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]	0.630 ± 0.411	18654908	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.455 \pm 84.015) \times 10^{-2}$	18654908	0.263	0.413	9.448×10^{-3}	-163	892
sulfurdioxide total vertical column precision [DU]	0.447 ± 0.548	18654908	0.222	0.288	0.300	4.398×10^{-2}	442
sulfurdioxide slant column density corrected [DU]	$(1.788 \pm 41.582) \times 10^{-2}$	18654908	0.242	0.371	9.141×10^{-3}	-79.7	499
sulfurdioxide slant column density cobra [DU]	$(1.764 \pm 36.188) \times 10^{-2}$	18654908	0.242	0.371	9.141×10^{-3}	-79.7	109
sulfurdioxide slant column density cobra precision [DU]	0.296 ± 0.134	18654908	0.213	0.128	0.256	8.765×10^{-2}	56.9
sulfurdioxide slant column density window1 [DU]	0.114 ± 0.680	18654908	0.125	0.745	0.118	-174	117
sulfurdioxide slant column density window1 precision [DU]	0.296 ± 0.134	18654908	0.213	0.128	0.256	8.765×10^{-2}	56.9
sulfurdioxide slant column density corrected win1 [DU]	$(3.945 \pm 67.103) \times 10^{-2}$	18654908	2.500×10^{-2}	0.729	2.275×10^{-2}	-174	117
background so2 slant column offset window1 [DU]	$(-7.460 \pm 13.834) \times 10^{-2}$	18654908	-0.140	0.172	-0.104	-1.47	4.33
sulfurdioxide slant column density window2 [DU]	1.48 ± 8.99	18654908	1.75	11.2	1.40	-896	1.481×10^{3}
sulfurdioxide slant column density window2 precision [DU]	8.11 ± 2.42	18654908	7.43	2.67	7.75	2.22	863
sulfurdioxide slant column density corrected win2 [DU]	0.767 ± 8.864	18654908	1.25	11.1	0.775	-896	1.480×10^{3}
background so2 slant column offset window2 [DU]	-0.711 ± 1.871	18654908	0.750	2.59	-0.319	-11.2	7.59
sulfurdioxide slant column density window3 [DU]	-7.88 ± 23.75	18654908	-8.40	29.1	-7.89	-1.705×10^{3}	943
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 13.5	18654908	21.5	10.3	24.3	9.20	1.799×10^{3}
sulfurdioxide slant column density corrected win3 [DU]	-3.93 ± 23.38	18654908	-3.92	28.7	-3.68	-1.706×10^{3}	950
background so2 slant column offset window3 [DU]	3.96 ± 4.73	18654908	7.28	7.27	4.32	-18.1	25.7
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	18654908	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(2.985 \pm 6.864) \times 10^{-2}$	18654908	1.316×10^{-2}	2.198×10^{-2}	1.419×10^{-2}	1.959×10^{-4}	2.08
fitted radiance shift [nm]	$(-1.172 \pm 25.555) \times 10^{-4}$	18654908	1.000×10^{-4}	1.660×10^{-3}	-1.117×10^{-4}	-0.110	4.415×10^{-2}
fitted radiance squeeze [1]	$(-4.244 \pm 18.962) \times 10^{-5}$	18654908	-3.000×10^{-5}	2.190×10^{-4}	-3.658×10^{-5}	-2.043×10^{-2}	2.369×10^{-2}
fitted root mean square [1]	$(1.292 \pm 0.529) \times 10^{-3}$	18654908	1.025×10^{-3}	5.171×10^{-4}	1.143×10^{-3}	3.067×10^{-4}	0.106
sulfurdioxide total air mass factor polluted [1]	0.976 ± 0.514	18654908	0.820	0.633	0.868	5.000×10^{-2}	2.79
sulfurdioxide total air mass factor polluted precision [1]	0.121 ± 0.139	18654908	3.500×10^{-2}	0.114	7.940×10^{-2}	2.500×10^{-3}	2.20
sulfurdioxide clear air mass factor polluted [1]	0.807 ± 0.374	18654908	0.660	0.397	0.749	4.749×10^{-2}	2.74
number of spectral points in retrieval [1]	73.4 ± 0.5	18654908	73.0	1.000	73.0	51.0	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}	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−1.89	−0.762	−0.478	−0.326	−0.194	0.219	0.360	0.526	0.845	2.15
sulfurdioxide total vertical column precision [DU]	9.301×10^{-2}	0.122	0.147	0.171	0.204	0.492	0.647	0.826	1.19	2.69
sulfurdioxide slant column density corrected [DU]	−0.860	−0.495	−0.360	−0.270	−0.174	0.196	0.297	0.395	0.549	1.01
sulfurdioxide slant column density cobra [DU]	−0.860	−0.495	−0.360	−0.270	−0.174	0.196	0.297	0.395	0.549	1.01
sulfurdioxide slant column density cobra precision [DU]	0.146	0.174	0.188	0.200	0.213	0.341	0.398	0.452	0.544	0.784
sulfurdioxide slant column density window1 [DU]	−1.68	−0.932	−0.647	−0.457	−0.257	0.488	0.681	0.865	1.14	1.90
sulfurdioxide slant column density window1 precision [DU]	0.146	0.174	0.188	0.200	0.213	0.341	0.398	0.452	0.544	0.784
sulfurdioxide slant column density corrected win1 [DU]	−1.62	−0.952	−0.696	−0.522	−0.336	0.393	0.592	0.785	1.08	1.91
background so2 slant column offset window1 [DU]	−0.319	−0.245	−0.216	−0.197	−0.172	4.961×10^{-4}	5.698×10^{-2}	0.109	0.184	0.340
sulfurdioxide slant column density window2 [DU]	−19.8	−12.8	−9.48	−6.98	−4.20	7.04	9.90	12.5	16.0	23.8
sulfurdioxide slant column density window2 precision [DU]	4.29	5.11	5.62	6.05	6.57	9.23	10.1	11.1	12.3	15.2
sulfurdioxide slant column density corrected win2 [DU]	−20.7	−13.5	−10.1	−7.55	−4.76	6.29	9.06	11.6	15.0	22.3
background so2 slant column offset window2 [DU]	−5.66	−4.15	−3.37	−2.68	−1.89	0.700	0.981	1.20	1.49	2.71
sulfurdioxide slant column density window3 [DU]	−68.5	−46.7	−36.8	−29.8	−22.3	6.77	14.4	21.4	31.1	50.3
sulfurdioxide slant column density window3 precision [DU]	13.1	15.3	17.1	18.6	20.4	30.7	35.4	40.9	52.6	85.4
sulfurdioxide slant column density corrected win3 [DU]	−64.1	−42.6	−32.6	−25.6	−18.1	10.6	18.0	24.7	33.8	52.8
background so2 slant column offset window3 [DU]	−6.72	−3.91	−2.22	−0.999	0.381	7.66	8.80	9.72	10.9	13.5
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]	4.147×10^{-4}	6.861×10^{-4}	1.143×10^{-3}	2.408×10^{-3}	6.086×10^{-3}	2.806×10^{-2}	4.009×10^{-2}	6.040×10^{-2}	0.104	0.300
fitted radiance shift [nm]	-7.967×10^{-3}	-3.839×10^{-3}	-2.405×10^{-3}	-1.609×10^{-3}	-9.635×10^{-4}	6.962×10^{-4}	1.338×10^{-3}	2.159×10^{-3}	3.638×10^{-3}	7.941×10^{-3}
fitted radiance squeeze [1]	-5.471×10^{-4}	-3.498×10^{-4}	-2.666×10^{-4}	-2.092×10^{-4}	-1.490×10^{-4}	7.004×10^{-5}	1.238×10^{-4}	1.735×10^{-4}	2.446×10^{-4}	4.167×10^{-4}
fitted root mean square [1]	6.049×10^{-4}	7.488×10^{-4}	8.298×10^{-4}	8.898×10^{-4}	9.603×10^{-4}	1.477×10^{-3}	1.723×10^{-3}	1.958×10^{-3}	2.291×10^{-3}	3.191×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.118	0.286	0.404	0.502	0.613	1.25	1.54	1.79	2.03	2.32
sulfurdioxide total air mass factor polluted precision [1]	1.145×10^{-2}	2.134×10^{-2}	2.784×10^{-2}	3.332×10^{-2}	4.138×10^{-2}	0.155	0.196	0.241	0.332	0.740
sulfurdioxide clear air mass factor polluted [1]	0.245	0.333	0.405	0.473	0.557	0.954	1.07	1.25	1.66	2.04
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]	0.574 ± 0.419	13063943	0.850	0.490	0.0	1.000	0.150	1.000
sulfurdioxide total vertical column [DU]	$(1.717 \pm 70.515) \times 10^{-2}$	13063943	0.370	7.600×10^{-3}	-137	106	-0.176	0.194
sulfurdioxide total vertical column precision [DU]	0.403 ± 0.505	13063943	0.242	0.264	4.398×10^{-2}	30.2	0.186	0.428
sulfurdioxide slant column density corrected [DU]	$(1.432 \pm 32.842) \times 10^{-2}$	13063943	0.349	7.643×10^{-3}	-7.21	60.8	-0.165	0.183
sulfurdioxide slant column density cobra [DU]	$(1.426 \pm 32.414) \times 10^{-2}$	13063943	0.349	7.643×10^{-3}	-7.21	41.8	-0.165	0.183
sulfurdioxide slant column density cobra precision [DU]	0.276 ± 0.114	13063943	0.104	0.240	8.765×10^{-2}	12.8	0.205	0.309
sulfurdioxide slant column density window1 [DU]	0.100 ± 0.631	13063943	0.708	0.109	-12.4	52.0	-0.250	0.458
sulfurdioxide slant column density window1 precision [DU]	0.276 ± 0.114	13063943	0.104	0.240	8.765×10^{-2}	12.8	0.205	0.309
sulfurdioxide slant column density corrected win1 [DU]	$(2.982 \pm 61.633) \times 10^{-2}$	13063943	0.688	1.669×10^{-2}	-12.3	52.4	-0.323	0.365
background so2 slant column offset window1 [DU]	$(-7.055 \pm 14.511) \times 10^{-2}$	13063943	0.201	-9.726×10^{-2}	-0.902	1.66	-0.182	1.940×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.34 ± 8.28	13063943	10.6	1.33	-215	783	-3.98	6.64
sulfurdioxide slant column density window2 precision [DU]	7.60 ± 2.05	13063943	2.29	7.31	2.22	287	6.26	8.55
sulfurdioxide slant column density corrected win2 [DU]	0.701 ± 8.154	13063943	10.4	0.735	-217	783	-4.49	5.93
background so2 slant column offset window2 [DU]	-0.638 ± 1.874	13063943	2.69	-0.284	-10.4	7.59	-1.87	0.820
sulfurdioxide slant column density window3 [DU]	-7.48 ± 21.96	13063943	27.1	-7.76	-1.705×10^{3}	436	-21.1	5.97
sulfurdioxide slant column density window3 precision [DU]	26.0 ± 13.2	13063943	8.19	22.6	9.20	1.799×10^{3}	19.3	27.5
sulfurdioxide slant column density corrected win3 [DU]	-3.68 ± 21.51	13063943	26.7	-3.53	-1.706×10^{3}	434	-16.9	9.80
background so2 slant column offset window3 [DU]	3.80 ± 4.86	13063943	7.97	4.86	-18.1	17.5	-0.240	7.73
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.16	13063943	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.189 \pm 7.903) \times 10^{-2}$	13063943	2.527×10^{-2}	1.113×10^{-2}	1.959×10^{-4}	2.08	3.114×10^{-3}	2.838×10^{-2}
fitted radiance shift [nm]	$(2.466 \pm 253.710) \times 10^{-5}$	13063943	1.559×10^{-3}	7.856×10^{-7}	-4.168×10^{-2}	4.393×10^{-2}	-7.731×10^{-4}	7.855×10^{-4}
fitted radiance squeeze [1]	$(-6.988 \pm 17.683) \times 10^{-5}$	13063943	2.117×10^{-4}	-5.732×10^{-5}	-1.248×10^{-2}	1.359×10^{-2}	-1.686×10^{-4}	4.312×10^{-5}
fitted root mean square [1]	$(1.218 \pm 0.480) \times 10^{-3}$	13063943	4.382×10^{-4}	1.084×10^{-3}	3.067×10^{-4}	3.470×10^{-2}	9.253×10^{-4}	1.363×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.04 ± 0.56	13063943	0.798	0.932	5.000×10^{-2}	2.71	0.620	1.42
sulfurdioxide total air mass factor polluted precision [1]	0.137 ± 0.156	13063943	0.127	9.490×10^{-2}	3.615×10^{-3}	2.20	4.556×10^{-2}	0.173
sulfurdioxide clear air mass factor polluted [1]	0.840 ± 0.422	13063943	0.471	0.768	8.836×10^{-2}	2.74	0.538	1.01
number of spectral points in retrieval [1]	73.5 ± 0.5	13063943	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]	0.762 ± 0.360	5590965	0.560	1.000	0.0	1.000	0.440	1.000
sulfurdioxide total vertical column [DU]	$(4.178 \pm 109.219) \times 10^{-2}$	5590965	0.542	1.571×10^{-2}	-163	892	-0.250	0.292
sulfurdioxide total vertical column precision [DU]	0.551 ± 0.626	5590965	0.338	0.394	4.792×10^{-2}	442	0.276	0.614
sulfurdioxide slant column density corrected [DU]	$(2.620 \pm 56.991) \times 10^{-2}$	5590965	0.432	1.343×10^{-2}	-79.7	499	-0.200	0.232
sulfurdioxide slant column density cobra [DU]	$(2.555 \pm 43.746) \times 10^{-2}$	5590965	0.432	1.342×10^{-2}	-79.7	109	-0.200	0.232
sulfurdioxide slant column density cobra precision [DU]	0.345 ± 0.160	5590965	0.161	0.303	0.105	56.9	0.242	0.403
sulfurdioxide slant column density window1 [DU]	0.146 ± 0.783	5590965	0.844	0.143	-174	117	-0.278	0.566
sulfurdioxide slant column density window1 precision [DU]	0.345 ± 0.160	5590965	0.161	0.303	0.105	56.9	0.242	0.403
sulfurdioxide slant column density corrected win1 [DU]	$(6.195 \pm 78.366) \times 10^{-2}$	5590965	0.841	4.001×10^{-2}	-174	117	-0.373	0.467
background so2 slant column offset window1 [DU]	$(-8.406 \pm 12.054) \times 10^{-2}$	5590965	0.103	-0.109	-1.47	4.33	-0.147	-4.400×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.80 ± 10.47	5590965	13.0	1.61	-896	1.481×10^{3}	-4.79	8.17
sulfurdioxide slant column density window2 precision [DU]	9.31 ± 2.78	5590965	2.86	8.95	2.62	863	7.68	10.5
sulfurdioxide slant column density corrected win2 [DU]	0.921 ± 10.334	5590965	12.8	0.891	-896	1.480×10^{3}	-5.50	7.30
background so2 slant column offset window2 [DU]	-0.883 ± 1.853	5590965	2.40	-0.377	-11.2	7.15	-1.96	0.438
sulfurdioxide slant column density window3 [DU]	-8.83 ± 27.48	5590965	34.8	-8.29	-588	943	-25.9	8.93
sulfurdioxide slant column density window3 precision [DU]	32.2 ± 13.3	5590965	10.3	29.0	10.2	309	24.8	35.2
sulfurdioxide slant column density corrected win3 [DU]	-4.51 ± 27.23	5590965	34.6	-4.13	-584	950	-21.5	13.0
background so2 slant column offset window3 [DU]	4.32 ± 4.39	5590965	6.06	3.46	-13.8	25.7	1.23	7.29
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.28	5590965	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.507 \pm 3.309) \times 10^{-2}$	5590965	1.534×10^{-2}	1.841×10^{-2}	8.752×10^{-4}	1.19	1.235×10^{-2}	2.768×10^{-2}
fitted radiance shift [nm]	$(-4.486 \pm 25.675) \times 10^{-4}$	5590965	1.801×10^{-3}	-4.177×10^{-4}	-0.110	4.415×10^{-2}	-1.372×10^{-3}	4.285×10^{-4}
fitted radiance squeeze [1]	$(2.167 \pm 20.257) \times 10^{-5}$	5590965	2.302×10^{-4}	1.697×10^{-5}	-2.043×10^{-2}	2.369×10^{-2}	-9.605×10^{-5}	1.342×10^{-4}
fitted root mean square [1]	$(1.464 \pm 0.592) \times 10^{-3}$	5590965	6.294×10^{-4}	1.310×10^{-3}	3.650×10^{-4}	0.106	1.078×10^{-3}	1.707×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.825 ± 0.340	5590965	0.394	0.776	5.000×10^{-2}	2.79	0.604	0.999
sulfurdioxide total air mass factor polluted precision [1]	$(8.379 \pm 7.190) \times 10^{-2}$	5590965	7.348×10^{-2}	5.468×10^{-2}	2.500×10^{-3}	1.09	3.646×10^{-2}	0.110
sulfurdioxide clear air mass factor polluted [1]	0.730 ± 0.204	5590965	0.277	0.725	4.749×10^{-2}	1.91	0.587	0.865
number of spectral points in retrieval [1]	73.4 ± 0.5	5590965	1.000	73.0	51.0	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]	0.629 ± 0.404	12387240	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(2.222 \pm 74.195) \times 10^{-2}$	12387240	0.406	8.914×10^{-3}	-163	265	-0.192	0.214
sulfurdioxide total vertical column precision [DU]	0.435 ± 0.513	12387240	0.267	0.290	4.846×10^{-2}	260	0.203	0.471
sulfurdioxide slant column density corrected [DU]	$(1.672 \pm 36.916) \times 10^{-2}$	12387240	0.370	8.619×10^{-3}	-79.7	177	-0.174	0.195
sulfurdioxide slant column density cobra [DU]	$(1.664 \pm 36.136) \times 10^{-2}$	12387240	0.370	8.619×10^{-3}	-79.7	41.3	-0.174	0.195
sulfurdioxide slant column density cobra precision [DU]	0.297 ± 0.134	12387240	0.140	0.254	8.765×10^{-2}	19.1	0.210	0.350
sulfurdioxide slant column density window1 [DU]	0.111 ± 0.683	12387240	0.747	0.120	-174	117	-0.258	0.489
sulfurdioxide slant column density window1 precision [DU]	0.297 ± 0.134	12387240	0.140	0.254	8.765×10^{-2}	19.1	0.210	0.350
sulfurdioxide slant column density corrected win1 [DU]	$(4.128 \pm 67.306) \times 10^{-2}$	12387240	0.730	2.467×10^{-2}	-174	117	-0.335	0.395
background so2 slant column offset window1 [DU]	$(-7.000 \pm 14.650) \times 10^{-2}$	12387240	0.183	-0.106	-1.47	4.33	-0.172	1.076×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.56 ± 8.88	12387240	11.2	1.45	-540	963	-4.10	7.08
sulfurdioxide slant column density window2 precision [DU]	8.01 ± 2.25	12387240	2.61	7.67	2.22	490	6.52	9.13
sulfurdioxide slant column density corrected win2 [DU]	0.827 ± 8.729	12387240	11.0	0.827	-539	960	-4.67	6.31
background so2 slant column offset window2 [DU]	-0.735 ± 1.954	12387240	2.77	-0.216	-11.2	7.59	-2.03	0.736
sulfurdioxide slant column density window3 [DU]	-5.24 ± 23.35	12387240	29.0	-5.59	-588	493	-19.8	9.18
sulfurdioxide slant column density window3 precision [DU]	26.8 ± 11.8	12387240	9.27	23.8	9.20	228	20.2	29.5
sulfurdioxide slant column density corrected win3 [DU]	-1.52 ± 22.74	12387240	28.3	-1.64	-584	501	-15.7	12.6
background so2 slant column offset window3 [DU]	3.72 ± 4.78	12387240	7.29	3.71	-18.1	25.7	0.148	7.43
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	12387240	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.978 \pm 3.672) \times 10^{-2}$	12387240	1.645×10^{-2}	1.309×10^{-2}	2.618×10^{-4}	2.03	6.741×10^{-3}	2.319×10^{-2}
fitted radiance shift [nm]	$(-1.340 \pm 22.582) \times 10^{-4}$	12387240	1.611×10^{-3}	-1.080×10^{-4}	-5.392×10^{-2}	4.415×10^{-2}	-9.465×10^{-4}	6.650×10^{-4}
fitted radiance squeeze [1]	$(-3.576 \pm 19.059) \times 10^{-5}$	12387240	2.183×10^{-4}	-2.898×10^{-5}	-1.979×10^{-2}	2.005×10^{-2}	-1.414×10^{-4}	7.688×10^{-5}
fitted root mean square [1]	$(1.297 \pm 0.538) \times 10^{-3}$	12387240	5.675×10^{-4}	1.136×10^{-3}	3.287×10^{-4}	8.208×10^{-2}	9.482×10^{-4}	1.516×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.980 ± 0.488	12387240	0.581	0.888	5.000×10^{-2}	2.58	0.651	1.23
sulfurdioxide total air mass factor polluted precision [1]	0.118 ± 0.144	12387240	9.856×10^{-2}	7.675×10^{-2}	3.615×10^{-3}	2.09	4.374×10^{-2}	0.142
sulfurdioxide clear air mass factor polluted [1]	0.838 ± 0.382	12387240	0.370	0.782	8.976×10^{-2}	2.43	0.598	0.968
number of spectral points in retrieval [1]	73.4 ± 0.5	12387240	1.000	73.0	51.0	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]	0.688 ± 0.412	4326065	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.750 \pm 101.866) \times 10^{-2}$	4326065	0.432	1.048×10^{-2}	-52.0	892	-0.201	0.231
sulfurdioxide total vertical column precision [DU]	0.462 ± 0.589	4326065	0.311	0.329	4.785×10^{-2}	442	0.215	0.526
sulfurdioxide slant column density corrected [DU]	$(1.992 \pm 53.035) \times 10^{-2}$	4326065	0.367	9.931×10^{-3}	-15.6	499	-0.172	0.196
sulfurdioxide slant column density cobra [DU]	$(1.933 \pm 35.657) \times 10^{-2}$	4326065	0.367	9.931×10^{-3}	-15.6	109	-0.172	0.196
sulfurdioxide slant column density cobra precision [DU]	0.290 ± 0.134	4326065	0.102	0.253	9.445×10^{-2}	56.9	0.217	0.318
sulfurdioxide slant column density window1 [DU]	0.143 ± 0.663	4326065	0.732	0.137	-64.6	105	-0.228	0.504
sulfurdioxide slant column density window1 precision [DU]	0.290 ± 0.134	4326065	0.102	0.253	9.445×10^{-2}	56.9	0.217	0.318
sulfurdioxide slant column density corrected win1 [DU]	$(4.010 \pm 65.559) \times 10^{-2}$	4326065	0.718	2.412×10^{-2}	-64.6	105	-0.330	0.388
background so2 slant column offset window1 [DU]	-0.103 ± 0.117	4326065	0.140	-0.121	-0.823	3.14	-0.183	-4.330×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.12 ± 9.38	4326065	11.5	1.11	-896	1.481×10^{3}	-4.67	6.87
sulfurdioxide slant column density window2 precision [DU]	8.44 ± 2.79	4326065	2.81	8.03	2.31	863	6.79	9.59
sulfurdioxide slant column density corrected win2 [DU]	0.705 ± 9.288	4326065	11.4	0.720	-896	1.480×10^{3}	-4.98	6.39
background so2 slant column offset window2 [DU]	-0.418 ± 1.667	4326065	2.16	-9.828×10^{-2}	-10.4	6.90	-1.40	0.768
sulfurdioxide slant column density window3 [DU]	-13.5 ± 24.3	4326065	29.7	-12.8	-1.705×10^{3}	943	-27.9	1.74
sulfurdioxide slant column density window3 precision [DU]	30.9 ± 16.9	4326065	12.7	26.3	9.37	1.799×10^{3}	21.5	34.1
sulfurdioxide slant column density corrected win3 [DU]	-9.81 ± 24.51	4326065	30.1	-8.93	-1.706×10^{3}	950	-24.4	5.67
background so2 slant column offset window3 [DU]	3.68 ± 4.66	4326065	7.25	4.08	-18.1	25.3	0.156	7.40
sulfurdioxide slant column cobra flag [1]	2.00 ± 0.08	4326065	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.542 \pm 10.693) \times 10^{-2}$	4326065	5.324×10^{-2}	2.480×10^{-2}	1.959×10^{-4}	2.08	6.574×10^{-3}	5.981×10^{-2}
fitted radiance shift [nm]	$(-9.093 \pm 319.965) \times 10^{-5}$	4326065	1.673×10^{-3}	-1.354×10^{-4}	-0.110	4.393×10^{-2}	-9.707×10^{-4}	7.027×10^{-4}
fitted radiance squeeze [1]	$(-4.042 \pm 18.488) \times 10^{-5}$	4326065	2.155×10^{-4}	-3.744×10^{-5}	-2.043×10^{-2}	1.885×10^{-2}	-1.467×10^{-4}	6.880×10^{-5}
fitted root mean square [1]	$(1.263 \pm 0.489) \times 10^{-3}$	4326065	4.228×10^{-4}	1.139×10^{-3}	3.067×10^{-4}	0.106	9.763×10^{-4}	1.399×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.943 ± 0.552	4326065	0.649	0.782	5.000×10^{-2}	2.72	0.549	1.20
sulfurdioxide total air mass factor polluted precision [1]	0.119 ± 0.122	4326065	0.140	7.250×10^{-2}	2.500×10^{-3}	2.20	3.307×10^{-2}	0.173
sulfurdioxide clear air mass factor polluted [1]	0.755 ± 0.354	4326065	0.379	0.676	4.749×10^{-2}	2.74	0.519	0.899
number of spectral points in retrieval [1]	73.4 ± 0.5	4326065	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

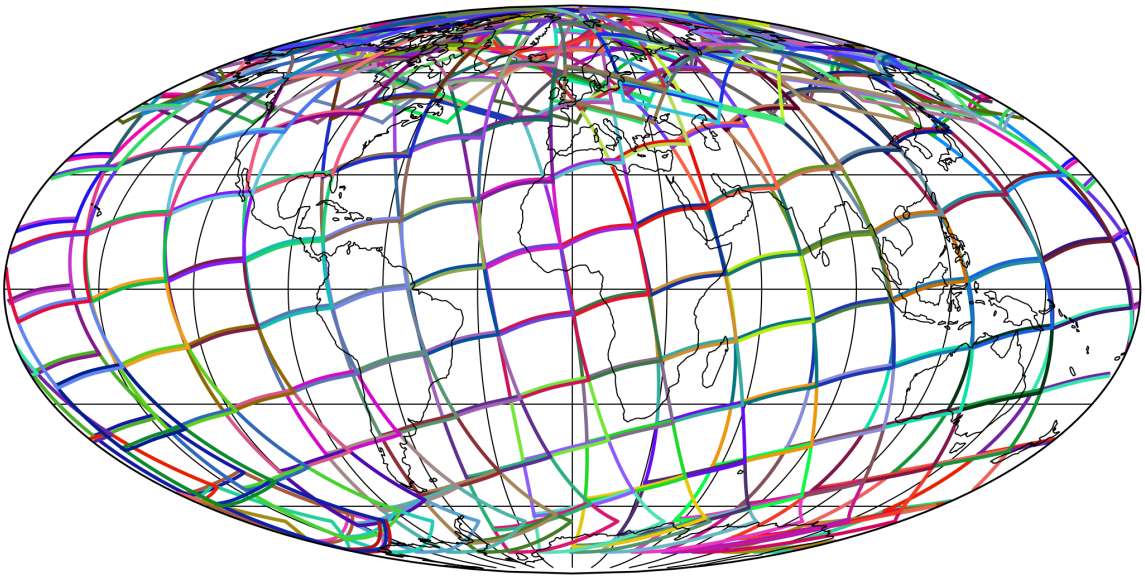


Figure 1: Outline of the granules.

4 Input data monitoring

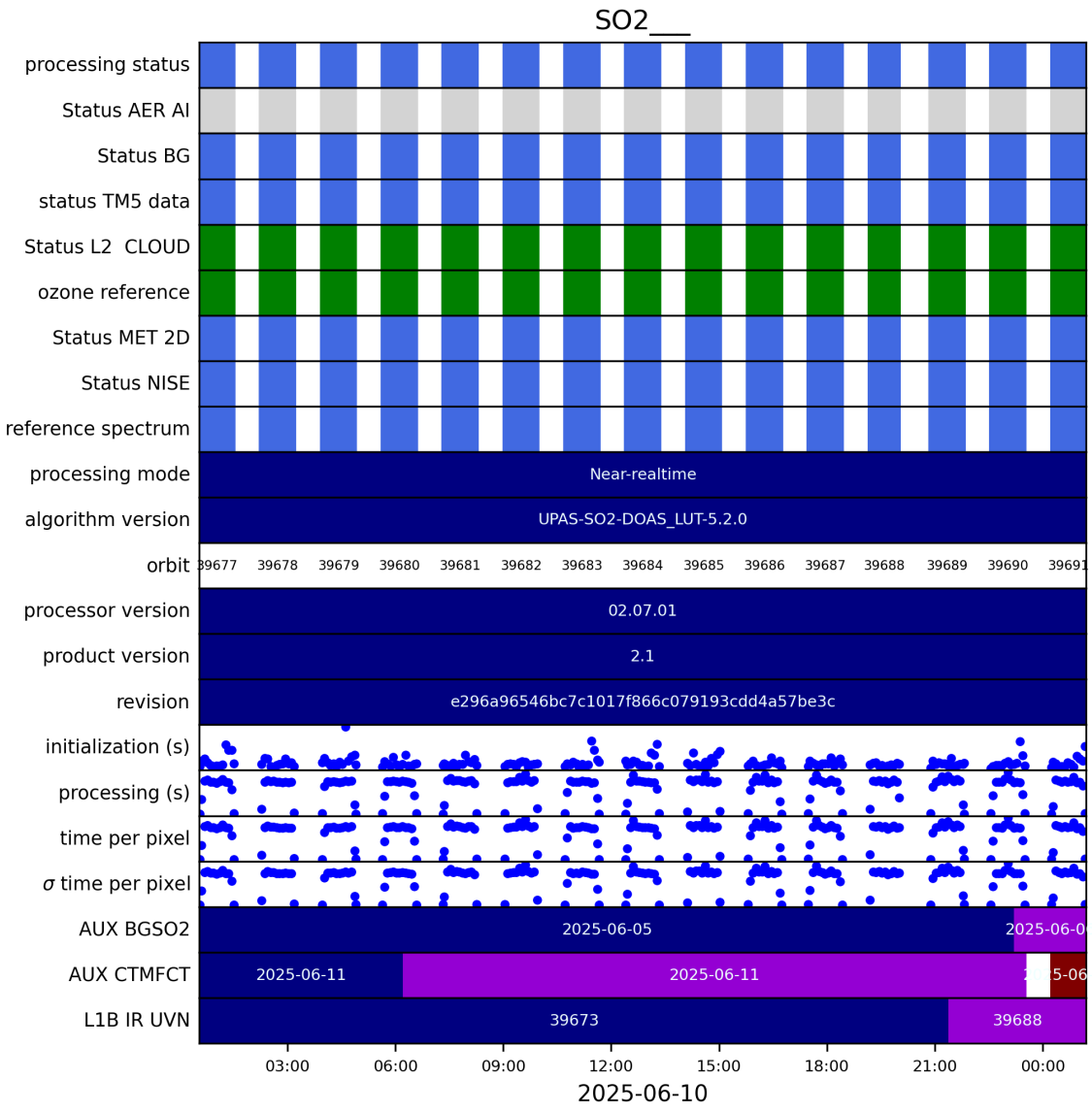


Figure 2: Input data per granule

5 Warnings and errors

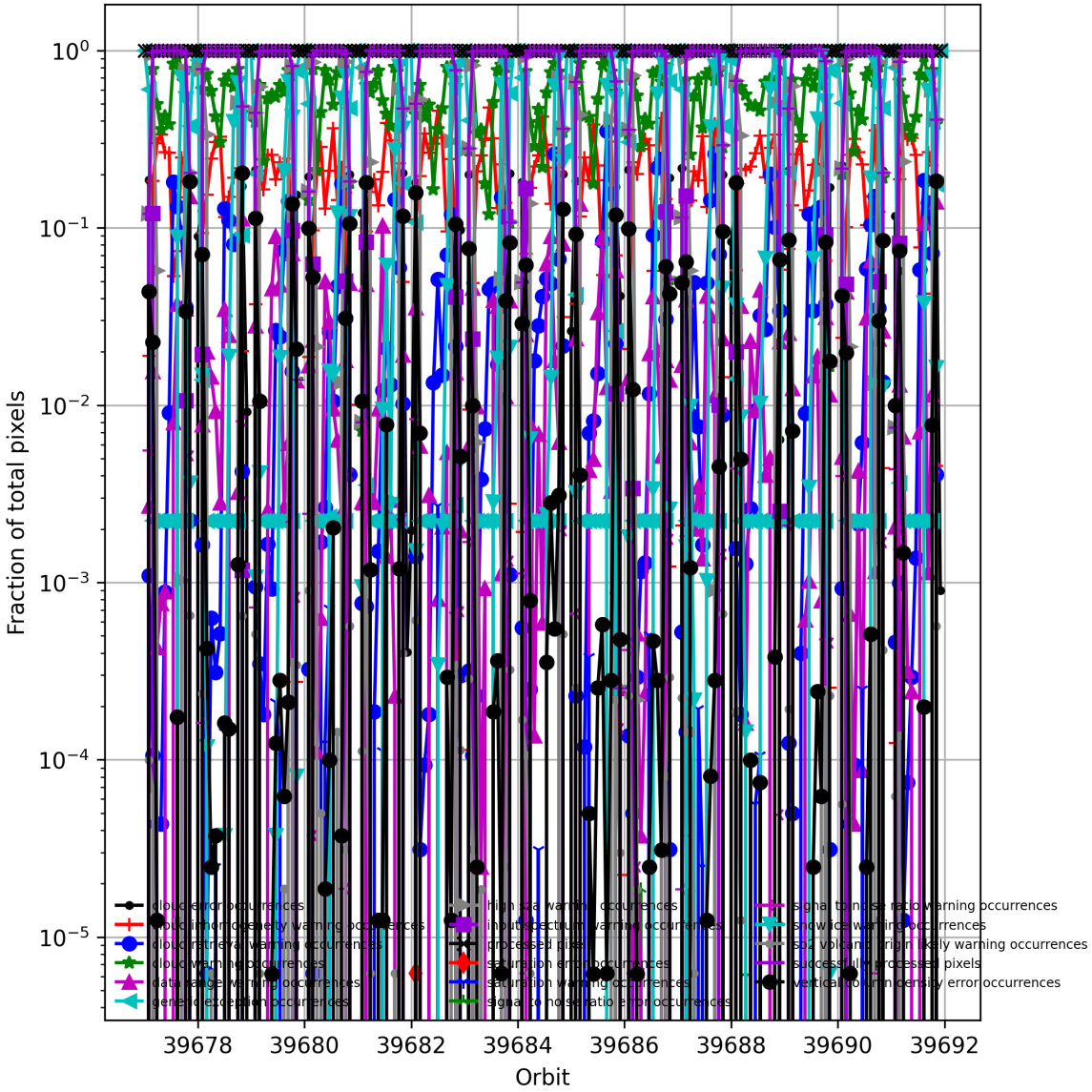


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

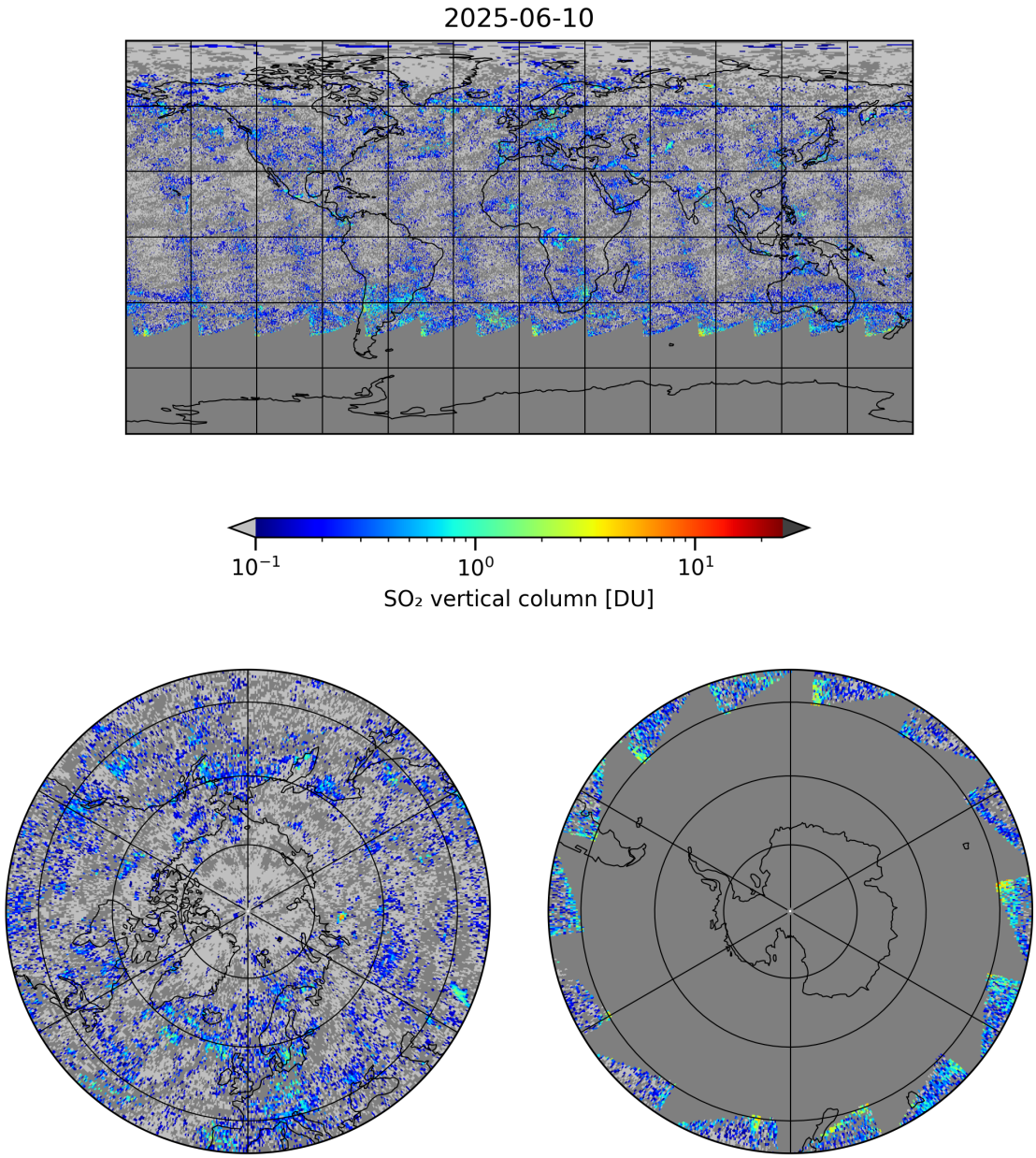


Figure 4: Map of "SO_2 vertical column" for 2025-06-10 to 2025-06-11

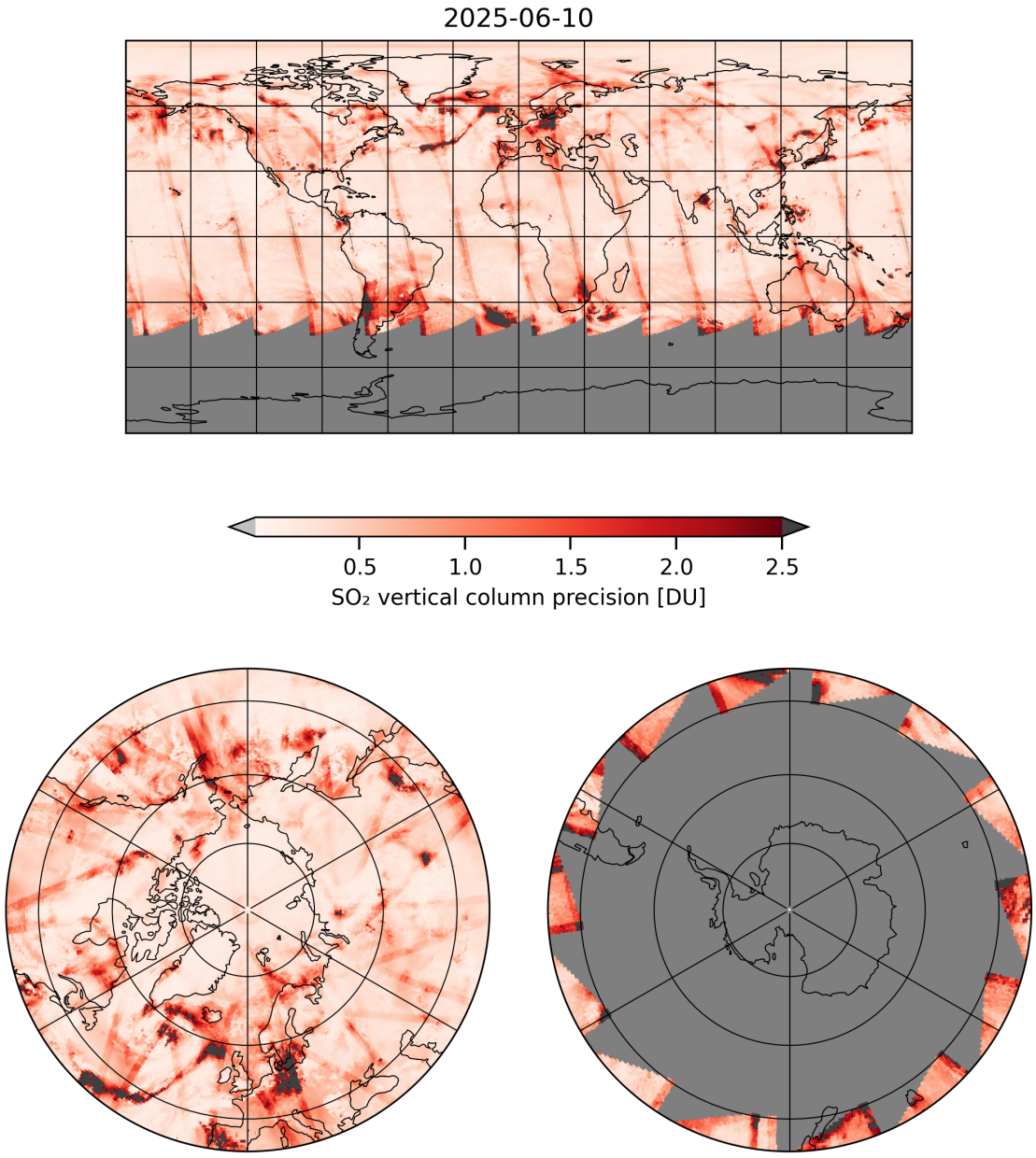


Figure 5: Map of "SO_2 vertical column precision" for 2025-06-10 to 2025-06-11

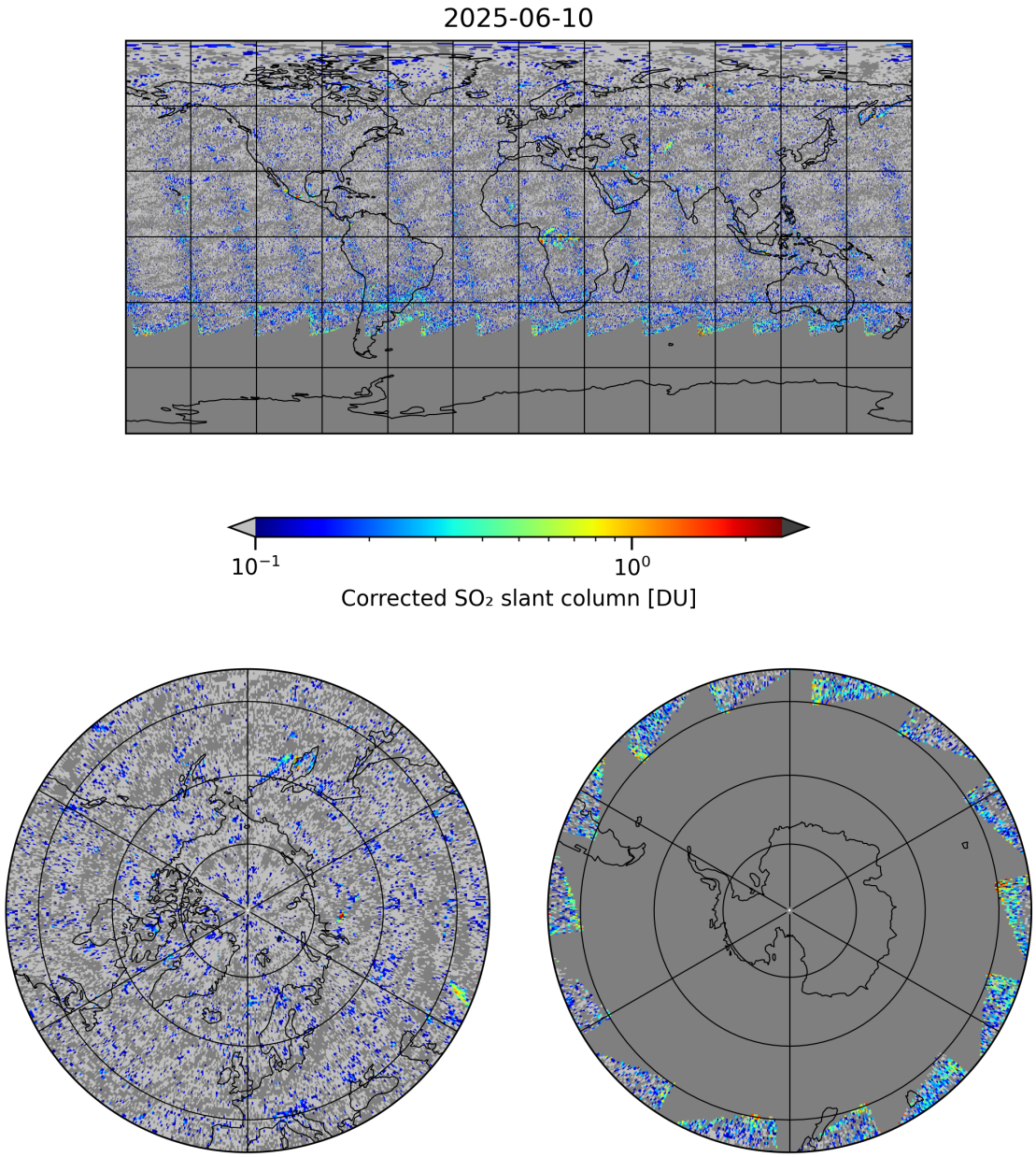


Figure 6: Map of “Corrected SO_2 slant column” for 2025-06-10 to 2025-06-11

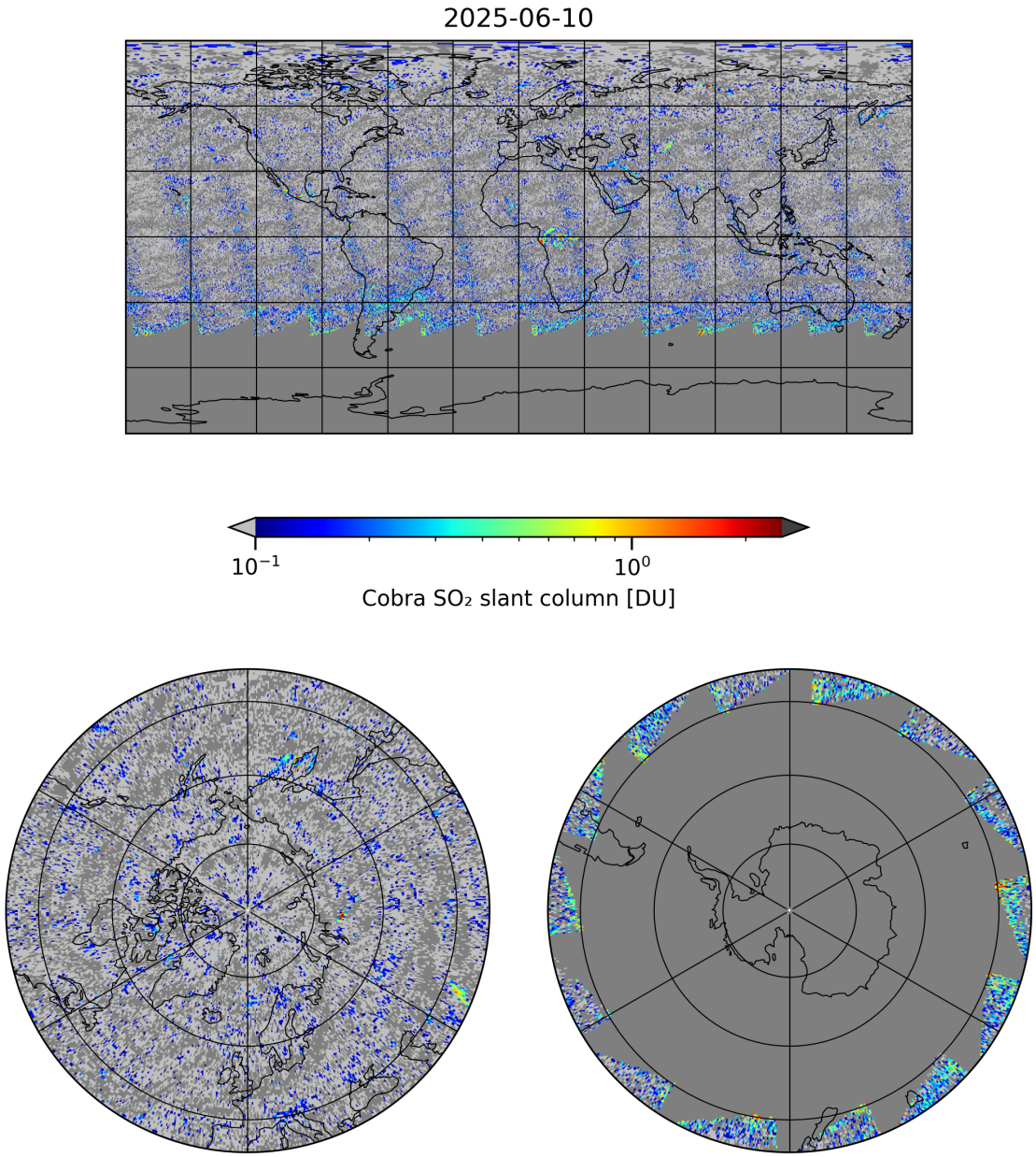


Figure 7: Map of "Cobra SO_2 slant column" for 2025-06-10 to 2025-06-11

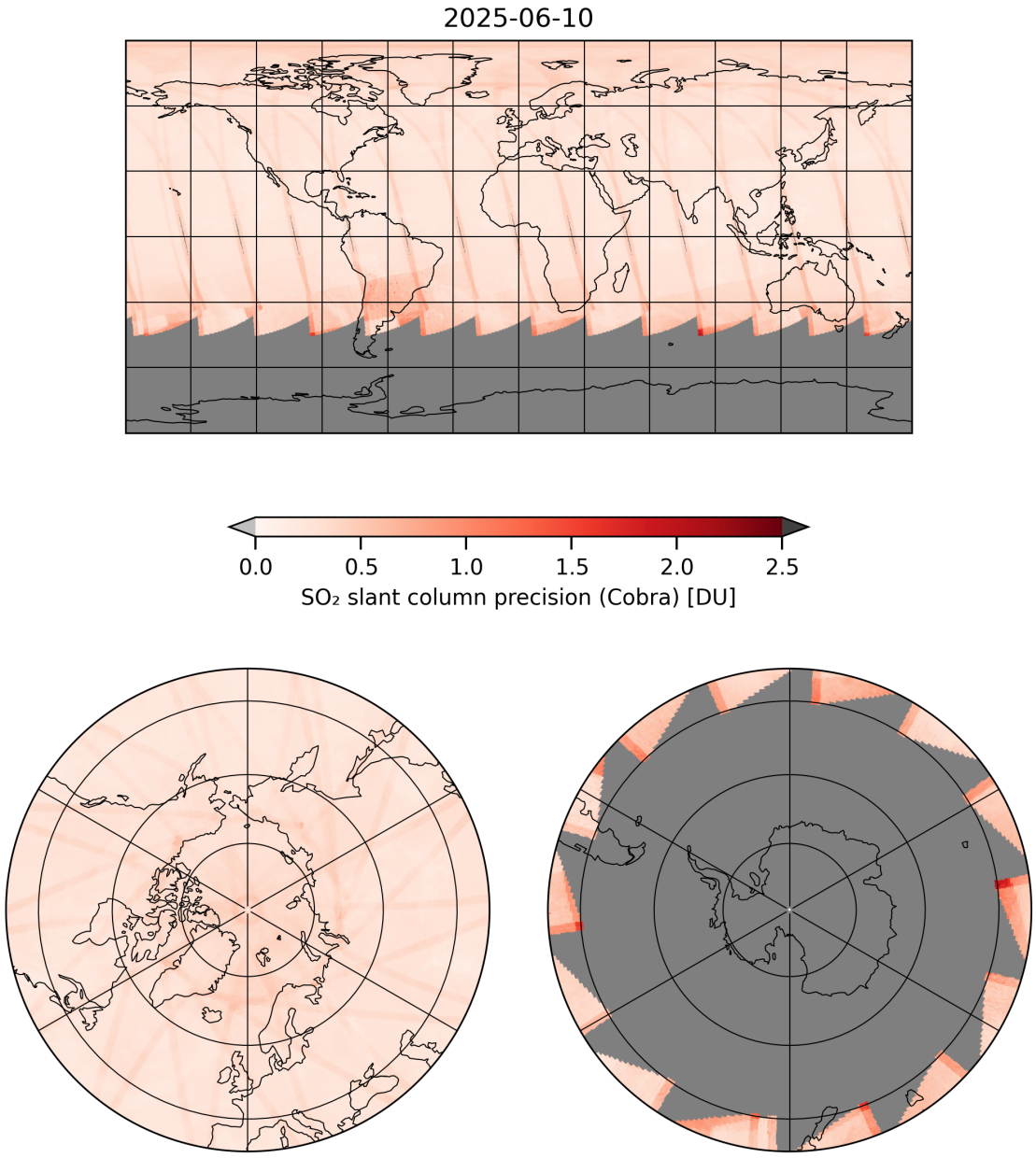


Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-06-10 to 2025-06-11

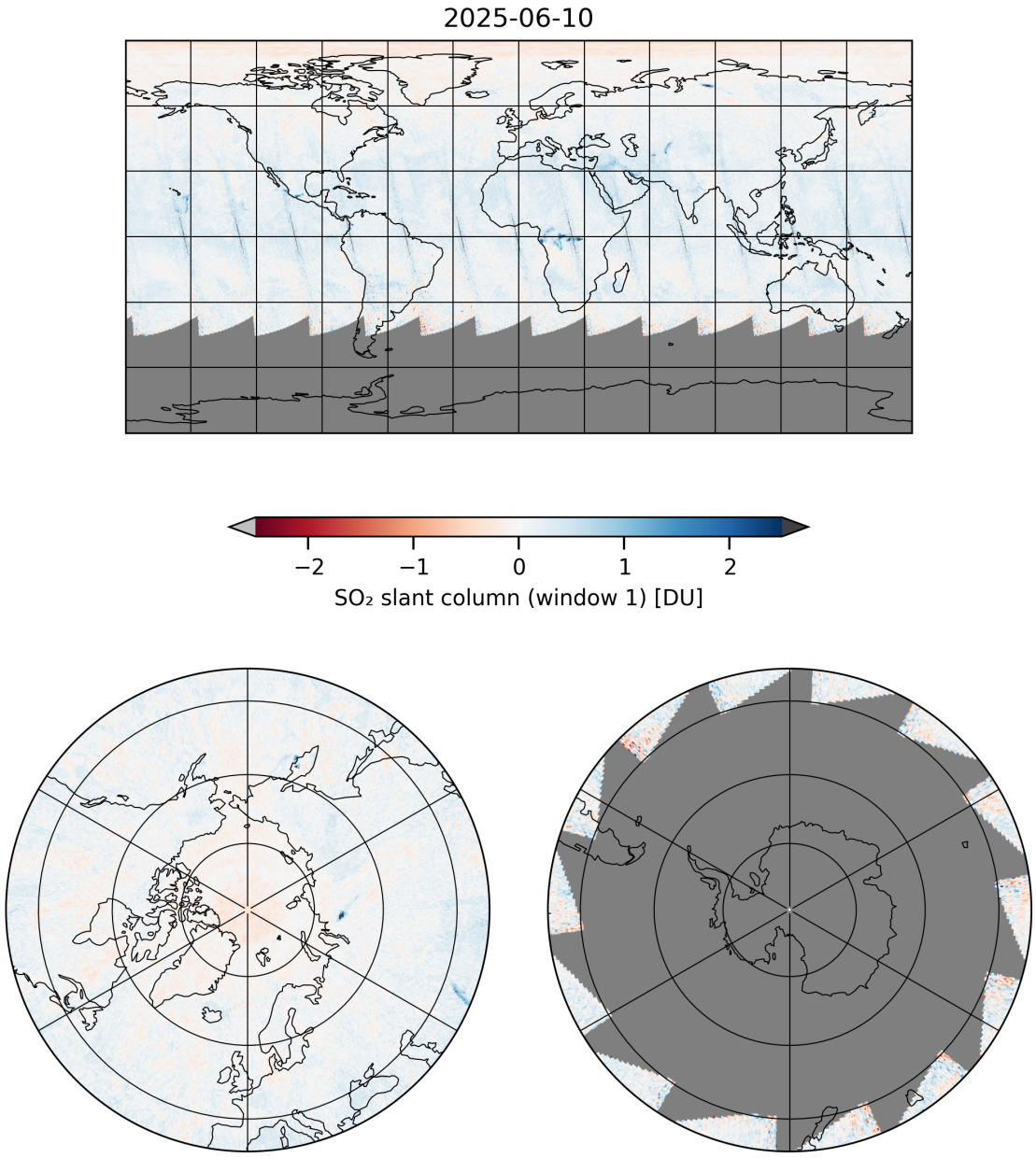


Figure 9: Map of "SO_2 slant column (window 1)" for 2025-06-10 to 2025-06-11

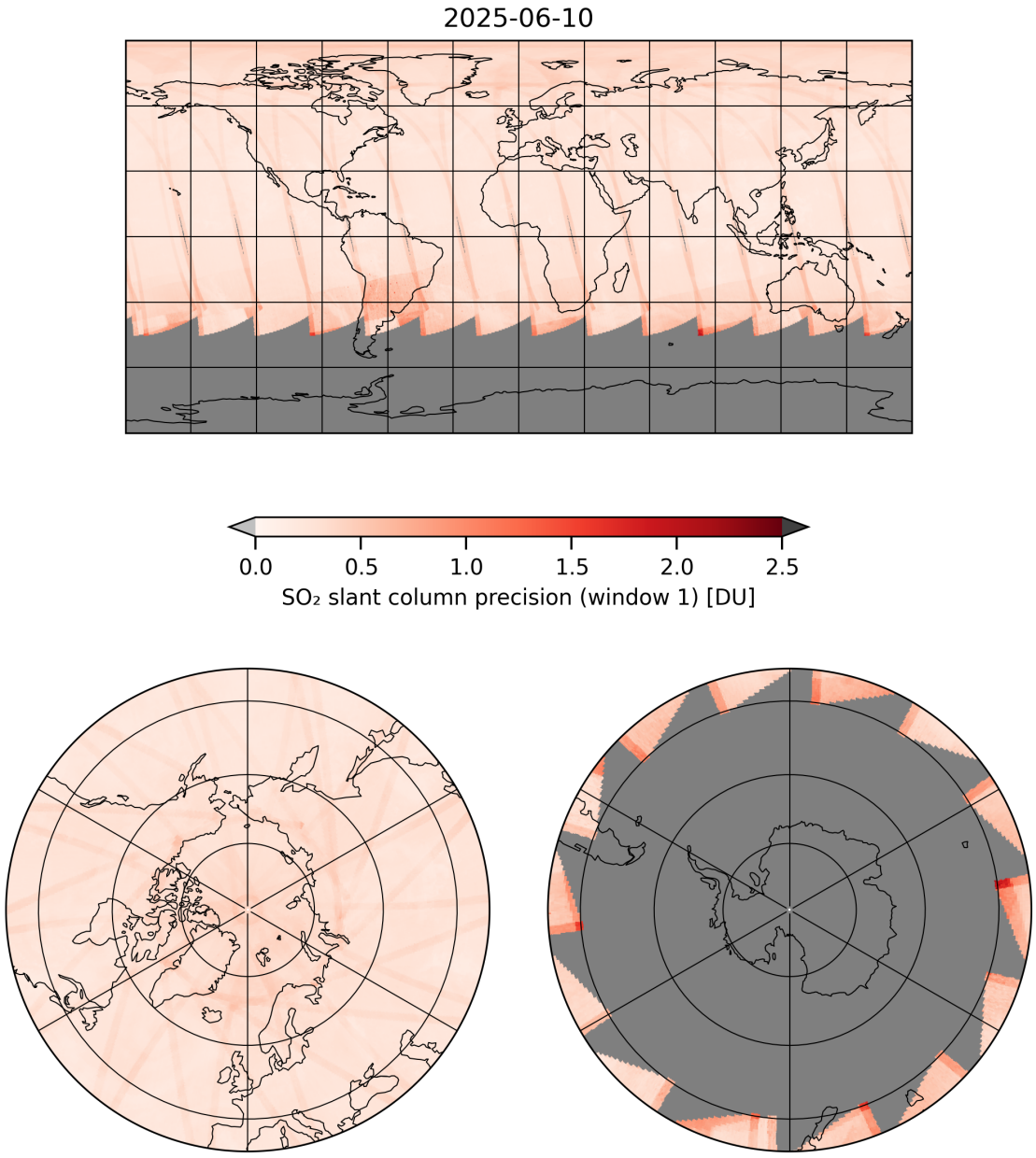


Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-06-10 to 2025-06-11

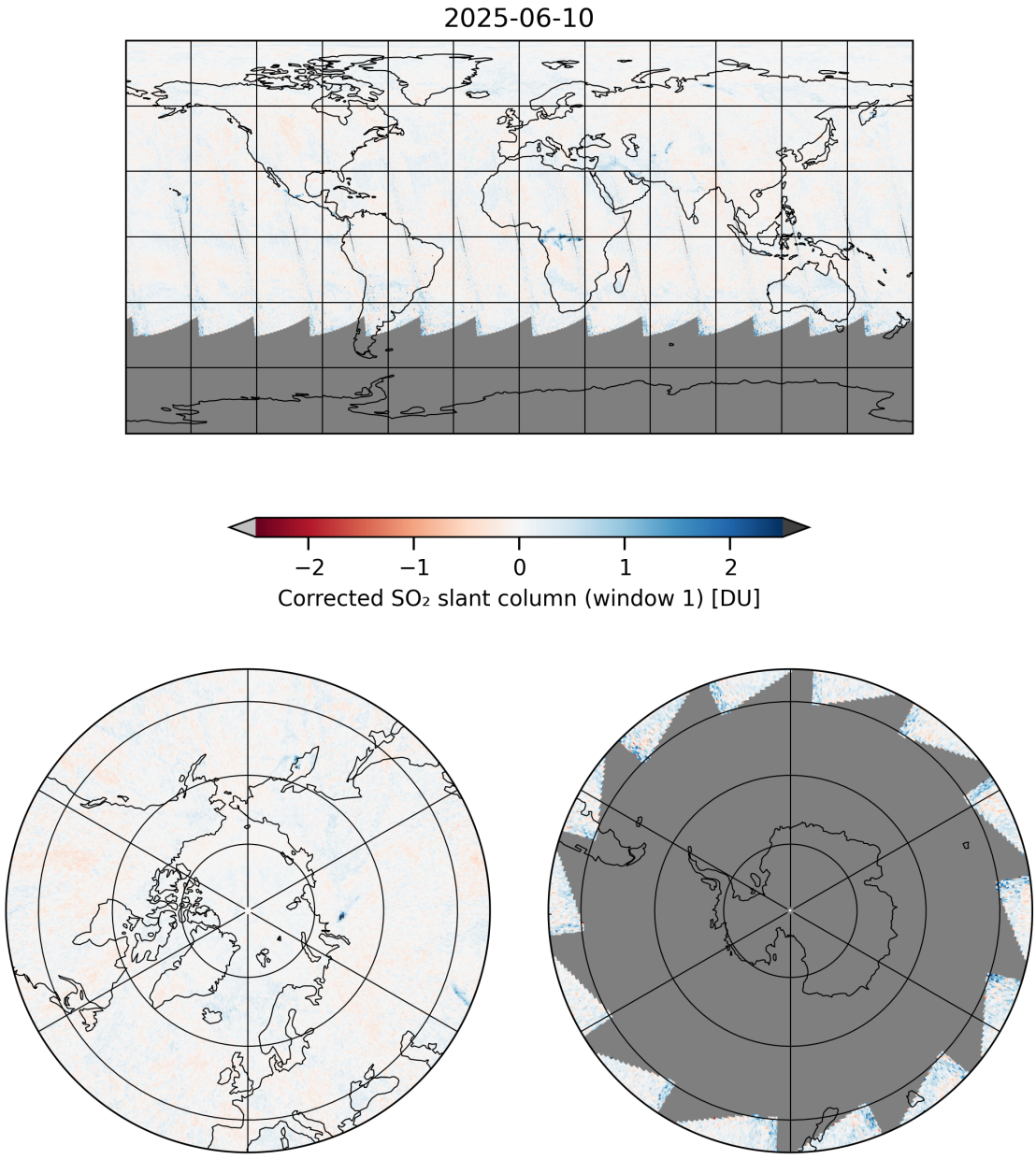


Figure 11: Map of "Corrected SO_2 slant column (window 1)" for 2025-06-10 to 2025-06-11

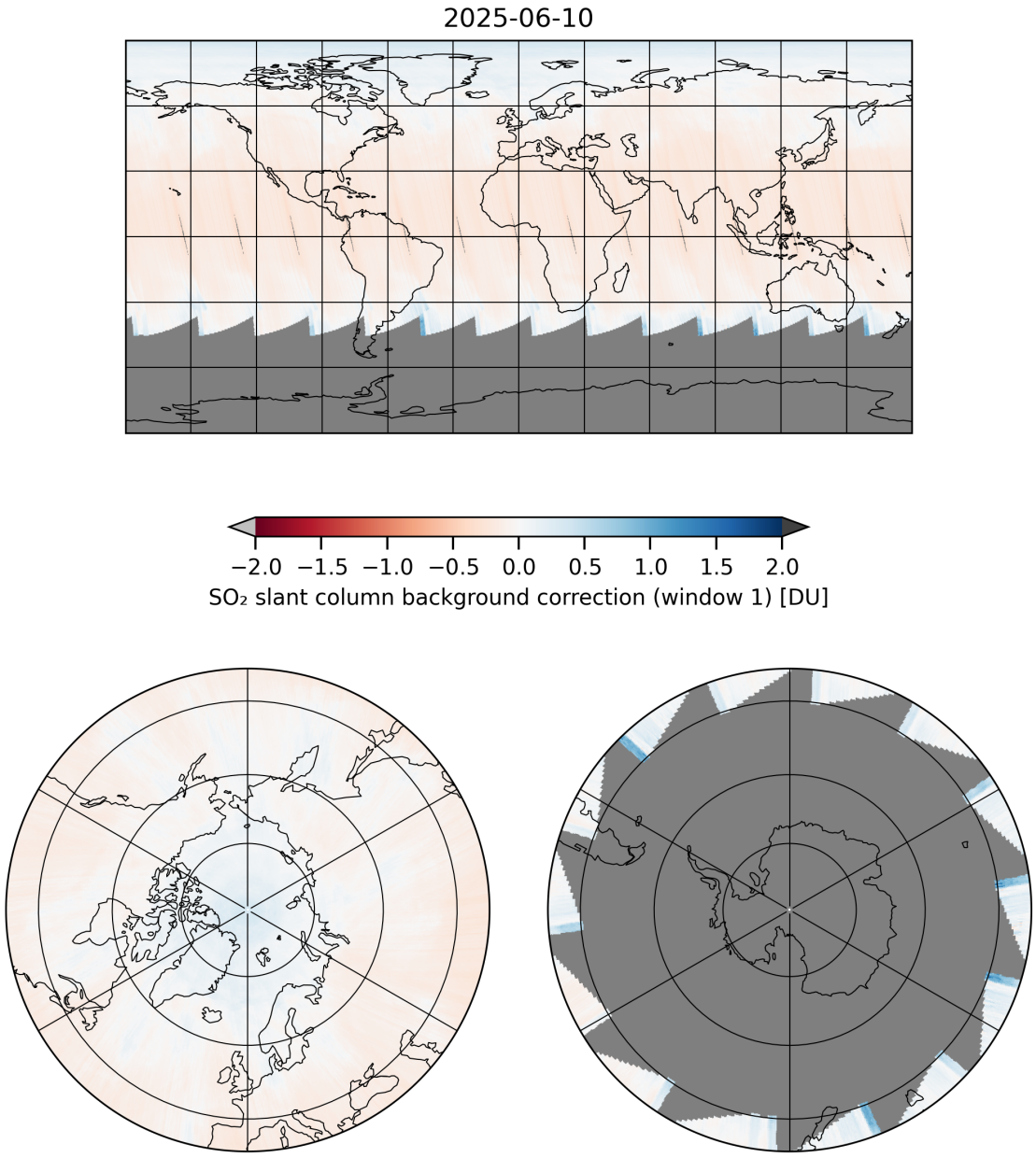


Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-06-10 to 2025-06-11

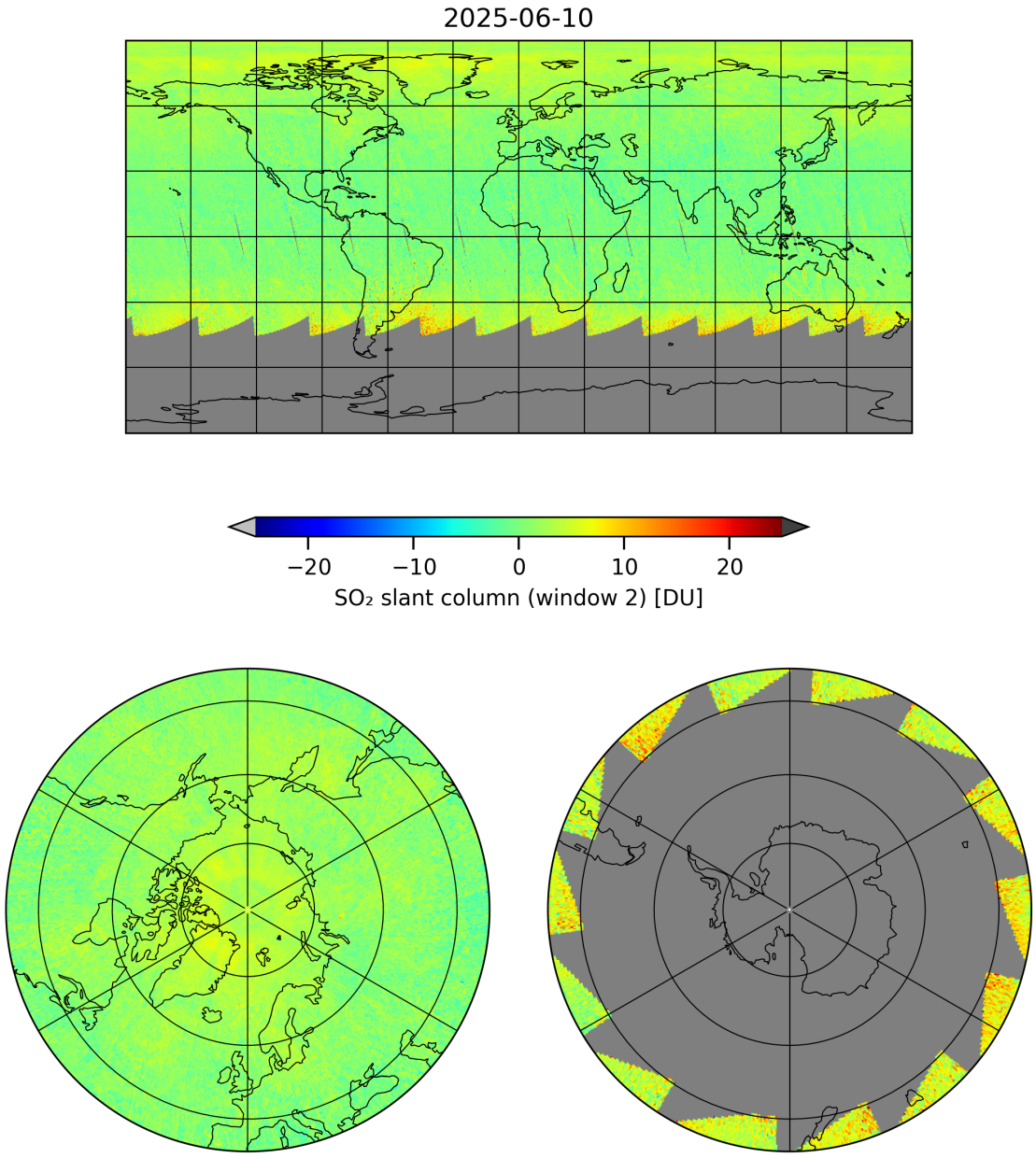


Figure 13: Map of "SO_2 slant column (window 2)" for 2025-06-10 to 2025-06-11

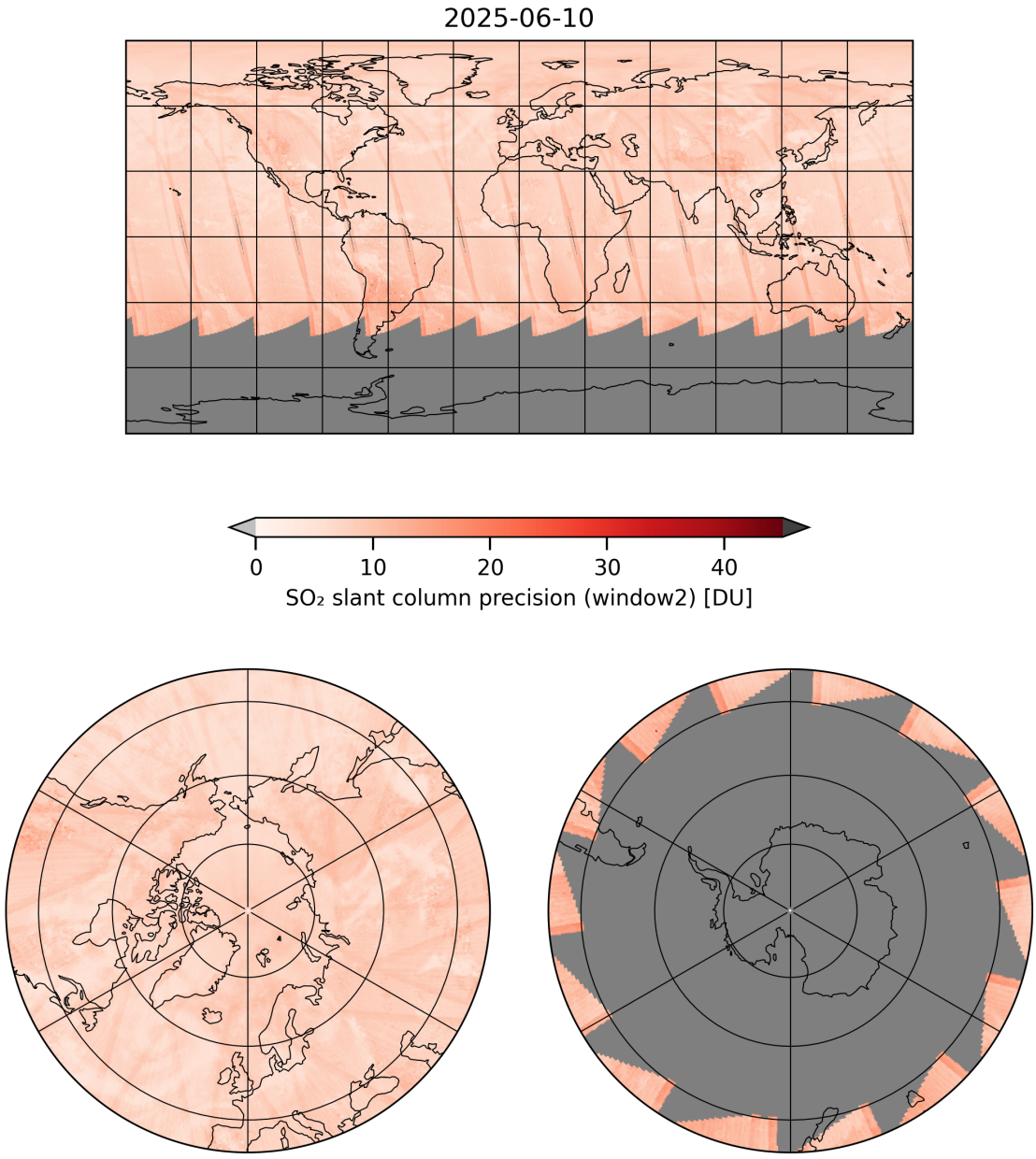


Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-06-10 to 2025-06-11

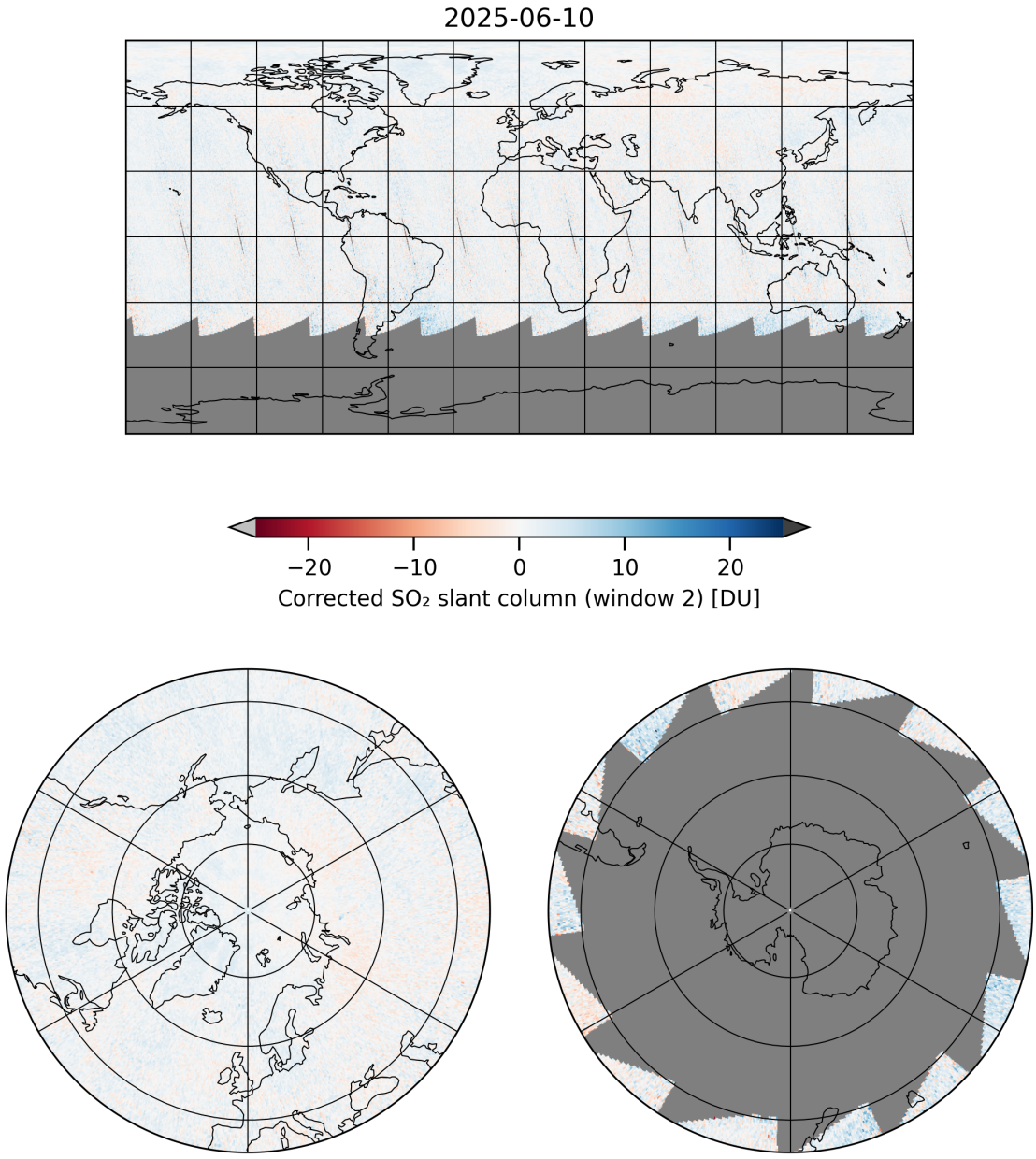


Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-06-10 to 2025-06-11

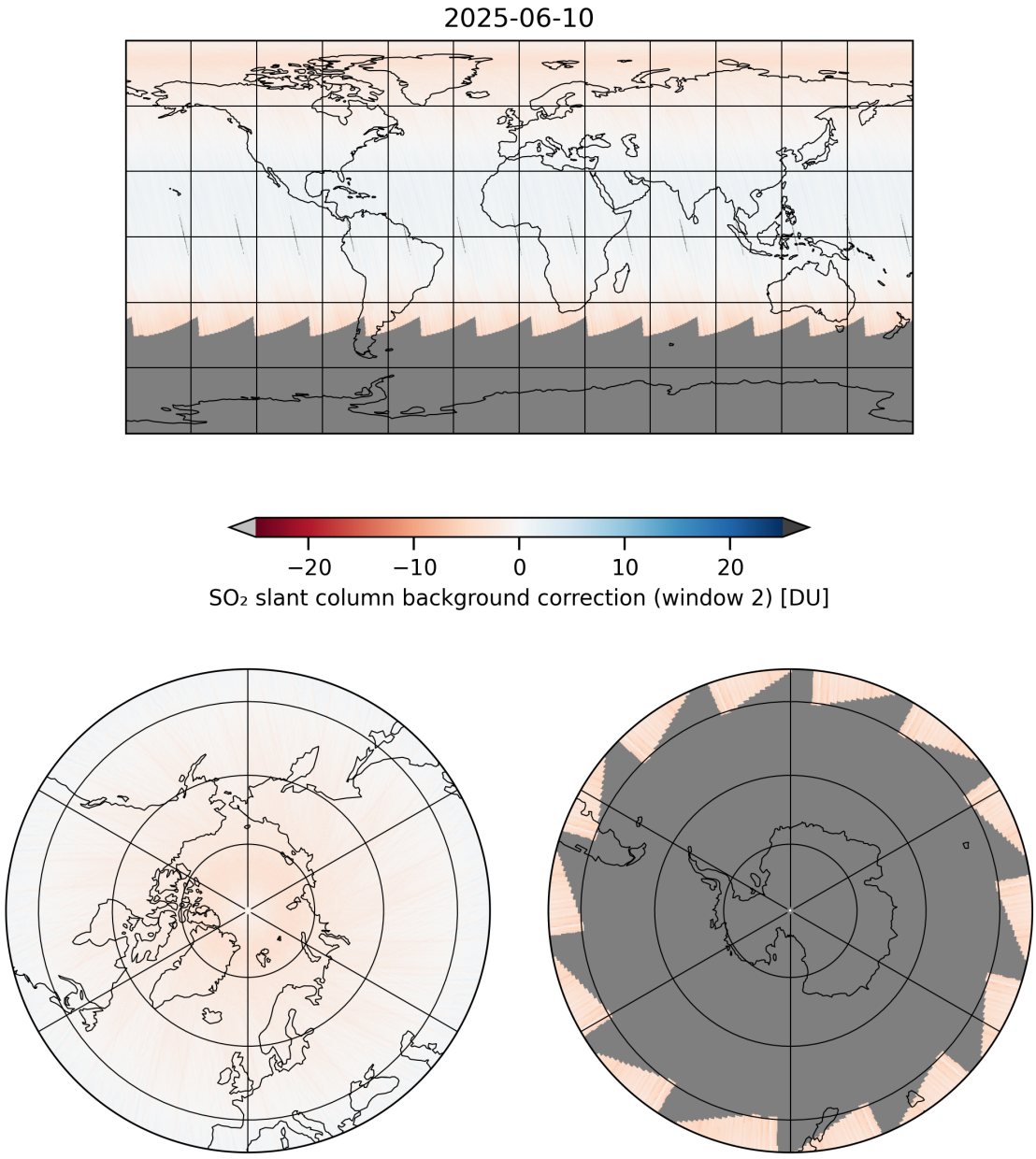


Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-06-10 to 2025-06-11

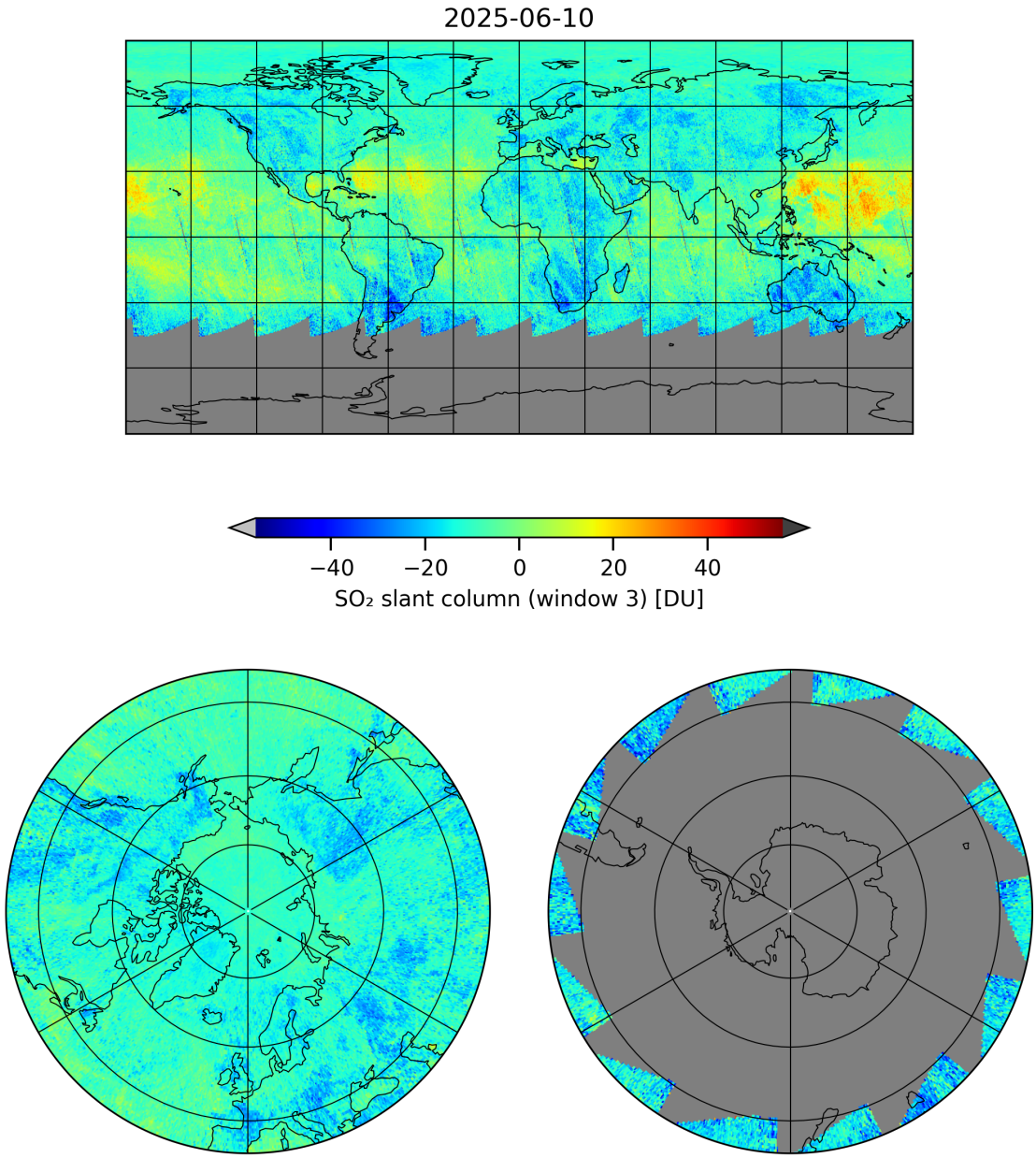


Figure 17: Map of "SO_2 slant column (window 3)" for 2025-06-10 to 2025-06-11

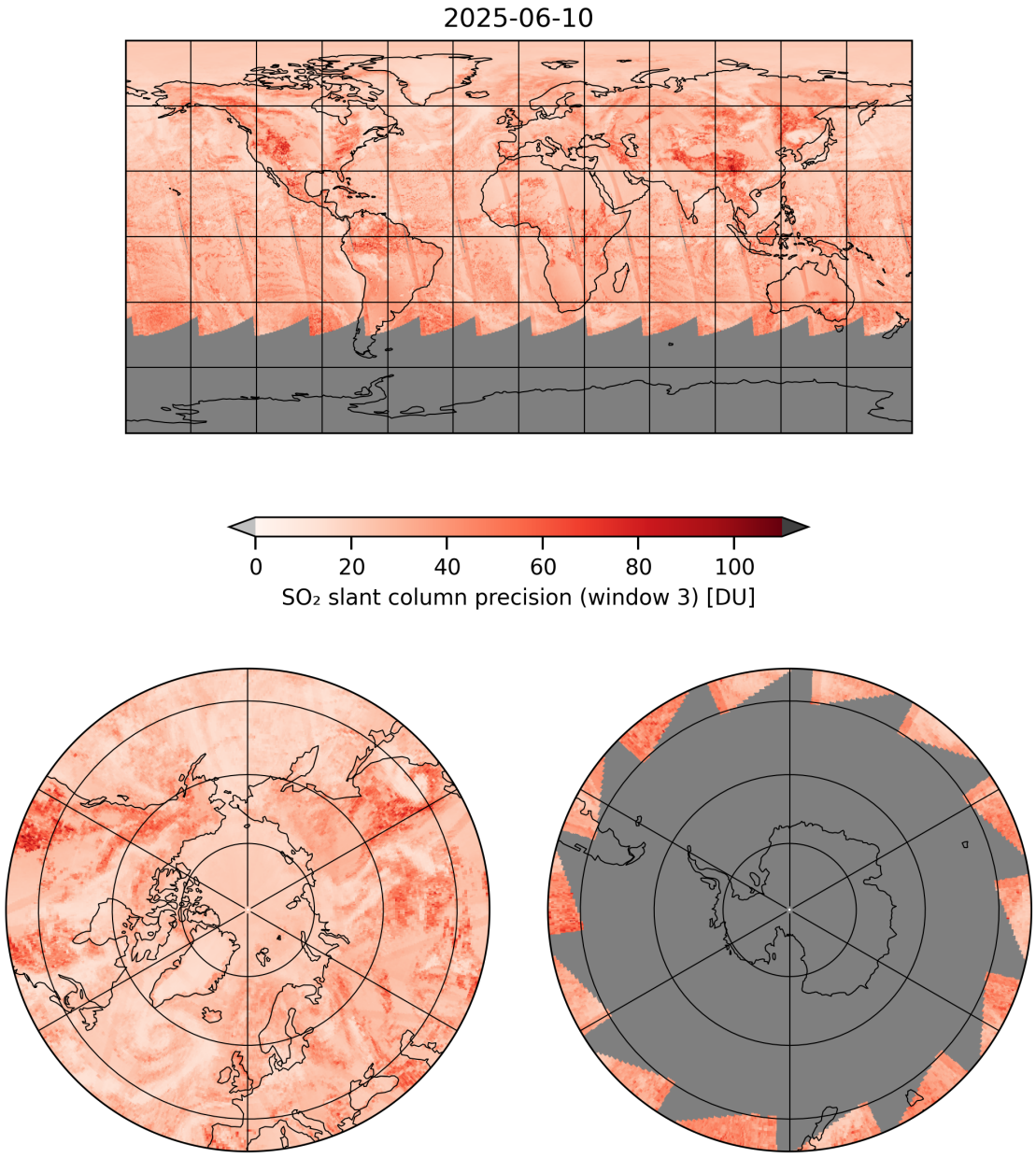


Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-06-10 to 2025-06-11

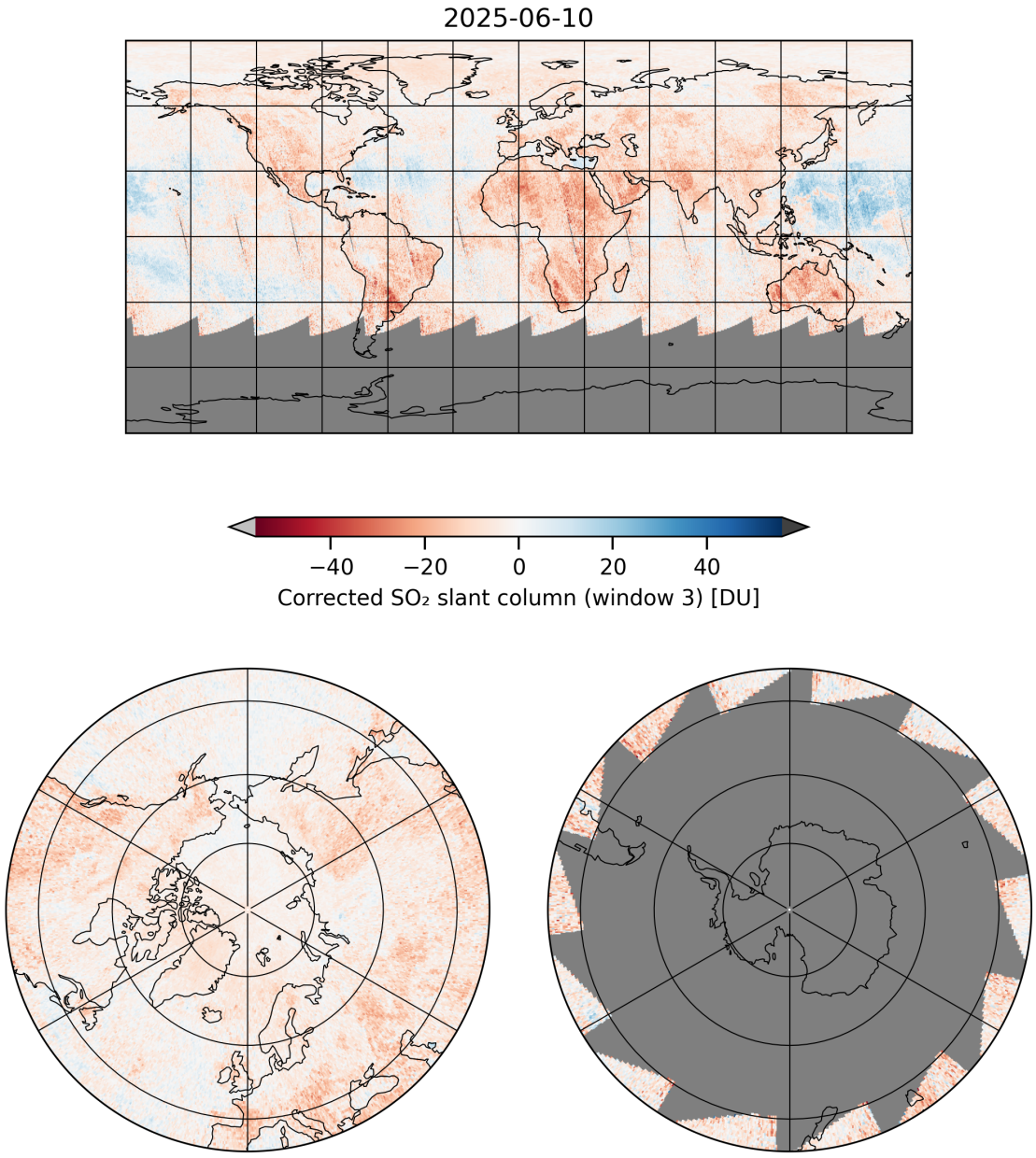


Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-06-10 to 2025-06-11

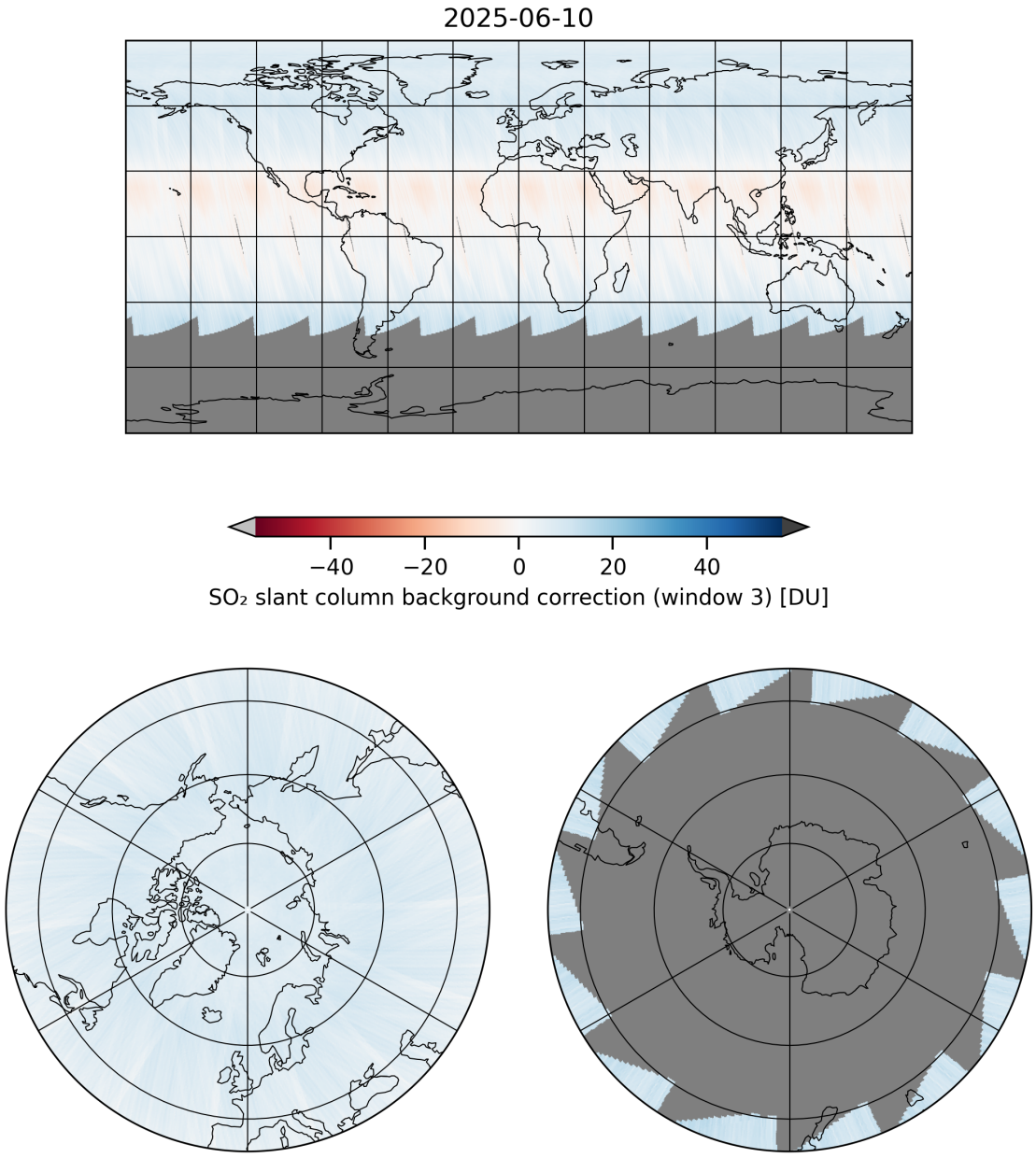


Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-06-10 to 2025-06-11

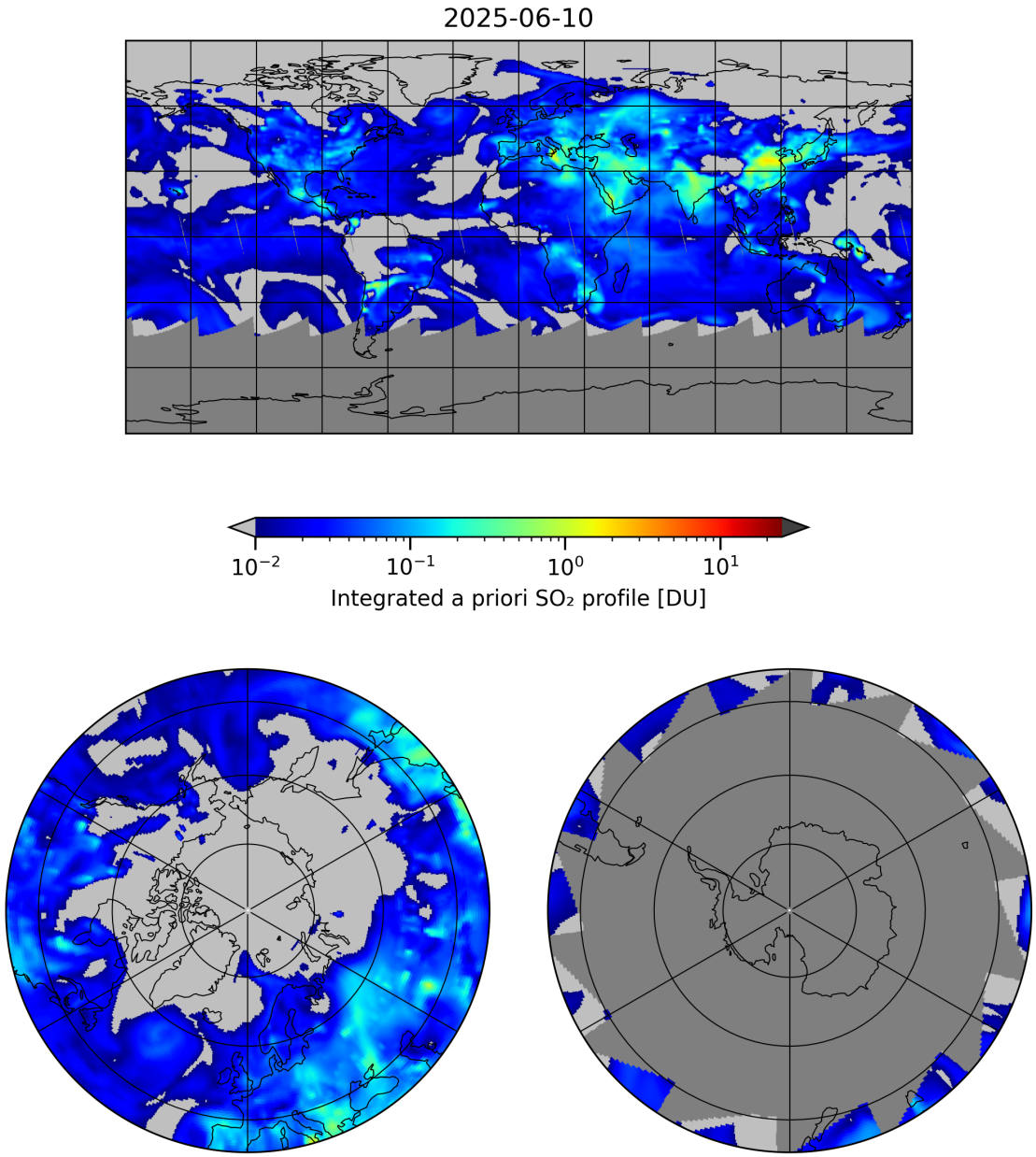


Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-06-10 to 2025-06-11

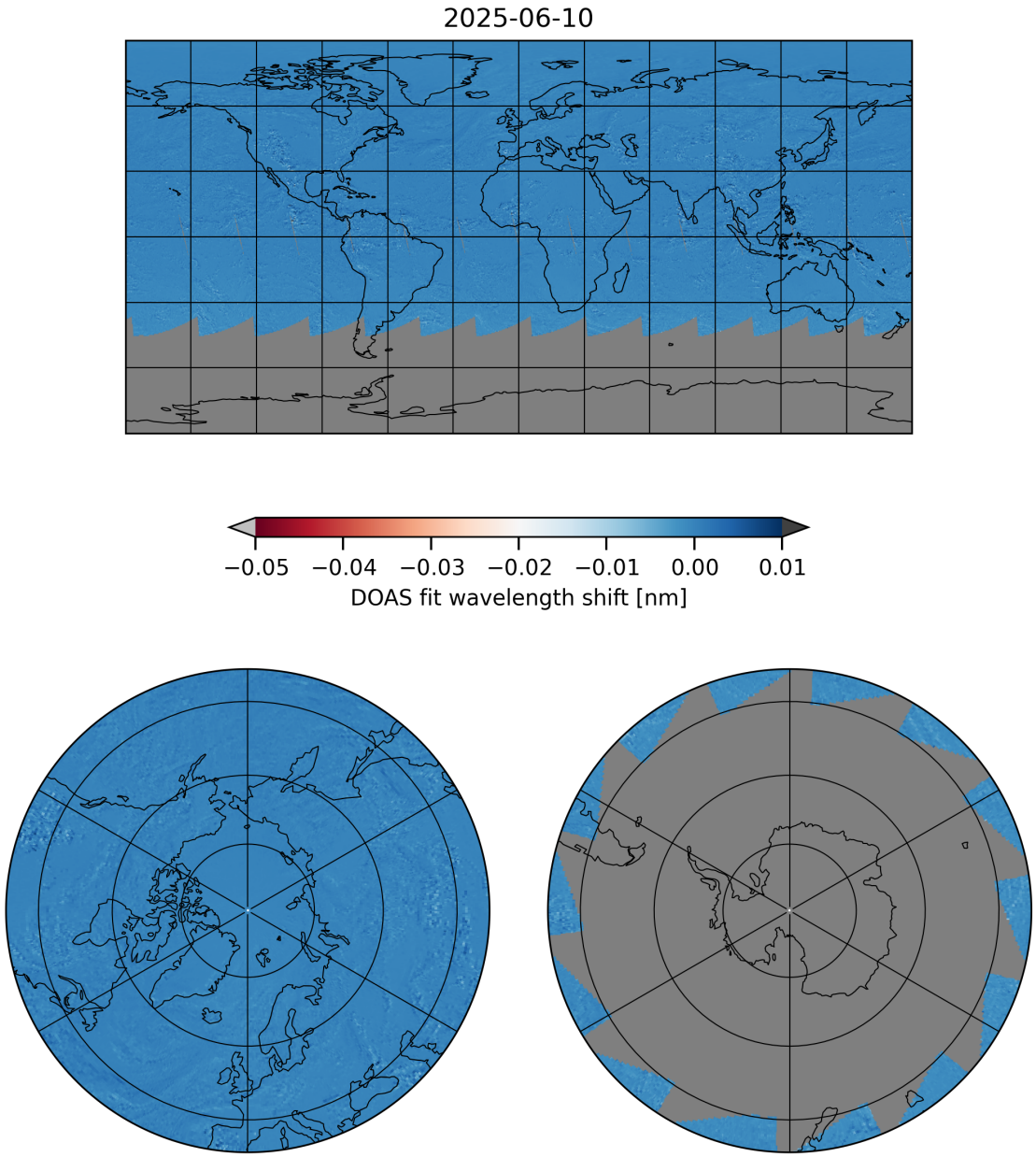


Figure 22: Map of “DOAS fit wavelength shift” for 2025-06-10 to 2025-06-11

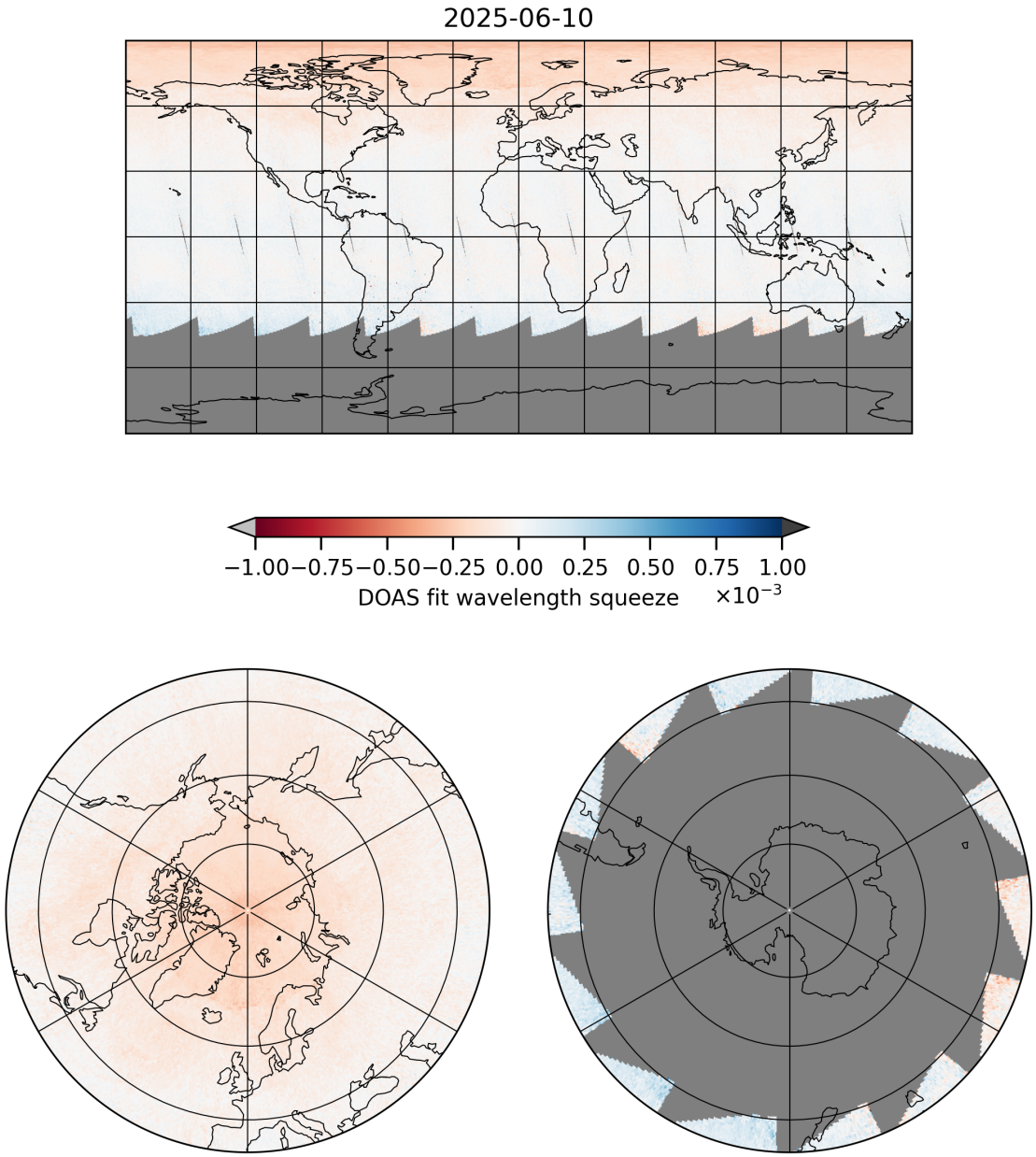


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-06-10 to 2025-06-11

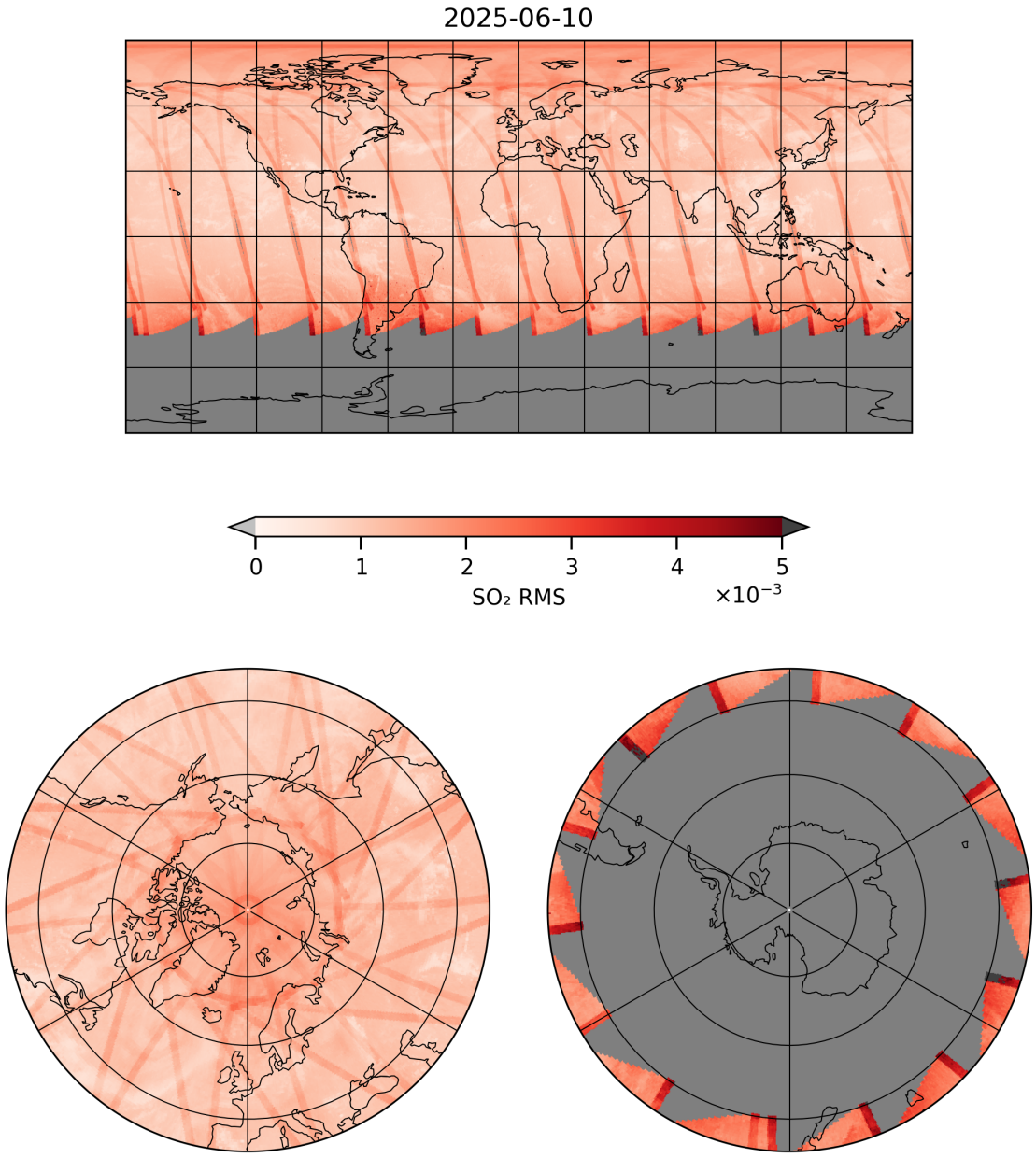


Figure 24: Map of "SO_2 RMS" for 2025-06-10 to 2025-06-11

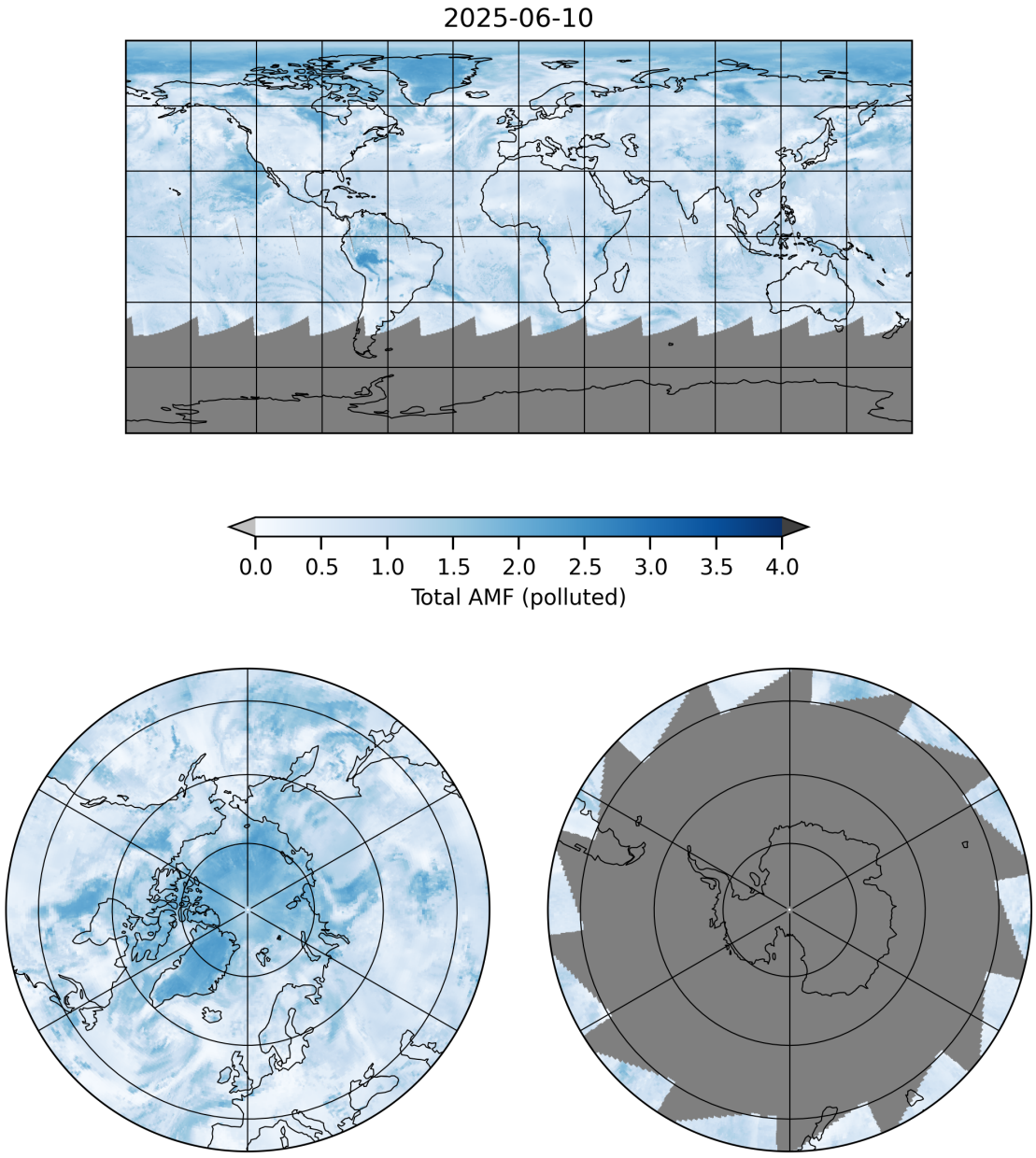


Figure 25: Map of “Total AMF (polluted)” for 2025-06-10 to 2025-06-11

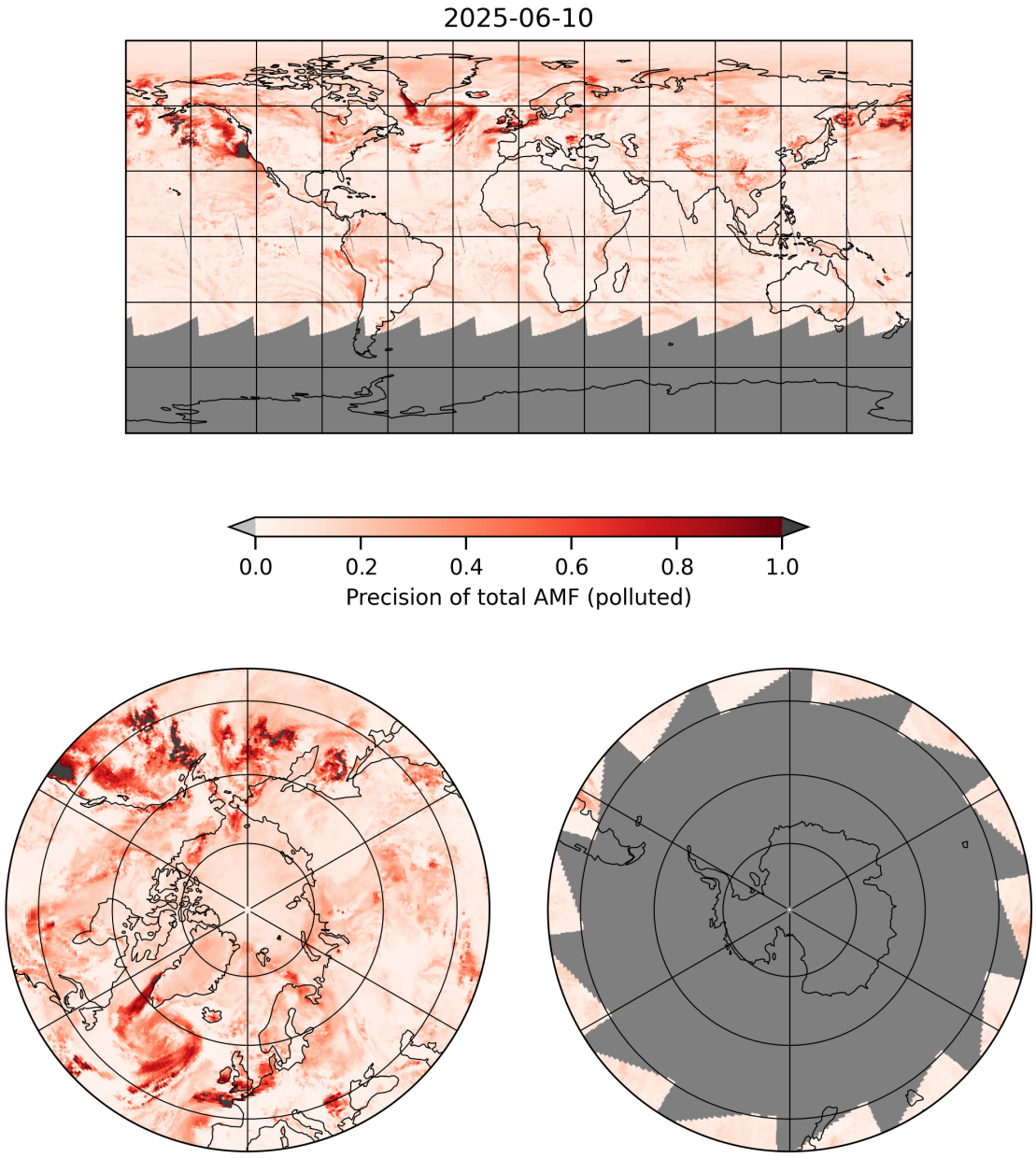


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-06-10 to 2025-06-11

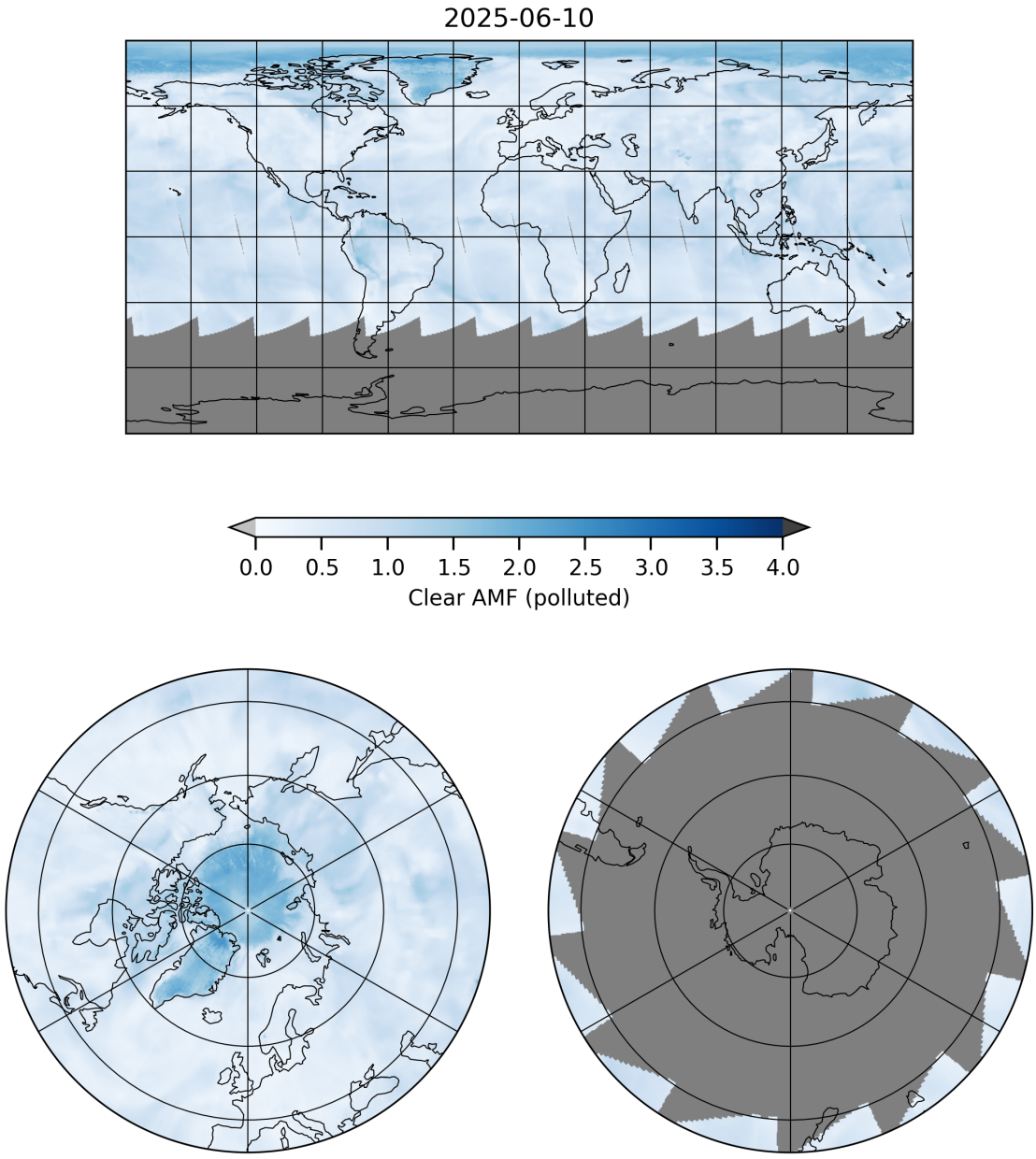


Figure 27: Map of “Clear AMF (polluted)” for 2025-06-10 to 2025-06-11

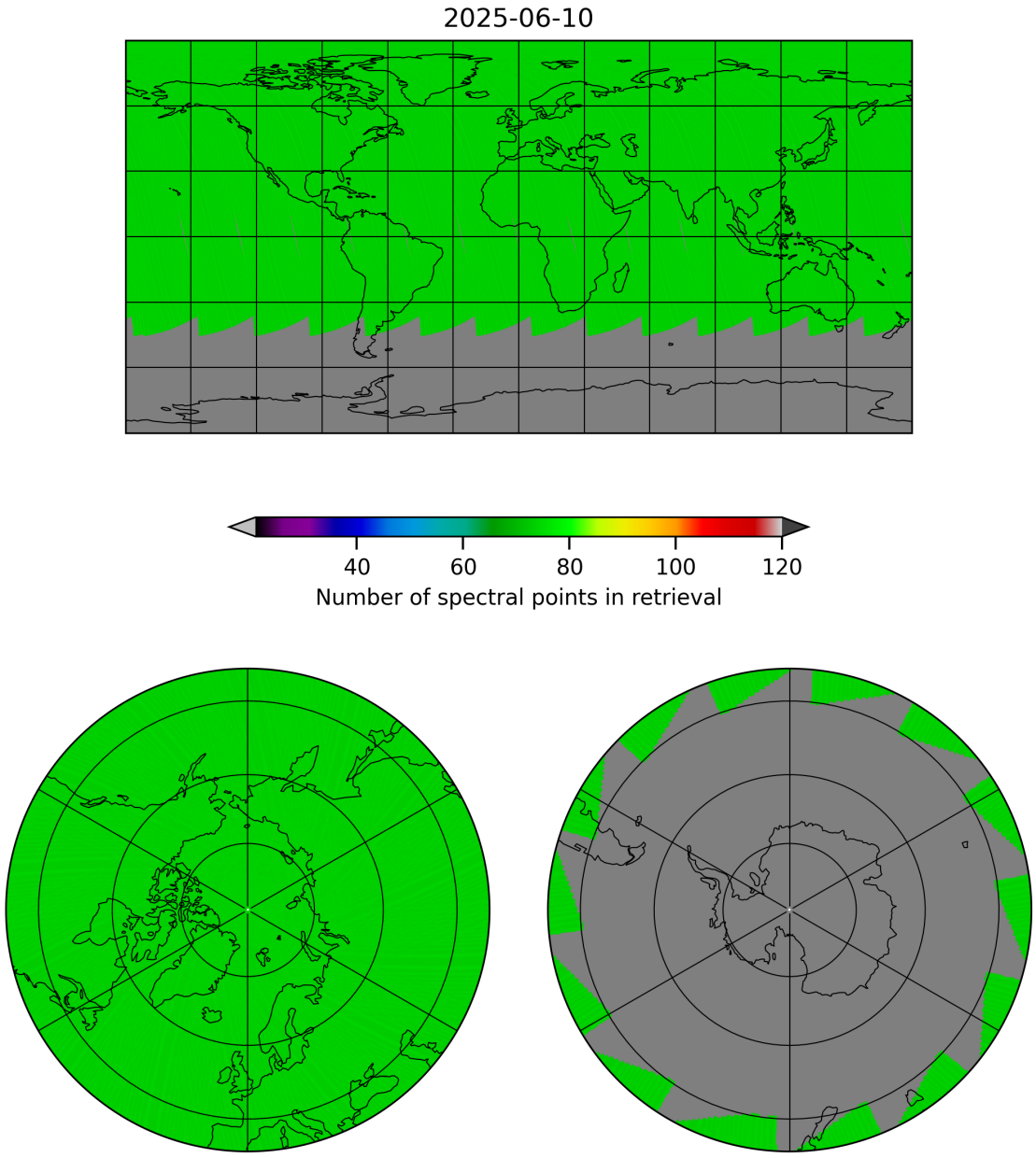


Figure 28: Map of “Number of spectral points in retrieval” for 2025-06-10 to 2025-06-11

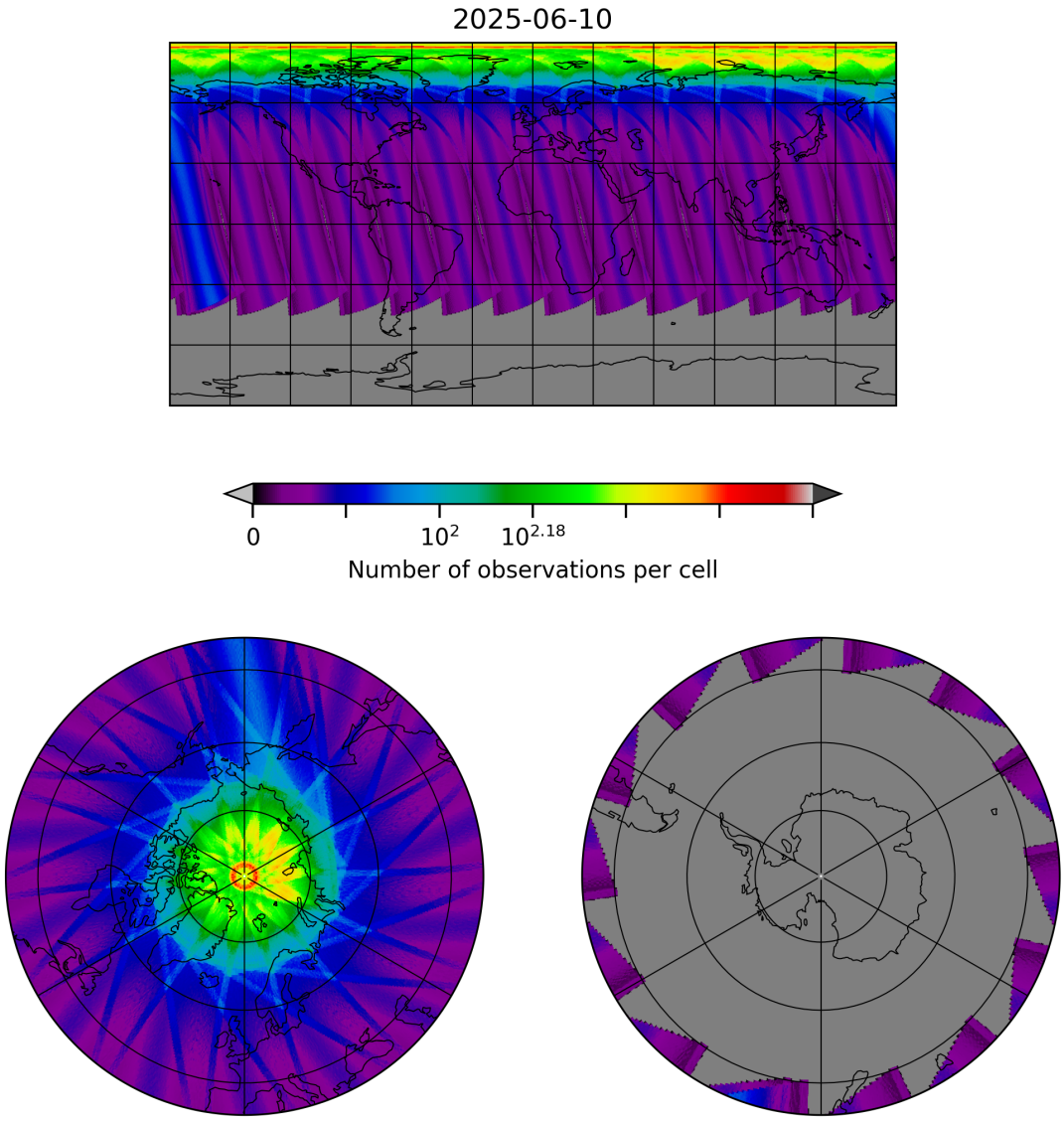


Figure 29: Map of the number of observations for 2025-06-10 to 2025-06-11

7 Zonal average

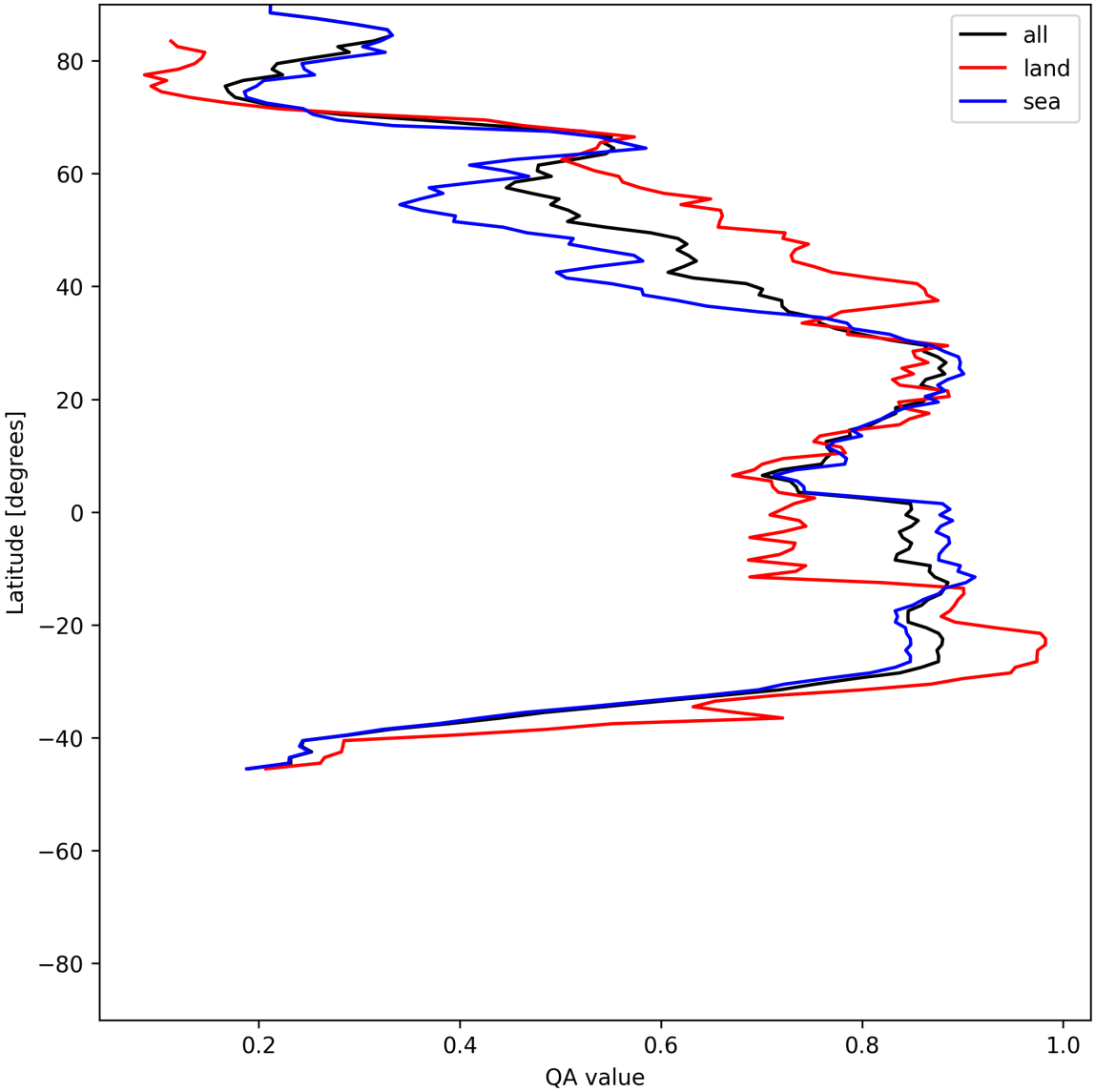


Figure 30: Zonal average of “QA value” for 2025-06-10 to 2025-06-11.

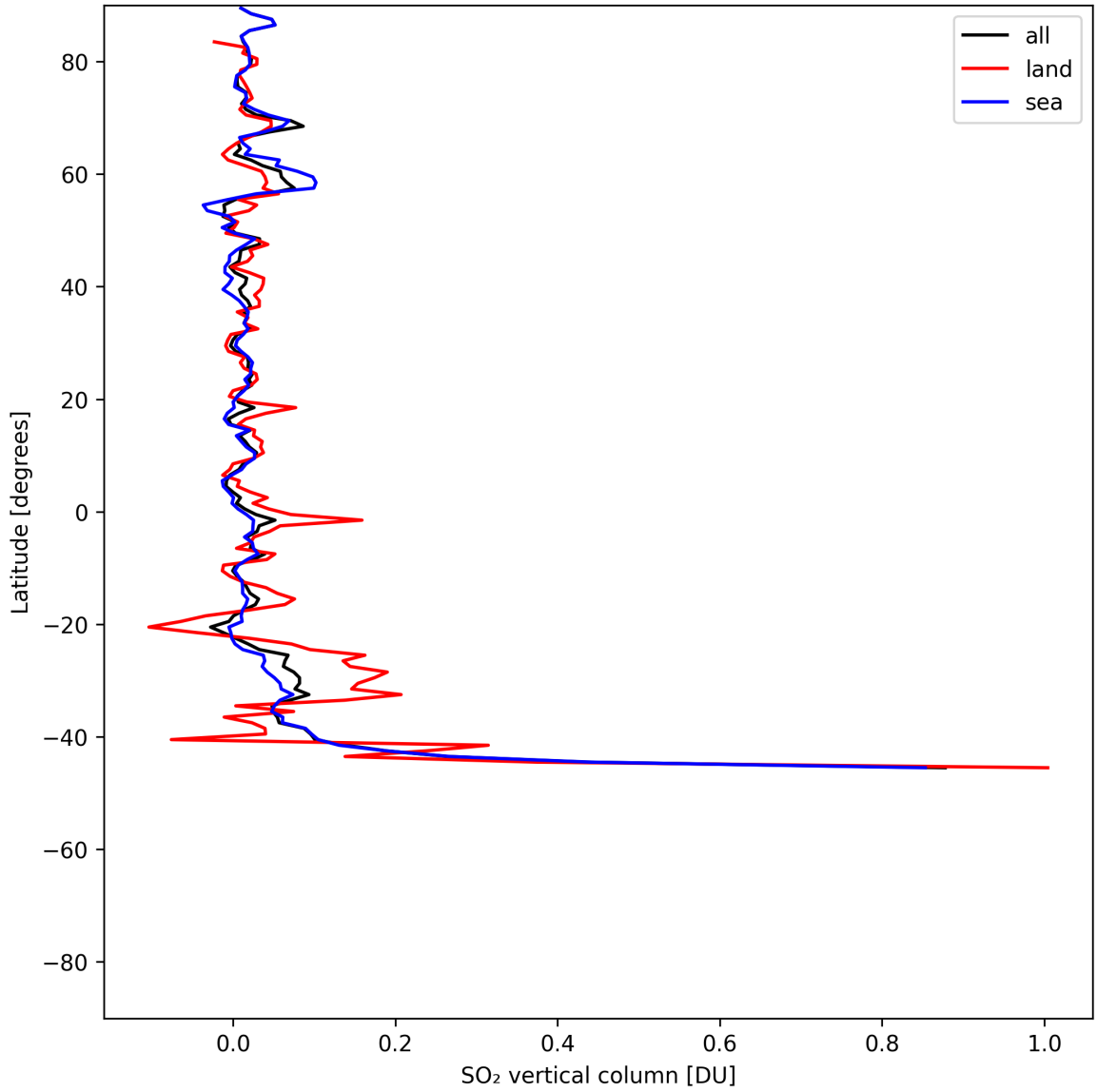


Figure 31: Zonal average of "SO_2 vertical column" for 2025-06-10 to 2025-06-11.

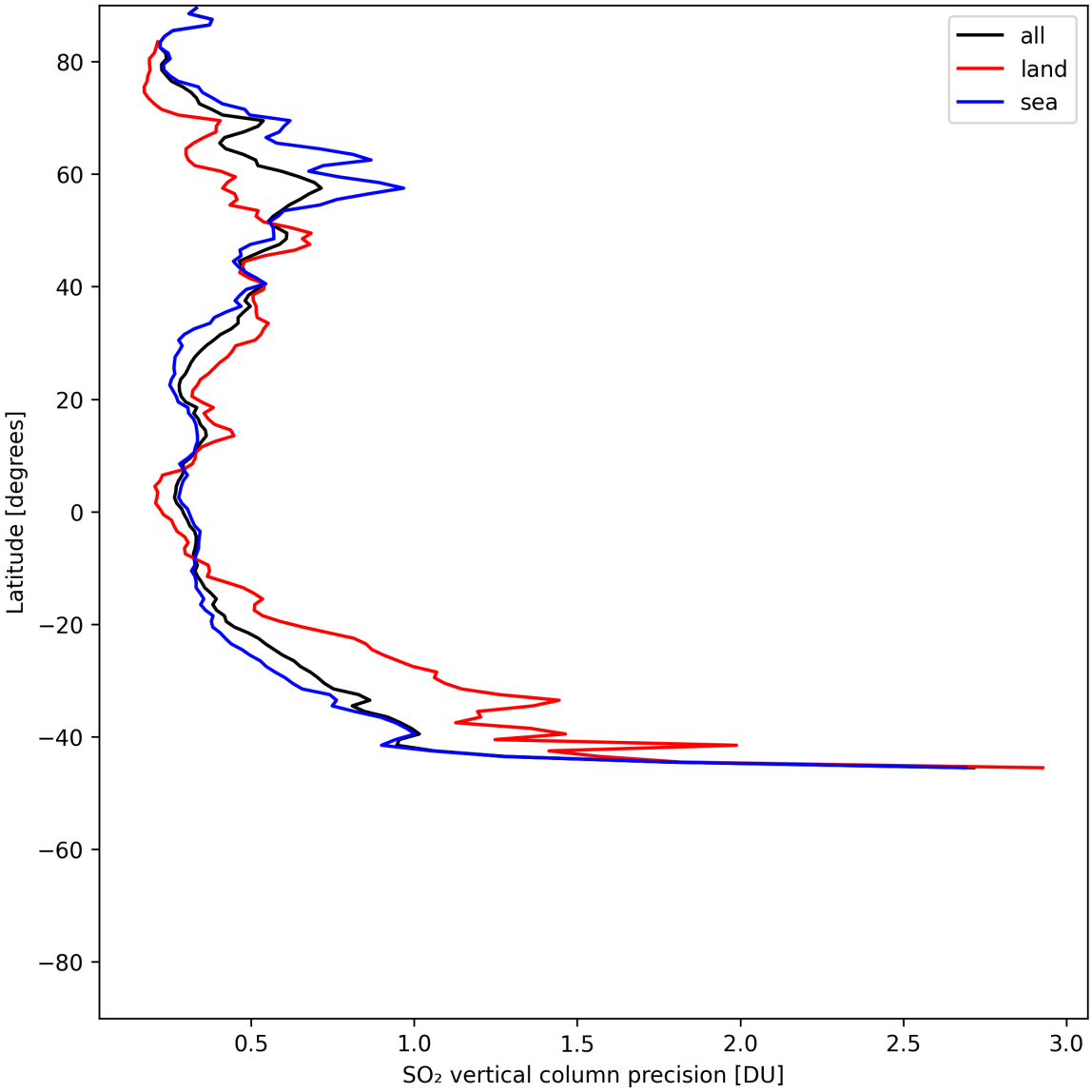


Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-06-10 to 2025-06-11.

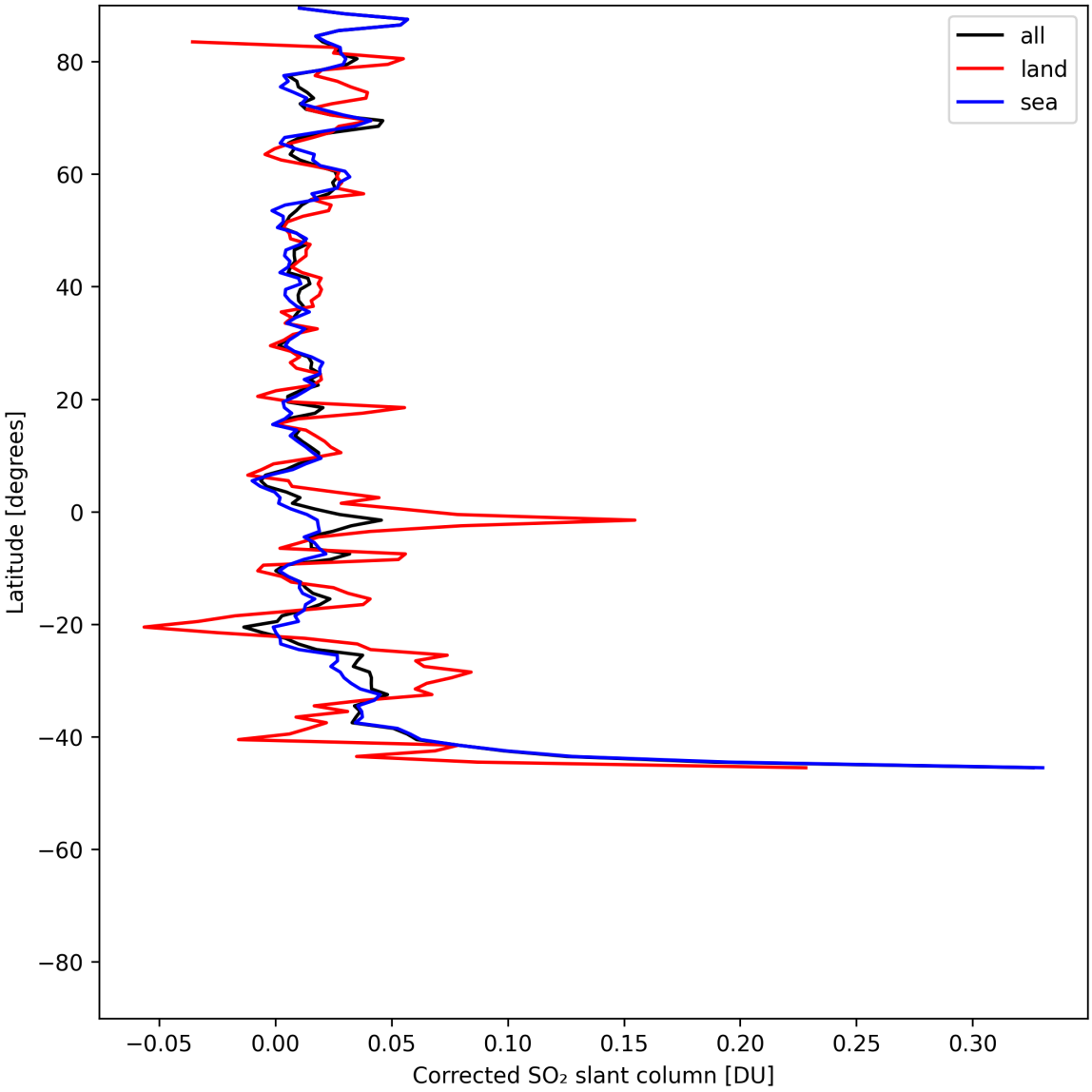


Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-06-10 to 2025-06-11.

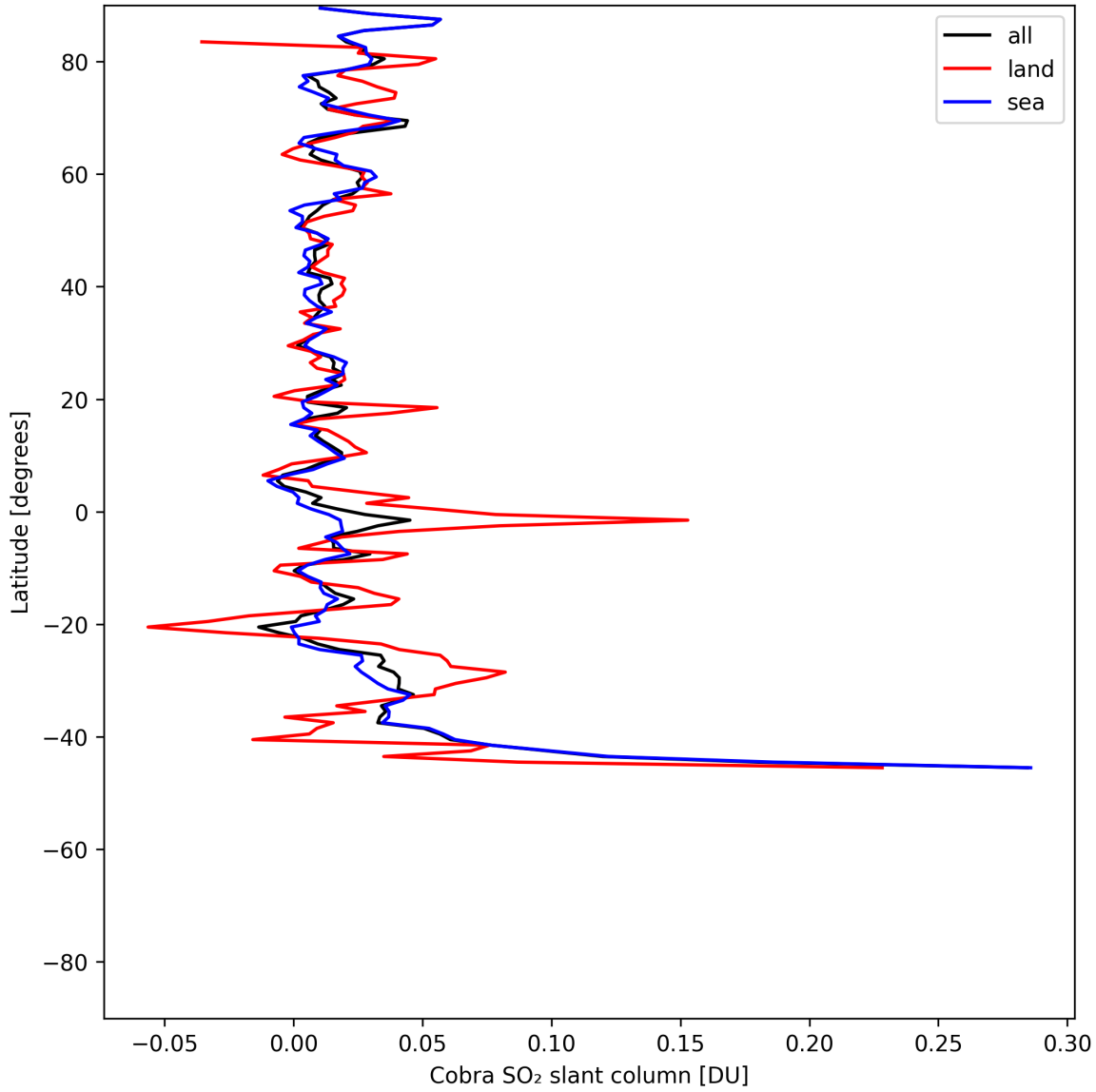


Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-06-10 to 2025-06-11.

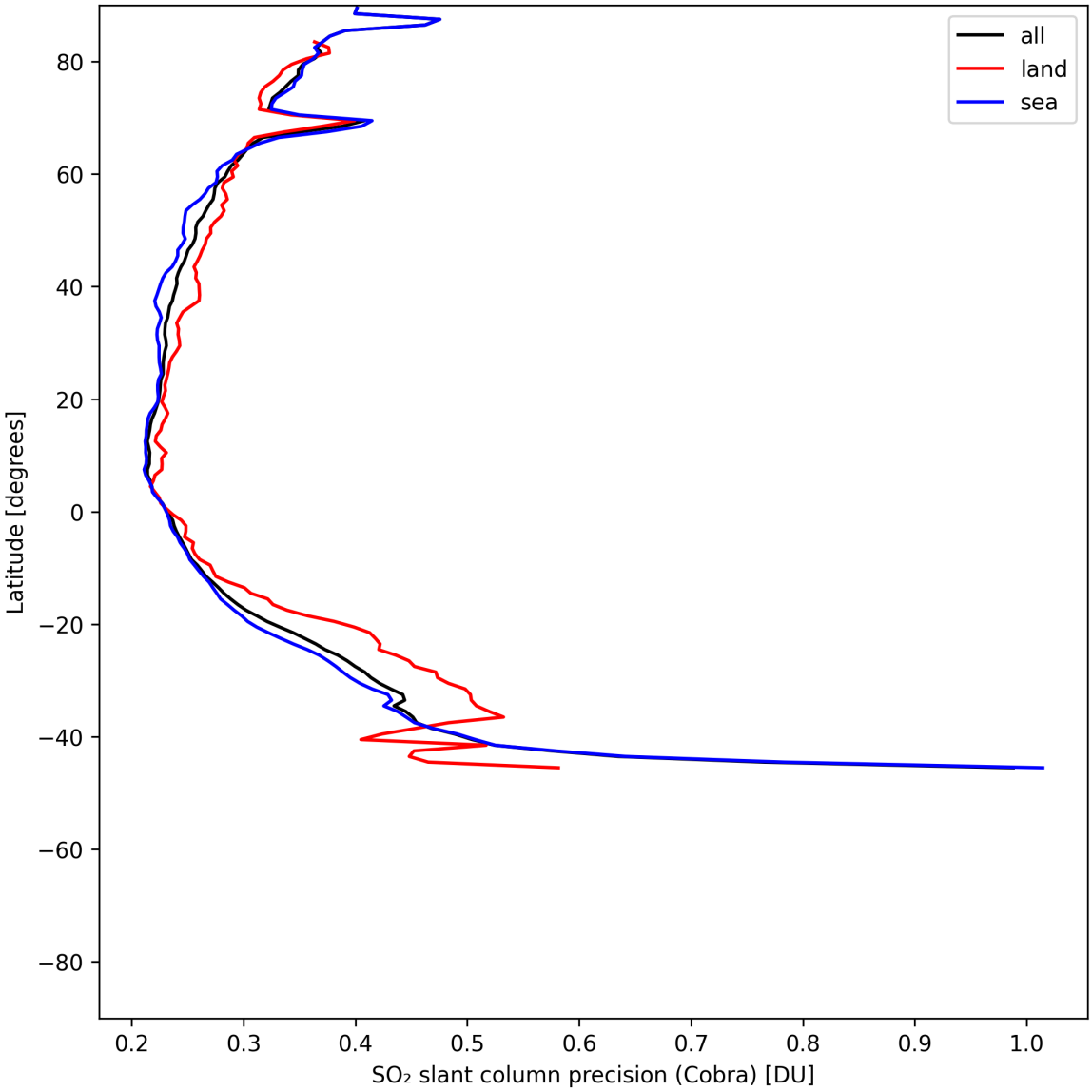


Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-06-10 to 2025-06-11.

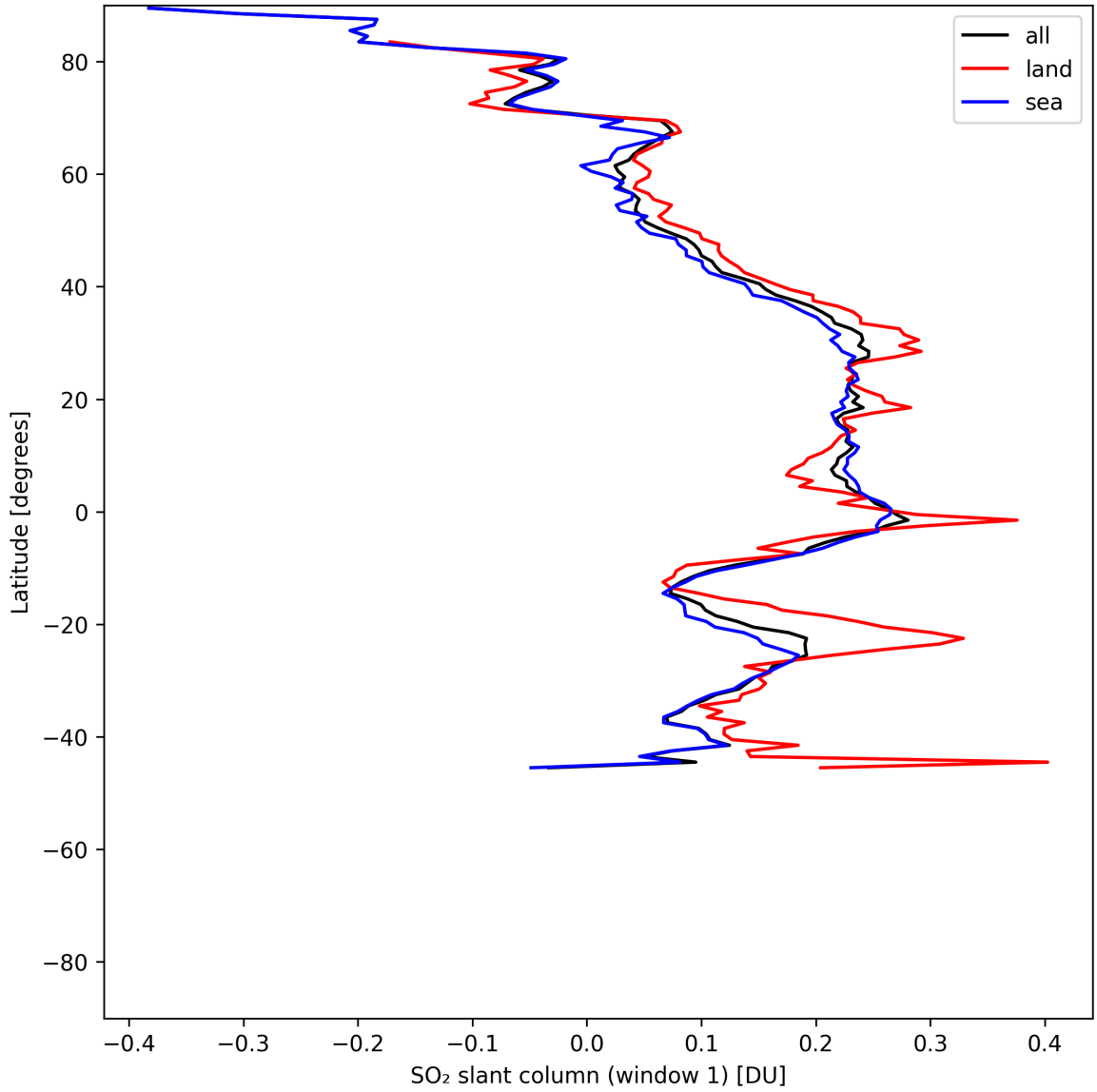


Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-06-10 to 2025-06-11.

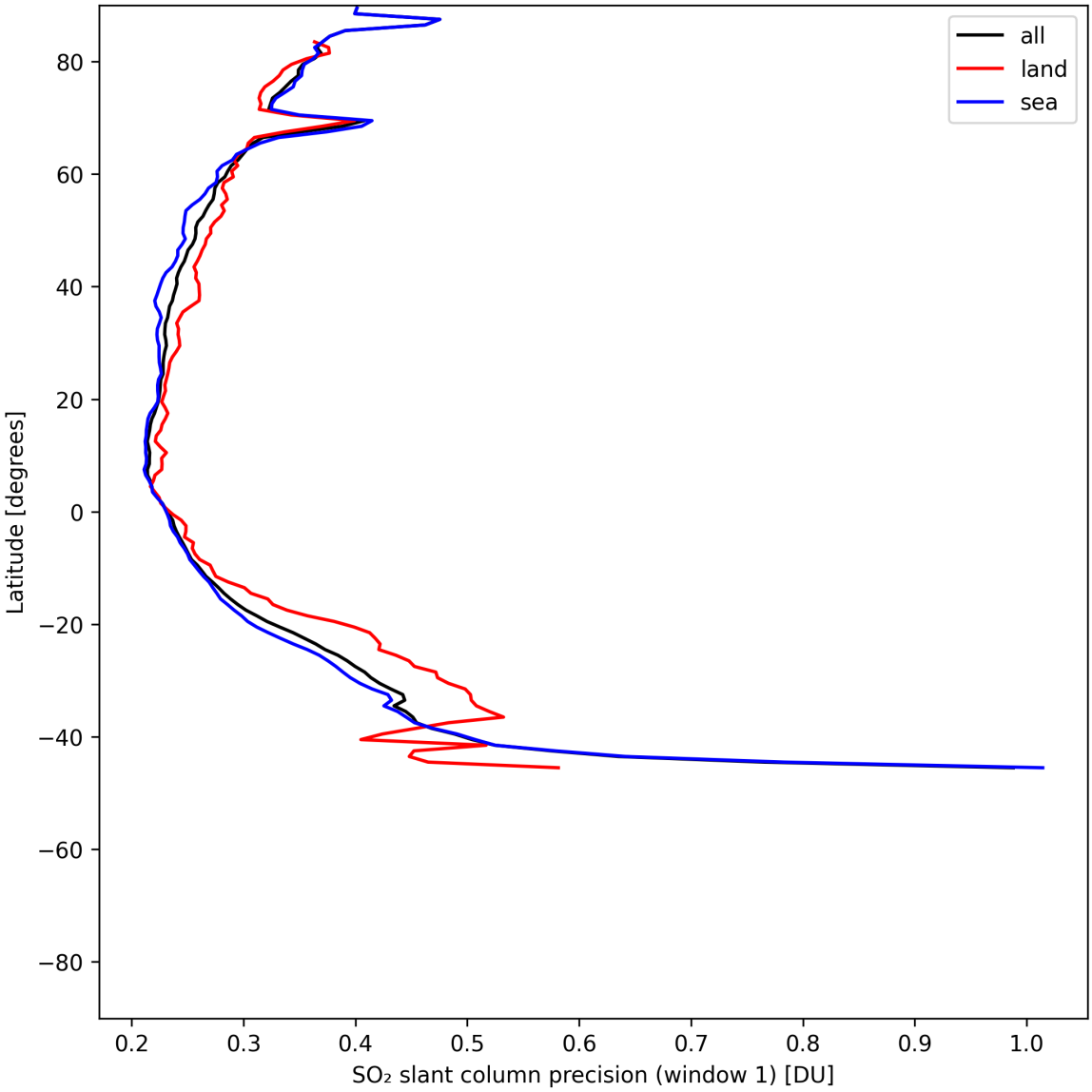


Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-06-10 to 2025-06-11.

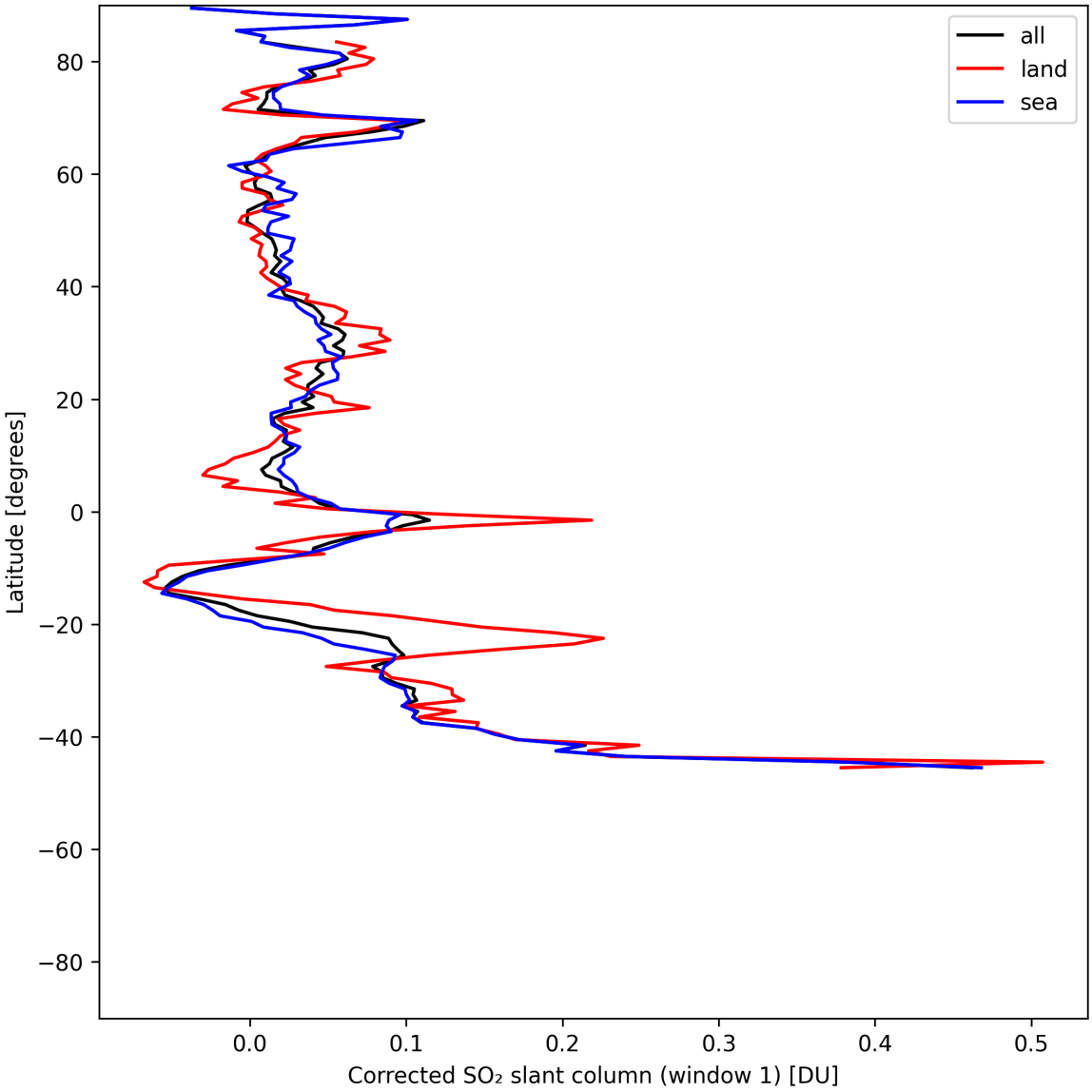


Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-06-10 to 2025-06-11.

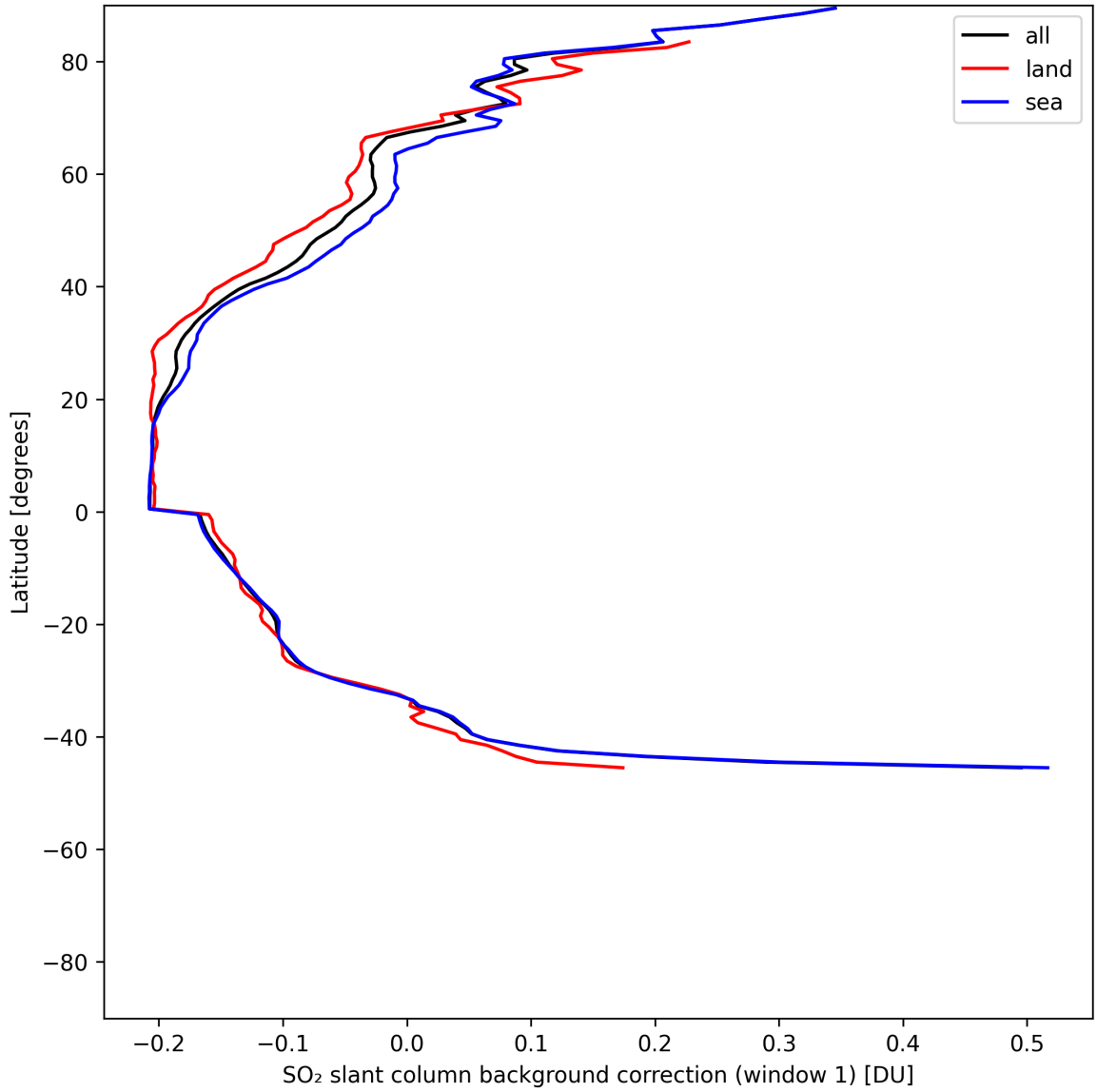


Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-06-10 to 2025-06-11.

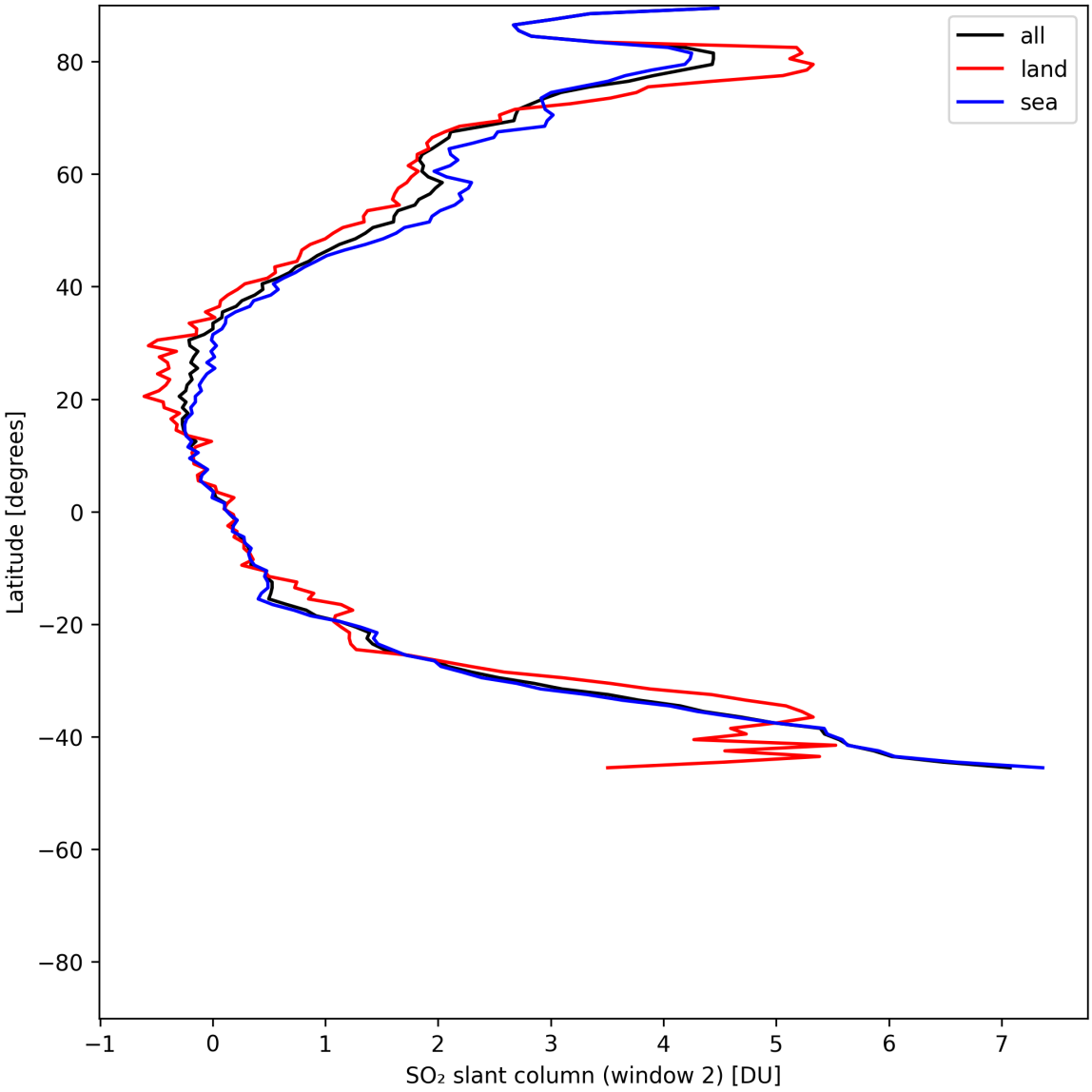


Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-06-10 to 2025-06-11.

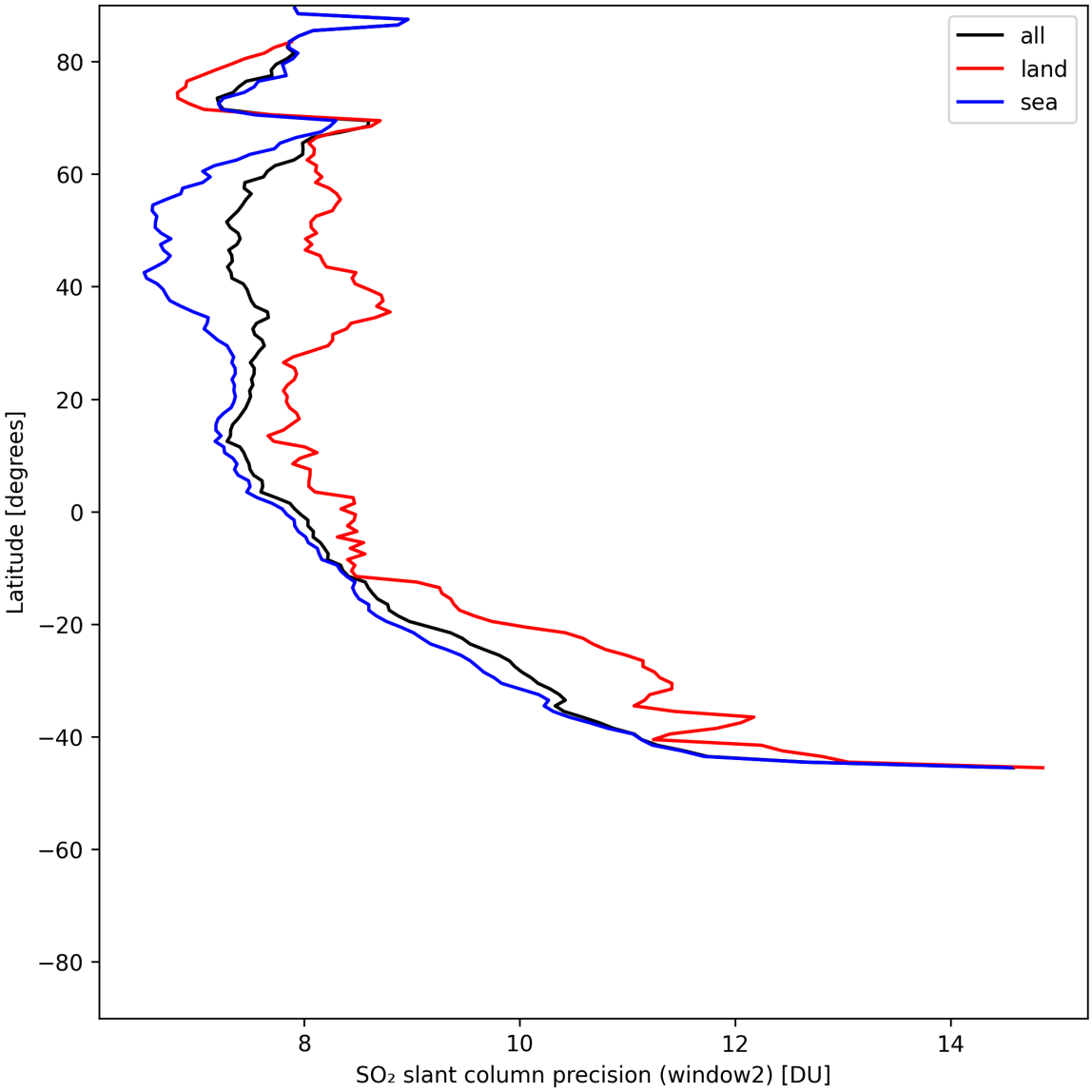


Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-06-10 to 2025-06-11.

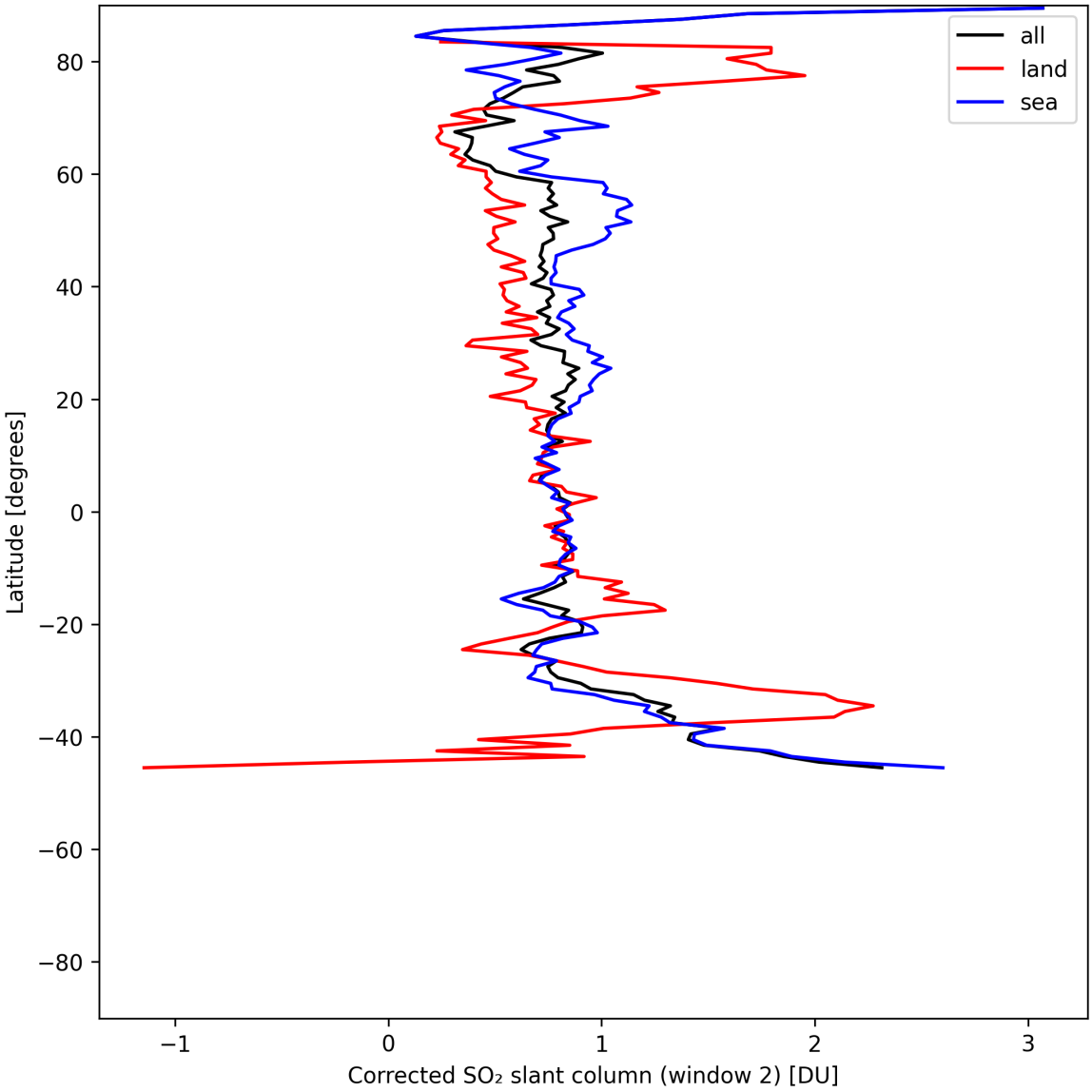


Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-06-10 to 2025-06-11.

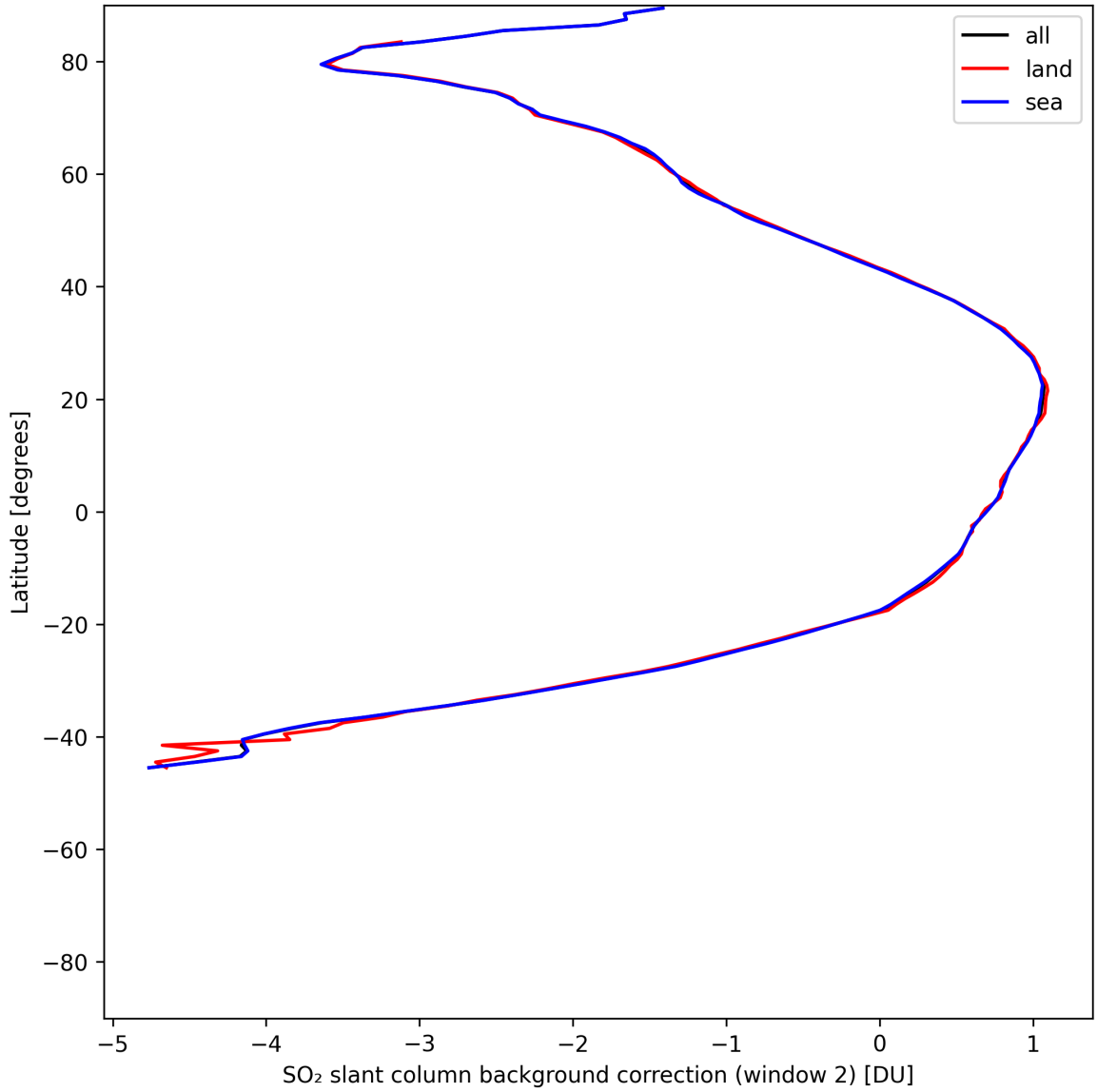


Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-06-10 to 2025-06-11.

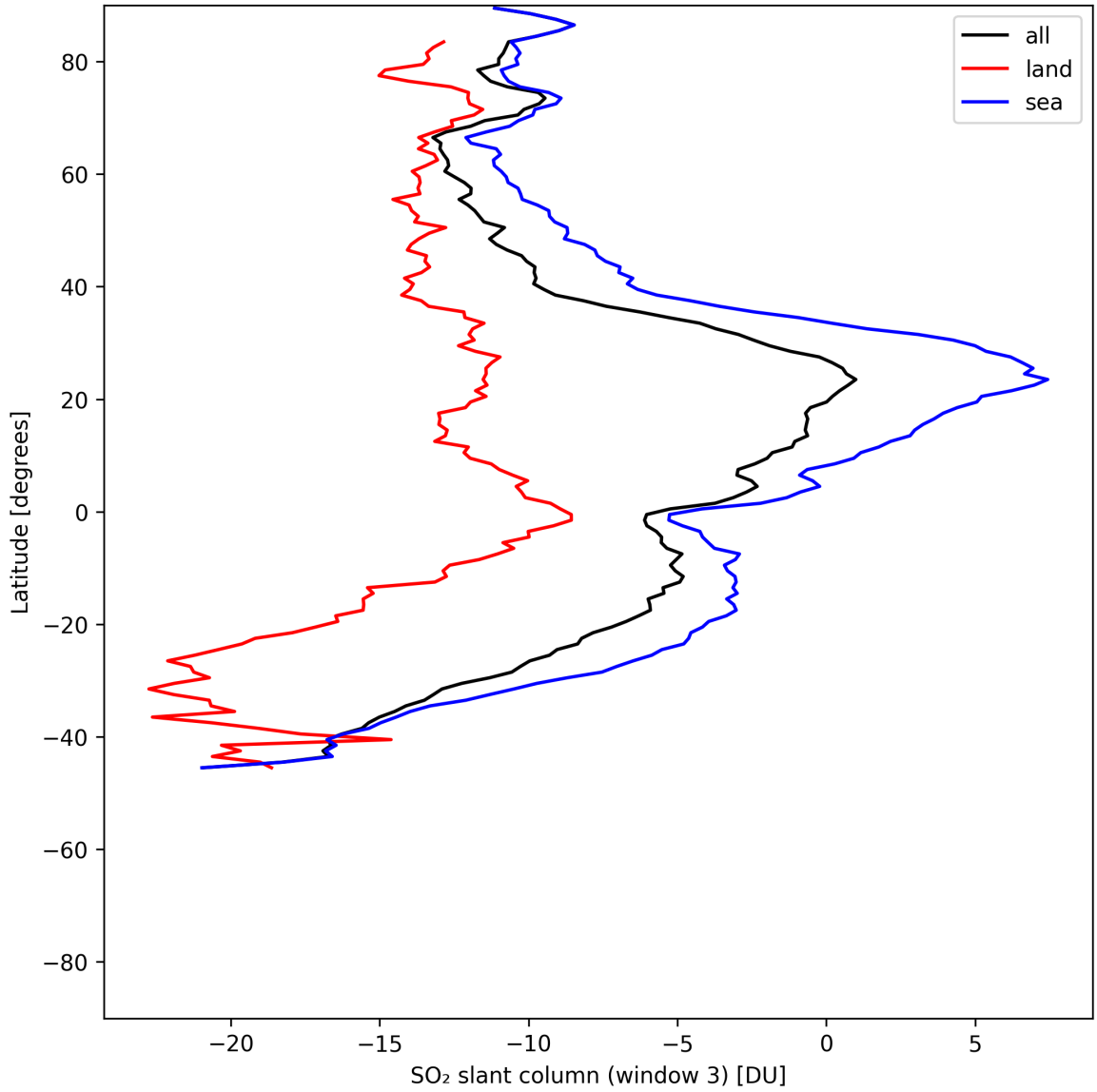


Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-06-10 to 2025-06-11.

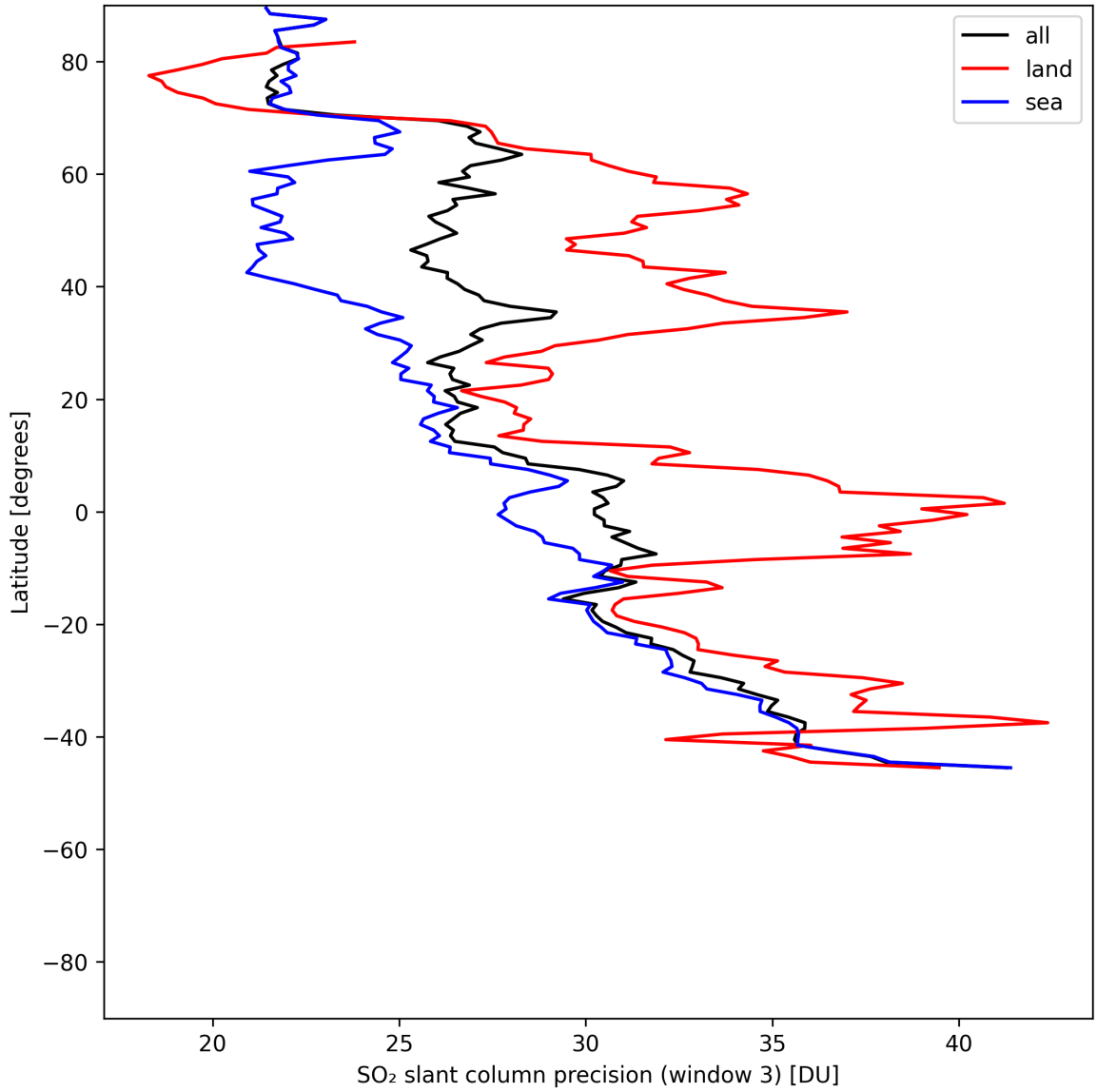


Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-06-10 to 2025-06-11.

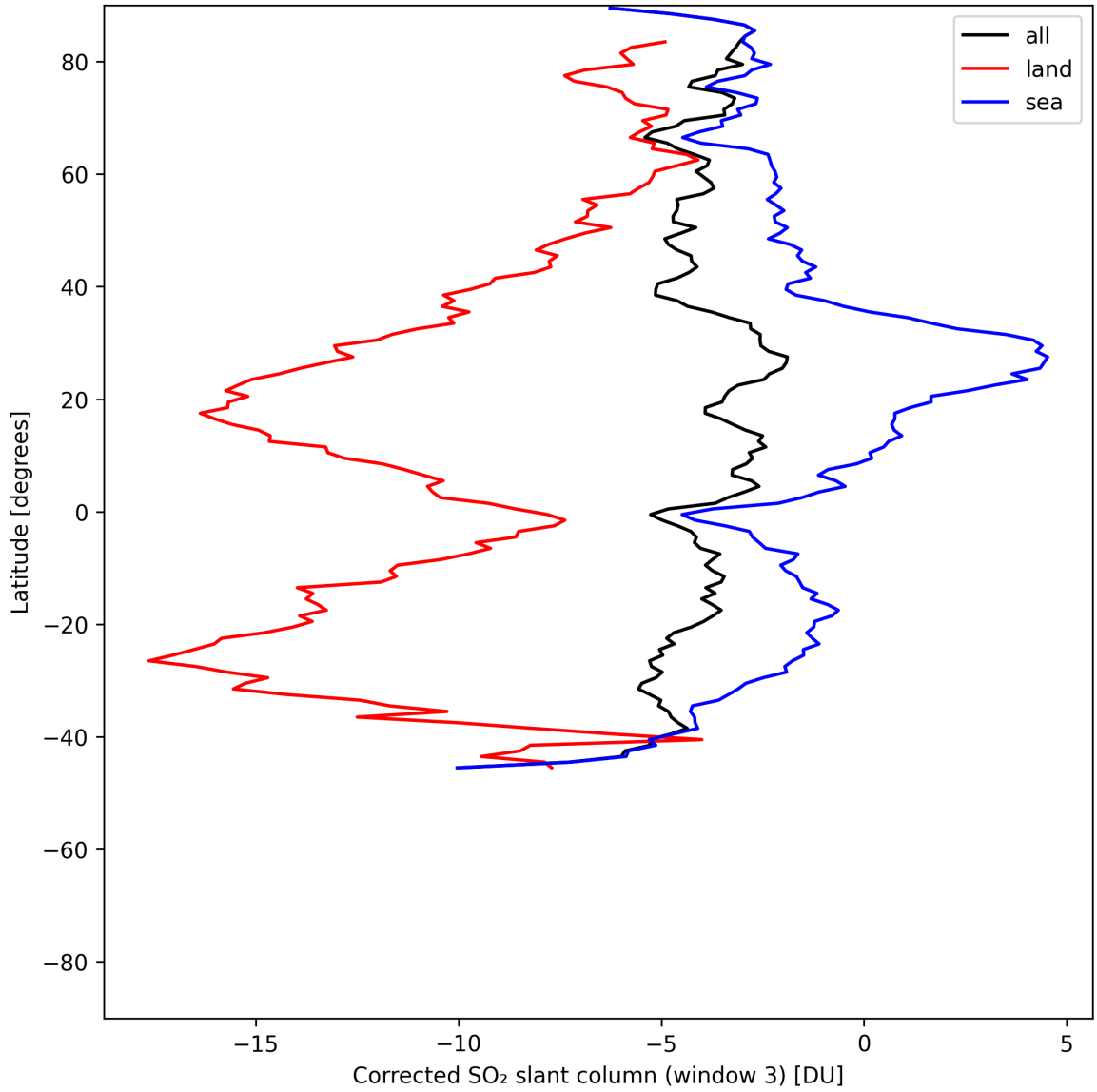


Figure 46: Zonal average of “Corrected SO_2 slant column (window 3)” for 2025-06-10 to 2025-06-11.

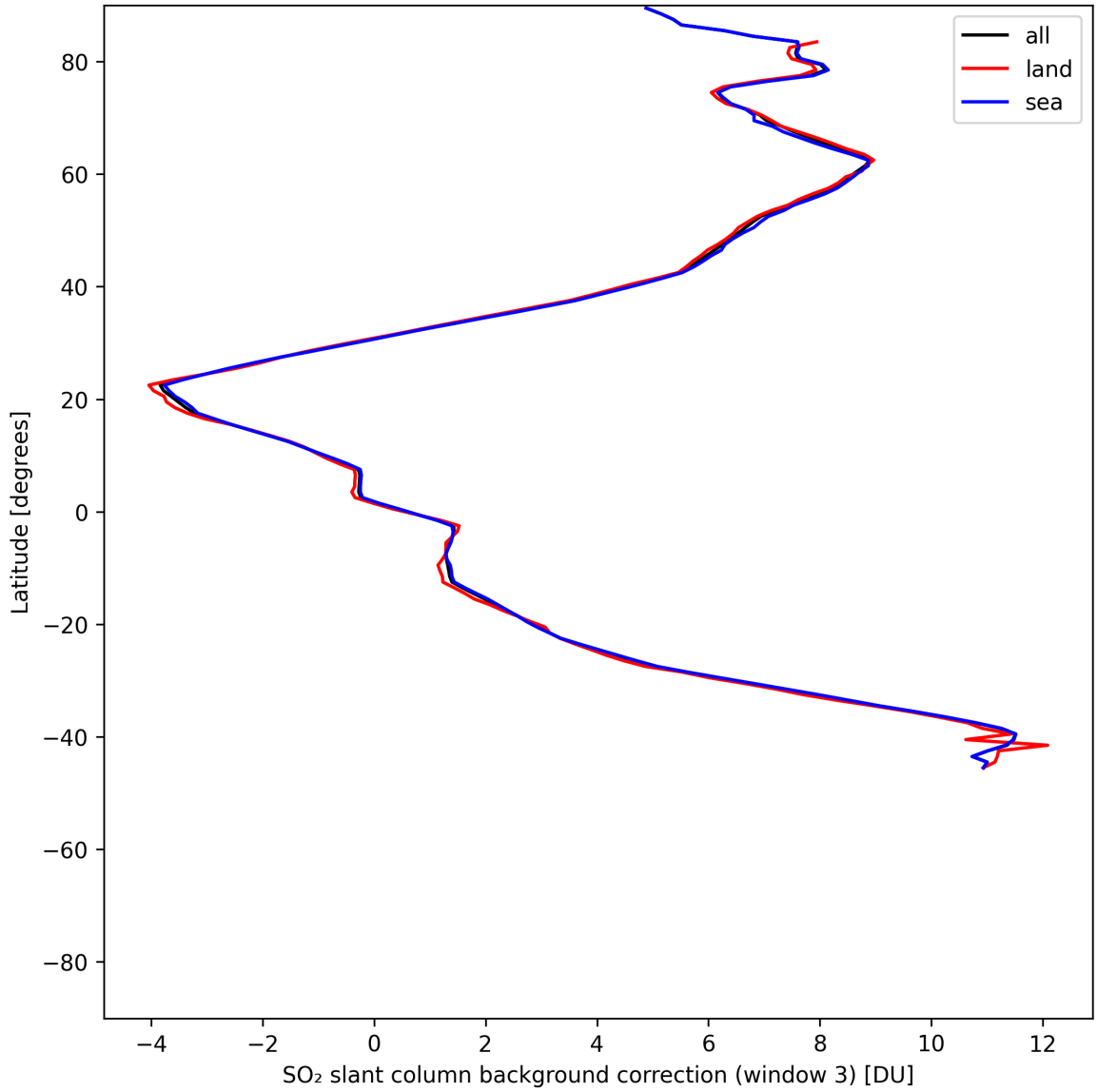


Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-06-10 to 2025-06-11.

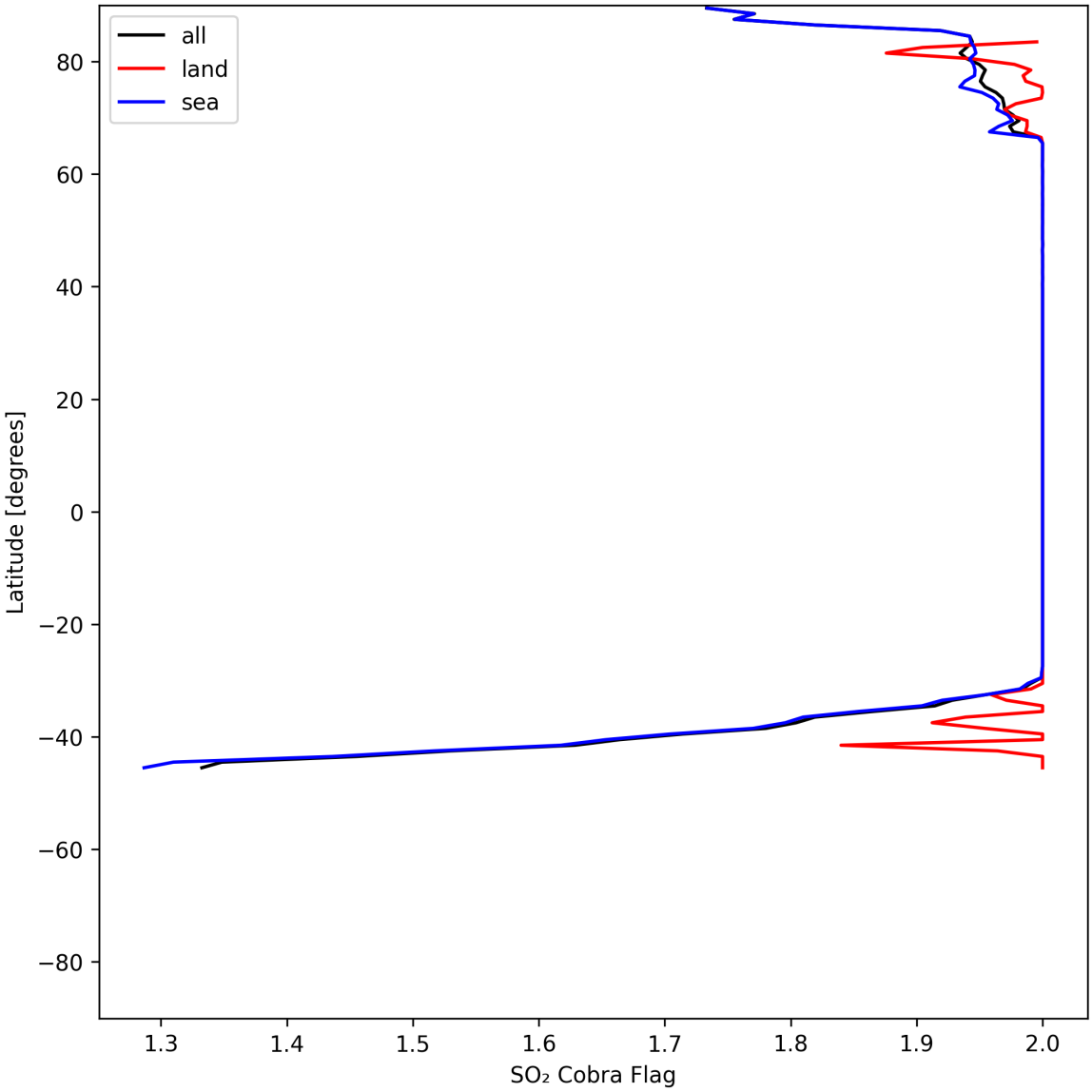


Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-06-10 to 2025-06-11.

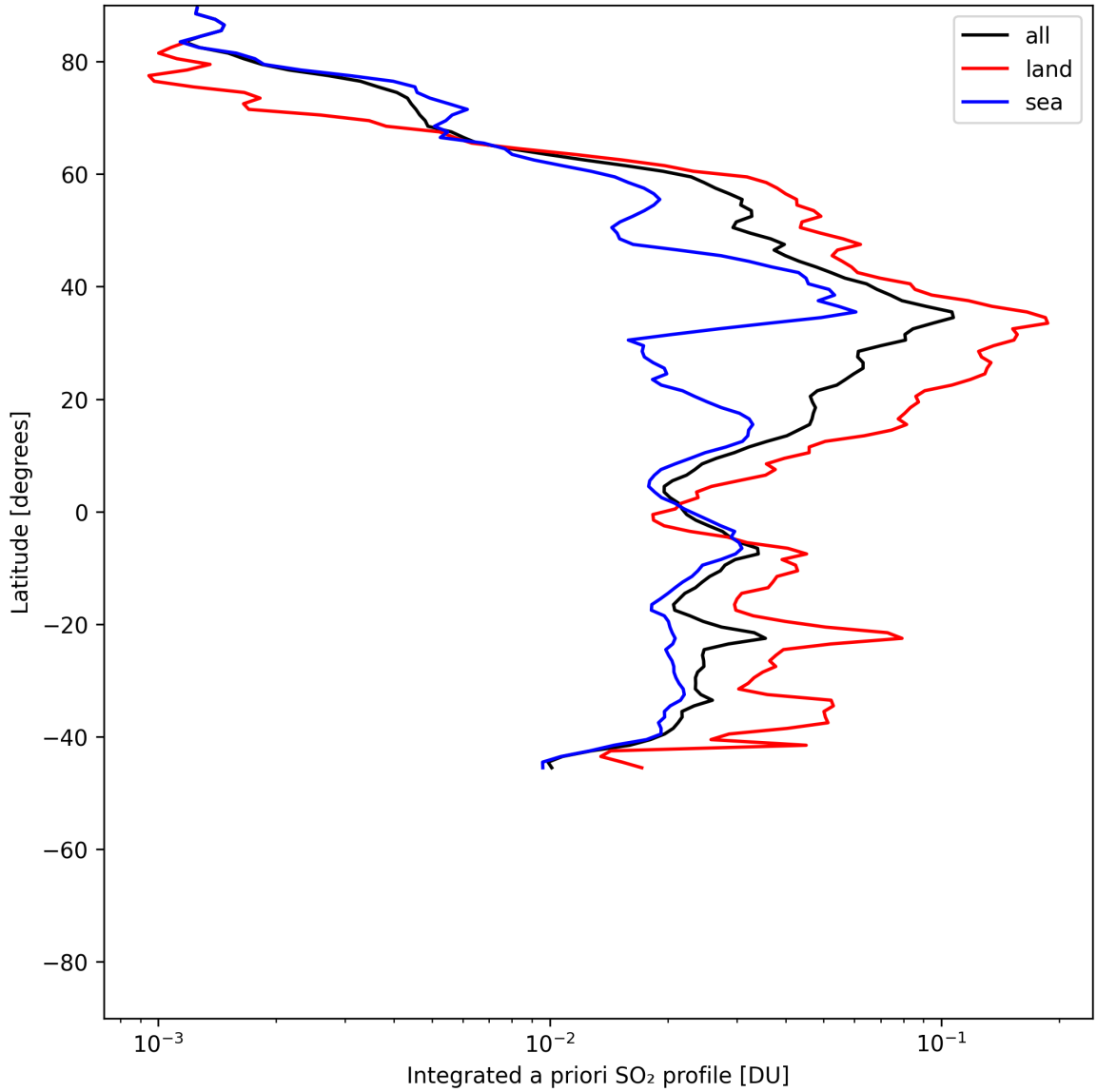


Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-06-10 to 2025-06-11.

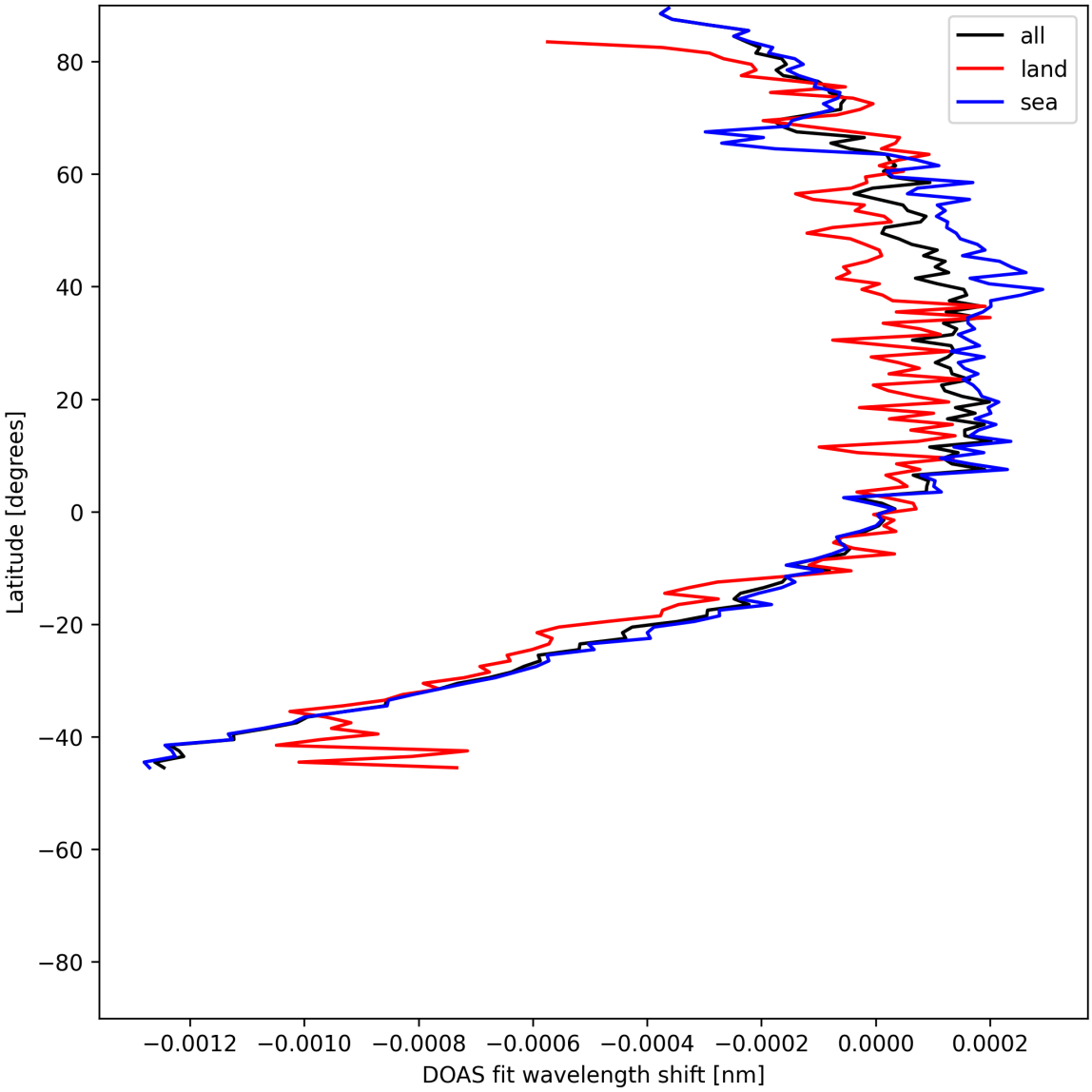


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-06-10 to 2025-06-11.

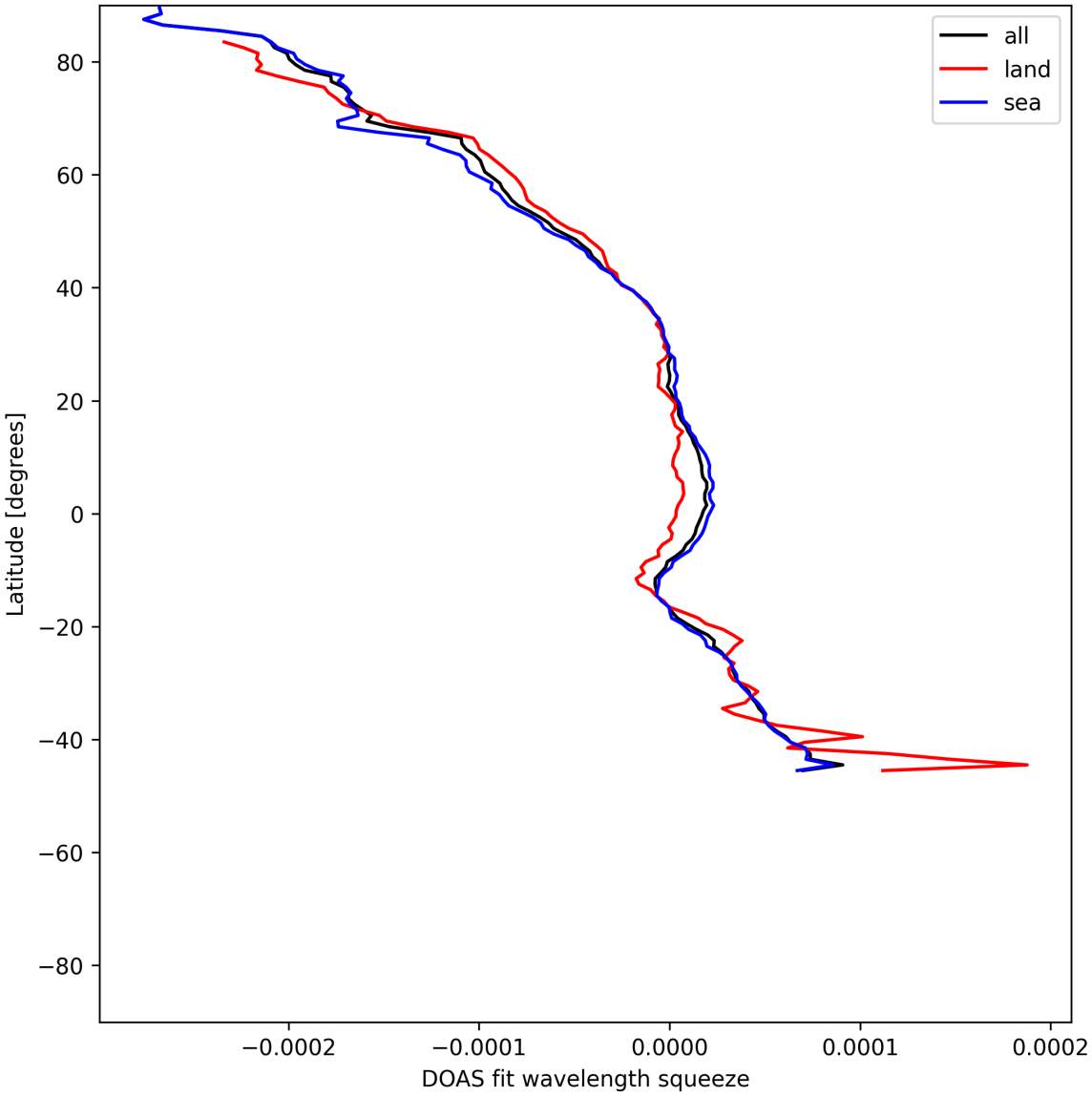


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-06-10 to 2025-06-11.

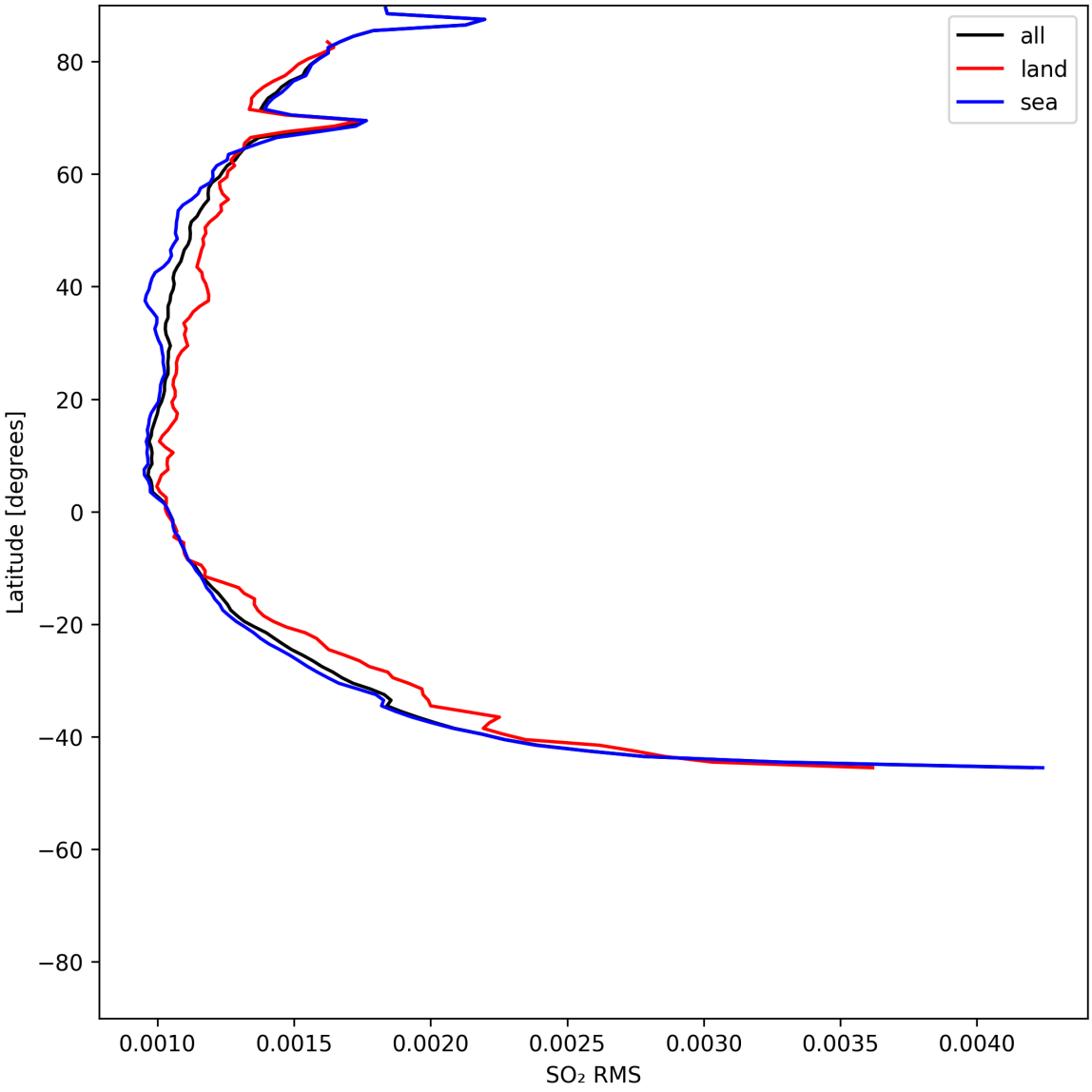


Figure 52: Zonal average of "SO_2 RMS" for 2025-06-10 to 2025-06-11.

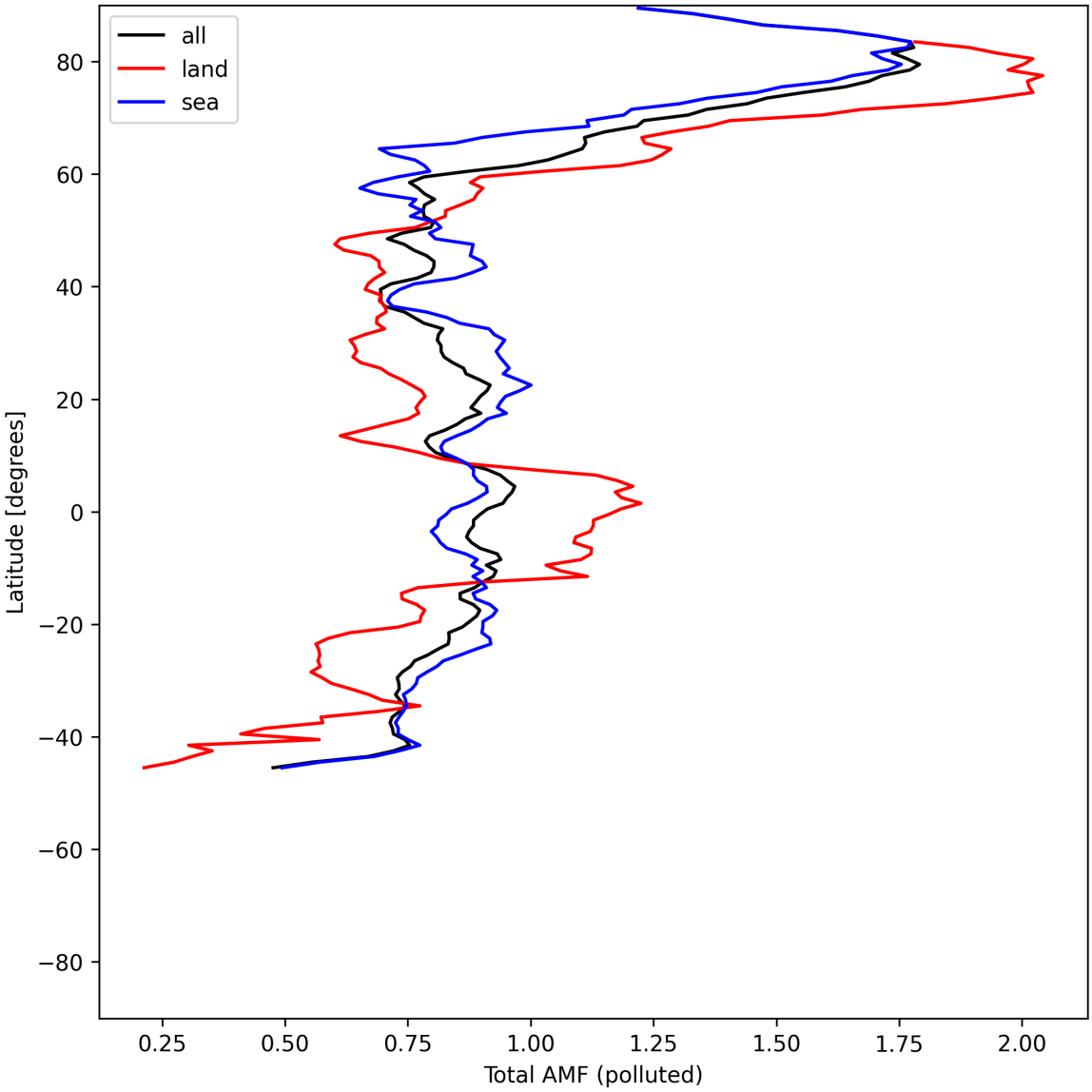


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-06-10 to 2025-06-11.

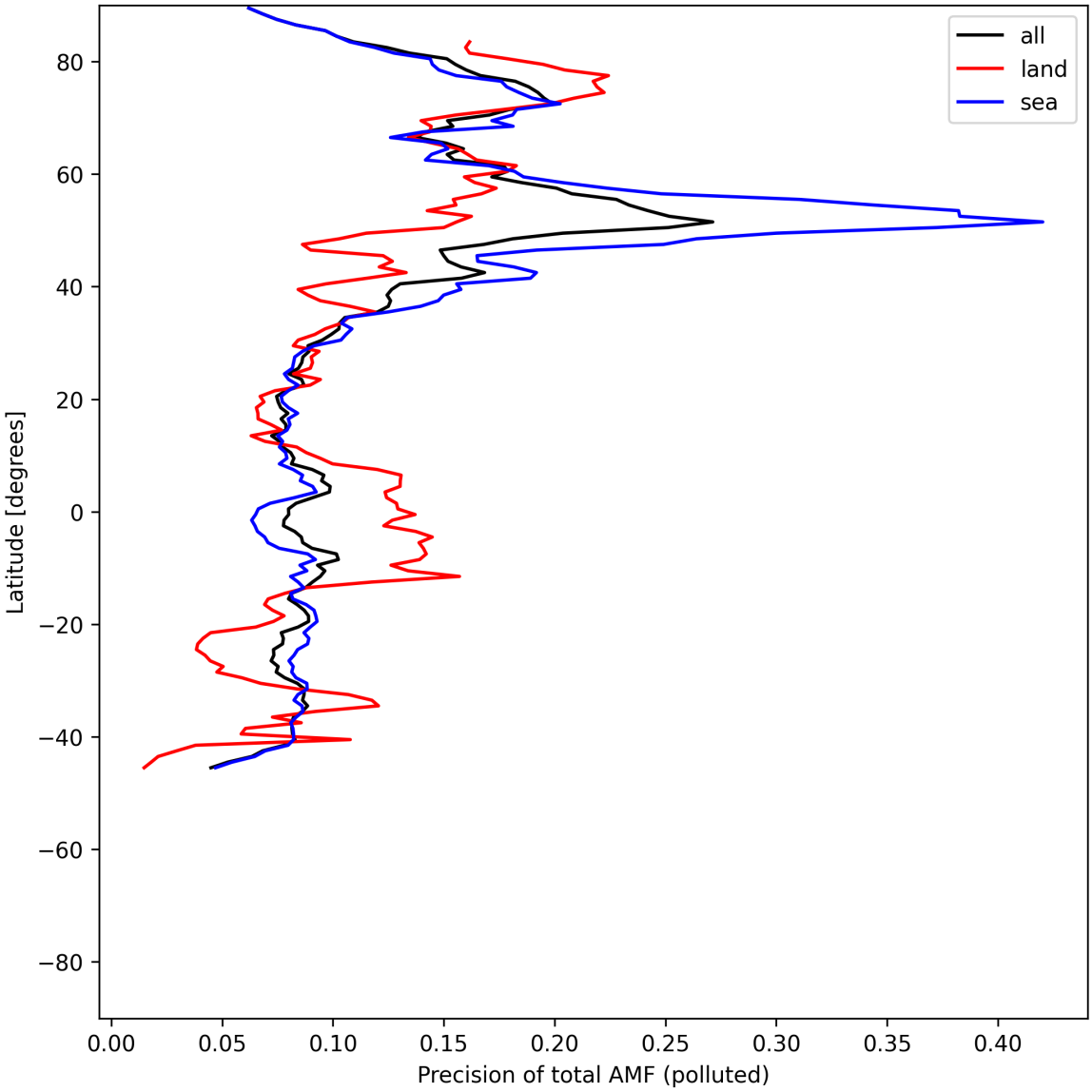


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-06-10 to 2025-06-11.

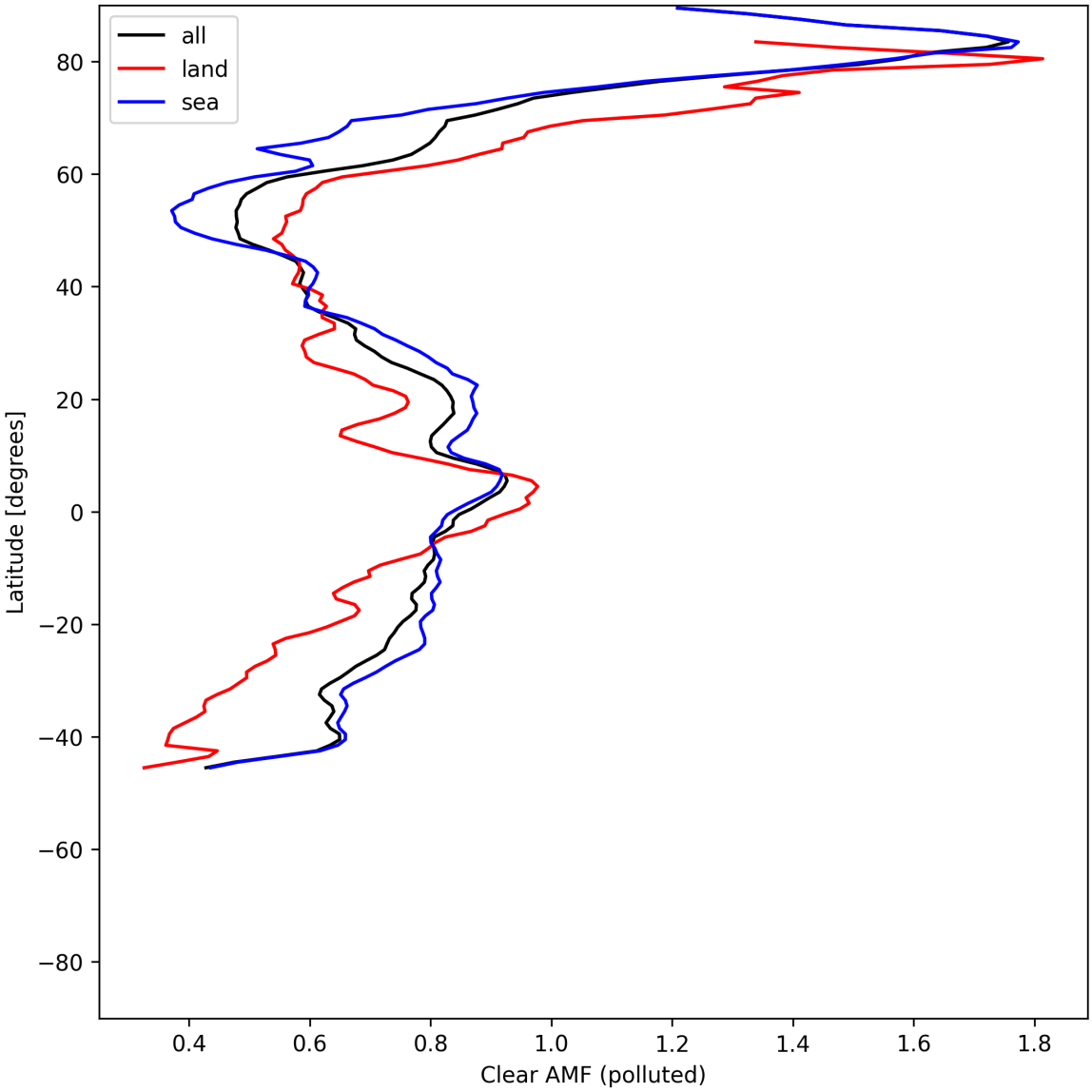


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-06-10 to 2025-06-11.

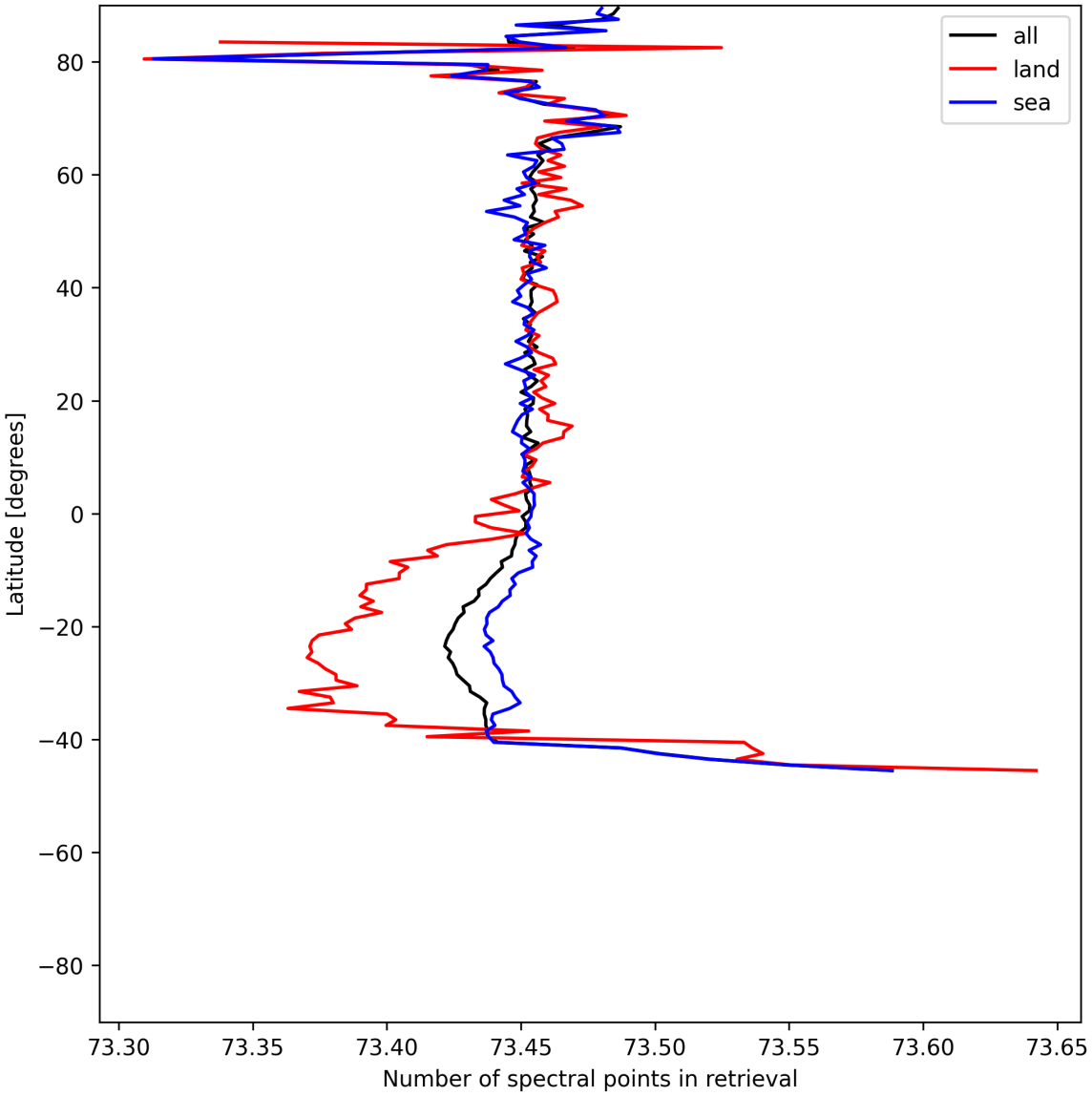


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-06-10 to 2025-06-11.

8 Histograms

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

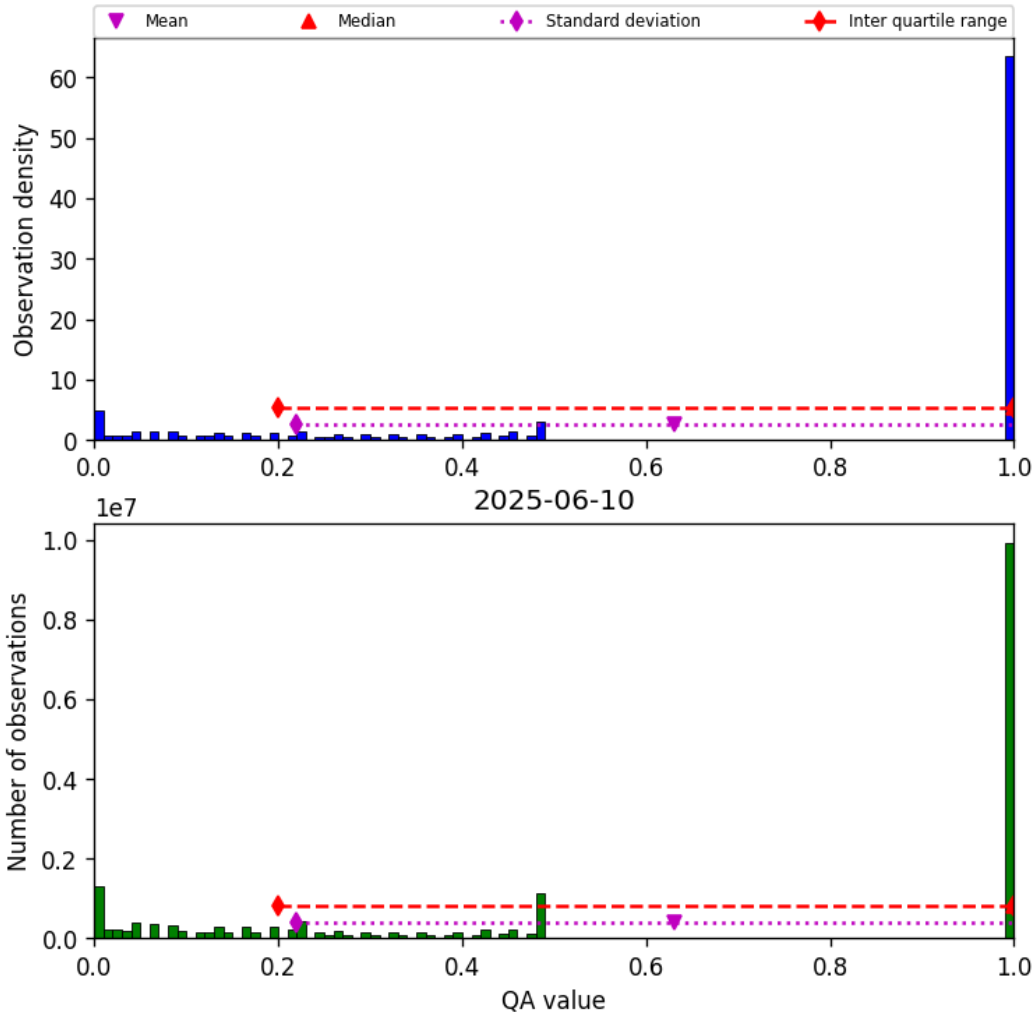


Figure 57: Histogram of “QA value” for 2025-06-10 to 2025-06-11

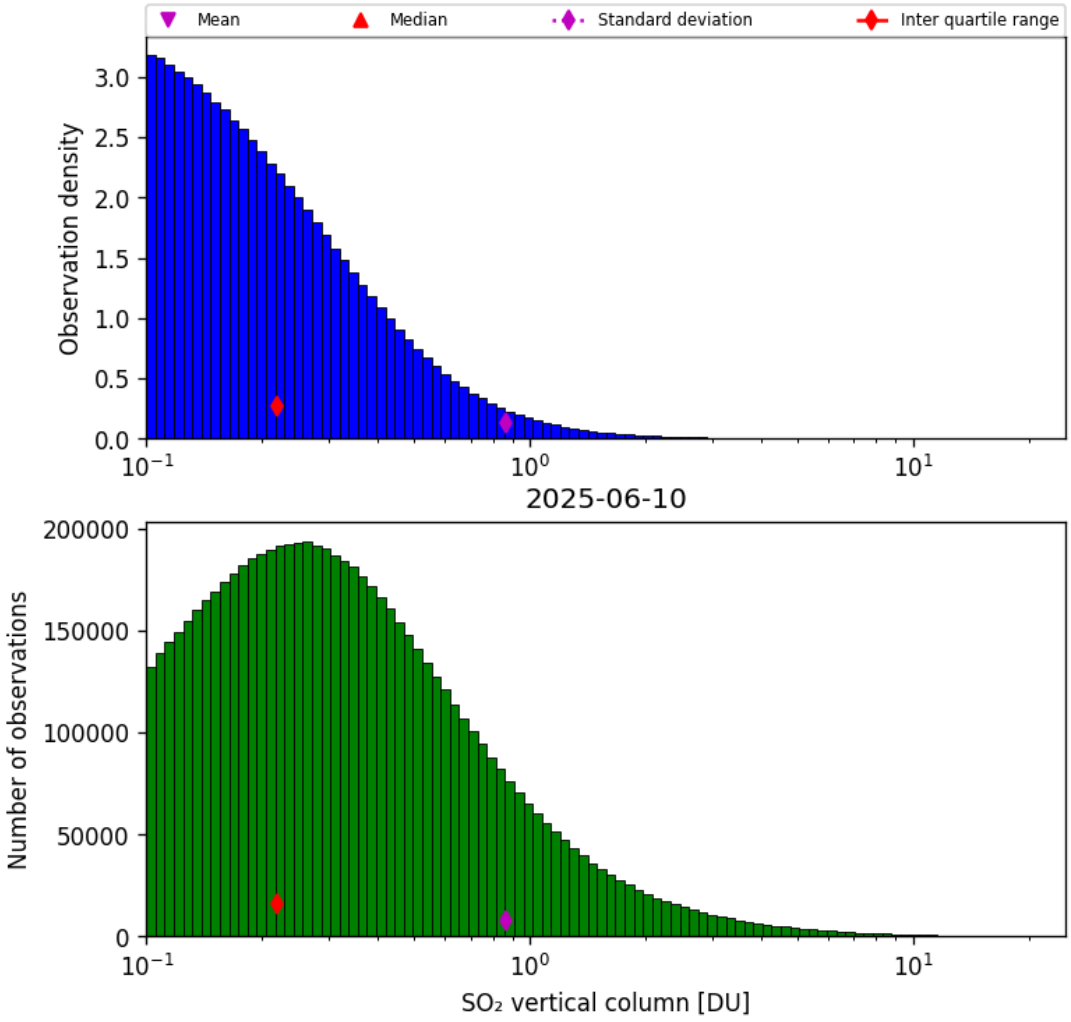


Figure 58: Histogram of "SO_2 vertical column" for 2025-06-10 to 2025-06-11

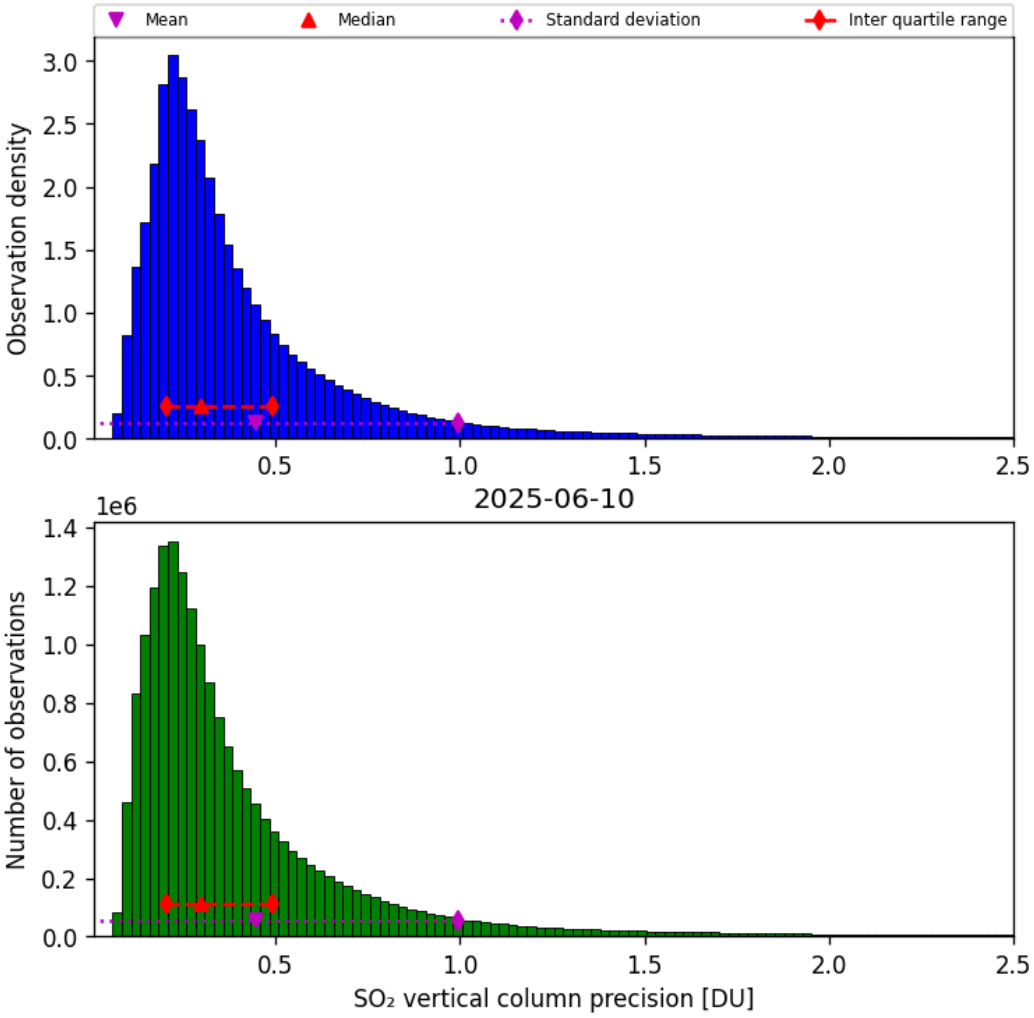


Figure 59: Histogram of "SO_2 vertical column precision" for 2025-06-10 to 2025-06-11

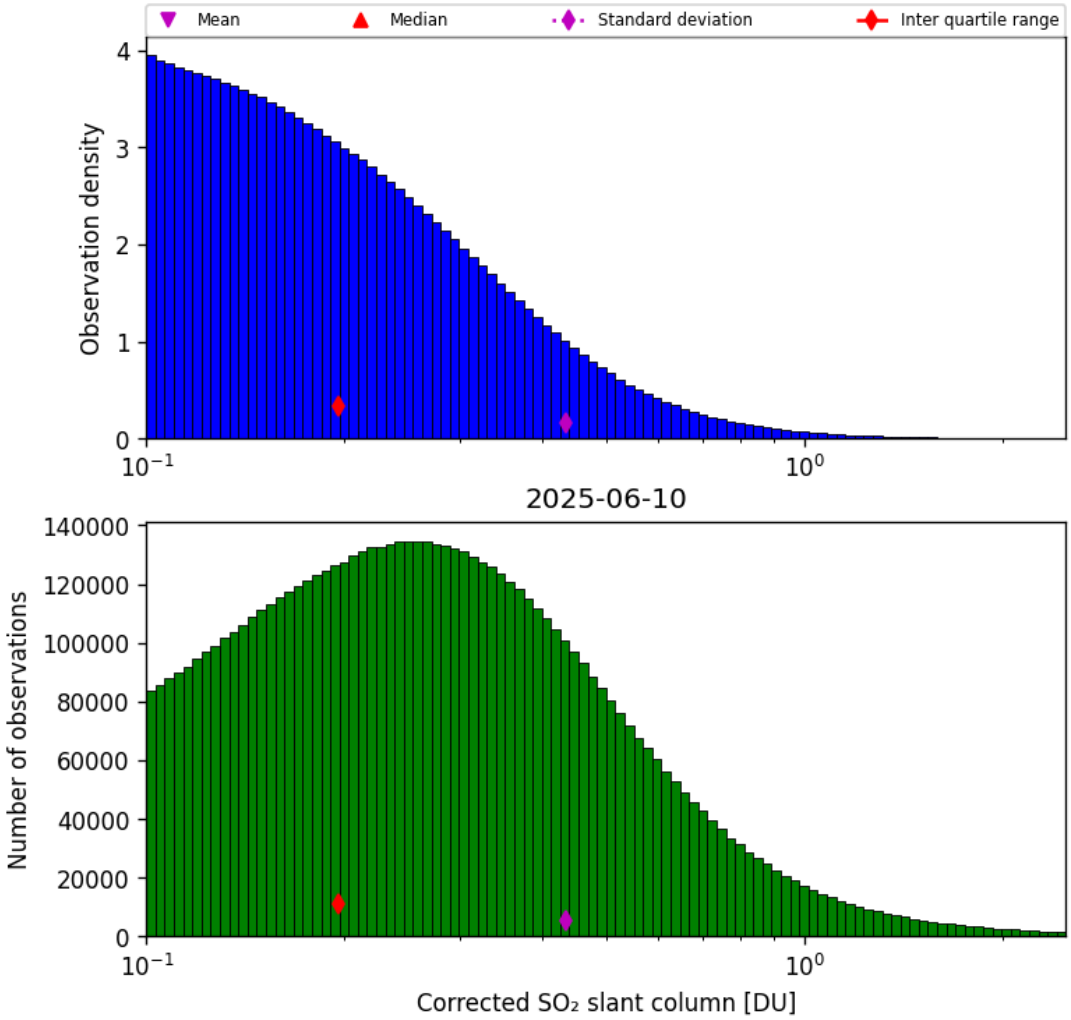


Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-06-10 to 2025-06-11

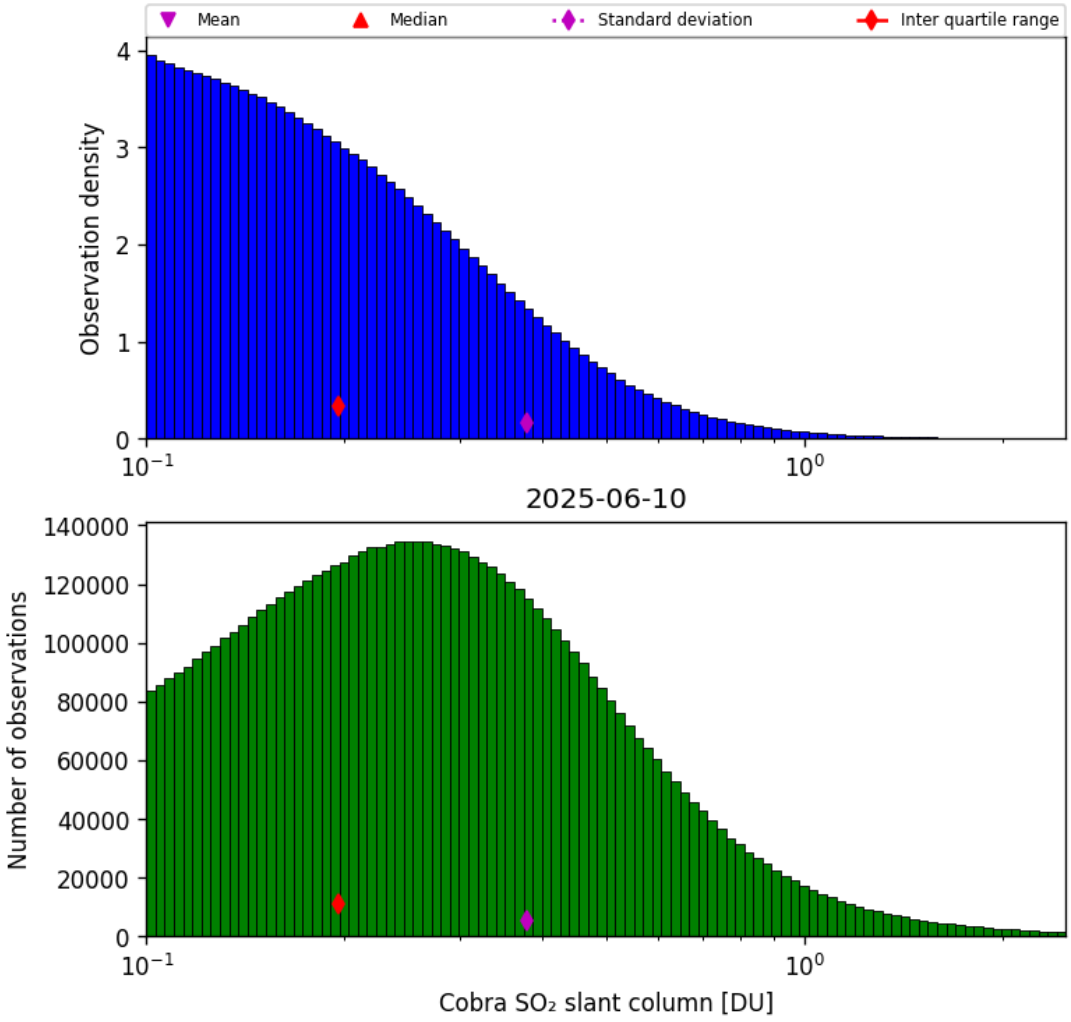


Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-06-10 to 2025-06-11

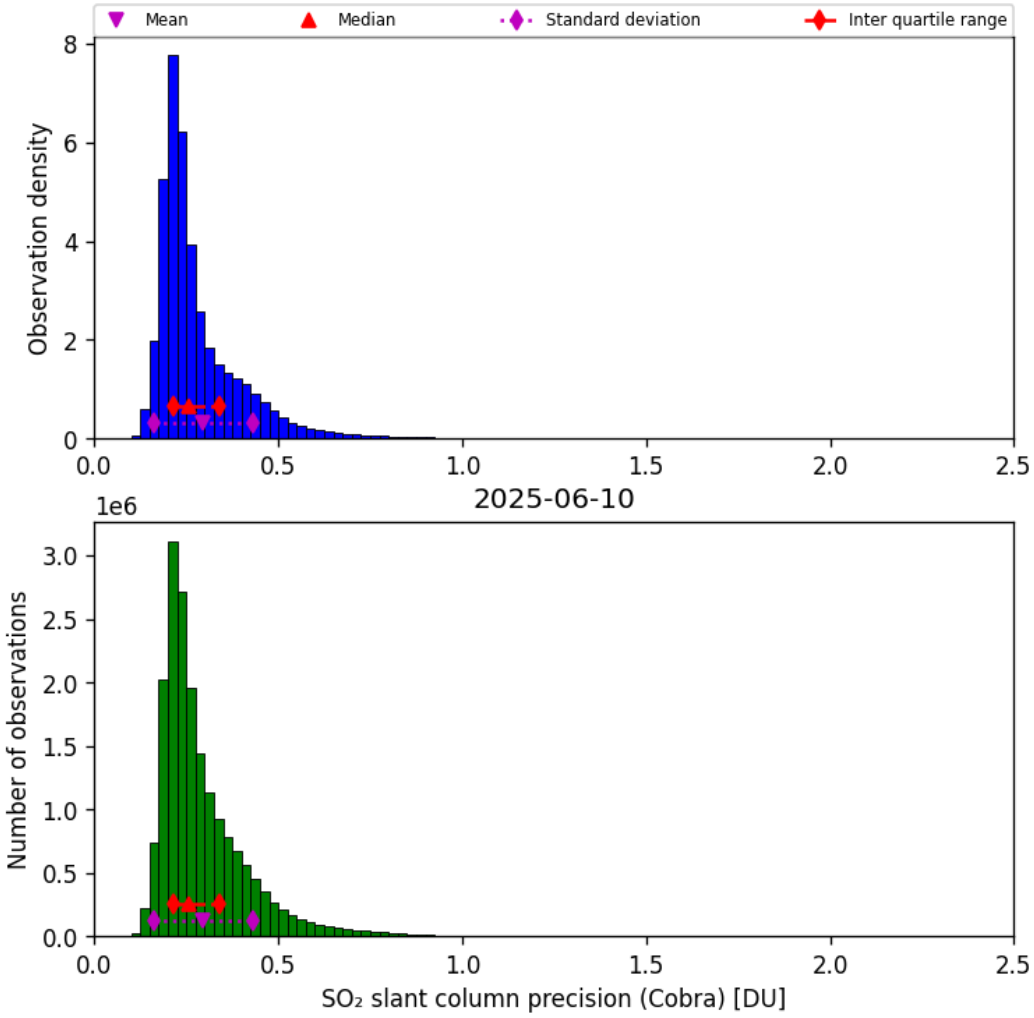


Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-06-10 to 2025-06-11

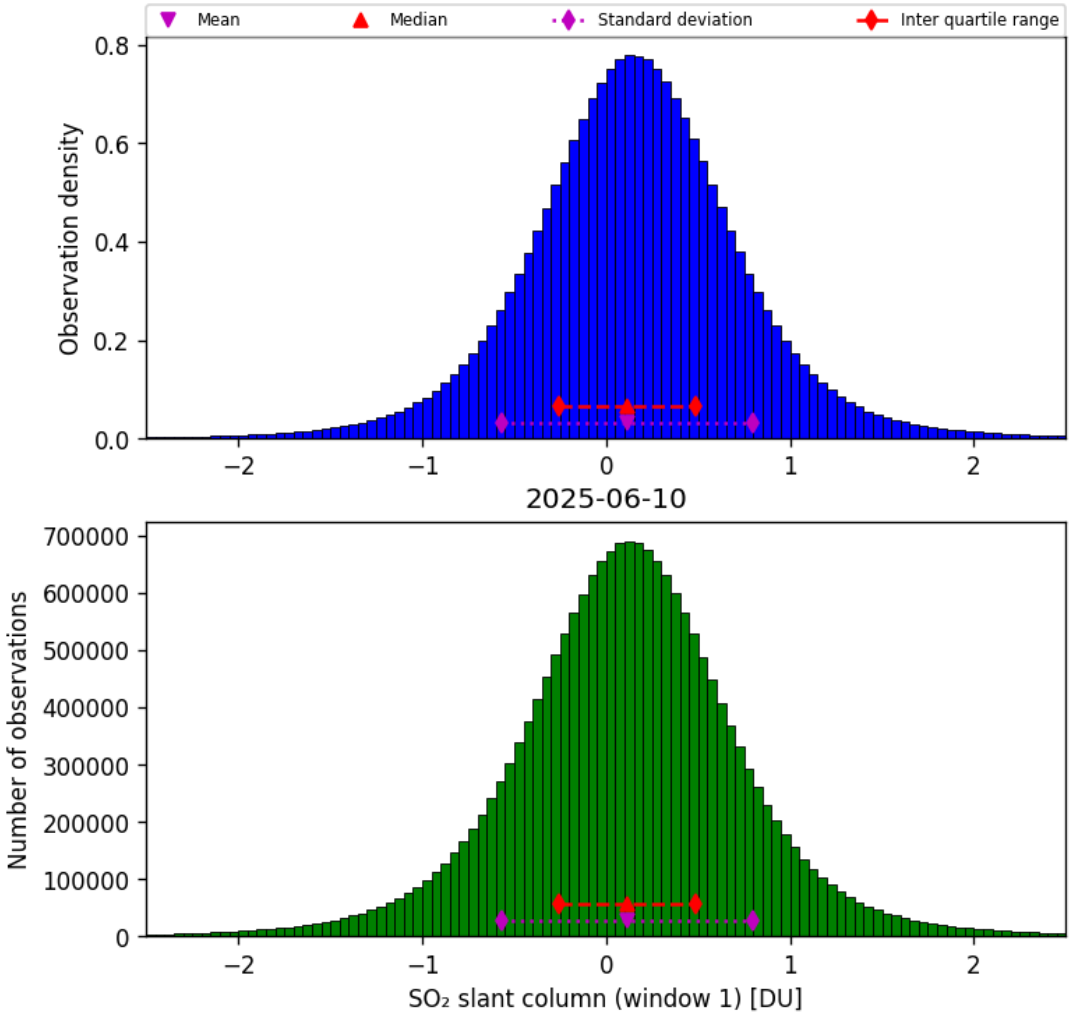


Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-06-10 to 2025-06-11

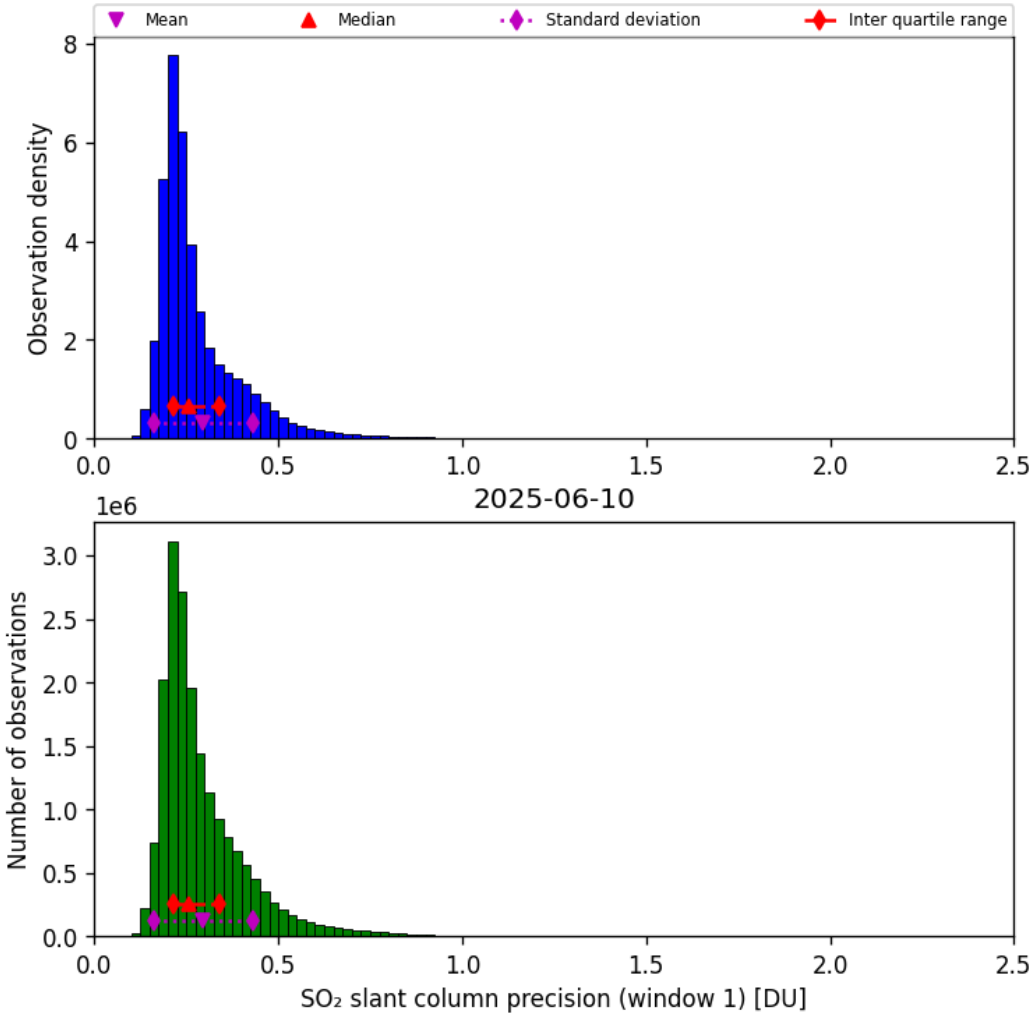


Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-06-10 to 2025-06-11

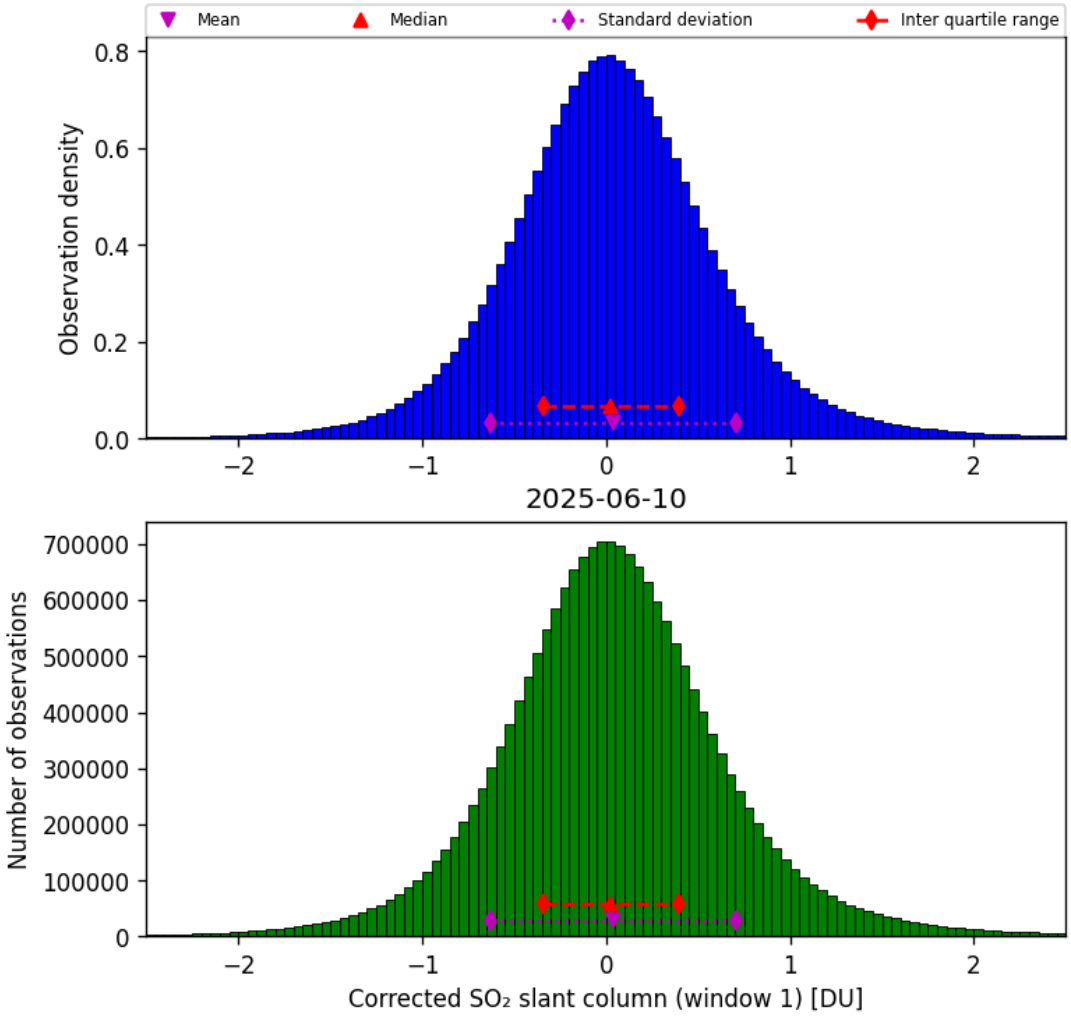


Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-06-10 to 2025-06-11

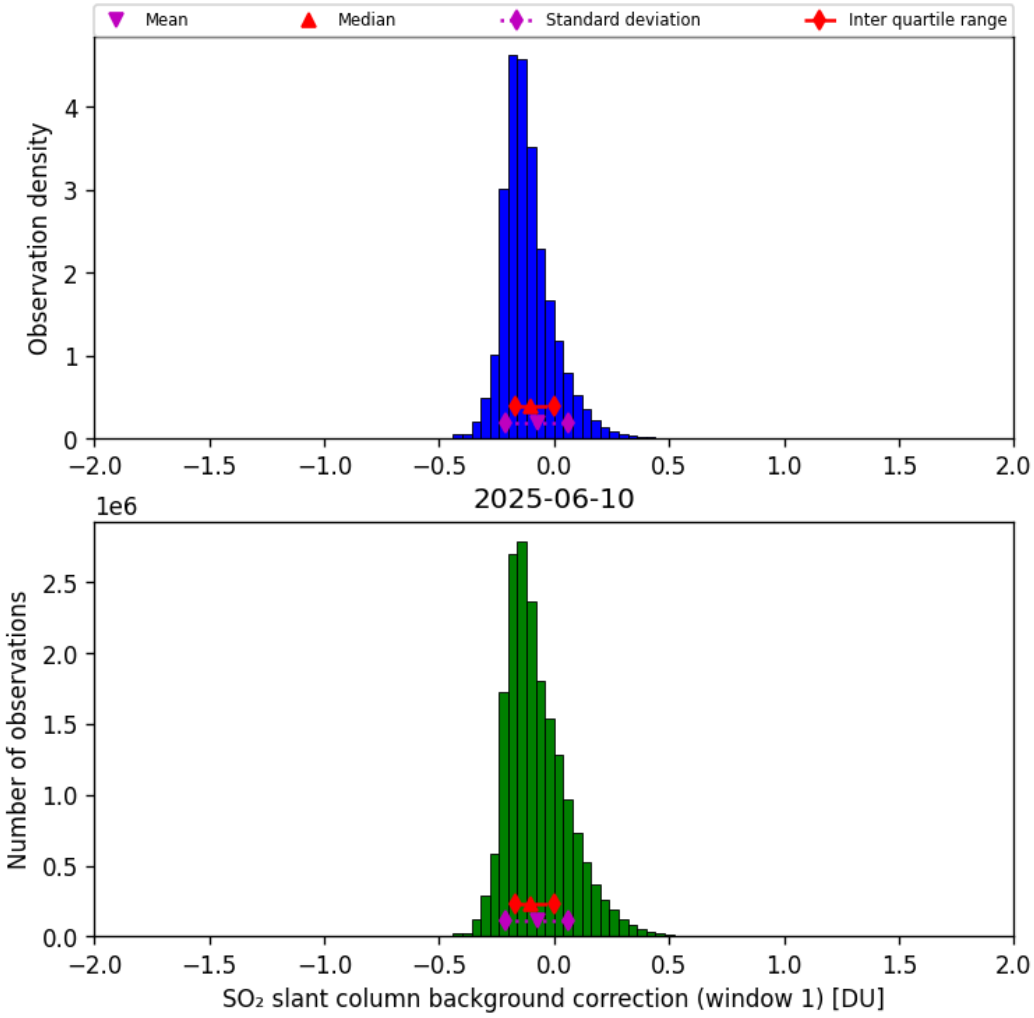


Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-06-10 to 2025-06-11

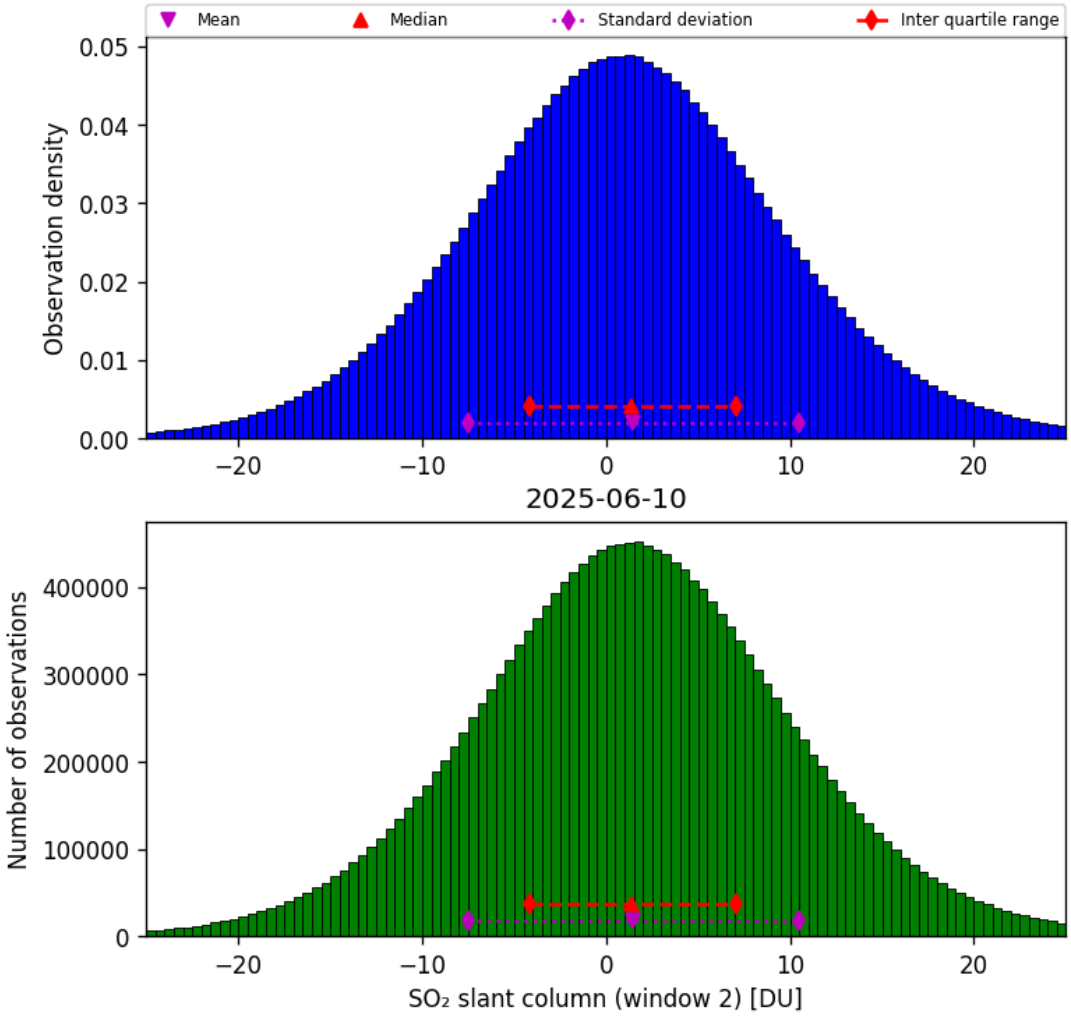


Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-06-10 to 2025-06-11

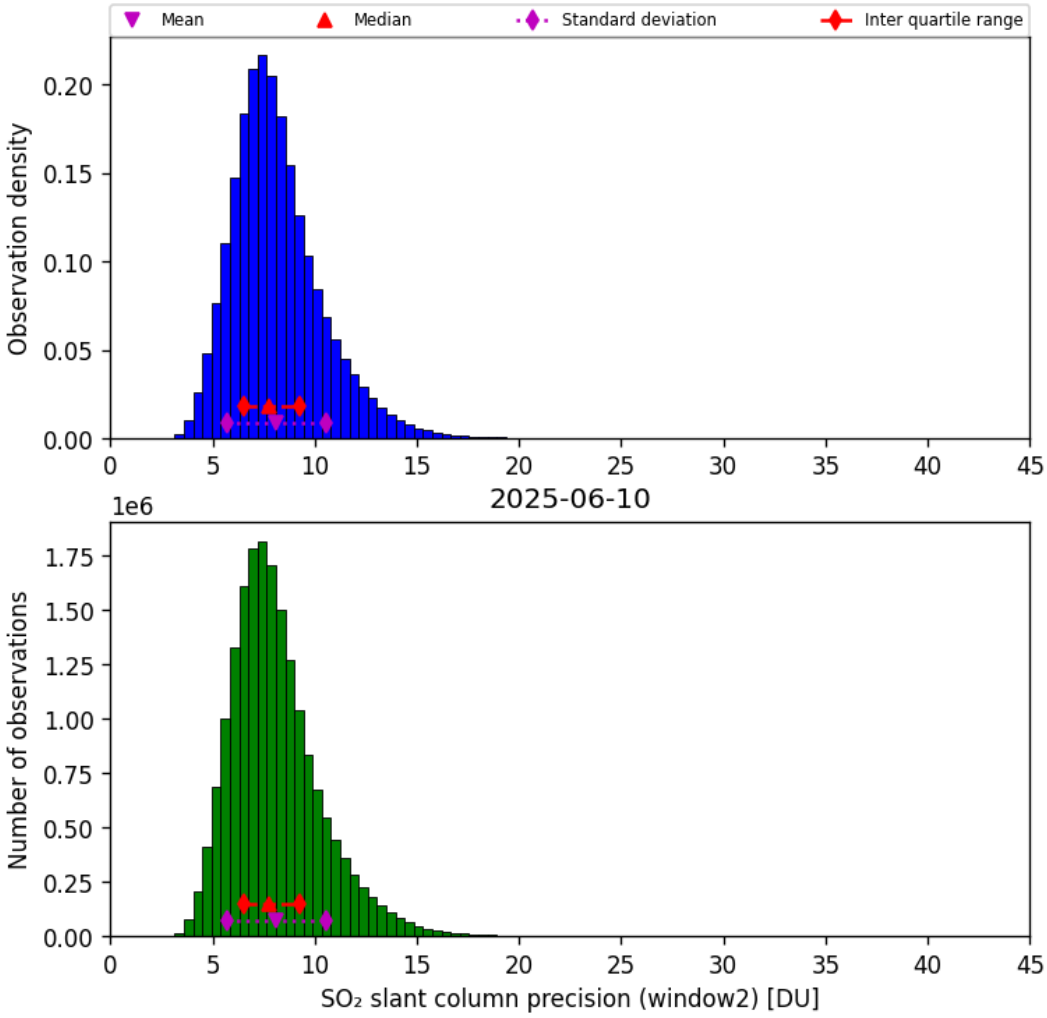


Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-06-10 to 2025-06-11

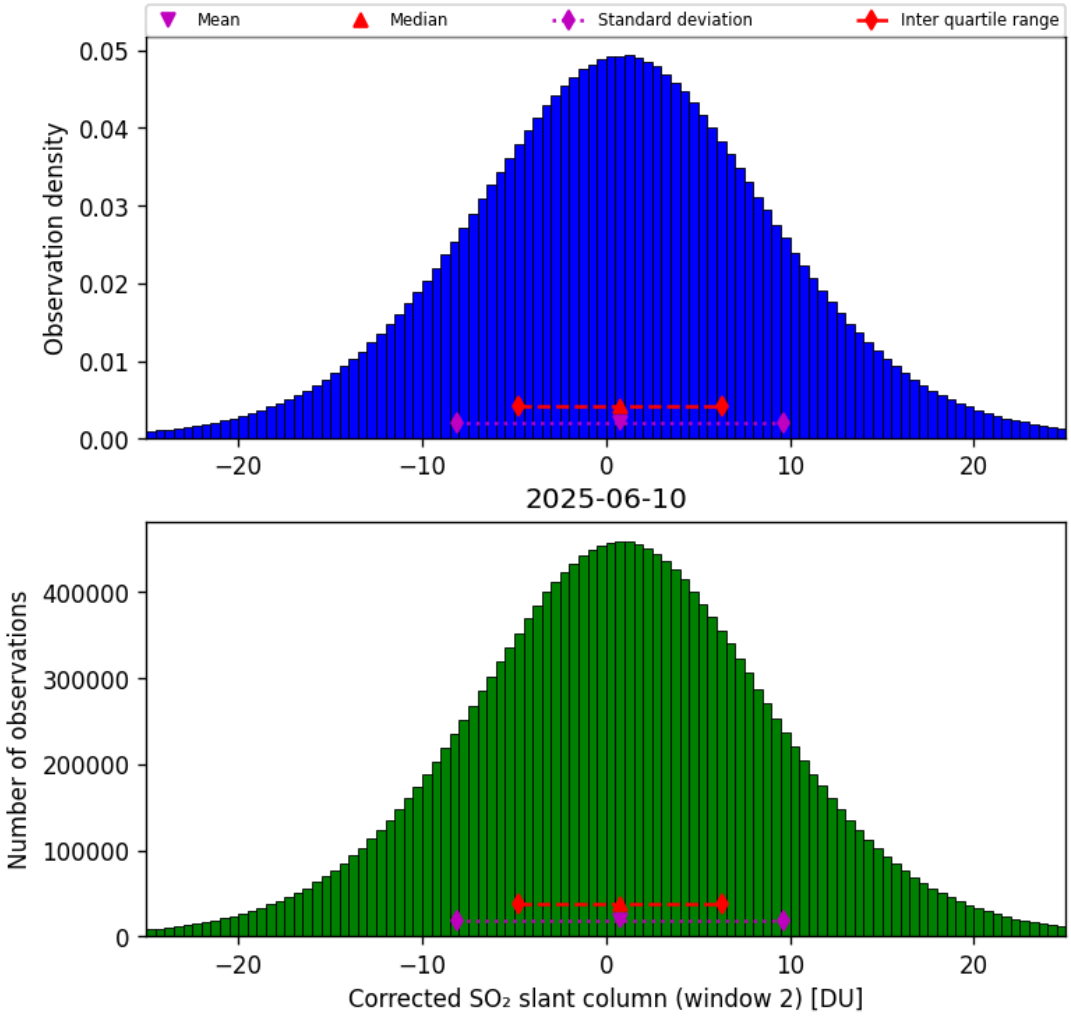


Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-06-10 to 2025-06-11

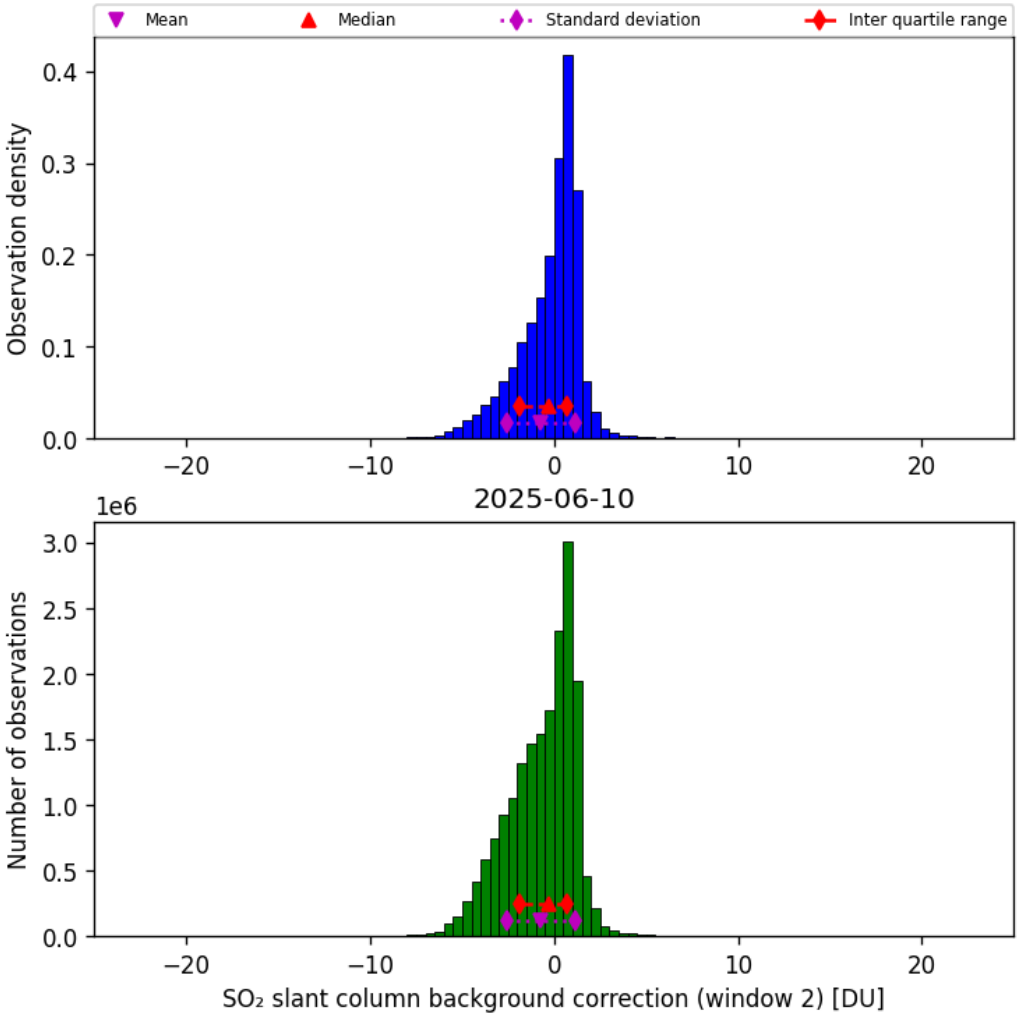


Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-06-10 to 2025-06-11

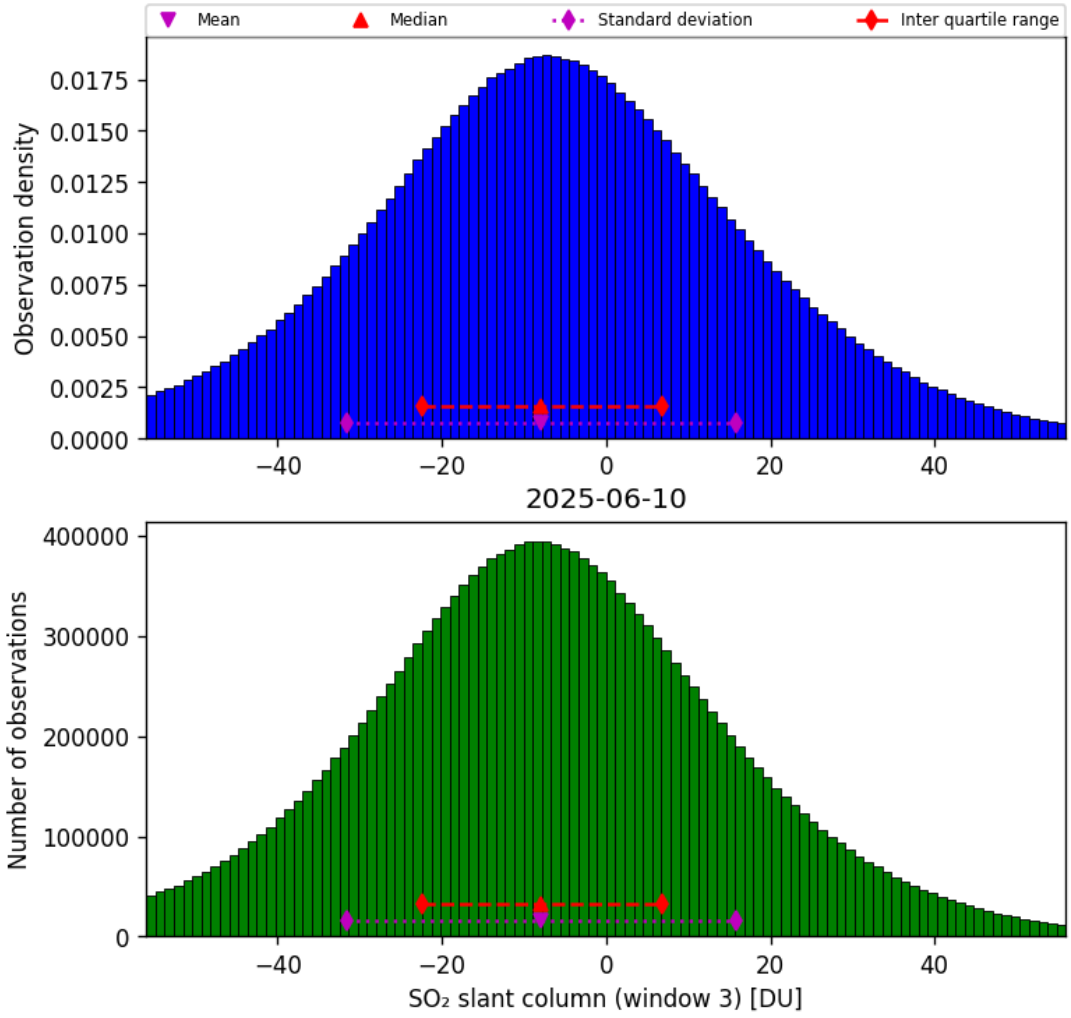


Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-06-10 to 2025-06-11

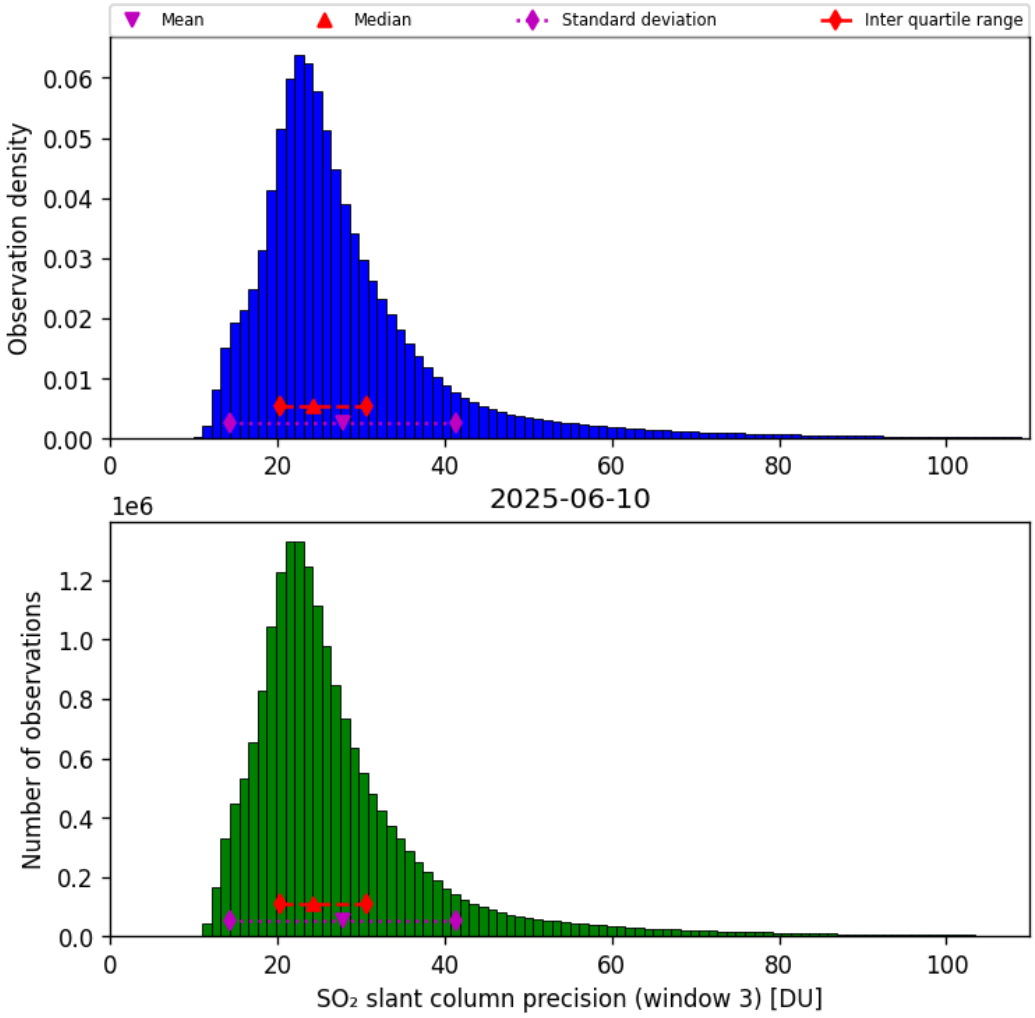


Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-06-10 to 2025-06-11

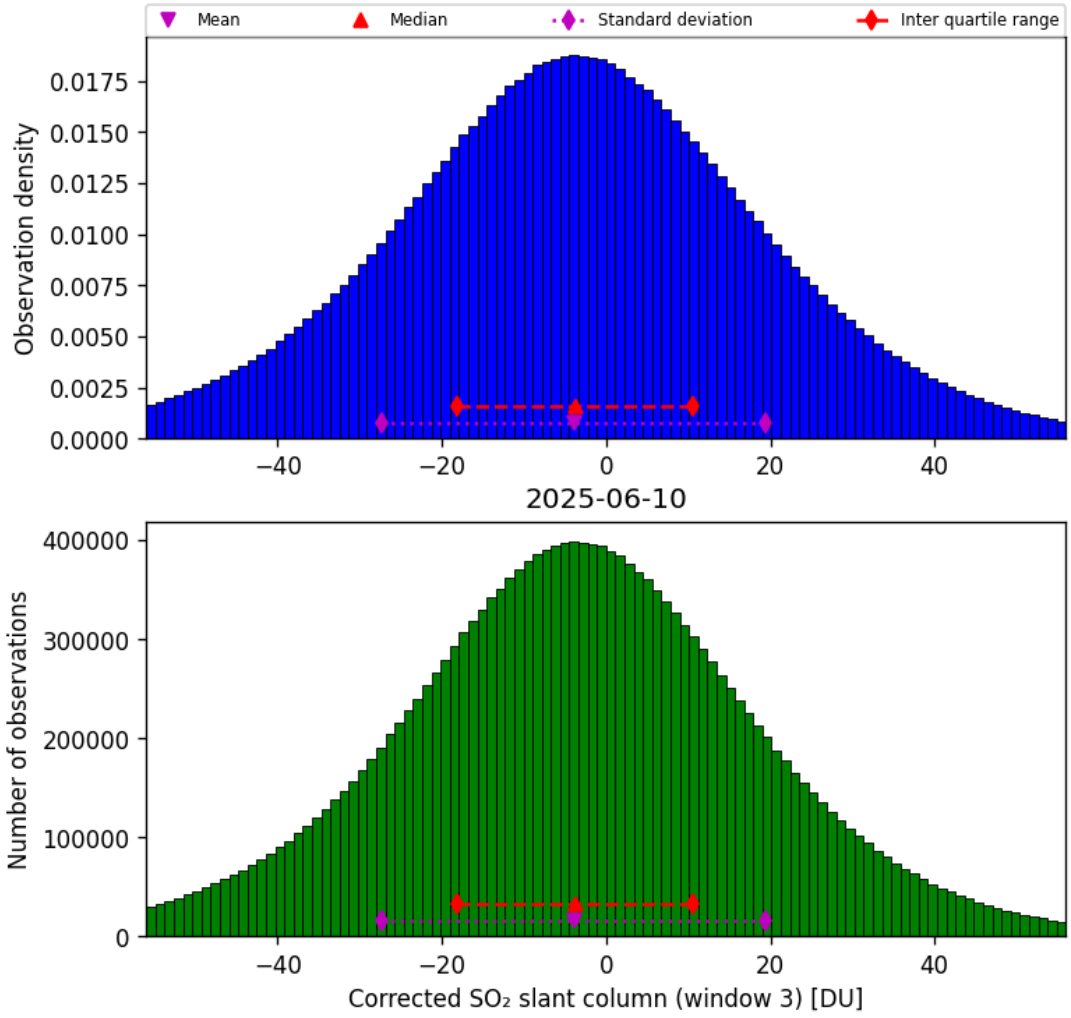


Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-06-10 to 2025-06-11

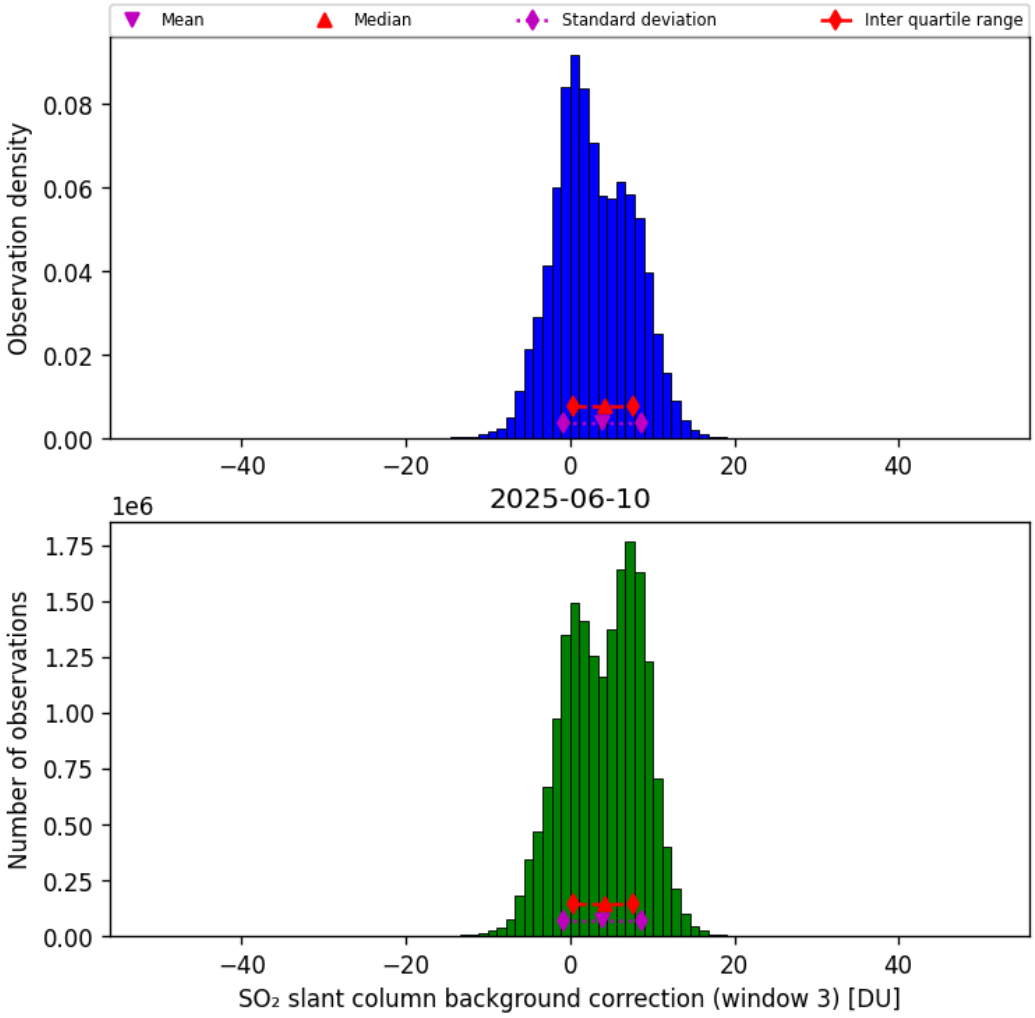


Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-06-10 to 2025-06-11

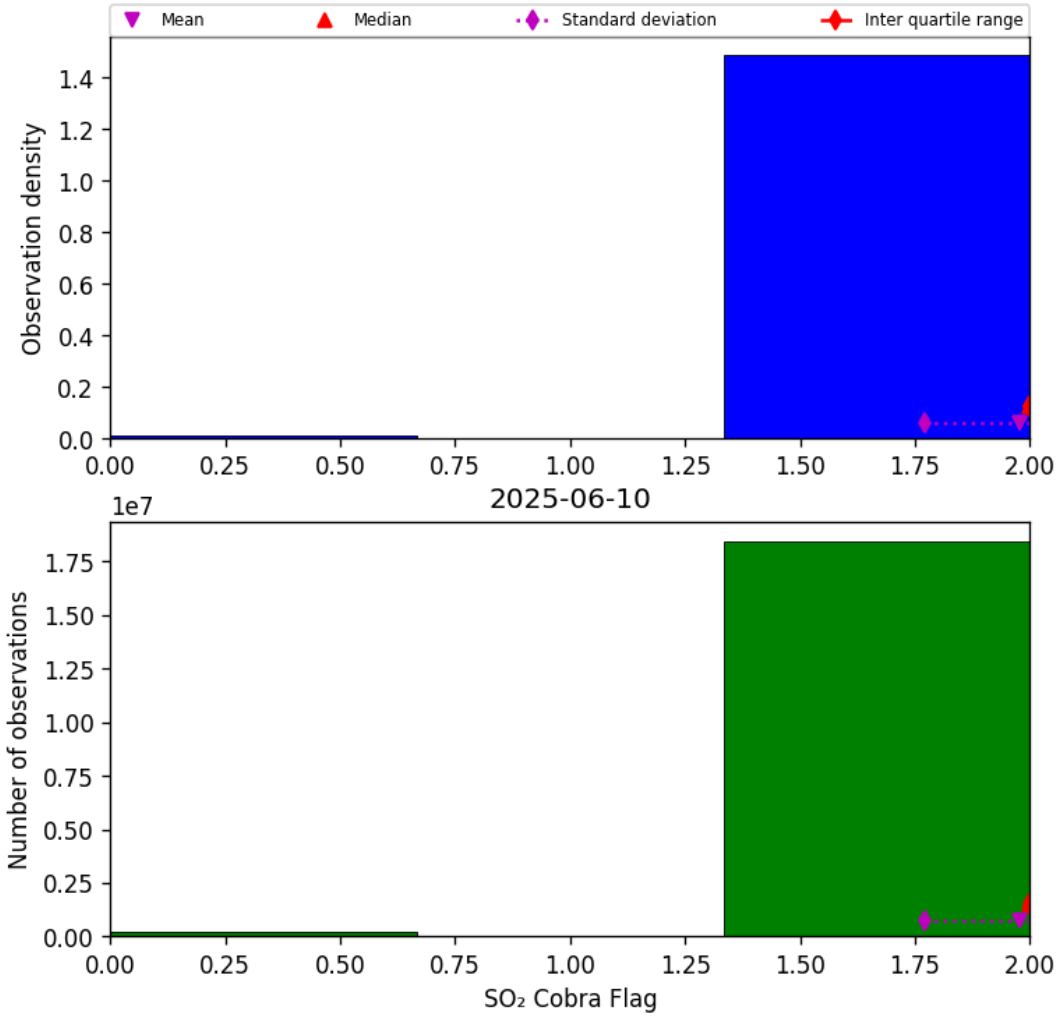


Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-06-10 to 2025-06-11

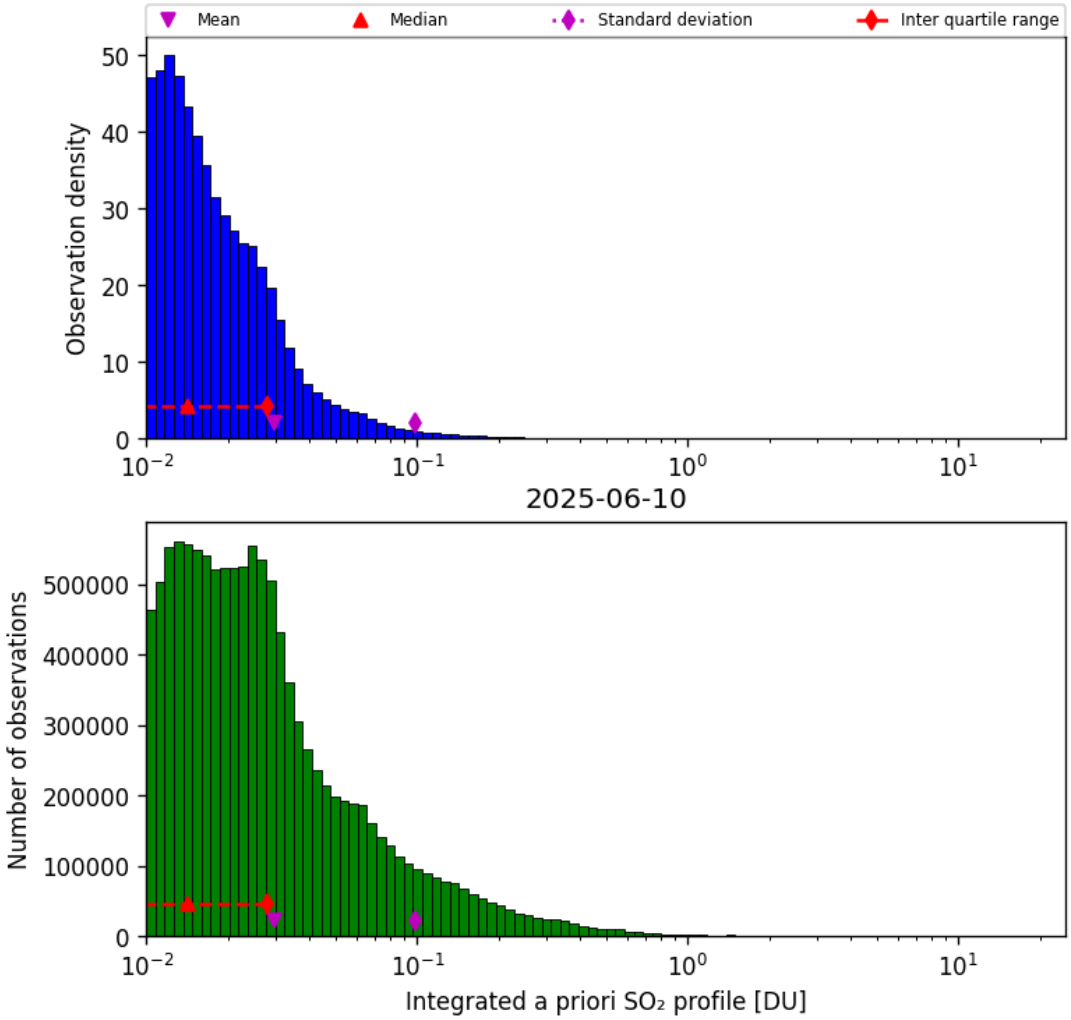


Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-06-10 to 2025-06-11

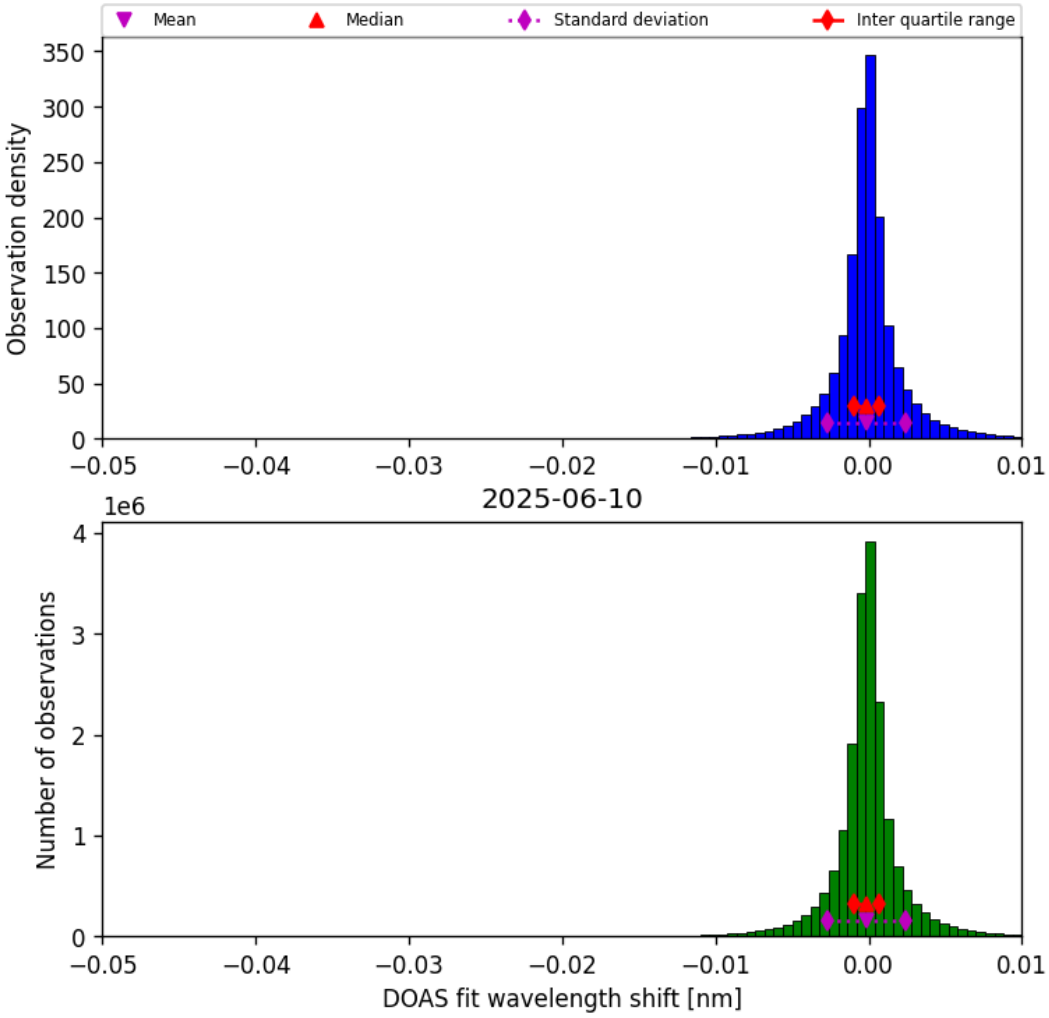


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-06-10 to 2025-06-11

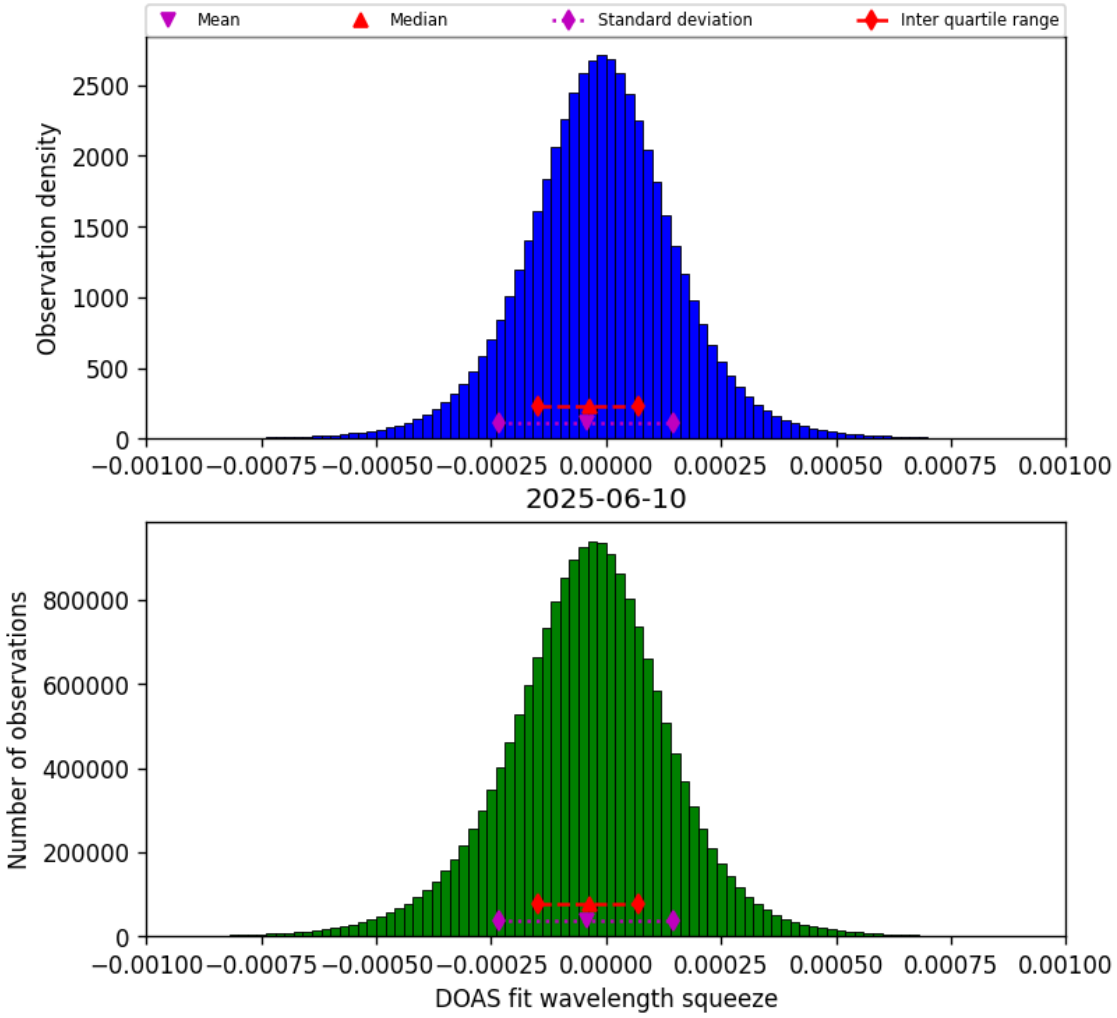


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-06-10 to 2025-06-11

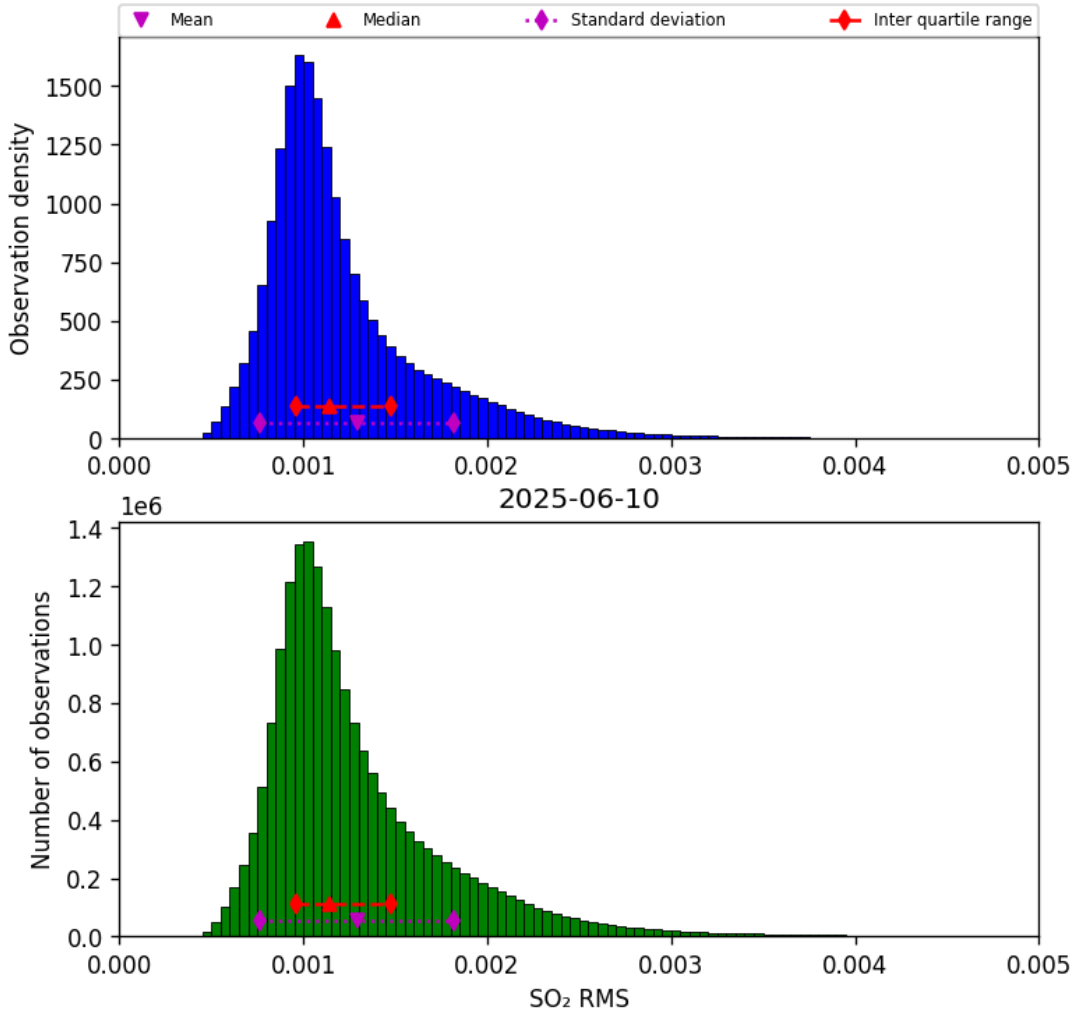


Figure 79: Histogram of "SO_2 RMS" for 2025-06-10 to 2025-06-11

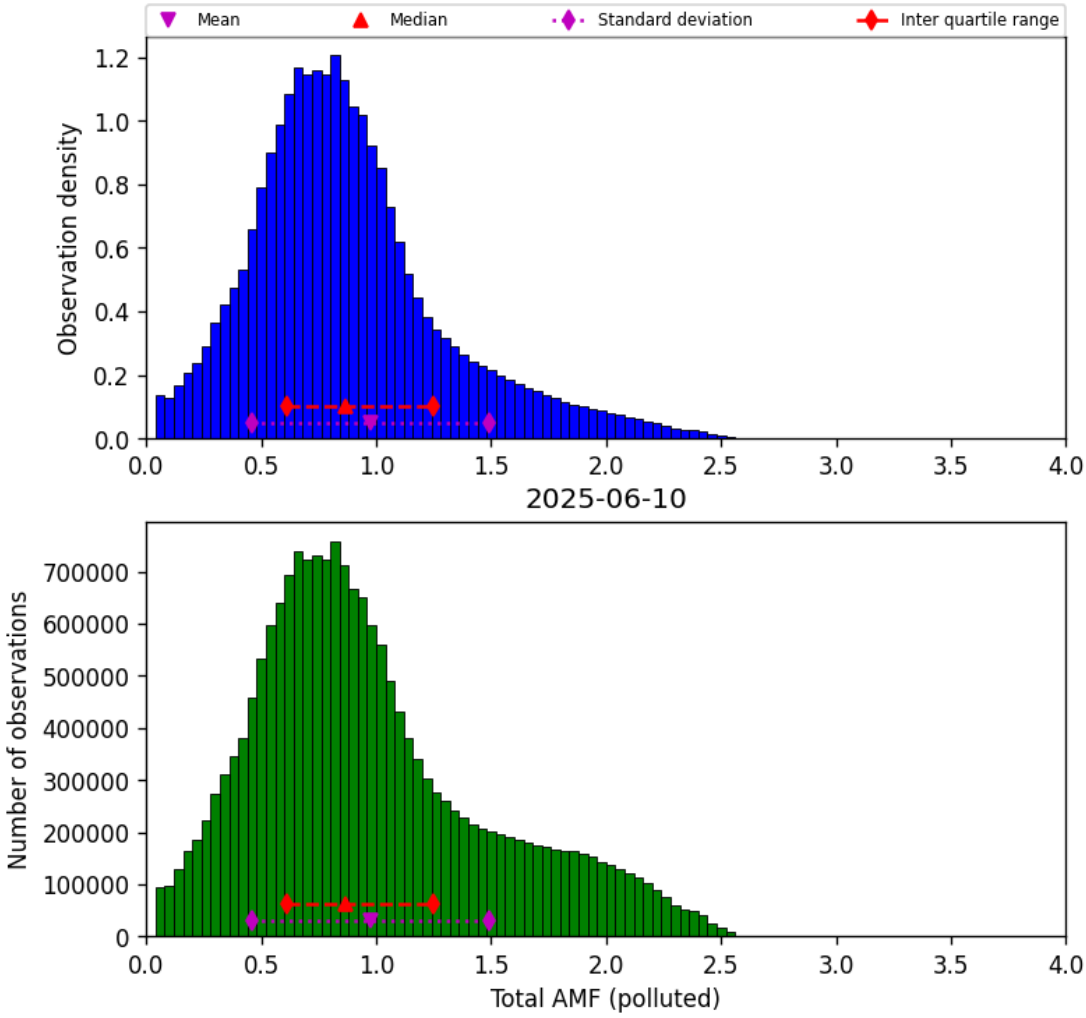


Figure 80: Histogram of “Total AMF (polluted)” for 2025-06-10 to 2025-06-11

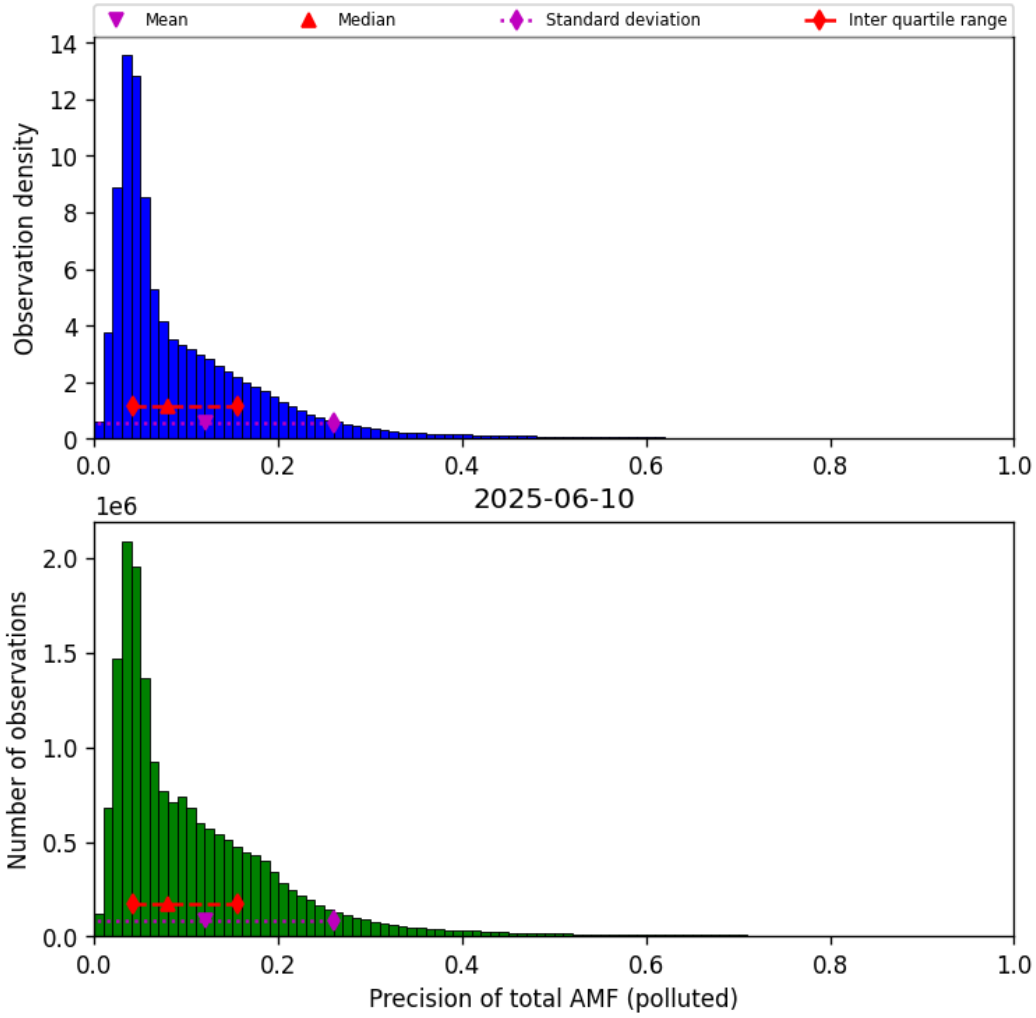


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-06-10 to 2025-06-11

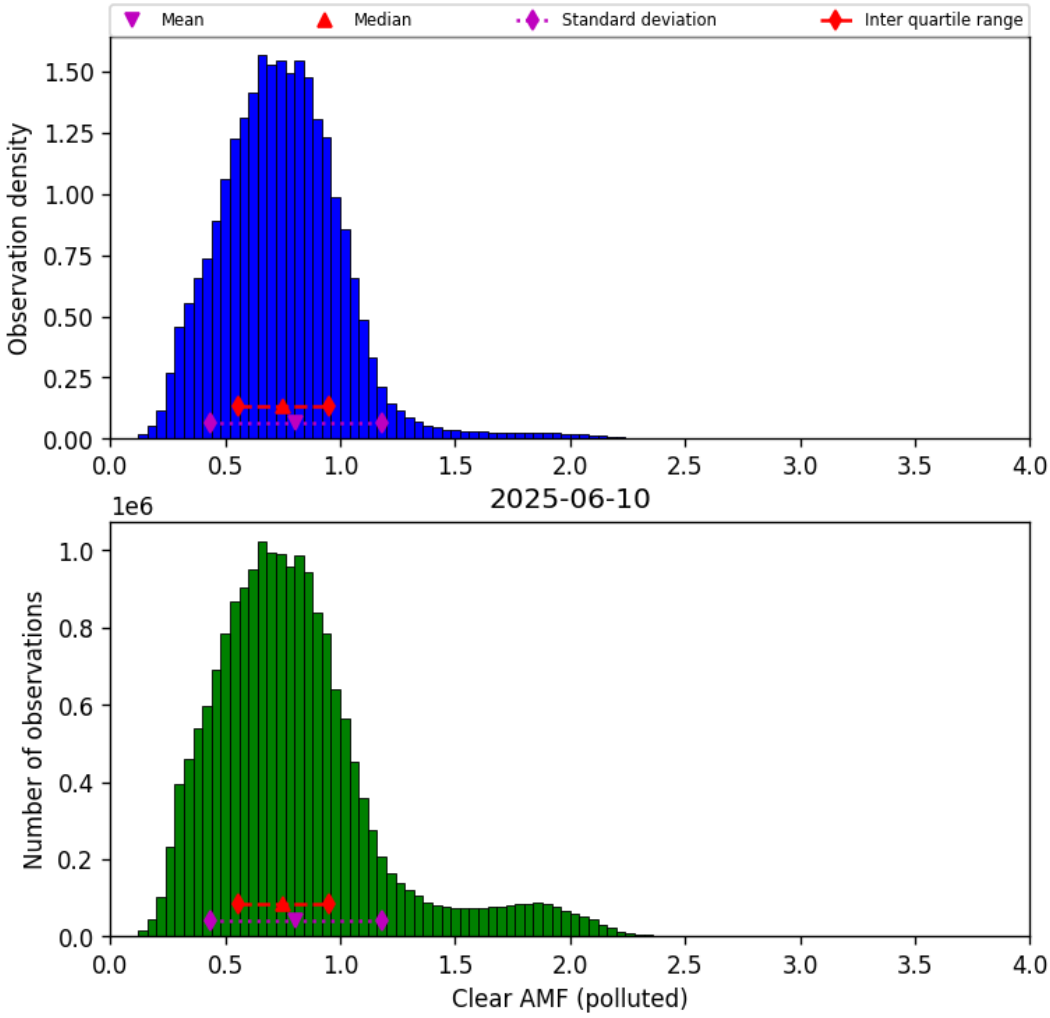


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-06-10 to 2025-06-11

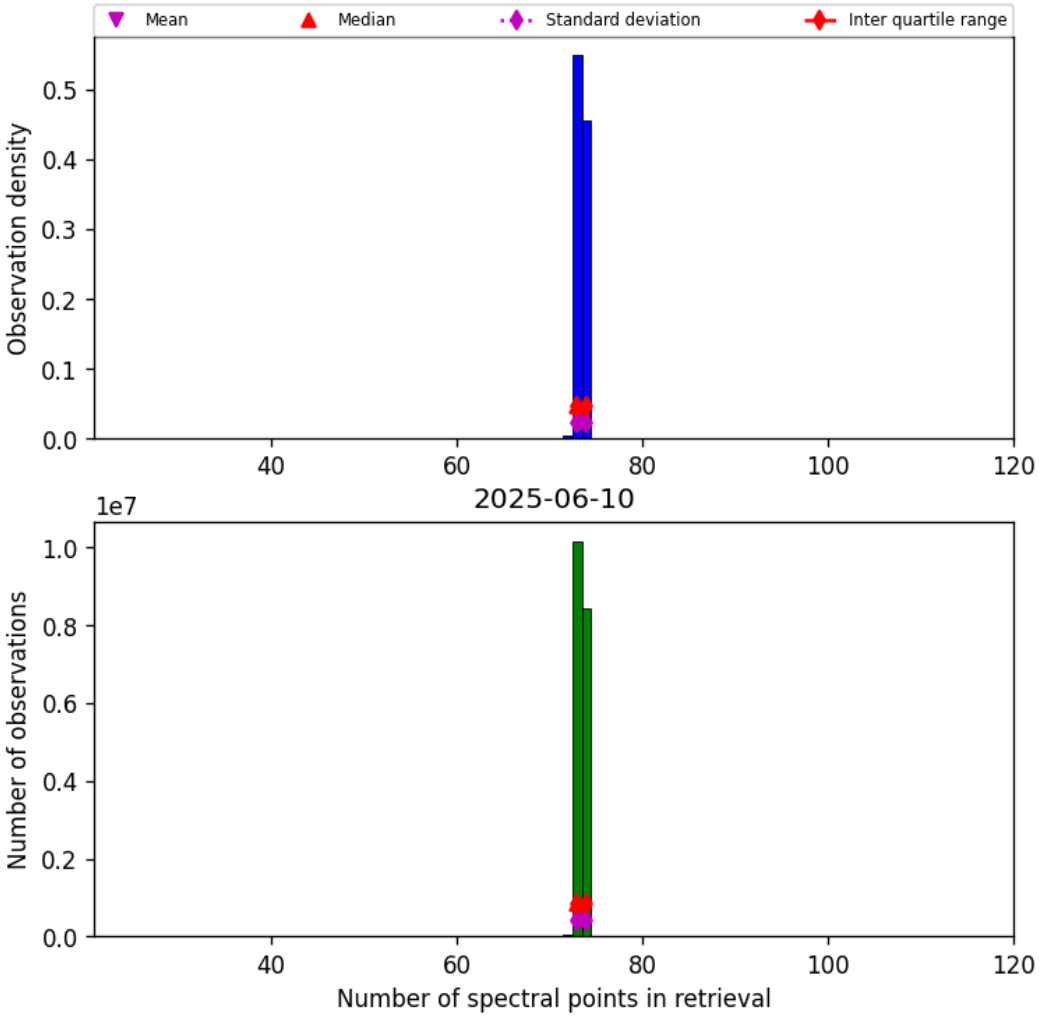


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-06-10 to 2025-06-11

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.

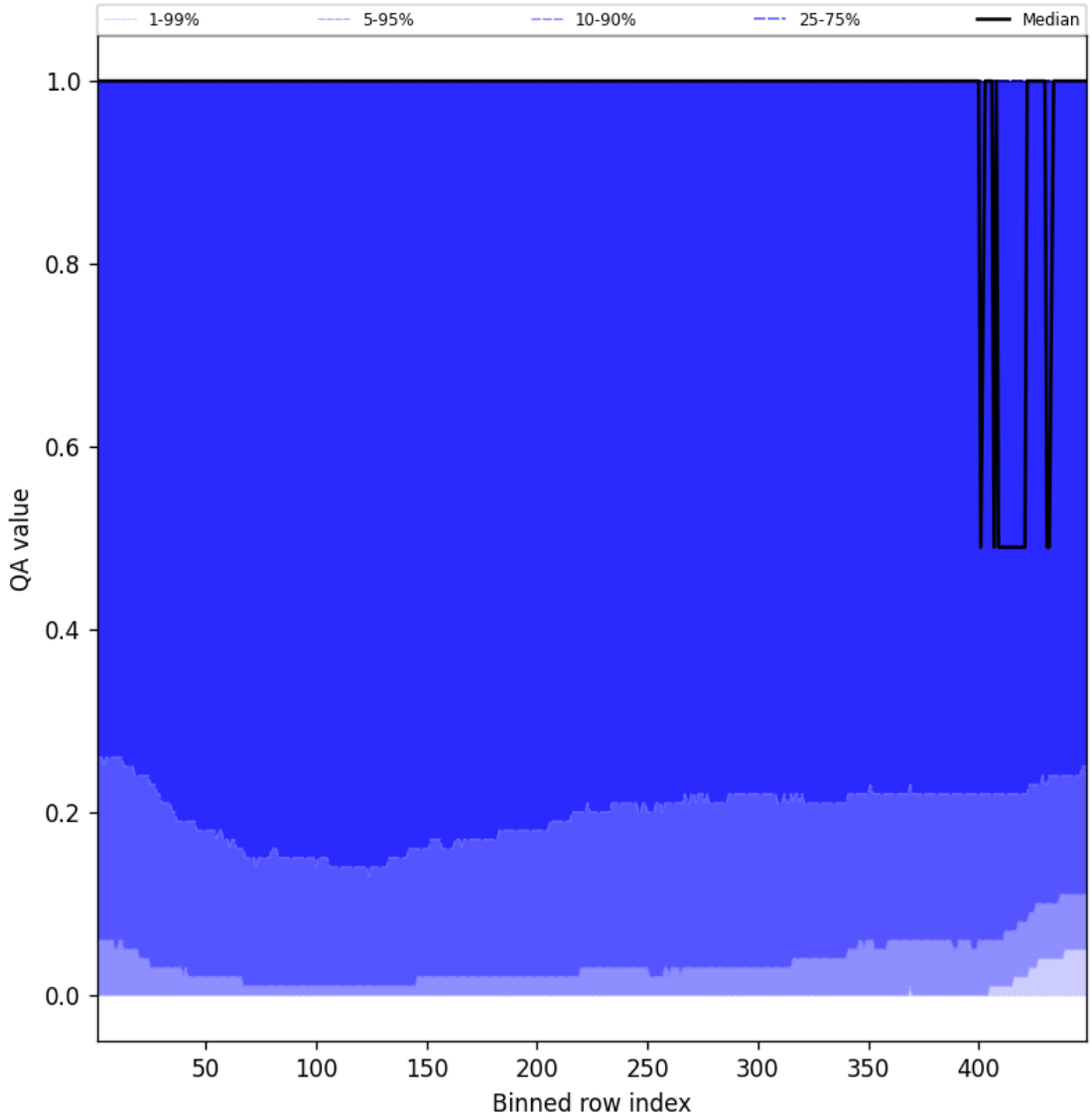


Figure 84: Along track statistics of “QA value” for 2025-06-10 to 2025-06-11

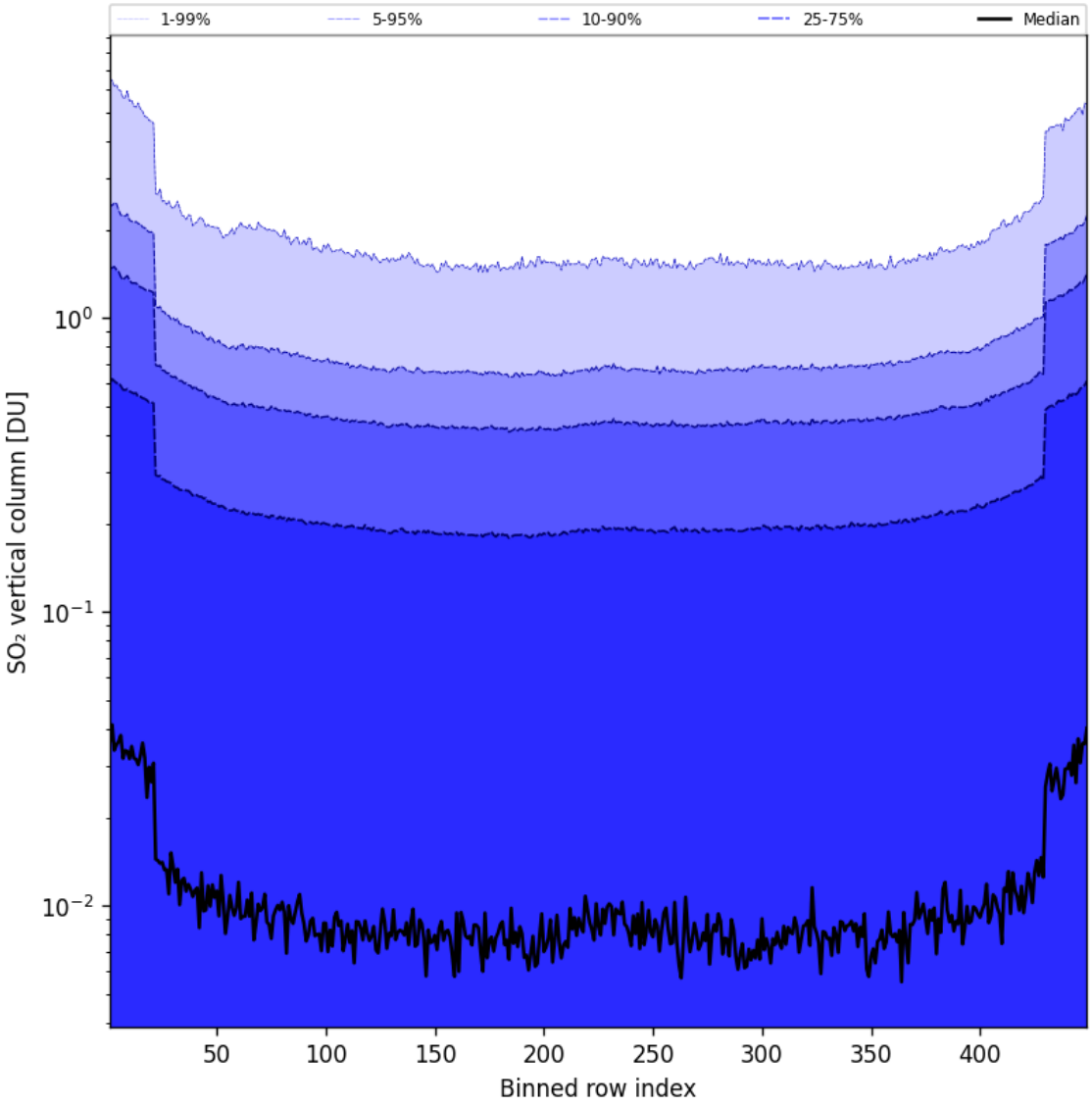


Figure 85: Along track statistics of "SO_2 vertical column" for 2025-06-10 to 2025-06-11

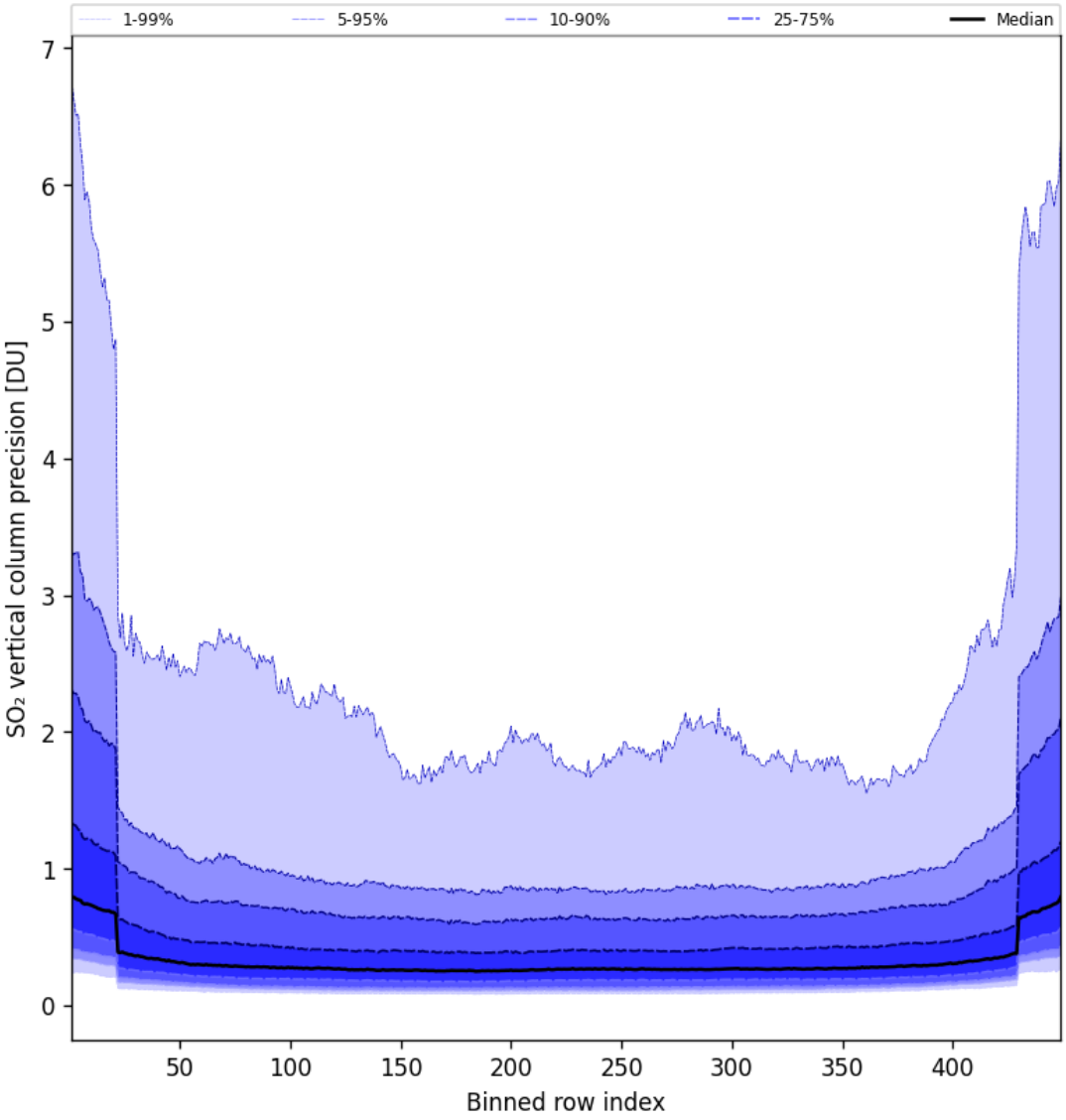


Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-06-10 to 2025-06-11

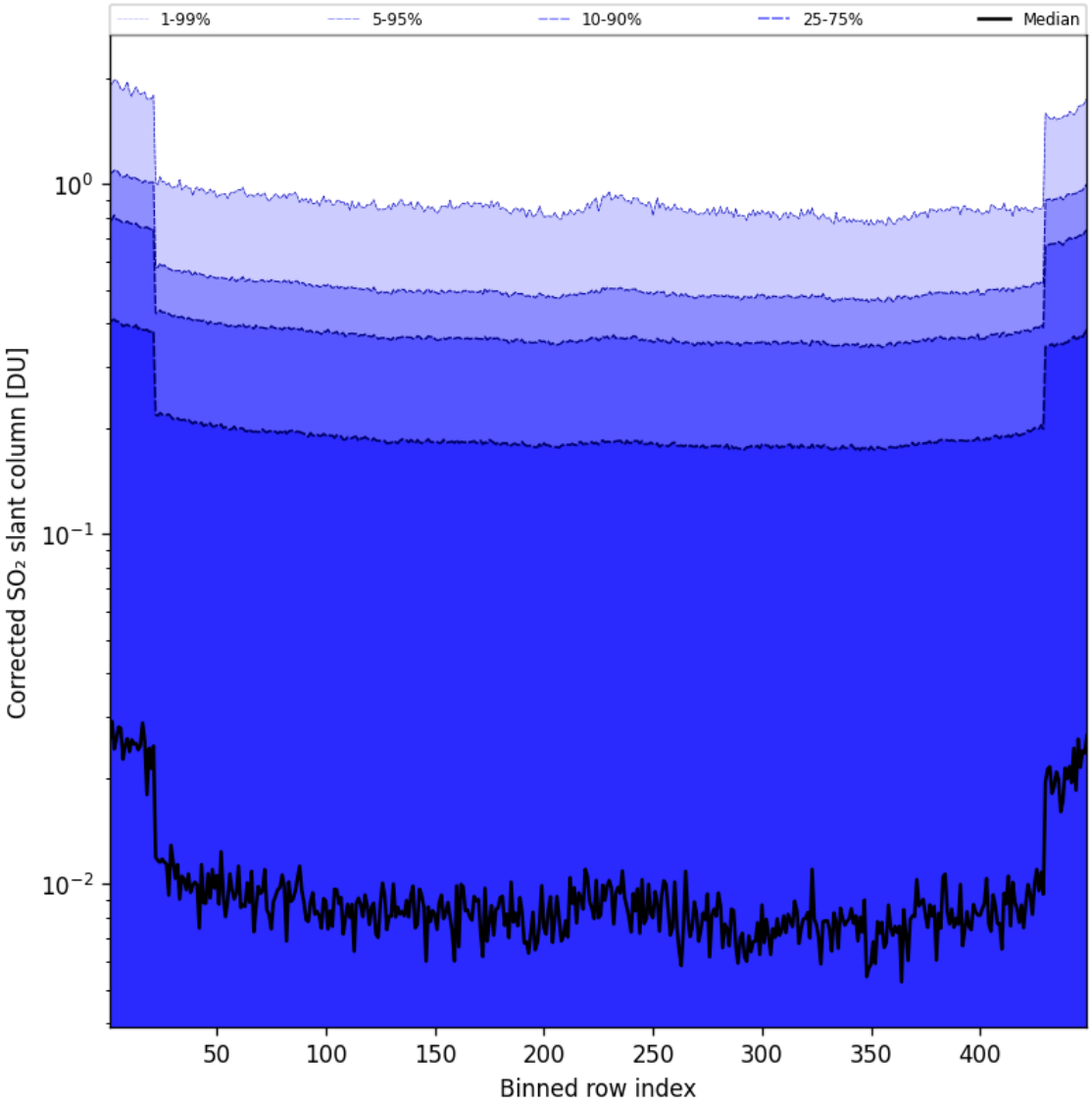


Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-06-10 to 2025-06-11

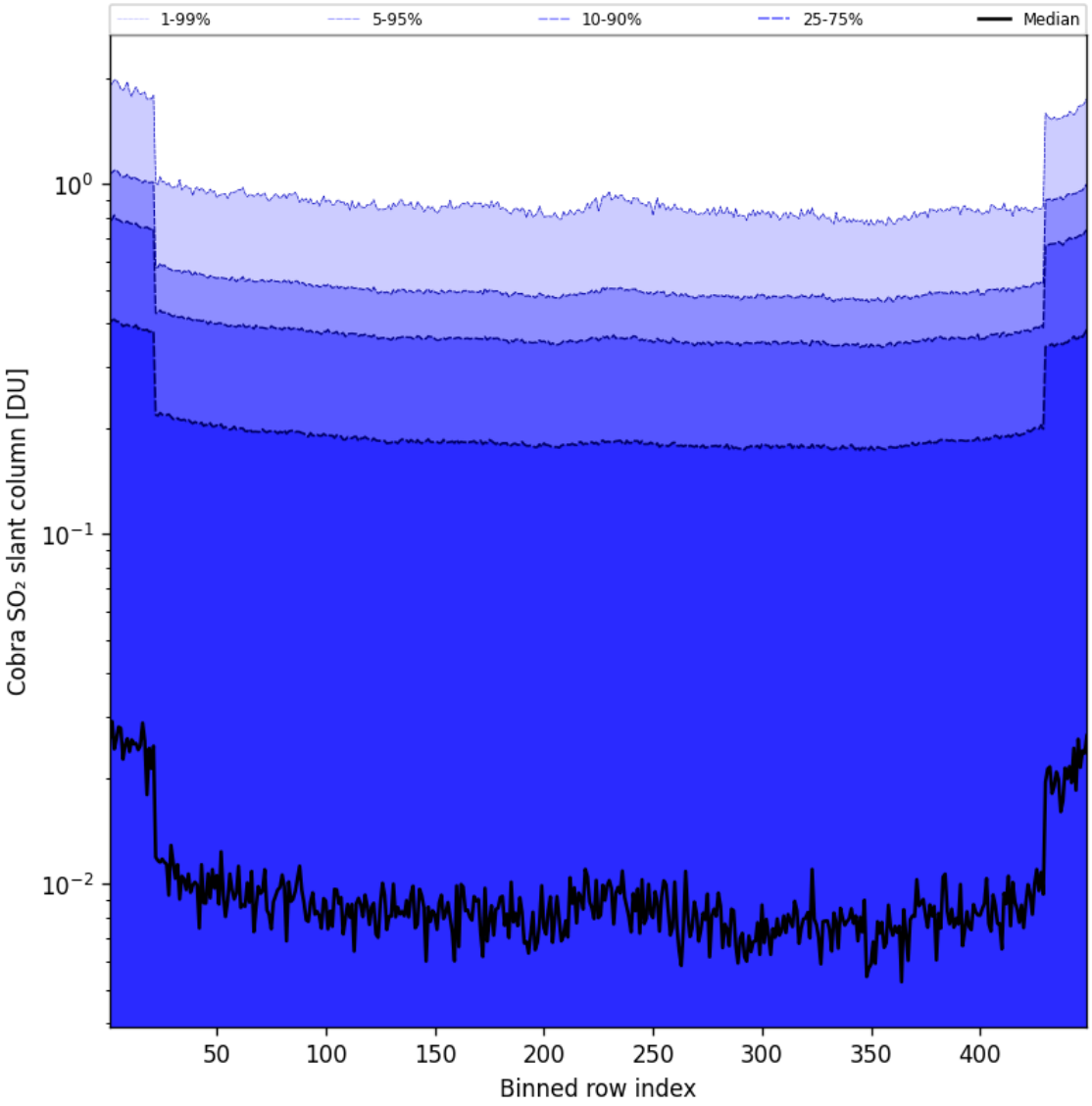


Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-06-10 to 2025-06-11

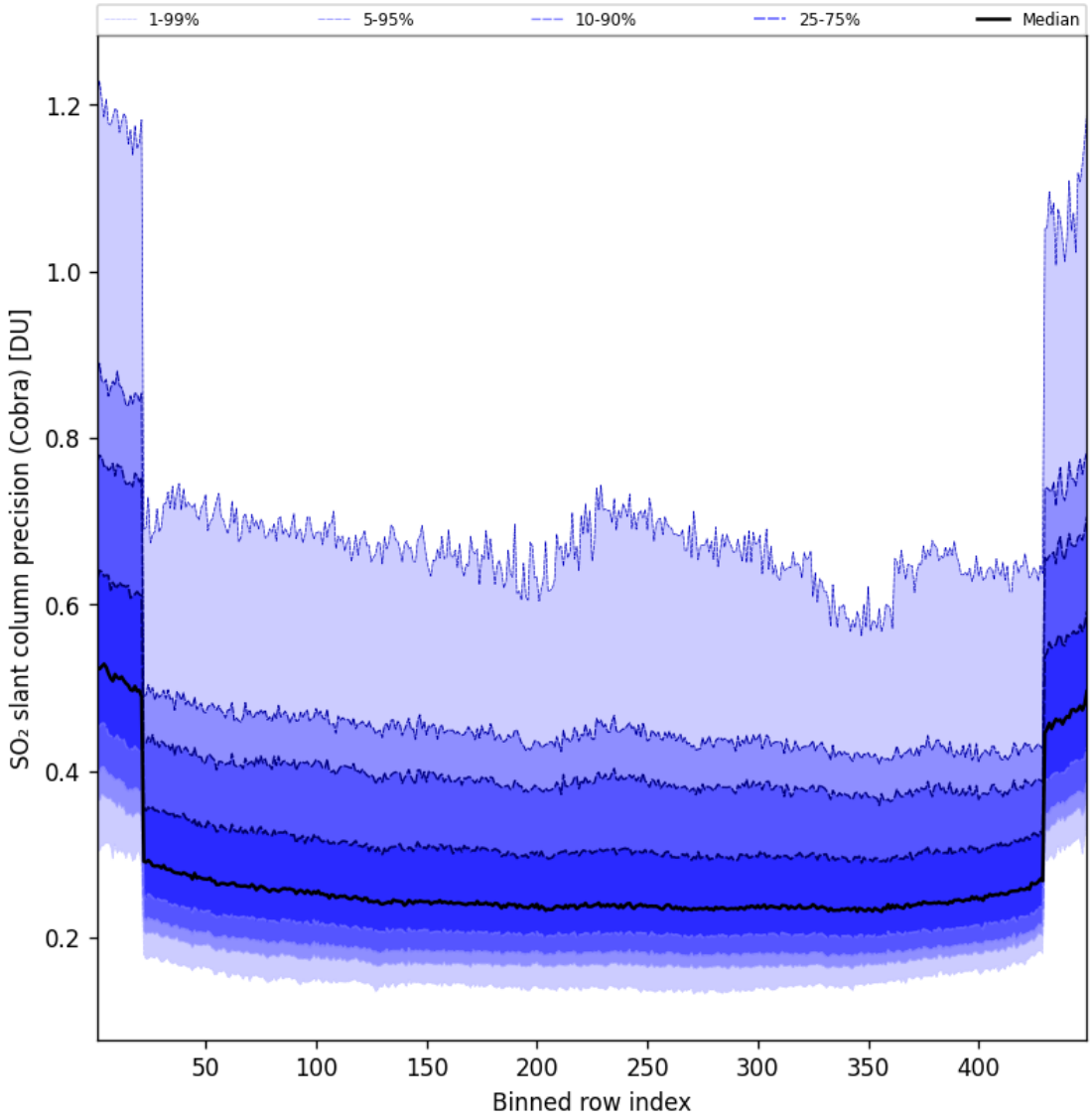


Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-06-10 to 2025-06-11

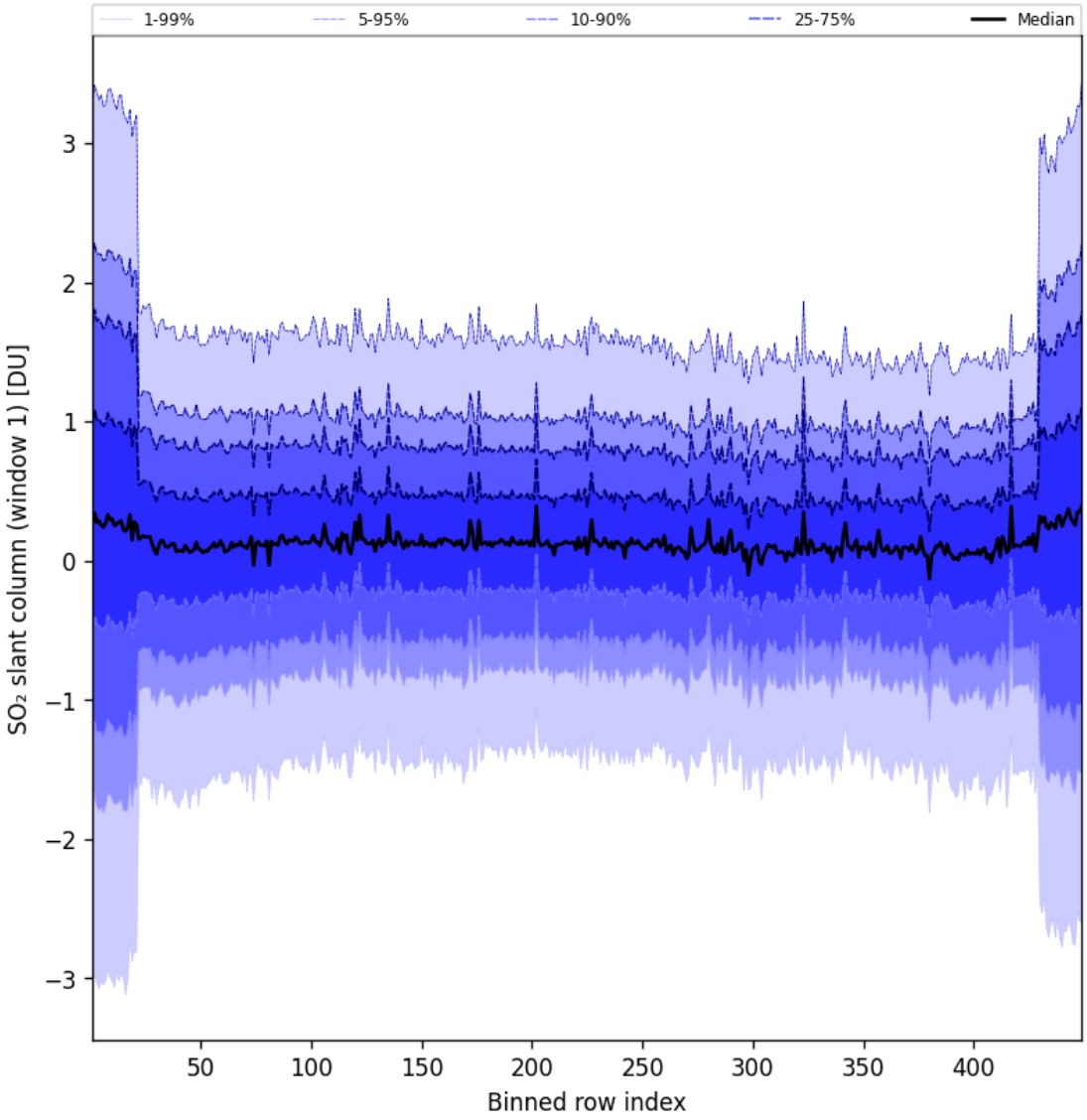


Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-06-10 to 2025-06-11

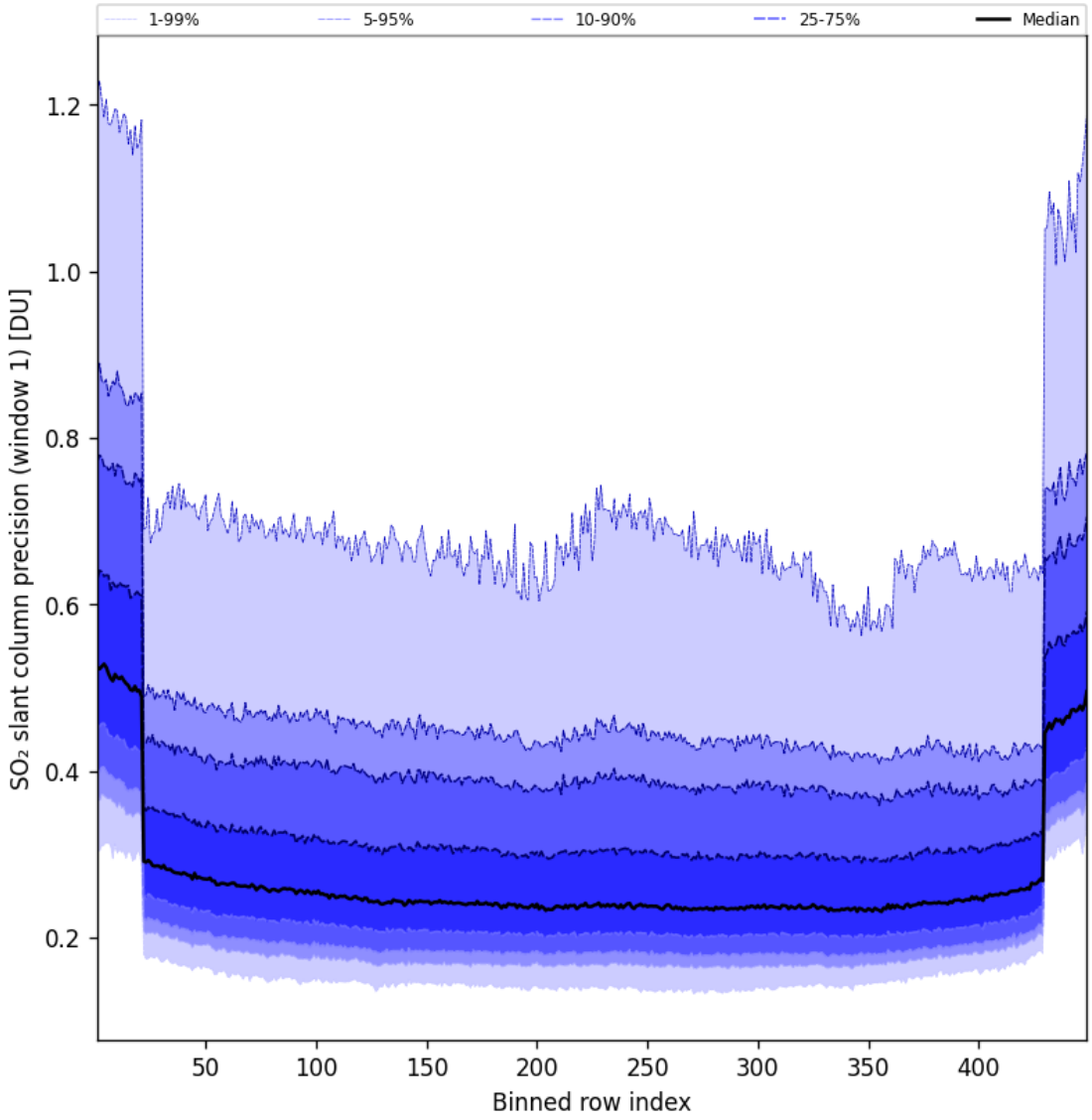


Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-06-10 to 2025-06-11

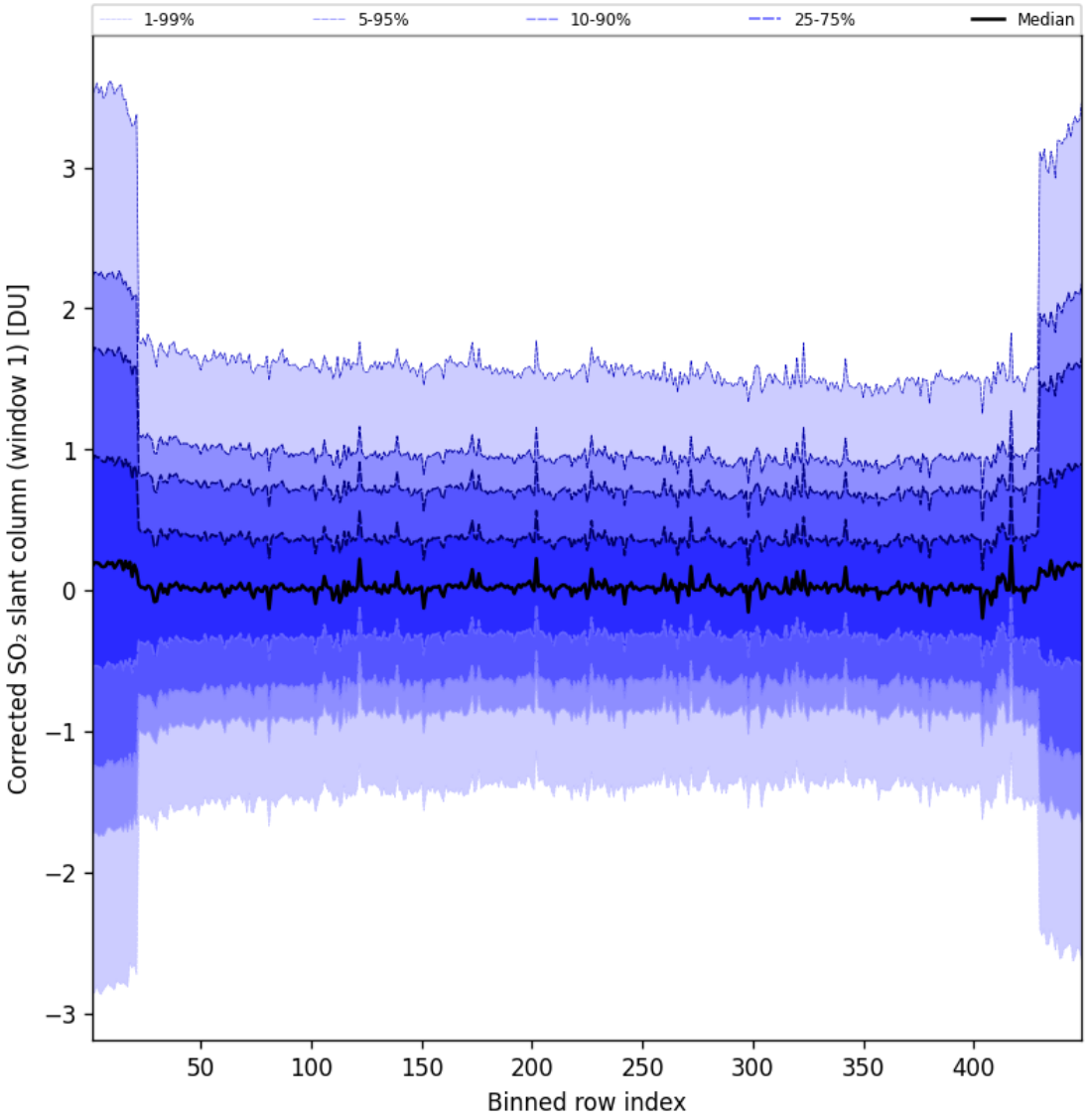


Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-06-10 to 2025-06-11

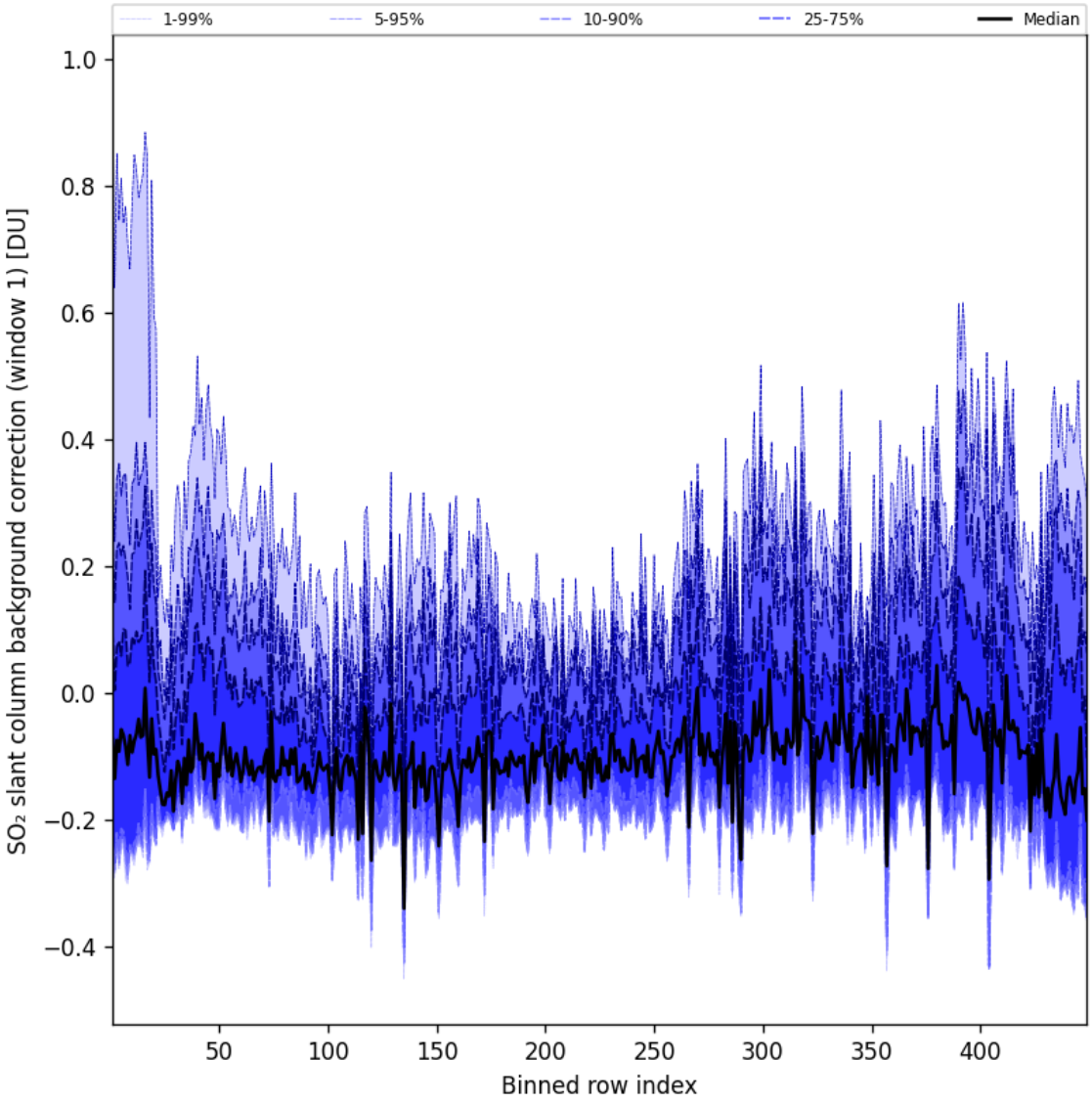


Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-06-10 to 2025-06-11

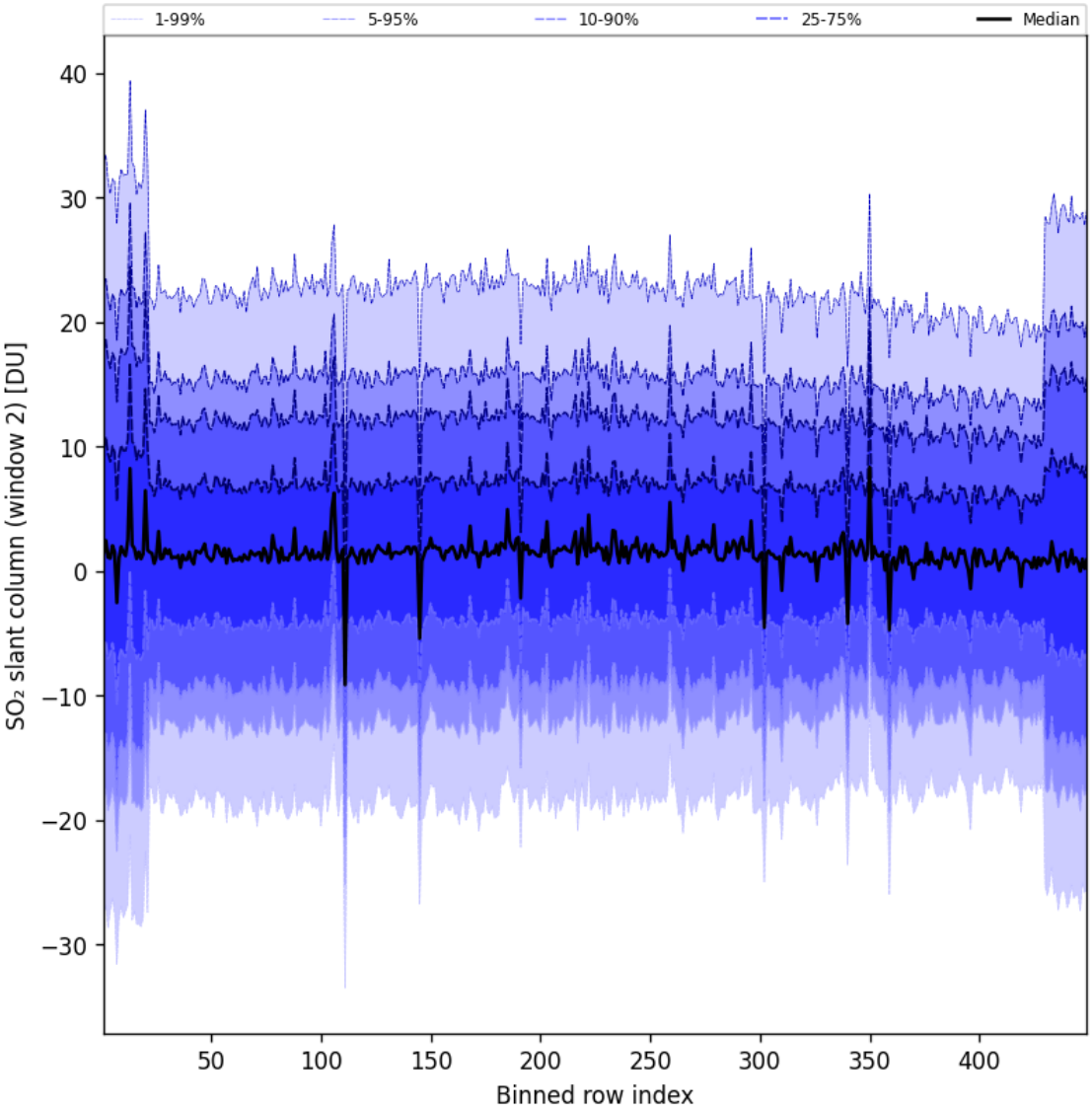


Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-06-10 to 2025-06-11

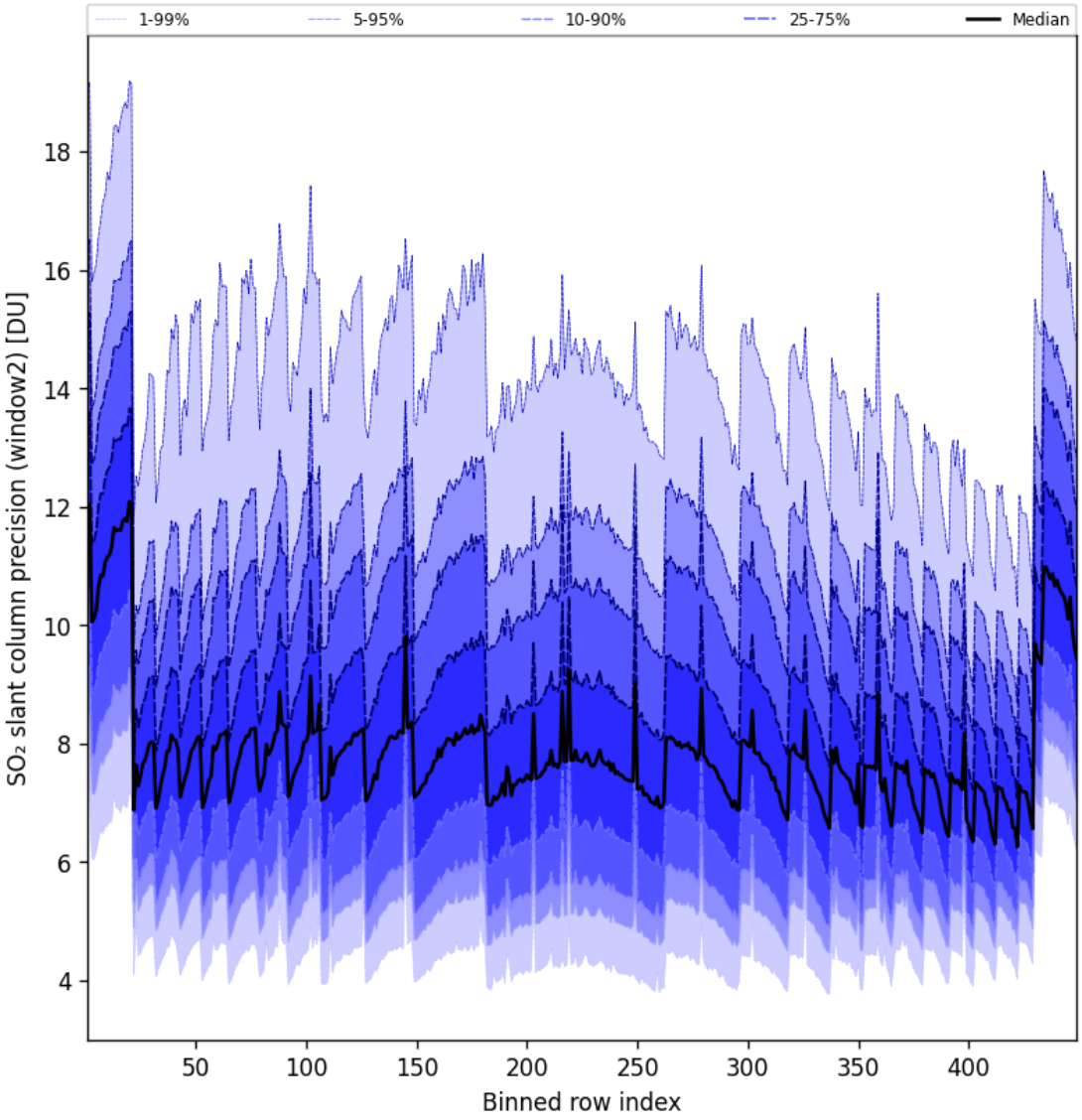


Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-06-10 to 2025-06-11

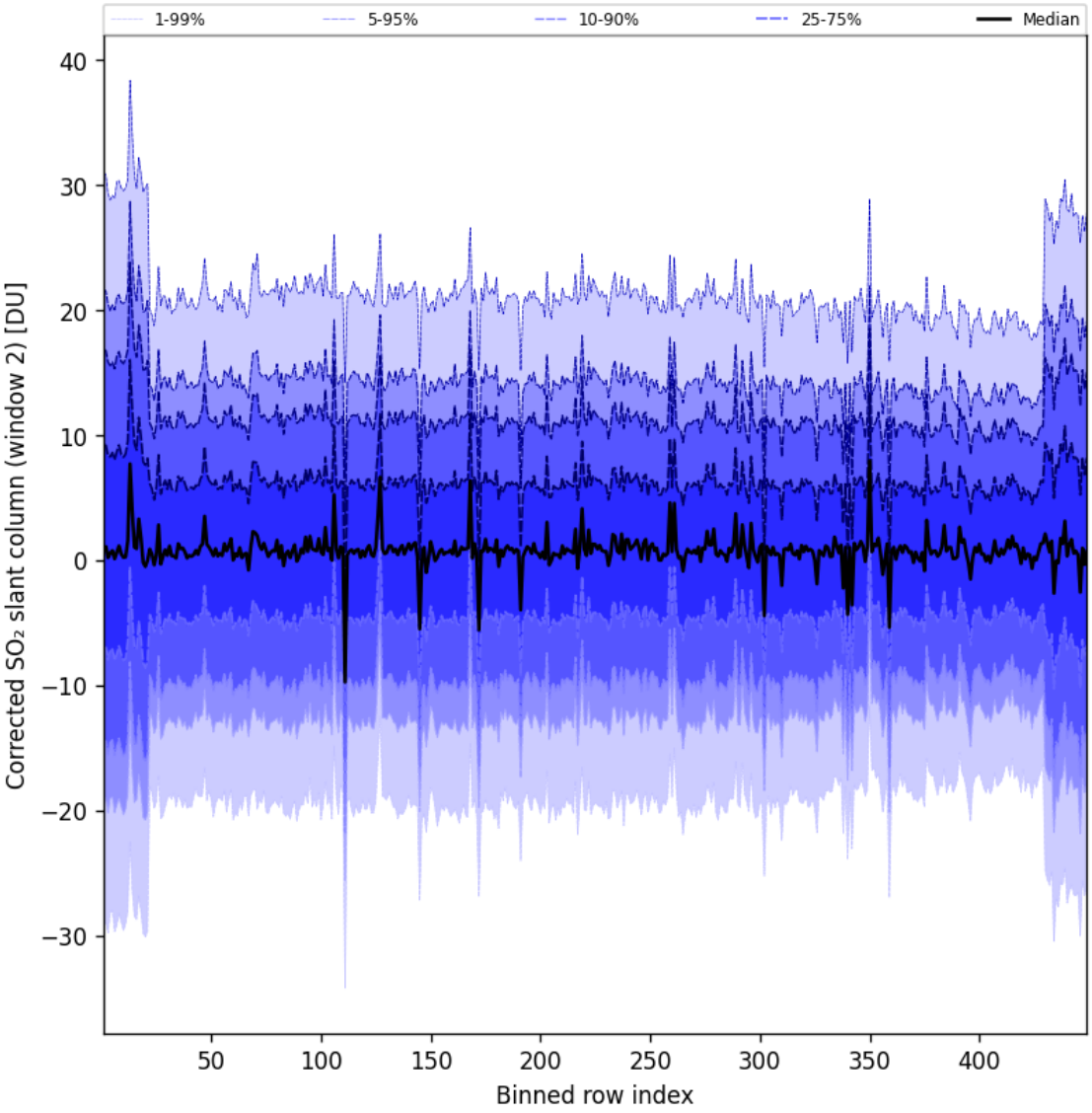
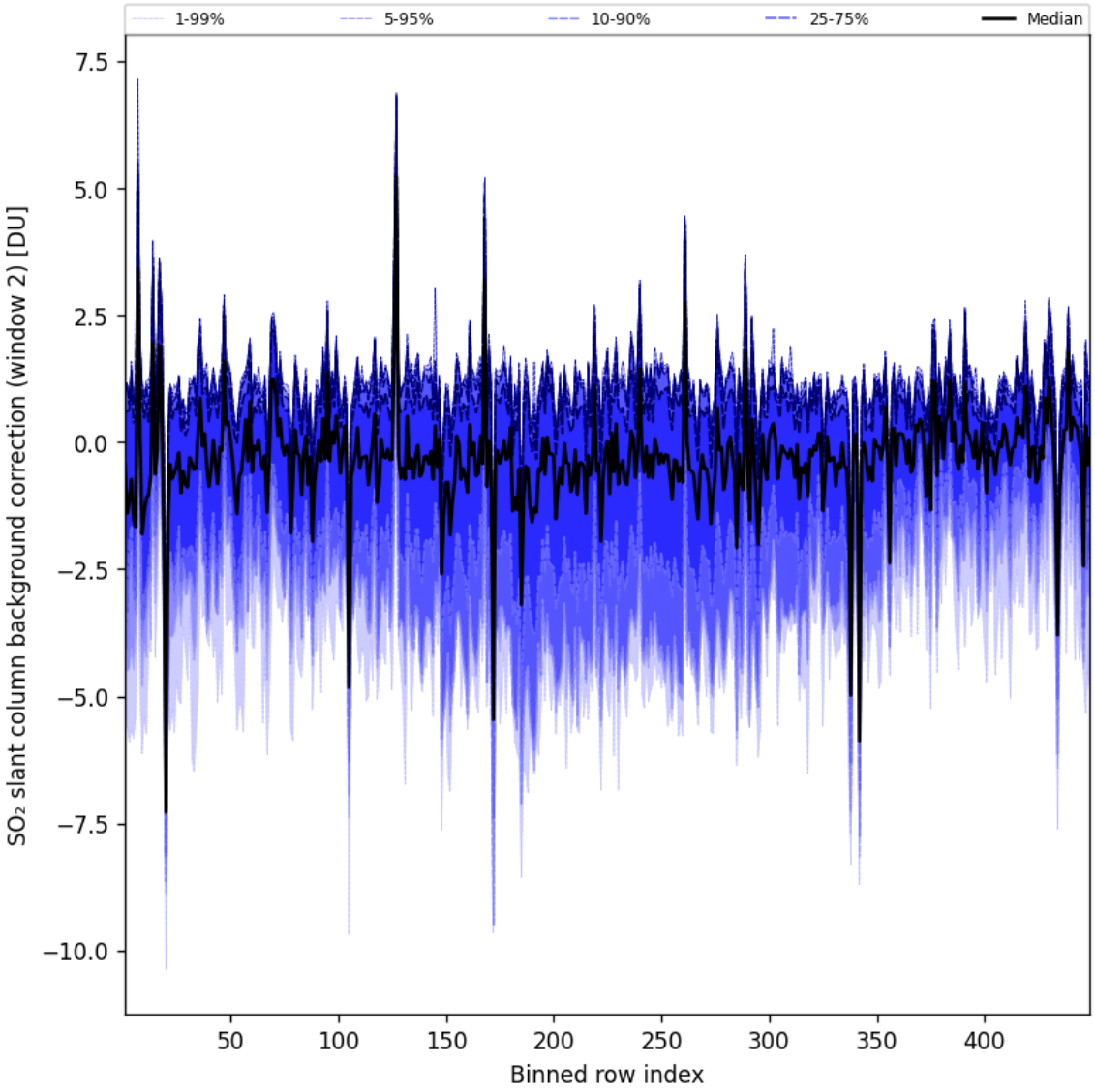


Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-06-10 to 2025-06-11



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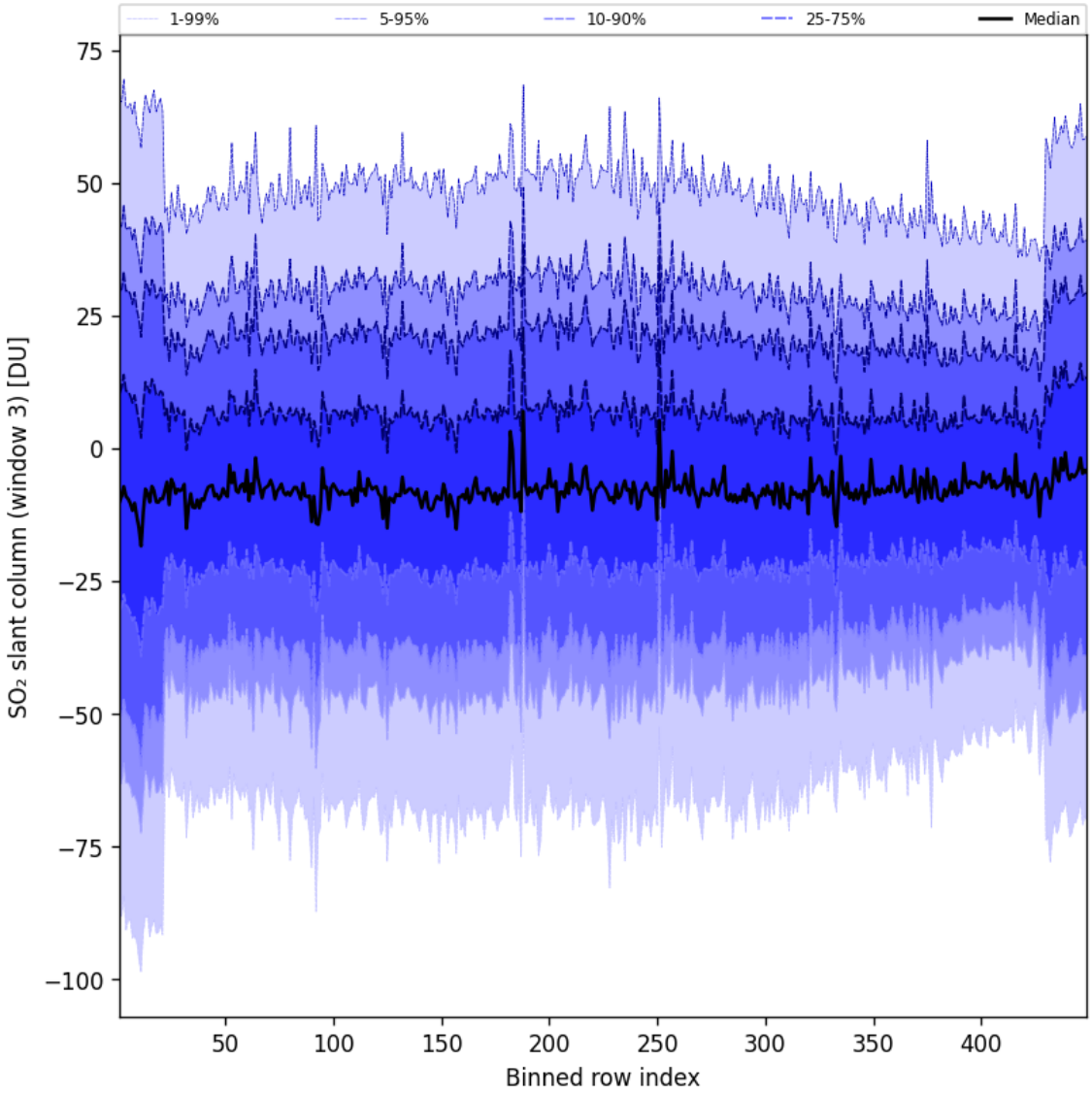

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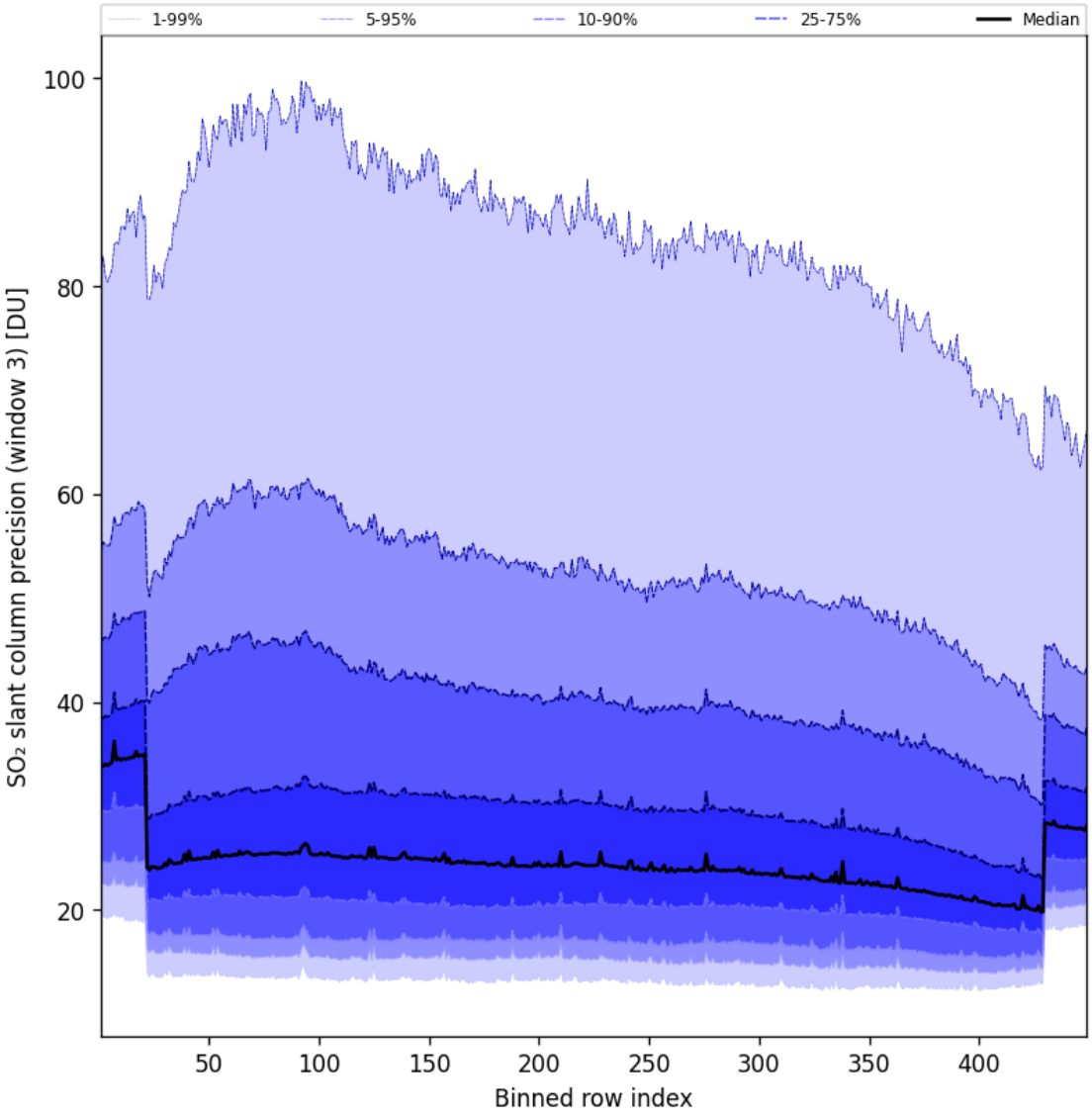

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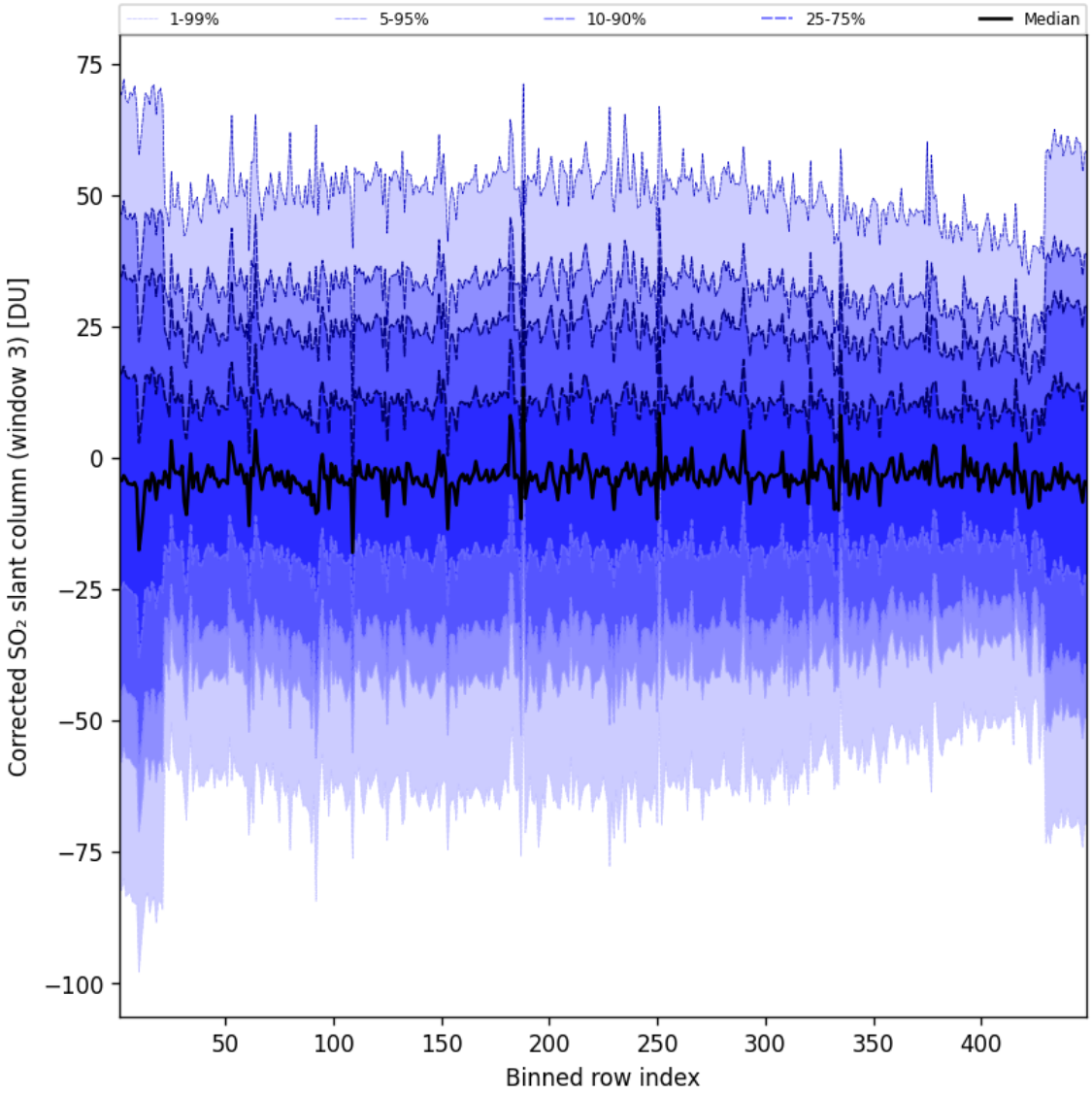

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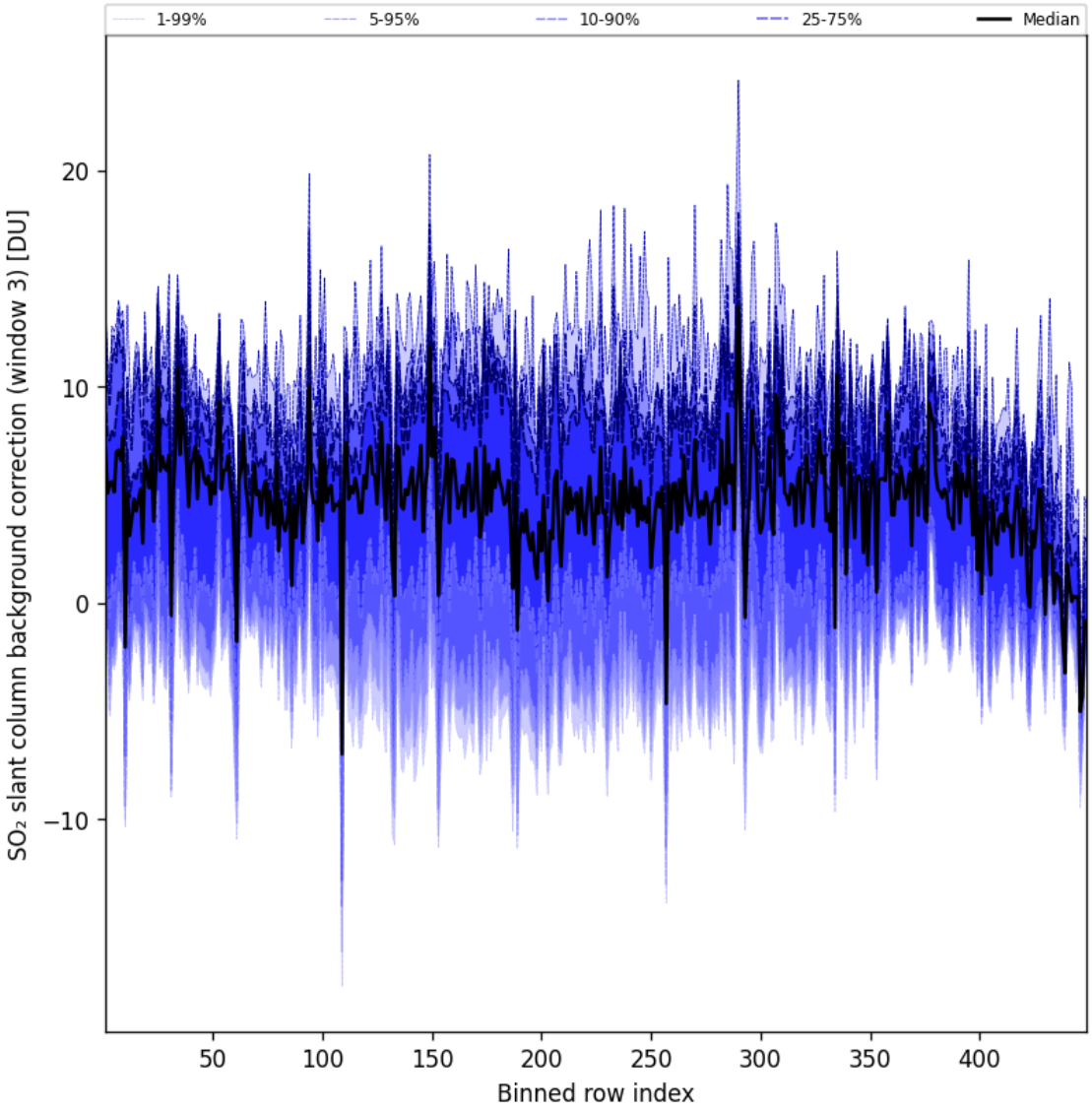

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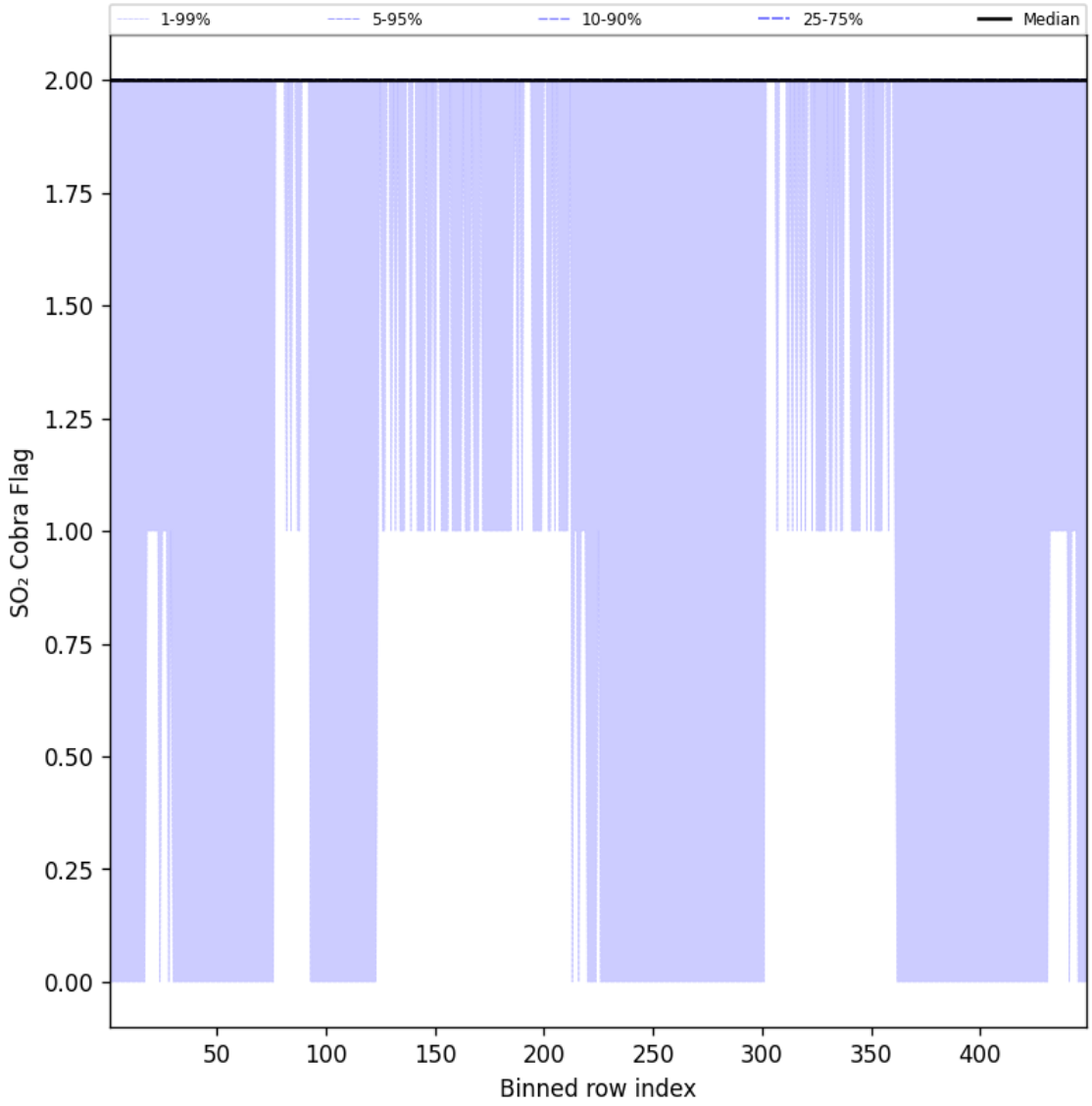

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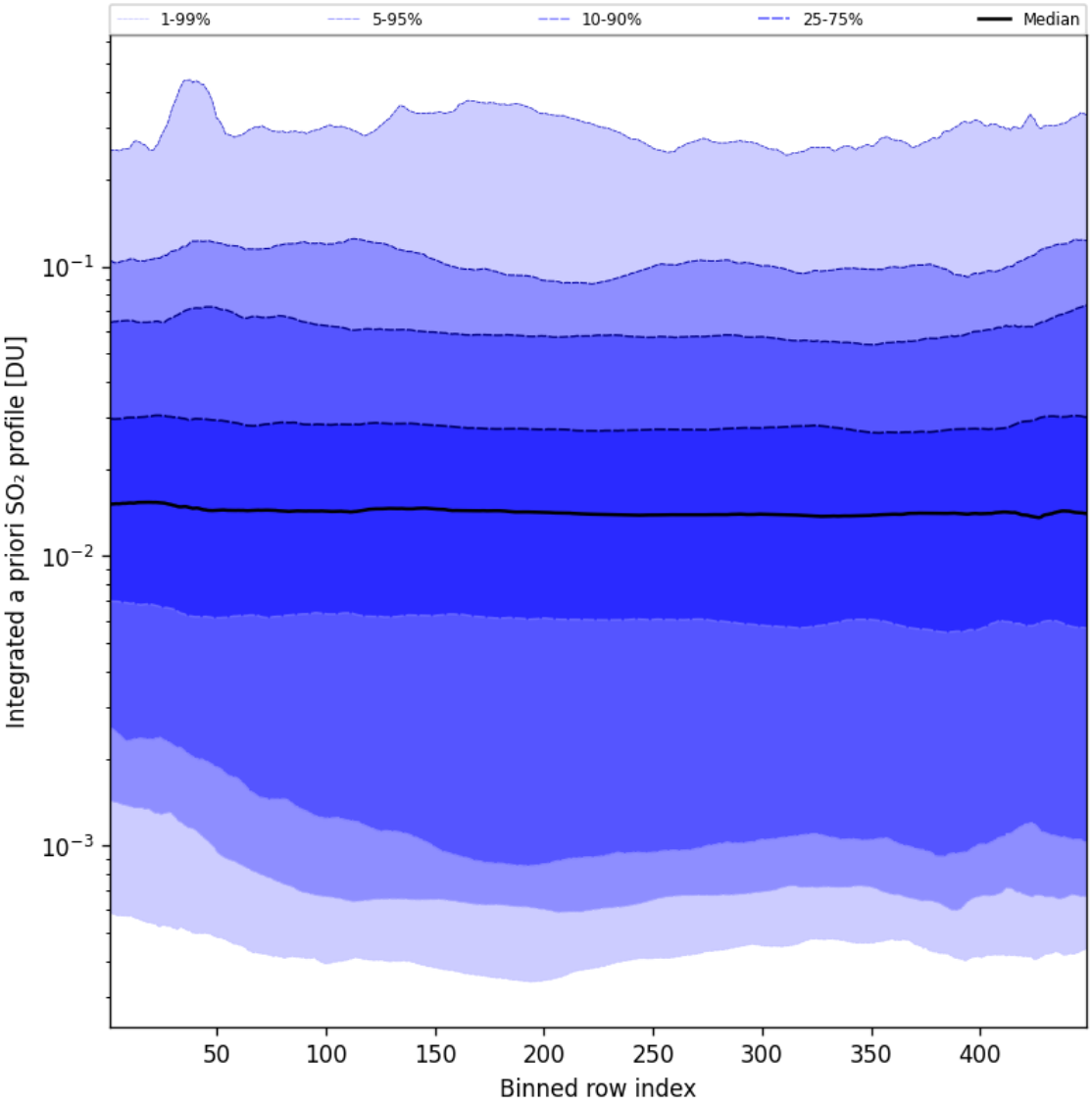

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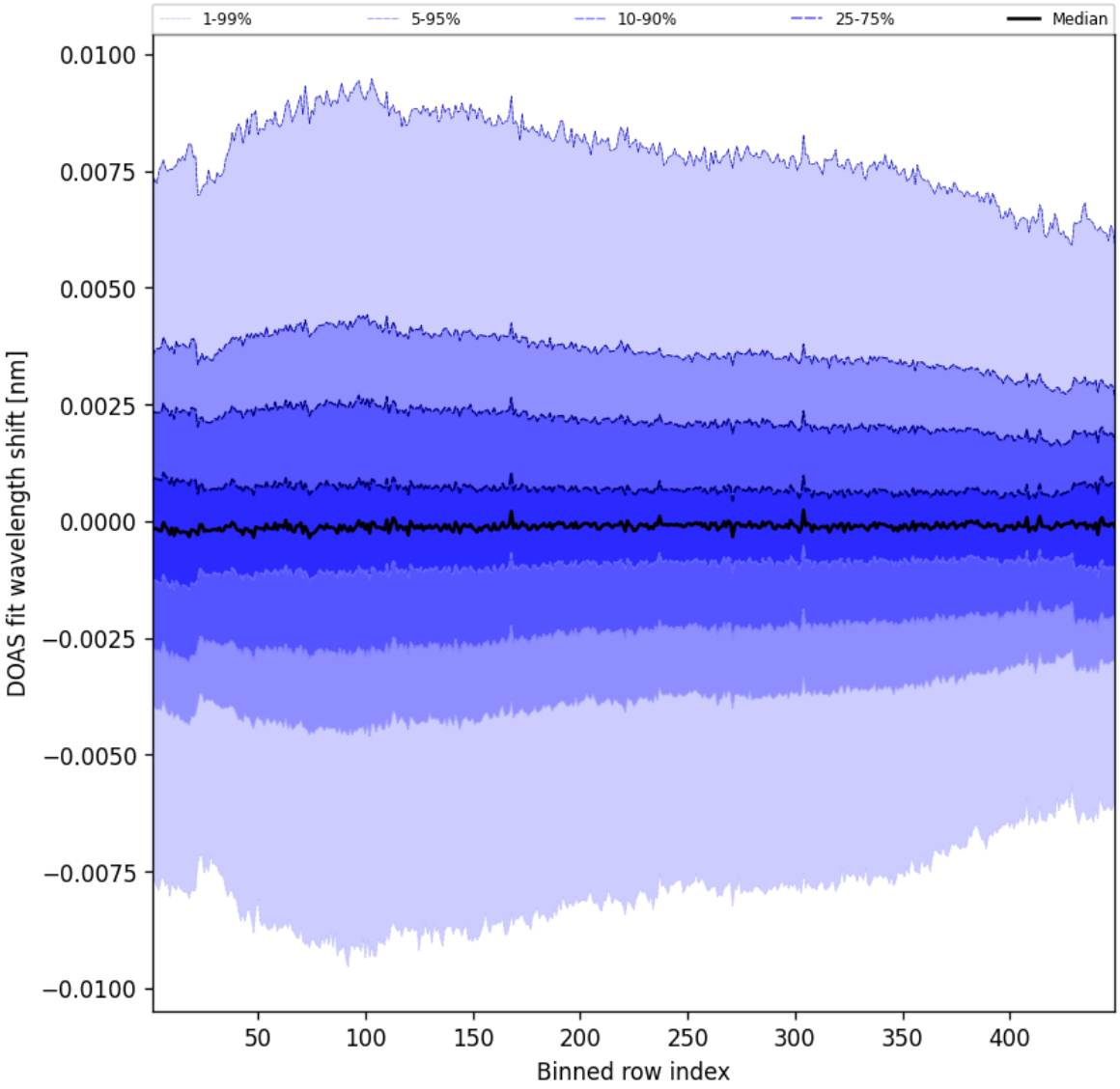

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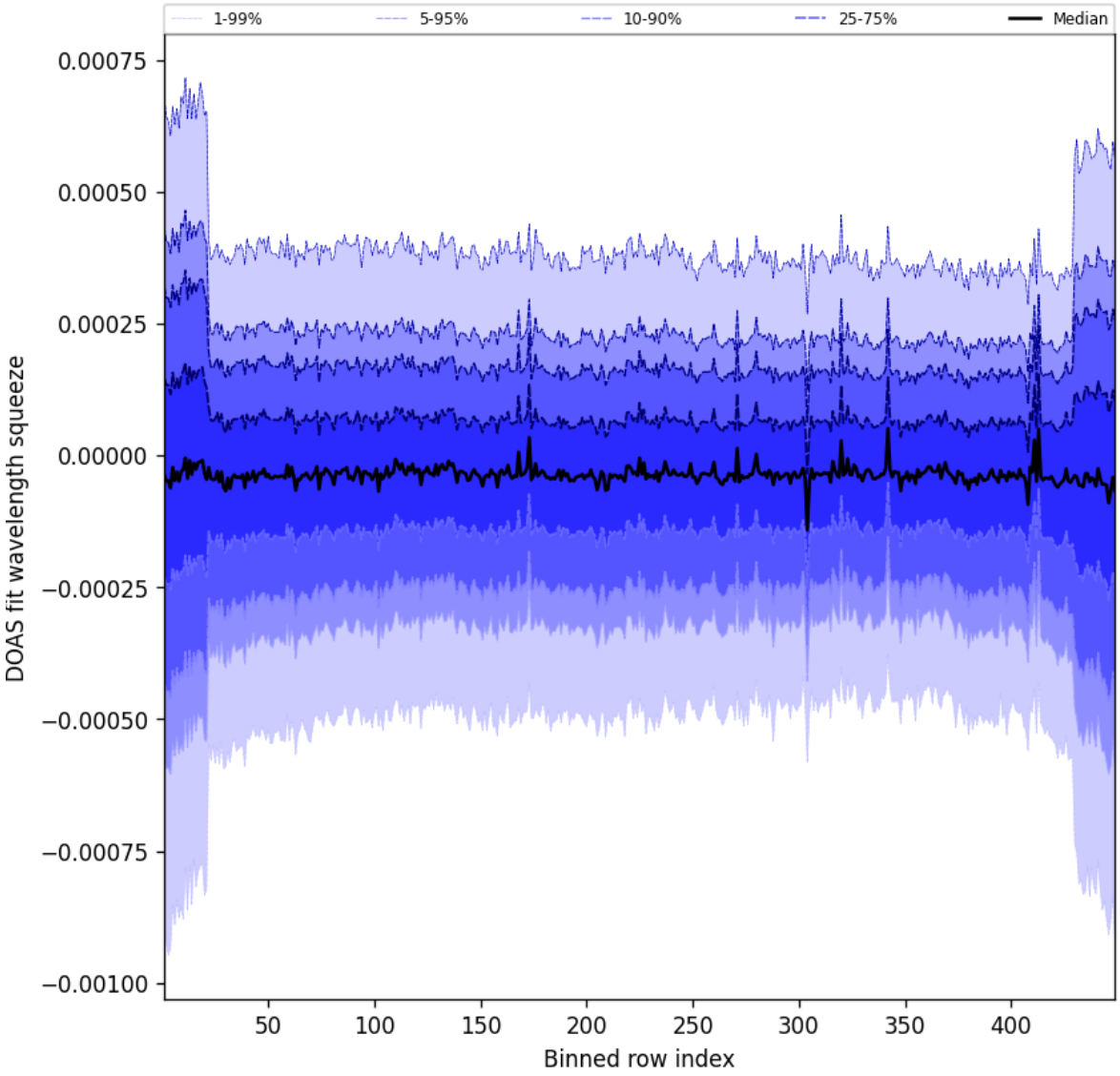

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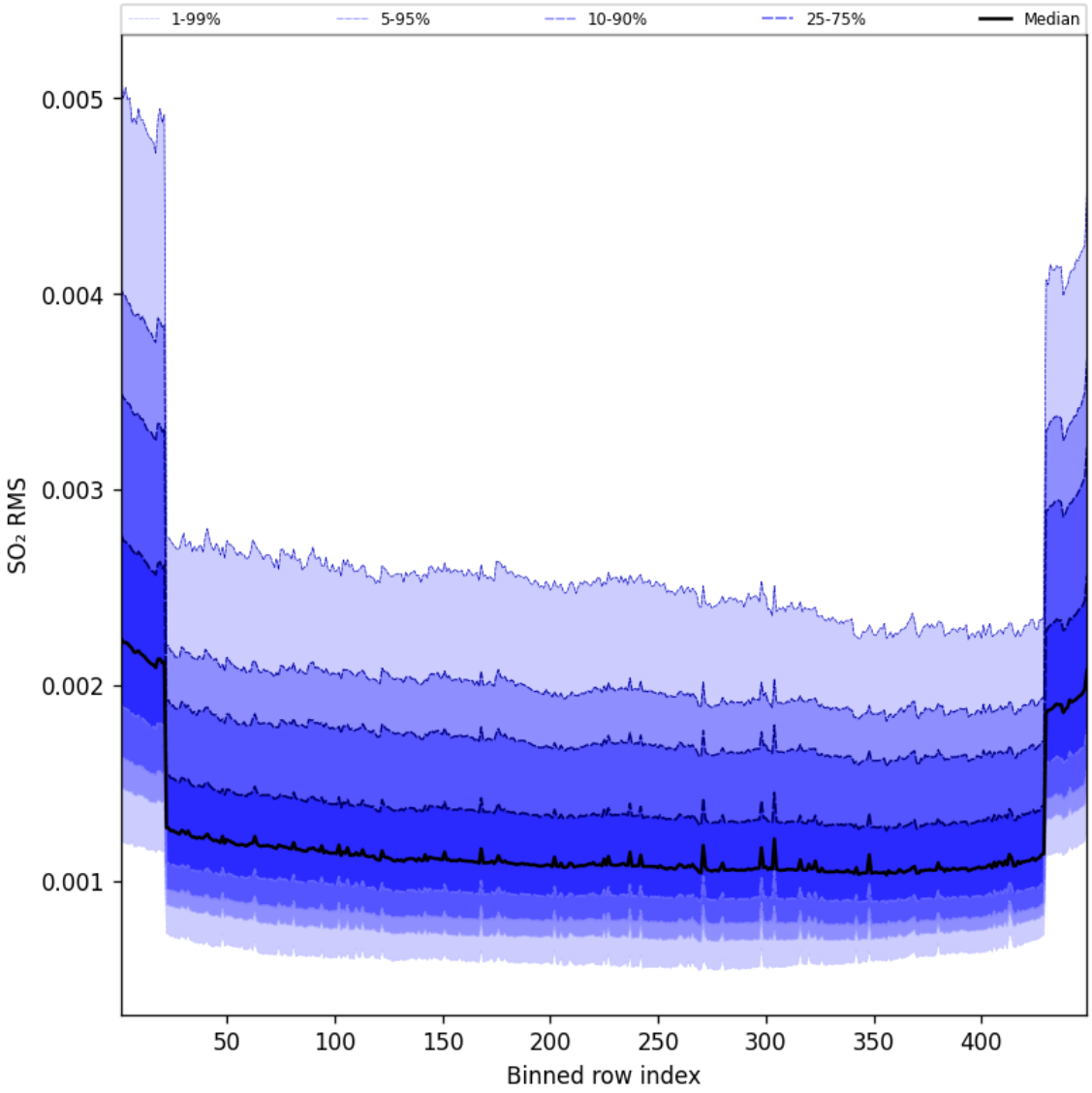

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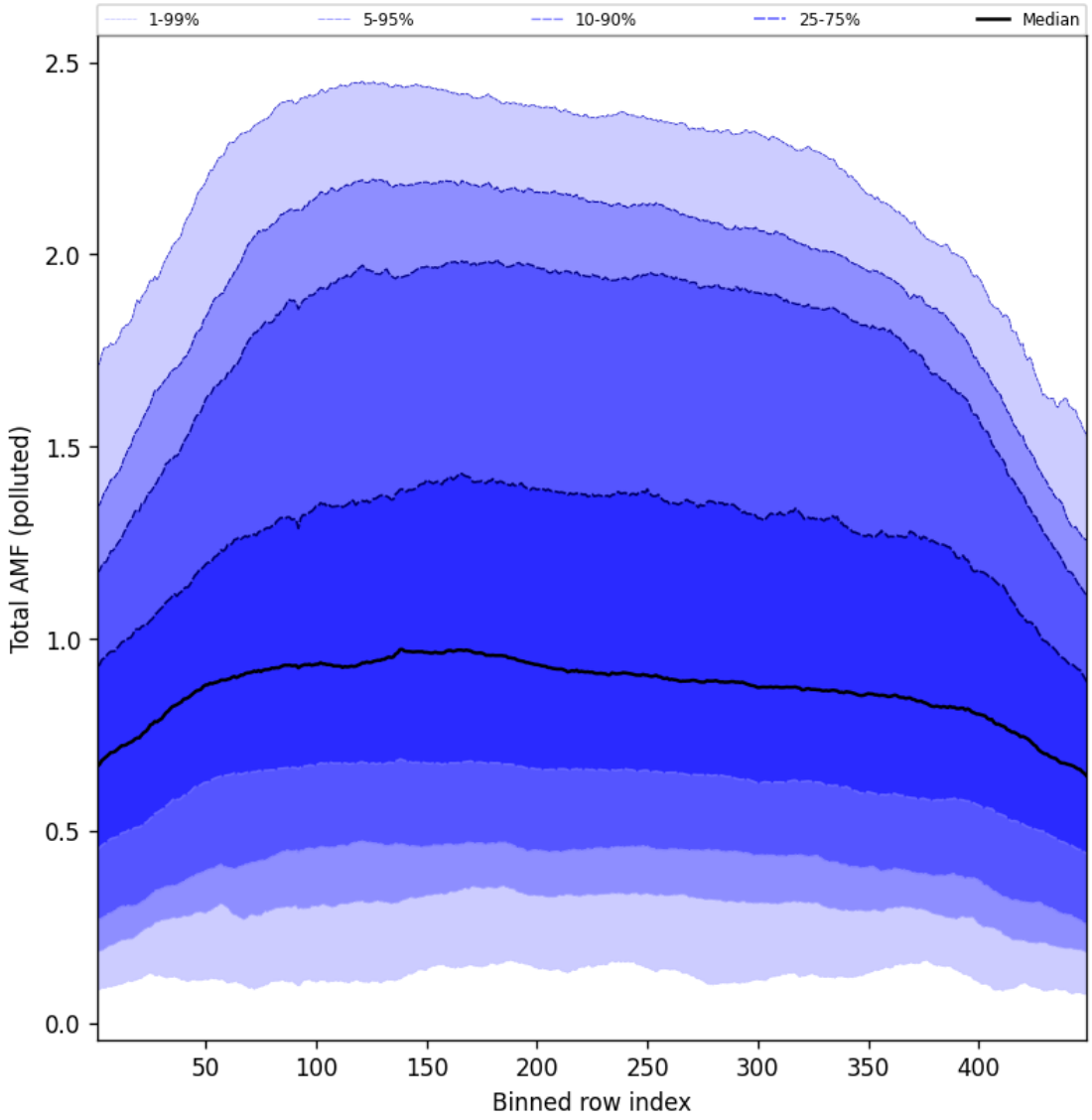

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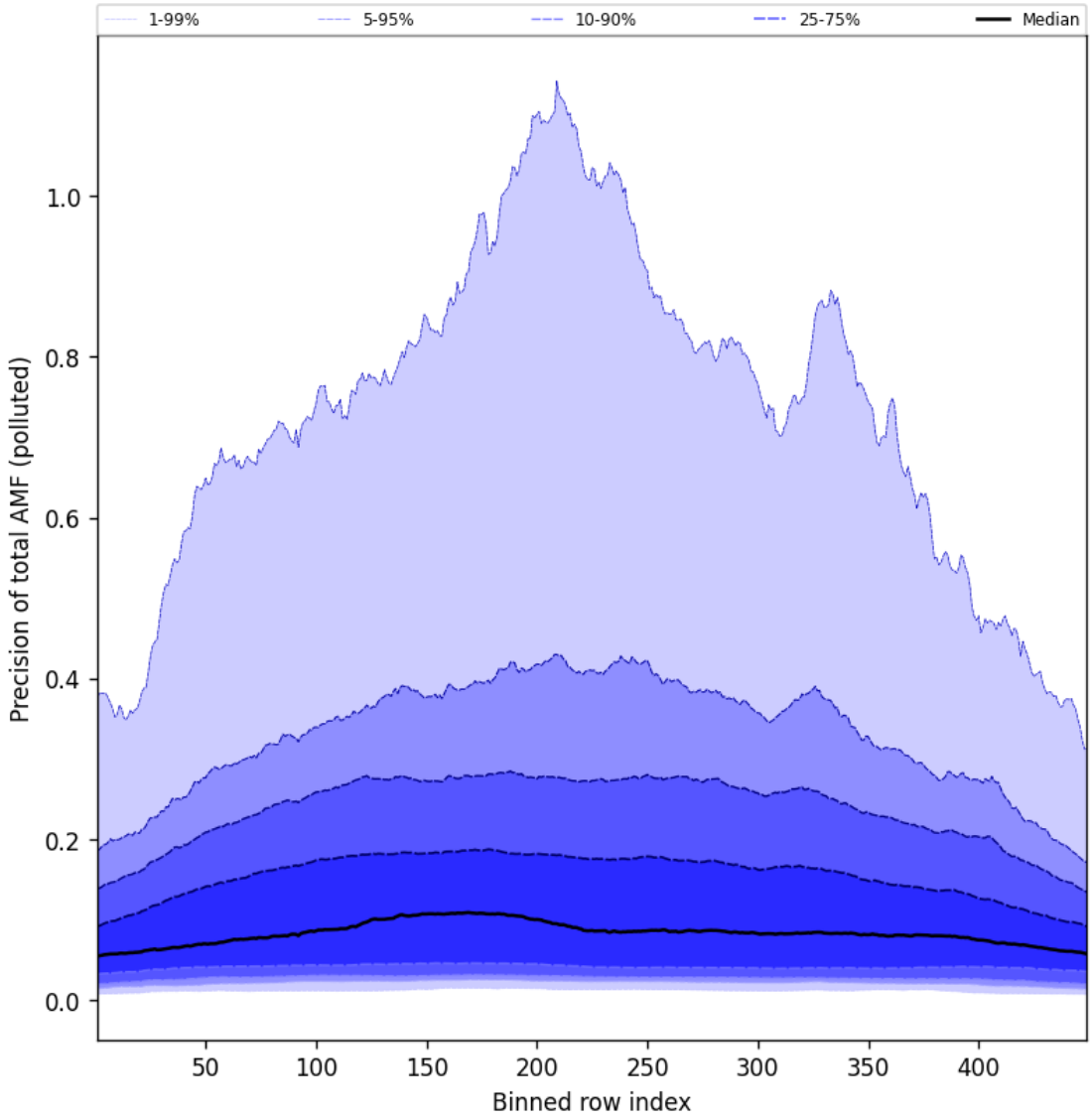

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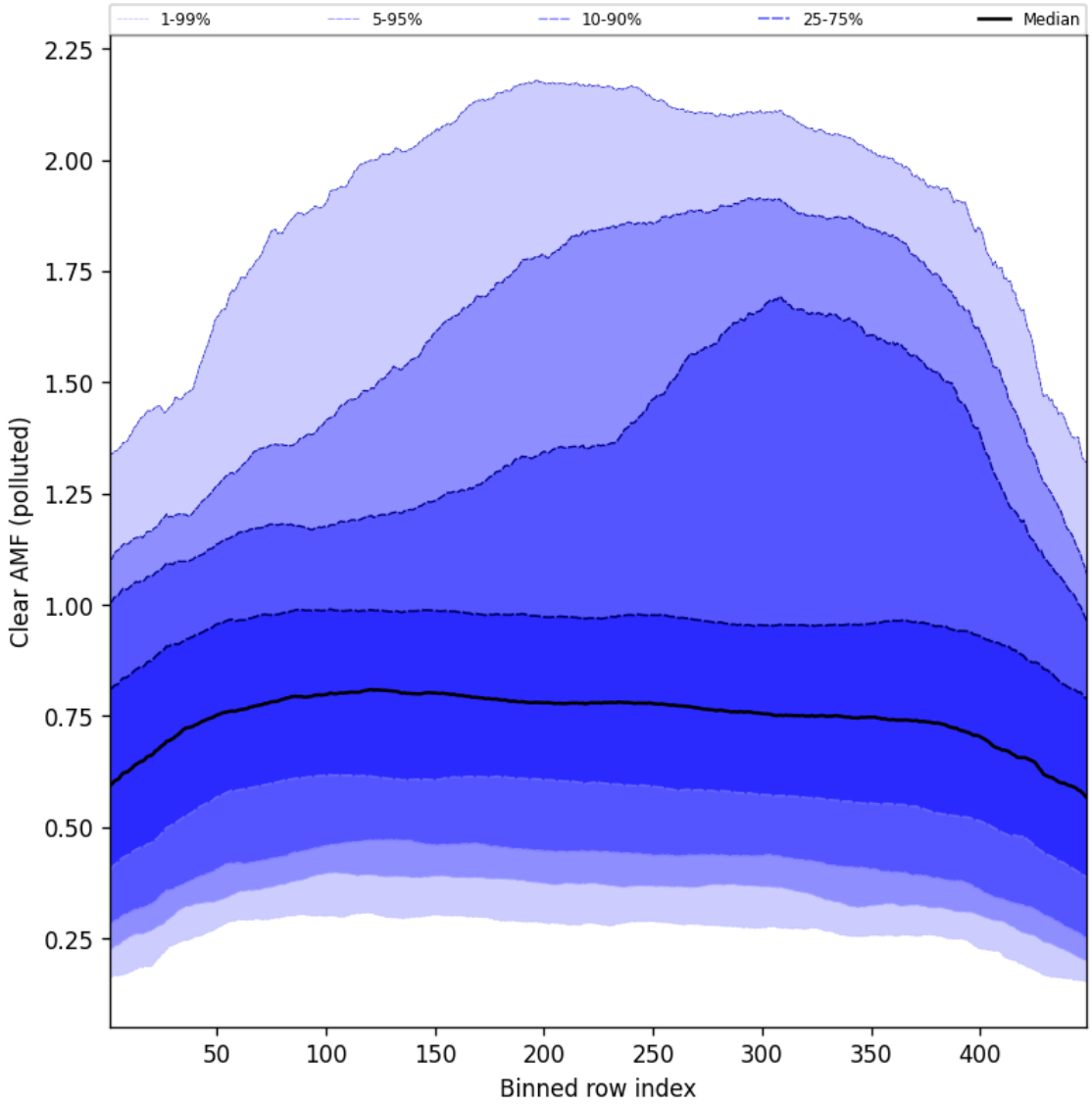

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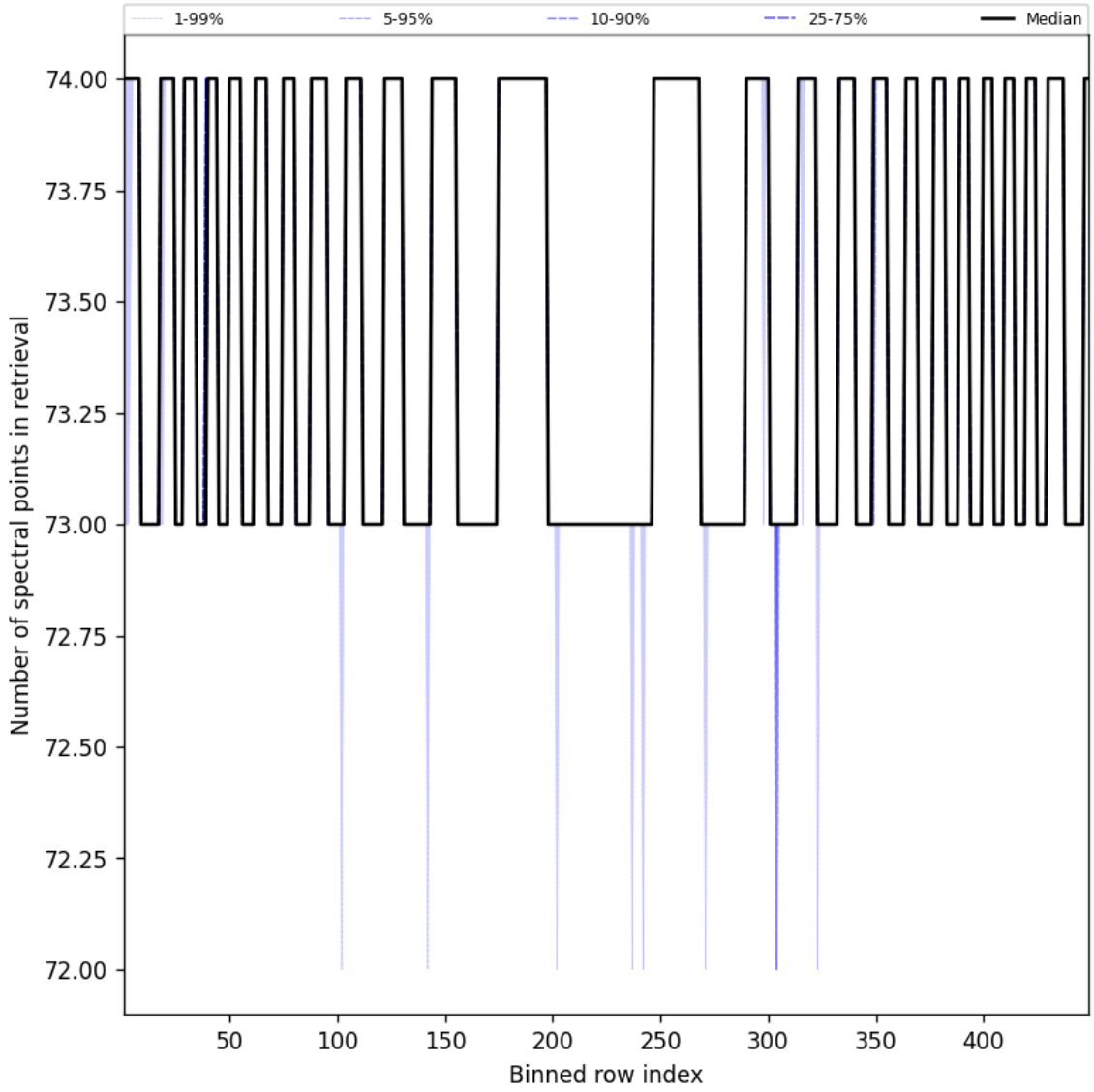

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10 Coincidence density

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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