

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]	0.616 ± 0.410	15786547	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.362 \pm 84.300) \times 10^{-2}$	15786547	0.249	0.414	9.530×10^{-3}	-76.7	537
sulfurdioxide total vertical column precision [DU]	0.450 ± 0.628	15786547	0.222	0.289	0.299	4.238×10^{-2}	829
sulfurdioxide slant column density corrected [DU]	$(1.719 \pm 43.498) \times 10^{-2}$	15786547	0.258	0.370	9.125×10^{-3}	-31.5	593
sulfurdioxide slant column density cobra [DU]	$(1.701 \pm 35.586) \times 10^{-2}$	15786547	0.258	0.370	9.125×10^{-3}	-31.5	48.6
sulfurdioxide slant column density cobra precision [DU]	0.295 ± 0.131	15786547	0.213	0.124	0.255	8.426×10^{-2}	27.2
sulfurdioxide slant column density window1 [DU]	0.135 ± 0.672	15786547	0.175	0.741	0.141	-62.7	87.0
sulfurdioxide slant column density window1 precision [DU]	0.295 ± 0.131	15786547	0.213	0.124	0.255	8.426×10^{-2}	27.2
sulfurdioxide slant column density corrected win1 [DU]	$(3.394 \pm 66.108) \times 10^{-2}$	15786547	-2.500×10^{-2}	0.725	1.907×10^{-2}	-62.7	87.2
background so2 slant column offset window1 [DU]	-0.101 ± 0.142	15786547	-0.180	0.161	-0.129	-1.44	2.10
sulfurdioxide slant column density window2 [DU]	2.27 ± 8.94	15786547	2.25	11.2	2.23	-1.711×10^3	1.261×10^3
sulfurdioxide slant column density window2 precision [DU]	8.01 ± 2.38	15786547	7.43	2.64	7.66	2.04	624
sulfurdioxide slant column density corrected win2 [DU]	0.222 ± 8.776	15786547	0.250	10.9	0.244	-1.712×10^3	1.260×10^3
background so2 slant column offset window2 [DU]	-2.05 ± 2.23	15786547	-0.250	3.17	-1.58	-9.81	8.93
sulfurdioxide slant column density window3 [DU]	-11.2 ± 23.5	15786547	-12.9	28.9	-11.4	-1.335×10^3	801
sulfurdioxide slant column density window3 precision [DU]	28.0 ± 13.7	15786547	22.5	10.4	24.3	9.36	778
sulfurdioxide slant column density corrected win3 [DU]	-0.488 ± 23.020	15786547	-0.560	28.3	-0.334	-1.329×10^3	806
background so2 slant column offset window3 [DU]	10.7 ± 5.4	15786547	15.1	8.56	10.9	-15.0	30.7
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	15786547	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(2.841 \pm 6.104) \times 10^{-2}$	15786547	2.276×10^{-2}	2.008×10^{-2}	1.444×10^{-2}	2.174×10^{-4}	1.62
fitted radiance shift [nm]	$(-2.169 \pm 25.961) \times 10^{-4}$	15786547	1.000×10^{-4}	1.724×10^{-3}	-2.039×10^{-4}	-7.402×10^{-2}	8.802×10^{-2}
fitted radiance squeeze [1]	$(-3.356 \pm 18.241) \times 10^{-5}$	15786547	-3.000×10^{-5}	2.082×10^{-4}	-2.892×10^{-5}	-1.982×10^{-2}	4.642×10^{-2}
fitted root mean square [1]	$(1.281 \pm 0.518) \times 10^{-3}$	15786547	1.025×10^{-3}	5.064×10^{-4}	1.132×10^{-3}	3.184×10^{-4}	0.105
sulfurdioxide total air mass factor polluted [1]	0.965 ± 0.493	15786547	0.660	0.630	0.876	5.000×10^{-2}	2.80
sulfurdioxide total air mass factor polluted precision [1]	0.122 ± 0.131	15786547	3.500×10^{-2}	0.114	7.860×10^{-2}	2.608×10^{-3}	2.17
sulfurdioxide clear air mass factor polluted [1]	0.790 ± 0.343	15786547	0.660	0.406	0.742	6.169×10^{-2}	2.62
number of spectral points in retrieval [1]	73.4 ± 0.5	15786547	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	2.000×10^{-2}	9.000×10^{-2}	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-1.91	-0.765	-0.478	-0.326	-0.195	0.219	0.359	0.525	0.844	2.16
sulfurdioxide total vertical column precision [DU]	9.447×10^{-2}	0.124	0.149	0.173	0.205	0.494	0.649	0.836	1.21	2.69
sulfurdioxide slant column density corrected [DU]	-0.857	-0.494	-0.359	-0.269	-0.174	0.196	0.296	0.393	0.546	1.00
sulfurdioxide slant column density cobra [DU]	-0.857	-0.494	-0.359	-0.269	-0.174	0.196	0.296	0.393	0.546	1.00
sulfurdioxide slant column density cobra precision [DU]	0.145	0.174	0.189	0.200	0.214	0.338	0.394	0.448	0.541	0.766
sulfurdioxide slant column density window1 [DU]	-1.68	-0.909	-0.621	-0.430	-0.232	0.509	0.701	0.882	1.15	1.89
sulfurdioxide slant column density window1 precision [DU]	0.145	0.174	0.189	0.200	0.214	0.338	0.394	0.448	0.541	0.766
sulfurdioxide slant column density corrected win1 [DU]	-1.63	-0.953	-0.696	-0.523	-0.339	0.387	0.584	0.775	1.07	1.88
background so2 slant column offset window1 [DU]	-0.375	-0.266	-0.233	-0.216	-0.194	-3.353×10^{-2}	2.445×10^{-2}	7.825×10^{-2}	0.162	0.359
sulfurdioxide slant column density window2 [DU]	-19.0	-12.0	-8.63	-6.14	-3.35	7.83	10.6	13.2	16.6	24.1
sulfurdioxide slant column density window2 precision [DU]	4.24	5.03	5.54	5.96	6.48	9.12	10.0	10.9	12.2	15.0
sulfurdioxide slant column density corrected win2 [DU]	-21.1	-13.9	-10.5	-7.98	-5.23	5.70	8.42	10.9	14.2	21.3
background so2 slant column offset window2 [DU]	-7.43	-6.14	-5.26	-4.49	-3.55	-0.383	-7.185×10^{-2}	0.174	0.527	3.08
sulfurdioxide slant column density window3 [DU]	-70.1	-49.1	-39.6	-32.9	-25.7	3.22	11.0	18.1	27.8	47.1
sulfurdioxide slant column density window3 precision [DU]	13.2	15.4	17.2	18.6	20.4	30.7	35.7	41.7	53.8	86.3
sulfurdioxide slant column density corrected win3 [DU]	-59.2	-38.4	-28.7	-21.9	-14.5	13.8	21.0	27.7	36.9	55.8
background so2 slant column offset window3 [DU]	-1.56	2.18	3.89	5.20	6.51	15.1	16.3	17.3	18.6	21.1
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]	4.908×10^{-4}	8.825×10^{-4}	1.263×10^{-3}	2.152×10^{-3}	6.080×10^{-3}	2.616×10^{-2}	3.662×10^{-2}	5.550×10^{-2}	9.799×10^{-2}	0.299
fitted radiance shift [nm]	-8.194×10^{-3}	-4.055×10^{-3}	-2.595×10^{-3}	-1.774×10^{-3}	-1.099×10^{-3}	6.250×10^{-4}	1.290×10^{-3}	2.143×10^{-3}	3.666×10^{-3}	7.949×10^{-3}
fitted radiance squeeze [1]	-5.237×10^{-4}	-3.275×10^{-4}	-2.466×10^{-4}	-1.920×10^{-4}	-1.349×10^{-4}	7.324×10^{-5}	1.254×10^{-4}	1.740×10^{-4}	2.439×10^{-4}	4.128×10^{-4}
fitted root mean square [1]	6.027×10^{-4}	7.475×10^{-4}	8.276×10^{-4}	8.866×10^{-4}	9.558×10^{-4}	1.462×10^{-3}	1.709×10^{-3}	1.947×10^{-3}	2.277×10^{-3}	3.133×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.110	0.293	0.403	0.497	0.611	1.24	1.50	1.73	1.96	2.22
sulfurdioxide total air mass factor polluted precision [1]	1.202×10^{-2}	2.108×10^{-2}	2.784×10^{-2}	3.364×10^{-2}	4.225×10^{-2}	0.156	0.202	0.255	0.362	0.670
sulfurdioxide clear air mass factor polluted [1]	0.238	0.334	0.400	0.462	0.552	0.958	1.07	1.21	1.47	1.92
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]	0.562 ± 0.416	10681843	0.860	0.490	0.0	1.000	0.140	1.000
sulfurdioxide total vertical column [DU]	$(1.777 \pm 71.771) \times 10^{-2}$	10681843	0.377	7.710×10^{-3}	-39.0	72.9	-0.179	0.198
sulfurdioxide total vertical column precision [DU]	0.413 ± 0.528	10681843	0.255	0.270	4.238×10^{-2}	25.2	0.187	0.442
sulfurdioxide slant column density corrected [DU]	$(1.475 \pm 33.180) \times 10^{-2}$	10681843	0.351	7.684×10^{-3}	-8.76	39.9	-0.166	0.185
sulfurdioxide slant column density cobra [DU]	$(1.473 \pm 33.073) \times 10^{-2}$	10681843	0.351	7.684×10^{-3}	-8.76	24.8	-0.166	0.185
sulfurdioxide slant column density cobra precision [DU]	0.278 ± 0.118	10681843	0.106	0.242	8.426×10^{-2}	12.8	0.207	0.313
sulfurdioxide slant column density window1 [DU]	0.122 ± 0.640	10681843	0.713	0.133	-16.4	51.7	-0.228	0.485
sulfurdioxide slant column density window1 precision [DU]	0.278 ± 0.118	10681843	0.106	0.242	8.426×10^{-2}	12.8	0.207	0.313
sulfurdioxide slant column density corrected win1 [DU]	$(2.939 \pm 62.390) \times 10^{-2}$	10681843	0.693	1.658×10^{-2}	-16.4	51.4	-0.326	0.367
background so2 slant column offset window1 [DU]	$(-9.295 \pm 15.218) \times 10^{-2}$	10681843	0.190	-0.127	-0.618	1.42	-0.200	-9.652×10^{-3}
sulfurdioxide slant column density window2 [DU]	2.34 ± 8.25	10681843	10.6	2.35	-73.9	875	-2.95	7.65
sulfurdioxide slant column density window2 precision [DU]	7.50 ± 2.02	10681843	2.28	7.22	2.04	430	6.17	8.44
sulfurdioxide slant column density corrected win2 [DU]	0.119 ± 8.044	10681843	10.3	0.170	-79.1	869	-5.00	5.30
background so2 slant column offset window2 [DU]	-2.22 ± 2.39	10681843	3.73	-1.88	-9.78	8.93	-4.00	-0.269
sulfurdioxide slant column density window3 [DU]	-11.4 ± 21.8	10681843	26.9	-11.9	-1.335×10^3	485	-25.1	1.83
sulfurdioxide slant column density window3 precision [DU]	26.2 ± 13.4	10681843	8.31	22.6	9.36	778	19.3	27.6
sulfurdioxide slant column density corrected win3 [DU]	-0.382 ± 21.218	10681843	26.3	-0.246	-1.329×10^3	490	-13.4	12.9
background so2 slant column offset window3 [DU]	11.0 ± 5.6	10681843	9.10	12.3	-15.0	26.8	6.40	15.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	10681843	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.101 \pm 7.024) \times 10^{-2}$	10681843	2.486×10^{-2}	1.176×10^{-2}	2.174×10^{-4}	1.62	2.451×10^{-3}	2.731×10^{-2}
fitted radiance shift [nm]	$(-7.047 \pm 255.481) \times 10^{-5}$	10681843	1.582×10^{-3}	-8.765×10^{-5}	-4.368×10^{-2}	3.964×10^{-2}	-8.806×10^{-4}	7.010×10^{-4}
fitted radiance squeeze [1]	$(-5.692 \pm 17.158) \times 10^{-5}$	10681843	2.007×10^{-4}	-4.595×10^{-5}	-9.414×10^{-3}	1.497×10^{-2}	-1.506×10^{-4}	5.016×10^{-5}
fitted root mean square [1]	$(1.222 \pm 0.486) \times 10^{-3}$	10681843	4.388×10^{-4}	1.084×10^{-3}	3.184×10^{-4}	3.955×10^{-2}	9.264×10^{-4}	1.365×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.02 ± 0.54	10681843	0.773	0.923	5.000×10^{-2}	2.80	0.615	1.39
sulfurdioxide total air mass factor polluted precision [1]	0.137 ± 0.147	10681843	0.130	9.066×10^{-2}	2.608×10^{-3}	2.17	4.478×10^{-2}	0.175
sulfurdioxide clear air mass factor polluted [1]	0.810 ± 0.388	10681843	0.483	0.749	6.169×10^{-2}	2.62	0.519	1.00
number of spectral points in retrieval [1]	73.5 ± 0.5	10681843	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.729 ± 0.373	5104704	0.610	1.000	0.0	1.000	0.390	1.000
sulfurdioxide total vertical column [DU]	$(3.587 \pm 105.812) \times 10^{-2}$	5104704	0.507	1.460×10^{-2}	-76.7	537	-0.236	0.271
sulfurdioxide total vertical column precision [DU]	0.527 ± 0.792	5104704	0.332	0.359	4.955×10^{-2}	829	0.254	0.587
sulfurdioxide slant column density corrected [DU]	$(2.231 \pm 59.559) \times 10^{-2}$	5104704	0.414	1.266×10^{-2}	-31.5	593	-0.192	0.222
sulfurdioxide slant column density cobra [DU]	$(2.180 \pm 40.337) \times 10^{-2}$	5104704	0.414	1.266×10^{-2}	-31.5	48.6	-0.192	0.222
sulfurdioxide slant column density cobra precision [DU]	0.330 ± 0.148	5104704	0.148	0.290	9.723×10^{-2}	27.2	0.236	0.384
sulfurdioxide slant column density window1 [DU]	0.162 ± 0.734	5104704	0.805	0.162	-62.7	87.0	-0.240	0.565
sulfurdioxide slant column density window1 precision [DU]	0.330 ± 0.148	5104704	0.148	0.290	9.723×10^{-2}	27.2	0.236	0.384
sulfurdioxide slant column density corrected win1 [DU]	$(4.344 \pm 73.272) \times 10^{-2}$	5104704	0.800	2.517×10^{-2}	-62.7	87.2	-0.369	0.431
background so2 slant column offset window1 [DU]	-0.119 ± 0.115	5104704	0.105	-0.132	-1.44	2.10	-0.180	-7.580×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.11 ± 10.23	5104704	12.5	1.94	-1.711×10^3	1.261×10^3	-4.26	8.28
sulfurdioxide slant column density window2 precision [DU]	9.08 ± 2.72	5104704	2.89	8.73	2.52	624	7.45	10.3
sulfurdioxide slant column density corrected win2 [DU]	0.436 ± 10.135	5104704	12.4	0.431	-1.712×10^3	1.260×10^3	-5.80	6.65
background so2 slant column offset window2 [DU]	-1.67 ± 1.79	5104704	2.04	-1.31	-9.81	8.75	-2.61	-0.571
sulfurdioxide slant column density window3 [DU]	-10.7 ± 26.7	5104704	33.6	-10.3	-416	801	-27.2	6.41
sulfurdioxide slant column density window3 precision [DU]	31.8 ± 13.5	5104704	10.8	28.4	10.1	294	24.1	34.9
sulfurdioxide slant column density corrected win3 [DU]	-0.712 ± 26.396	5104704	33.4	-0.568	-406	806	-17.2	16.2
background so2 slant column offset window3 [DU]	9.97 ± 4.79	5104704	6.46	9.06	-11.3	30.7	6.63	13.1
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.28	5104704	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.297 \pm 3.398) \times 10^{-2}$	5104704	1.328×10^{-2}	1.794×10^{-2}	1.038×10^{-3}	1.37	1.200×10^{-2}	2.529×10^{-2}
fitted radiance shift [nm]	$(-5.232 \pm 26.544) \times 10^{-4}$	5104704	1.949×10^{-3}	-5.049×10^{-4}	-7.402×10^{-2}	8.802×10^{-2}	-1.536×10^{-3}	4.133×10^{-4}
fitted radiance squeeze [1]	$(1.532 \pm 19.433) \times 10^{-5}$	5104704	2.215×10^{-4}	1.093×10^{-5}	-1.982×10^{-2}	4.642×10^{-2}	-9.805×10^{-5}	1.234×10^{-4}
fitted root mean square [1]	$(1.404 \pm 0.560) \times 10^{-3}$	5104704	5.933×10^{-4}	1.255×10^{-3}	3.655×10^{-4}	0.105	1.039×10^{-3}	1.632×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.845 ± 0.354	5104704	0.429	0.804	5.000×10^{-2}	2.59	0.606	1.03
sulfurdioxide total air mass factor polluted precision [1]	$(9.138 \pm 8.301) \times 10^{-2}$	5104704	8.267×10^{-2}	5.956×10^{-2}	3.710×10^{-3}	1.65	3.854×10^{-2}	0.121
sulfurdioxide clear air mass factor polluted [1]	0.748 ± 0.217	5104704	0.300	0.733	9.957×10^{-2}	1.64	0.600	0.900
number of spectral points in retrieval [1]	73.4 ± 0.5	5104704	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]	0.638 ± 0.401	10730040	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.064 \pm 81.791) \times 10^{-2}$	10730040	0.408	9.247×10^{-3}	-76.7	537	-0.193	0.215
sulfurdioxide total vertical column precision [DU]	0.430 ± 0.534	10730040	0.257	0.289	5.657×10^{-2}	39.4	0.207	0.465
sulfurdioxide slant column density corrected [DU]	$(1.633 \pm 43.223) \times 10^{-2}$	10730040	0.369	8.814×10^{-3}	-31.5	593	-0.174	0.195
sulfurdioxide slant column density cobra [DU]	$(1.617 \pm 35.820) \times 10^{-2}$	10730040	0.369	8.814×10^{-3}	-31.5	48.6	-0.174	0.195
sulfurdioxide slant column density cobra precision [DU]	0.296 ± 0.132	10730040	0.135	0.254	9.051×10^{-2}	22.5	0.211	0.347
sulfurdioxide slant column density window1 [DU]	0.133 ± 0.676	10730040	0.745	0.145	-62.7	66.9	-0.232	0.512
sulfurdioxide slant column density window1 precision [DU]	0.296 ± 0.132	10730040	0.135	0.254	9.051×10^{-2}	22.5	0.211	0.347
sulfurdioxide slant column density corrected win1 [DU]	$(3.378 \pm 66.326) \times 10^{-2}$	10730040	0.729	2.054×10^{-2}	-62.7	67.7	-0.340	0.390
background so2 slant column offset window1 [DU]	$(-9.915 \pm 14.924) \times 10^{-2}$	10730040	0.163	-0.133	-1.44	2.10	-0.195	-3.204×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.23 ± 8.93	10730040	11.2	2.15	-1.522×10^3	1.261×10^3	-3.42	7.79
sulfurdioxide slant column density window2 precision [DU]	7.98 ± 2.25	10730040	2.55	7.64	2.33	624	6.51	9.06
sulfurdioxide slant column density corrected win2 [DU]	0.293 ± 8.750	10730040	10.9	0.307	-1.524×10^3	1.260×10^3	-5.18	5.77
background so2 slant column offset window2 [DU]	-1.94 ± 2.28	10730040	3.06	-1.32	-9.81	8.93	-3.37	-0.309
sulfurdioxide slant column density window3 [DU]	-8.77 ± 23.43	10730040	29.3	-9.29	-409	253	-23.5	5.73
sulfurdioxide slant column density window3 precision [DU]	27.0 ± 11.8	10730040	9.28	24.0	9.36	294	20.5	29.7
sulfurdioxide slant column density corrected win3 [DU]	1.50 ± 22.72	10730040	28.3	1.33	-402	265	-12.7	15.6
background so2 slant column offset window3 [DU]	10.3 ± 5.5	10730040	8.63	9.76	-15.0	30.7	6.14	14.8
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	10730040	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.922 \pm 2.841) \times 10^{-2}$	10730040	1.538×10^{-2}	1.420×10^{-2}	2.833×10^{-4}	1.09	7.485×10^{-3}	2.287×10^{-2}
fitted radiance shift [nm]	$(-2.474 \pm 22.806) \times 10^{-4}$	10730040	1.662×10^{-3}	-2.221×10^{-4}	-5.276×10^{-2}	8.802×10^{-2}	-1.091×10^{-3}	5.714×10^{-4}
fitted radiance squeeze [1]	$(-2.750 \pm 18.369) \times 10^{-5}$	10730040	2.083×10^{-4}	-2.219×10^{-5}	-1.494×10^{-2}	4.642×10^{-2}	-1.286×10^{-4}	7.975×10^{-5}
fitted root mean square [1]	$(1.290 \pm 0.524) \times 10^{-3}$	10730040	5.567×10^{-4}	1.130×10^{-3}	3.408×10^{-4}	0.105	9.491×10^{-4}	1.506×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.966 ± 0.454	10730040	0.567	0.900	5.000×10^{-2}	2.57	0.654	1.22
sulfurdioxide total air mass factor polluted precision [1]	0.114 ± 0.126	10730040	9.437×10^{-2}	7.393×10^{-2}	3.831×10^{-3}	2.17	4.452×10^{-2}	0.139
sulfurdioxide clear air mass factor polluted [1]	0.819 ± 0.341	10730040	0.373	0.778	0.109	2.62	0.600	0.973
number of spectral points in retrieval [1]	73.4 ± 0.5	10730040	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]	0.630 ± 0.420	3412857	0.830	1.000	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(2.349 \pm 84.069) \times 10^{-2}$	3412857	0.434	8.701×10^{-3}	-41.2	438	-0.204	0.230
sulfurdioxide total vertical column precision [DU]	0.482 ± 0.815	3412857	0.344	0.336	4.570×10^{-2}	829	0.206	0.550
sulfurdioxide slant column density corrected [DU]	$(1.540 \pm 46.362) \times 10^{-2}$	3412857	0.362	8.136×10^{-3}	-13.2	577	-0.171	0.191
sulfurdioxide slant column density cobra [DU]	$(1.515 \pm 33.693) \times 10^{-2}$	3412857	0.362	8.136×10^{-3}	-28.0	26.9	-0.171	0.191
sulfurdioxide slant column density cobra precision [DU]	0.287 ± 0.126	3412857	9.835×10^{-2}	0.252	8.657×10^{-2}	27.2	0.216	0.314
sulfurdioxide slant column density window1 [DU]	0.162 ± 0.647	3412857	0.719	0.157	-61.8	87.0	-0.202	0.518
sulfurdioxide slant column density window1 precision [DU]	0.287 ± 0.126	3412857	9.835×10^{-2}	0.252	8.657×10^{-2}	27.2	0.216	0.314
sulfurdioxide slant column density corrected win1 [DU]	$(3.348 \pm 63.975) \times 10^{-2}$	3412857	0.706	1.877×10^{-2}	-61.8	87.2	-0.329	0.376
background so2 slant column offset window1 [DU]	-0.128 ± 0.117	3412857	0.133	-0.145	-0.618	0.943	-0.203	-7.022×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.99 ± 9.19	3412857	11.4	2.03	-1.711×10^3	906	-3.68	7.68
sulfurdioxide slant column density window2 precision [DU]	8.29 ± 2.77	3412857	2.83	7.89	2.04	604	6.62	9.45
sulfurdioxide slant column density corrected win2 [DU]	0.109 ± 9.073	3412857	11.1	0.143	-1.712×10^3	903	-5.44	5.70
background so2 slant column offset window2 [DU]	-1.88 ± 2.02	3412857	2.82	-1.56	-9.78	8.93	-3.24	-0.418
sulfurdioxide slant column density window3 [DU]	-16.8 ± 23.6	3412857	28.7	-16.2	-1.335×10^3	801	-30.8	-2.12
sulfurdioxide slant column density window3 precision [DU]	31.3 ± 17.8	3412857	13.5	26.2	9.41	526	21.1	34.7
sulfurdioxide slant column density corrected win3 [DU]	-5.92 ± 23.84	3412857	29.2	-5.06	-1.329×10^3	806	-20.1	9.07
background so2 slant column offset window3 [DU]	10.8 ± 5.0	3412857	7.96	11.5	-15.0	30.6	6.95	14.9
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.11	3412857	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.517 \pm 10.250) \times 10^{-2}$	3412857	5.375×10^{-2}	2.210×10^{-2}	2.174×10^{-4}	1.62	5.720×10^{-3}	5.947×10^{-2}
fitted radiance shift [nm]	$(-1.445 \pm 33.511) \times 10^{-4}$	3412857	1.893×10^{-3}	-1.623×10^{-4}	-7.402×10^{-2}	4.317×10^{-2}	-1.132×10^{-3}	7.612×10^{-4}
fitted radiance squeeze [1]	$(-3.472 \pm 17.782) \times 10^{-5}$	3412857	2.045×10^{-4}	-3.256×10^{-5}	-1.982×10^{-2}	1.497×10^{-2}	-1.356×10^{-4}	6.890×10^{-5}
fitted root mean square [1]	$(1.242 \pm 0.483) \times 10^{-3}$	3412857	4.074×10^{-4}	1.124×10^{-3}	3.184×10^{-4}	4.757×10^{-2}	9.616×10^{-4}	1.369×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.924 ± 0.545	3412857	0.673	0.754	5.000×10^{-2}	2.80	0.530	1.20
sulfurdioxide total air mass factor polluted precision [1]	0.133 ± 0.141	3412857	0.154	8.814×10^{-2}	2.608×10^{-3}	1.65	3.298×10^{-2}	0.187
sulfurdioxide clear air mass factor polluted [1]	0.718 ± 0.330	3412857	0.382	0.645	6.530×10^{-2}	2.59	0.485	0.867
number of spectral points in retrieval [1]	73.4 ± 0.5	3412857	1.000	73.0	53.0	74.0	73.0	74.0

3 Granule outlines

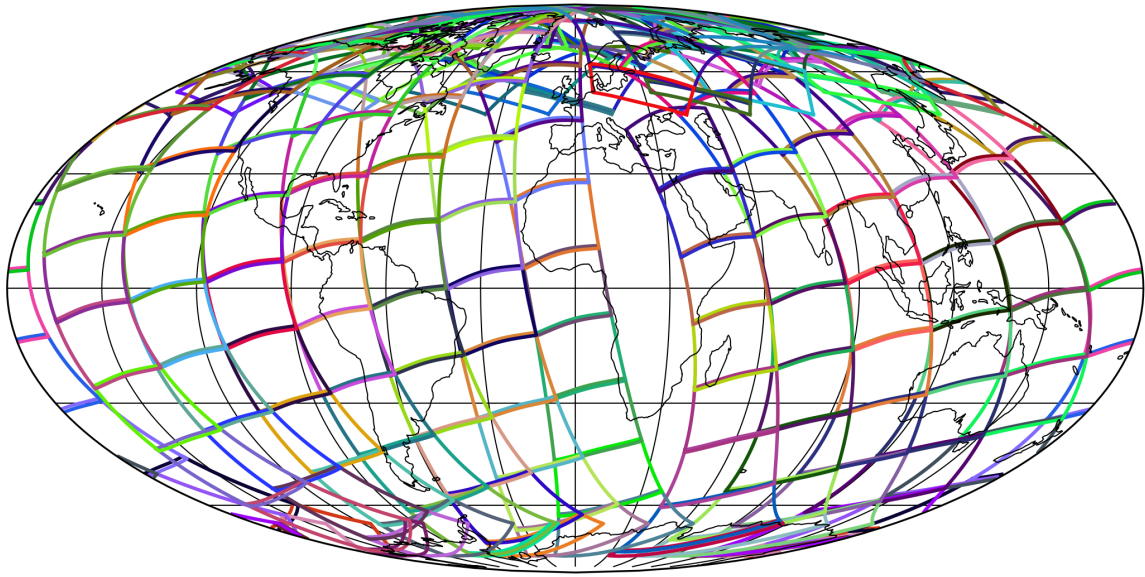


Figure 1: Outline of the granules.

4 Input data monitoring

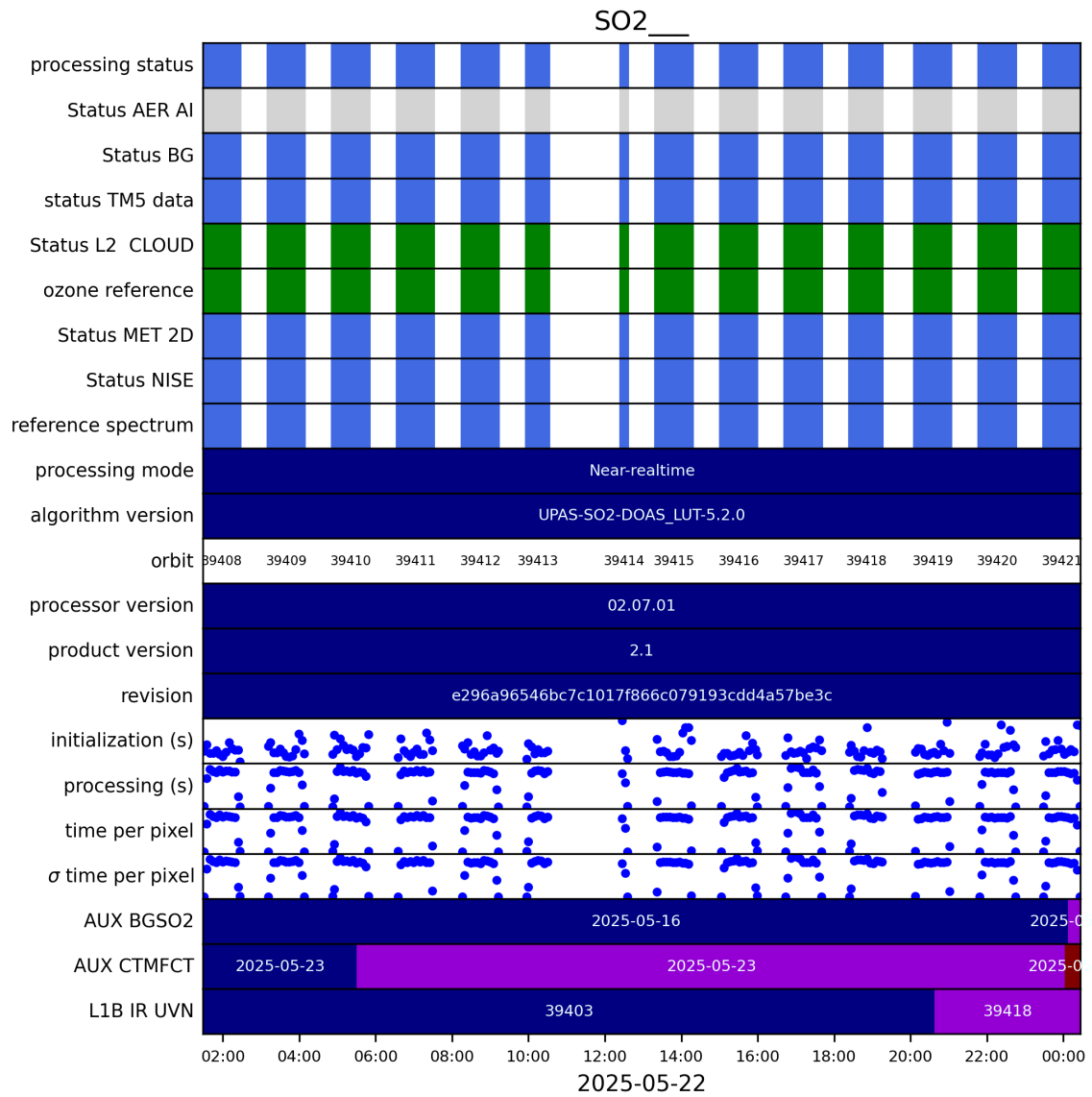


Figure 2: Input data per granule

5 Warnings and errors

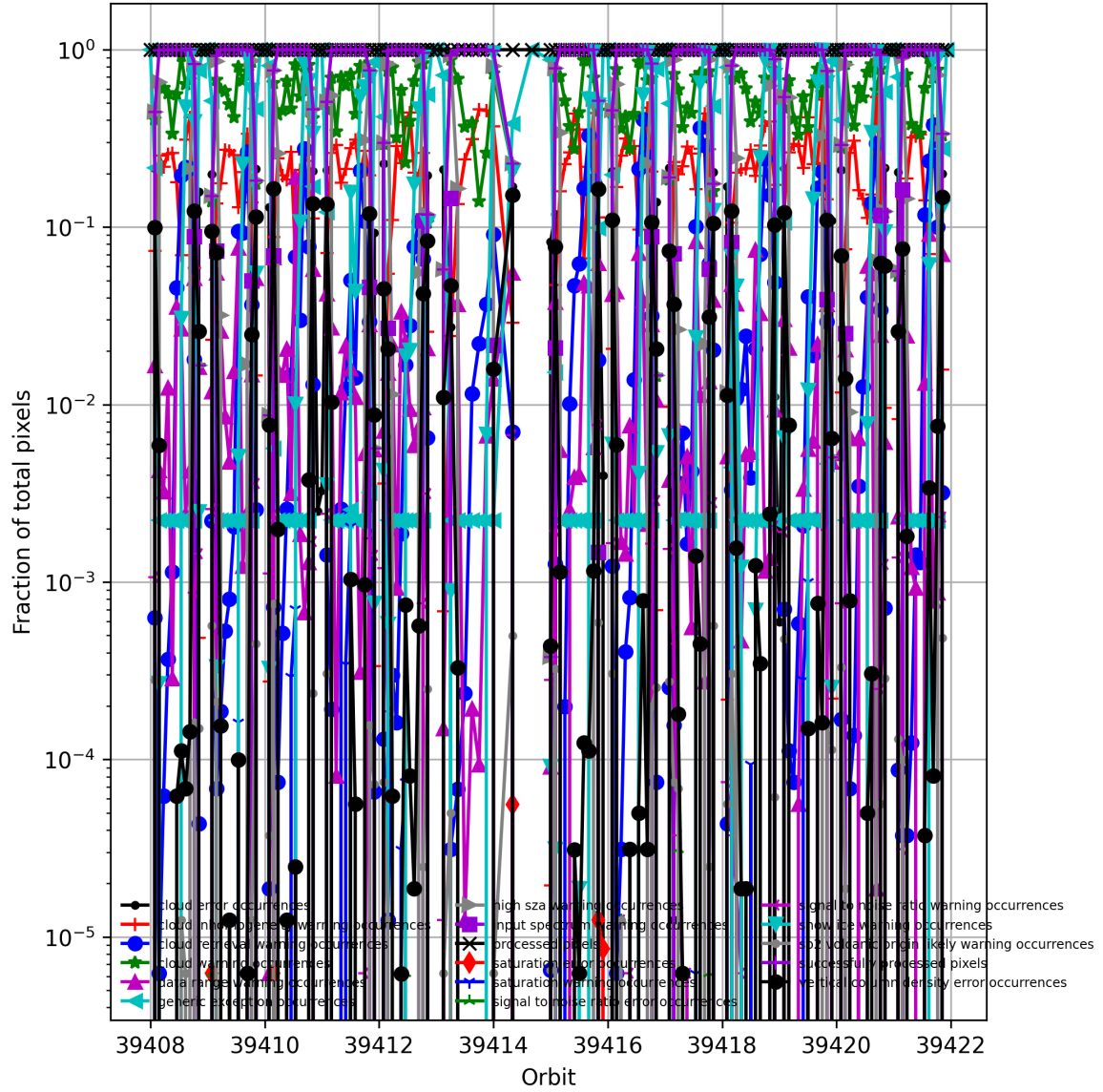


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

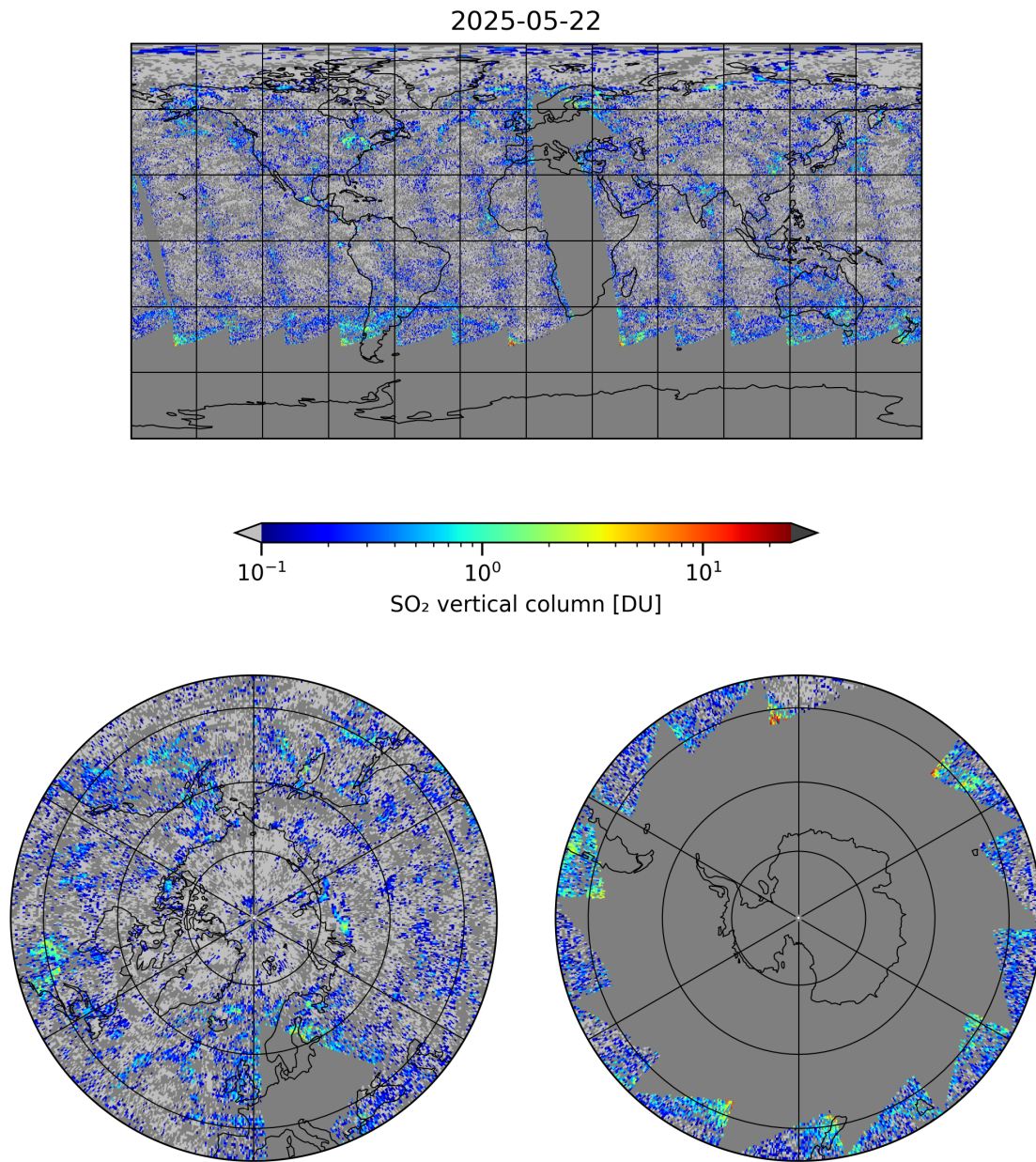


Figure 4: Map of “SO₂ vertical column” for 2025-05-22 to 2025-05-23

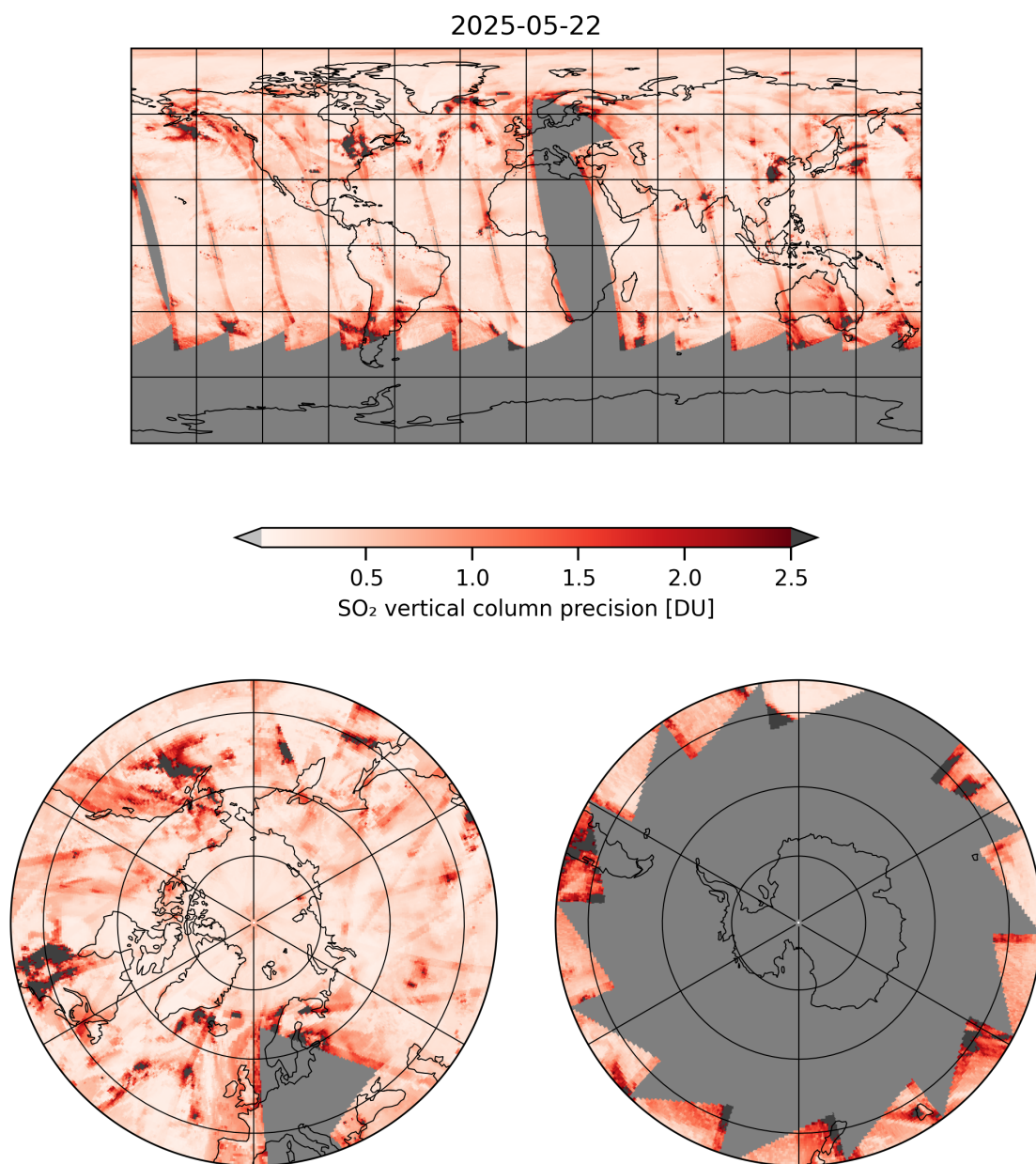


Figure 5: Map of “SO₂ vertical column precision” for 2025-05-22 to 2025-05-23

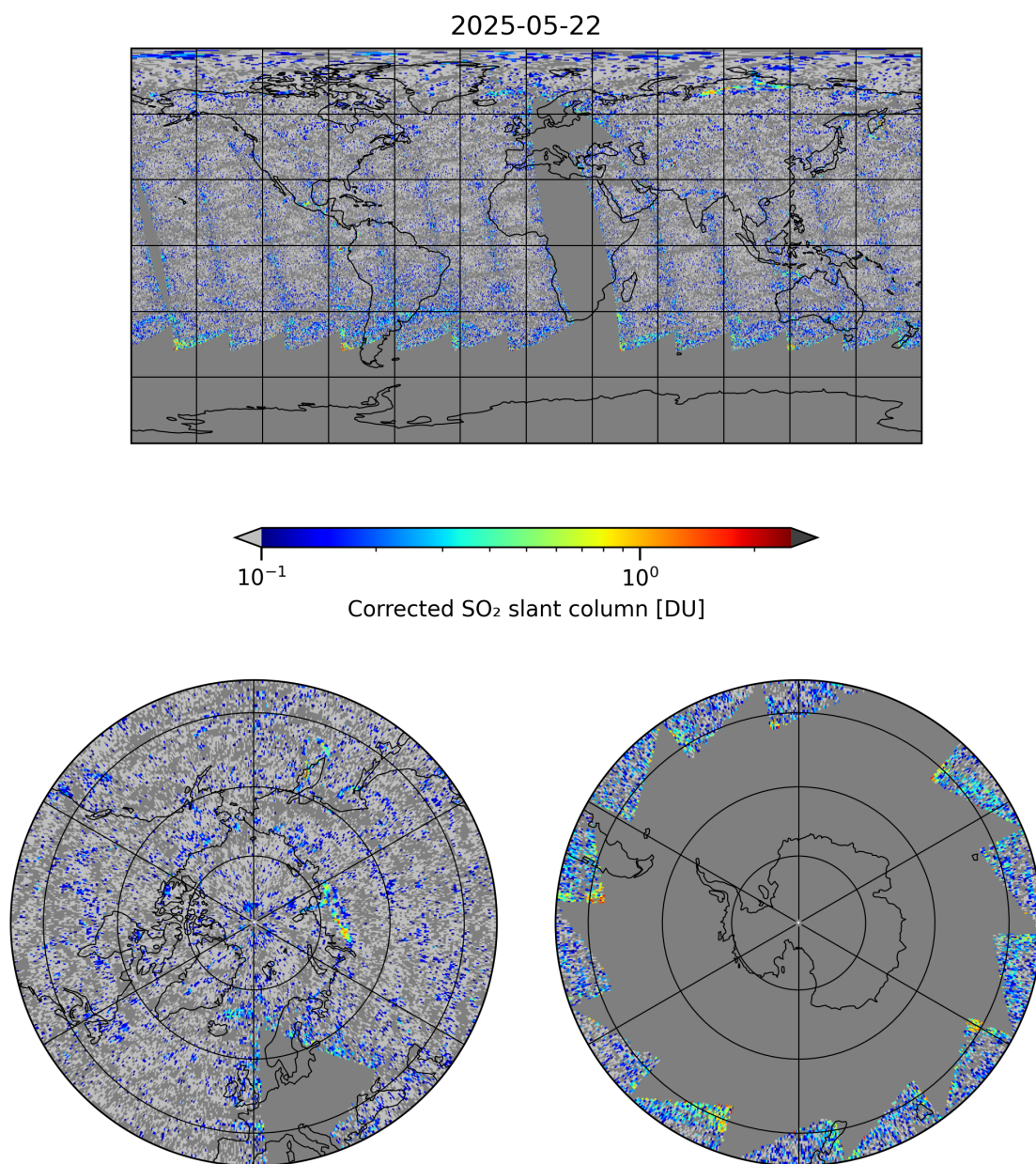


Figure 6: Map of “Corrected SO₂ slant column” for 2025-05-22 to 2025-05-23

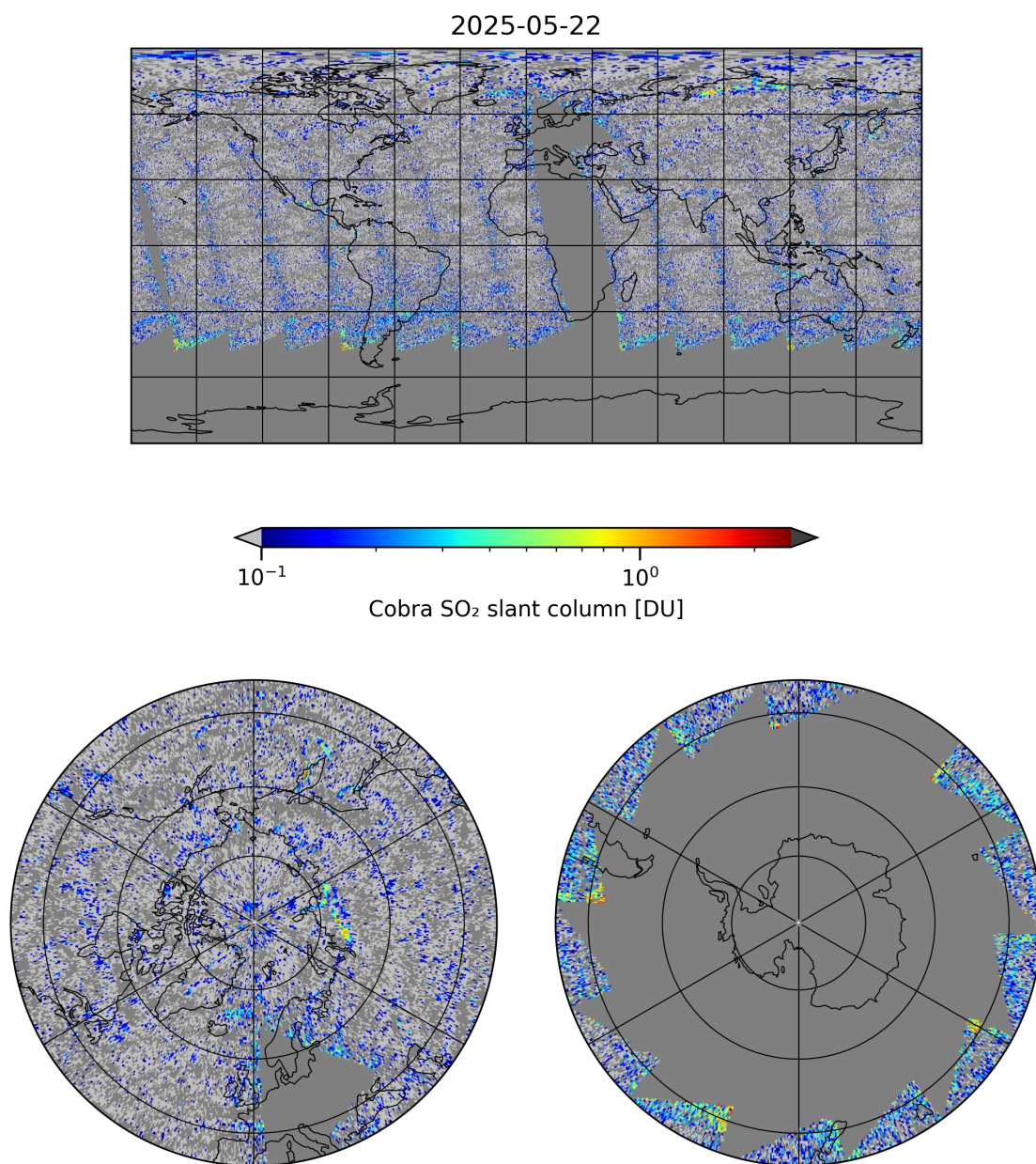


Figure 7: Map of “Cobra SO₂ slant column” for 2025-05-22 to 2025-05-23

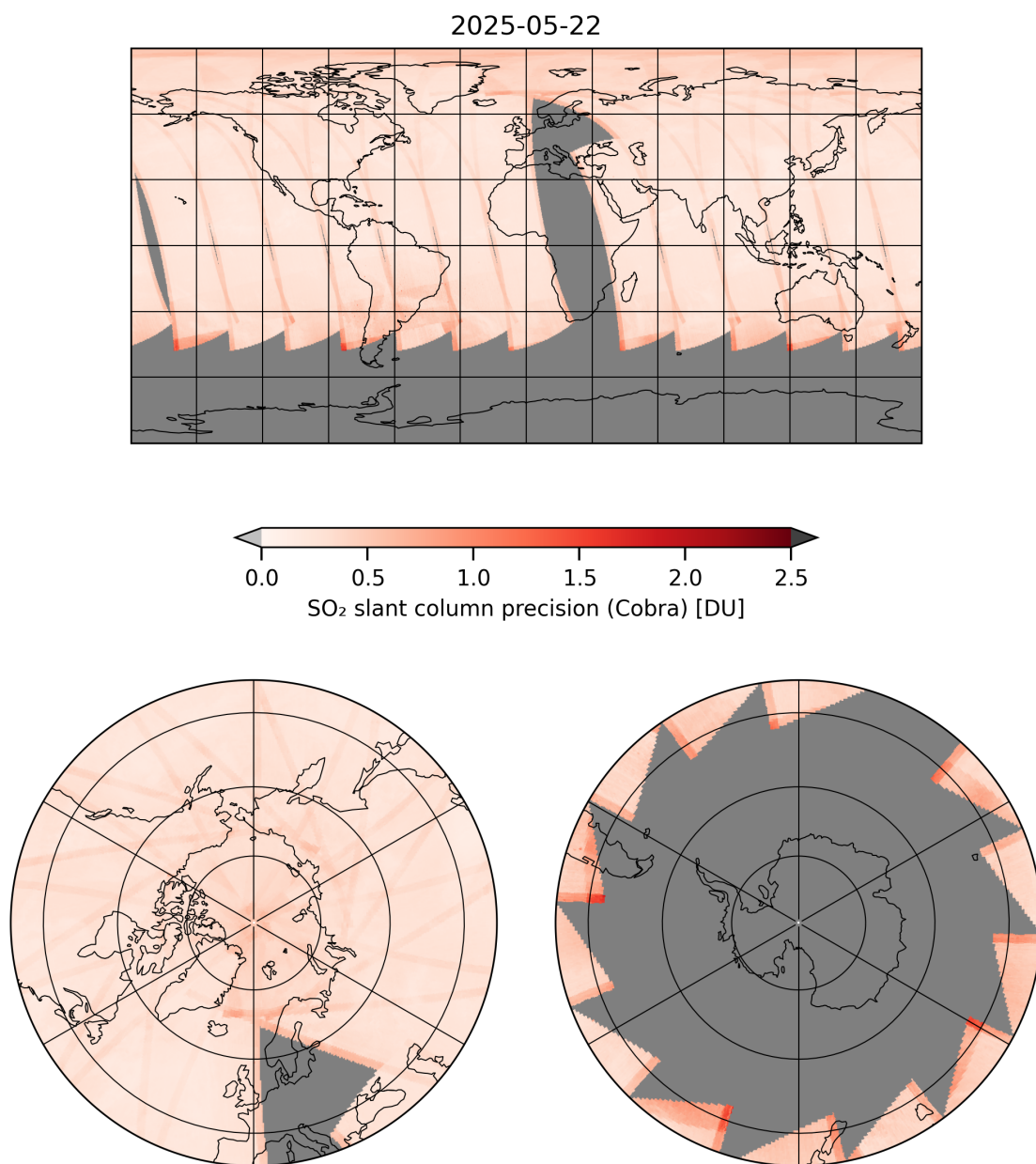


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-05-22 to 2025-05-23

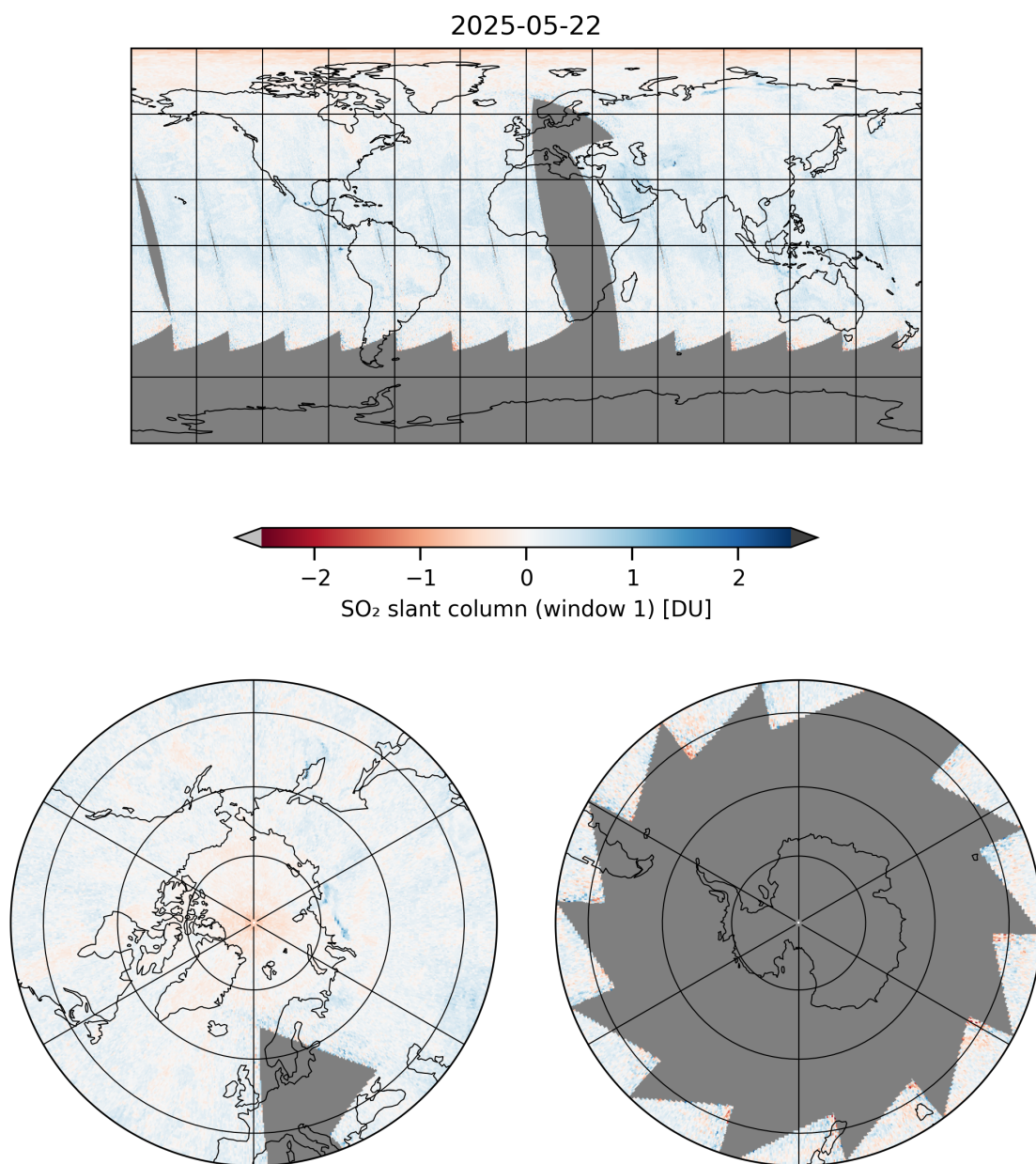


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-05-22 to 2025-05-23

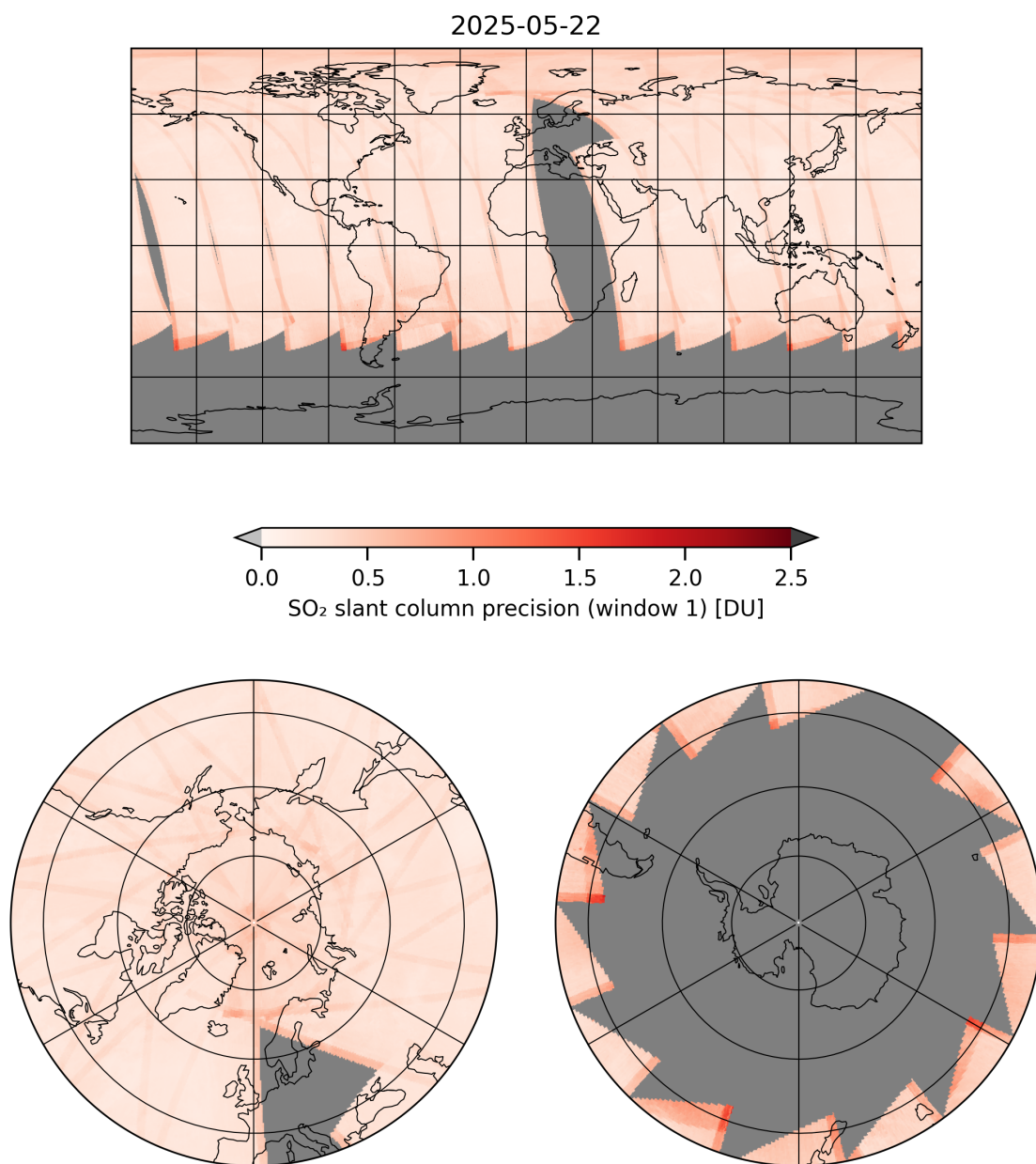


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-05-22 to 2025-05-23

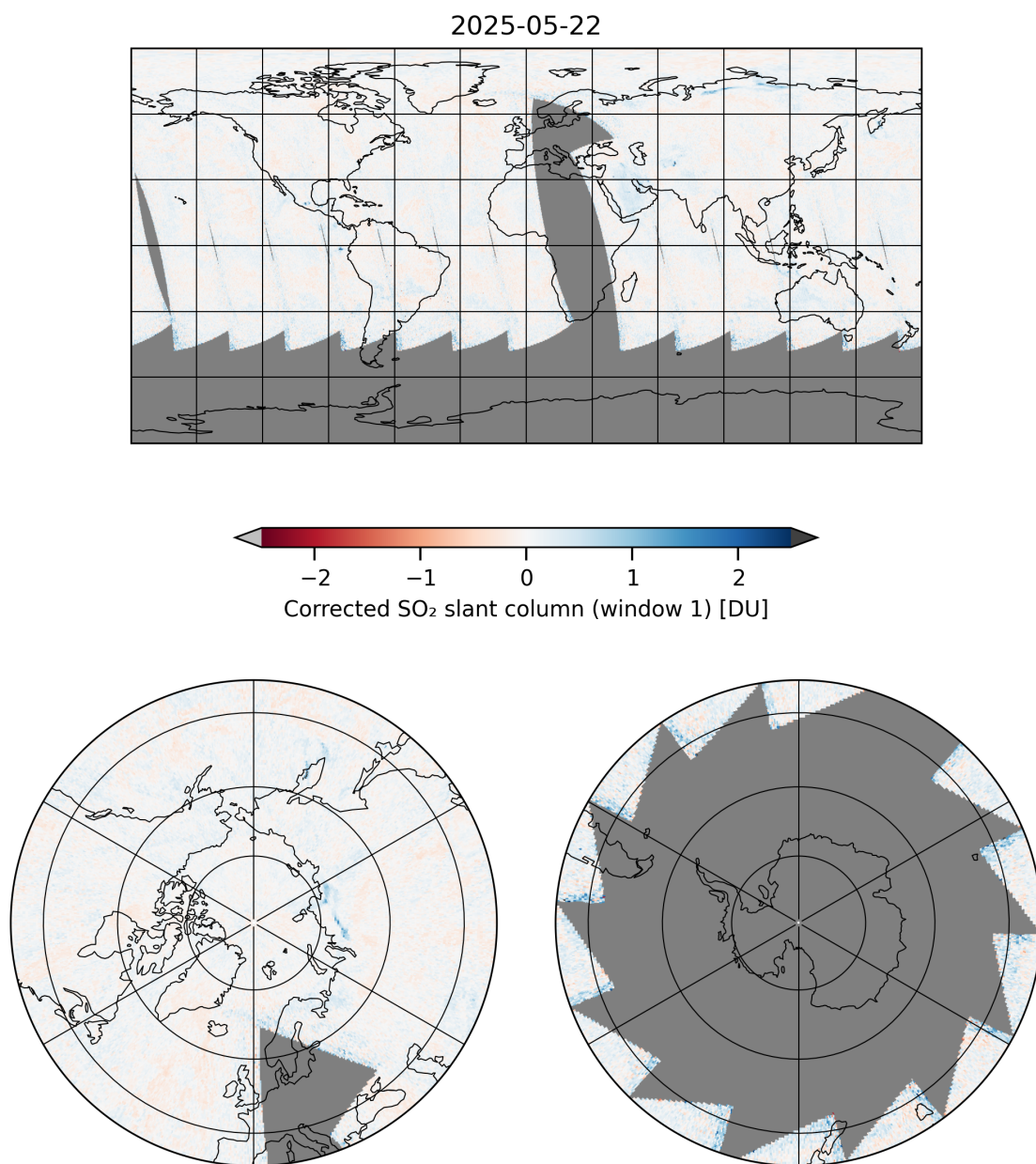


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-05-22 to 2025-05-23

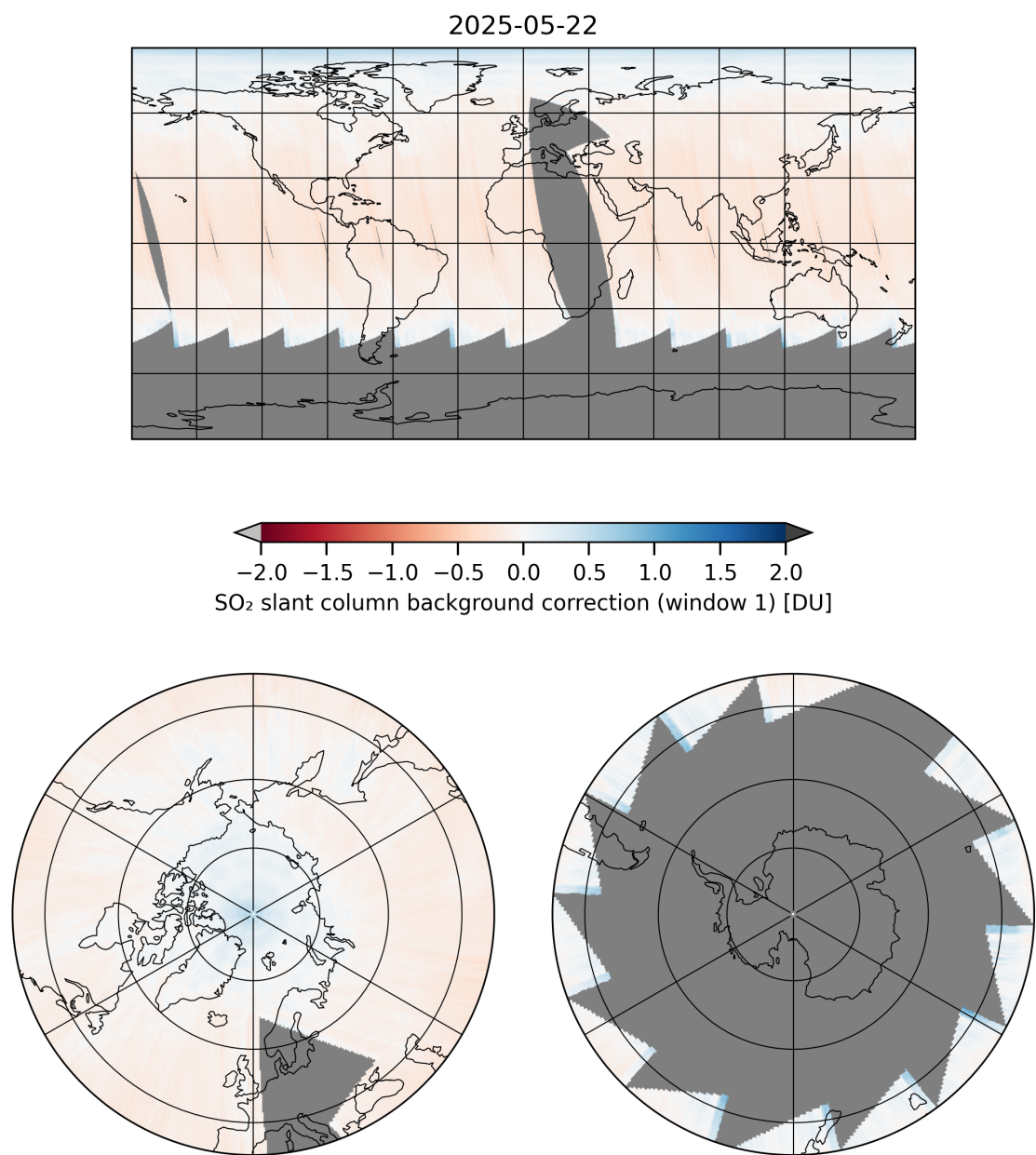


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-05-22 to 2025-05-23

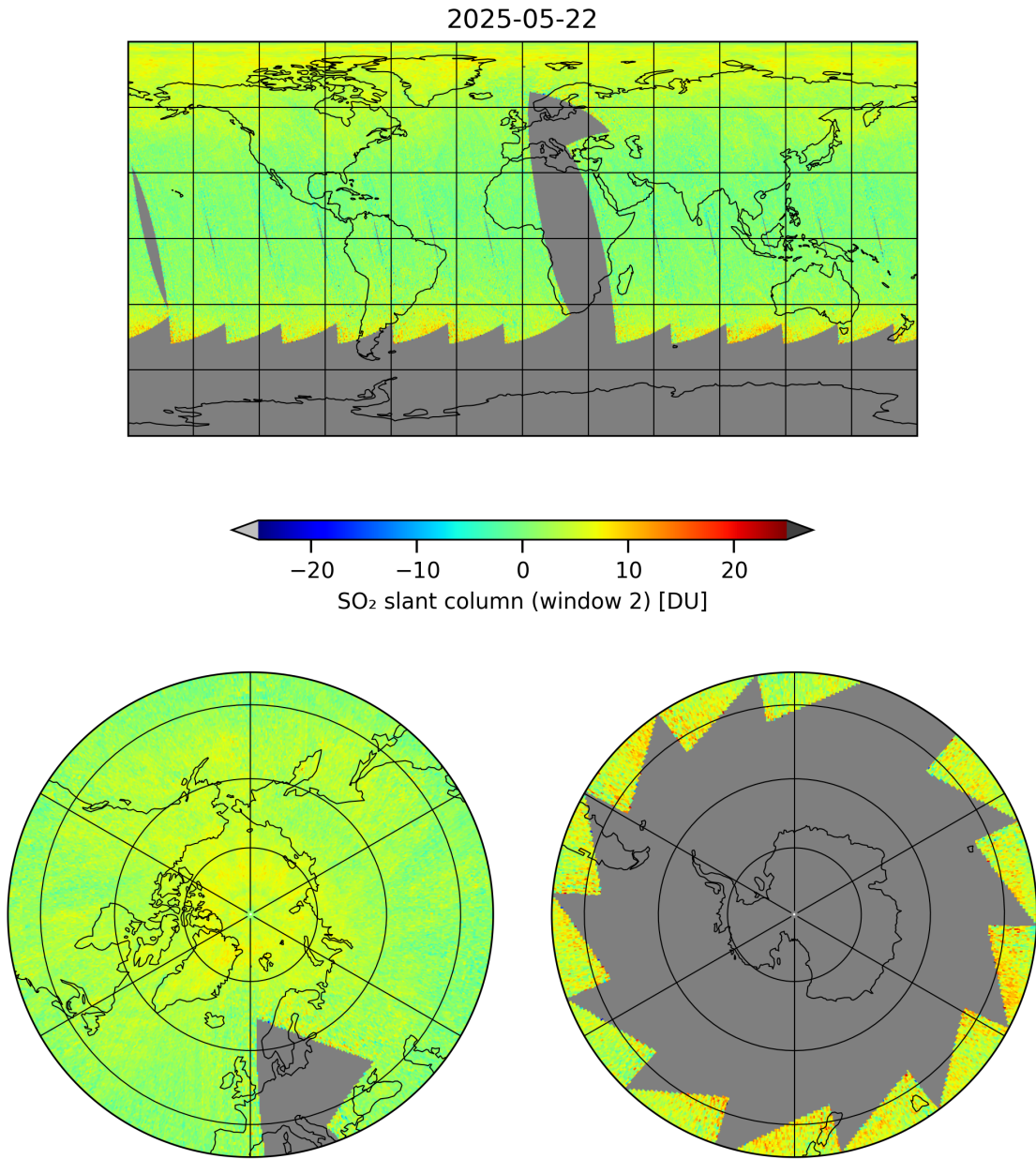


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-05-22 to 2025-05-23

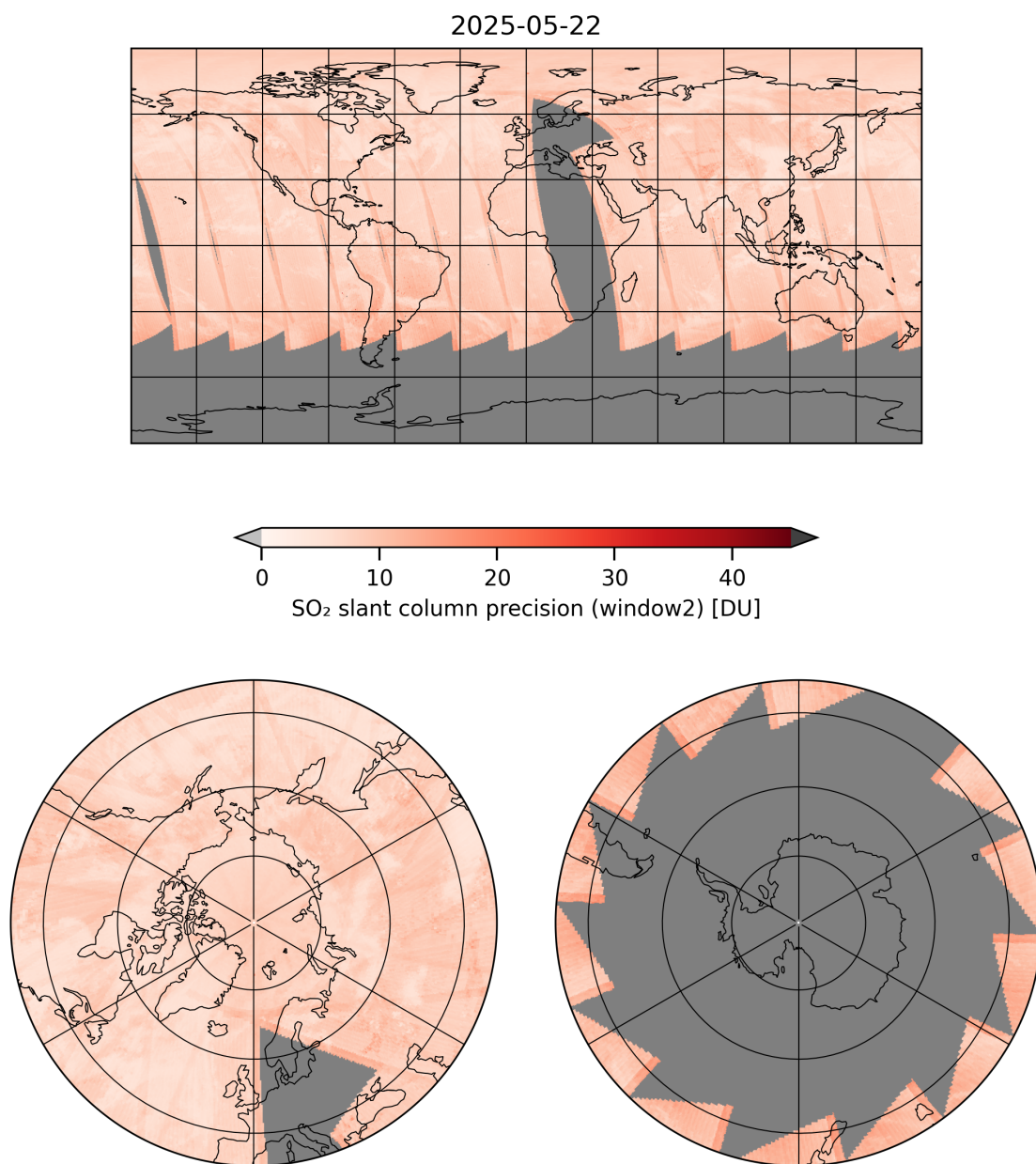


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-05-22 to 2025-05-23

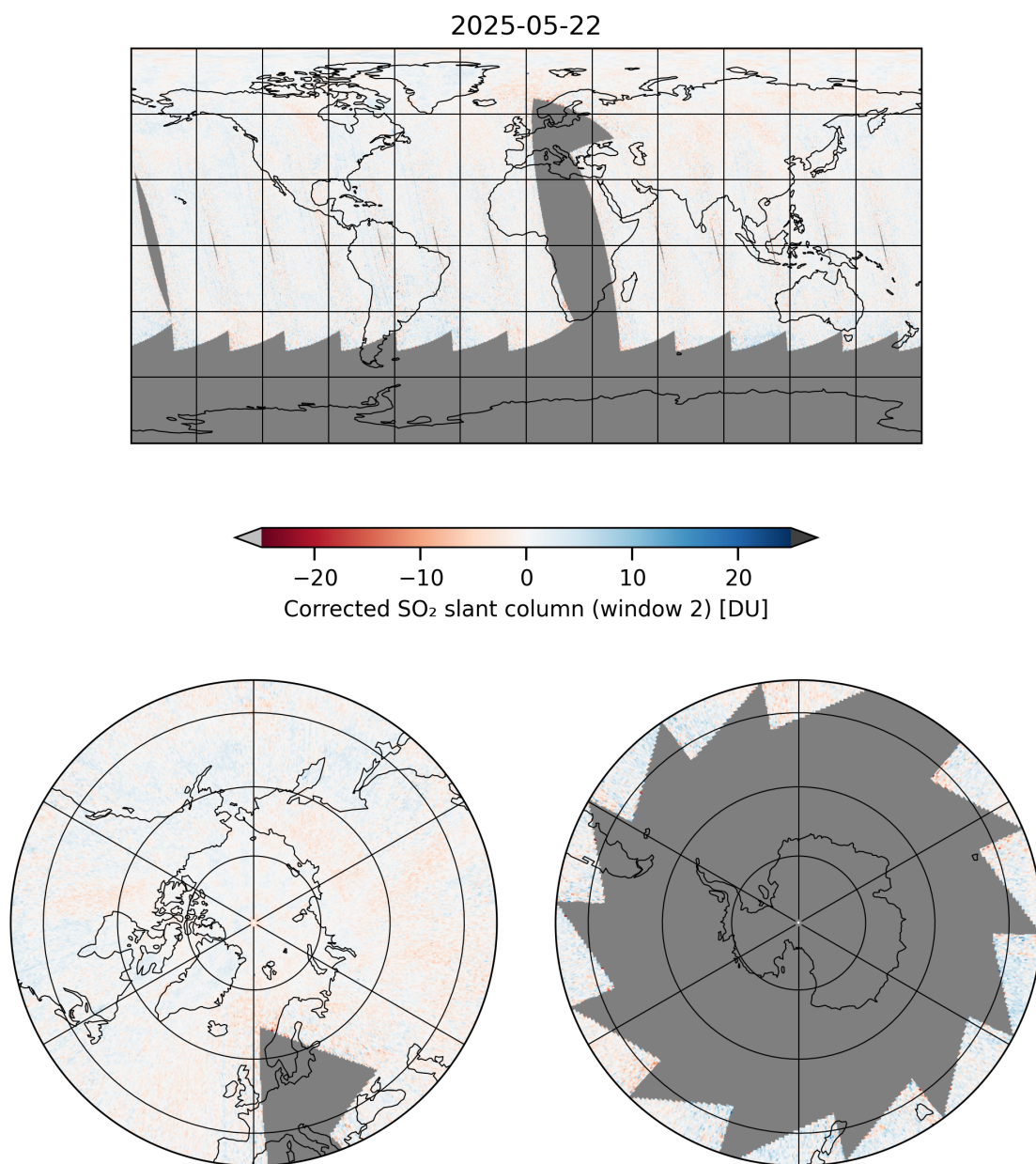


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-05-22 to 2025-05-23

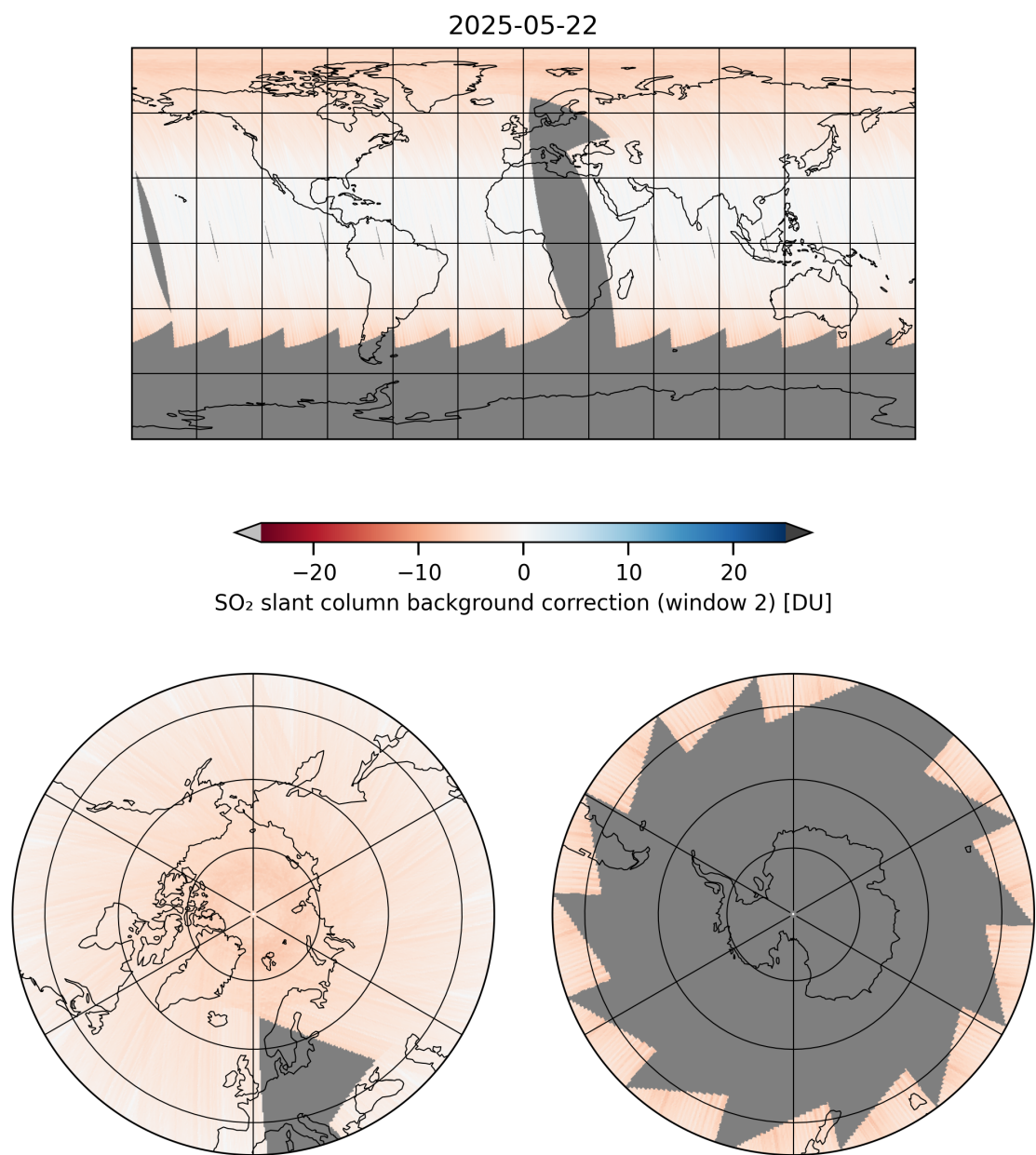


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-05-22 to 2025-05-23

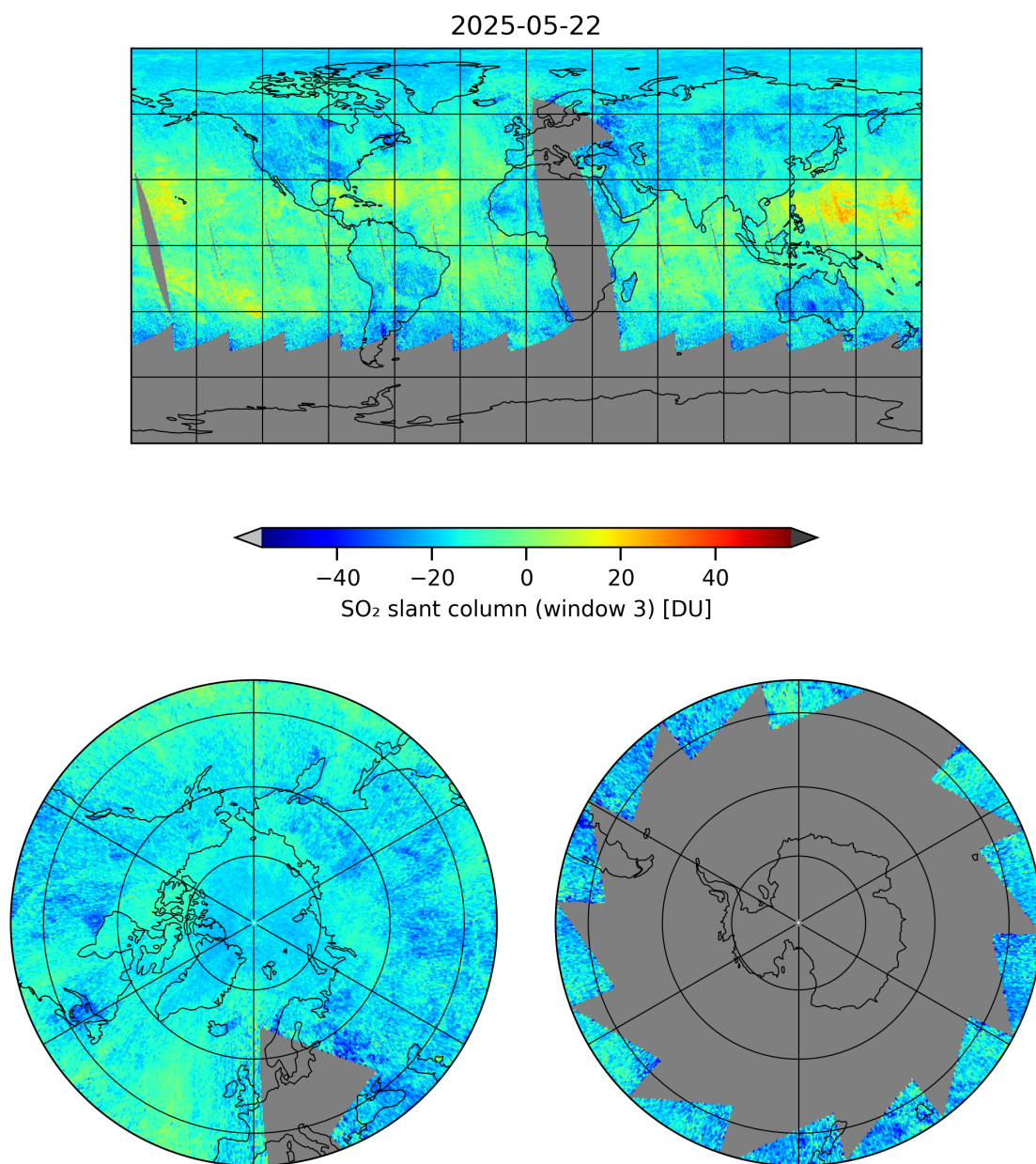


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-05-22 to 2025-05-23

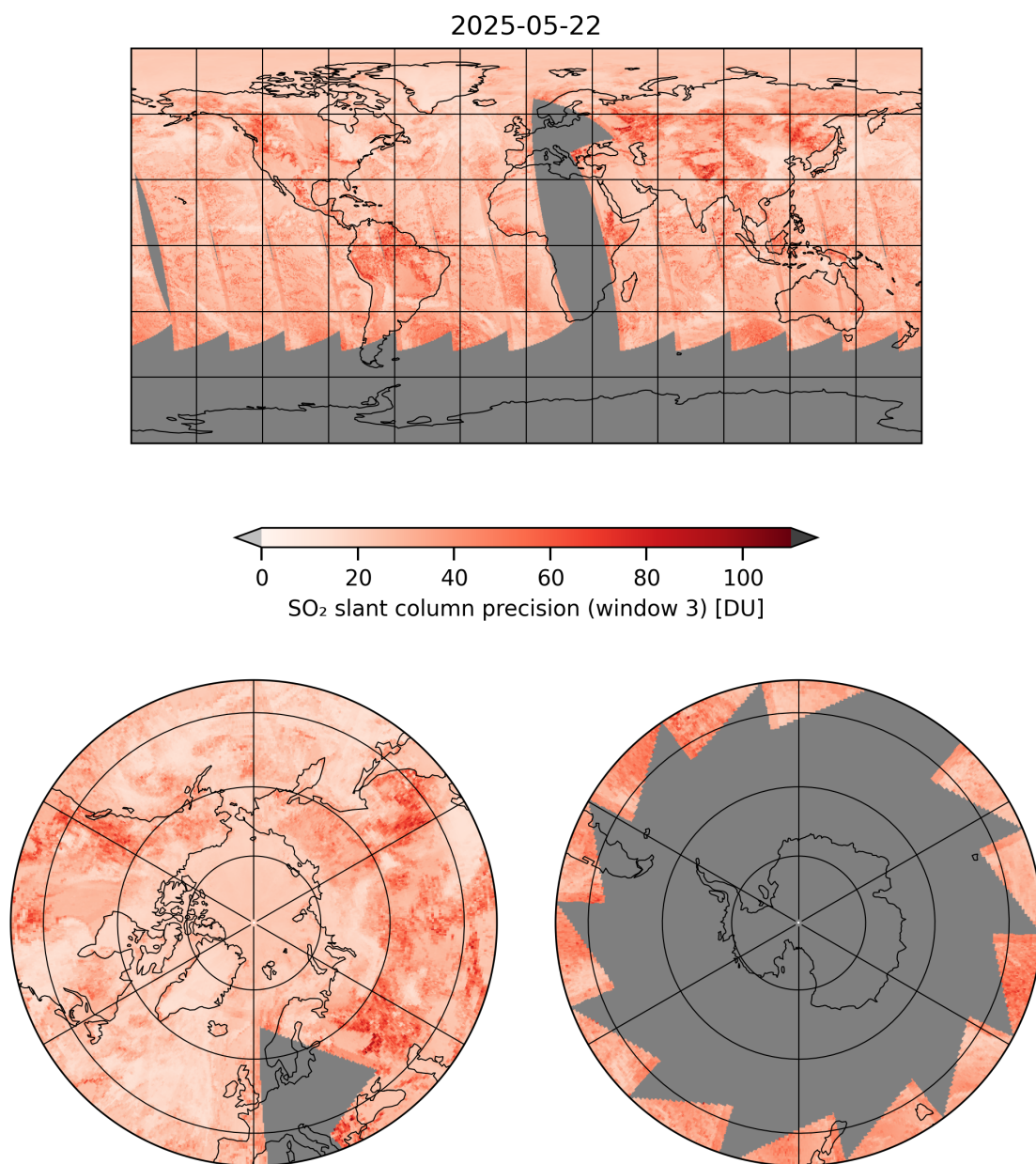


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-05-22 to 2025-05-23

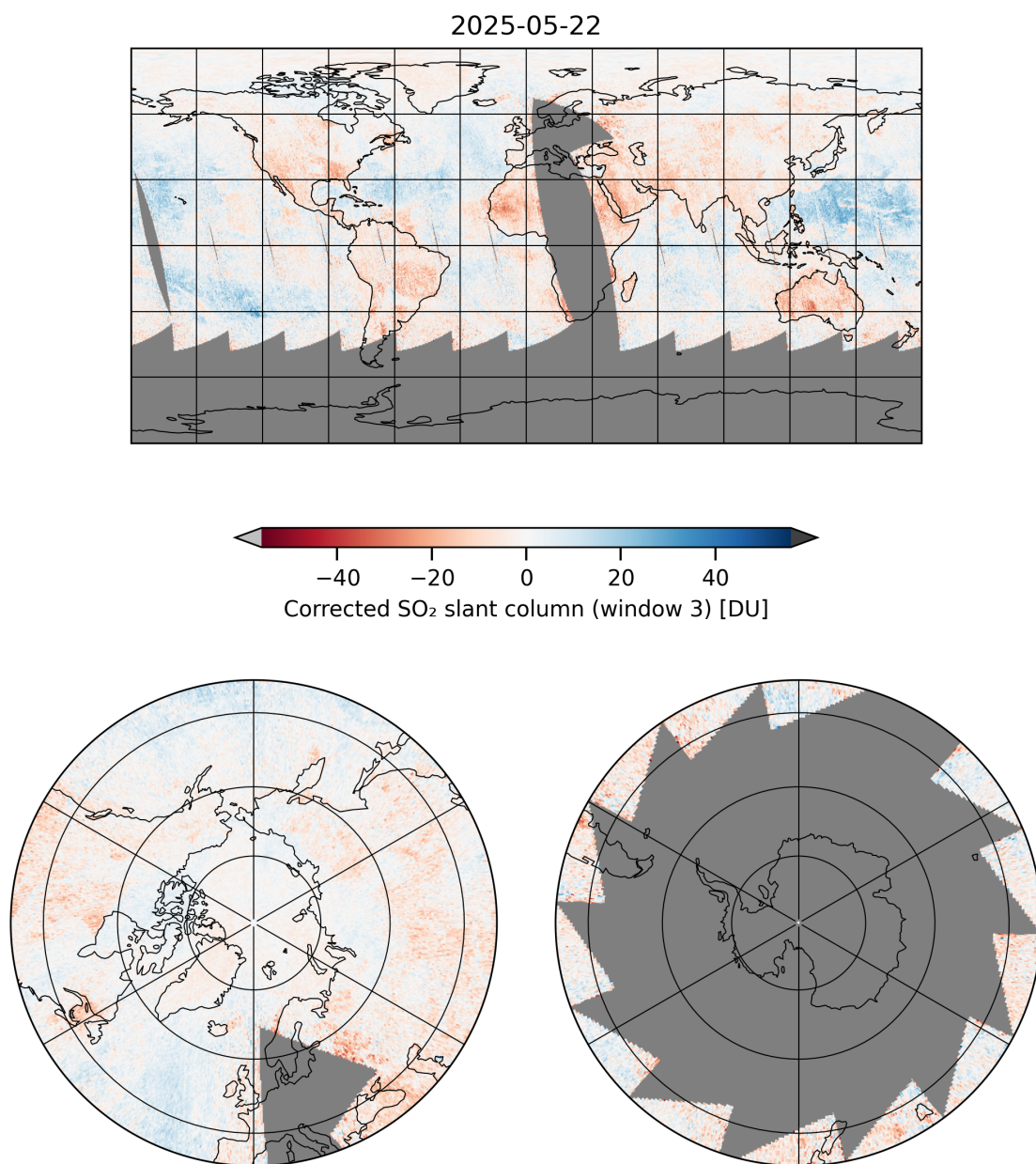


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-05-22 to 2025-05-23

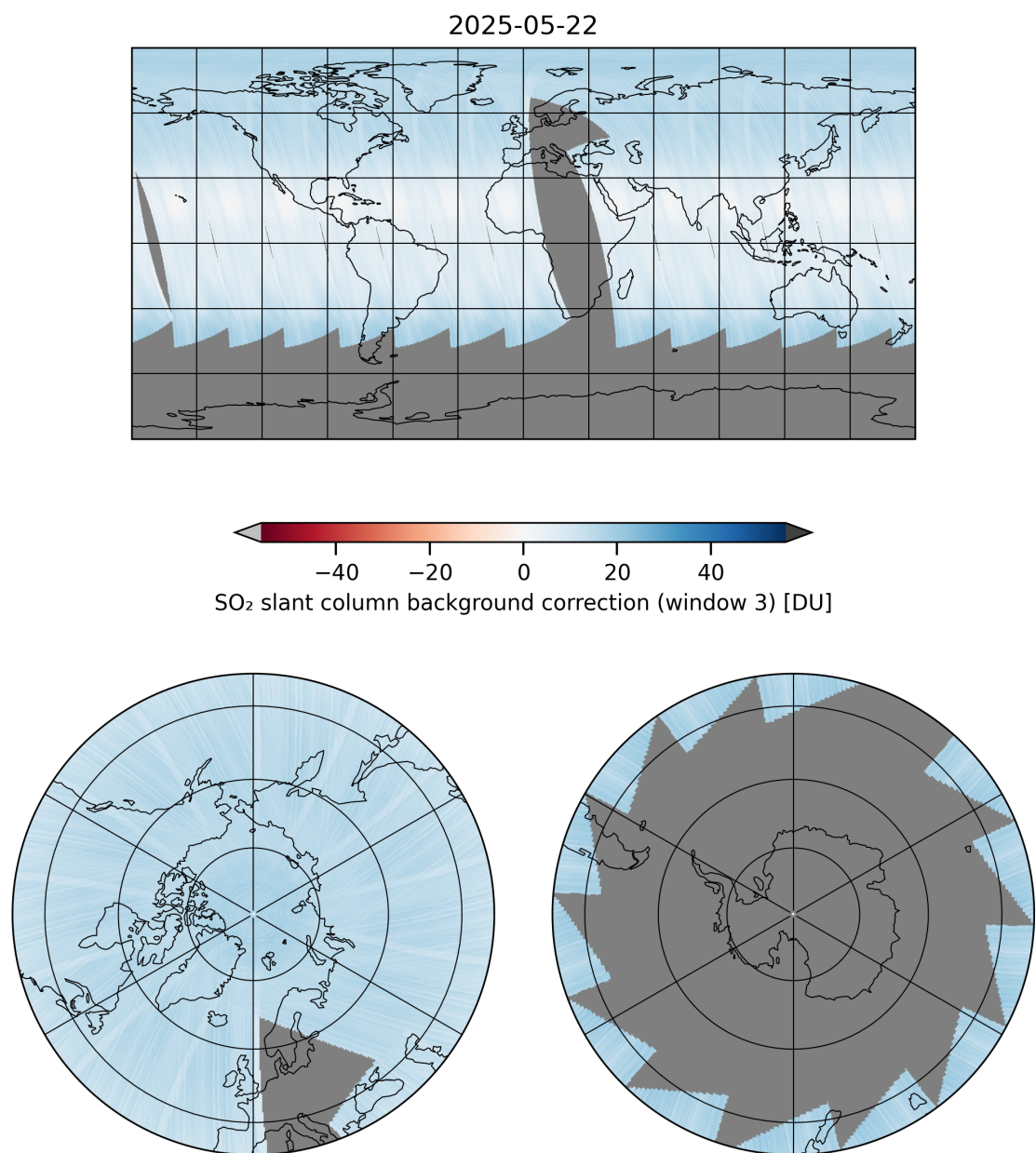


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-05-22 to 2025-05-23

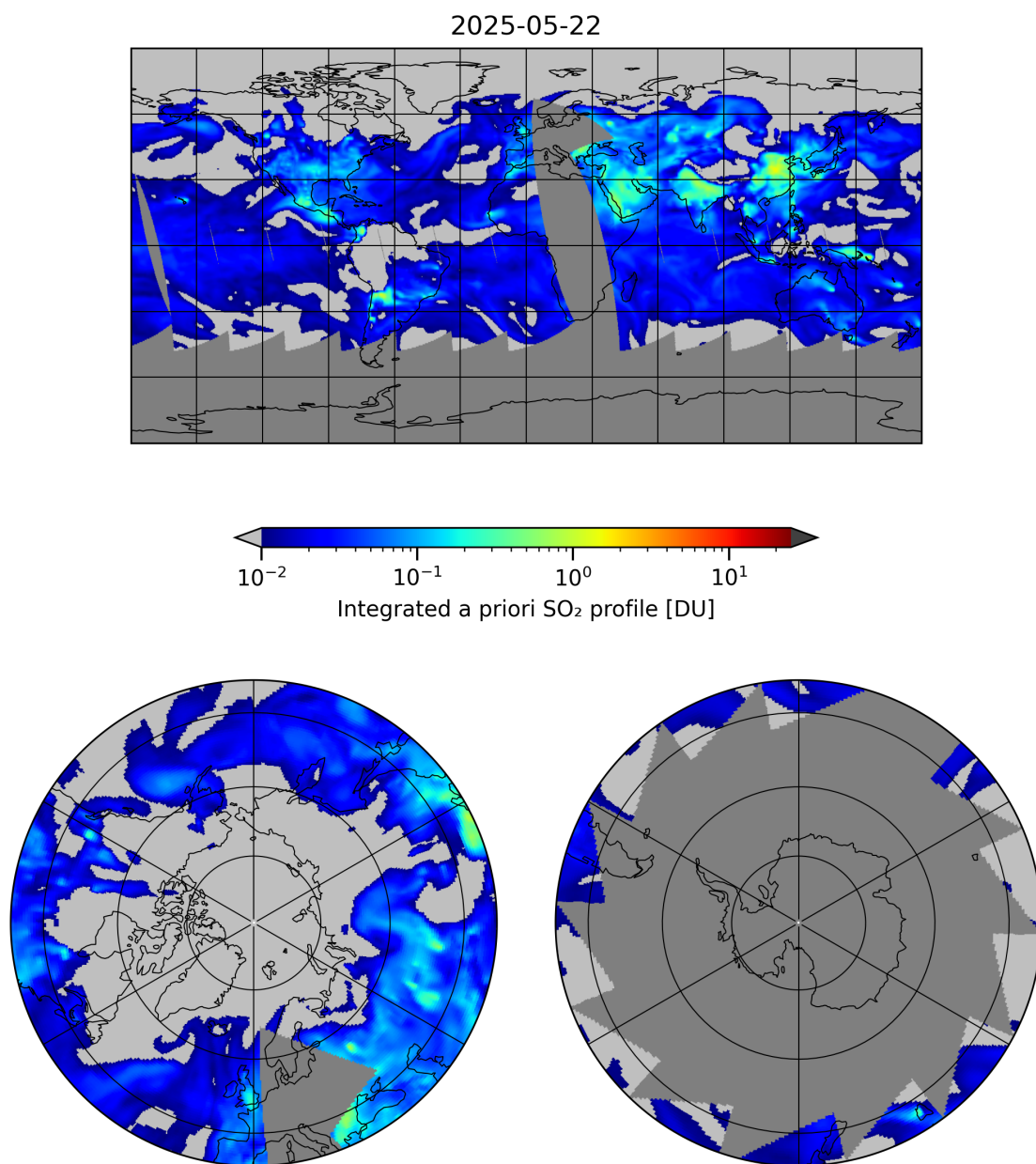


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-05-22 to 2025-05-23

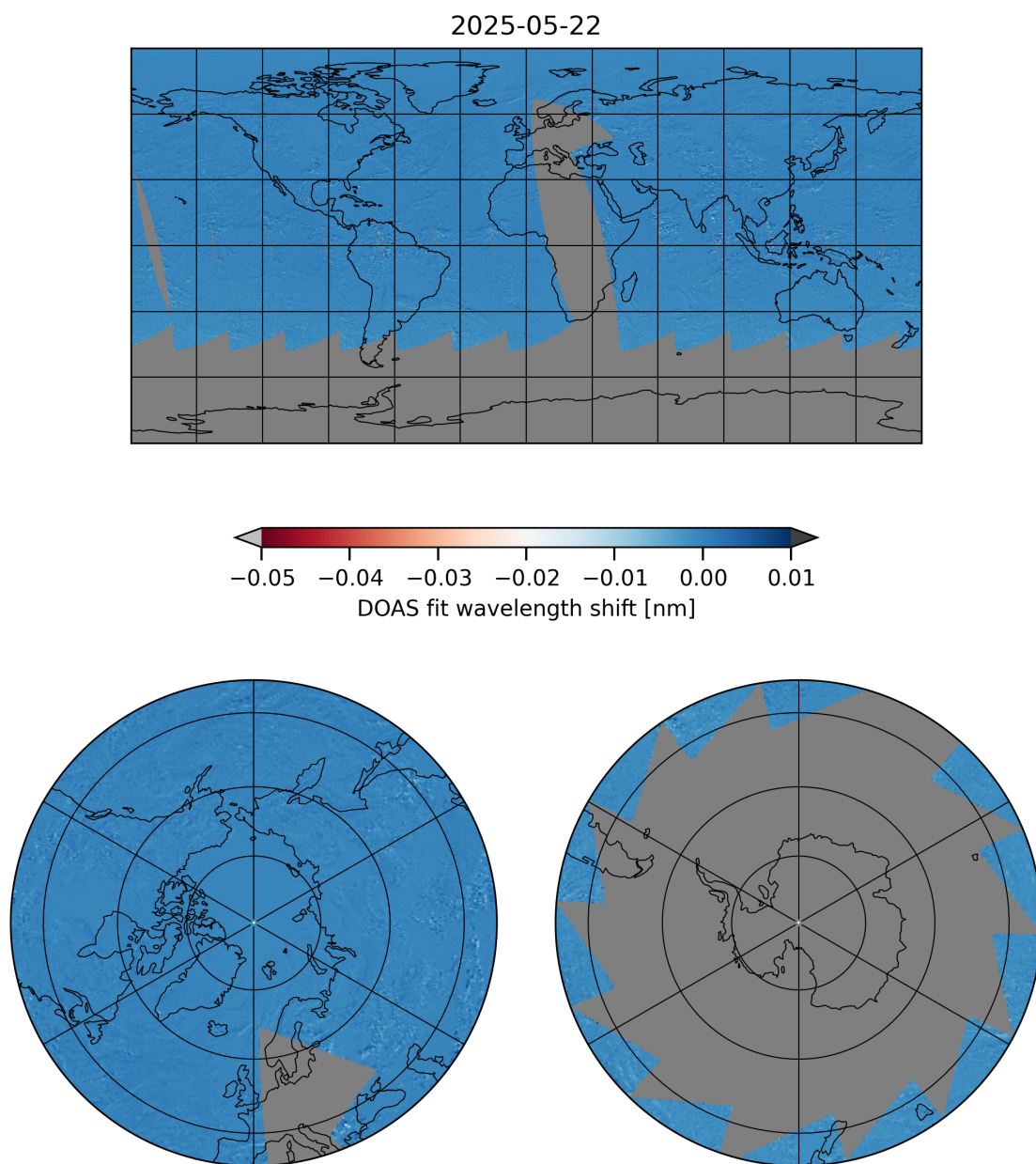


Figure 22: Map of “DOAS fit wavelength shift” for 2025-05-22 to 2025-05-23

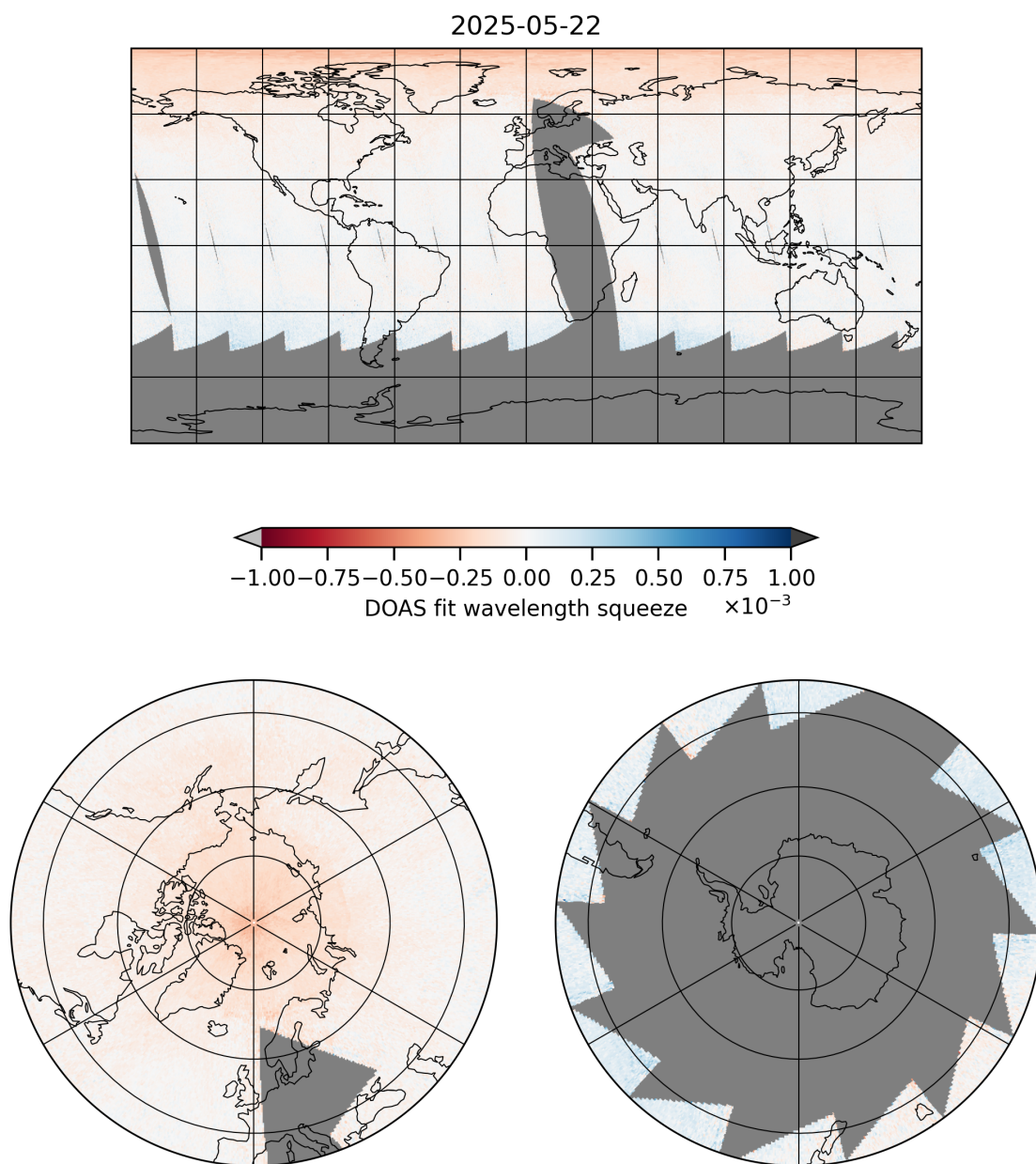


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-05-22 to 2025-05-23

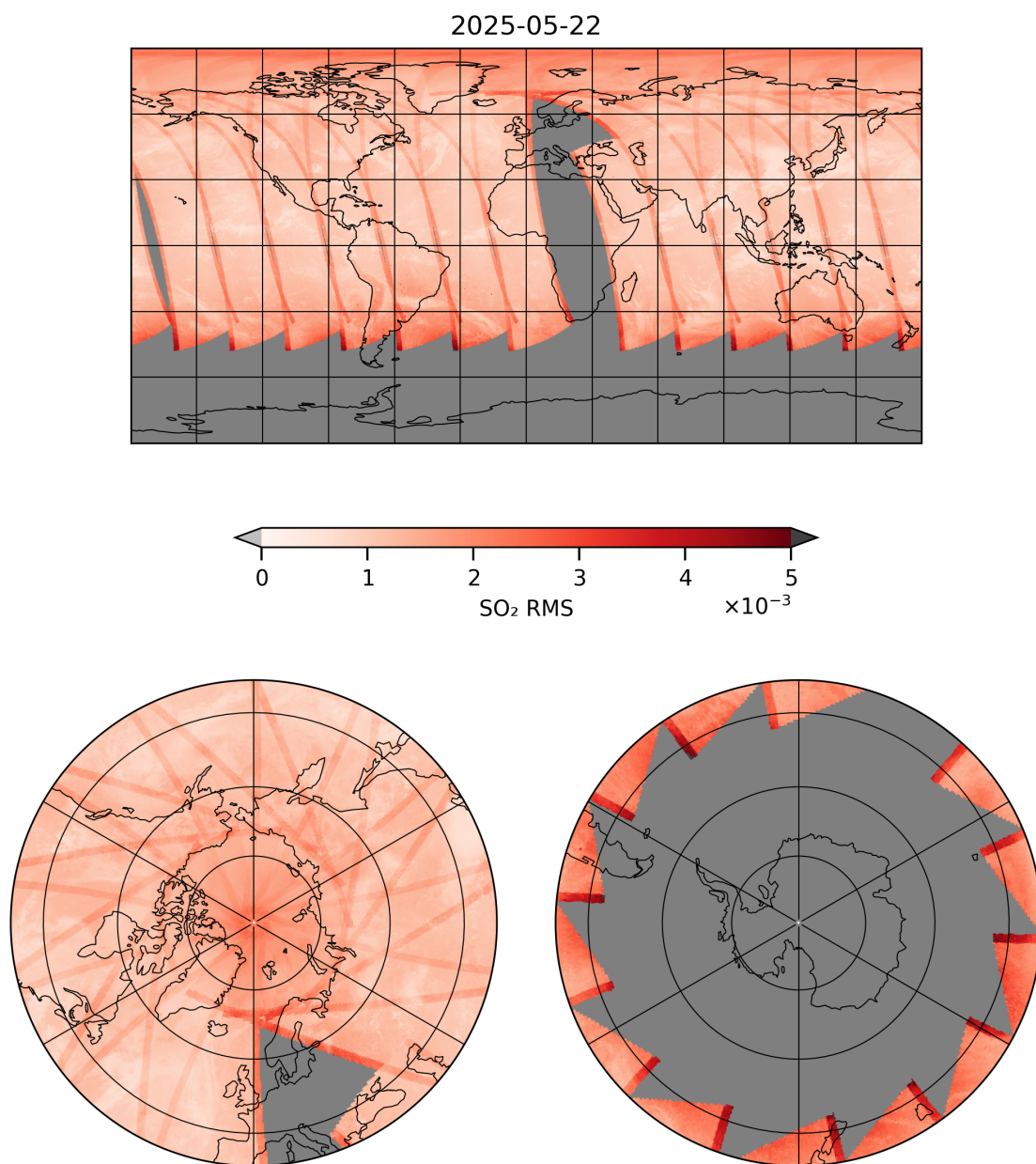


Figure 24: Map of “SO₂ RMS” for 2025-05-22 to 2025-05-23

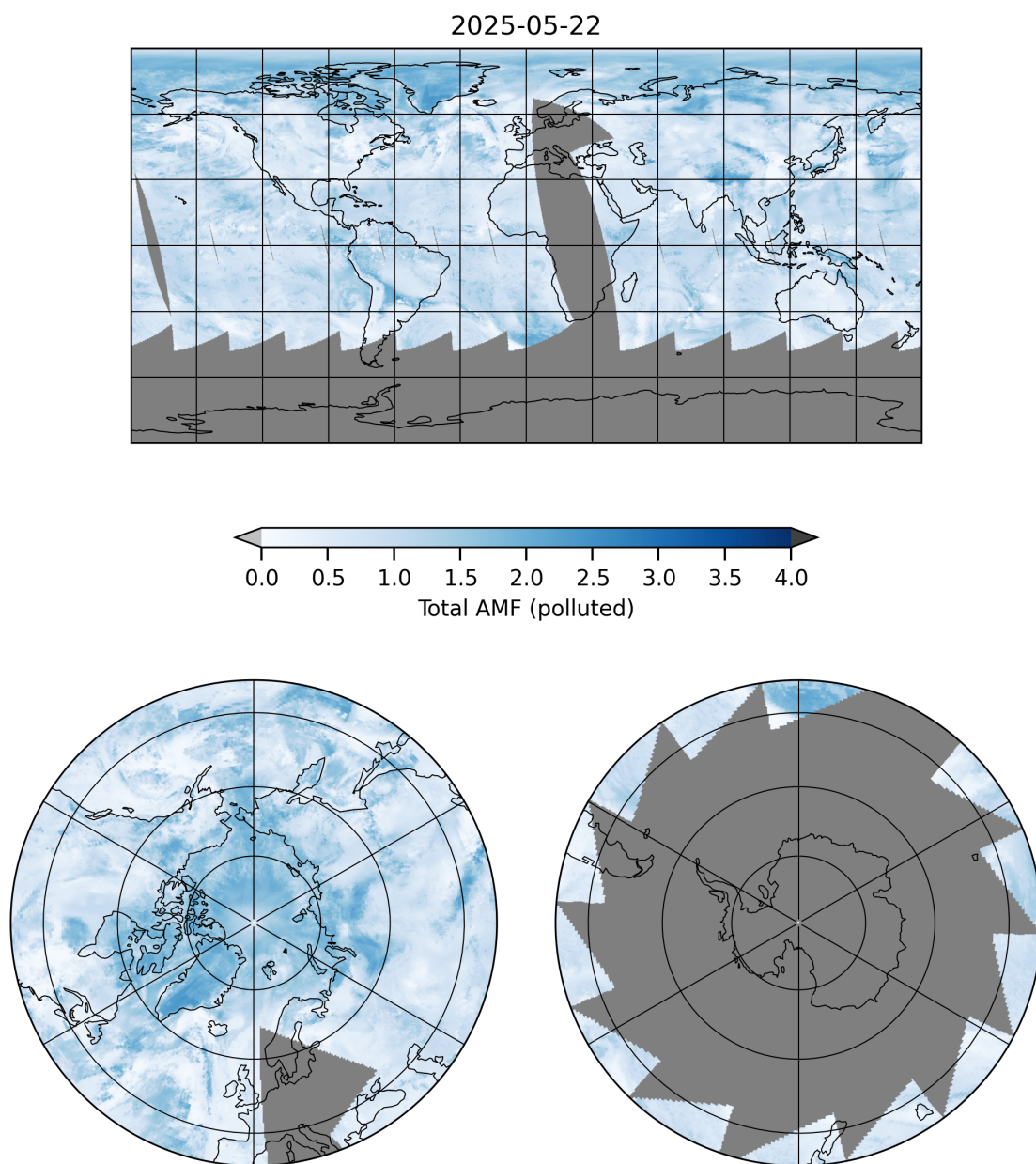


Figure 25: Map of “Total AMF (polluted)” for 2025-05-22 to 2025-05-23

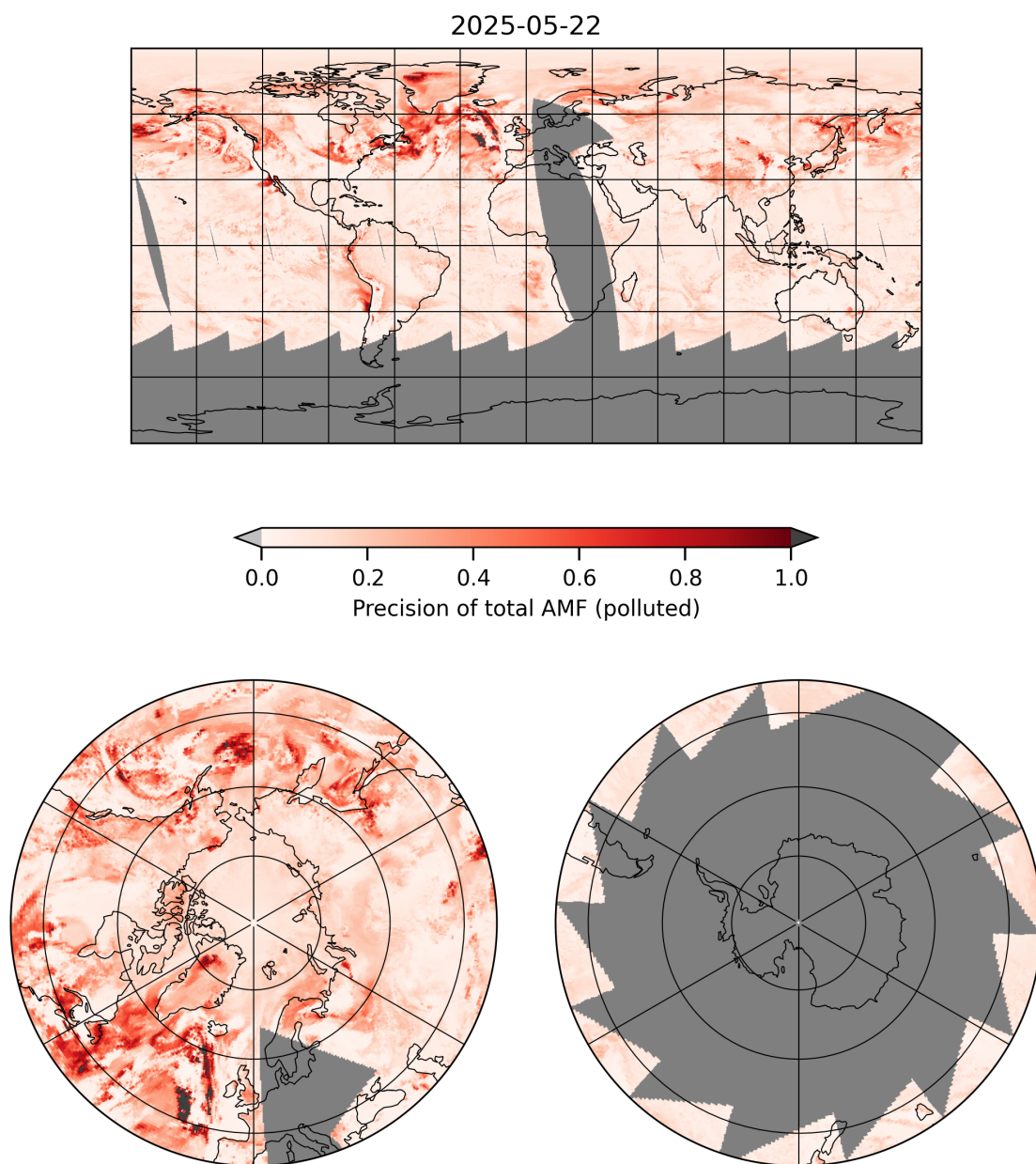


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-05-22 to 2025-05-23

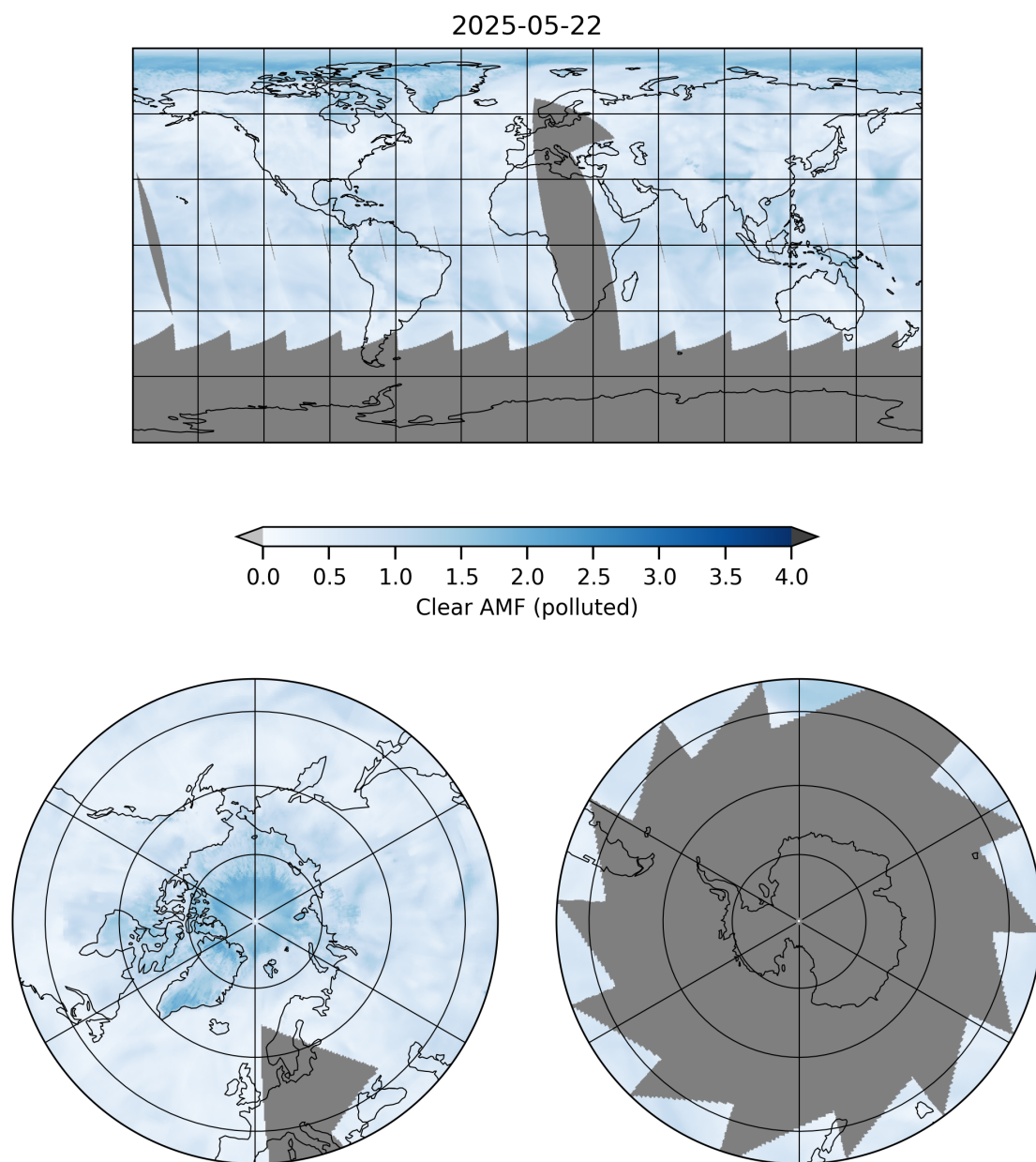


Figure 27: Map of “Clear AMF (polluted)” for 2025-05-22 to 2025-05-23

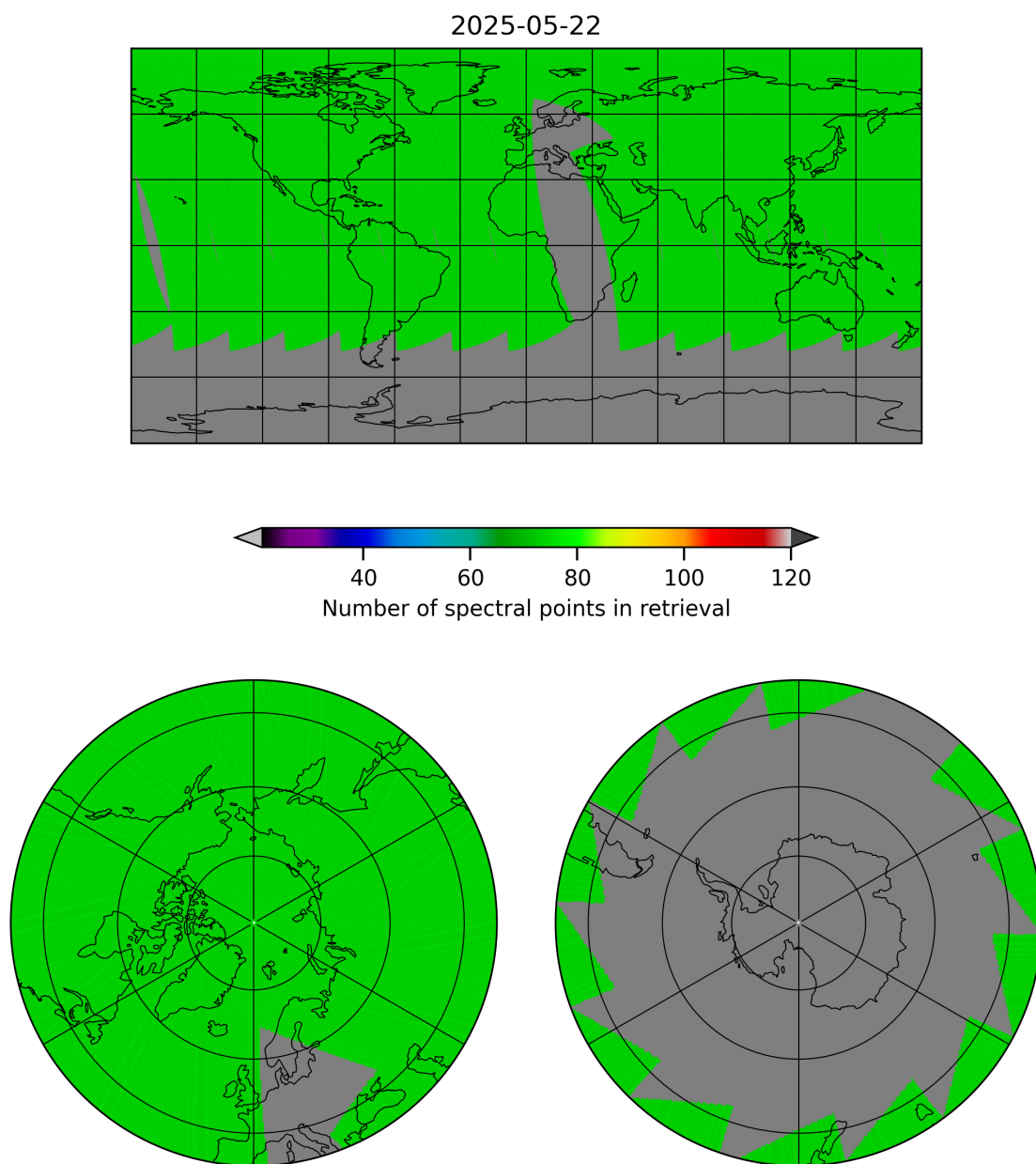


Figure 28: Map of “Number of spectral points in retrieval” for 2025-05-22 to 2025-05-23

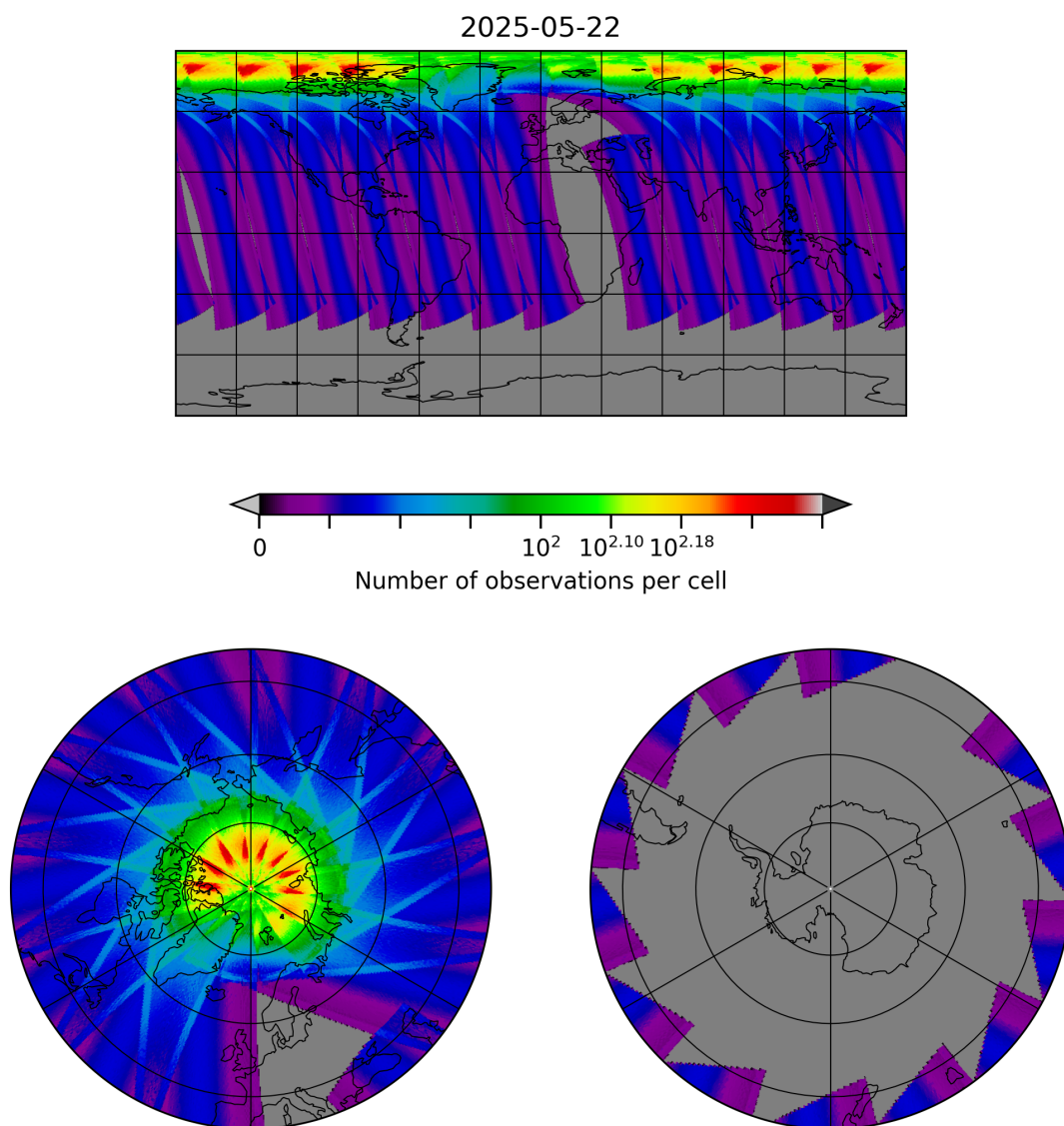


Figure 29: Map of the number of observations for 2025-05-22 to 2025-05-23

7 Zonal average

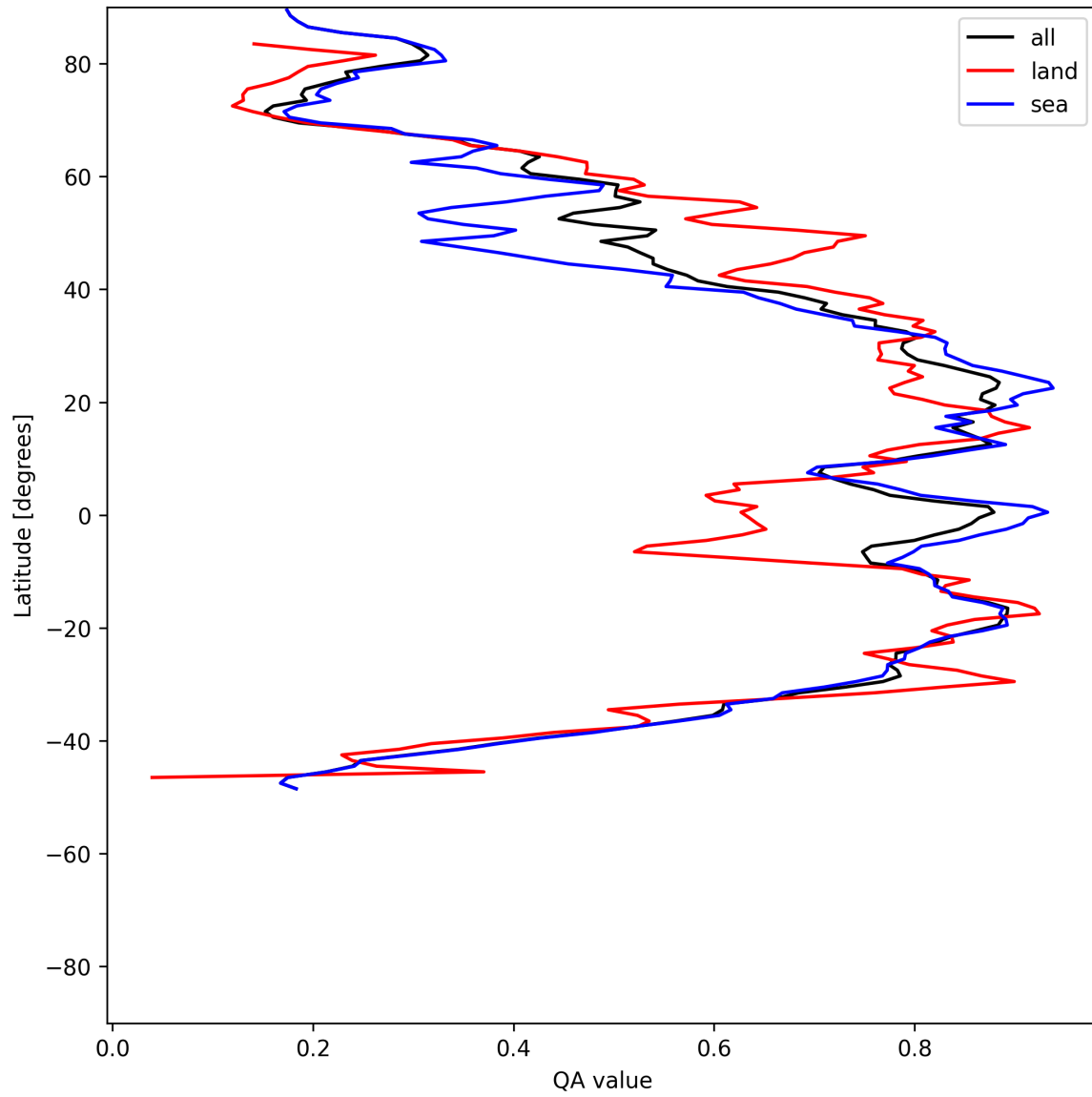


Figure 30: Zonal average of “QA value” for 2025-05-22 to 2025-05-23.

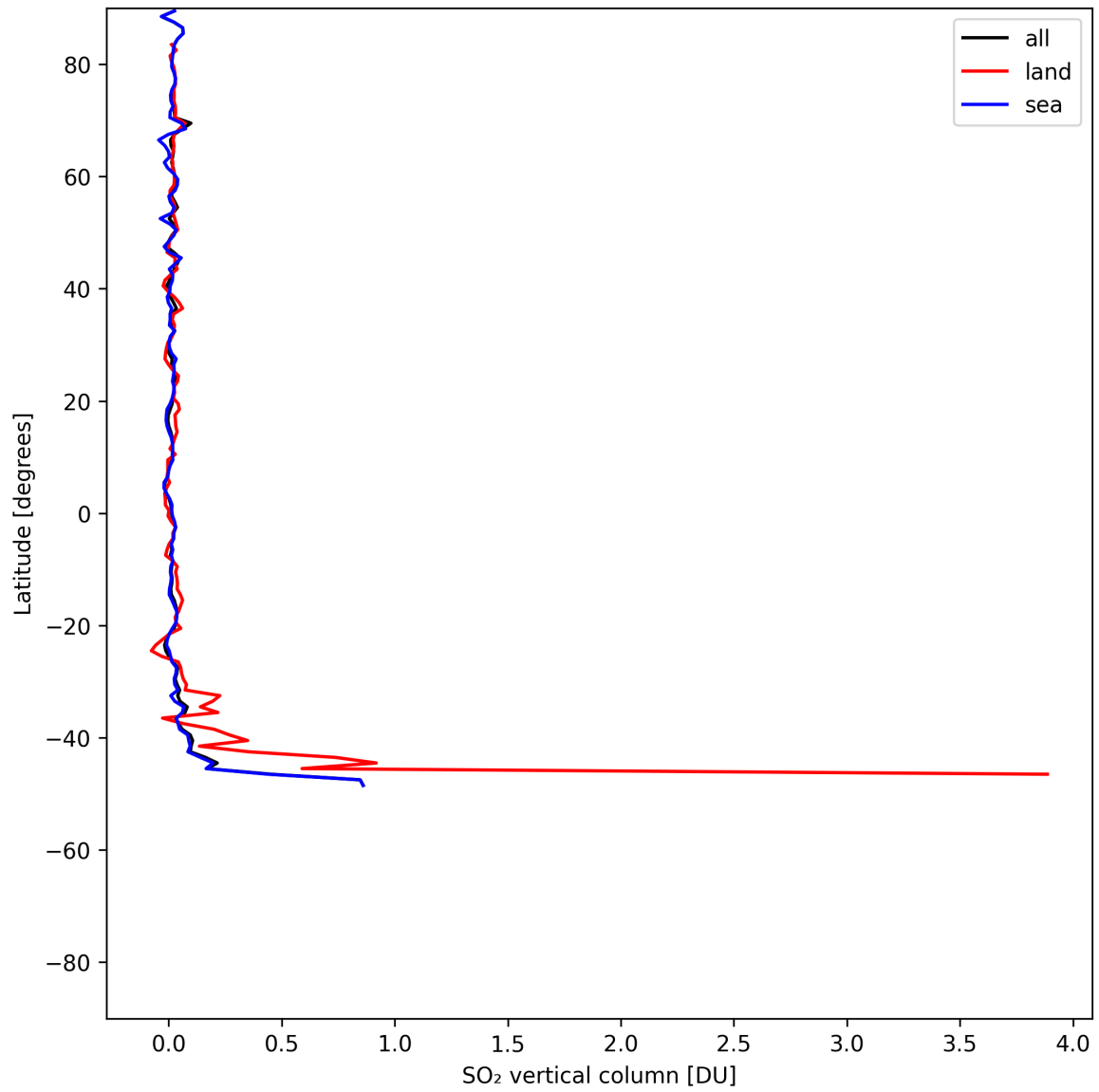


Figure 31: Zonal average of “SO₂ vertical column” for 2025-05-22 to 2025-05-23.

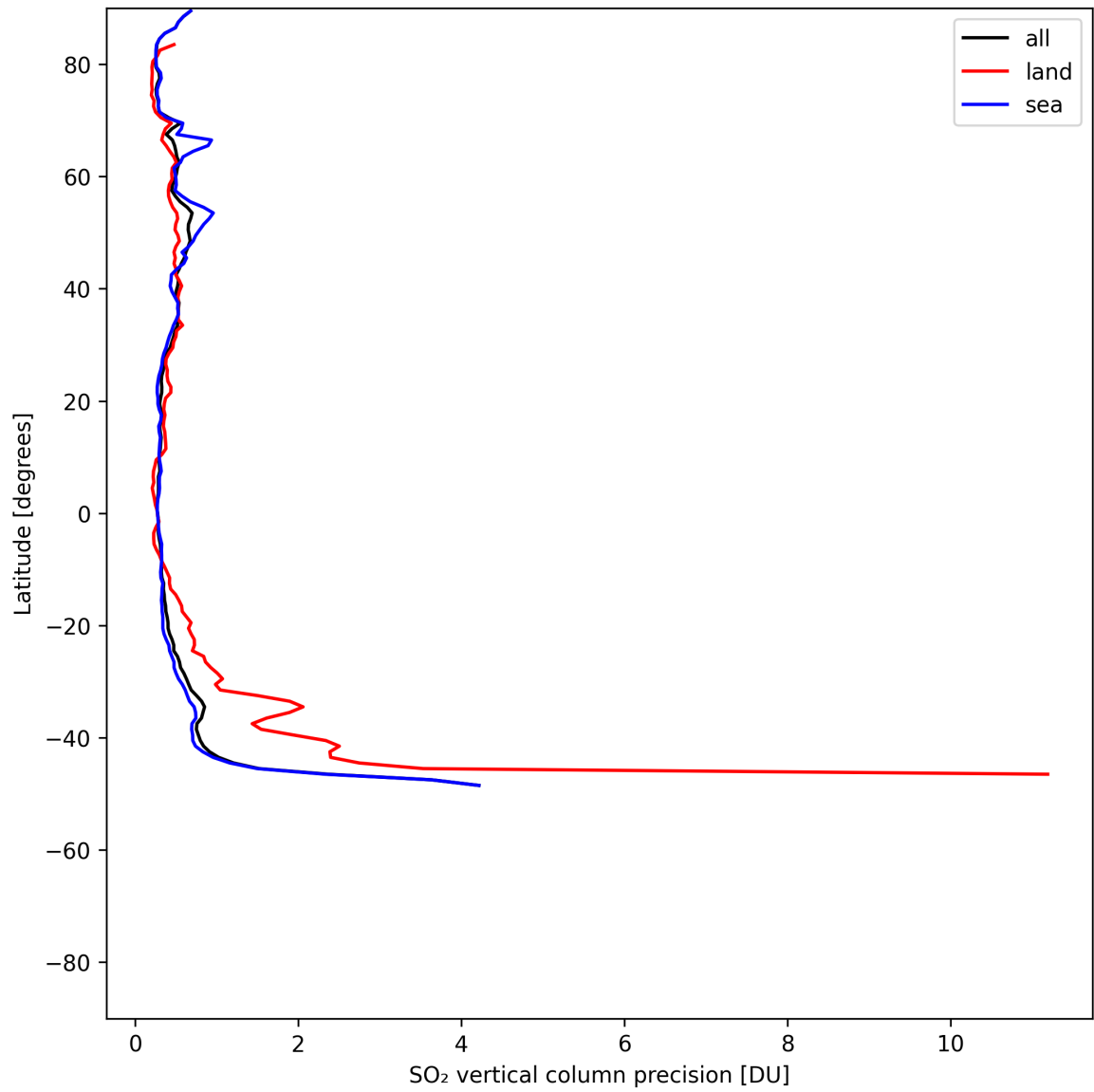


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-05-22 to 2025-05-23.

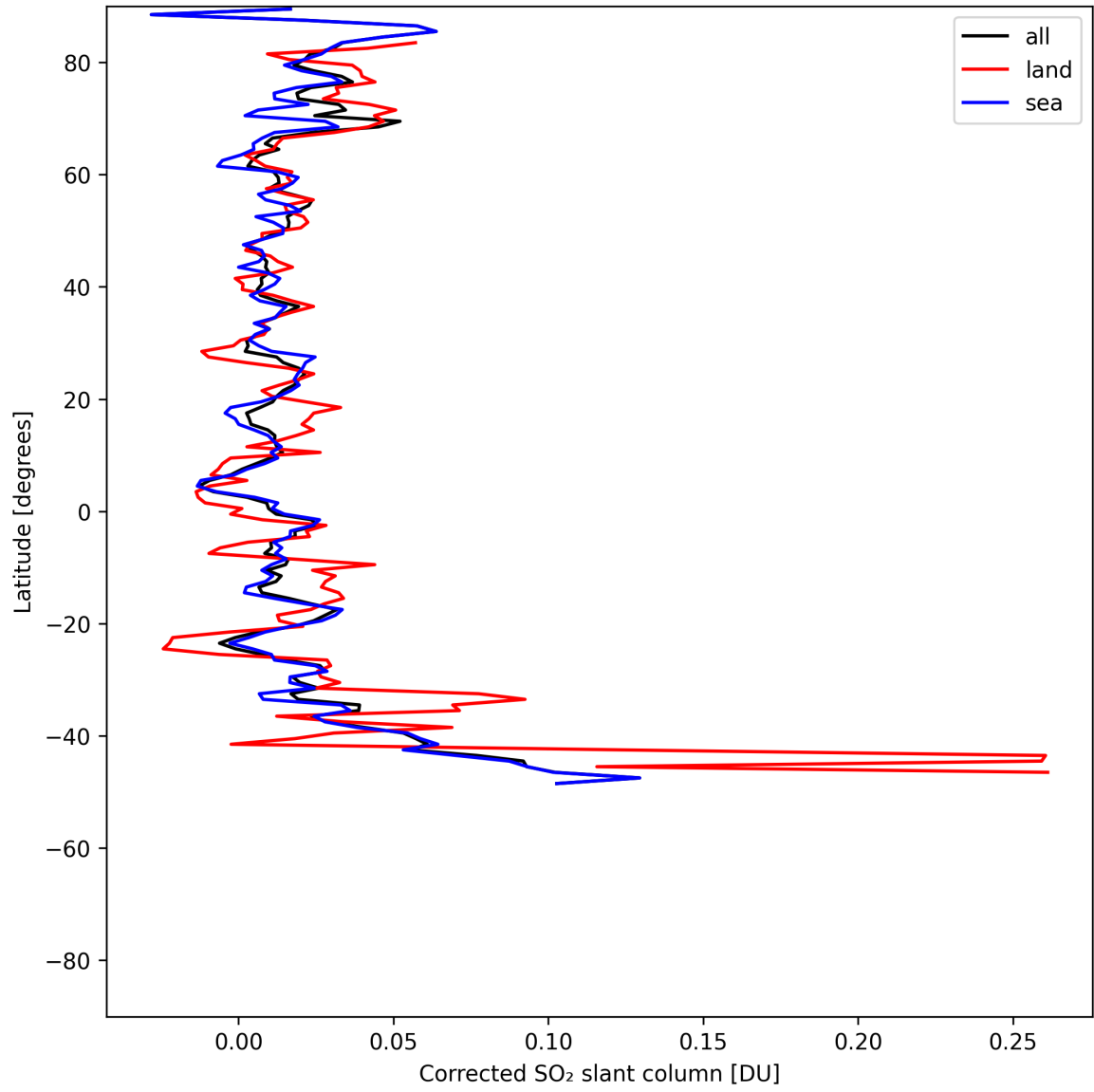


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-05-22 to 2025-05-23.

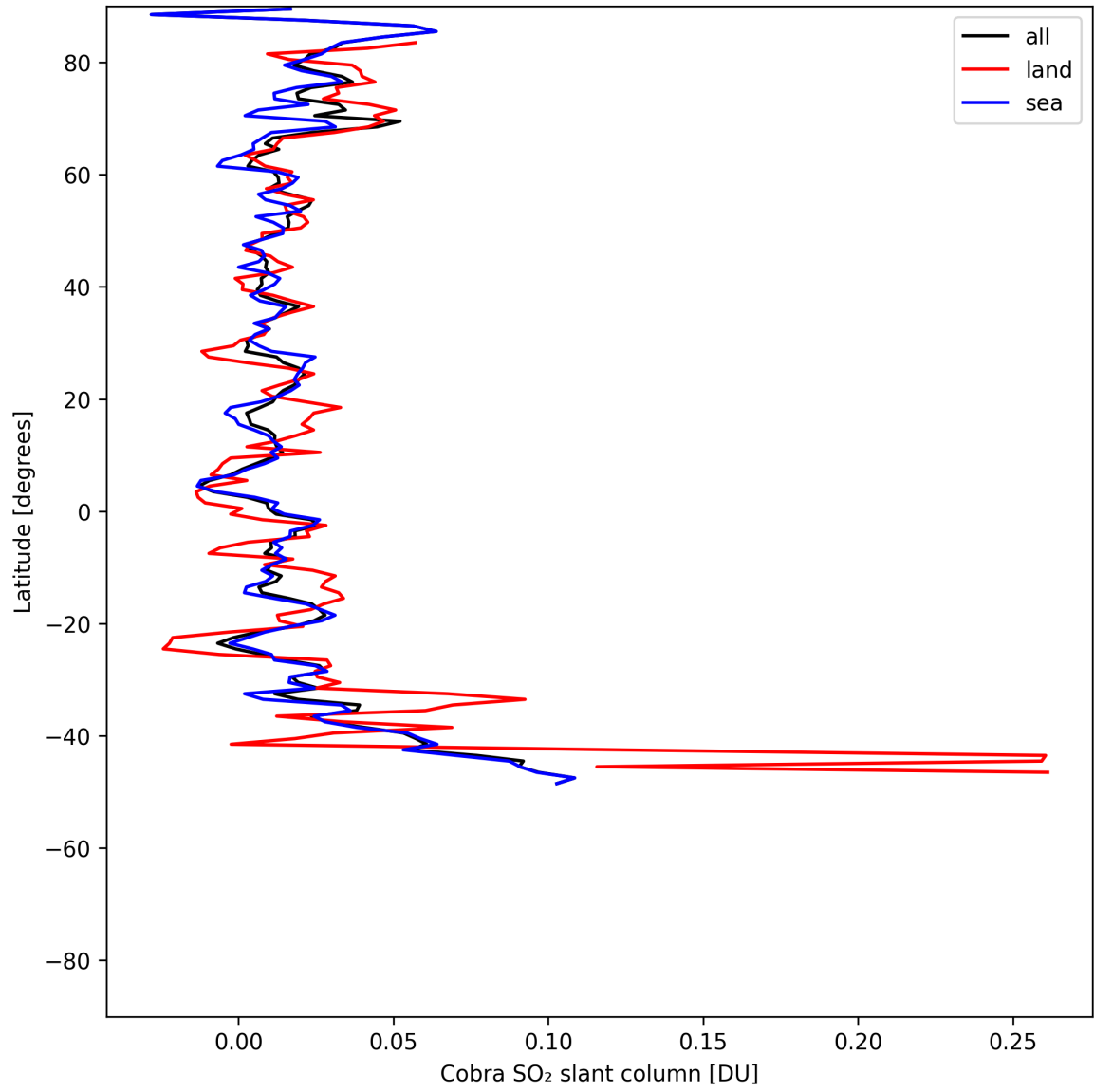


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-05-22 to 2025-05-23.

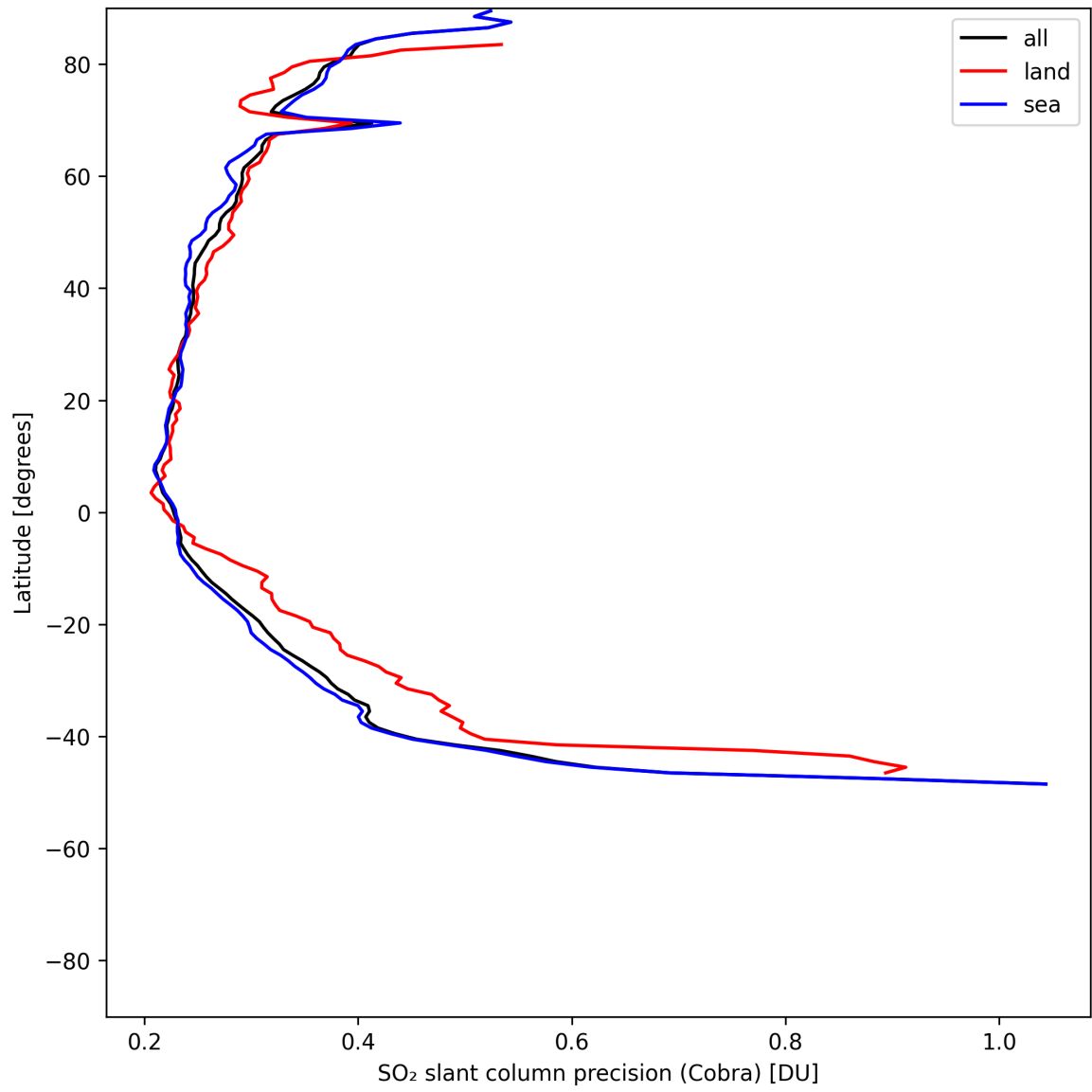


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-05-22 to 2025-05-23.

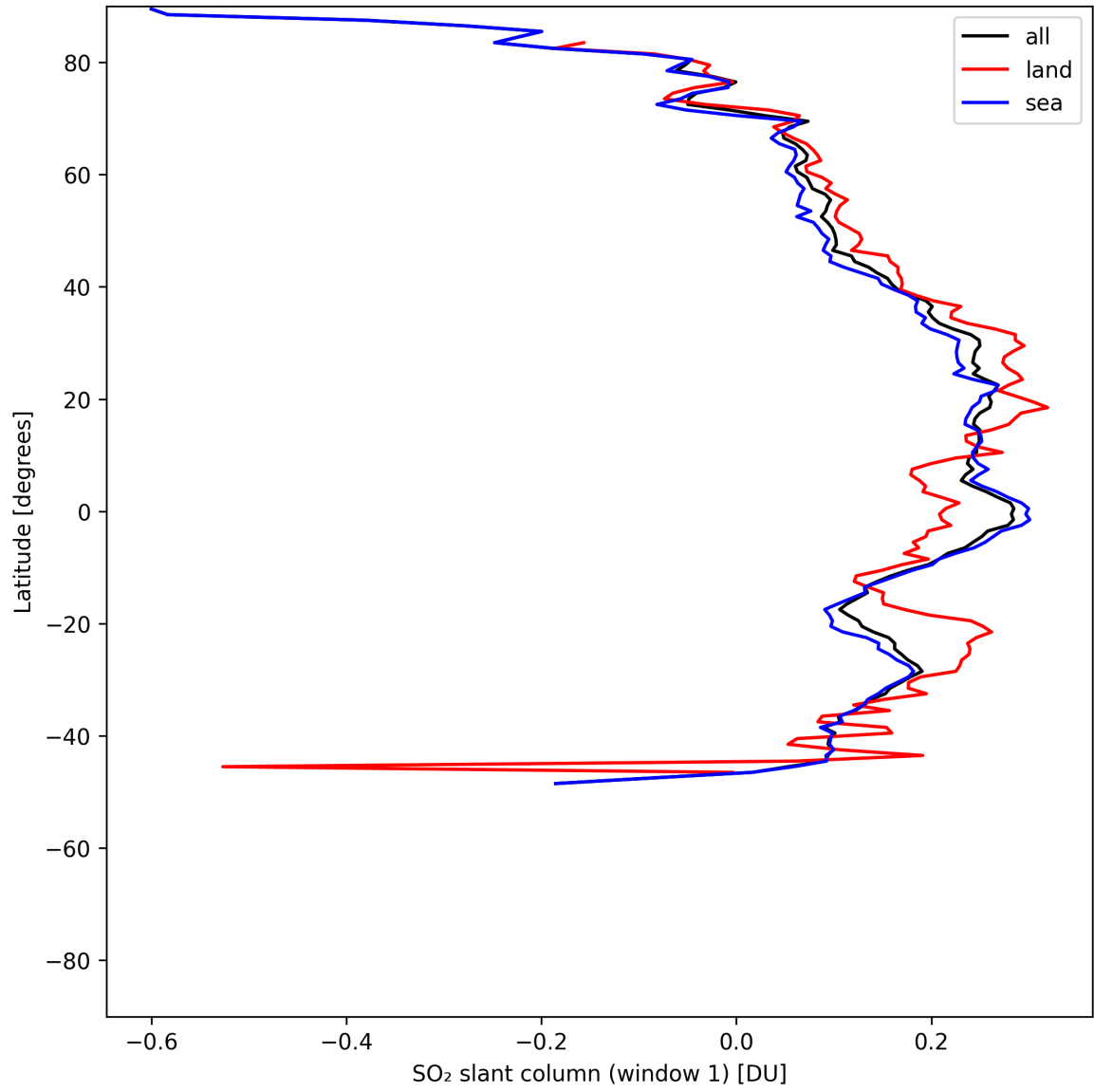


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-05-22 to 2025-05-23.

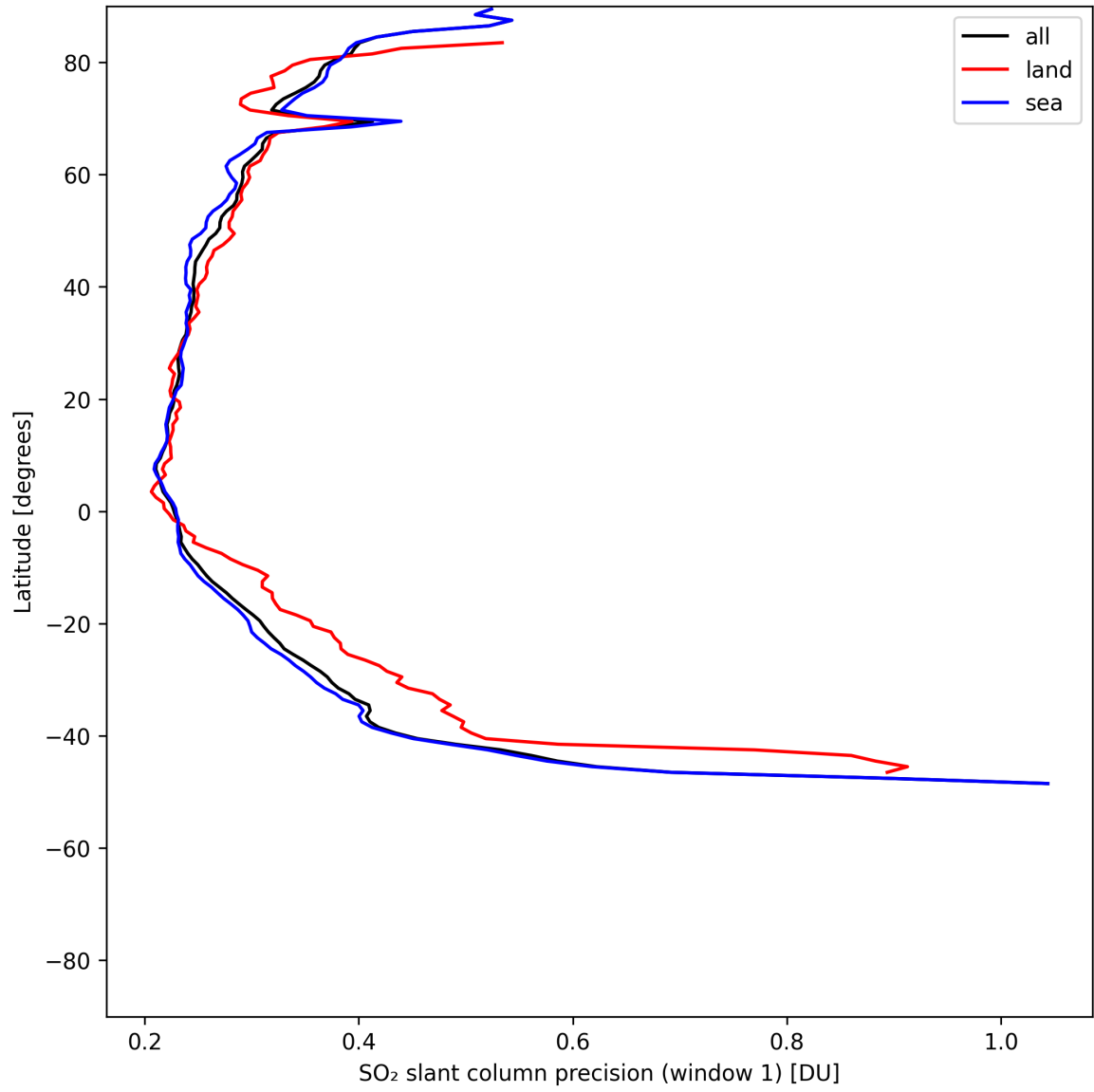


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-05-22 to 2025-05-23.

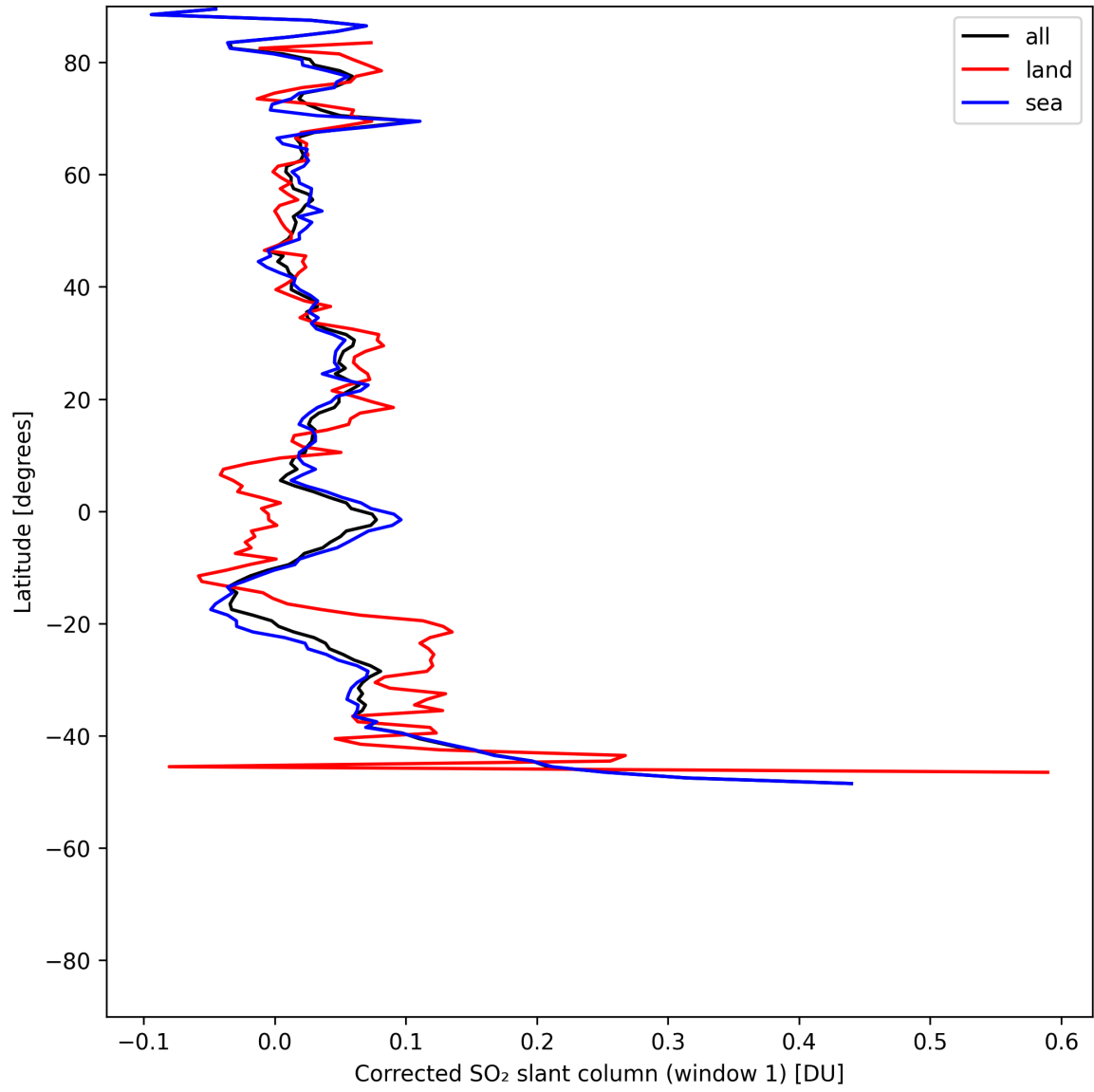


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-05-22 to 2025-05-23.

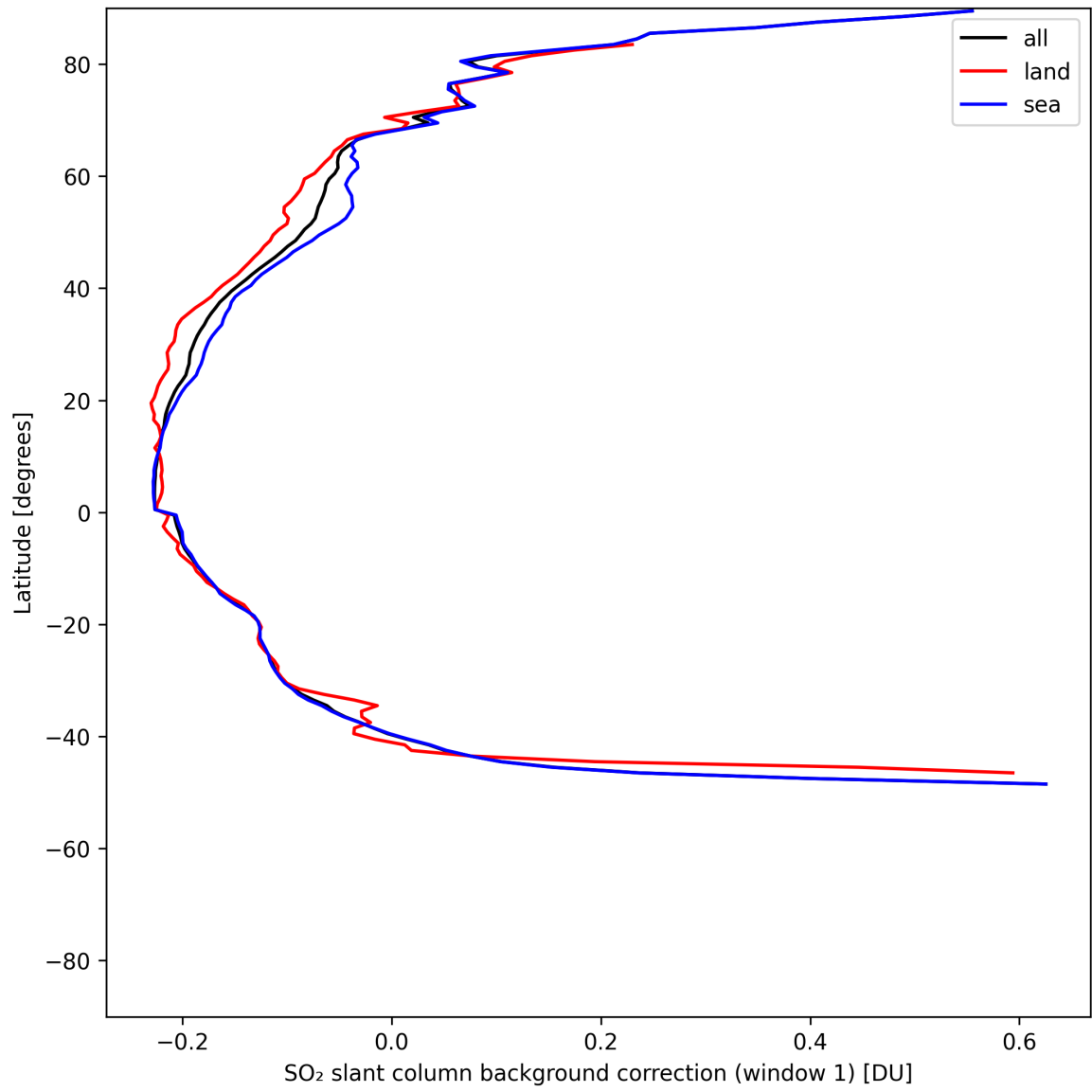


Figure 39: Zonal average of "SO₂ slant column background correction (window 1)" for 2025-05-22 to 2025-05-23.

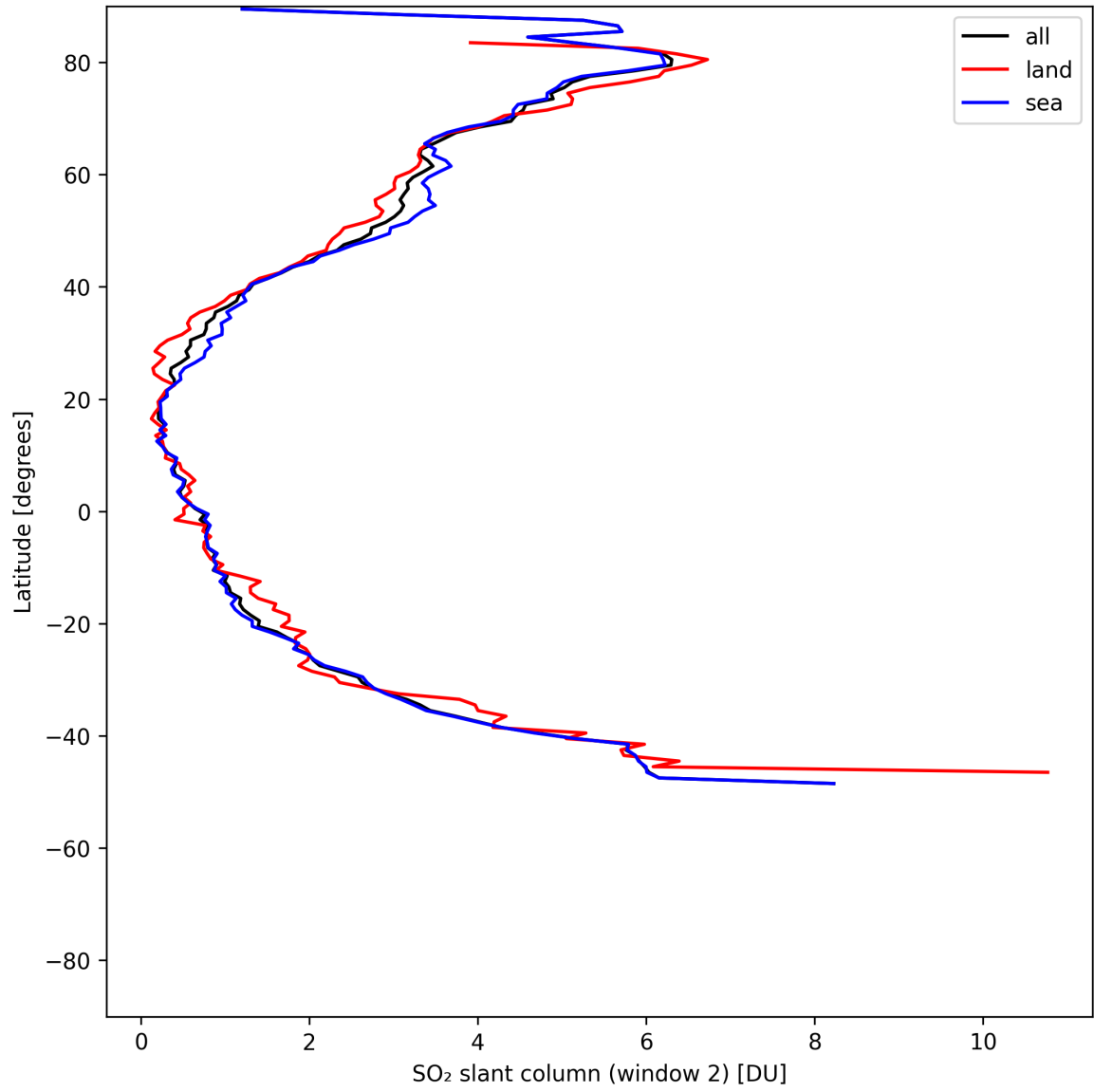


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-05-22 to 2025-05-23.

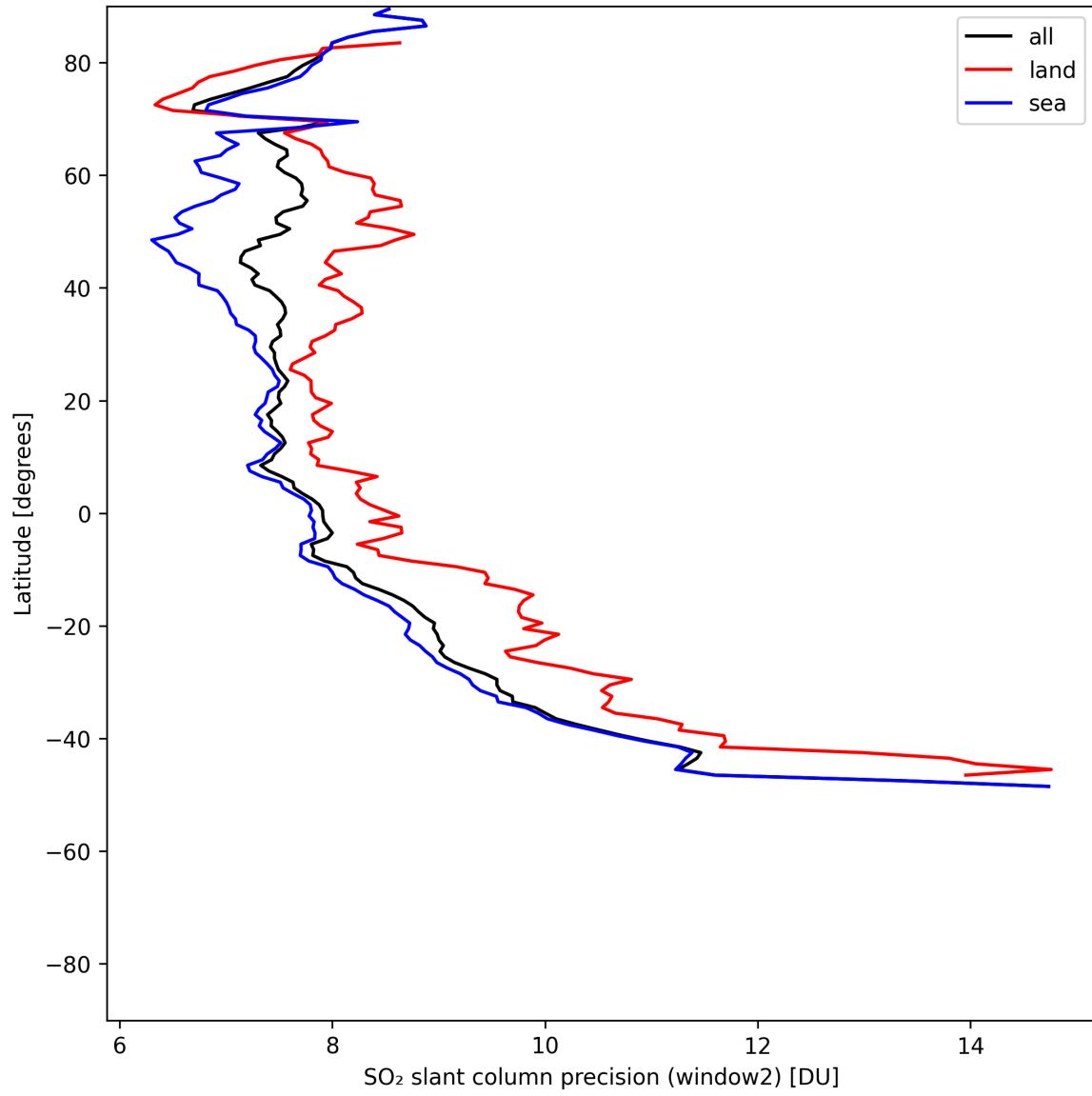


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-05-22 to 2025-05-23.

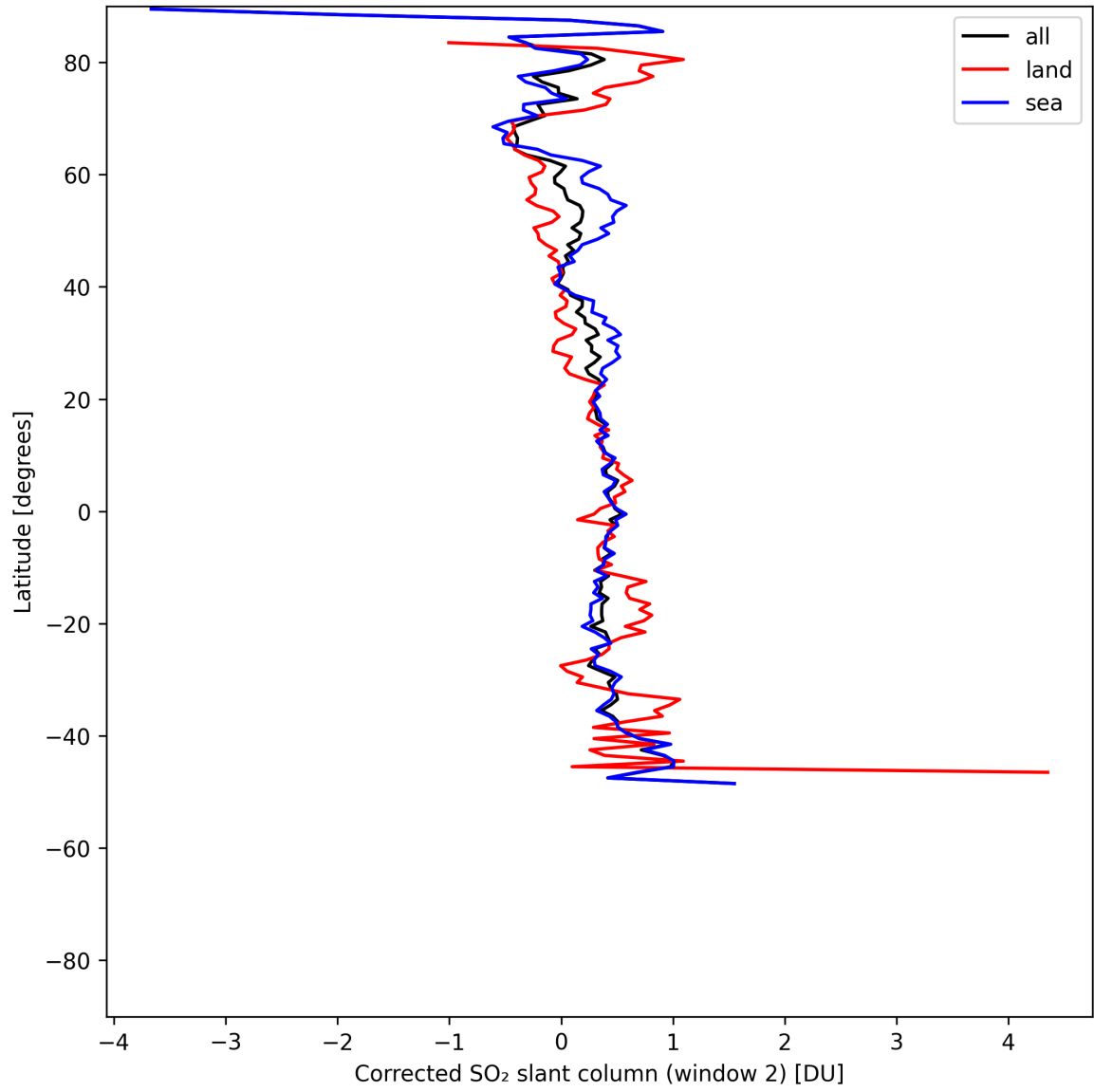


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-05-22 to 2025-05-23.

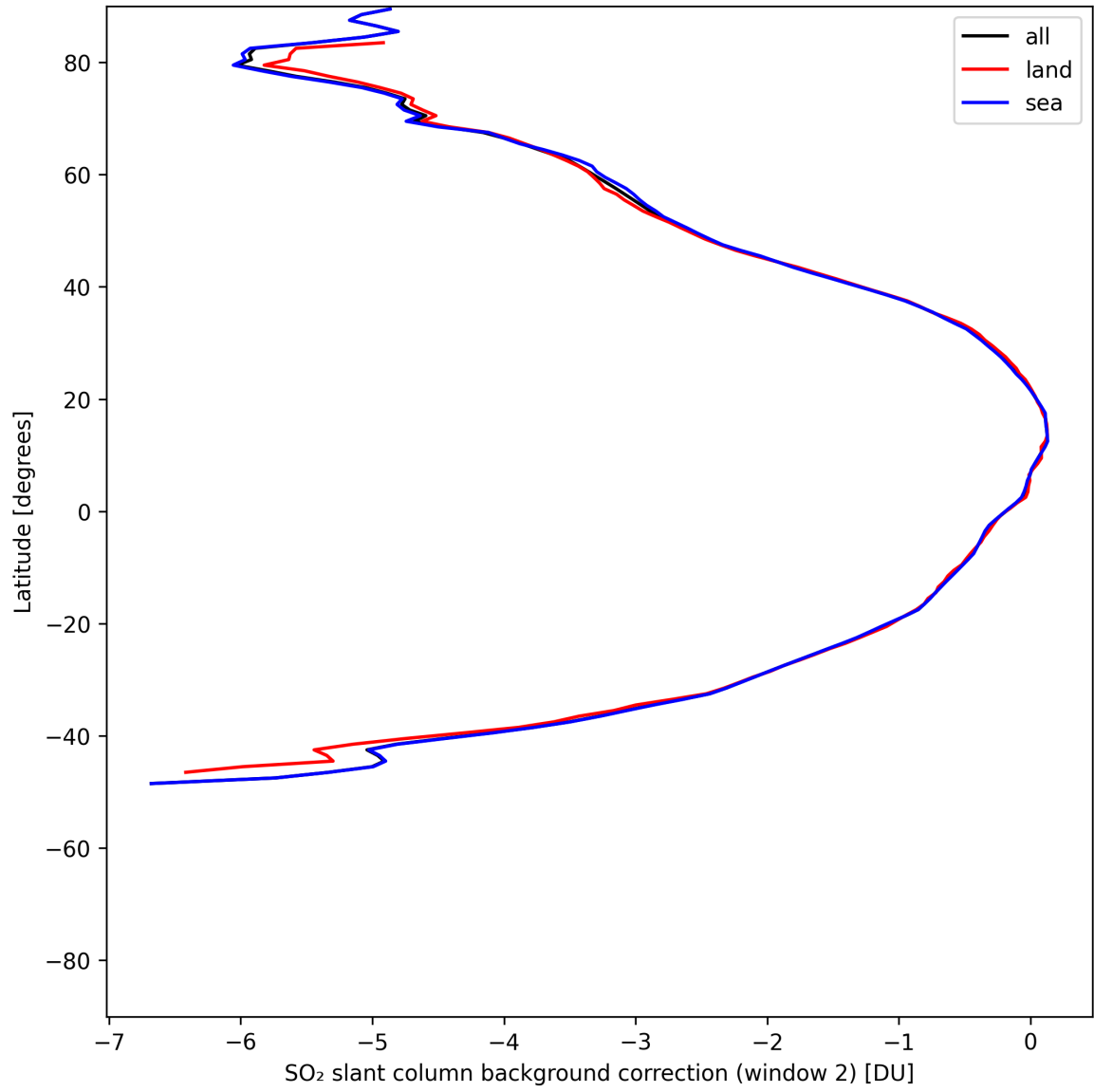


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-05-22 to 2025-05-23.

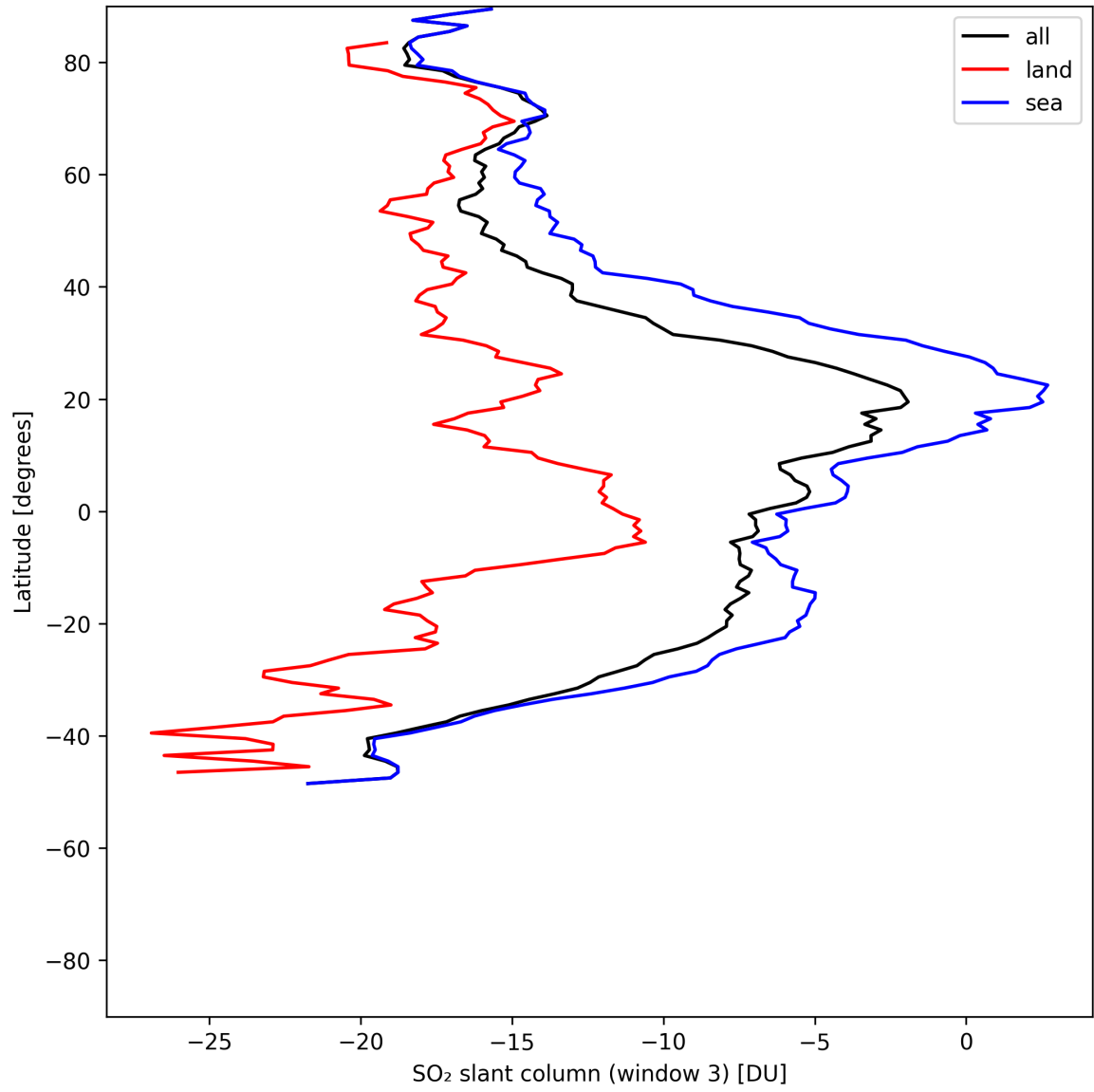


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-05-22 to 2025-05-23.

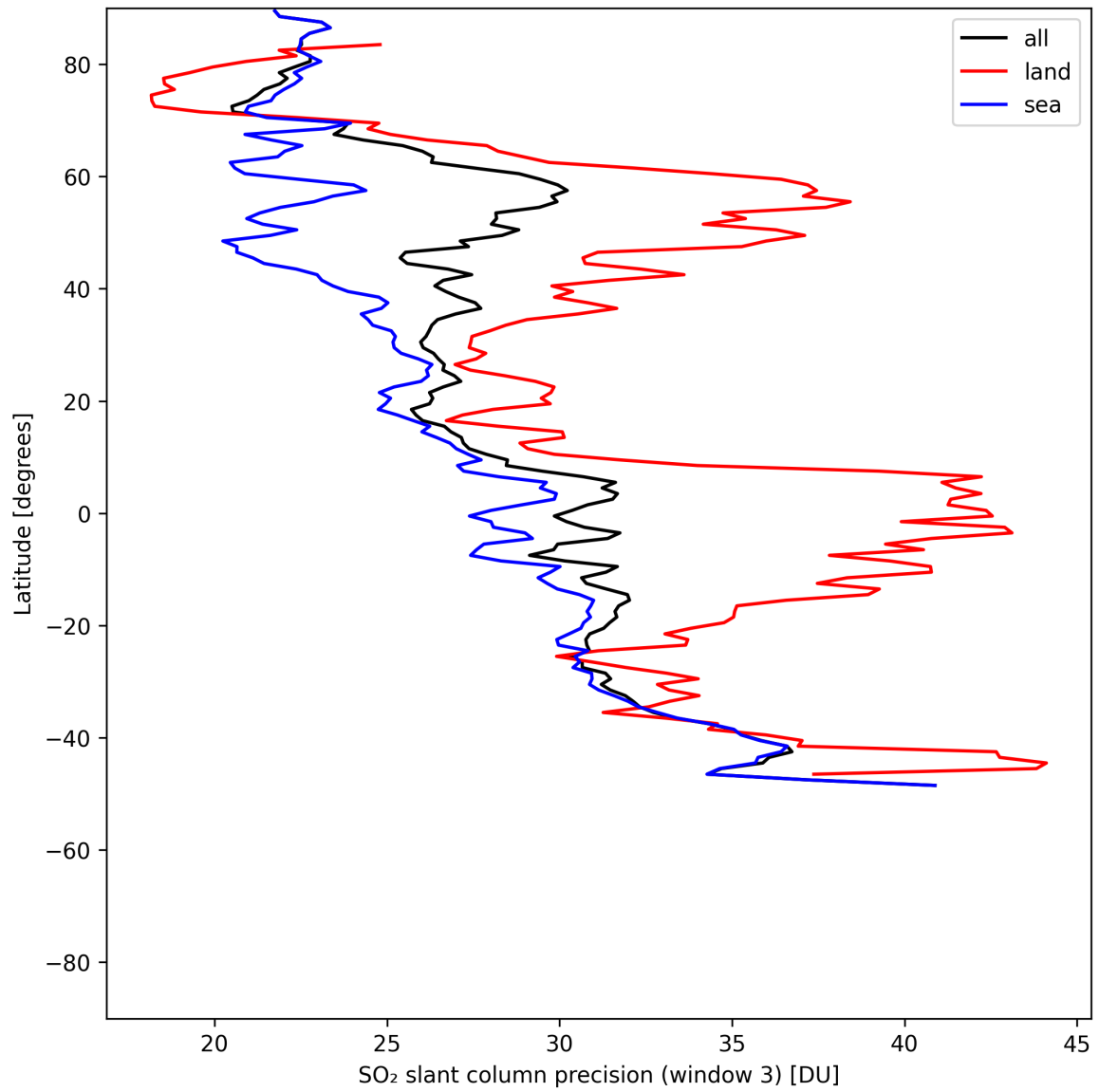


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-05-22 to 2025-05-23.

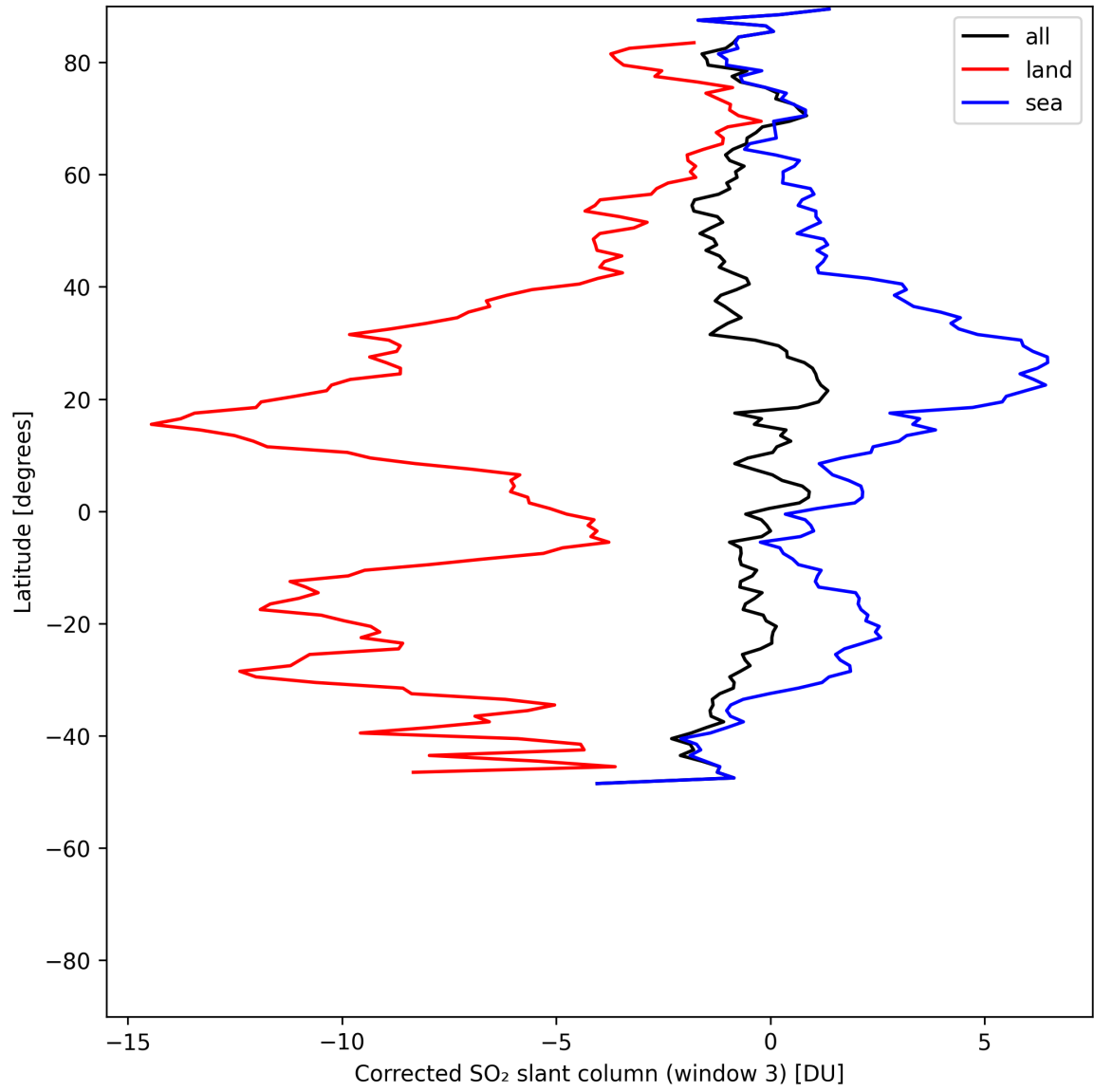


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-05-22 to 2025-05-23.

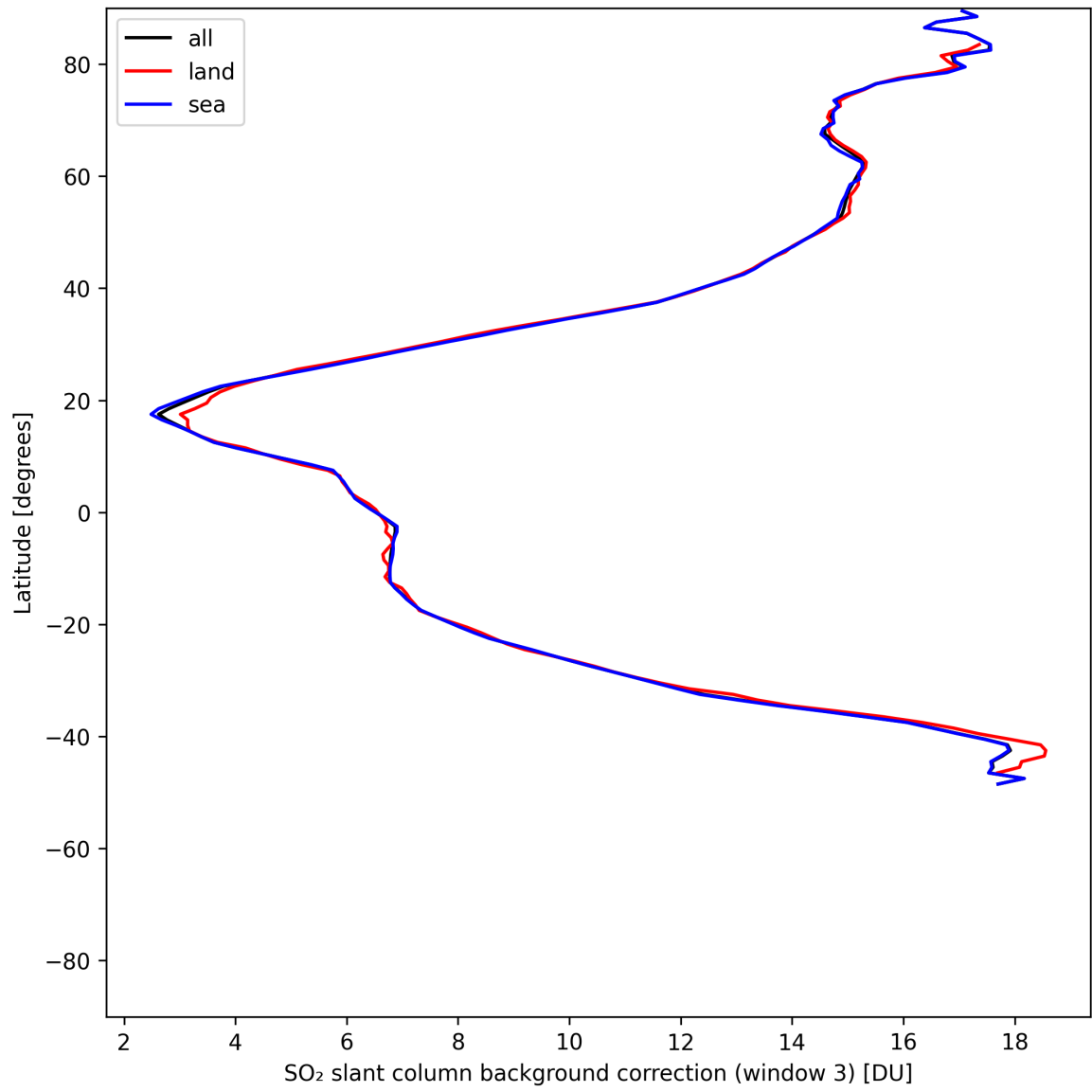


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-05-22 to 2025-05-23.

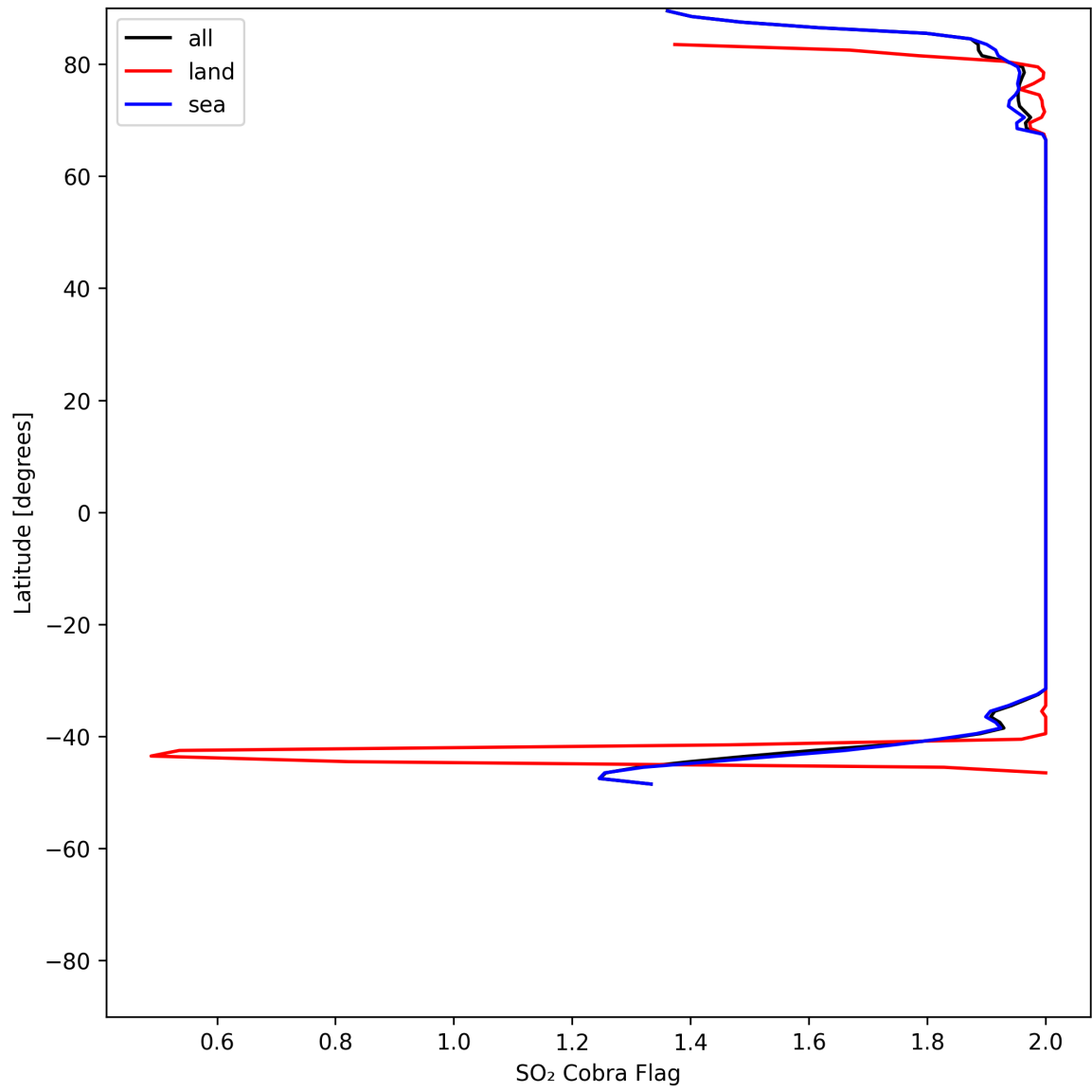


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-05-22 to 2025-05-23.

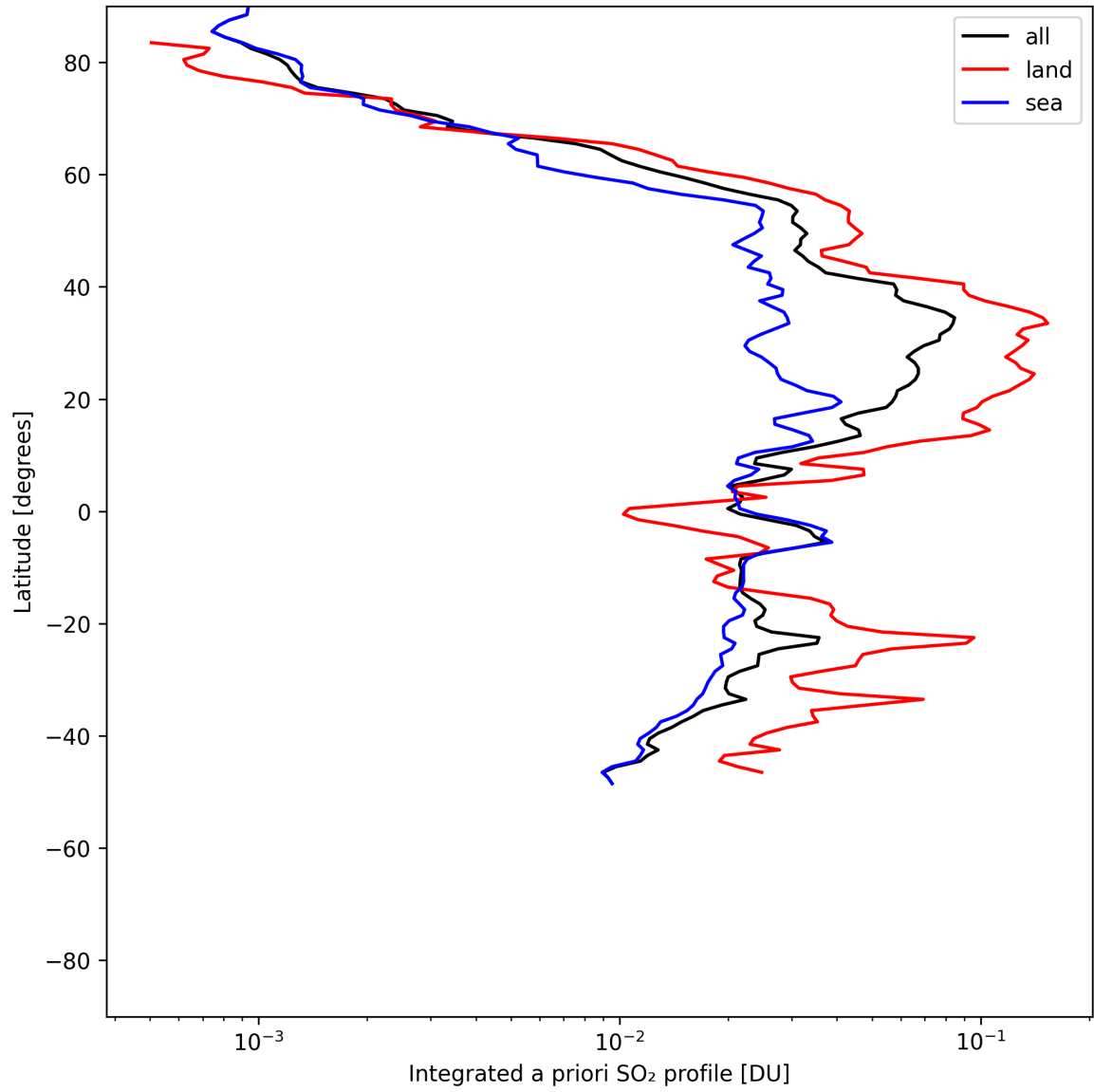


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-05-22 to 2025-05-23.

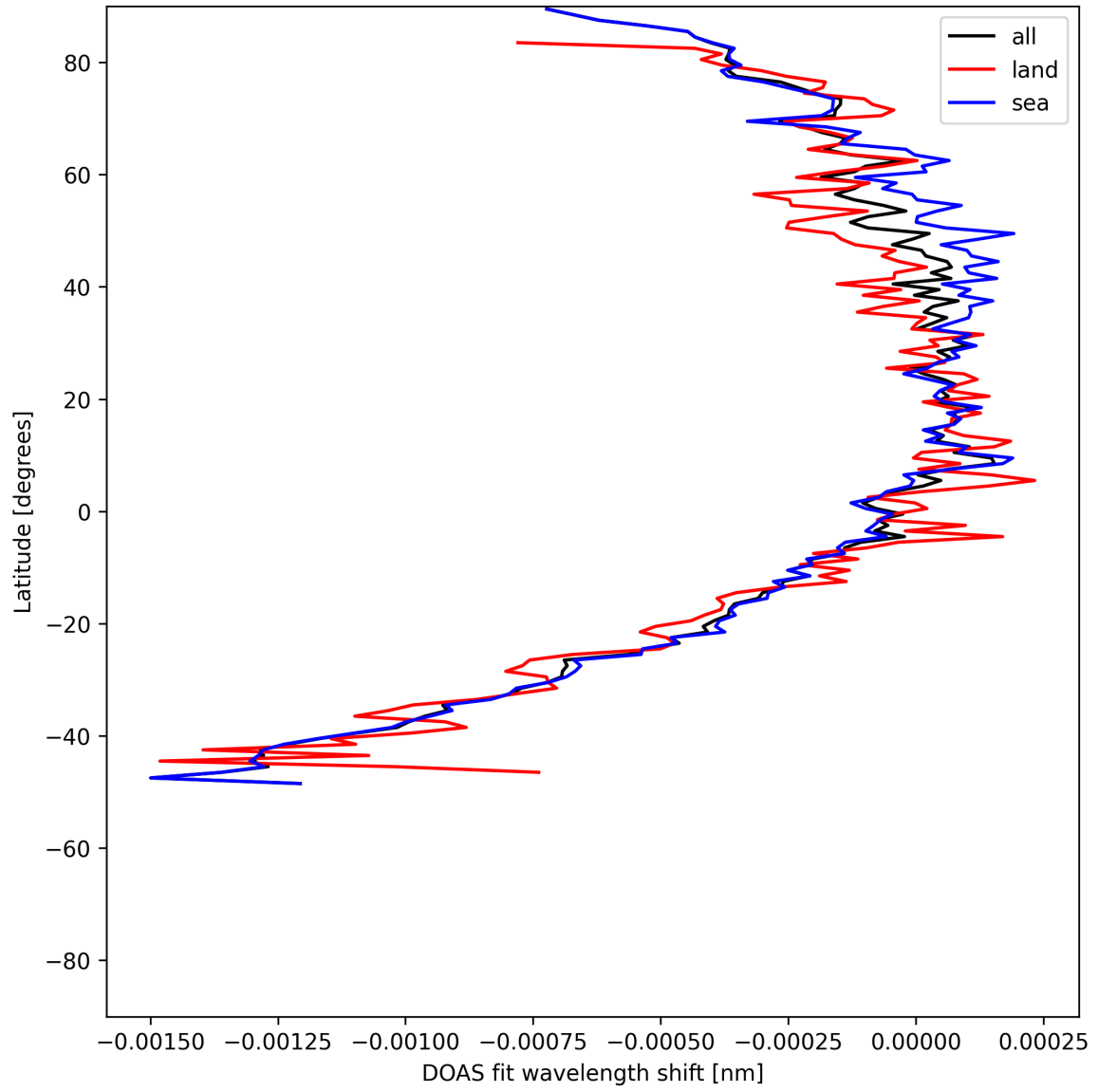


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-05-22 to 2025-05-23.

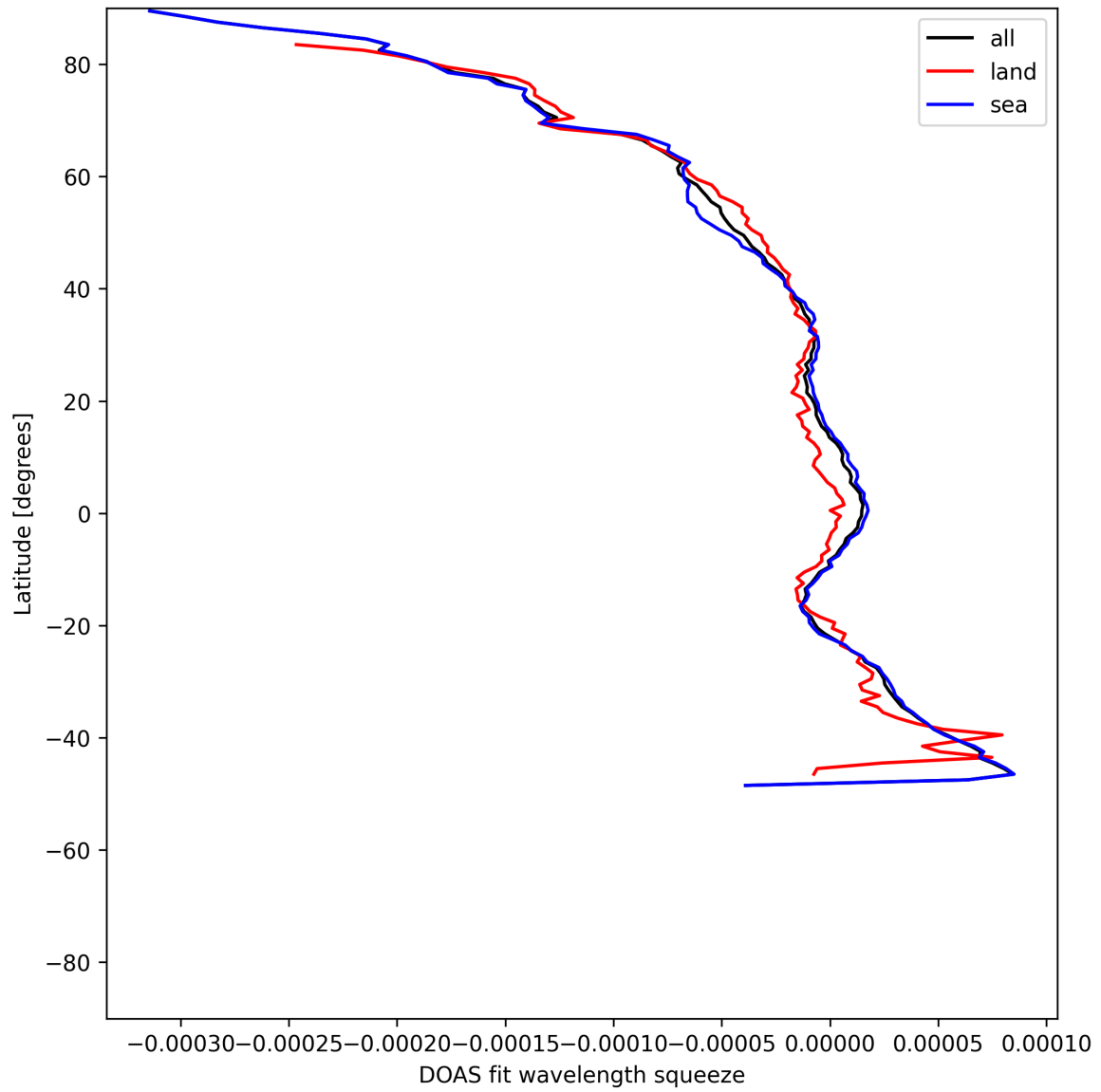


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-05-22 to 2025-05-23.

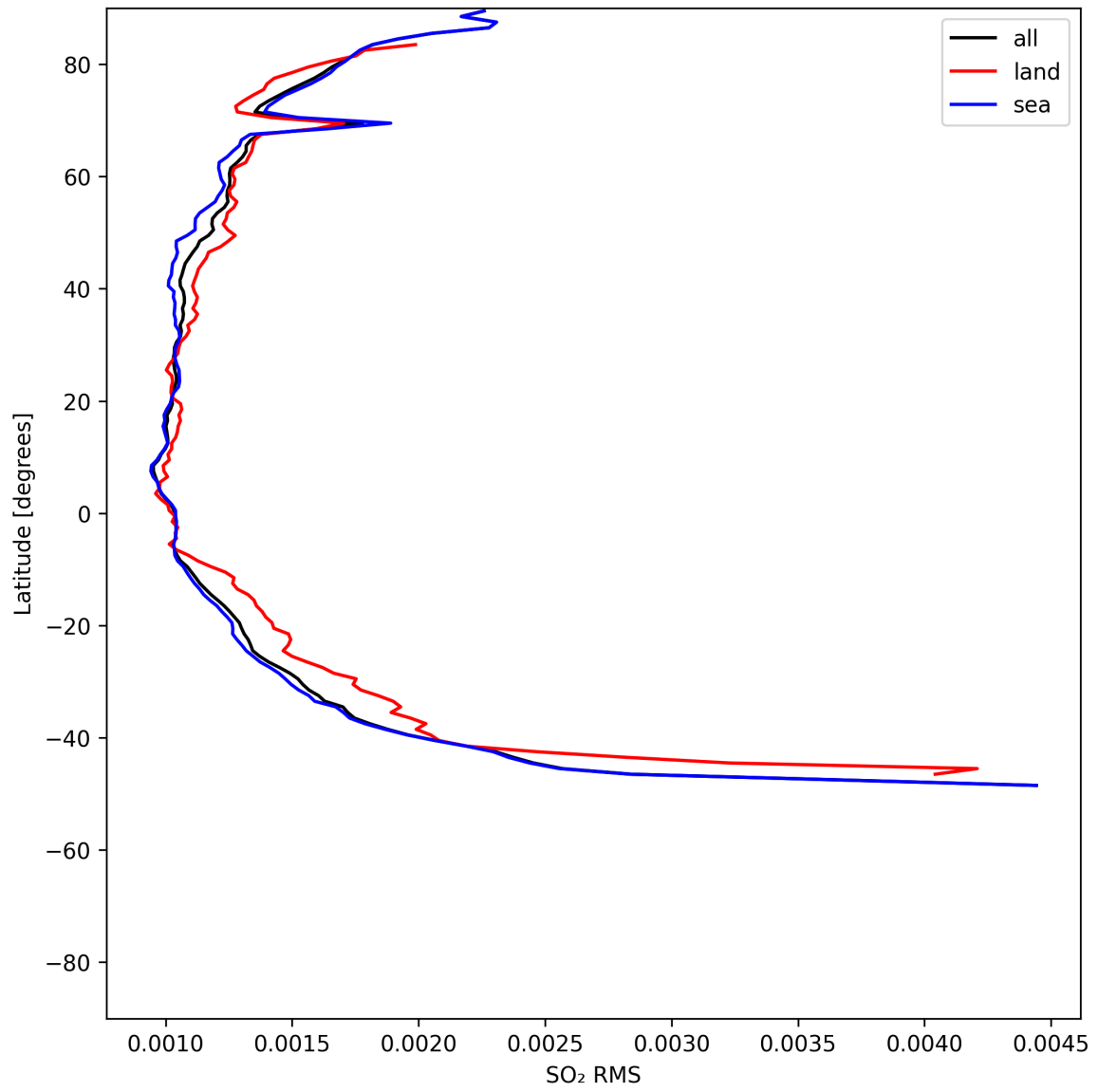


Figure 52: Zonal average of “SO₂ RMS” for 2025-05-22 to 2025-05-23.

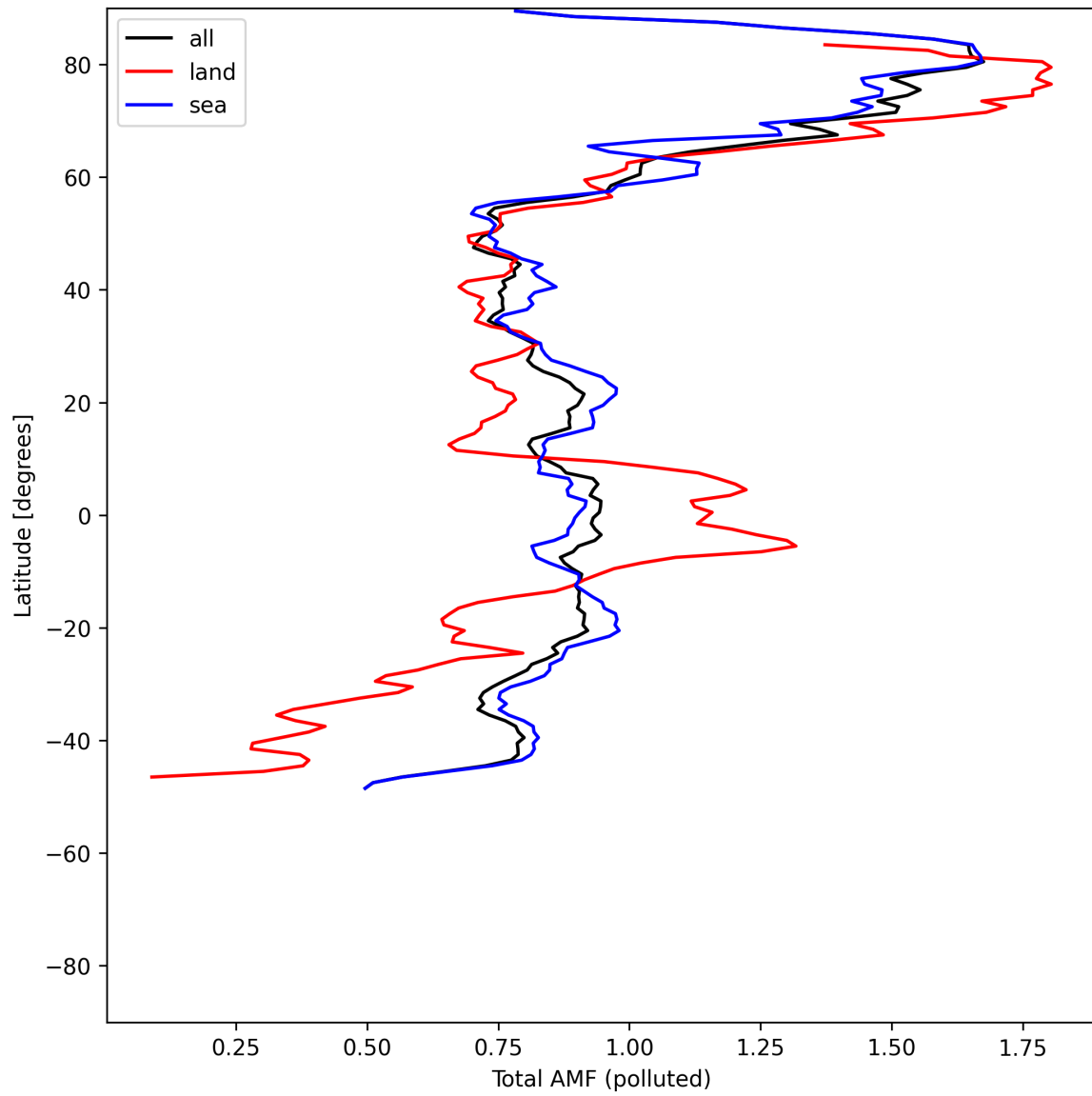


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-05-22 to 2025-05-23.

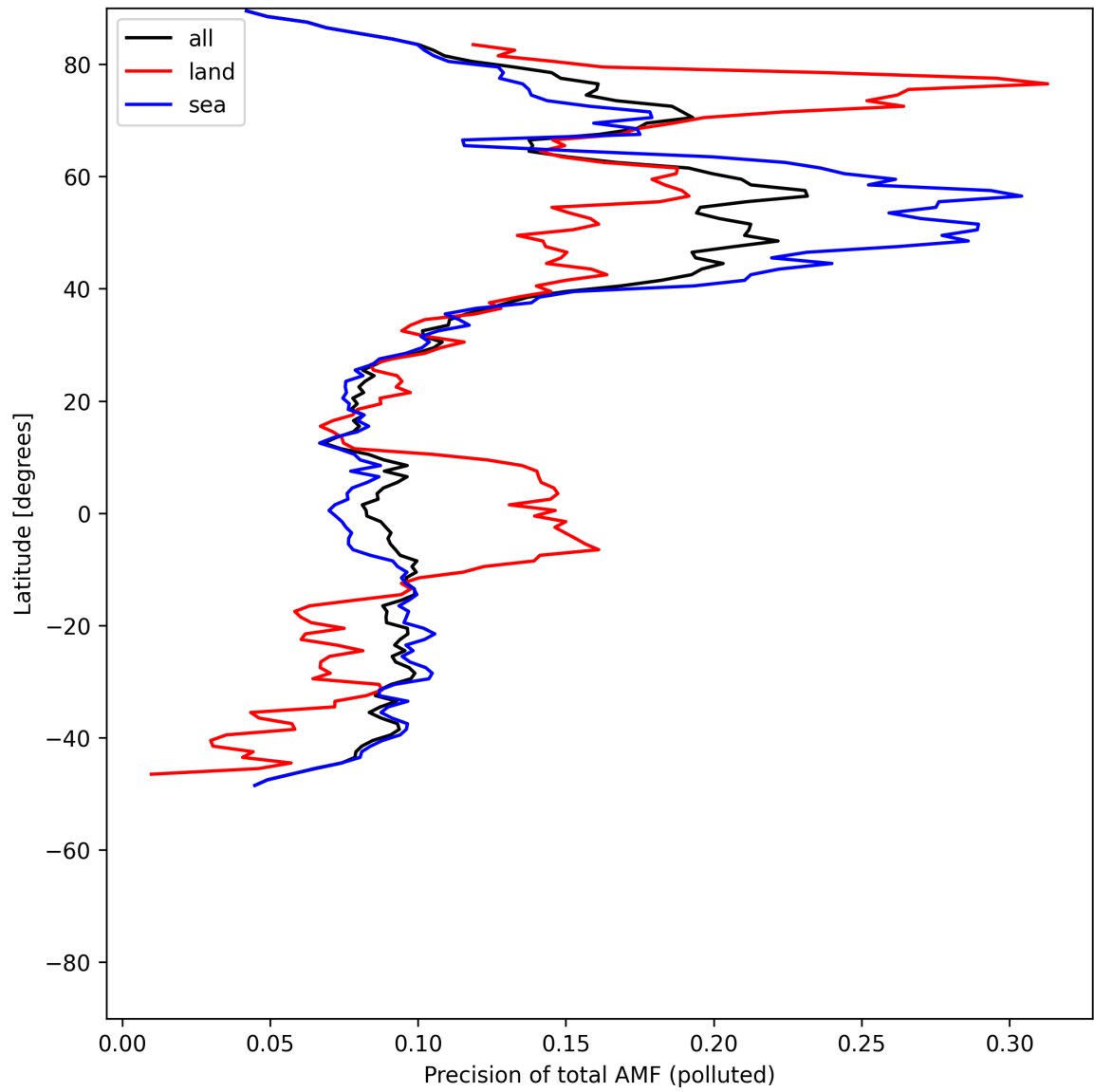


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-05-22 to 2025-05-23.

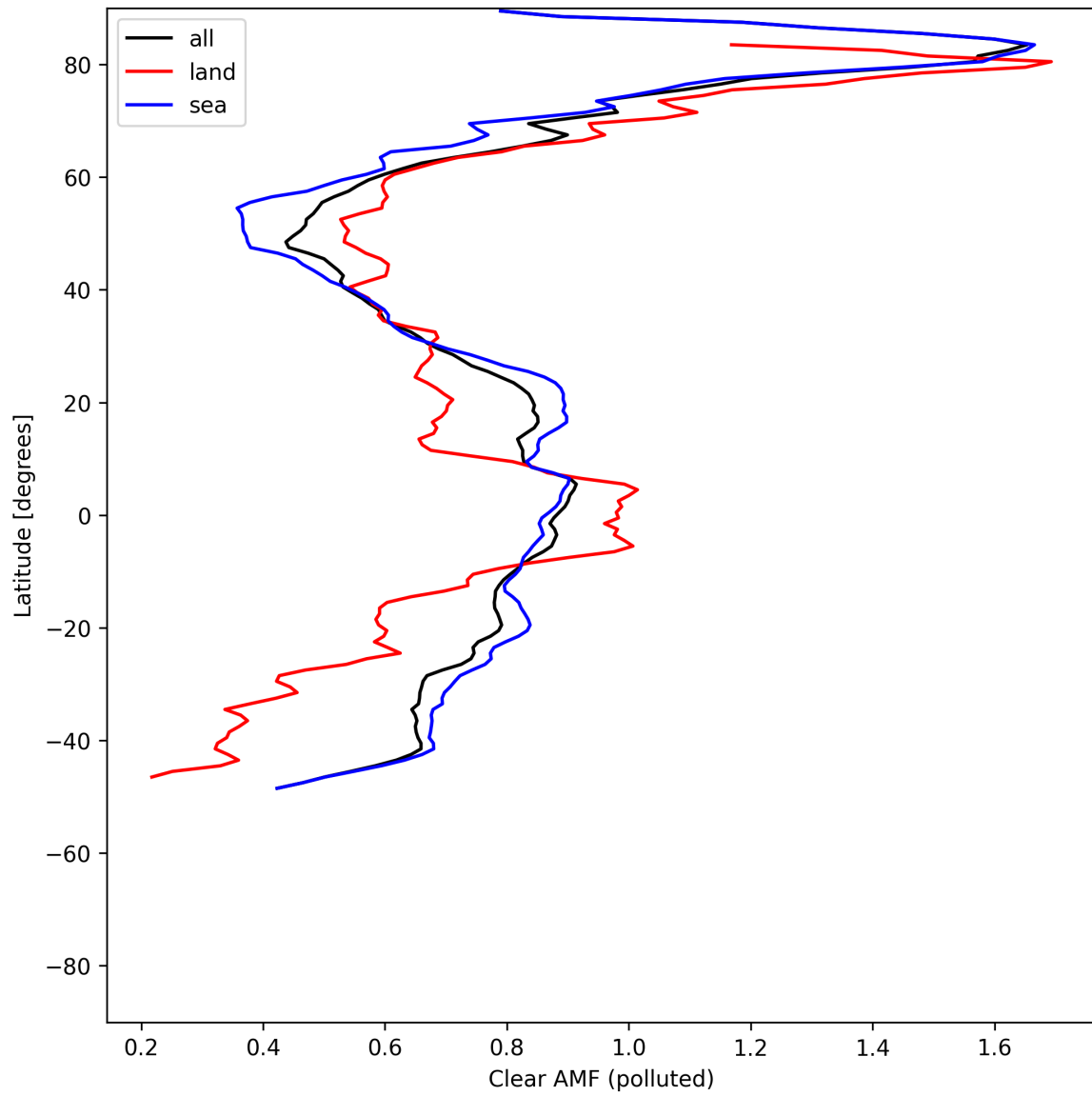


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-05-22 to 2025-05-23.

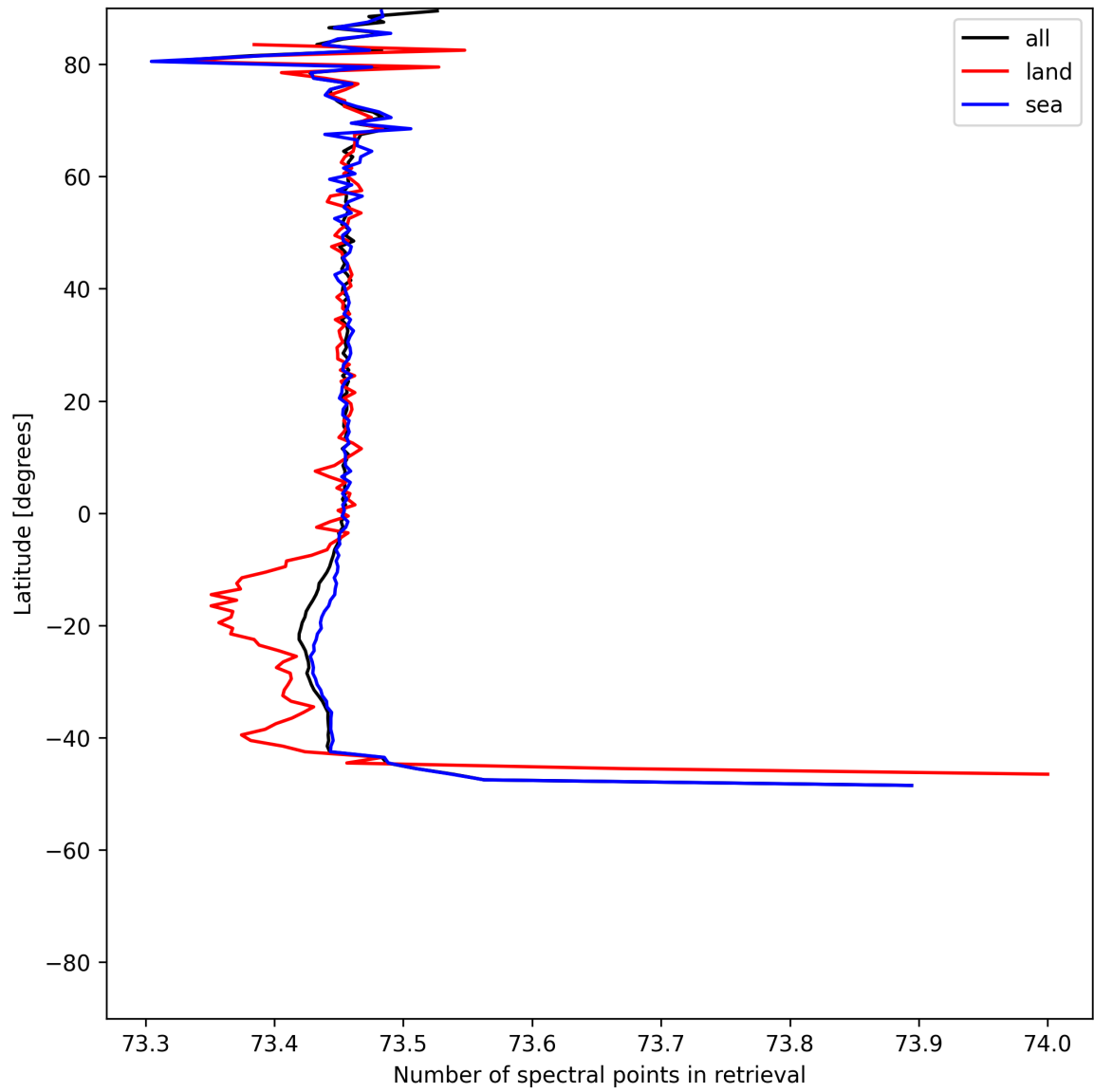


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-05-22 to 2025-05-23.

8 Histograms

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

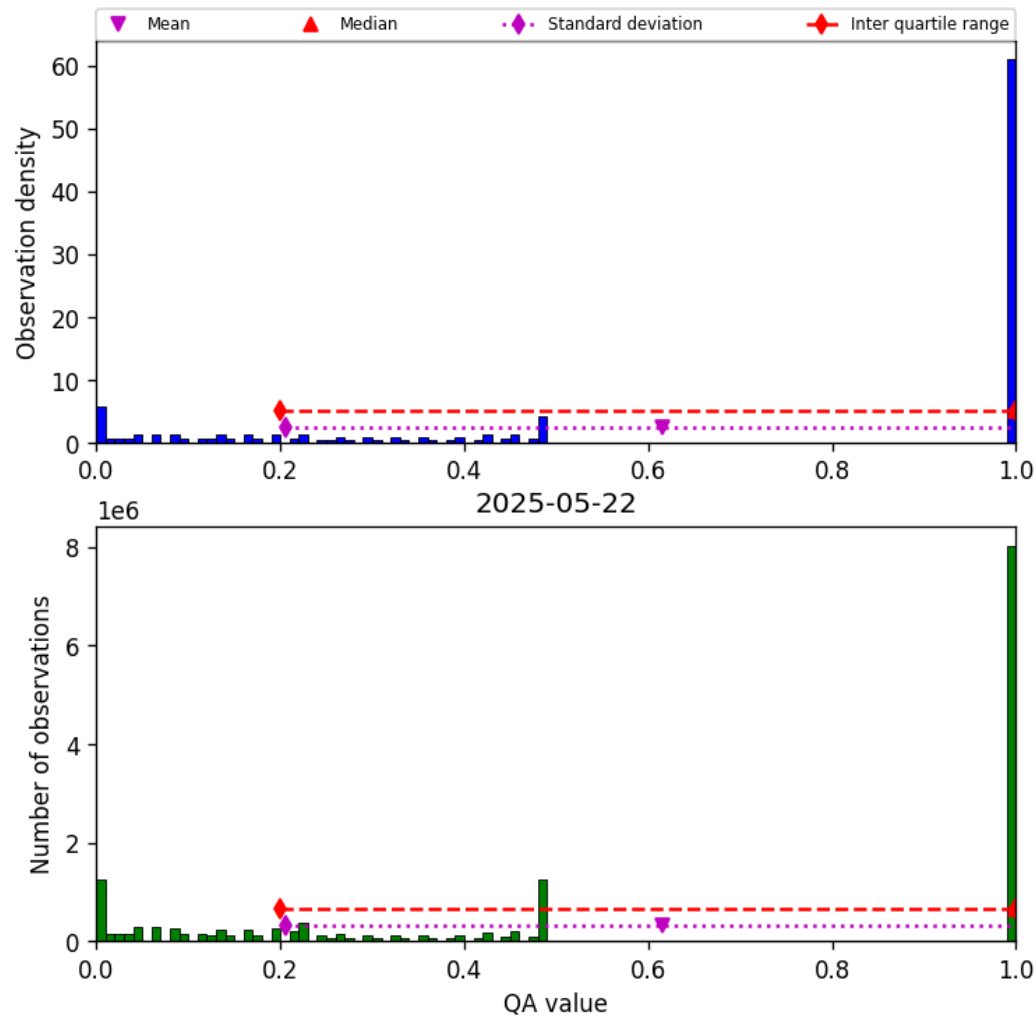


Figure 57: Histogram of “QA value” for 2025-05-22 to 2025-05-23

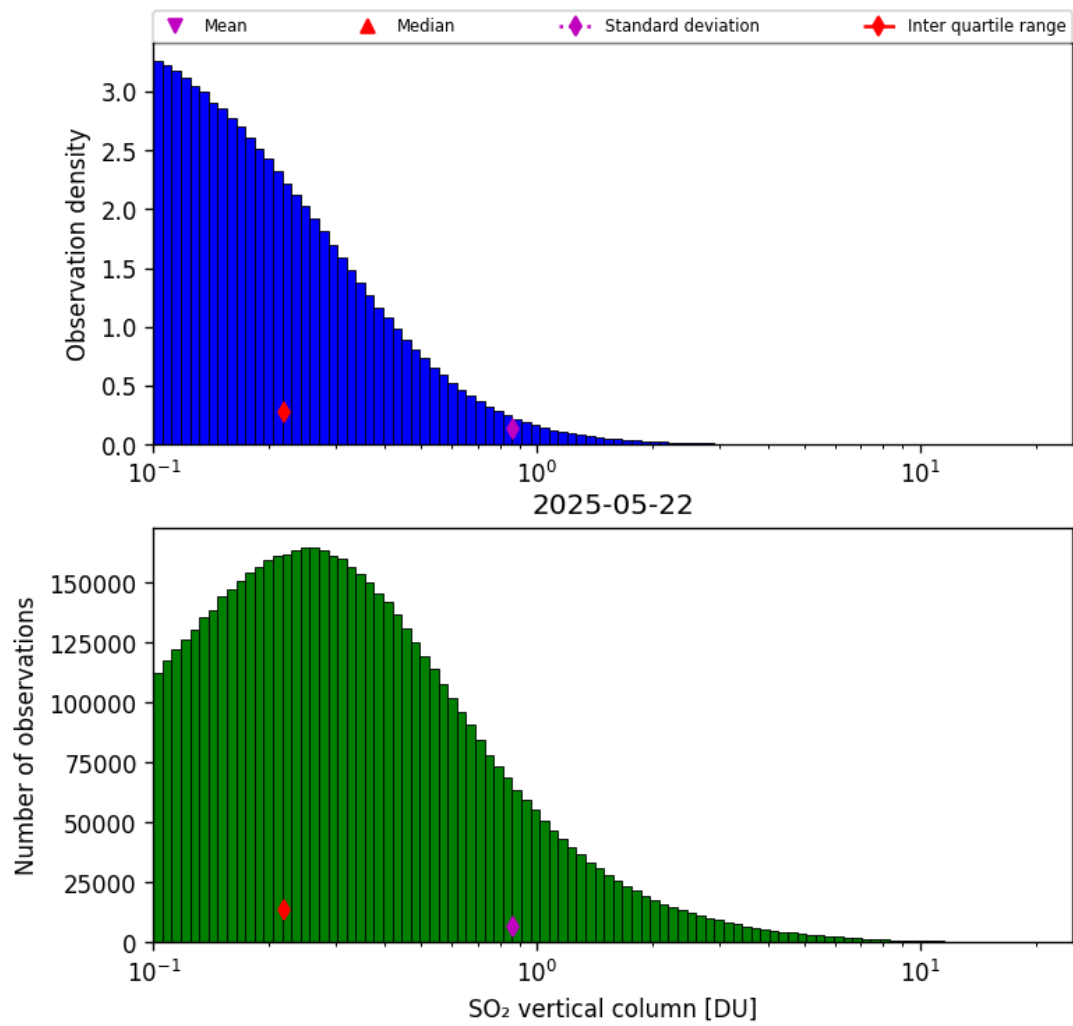


Figure 58: Histogram of “SO₂ vertical column” for 2025-05-22 to 2025-05-23

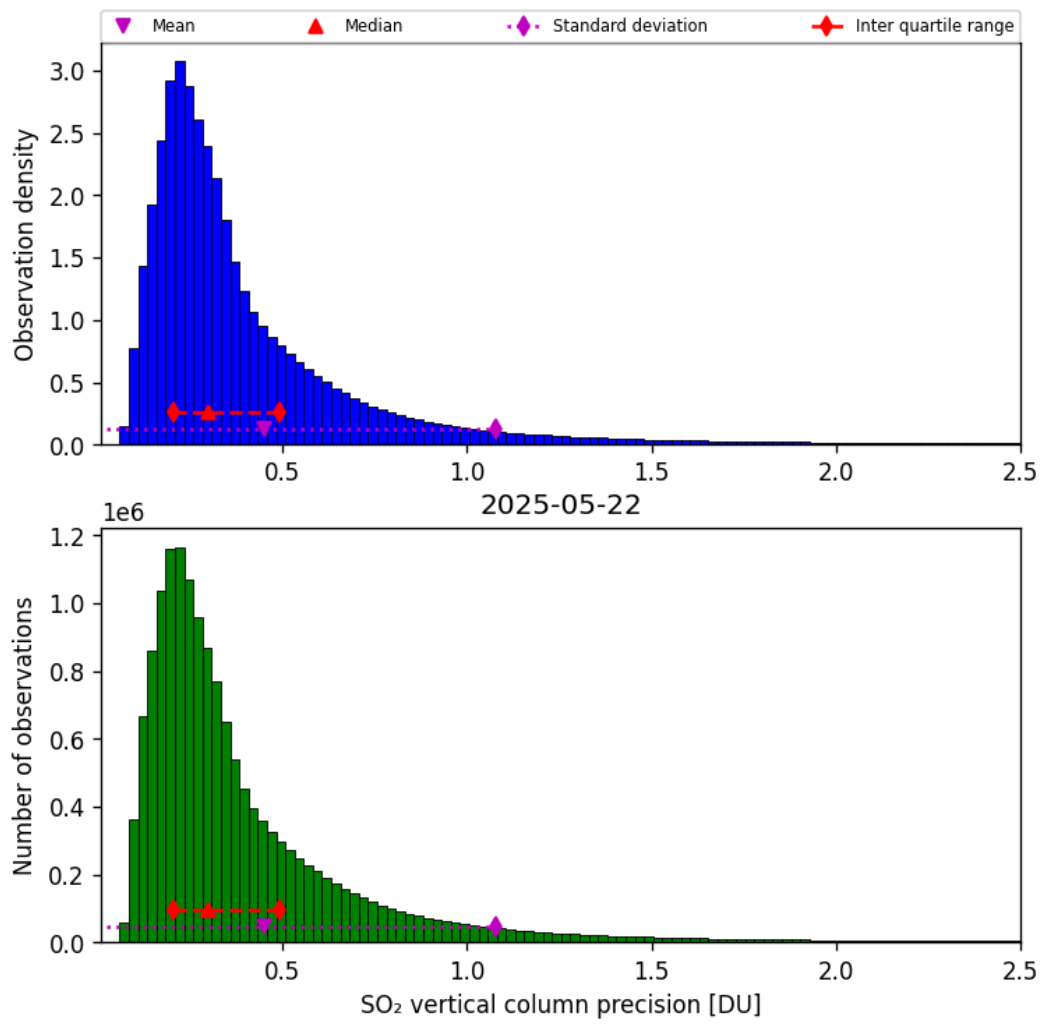


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-05-22 to 2025-05-23

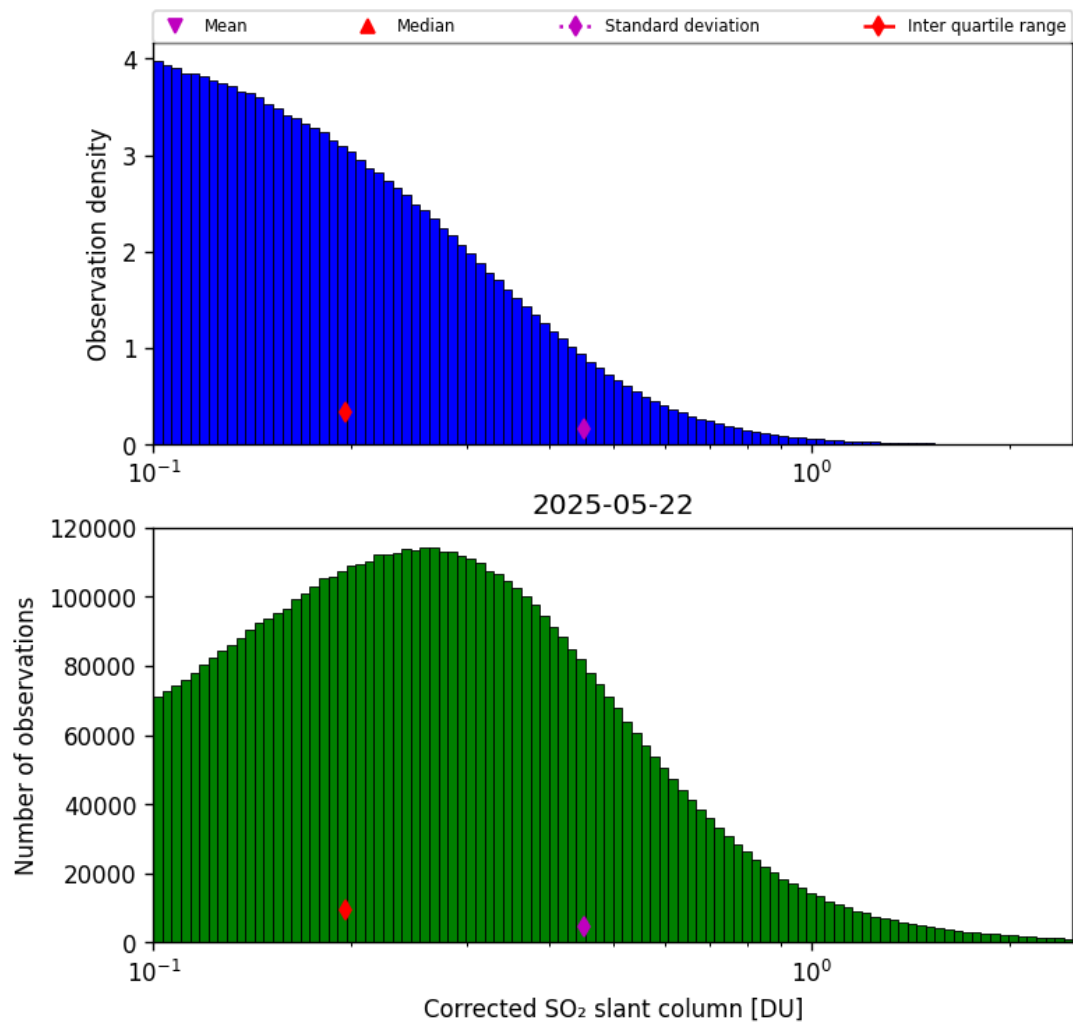


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-05-22 to 2025-05-23

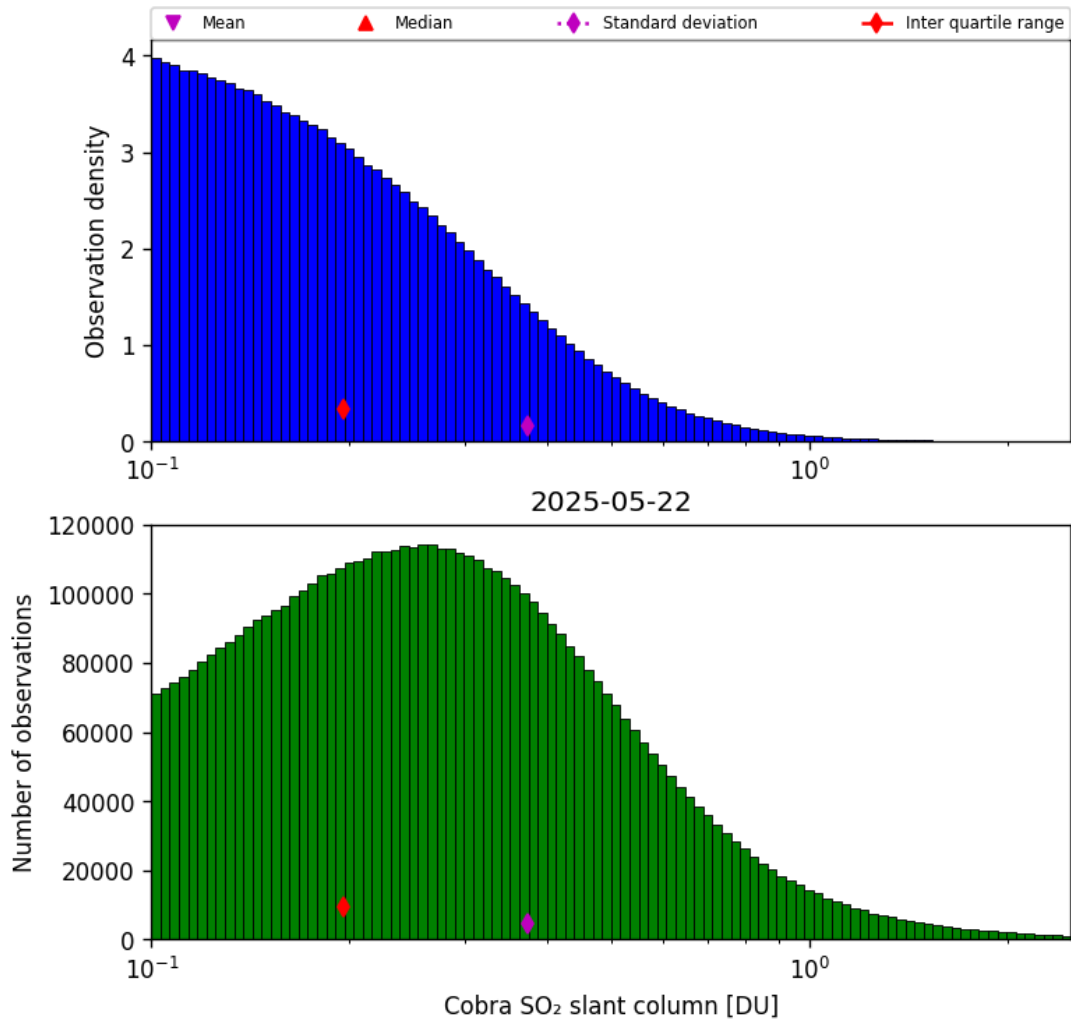


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-05-22 to 2025-05-23

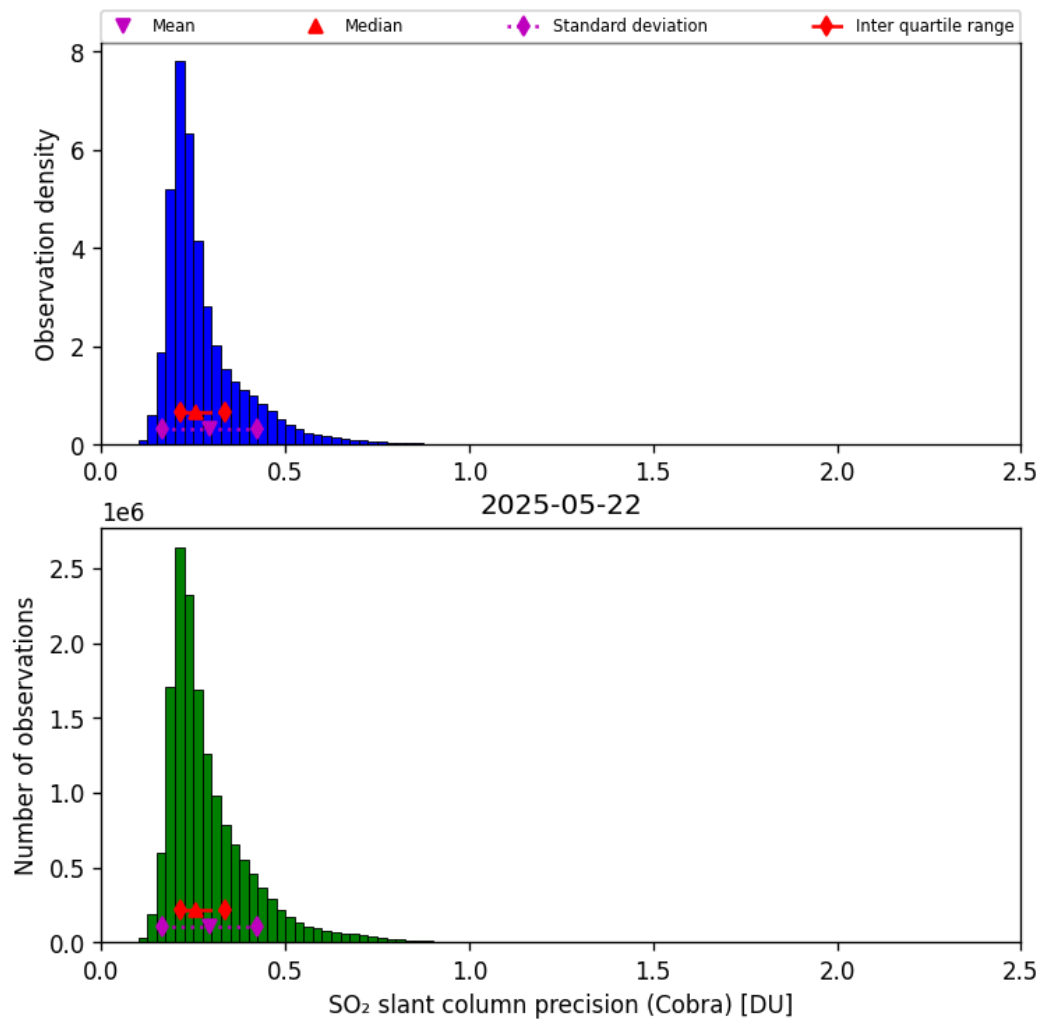


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-05-22 to 2025-05-23

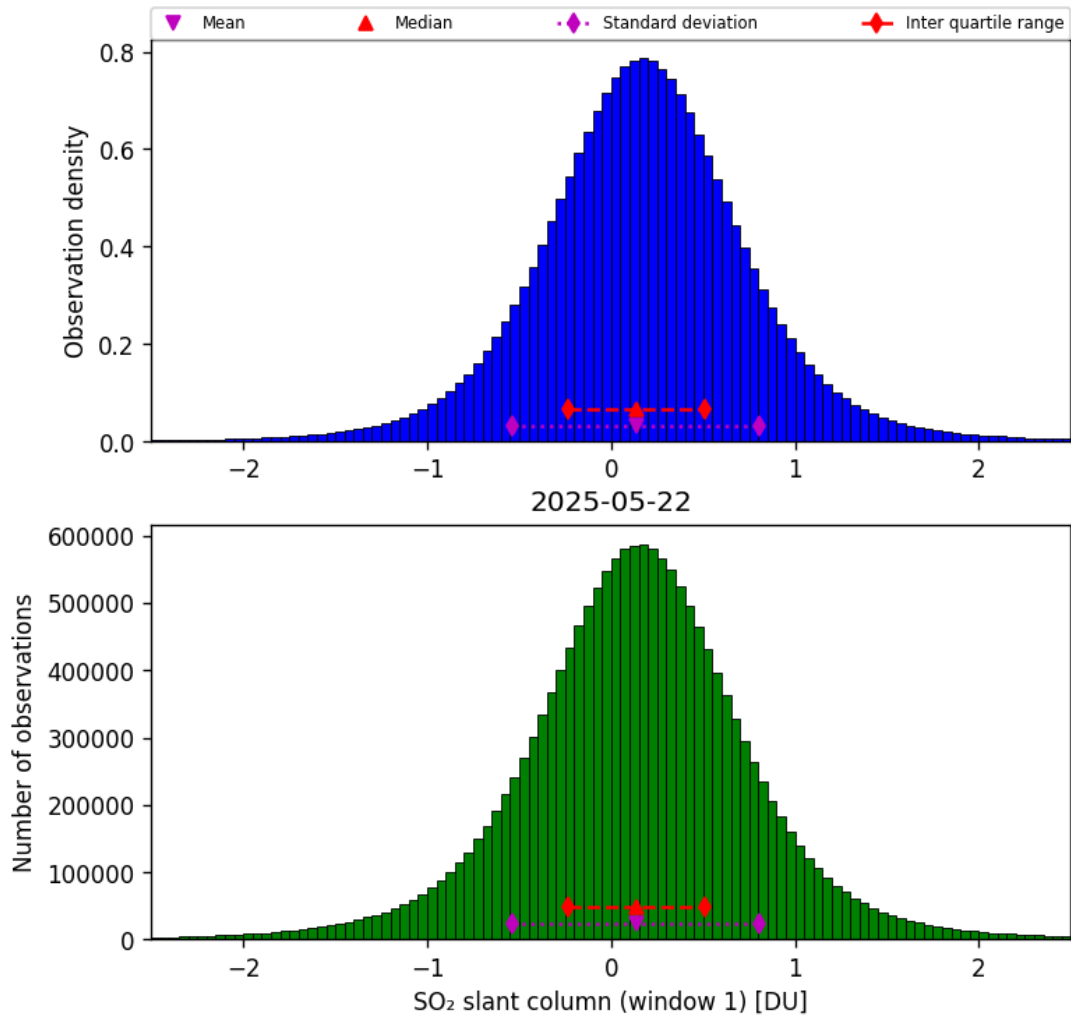


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-05-22 to 2025-05-23

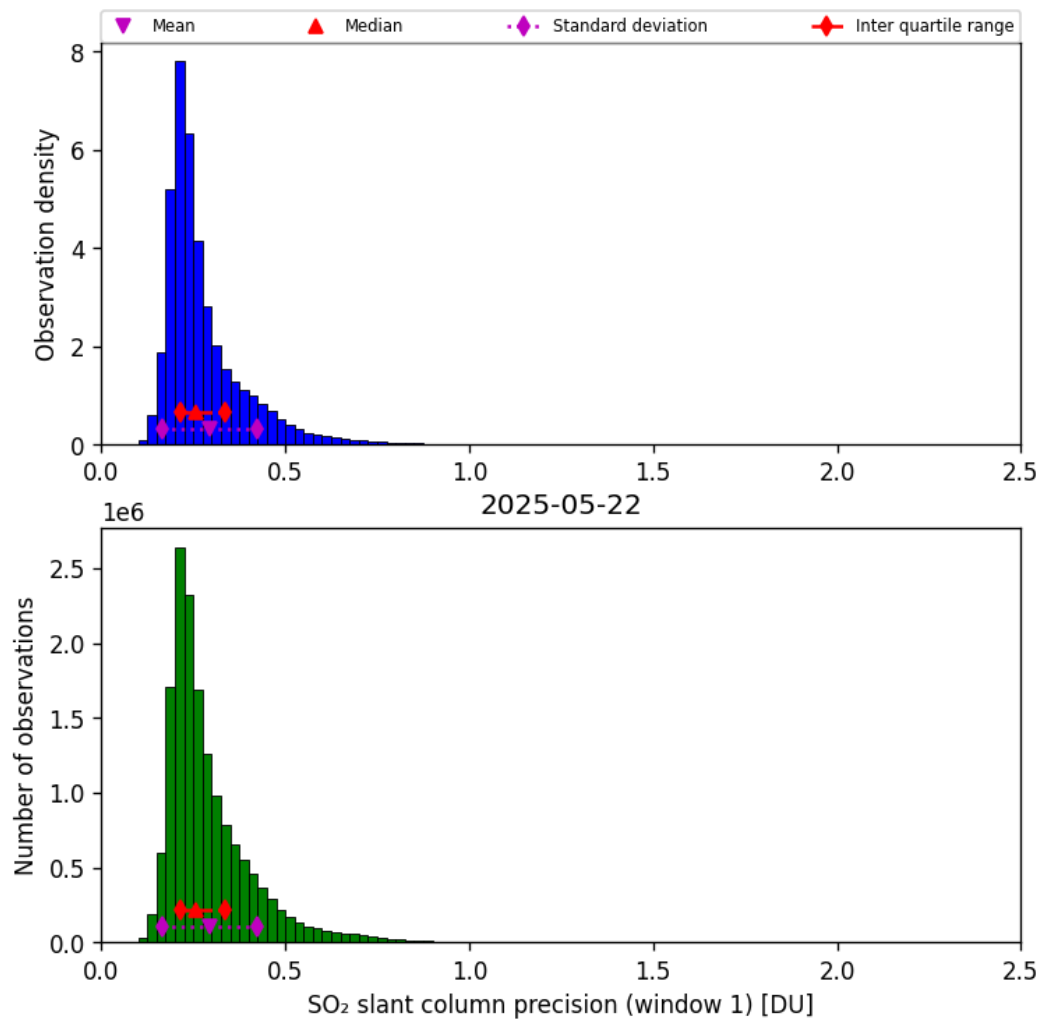


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-05-22 to 2025-05-23

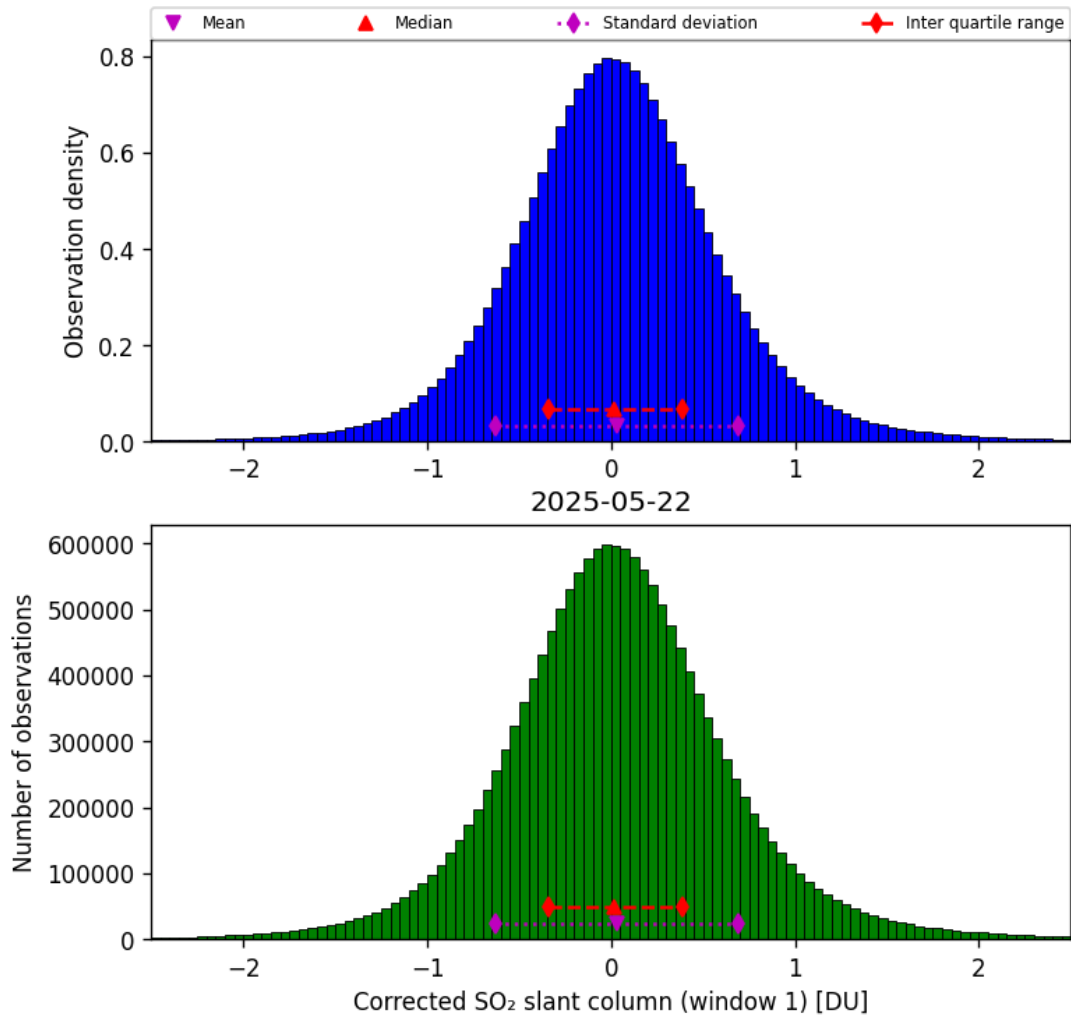


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-05-22 to 2025-05-23

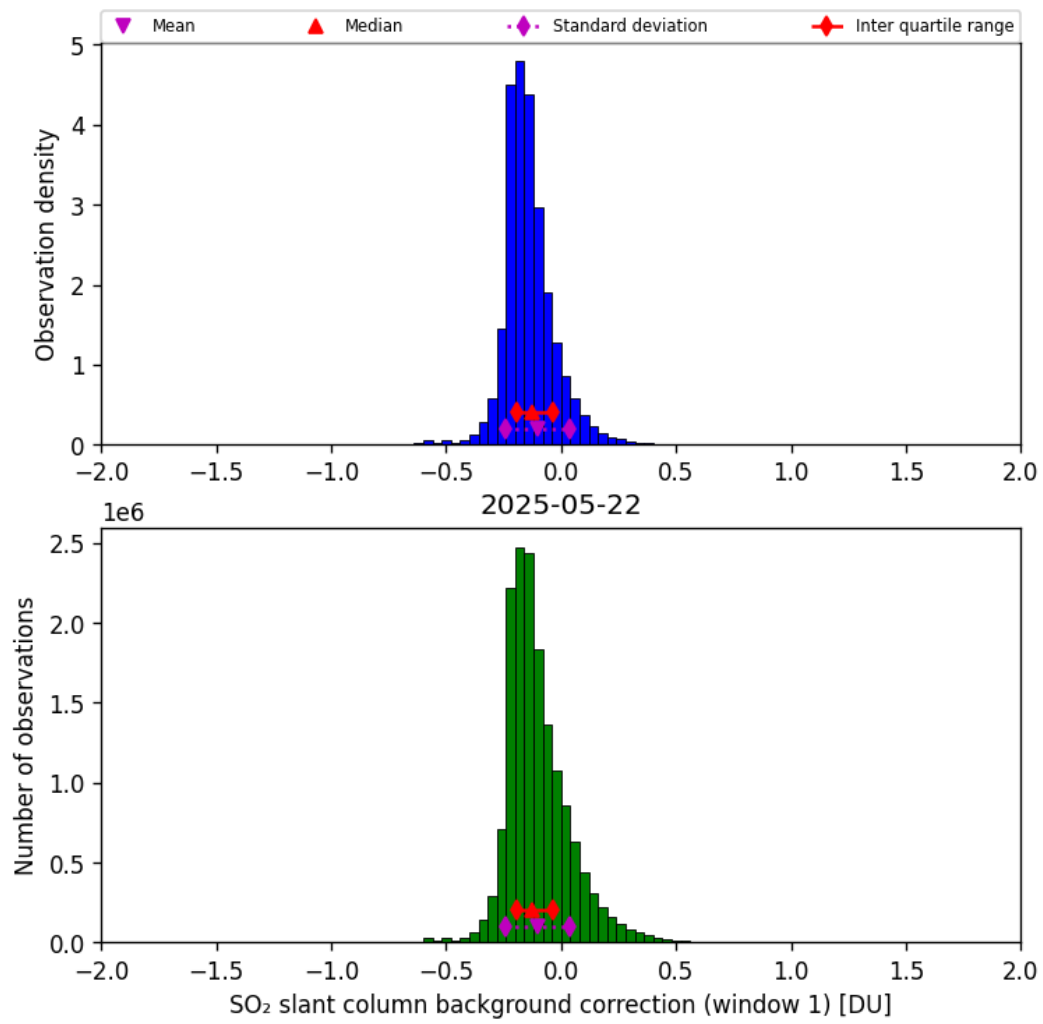


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-05-22 to 2025-05-23

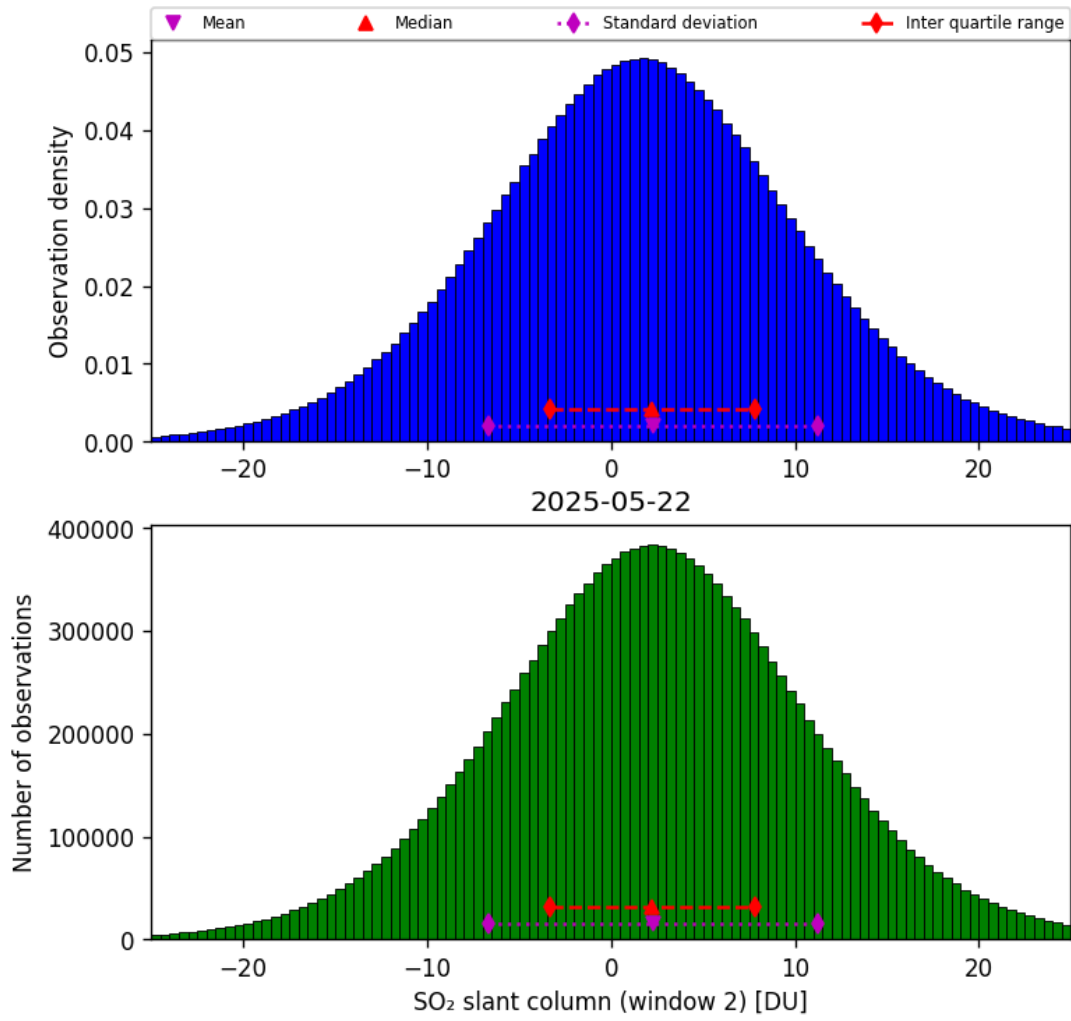


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-05-22 to 2025-05-23

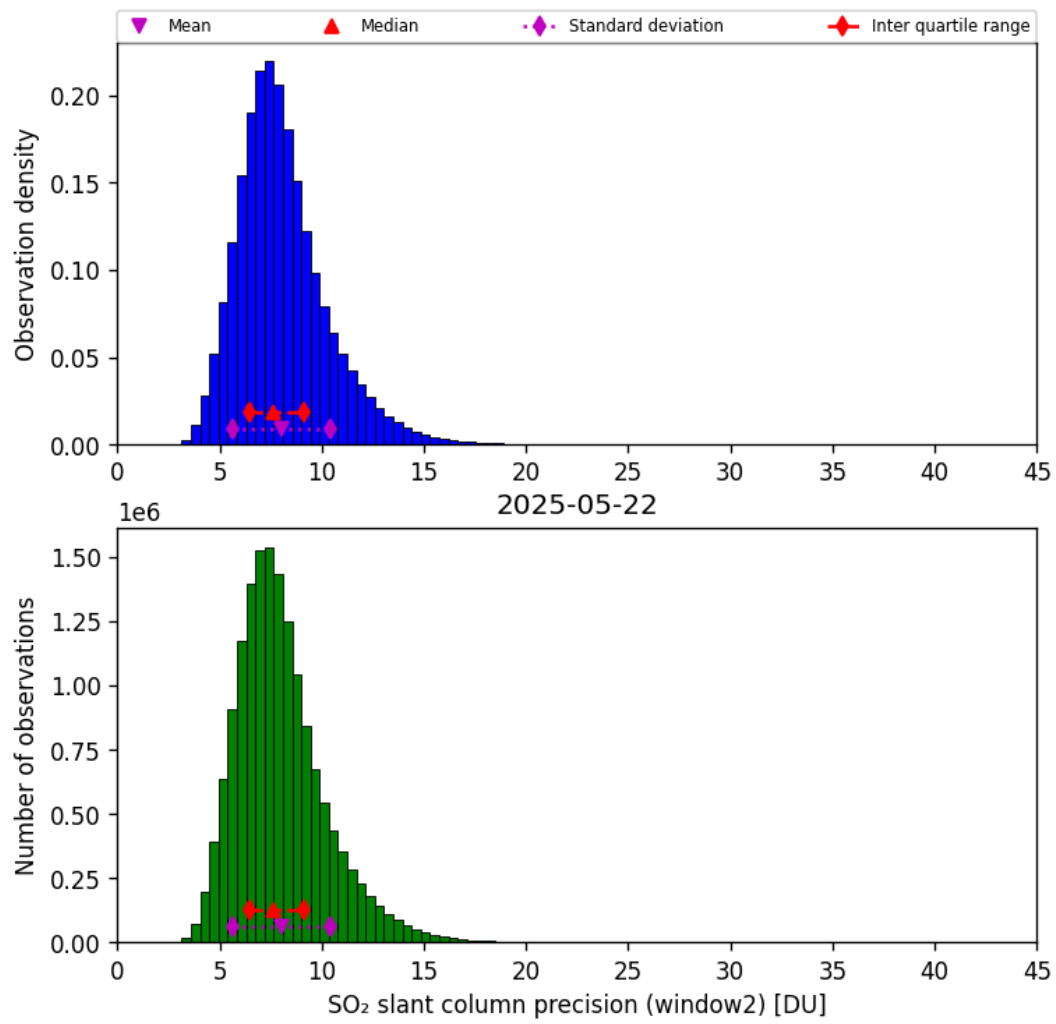


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-05-22 to 2025-05-23

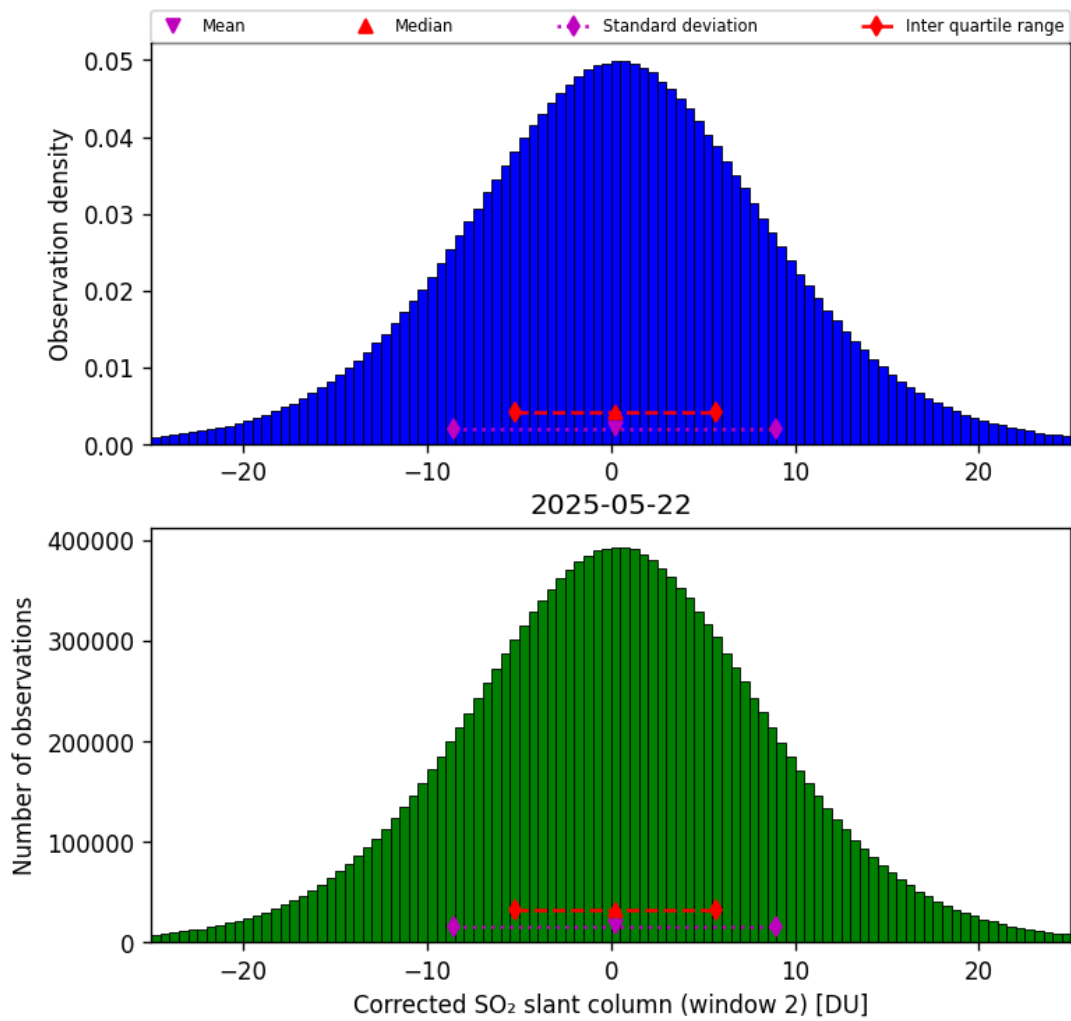


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-05-22 to 2025-05-23

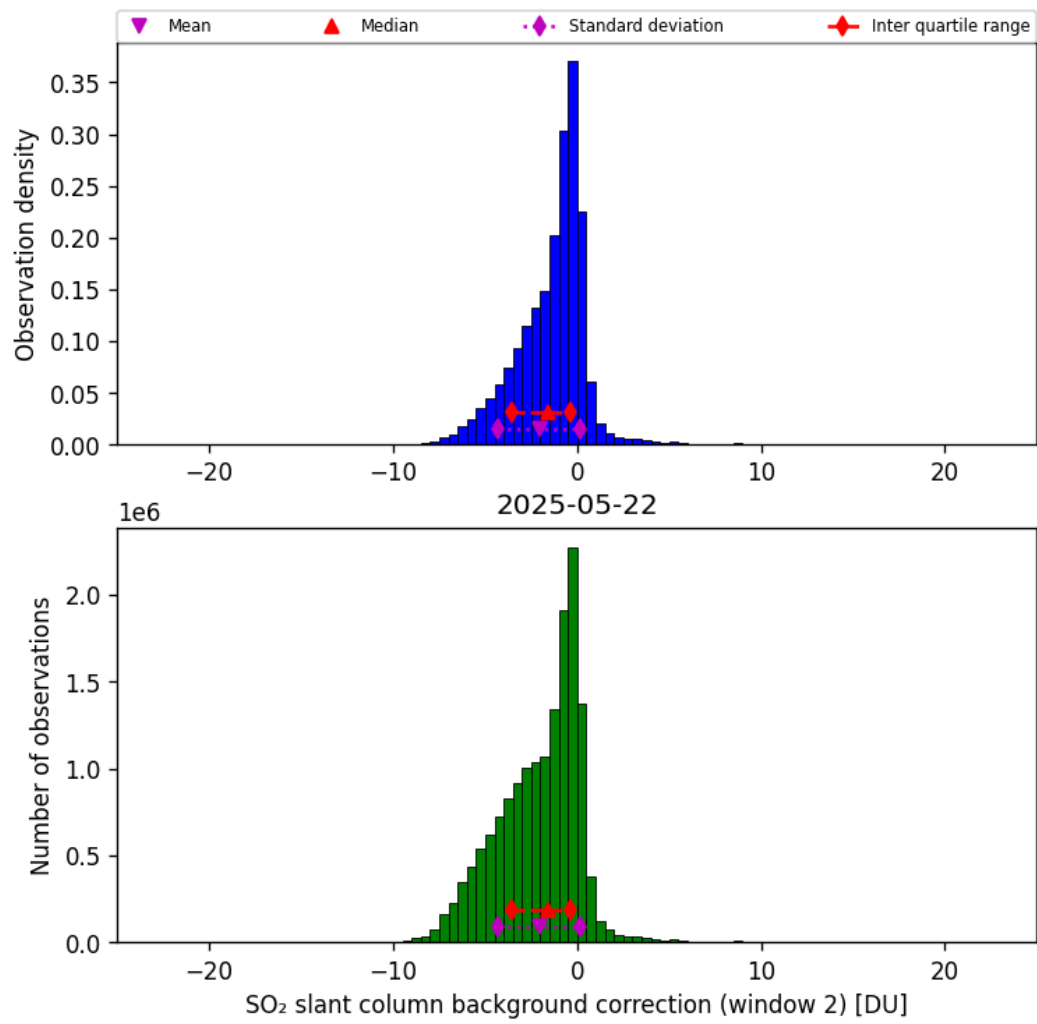


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-05-22 to 2025-05-23

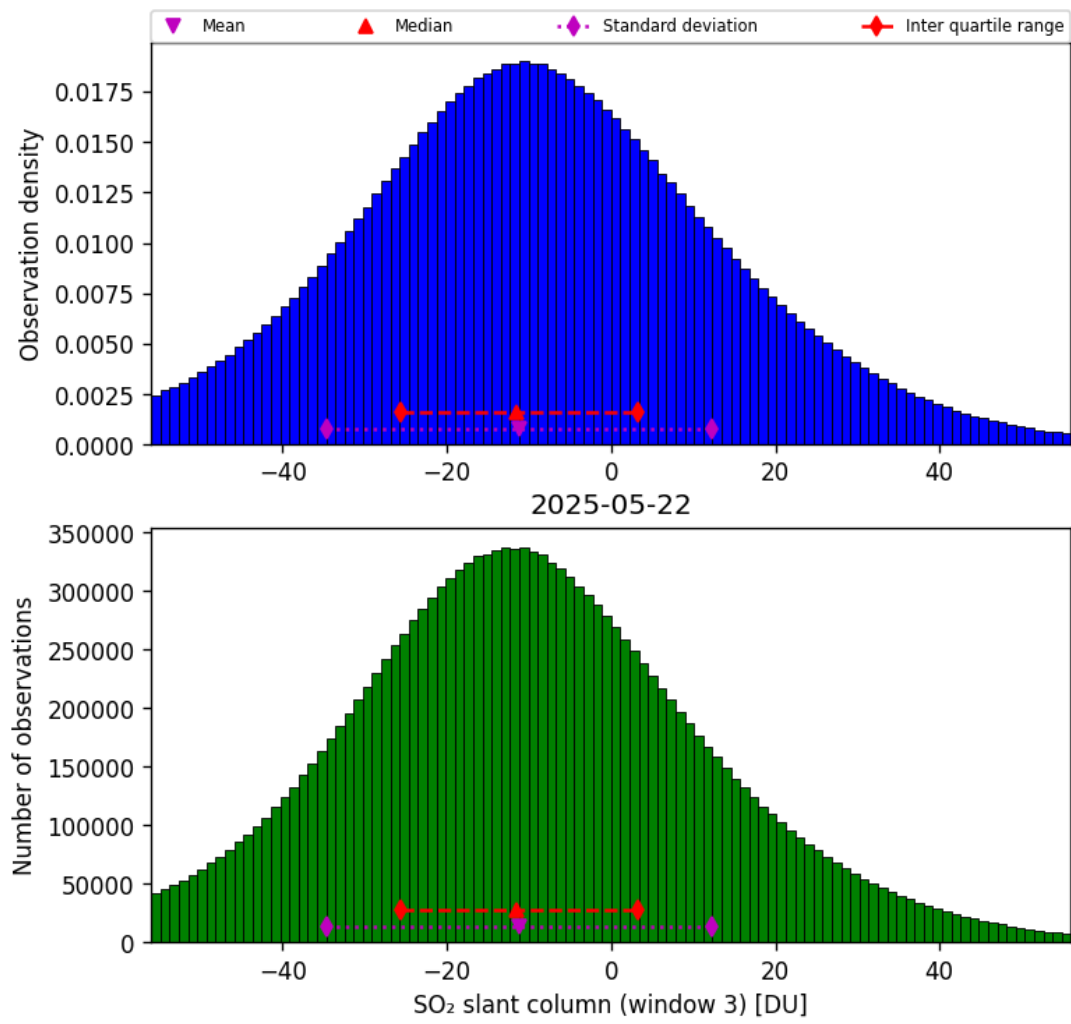


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-05-22 to 2025-05-23

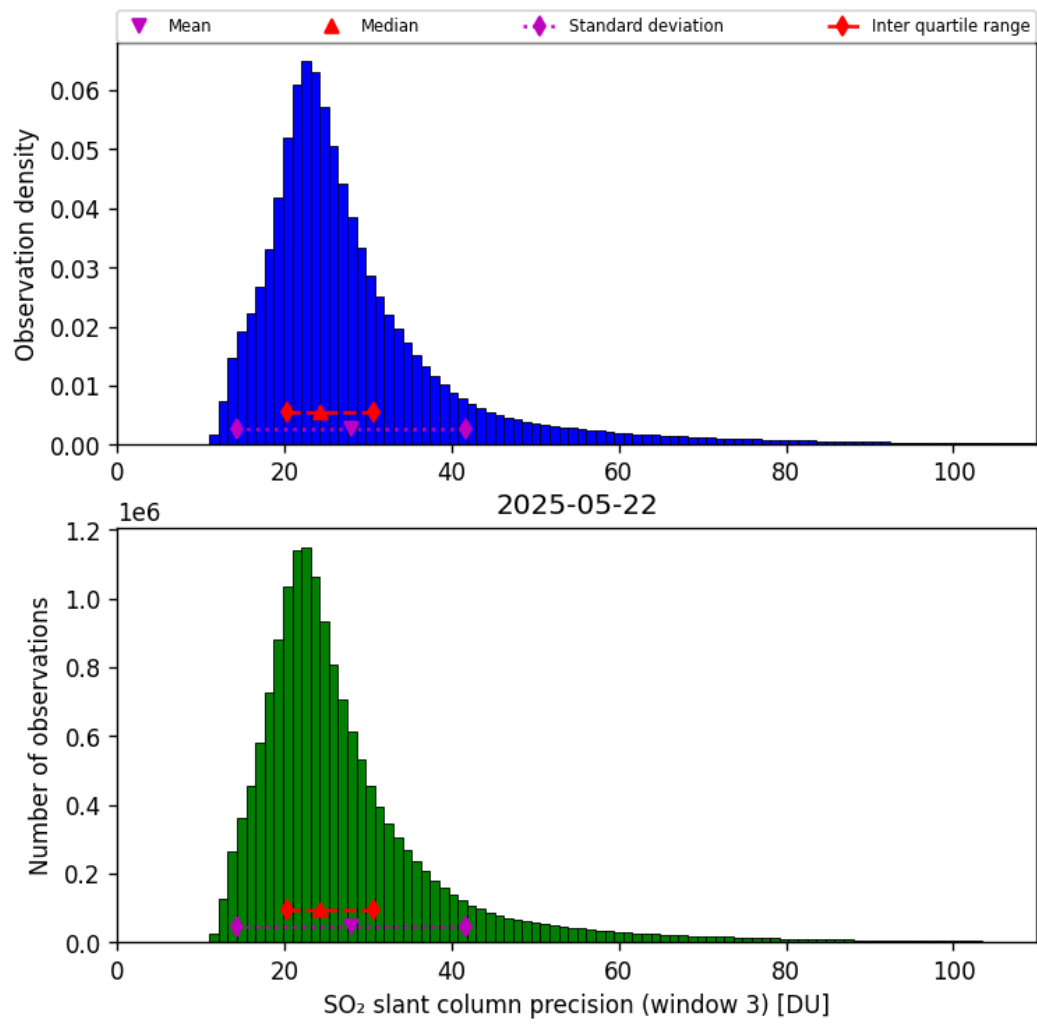


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-05-22 to 2025-05-23

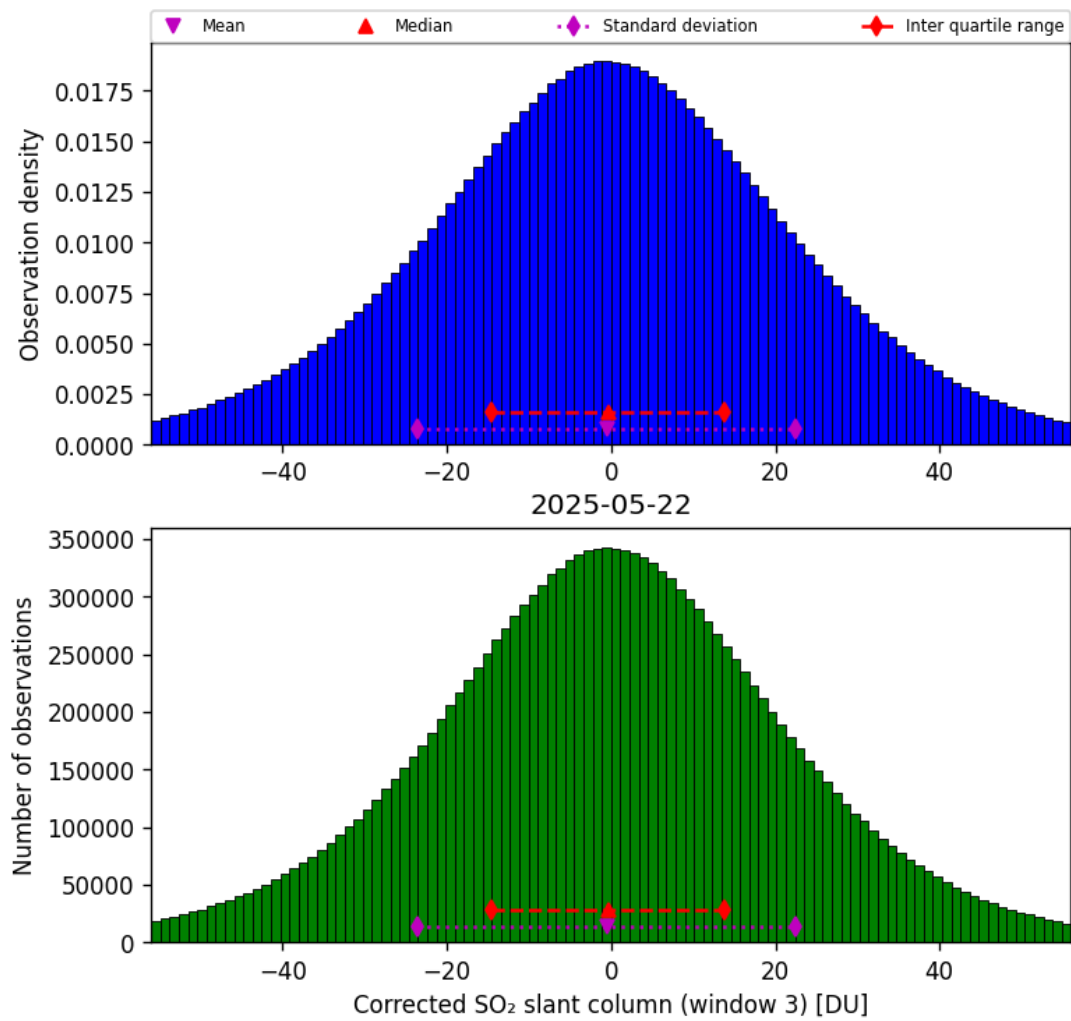


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-05-22 to 2025-05-23

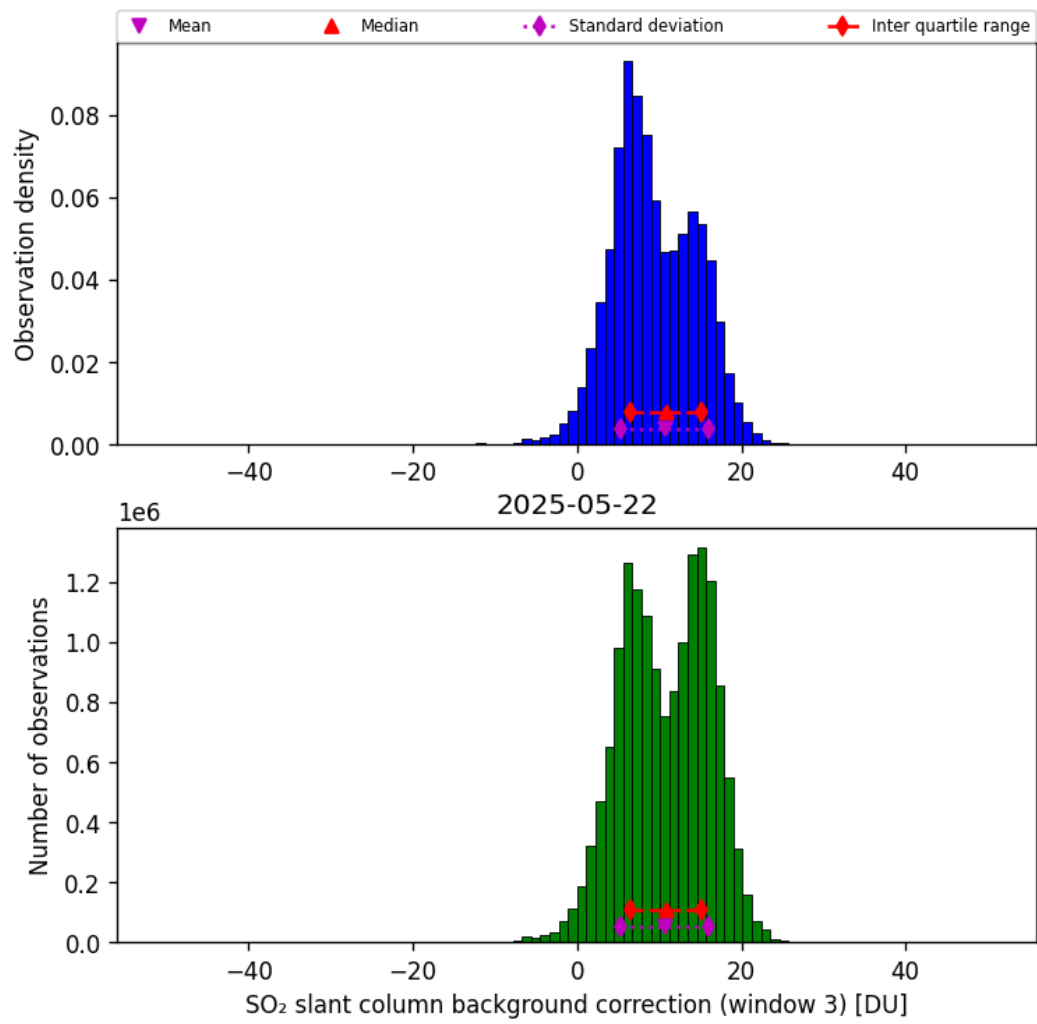


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-05-22 to 2025-05-23

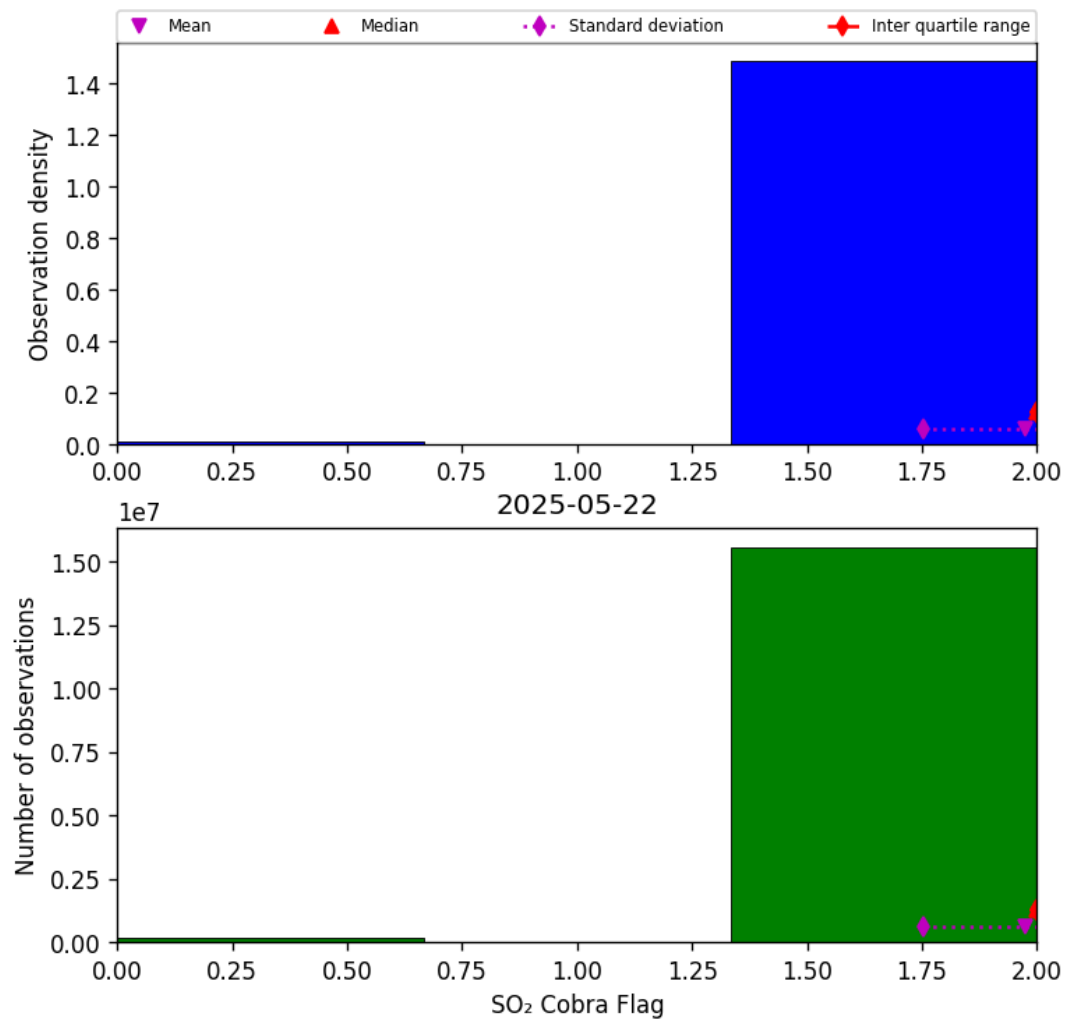


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-05-22 to 2025-05-23

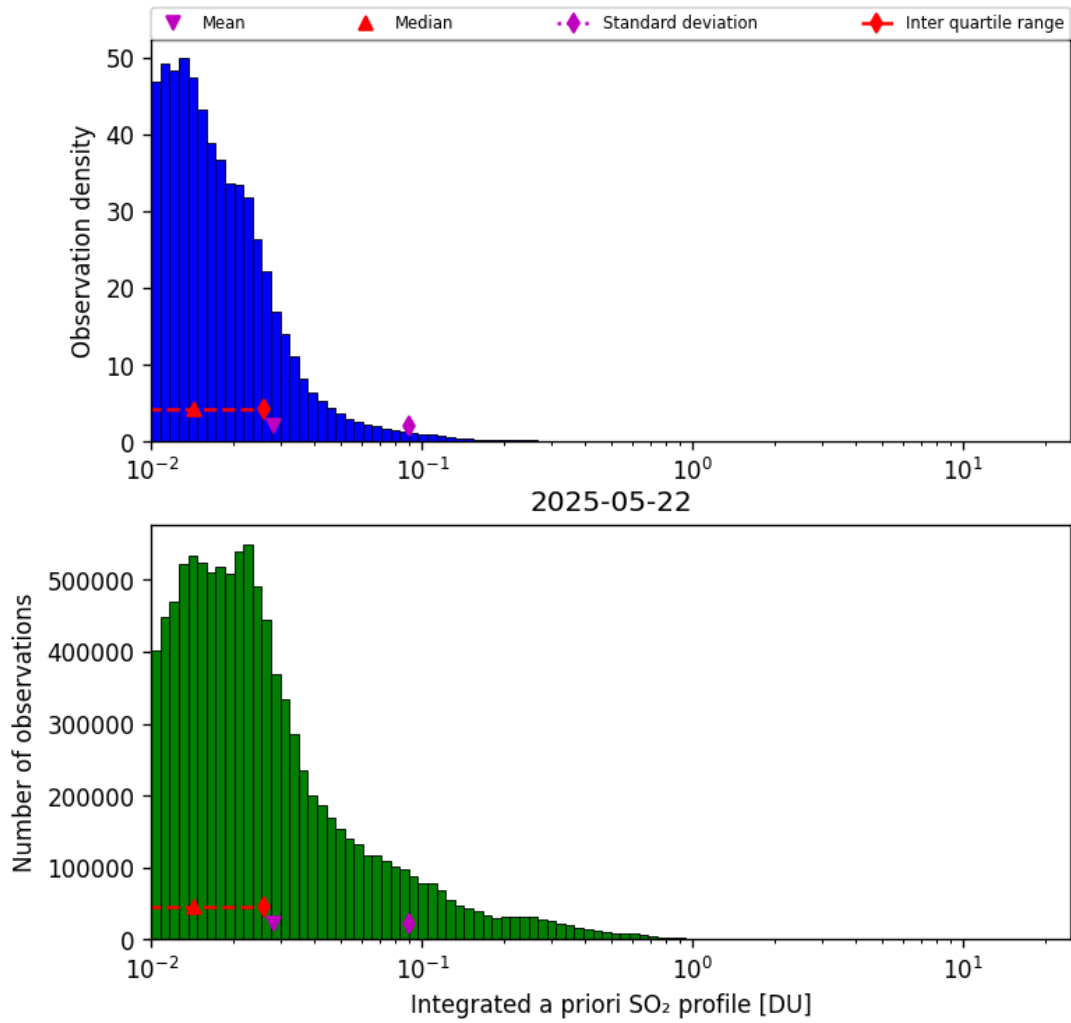


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-05-22 to 2025-05-23

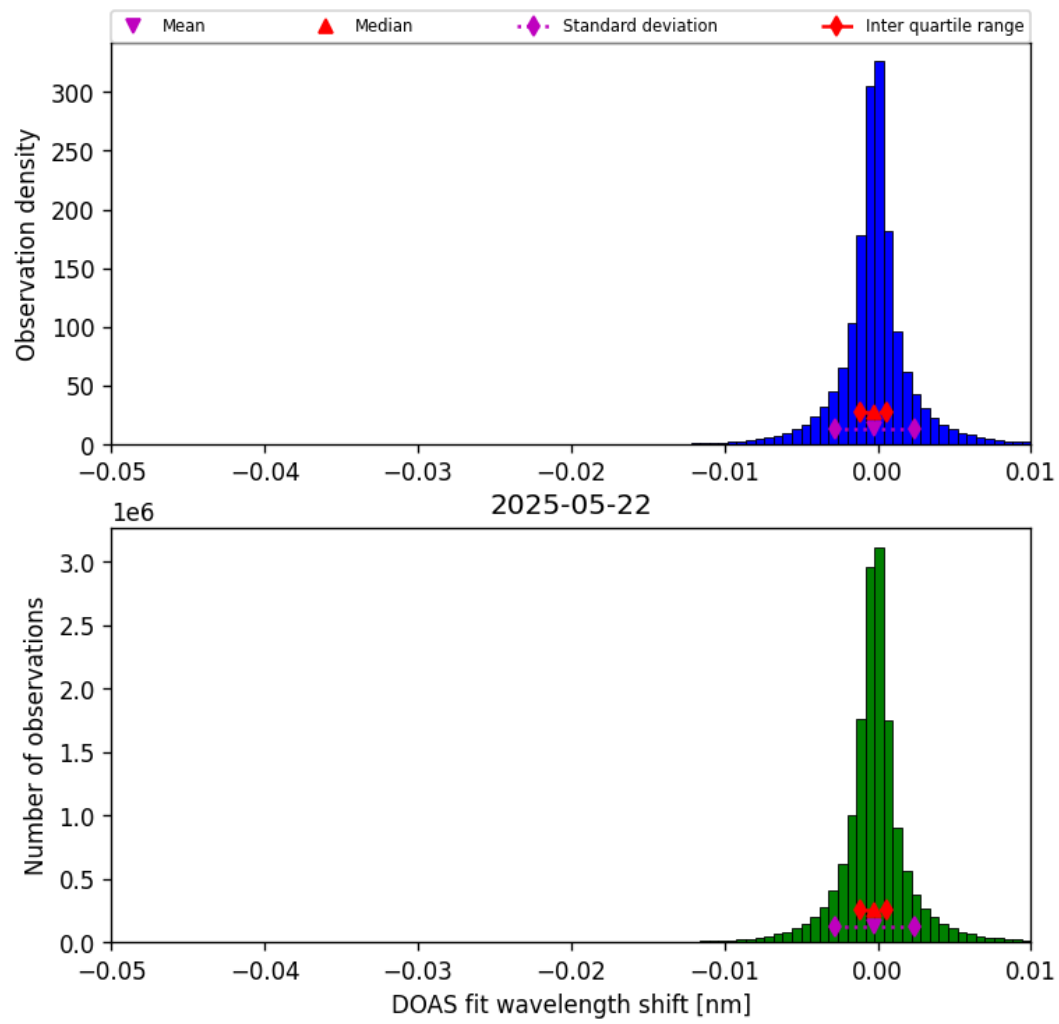


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-05-22 to 2025-05-23

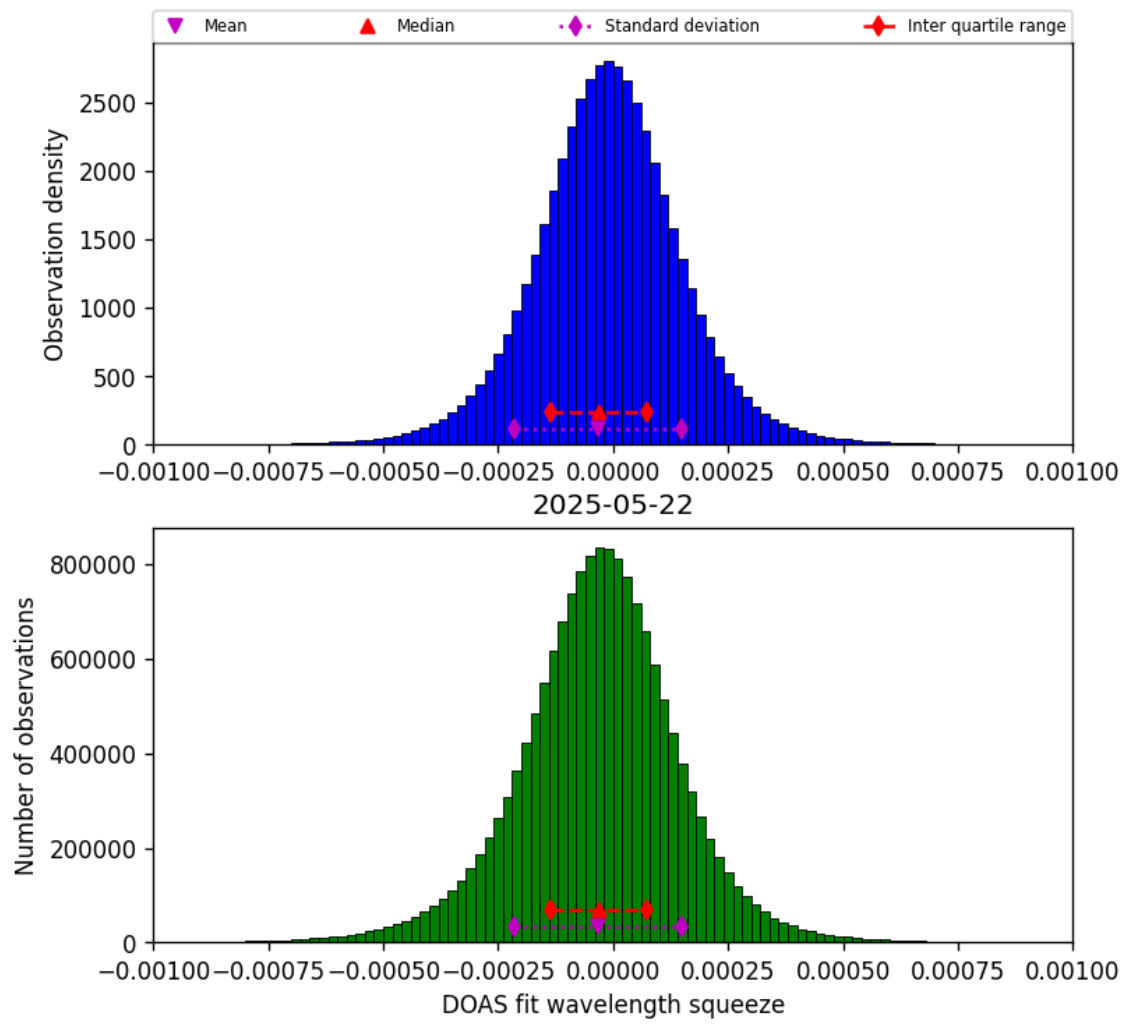


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-05-22 to 2025-05-23

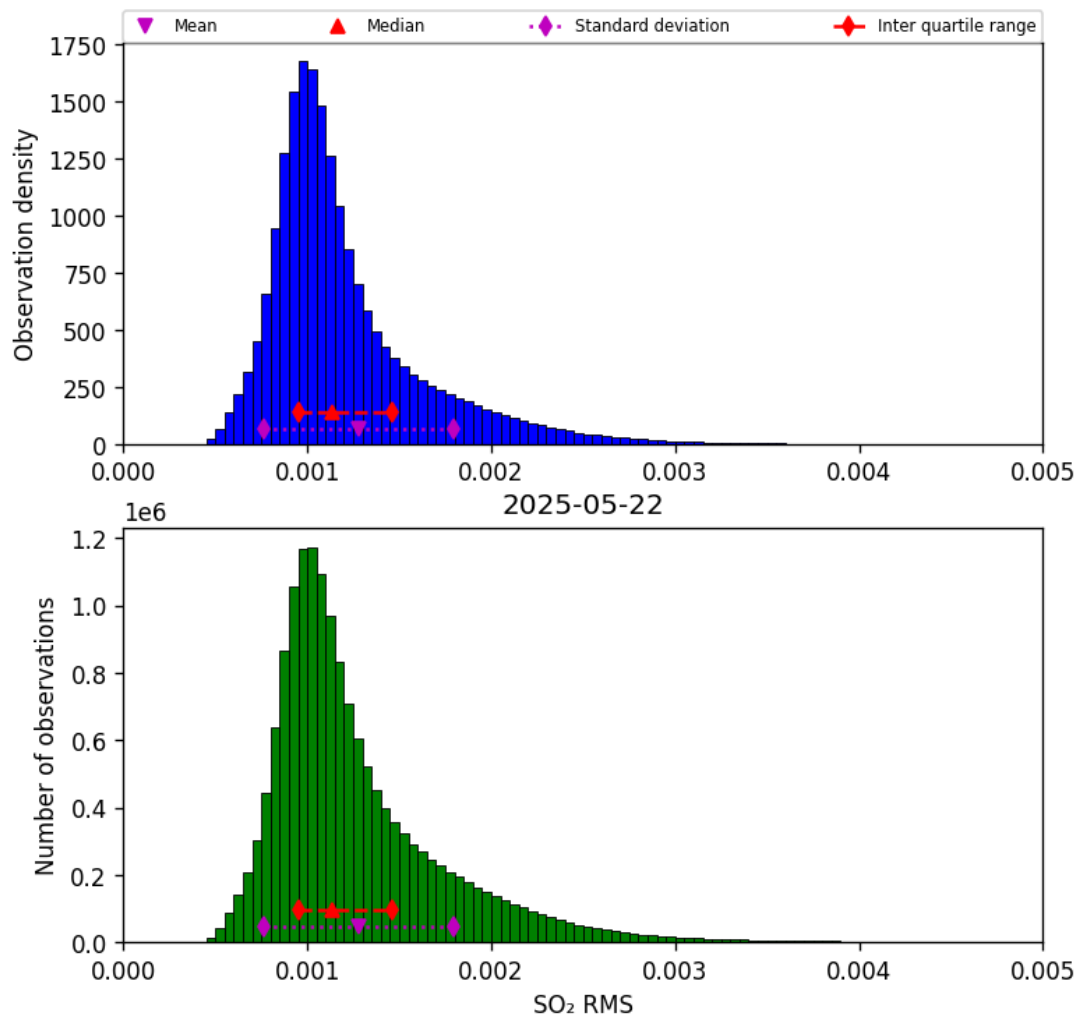


Figure 79: Histogram of “SO₂ RMS” for 2025-05-22 to 2025-05-23

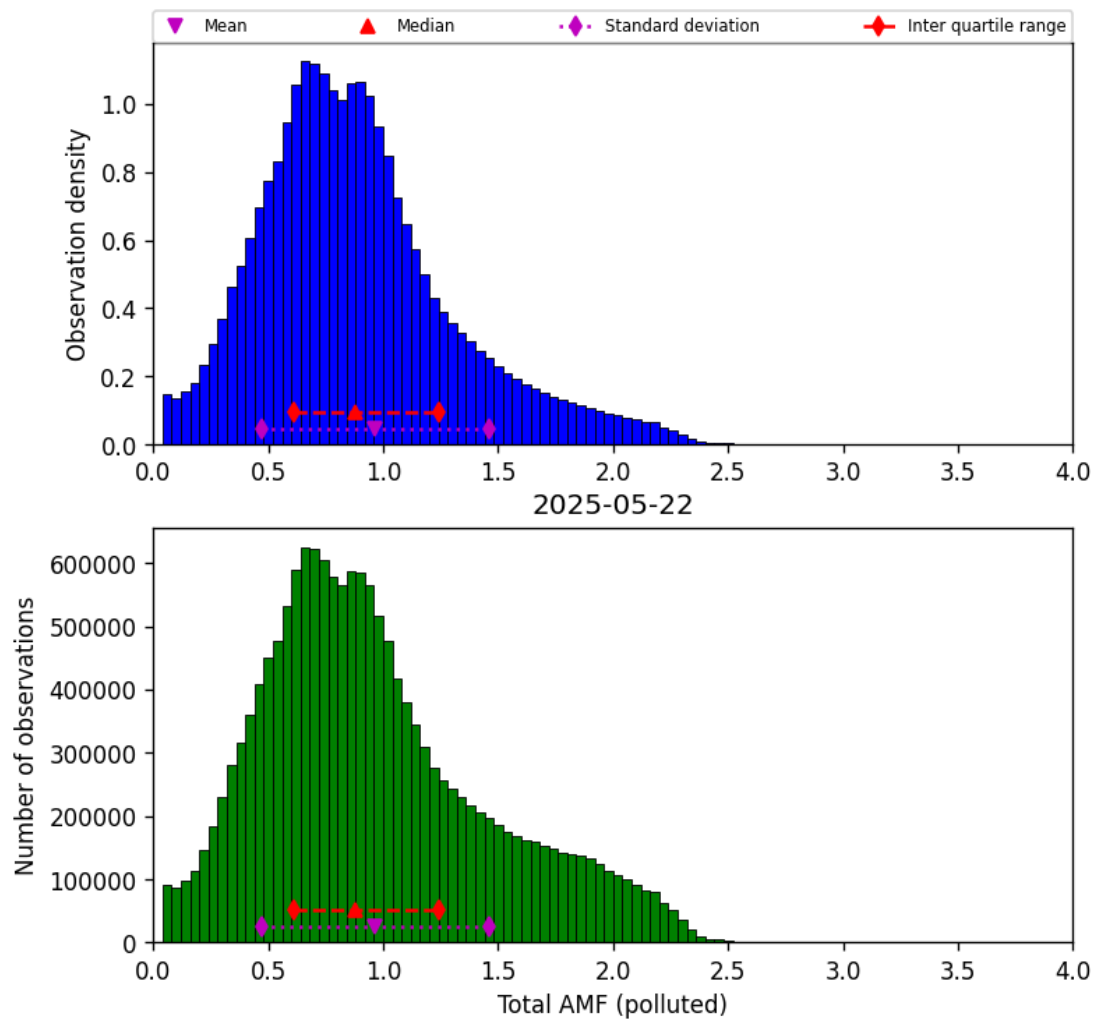


Figure 80: Histogram of “Total AMF (polluted)” for 2025-05-22 to 2025-05-23

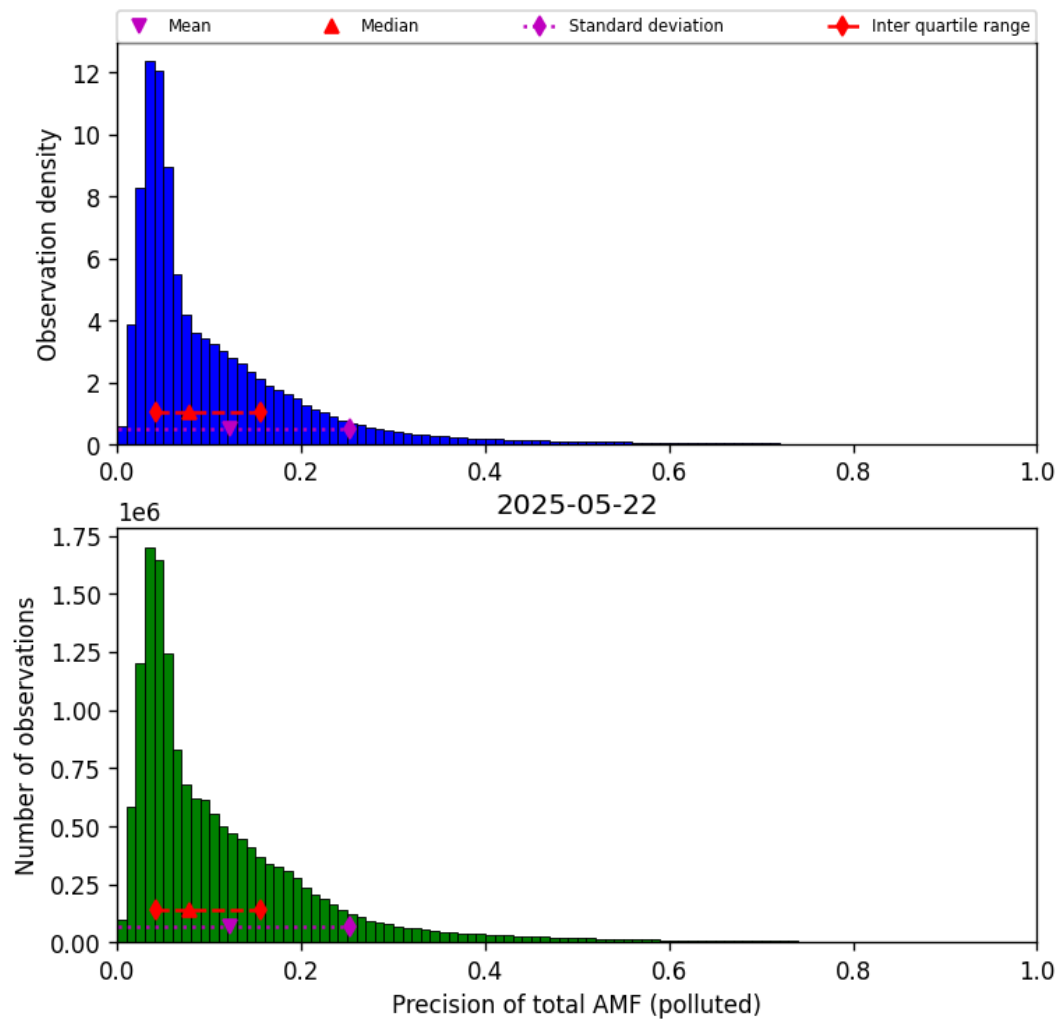


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-05-22 to 2025-05-23

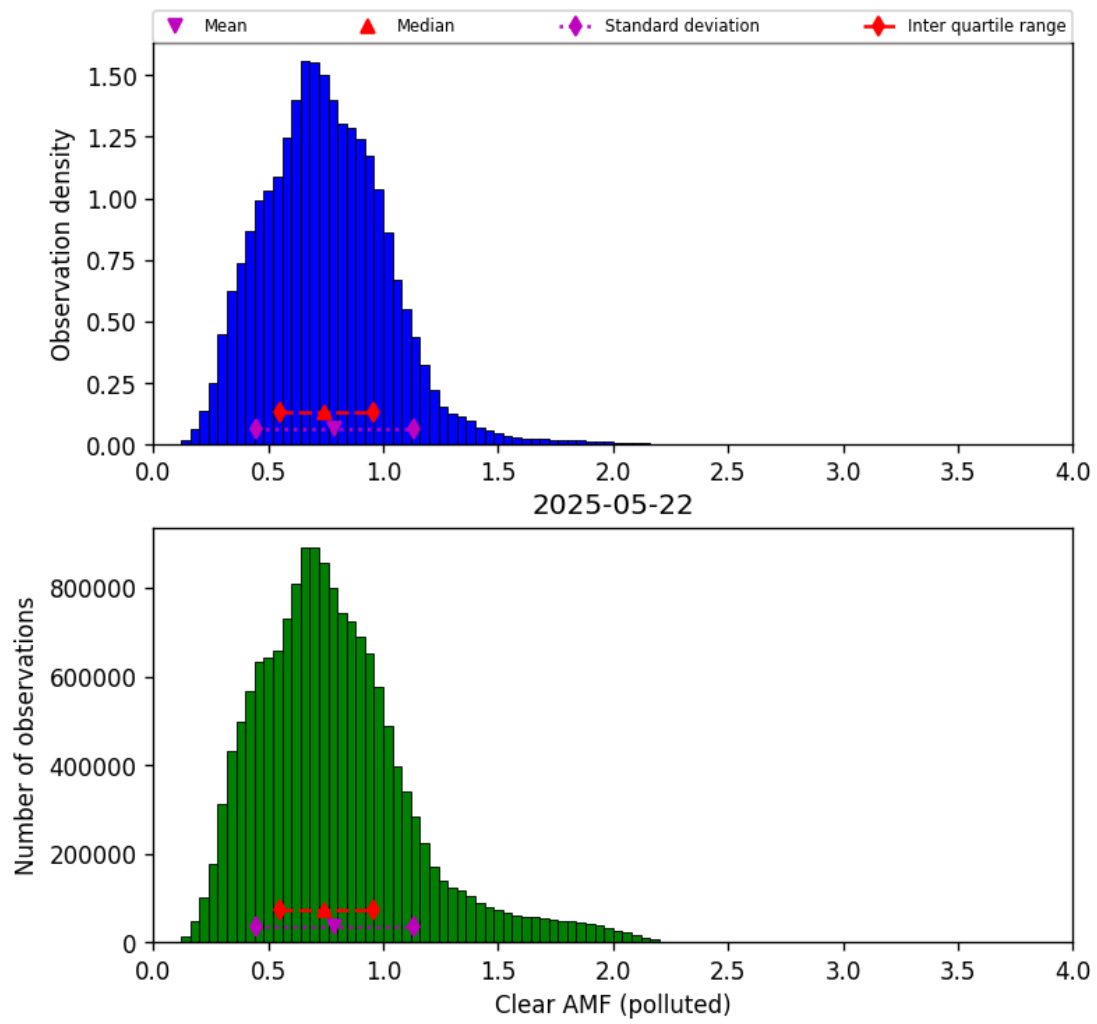


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-05-22 to 2025-05-23

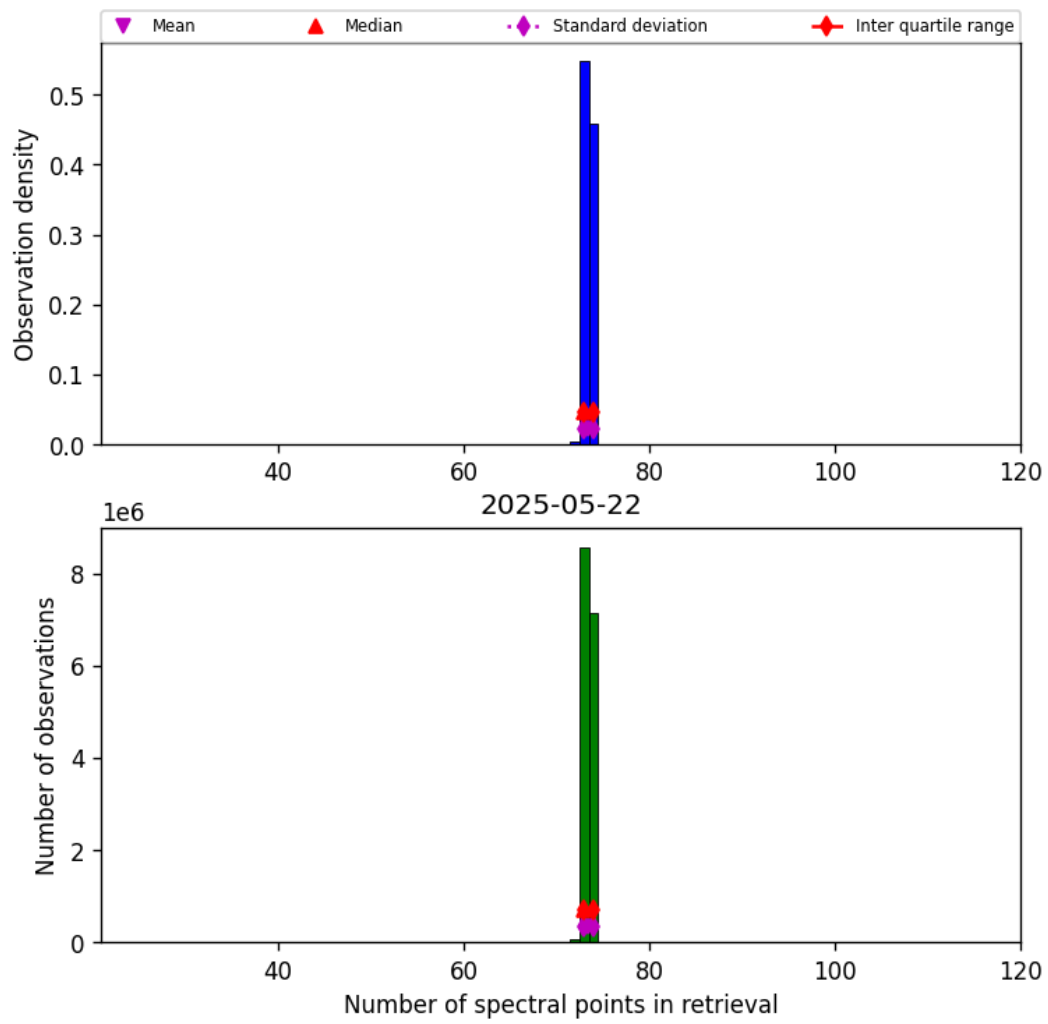


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-05-22 to 2025-05-23

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.

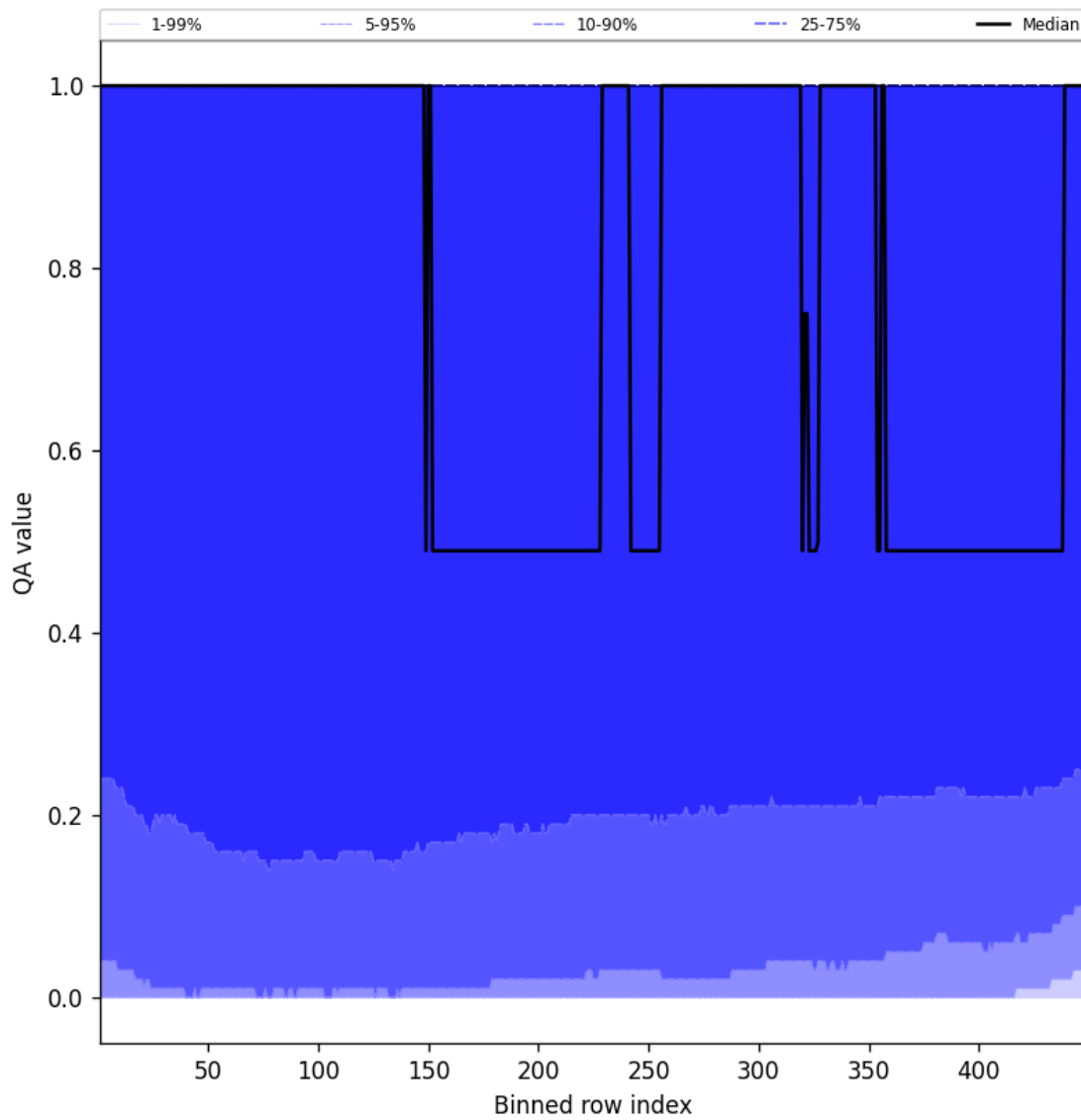


Figure 84: Along track statistics of “QA value” for 2025-05-22 to 2025-05-23

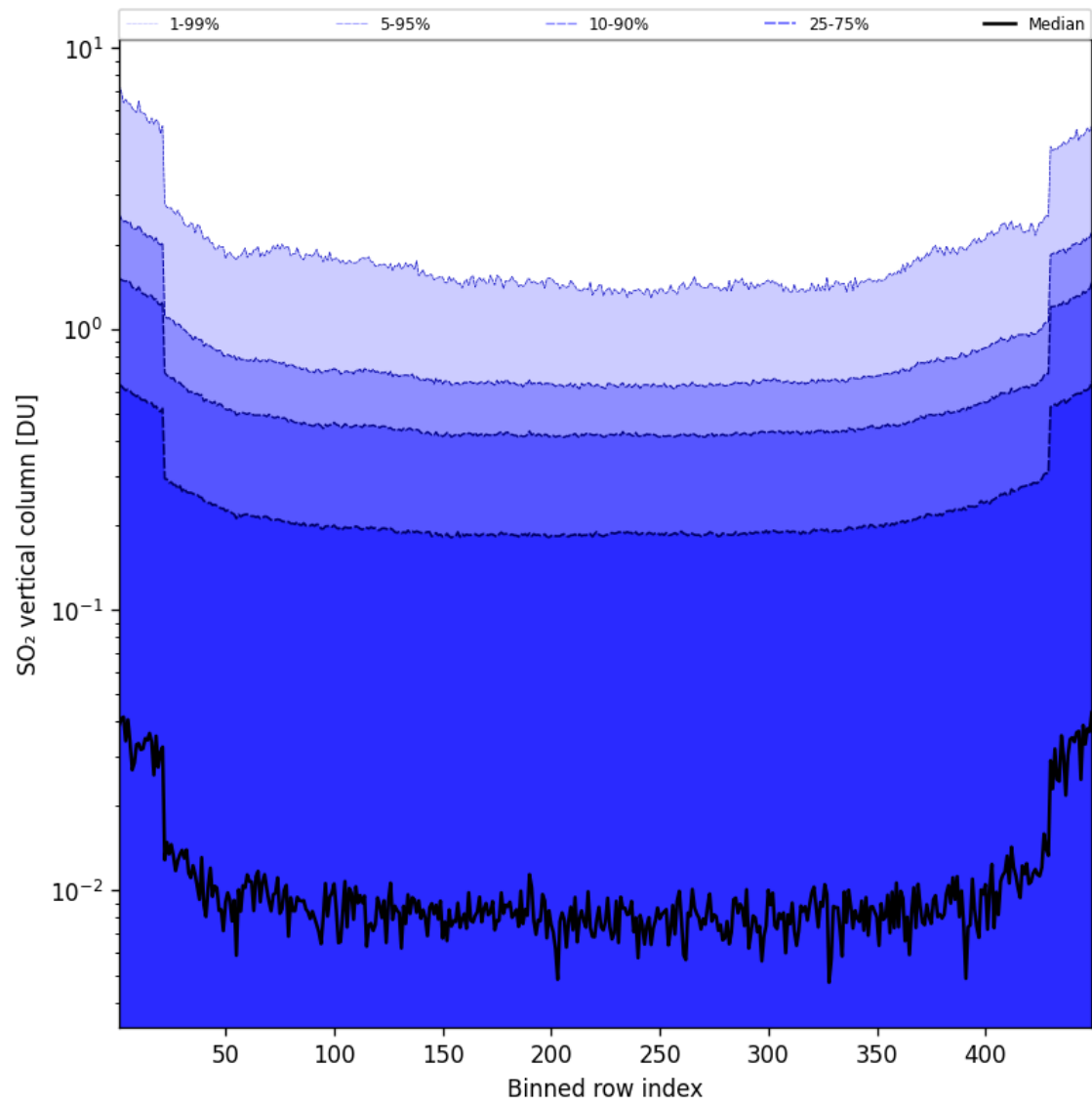


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-05-22 to 2025-05-23

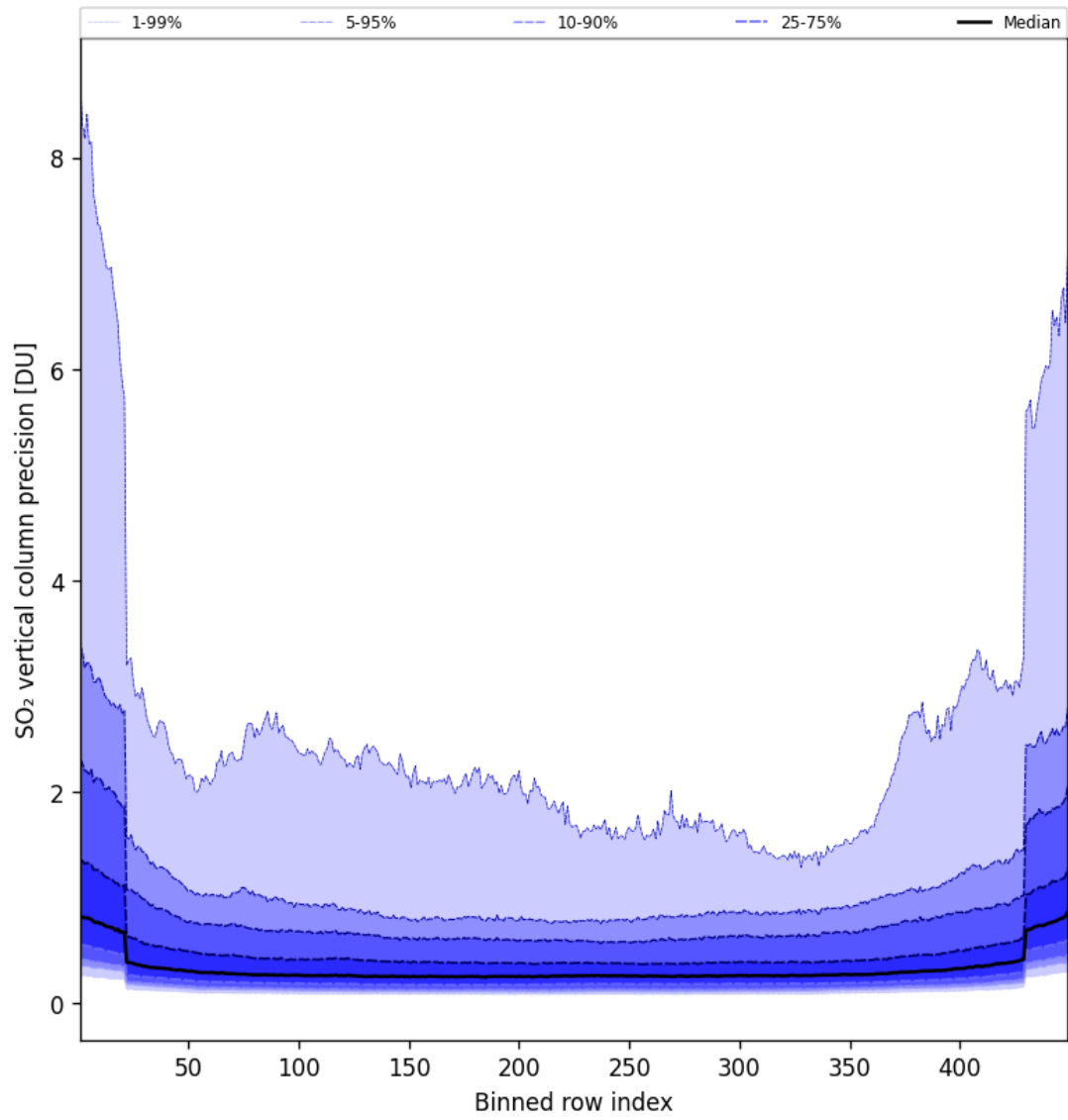


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-05-22 to 2025-05-23

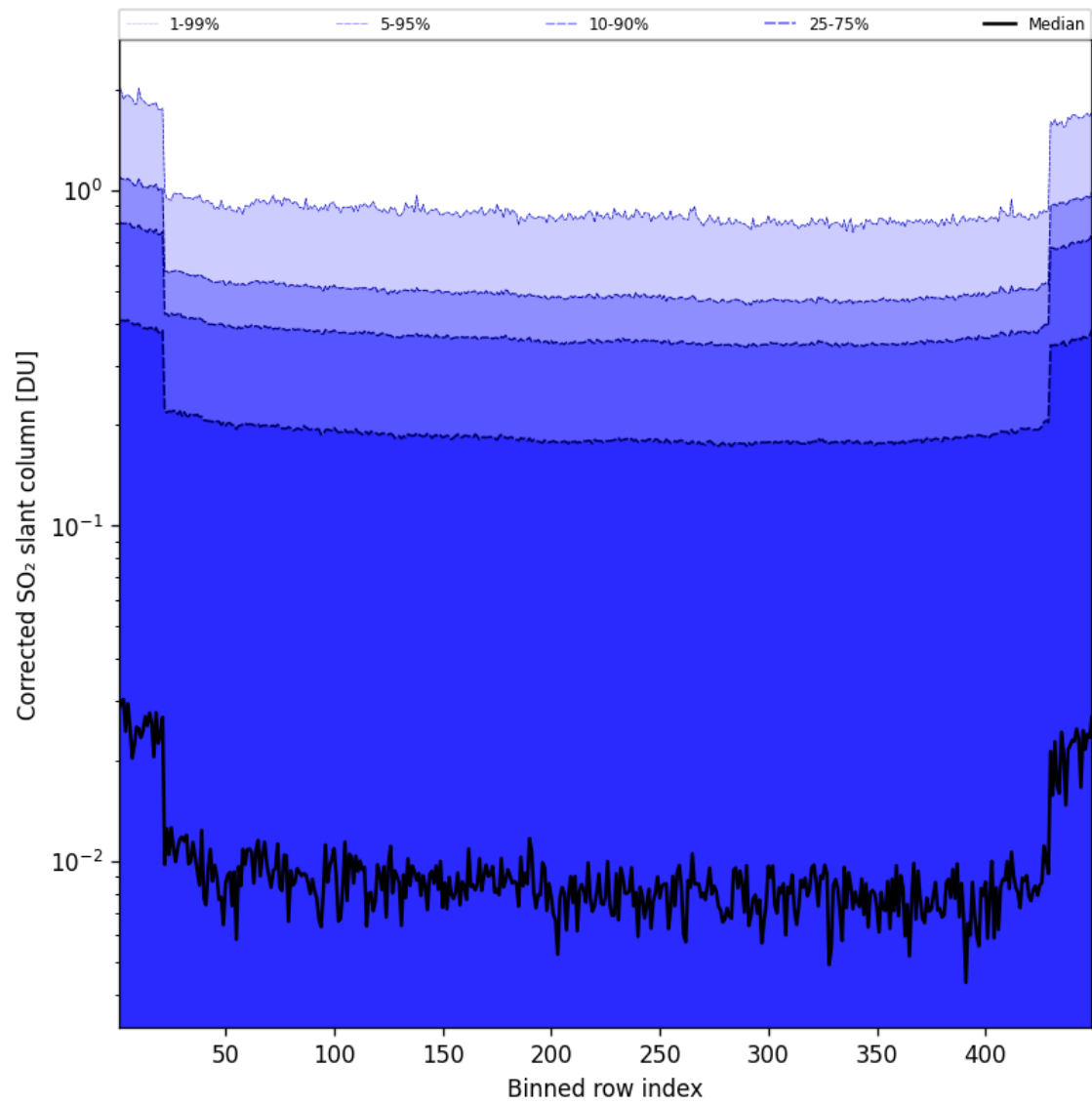


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-05-22 to 2025-05-23

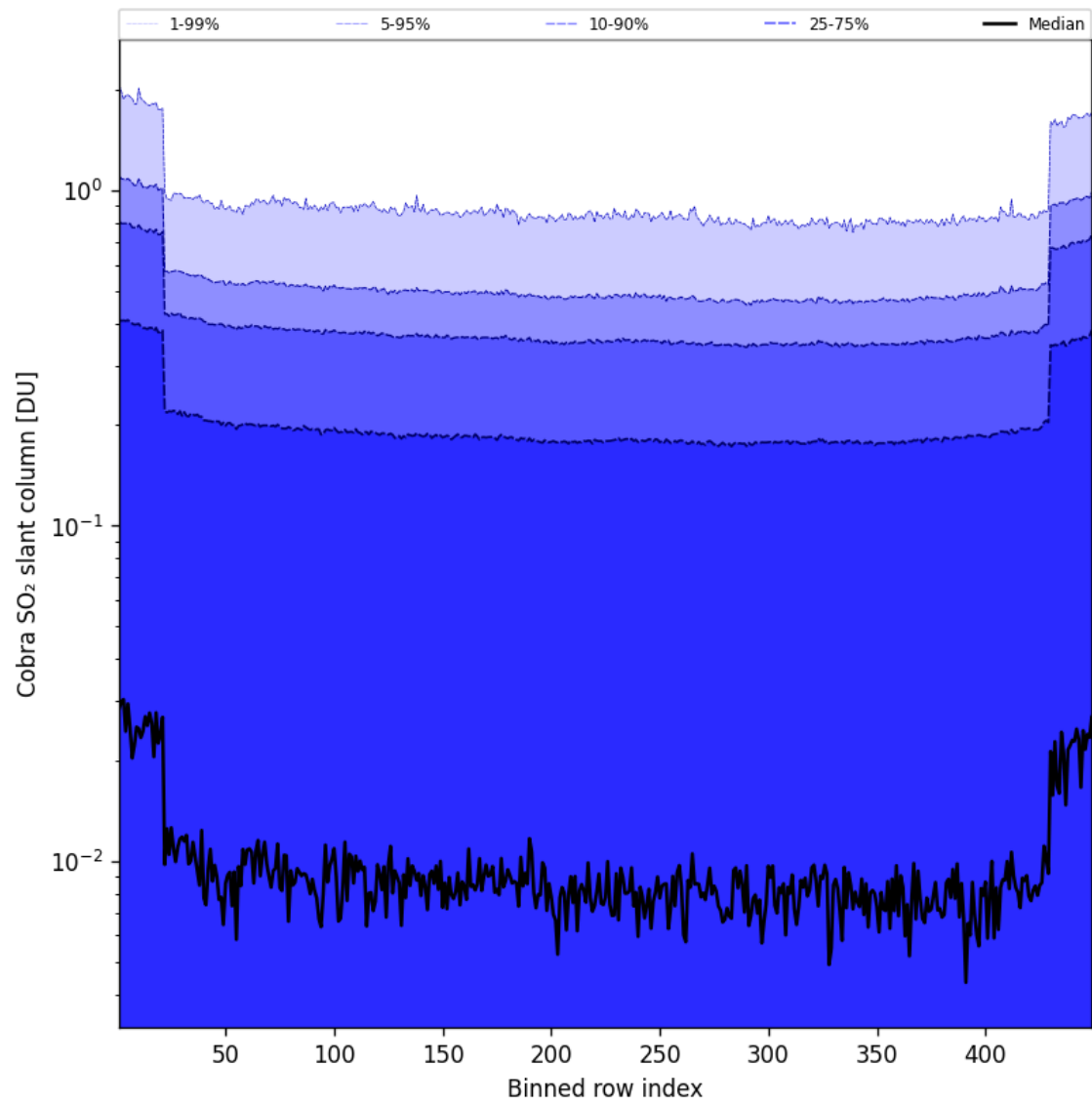


Figure 88: Along track statistics of "Cobra SO₂ slant column" for 2025-05-22 to 2025-05-23

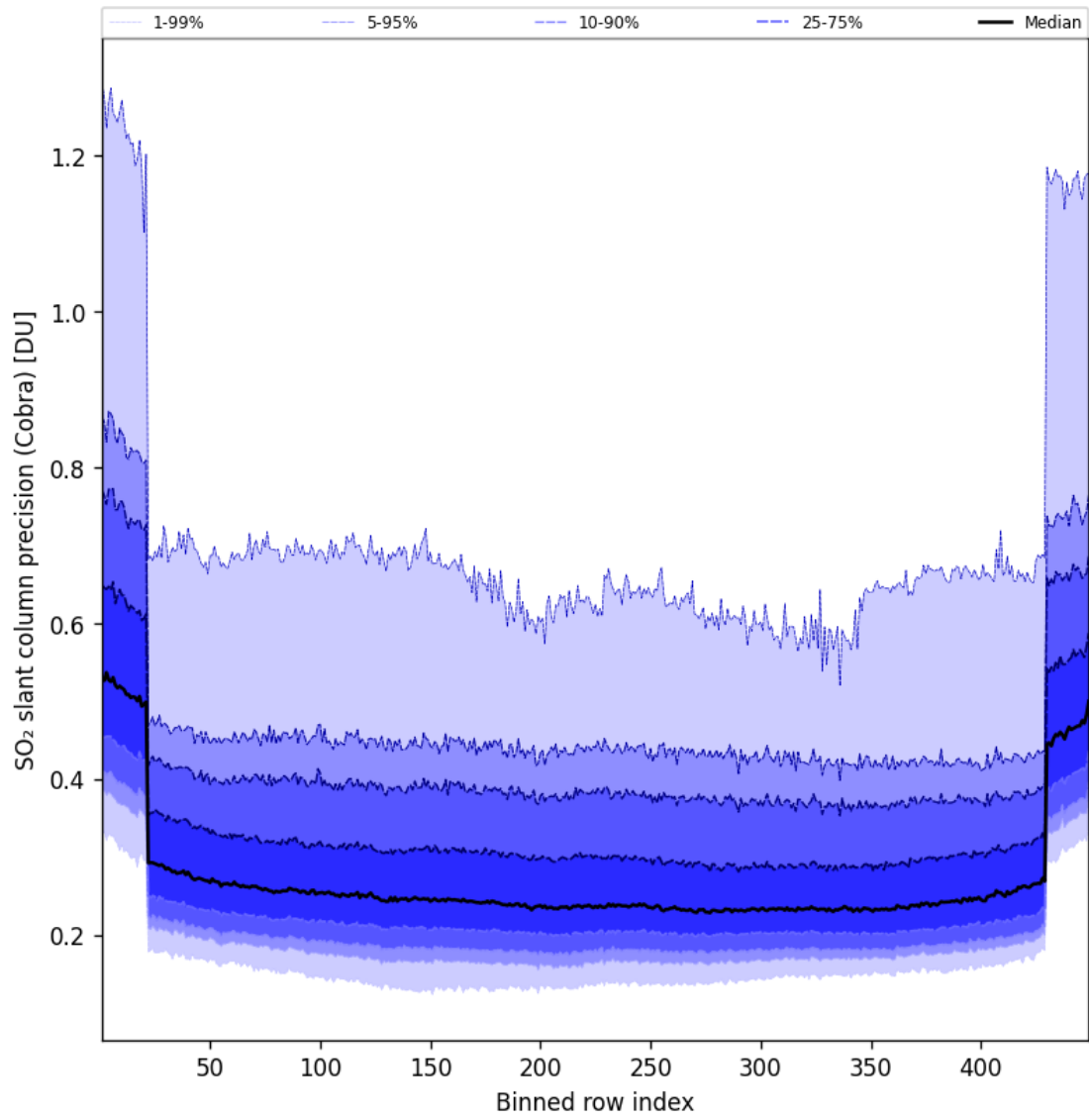


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-05-22 to 2025-05-23

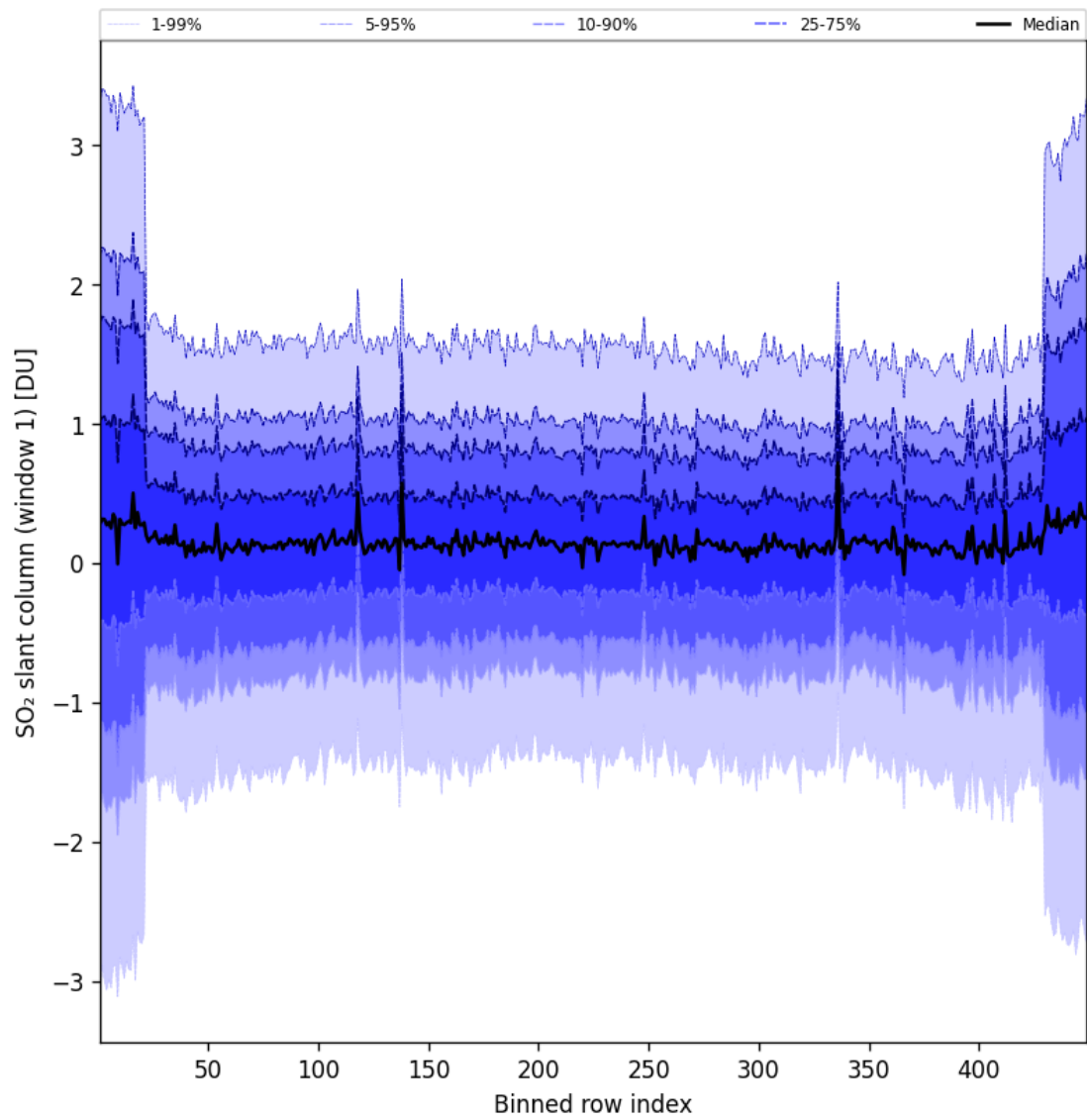


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-05-22 to 2025-05-23

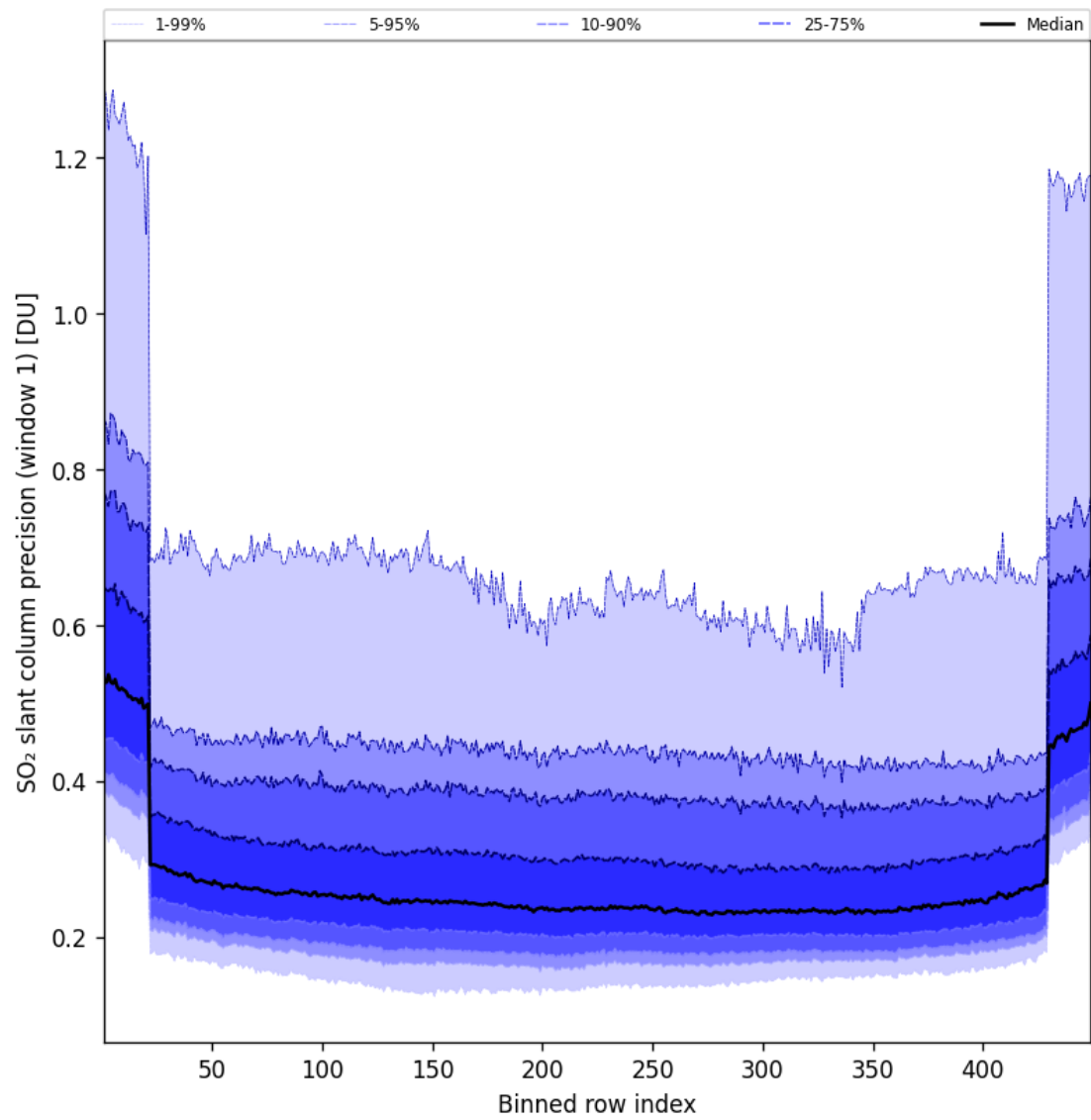


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-05-22 to 2025-05-23

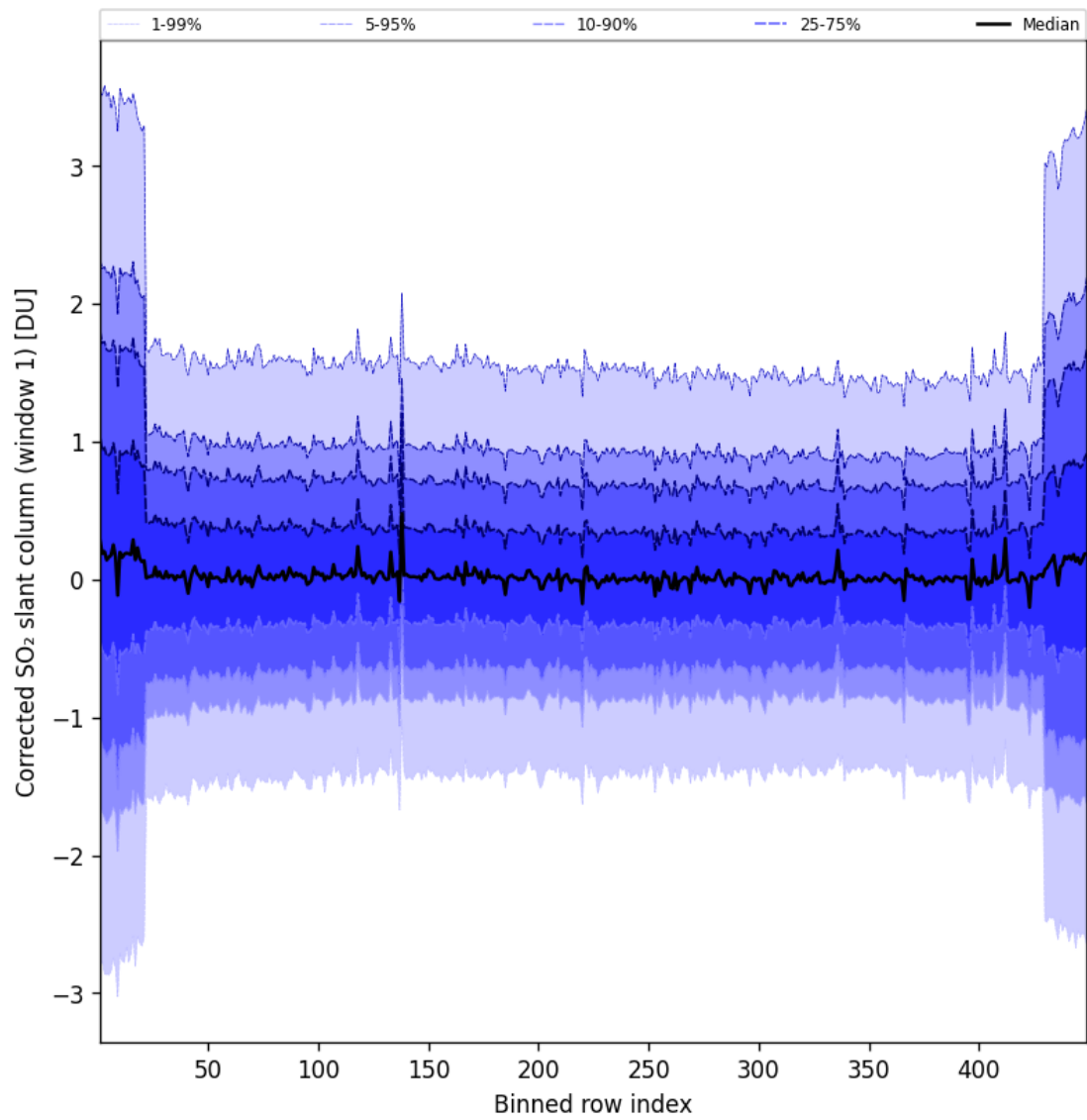


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-05-22 to 2025-05-23

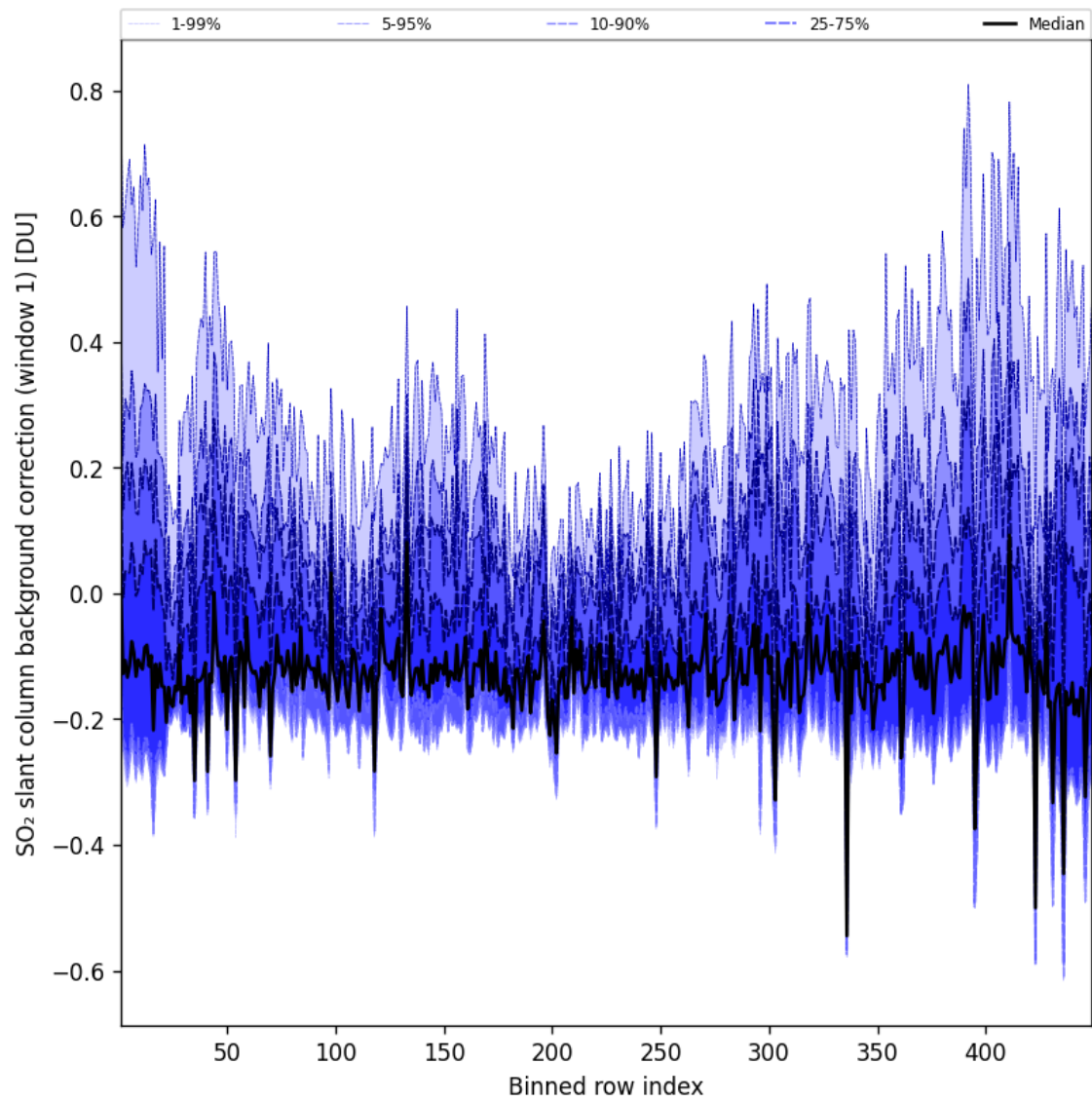


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-05-22 to 2025-05-23

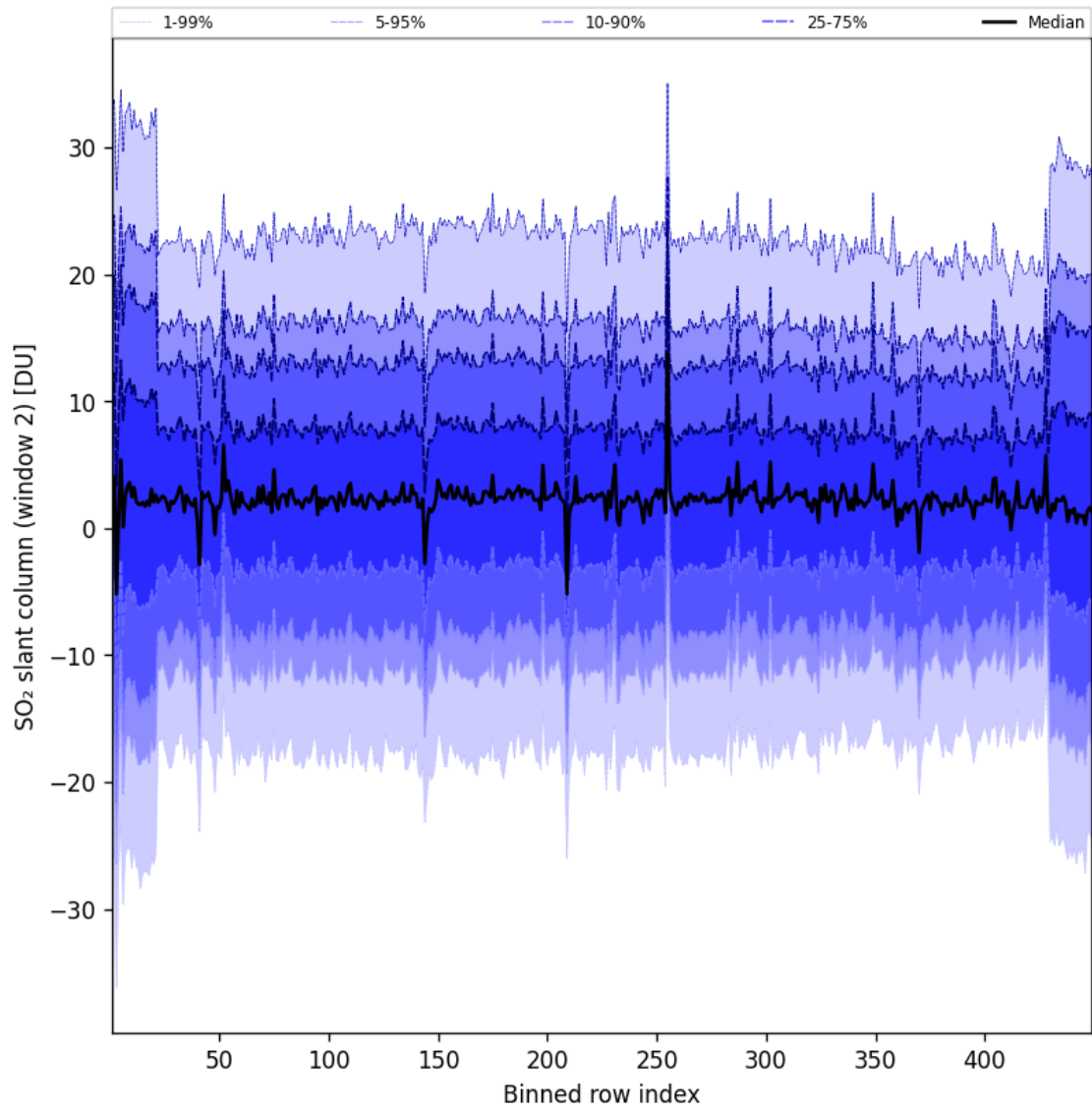


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-05-22 to 2025-05-23

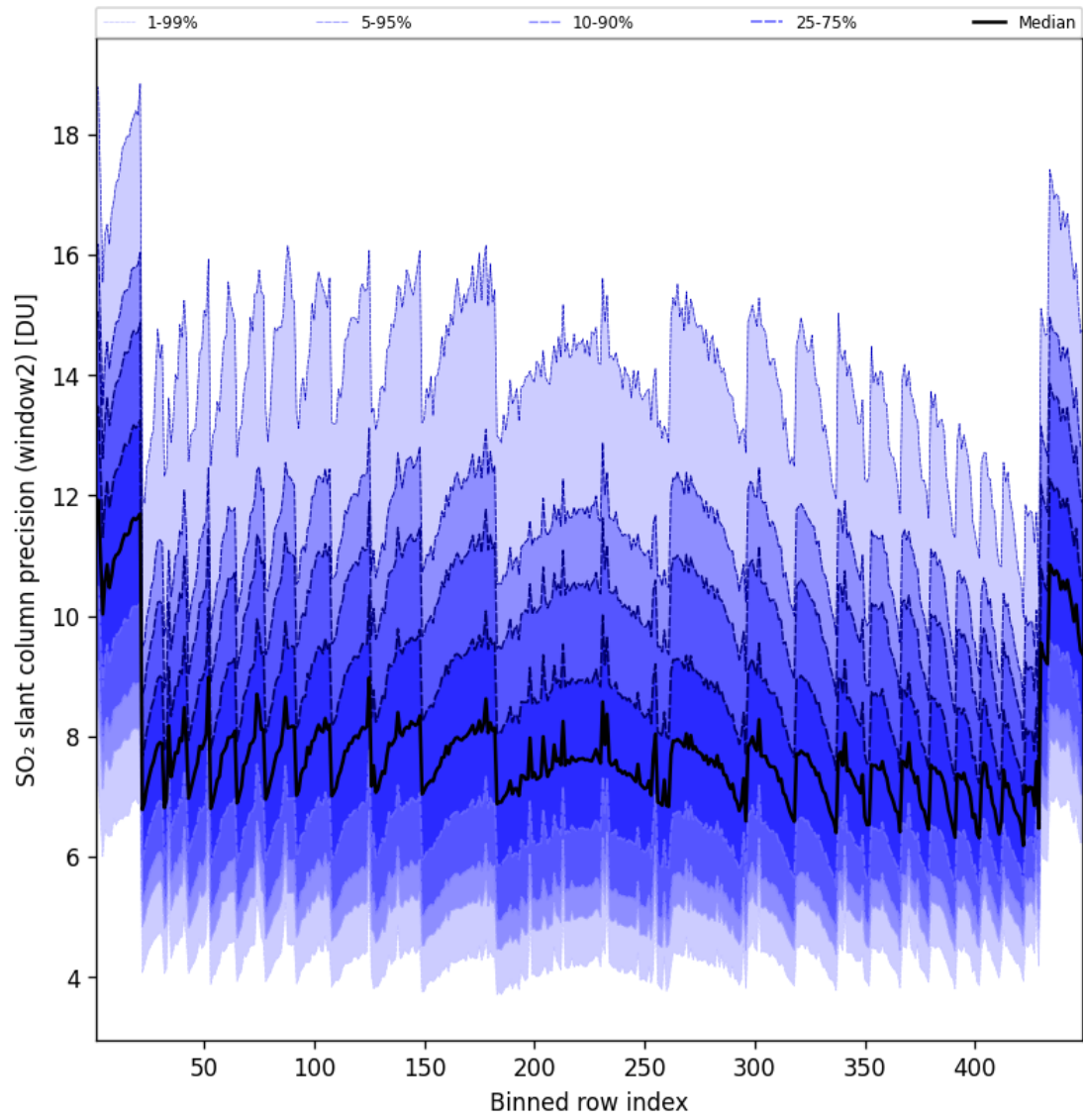


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-05-22 to 2025-05-23

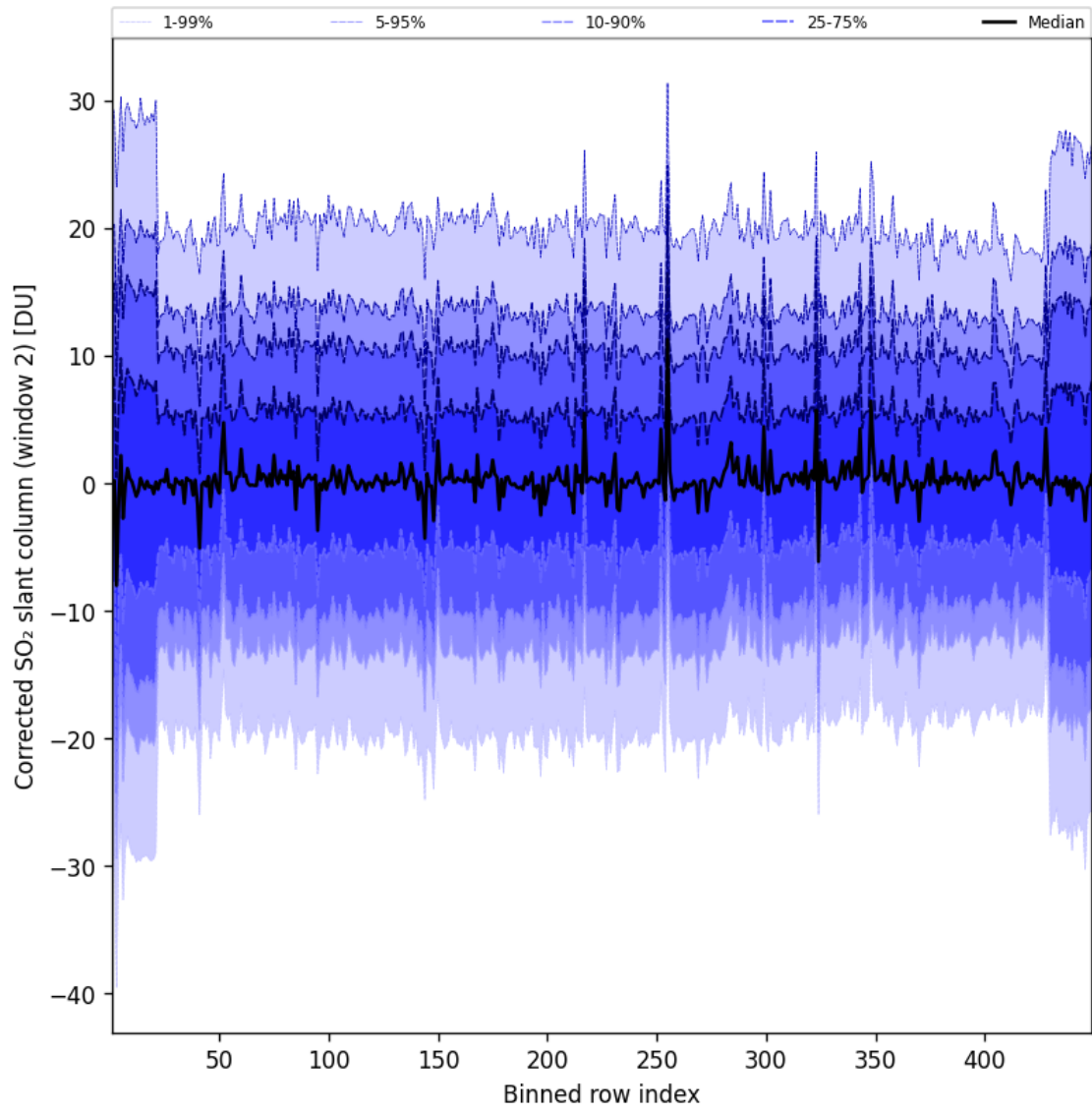


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-05-22 to 2025-05-23

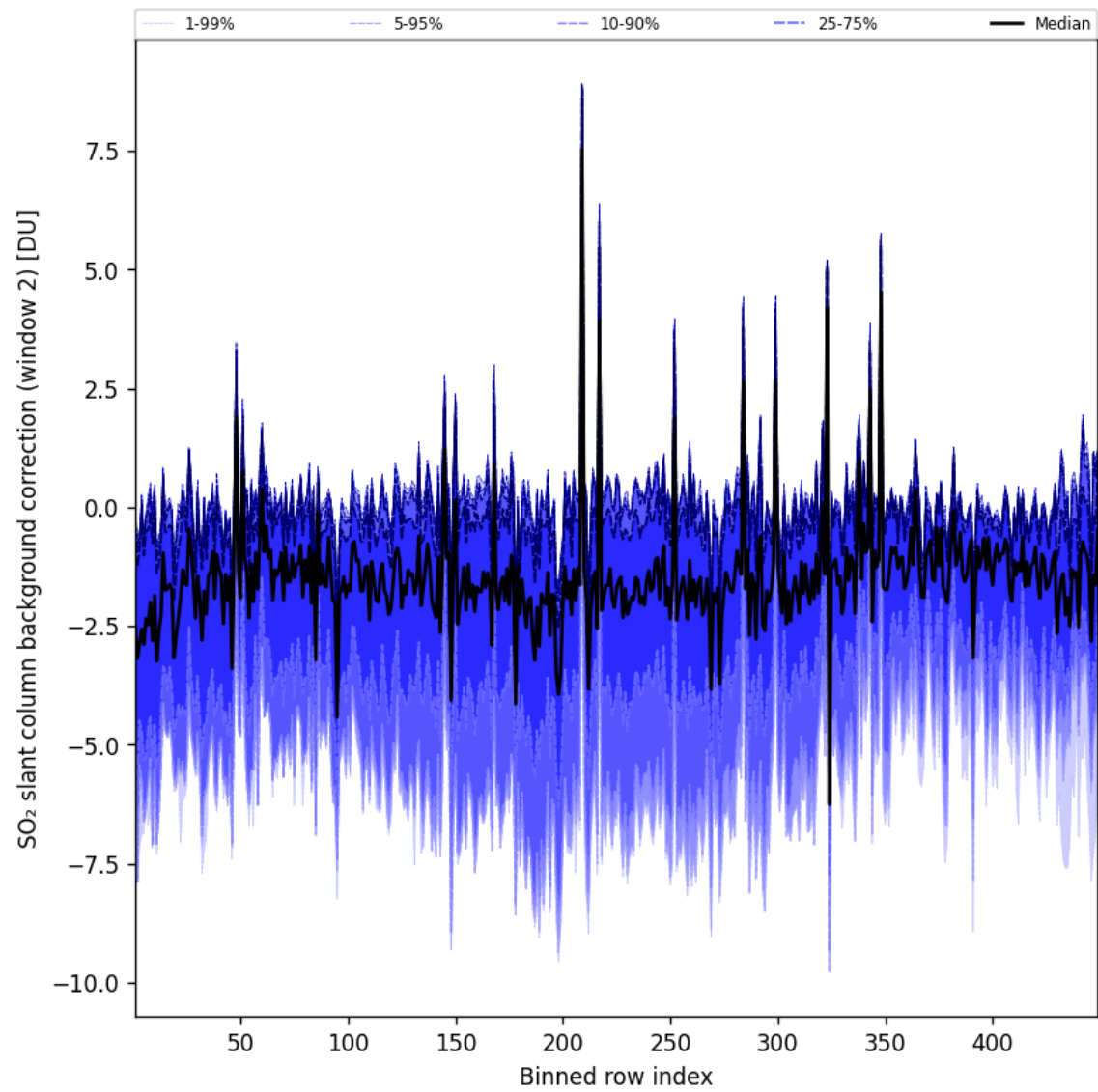


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-05-22 to 2025-05-23

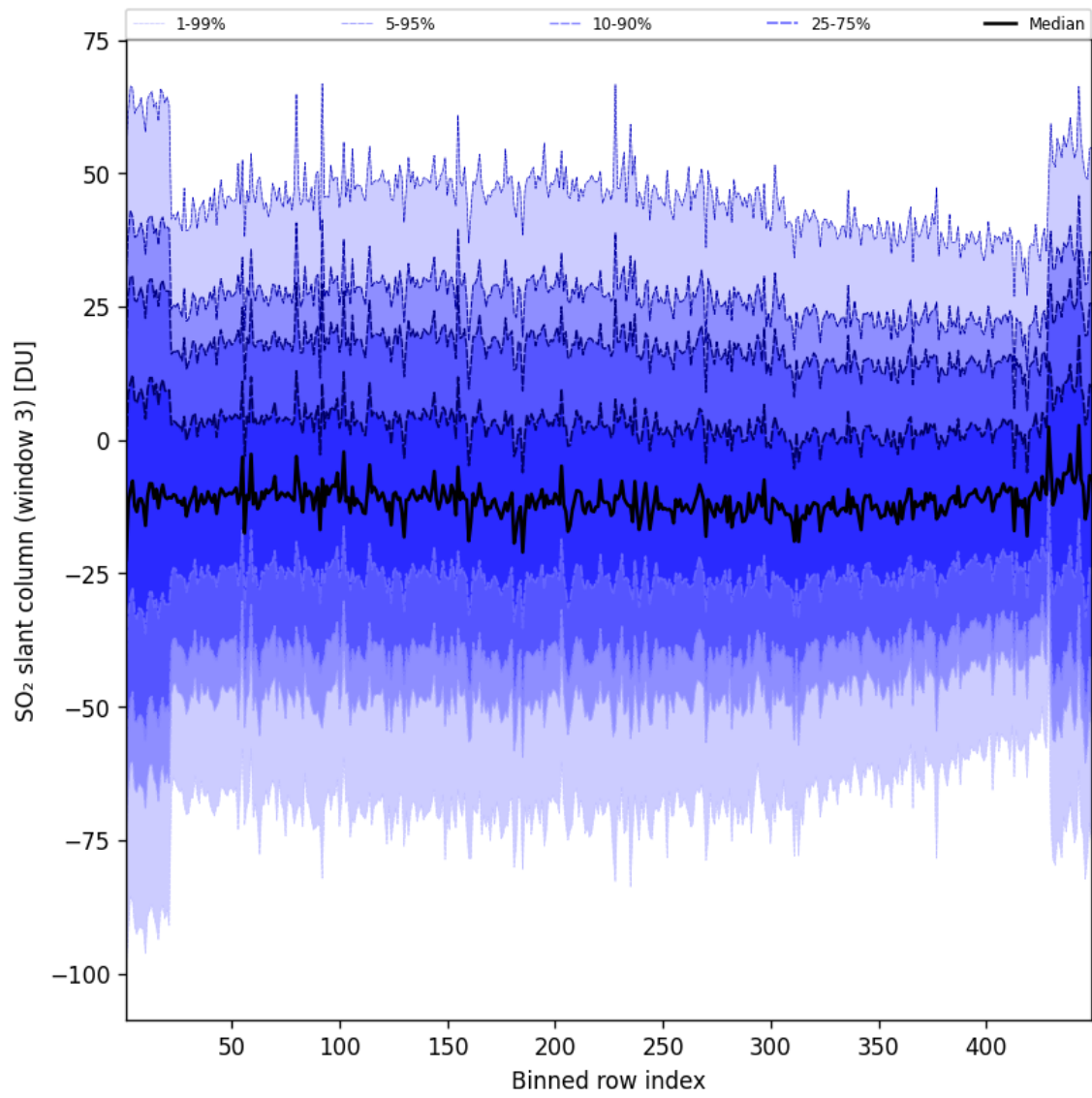


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-05-22 to 2025-05-23

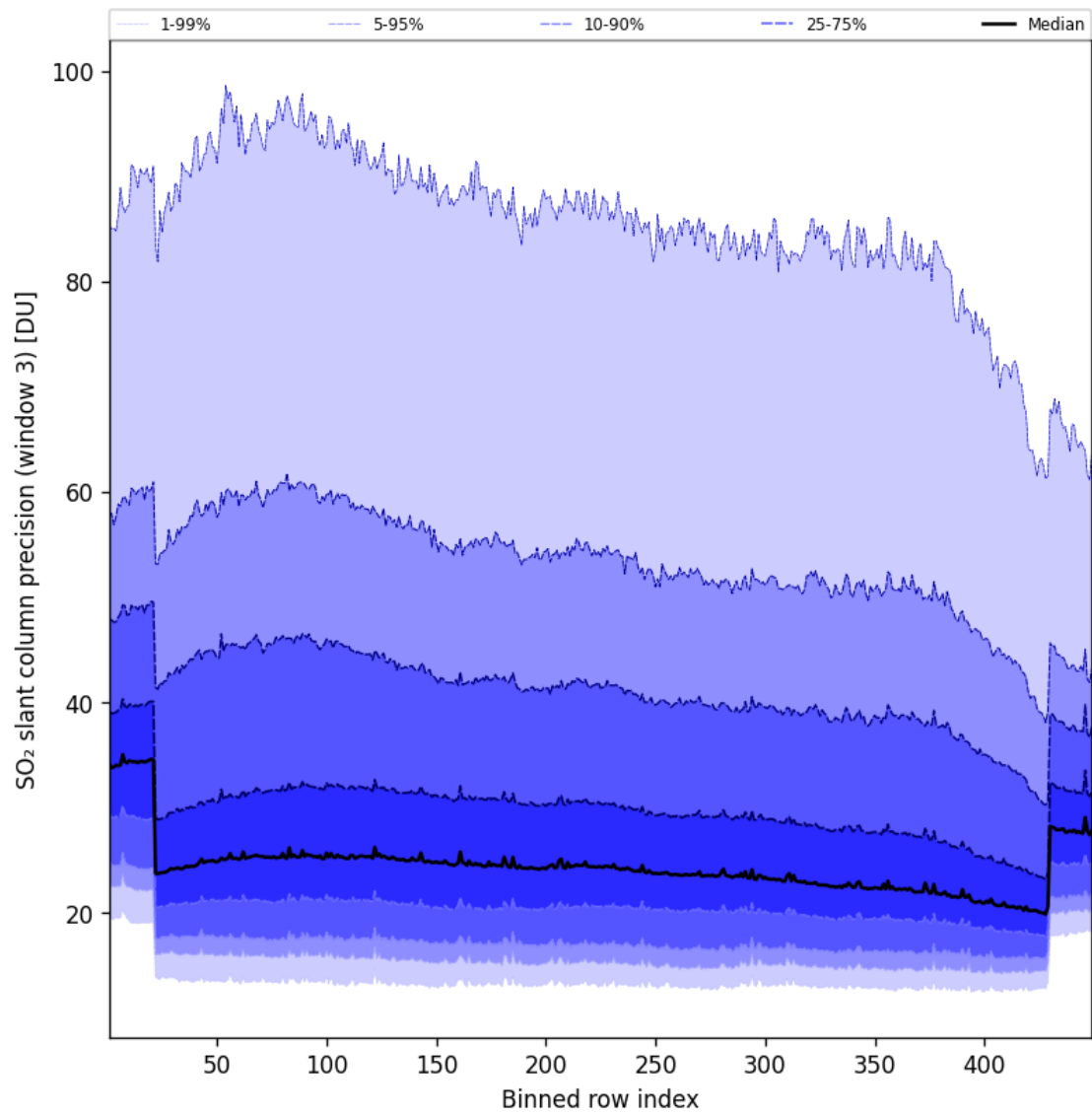


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-05-22 to 2025-05-23

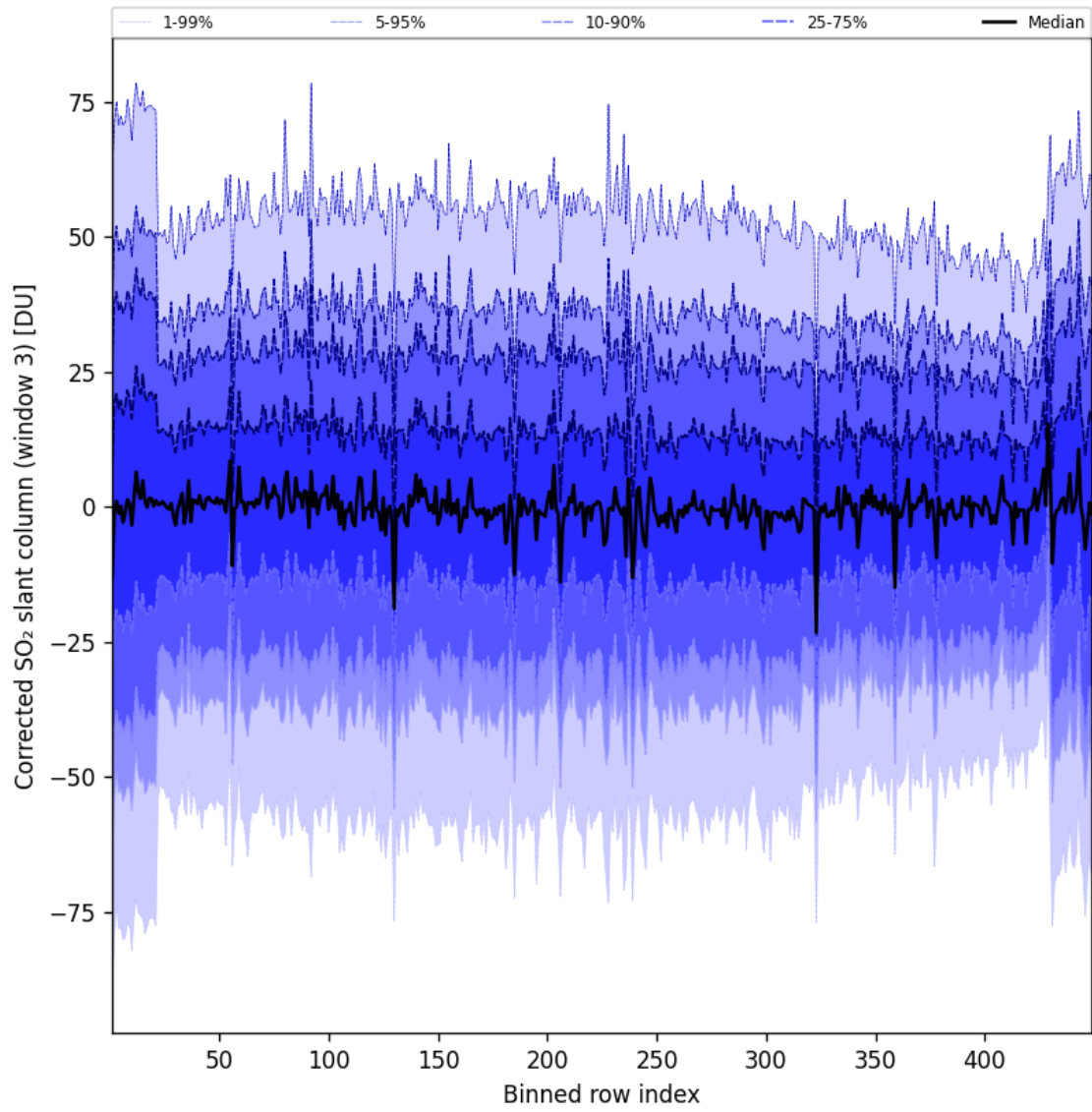


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-05-22 to 2025-05-23

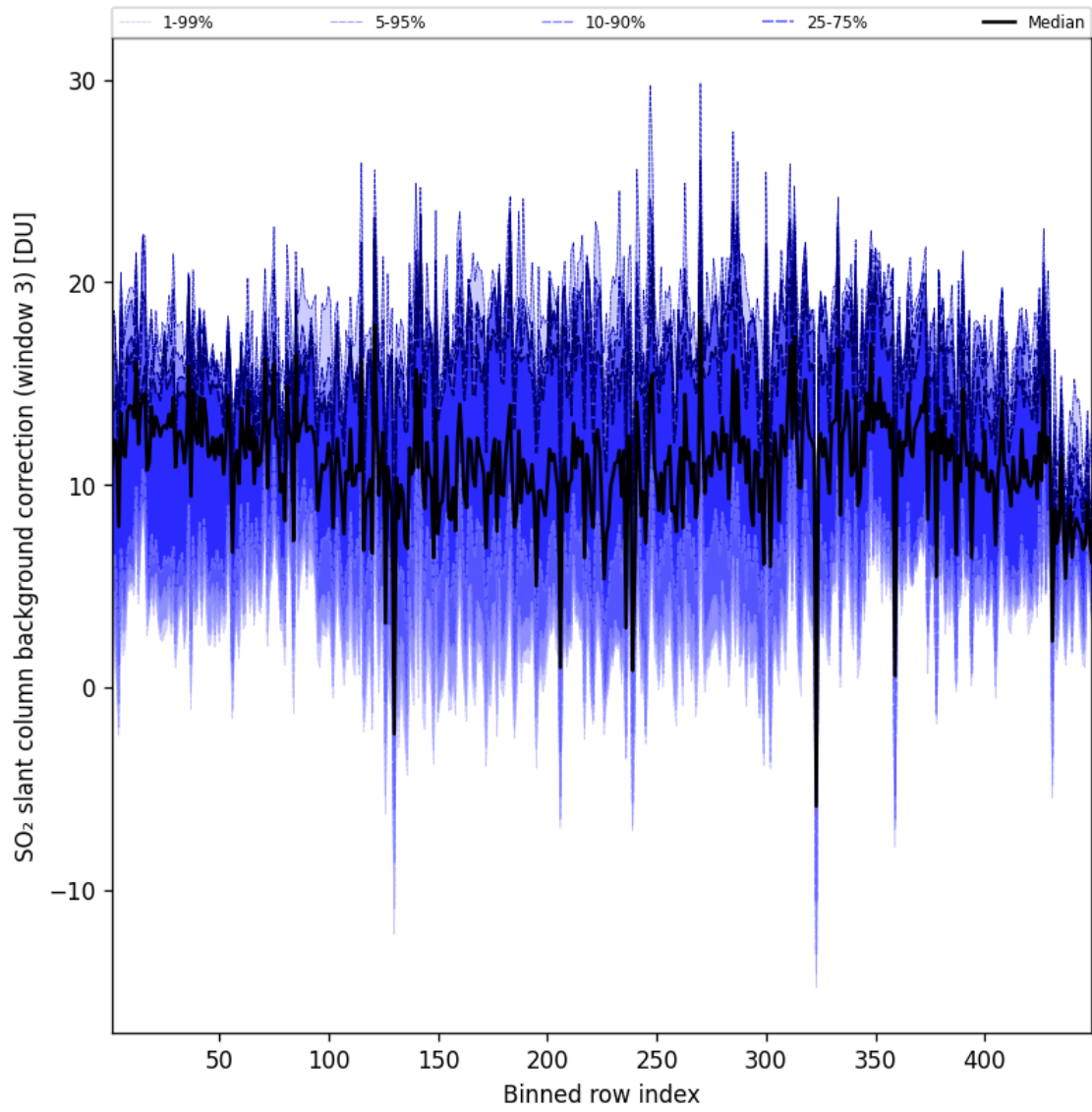


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-05-22 to 2025-05-23

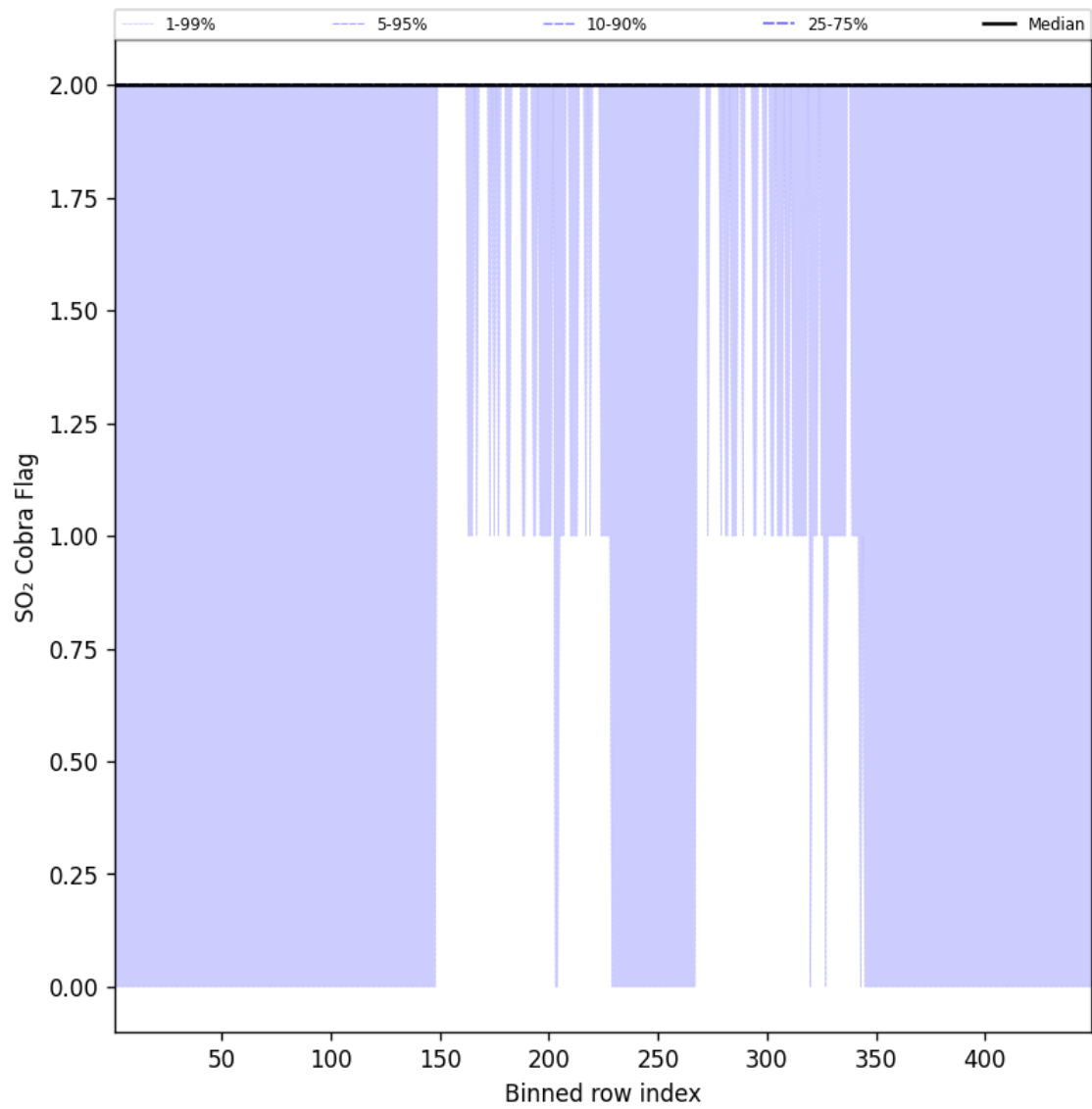


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-05-22 to 2025-05-23

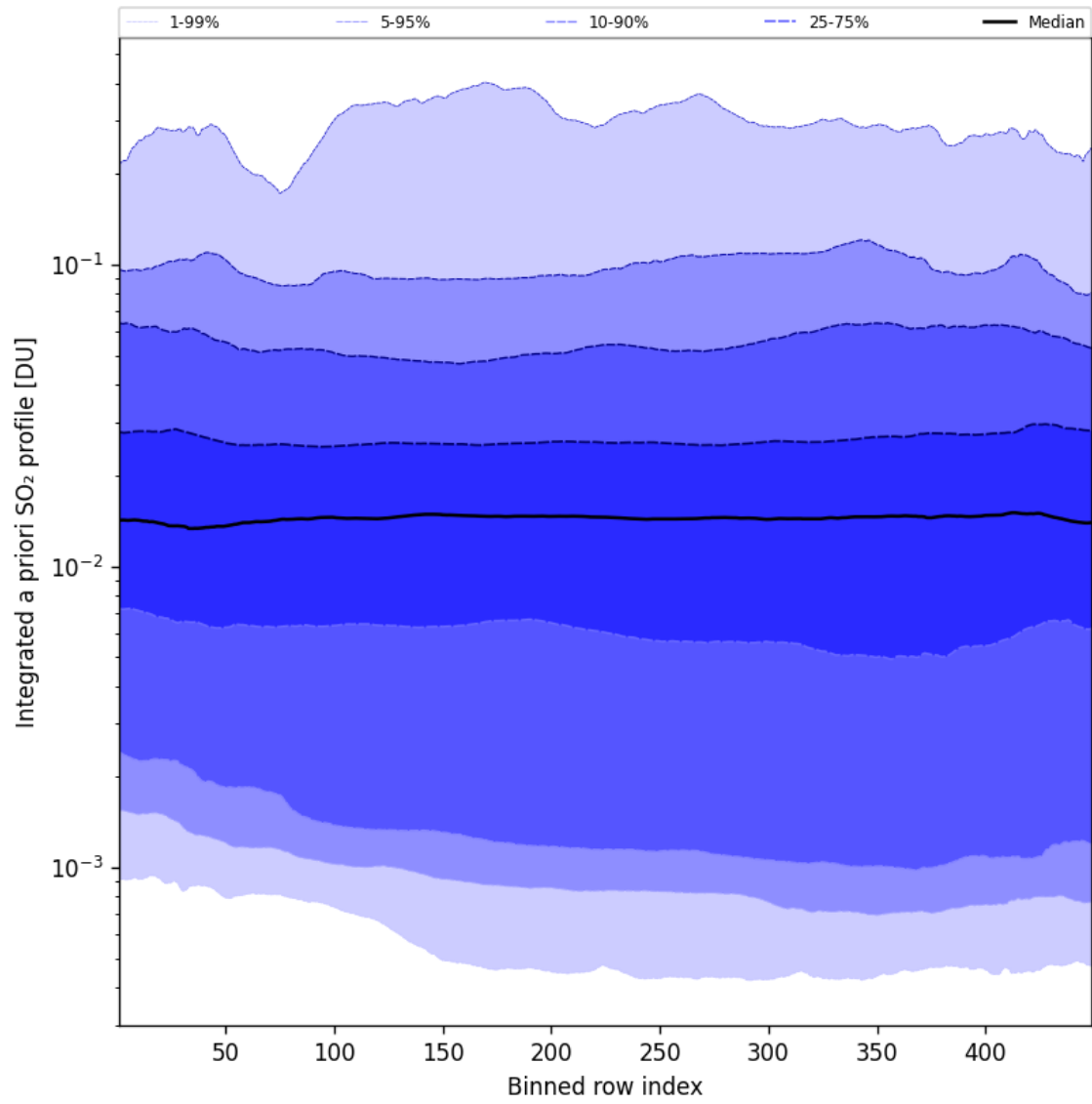


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-05-22 to 2025-05-23

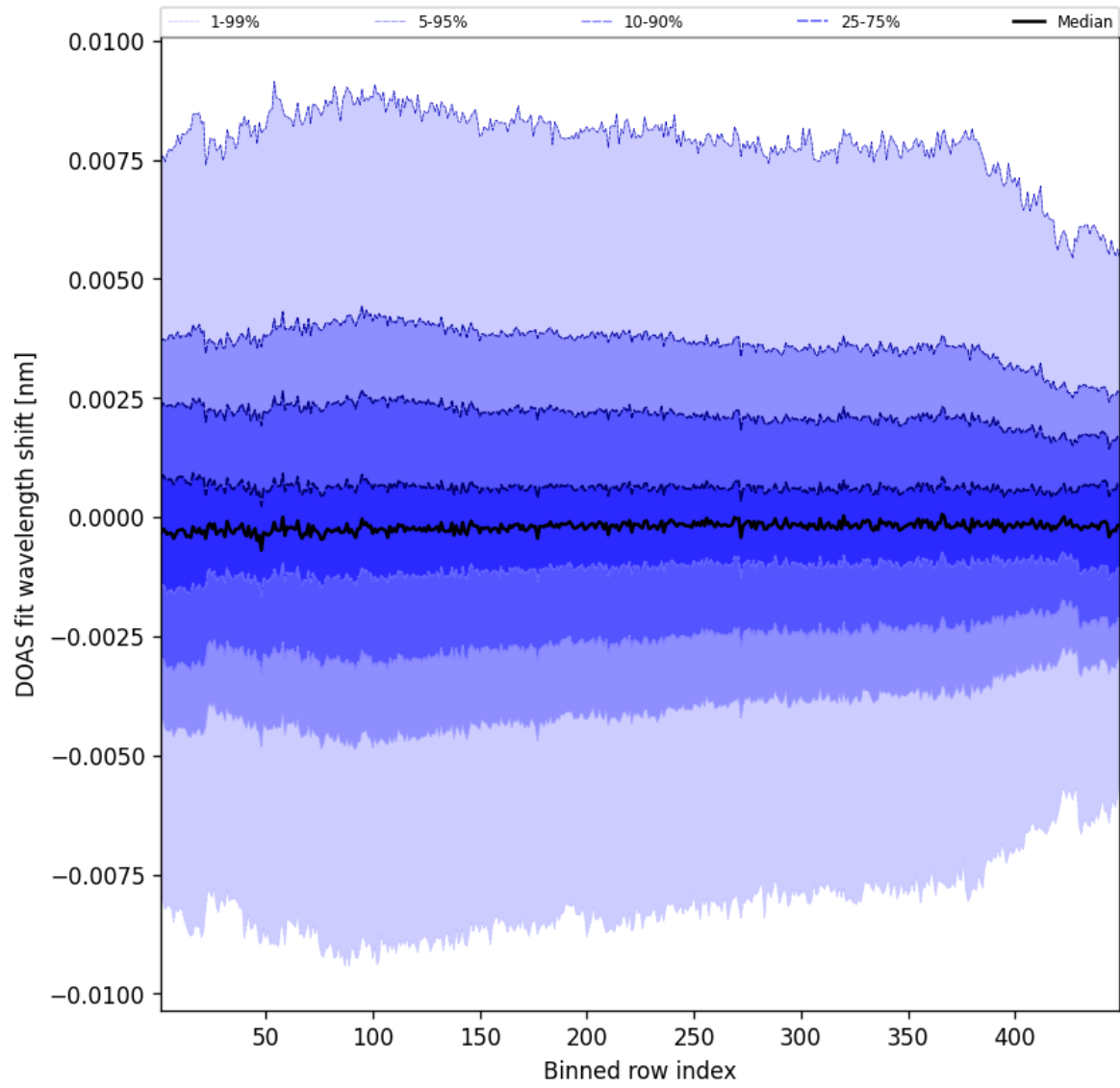


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-05-22 to 2025-05-23

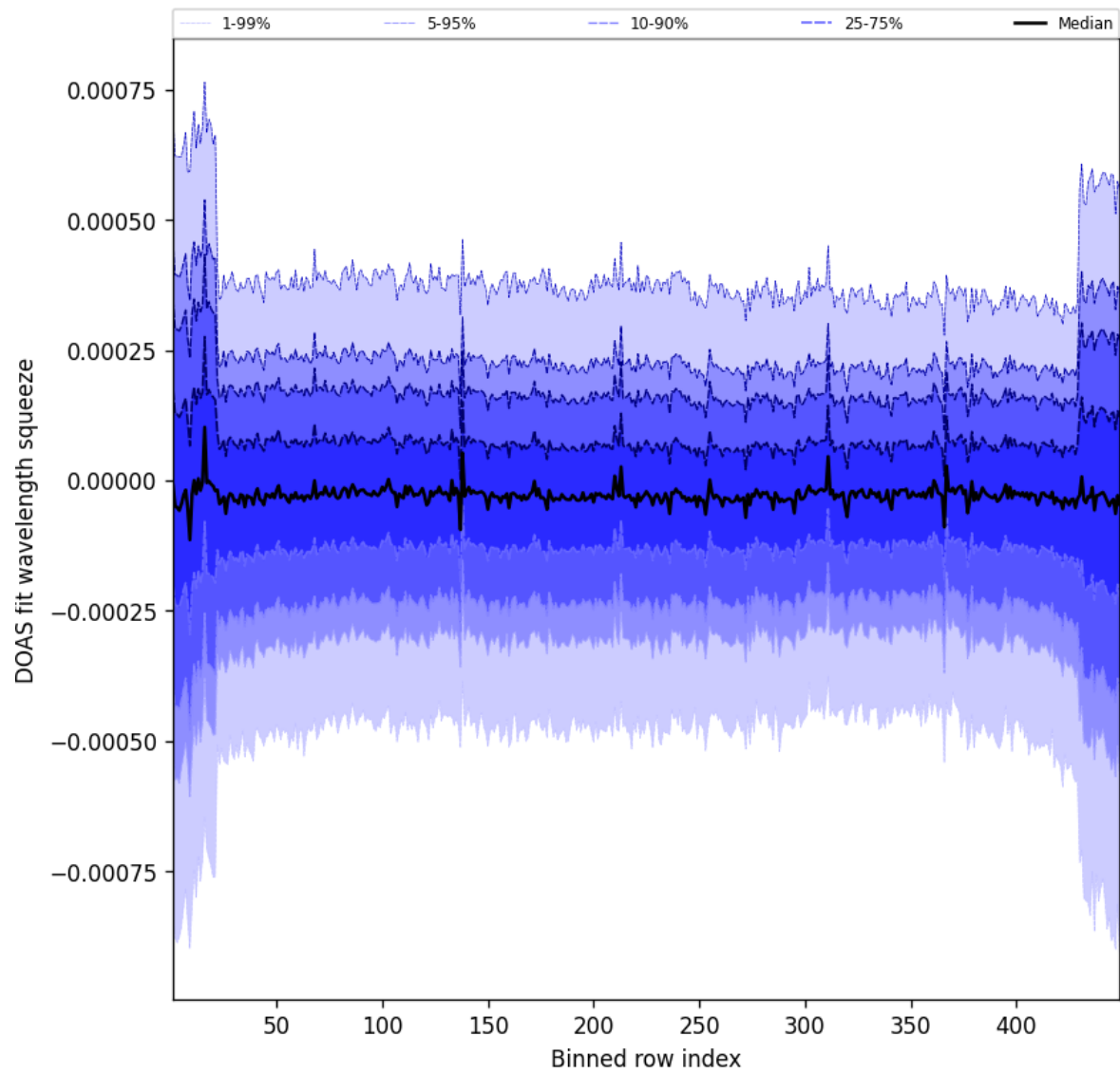


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-05-22 to 2025-05-23

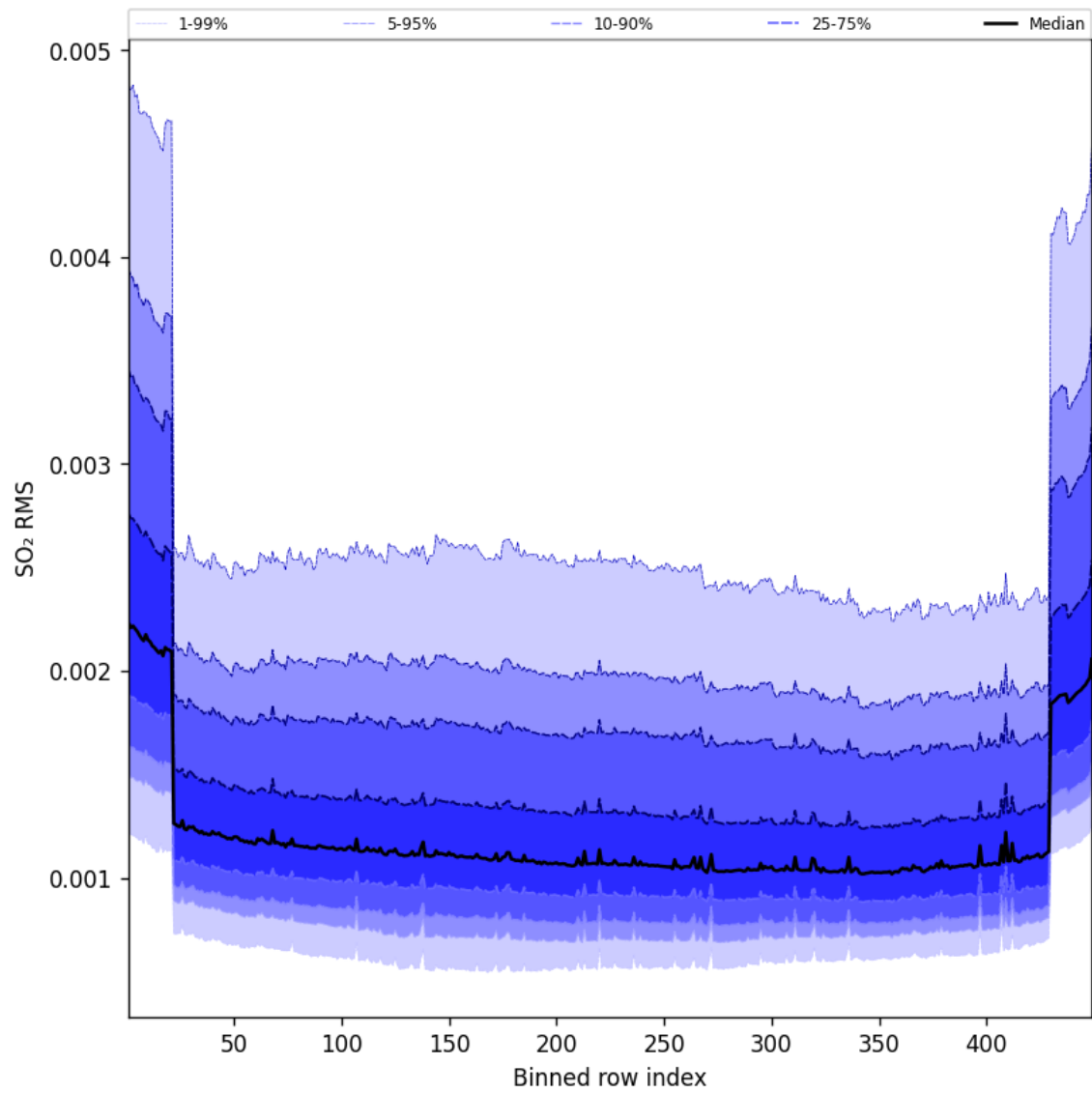


Figure 106: Along track statistics of “SO₂ RMS” for 2025-05-22 to 2025-05-23

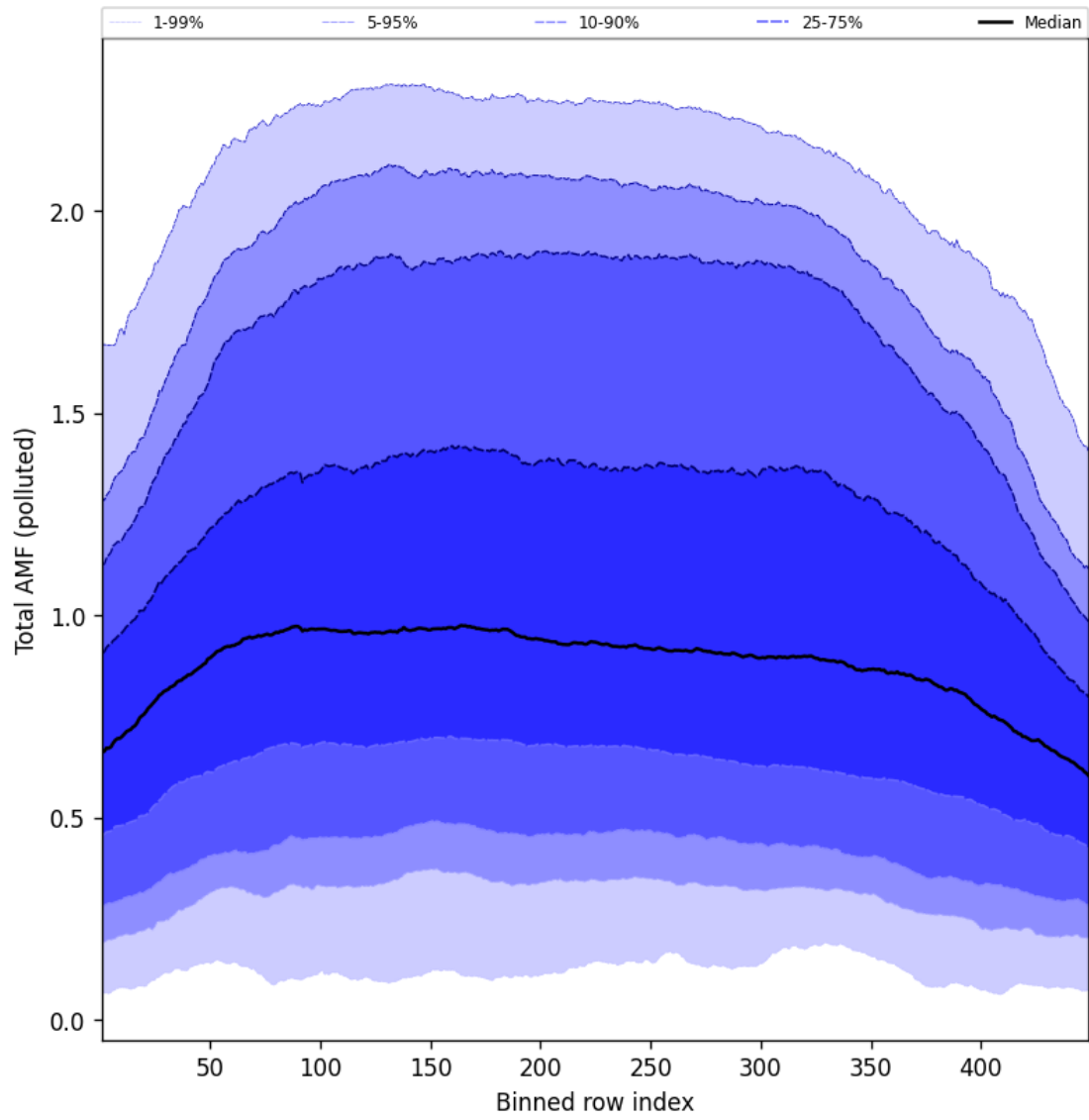


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-05-22 to 2025-05-23

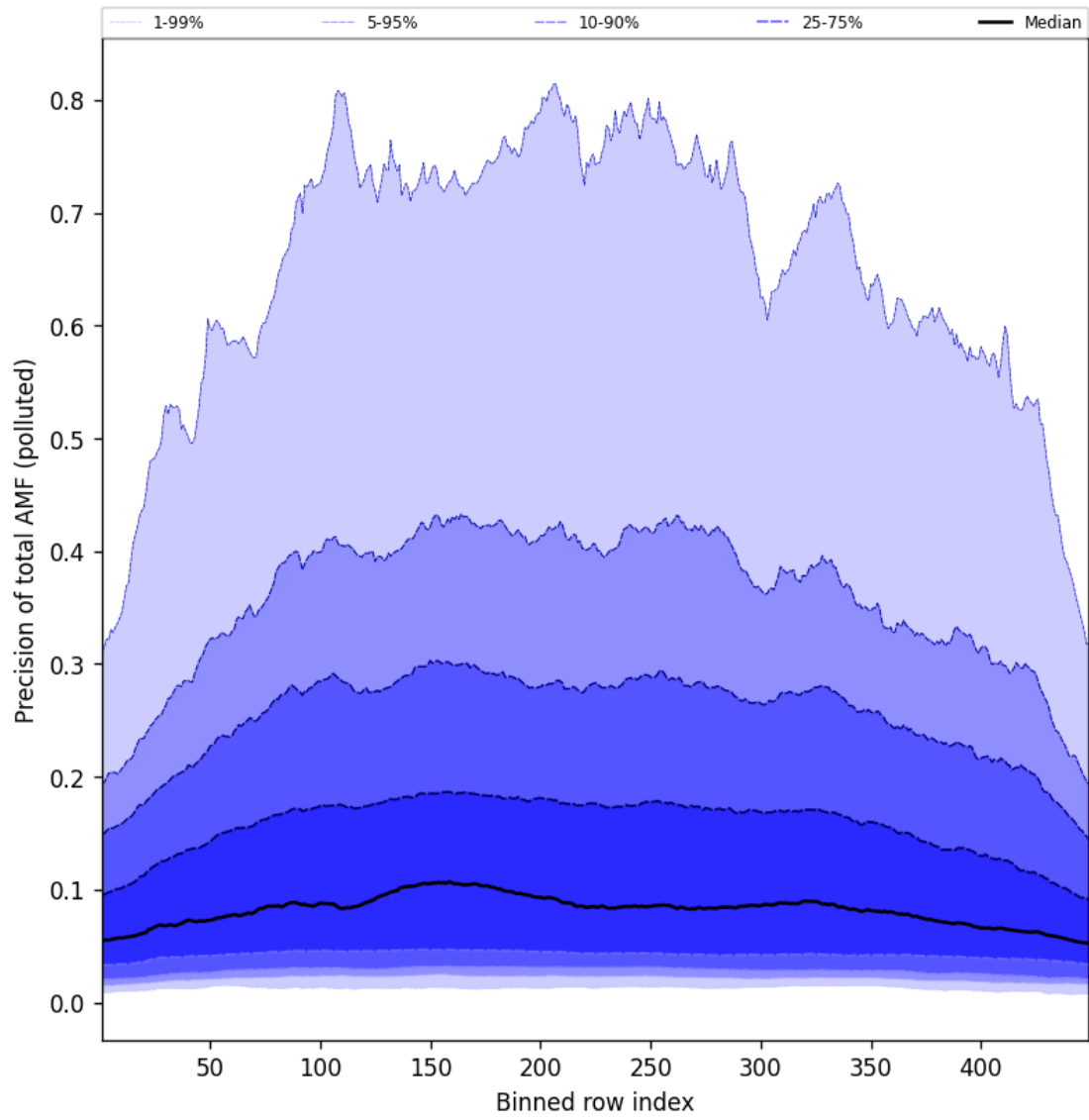


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-05-22 to 2025-05-23

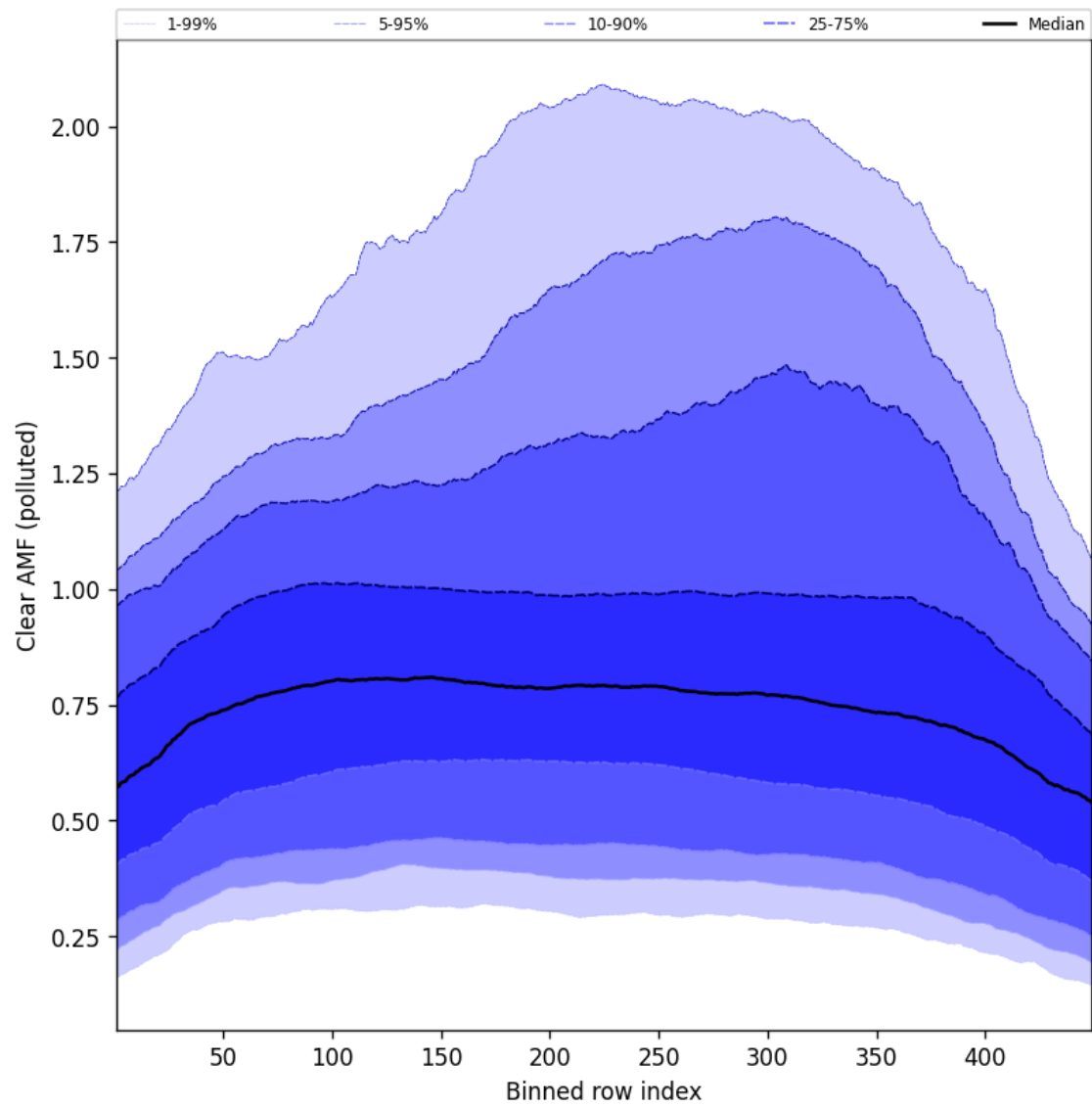


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-05-22 to 2025-05-23

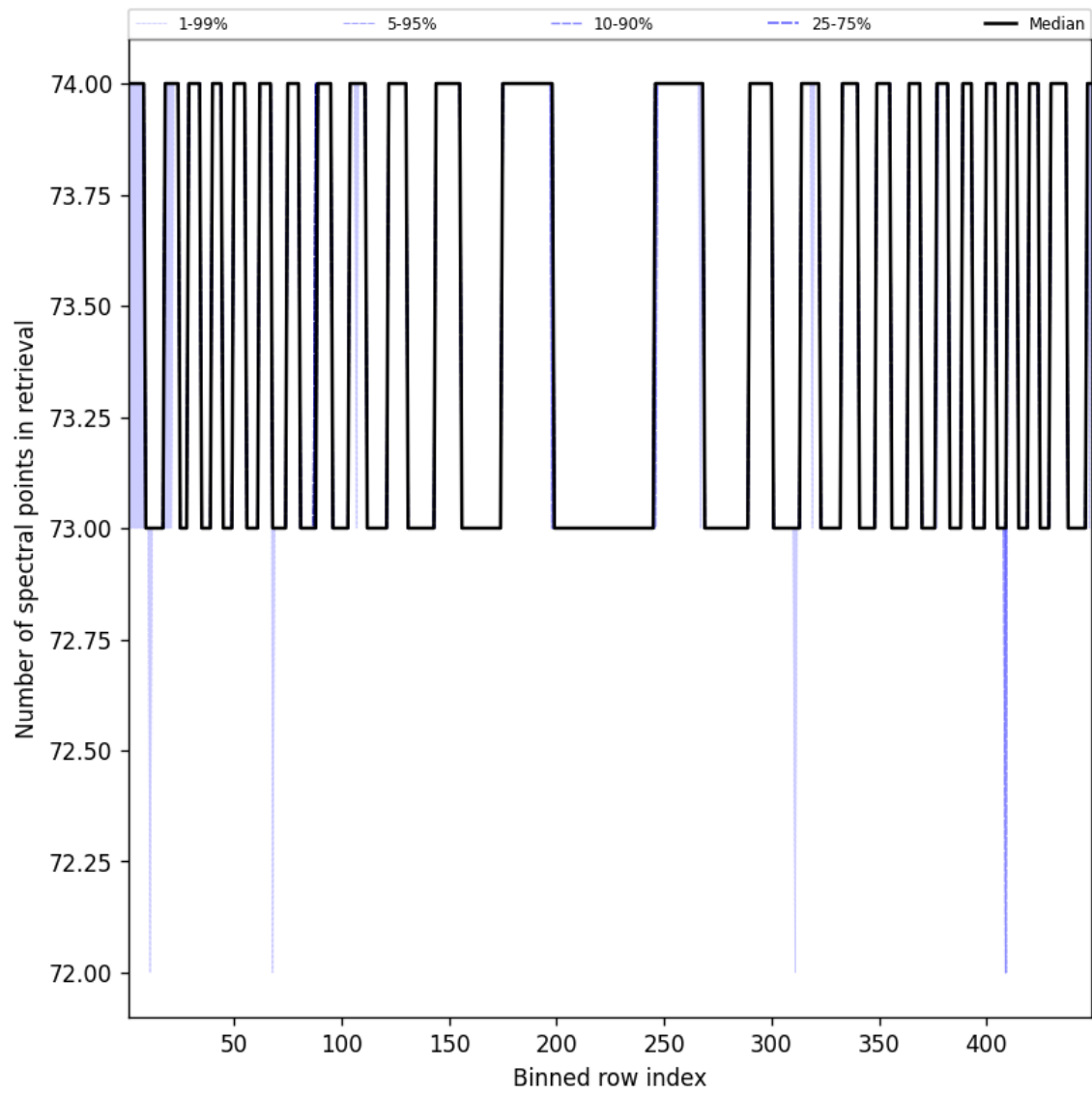


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-05-22 to 2025-05-23

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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