

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]	0.625 ± 0.410	17366496	0.995	0.790	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.059 \pm 92.581) \times 10^{-2}$	17366496	0.249	0.436	1.079×10^{-2}	-85.5	849
sulfurdioxide total vertical column precision [DU]	0.475 ± 0.590	17366496	0.222	0.320	0.313	3.839×10^{-2}	64.3
sulfurdioxide slant column density corrected [DU]	$(2.092 \pm 45.271) \times 10^{-2}$	17366496	0.258	0.375	1.005×10^{-2}	-68.4	214
sulfurdioxide slant column density cobra [DU]	$(2.016 \pm 38.250) \times 10^{-2}$	17366496	0.258	0.375	1.005×10^{-2}	-68.4	88.3
sulfurdioxide slant column density cobra precision [DU]	0.297 ± 0.130	17366496	0.213	0.126	0.260	8.152×10^{-2}	41.3
sulfurdioxide slant column density window1 [DU]	0.118 ± 0.697	17366496	0.125	0.747	0.121	-130	178
sulfurdioxide slant column density window1 precision [DU]	0.297 ± 0.130	17366496	0.213	0.126	0.260	8.152×10^{-2}	41.3
sulfurdioxide slant column density corrected win1 [DU]	$(3.992 \pm 68.822) \times 10^{-2}$	17366496	2.500×10^{-2}	0.735	2.134×10^{-2}	-130	177
background so2 slant column offset window1 [DU]	$(-7.850 \pm 13.681) \times 10^{-2}$	17366496	-0.180	0.156	-0.103	-0.829	2.98
sulfurdioxide slant column density window2 [DU]	1.80 ± 9.01	17366496	1.75	11.3	1.77	-1.621×10^3	1.640×10^3
sulfurdioxide slant column density window2 precision [DU]	8.06 ± 2.37	17366496	7.43	2.67	7.71	2.37	722
sulfurdioxide slant column density corrected win2 [DU]	0.634 ± 8.792	17366496	0.750	11.0	0.657	-1.622×10^3	1.640×10^3
background so2 slant column offset window2 [DU]	-1.16 ± 2.22	17366496	0.750	3.33	-0.598	-11.6	5.65
sulfurdioxide slant column density window3 [DU]	-8.01 ± 23.62	17366496	-8.40	29.1	-8.36	-388	713
sulfurdioxide slant column density window3 precision [DU]	28.0 ± 13.4	17366496	21.5	10.3	24.4	9.15	368
sulfurdioxide slant column density corrected win3 [DU]	-3.09 ± 23.11	17366496	-3.92	28.4	-2.97	-382	709
background so2 slant column offset window3 [DU]	4.92 ± 5.46	17366496	9.52	9.41	4.98	-16.1	25.7
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	17366496	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.156 \pm 7.353) \times 10^{-2}$	17366496	1.800×10^{-2}	2.116×10^{-2}	1.478×10^{-2}	2.784×10^{-4}	2.38
fitted radiance shift [nm]	$(-1.438 \pm 25.769) \times 10^{-4}$	17366496	1.000×10^{-4}	1.676×10^{-3}	-1.411×10^{-4}	-0.105	6.458×10^{-2}
fitted radiance squeeze [1]	$(-2.881 \pm 18.201) \times 10^{-5}$	17366496	-1.000×10^{-5}	2.083×10^{-4}	-2.446×10^{-5}	-2.225×10^{-2}	2.451×10^{-2}
fitted root mean square [1]	$(1.291 \pm 0.520) \times 10^{-3}$	17366496	1.025×10^{-3}	5.153×10^{-4}	1.147×10^{-3}	2.696×10^{-4}	0.162
sulfurdioxide total air mass factor polluted [1]	0.932 ± 0.488	17366496	0.740	0.610	0.845	5.000×10^{-2}	2.82
sulfurdioxide total air mass factor polluted precision [1]	0.117 ± 0.128	17366496	3.500×10^{-2}	0.114	7.203×10^{-2}	3.862×10^{-3}	2.12
sulfurdioxide clear air mass factor polluted [1]	0.768 ± 0.328	17366496	0.700	0.406	0.735	5.830×10^{-2}	2.79
number of spectral points in retrieval [1]	73.4 ± 0.5	17366496	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	3.000×10^{-2}	9.000×10^{-2}	0.210	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-1.98	-0.811	-0.506	-0.344	-0.203	0.232	0.384	0.564	0.911	2.30
sulfurdioxide total vertical column precision [DU]	9.762×10^{-2}	0.126	0.153	0.180	0.213	0.533	0.693	0.883	1.25	2.86
sulfurdioxide slant column density corrected [DU]	-0.853	-0.497	-0.362	-0.271	-0.175	0.199	0.301	0.400	0.555	1.02
sulfurdioxide slant column density cobra [DU]	-0.853	-0.497	-0.362	-0.271	-0.175	0.199	0.301	0.400	0.555	1.02
sulfurdioxide slant column density cobra precision [DU]	0.147	0.175	0.190	0.201	0.215	0.341	0.394	0.446	0.540	0.761
sulfurdioxide slant column density window1 [DU]	-1.69	-0.935	-0.647	-0.456	-0.256	0.492	0.686	0.871	1.15	1.92
sulfurdioxide slant column density window1 precision [DU]	0.147	0.175	0.190	0.201	0.215	0.341	0.394	0.446	0.540	0.761
sulfurdioxide slant column density corrected win1 [DU]	-1.63	-0.959	-0.702	-0.527	-0.341	0.394	0.595	0.790	1.09	1.93
background so2 slant column offset window1 [DU]	-0.341	-0.250	-0.208	-0.190	-0.170	-1.443×10^{-2}	4.267×10^{-2}	9.512×10^{-2}	0.177	0.375
sulfurdioxide slant column density window2 [DU]	-19.6	-12.6	-9.24	-6.72	-3.90	7.43	10.3	12.8	16.3	23.8
sulfurdioxide slant column density window2 precision [DU]	4.26	5.07	5.58	6.00	6.52	9.19	10.1	11.0	12.2	14.9
sulfurdioxide slant column density corrected win2 [DU]	-20.7	-13.5	-10.1	-7.62	-4.85	6.13	8.87	11.3	14.7	21.9
background so2 slant column offset window2 [DU]	-6.67	-5.33	-4.47	-3.70	-2.70	0.622	0.927	1.15	1.48	2.44
sulfurdioxide slant column density window3 [DU]	-67.1	-46.1	-36.5	-29.8	-22.6	6.47	14.3	21.5	31.3	50.8
sulfurdioxide slant column density window3 precision [DU]	13.2	15.6	17.5	19.0	20.5	30.8	35.5	41.2	53.1	85.2
sulfurdioxide slant column density corrected win3 [DU]	-62.0	-41.1	-31.4	-24.5	-17.2	11.2	18.5	25.3	34.5	53.6
background so2 slant column offset window3 [DU]	-5.98	-3.46	-2.20	-1.06	0.263	9.67	10.9	11.8	13.0	15.1
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]	8.051×10^{-4}	1.478×10^{-3}	2.402×10^{-3}	4.116×10^{-3}	7.105×10^{-3}	2.826×10^{-2}	4.043×10^{-2}	6.271×10^{-2}	0.108	0.328
fitted radiance shift [nm]	-8.058×10^{-3}	-3.918×10^{-3}	-2.469×10^{-3}	-1.664×10^{-3}	-1.009×10^{-3}	6.673×10^{-4}	1.327×10^{-3}	2.188×10^{-3}	3.719×10^{-3}	8.024×10^{-3}
fitted radiance squeeze [1]	-5.197×10^{-4}	-3.215×10^{-4}	-2.410×10^{-4}	-1.869×10^{-4}	-1.303×10^{-4}	7.797×10^{-5}	1.304×10^{-4}	1.791×10^{-4}	2.490×10^{-4}	4.160×10^{-4}
fitted root mean square [1]	6.065×10^{-4}	7.504×10^{-4}	8.300×10^{-4}	8.899×10^{-4}	9.614×10^{-4}	1.477×10^{-3}	1.716×10^{-3}	1.953×10^{-3}	2.283×10^{-3}	3.129×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.109	0.276	0.372	0.460	0.581	1.19	1.45	1.67	1.93	2.22
sulfurdioxide total air mass factor polluted precision [1]	1.155×10^{-2}	1.967×10^{-2}	2.575×10^{-2}	3.193×10^{-2}	3.950×10^{-2}	0.154	0.201	0.249	0.341	0.631
sulfurdioxide clear air mass factor polluted [1]	0.232	0.325	0.386	0.446	0.533	0.939	1.04	1.15	1.39	1.84
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]	0.564 ± 0.418	11716892	0.860	0.490	0.0	1.000	0.140	1.000
sulfurdioxide total vertical column [DU]	$(2.908 \pm 94.285) \times 10^{-2}$	11716892	0.407	9.215×10^{-3}	-85.5	259	-0.191	0.216
sulfurdioxide total vertical column precision [DU]	0.466 ± 0.626	11716892	0.314	0.289	3.839×10^{-2}	41.9	0.196	0.510
sulfurdioxide slant column density corrected [DU]	$(2.012 \pm 46.764) \times 10^{-2}$	11716892	0.359	8.834×10^{-3}	-68.4	214	-0.169	0.190
sulfurdioxide slant column density cobra [DU]	$(1.910 \pm 37.506) \times 10^{-2}$	11716892	0.359	8.834×10^{-3}	-68.4	34.6	-0.169	0.190
sulfurdioxide slant column density cobra precision [DU]	0.284 ± 0.122	11716892	0.113	0.247	8.152×10^{-2}	33.5	0.208	0.321
sulfurdioxide slant column density window1 [DU]	0.106 ± 0.678	11716892	0.721	0.112	-30.2	41.3	-0.253	0.468
sulfurdioxide slant column density window1 precision [DU]	0.284 ± 0.122	11716892	0.113	0.247	8.152×10^{-2}	33.5	0.208	0.321
sulfurdioxide slant column density corrected win1 [DU]	$(3.750 \pm 66.546) \times 10^{-2}$	11716892	0.705	1.894×10^{-2}	-30.2	41.2	-0.329	0.377
background so2 slant column offset window1 [DU]	$(-6.824 \pm 15.086) \times 10^{-2}$	11716892	0.190	-9.965×10^{-2}	-0.541	1.47	-0.175	1.452×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.98 ± 8.37	11716892	10.8	1.97	-436	212	-3.41	7.36
sulfurdioxide slant column density window2 precision [DU]	7.55 ± 2.02	11716892	2.31	7.25	2.37	255	6.20	8.51
sulfurdioxide slant column density corrected win2 [DU]	0.552 ± 8.085	11716892	10.4	0.603	-439	214	-4.60	5.76
background so2 slant column offset window2 [DU]	-1.43 ± 2.42	11716892	4.03	-1.05	-11.6	5.65	-3.33	0.705
sulfurdioxide slant column density window3 [DU]	-8.35 ± 21.81	11716892	26.9	-8.90	-178	363	-22.1	4.89
sulfurdioxide slant column density window3 precision [DU]	26.1 ± 13.1	11716892	8.02	22.6	9.15	250	19.6	27.6
sulfurdioxide slant column density corrected win3 [DU]	-2.84 ± 21.18	11716892	26.2	-2.80	-172	356	-15.9	10.3
background so2 slant column offset window3 [DU]	5.51 ± 5.78	11716892	10.2	7.08	-16.1	19.2	7.410×10^{-2}	10.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	11716892	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.433 \pm 8.021) \times 10^{-2}$	11716892	2.638×10^{-2}	1.307×10^{-2}	2.784×10^{-4}	2.06	4.719×10^{-3}	3.110×10^{-2}
fitted radiance shift [nm]	$(-8.601 \pm 2553.360) \times 10^{-6}$	11716892	1.550×10^{-3}	-2.941×10^{-5}	-3.974×10^{-2}	3.844×10^{-2}	-8.089×10^{-4}	7.414×10^{-4}
fitted radiance squeeze [1]	$(-5.237 \pm 17.231) \times 10^{-5}$	11716892	2.005×10^{-4}	-4.153×10^{-5}	-3.764×10^{-3}	1.325×10^{-2}	-1.459×10^{-4}	5.463×10^{-5}
fitted root mean square [1]	$(1.241 \pm 0.503) \times 10^{-3}$	11716892	4.666×10^{-4}	1.097×10^{-3}	2.696×10^{-4}	3.200×10^{-2}	9.291×10^{-4}	1.396×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.973 ± 0.541	11716892	0.769	0.874	5.000×10^{-2}	2.82	0.552	1.32
sulfurdioxide total air mass factor polluted precision [1]	0.132 ± 0.145	11716892	0.135	8.212×10^{-2}	3.862×10^{-3}	2.12	4.064×10^{-2}	0.176
sulfurdioxide clear air mass factor polluted [1]	0.774 ± 0.371	11716892	0.481	0.724	5.830×10^{-2}	2.79	0.485	0.967
number of spectral points in retrieval [1]	73.4 ± 0.5	11716892	1.000	73.0	52.0	155	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.752 ± 0.363	5649604	0.570	1.000	0.0	1.000	0.430	1.000
sulfurdioxide total vertical column [DU]	$(3.370 \pm 88.943) \times 10^{-2}$	5649604	0.502	1.492×10^{-2}	-73.0	849	-0.233	0.269
sulfurdioxide total vertical column precision [DU]	0.493 ± 0.506	5649604	0.317	0.362	4.981×10^{-2}	64.3	0.252	0.569
sulfurdioxide slant column density corrected [DU]	$(2.256 \pm 42.004) \times 10^{-2}$	5649604	0.411	1.294×10^{-2}	-53.9	197	-0.191	0.220
sulfurdioxide slant column density cobra [DU]	$(2.237 \pm 39.749) \times 10^{-2}$	5649604	0.411	1.294×10^{-2}	-53.9	88.3	-0.191	0.220
sulfurdioxide slant column density cobra precision [DU]	0.324 ± 0.140	5649604	0.138	0.291	8.460×10^{-2}	41.3	0.236	0.374
sulfurdioxide slant column density window1 [DU]	0.145 ± 0.734	5649604	0.805	0.141	-130	178	-0.262	0.544
sulfurdioxide slant column density window1 precision [DU]	0.324 ± 0.140	5649604	0.138	0.291	8.460×10^{-2}	41.3	0.236	0.374
sulfurdioxide slant column density corrected win1 [DU]	$(4.495 \pm 73.315) \times 10^{-2}$	5649604	0.802	2.698×10^{-2}	-130	177	-0.369	0.434
background so2 slant column offset window1 [DU]	$(-9.977 \pm 9.833) \times 10^{-2}$	5649604	9.314×10^{-2}	-0.105	-0.829	2.98	-0.154	-6.094×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.41 ± 10.20	5649604	12.6	1.26	-1.621×10^3	1.640×10^3	-4.98	7.62
sulfurdioxide slant column density window2 precision [DU]	9.12 ± 2.67	5649604	2.85	8.78	2.44	722	7.52	10.4
sulfurdioxide slant column density corrected win2 [DU]	0.803 ± 10.101	5649604	12.5	0.791	-1.622×10^3	1.640×10^3	-5.45	7.04
background so2 slant column offset window2 [DU]	-0.610 ± 1.578	5649604	1.97	-0.226	-9.36	5.31	-1.47	0.497
sulfurdioxide slant column density window3 [DU]	-7.30 ± 26.97	5649604	34.1	-6.93	-388	713	-24.1	10.0
sulfurdioxide slant column density window3 precision [DU]	31.9 ± 13.2	5649604	10.7	28.7	9.80	368	24.3	35.0
sulfurdioxide slant column density corrected win3 [DU]	-3.61 ± 26.67	5649604	33.8	-3.44	-382	709	-20.4	13.5
background so2 slant column offset window3 [DU]	3.69 ± 4.49	5649604	6.30	2.71	-10.7	25.7	0.458	6.75
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.27	5649604	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.583 \pm 5.682) \times 10^{-2}$	5649604	1.487×10^{-2}	1.647×10^{-2}	1.195×10^{-3}	2.38	1.111×10^{-2}	2.598×10^{-2}
fitted radiance shift [nm]	$(-4.241 \pm 26.027) \times 10^{-4}$	5649604	1.861×10^{-3}	-4.200×10^{-4}	-0.105	6.458×10^{-2}	-1.395×10^{-3}	4.651×10^{-4}
fitted radiance squeeze [1]	$(2.005 \pm 19.160) \times 10^{-5}$	5649604	2.220×10^{-4}	1.524×10^{-5}	-2.225×10^{-2}	2.451×10^{-2}	-9.383×10^{-5}	1.282×10^{-4}
fitted root mean square [1]	$(1.393 \pm 0.540) \times 10^{-3}$	5649604	5.592×10^{-4}	1.262×10^{-3}	3.351×10^{-4}	0.162	1.050×10^{-3}	1.609×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.846 ± 0.339	5649604	0.397	0.810	5.000×10^{-2}	2.61	0.623	1.02
sulfurdioxide total air mass factor polluted precision [1]	$(8.597 \pm 7.152) \times 10^{-2}$	5649604	7.744×10^{-2}	5.697×10^{-2}	5.499×10^{-3}	1.57	3.826×10^{-2}	0.116
sulfurdioxide clear air mass factor polluted [1]	0.756 ± 0.211	5649604	0.279	0.748	0.117	1.82	0.616	0.896
number of spectral points in retrieval [1]	73.4 ± 0.5	5649604	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]	0.666 ± 0.392	11339573	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(2.659 \pm 82.453) \times 10^{-2}$	11339573	0.444	1.082×10^{-2}	-85.5	237	-0.209	0.236
sulfurdioxide total vertical column precision [DU]	0.464 ± 0.531	11339573	0.306	0.311	5.918×10^{-2}	41.9	0.221	0.527
sulfurdioxide slant column density corrected [DU]	$(1.842 \pm 39.508) \times 10^{-2}$	11339573	0.378	9.735×10^{-3}	-68.4	174	-0.177	0.200
sulfurdioxide slant column density cobra [DU]	$(1.814 \pm 37.345) \times 10^{-2}$	11339573	0.378	9.735×10^{-3}	-68.4	39.5	-0.177	0.200
sulfurdioxide slant column density cobra precision [DU]	0.301 ± 0.132	11339573	0.139	0.263	8.152×10^{-2}	33.5	0.214	0.354
sulfurdioxide slant column density window1 [DU]	0.114 ± 0.698	11339573	0.758	0.124	-110	54.9	-0.261	0.498
sulfurdioxide slant column density window1 precision [DU]	0.301 ± 0.132	11339573	0.139	0.263	8.152×10^{-2}	33.5	0.214	0.354
sulfurdioxide slant column density corrected win1 [DU]	$(3.700 \pm 68.744) \times 10^{-2}$	11339573	0.747	2.183×10^{-2}	-110	54.8	-0.347	0.400
background so2 slant column offset window1 [DU]	$(-7.691 \pm 14.227) \times 10^{-2}$	11339573	0.153	-0.105	-0.541	2.98	-0.170	-1.689×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.72 ± 9.07	11339573	11.5	1.63	-1.621×10^3	1.640×10^3	-4.07	7.40
sulfurdioxide slant column density window2 precision [DU]	8.12 ± 2.25	11339573	2.60	7.77	2.37	591	6.64	9.24
sulfurdioxide slant column density corrected win2 [DU]	0.675 ± 8.858	11339573	11.1	0.692	-1.622×10^3	1.640×10^3	-4.89	6.25
background so2 slant column offset window2 [DU]	-1.05 ± 2.23	11339573	3.19	-0.373	-11.6	5.65	-2.51	0.685
sulfurdioxide slant column density window3 [DU]	-5.56 ± 23.98	11339573	30.0	-6.04	-366	527	-20.7	9.37
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 11.7	11339573	9.36	24.3	9.15	368	20.9	30.2
sulfurdioxide slant column density corrected win3 [DU]	-1.09 ± 23.16	11339573	28.9	-1.27	-366	528	-15.6	13.3
background so2 slant column offset window3 [DU]	4.47 ± 5.48	11339573	9.37	3.94	-16.1	25.7	-4.791×10^{-2}	9.32
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	11339573	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.171 \pm 3.271) \times 10^{-2}$	11339573	1.603×10^{-2}	1.462×10^{-2}	4.221×10^{-4}	1.75	8.432×10^{-3}	2.446×10^{-2}
fitted radiance shift [nm]	$(-1.865 \pm 23.002) \times 10^{-4}$	11339573	1.624×10^{-3}	-1.718×10^{-4}	-0.105	4.382×10^{-2}	-1.021×10^{-3}	6.028×10^{-4}
fitted radiance squeeze [1]	$(-2.261 \pm 18.547) \times 10^{-5}$	11339573	2.107×10^{-4}	-1.738×10^{-5}	-1.942×10^{-2}	1.429×10^{-2}	-1.248×10^{-4}	8.585×10^{-5}
fitted root mean square [1]	$(1.315 \pm 0.532) \times 10^{-3}$	11339573	5.788×10^{-4}	1.161×10^{-3}	3.249×10^{-4}	4.920×10^{-2}	9.608×10^{-4}	1.540×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.903 ± 0.421	11339573	0.510	0.855	5.000×10^{-2}	2.45	0.615	1.12
sulfurdioxide total air mass factor polluted precision [1]	0.102 ± 0.107	11339573	8.713×10^{-2}	6.485×10^{-2}	4.129×10^{-3}	2.12	4.056×10^{-2}	0.128
sulfurdioxide clear air mass factor polluted [1]	0.787 ± 0.313	11339573	0.374	0.765	8.117×10^{-2}	2.41	0.576	0.950
number of spectral points in retrieval [1]	73.4 ± 0.5	11339573	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]	0.603 ± 0.430	4189864	0.880	1.000	0.0	1.000	0.120	1.000
sulfurdioxide total vertical column [DU]	$(3.187 \pm 105.385) \times 10^{-2}$	4189864	0.433	1.071×10^{-2}	-73.0	849	-0.201	0.232
sulfurdioxide total vertical column precision [DU]	0.496 ± 0.657	4189864	0.341	0.331	4.386×10^{-2}	64.3	0.201	0.542
sulfurdioxide slant column density corrected [DU]	$(2.196 \pm 46.203) \times 10^{-2}$	4189864	0.362	1.003×10^{-2}	-53.9	214	-0.169	0.193
sulfurdioxide slant column density cobra [DU]	$(2.119 \pm 36.546) \times 10^{-2}$	4189864	0.362	1.003×10^{-2}	-53.9	88.3	-0.169	0.193
sulfurdioxide slant column density cobra precision [DU]	0.283 ± 0.119	4189864	9.726×10^{-2}	0.251	9.387×10^{-2}	35.2	0.214	0.312
sulfurdioxide slant column density window1 [DU]	0.148 ± 0.661	4189864	0.714	0.139	-130	178	-0.217	0.497
sulfurdioxide slant column density window1 precision [DU]	0.283 ± 0.119	4189864	9.726×10^{-2}	0.251	9.387×10^{-2}	35.2	0.214	0.312
sulfurdioxide slant column density corrected win1 [DU]	$(4.543 \pm 65.508) \times 10^{-2}$	4189864	0.703	2.522×10^{-2}	-130	177	-0.321	0.383
background so2 slant column offset window1 [DU]	-0.102 ± 0.117	4189864	0.138	-0.121	-0.829	1.14	-0.179	-4.142×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.55 ± 9.04	4189864	11.3	1.60	-1.162×10^3	1.306×10^3	-4.06	7.20
sulfurdioxide slant column density window2 precision [DU]	8.11 ± 2.65	4189864	2.76	7.74	2.40	722	6.49	9.25
sulfurdioxide slant column density corrected win2 [DU]	0.600 ± 8.854	4189864	10.9	0.628	-1.162×10^3	1.304×10^3	-4.84	6.07
background so2 slant column offset window2 [DU]	-0.950 ± 2.069	4189864	2.95	-0.423	-11.6	4.28	-2.30	0.654
sulfurdioxide slant column density window3 [DU]	-12.8 ± 22.9	4189864	27.9	-12.4	-333	713	-26.5	1.38
sulfurdioxide slant column density window3 precision [DU]	30.2 ± 16.9	4189864	13.0	25.4	9.55	261	20.5	33.5
sulfurdioxide slant column density corrected win3 [DU]	-7.99 ± 23.26	4189864	28.5	-7.12	-328	709	-21.8	6.66
background so2 slant column offset window3 [DU]	4.79 ± 5.32	4189864	9.13	4.86	-15.4	25.2	0.273	9.41
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.13	4189864	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.505 \pm 11.832) \times 10^{-2}$	4189864	4.864×10^{-2}	1.954×10^{-2}	2.784×10^{-4}	2.36	5.874×10^{-3}	5.451×10^{-2}
fitted radiance shift [nm]	$(-5.265 \pm 320.457) \times 10^{-5}$	4189864	1.849×10^{-3}	-7.964×10^{-5}	-7.310×10^{-2}	5.125×10^{-2}	-1.006×10^{-3}	8.435×10^{-4}
fitted radiance squeeze [1]	$(-3.010 \pm 17.280) \times 10^{-5}$	4189864	2.011×10^{-4}	-2.794×10^{-5}	-2.225×10^{-2}	2.451×10^{-2}	-1.292×10^{-4}	7.191×10^{-5}
fitted root mean square [1]	$(1.221 \pm 0.466) \times 10^{-3}$	4189864	3.979×10^{-4}	1.115×10^{-3}	2.696×10^{-4}	0.155	9.549×10^{-4}	1.353×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.937 ± 0.570	4189864	0.765	0.771	5.000×10^{-2}	2.82	0.507	1.27
sulfurdioxide total air mass factor polluted precision [1]	0.141 ± 0.157	4189864	0.159	9.320×10^{-2}	3.979×10^{-3}	1.66	3.500×10^{-2}	0.194
sulfurdioxide clear air mass factor polluted [1]	0.719 ± 0.340	4189864	0.393	0.662	5.830×10^{-2}	2.79	0.473	0.866
number of spectral points in retrieval [1]	73.4 ± 0.5	4189864	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

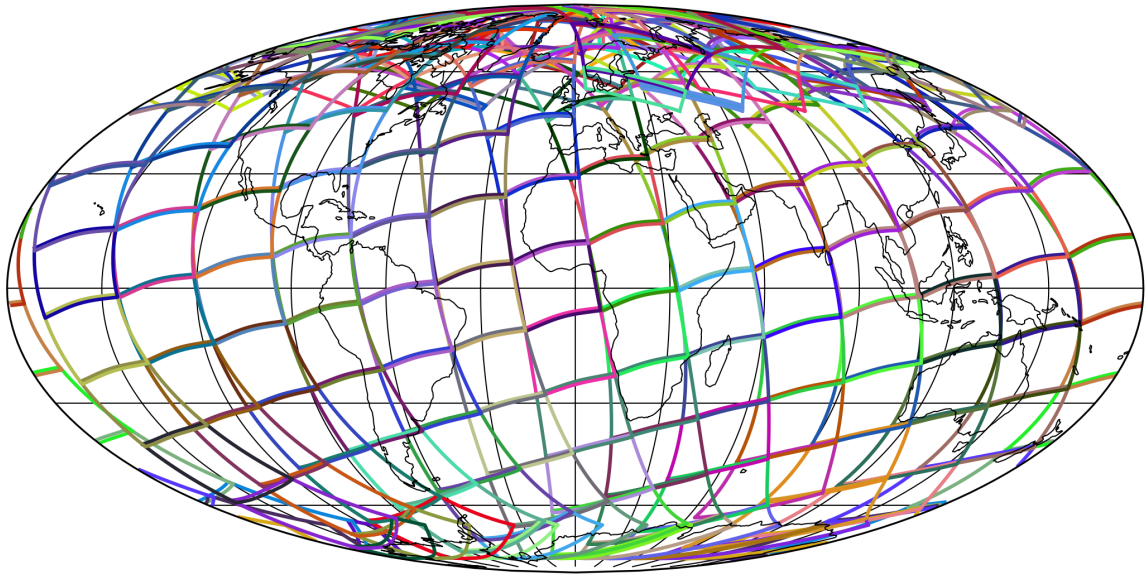


Figure 1: Outline of the granules.

4 Input data monitoring

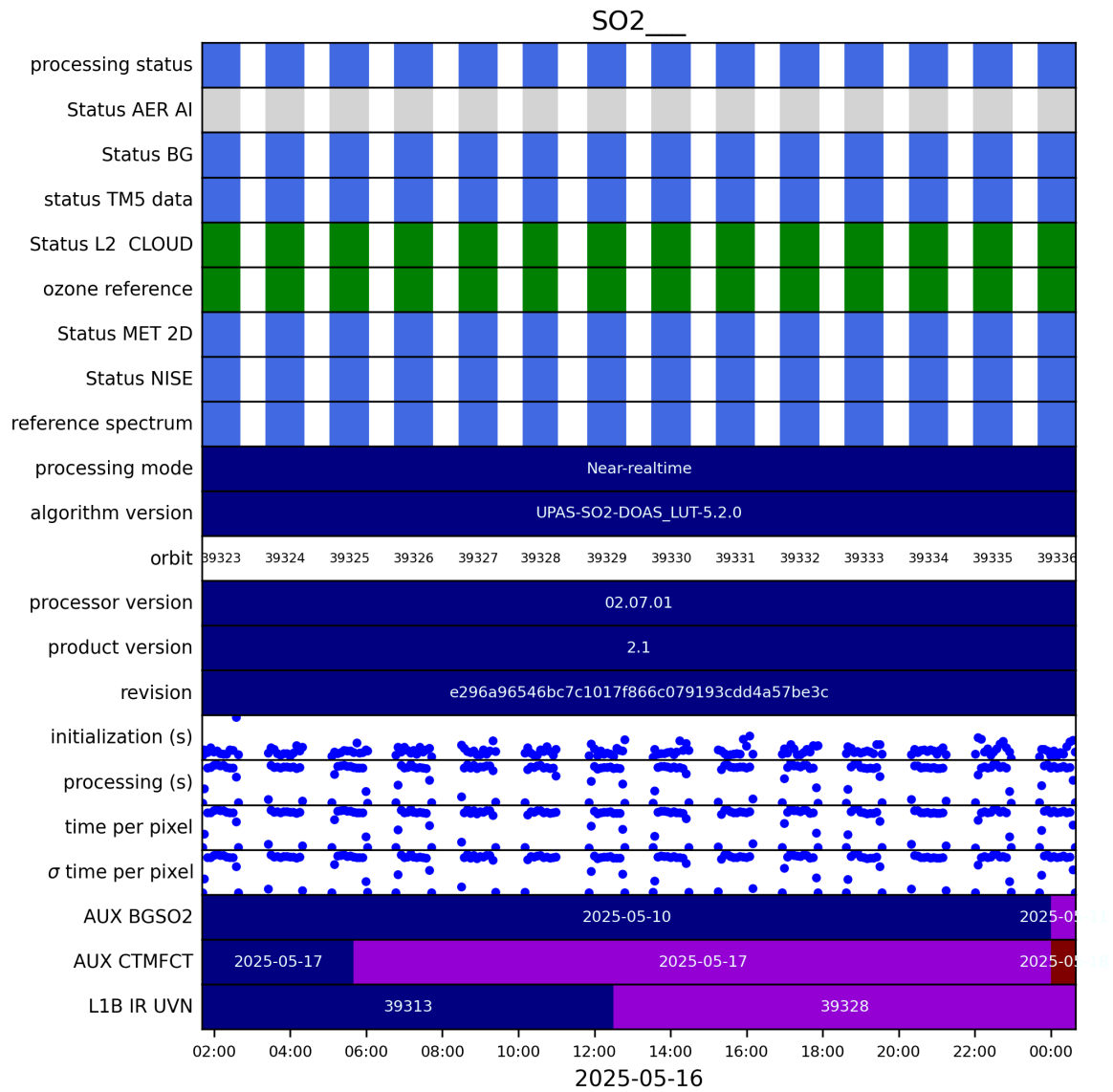


Figure 2: Input data per granule

5 Warnings and errors

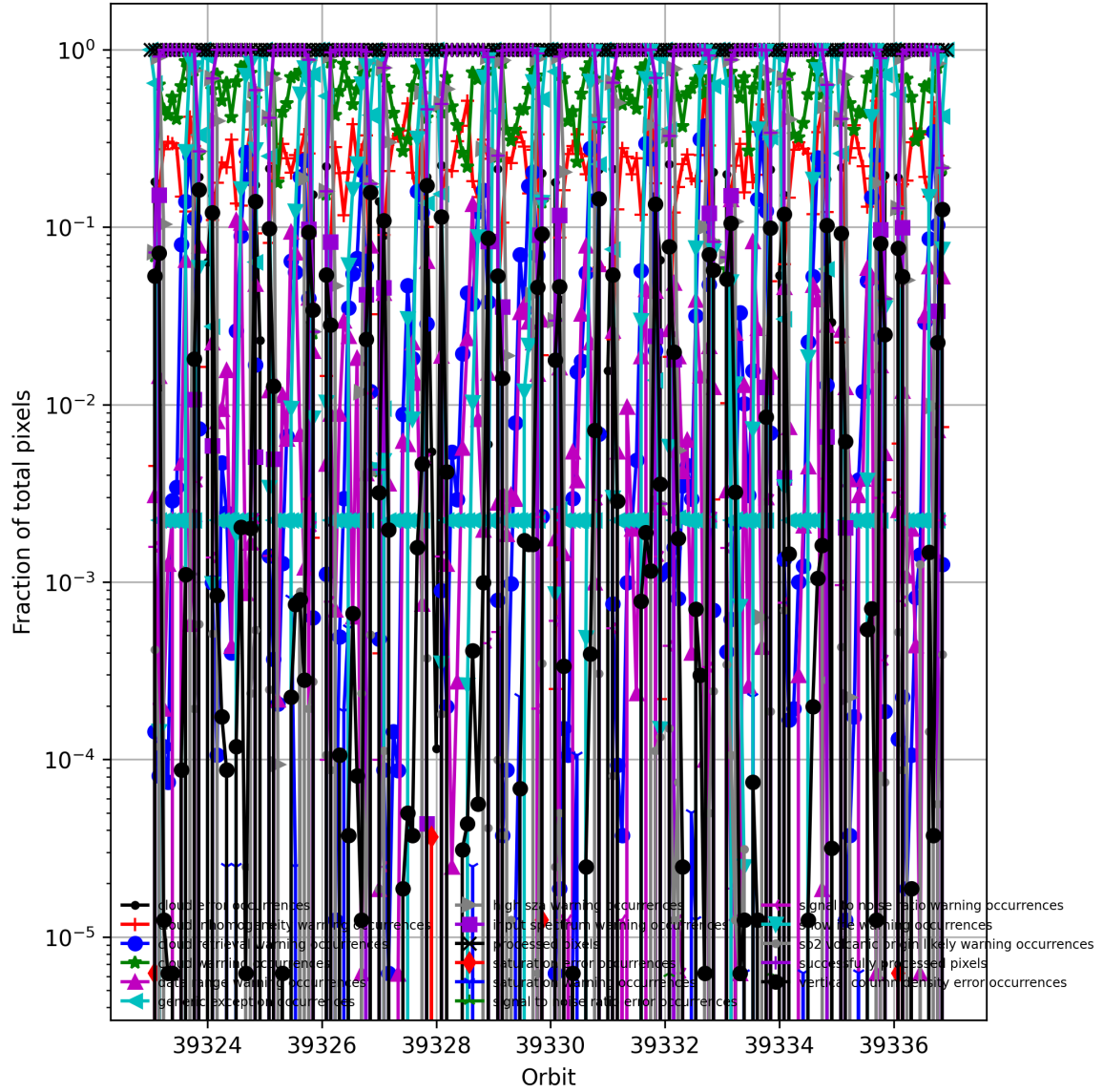


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

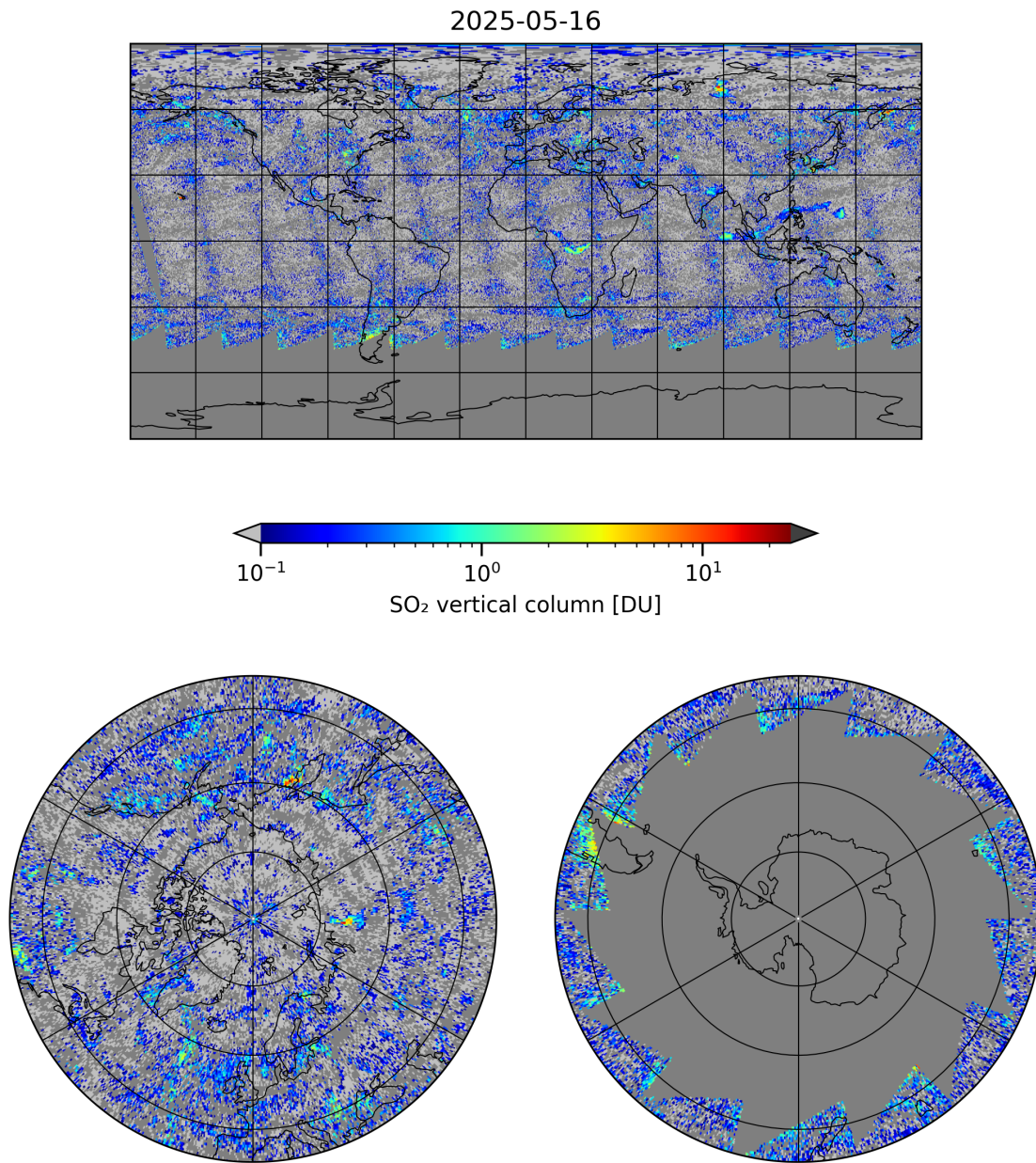


Figure 4: Map of “SO₂ vertical column” for 2025-05-16 to 2025-05-17

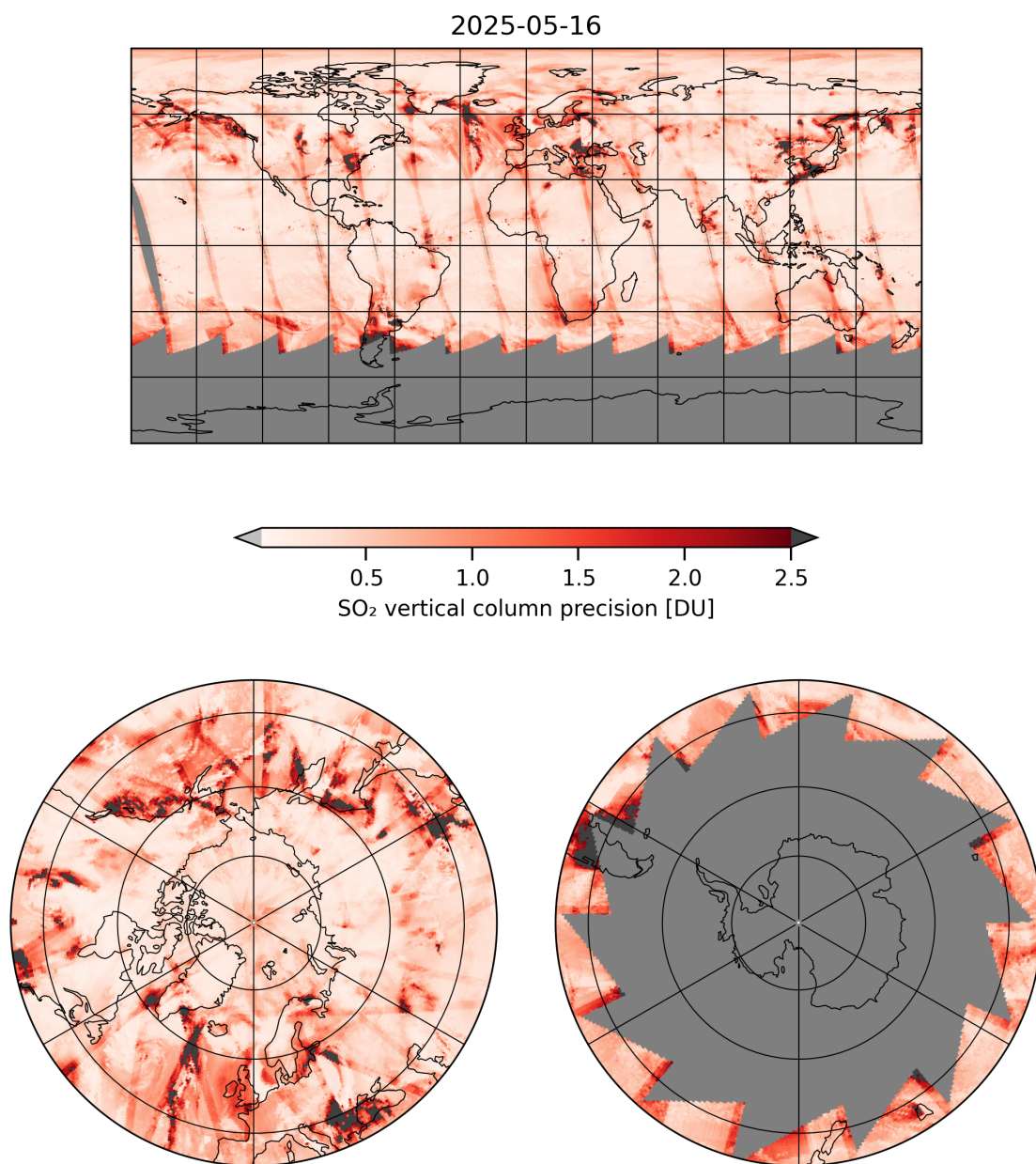


Figure 5: Map of “SO₂ vertical column precision” for 2025-05-16 to 2025-05-17

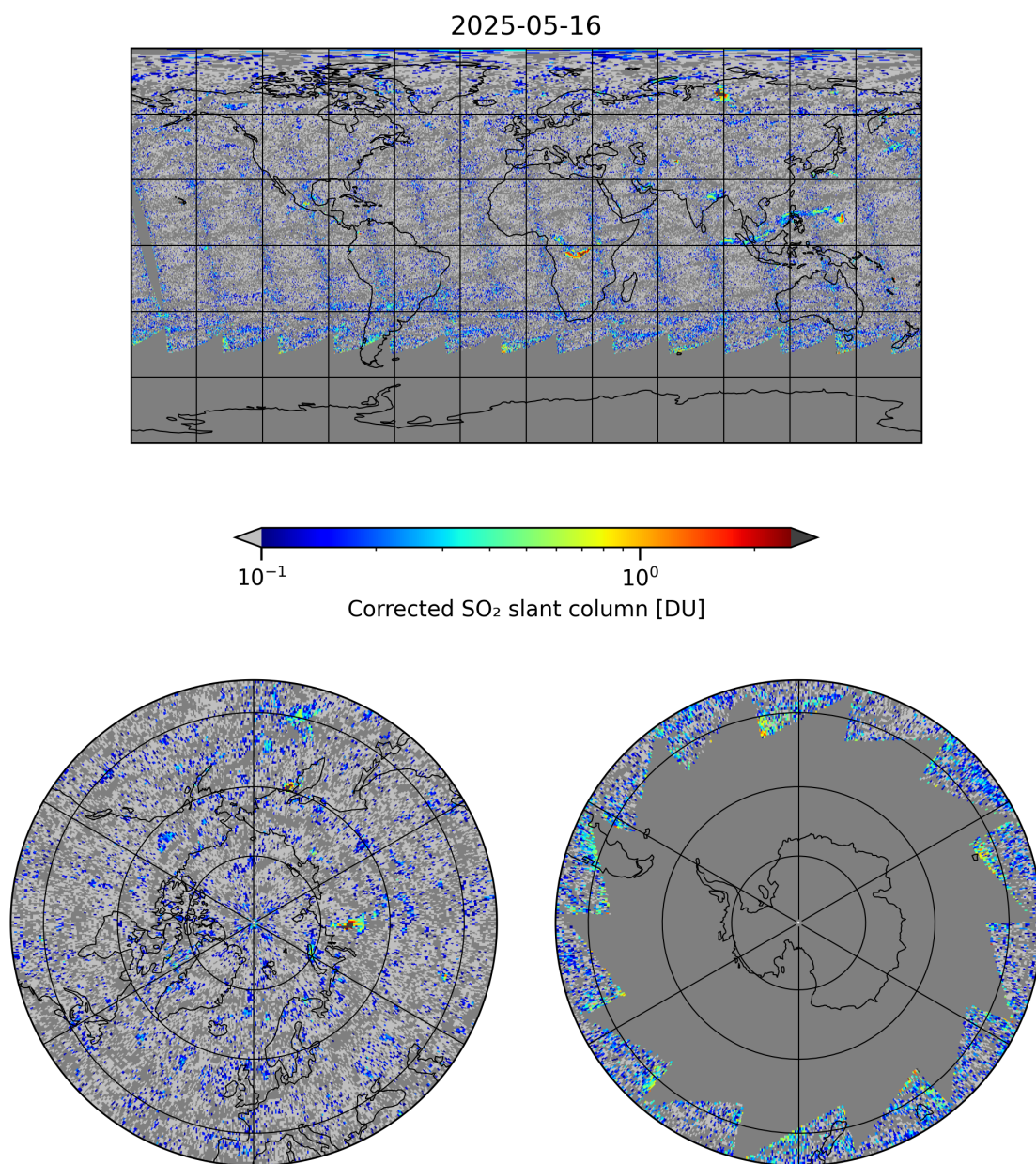


Figure 6: Map of “Corrected SO₂ slant column” for 2025-05-16 to 2025-05-17

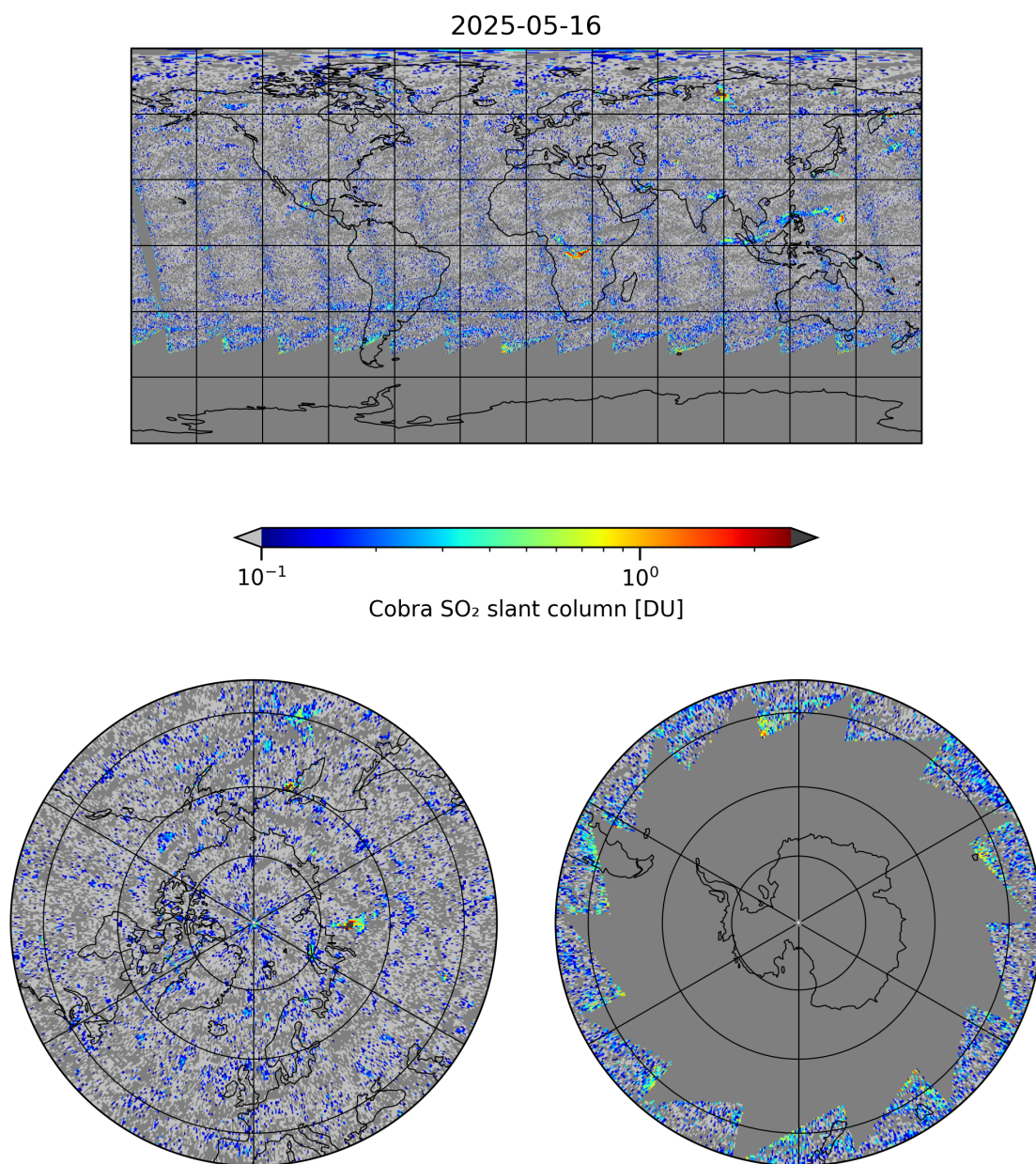


Figure 7: Map of “Cobra SO₂ slant column” for 2025-05-16 to 2025-05-17

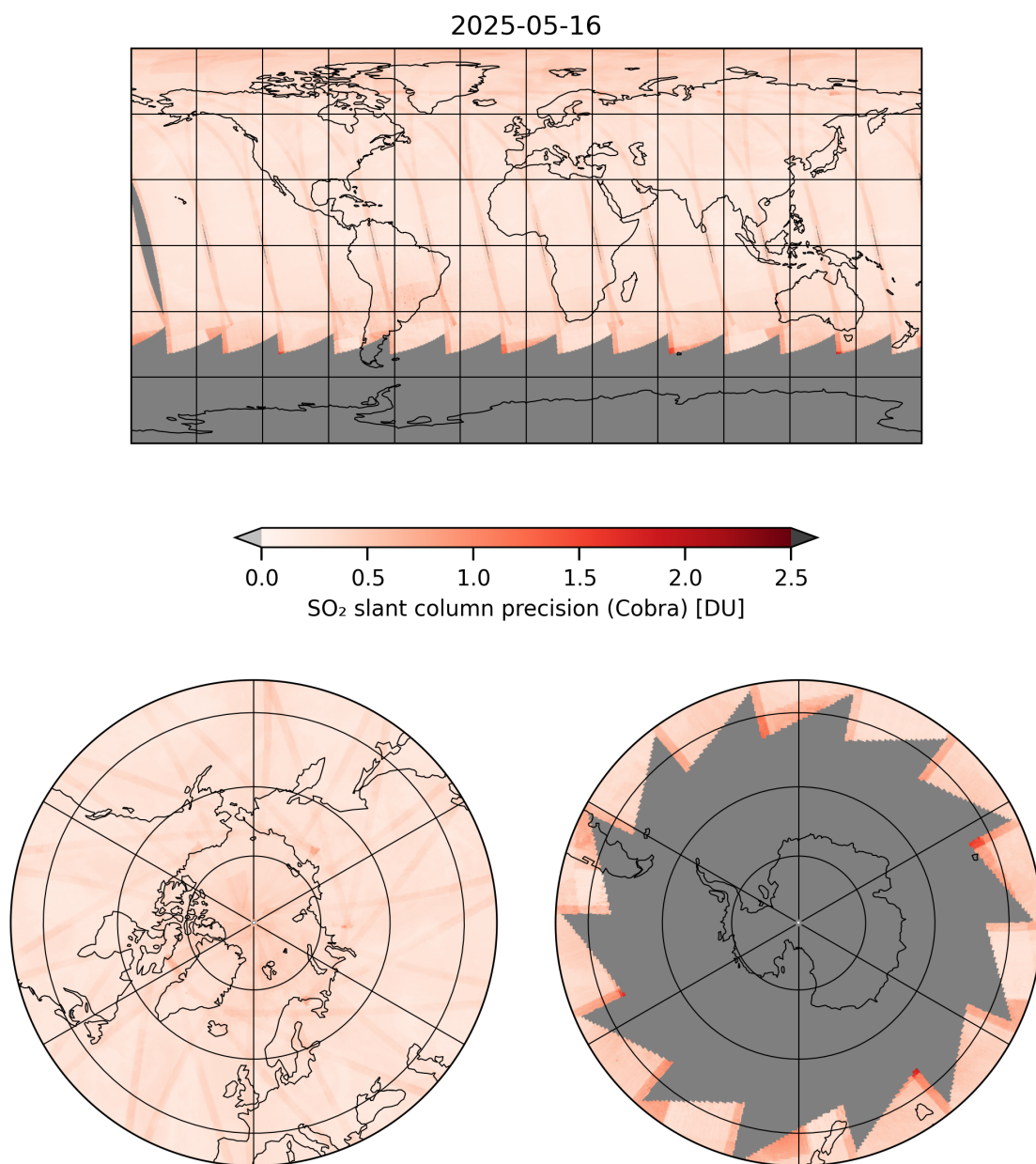


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-05-16 to 2025-05-17

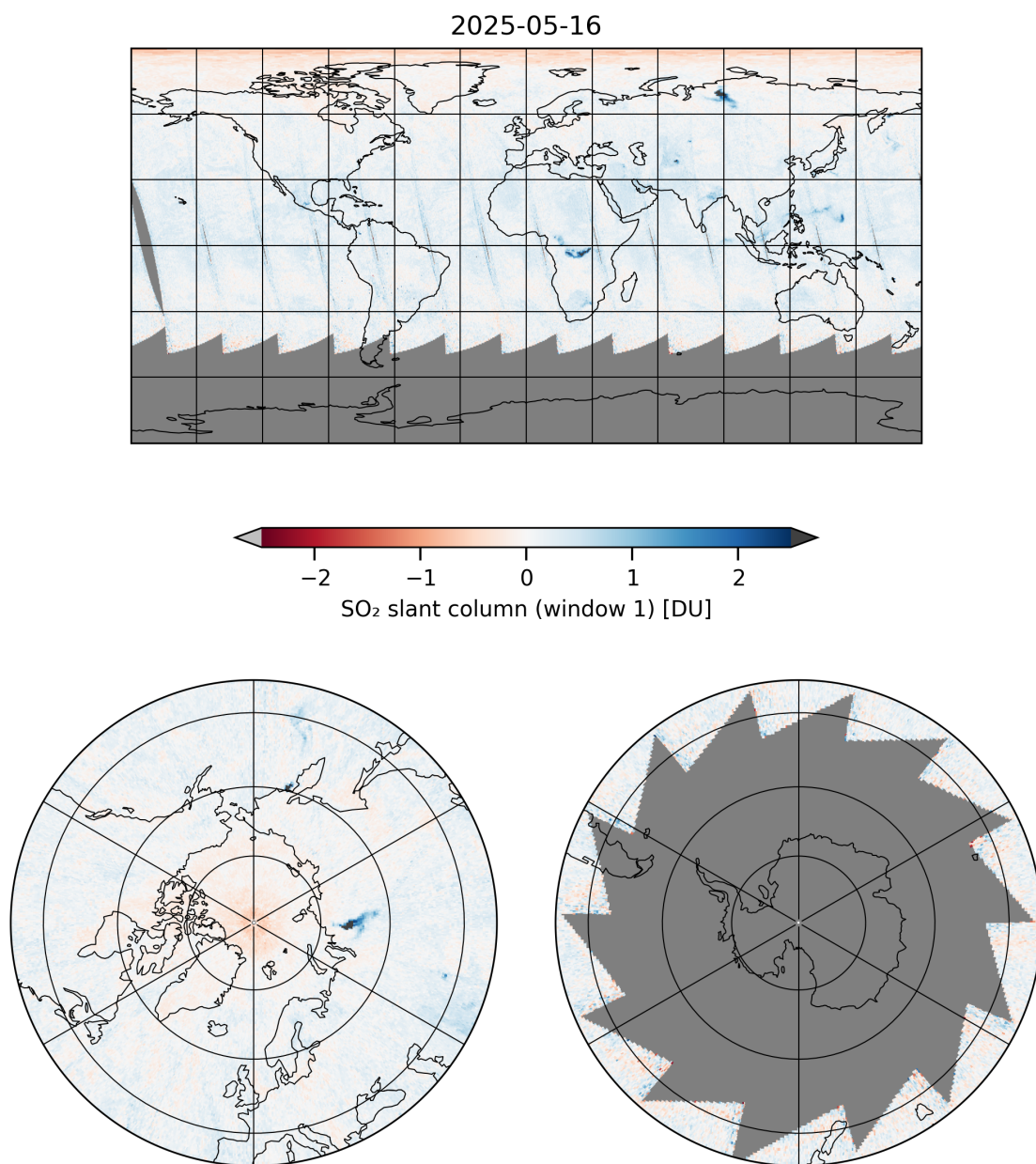


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-05-16 to 2025-05-17

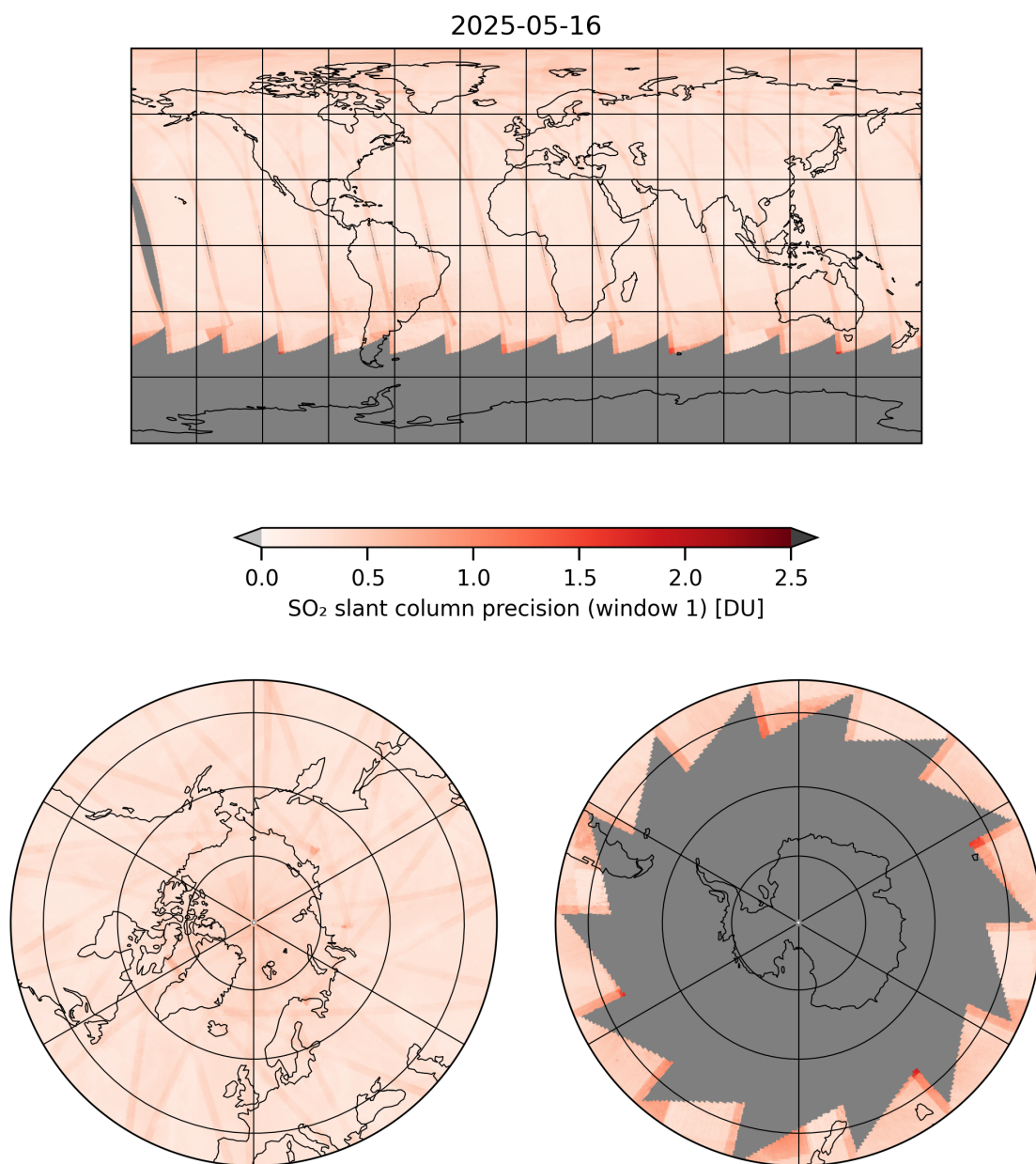


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-05-16 to 2025-05-17

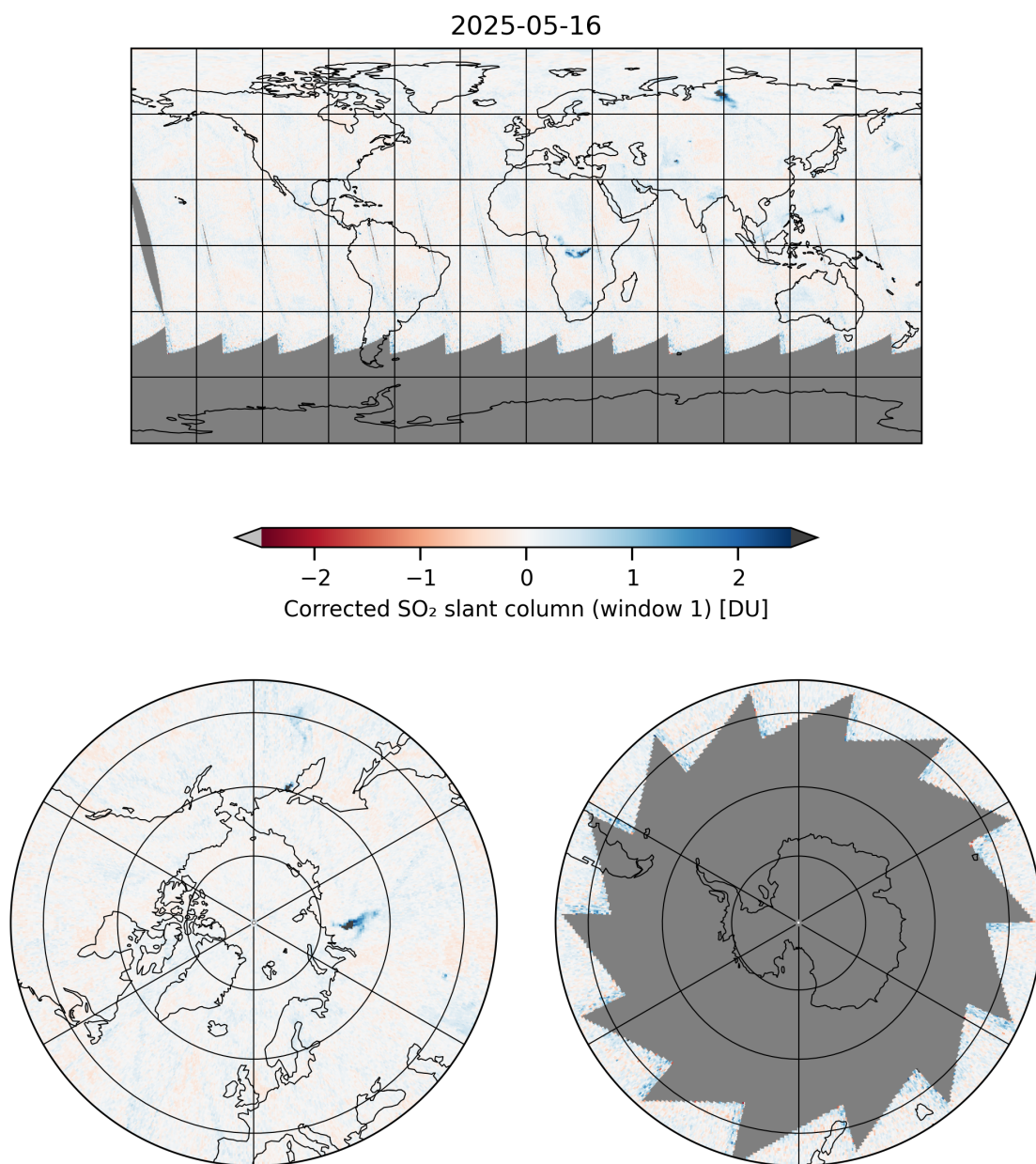


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-05-16 to 2025-05-17

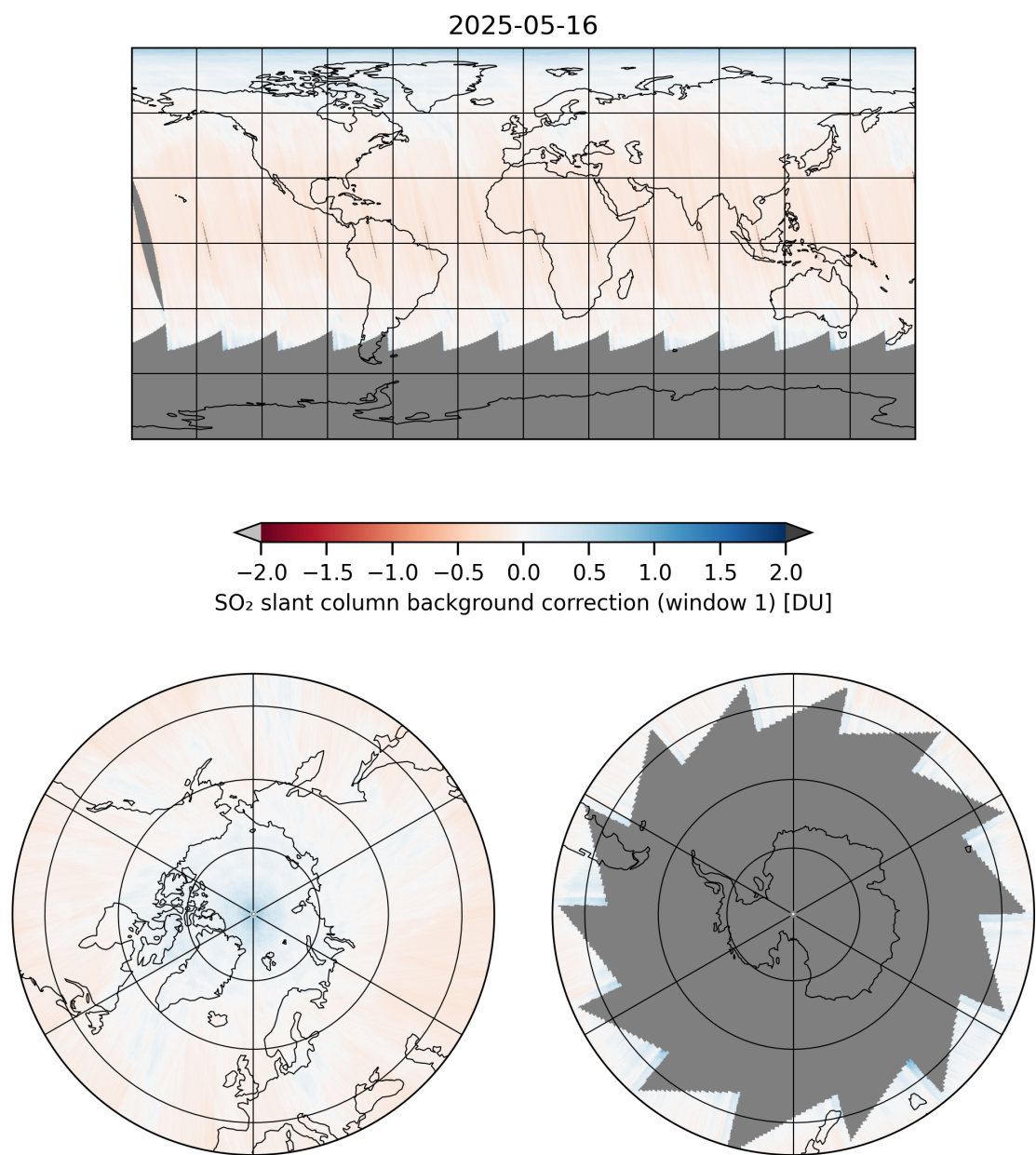


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-05-16 to 2025-05-17

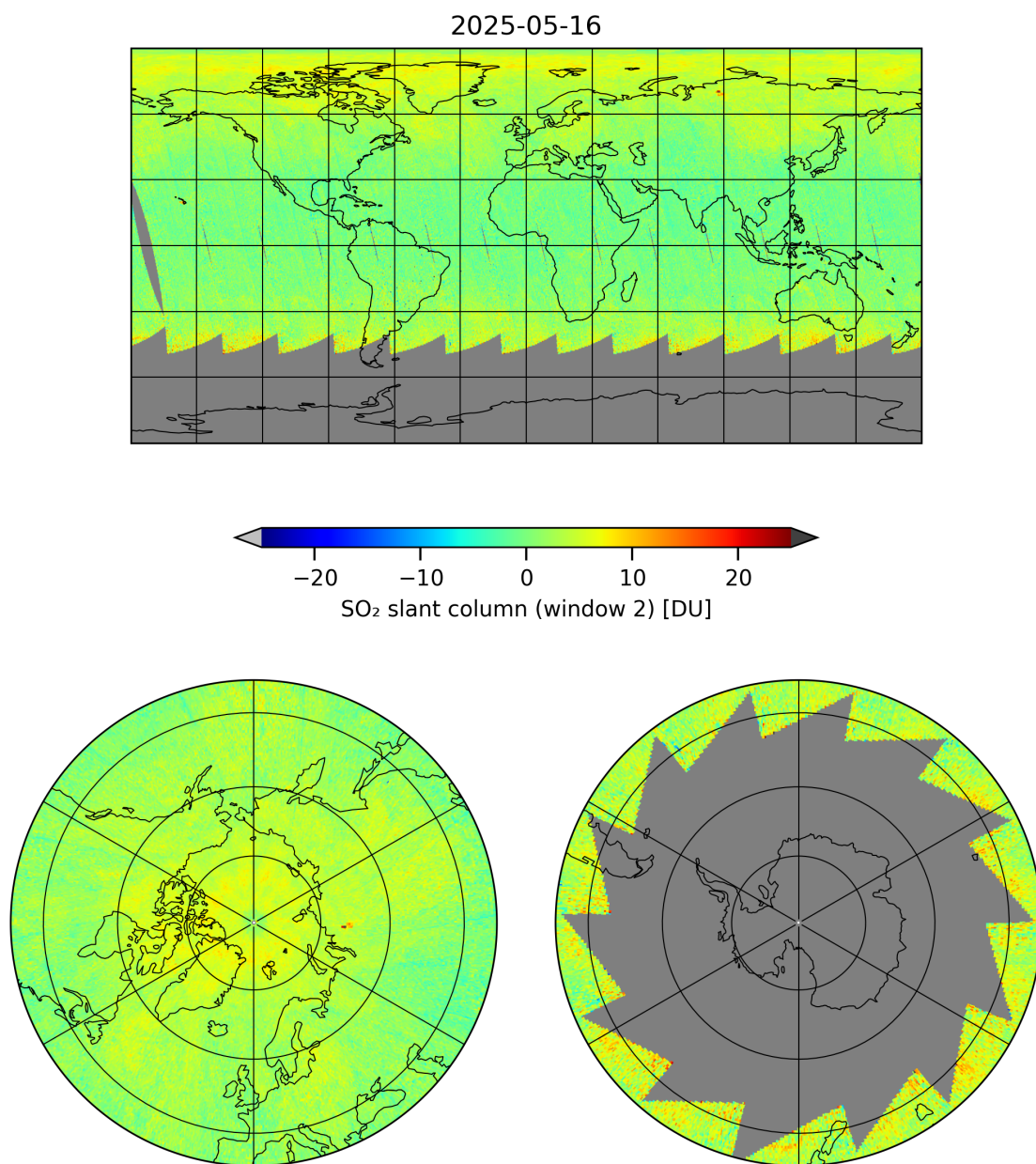


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-05-16 to 2025-05-17

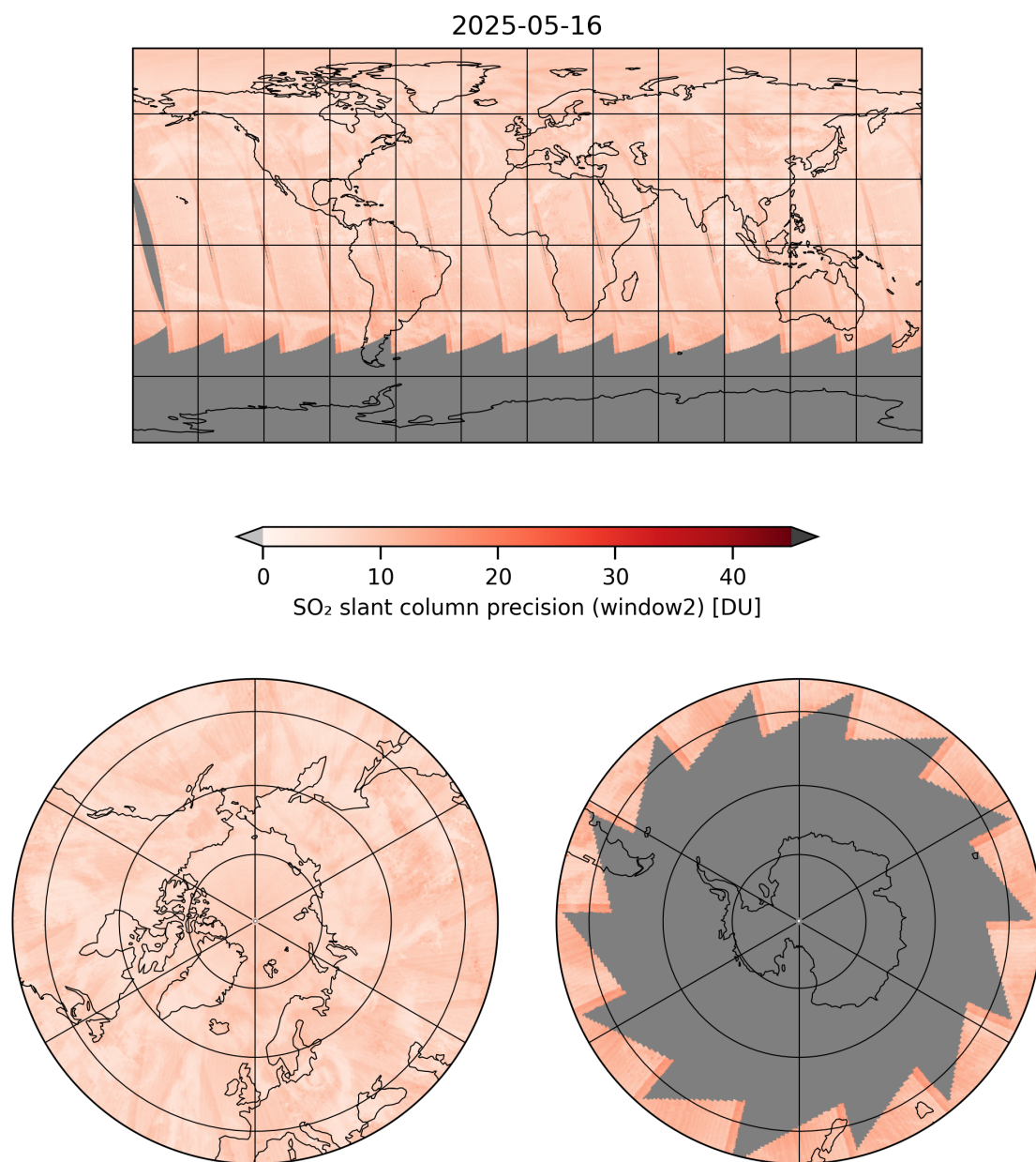


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-05-16 to 2025-05-17

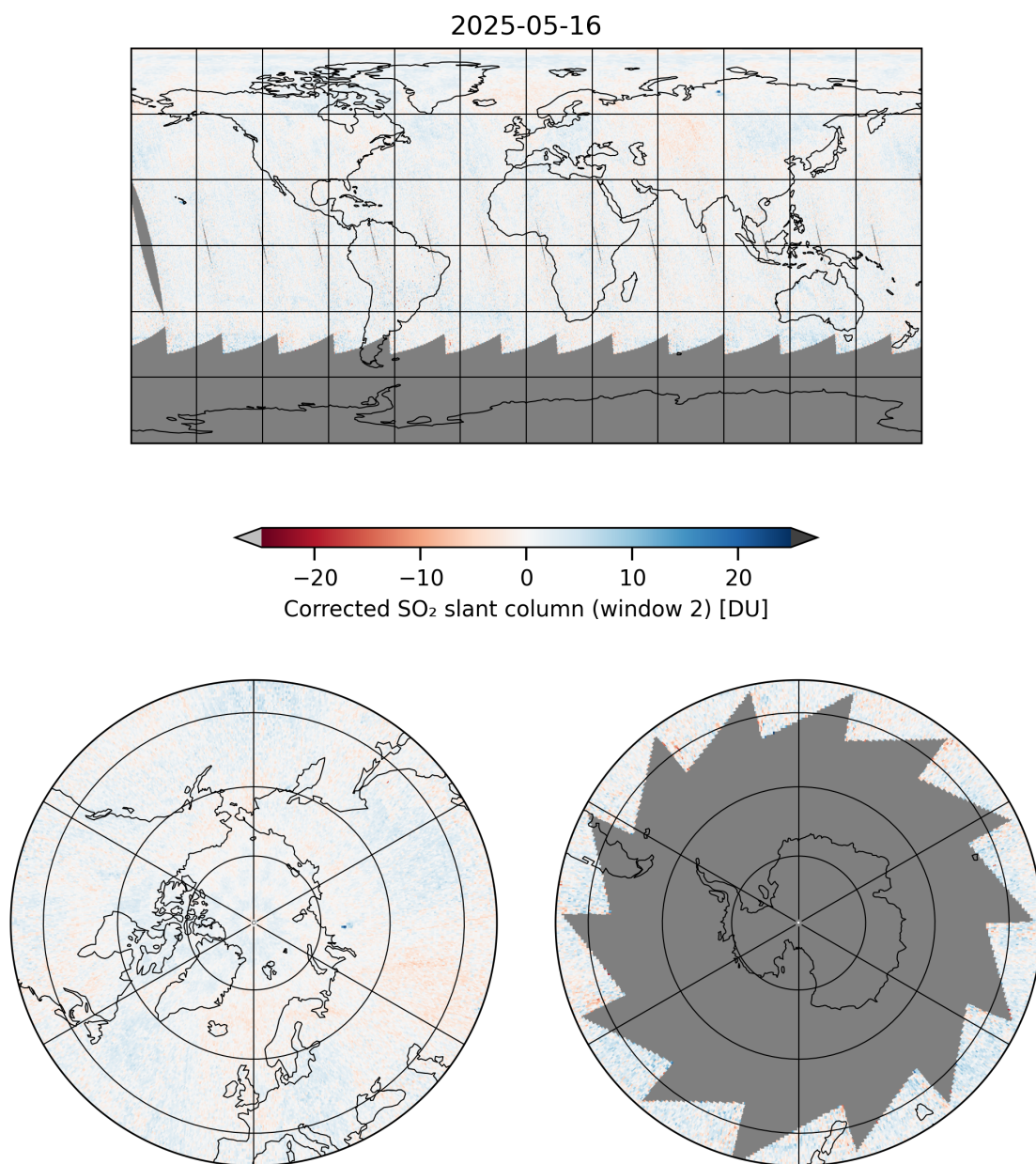


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-05-16 to 2025-05-17

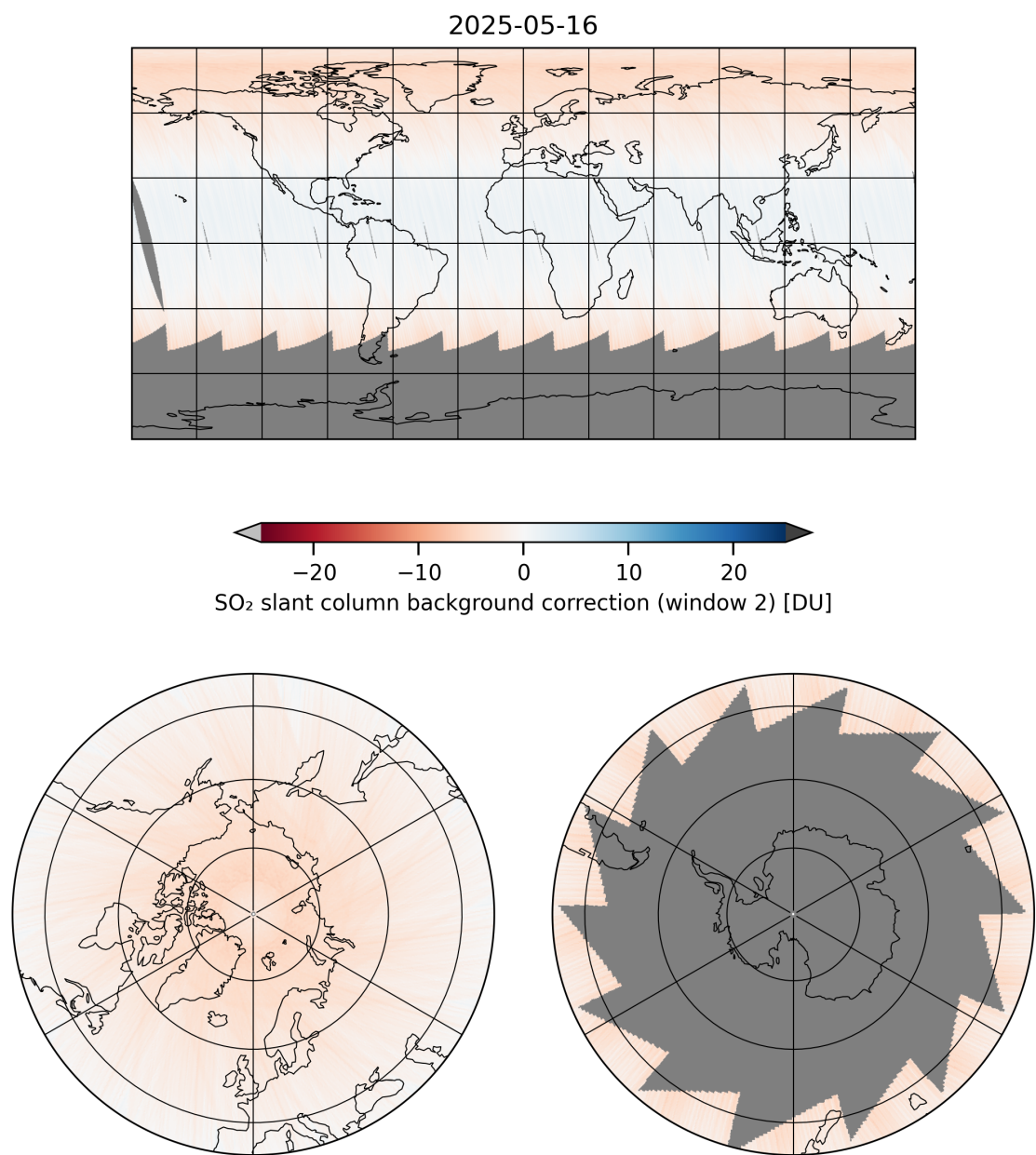


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-05-16 to 2025-05-17

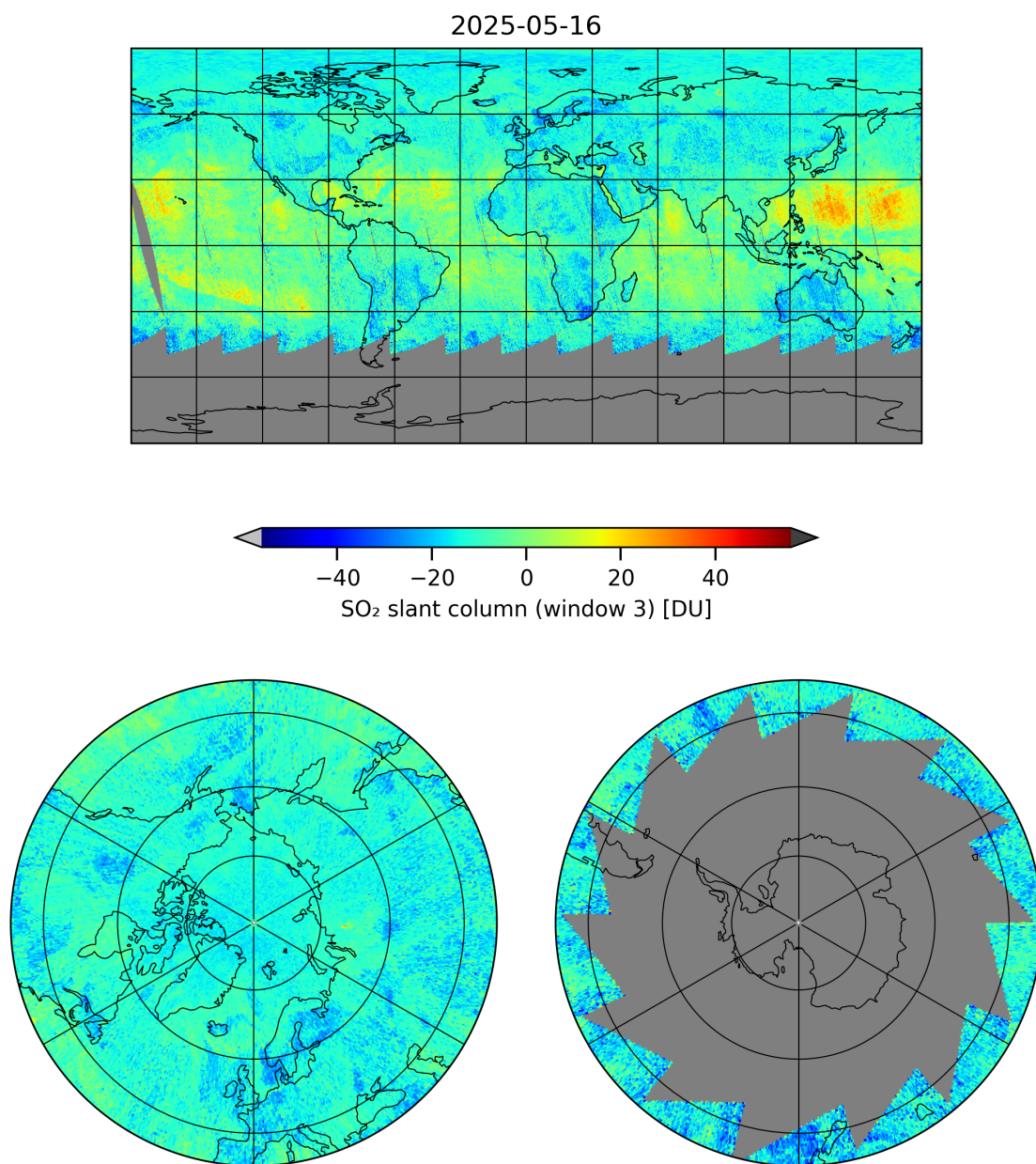


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-05-16 to 2025-05-17

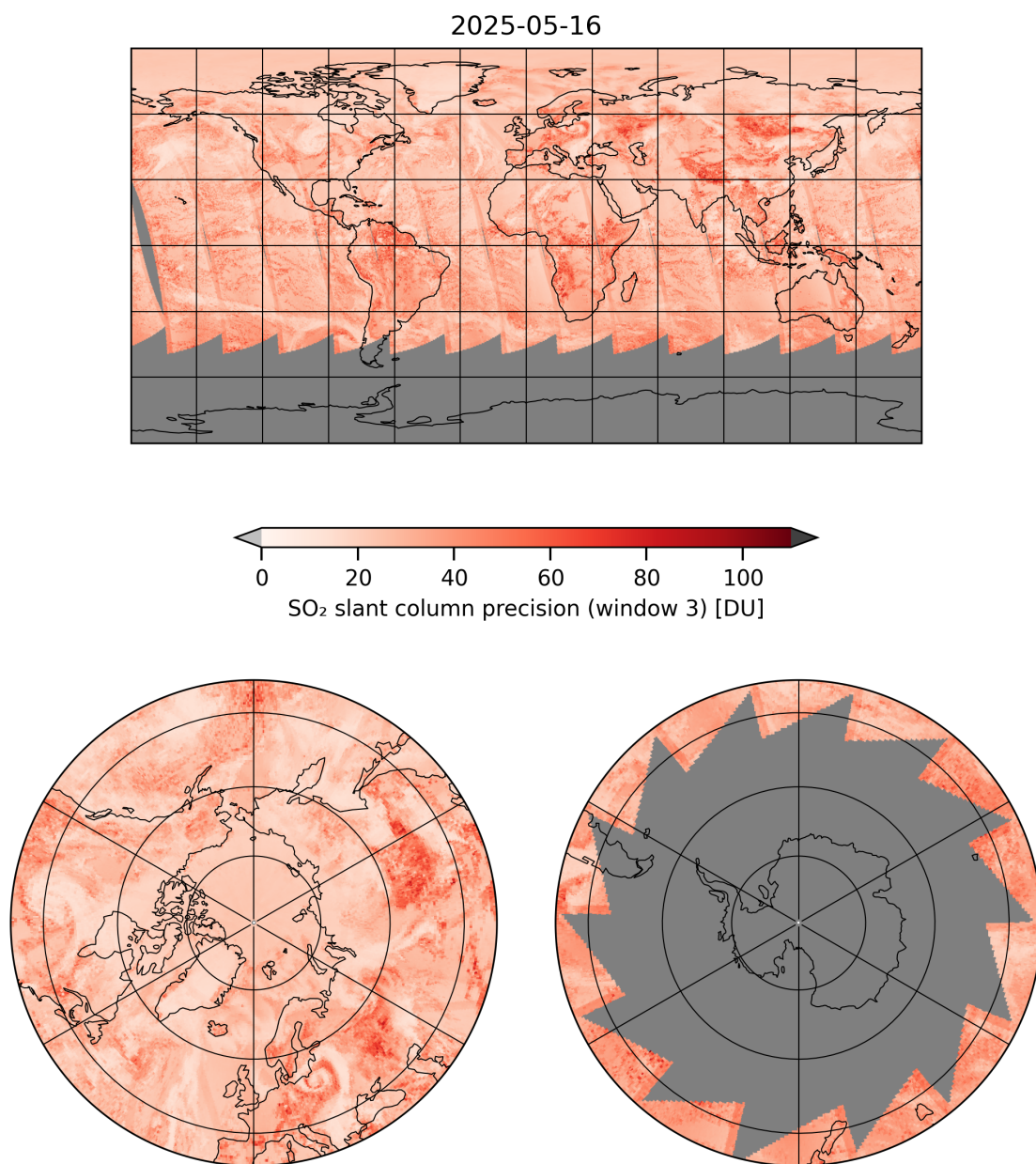
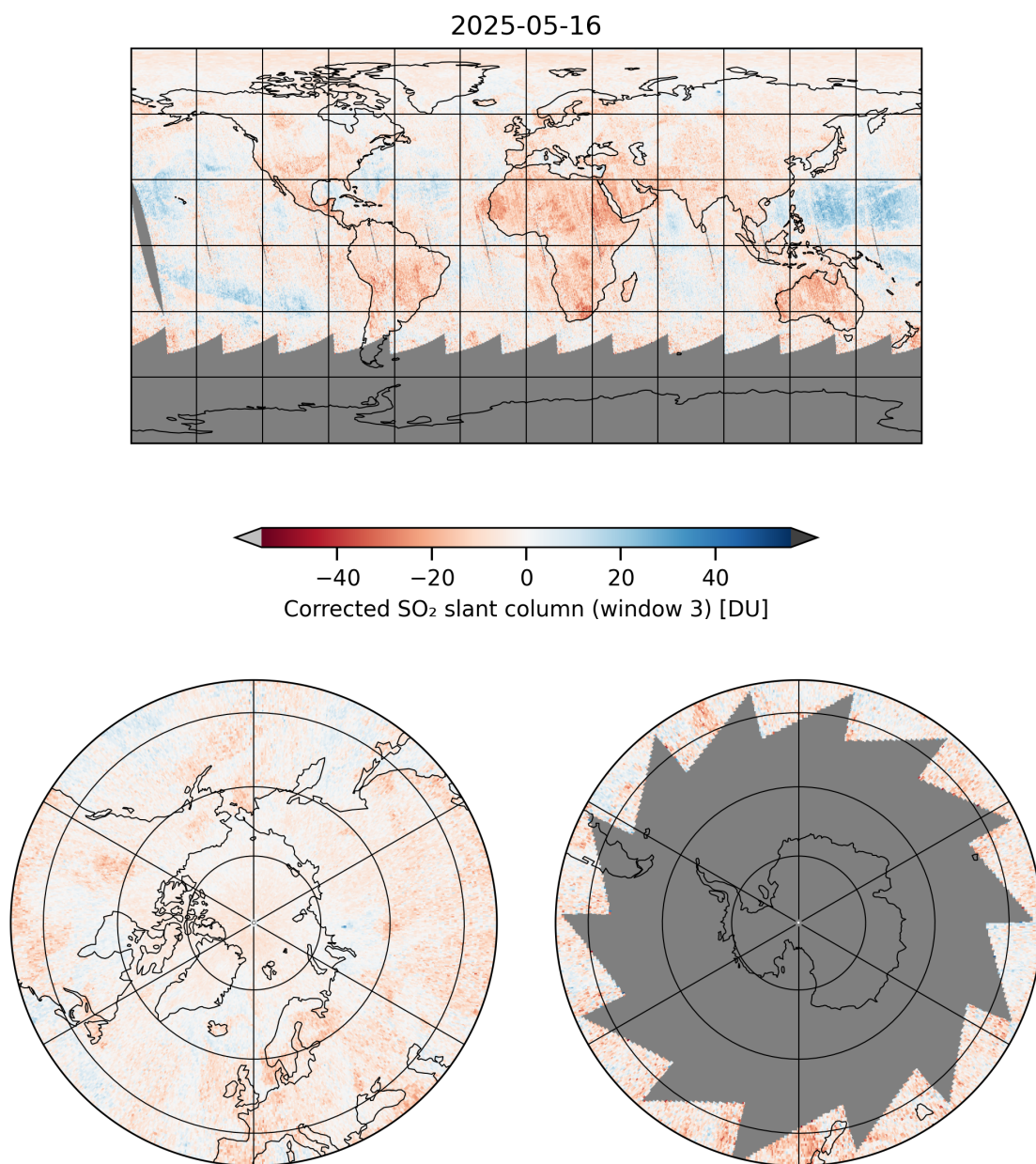


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-05-16 to 2025-05-17



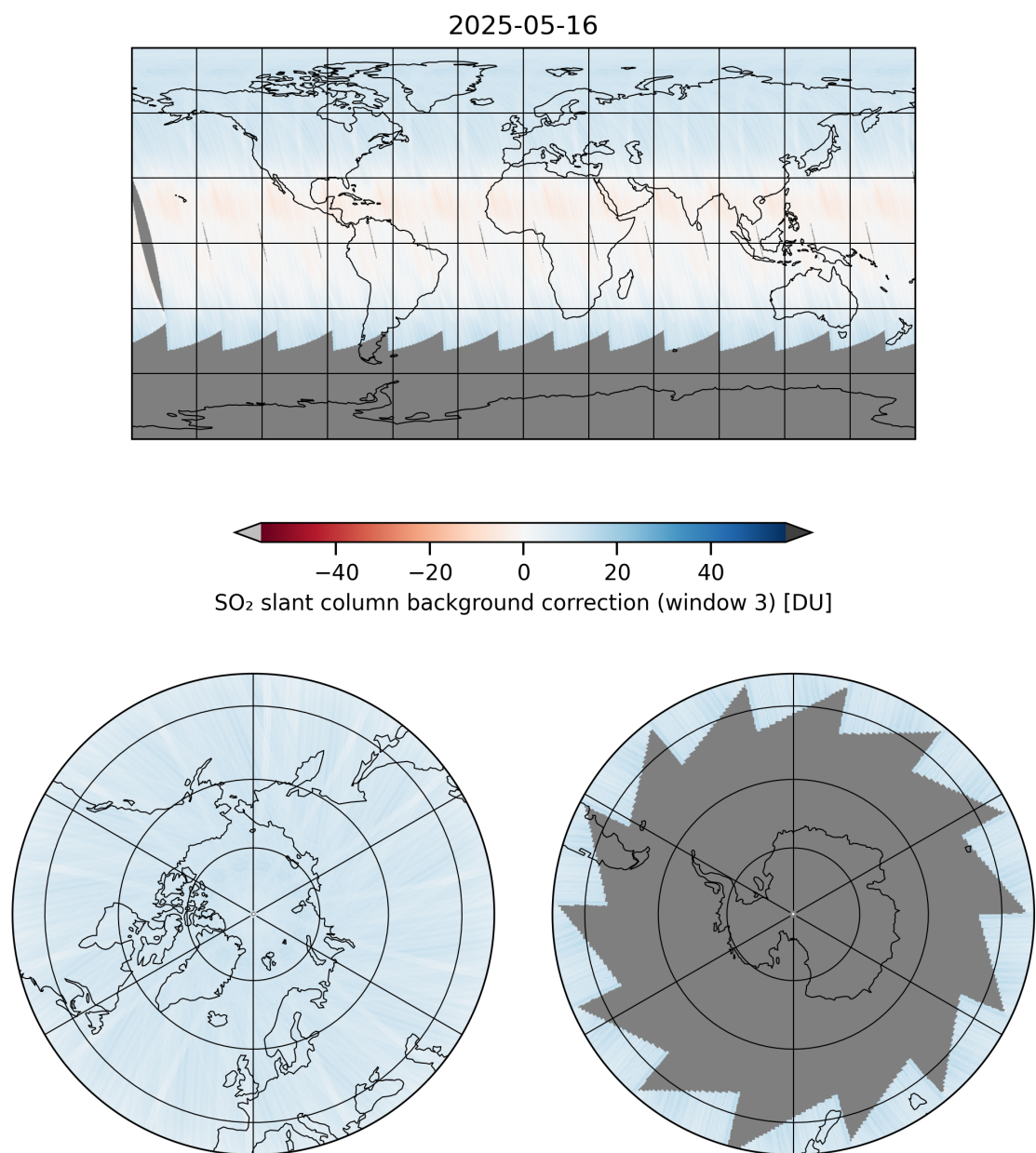


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-05-16 to 2025-05-17

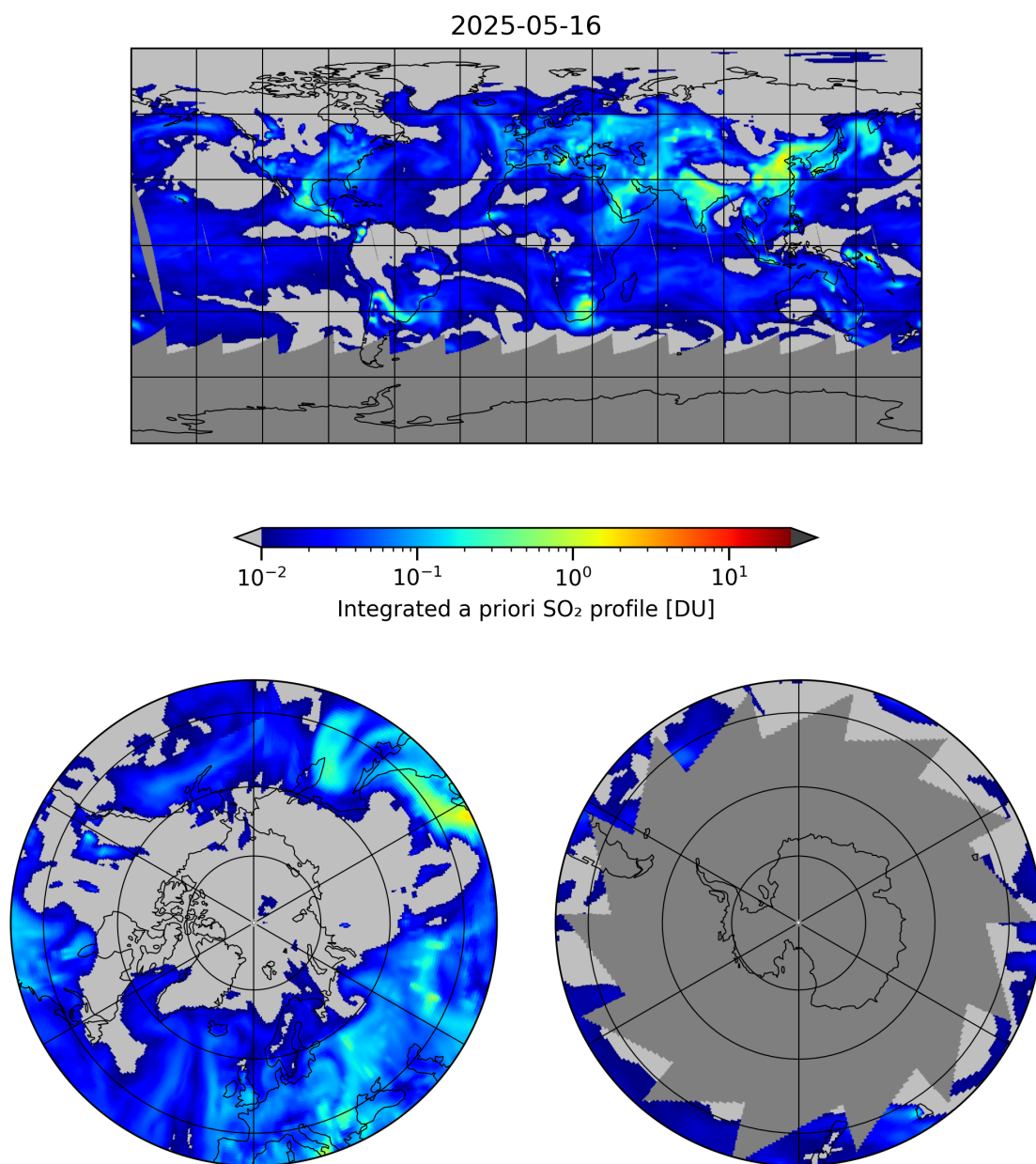


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-05-16 to 2025-05-17

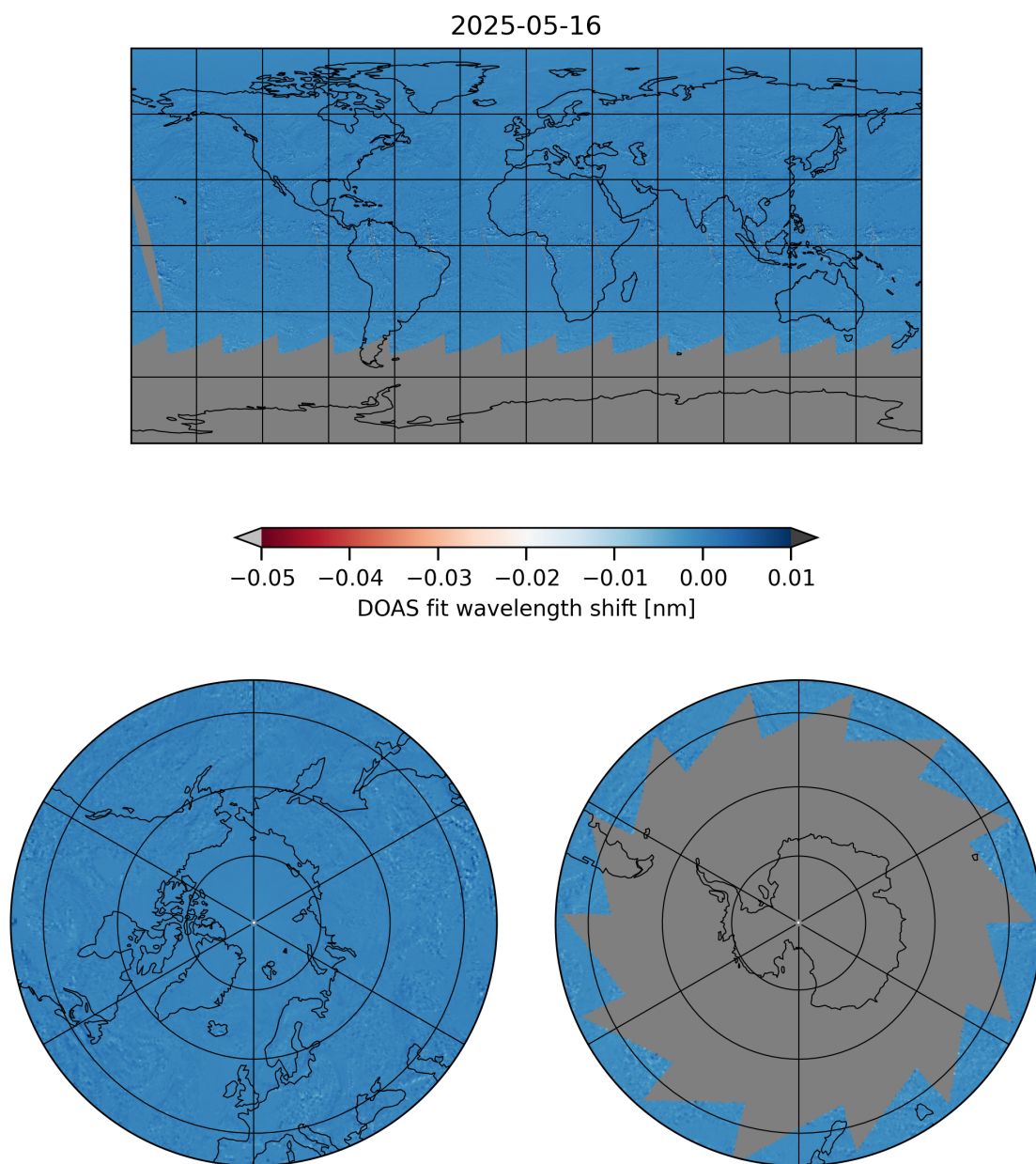


Figure 22: Map of “DOAS fit wavelength shift” for 2025-05-16 to 2025-05-17

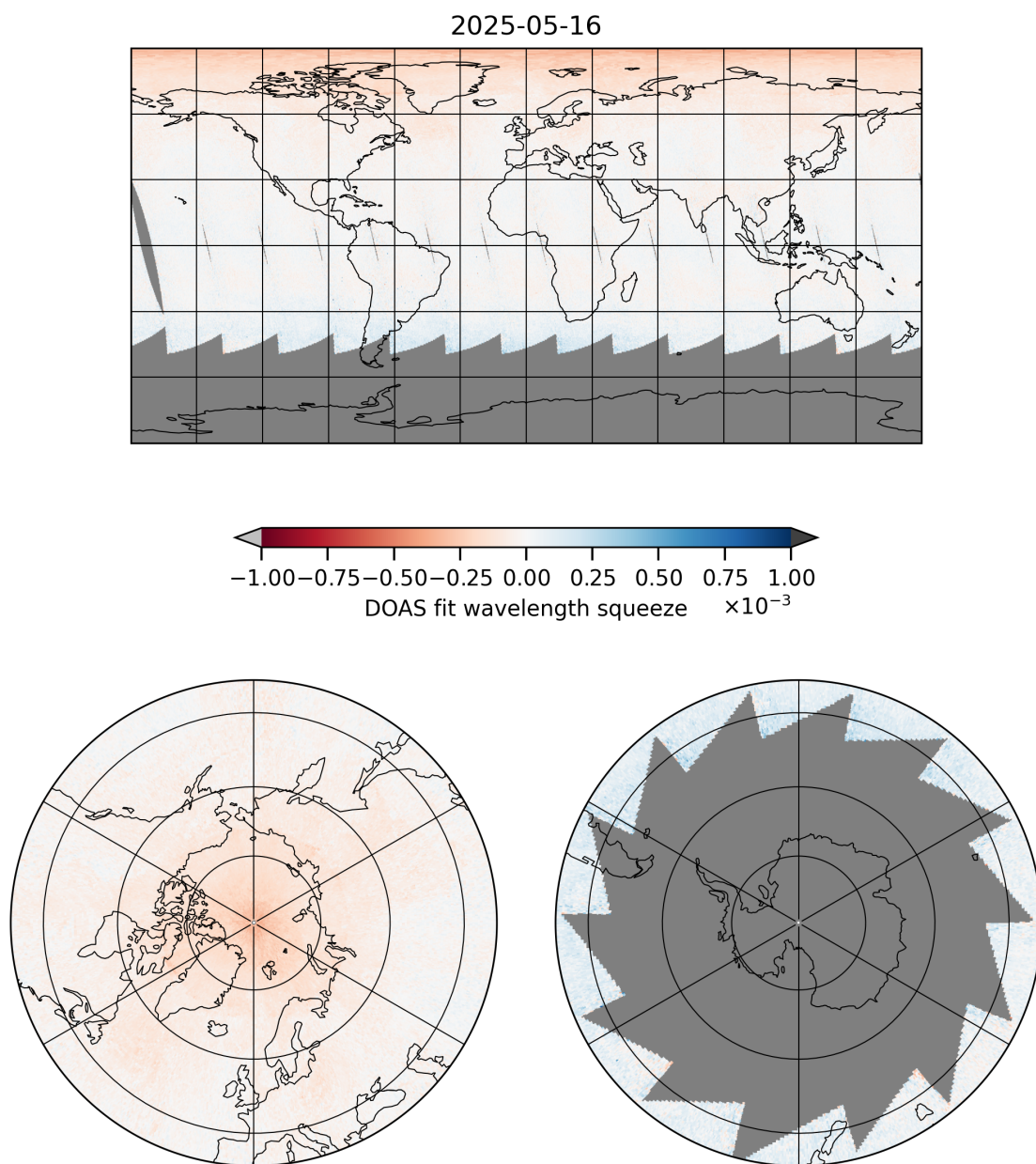


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-05-16 to 2025-05-17

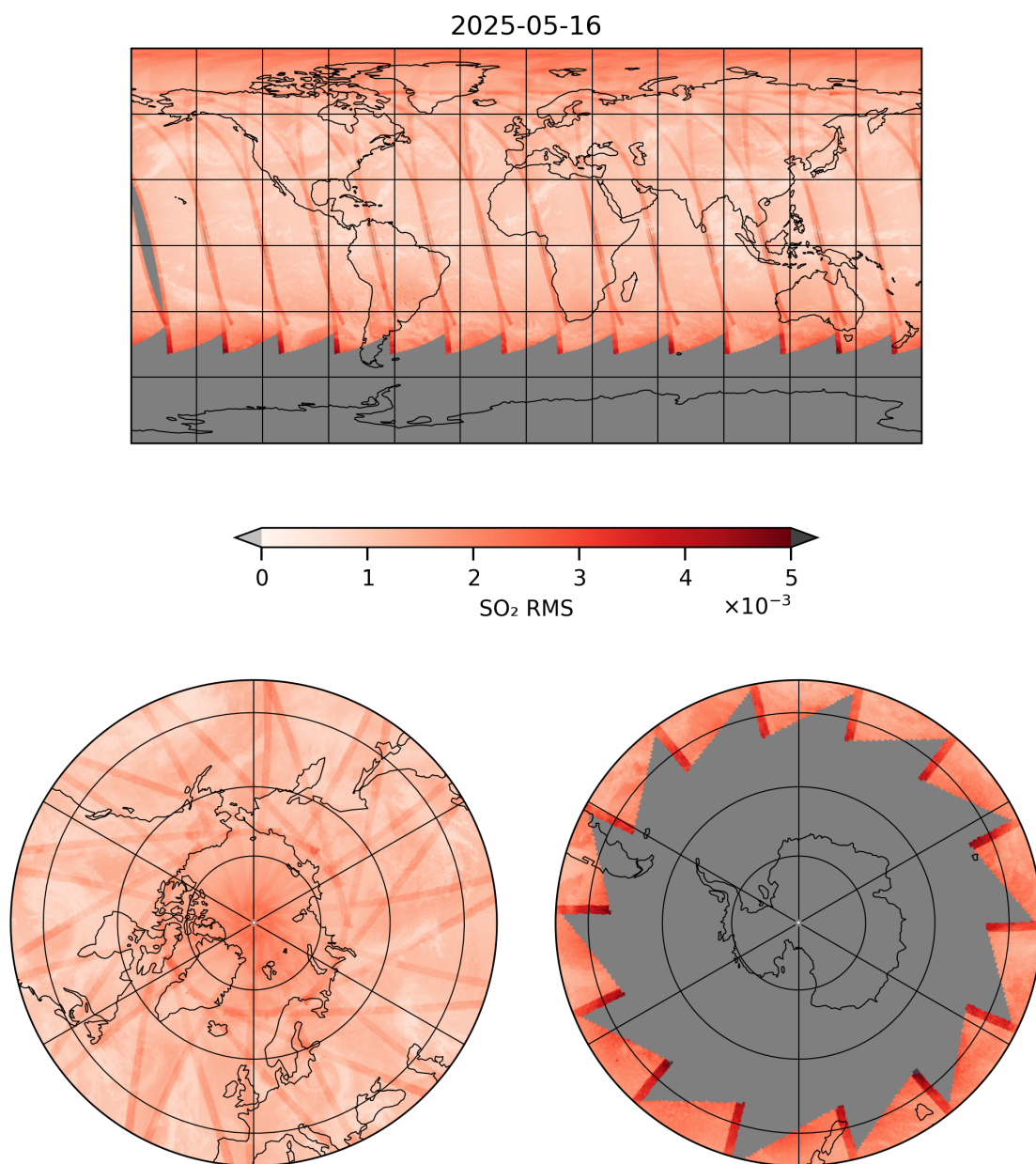


Figure 24: Map of “SO₂ RMS” for 2025-05-16 to 2025-05-17

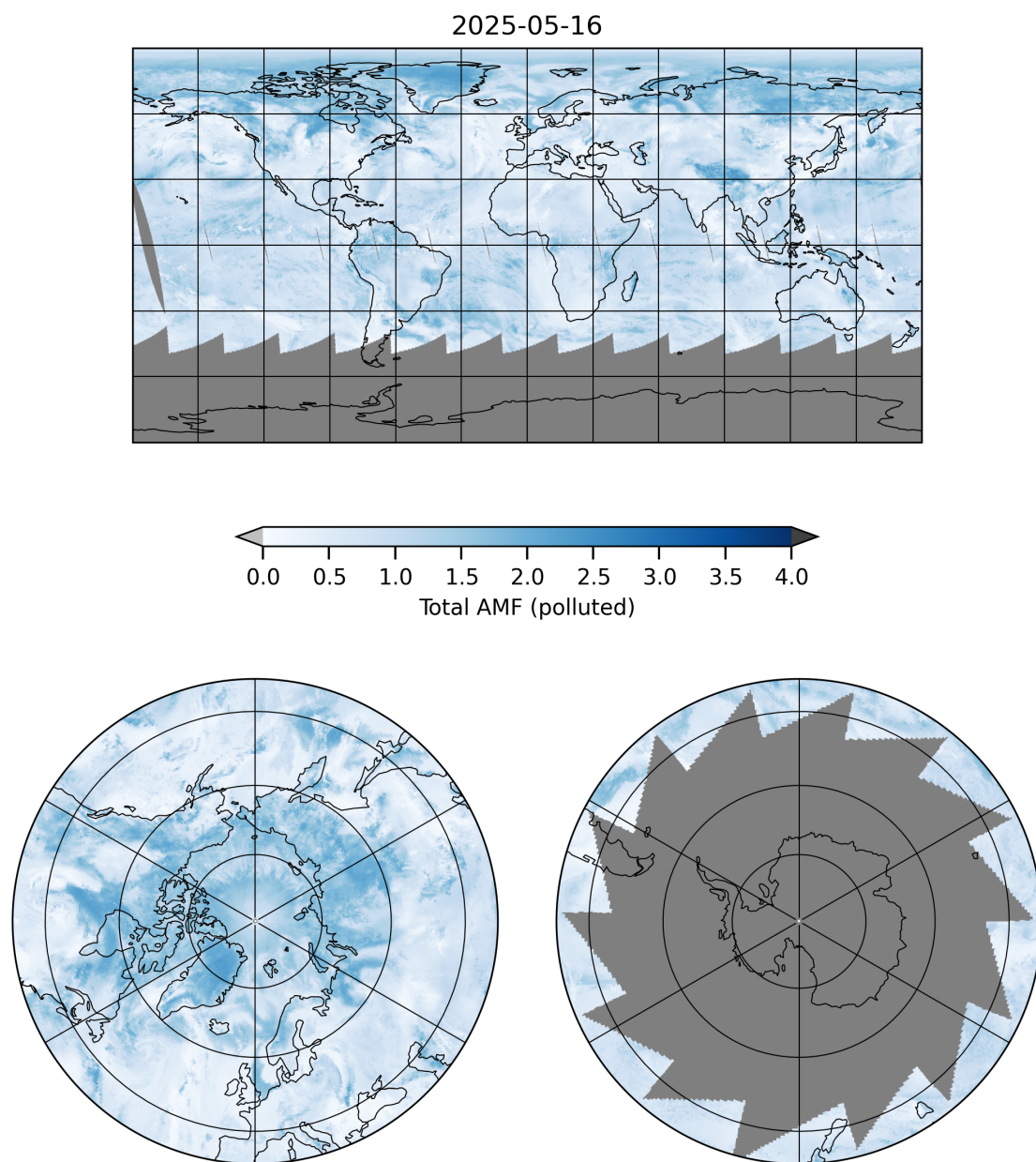


Figure 25: Map of “Total AMF (polluted)” for 2025-05-16 to 2025-05-17

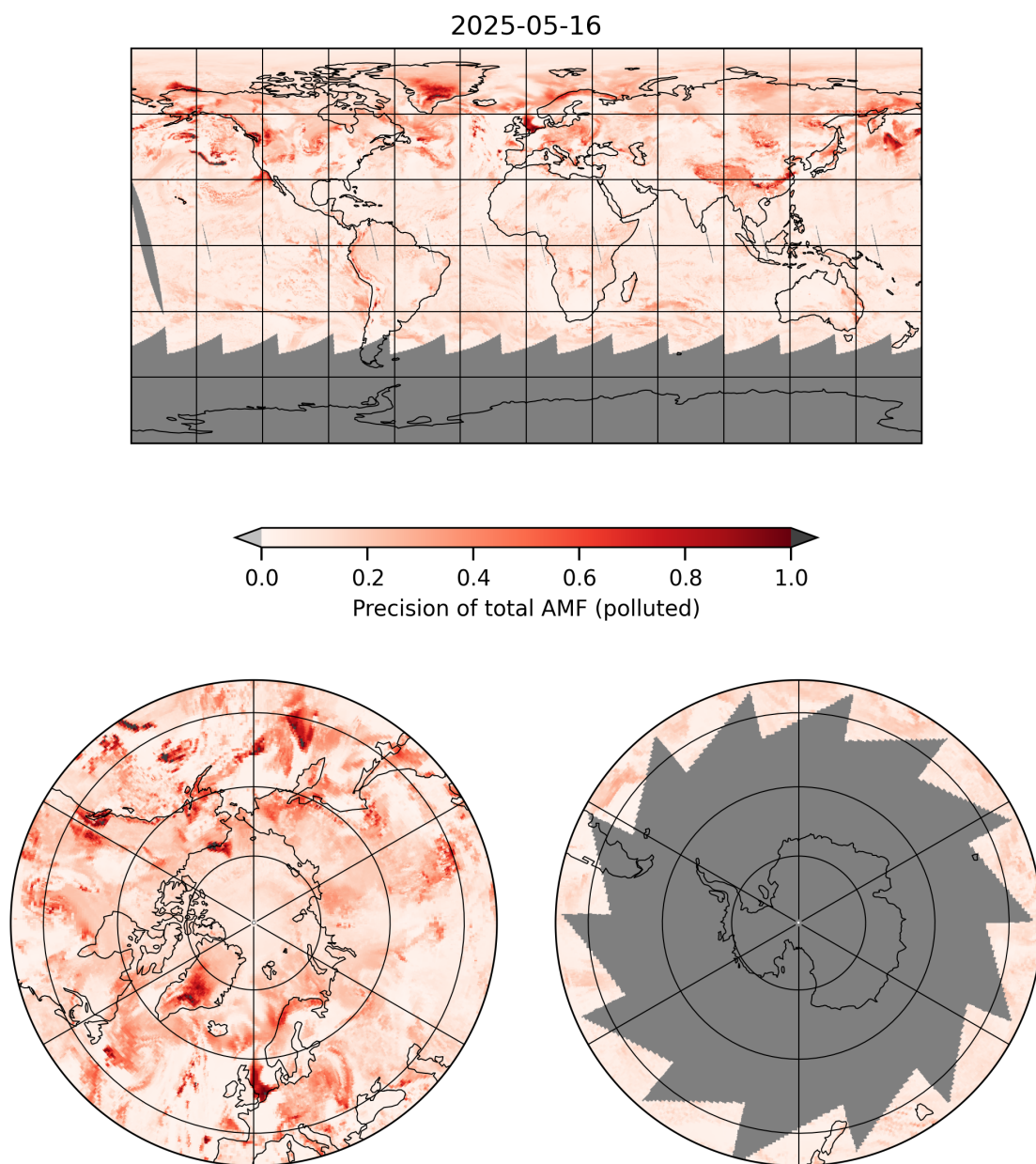


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-05-16 to 2025-05-17

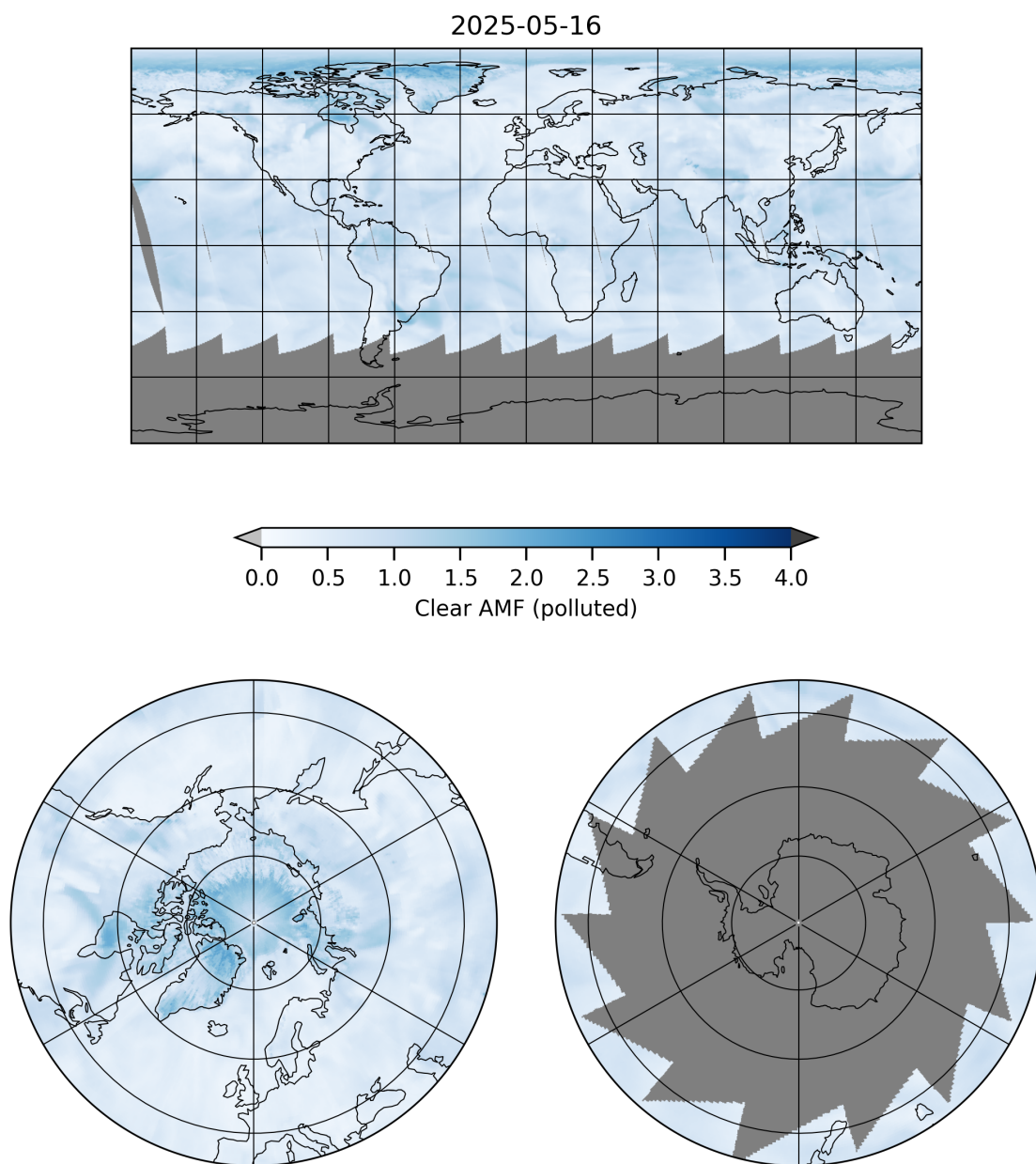


Figure 27: Map of “Clear AMF (polluted)” for 2025-05-16 to 2025-05-17

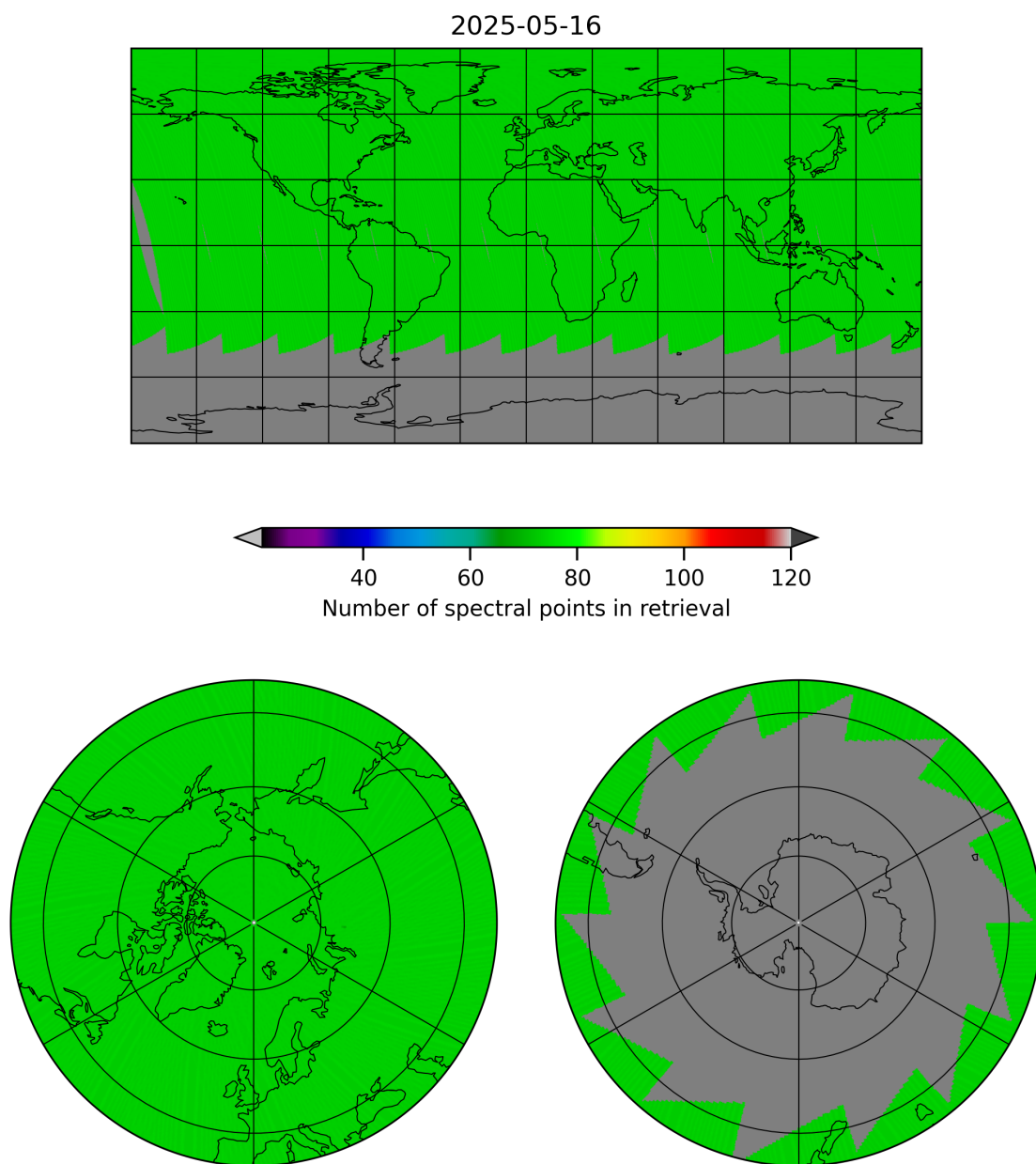


Figure 28: Map of “Number of spectral points in retrieval” for 2025-05-16 to 2025-05-17

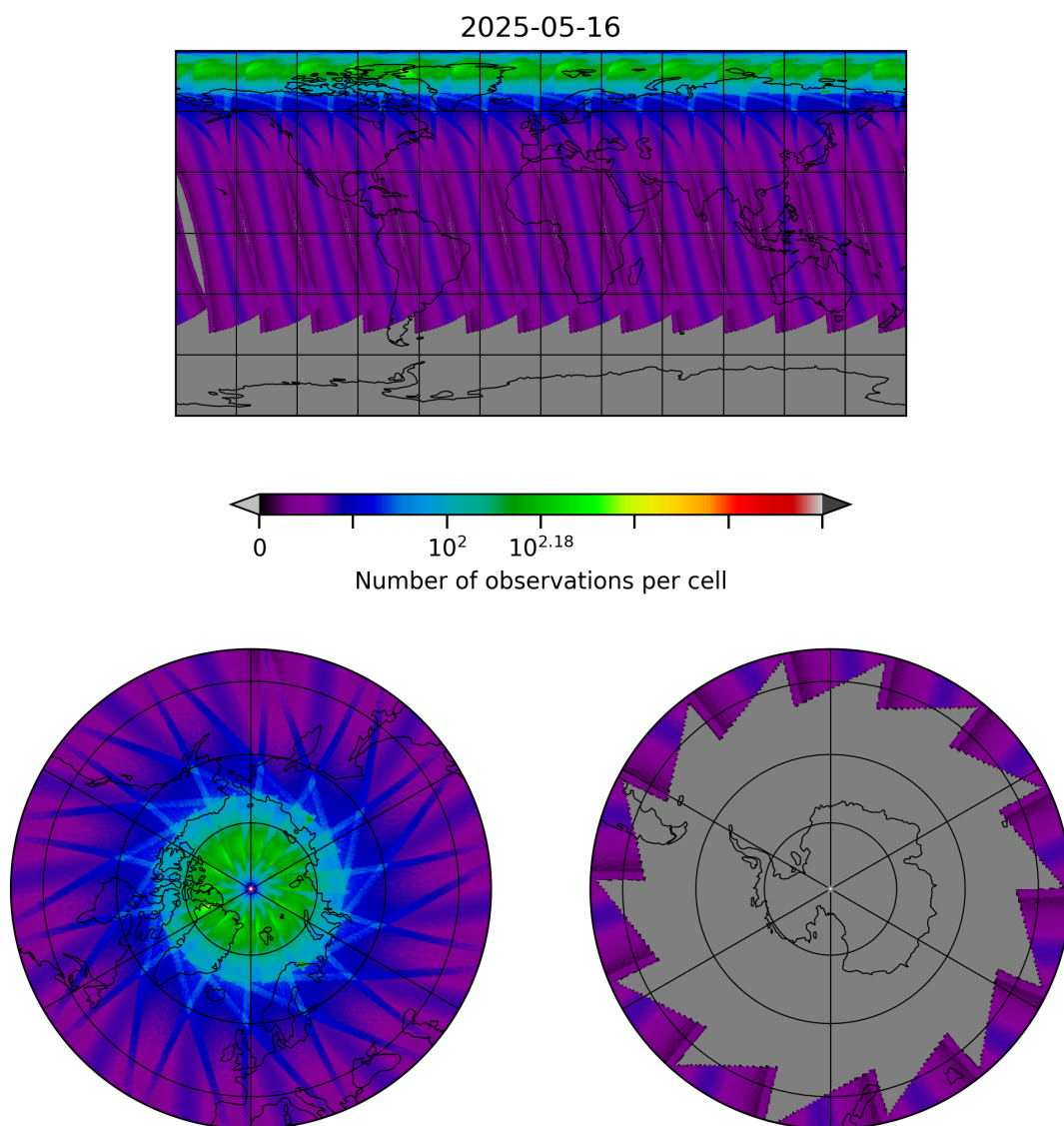


Figure 29: Map of the number of observations for 2025-05-16 to 2025-05-17

7 Zonal average

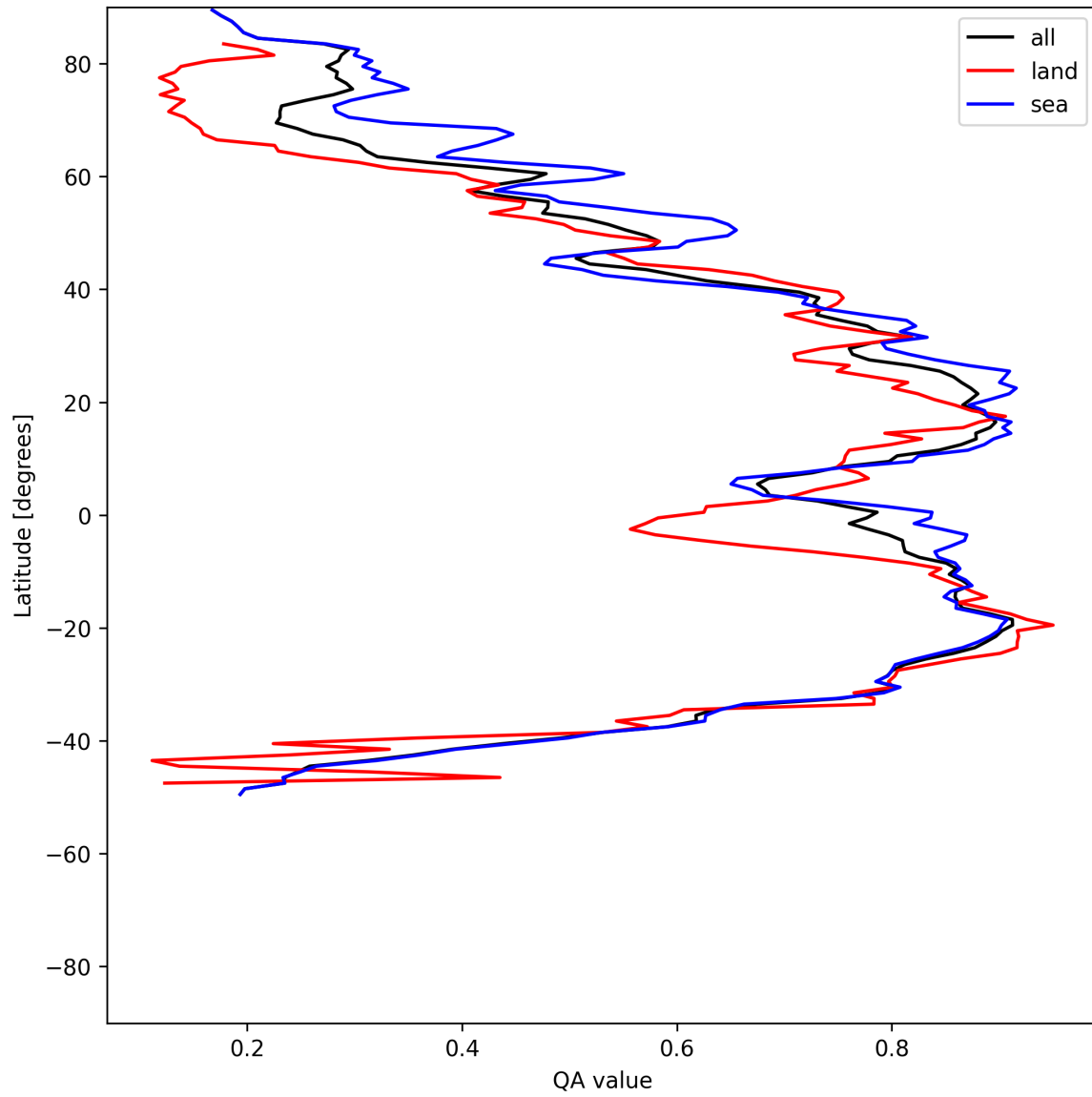


Figure 30: Zonal average of “QA value” for 2025-05-16 to 2025-05-17.

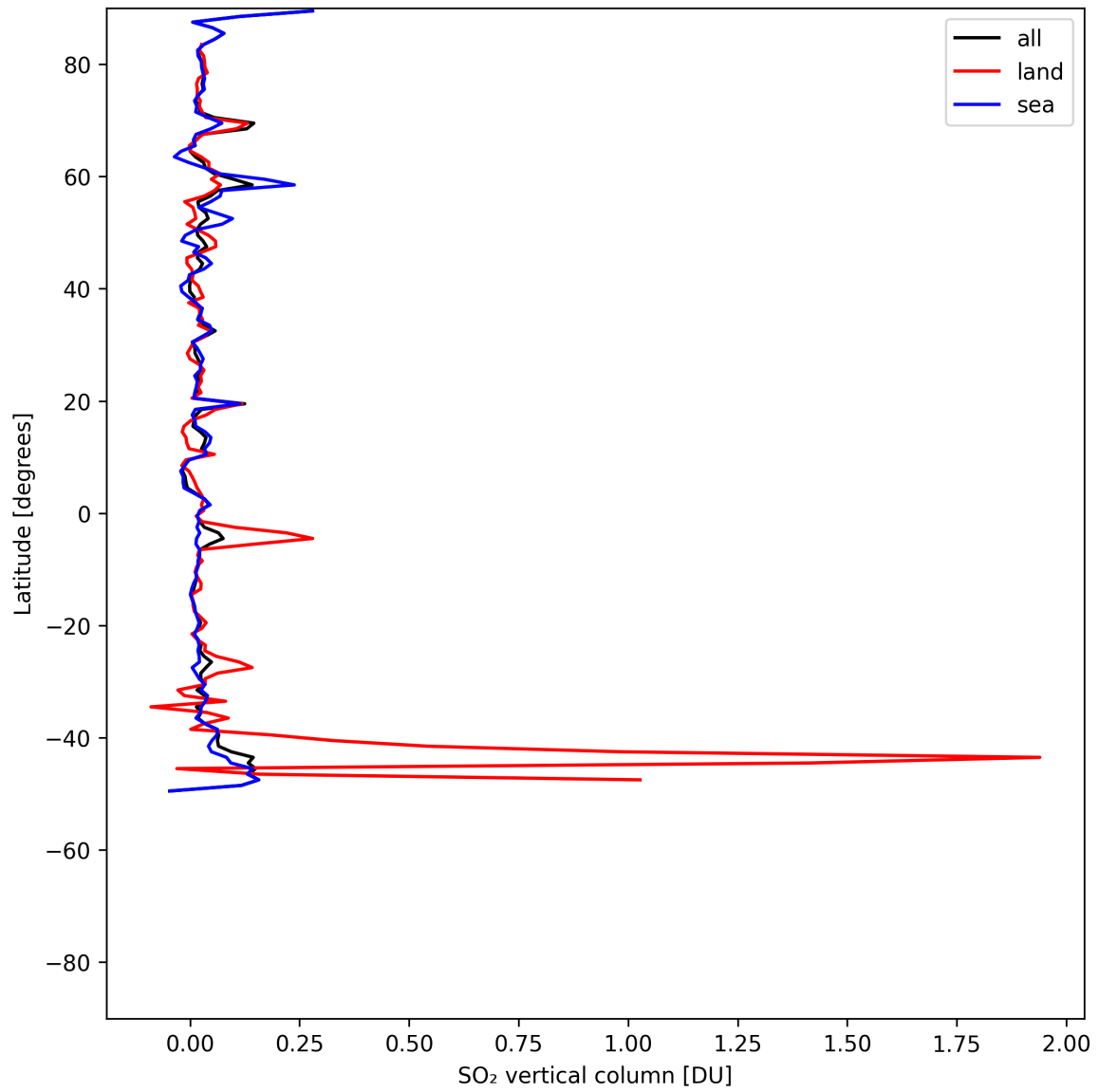


Figure 31: Zonal average of “SO₂ vertical column” for 2025-05-16 to 2025-05-17.

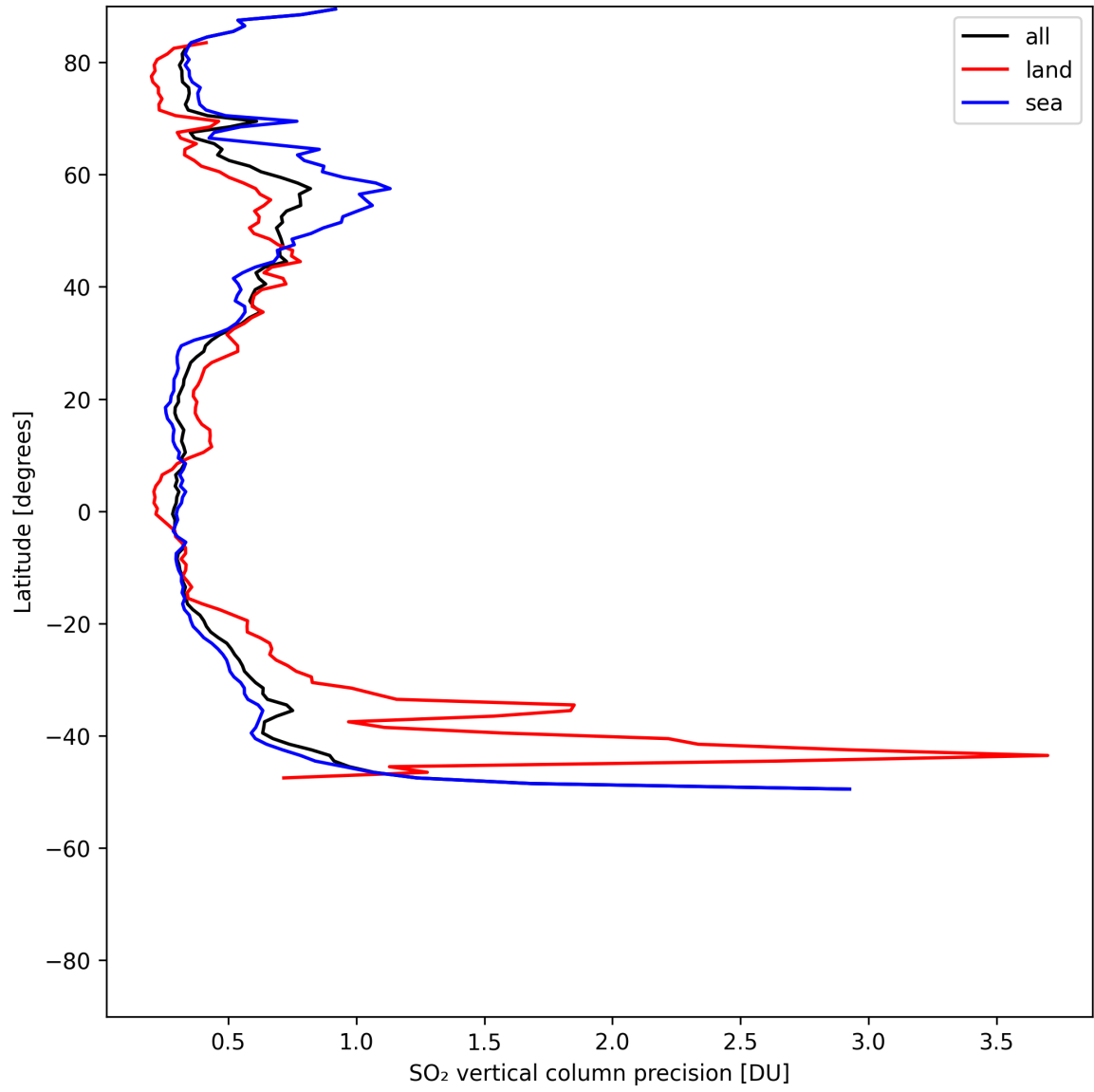


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-05-16 to 2025-05-17.

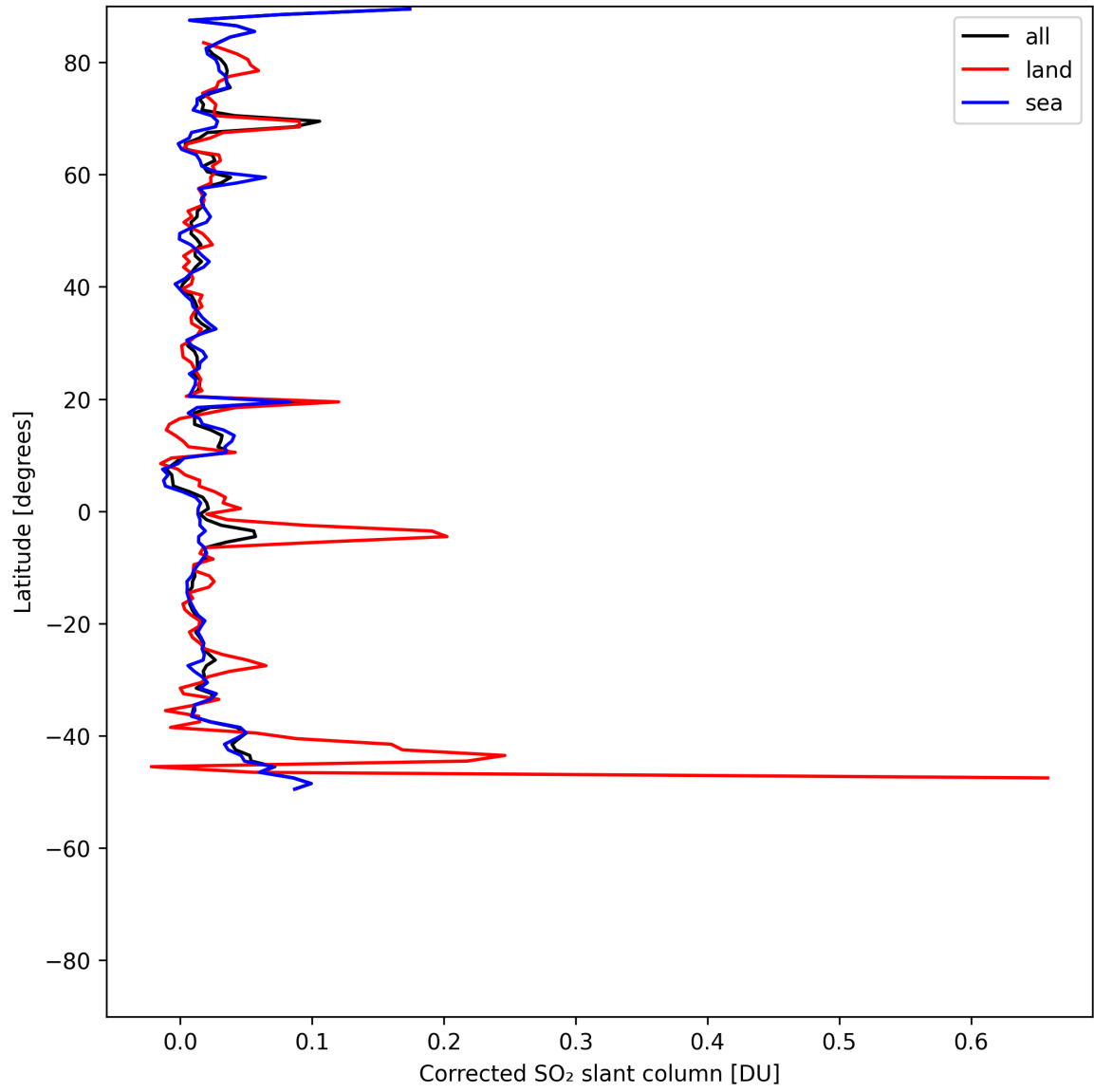


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-05-16 to 2025-05-17.

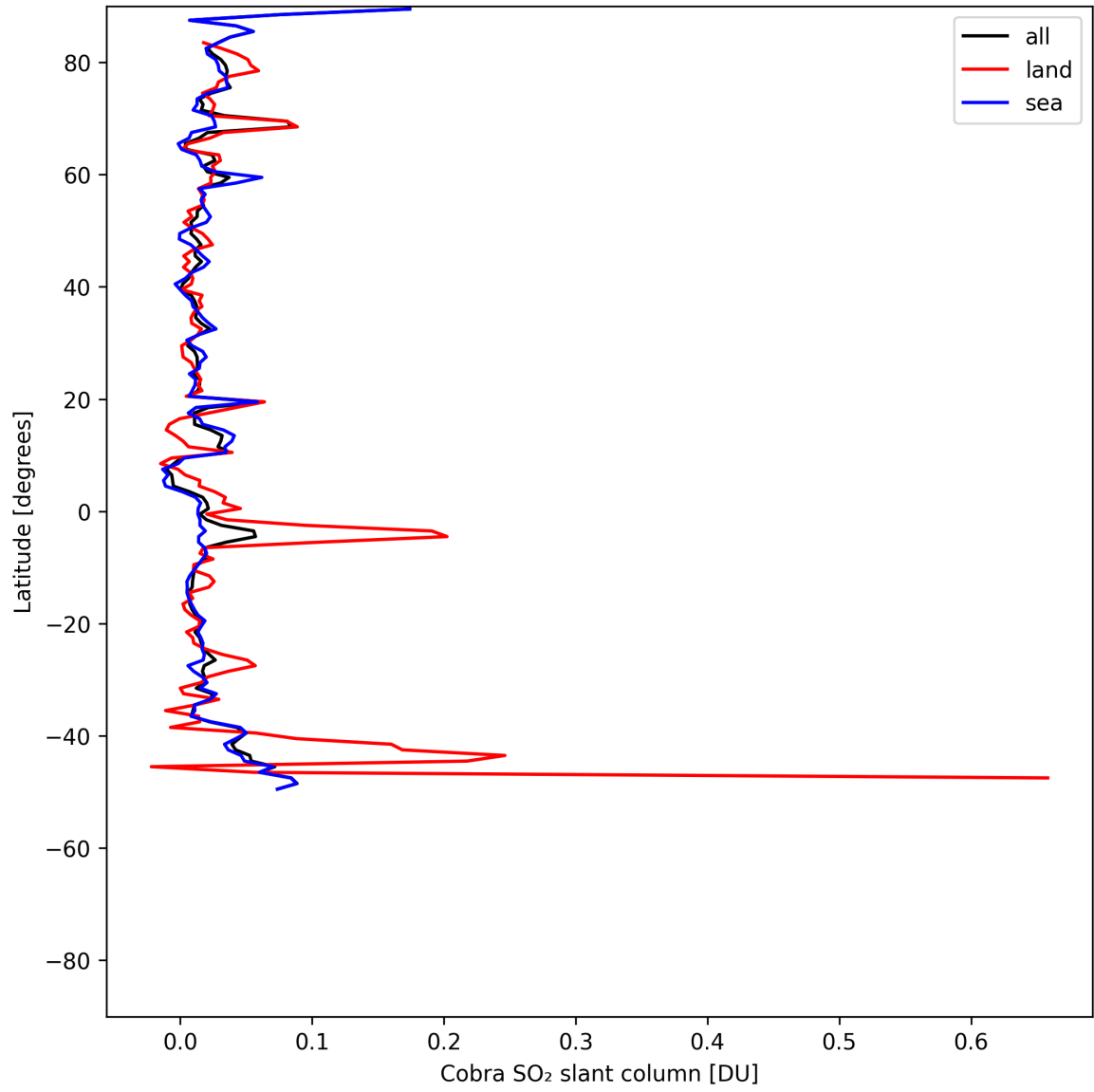


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-05-16 to 2025-05-17.

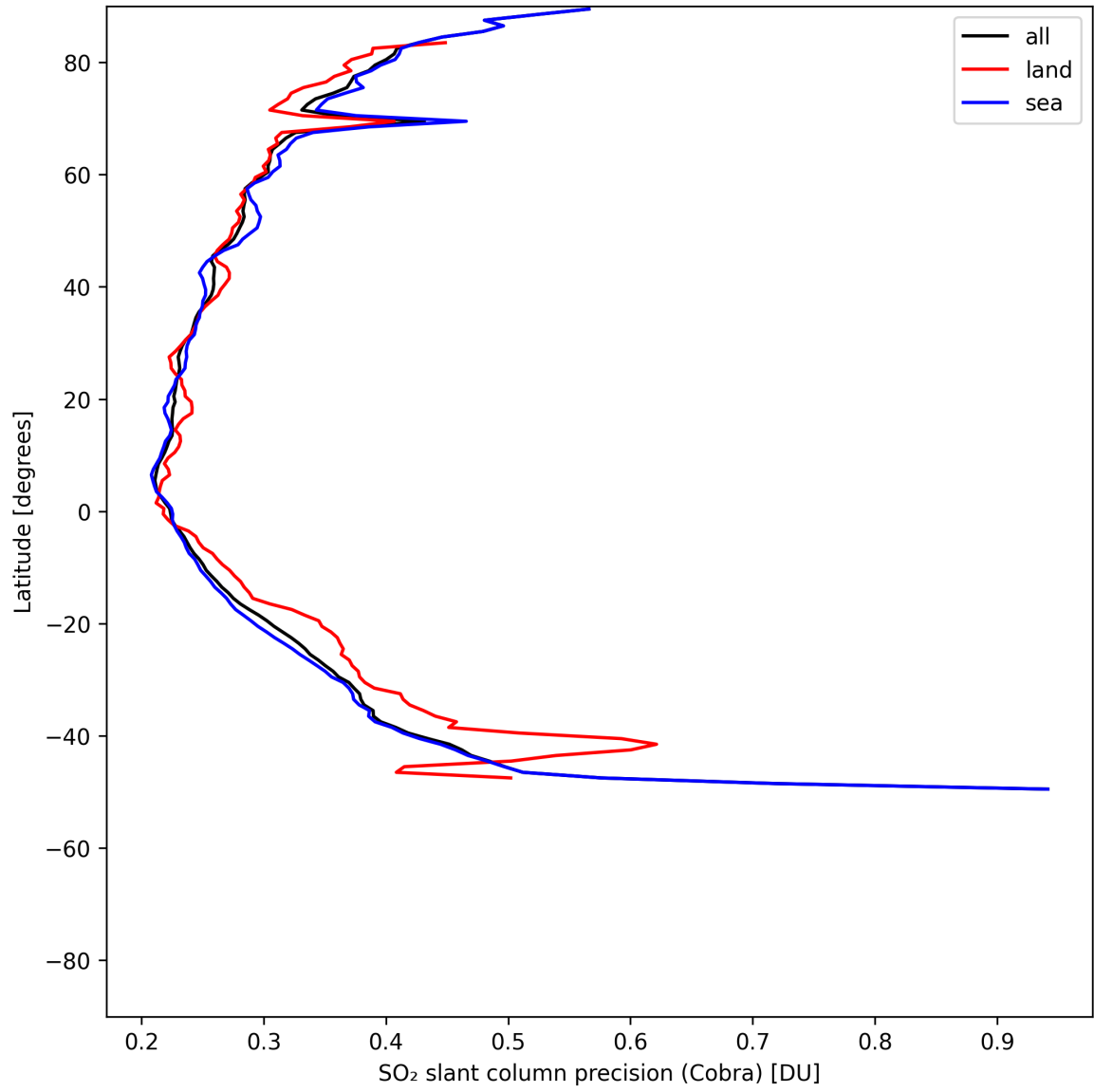


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-05-16 to 2025-05-17.

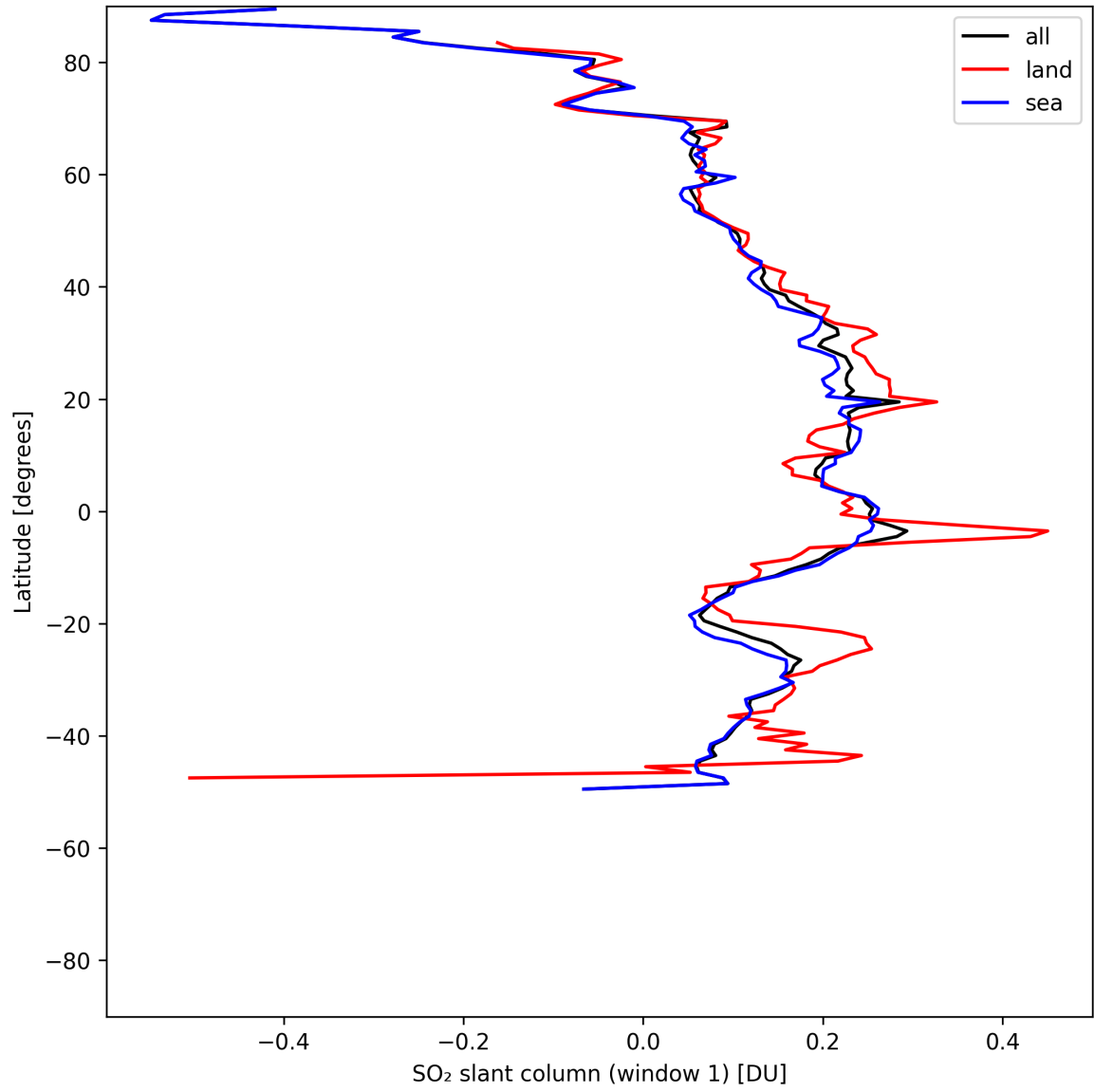


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-05-16 to 2025-05-17.

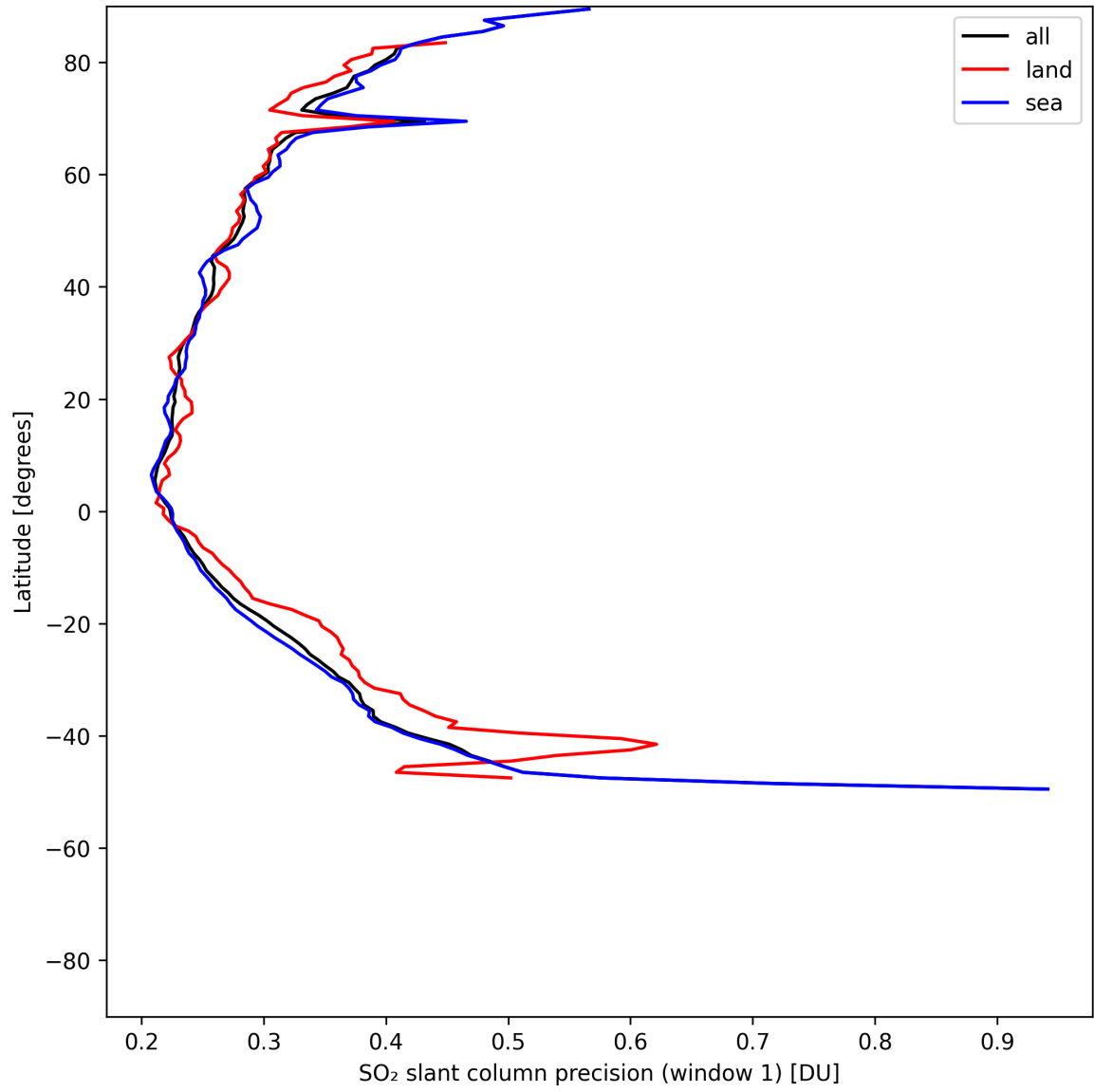


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-05-16 to 2025-05-17.

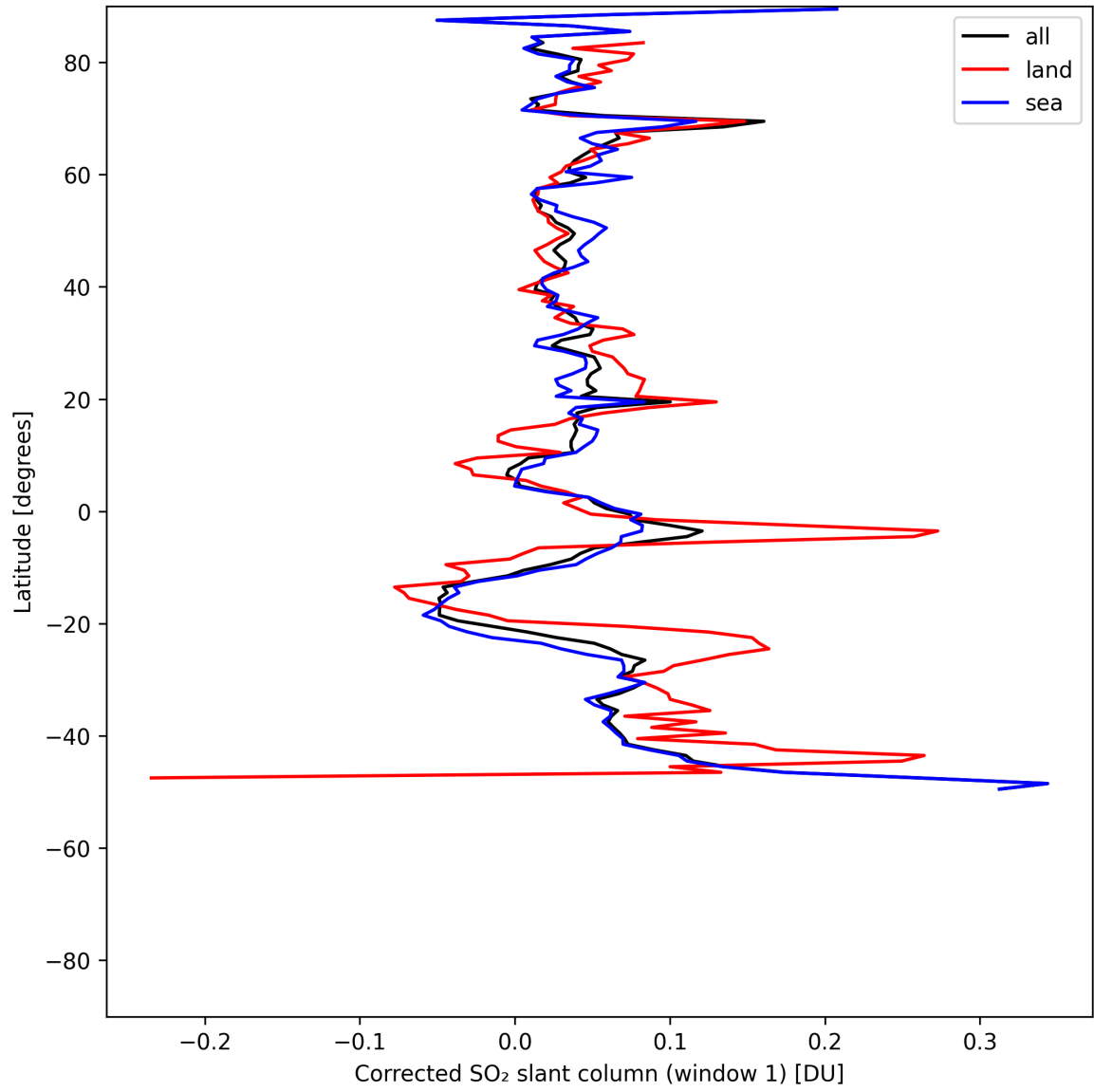


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-05-16 to 2025-05-17.

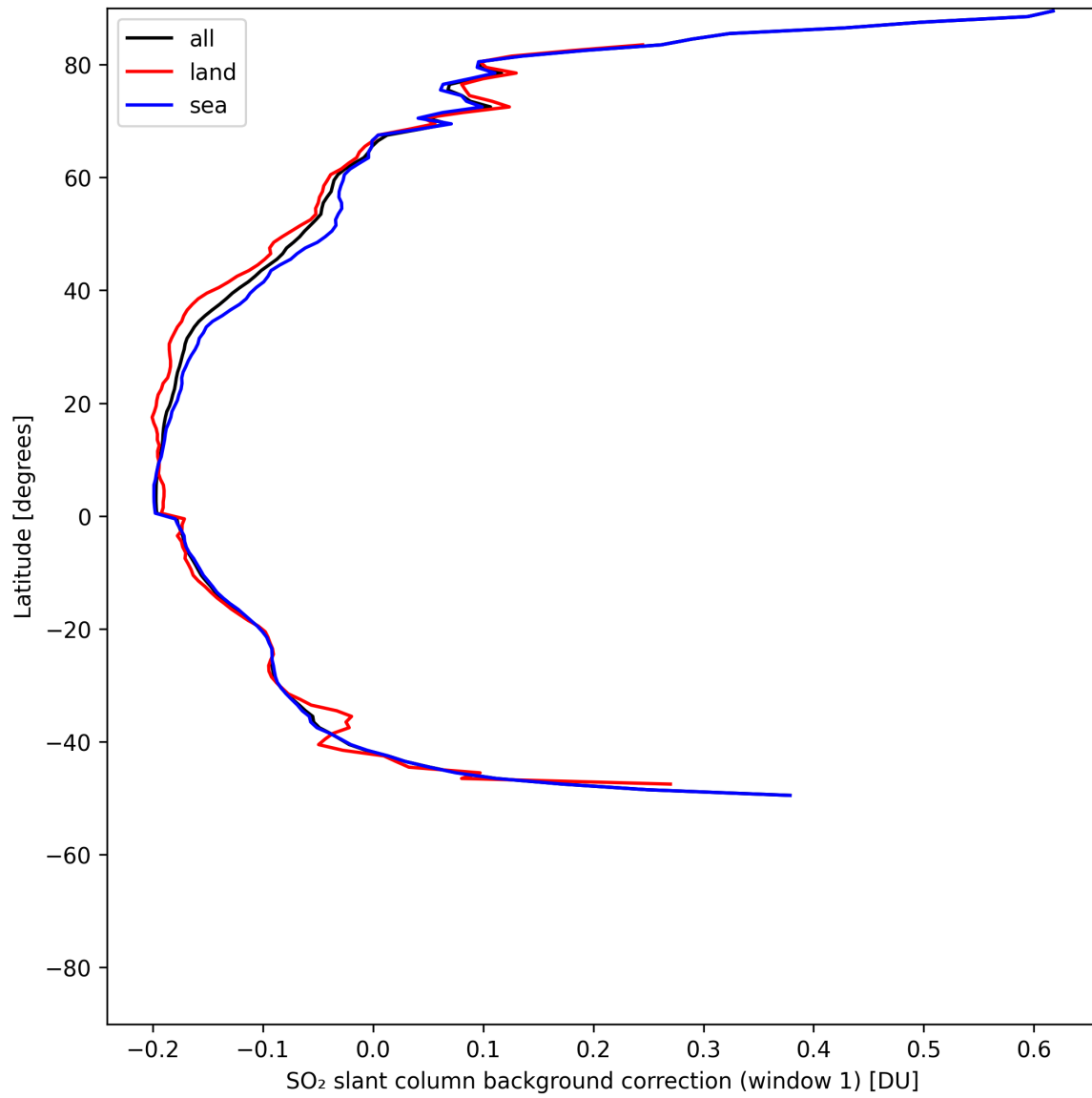


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-05-16 to 2025-05-17.

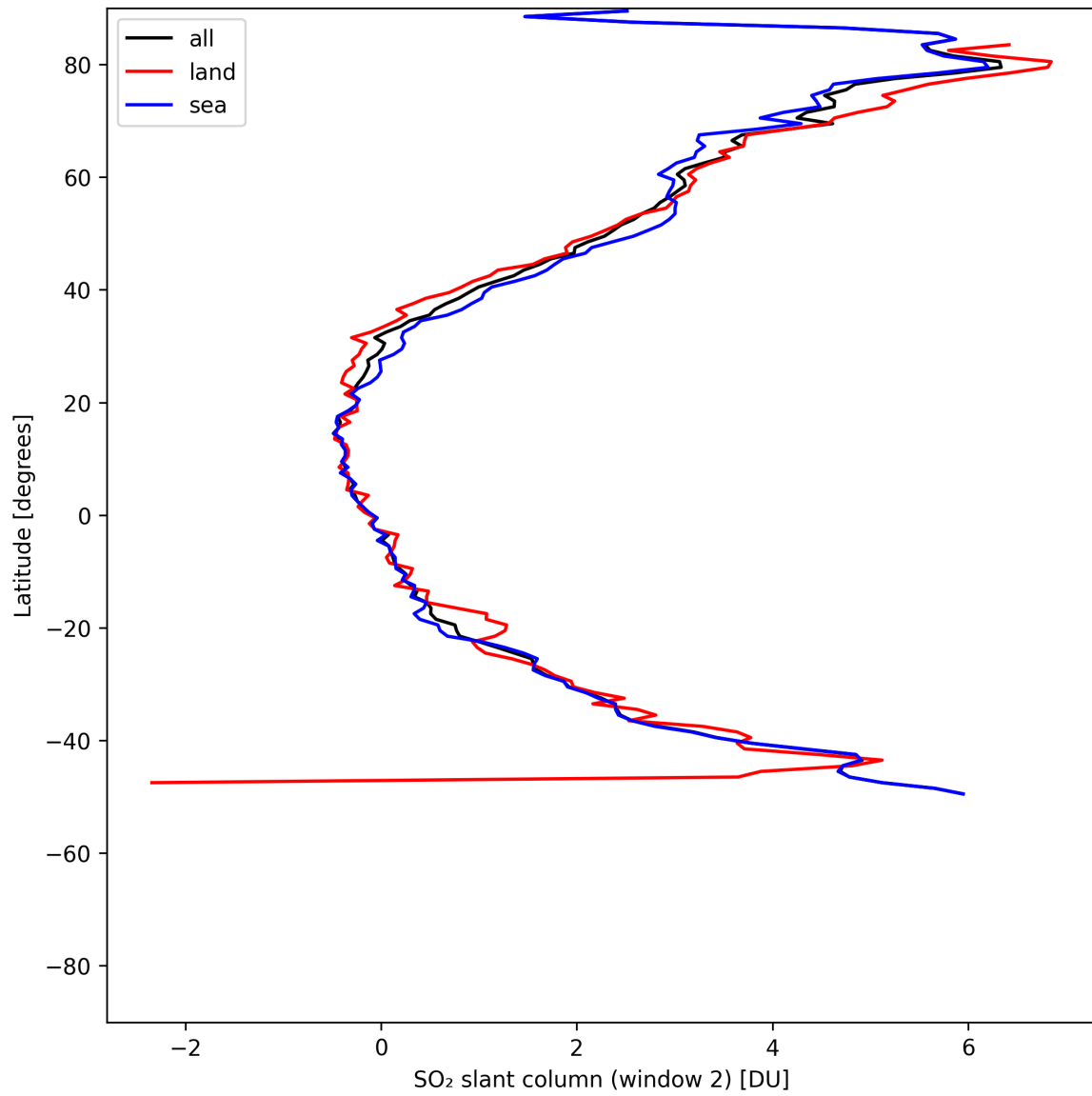


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-05-16 to 2025-05-17.

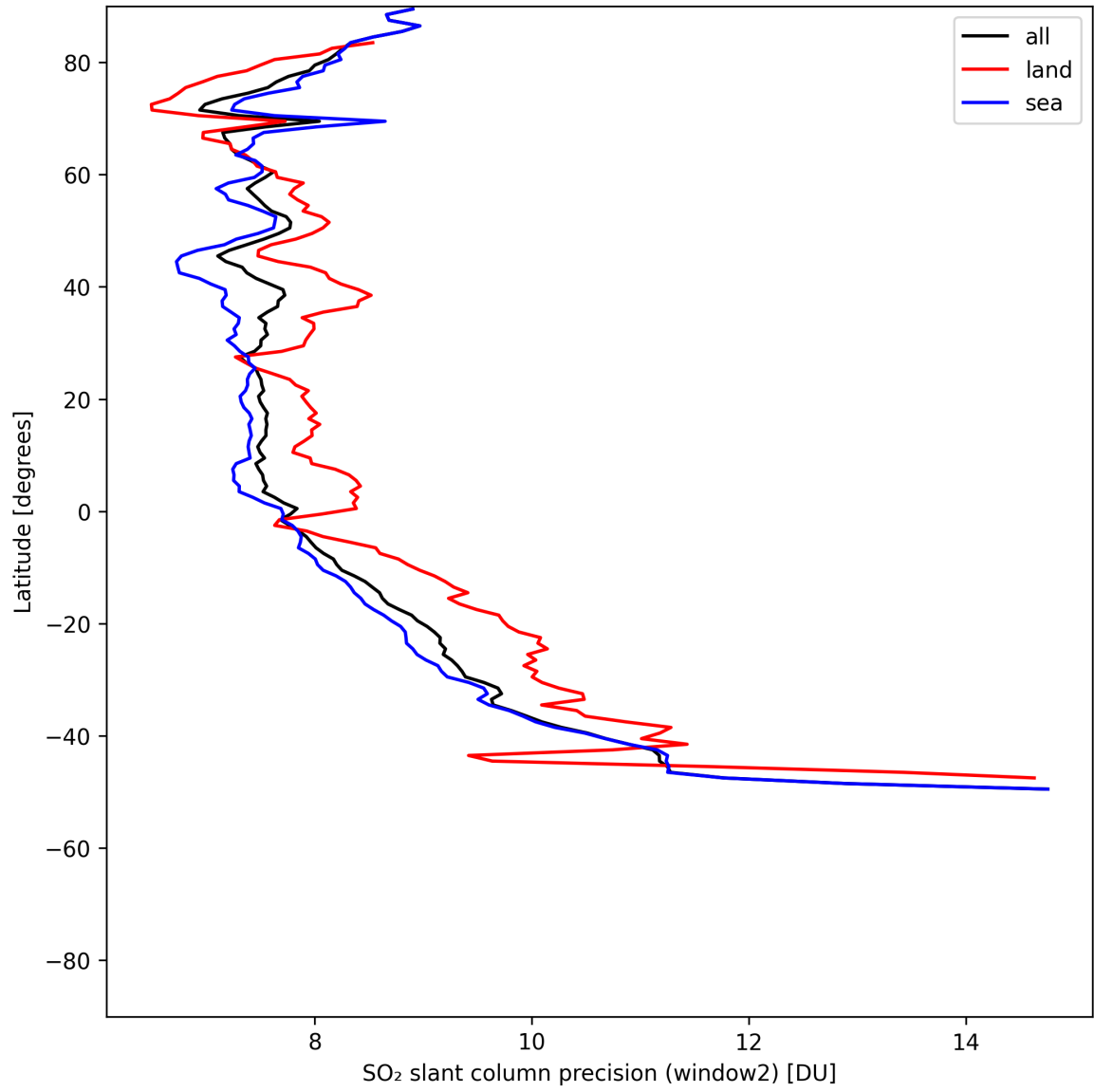


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-05-16 to 2025-05-17.

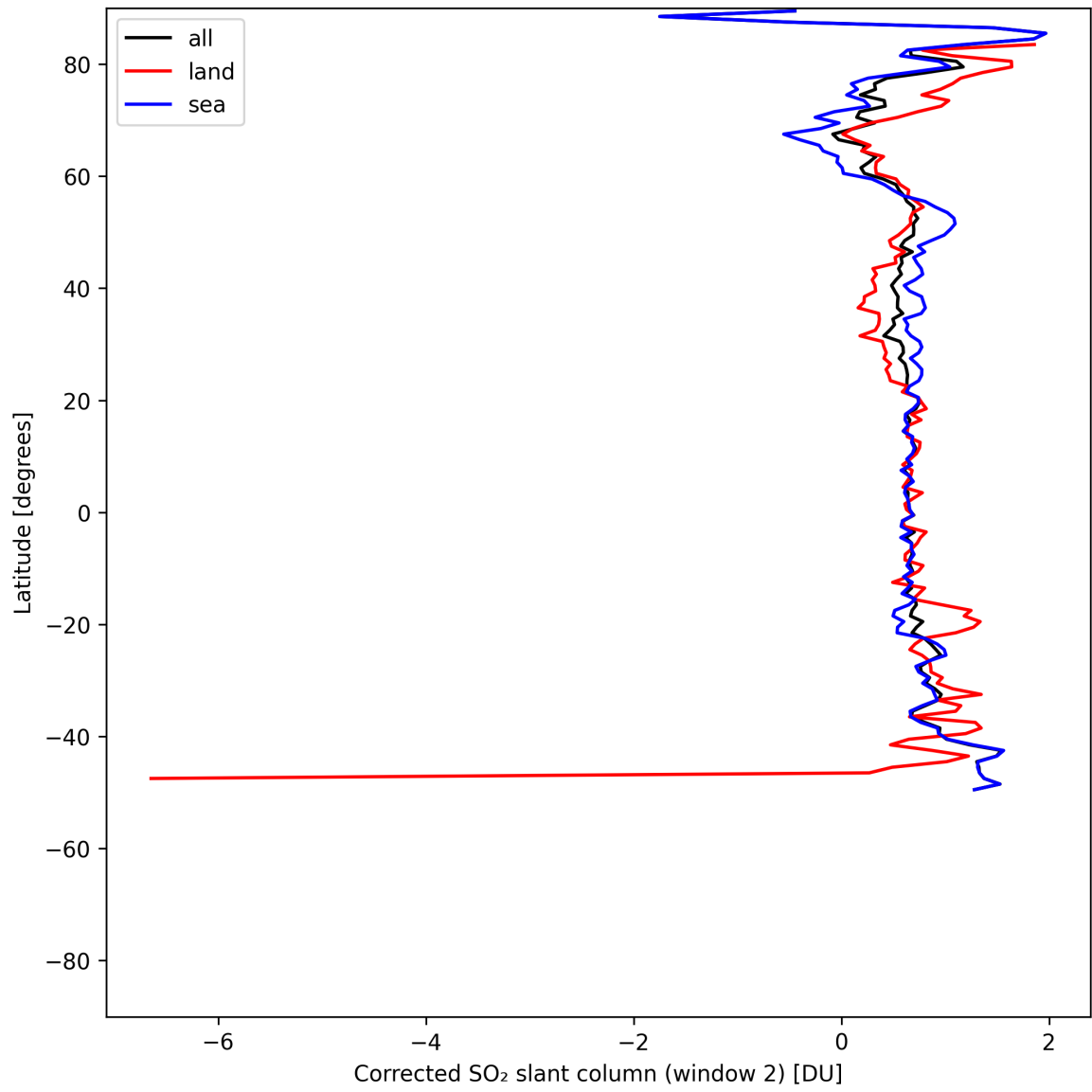


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-05-16 to 2025-05-17.

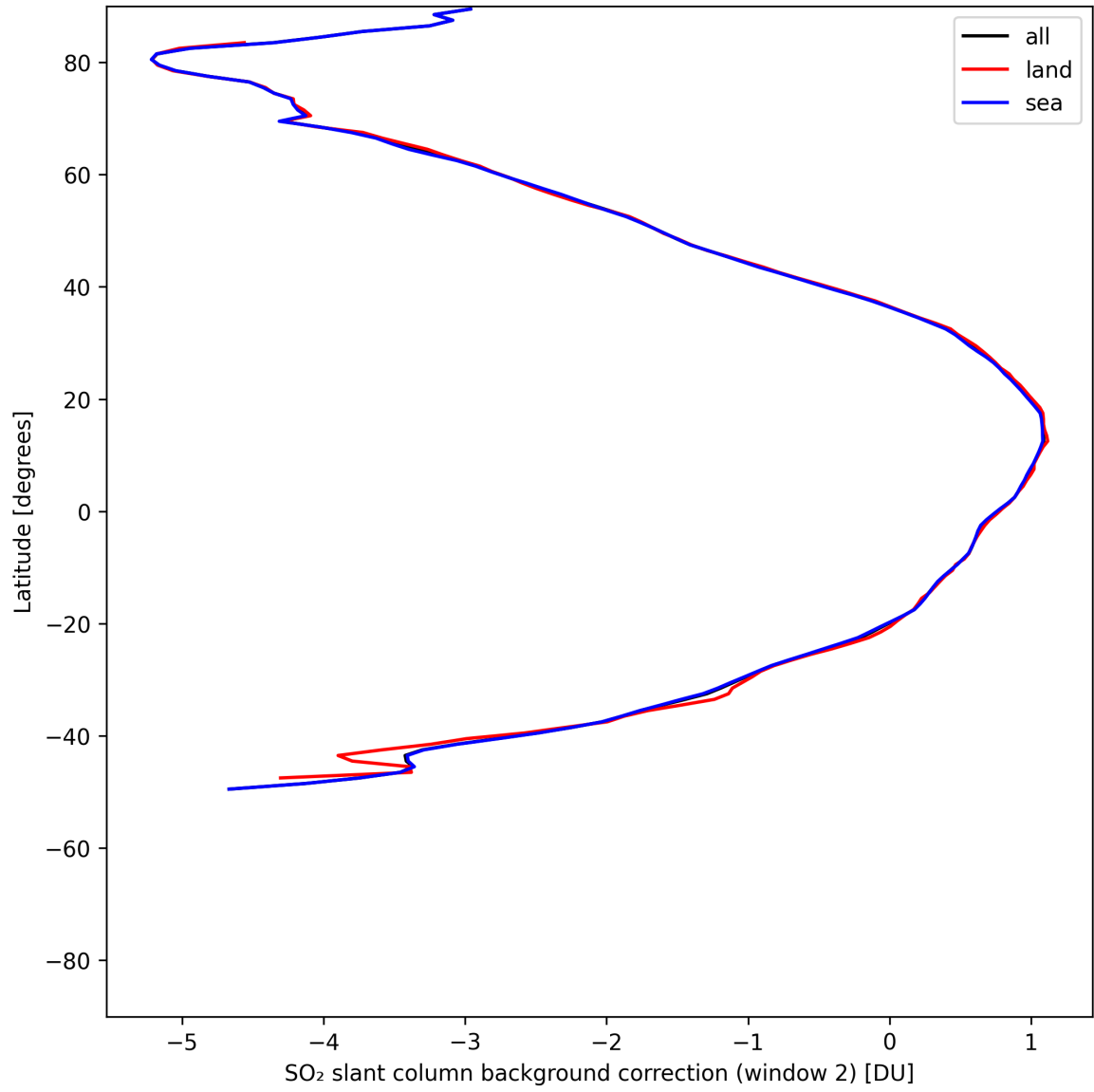


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-05-16 to 2025-05-17.

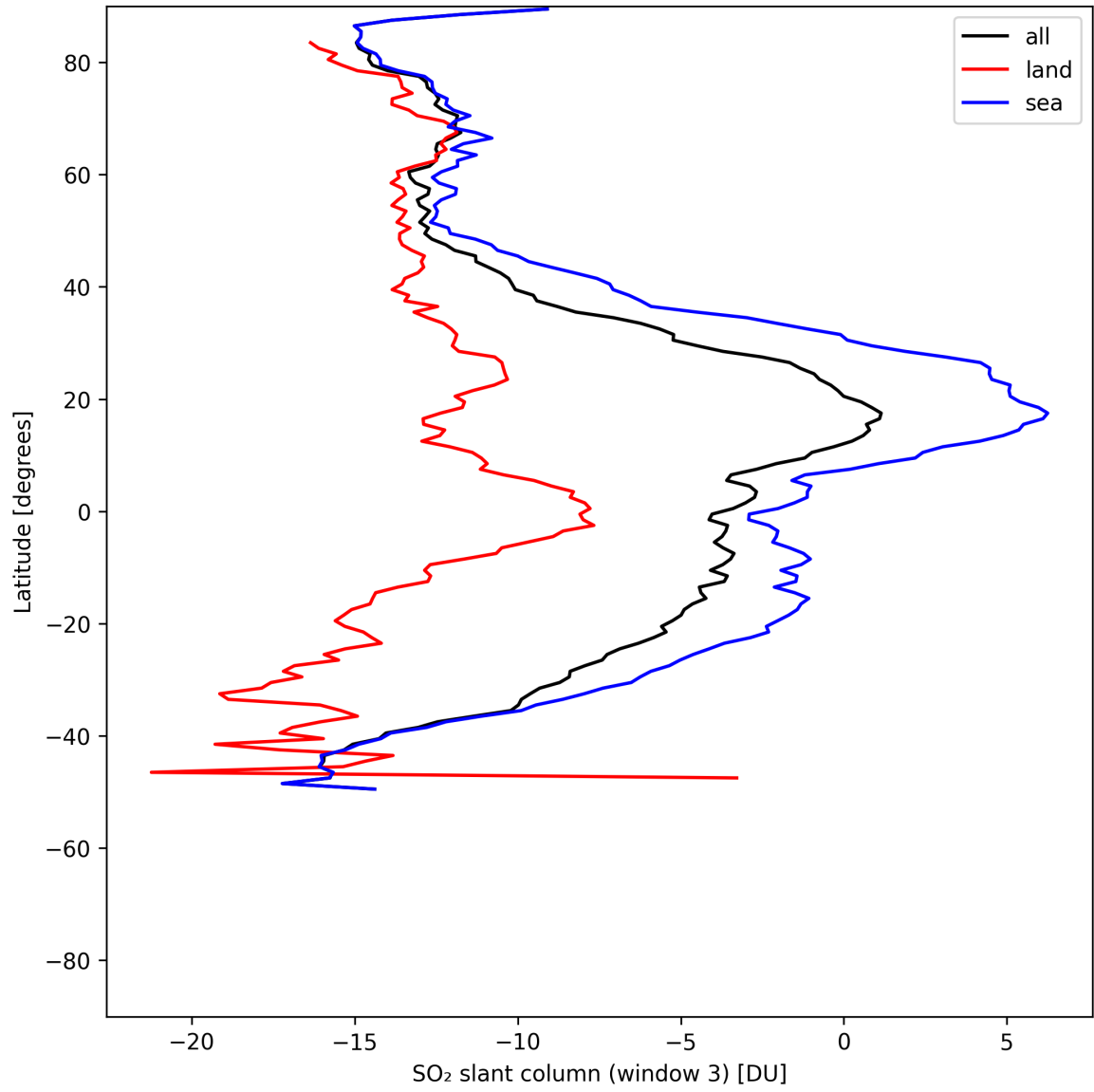


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-05-16 to 2025-05-17.

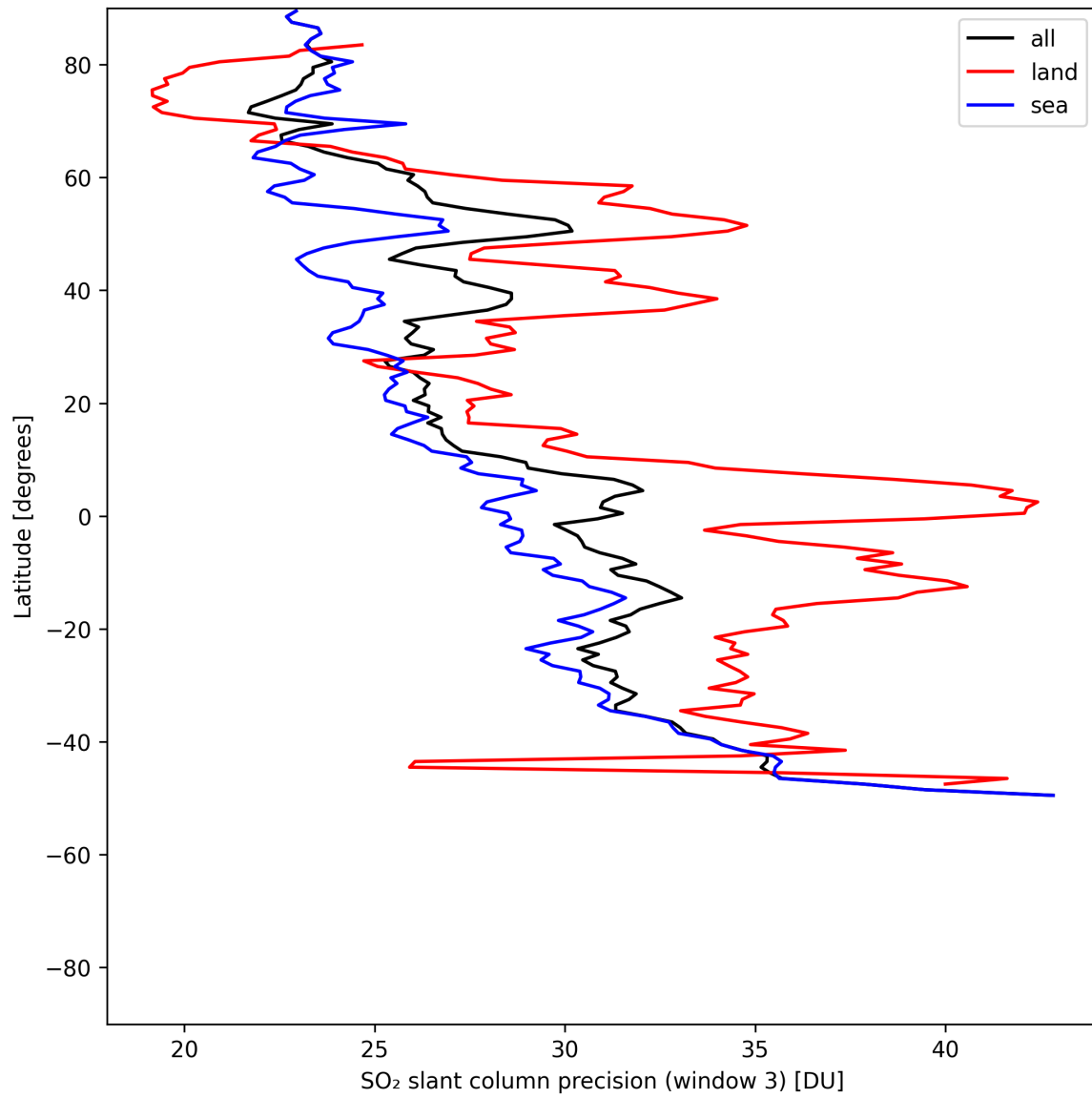


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-05-16 to 2025-05-17.

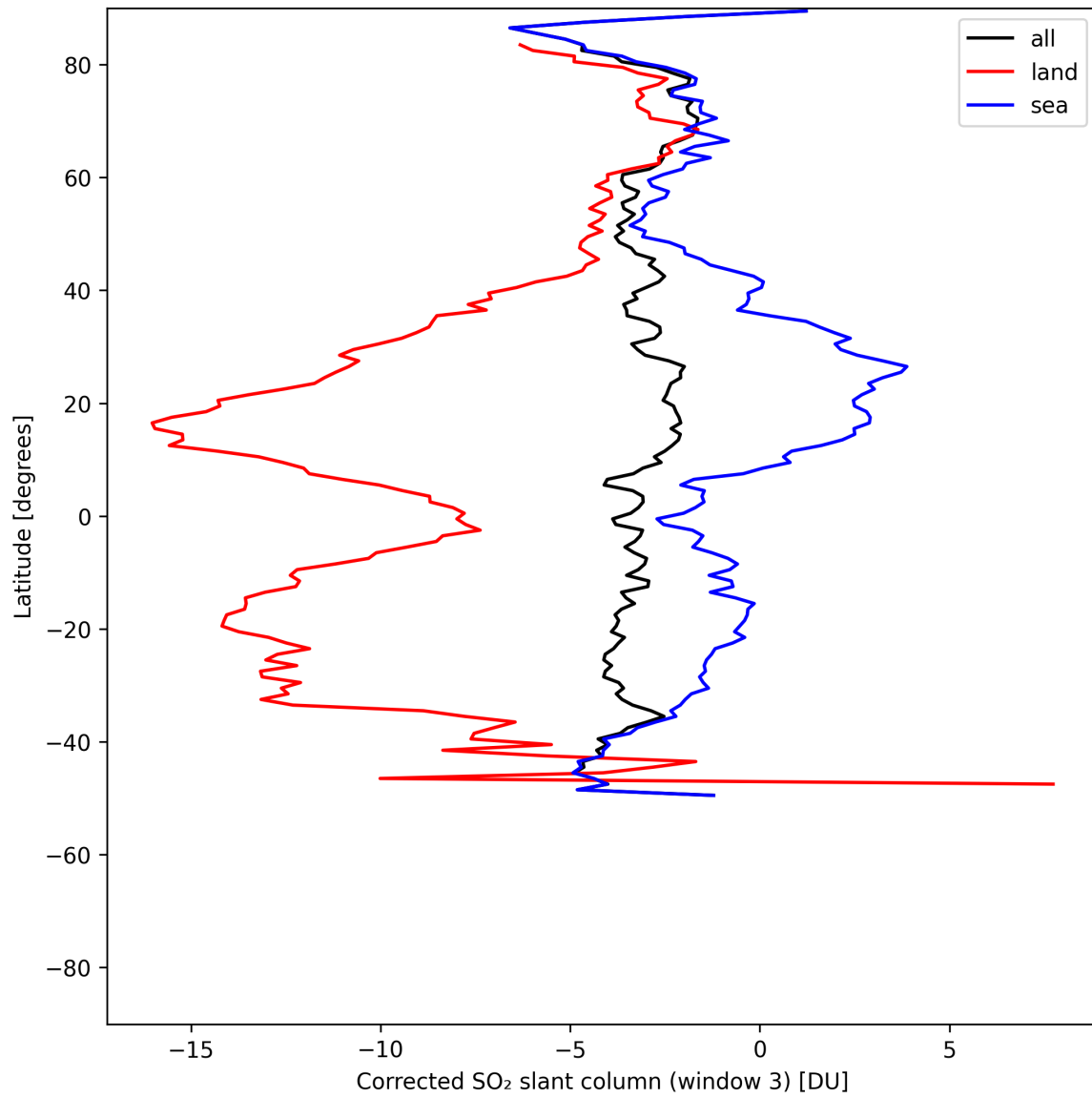


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-05-16 to 2025-05-17.

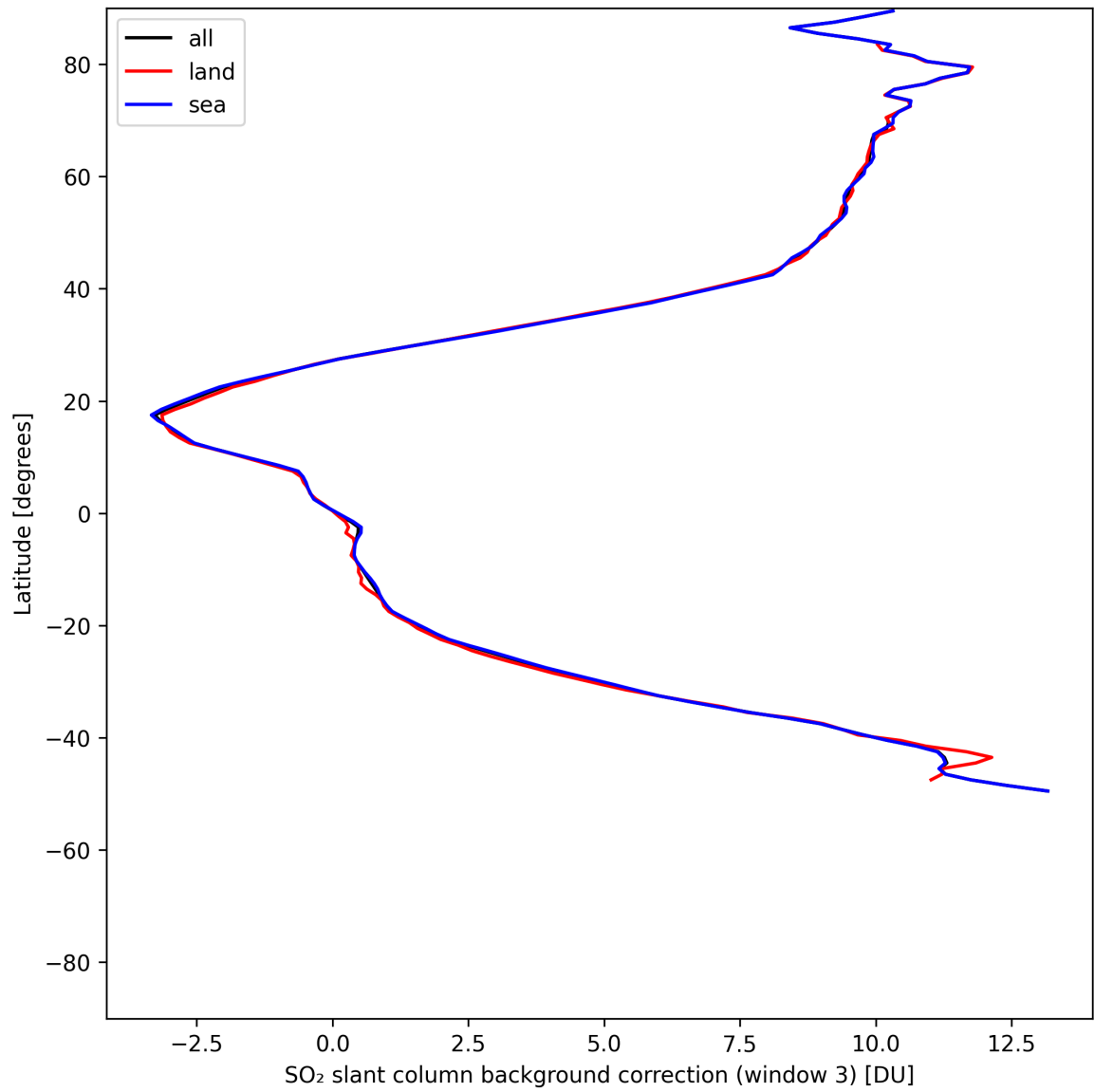


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-05-16 to 2025-05-17.

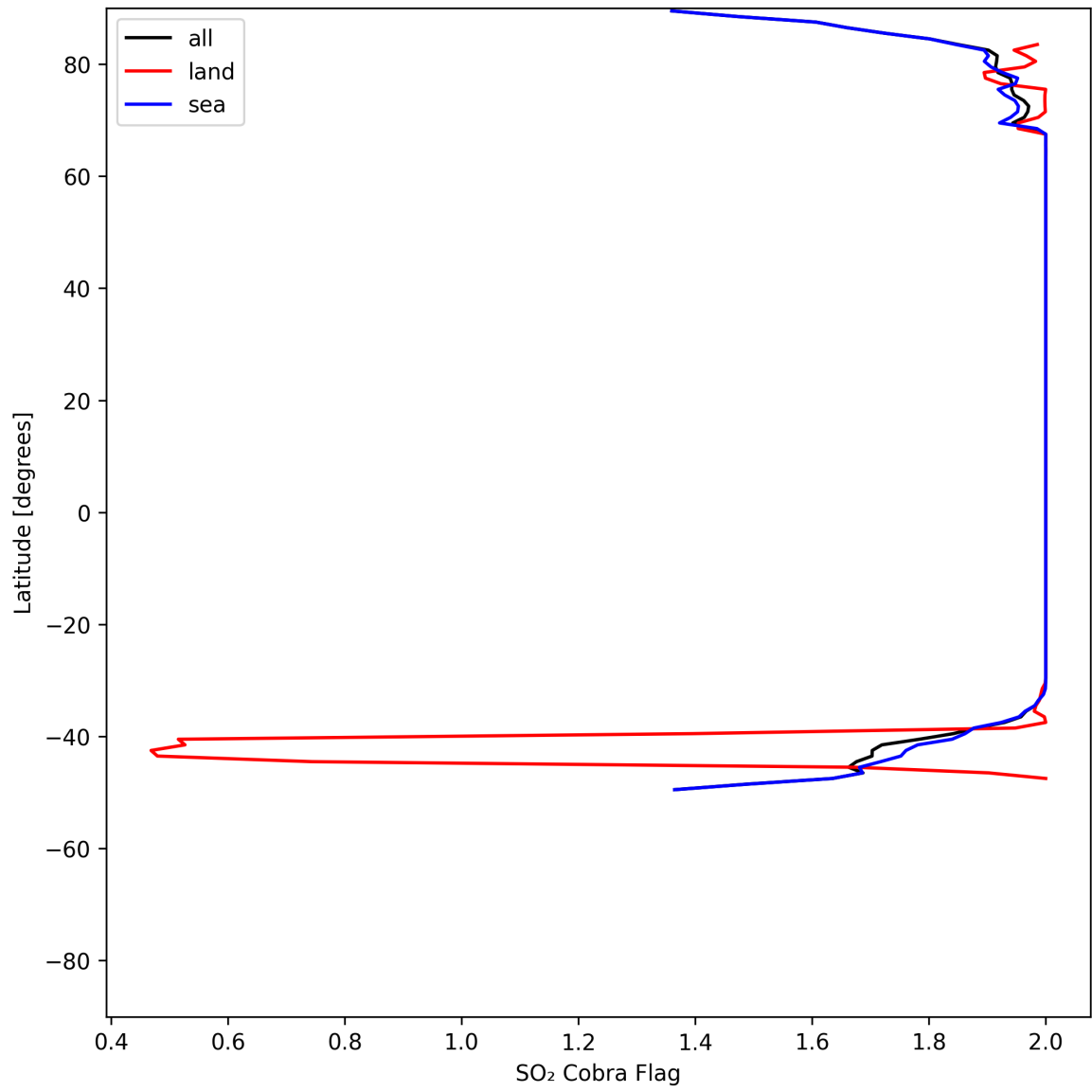


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-05-16 to 2025-05-17.

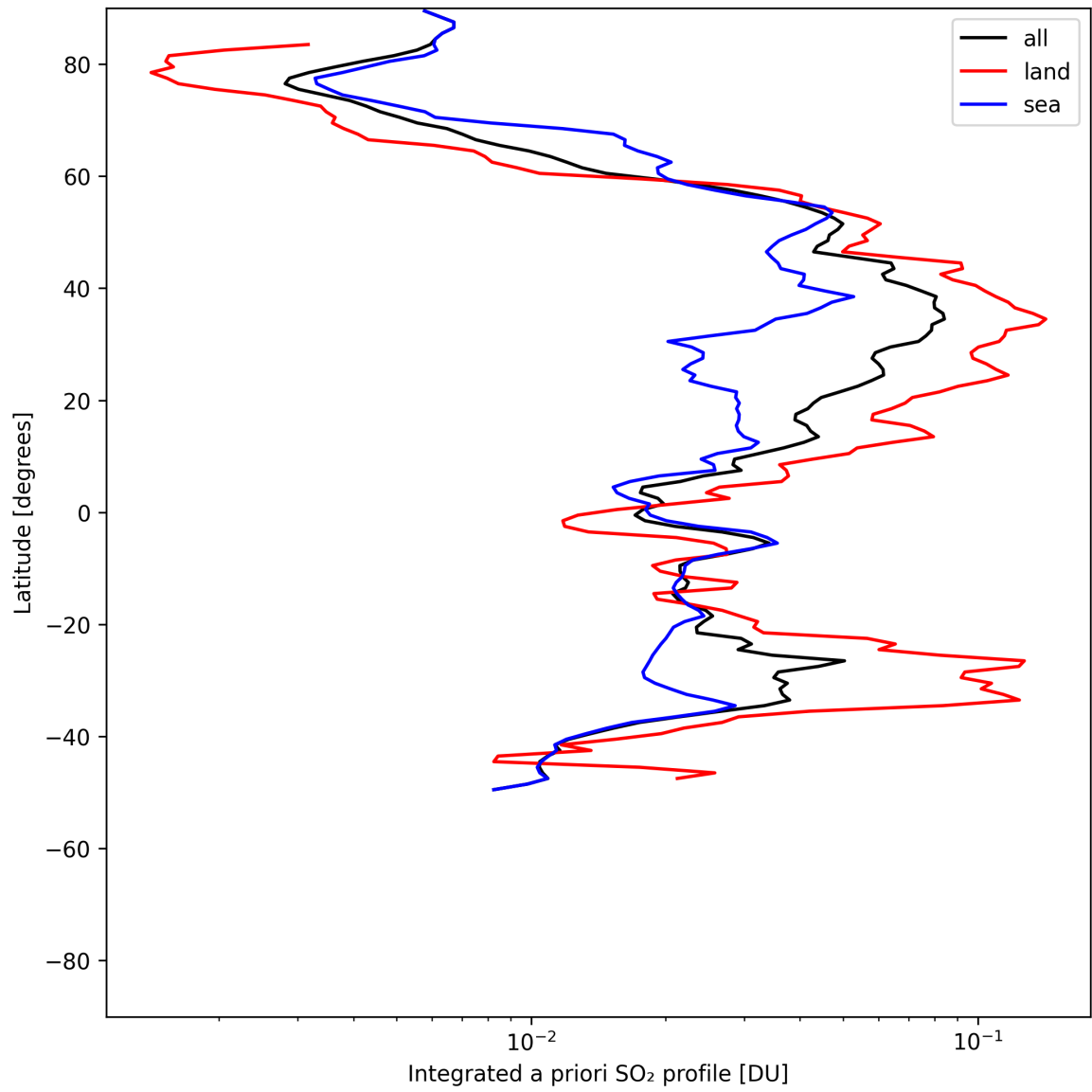


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-05-16 to 2025-05-17.

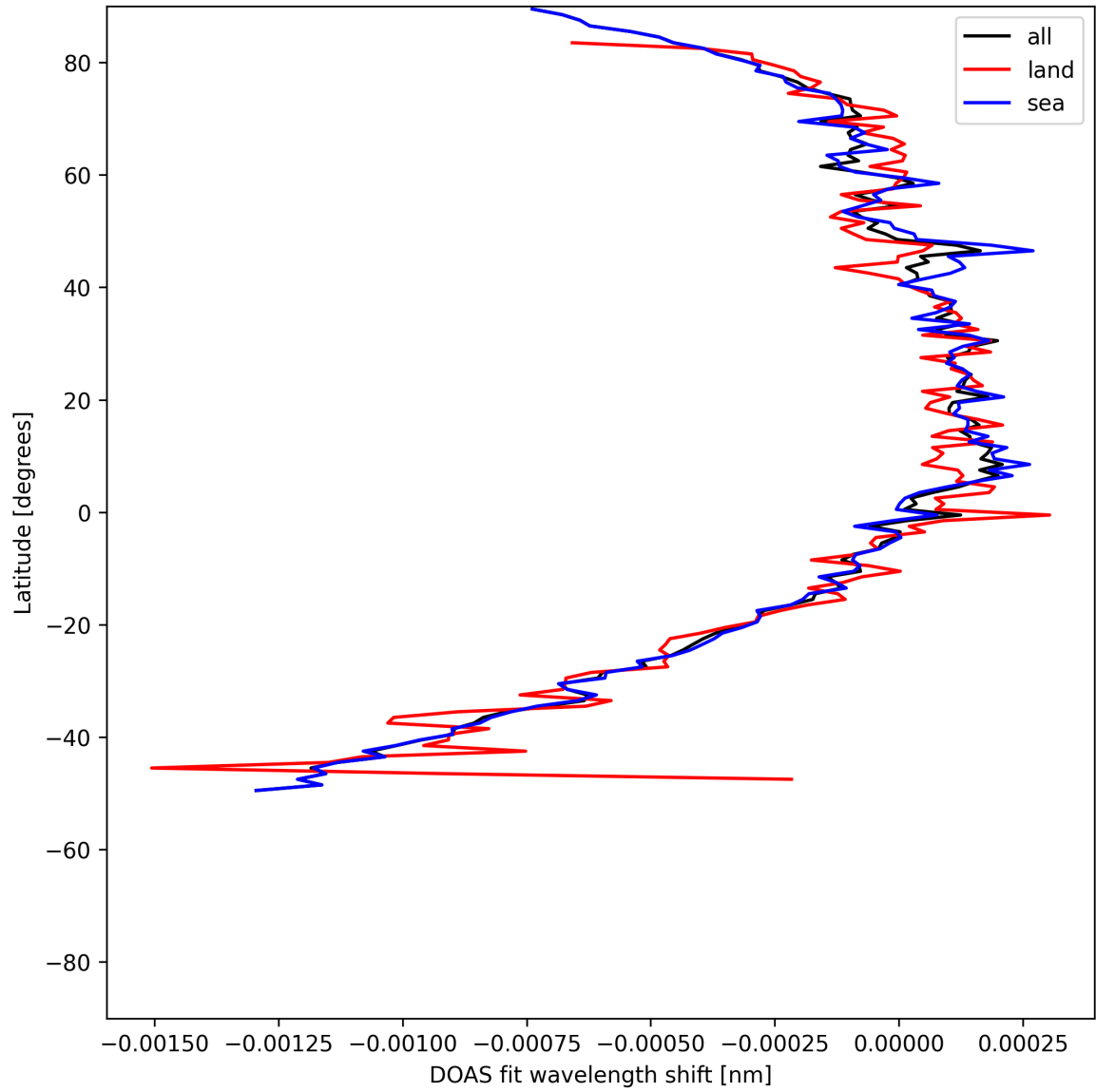


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-05-16 to 2025-05-17.

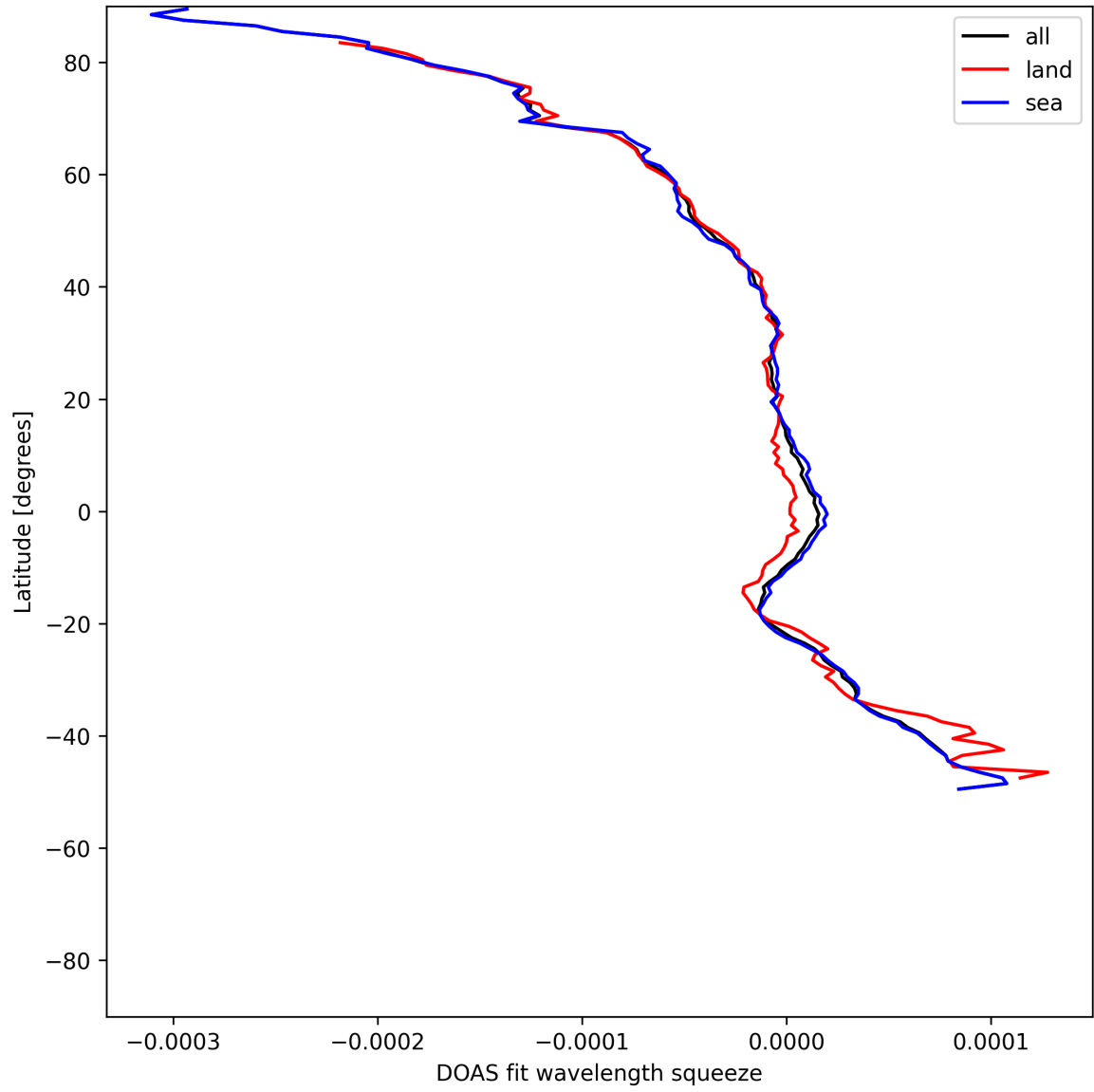


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-05-16 to 2025-05-17.

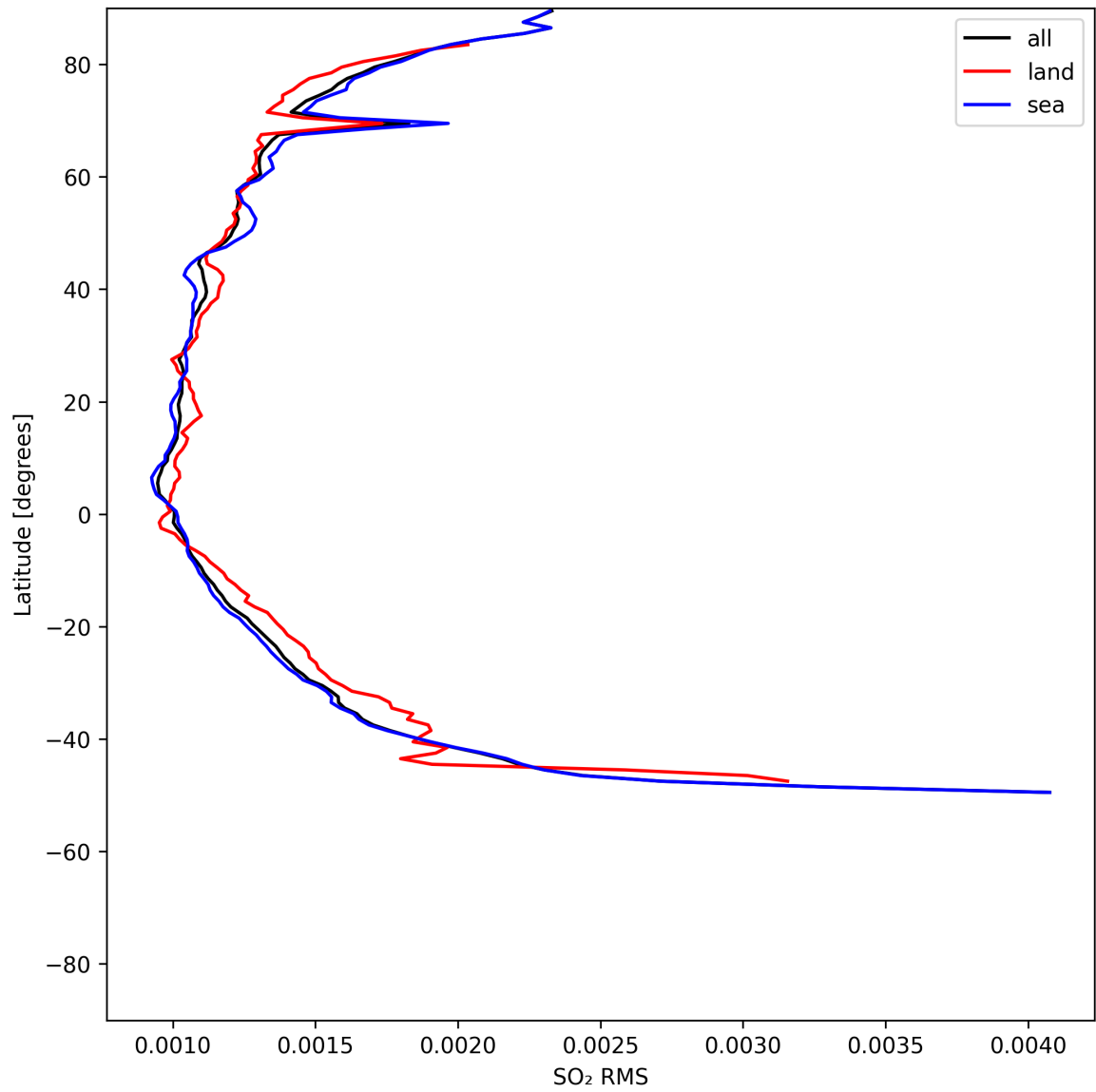


Figure 52: Zonal average of “SO₂ RMS” for 2025-05-16 to 2025-05-17.

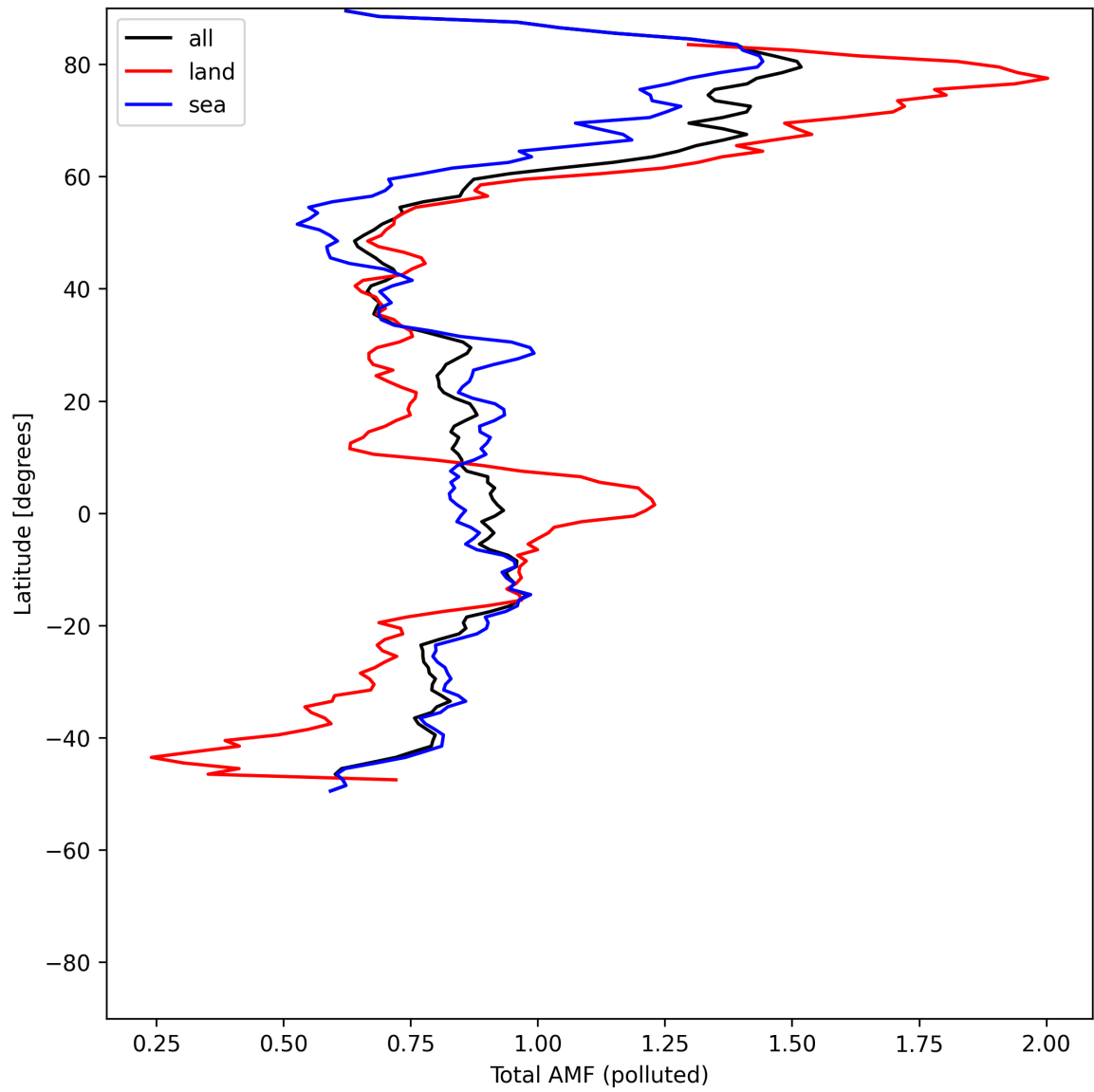


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-05-16 to 2025-05-17.

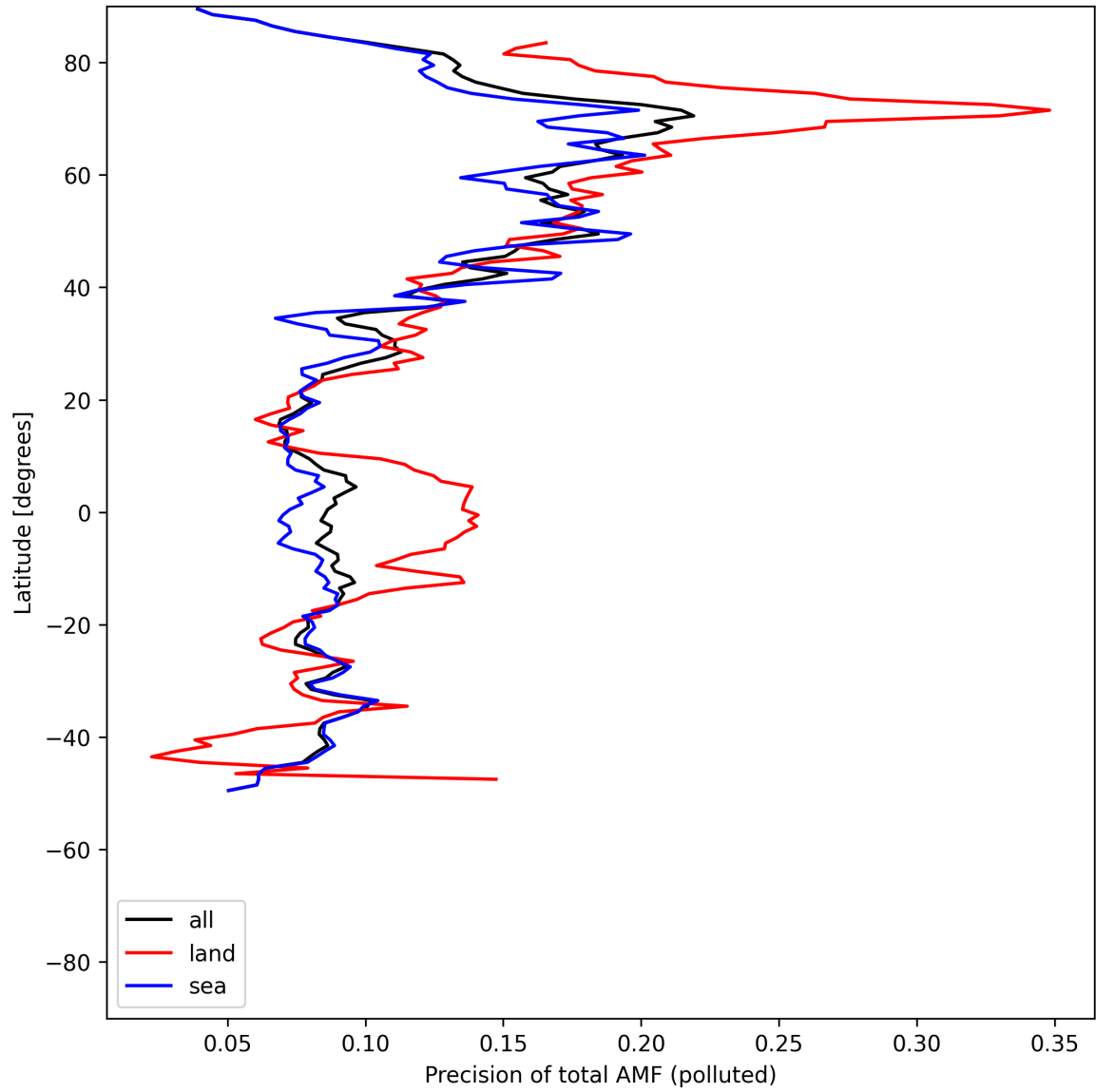


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-05-16 to 2025-05-17.

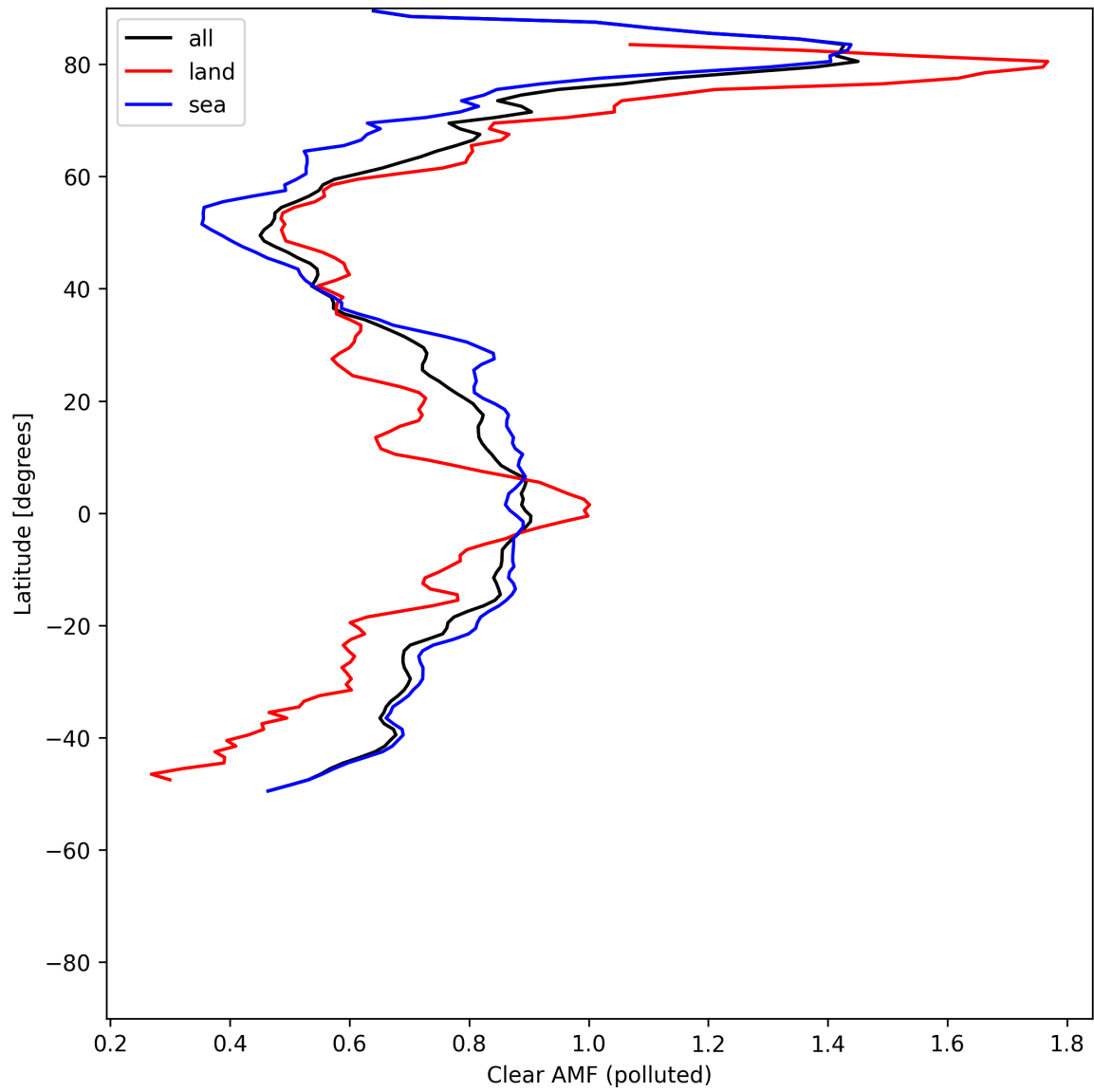


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-05-16 to 2025-05-17.

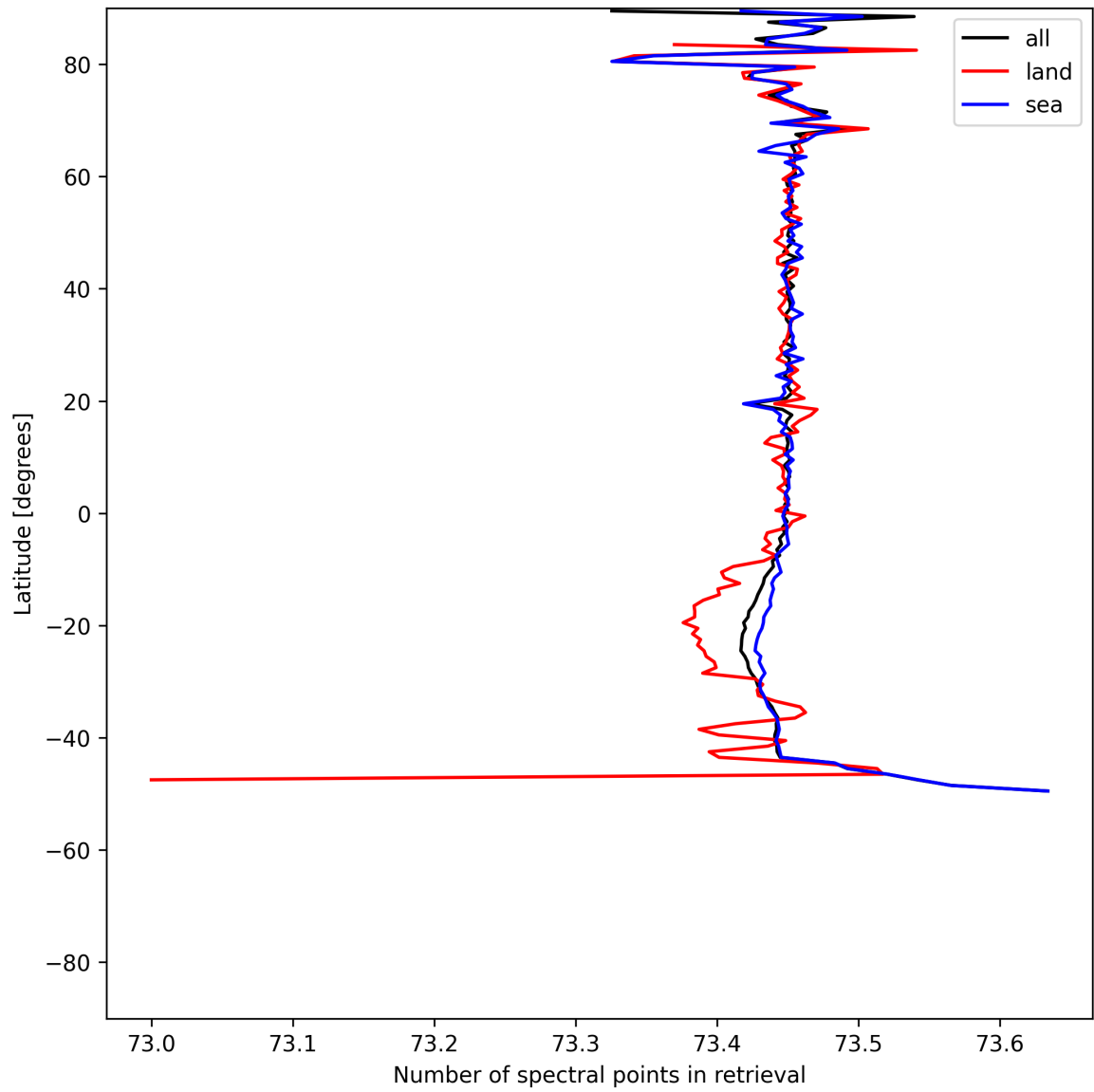


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-05-16 to 2025-05-17.

8 Histograms

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

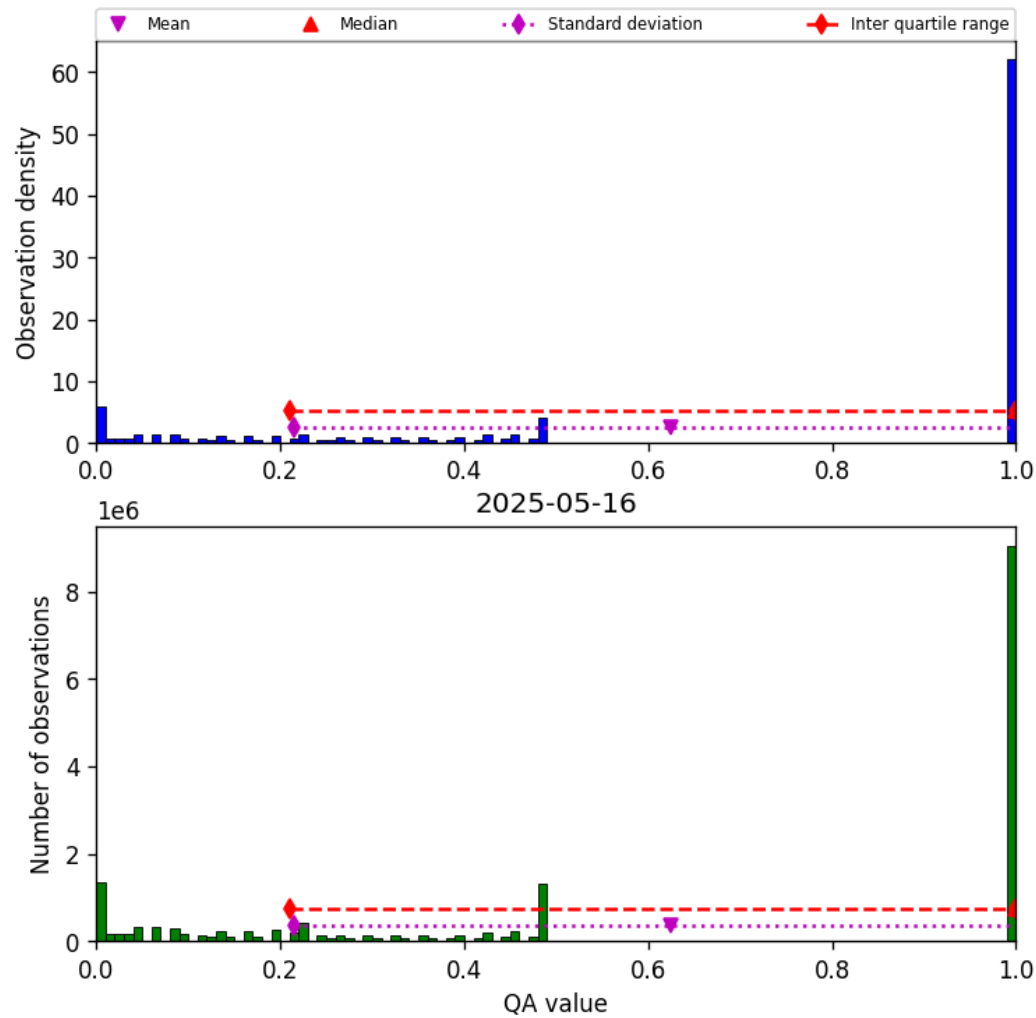


Figure 57: Histogram of “QA value” for 2025-05-16 to 2025-05-17

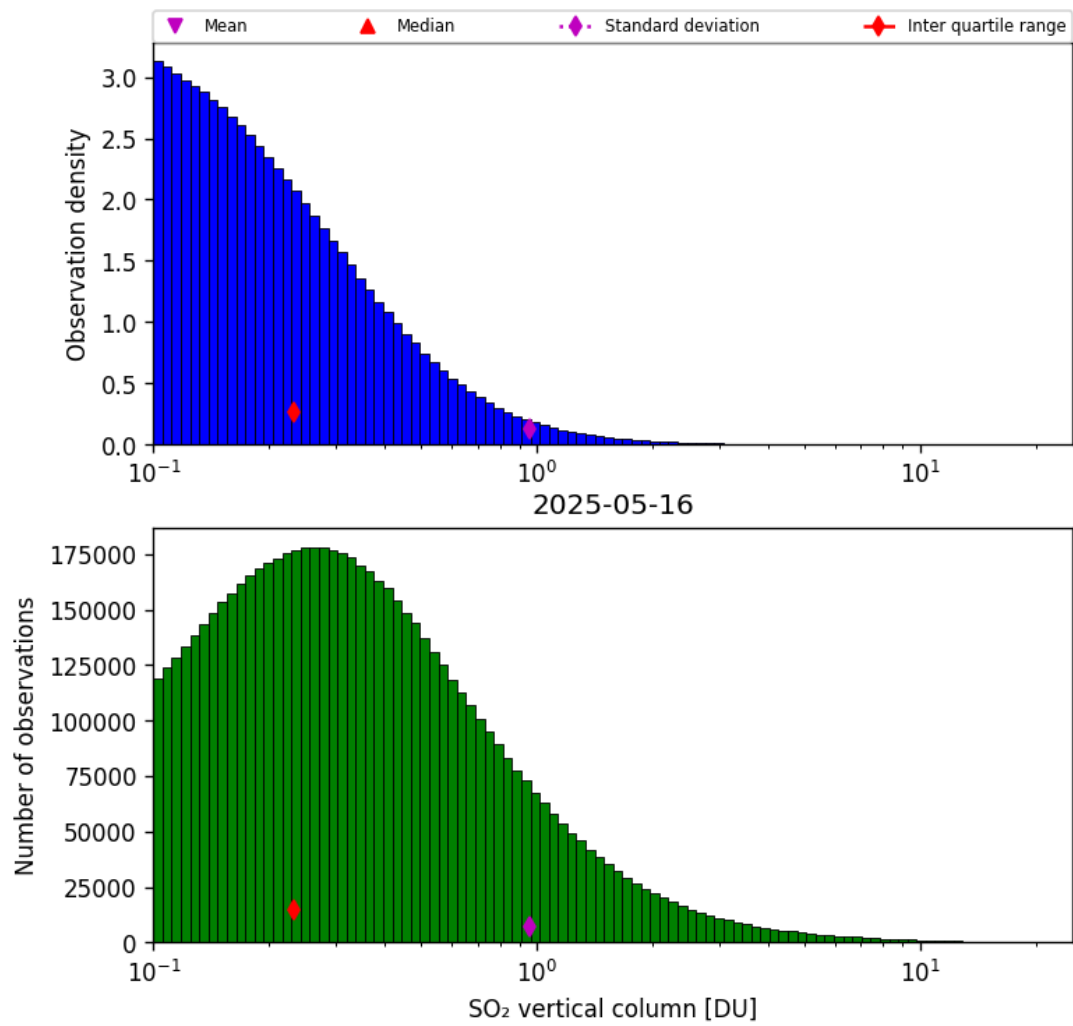


Figure 58: Histogram of “SO₂ vertical column” for 2025-05-16 to 2025-05-17

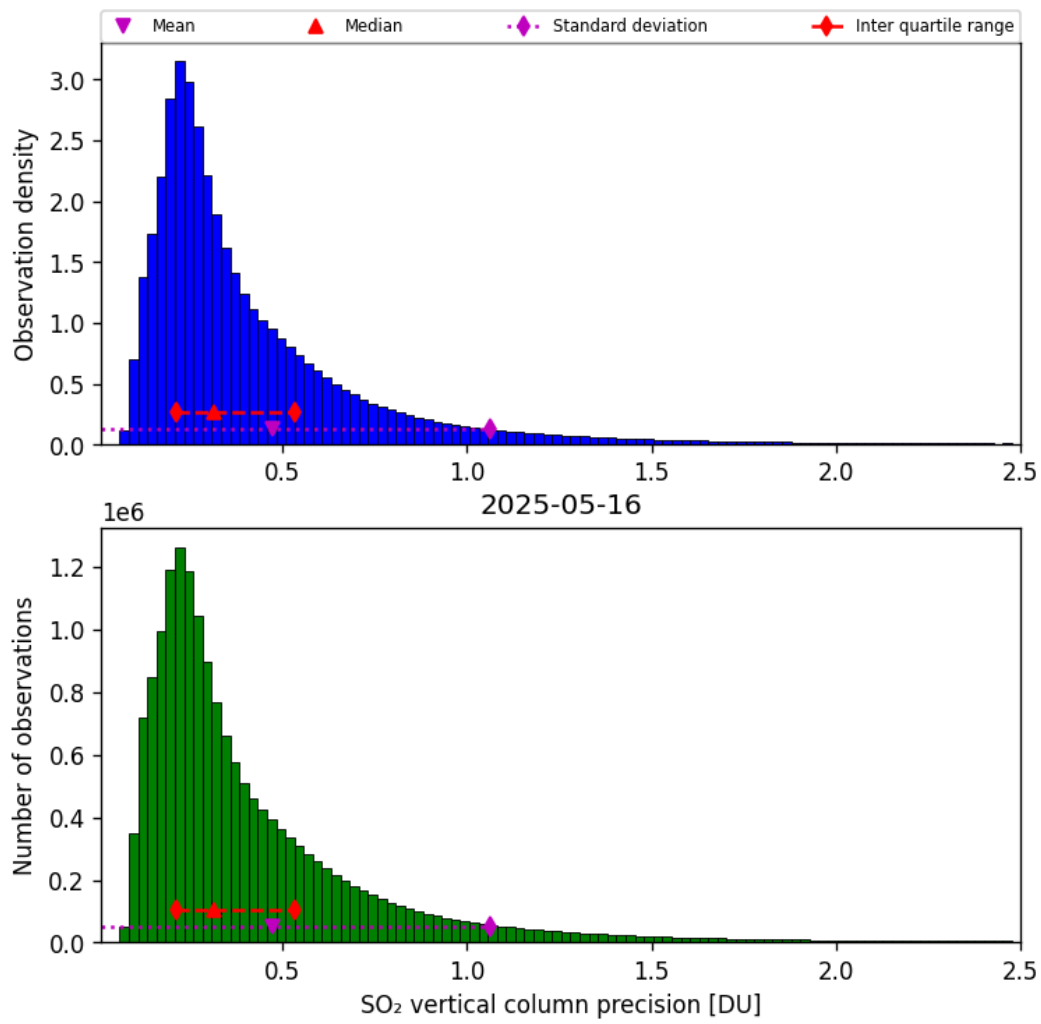


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-05-16 to 2025-05-17

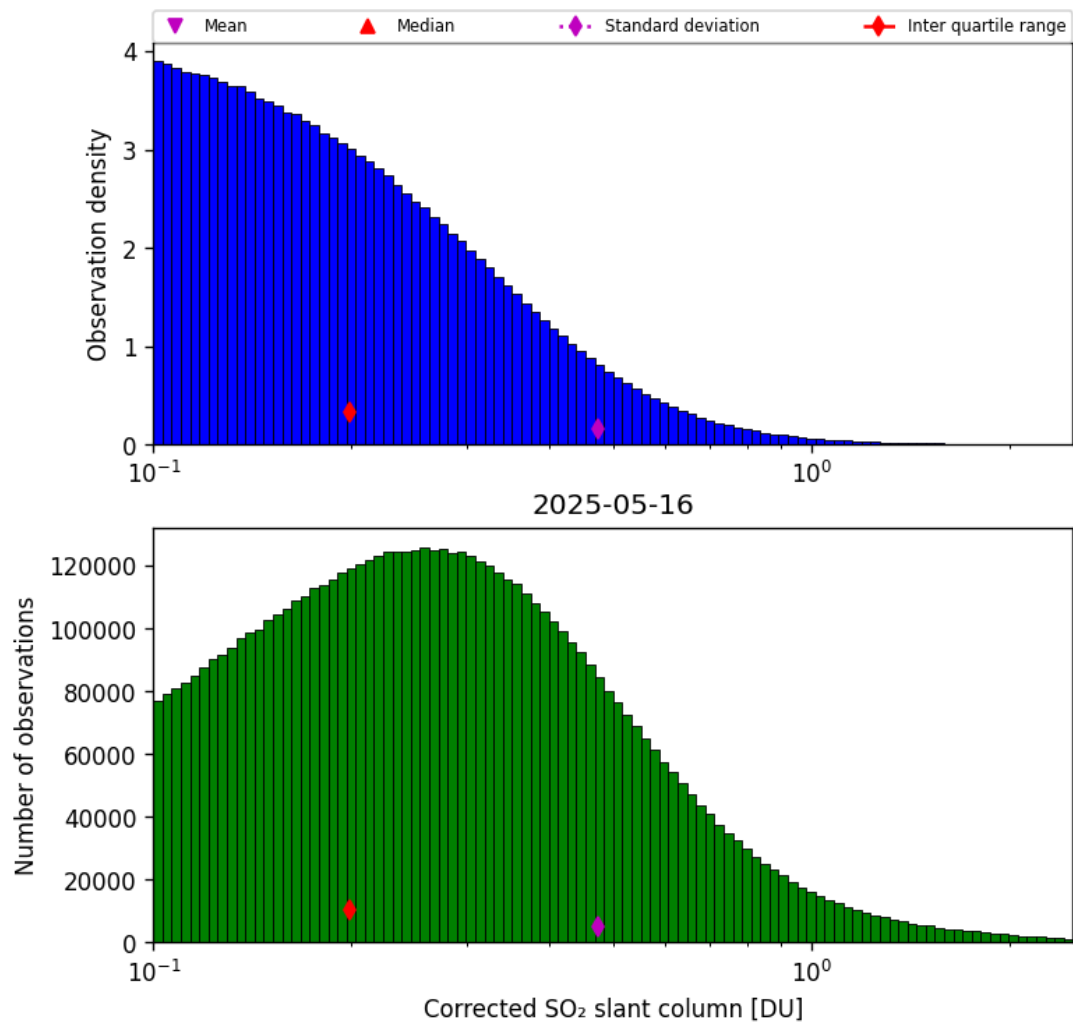


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-05-16 to 2025-05-17

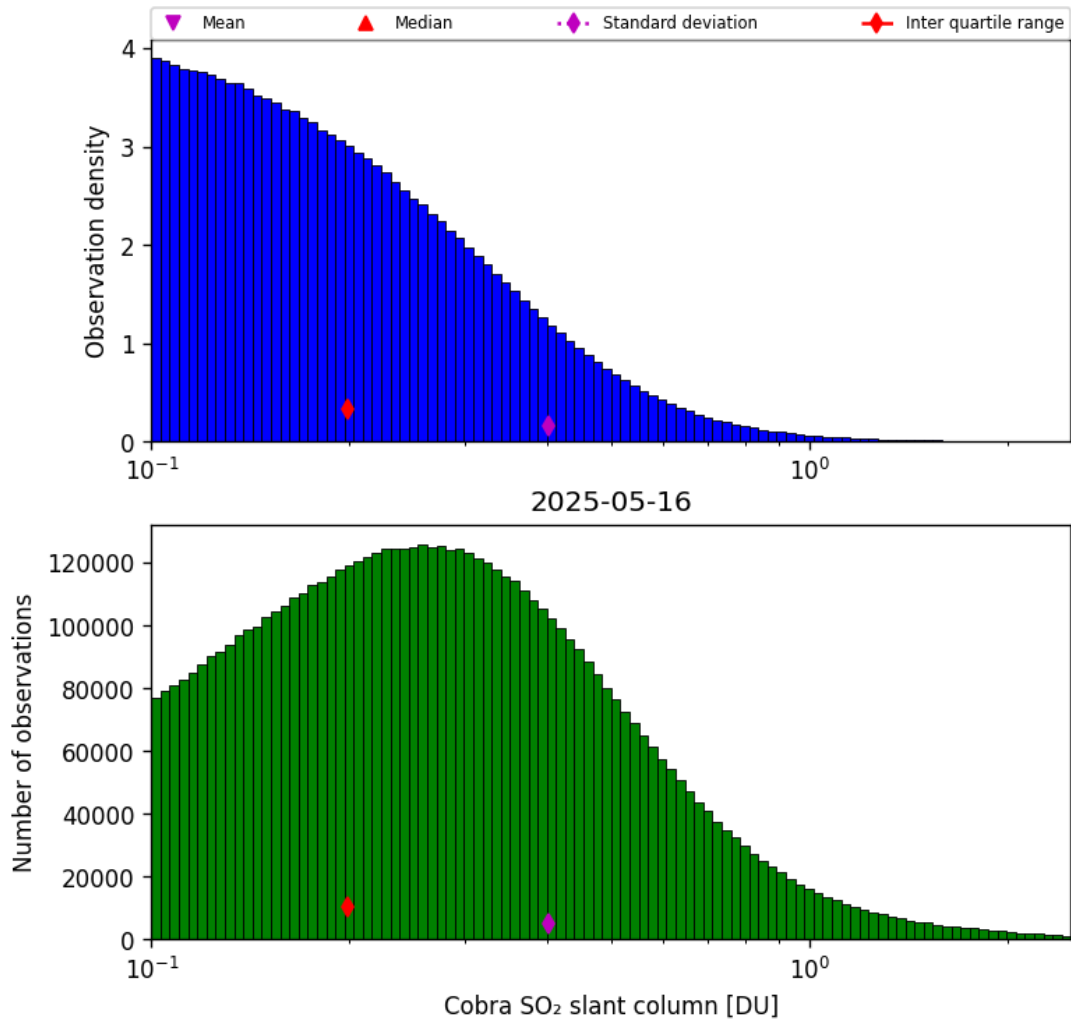


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-05-16 to 2025-05-17

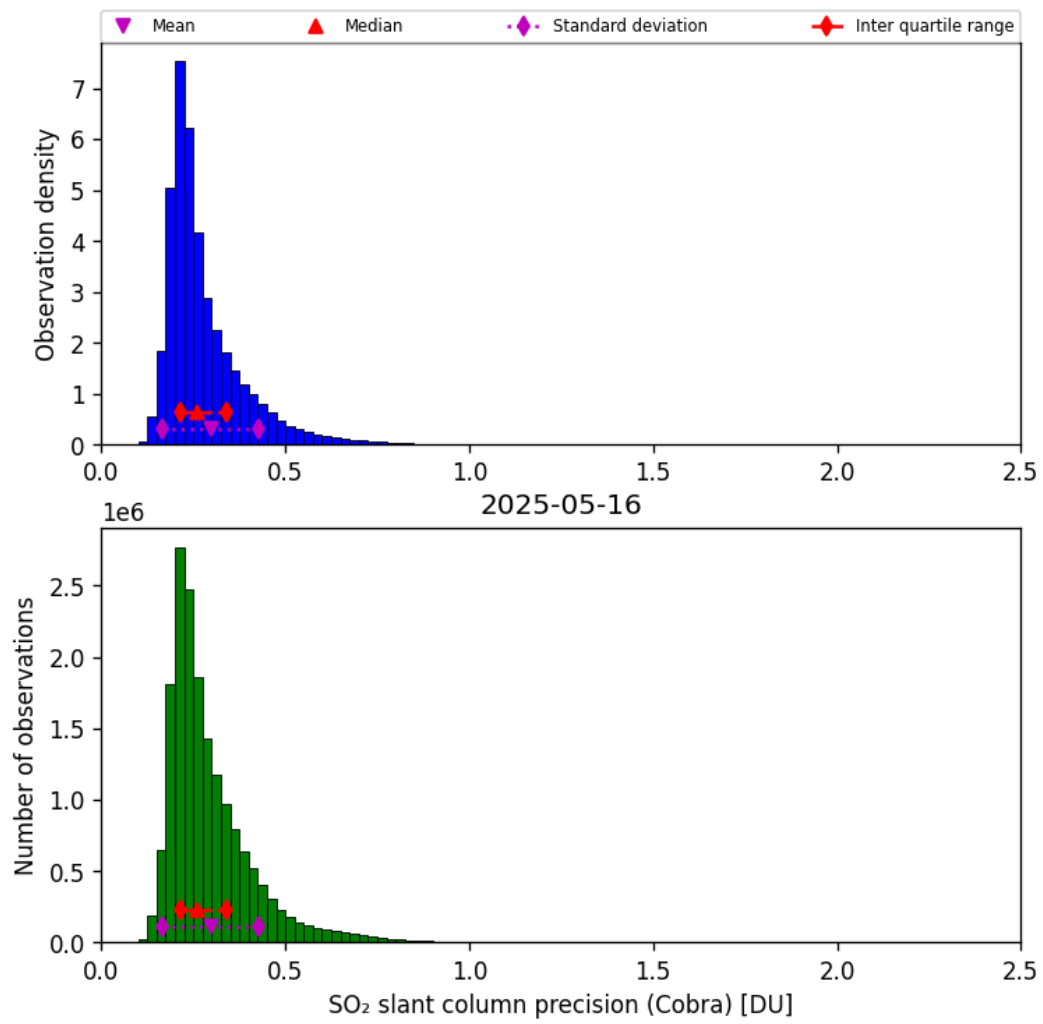


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-05-16 to 2025-05-17

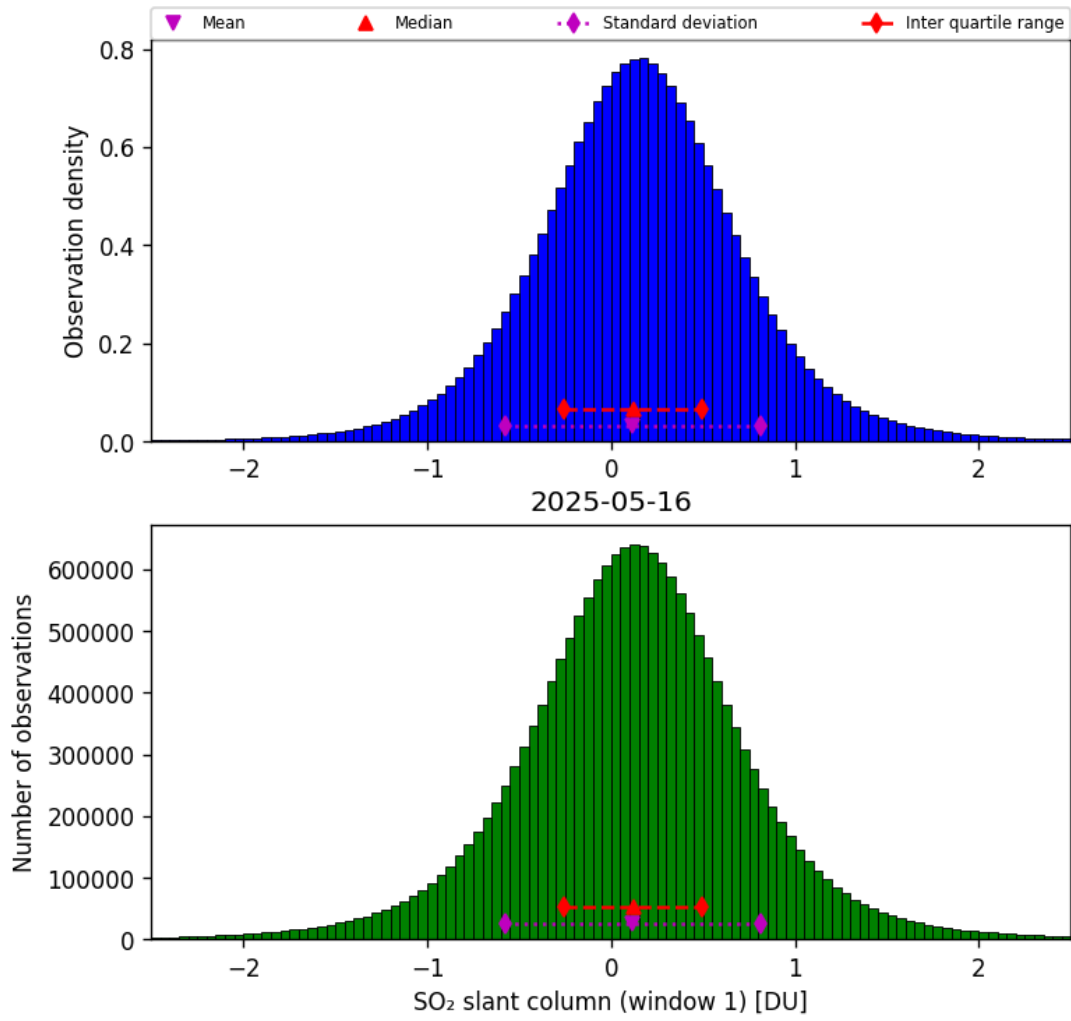


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-05-16 to 2025-05-17

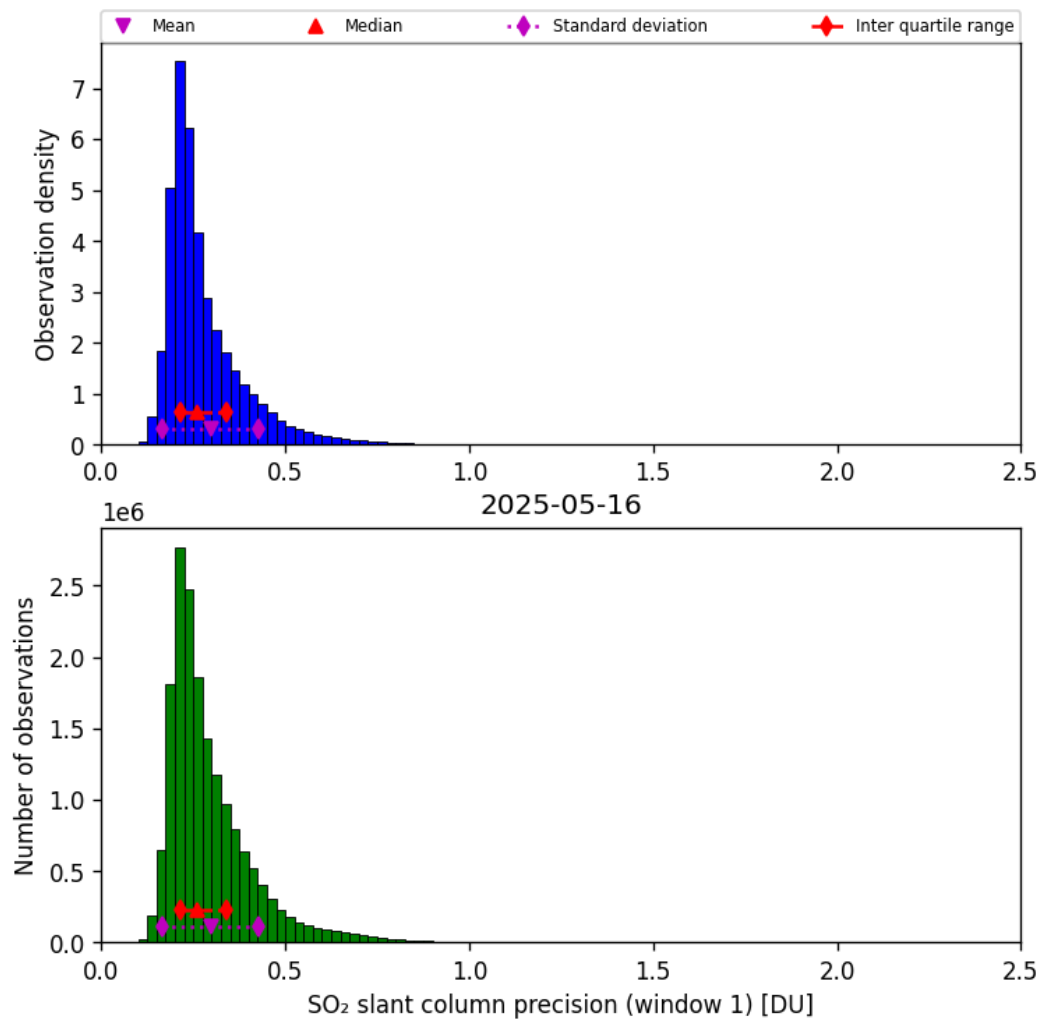


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-05-16 to 2025-05-17

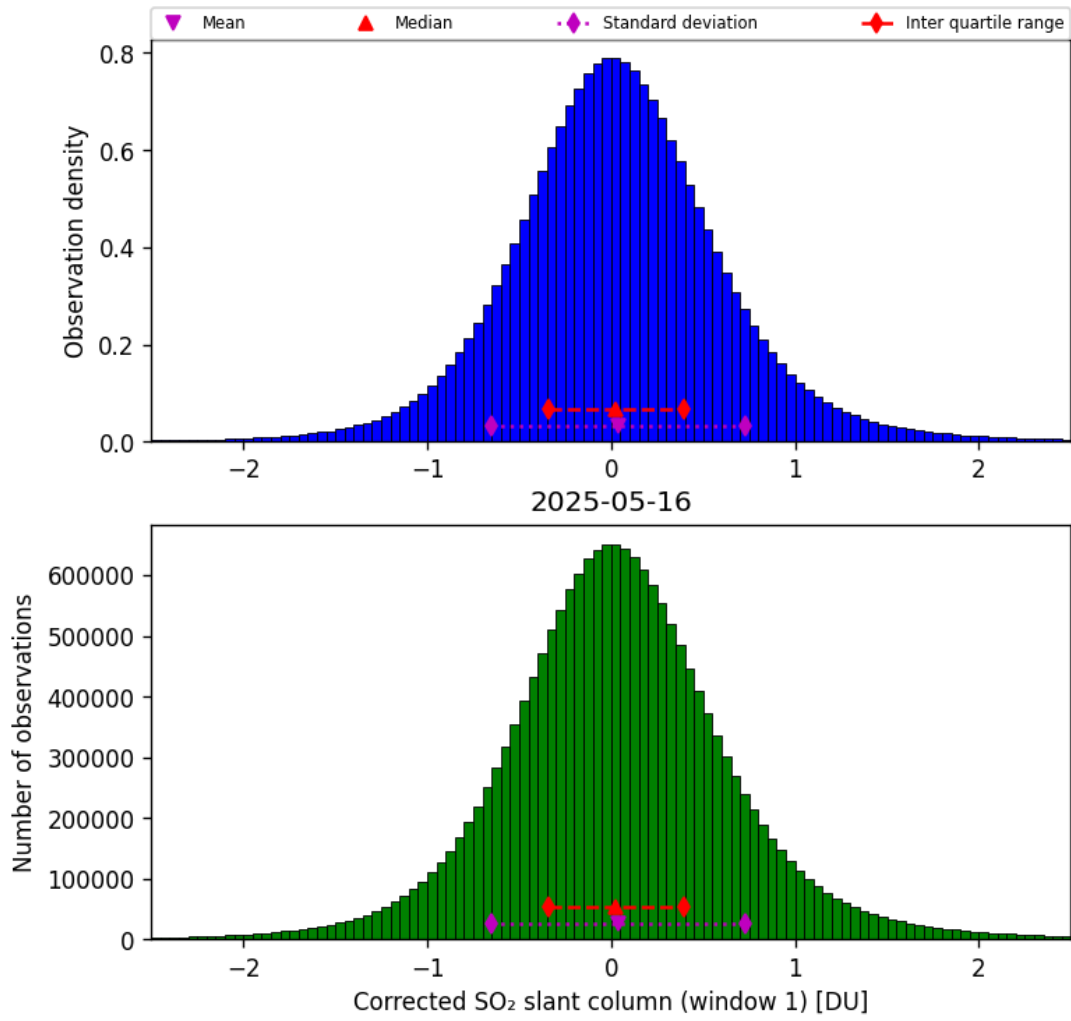


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-05-16 to 2025-05-17

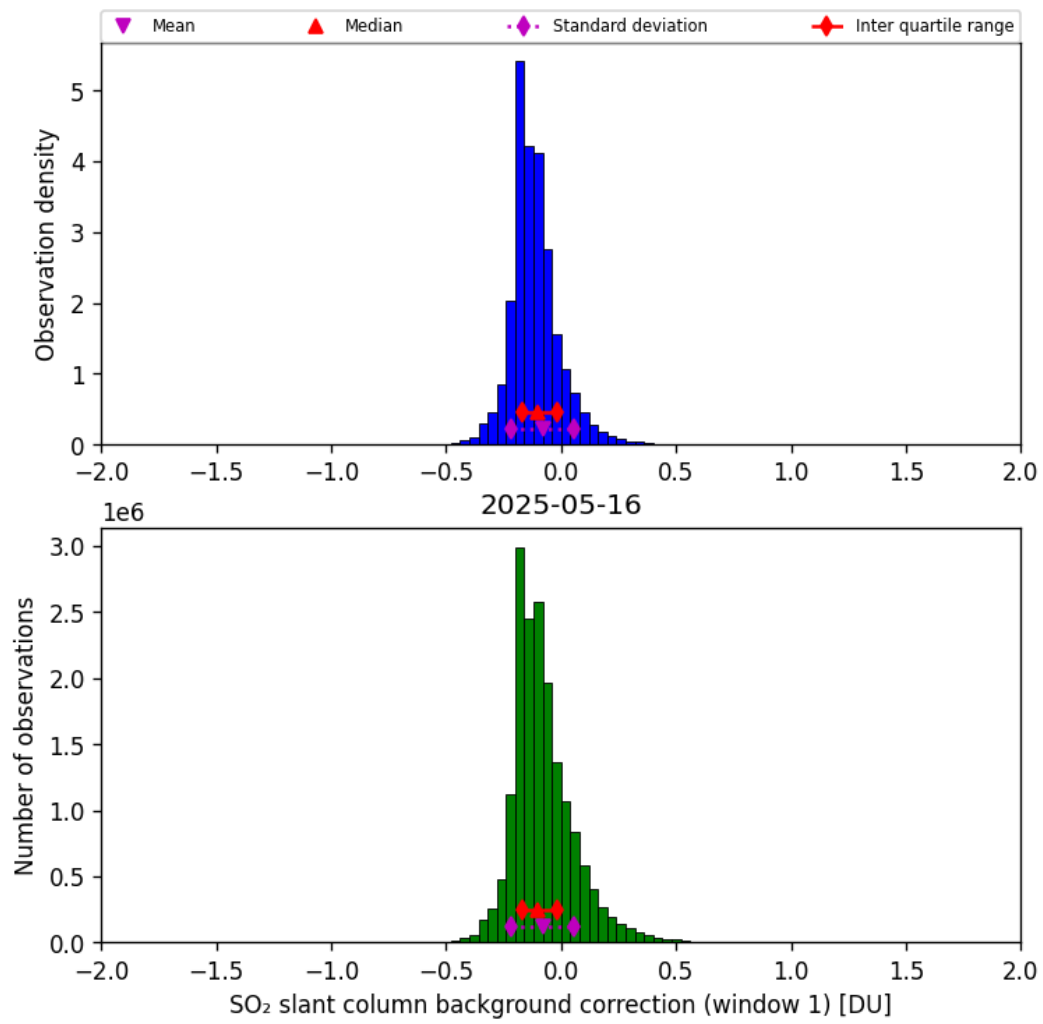


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-05-16 to 2025-05-17

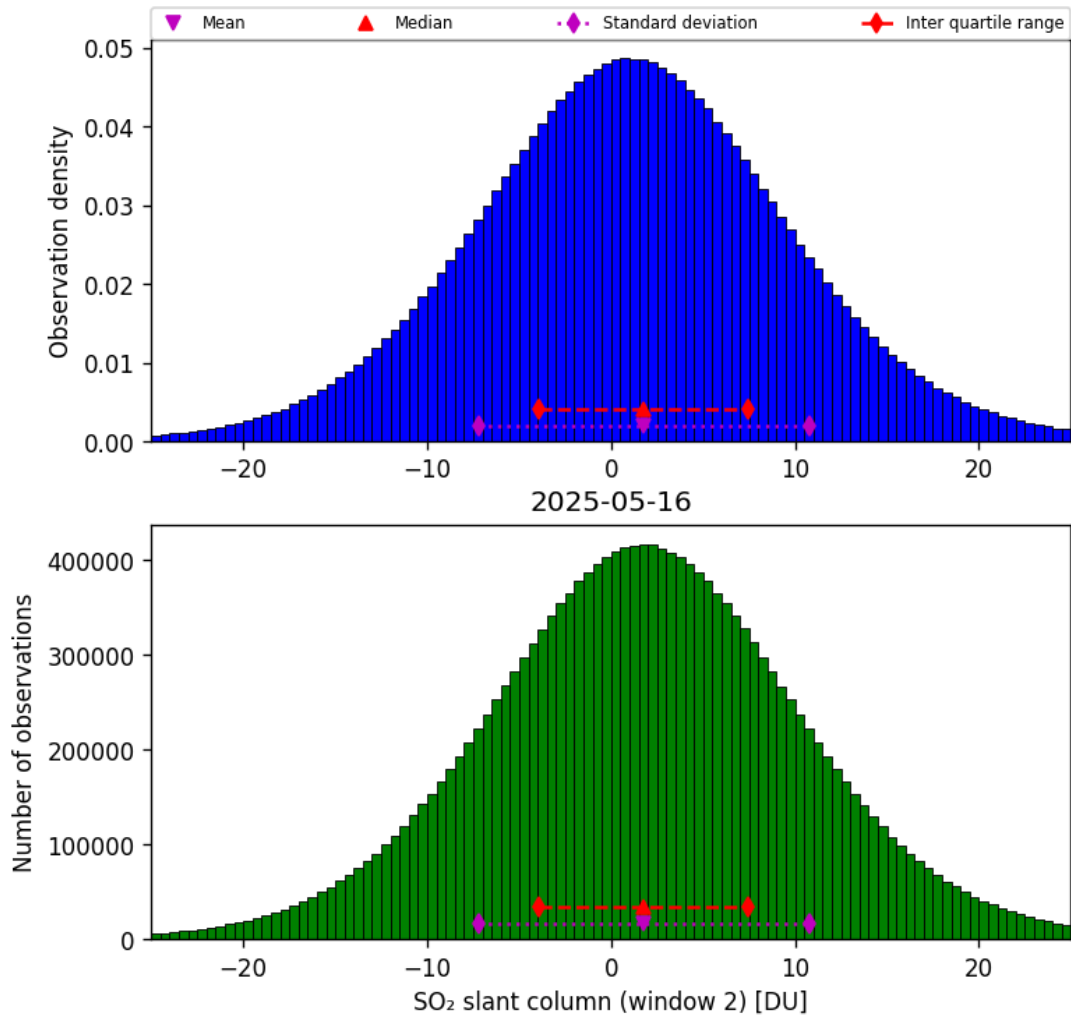


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-05-16 to 2025-05-17

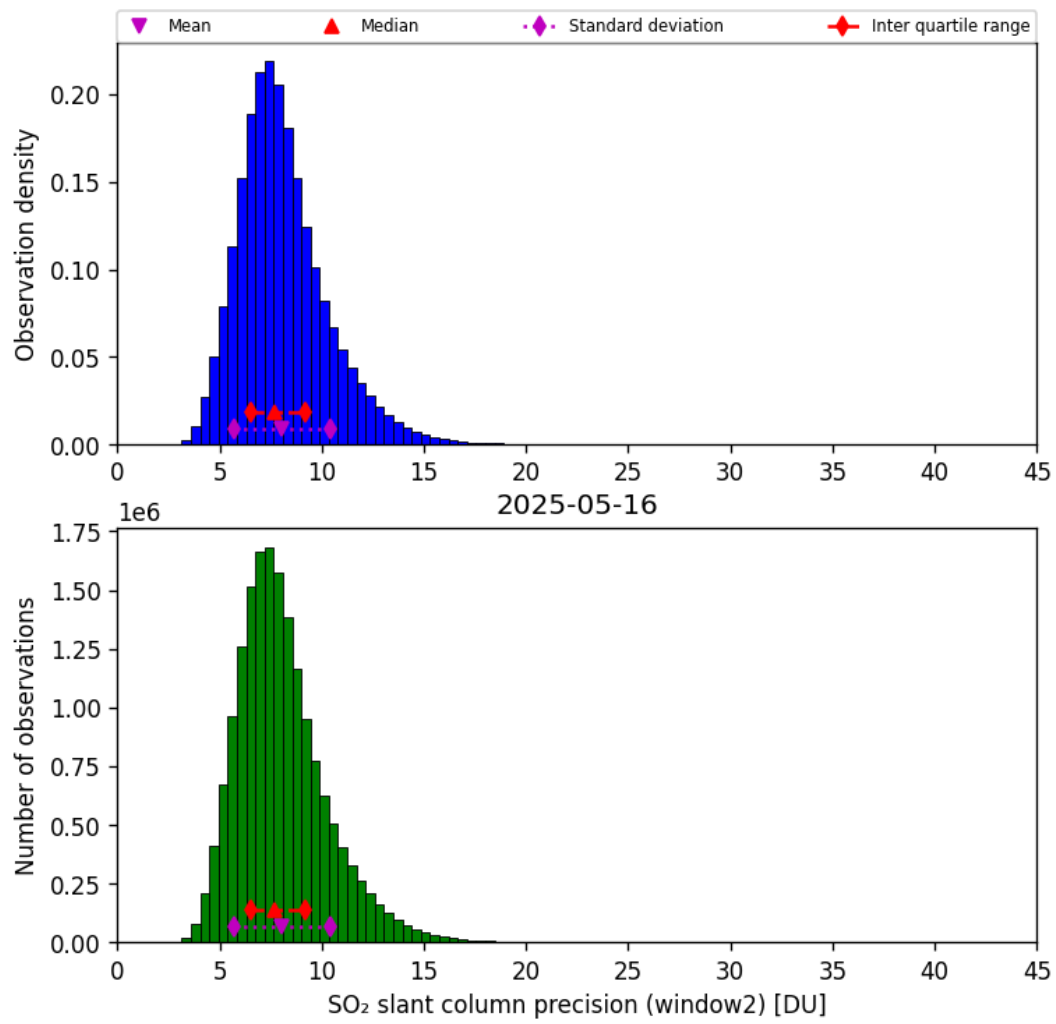


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-05-16 to 2025-05-17

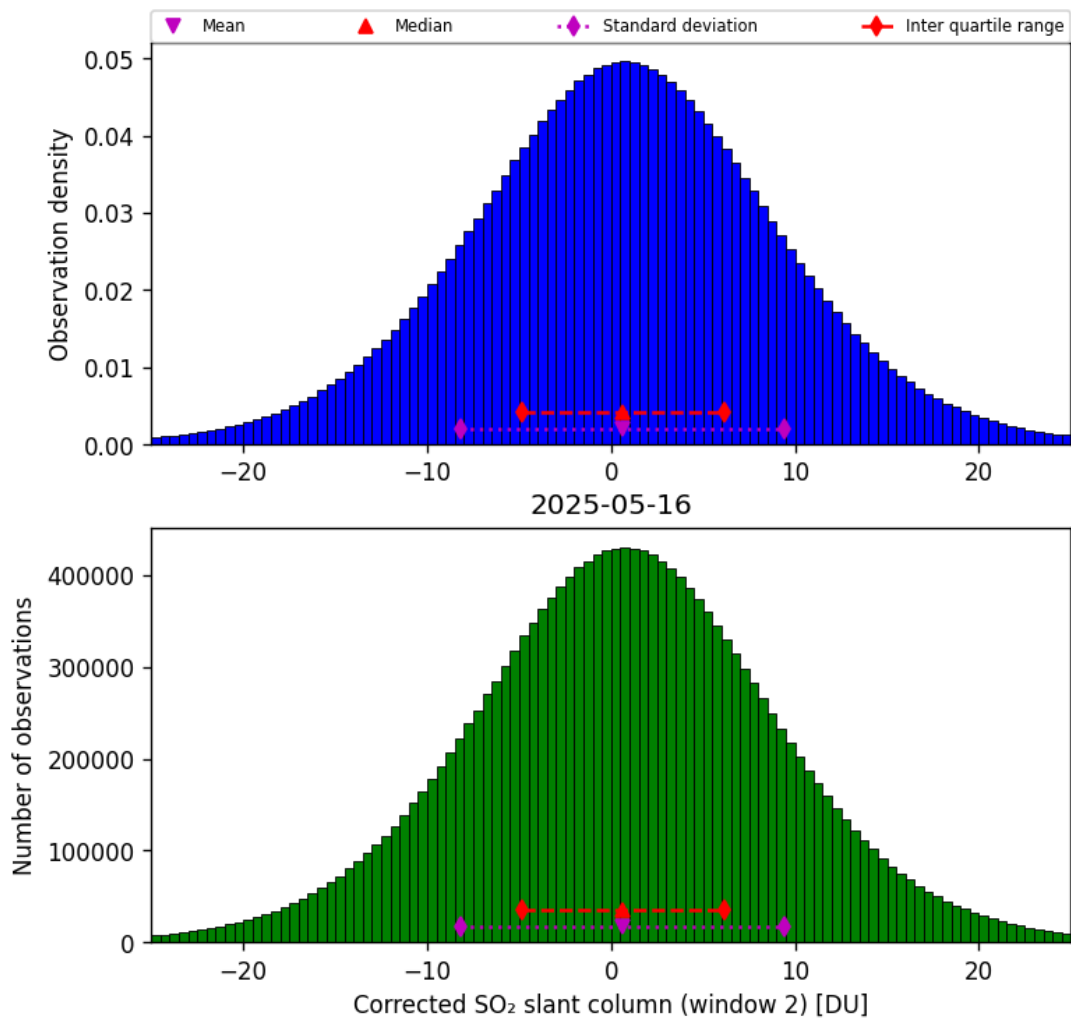


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-05-16 to 2025-05-17

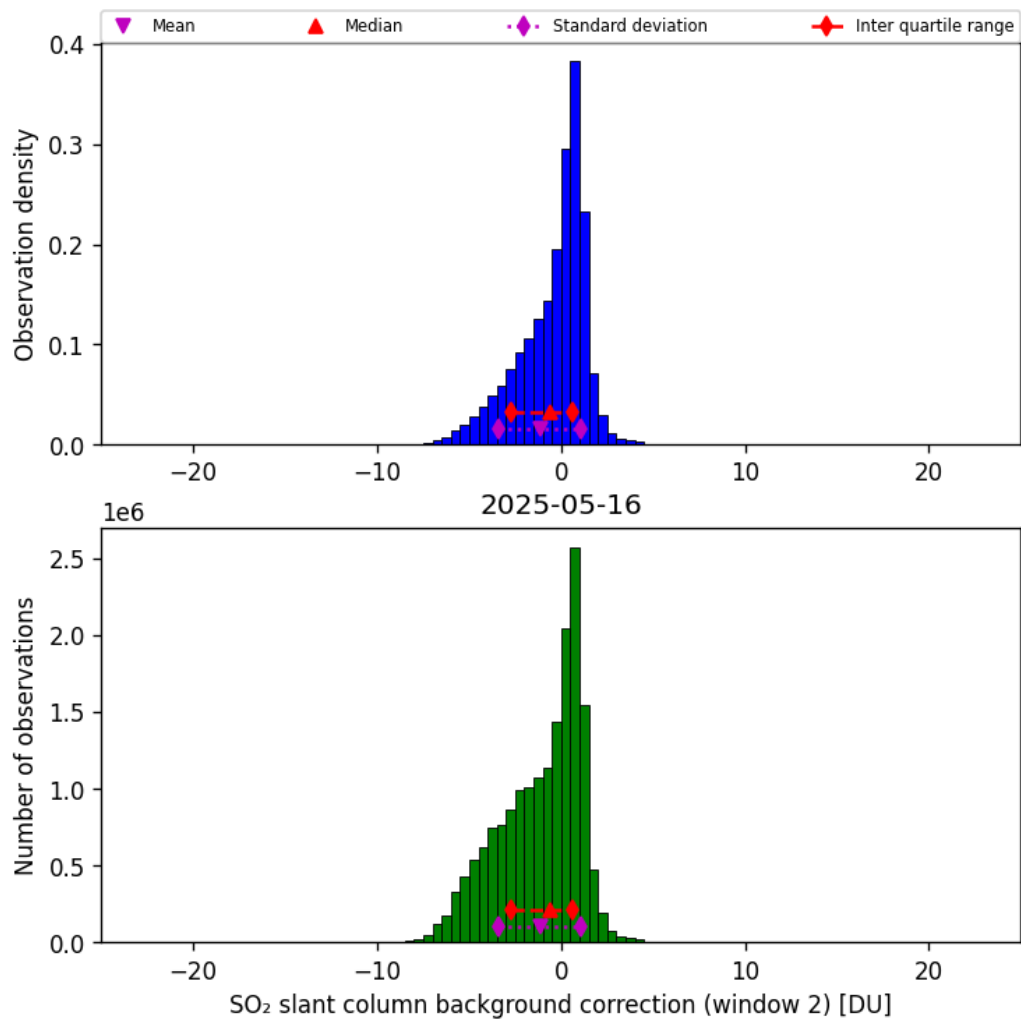


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-05-16 to 2025-05-17

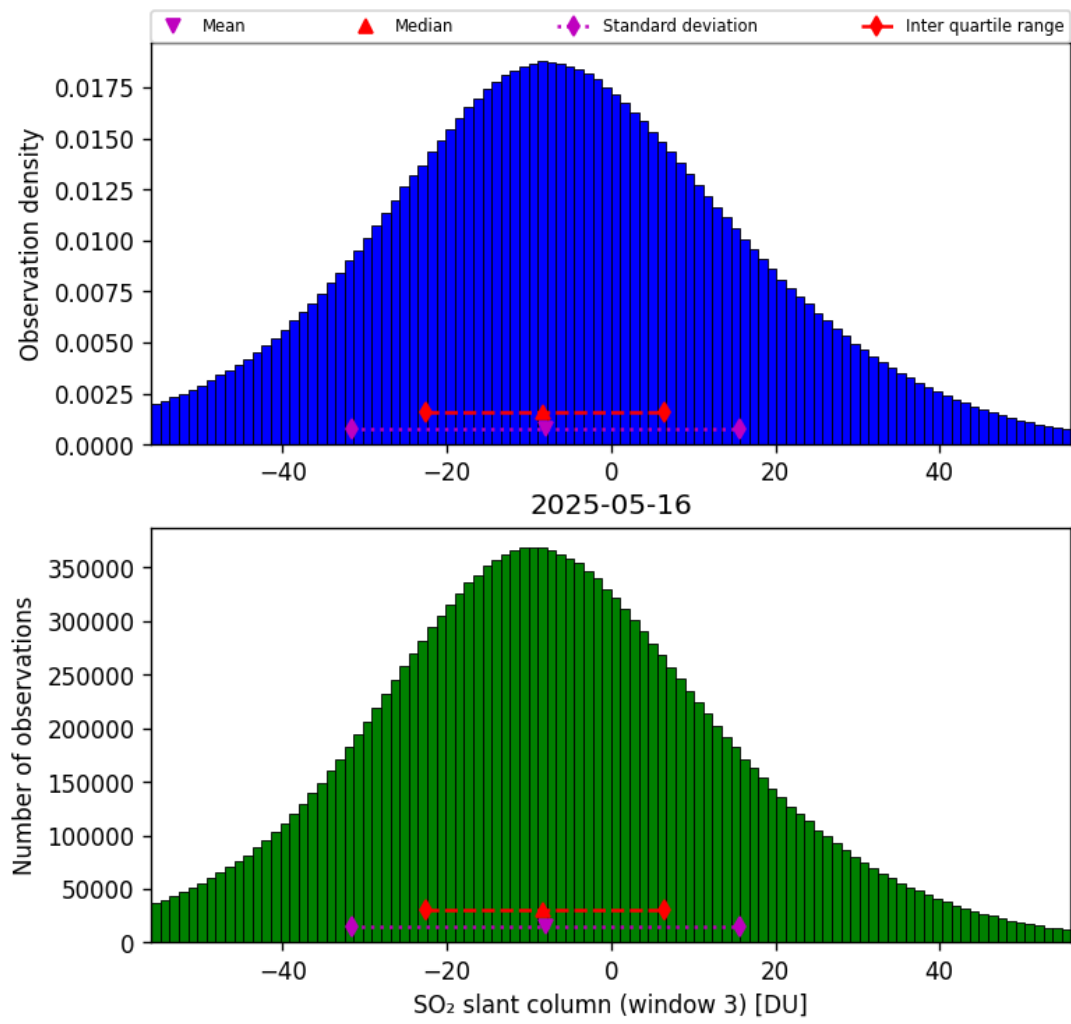


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-05-16 to 2025-05-17

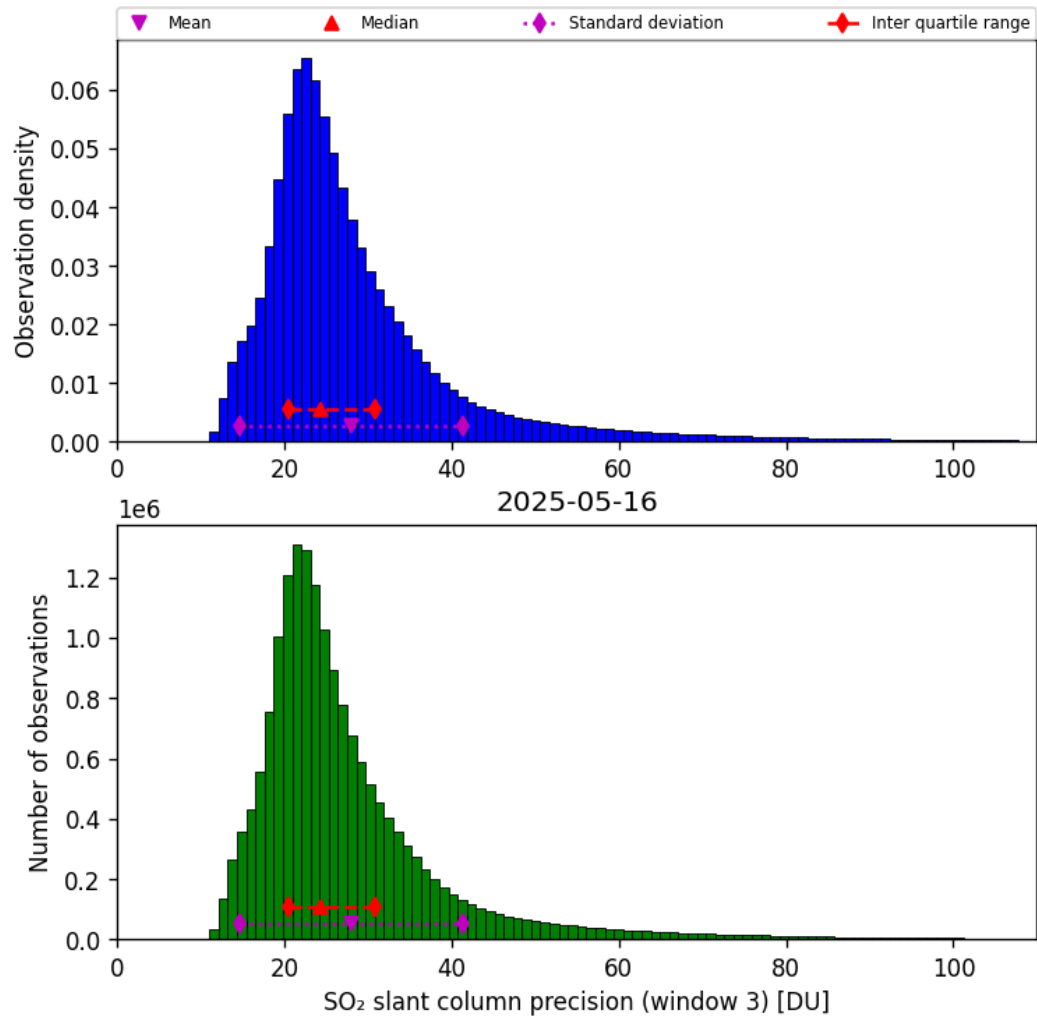


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-05-16 to 2025-05-17

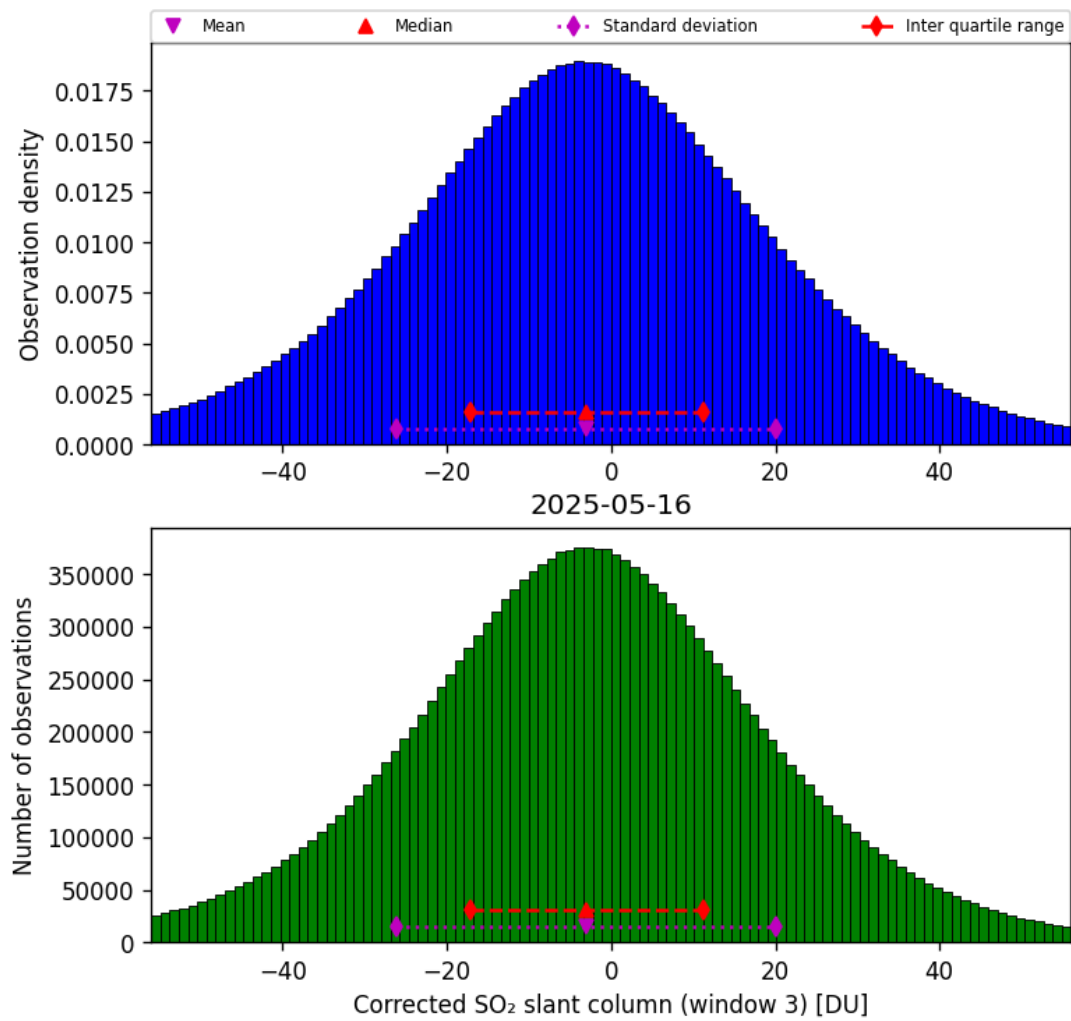


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-05-16 to 2025-05-17

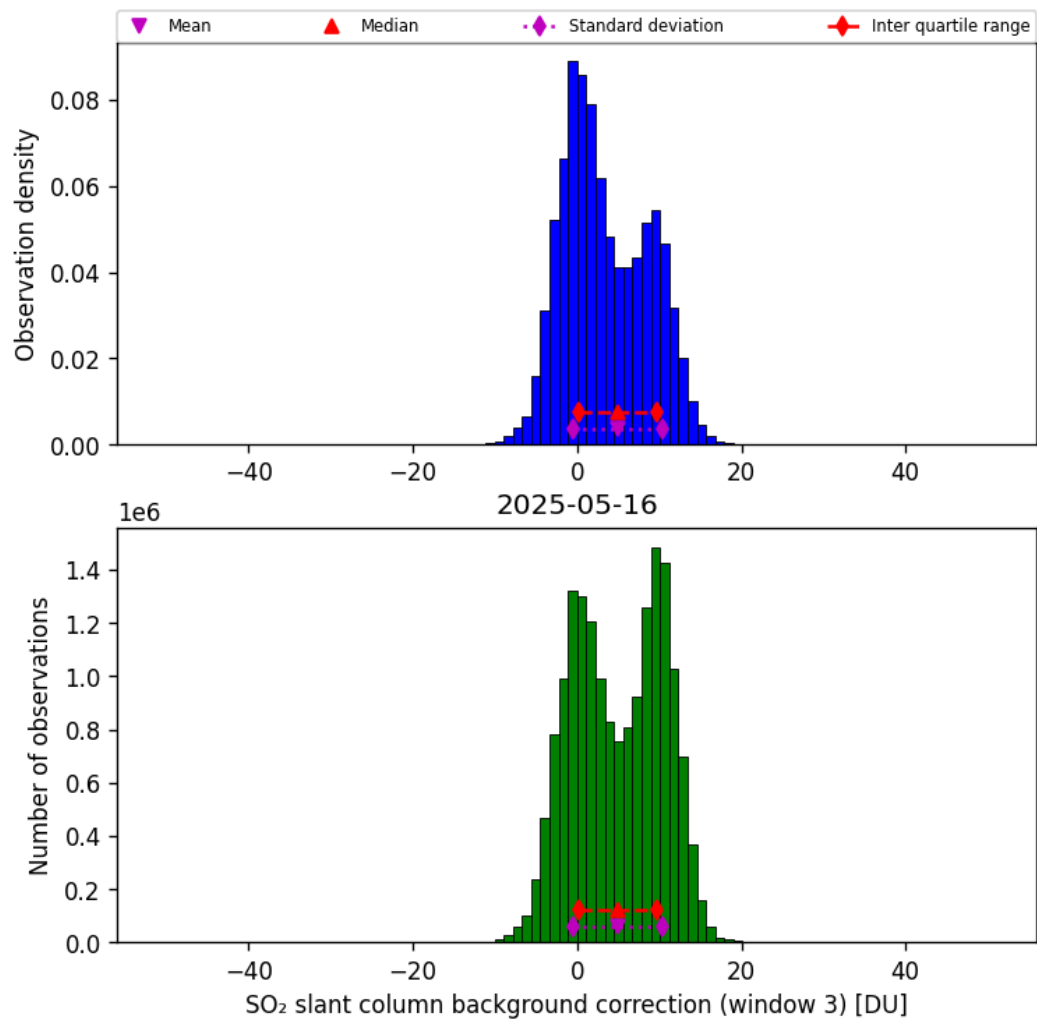


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-05-16 to 2025-05-17

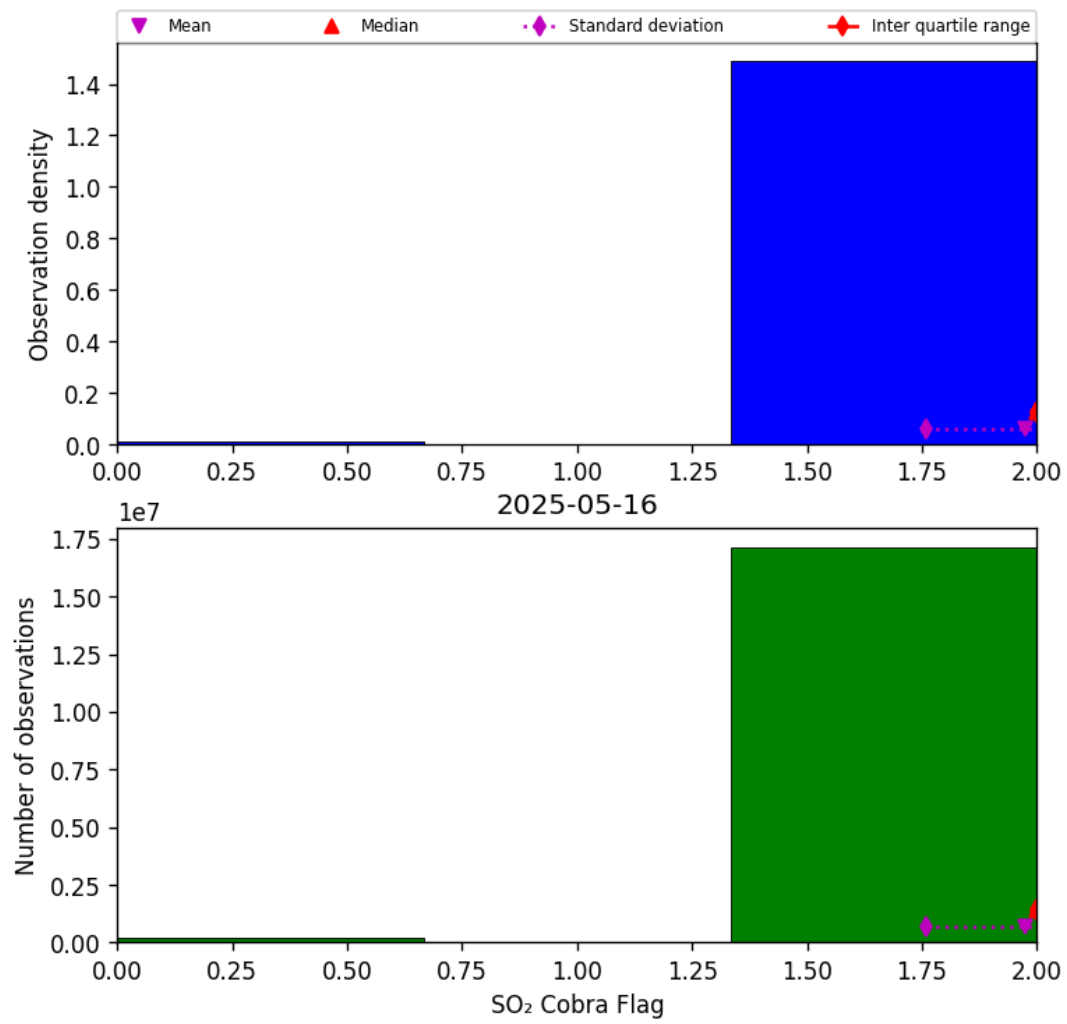


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-05-16 to 2025-05-17

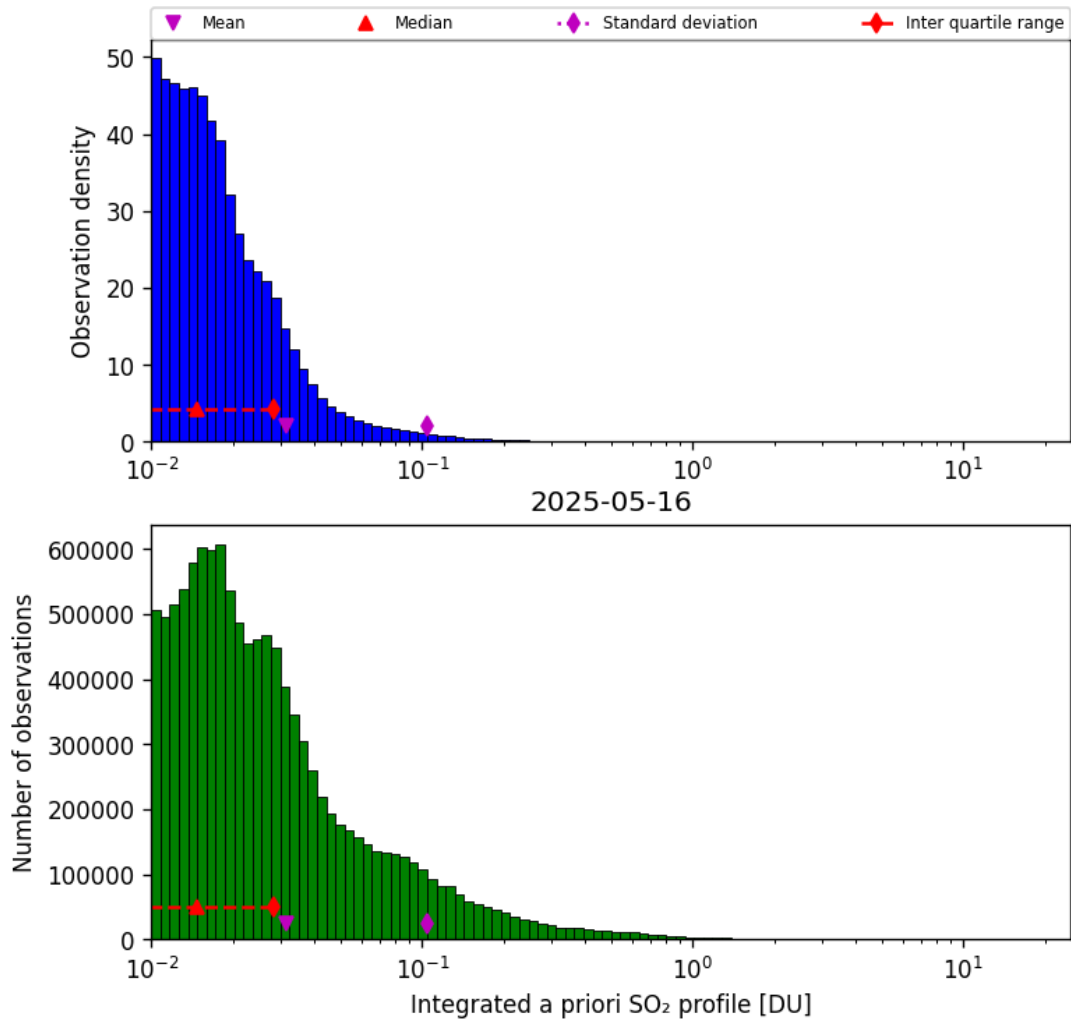


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-05-16 to 2025-05-17

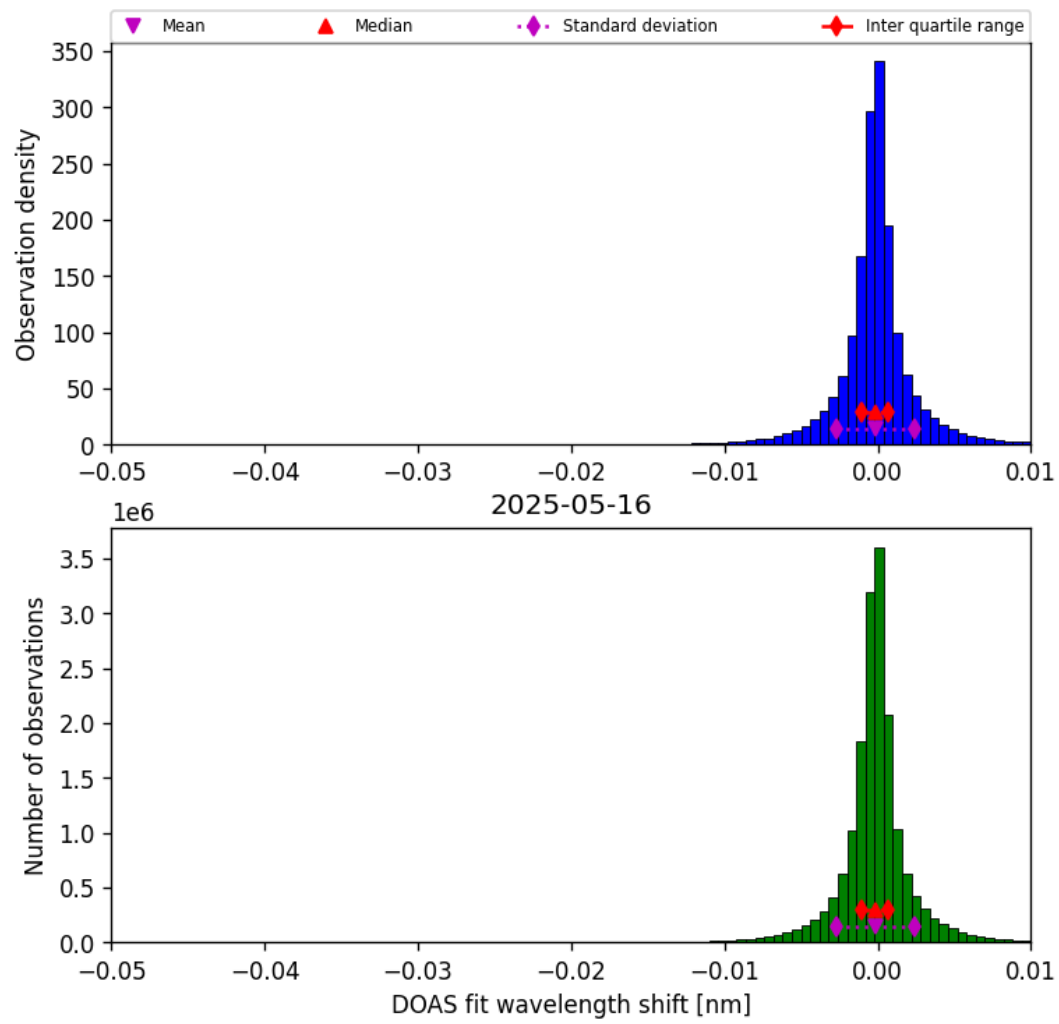


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-05-16 to 2025-05-17

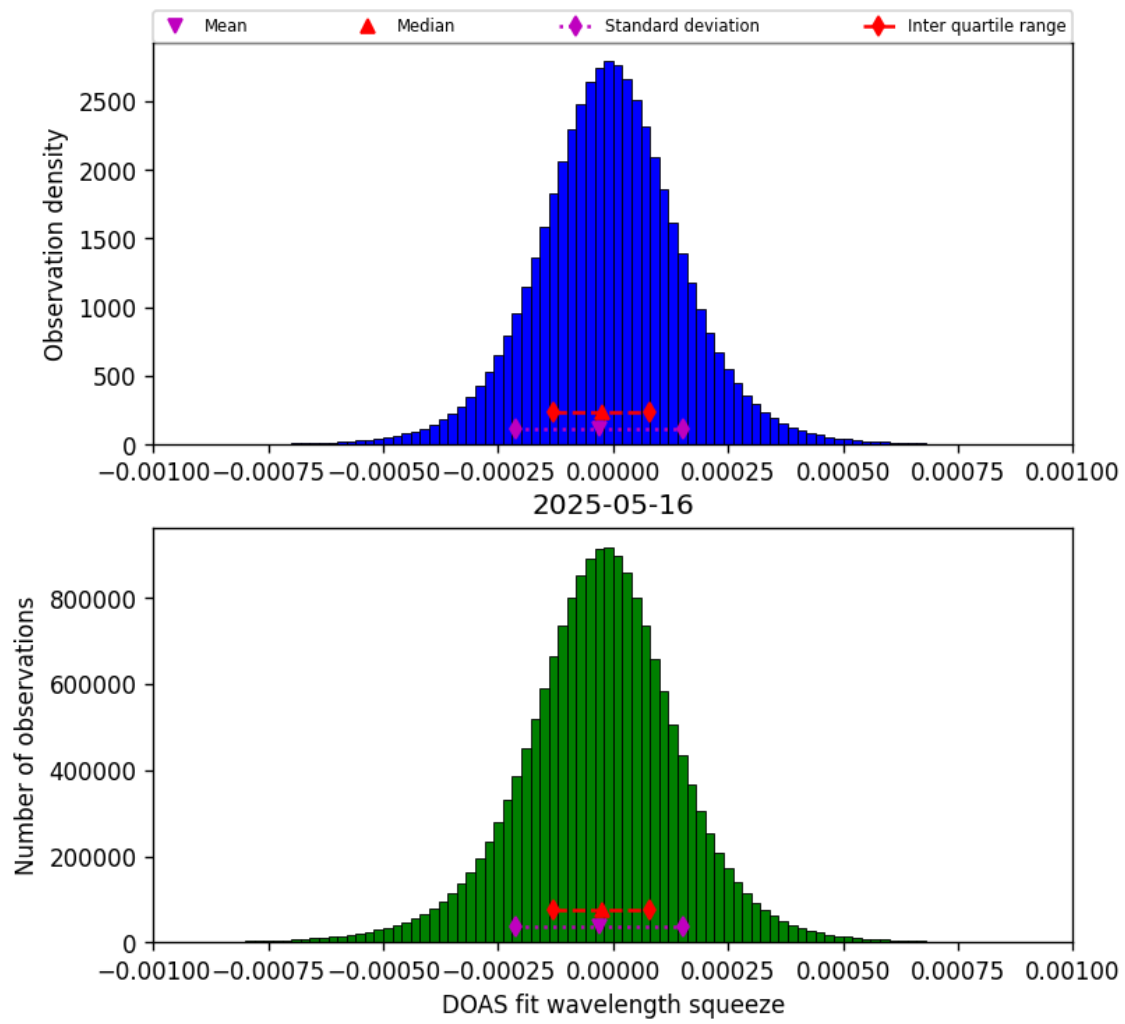


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-05-16 to 2025-05-17

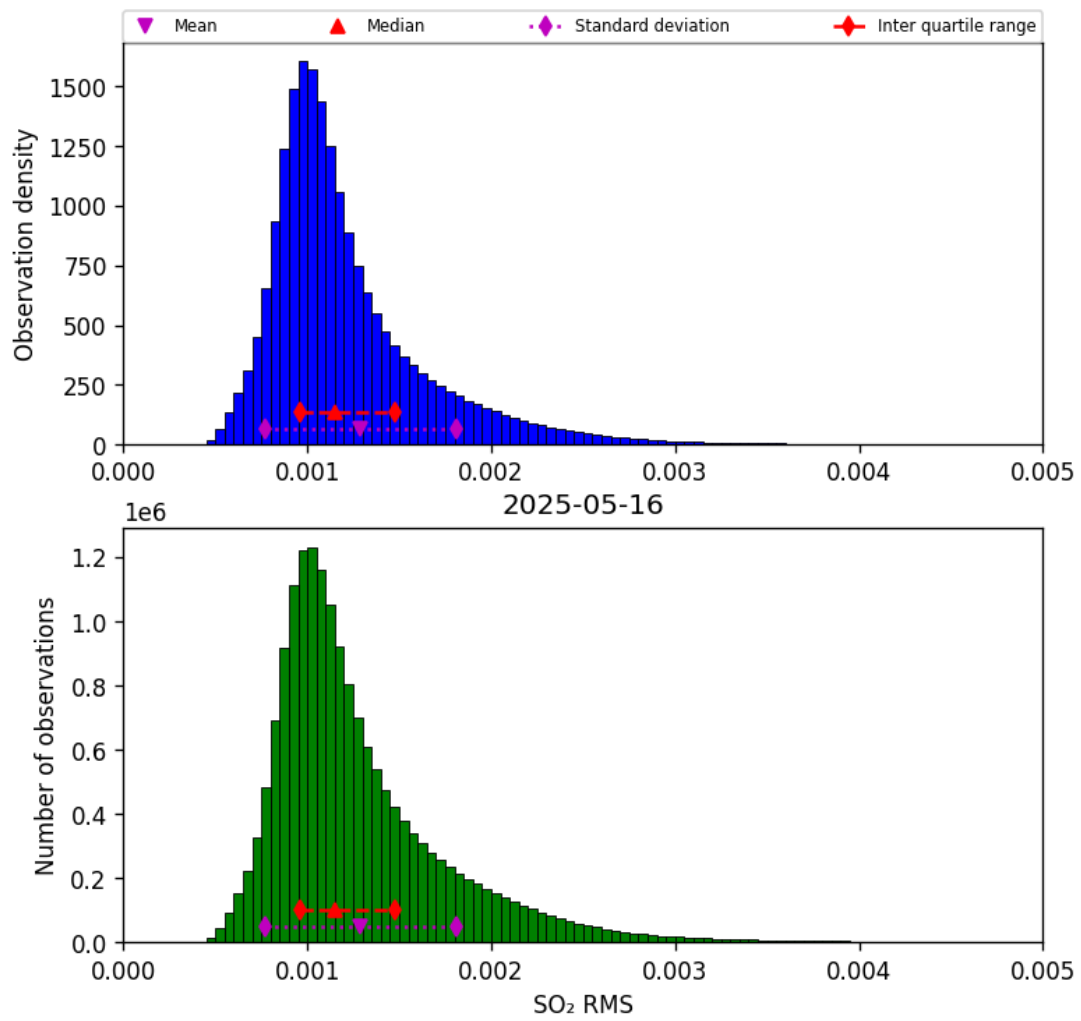


Figure 79: Histogram of “SO₂ RMS” for 2025-05-16 to 2025-05-17

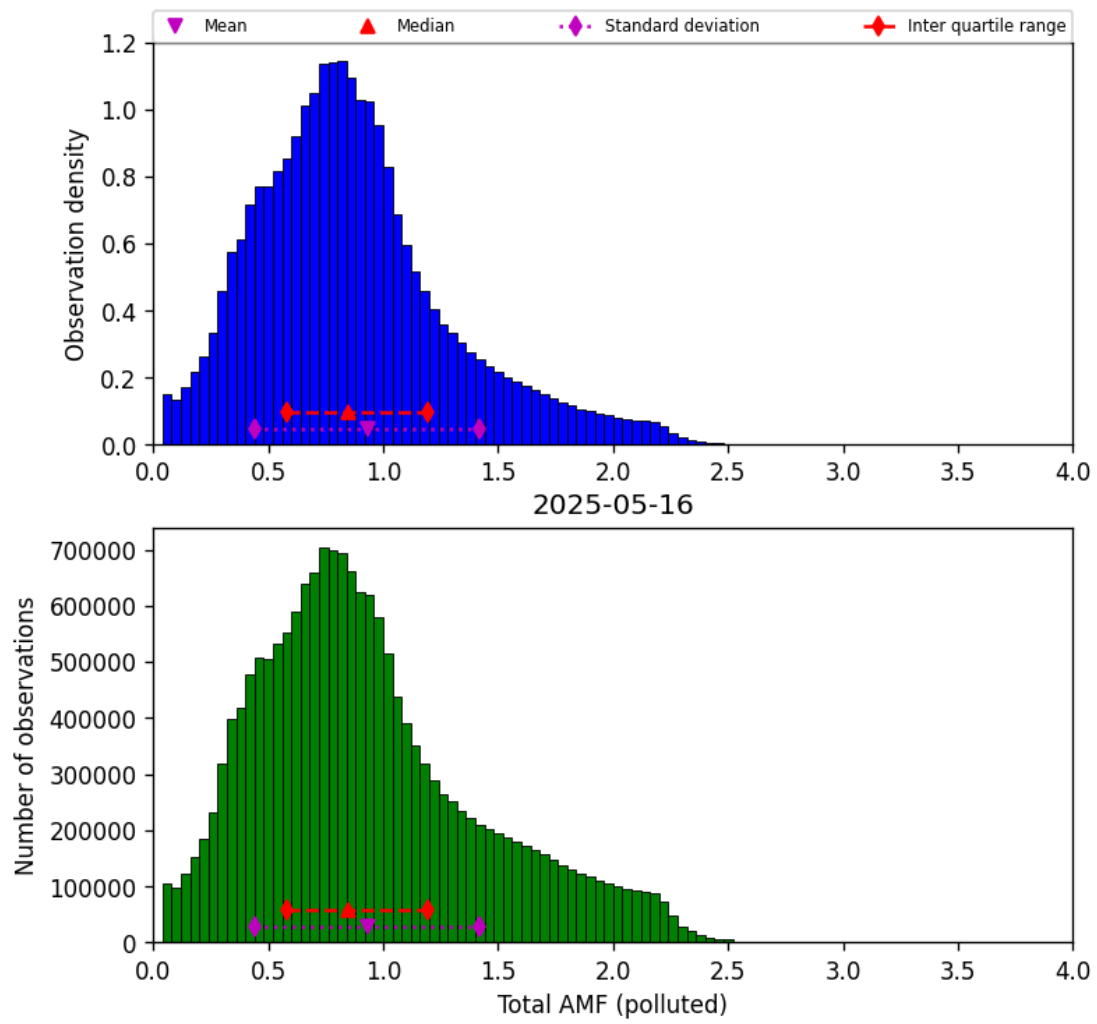


Figure 80: Histogram of “Total AMF (polluted)” for 2025-05-16 to 2025-05-17

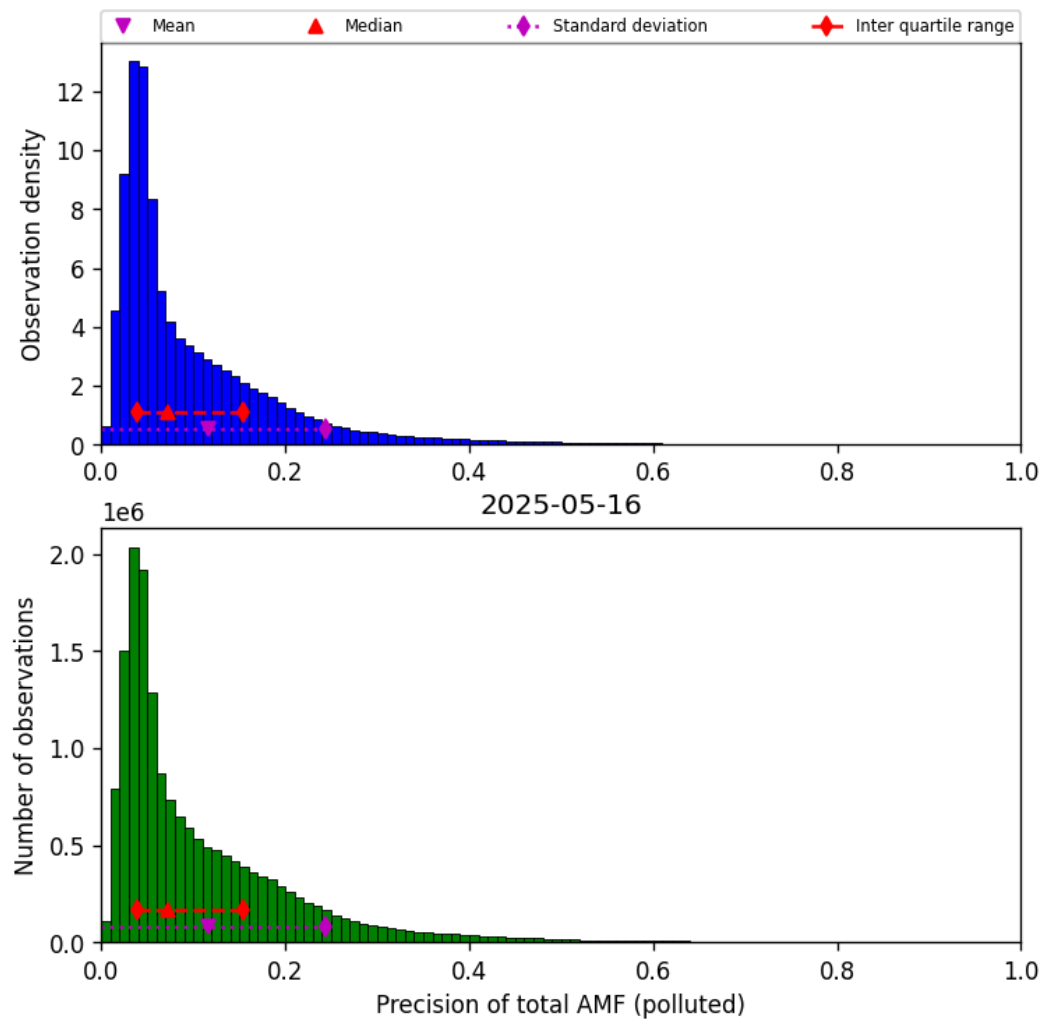


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-05-16 to 2025-05-17

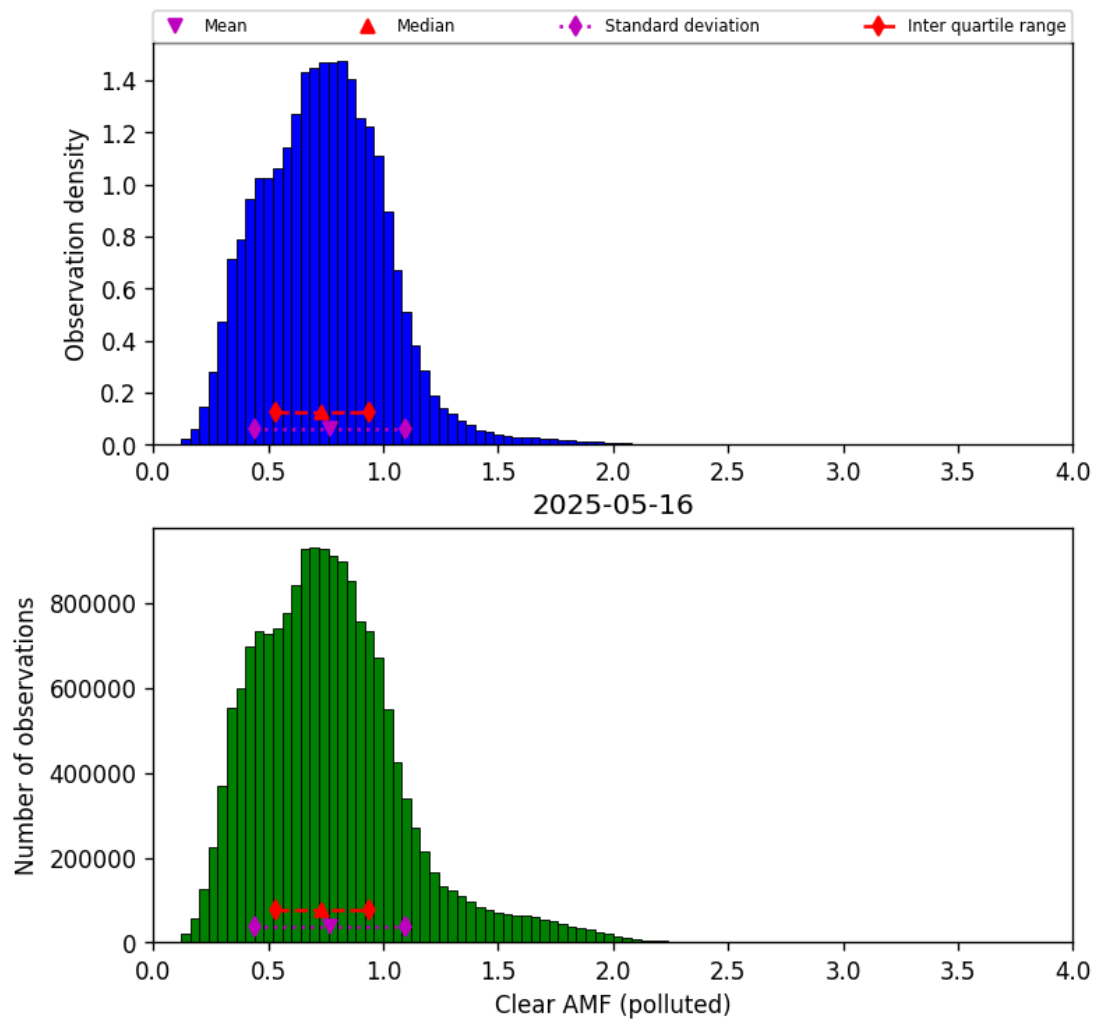


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-05-16 to 2025-05-17

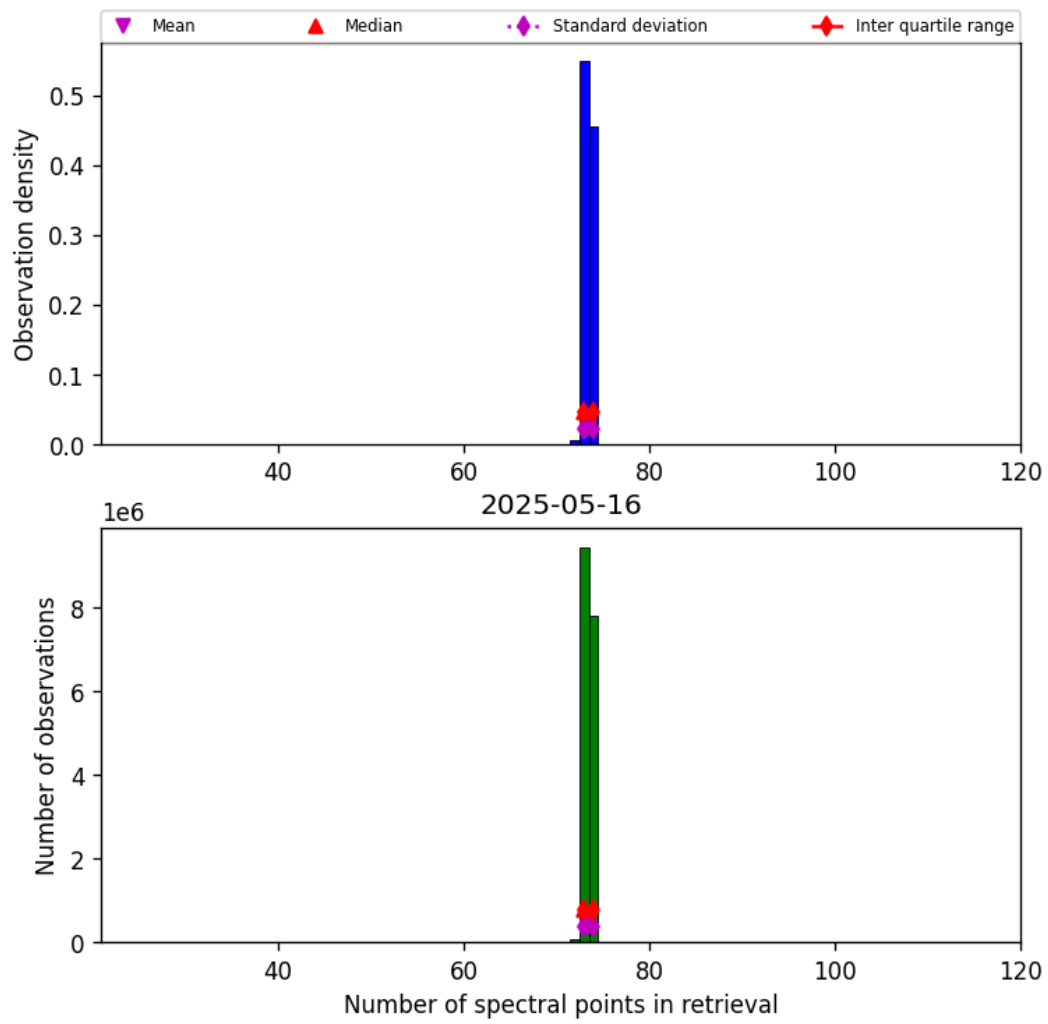


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-05-16 to 2025-05-17

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.

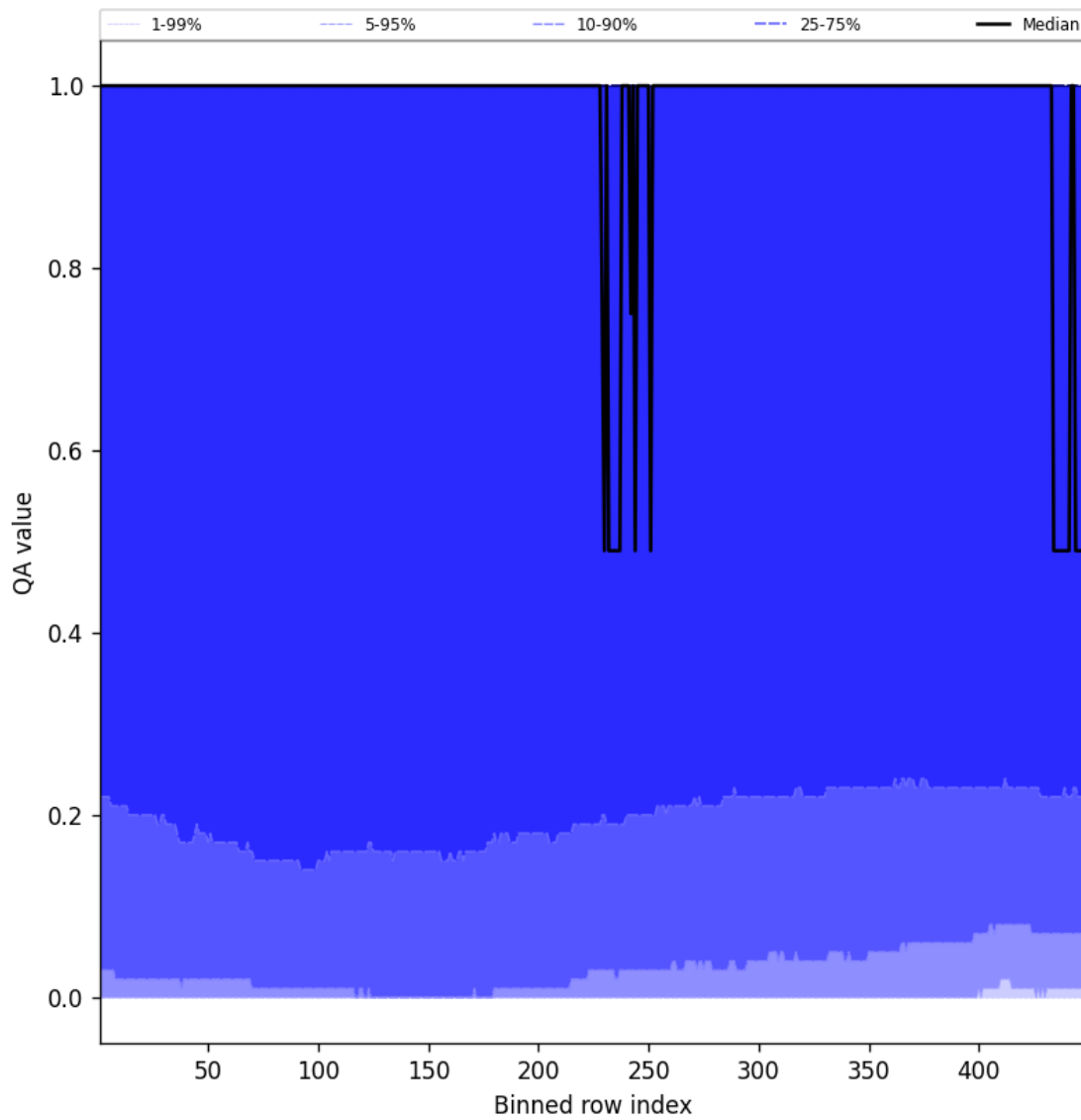


Figure 84: Along track statistics of “QA value” for 2025-05-16 to 2025-05-17

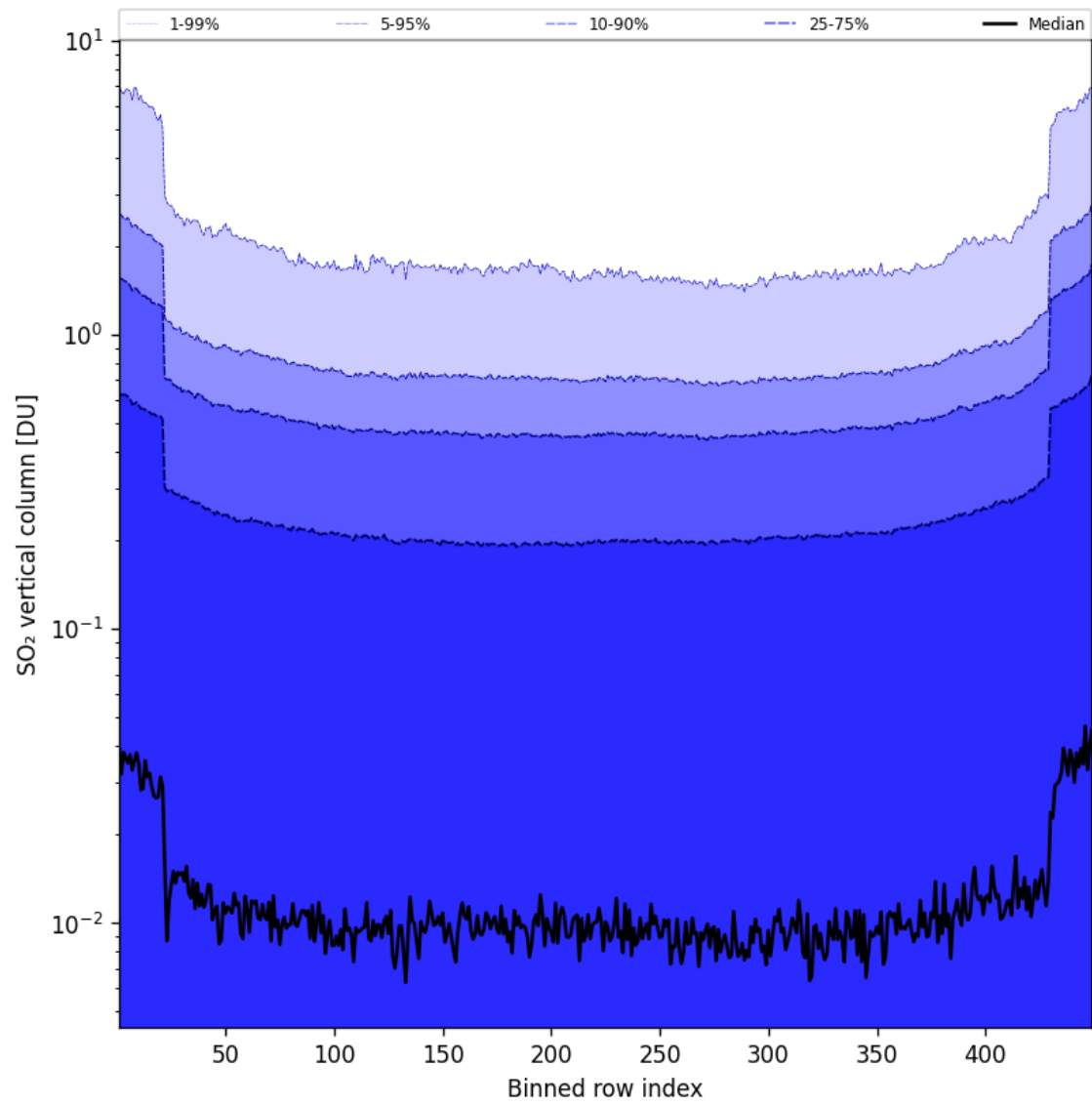


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-05-16 to 2025-05-17

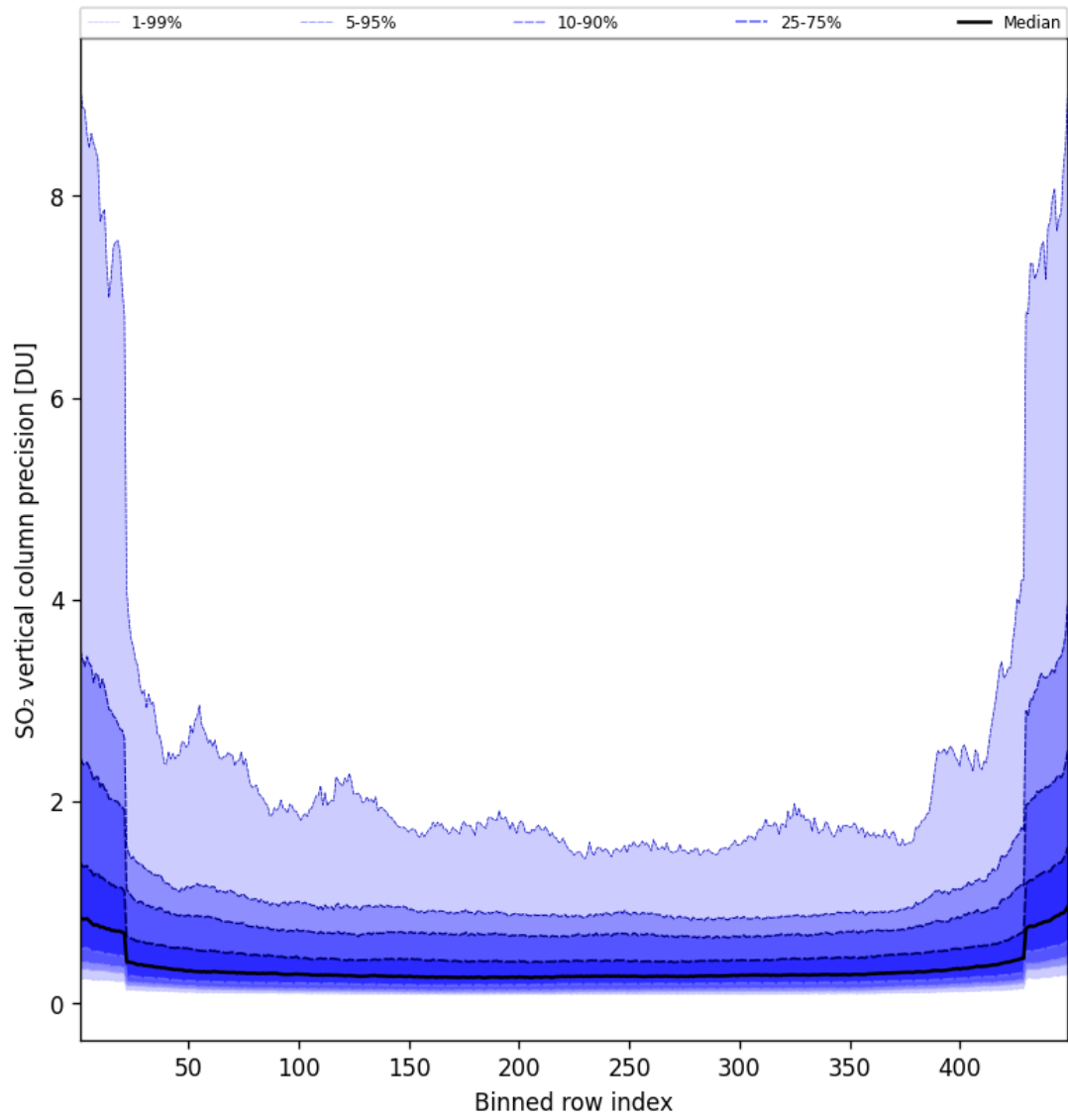


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-05-16 to 2025-05-17

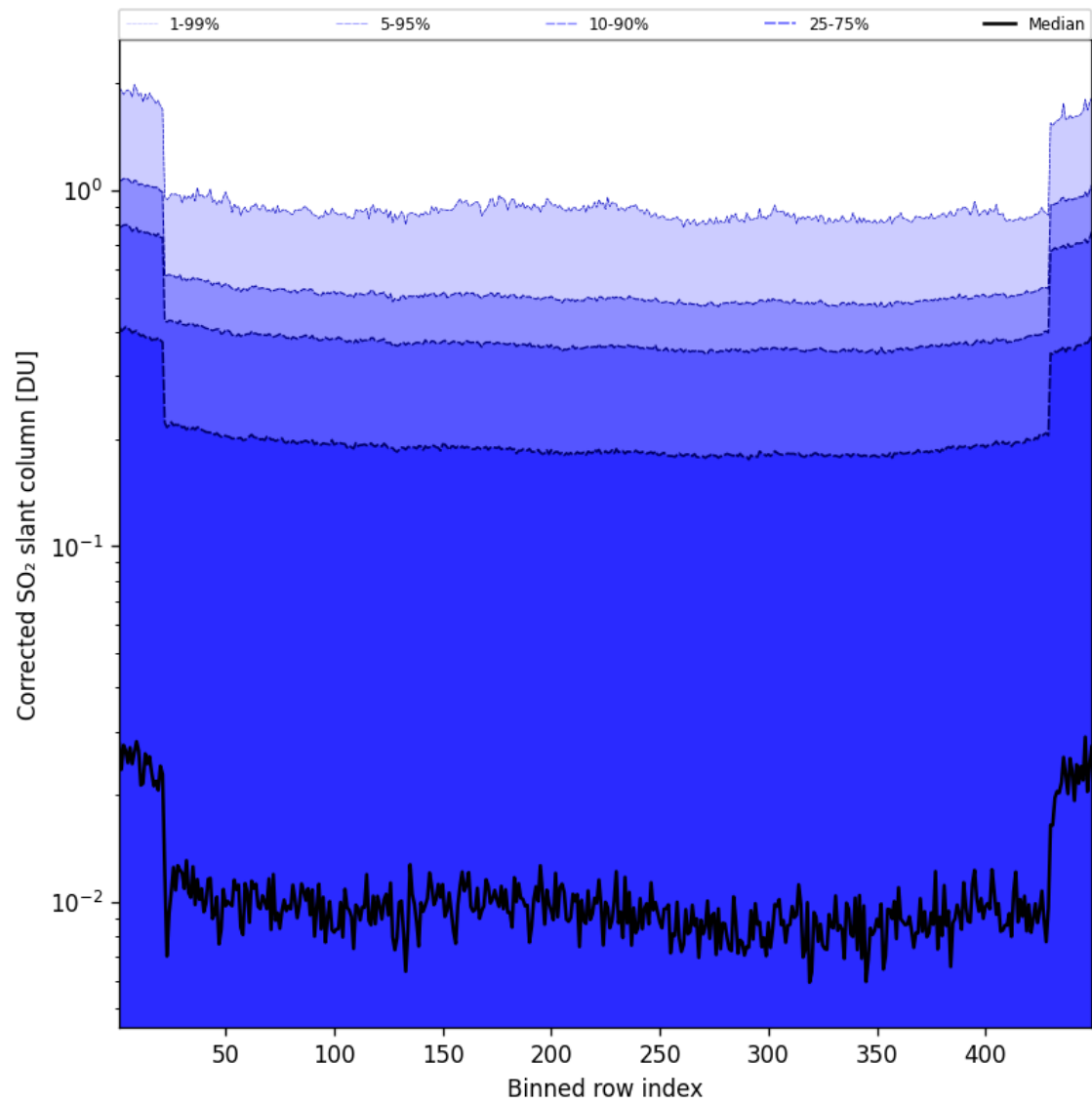


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-05-16 to 2025-05-17

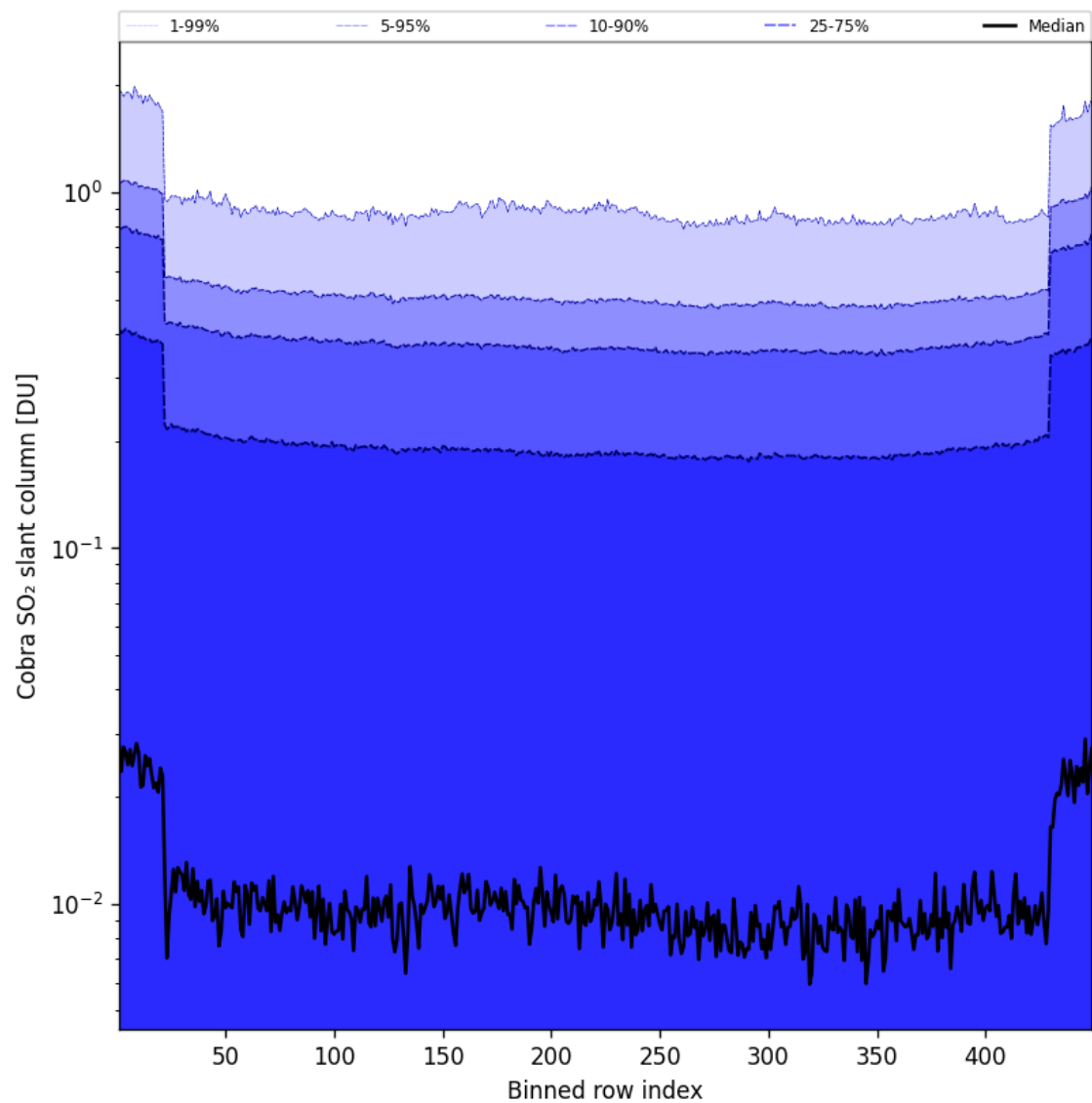


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-05-16 to 2025-05-17

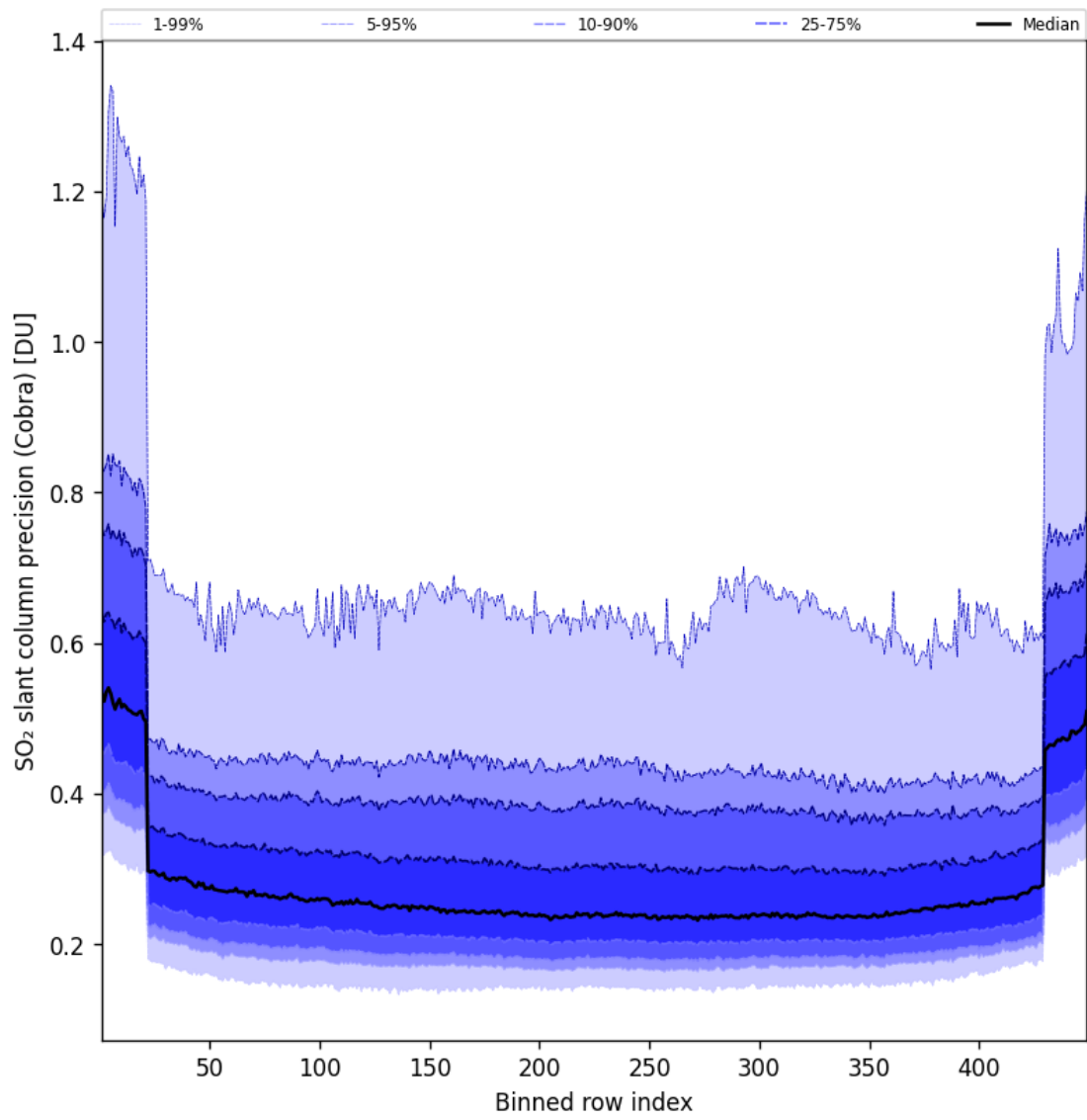


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-05-16 to 2025-05-17

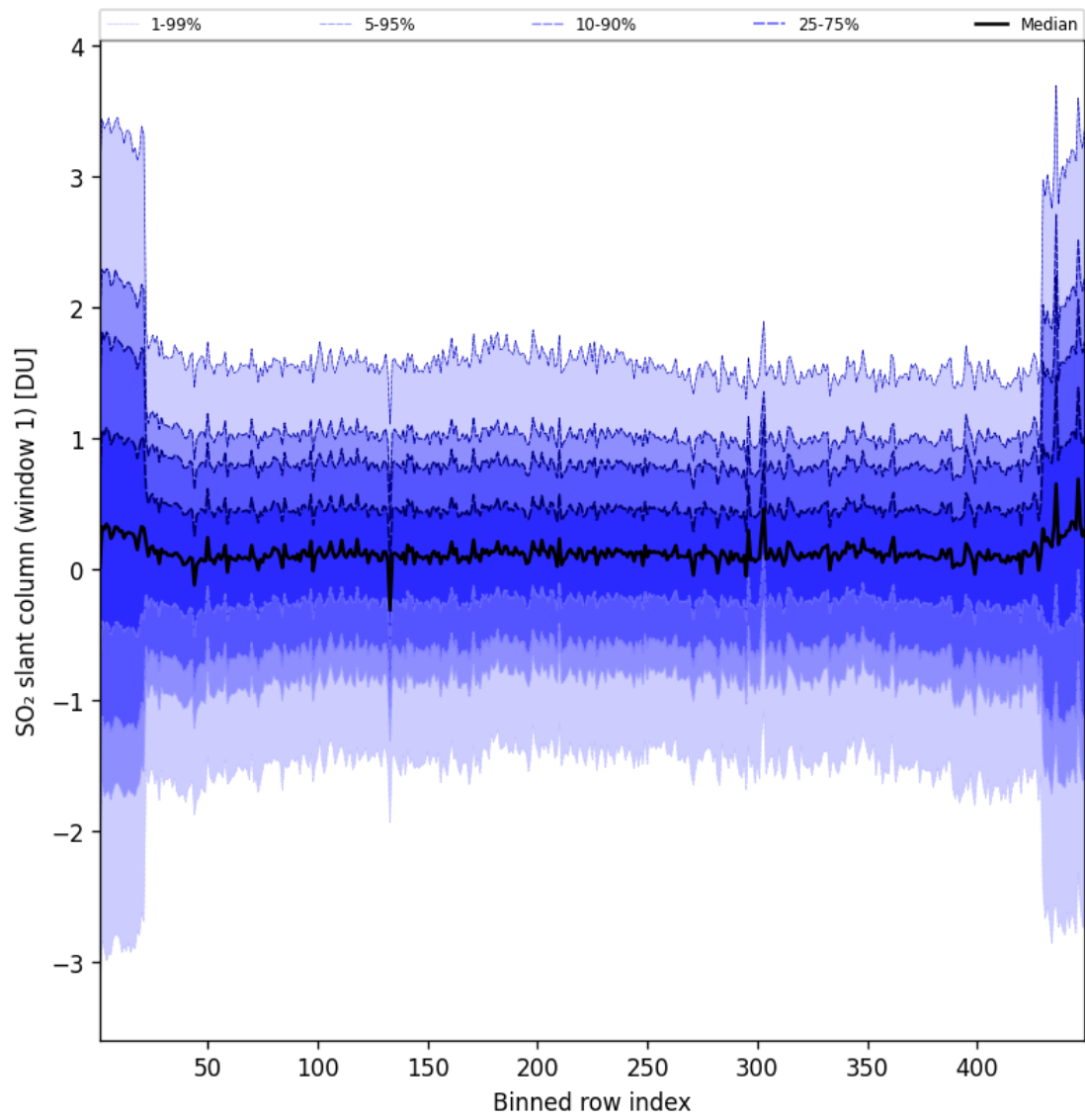


Figure 90: Along track statistics of "SO₂ slant column (window 1)" for 2025-05-16 to 2025-05-17

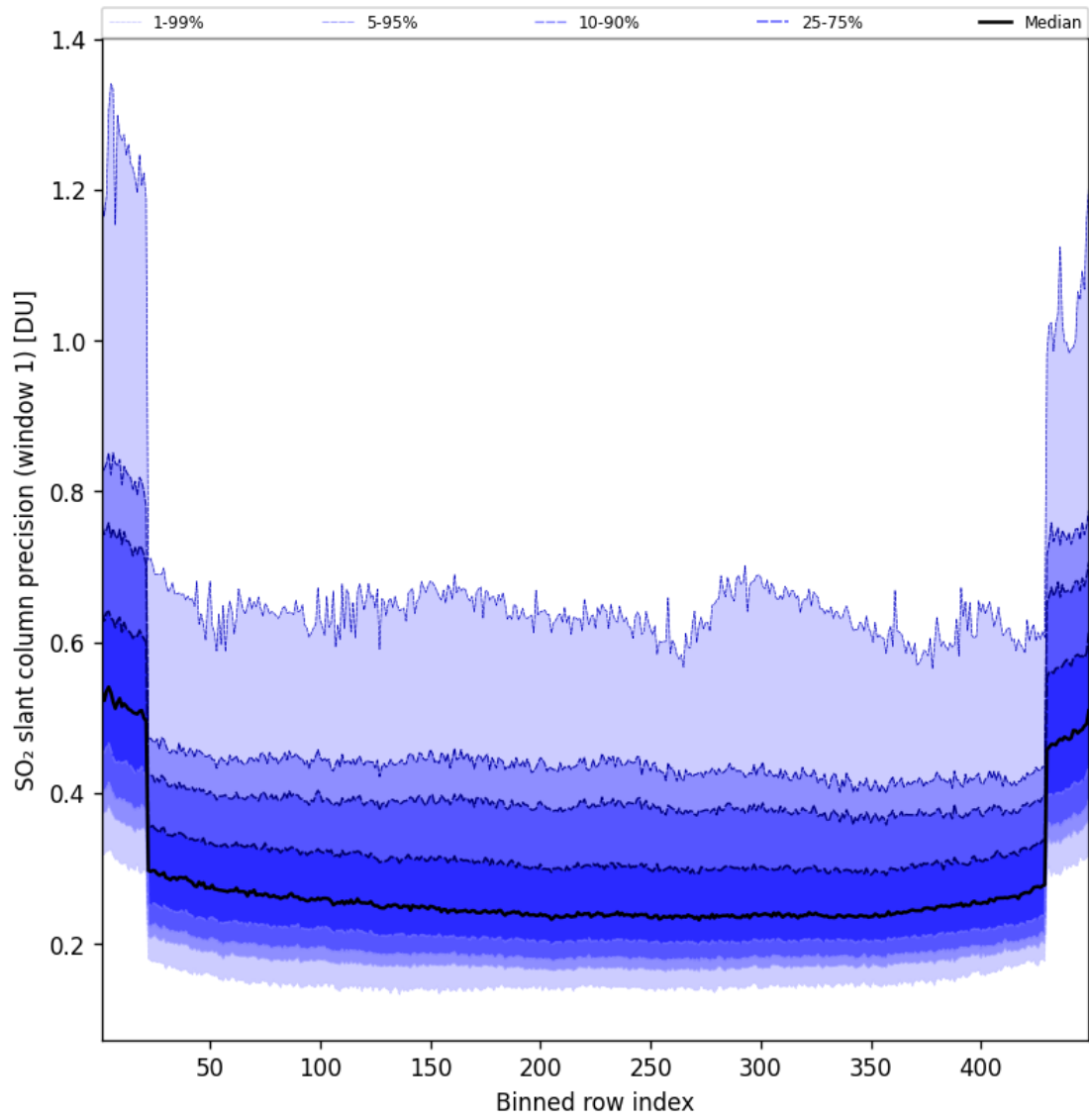


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-05-16 to 2025-05-17

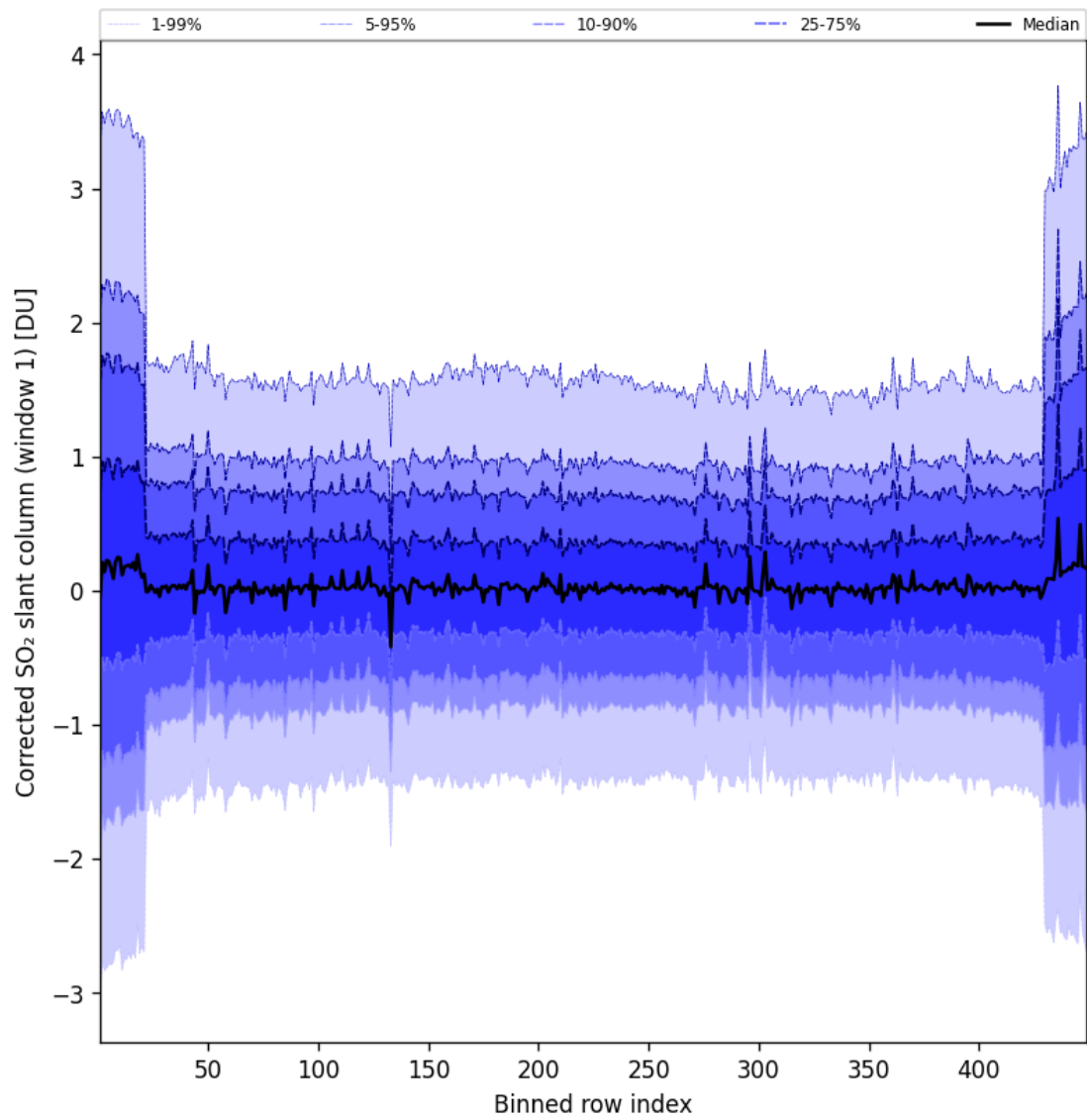


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-05-16 to 2025-05-17

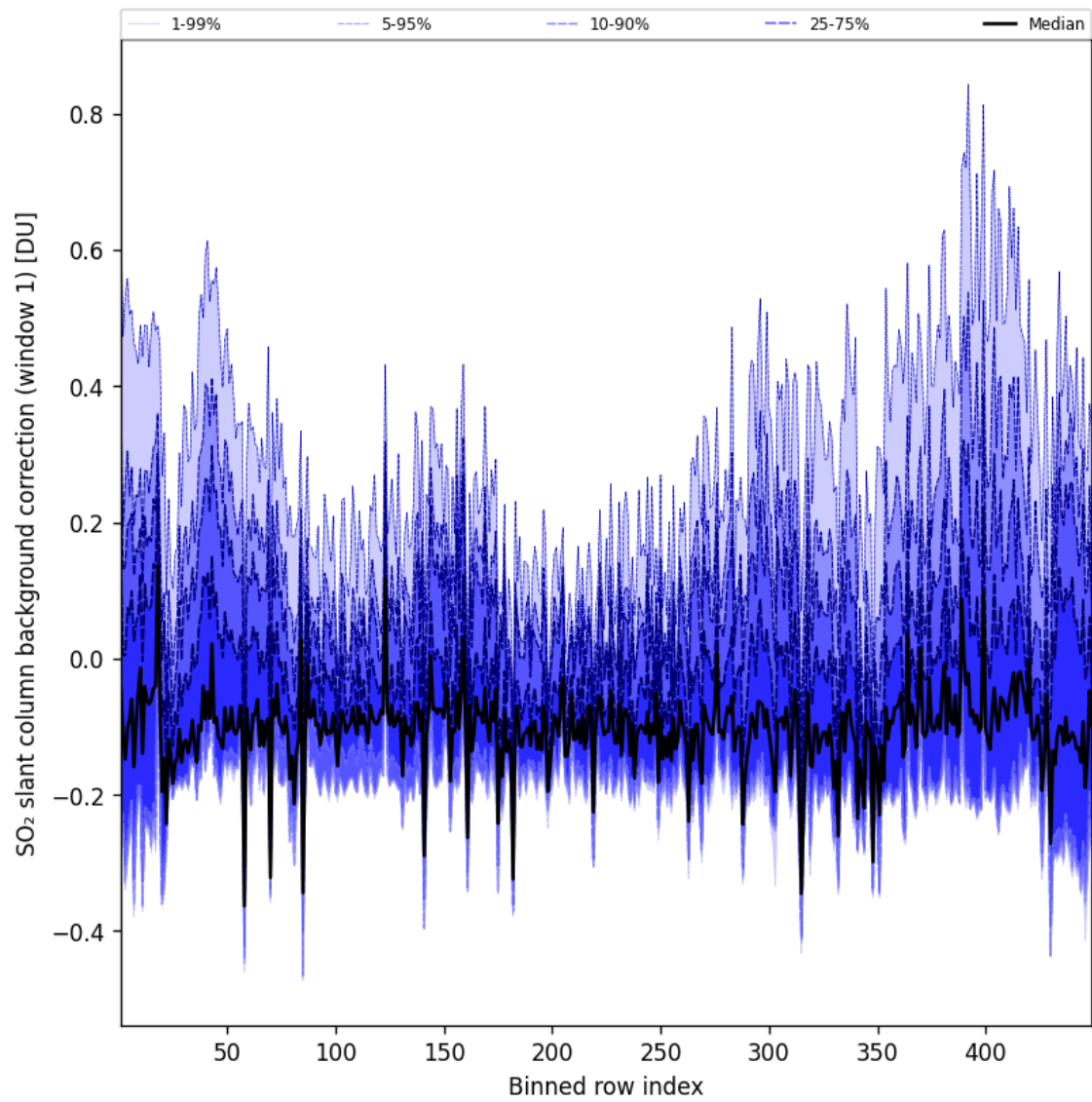


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-05-16 to 2025-05-17

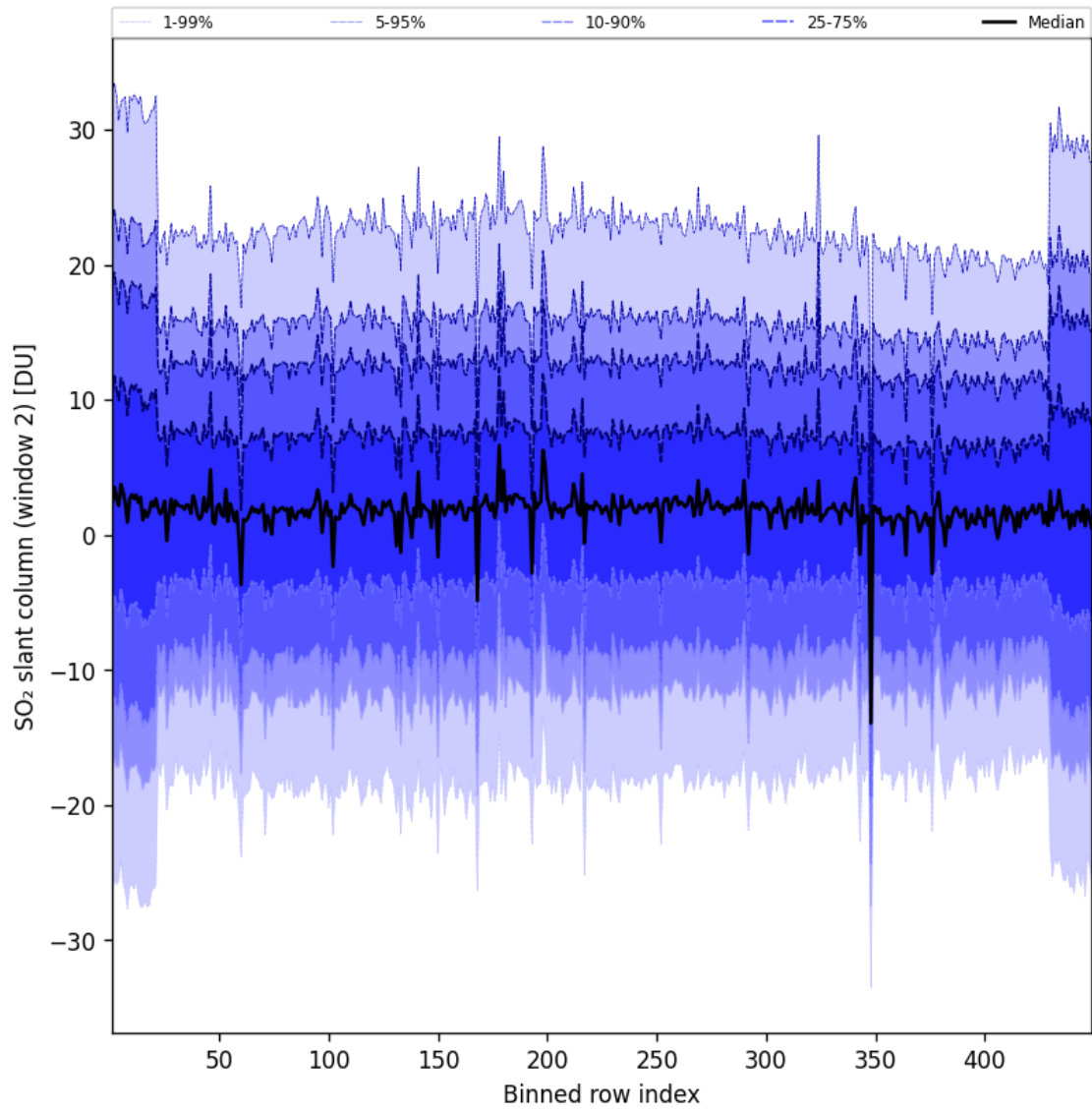


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-05-16 to 2025-05-17

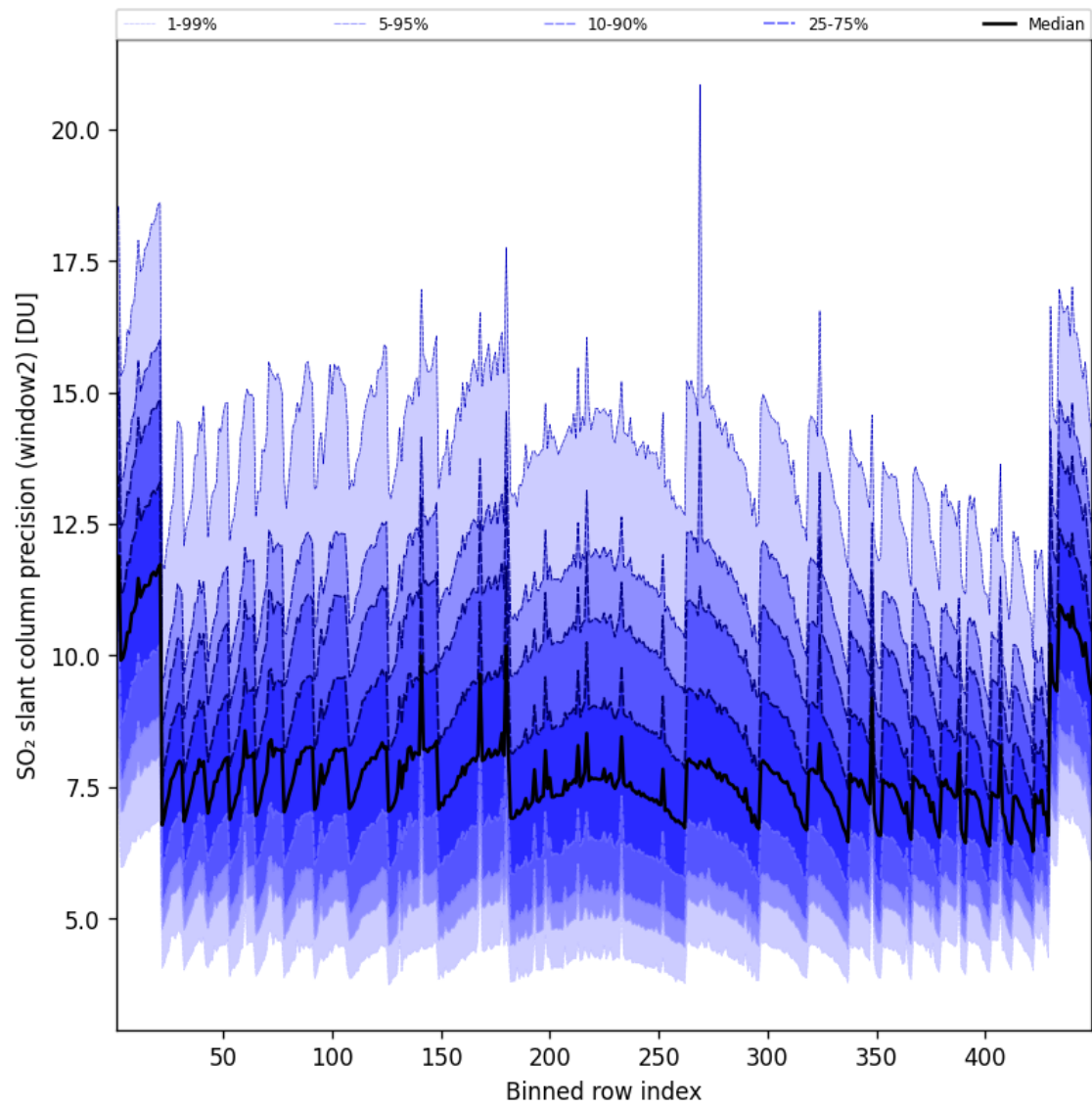


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-05-16 to 2025-05-17

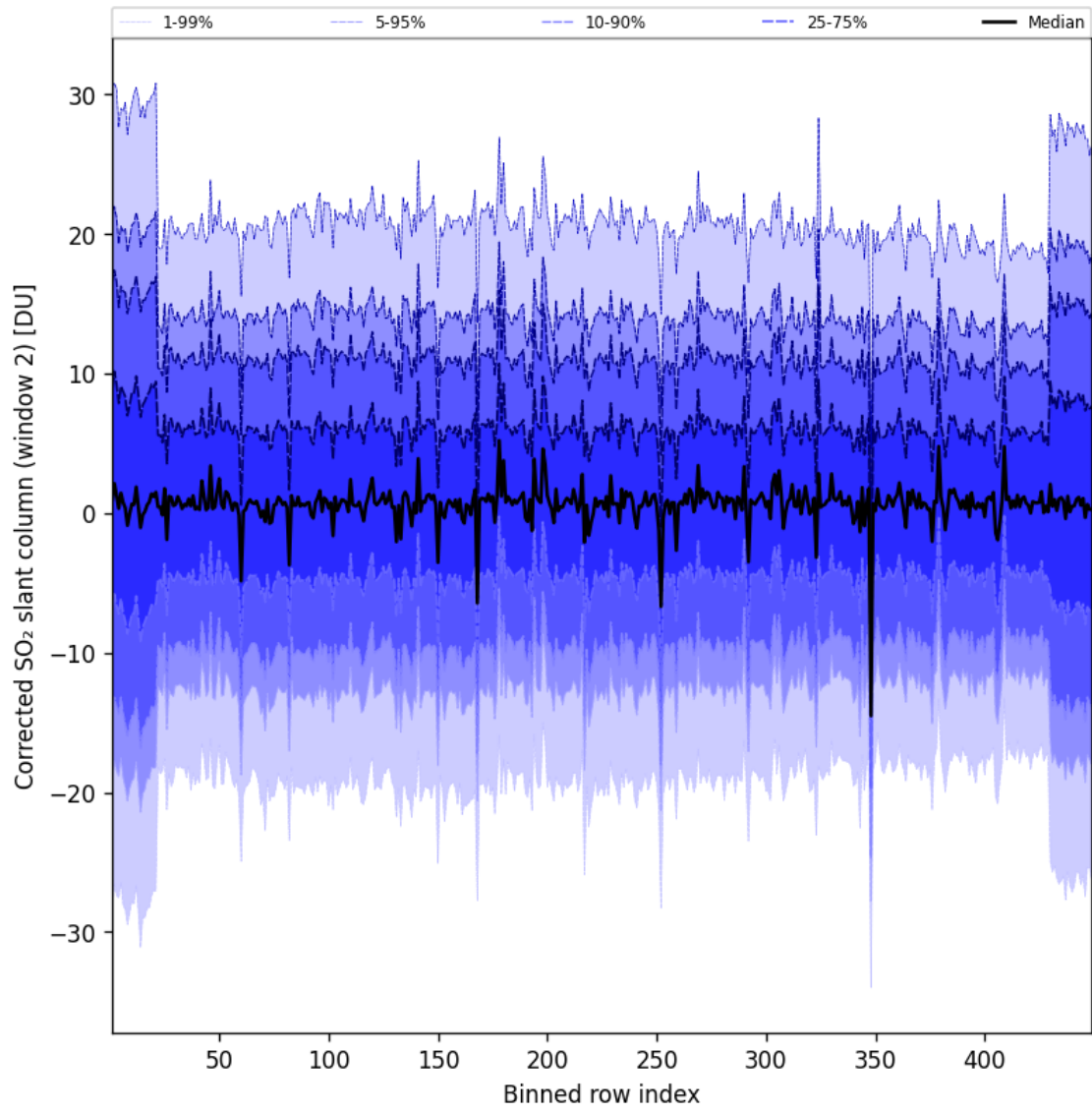


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-05-16 to 2025-05-17

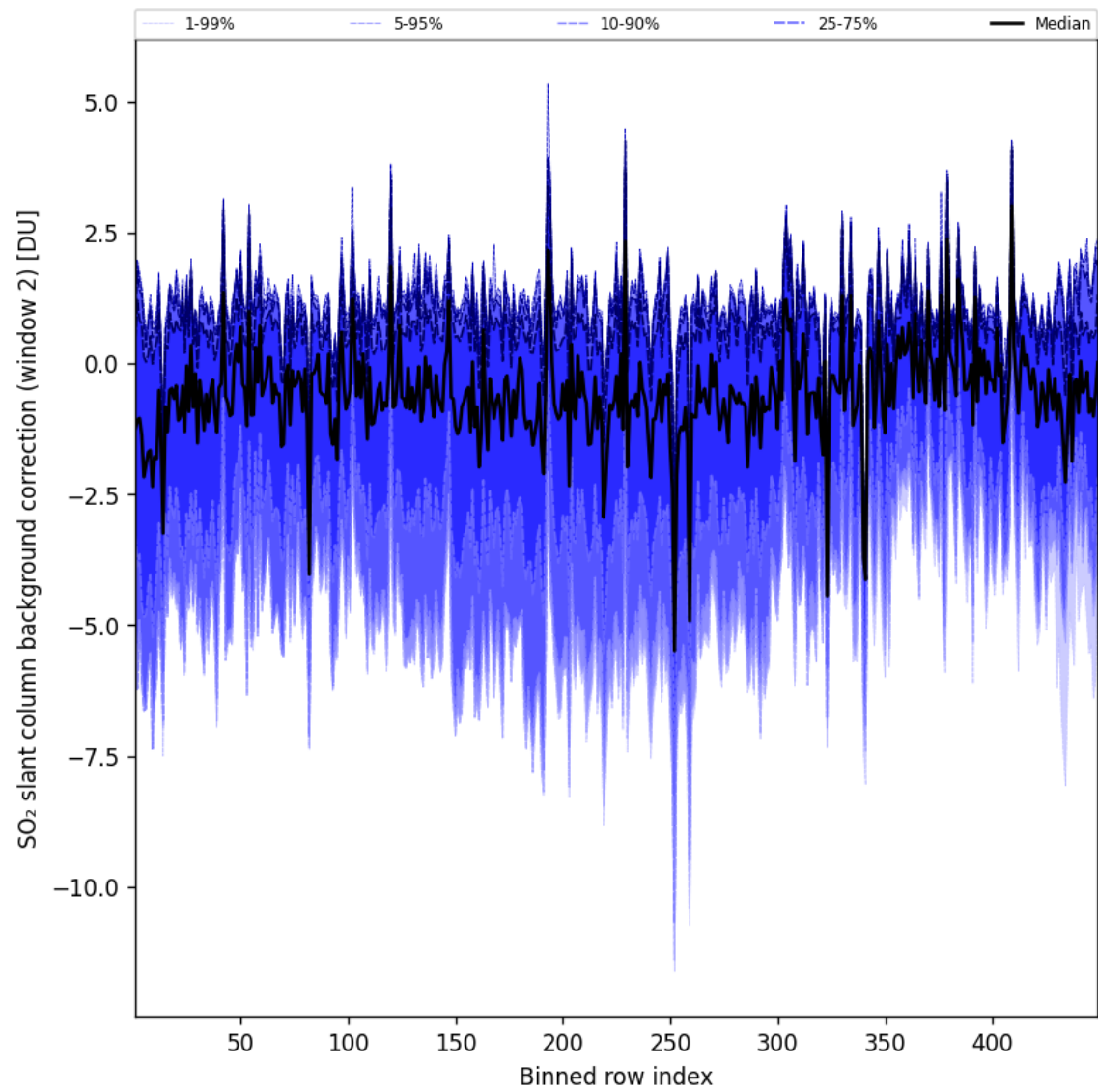


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-05-16 to 2025-05-17

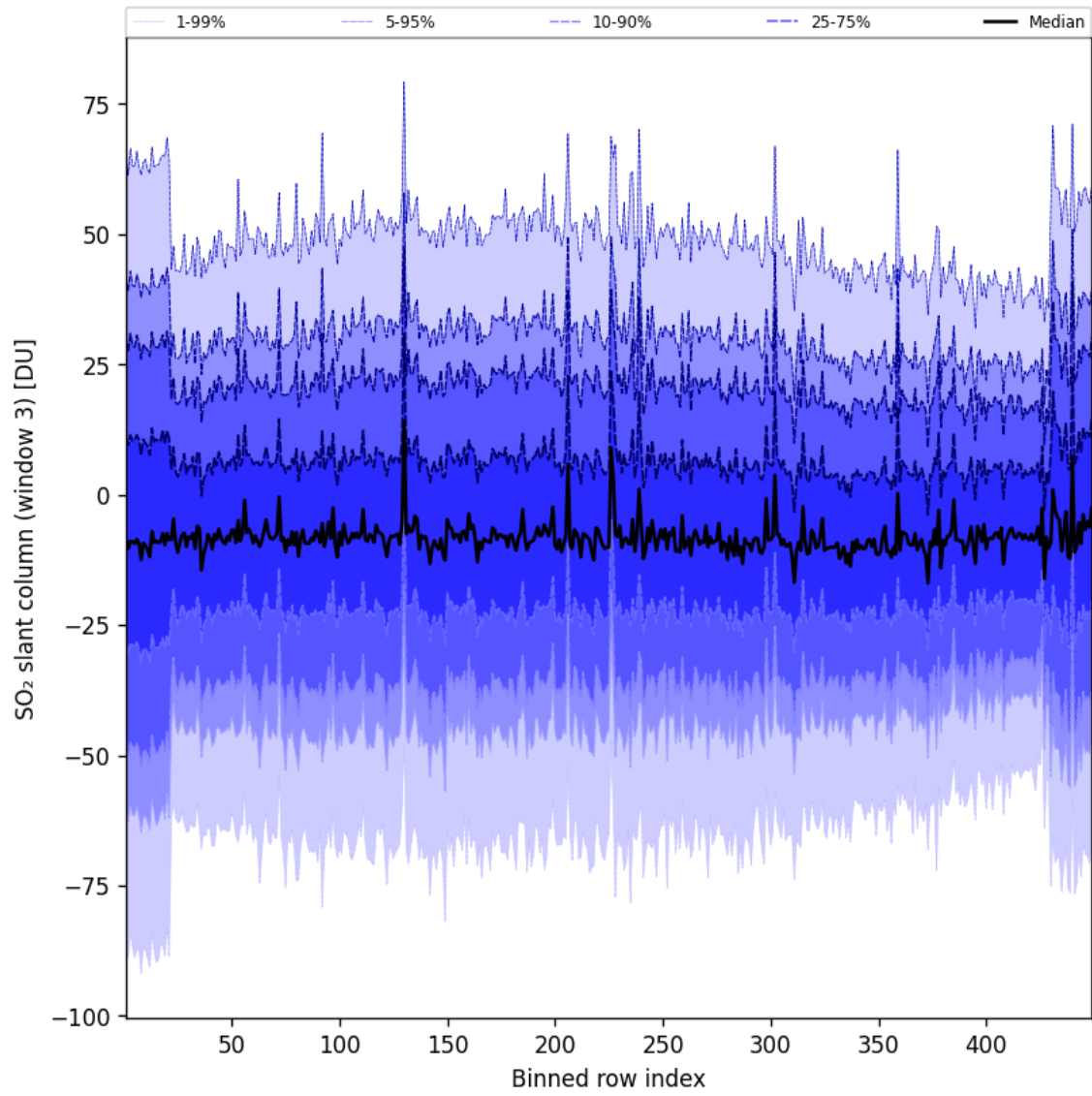


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-05-16 to 2025-05-17

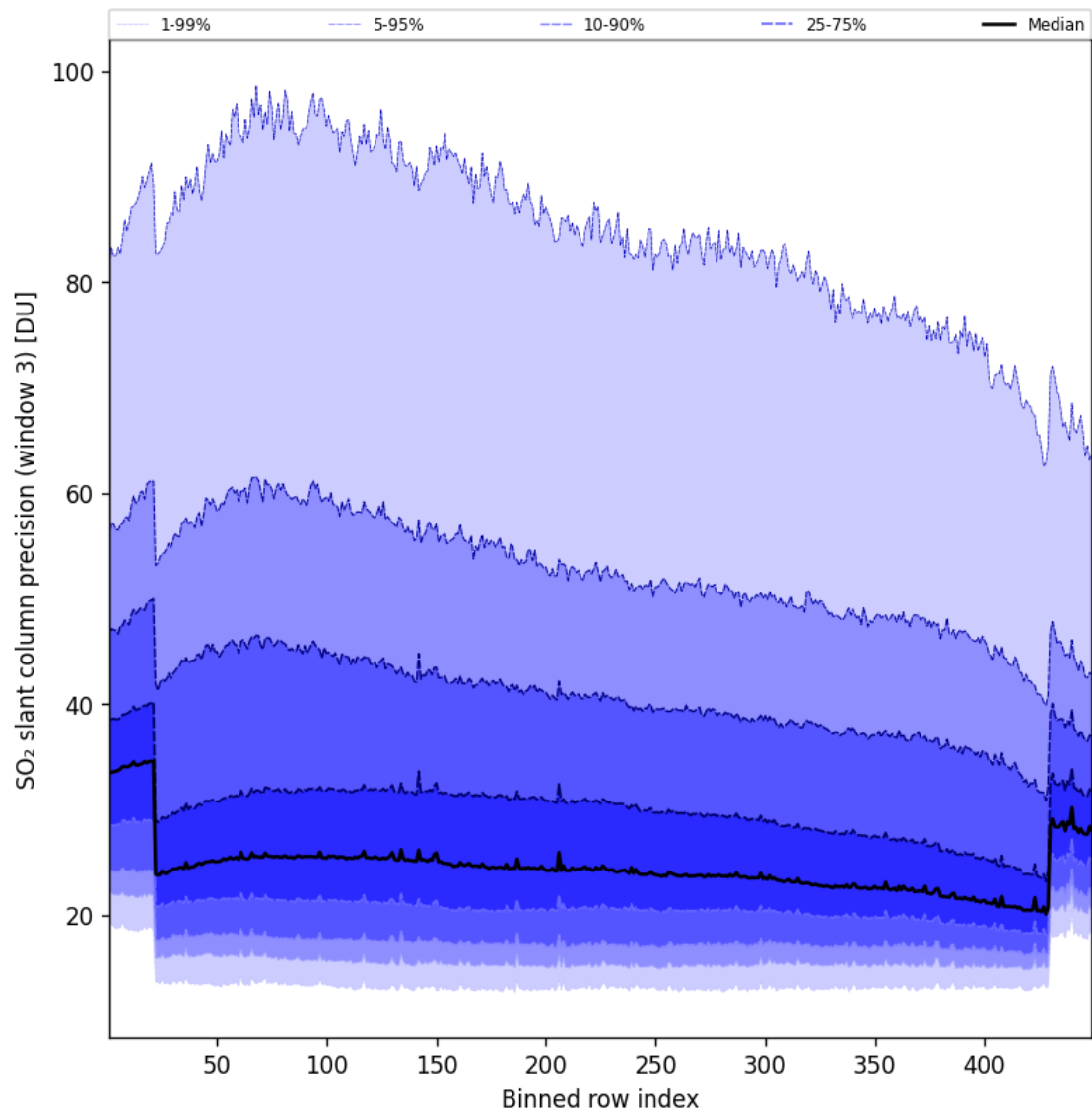


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-05-16 to 2025-05-17

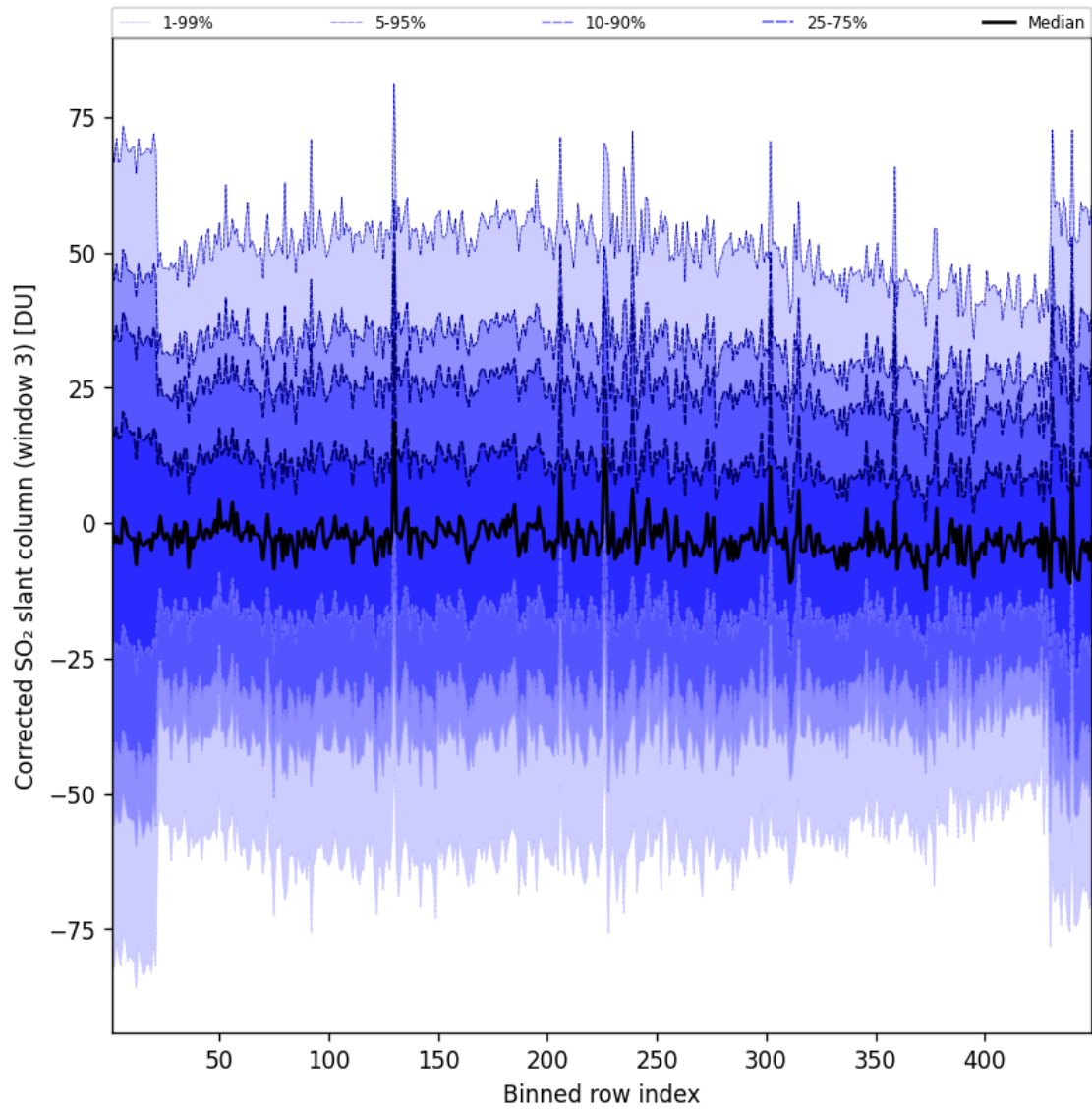


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-05-16 to 2025-05-17

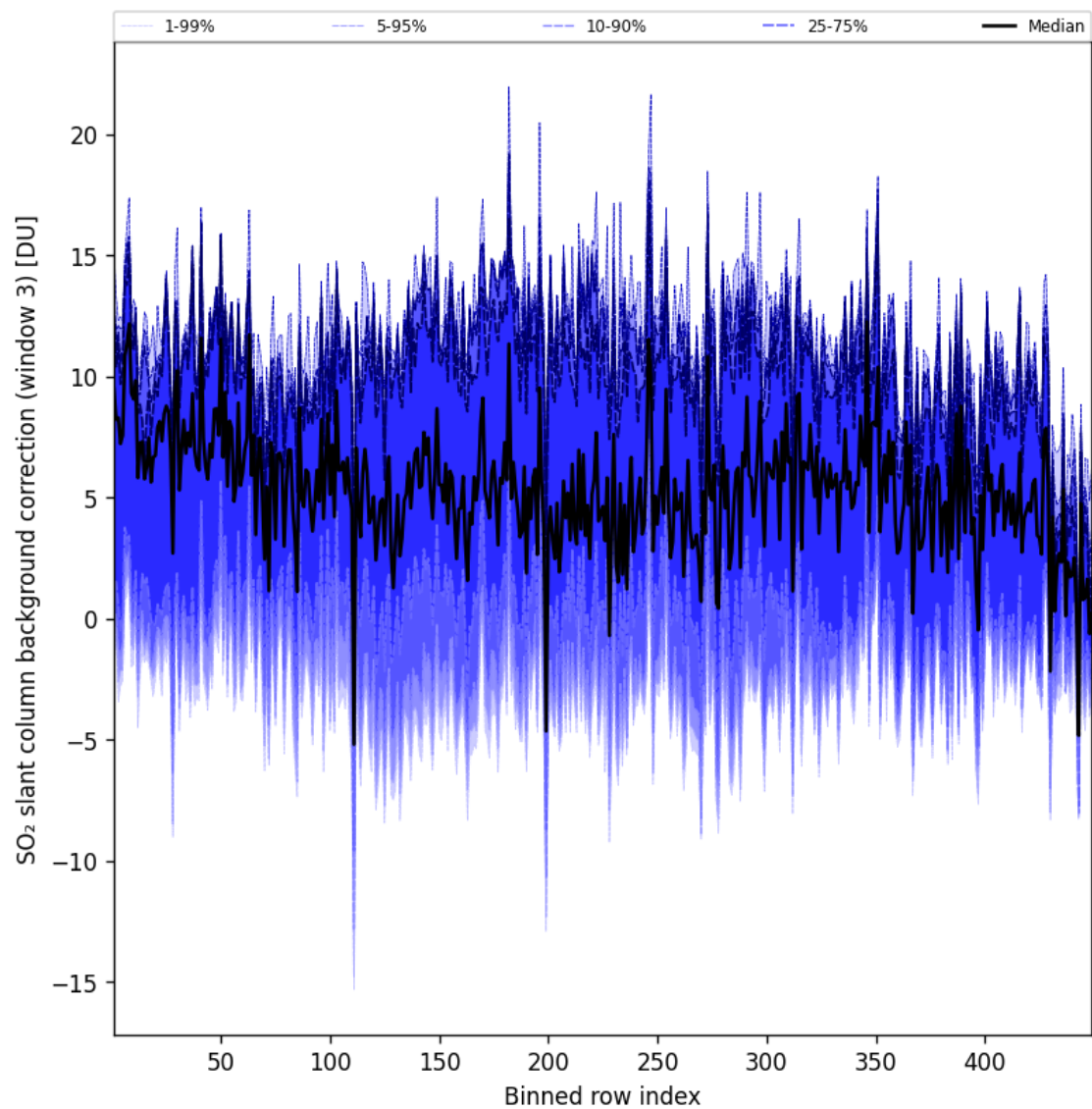


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-05-16 to 2025-05-17

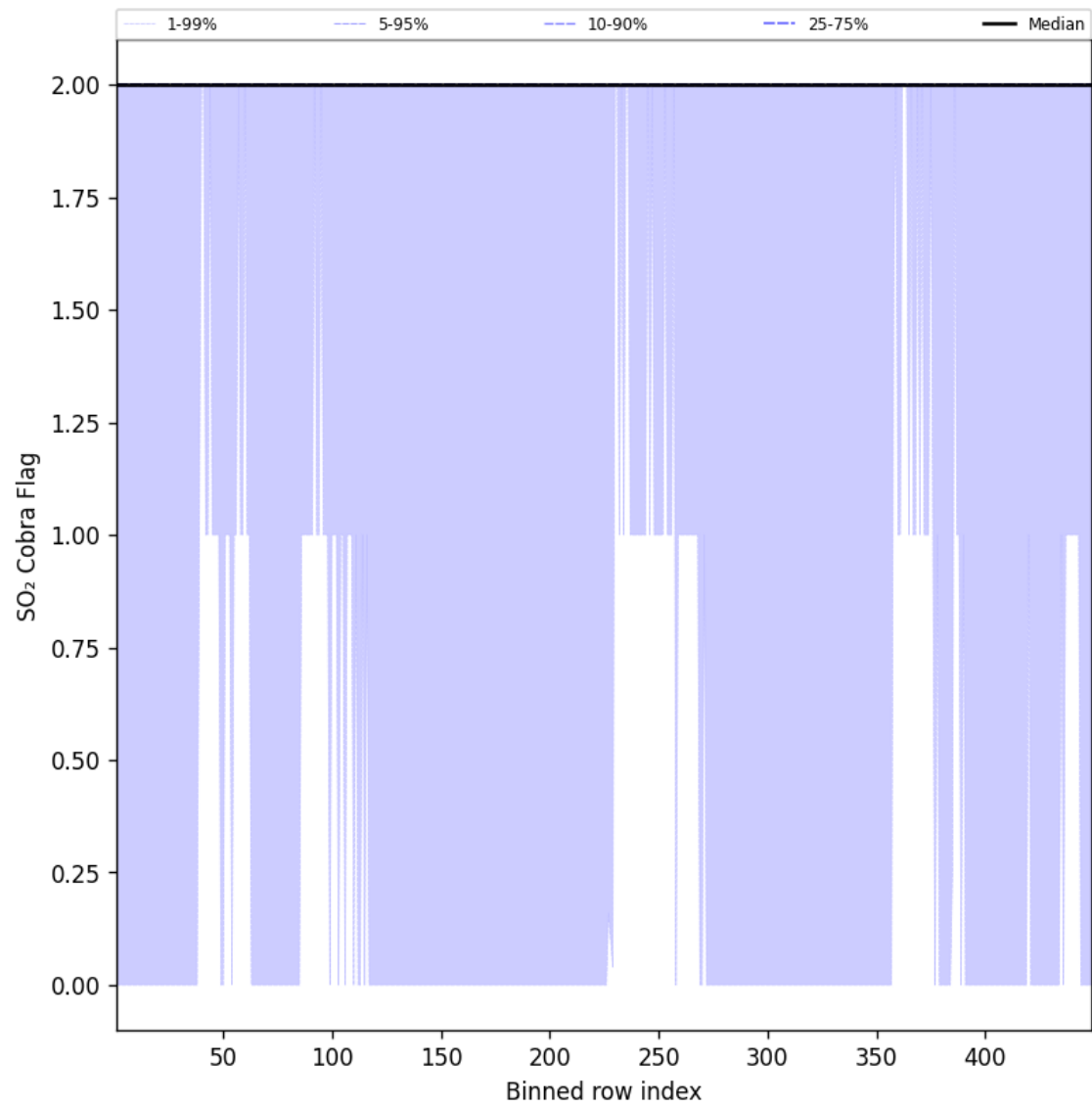


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-05-16 to 2025-05-17

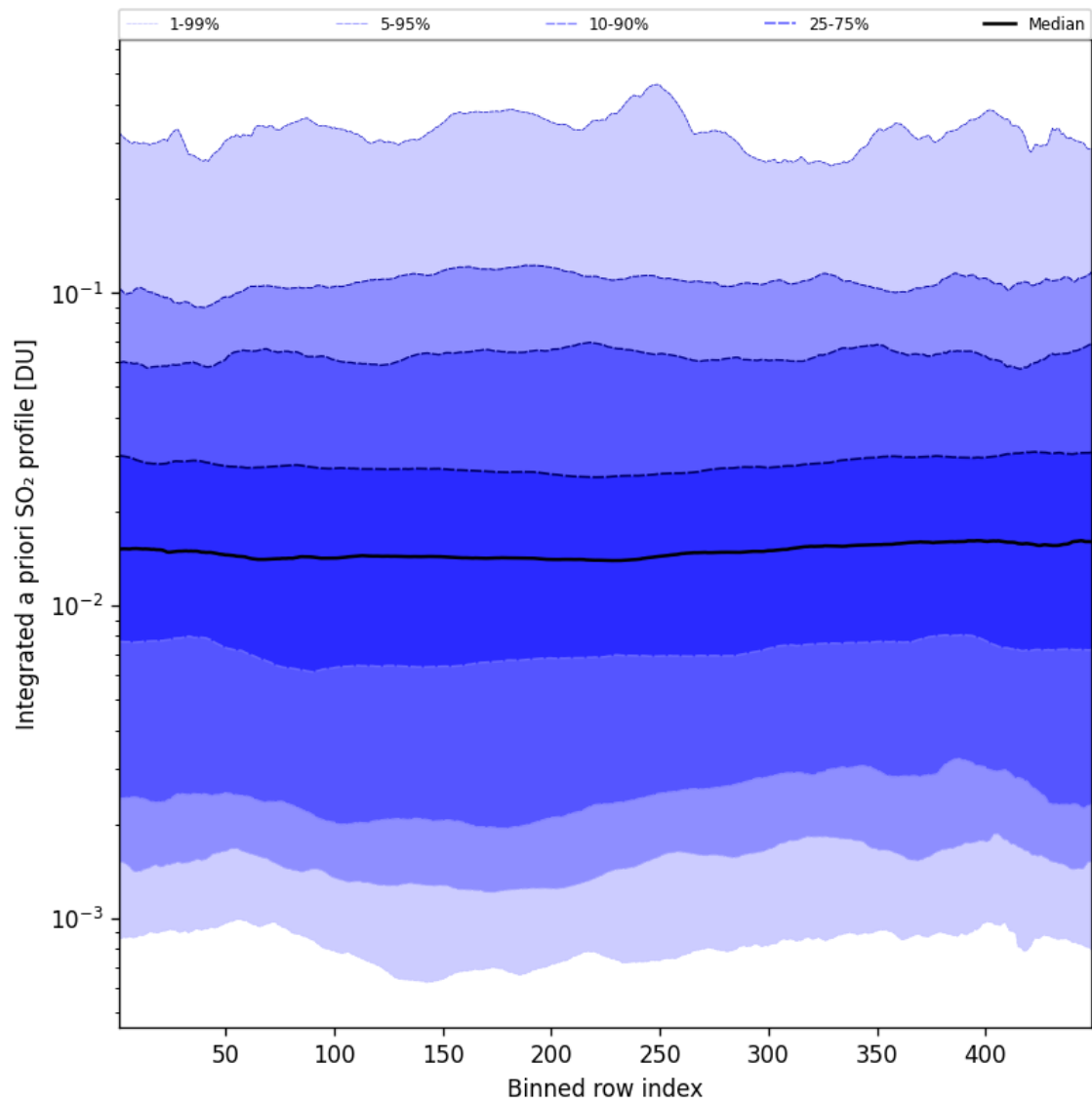


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-05-16 to 2025-05-17

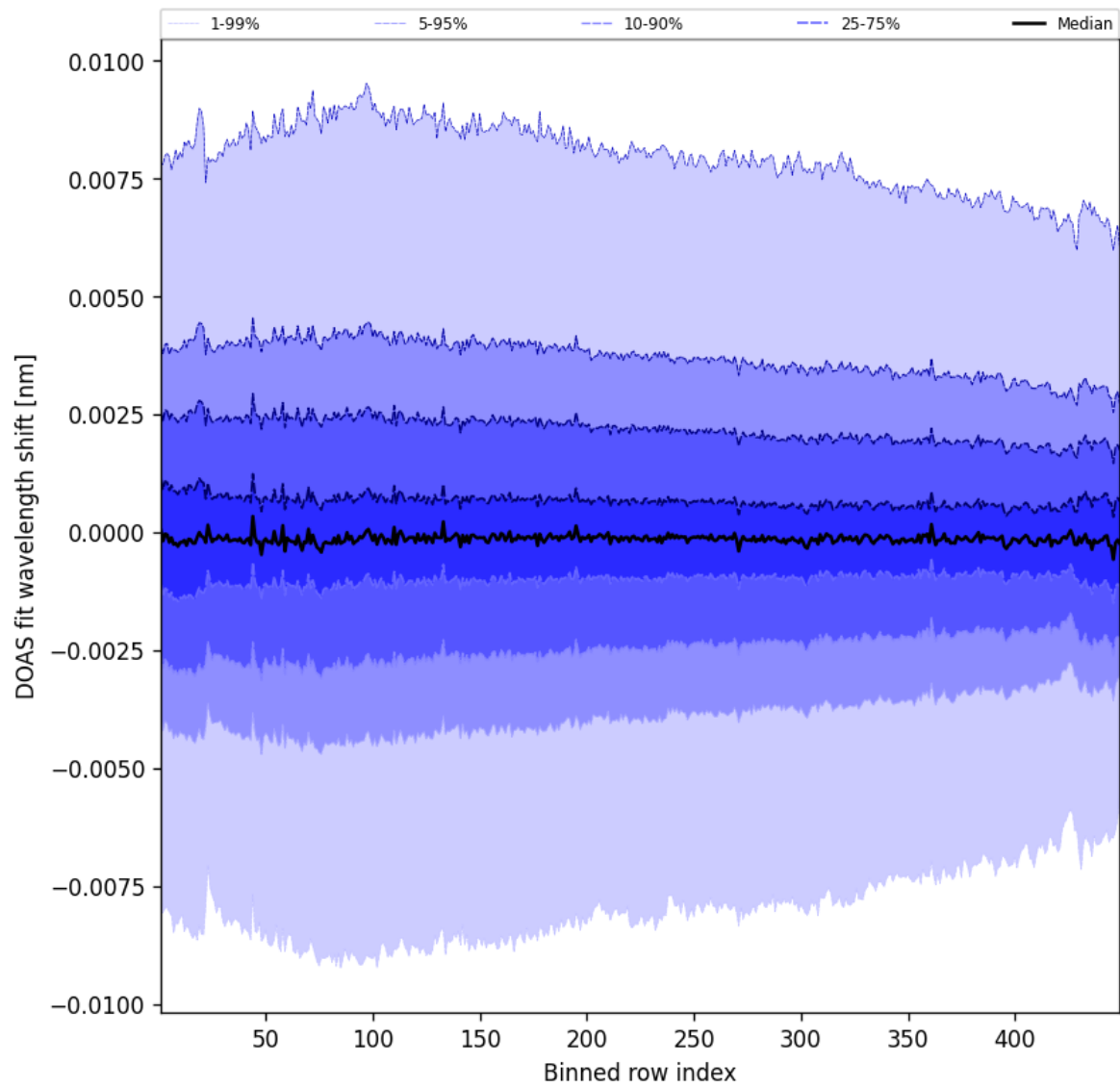


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-05-16 to 2025-05-17

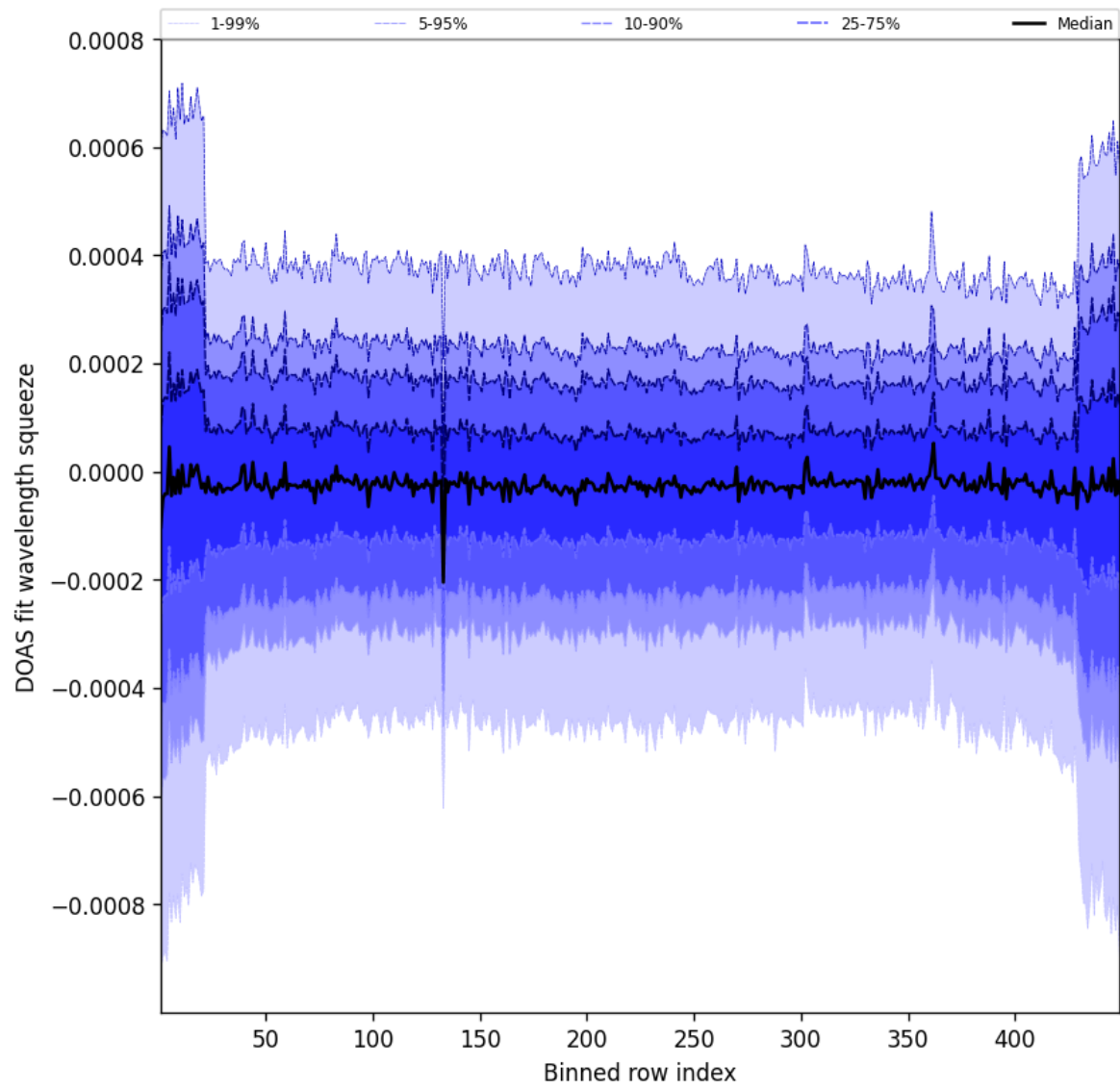


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-05-16 to 2025-05-17

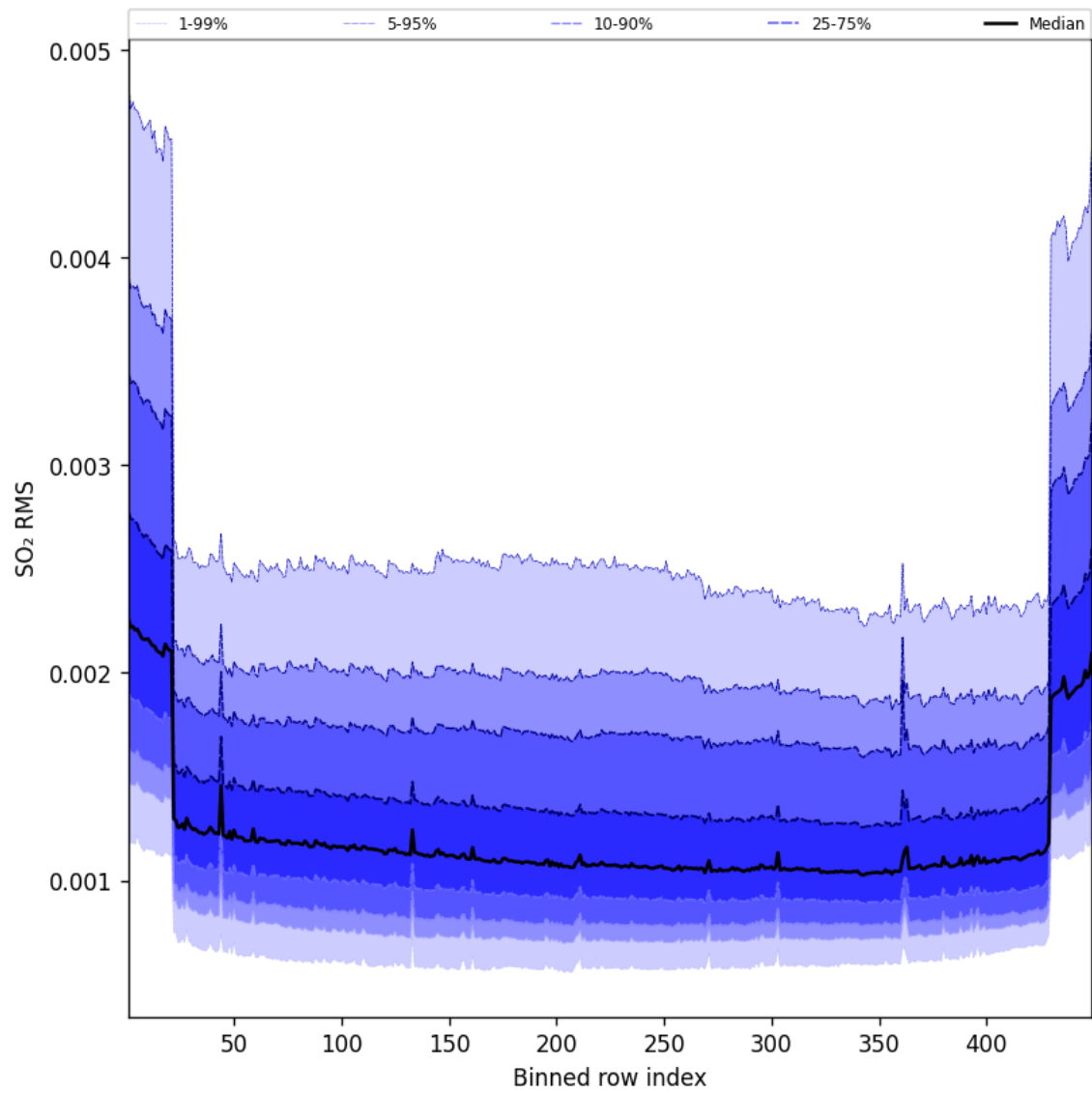


Figure 106: Along track statistics of “SO₂ RMS” for 2025-05-16 to 2025-05-17

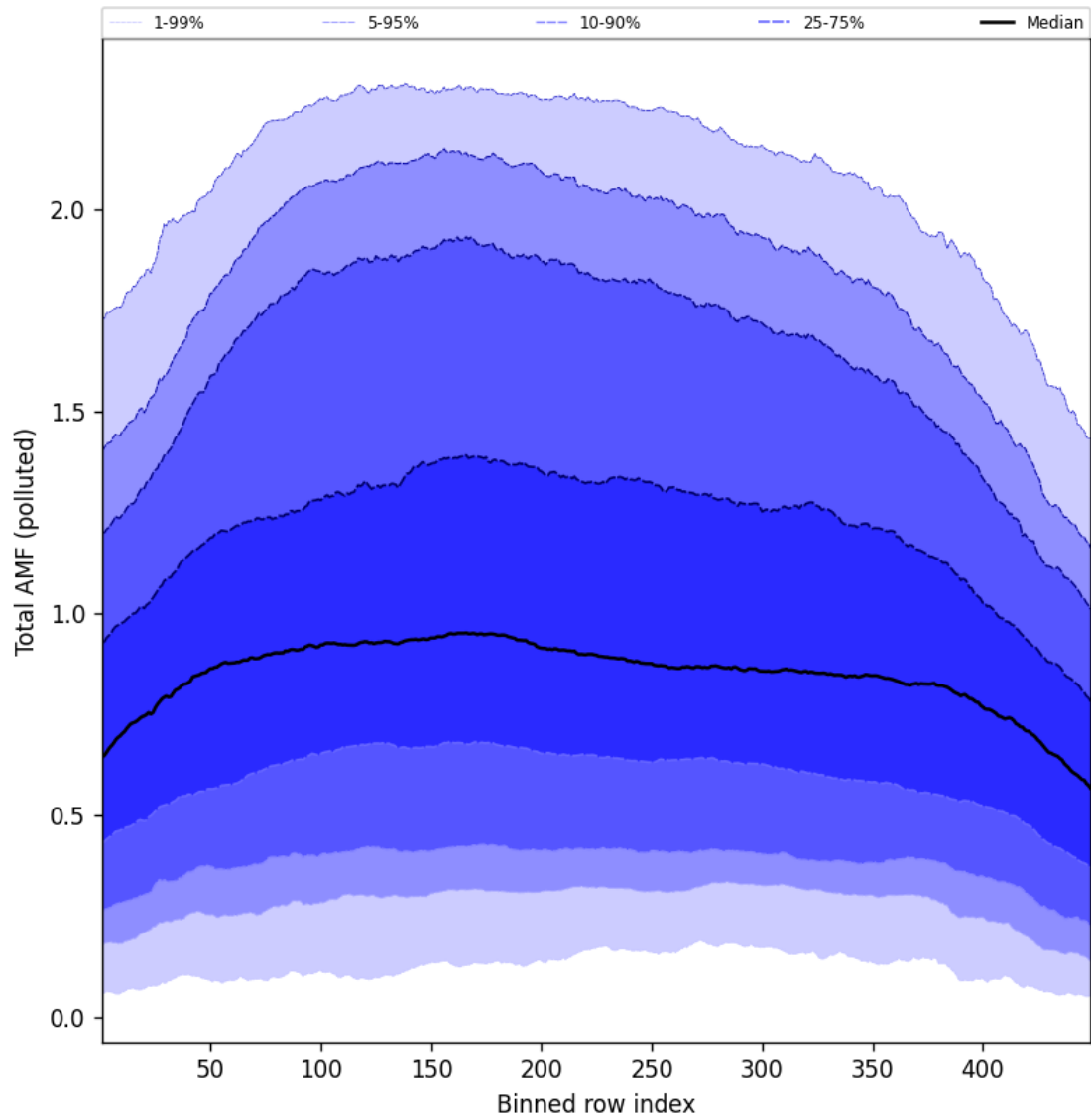


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-05-16 to 2025-05-17

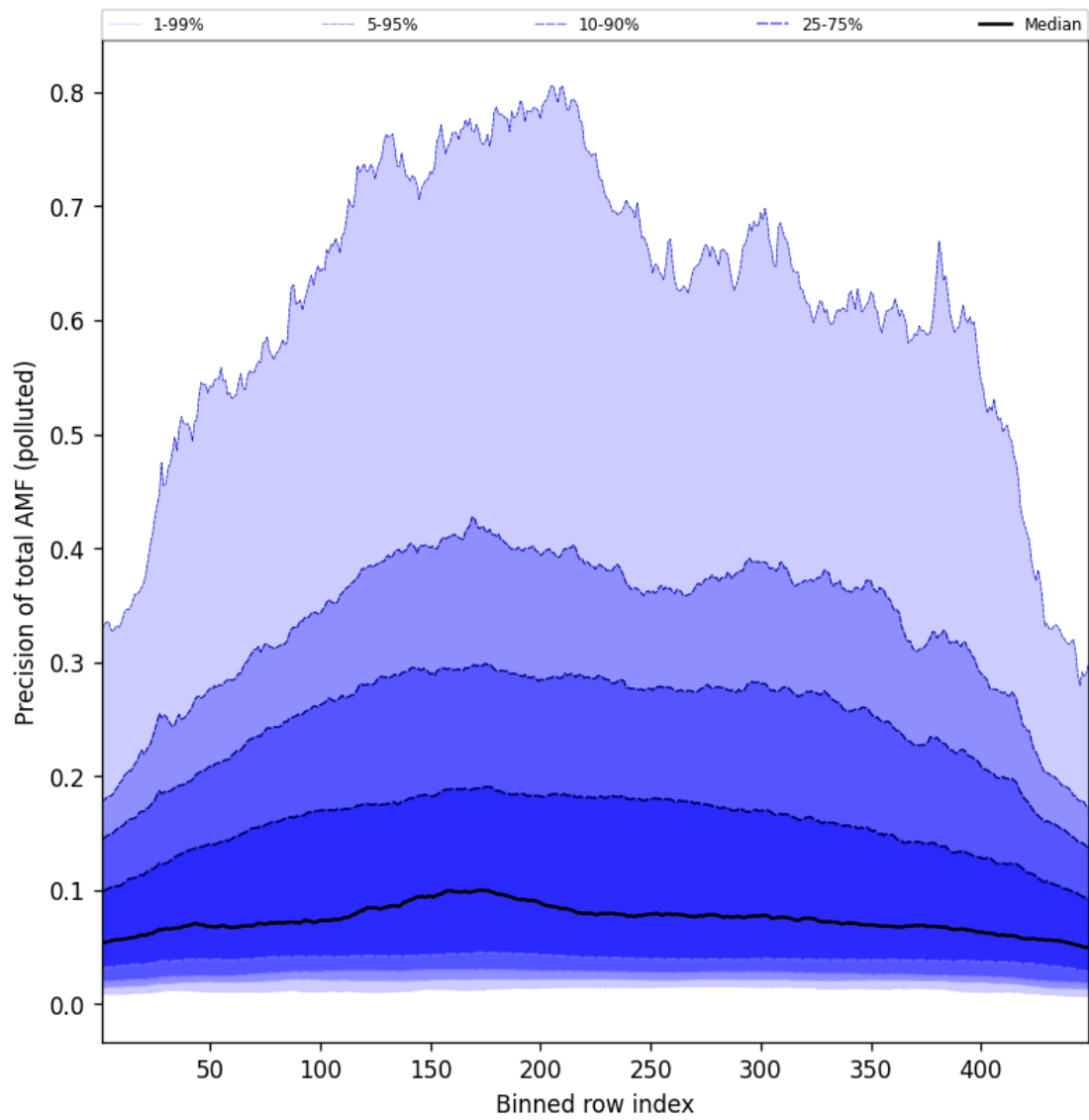


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-05-16 to 2025-05-17

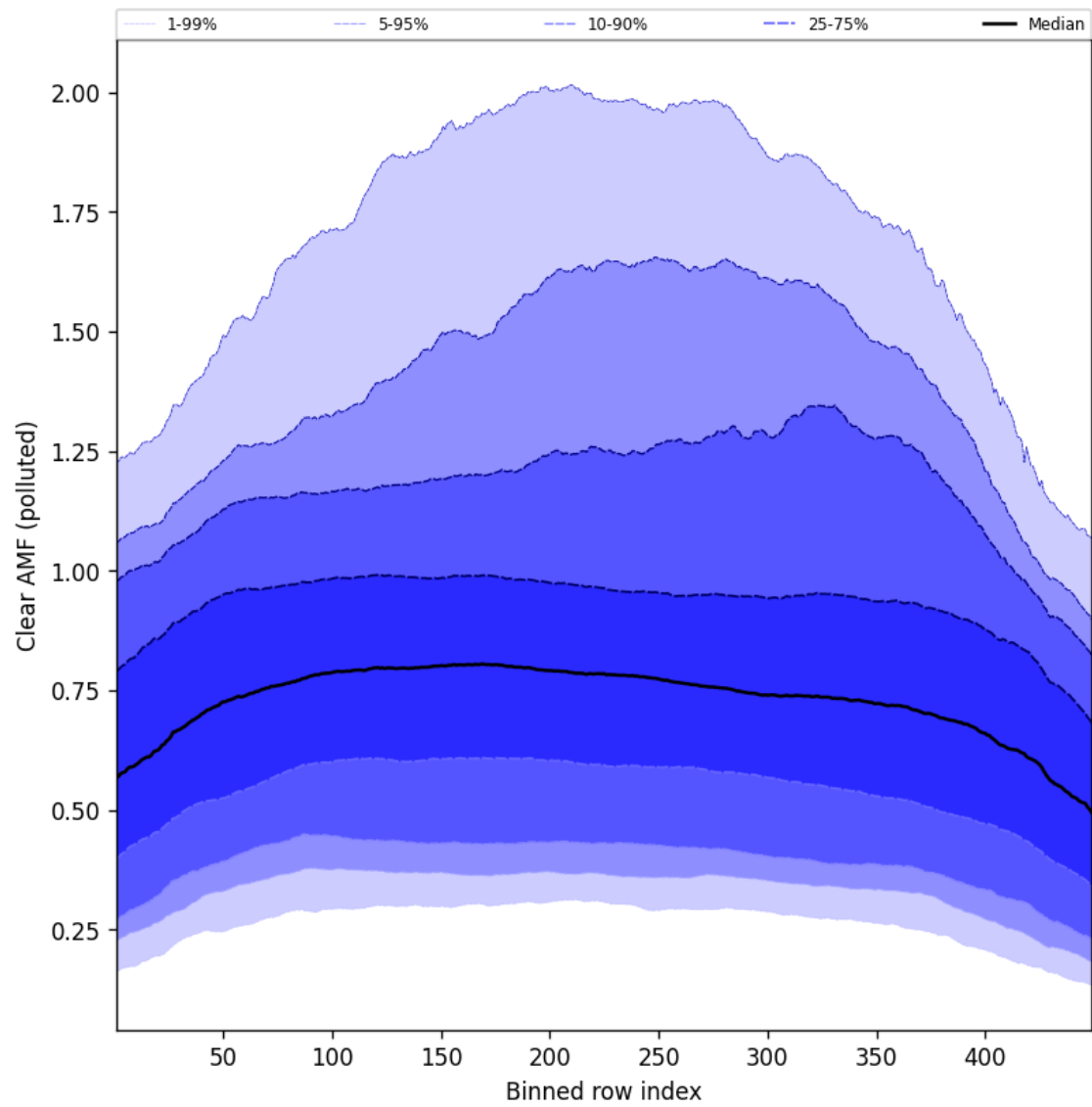


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-05-16 to 2025-05-17

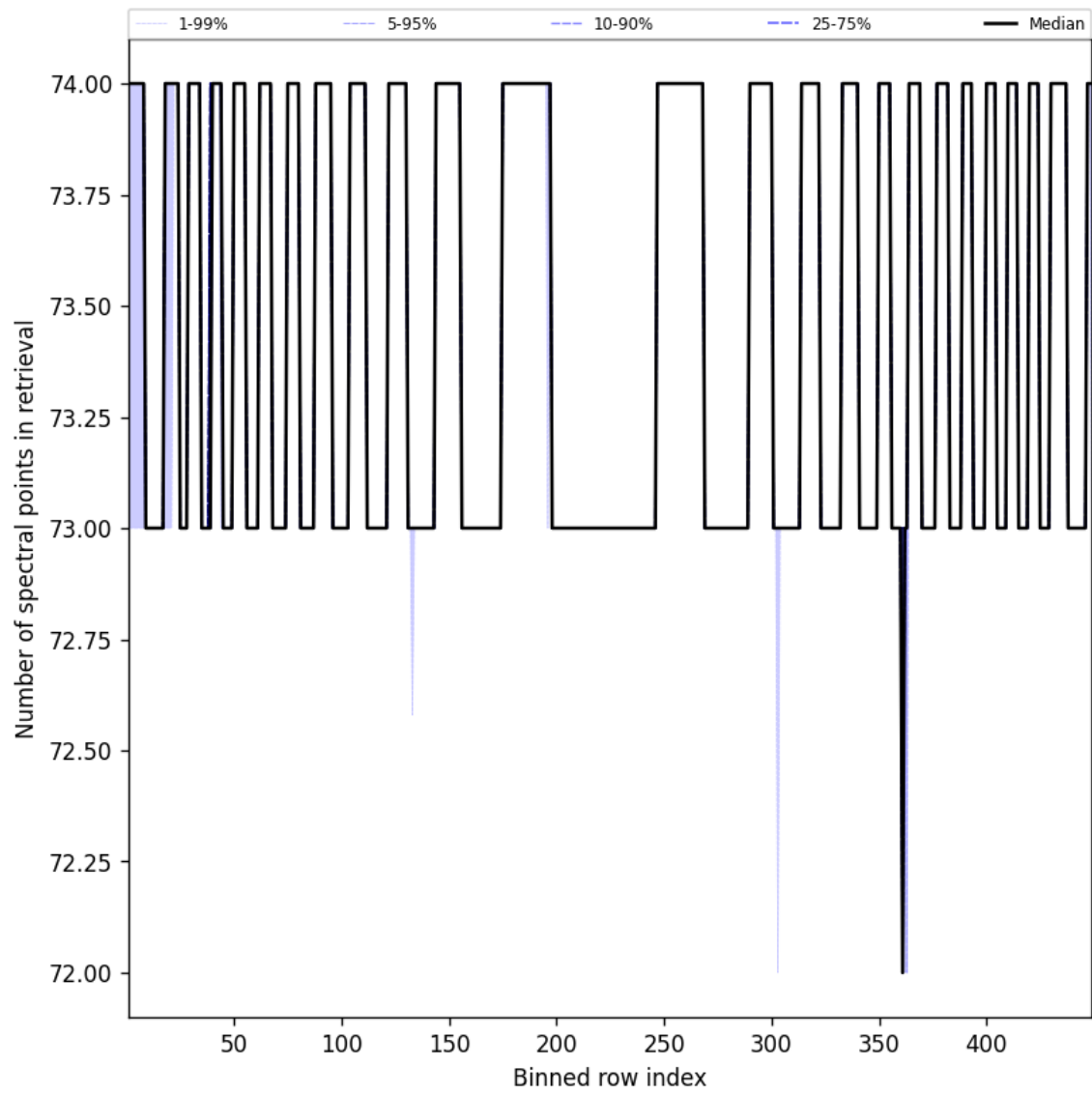


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-05-16 to 2025-05-17

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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