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]	0.627 ± 0.411	18573946	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.574 \pm 86.828) \times 10^{-2}$	18573946	0.263	0.439	9.969×10^{-3}	-162	274
sulfurdioxide total vertical column precision [DU]	0.476 ± 0.596	18573946	0.222	0.309	0.319	4.318×10^{-2}	173
sulfurdioxide slant column density corrected [DU]	$(1.788 \pm 39.327) \times 10^{-2}$	18573946	0.258	0.374	9.104×10^{-3}	-47.5	383
sulfurdioxide slant column density cobra [DU]	$(1.764 \pm 36.287) \times 10^{-2}$	18573946	0.258	0.374	9.104×10^{-3}	-47.5	53.3
sulfurdioxide slant column density cobra precision [DU]	0.297 ± 0.126	18573946	0.213	0.130	0.263	8.824×10^{-2}	35.6
sulfurdioxide slant column density window1 [DU]	0.114 ± 0.680	18573946	0.125	0.744	0.118	-138	87.3
sulfurdioxide slant column density window1 precision [DU]	0.297 ± 0.126	18573946	0.213	0.130	0.263	8.824×10^{-2}	35.6
sulfurdioxide slant column density corrected win1 [DU]	$(4.142 \pm 67.266) \times 10^{-2}$	18573946	2.500×10^{-2}	0.733	2.302×10^{-2}	-138	87.2
background so2 slant column offset window1 [DU]	$(-7.214 \pm 13.371) \times 10^{-2}$	18573946	-0.140	0.147	-9.585×10^{-2}	-1.30	3.01
sulfurdioxide slant column density window2 [DU]	1.75 ± 8.97	18573946	1.75	11.3	1.69	-1.872×10^{3}	1.697×10^{3}
sulfurdioxide slant column density window2 precision [DU]	8.03 ± 2.33	18573946	7.43	2.62	7.69	2.14	876
sulfurdioxide slant column density corrected win2 [DU]	0.118 ± 8.743	18573946	-0.250	11.0	0.123	-1.872×10^{3}	1.696×10^{3}
background so2 slant column offset window2 [DU]	-1.63 ± 2.51	18573946	0.250	3.56	-0.918	-13.8	7.71
sulfurdioxide slant column density window3 [DU]	-5.21 ± 23.65	18573946	-7.28	29.2	-5.54	-3.131×10^{3}	532
sulfurdioxide slant column density window3 precision [DU]	28.0 ± 13.6	18573946	21.5	10.3	24.4	9.19	1.675×10^{3}
sulfurdioxide slant column density corrected win3 [DU]	3.26 ± 23.09	18573946	3.92	28.4	3.46	-3.115×10^{3}	542
background so2 slant column offset window3 [DU]	8.47 ± 5.90	18573946	3.92	9.93	8.30	-15.8	26.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	18573946	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(2.818 \pm 5.779) \times 10^{-2}$	18573946	1.946×10^{-2}	1.983×10^{-2}	1.453×10^{-2}	1.588×10^{-4}	2.79
fitted radiance shift [nm]	$(-2.246 \pm 25.633) \times 10^{-4}$	18573946	1.000×10^{-4}	1.678×10^{-3}	-2.160×10^{-4}	-6.958×10^{-2}	4.534×10^{-2}
fitted radiance squeeze [1]	$(-2.791 \pm 17.788) \times 10^{-5}$	18573946	-1.000×10^{-5}	2.054×10^{-4}	-2.410×10^{-5}	-1.736×10^{-2}	4.111×10^{-2}
fitted root mean square [1]	$(1.291 \pm 0.514) \times 10^{-3}$	18573946	1.025×10^{-3}	5.304×10^{-4}	1.153×10^{-3}	2.799×10^{-4}	5.596×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.920 ± 0.475	18573946	0.660	0.599	0.836	5.000×10^{-2}	2.72
sulfurdioxide total air mass factor polluted precision [1]	0.117 ± 0.124	18573946	3.500×10^{-2}	0.110	7.292×10^{-2}	2.632×10^{-3}	1.83
sulfurdioxide clear air mass factor polluted [1]	0.769 ± 0.328	18573946	0.660	0.416	0.729	4.869×10^{-2}	2.59
number of spectral points in retrieval [1]	73.4 ± 0.5	18573946	73.0	1.000	73.0	52.0	155

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	3.000×10^{-2}	9.000×10^{-2}	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−1.99	−0.808	−0.507	−0.347	−0.207	0.232	0.381	0.557	0.894	2.27
sulfurdioxide total vertical column precision [DU]	0.100	0.132	0.158	0.183	0.216	0.525	0.684	0.874	1.26	2.87
sulfurdioxide slant column density corrected [DU]	−0.851	−0.499	−0.364	−0.272	−0.176	0.197	0.299	0.397	0.550	1.00
sulfurdioxide slant column density cobra [DU]	−0.851	−0.499	−0.364	−0.272	−0.176	0.197	0.299	0.397	0.550	1.00
sulfurdioxide slant column density cobra precision [DU]	0.144	0.173	0.188	0.200	0.214	0.345	0.394	0.443	0.539	0.753
sulfurdioxide slant column density window1 [DU]	−1.68	−0.941	−0.652	−0.459	−0.258	0.486	0.680	0.865	1.14	1.91
sulfurdioxide slant column density window1 precision [DU]	0.144	0.173	0.188	0.200	0.214	0.345	0.394	0.443	0.539	0.753
sulfurdioxide slant column density corrected win1 [DU]	−1.62	−0.957	−0.700	−0.524	−0.338	0.395	0.597	0.793	1.09	1.93
background so2 slant column offset window1 [DU]	−0.307	−0.234	−0.200	−0.182	−0.161	-1.401×10^{-2}	4.141×10^{-2}	9.764×10^{-2}	0.181	0.370
sulfurdioxide slant column density window2 [DU]	−19.5	−12.6	−9.26	−6.76	−3.96	7.39	10.2	12.8	16.3	23.6
sulfurdioxide slant column density window2 precision [DU]	4.22	5.07	5.59	6.02	6.53	9.15	10.0	10.9	12.1	14.7
sulfurdioxide slant column density corrected win2 [DU]	−21.0	−14.0	−10.6	−8.12	−5.36	5.60	8.34	10.8	14.2	21.3
background so2 slant column offset window2 [DU]	−8.06	−6.43	−5.40	−4.46	−3.29	0.277	0.600	0.859	1.22	2.52
sulfurdioxide slant column density window3 [DU]	−64.3	−43.3	−33.8	−27.1	−19.9	9.36	17.2	24.4	34.1	53.3
sulfurdioxide slant column density window3 precision [DU]	13.2	15.6	17.4	18.9	20.6	30.8	35.4	41.3	53.5	86.0
sulfurdioxide slant column density corrected win3 [DU]	−56.0	−34.9	−25.1	−18.1	−10.7	17.6	24.9	31.5	40.7	59.3
background so2 slant column offset window3 [DU]	−3.52	−0.419	1.23	2.27	3.56	13.5	14.9	16.1	17.5	20.1
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	7.014×10^{-4}	1.276×10^{-3}	1.967×10^{-3}	3.587×10^{-3}	7.133×10^{-3}	2.696×10^{-2}	3.649×10^{-2}	5.459×10^{-2}	9.893×10^{-2}	0.277
fitted radiance shift [nm]	-8.093×10^{-3}	-3.968×10^{-3}	-2.538×10^{-3}	-1.741×10^{-3}	-1.088×10^{-3}	5.902×10^{-4}	1.233×10^{-3}	2.073×10^{-3}	3.589×10^{-3}	7.896×10^{-3}
fitted radiance squeeze [1]	-5.019×10^{-4}	-3.145×10^{-4}	-2.371×10^{-4}	-1.842×10^{-4}	-1.285×10^{-4}	7.693×10^{-5}	1.288×10^{-4}	1.771×10^{-4}	2.464×10^{-4}	4.118×10^{-4}
fitted root mean square [1]	5.947×10^{-4}	7.400×10^{-4}	8.243×10^{-4}	8.864×10^{-4}	9.597×10^{-4}	1.490×10^{-3}	1.716×10^{-3}	1.933×10^{-3}	2.261×10^{-3}	3.168×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.107	0.281	0.385	0.469	0.576	1.17	1.42	1.64	1.89	2.18
sulfurdioxide total air mass factor polluted precision [1]	1.118×10^{-2}	1.986×10^{-2}	2.594×10^{-2}	3.166×10^{-2}	4.027×10^{-2}	0.150	0.196	0.250	0.352	0.645
sulfurdioxide clear air mass factor polluted [1]	0.229	0.328	0.390	0.447	0.530	0.947	1.05	1.17	1.39	1.82
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]	0.576 ± 0.418	12289877	0.860	0.490	0.0	1.000	0.140	1.000
sulfurdioxide total vertical column [DU]	$(2.256 \pm 89.341) \times 10^{-2}$	12289877	0.414	8.467×10^{-3}	-162	235	-0.196	0.218
sulfurdioxide total vertical column precision [DU]	0.466 ± 0.632	12289877	0.301	0.299	4.318×10^{-2}	49.4	0.201	0.502
sulfurdioxide slant column density corrected [DU]	$(1.662 \pm 37.070) \times 10^{-2}$	12289877	0.362	7.939×10^{-3}	-47.5	125	-0.171	0.190
sulfurdioxide slant column density cobra [DU]	$(1.639 \pm 35.123) \times 10^{-2}$	12289877	0.362	7.939×10^{-3}	-47.5	53.3	-0.171	0.190
sulfurdioxide slant column density cobra precision [DU]	0.288 ± 0.121	12289877	0.121	0.252	8.853×10^{-2}	14.6	0.209	0.331
sulfurdioxide slant column density window1 [DU]	0.102 ± 0.667	12289877	0.726	0.110	-138	60.8	-0.258	0.469
sulfurdioxide slant column density window1 precision [DU]	0.288 ± 0.121	12289877	0.121	0.252	8.853×10^{-2}	14.6	0.209	0.331
sulfurdioxide slant column density corrected win1 [DU]	$(3.997 \pm 65.663) \times 10^{-2}$	12289877	0.712	2.160×10^{-2}	-138	60.6	-0.329	0.383
background so2 slant column offset window1 [DU]	$(-6.225 \pm 14.654) \times 10^{-2}$	12289877	0.177	-9.424×10^{-2}	-0.620	3.01	-0.165	1.173×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.02 ± 8.42	12289877	10.9	1.98	-649	644	-3.45	7.44
sulfurdioxide slant column density window2 precision [DU]	7.58 ± 2.02	12289877	2.26	7.29	2.14	425	6.26	8.52
sulfurdioxide slant column density corrected win2 [DU]	$(2.538 \pm 811.225) \times 10^{-2}$	12289877	10.4	5.766×10^{-2}	-650	644	-5.16	5.24
background so2 slant column offset window2 [DU]	-1.99 ± 2.75	12289877	4.43	-1.43	-13.8	7.71	-4.09	0.338
sulfurdioxide slant column density window3 [DU]	-5.69 ± 22.09	12289877	27.4	-6.26	-204	156	-19.6	7.77
sulfurdioxide slant column density window3 precision [DU]	26.4 ± 13.5	12289877	8.01	22.7	9.19	262	19.7	27.7
sulfurdioxide slant column density corrected win3 [DU]	3.68 ± 21.36	12289877	26.4	3.81	-205	169	-9.41	17.0
background so2 slant column offset window3 [DU]	9.37 ± 6.20	12289877	10.6	10.7	-15.8	24.8	3.81	14.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	12289877	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.150 \pm 6.636) \times 10^{-2}$	12289877	2.494×10^{-2}	1.332×10^{-2}	1.588×10^{-4}	2.79	4.089×10^{-3}	2.903×10^{-2}
fitted radiance shift [nm]	$(-8.597 \pm 254.353) \times 10^{-5}$	12289877	1.518×10^{-3}	-1.012×10^{-4}	-4.136×10^{-2}	4.534×10^{-2}	-8.680×10^{-4}	6.498×10^{-4}
fitted radiance squeeze [1]	$(-4.919 \pm 17.072) \times 10^{-5}$	12289877	1.996×10^{-4}	-3.974×10^{-5}	-1.736×10^{-2}	9.950×10^{-3}	-1.433×10^{-4}	5.634×10^{-5}
fitted root mean square [1]	$(1.257 \pm 0.509) \times 10^{-3}$	12289877	4.914×10^{-4}	1.114×10^{-3}	2.799×10^{-4}	3.997×10^{-2}	9.381×10^{-4}	1.429×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.958 ± 0.519	12289877	0.718	0.861	5.000×10^{-2}	2.72	0.561	1.28
sulfurdioxide total air mass factor polluted precision [1]	0.131 ± 0.142	12289877	0.129	8.141×10^{-2}	2.632×10^{-3}	1.83	4.117×10^{-2}	0.170
sulfurdioxide clear air mass factor polluted [1]	0.772 ± 0.370	12289877	0.489	0.709	4.869×10^{-2}	2.59	0.485	0.974
number of spectral points in retrieval [1]	73.5 ± 0.5	12289877	1.000	73.0	52.0	155	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.726 ± 0.378	6284069	0.630	1.000	0.0	1.000	0.370	1.000
sulfurdioxide total vertical column [DU]	$(3.196 \pm 81.685) \times 10^{-2}$	6284069	0.493	1.355×10^{-2}	-52.1	274	-0.230	0.262
sulfurdioxide total vertical column precision [DU]	0.496 ± 0.518	6284069	0.315	0.353	5.237×10^{-2}	173	0.249	0.564
sulfurdioxide slant column density corrected [DU]	$(2.036 \pm 43.402) \times 10^{-2}$	6284069	0.398	1.155×10^{-2}	-27.1	383	-0.186	0.212
sulfurdioxide slant column density cobra [DU]	$(2.007 \pm 38.459) \times 10^{-2}$	6284069	0.398	1.155×10^{-2}	-27.1	40.8	-0.186	0.212
sulfurdioxide slant column density cobra precision [DU]	0.316 ± 0.133	6284069	0.138	0.285	8.824×10^{-2}	35.6	0.229	0.368
sulfurdioxide slant column density window1 [DU]	0.136 ± 0.704	6284069	0.781	0.134	-101	87.3	-0.257	0.523
sulfurdioxide slant column density window1 precision [DU]	0.316 ± 0.133	6284069	0.138	0.285	8.824×10^{-2}	35.6	0.229	0.368
sulfurdioxide slant column density corrected win1 [DU]	$(4.426 \pm 70.294) \times 10^{-2}$	6284069	0.777	2.606×10^{-2}	-101	87.2	-0.357	0.420
background so2 slant column offset window1 [DU]	$(-9.148 \pm 10.140) \times 10^{-2}$	6284069	9.947×10^{-2}	-9.739×10^{-2}	-1.30	2.74	-0.149	-4.961×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.22 ± 9.94	6284069	12.3	1.04	-1.872×10^{3}	1.697×10^{3}	-5.02	7.26
sulfurdioxide slant column density window2 precision [DU]	8.91 ± 2.65	6284069	2.87	8.63	2.40	876	7.33	10.2
sulfurdioxide slant column density corrected win2 [DU]	0.300 ± 9.858	6284069	12.2	0.272	-1.872×10^{3}	1.696×10^{3}	-5.81	6.38
background so2 slant column offset window2 [DU]	-0.924 ± 1.725	6284069	1.96	-0.522	-11.2	7.56	-1.77	0.190
sulfurdioxide slant column density window3 [DU]	-4.27 ± 26.43	6284069	33.1	-3.85	-3.131×10^{3}	532	-20.5	12.6
sulfurdioxide slant column density window3 precision [DU]	31.3 ± 13.2	6284069	10.6	28.4	9.75	1.675×10^{3}	23.8	34.4
sulfurdioxide slant column density corrected win3 [DU]	2.45 ± 26.13	6284069	32.9	2.62	-3.115×10^{3}	542	-13.8	19.1
background so2 slant column offset window3 [DU]	6.72 ± 4.81	6284069	6.67	5.62	-11.5	26.2	3.33	10.0
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.26	6284069	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.168 \pm 3.460) \times 10^{-2}$	6284069	1.451×10^{-2}	1.585×10^{-2}	1.026×10^{-3}	1.62	1.037×10^{-2}	2.488×10^{-2}
fitted radiance shift [nm]	$(-4.957 \pm 25.800) \times 10^{-4}$	6284069	1.919×10^{-3}	-5.002×10^{-4}	-6.958×10^{-2}	4.059×10^{-2}	-1.491×10^{-3}	4.280×10^{-4}
fitted radiance squeeze [1]	$(1.373 \pm 18.412) \times 10^{-5}$	6284069	2.149×10^{-4}	8.956×10^{-6}	-1.454×10^{-2}	4.111×10^{-2}	-9.653×10^{-5}	1.184×10^{-4}
fitted root mean square [1]	$(1.359 \pm 0.518) \times 10^{-3}$	6284069	5.768×10^{-4}	1.237×10^{-3}	3.504×10^{-4}	5.596×10^{-2}	1.015×10^{-3}	1.592×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.845 ± 0.362	6284069	0.443	0.805	5.000×10^{-2}	2.68	0.599	1.04
sulfurdioxide total air mass factor polluted precision [1]	$(8.819 \pm 7.079) \times 10^{-2}$	6284069	7.970×10^{-2}	6.173×10^{-2}	3.114×10^{-3}	1.19	3.909×10^{-2}	0.119
sulfurdioxide clear air mass factor polluted [1]	0.763 ± 0.224	6284069	0.303	0.755	6.229×10^{-2}	1.90	0.610	0.913
number of spectral points in retrieval [1]	73.4 ± 0.5	6284069	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]	0.654 ± 0.400	12436606	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.149 \pm 82.638) \times 10^{-2}$	12436606	0.435	9.297×10^{-3}	-162	126	-0.206	0.228
sulfurdioxide total vertical column precision [DU]	0.464 ± 0.581	12436606	0.285	0.309	5.099×10^{-2}	69.7	0.219	0.504
sulfurdioxide slant column density corrected [DU]	$(1.493 \pm 35.232) \times 10^{-2}$	12436606	0.369	8.346×10^{-3}	-47.5	64.6	-0.175	0.194
sulfurdioxide slant column density cobra [DU]	$(1.490 \pm 35.030) \times 10^{-2}$	12436606	0.369	8.346×10^{-3}	-47.5	40.8	-0.175	0.194
sulfurdioxide slant column density cobra precision [DU]	0.296 ± 0.126	12436606	0.139	0.258	8.824×10^{-2}	17.9	0.211	0.350
sulfurdioxide slant column density window1 [DU]	0.112 ± 0.670	12436606	0.740	0.121	-101	87.3	-0.253	0.487
sulfurdioxide slant column density window1 precision [DU]	0.296 ± 0.126	12436606	0.139	0.258	8.824×10^{-2}	17.9	0.211	0.350
sulfurdioxide slant column density corrected win1 [DU]	$(3.457 \pm 66.186) \times 10^{-2}$	12436606	0.730	2.035×10^{-2}	-101	87.2	-0.340	0.390
background so2 slant column offset window1 [DU]	$(-7.763 \pm 12.840) \times 10^{-2}$	12436606	0.139	-9.952×10^{-2}	-1.30	3.01	-0.162	-2.319×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.56 ± 8.91	12436606	11.3	1.44	-1.551×10^{3}	898	-4.16	7.14
sulfurdioxide slant column density window2 precision [DU]	8.00 ± 2.20	12436606	2.56	7.69	2.14	715	6.56	9.12
sulfurdioxide slant column density corrected win2 [DU]	$(9.958 \pm 870.694) \times 10^{-2}$	12436606	11.0	9.720×10^{-2}	-1.552×10^{3}	896	-5.40	5.59
background so2 slant column offset window2 [DU]	-1.46 ± 2.48	12436606	3.27	-0.679	-13.8	7.71	-2.93	0.345
sulfurdioxide slant column density window3 [DU]	-2.49 ± 23.67	12436606	29.7	-2.95	-3.131×10^{3}	532	-17.4	12.3
sulfurdioxide slant column density window3 precision [DU]	27.1 ± 11.7	12436606	9.25	24.1	9.19	1.675×10^{3}	20.7	30.0
sulfurdioxide slant column density corrected win3 [DU]	5.44 ± 22.84	12436606	28.5	5.32	-3.115×10^{3}	542	-8.80	19.7
background so2 slant column offset window3 [DU]	7.93 ± 5.89	12436606	9.73	7.03	-15.8	26.2	3.22	12.9
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	12436606	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.016 \pm 3.163) \times 10^{-2}$	12436606	1.556×10^{-2}	1.419×10^{-2}	2.666×10^{-4}	2.67	8.227×10^{-3}	2.379×10^{-2}
fitted radiance shift [nm]	$(-2.550 \pm 22.659) \times 10^{-4}$	12436606	1.646×10^{-3}	-2.295×10^{-4}	-4.418×10^{-2}	4.131×10^{-2}	-1.095×10^{-3}	5.508×10^{-4}
fitted radiance squeeze [1]	$(-1.904 \pm 17.587) \times 10^{-5}$	12436606	2.023×10^{-4}	-1.601×10^{-5}	-1.736×10^{-2}	1.934×10^{-2}	-1.185×10^{-4}	8.380×10^{-5}
fitted root mean square [1]	$(1.288 \pm 0.515) \times 10^{-3}$	12436606	5.792×10^{-4}	1.140×10^{-3}	3.304×10^{-4}	4.634×10^{-2}	9.432×10^{-4}	1.522×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.906 ± 0.429	12436606	0.526	0.854	5.000×10^{-2}	2.63	0.610	1.14
sulfurdioxide total air mass factor polluted precision [1]	0.106 ± 0.113	12436606	8.812×10^{-2}	6.796×10^{-2}	2.632×10^{-3}	1.83	4.240×10^{-2}	0.131
sulfurdioxide clear air mass factor polluted [1]	0.793 ± 0.317	12436606	0.380	0.769	4.869×10^{-2}	2.39	0.574	0.954
number of spectral points in retrieval [1]	73.4 ± 0.5	12436606	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]	0.632 ± 0.425	4264192	0.850	1.000	0.0	1.000	0.150	1.000
sulfurdioxide total vertical column [DU]	$(3.006 \pm 89.122) \times 10^{-2}$	4264192	0.457	1.073×10^{-2}	-52.1	274	-0.214	0.243
sulfurdioxide total vertical column precision [DU]	0.495 ± 0.590	4264192	0.338	0.351	4.318×10^{-2}	173	0.217	0.555
sulfurdioxide slant column density corrected [DU]	$(2.029 \pm 43.837) \times 10^{-2}$	4264192	0.373	9.703×10^{-3}	-11.3	383	-0.175	0.198
sulfurdioxide slant column density cobra [DU]	$(1.985 \pm 36.160) \times 10^{-2}$	4264192	0.373	9.703×10^{-3}	-11.3	34.6	-0.175	0.198
sulfurdioxide slant column density cobra precision [DU]	0.293 ± 0.120	4264192	0.107	0.262	8.853×10^{-2}	17.2	0.219	0.326
sulfurdioxide slant column density window1 [DU]	0.137 ± 0.666	4264192	0.732	0.131	-56.9	43.1	-0.234	0.498
sulfurdioxide slant column density window1 precision [DU]	0.293 ± 0.120	4264192	0.107	0.262	8.853×10^{-2}	17.2	0.219	0.326
sulfurdioxide slant column density corrected win1 [DU]	$(5.412 \pm 66.061) \times 10^{-2}$	4264192	0.723	3.157×10^{-2}	-56.9	43.4	-0.323	0.400
background so2 slant column offset window1 [DU]	$(-8.329 \pm 13.123) \times 10^{-2}$	4264192	0.140	-0.110	-0.516	2.01	-0.167	-2.738×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.70 ± 9.26	4264192	11.6	1.74	-1.872×10^{3}	1.697×10^{3}	-4.07	7.49
sulfurdioxide slant column density window2 precision [DU]	8.25 ± 2.67	4264192	2.73	7.87	2.18	876	6.65	9.38
sulfurdioxide slant column density corrected win2 [DU]	0.203 ± 9.017	4264192	11.1	0.217	-1.872×10^{3}	1.696×10^{3}	-5.35	5.76
background so2 slant column offset window2 [DU]	-1.50 ± 2.40	4264192	3.28	-0.828	-13.8	7.71	-3.00	0.279
sulfurdioxide slant column density window3 [DU]	-10.8 ± 23.4	4264192	28.5	-10.4	-632	216	-24.8	3.69
sulfurdioxide slant column density window3 precision [DU]	30.9 ± 17.2	4264192	13.0	26.0	9.54	266	20.9	33.9
sulfurdioxide slant column density corrected win3 [DU]	-2.24 ± 23.72	4264192	29.1	-1.27	-630	221	-16.3	12.8
background so2 slant column offset window3 [DU]	8.54 ± 5.76	4264192	9.63	8.65	-15.8	24.7	3.78	13.4
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.12	4264192	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.849 \pm 8.942) \times 10^{-2}$	4264192	4.394×10^{-2}	1.948×10^{-2}	1.588×10^{-4}	2.79	6.861×10^{-3}	5.080×10^{-2}
fitted radiance shift [nm]	$(-1.571 \pm 32.387) \times 10^{-4}$	4264192	1.784×10^{-3}	-1.975×10^{-4}	-6.958×10^{-2}	4.534×10^{-2}	-1.088×10^{-3}	6.959×10^{-4}
fitted radiance squeeze [1]	$(-3.676 \pm 17.725) \times 10^{-5}$	4264192	2.075×10^{-4}	-3.351×10^{-5}	-1.103×10^{-2}	4.111×10^{-2}	-1.385×10^{-4}	6.904×10^{-5}
fitted root mean square [1]	$(1.268 \pm 0.483) \times 10^{-3}$	4264192	4.268×10^{-4}	1.152×10^{-3}	3.459×10^{-4}	3.449×10^{-2}	9.814×10^{-4}	1.408×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.904 ± 0.529	4264192	0.665	0.743	5.000×10^{-2}	2.69	0.520	1.19
sulfurdioxide total air mass factor polluted precision [1]	0.135 ± 0.144	4264192	0.153	8.706×10^{-2}	3.114×10^{-3}	1.68	3.225×10^{-2}	0.185
sulfurdioxide clear air mass factor polluted [1]	0.703 ± 0.324	4264192	0.376	0.632	5.171×10^{-2}	2.59	0.478	0.853
number of spectral points in retrieval [1]	73.4 ± 0.5	4264192	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

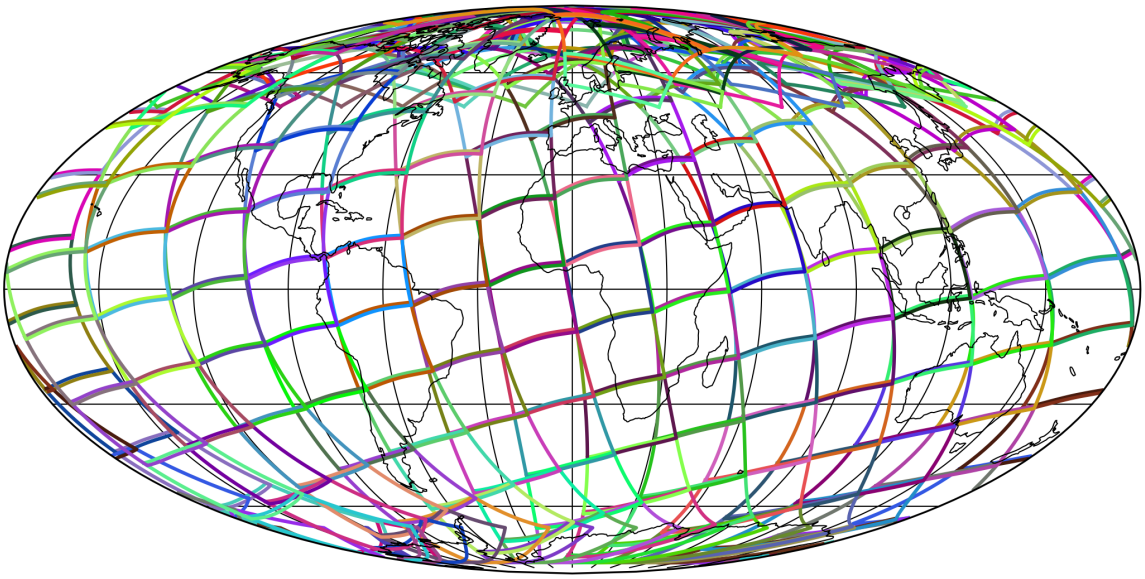

Figure 1: Outline of the granules.

4 Input data monitoring

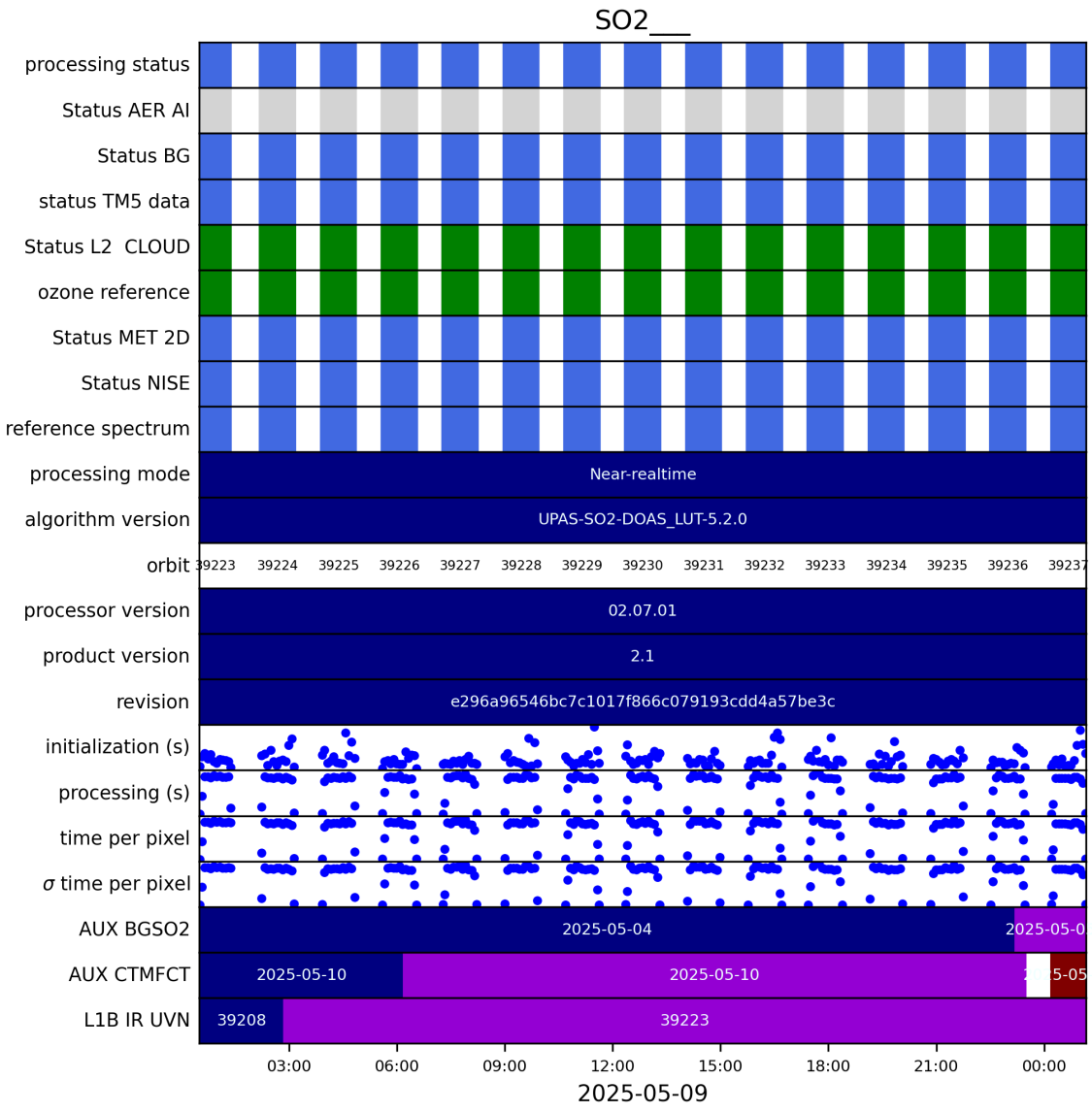

Figure 2: Input data per granule

5 Warnings and errors

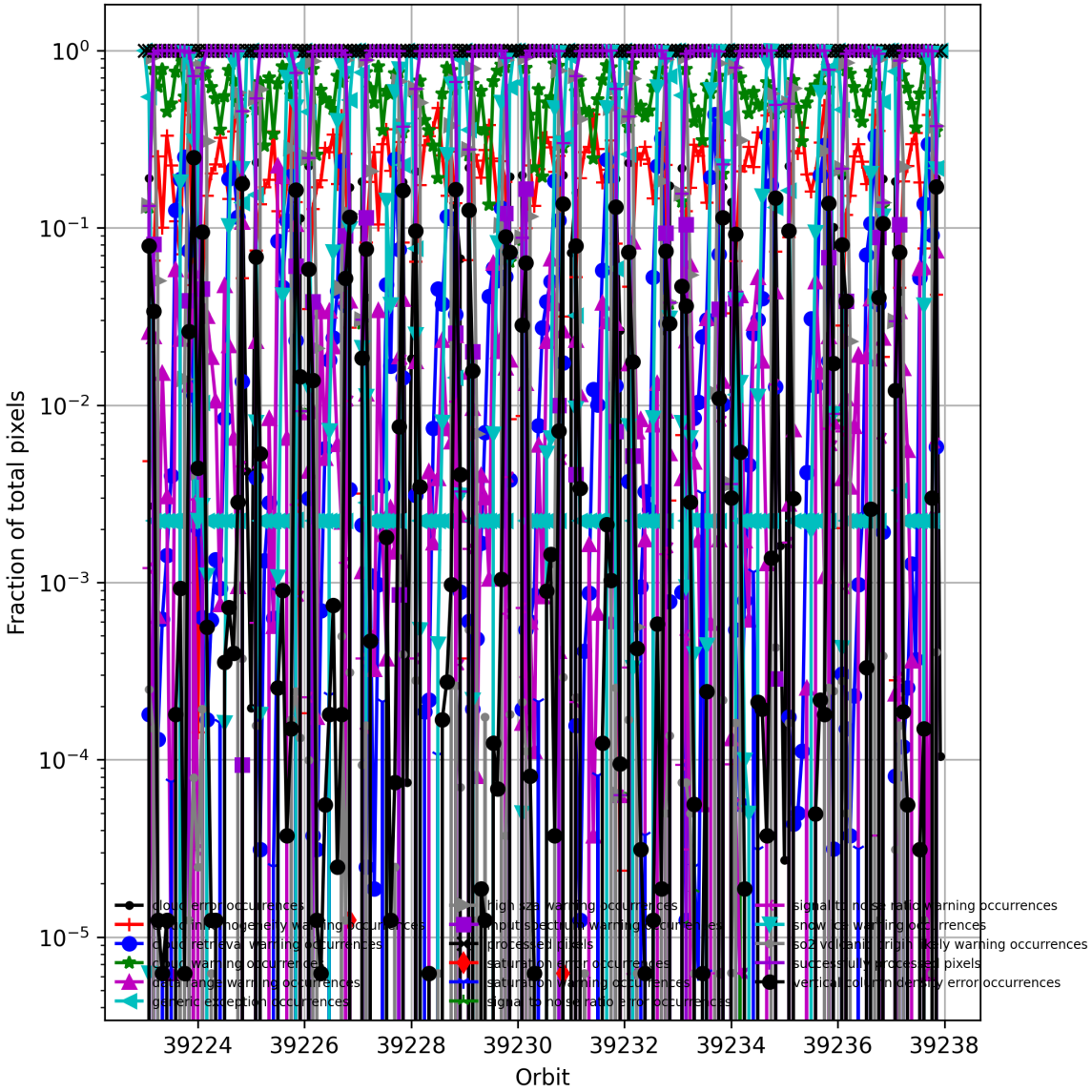

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

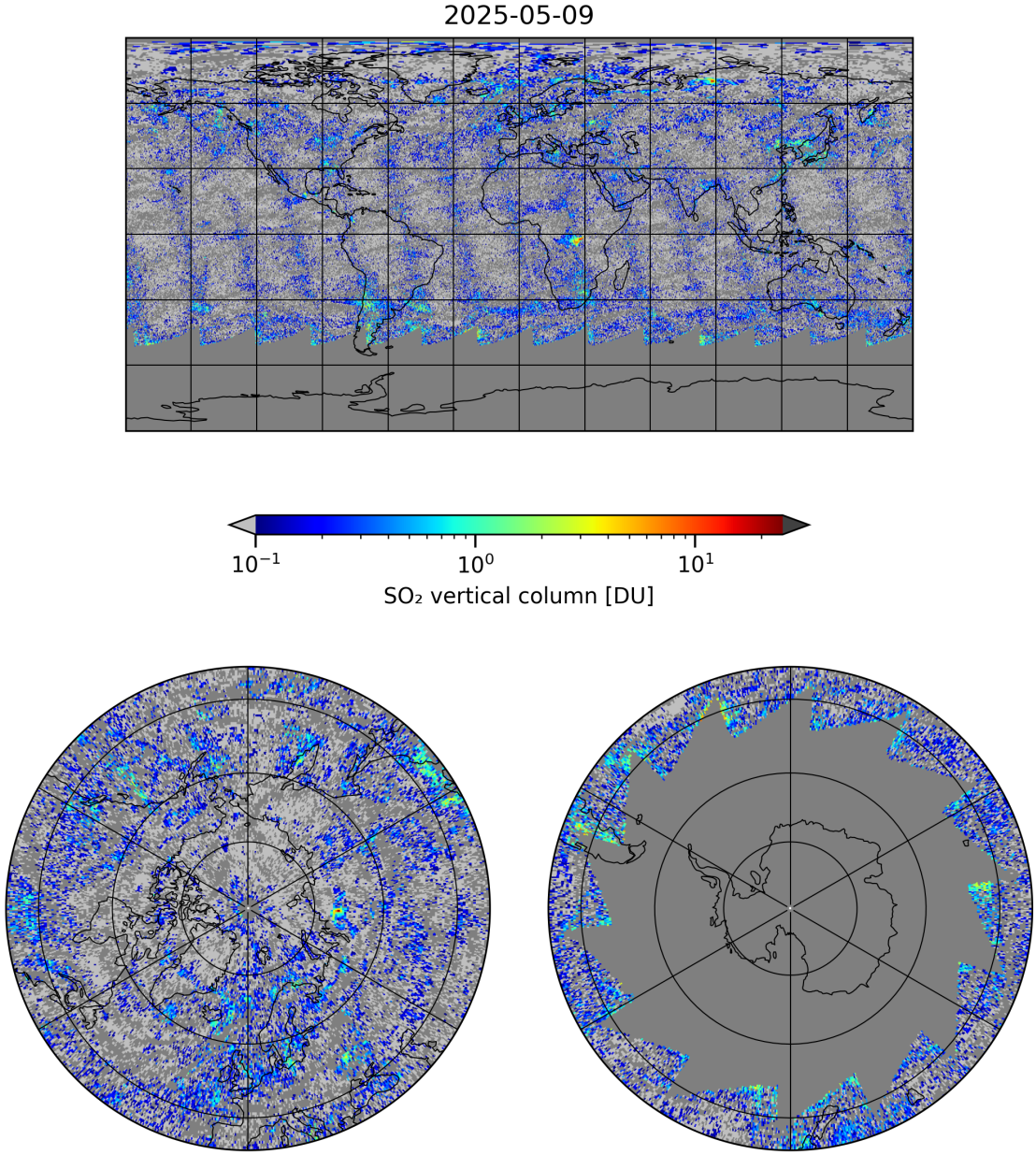

Figure 4: Map of "SO_2 vertical column" for 2025-05-09 to 2025-05-10

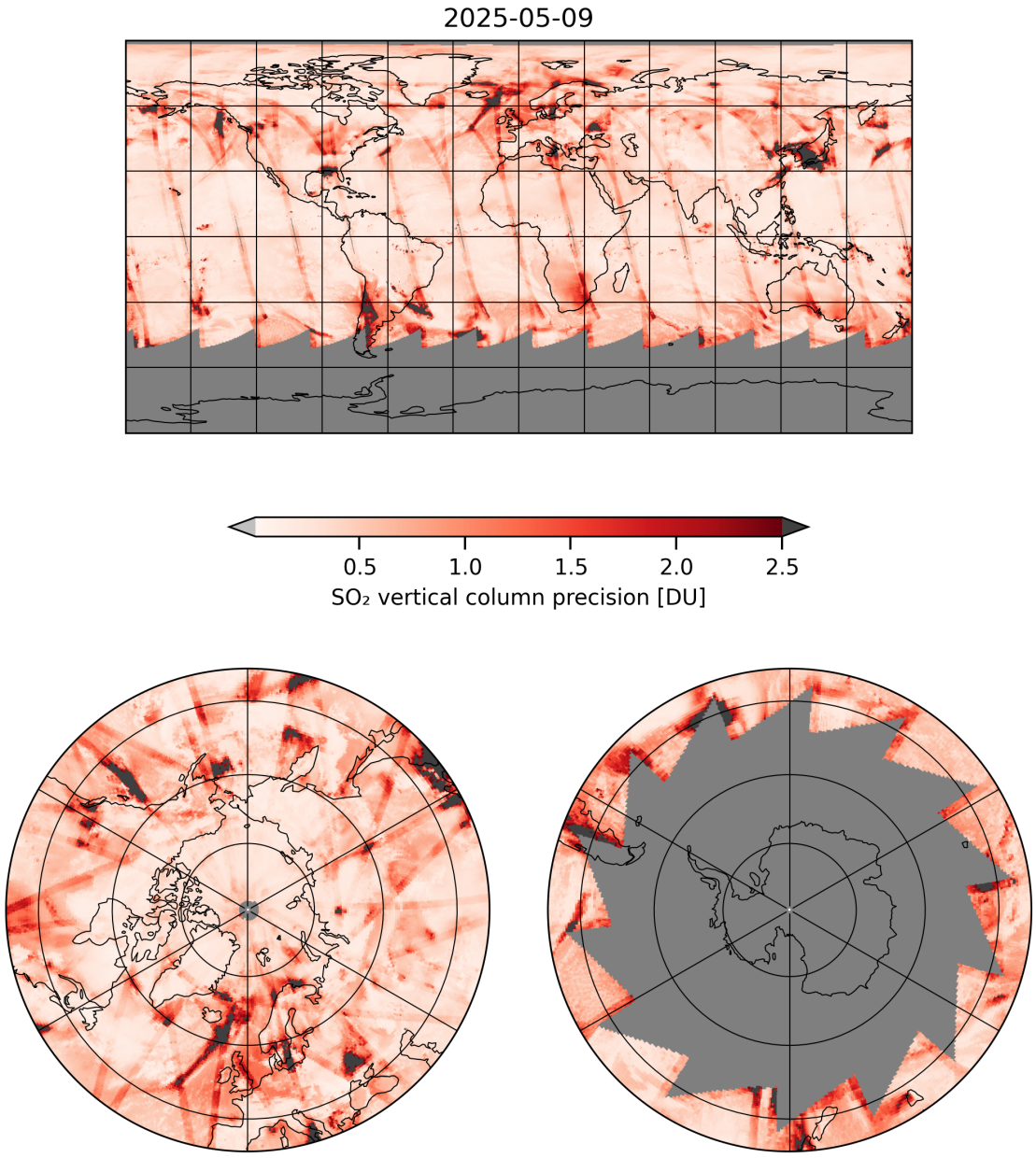

Figure 5: Map of "SO_2 vertical column precision" for 2025-05-09 to 2025-05-10

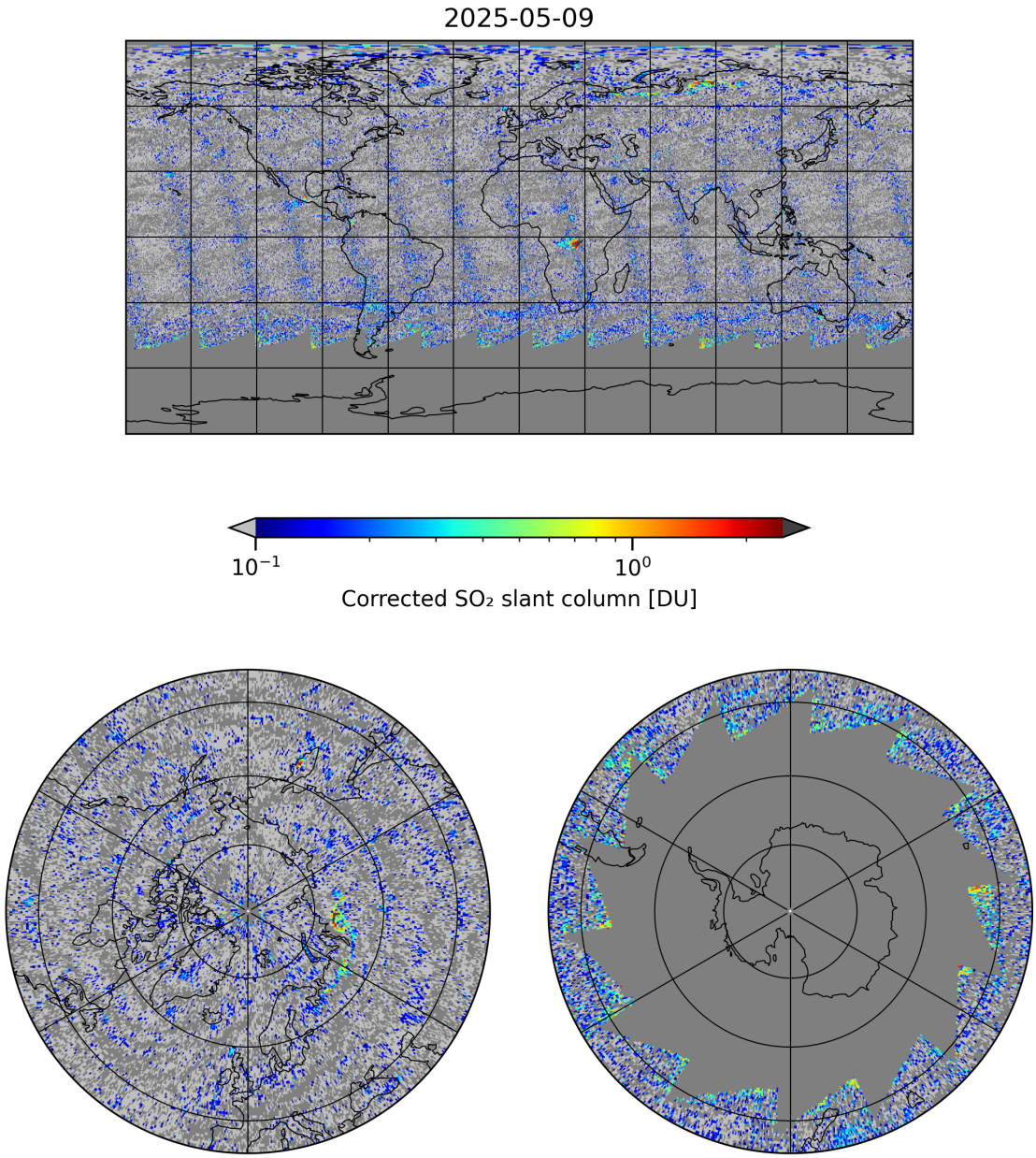

Figure 6: Map of "Corrected SO_2 slant column" for 2025-05-09 to 2025-05-10

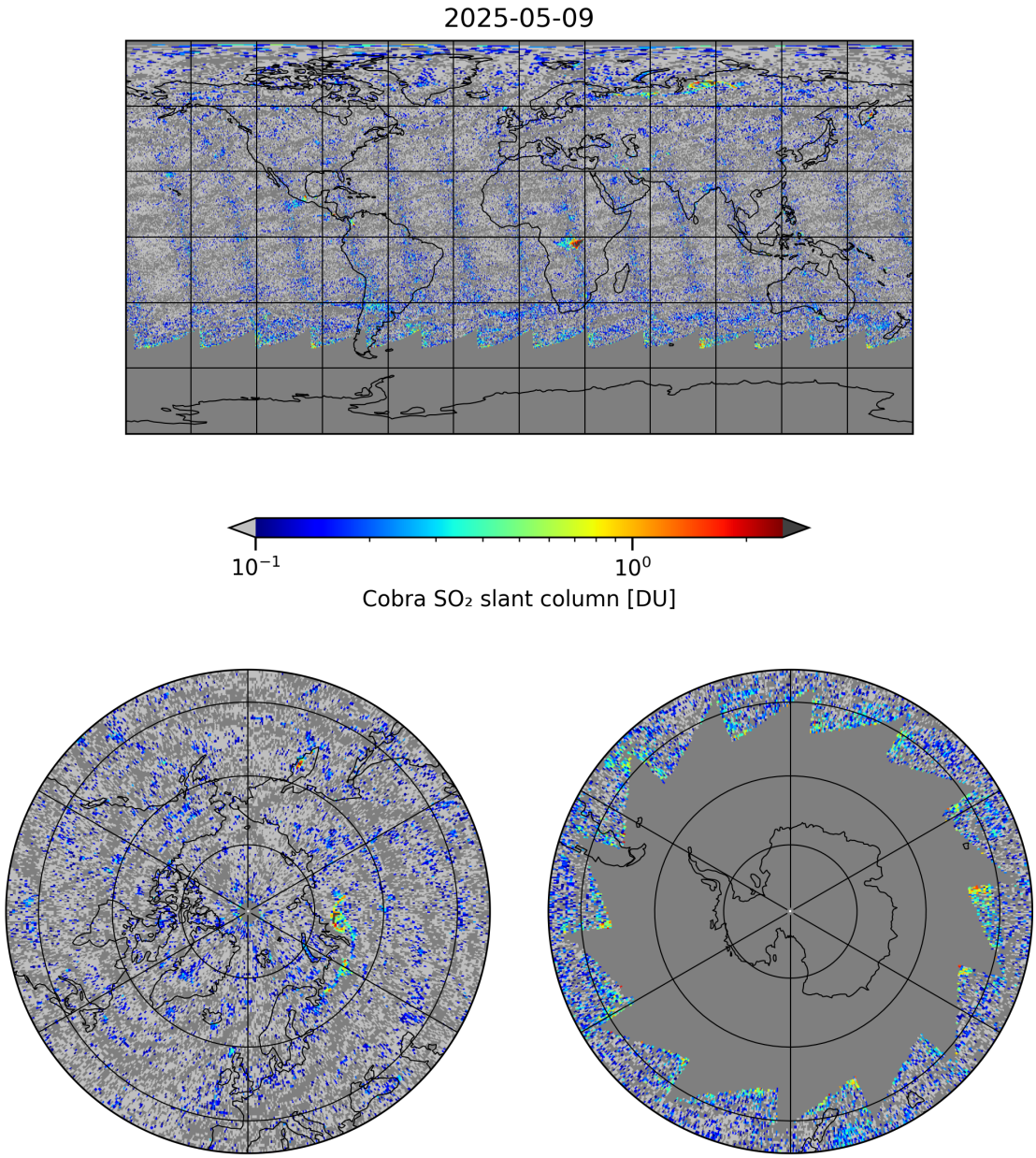

Figure 7: Map of "Cobra SO_2 slant column" for 2025-05-09 to 2025-05-10

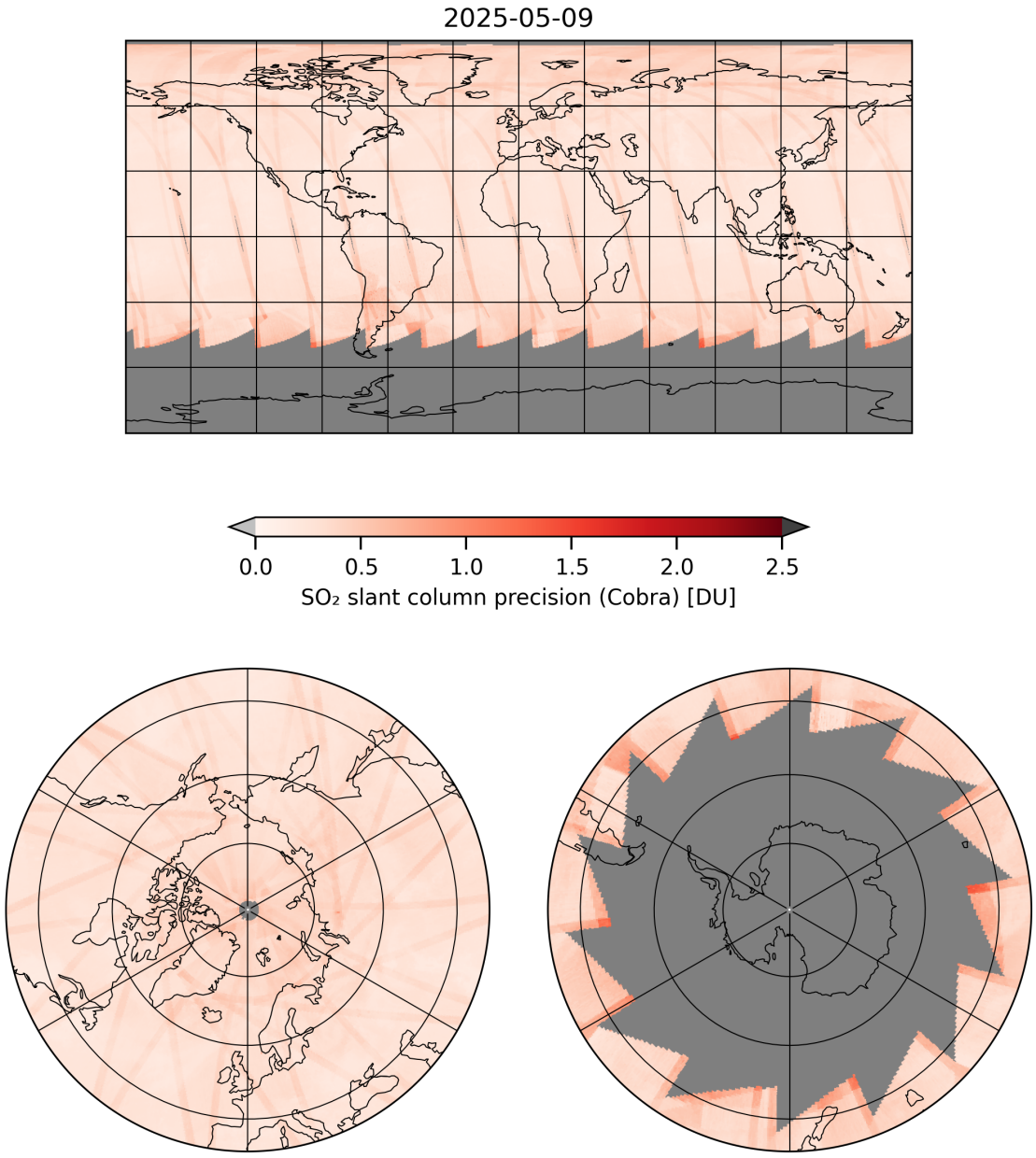

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-05-09 to 2025-05-10

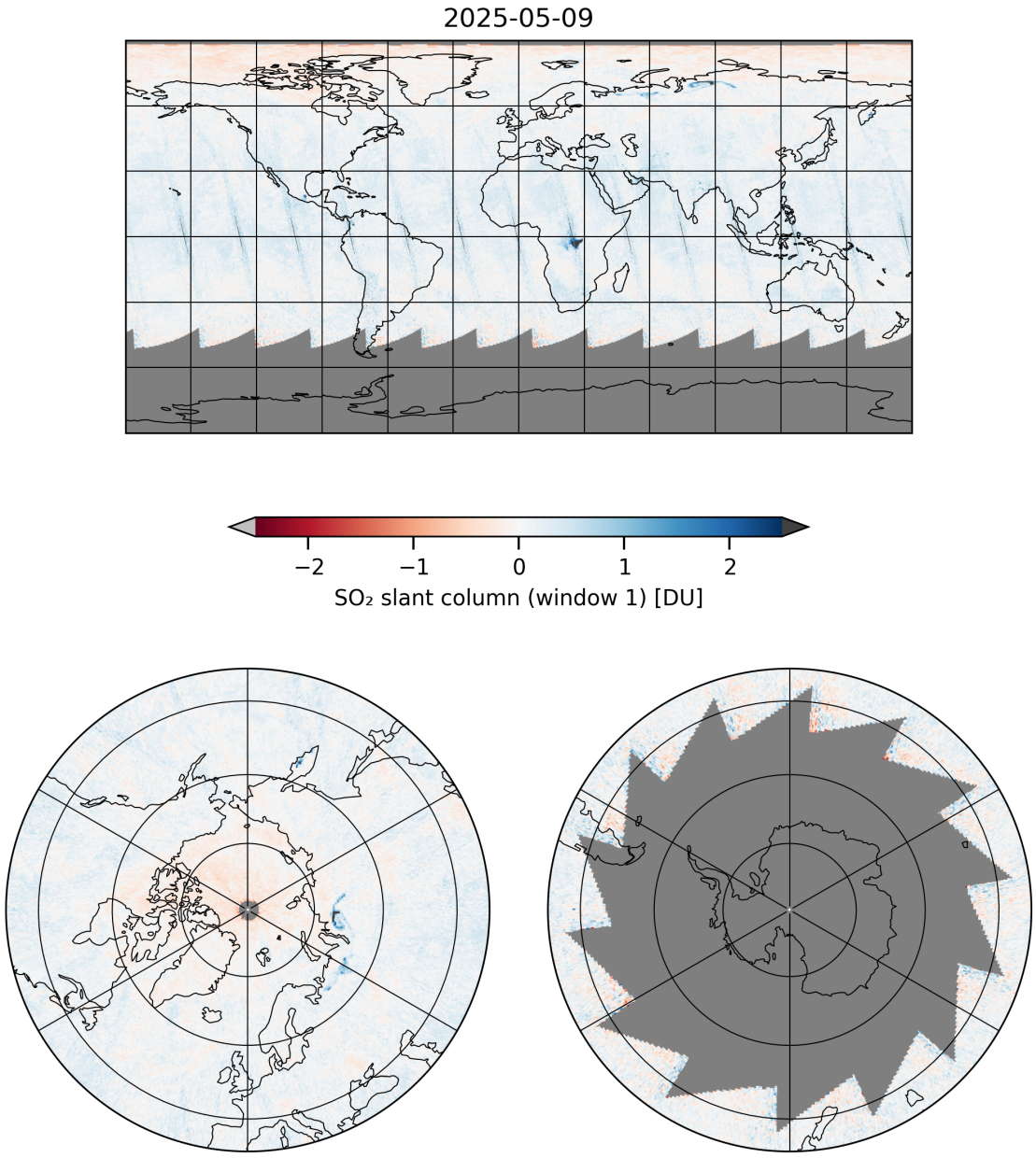

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-05-09 to 2025-05-10

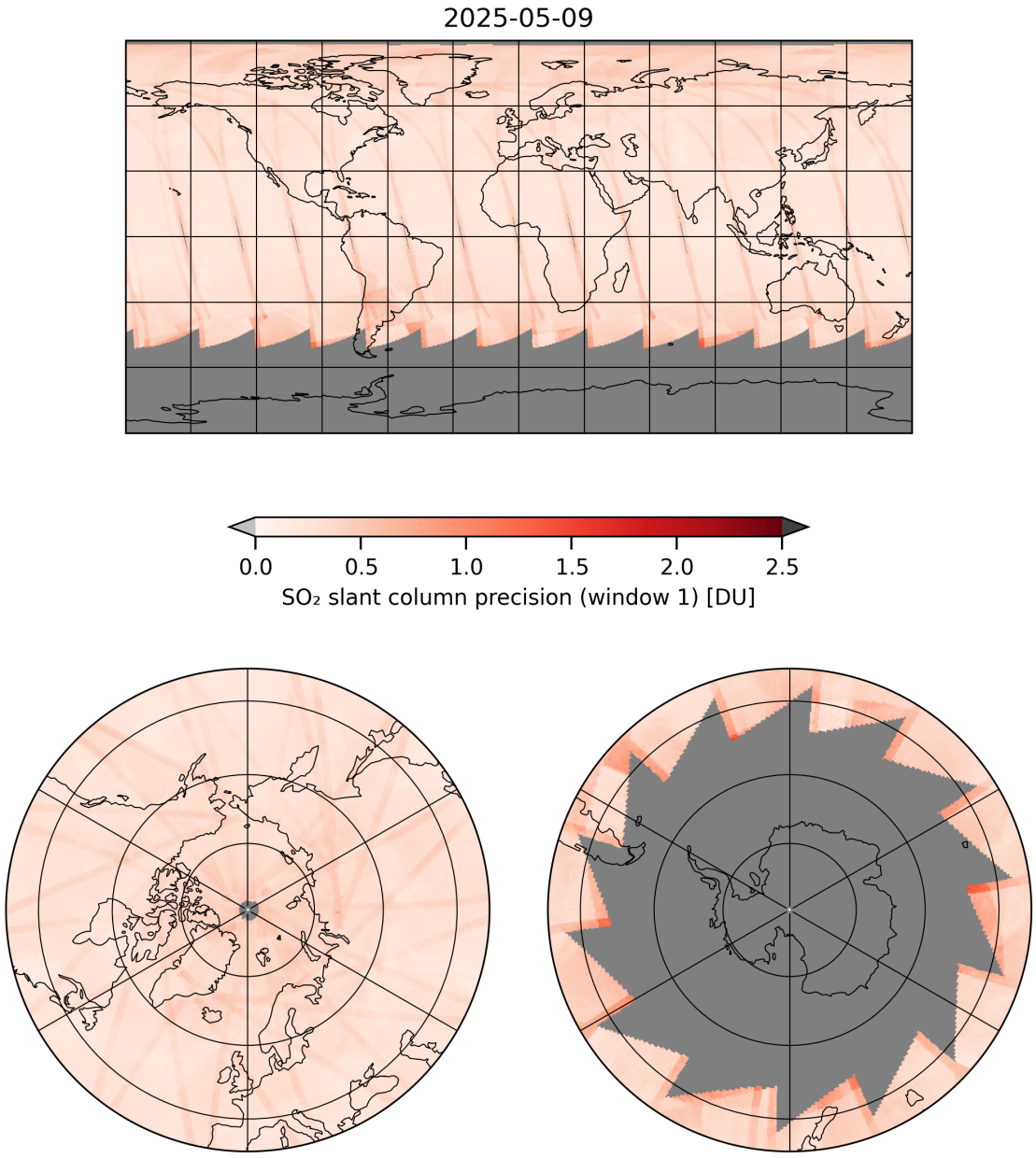

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-05-09 to 2025-05-10

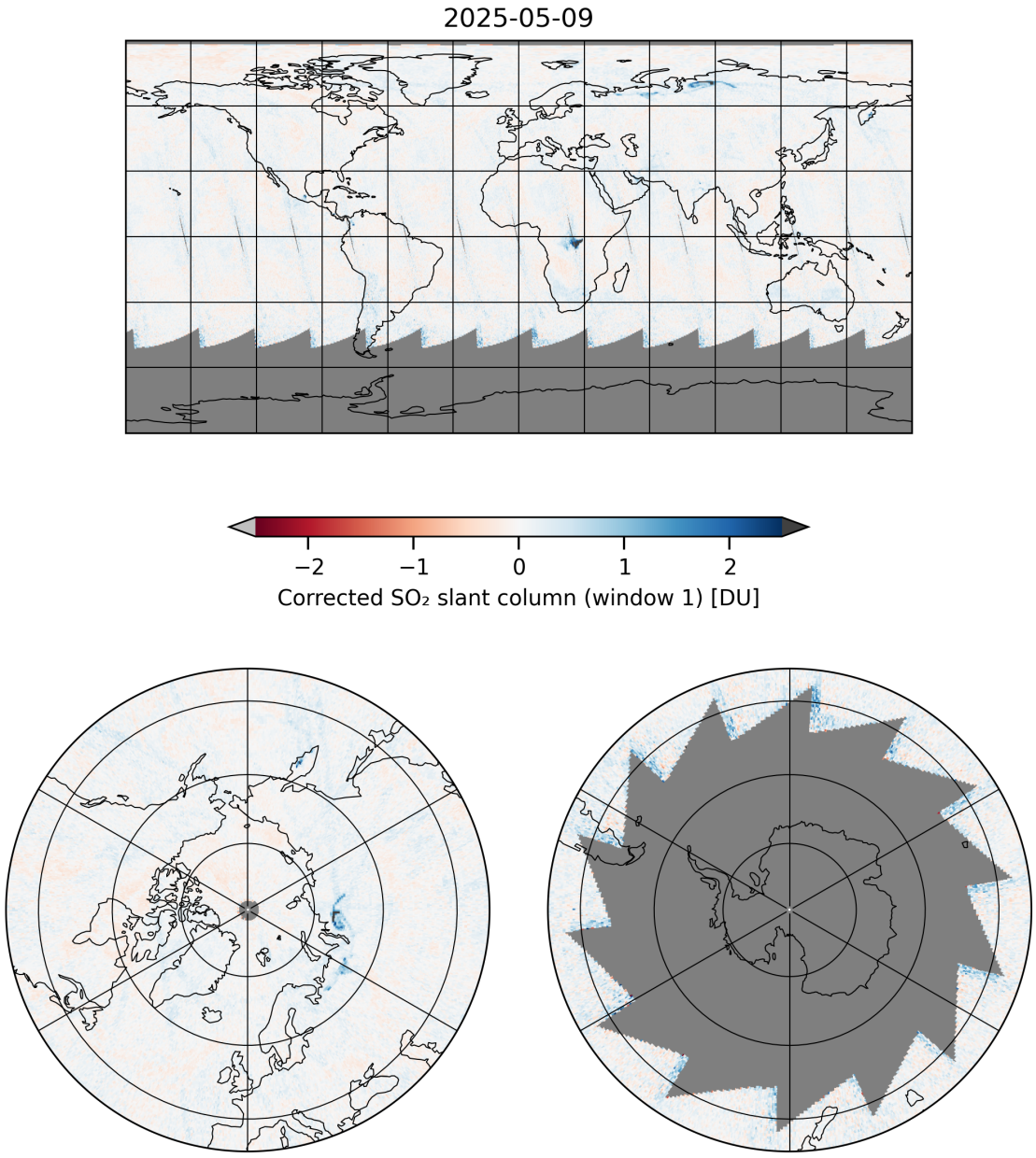

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-05-09 to 2025-05-10

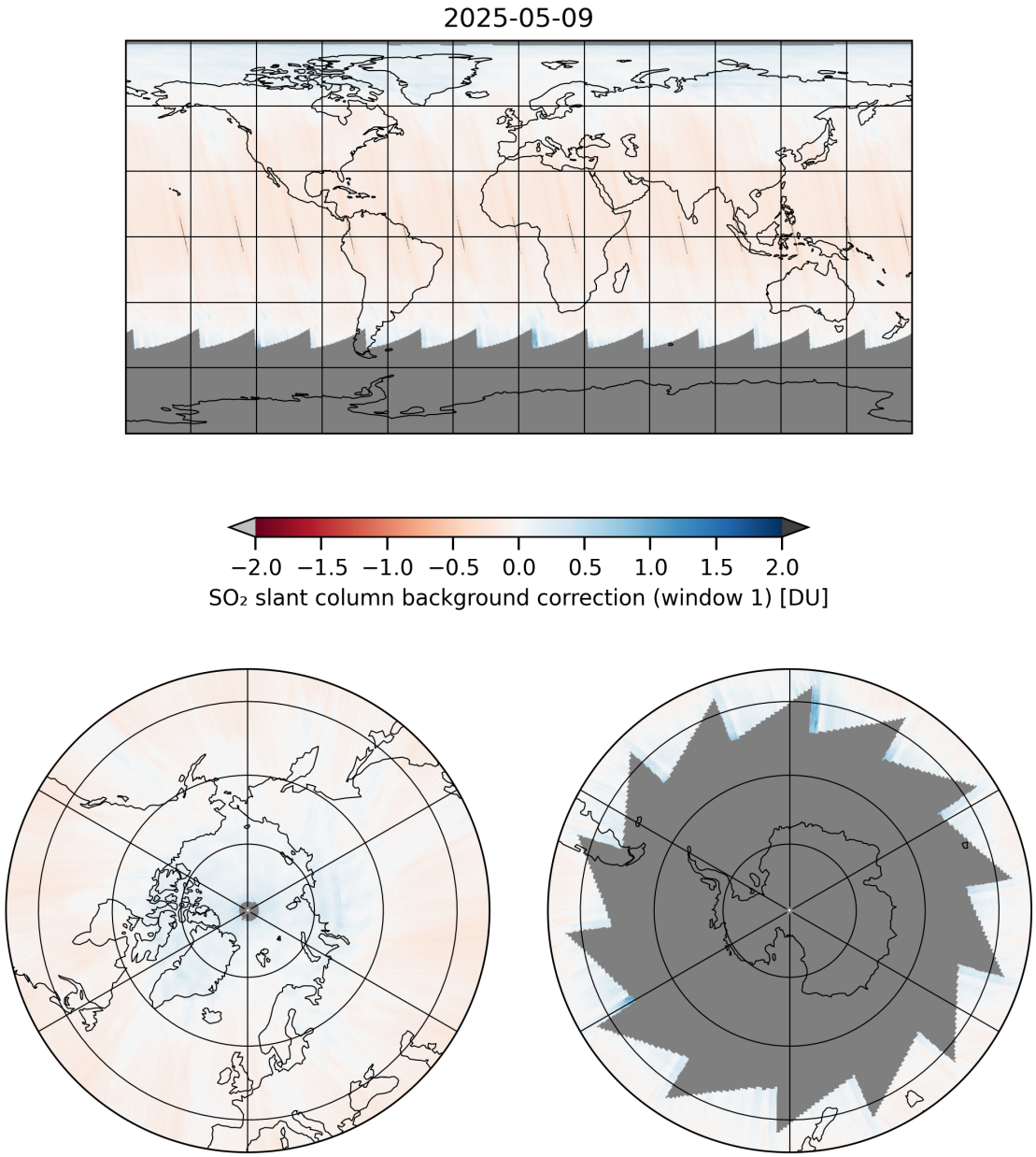

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-05-09 to 2025-05-10

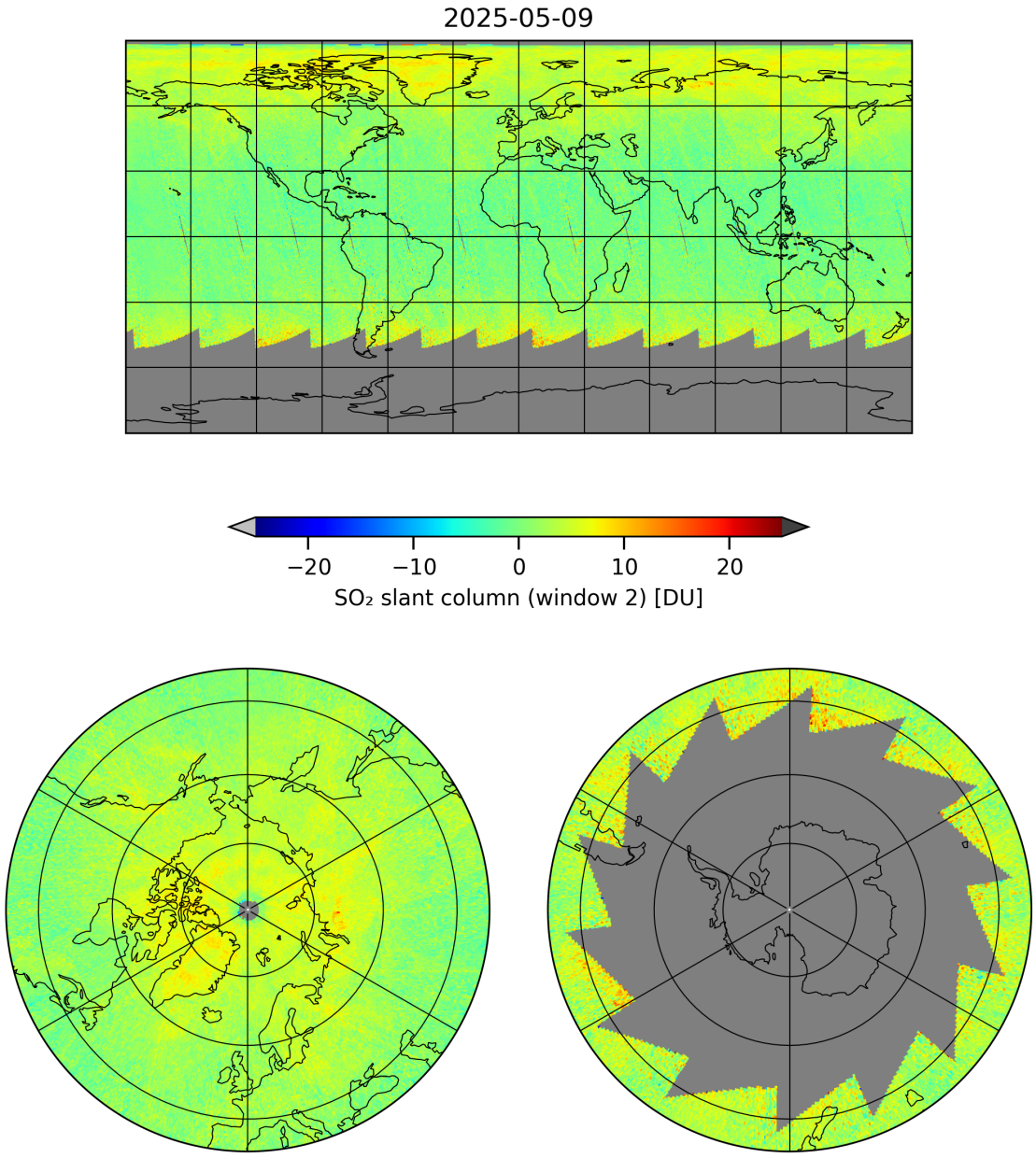

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-05-09 to 2025-05-10

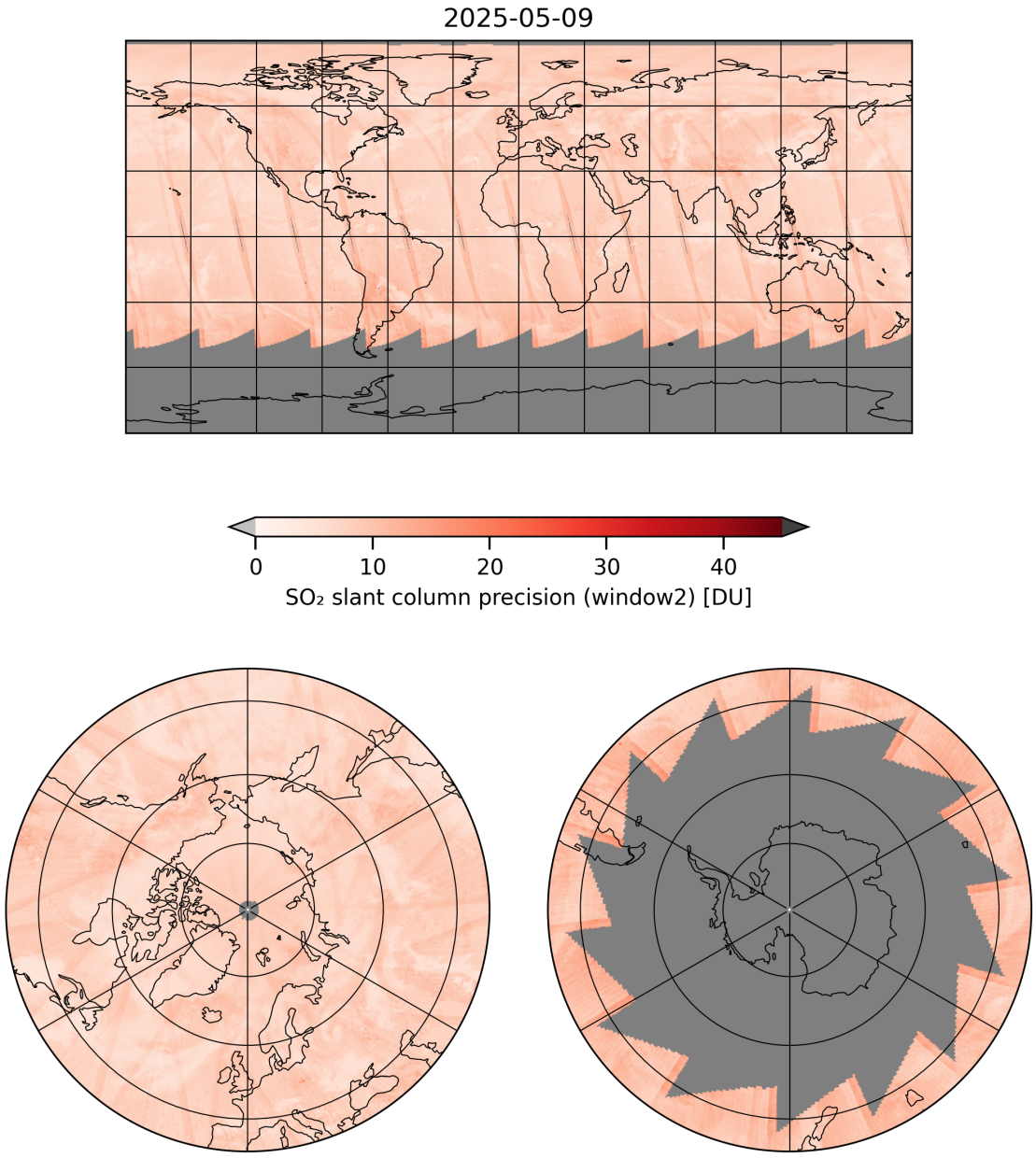

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-05-09 to 2025-05-10

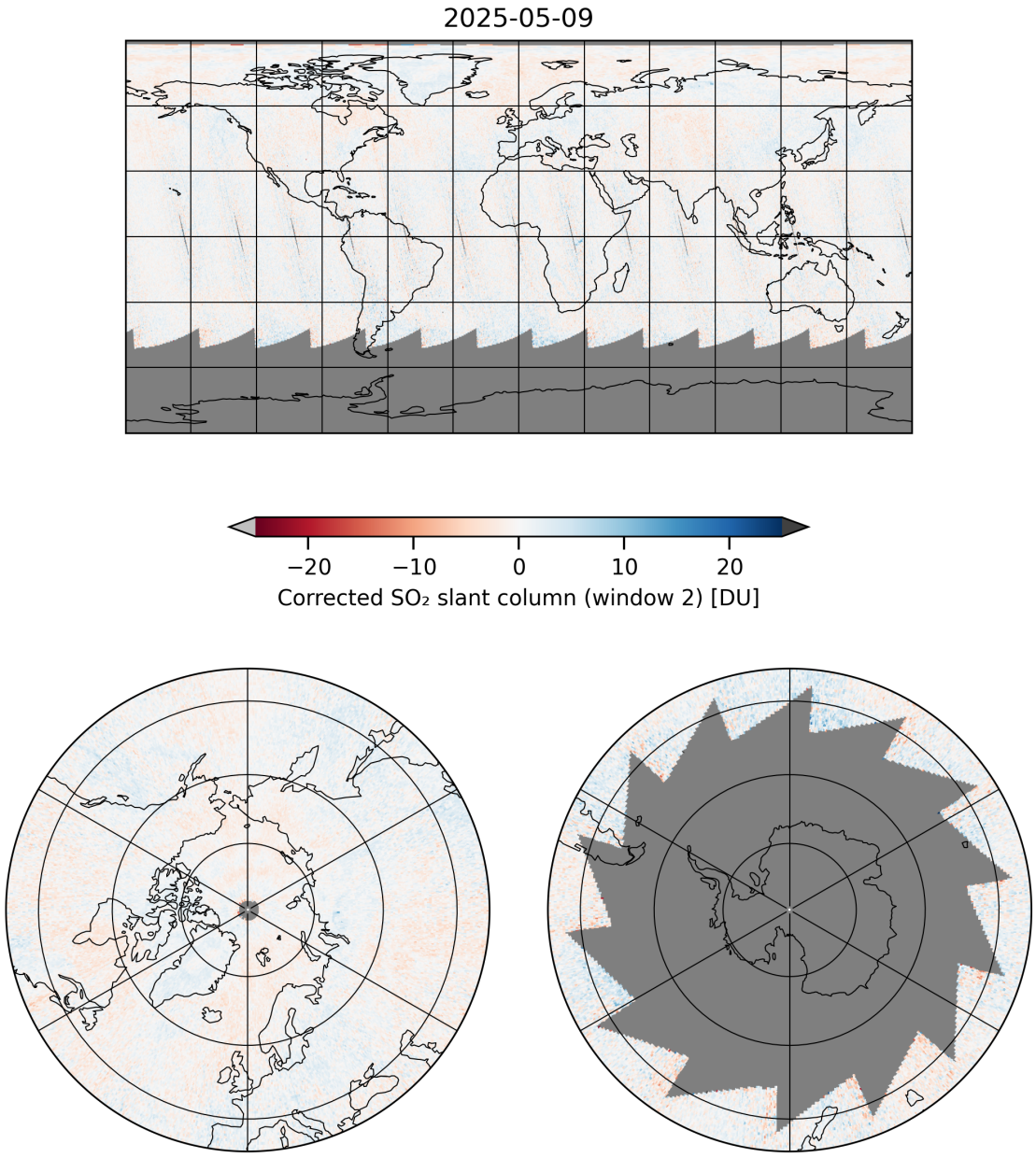

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-05-09 to 2025-05-10

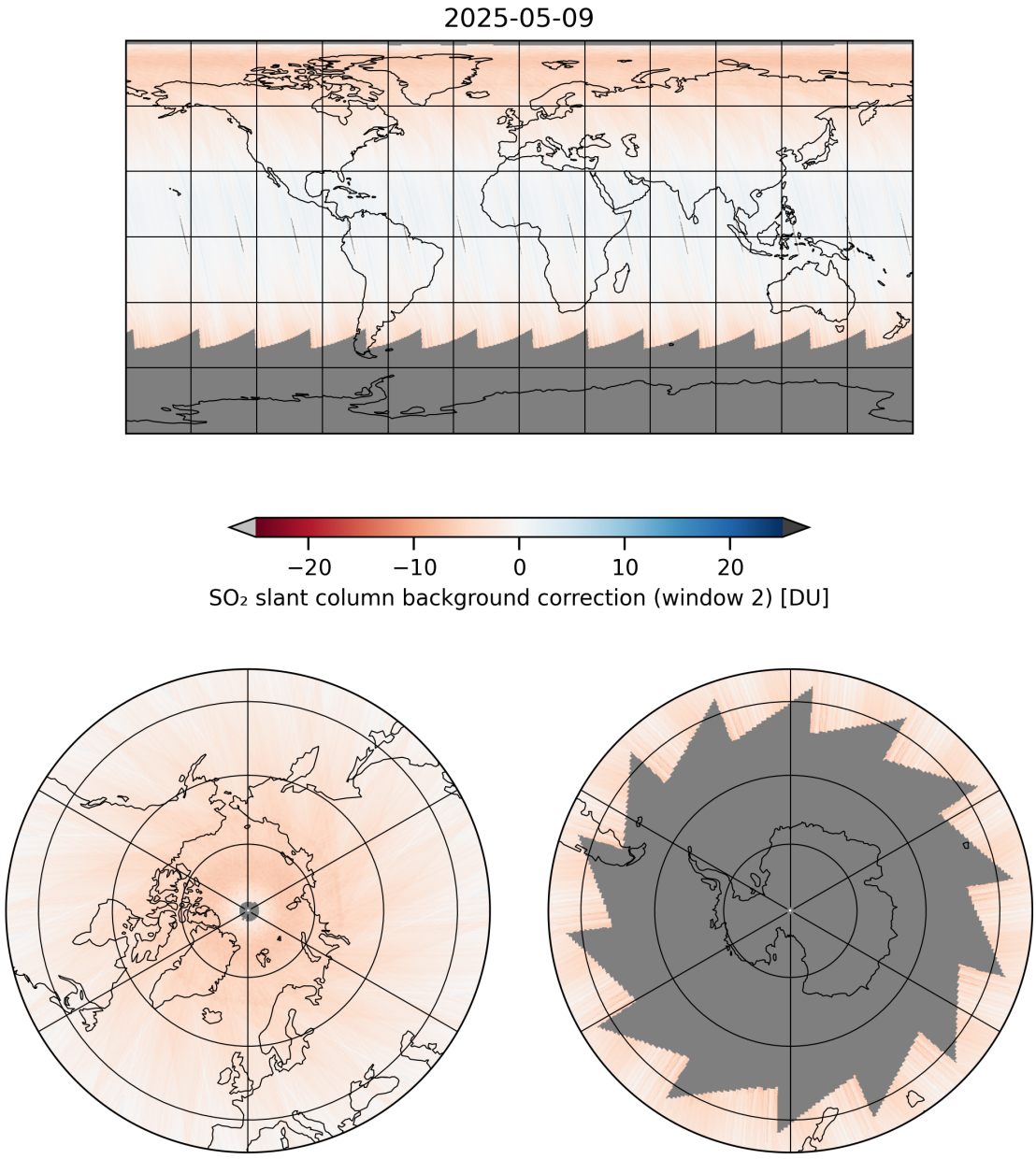

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-05-09 to 2025-05-10

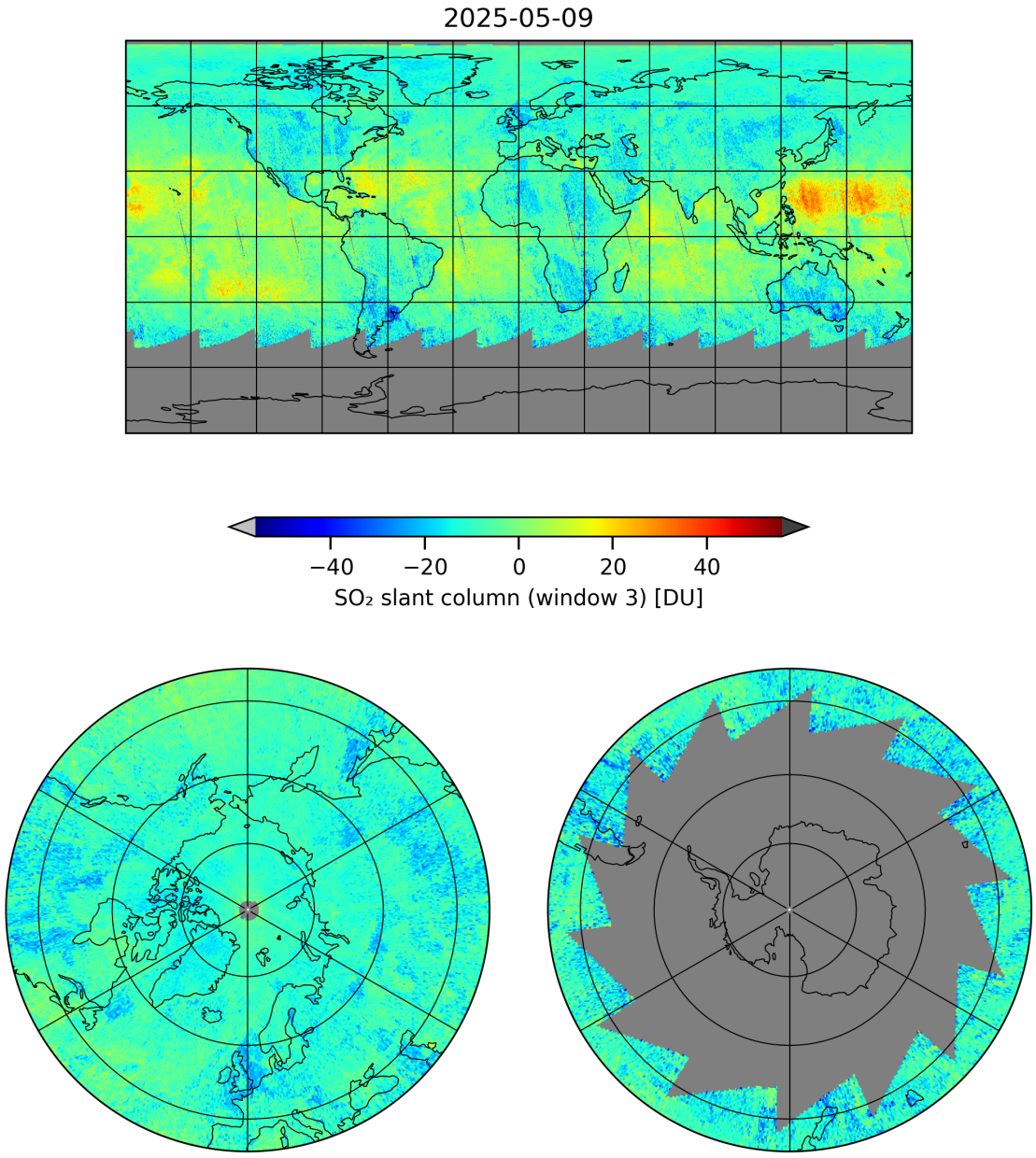

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-05-09 to 2025-05-10

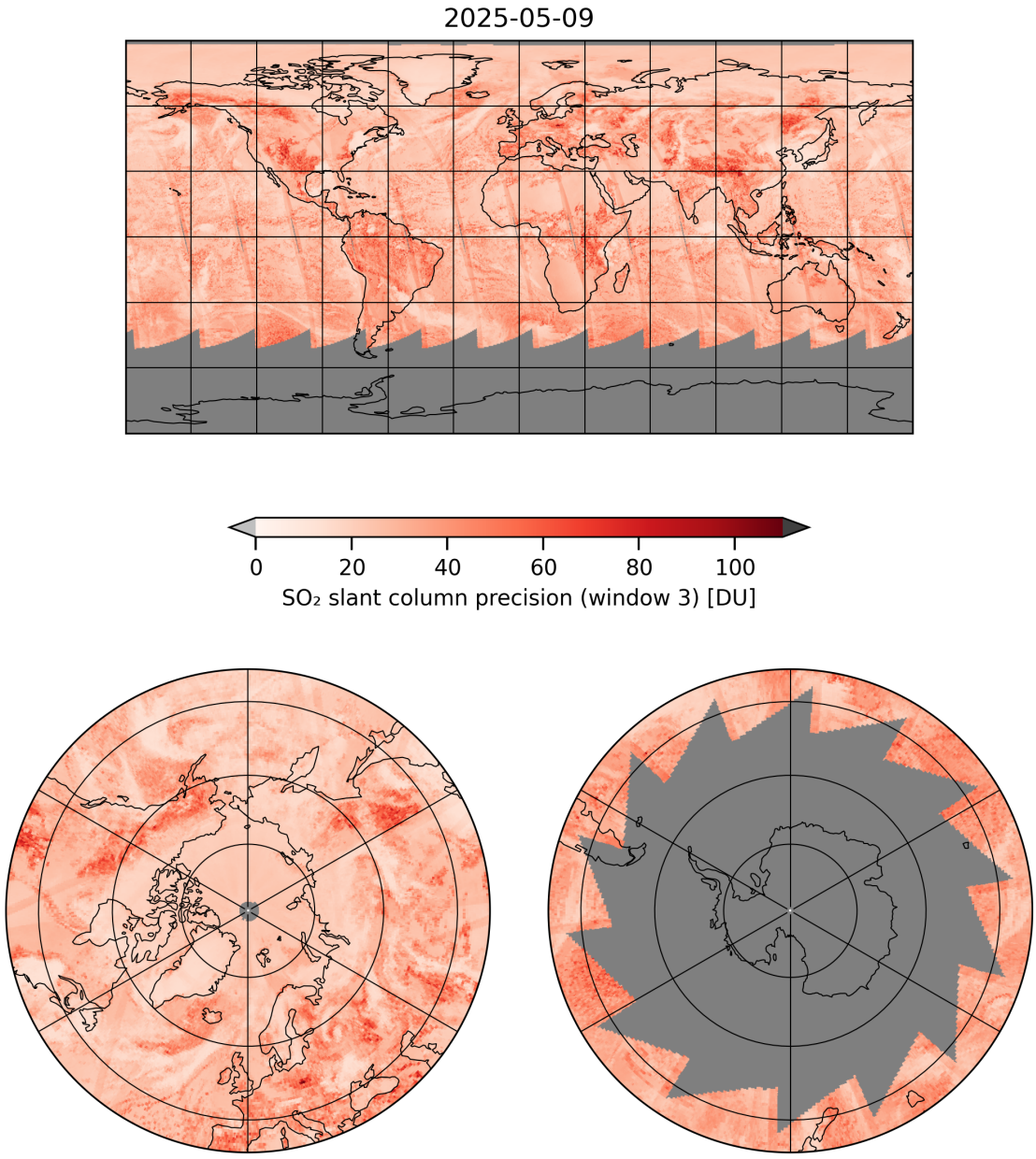

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-05-09 to 2025-05-10

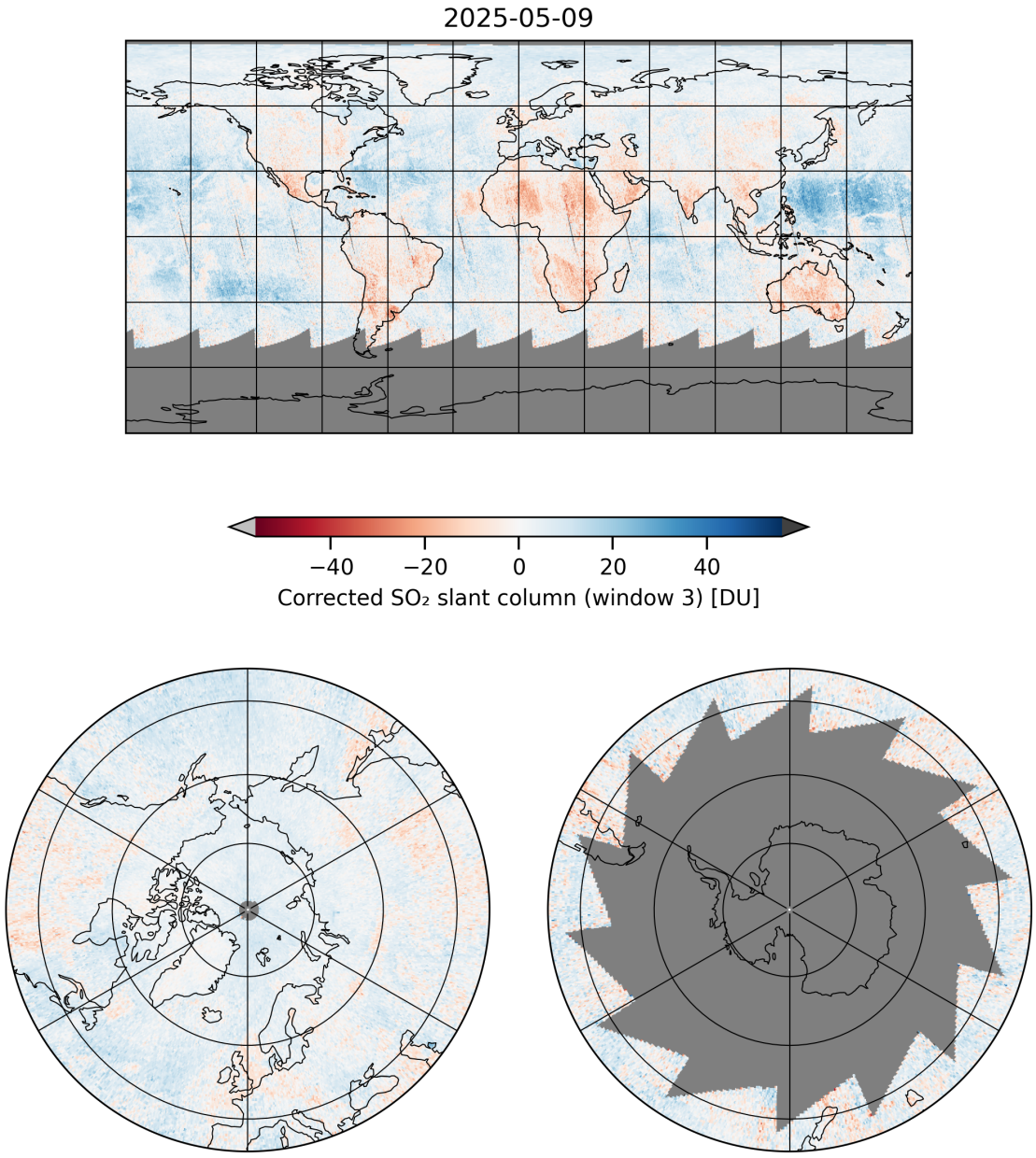

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-05-09 to 2025-05-10

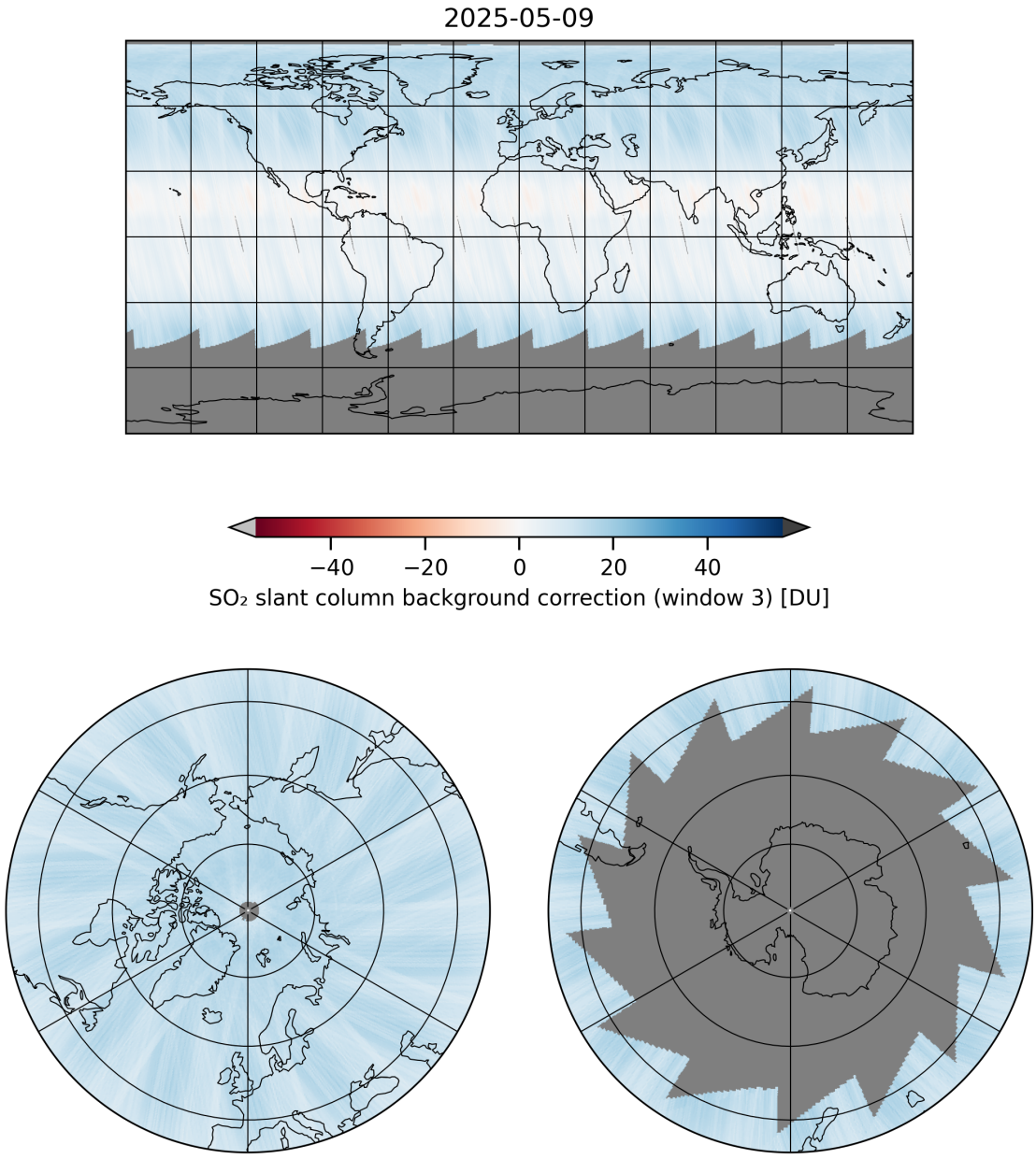

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-05-09 to 2025-05-10

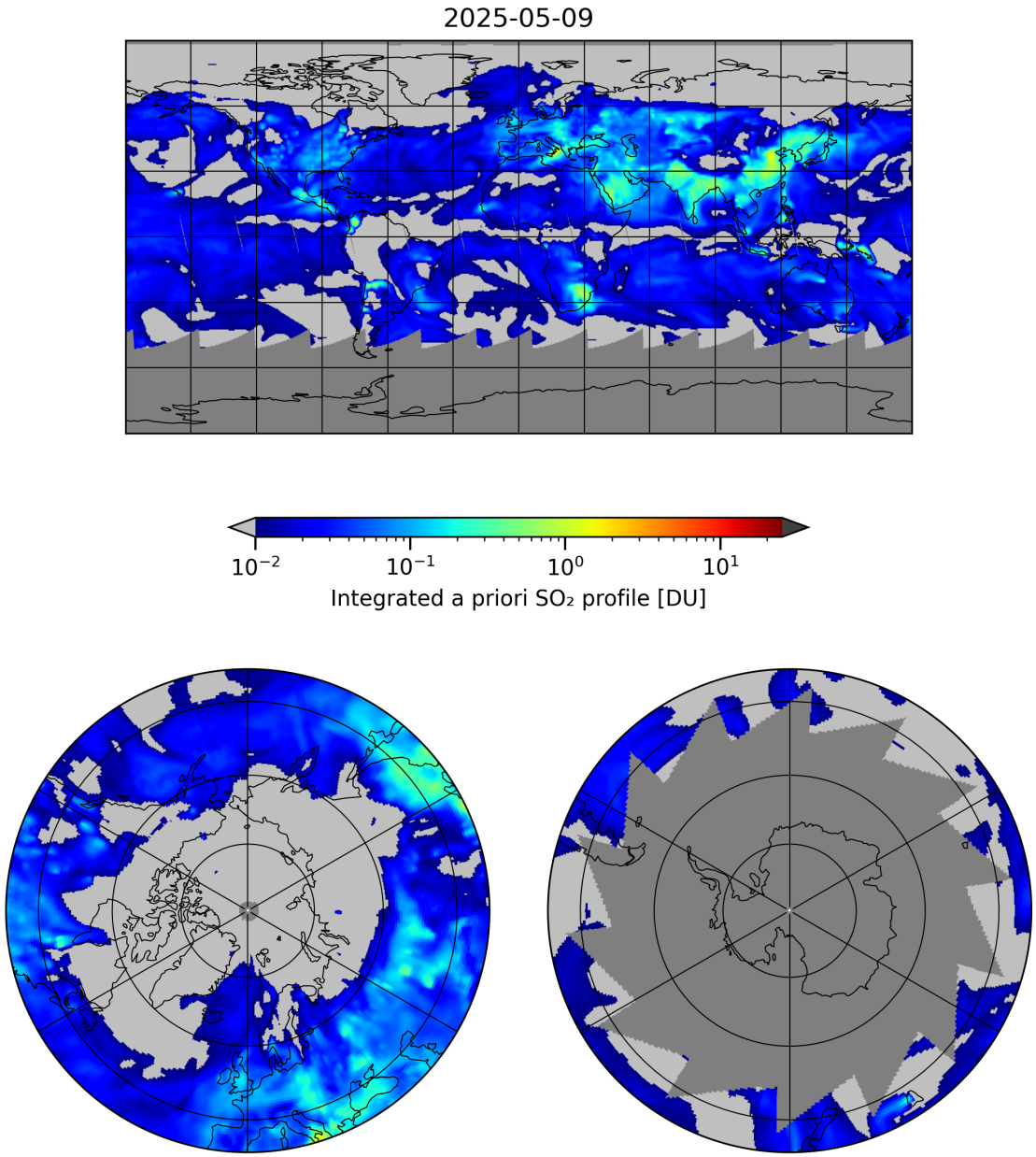

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-05-09 to 2025-05-10

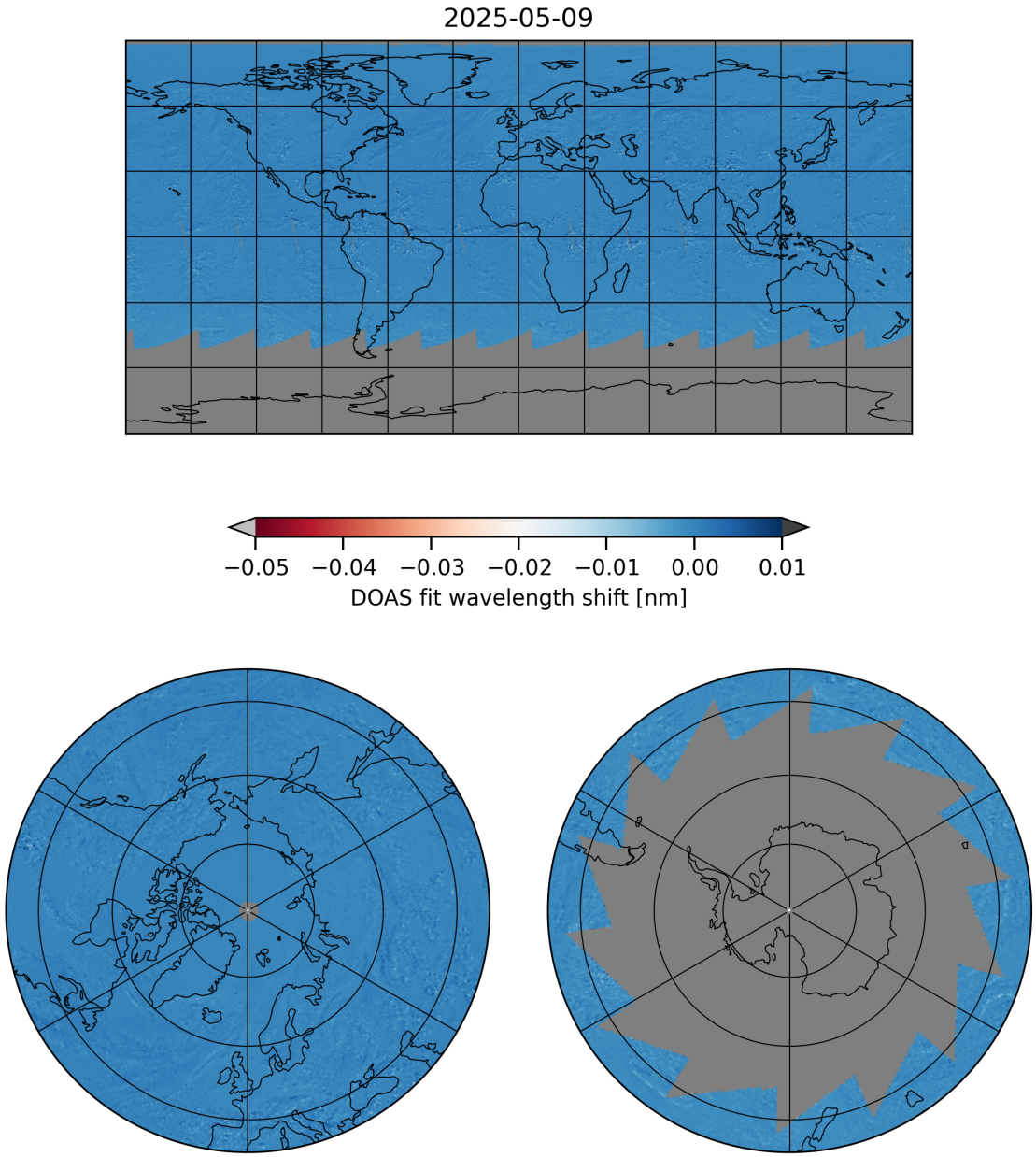

Figure 22: Map of “DOAS fit wavelength shift” for 2025-05-09 to 2025-05-10

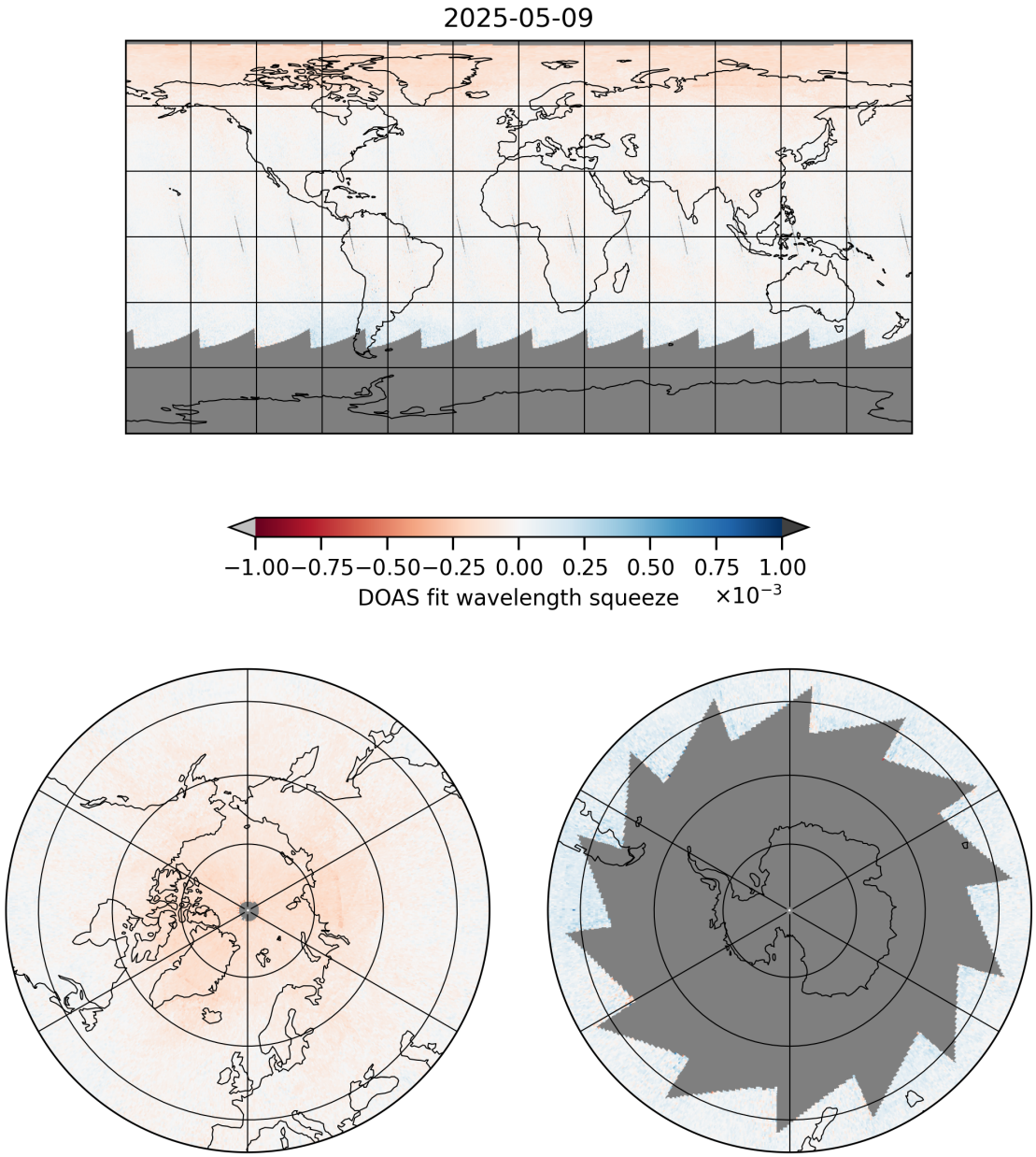

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-05-09 to 2025-05-10

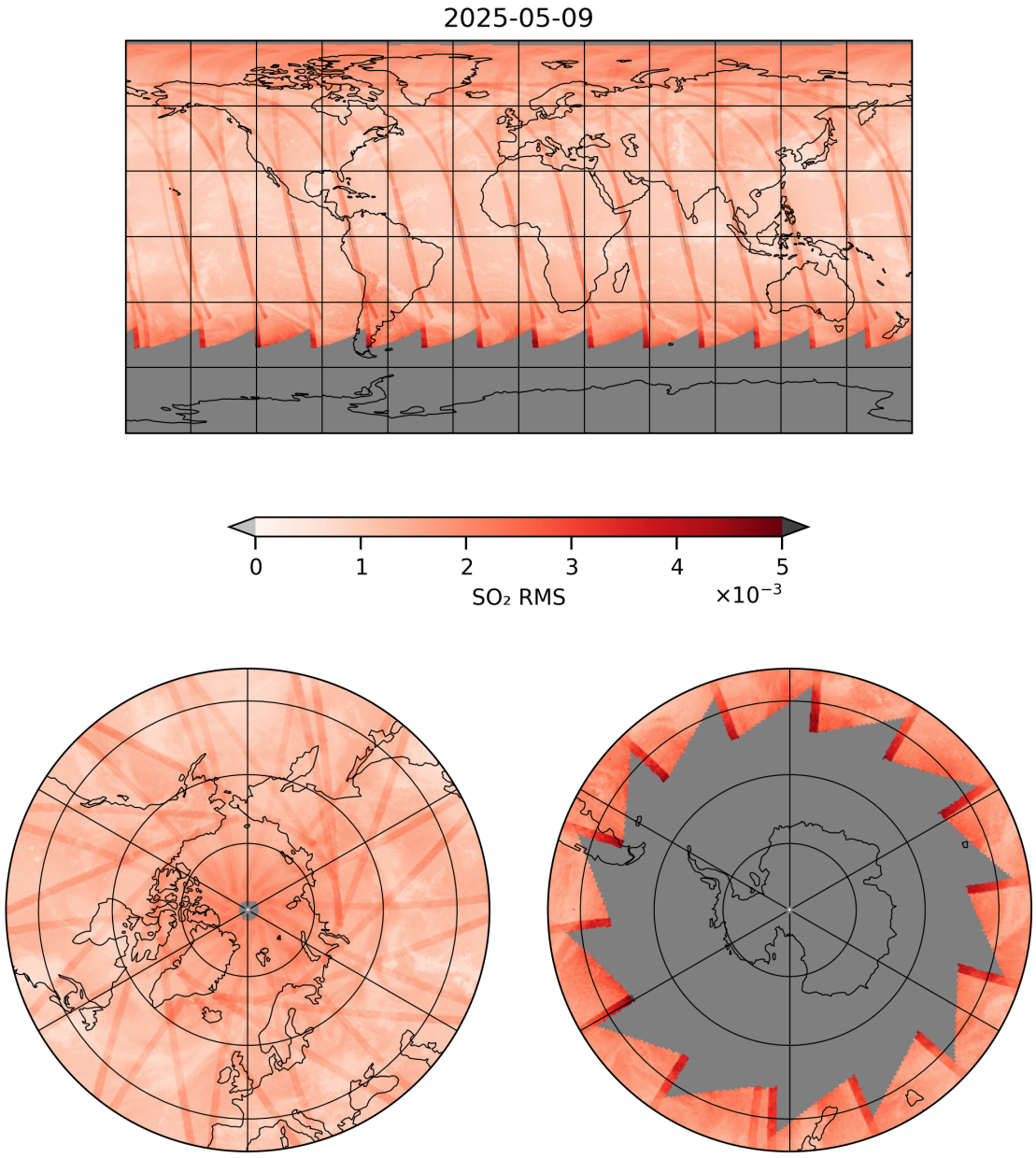

Figure 24: Map of "SO_2 RMS" for 2025-05-09 to 2025-05-10

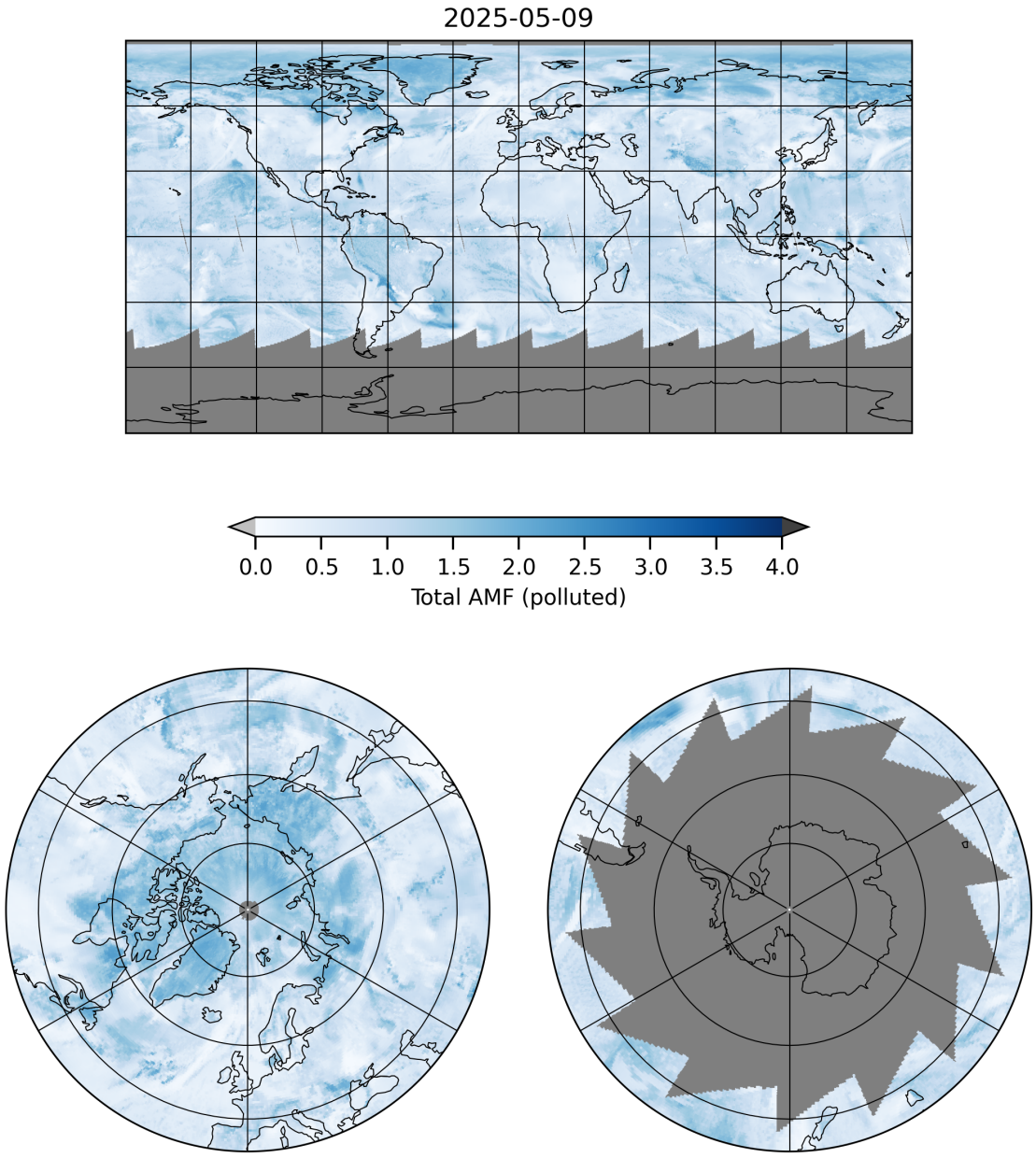

Figure 25: Map of “Total AMF (polluted)” for 2025-05-09 to 2025-05-10

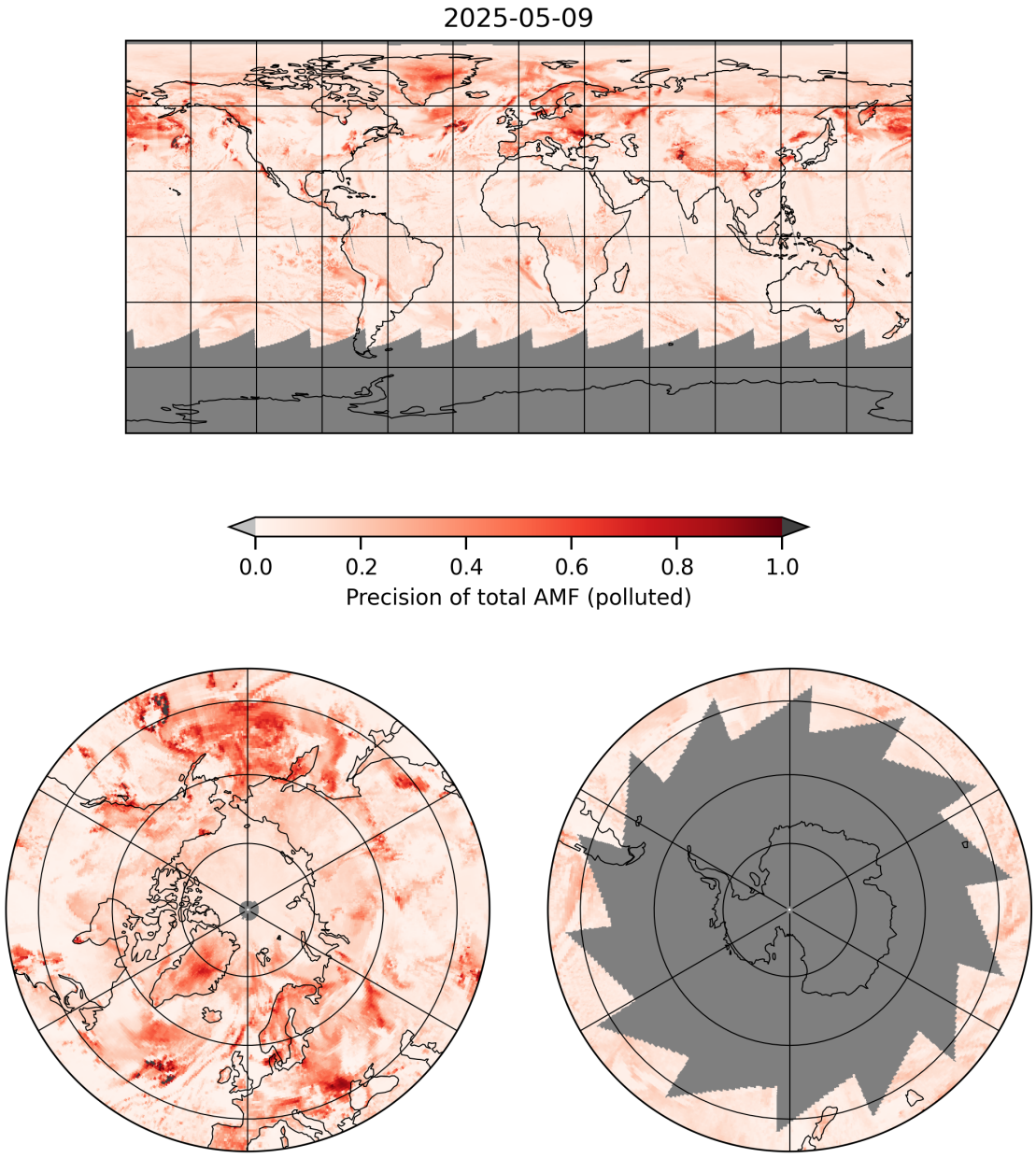

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-05-09 to 2025-05-10

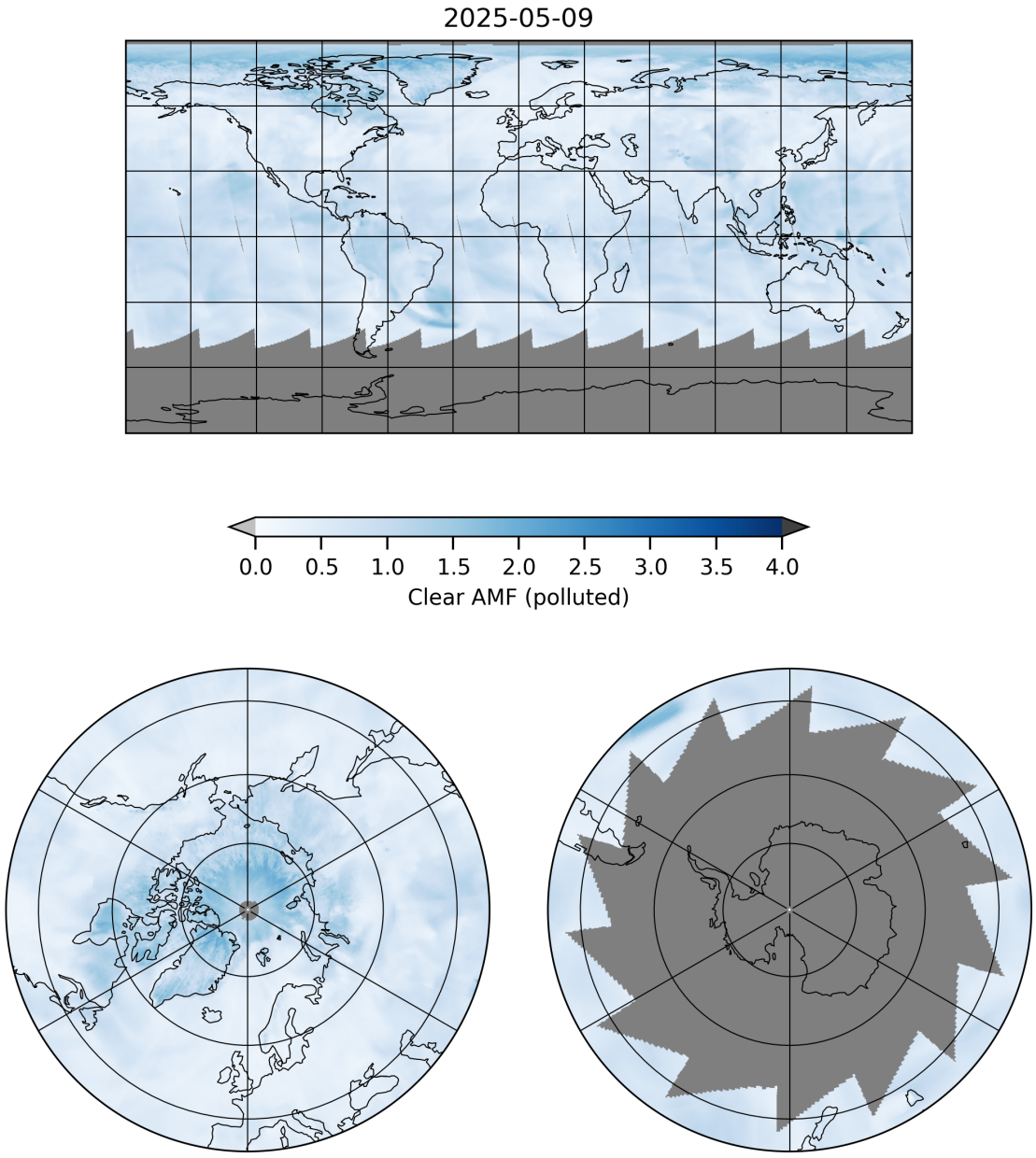

Figure 27: Map of “Clear AMF (polluted)” for 2025-05-09 to 2025-05-10

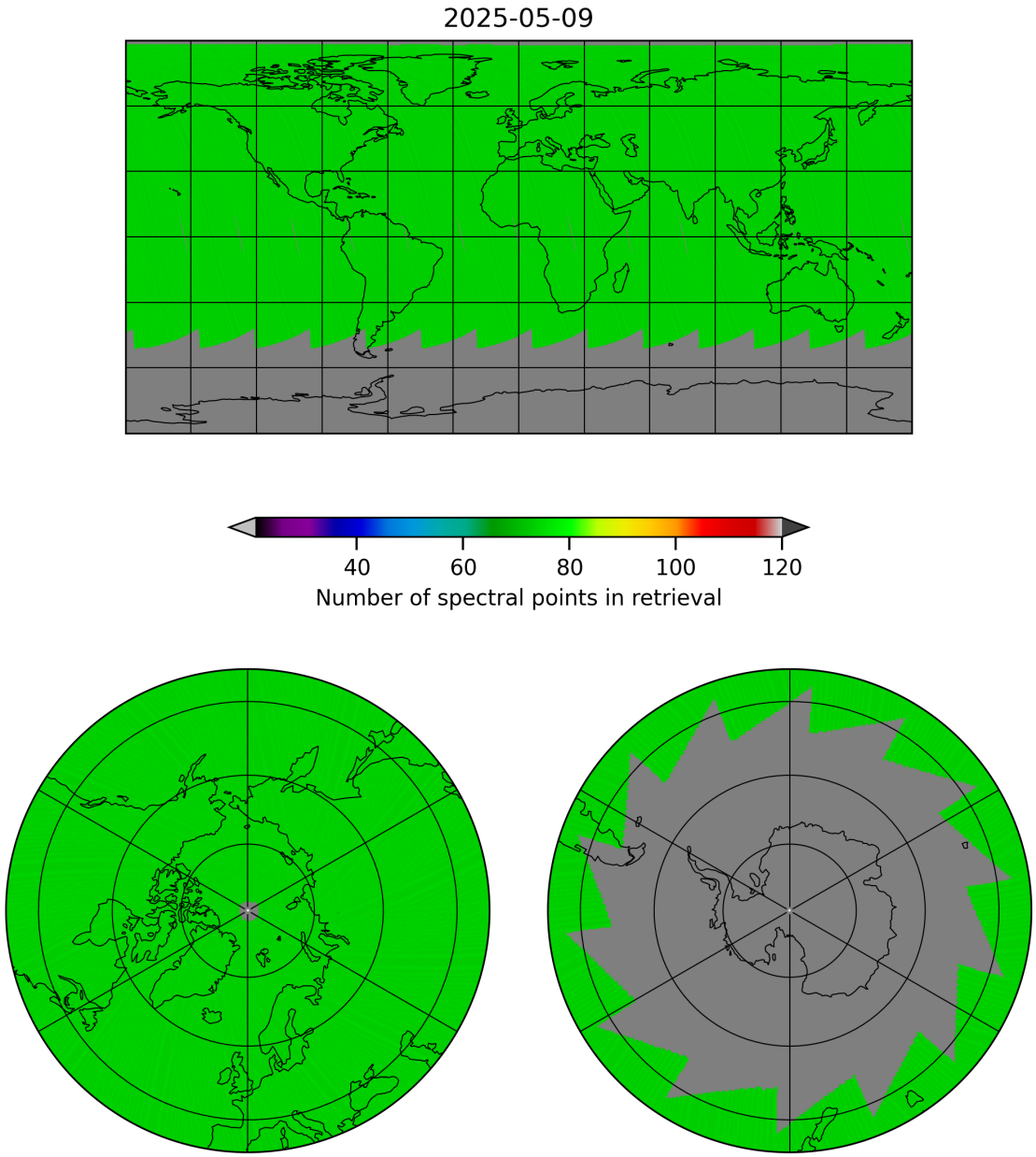

Figure 28: Map of “Number of spectral points in retrieval” for 2025-05-09 to 2025-05-10

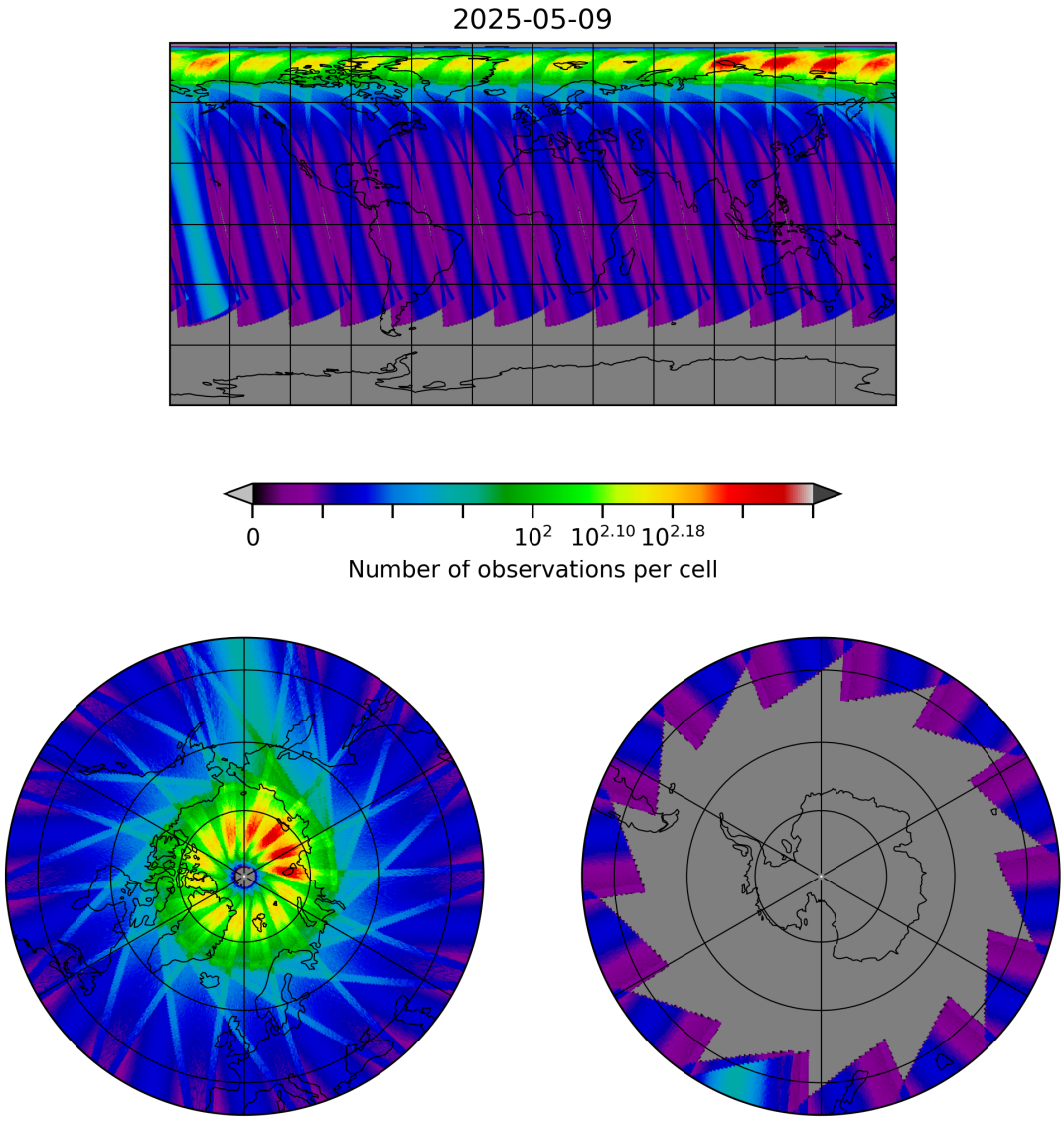

Figure 29: Map of the number of observations for 2025-05-09 to 2025-05-10

7 Zonal average

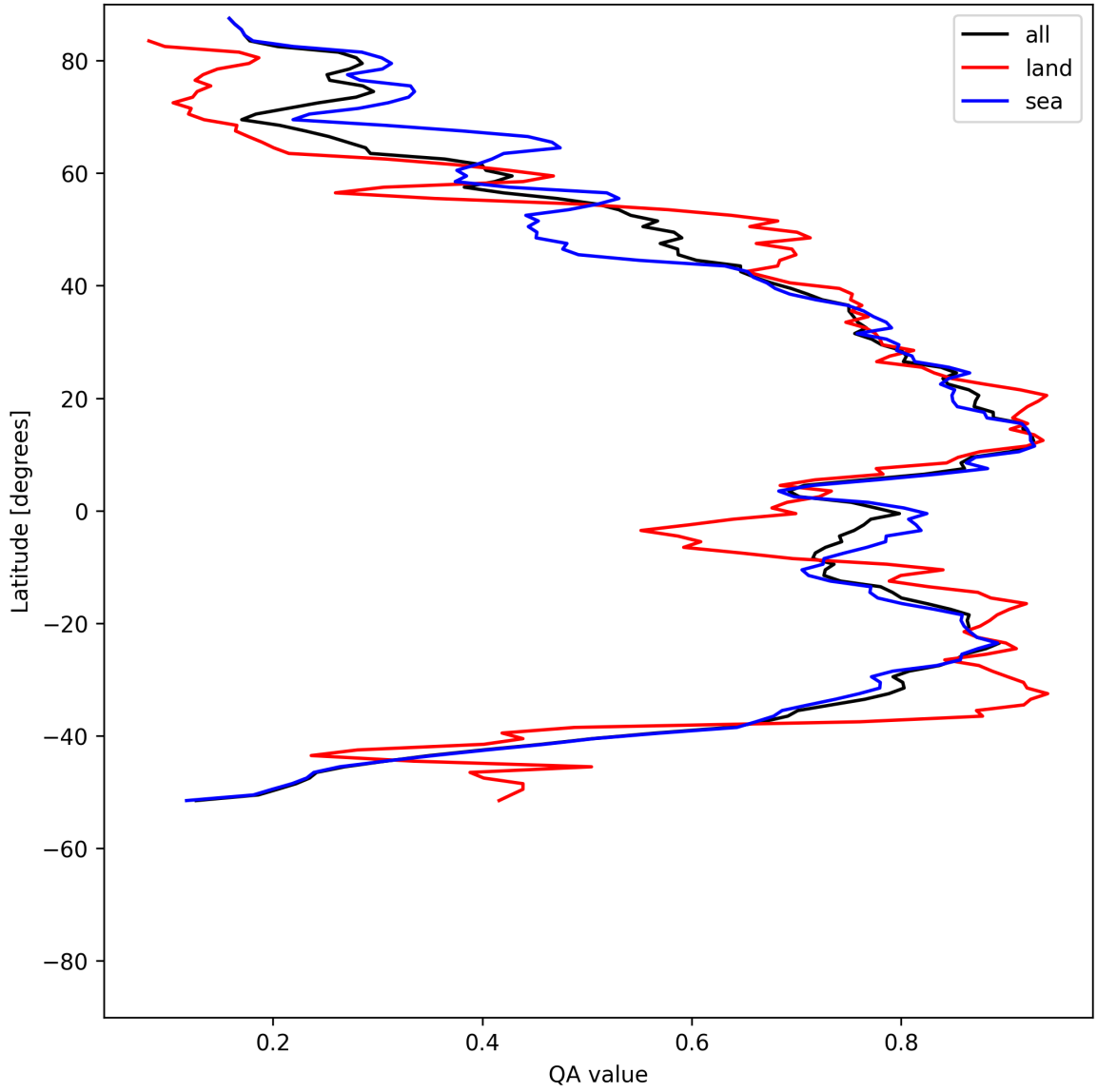

Figure 30: Zonal average of “QA value” for 2025-05-09 to 2025-05-10.

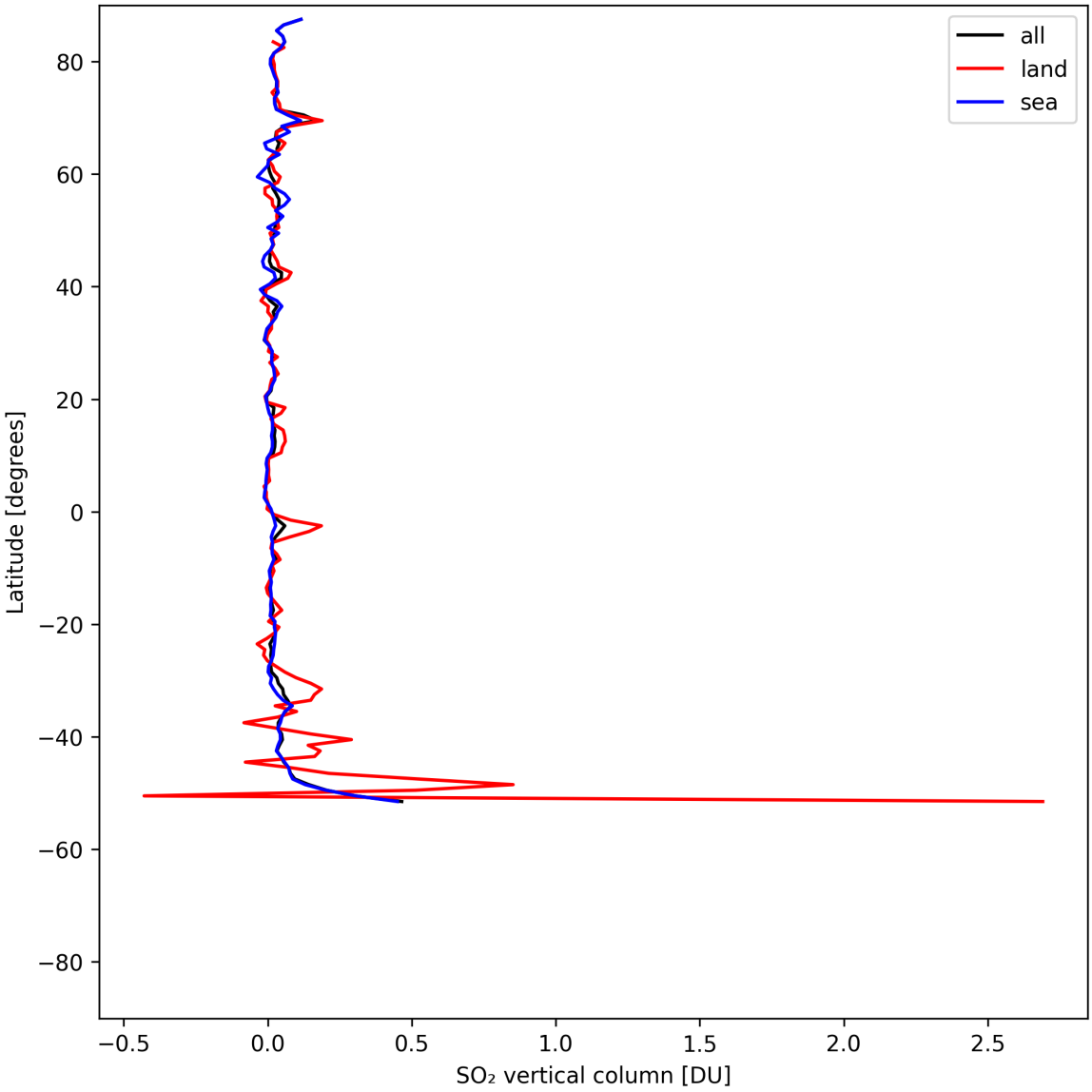

Figure 31: Zonal average of "SO_2 vertical column" for 2025-05-09 to 2025-05-10.

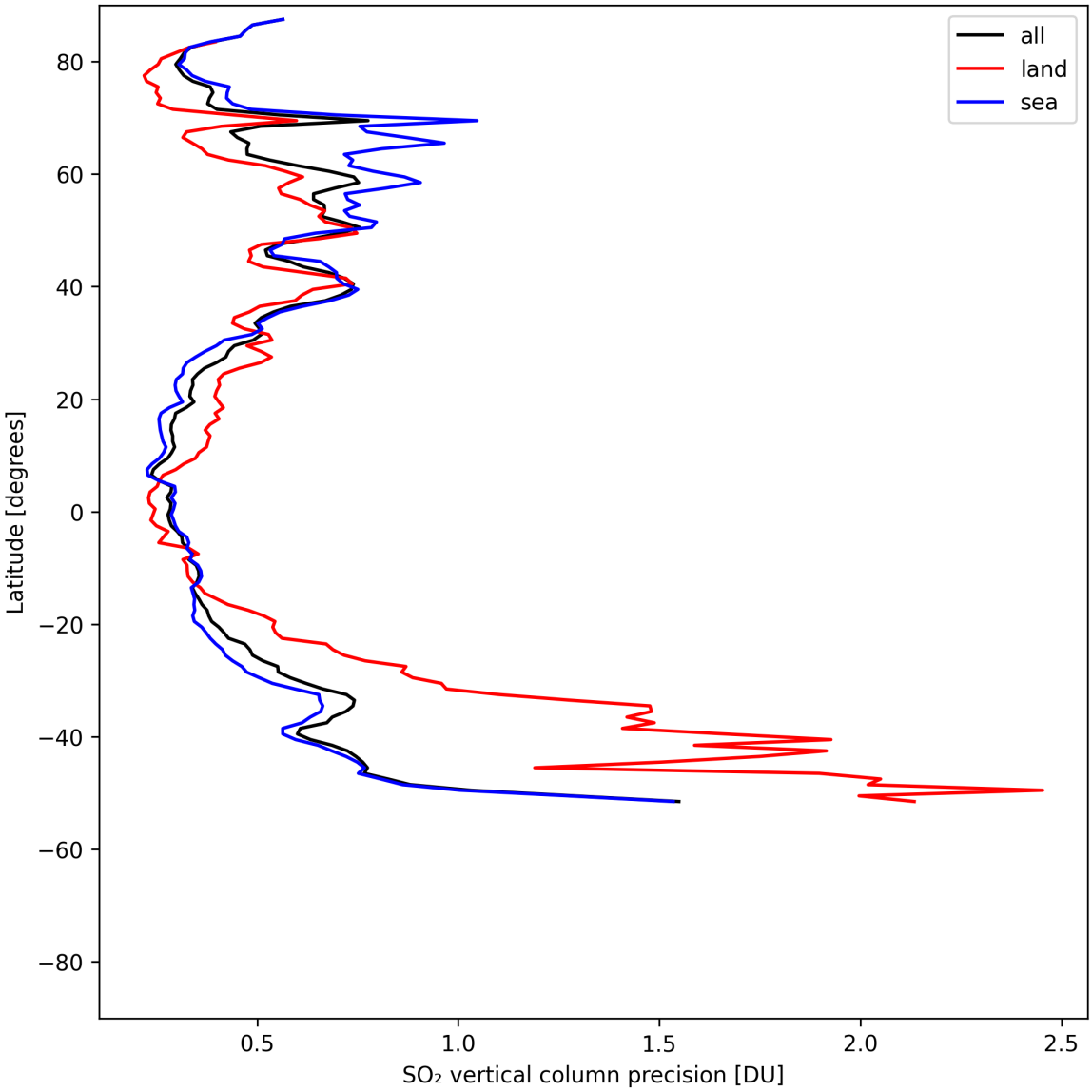

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-05-09 to 2025-05-10.

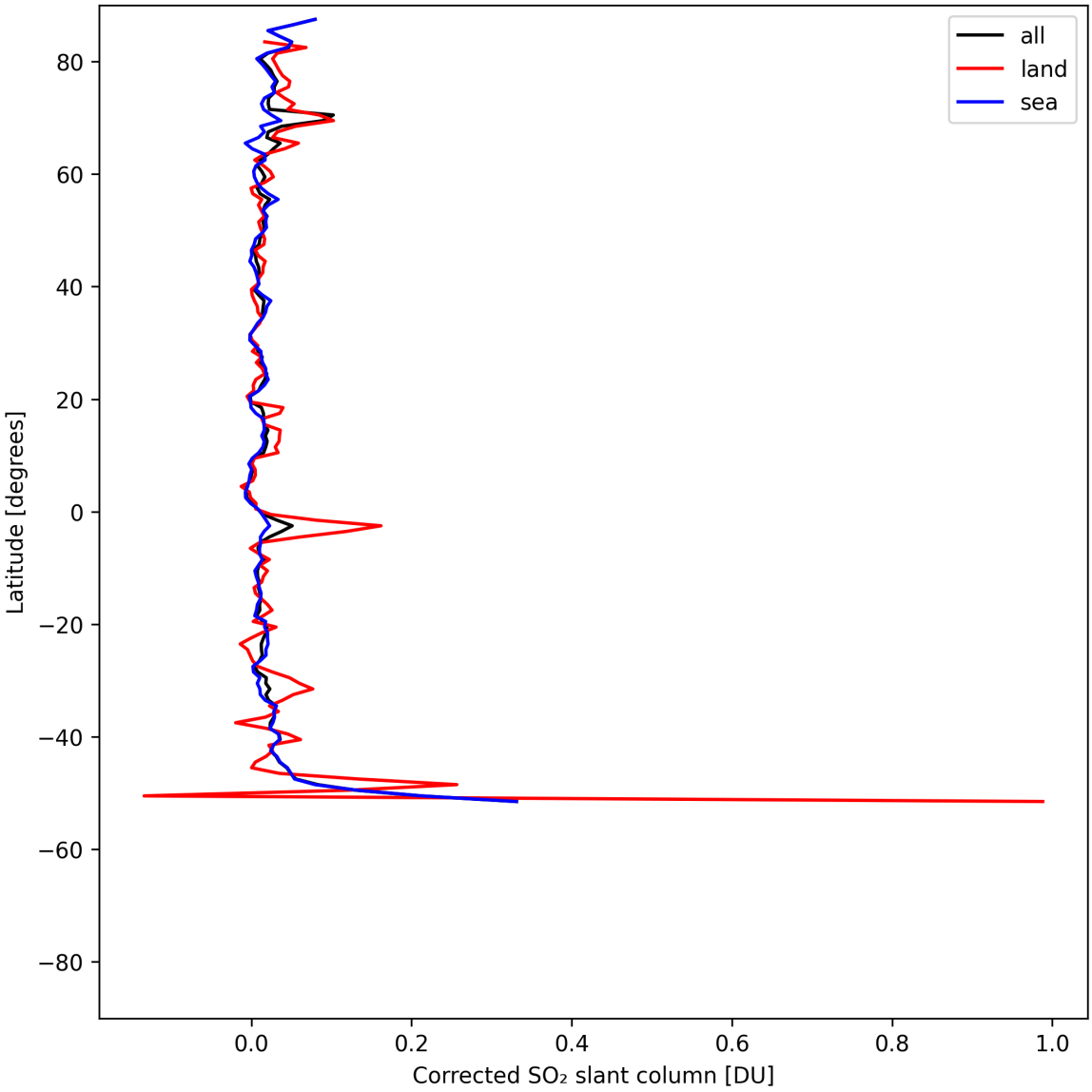

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-05-09 to 2025-05-10.

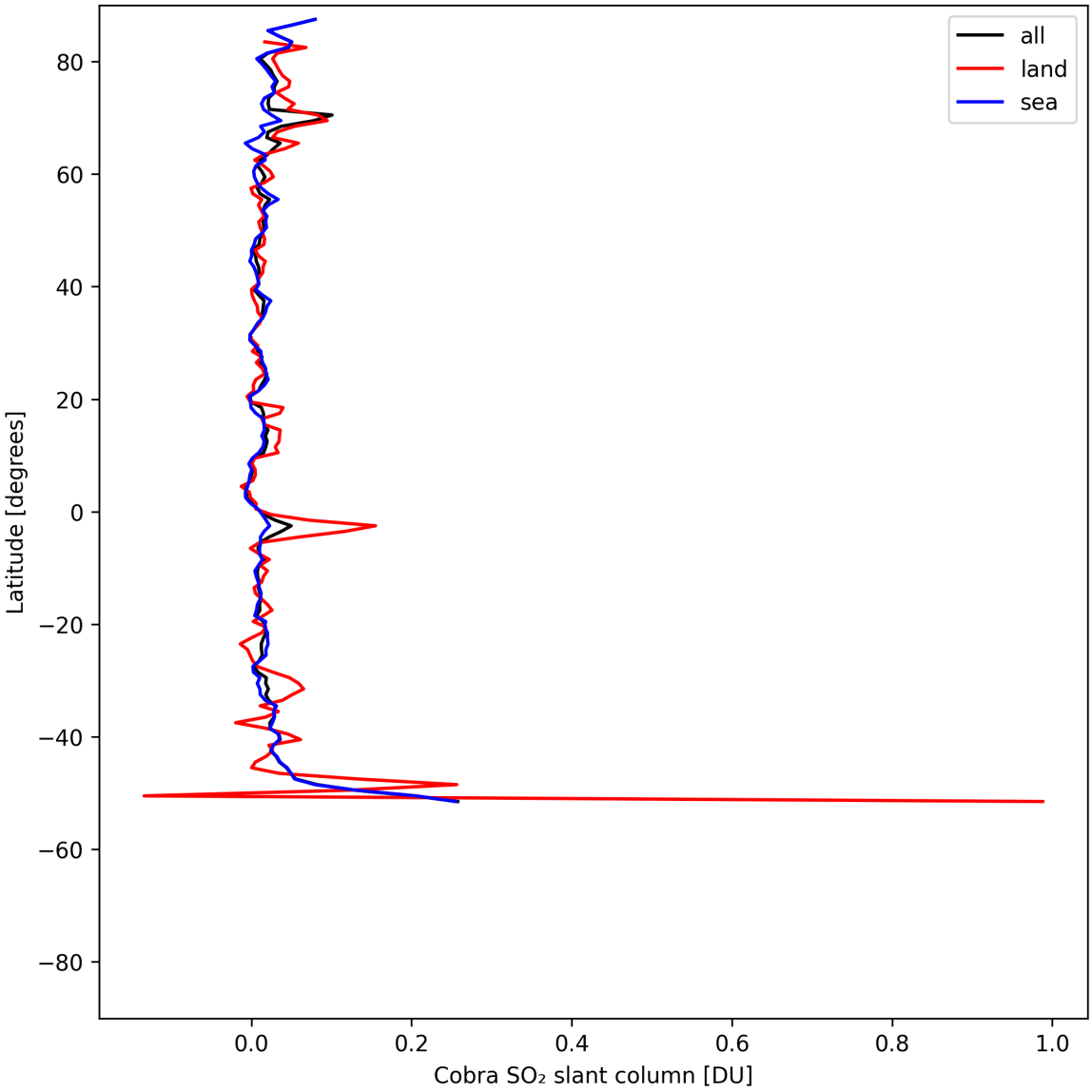

Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-05-09 to 2025-05-10.

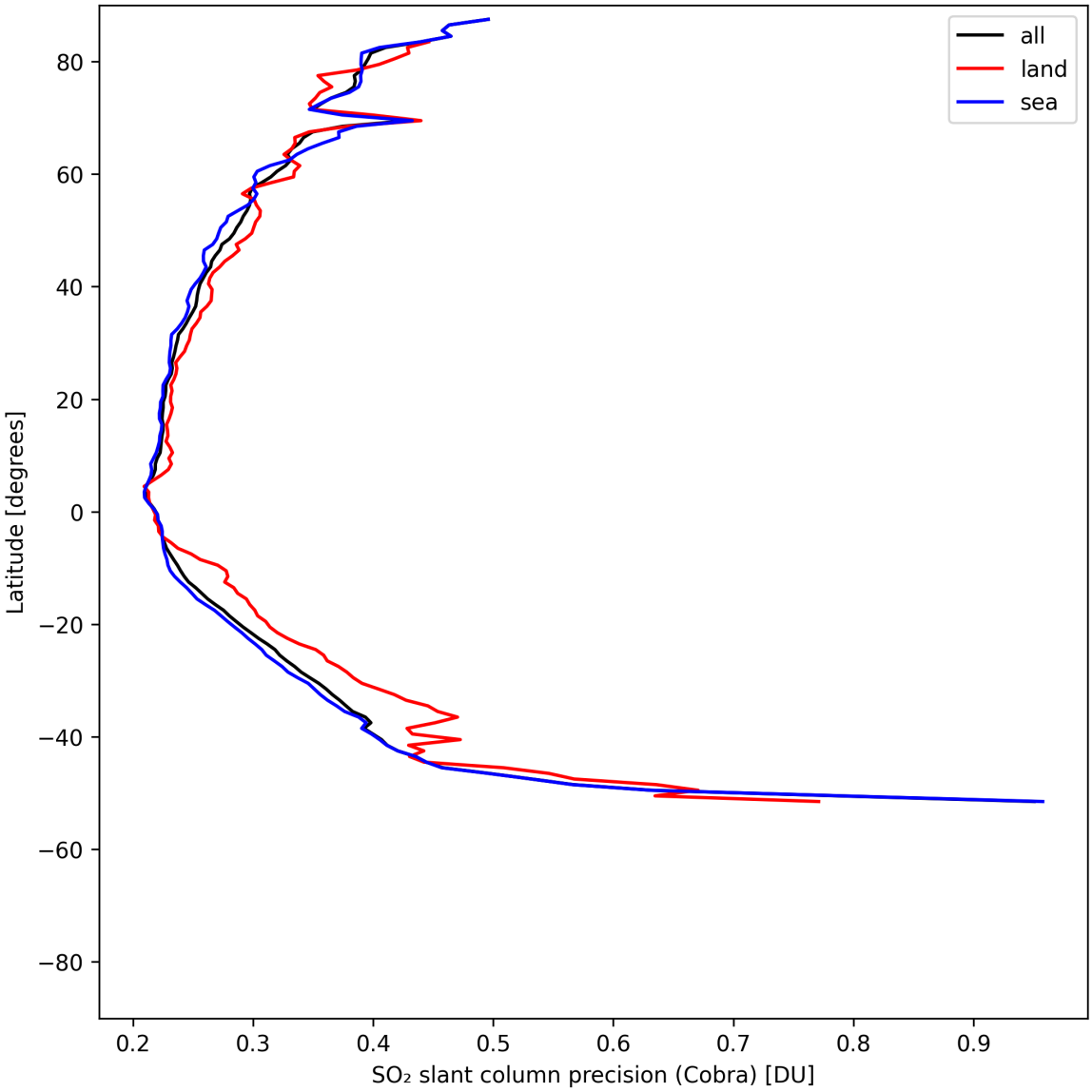

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-05-09 to 2025-05-10.

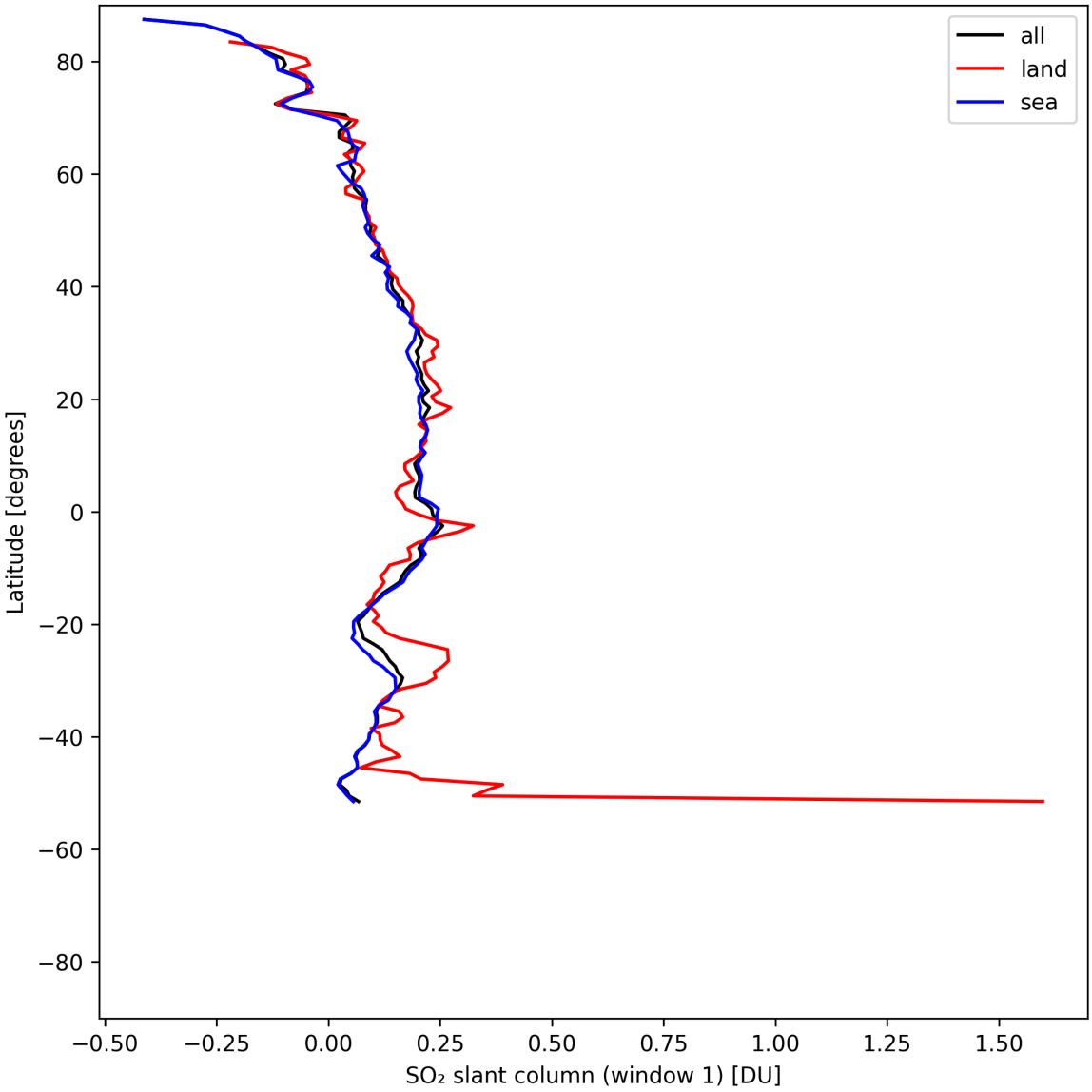

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-05-09 to 2025-05-10.

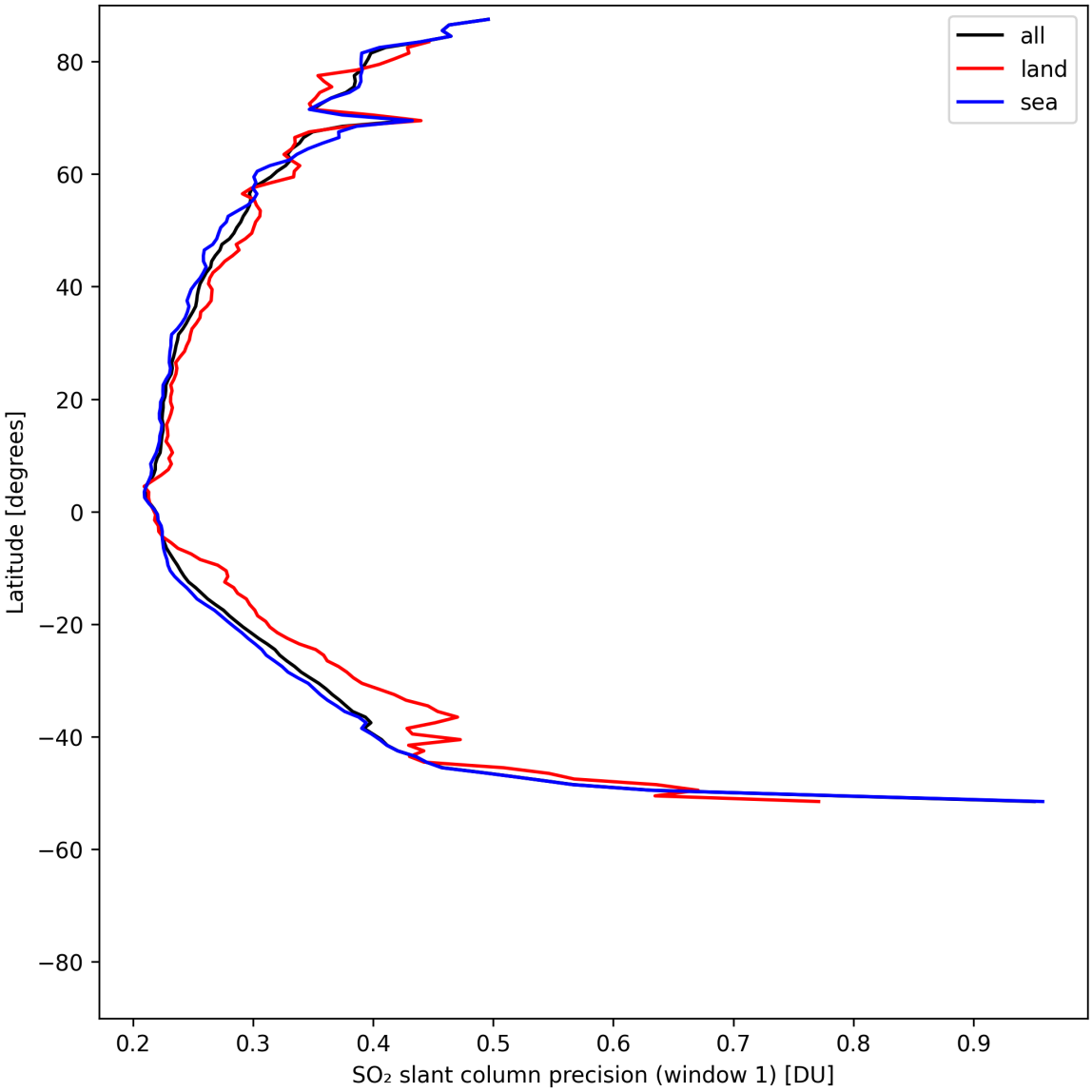

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-05-09 to 2025-05-10.

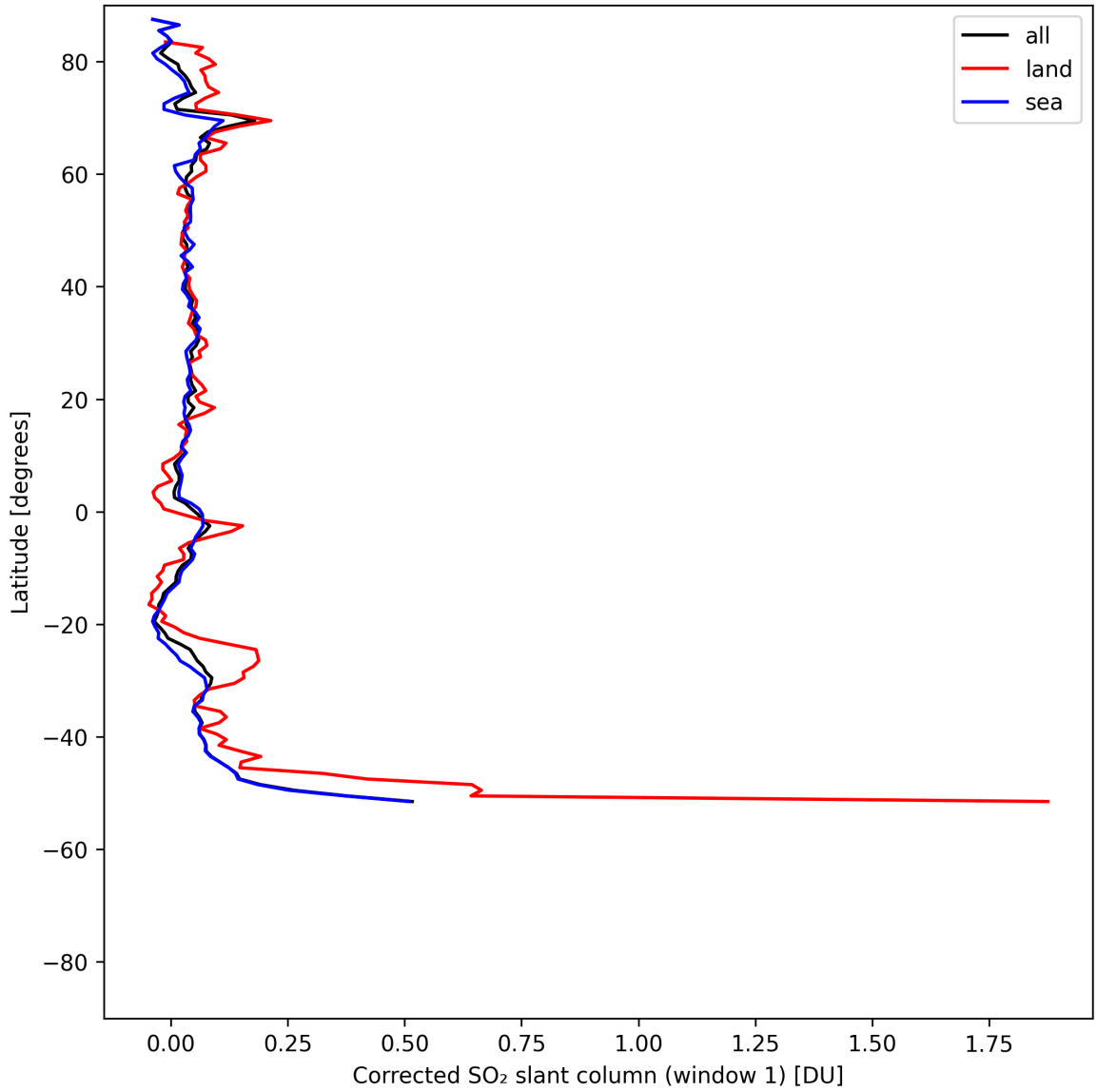

Figure 38: Zonal average of “Corrected SO_2 slant column (window 1)” for 2025-05-09 to 2025-05-10.

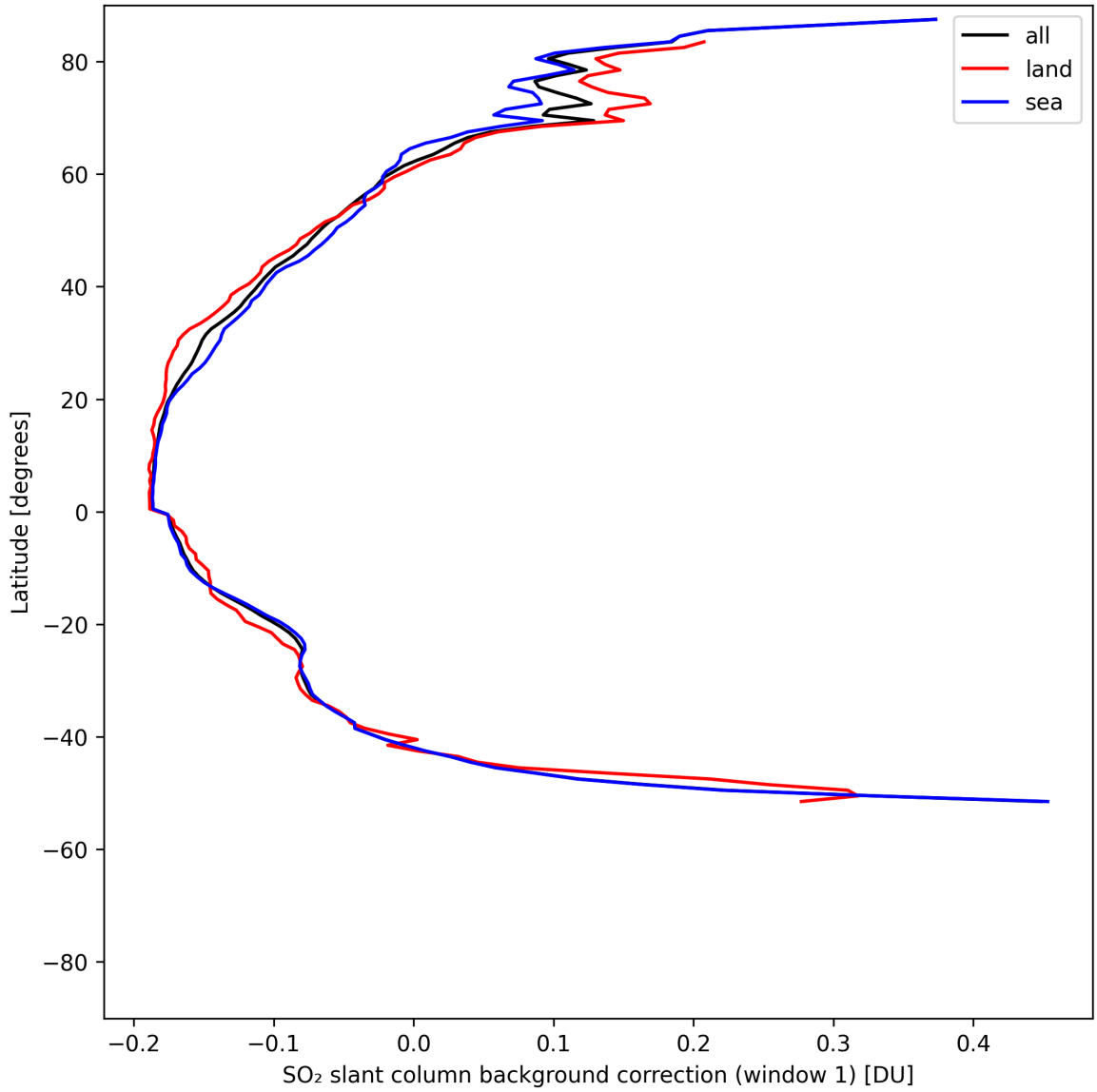

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-05-09 to 2025-05-10.

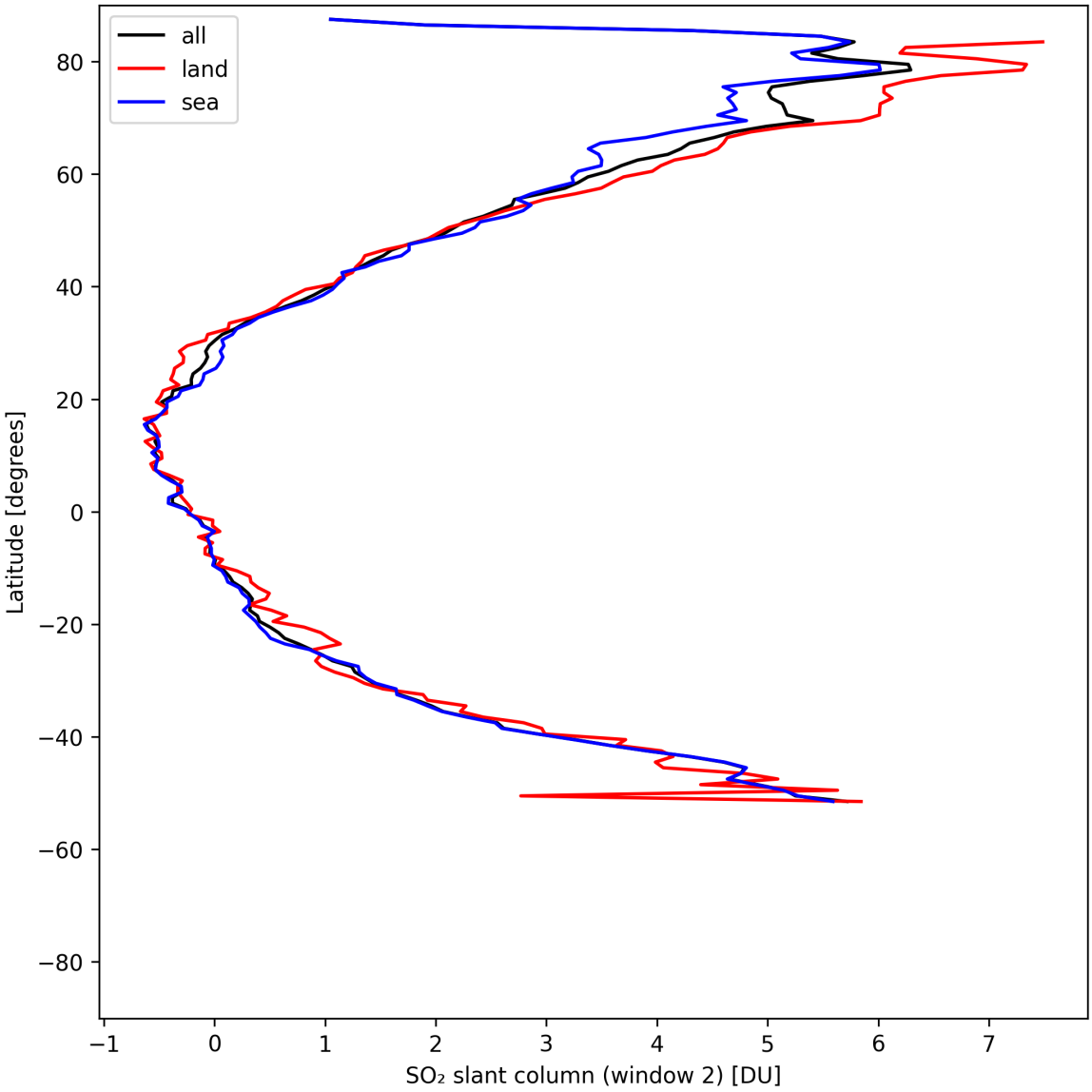

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-05-09 to 2025-05-10.

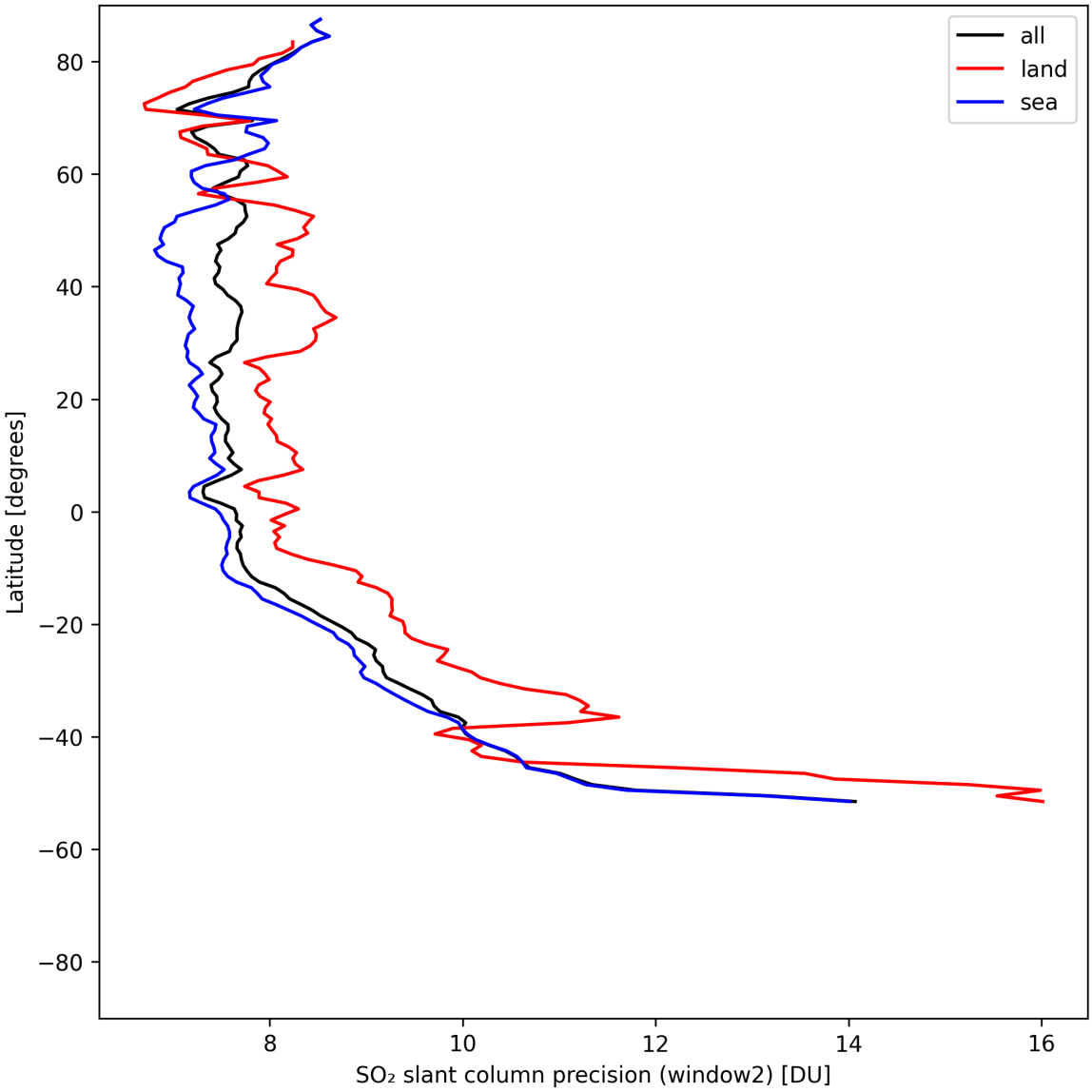

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-05-09 to 2025-05-10.

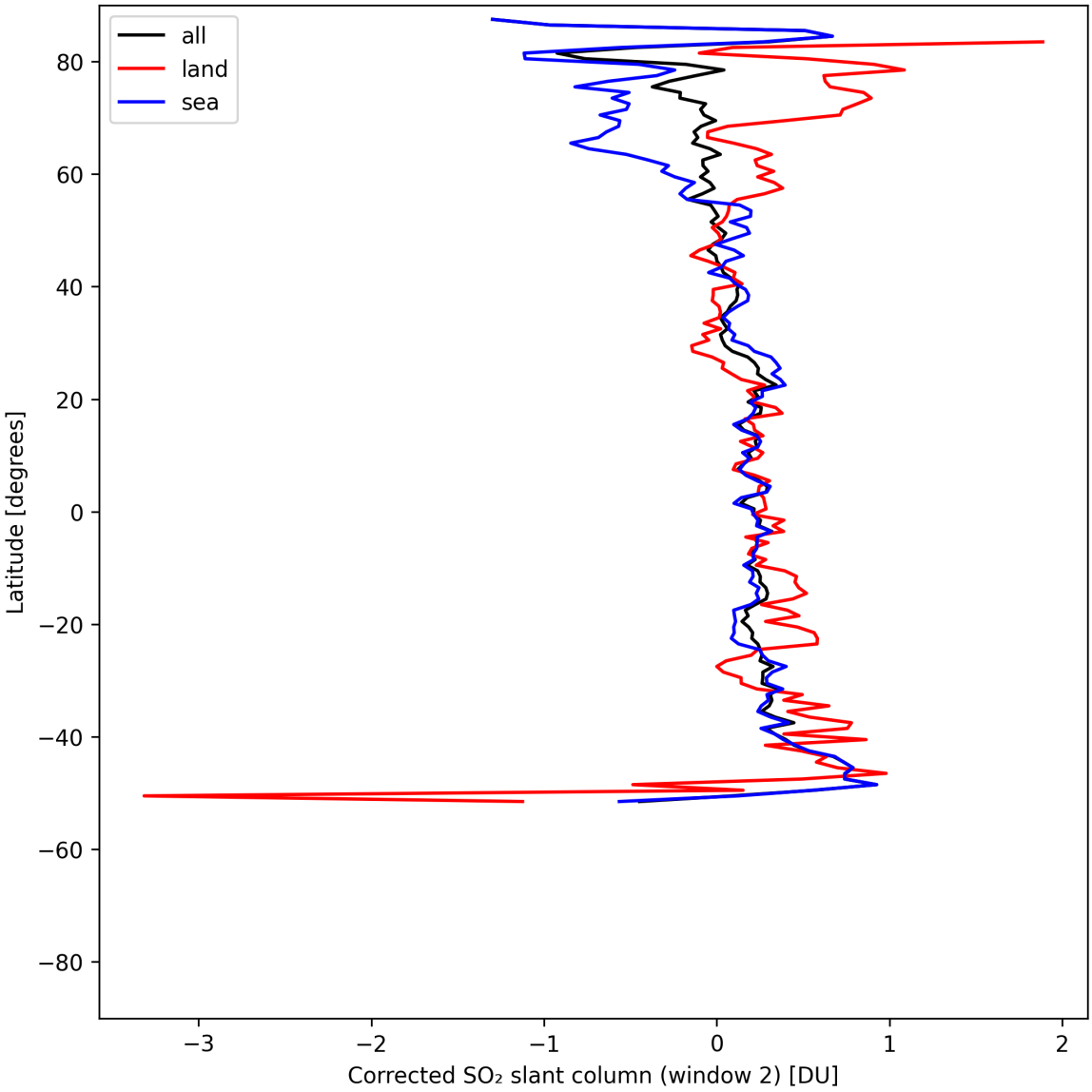

Figure 42: Zonal average of “Corrected SO_2 slant column (window 2)” for 2025-05-09 to 2025-05-10.

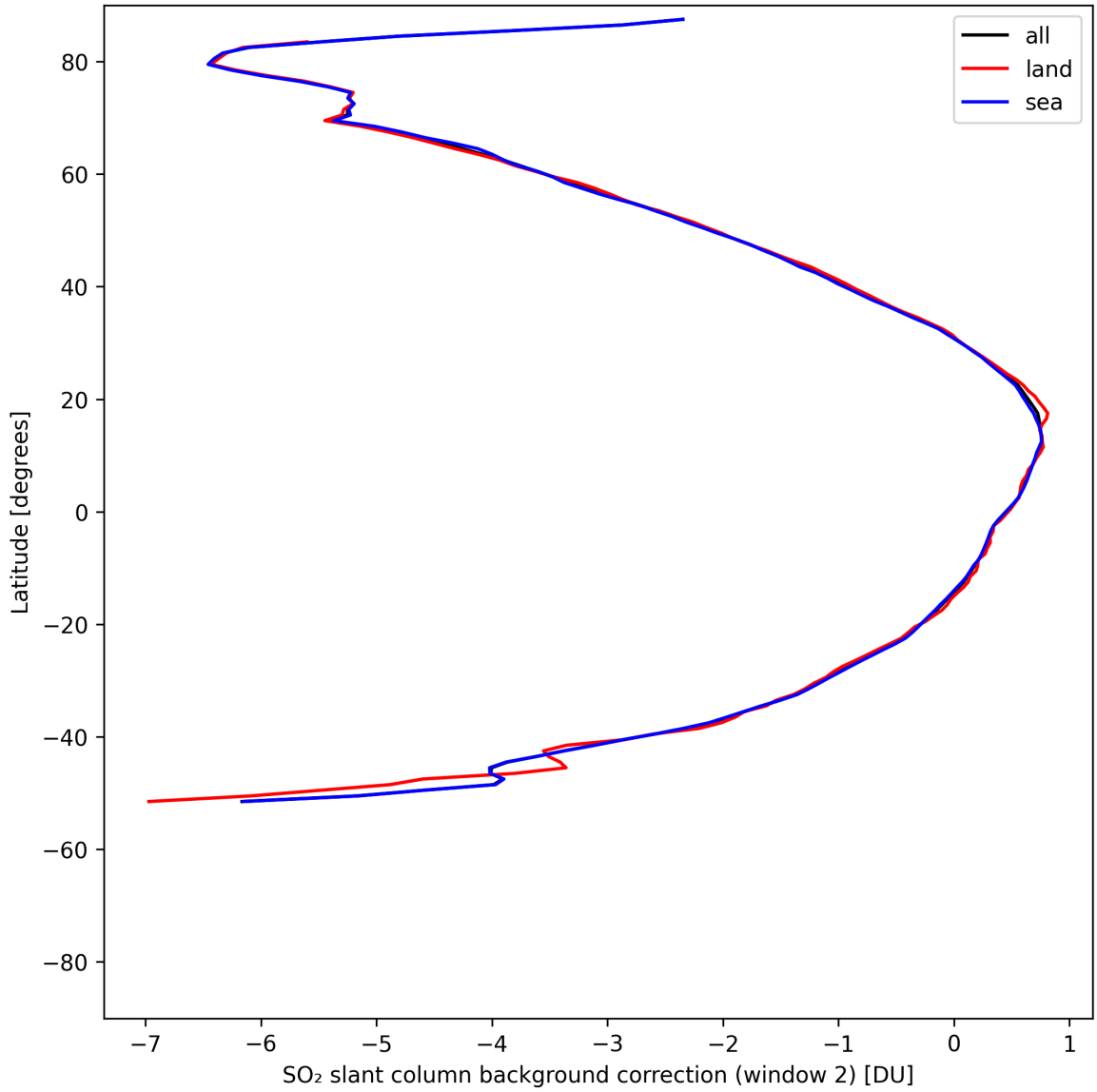

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-05-09 to 2025-05-10.

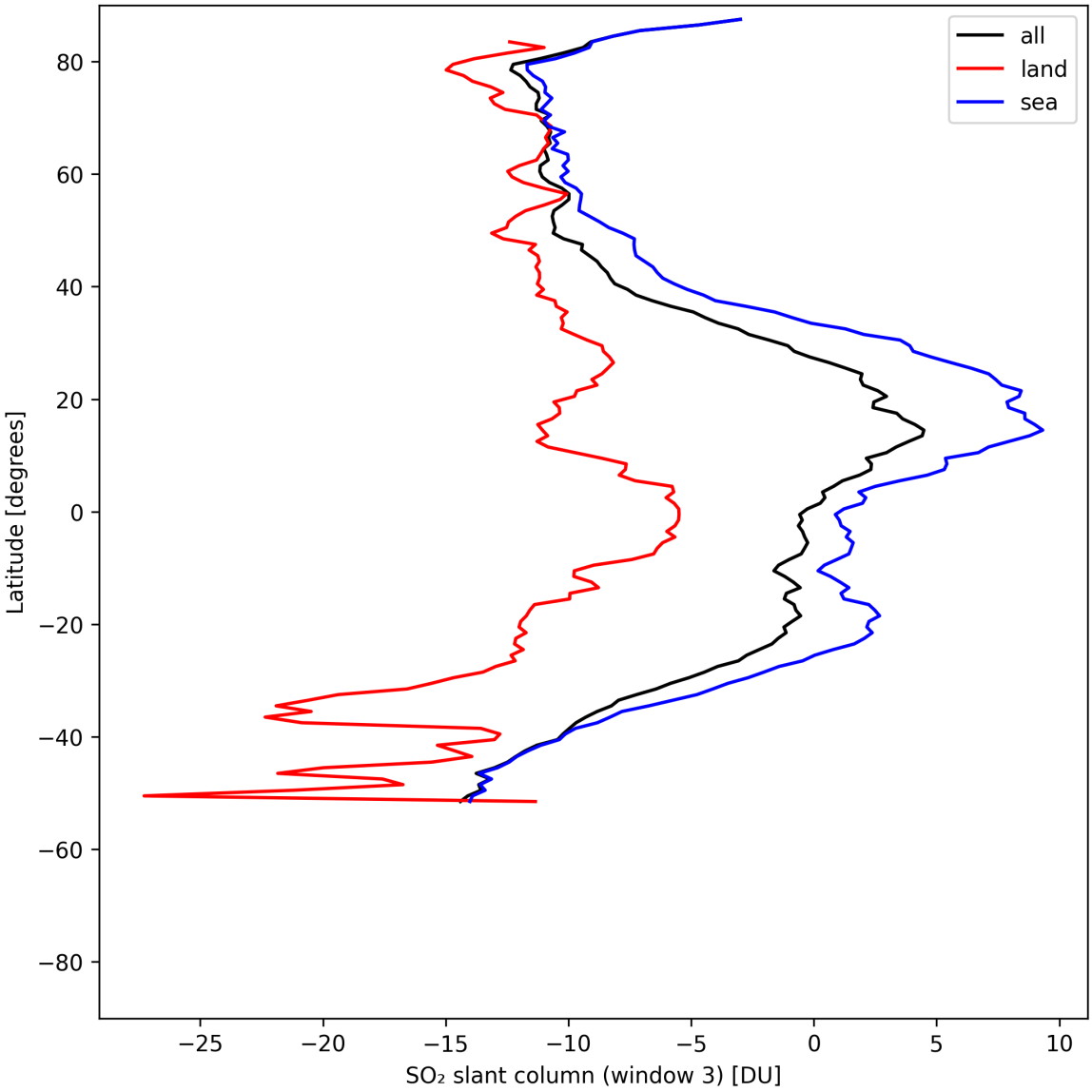

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-05-09 to 2025-05-10.

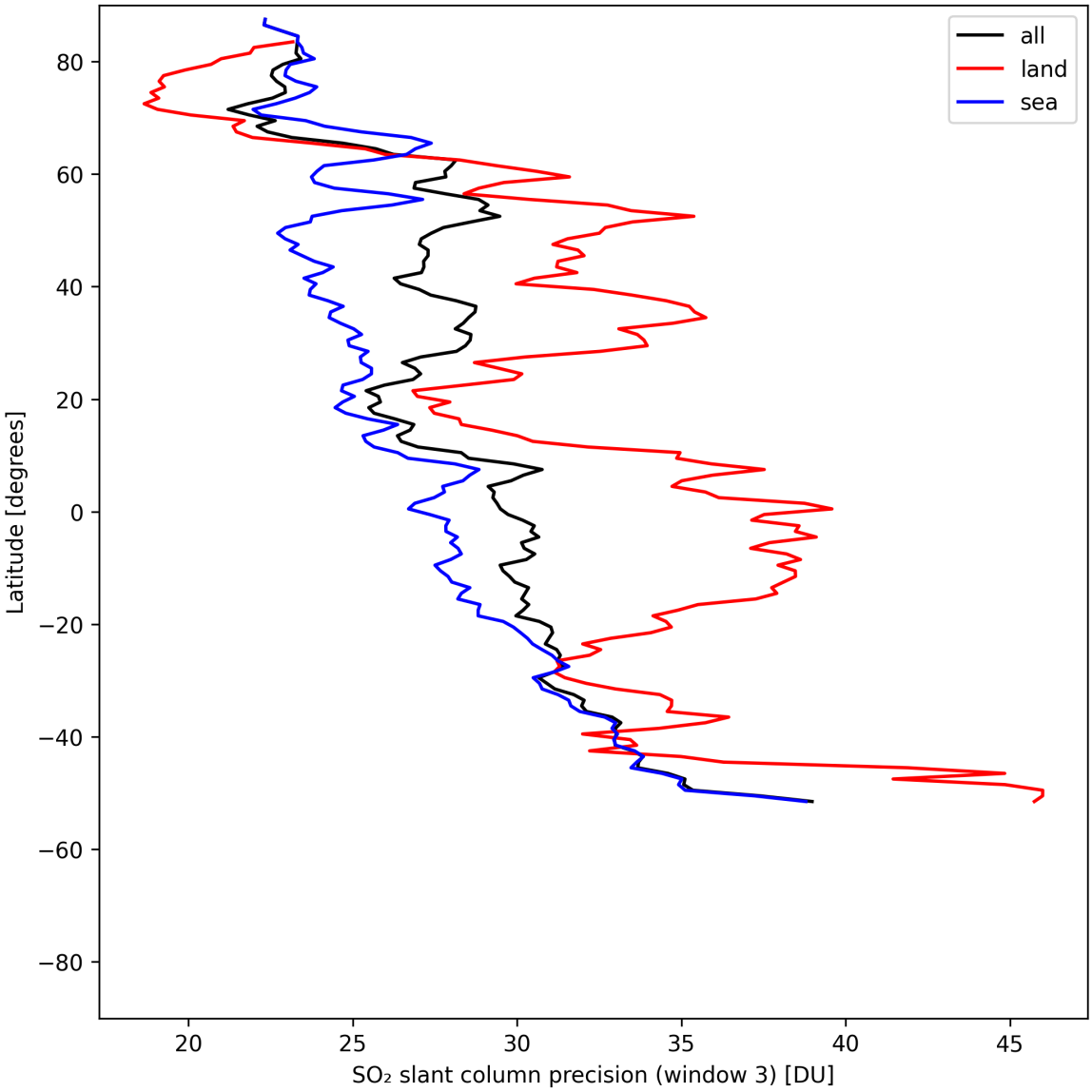

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-05-09 to 2025-05-10.

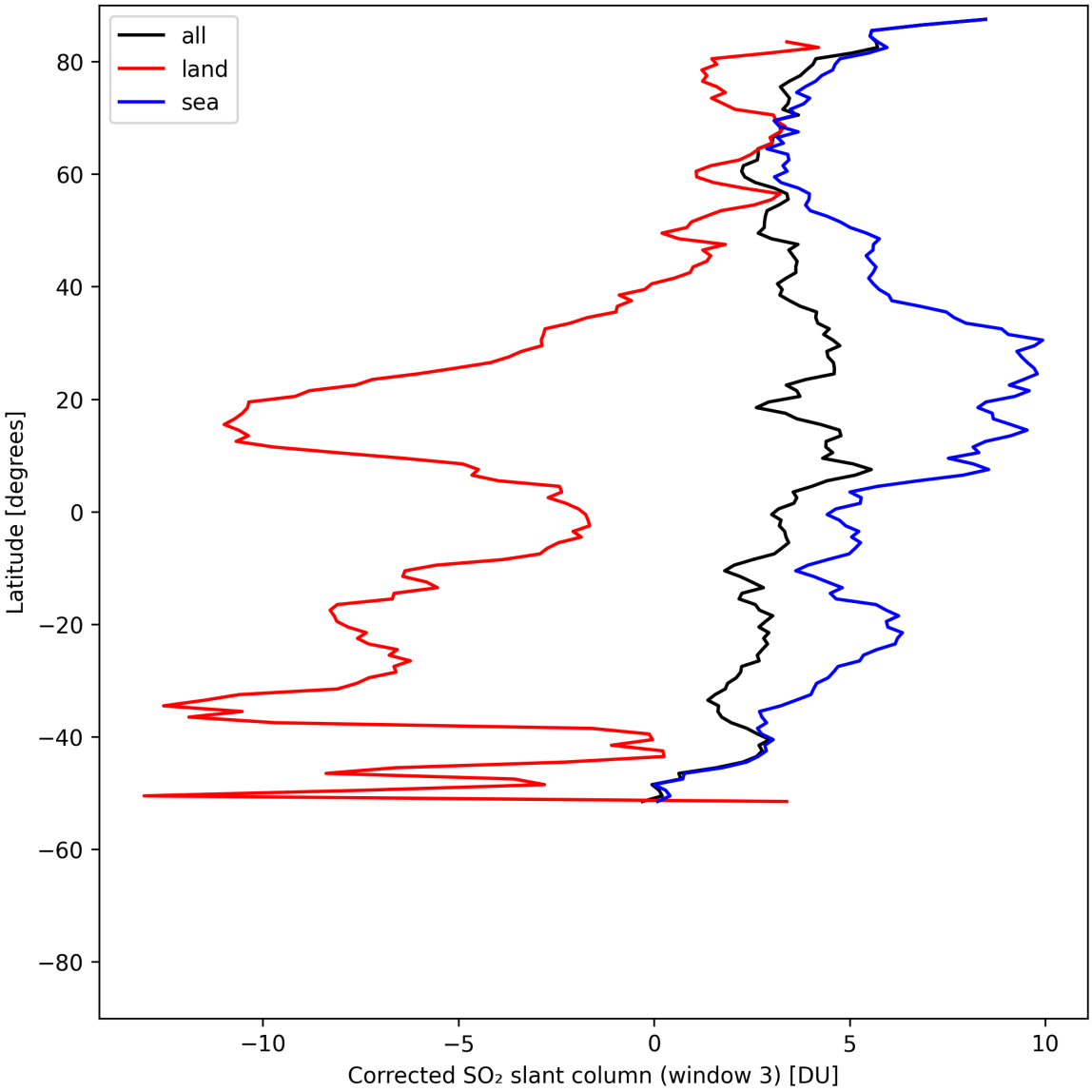

Figure 46: Zonal average of “Corrected SO_2 slant column (window 3)” for 2025-05-09 to 2025-05-10.

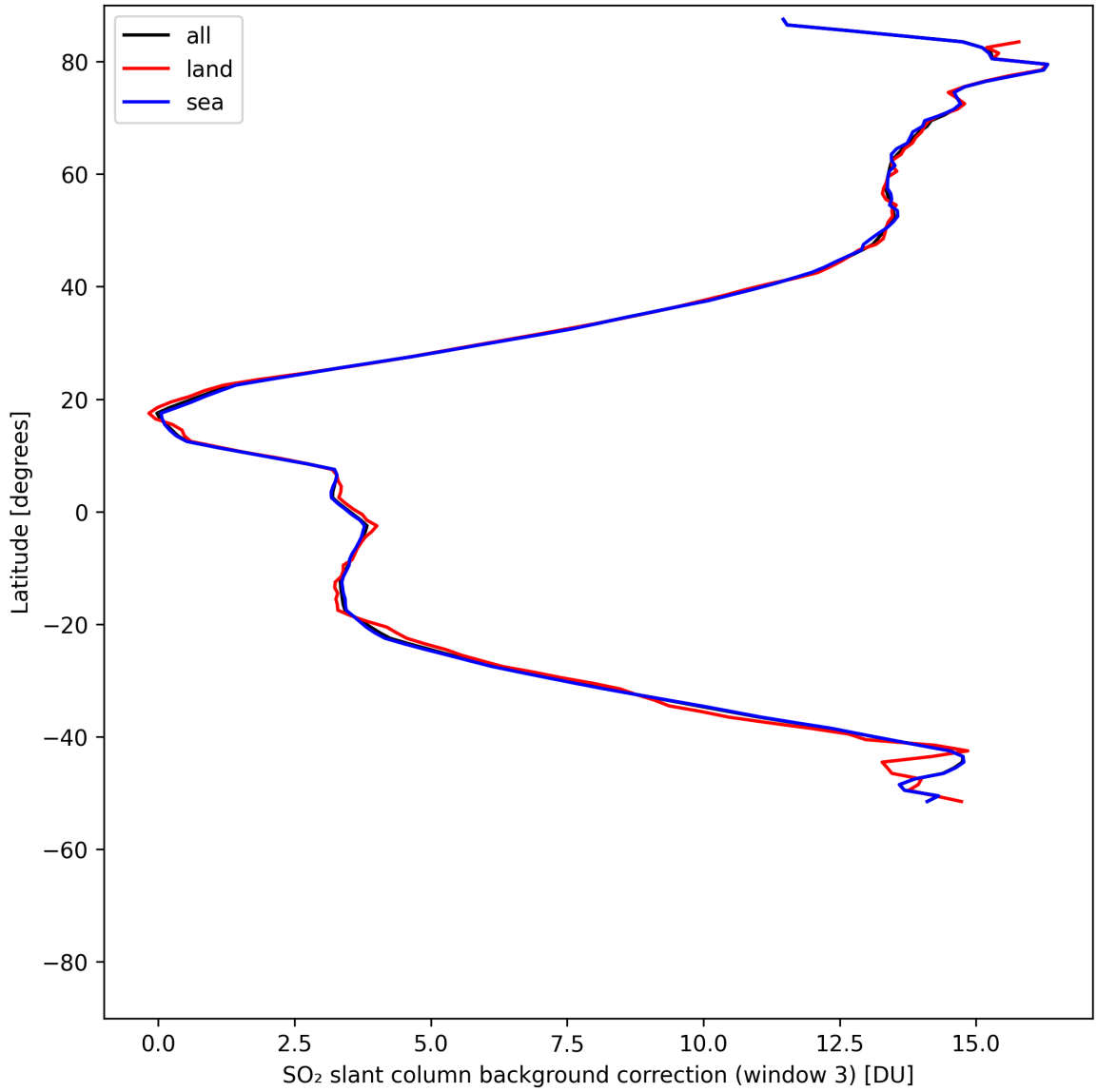

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-05-09 to 2025-05-10.

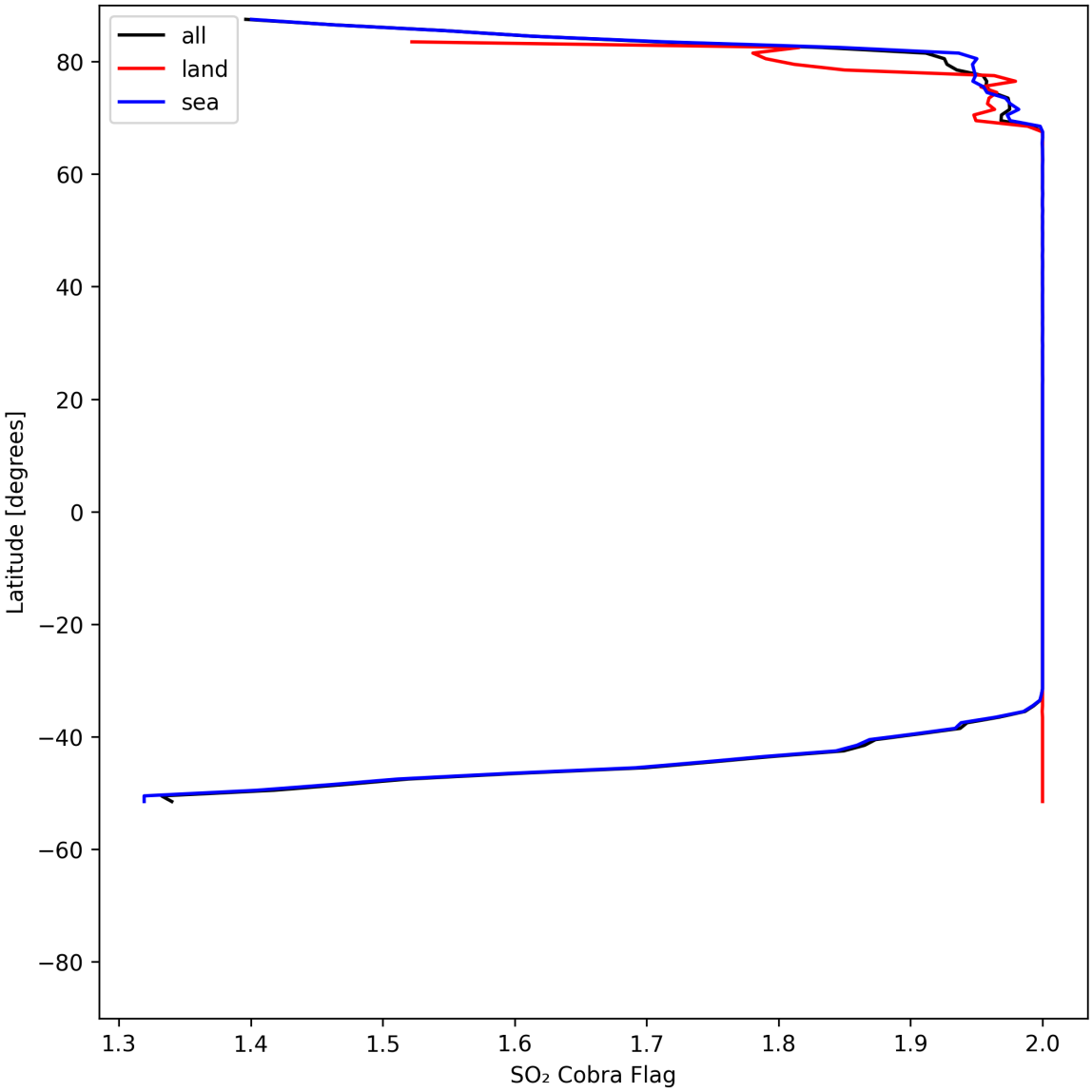

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-05-09 to 2025-05-10.

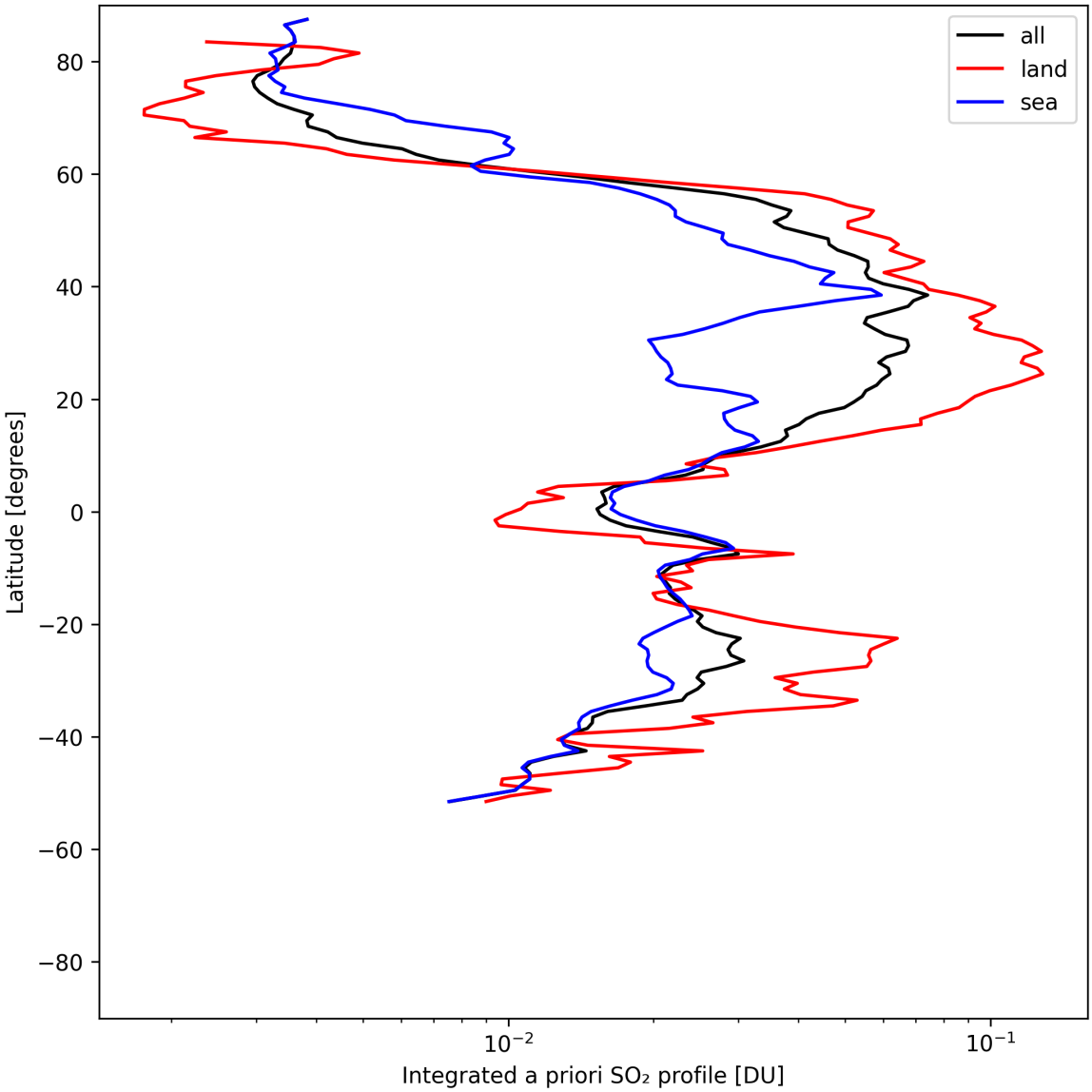

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-05-09 to 2025-05-10.

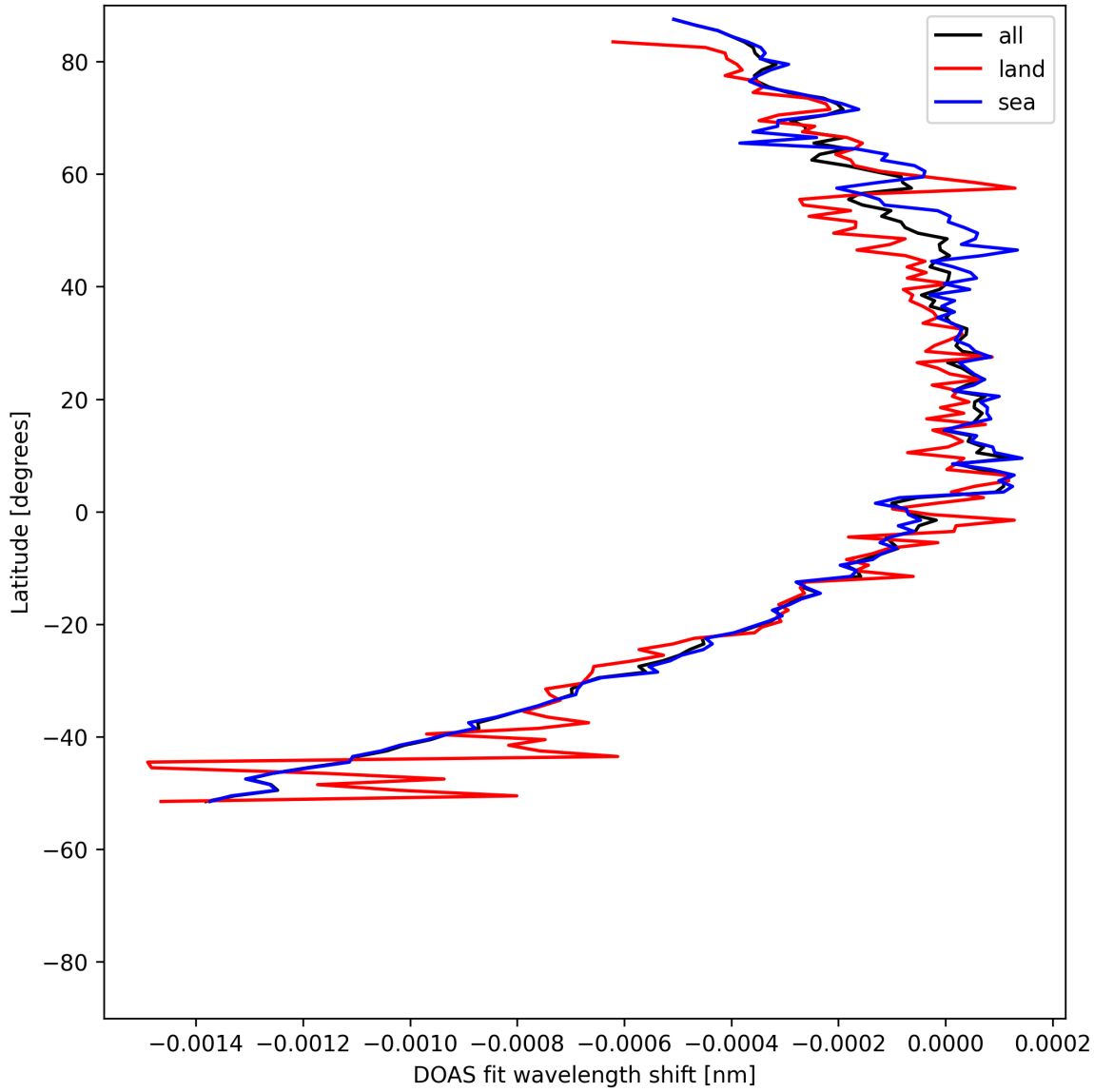

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-05-09 to 2025-05-10.

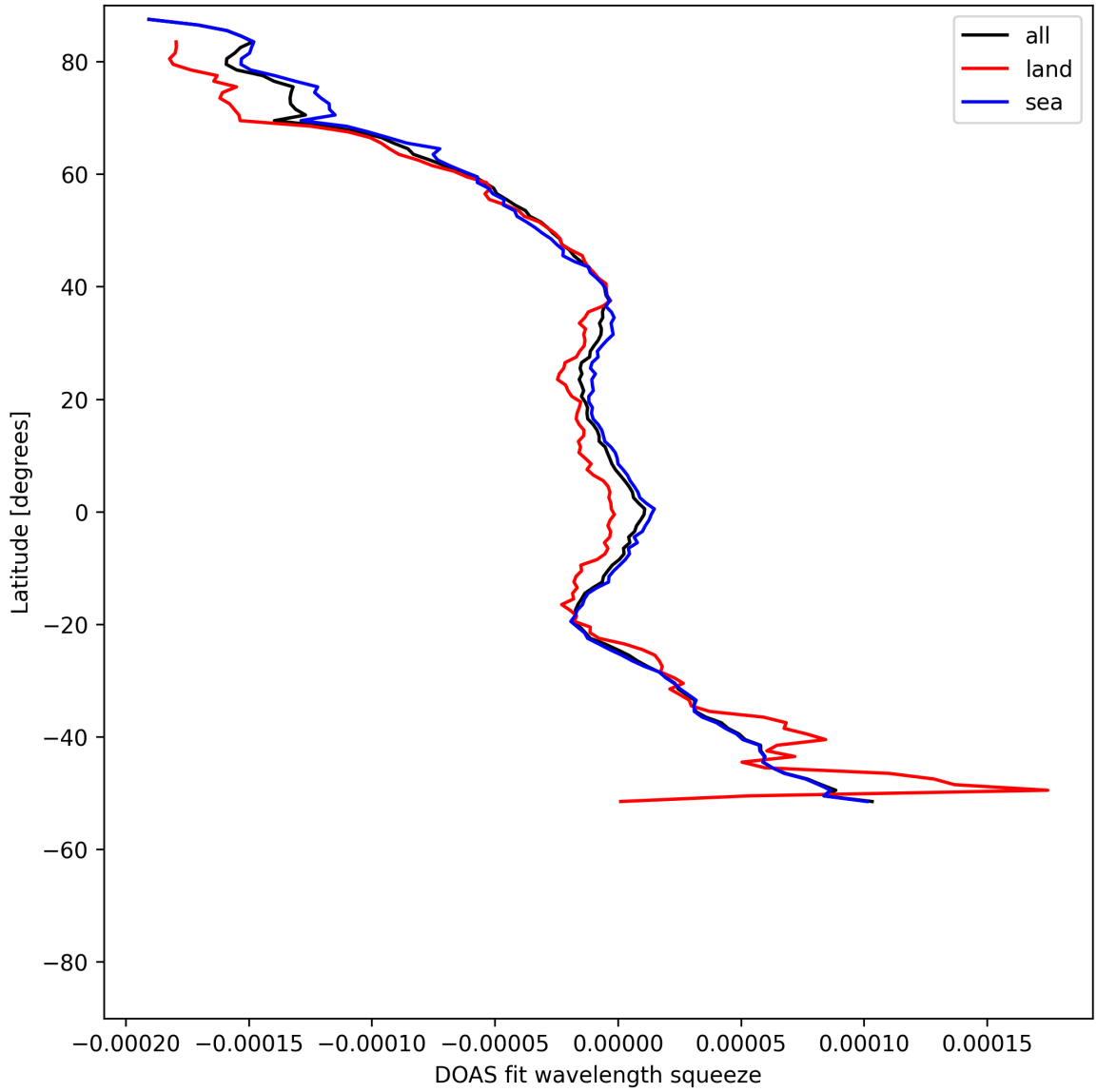

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-05-09 to 2025-05-10.

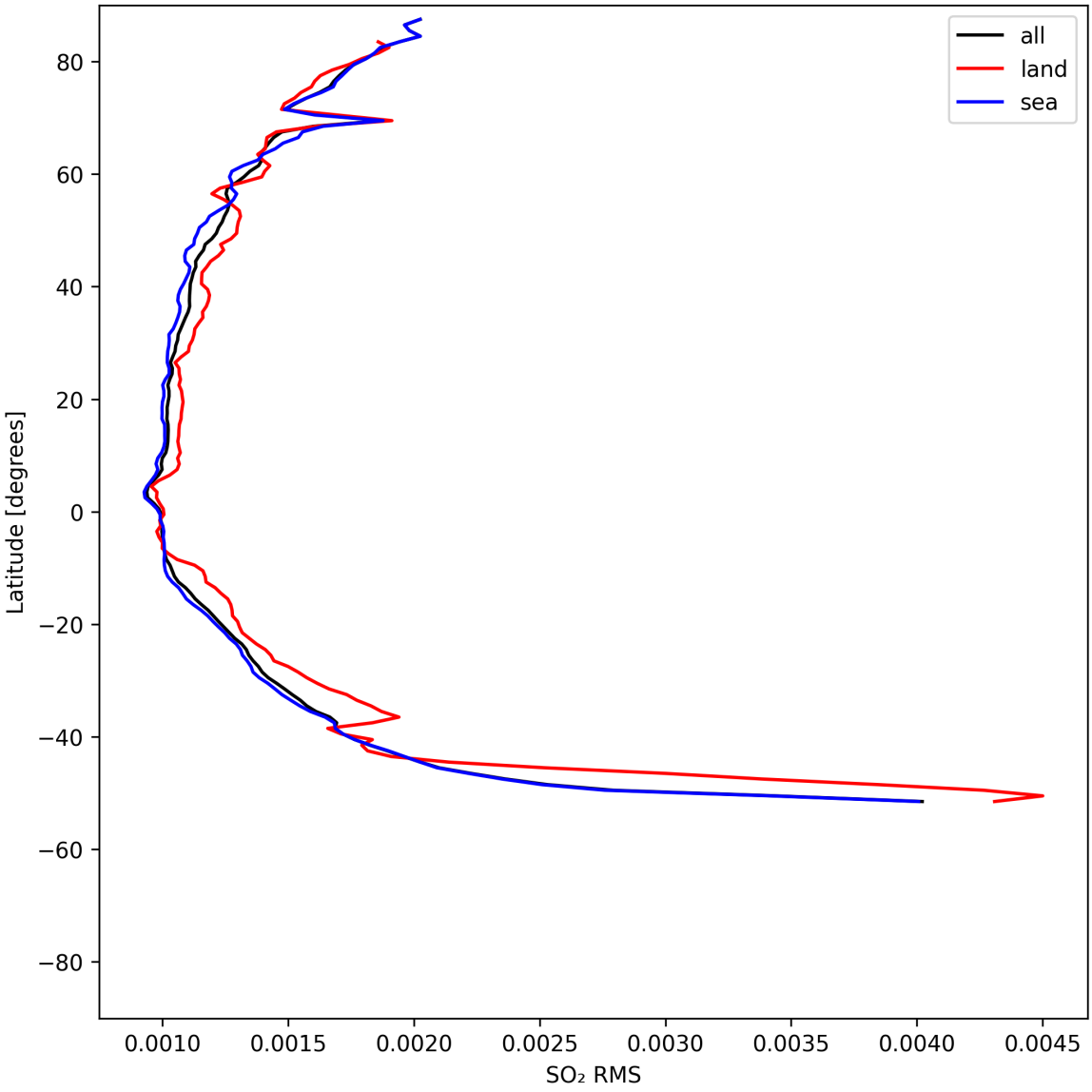

Figure 52: Zonal average of "SO_2 RMS" for 2025-05-09 to 2025-05-10.

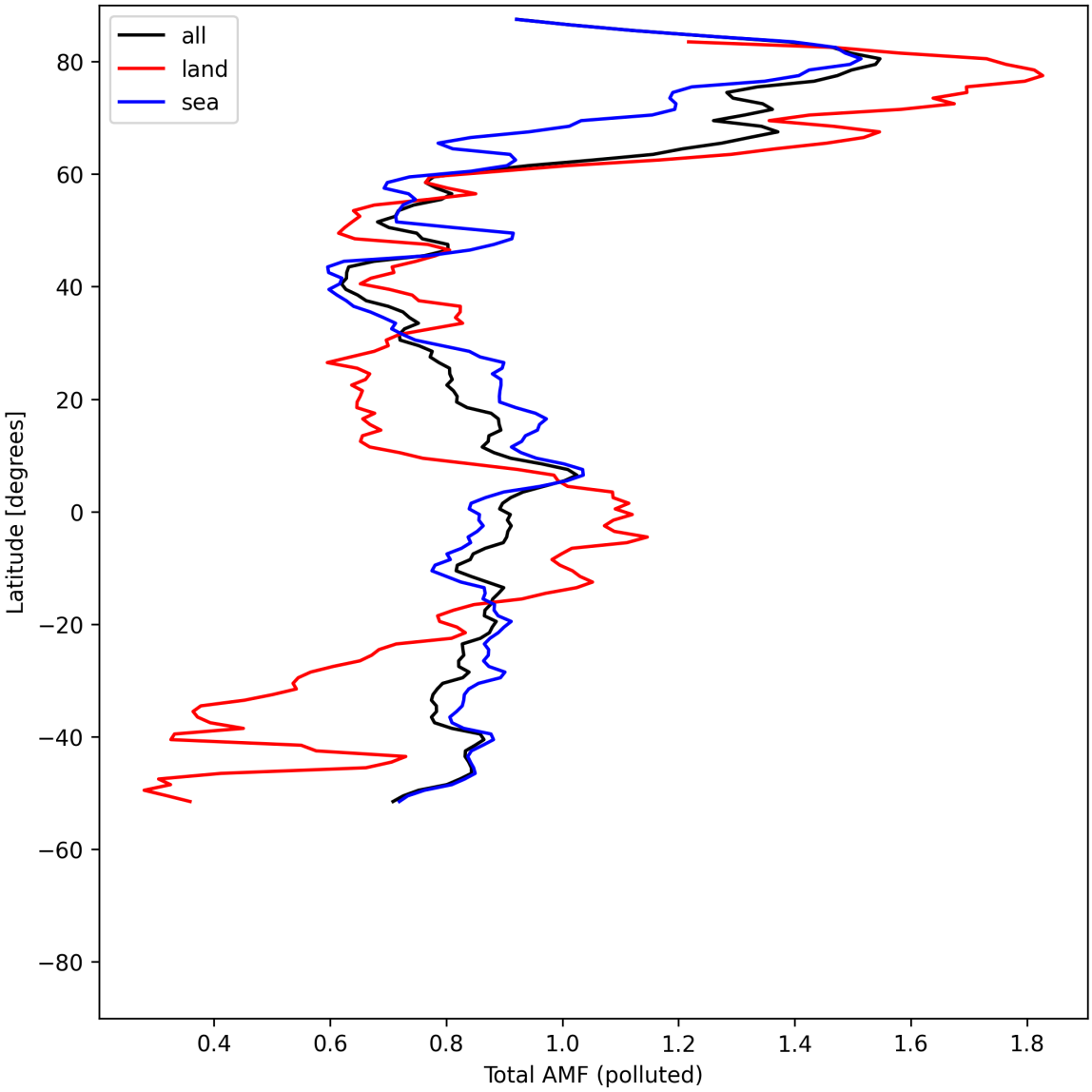

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-05-09 to 2025-05-10.

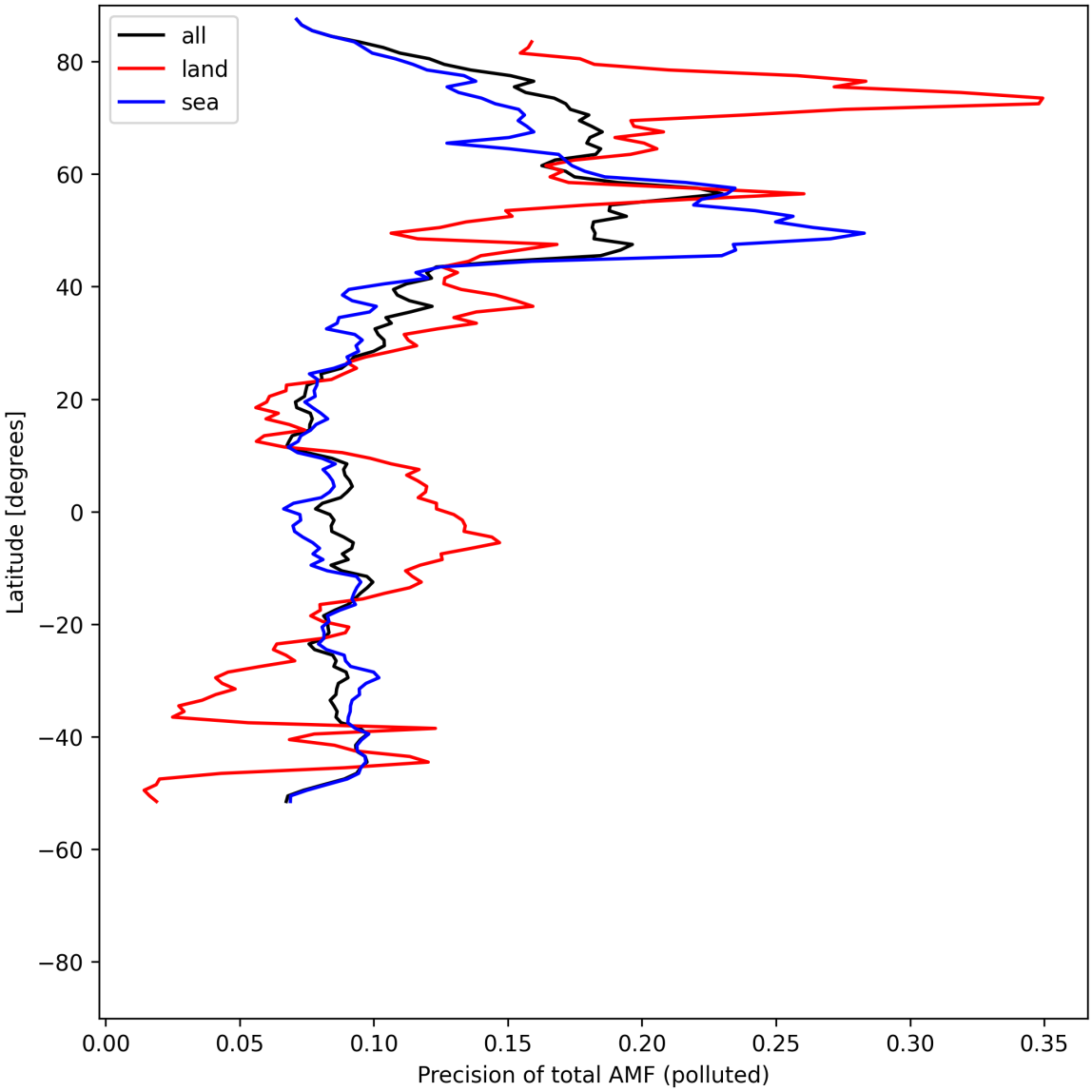

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-05-09 to 2025-05-10.

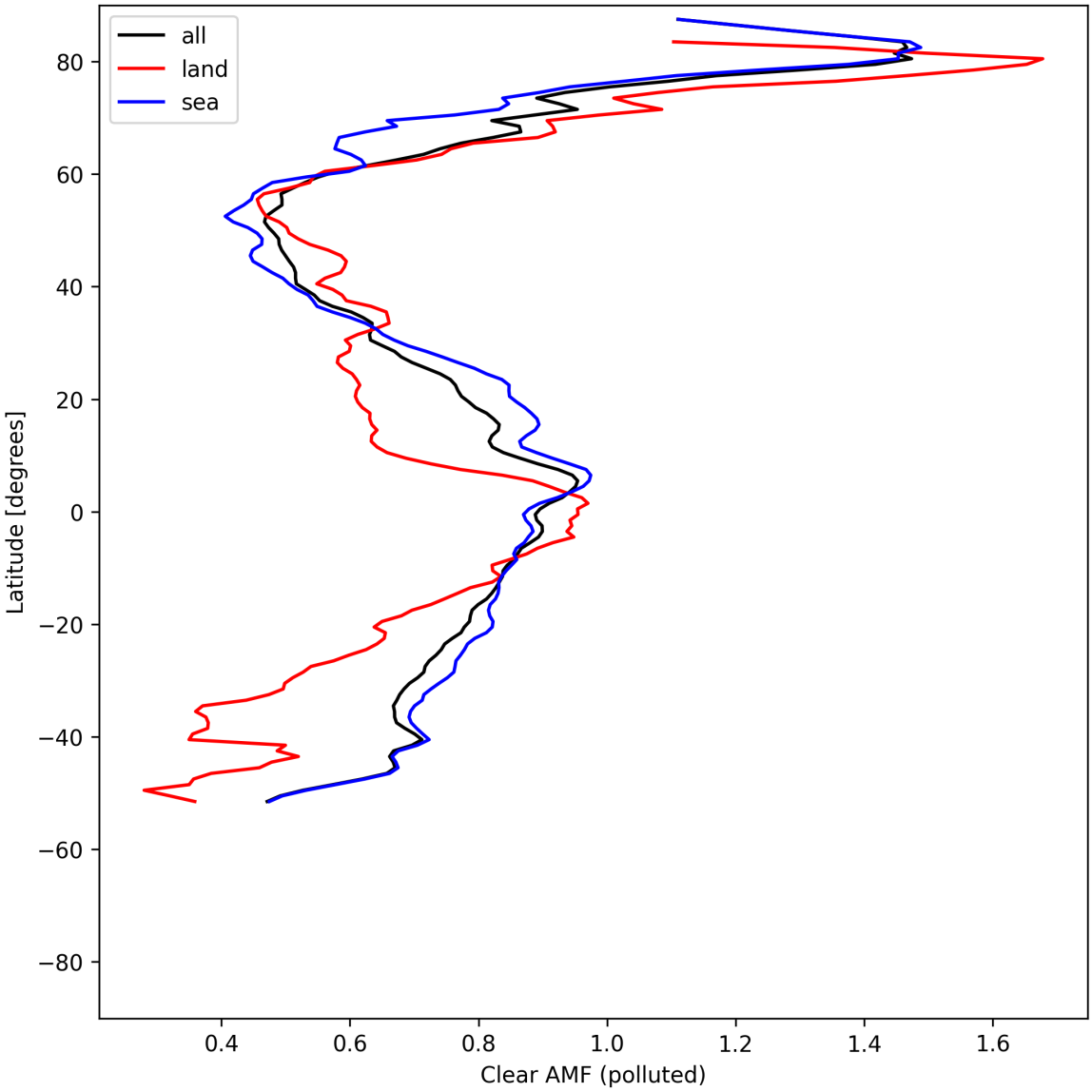

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-05-09 to 2025-05-10.

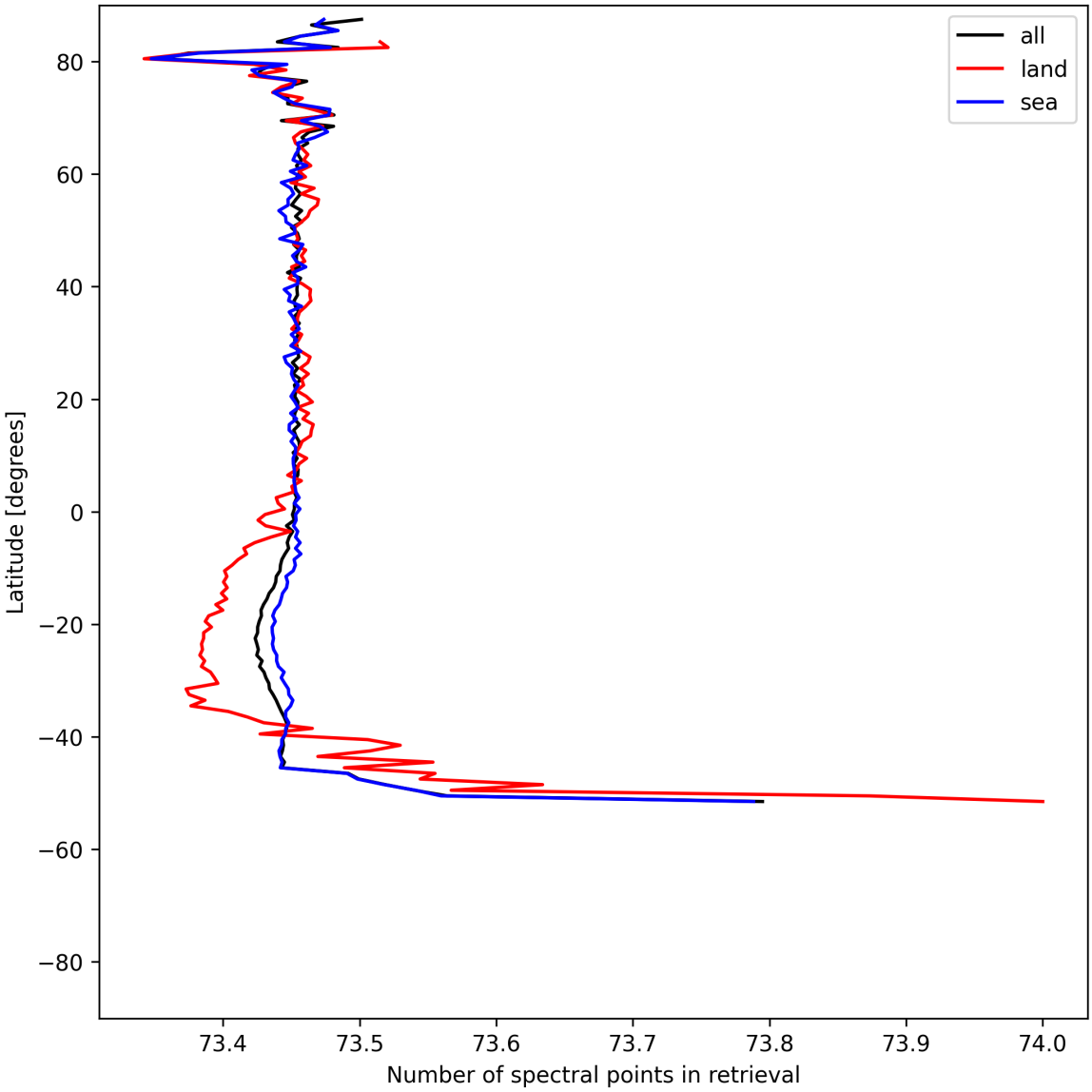

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-05-09 to 2025-05-10.

8 Histograms

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

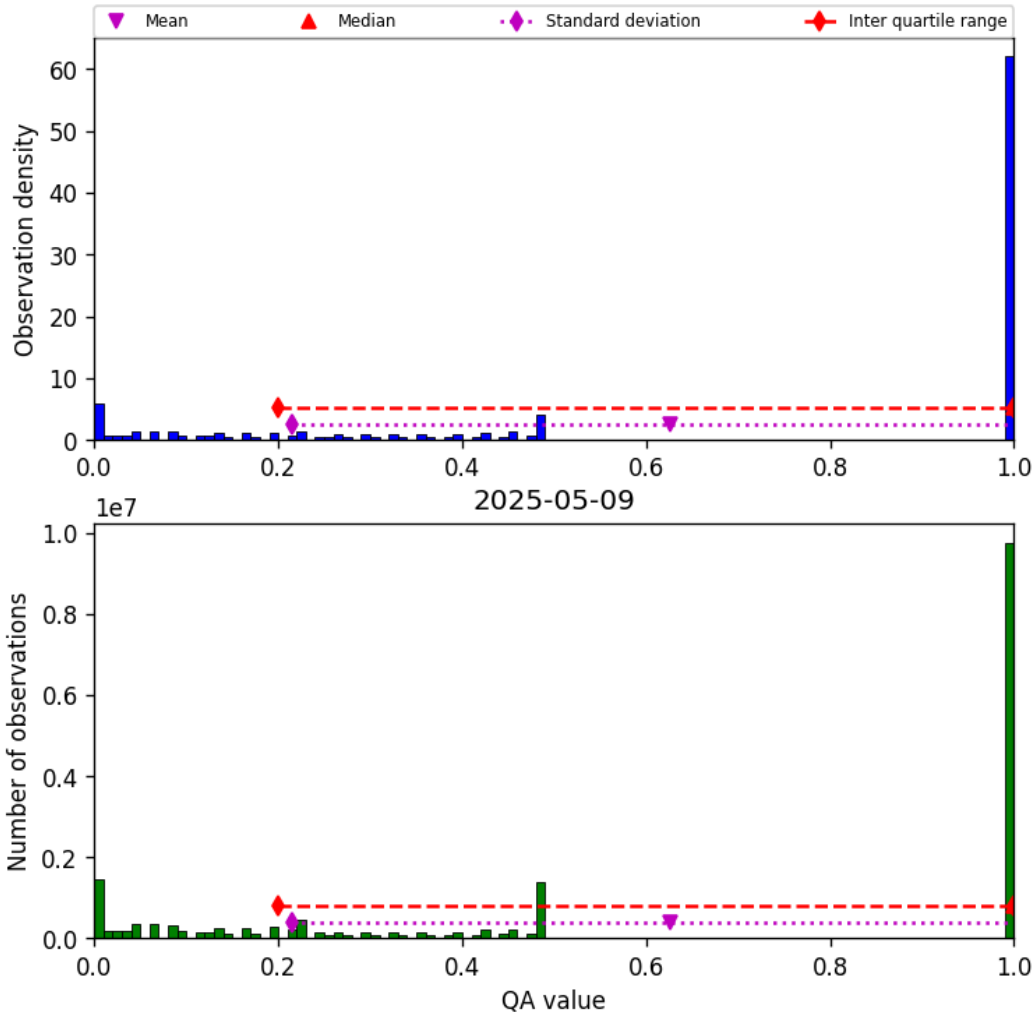

Figure 57: Histogram of “QA value” for 2025-05-09 to 2025-05-10

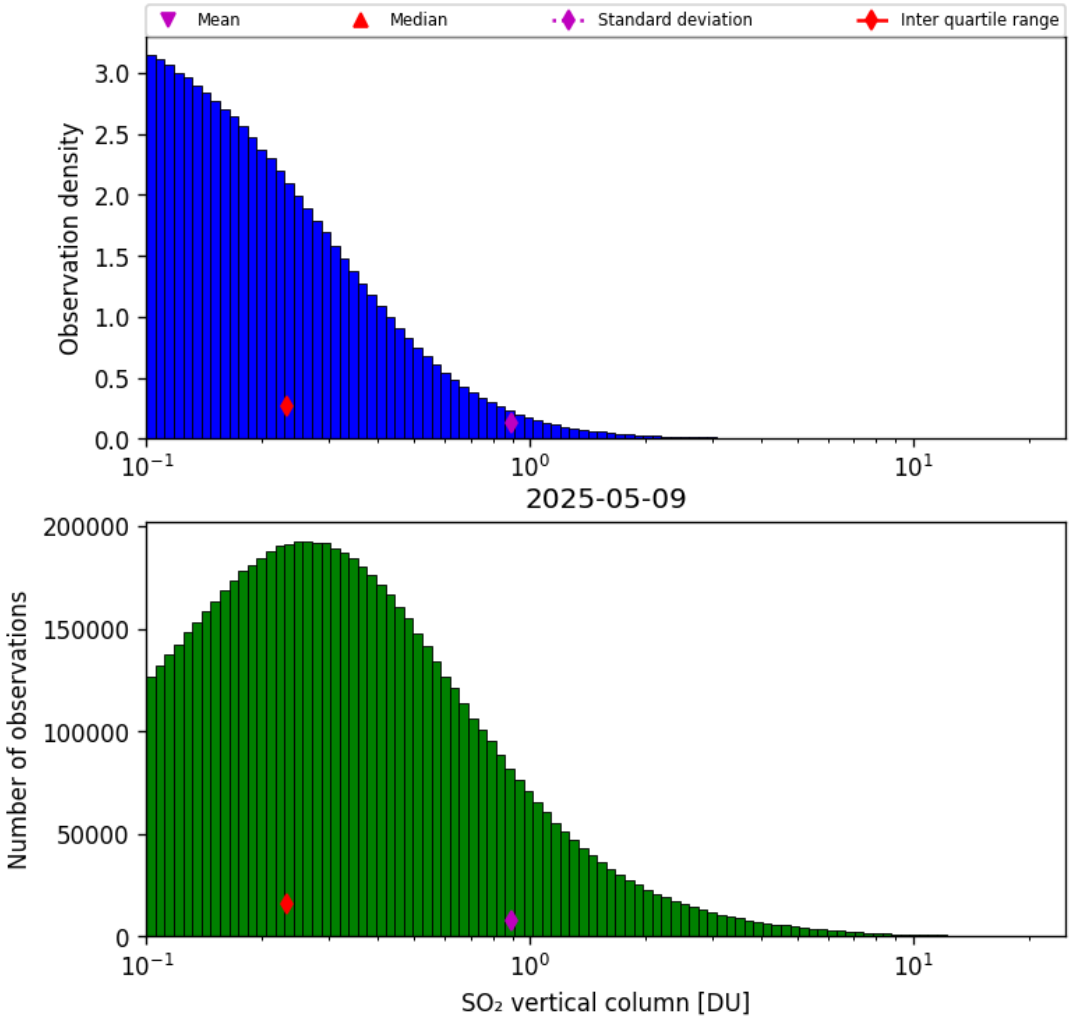

Figure 58: Histogram of "SO_2 vertical column" for 2025-05-09 to 2025-05-10

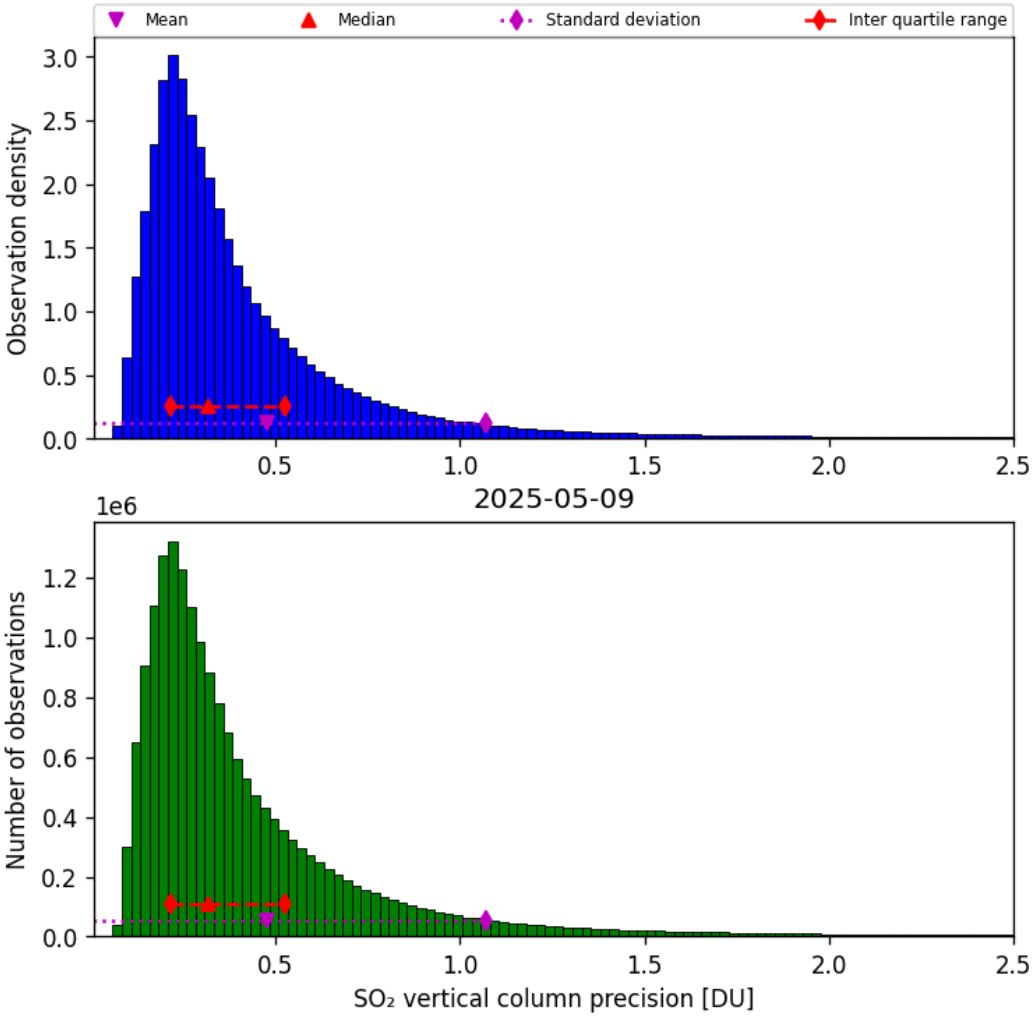

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-05-09 to 2025-05-10

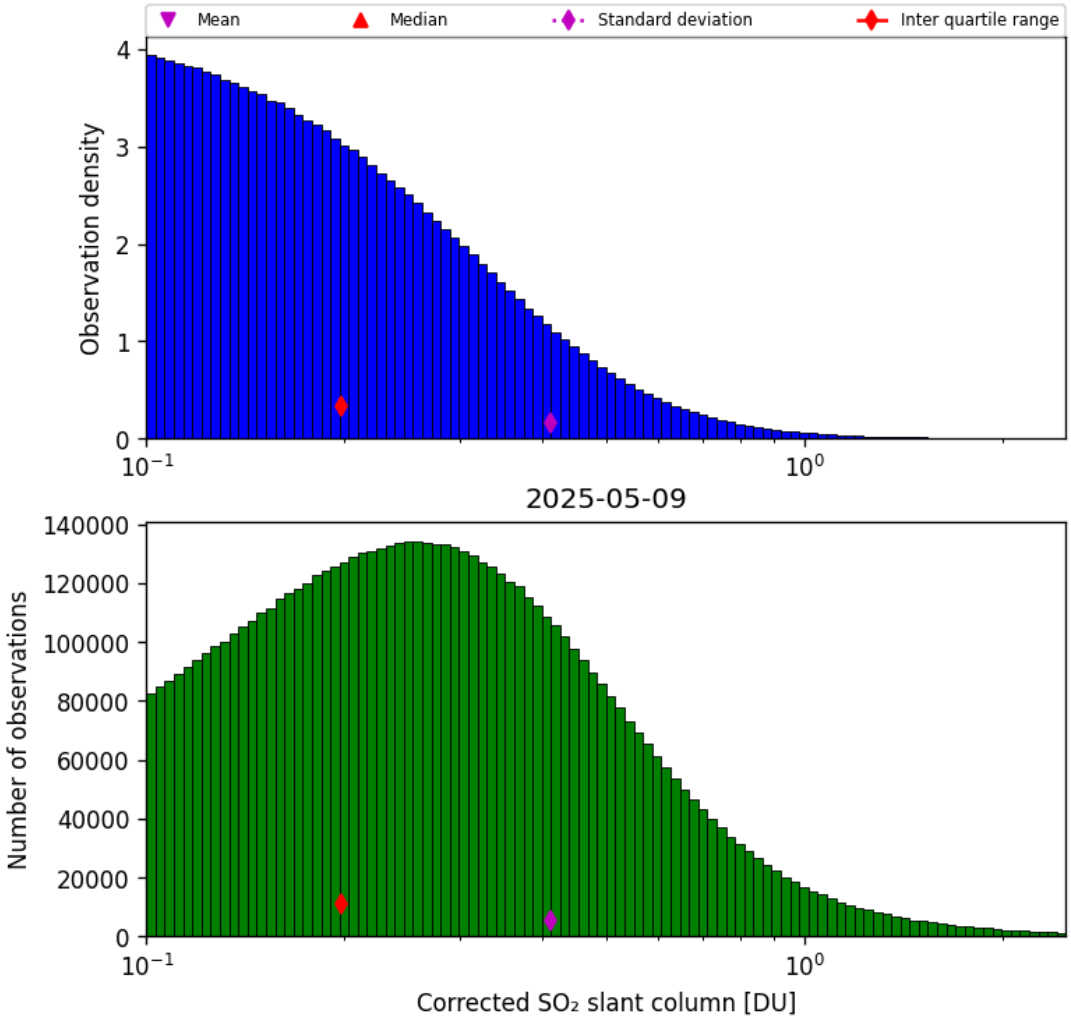

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-05-09 to 2025-05-10

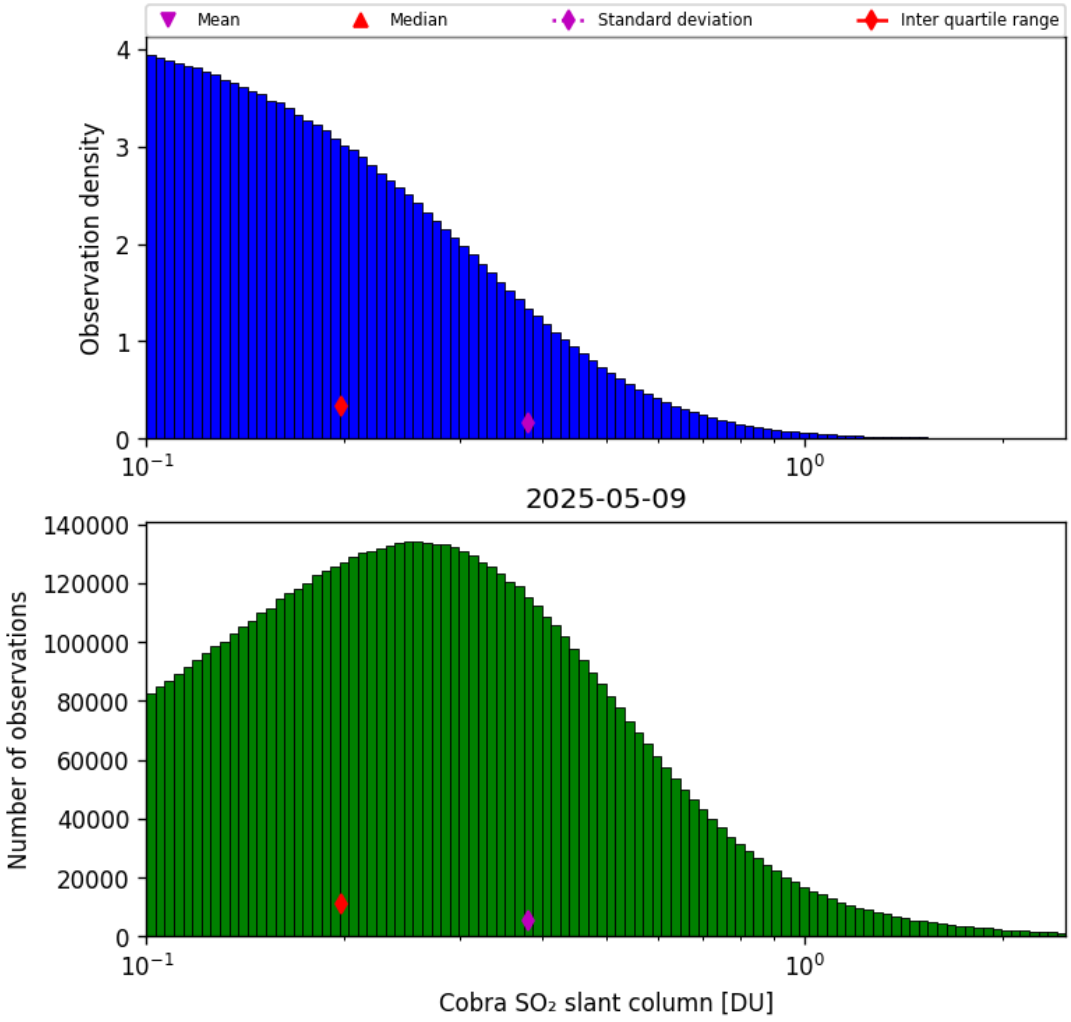

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-05-09 to 2025-05-10

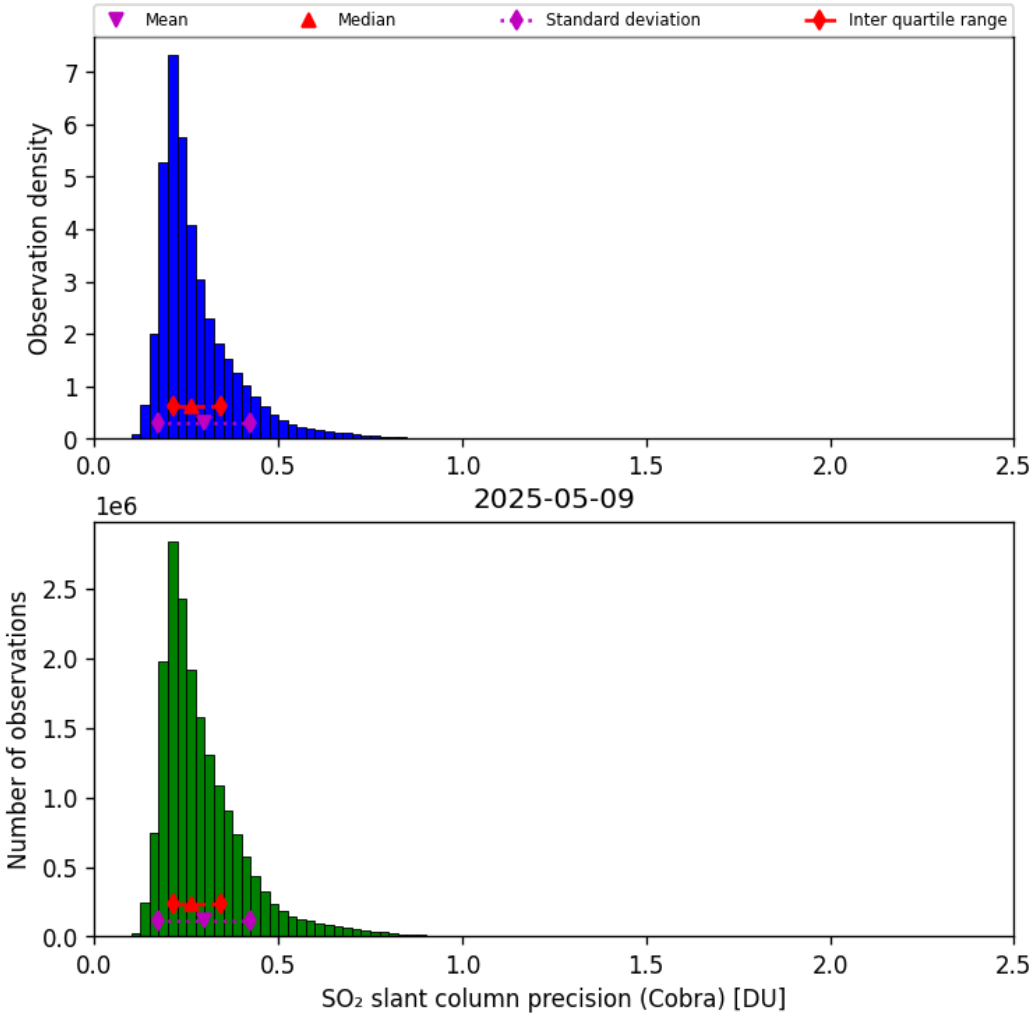

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-05-09 to 2025-05-10

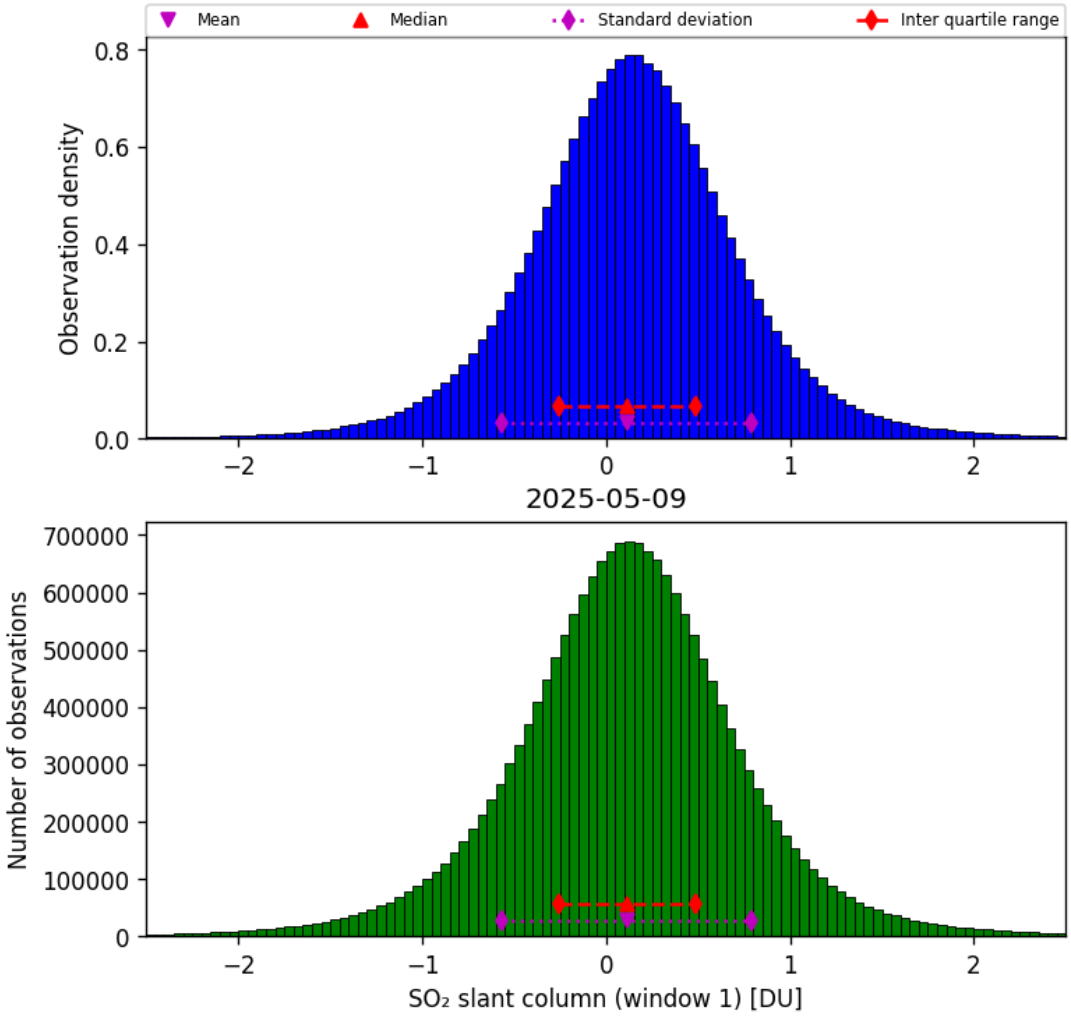

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-05-09 to 2025-05-10

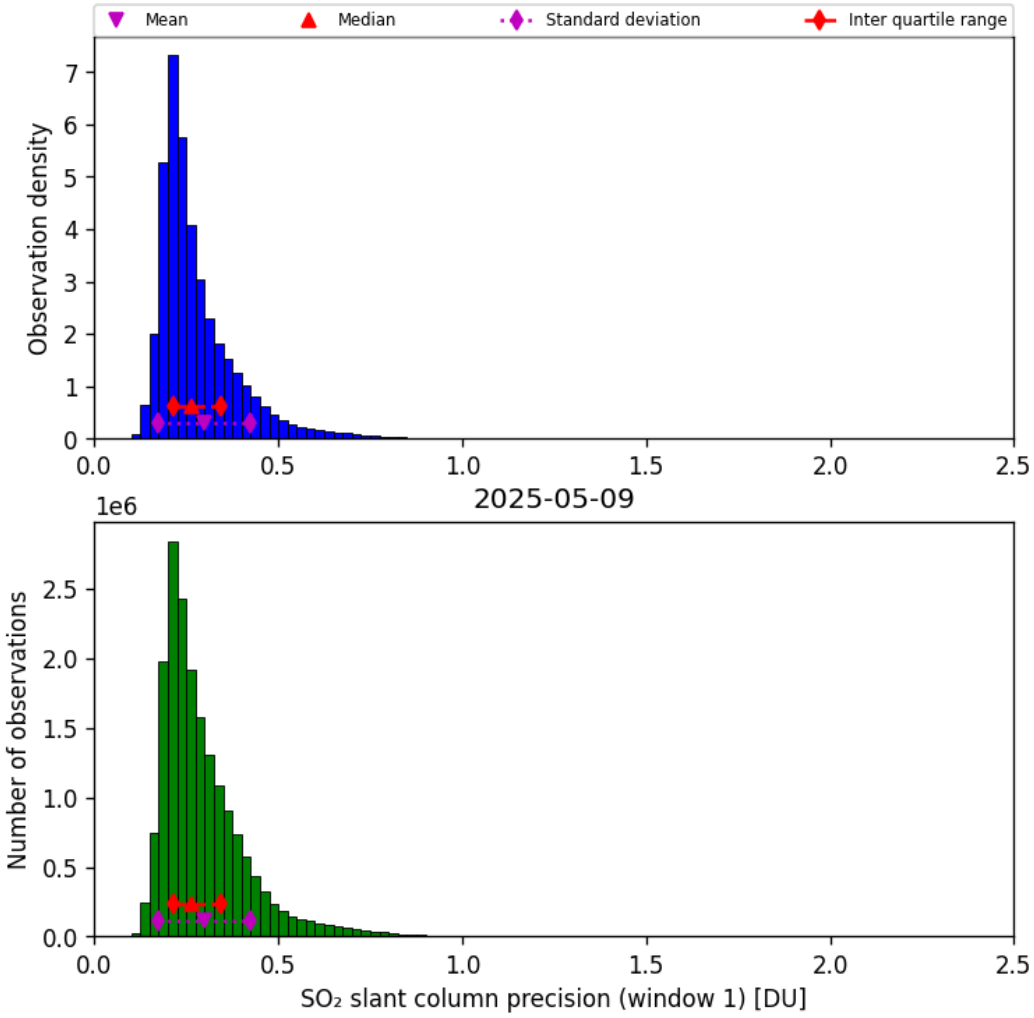

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-05-09 to 2025-05-10

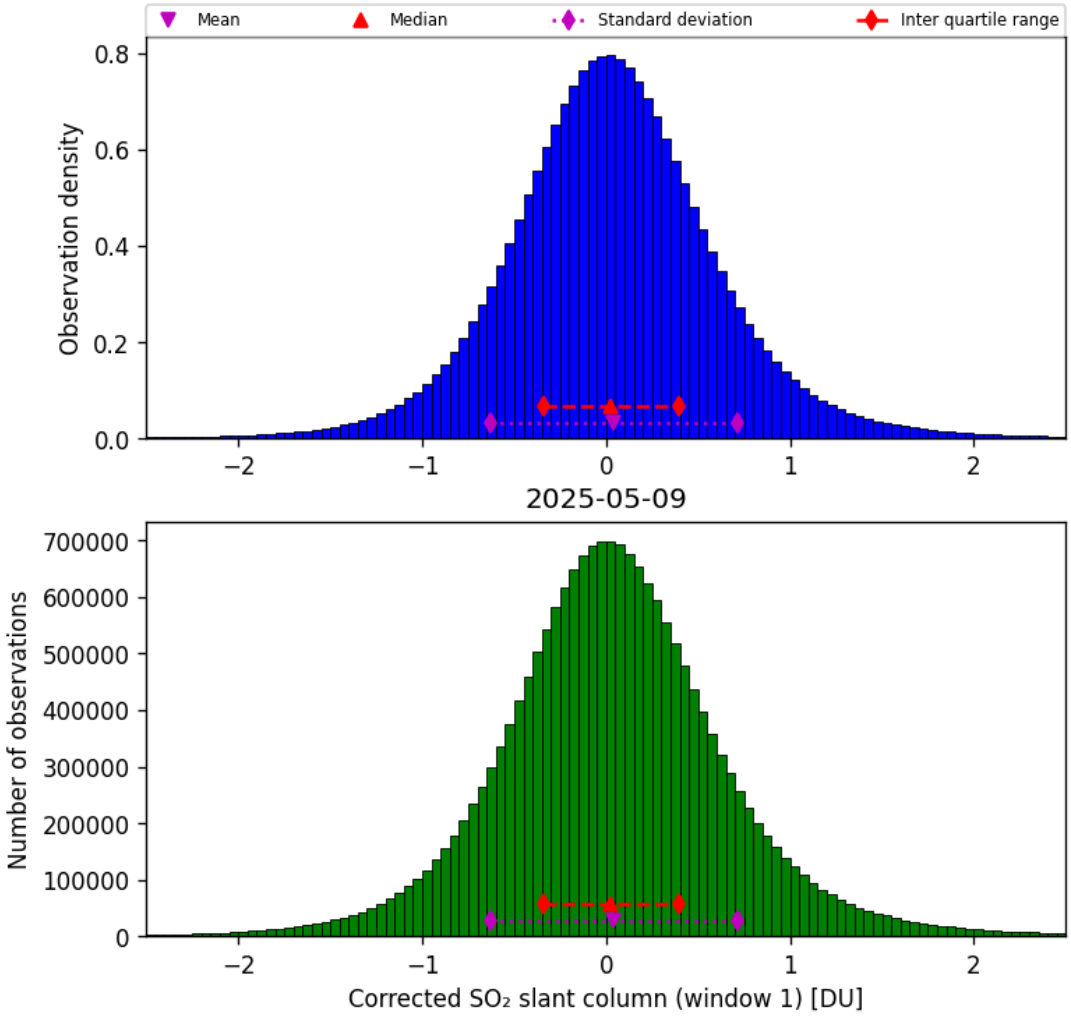

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-05-09 to 2025-05-10

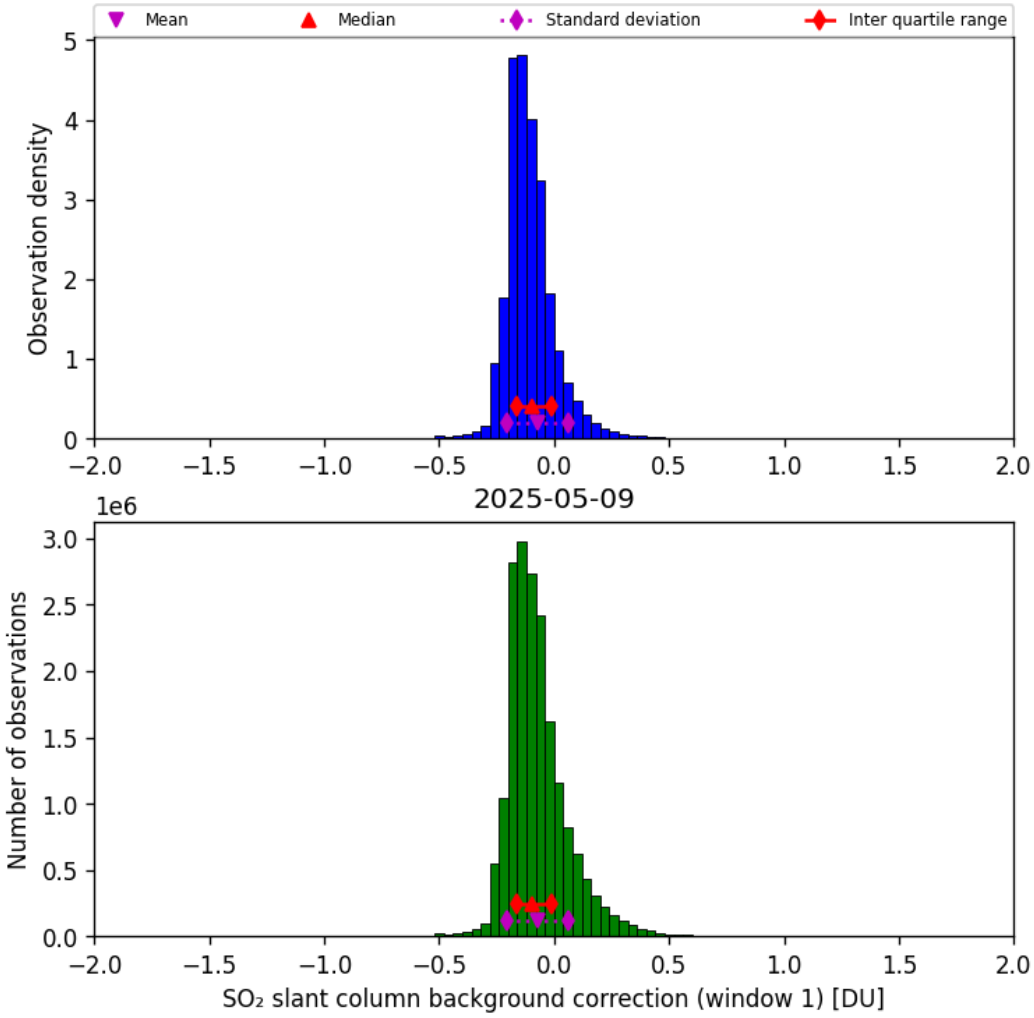

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-05-09 to 2025-05-10

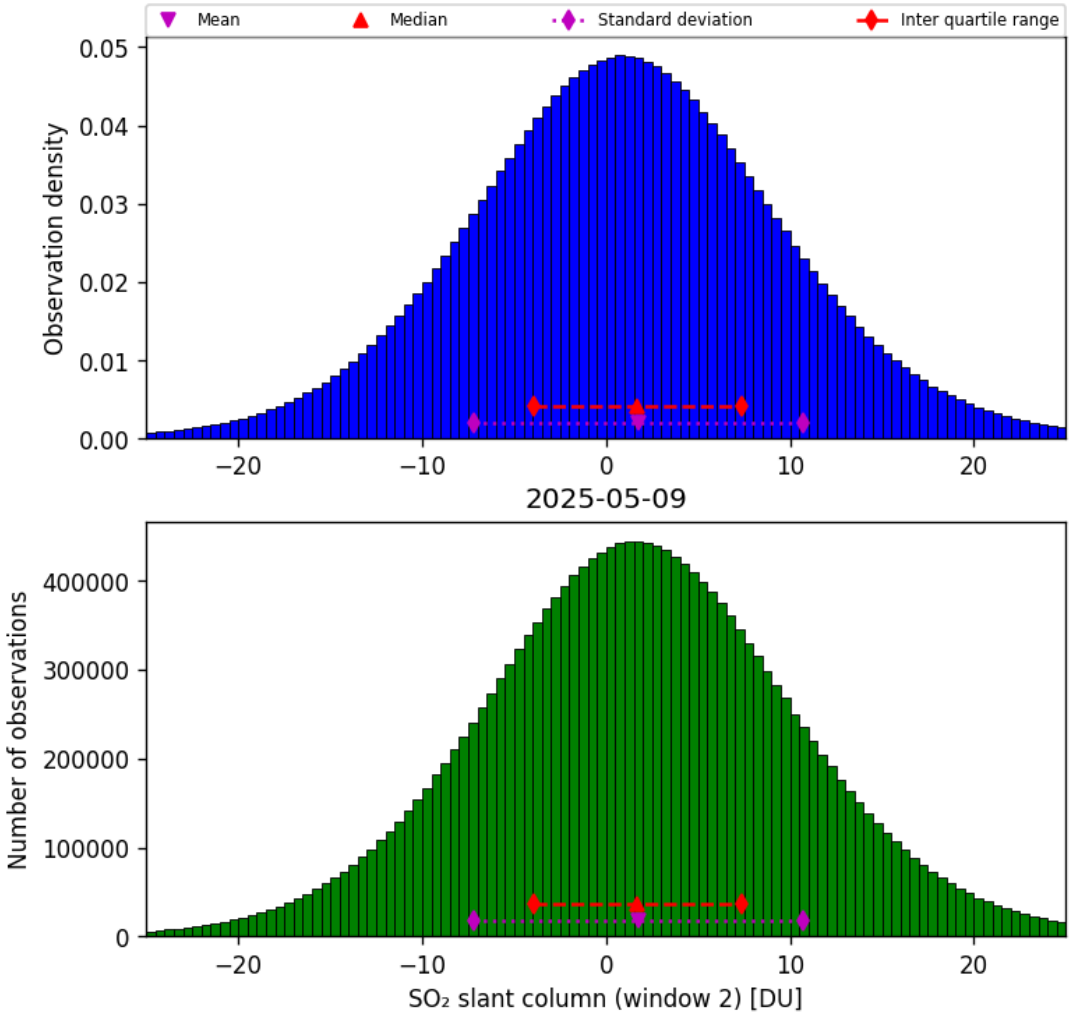

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-05-09 to 2025-05-10

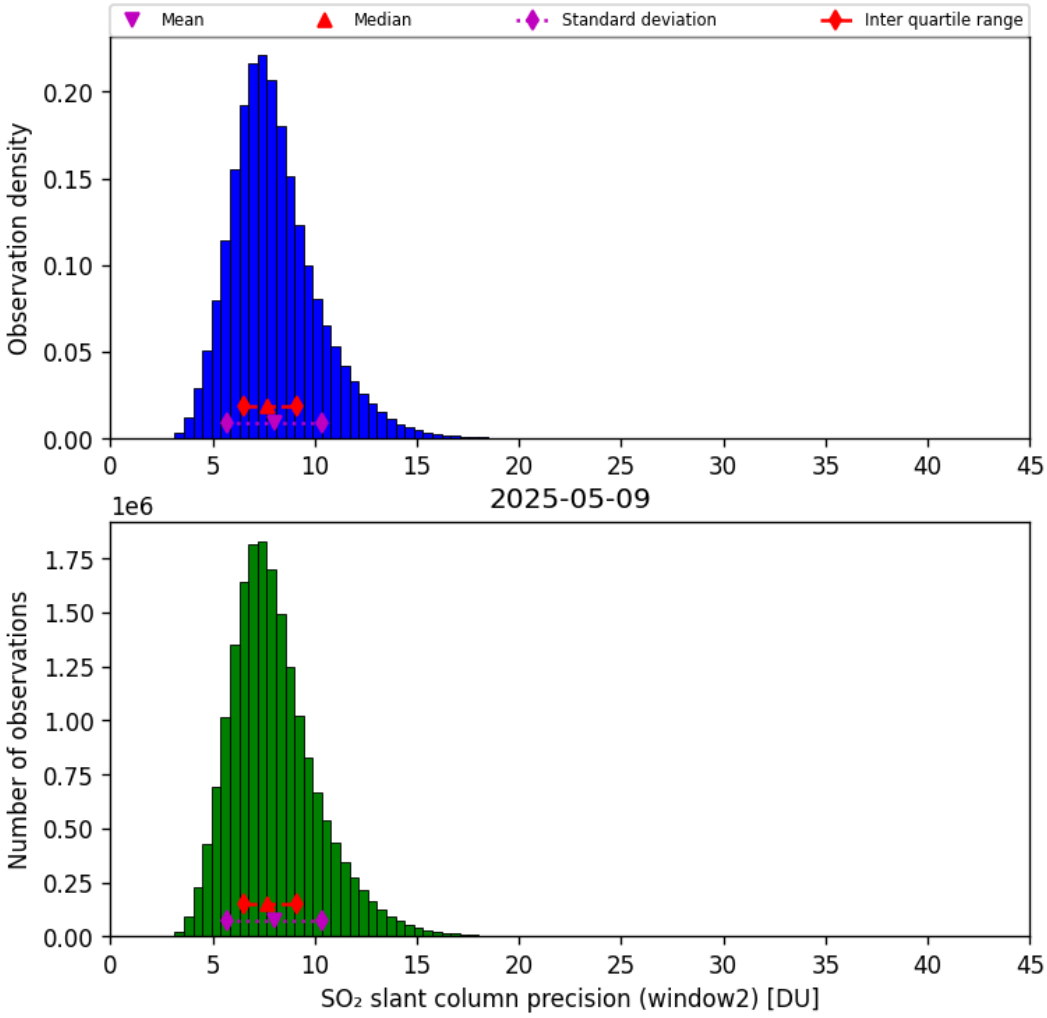

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-05-09 to 2025-05-10

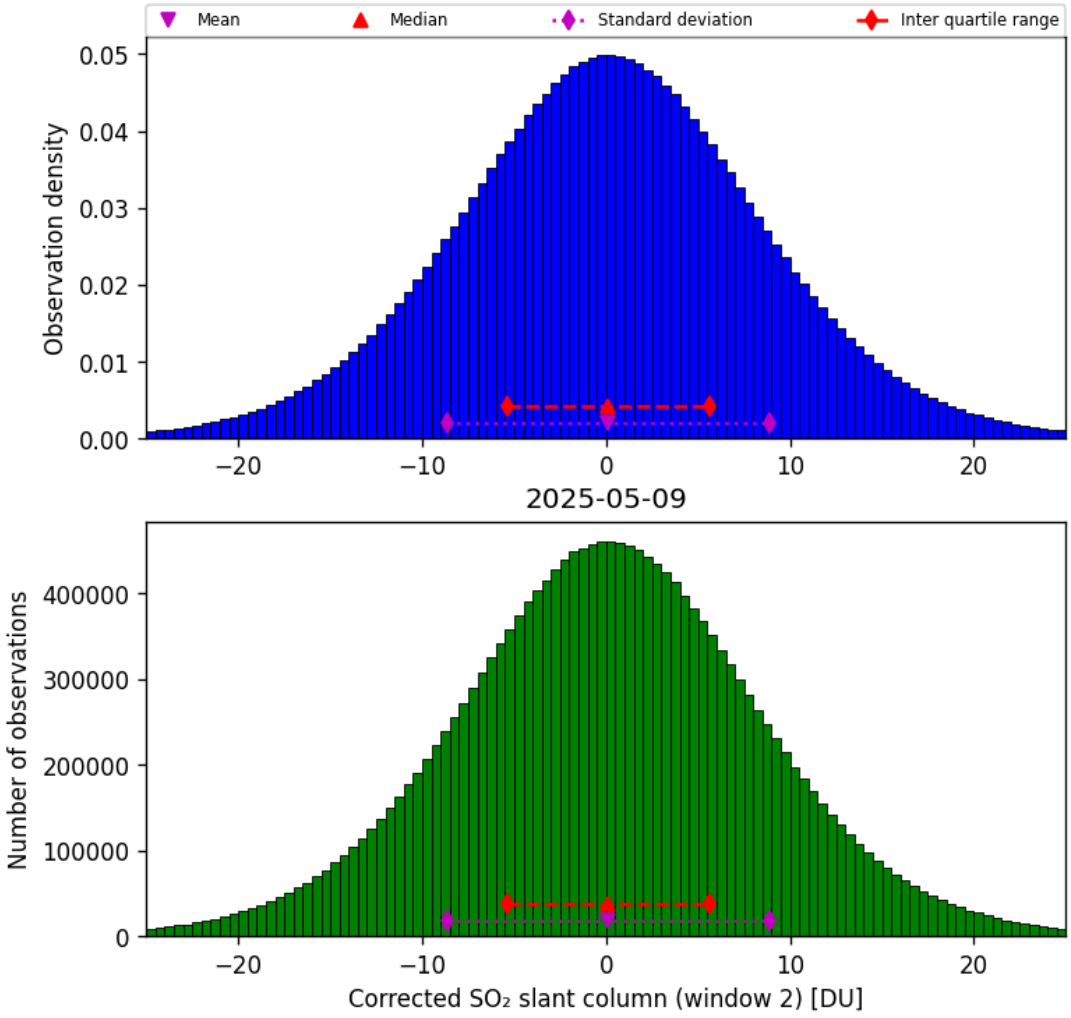

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-05-09 to 2025-05-10

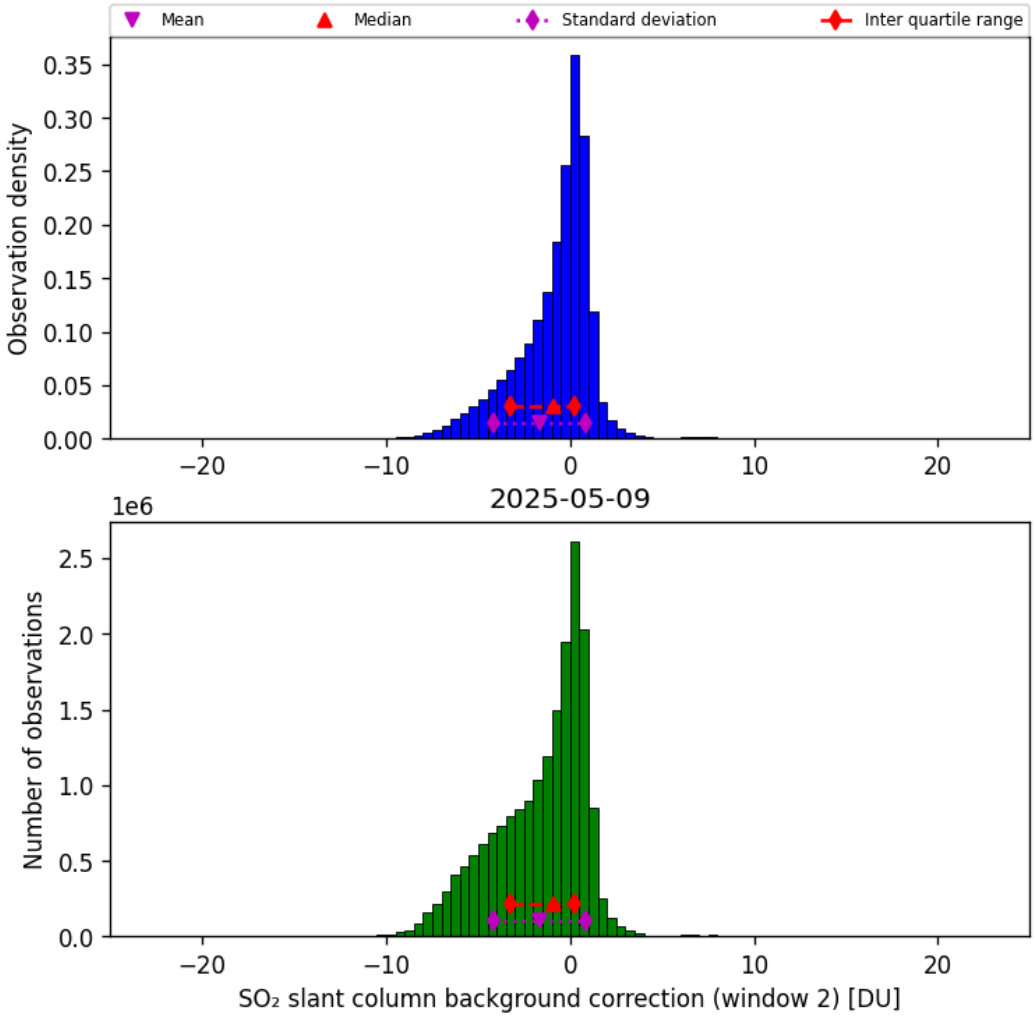

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-05-09 to 2025-05-10

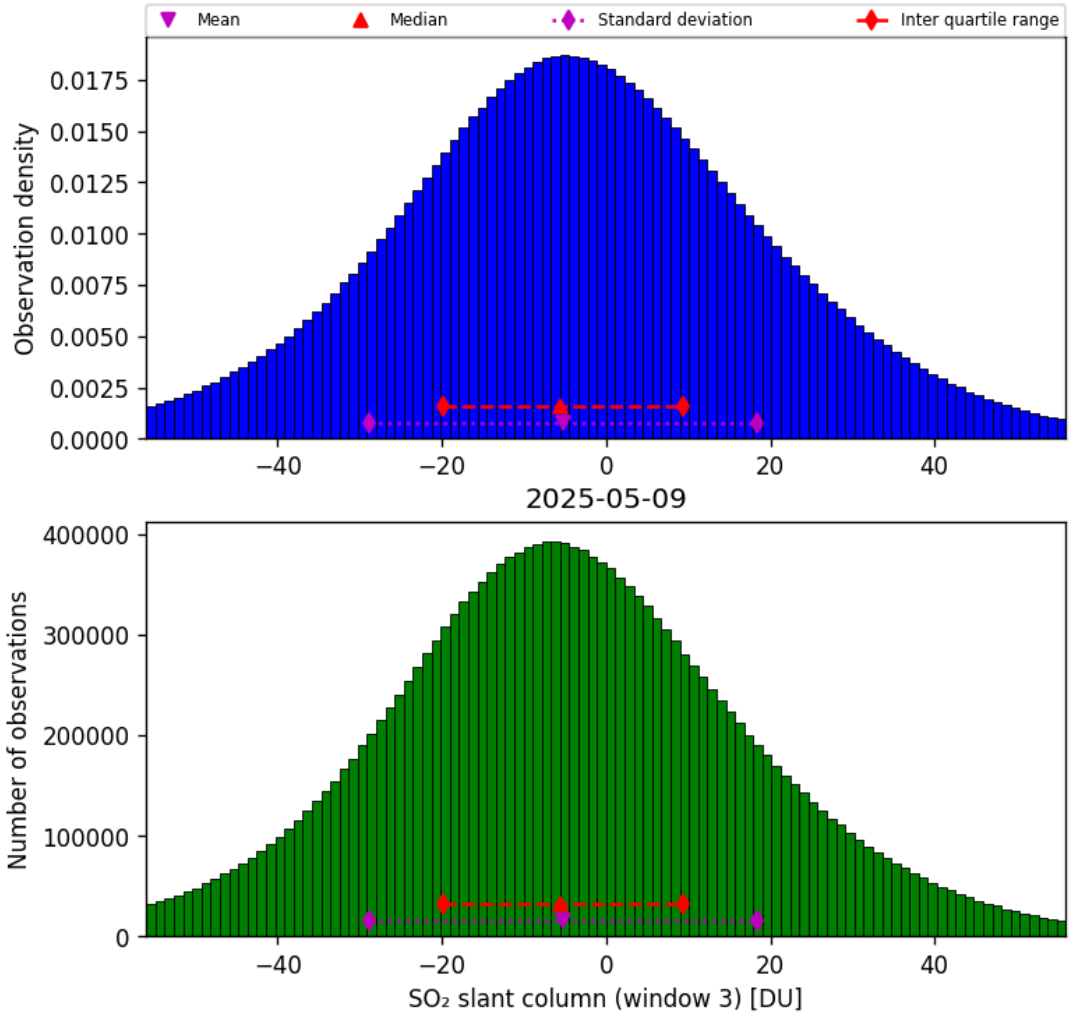

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-05-09 to 2025-05-10

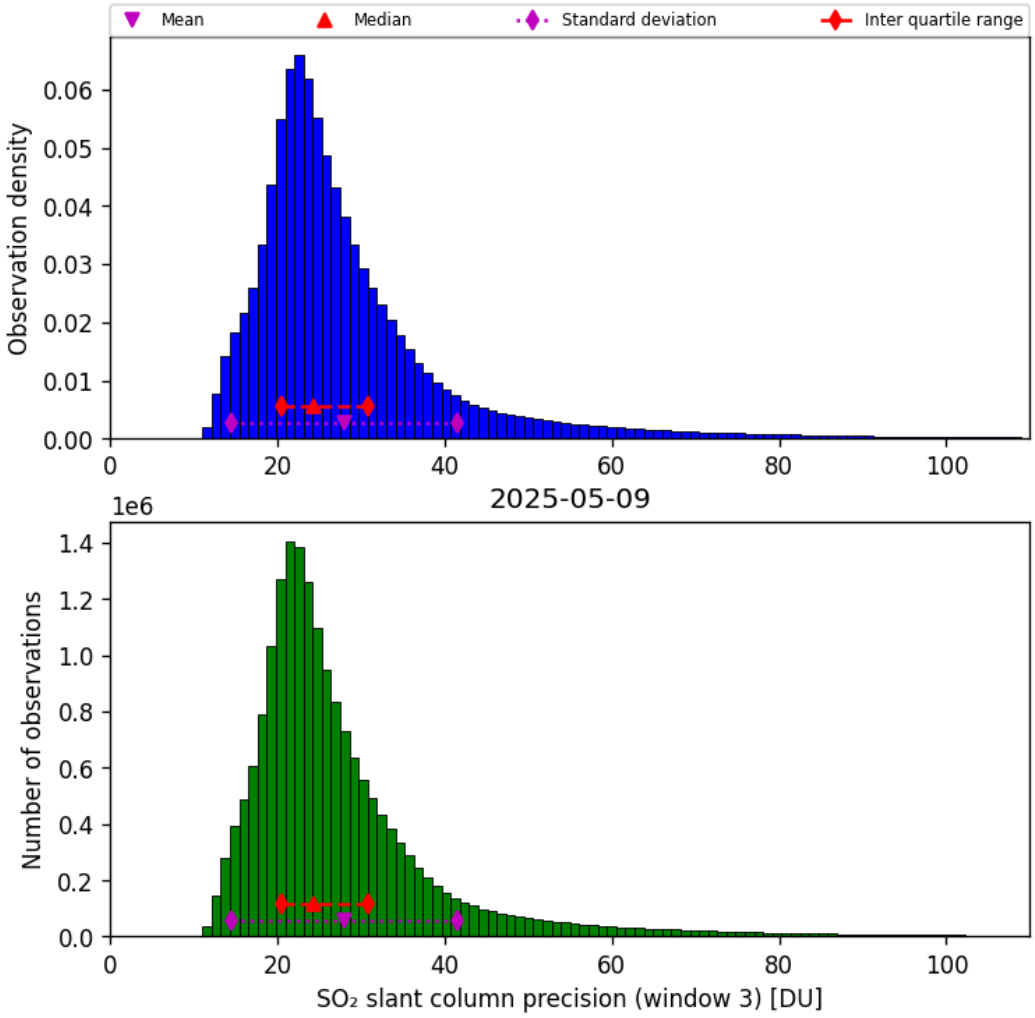

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-05-09 to 2025-05-10

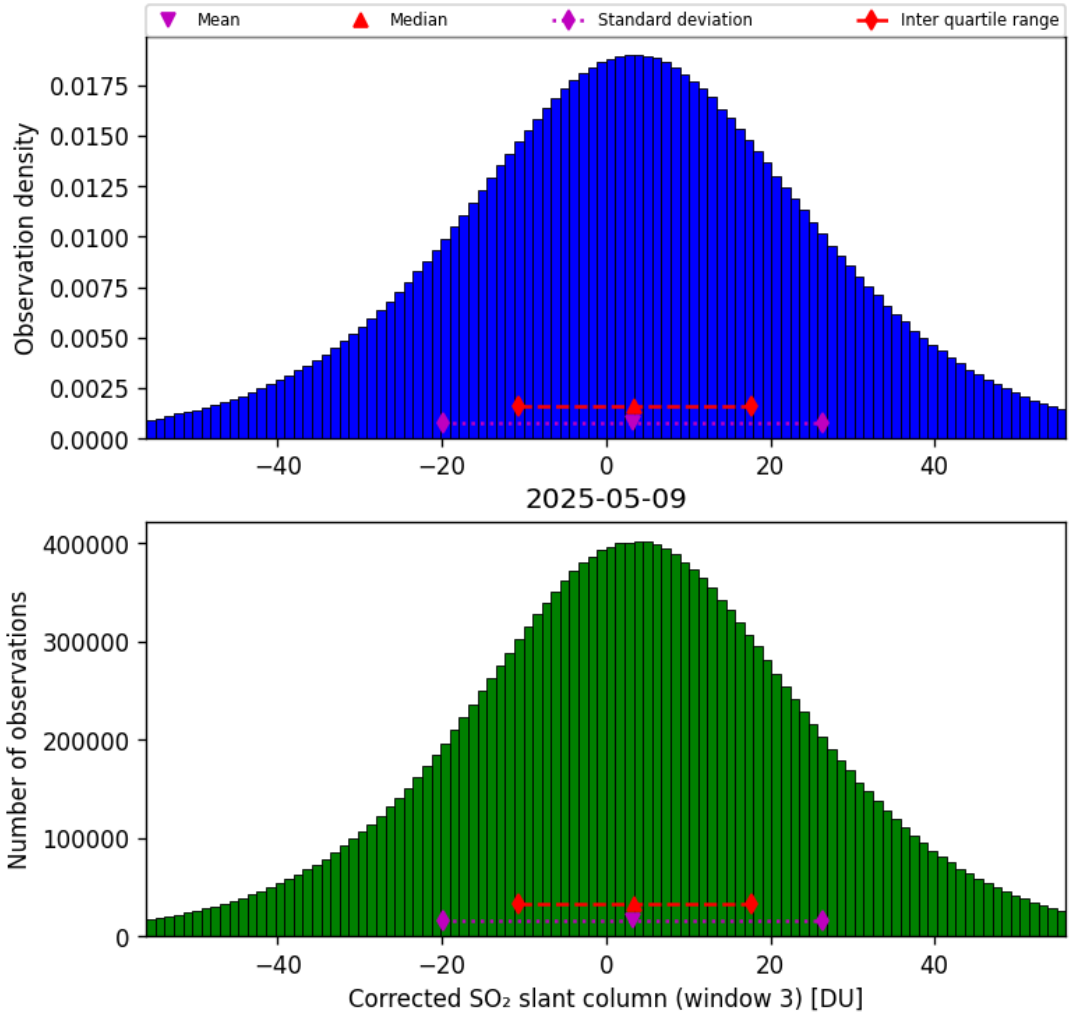

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-05-09 to 2025-05-10

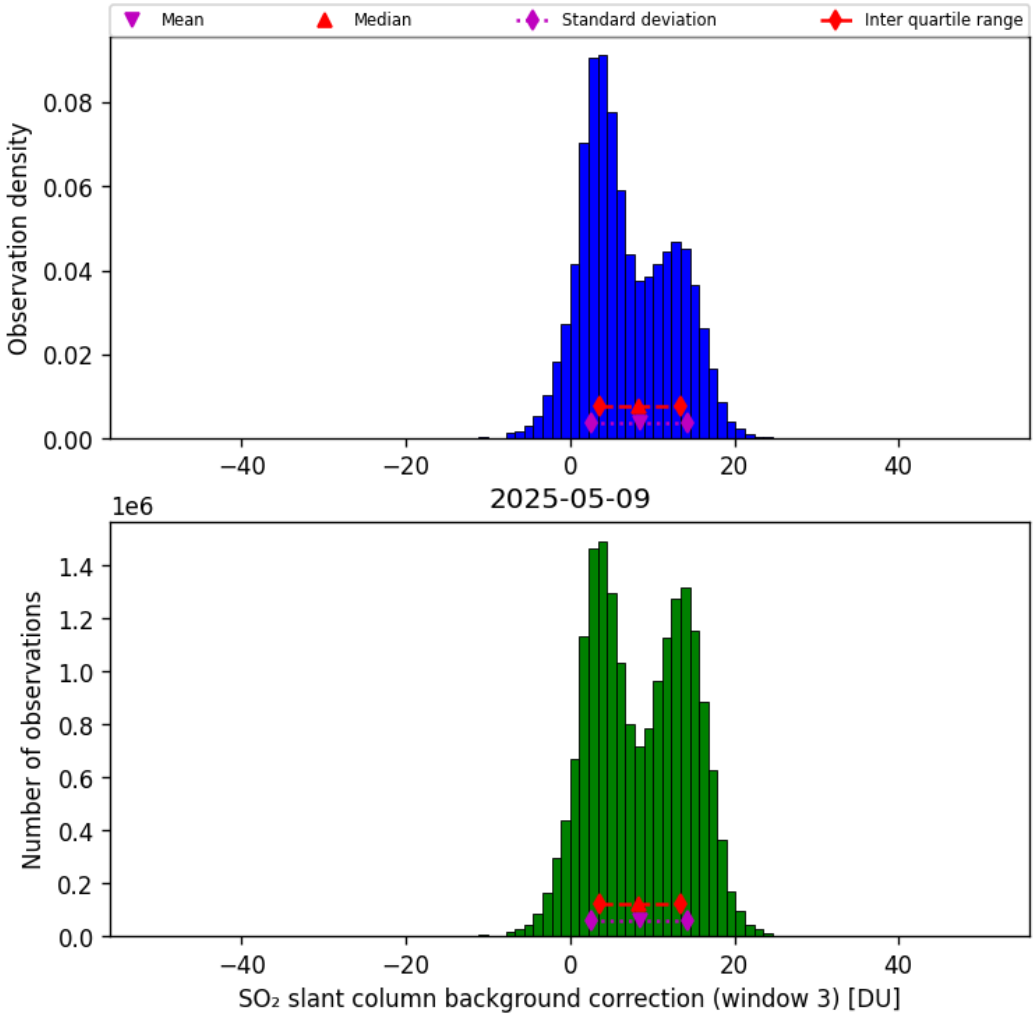

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-05-09 to 2025-05-10

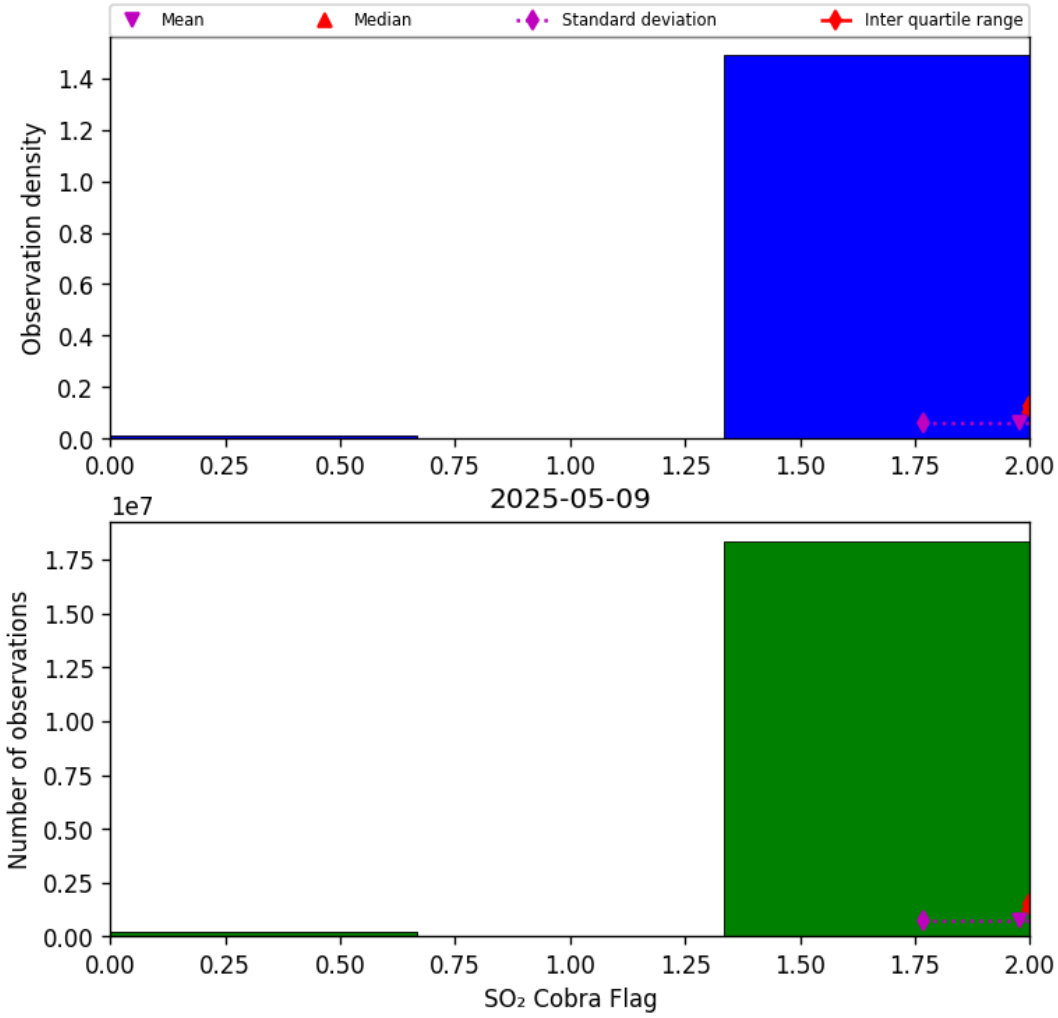

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-05-09 to 2025-05-10

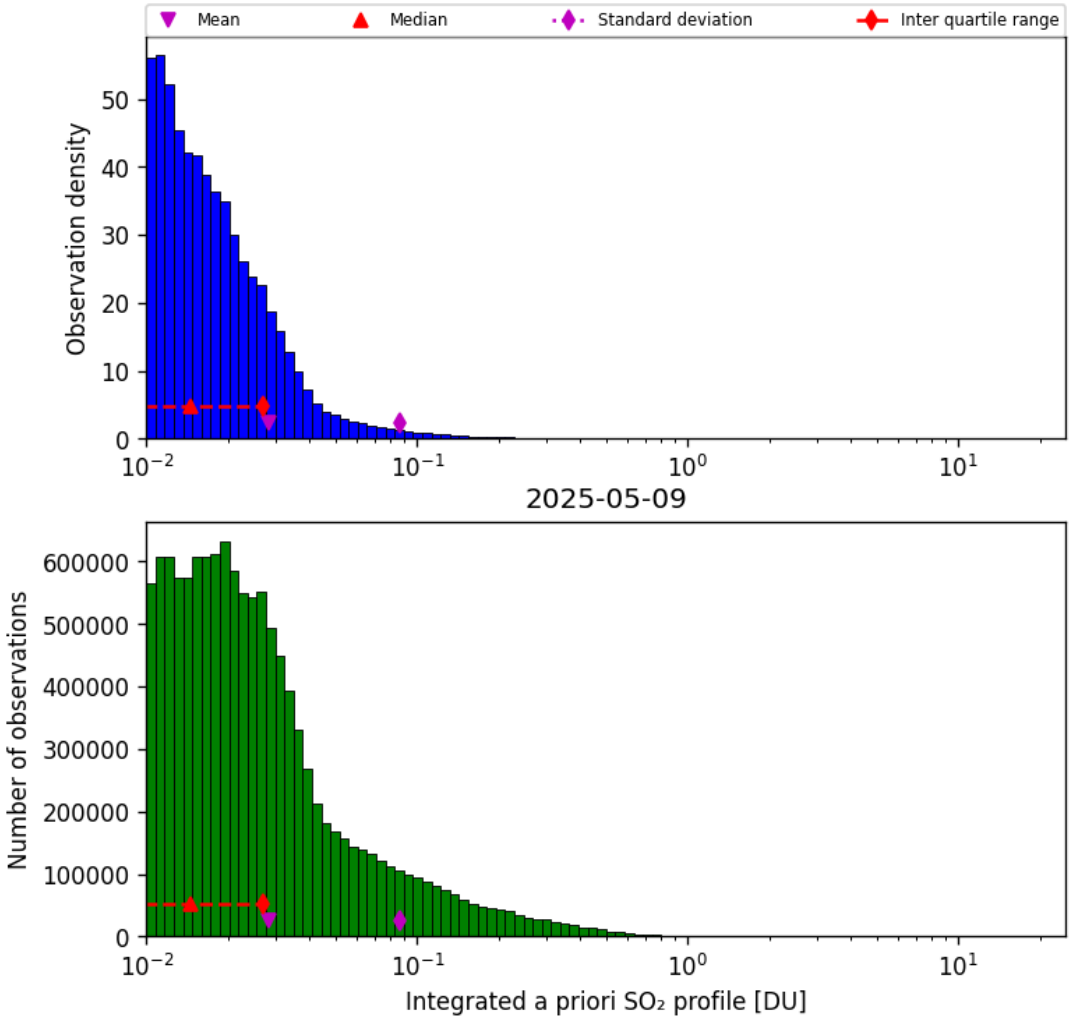

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-05-09 to 2025-05-10

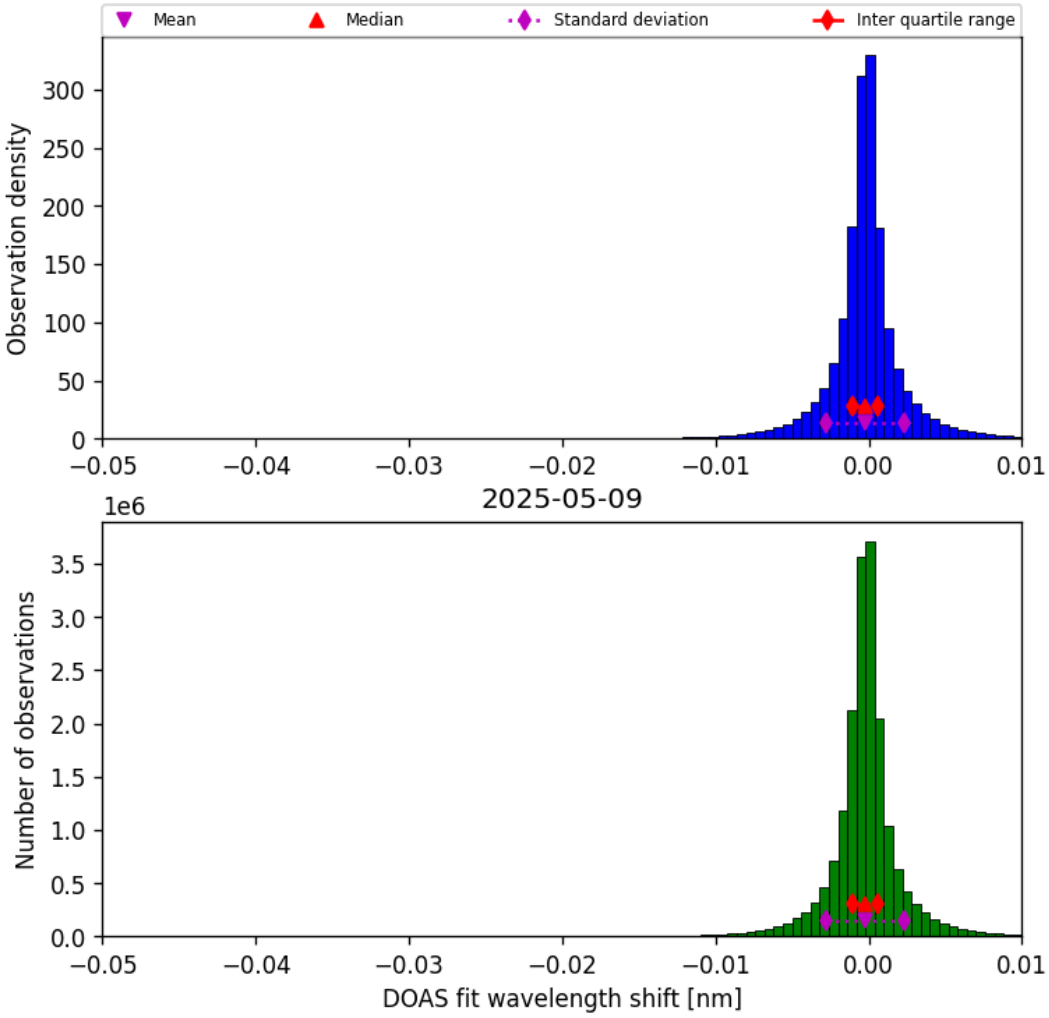

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-05-09 to 2025-05-10

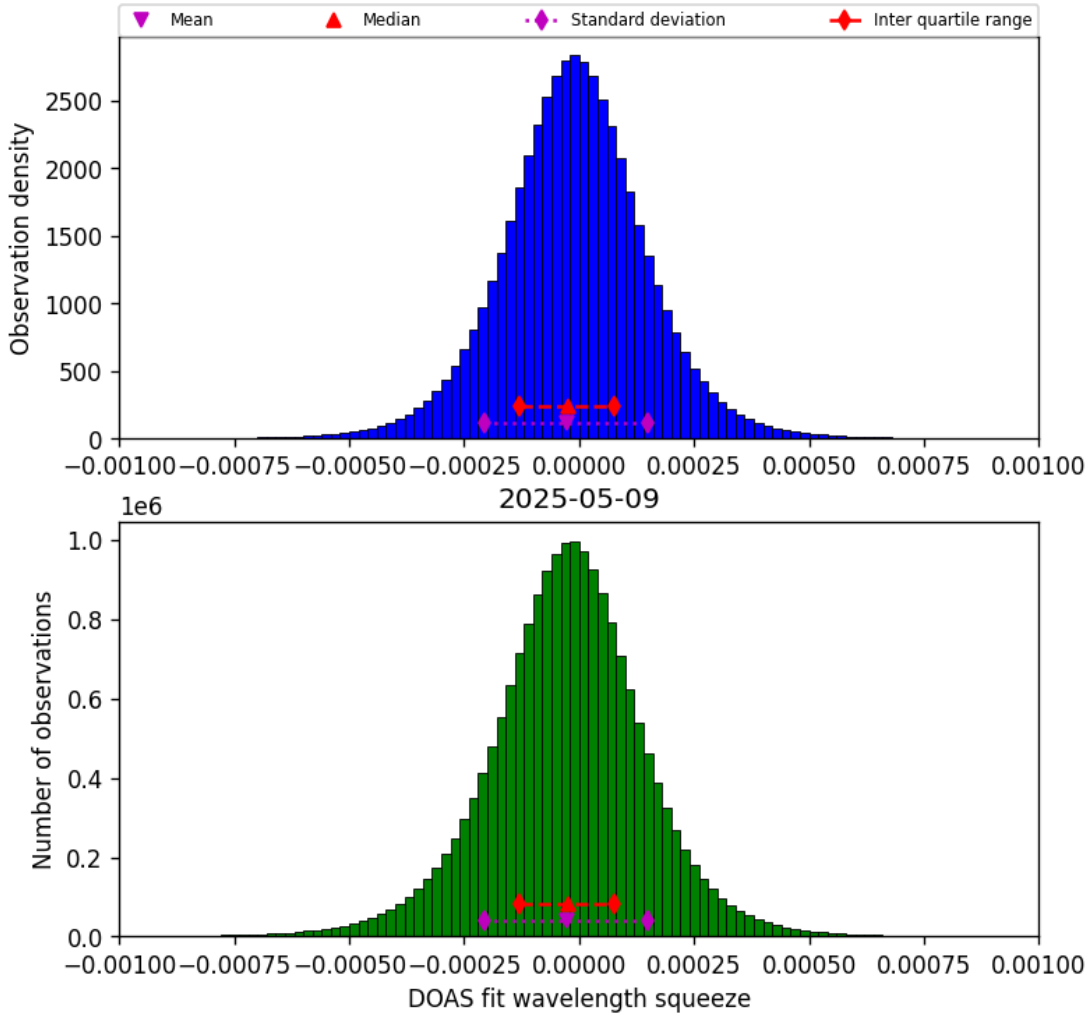

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-05-09 to 2025-05-10

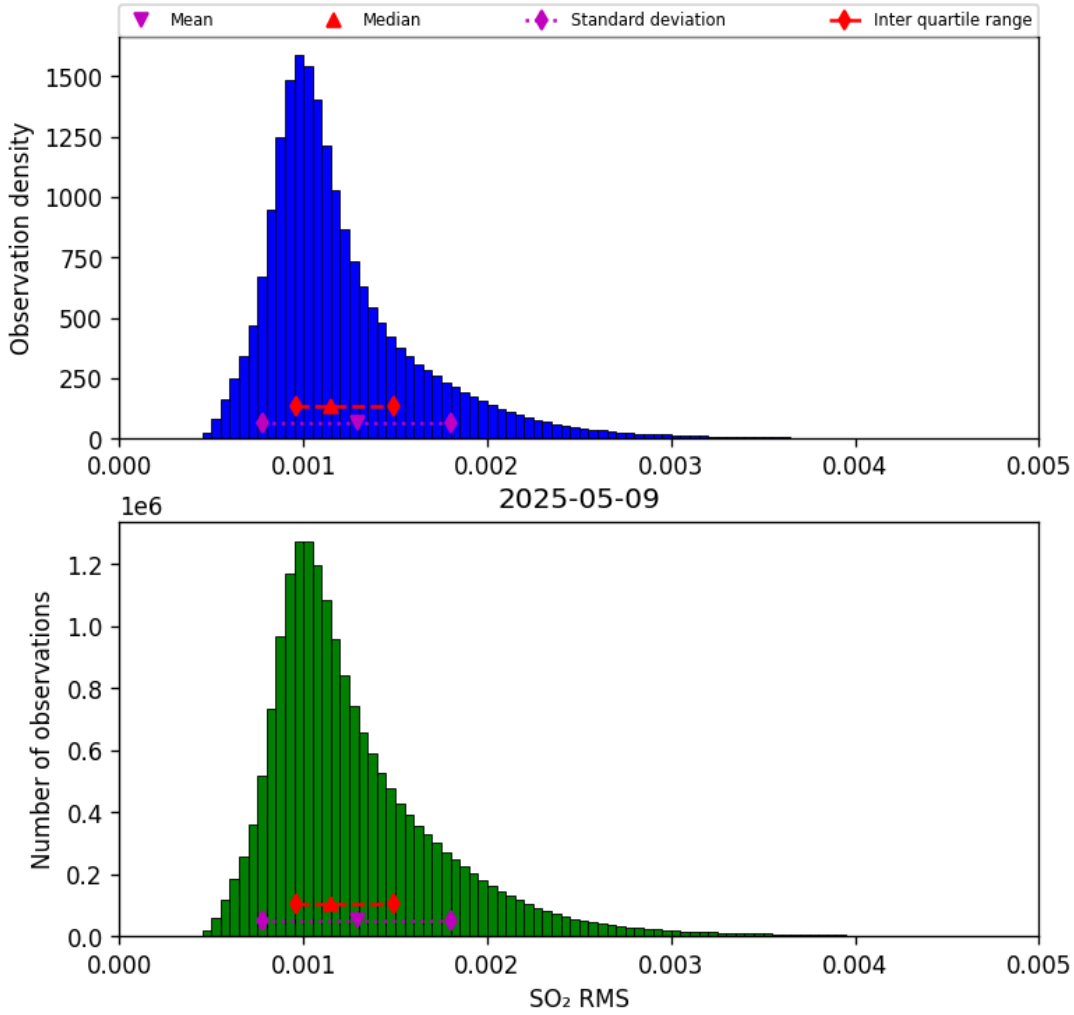

Figure 79: Histogram of "SO_2 RMS" for 2025-05-09 to 2025-05-10

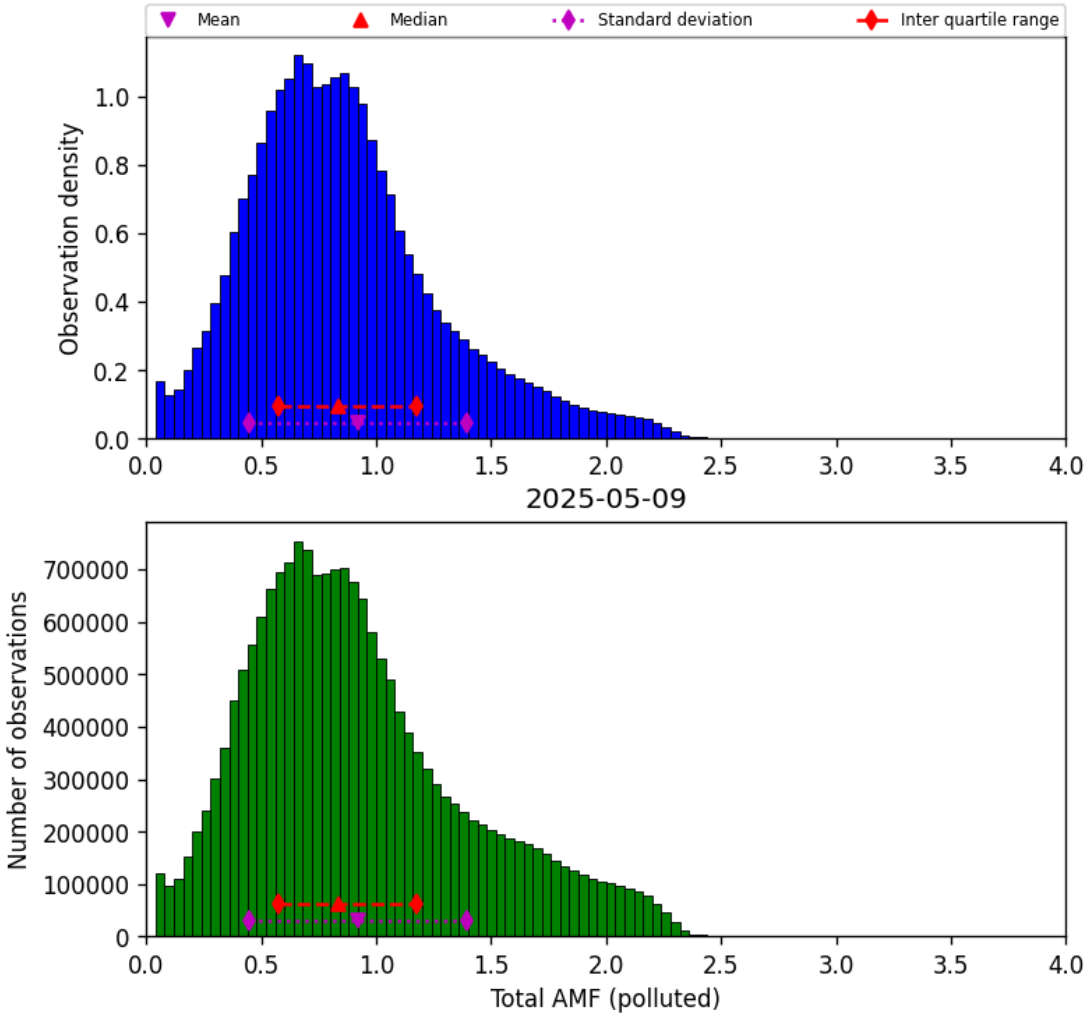

Figure 80: Histogram of “Total AMF (polluted)” for 2025-05-09 to 2025-05-10

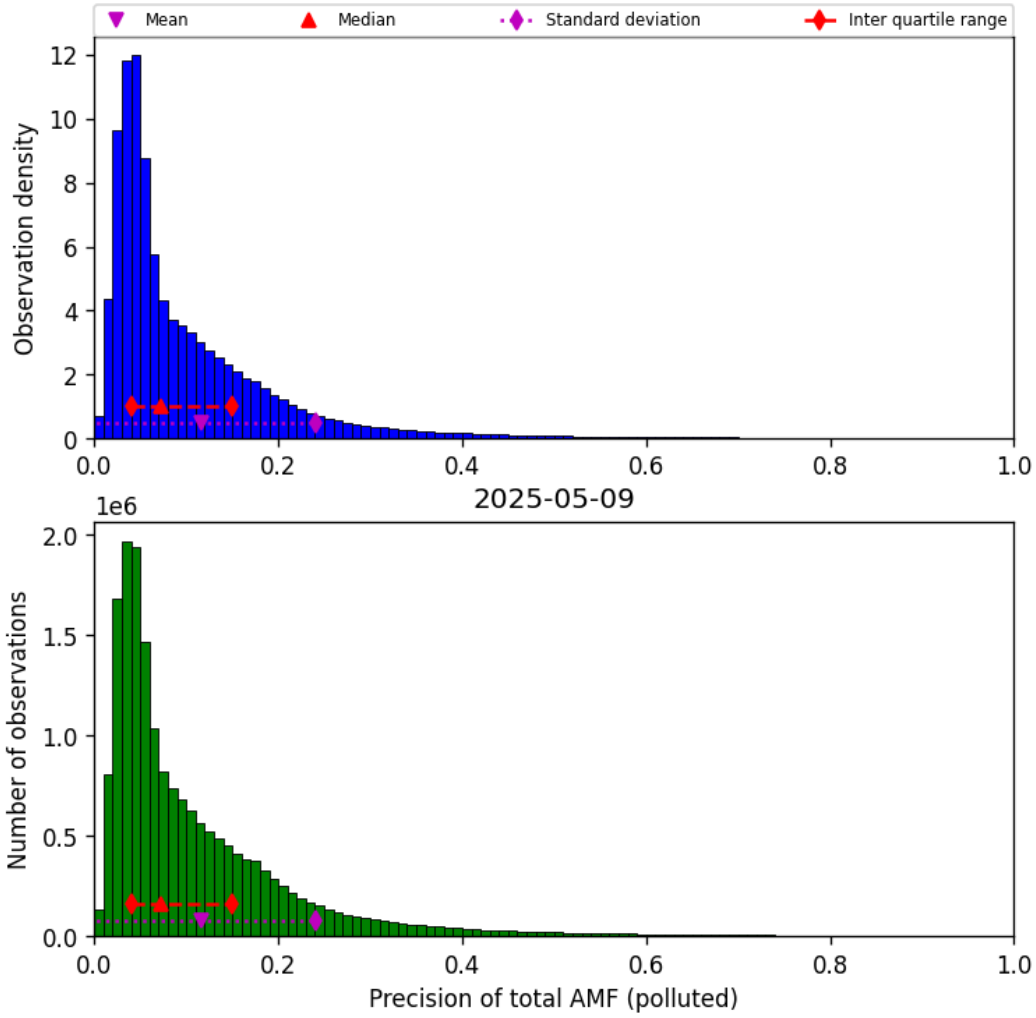

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-05-09 to 2025-05-10

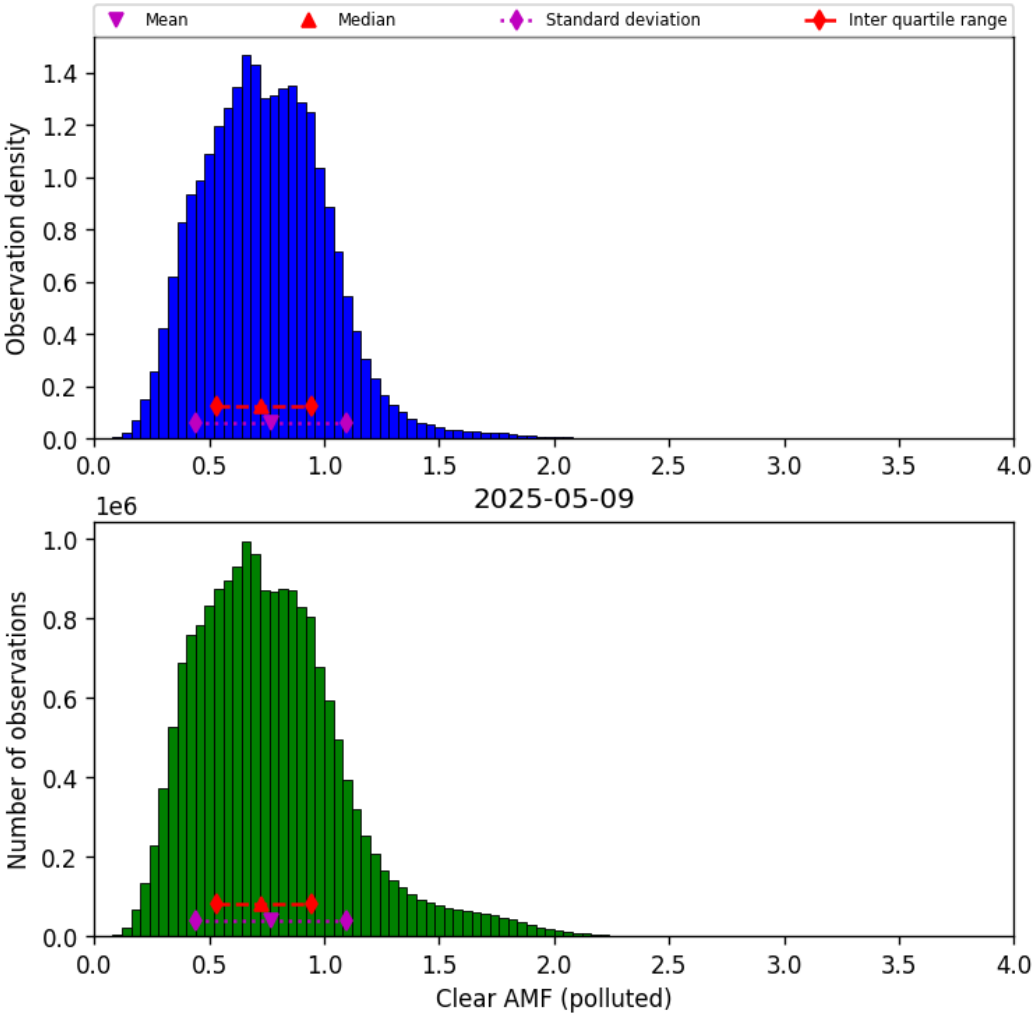

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-05-09 to 2025-05-10

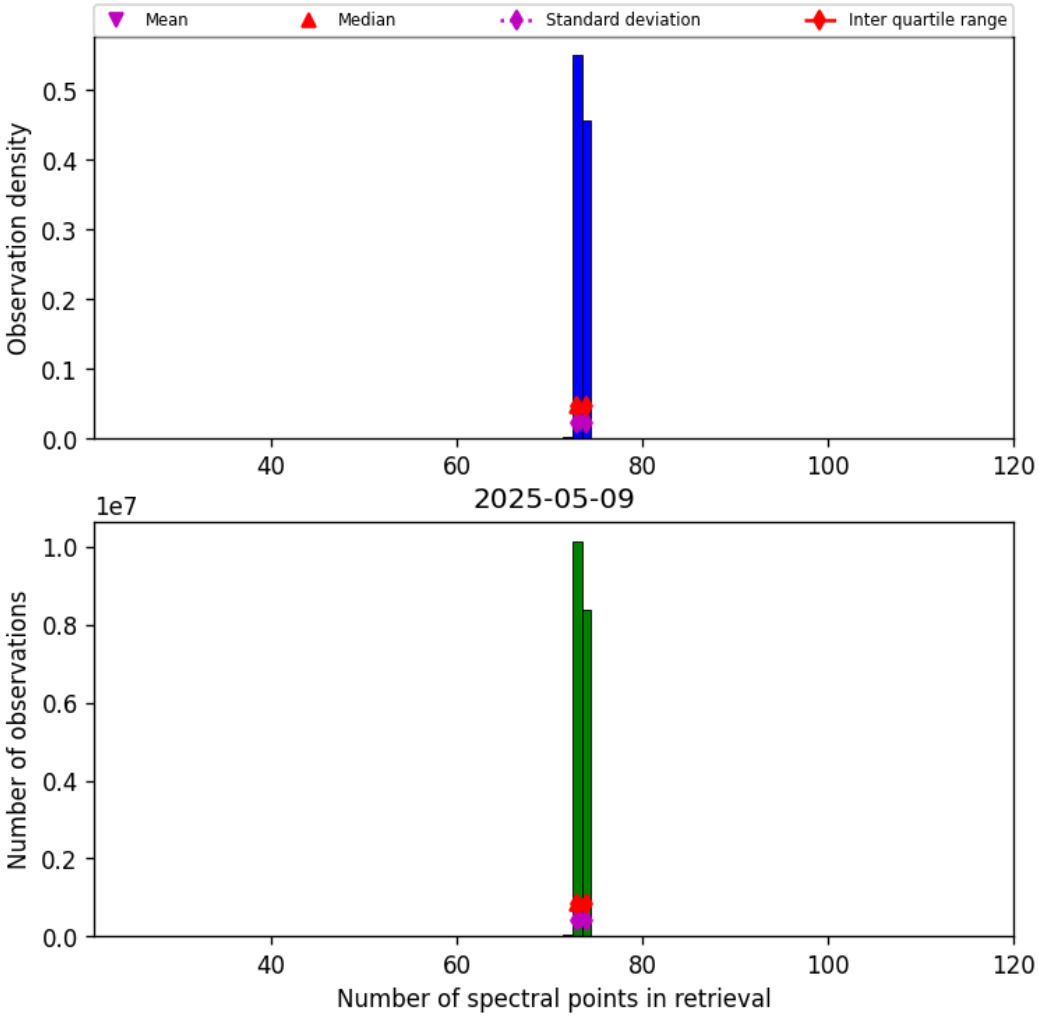

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-05-09 to 2025-05-10

9 Along track statistics

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

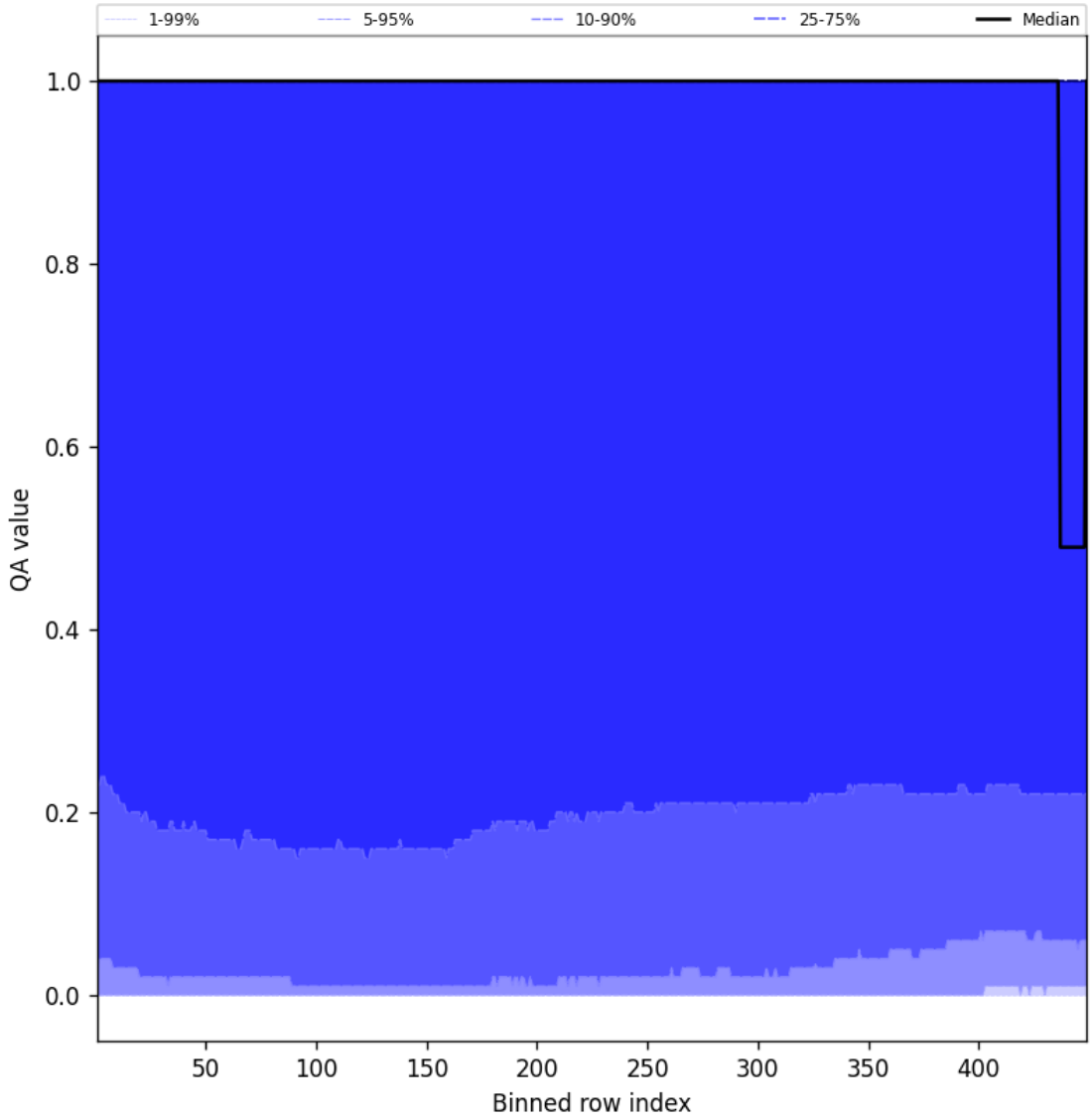

Figure 84: Along track statistics of “QA value” for 2025-05-09 to 2025-05-10

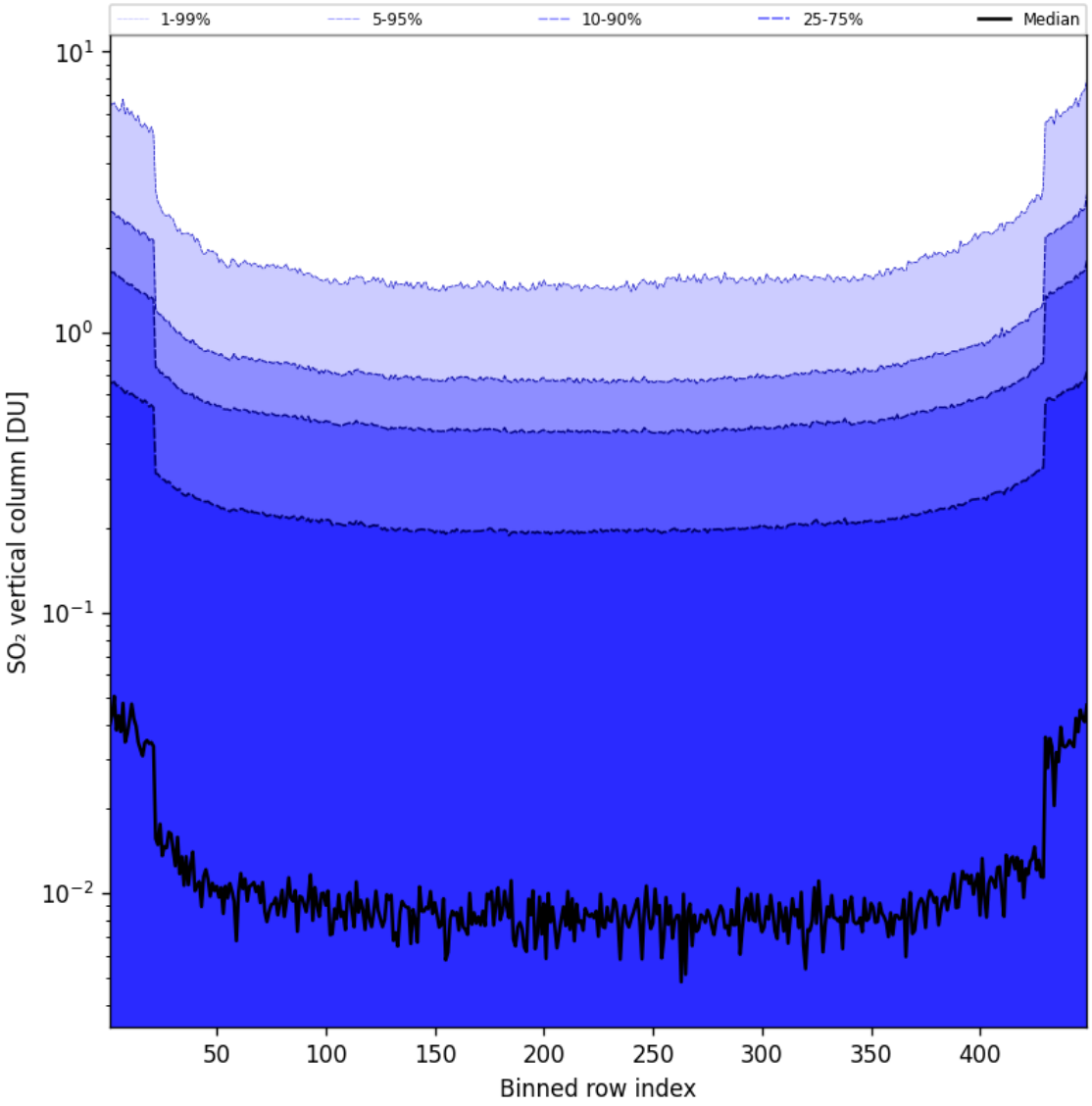

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-05-09 to 2025-05-10

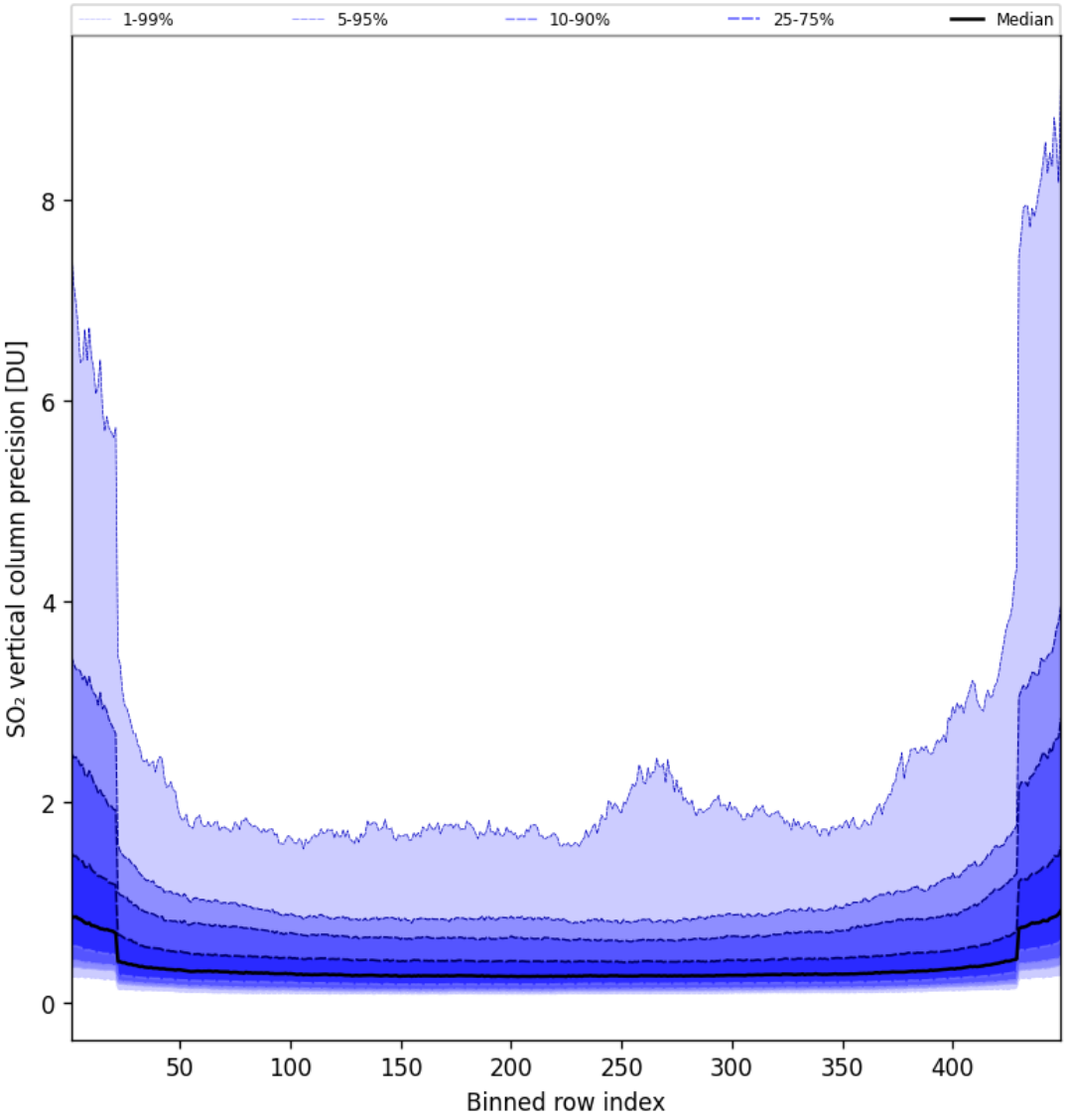

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-05-09 to 2025-05-10

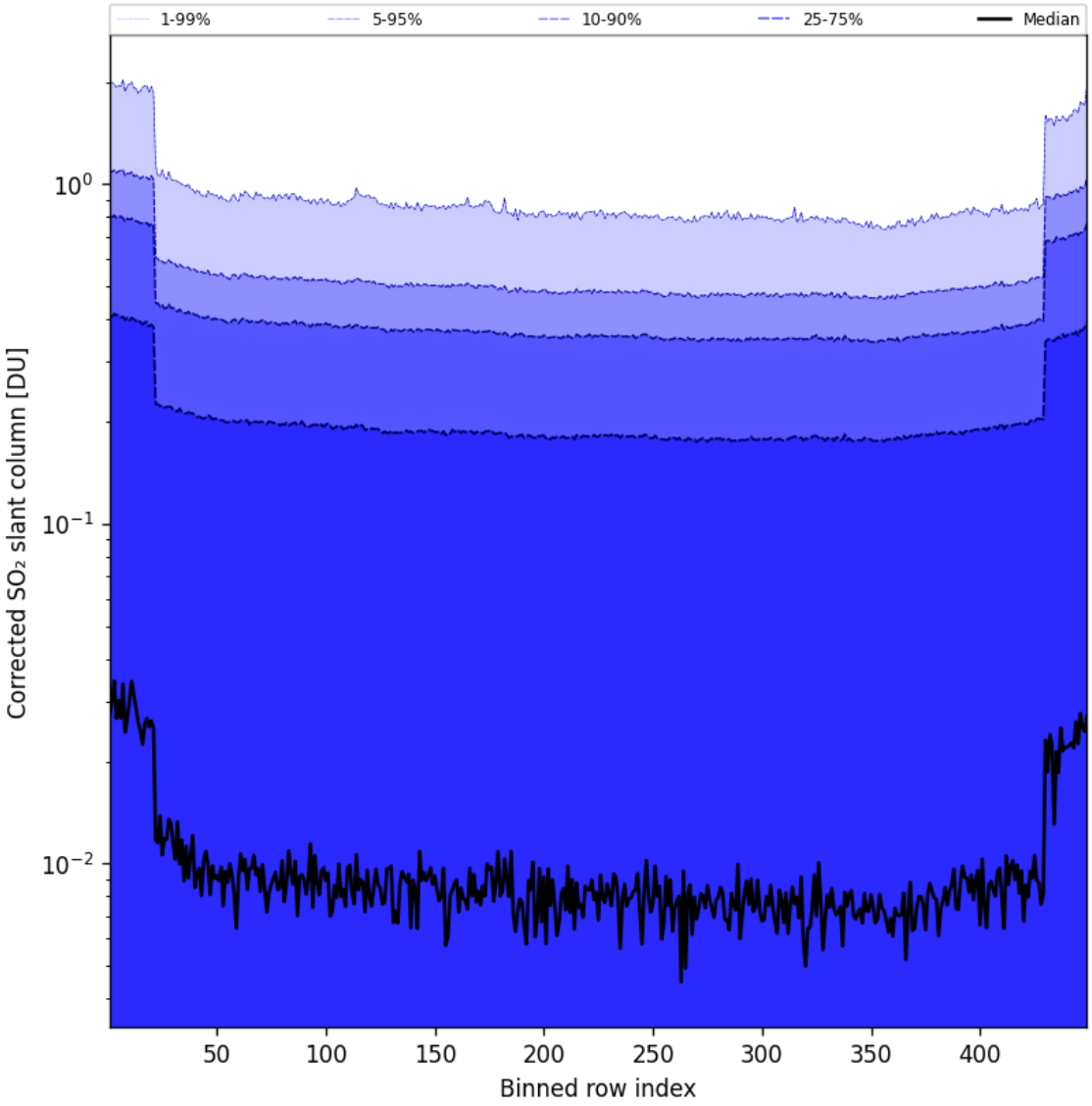

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-05-09 to 2025-05-10

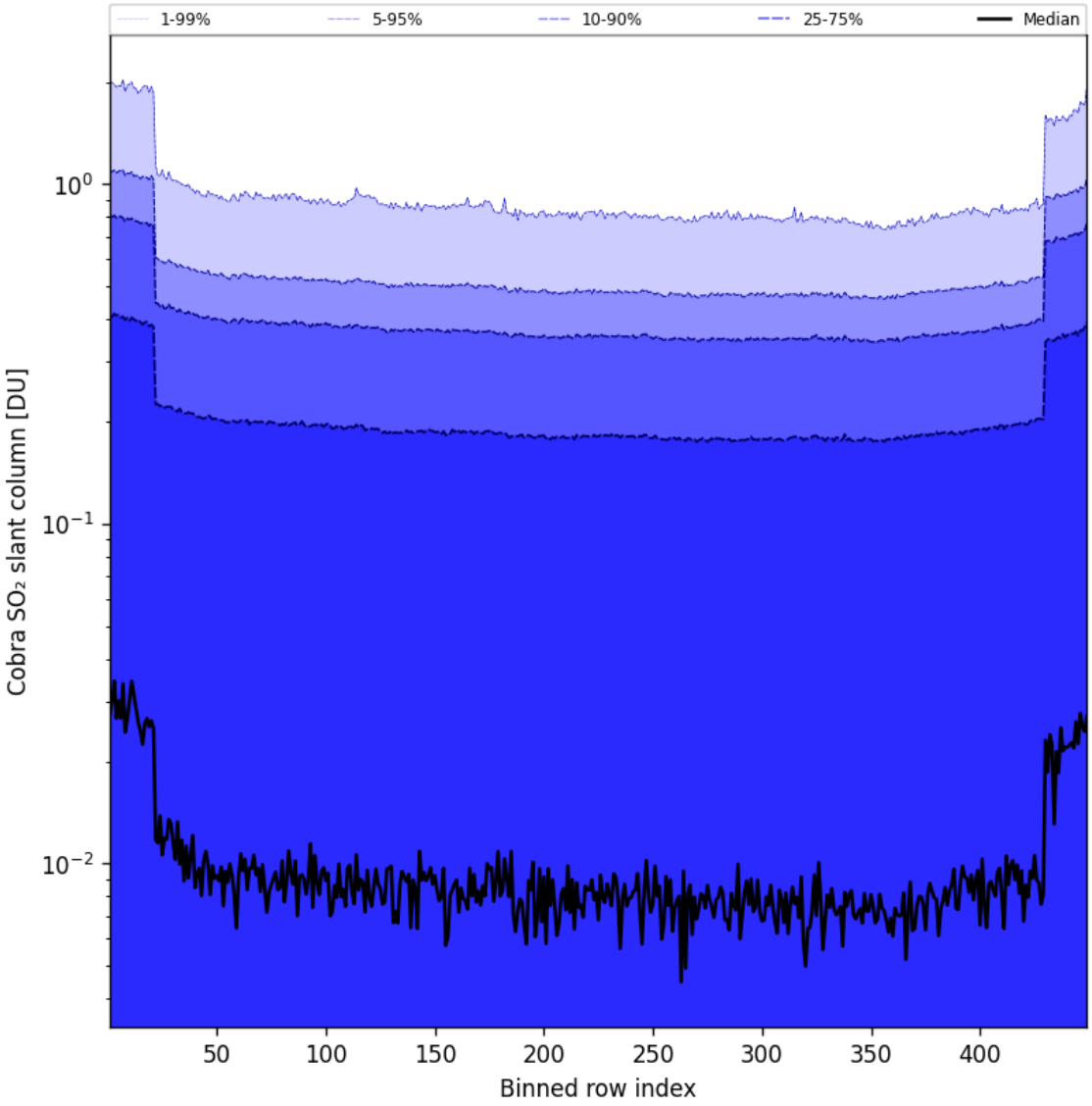

Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-05-09 to 2025-05-10

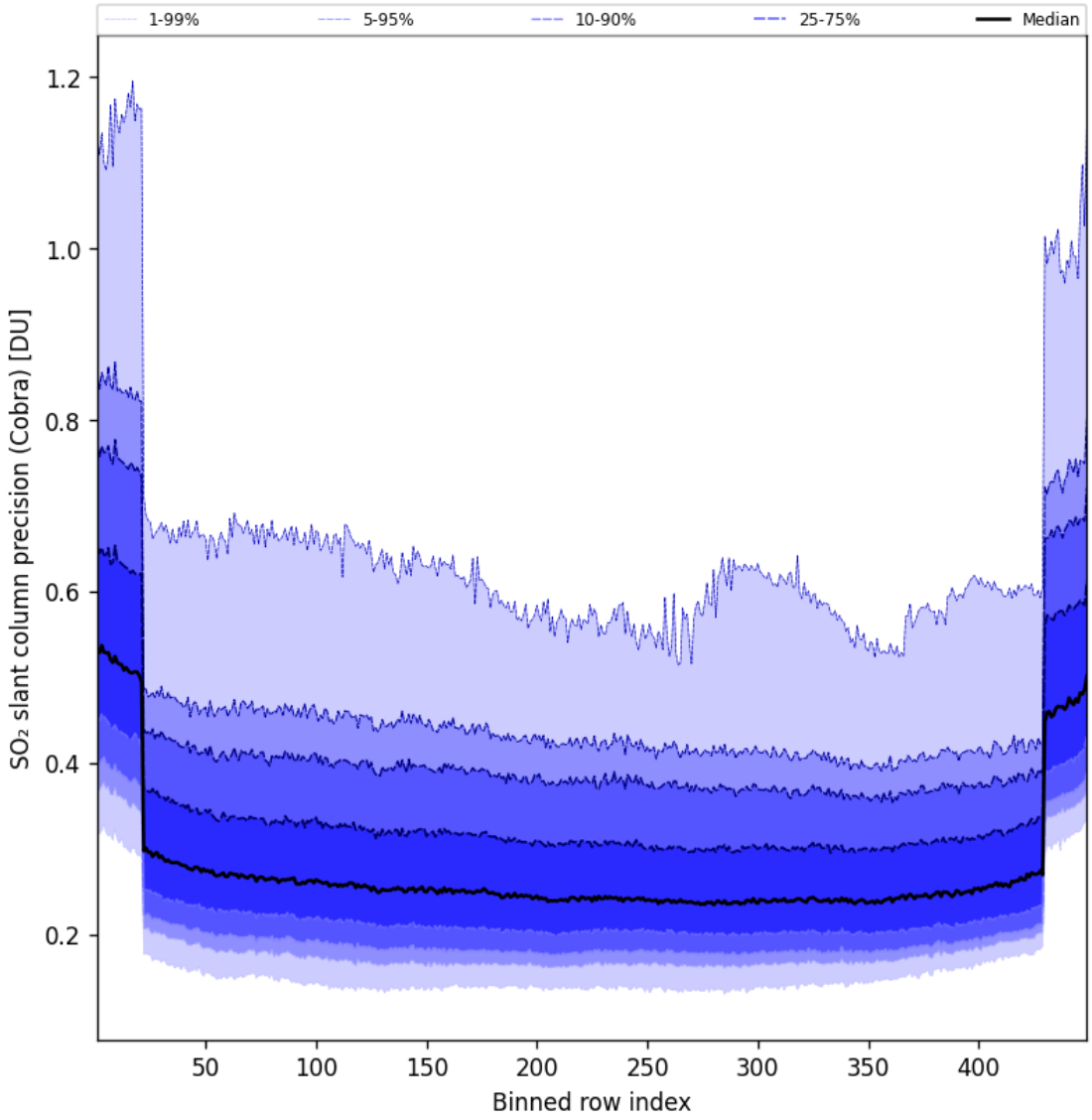

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-05-09 to 2025-05-10

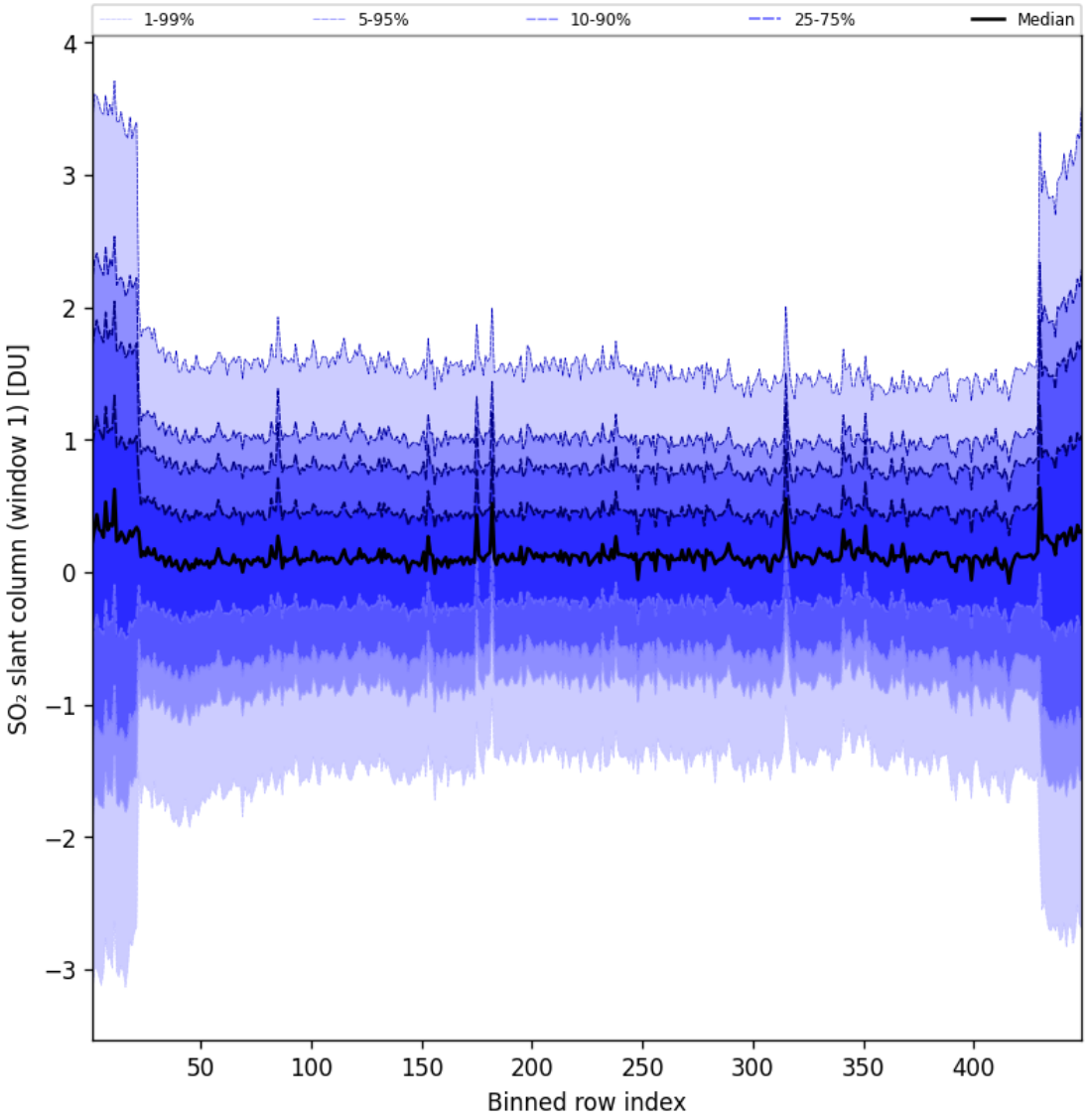

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-05-09 to 2025-05-10

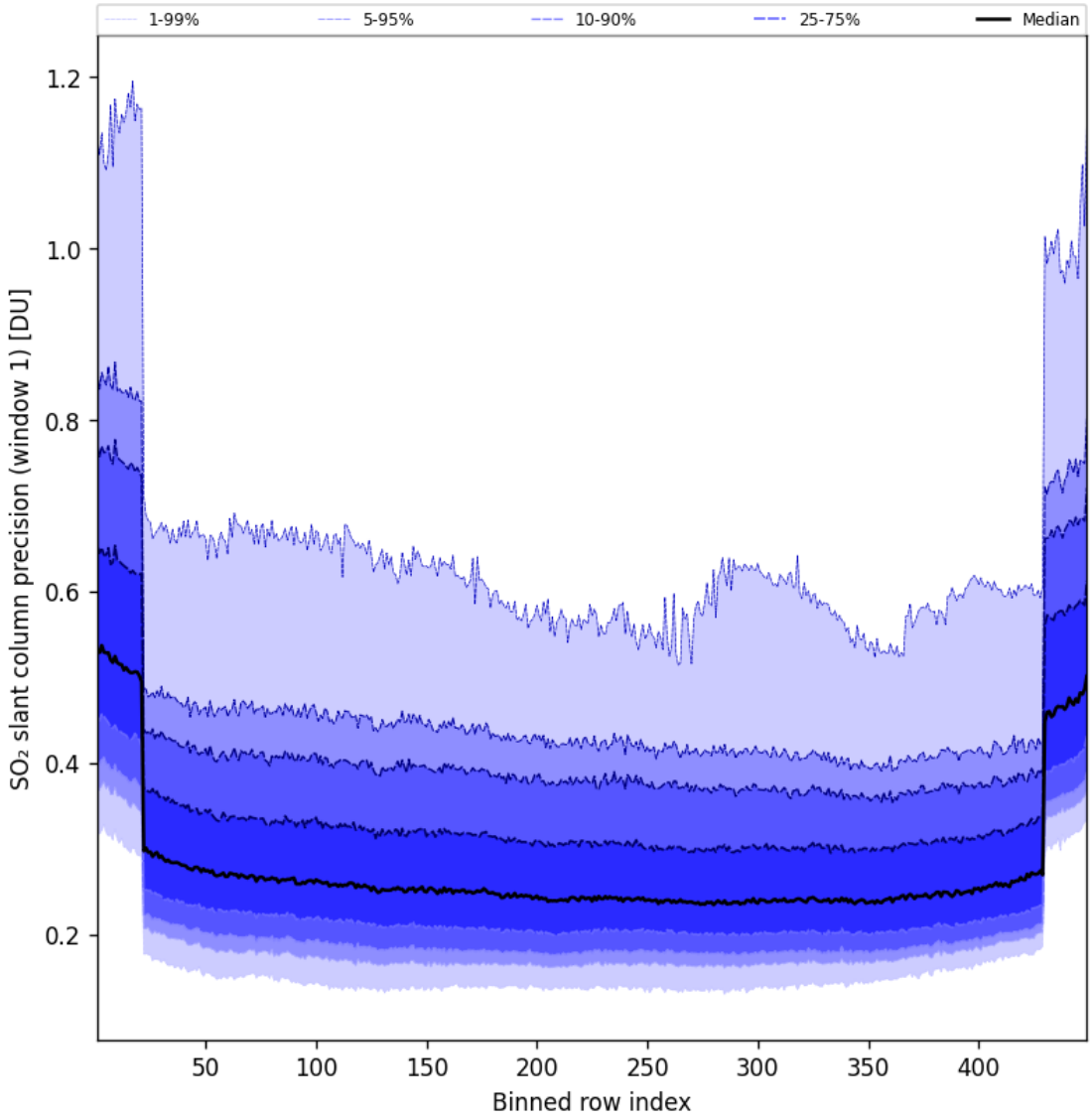

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-05-09 to 2025-05-10

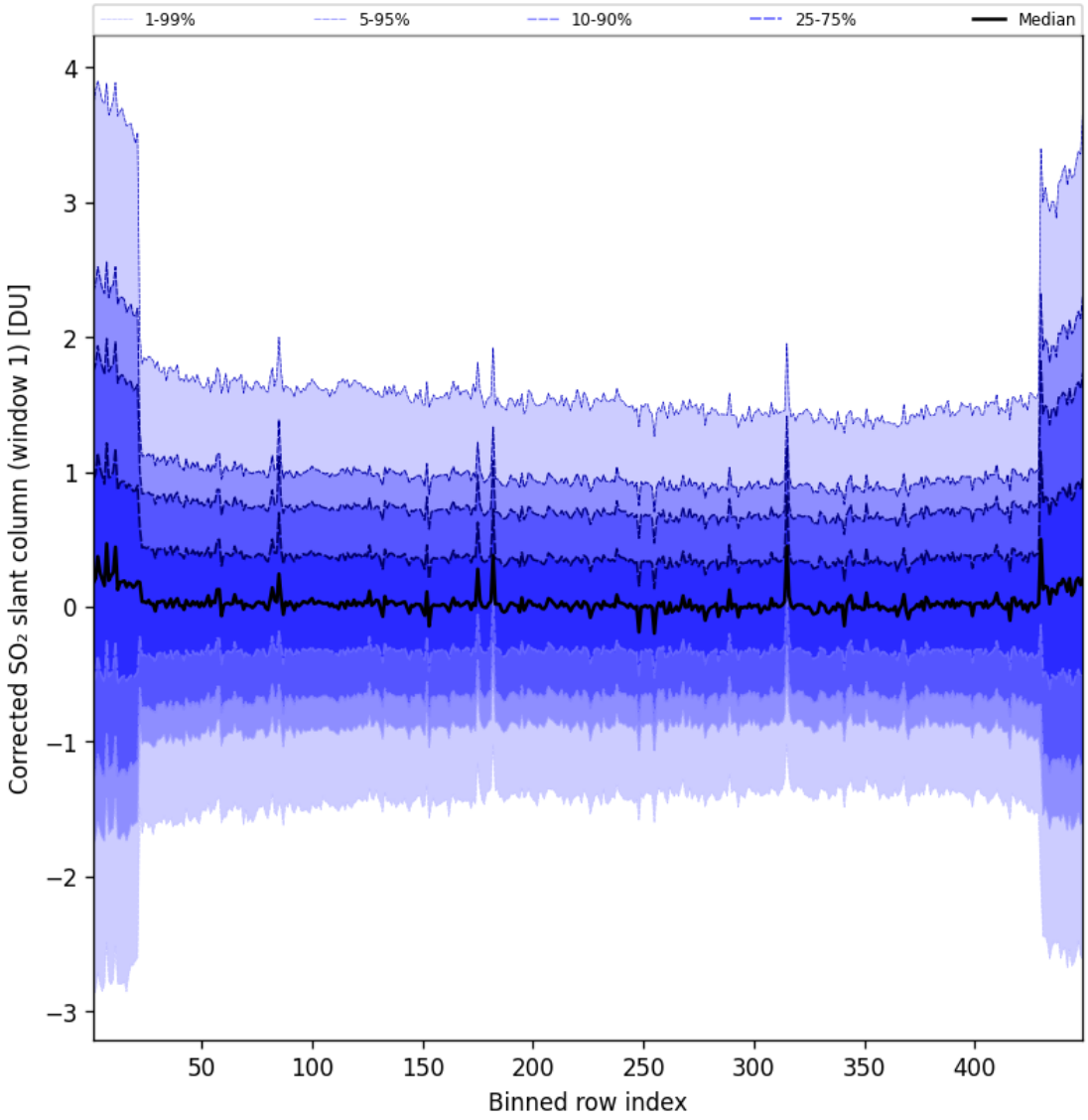

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-05-09 to 2025-05-10

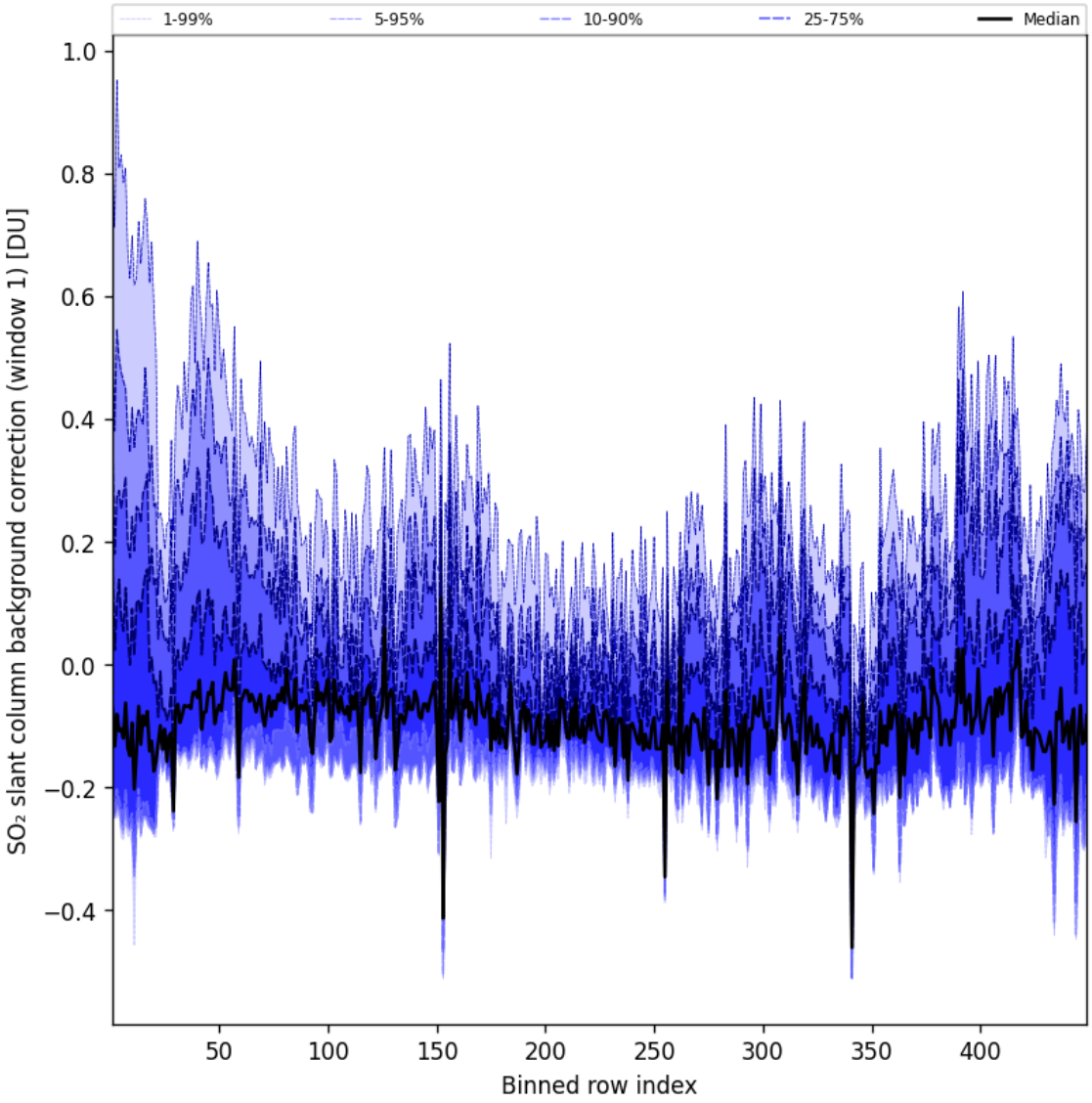

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-05-09 to 2025-05-10

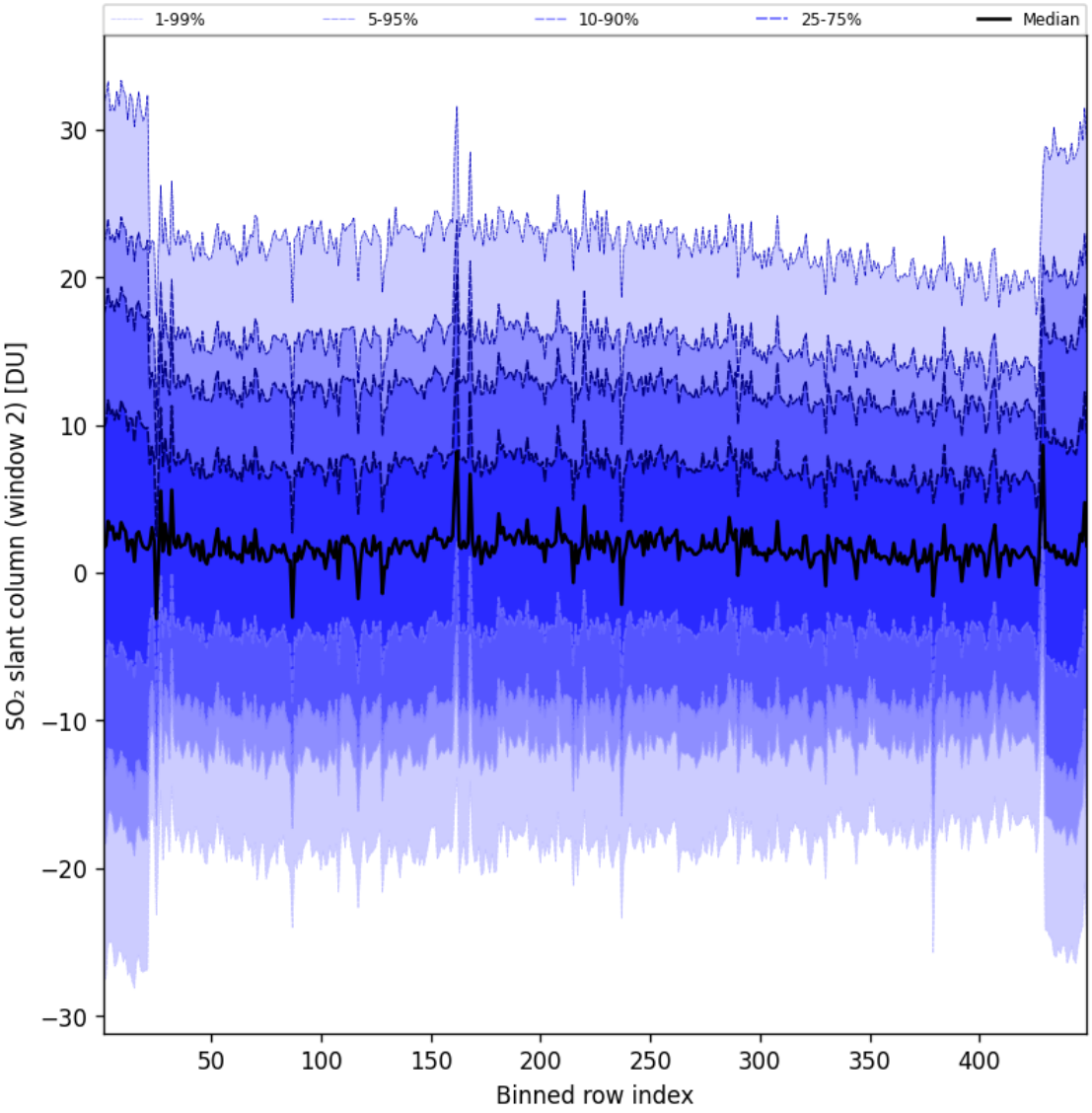

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-05-09 to 2025-05-10

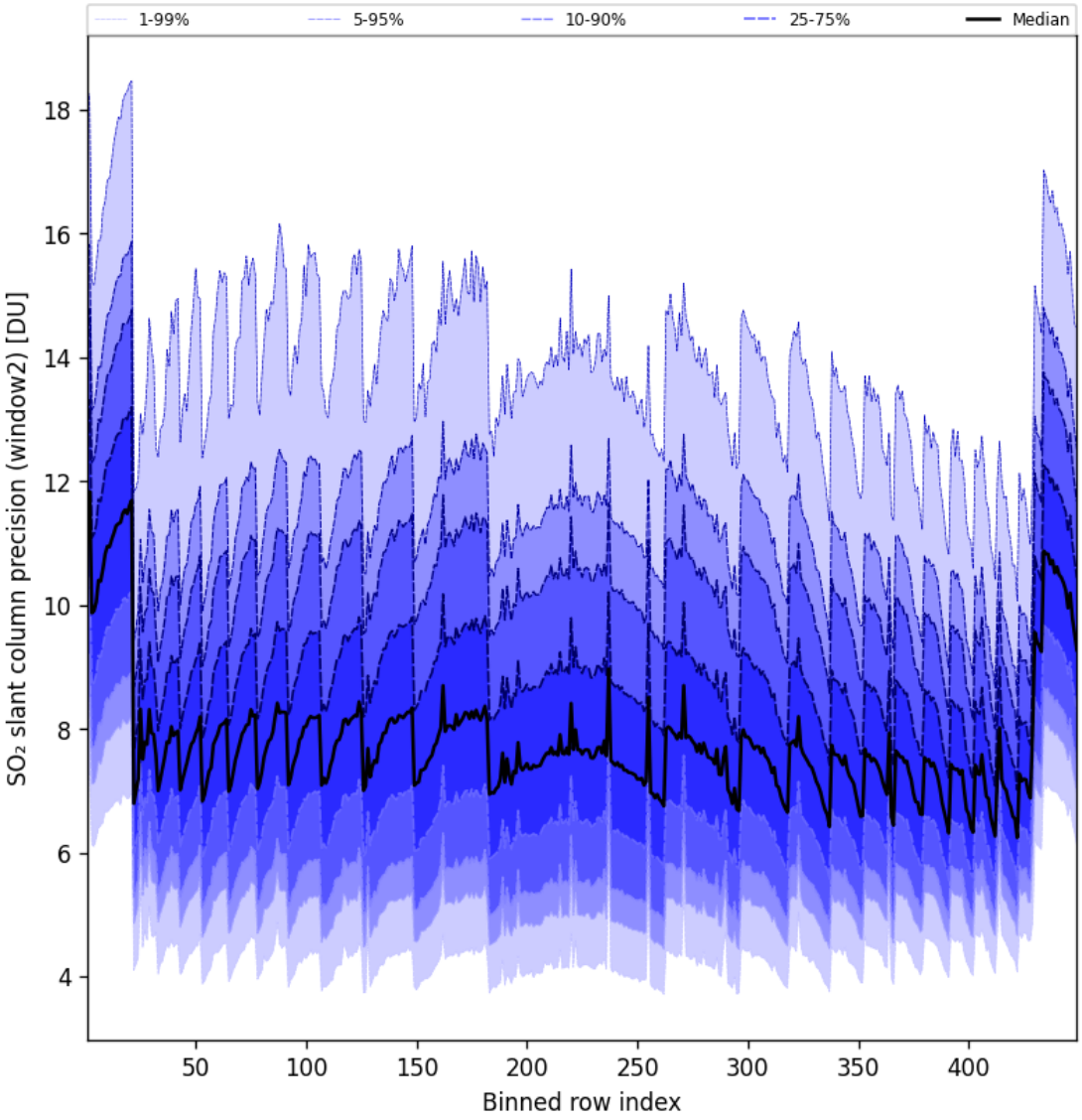

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-05-09 to 2025-05-10

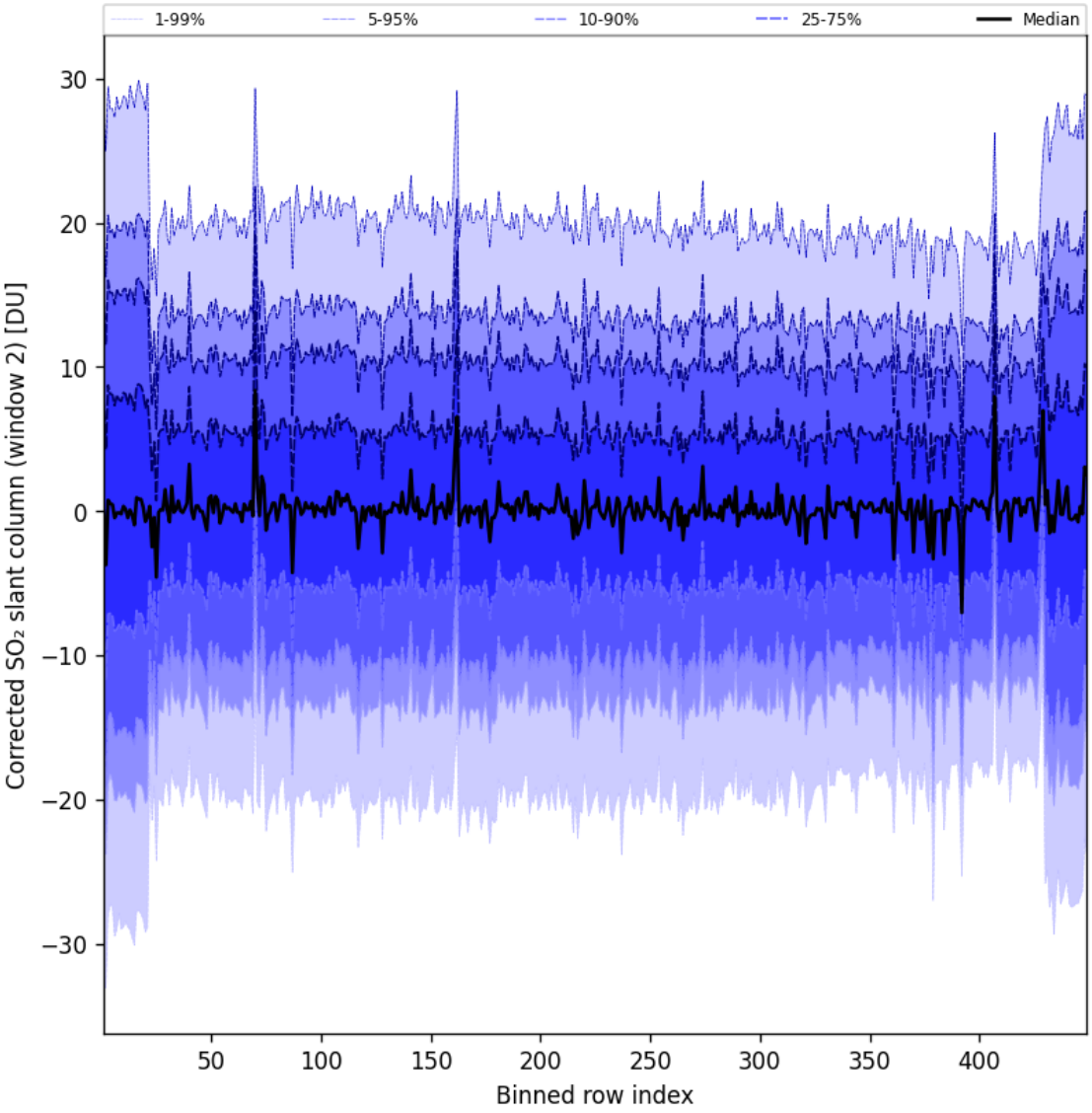

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-05-09 to 2025-05-10

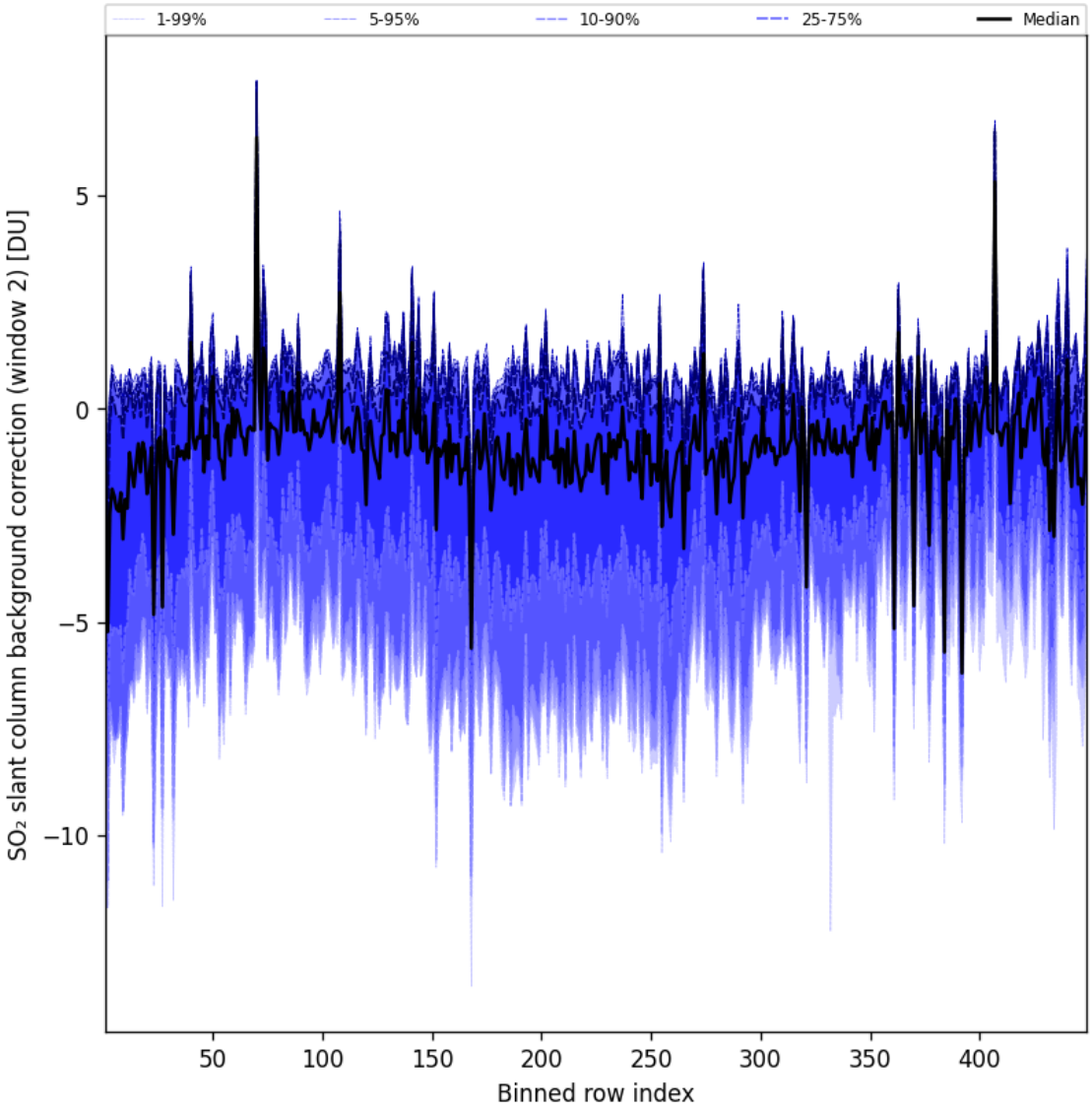

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-05-09 to 2025-05-10

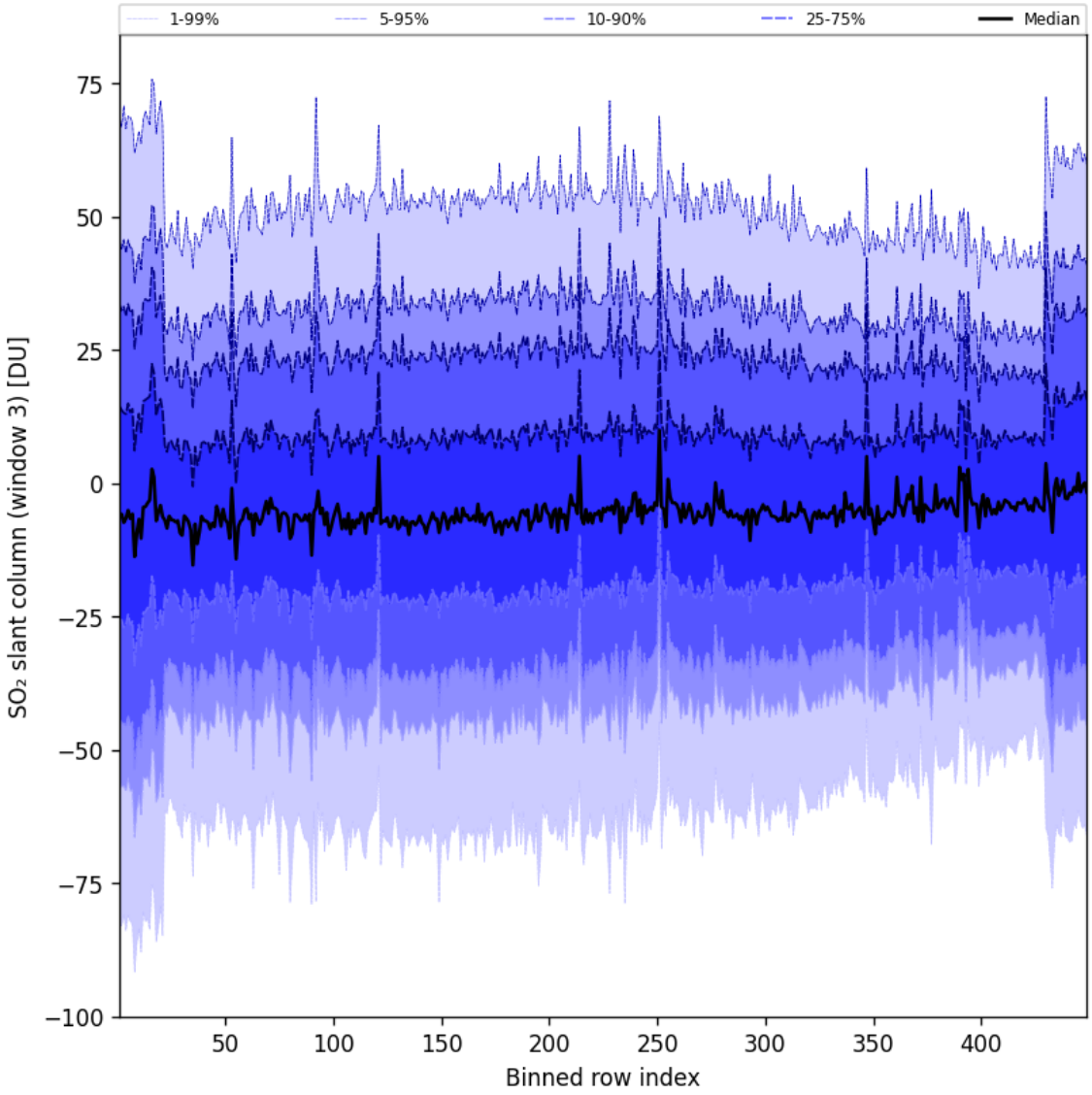

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-05-09 to 2025-05-10

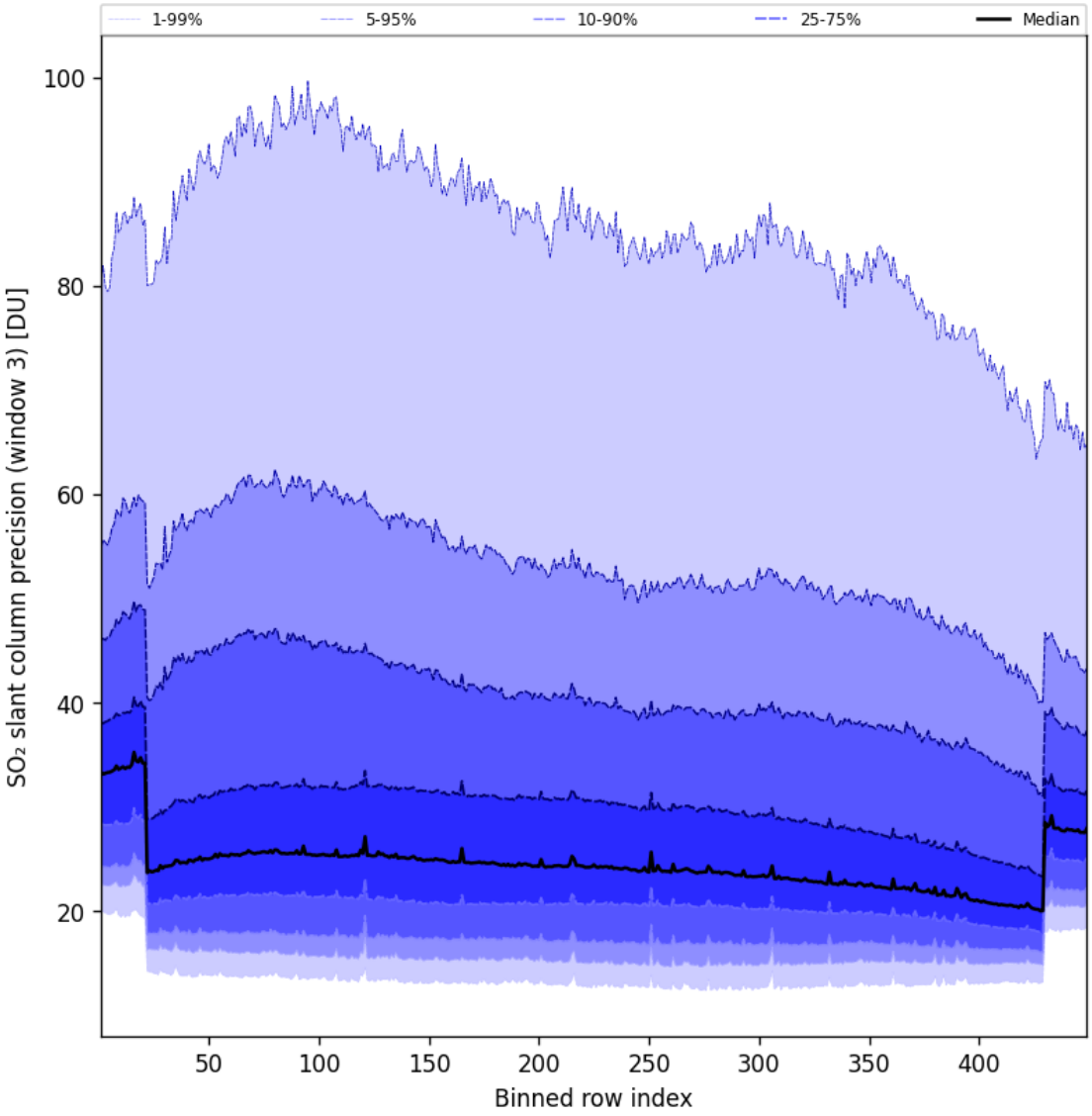

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-05-09 to 2025-05-10

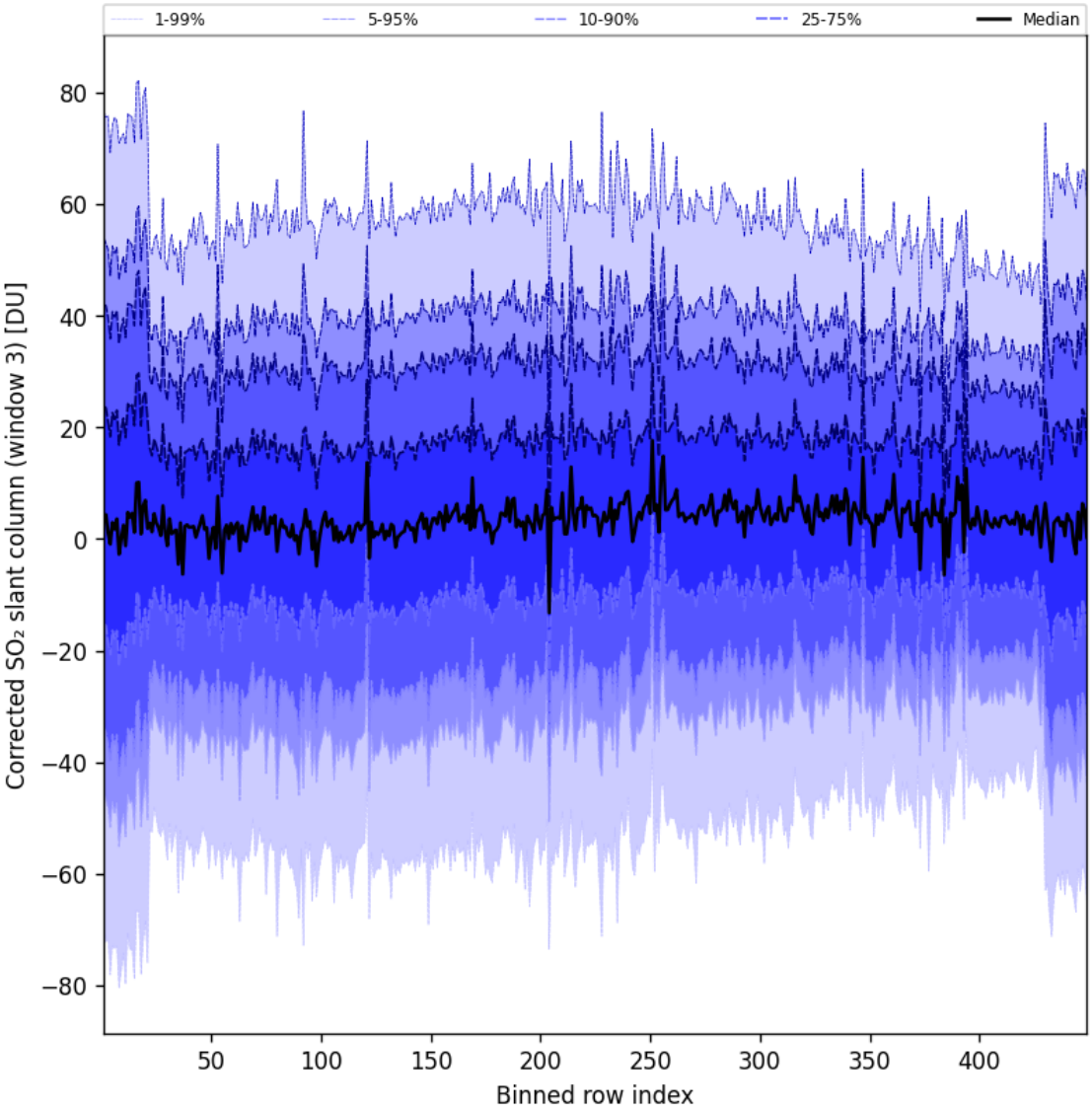

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-05-09 to 2025-05-10

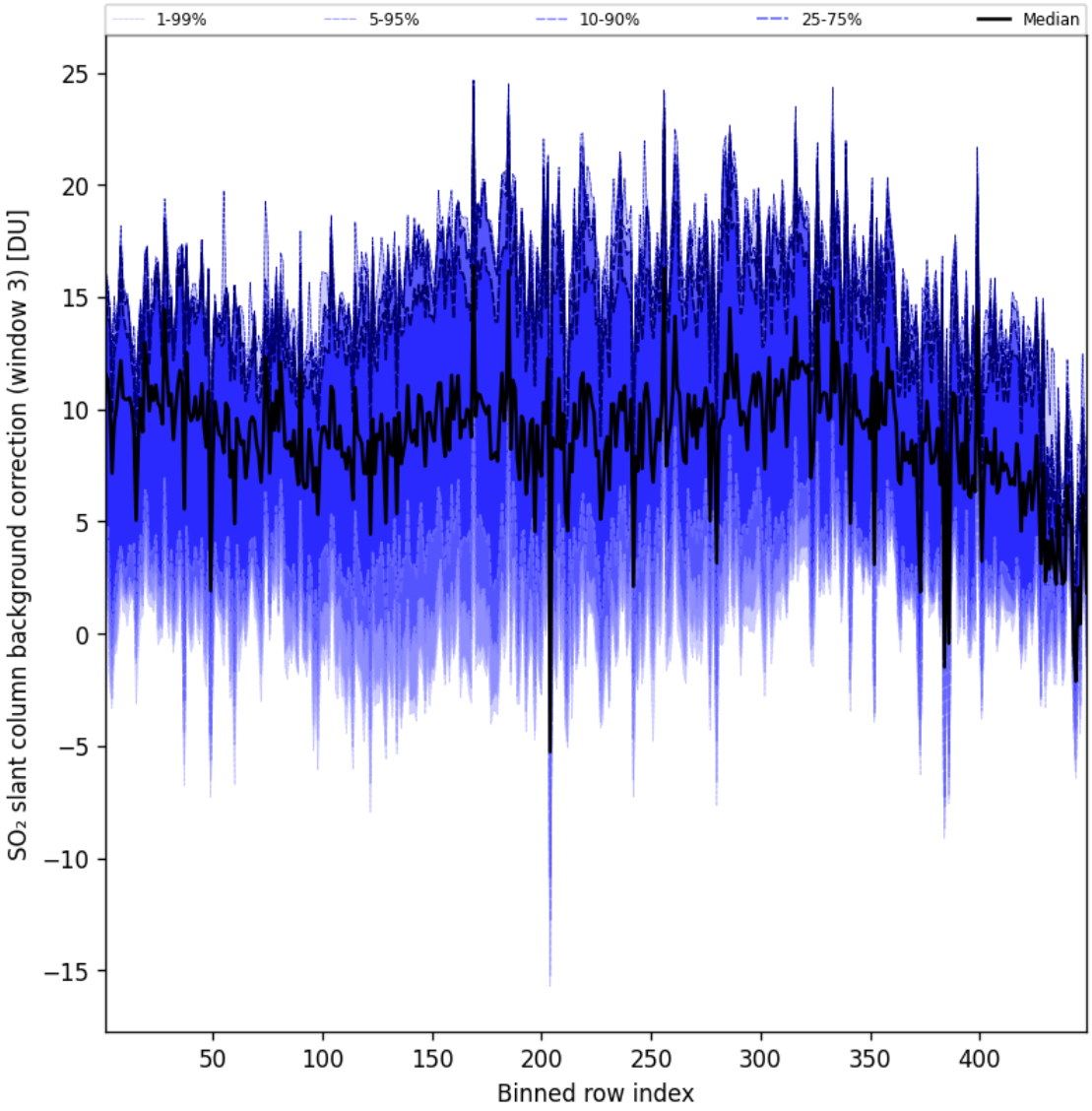

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-05-09 to 2025-05-10

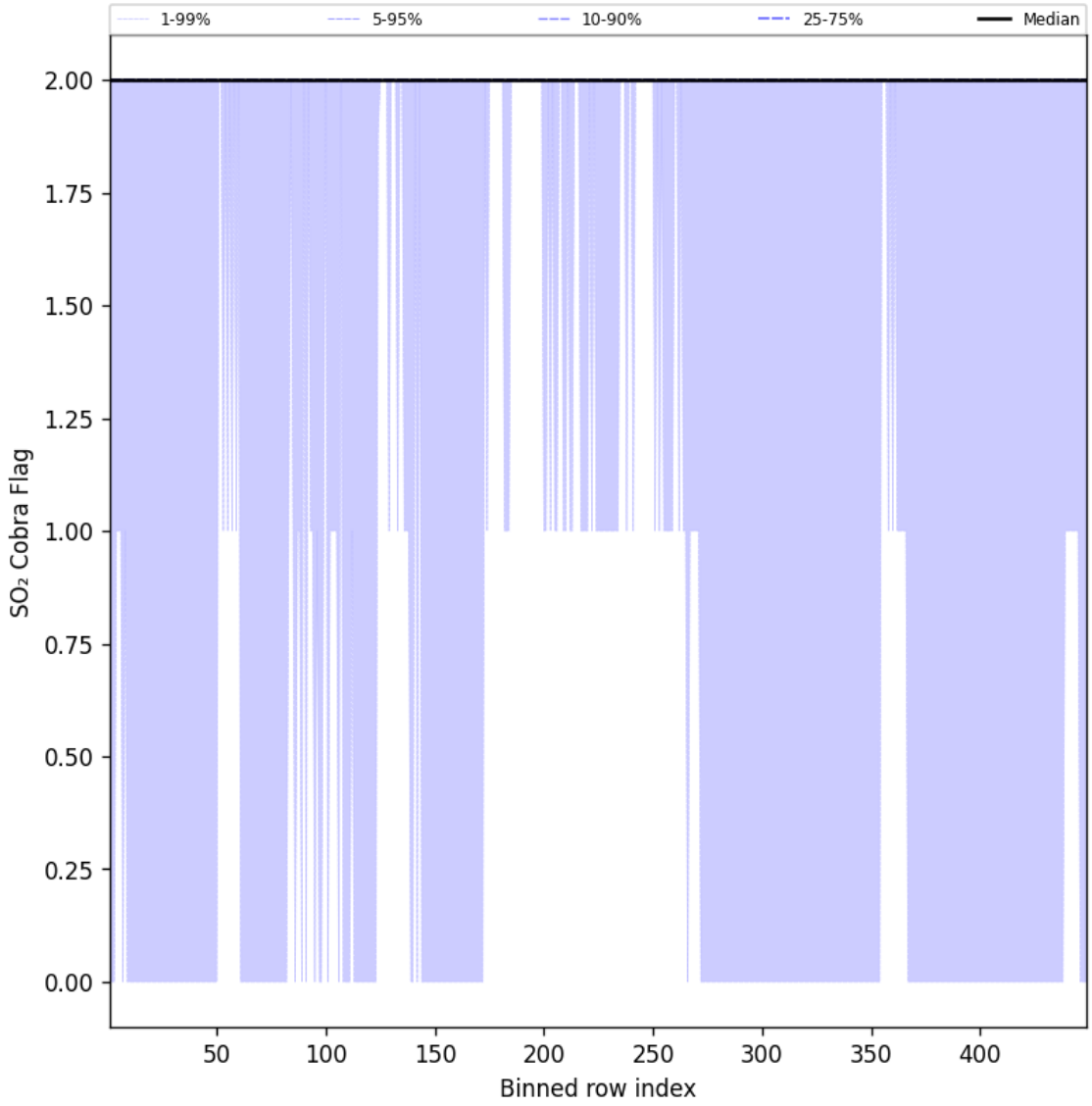

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-05-09 to 2025-05-10

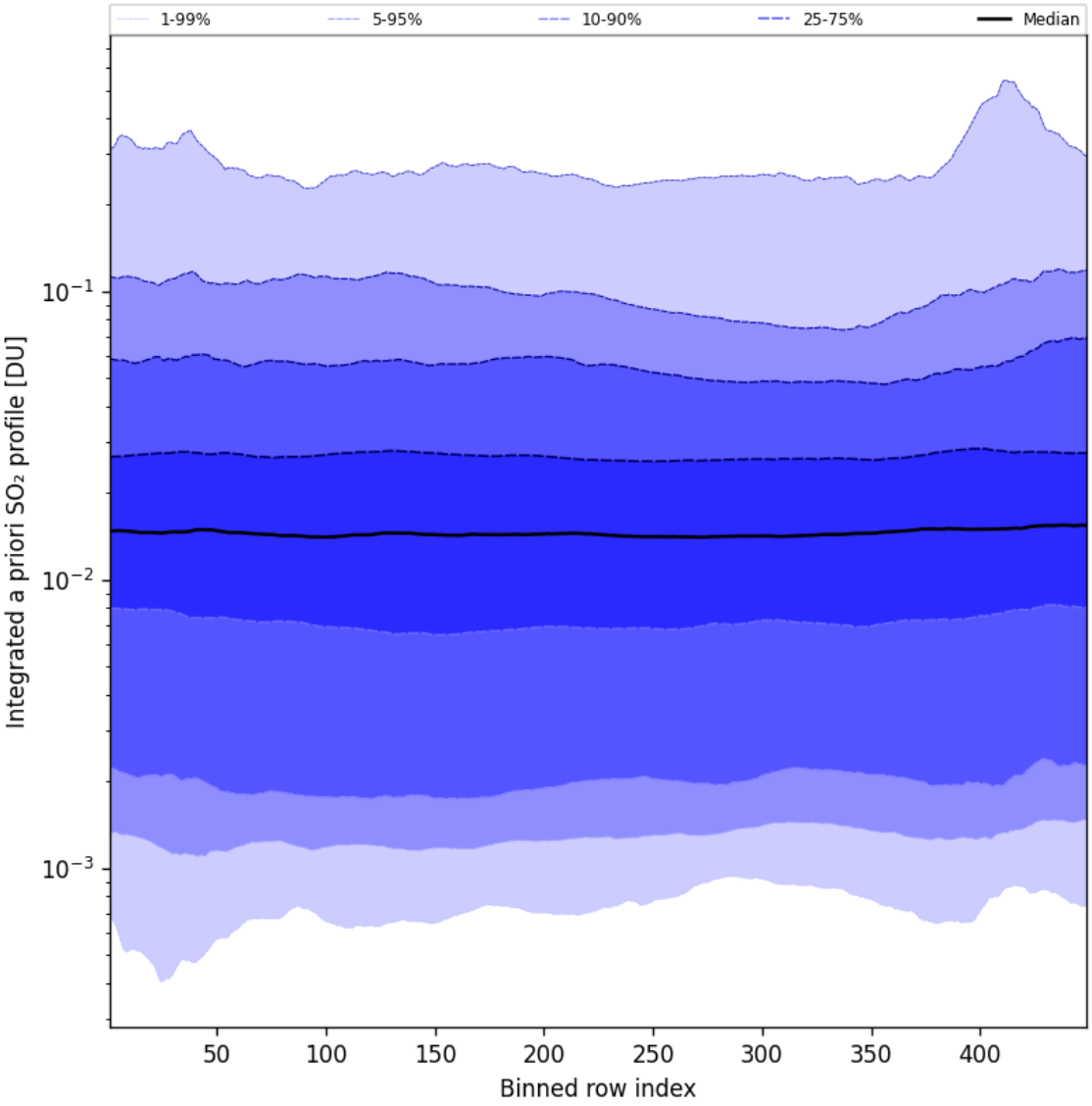

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-05-09 to 2025-05-10

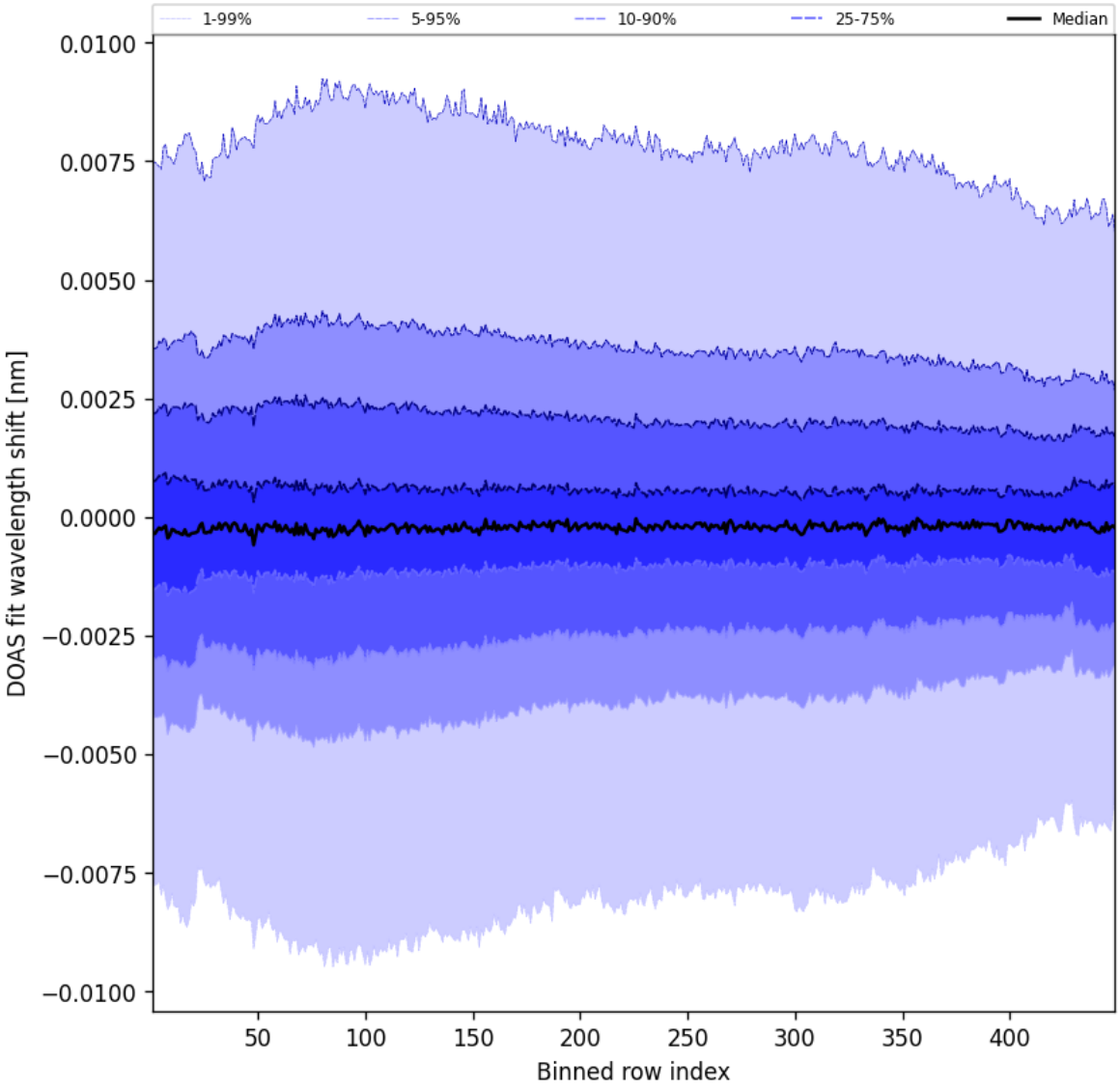

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-05-09 to 2025-05-10

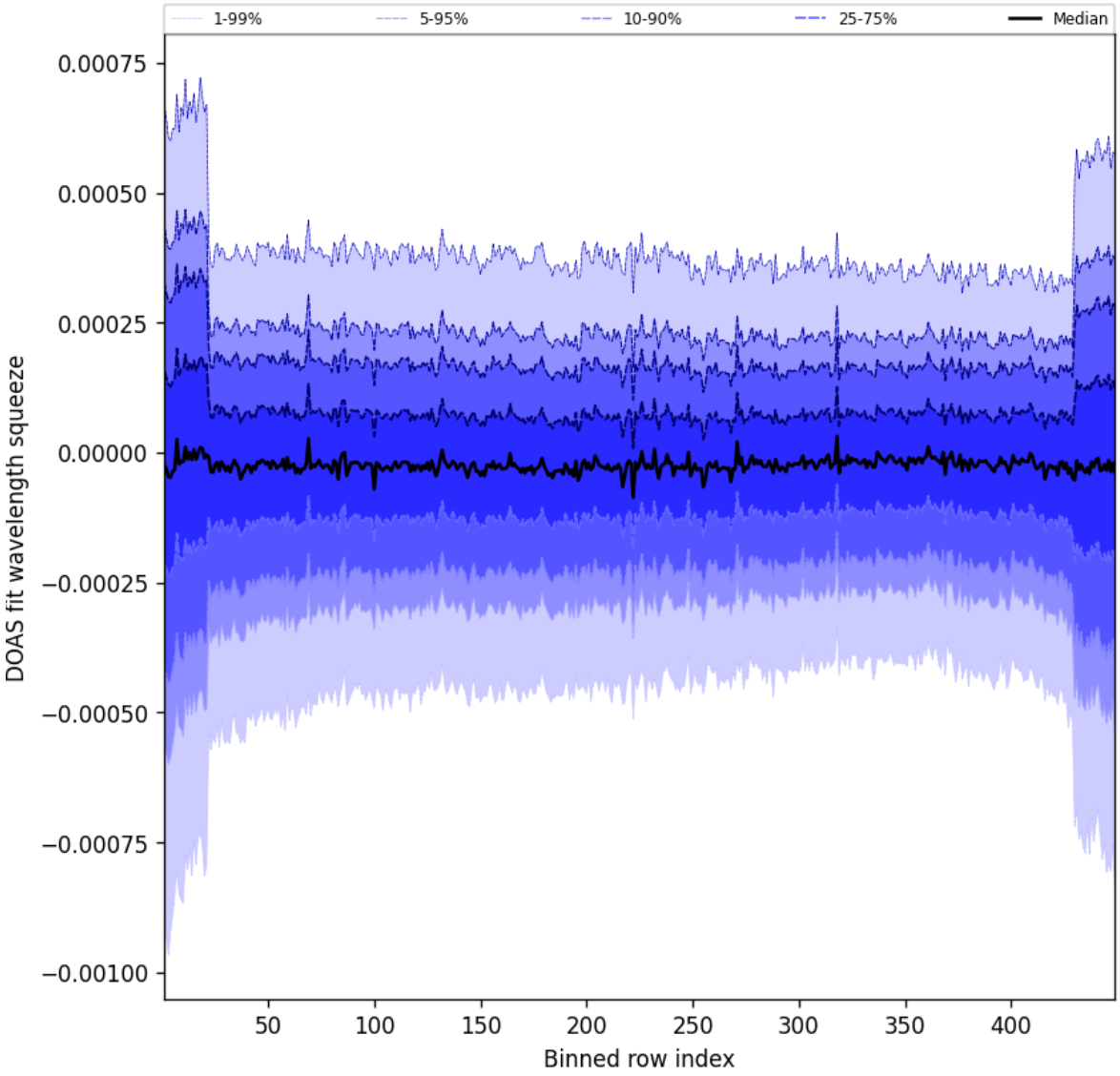

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-05-09 to 2025-05-10

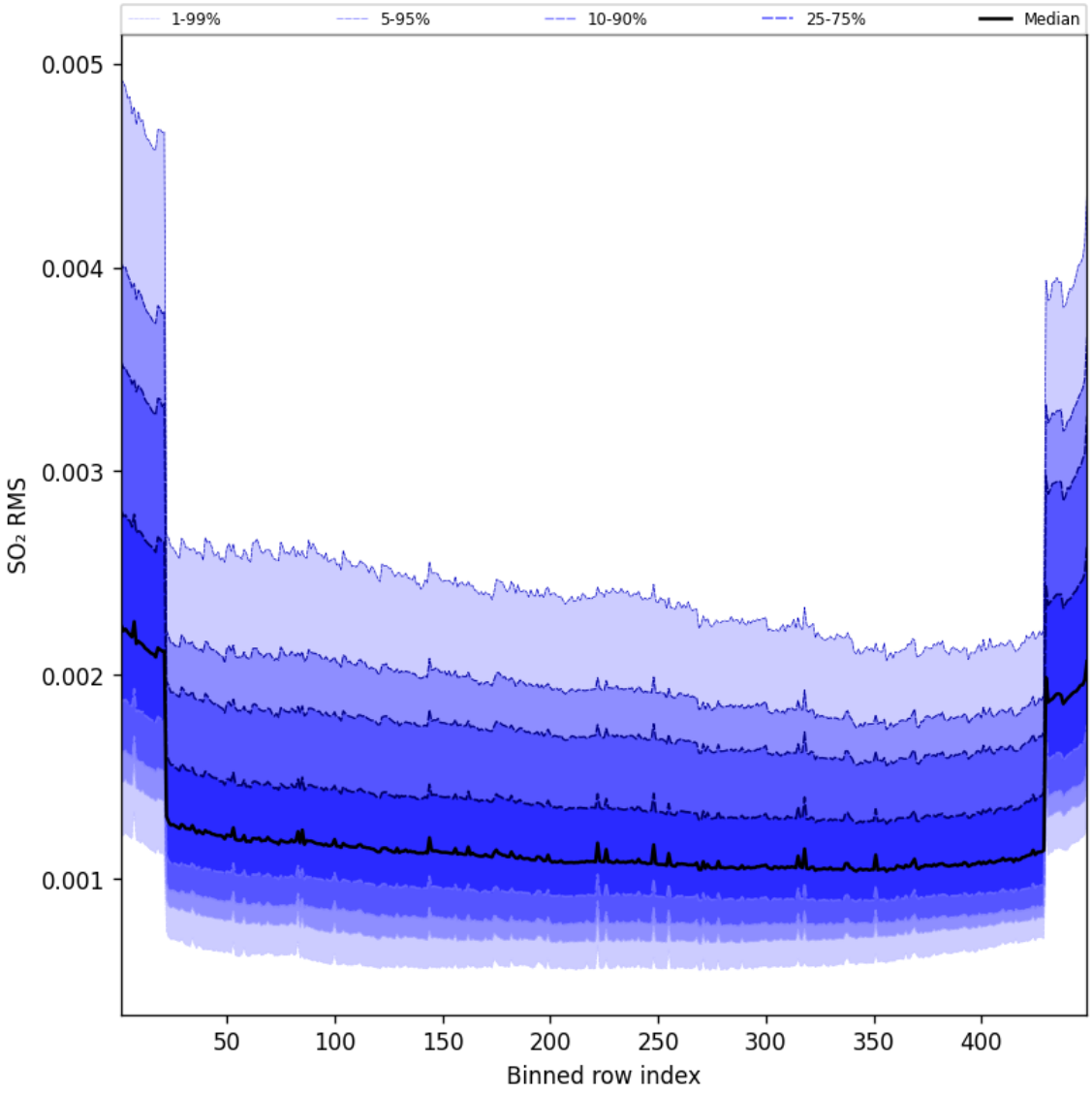

Figure 106: Along track statistics of "SO_2 RMS" for 2025-05-09 to 2025-05-10

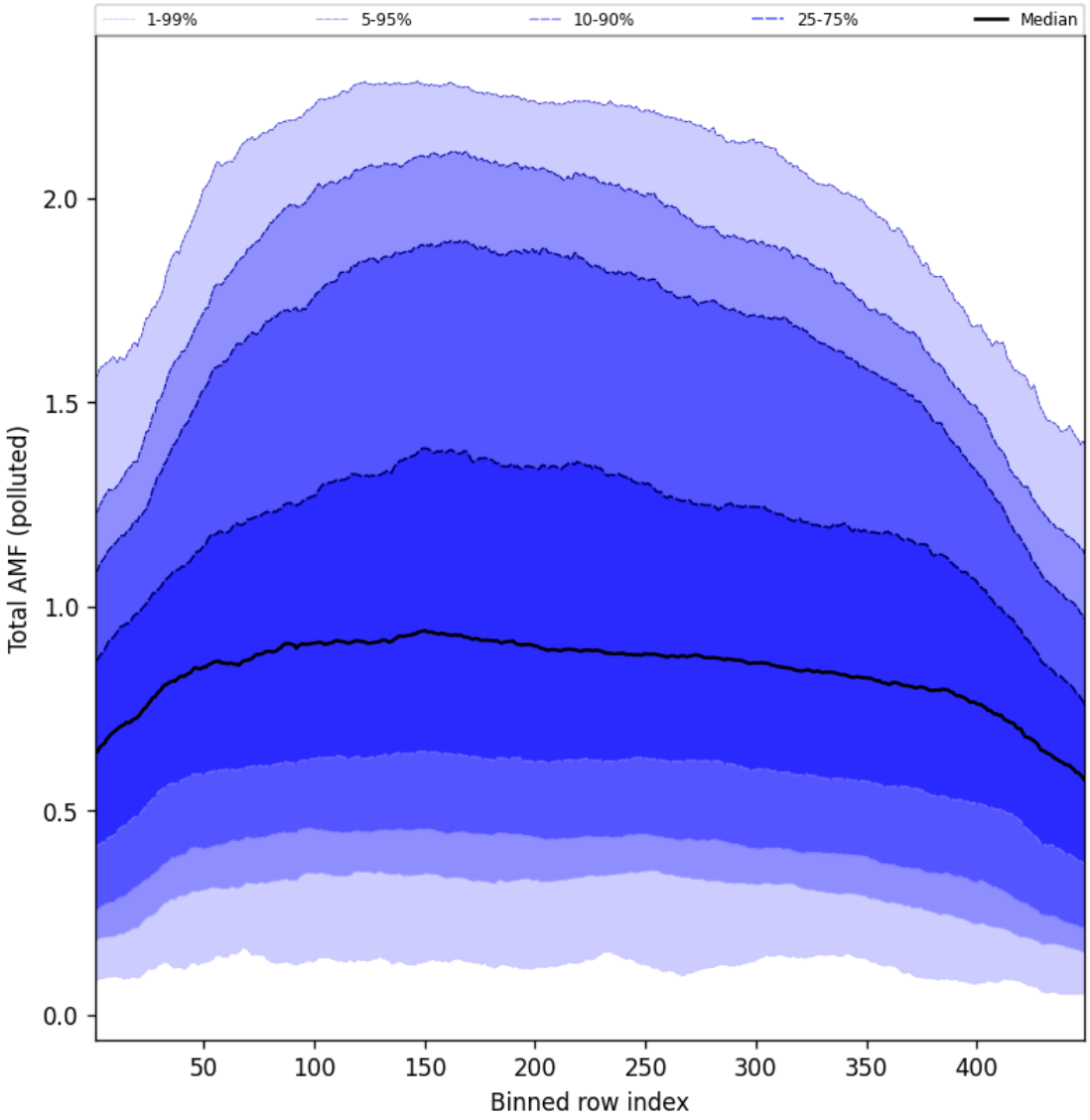

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-05-09 to 2025-05-10

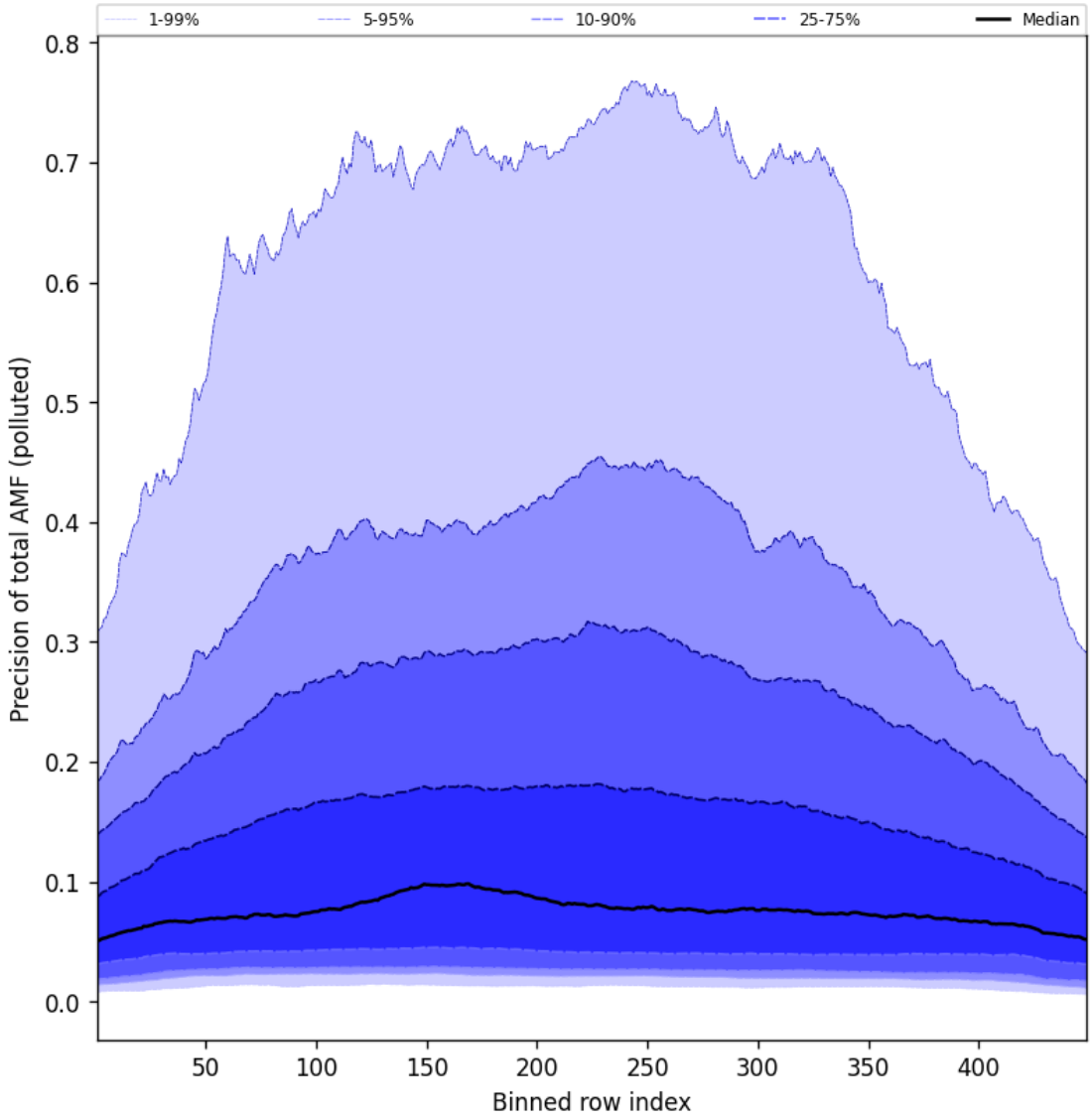

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-05-09 to 2025-05-10

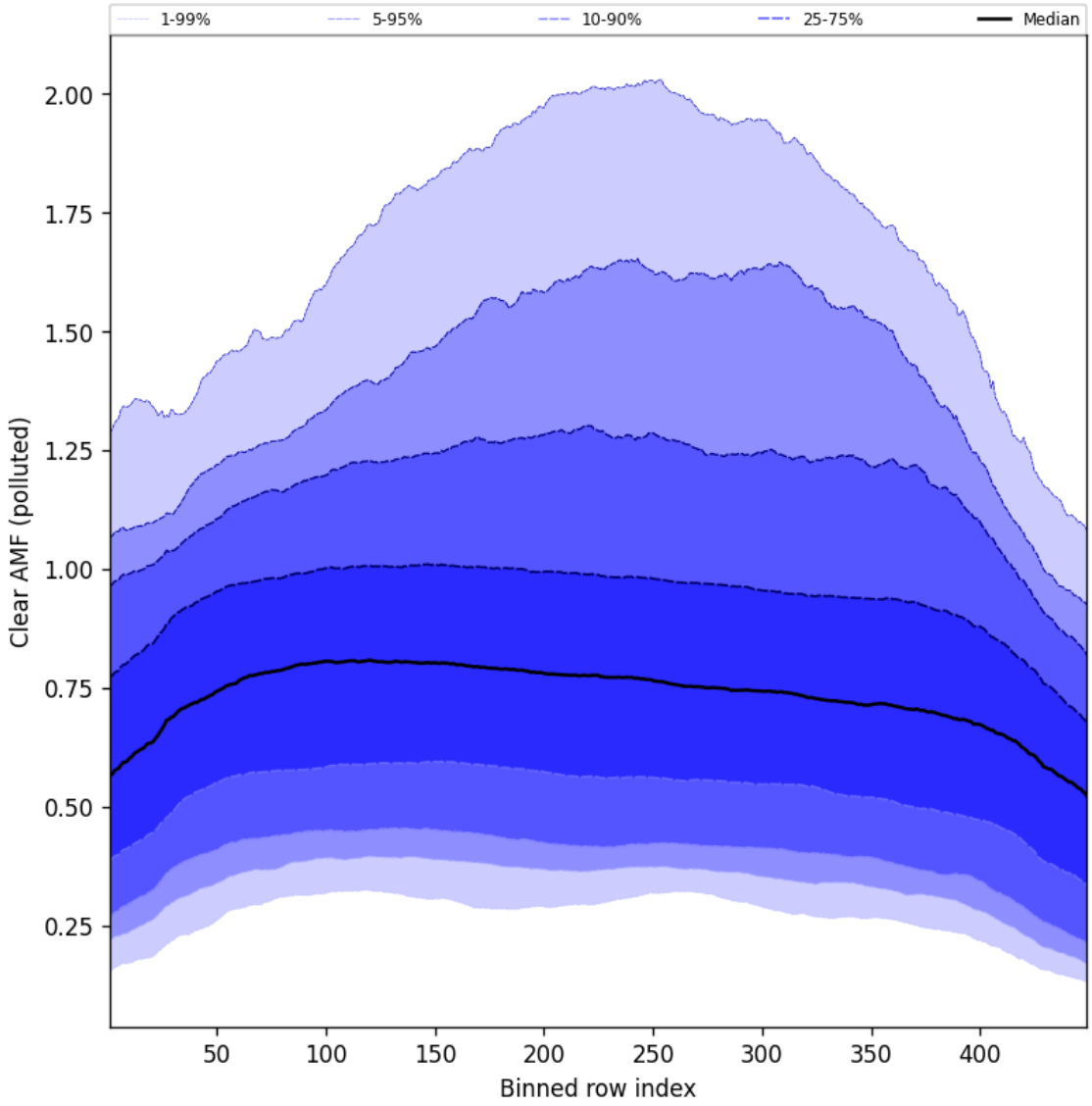

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-05-09 to 2025-05-10

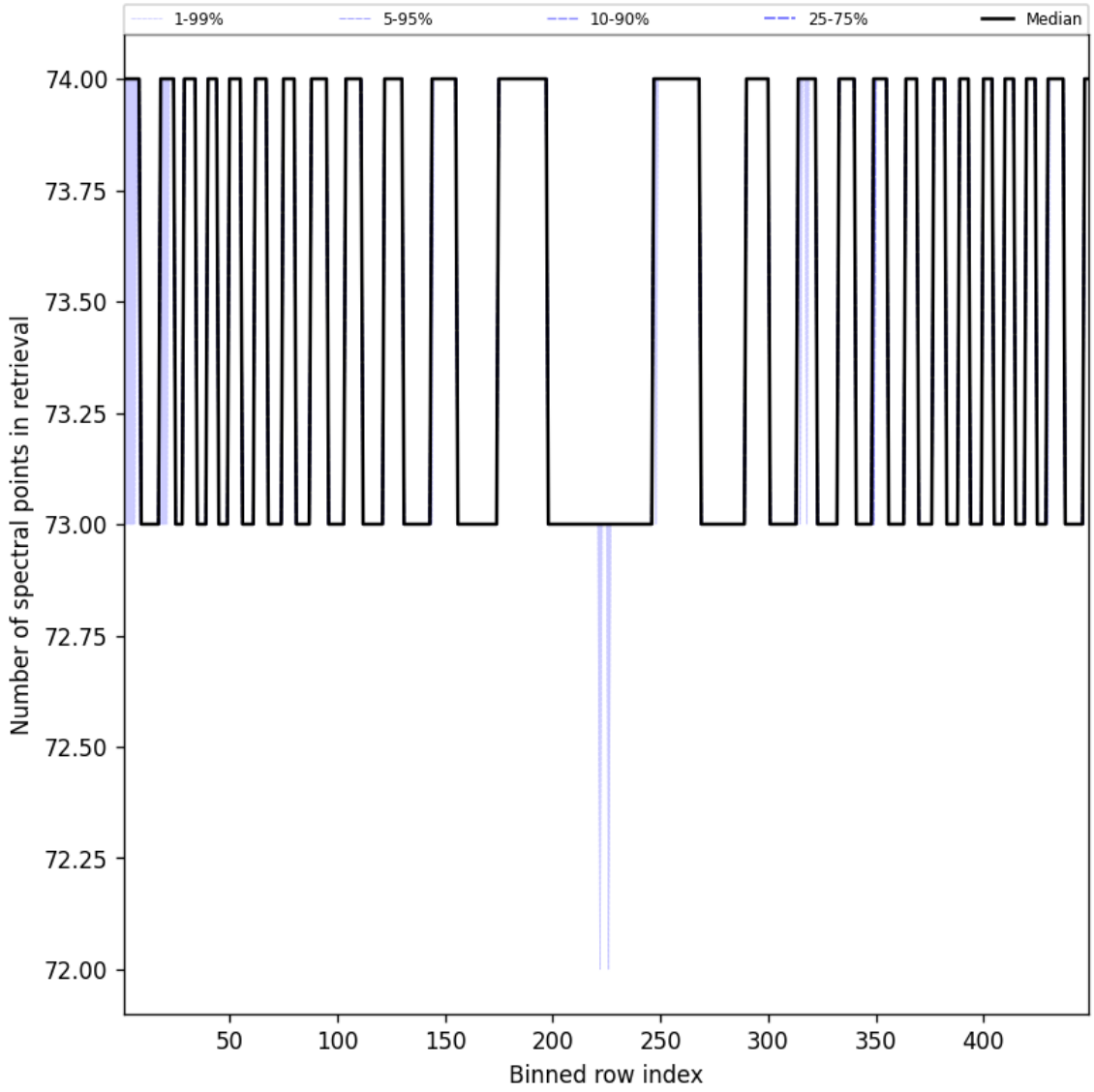

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-05-09 to 2025-05-10

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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