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]	0.626 ± 0.413	17275327	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.915 \pm 95.485) \times 10^{-2}$	17275327	0.263	0.448	1.022×10^{-2}	-87.1	118
sulfurdioxide total vertical column precision [DU]	0.507 ± 0.700	17275327	0.222	0.330	0.323	4.641×10^{-2}	43.7
sulfurdioxide slant column density corrected [DU]	$(1.811 \pm 36.666) \times 10^{-2}$	17275327	0.258	0.374	9.229×10^{-3}	-17.4	140
sulfurdioxide slant column density cobra [DU]	$(1.804 \pm 36.151) \times 10^{-2}$	17275327	0.258	0.374	9.229×10^{-3}	-17.4	34.1
sulfurdioxide slant column density cobra precision [DU]	0.298 ± 0.128	17275327	0.213	0.131	0.262	8.883×10^{-2}	17.8
sulfurdioxide slant column density window1 [DU]	0.121 ± 0.680	17275327	0.125	0.747	0.124	-70.5	66.9
sulfurdioxide slant column density window1 precision [DU]	0.298 ± 0.128	17275327	0.213	0.131	0.262	8.883×10^{-2}	17.8
sulfurdioxide slant column density corrected win1 [DU]	$(4.672 \pm 67.205) \times 10^{-2}$	17275327	2.500×10^{-2}	0.735	2.865×10^{-2}	-70.5	66.9
background so2 slant column offset window1 [DU]	$(-7.413 \pm 13.192) \times 10^{-2}$	17275327	-0.140	0.147	-9.794×10^{-2}	-1.12	3.05
sulfurdioxide slant column density window2 [DU]	1.54 ± 9.00	17275327	1.75	11.3	1.49	-1.591×10^{3}	1.600×10^{3}
sulfurdioxide slant column density window2 precision [DU]	8.04 ± 2.37	17275327	7.43	2.60	7.69	2.23	868
sulfurdioxide slant column density corrected win2 [DU]	-0.372 ± 8.774	17275327	-0.250	11.0	-0.352	-1.595×10^{3}	1.598×10^{3}
background so2 slant column offset window2 [DU]	-1.91 ± 2.50	17275327	0.250	3.58	-1.20	-13.9	5.37
sulfurdioxide slant column density window3 [DU]	-5.23 ± 23.63	17275327	-6.16	29.1	-5.52	-339	551
sulfurdioxide slant column density window3 precision [DU]	27.9 ± 13.3	17275327	21.5	10.0	24.4	9.38	295
sulfurdioxide slant column density corrected win3 [DU]	3.13 ± 23.07	17275327	3.92	28.3	3.36	-328	551
background so2 slant column offset window3 [DU]	8.36 ± 5.76	17275327	3.92	9.68	8.18	-12.4	31.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17275327	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(2.912 \pm 5.883) \times 10^{-2}$	17275327	1.423×10^{-2}	1.957×10^{-2}	1.470×10^{-2}	1.559×10^{-4}	1.83
fitted radiance shift [nm]	$(-1.728 \pm 25.424) \times 10^{-4}$	17275327	1.000×10^{-4}	1.663×10^{-3}	-1.608×10^{-4}	-8.114×10^{-2}	7.890×10^{-2}
fitted radiance squeeze [1]	$(-2.791 \pm 17.878) \times 10^{-5}$	17275327	-1.000×10^{-5}	2.057×10^{-4}	-2.412×10^{-5}	-2.651×10^{-2}	2.100×10^{-2}
fitted root mean square [1]	$(1.292 \pm 0.518) \times 10^{-3}$	17275327	9.750×10^{-4}	5.273×10^{-4}	1.155×10^{-3}	3.336×10^{-4}	0.125
sulfurdioxide total air mass factor polluted [1]	0.907 ± 0.485	17275327	0.620	0.611	0.821	5.000×10^{-2}	2.85
sulfurdioxide total air mass factor polluted precision [1]	0.116 ± 0.126	17275327	3.500×10^{-2}	0.112	7.038×10^{-2}	2.500×10^{-3}	1.78
sulfurdioxide clear air mass factor polluted [1]	0.758 ± 0.333	17275327	0.660	0.412	0.719	4.116×10^{-2}	2.58
number of spectral points in retrieval [1]	73.4 ± 0.5	17275327	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	2.000×10^{-2}	8.000×10^{-2}	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.18	−0.854	−0.525	−0.355	−0.211	0.237	0.393	0.581	0.953	2.49
sulfurdioxide total vertical column precision [DU]	0.101	0.133	0.159	0.184	0.217	0.548	0.732	0.954	1.37	3.29
sulfurdioxide slant column density corrected [DU]	−0.856	−0.500	−0.364	−0.272	−0.176	0.198	0.300	0.399	0.553	1.01
sulfurdioxide slant column density cobra [DU]	−0.856	−0.500	−0.364	−0.272	−0.176	0.198	0.300	0.399	0.553	1.01
sulfurdioxide slant column density cobra precision [DU]	0.147	0.174	0.188	0.199	0.214	0.345	0.394	0.446	0.543	0.765
sulfurdioxide slant column density window1 [DU]	−1.67	−0.933	−0.645	−0.453	−0.252	0.495	0.689	0.874	1.15	1.92
sulfurdioxide slant column density window1 precision [DU]	0.147	0.174	0.188	0.199	0.214	0.345	0.394	0.446	0.543	0.765
sulfurdioxide slant column density corrected win1 [DU]	−1.61	−0.953	−0.696	−0.520	−0.333	0.402	0.603	0.799	1.10	1.93
background so2 slant column offset window1 [DU]	−0.309	−0.236	−0.202	−0.183	−0.162	-1.488×10^{-2}	4.015×10^{-2}	9.566×10^{-2}	0.175	0.360
sulfurdioxide slant column density window2 [DU]	−19.7	−12.8	−9.46	−6.96	−4.16	7.18	10.0	12.6	16.1	23.4
sulfurdioxide slant column density window2 precision [DU]	4.24	5.08	5.61	6.03	6.54	9.14	10.0	10.9	12.1	14.8
sulfurdioxide slant column density corrected win2 [DU]	−21.5	−14.5	−11.1	−8.60	−5.84	5.11	7.84	10.3	13.6	20.7
background so2 slant column offset window2 [DU]	−8.42	−6.69	−5.68	−4.74	−3.55	2.428×10^{-2}	0.348	0.595	0.947	2.09
sulfurdioxide slant column density window3 [DU]	−64.7	−43.4	−33.8	−27.1	−19.8	9.32	17.1	24.3	33.9	53.1
sulfurdioxide slant column density window3 precision [DU]	13.2	15.7	17.7	19.1	20.6	30.7	35.2	40.7	52.4	84.9
sulfurdioxide slant column density corrected win3 [DU]	−56.4	−35.0	−25.2	−18.2	−10.8	17.5	24.7	31.4	40.5	59.1
background so2 slant column offset window3 [DU]	−3.53	−0.290	1.22	2.29	3.56	13.2	14.8	15.9	17.2	19.7
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	7.337×10^{-4}	1.344×10^{-3}	2.098×10^{-3}	3.971×10^{-3}	7.522×10^{-3}	2.709×10^{-2}	3.750×10^{-2}	5.628×10^{-2}	9.959×10^{-2}	0.307
fitted radiance shift [nm]	-7.978×10^{-3}	-3.885×10^{-3}	-2.465×10^{-3}	-1.676×10^{-3}	-1.030×10^{-3}	6.331×10^{-4}	1.263×10^{-3}	2.102×10^{-3}	3.616×10^{-3}	7.882×10^{-3}
fitted radiance squeeze [1]	-5.022×10^{-4}	-3.145×10^{-4}	-2.372×10^{-4}	-1.843×10^{-4}	-1.286×10^{-4}	7.702×10^{-5}	1.288×10^{-4}	1.770×10^{-4}	2.464×10^{-4}	4.128×10^{-4}
fitted root mean square [1]	5.990×10^{-4}	7.435×10^{-4}	8.259×10^{-4}	8.874×10^{-4}	9.605×10^{-4}	1.488×10^{-3}	1.708×10^{-3}	1.927×10^{-3}	2.263×10^{-3}	3.182×10^{-3}
sulfurdioxide total air mass factor polluted [1]	9.472×10^{-2}	0.256	0.360	0.445	0.556	1.17	1.41	1.65	1.90	2.18
sulfurdioxide total air mass factor polluted precision [1]	1.042×10^{-2}	1.889×10^{-2}	2.448×10^{-2}	2.999×10^{-2}	3.832×10^{-2}	0.150	0.197	0.248	0.353	0.652
sulfurdioxide clear air mass factor polluted [1]	0.216	0.313	0.379	0.437	0.519	0.931	1.04	1.15	1.38	1.87
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]	0.571 ± 0.422	11444001	0.870	0.490	0.0	1.000	0.130	1.000
sulfurdioxide total vertical column [DU]	$(2.727 \pm 100.689) \times 10^{-2}$	11444001	0.420	8.493×10^{-3}	-87.1	115	-0.199	0.221
sulfurdioxide total vertical column precision [DU]	0.500 ± 0.771	11444001	0.315	0.301	4.641×10^{-2}	43.7	0.201	0.517
sulfurdioxide slant column density corrected [DU]	$(1.650 \pm 35.231) \times 10^{-2}$	11444001	0.361	7.878×10^{-3}	-8.48	45.1	-0.171	0.190
sulfurdioxide slant column density cobra [DU]	$(1.645 \pm 34.889) \times 10^{-2}$	11444001	0.361	7.878×10^{-3}	-8.48	17.1	-0.171	0.190
sulfurdioxide slant column density cobra precision [DU]	0.287 ± 0.123	11444001	0.123	0.250	8.883×10^{-2}	3.00	0.208	0.331
sulfurdioxide slant column density window1 [DU]	0.108 ± 0.662	11444001	0.725	0.116	-25.4	17.5	-0.252	0.474
sulfurdioxide slant column density window1 precision [DU]	0.287 ± 0.123	11444001	0.123	0.250	8.883×10^{-2}	3.00	0.208	0.331
sulfurdioxide slant column density corrected win1 [DU]	$(4.310 \pm 65.153) \times 10^{-2}$	11444001	0.711	2.564×10^{-2}	-25.4	17.6	-0.325	0.386
background so2 slant column offset window1 [DU]	$(-6.499 \pm 14.423) \times 10^{-2}$	11444001	0.177	-9.621×10^{-2}	-0.511	1.89	-0.167	1.023×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.80 ± 8.39	11444001	10.9	1.77	-392	79.5	-3.64	7.21
sulfurdioxide slant column density window2 precision [DU]	7.57 ± 2.01	11444001	2.26	7.28	2.23	432	6.25	8.51
sulfurdioxide slant column density corrected win2 [DU]	-0.463 ± 8.084	11444001	10.4	-0.411	-399	77.5	-5.62	4.75
background so2 slant column offset window2 [DU]	-2.26 ± 2.74	11444001	4.44	-1.69	-13.9	5.37	-4.35	9.357×10^{-2}
sulfurdioxide slant column density window3 [DU]	-5.71 ± 21.96	11444001	27.1	-6.24	-204	163	-19.5	7.65
sulfurdioxide slant column density window3 precision [DU]	26.2 ± 13.1	11444001	7.90	22.7	9.38	234	19.7	27.6
sulfurdioxide slant column density corrected win3 [DU]	3.46 ± 21.26	11444001	26.2	3.58	-199	171	-9.54	16.7
background so2 slant column offset window3 [DU]	9.17 ± 6.08	11444001	10.5	10.5	-12.4	24.0	3.66	14.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	11444001	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.241 \pm 6.668) \times 10^{-2}$	11444001	2.416×10^{-2}	1.362×10^{-2}	1.559×10^{-4}	1.83	4.810×10^{-3}	2.897×10^{-2}
fitted radiance shift [nm]	$(-3.288 \pm 250.418) \times 10^{-5}$	11444001	1.508×10^{-3}	-4.137×10^{-5}	-4.246×10^{-2}	4.242×10^{-2}	-8.073×10^{-4}	7.010×10^{-4}
fitted radiance squeeze [1]	$(-4.939 \pm 17.052) \times 10^{-5}$	11444001	1.995×10^{-4}	-3.974×10^{-5}	-2.552×10^{-3}	2.261×10^{-3}	-1.434×10^{-4}	5.610×10^{-5}
fitted root mean square [1]	$(1.253 \pm 0.509) \times 10^{-3}$	11444001	4.919×10^{-4}	1.114×10^{-3}	3.336×10^{-4}	1.732×10^{-2}	9.350×10^{-4}	1.427×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.947 ± 0.533	11444001	0.734	0.842	5.000×10^{-2}	2.85	0.541	1.27
sulfurdioxide total air mass factor polluted precision [1]	0.129 ± 0.142	11444001	0.129	7.975×10^{-2}	2.500×10^{-3}	1.78	3.958×10^{-2}	0.169
sulfurdioxide clear air mass factor polluted [1]	0.766 ± 0.377	11444001	0.486	0.707	4.116×10^{-2}	2.58	0.480	0.965
number of spectral points in retrieval [1]	73.5 ± 0.5	11444001	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]	0.735 ± 0.372	5831326	0.610	1.000	0.0	1.000	0.390	1.000
sulfurdioxide total vertical column [DU]	$(3.283 \pm 84.341) \times 10^{-2}$	5831326	0.508	1.435×10^{-2}	-38.5	118	-0.236	0.272
sulfurdioxide total vertical column precision [DU]	0.522 ± 0.536	5831326	0.350	0.363	4.826×10^{-2}	36.8	0.251	0.601
sulfurdioxide slant column density corrected [DU]	$(2.126 \pm 39.327) \times 10^{-2}$	5831326	0.403	1.217×10^{-2}	-17.4	140	-0.188	0.215
sulfurdioxide slant column density cobra [DU]	$(2.117 \pm 38.505) \times 10^{-2}$	5831326	0.403	1.217×10^{-2}	-17.4	34.1	-0.188	0.215
sulfurdioxide slant column density cobra precision [DU]	0.319 ± 0.134	5831326	0.140	0.286	9.151×10^{-2}	17.8	0.231	0.371
sulfurdioxide slant column density window1 [DU]	0.146 ± 0.712	5831326	0.792	0.142	-70.5	66.9	-0.254	0.538
sulfurdioxide slant column density window1 precision [DU]	0.319 ± 0.134	5831326	0.140	0.286	9.151×10^{-2}	17.8	0.231	0.371
sulfurdioxide slant column density corrected win1 [DU]	$(5.384 \pm 71.054) \times 10^{-2}$	5831326	0.787	3.530×10^{-2}	-70.5	66.9	-0.352	0.435
background so2 slant column offset window1 [DU]	$(-9.208 \pm 10.122) \times 10^{-2}$	5831326	9.811×10^{-2}	-9.951×10^{-2}	-1.12	3.05	-0.150	-5.199×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.04 ± 10.08	5831326	12.4	0.868	-1.591×10^{3}	1.600×10^{3}	-5.22	7.13
sulfurdioxide slant column density window2 precision [DU]	8.96 ± 2.71	5831326	2.83	8.63	2.52	868	7.37	10.2
sulfurdioxide slant column density corrected win2 [DU]	-0.194 ± 9.990	5831326	12.3	-0.214	-1.595×10^{3}	1.598×10^{3}	-6.33	5.92
background so2 slant column offset window2 [DU]	-1.24 ± 1.74	5831326	2.01	-0.819	-11.7	4.60	-2.08	-6.708×10^{-2}
sulfurdioxide slant column density window3 [DU]	-4.29 ± 26.57	5831326	33.4	-3.76	-339	551	-20.6	12.8
sulfurdioxide slant column density window3 precision [DU]	31.2 ± 13.0	5831326	10.5	28.3	9.91	295	23.9	34.4
sulfurdioxide slant column density corrected win3 [DU]	2.48 ± 26.25	5831326	33.1	2.81	-328	551	-13.8	19.3
background so2 slant column offset window3 [DU]	6.77 ± 4.71	5831326	6.43	5.73	-7.78	31.5	3.47	9.91
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	5831326	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.268 \pm 3.828) \times 10^{-2}$	5831326	1.444×10^{-2}	1.594×10^{-2}	7.994×10^{-4}	1.74	1.062×10^{-2}	2.506×10^{-2}
fitted radiance shift [nm]	$(-4.472 \pm 25.939) \times 10^{-4}$	5831326	1.878×10^{-3}	-4.558×10^{-4}	-8.114×10^{-2}	7.890×10^{-2}	-1.429×10^{-3}	4.485×10^{-4}
fitted radiance squeeze [1]	$(1.426 \pm 18.694) \times 10^{-5}$	5831326	2.163×10^{-4}	9.418×10^{-6}	-2.651×10^{-2}	2.100×10^{-2}	-9.682×10^{-5}	1.194×10^{-4}
fitted root mean square [1]	$(1.368 \pm 0.527) \times 10^{-3}$	5831326	5.705×10^{-4}	1.240×10^{-3}	3.677×10^{-4}	0.125	1.022×10^{-3}	1.593×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.828 ± 0.361	5831326	0.456	0.792	5.000×10^{-2}	2.70	0.579	1.03
sulfurdioxide total air mass factor polluted precision [1]	$(8.885 \pm 7.936) \times 10^{-2}$	5831326	8.205×10^{-2}	5.803×10^{-2}	4.112×10^{-3}	1.49	3.659×10^{-2}	0.119
sulfurdioxide clear air mass factor polluted [1]	0.743 ± 0.220	5831326	0.301	0.732	7.868×10^{-2}	1.82	0.588	0.889
number of spectral points in retrieval [1]	73.4 ± 0.5	5831326	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]	0.655 ± 0.400	11314421	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.653 \pm 95.636) \times 10^{-2}$	11314421	0.443	9.832×10^{-3}	-87.1	117	-0.209	0.233
sulfurdioxide total vertical column precision [DU]	0.498 ± 0.718	11314421	0.301	0.311	5.642×10^{-2}	38.3	0.220	0.521
sulfurdioxide slant column density corrected [DU]	$(1.569 \pm 35.621) \times 10^{-2}$	11314421	0.372	8.760×10^{-3}	-17.4	140	-0.176	0.196
sulfurdioxide slant column density cobra [DU]	$(1.566 \pm 35.308) \times 10^{-2}$	11314421	0.372	8.760×10^{-3}	-17.4	19.2	-0.176	0.196
sulfurdioxide slant column density cobra precision [DU]	0.298 ± 0.129	11314421	0.141	0.259	8.944×10^{-2}	17.8	0.211	0.352
sulfurdioxide slant column density window1 [DU]	0.116 ± 0.675	11314421	0.746	0.125	-43.8	57.1	-0.253	0.493
sulfurdioxide slant column density window1 precision [DU]	0.298 ± 0.129	11314421	0.141	0.259	8.944×10^{-2}	17.8	0.211	0.352
sulfurdioxide slant column density corrected win1 [DU]	$(3.823 \pm 66.699) \times 10^{-2}$	11314421	0.735	2.425×10^{-2}	-43.8	57.1	-0.339	0.396
background so2 slant column offset window1 [DU]	$(-7.763 \pm 12.874) \times 10^{-2}$	11314421	0.142	-0.101	-1.12	3.05	-0.163	-2.101×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.39 ± 8.97	11314421	11.4	1.28	-824	1.600×10^{3}	-4.35	7.00
sulfurdioxide slant column density window2 precision [DU]	8.04 ± 2.24	11314421	2.50	7.71	2.28	868	6.61	9.11
sulfurdioxide slant column density corrected win2 [DU]	-0.370 ± 8.758	11314421	11.0	-0.360	-826	1.598×10^{3}	-5.88	5.15
background so2 slant column offset window2 [DU]	-1.76 ± 2.49	11314421	3.36	-0.974	-13.9	5.37	-3.26	9.957×10^{-2}
sulfurdioxide slant column density window3 [DU]	-2.46 ± 23.69	11314421	29.7	-2.87	-320	551	-17.4	12.3
sulfurdioxide slant column density window3 precision [DU]	27.2 ± 11.5	11314421	9.07	24.2	9.38	217	20.8	29.9
sulfurdioxide slant column density corrected win3 [DU]	5.37 ± 22.87	11314421	28.6	5.26	-316	551	-8.87	19.7
background so2 slant column offset window3 [DU]	7.83 ± 5.75	11314421	9.41	7.05	-12.4	31.5	3.24	12.6
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	11314421	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.140 \pm 3.806) \times 10^{-2}$	11314421	1.462×10^{-2}	1.438×10^{-2}	4.051×10^{-4}	1.82	8.777×10^{-3}	2.340×10^{-2}
fitted radiance shift [nm]	$(-1.951 \pm 22.731) \times 10^{-4}$	11314421	1.639×10^{-3}	-1.652×10^{-4}	-8.114×10^{-2}	3.870×10^{-2}	-1.036×10^{-3}	6.038×10^{-4}
fitted radiance squeeze [1]	$(-1.990 \pm 17.780) \times 10^{-5}$	11314421	2.042×10^{-4}	-1.657×10^{-5}	-1.361×10^{-2}	2.100×10^{-2}	-1.202×10^{-4}	8.398×10^{-5}
fitted root mean square [1]	$(1.296 \pm 0.522) \times 10^{-3}$	11314421	5.740×10^{-4}	1.147×10^{-3}	3.336×10^{-4}	0.125	9.504×10^{-4}	1.524×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.896 ± 0.439	11314421	0.540	0.843	5.000×10^{-2}	2.47	0.591	1.13
sulfurdioxide total air mass factor polluted precision [1]	0.105 ± 0.109	11314421	8.961×10^{-2}	6.712×10^{-2}	2.889×10^{-3}	1.64	4.127×10^{-2}	0.131
sulfurdioxide clear air mass factor polluted [1]	0.783 ± 0.326	11314421	0.381	0.758	5.575×10^{-2}	2.46	0.562	0.943
number of spectral points in retrieval [1]	73.4 ± 0.5	11314421	1.000	73.0	53.0	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 ± 0.428	4164818	0.850	1.000	0.0	1.000	0.150	1.000
sulfurdioxide total vertical column [DU]	$(3.237 \pm 90.007) \times 10^{-2}$	4164818	0.466	1.080×10^{-2}	-49.3	118	-0.218	0.249
sulfurdioxide total vertical column precision [DU]	0.511 ± 0.623	4164818	0.354	0.354	4.641×10^{-2}	36.9	0.223	0.576
sulfurdioxide slant column density corrected [DU]	$(2.105 \pm 36.976) \times 10^{-2}$	4164818	0.371	9.540×10^{-3}	-15.4	51.3	-0.174	0.197
sulfurdioxide slant column density cobra [DU]	$(2.090 \pm 36.097) \times 10^{-2}$	4164818	0.371	9.540×10^{-3}	-15.4	34.1	-0.174	0.197
sulfurdioxide slant column density cobra precision [DU]	0.291 ± 0.119	4164818	0.108	0.260	8.883×10^{-2}	15.4	0.217	0.325
sulfurdioxide slant column density window1 [DU]	0.155 ± 0.664	4164818	0.731	0.147	-70.5	66.9	-0.218	0.513
sulfurdioxide slant column density window1 precision [DU]	0.291 ± 0.119	4164818	0.108	0.260	8.883×10^{-2}	15.4	0.217	0.325
sulfurdioxide slant column density corrected win1 [DU]	$(6.444 \pm 65.806) \times 10^{-2}$	4164818	0.721	4.170×10^{-2}	-70.5	66.9	-0.312	0.410
background so2 slant column offset window1 [DU]	$(-9.053 \pm 12.611) \times 10^{-2}$	4164818	0.135	-0.114	-0.462	1.58	-0.171	-3.598×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.35 ± 9.17	4164818	11.5	1.40	-1.109×10^{3}	862	-4.36	7.10
sulfurdioxide slant column density window2 precision [DU]	8.20 ± 2.64	4164818	2.76	7.83	2.39	596	6.59	9.35
sulfurdioxide slant column density corrected win2 [DU]	-0.374 ± 8.949	4164818	11.0	-0.344	-1.109×10^{3}	862	-5.88	5.16
background so2 slant column offset window2 [DU]	-1.73 ± 2.35	4164818	3.16	-1.08	-13.9	5.34	-3.12	3.578×10^{-2}
sulfurdioxide slant column density window3 [DU]	-10.5 ± 23.4	4164818	28.4	-10.1	-339	426	-24.5	3.90
sulfurdioxide slant column density window3 precision [DU]	30.2 ± 16.6	4164818	12.5	25.8	9.40	295	20.8	33.3
sulfurdioxide slant column density corrected win3 [DU]	-2.15 ± 23.64	4164818	28.9	-1.14	-328	434	-16.1	12.8
background so2 slant column offset window3 [DU]	8.38 ± 5.64	4164818	9.48	8.31	-10.3	24.0	3.69	13.2
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.12	4164818	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.755 \pm 8.378) \times 10^{-2}$	4164818	4.254×10^{-2}	2.024×10^{-2}	1.559×10^{-4}	1.81	7.155×10^{-3}	4.970×10^{-2}
fitted radiance shift [nm]	$(-1.276 \pm 31.284) \times 10^{-4}$	4164818	1.737×10^{-3}	-1.590×10^{-4}	-4.107×10^{-2}	7.890×10^{-2}	-1.034×10^{-3}	7.030×10^{-4}
fitted radiance squeeze [1]	$(-3.317 \pm 17.698) \times 10^{-5}$	4164818	2.045×10^{-4}	-2.998×10^{-5}	-2.651×10^{-2}	1.486×10^{-2}	-1.335×10^{-4}	7.098×10^{-5}
fitted root mean square [1]	$(1.256 \pm 0.484) \times 10^{-3}$	4164818	4.353×10^{-4}	1.146×10^{-3}	3.450×10^{-4}	0.105	9.690×10^{-4}	1.404×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.886 ± 0.530	4164818	0.657	0.725	5.000×10^{-2}	2.78	0.504	1.16
sulfurdioxide total air mass factor polluted precision [1]	0.132 ± 0.150	4164818	0.150	7.260×10^{-2}	3.455×10^{-3}	1.78	3.081×10^{-2}	0.181
sulfurdioxide clear air mass factor polluted [1]	0.702 ± 0.323	4164818	0.381	0.634	6.326×10^{-2}	2.58	0.476	0.857
number of spectral points in retrieval [1]	73.4 ± 0.5	4164818	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

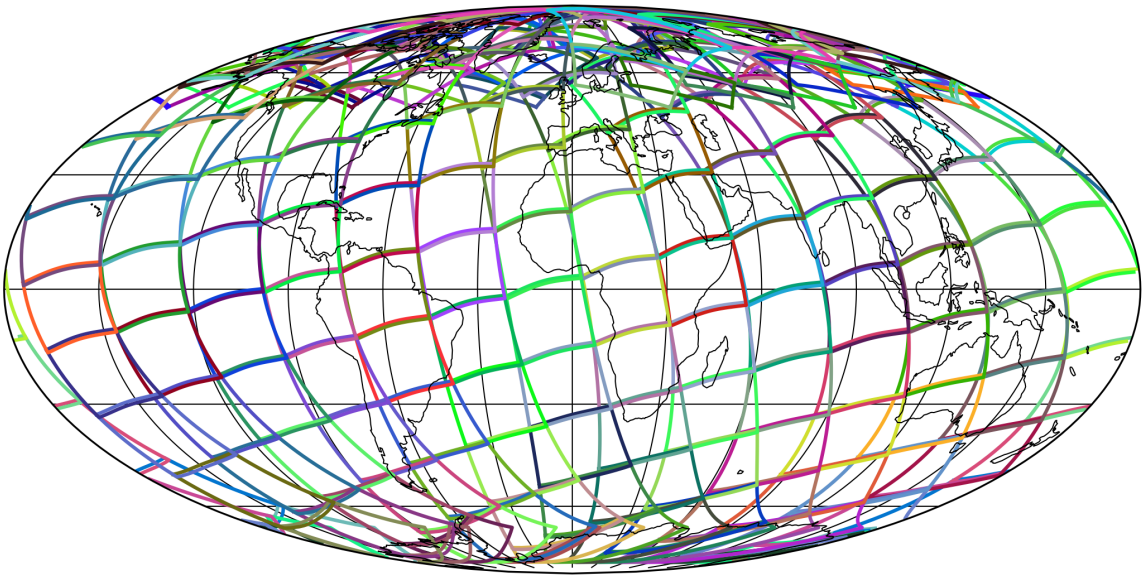


Figure 1: Outline of the granules.

4 Input data monitoring

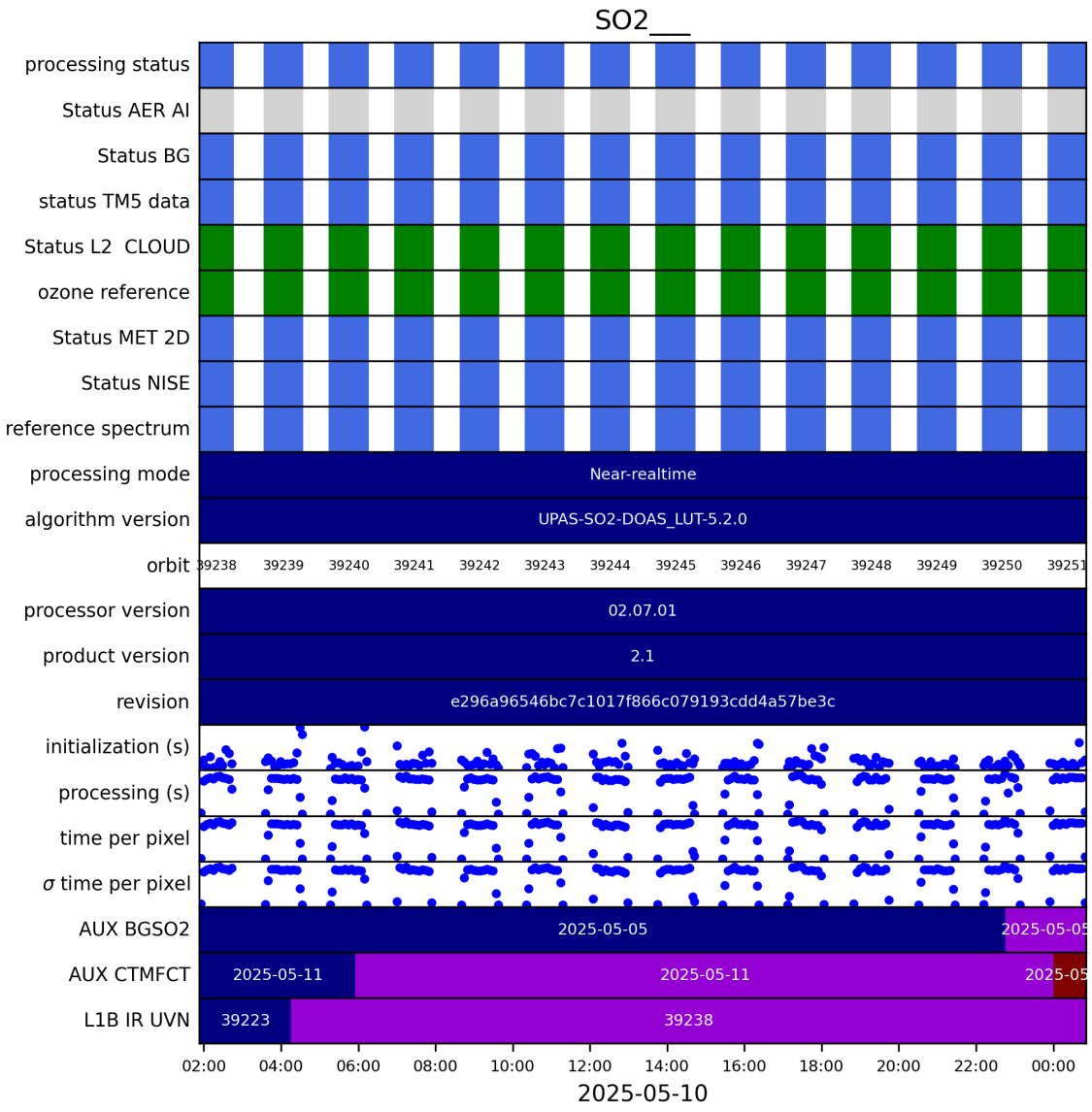


Figure 2: Input data per granule

5 Warnings and errors

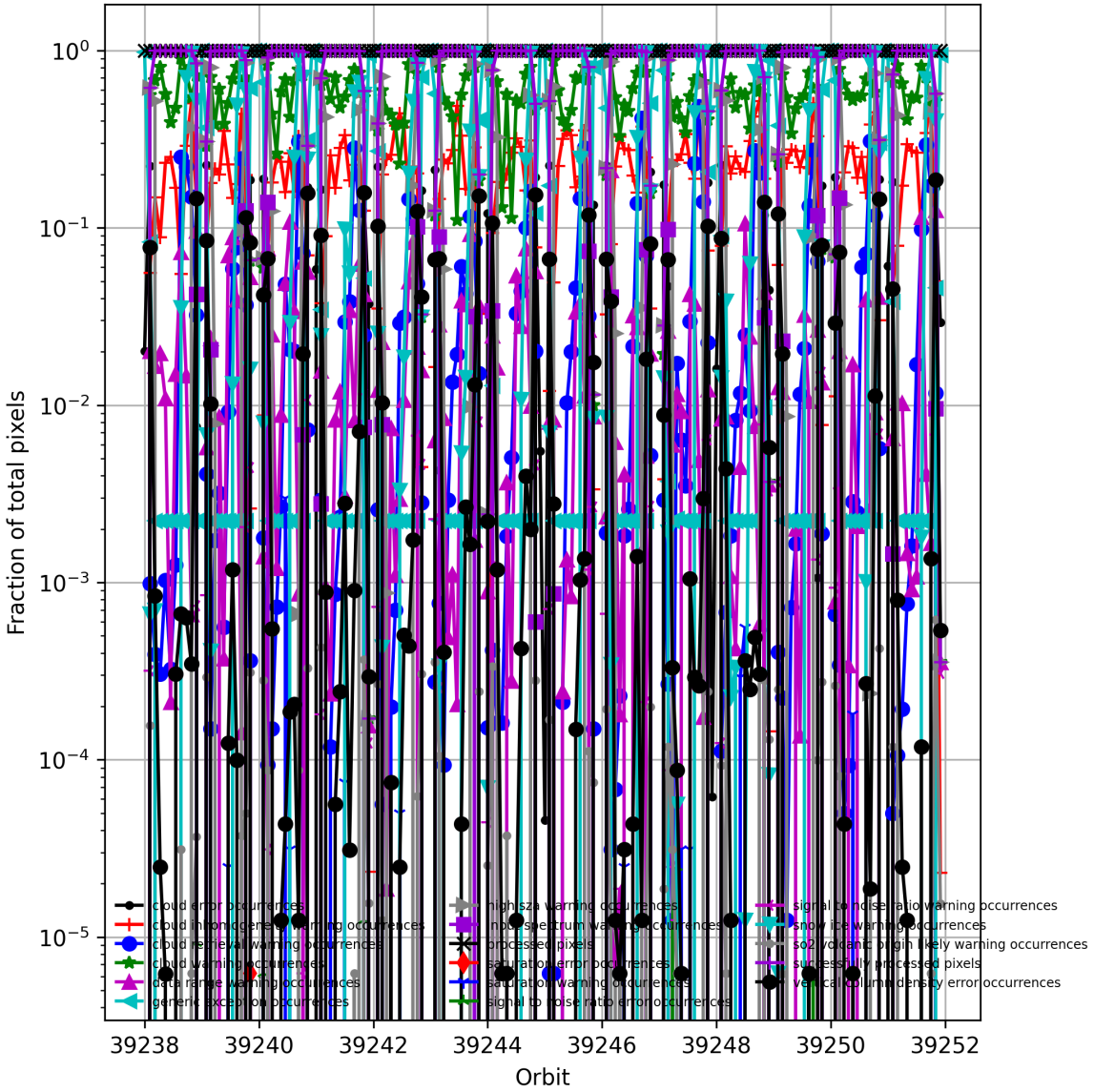


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

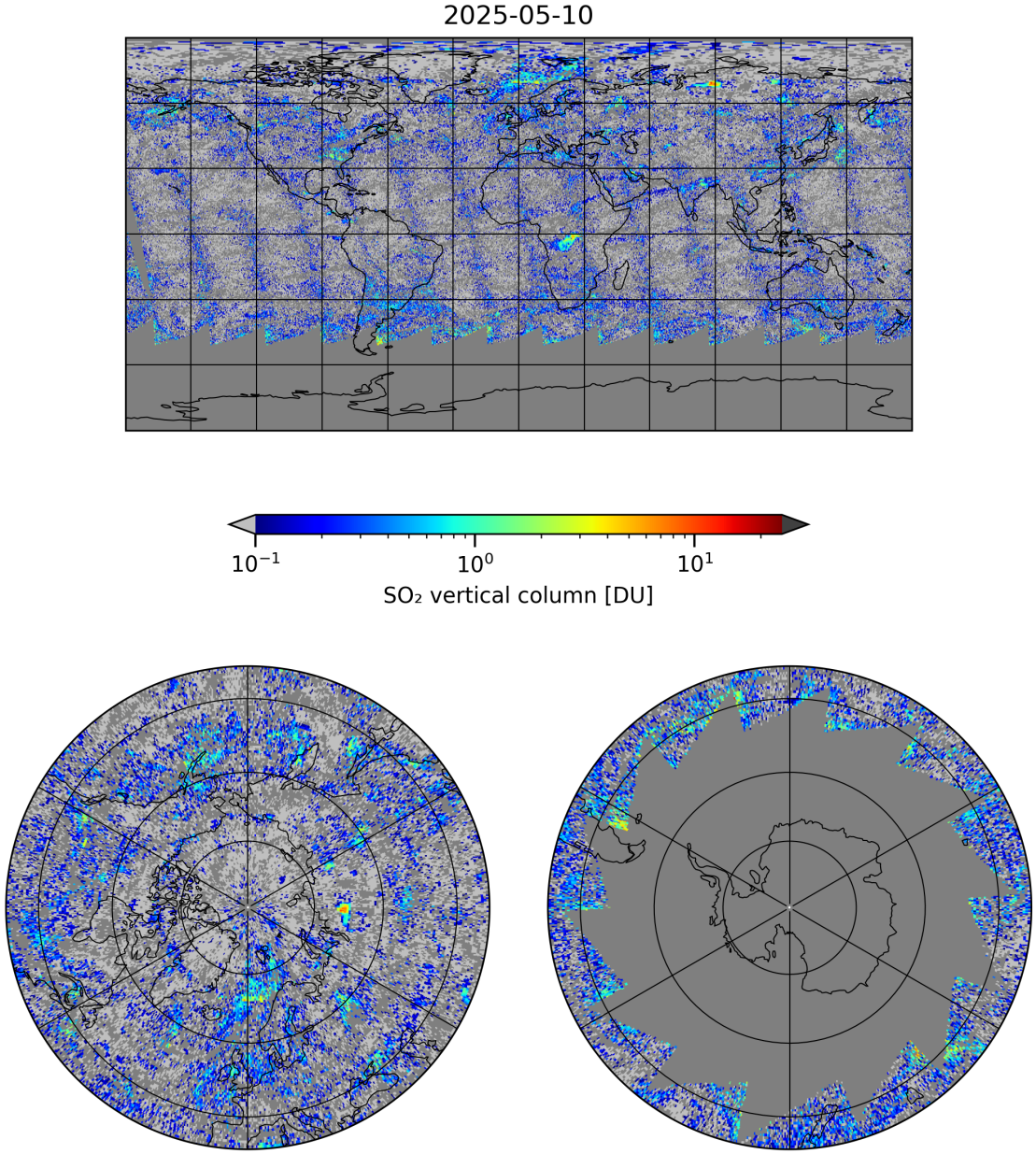


Figure 4: Map of "SO_2 vertical column" for 2025-05-10 to 2025-05-11

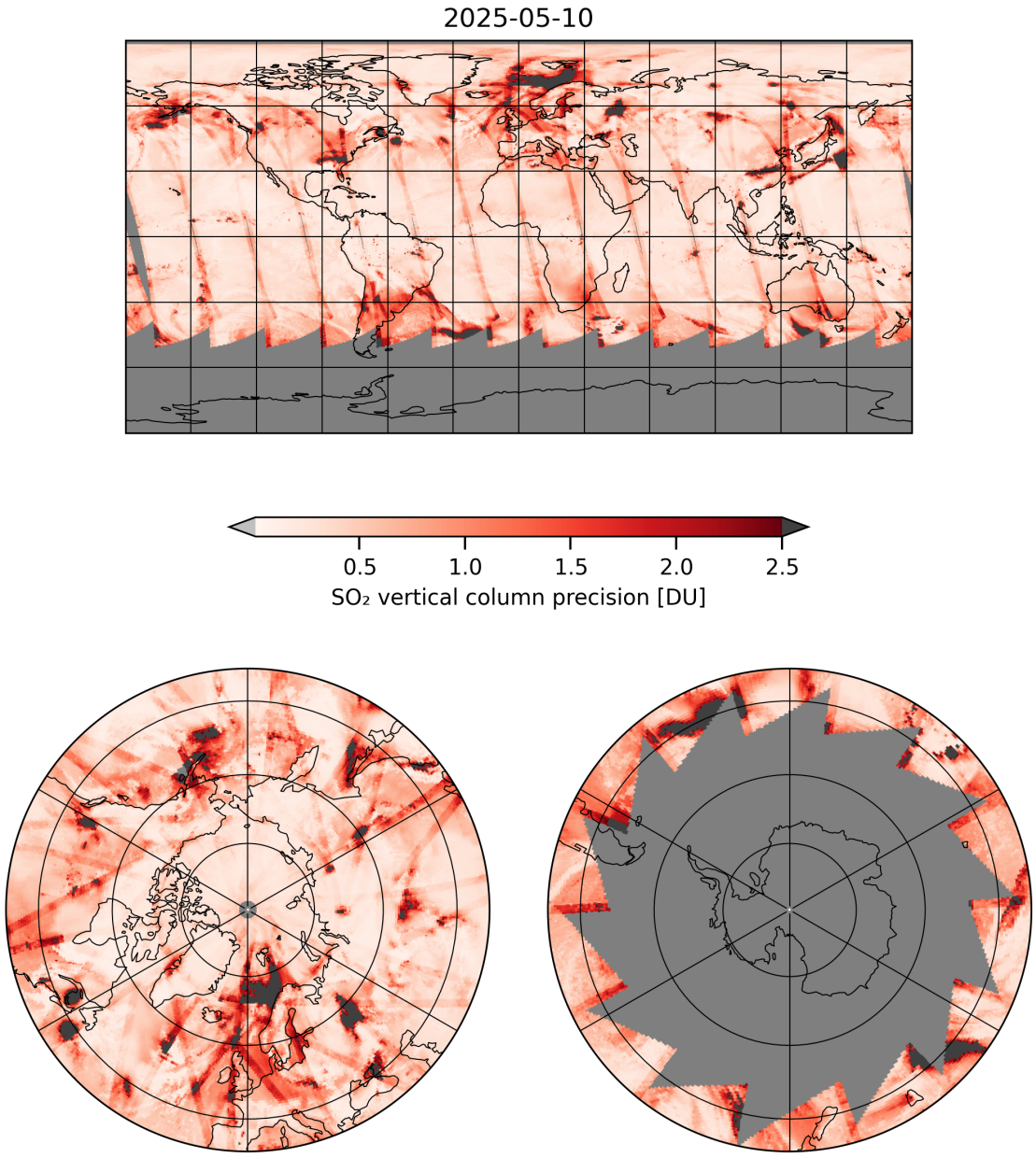


Figure 5: Map of "SO_2 vertical column precision" for 2025-05-10 to 2025-05-11

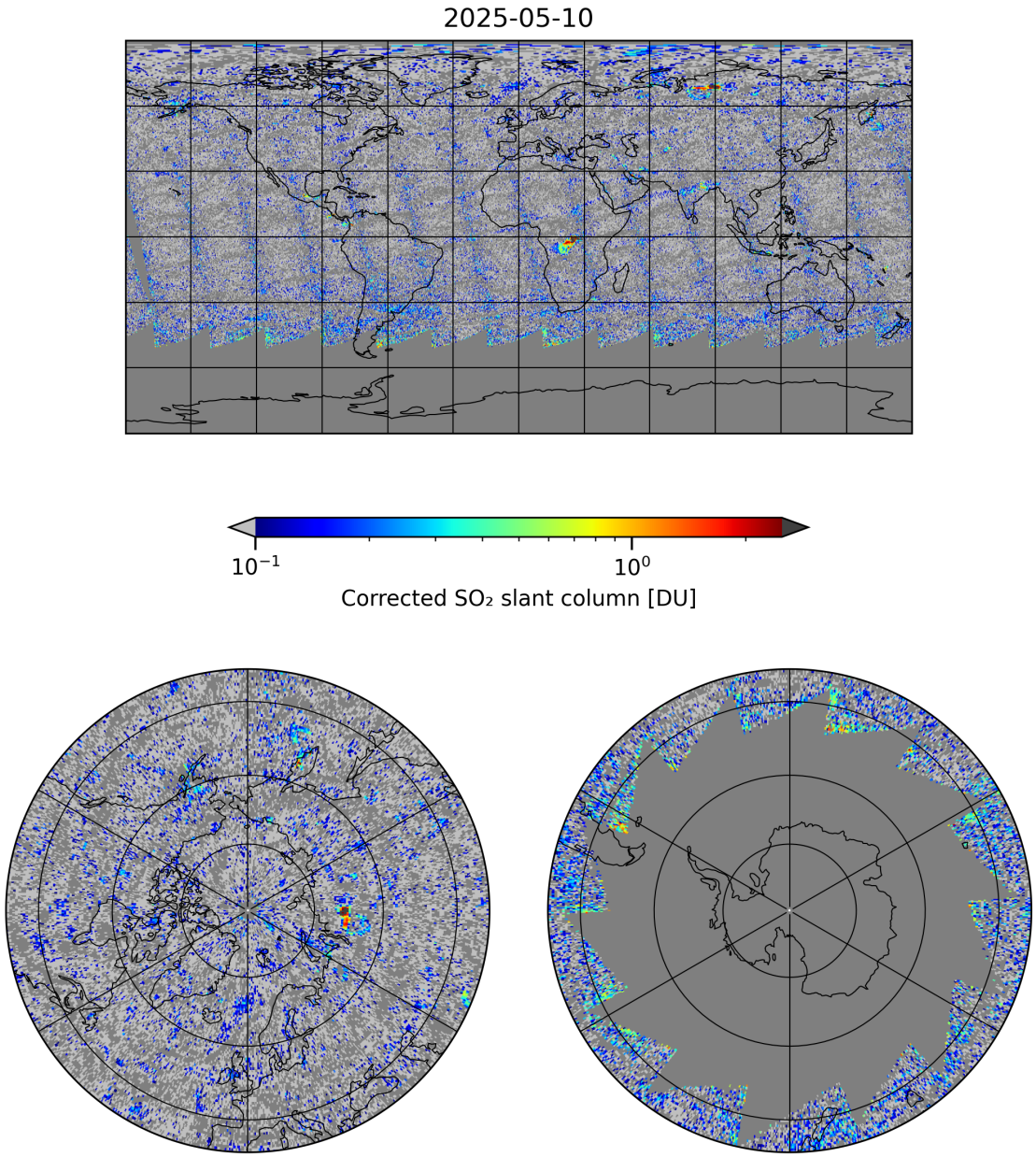


Figure 6: Map of "Corrected SO_2 slant column" for 2025-05-10 to 2025-05-11

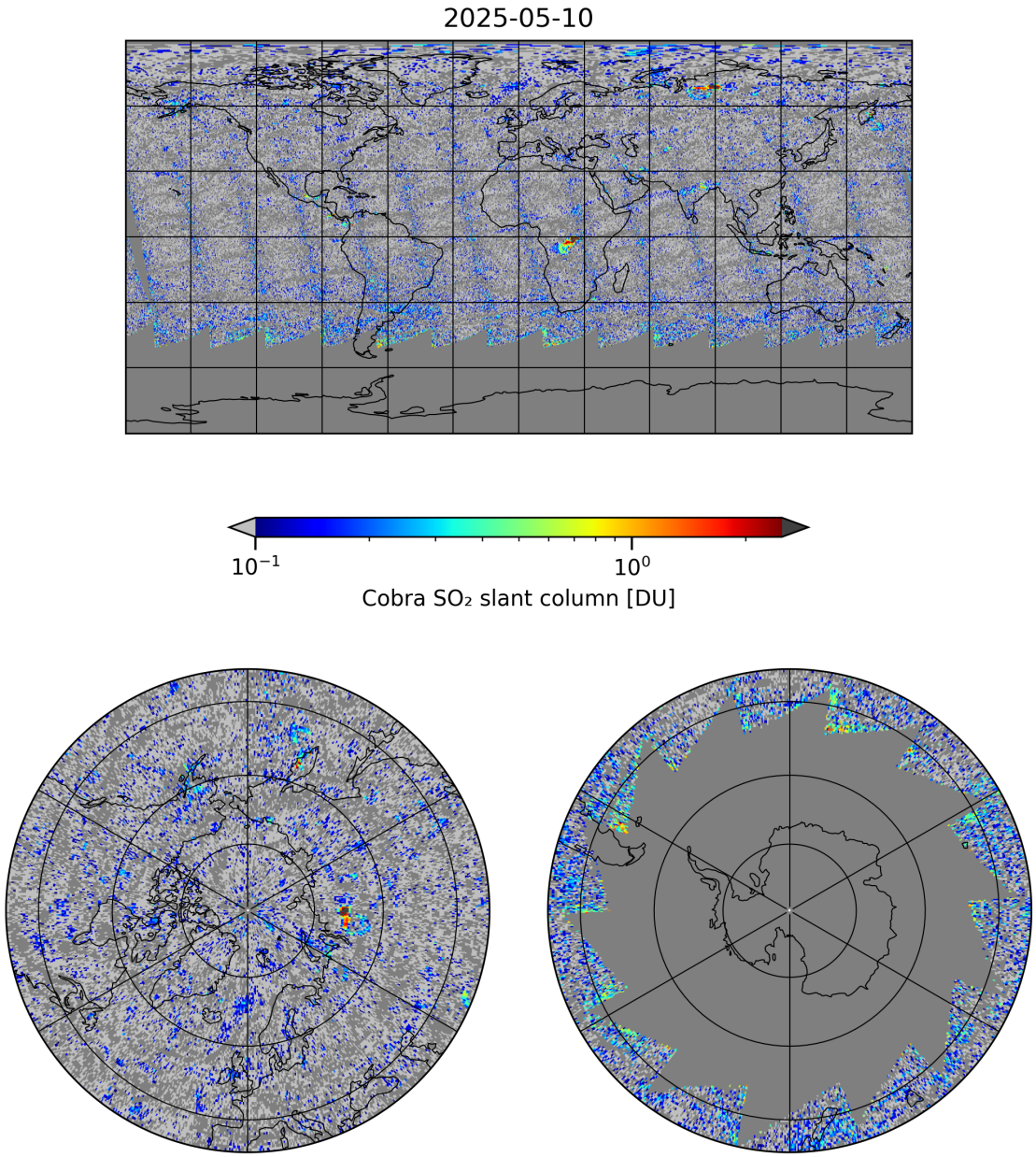


Figure 7: Map of "Cobra SO_2 slant column" for 2025-05-10 to 2025-05-11

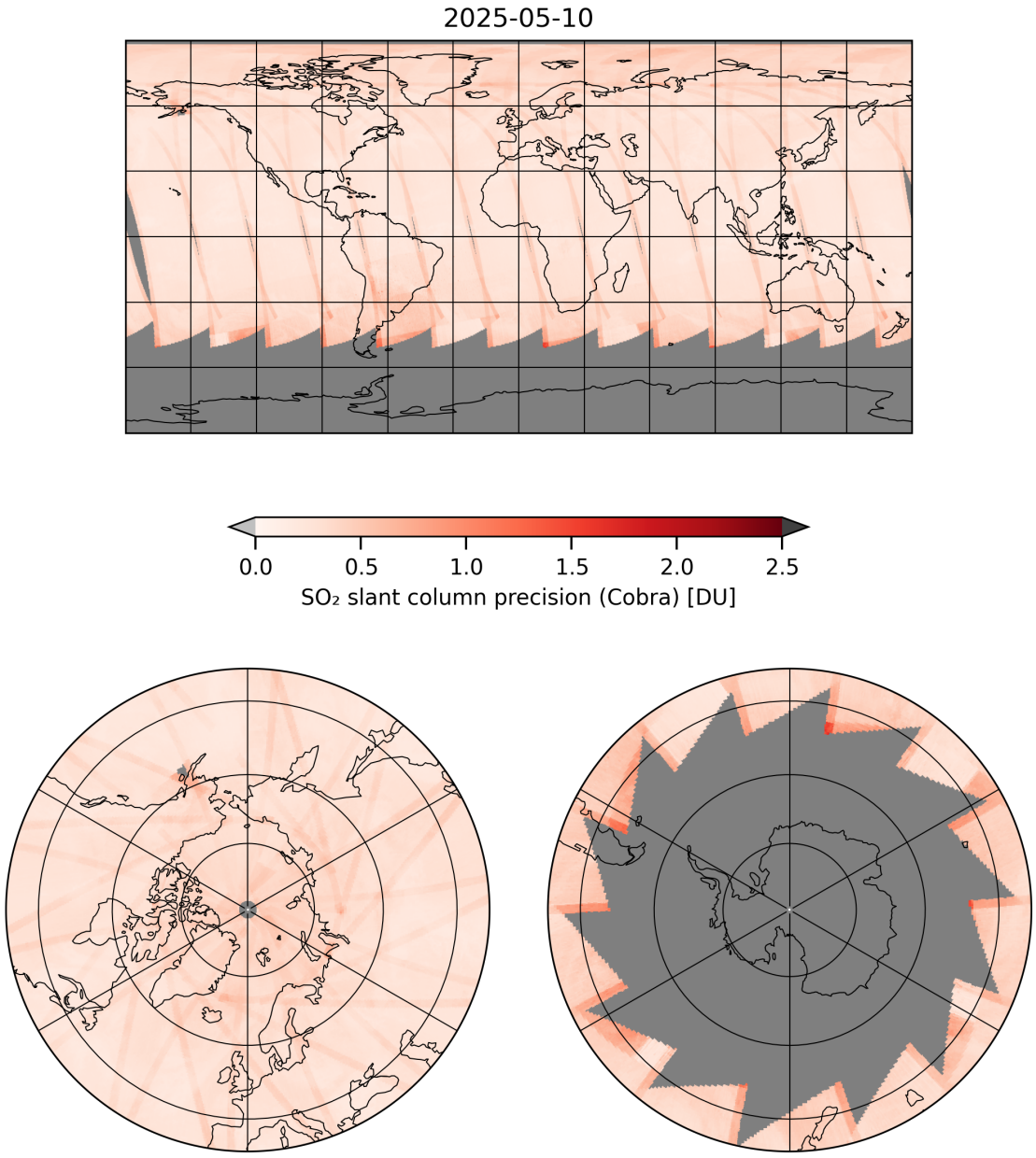


Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-05-10 to 2025-05-11

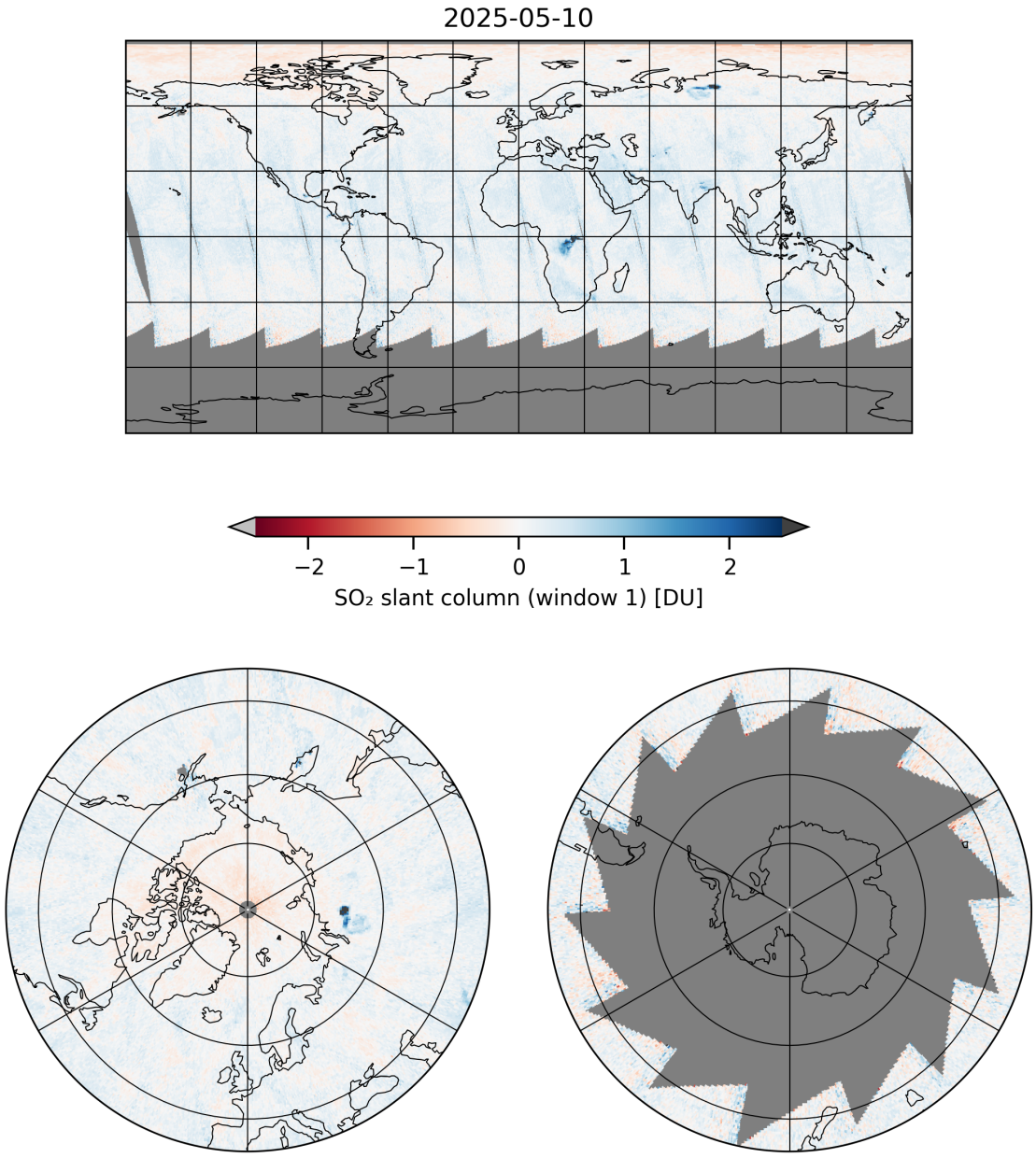


Figure 9: Map of "SO_2 slant column (window 1)" for 2025-05-10 to 2025-05-11

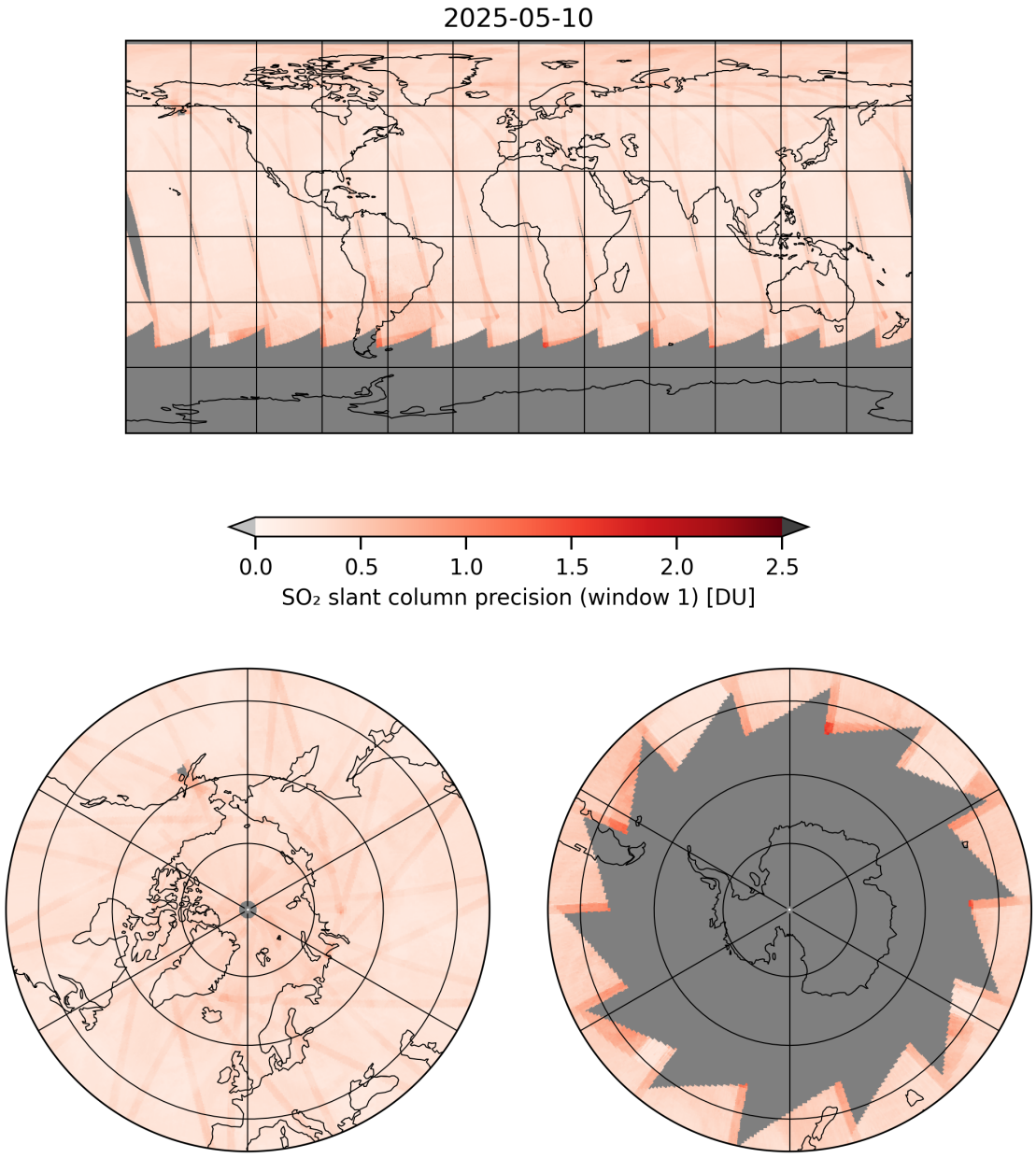


Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-05-10 to 2025-05-11

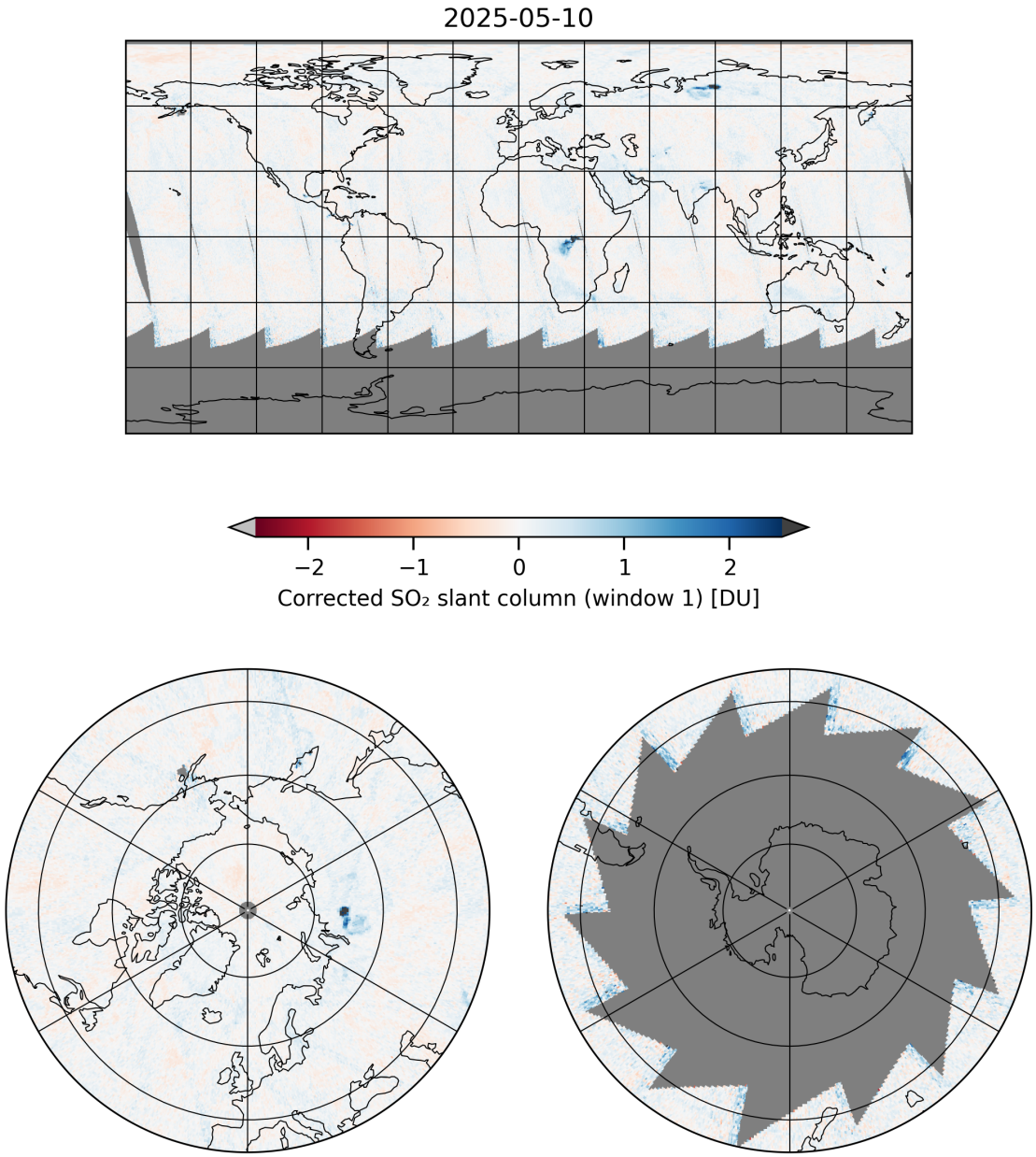


Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-05-10 to 2025-05-11

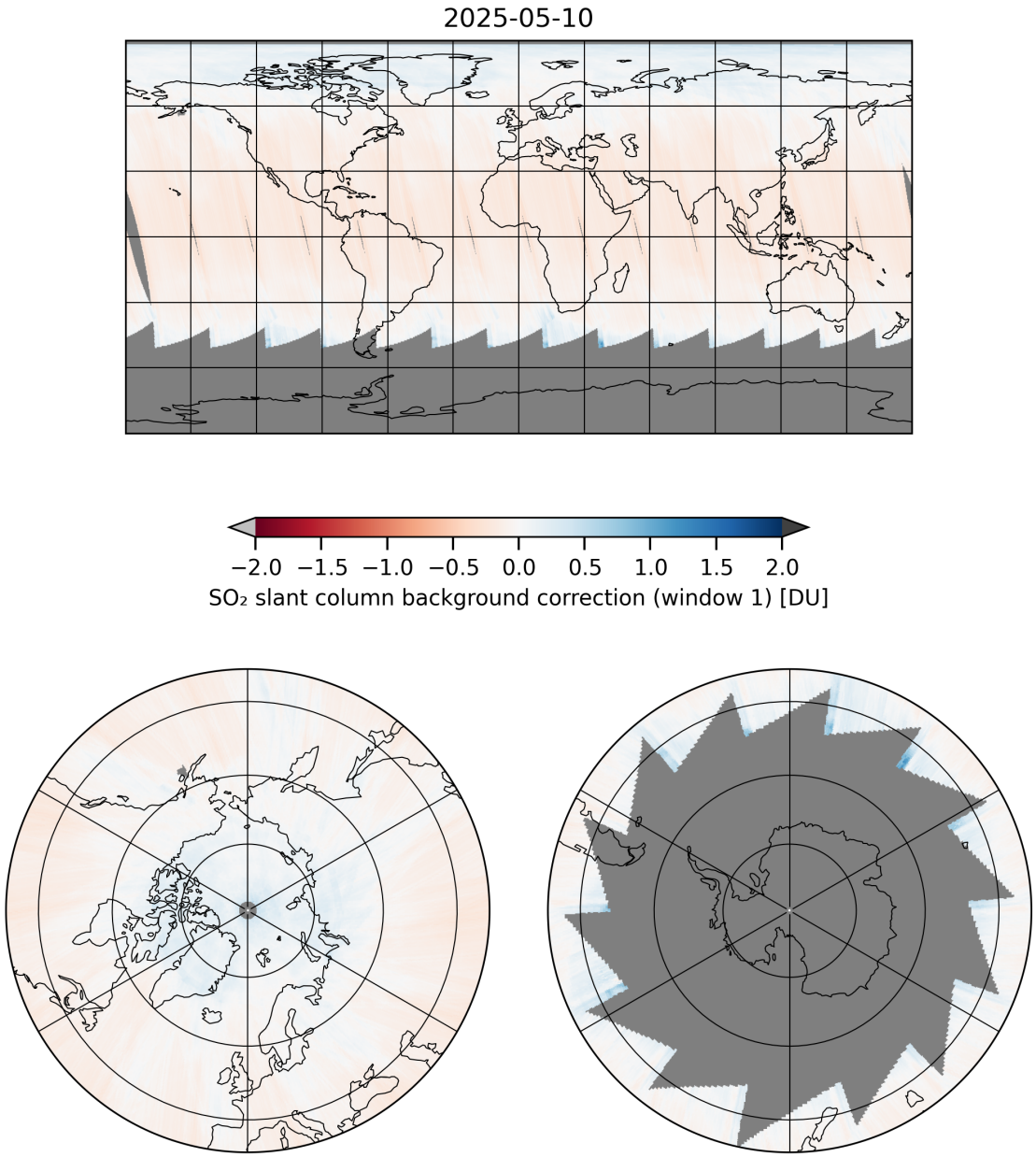


Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-05-10 to 2025-05-11

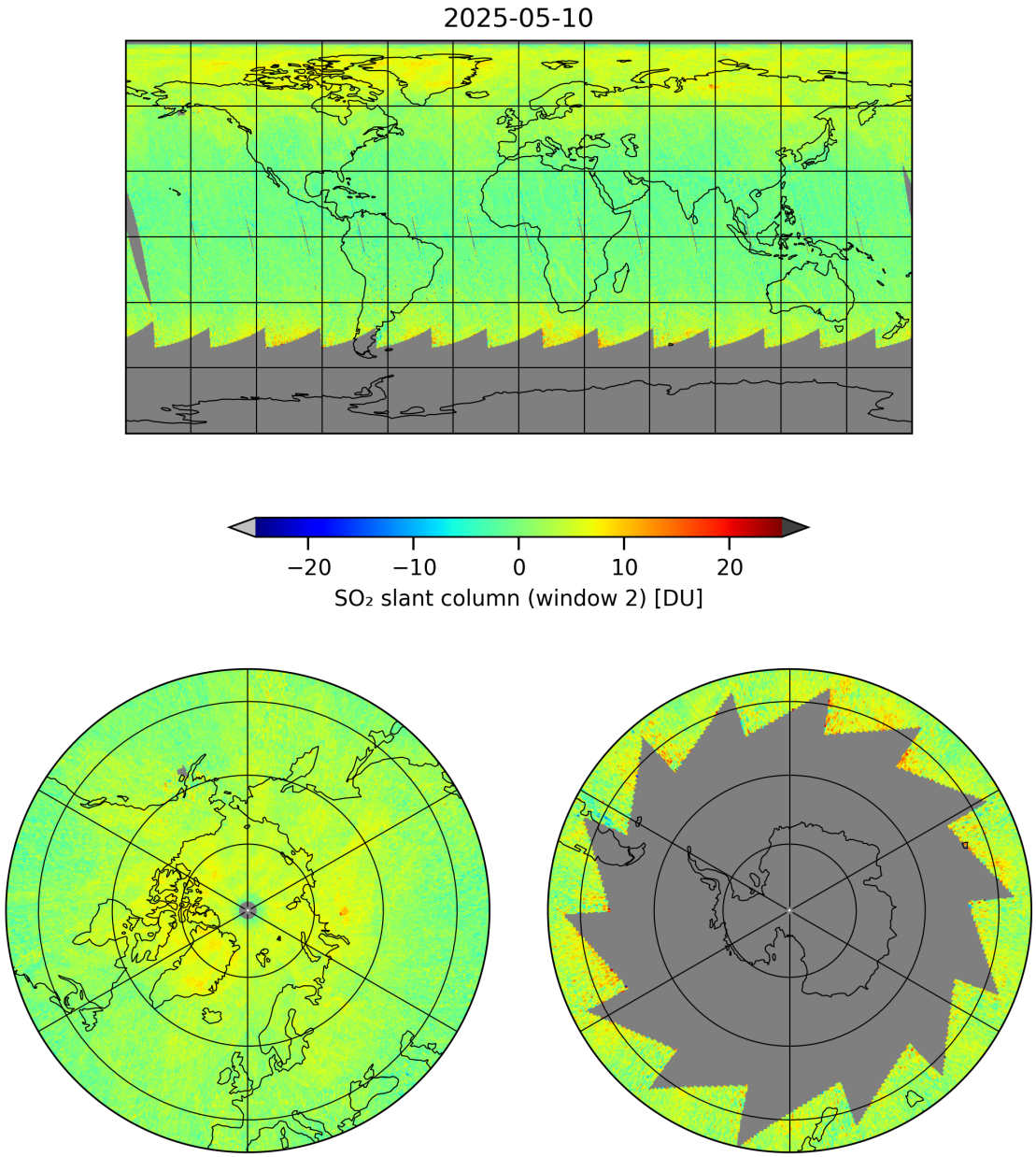


Figure 13: Map of "SO_2 slant column (window 2)" for 2025-05-10 to 2025-05-11

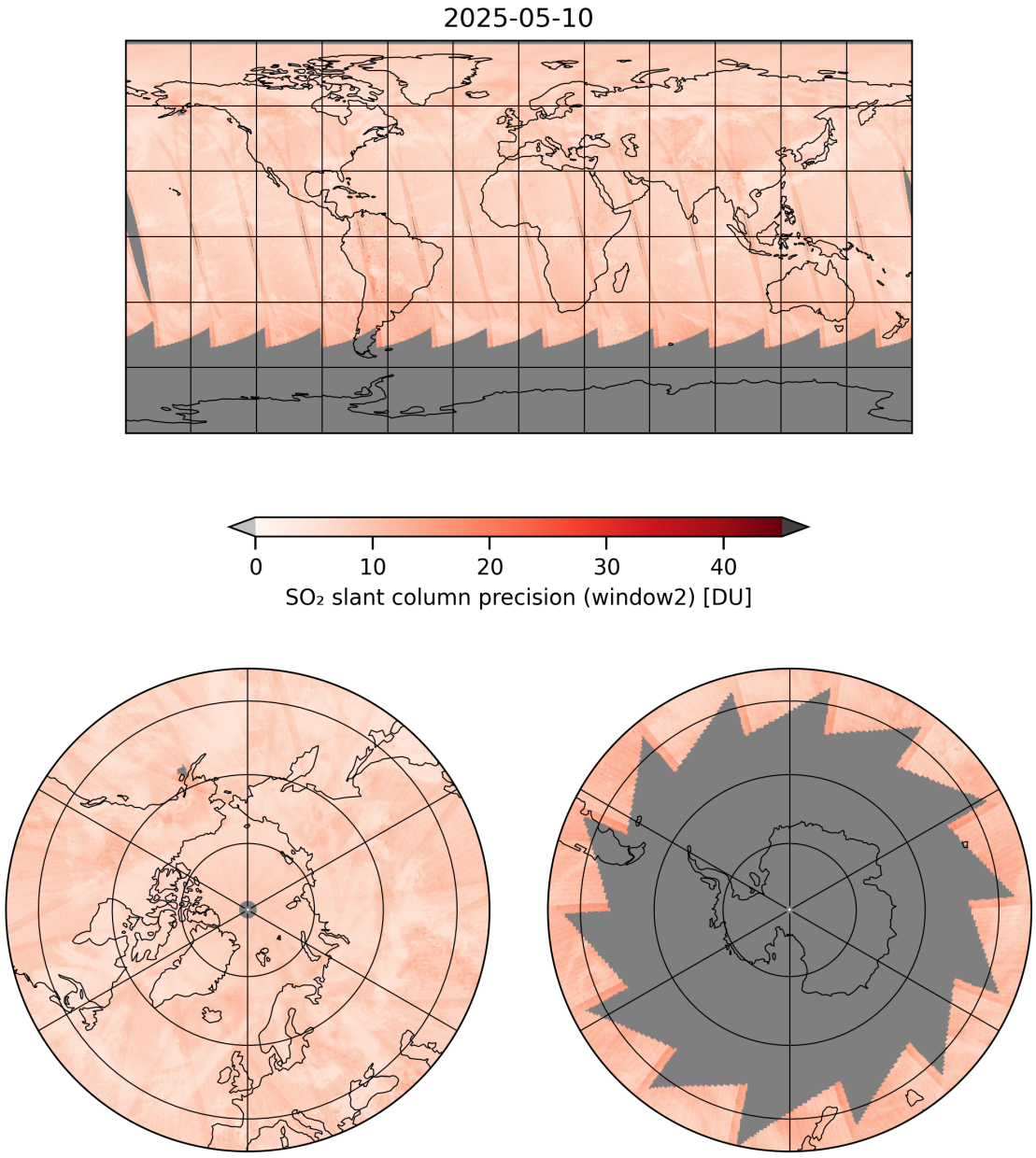


Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-05-10 to 2025-05-11

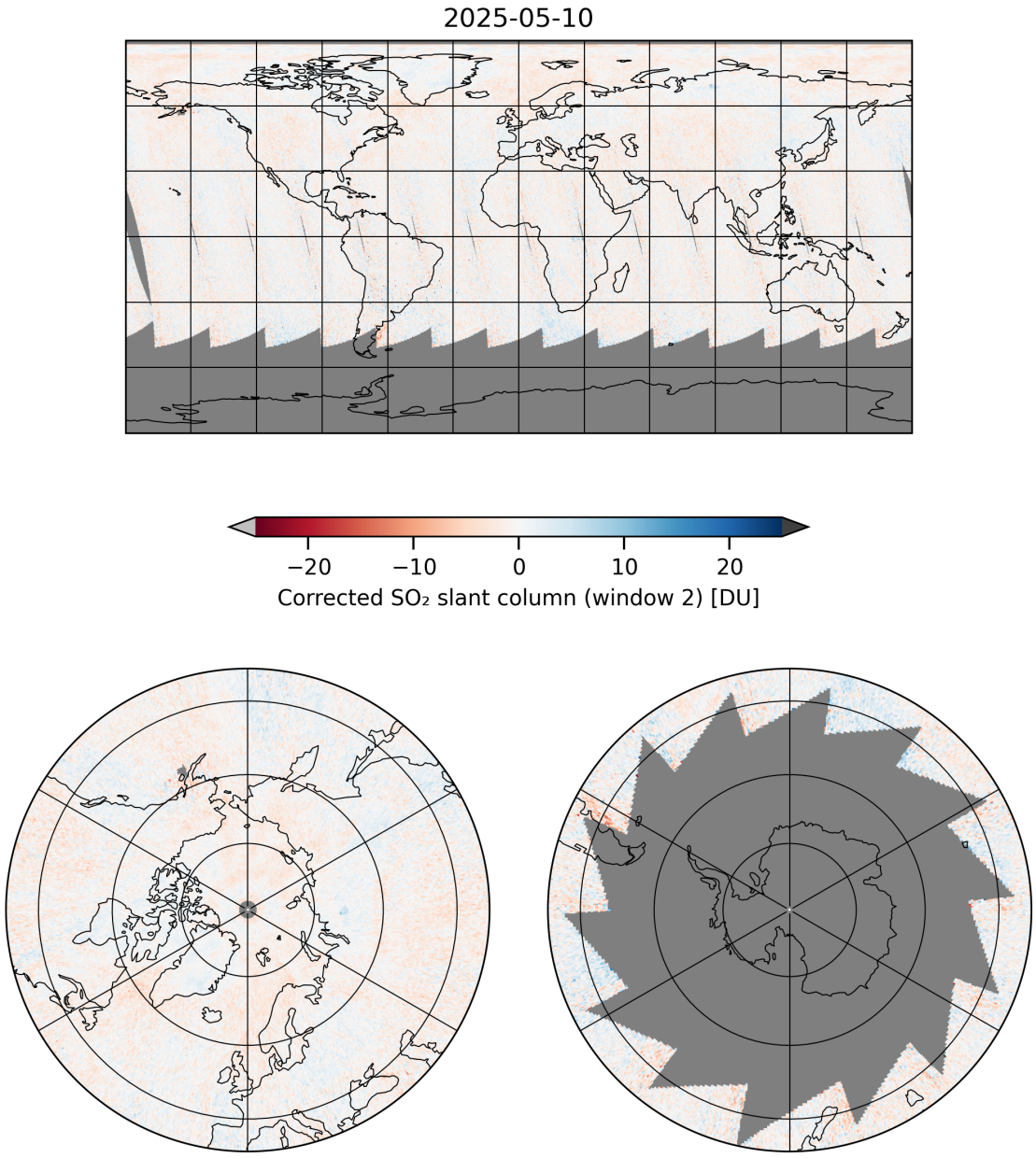


Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-05-10 to 2025-05-11

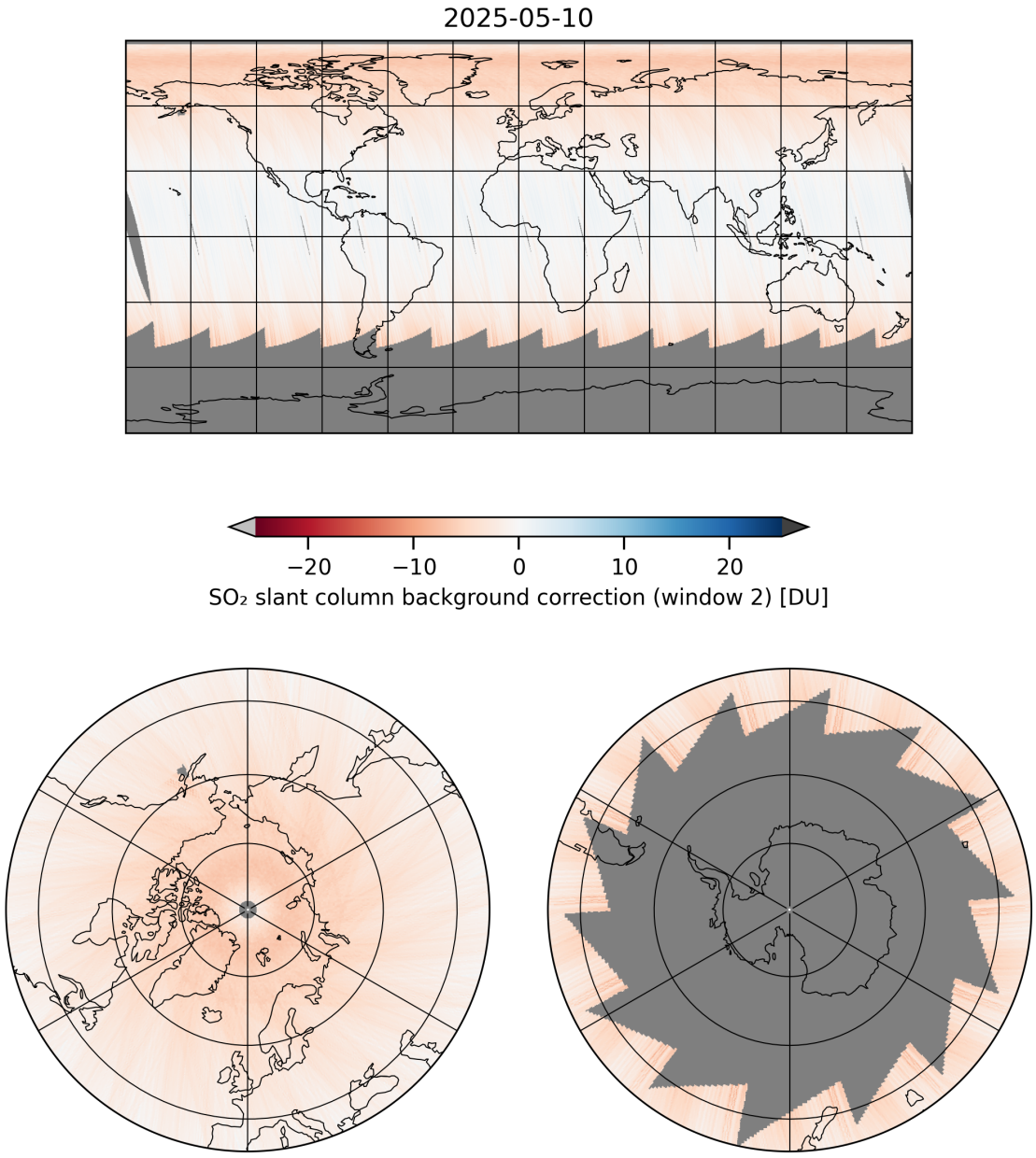


Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-05-10 to 2025-05-11

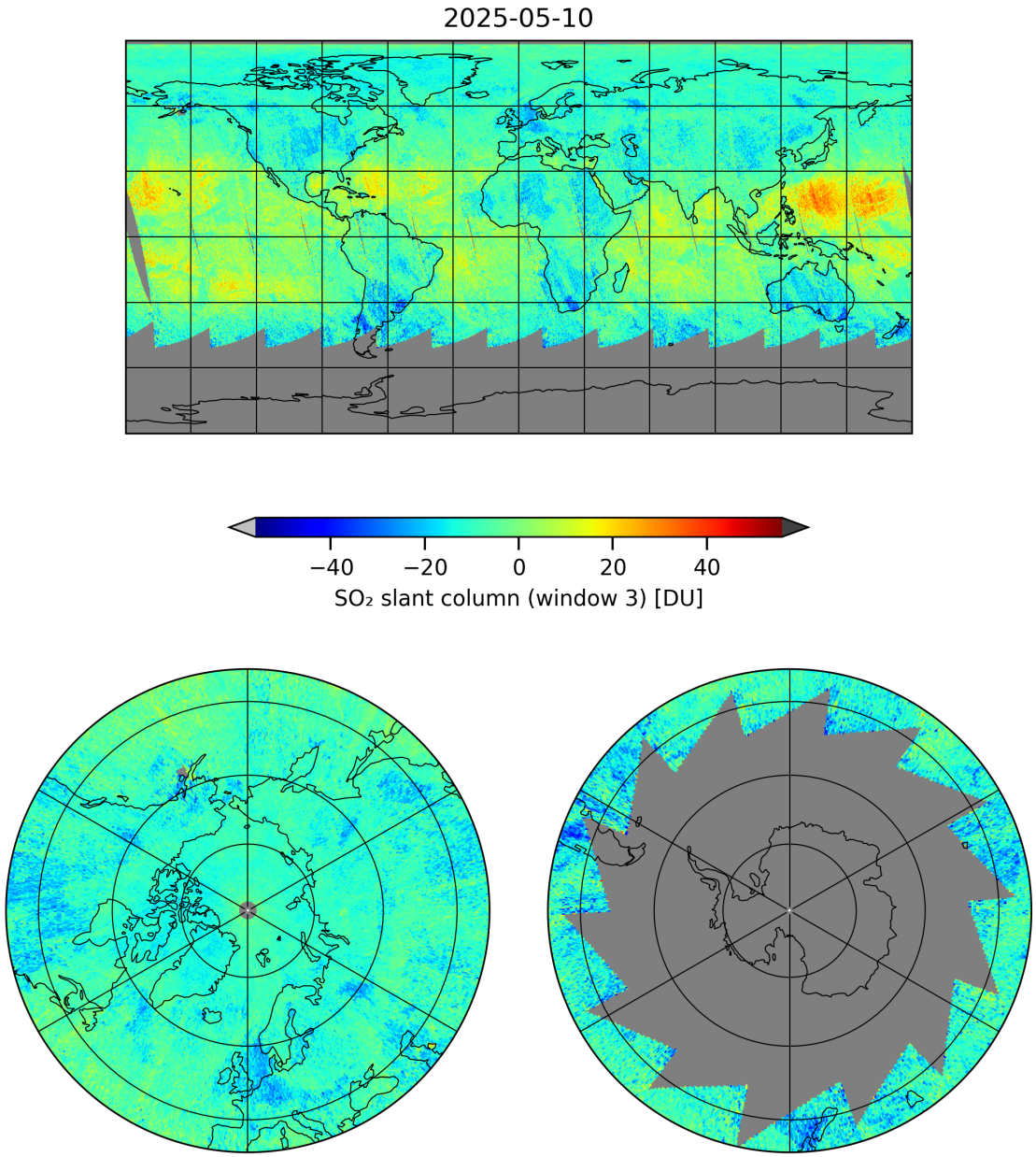


Figure 17: Map of "SO_2 slant column (window 3)" for 2025-05-10 to 2025-05-11

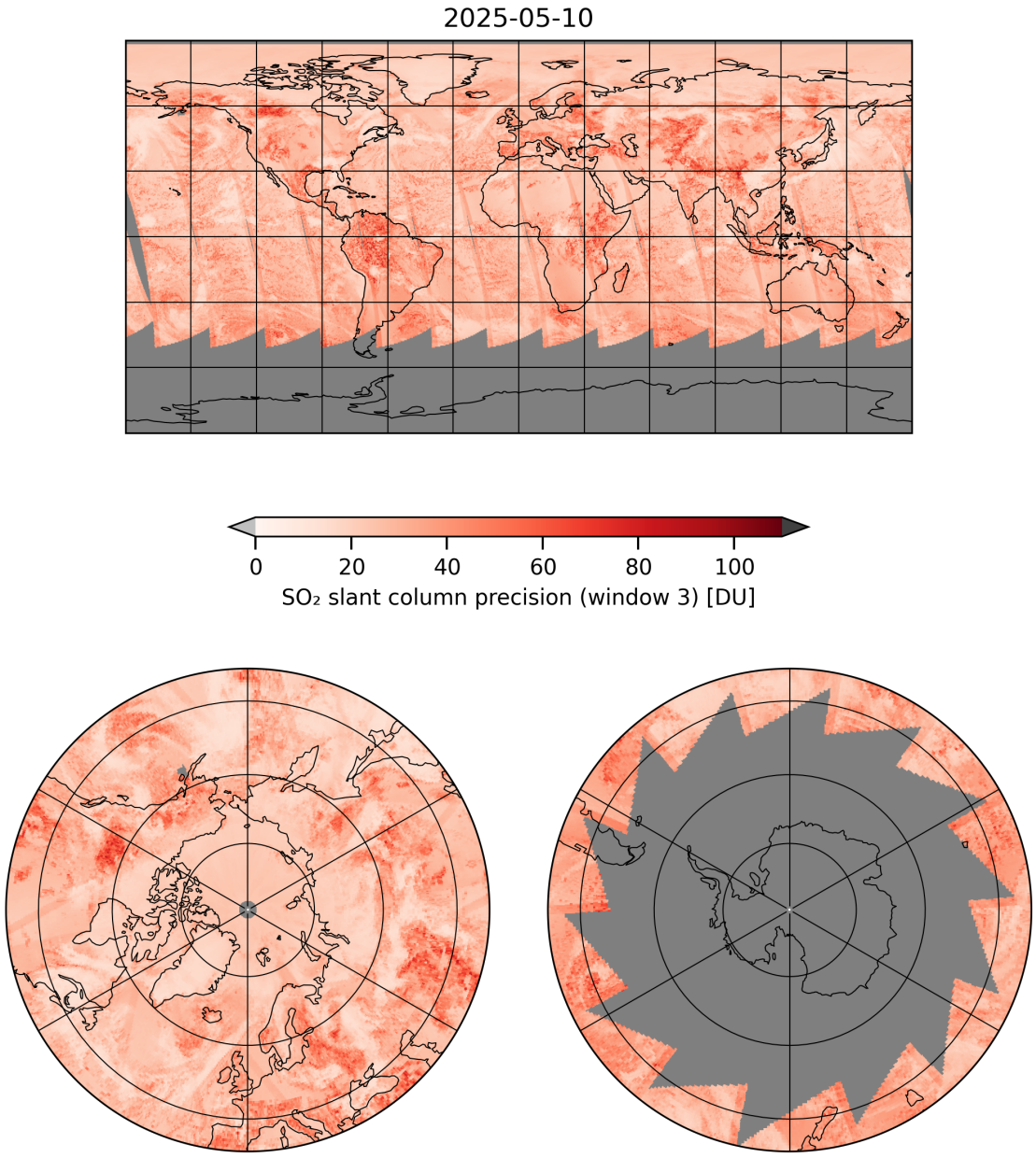


Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-05-10 to 2025-05-11

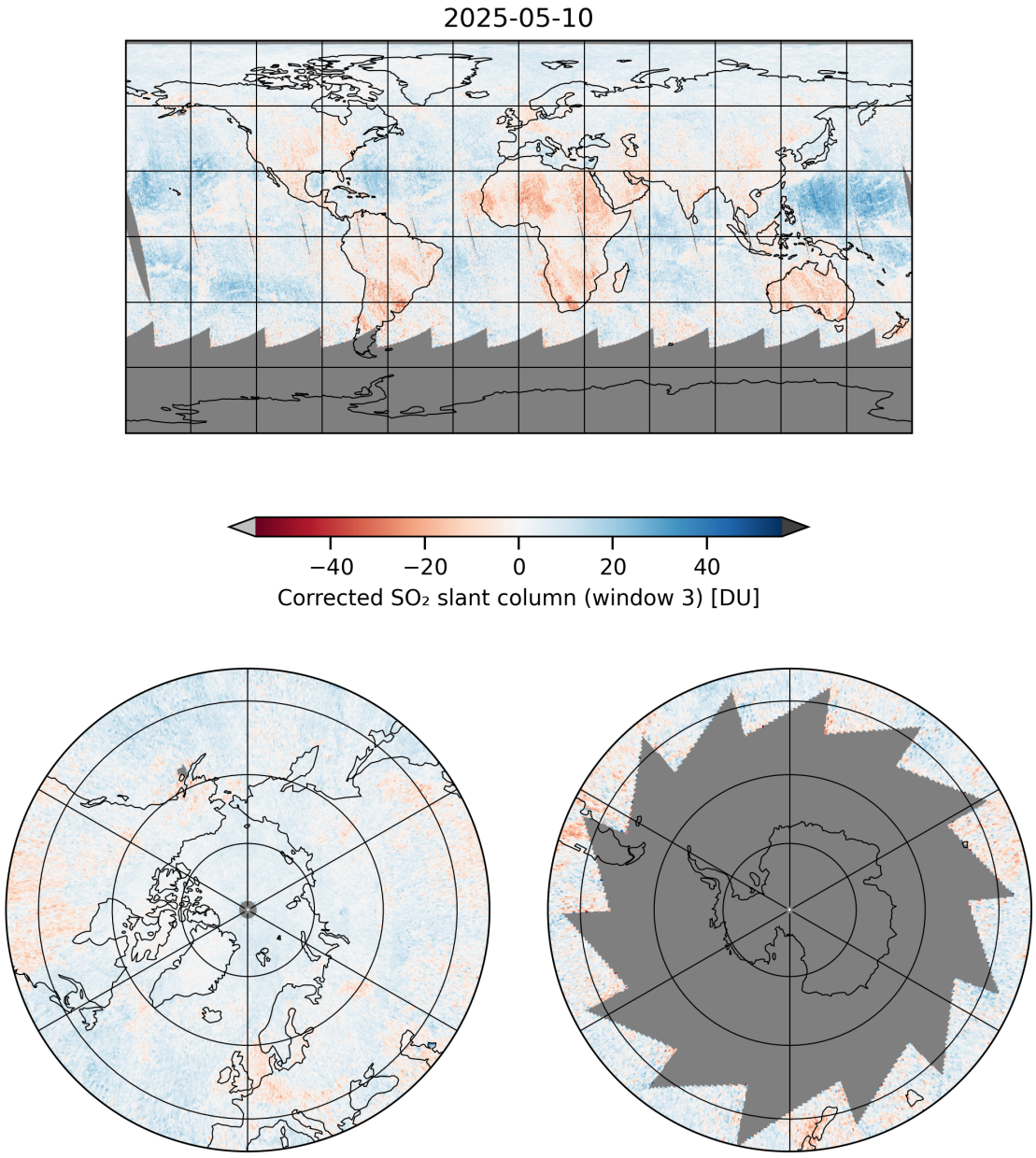


Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-05-10 to 2025-05-11

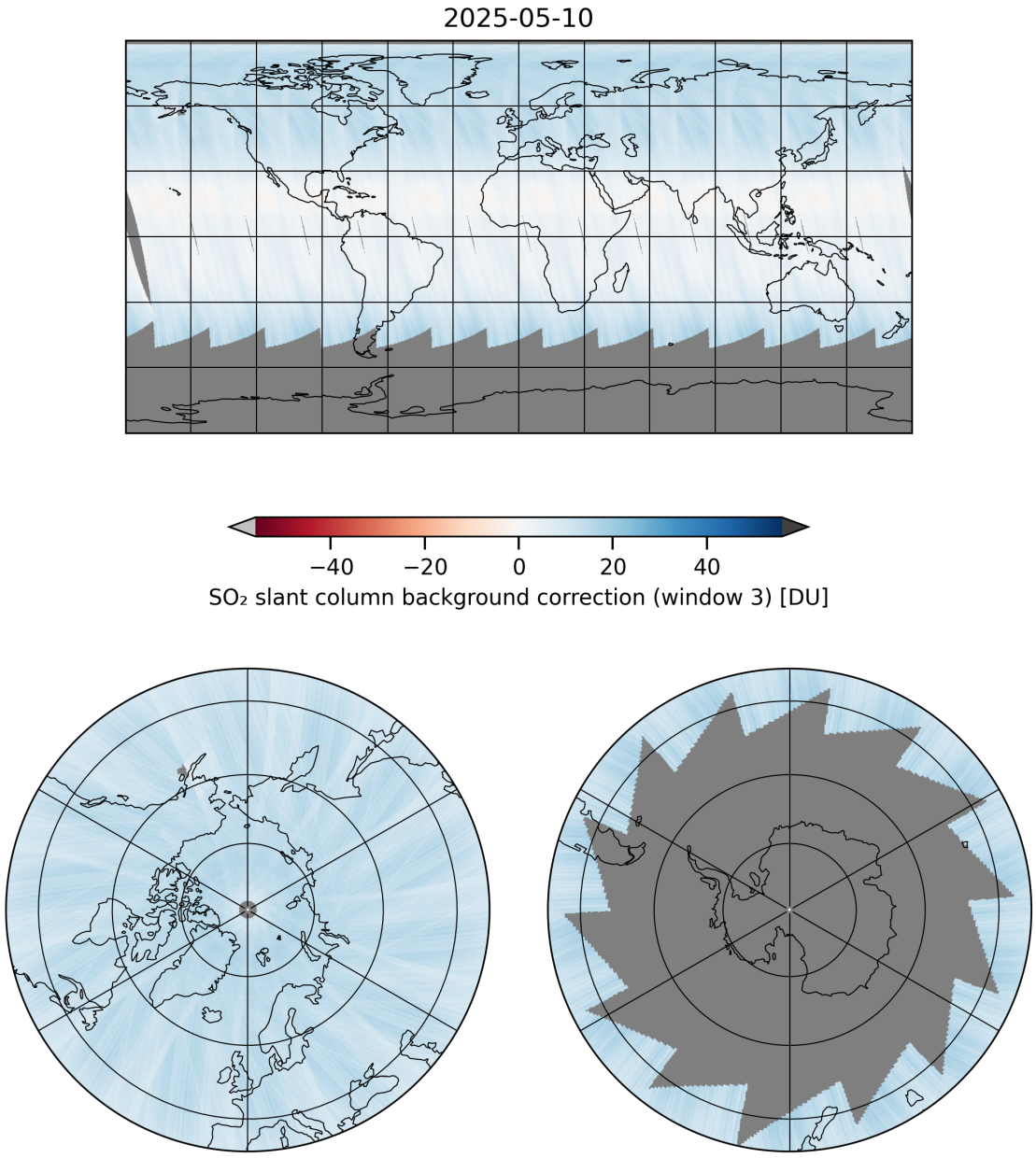


Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-05-10 to 2025-05-11

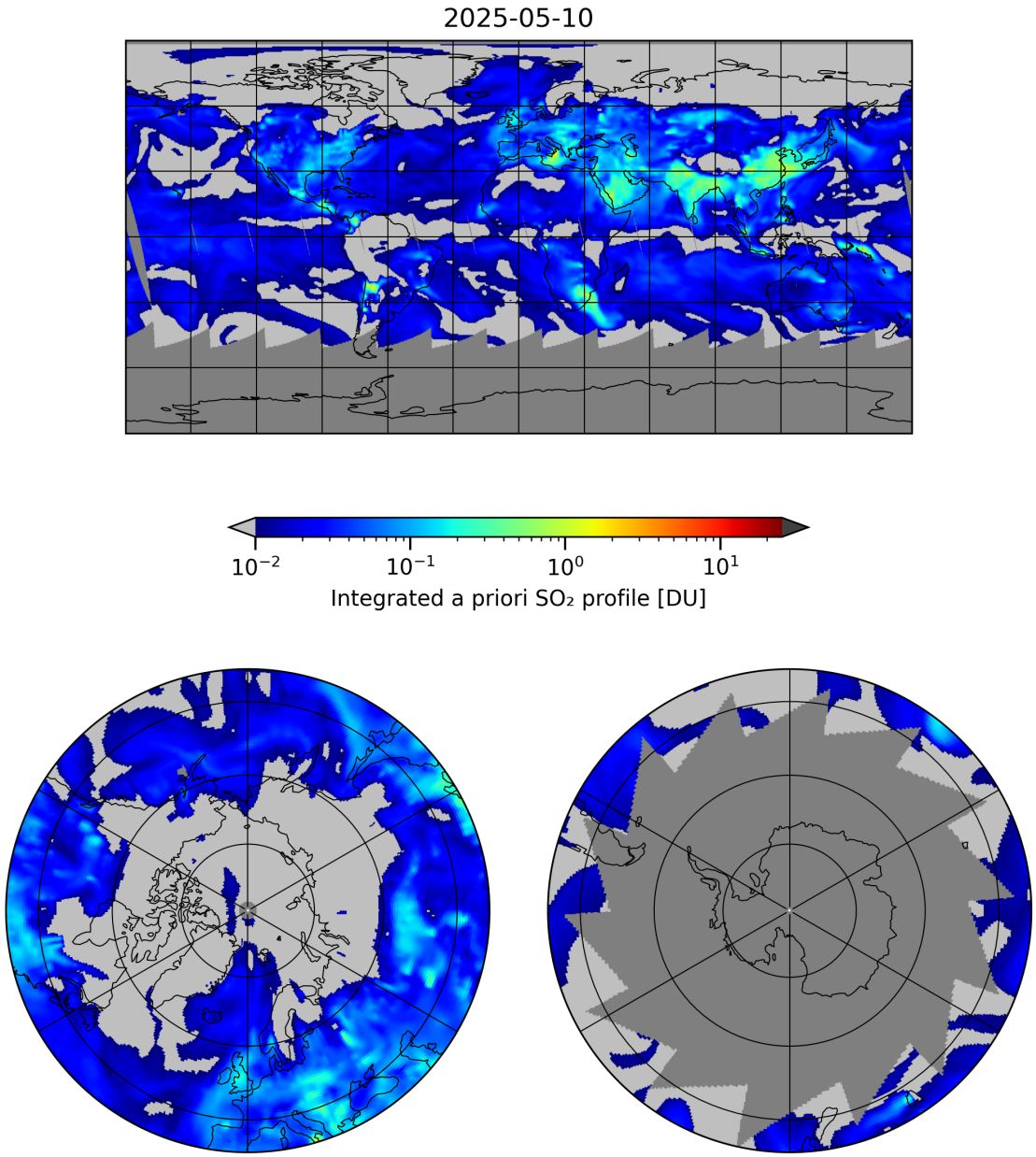


Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-05-10 to 2025-05-11

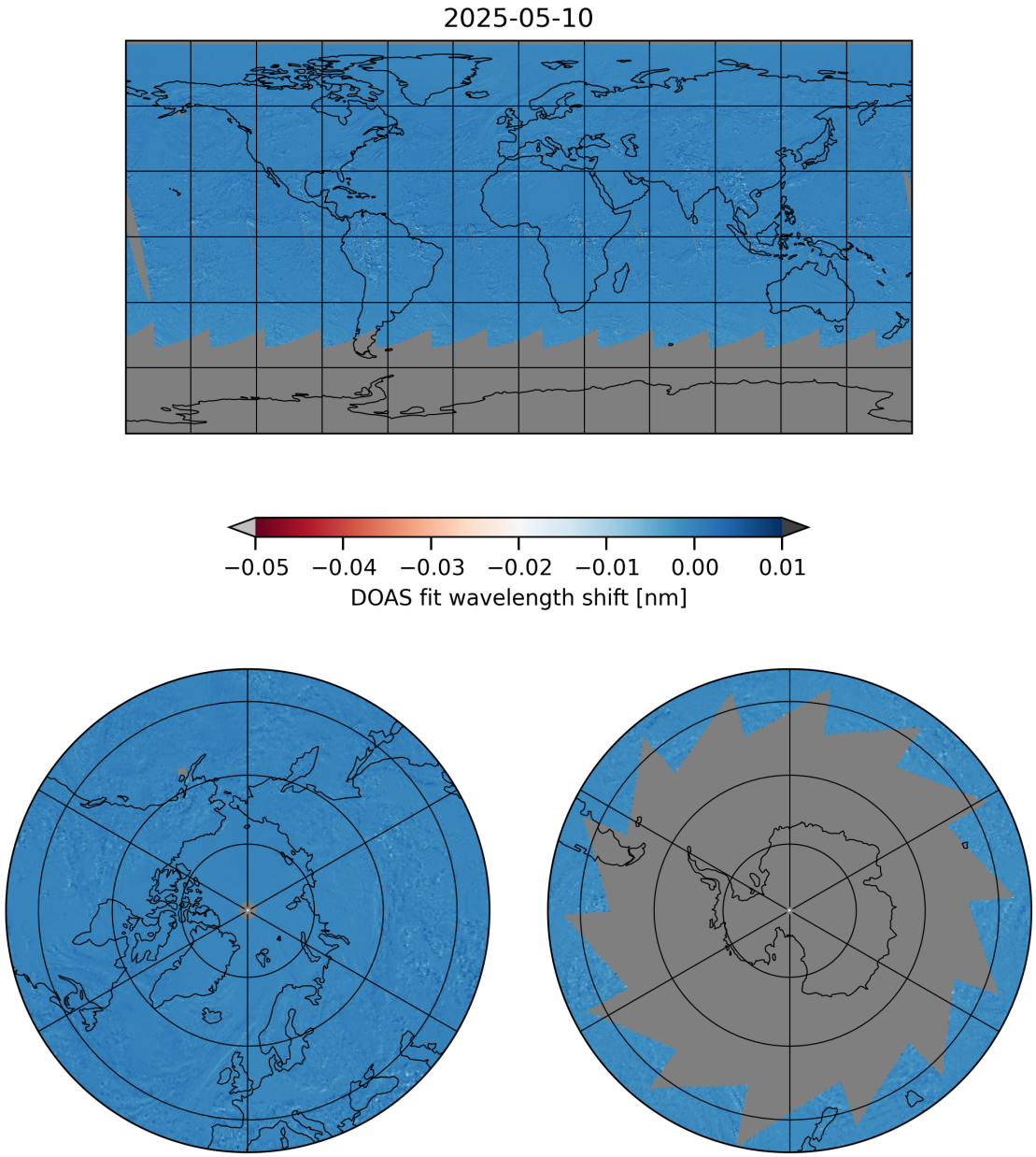


Figure 22: Map of “DOAS fit wavelength shift” for 2025-05-10 to 2025-05-11

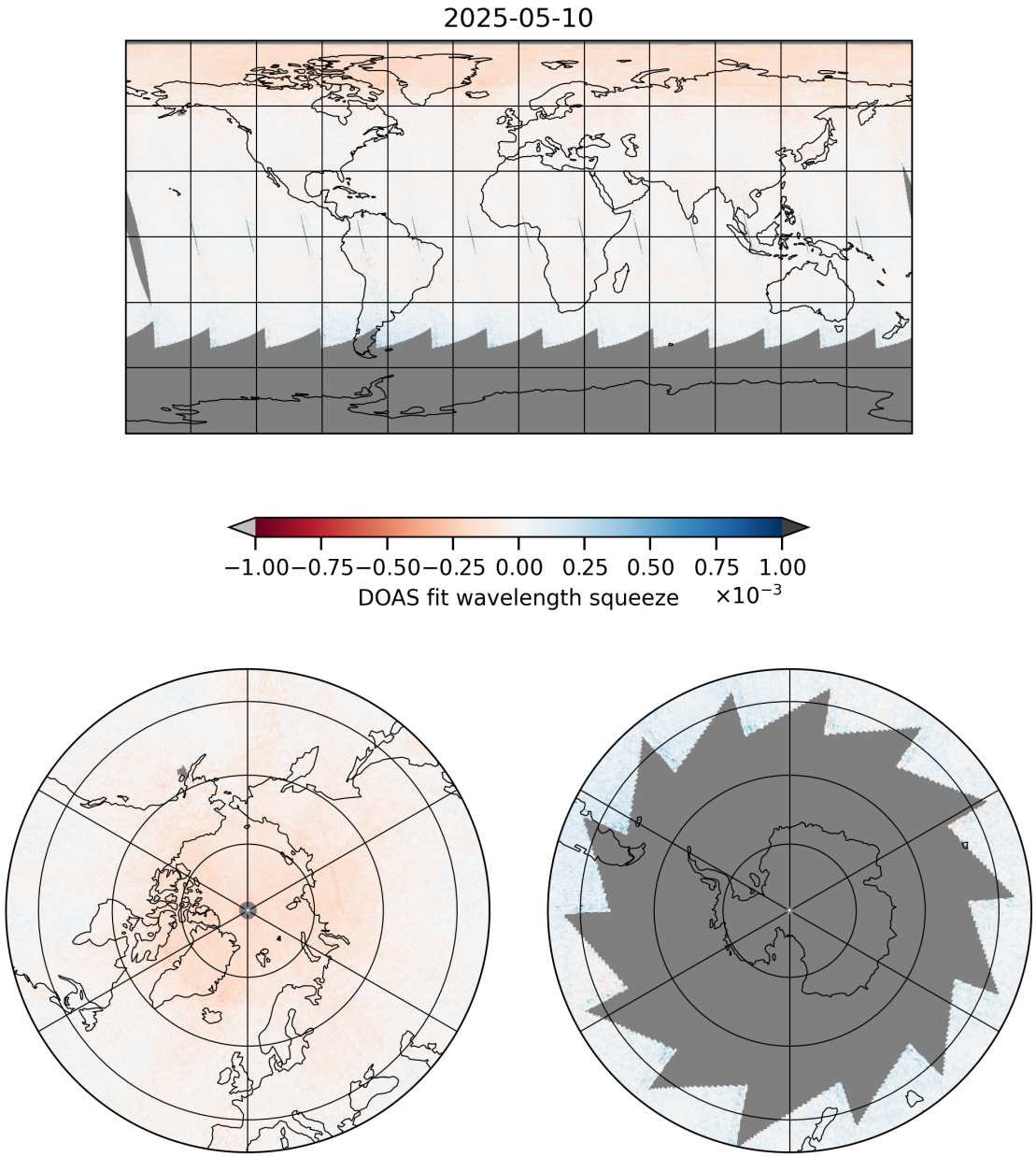


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-05-10 to 2025-05-11

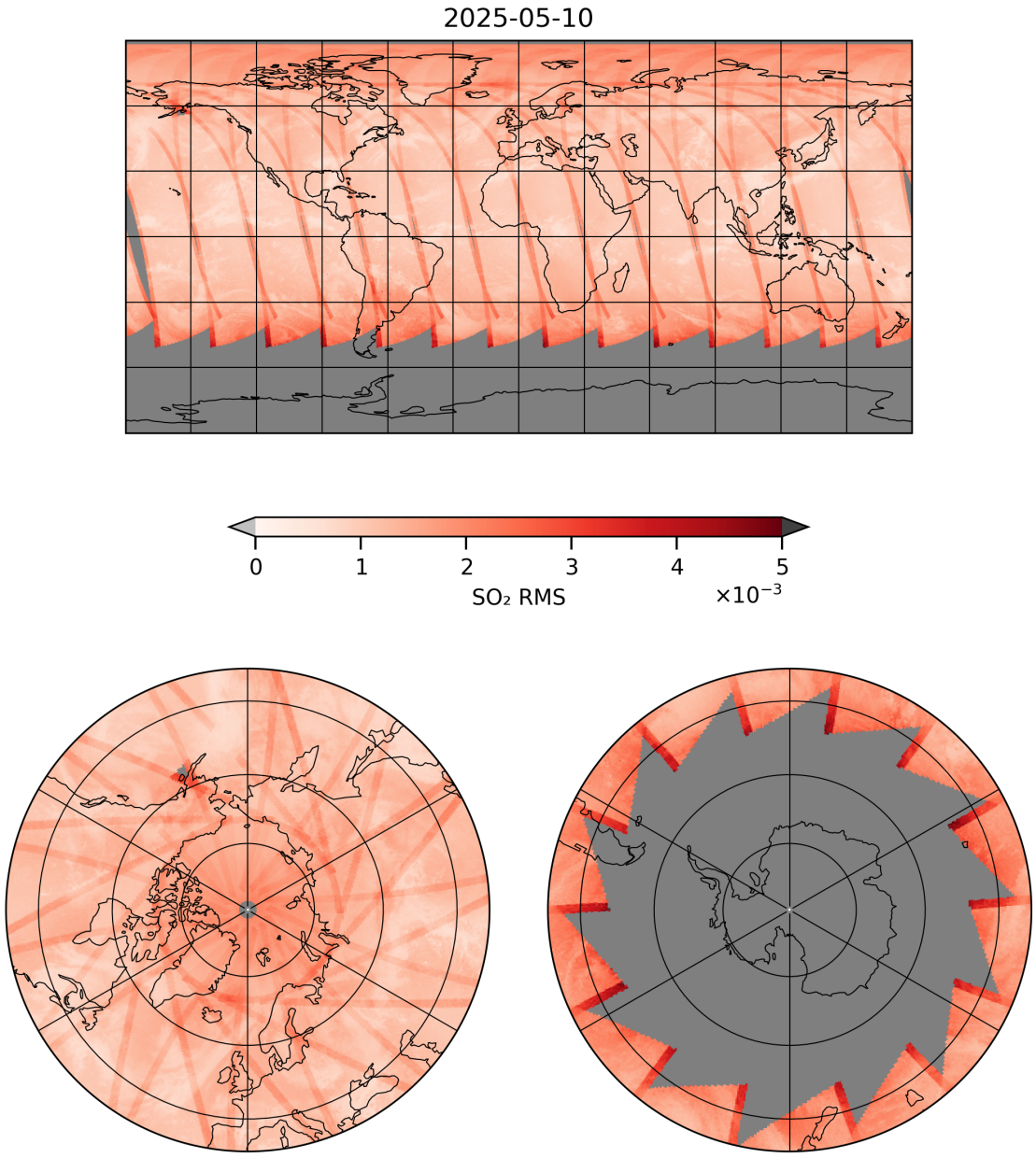


Figure 24: Map of "SO_2 RMS" for 2025-05-10 to 2025-05-11

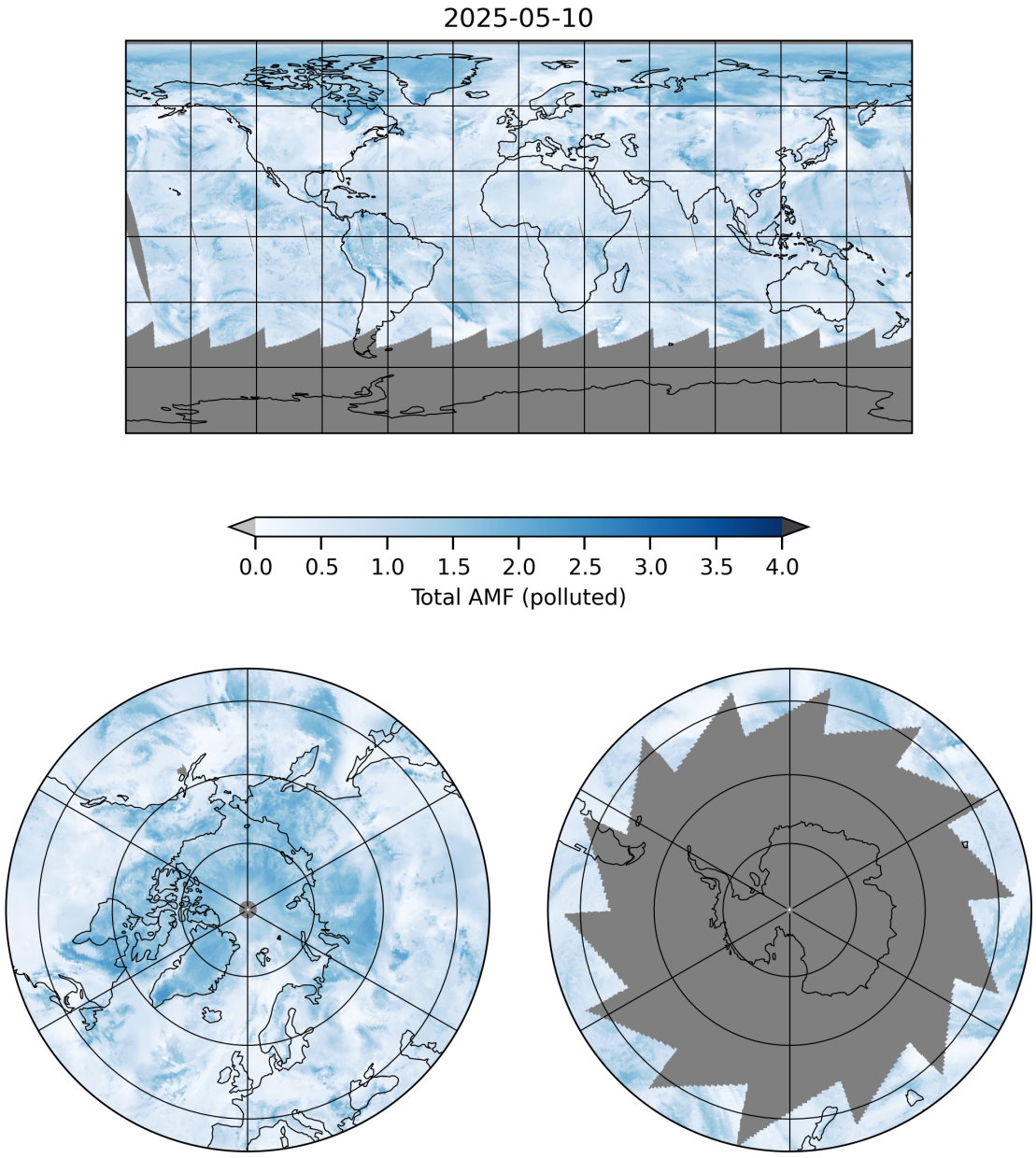


Figure 25: Map of “Total AMF (polluted)” for 2025-05-10 to 2025-05-11

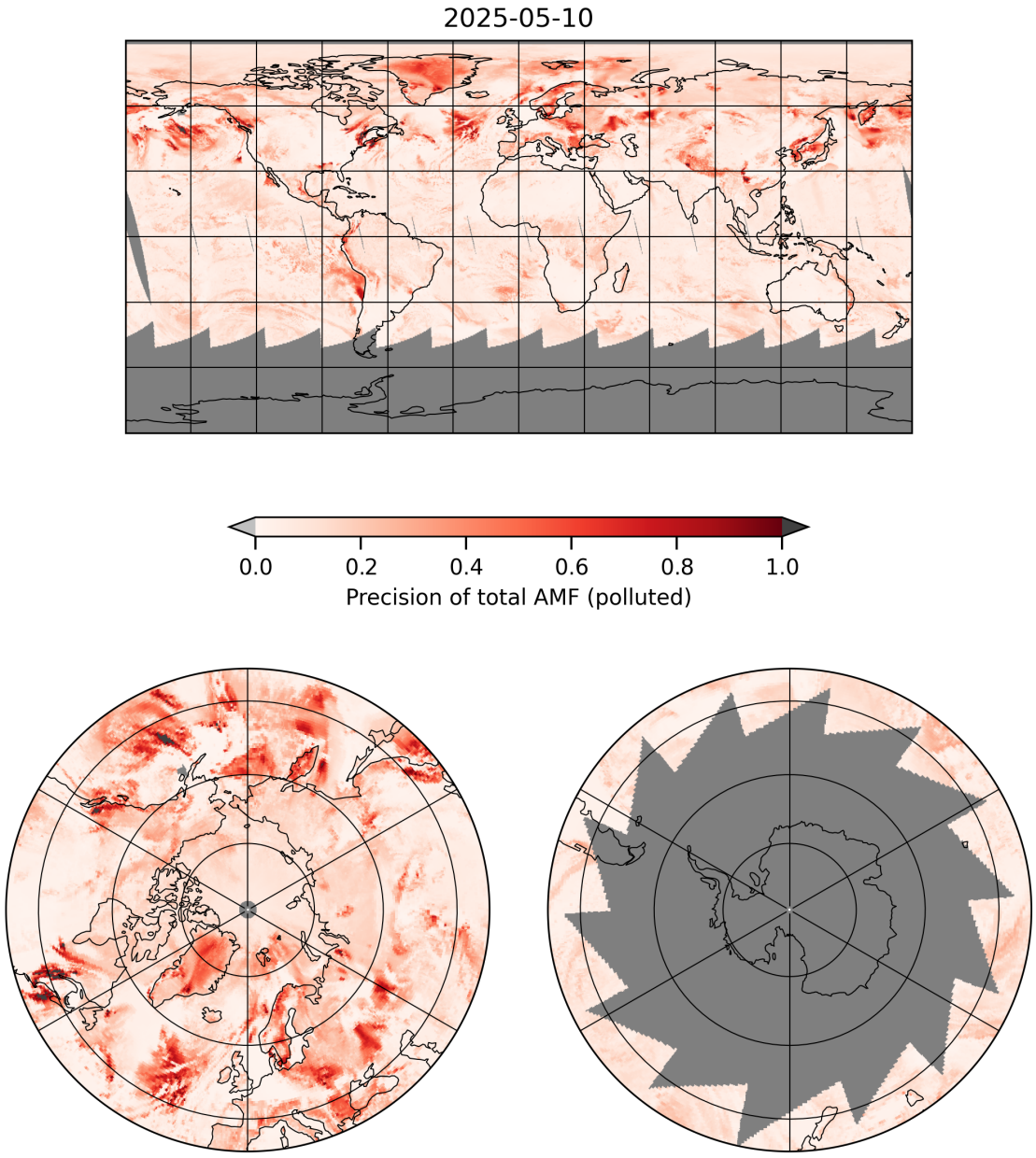


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-05-10 to 2025-05-11

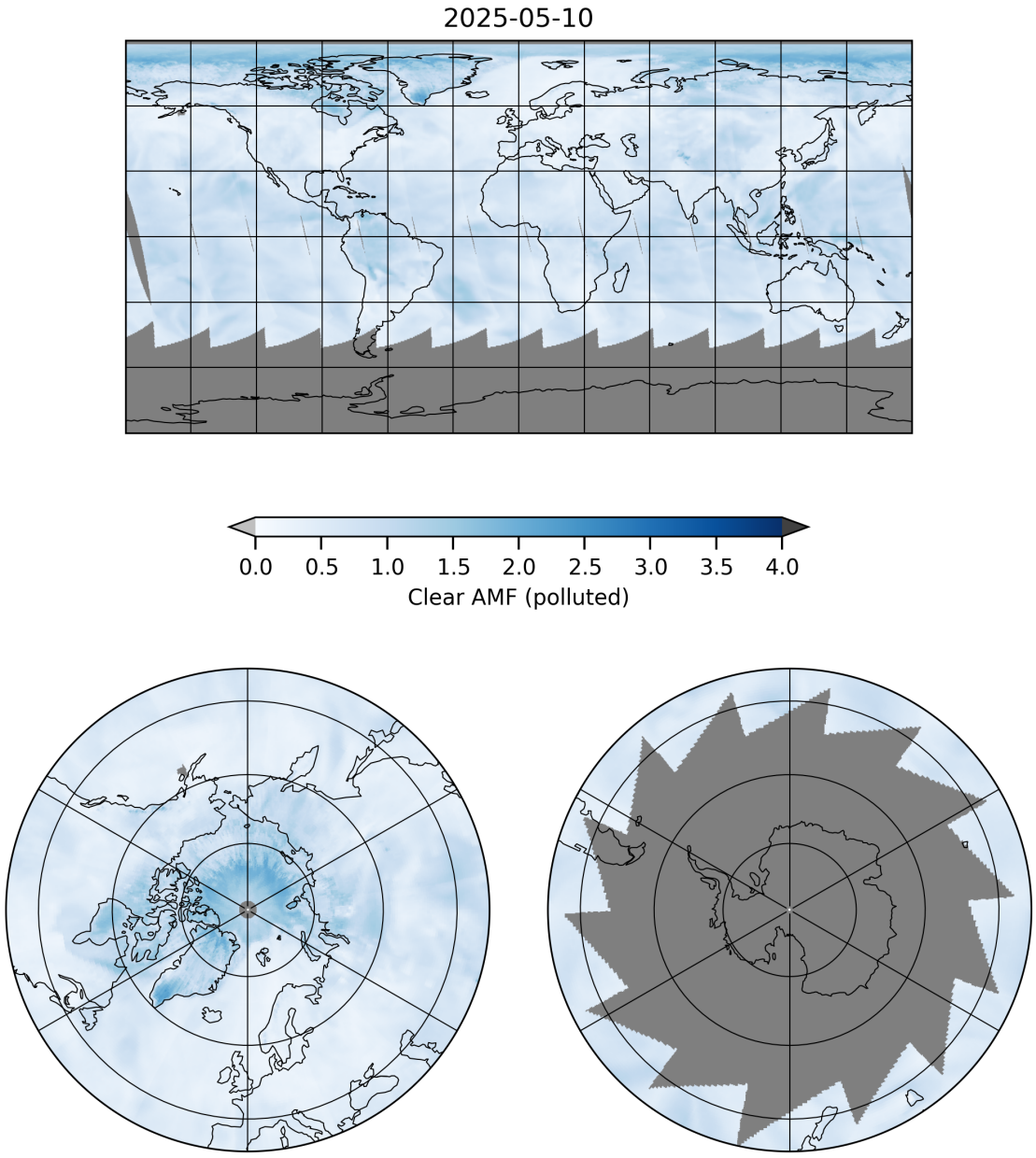


Figure 27: Map of “Clear AMF (polluted)” for 2025-05-10 to 2025-05-11

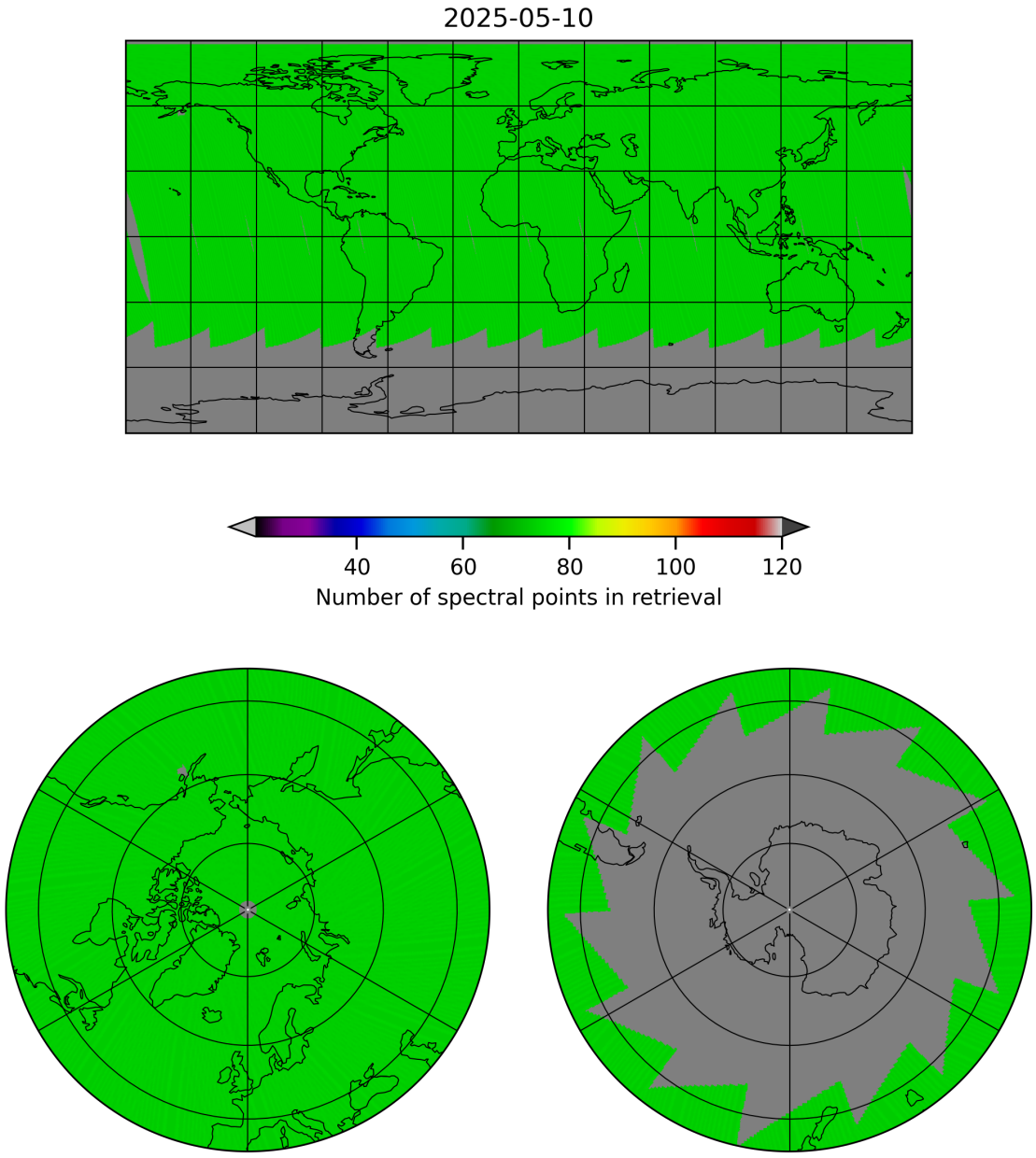


Figure 28: Map of “Number of spectral points in retrieval” for 2025-05-10 to 2025-05-11

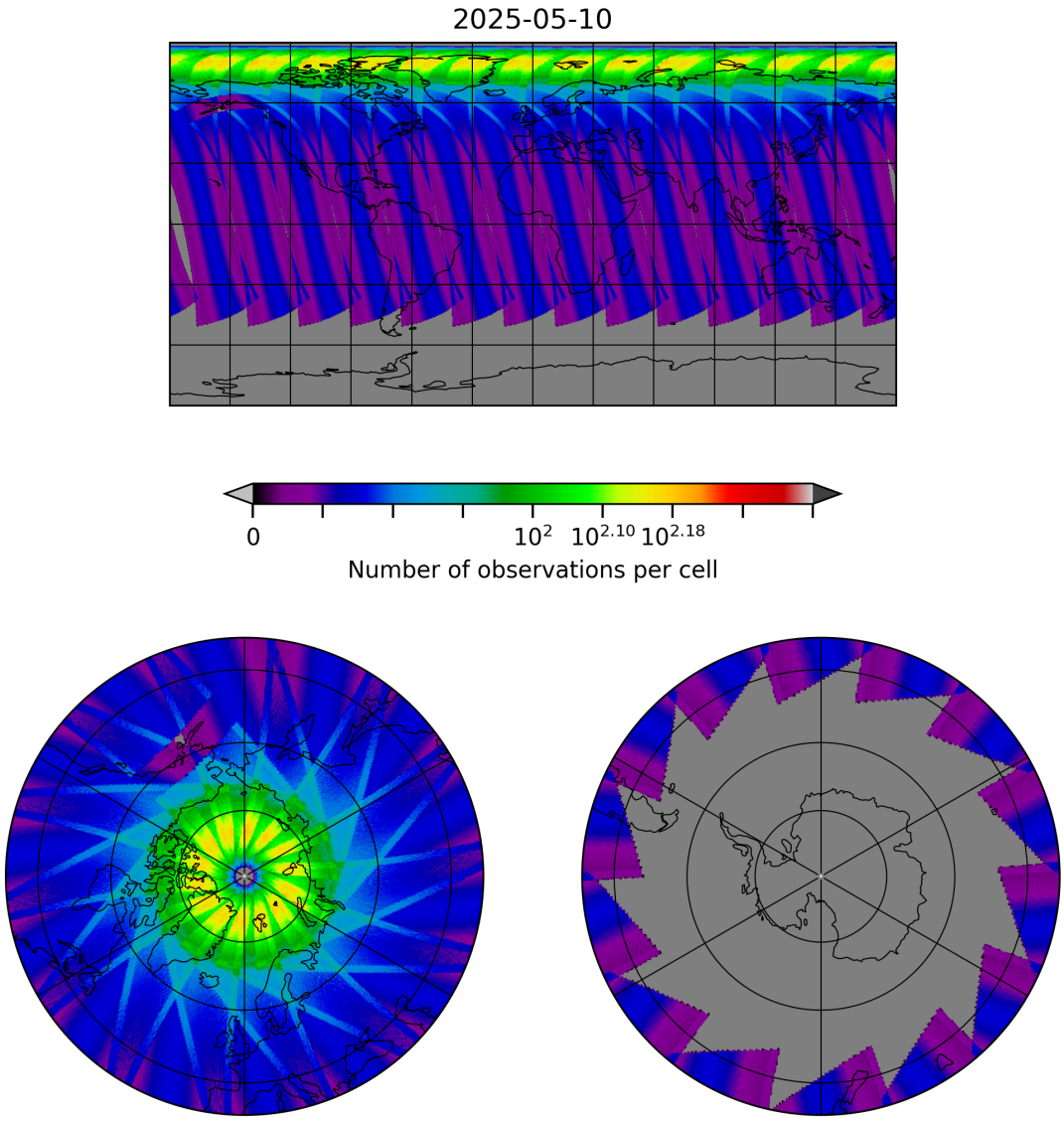


Figure 29: Map of the number of observations for 2025-05-10 to 2025-05-11

7 Zonal average

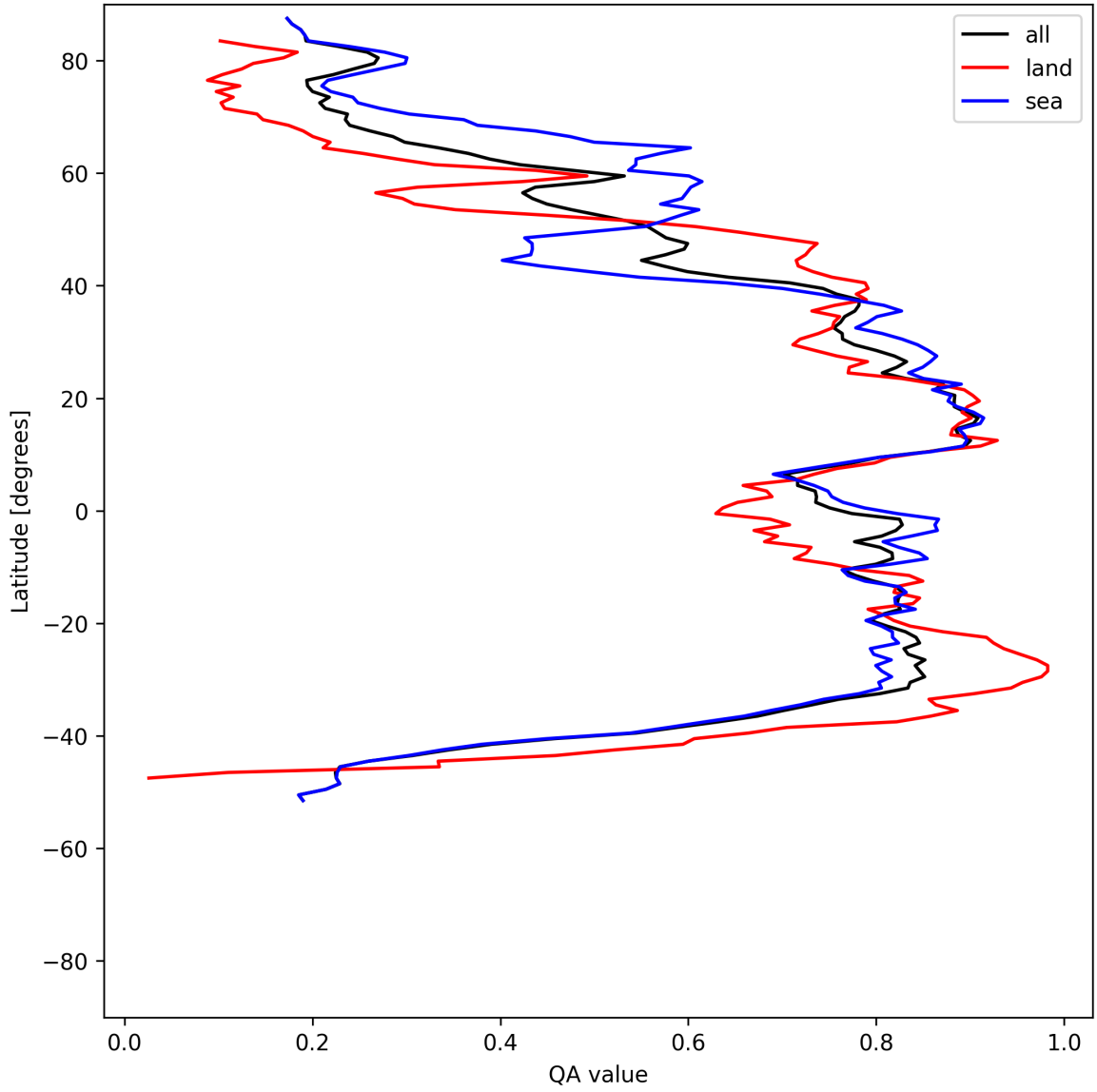


Figure 30: Zonal average of “QA value” for 2025-05-10 to 2025-05-11.

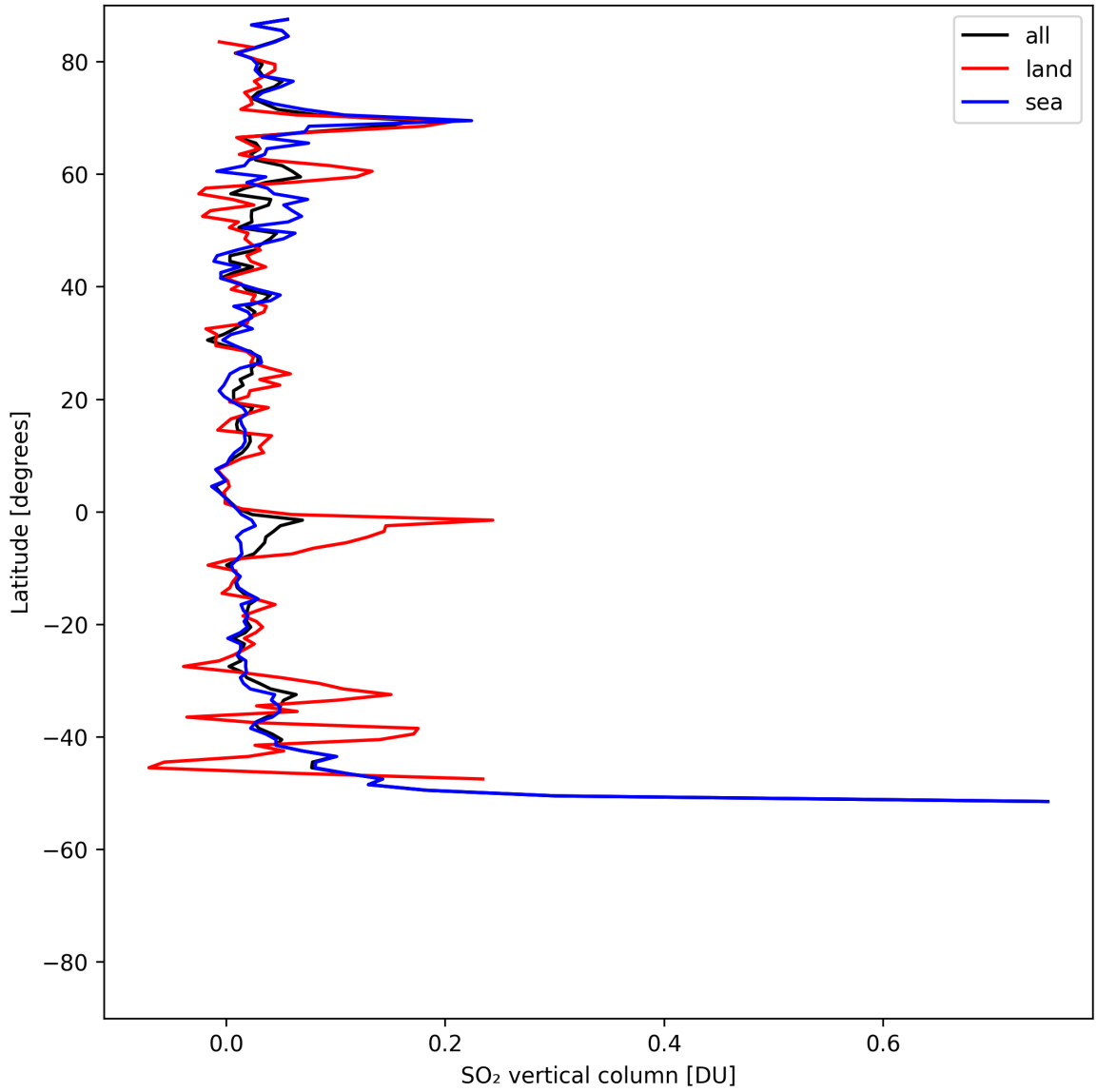


Figure 31: Zonal average of "SO_2 vertical column" for 2025-05-10 to 2025-05-11.

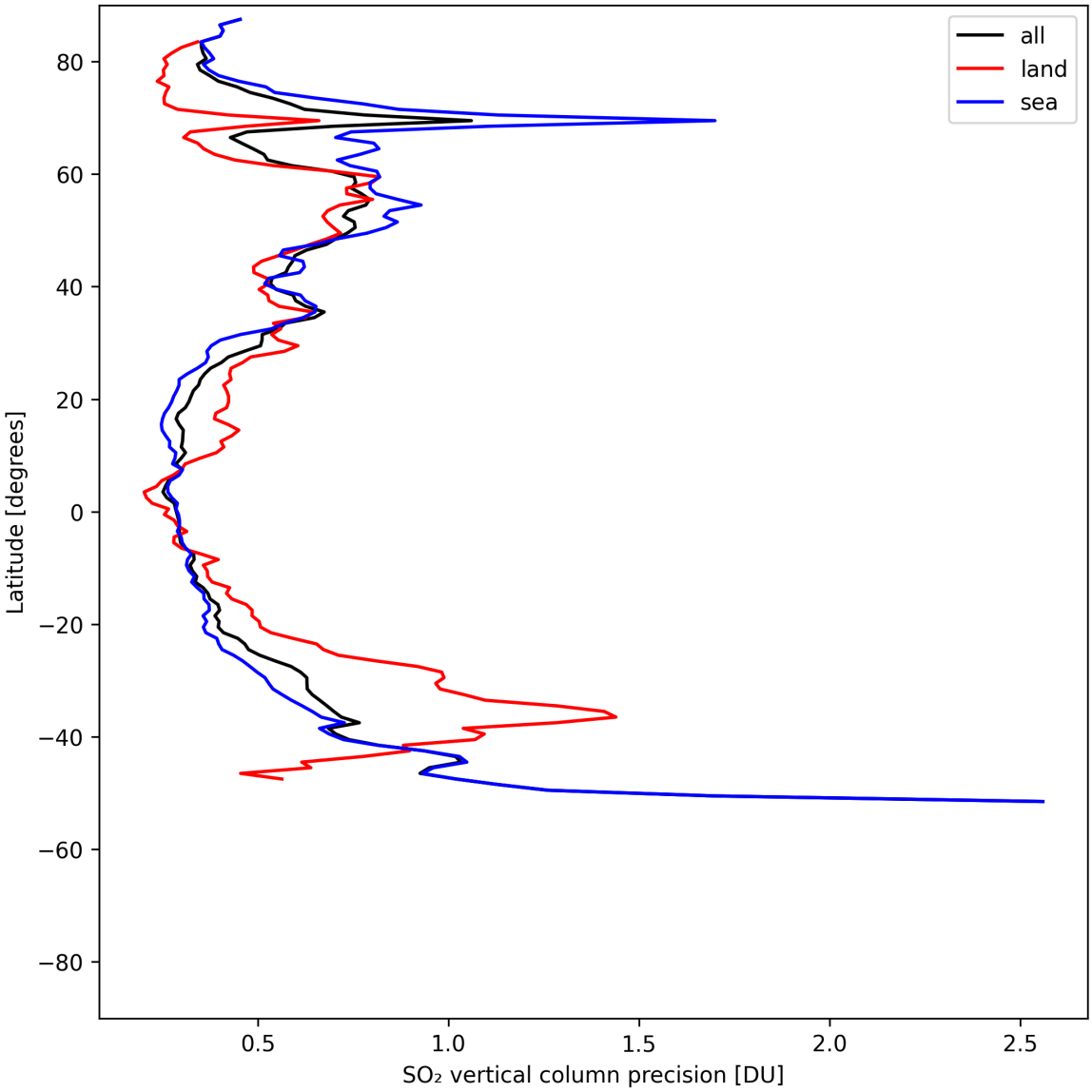


Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-05-10 to 2025-05-11.

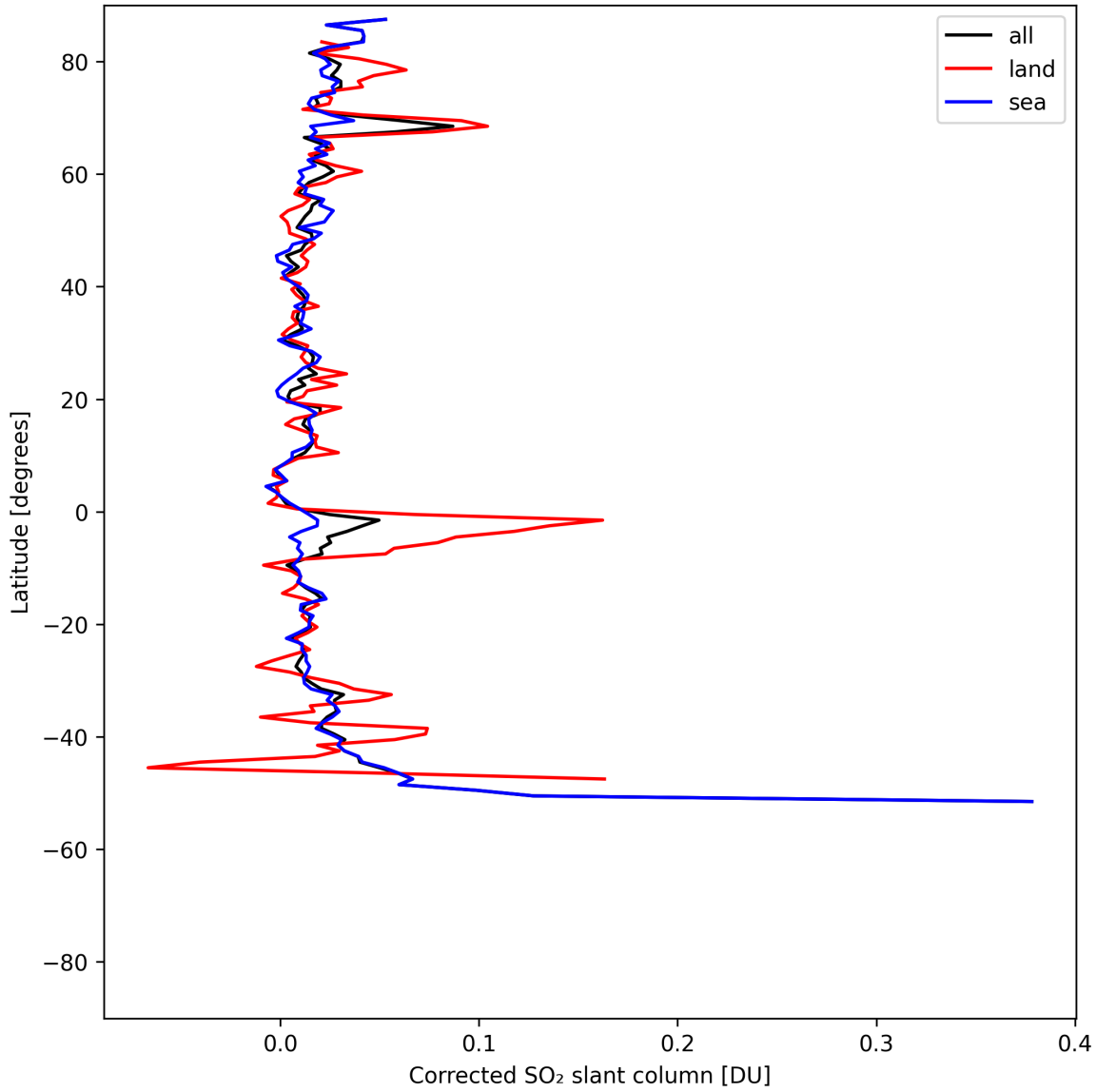


Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-05-10 to 2025-05-11.

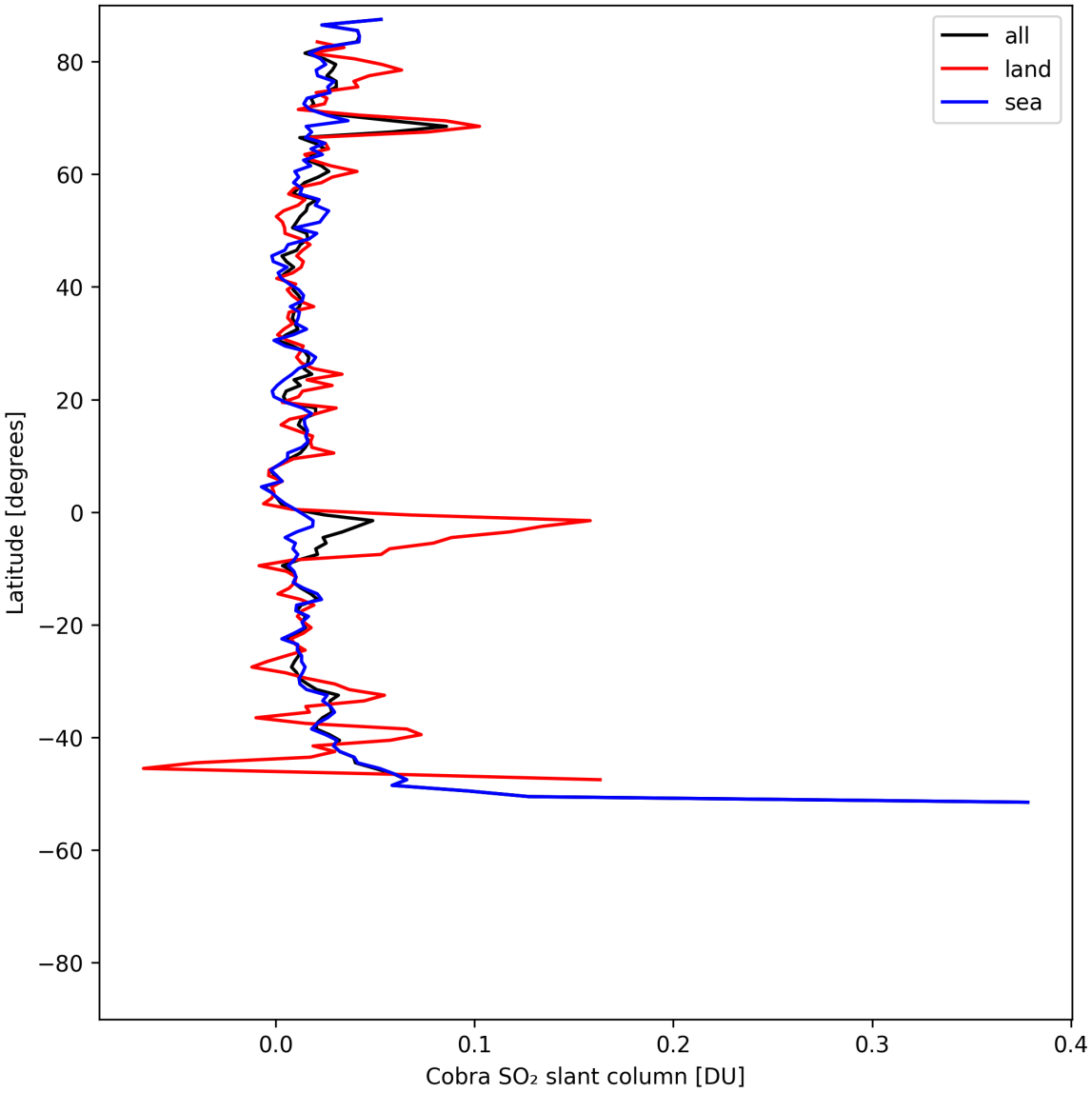


Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-05-10 to 2025-05-11.

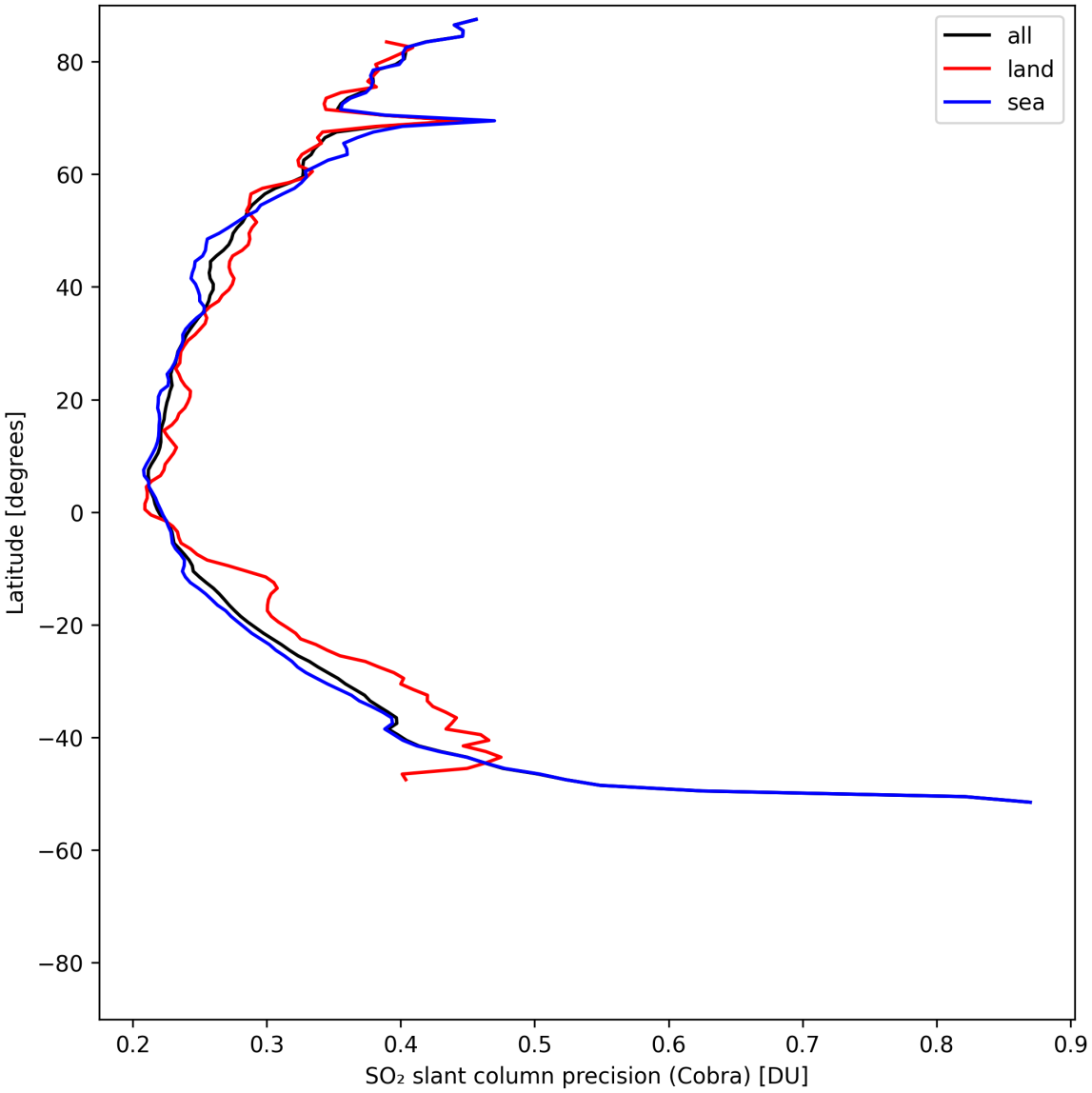


Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-05-10 to 2025-05-11.

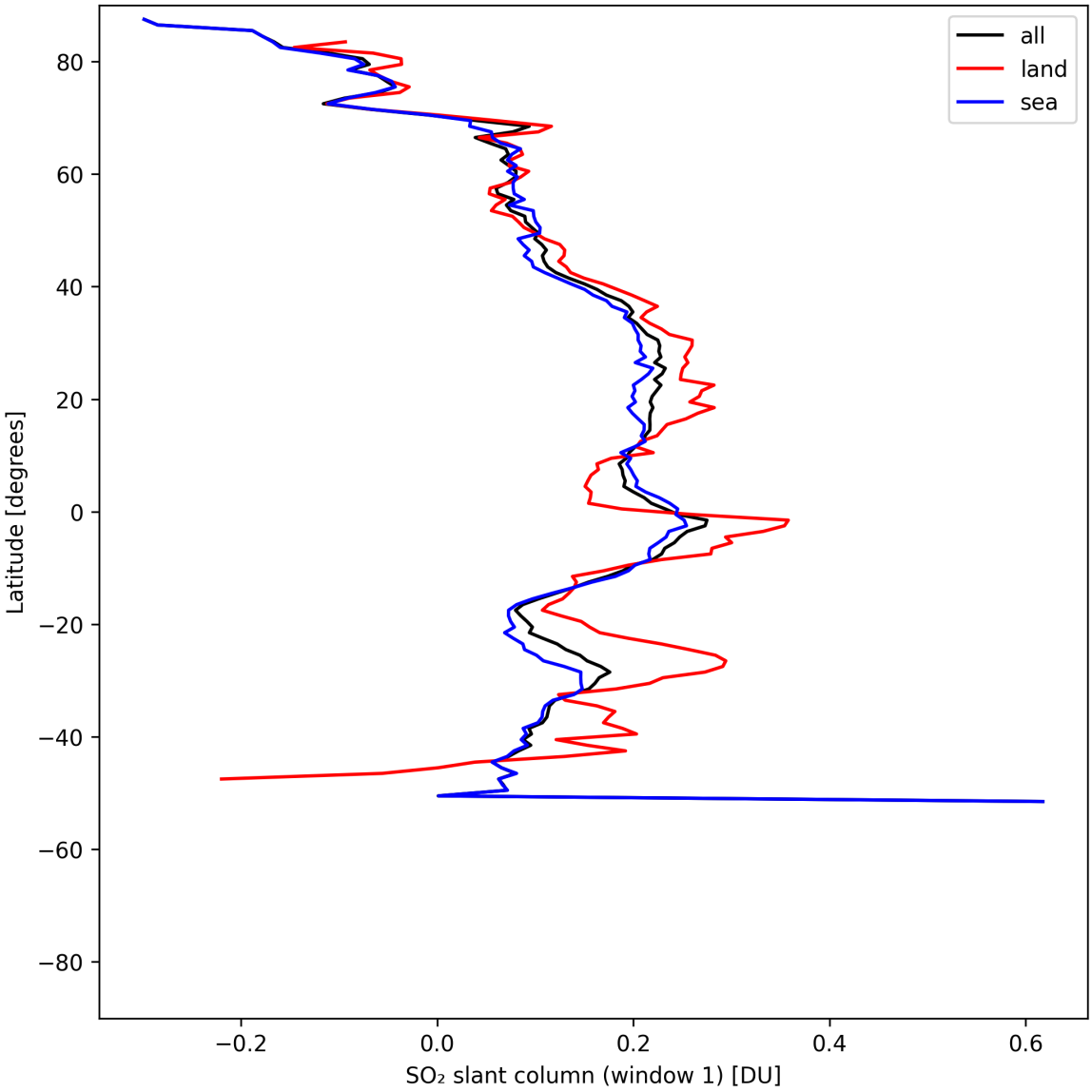


Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-05-10 to 2025-05-11.

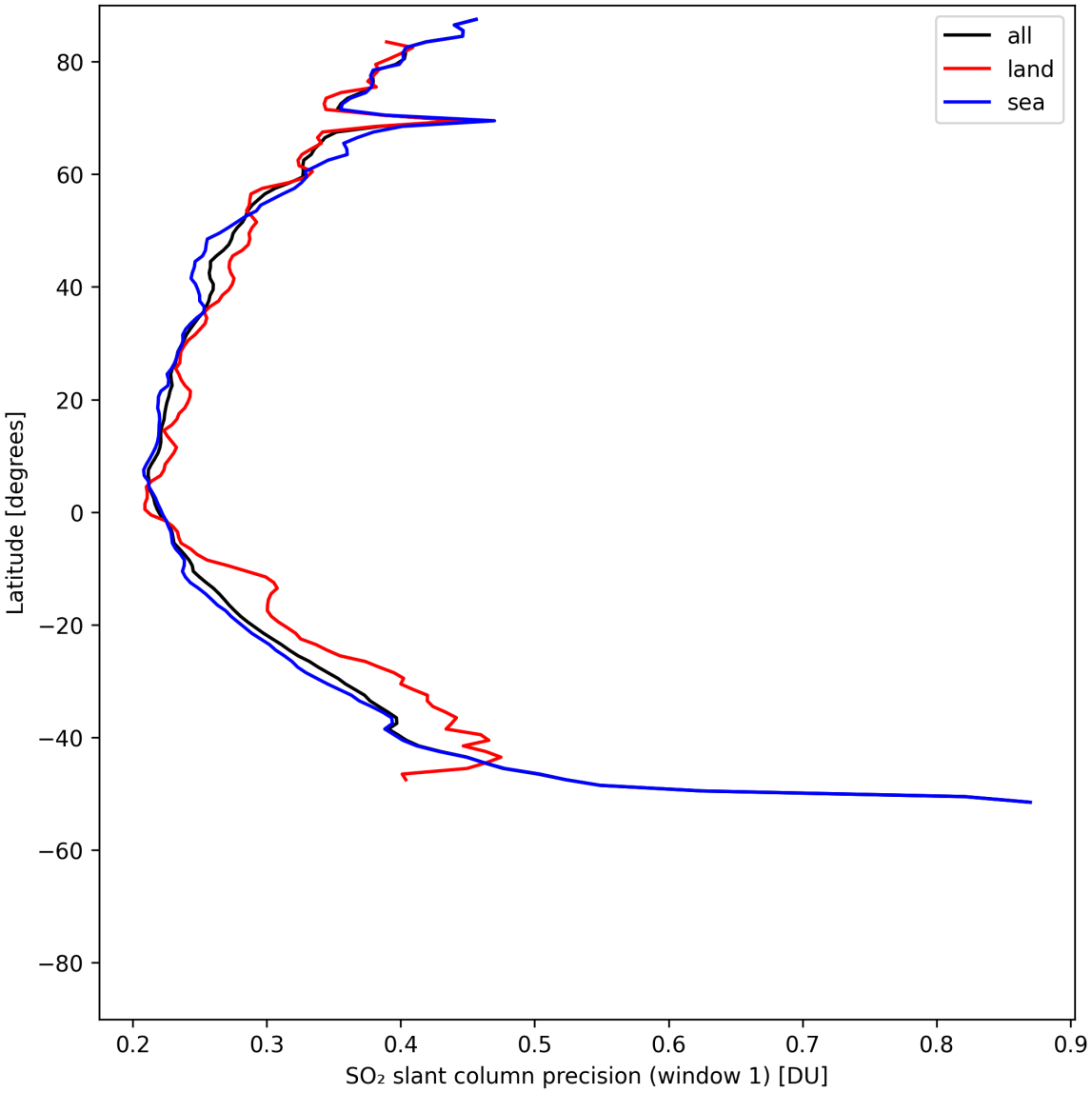


Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-05-10 to 2025-05-11.

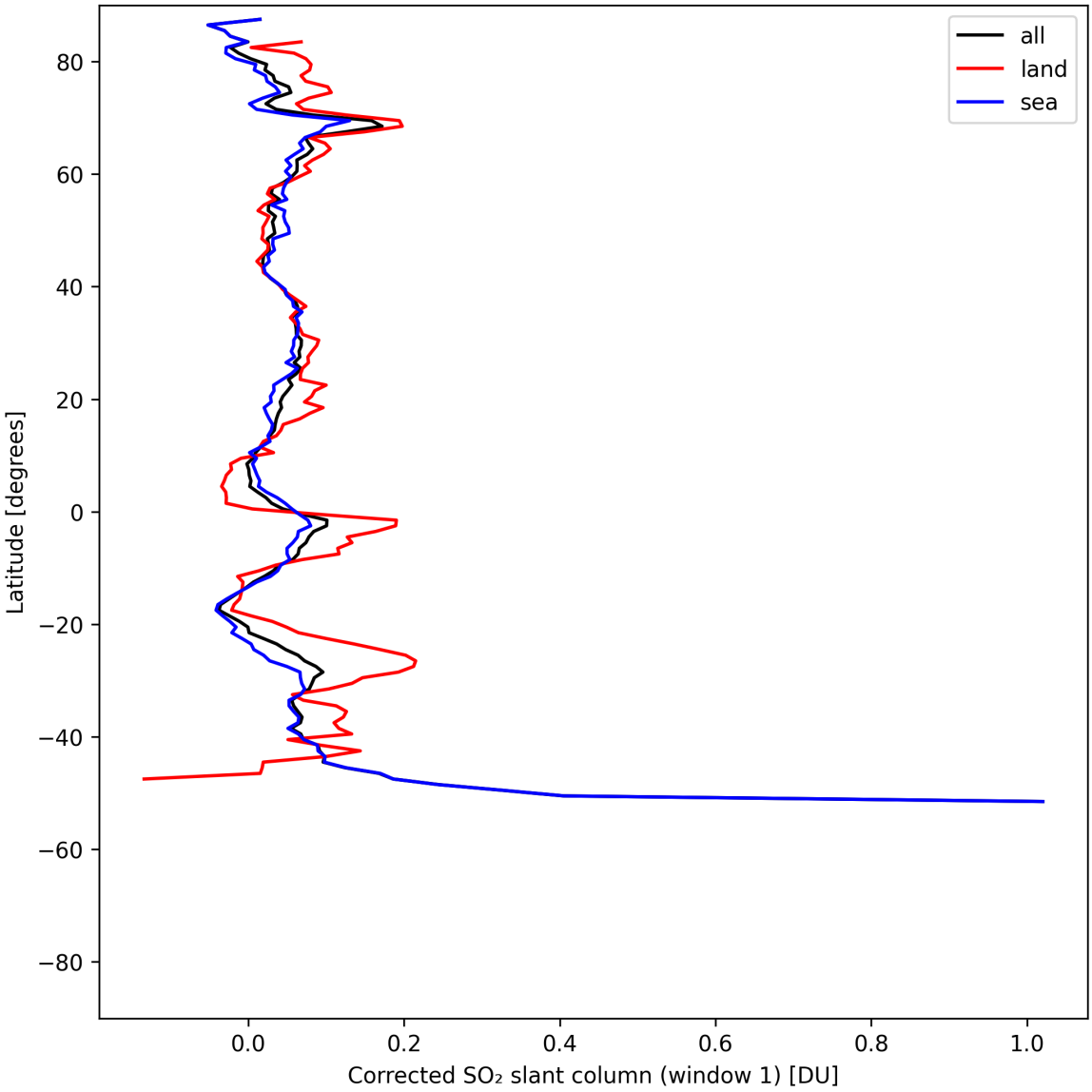


Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-05-10 to 2025-05-11.

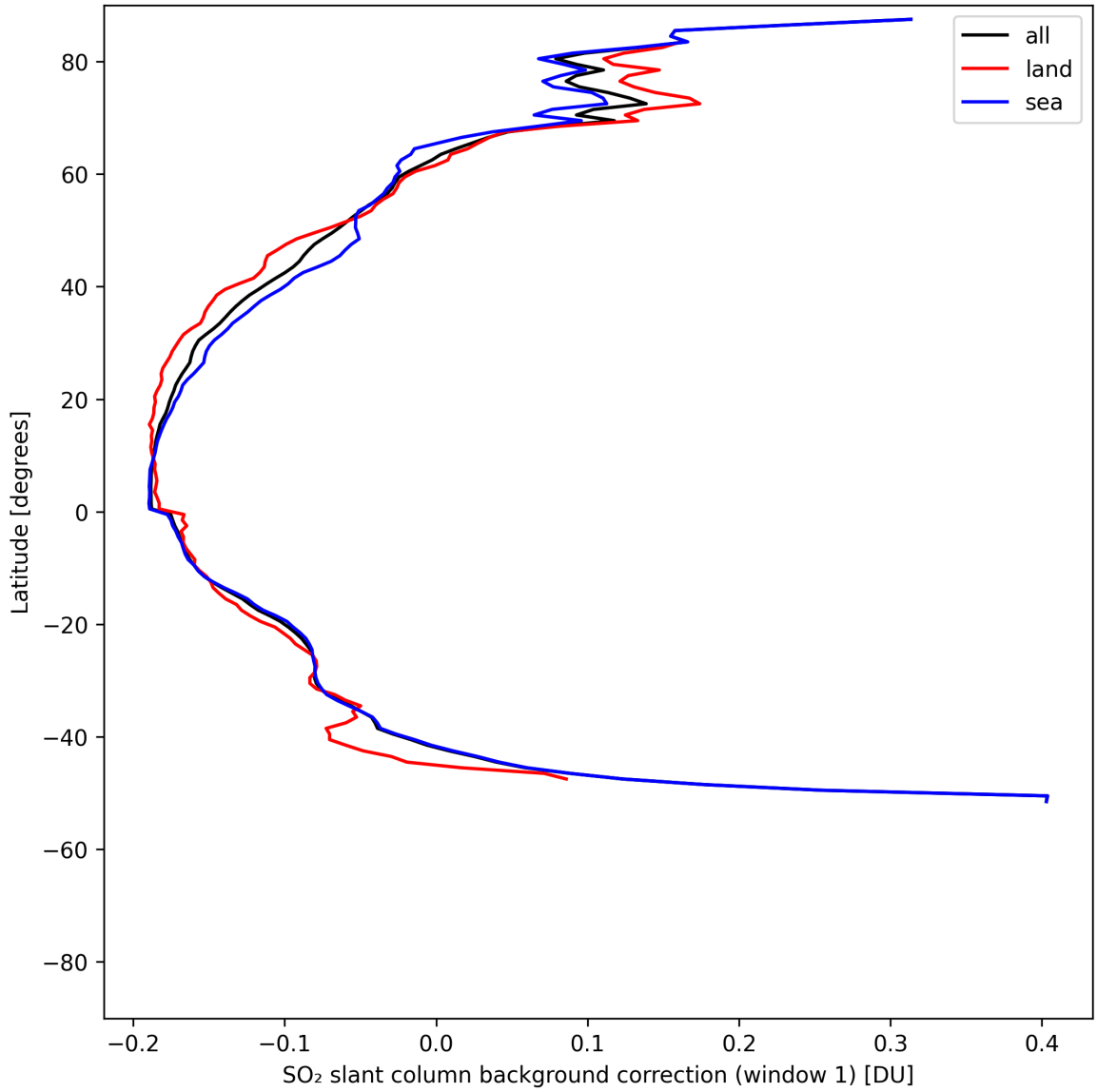


Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-05-10 to 2025-05-11.

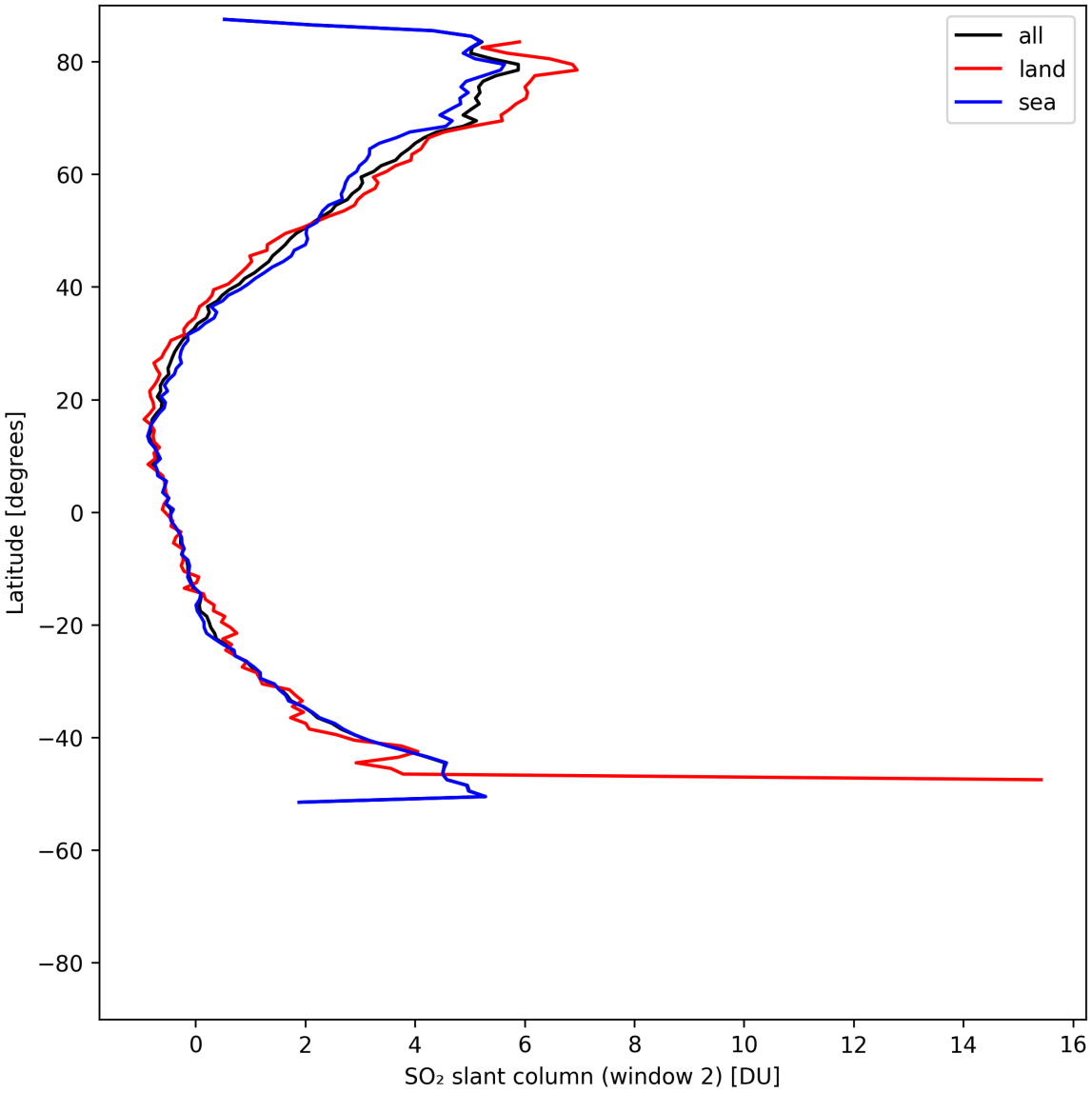


Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-05-10 to 2025-05-11.

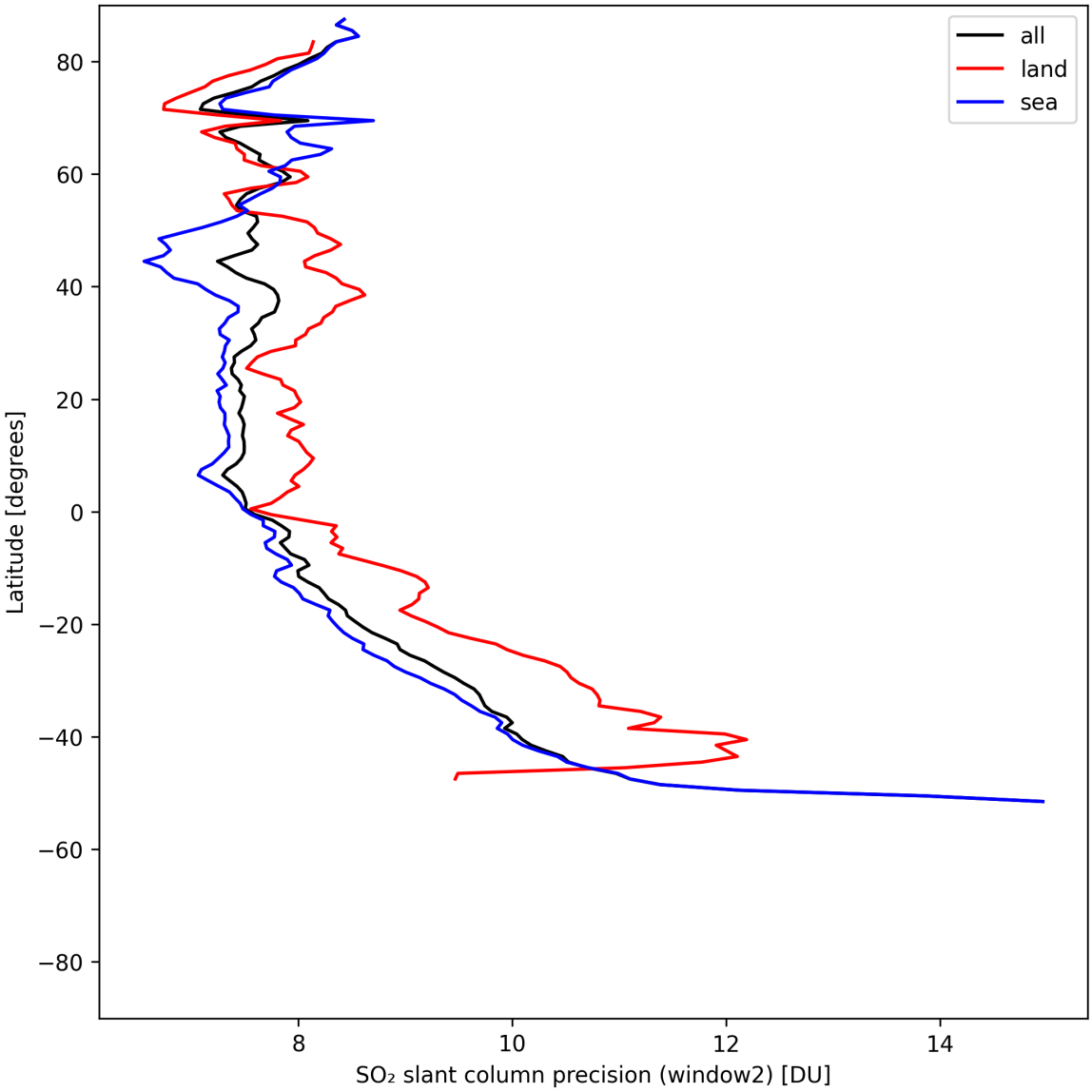


Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-05-10 to 2025-05-11.

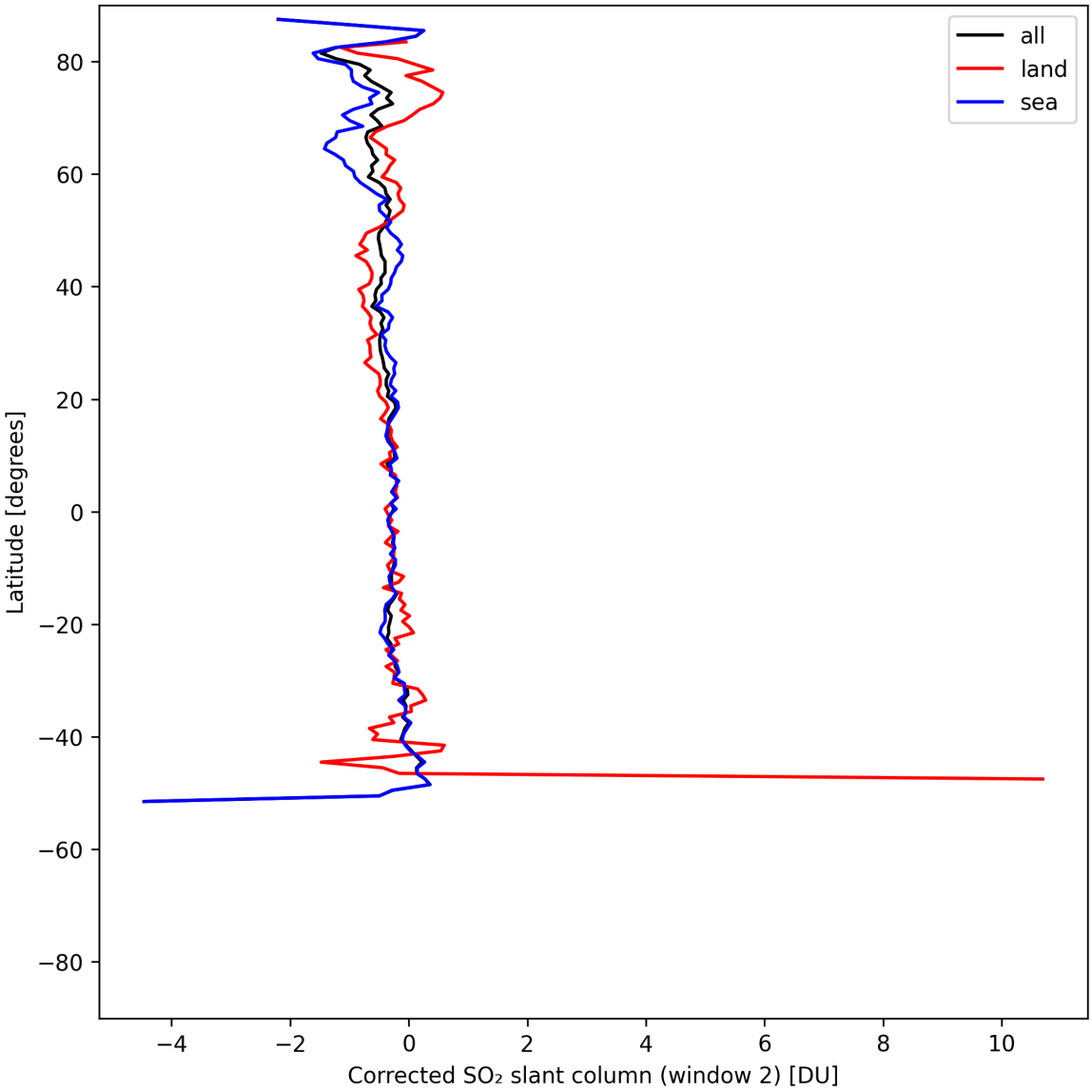


Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-05-10 to 2025-05-11.

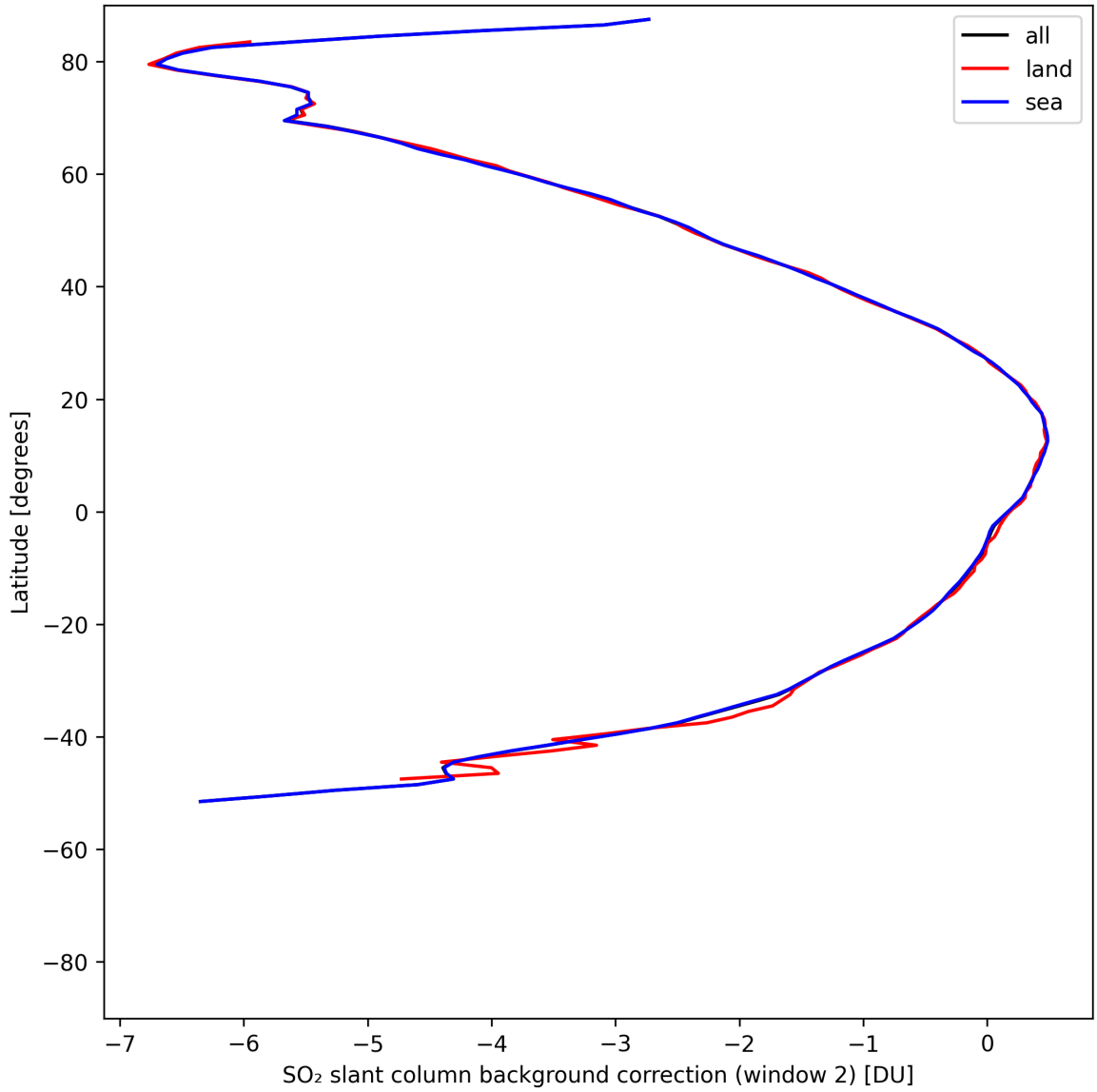


Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-05-10 to 2025-05-11.

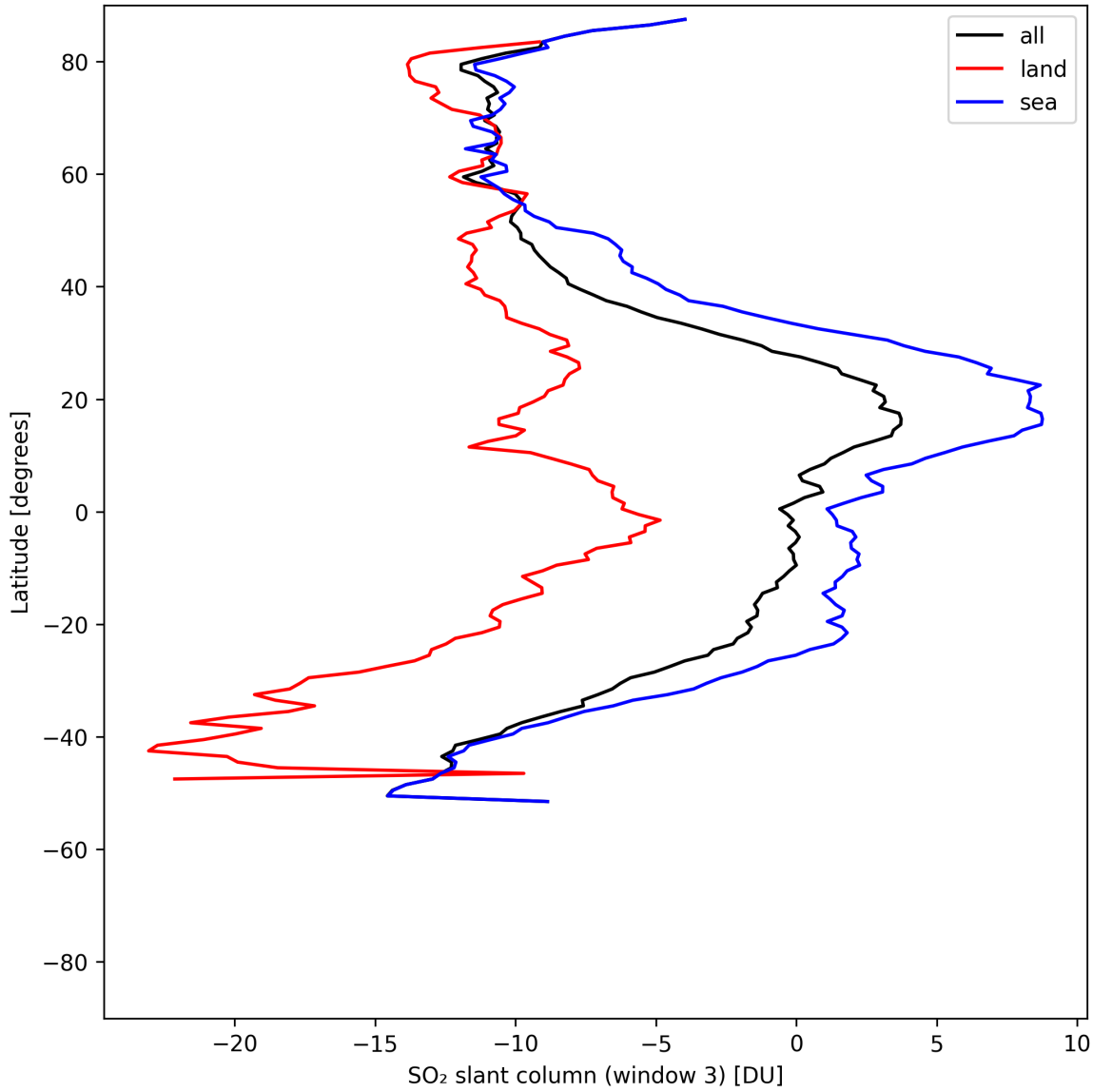


Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-05-10 to 2025-05-11.

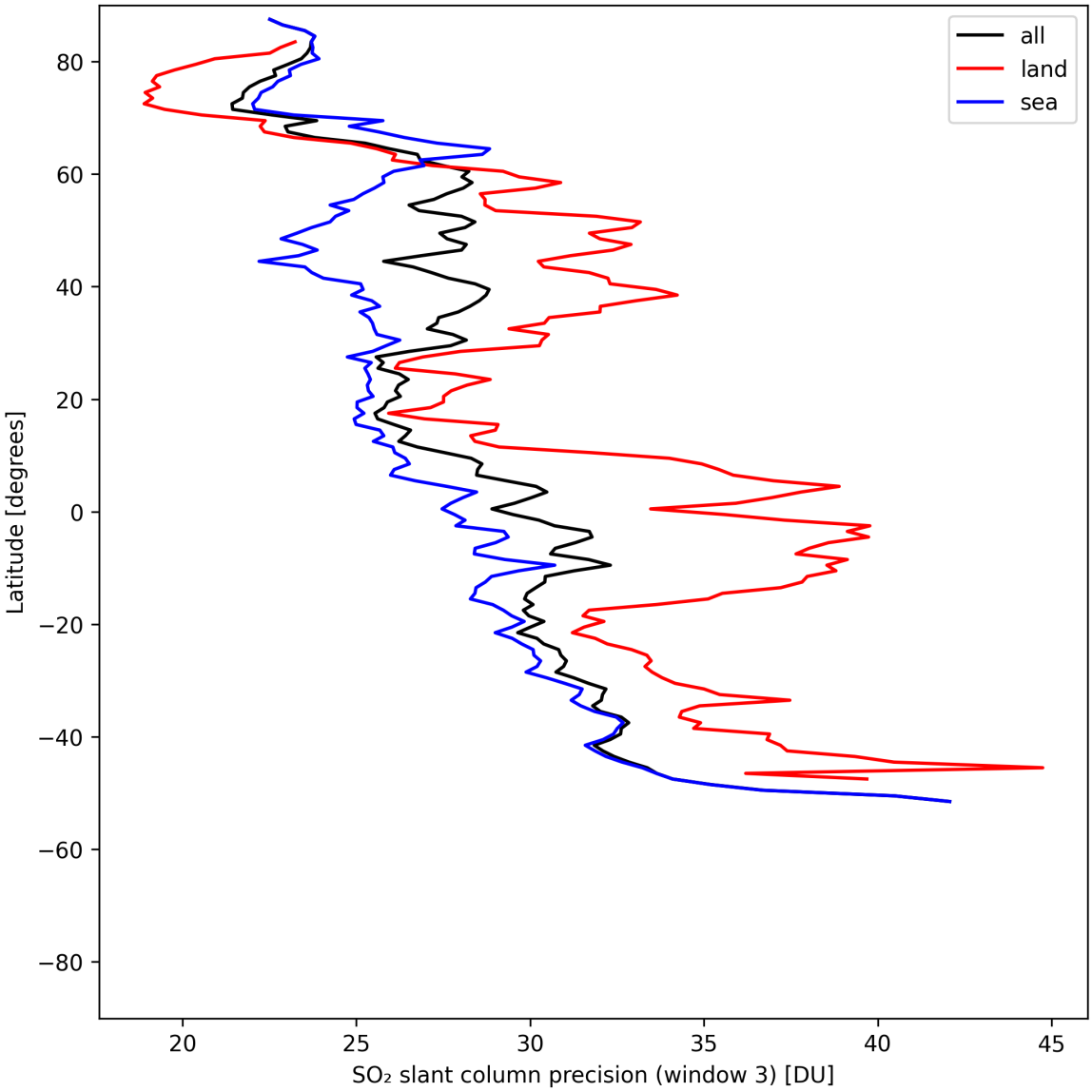


Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-05-10 to 2025-05-11.

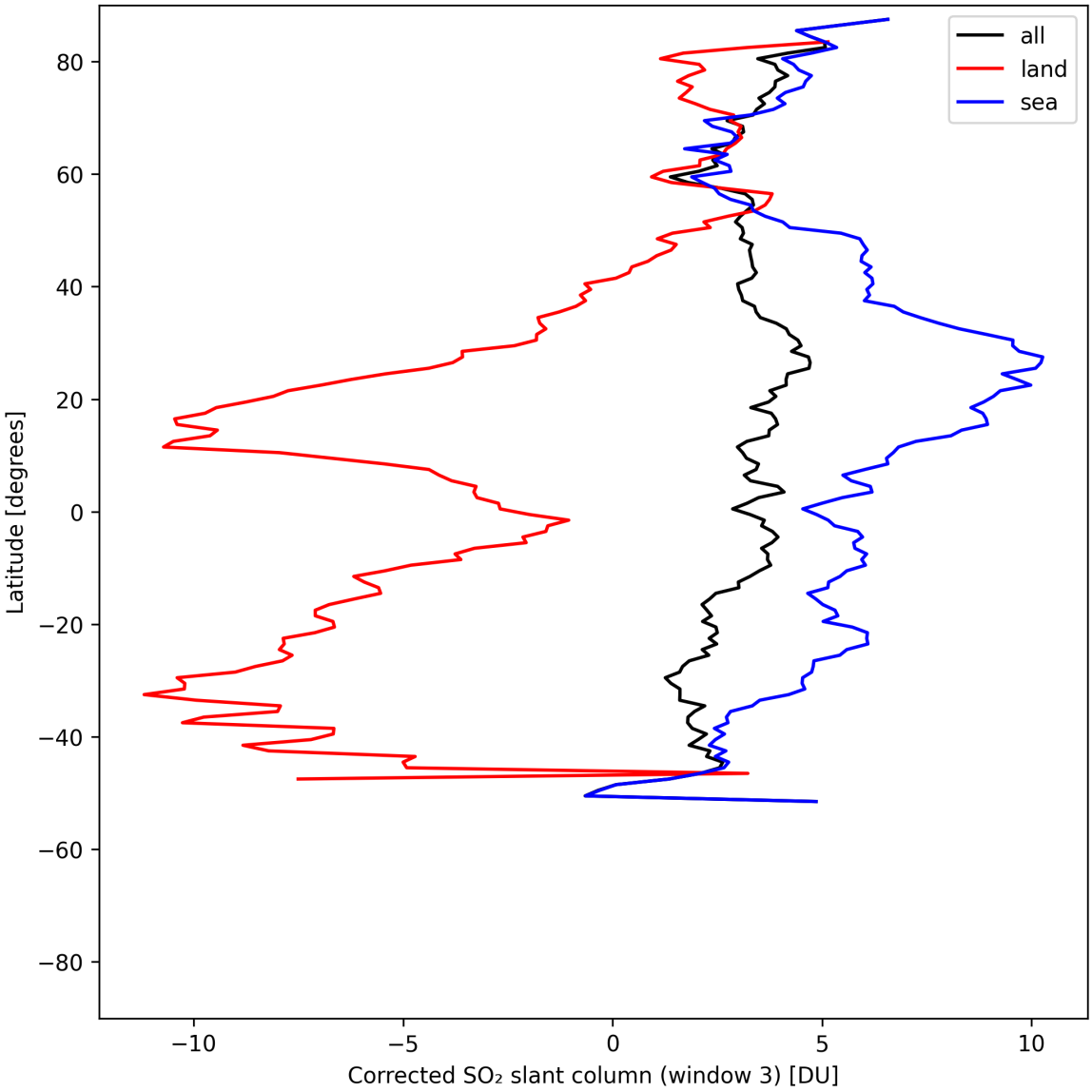


Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-05-10 to 2025-05-11.

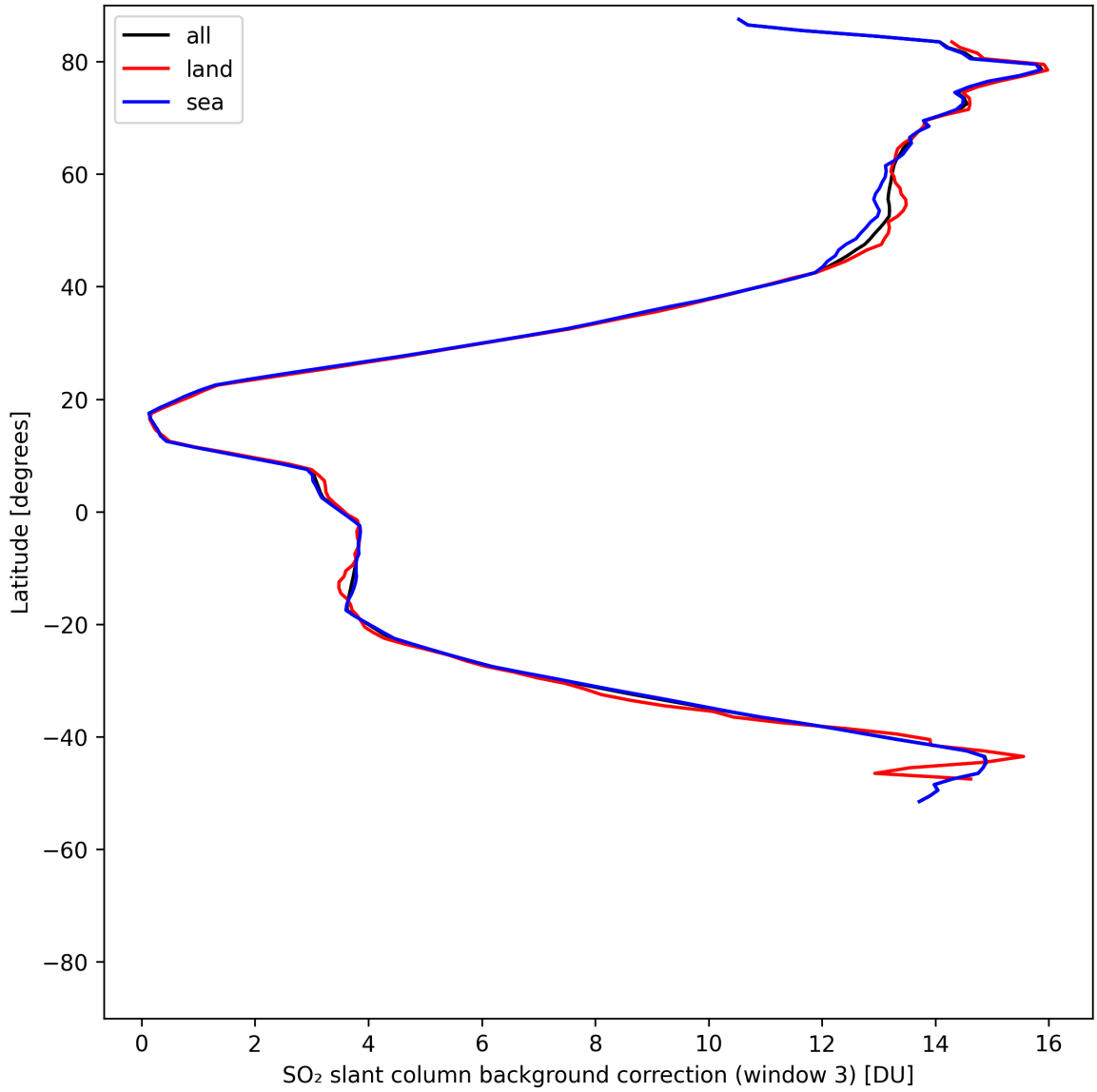


Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-05-10 to 2025-05-11.

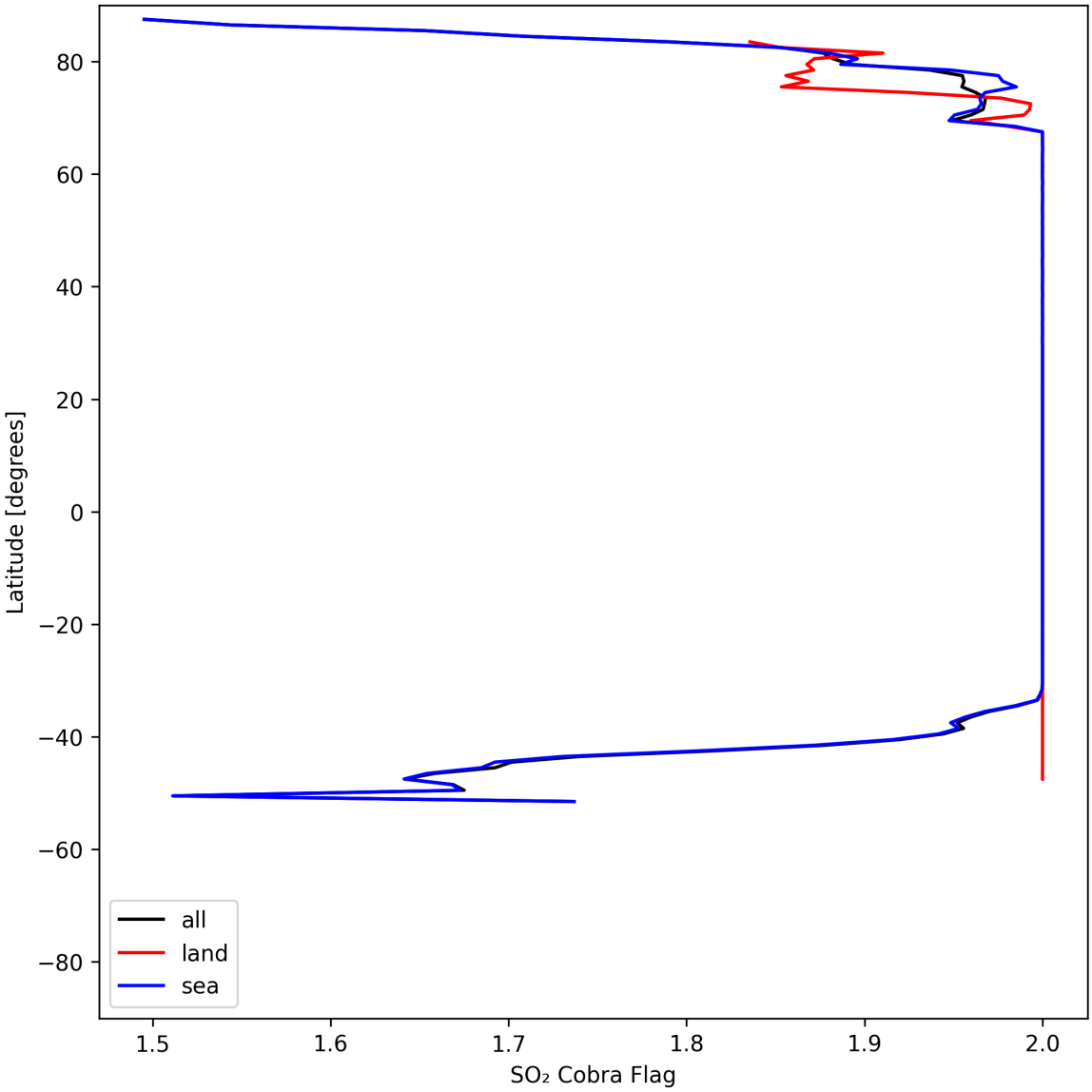


Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-05-10 to 2025-05-11.

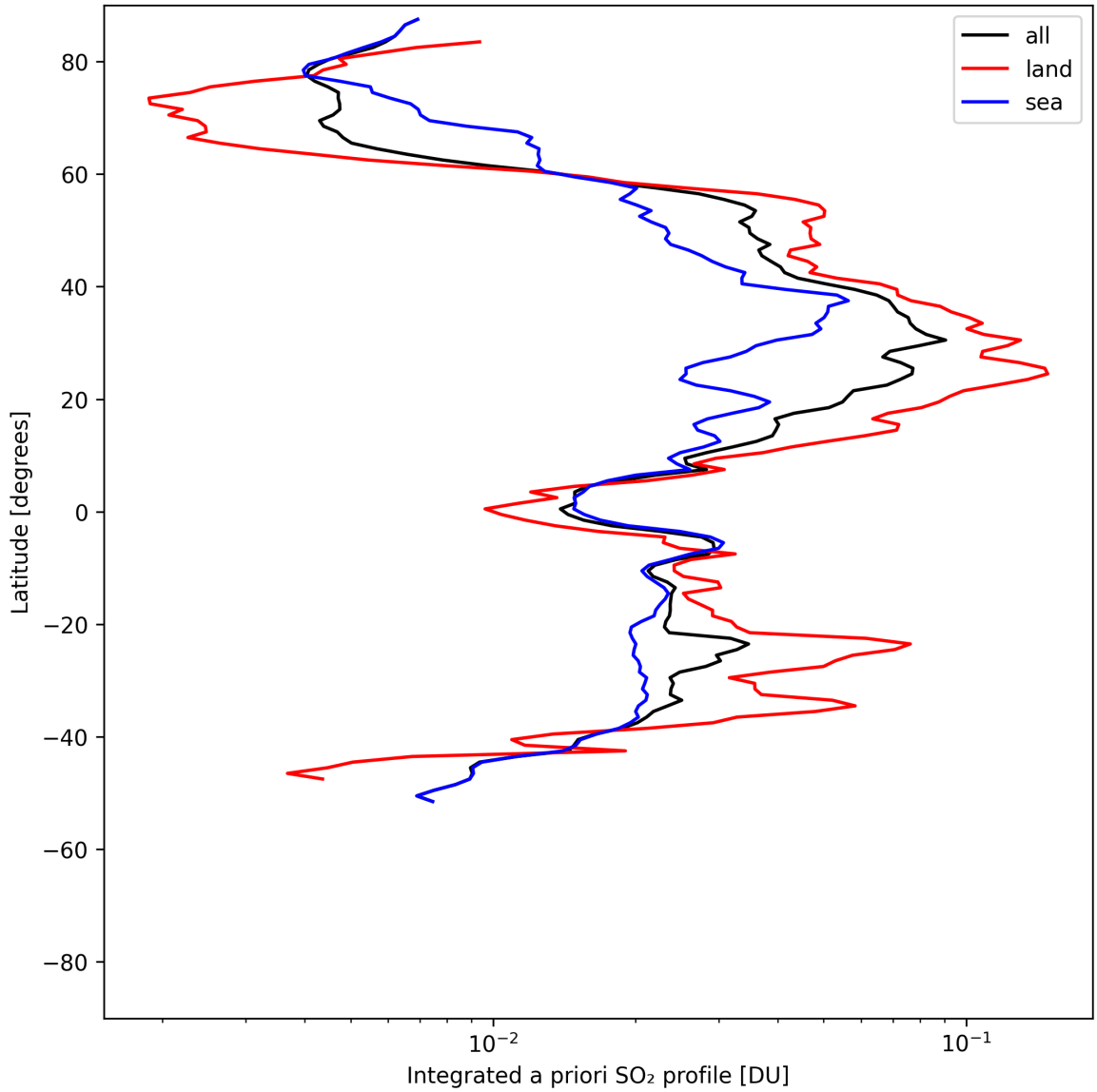


Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-05-10 to 2025-05-11.

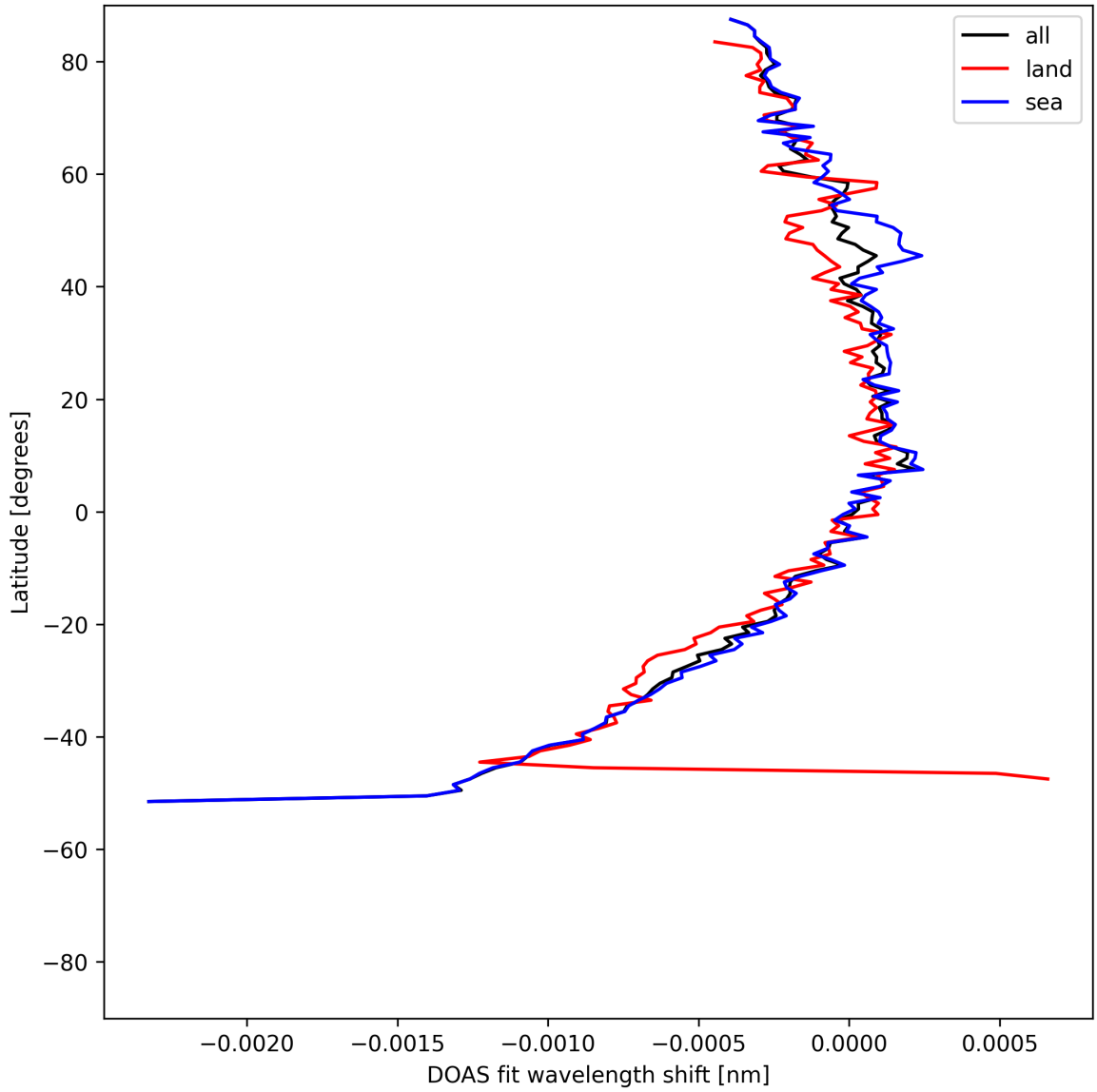


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-05-10 to 2025-05-11.

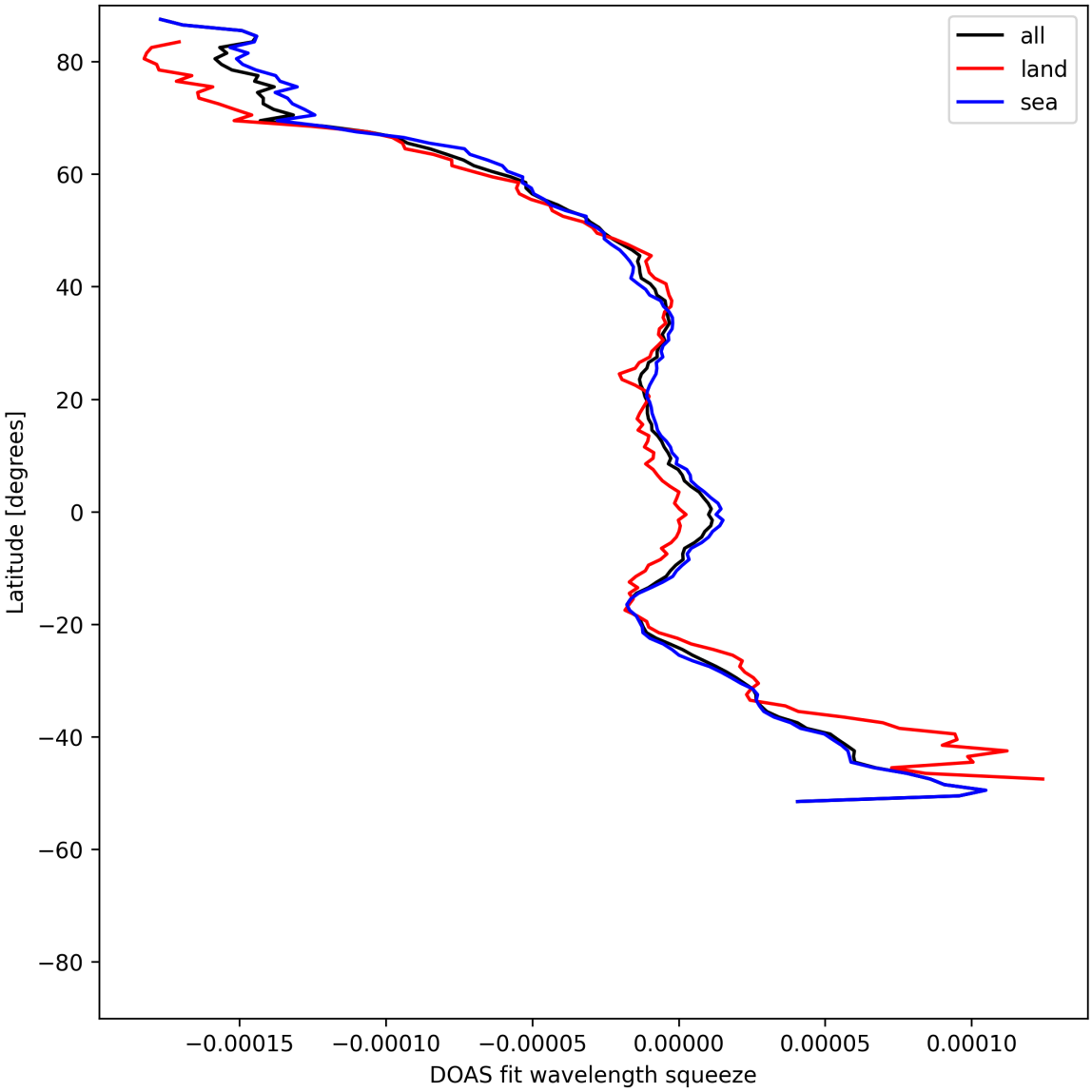


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-05-10 to 2025-05-11.

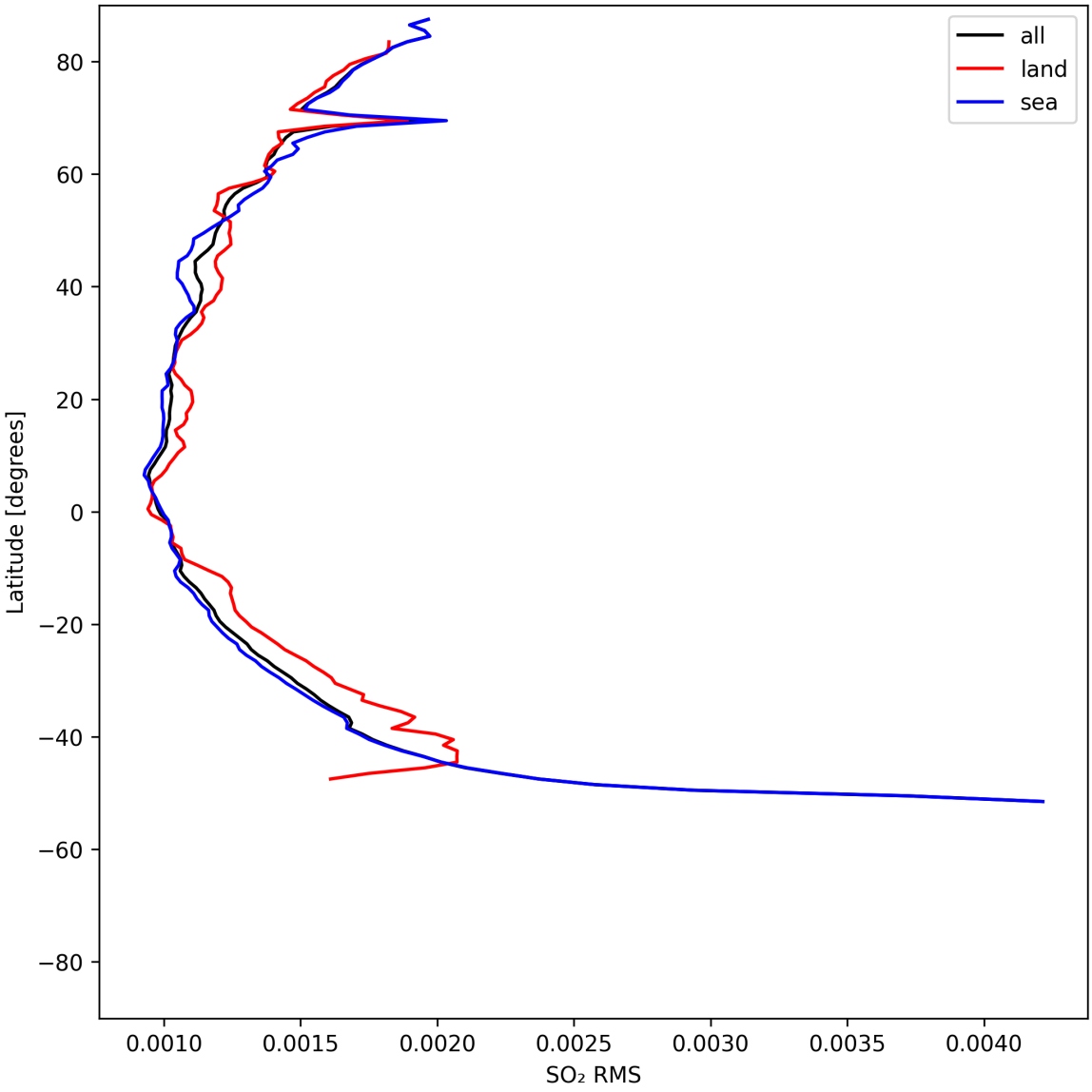


Figure 52: Zonal average of "SO_2 RMS" for 2025-05-10 to 2025-05-11.

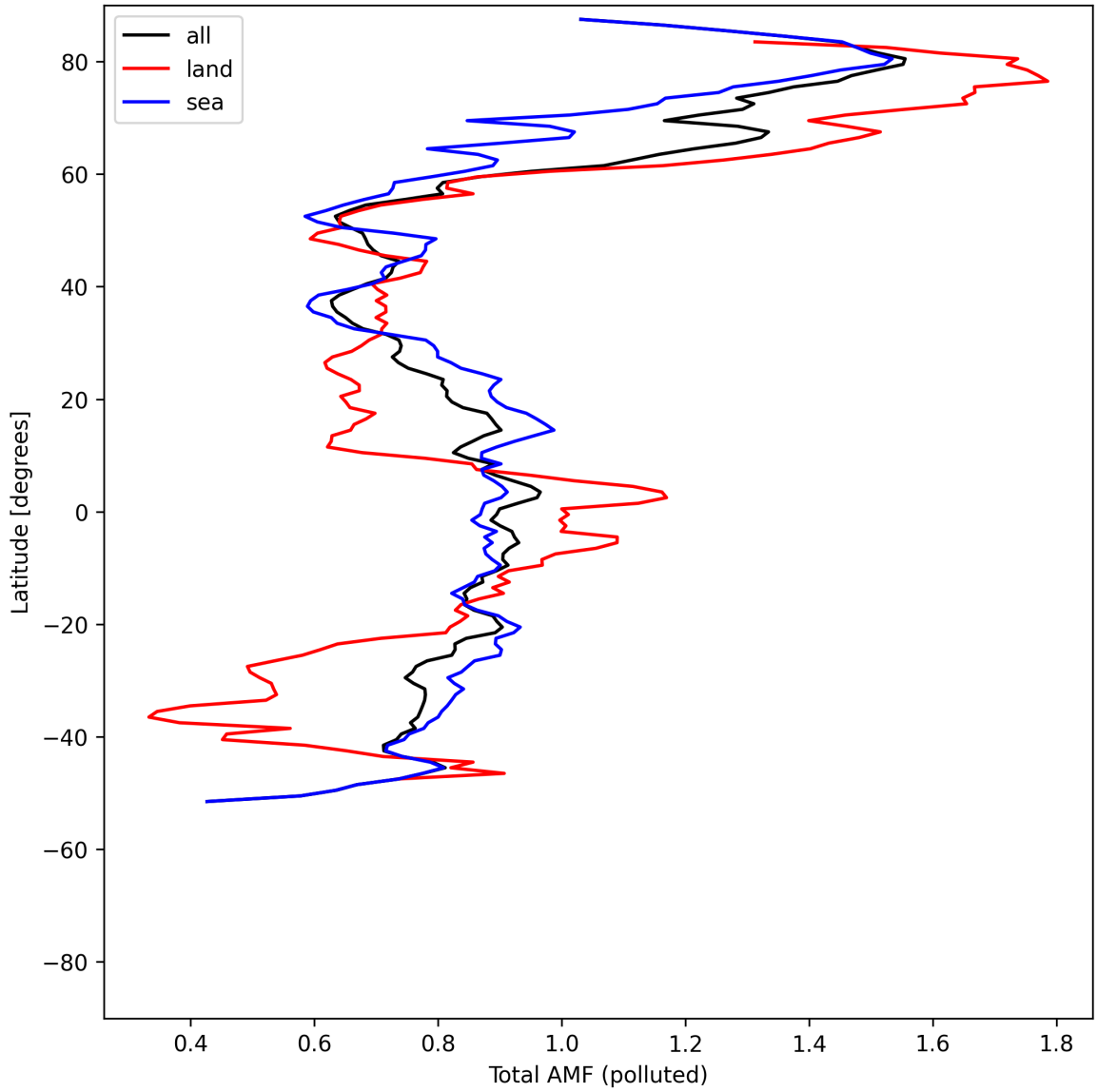


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-05-10 to 2025-05-11.

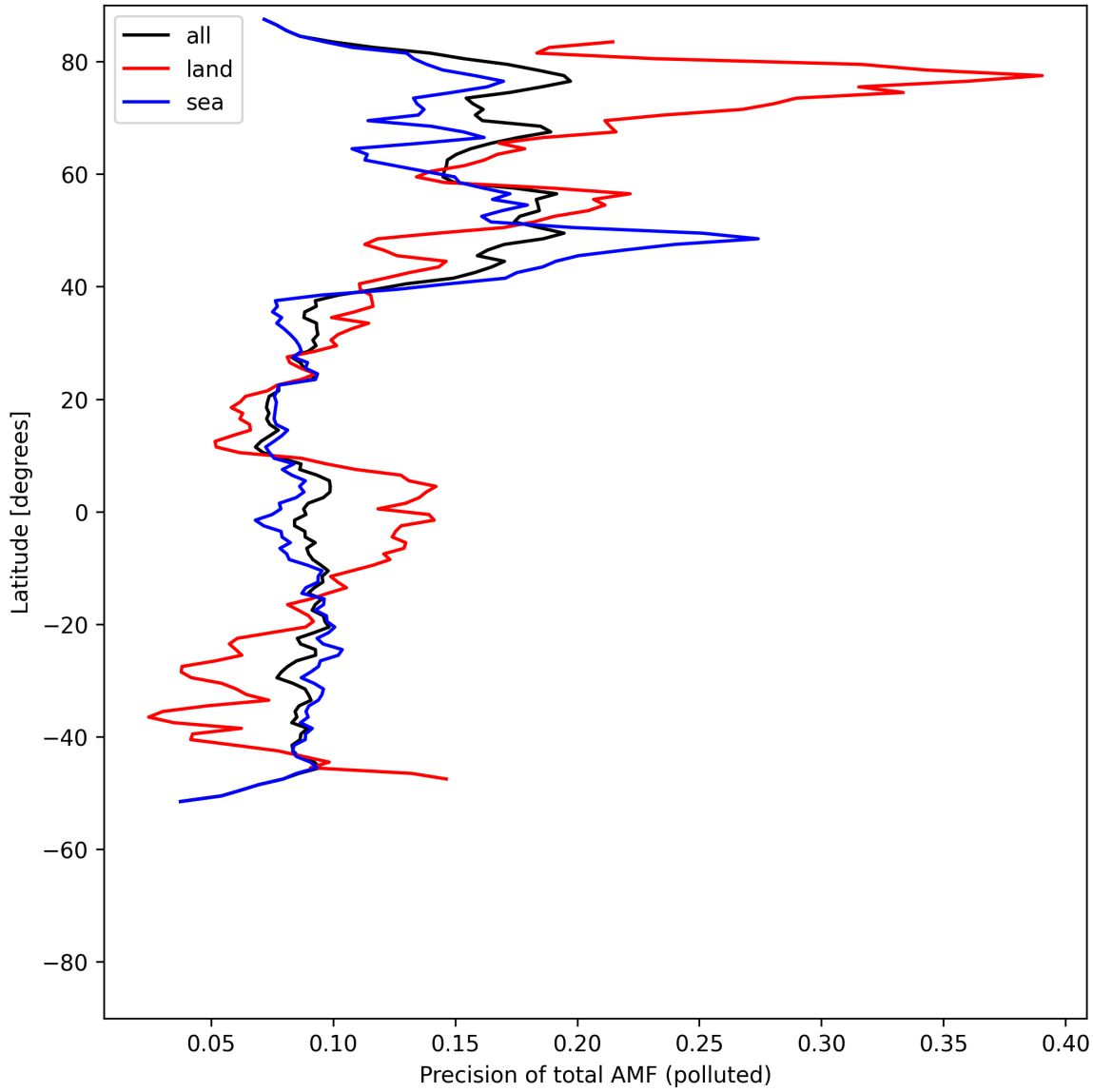


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-05-10 to 2025-05-11.

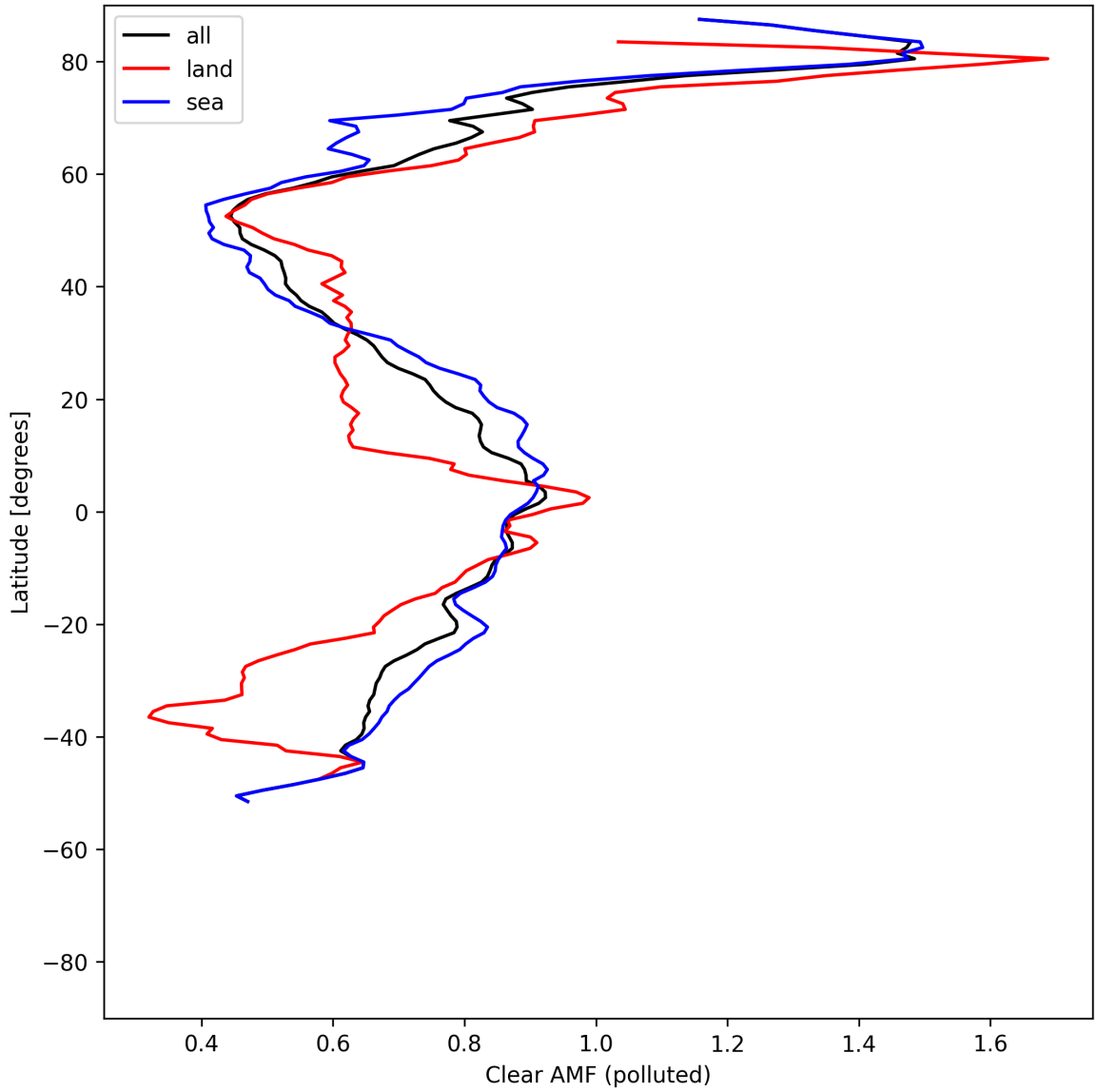


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-05-10 to 2025-05-11.

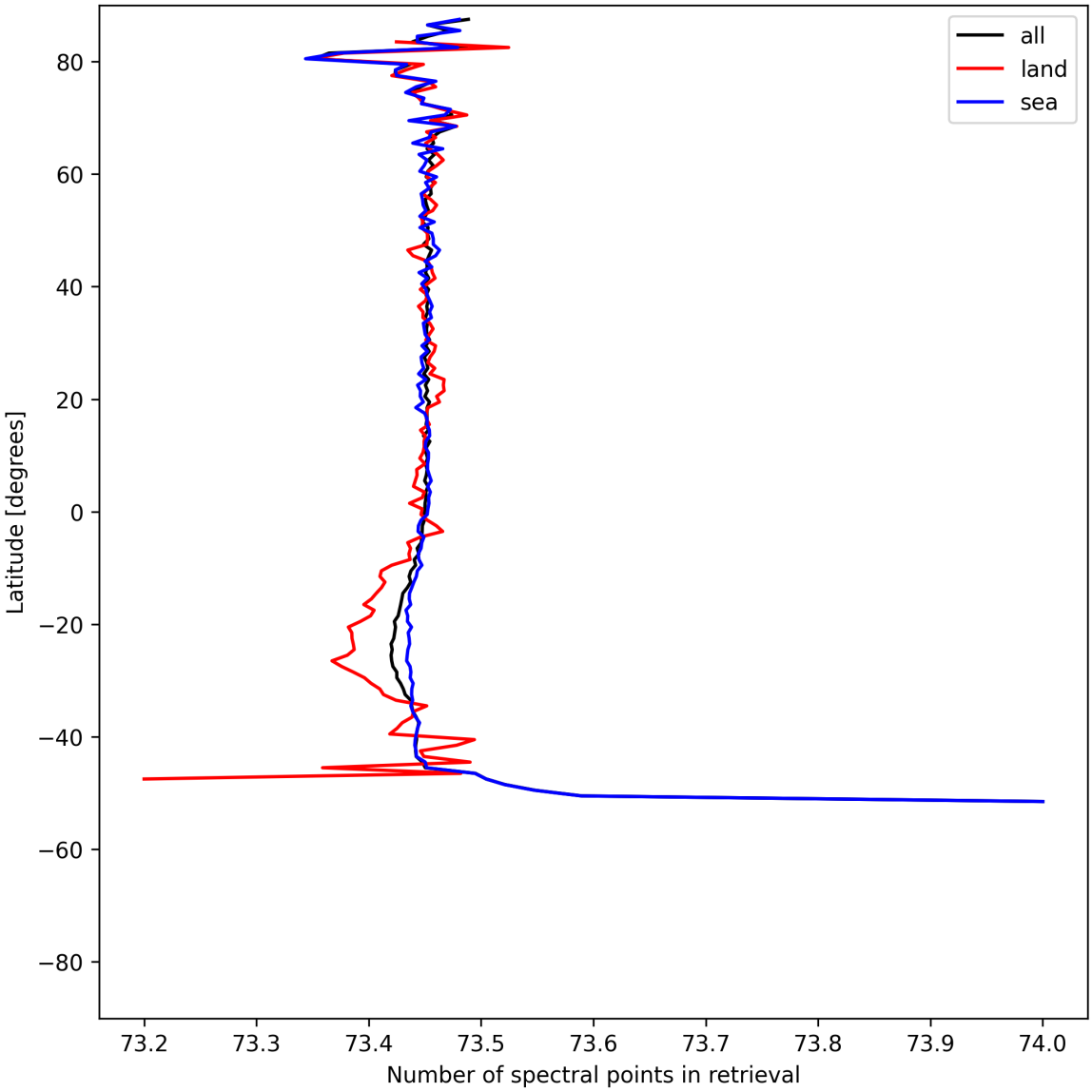


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-05-10 to 2025-05-11.

8 Histograms

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

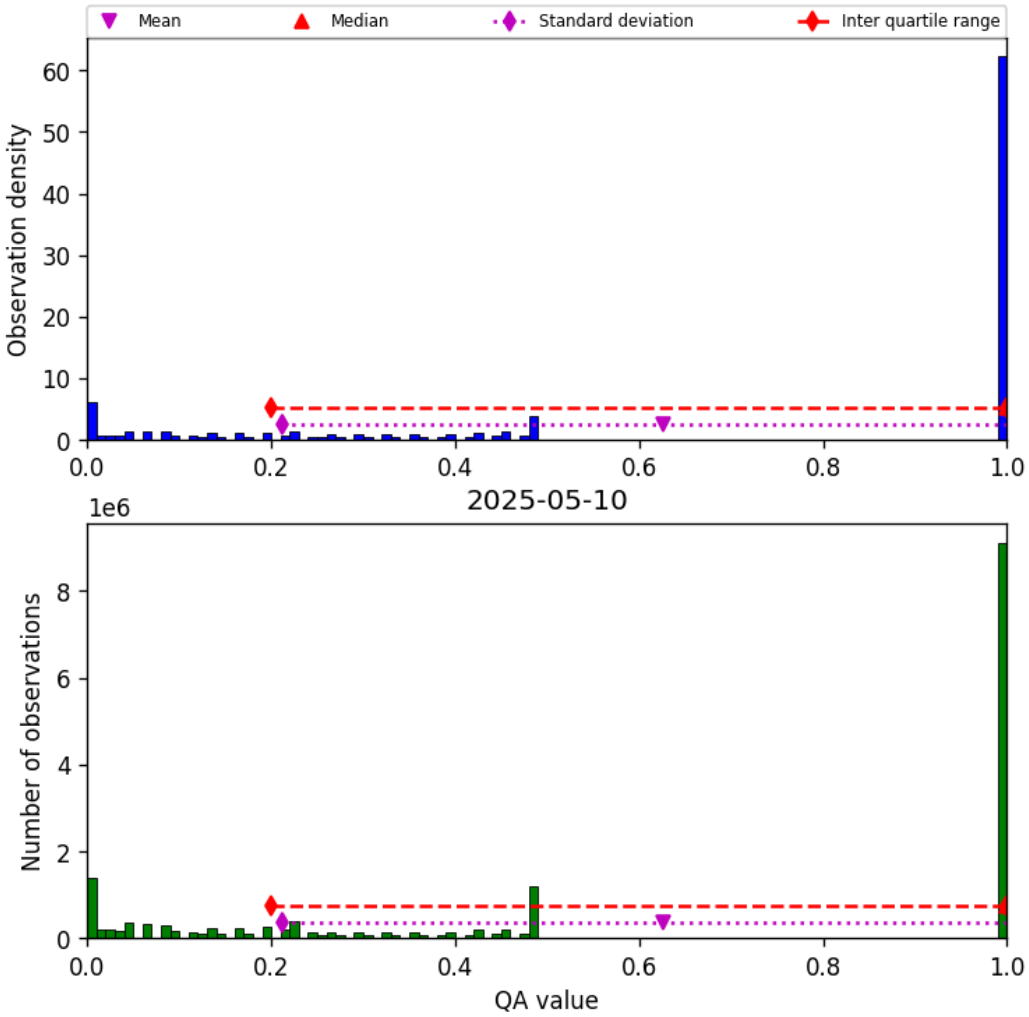


Figure 57: Histogram of “QA value” for 2025-05-10 to 2025-05-11

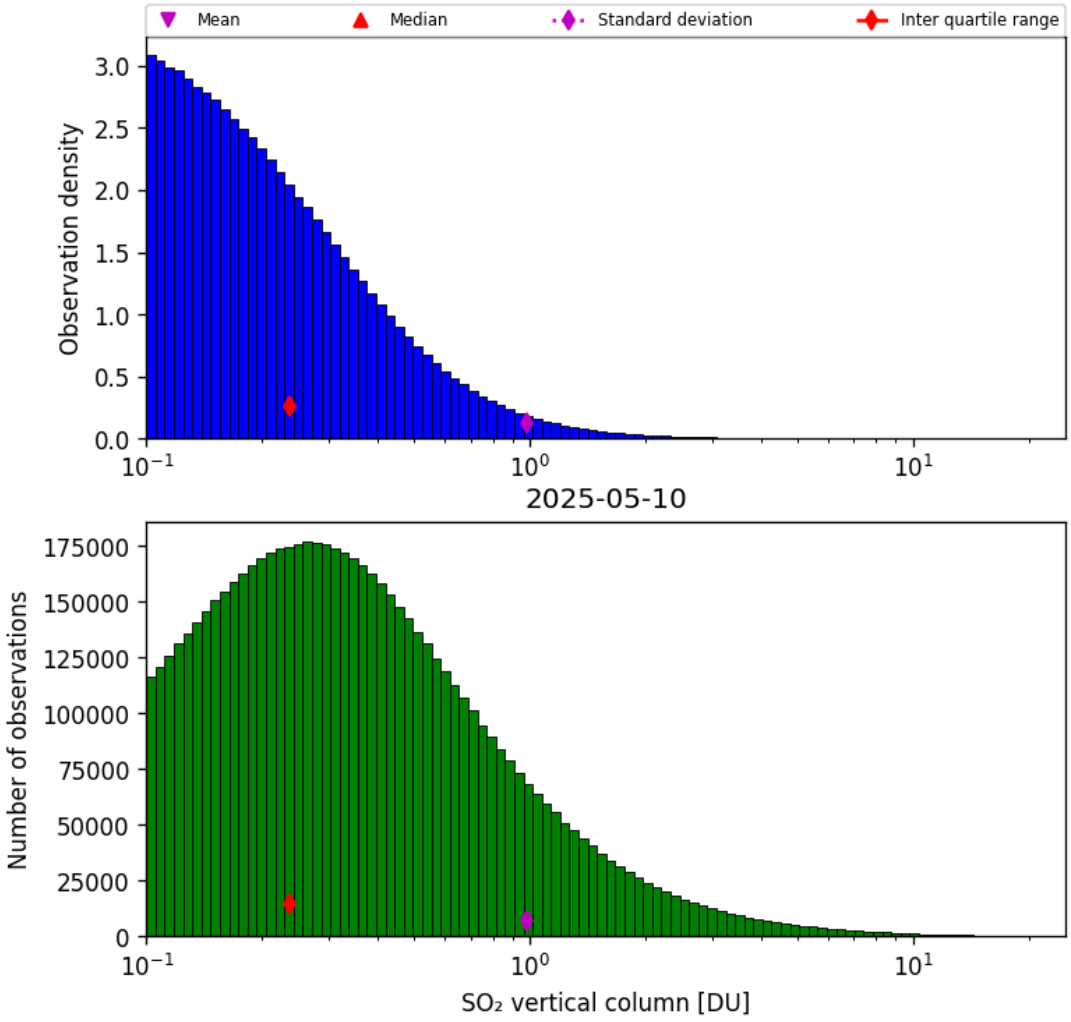


Figure 58: Histogram of "SO_2 vertical column" for 2025-05-10 to 2025-05-11

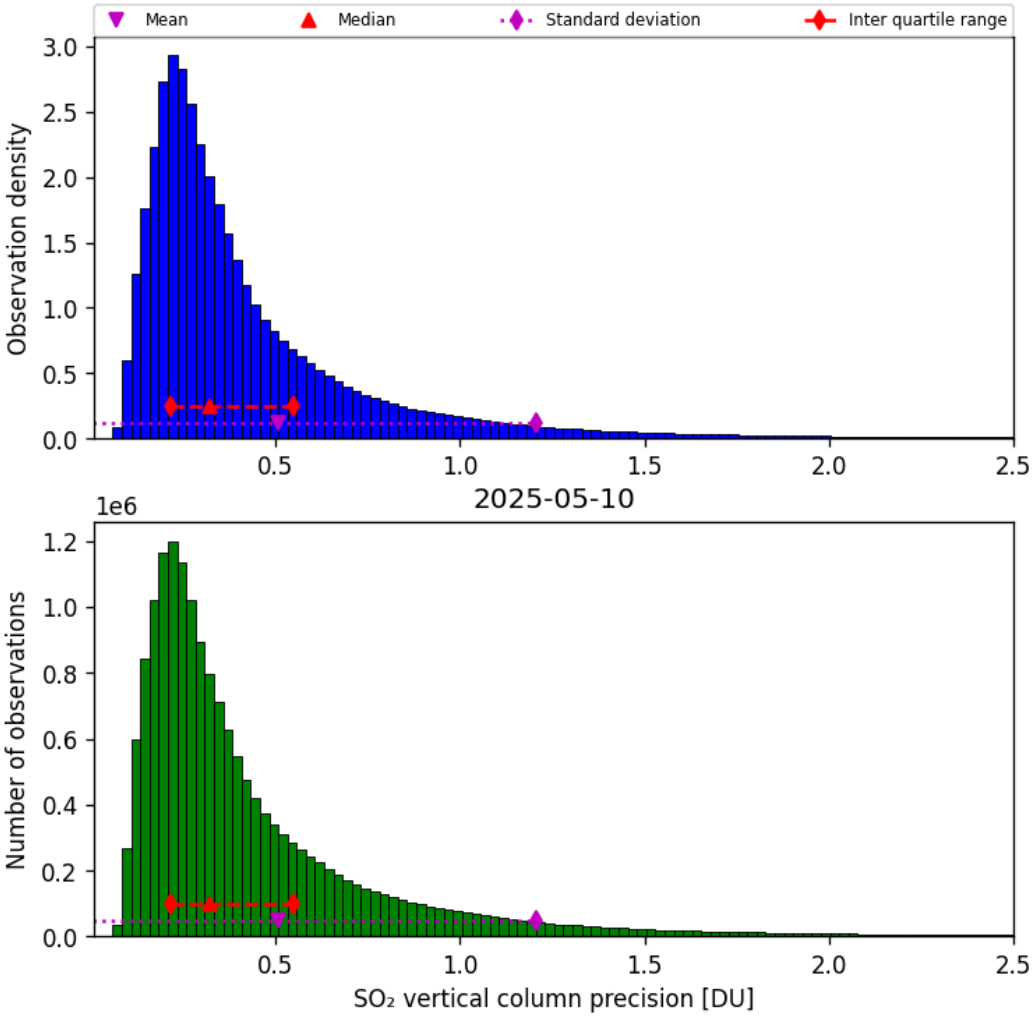


Figure 59: Histogram of "SO_2 vertical column precision" for 2025-05-10 to 2025-05-11

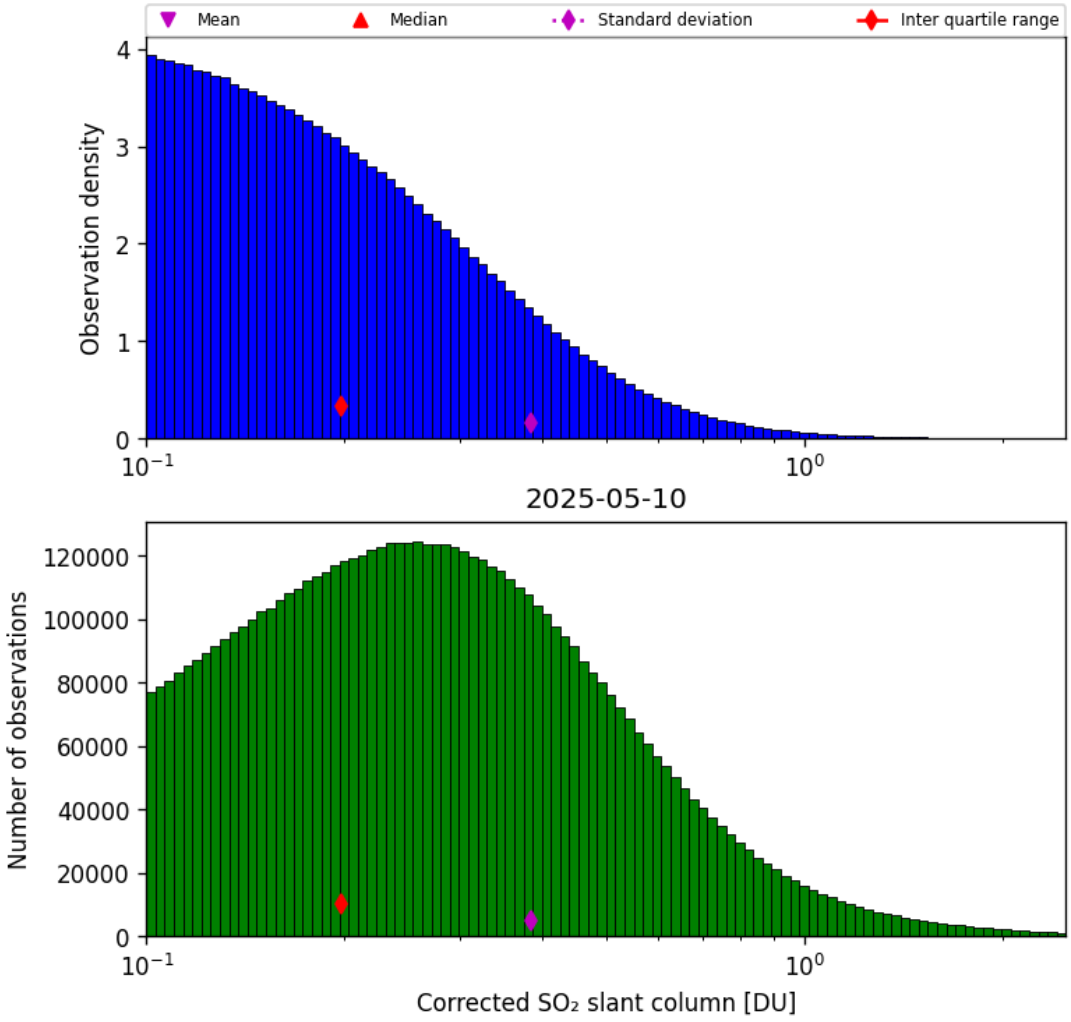


Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-05-10 to 2025-05-11

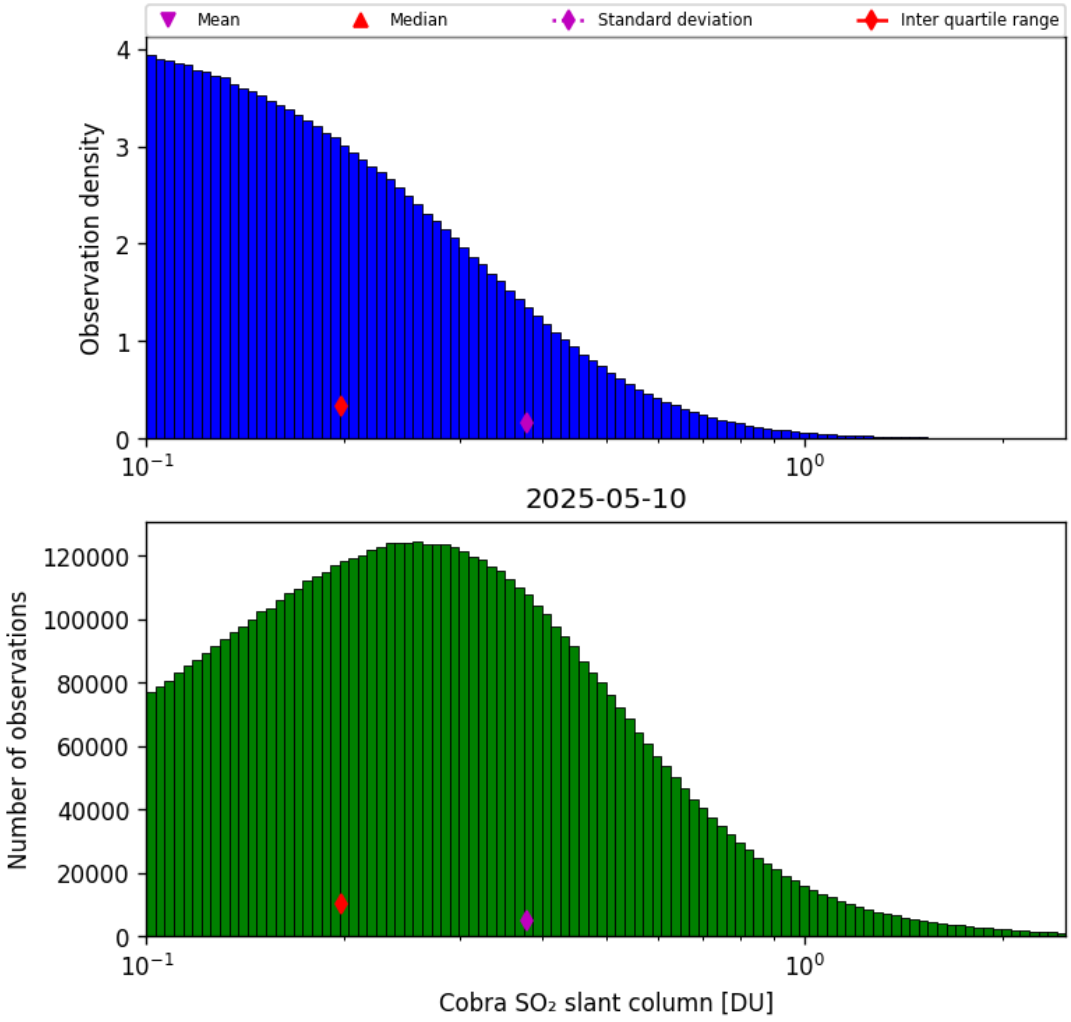


Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-05-10 to 2025-05-11

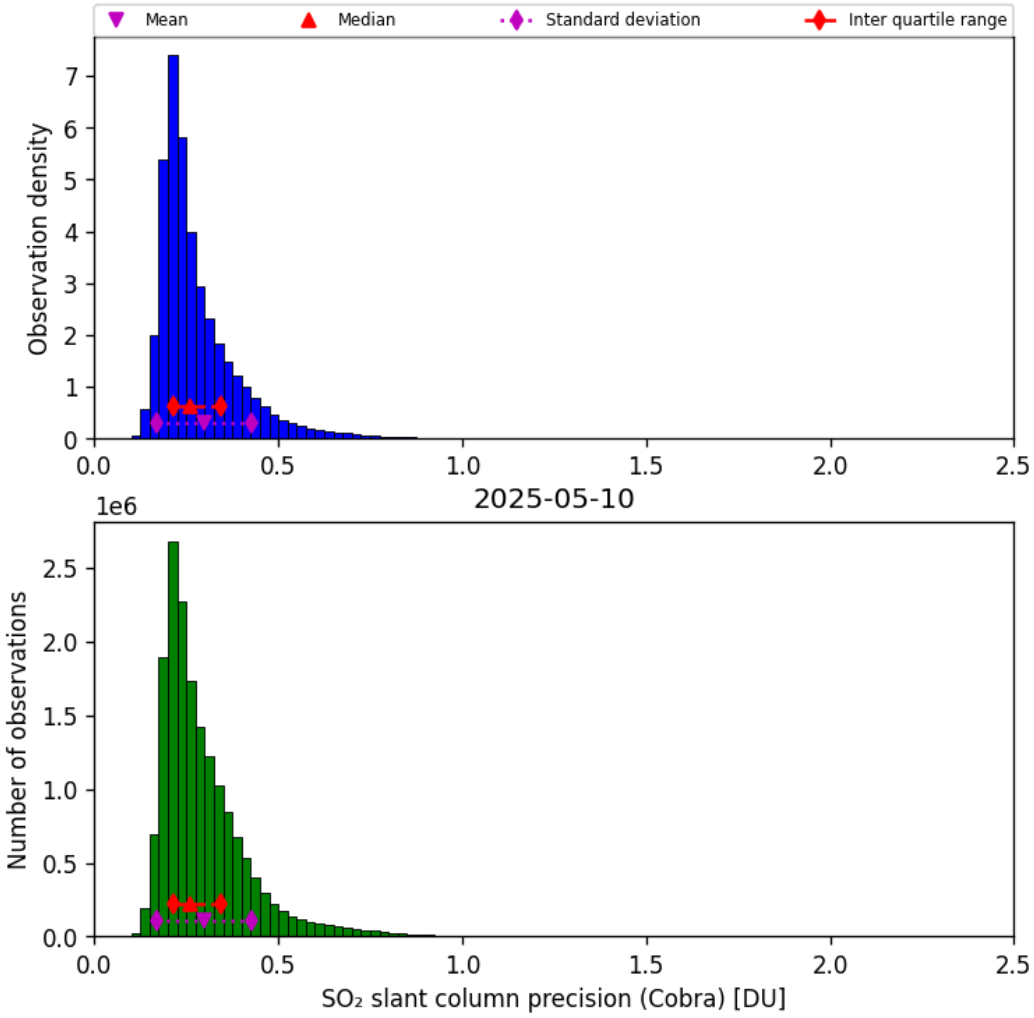


Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-05-10 to 2025-05-11

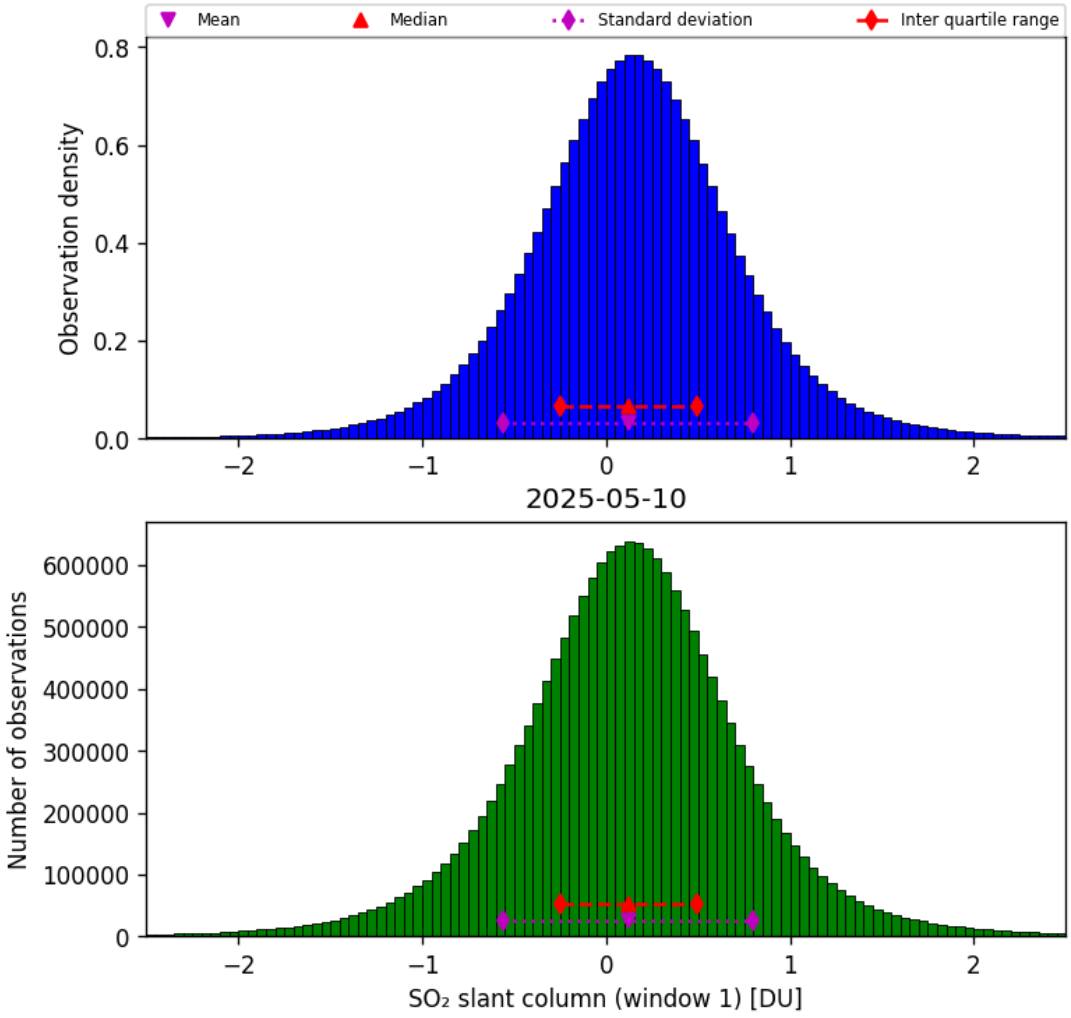


Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-05-10 to 2025-05-11

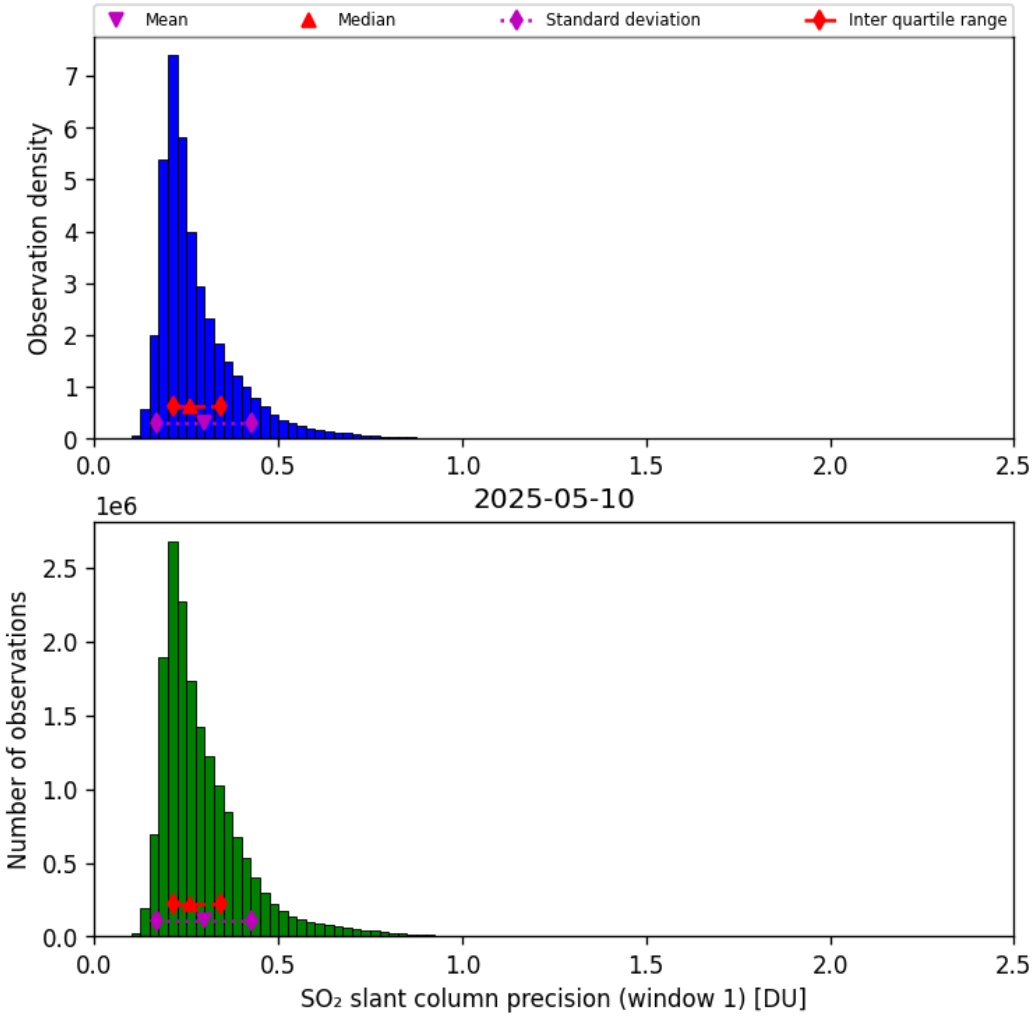


Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-05-10 to 2025-05-11

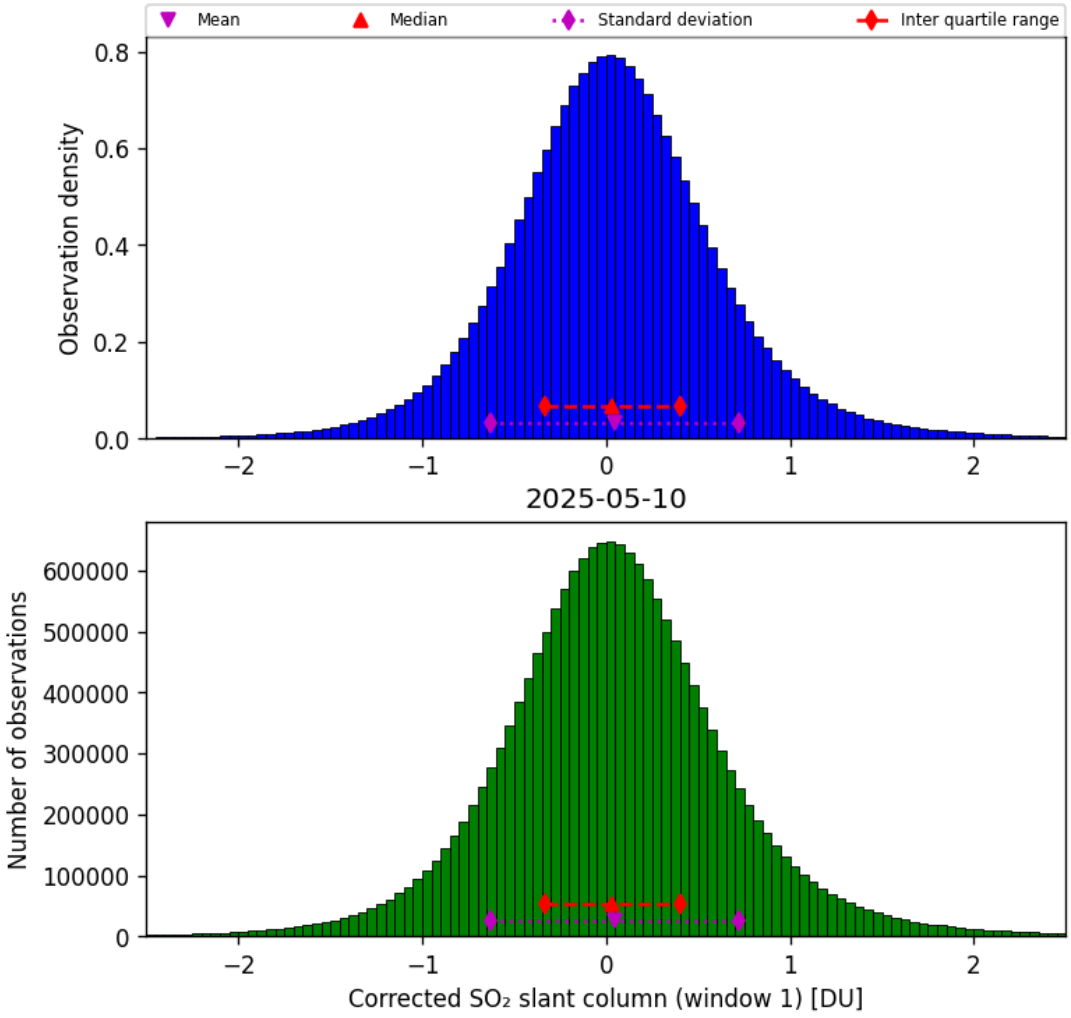


Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-05-10 to 2025-05-11

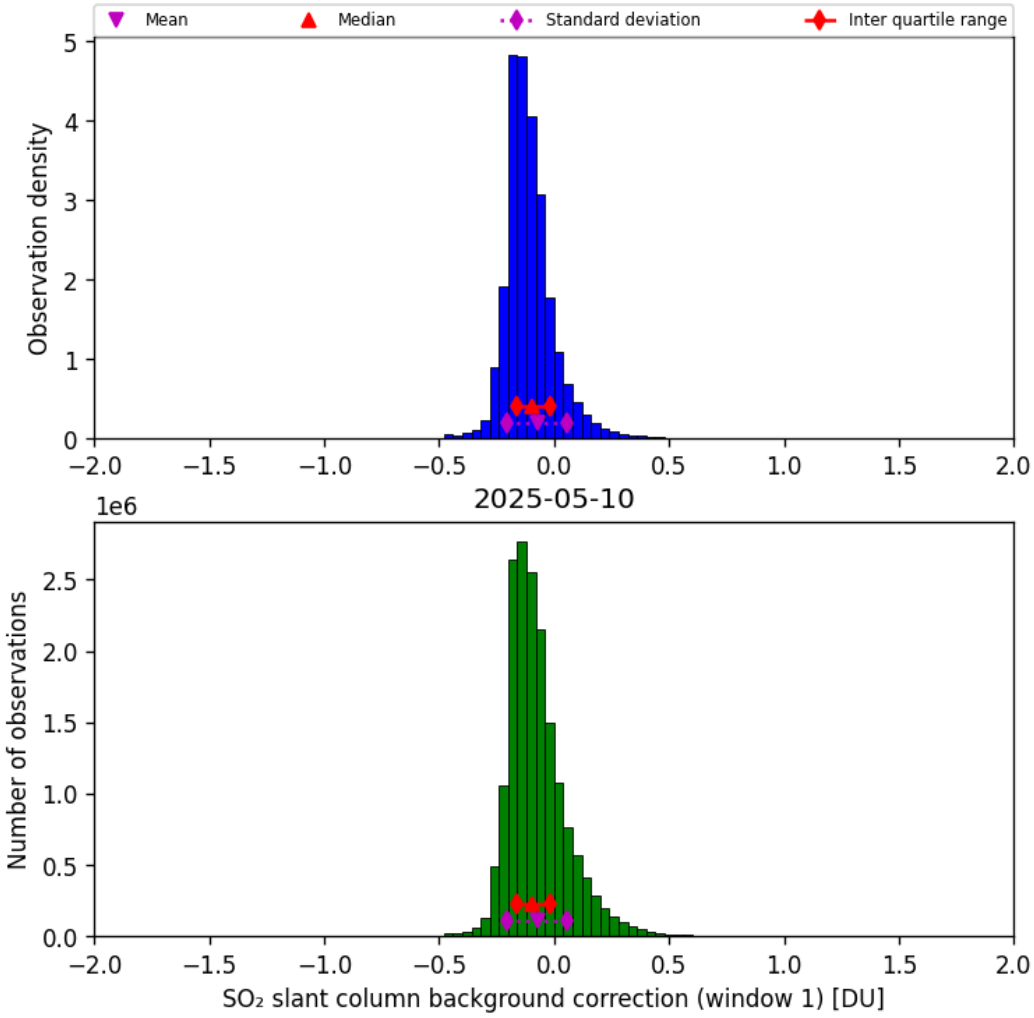


Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-05-10 to 2025-05-11

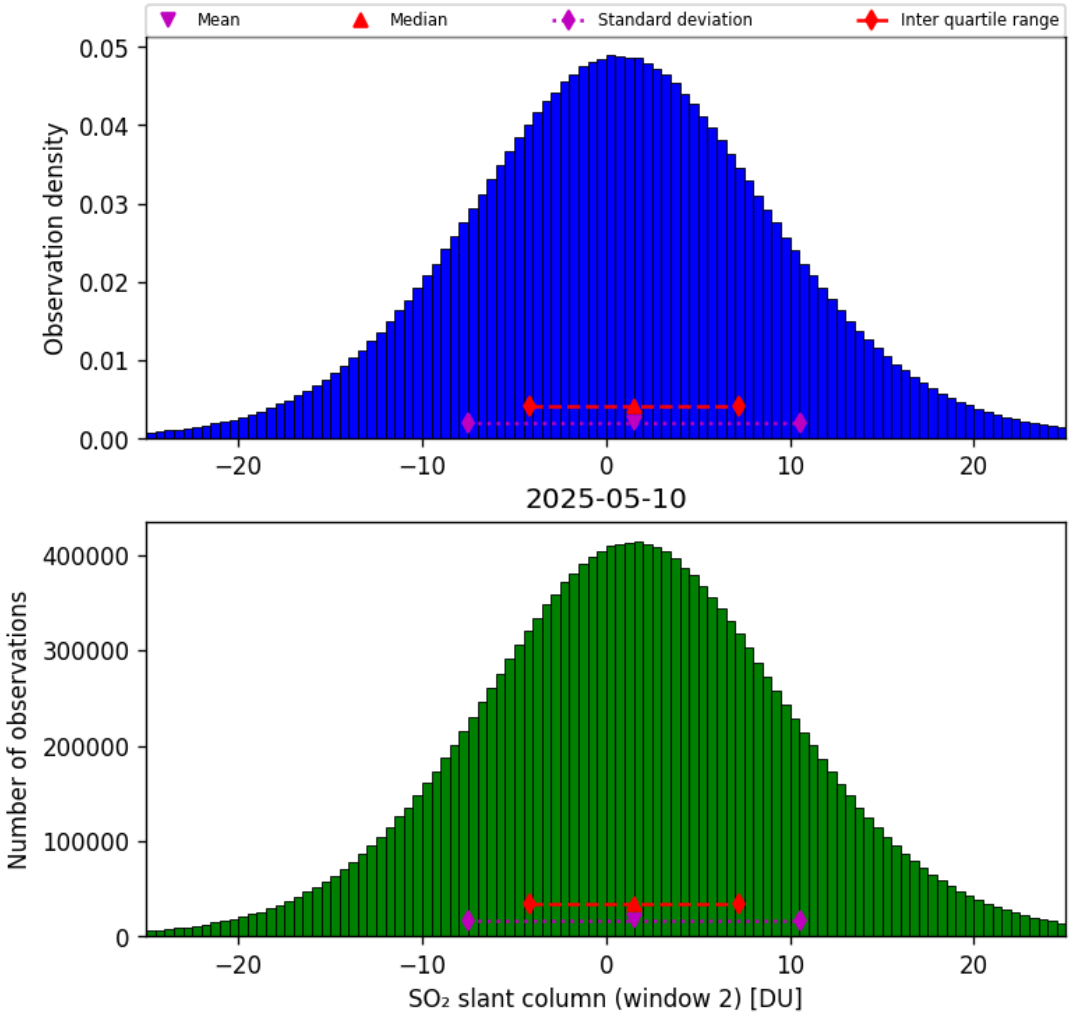


Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-05-10 to 2025-05-11

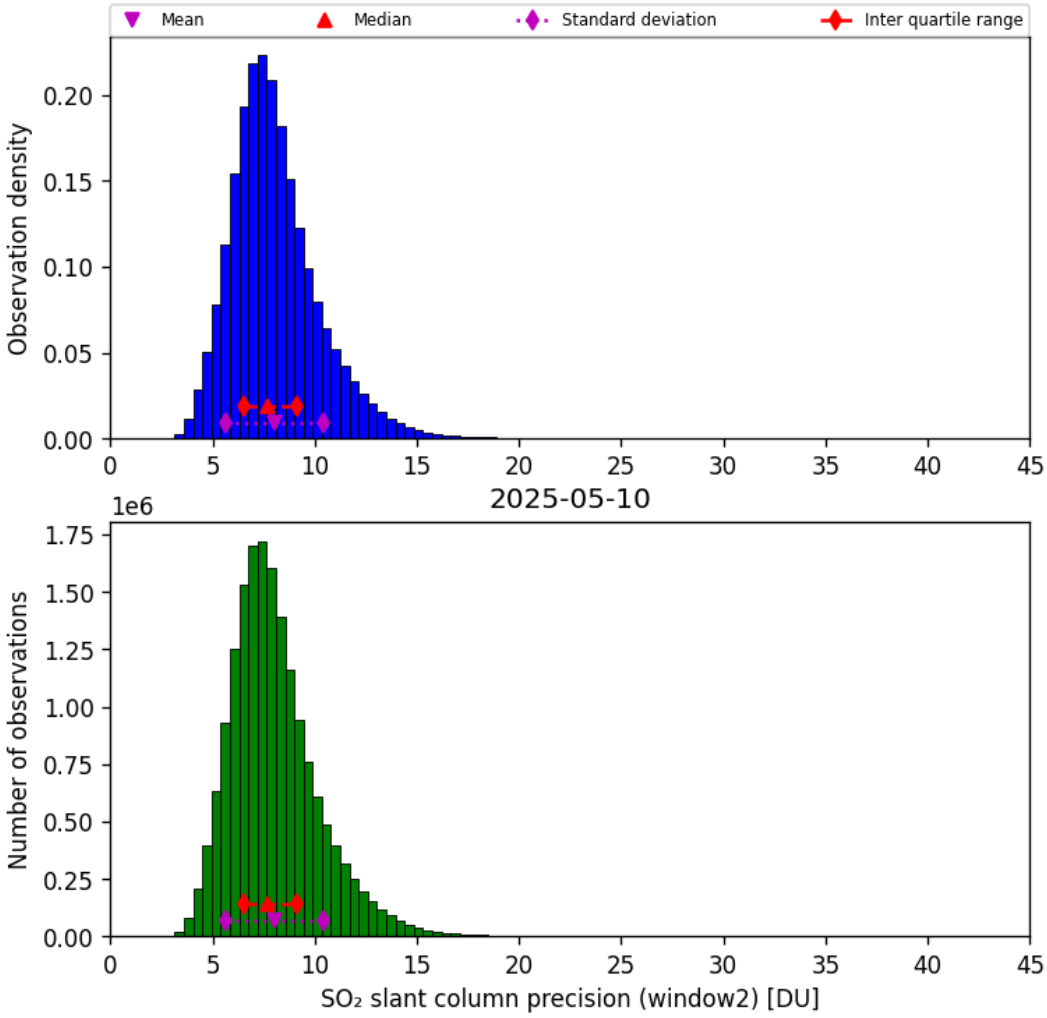


Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-05-10 to 2025-05-11

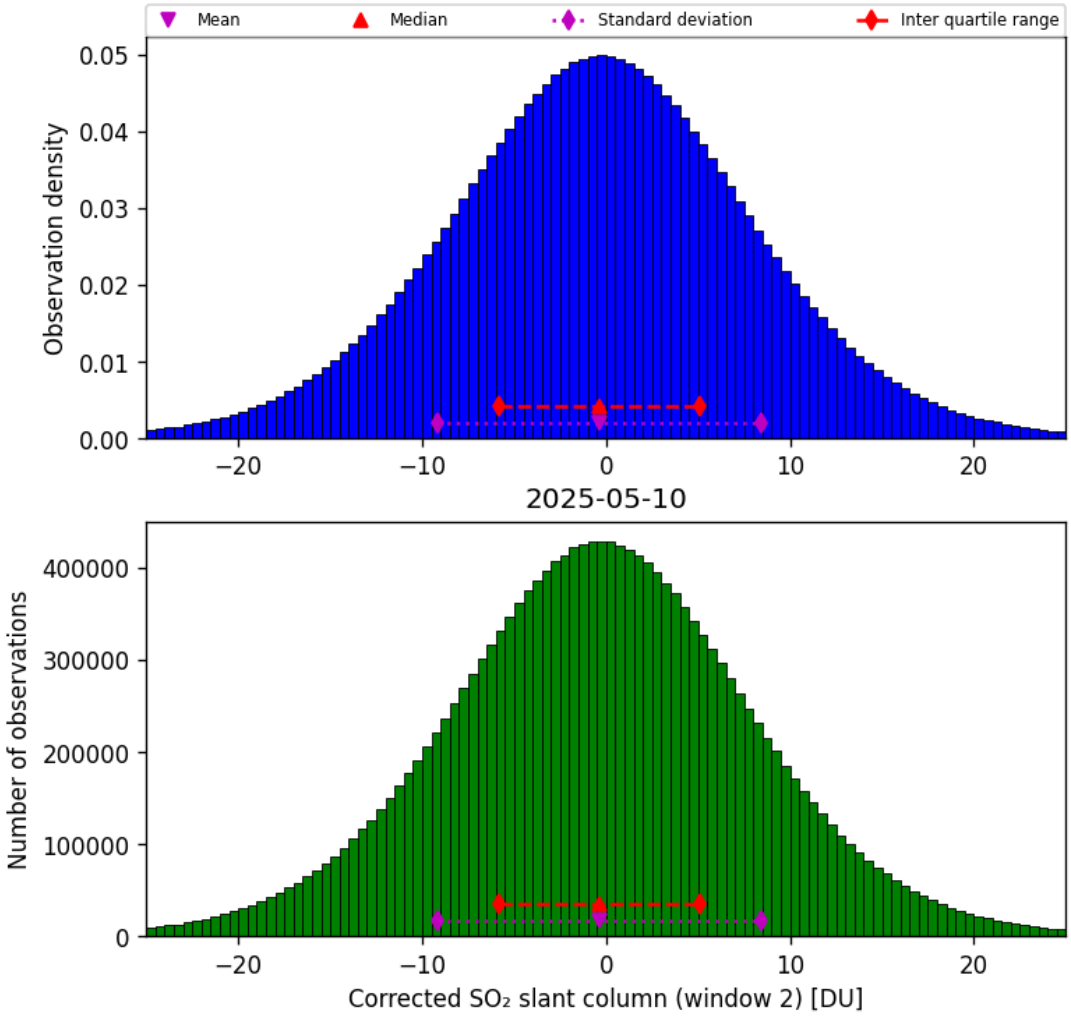


Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-05-10 to 2025-05-11

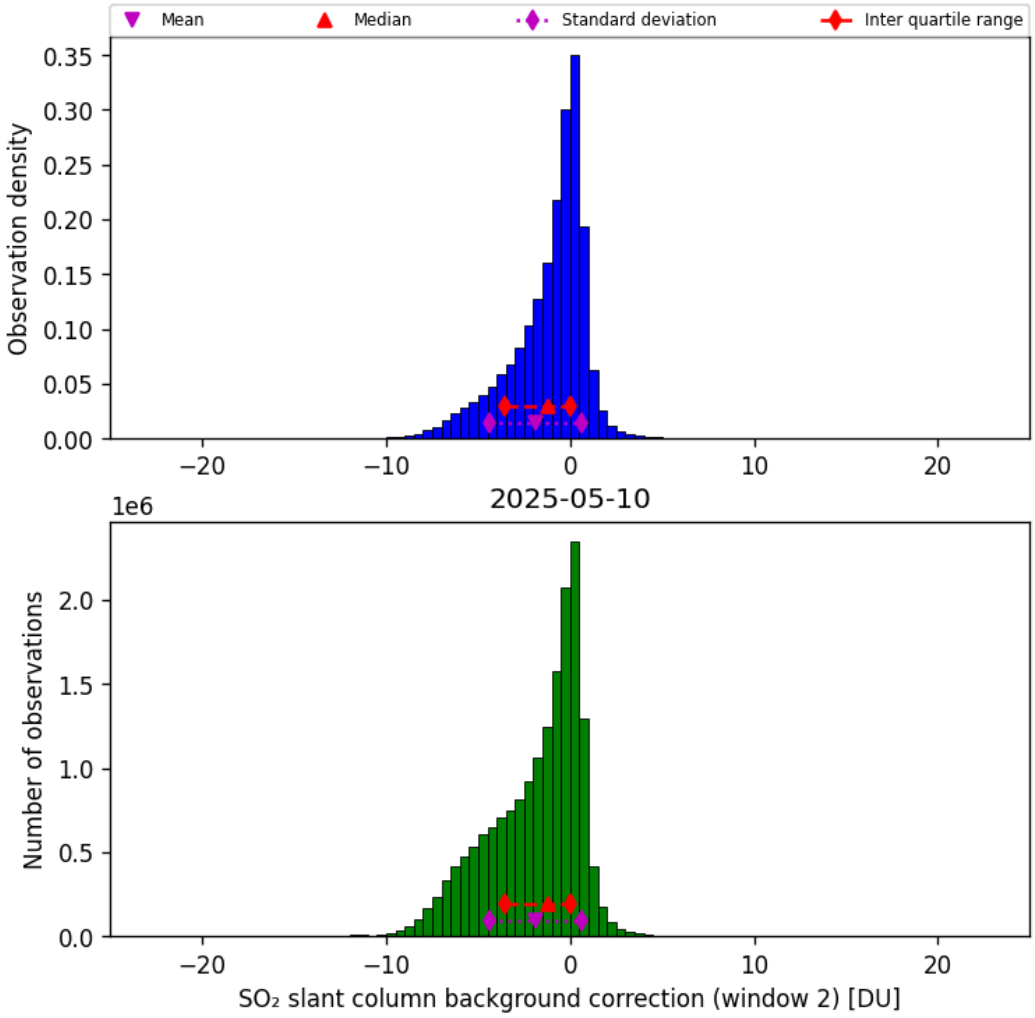


Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-05-10 to 2025-05-11

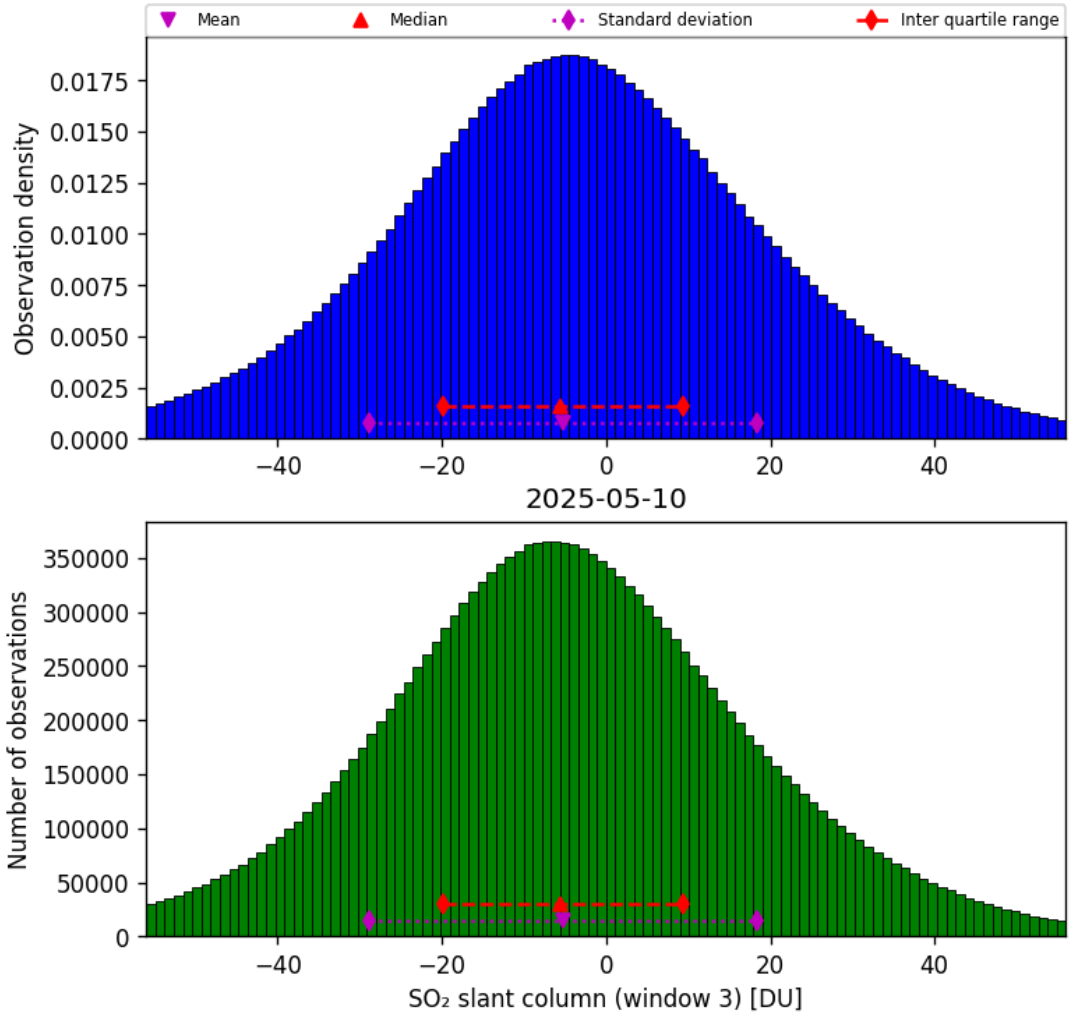


Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-05-10 to 2025-05-11

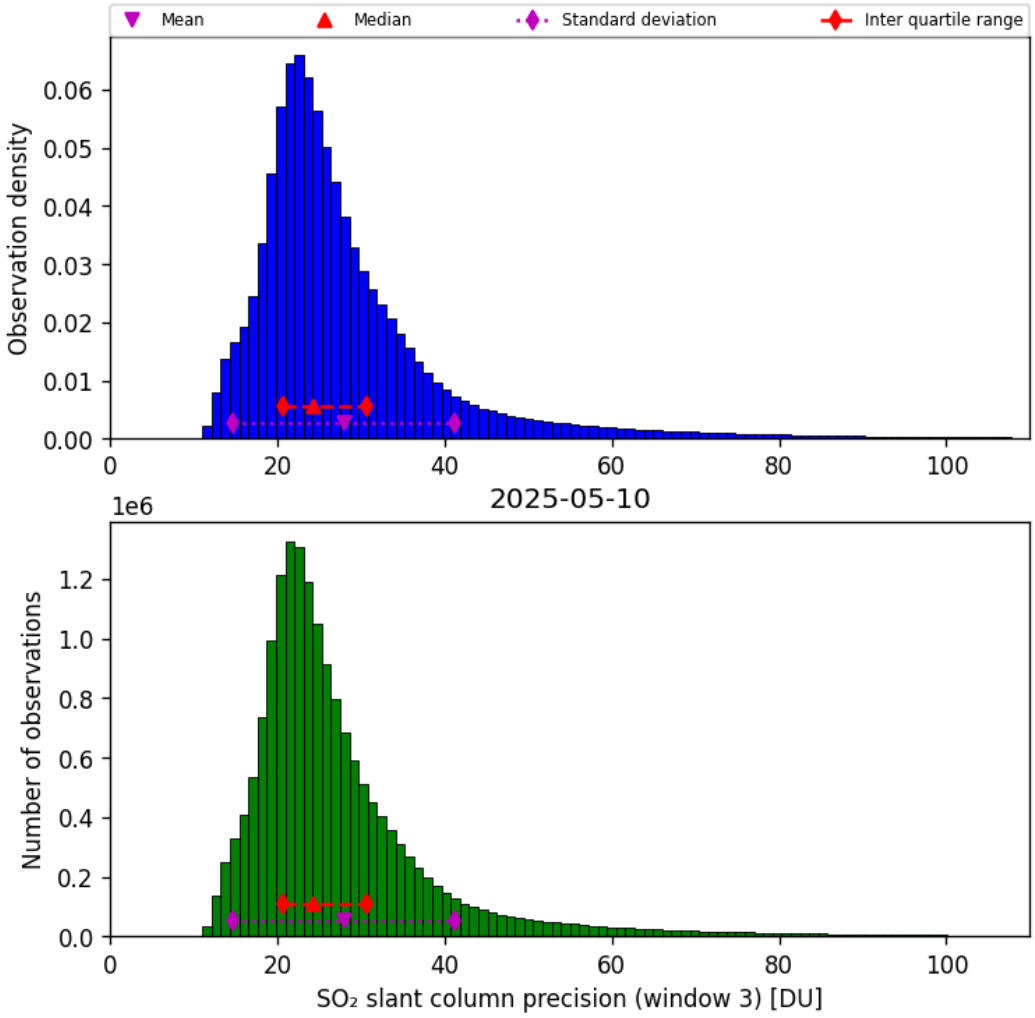


Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-05-10 to 2025-05-11

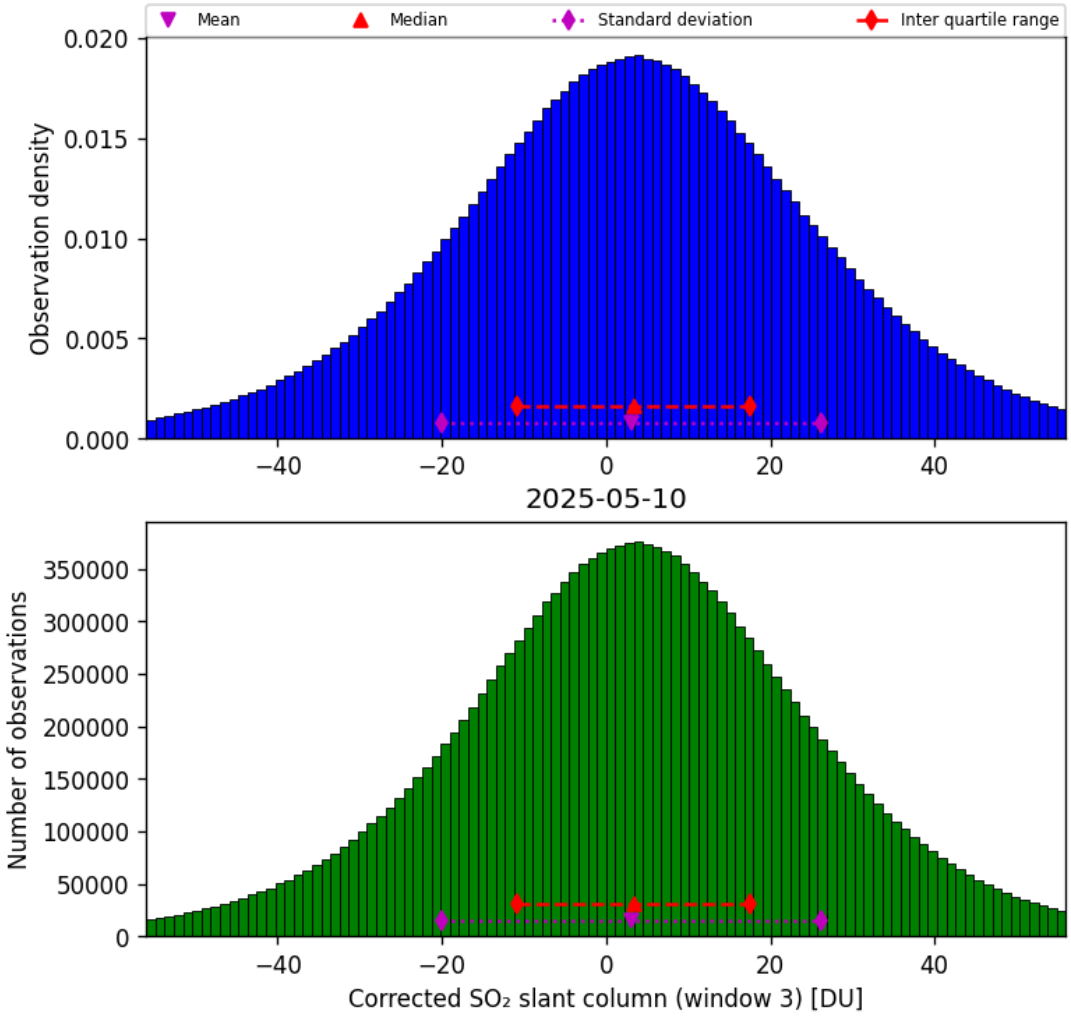


Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-05-10 to 2025-05-11

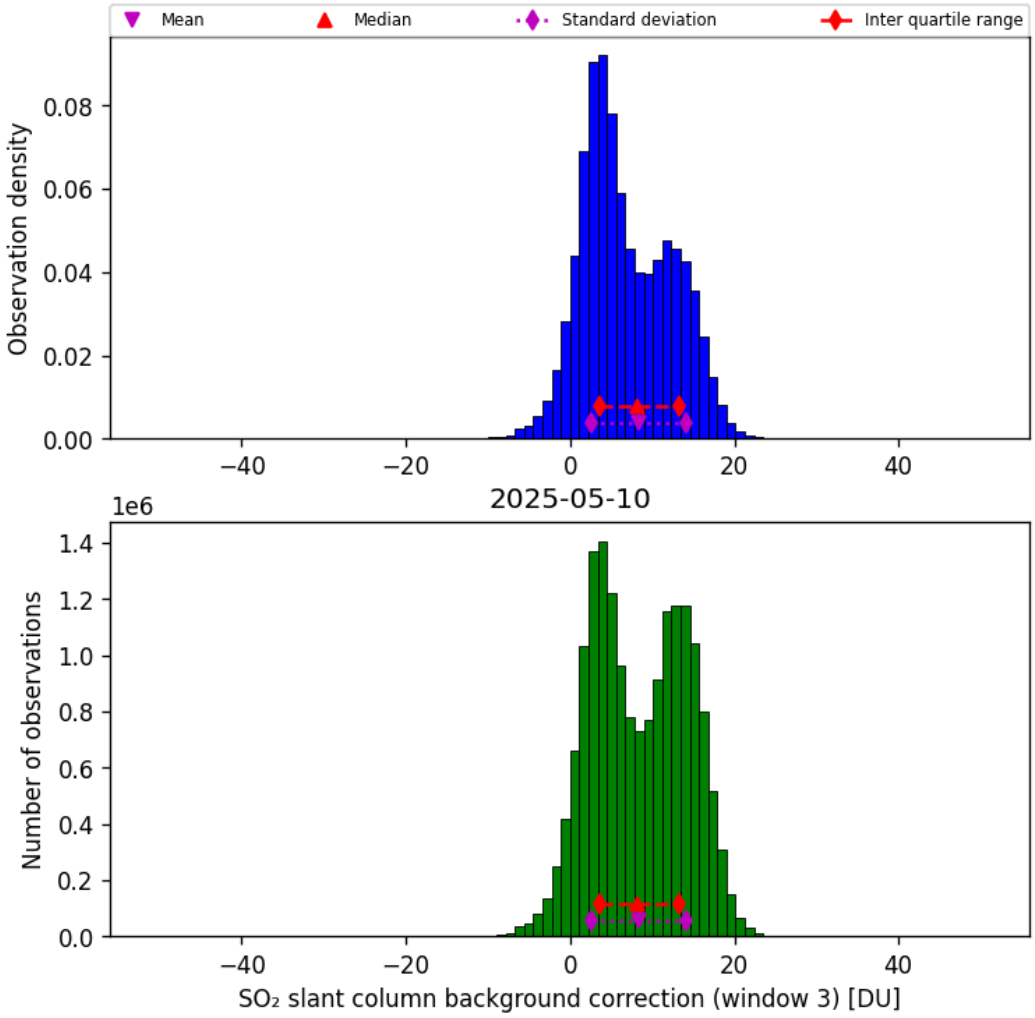


Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-05-10 to 2025-05-11

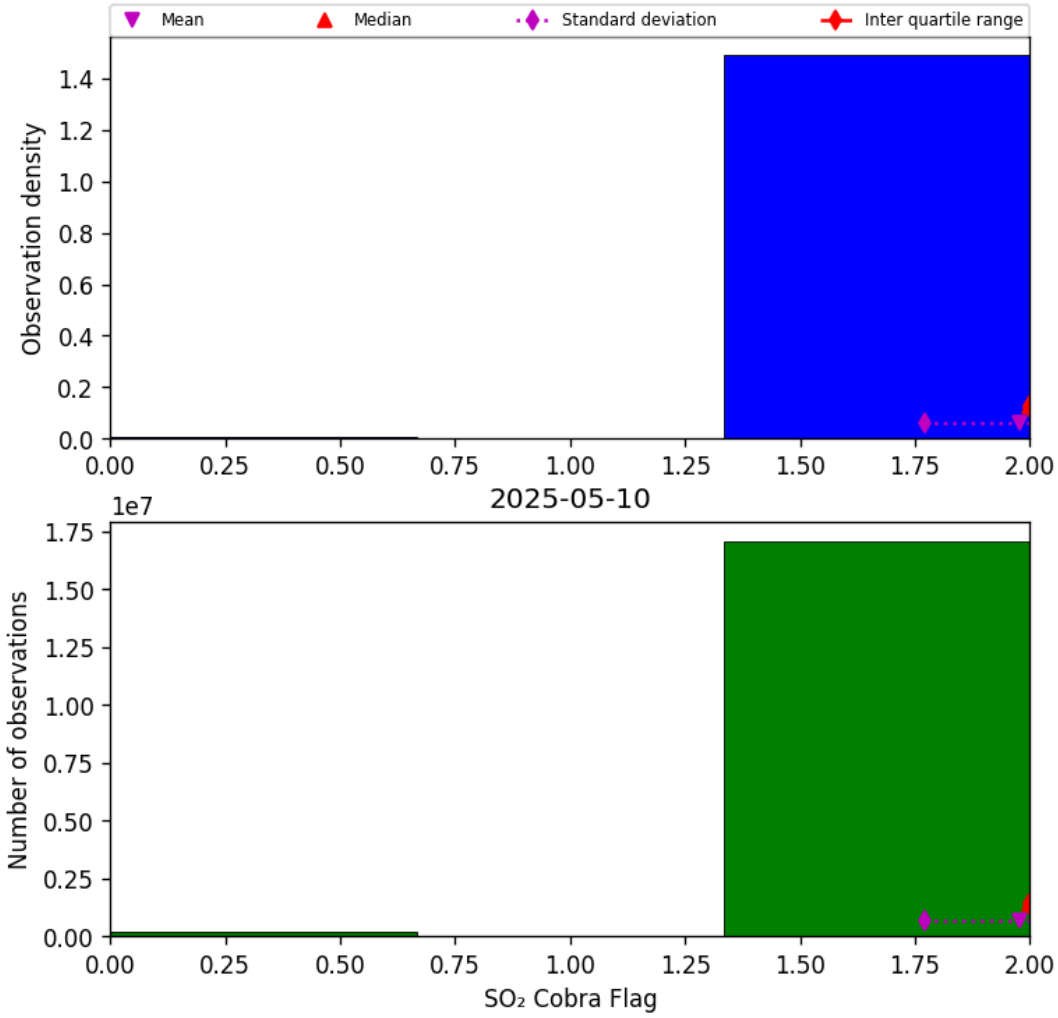


Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-05-10 to 2025-05-11

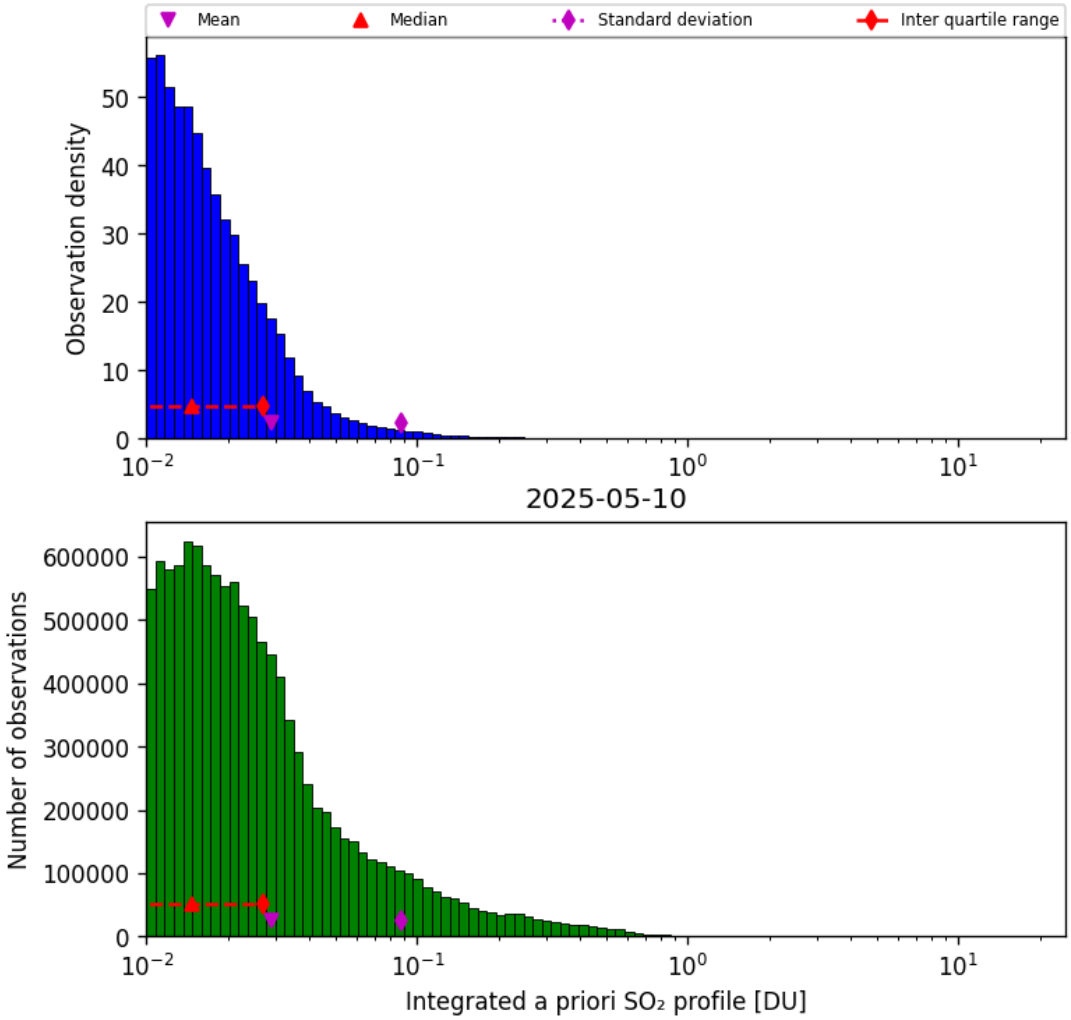


Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-05-10 to 2025-05-11

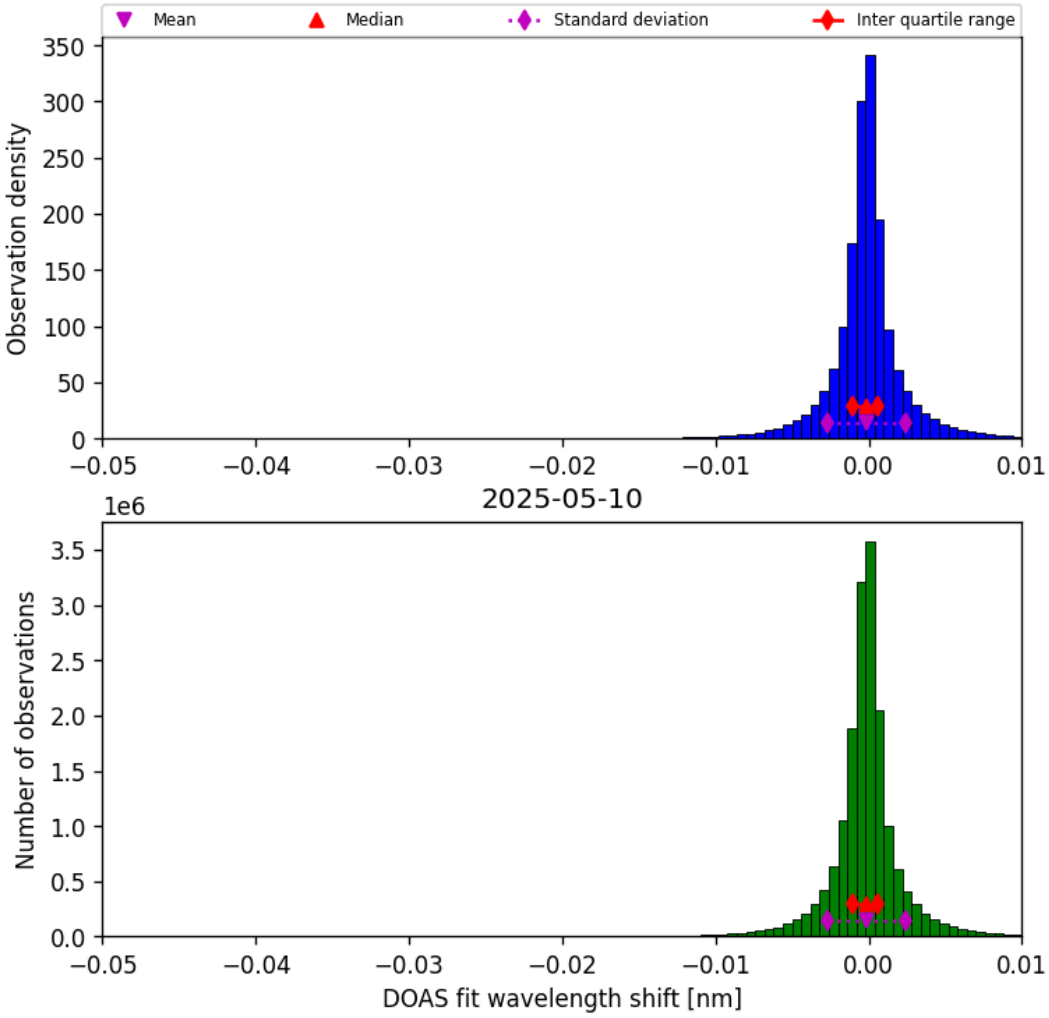


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-05-10 to 2025-05-11

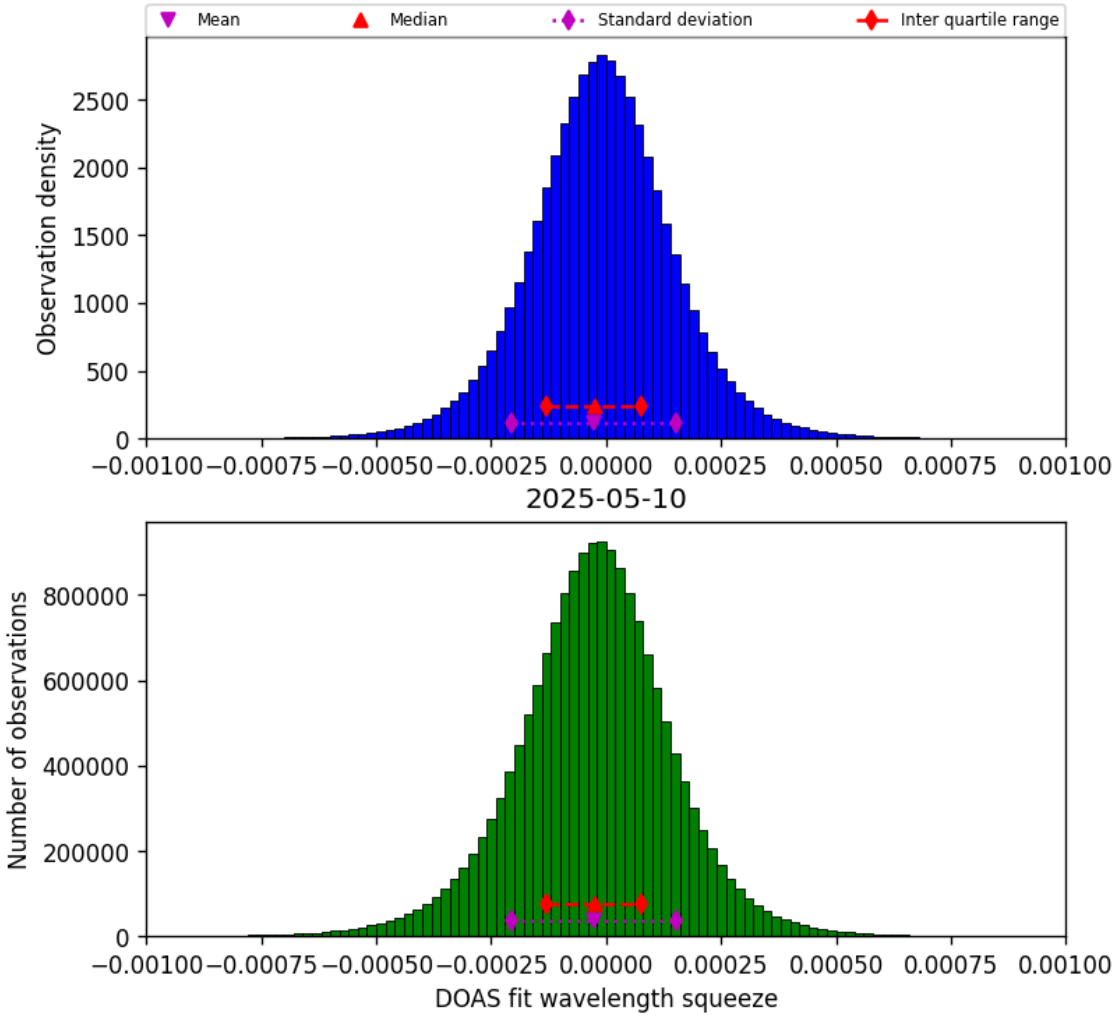


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-05-10 to 2025-05-11

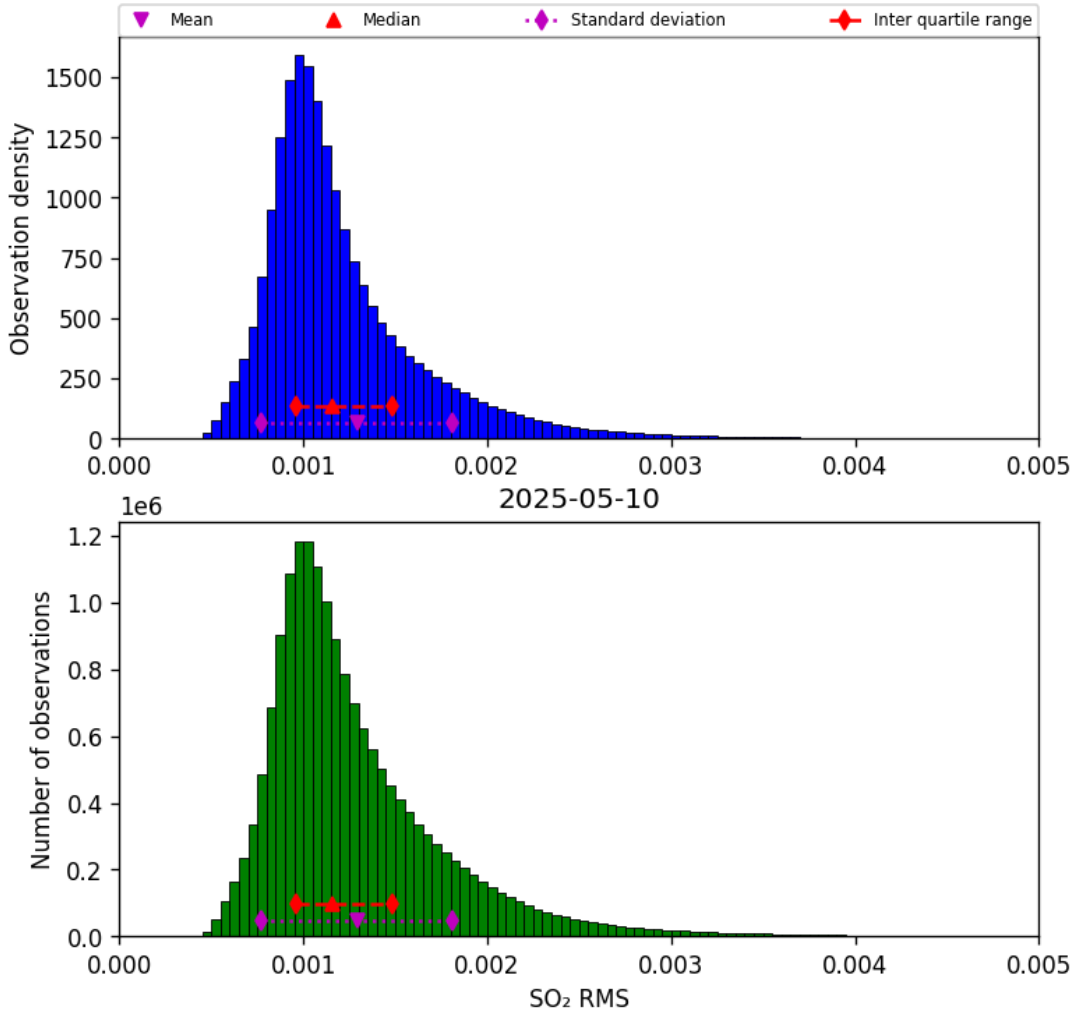


Figure 79: Histogram of "SO_2 RMS" for 2025-05-10 to 2025-05-11

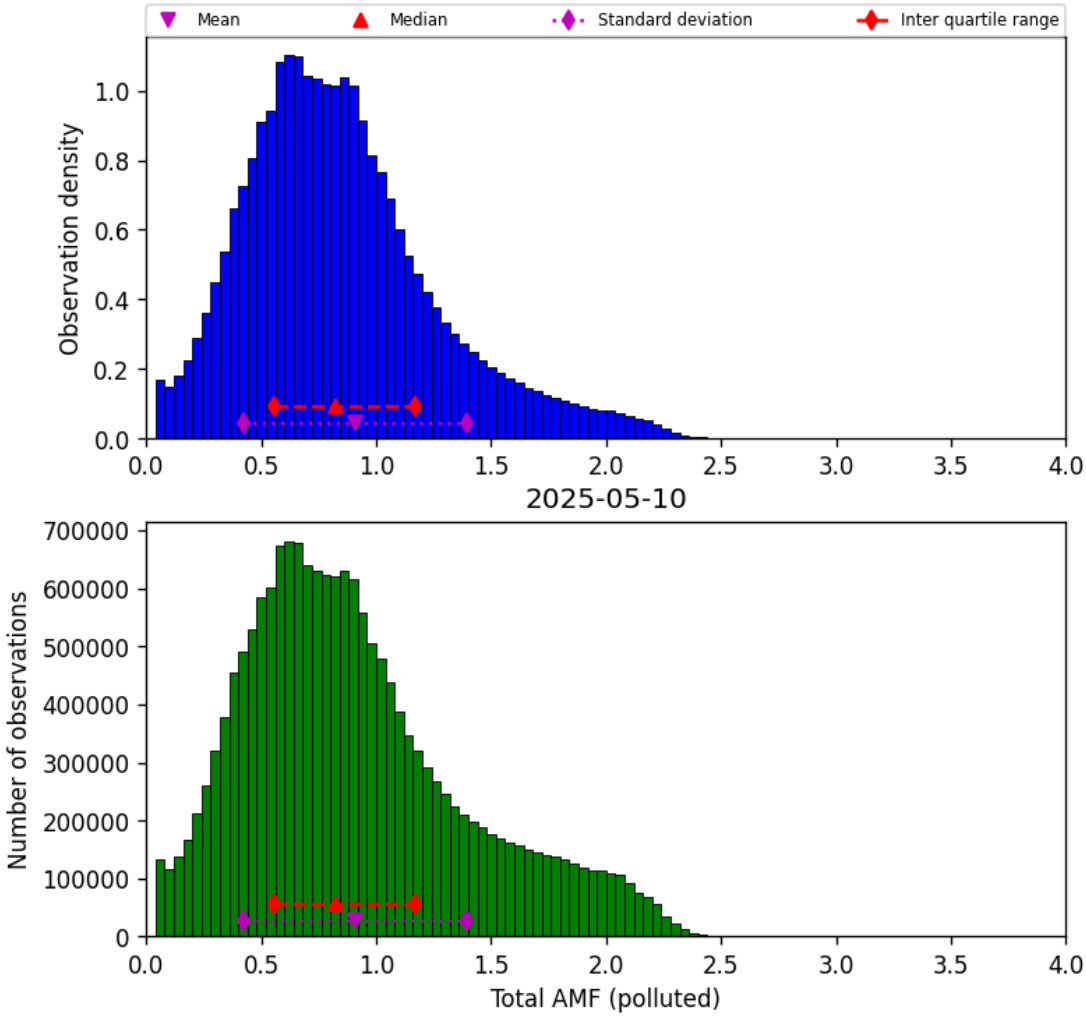


Figure 80: Histogram of “Total AMF (polluted)” for 2025-05-10 to 2025-05-11

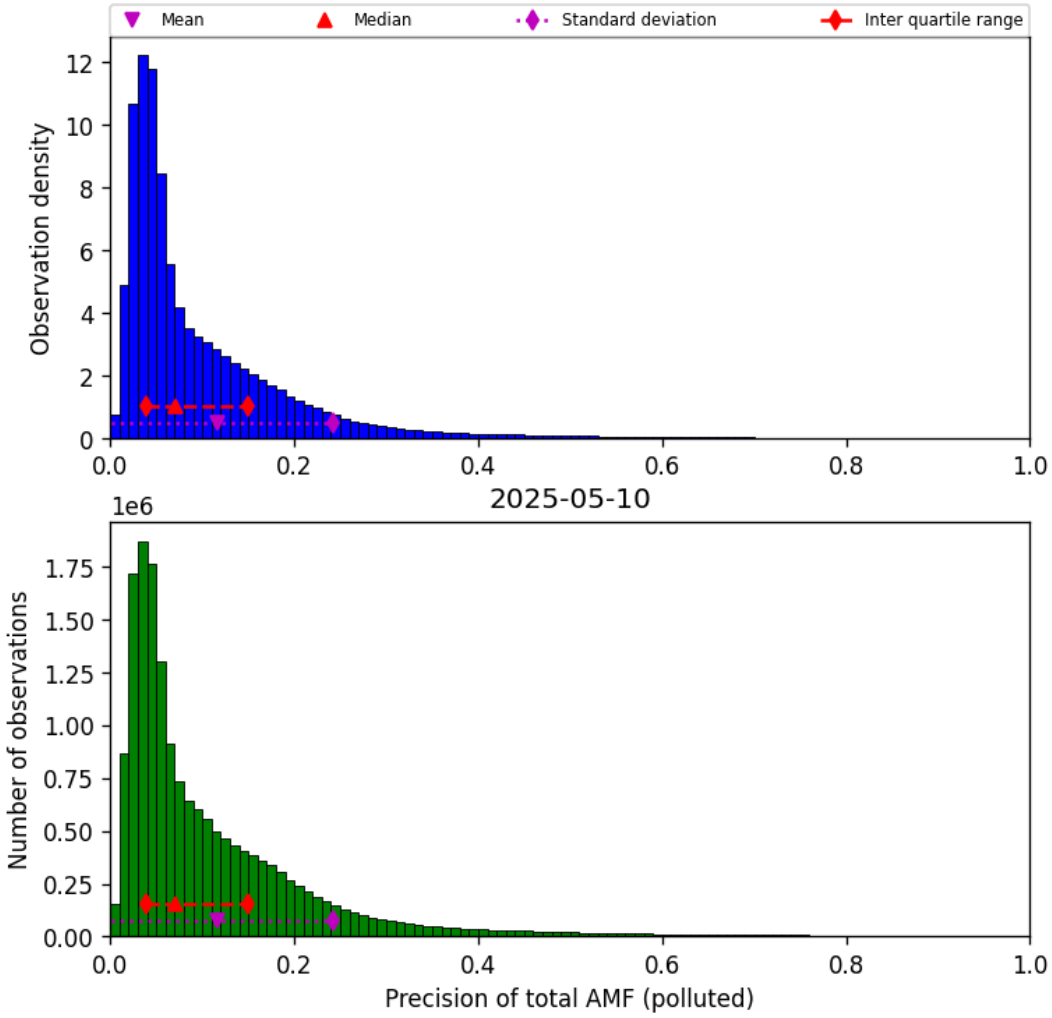


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-05-10 to 2025-05-11

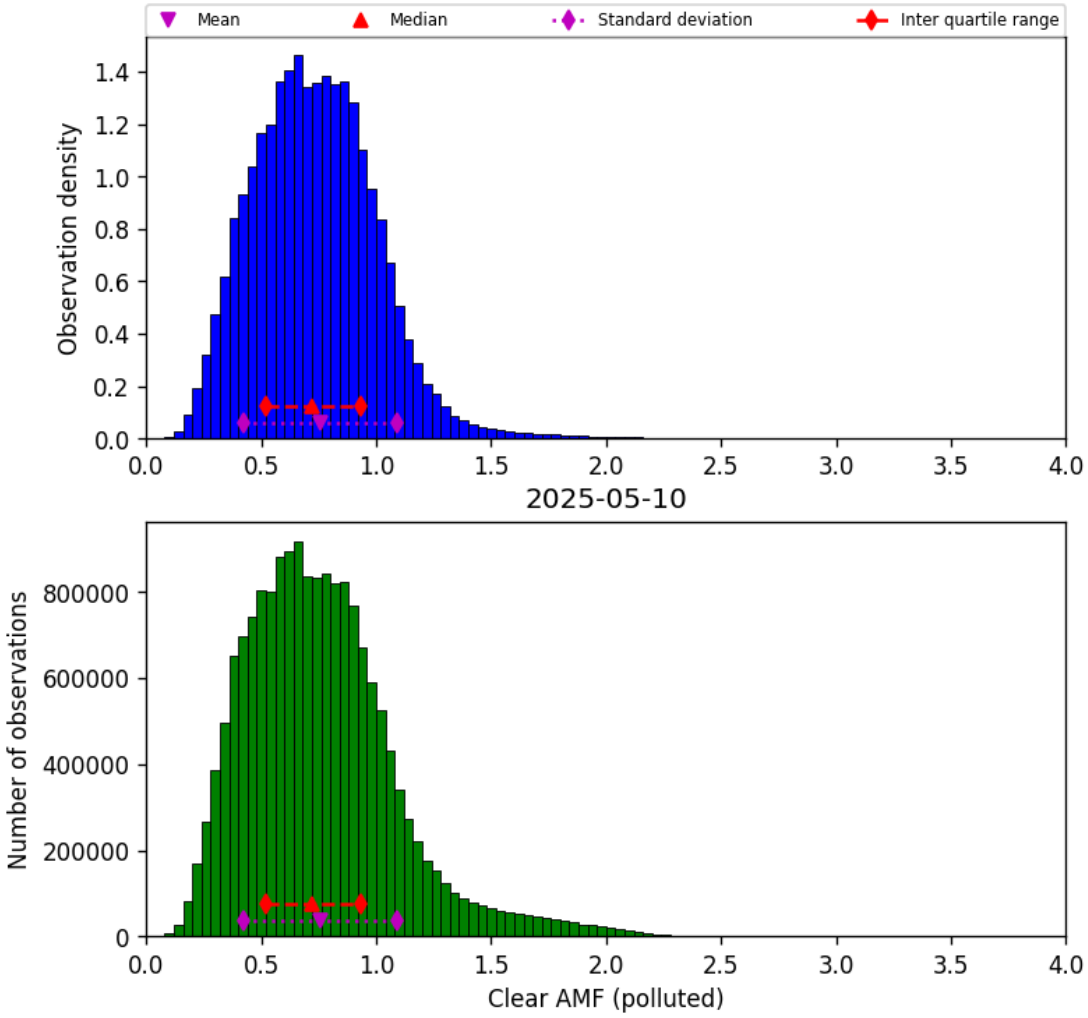


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-05-10 to 2025-05-11

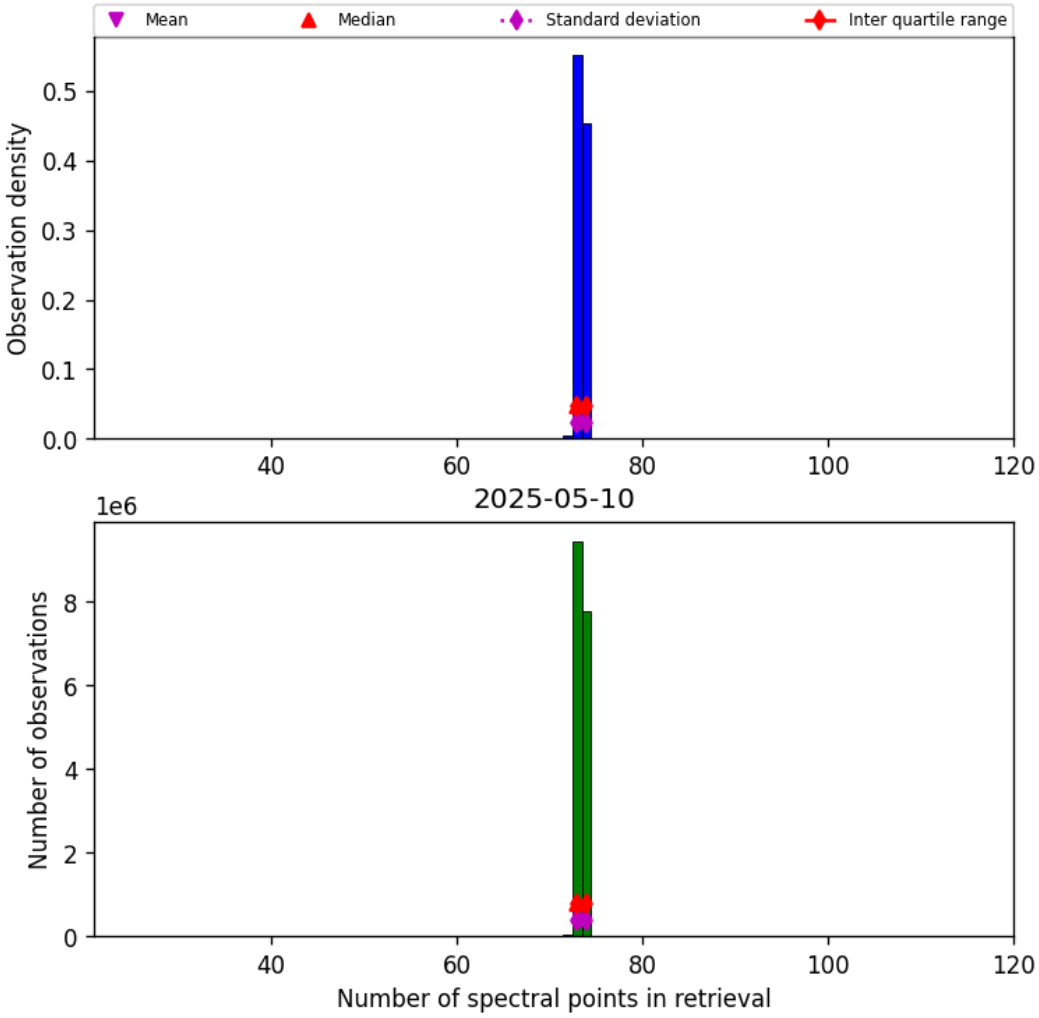


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-05-10 to 2025-05-11

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.

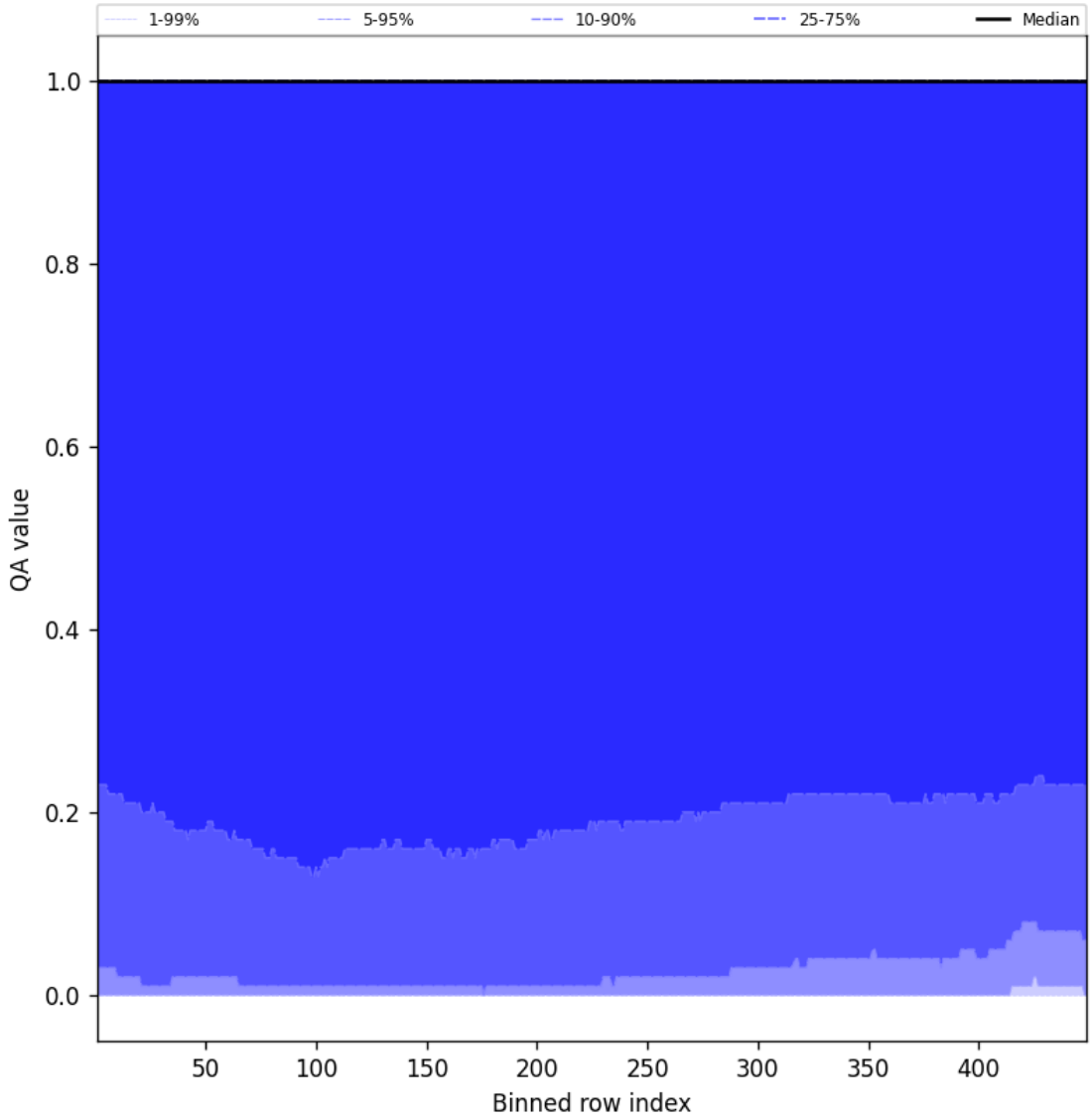


Figure 84: Along track statistics of “QA value” for 2025-05-10 to 2025-05-11

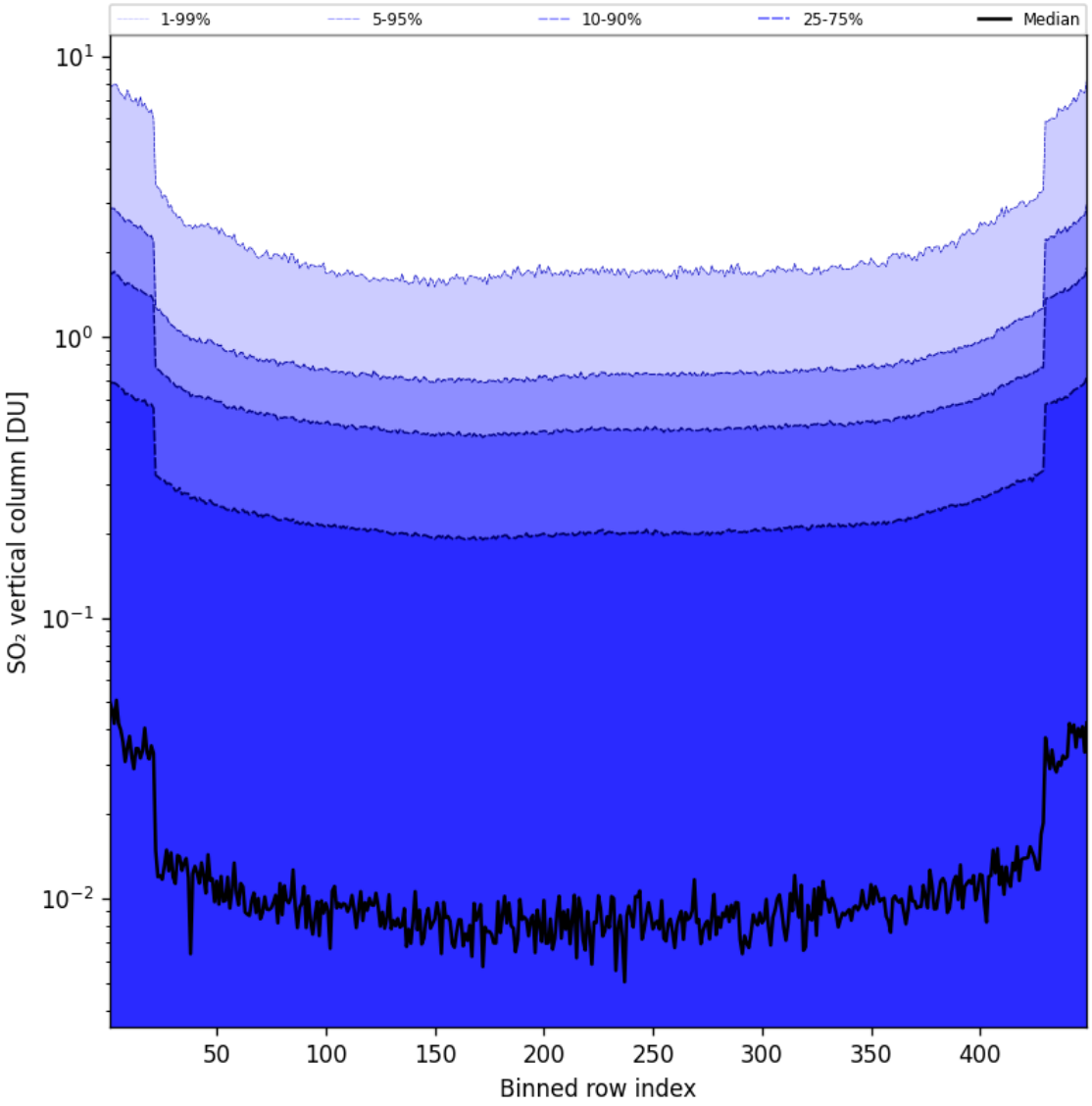


Figure 85: Along track statistics of "SO_2 vertical column" for 2025-05-10 to 2025-05-11

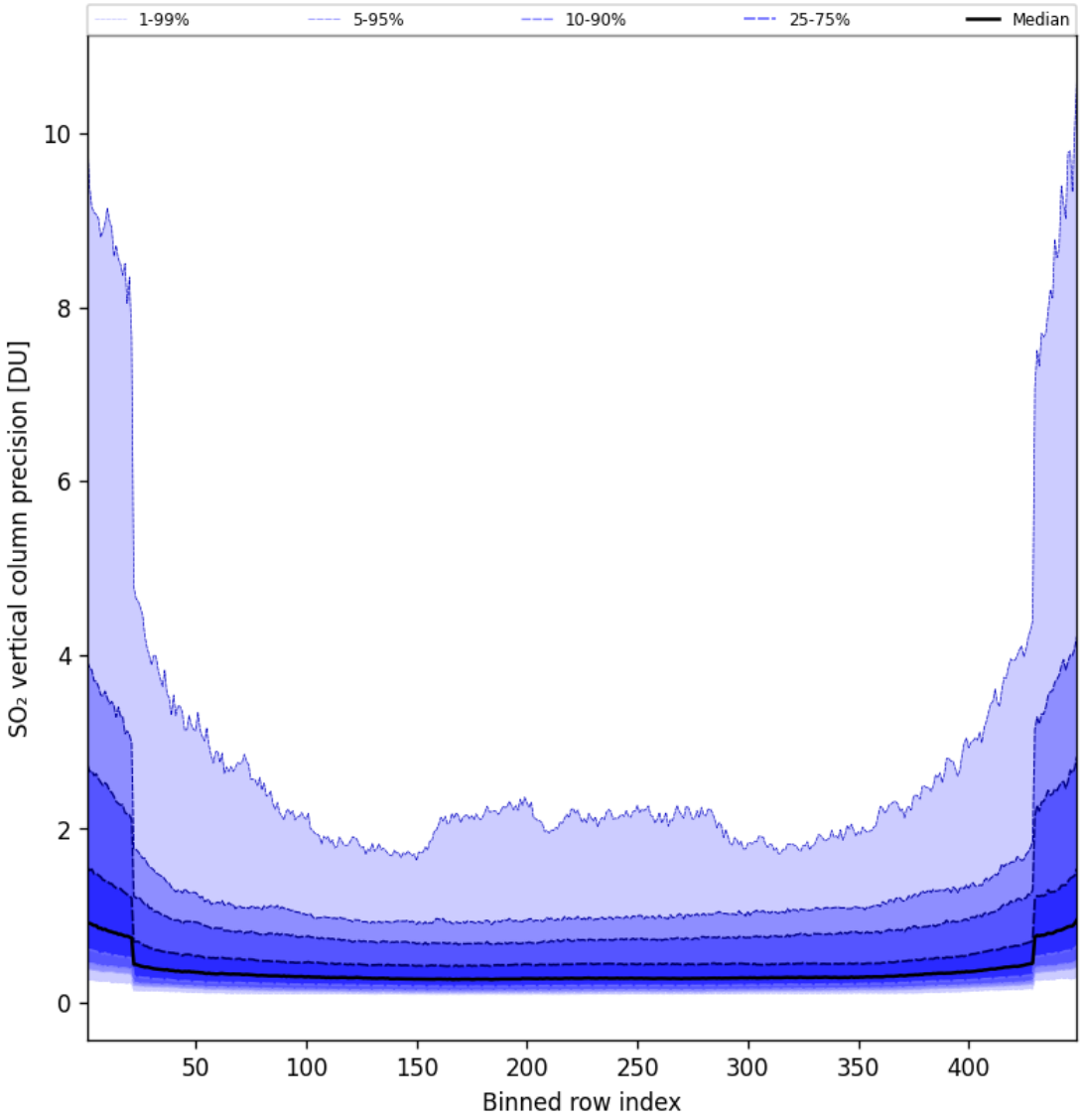


Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-05-10 to 2025-05-11

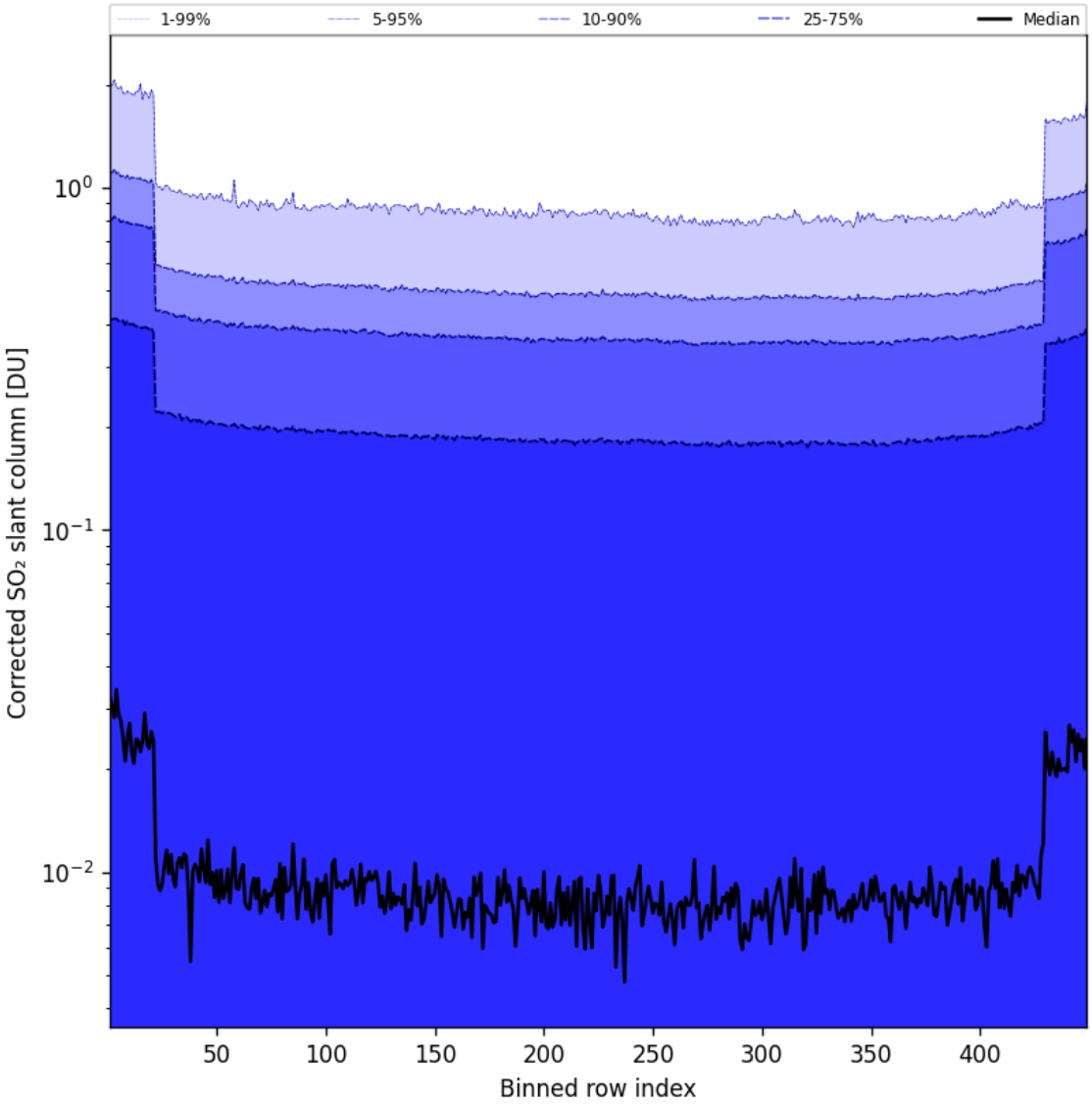


Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-05-10 to 2025-05-11

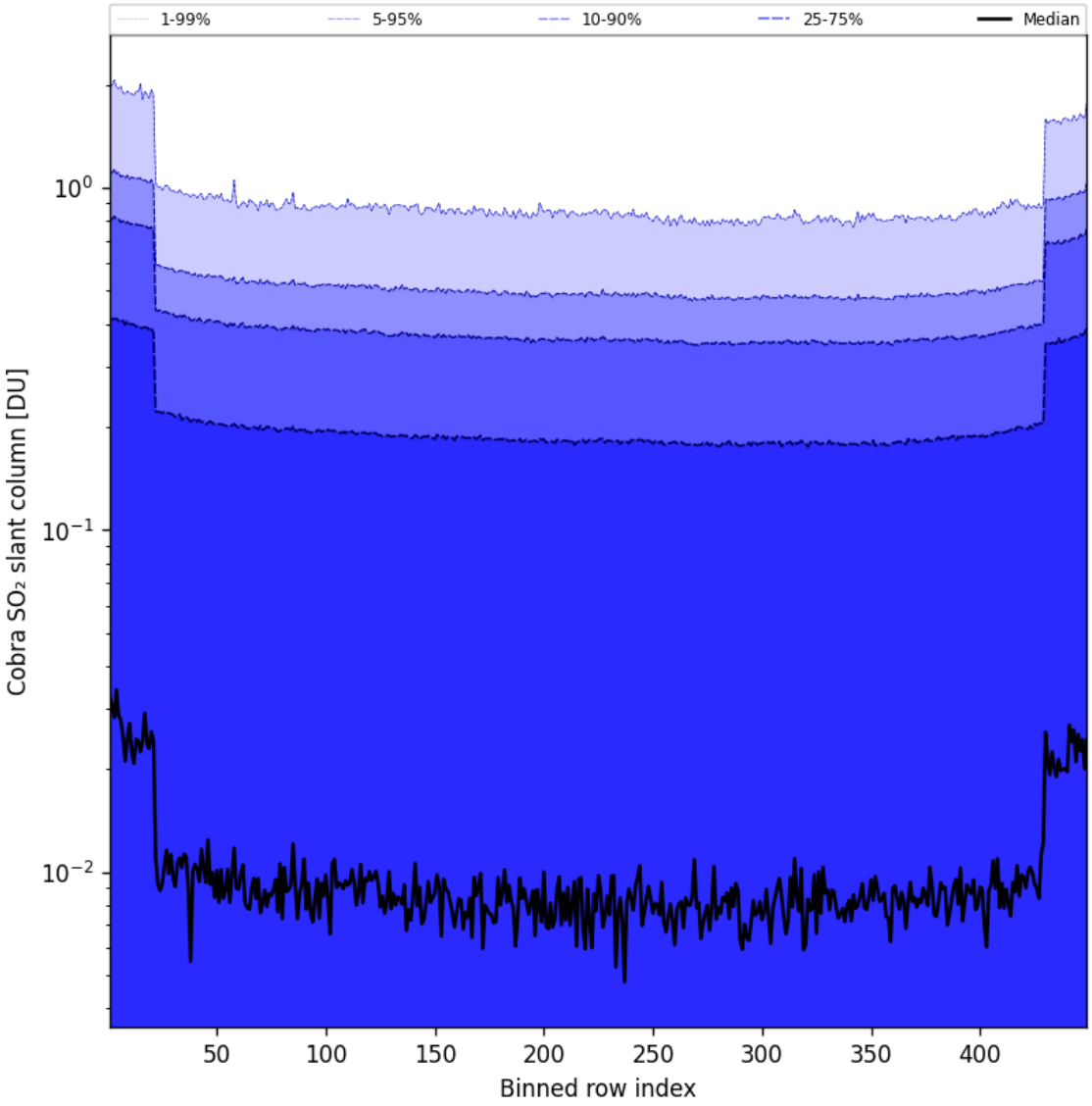


Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-05-10 to 2025-05-11

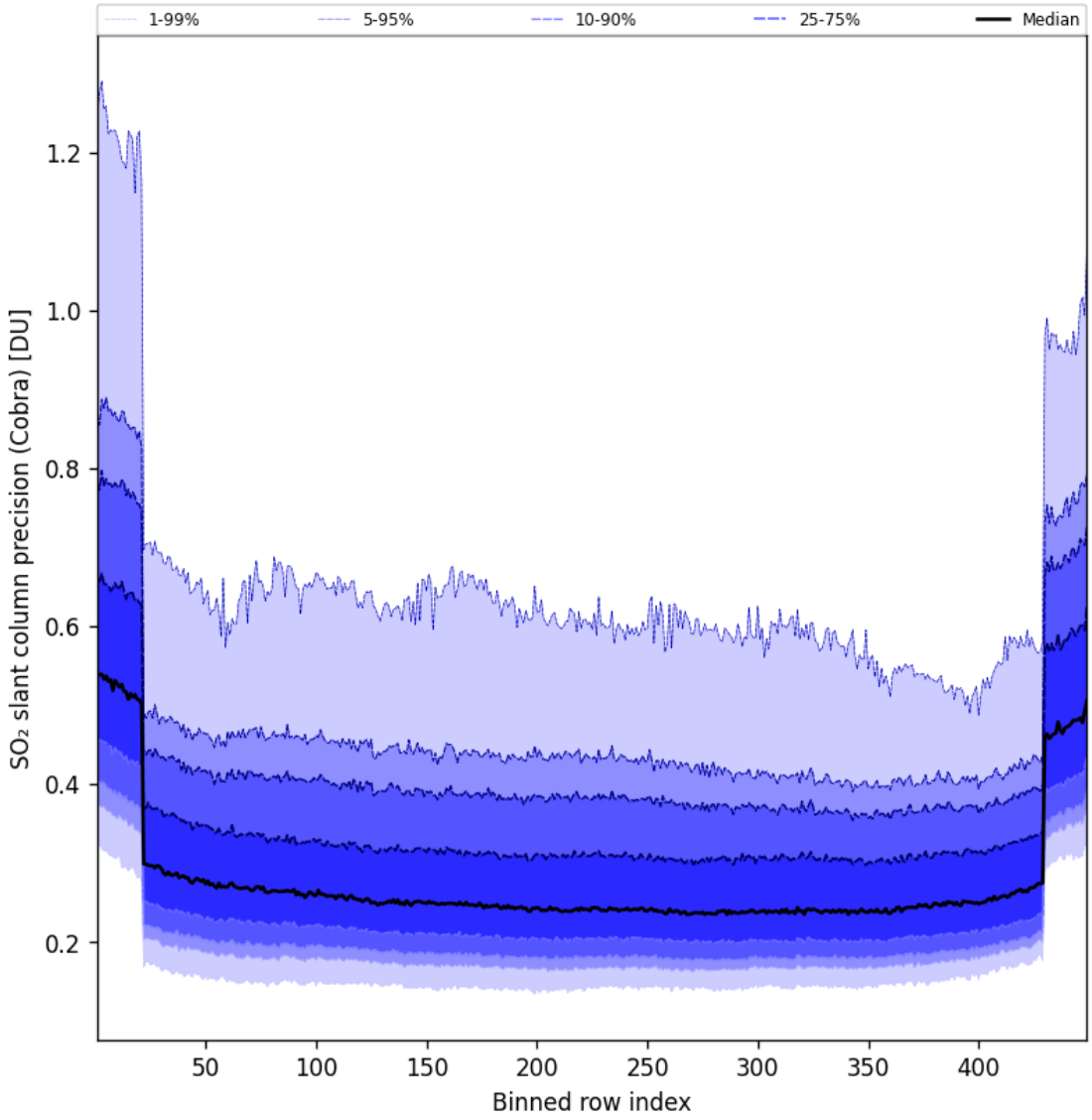


Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-05-10 to 2025-05-11

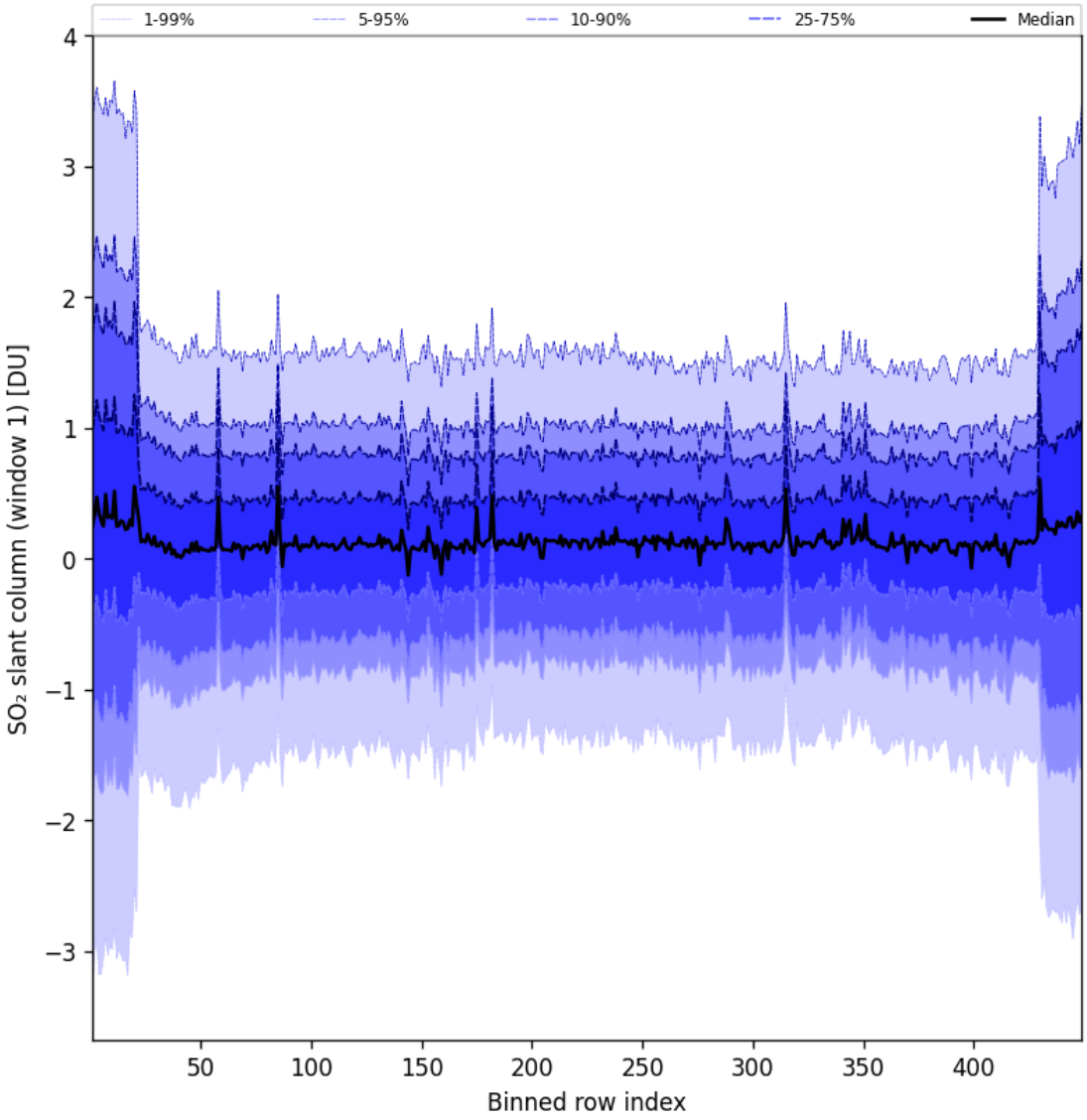


Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-05-10 to 2025-05-11

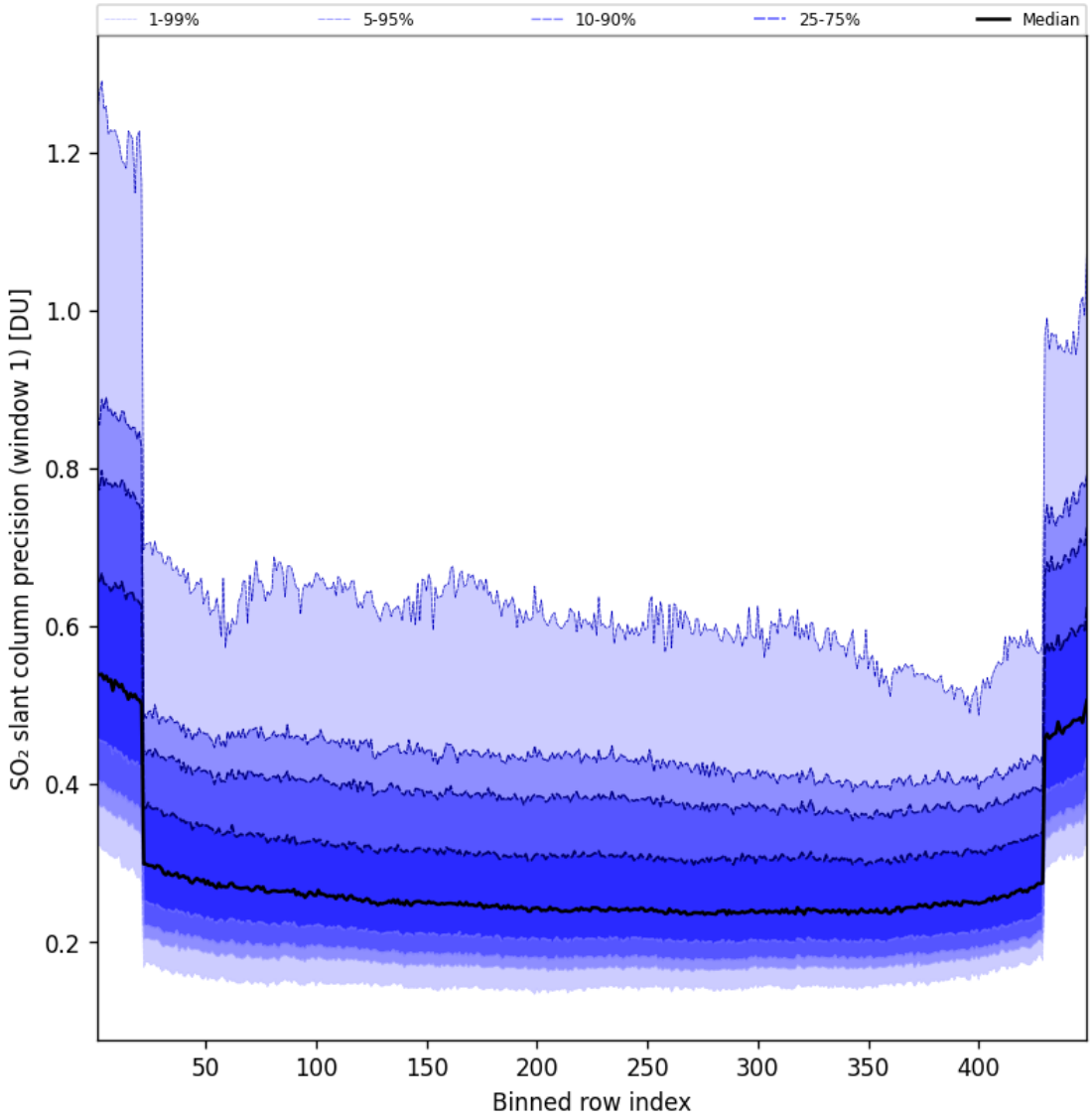


Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-05-10 to 2025-05-11

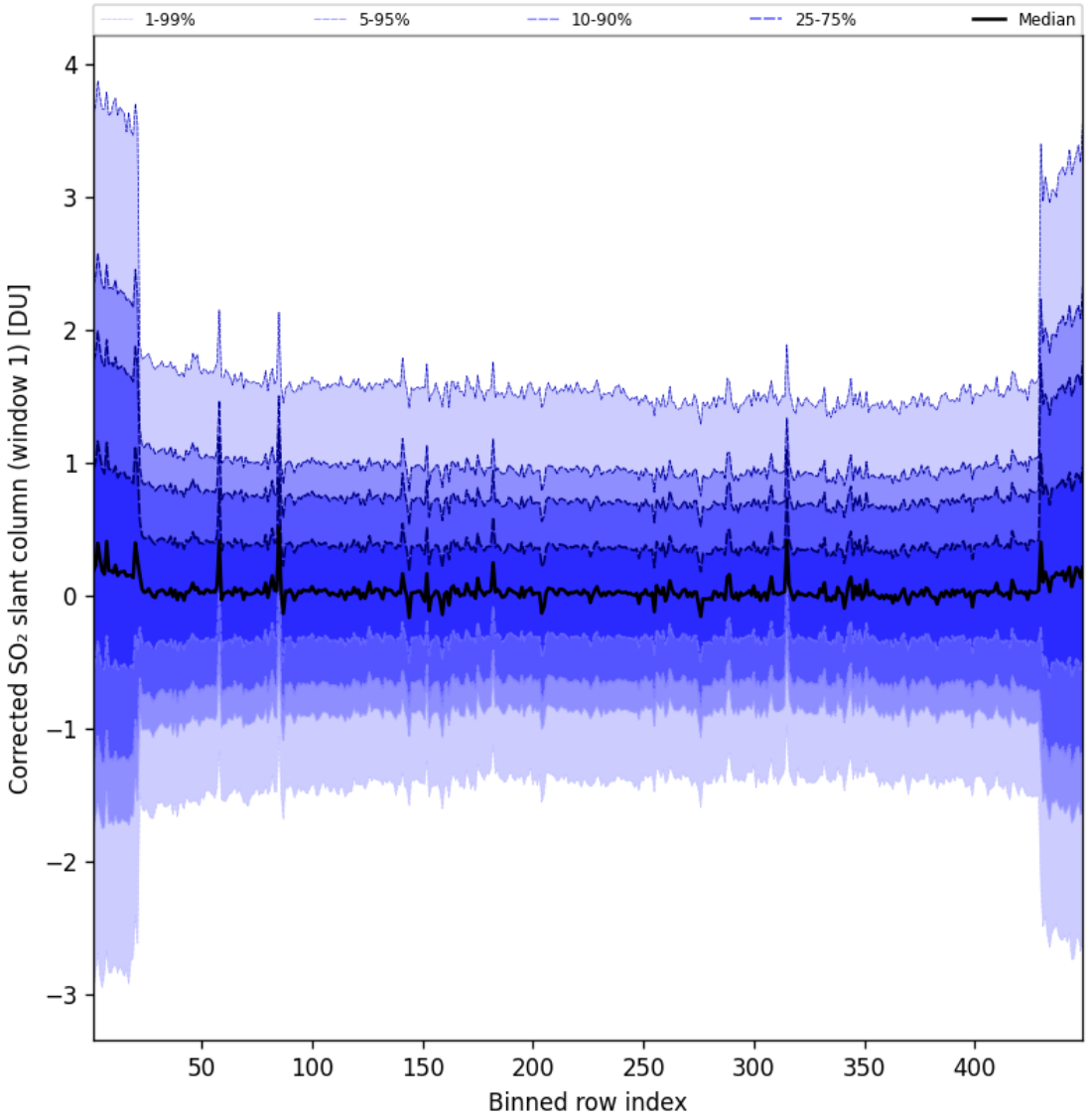


Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-05-10 to 2025-05-11

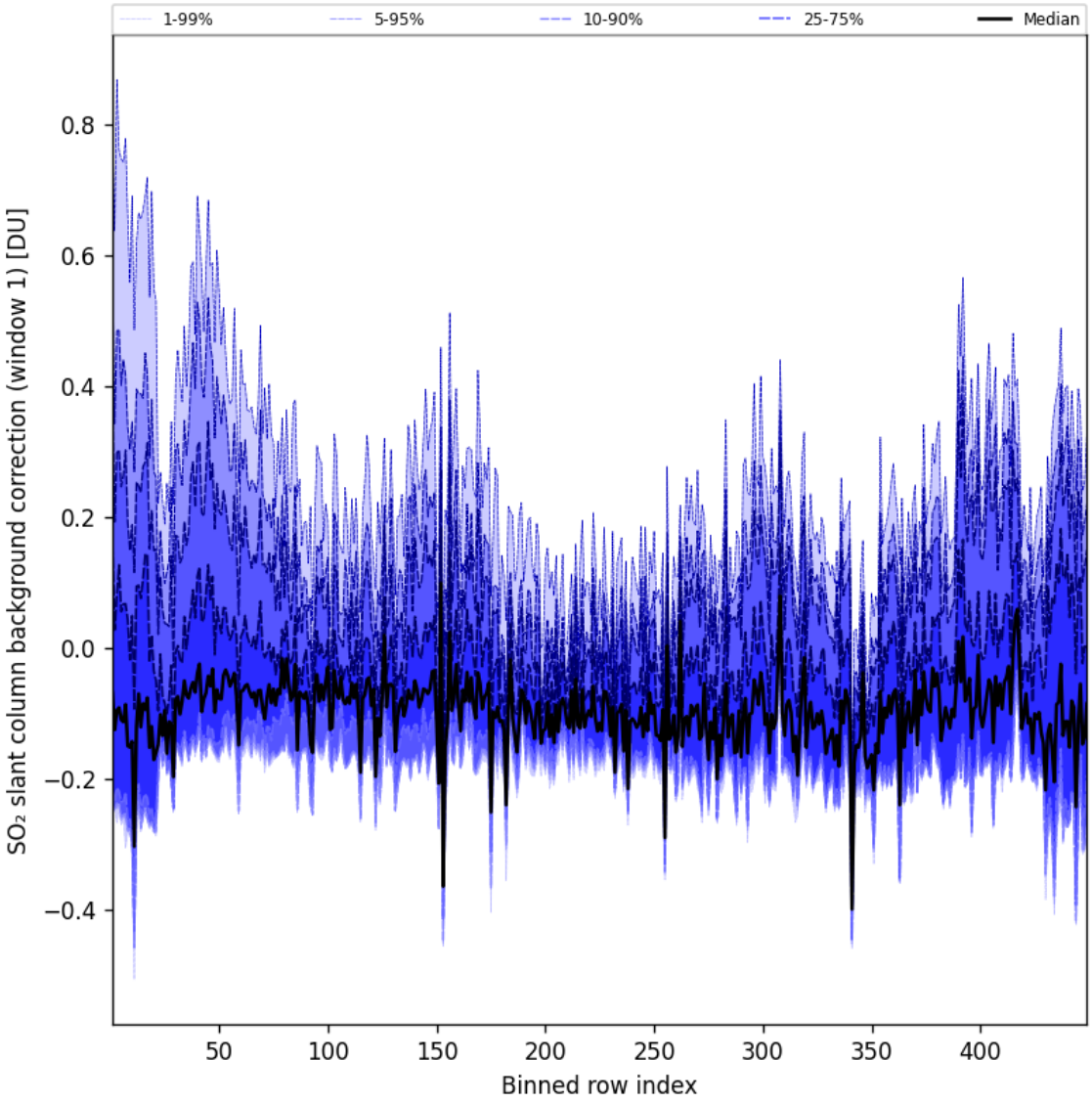


Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-05-10 to 2025-05-11

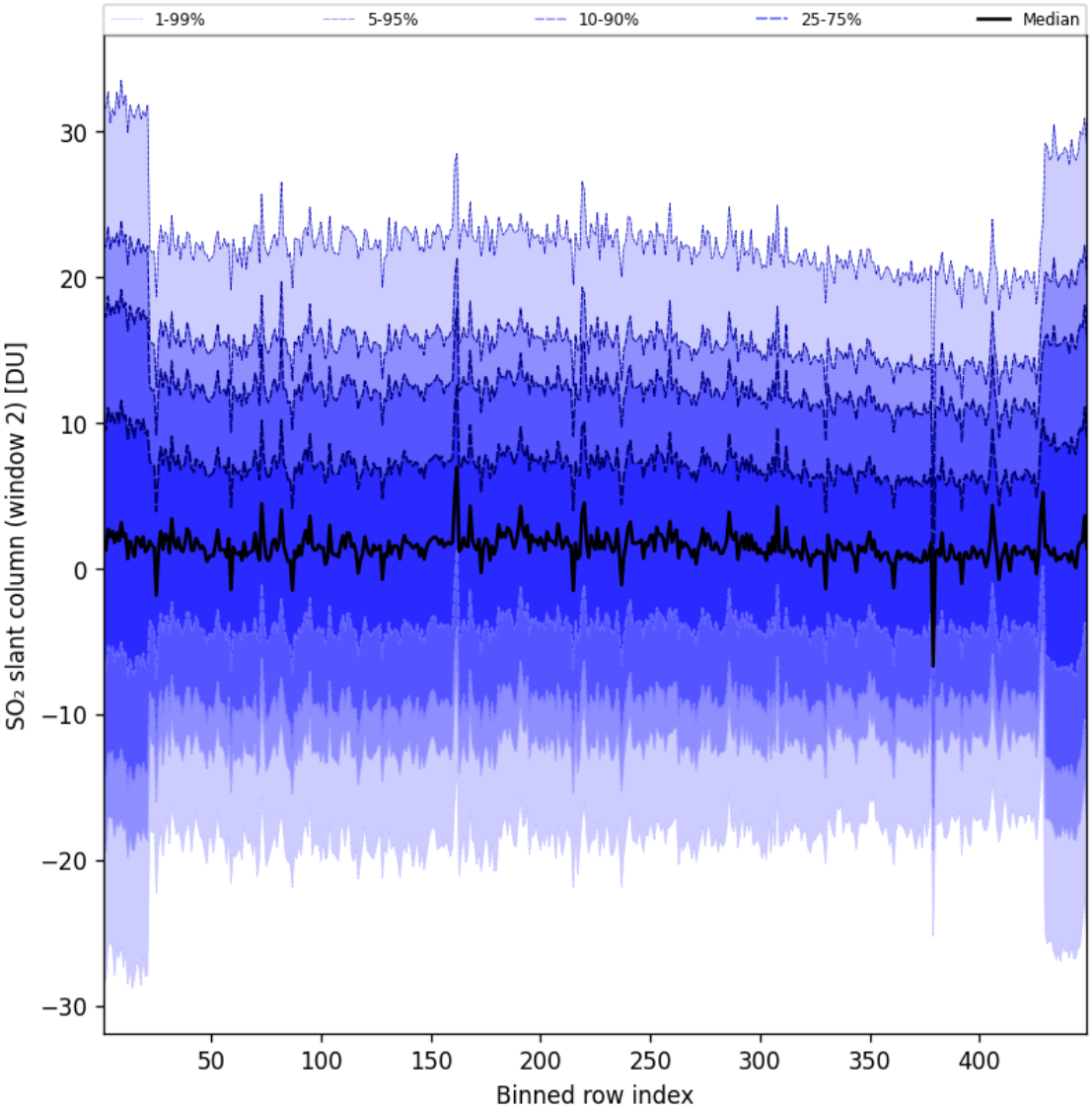


Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-05-10 to 2025-05-11

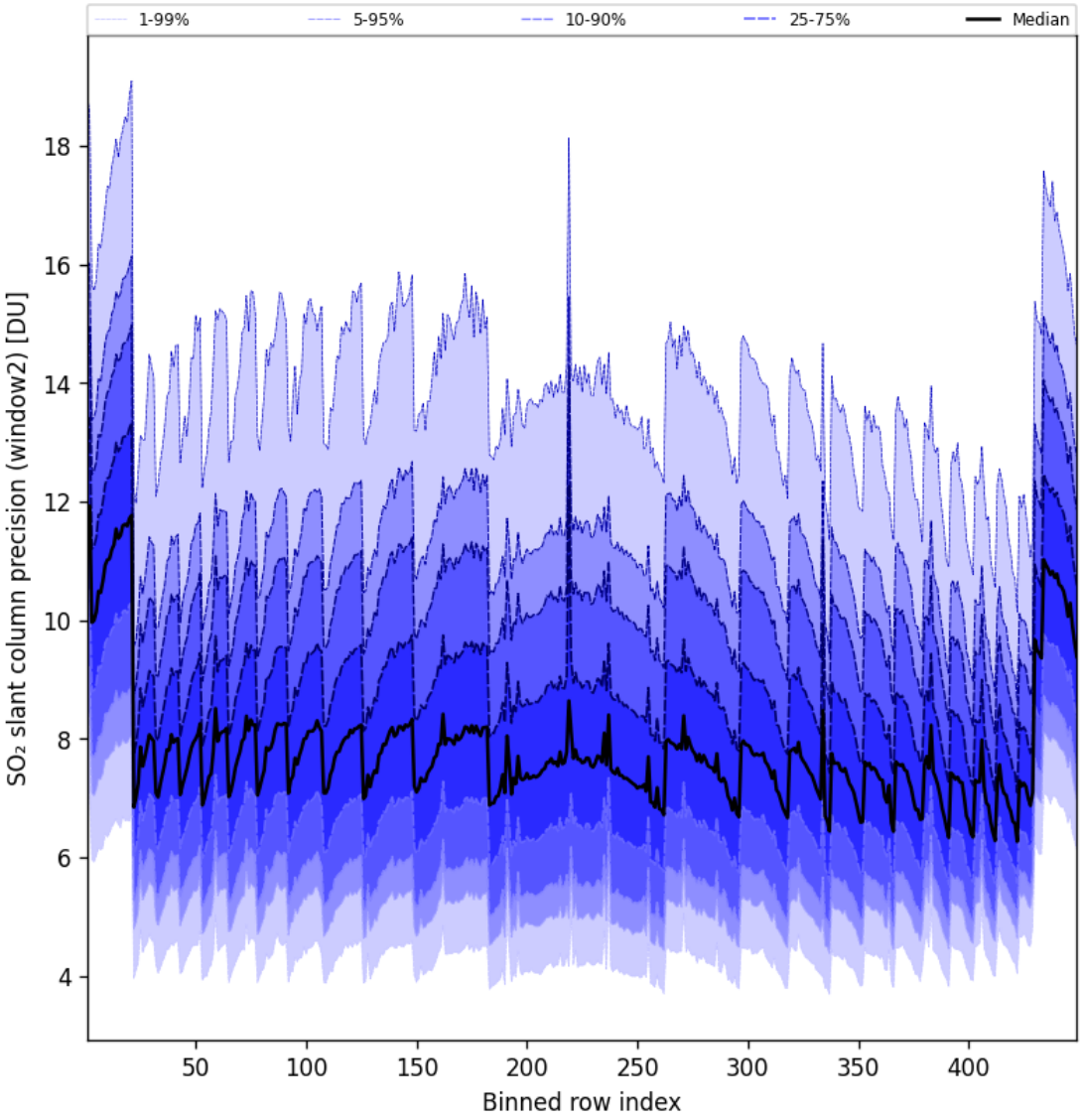


Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-05-10 to 2025-05-11

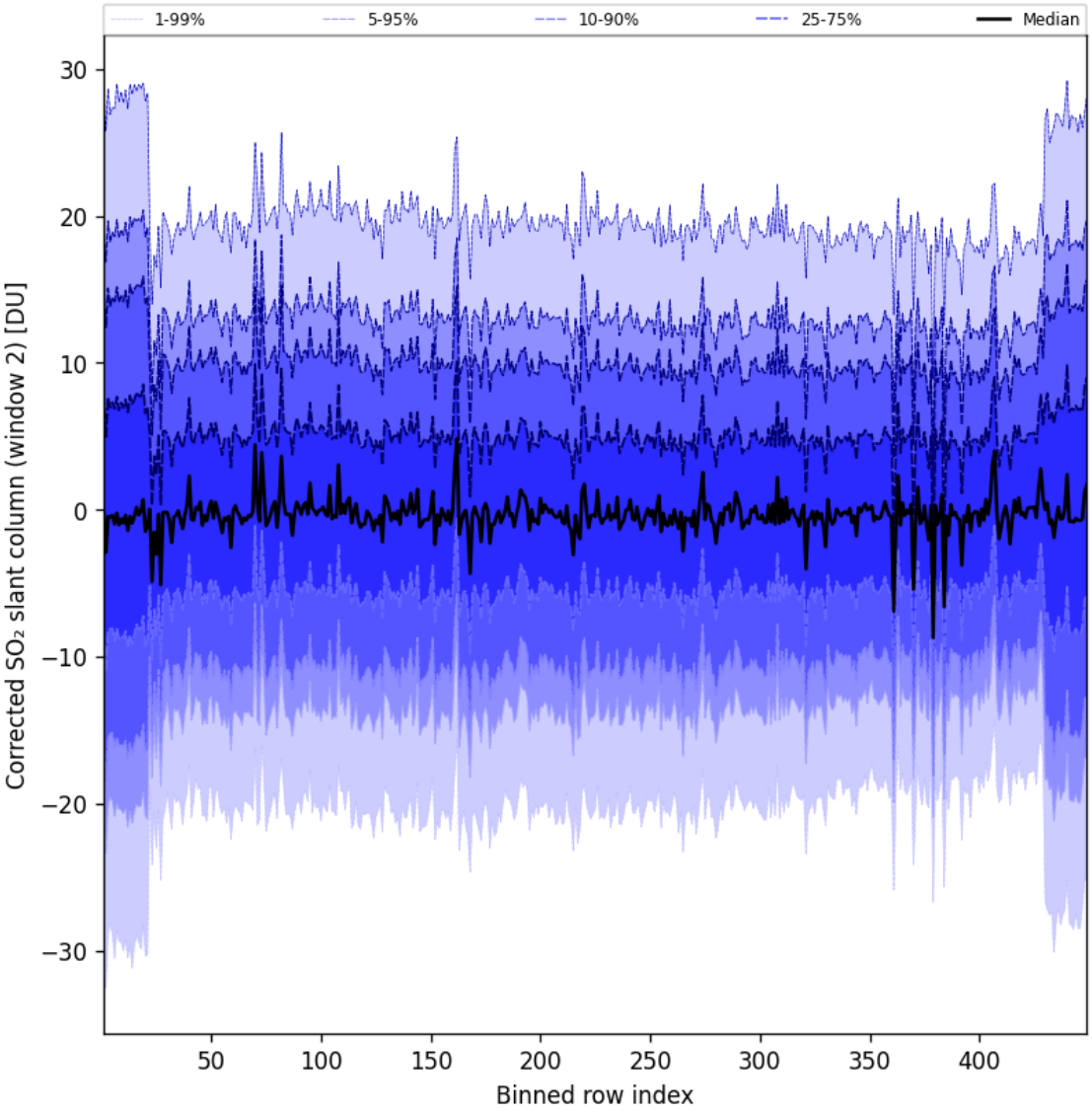


Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-05-10 to 2025-05-11

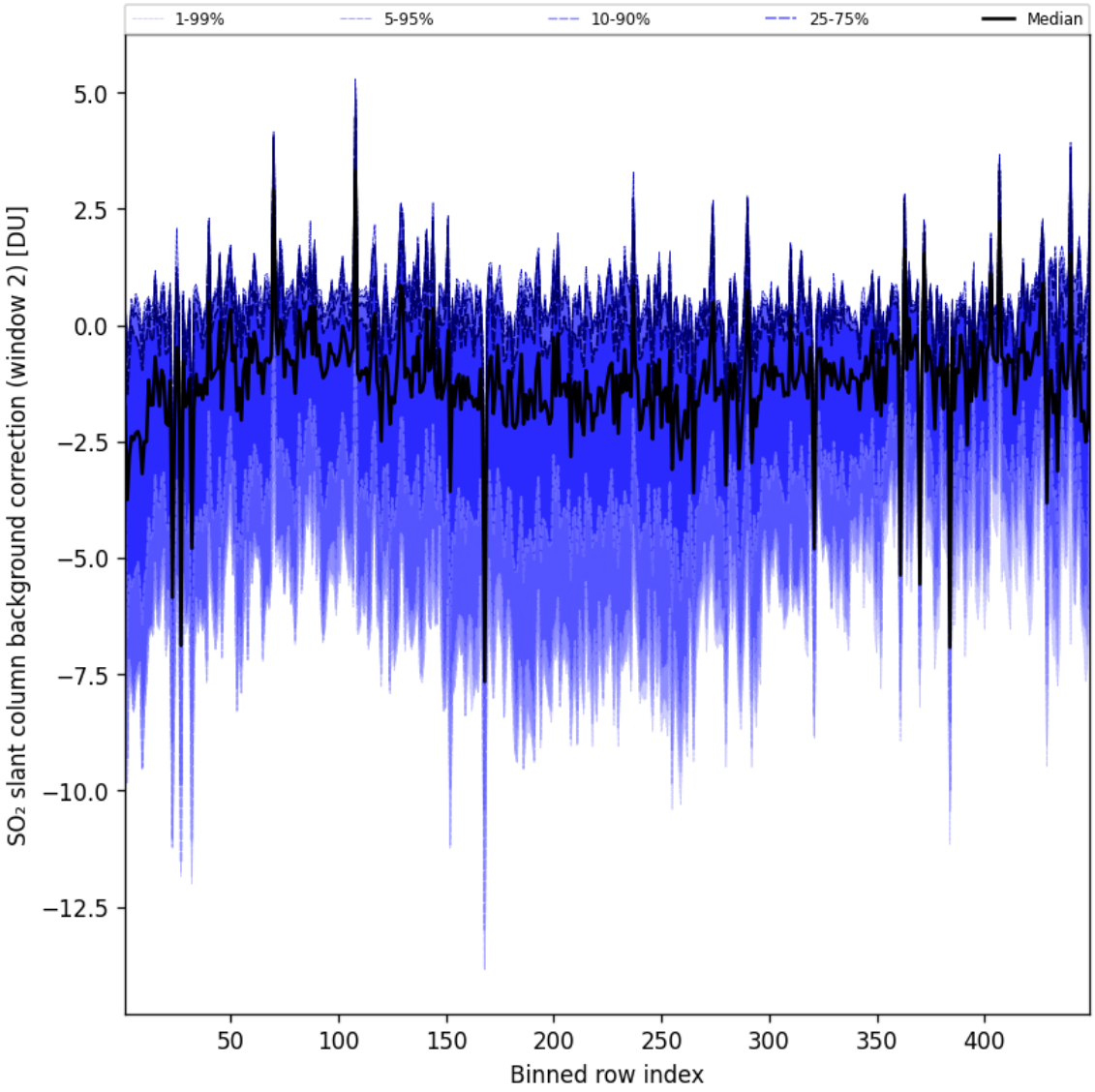


Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-05-10 to 2025-05-11

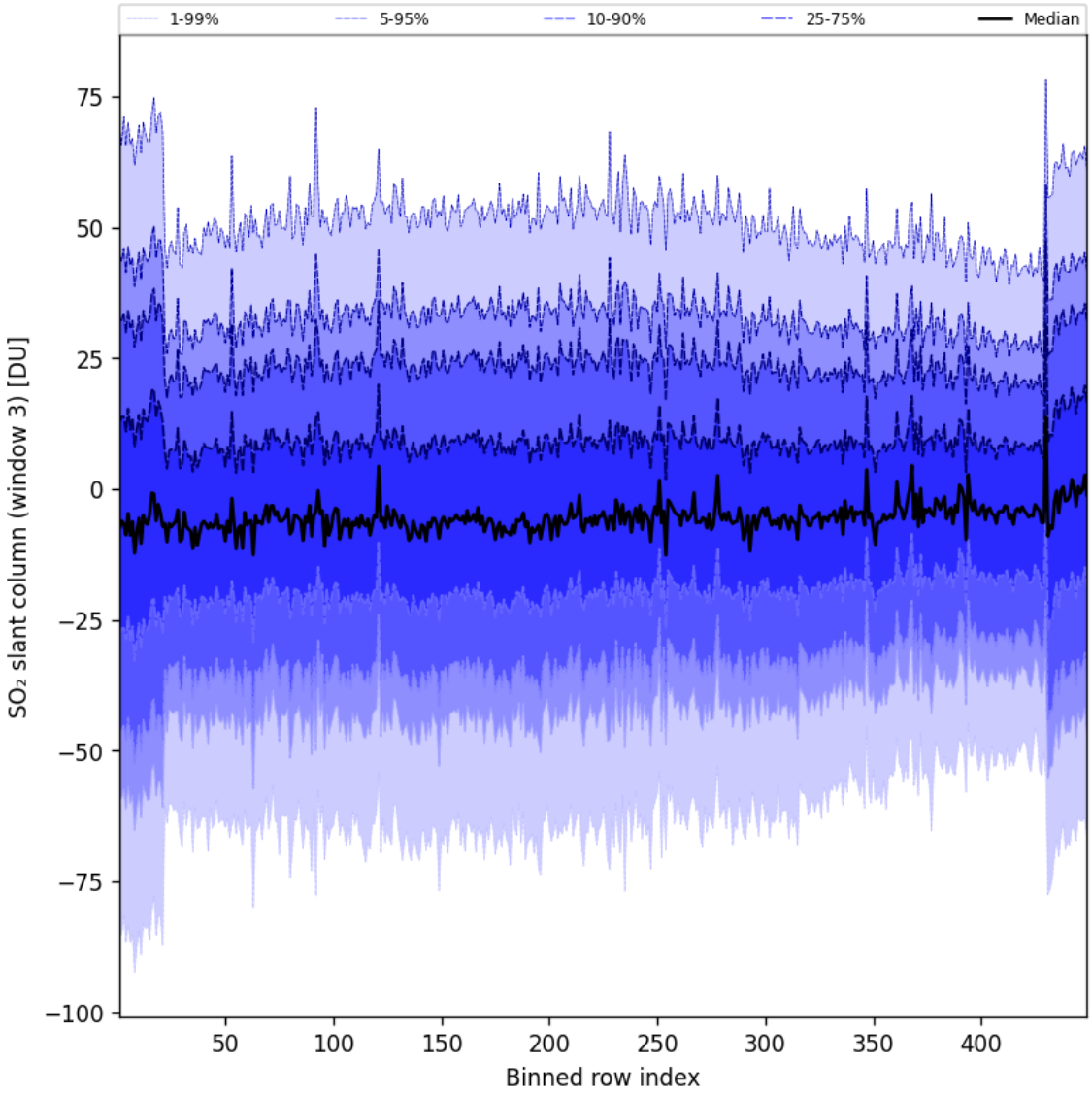


Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-05-10 to 2025-05-11

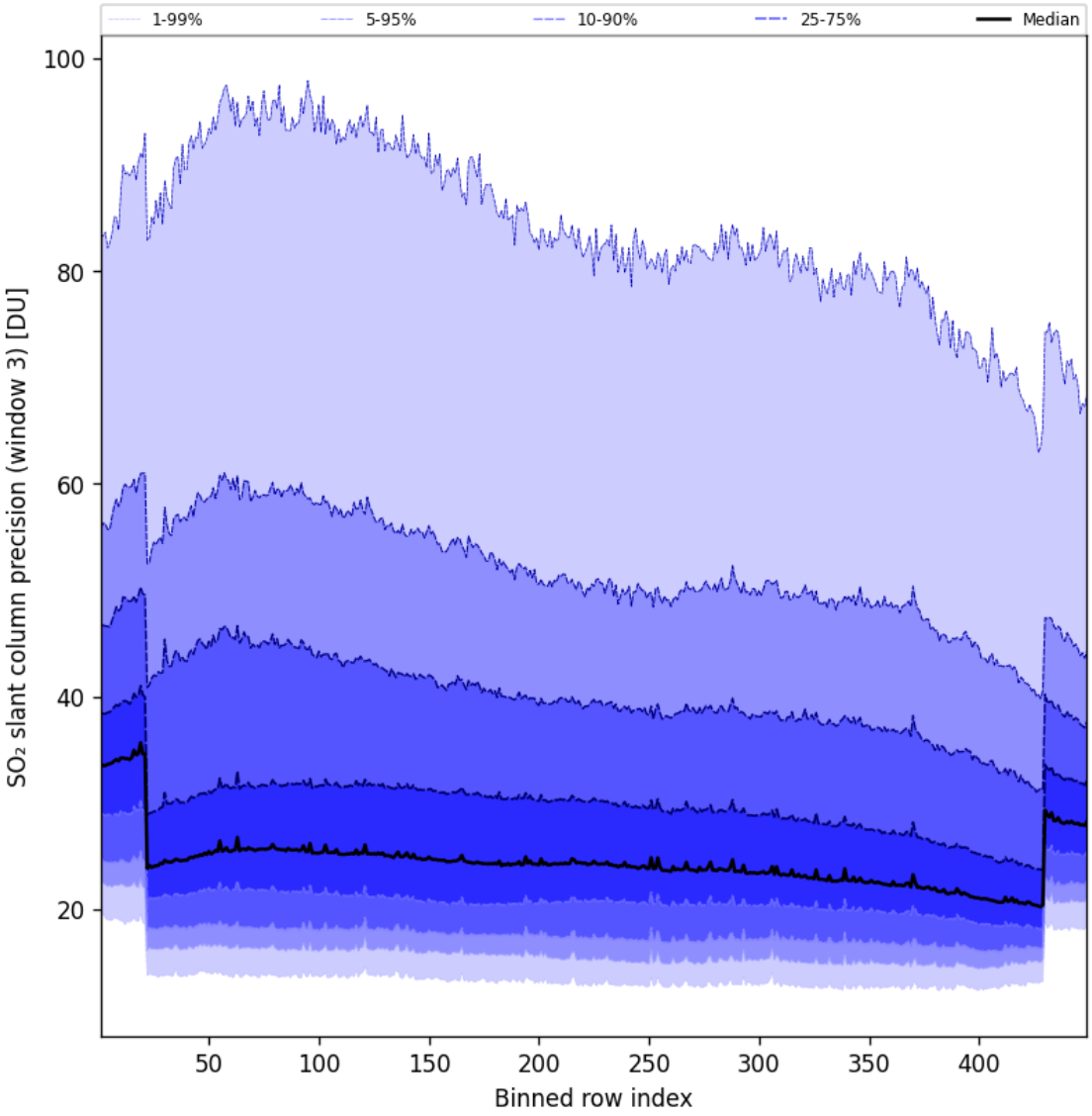


Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-05-10 to 2025-05-11

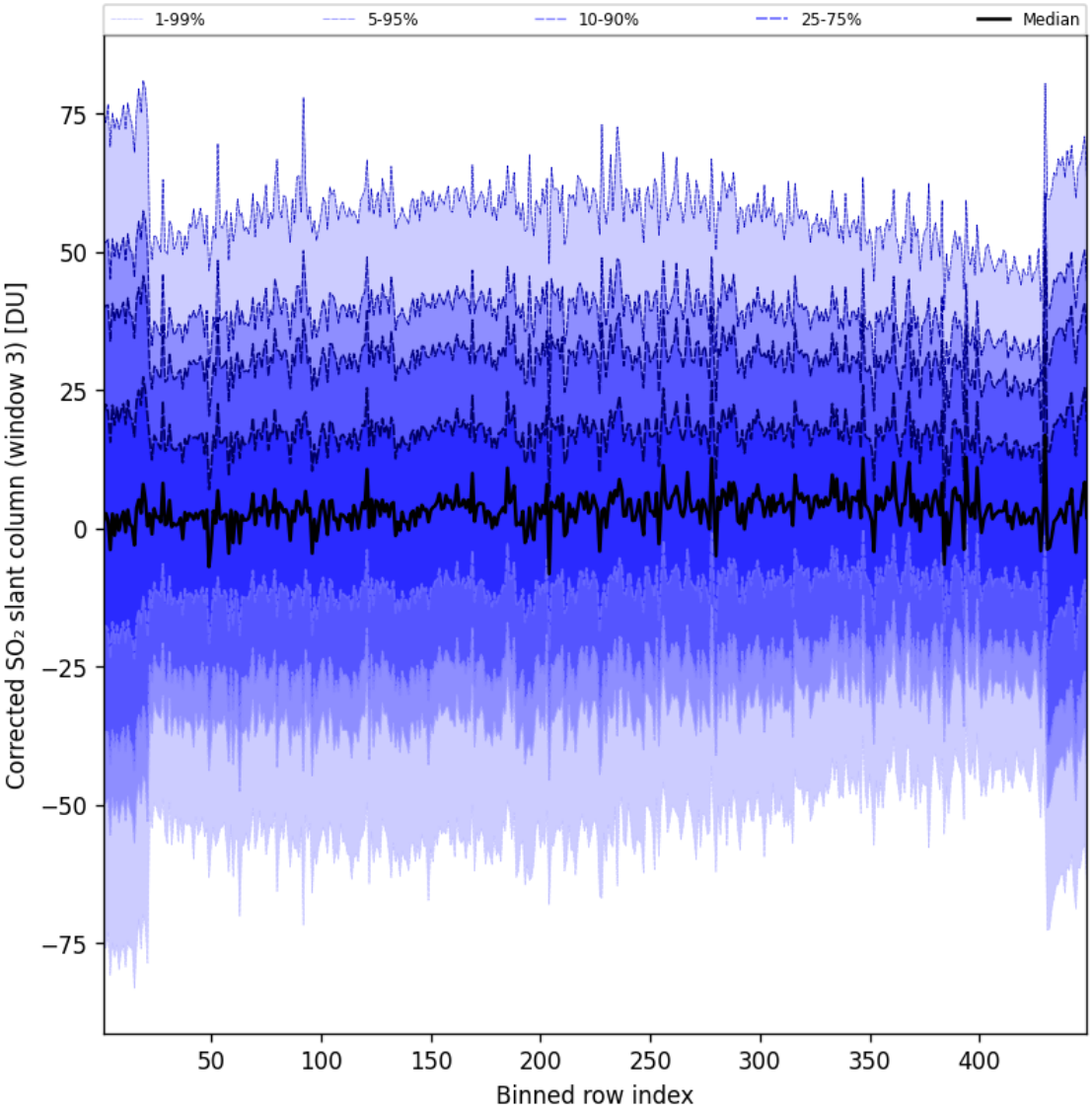


Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-05-10 to 2025-05-11

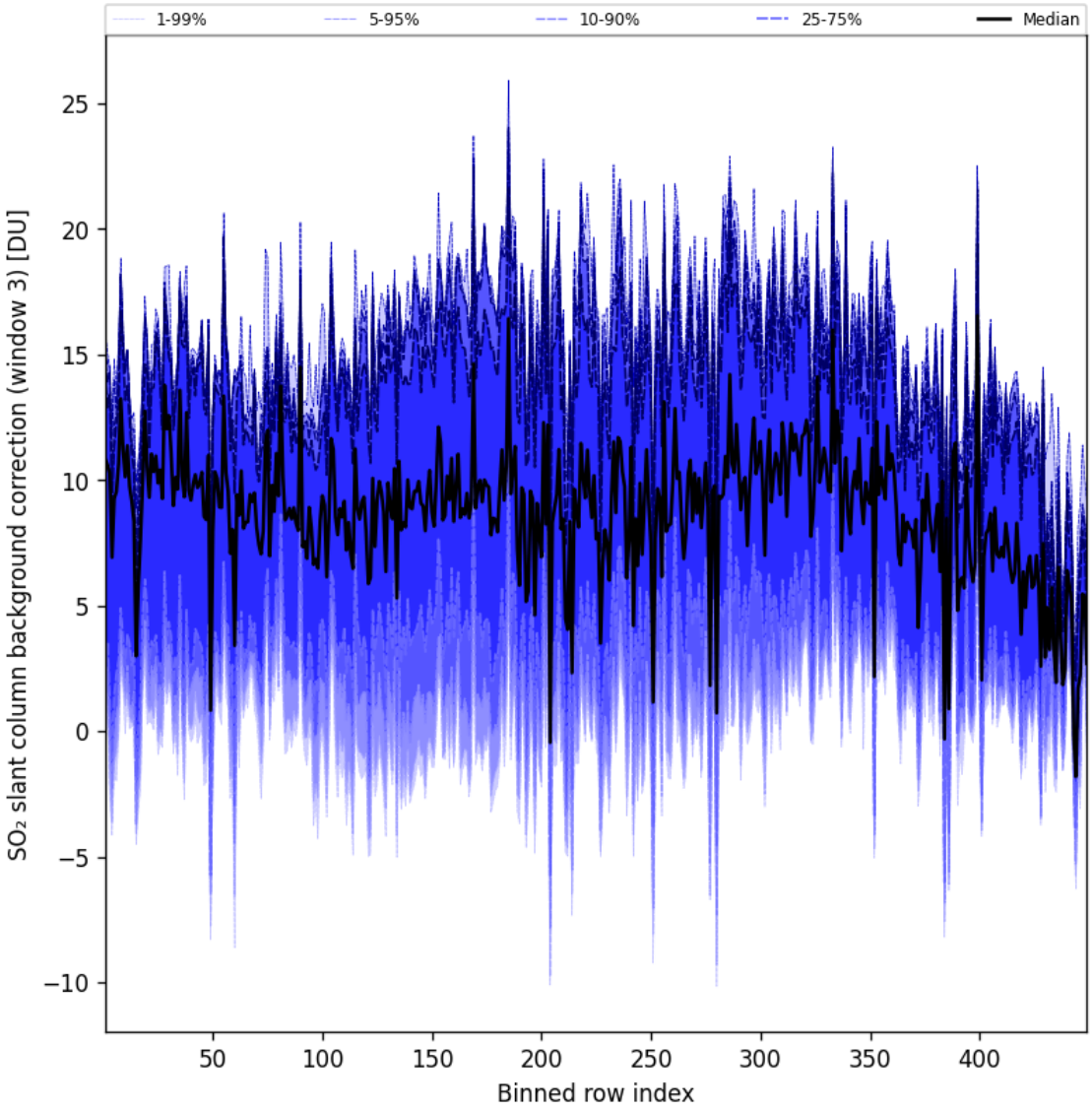


Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-05-10 to 2025-05-11

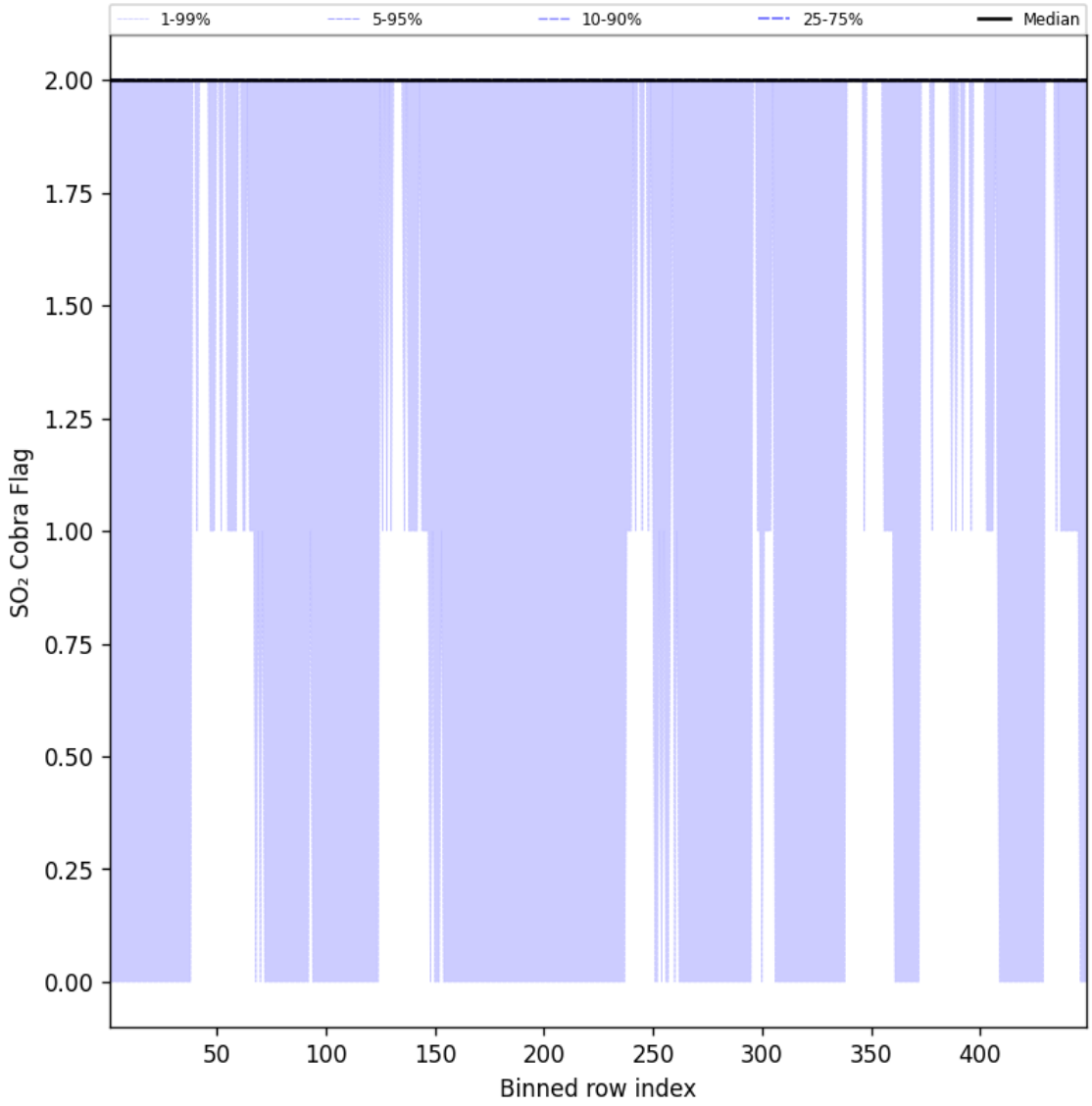


Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-05-10 to 2025-05-11

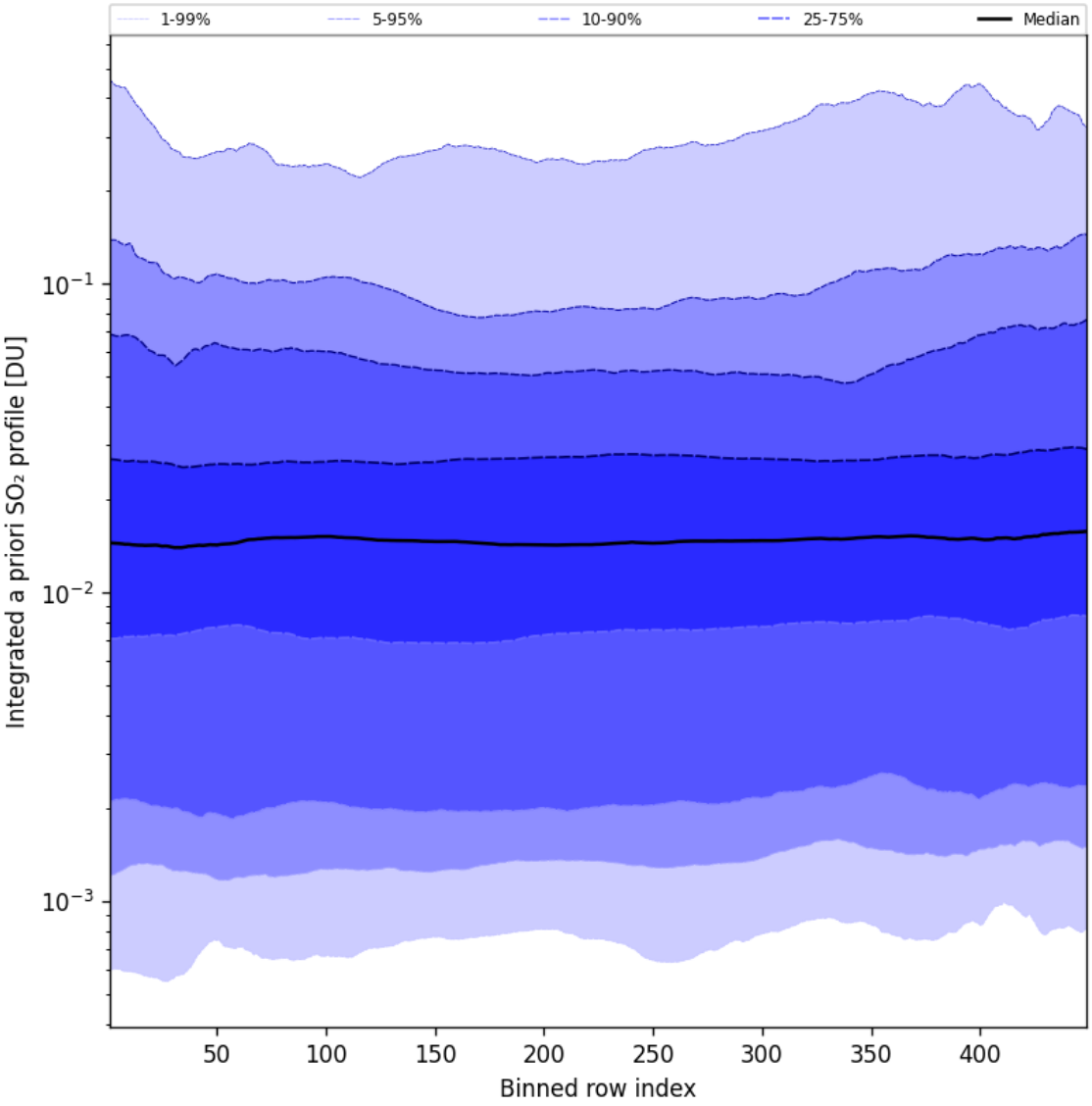
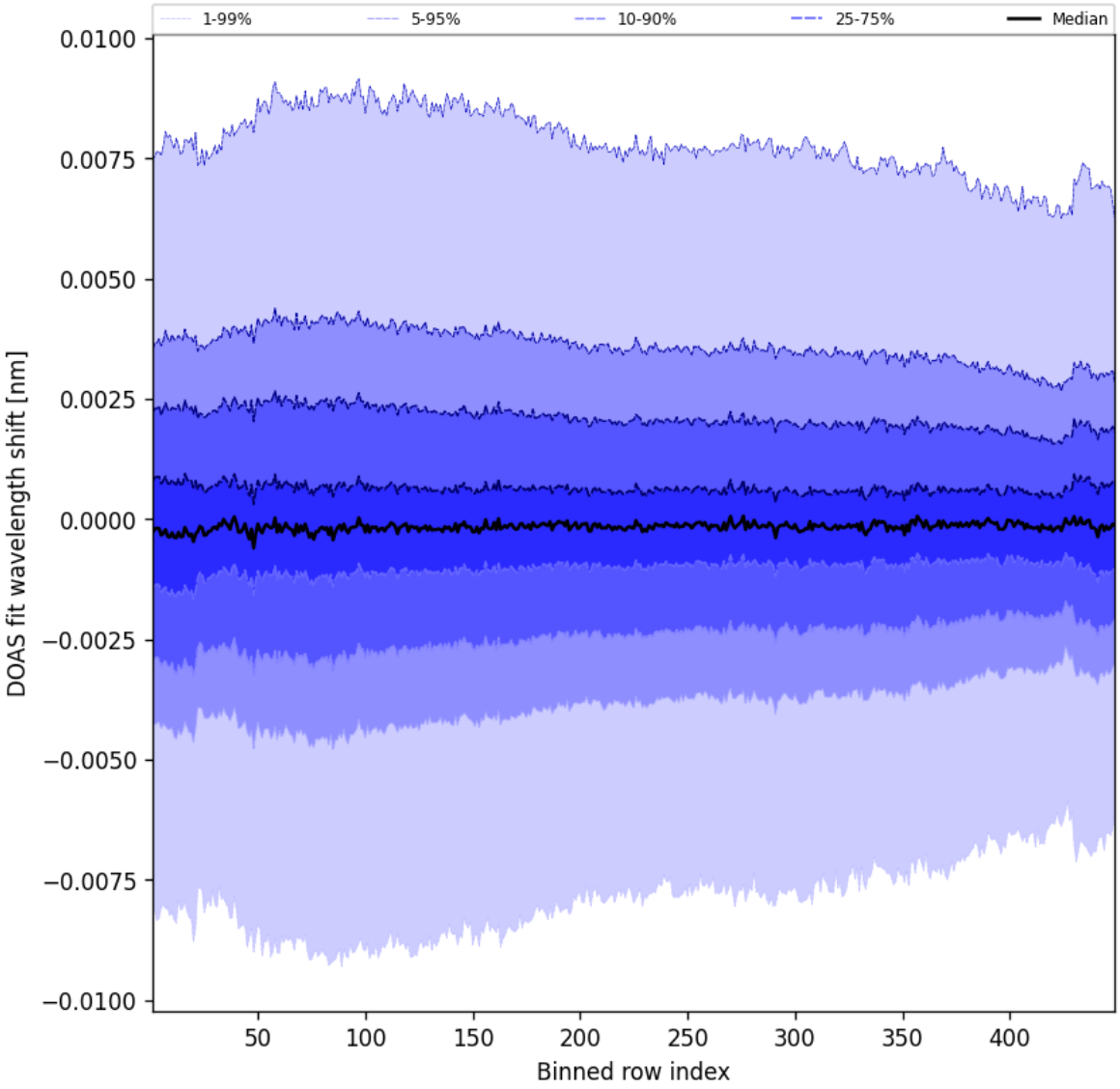


Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-05-10 to 2025-05-11



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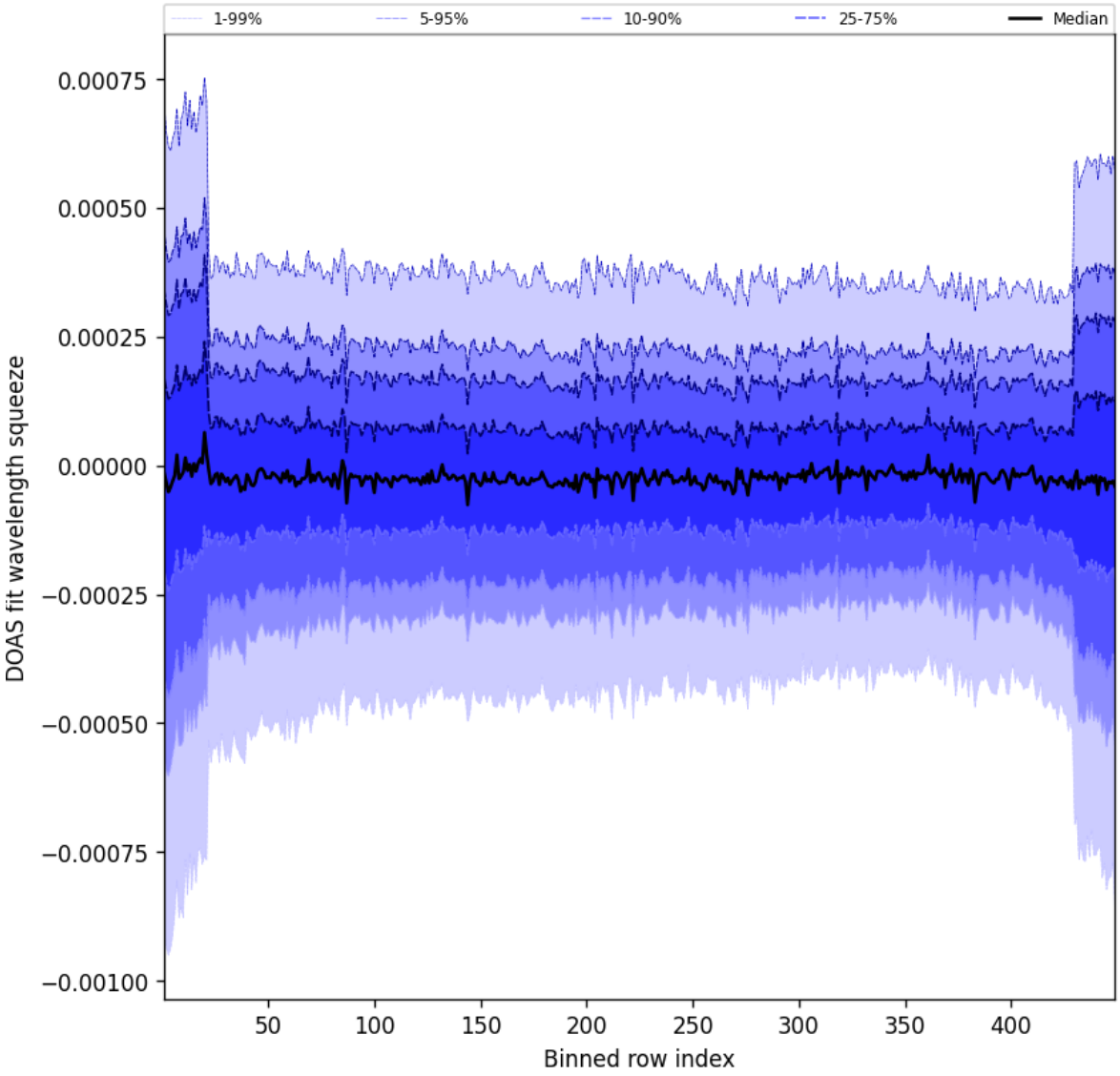

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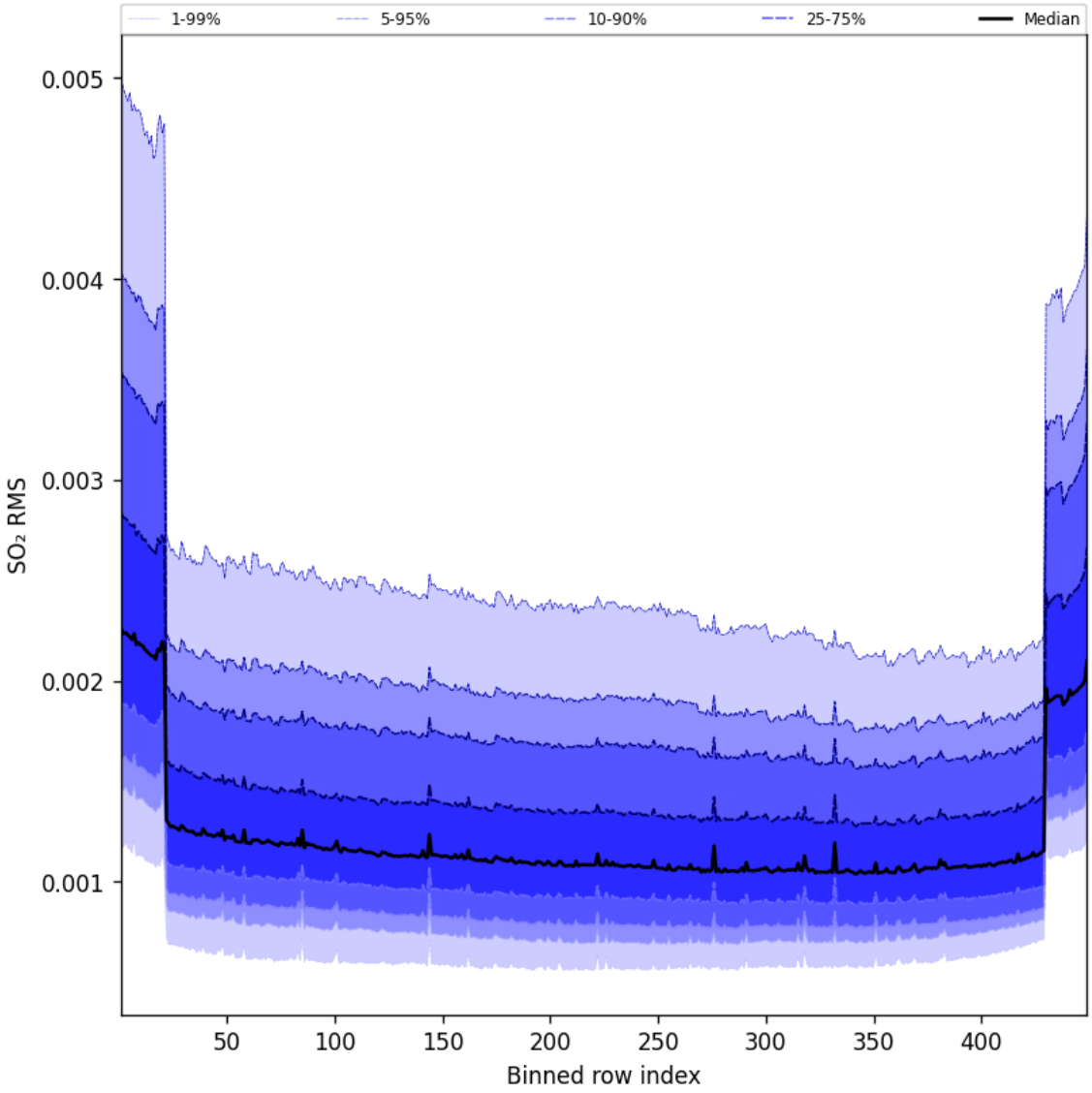

Figure 106: Along track statistics of "SO_2 RMS" for 2025-05-10 to 2025-05-11

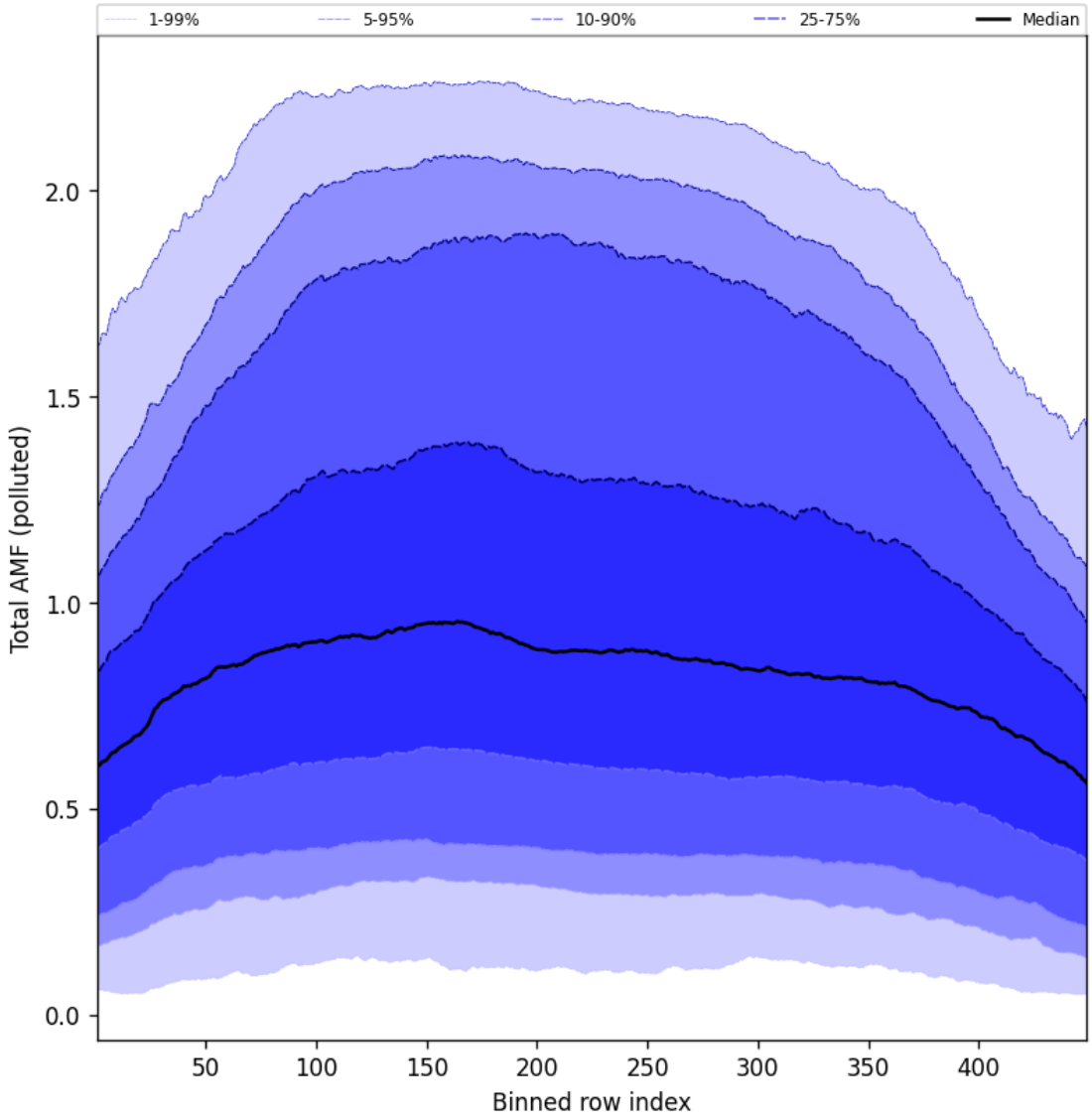

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-05-10 to 2025-05-11

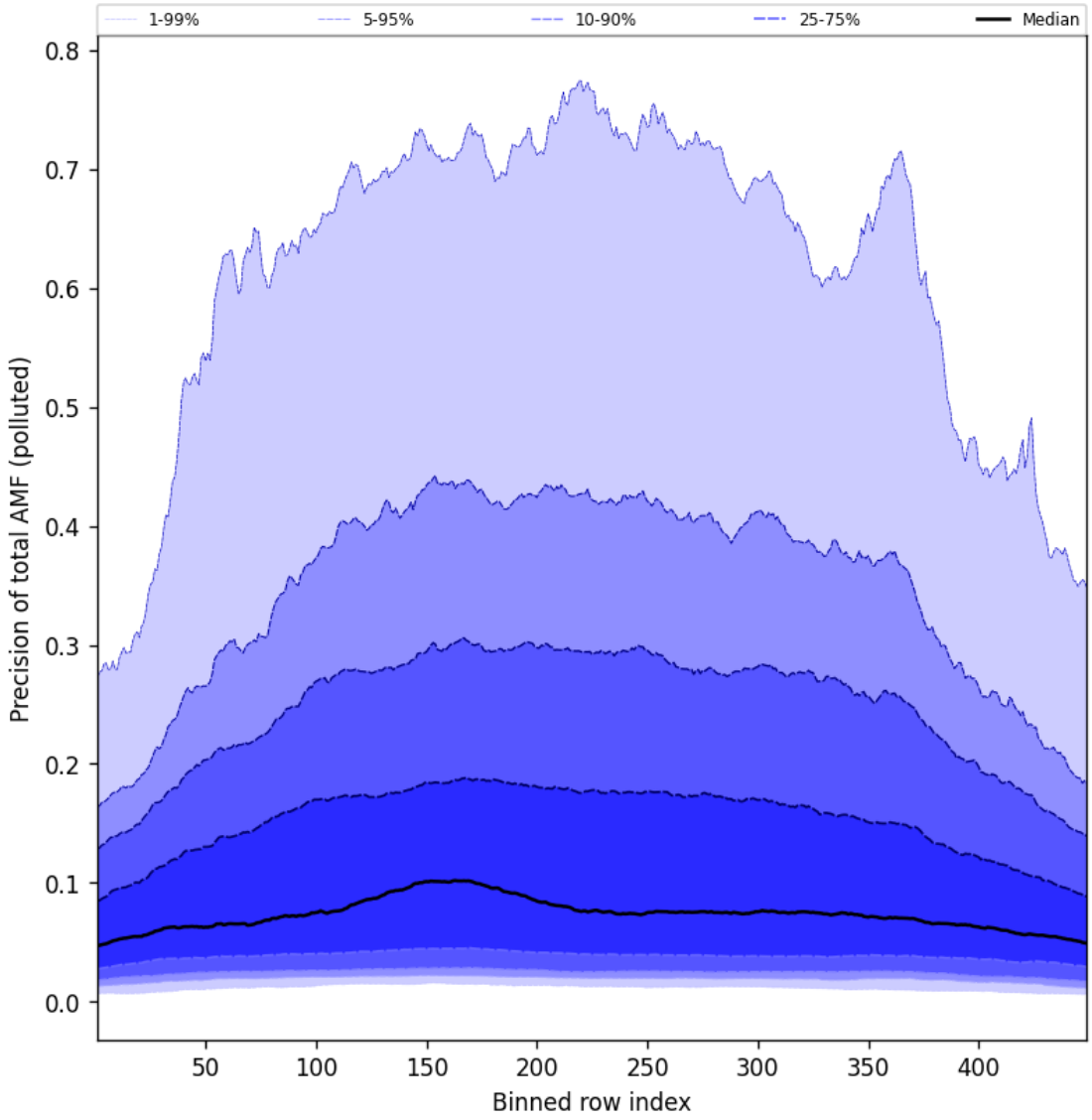

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-05-10 to 2025-05-11

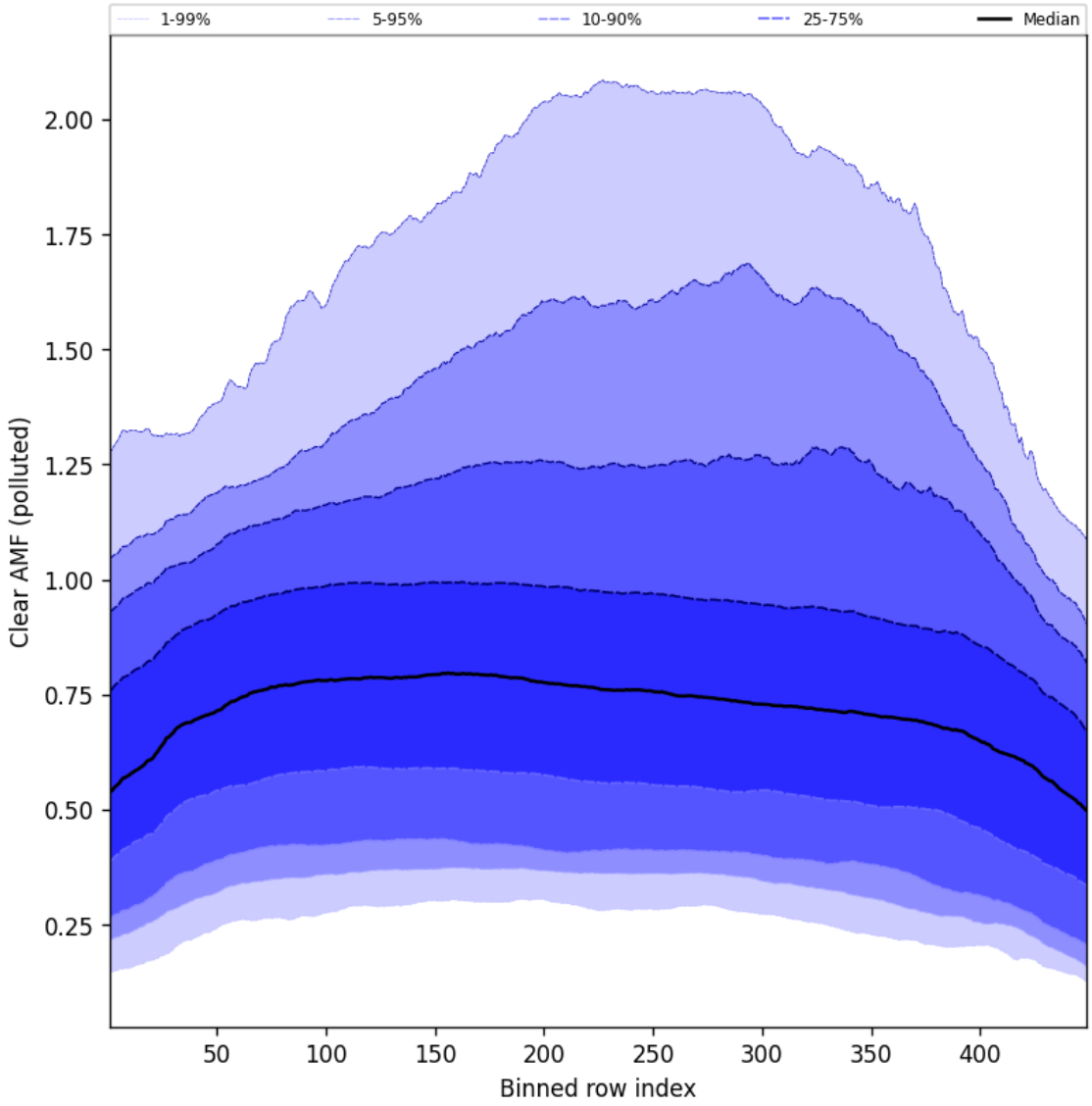

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-05-10 to 2025-05-11

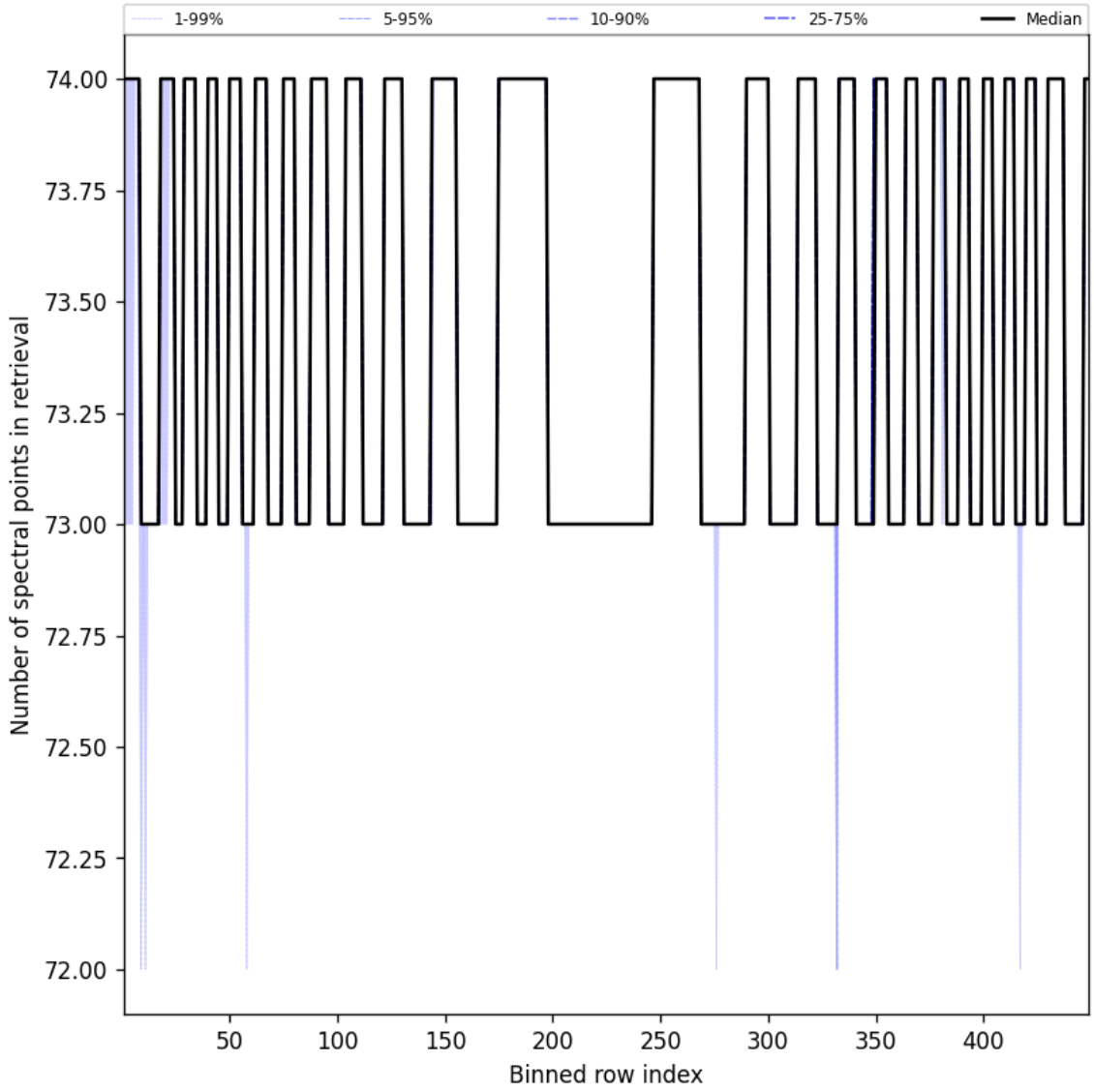

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-05-10 to 2025-05-11

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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