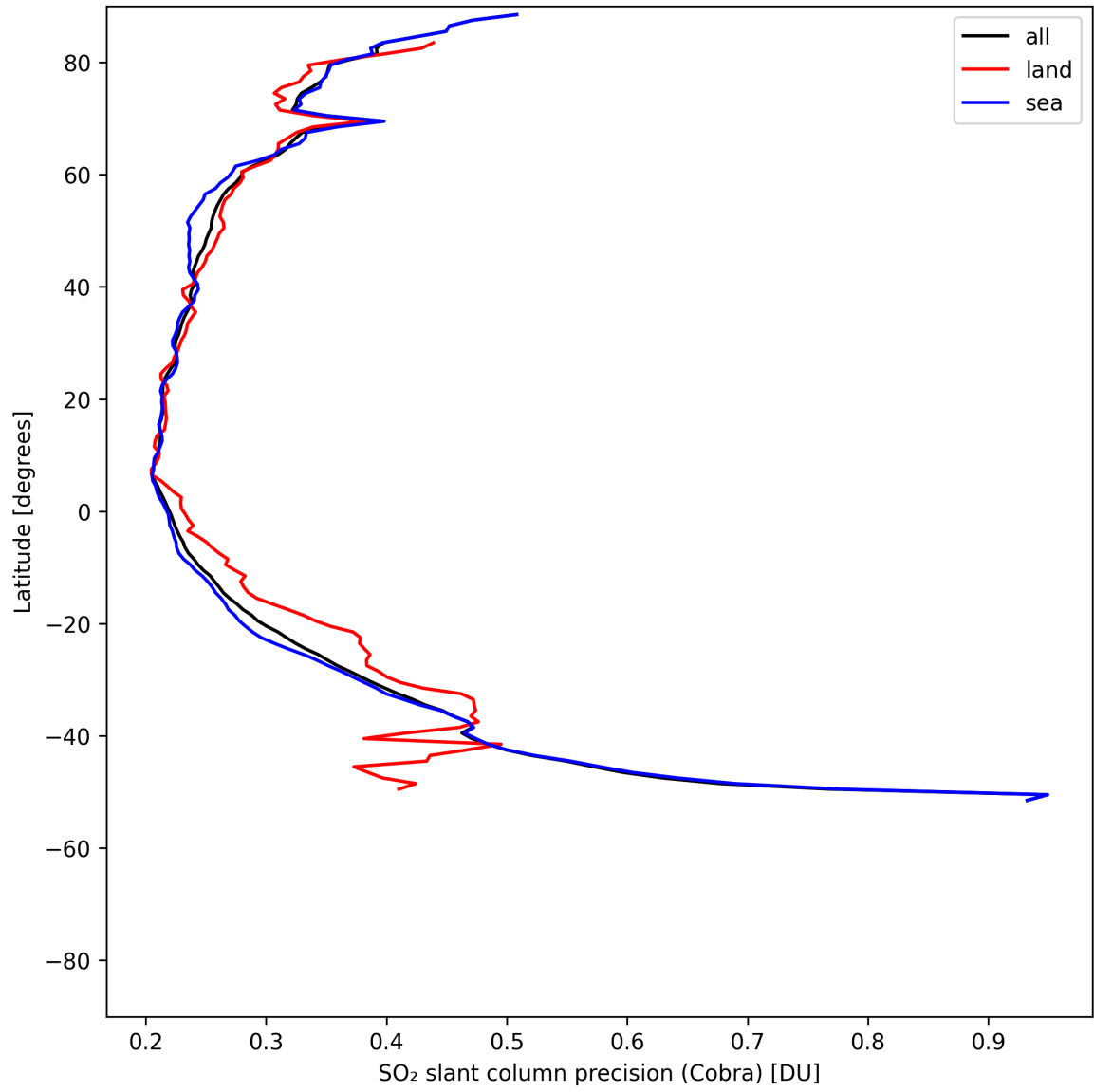


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-07-31 to 2025-08-01.

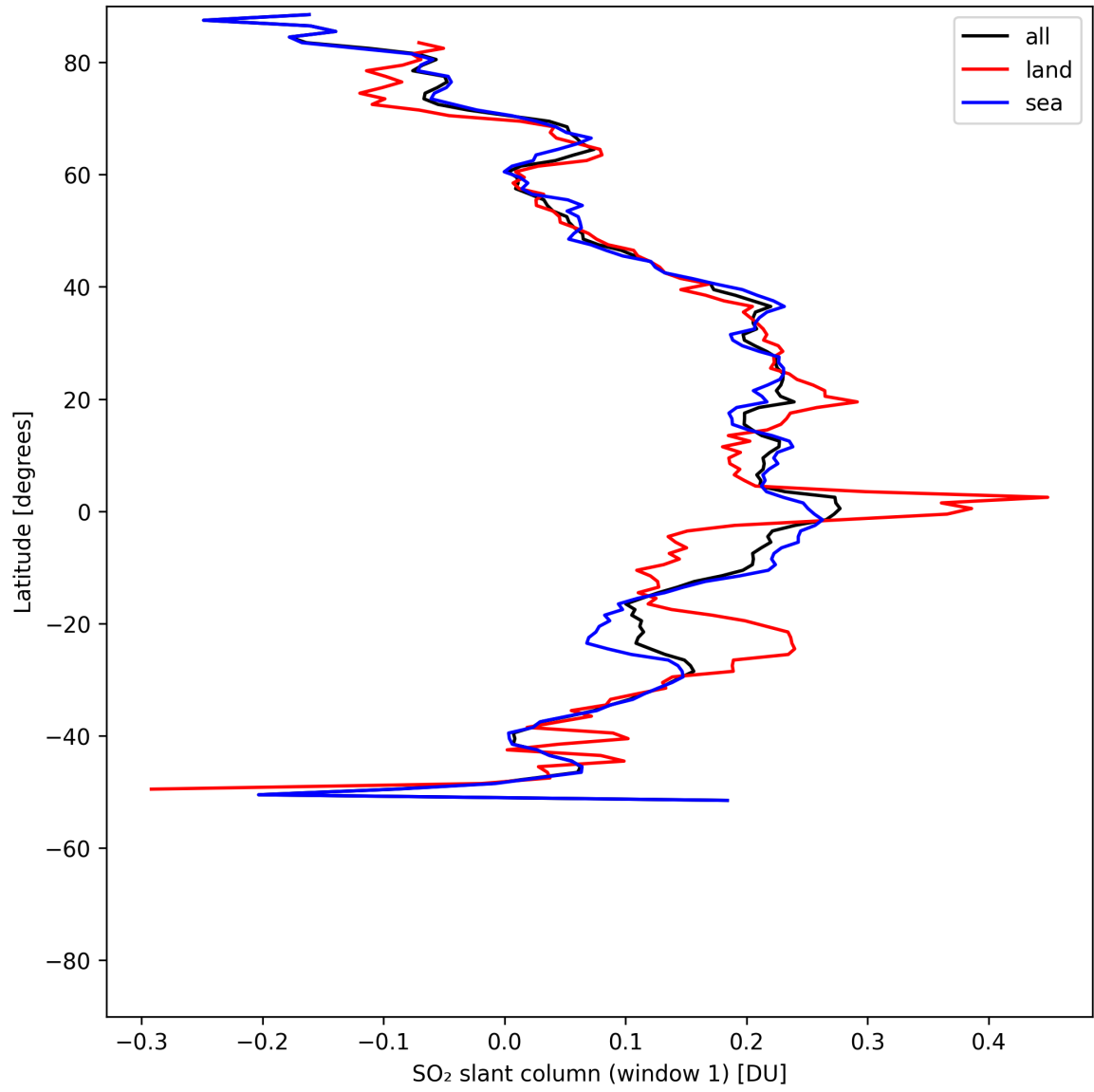


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-07-31 to 2025-08-01.

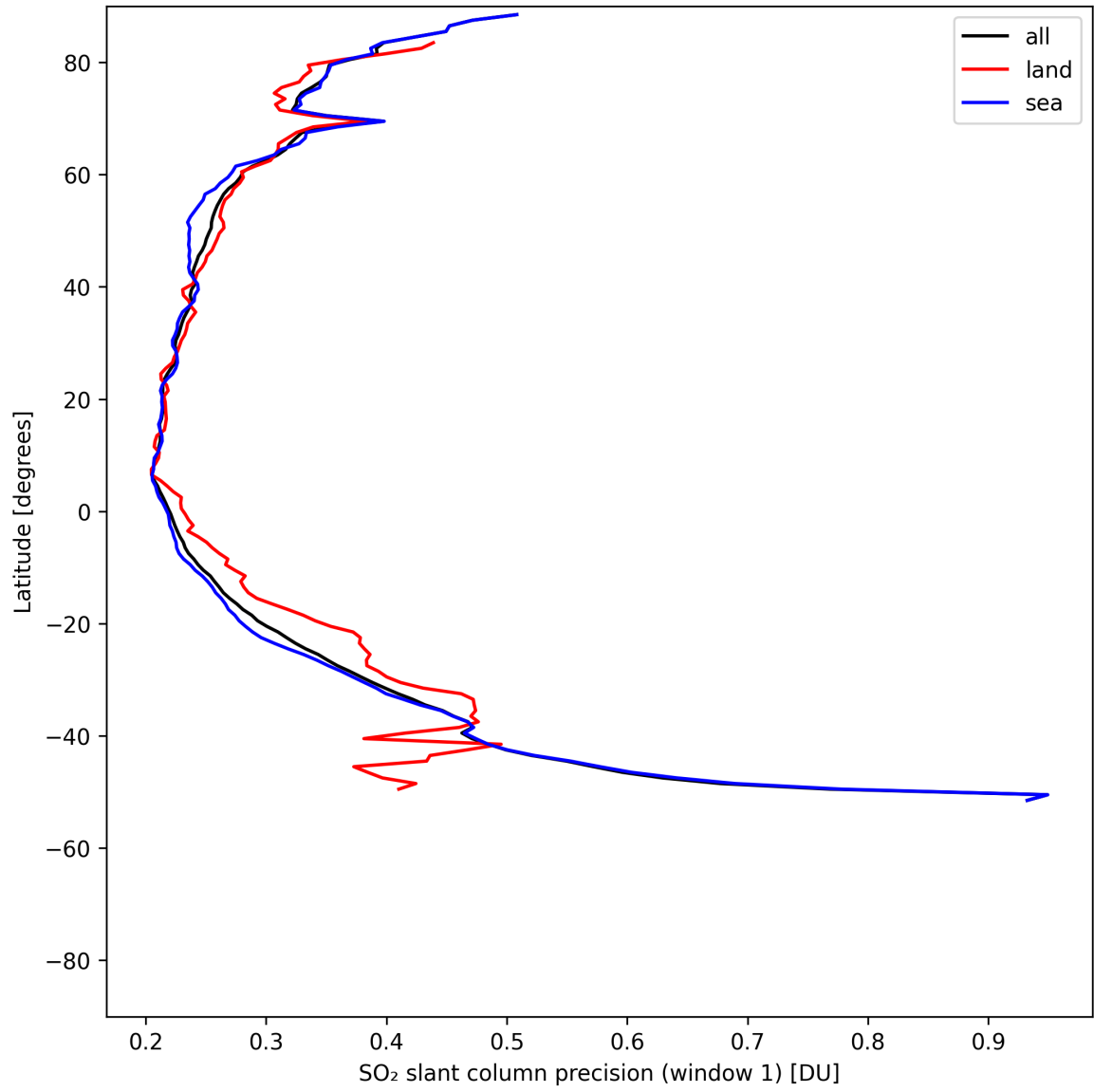


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-07-31 to 2025-08-01.

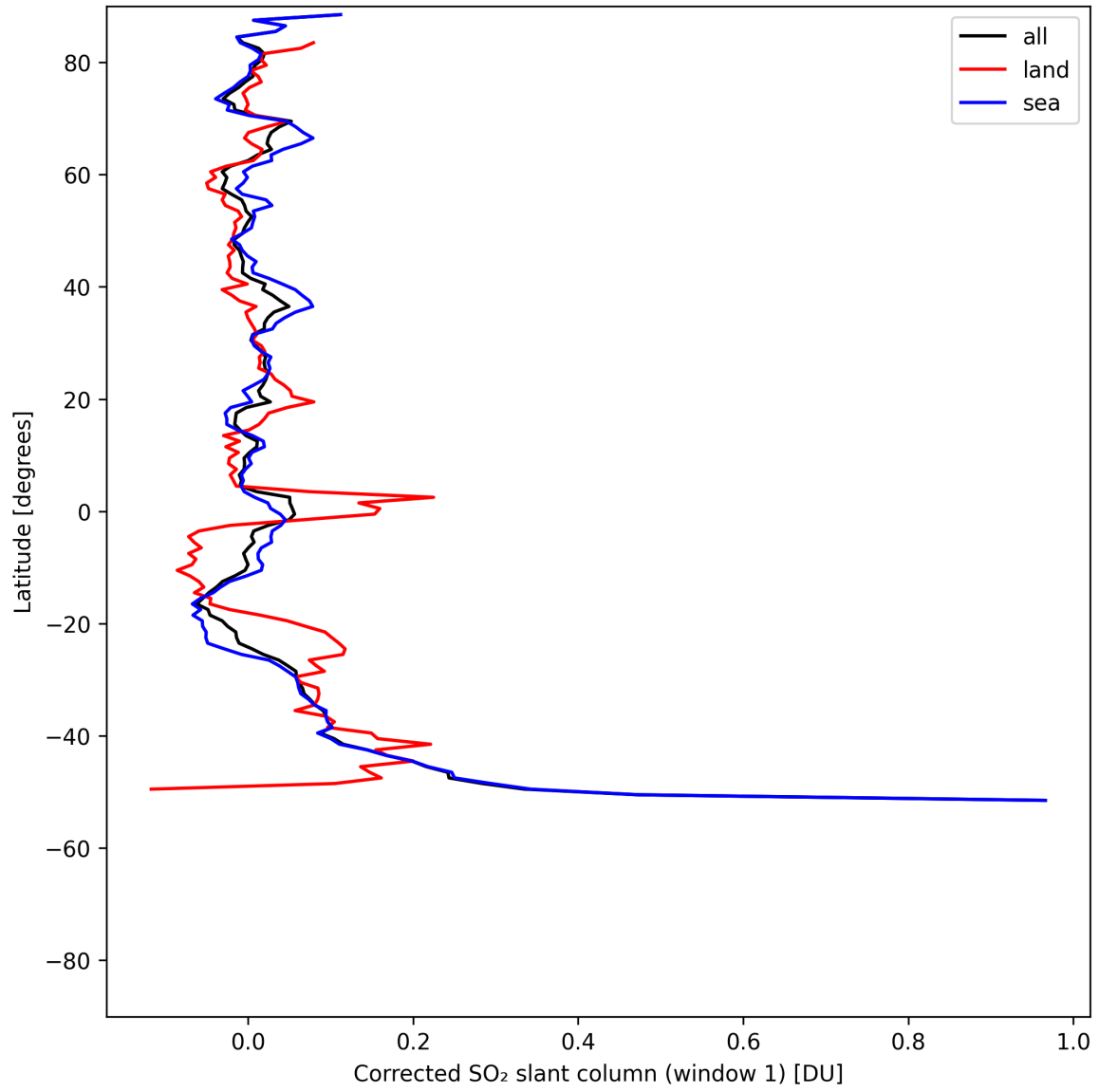


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-07-31 to 2025-08-01.

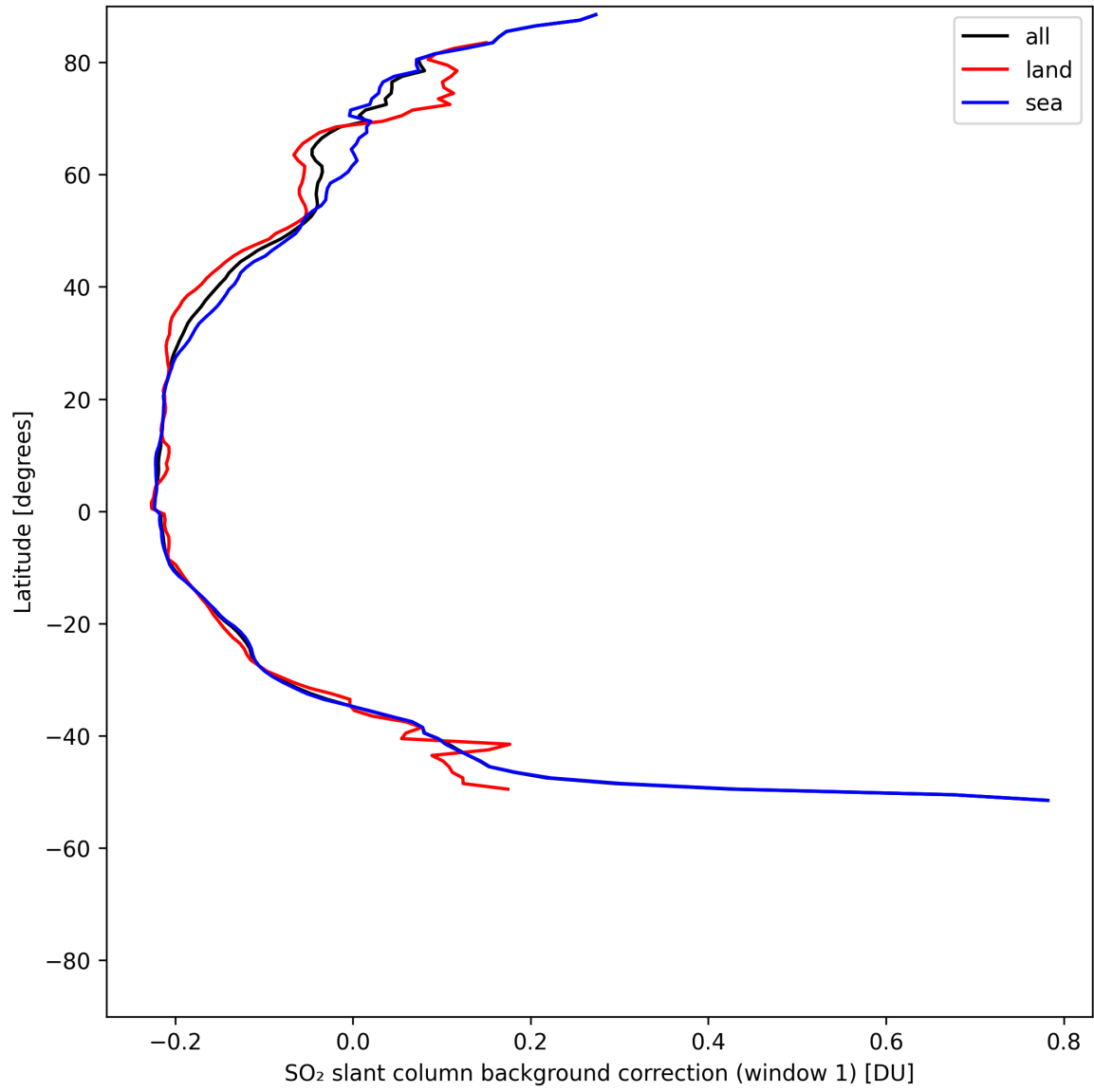


Figure 39: Zonal average of "SO₂ slant column background correction (window 1)" for 2025-07-31 to 2025-08-01.

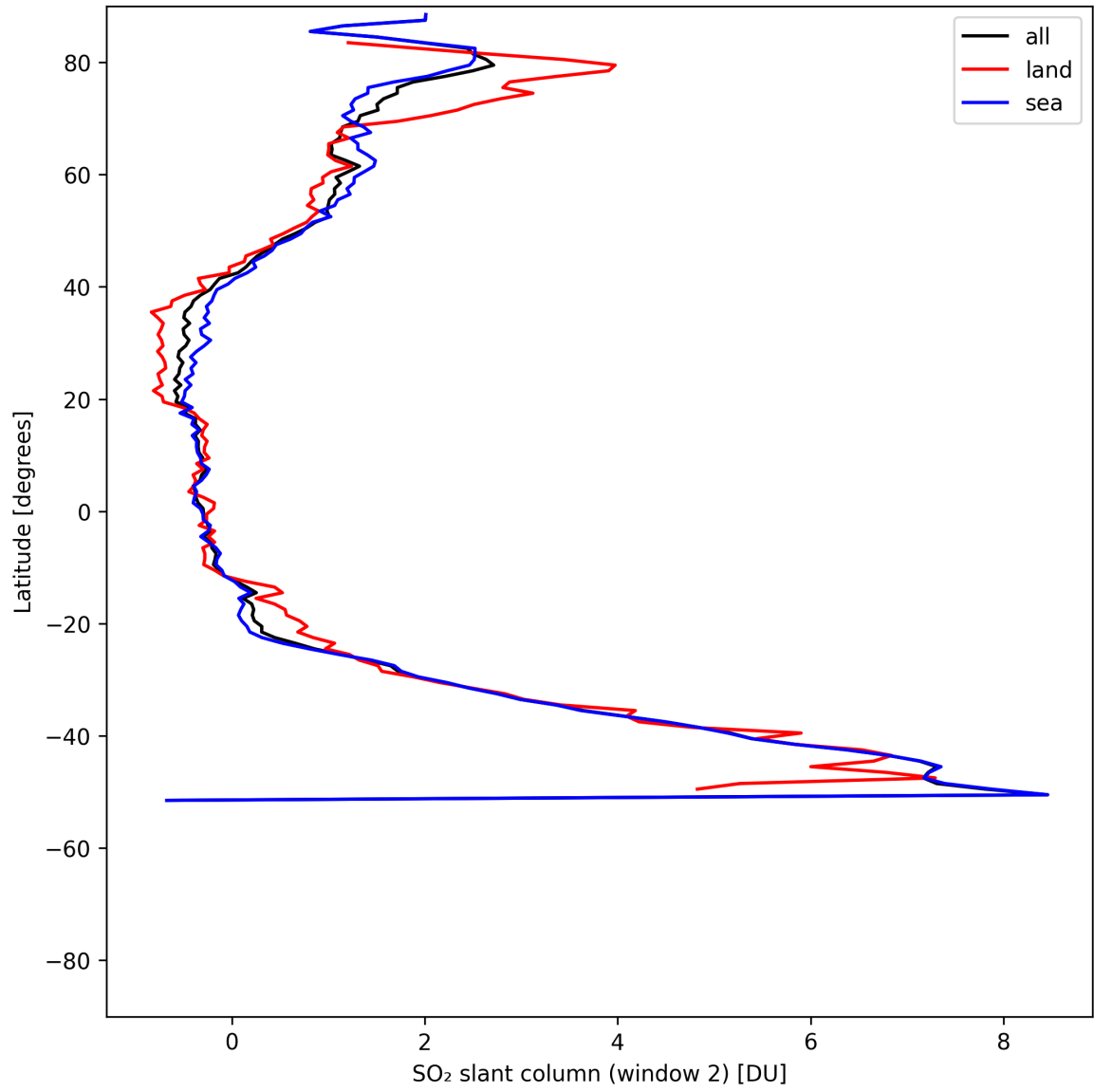


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-07-31 to 2025-08-01.

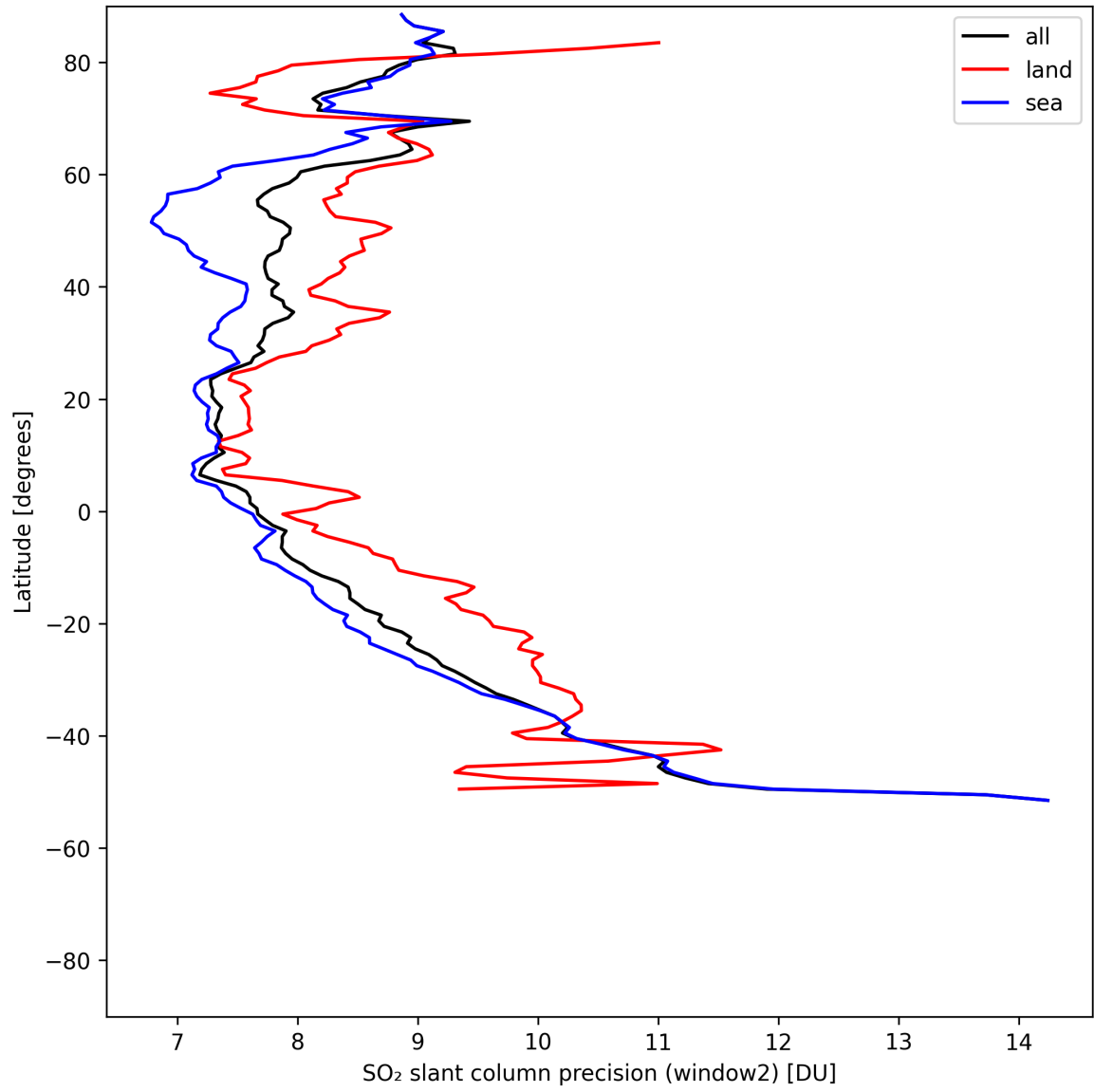


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-07-31 to 2025-08-01.

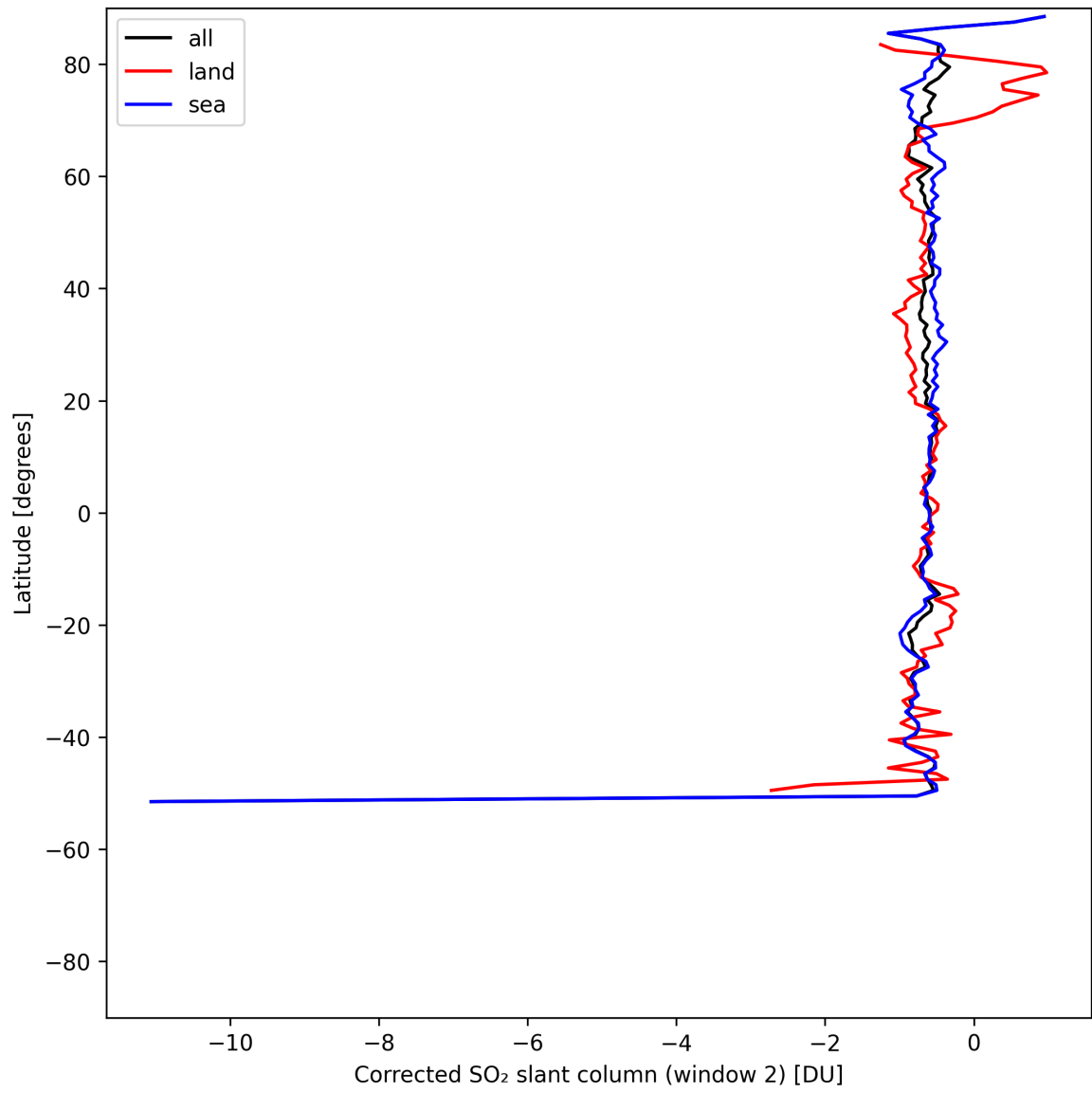


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-07-31 to 2025-08-01.

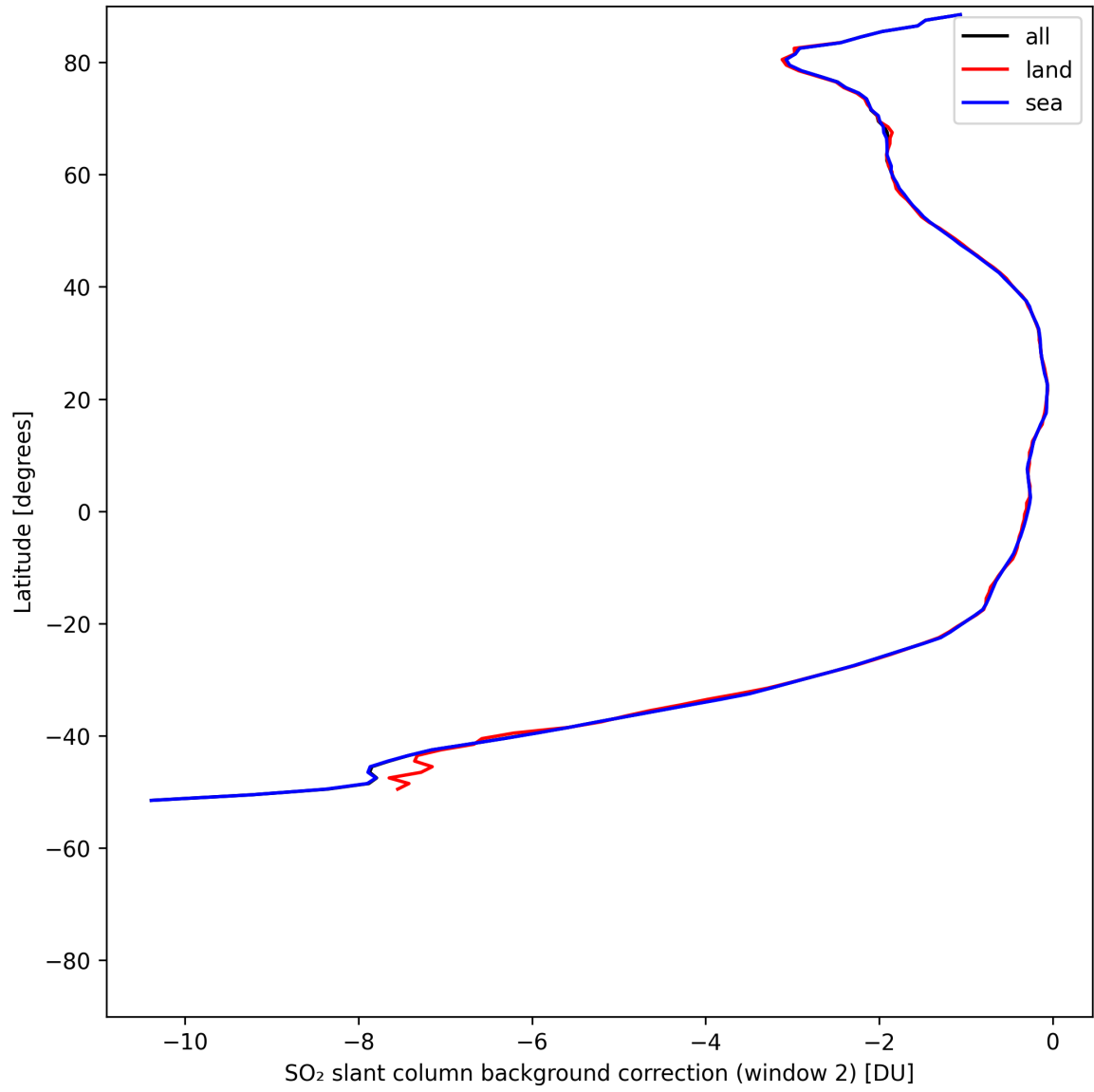


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-07-31 to 2025-08-01.

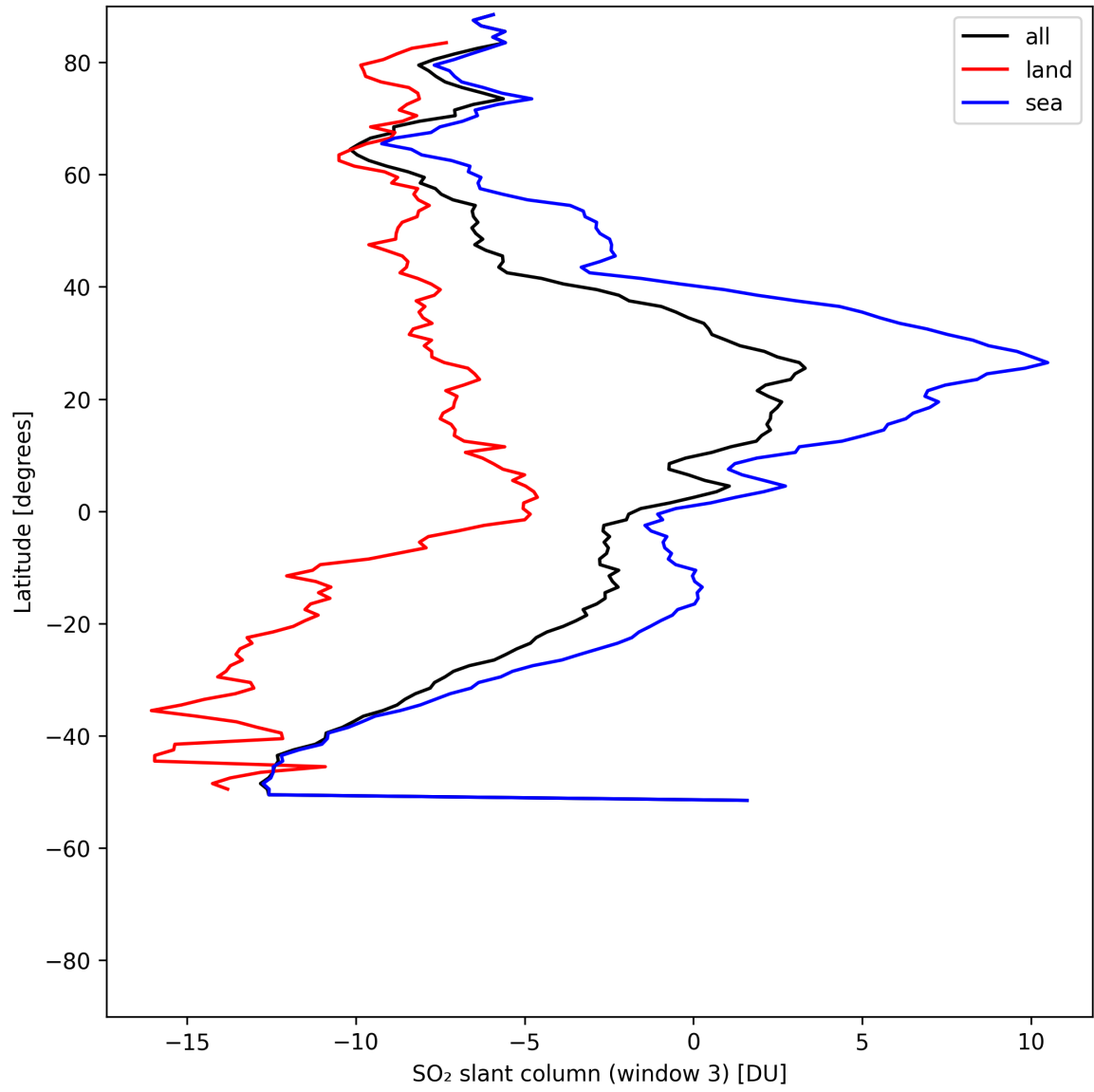


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-07-31 to 2025-08-01.

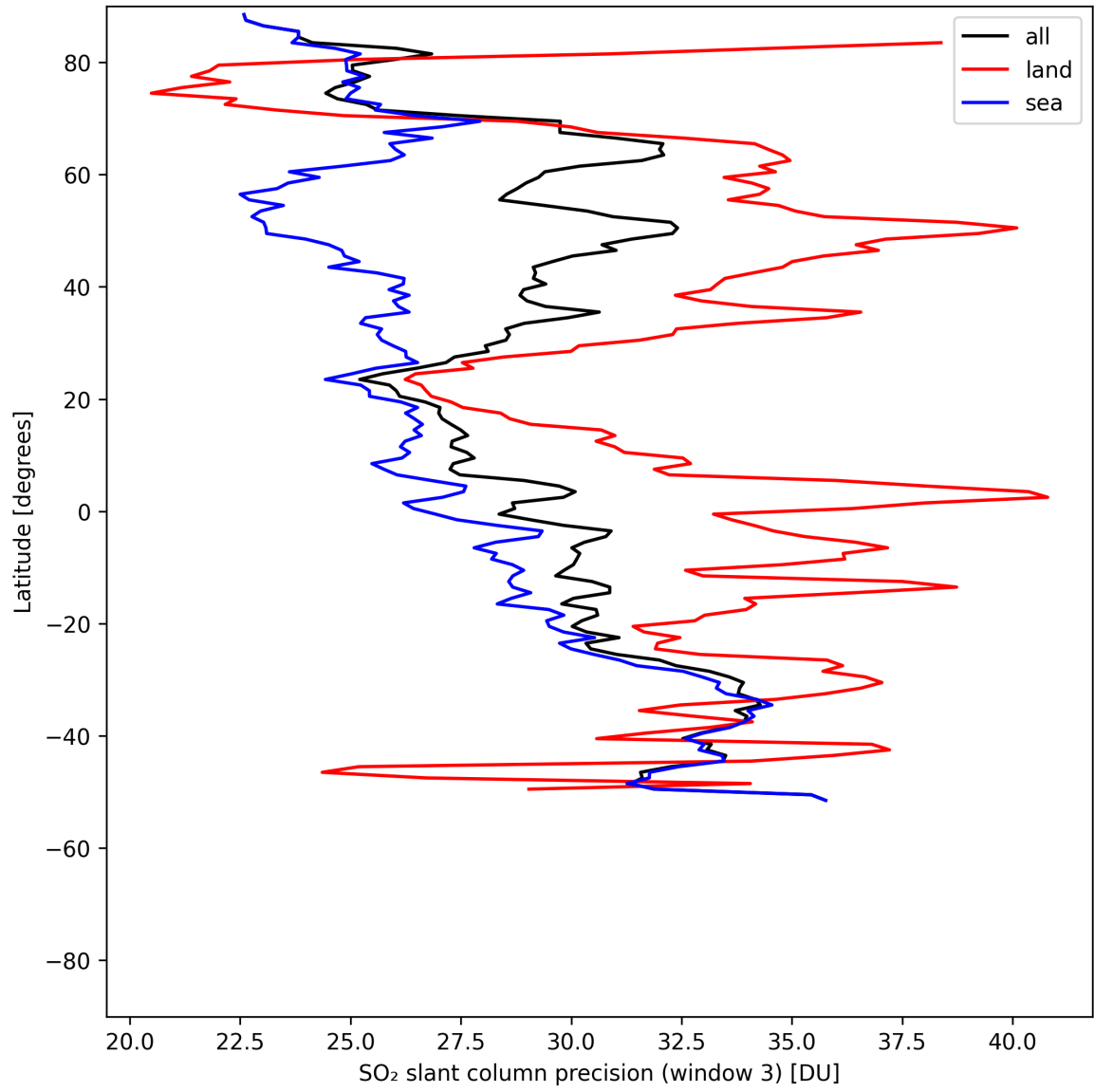


Figure 45: Zonal average of "SO₂ slant column precision (window 3)" for 2025-07-31 to 2025-08-01.

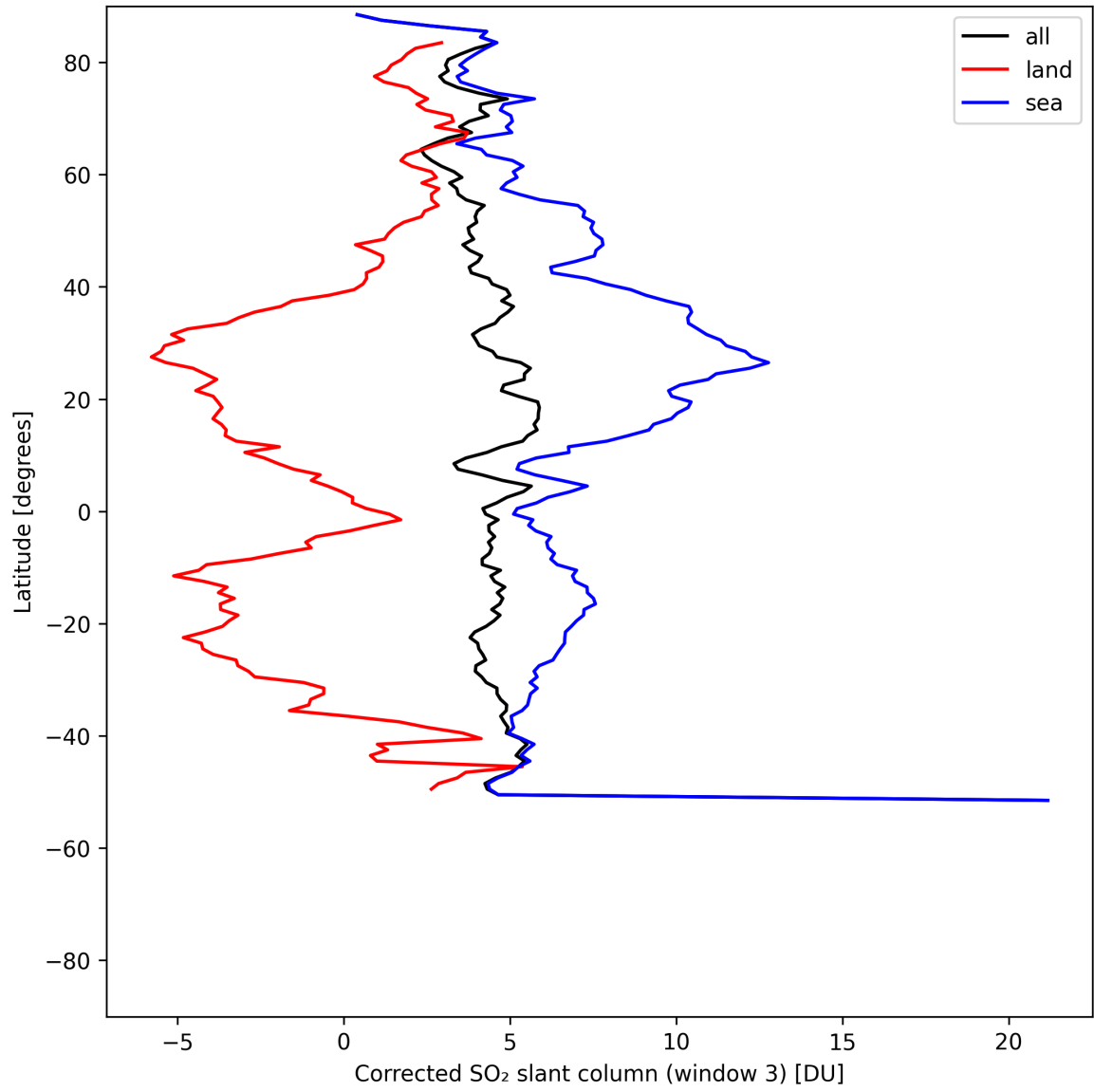


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-07-31 to 2025-08-01.

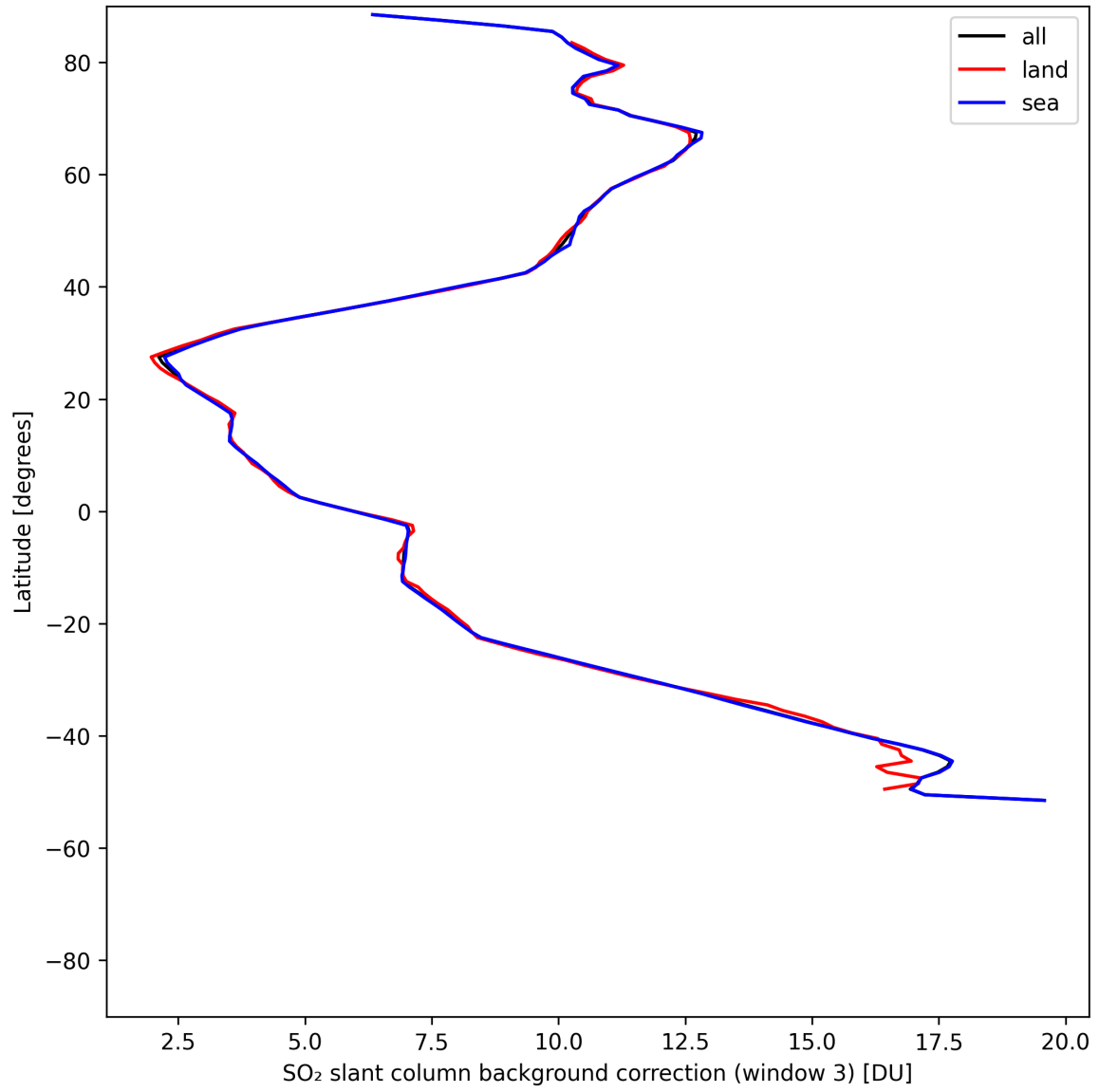


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-07-31 to 2025-08-01.

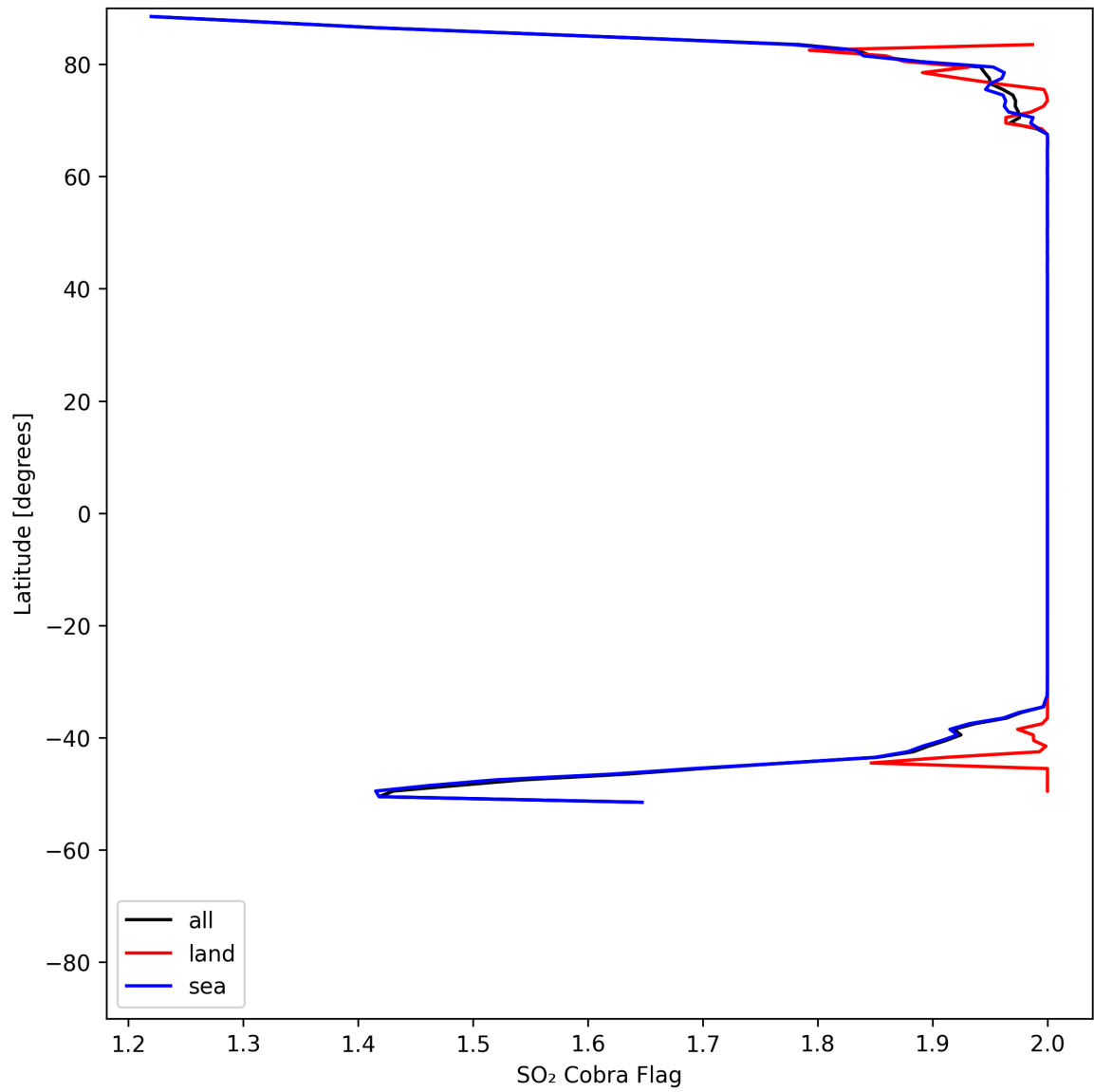


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-07-31 to 2025-08-01.

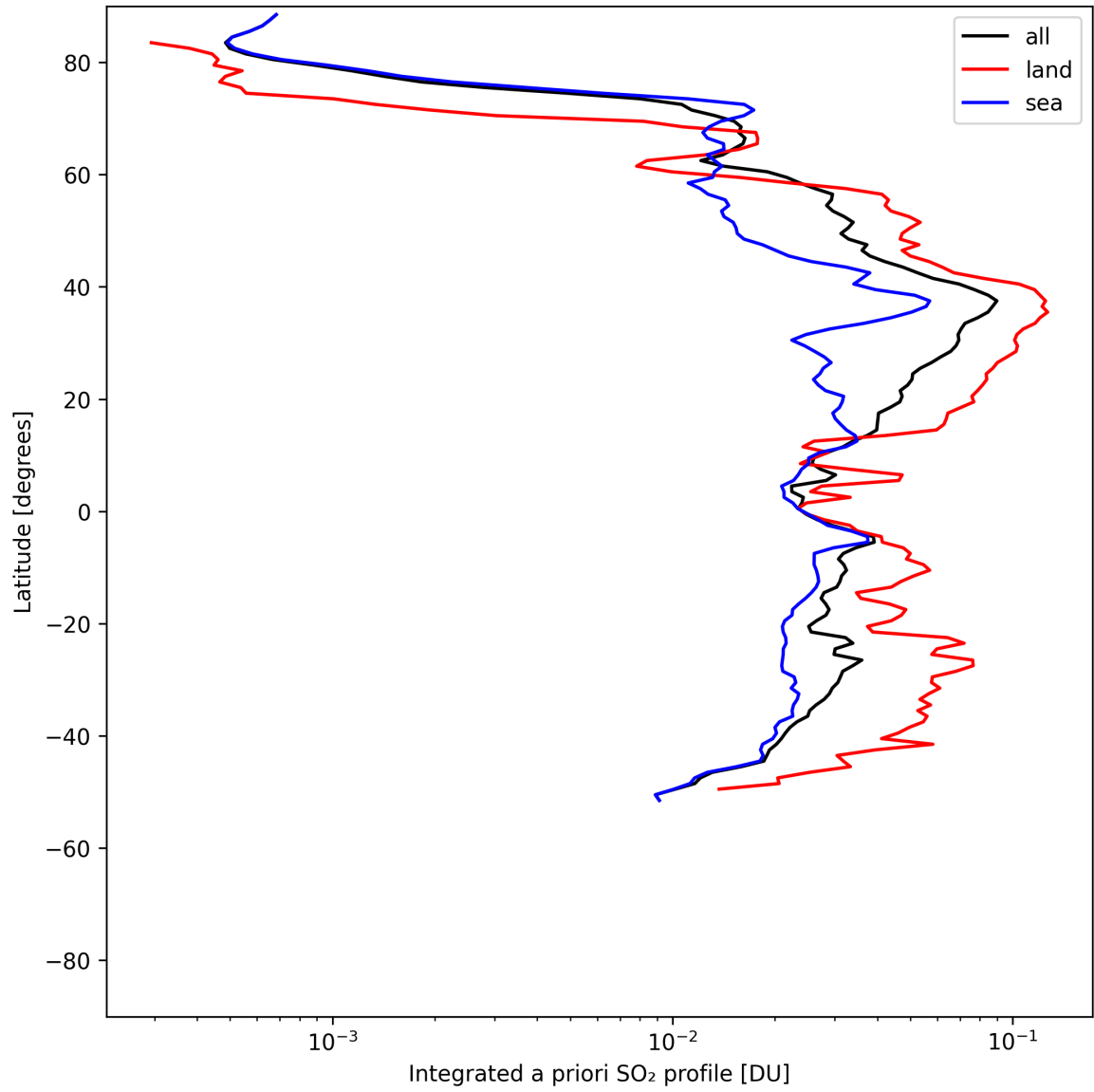


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-07-31 to 2025-08-01.

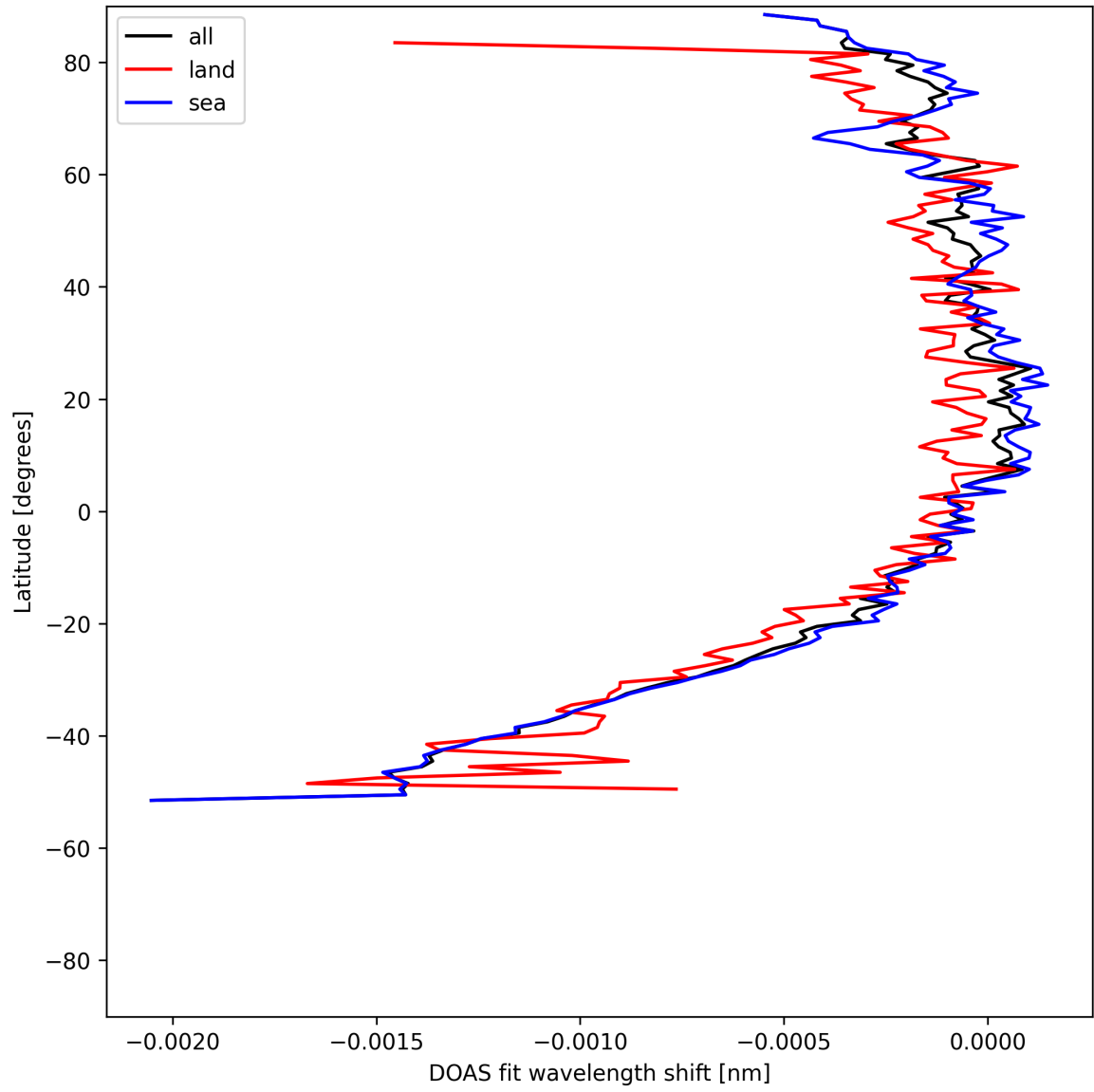


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-07-31 to 2025-08-01.

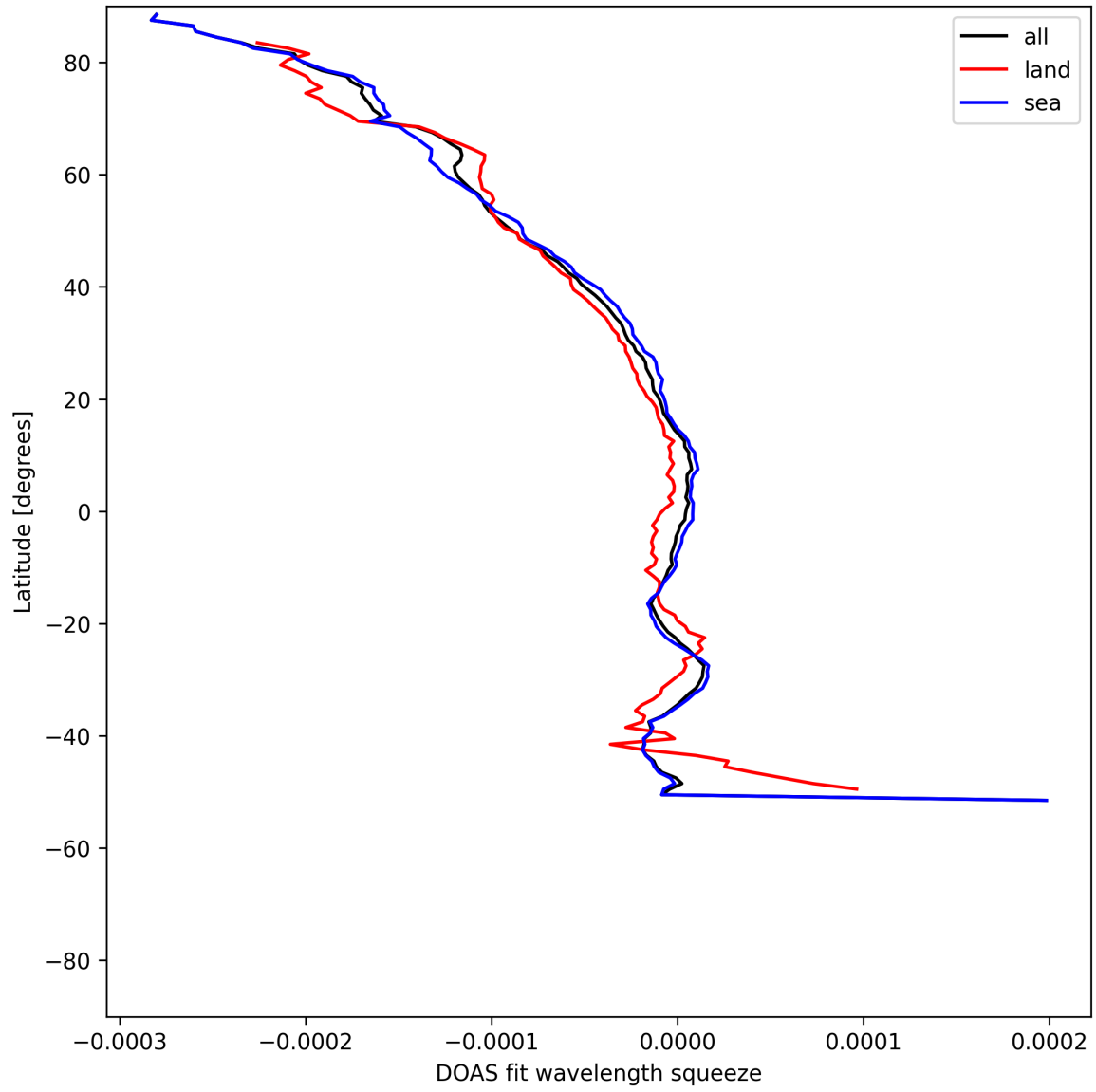


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-07-31 to 2025-08-01.

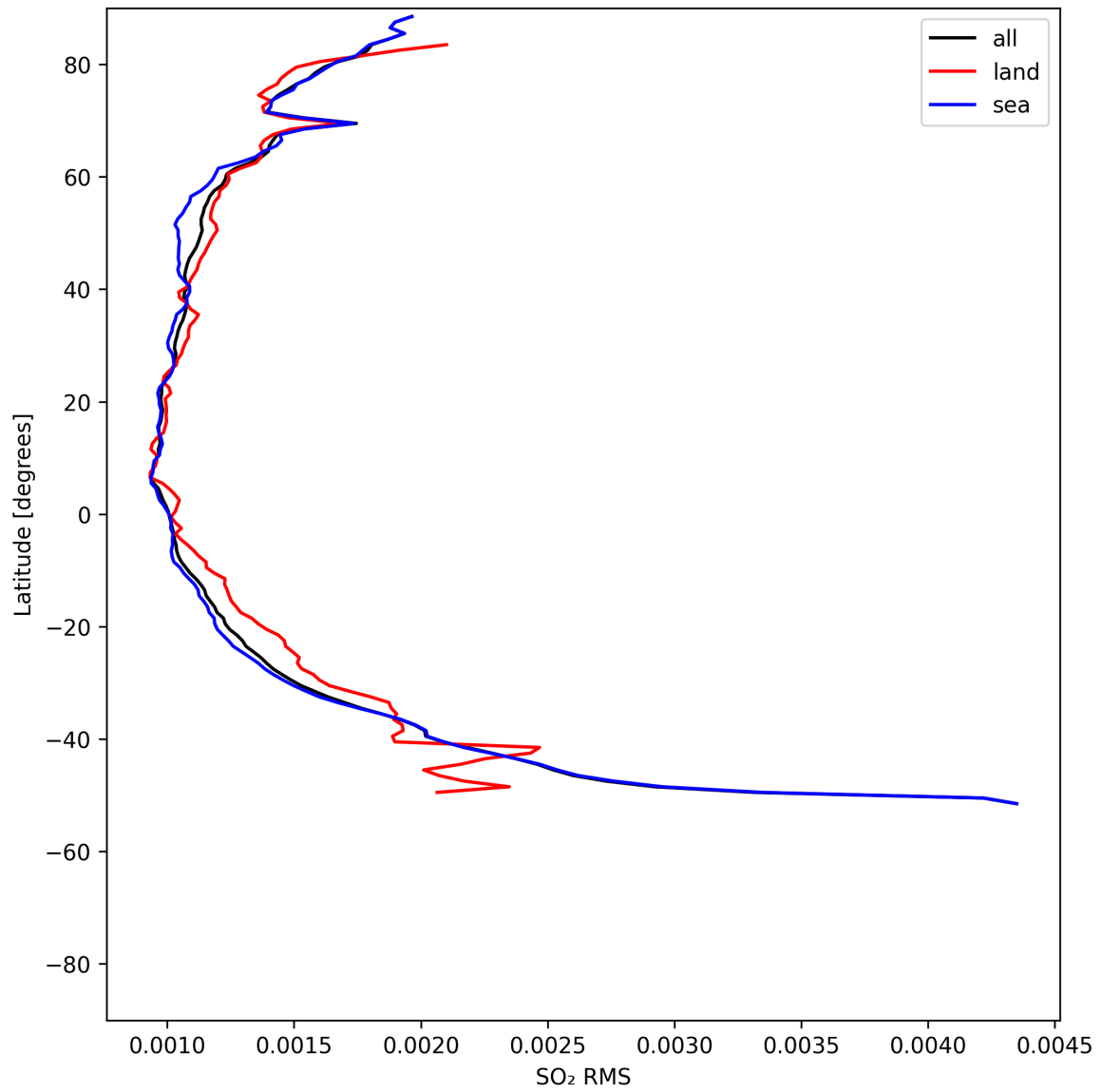


Figure 52: Zonal average of “SO₂ RMS” for 2025-07-31 to 2025-08-01.

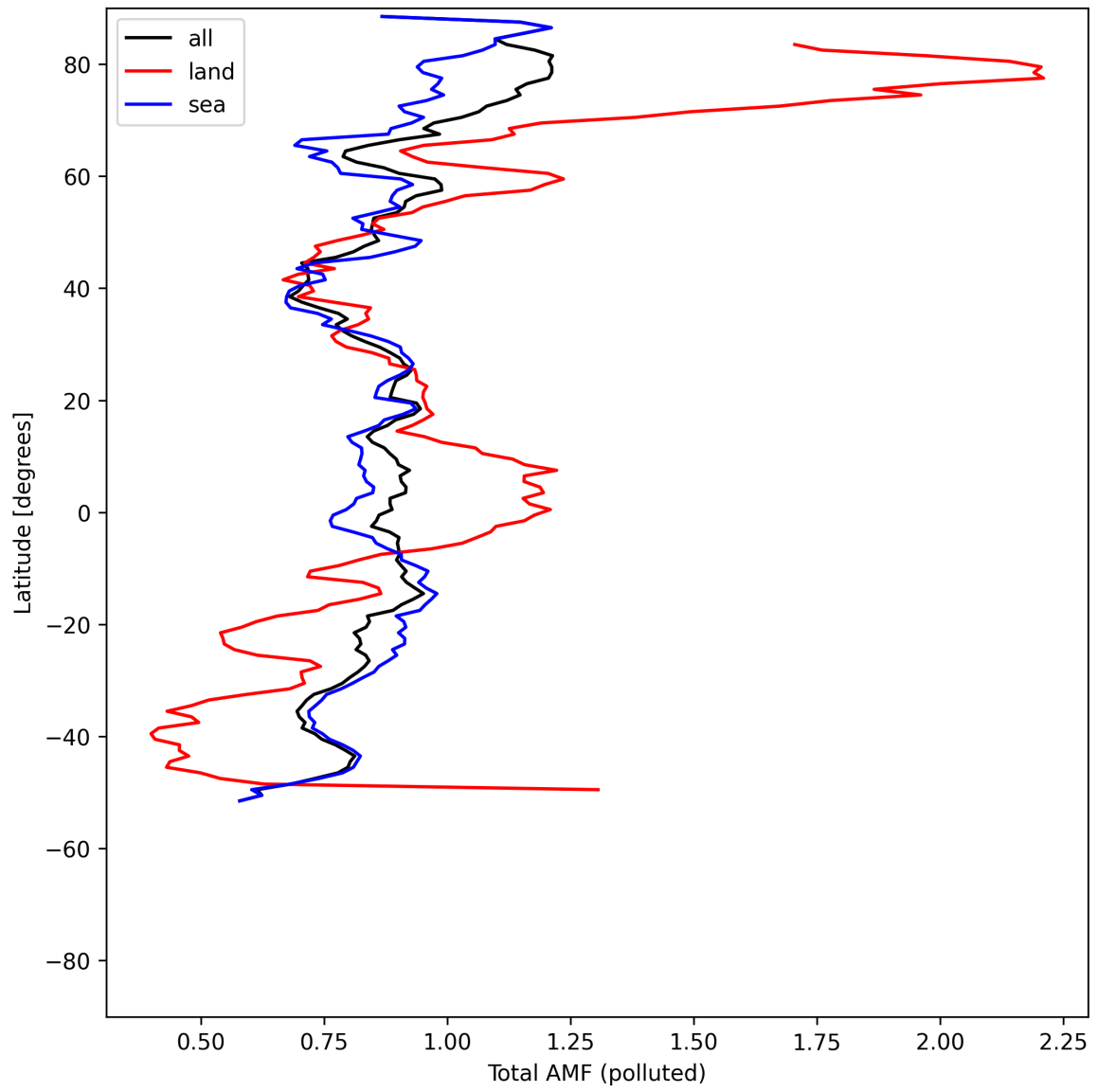


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-07-31 to 2025-08-01.

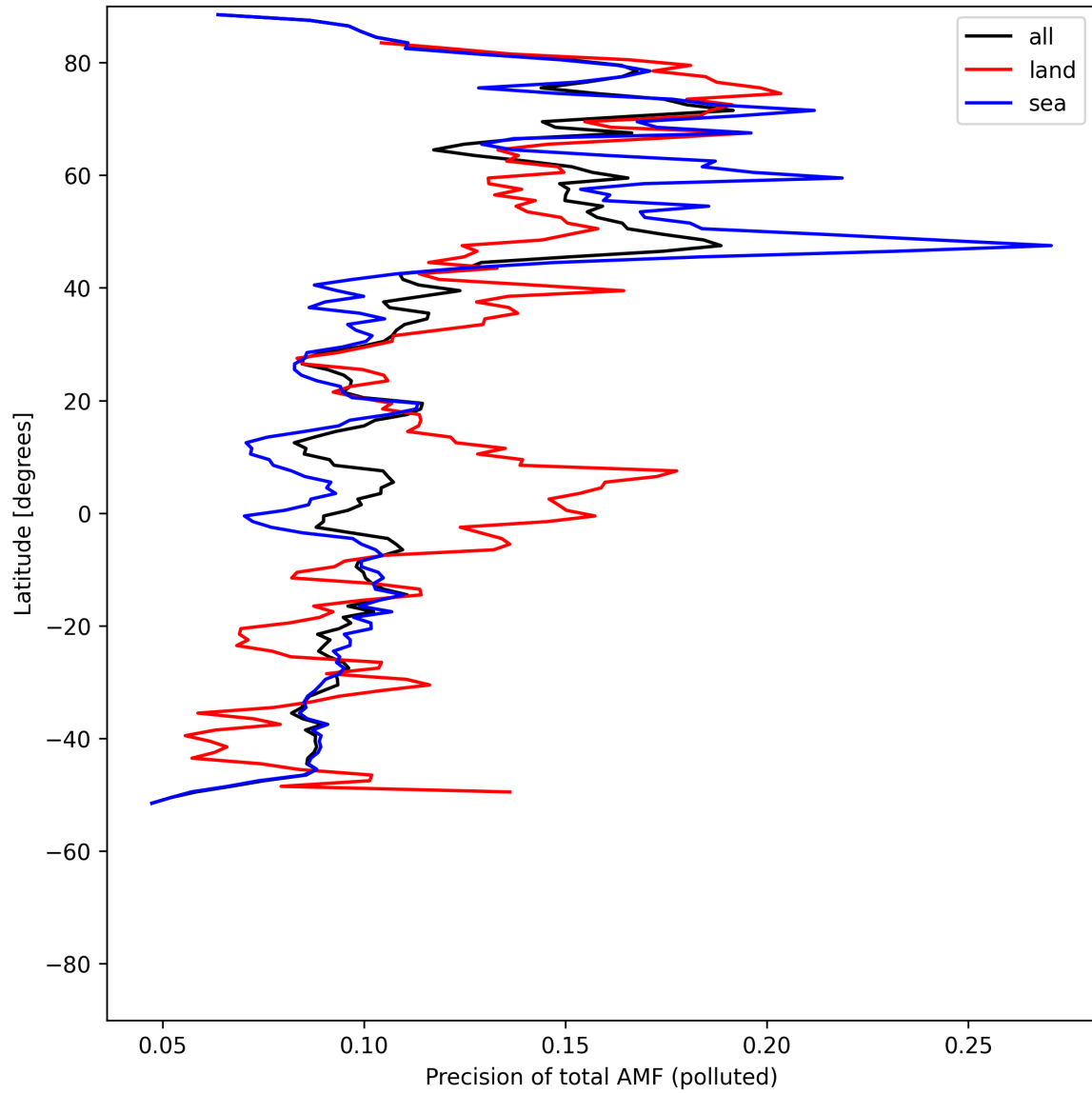


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-07-31 to 2025-08-01.

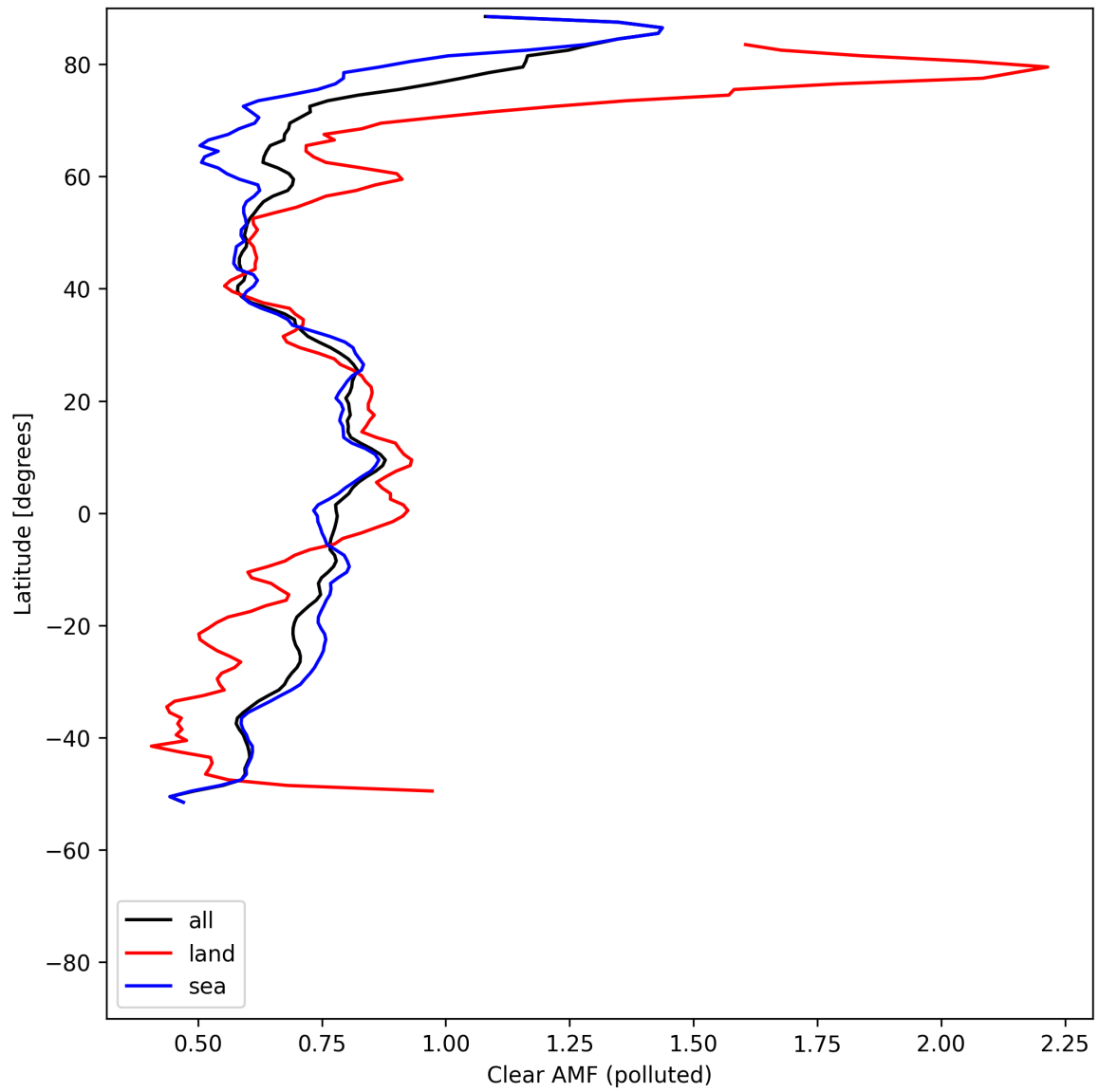


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-07-31 to 2025-08-01.

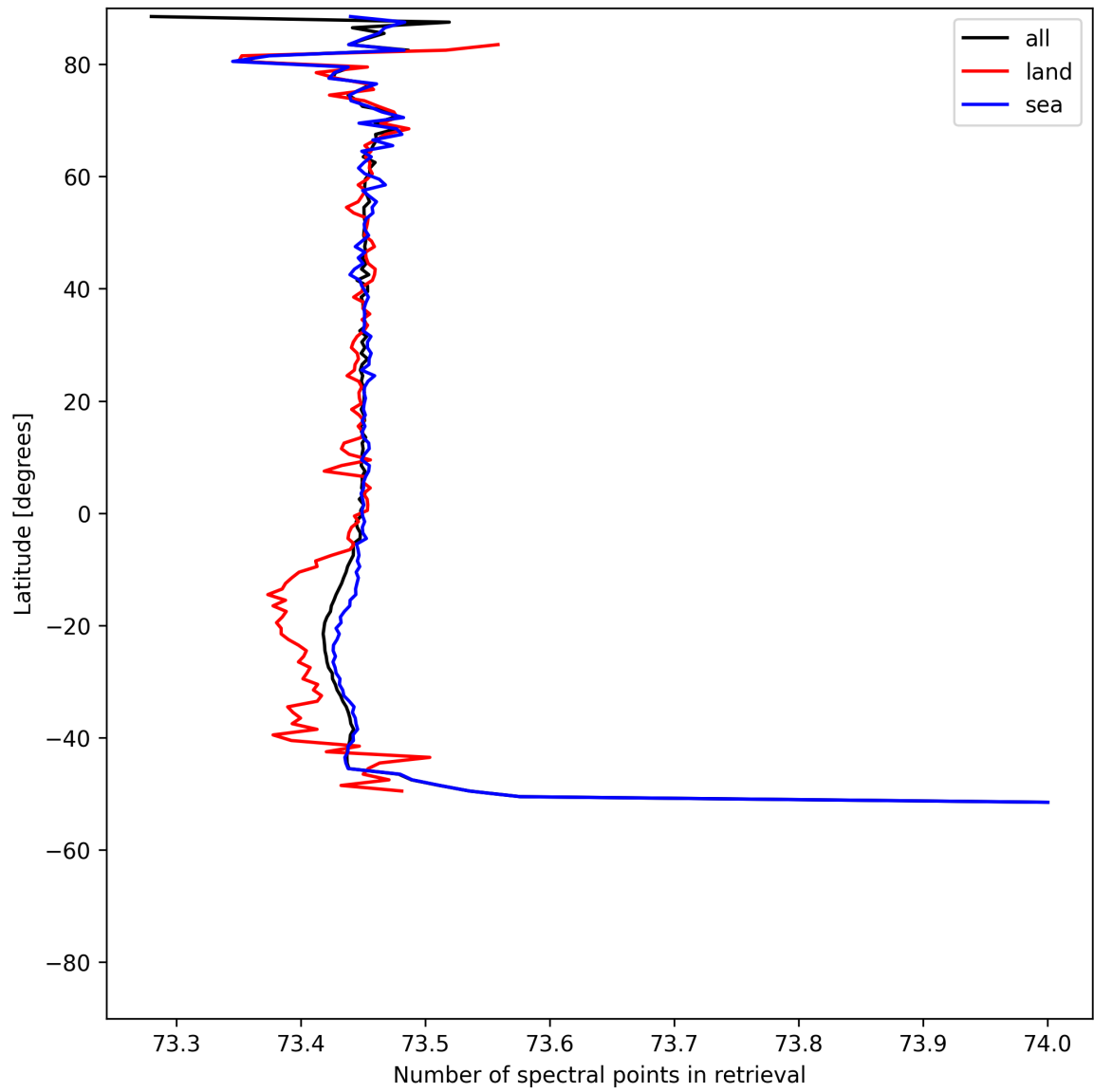


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-07-31 to 2025-08-01.

8 Histograms

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

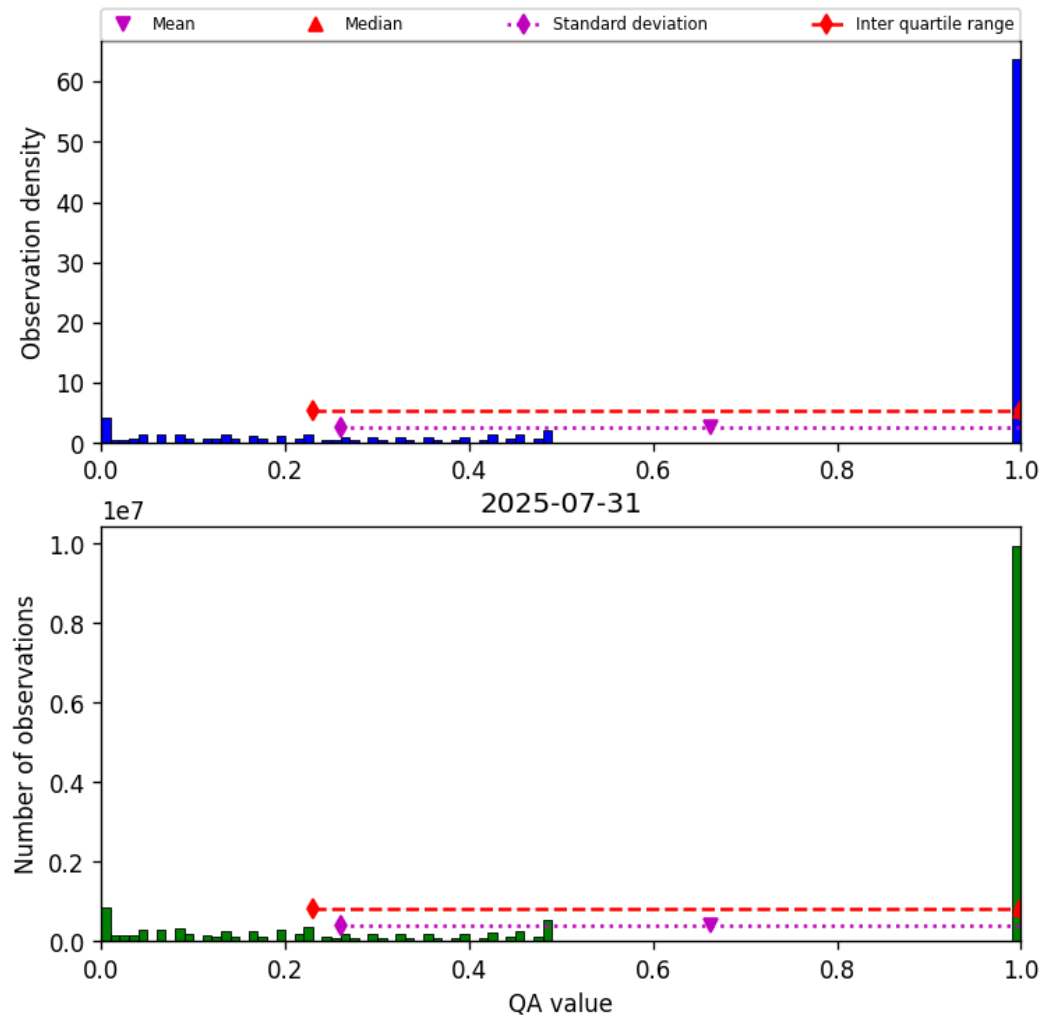


Figure 57: Histogram of “QA value” for 2025-07-31 to 2025-08-01

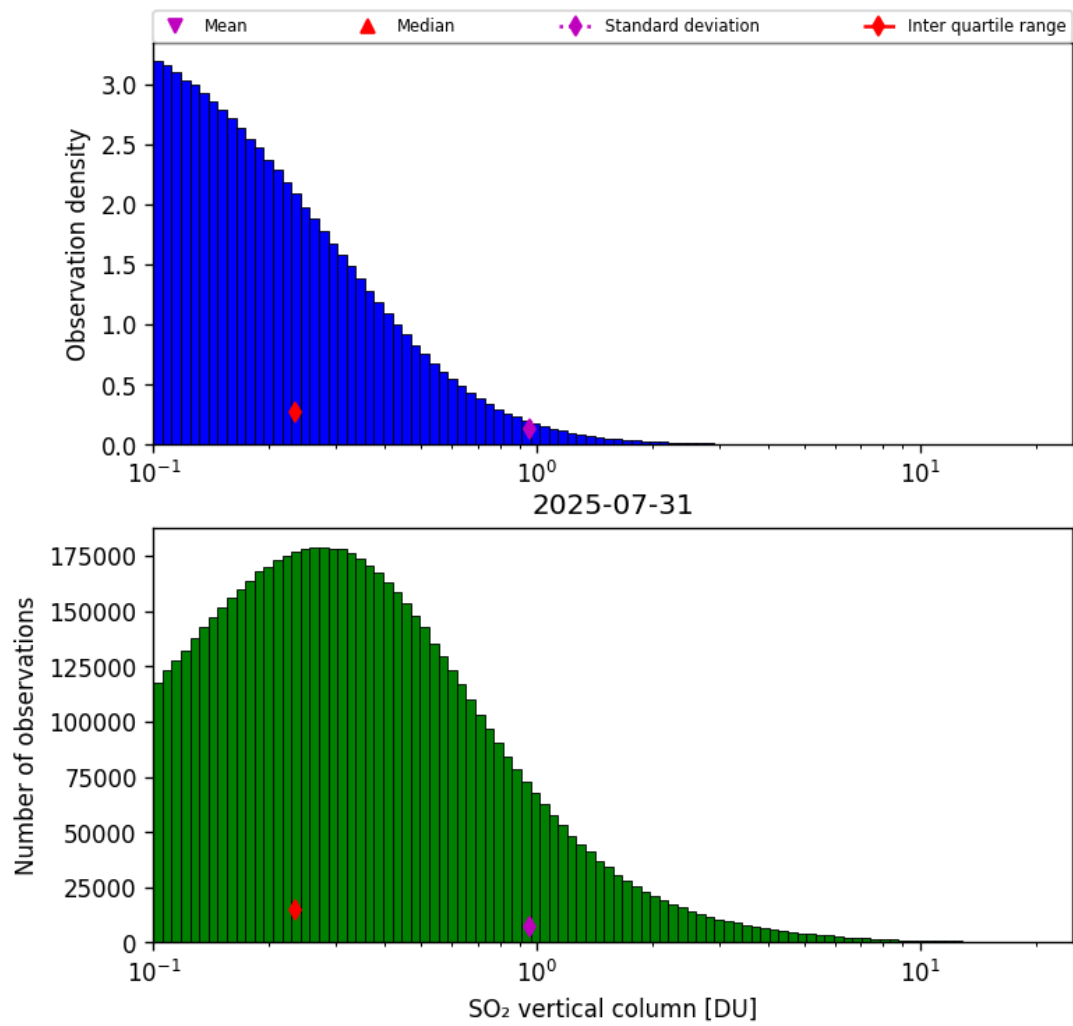


Figure 58: Histogram of “SO₂ vertical column” for 2025-07-31 to 2025-08-01

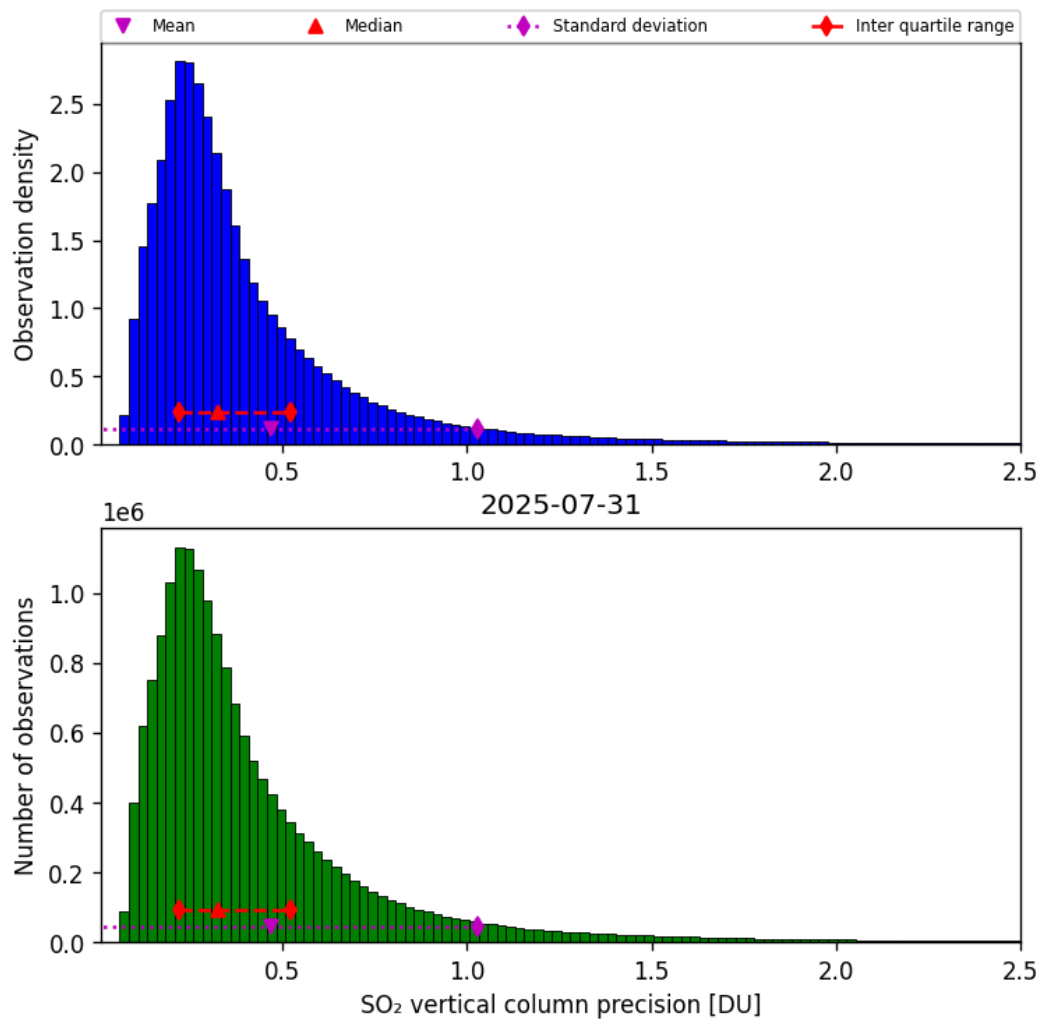


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-07-31 to 2025-08-01

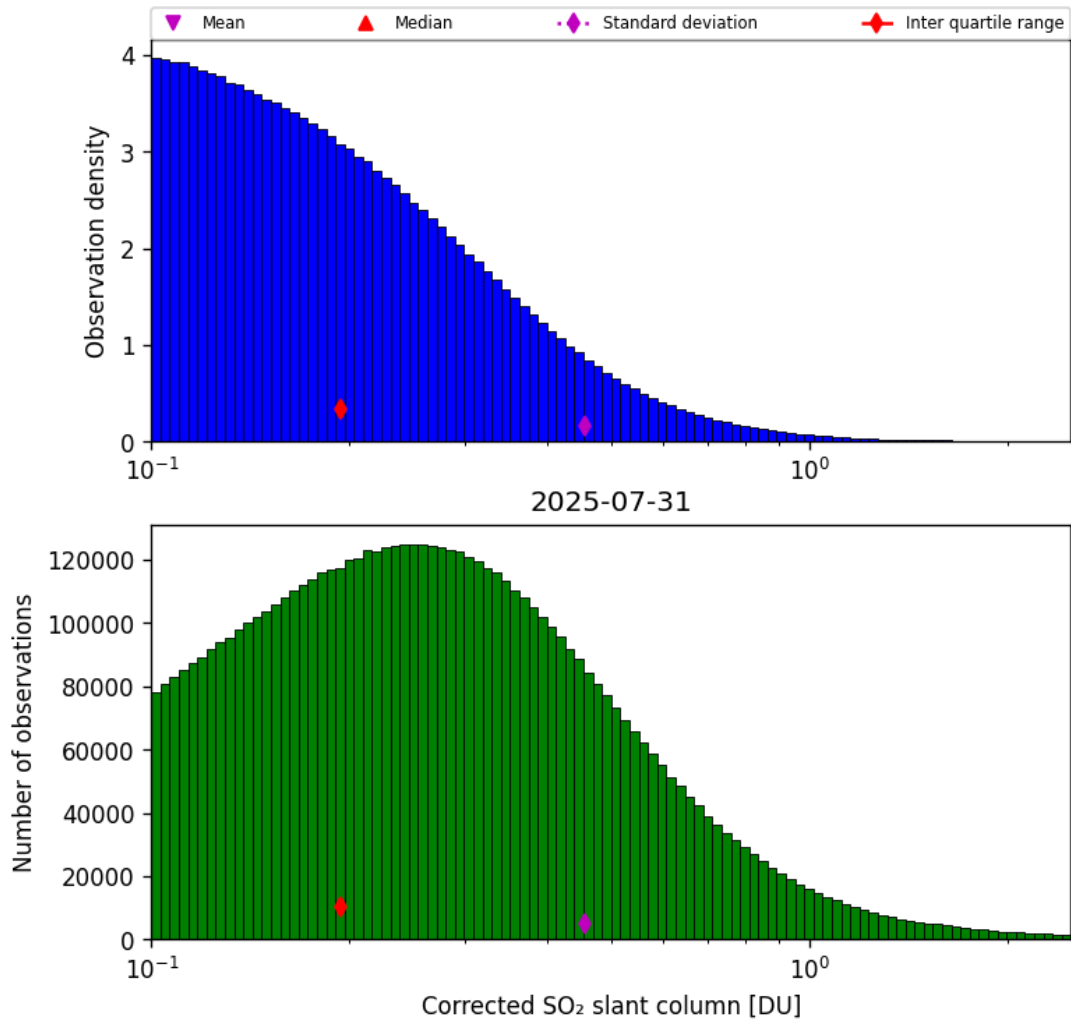


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-07-31 to 2025-08-01

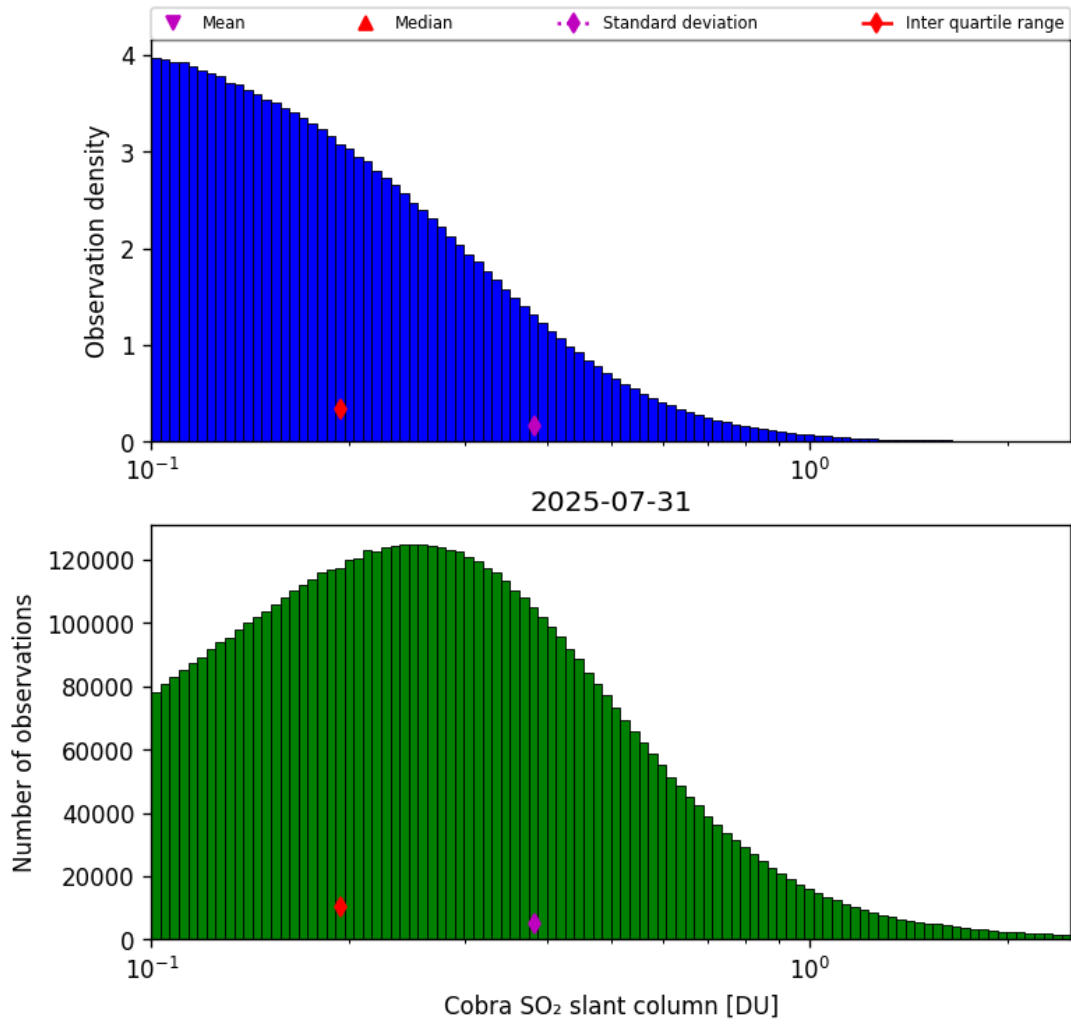


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-07-31 to 2025-08-01

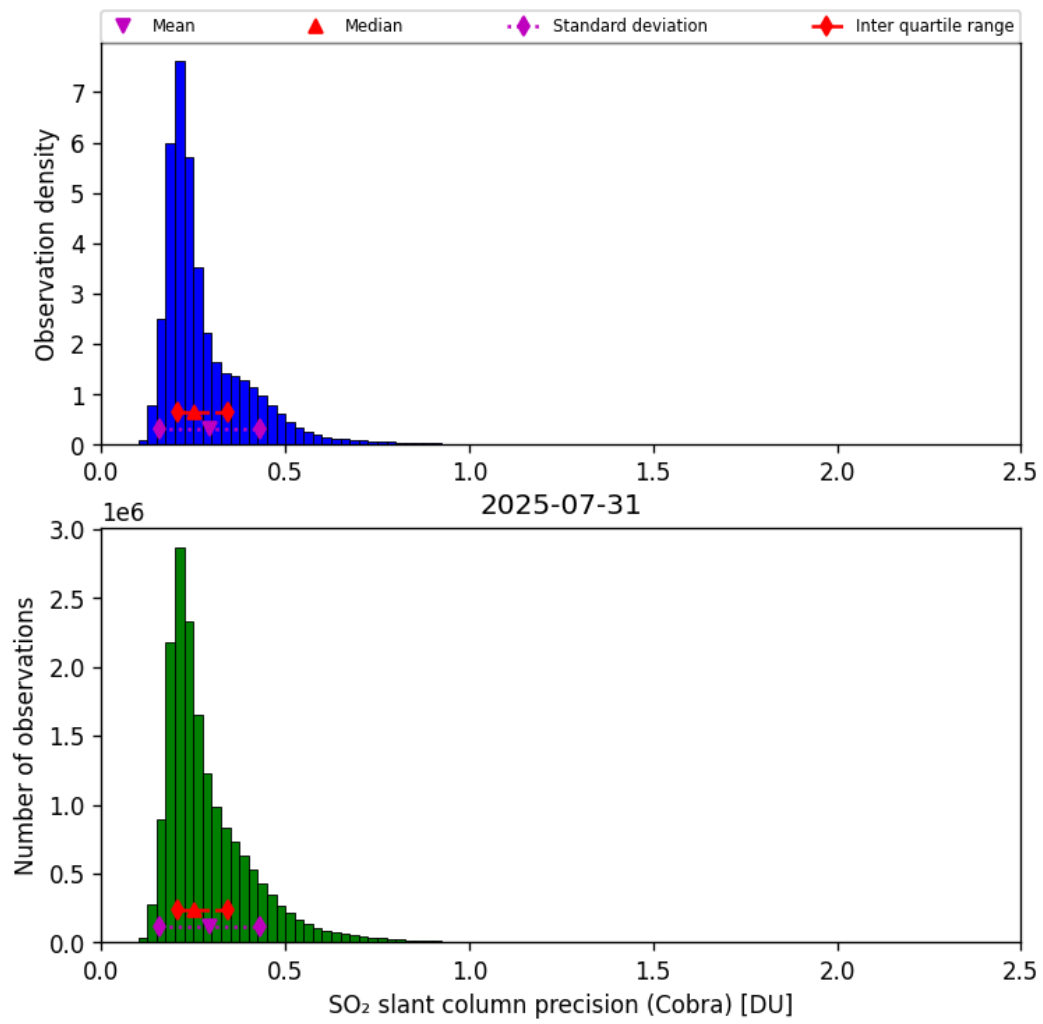


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-07-31 to 2025-08-01

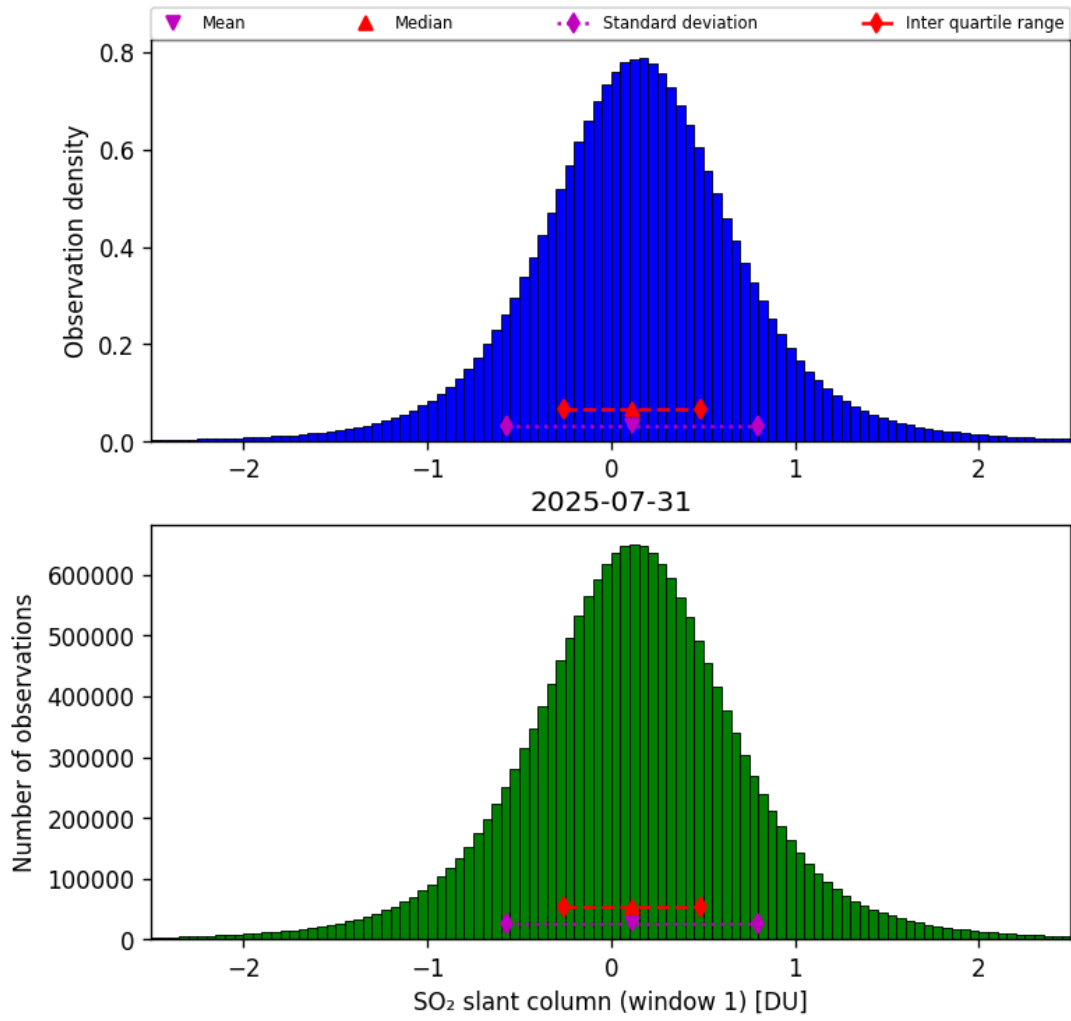


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-07-31 to 2025-08-01

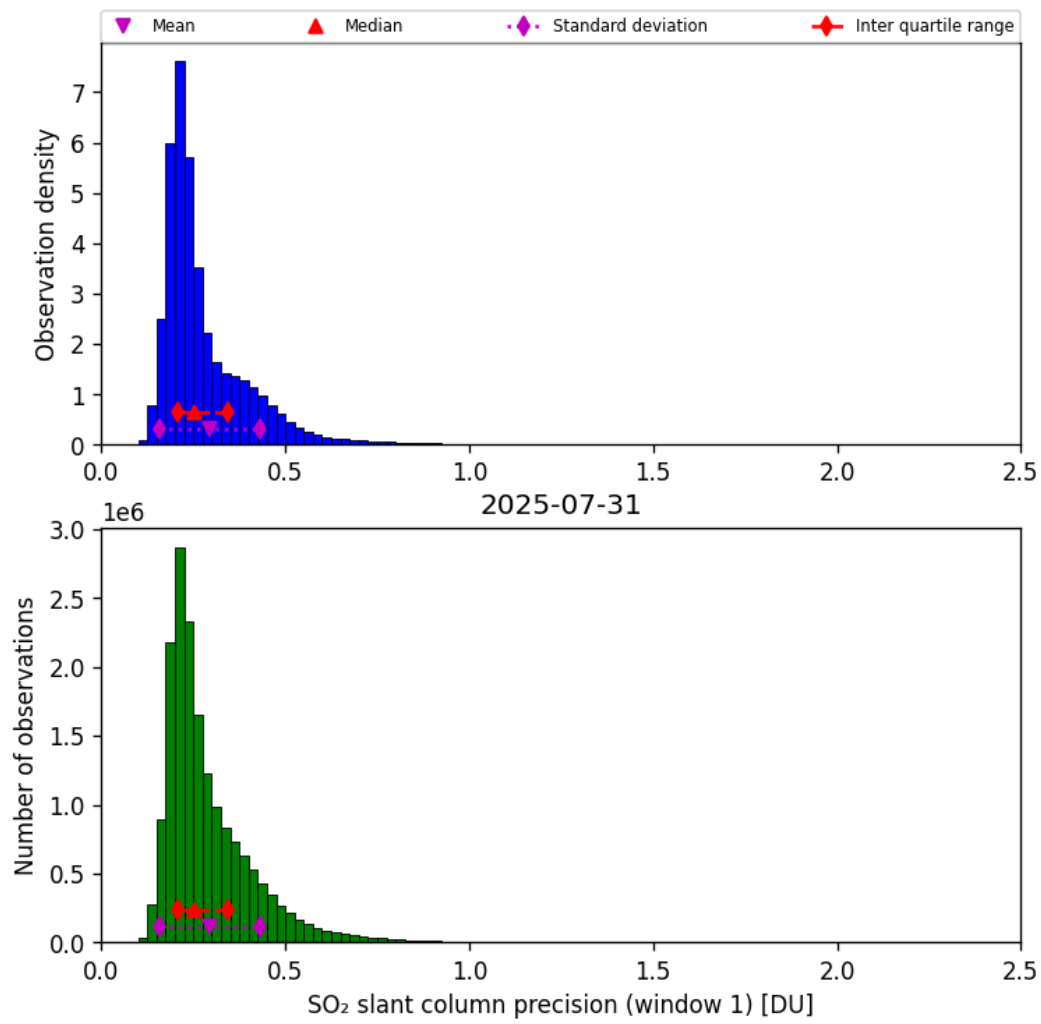


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-07-31 to 2025-08-01

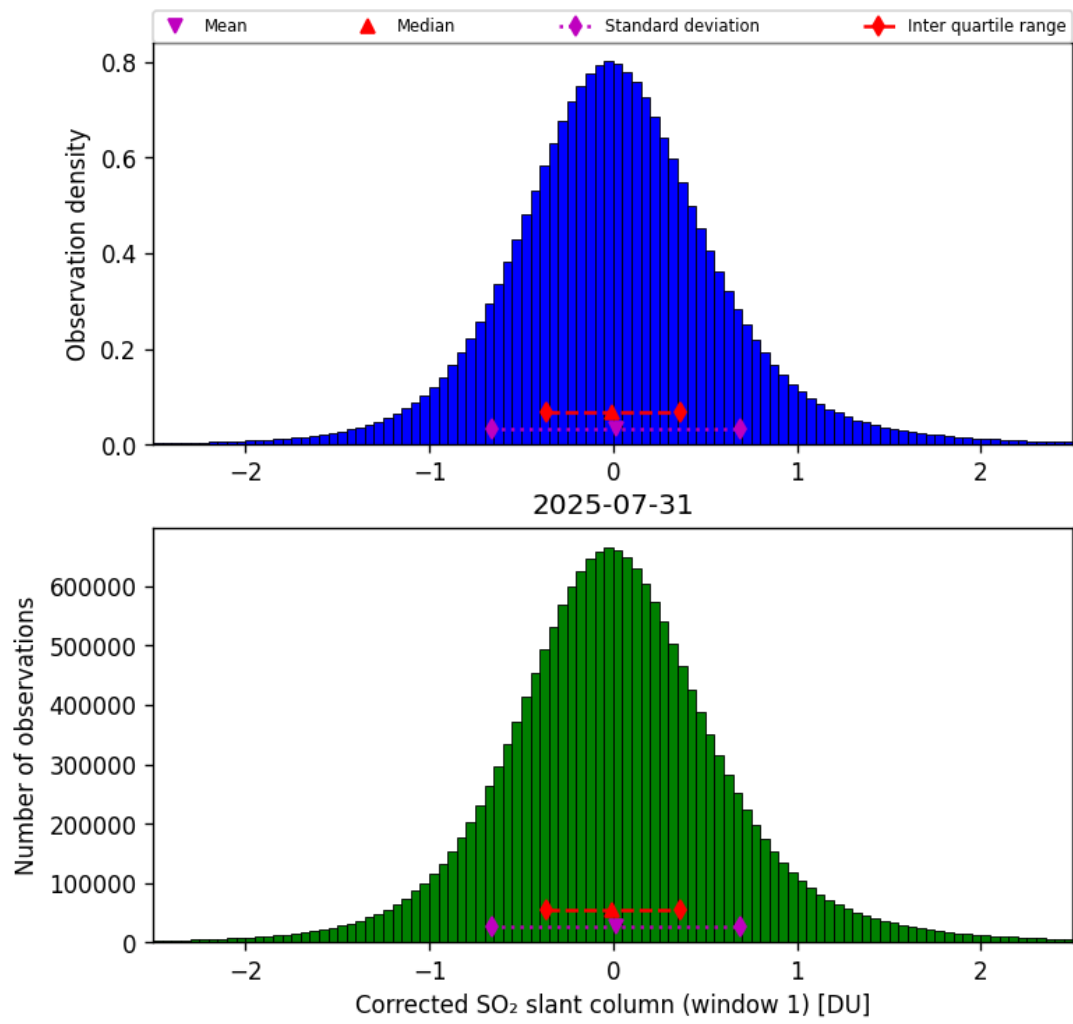


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-07-31 to 2025-08-01

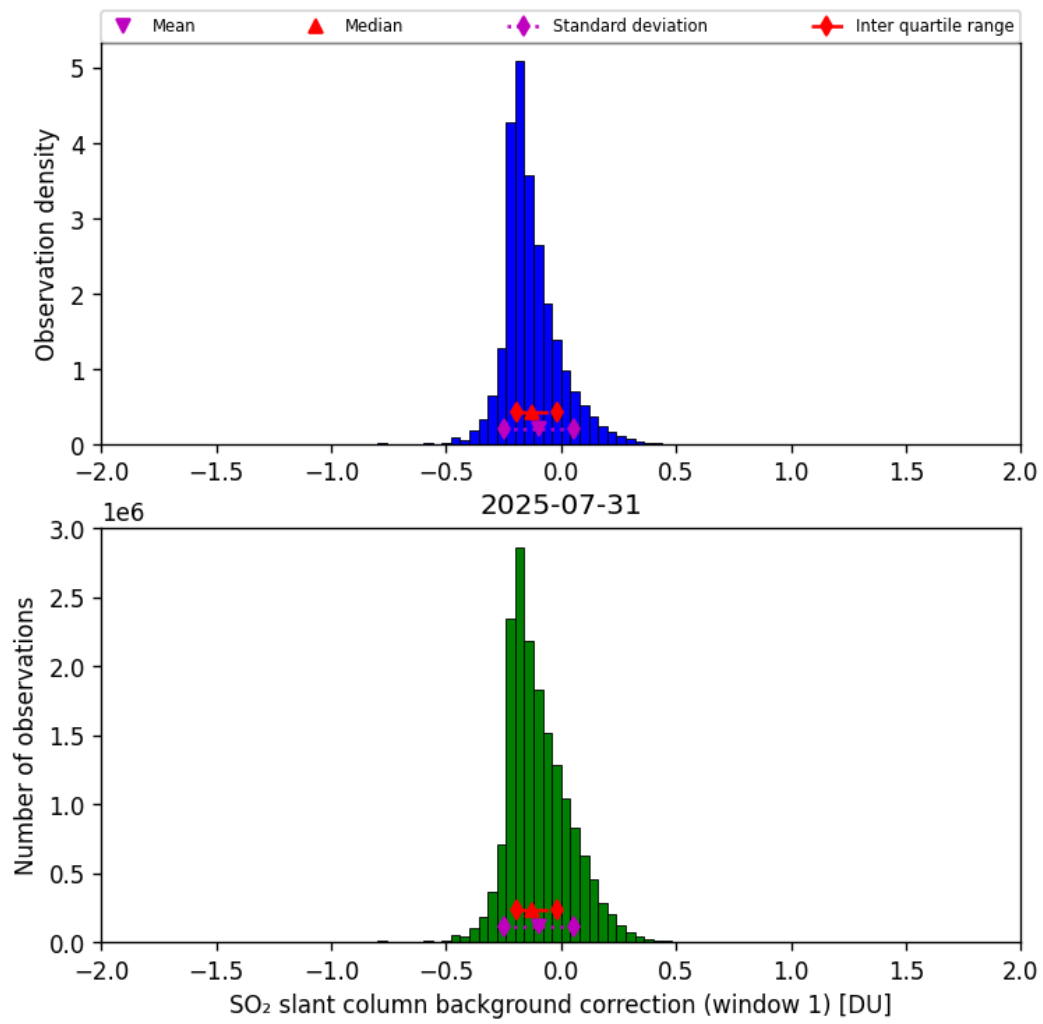


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-07-31 to 2025-08-01

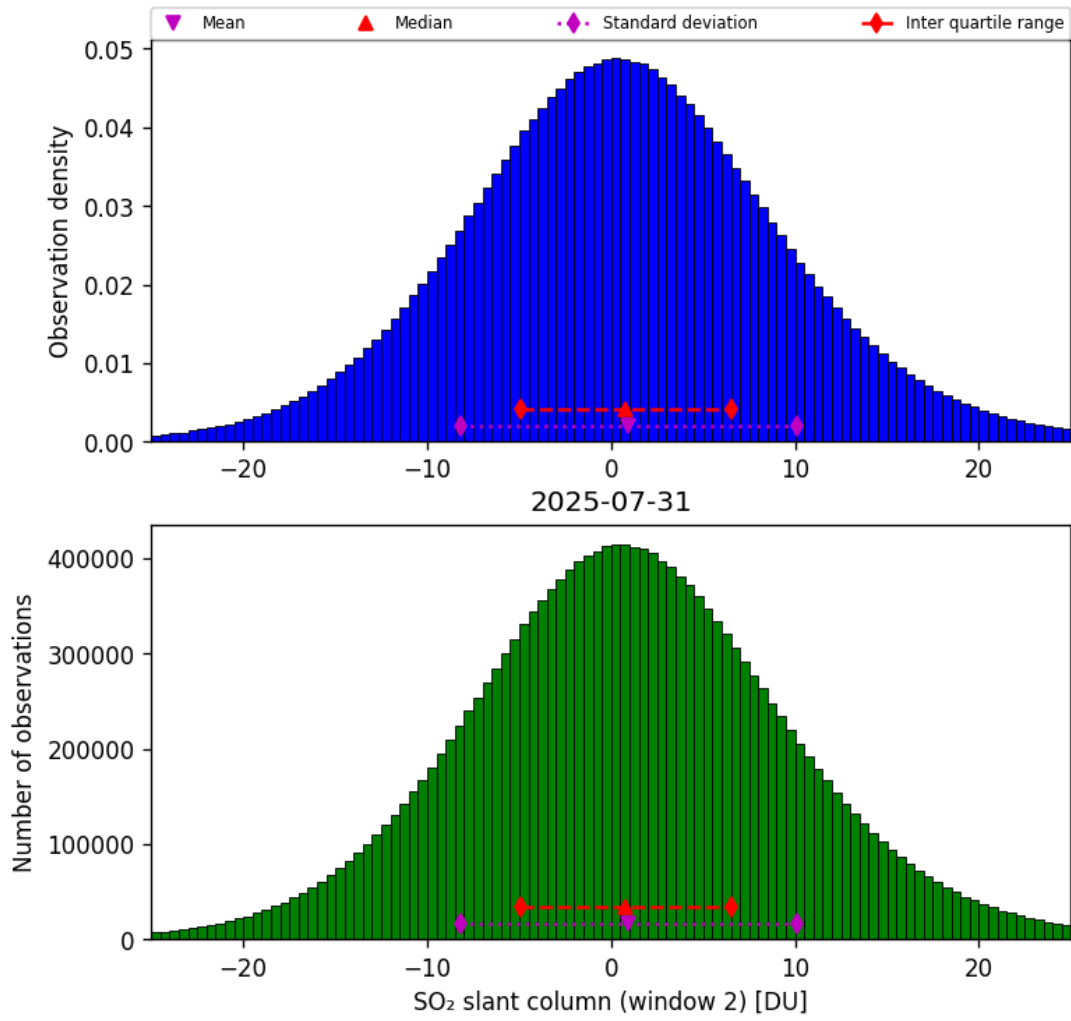


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-07-31 to 2025-08-01

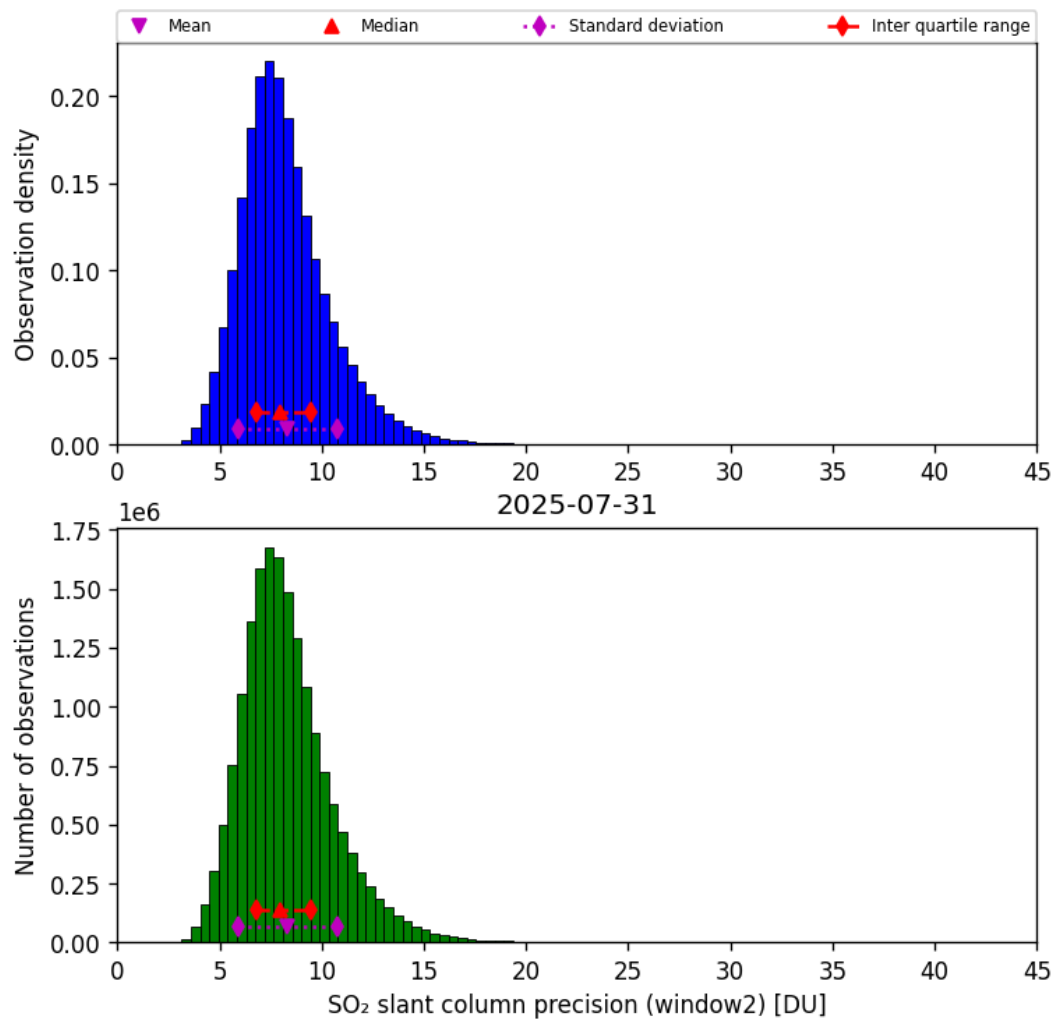


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-07-31 to 2025-08-01

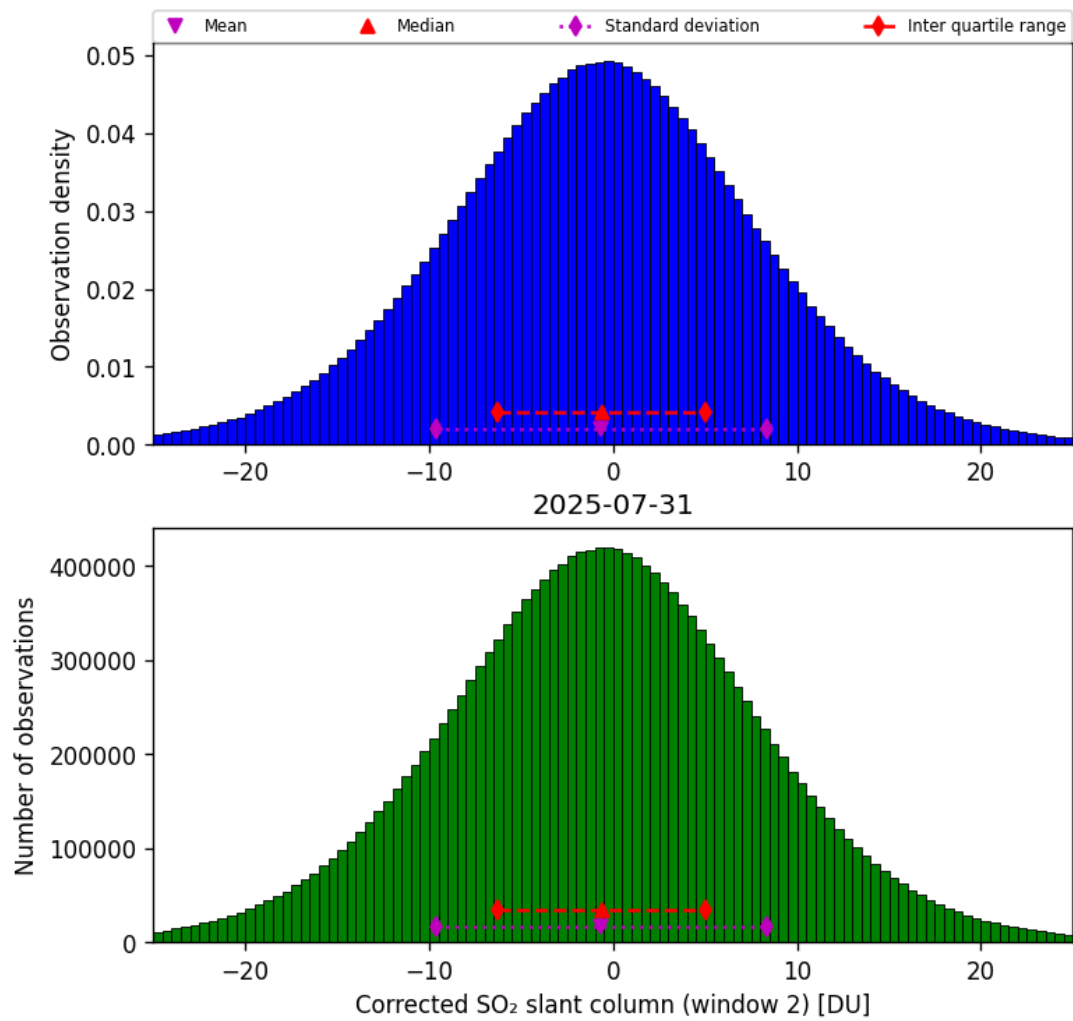


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-07-31 to 2025-08-01

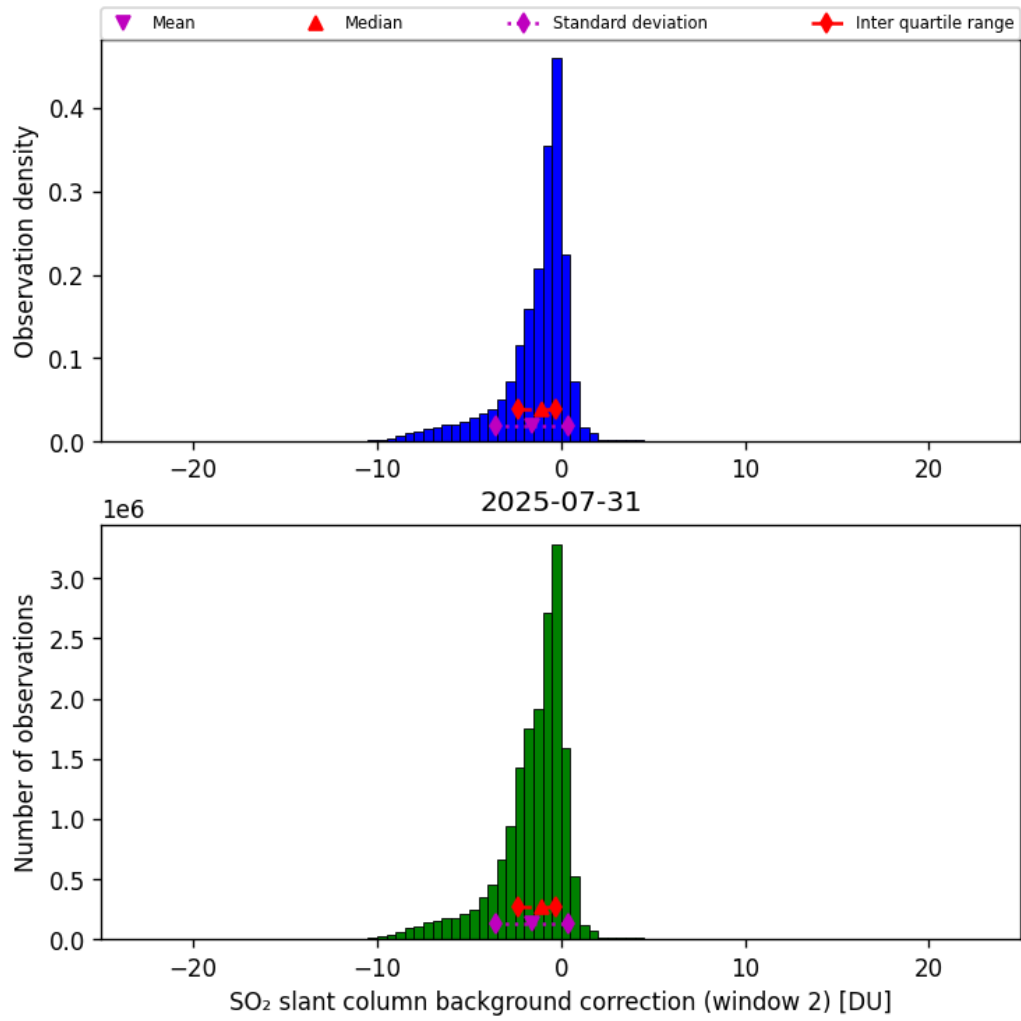


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-07-31 to 2025-08-01

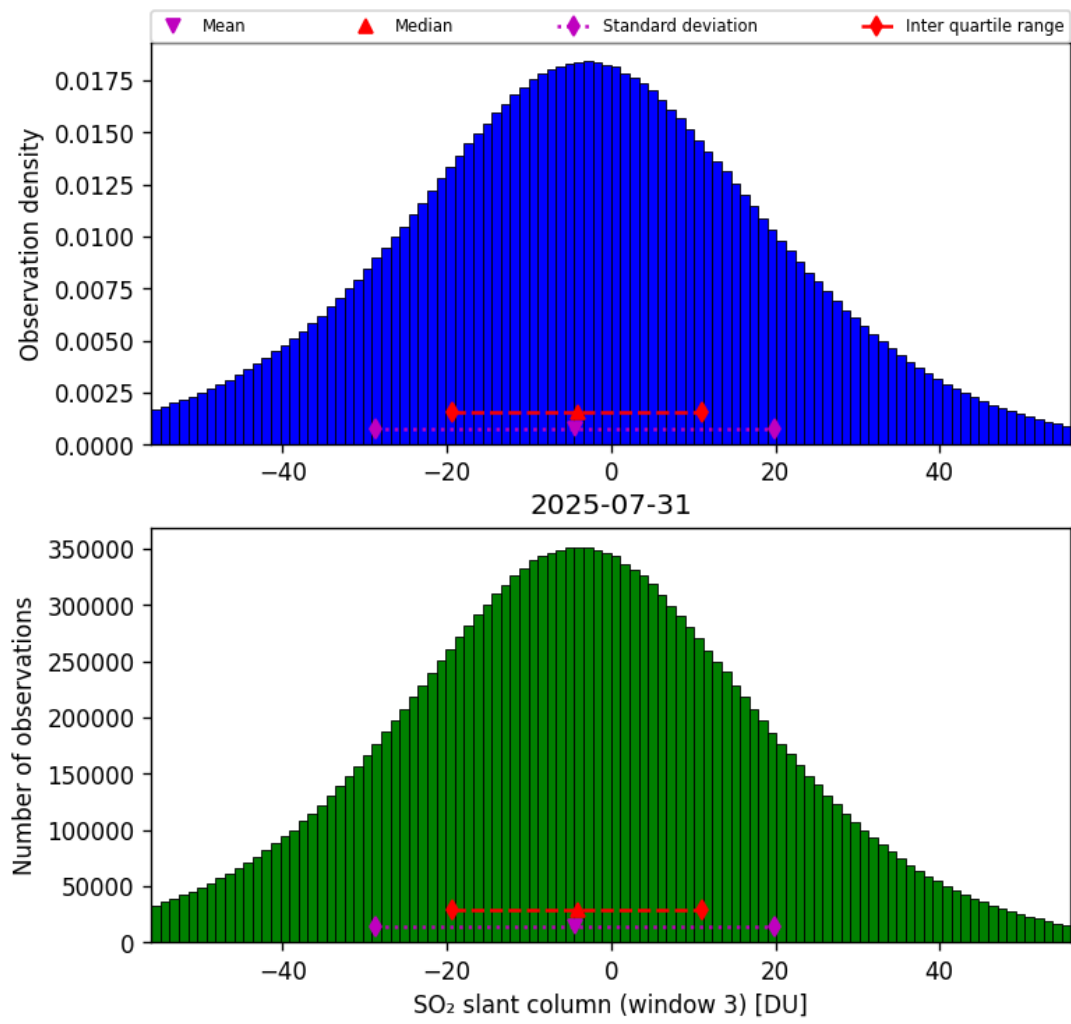


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-07-31 to 2025-08-01

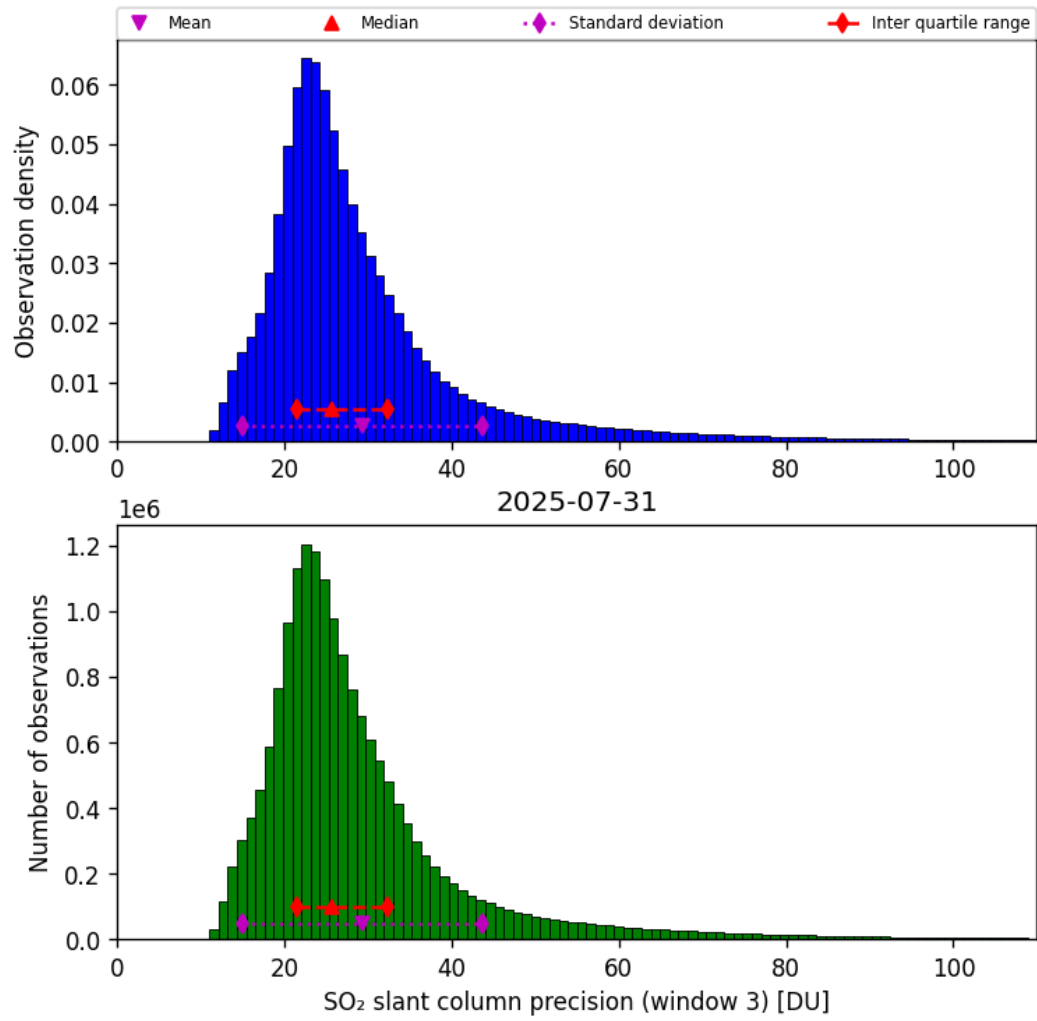


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-07-31 to 2025-08-01

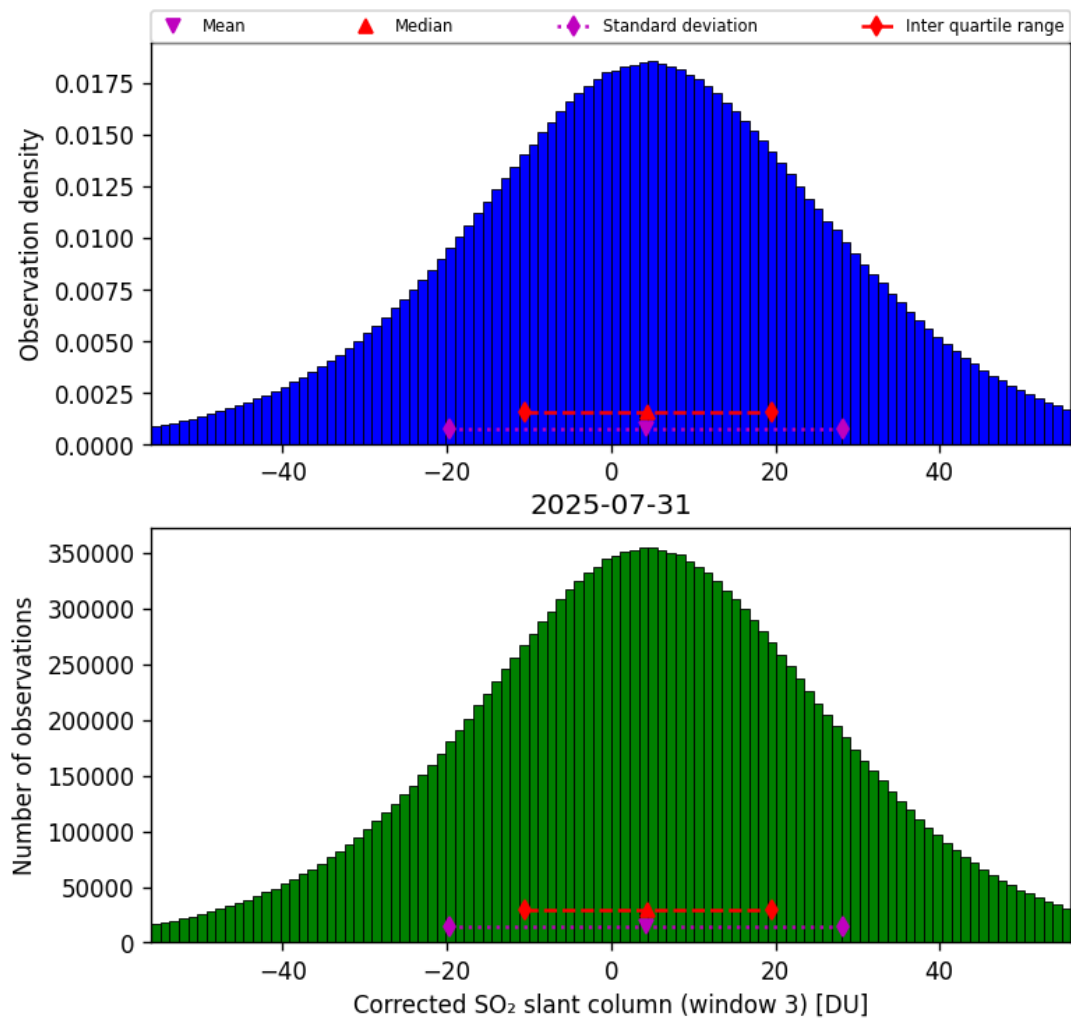


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-07-31 to 2025-08-01

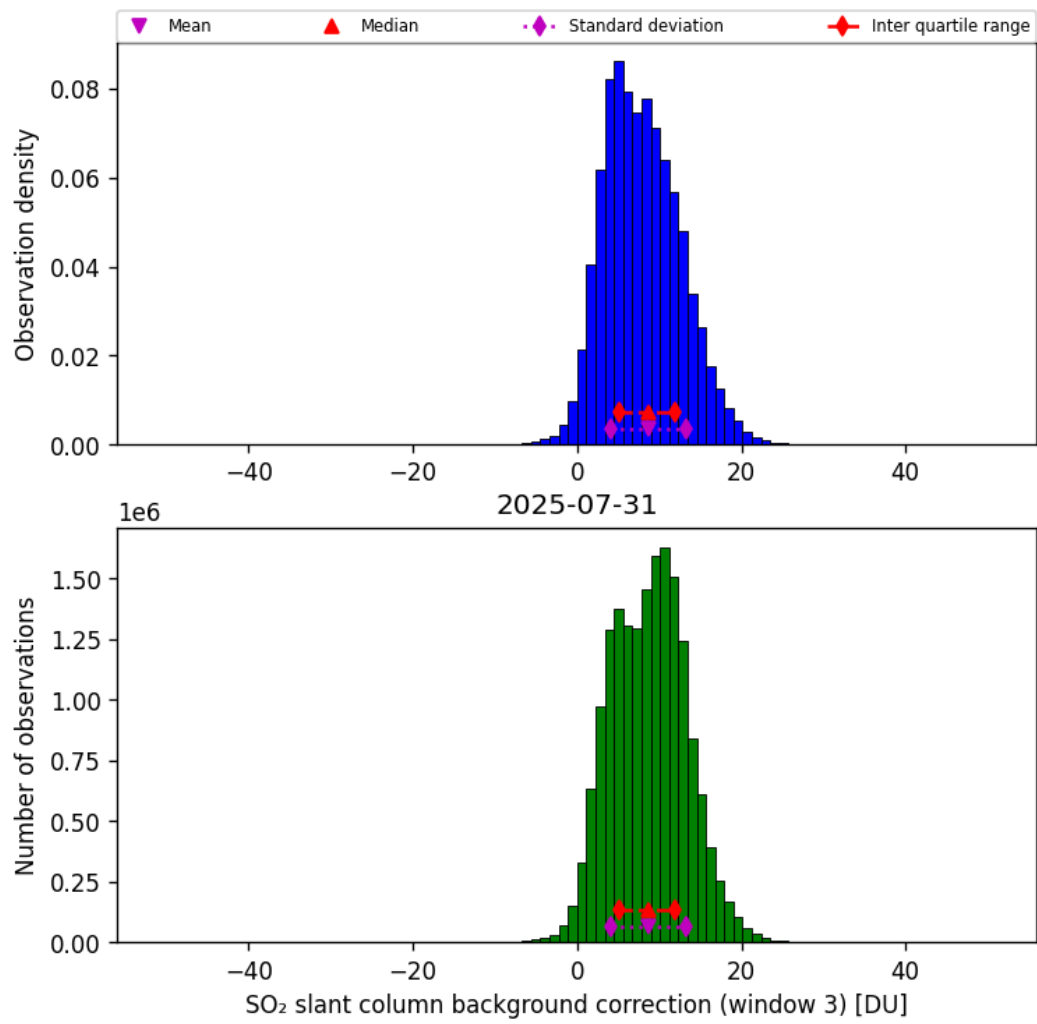


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-07-31 to 2025-08-01

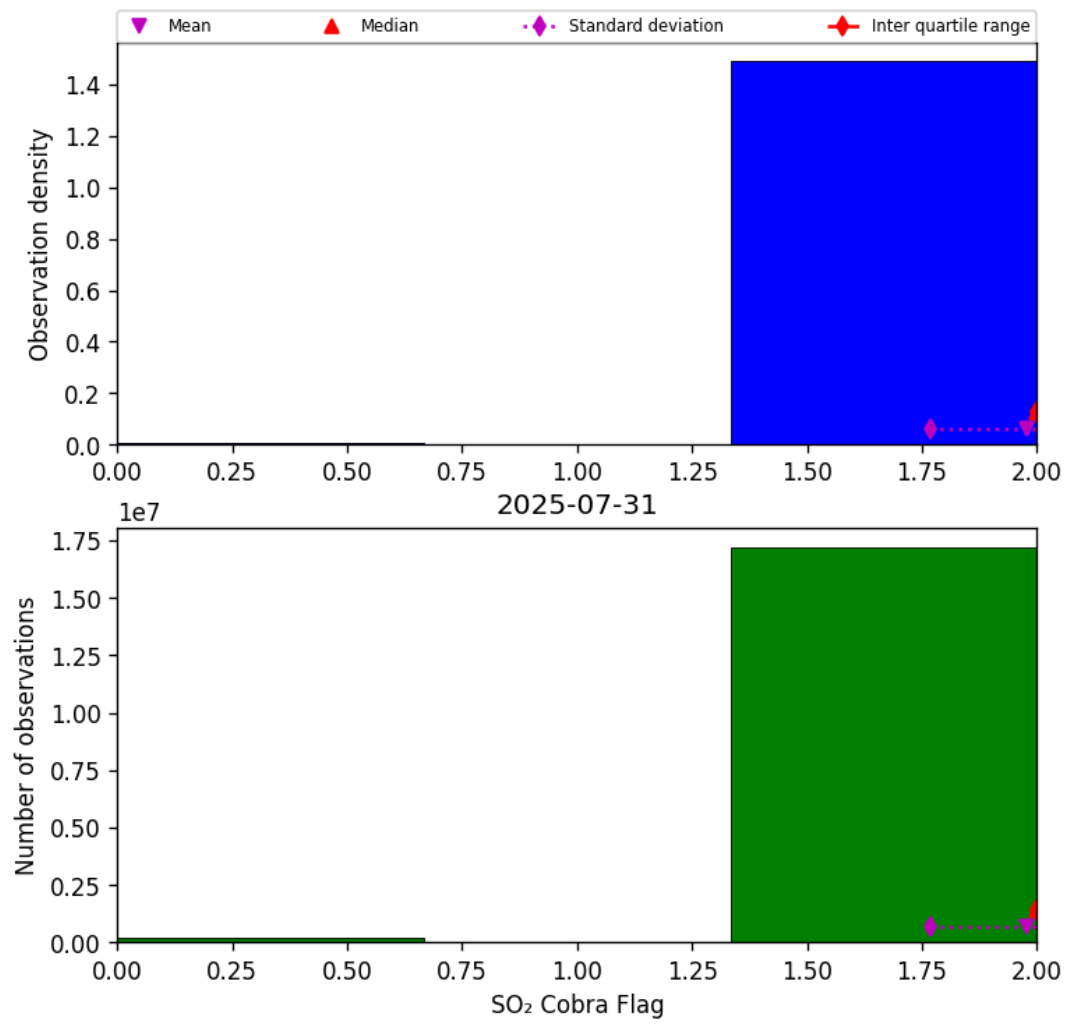


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-07-31 to 2025-08-01

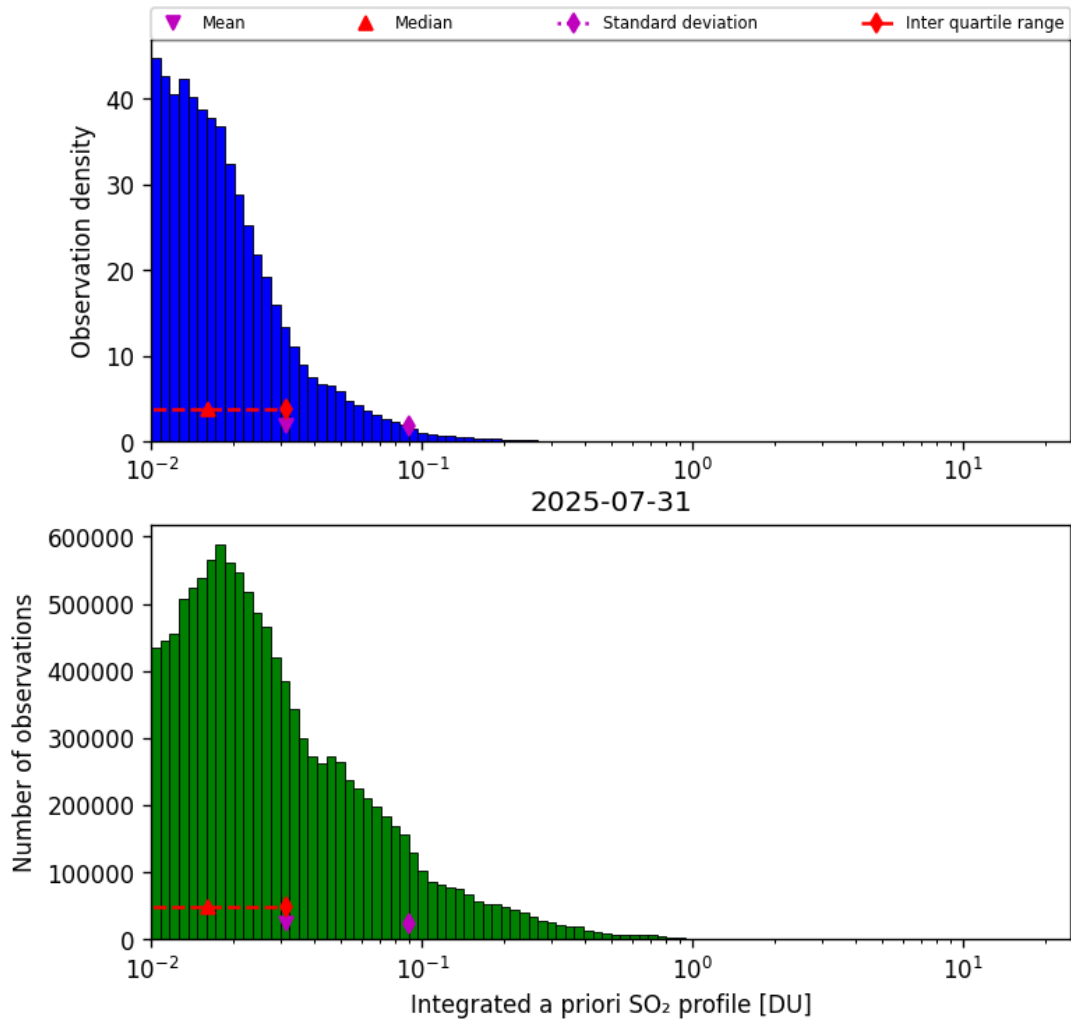


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-07-31 to 2025-08-01

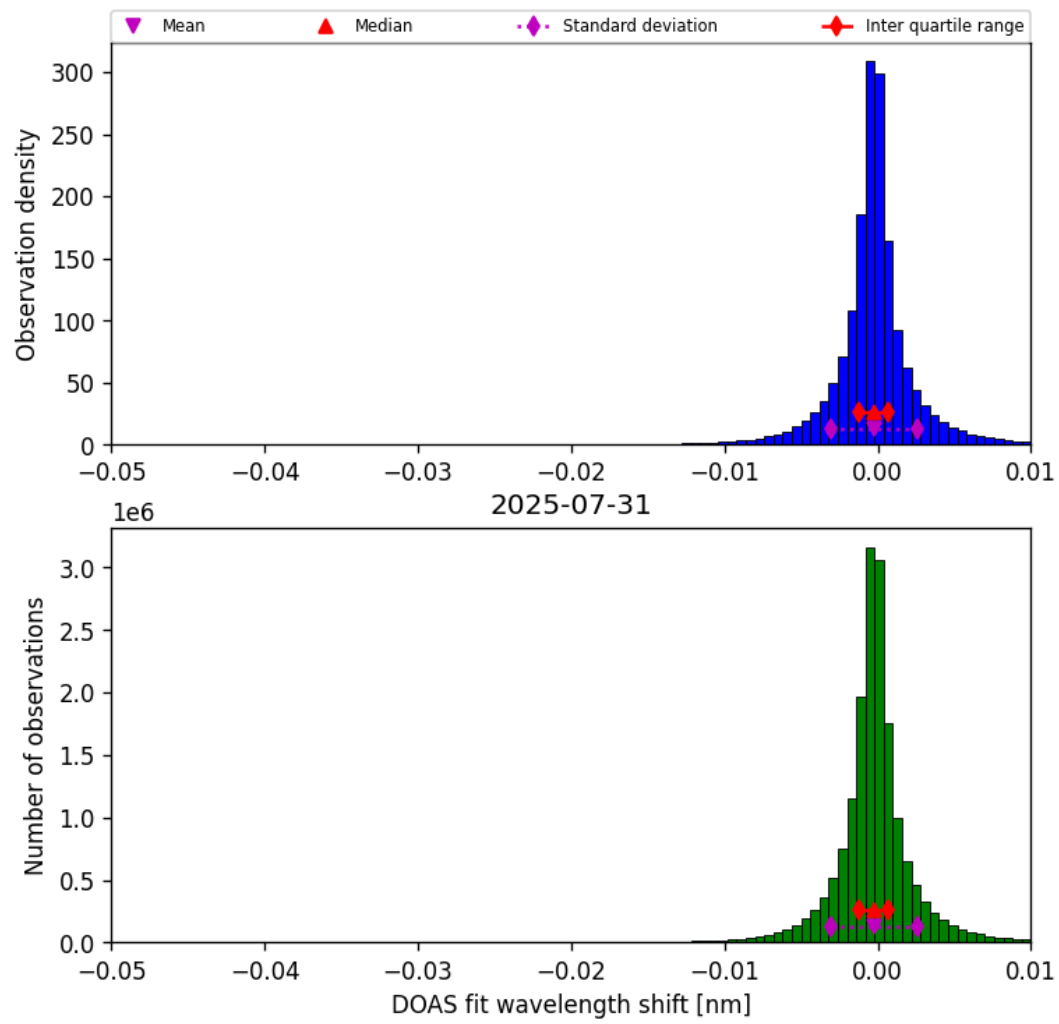


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-07-31 to 2025-08-01

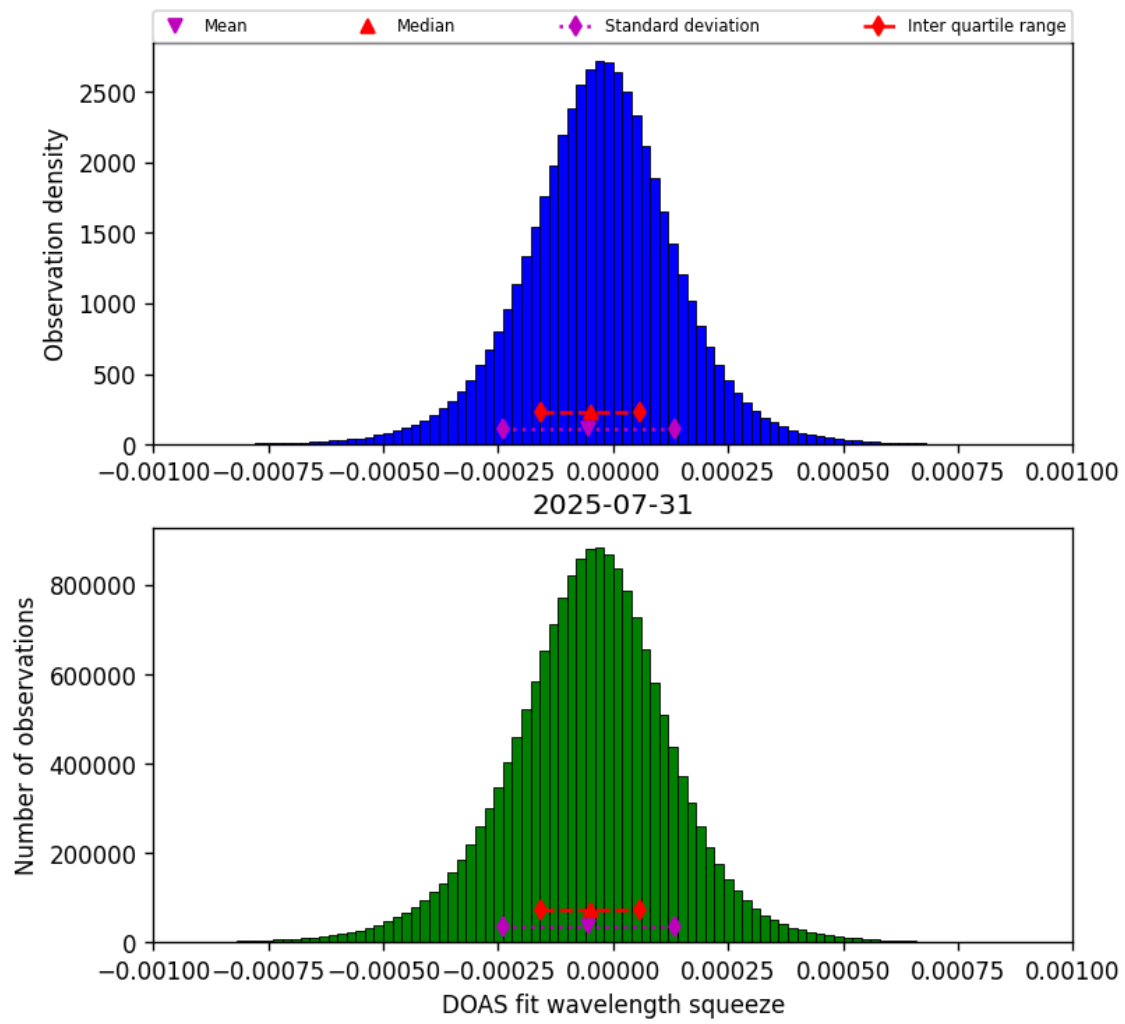


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-07-31 to 2025-08-01

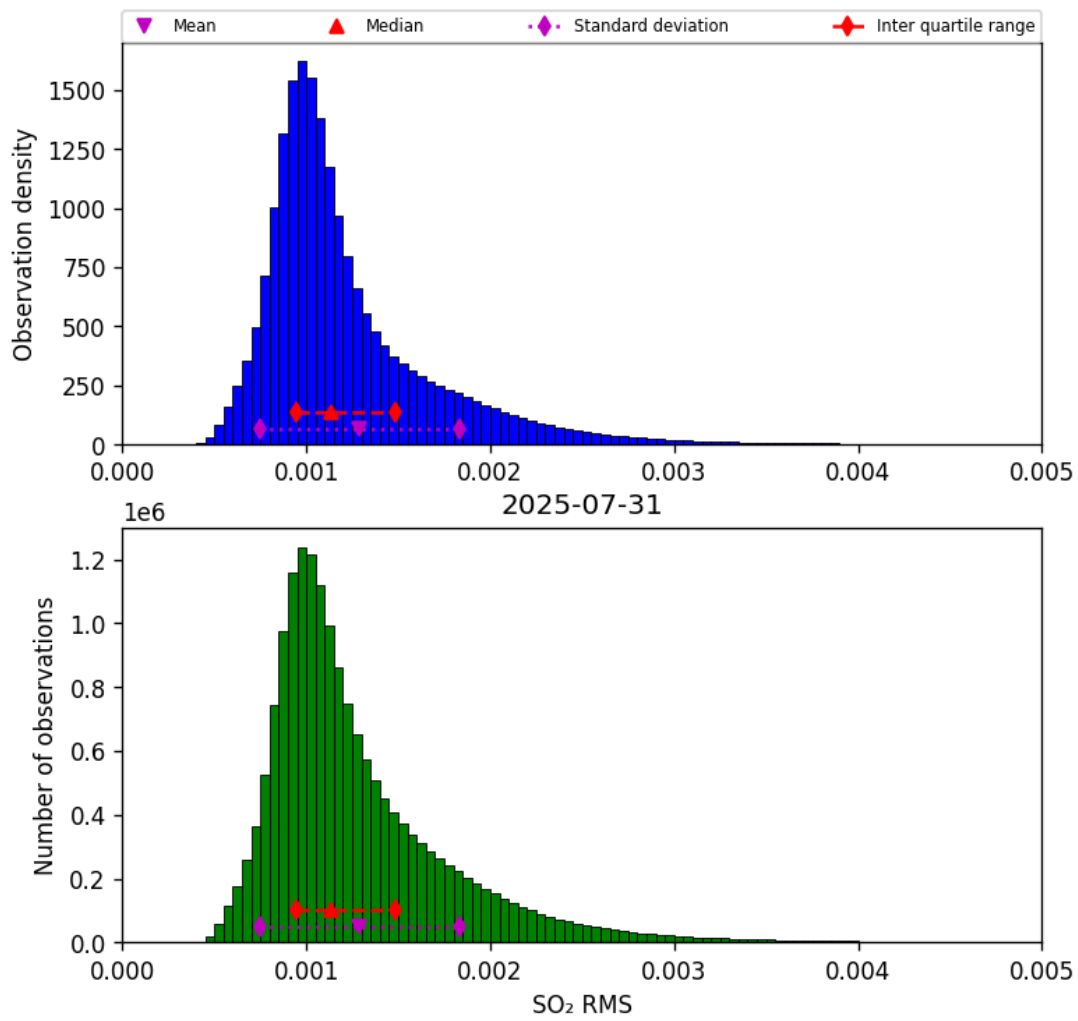


Figure 79: Histogram of “SO₂ RMS” for 2025-07-31 to 2025-08-01

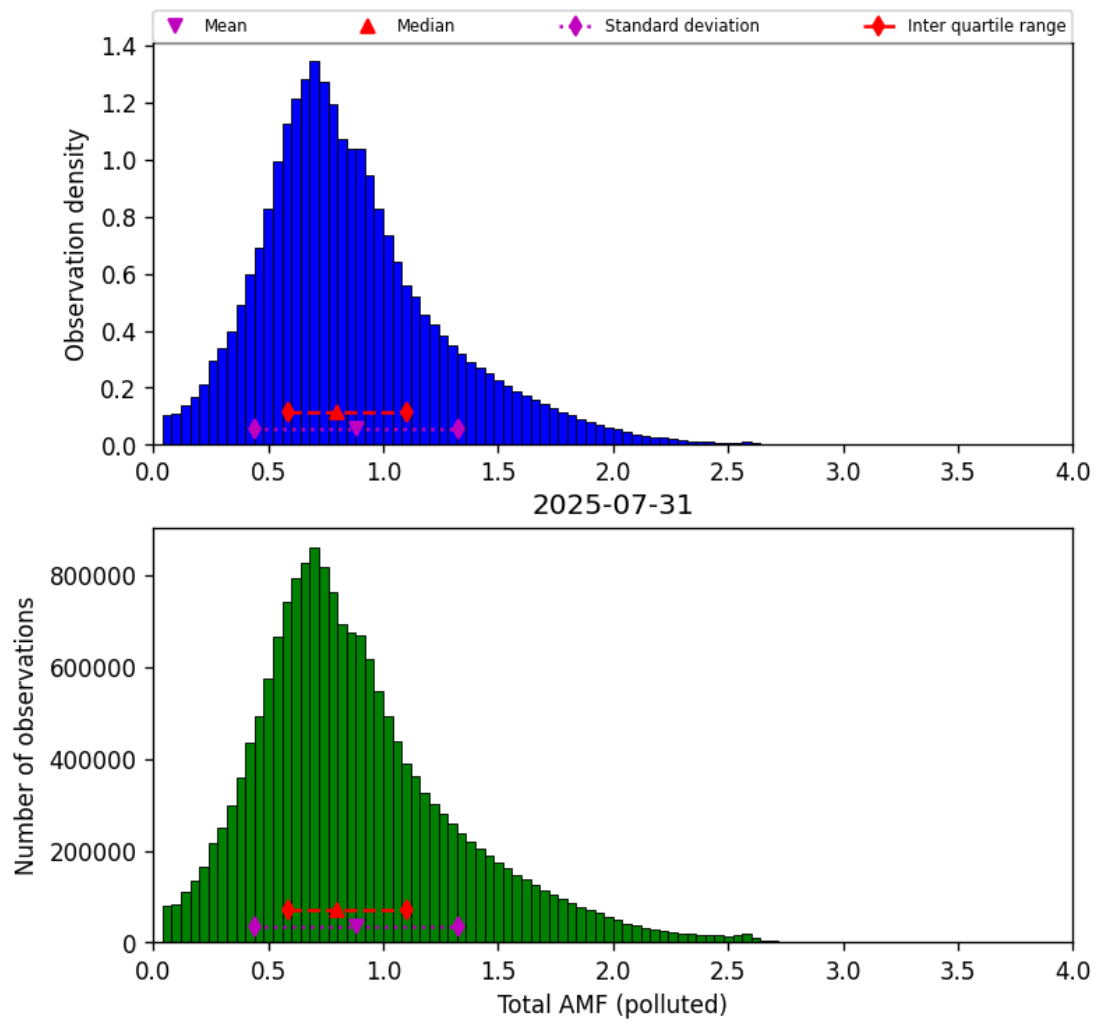


Figure 80: Histogram of “Total AMF (polluted)” for 2025-07-31 to 2025-08-01

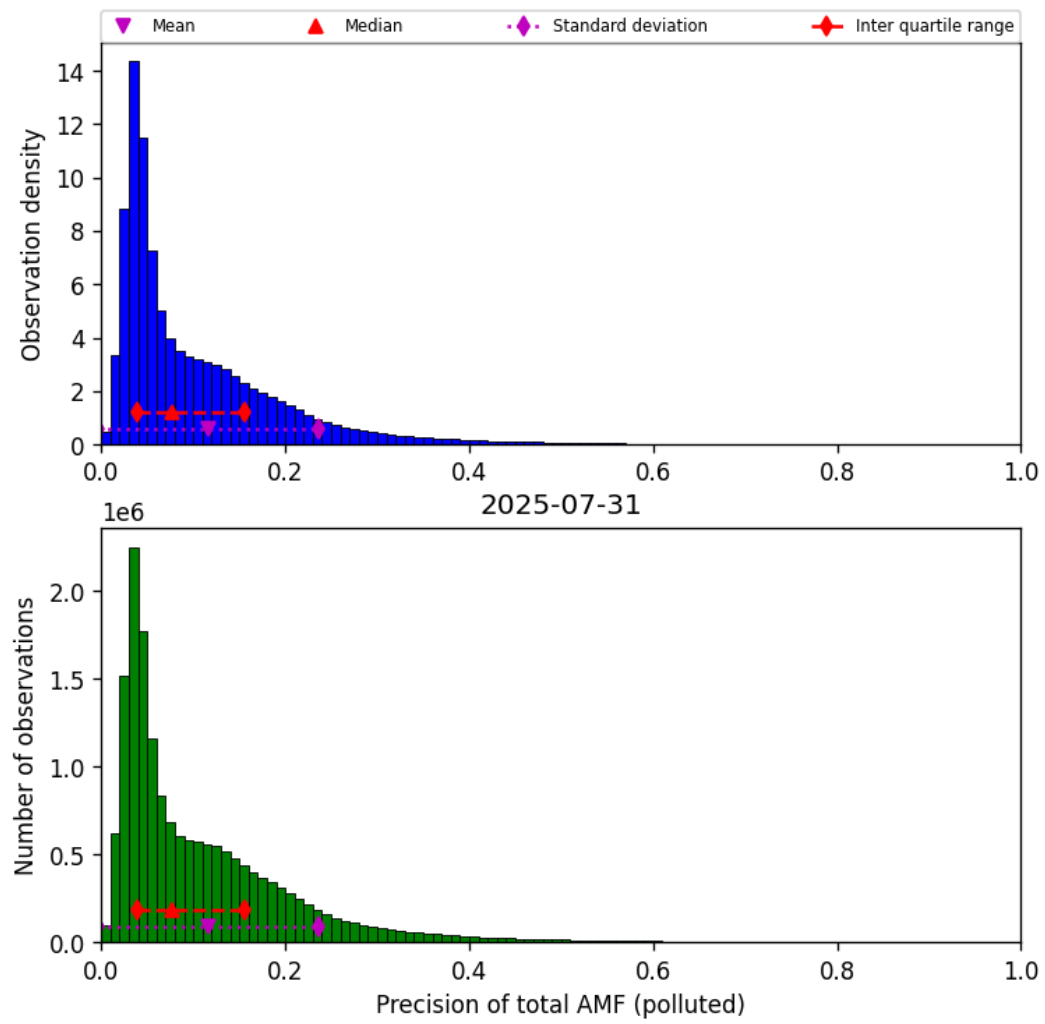


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-07-31 to 2025-08-01

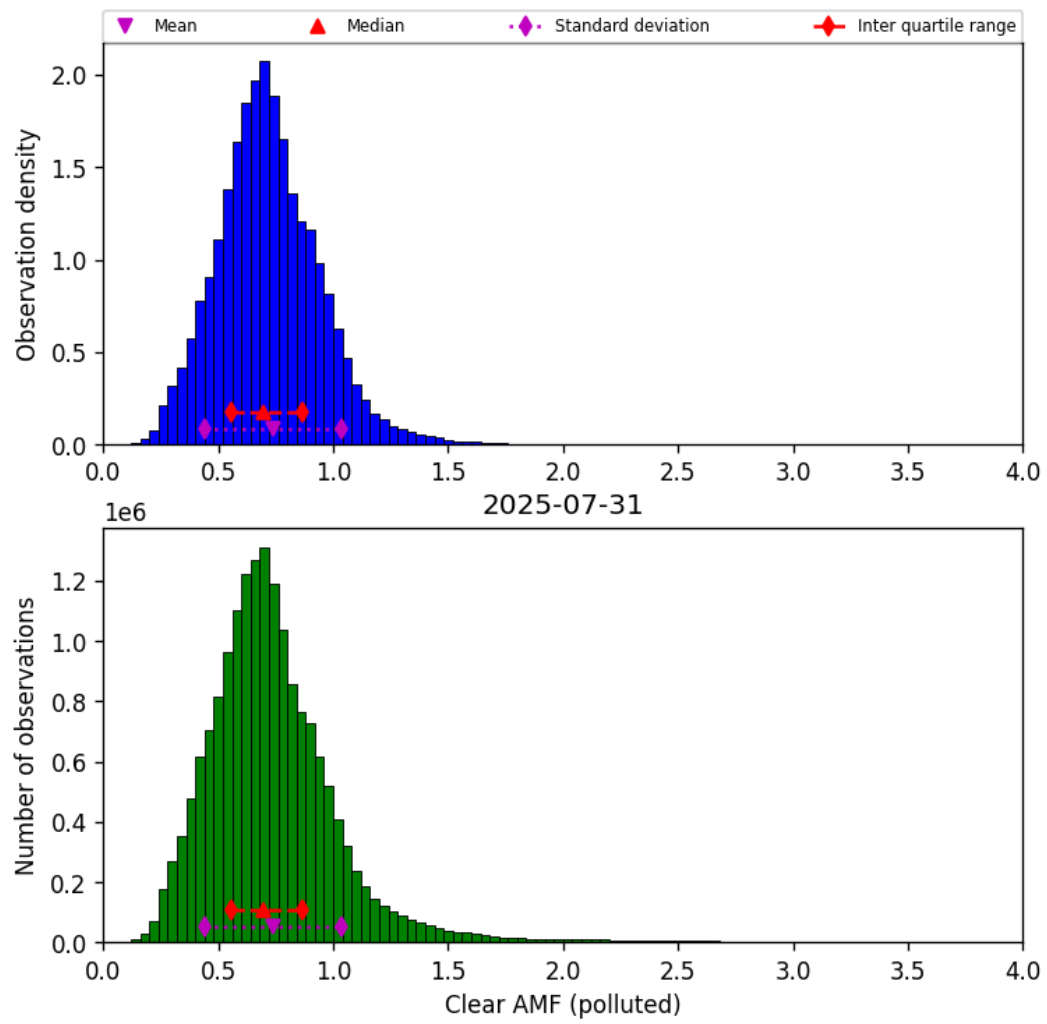


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-07-31 to 2025-08-01

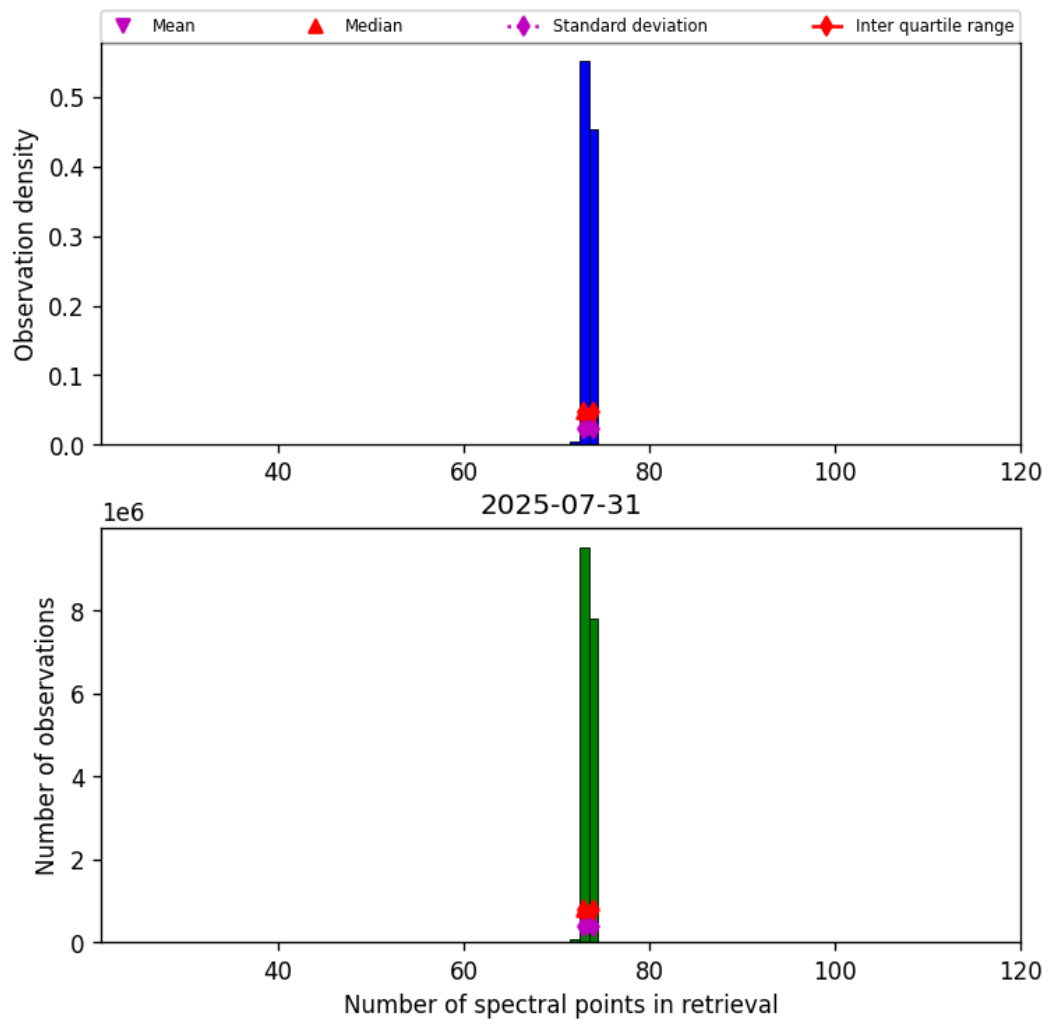


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-07-31 to 2025-08-01

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.

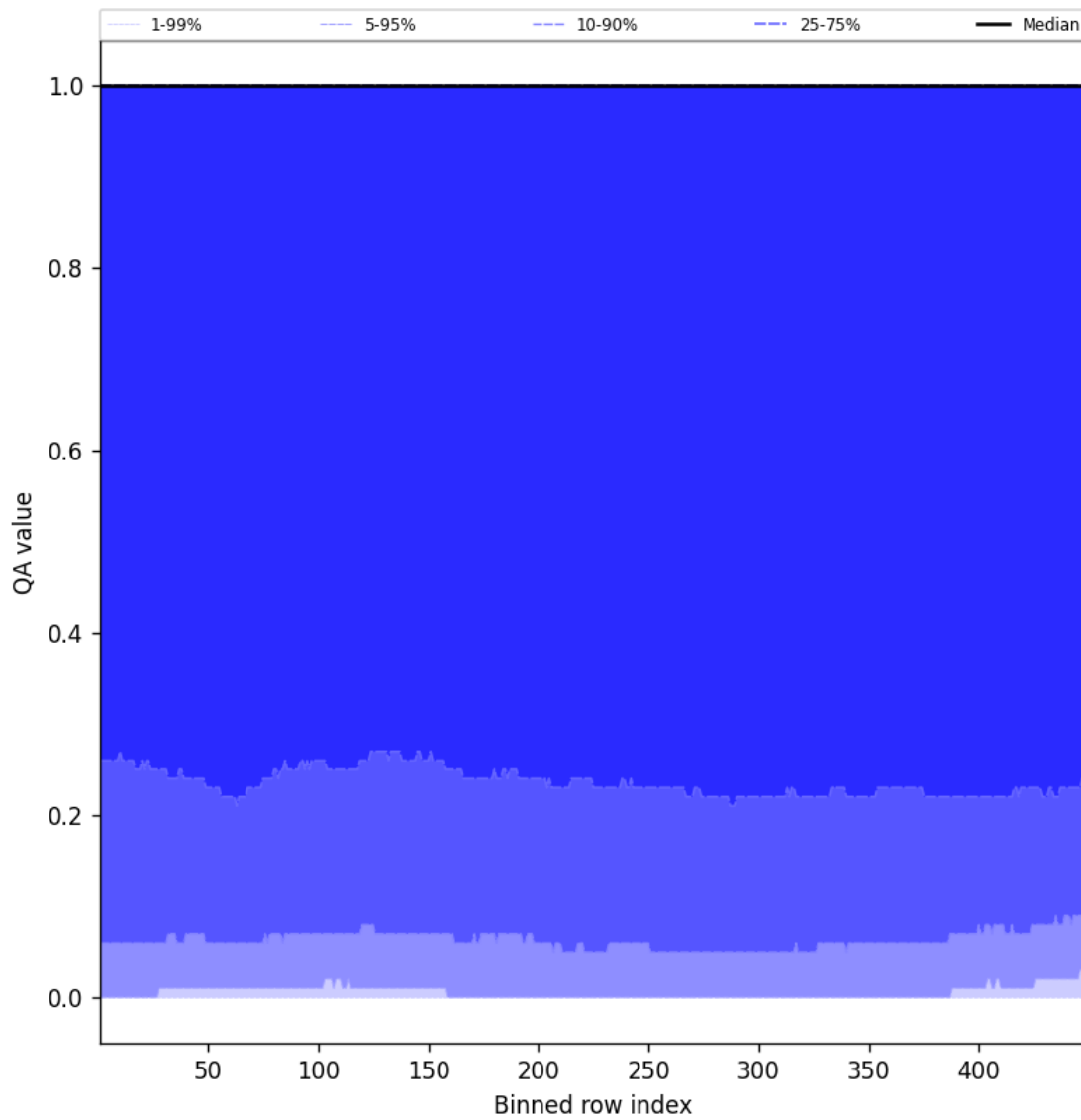


Figure 84: Along track statistics of “QA value” for 2025-07-31 to 2025-08-01

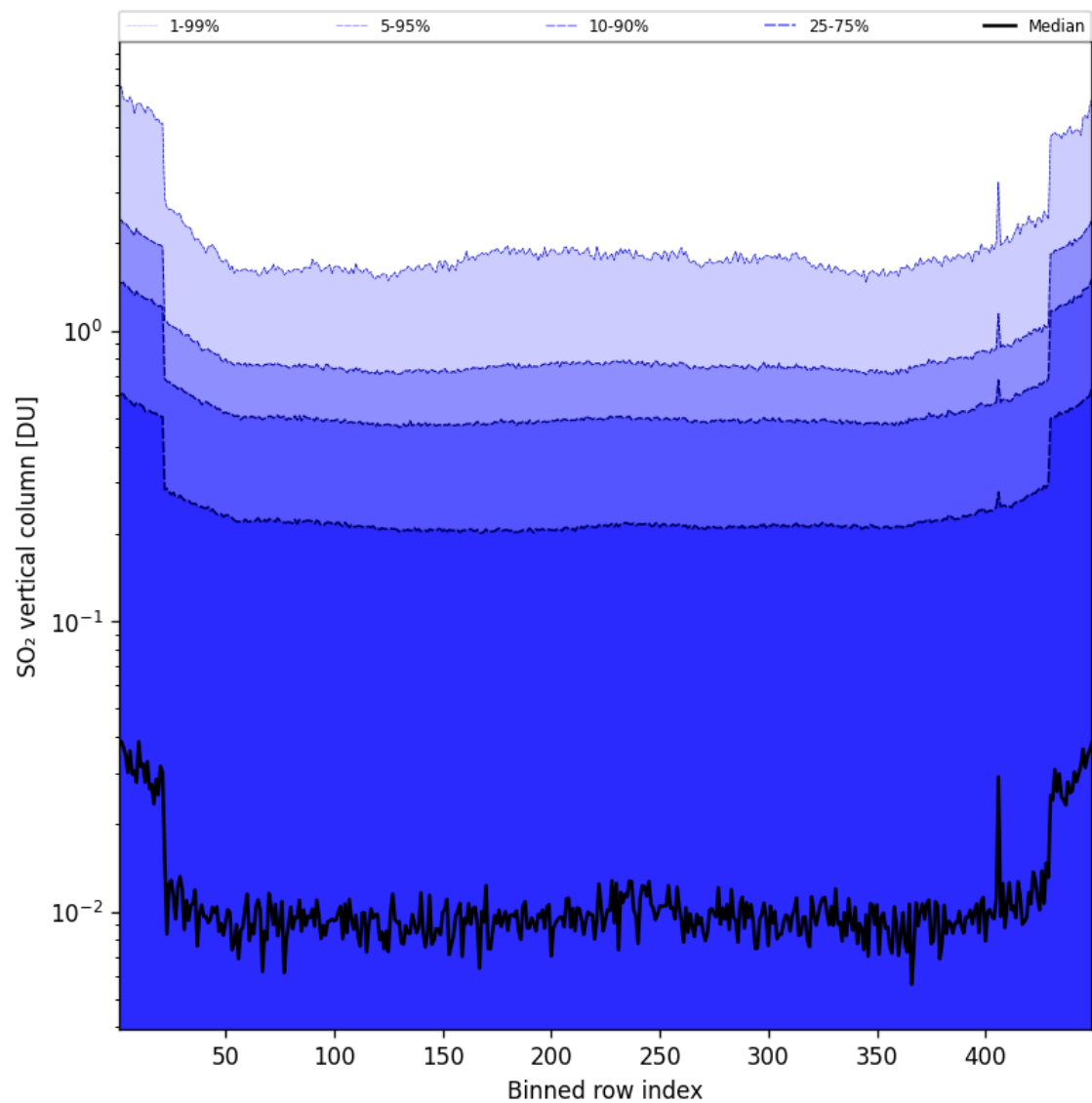


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-07-31 to 2025-08-01

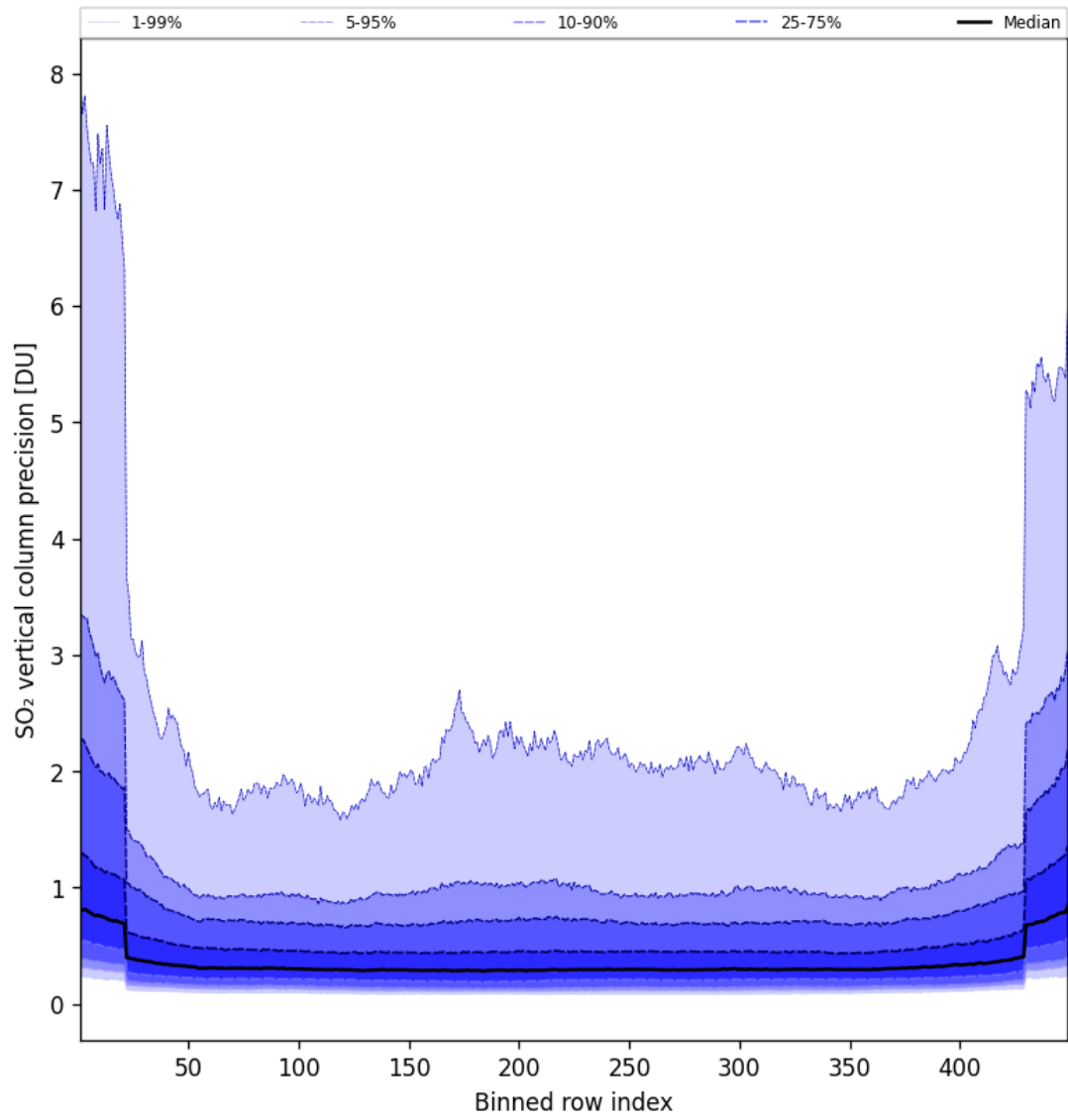


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-07-31 to 2025-08-01

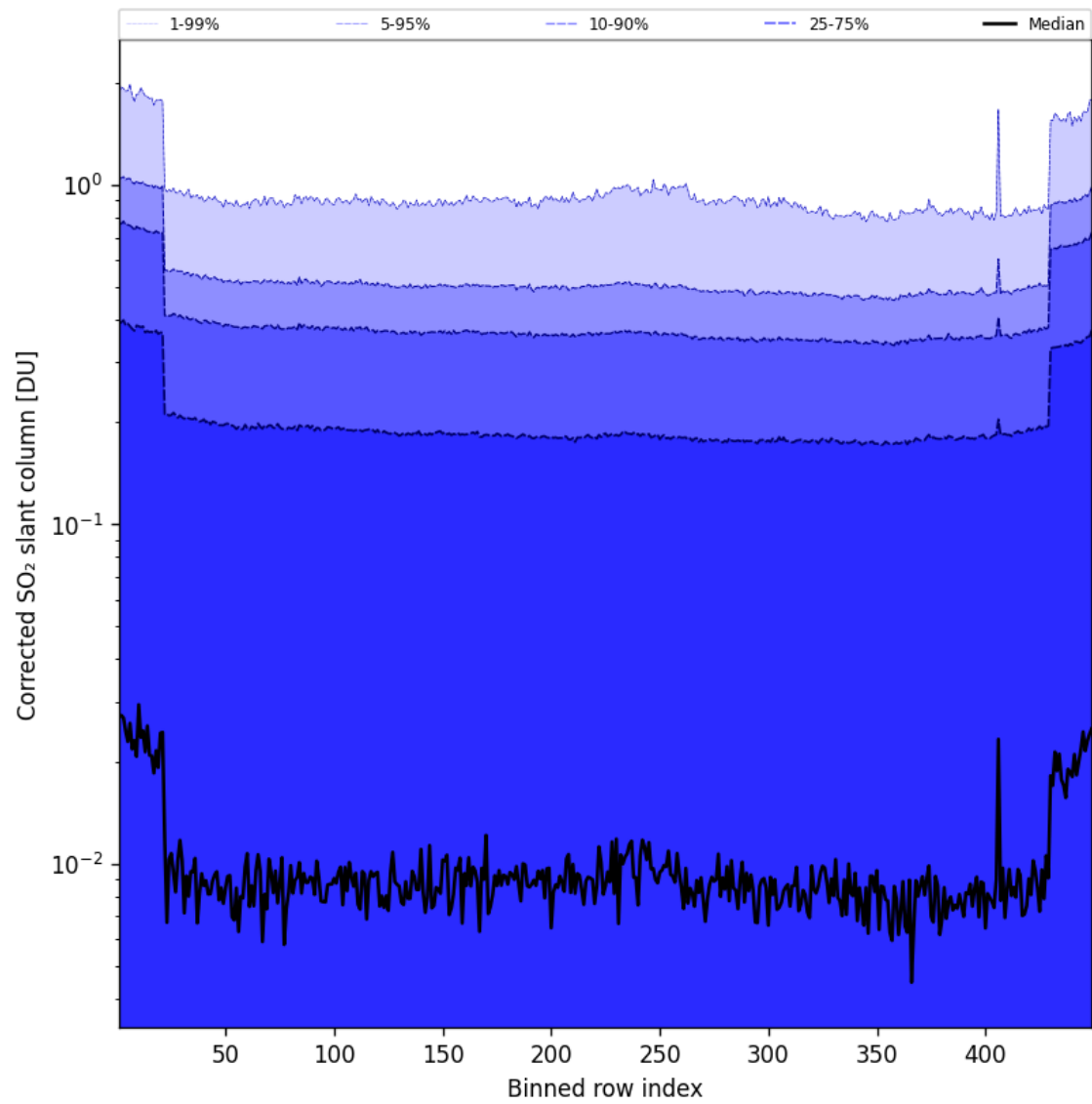


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-07-31 to 2025-08-01

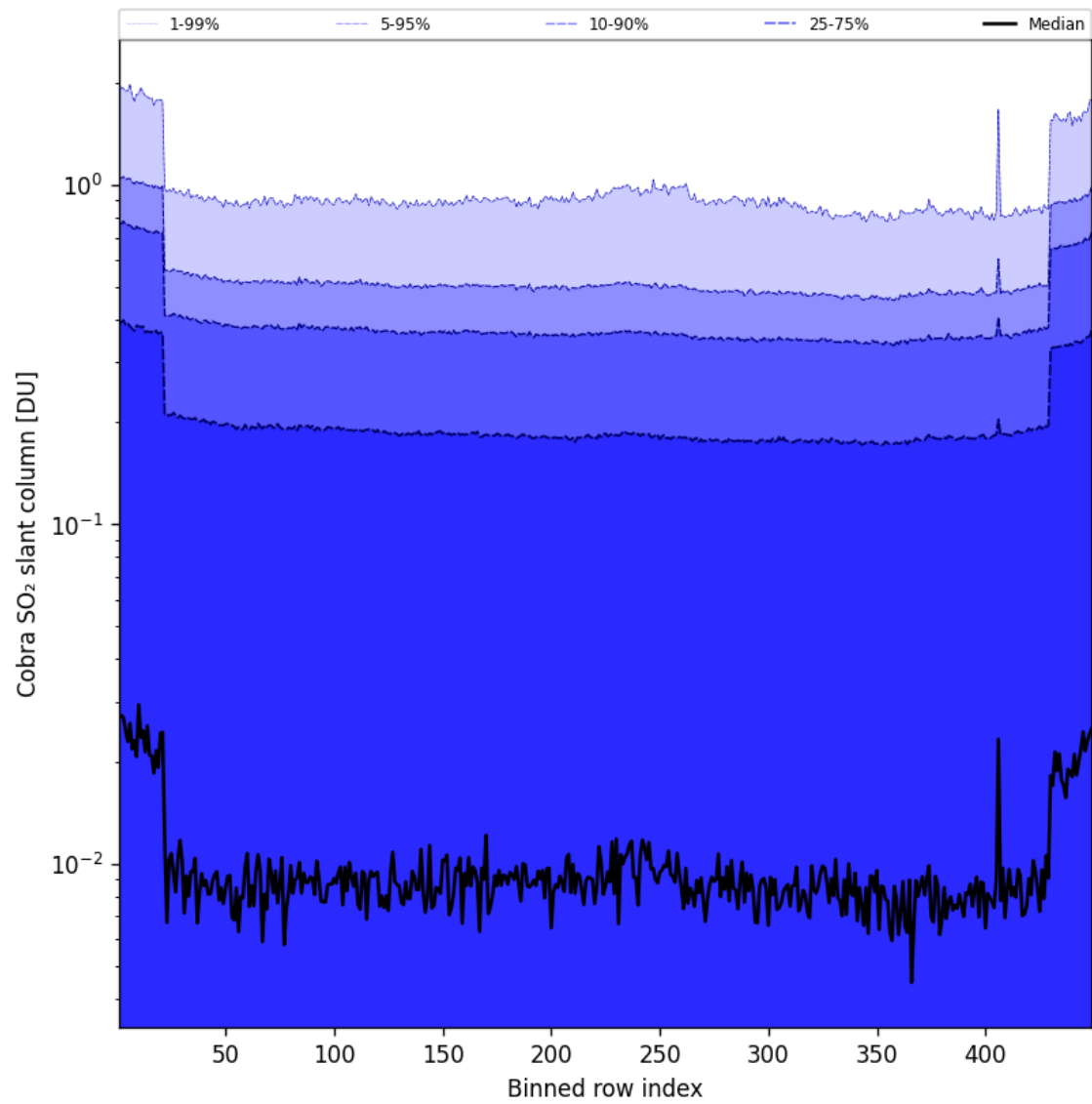


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-07-31 to 2025-08-01

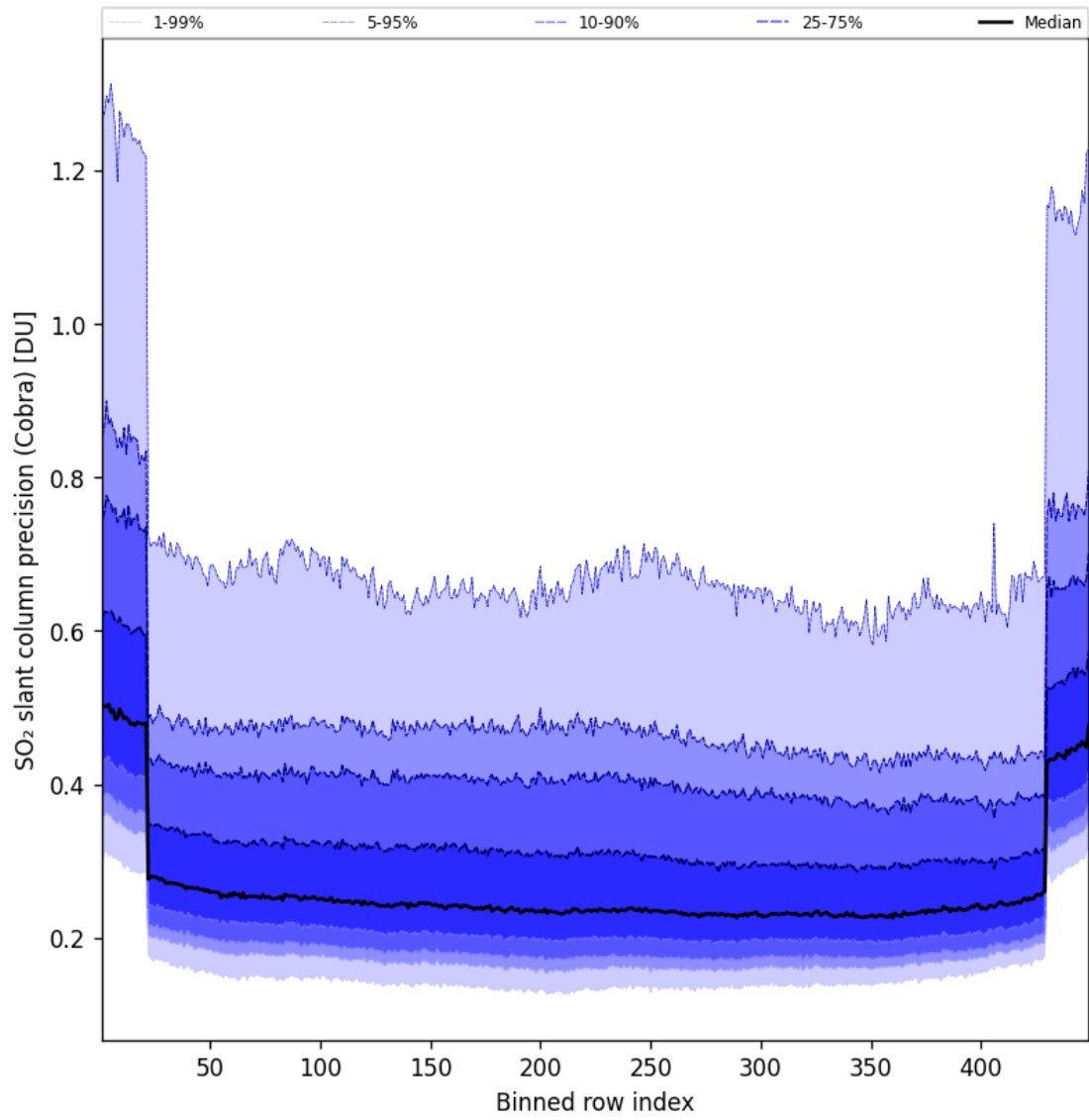


Figure 89: Along track statistics of "SO₂ slant column precision (Cobra)" for 2025-07-31 to 2025-08-01

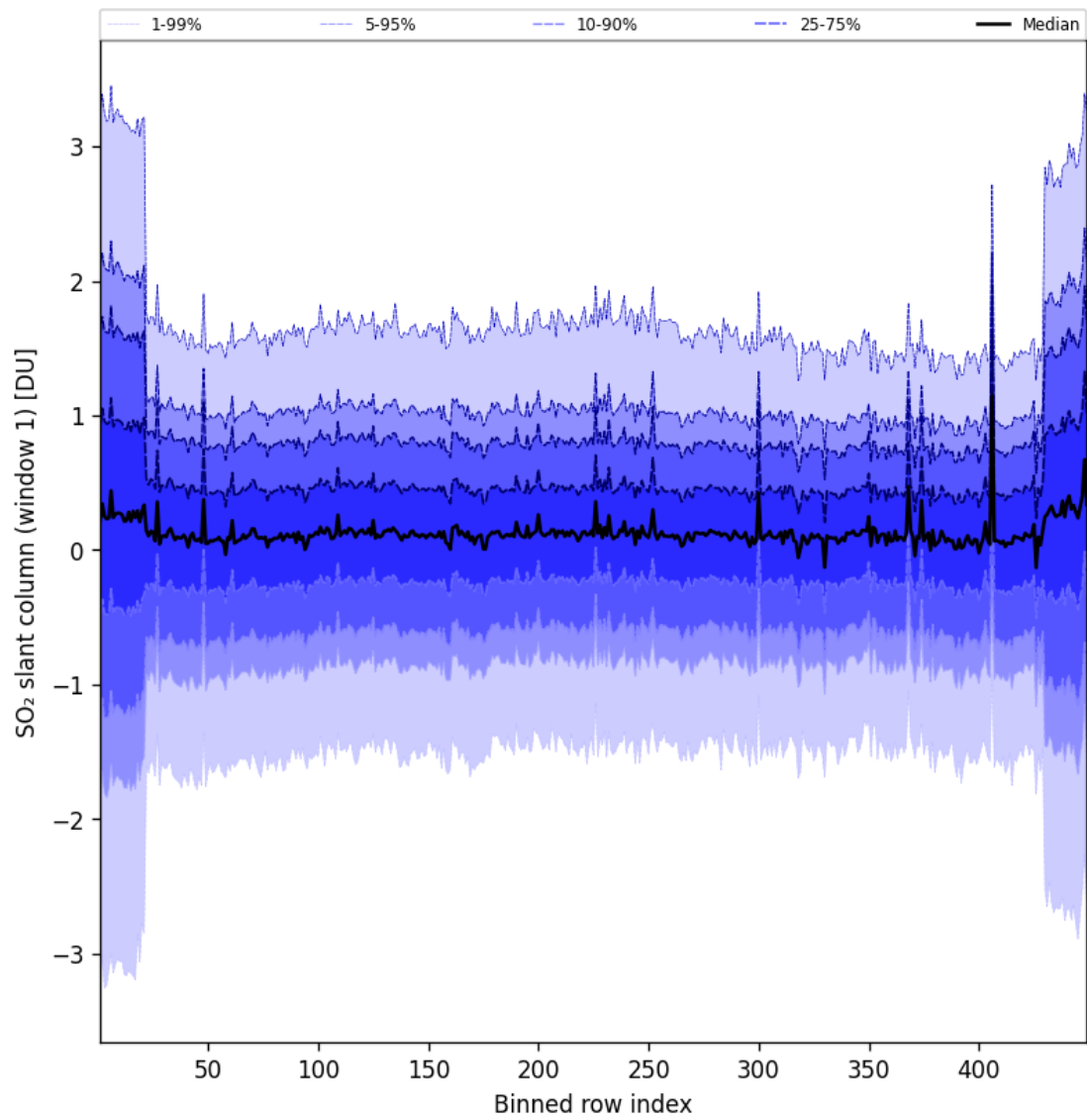


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-07-31 to 2025-08-01

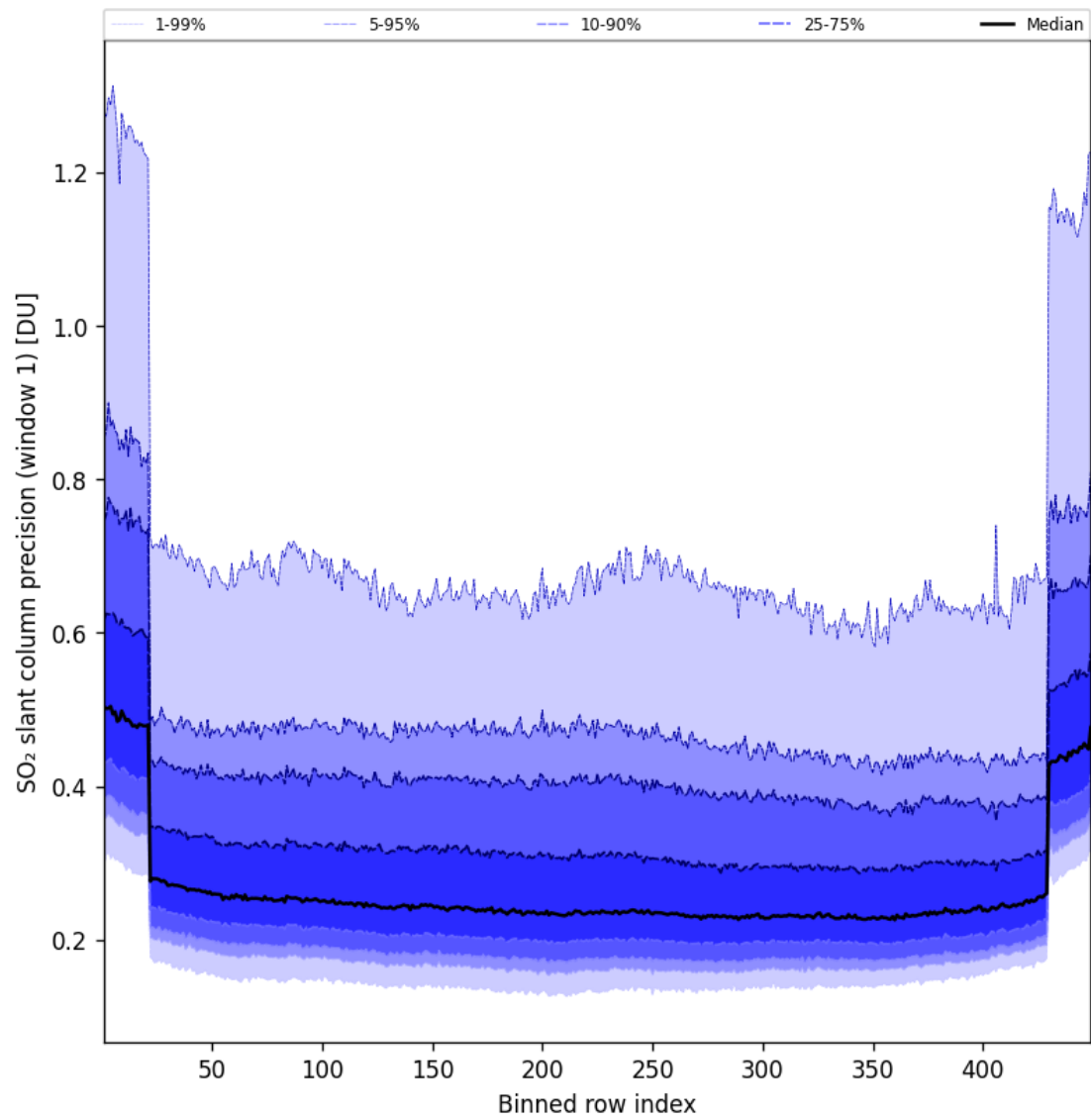


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-07-31 to 2025-08-01

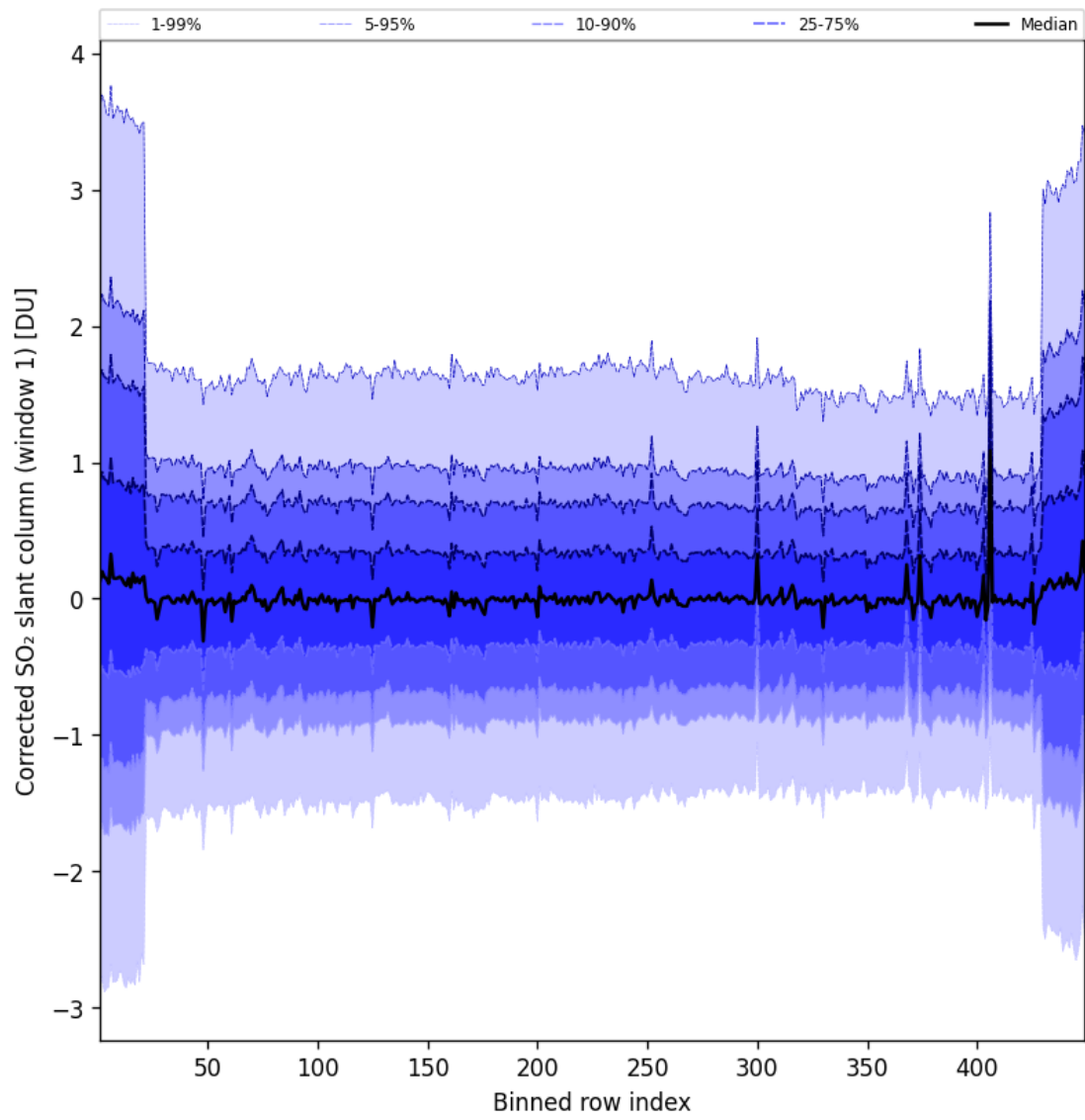


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-07-31 to 2025-08-01

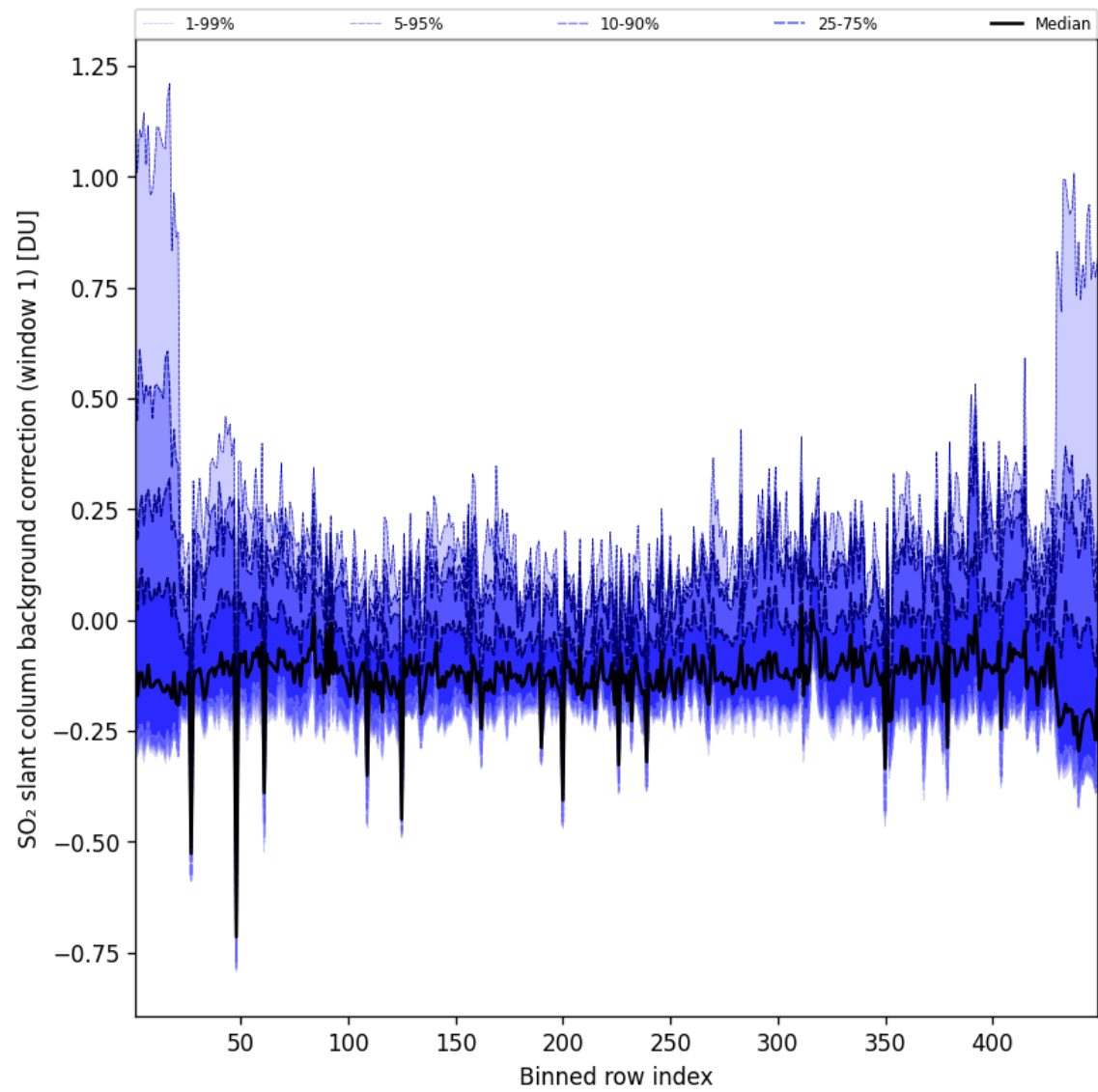


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-07-31 to 2025-08-01

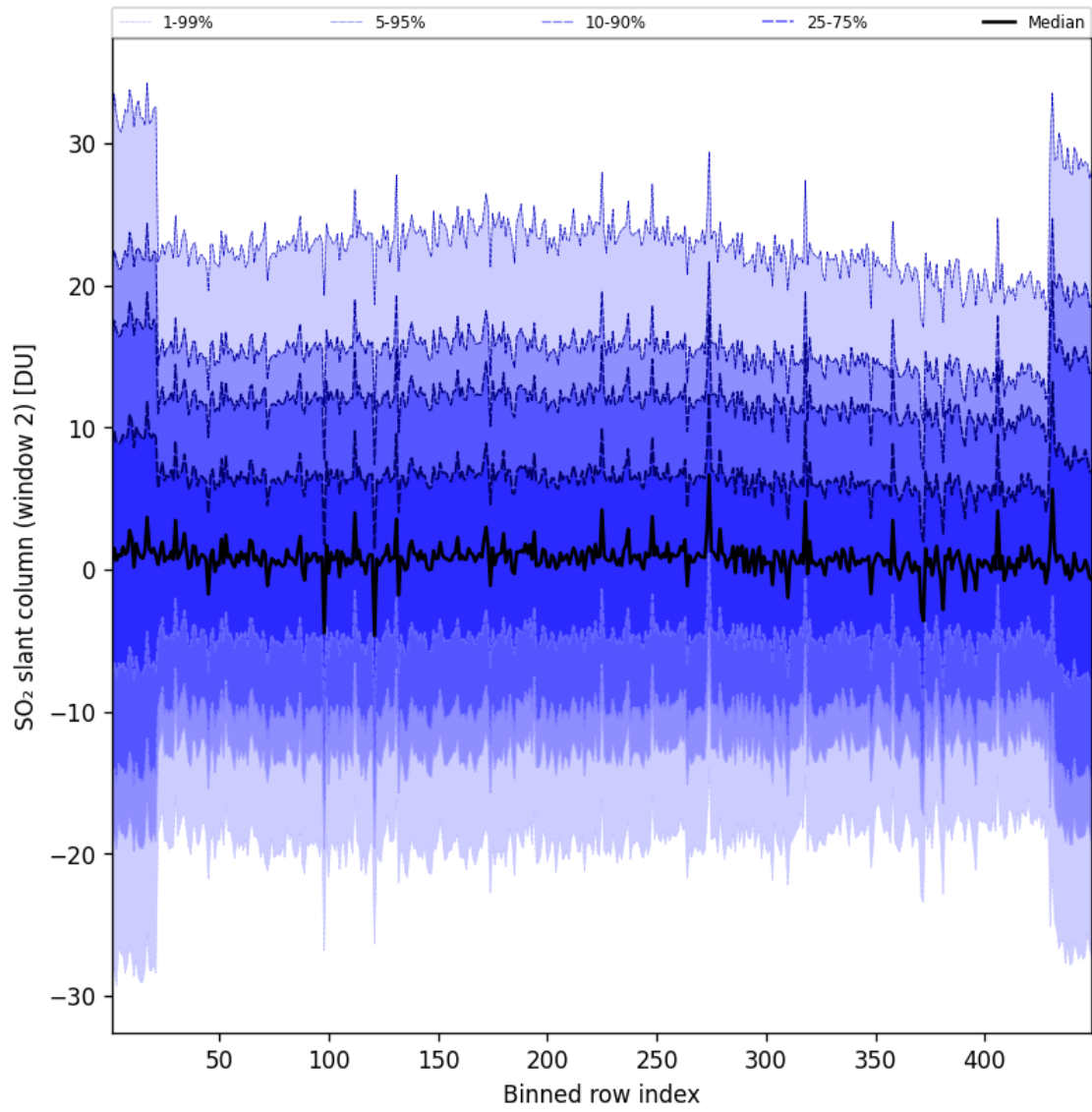


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-07-31 to 2025-08-01

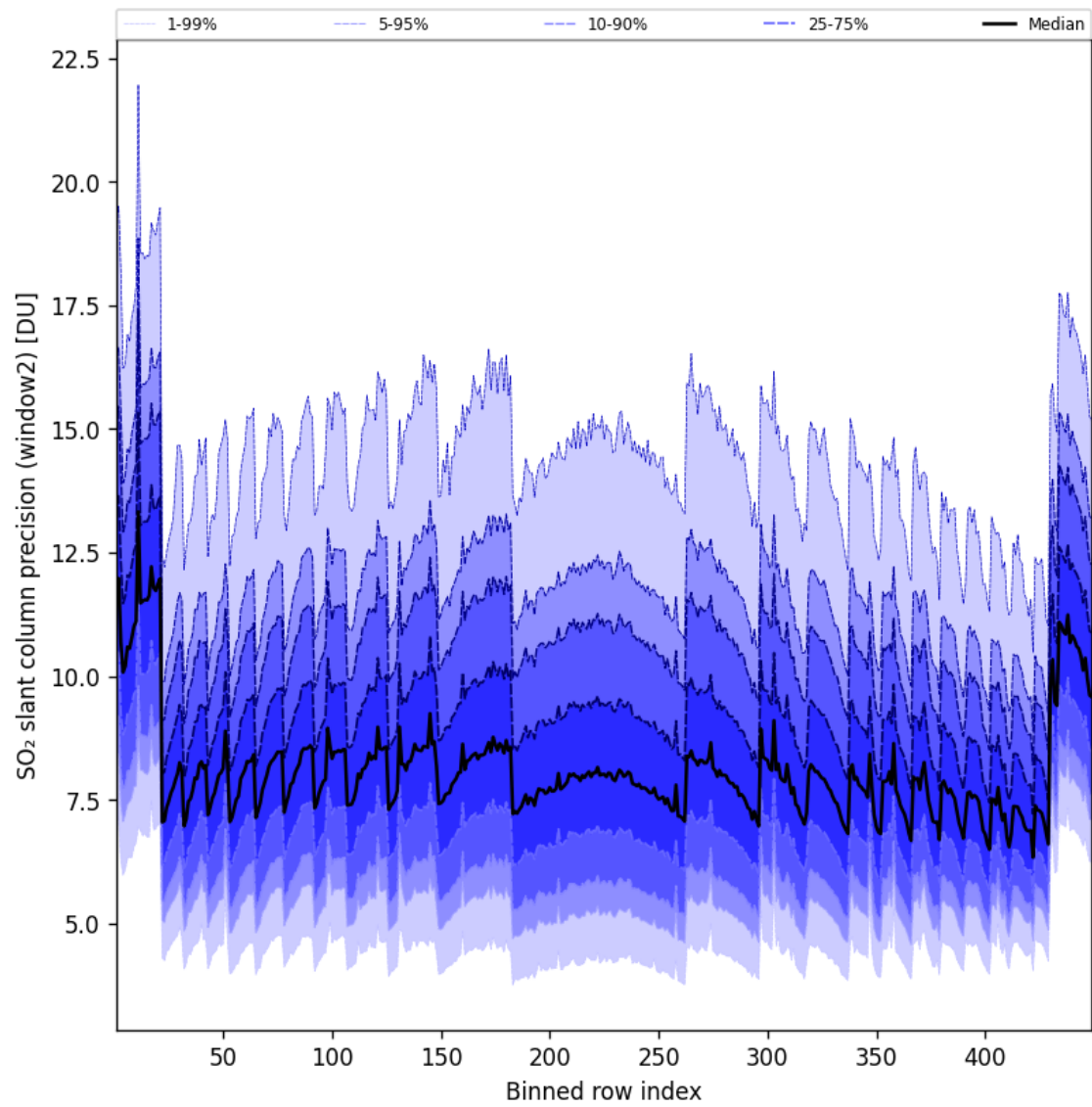


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-07-31 to 2025-08-01

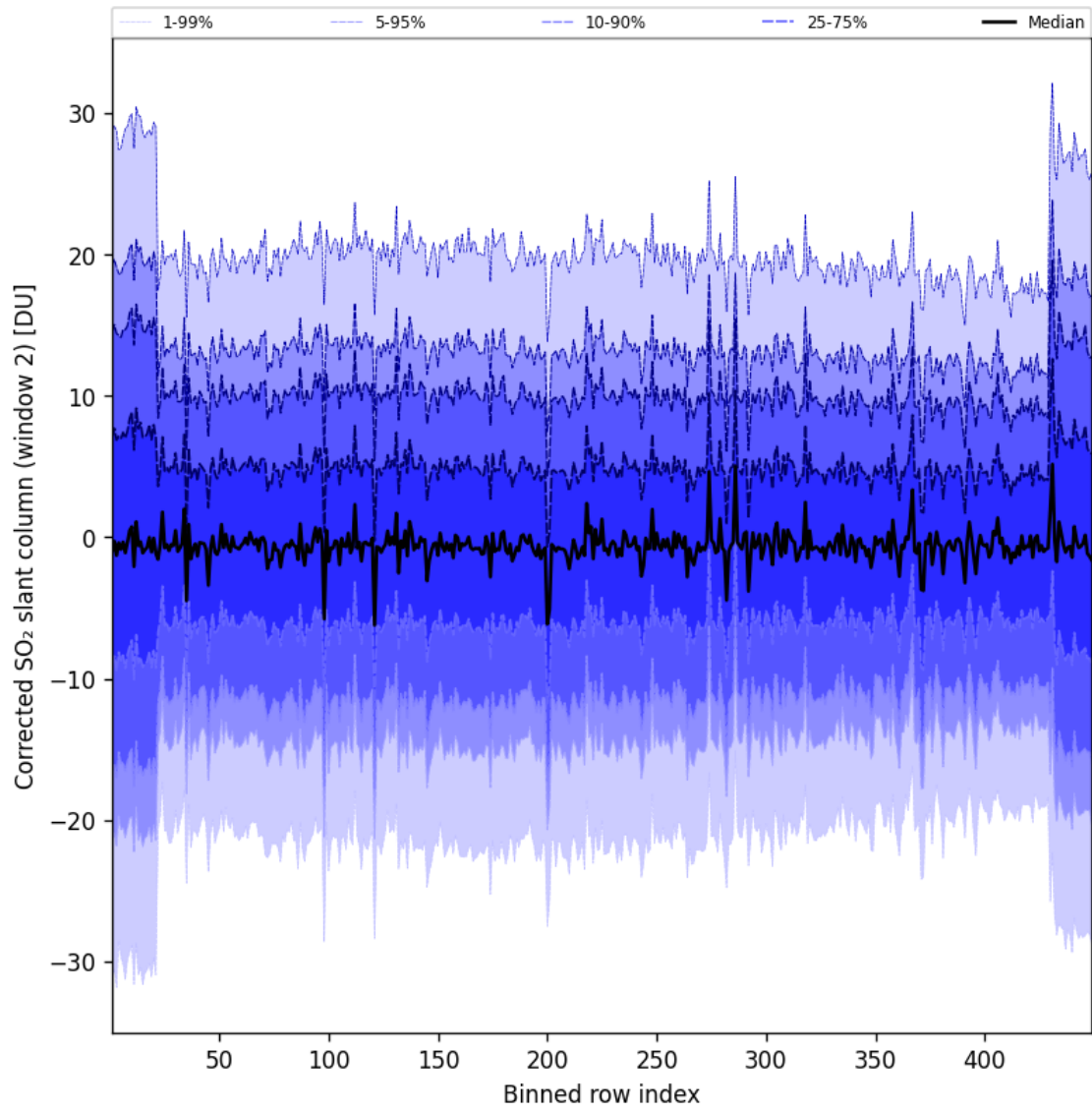


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-07-31 to 2025-08-01

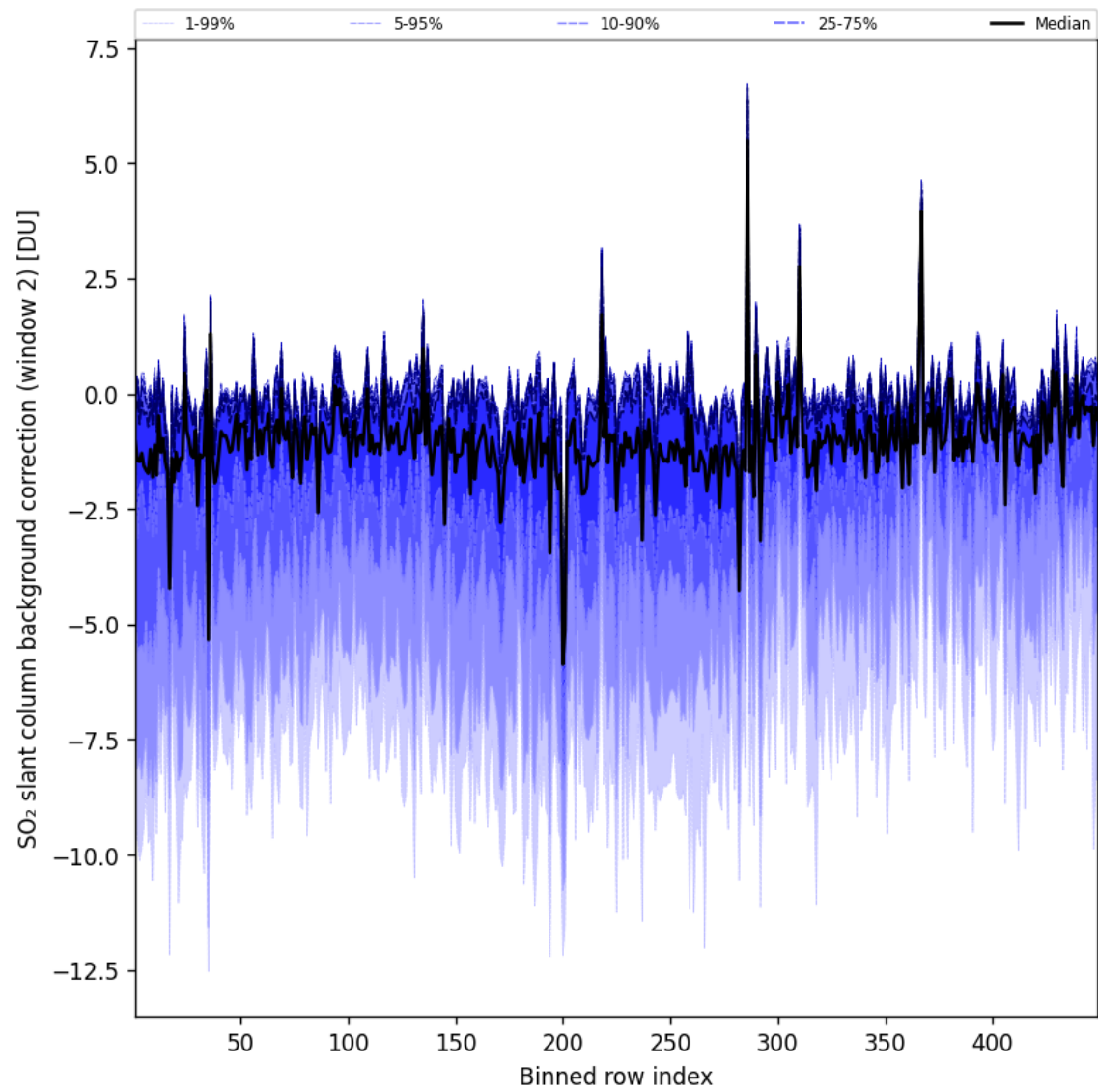


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-07-31 to 2025-08-01

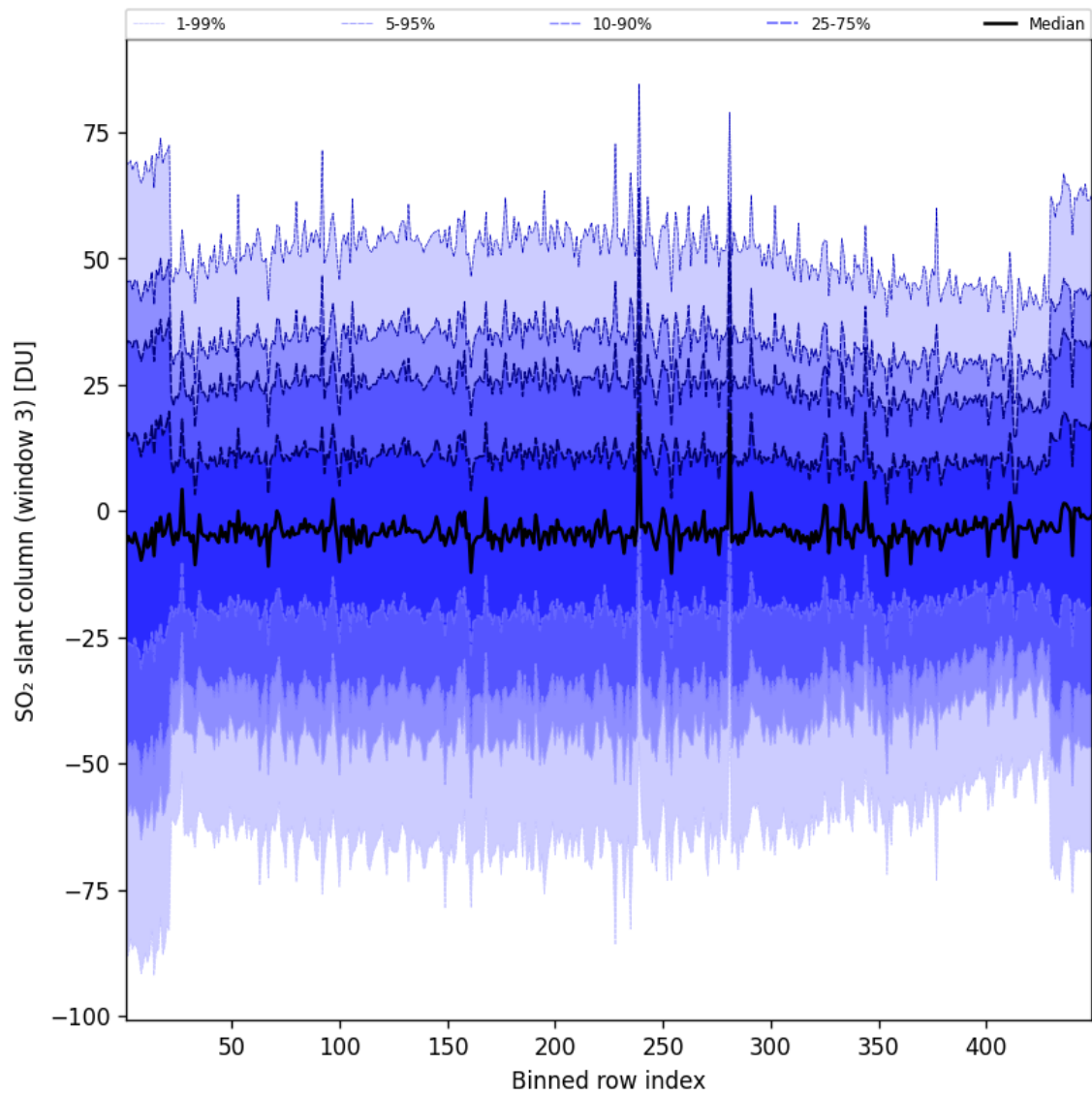


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-07-31 to 2025-08-01

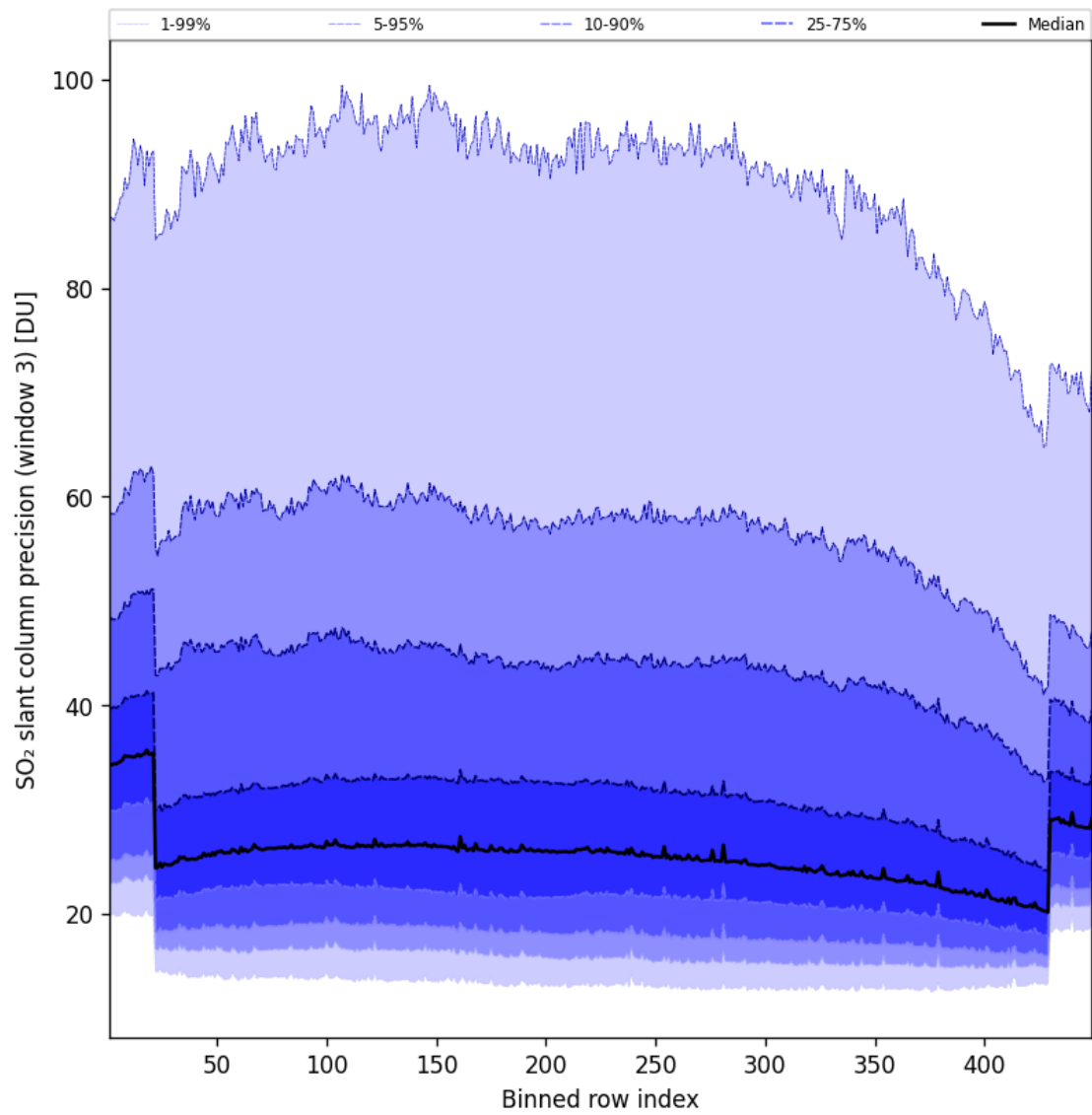


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-07-31 to 2025-08-01

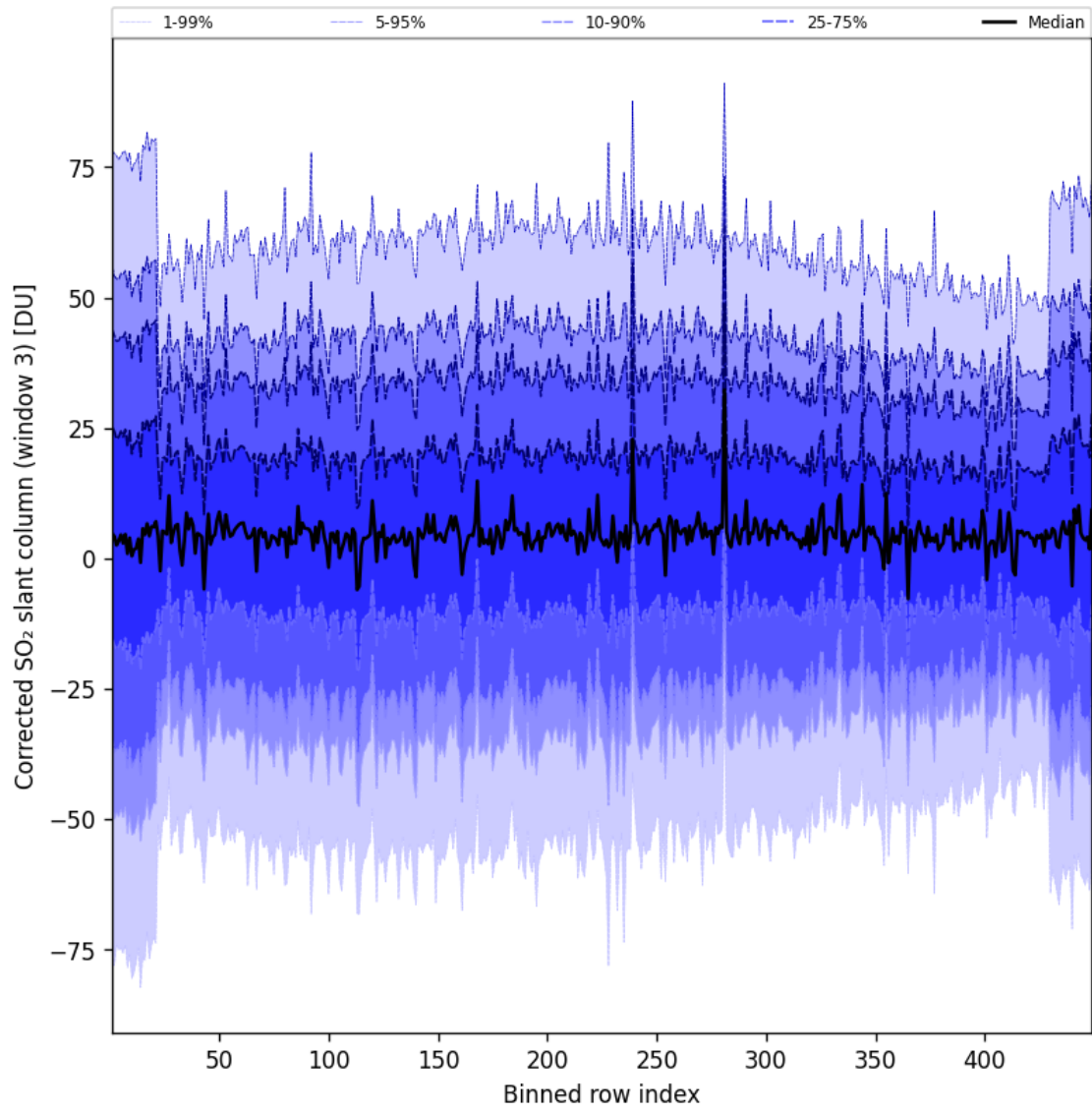


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-07-31 to 2025-08-01

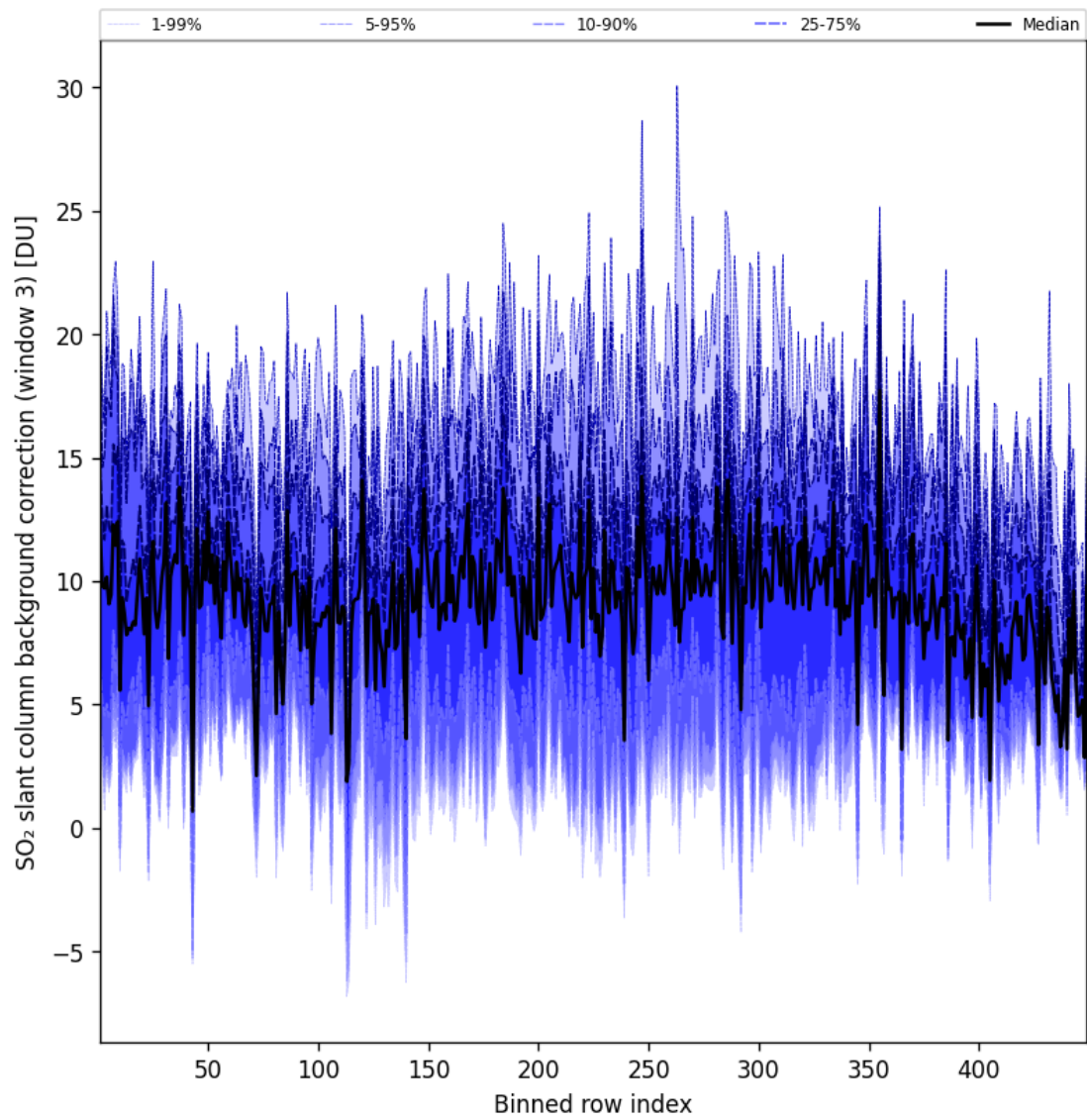


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-07-31 to 2025-08-01

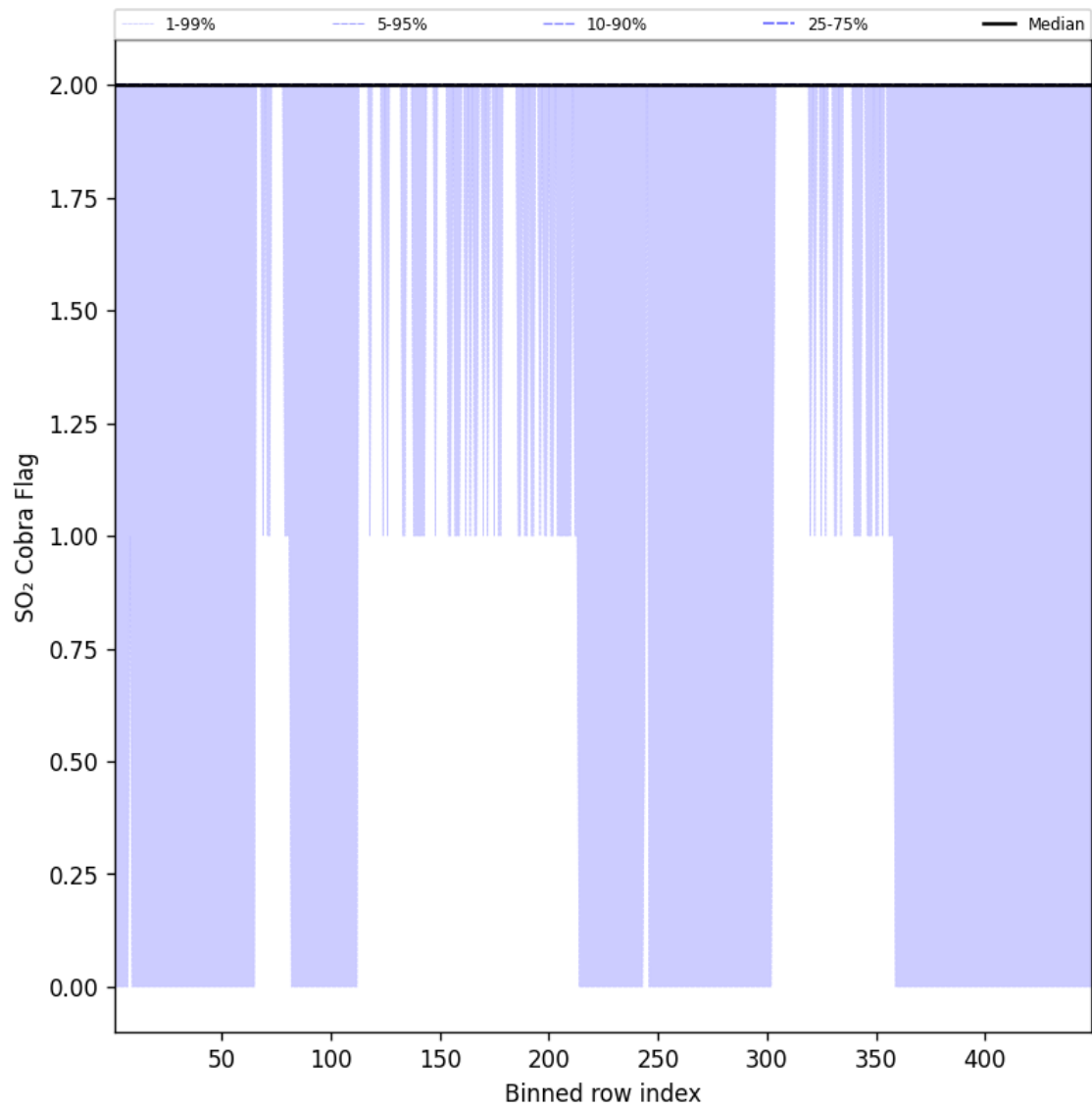


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-07-31 to 2025-08-01

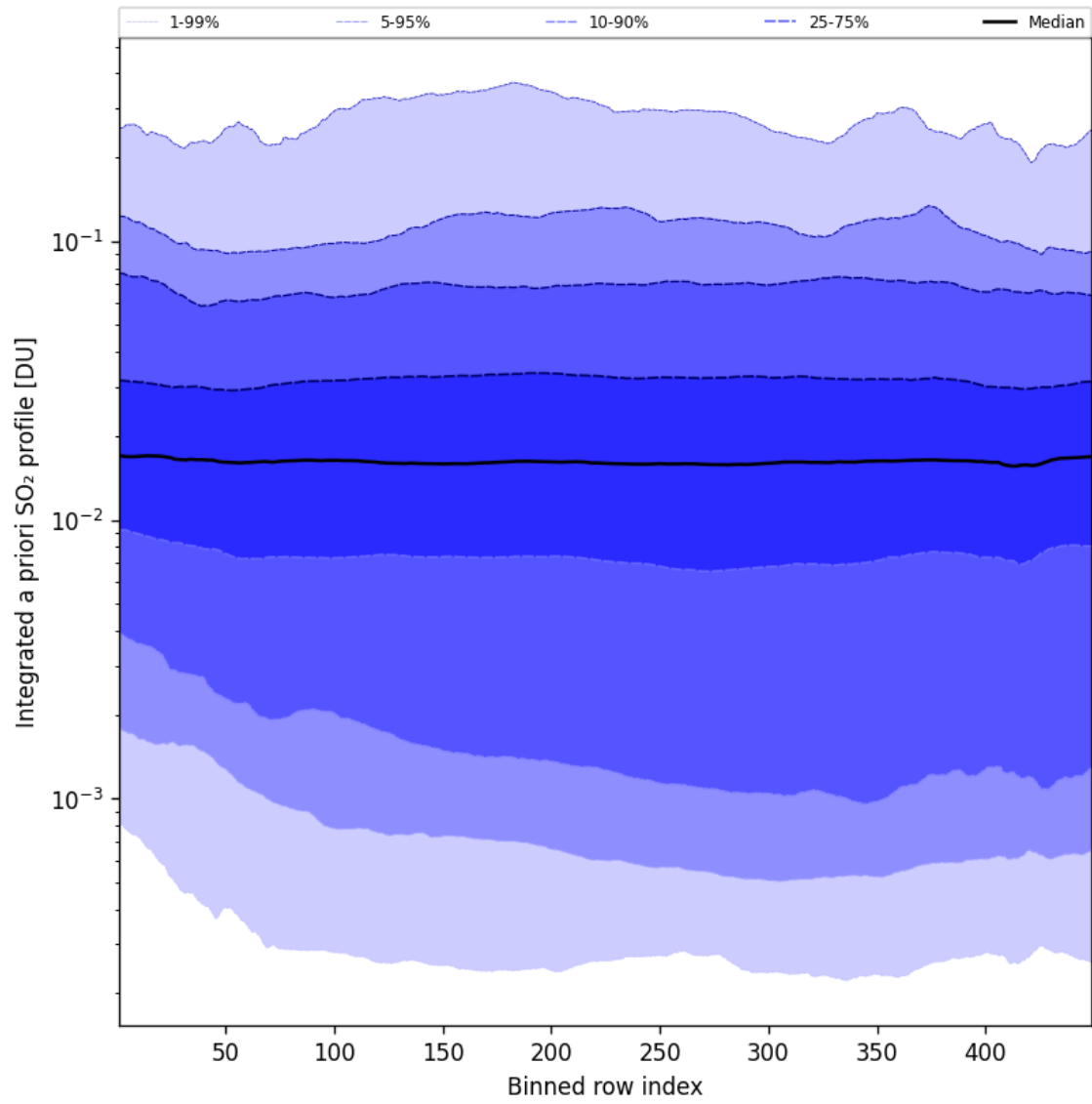


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-07-31 to 2025-08-01

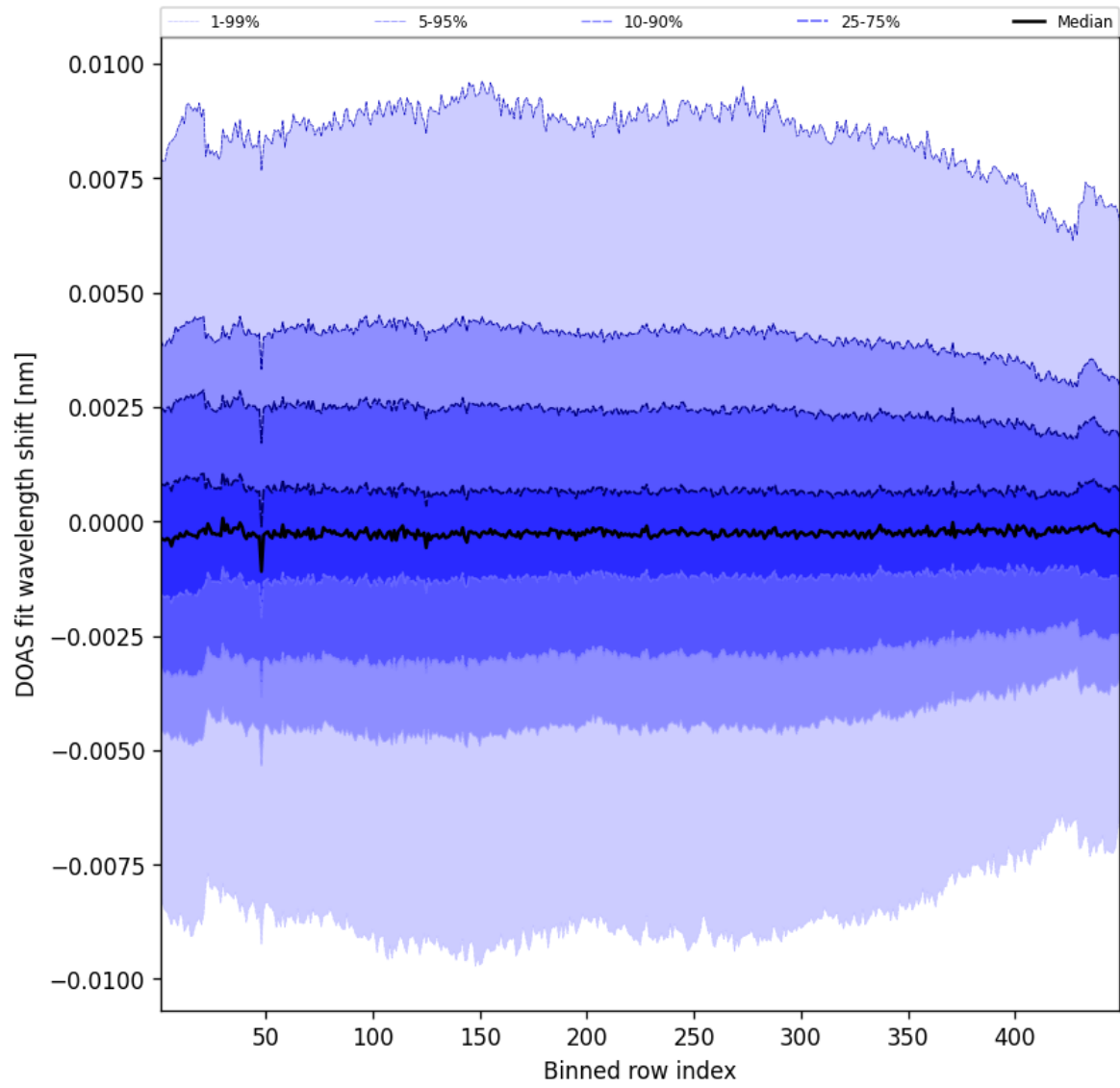


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-07-31 to 2025-08-01

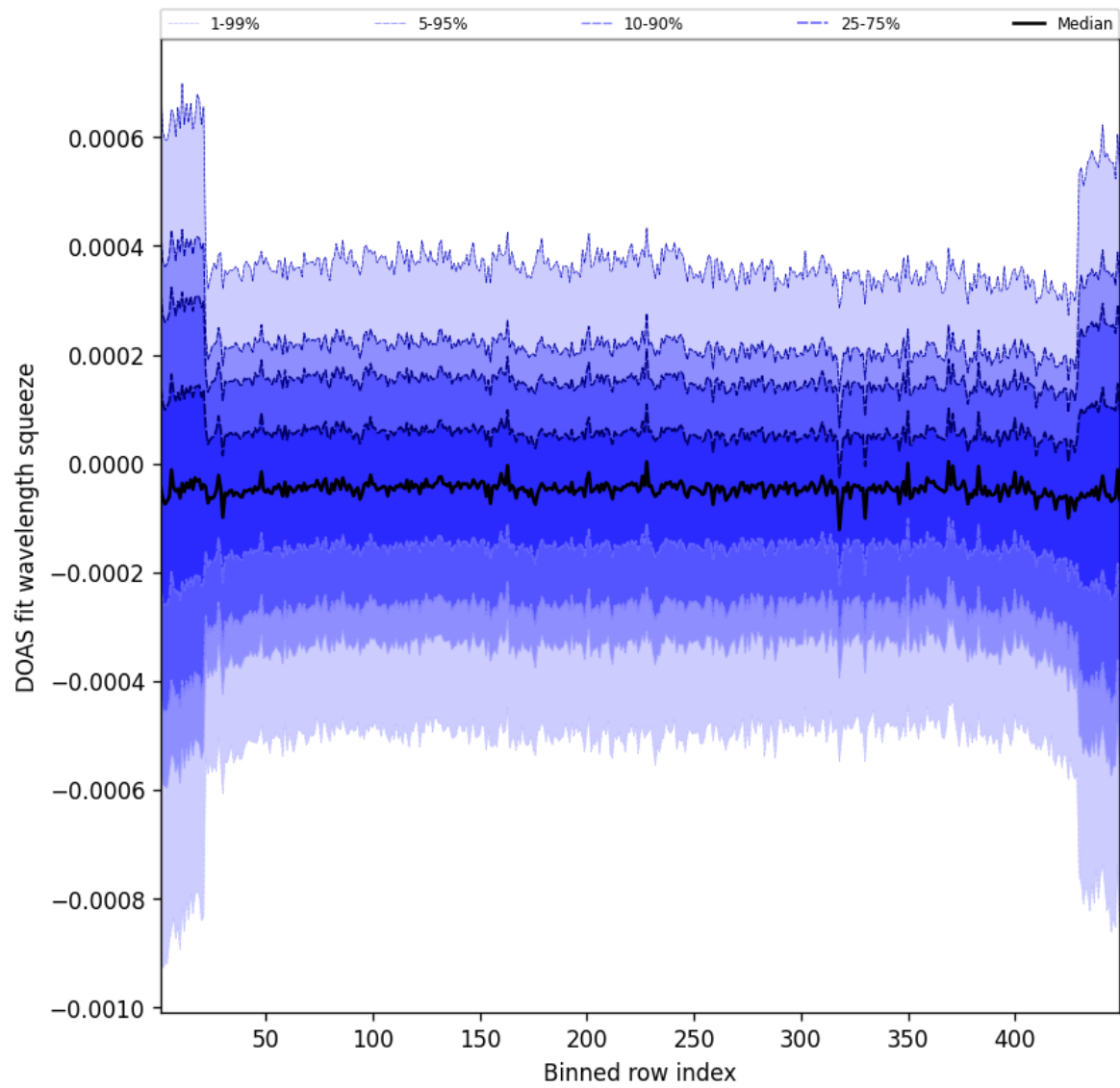


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-07-31 to 2025-08-01

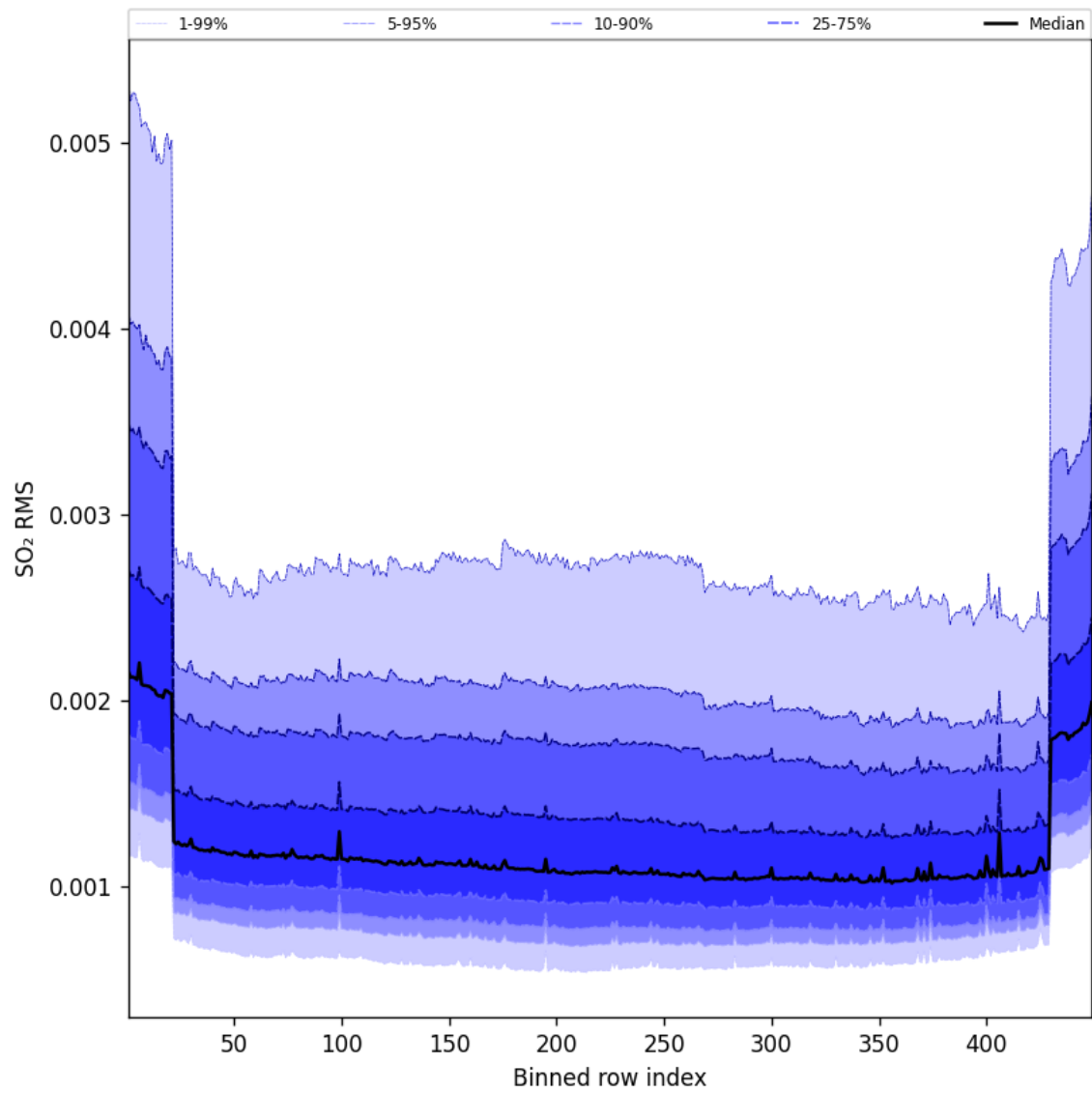


Figure 106: Along track statistics of “SO₂ RMS” for 2025-07-31 to 2025-08-01

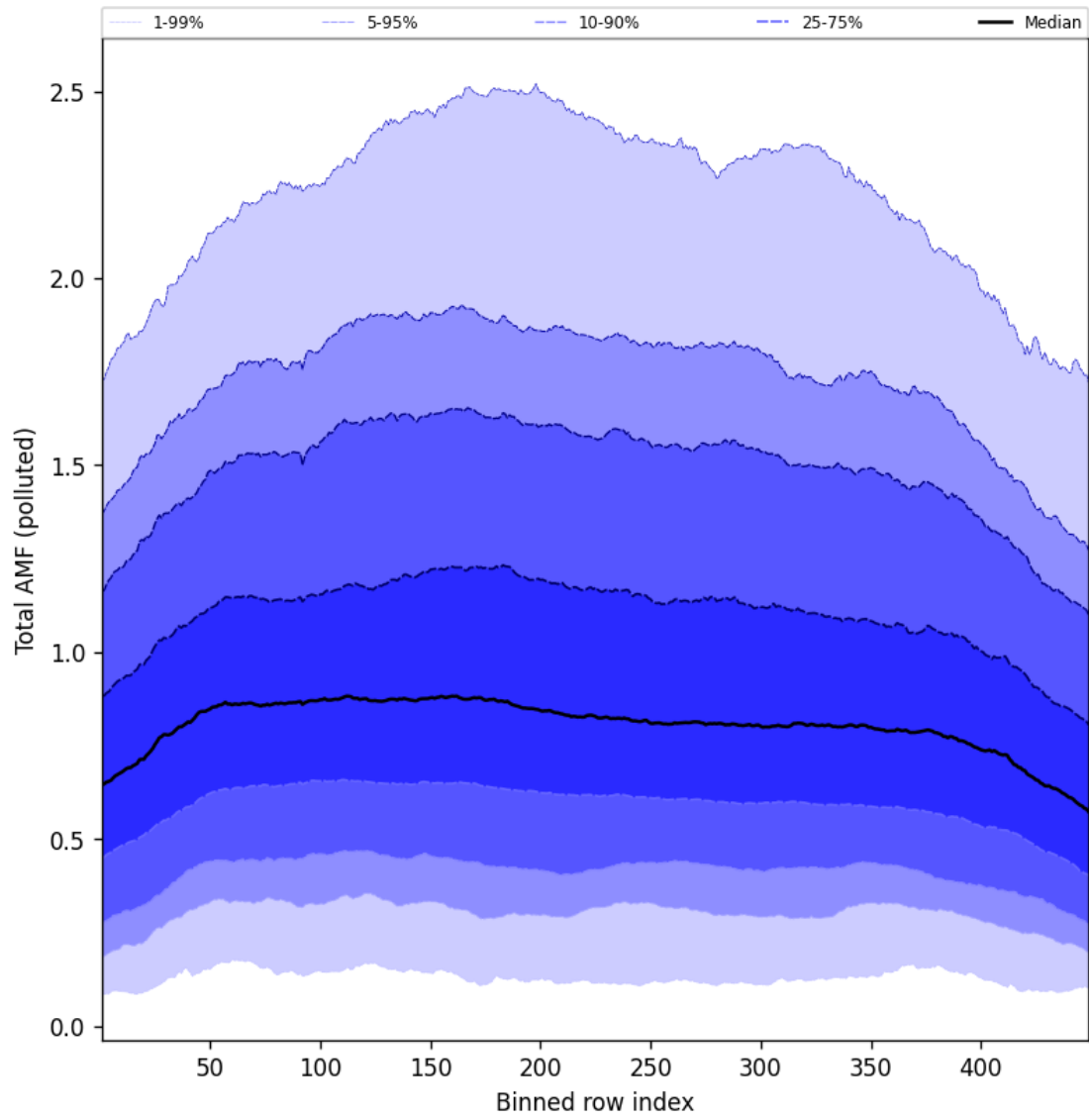


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-07-31 to 2025-08-01

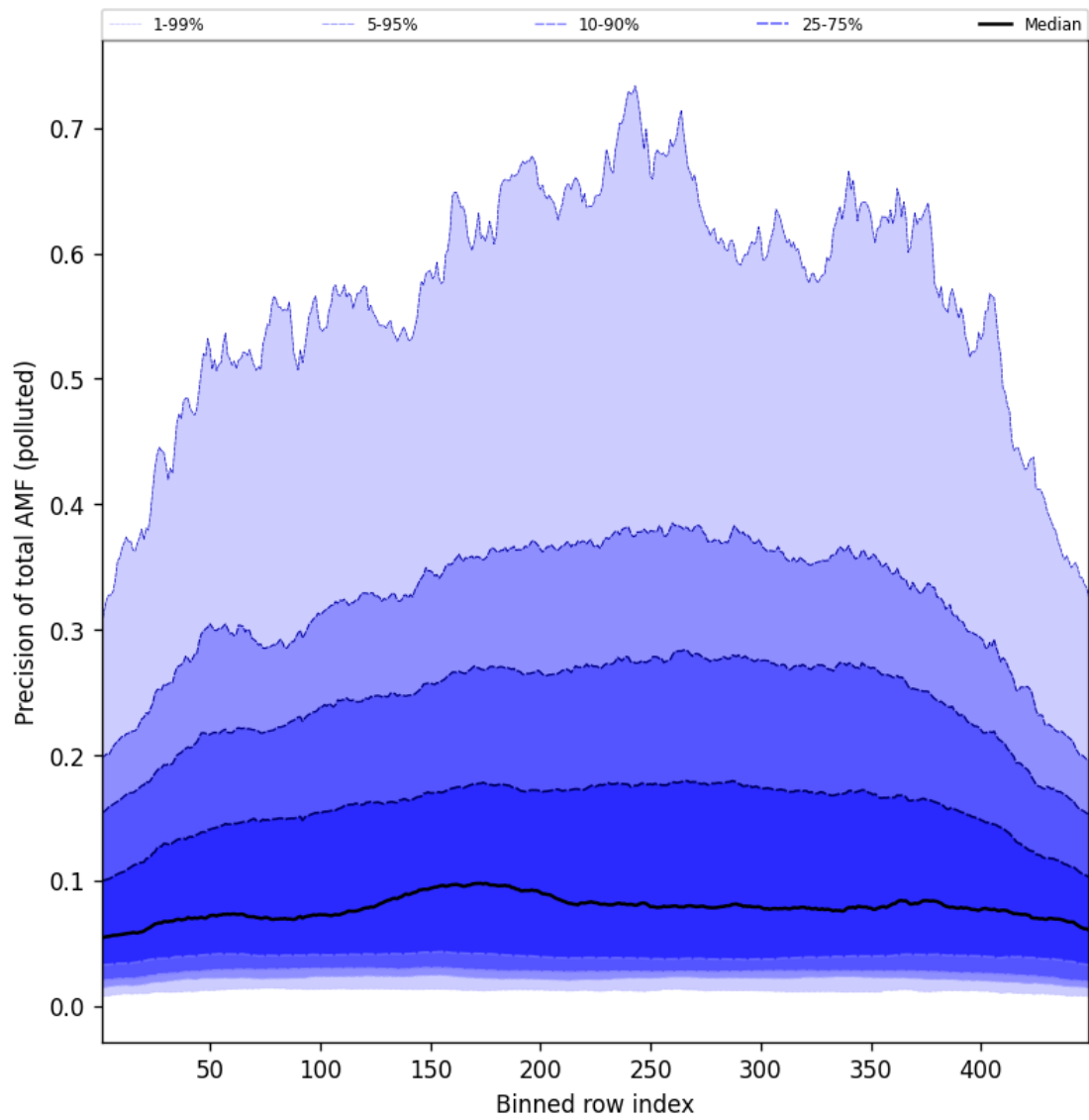


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-07-31 to 2025-08-01

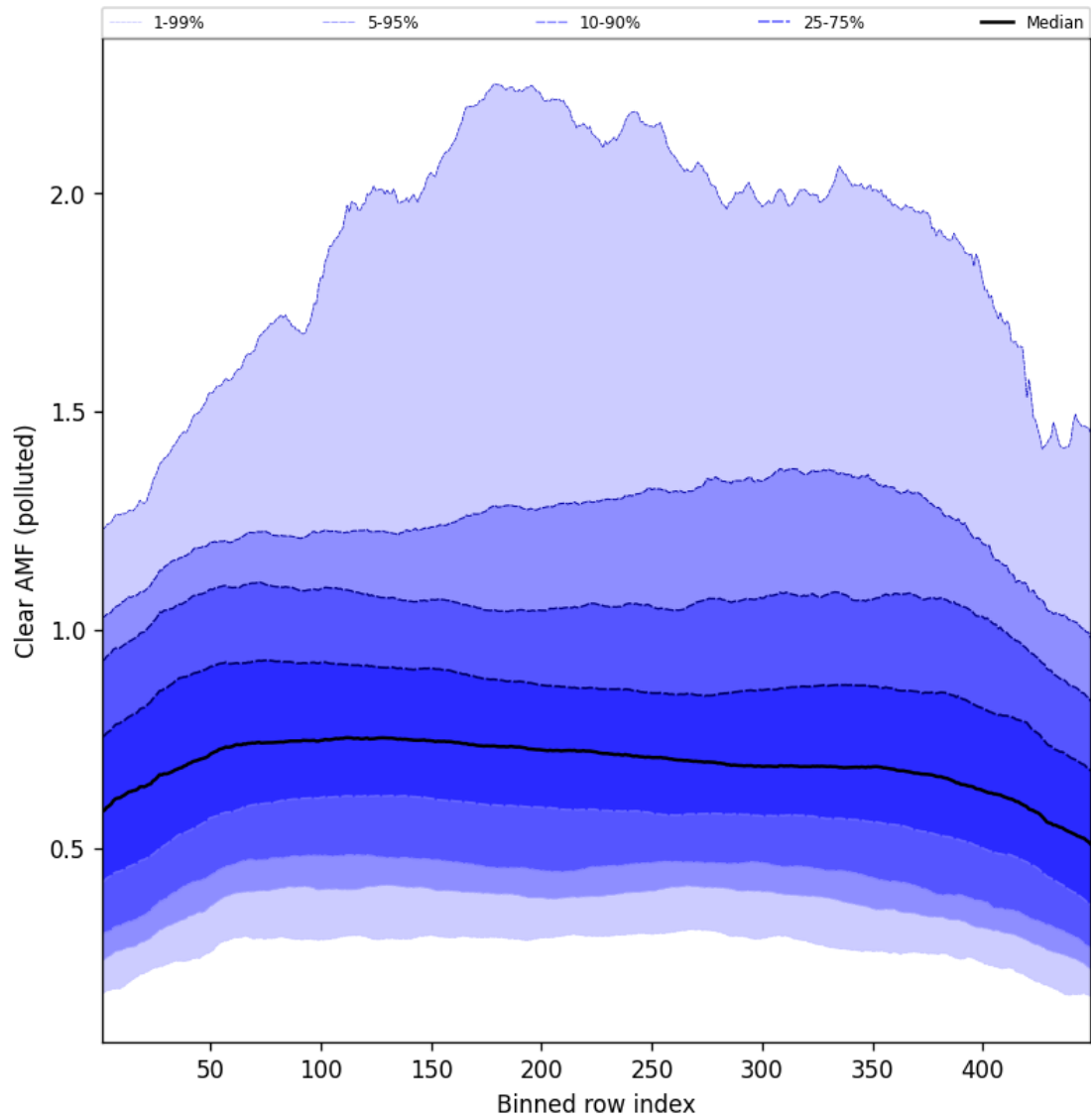


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-07-31 to 2025-08-01

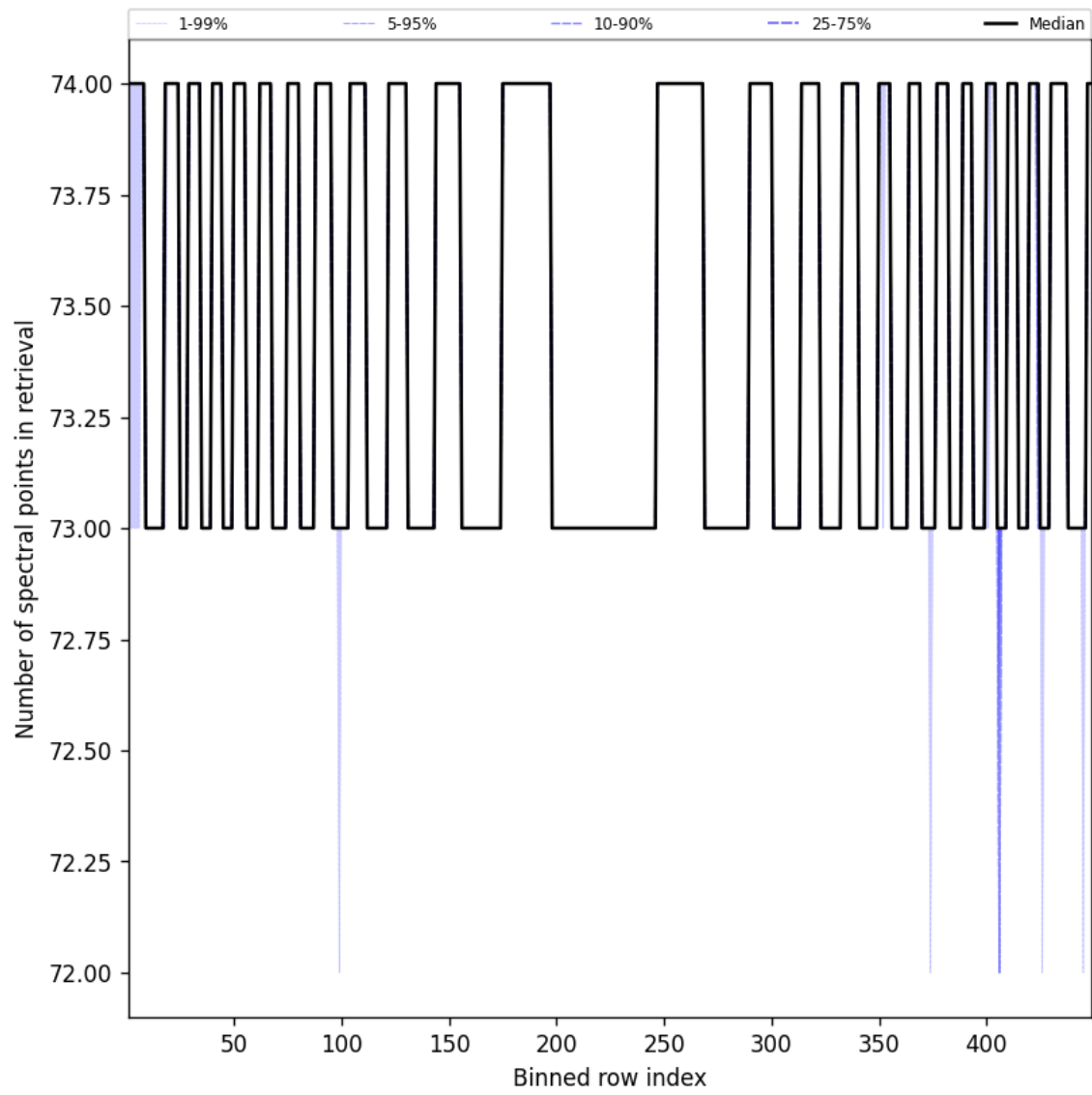


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-07-31 to 2025-08-01

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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