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:

$$\overline{x} = \frac{1}{N}\sum_{i=1}^{N} x_i \tag{1}$$

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 $\sigma(x) = \sqrt{V(x)}$.

$$V(x) = \frac{1}{N-1}\sum_{i=1}^{N}(x_i - \overline{x})^2 \tag{2}$$

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:

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^{m} f(x)\,\mathrm{d}x = \frac{1}{2} \tag{3}$$

with $f(x)$ the probability density function.

The median is a special case of a percentile. Instead of ½ 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}.

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1}\sum_{i=1}^{N}(x_{(k),i} - \overline{x_{(k)}})(x_{(l),i} - \overline{x_{(l)}}) \tag{4}$$

Rather than a dimensionally dependent covariance, it is often easier to interpret a correlation matrix R_{kl}, a matrix of Pearson's r coefficients:

$$R_{kl} = R(x_{(k)}, x_{(l)}) = \frac{C_{kl}}{\sqrt{C_{kk}C_{ll}}} = \frac{C_{kl}}{\sqrt{V(x_k)V(x_l)}} \tag{5}$$

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]	0.629 ± 0.409	18688162	0.995	0.790	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.604 \pm 94.035) \times 10^{-2}$	18688162	0.249	0.427	9.698×10^{-3}	-105	622
sulfurdioxide total vertical column precision [DU]	0.479 ± 0.634	18688162	0.222	0.316	0.312	4.311×10^{-2}	97.5
sulfurdioxide slant column density corrected [DU]	$(1.809 \pm 40.485) \times 10^{-2}$	18688162	0.258	0.371	9.130×10^{-3}	-42.7	403
sulfurdioxide slant column density cobra [DU]	$(1.784 \pm 36.766) \times 10^{-2}$	18688162	0.258	0.371	9.130×10^{-3}	-42.7	44.6
sulfurdioxide slant column density cobra precision [DU]	0.296 ± 0.129	18688162	0.213	0.126	0.259	8.692×10^{-2}	58.3
sulfurdioxide slant column density window1 [DU]	0.107 ± 0.681	18688162	0.125	0.744	0.111	-95.9	119
sulfurdioxide slant column density window1 precision [DU]	0.296 ± 0.129	18688162	0.213	0.126	0.259	8.692×10^{-2}	58.3
sulfurdioxide slant column density corrected win1 [DU]	$(2.866 \pm 67.182) \times 10^{-2}$	18688162	2.500×10^{-2}	0.730	1.234×10^{-2}	-95.9	119
background so2 slant column offset window1 [DU]	$(-7.872 \pm 13.916) \times 10^{-2}$	18688162	-0.140	0.168	-0.106	-1.16	2.98
sulfurdioxide slant column density window2 [DU]	0.714 ± 8.966	18688162	0.750	11.2	0.652	-1.406×10^3	2.599×10^3
sulfurdioxide slant column density window2 precision [DU]	8.12 ± 2.40	18688162	7.43	2.67	7.74	2.23	627
sulfurdioxide slant column density corrected win2 [DU]	-0.333 ± 8.857	18688162	-0.250	11.0	-0.309	-1.410×10^3	2.598×10^3
background so2 slant column offset window2 [DU]	-1.05 ± 1.78	18688162	0.250	2.52	-0.692	-11.8	7.19
sulfurdioxide slant column density window3 [DU]	-2.09 ± 23.66	18688162	-3.92	29.1	-2.21	-3.619×10^3	542
sulfurdioxide slant column density window3 precision [DU]	28.2 ± 13.7	18688162	21.5	10.5	24.5	9.38	883
sulfurdioxide slant column density corrected win3 [DU]	4.85 ± 23.20	18688162	6.16	28.5	4.99	-3.618×10^3	556
background so2 slant column offset window3 [DU]	6.94 ± 4.73	18688162	10.6	7.55	7.27	-19.0	25.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	18688162	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.131 \pm 7.121) \times 10^{-2}$	18688162	1.423×10^{-2}	2.305×10^{-2}	1.394×10^{-2}	2.367×10^{-4}	3.34
fitted radiance shift [nm]	$(-7.034 \pm 261.005) \times 10^{-5}$	18688162	1.000×10^{-4}	1.699×10^{-3}	-6.840×10^{-5}	-6.182×10^{-2}	0.110
fitted radiance squeeze [1]	$(-4.415 \pm 18.775) \times 10^{-5}$	18688162	-3.000×10^{-5}	2.175×10^{-4}	-3.912×10^{-5}	-1.827×10^{-2}	4.343×10^{-2}
fitted root mean square [1]	$(1.290 \pm 0.519) \times 10^{-3}$	18688162	1.025×10^{-3}	5.167×10^{-4}	1.150×10^{-3}	3.493×10^{-4}	0.134
sulfurdioxide total air mass factor polluted [1]	0.953 ± 0.520	18688162	0.620	0.657	0.845	5.000×10^{-2}	2.85
sulfurdioxide total air mass factor polluted precision [1]	0.118 ± 0.130	18688162	3.500×10^{-2}	0.114	7.700×10^{-2}	2.757×10^{-3}	2.18
sulfurdioxide clear air mass factor polluted [1]	0.794 ± 0.371	18688162	0.620	0.412	0.724	5.763×10^{-2}	2.67
number of spectral points in retrieval [1]	73.4 ± 0.5	18688162	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	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]	−2.08	−0.811	−0.503	−0.340	−0.201	0.226	0.375	0.553	0.898	2.35
sulfurdioxide total vertical column precision [DU]	9.421×10^{-2}	0.123	0.147	0.172	0.208	0.524	0.684	0.879	1.29	3.10
sulfurdioxide slant column density corrected [DU]	−0.852	−0.496	−0.361	−0.270	−0.175	0.196	0.297	0.395	0.548	1.00
sulfurdioxide slant column density cobra [DU]	−0.852	−0.496	−0.361	−0.270	−0.175	0.196	0.297	0.395	0.548	1.00
sulfurdioxide slant column density cobra precision [DU]	0.144	0.172	0.187	0.199	0.214	0.340	0.393	0.446	0.540	0.756
sulfurdioxide slant column density window1 [DU]	−1.67	−0.939	−0.655	−0.464	−0.264	0.479	0.672	0.856	1.13	1.89
sulfurdioxide slant column density window1 precision [DU]	0.144	0.172	0.187	0.199	0.214	0.340	0.393	0.446	0.540	0.756
sulfurdioxide slant column density corrected win1 [DU]	−1.63	−0.966	−0.709	−0.534	−0.348	0.382	0.581	0.774	1.07	1.88
background so2 slant column offset window1 [DU]	−0.322	−0.242	−0.213	−0.197	−0.174	-5.710×10^{-3}	5.167×10^{-2}	0.104	0.180	0.335
sulfurdioxide slant column density window2 [DU]	−20.5	−13.6	−10.2	−7.71	−4.93	6.27	9.10	11.7	15.2	22.8
sulfurdioxide slant column density window2 precision [DU]	4.27	5.10	5.62	6.05	6.57	9.24	10.2	11.1	12.4	15.1
sulfurdioxide slant column density corrected win2 [DU]	−21.8	−14.6	−11.1	−8.63	−5.84	5.18	7.94	10.4	13.8	21.1
background so2 slant column offset window2 [DU]	−5.61	−4.25	−3.59	−2.96	−2.21	0.313	0.596	0.806	1.12	2.27
sulfurdioxide slant column density window3 [DU]	−61.8	−40.5	−30.8	−24.0	−16.6	12.5	20.1	27.2	36.8	56.3
sulfurdioxide slant column density window3 precision [DU]	13.5	15.8	17.6	19.0	20.6	31.1	35.8	41.7	53.9	87.0
sulfurdioxide slant column density corrected win3 [DU]	−54.3	−33.3	−23.6	−16.7	−9.28	19.2	26.5	33.2	42.5	61.6
background so2 slant column offset window3 [DU]	−3.44	−0.462	0.847	1.91	3.22	10.8	11.9	12.6	13.8	16.7
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	4.863×10^{-4}	7.752×10^{-4}	1.211×10^{-3}	2.381×10^{-3}	6.150×10^{-3}	2.920×10^{-2}	4.480×10^{-2}	6.854×10^{-2}	0.113	0.307
fitted radiance shift [nm]	-8.044×10^{-3}	-3.885×10^{-3}	-2.423×10^{-3}	-1.607×10^{-3}	-9.425×10^{-4}	7.561×10^{-4}	1.420×10^{-3}	2.279×10^{-3}	3.814×10^{-3}	8.169×10^{-3}
fitted radiance squeeze [1]	-5.388×10^{-4}	-3.475×10^{-4}	-2.664×10^{-4}	-2.103×10^{-4}	-1.506×10^{-4}	6.687×10^{-5}	1.206×10^{-4}	1.707×10^{-4}	2.427×10^{-4}	4.167×10^{-4}
fitted root mean square [1]	6.021×10^{-4}	7.408×10^{-4}	8.245×10^{-4}	8.876×10^{-4}	9.614×10^{-4}	1.478×10^{-3}	1.715×10^{-3}	1.944×10^{-3}	2.271×10^{-3}	3.133×10^{-3}
sulfurdioxide total air mass factor polluted [1]	8.805×10^{-2}	0.260	0.375	0.469	0.582	1.24	1.51	1.76	2.02	2.31
sulfurdioxide total air mass factor polluted precision [1]	1.037×10^{-2}	1.978×10^{-2}	2.647×10^{-2}	3.151×10^{-2}	3.928×10^{-2}	0.153	0.193	0.237	0.327	0.669
sulfurdioxide clear air mass factor polluted [1]	0.242	0.337	0.398	0.457	0.537	0.949	1.10	1.29	1.59	1.99
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]	0.577 ± 0.416	13050895	0.850	0.490	0.0	1.000	0.150	1.000
sulfurdioxide total vertical column [DU]	$(2.145 \pm 86.420) \times 10^{-2}$	13050895	0.387	8.259×10^{-3}	-105	236	-0.183	0.204
sulfurdioxide total vertical column precision [DU]	0.436 ± 0.595	13050895	0.277	0.280	4.311×10^{-2}	65.8	0.189	0.465
sulfurdioxide slant column density corrected [DU]	$(1.645 \pm 36.031) \times 10^{-2}$	13050895	0.352	8.076×10^{-3}	-7.04	78.4	-0.166	0.185
sulfurdioxide slant column density cobra [DU]	$(1.627 \pm 34.714) \times 10^{-2}$	13050895	0.352	8.076×10^{-3}	-7.04	44.6	-0.166	0.185
sulfurdioxide slant column density cobra precision [DU]	0.278 ± 0.117	13050895	0.108	0.244	8.692×10^{-2}	58.3	0.206	0.313
sulfurdioxide slant column density window1 [DU]	$(9.628 \pm 64.608) \times 10^{-2}$	13050895	0.711	0.104	-62.6	48.1	-0.256	0.454
sulfurdioxide slant column density window1 precision [DU]	0.278 ± 0.117	13050895	0.108	0.244	8.692×10^{-2}	58.3	0.206	0.313
sulfurdioxide slant column density corrected win1 [DU]	$(2.548 \pm 63.277) \times 10^{-2}$	13050895	0.693	1.096×10^{-2}	-62.6	47.9	-0.331	0.362
background so2 slant column offset window1 [DU]	$(-7.081 \pm 14.991) \times 10^{-2}$	13050895	0.202	-9.805×10^{-2}	-0.936	1.36	-0.183	1.899×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.634 ± 8.259	13050895	10.6	0.631	-430	77.3	-4.67	5.93
sulfurdioxide slant column density window2 precision [DU]	7.62 ± 2.06	13050895	2.28	7.32	2.23	261	6.28	8.55
sulfurdioxide slant column density corrected win2 [DU]	-0.370 ± 8.141	13050895	10.4	-0.324	-433	78.4	-5.56	4.85
background so2 slant column offset window2 [DU]	-1.00 ± 1.79	13050895	2.69	-0.700	-9.24	7.19	-2.25	0.438
sulfurdioxide slant column density window3 [DU]	-1.98 ± 21.89	13050895	27.1	-2.32	-3.619×10^{3}	481	-15.7	11.4
sulfurdioxide slant column density window3 precision [DU]	26.4 ± 13.3	13050895	8.16	22.7	9.38	883	19.7	27.8
sulfurdioxide slant column density corrected win3 [DU]	5.05 ± 21.36	13050895	26.5	5.11	-3.618×10^{3}	482	-8.11	18.4
background so2 slant column offset window3 [DU]	7.03 ± 4.85	13050895	8.14	8.14	-19.0	19.8	2.83	11.0
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	13050895	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.353 \pm 8.103) \times 10^{-2}$	13050895	2.651×10^{-2}	1.138×10^{-2}	2.367×10^{-4}	3.34	3.153×10^{-3}	2.966×10^{-2}
fitted radiance shift [nm]	$(6.905 \pm 259.184) \times 10^{-5}$	13050895	1.575×10^{-3}	4.674×10^{-5}	-4.459×10^{-2}	0.110	-7.380×10^{-4}	8.373×10^{-4}
fitted radiance squeeze [1]	$(-7.129 \pm 17.589) \times 10^{-5}$	13050895	2.105×10^{-4}	-5.928×10^{-5}	-1.250×10^{-2}	4.343×10^{-2}	-1.699×10^{-4}	4.054×10^{-5}
fitted root mean square [1]	$(1.224 \pm 0.486) \times 10^{-3}$	13050895	4.478×10^{-4}	1.095×10^{-3}	3.493×10^{-4}	0.134	9.268×10^{-4}	1.375×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.01 ± 0.57	13050895	0.804	0.896	5.000×10^{-2}	2.85	0.583	1.39
sulfurdioxide total air mass factor polluted precision [1]	0.131 ± 0.146	13050895	0.125	8.928×10^{-2}	2.757×10^{-3}	2.18	4.203×10^{-2}	0.167
sulfurdioxide clear air mass factor polluted [1]	0.826 ± 0.416	13050895	0.500	0.739	6.938×10^{-2}	2.67	0.516	1.02
number of spectral points in retrieval [1]	73.5 ± 0.5	13050895	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]	0.752 ± 0.362	5637267	0.570	1.000	0.0	1.000	0.430	1.000
sulfurdioxide total vertical column [DU]	$(3.667 \pm 109.647) \times 10^{-2}$	5637267	0.541	1.436×10^{-2}	-80.3	622	-0.252	0.289
sulfurdioxide total vertical column precision [DU]	0.578 ± 0.705	5637267	0.366	0.393	4.899×10^{-2}	97.5	0.269	0.635
sulfurdioxide slant column density corrected [DU]	$(2.190 \pm 49.273) \times 10^{-2}$	5637267	0.424	1.209×10^{-2}	-42.7	403	-0.198	0.226
sulfurdioxide slant column density cobra [DU]	$(2.145 \pm 41.125) \times 10^{-2}$	5637267	0.424	1.209×10^{-2}	-42.7	31.3	-0.198	0.226
sulfurdioxide slant column density cobra precision [DU]	0.337 ± 0.144	5637267	0.152	0.302	8.945×10^{-2}	25.7	0.242	0.394
sulfurdioxide slant column density window1 [DU]	0.133 ± 0.754	5637267	0.830	0.129	-95.9	119	-0.285	0.545
sulfurdioxide slant column density window1 precision [DU]	0.337 ± 0.144	5637267	0.152	0.302	8.945×10^{-2}	25.7	0.242	0.394
sulfurdioxide slant column density corrected win1 [DU]	$(3.604 \pm 75.448) \times 10^{-2}$	5637267	0.828	1.611×10^{-2}	-95.9	119	-0.391	0.437
background so2 slant column offset window1 [DU]	$(-9.704 \pm 10.815) \times 10^{-2}$	5637267	0.102	-0.115	-1.16	2.98	-0.154	-5.210×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.897 ± 10.416	5637267	12.8	0.709	-1.406×10^{3}	2.599×10^{3}	-5.60	7.19
sulfurdioxide slant column density window2 precision [DU]	9.27 ± 2.71	5637267	2.93	8.94	2.41	627	7.63	10.6
sulfurdioxide slant column density corrected win2 [DU]	-0.248 ± 10.325	5637267	12.7	-0.267	-1.410×10^{3}	2.598×10^{3}	-6.60	6.09
background so2 slant column offset window2 [DU]	-1.14 ± 1.74	5637267	2.18	-0.680	-11.8	6.74	-2.10	7.655×10^{-2}
sulfurdioxide slant column density window3 [DU]	-2.35 ± 27.31	5637267	34.5	-1.90	-844	542	-19.3	15.2
sulfurdioxide slant column density window3 precision [DU]	32.6 ± 13.8	5637267	10.8	29.2	10.1	303	24.8	35.6
sulfurdioxide slant column density corrected win3 [DU]	4.37 ± 26.98	5637267	34.1	4.61	-836	556	-12.5	21.6
background so2 slant column offset window3 [DU]	6.72 ± 4.43	5637267	5.93	5.84	-14.9	25.8	3.71	9.63
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.26	5637267	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.618 \pm 3.962) \times 10^{-2}$	5637267	1.634×10^{-2}	1.696×10^{-2}	1.303×10^{-3}	2.39	1.221×10^{-2}	2.855×10^{-2}
fitted radiance shift [nm]	$(-3.930 \pm 26.235) \times 10^{-4}$	5637267	1.879×10^{-3}	-3.890×10^{-4}	-6.182×10^{-2}	6.806×10^{-2}	-1.375×10^{-3}	5.038×10^{-4}
fitted radiance squeeze [1]	$(1.867 \pm 19.894) \times 10^{-5}$	5637267	2.295×10^{-4}	1.242×10^{-5}	-1.827×10^{-2}	1.634×10^{-2}	-9.962×10^{-5}	1.299×10^{-4}
fitted root mean square [1]	$(1.442 \pm 0.557) \times 10^{-3}$	5637267	6.210×10^{-4}	1.302×10^{-3}	3.617×10^{-4}	6.064×10^{-2}	1.072×10^{-3}	1.693×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.813 ± 0.351	5637267	0.423	0.770	5.000×10^{-2}	2.62	0.581	1.00
sulfurdioxide total air mass factor polluted precision [1]	$(8.625 \pm 7.393) \times 10^{-2}$	5637267	8.222×10^{-2}	5.635×10^{-2}	3.090×10^{-3}	1.14	3.538×10^{-2}	0.118
sulfurdioxide clear air mass factor polluted [1]	0.720 ± 0.216	5637267	0.289	0.703	5.763×10^{-2}	1.72	0.571	0.860
number of spectral points in retrieval [1]	73.4 ± 0.5	5637267	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 ± 0.399	12422863	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.477 \pm 86.396) \times 10^{-2}$	12422863	0.429	9.877×10^{-3}	-63.0	163	-0.202	0.227
sulfurdioxide total vertical column precision [DU]	0.475 ± 0.610	12422863	0.306	0.307	4.823×10^{-2}	50.8	0.211	0.517
sulfurdioxide slant column density corrected [DU]	$(1.703 \pm 37.797) \times 10^{-2}$	12422863	0.370	9.151×10^{-3}	-29.6	280	-0.174	0.196
sulfurdioxide slant column density cobra [DU]	$(1.690 \pm 35.948) \times 10^{-2}$	12422863	0.370	9.151×10^{-3}	-29.6	27.2	-0.174	0.196
sulfurdioxide slant column density cobra precision [DU]	0.296 ± 0.129	12422863	0.139	0.259	8.692×10^{-2}	25.7	0.210	0.350
sulfurdioxide slant column density window1 [DU]	0.105 ± 0.678	12422863	0.747	0.114	-95.9	55.7	-0.264	0.482
sulfurdioxide slant column density window1 precision [DU]	0.296 ± 0.129	12422863	0.139	0.259	8.692×10^{-2}	25.7	0.210	0.350
sulfurdioxide slant column density corrected win1 [DU]	$(2.767 \pm 66.836) \times 10^{-2}$	12422863	0.733	1.288×10^{-2}	-95.9	56.0	-0.349	0.384
background so2 slant column offset window1 [DU]	$(-7.754 \pm 14.556) \times 10^{-2}$	12422863	0.174	-0.113	-1.02	2.98	-0.176	-1.452×10^{-3}
sulfurdioxide slant column density window2 [DU]	0.739 ± 8.880	12422863	11.2	0.630	-974	1.777×10^{3}	-4.91	6.25
sulfurdioxide slant column density window2 precision [DU]	8.03 ± 2.25	12422863	2.62	7.68	2.28	570	6.54	9.16
sulfurdioxide slant column density corrected win2 [DU]	-0.303 ± 8.756	12422863	11.0	-0.290	-974	1.777×10^{3}	-5.79	5.19
background so2 slant column offset window2 [DU]	-1.04 ± 1.85	12422863	2.65	-0.570	-11.8	7.19	-2.29	0.361
sulfurdioxide slant column density window3 [DU]	0.197 ± 23.455	12422863	29.1	-0.155	-844	542	-14.4	14.7
sulfurdioxide slant column density window3 precision [DU]	27.0 ± 11.6	12422863	9.36	23.9	9.38	303	20.5	29.8
sulfurdioxide slant column density corrected win3 [DU]	6.78 ± 22.78	12422863	28.3	6.60	-836	556	-7.38	20.9
background so2 slant column offset window3 [DU]	6.59 ± 4.81	12422863	7.59	6.42	-19.0	25.8	2.89	10.5
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	12422863	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.180 \pm 4.723) \times 10^{-2}$	12422863	1.540×10^{-2}	1.301×10^{-2}	2.367×10^{-4}	3.34	6.775×10^{-3}	2.218×10^{-2}
fitted radiance shift [nm]	$(-9.907 \pm 223.078) \times 10^{-5}$	12422863	1.607×10^{-3}	-8.062×10^{-5}	-4.992×10^{-2}	6.806×10^{-2}	-9.174×10^{-4}	6.896×10^{-4}
fitted radiance squeeze [1]	$(-3.537 \pm 18.840) \times 10^{-5}$	12422863	2.162×10^{-4}	-2.953×10^{-5}	-1.659×10^{-2}	1.634×10^{-2}	-1.409×10^{-4}	7.535×10^{-5}
fitted root mean square [1]	$(1.295 \pm 0.523) \times 10^{-3}$	12422863	5.715×10^{-4}	1.146×10^{-3}	3.493×10^{-4}	6.064×10^{-2}	9.492×10^{-4}	1.521×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.941 ± 0.490	12422863	0.606	0.853	5.000×10^{-2}	2.55	0.602	1.21
sulfurdioxide total air mass factor polluted precision [1]	0.112 ± 0.134	12422863	9.827×10^{-2}	7.114×10^{-2}	2.757×10^{-3}	2.18	4.031×10^{-2}	0.139
sulfurdioxide clear air mass factor polluted [1]	0.811 ± 0.372	12422863	0.391	0.744	6.938×10^{-2}	2.57	0.563	0.954
number of spectral points in retrieval [1]	73.4 ± 0.5	12422863	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]	0.658 ± 0.418	4318705	0.810	1.000	0.0	1.000	0.190	1.000
sulfurdioxide total vertical column [DU]	$(2.757 \pm 103.058) \times 10^{-2}$	4318705	0.424	8.636×10^{-3}	-80.3	622	-0.200	0.224
sulfurdioxide total vertical column precision [DU]	0.470 ± 0.602	4318705	0.323	0.327	4.311×10^{-2}	65.8	0.203	0.526
sulfurdioxide slant column density corrected [DU]	$(1.922 \pm 47.687) \times 10^{-2}$	4318705	0.365	8.268×10^{-3}	-42.7	403	-0.173	0.193
sulfurdioxide slant column density cobra [DU]	$(1.858 \pm 38.354) \times 10^{-2}$	4318705	0.365	8.268×10^{-3}	-42.7	44.6	-0.173	0.193
sulfurdioxide slant column density cobra precision [DU]	0.288 ± 0.125	4318705	9.961×10^{-2}	0.254	9.861×10^{-2}	58.3	0.216	0.316
sulfurdioxide slant column density window1 [DU]	0.133 ± 0.672	4318705	0.723	0.124	-62.6	62.5	-0.236	0.487
sulfurdioxide slant column density window1 precision [DU]	0.288 ± 0.125	4318705	9.961×10^{-2}	0.254	9.861×10^{-2}	58.3	0.216	0.316
sulfurdioxide slant column density corrected win1 [DU]	$(3.354 \pm 66.499) \times 10^{-2}$	4318705	0.711	1.478×10^{-2}	-62.6	62.3	-0.335	0.376
background so2 slant column offset window1 [DU]	$(-9.956 \pm 12.304) \times 10^{-2}$	4318705	0.145	-0.118	-1.16	1.59	-0.182	-3.705×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.487 ± 9.287	4318705	11.4	0.519	-1.406×10^{3}	2.599×10^{3}	-5.21	6.18
sulfurdioxide slant column density window2 precision [DU]	8.38 ± 2.76	4318705	2.81	7.97	2.23	627	6.72	9.53
sulfurdioxide slant column density corrected win2 [DU]	-0.306 ± 9.200	4318705	11.2	-0.259	-1.410×10^{3}	2.598×10^{3}	-5.90	5.31
background so2 slant column offset window2 [DU]	-0.793 ± 1.589	4318705	2.13	-0.507	-10.6	6.20	-1.76	0.367
sulfurdioxide slant column density window3 [DU]	-6.91 ± 23.92	4318705	29.1	-6.46	-552	469	-21.2	7.92
sulfurdioxide slant column density window3 precision [DU]	31.6 ± 17.7	4318705	13.4	26.5	9.77	257	21.5	34.9
sulfurdioxide slant column density corrected win3 [DU]	$(-3.826 \pm 2403.994) \times 10^{-2}$	4318705	29.4	0.740	-548	481	-14.4	15.0
background so2 slant column offset window3 [DU]	6.87 ± 4.54	4318705	7.29	7.30	-14.4	23.7	3.29	10.6
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.10	4318705	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.403 \pm 10.243) \times 10^{-2}$	4318705	5.153×10^{-2}	2.303×10^{-2}	3.442×10^{-4}	2.60	6.771×10^{-3}	5.830×10^{-2}
fitted radiance shift [nm]	$(-1.657 \pm 338.534) \times 10^{-5}$	4318705	1.865×10^{-3}	-4.942×10^{-5}	-6.182×10^{-2}	0.110	-9.846×10^{-4}	8.800×10^{-4}
fitted radiance squeeze [1]	$(-4.821 \pm 18.248) \times 10^{-5}$	4318705	2.134×10^{-4}	-4.615×10^{-5}	-1.558×10^{-2}	4.343×10^{-2}	-1.537×10^{-4}	5.964×10^{-5}
fitted root mean square [1]	$(1.254 \pm 0.484) \times 10^{-3}$	4318705	4.150×10^{-4}	1.139×10^{-3}	3.516×10^{-4}	0.134	9.733×10^{-4}	1.388×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.953 ± 0.561	4318705	0.702	0.789	5.000×10^{-2}	2.85	0.540	1.24
sulfurdioxide total air mass factor polluted precision [1]	0.125 ± 0.124	4318705	0.142	8.798×10^{-2}	3.090×10^{-3}	1.76	3.471×10^{-2}	0.177
sulfurdioxide clear air mass factor polluted [1]	0.758 ± 0.364	4318705	0.395	0.680	5.763×10^{-2}	2.67	0.511	0.906
number of spectral points in retrieval [1]	73.4 ± 0.5	4318705	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

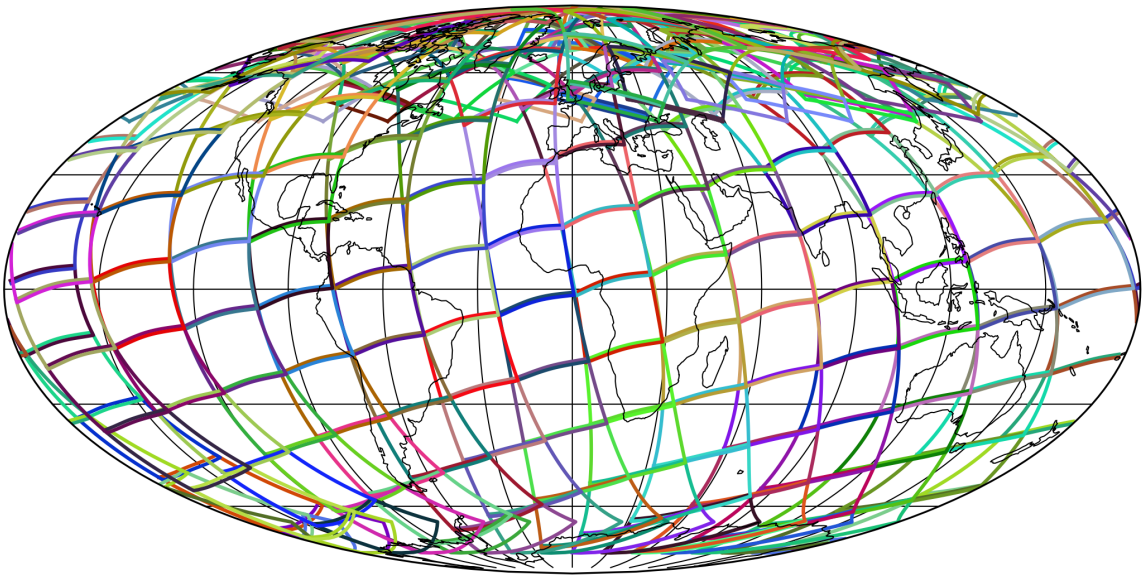

Figure 1: Outline of the granules.

4 Input data monitoring

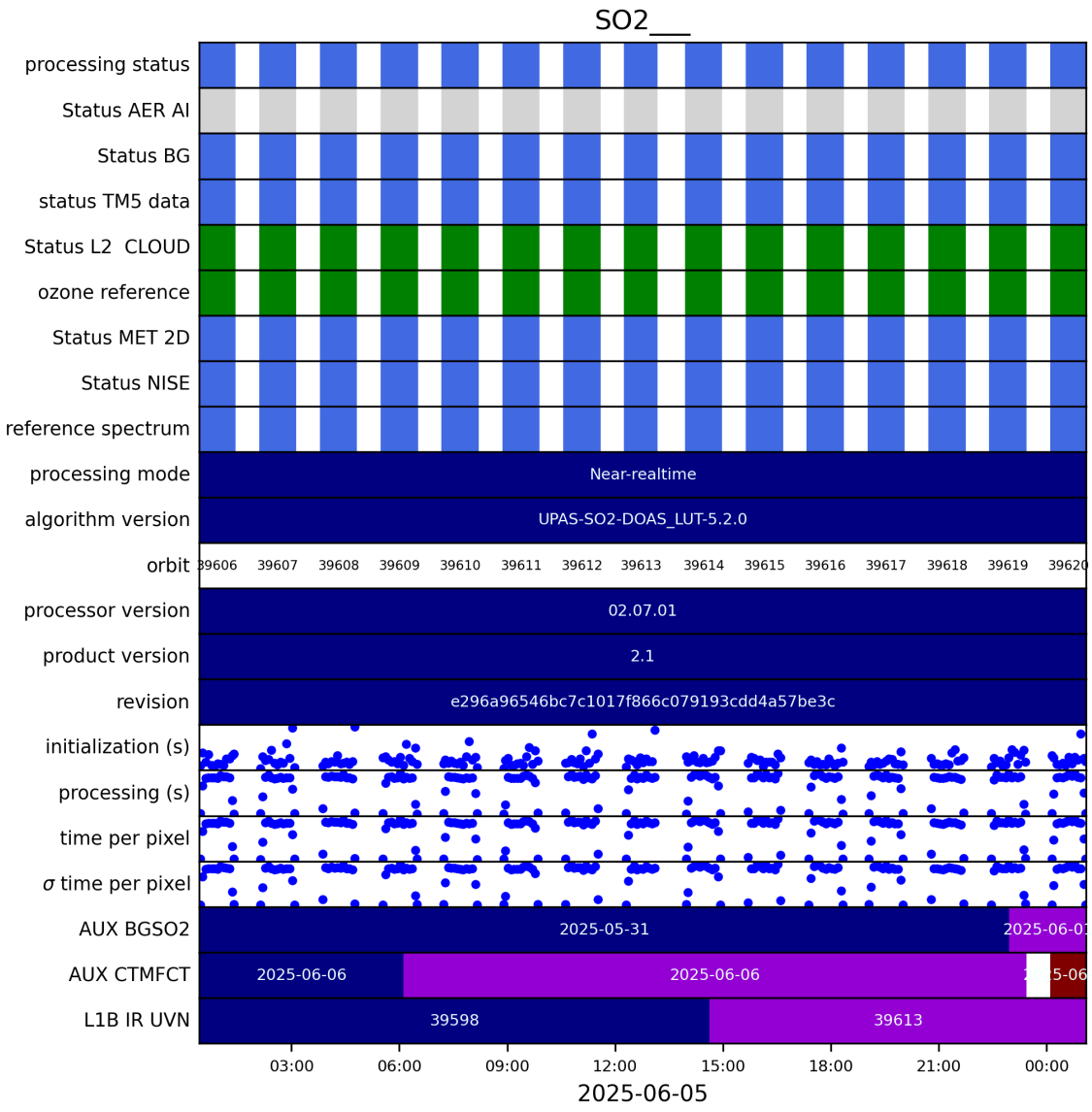

Figure 2: Input data per granule

5 Warnings and errors

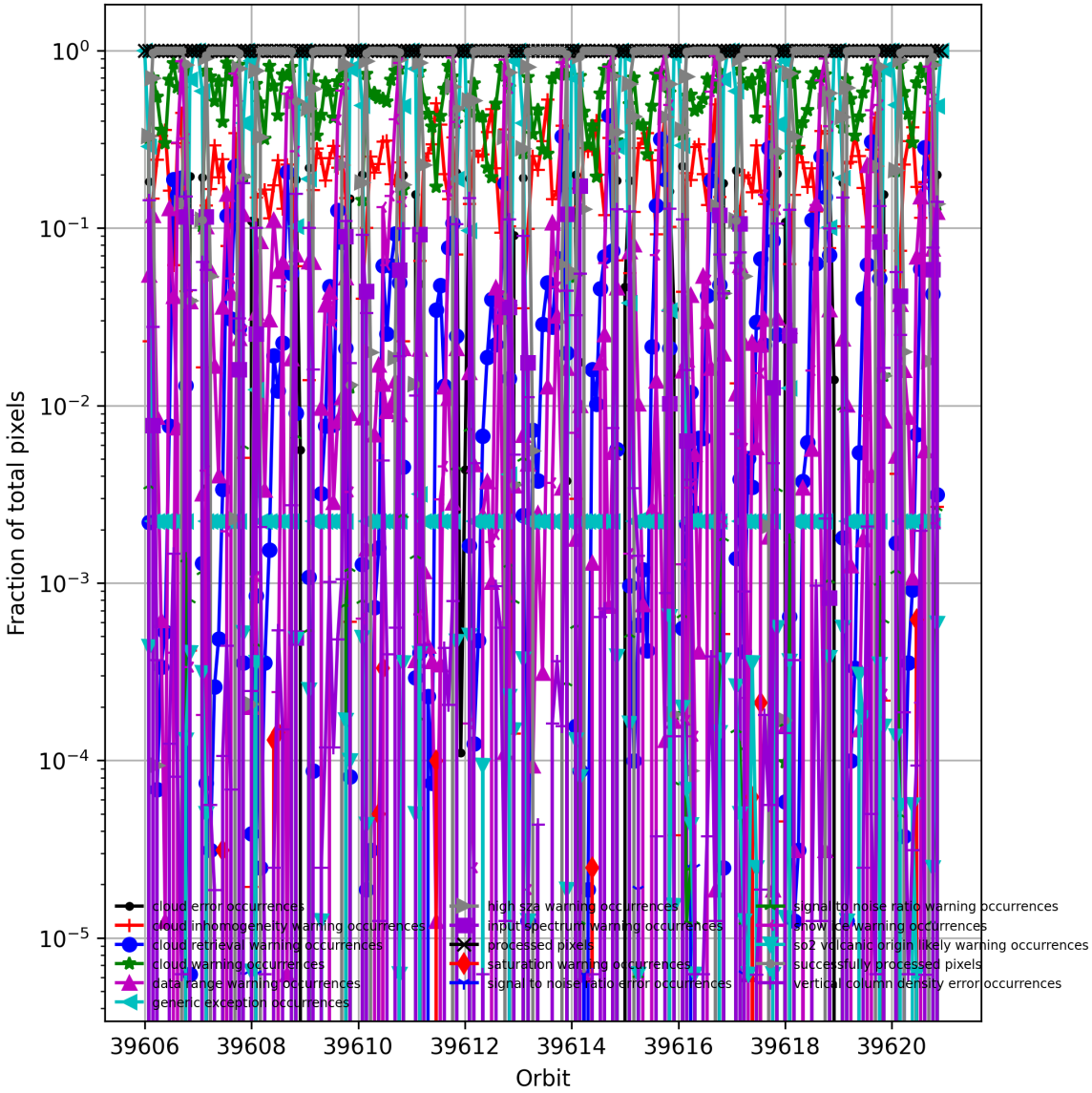

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

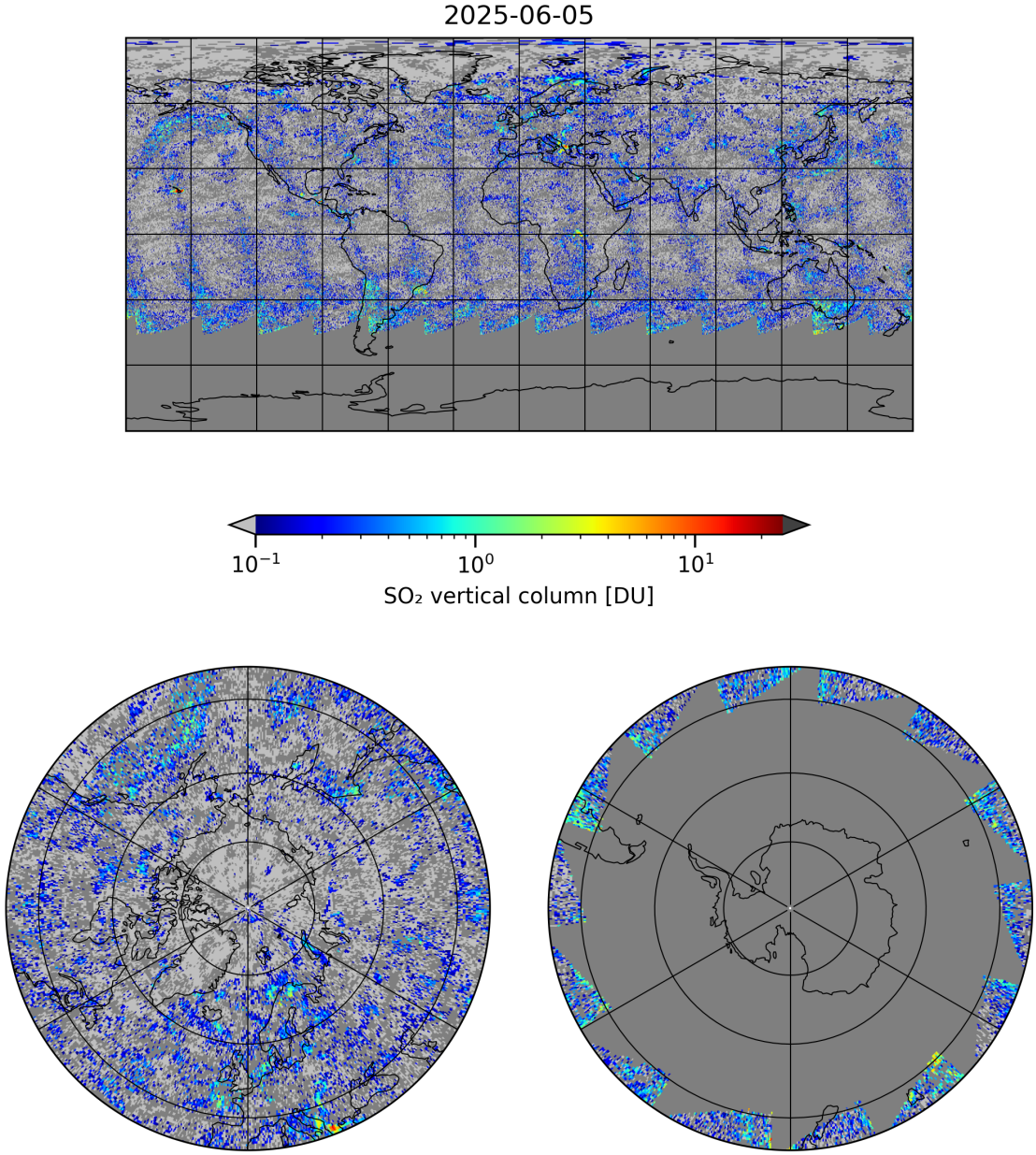

Figure 4: Map of "SO_2 vertical column" for 2025-06-05 to 2025-06-06

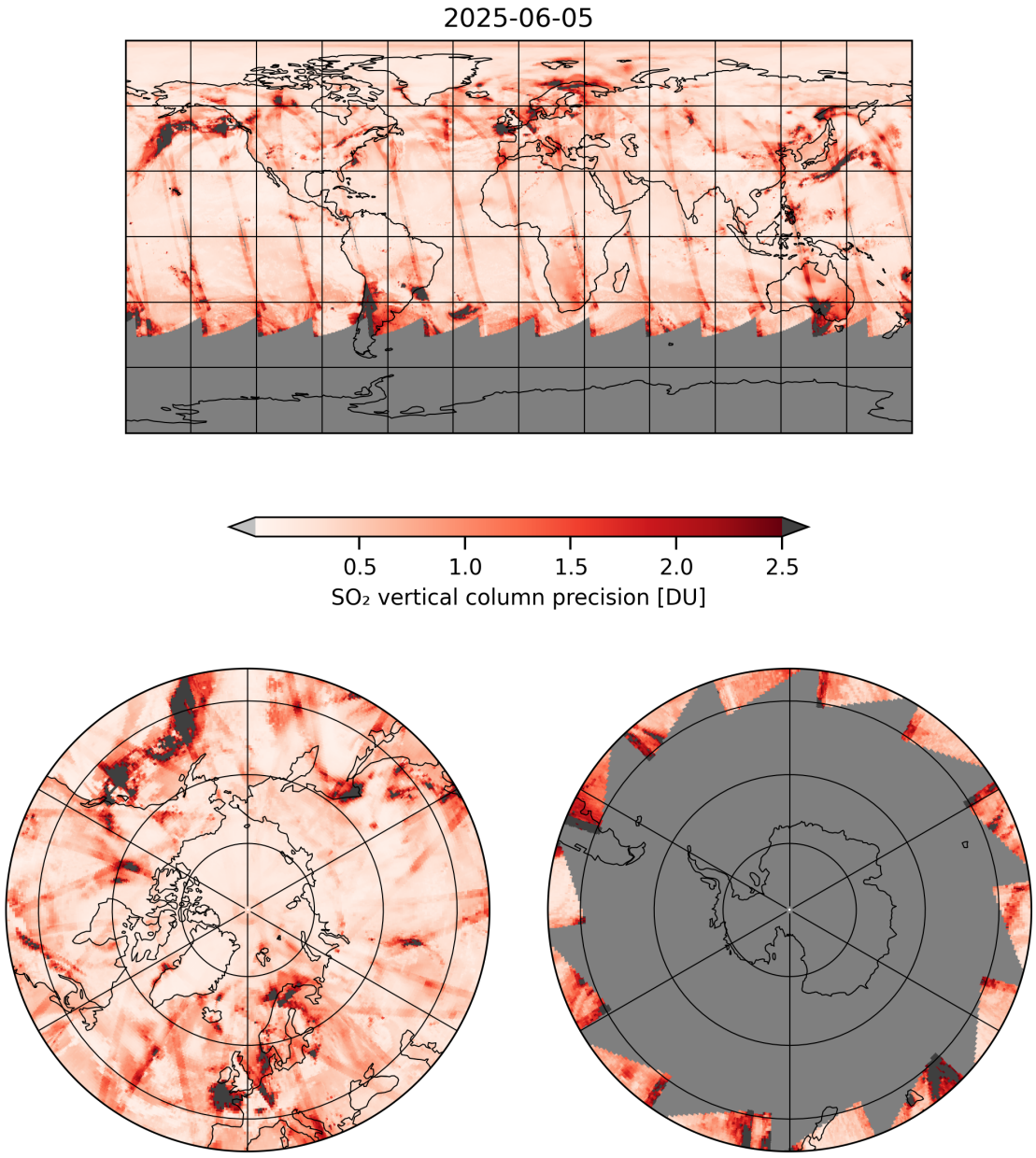

Figure 5: Map of "SO_2 vertical column precision" for 2025-06-05 to 2025-06-06

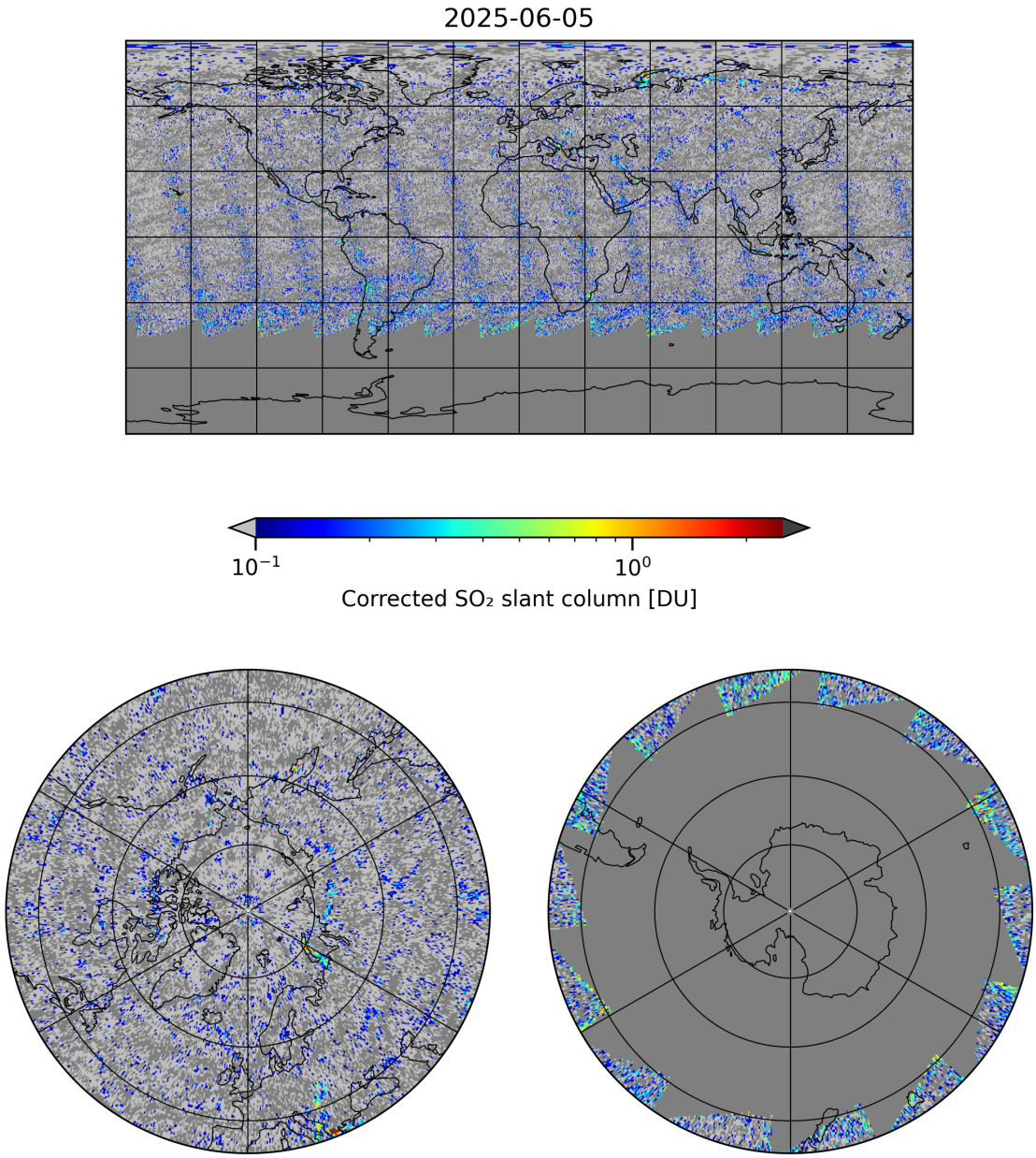

Figure 6: Map of "Corrected SO_2 slant column" for 2025-06-05 to 2025-06-06

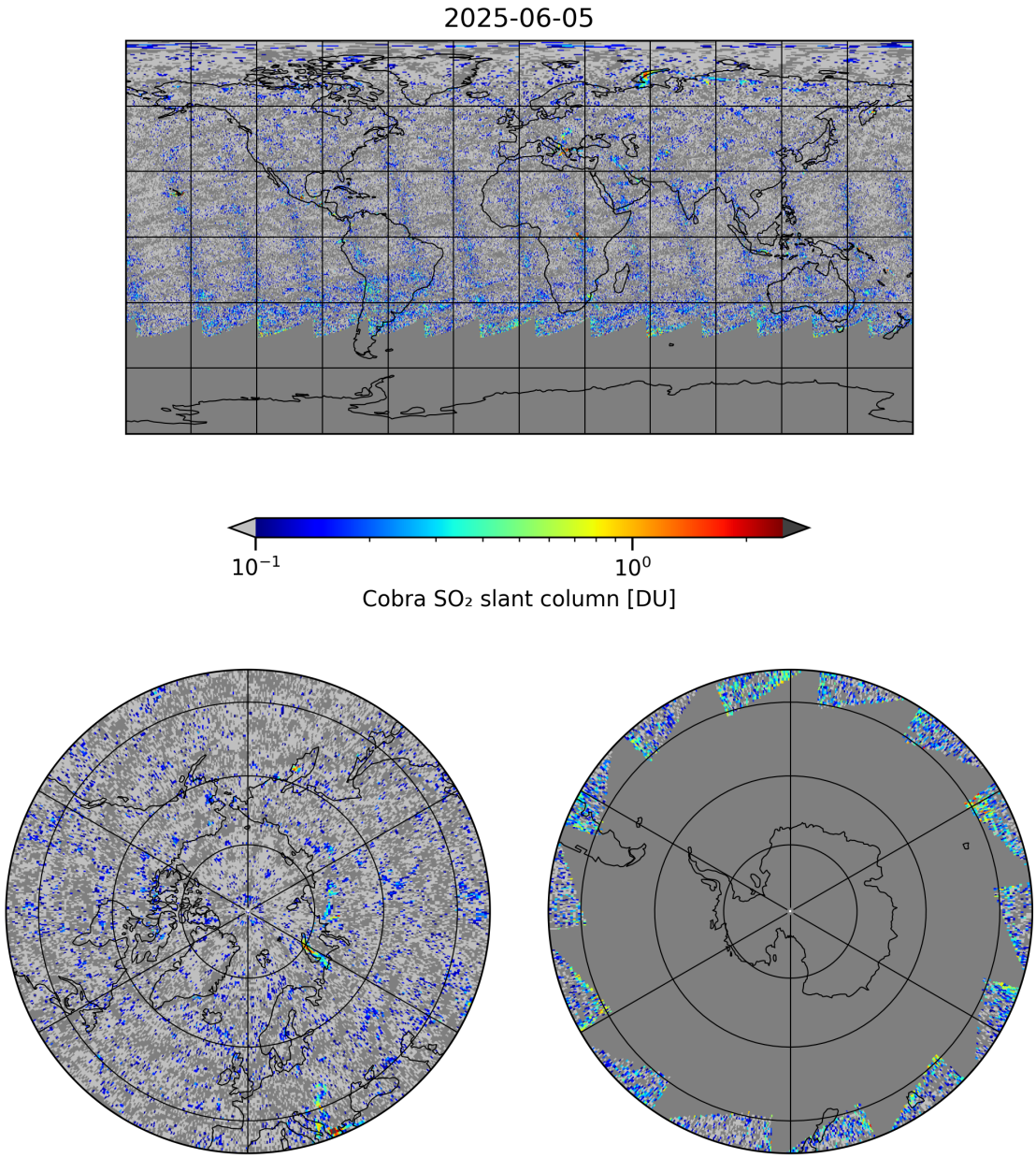

Figure 7: Map of "Cobra SO_2 slant column" for 2025-06-05 to 2025-06-06

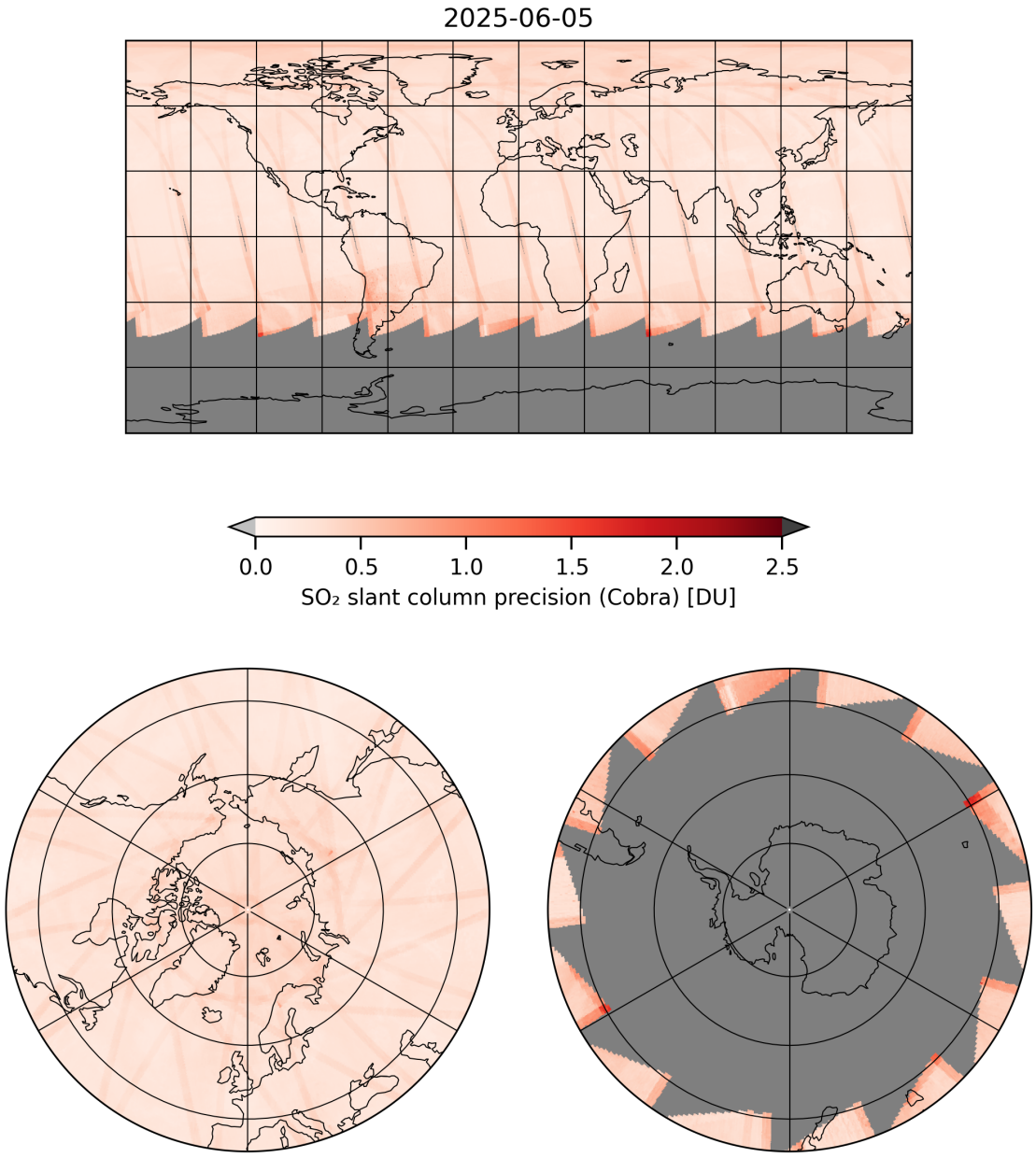

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-06-05 to 2025-06-06

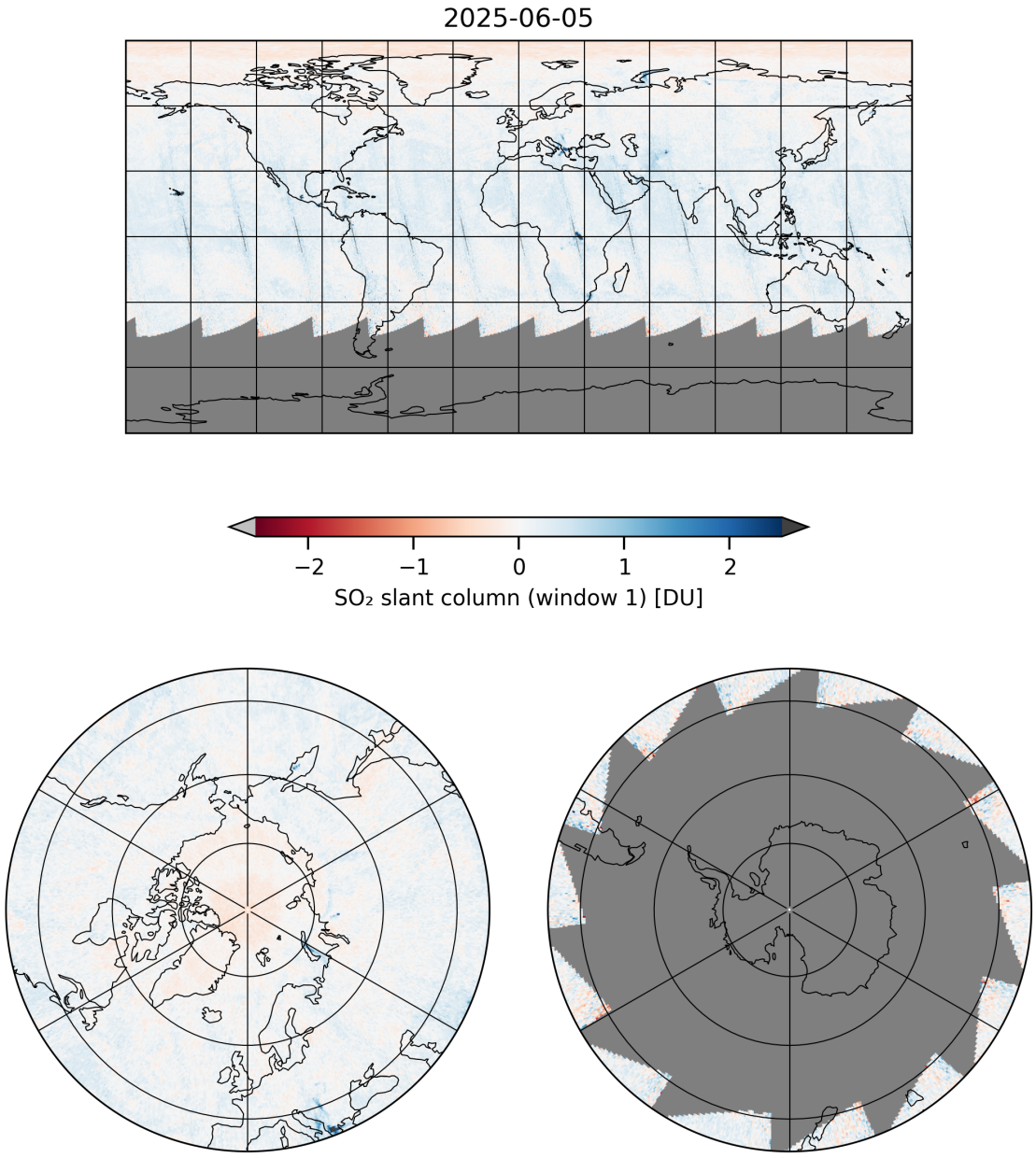

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-06-05 to 2025-06-06

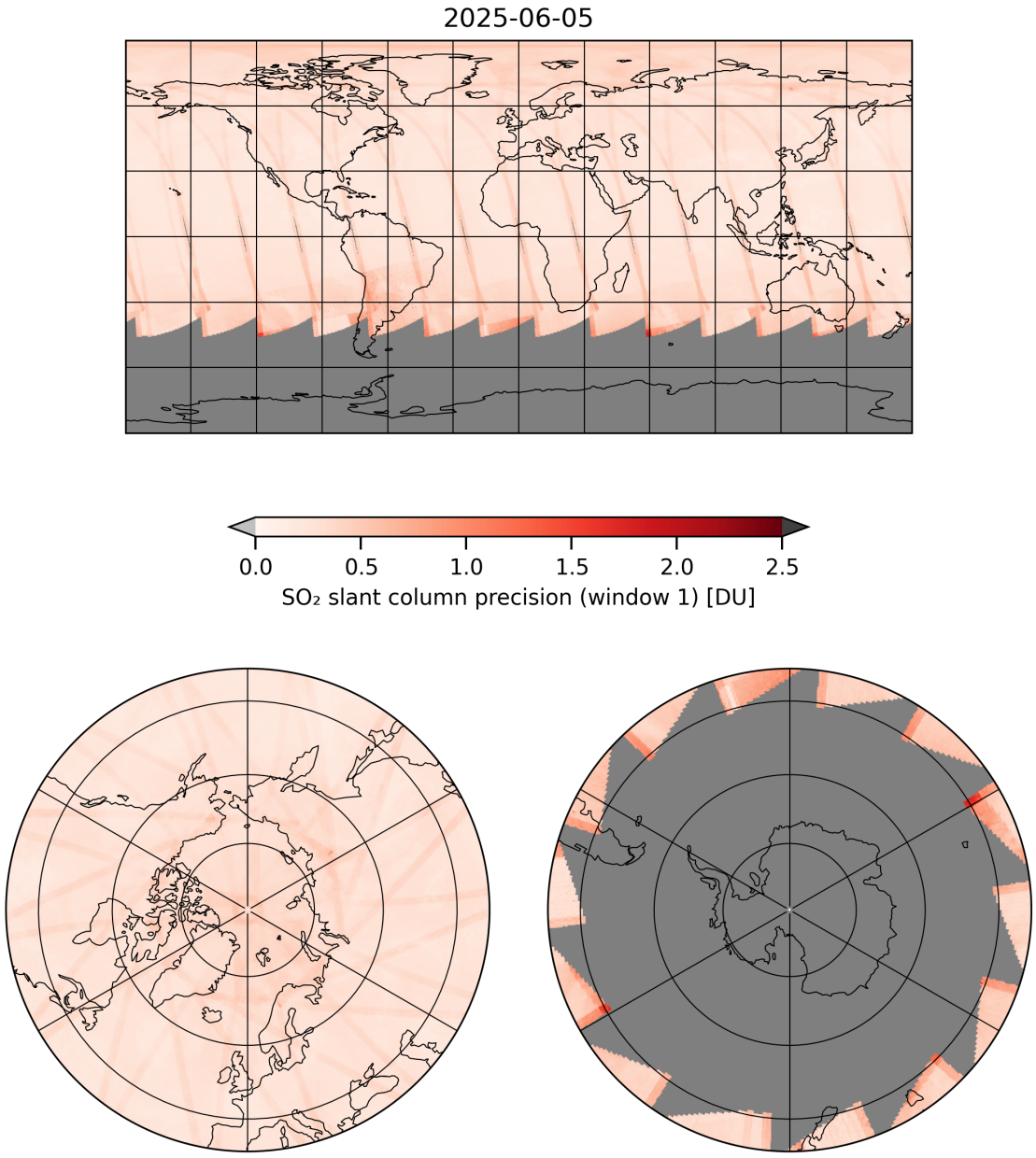

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-06-05 to 2025-06-06

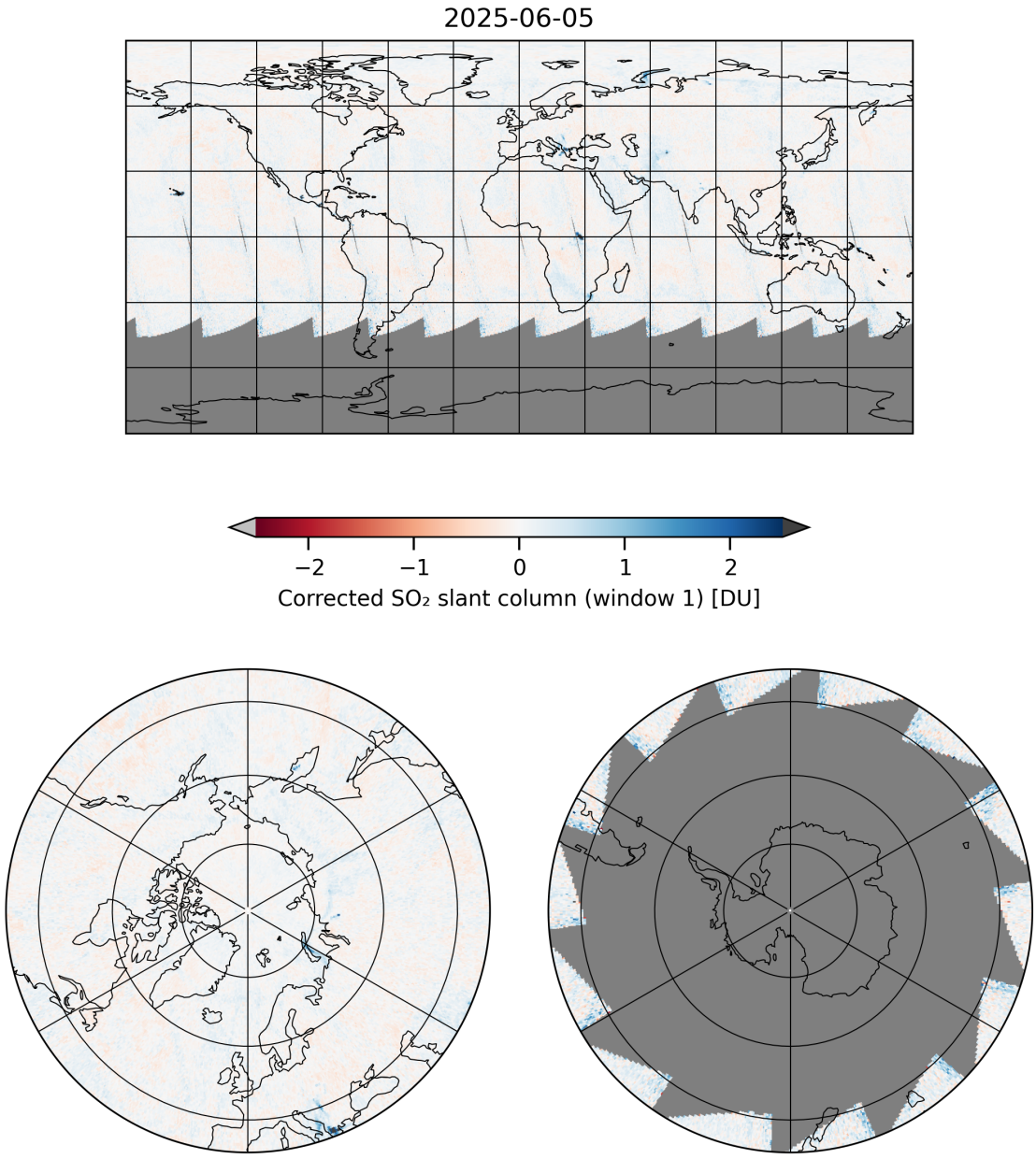

Figure 11: Map of "Corrected SO_2 slant column (window 1)" for 2025-06-05 to 2025-06-06

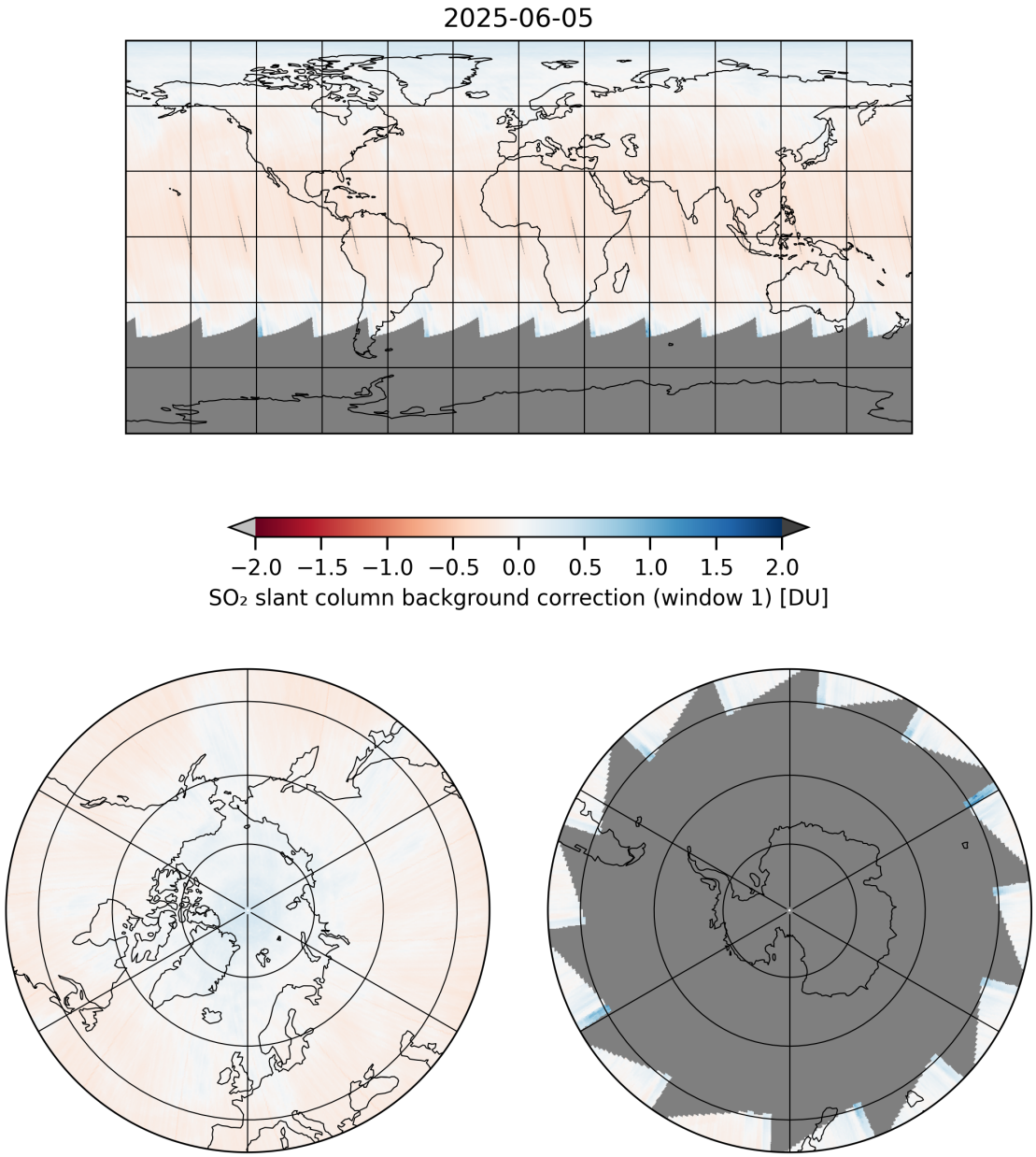

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-06-05 to 2025-06-06

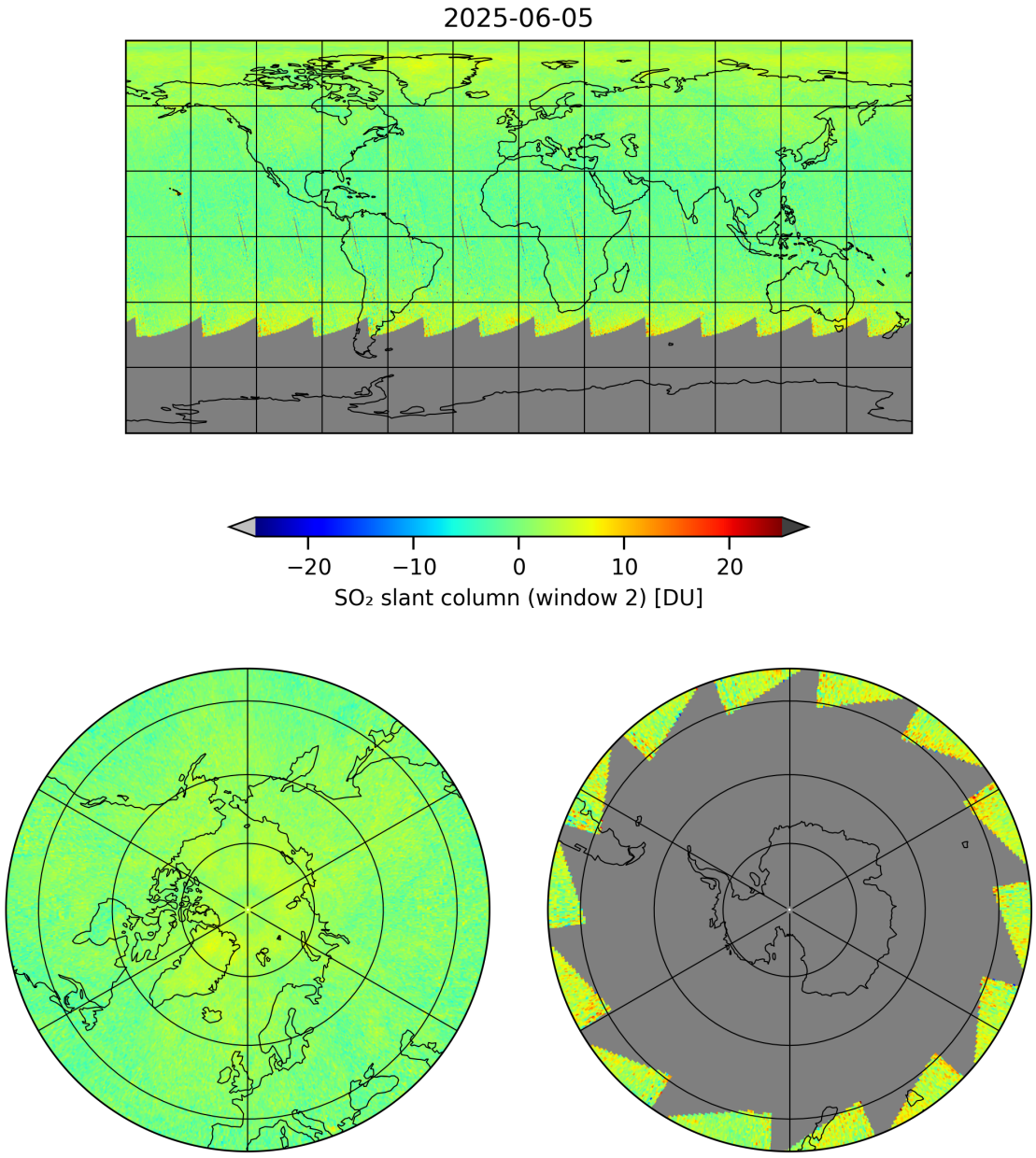

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-06-05 to 2025-06-06

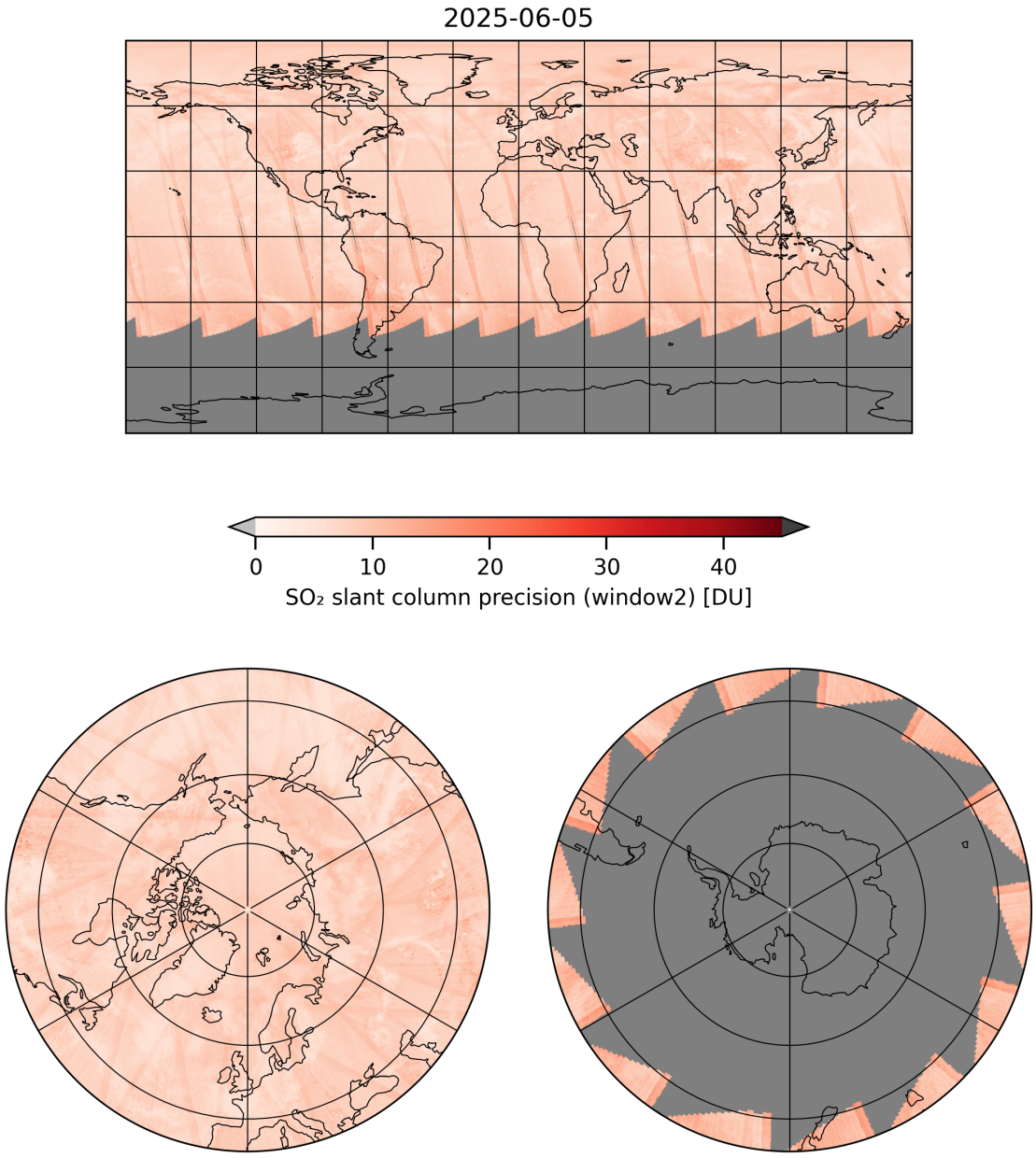

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-06-05 to 2025-06-06

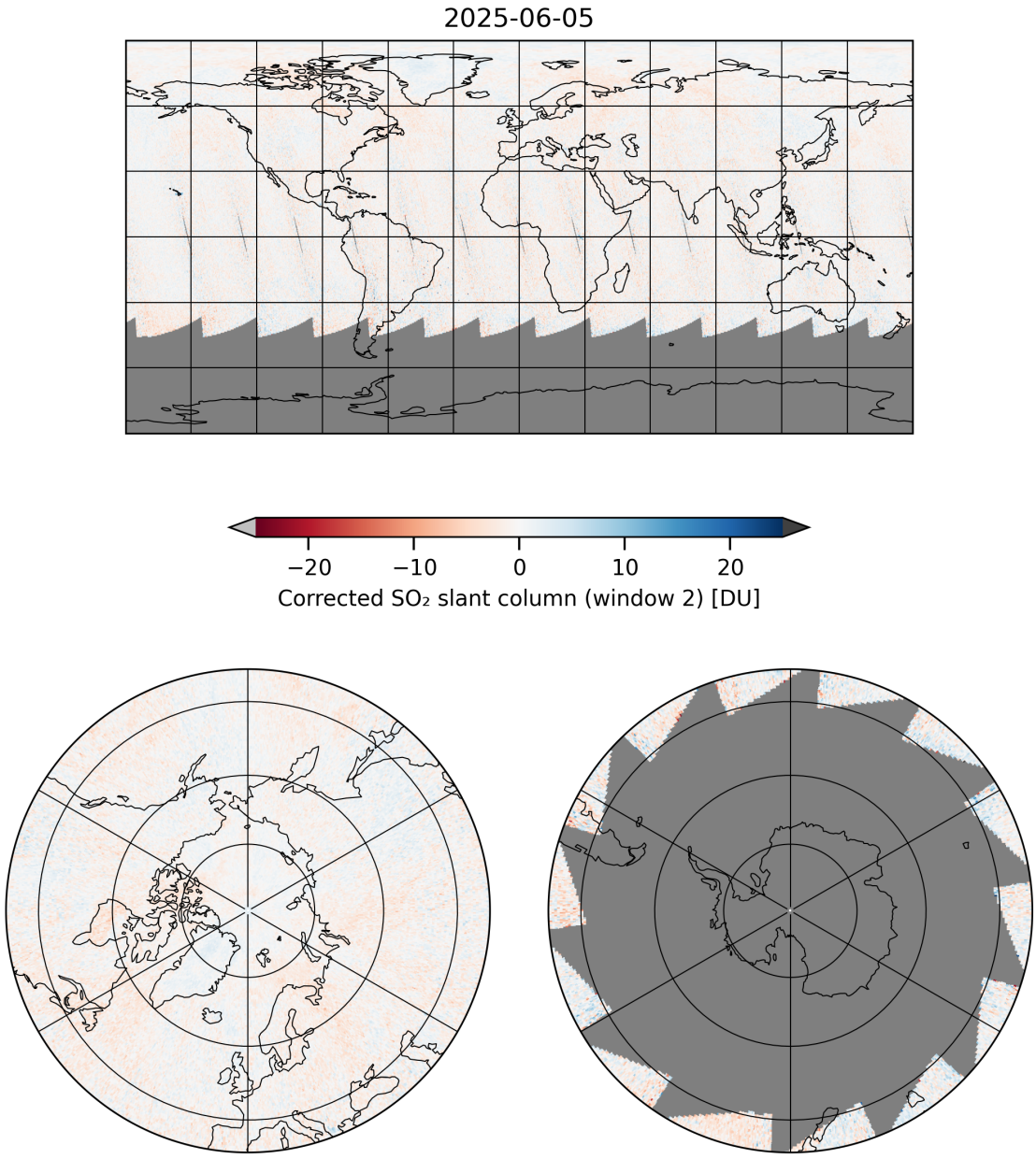

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-06-05 to 2025-06-06

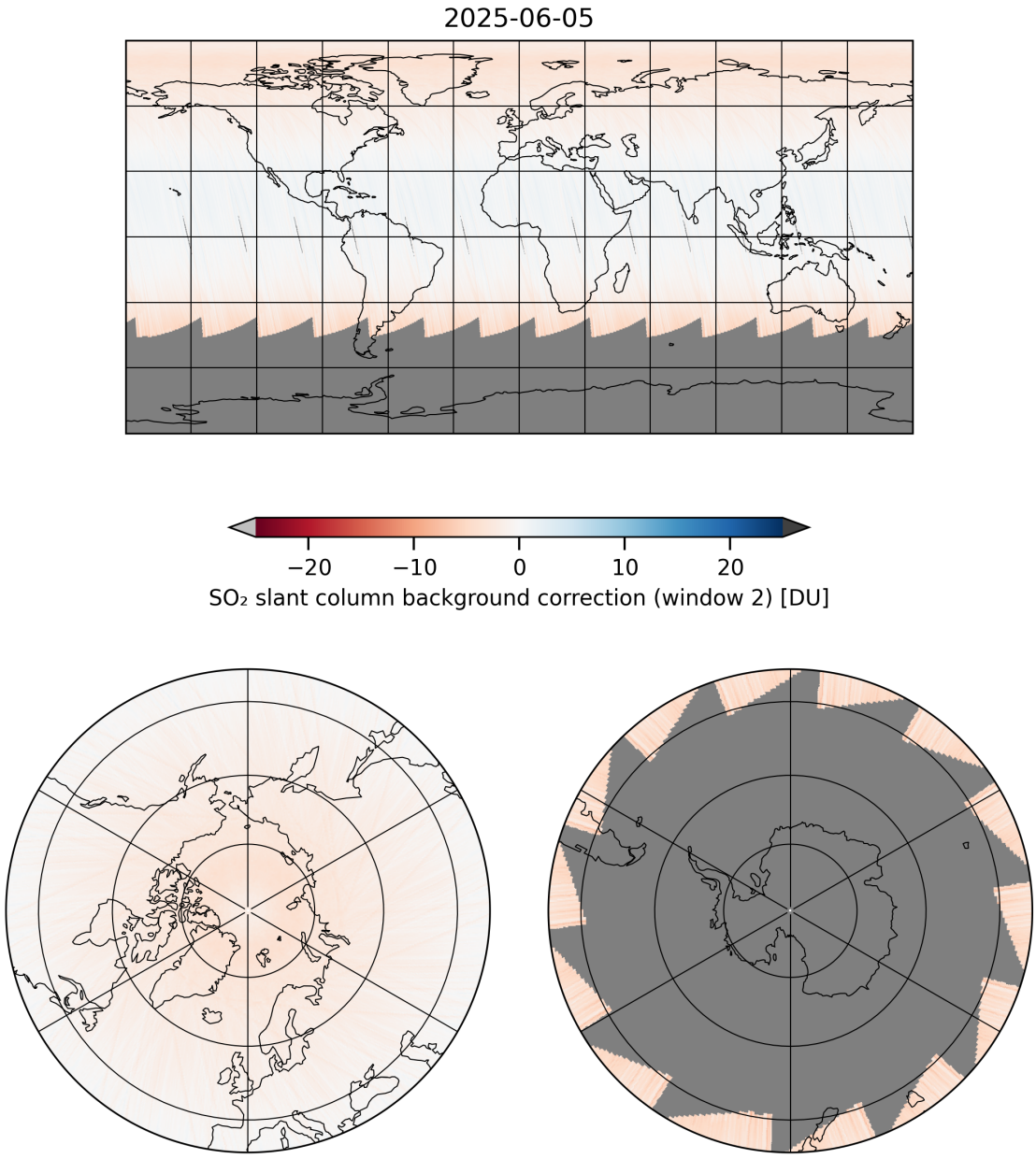

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-06-05 to 2025-06-06

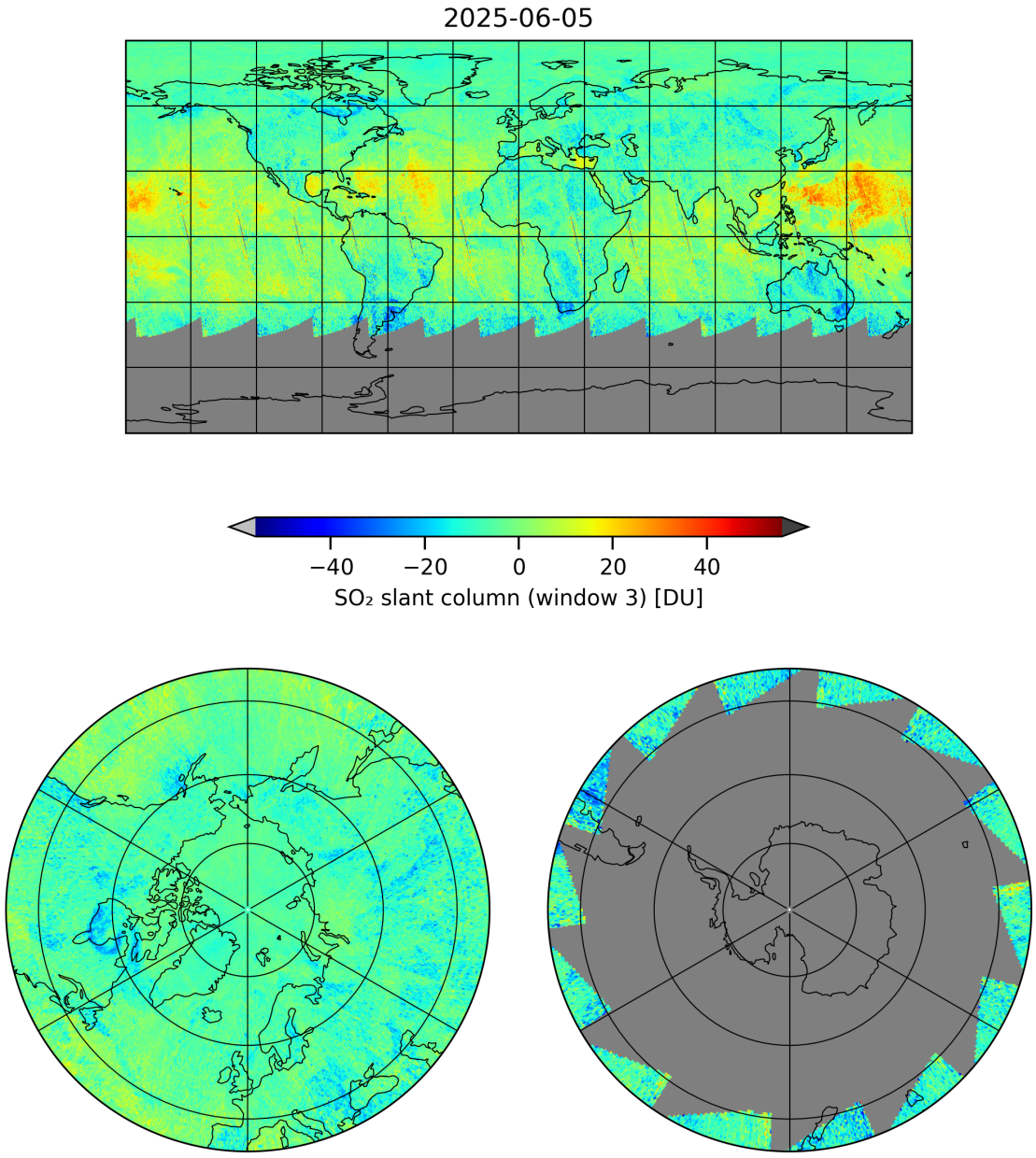

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-06-05 to 2025-06-06

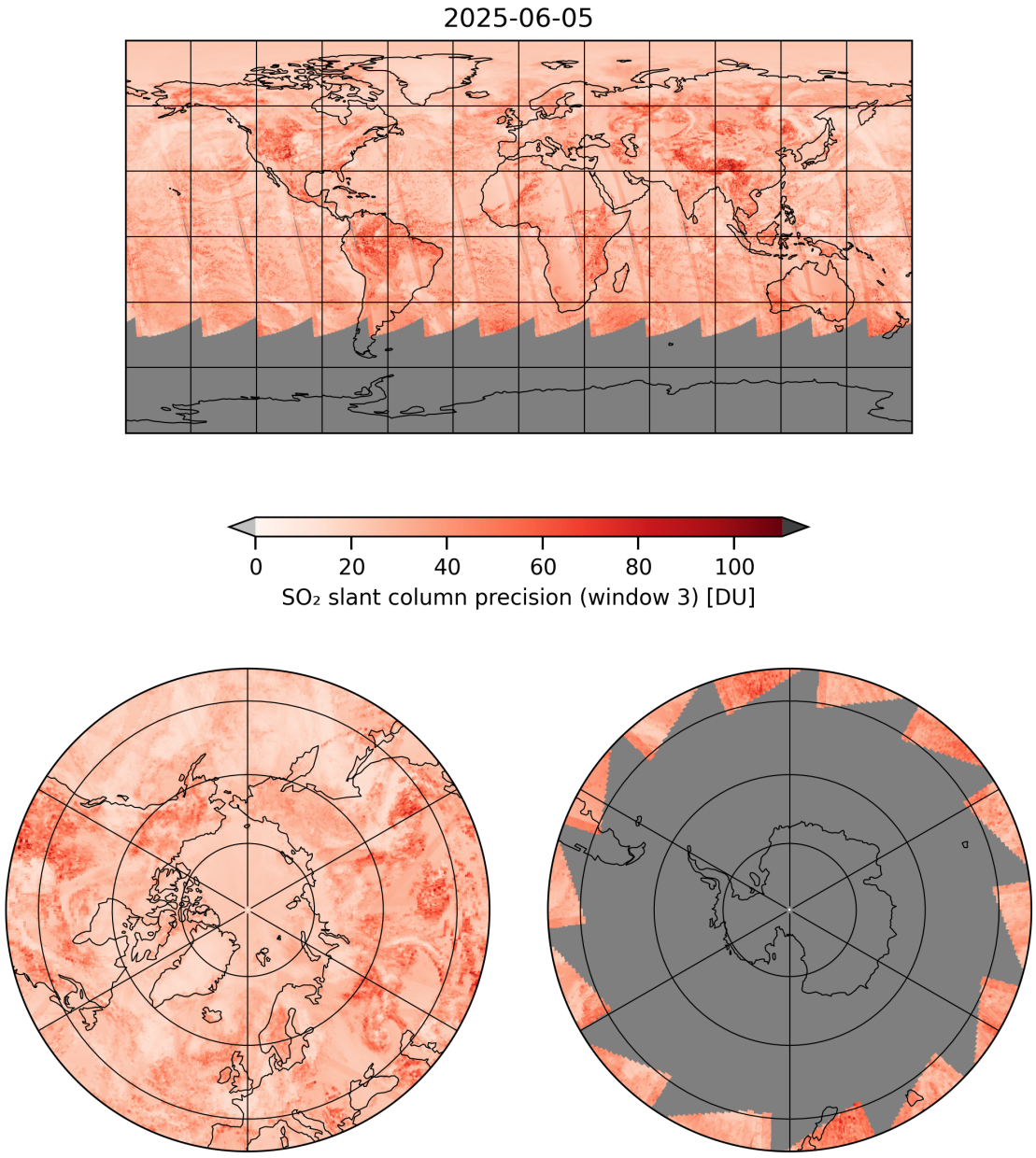

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-06-05 to 2025-06-06

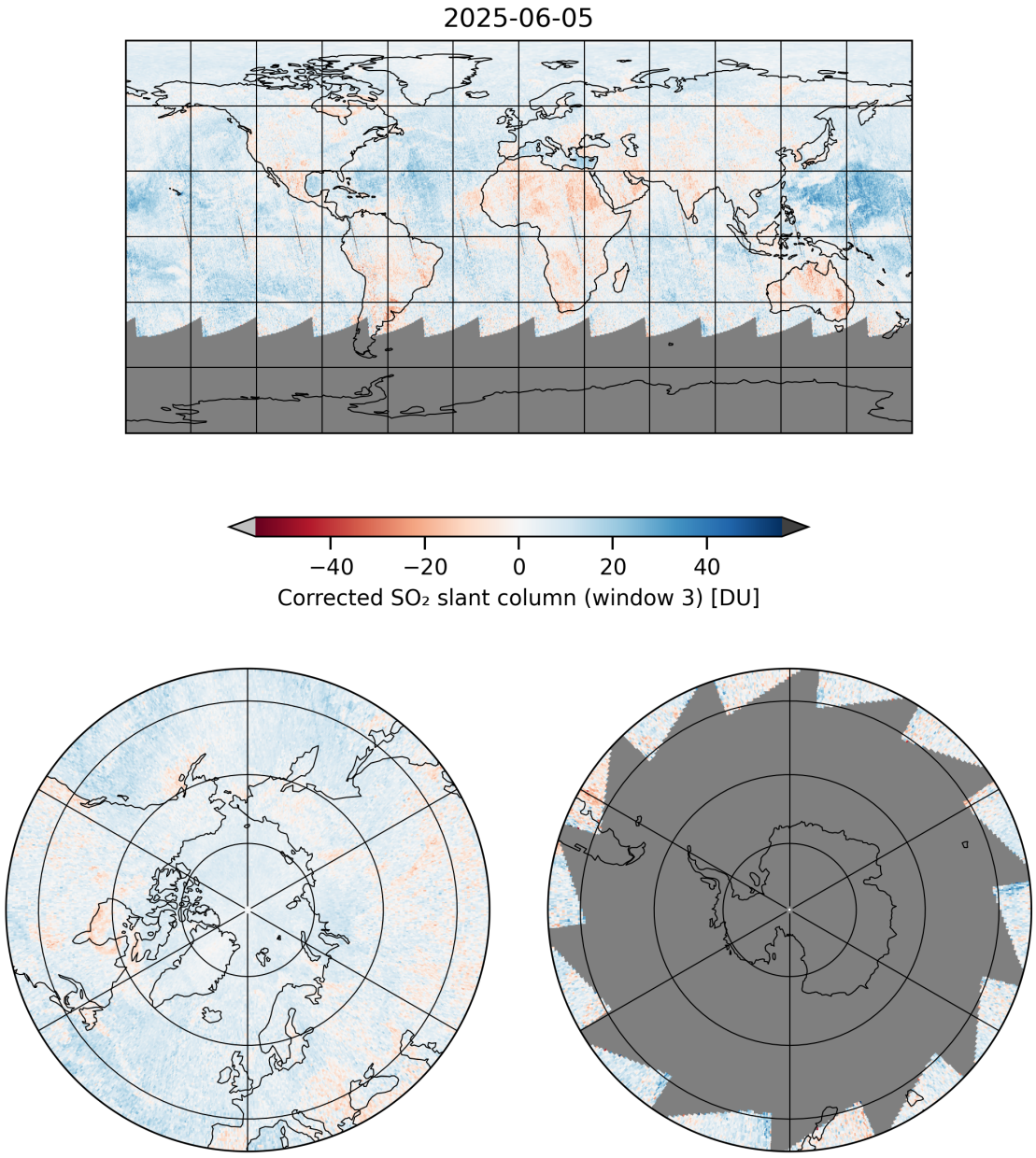

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-06-05 to 2025-06-06

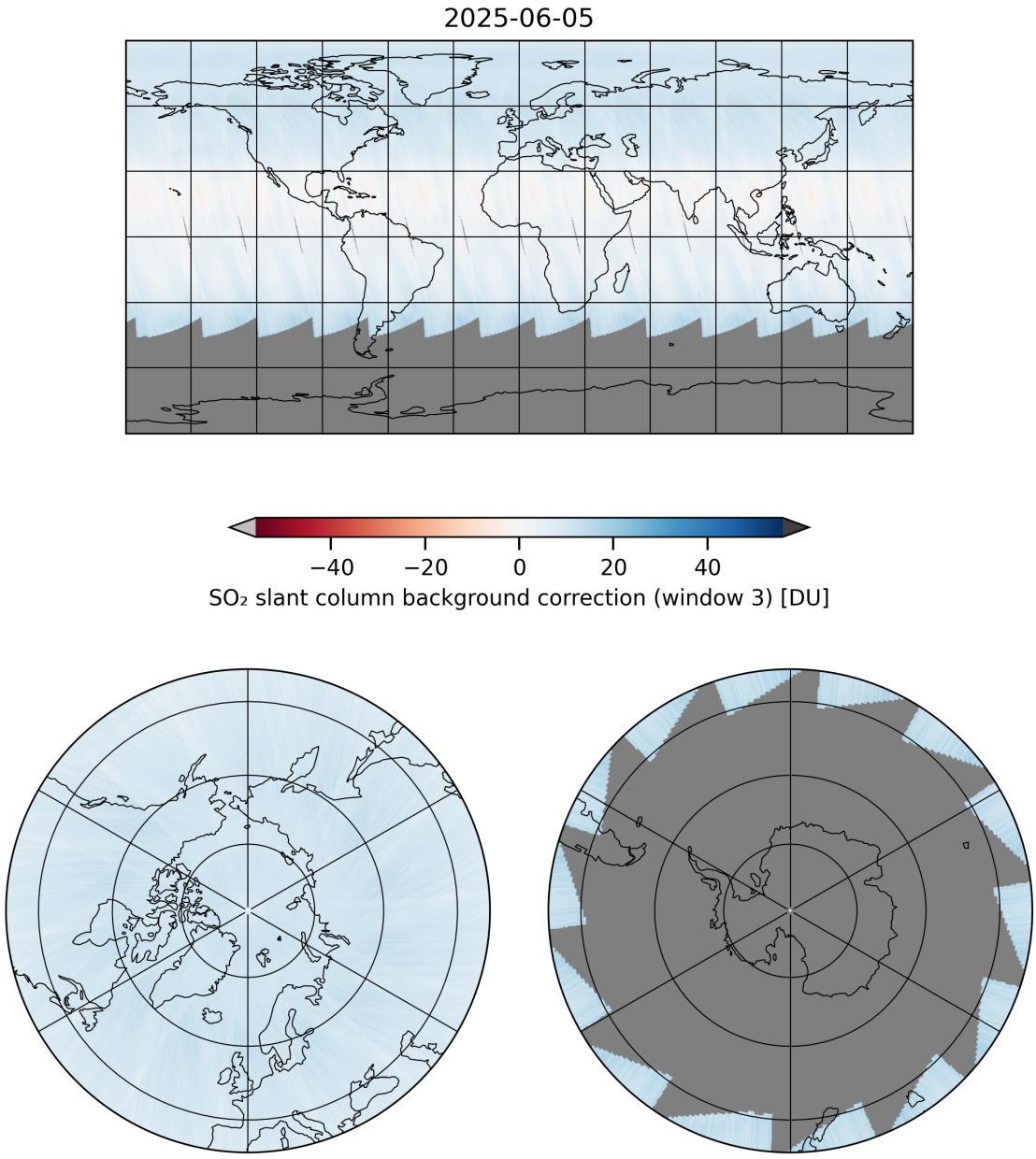

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-06-05 to 2025-06-06

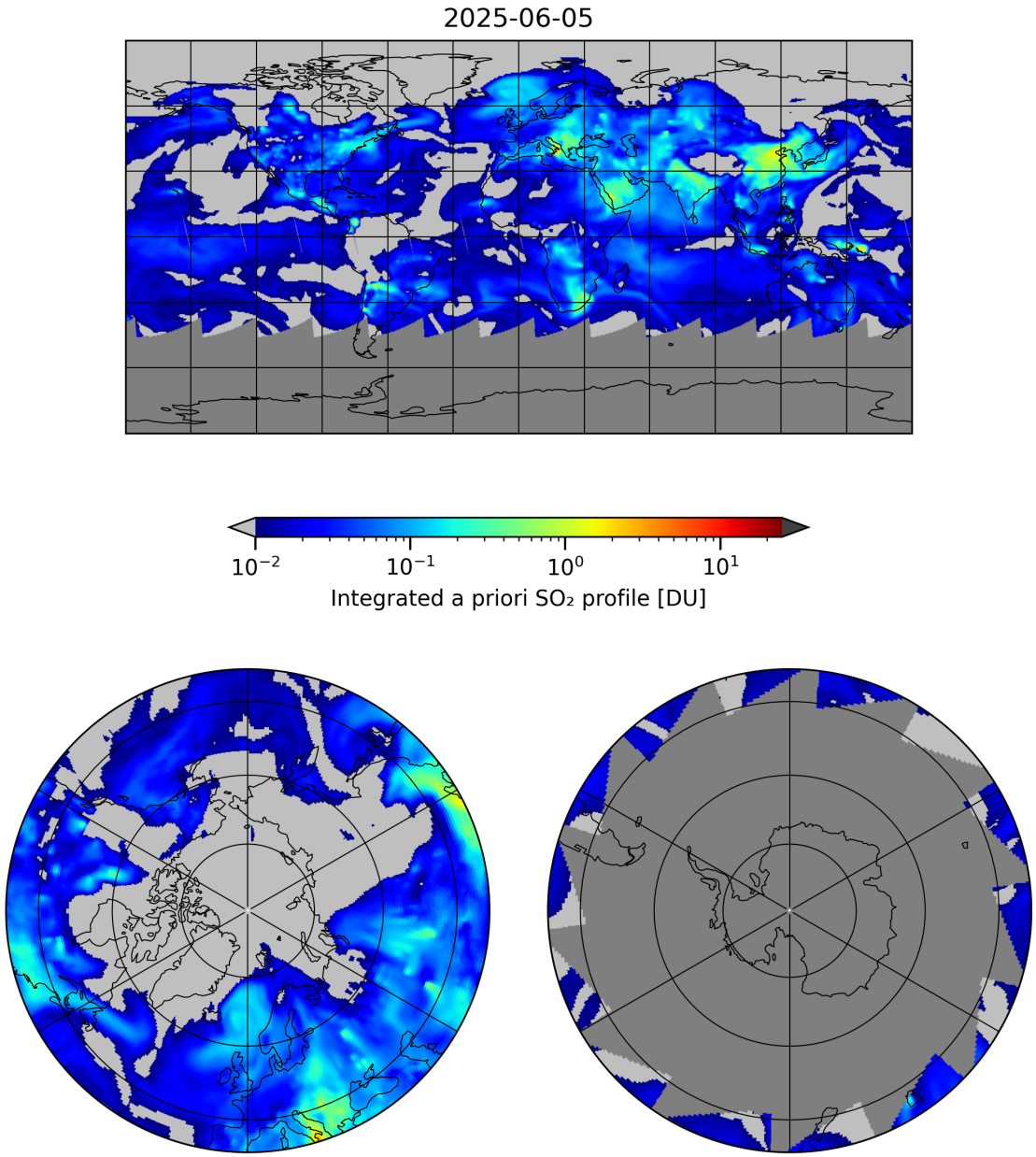

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-06-05 to 2025-06-06

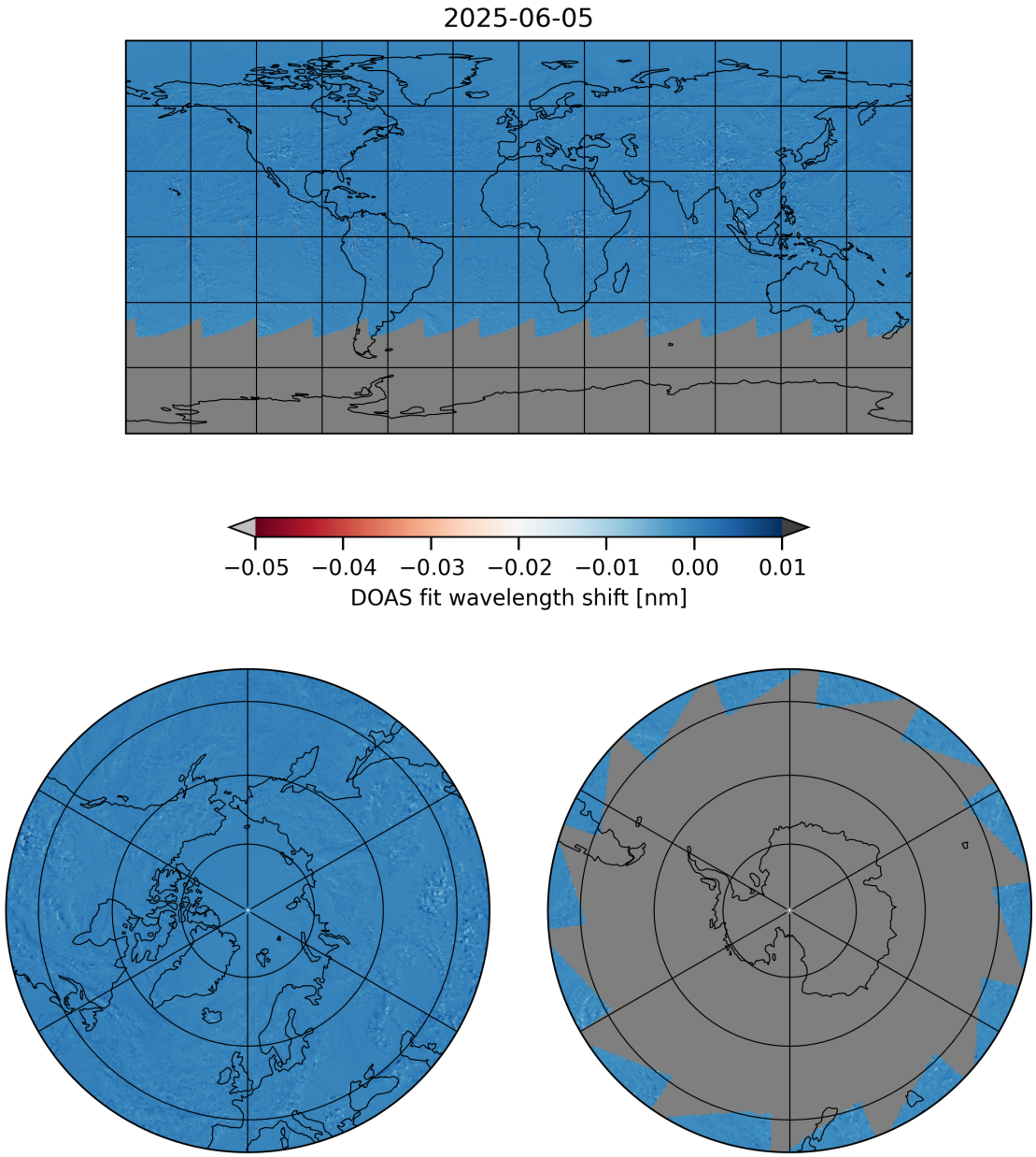

Figure 22: Map of “DOAS fit wavelength shift” for 2025-06-05 to 2025-06-06

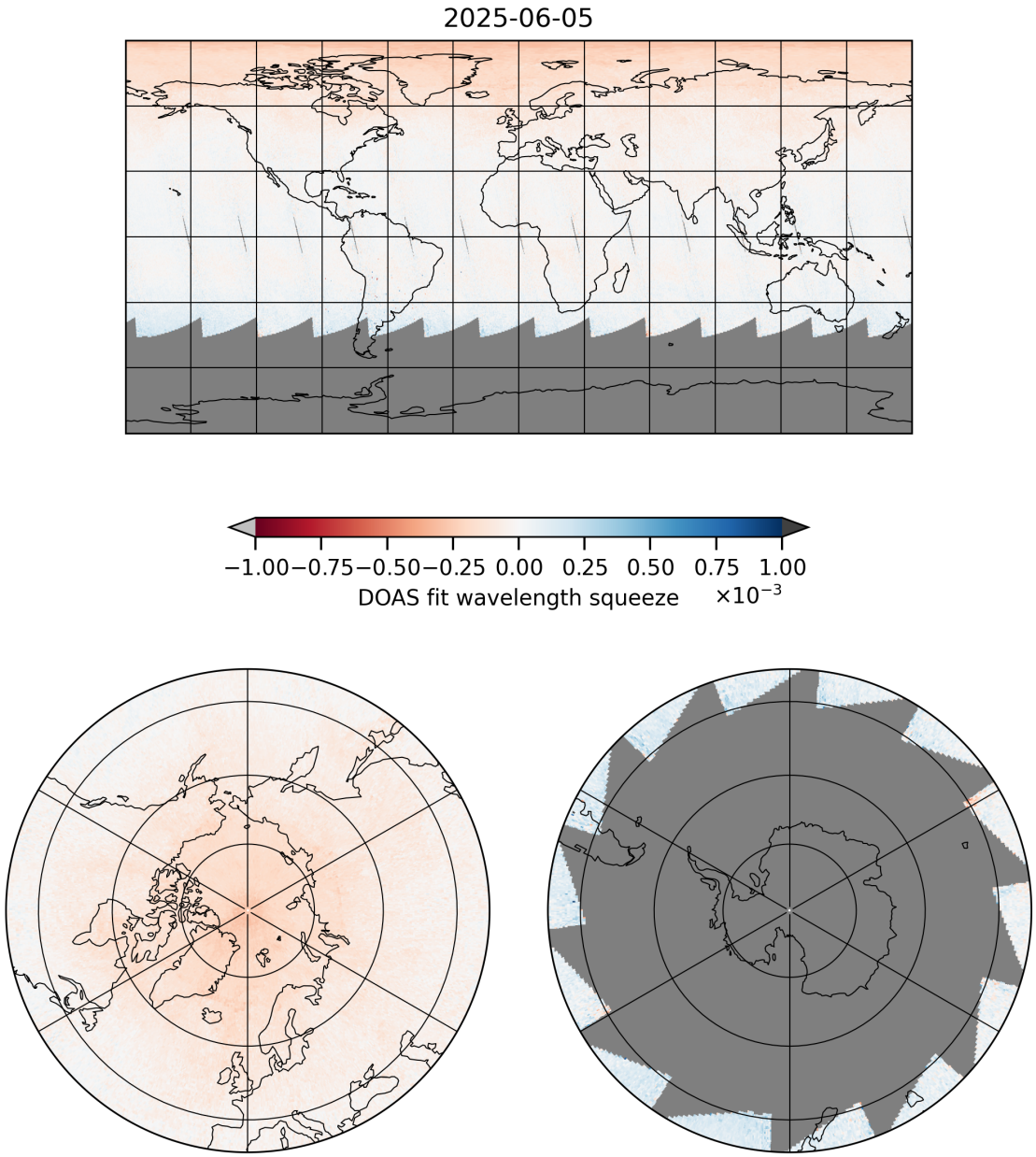

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-06-05 to 2025-06-06

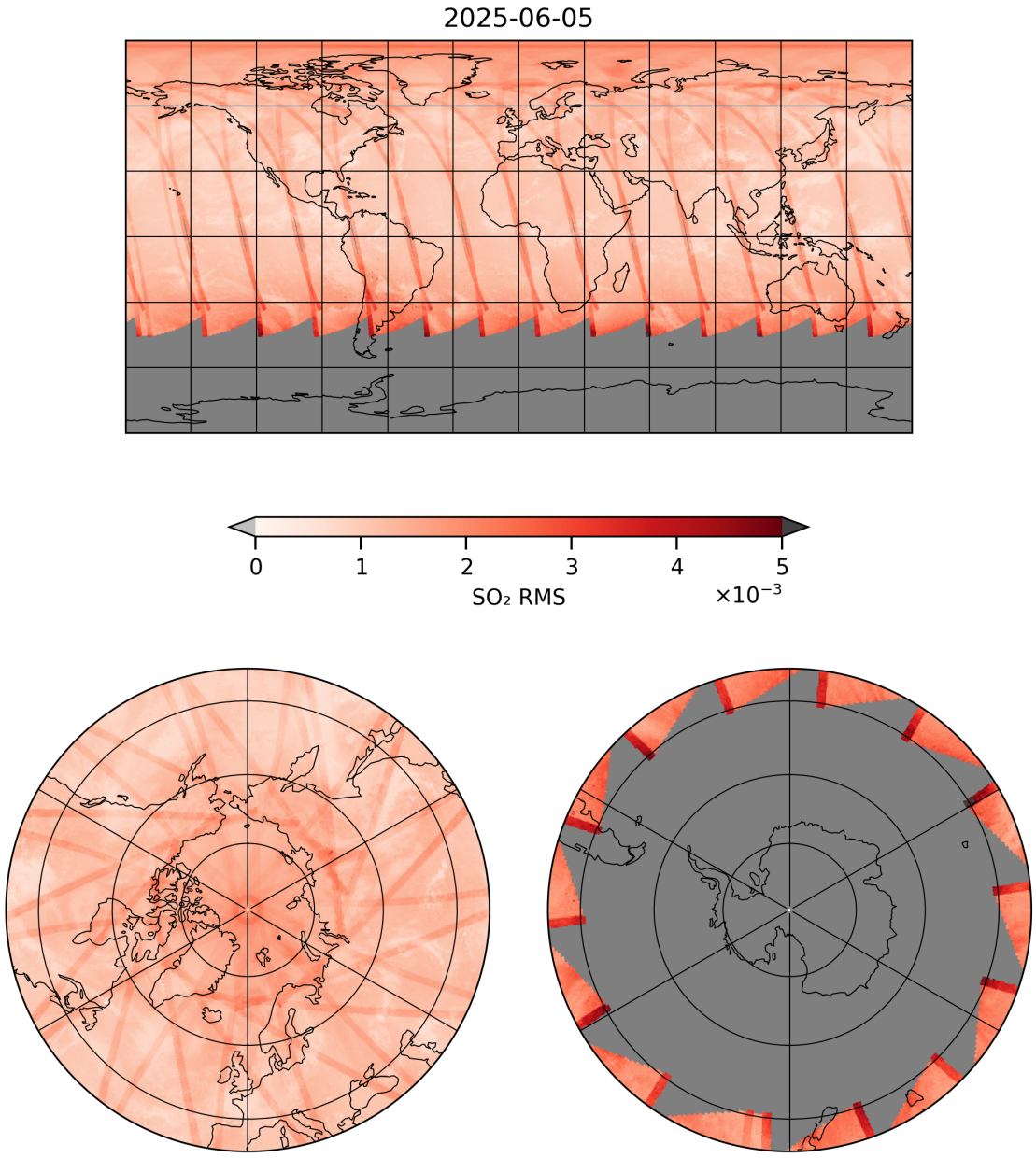

Figure 24: Map of "SO_2 RMS" for 2025-06-05 to 2025-06-06

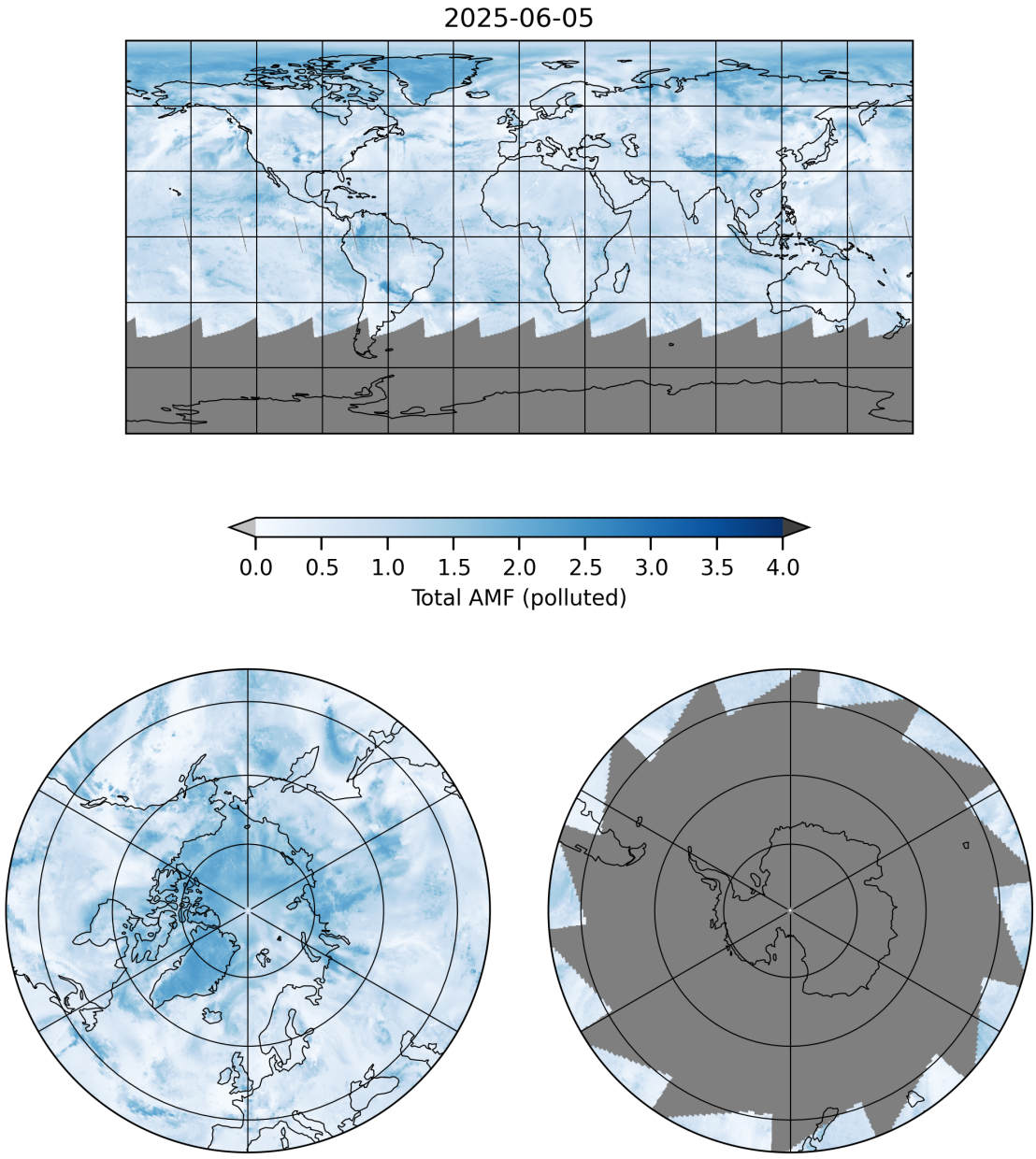

Figure 25: Map of “Total AMF (polluted)” for 2025-06-05 to 2025-06-06

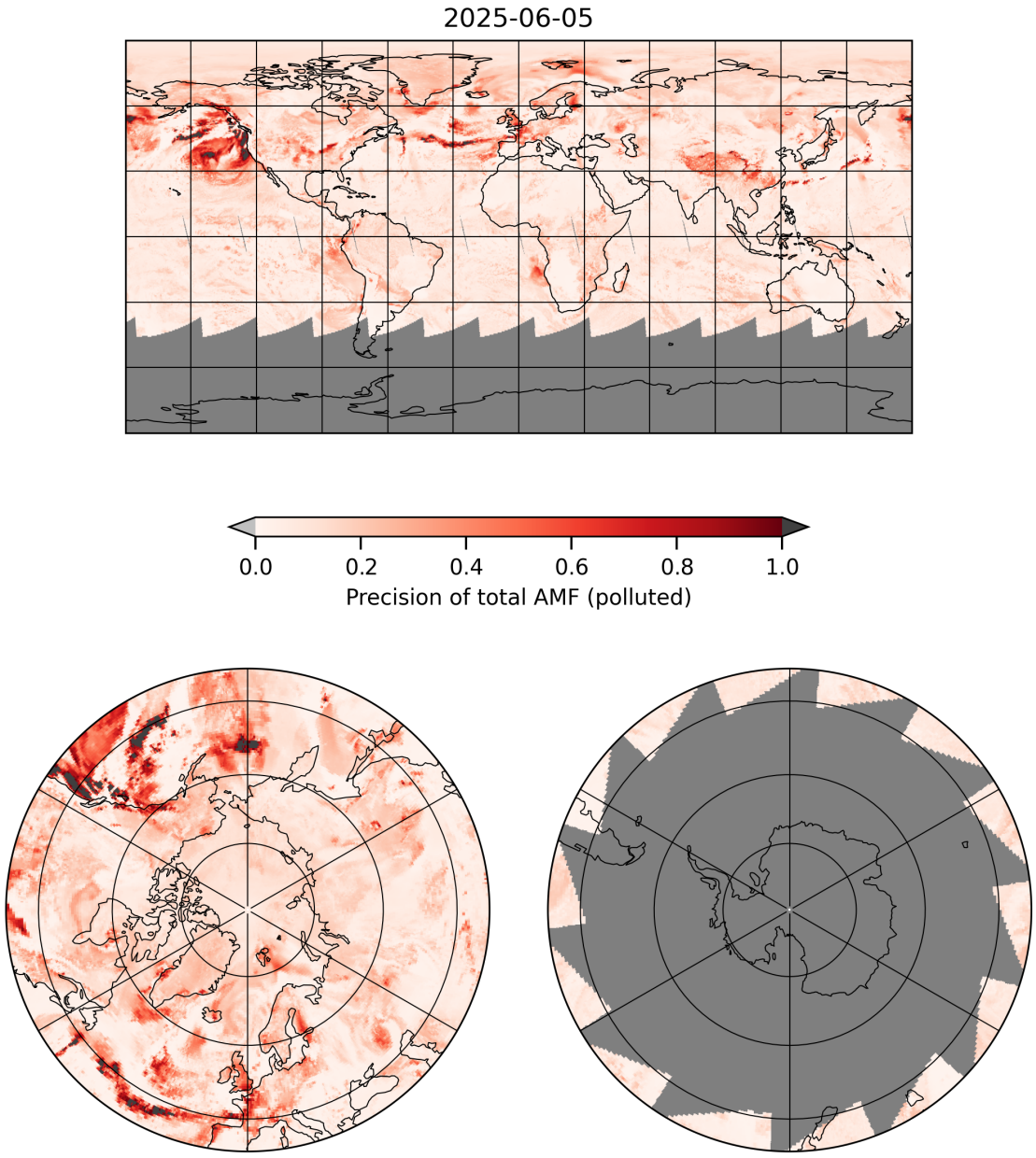

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-06-05 to 2025-06-06

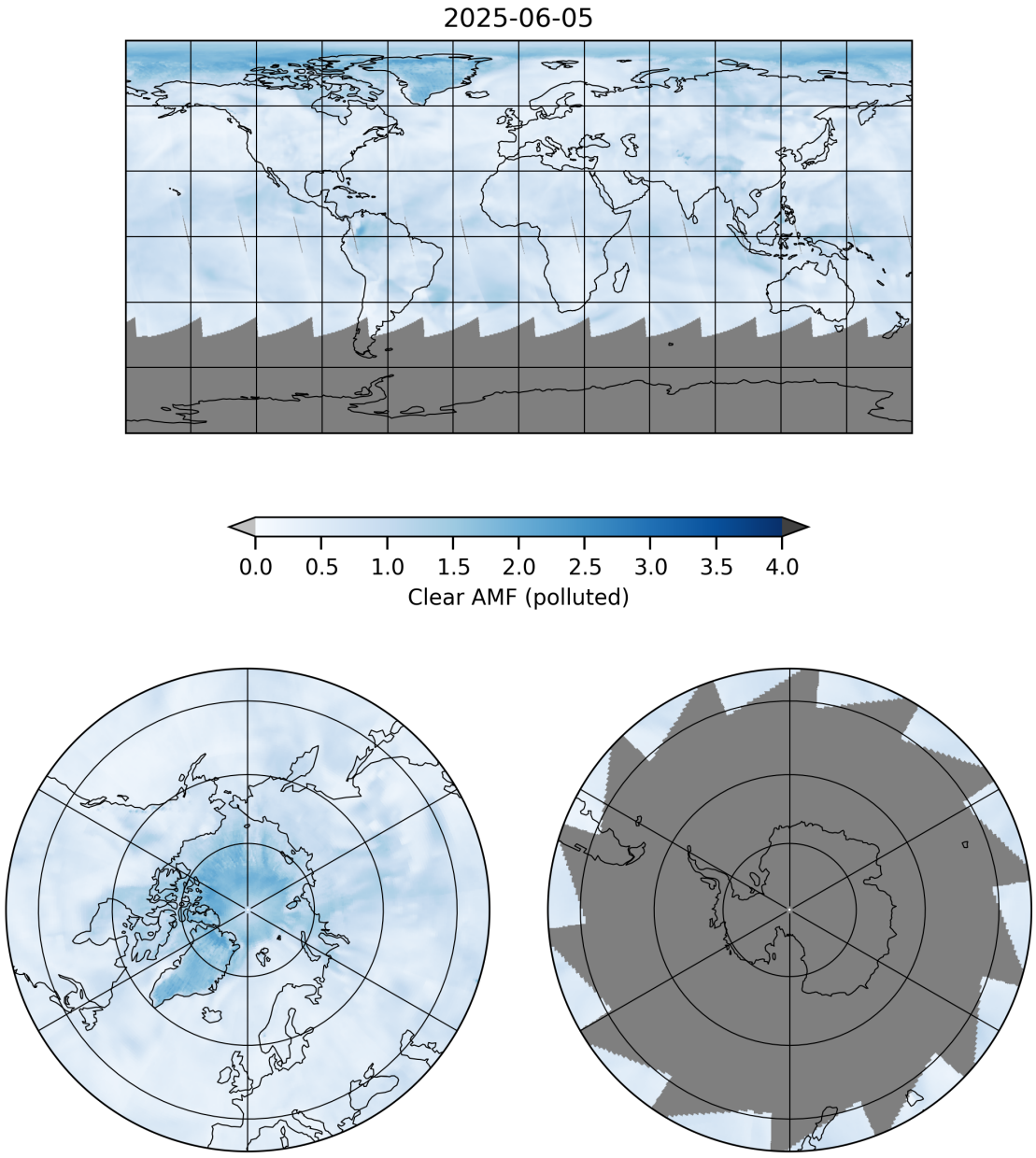

Figure 27: Map of “Clear AMF (polluted)” for 2025-06-05 to 2025-06-06

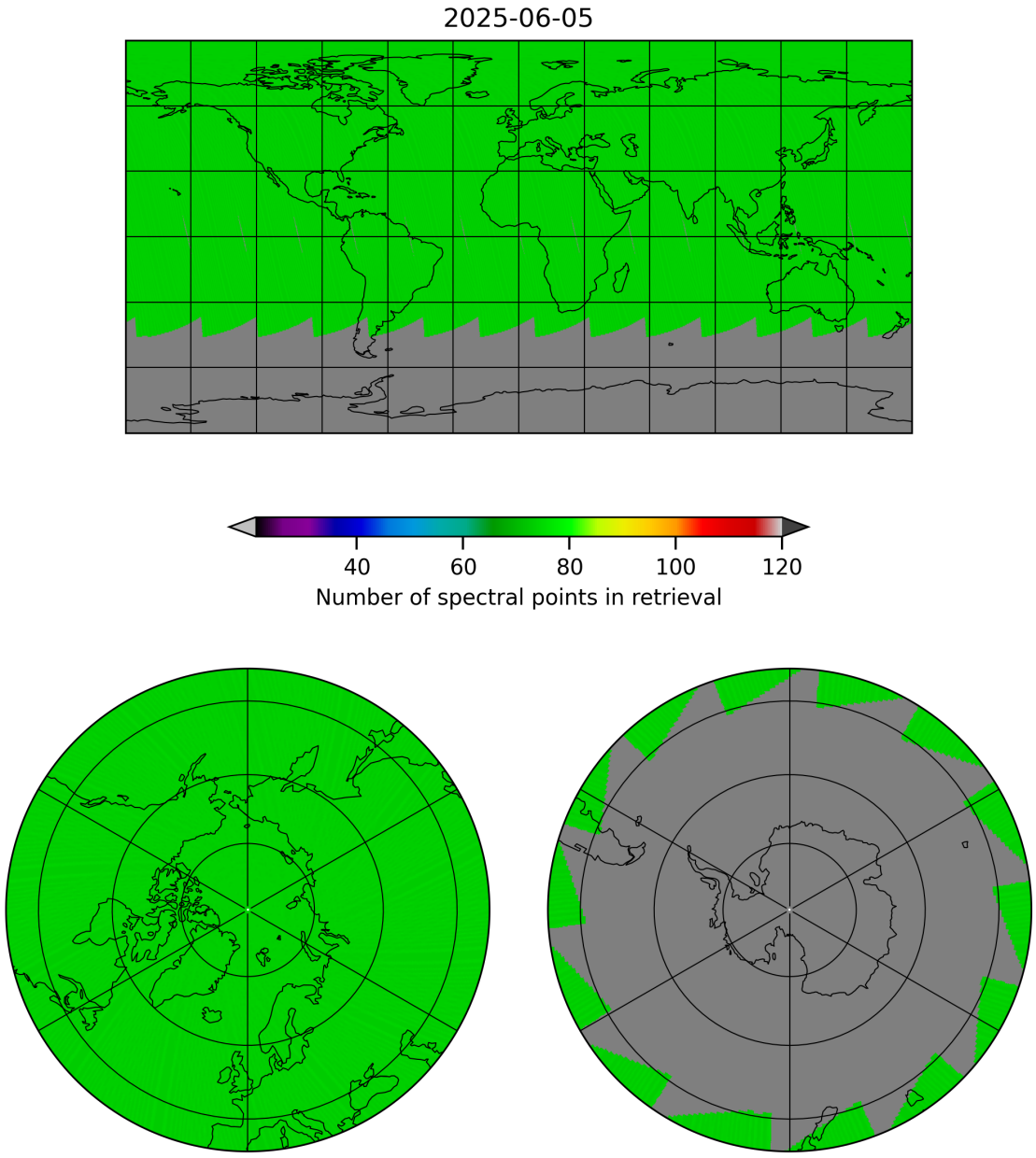

Figure 28: Map of “Number of spectral points in retrieval” for 2025-06-05 to 2025-06-06

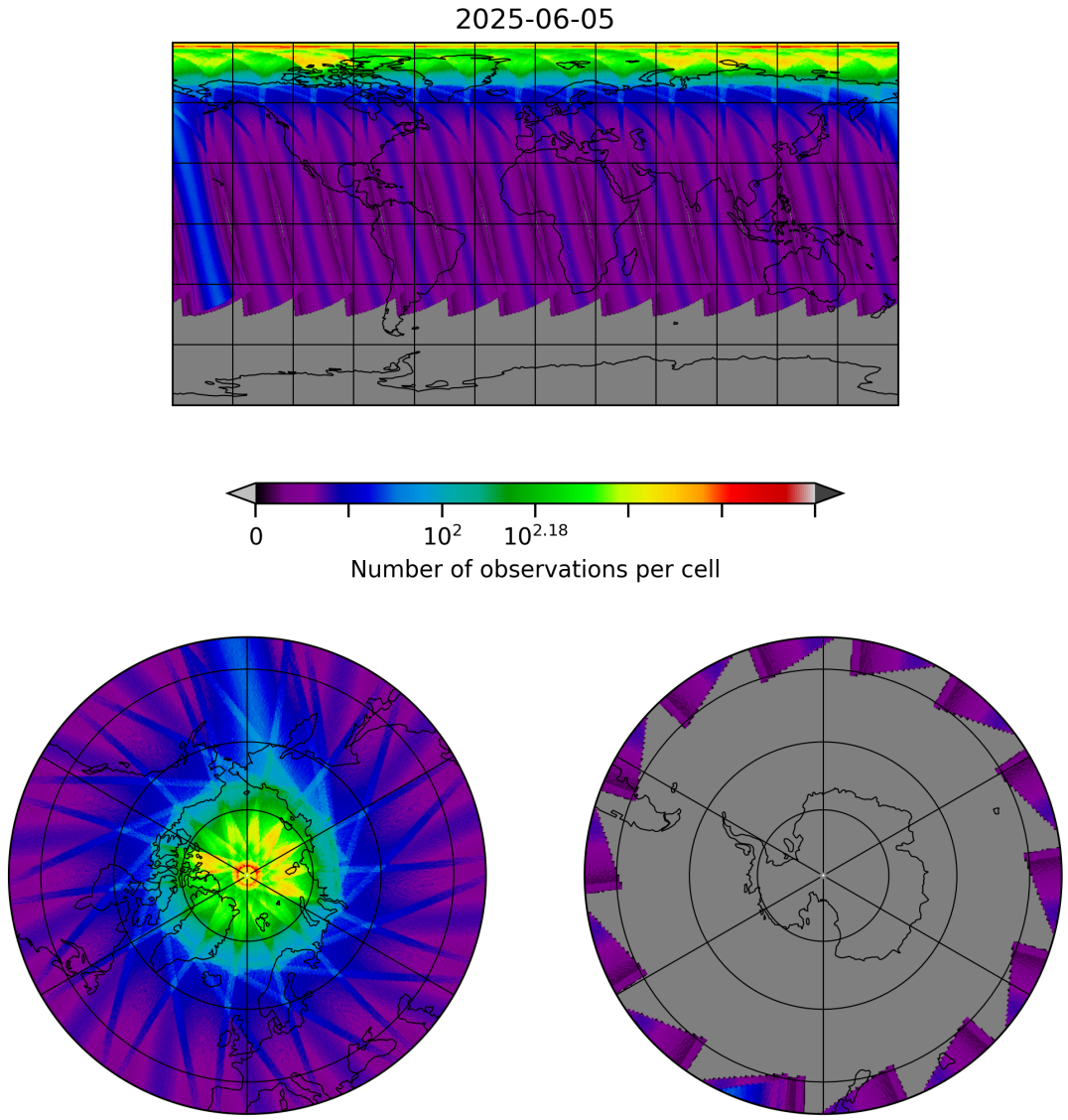

Figure 29: Map of the number of observations for 2025-06-05 to 2025-06-06

7 Zonal average

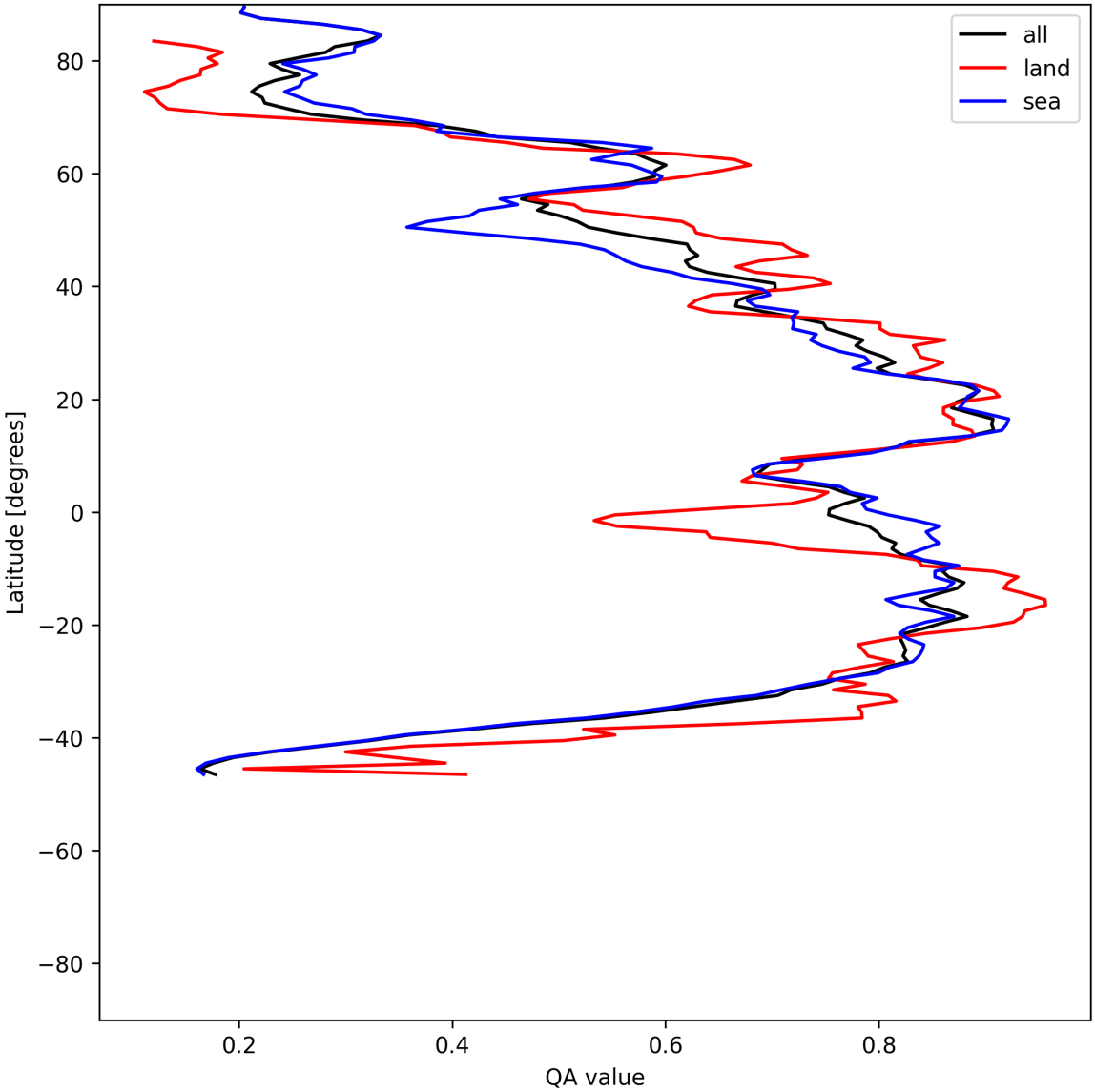

Figure 30: Zonal average of “QA value” for 2025-06-05 to 2025-06-06.

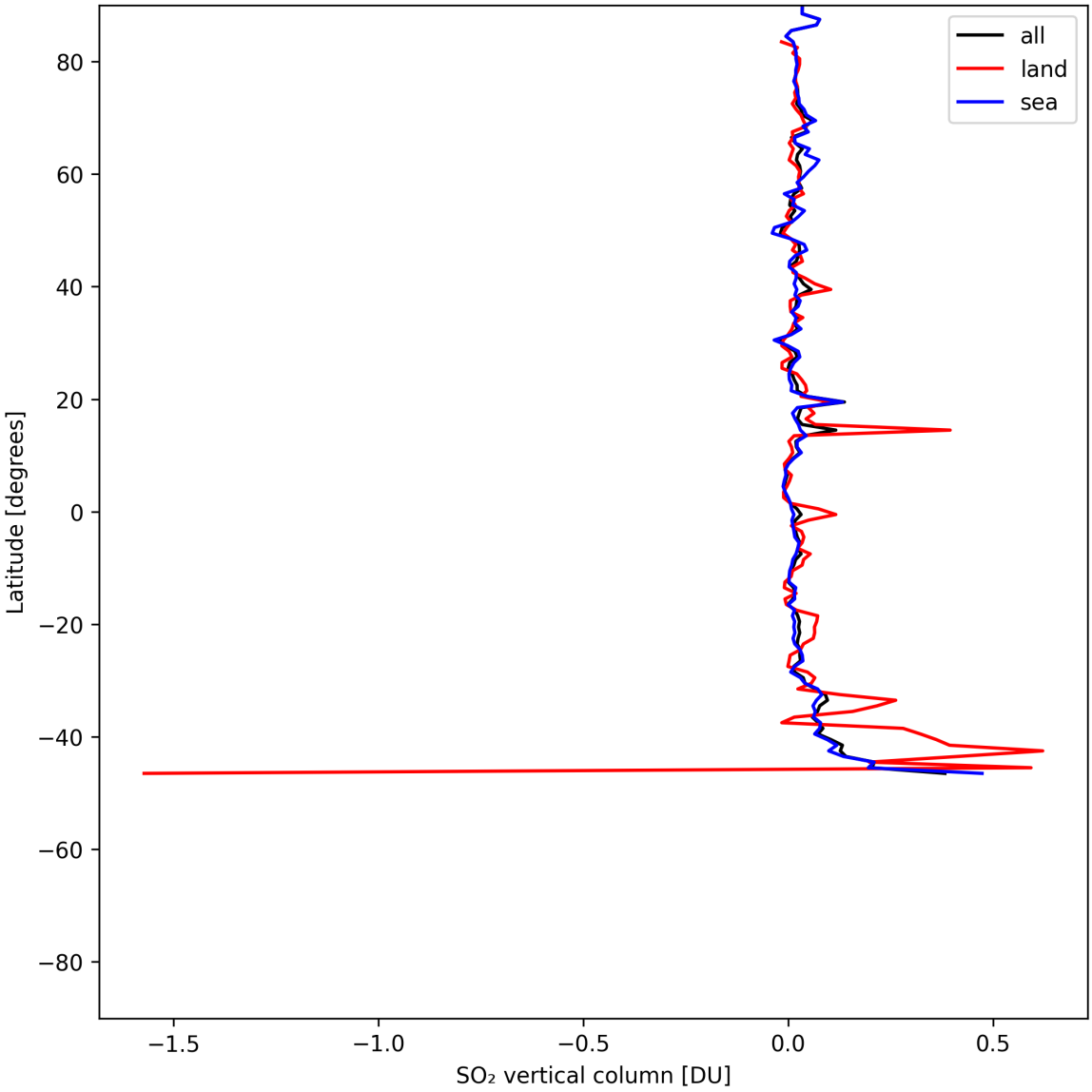

Figure 31: Zonal average of "SO_2 vertical column" for 2025-06-05 to 2025-06-06.

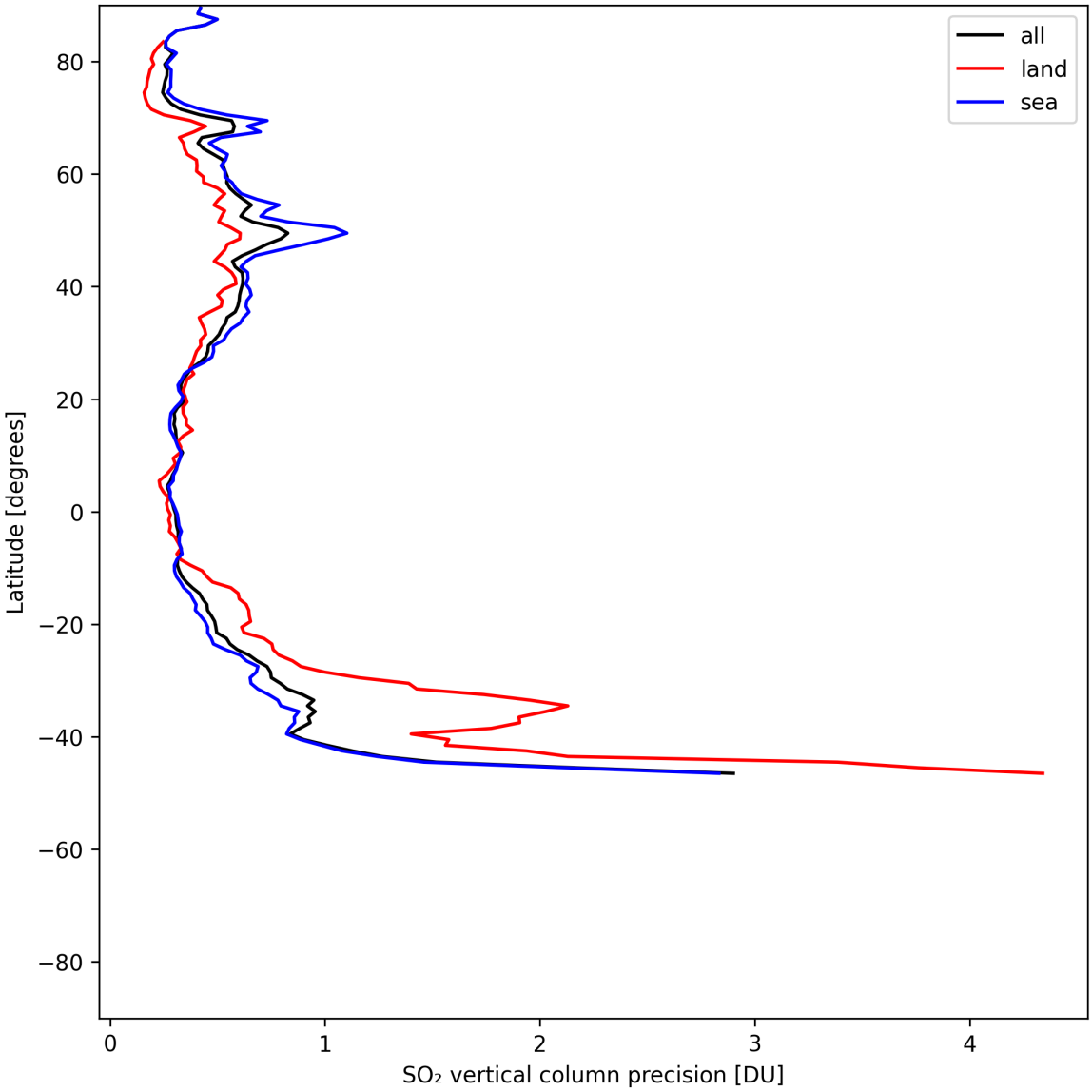

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-06-05 to 2025-06-06.

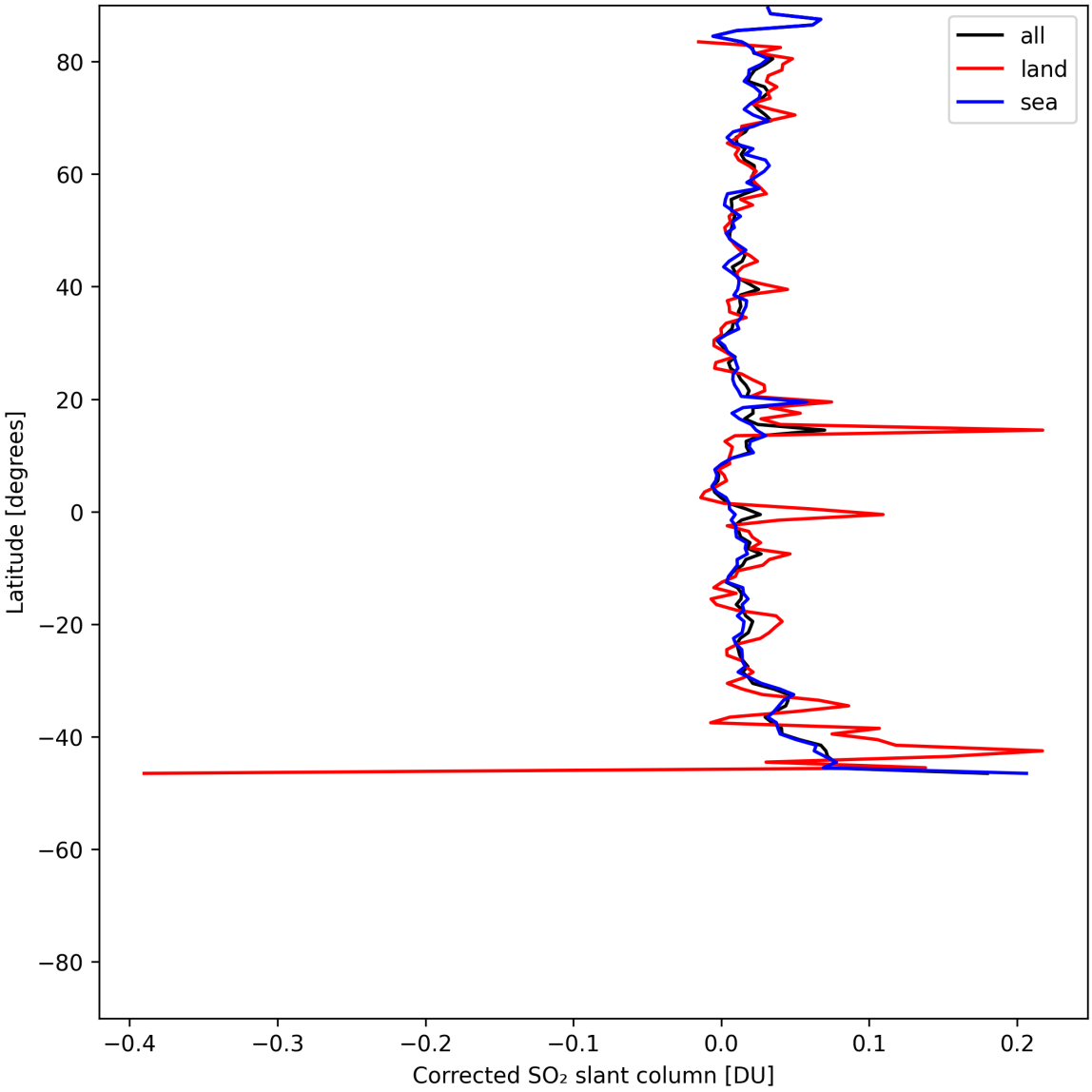

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-06-05 to 2025-06-06.

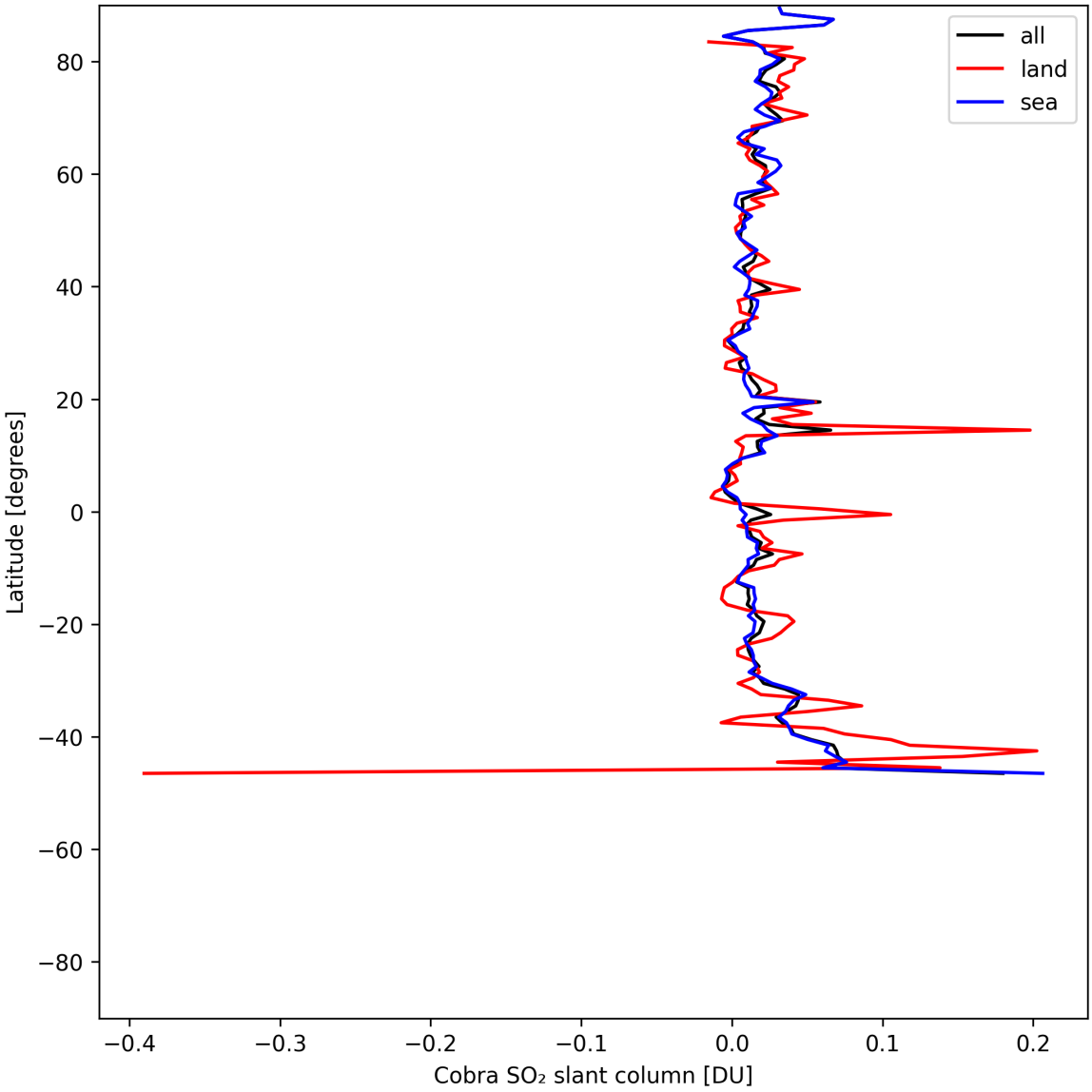

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-06-05 to 2025-06-06.

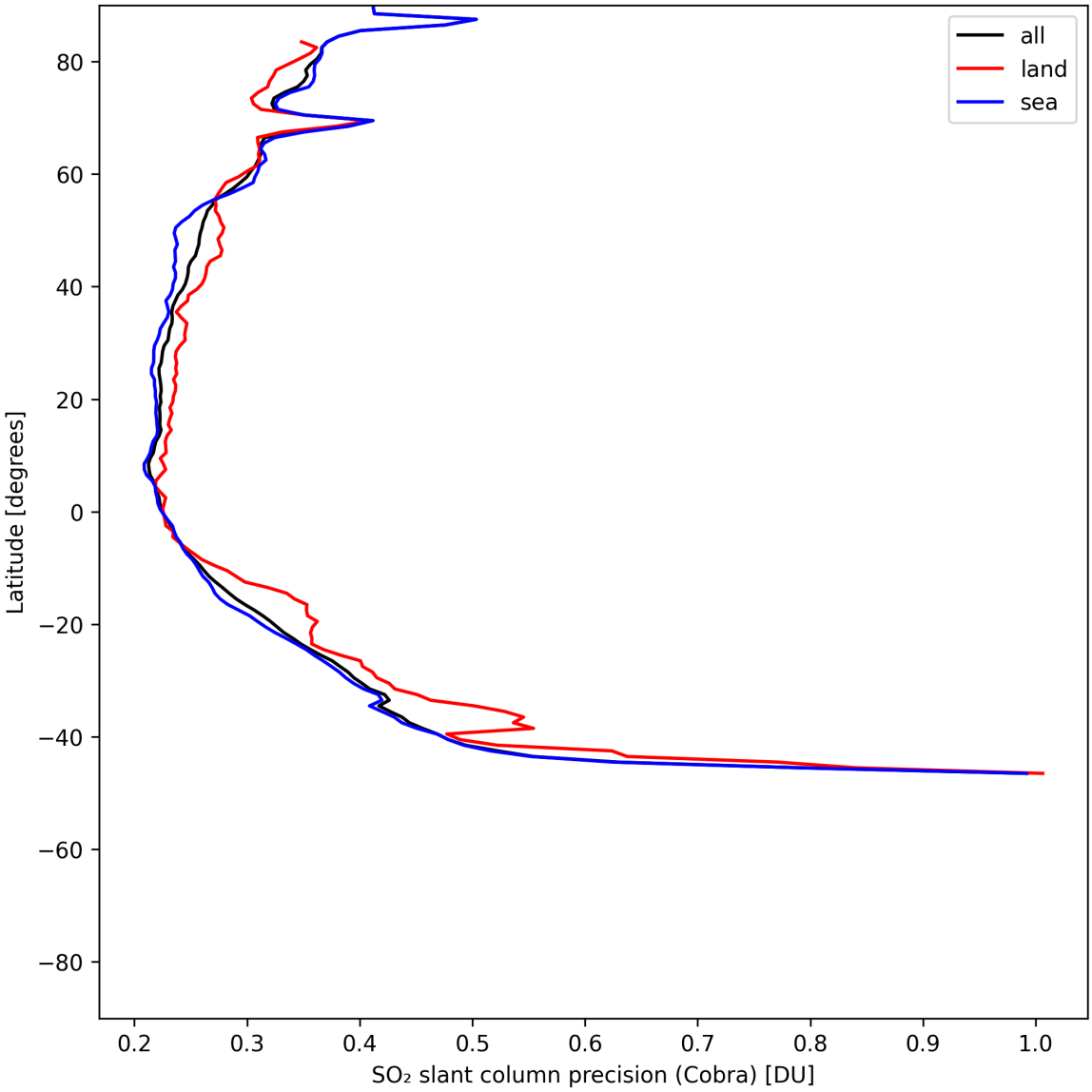

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-06-05 to 2025-06-06.

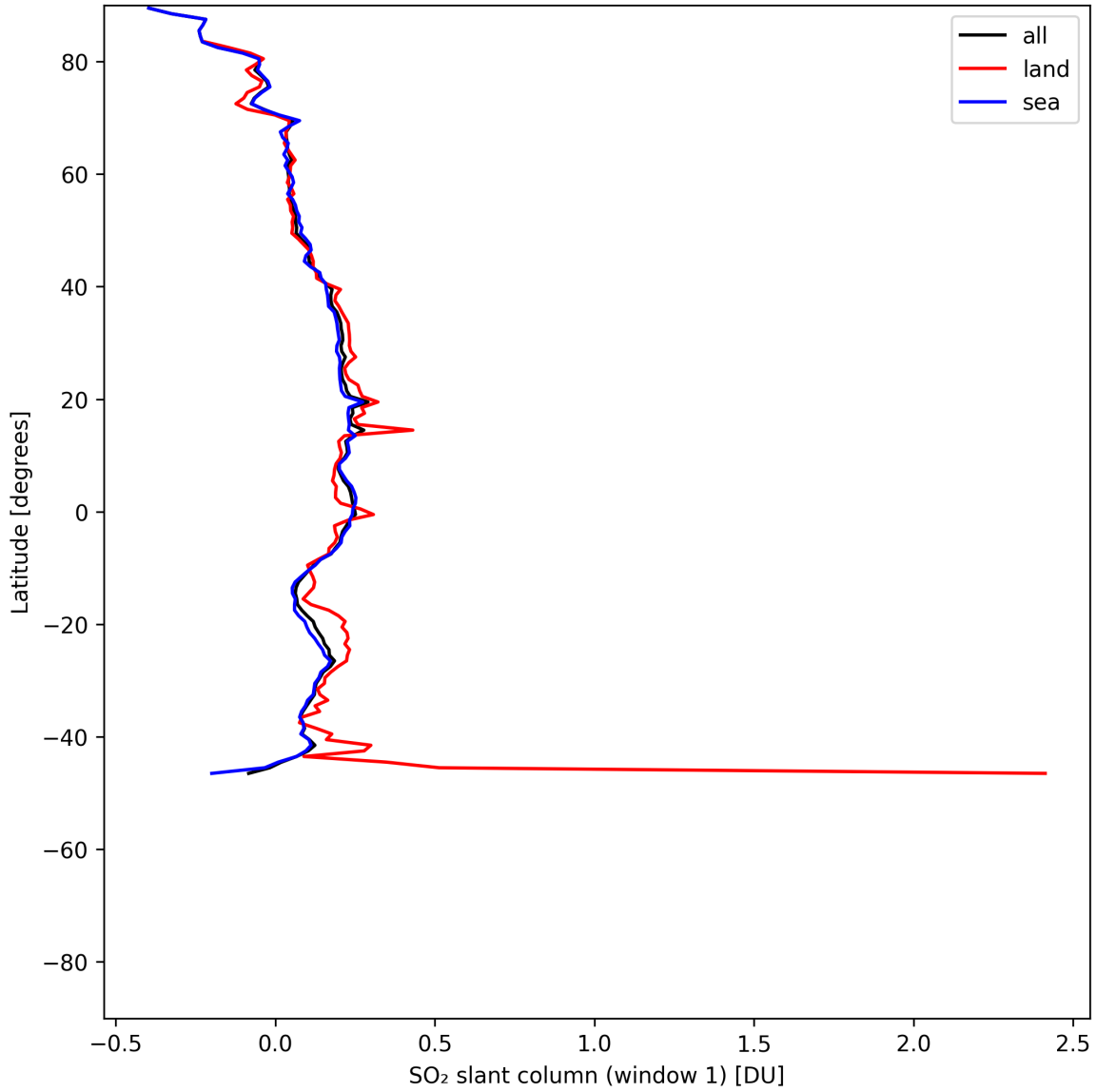

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-06-05 to 2025-06-06.

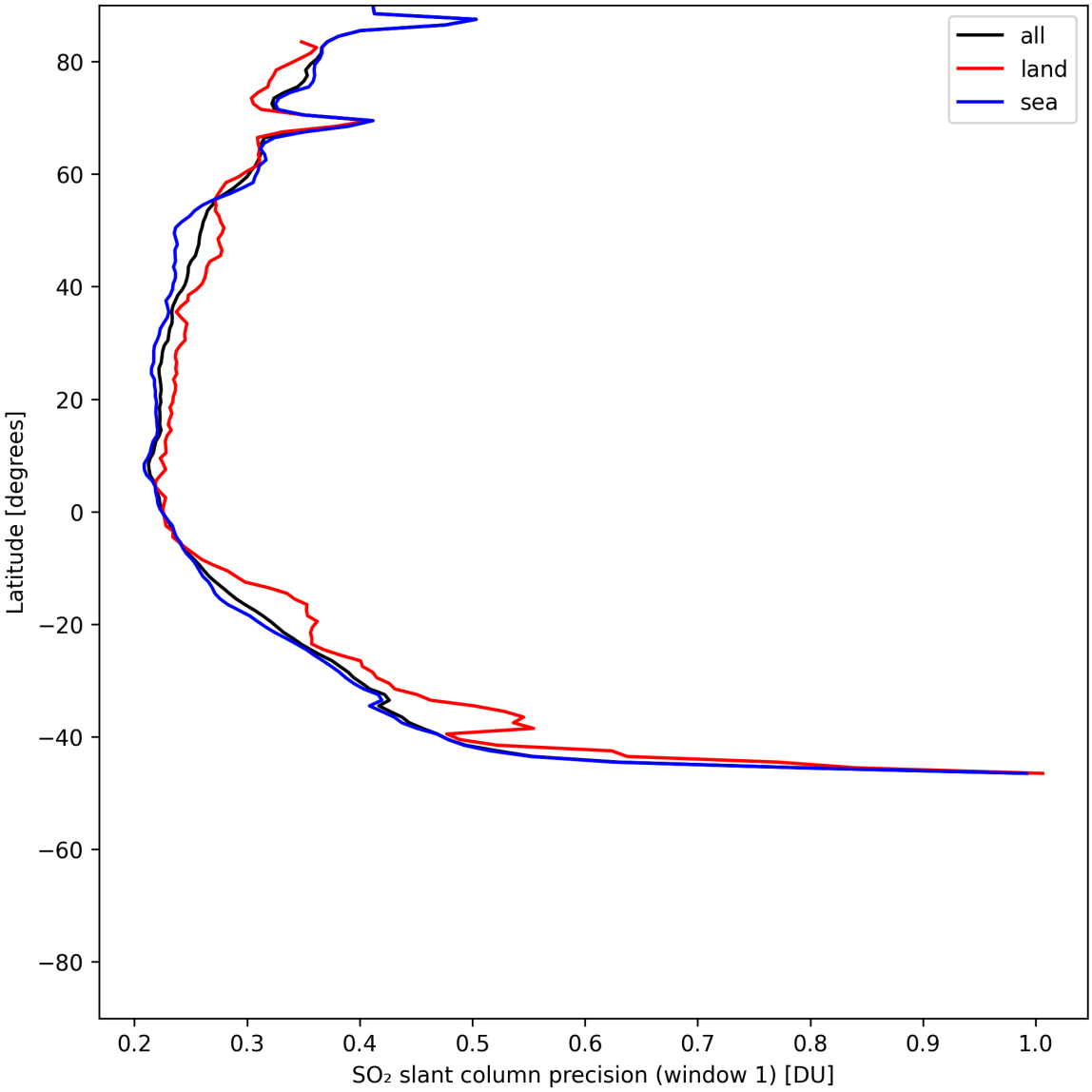

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-06-05 to 2025-06-06.

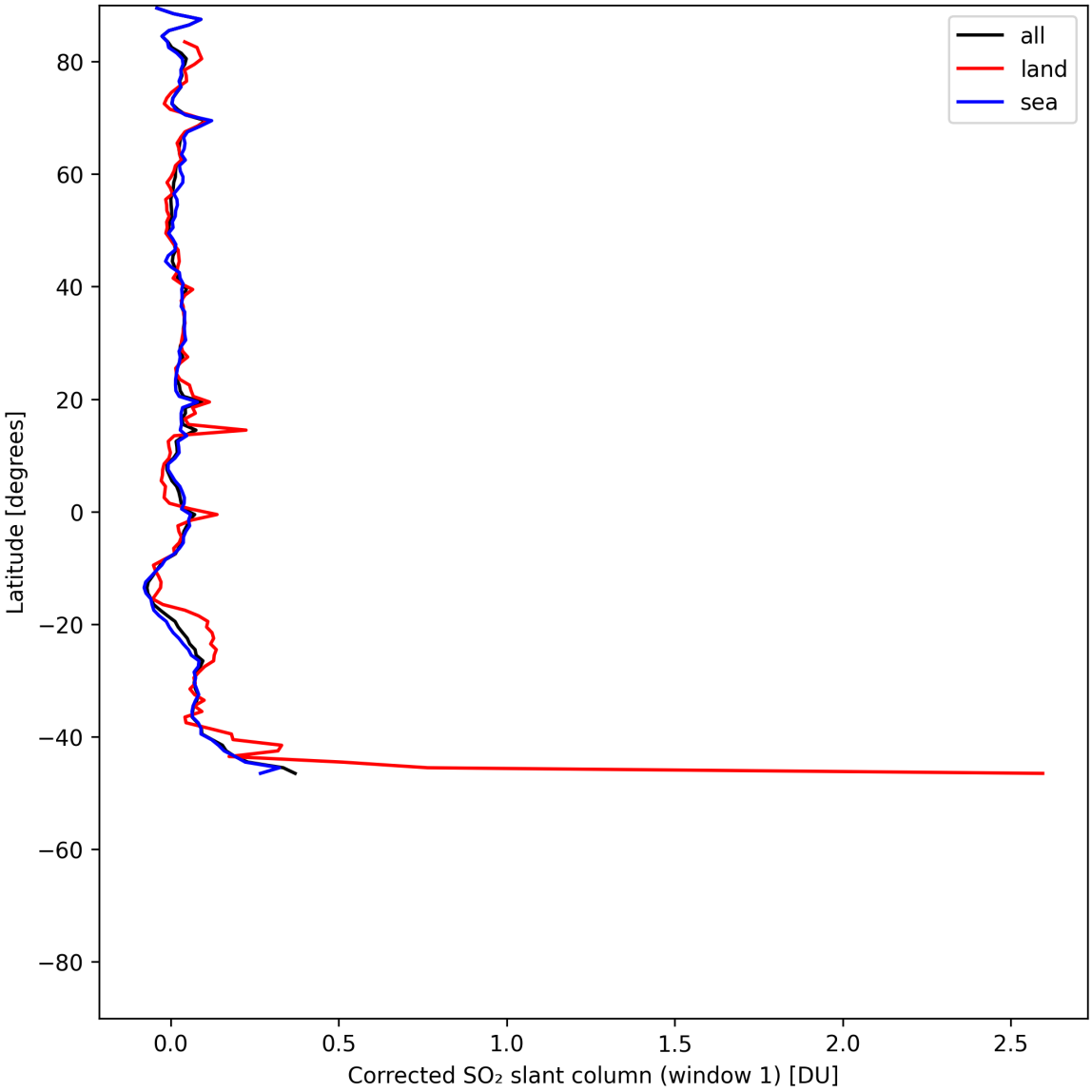

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-06-05 to 2025-06-06.

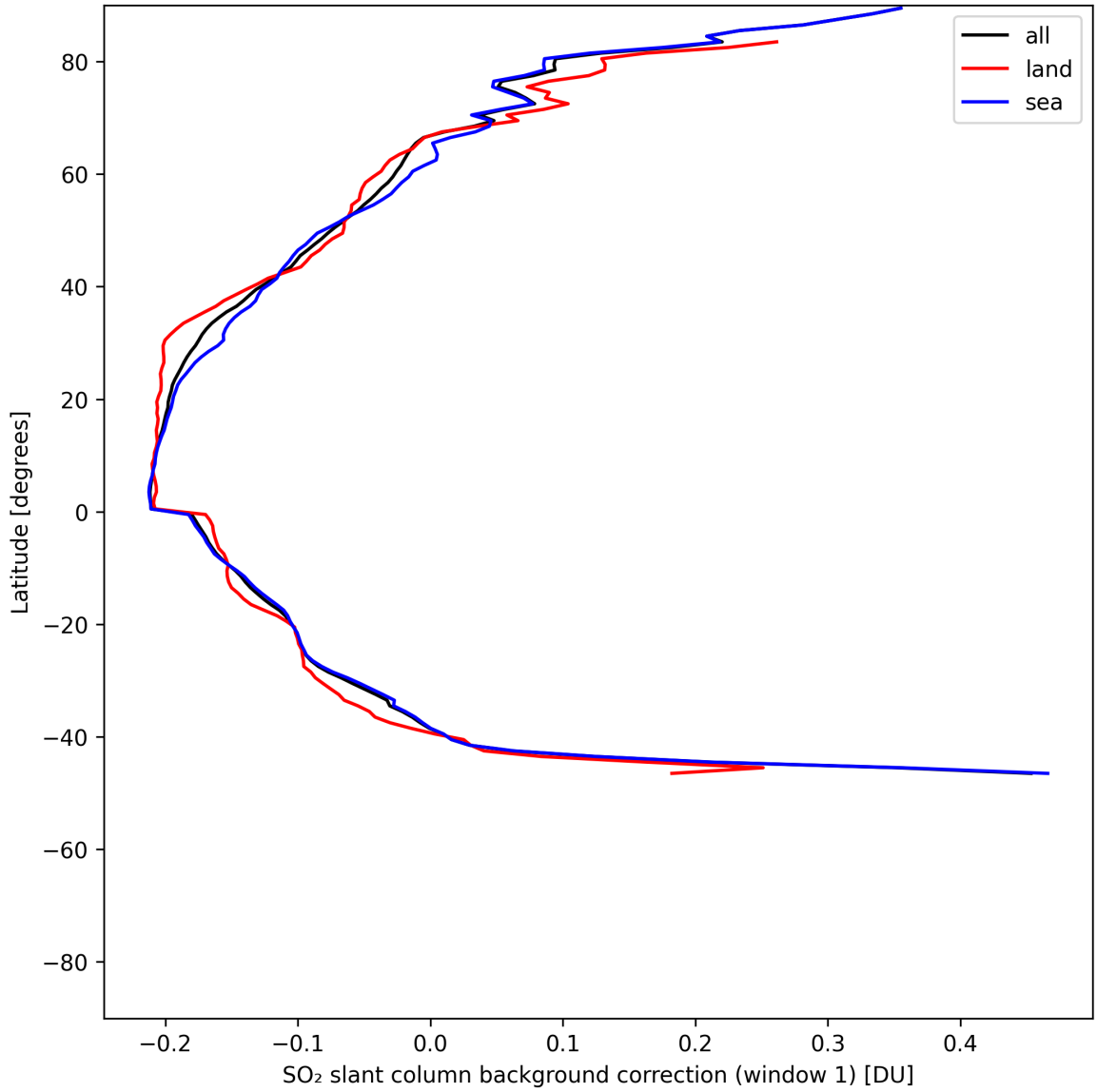

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-06-05 to 2025-06-06.

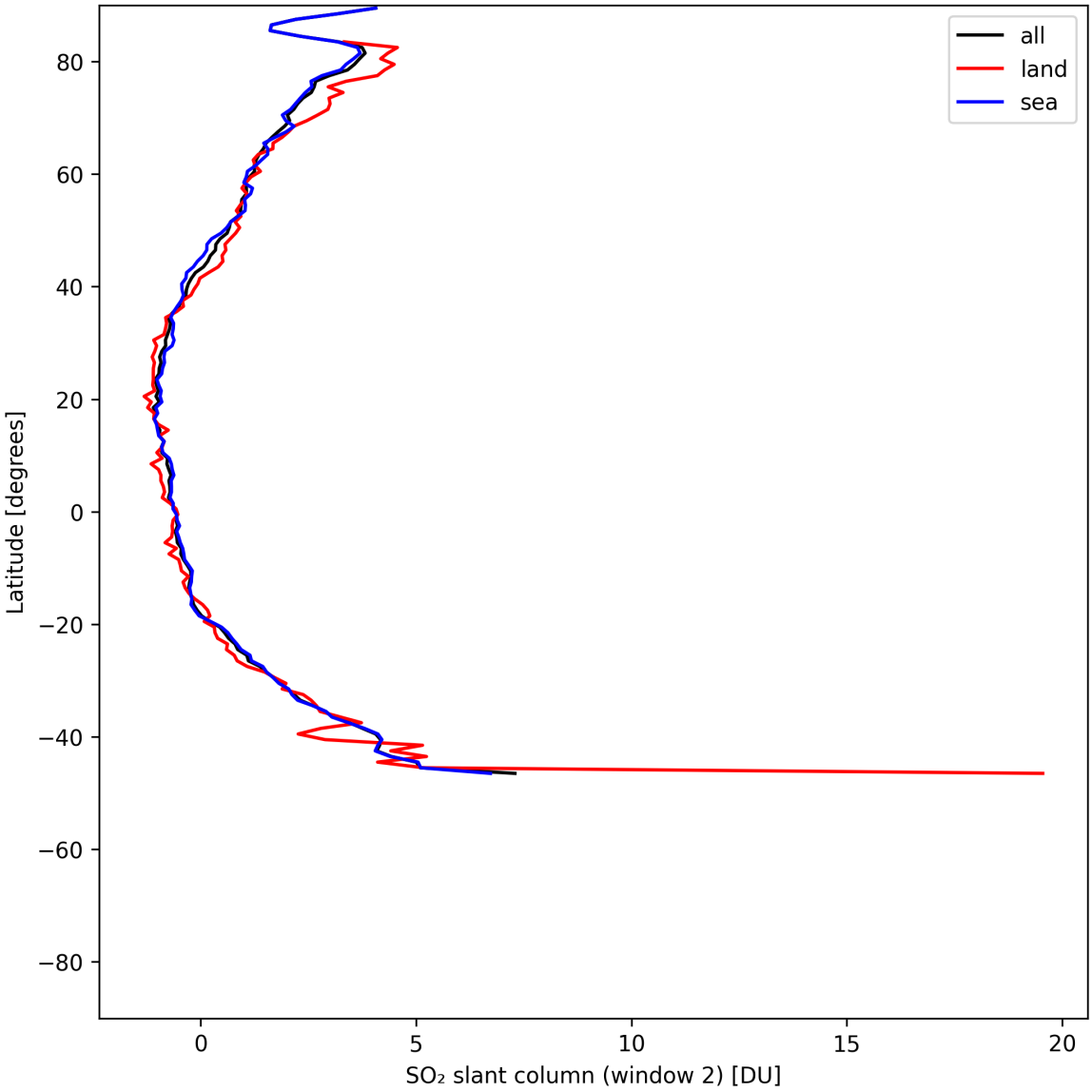

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-06-05 to 2025-06-06.

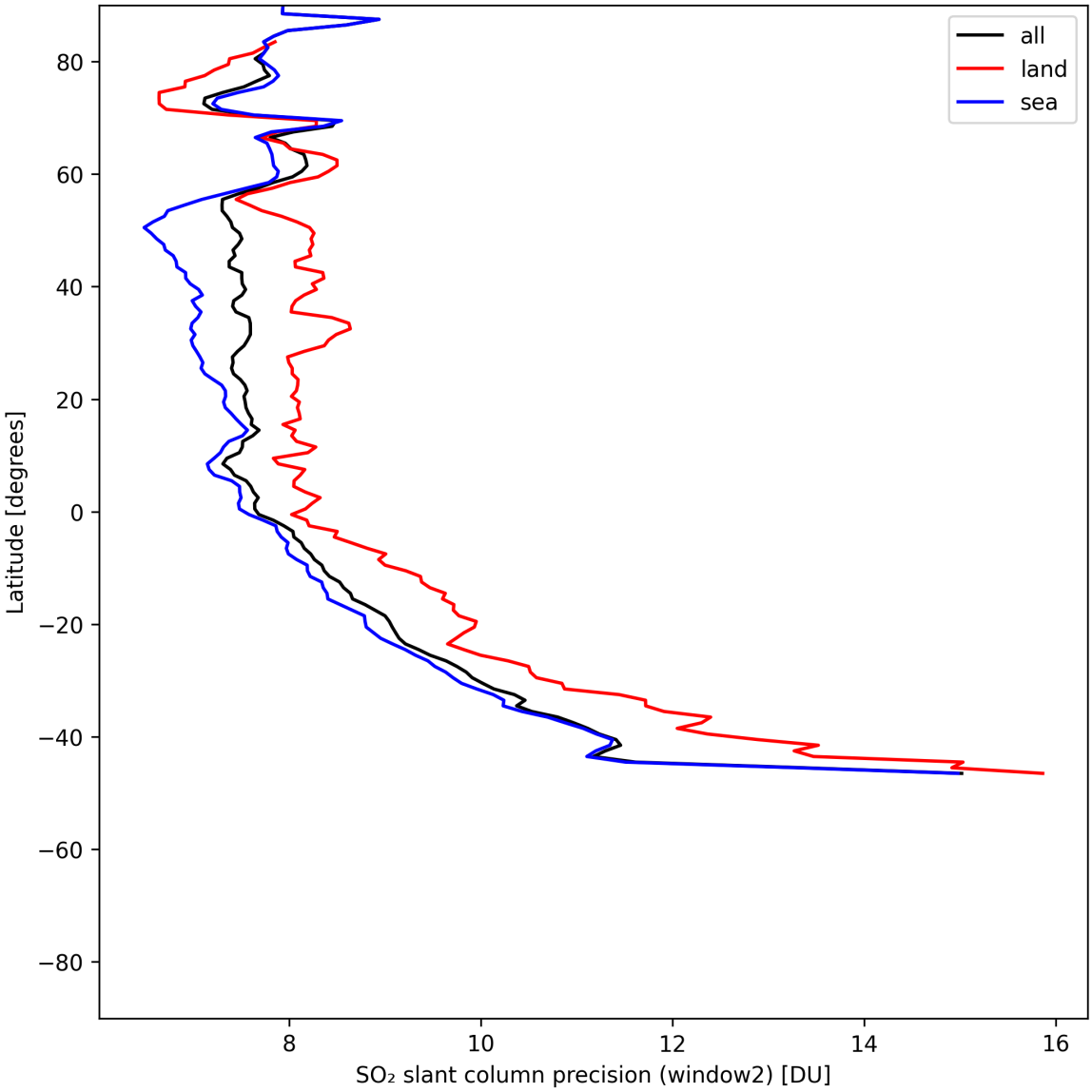

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-06-05 to 2025-06-06.

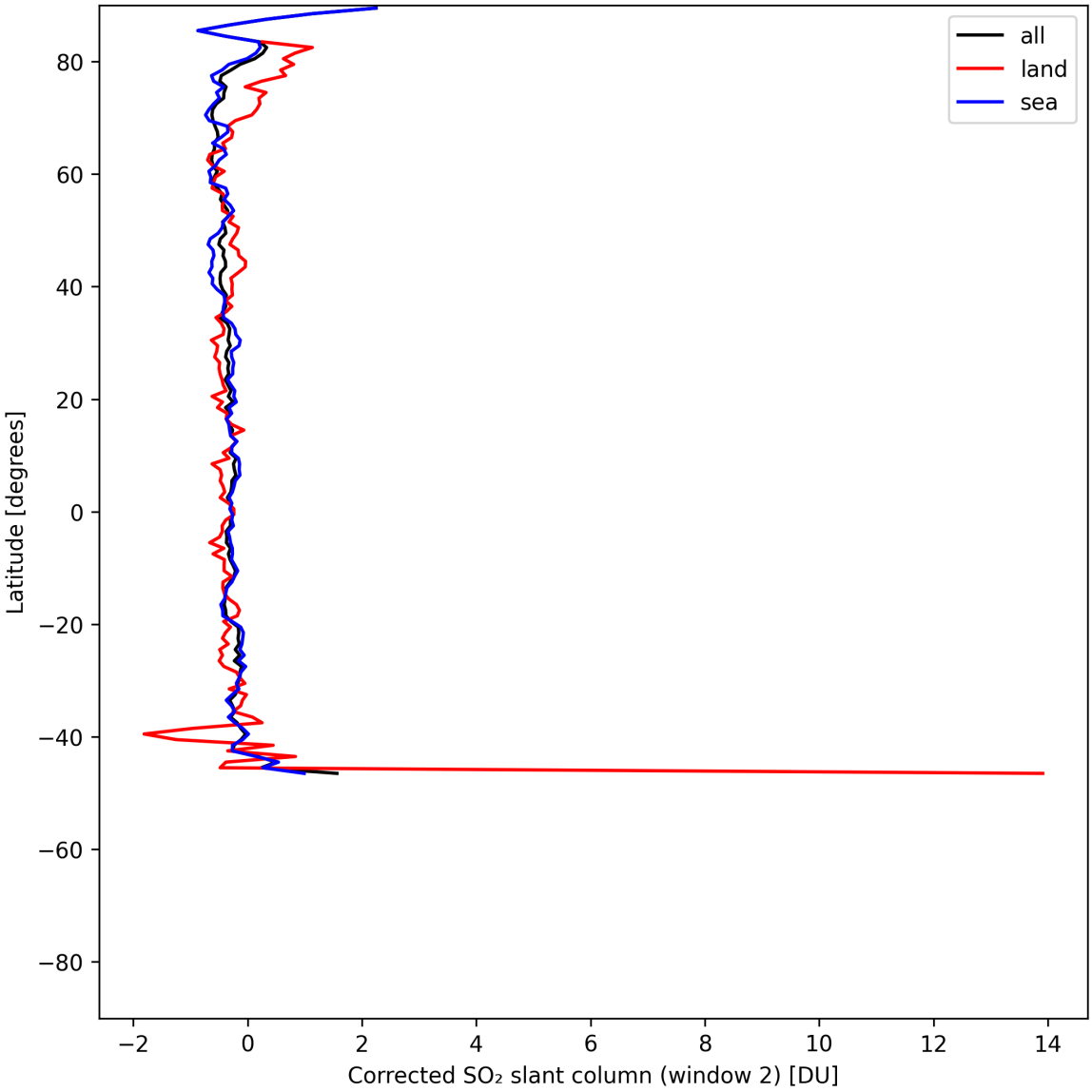

Figure 42: Zonal average of “Corrected SO_2 slant column (window 2)” for 2025-06-05 to 2025-06-06.

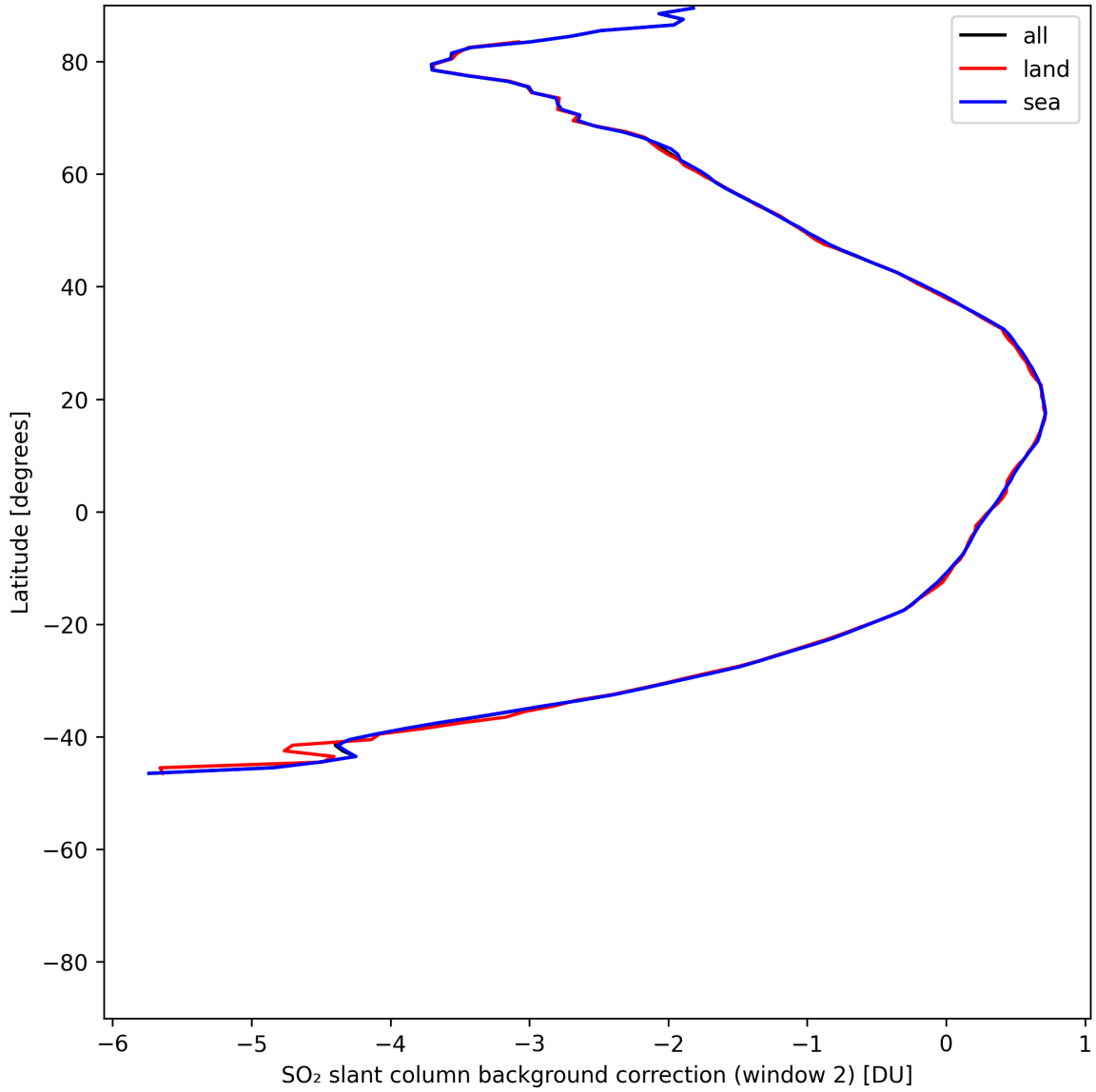

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-06-05 to 2025-06-06.

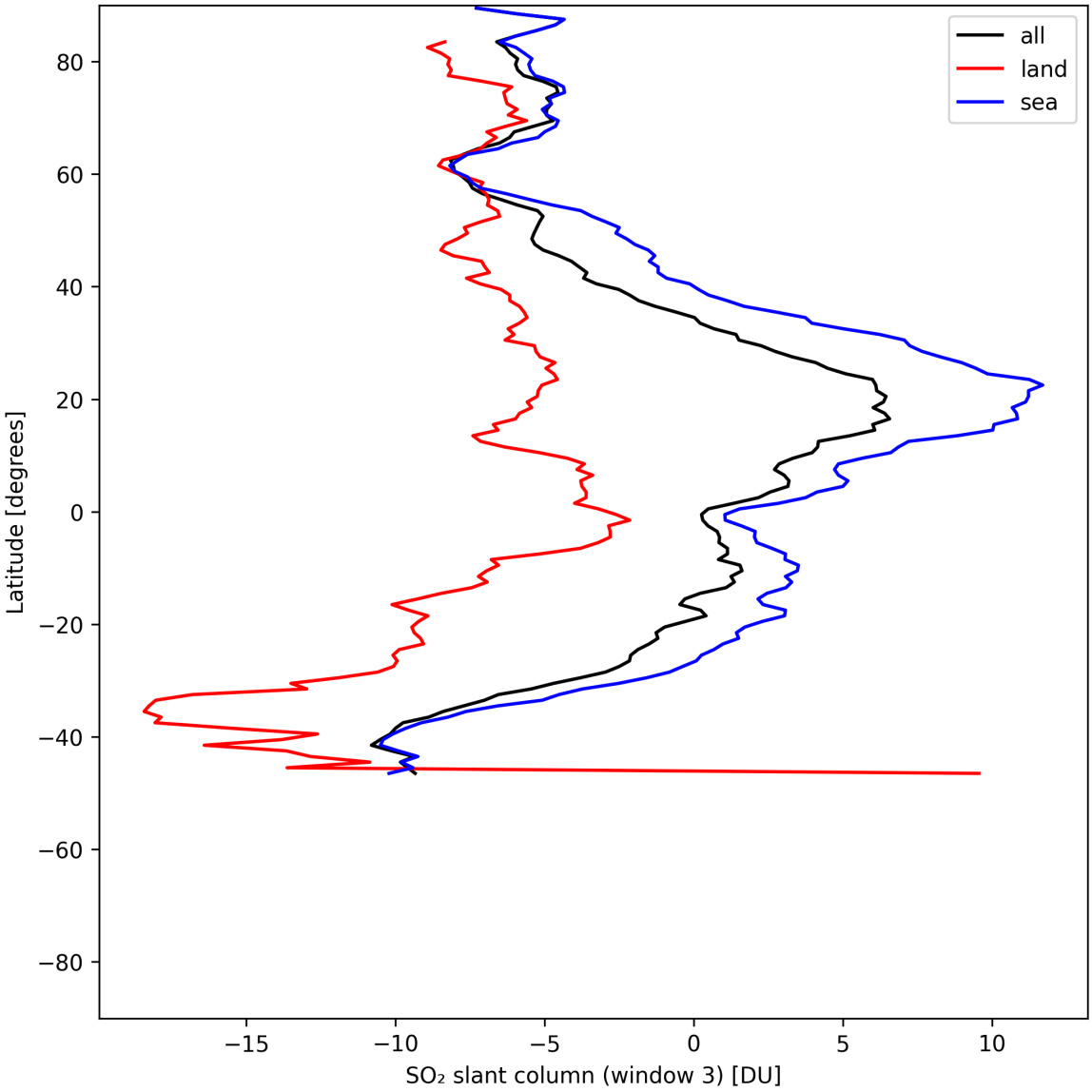

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-06-05 to 2025-06-06.

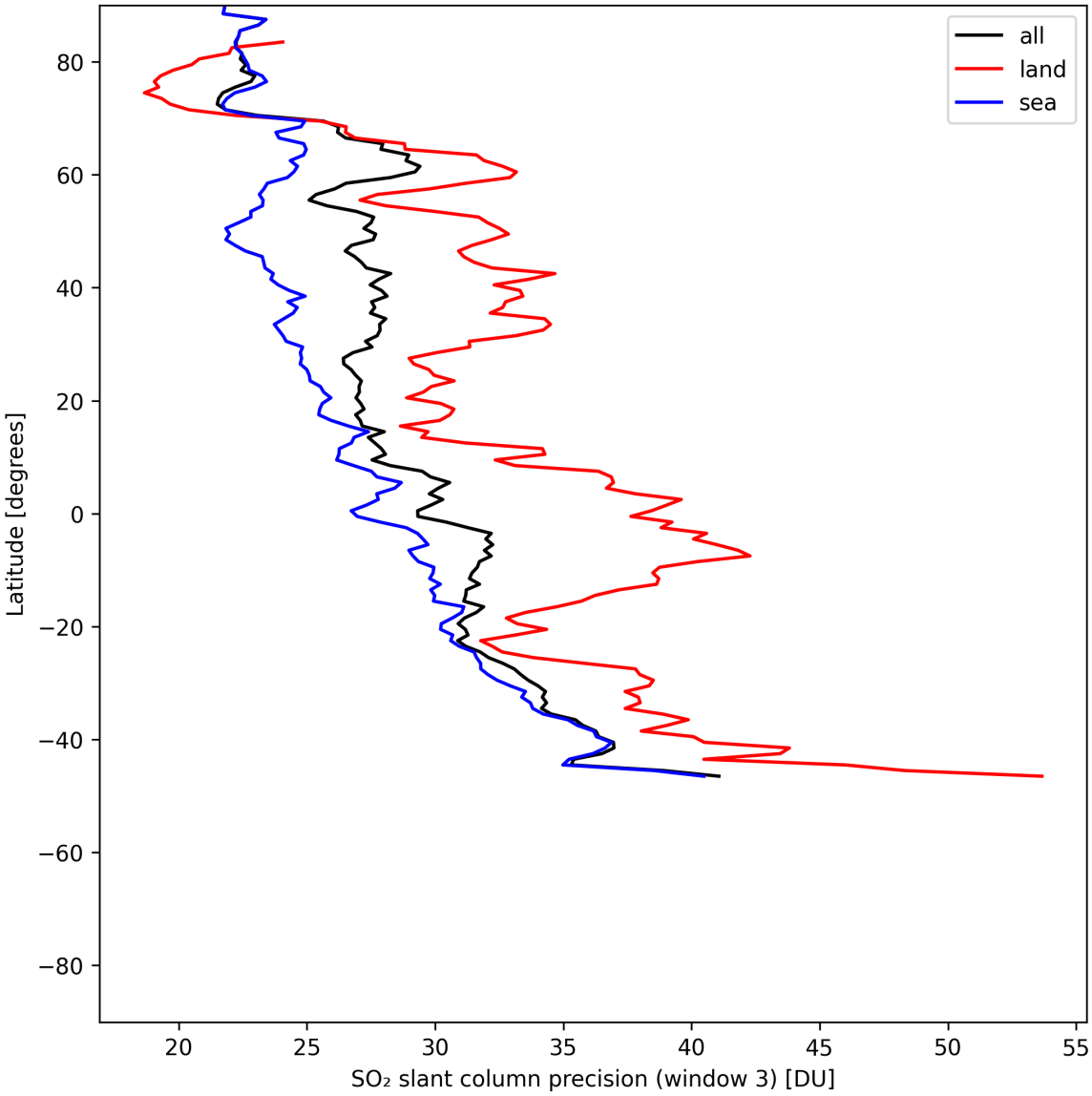

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-06-05 to 2025-06-06.

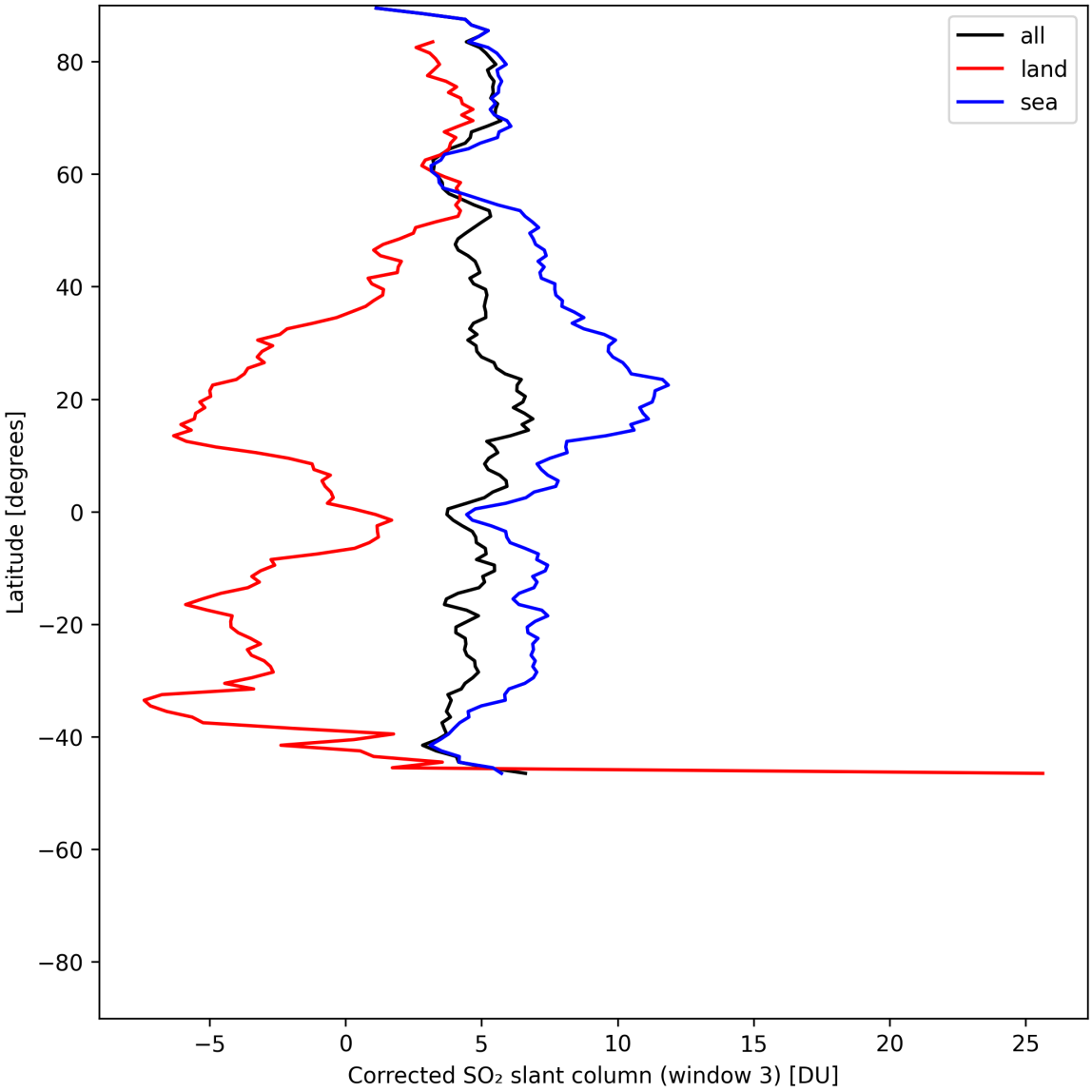

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-06-05 to 2025-06-06.

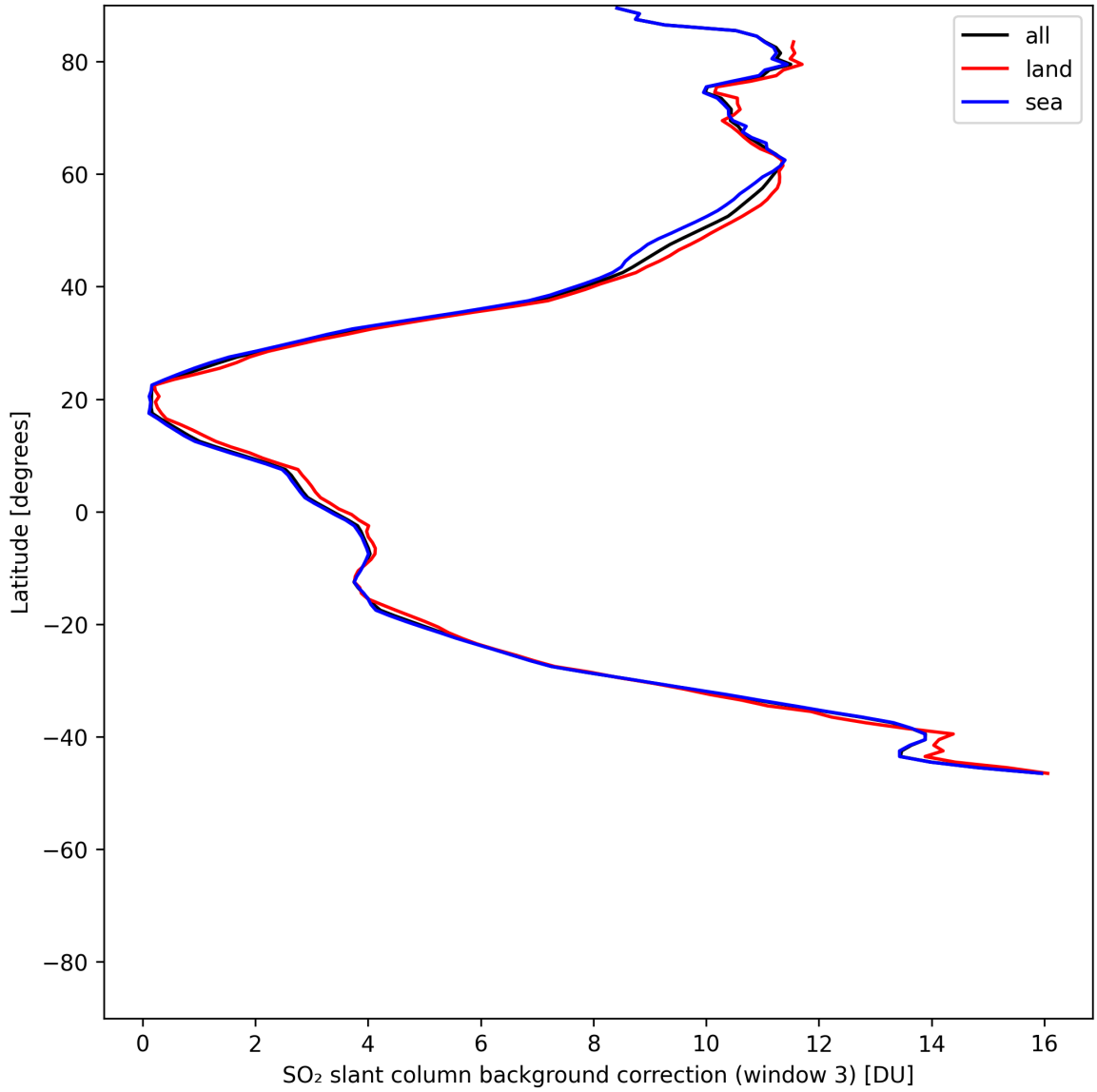

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-06-05 to 2025-06-06.

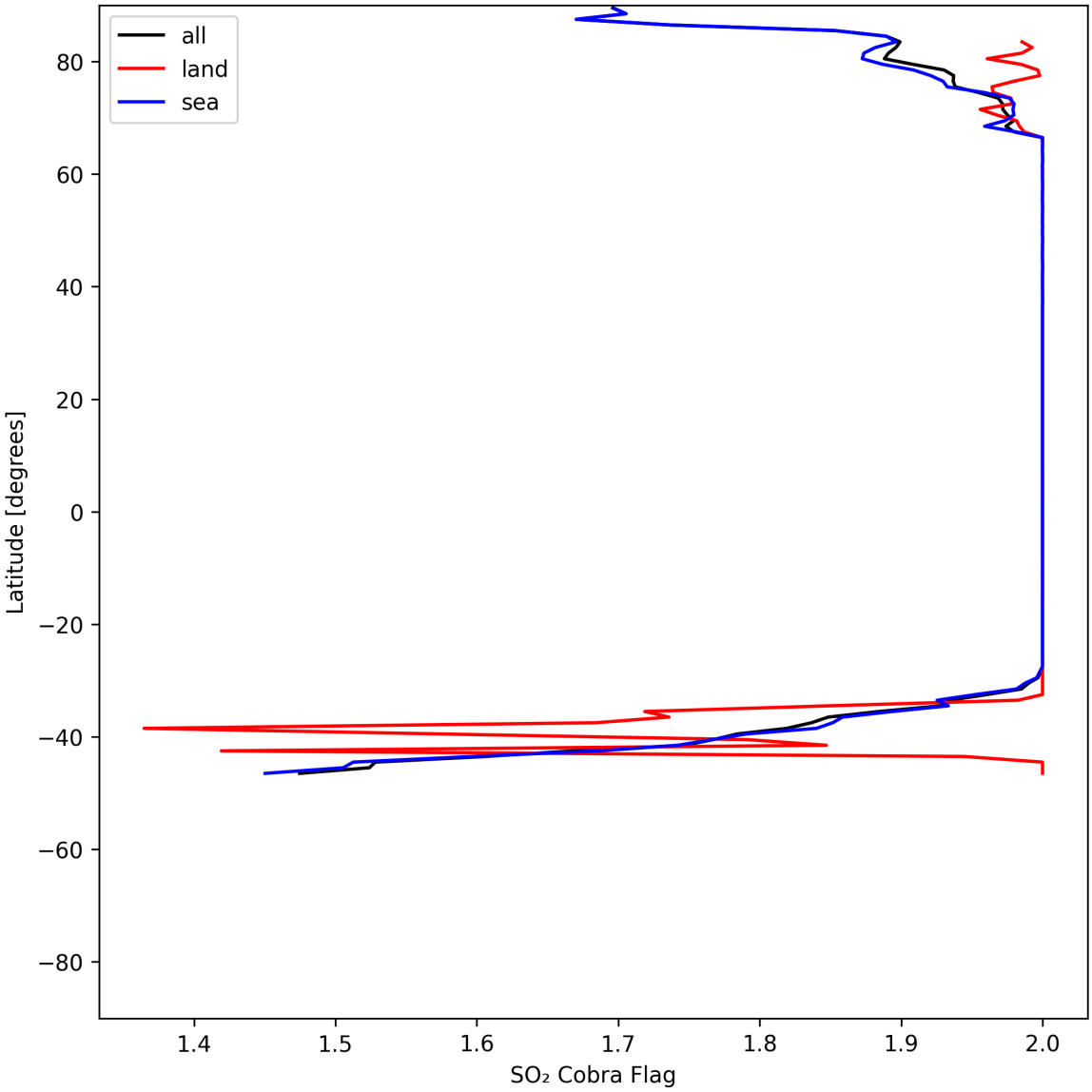

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-06-05 to 2025-06-06.

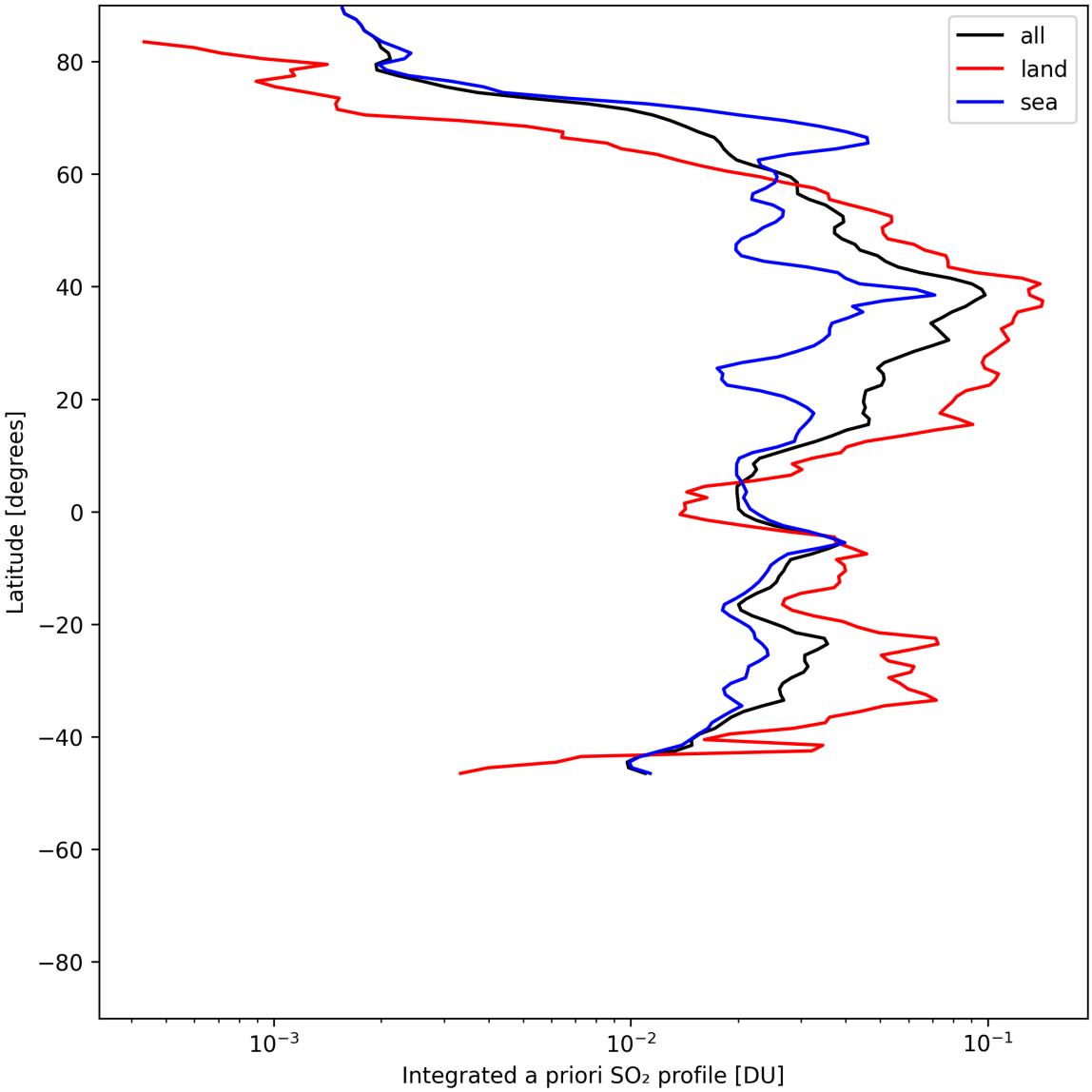

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-06-05 to 2025-06-06.

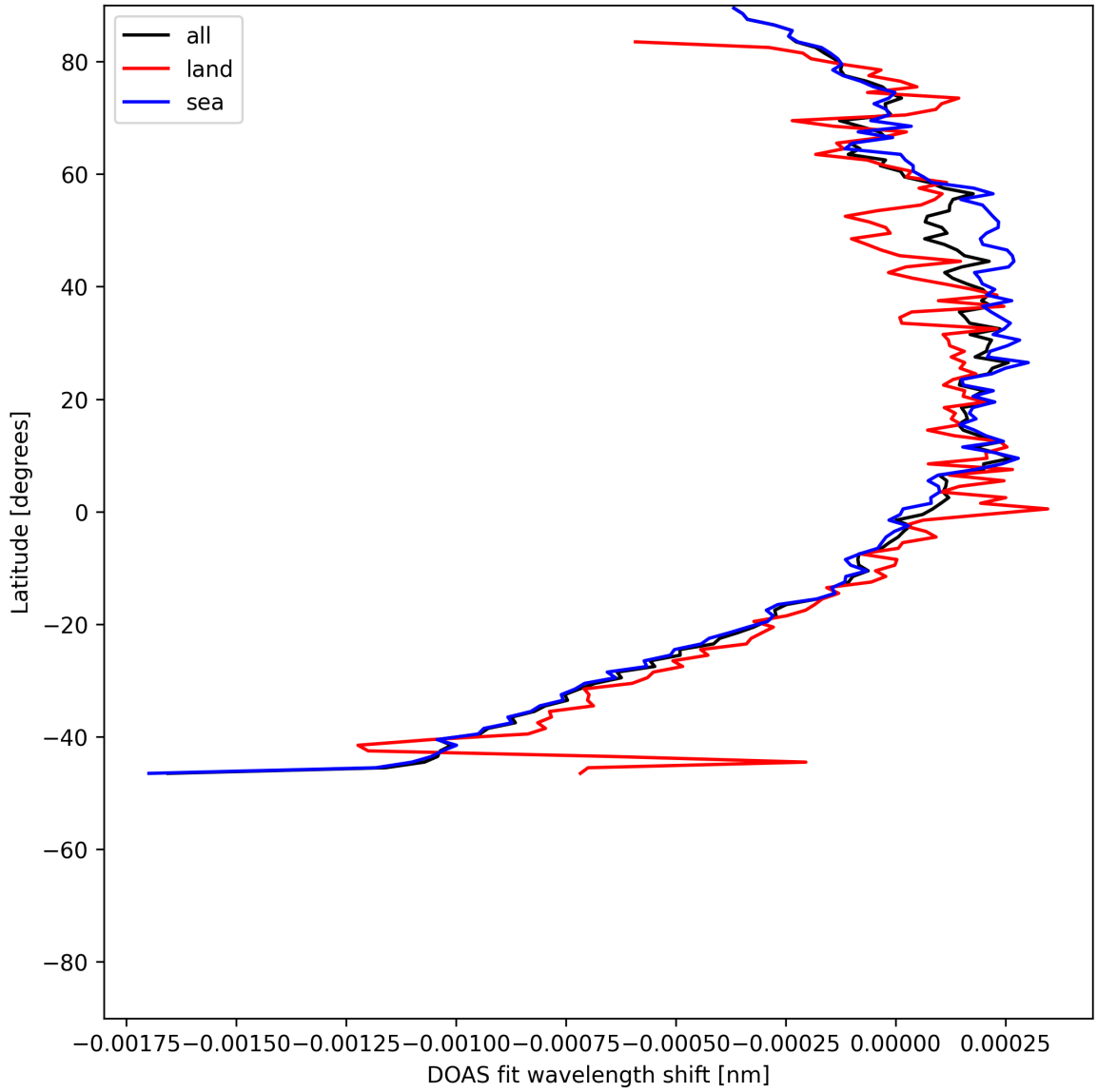

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-06-05 to 2025-06-06.

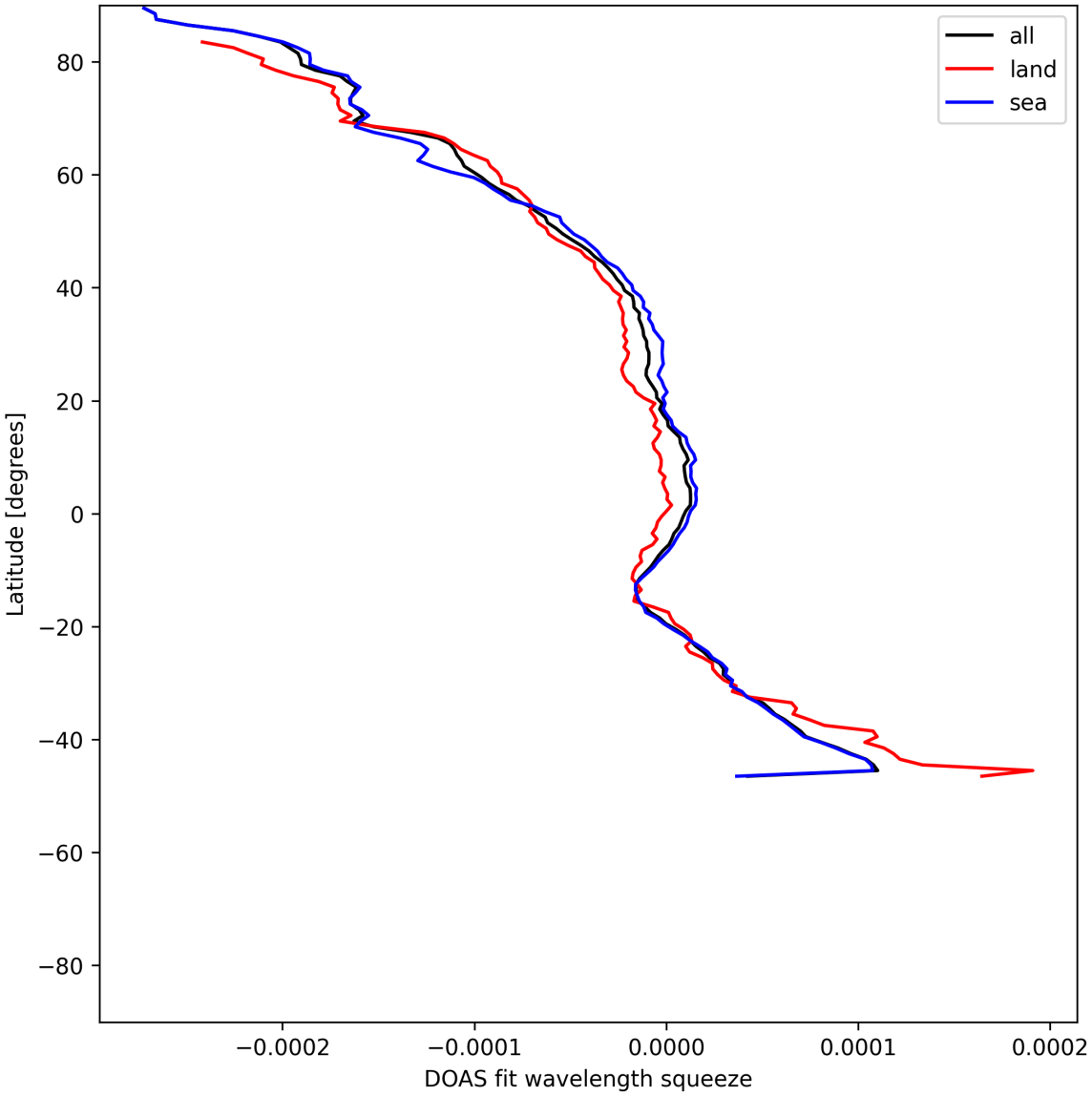

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-06-05 to 2025-06-06.

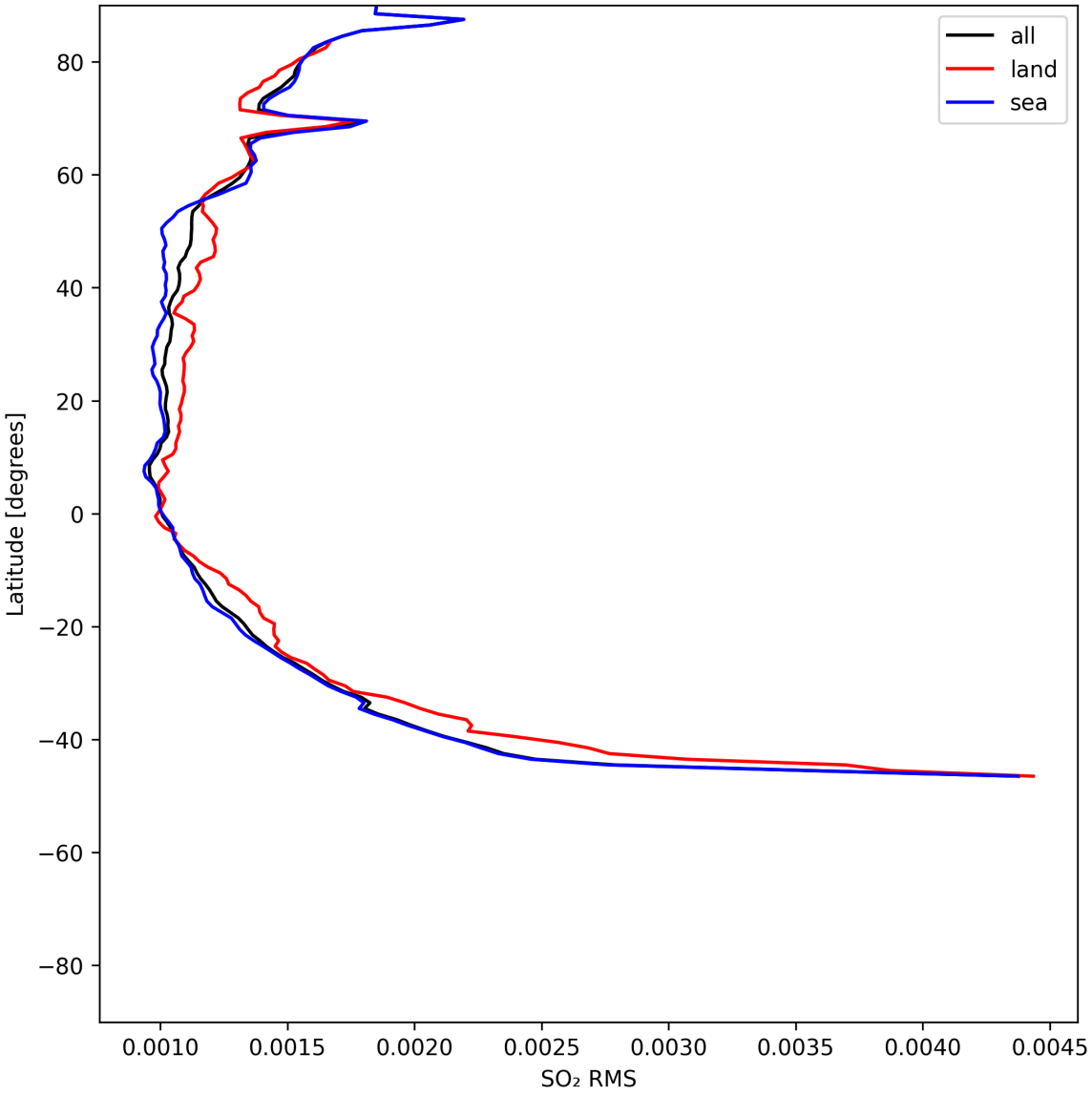

Figure 52: Zonal average of "SO_2 RMS" for 2025-06-05 to 2025-06-06.

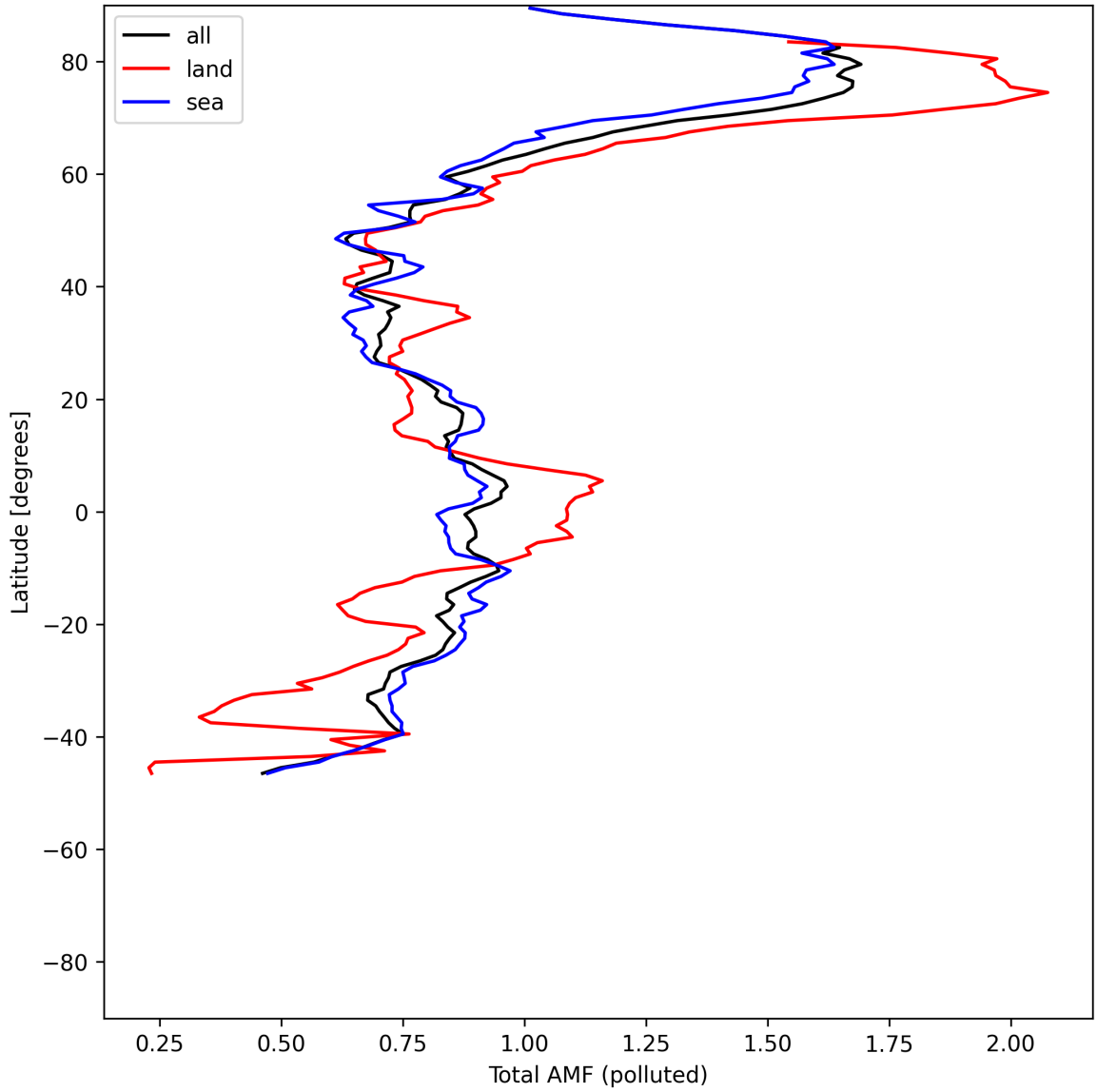

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-06-05 to 2025-06-06.

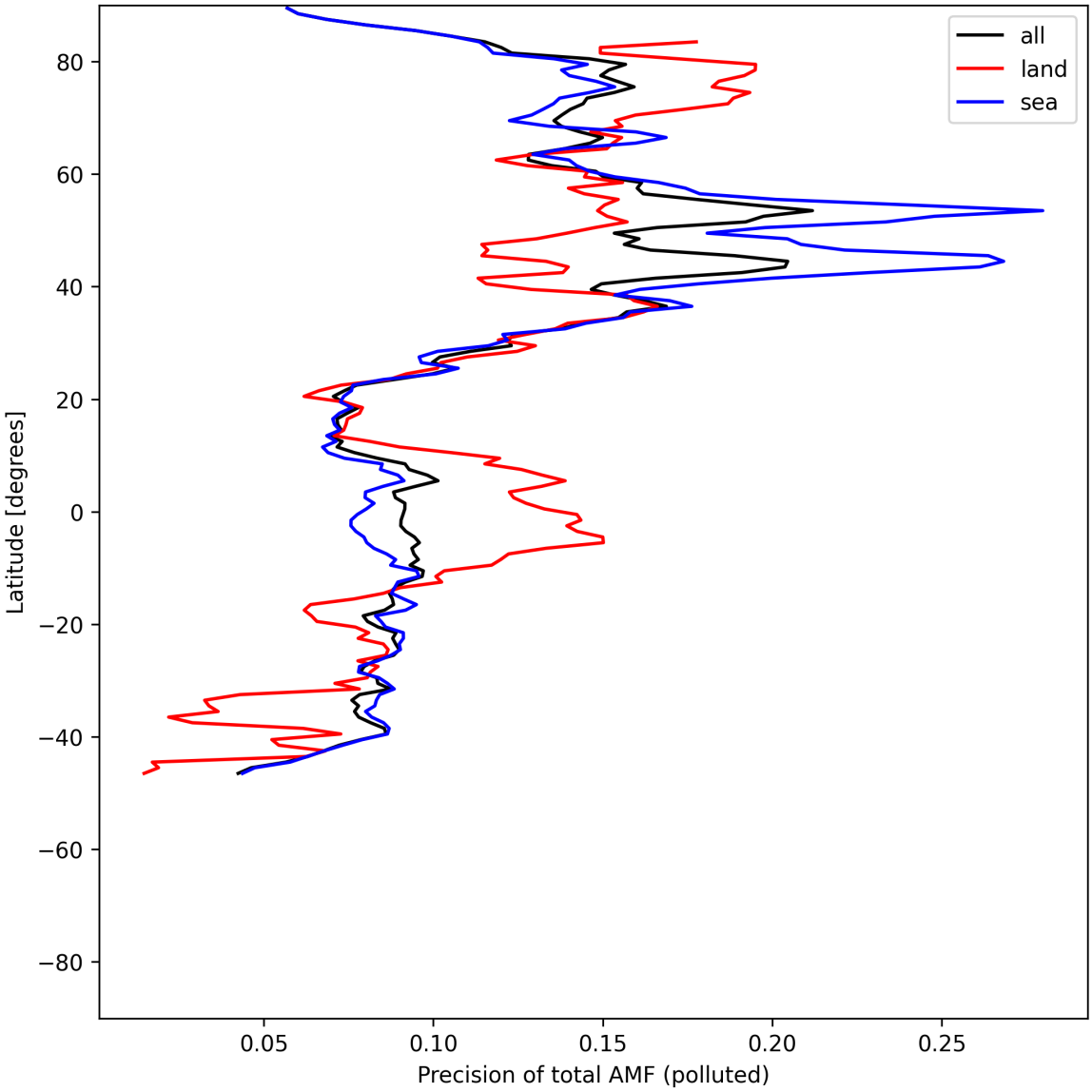

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-06-05 to 2025-06-06.

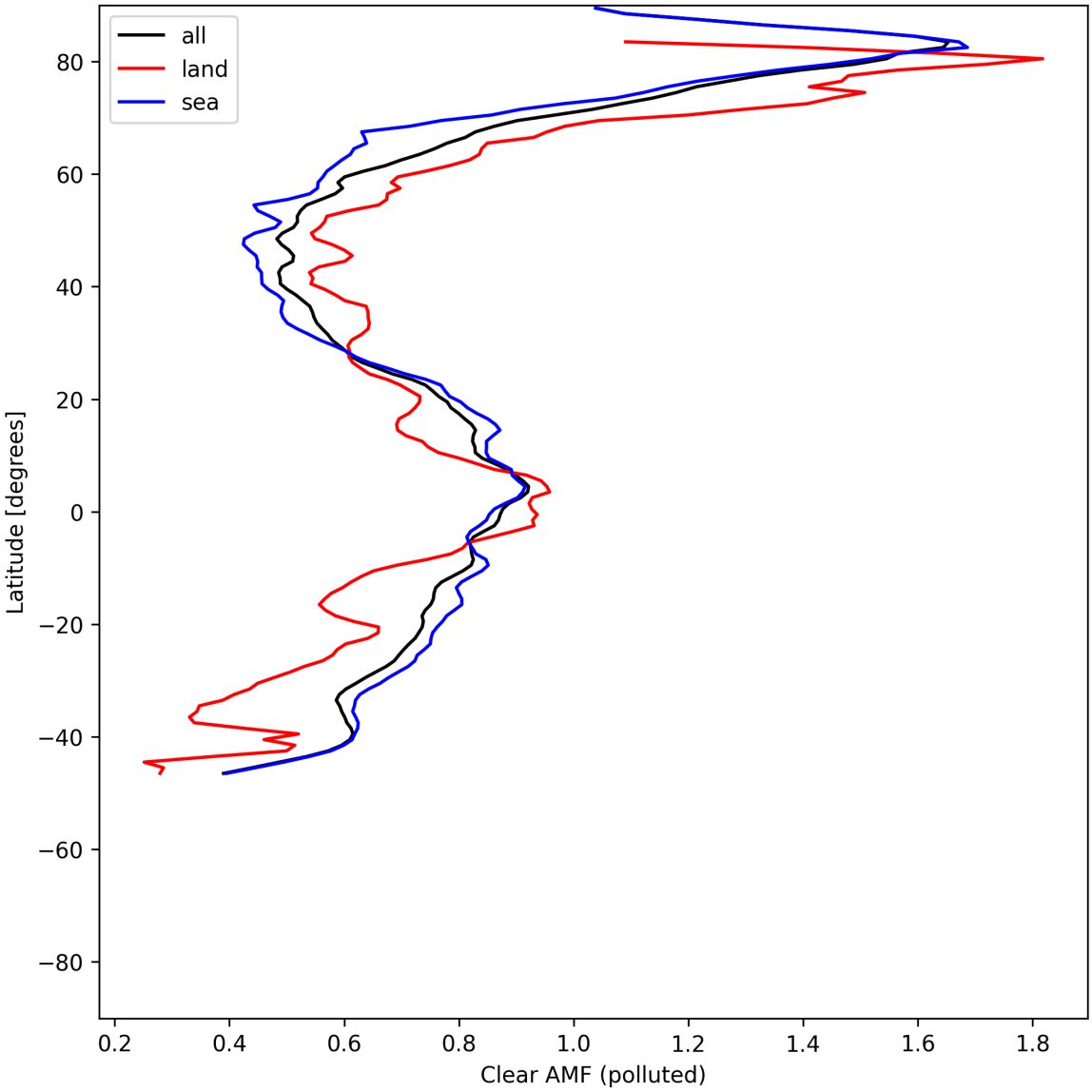

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-06-05 to 2025-06-06.

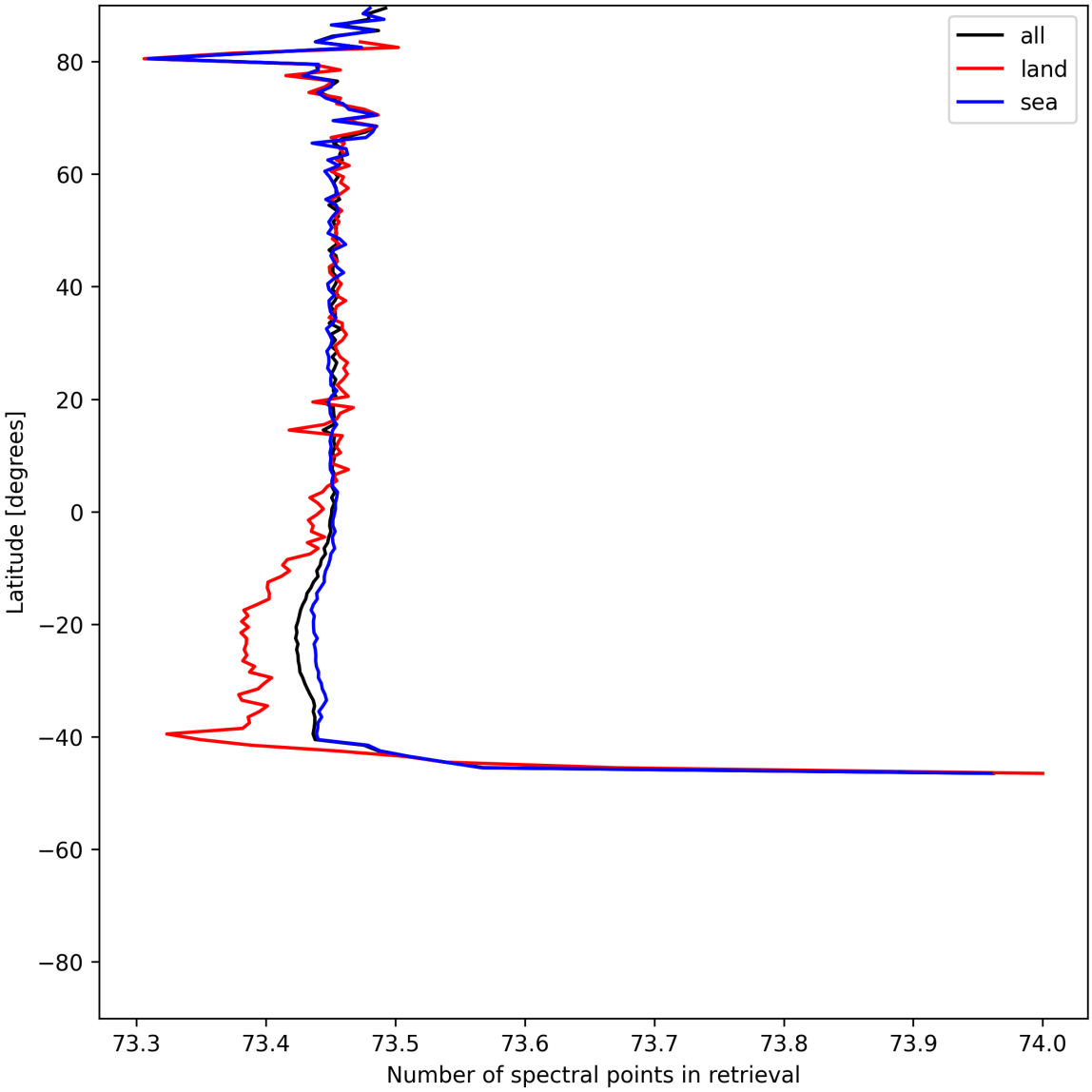

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-06-05 to 2025-06-06.

8 Histograms

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

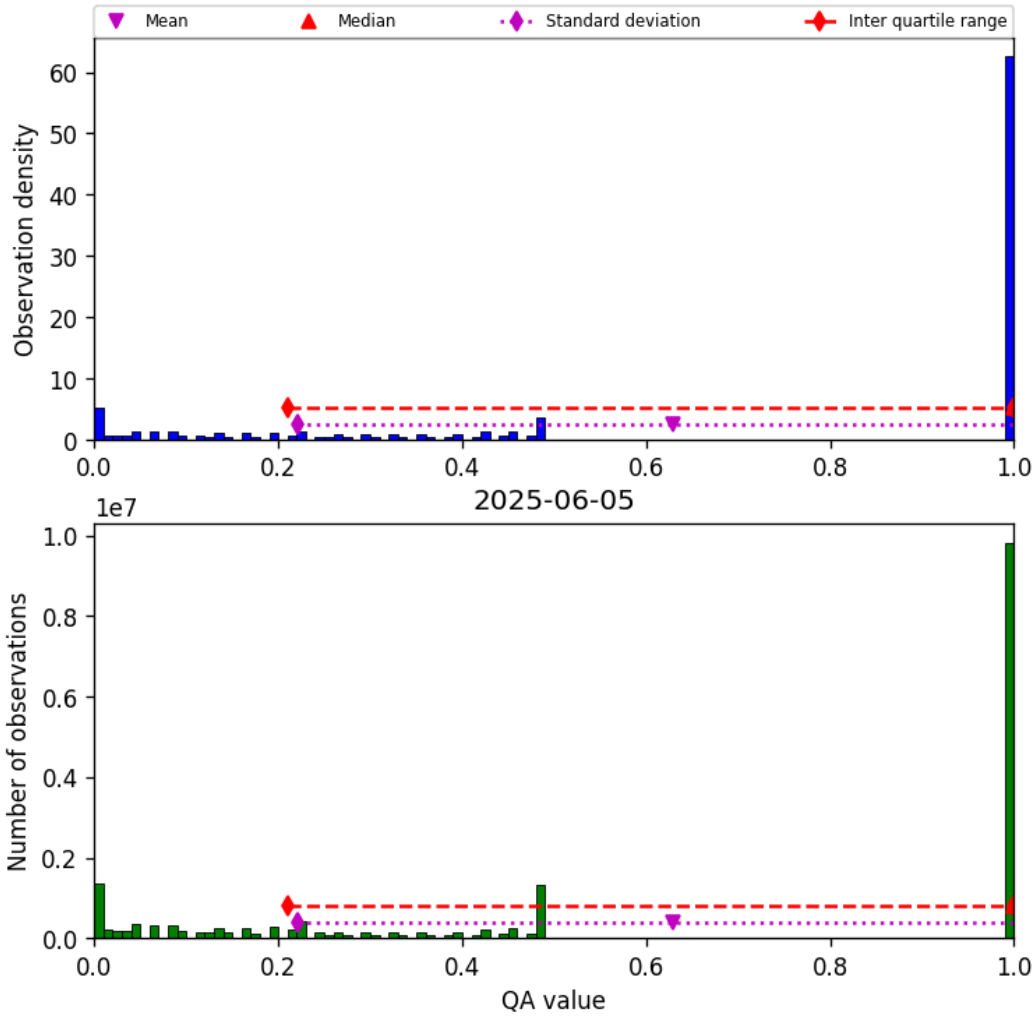

Figure 57: Histogram of “QA value” for 2025-06-05 to 2025-06-06

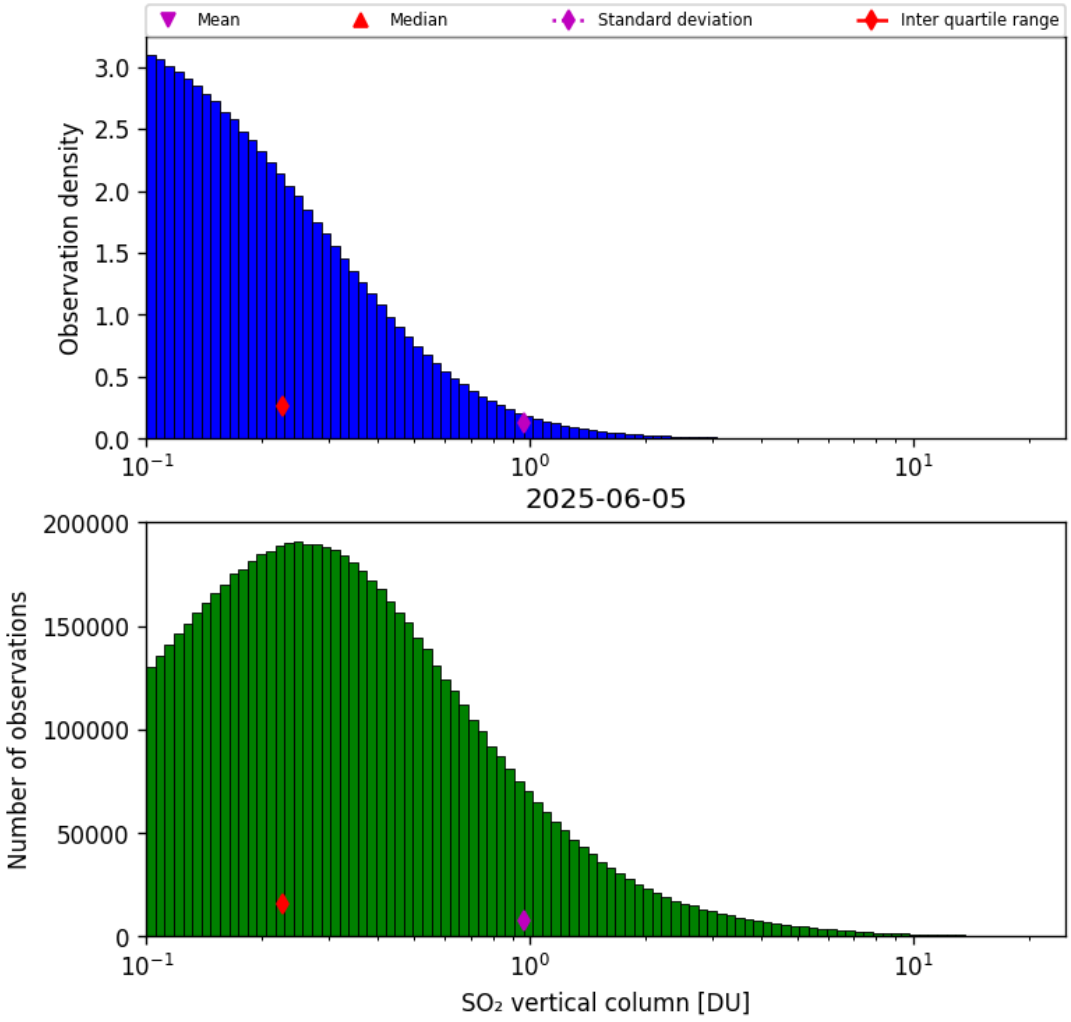

Figure 58: Histogram of "SO_2 vertical column" for 2025-06-05 to 2025-06-06

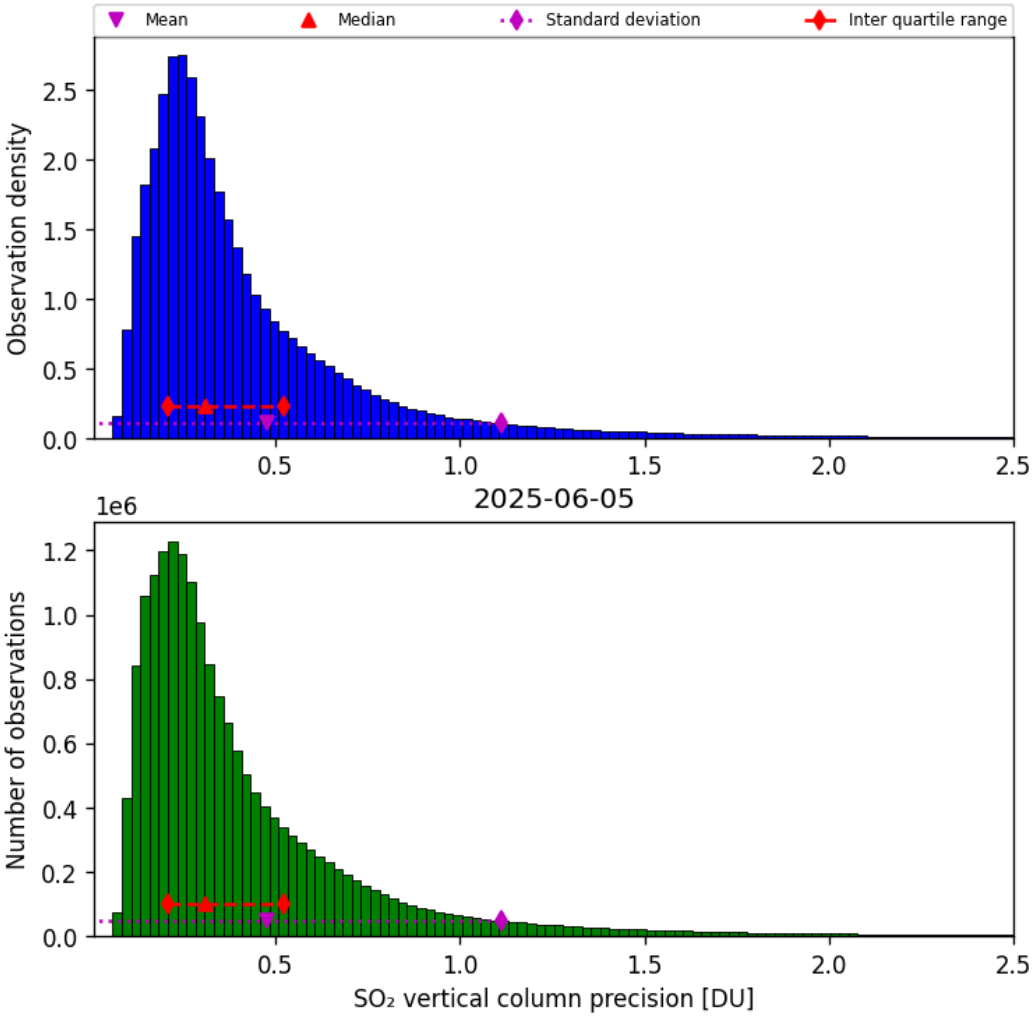

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-06-05 to 2025-06-06

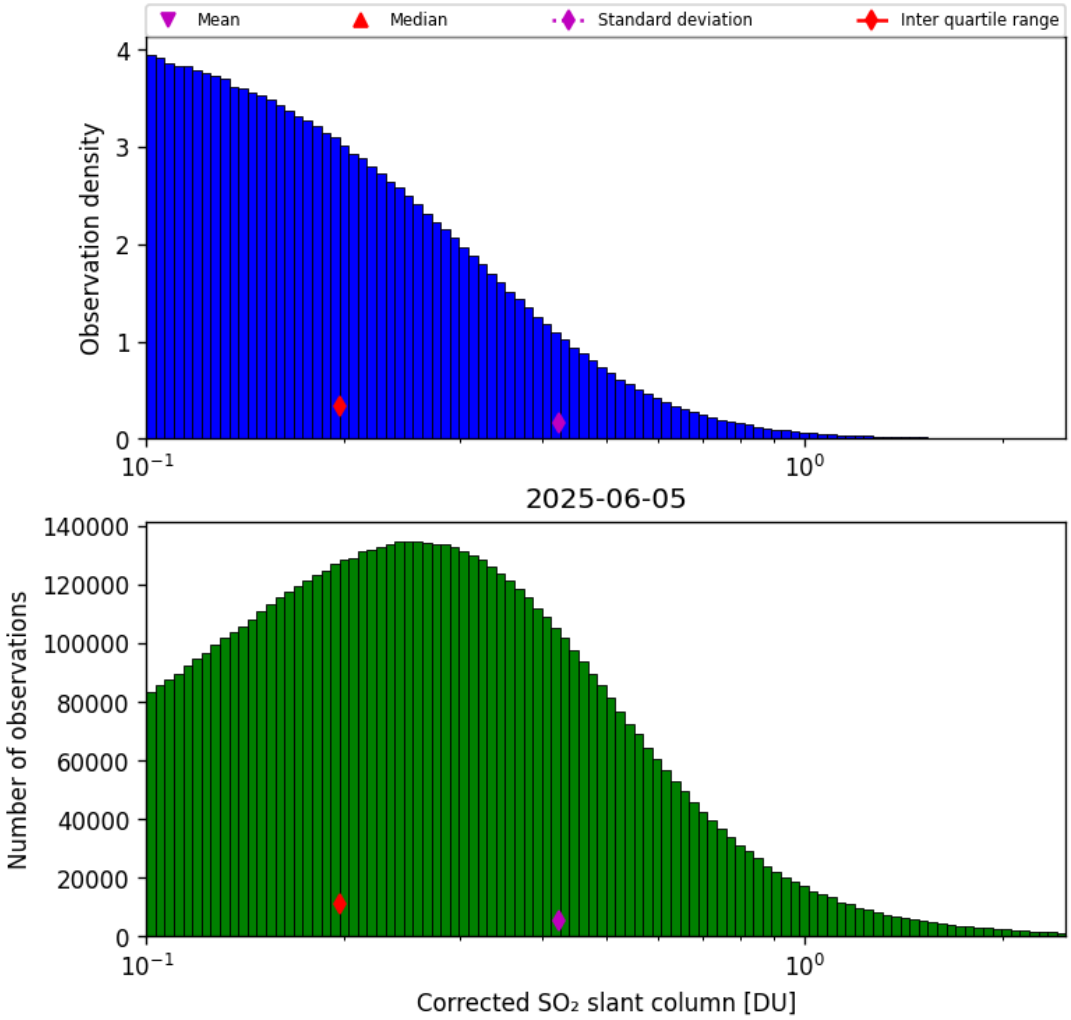

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-06-05 to 2025-06-06

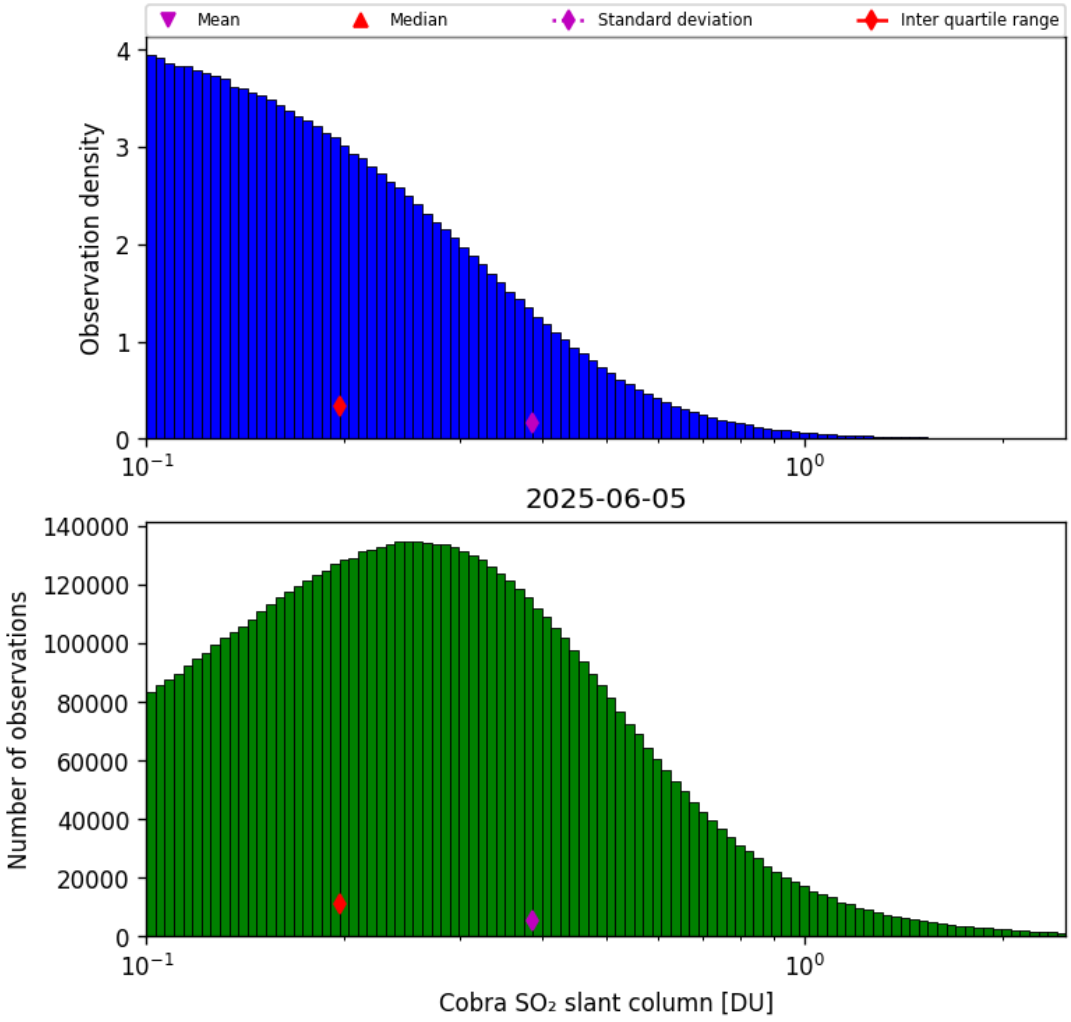

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-06-05 to 2025-06-06

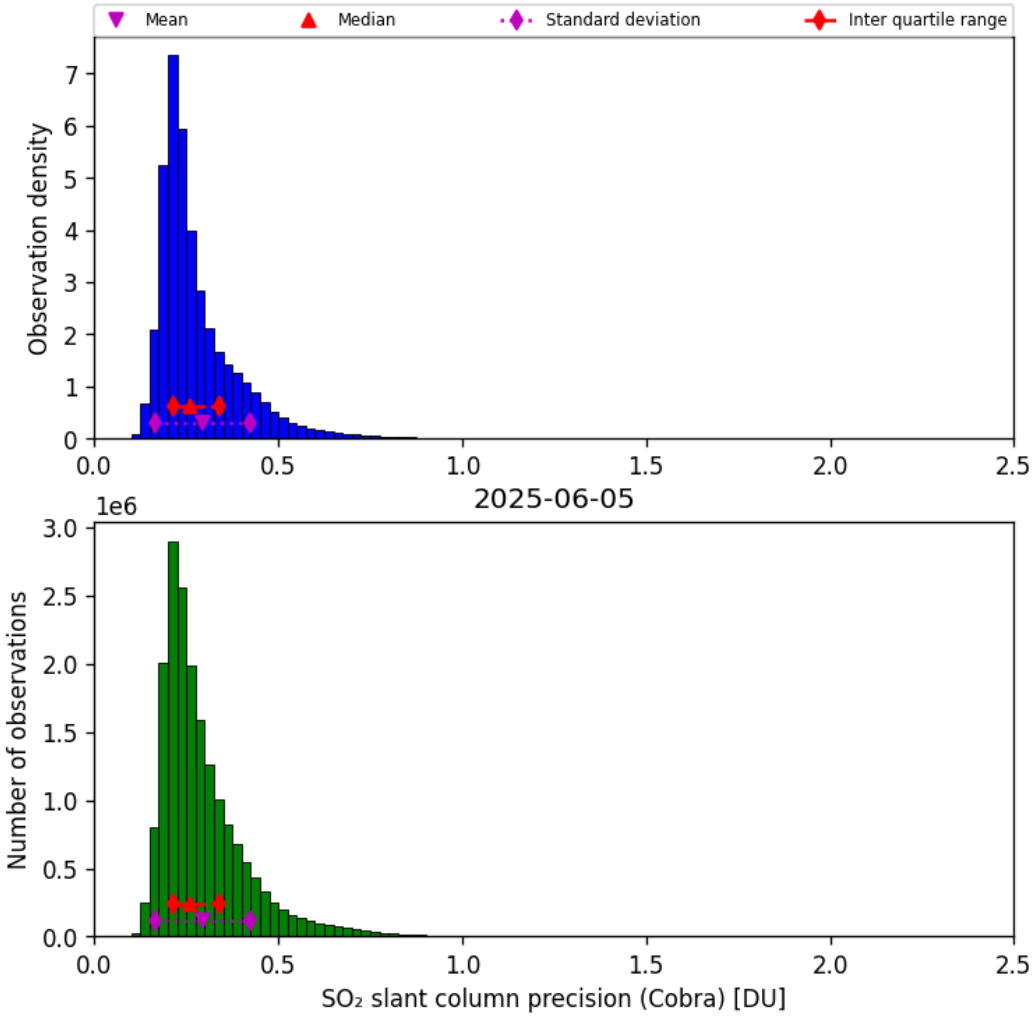

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-06-05 to 2025-06-06

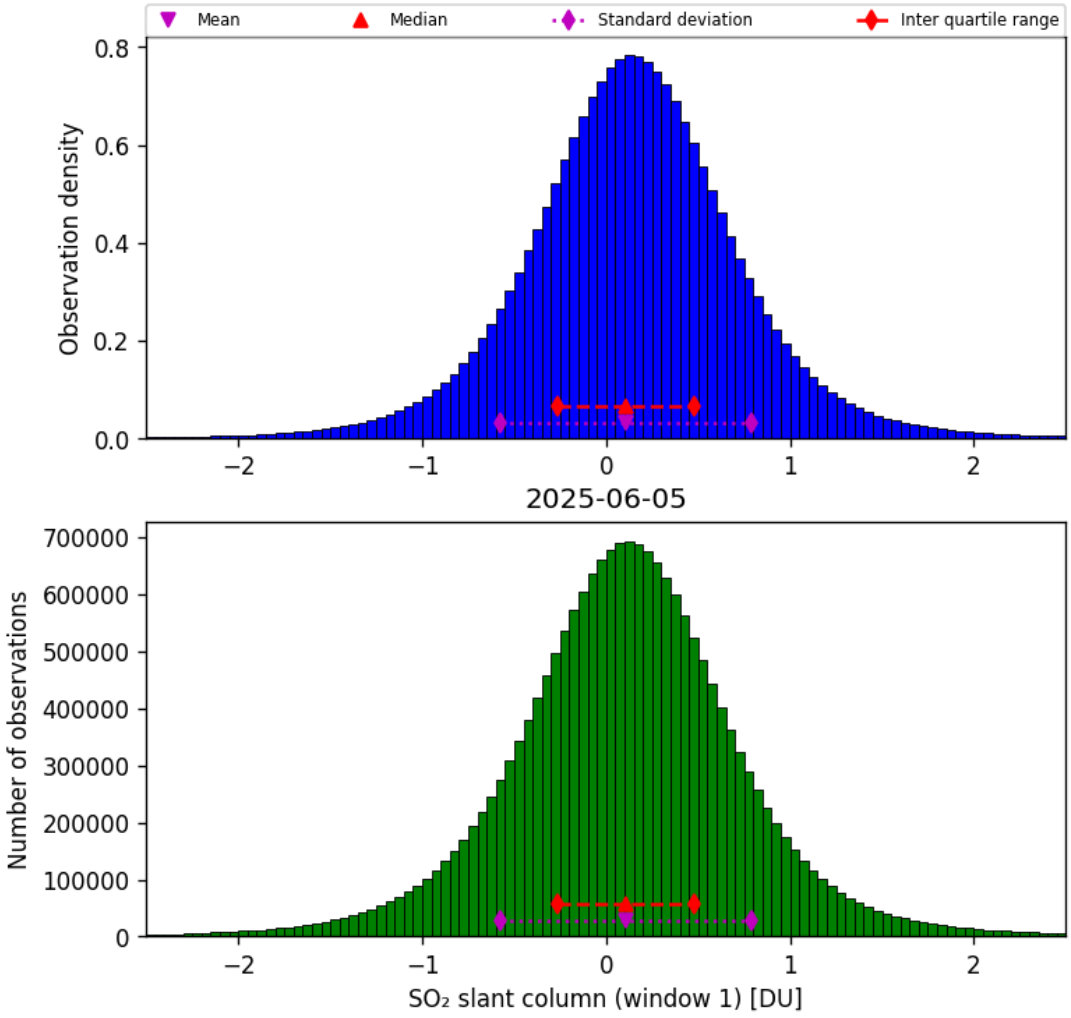

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-06-05 to 2025-06-06

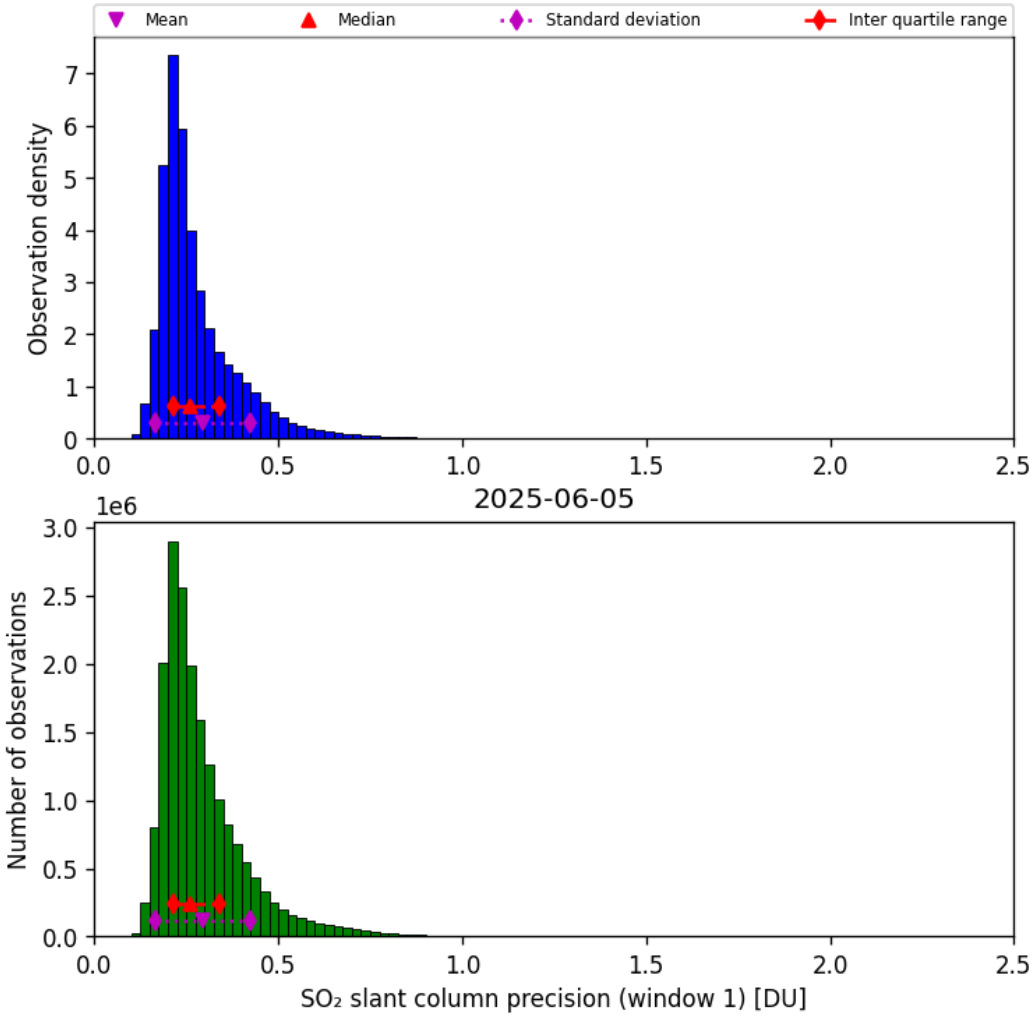

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-06-05 to 2025-06-06

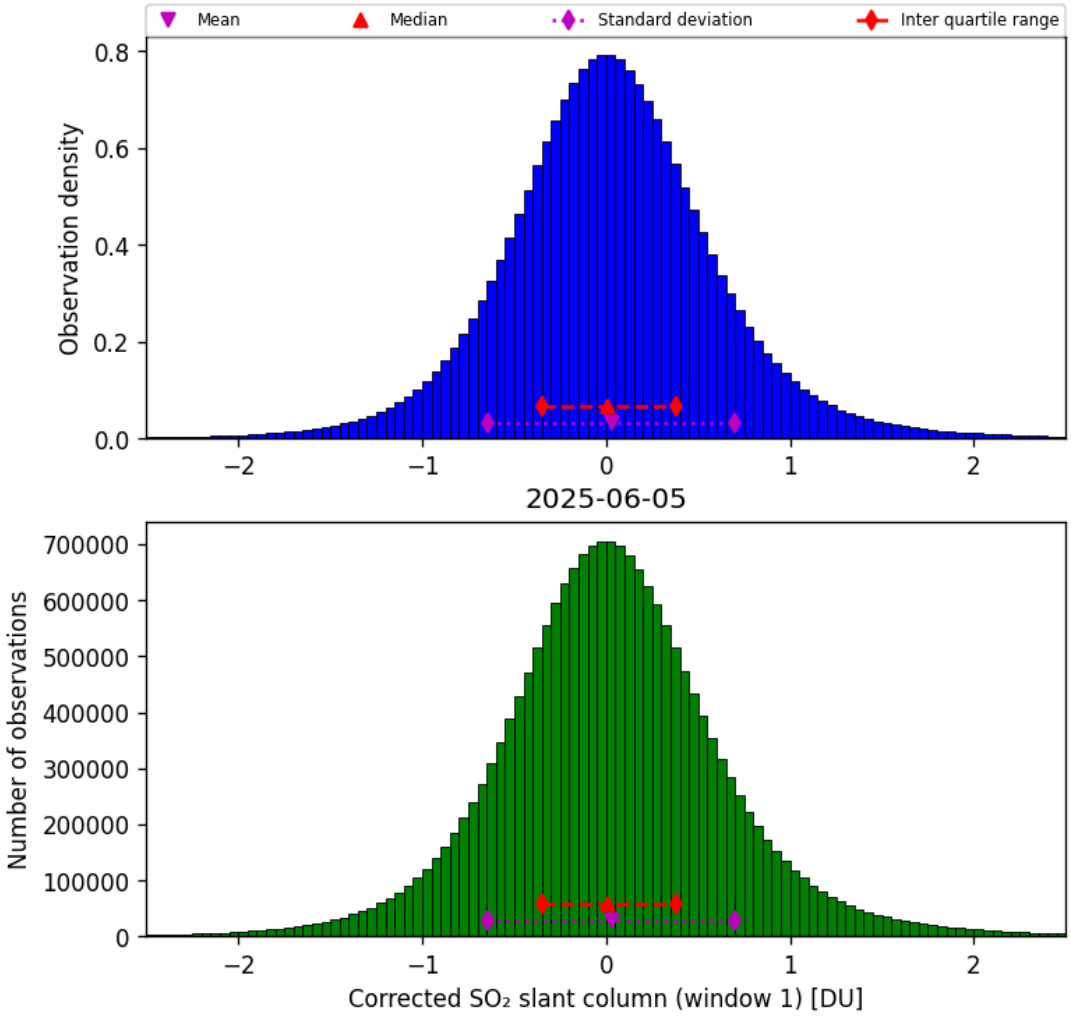

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-06-05 to 2025-06-06

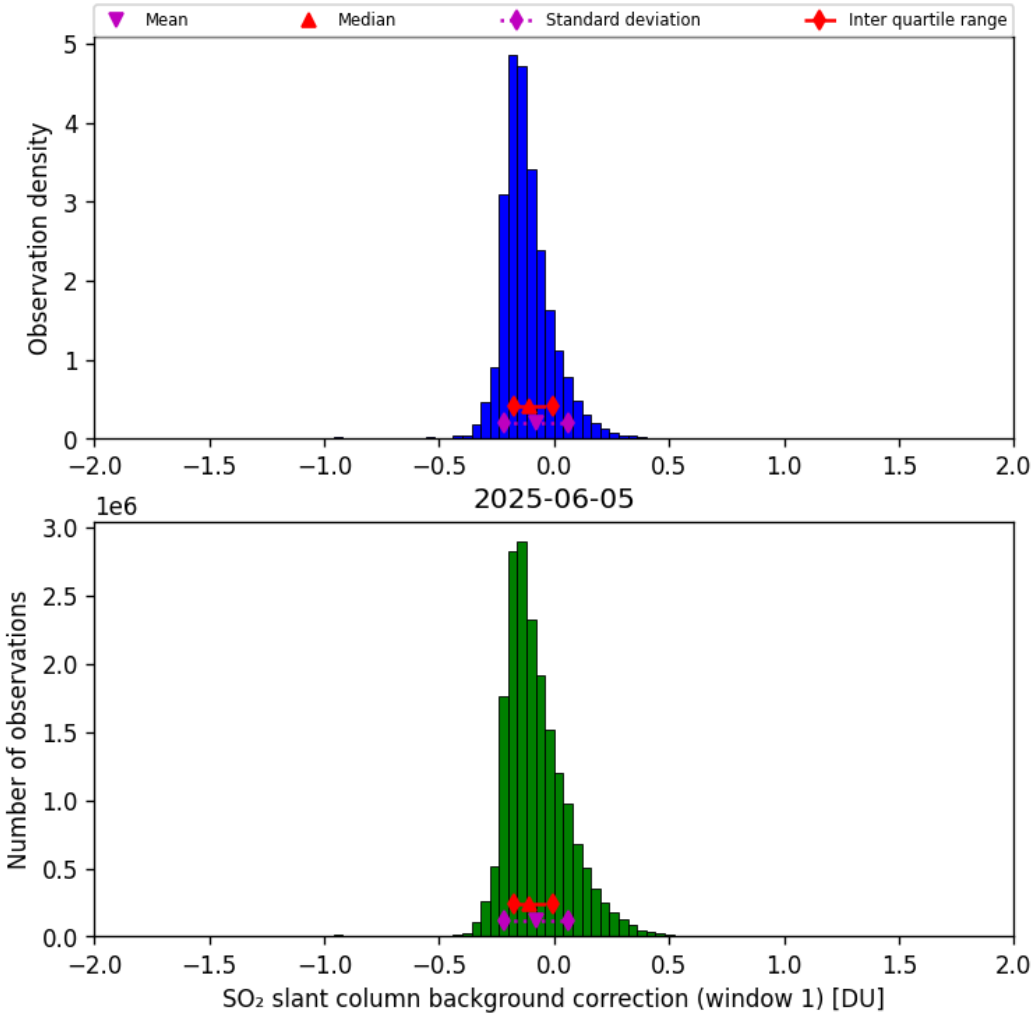

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-06-05 to 2025-06-06

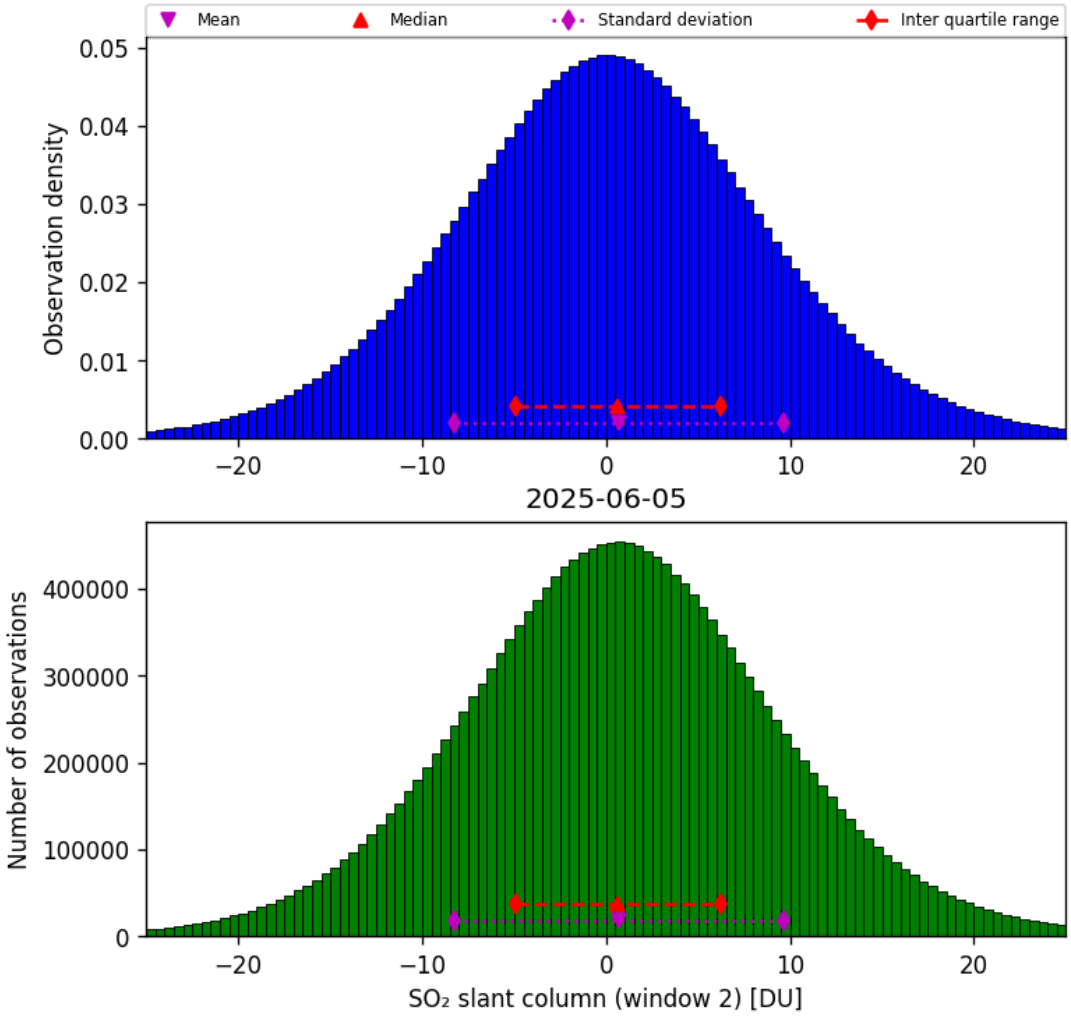

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-06-05 to 2025-06-06

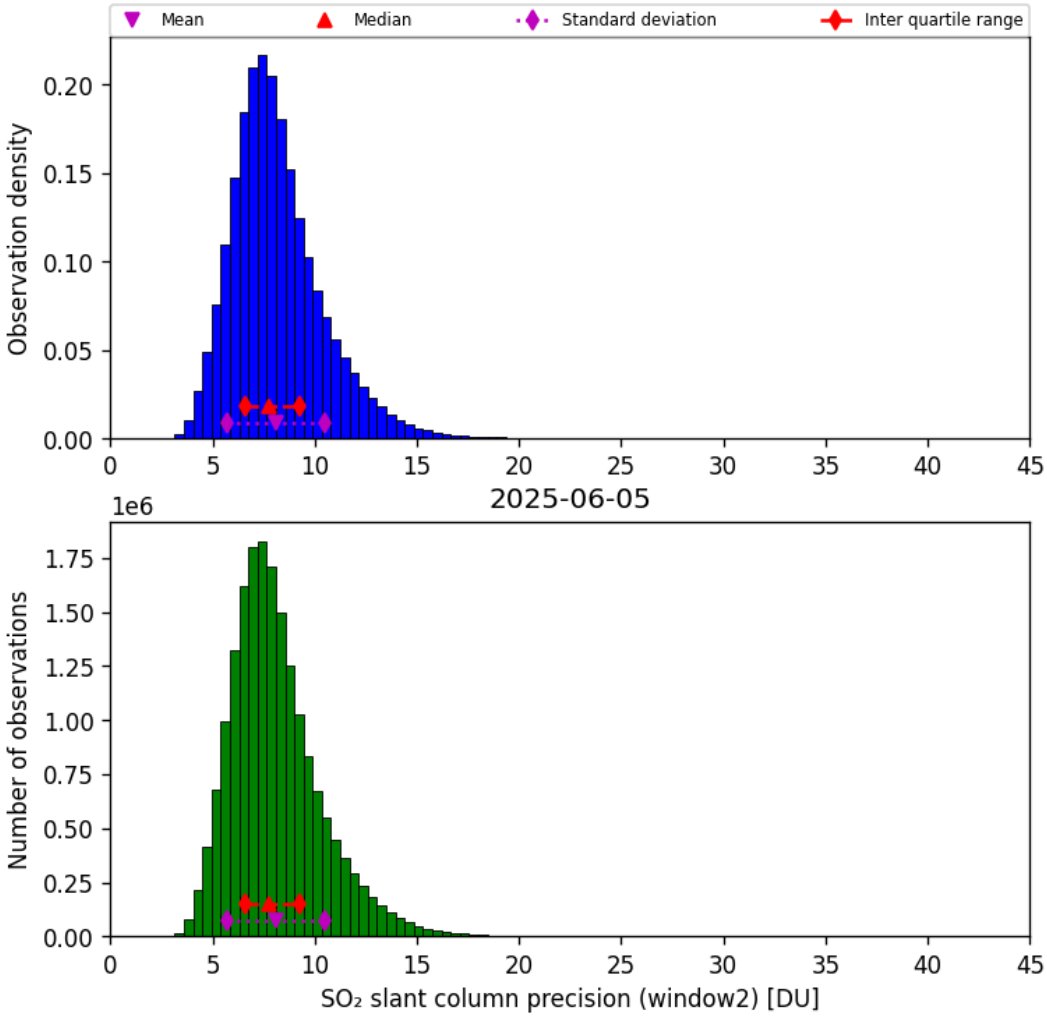

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-06-05 to 2025-06-06

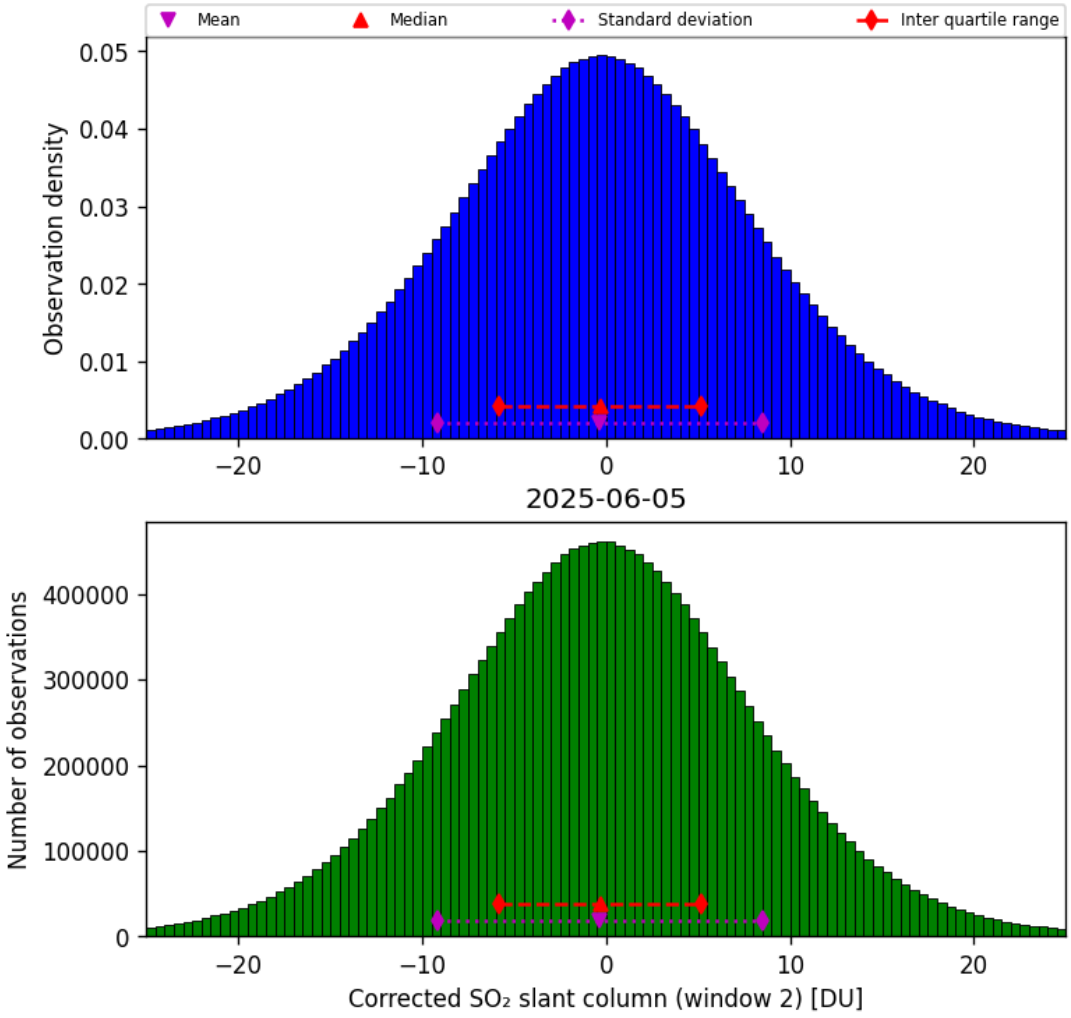

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-06-05 to 2025-06-06

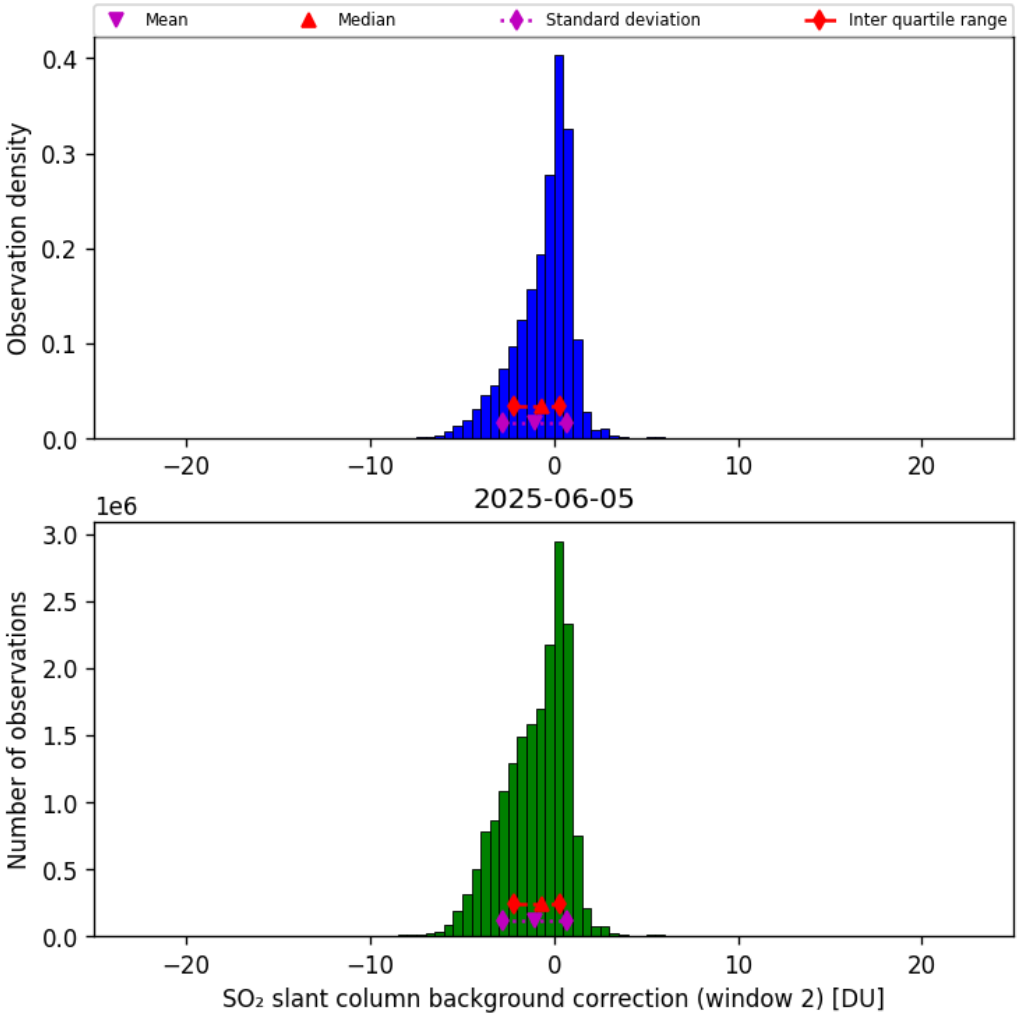

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-06-05 to 2025-06-06

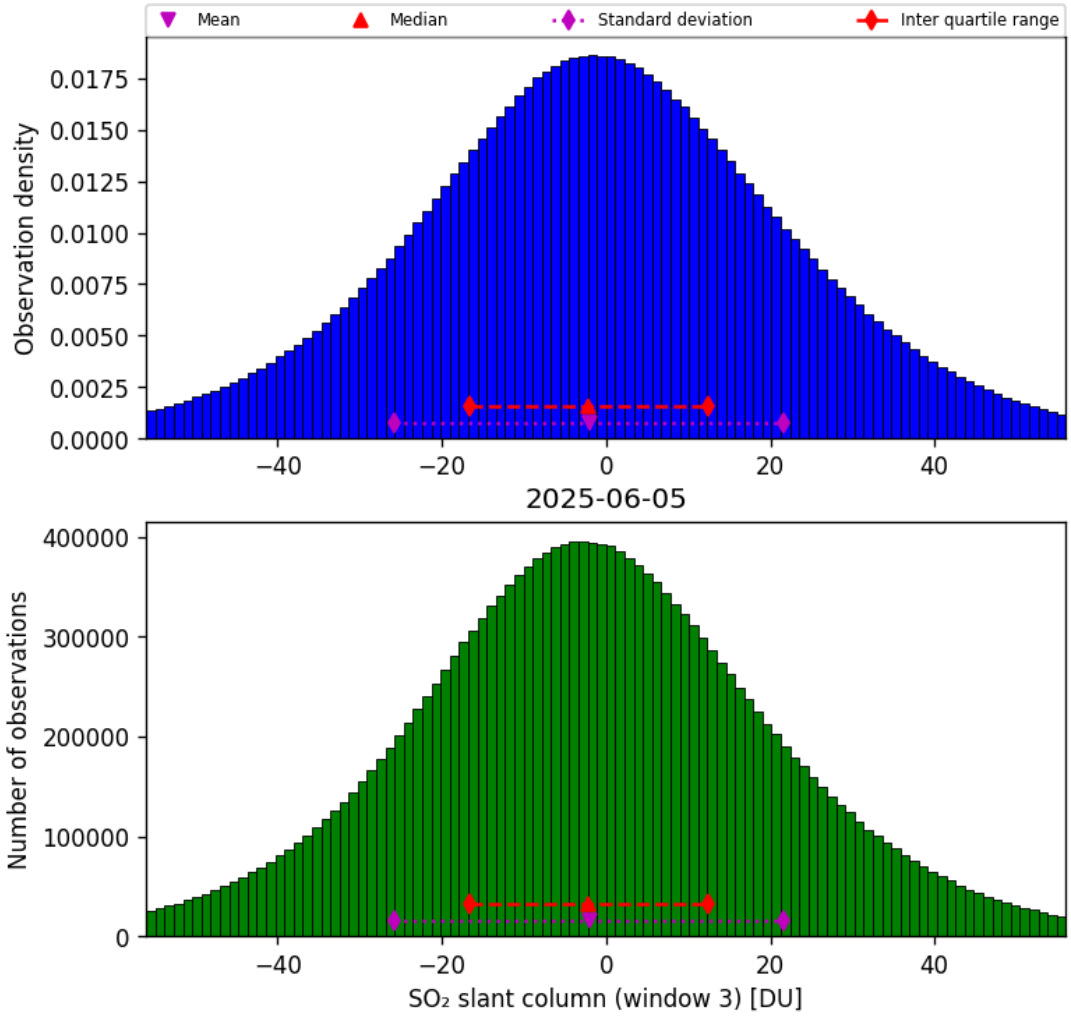

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-06-05 to 2025-06-06

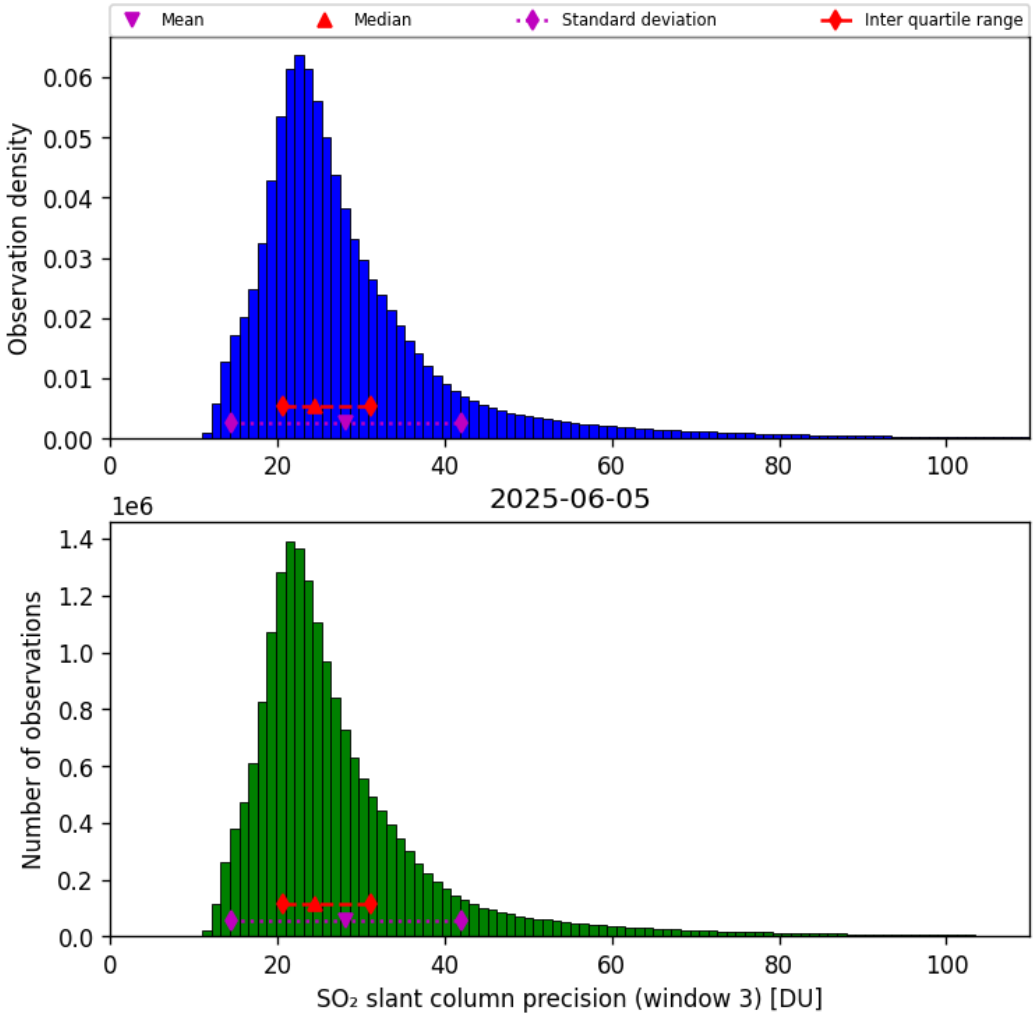

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-06-05 to 2025-06-06

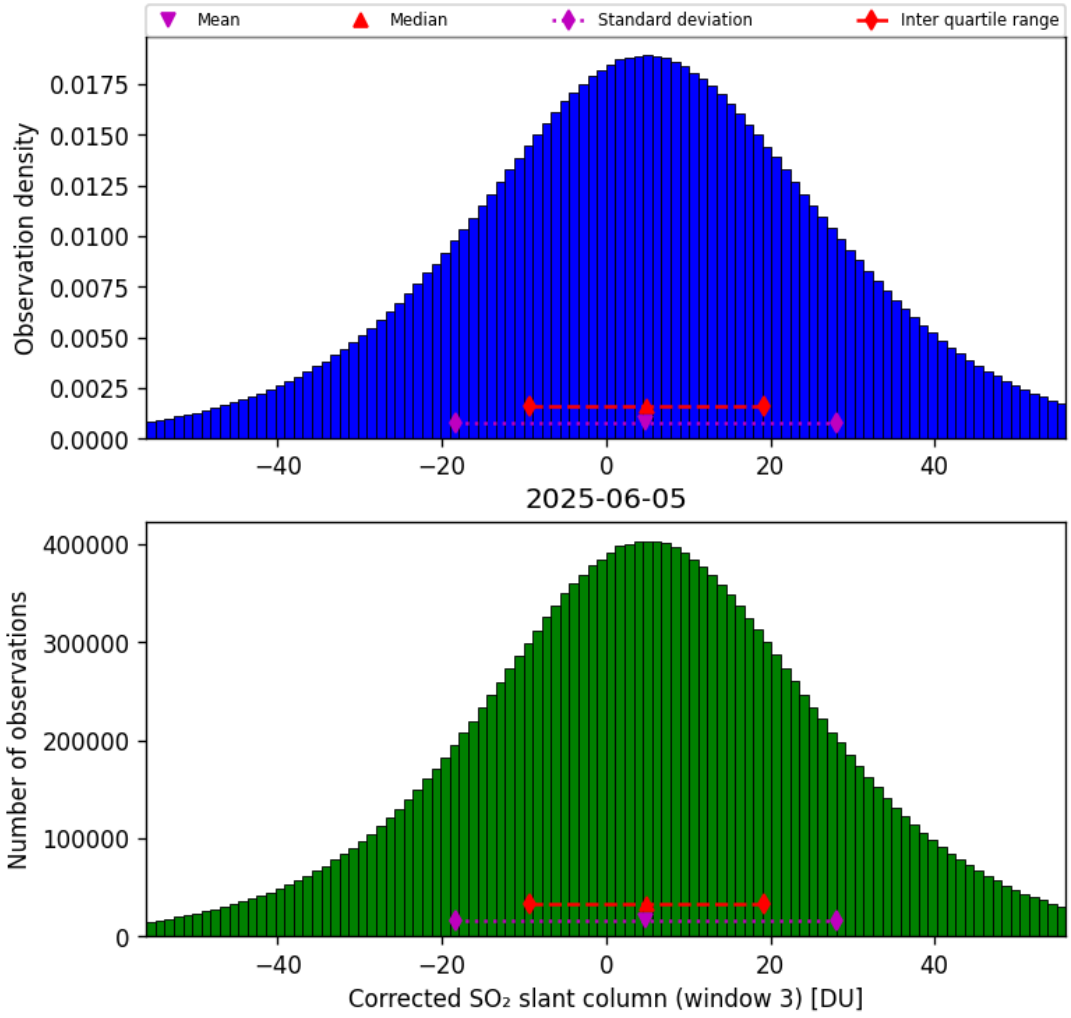

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-06-05 to 2025-06-06

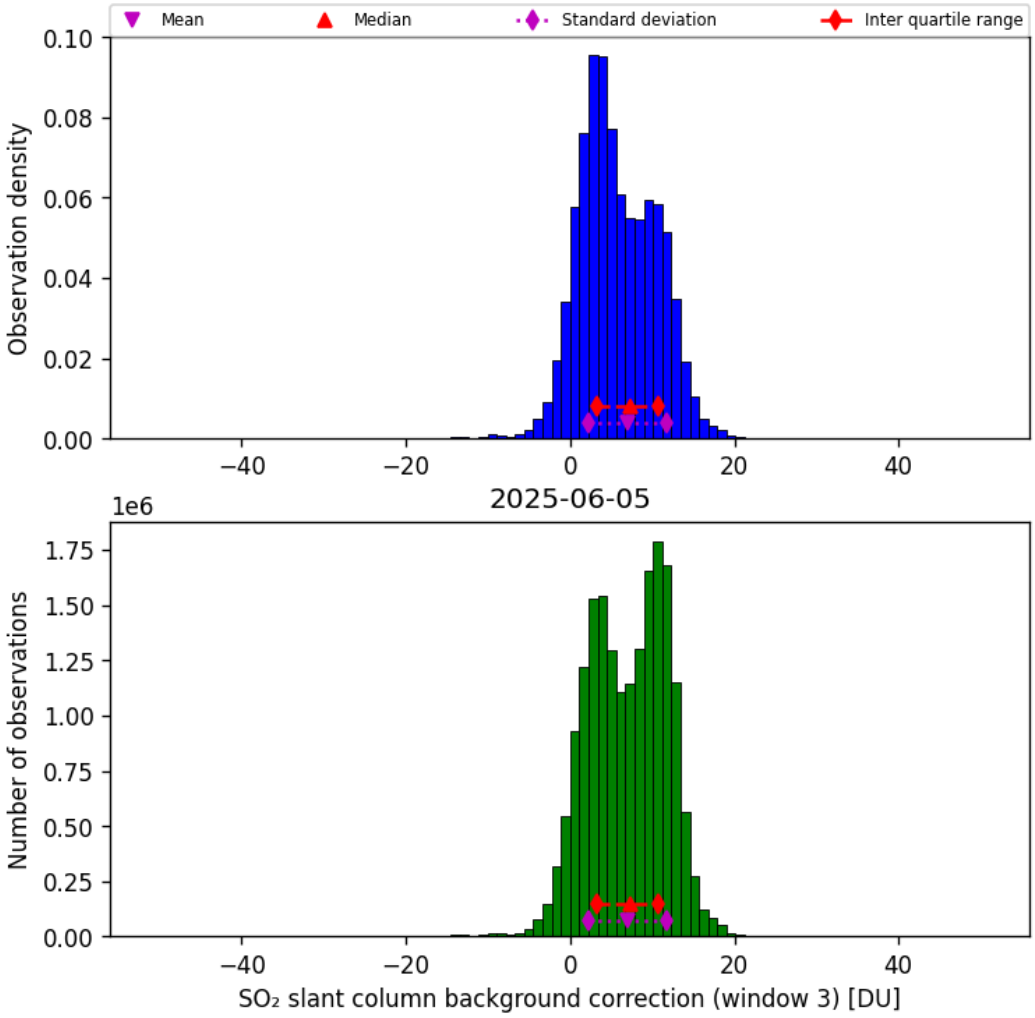

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-06-05 to 2025-06-06

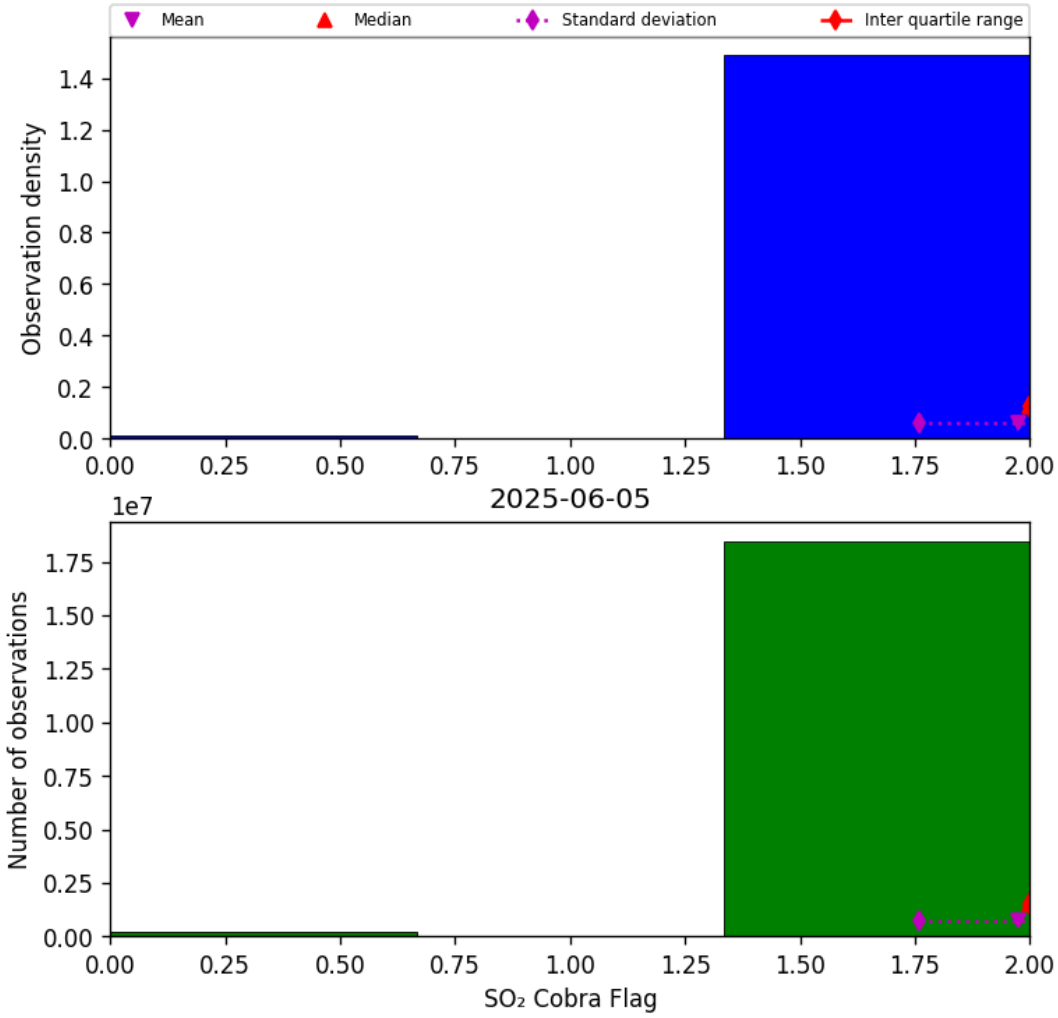

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-06-05 to 2025-06-06

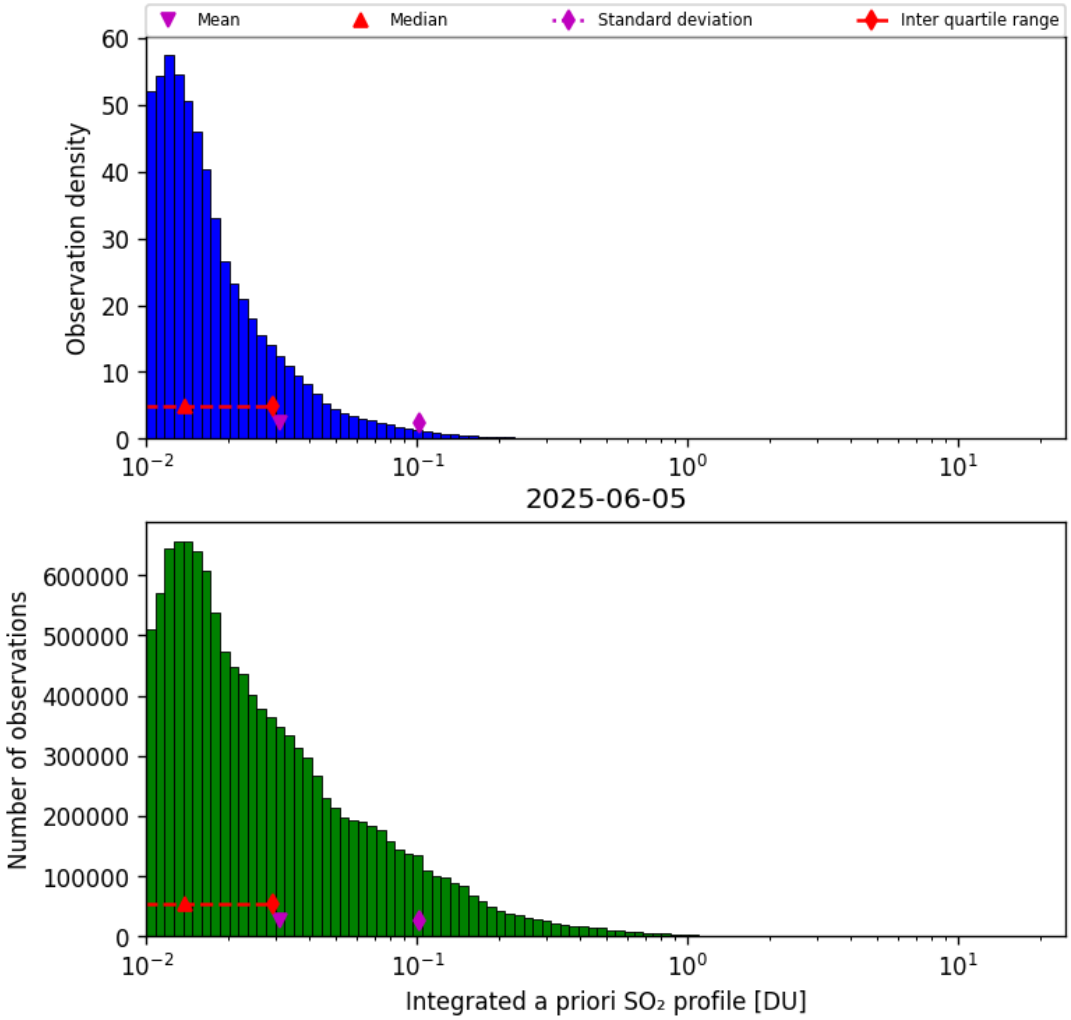

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-06-05 to 2025-06-06

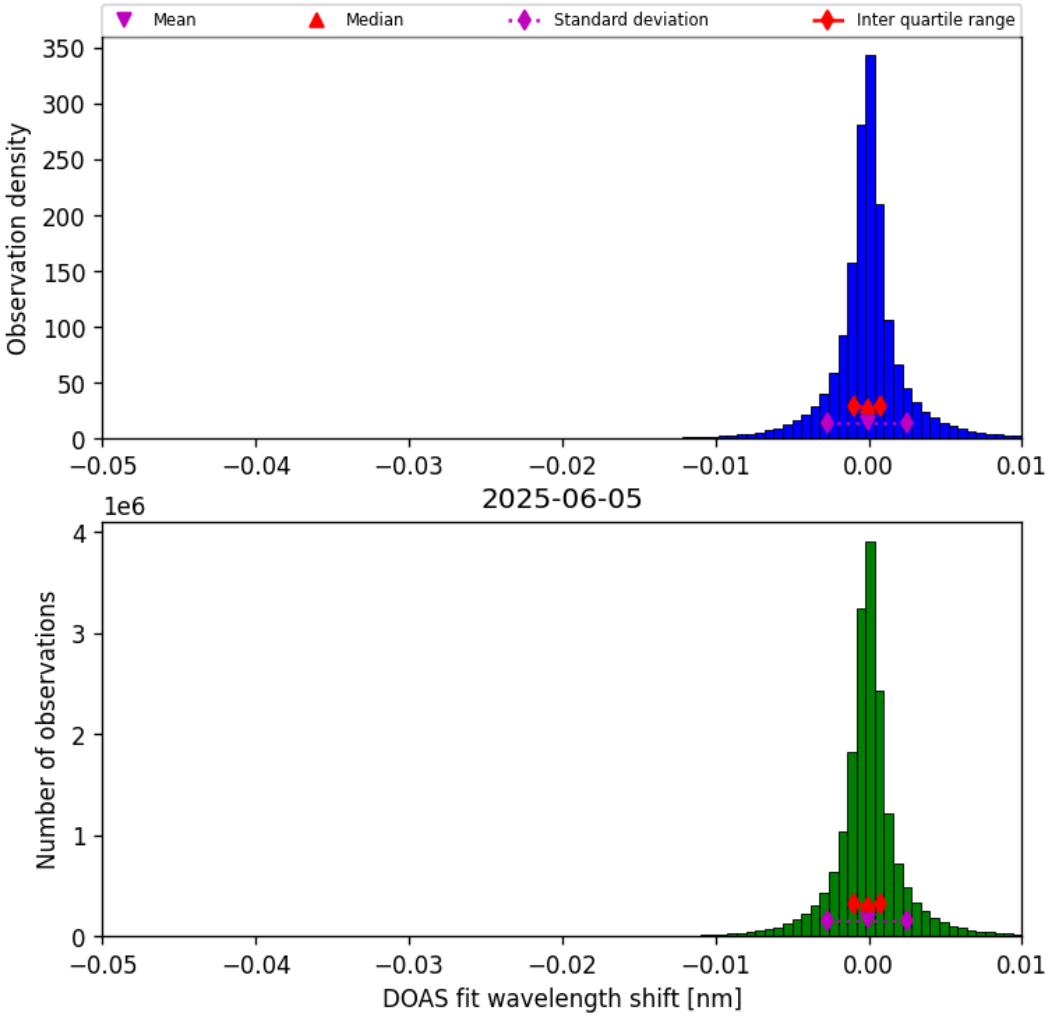

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-06-05 to 2025-06-06

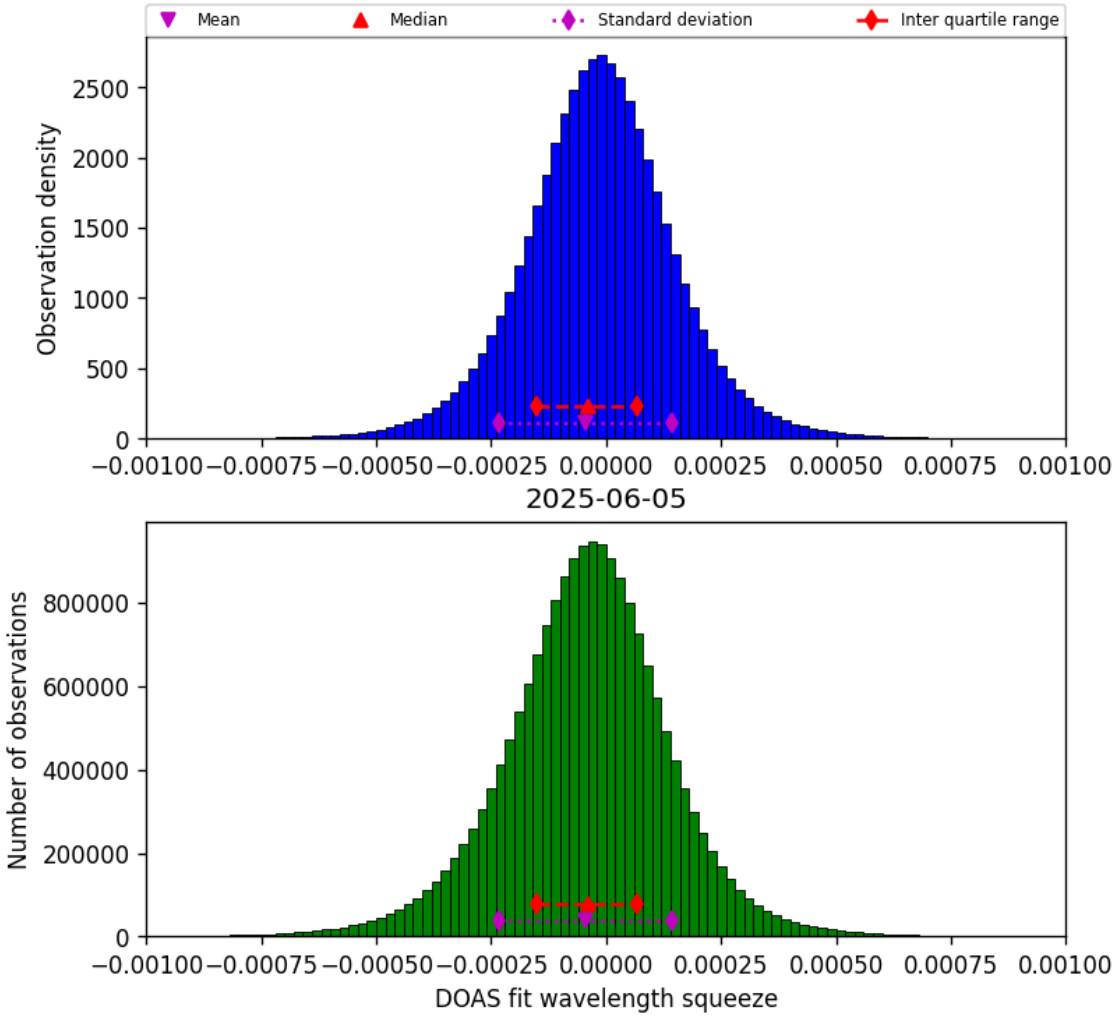

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-06-05 to 2025-06-06

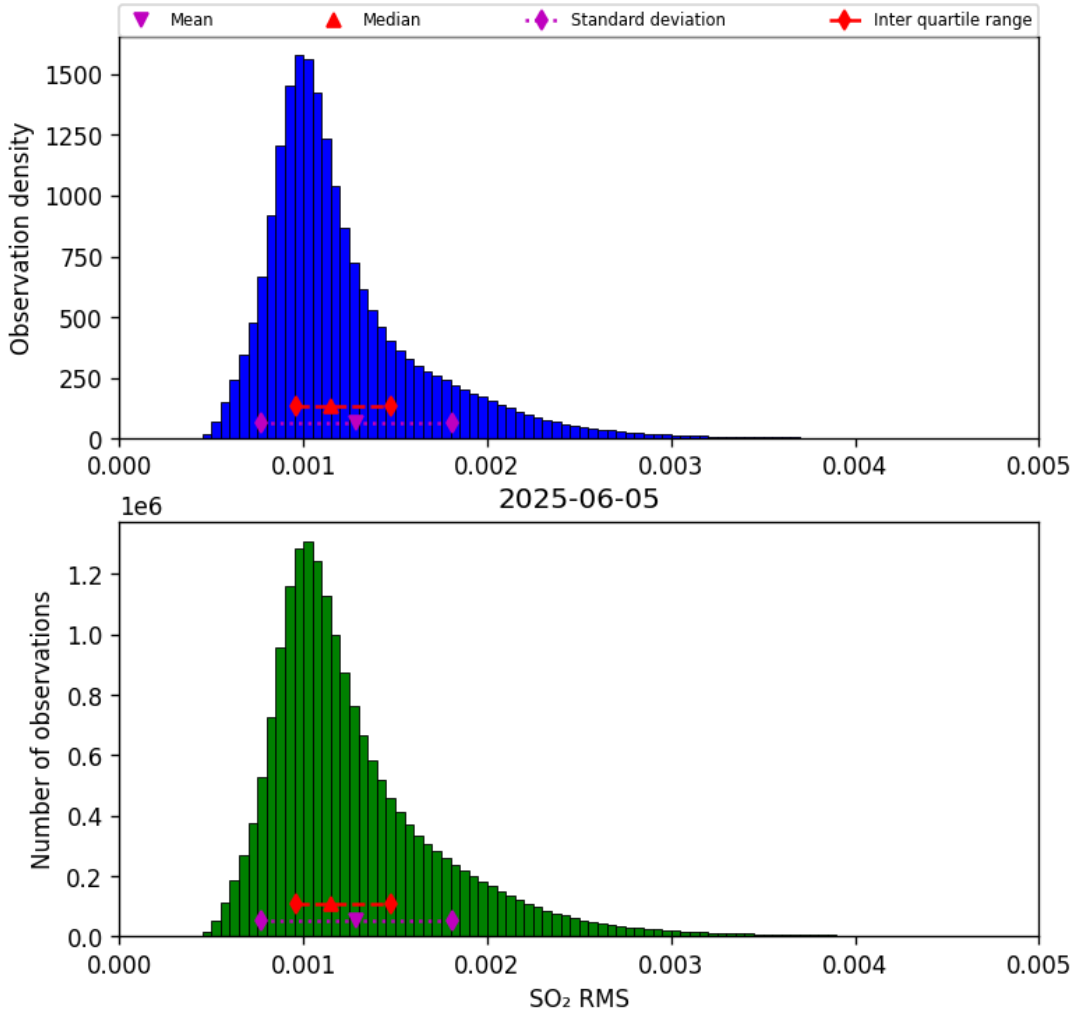

Figure 79: Histogram of "SO_2 RMS" for 2025-06-05 to 2025-06-06

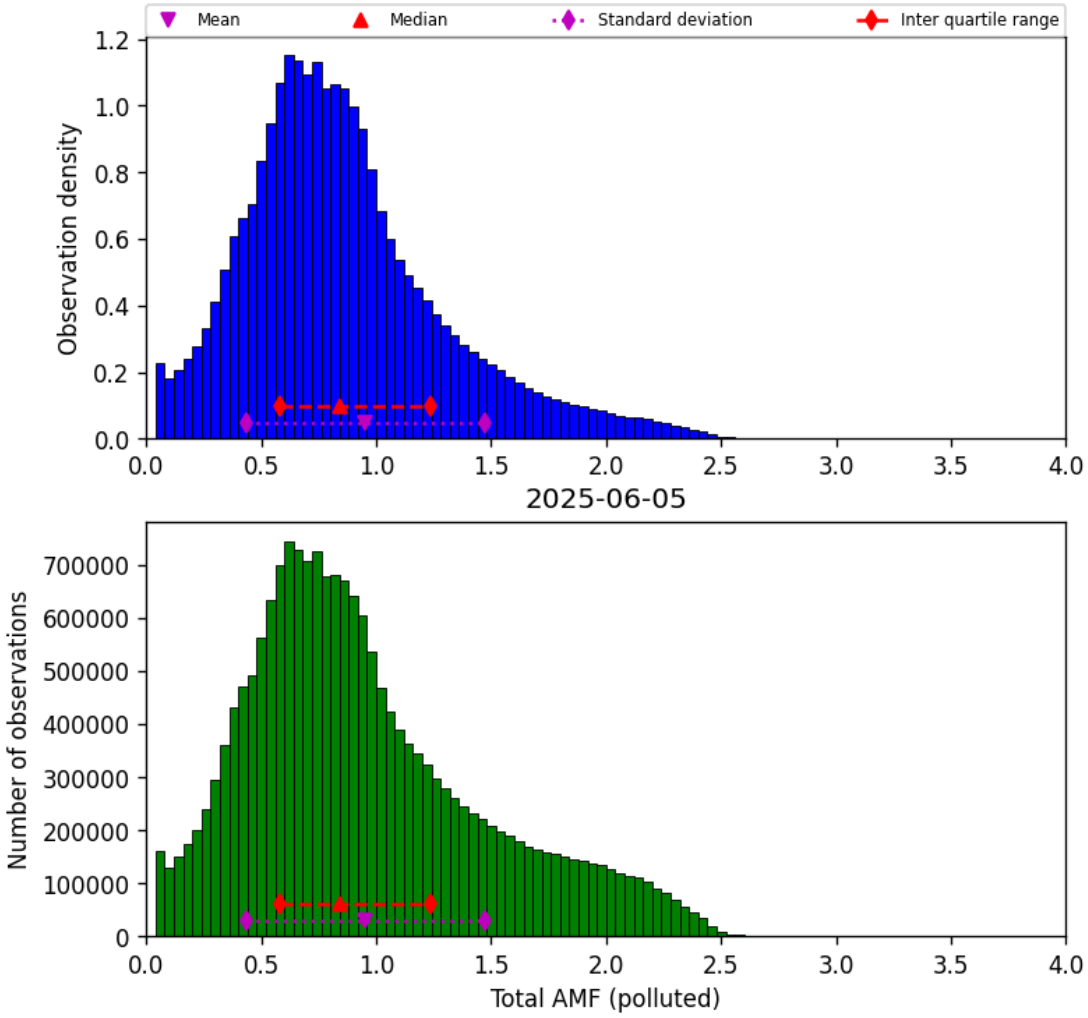

Figure 80: Histogram of “Total AMF (polluted)” for 2025-06-05 to 2025-06-06

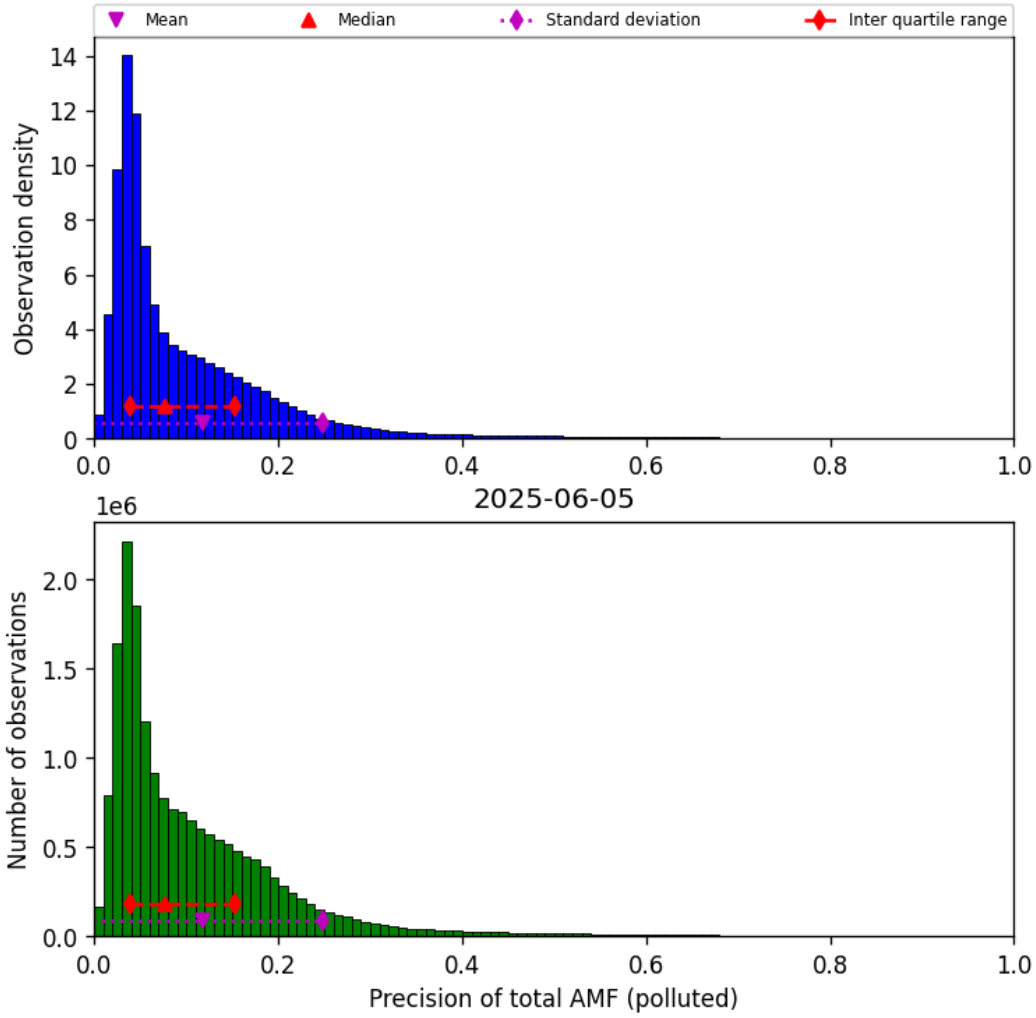

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-06-05 to 2025-06-06

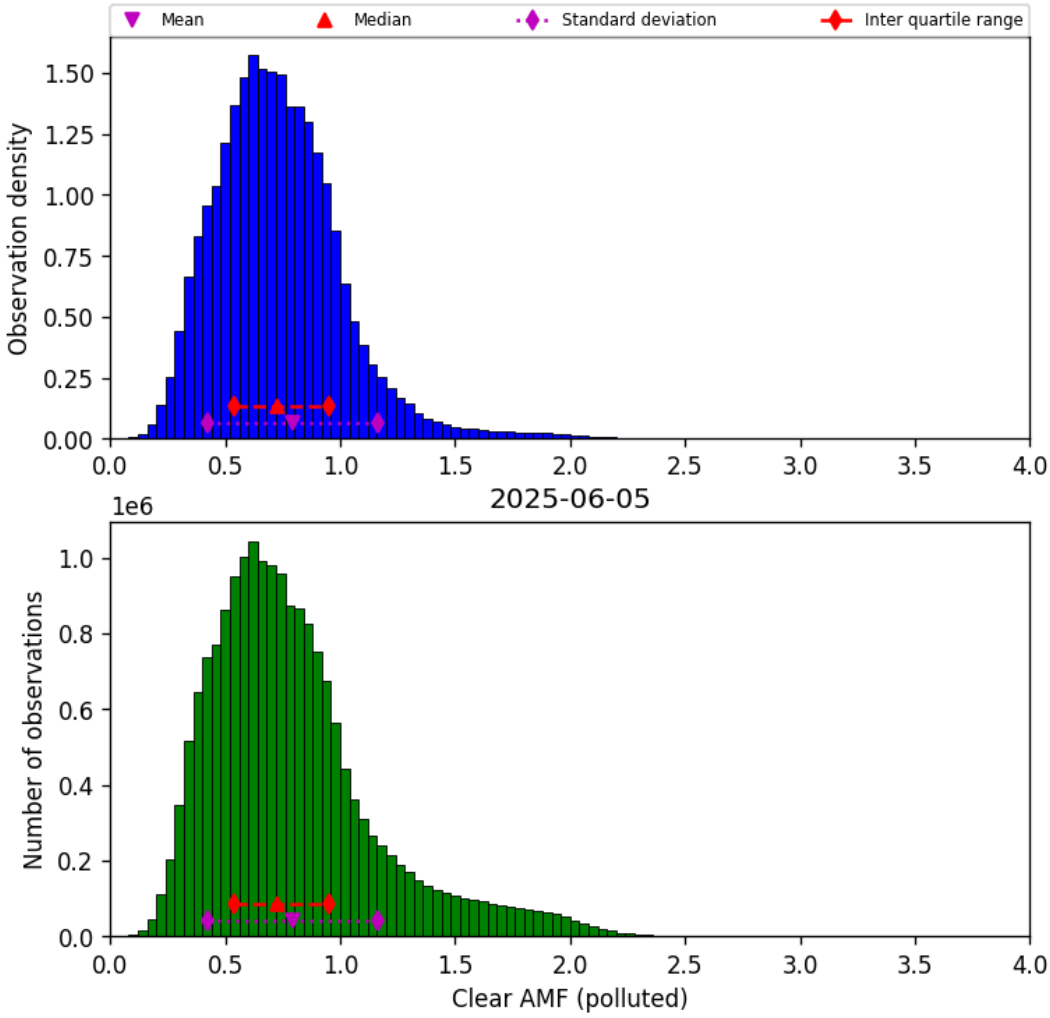

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-06-05 to 2025-06-06

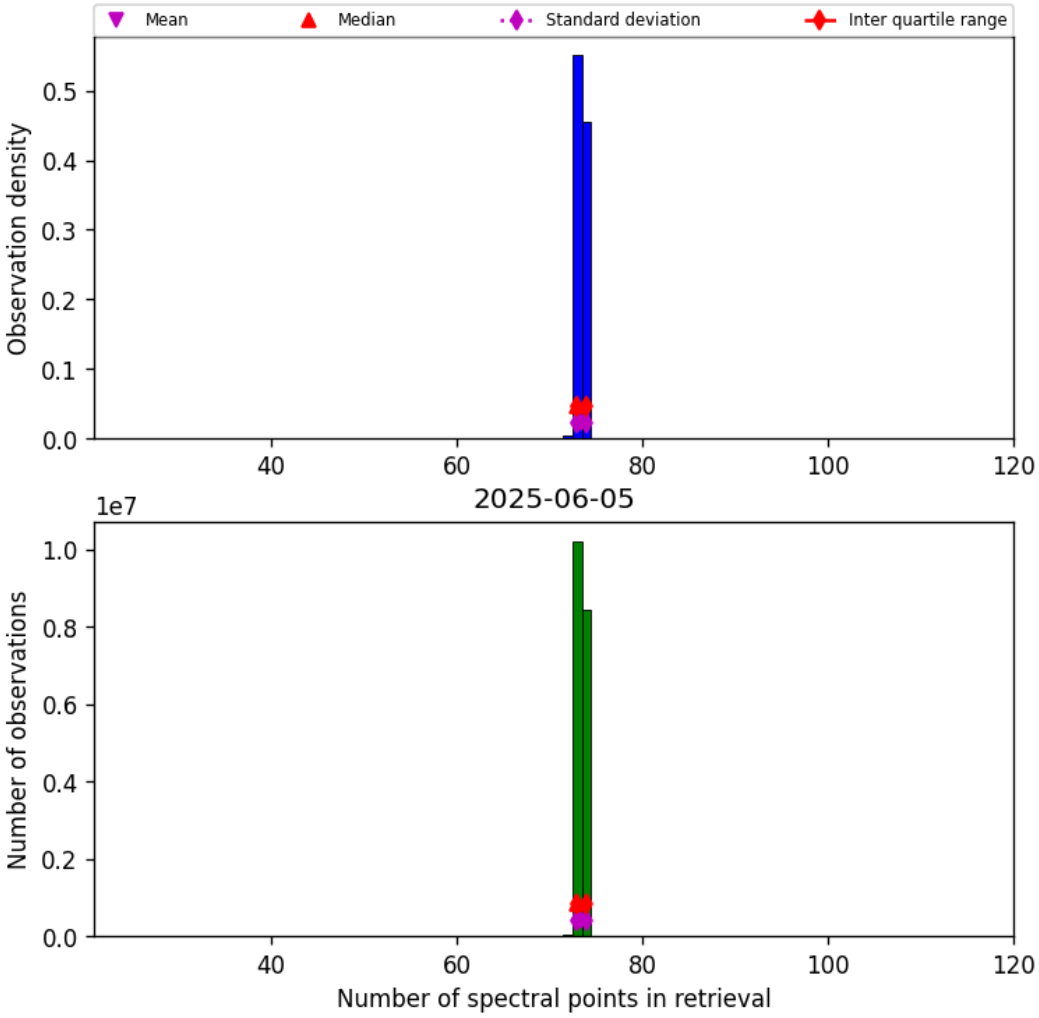

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-06-05 to 2025-06-06

9 Along track statistics

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

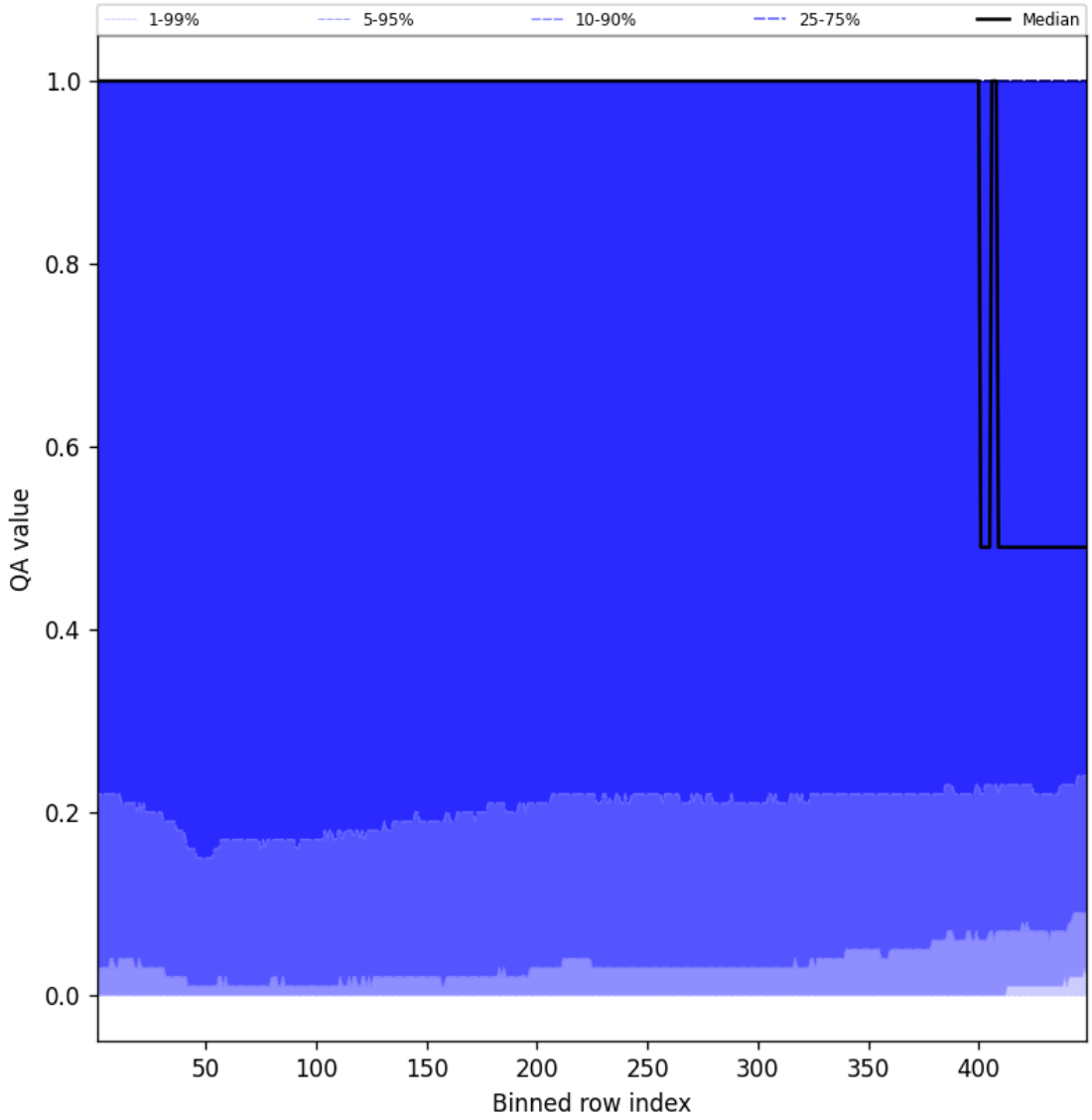

Figure 84: Along track statistics of “QA value” for 2025-06-05 to 2025-06-06

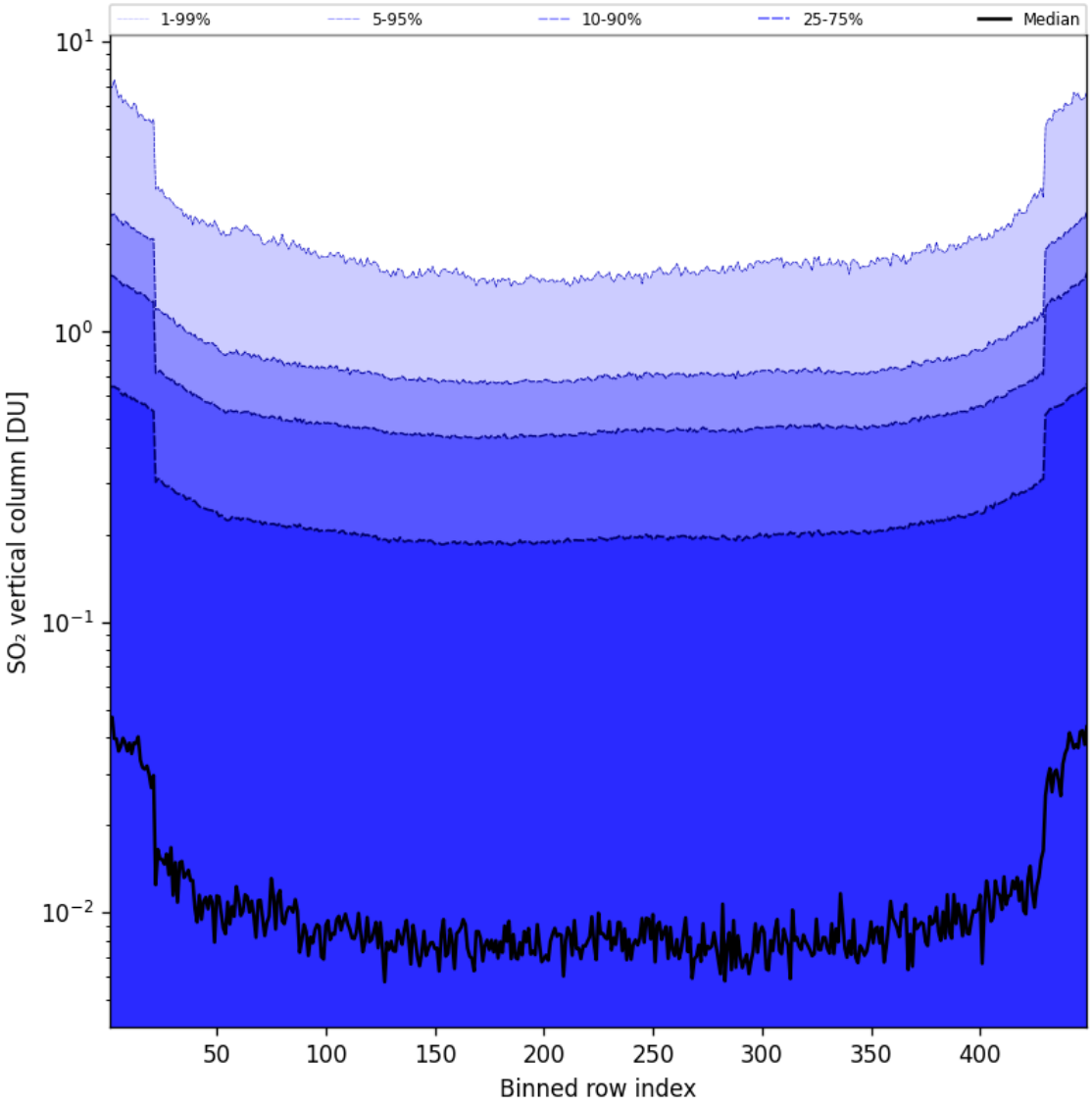

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-06-05 to 2025-06-06

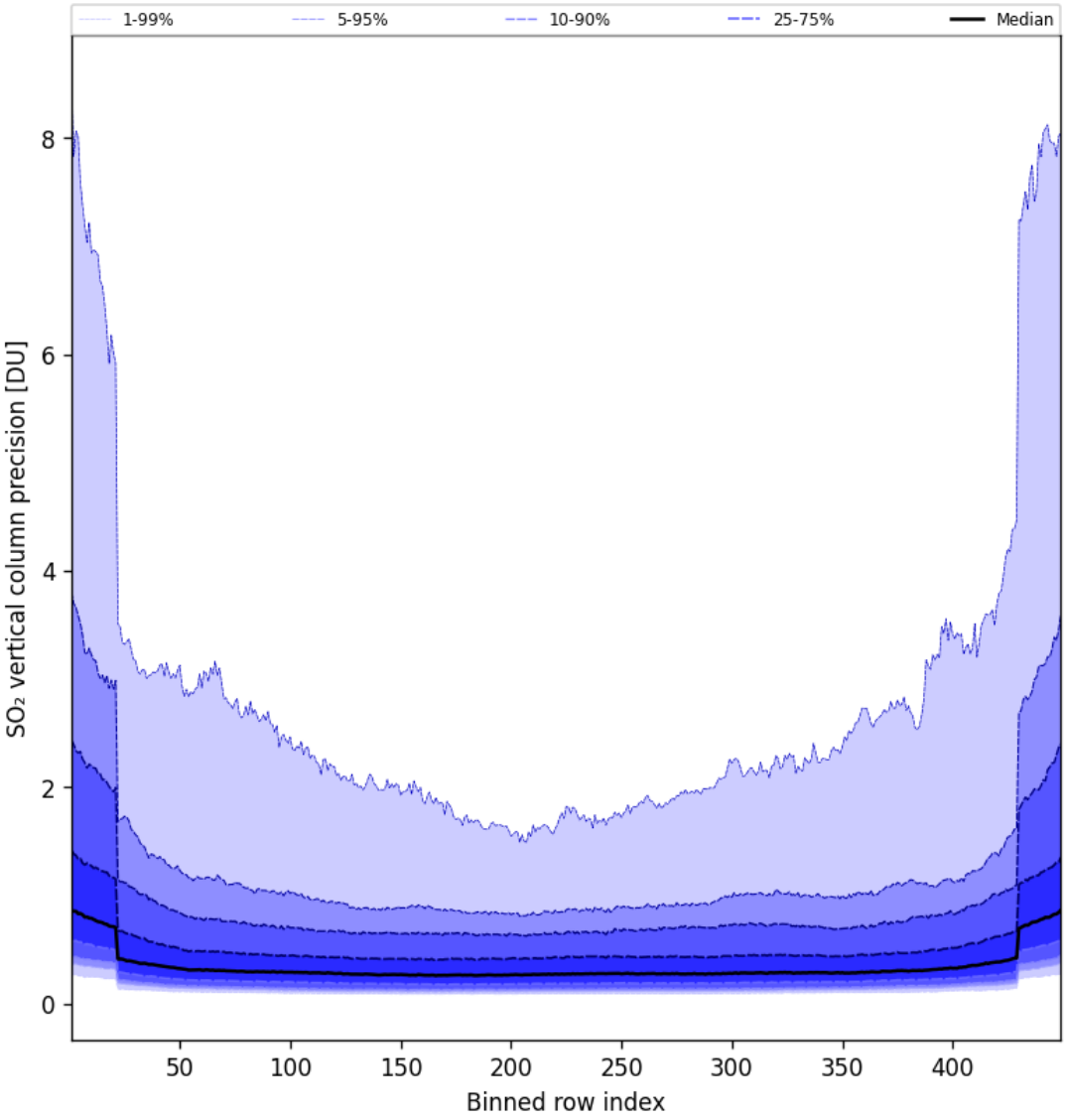

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-06-05 to 2025-06-06

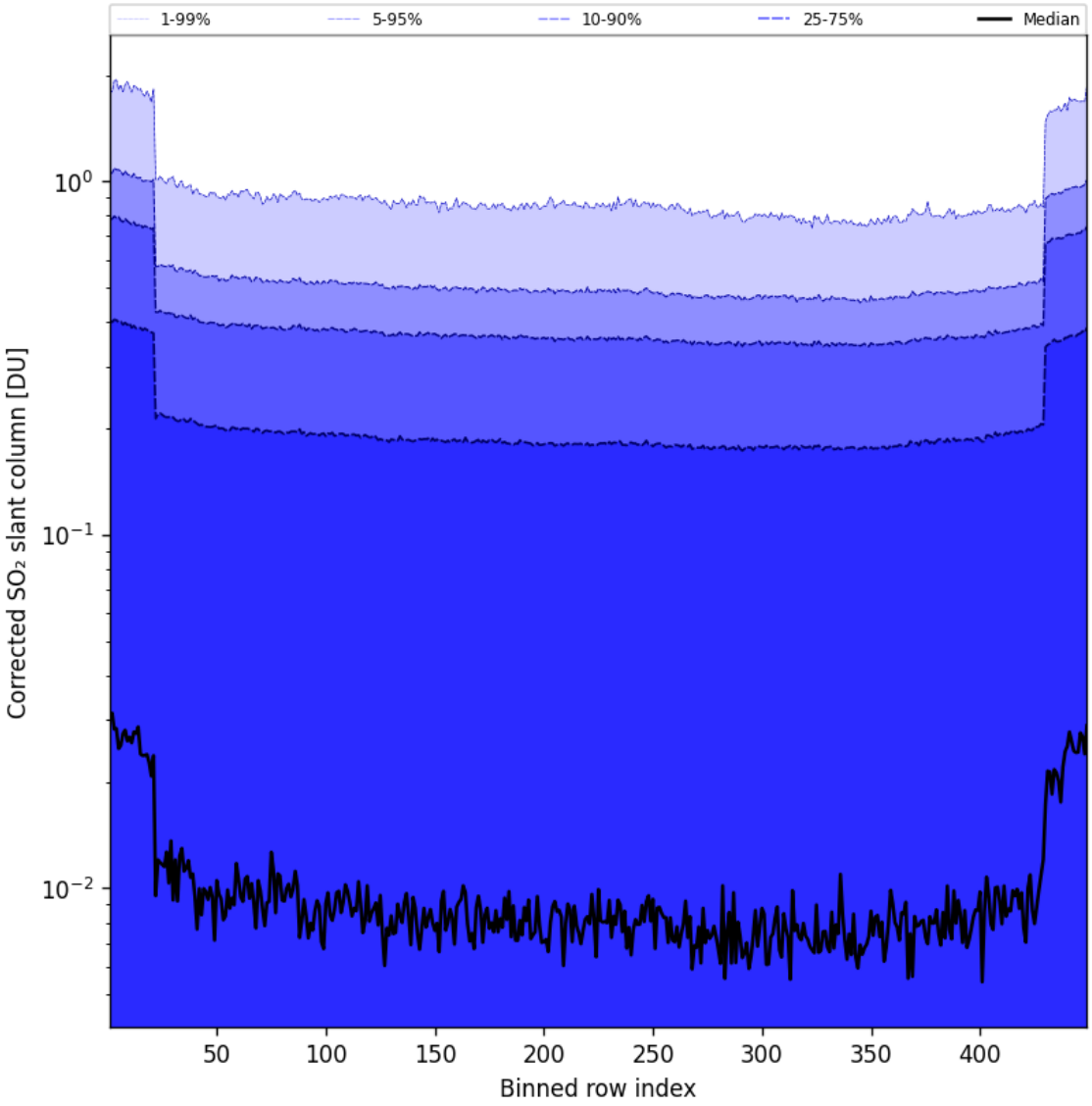

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-06-05 to 2025-06-06

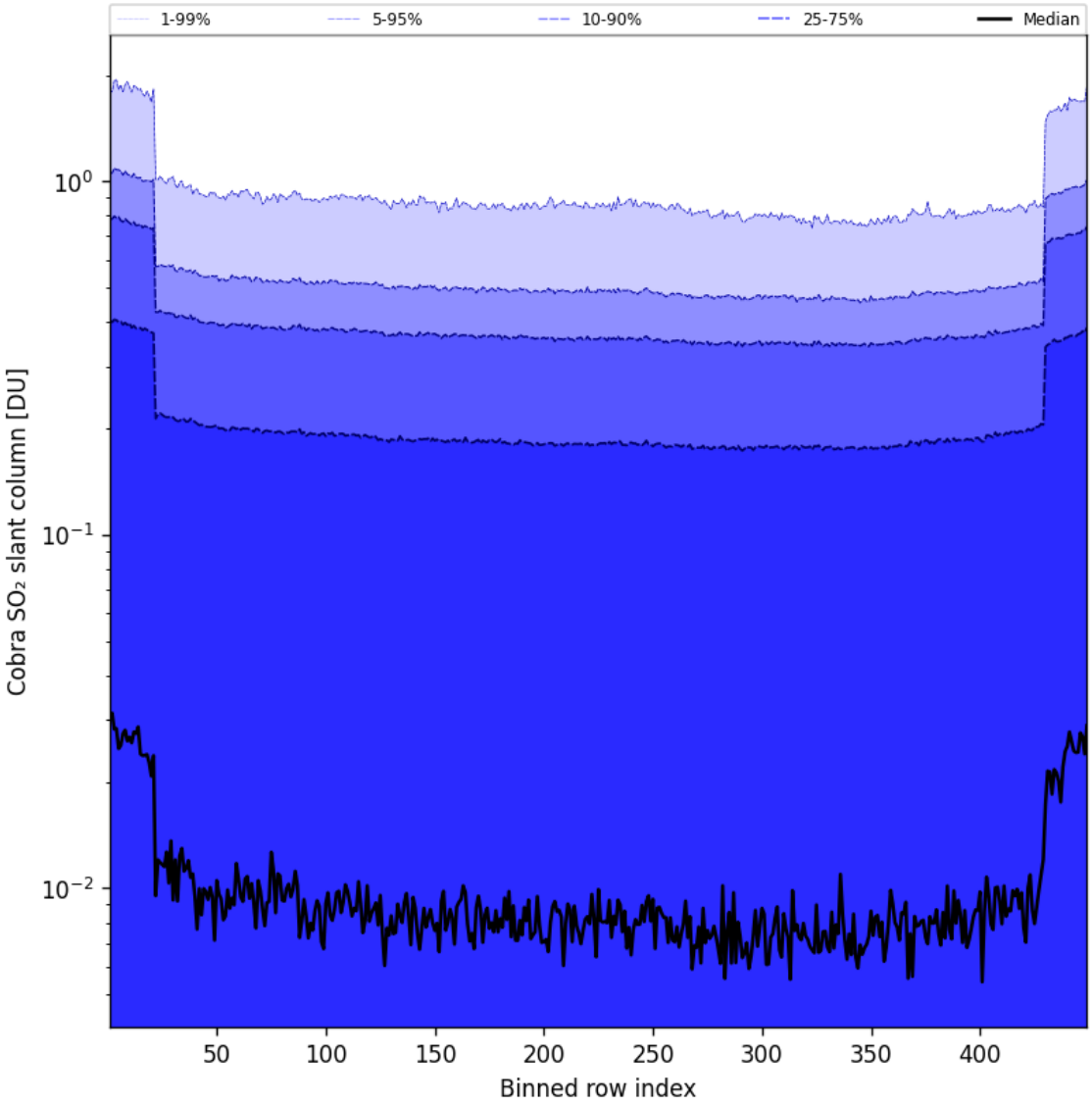

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-06-05 to 2025-06-06

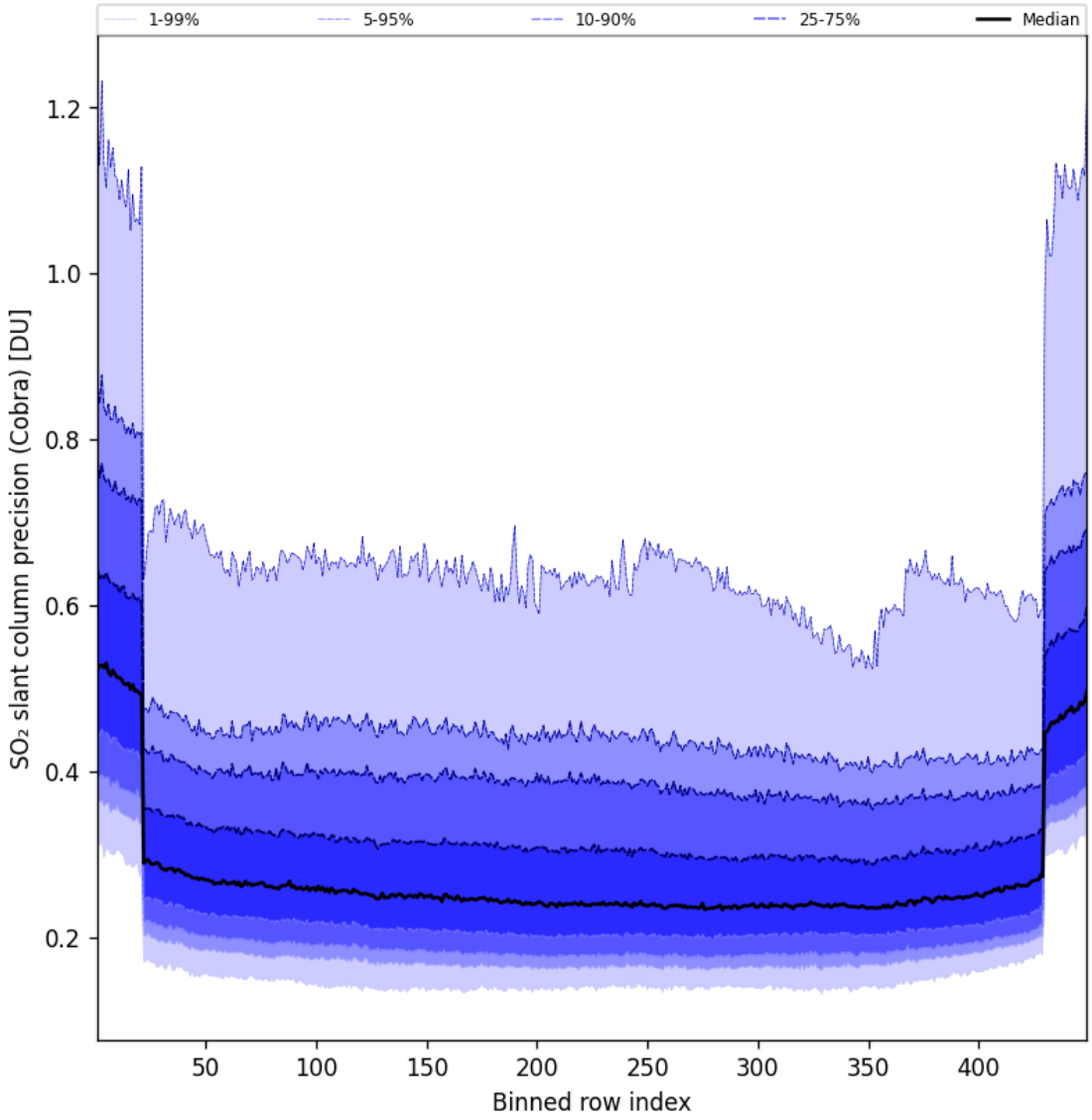

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-06-05 to 2025-06-06

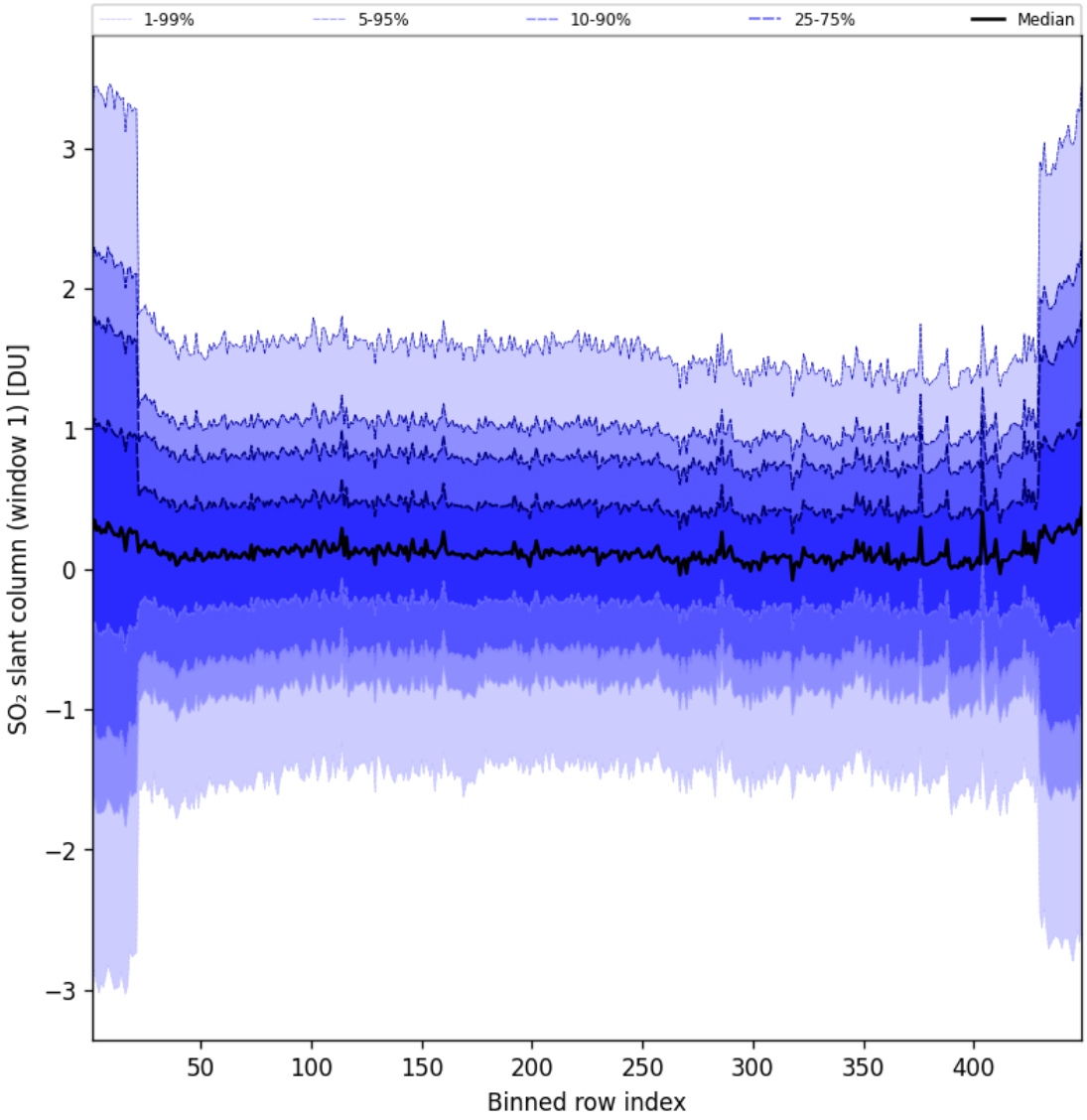

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-06-05 to 2025-06-06

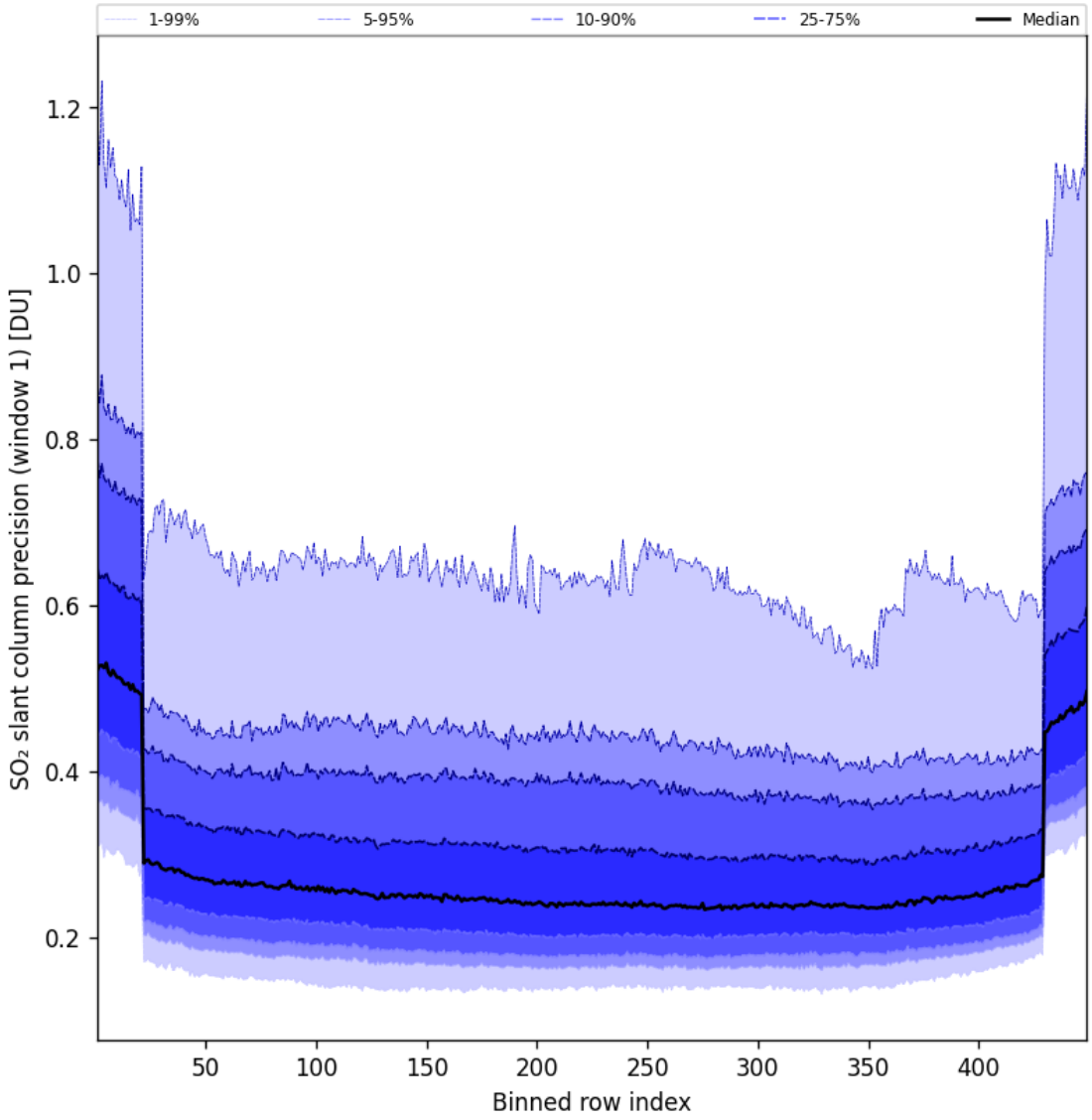

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-06-05 to 2025-06-06

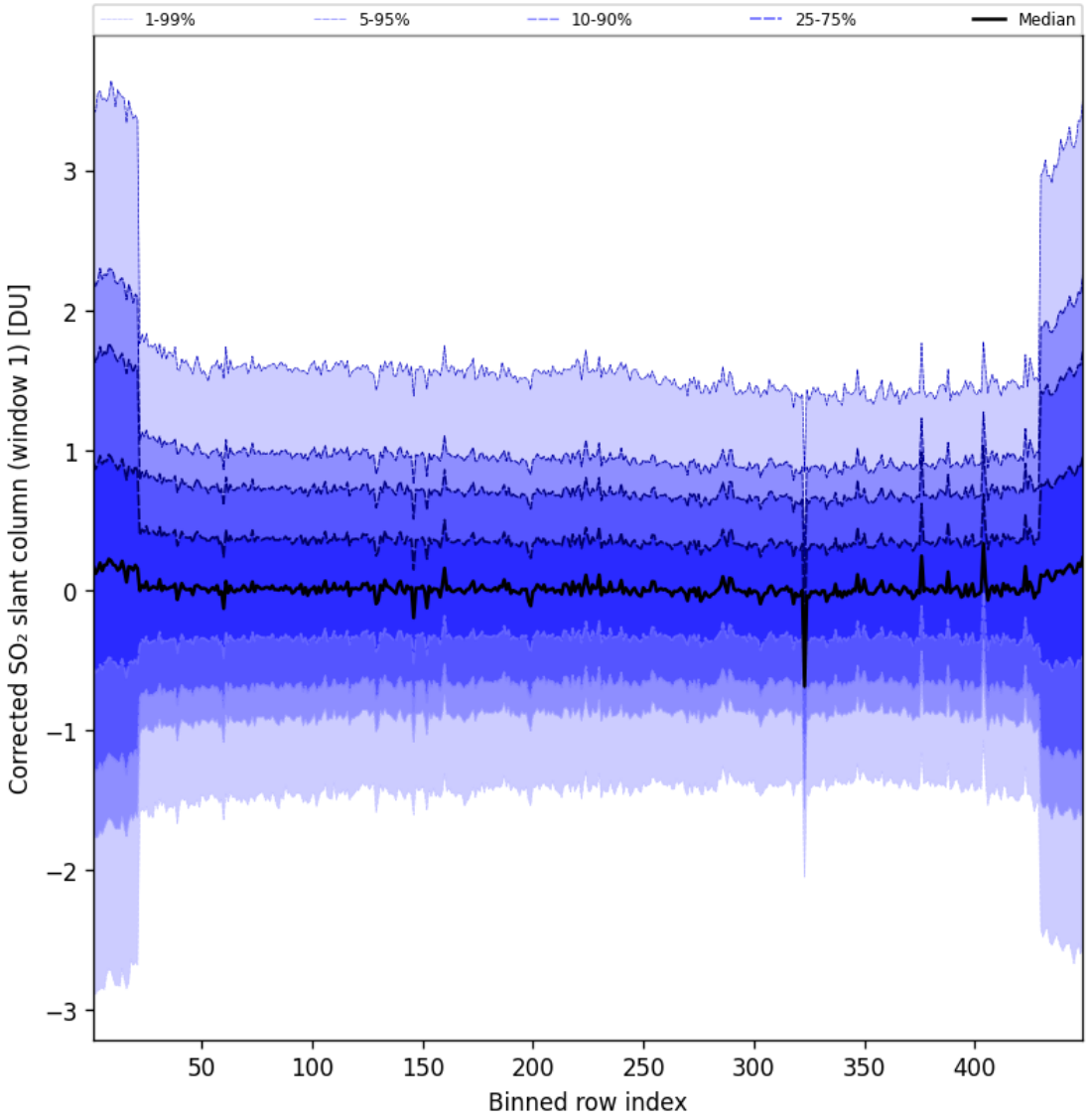

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-06-05 to 2025-06-06

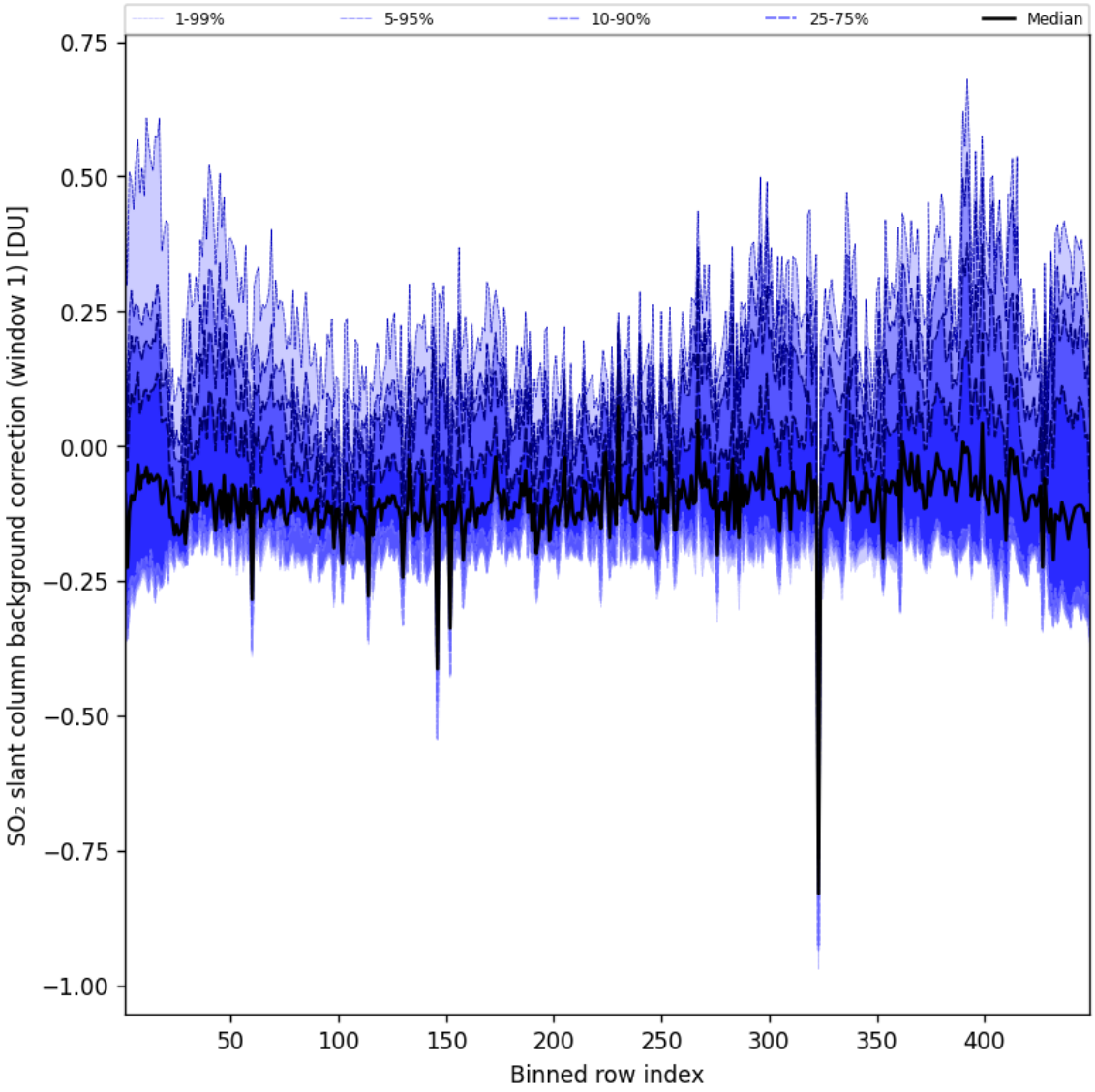

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-06-05 to 2025-06-06

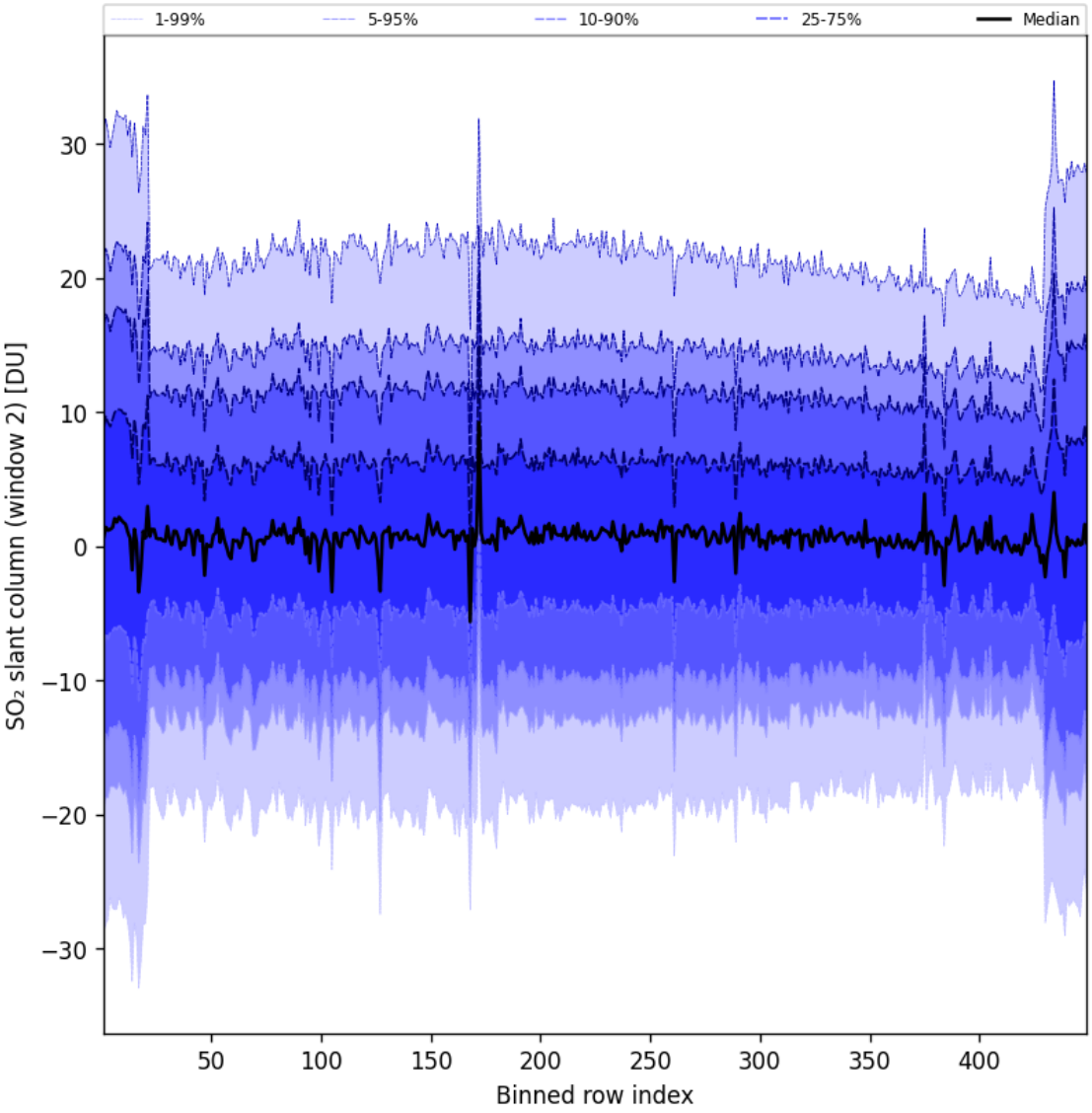

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-06-05 to 2025-06-06

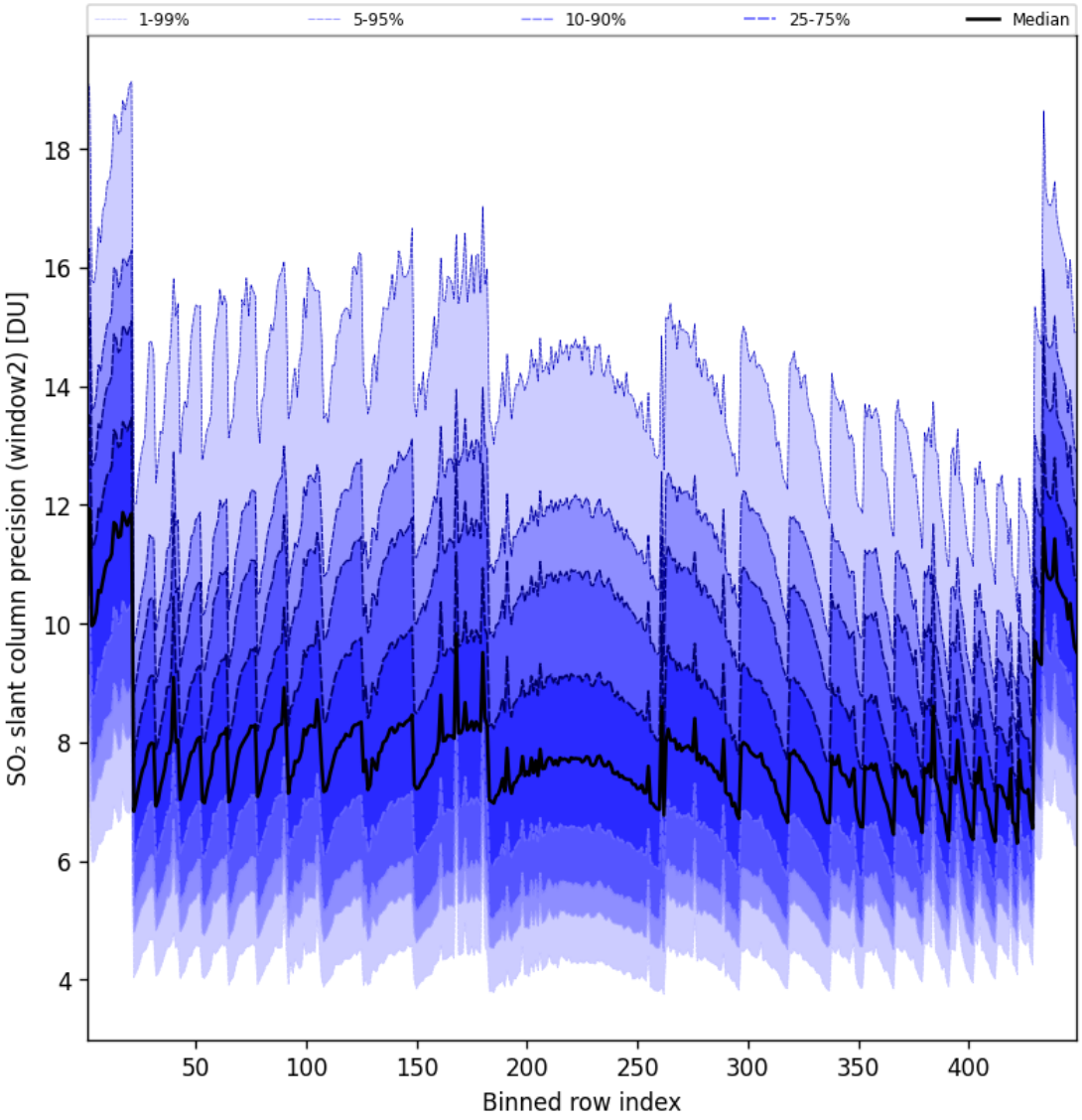

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-06-05 to 2025-06-06

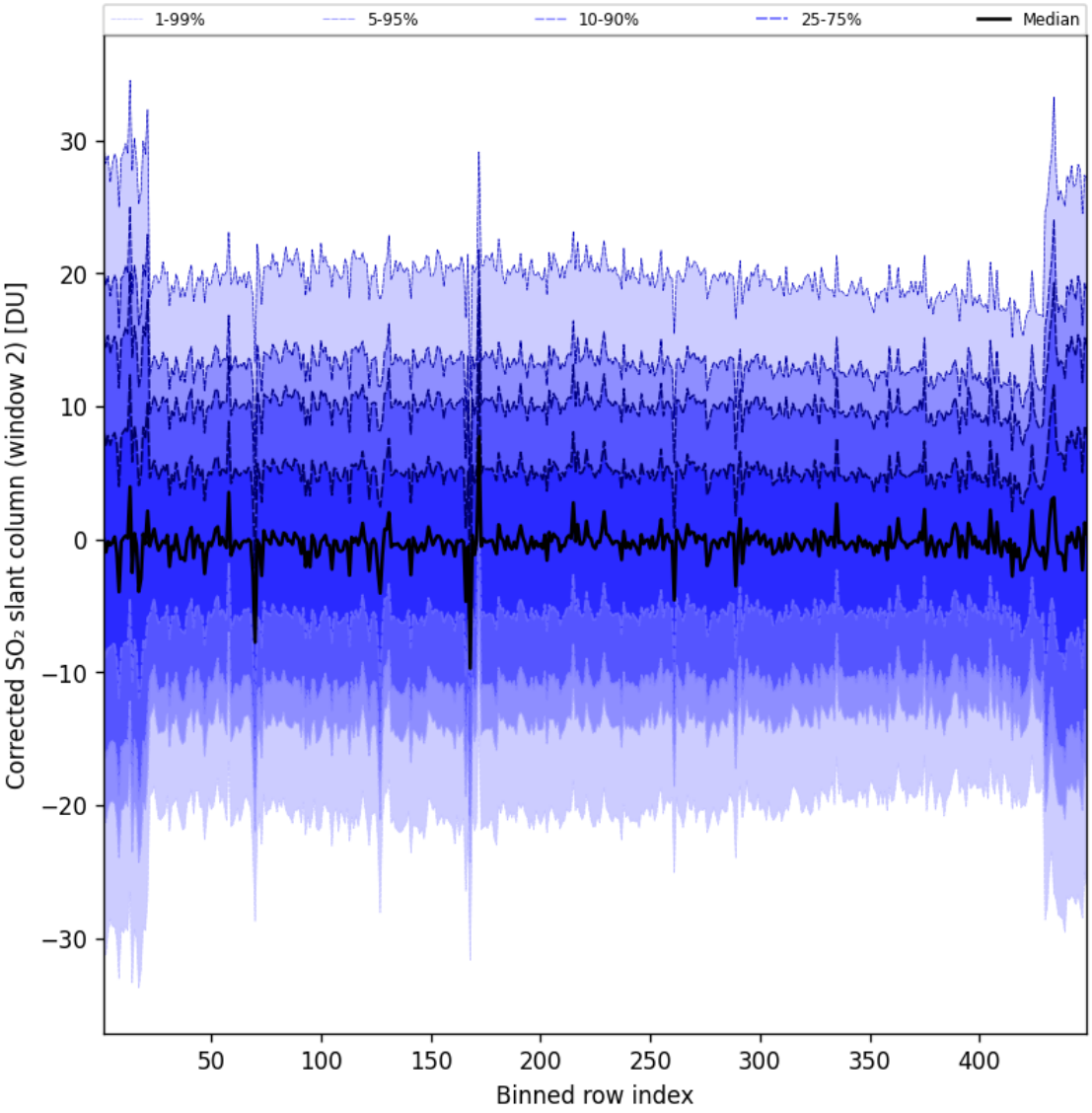

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-06-05 to 2025-06-06

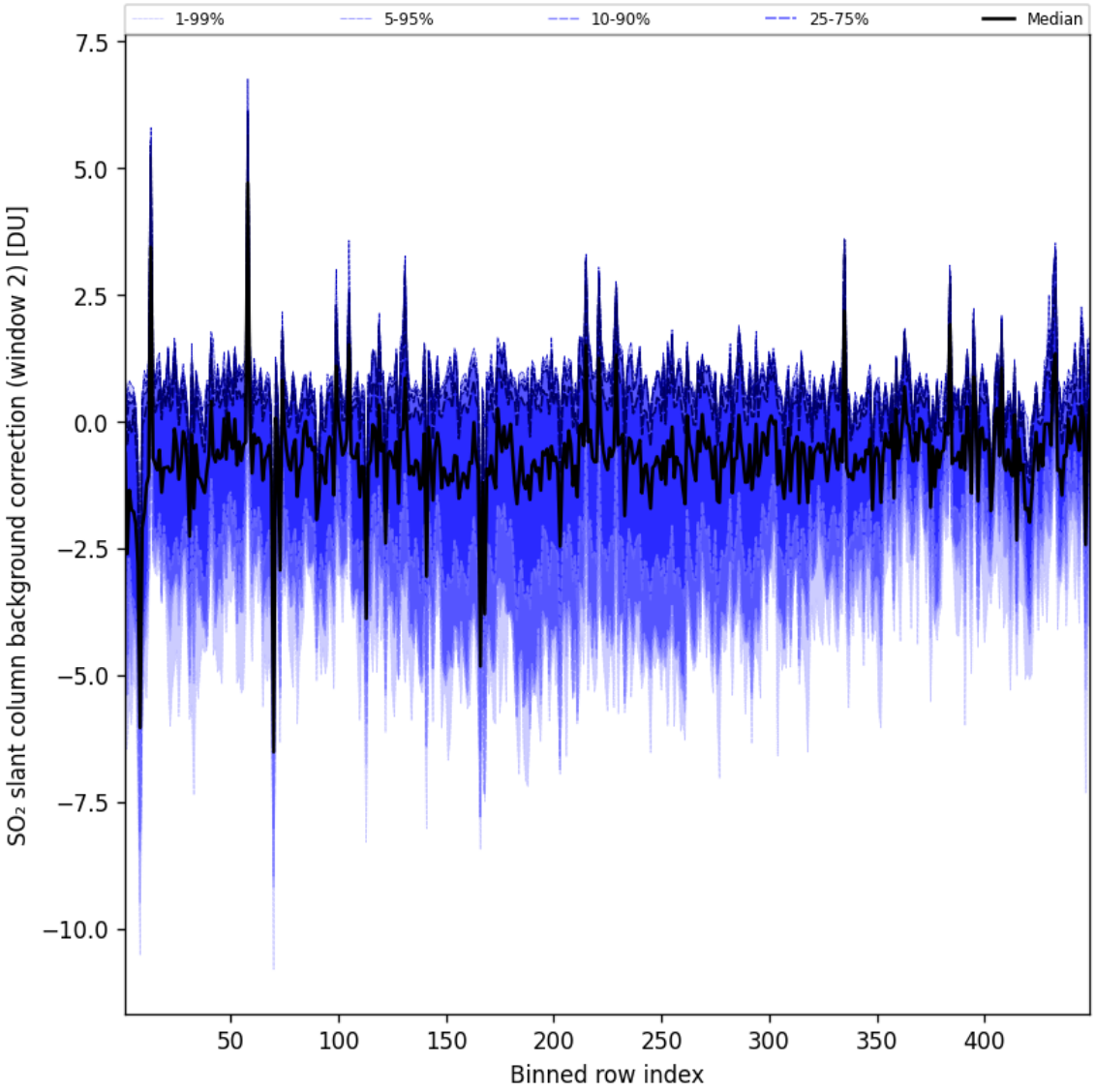

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-06-05 to 2025-06-06

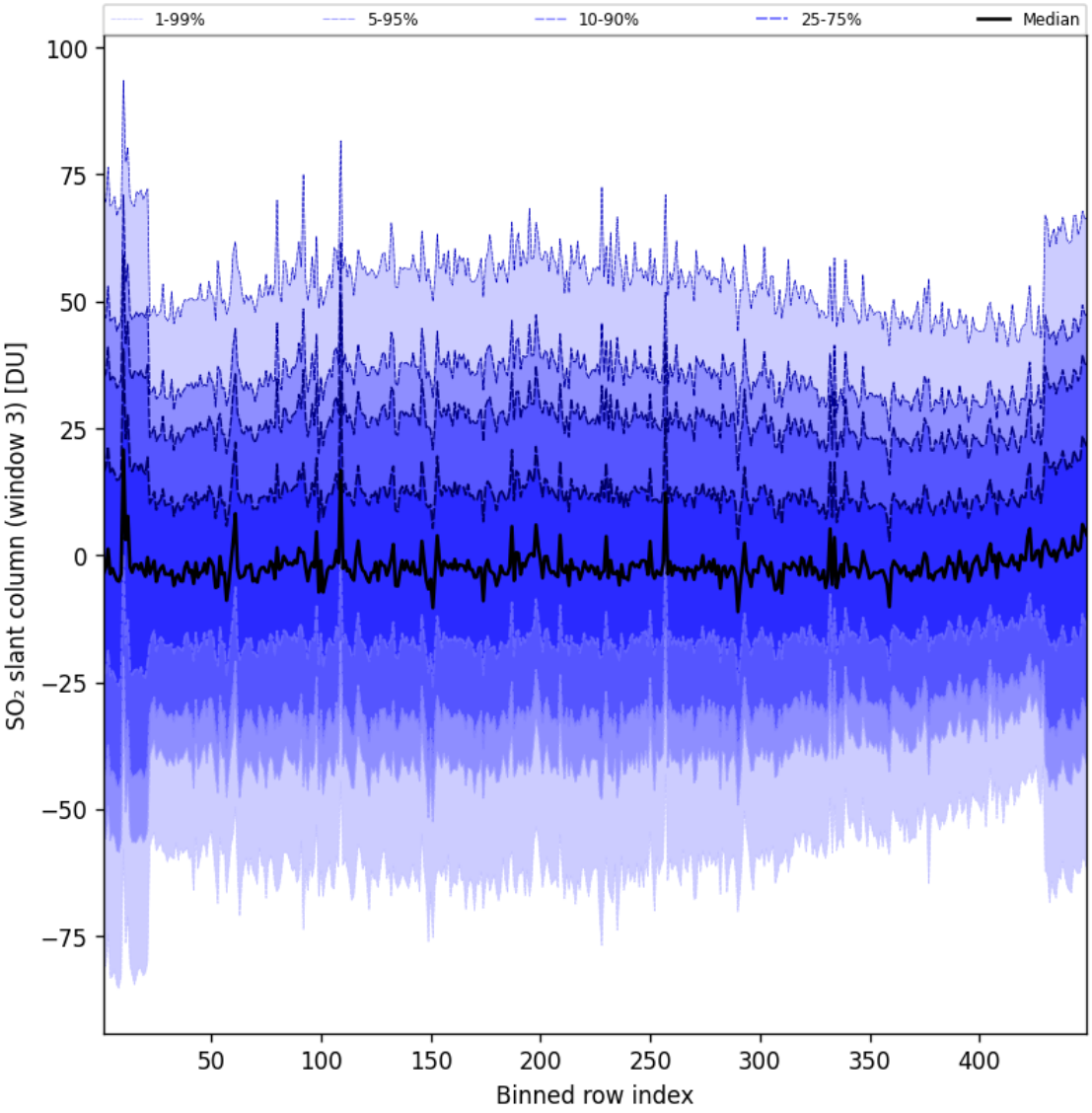

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-06-05 to 2025-06-06

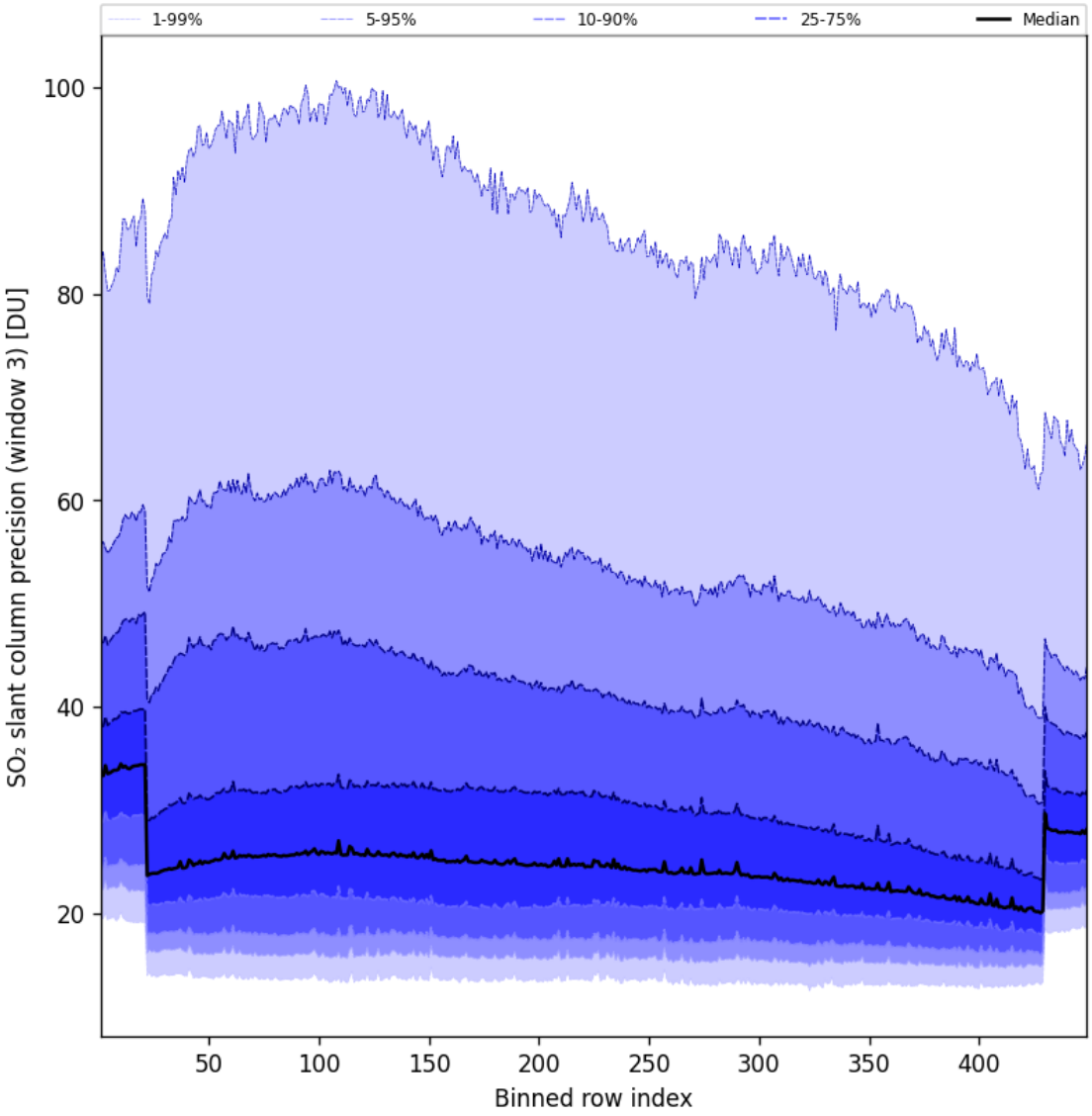

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-06-05 to 2025-06-06

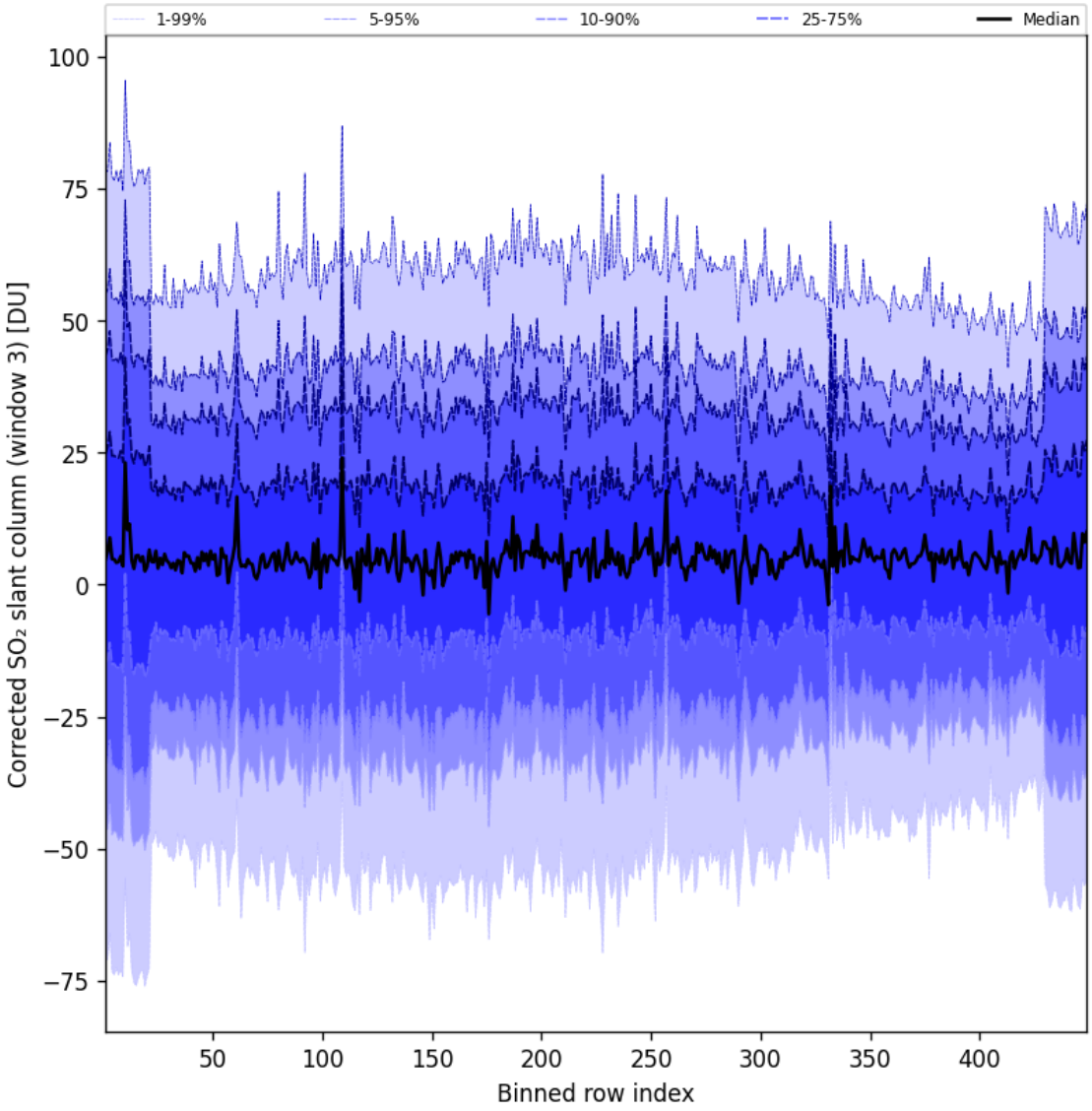

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-06-05 to 2025-06-06

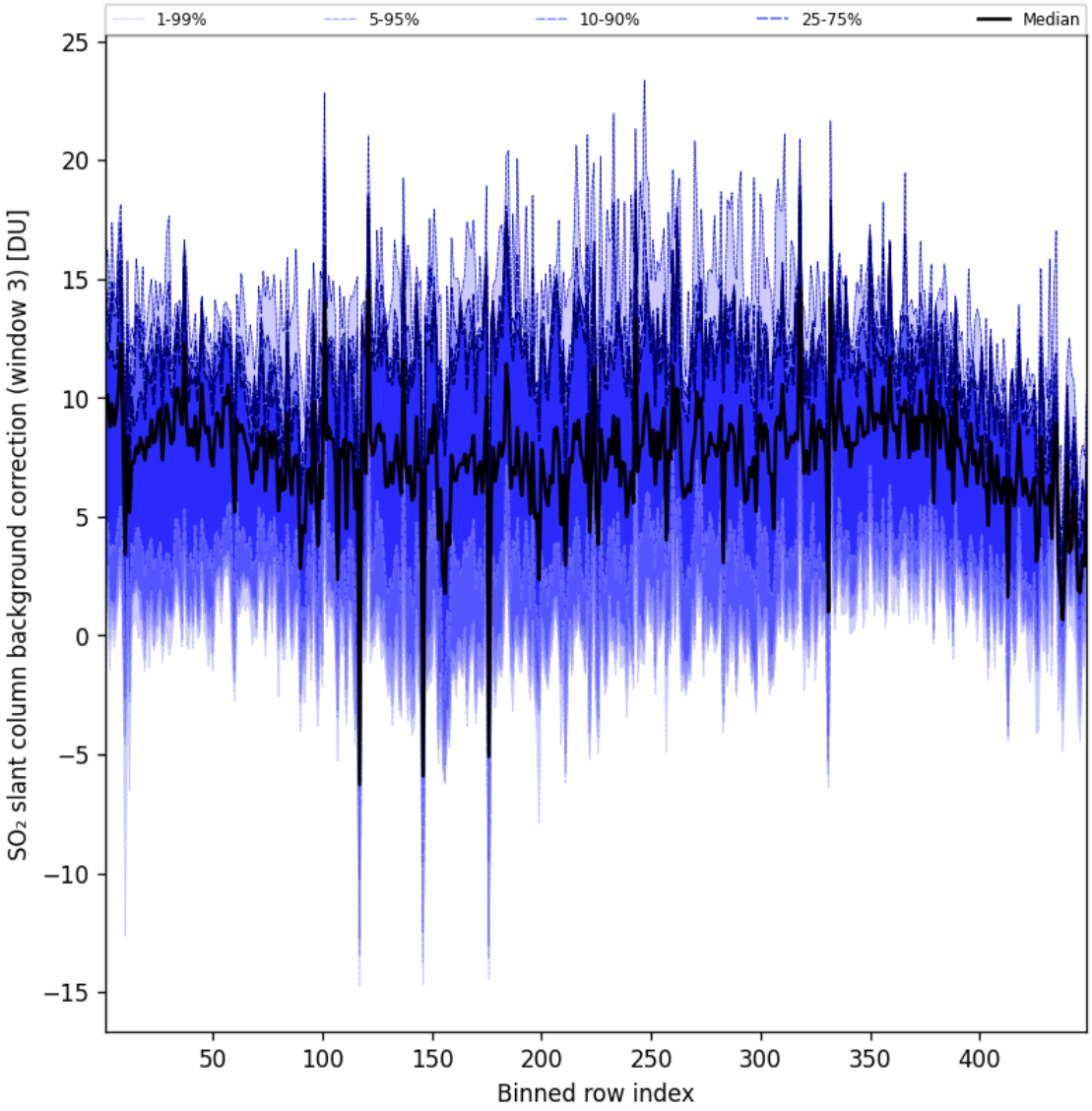

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-06-05 to 2025-06-06

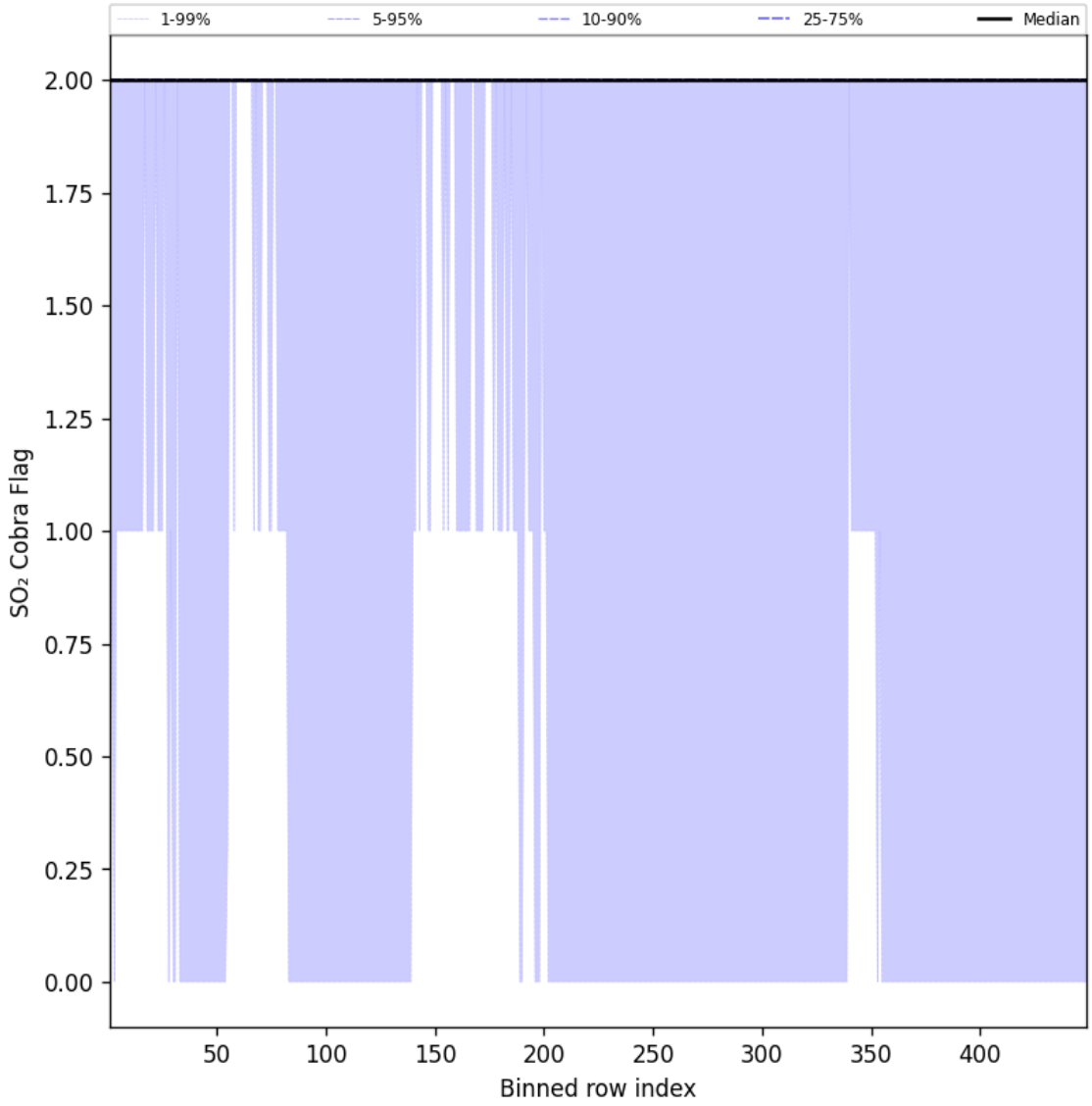

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-06-05 to 2025-06-06

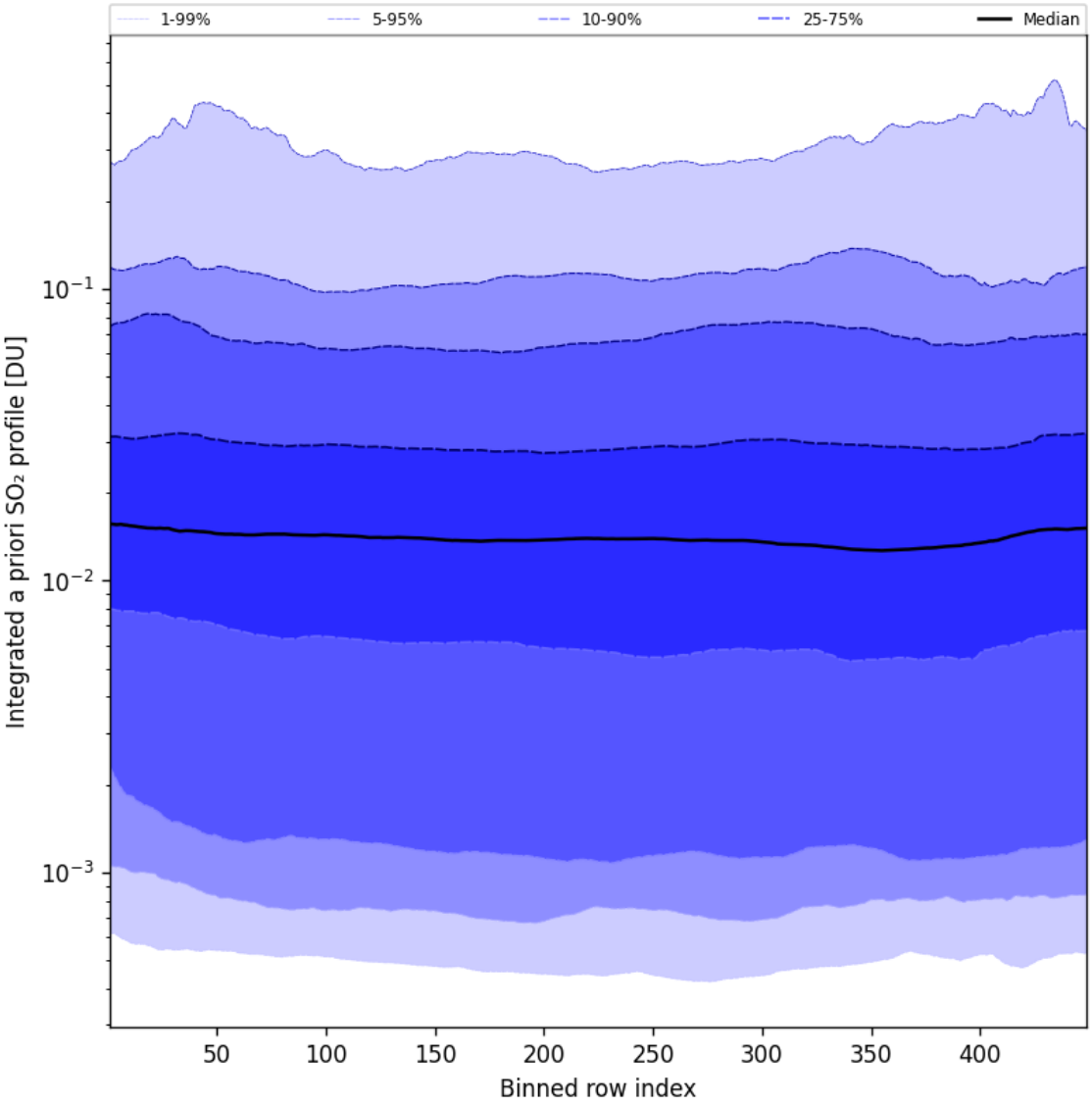

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-06-05 to 2025-06-06

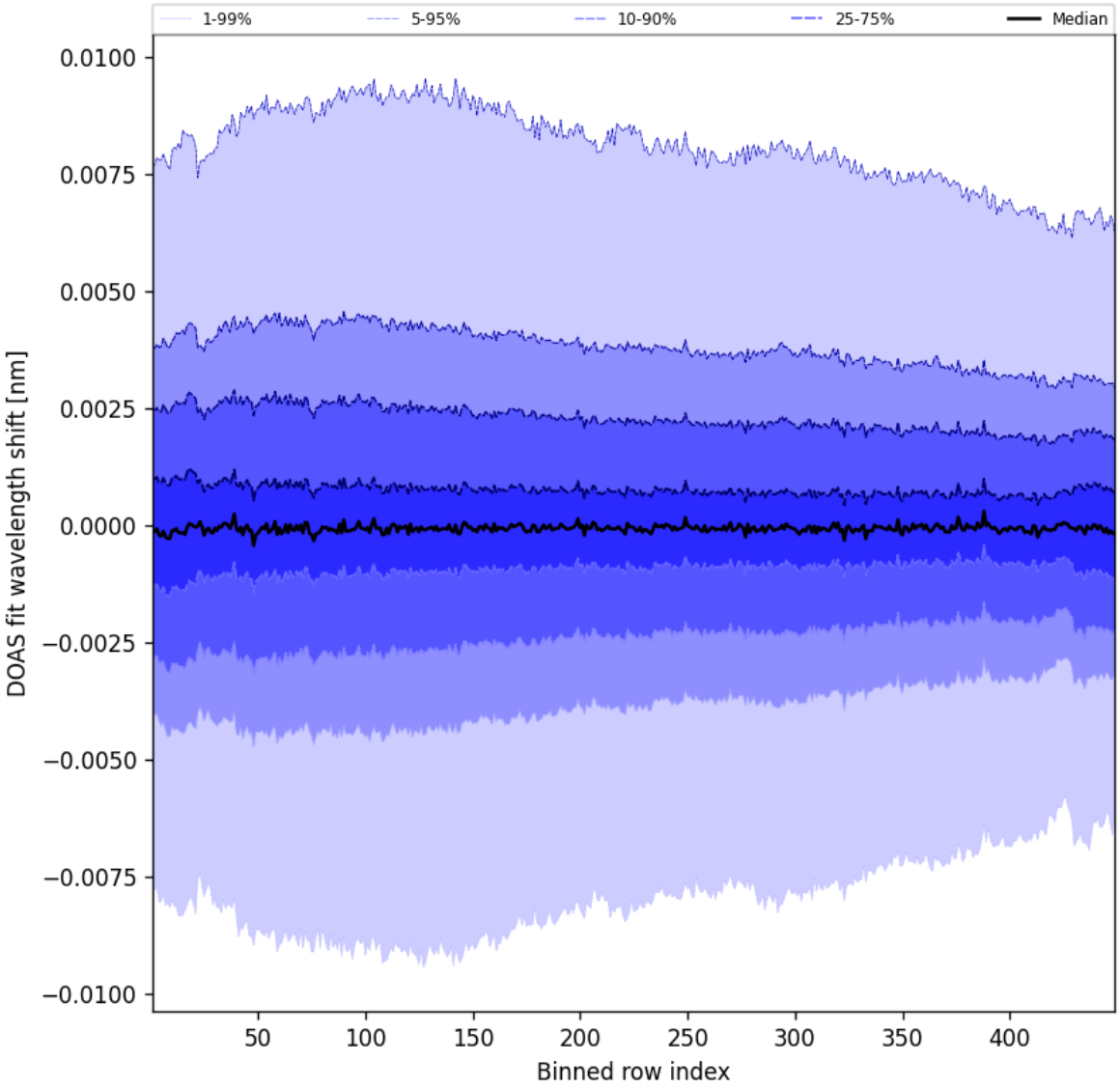

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-06-05 to 2025-06-06

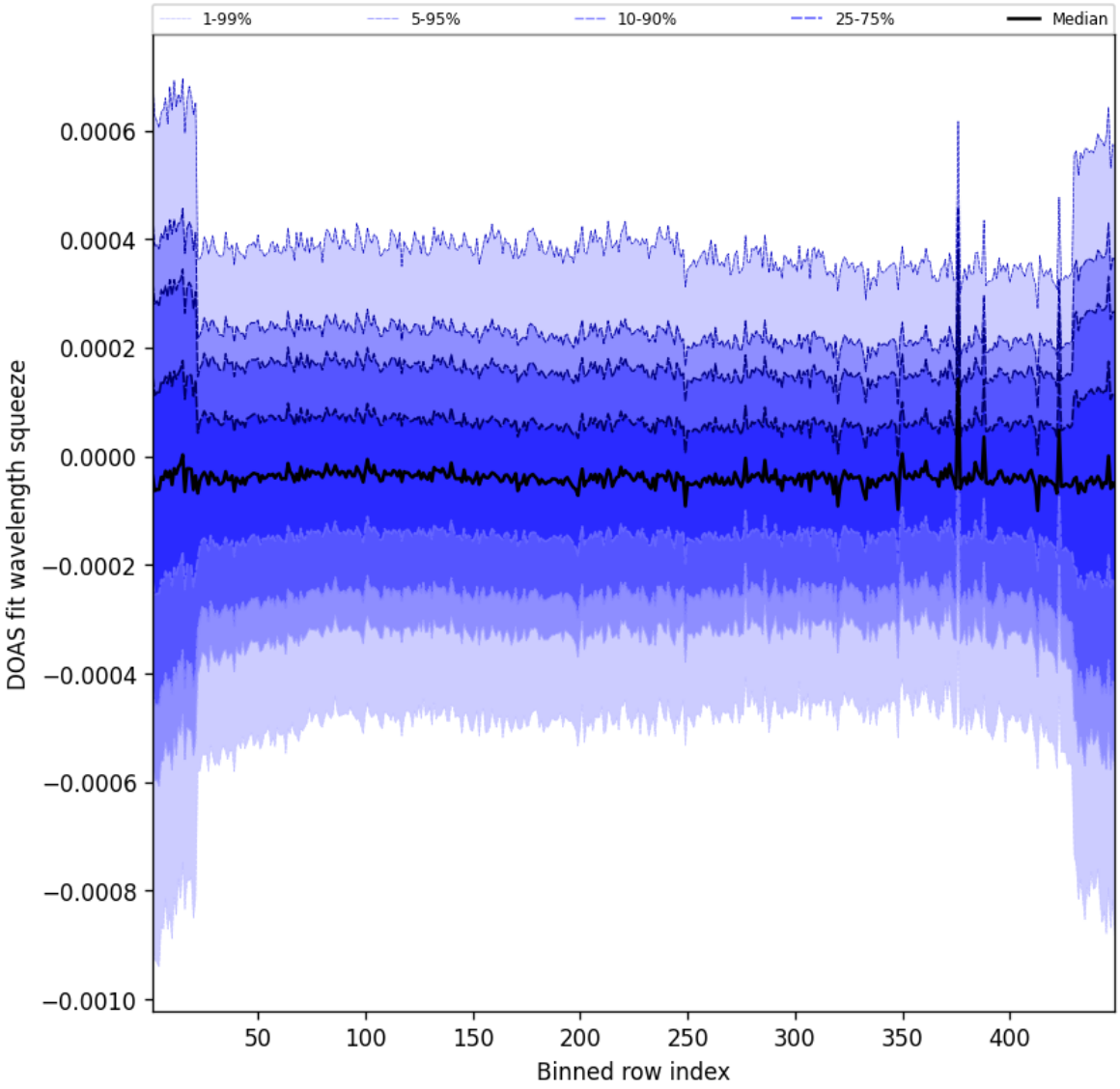

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-06-05 to 2025-06-06

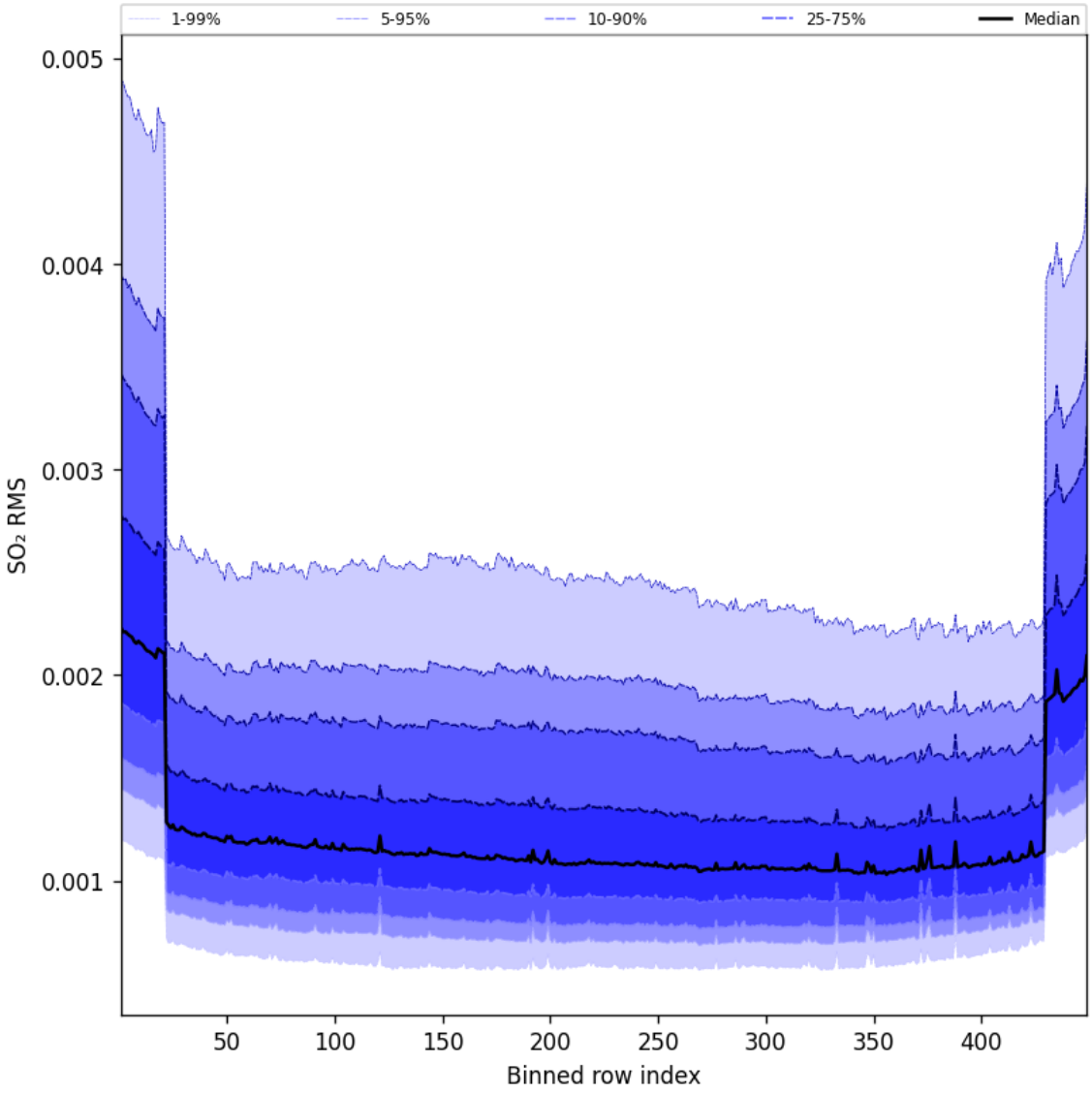

Figure 106: Along track statistics of "SO_2 RMS" for 2025-06-05 to 2025-06-06

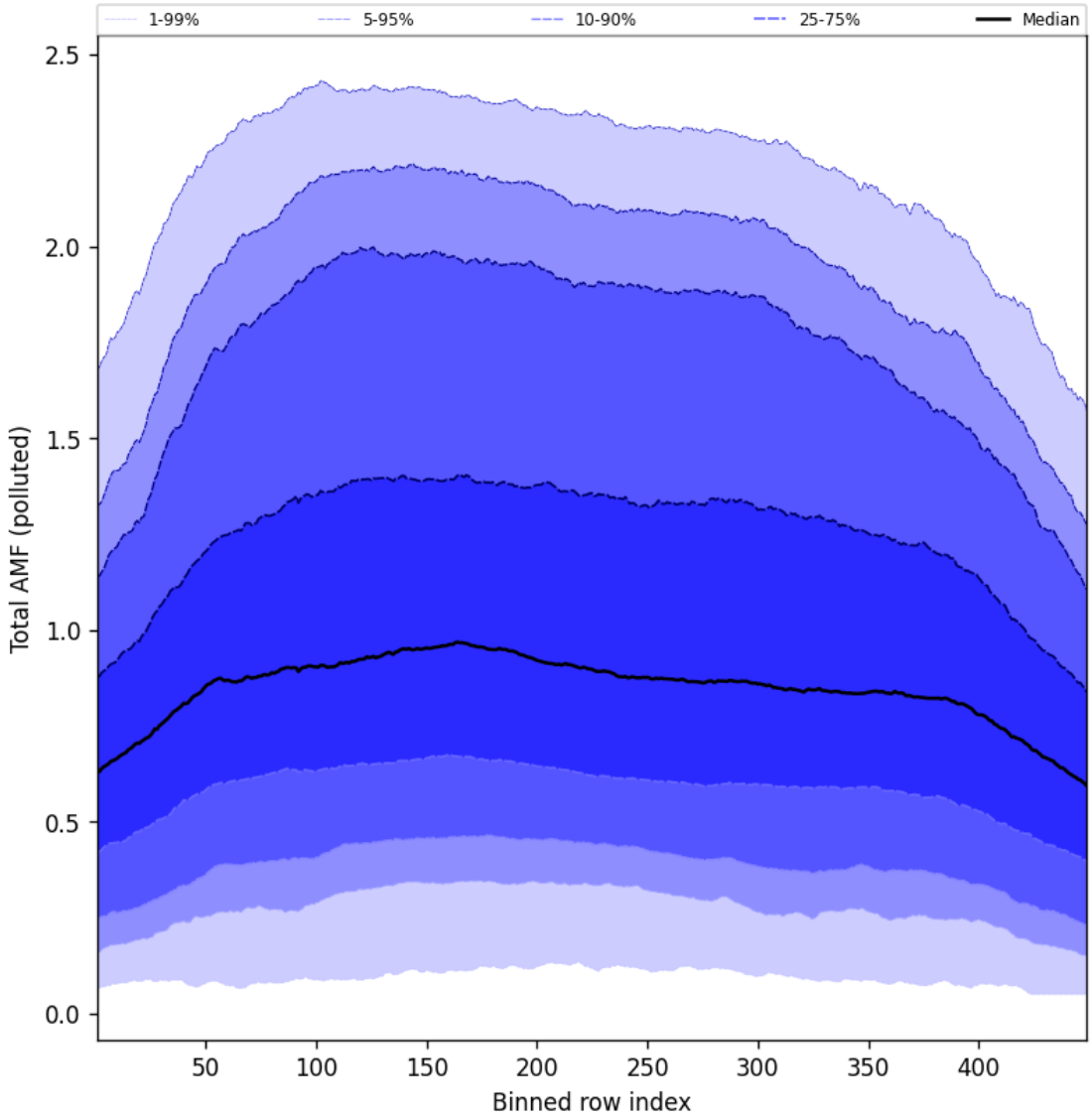

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-06-05 to 2025-06-06

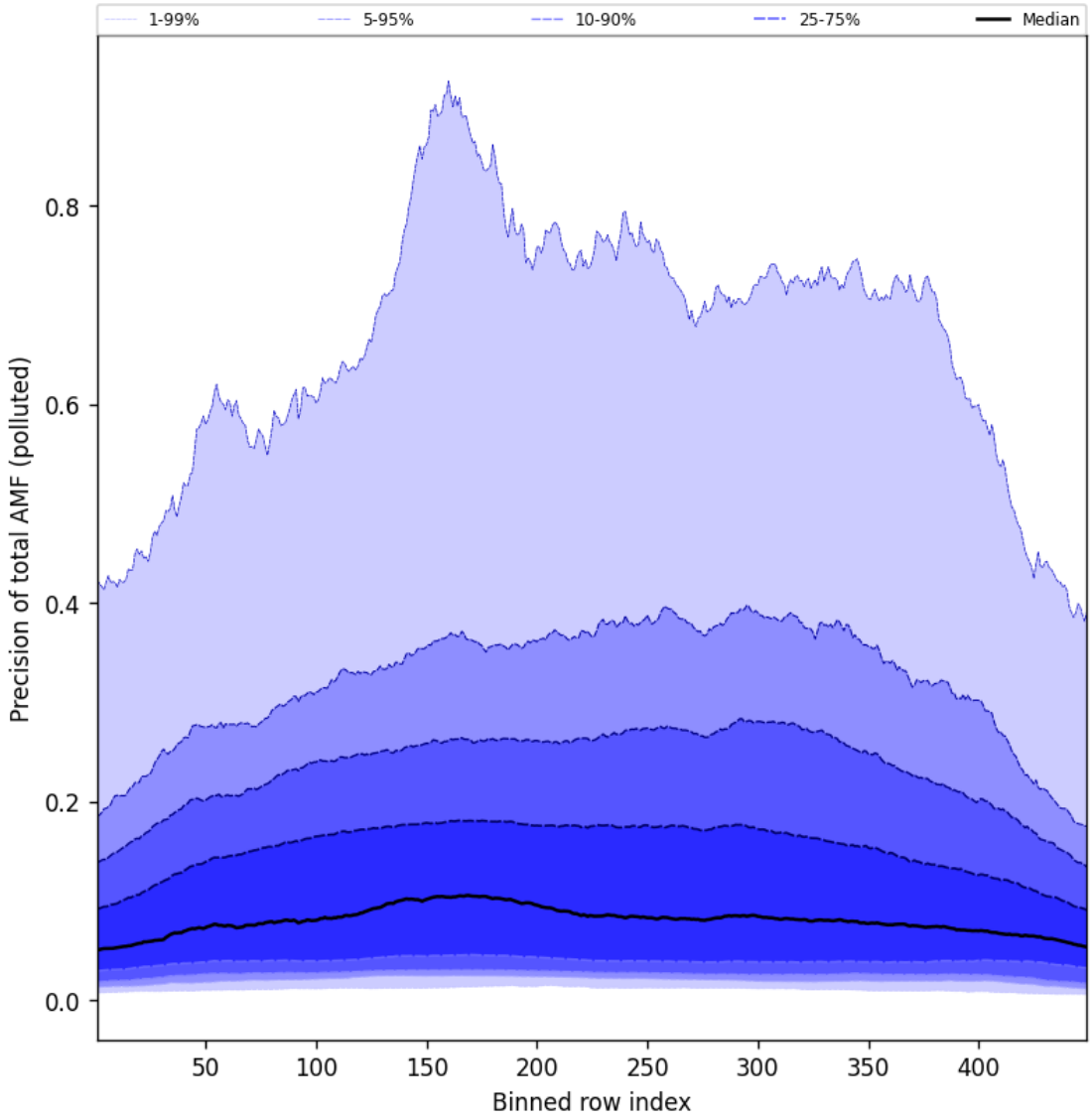

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-06-05 to 2025-06-06

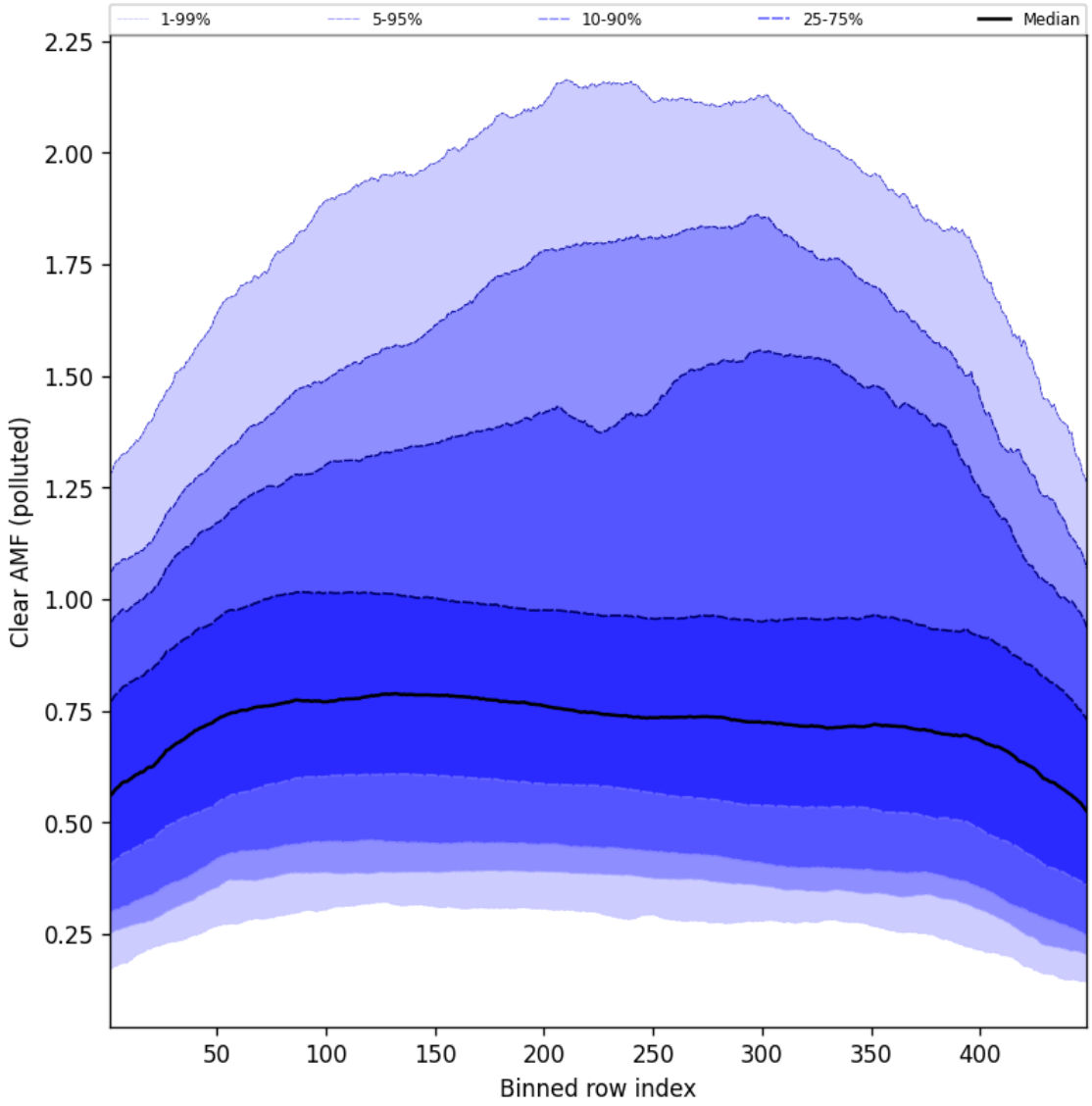

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-06-05 to 2025-06-06

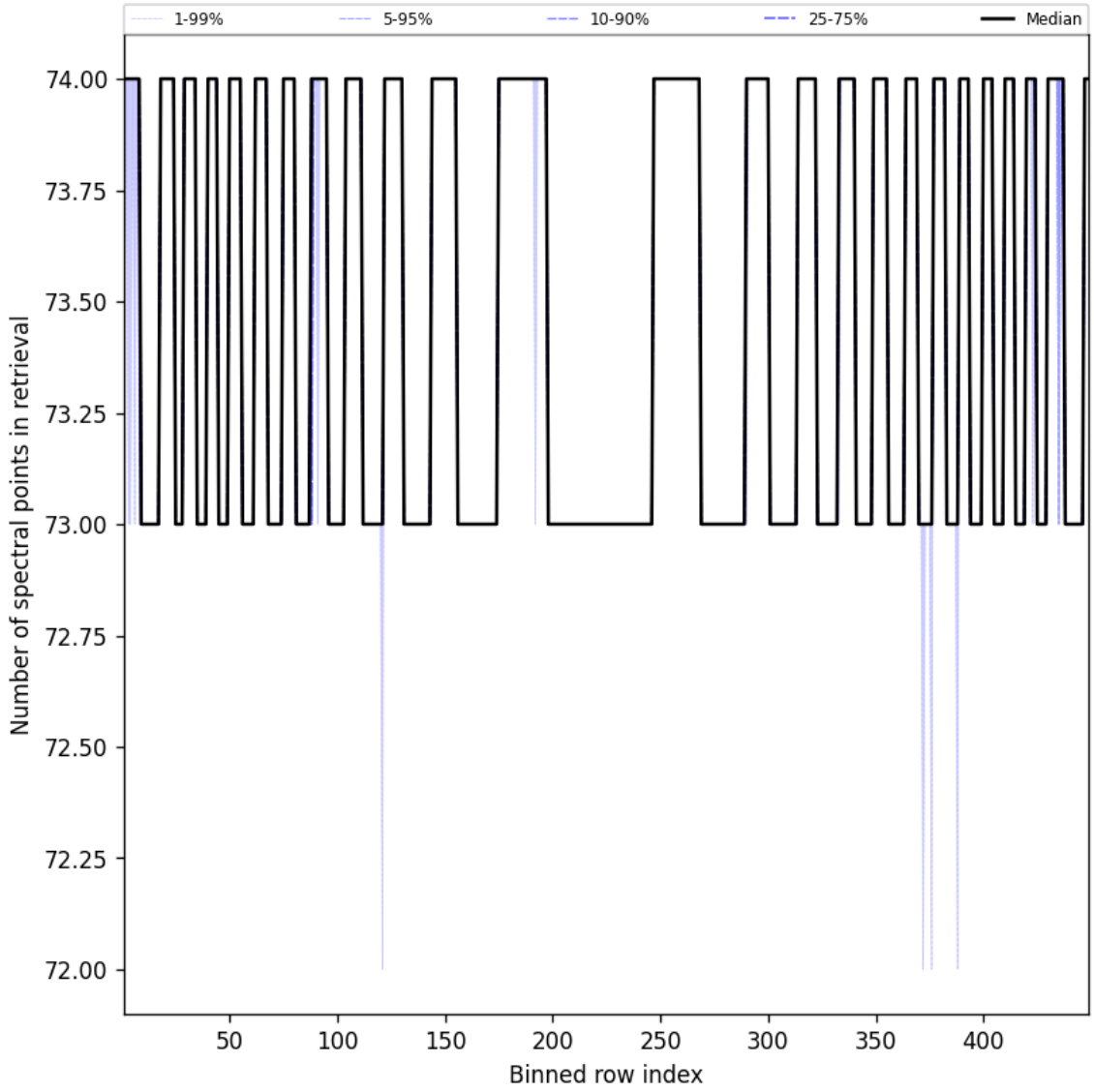

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-06-05 to 2025-06-06

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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11 Copyright information of 'PyCAMA'

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