

PyCAMA report generated by tropl2-proc

tropl2-proc

2025-05-17 (05:01)

1 Short Introduction

1.1 The list of parameters

You may want to keep the list given in table 1 at hand when viewing the results.

2 Definitions

The averages shown here are *unweighed* averages:

$$\bar{x} = \frac{1}{N} \sum_{i=1}^N x_i \quad (1)$$

with N the number of observations in the dataset.

The spread of the measurements is indicated with the variance $V(x)$, or rather the standard deviation $\sigma(x) = \sqrt{V(x)}$.

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

We also report the more robust statistics median, minimum, maximum, various percentiles and inter quartile range.

The median m is the value of parameter x for which half of the observations of x is smaller than m :

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^m f(x) dx = \frac{1}{2} \quad (3)$$

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

The median is a special case of a percentile. Instead of 1/2 in equation 3, other threshold values can be used. We report results for 1 %, 5 %, 10 %, 15.9 %, 25 %, 75 %, 84.1 %, 90 %, 95 % and 99 %. The inter quartile range is the difference between the 75 % and 25 % percentiles. Similarly the minimum and maximum values correspond to the 0 % and 100 % percentiles respectively.

For normally distributed parameters the mean and median are the same, while the $\mu \pm \sigma$ values and the 15.9 % and 84.1 % percentiles coincide.

To get a measure for the relation of one variable $x_{(k)}$ with another $x_{(l)}$, we calculate the covariance matrix C_{kl} .

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1} \sum_{i=1}^N (x_{(k),i} - \bar{x}_{(k)})(x_{(l),i} - \bar{x}_{(l)}) \quad (4)$$

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

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

The diagonal elements of the covariance matrix are the variances of the elements, $V(x_{(k)}) = C_{kk}$ and obviously $R_{kk} = 1$.

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm \sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.631 ± 0.408	17351248	0.995	0.790	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.813 \pm 79.809) \times 10^{-2}$	17351248	0.278	0.440	1.072×10^{-2}	-47.2	546
sulfurdioxide total vertical column precision [DU]	0.469 ± 0.537	17351248	0.222	0.313	0.317	4.317×10^{-2}	32.6
sulfurdioxide slant column density corrected [DU]	$(2.011 \pm 39.990) \times 10^{-2}$	17351248	0.258	0.375	9.835×10^{-3}	-14.9	375
sulfurdioxide slant column density cobra [DU]	$(1.987 \pm 36.785) \times 10^{-2}$	17351248	0.258	0.375	9.835×10^{-3}	-14.9	50.2
sulfurdioxide slant column density cobra precision [DU]	0.298 ± 0.127	17351248	0.213	0.129	0.261	8.570×10^{-2}	25.2
sulfurdioxide slant column density window1 [DU]	0.110 ± 0.685	17351248	0.125	0.746	0.113	-214	102
sulfurdioxide slant column density window1 precision [DU]	0.298 ± 0.127	17351248	0.213	0.129	0.261	8.570×10^{-2}	25.2
sulfurdioxide slant column density corrected win1 [DU]	$(2.805 \pm 67.658) \times 10^{-2}$	17351248	-2.500×10^{-2}	0.735	9.319×10^{-3}	-214	103
background so2 slant column offset window1 [DU]	$(-8.241 \pm 13.671) \times 10^{-2}$	17351248	-0.180	0.156	-0.106	-0.655	2.01
sulfurdioxide slant column density window2 [DU]	1.63 ± 8.98	17351248	1.75	11.3	1.59	-1.243×10^3	995
sulfurdioxide slant column density window2 precision [DU]	8.07 ± 2.37	17351248	7.43	2.68	7.72	2.28	749
sulfurdioxide slant column density corrected win2 [DU]	0.415 ± 8.758	17351248	0.250	11.0	0.432	-1.241×10^3	995
background so2 slant column offset window2 [DU]	-1.21 ± 2.24	17351248	0.750	3.37	-0.648	-11.6	6.09
sulfurdioxide slant column density window3 [DU]	-6.70 ± 23.64	17351248	-8.40	29.1	-7.00	-1.083×10^3	704
sulfurdioxide slant column density window3 precision [DU]	28.2 ± 13.7	17351248	21.5	10.4	24.5	9.16	339
sulfurdioxide slant column density corrected win3 [DU]	-1.88 ± 23.12	17351248	-2.80	28.4	-1.73	-1.080×10^3	707
background so2 slant column offset window3 [DU]	4.82 ± 5.54	17351248	9.52	9.49	4.91	-15.4	25.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17351248	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.214 \pm 7.372) \times 10^{-2}$	17351248	1.423×10^{-2}	2.050×10^{-2}	1.471×10^{-2}	2.127×10^{-4}	2.52
fitted radiance shift [nm]	$(-1.560 \pm 26.018) \times 10^{-4}$	17351248	1.000×10^{-4}	1.681×10^{-3}	-1.499×10^{-4}	-5.551×10^{-2}	4.665×10^{-2}
fitted radiance squeeze [1]	$(-3.036 \pm 18.214) \times 10^{-5}$	17351248	-1.000×10^{-5}	2.087×10^{-4}	-2.592×10^{-5}	-1.935×10^{-2}	3.430×10^{-2}
fitted root mean square [1]	$(1.293 \pm 0.517) \times 10^{-3}$	17351248	1.025×10^{-3}	5.261×10^{-4}	1.151×10^{-3}	3.421×10^{-4}	0.106
sulfurdioxide total air mass factor polluted [1]	0.921 ± 0.478	17351248	0.780	0.582	0.830	5.000×10^{-2}	2.87
sulfurdioxide total air mass factor polluted precision [1]	0.116 ± 0.127	17351248	3.500×10^{-2}	0.113	7.163×10^{-2}	4.439×10^{-3}	1.98
sulfurdioxide clear air mass factor polluted [1]	0.762 ± 0.321	17351248	0.820	0.385	0.732	8.932×10^{-2}	2.69
number of spectral points in retrieval [1]	73.4 ± 0.5	17351248	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	3.000×10^{-2}	9.000×10^{-2}	0.210	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-1.94	-0.808	-0.507	-0.346	-0.206	0.234	0.386	0.565	0.906	2.24
sulfurdioxide total vertical column precision [DU]	9.866×10^{-2}	0.129	0.157	0.183	0.216	0.529	0.691	0.873	1.23	2.77
sulfurdioxide slant column density corrected [DU]	-0.857	-0.499	-0.363	-0.272	-0.175	0.199	0.301	0.401	0.559	1.04
sulfurdioxide slant column density cobra [DU]	-0.857	-0.499	-0.363	-0.272	-0.175	0.199	0.301	0.401	0.559	1.04
sulfurdioxide slant column density cobra precision [DU]	0.146	0.174	0.188	0.199	0.214	0.344	0.394	0.446	0.543	0.763
sulfurdioxide slant column density window1 [DU]	-1.70	-0.944	-0.655	-0.463	-0.263	0.484	0.678	0.865	1.15	1.93
sulfurdioxide slant column density window1 precision [DU]	0.146	0.174	0.188	0.199	0.214	0.344	0.394	0.446	0.543	0.763
sulfurdioxide slant column density corrected win1 [DU]	-1.64	-0.973	-0.714	-0.539	-0.352	0.383	0.585	0.782	1.09	1.92
background so2 slant column offset window1 [DU]	-0.367	-0.253	-0.209	-0.192	-0.173	-1.784×10^{-2}	3.907×10^{-2}	9.053×10^{-2}	0.169	0.363
sulfurdioxide slant column density window2 [DU]	-19.8	-12.8	-9.40	-6.88	-4.07	7.26	10.1	12.7	16.2	23.6
sulfurdioxide slant column density window2 precision [DU]	4.23	5.05	5.57	6.00	6.53	9.21	10.1	11.0	12.3	15.0
sulfurdioxide slant column density corrected win2 [DU]	-20.9	-13.7	-10.3	-7.83	-5.06	5.90	8.64	11.1	14.5	21.6
background so2 slant column offset window2 [DU]	-6.73	-5.41	-4.56	-3.79	-2.77	0.600	0.899	1.11	1.42	2.29
sulfurdioxide slant column density window3 [DU]	-66.1	-44.9	-35.3	-28.5	-21.3	7.80	15.6	22.8	32.5	52.1
sulfurdioxide slant column density window3 precision [DU]	13.2	15.6	17.6	19.1	20.7	31.0	35.8	41.5	53.7	86.7
sulfurdioxide slant column density corrected win3 [DU]	-60.9	-40.0	-30.2	-23.3	-15.9	12.4	19.7	26.4	35.7	54.8
background so2 slant column offset window3 [DU]	-6.19	-3.72	-2.35	-1.24	0.113	9.60	10.9	11.8	13.1	15.2
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]	7.344×10^{-4}	1.457×10^{-3}	2.566×10^{-3}	4.352×10^{-3}	7.455×10^{-3}	2.796×10^{-2}	4.097×10^{-2}	6.183×10^{-2}	0.114	0.340
fitted radiance shift [nm]	-8.166×10^{-3}	-3.981×10^{-3}	-2.506×10^{-3}	-1.686×10^{-3}	-1.023×10^{-3}	6.581×10^{-4}	1.321×10^{-3}	2.192×10^{-3}	3.747×10^{-3}	8.102×10^{-3}
fitted radiance squeeze [1]	-5.234×10^{-4}	-3.247×10^{-4}	-2.436×10^{-4}	-1.890×10^{-4}	-1.320×10^{-4}	7.672×10^{-5}	1.293×10^{-4}	1.783×10^{-4}	2.488×10^{-4}	4.165×10^{-4}
fitted root mean square [1]	5.994×10^{-4}	7.434×10^{-4}	8.254×10^{-4}	8.867×10^{-4}	9.597×10^{-4}	1.486×10^{-3}	1.722×10^{-3}	1.956×10^{-3}	2.288×10^{-3}	3.131×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.124	0.282	0.380	0.469	0.583	1.17	1.42	1.65	1.91	2.20
sulfurdioxide total air mass factor polluted precision [1]	1.210×10^{-2}	1.987×10^{-2}	2.587×10^{-2}	3.159×10^{-2}	3.912×10^{-2}	0.152	0.199	0.250	0.345	0.618
sulfurdioxide clear air mass factor polluted [1]	0.236	0.327	0.391	0.452	0.537	0.921	1.02	1.14	1.38	1.84
number of spectral points in retrieval [1]	73.0	73.0	73.0	73.0	73.0	74.0	74.0	74.0	74.0	74.0

Table 3: Parameterlist and basic statistics for the analysis for observations in the northern hemisphere

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.571 ± 0.416	11673736	0.850	0.490	0.0	1.000	0.150	1.000
sulfurdioxide total vertical column [DU]	$(2.784 \pm 80.938) \times 10^{-2}$	11673736	0.418	9.554×10^{-3}	-38.5	81.6	-0.196	0.222
sulfurdioxide total vertical column precision [DU]	0.465 ± 0.579	11673736	0.310	0.298	4.317×10^{-2}	21.6	0.202	0.513
sulfurdioxide slant column density corrected [DU]	$(1.996 \pm 37.190) \times 10^{-2}$	11673736	0.359	8.904×10^{-3}	-6.96	77.5	-0.169	0.191
sulfurdioxide slant column density cobra [DU]	$(1.973 \pm 35.681) \times 10^{-2}$	11673736	0.359	8.904×10^{-3}	-6.96	19.6	-0.169	0.191
sulfurdioxide slant column density cobra precision [DU]	0.285 ± 0.122	11673736	0.118	0.248	8.570×10^{-2}	6.60	0.207	0.325
sulfurdioxide slant column density window1 [DU]	$(9.903 \pm 66.478) \times 10^{-2}$	11673736	0.721	0.105	-10.3	25.7	-0.259	0.461
sulfurdioxide slant column density window1 precision [DU]	0.285 ± 0.122	11673736	0.118	0.248	8.570×10^{-2}	6.60	0.207	0.325
sulfurdioxide slant column density corrected win1 [DU]	$(2.701 \pm 65.275) \times 10^{-2}$	11673736	0.706	7.846×10^{-3}	-10.3	26.0	-0.339	0.367
background so2 slant column offset window1 [DU]	$(-7.202 \pm 15.043) \times 10^{-2}$	11673736	0.188	-0.103	-0.655	1.91	-0.178	1.015×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.82 ± 8.37	11673736	10.8	1.81	-268	475	-3.57	7.19
sulfurdioxide slant column density window2 precision [DU]	7.57 ± 2.06	11673736	2.34	7.26	2.28	334	6.20	8.53
sulfurdioxide slant column density corrected win2 [DU]	0.338 ± 8.080	11673736	10.3	0.385	-276	471	-4.80	5.53
background so2 slant column offset window2 [DU]	-1.48 ± 2.44	11673736	4.10	-1.09	-11.6	6.09	-3.41	0.689
sulfurdioxide slant column density window3 [DU]	-7.13 ± 21.84	11673736	26.9	-7.61	-185	156	-20.8	6.14
sulfurdioxide slant column density window3 precision [DU]	26.3 ± 13.3	11673736	8.17	22.7	9.16	234	19.6	27.8
sulfurdioxide slant column density corrected win3 [DU]	-1.73 ± 21.21	11673736	26.2	-1.63	-189	162	-14.7	11.5
background so2 slant column offset window3 [DU]	5.40 ± 5.86	11673736	10.4	6.88	-15.4	19.2	-0.100	10.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	11673736	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.590 \pm 8.290) \times 10^{-2}$	11673736	2.627×10^{-2}	1.314×10^{-2}	2.127×10^{-4}	2.08	5.147×10^{-3}	3.142×10^{-2}
fitted radiance shift [nm]	$(-2.208 \pm 257.763) \times 10^{-5}$	11673736	1.544×10^{-3}	-3.752×10^{-5}	-4.151×10^{-2}	3.854×10^{-2}	-8.164×10^{-4}	7.279×10^{-4}
fitted radiance squeeze [1]	$(-5.393 \pm 17.301) \times 10^{-5}$	11673736	2.009×10^{-4}	-4.295×10^{-5}	-5.010×10^{-3}	1.475×10^{-2}	-1.476×10^{-4}	5.334×10^{-5}
fitted root mean square [1]	$(1.245 \pm 0.506) \times 10^{-3}$	11673736	4.822×10^{-4}	1.101×10^{-3}	3.503×10^{-4}	2.206×10^{-2}	9.272×10^{-4}	1.409×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.949 ± 0.528	11673736	0.714	0.841	5.000×10^{-2}	2.87	0.548	1.26
sulfurdioxide total air mass factor polluted precision [1]	0.130 ± 0.145	11673736	0.132	7.892×10^{-2}	4.466×10^{-3}	1.98	3.961×10^{-2}	0.172
sulfurdioxide clear air mass factor polluted [1]	0.764 ± 0.362	11673736	0.452	0.714	8.932×10^{-2}	2.69	0.490	0.942
number of spectral points in retrieval [1]	73.5 ± 0.5	11673736	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]	0.754 ± 0.360	5677512	0.570	1.000	0.0	1.000	0.430	1.000
sulfurdioxide total vertical column [DU]	$(2.873 \pm 77.437) \times 10^{-2}$	5677512	0.489	1.360×10^{-2}	-47.2	546	-0.228	0.261
sulfurdioxide total vertical column precision [DU]	0.479 ± 0.436	5677512	0.307	0.354	5.227×10^{-2}	32.6	0.248	0.556
sulfurdioxide slant column density corrected [DU]	$(2.040 \pm 45.205) \times 10^{-2}$	5677512	0.409	1.202×10^{-2}	-14.9	375	-0.191	0.218
sulfurdioxide slant column density cobra [DU]	$(2.016 \pm 38.957) \times 10^{-2}$	5677512	0.409	1.202×10^{-2}	-14.9	50.2	-0.191	0.218
sulfurdioxide slant column density cobra precision [DU]	0.324 ± 0.134	5677512	0.139	0.293	9.677×10^{-2}	25.2	0.235	0.374
sulfurdioxide slant column density window1 [DU]	0.134 ± 0.724	5677512	0.803	0.131	-214	102	-0.270	0.533
sulfurdioxide slant column density window1 precision [DU]	0.324 ± 0.134	5677512	0.139	0.293	9.677×10^{-2}	25.2	0.235	0.374
sulfurdioxide slant column density corrected win1 [DU]	$(3.020 \pm 72.311) \times 10^{-2}$	5677512	0.800	1.278×10^{-2}	-214	103	-0.381	0.418
background so2 slant column offset window1 [DU]	-0.104 ± 0.100	5677512	9.459×10^{-2}	-0.109	-0.556	2.01	-0.159	-6.421×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.22 ± 10.10	5677512	12.6	1.05	-1.243×10^3	995	-5.16	7.41
sulfurdioxide slant column density window2 precision [DU]	9.11 ± 2.61	5677512	2.83	8.76	2.29	749	7.51	10.3
sulfurdioxide slant column density corrected win2 [DU]	0.571 ± 10.007	5677512	12.5	0.549	-1.241×10^3	995	-5.67	6.79
background so2 slant column offset window2 [DU]	-0.651 ± 1.587	5677512	1.99	-0.255	-9.36	5.83	-1.52	0.470
sulfurdioxide slant column density window3 [DU]	-5.82 ± 26.95	5677512	34.1	-5.43	-1.083×10^3	704	-22.6	11.5
sulfurdioxide slant column density window3 precision [DU]	32.1 ± 13.6	5677512	10.8	28.7	9.65	339	24.4	35.2
sulfurdioxide slant column density corrected win3 [DU]	-2.19 ± 26.63	5677512	33.8	-2.01	-1.080×10^3	707	-18.9	14.9
background so2 slant column offset window3 [DU]	3.63 ± 4.57	5677512	6.47	2.60	-12.6	25.8	0.329	6.80
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.26	5677512	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.443 \pm 4.889) \times 10^{-2}$	5677512	1.420×10^{-2}	1.666×10^{-2}	1.206×10^{-3}	2.52	1.094×10^{-2}	2.514×10^{-2}
fitted radiance shift [nm]	$(-4.314 \pm 26.294) \times 10^{-4}$	5677512	1.882×10^{-3}	-4.329×10^{-4}	-5.551×10^{-2}	4.665×10^{-2}	-1.415×10^{-3}	4.666×10^{-4}
fitted radiance squeeze [1]	$(1.810 \pm 19.067) \times 10^{-5}$	5677512	2.227×10^{-4}	1.351×10^{-5}	-1.935×10^{-2}	3.430×10^{-2}	-9.601×10^{-5}	1.267×10^{-4}
fitted root mean square [1]	$(1.391 \pm 0.523) \times 10^{-3}$	5677512	5.632×10^{-4}	1.263×10^{-3}	3.421×10^{-4}	0.106	1.046×10^{-3}	1.609×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.863 ± 0.345	5677512	0.405	0.814	5.000×10^{-2}	2.76	0.636	1.04
sulfurdioxide total air mass factor polluted precision [1]	$(8.833 \pm 7.044) \times 10^{-2}$	5677512	8.314×10^{-2}	6.025×10^{-2}	4.439×10^{-3}	1.28	3.859×10^{-2}	0.122
sulfurdioxide clear air mass factor polluted [1]	0.759 ± 0.211	5677512	0.275	0.753	9.386×10^{-2}	1.72	0.616	0.892
number of spectral points in retrieval [1]	73.4 ± 0.5	5677512	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]	0.674 ± 0.389	11323254	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(2.618 \pm 74.593) \times 10^{-2}$	11323254	0.449	1.106×10^{-2}	-32.6	228	-0.211	0.238
sulfurdioxide total vertical column precision [DU]	0.462 ± 0.496	11323254	0.301	0.316	5.528×10^{-2}	21.8	0.224	0.525
sulfurdioxide slant column density corrected [DU]	$(1.826 \pm 36.889) \times 10^{-2}$	11323254	0.377	9.820×10^{-3}	-8.96	209	-0.177	0.200
sulfurdioxide slant column density cobra [DU]	$(1.823 \pm 36.284) \times 10^{-2}$	11323254	0.377	9.820×10^{-3}	-8.96	35.4	-0.177	0.200
sulfurdioxide slant column density cobra precision [DU]	0.301 ± 0.130	11323254	0.142	0.265	8.570×10^{-2}	14.9	0.213	0.355
sulfurdioxide slant column density window1 [DU]	0.109 ± 0.688	11323254	0.756	0.118	-53.7	102	-0.264	0.491
sulfurdioxide slant column density window1 precision [DU]	0.301 ± 0.130	11323254	0.142	0.265	8.570×10^{-2}	14.9	0.213	0.355
sulfurdioxide slant column density corrected win1 [DU]	$(2.662 \pm 67.857) \times 10^{-2}$	11323254	0.745	1.080×10^{-2}	-53.7	103	-0.357	0.389
background so2 slant column offset window1 [DU]	$(-8.232 \pm 14.039) \times 10^{-2}$	11323254	0.153	-0.108	-0.655	2.01	-0.174	-2.102×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.55 ± 9.02	11323254	11.4	1.45	-818	995	-4.23	7.21
sulfurdioxide slant column density window2 precision [DU]	8.12 ± 2.23	11323254	2.61	7.78	2.29	422	6.63	9.24
sulfurdioxide slant column density corrected win2 [DU]	0.463 ± 8.811	11323254	11.1	0.481	-817	995	-5.09	6.02
background so2 slant column offset window2 [DU]	-1.08 ± 2.25	11323254	3.24	-0.405	-11.6	6.09	-2.57	0.669
sulfurdioxide slant column density window3 [DU]	-4.32 ± 24.01	11323254	30.0	-4.72	-311	649	-19.4	10.6
sulfurdioxide slant column density window3 precision [DU]	27.5 ± 11.8	11323254	9.38	24.4	9.45	339	20.9	30.3
sulfurdioxide slant column density corrected win3 [DU]	$(5.079 \pm 2318.518) \times 10^{-2}$	11323254	28.9	-9.880×10^{-2}	-313	656	-14.4	14.5
background so2 slant column offset window3 [DU]	4.37 ± 5.56	11323254	9.47	3.84	-15.4	25.8	-0.236	9.24
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	11323254	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.202 \pm 3.847) \times 10^{-2}$	11323254	1.535×10^{-2}	1.435×10^{-2}	3.382×10^{-4}	2.07	8.507×10^{-3}	2.386×10^{-2}
fitted radiance shift [nm]	$(-2.018 \pm 22.959) \times 10^{-4}$	11323254	1.614×10^{-3}	-1.840×10^{-4}	-4.960×10^{-2}	3.441×10^{-2}	-1.030×10^{-3}	5.837×10^{-4}
fitted radiance squeeze [1]	$(-2.331 \pm 18.486) \times 10^{-5}$	11323254	2.104×10^{-4}	-1.826×10^{-5}	-1.649×10^{-2}	3.430×10^{-2}	-1.256×10^{-4}	8.485×10^{-5}
fitted root mean square [1]	$(1.313 \pm 0.530) \times 10^{-3}$	11323254	5.849×10^{-4}	1.163×10^{-3}	3.503×10^{-4}	6.396×10^{-2}	9.566×10^{-4}	1.542×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.893 ± 0.421	11323254	0.498	0.833	5.000×10^{-2}	2.37	0.604	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.101 ± 0.112	11323254	8.613×10^{-2}	6.388×10^{-2}	4.690×10^{-3}	1.97	3.956×10^{-2}	0.126
sulfurdioxide clear air mass factor polluted [1]	0.780 ± 0.313	11323254	0.363	0.761	9.761×10^{-2}	2.34	0.569	0.932
number of spectral points in retrieval [1]	73.4 ± 0.5	11323254	1.000	73.0	70.0	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]	0.607 ± 0.429	4196956	0.870	1.000	0.0	1.000	0.130	1.000
sulfurdioxide total vertical column [DU]	$(2.632 \pm 81.218) \times 10^{-2}$	4196956	0.433	9.305×10^{-3}	-47.2	164	-0.203	0.230
sulfurdioxide total vertical column precision [DU]	0.477 ± 0.568	4196956	0.327	0.328	4.317×10^{-2}	30.8	0.206	0.533
sulfurdioxide slant column density corrected [DU]	$(1.939 \pm 39.931) \times 10^{-2}$	4196956	0.363	8.680×10^{-3}	-14.9	269	-0.171	0.192
sulfurdioxide slant column density cobra [DU]	$(1.900 \pm 35.409) \times 10^{-2}$	4196956	0.363	8.680×10^{-3}	-14.9	50.2	-0.171	0.192
sulfurdioxide slant column density cobra precision [DU]	0.285 ± 0.117	4196956	0.101	0.252	9.576×10^{-2}	25.2	0.214	0.316
sulfurdioxide slant column density window1 [DU]	0.133 ± 0.656	4196956	0.716	0.125	-214	69.4	-0.232	0.484
sulfurdioxide slant column density window1 precision [DU]	0.285 ± 0.117	4196956	0.101	0.252	9.576×10^{-2}	25.2	0.214	0.316
sulfurdioxide slant column density corrected win1 [DU]	$(2.962 \pm 64.960) \times 10^{-2}$	4196956	0.705	9.555×10^{-3}	-214	69.6	-0.336	0.368
background so2 slant column offset window1 [DU]	-0.104 ± 0.120	4196956	0.136	-0.122	-0.558	1.21	-0.180	-4.414×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.37 ± 9.06	4196956	11.3	1.41	-1.243×10^3	956	-4.26	7.02
sulfurdioxide slant column density window2 precision [DU]	8.15 ± 2.70	4196956	2.80	7.76	2.28	749	6.51	9.31
sulfurdioxide slant column density corrected win2 [DU]	0.355 ± 8.858	4196956	10.9	0.367	-1.241×10^3	956	-5.10	5.81
background so2 slant column offset window2 [DU]	-1.01 ± 2.08	4196956	2.97	-0.496	-10.8	6.09	-2.36	0.612
sulfurdioxide slant column density window3 [DU]	-11.3 ± 23.0	4196956	28.0	-11.0	-903	704	-25.1	2.86
sulfurdioxide slant column density window3 precision [DU]	30.5 ± 17.3	4196956	13.2	25.5	9.16	331	20.5	33.8
sulfurdioxide slant column density corrected win3 [DU]	-6.64 ± 23.31	4196956	28.5	-5.78	-899	707	-20.5	8.01
background so2 slant column offset window3 [DU]	4.70 ± 5.38	4196956	9.12	4.75	-12.6	22.0	0.193	9.31
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.11	4196956	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.572 \pm 11.216) \times 10^{-2}$	4196956	4.881×10^{-2}	1.971×10^{-2}	2.127×10^{-4}	2.52	6.608×10^{-3}	5.541×10^{-2}
fitted radiance shift [nm]	$(-6.418 \pm 324.831) \times 10^{-5}$	4196956	1.867×10^{-3}	-7.574×10^{-5}	-5.551×10^{-2}	4.665×10^{-2}	-1.024×10^{-3}	8.431×10^{-4}
fitted radiance squeeze [1]	$(-3.395 \pm 17.427) \times 10^{-5}$	4196956	2.029×10^{-4}	-3.127×10^{-5}	-1.935×10^{-2}	1.352×10^{-2}	-1.335×10^{-4}	6.940×10^{-5}
fitted root mean square [1]	$(1.232 \pm 0.463) \times 10^{-3}$	4196956	4.127×10^{-4}	1.121×10^{-3}	3.421×10^{-4}	0.106	9.569×10^{-4}	1.370×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.930 ± 0.541	4196956	0.690	0.781	5.000×10^{-2}	2.87	0.535	1.22
sulfurdioxide total air mass factor polluted precision [1]	0.141 ± 0.146	4196956	0.161	9.626×10^{-2}	4.439×10^{-3}	1.94	3.599×10^{-2}	0.197
sulfurdioxide clear air mass factor polluted [1]	0.714 ± 0.317	4196956	0.368	0.669	8.932×10^{-2}	2.69	0.488	0.856
number of spectral points in retrieval [1]	73.4 ± 0.5	4196956	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

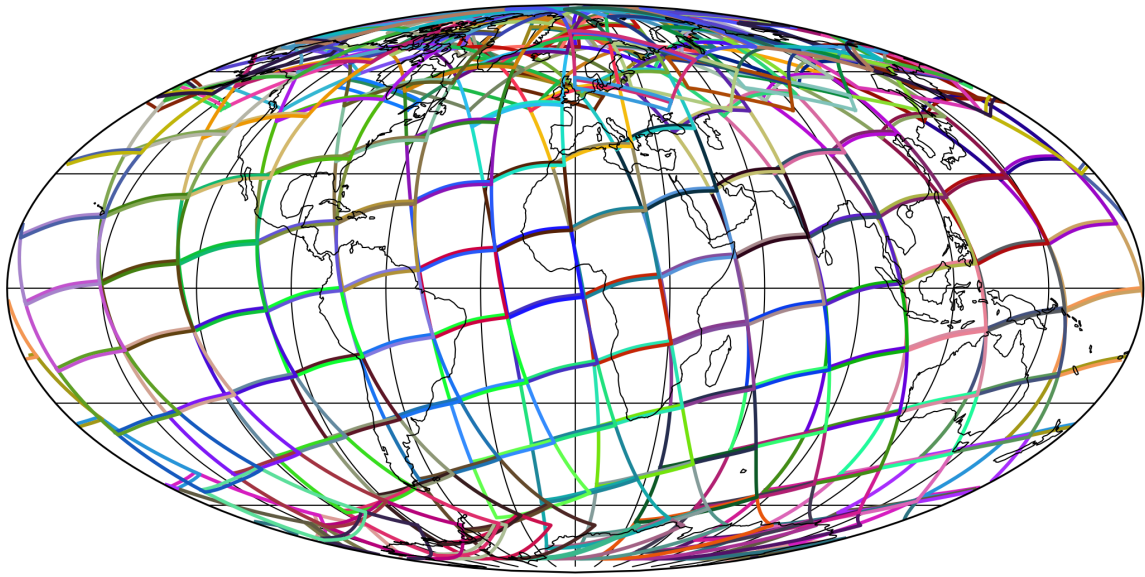


Figure 1: Outline of the granules.

4 Input data monitoring

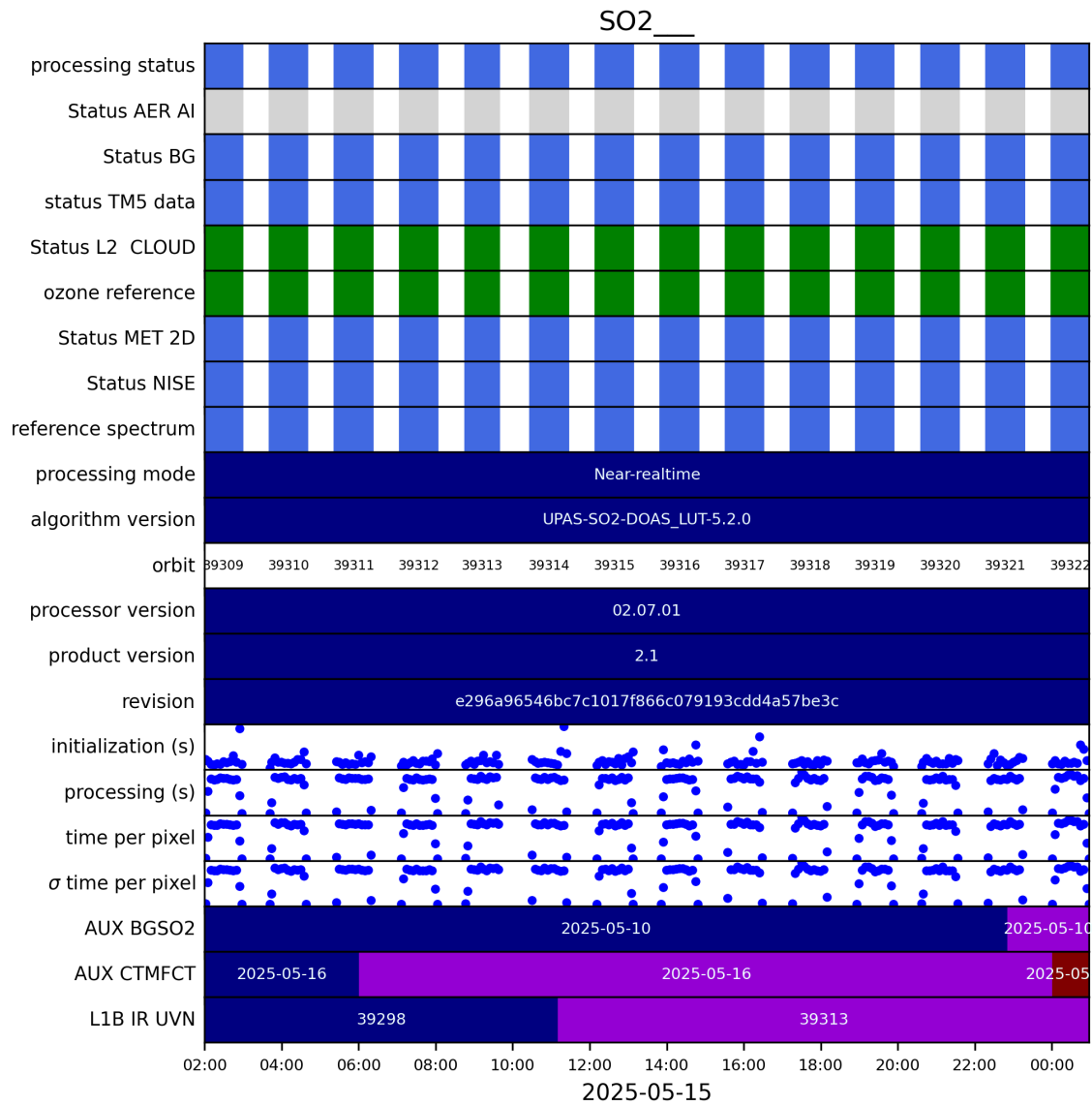


Figure 2: Input data per granule

5 Warnings and errors

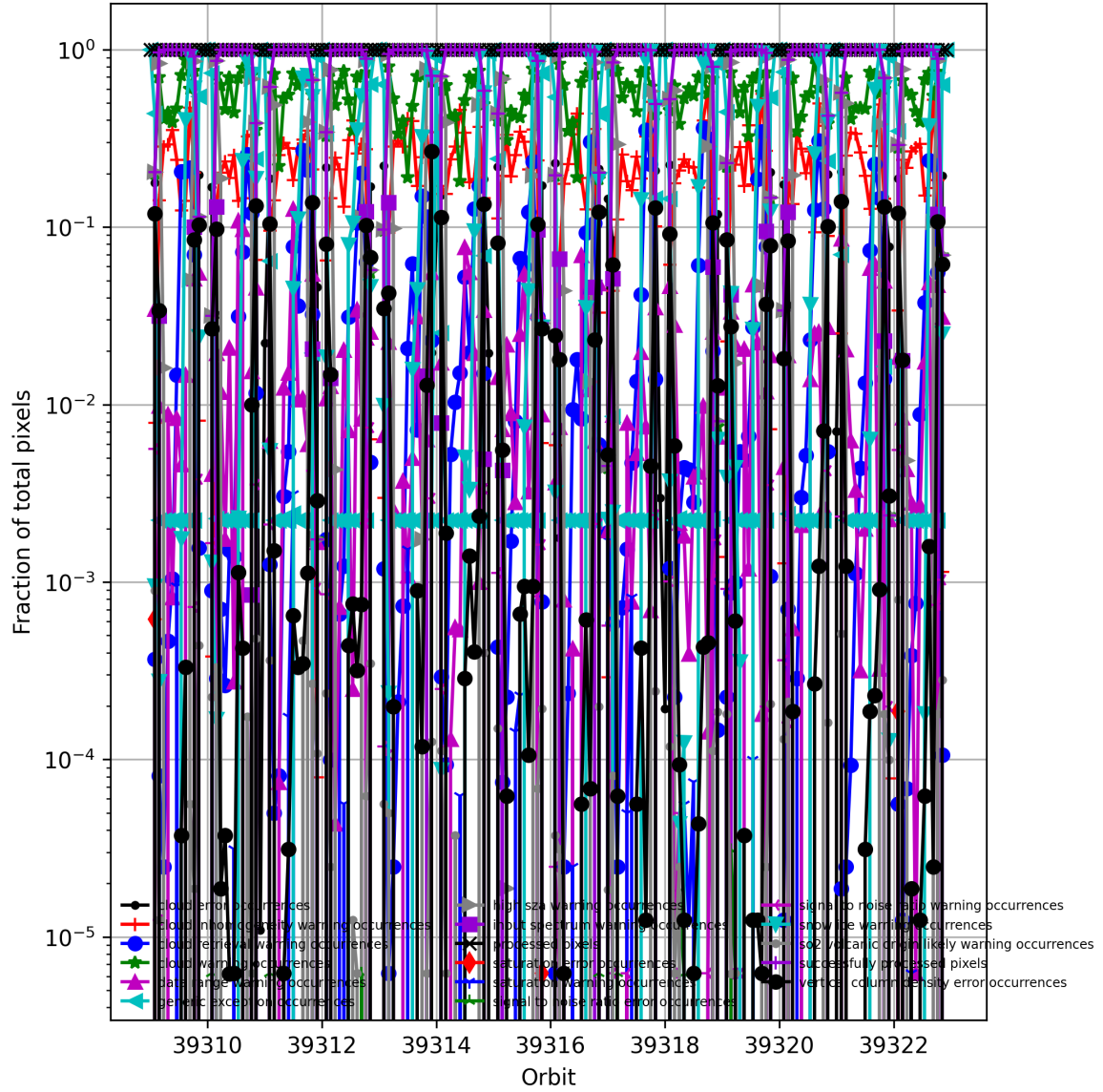


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

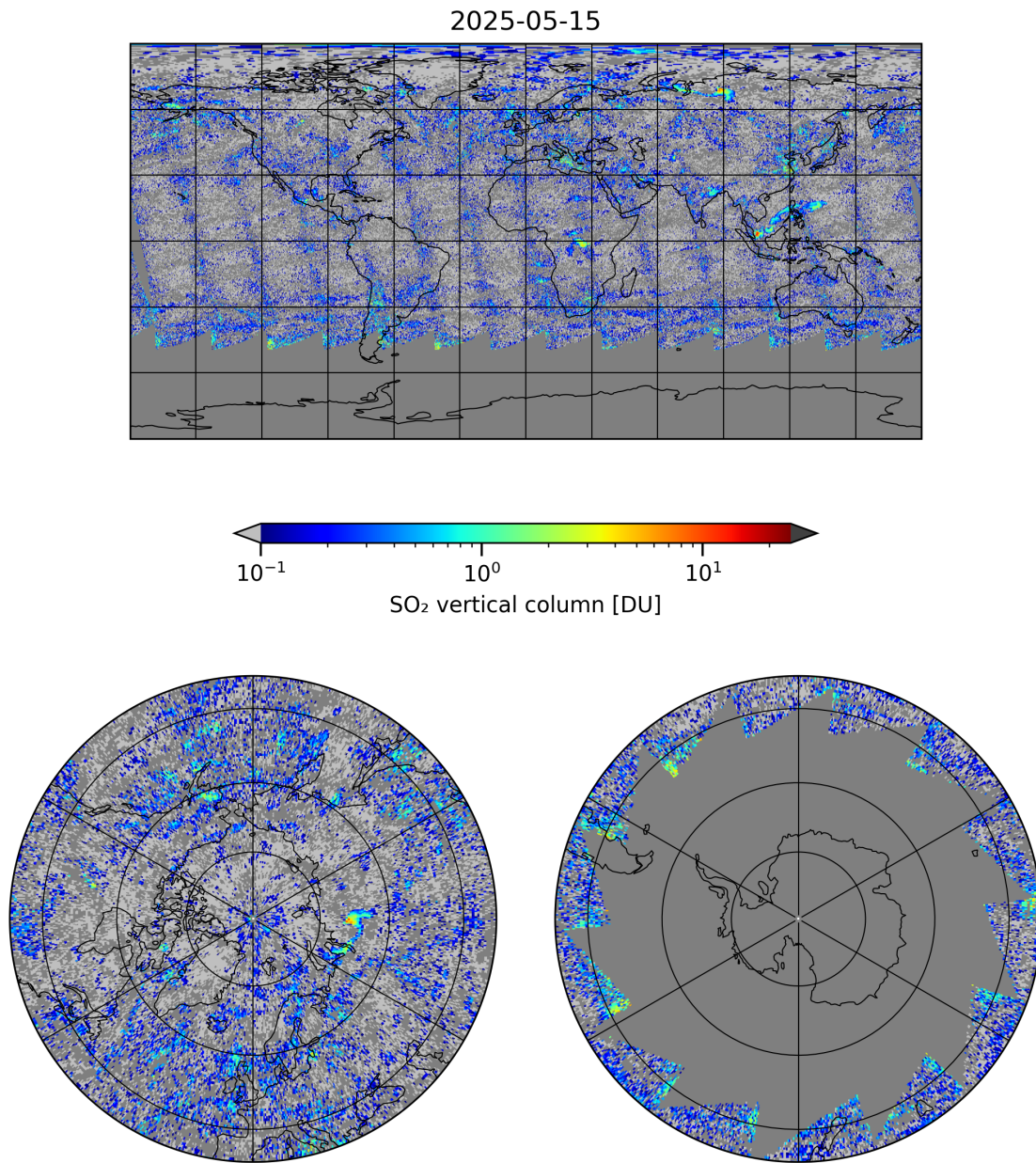


Figure 4: Map of “SO₂ vertical column” for 2025-05-15 to 2025-05-16

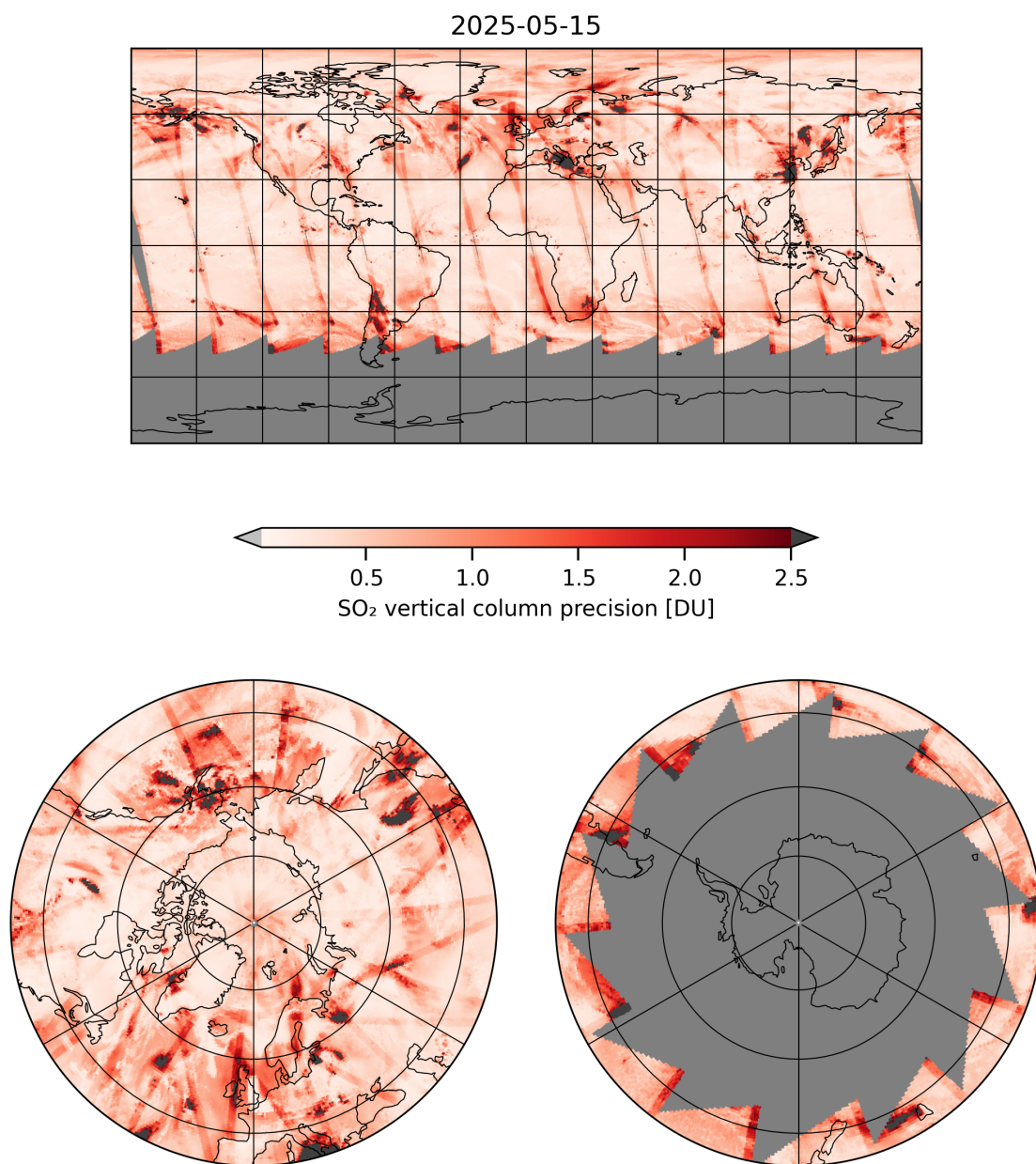


Figure 5: Map of “SO₂ vertical column precision” for 2025-05-15 to 2025-05-16

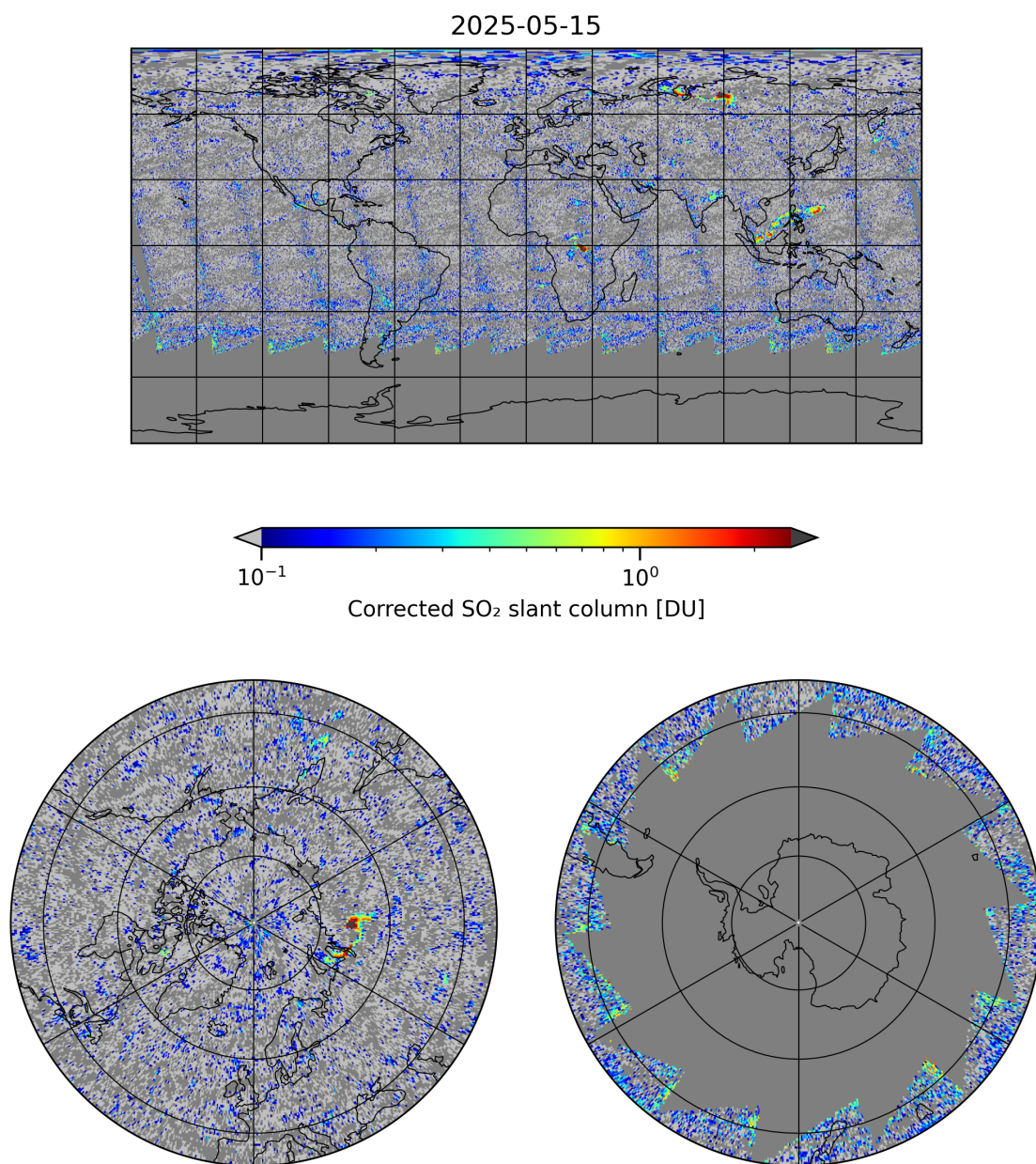


Figure 6: Map of “Corrected SO₂ slant column” for 2025-05-15 to 2025-05-16

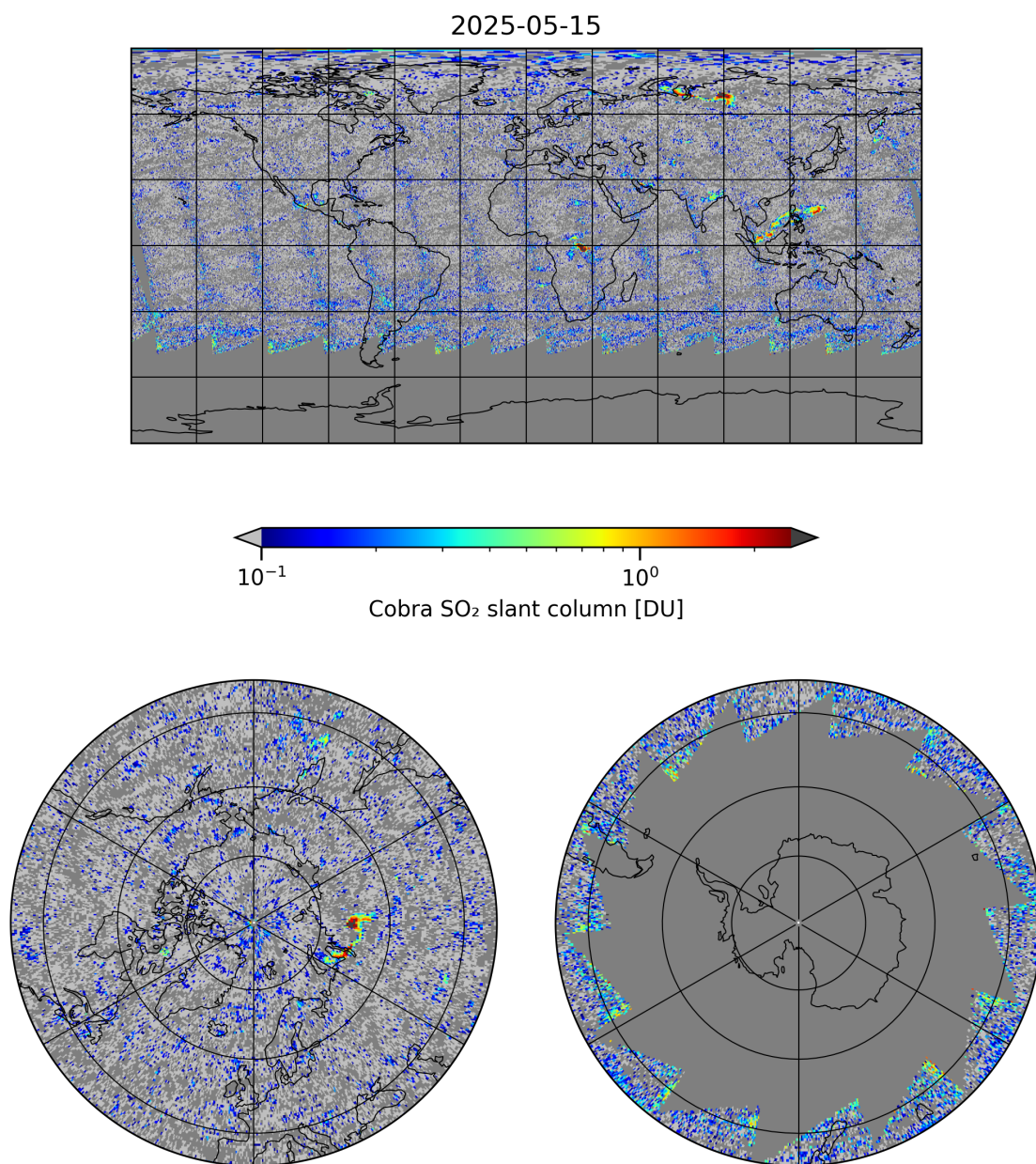


Figure 7: Map of “Cobra SO₂ slant column” for 2025-05-15 to 2025-05-16

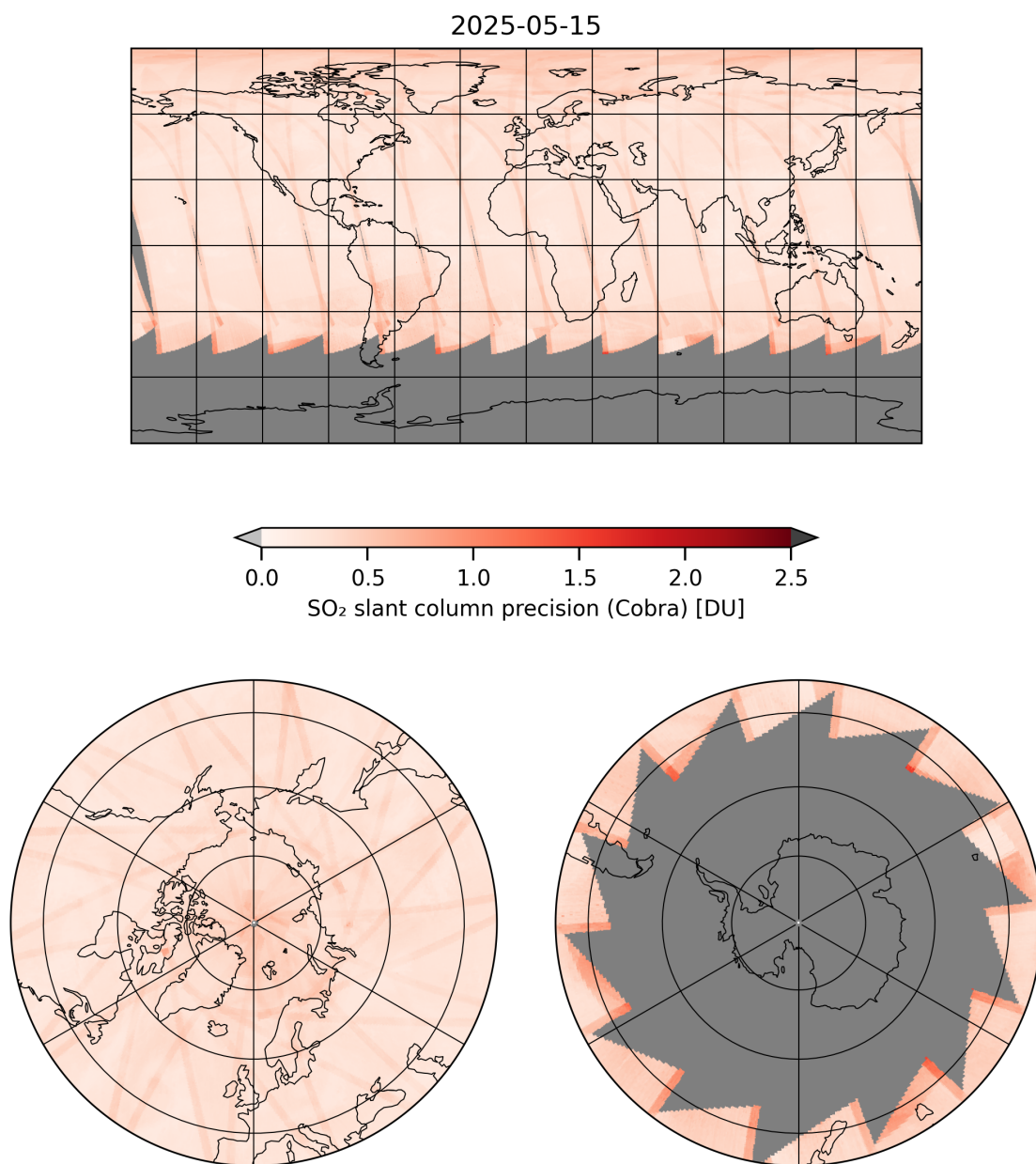


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-05-15 to 2025-05-16

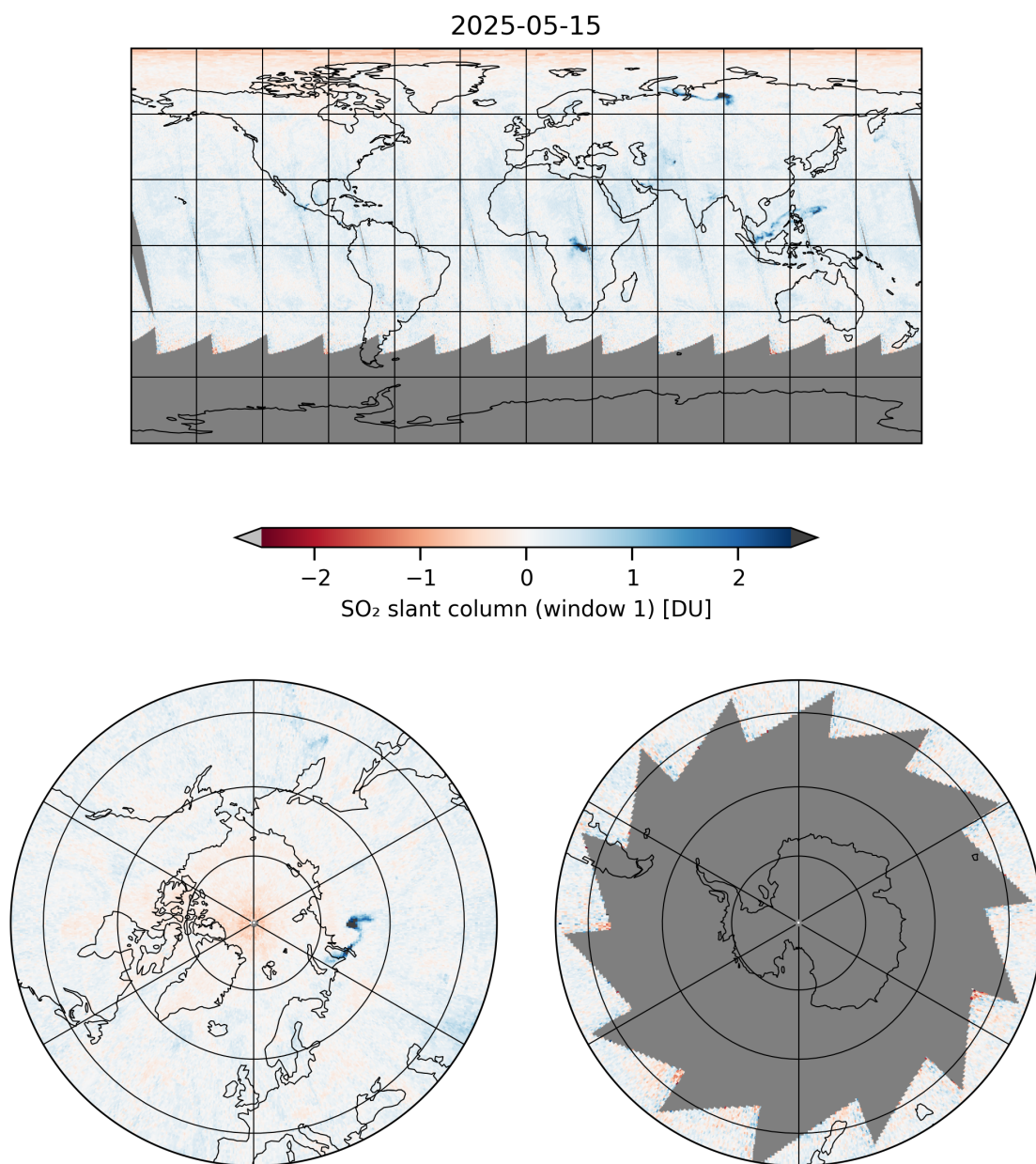


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-05-15 to 2025-05-16

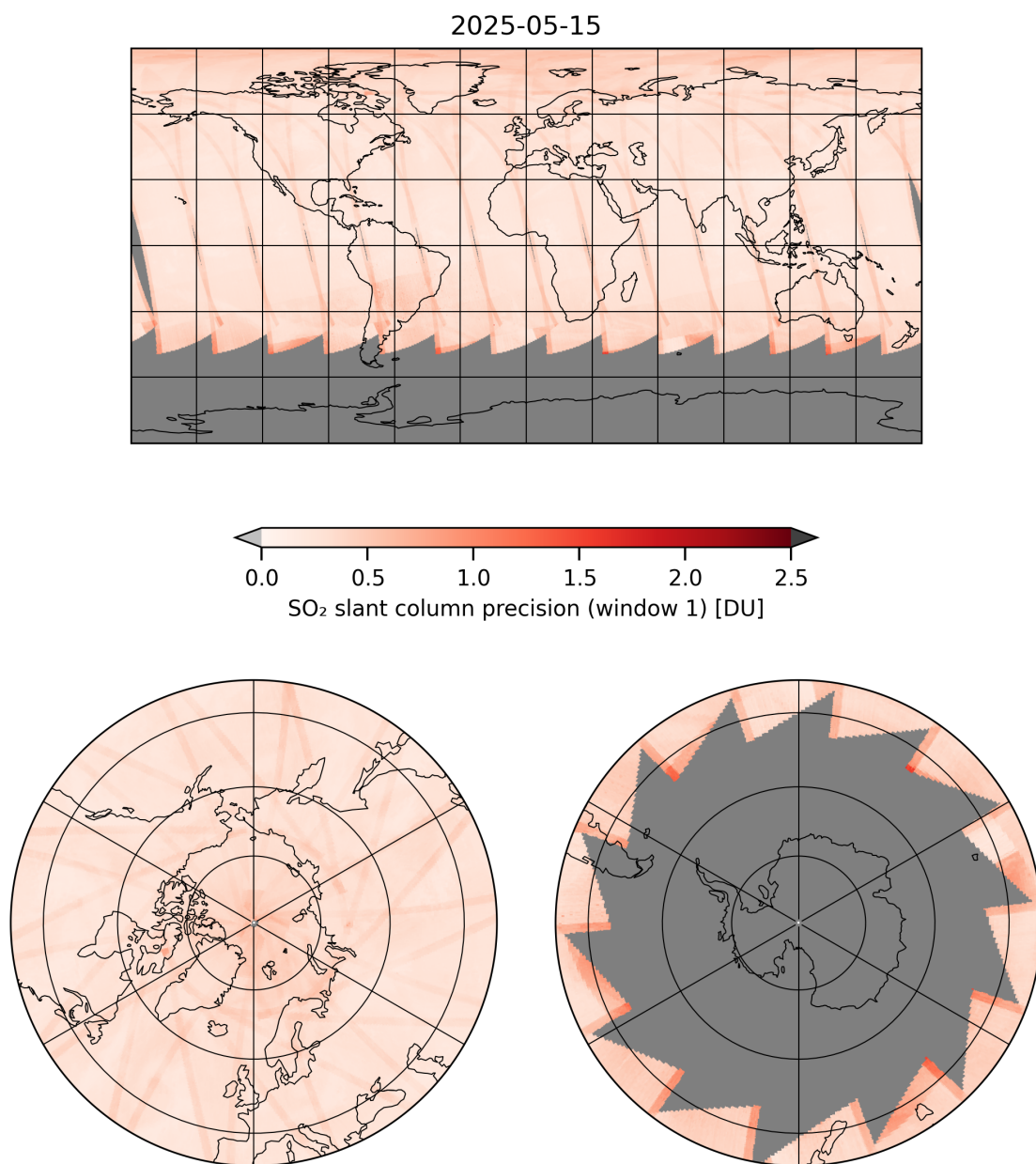


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-05-15 to 2025-05-16

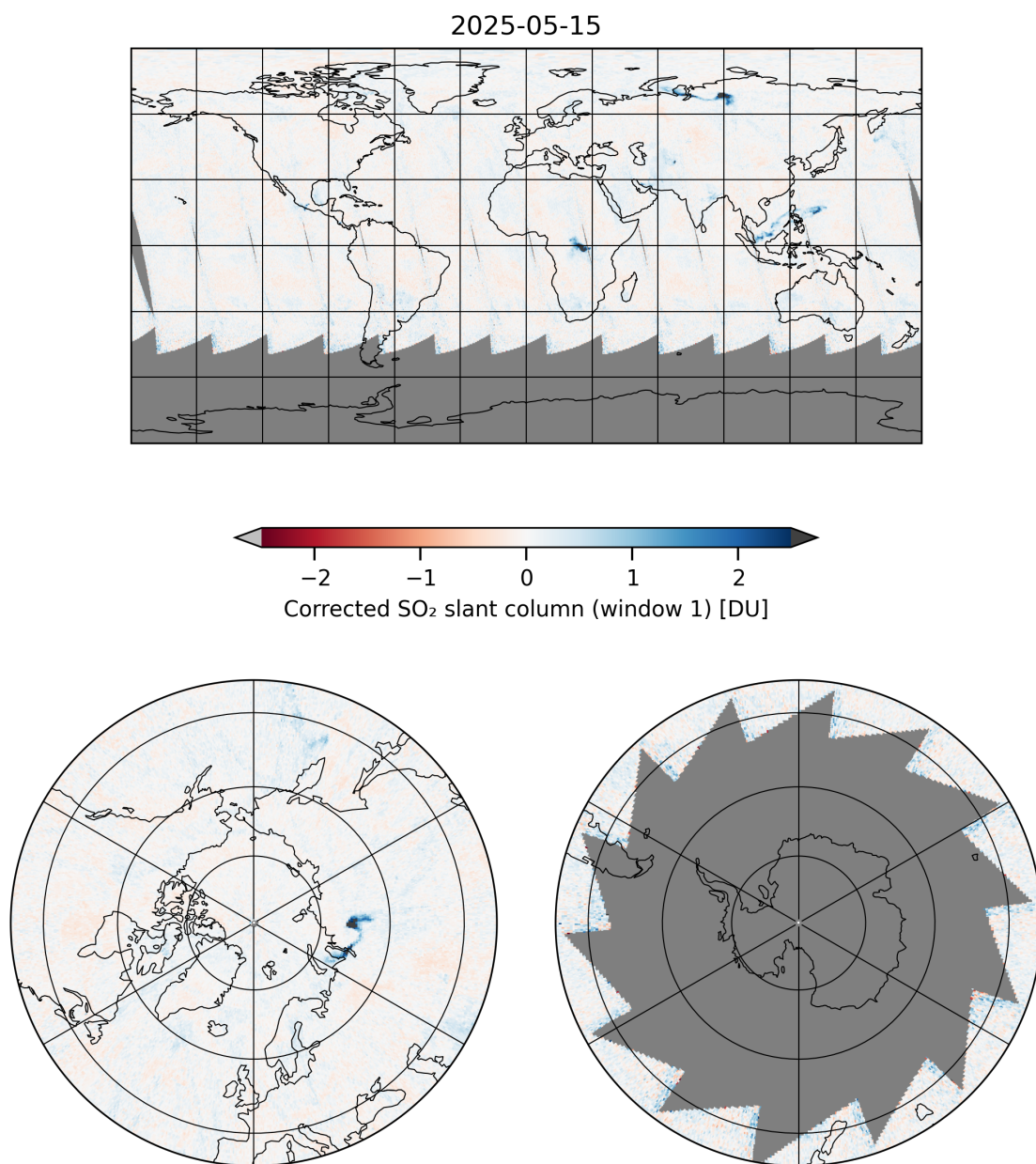


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-05-15 to 2025-05-16

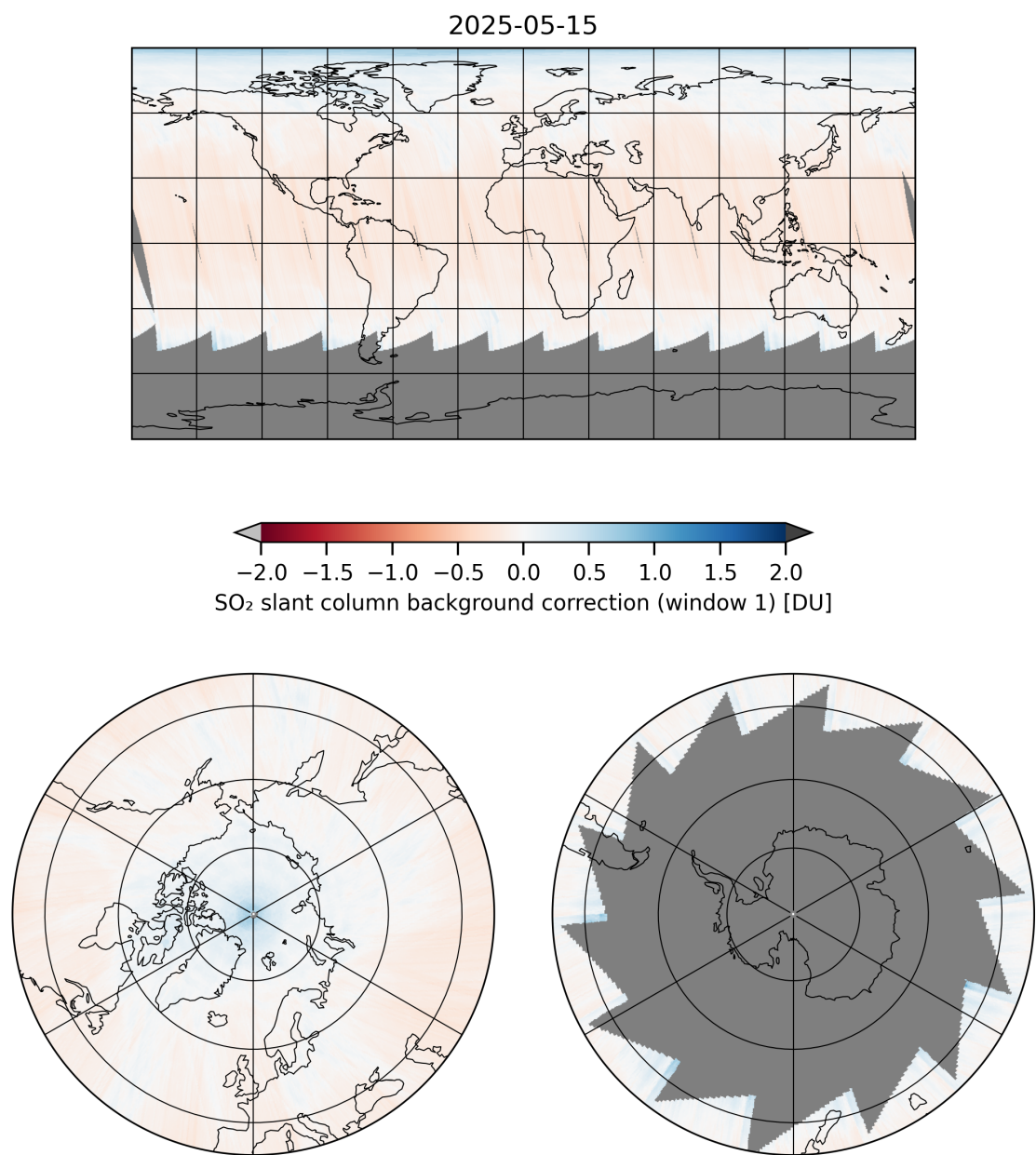


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-05-15 to 2025-05-16

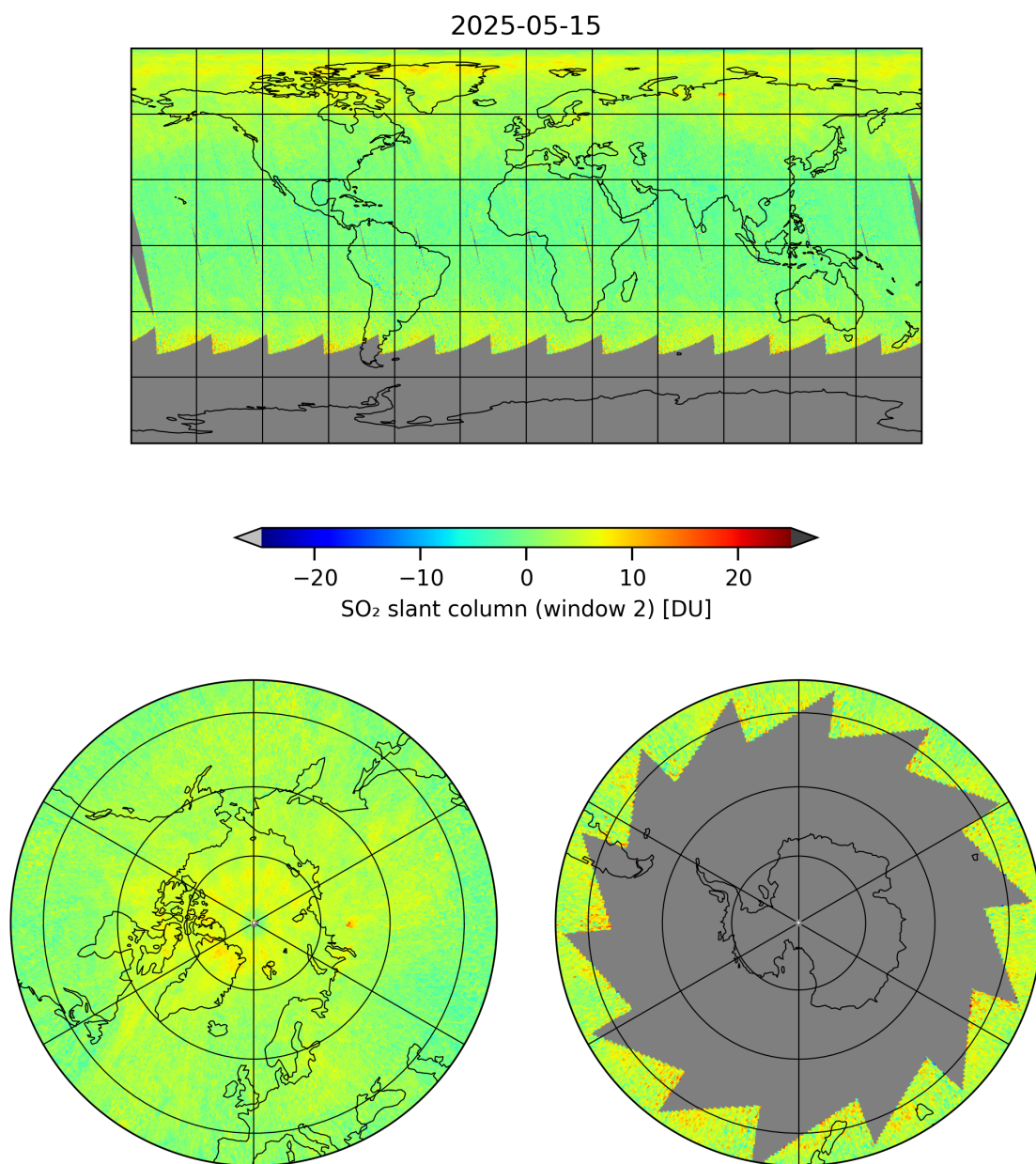


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-05-15 to 2025-05-16

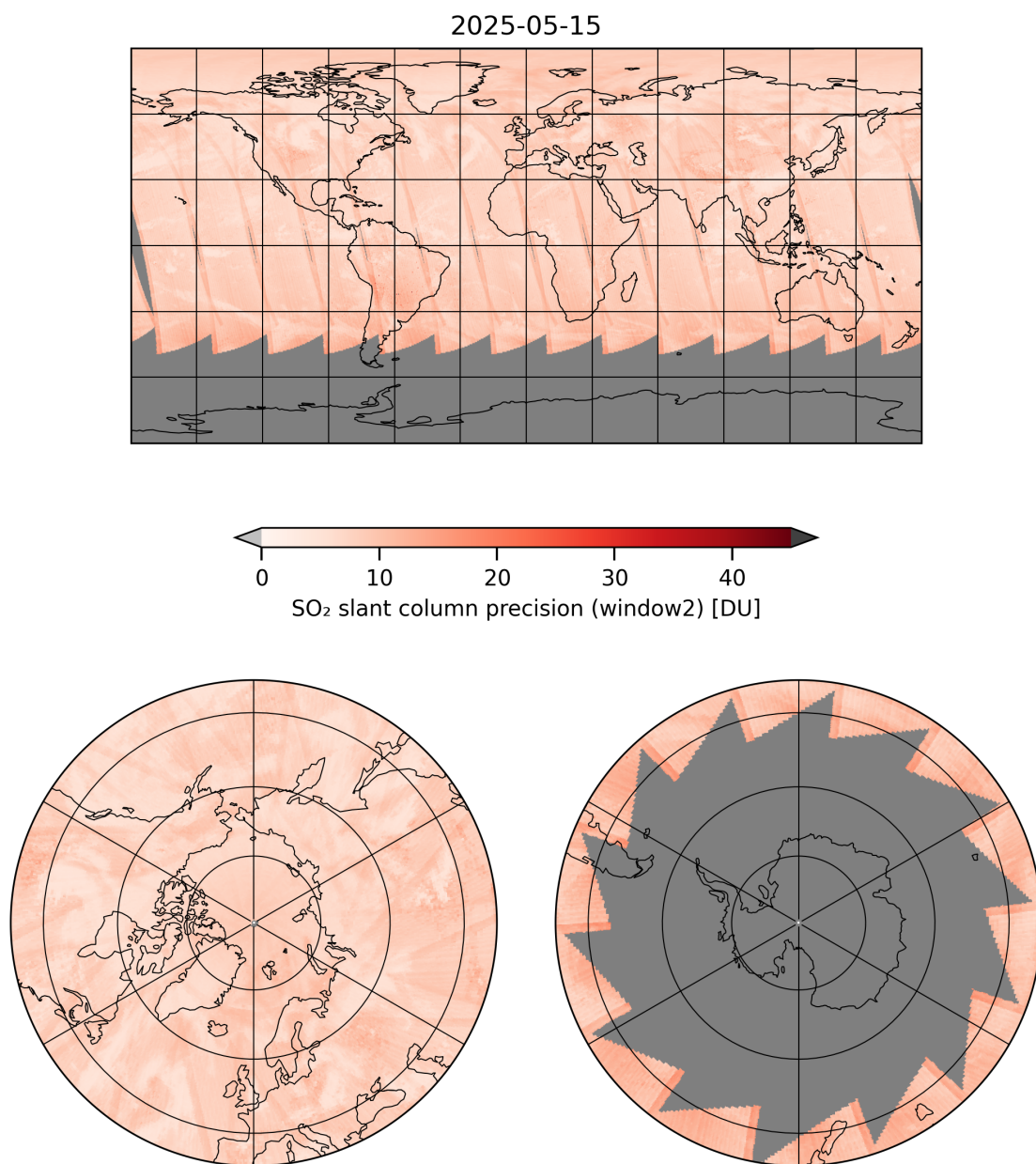


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-05-15 to 2025-05-16

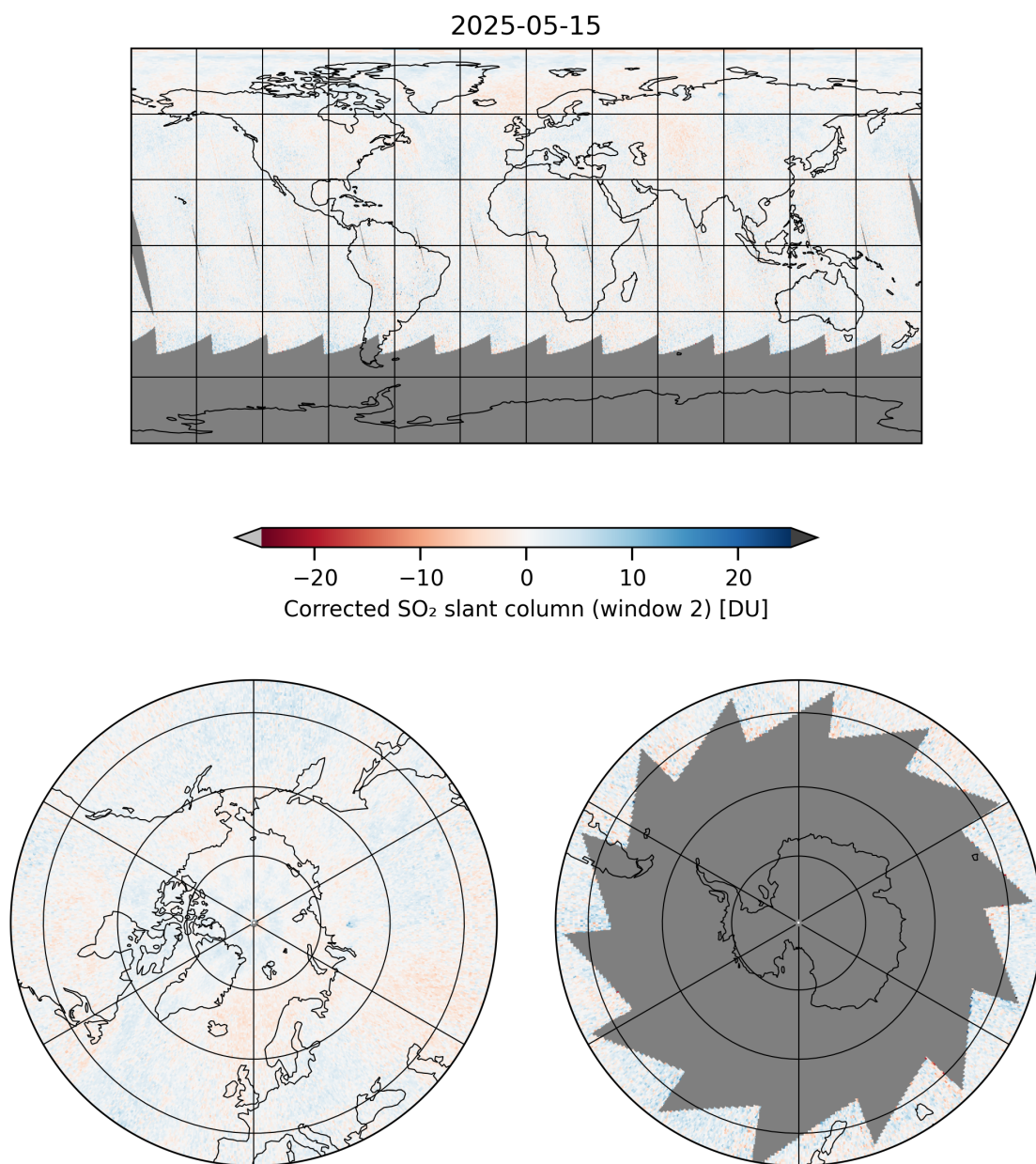


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-05-15 to 2025-05-16

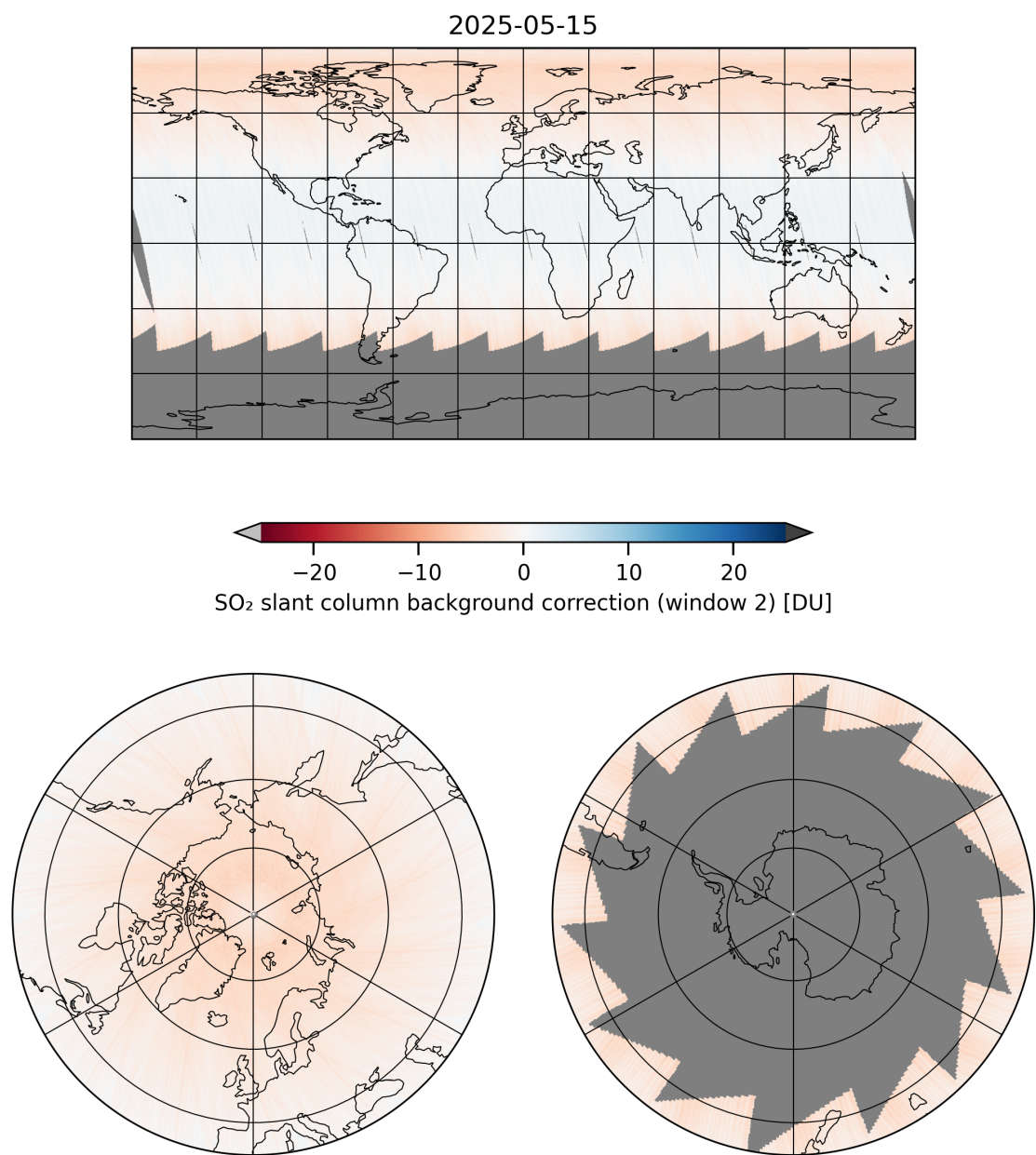


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-05-15 to 2025-05-16

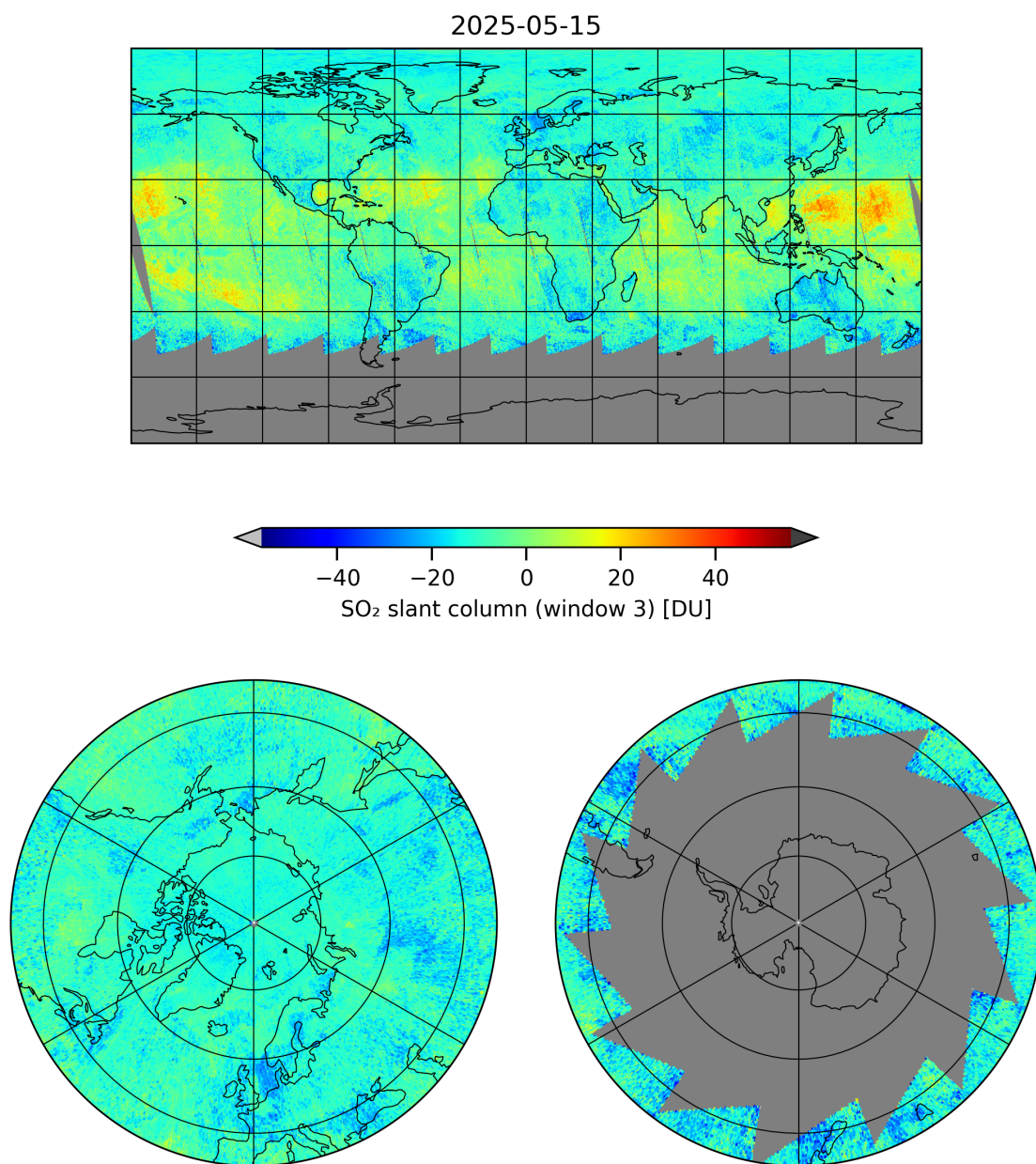


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-05-15 to 2025-05-16

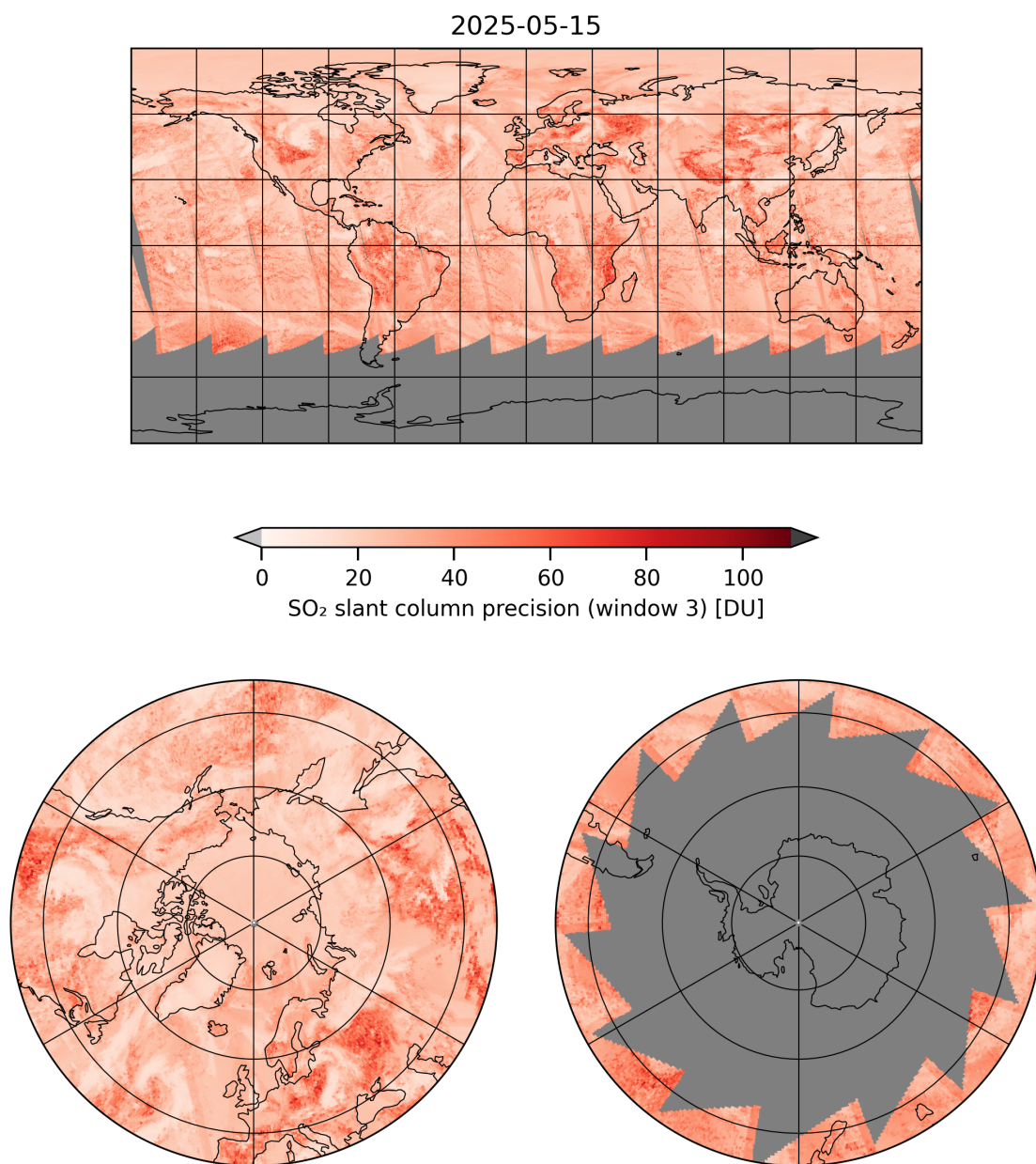


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-05-15 to 2025-05-16

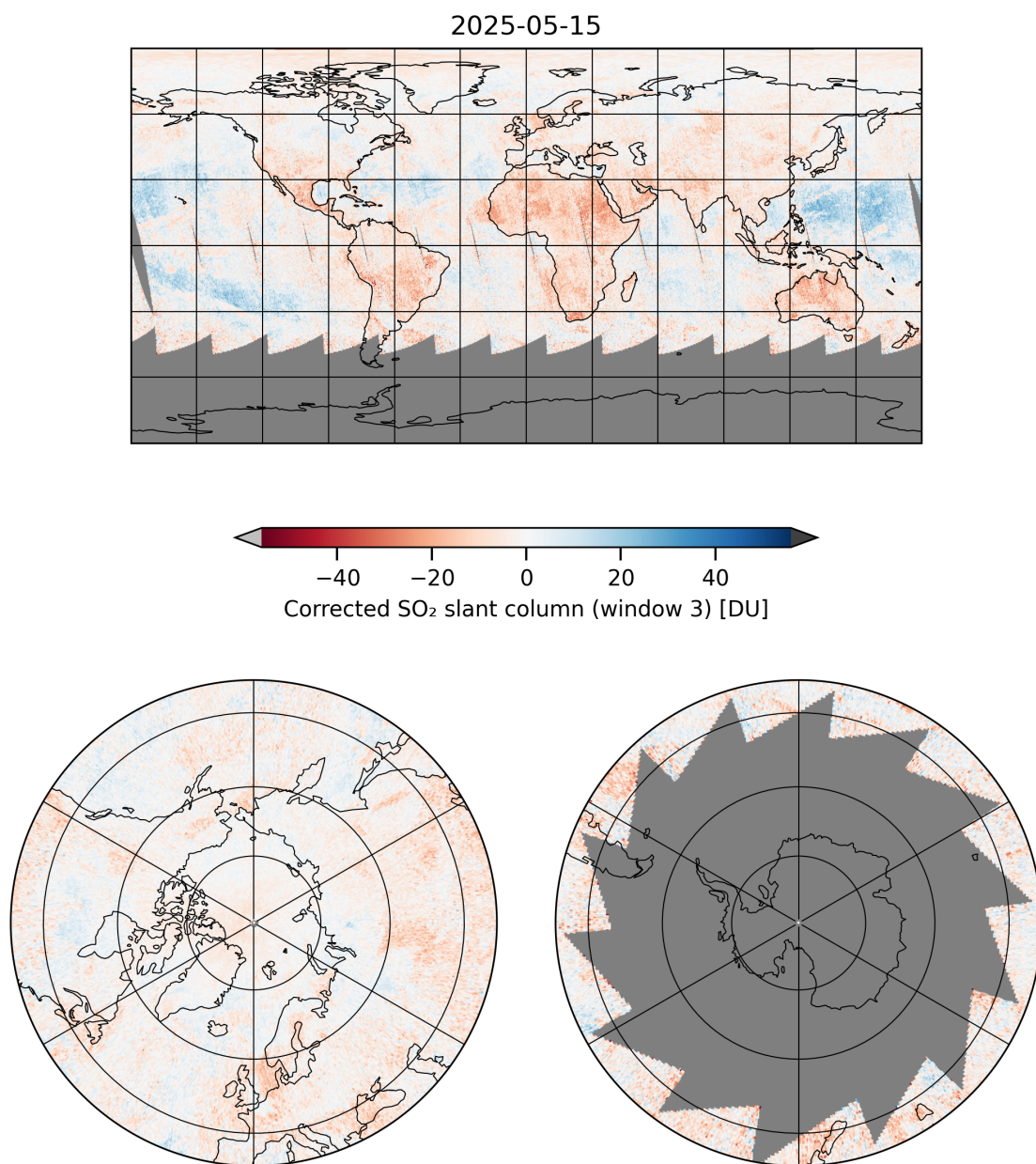


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-05-15 to 2025-05-16

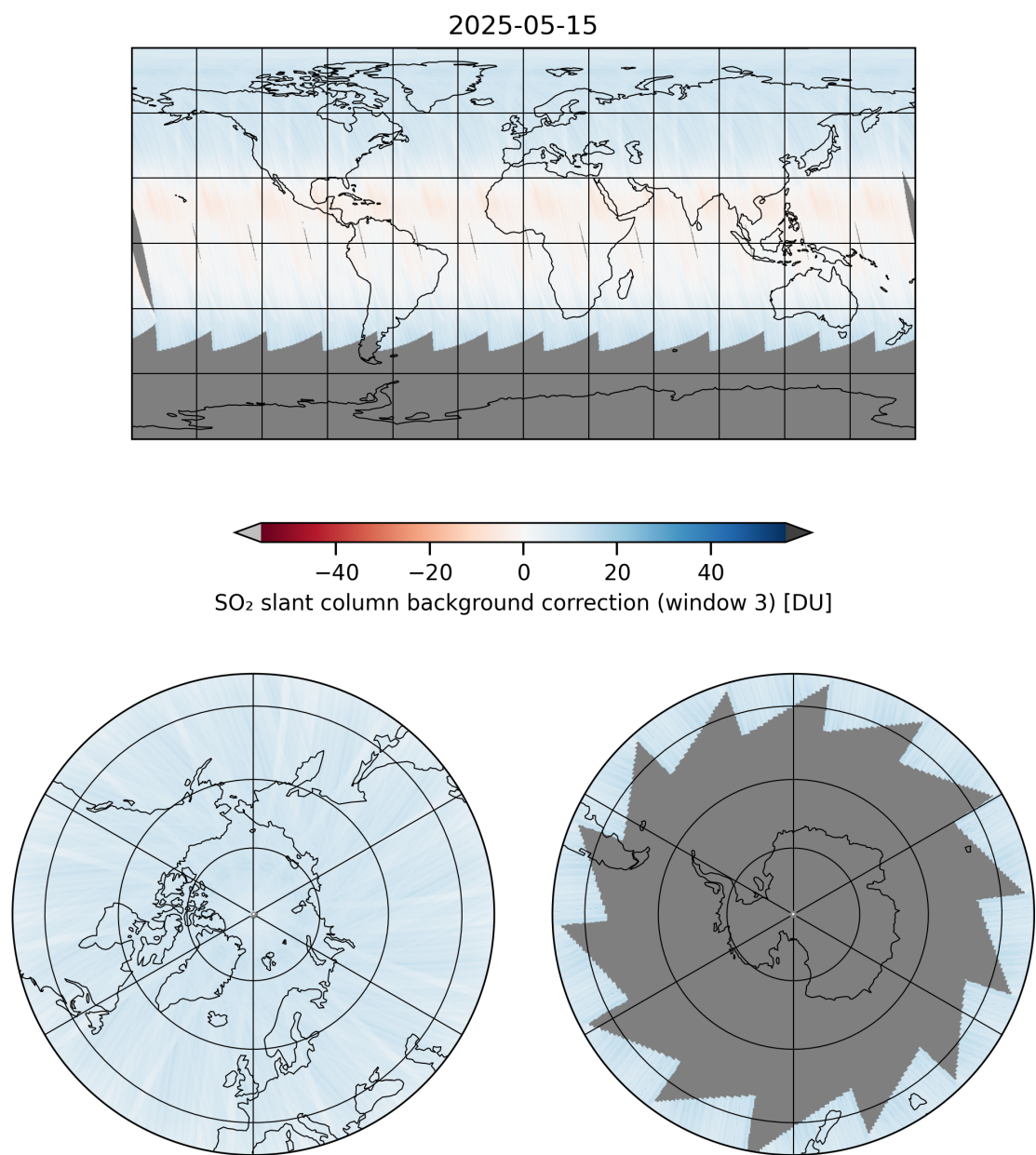


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-05-15 to 2025-05-16

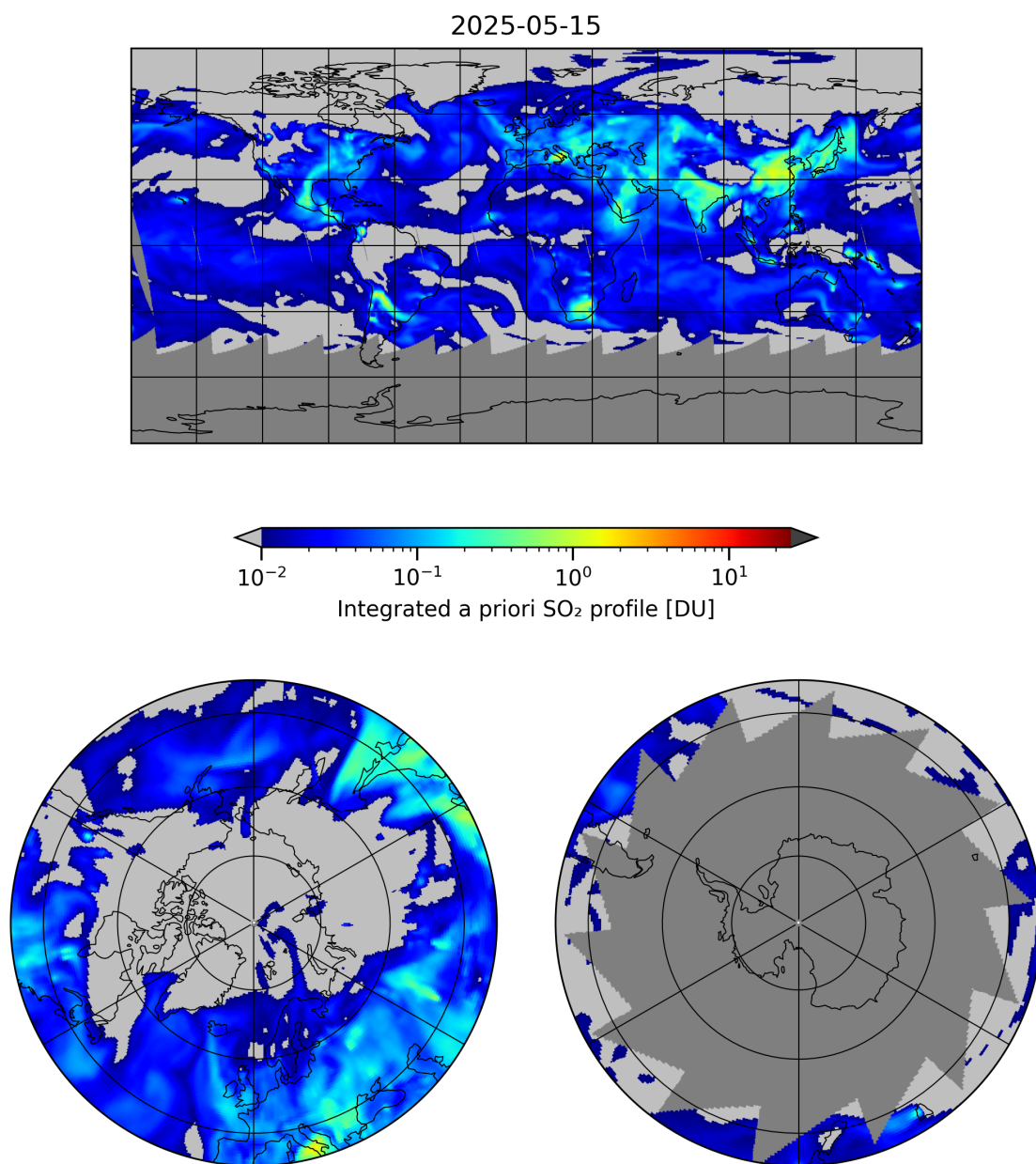


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-05-15 to 2025-05-16

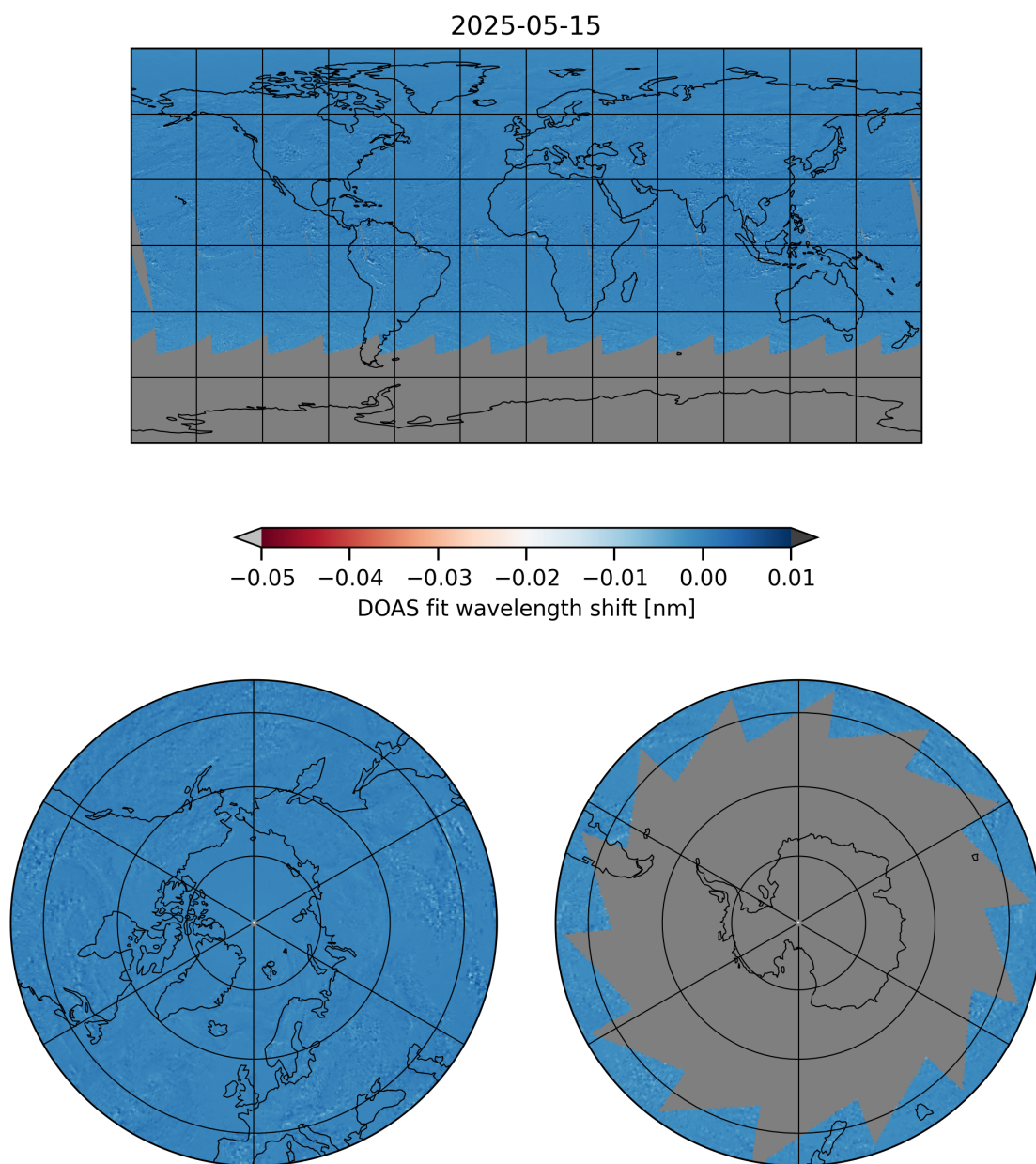


Figure 22: Map of “DOAS fit wavelength shift” for 2025-05-15 to 2025-05-16

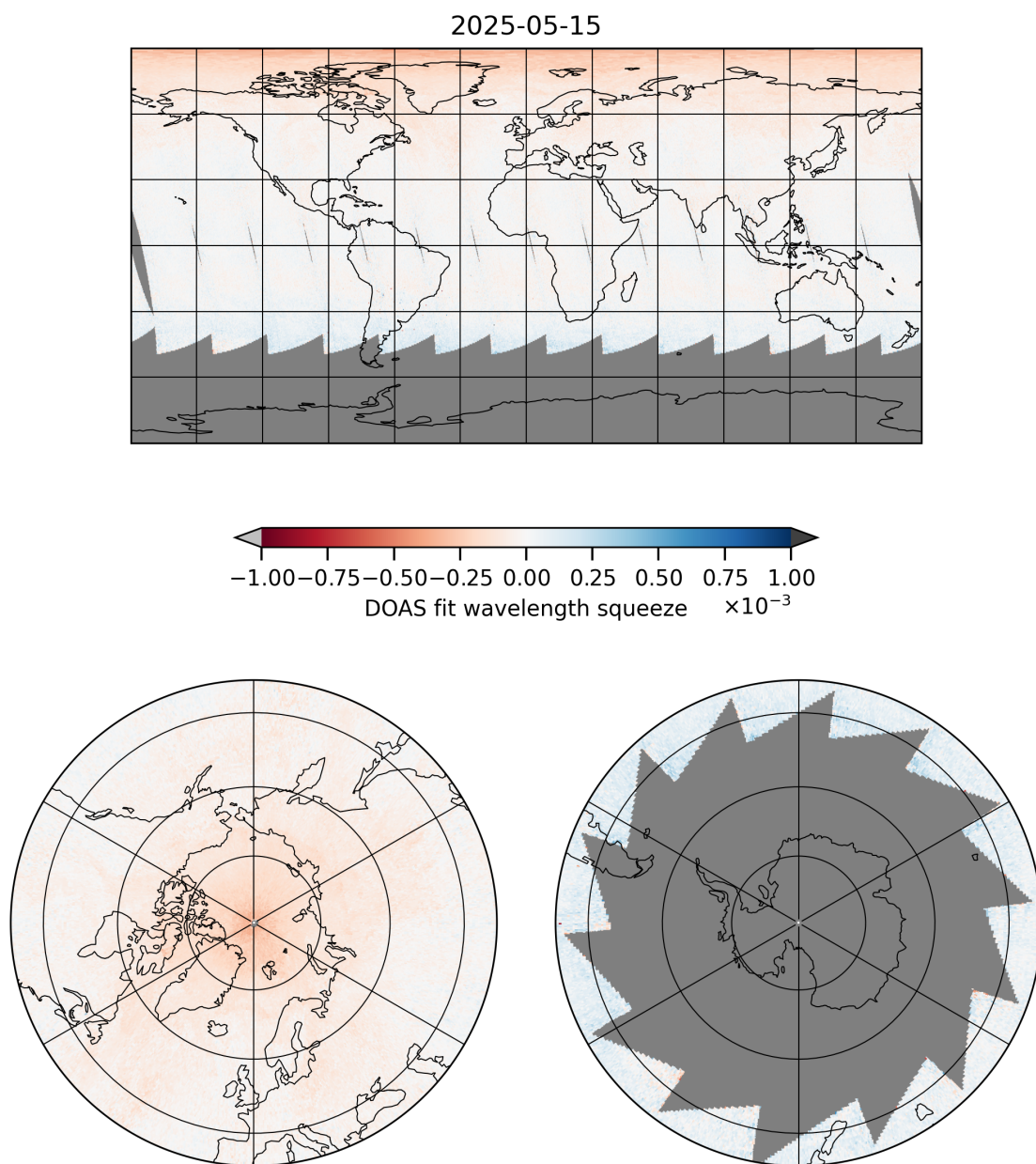


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-05-15 to 2025-05-16

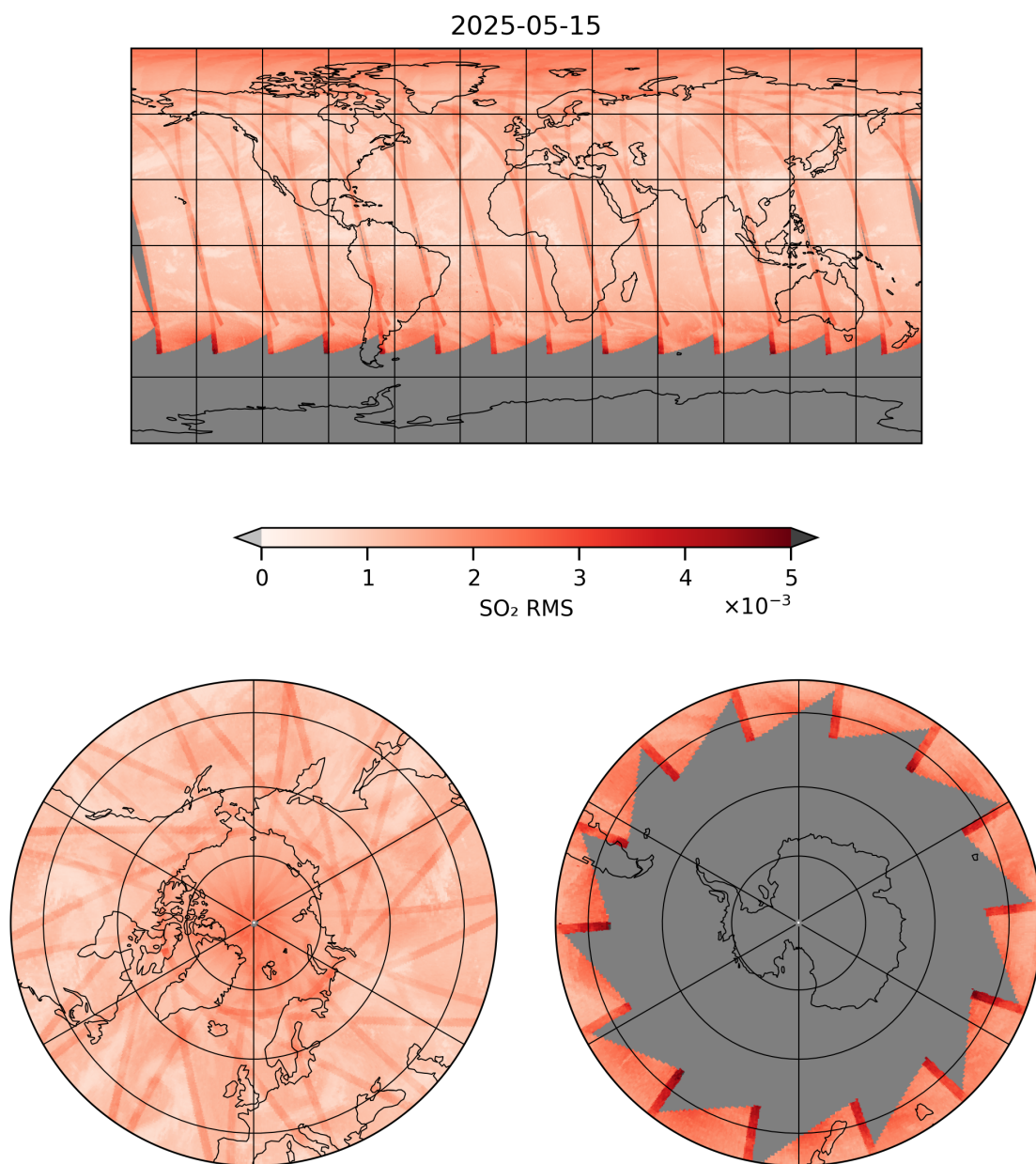


Figure 24: Map of “SO₂ RMS” for 2025-05-15 to 2025-05-16

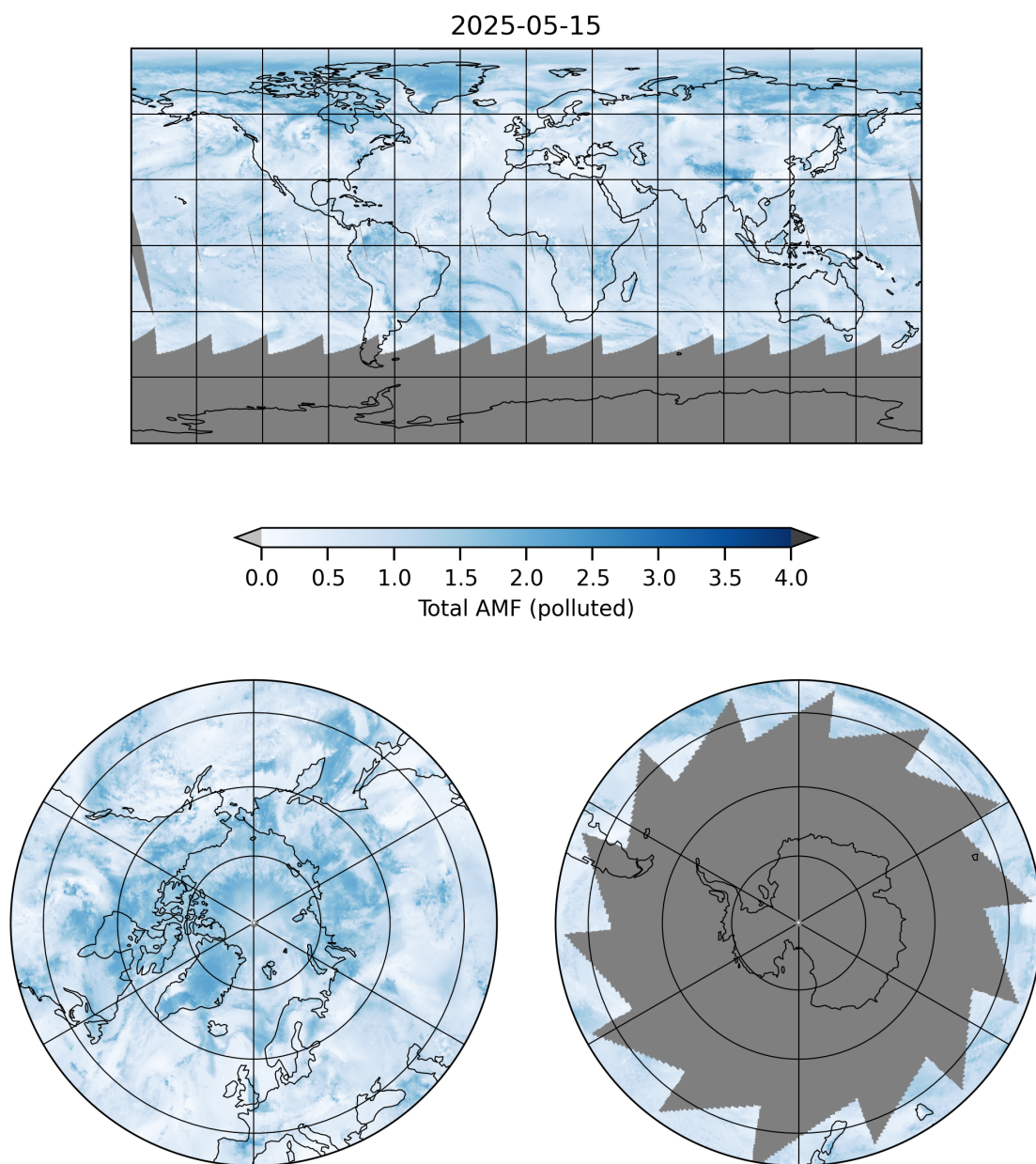


Figure 25: Map of “Total AMF (polluted)” for 2025-05-15 to 2025-05-16

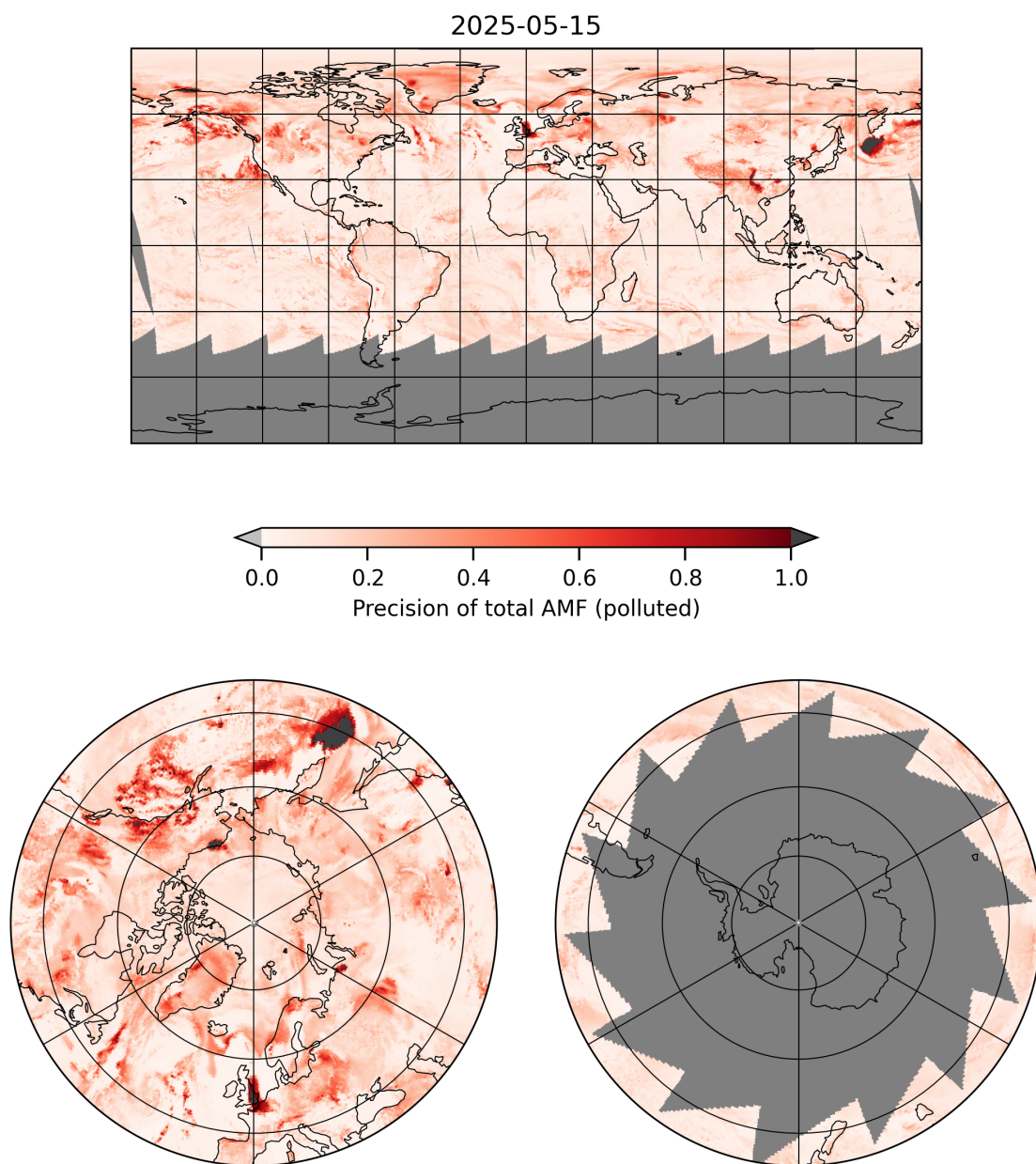


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-05-15 to 2025-05-16

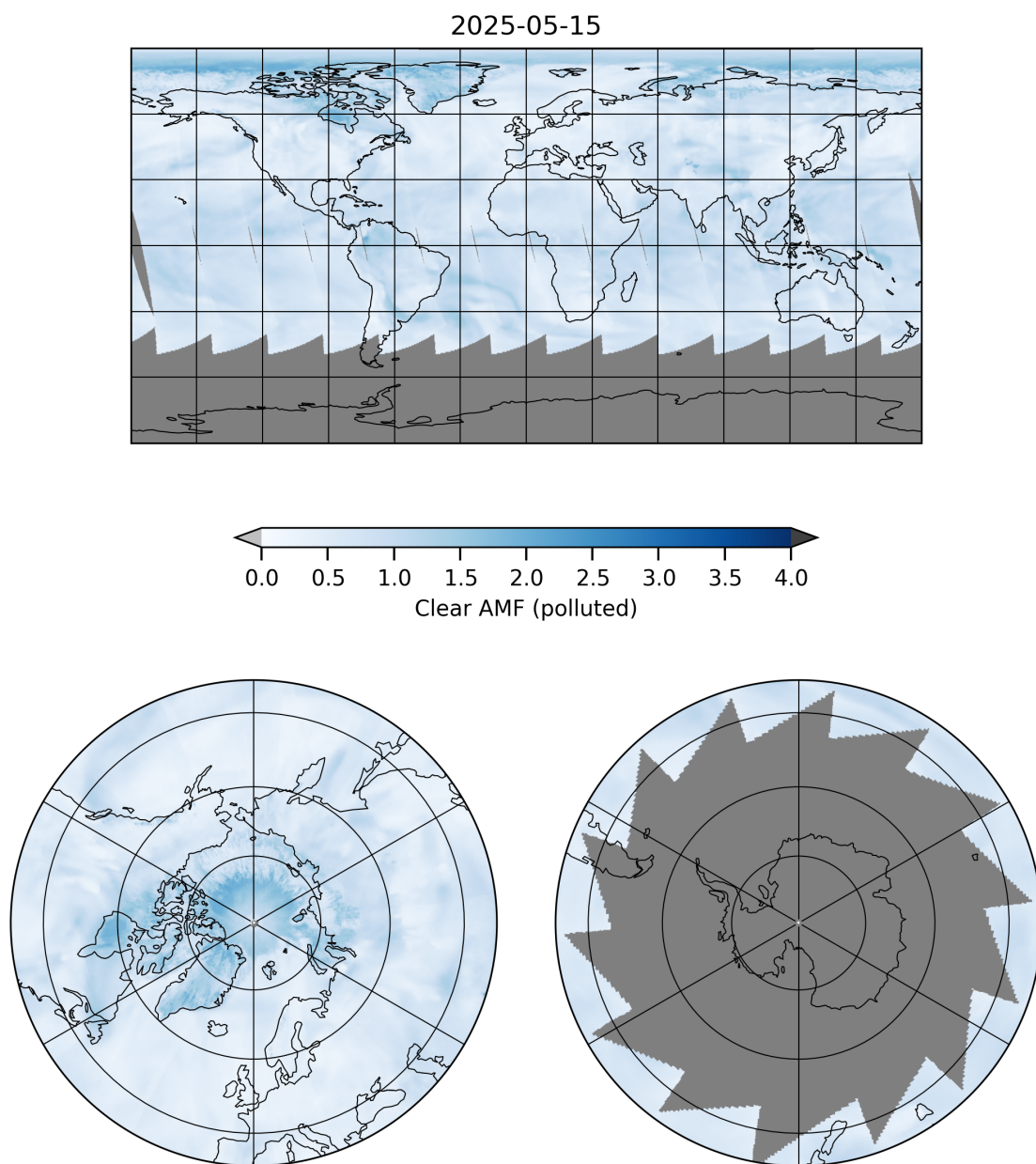


Figure 27: Map of “Clear AMF (polluted)” for 2025-05-15 to 2025-05-16

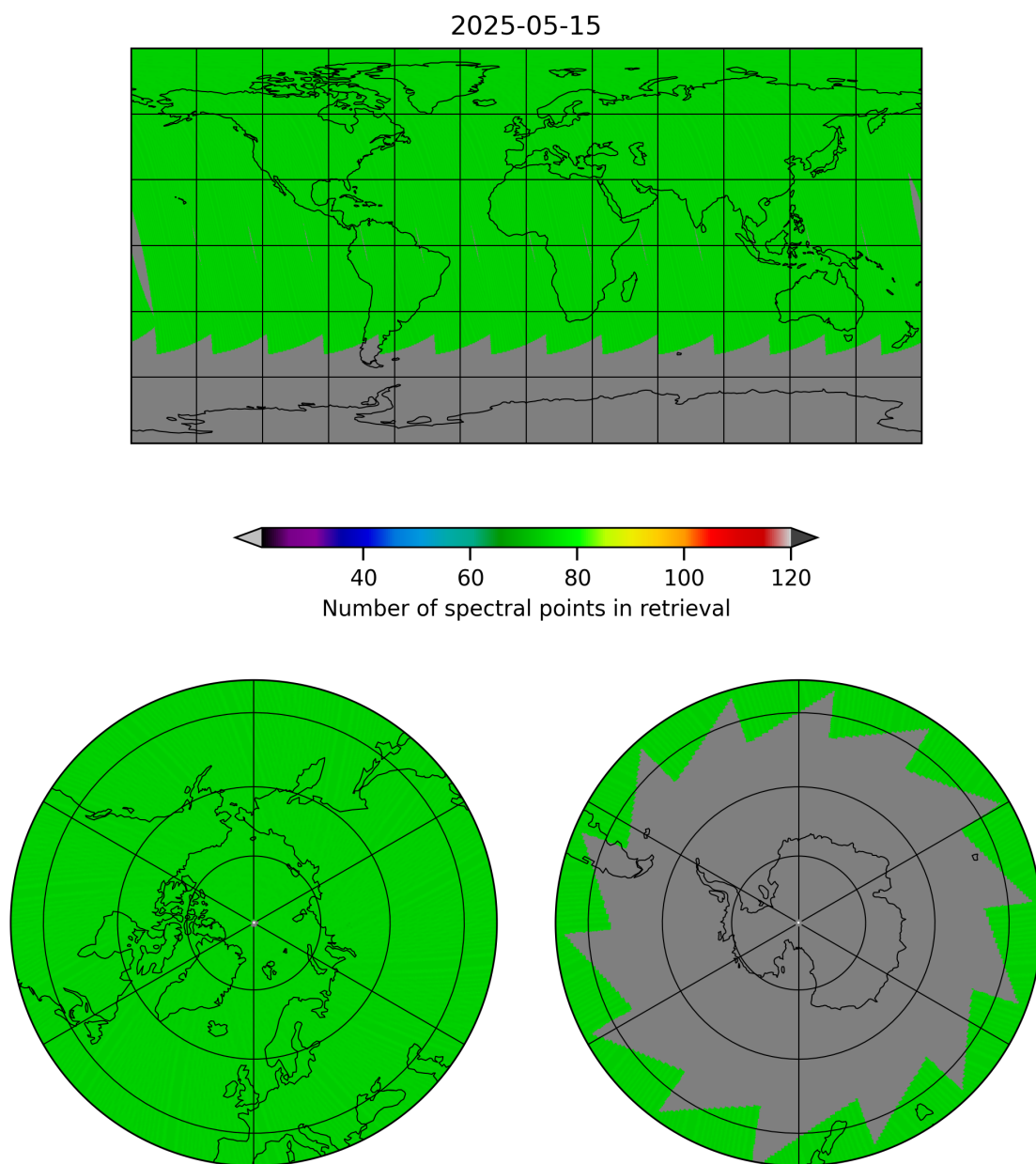


Figure 28: Map of “Number of spectral points in retrieval” for 2025-05-15 to 2025-05-16

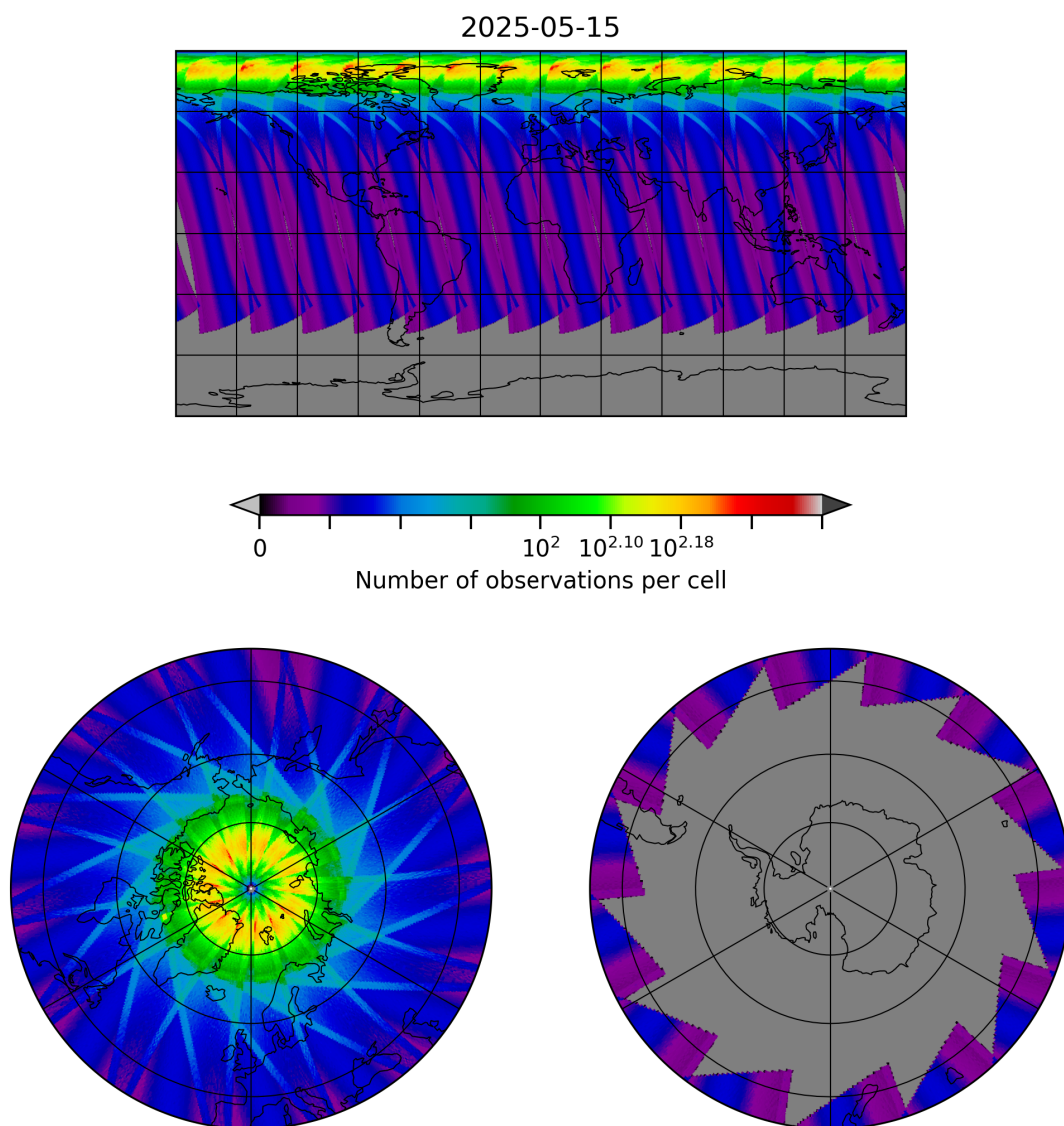


Figure 29: Map of the number of observations for 2025-05-15 to 2025-05-16

7 Zonal average

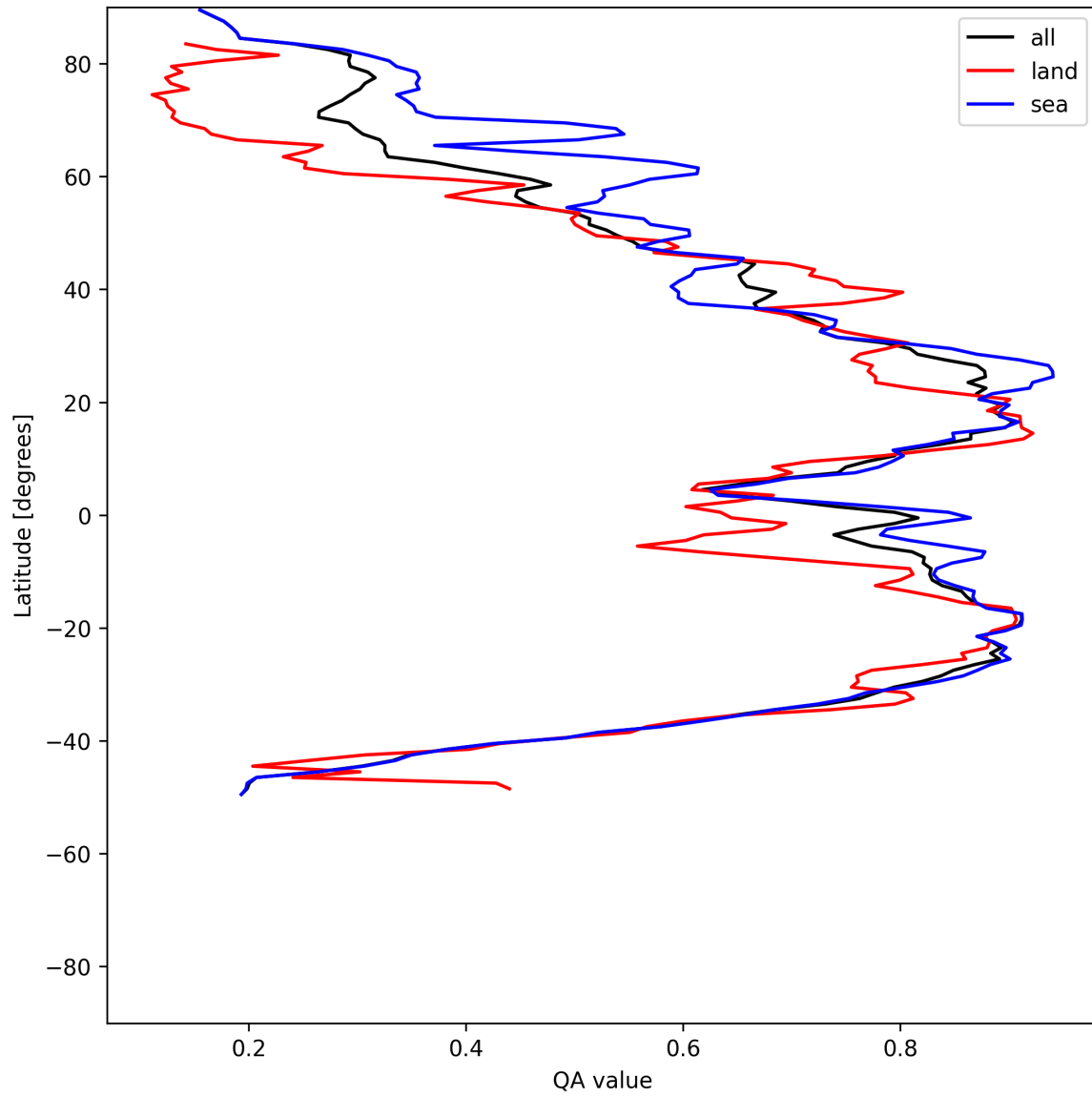


Figure 30: Zonal average of “QA value” for 2025-05-15 to 2025-05-16.

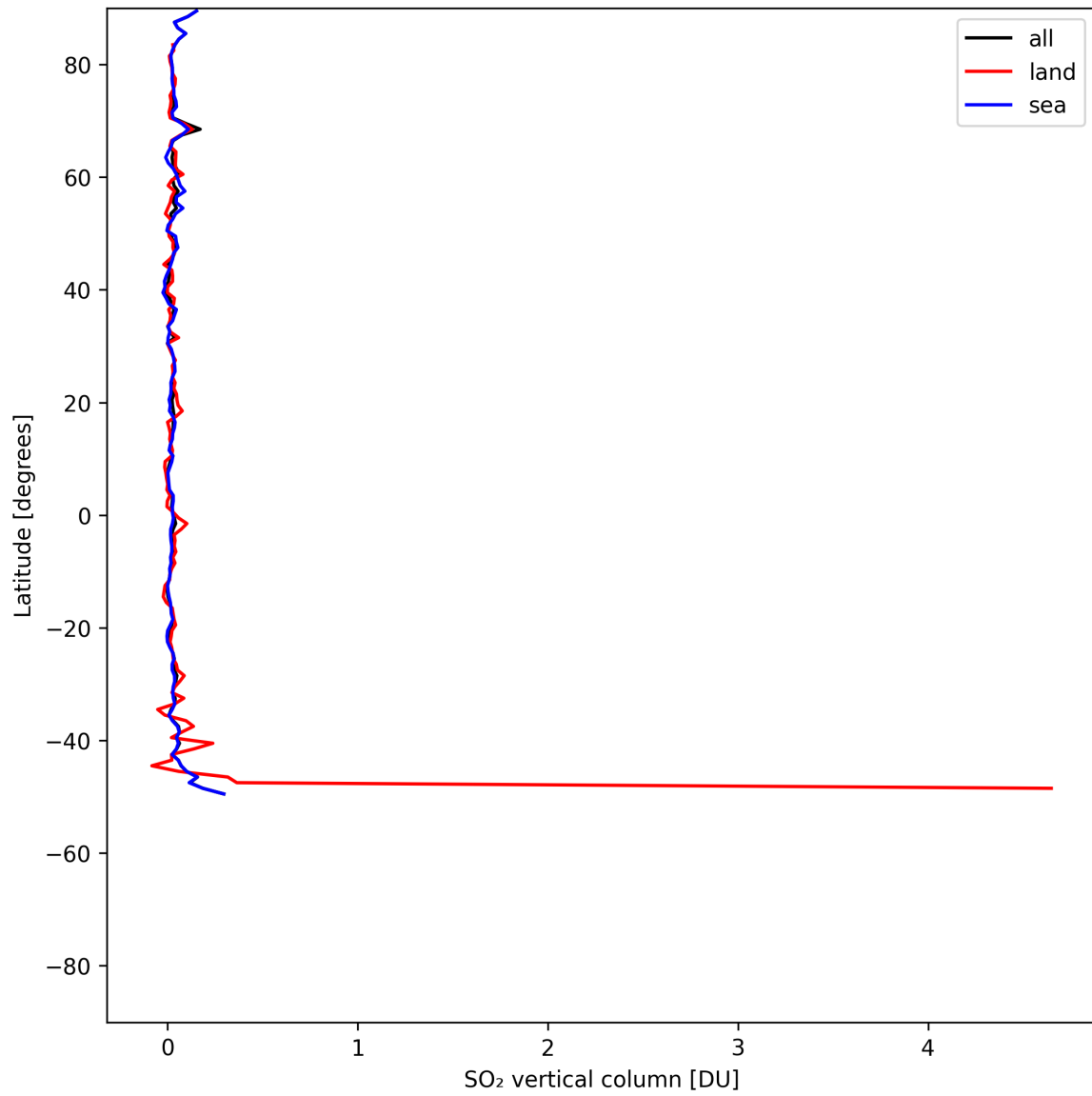


Figure 31: Zonal average of “SO₂ vertical column” for 2025-05-15 to 2025-05-16.

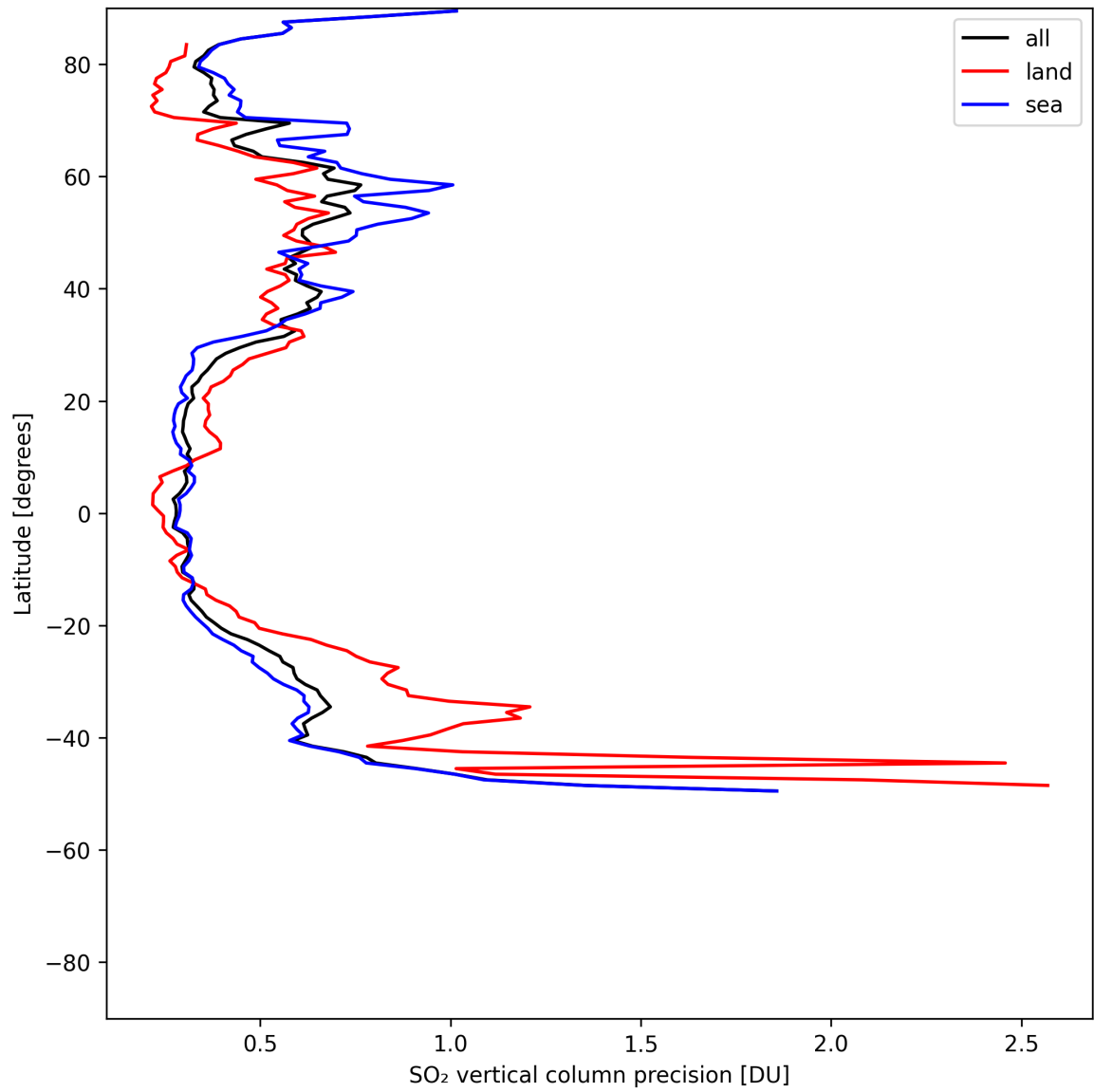


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-05-15 to 2025-05-16.

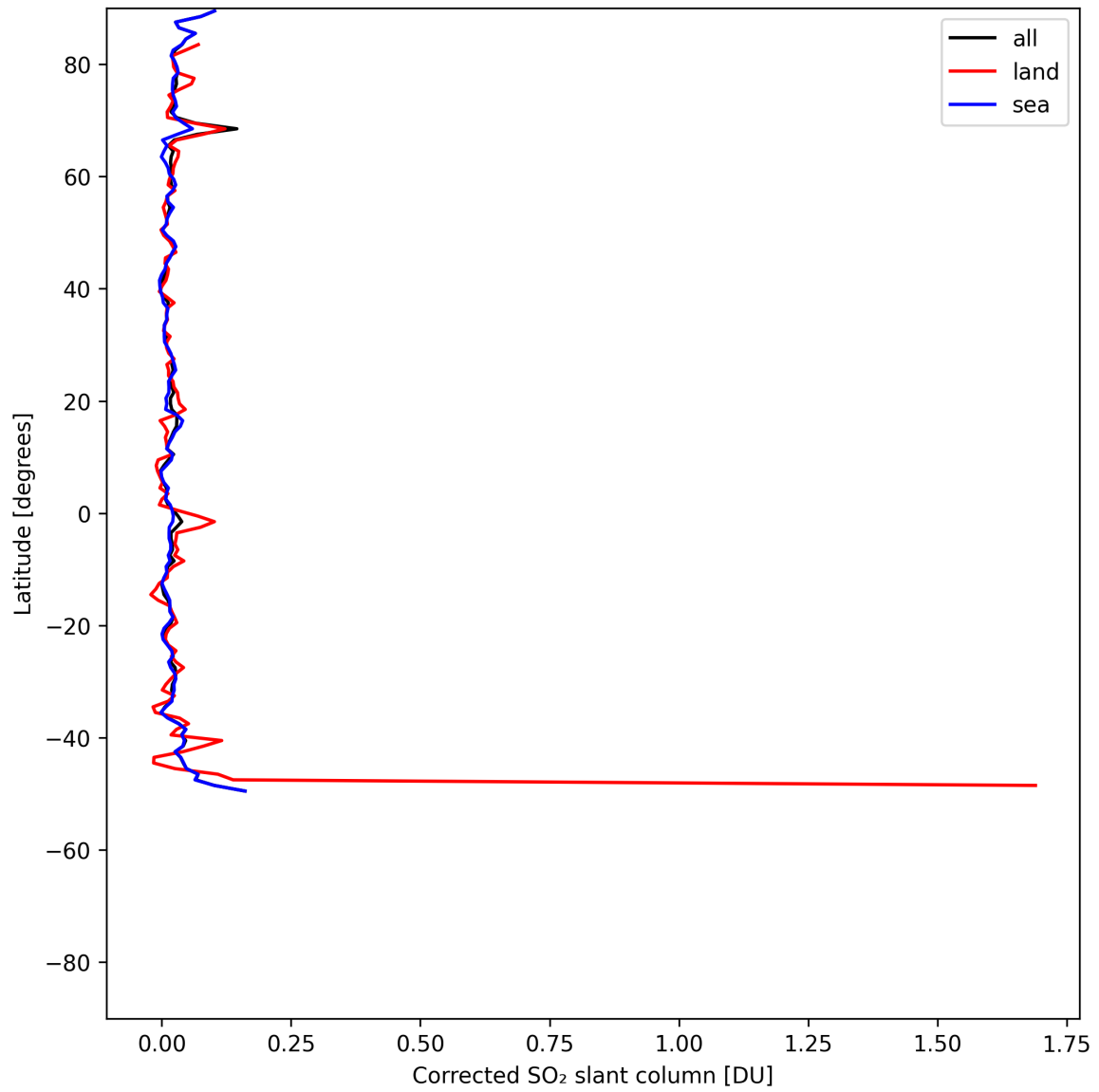


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-05-15 to 2025-05-16.

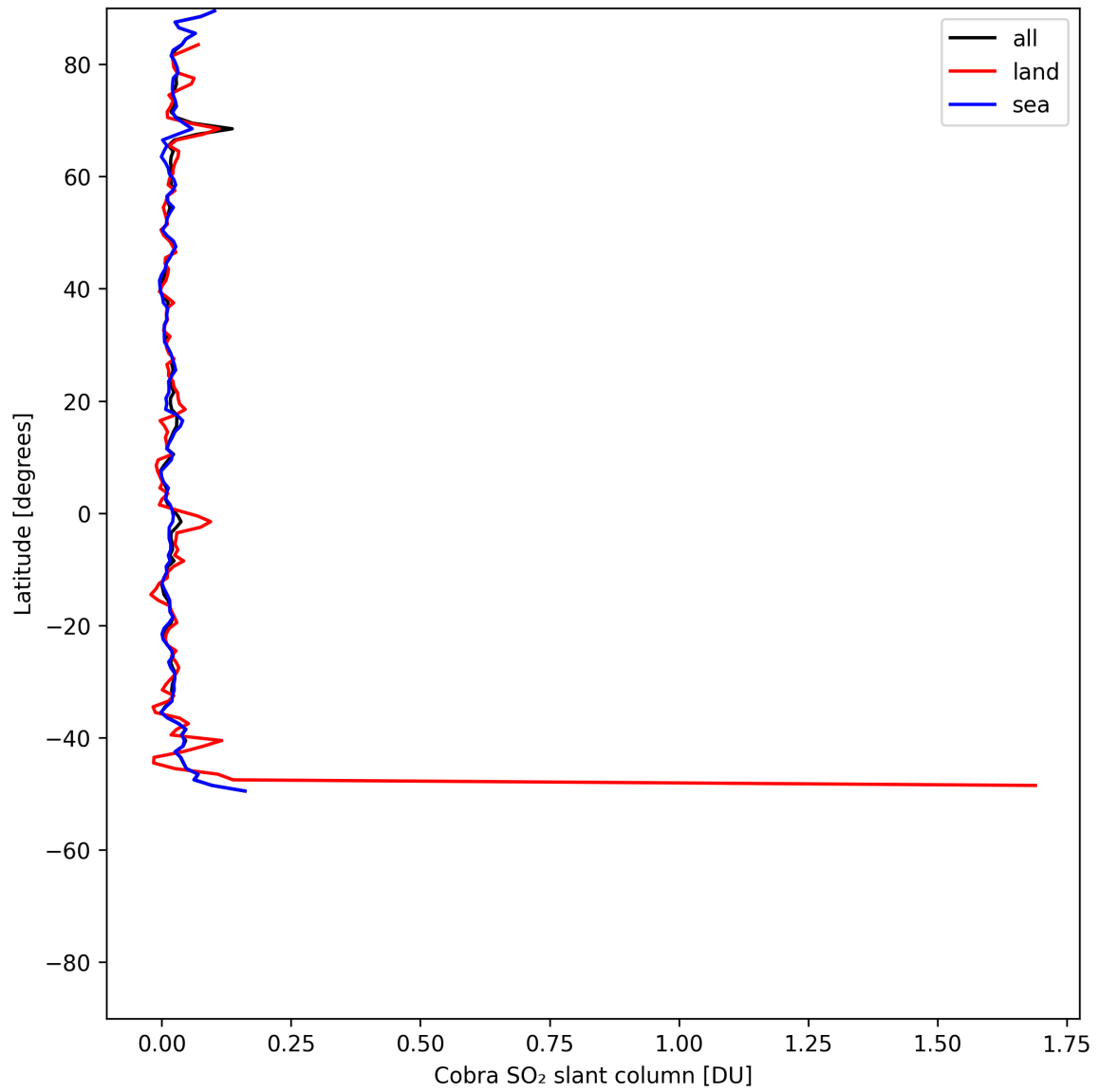


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-05-15 to 2025-05-16.

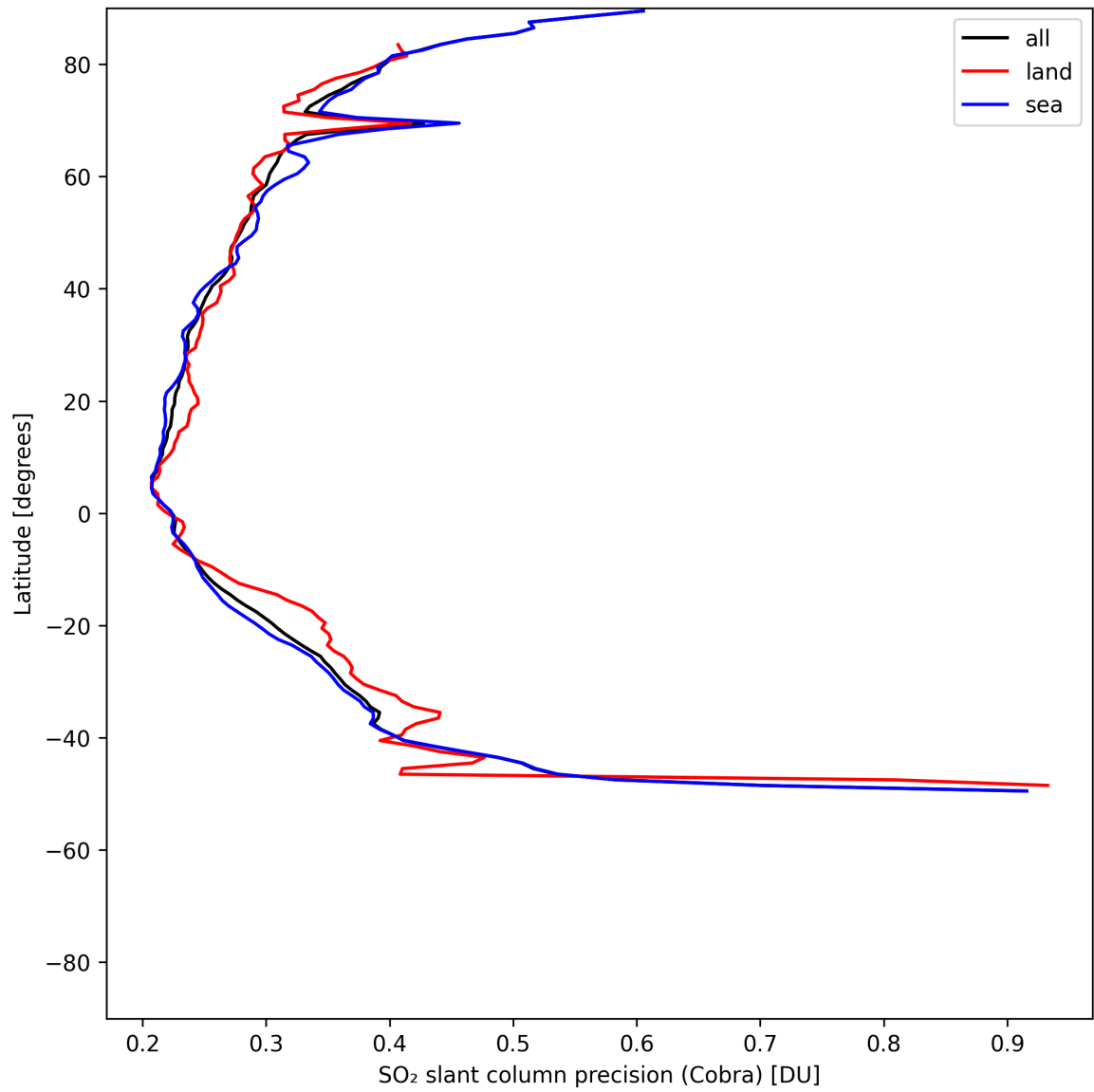


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-05-15 to 2025-05-16.

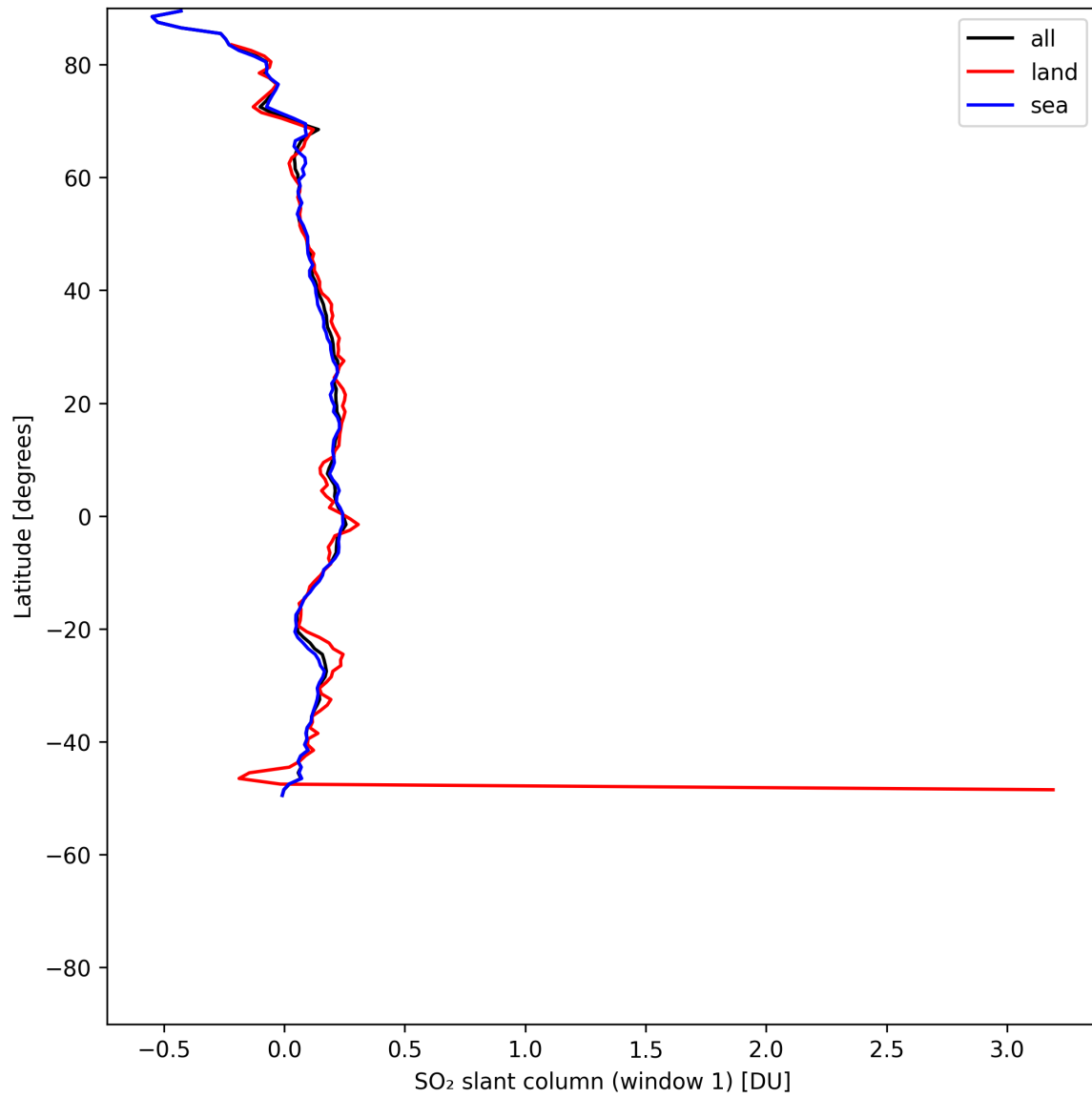


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-05-15 to 2025-05-16.

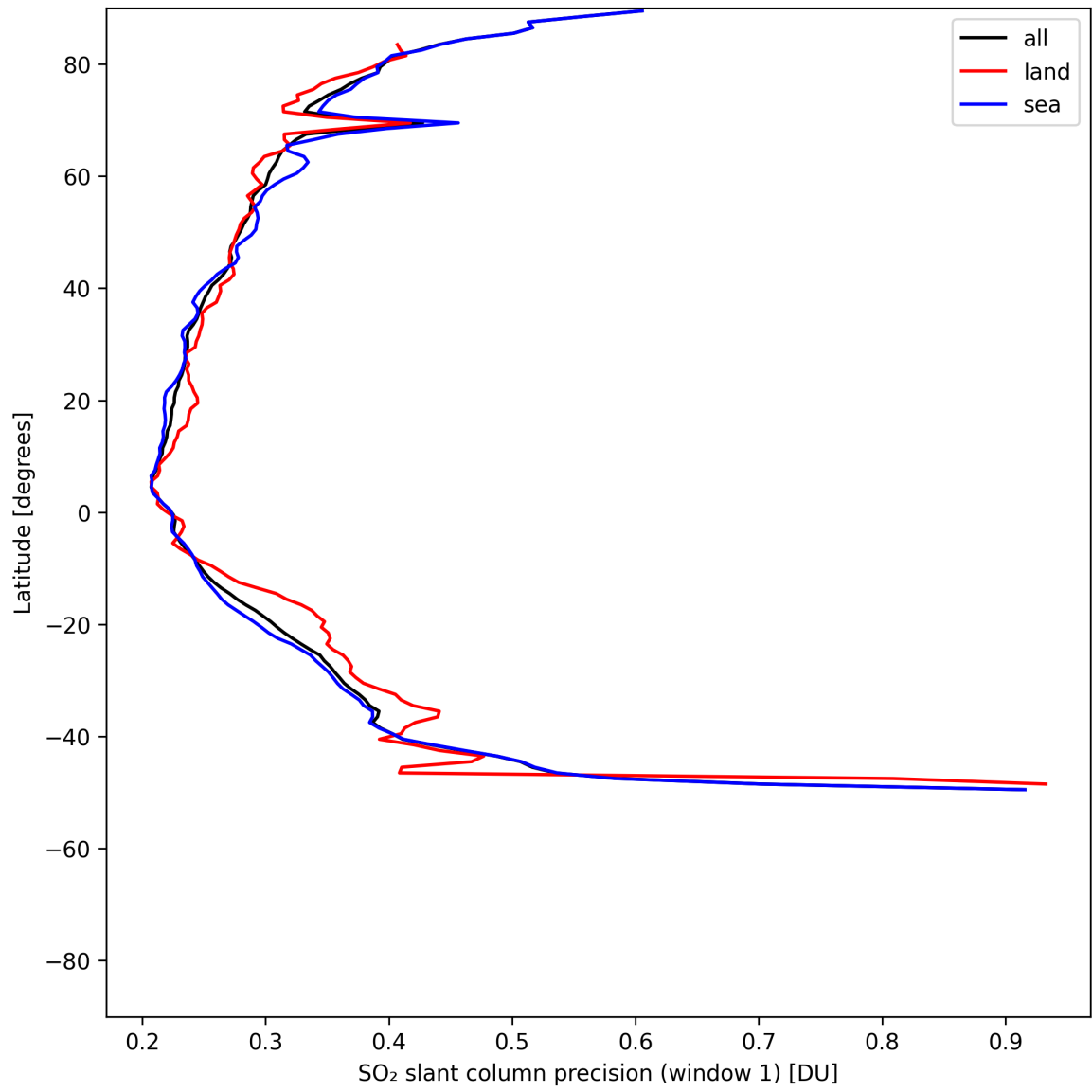


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-05-15 to 2025-05-16.

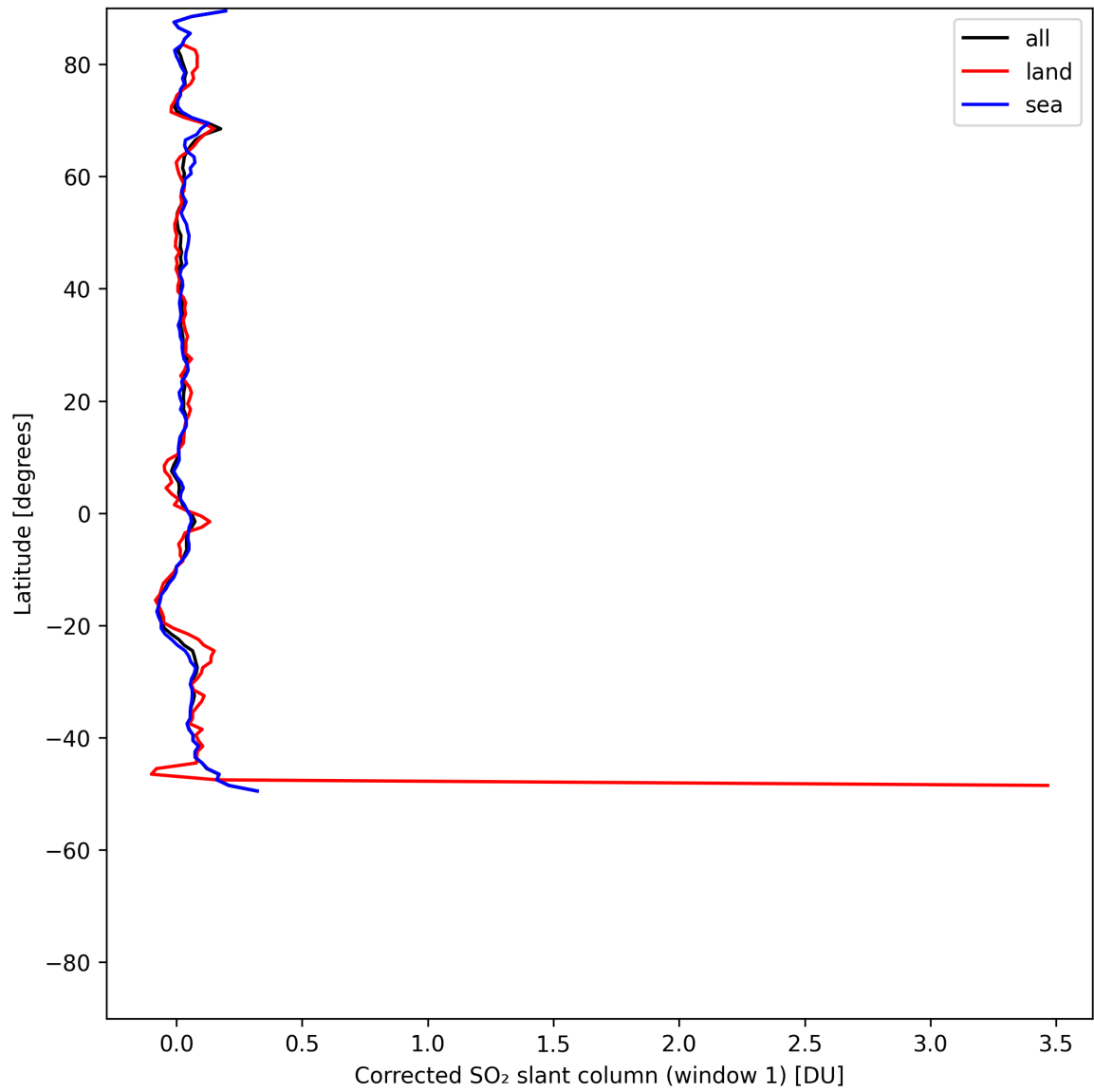


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-05-15 to 2025-05-16.

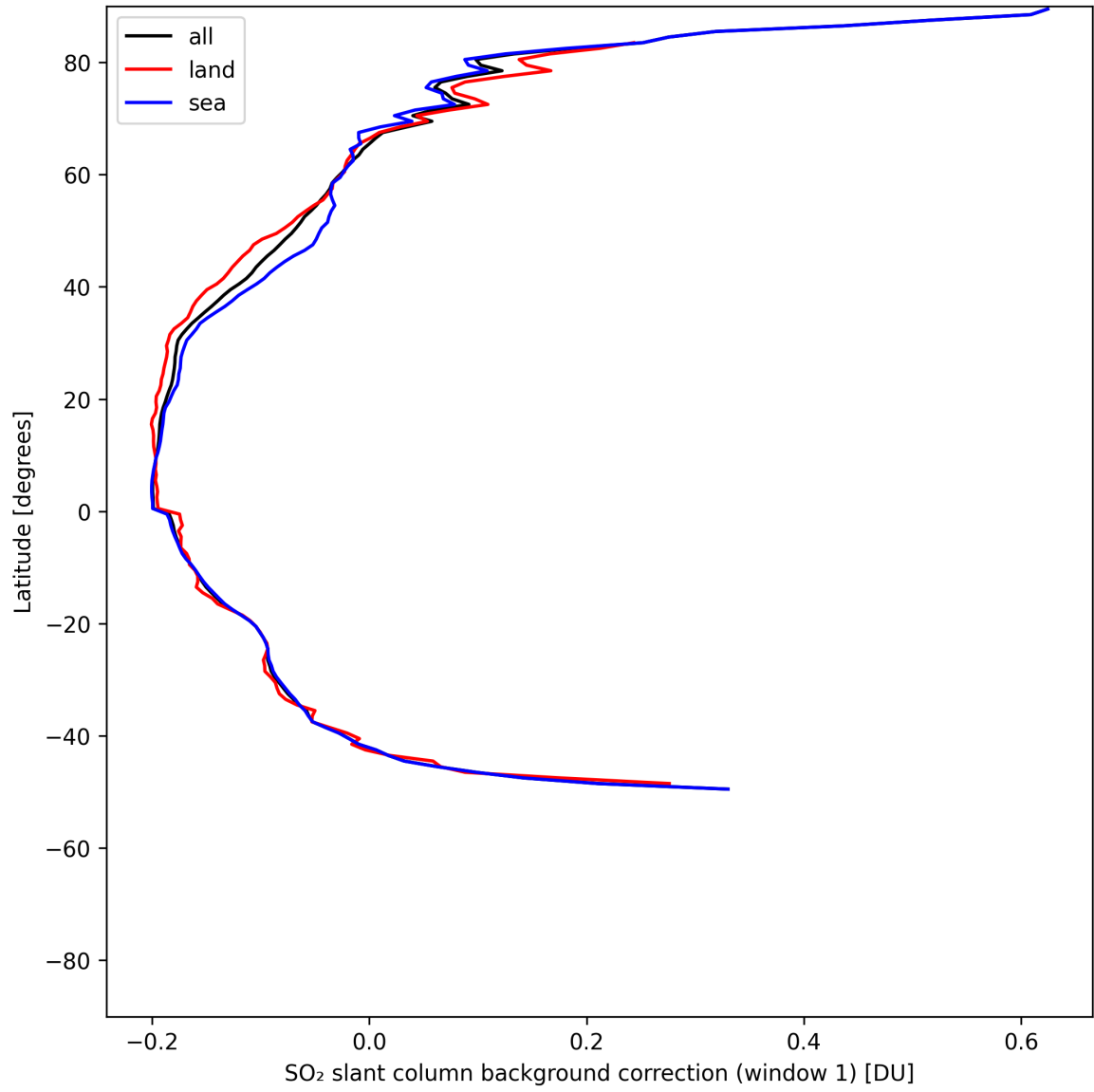


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-05-15 to 2025-05-16.

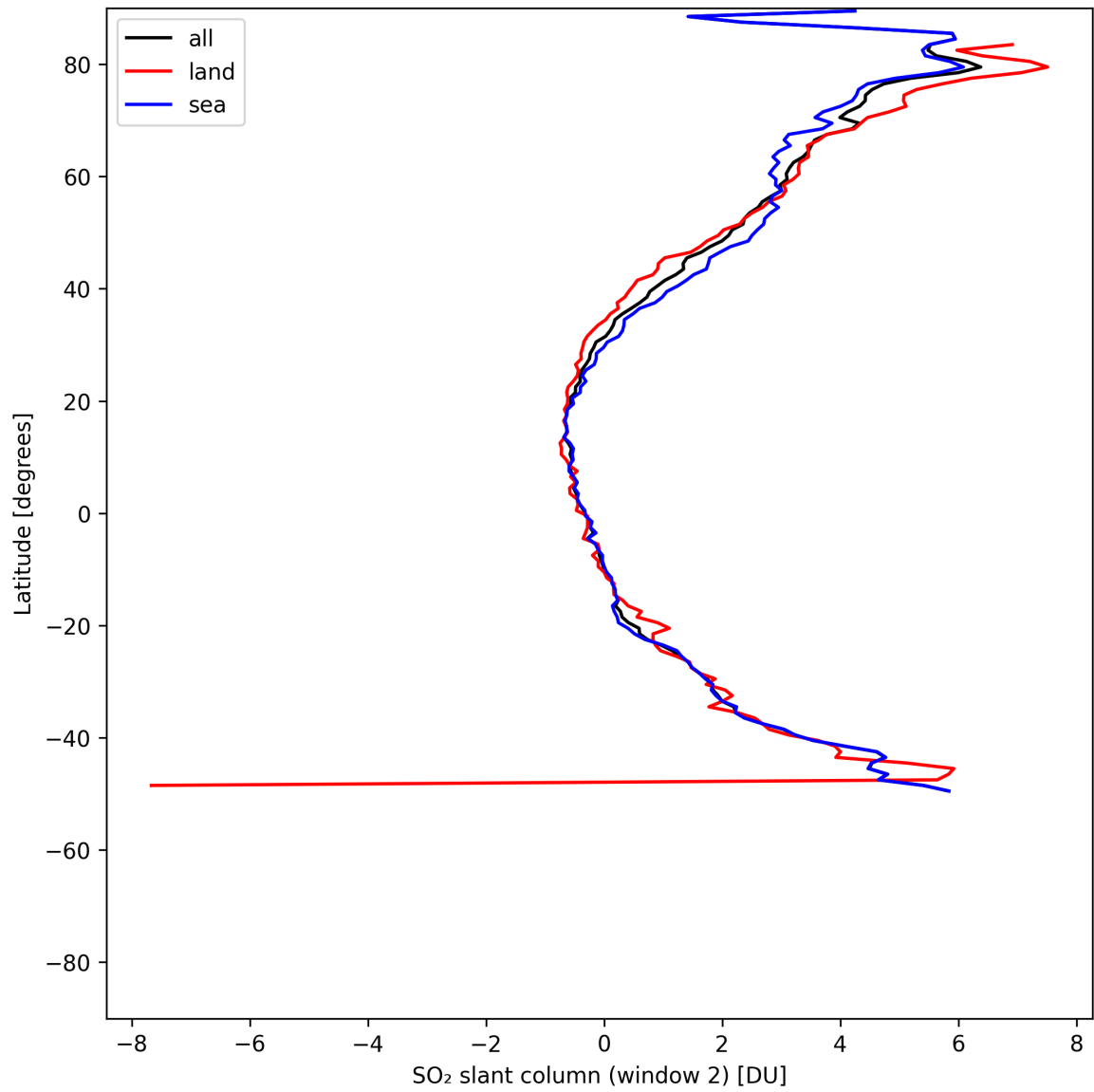


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-05-15 to 2025-05-16.

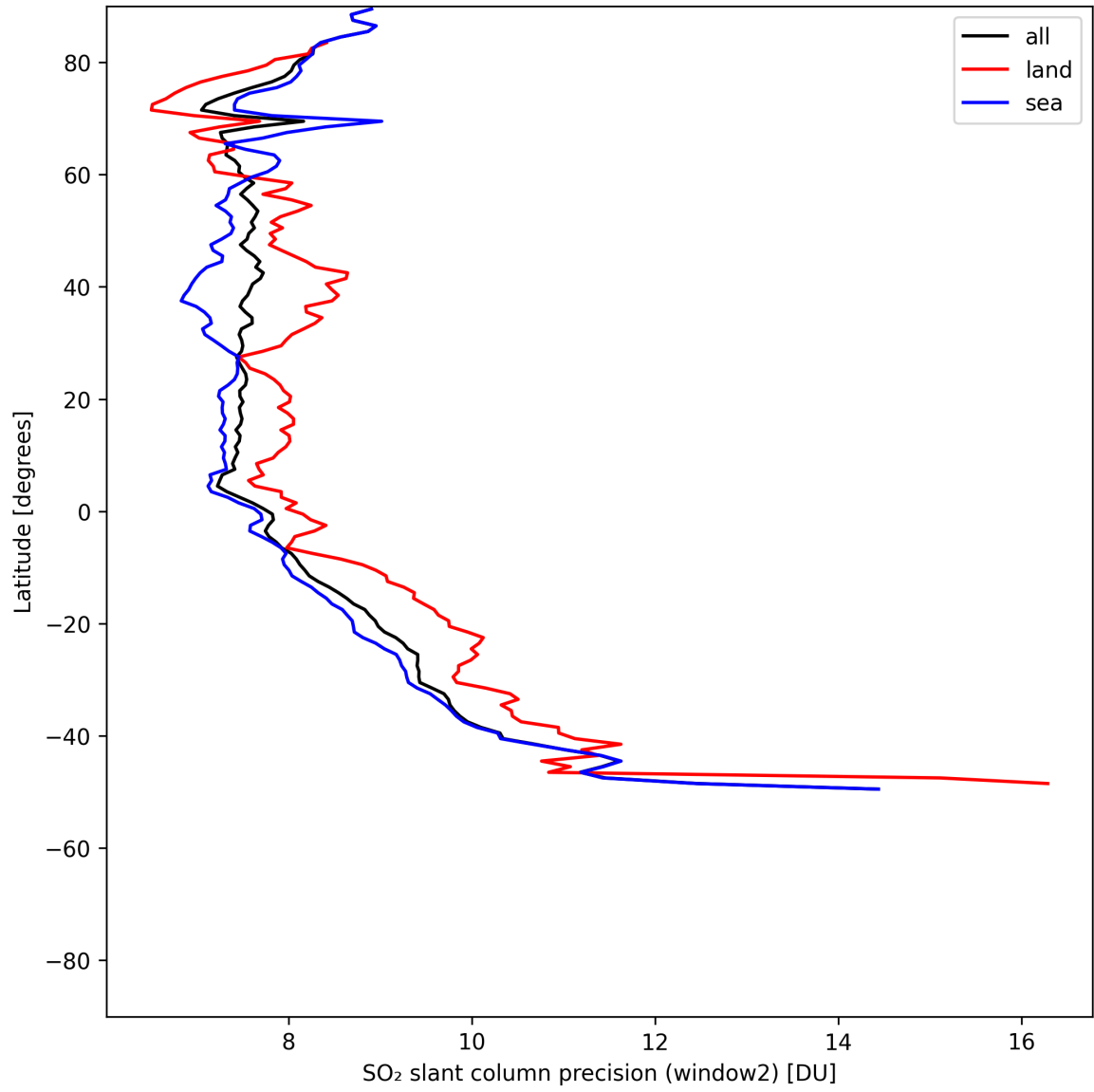


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-05-15 to 2025-05-16.

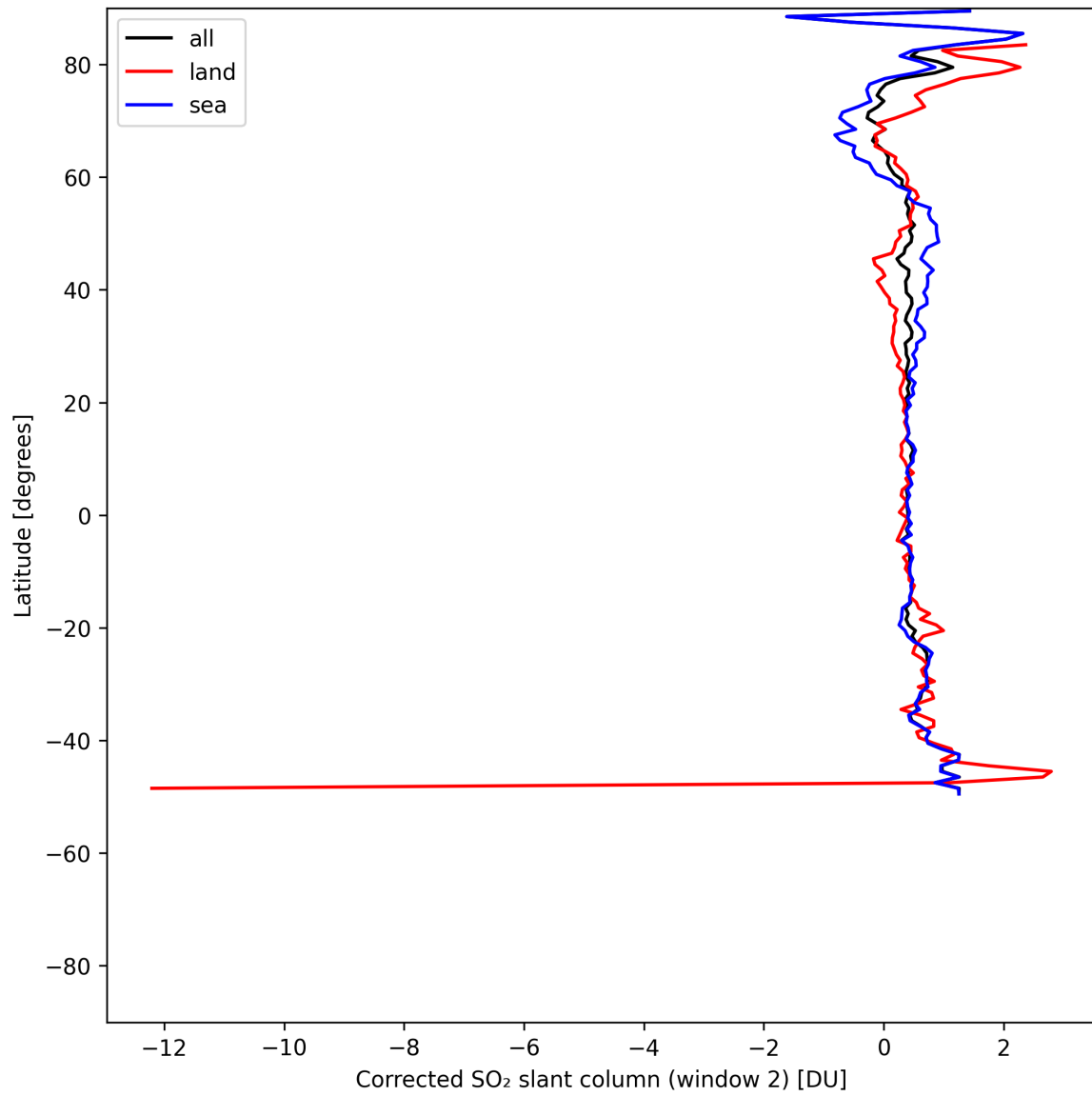


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-05-15 to 2025-05-16.

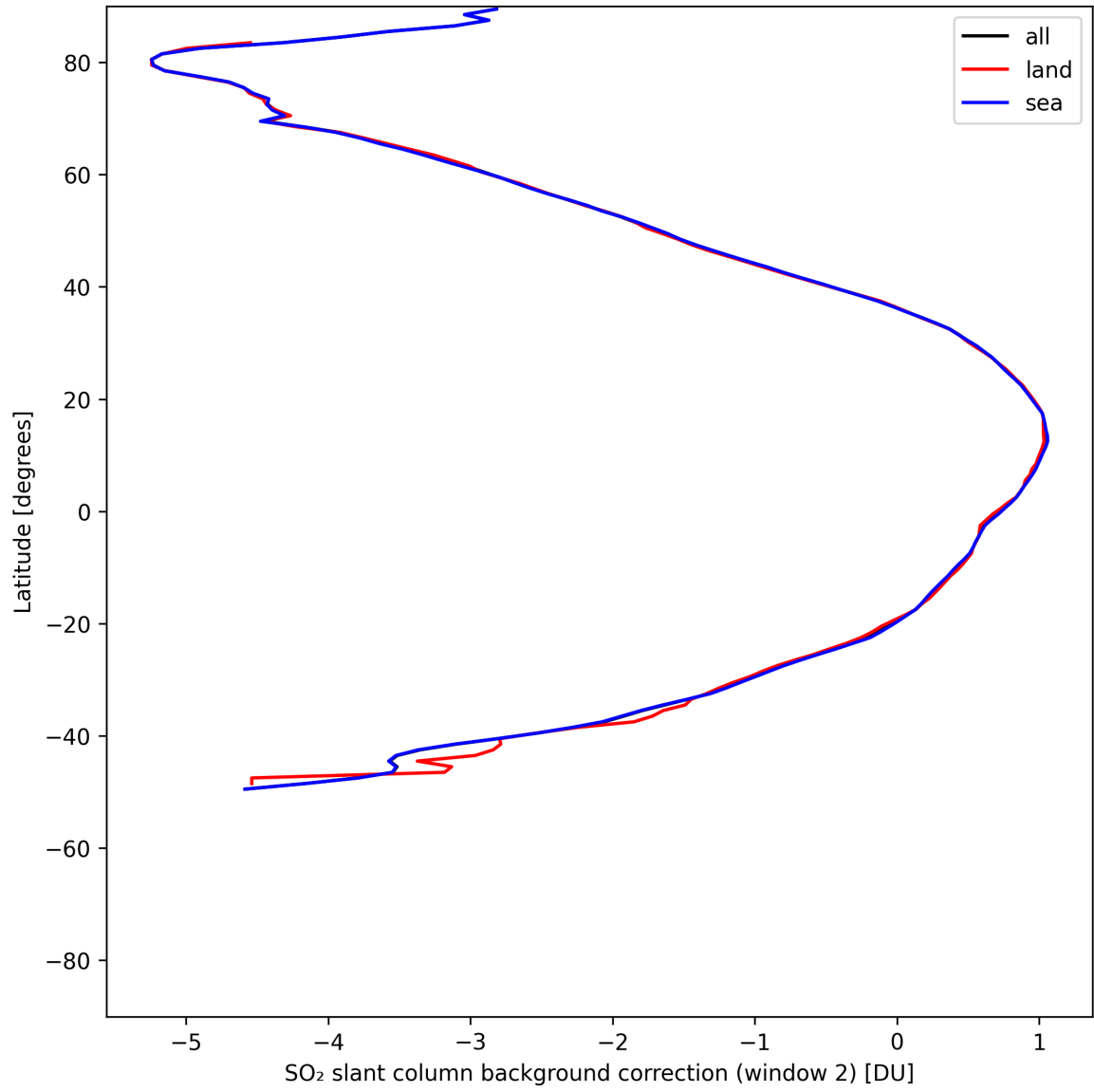


Figure 43: Zonal average of "SO₂ slant column background correction (window 2)" for 2025-05-15 to 2025-05-16.

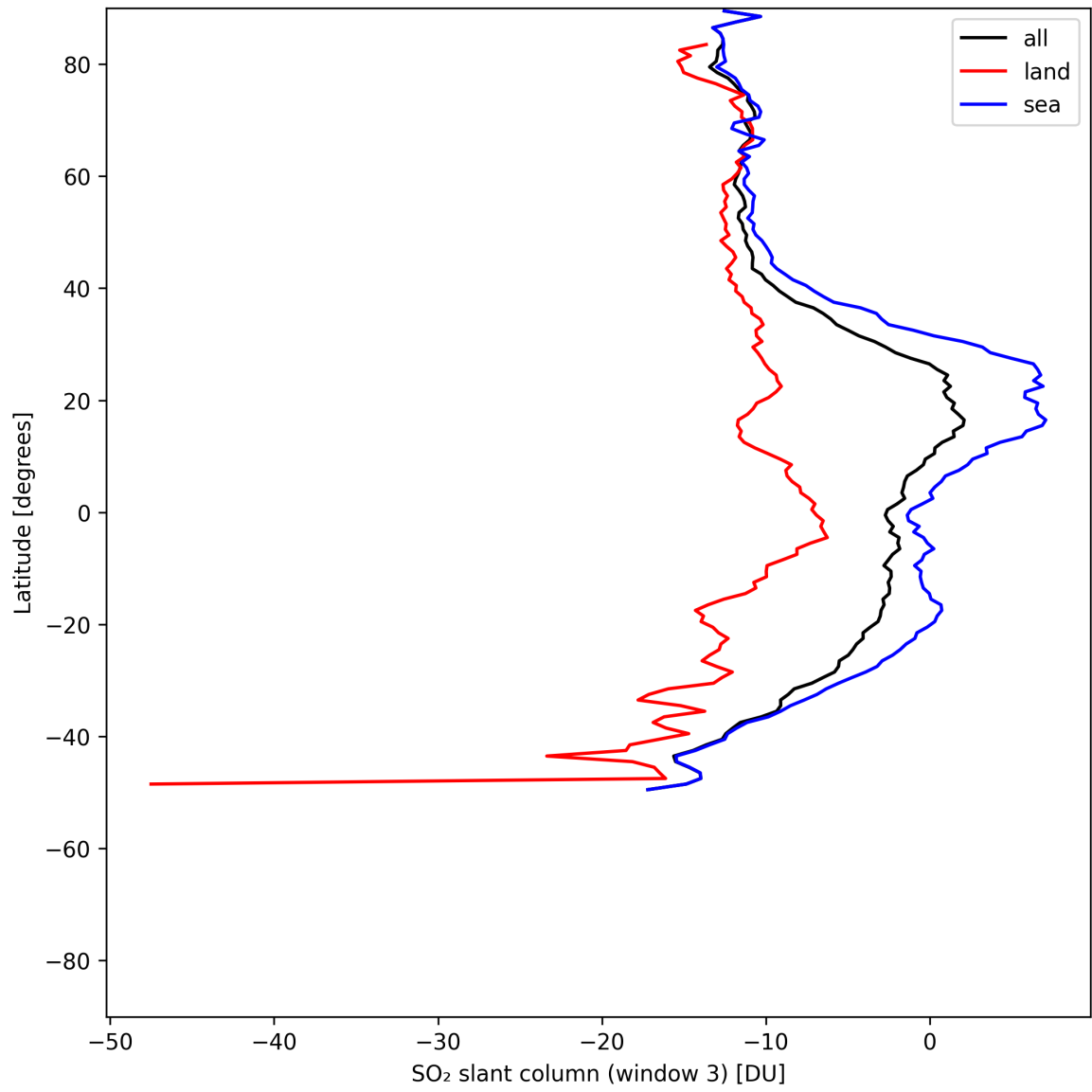


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-05-15 to 2025-05-16.

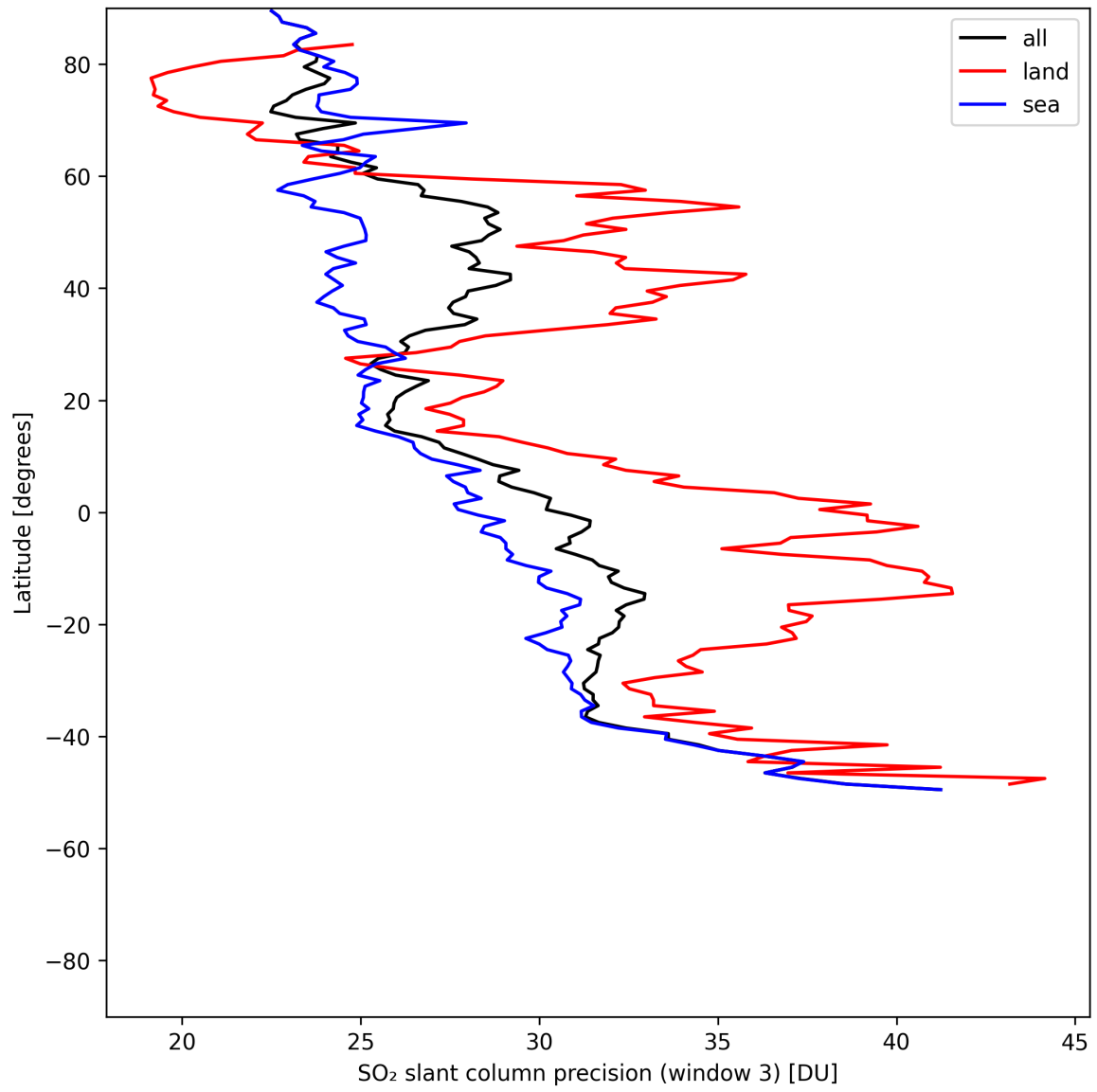


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-05-15 to 2025-05-16.

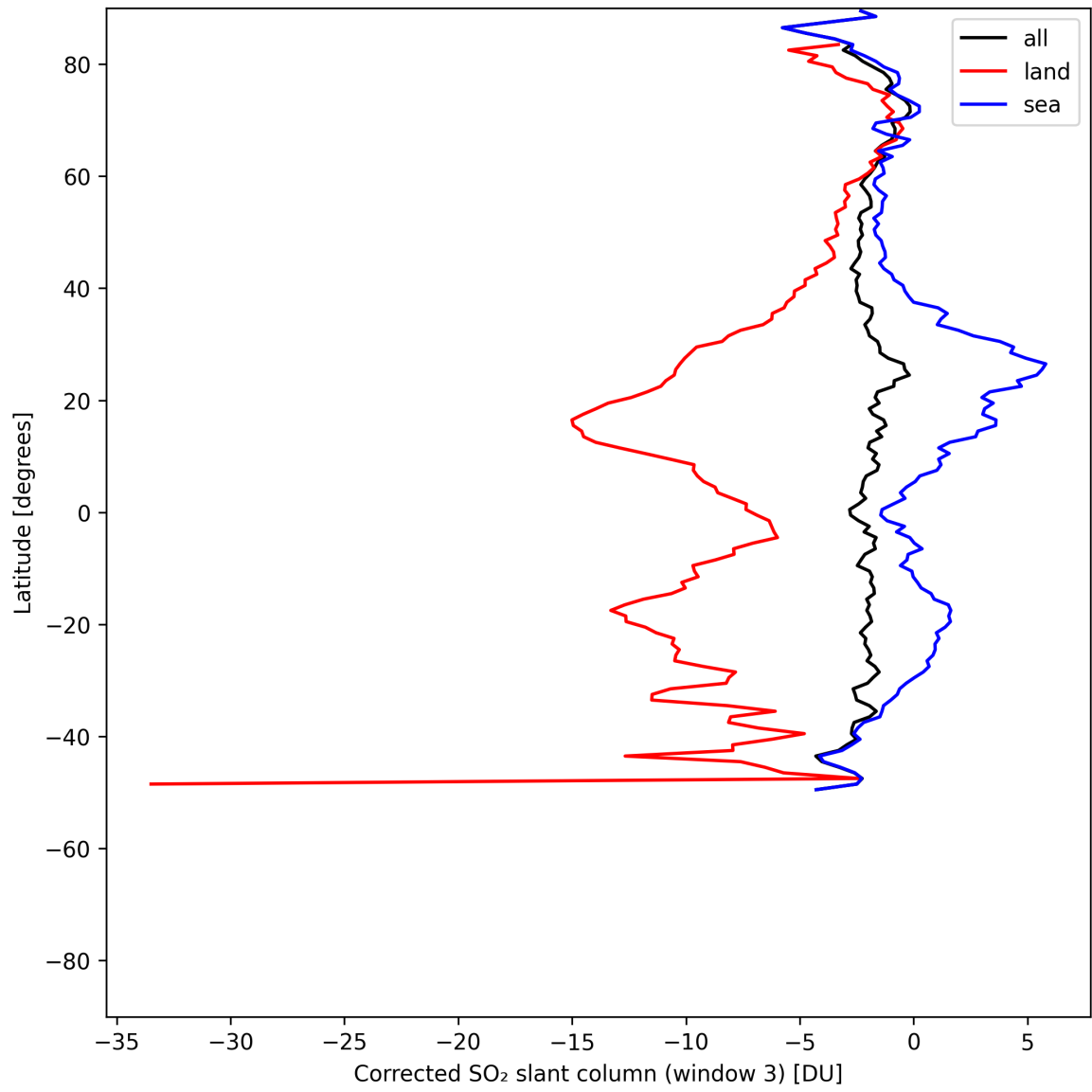


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-05-15 to 2025-05-16.

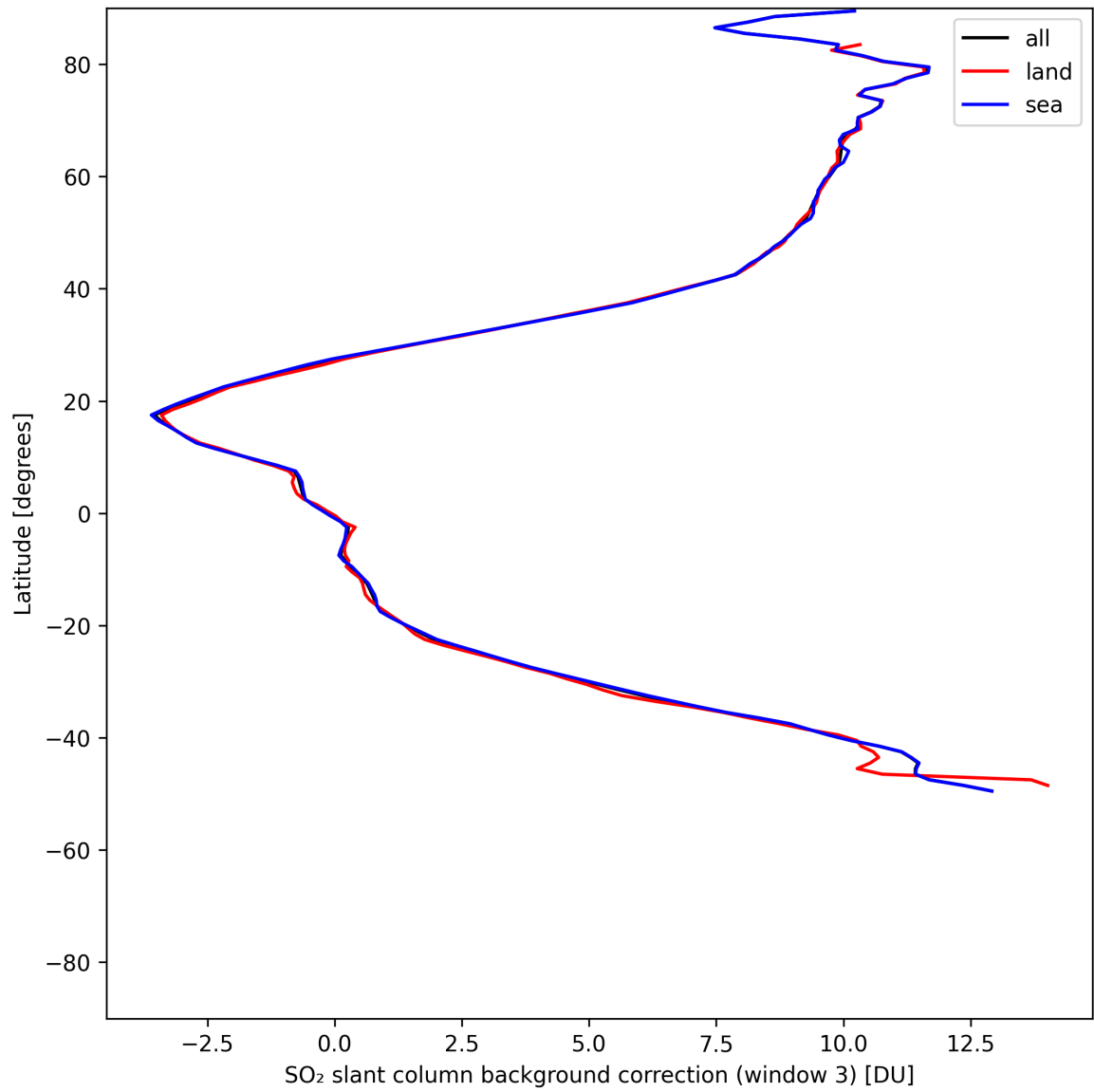


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-05-15 to 2025-05-16.

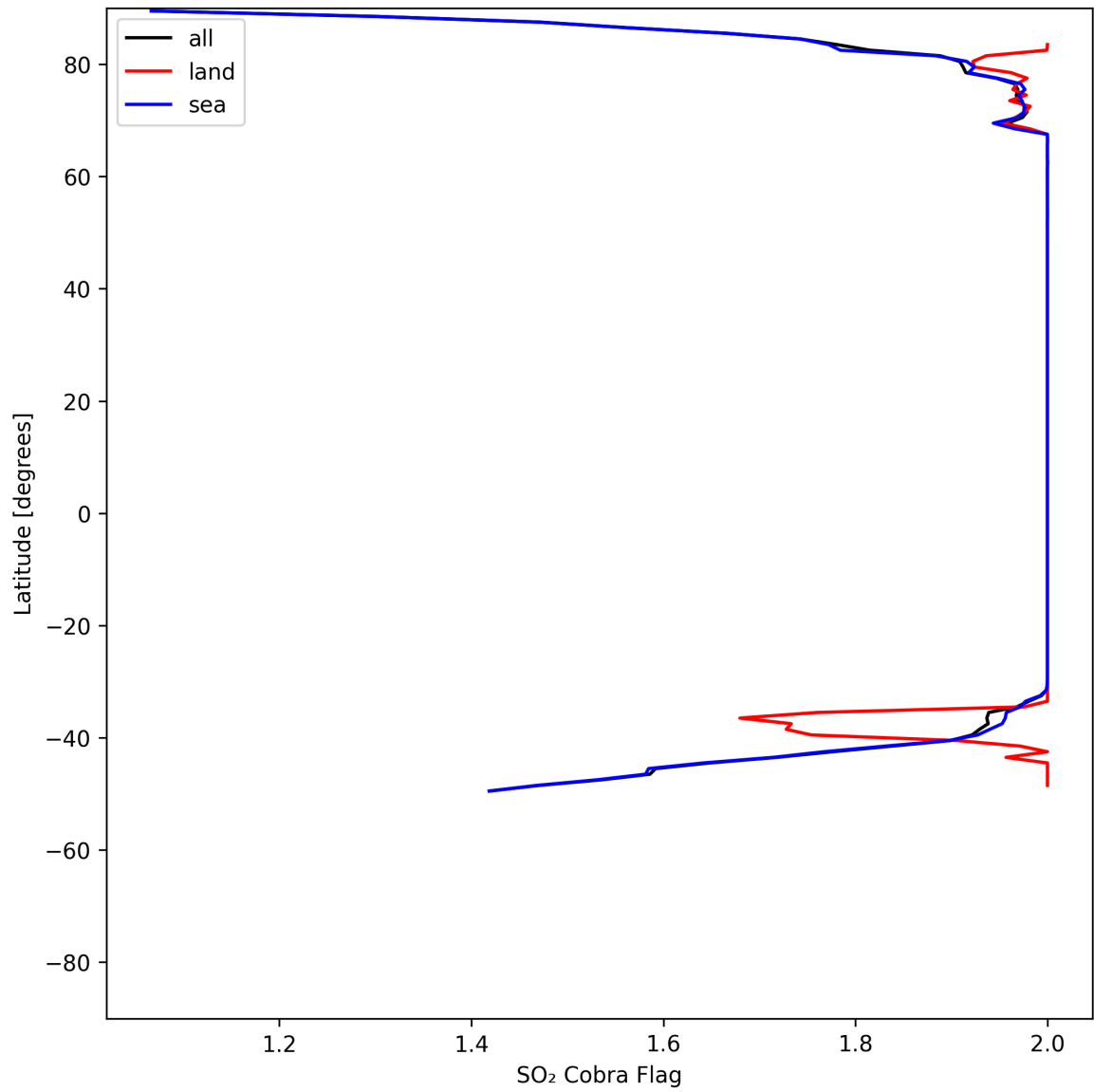


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-05-15 to 2025-05-16.

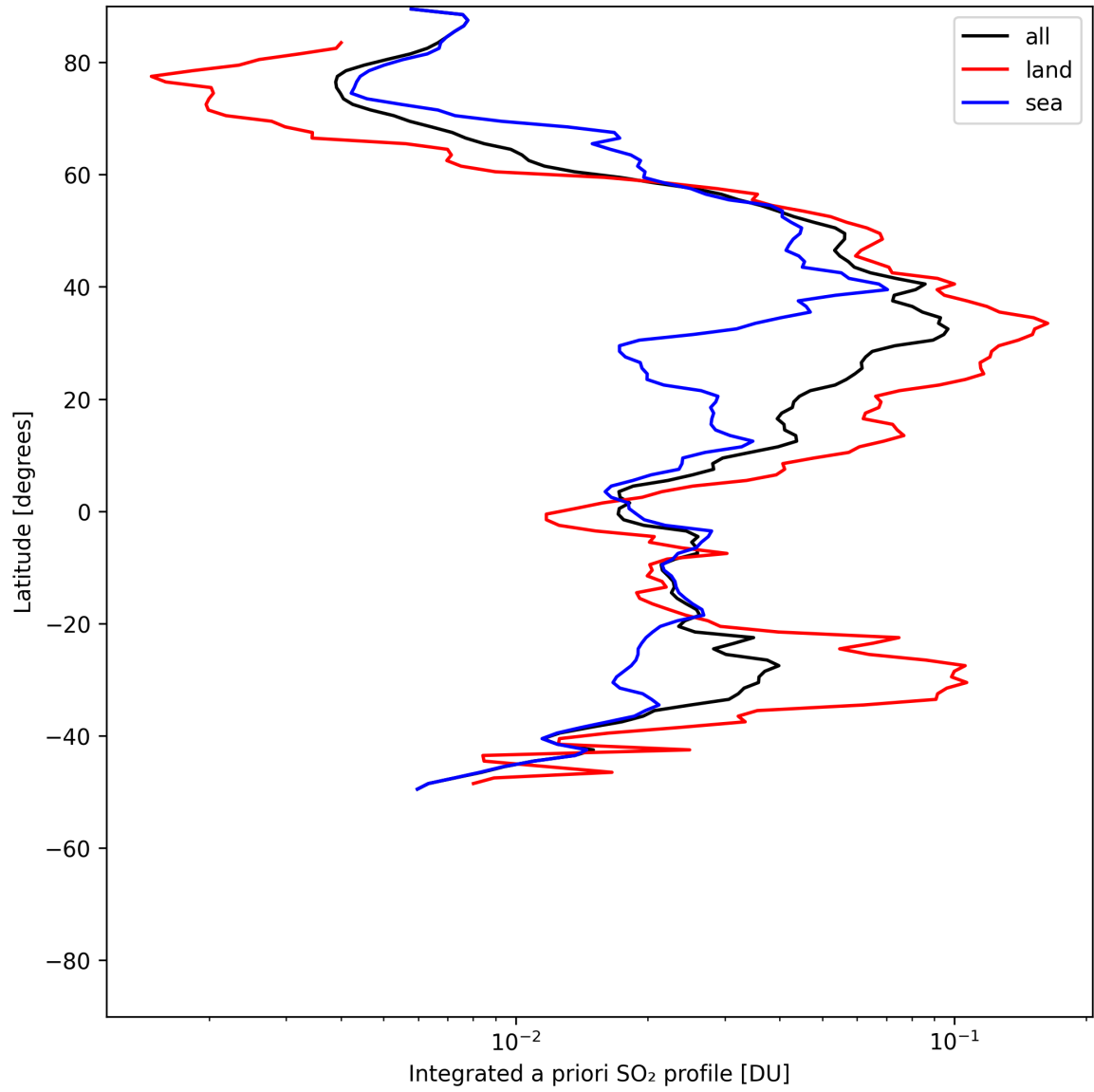


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-05-15 to 2025-05-16.

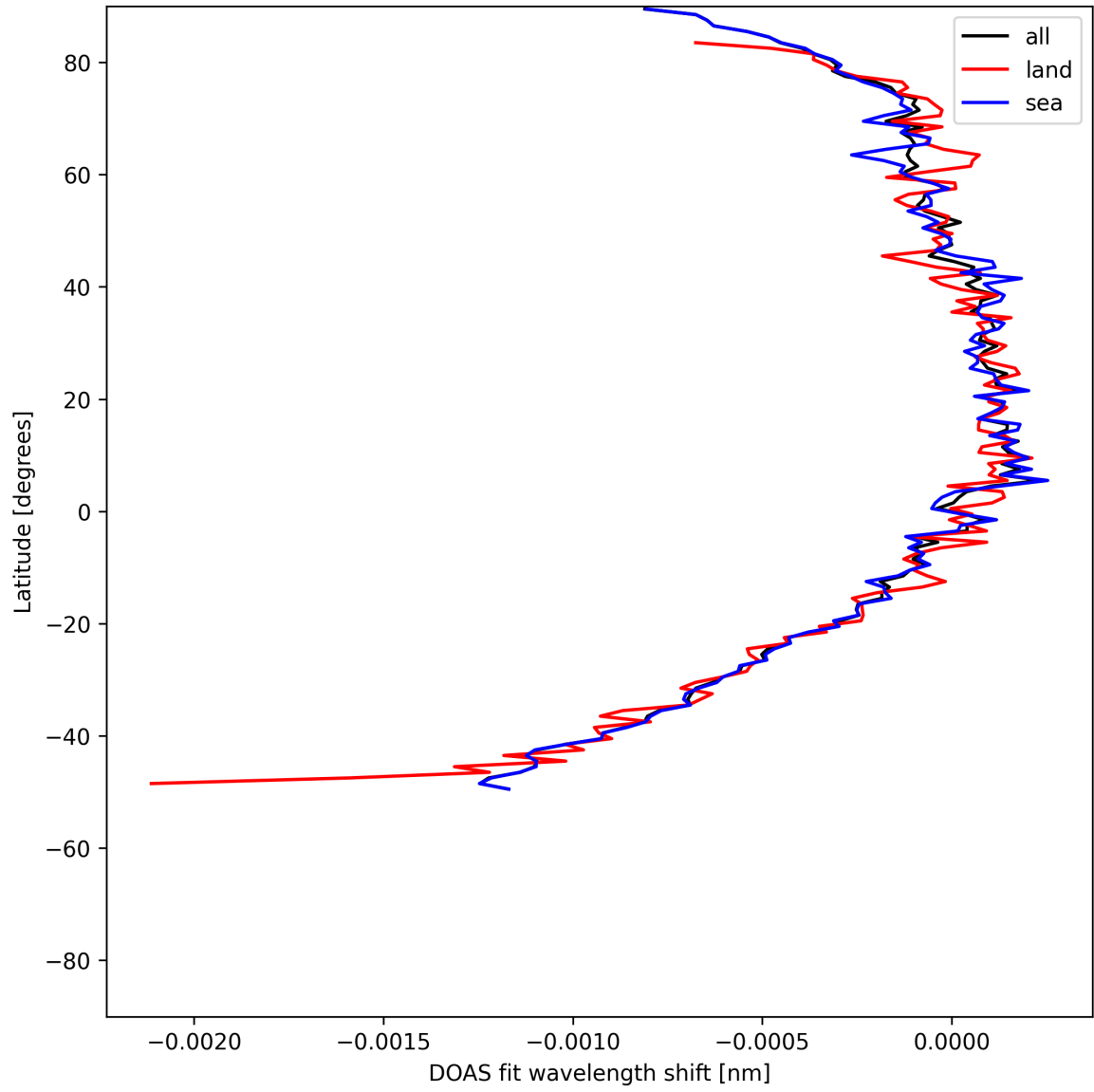


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-05-15 to 2025-05-16.

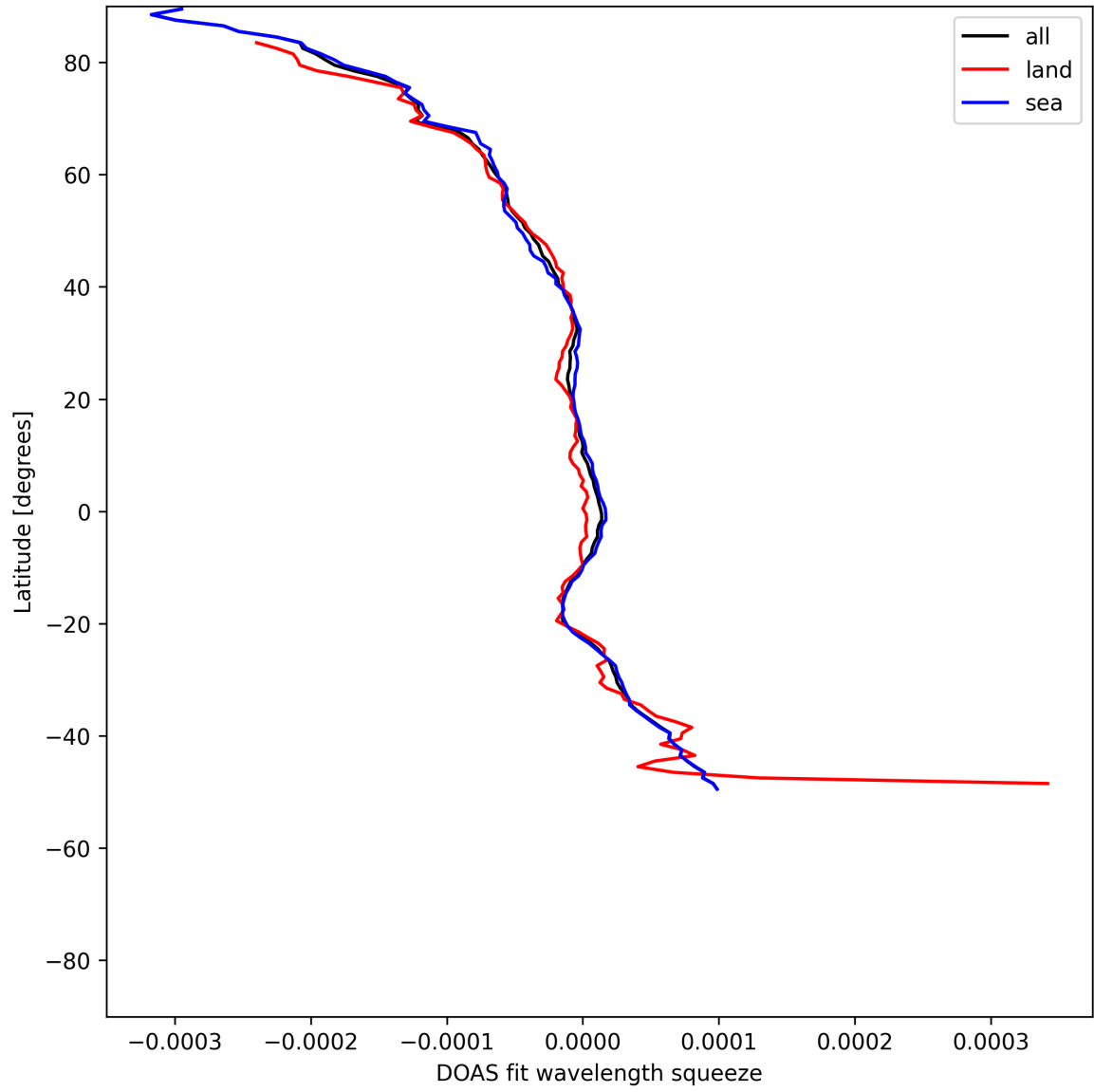


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-05-15 to 2025-05-16.

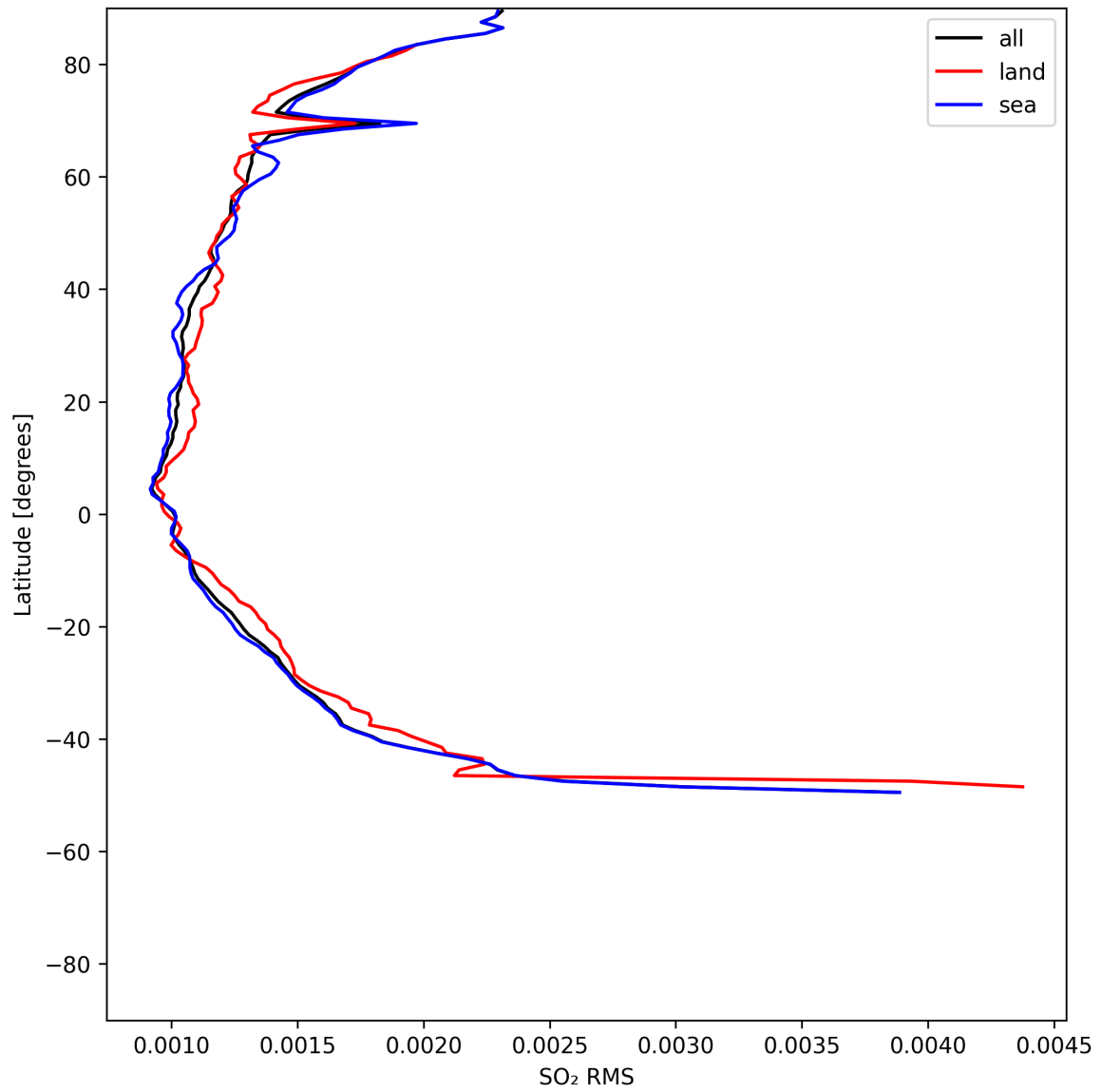


Figure 52: Zonal average of “SO₂ RMS” for 2025-05-15 to 2025-05-16.

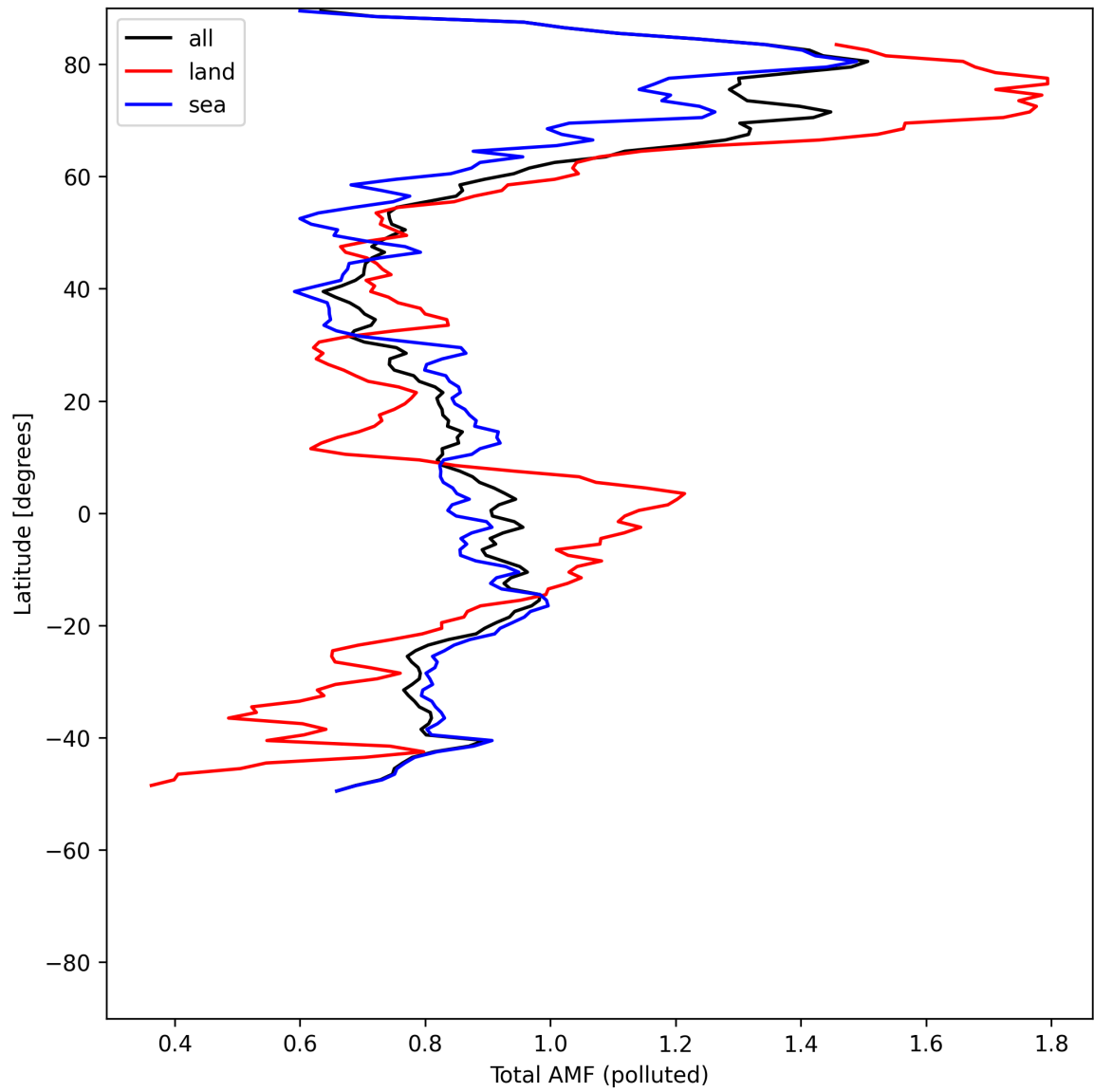


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-05-15 to 2025-05-16.

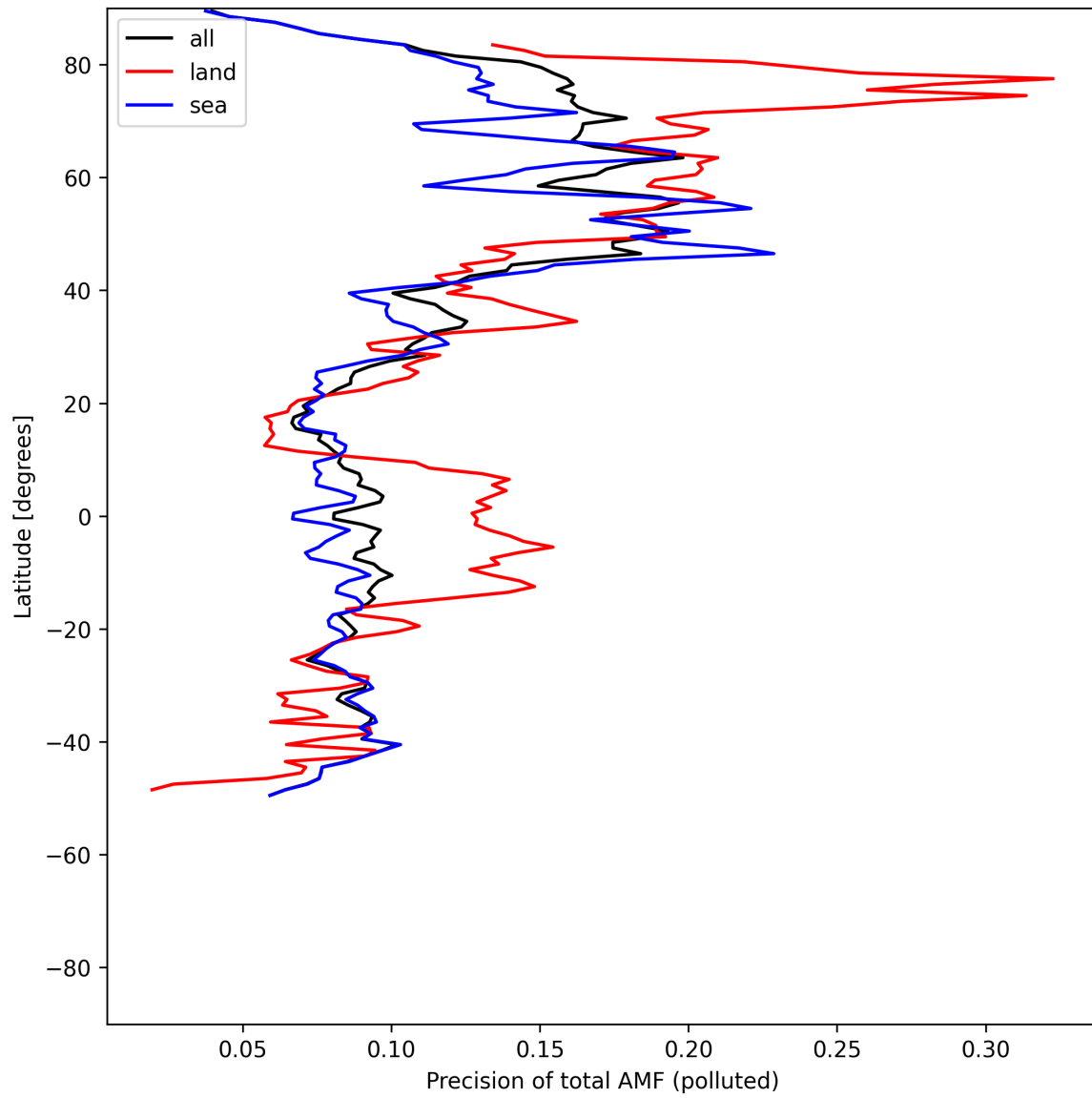


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-05-15 to 2025-05-16.

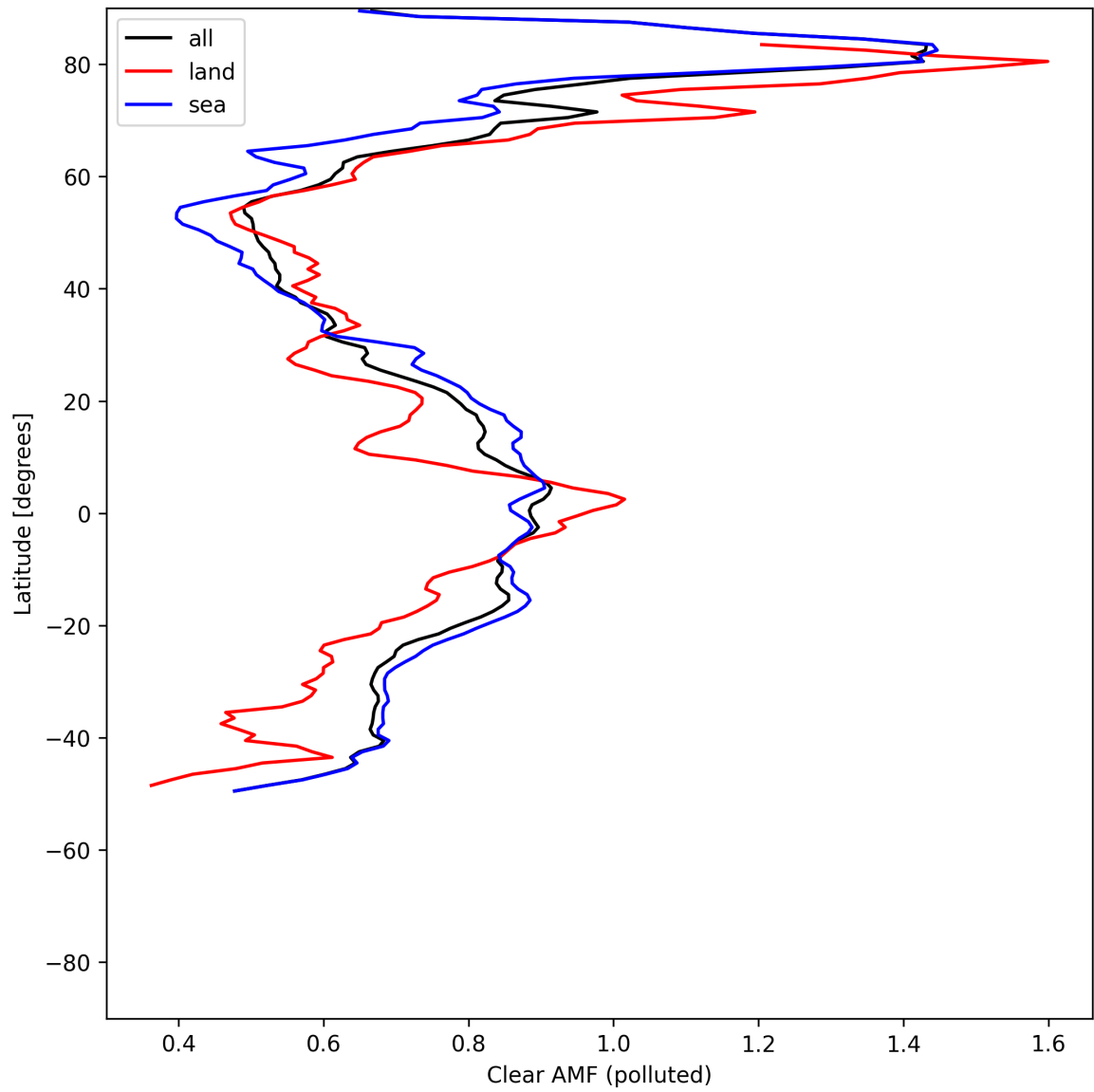


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-05-15 to 2025-05-16.

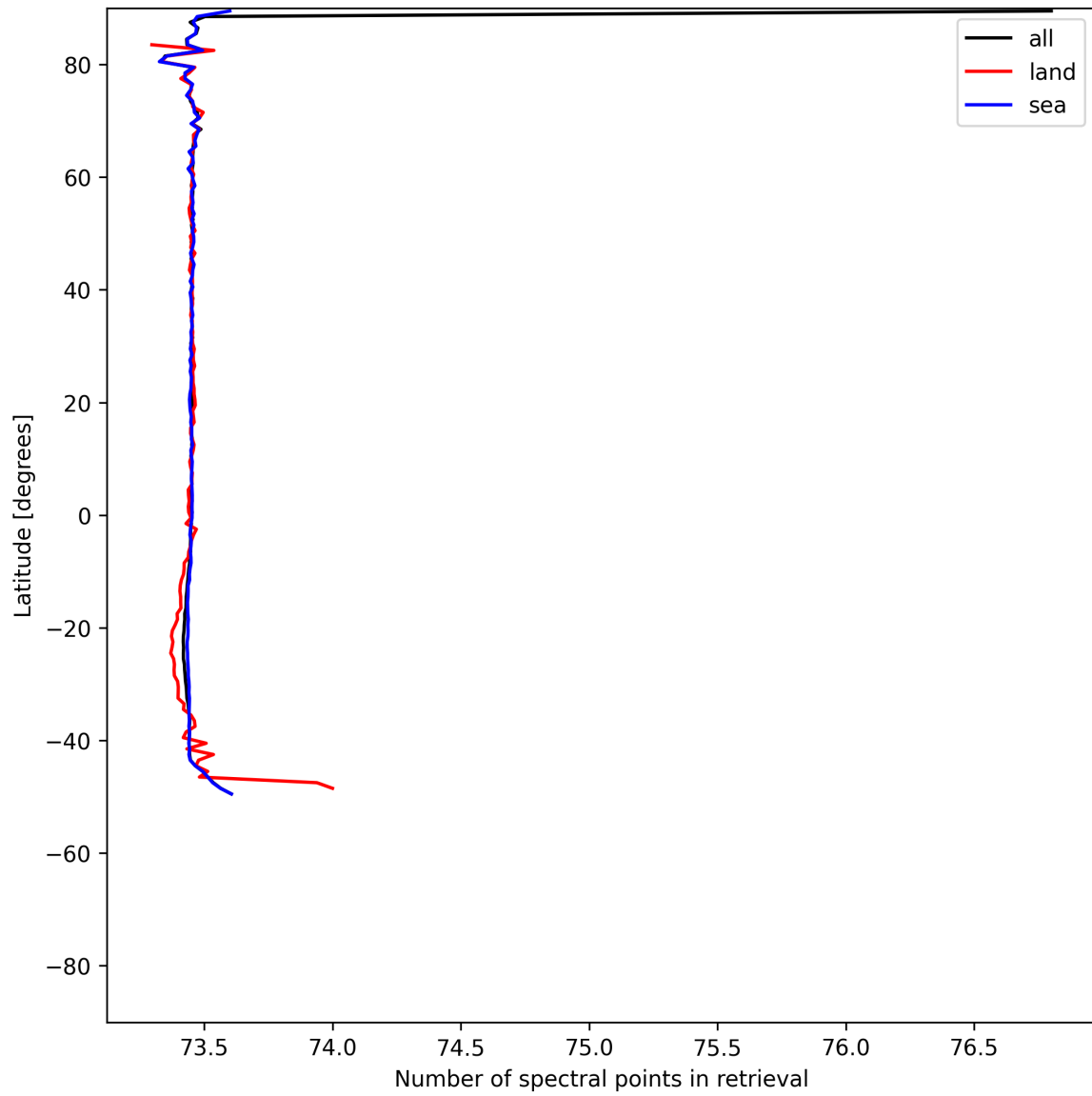


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-05-15 to 2025-05-16.

8 Histograms

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

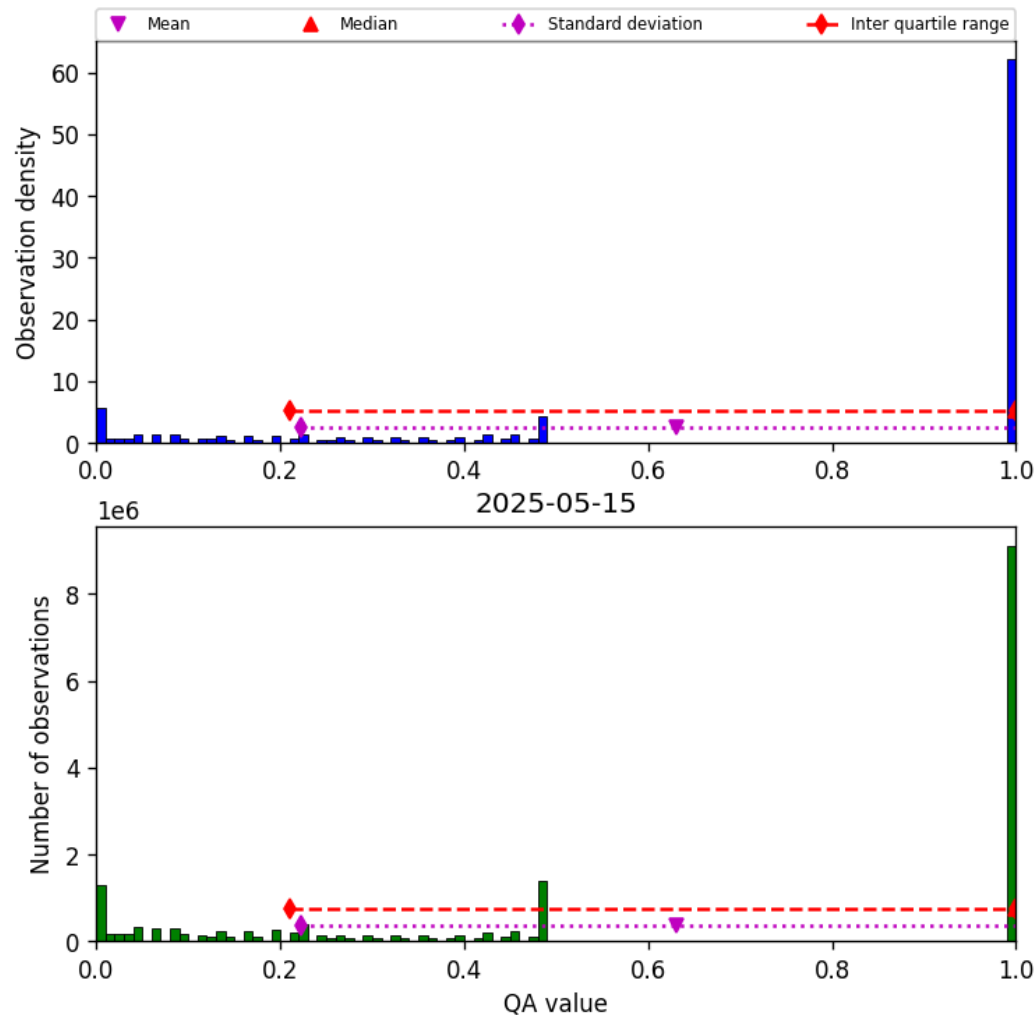


Figure 57: Histogram of “QA value” for 2025-05-15 to 2025-05-16

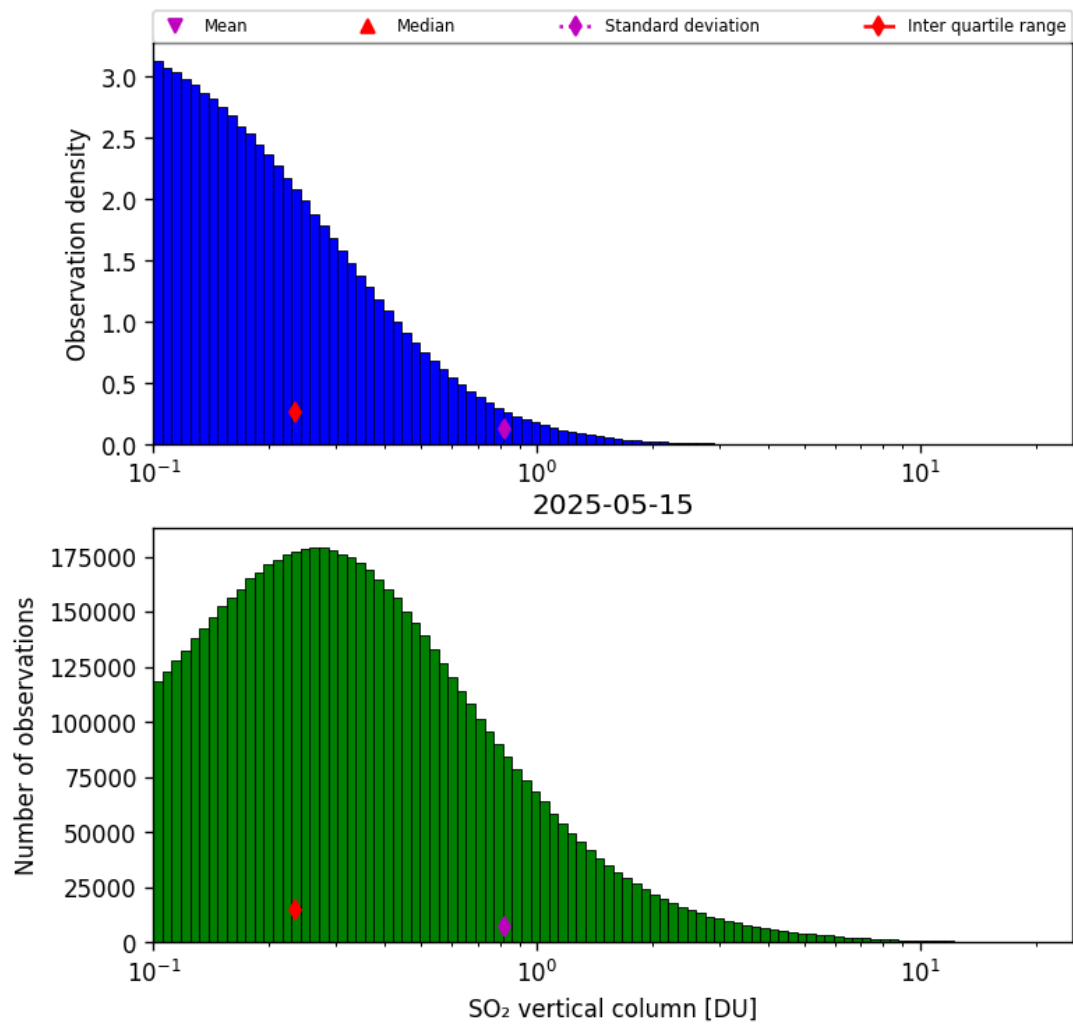


Figure 58: Histogram of “SO₂ vertical column” for 2025-05-15 to 2025-05-16

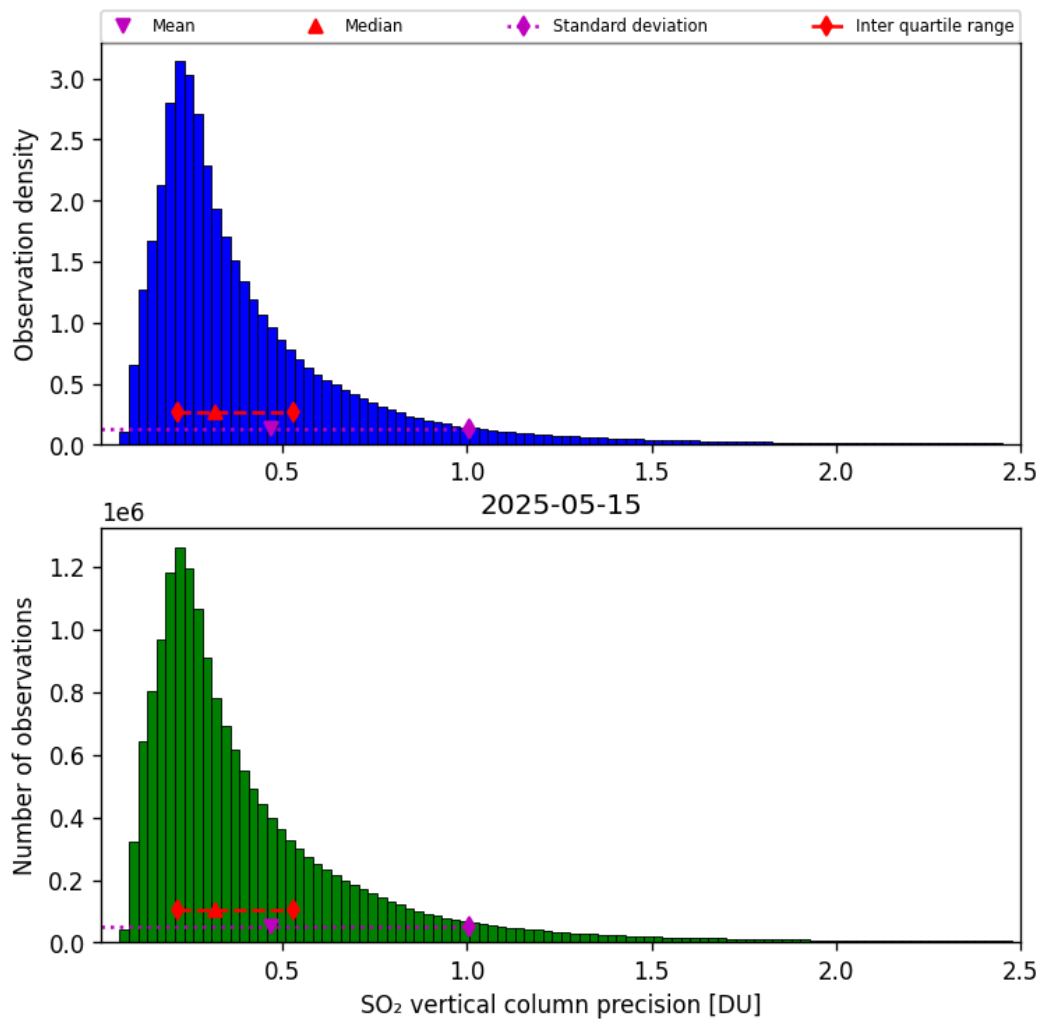


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-05-15 to 2025-05-16

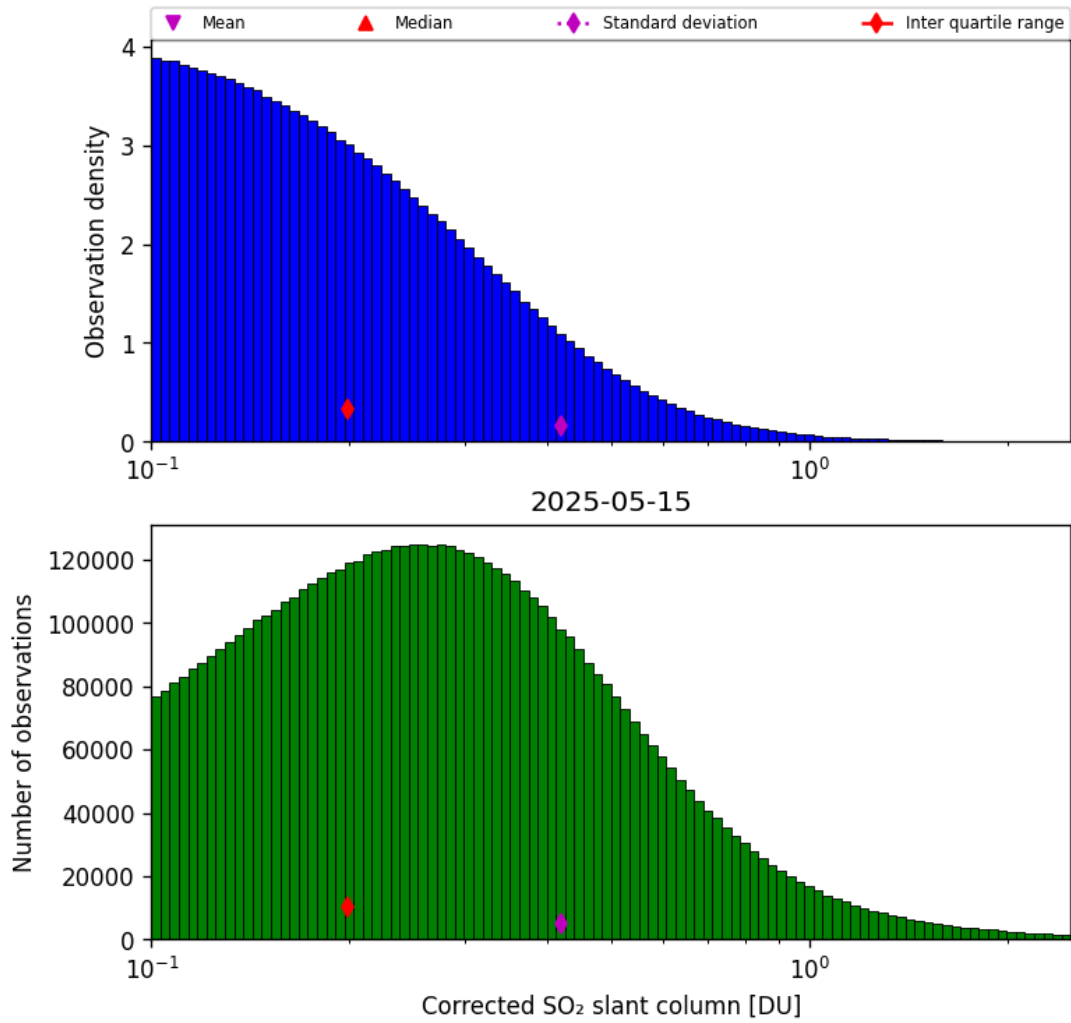


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-05-15 to 2025-05-16

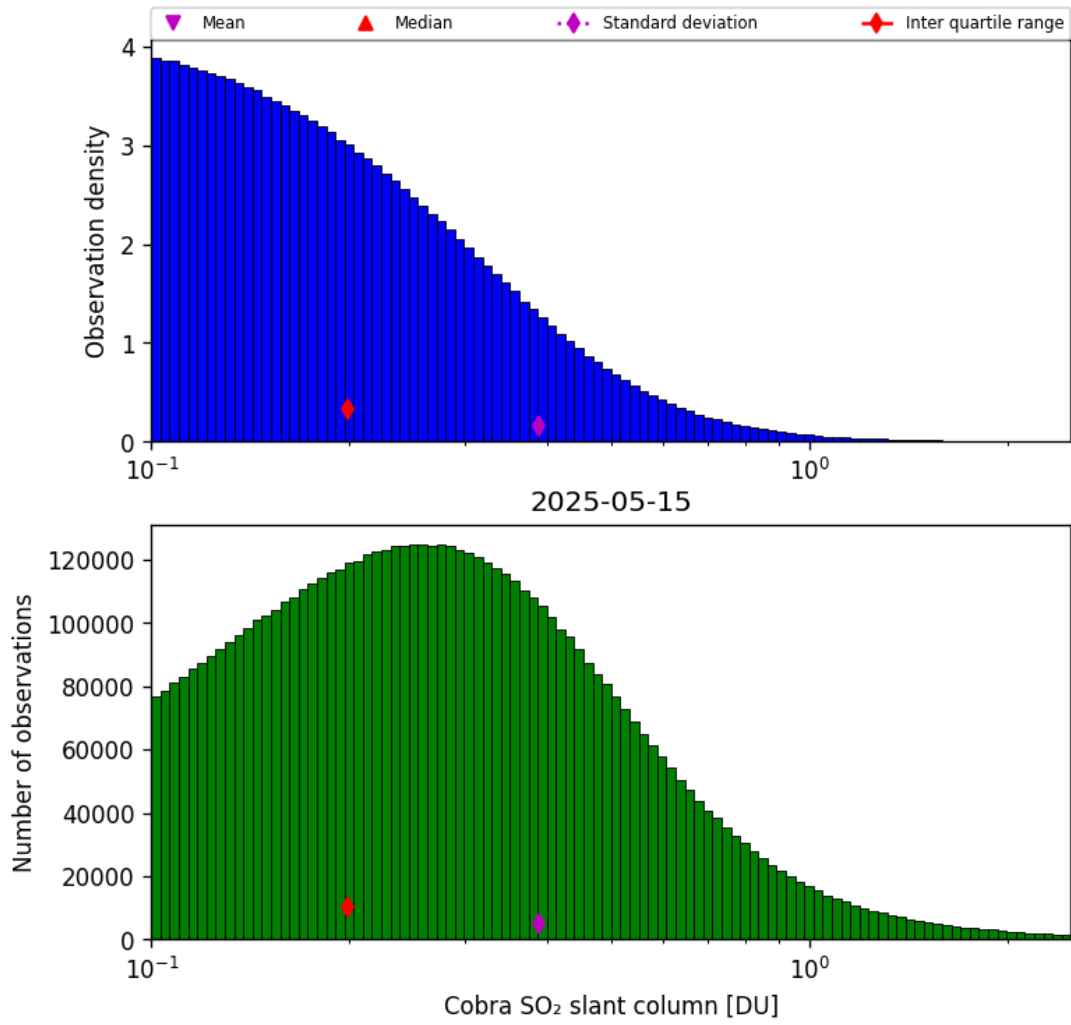


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-05-15 to 2025-05-16

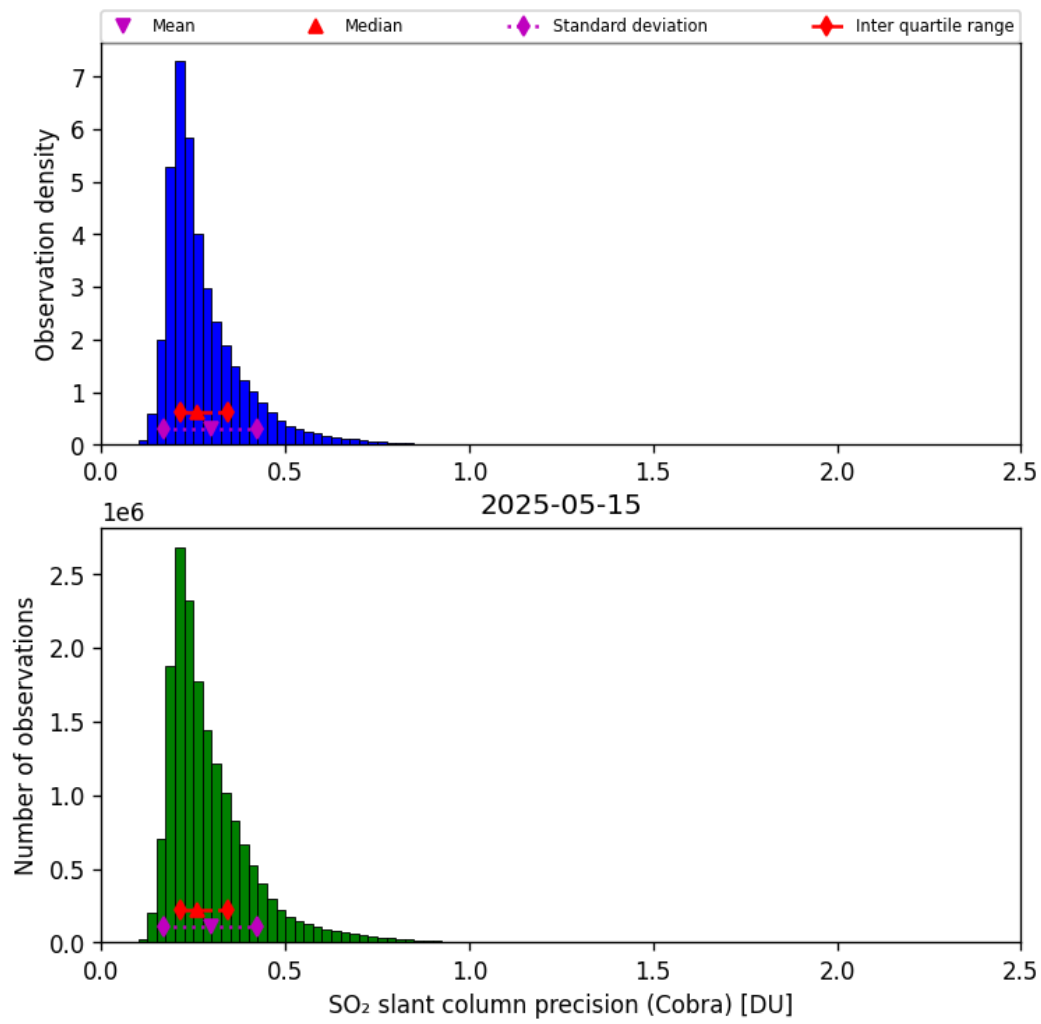


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-05-15 to 2025-05-16

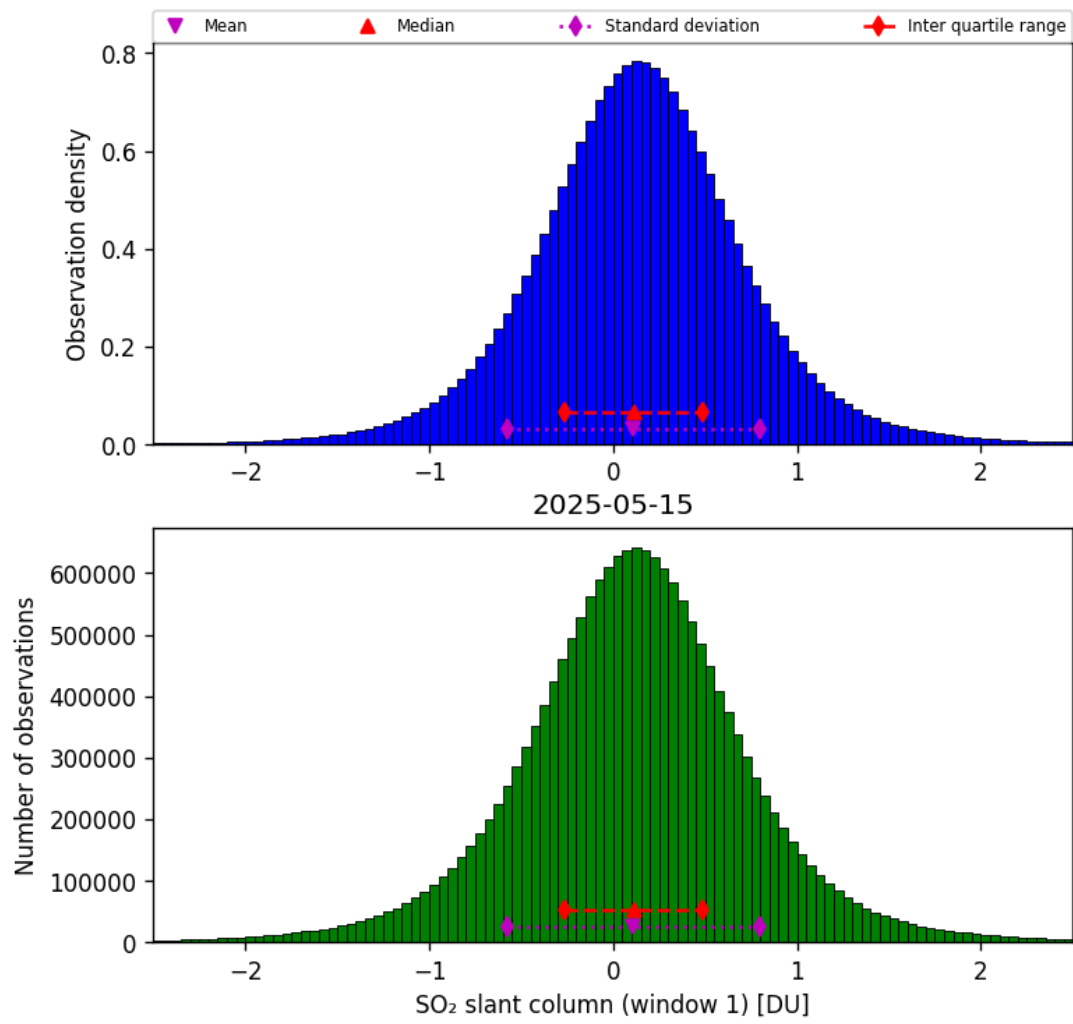


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-05-15 to 2025-05-16

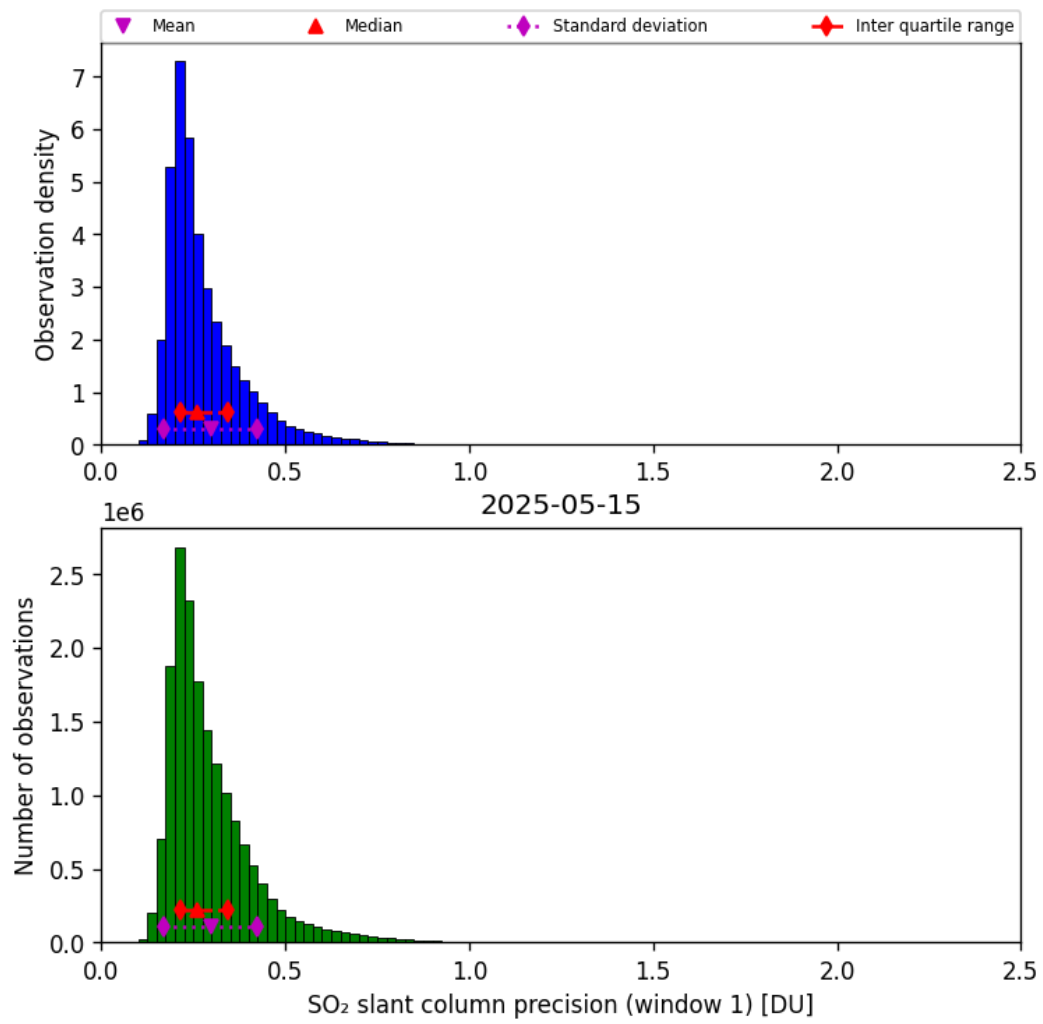


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-05-15 to 2025-05-16

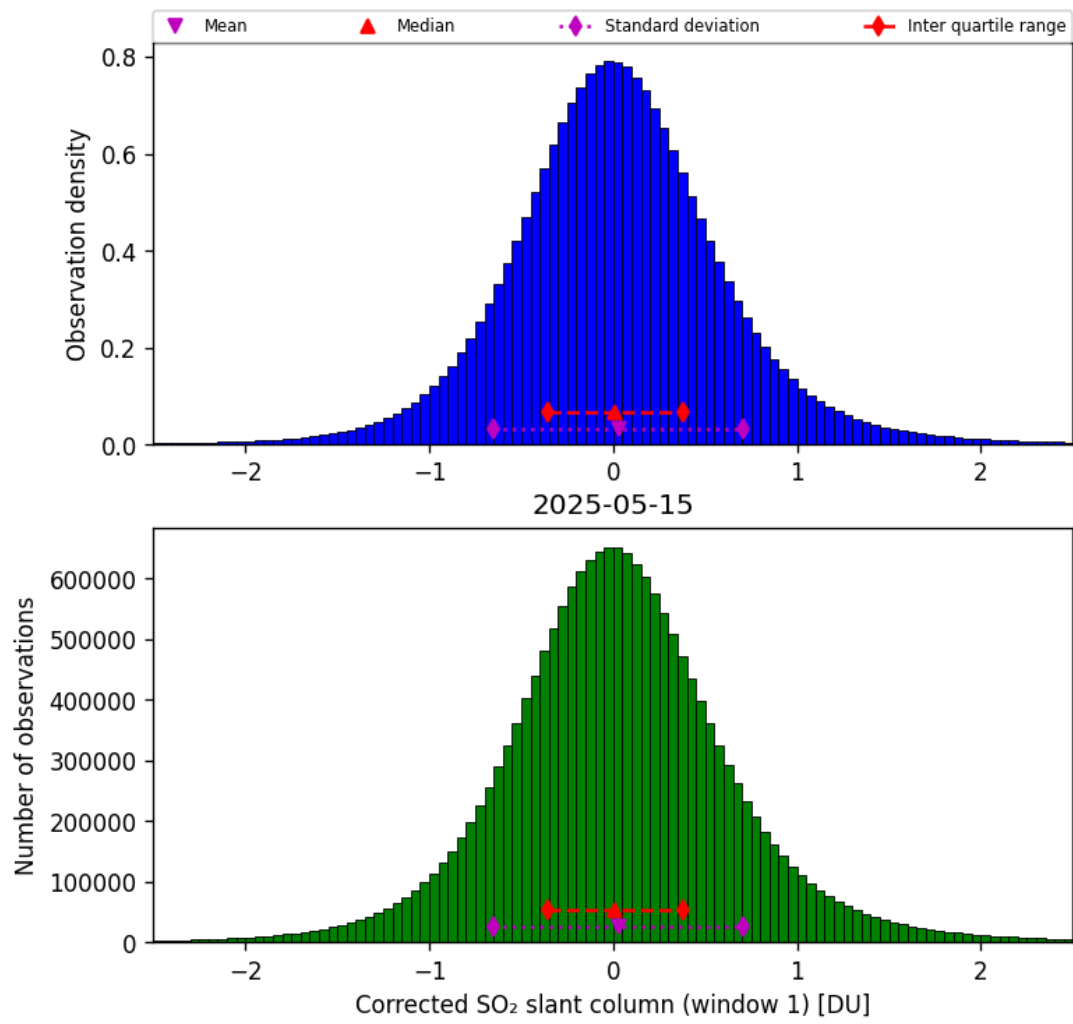


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-05-15 to 2025-05-16

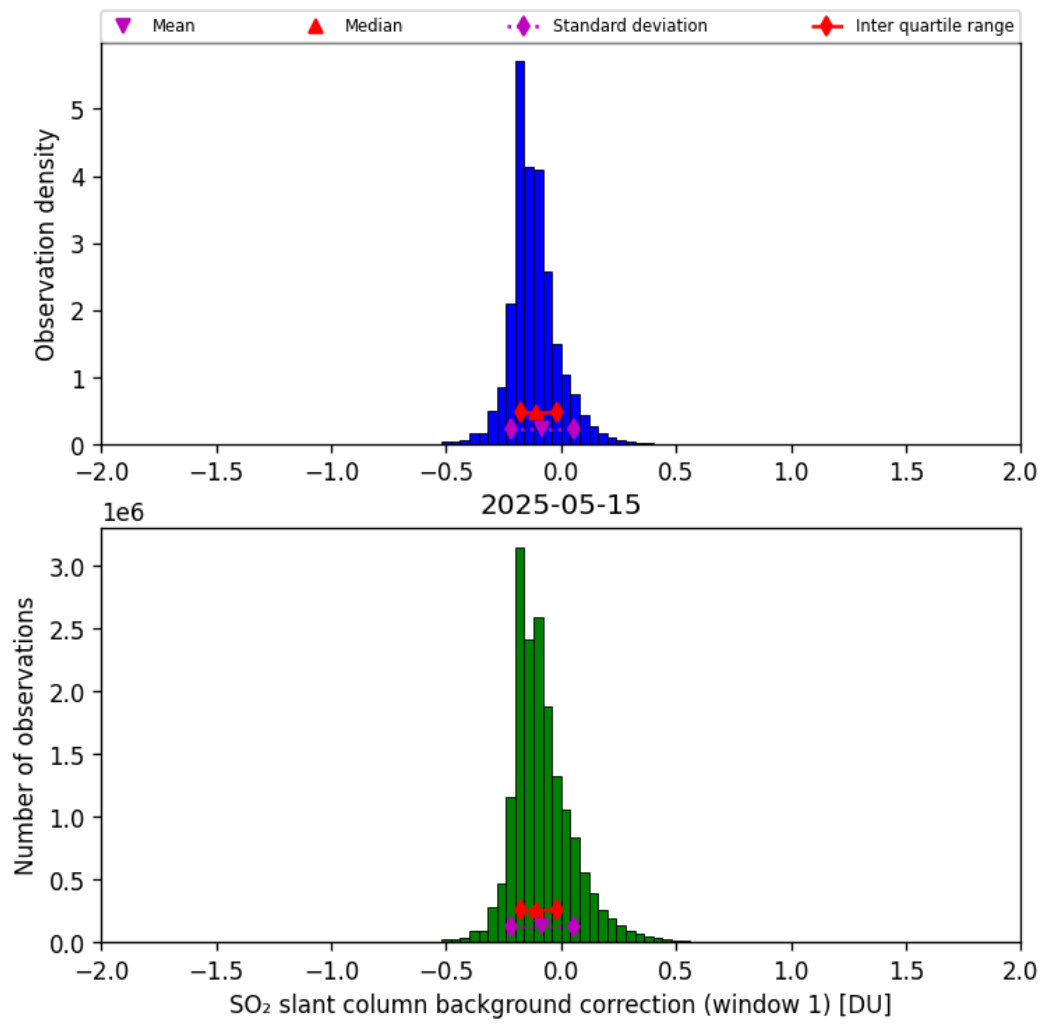


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-05-15 to 2025-05-16

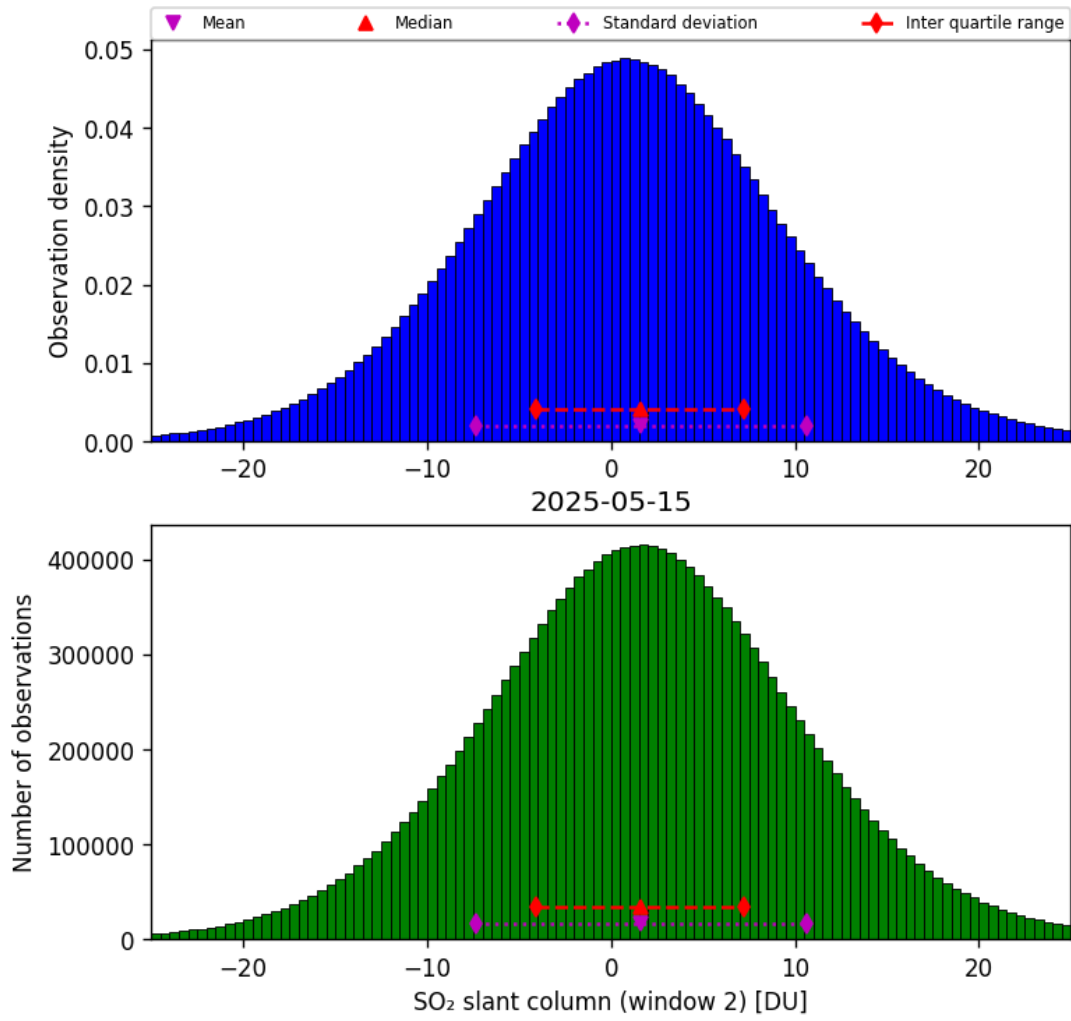


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-05-15 to 2025-05-16

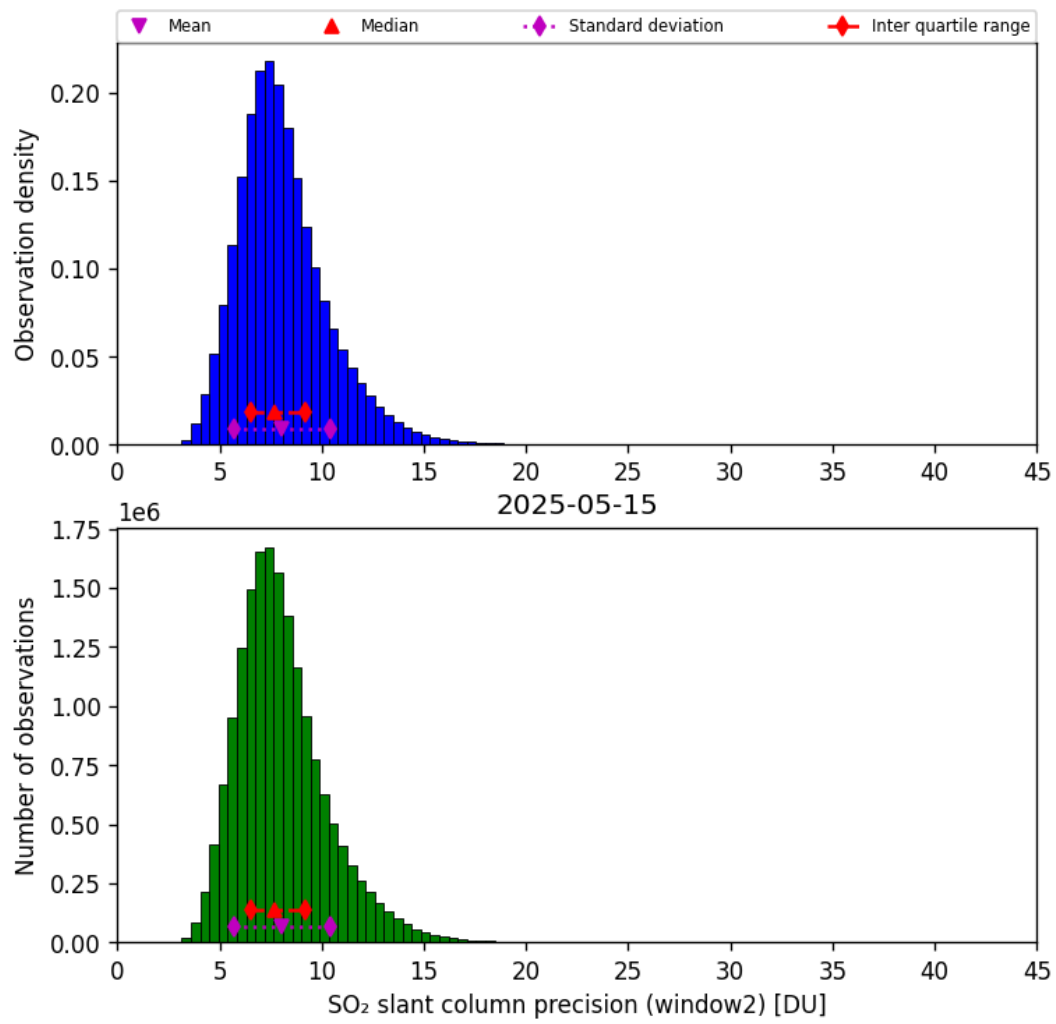


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-05-15 to 2025-05-16

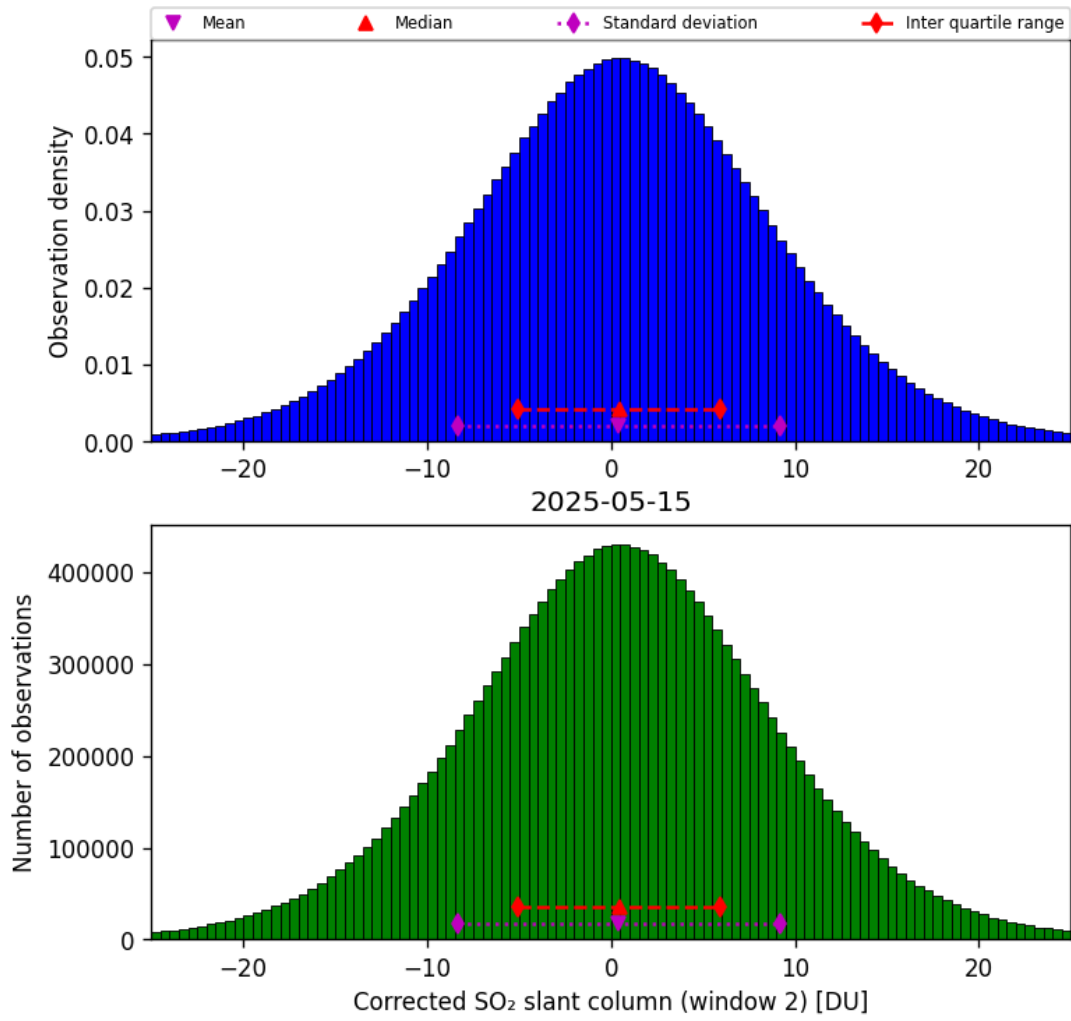


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-05-15 to 2025-05-16

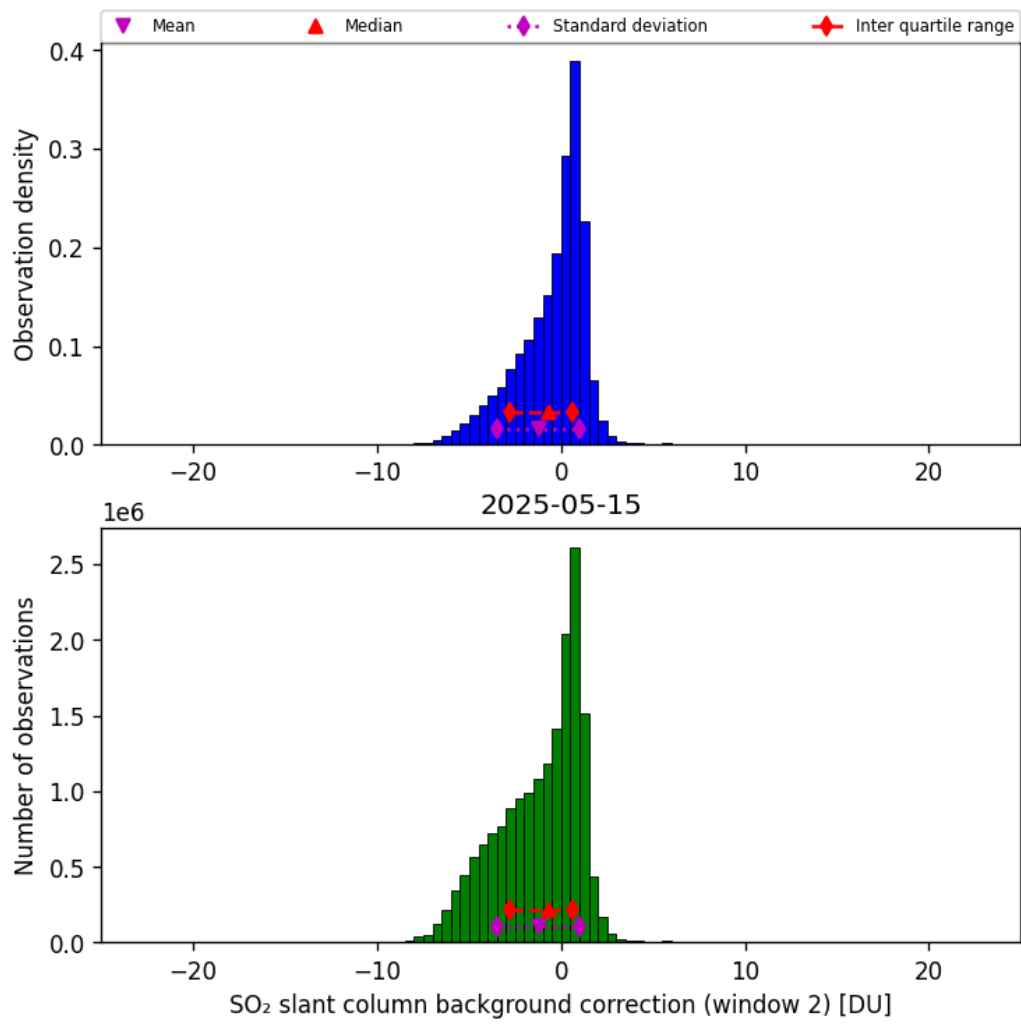


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-05-15 to 2025-05-16

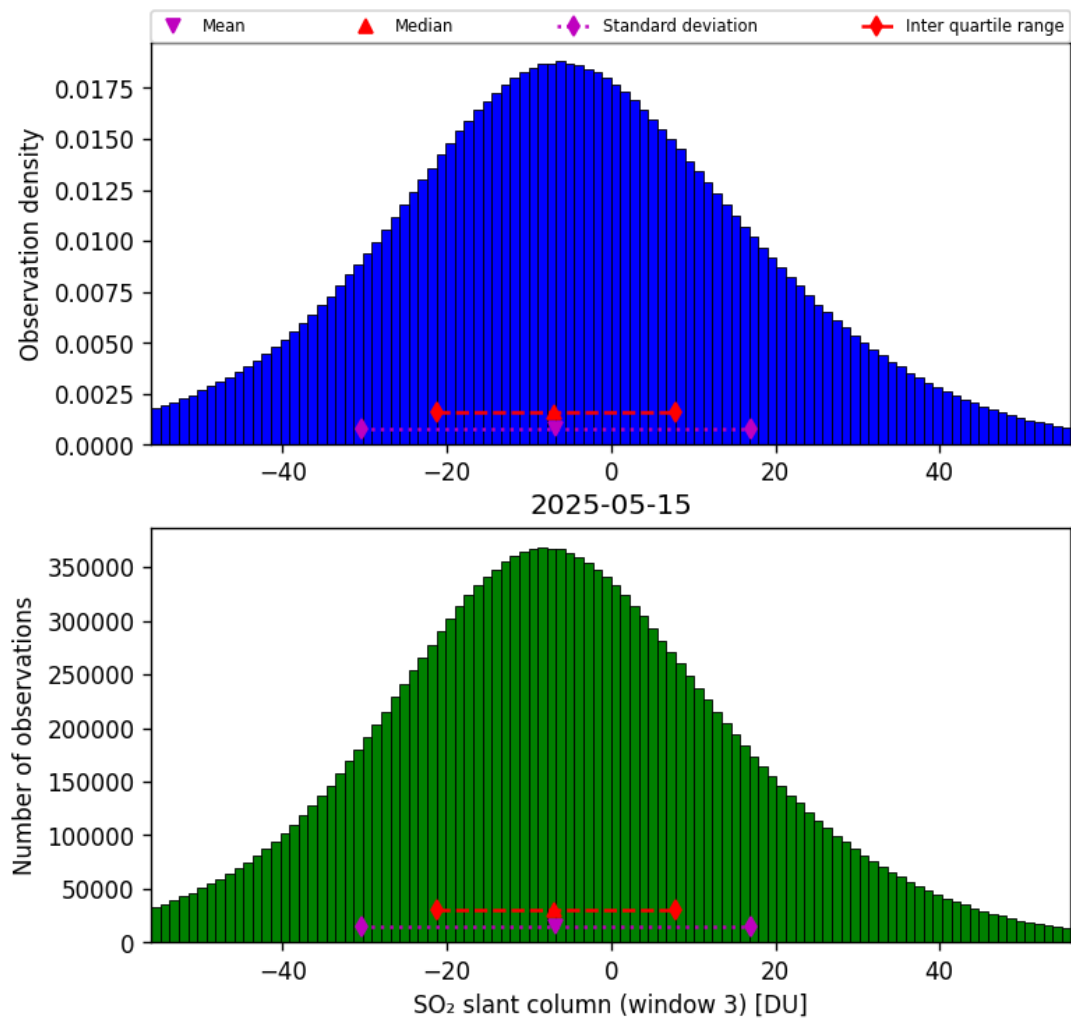


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-05-15 to 2025-05-16

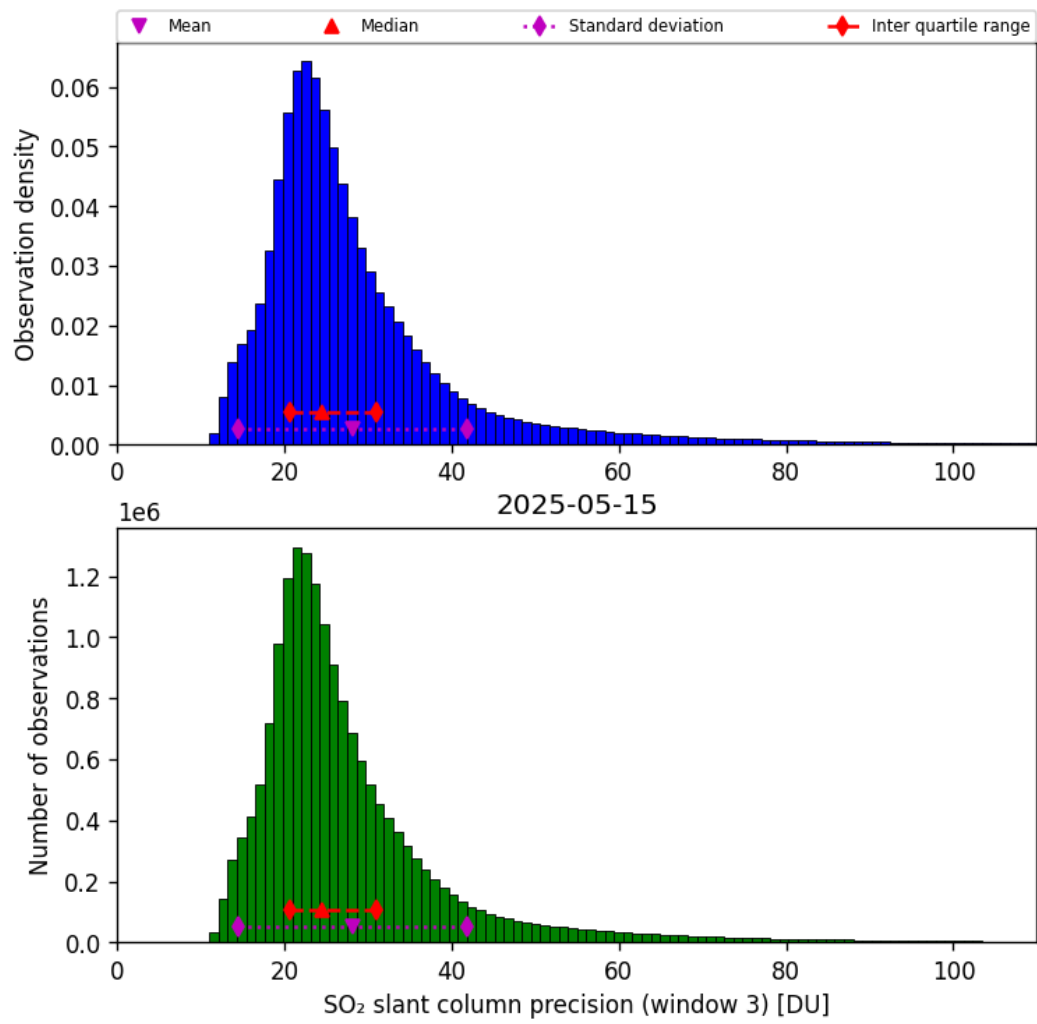


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-05-15 to 2025-05-16

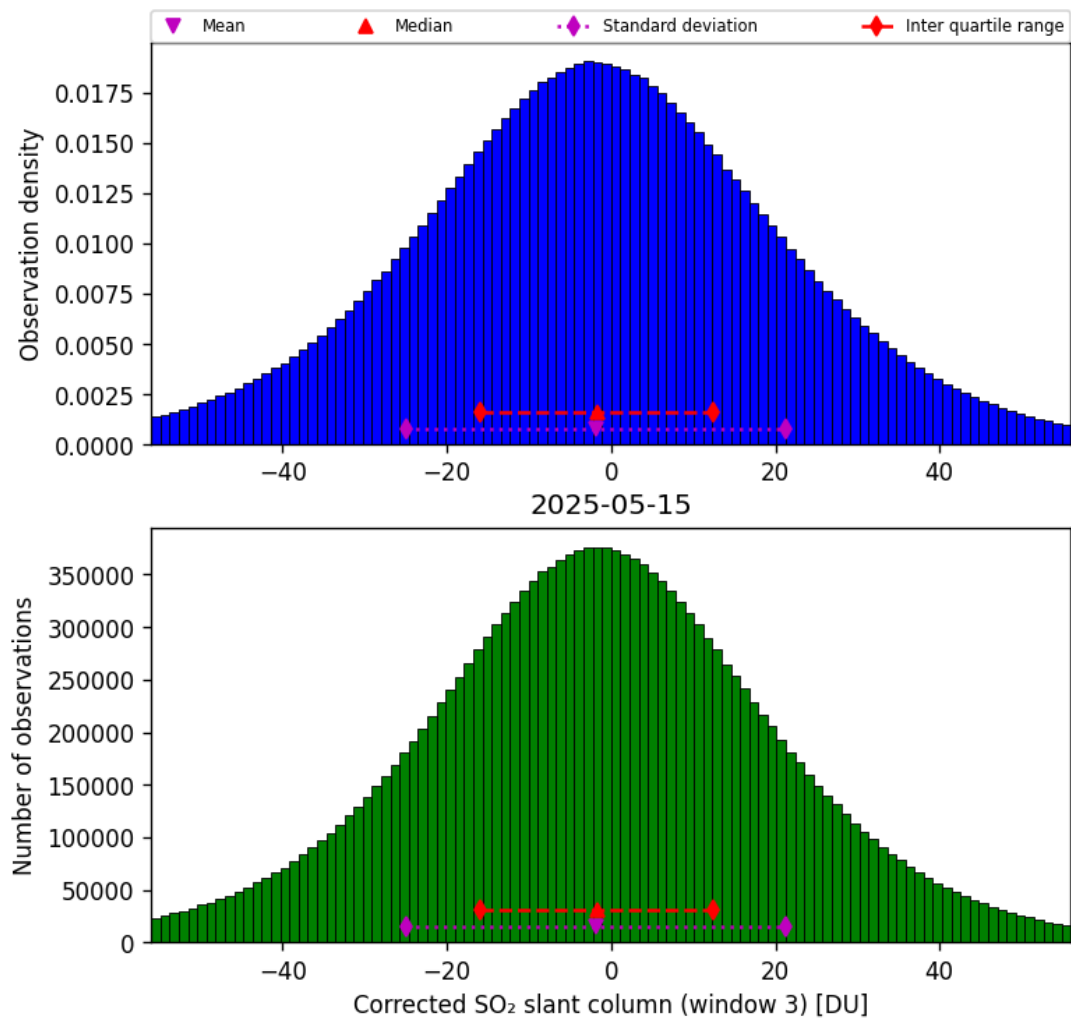


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-05-15 to 2025-05-16

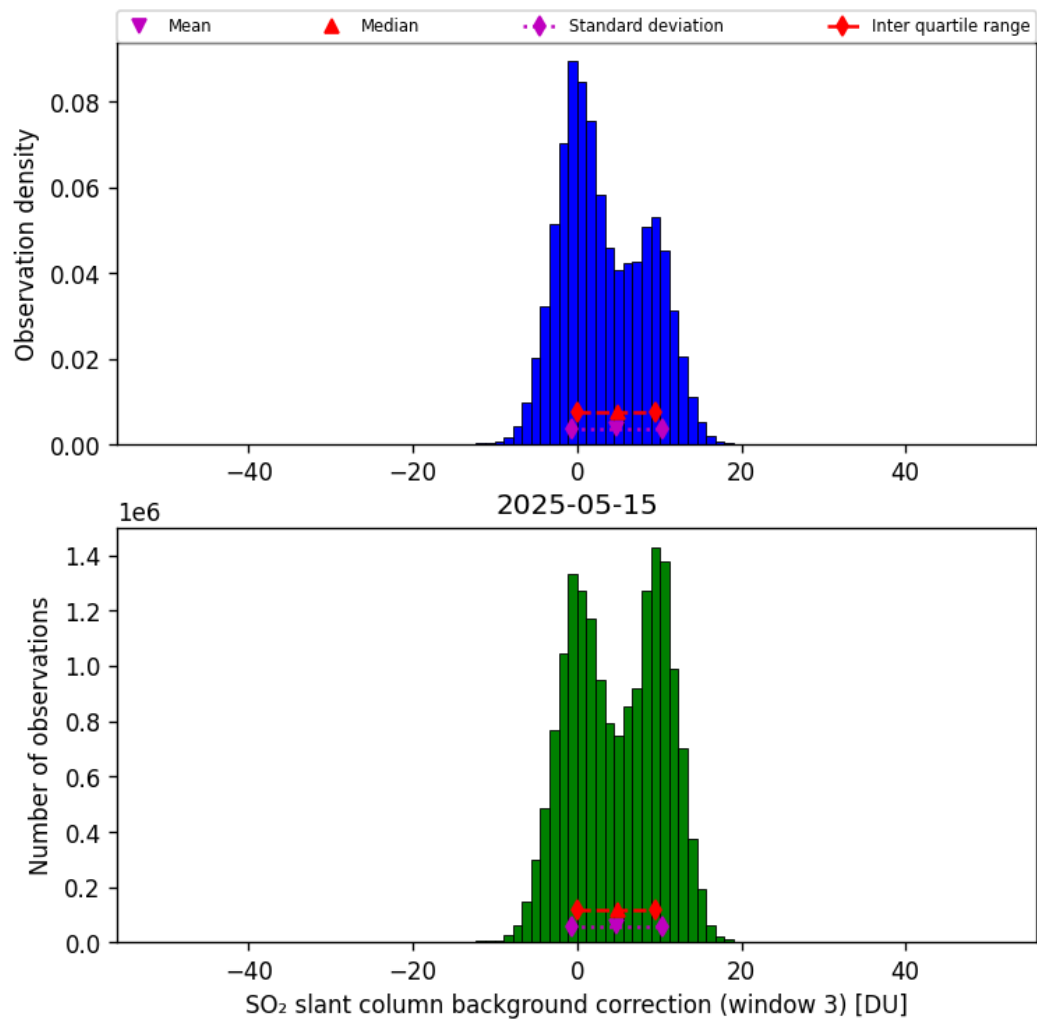


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-05-15 to 2025-05-16

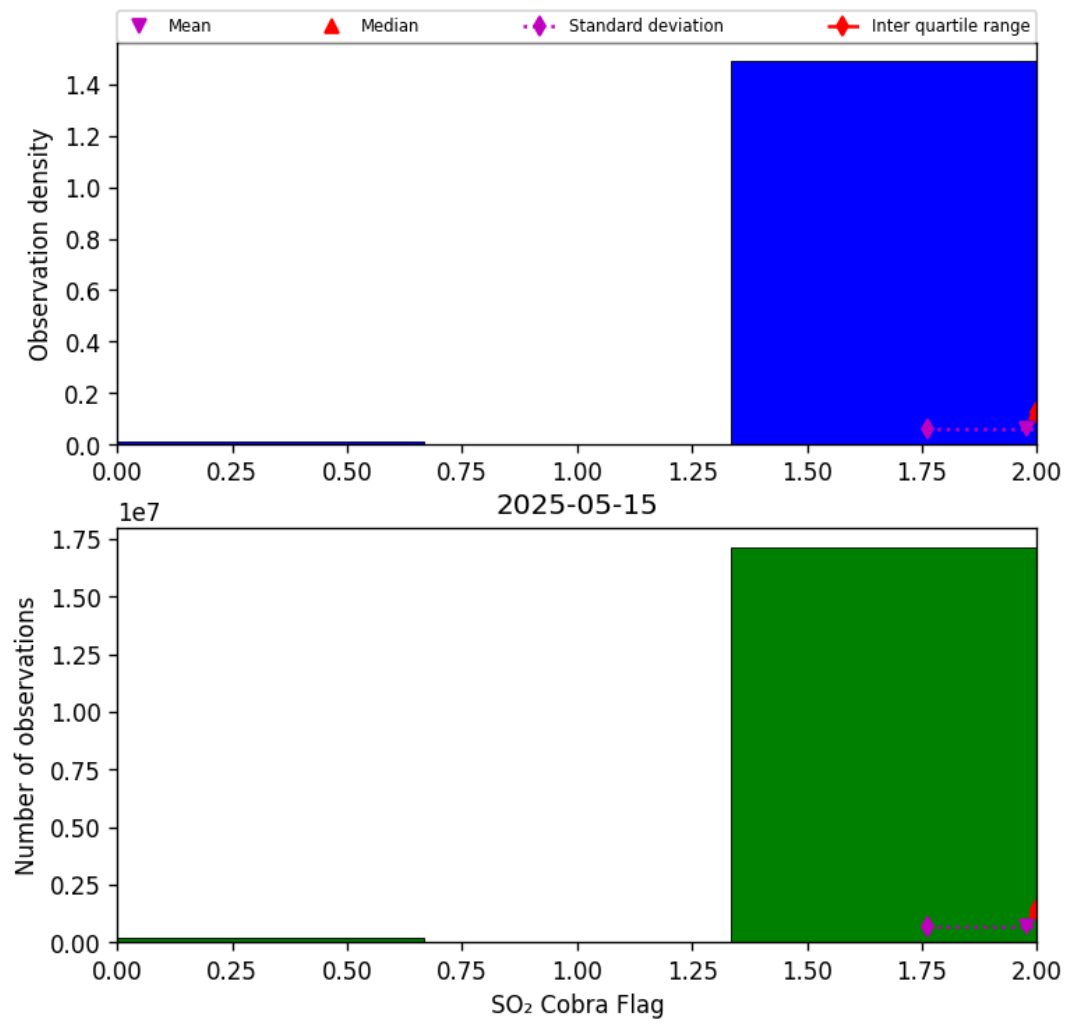


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-05-15 to 2025-05-16

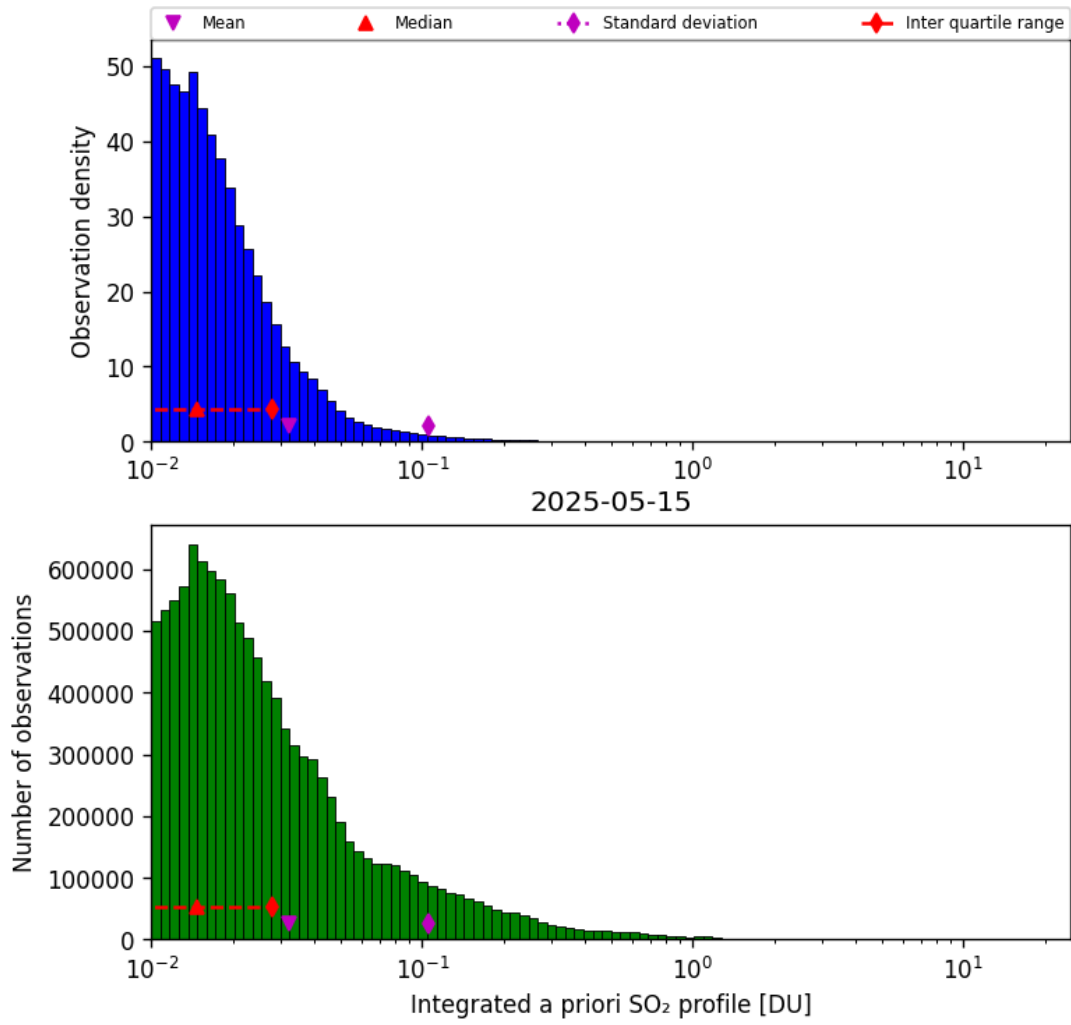


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-05-15 to 2025-05-16

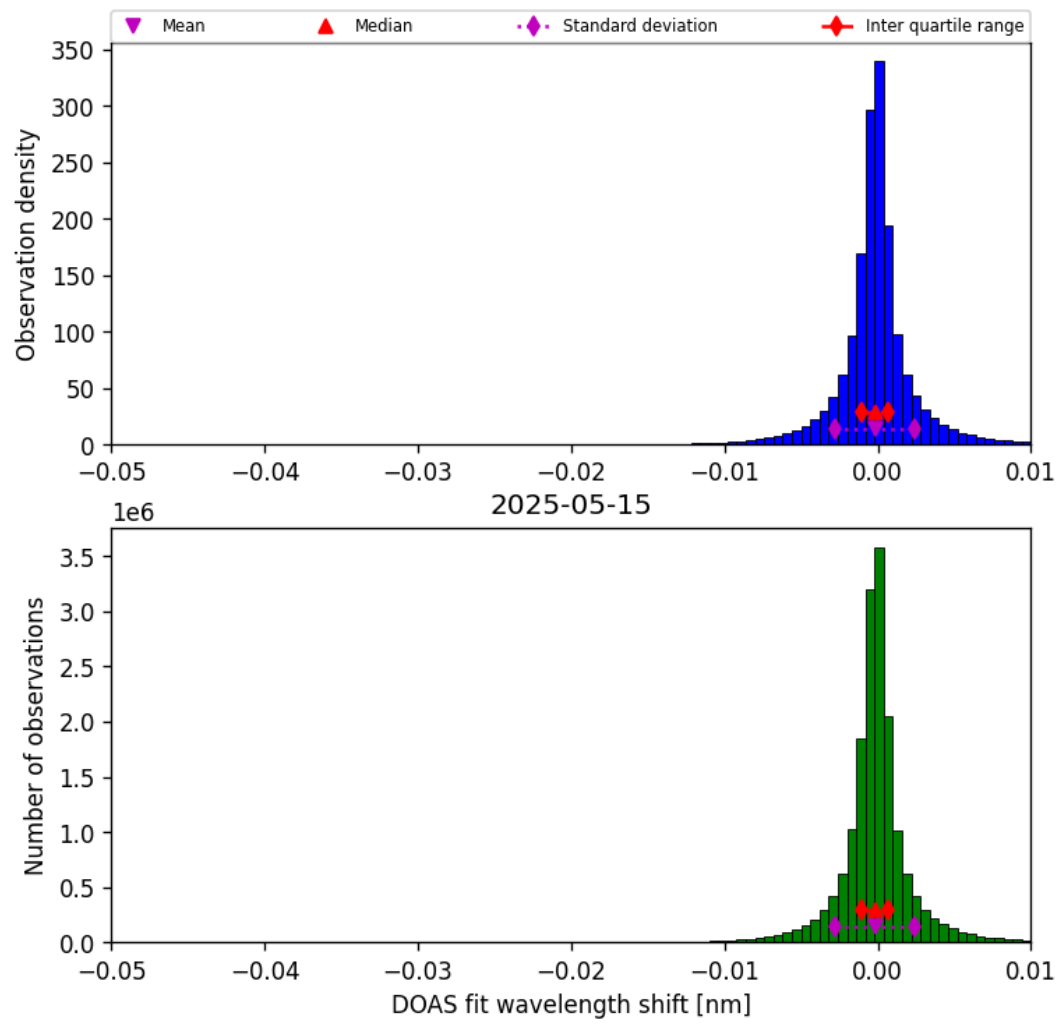


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-05-15 to 2025-05-16

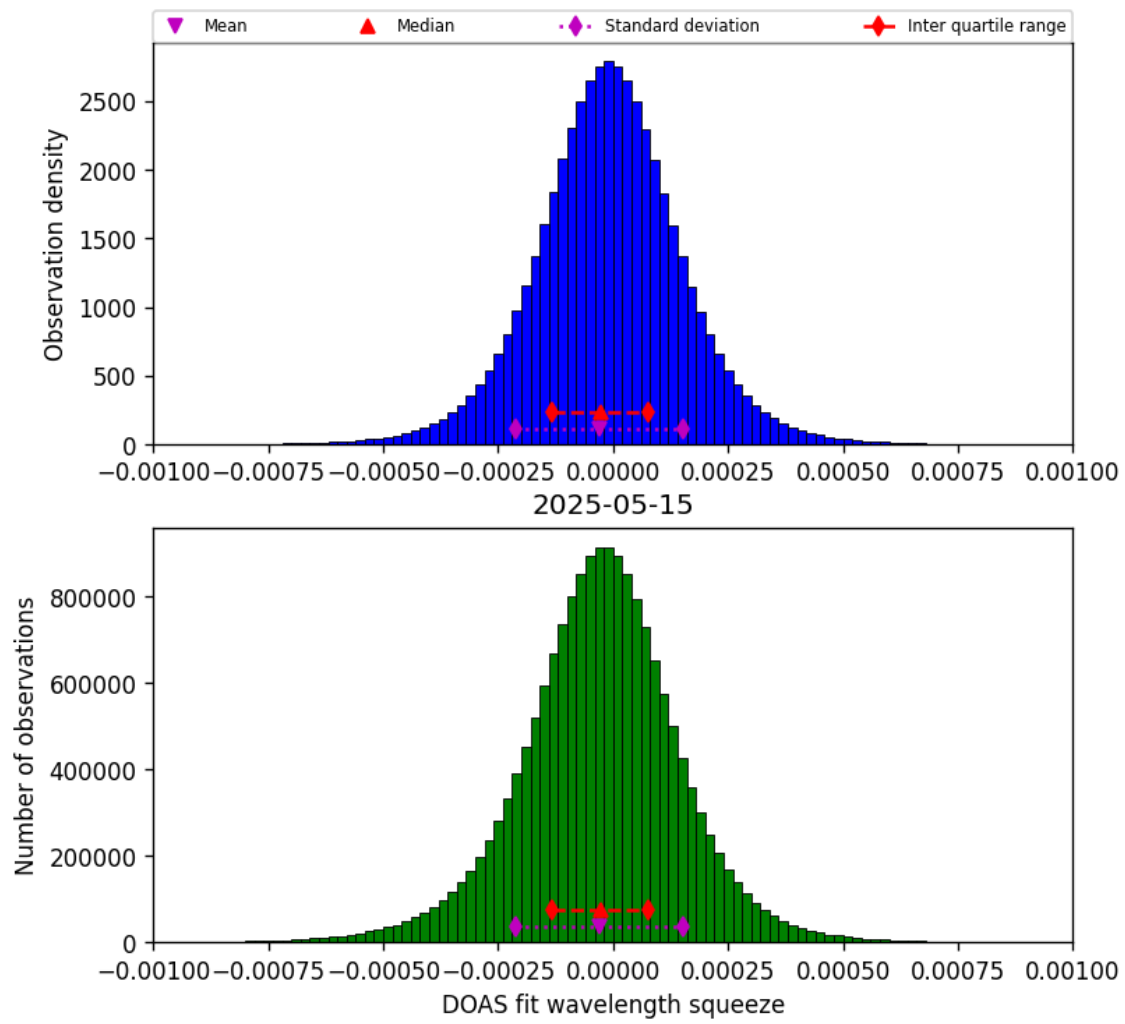


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-05-15 to 2025-05-16

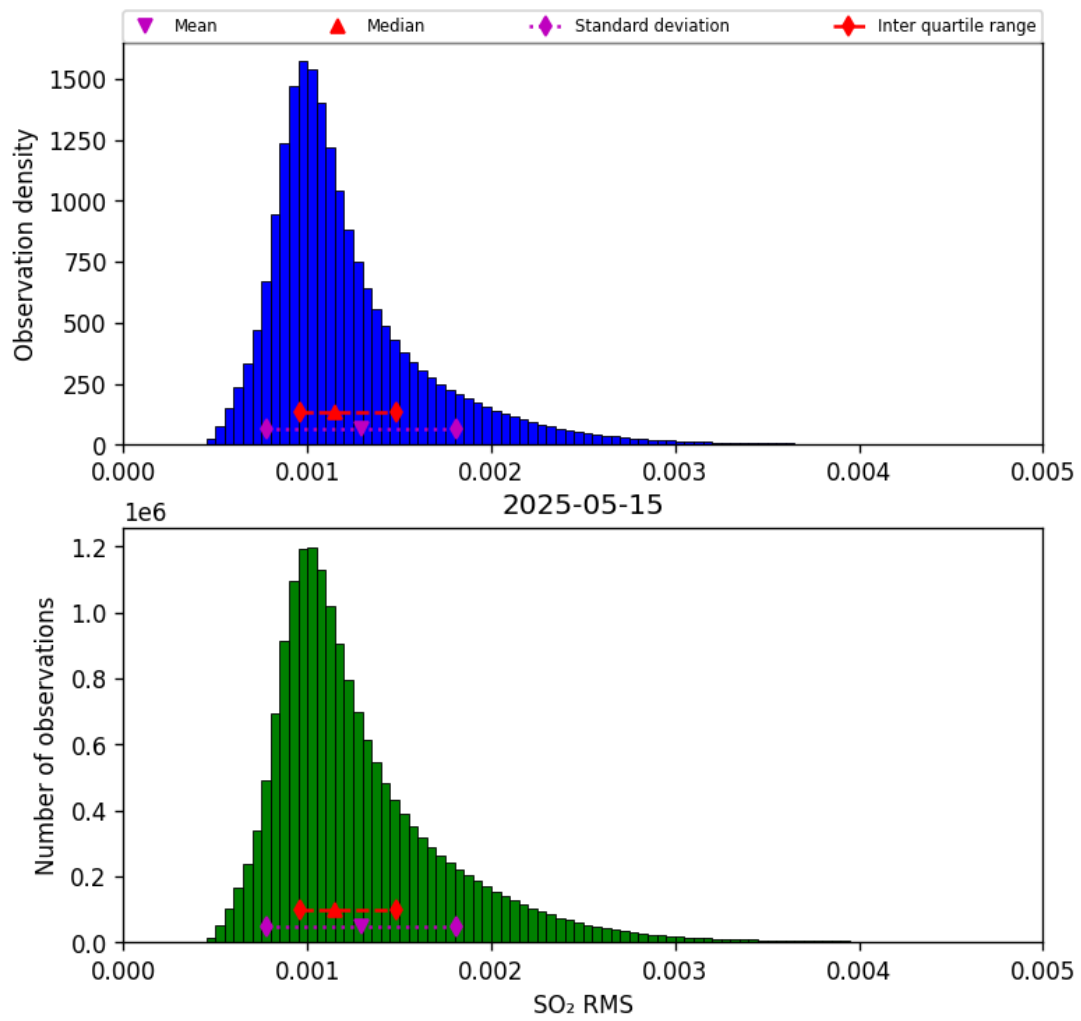


Figure 79: Histogram of “SO₂ RMS” for 2025-05-15 to 2025-05-16

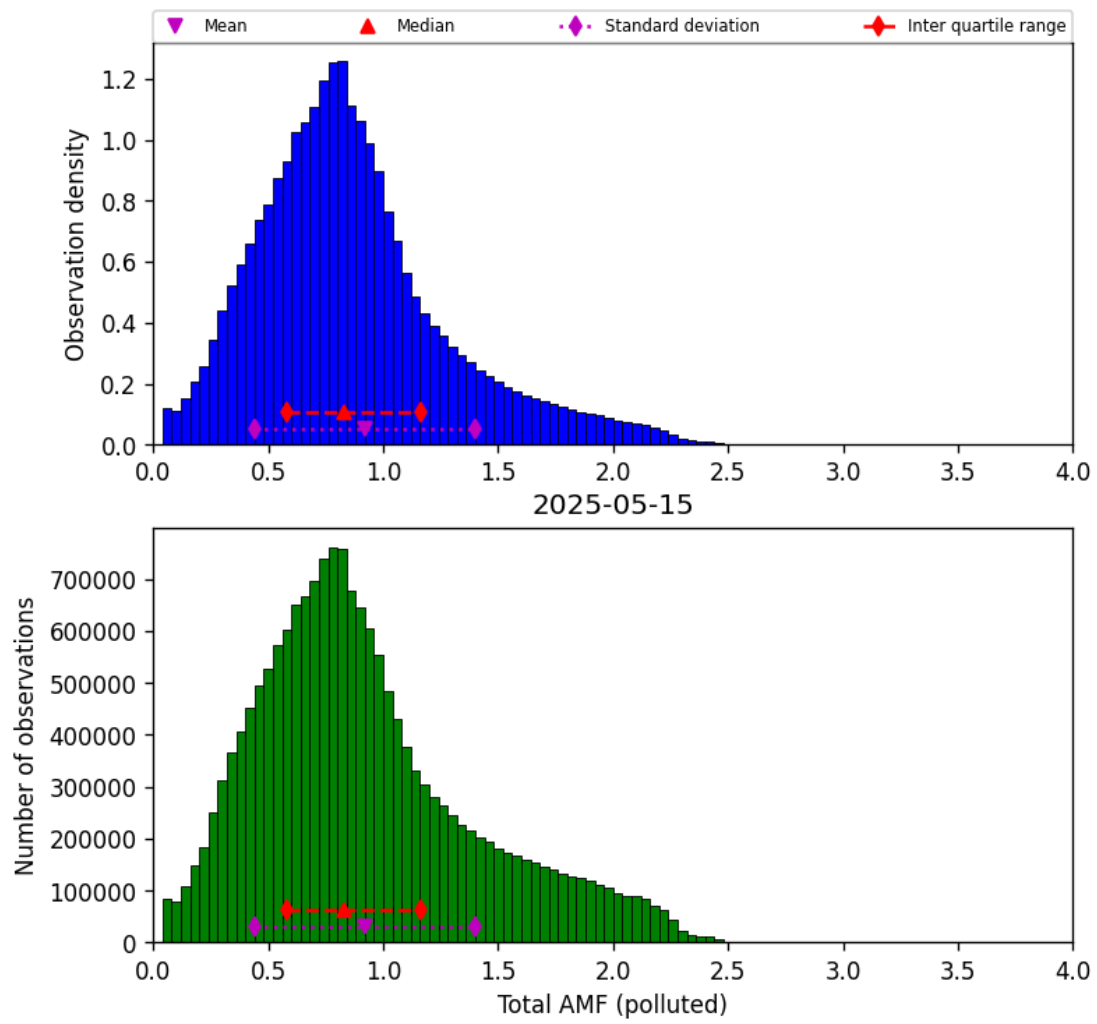


Figure 80: Histogram of “Total AMF (polluted)” for 2025-05-15 to 2025-05-16

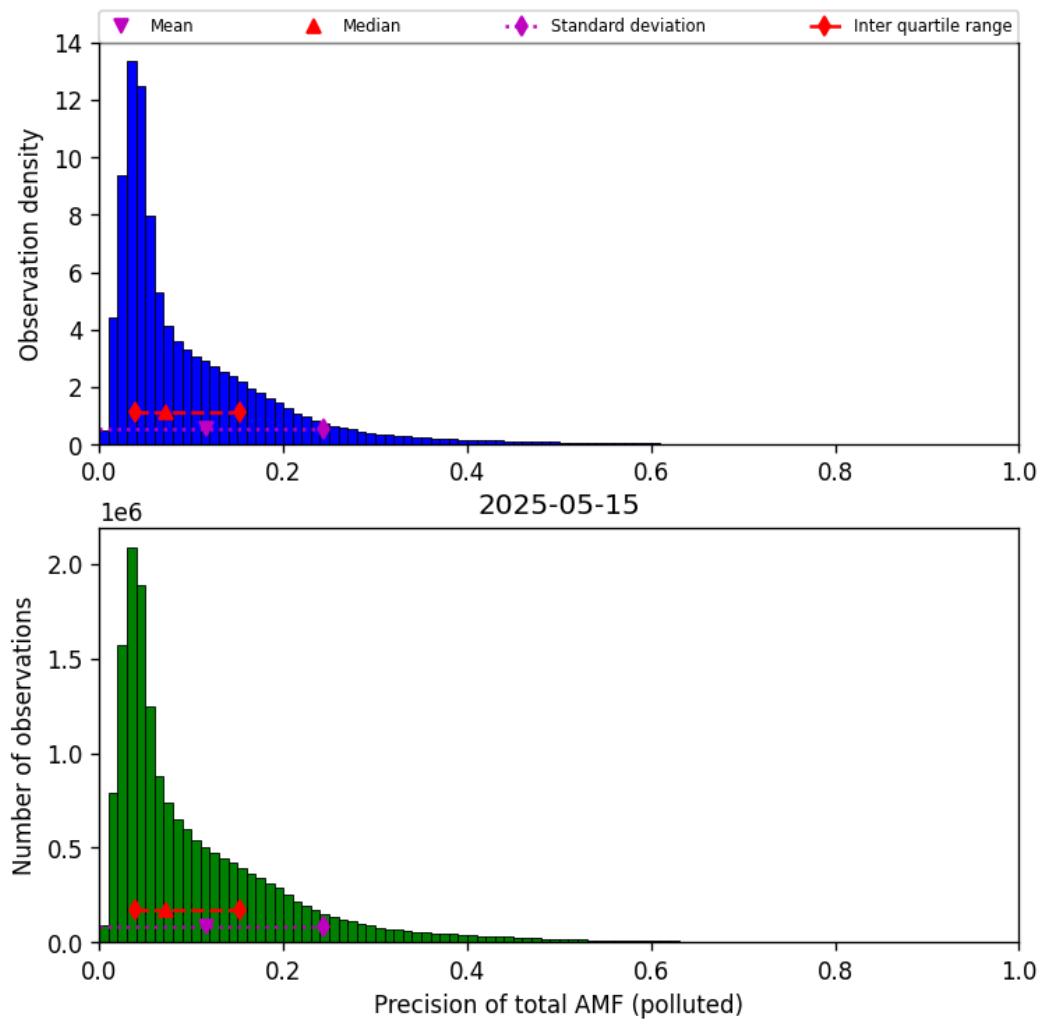


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-05-15 to 2025-05-16

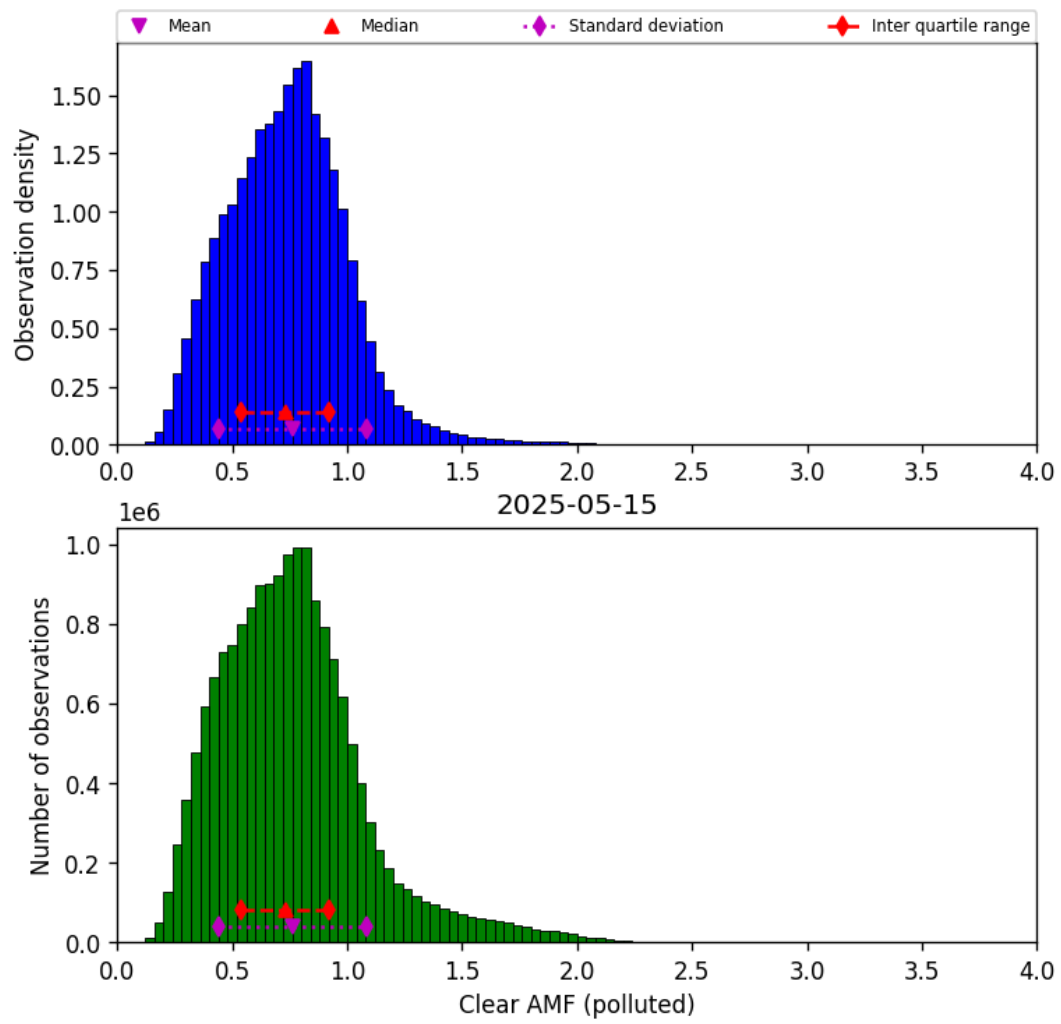


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-05-15 to 2025-05-16

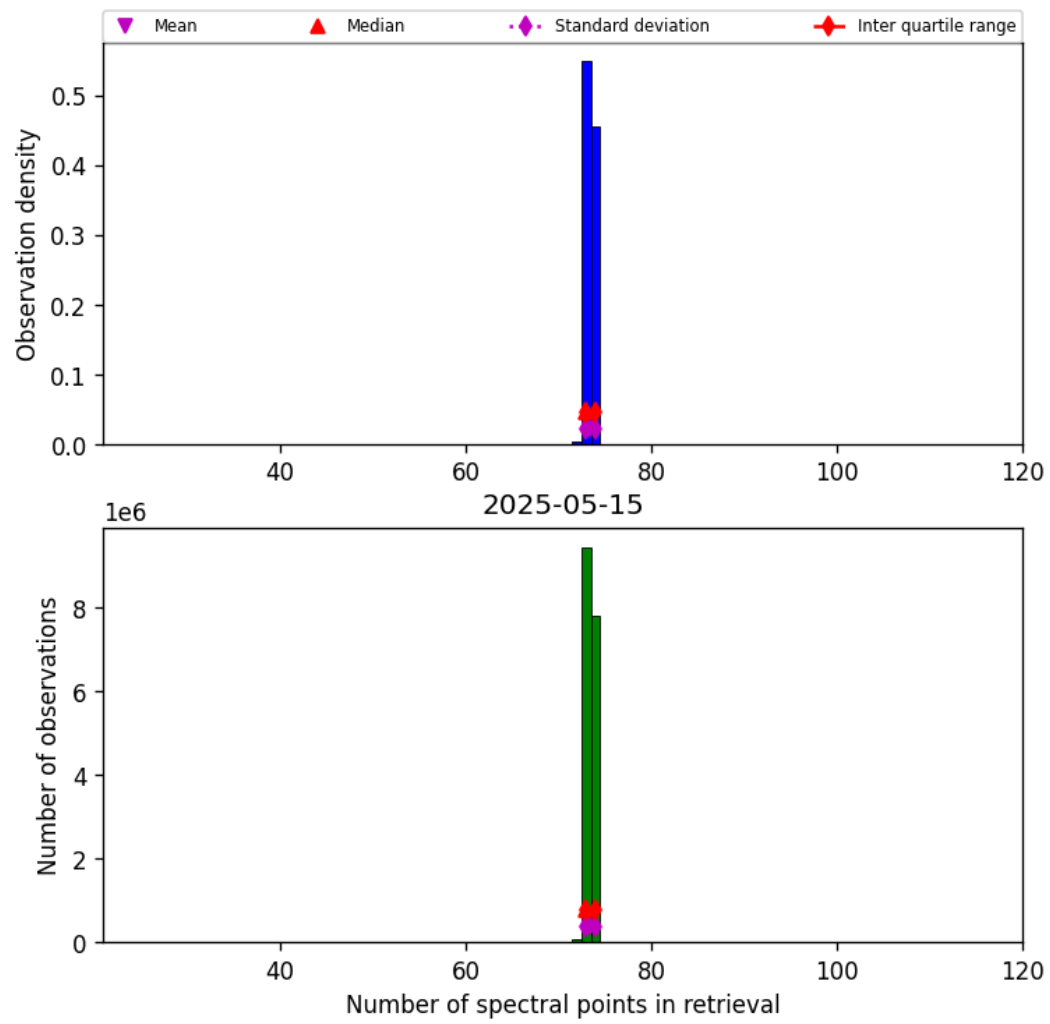


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-05-15 to 2025-05-16

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.

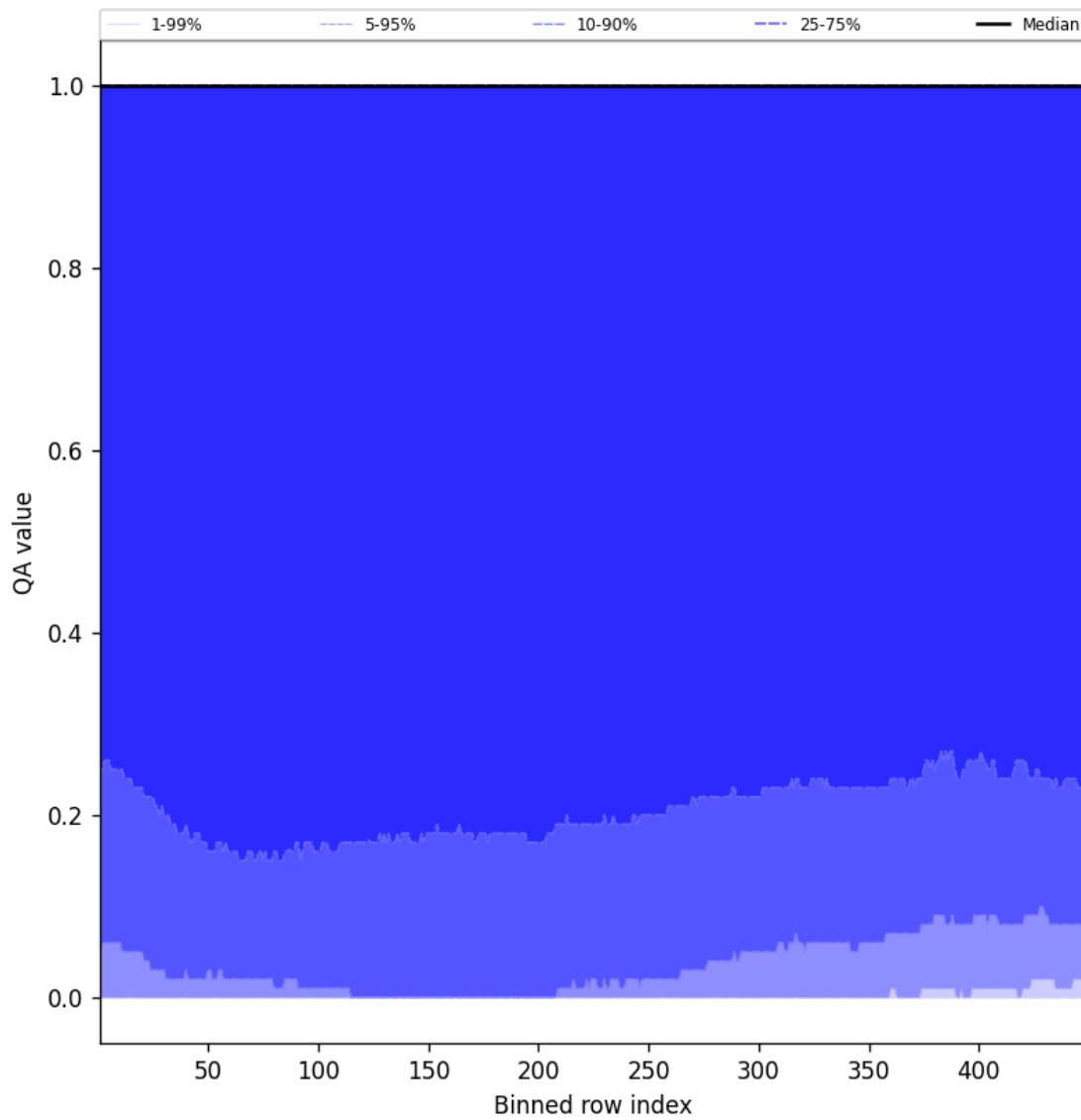


Figure 84: Along track statistics of “QA value” for 2025-05-15 to 2025-05-16

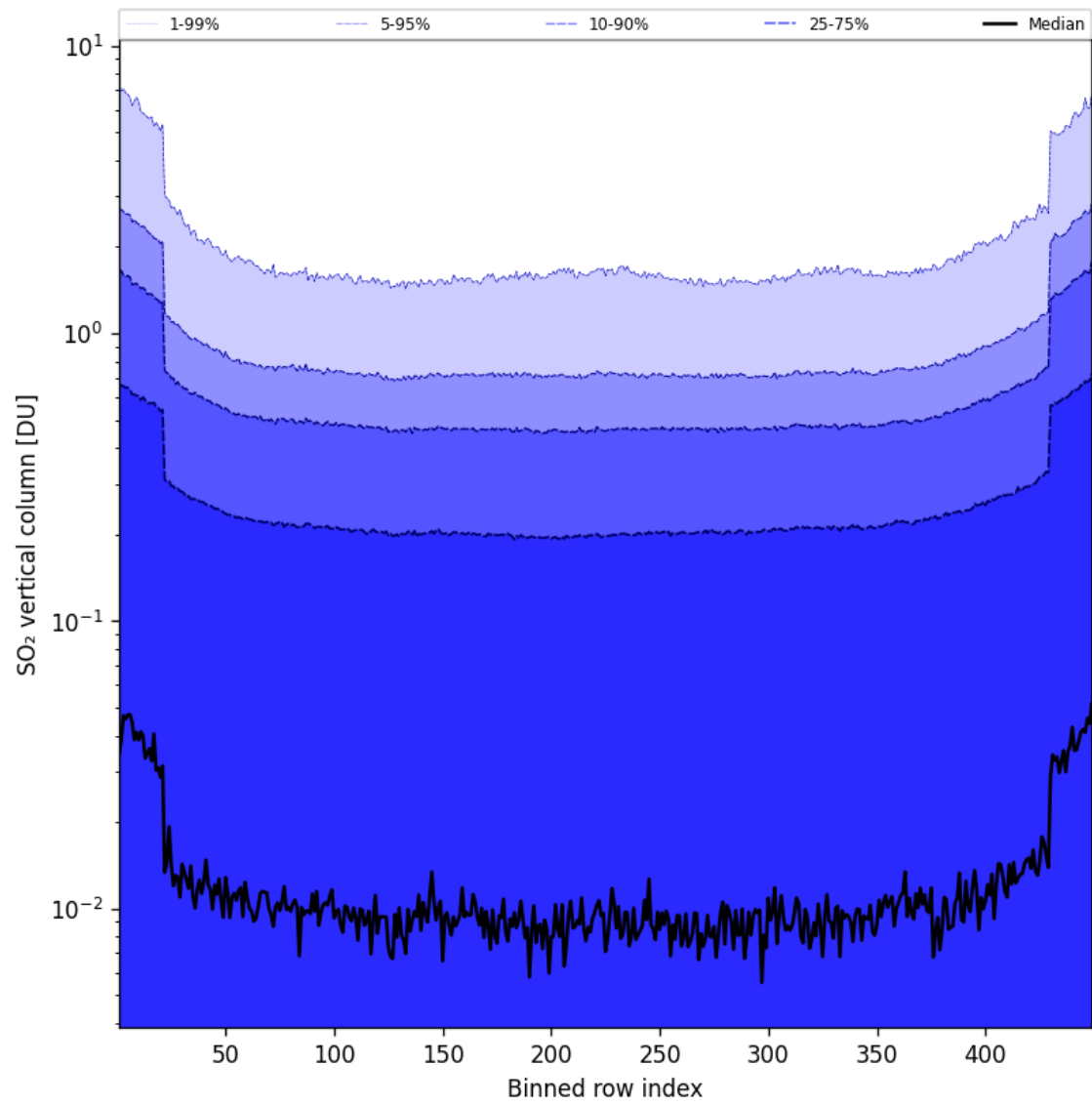


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-05-15 to 2025-05-16

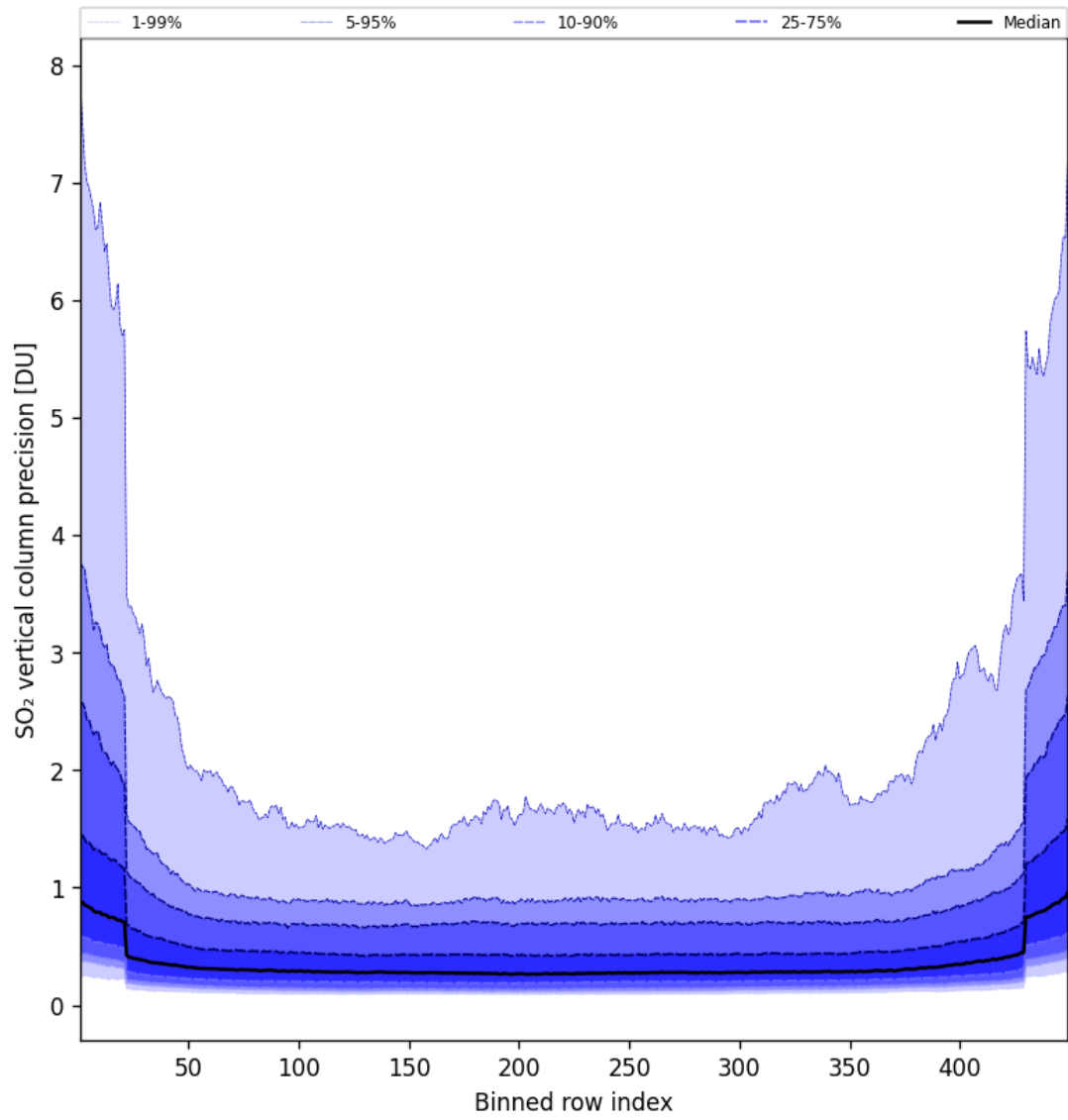


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-05-15 to 2025-05-16

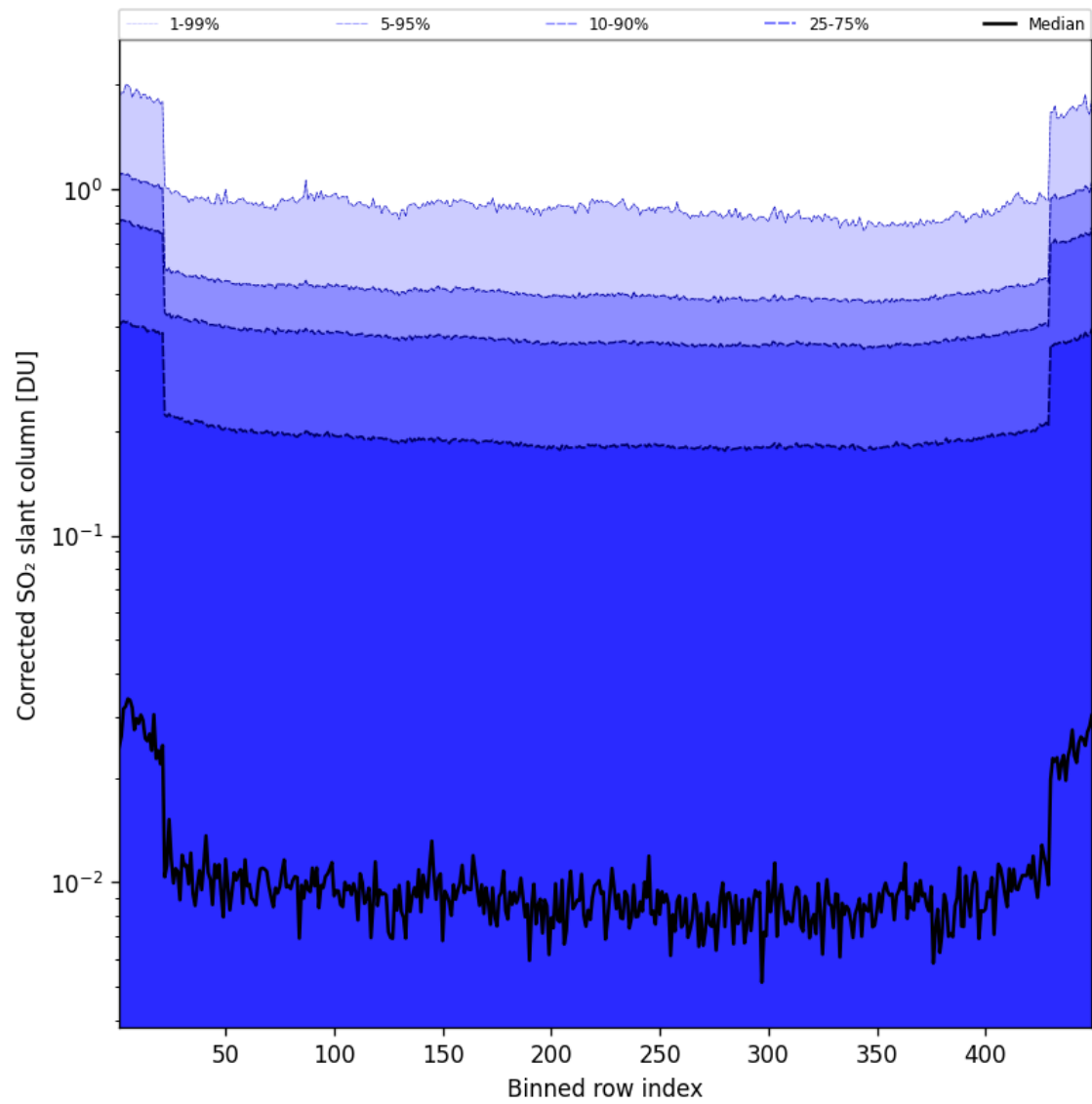


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-05-15 to 2025-05-16

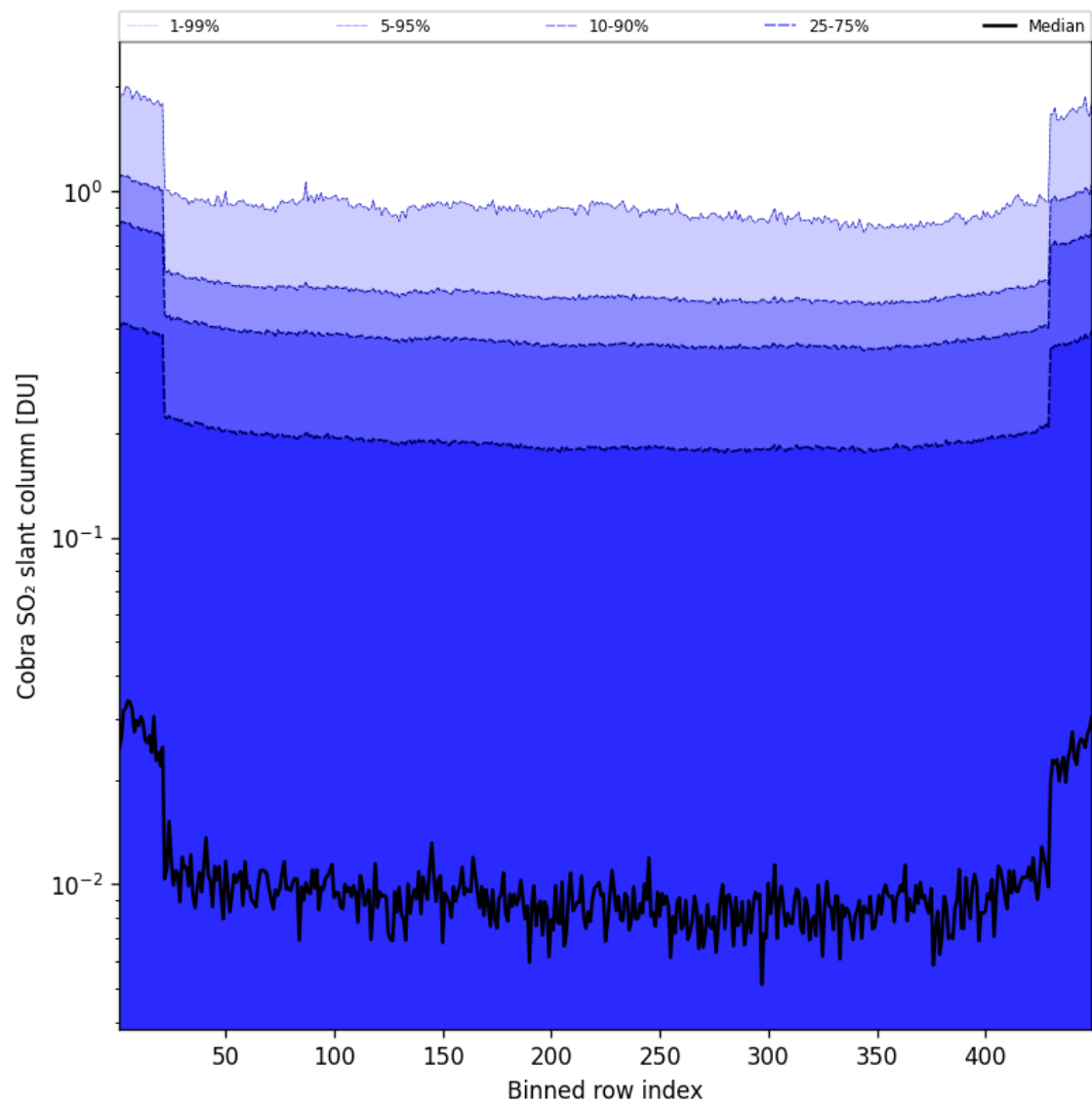


Figure 88: Along track statistics of "Cobra SO₂ slant column" for 2025-05-15 to 2025-05-16

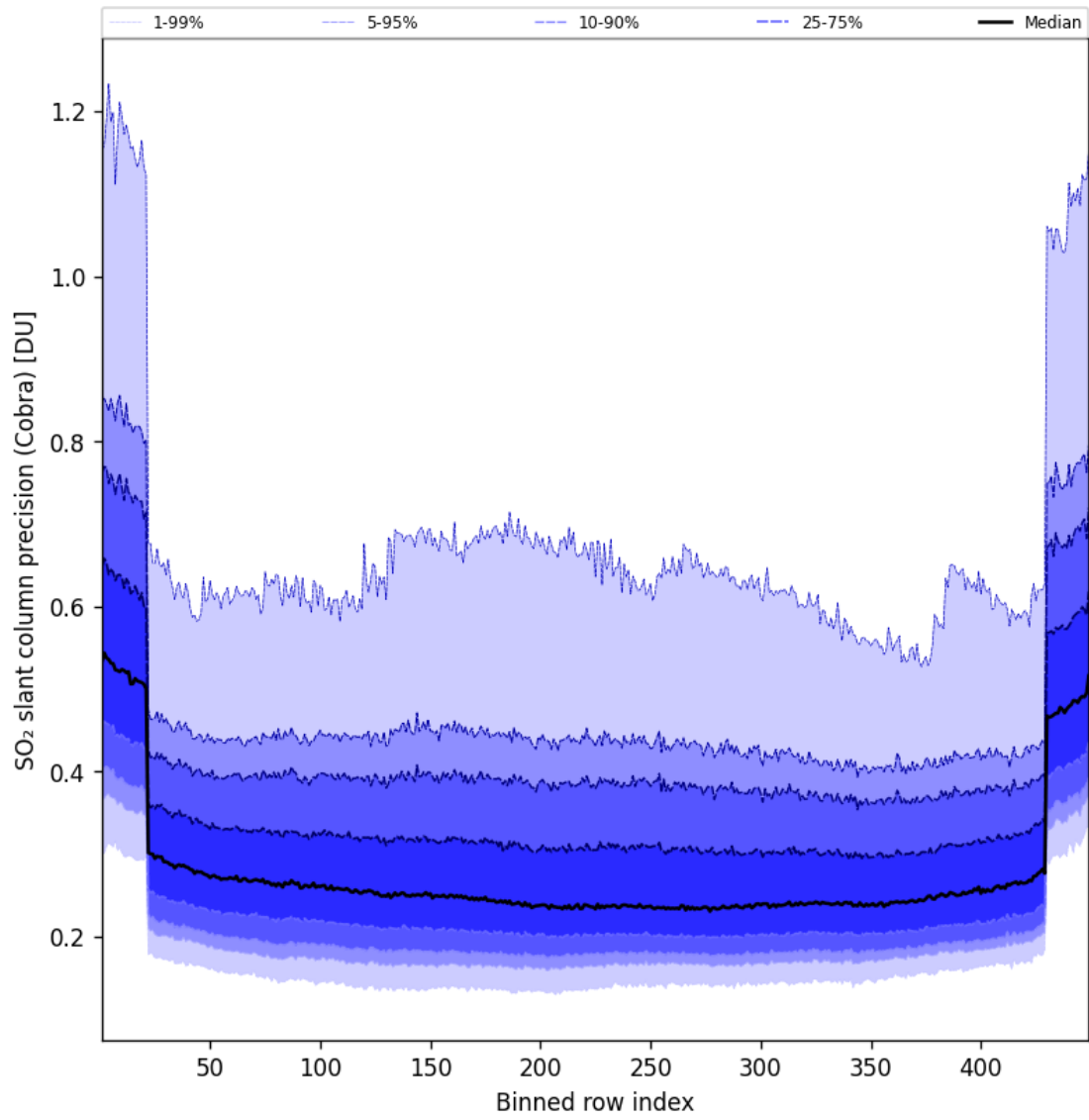


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-05-15 to 2025-05-16

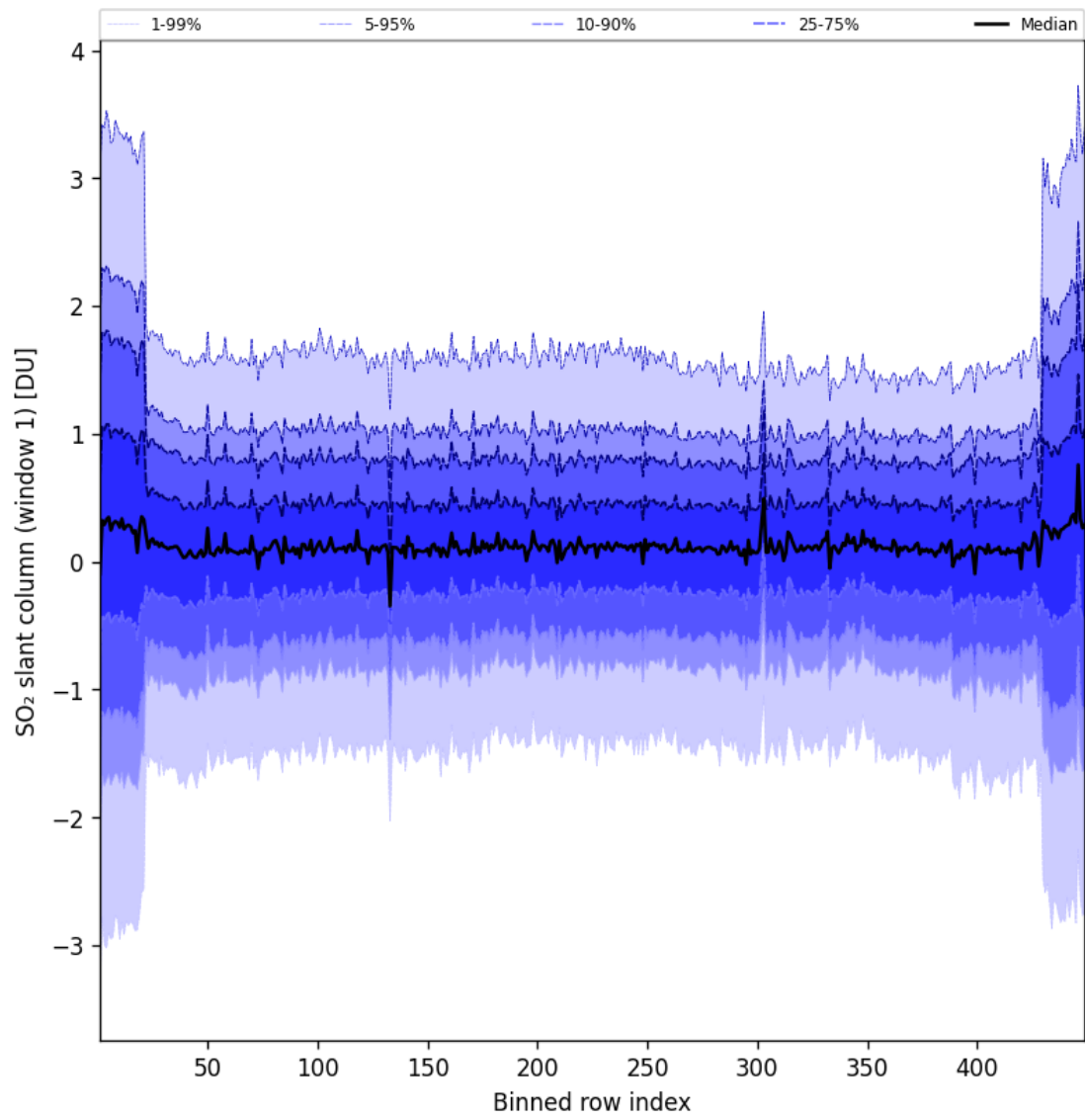


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-05-15 to 2025-05-16

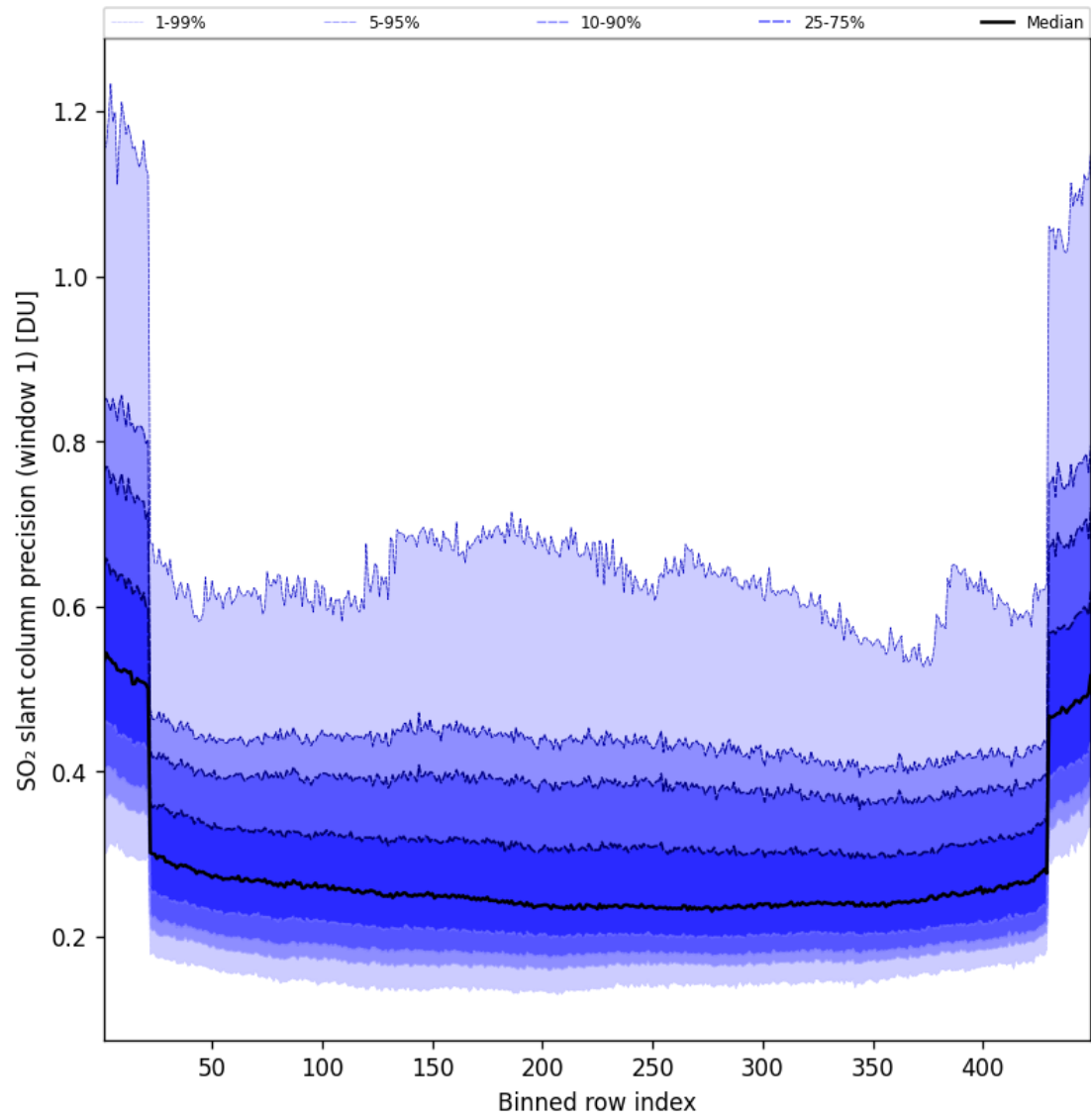


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-05-15 to 2025-05-16

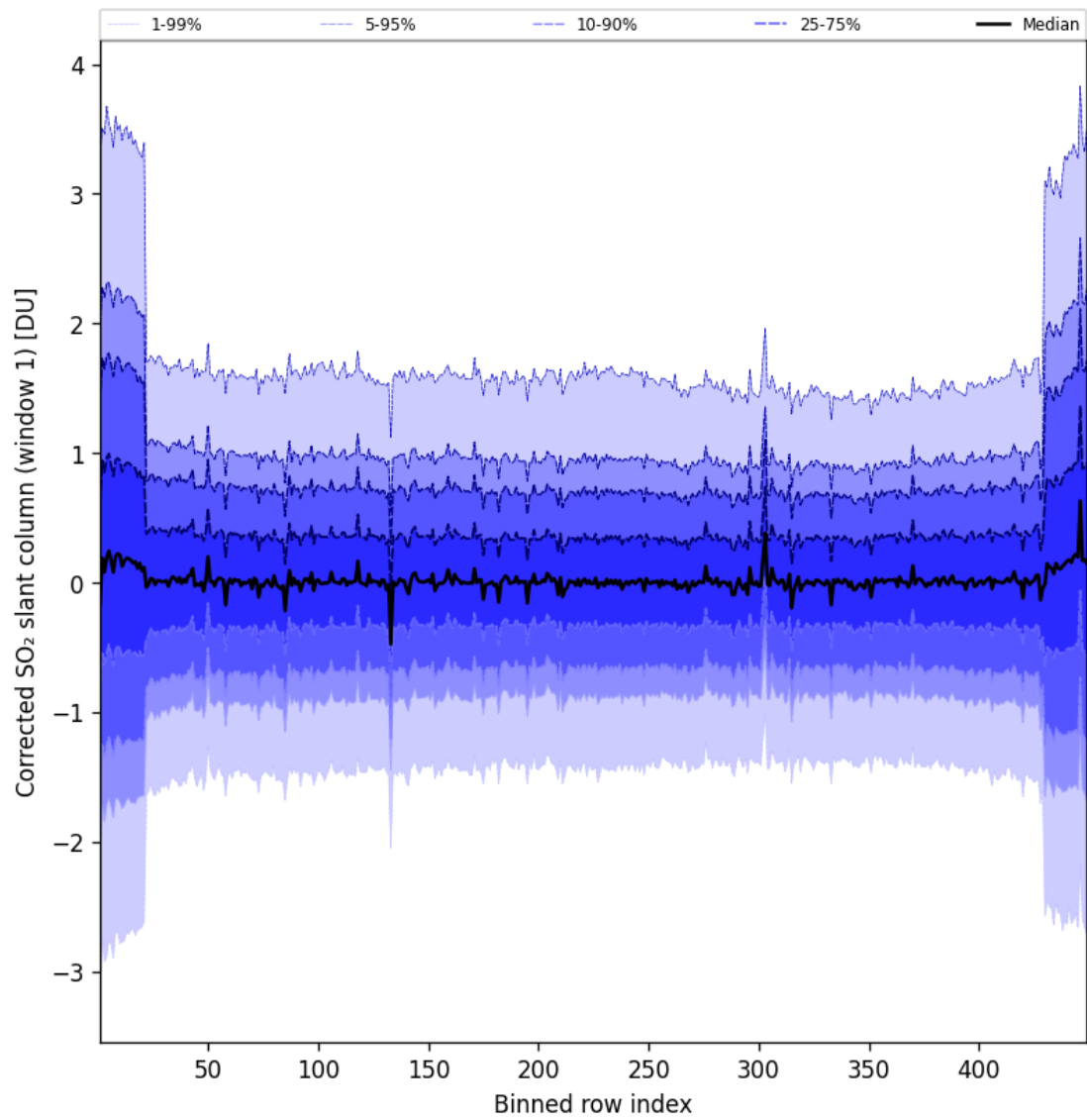


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-05-15 to 2025-05-16

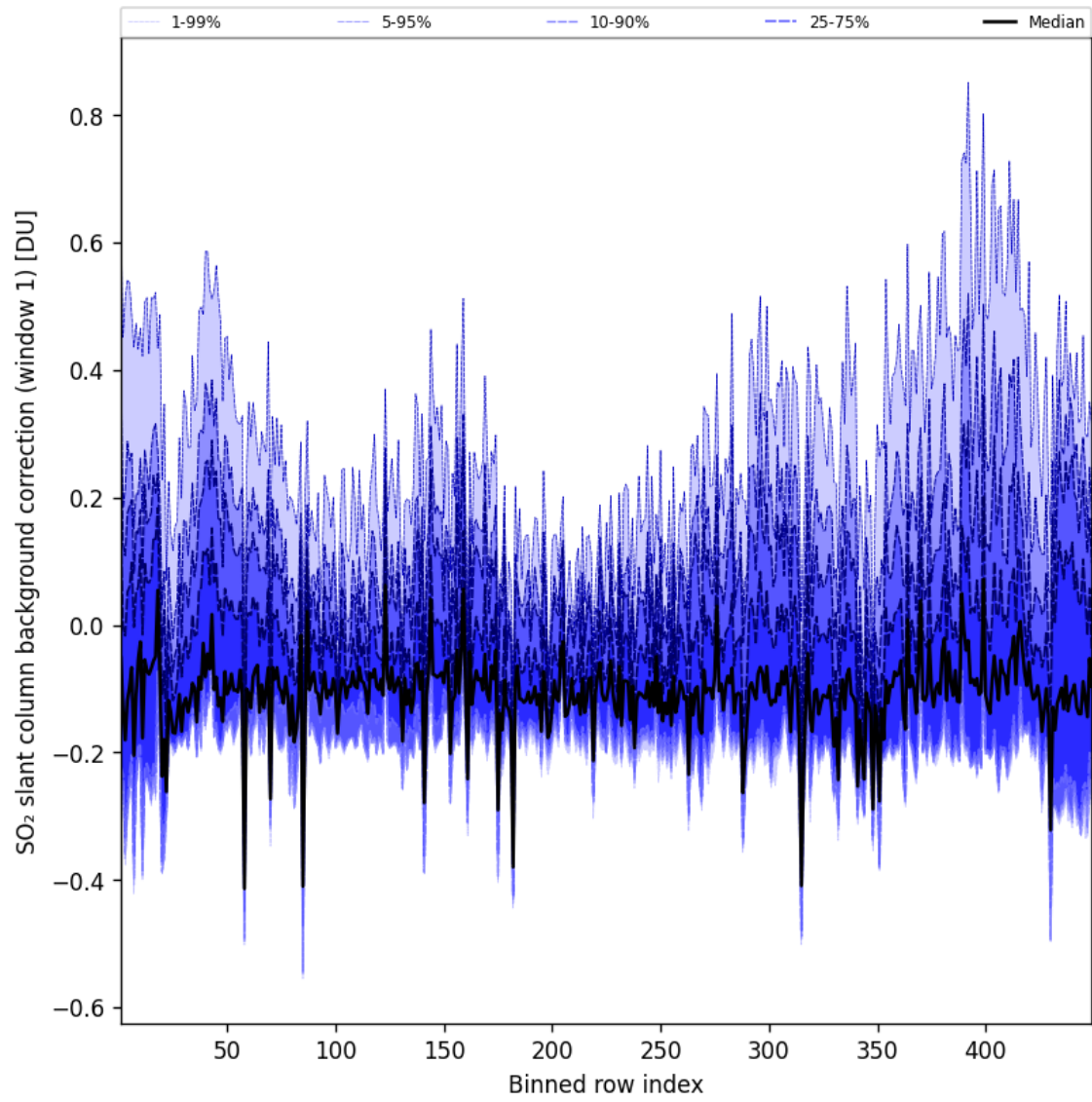


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-05-15 to 2025-05-16

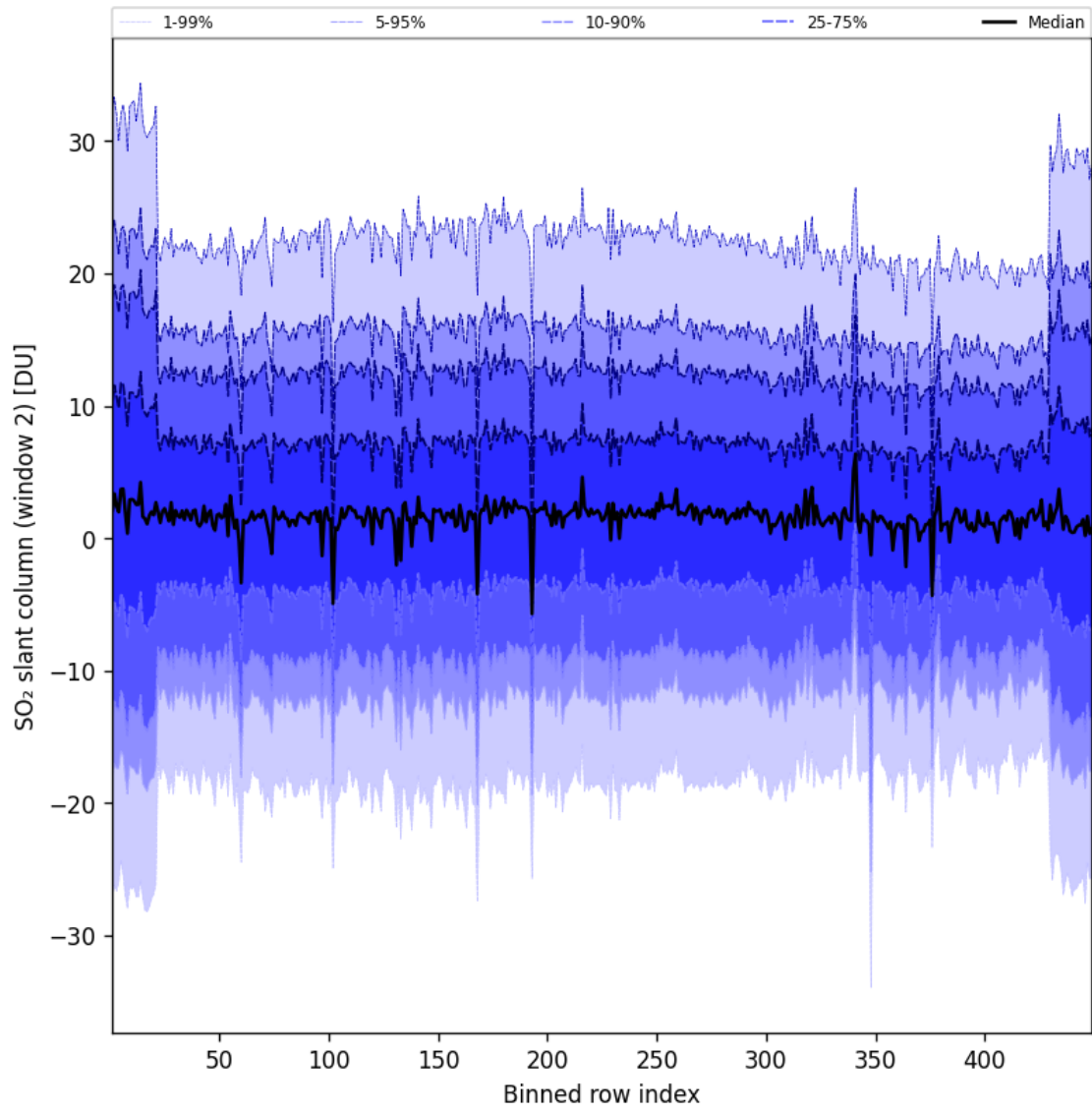


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-05-15 to 2025-05-16

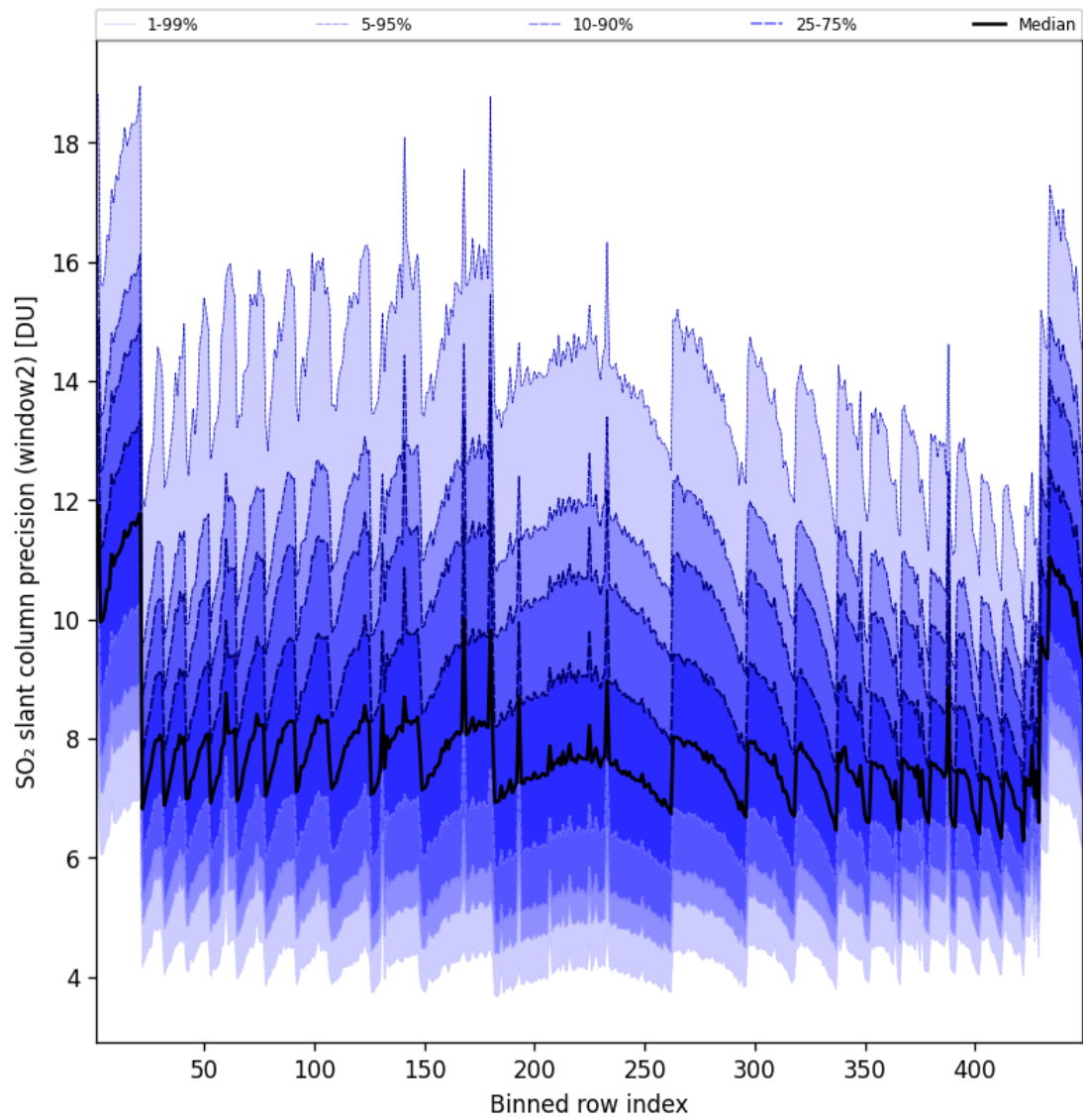


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-05-15 to 2025-05-16

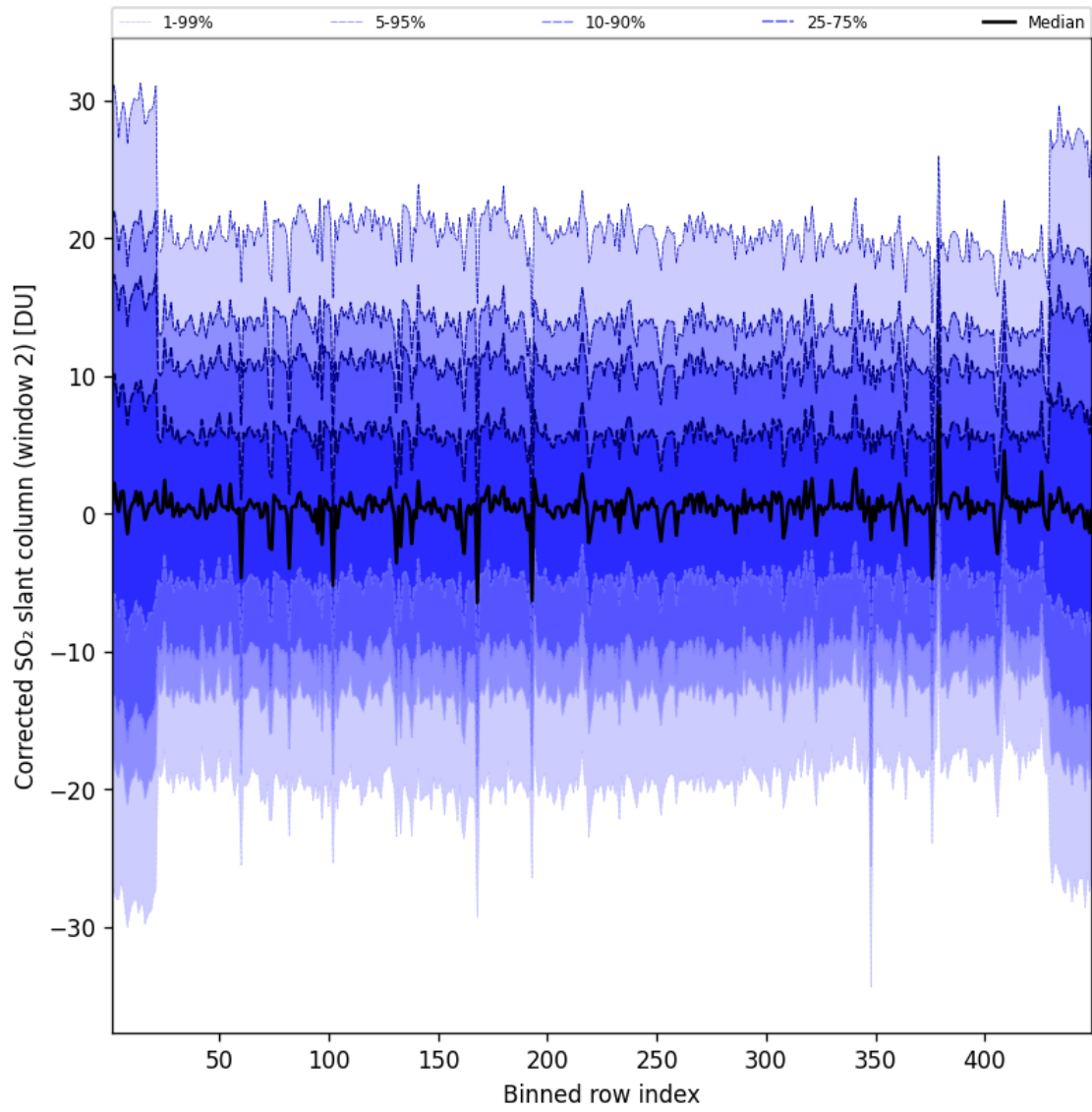


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-05-15 to 2025-05-16

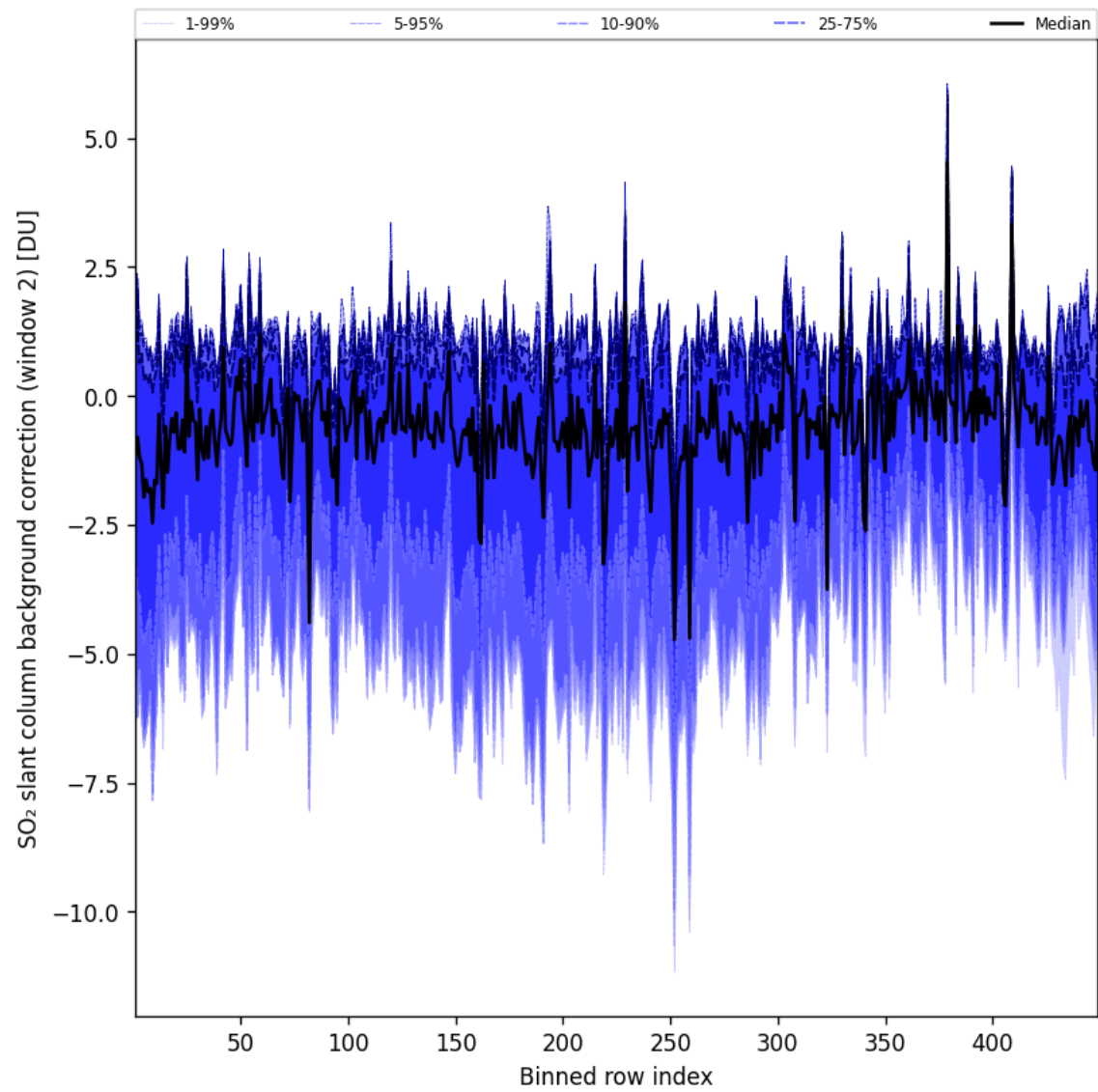


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-05-15 to 2025-05-16

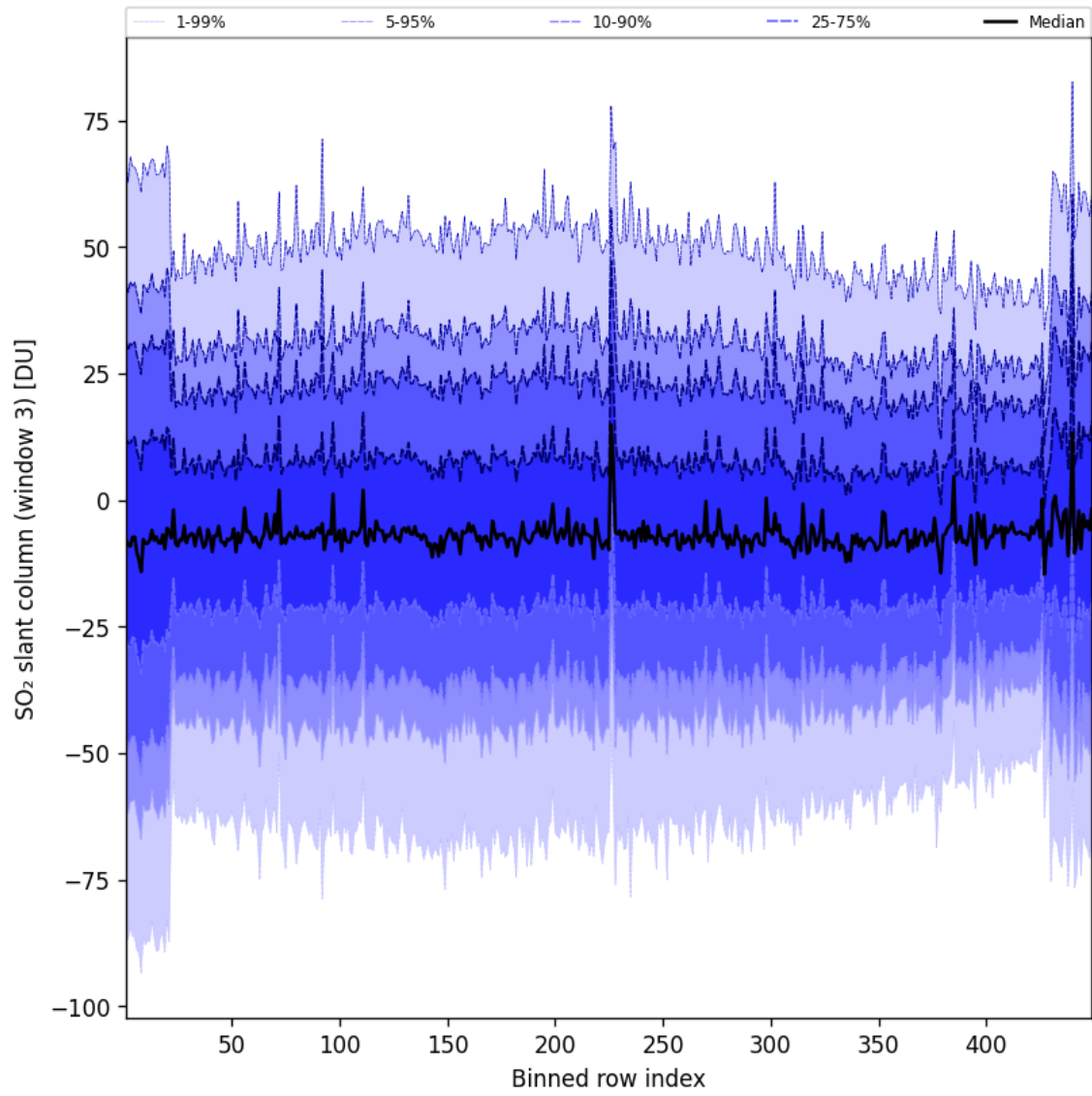


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-05-15 to 2025-05-16

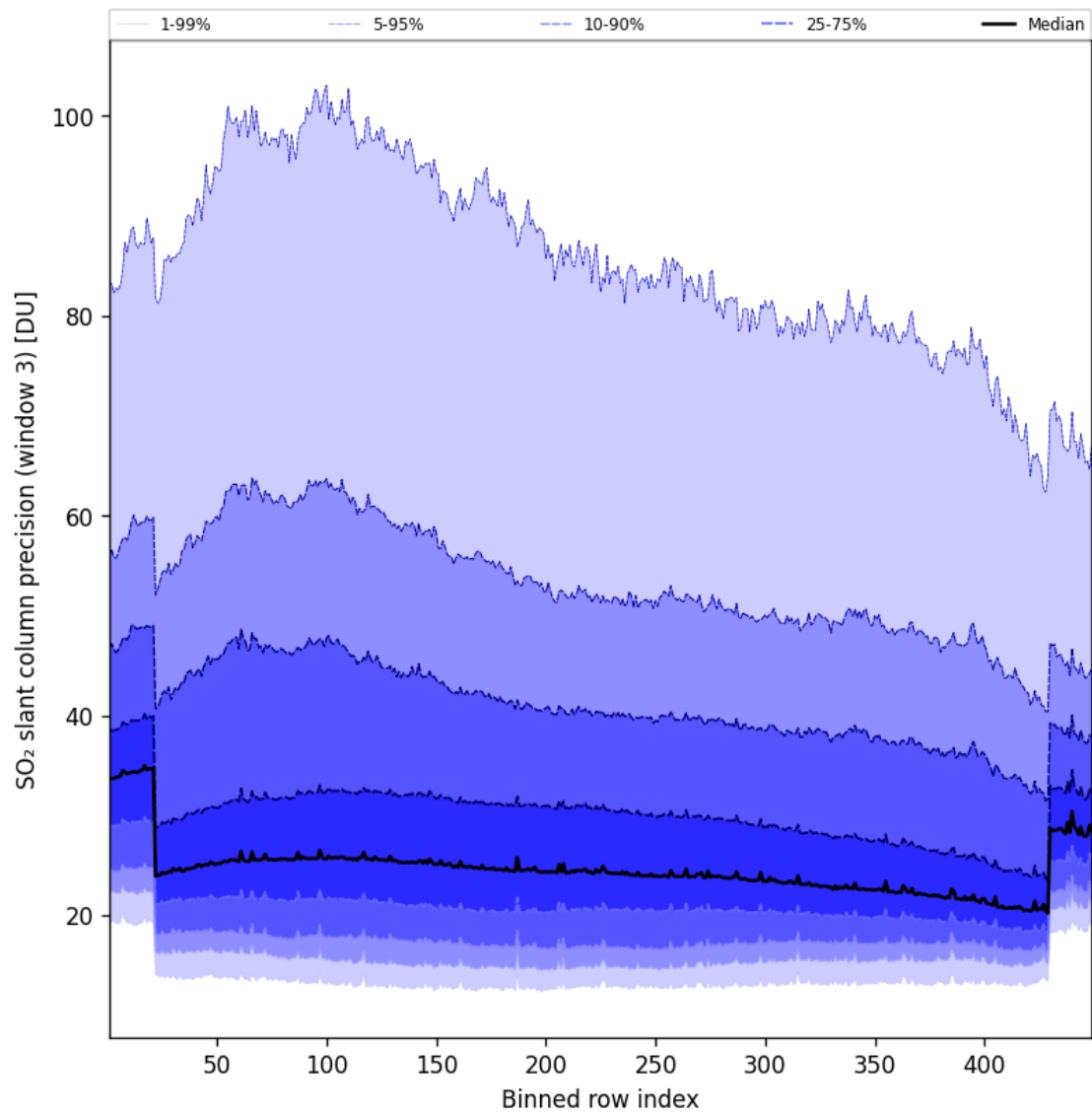


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-05-15 to 2025-05-16

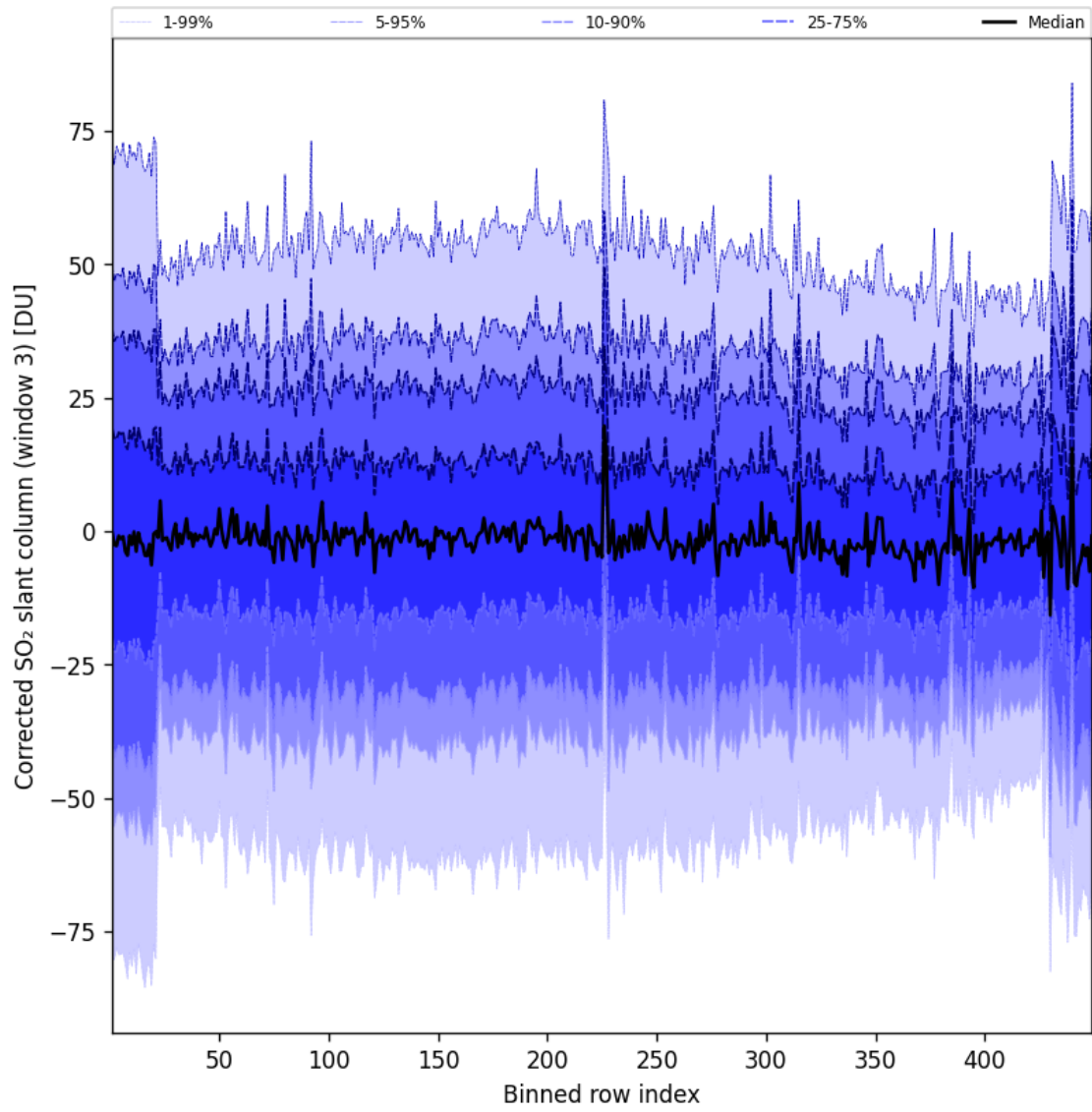


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-05-15 to 2025-05-16

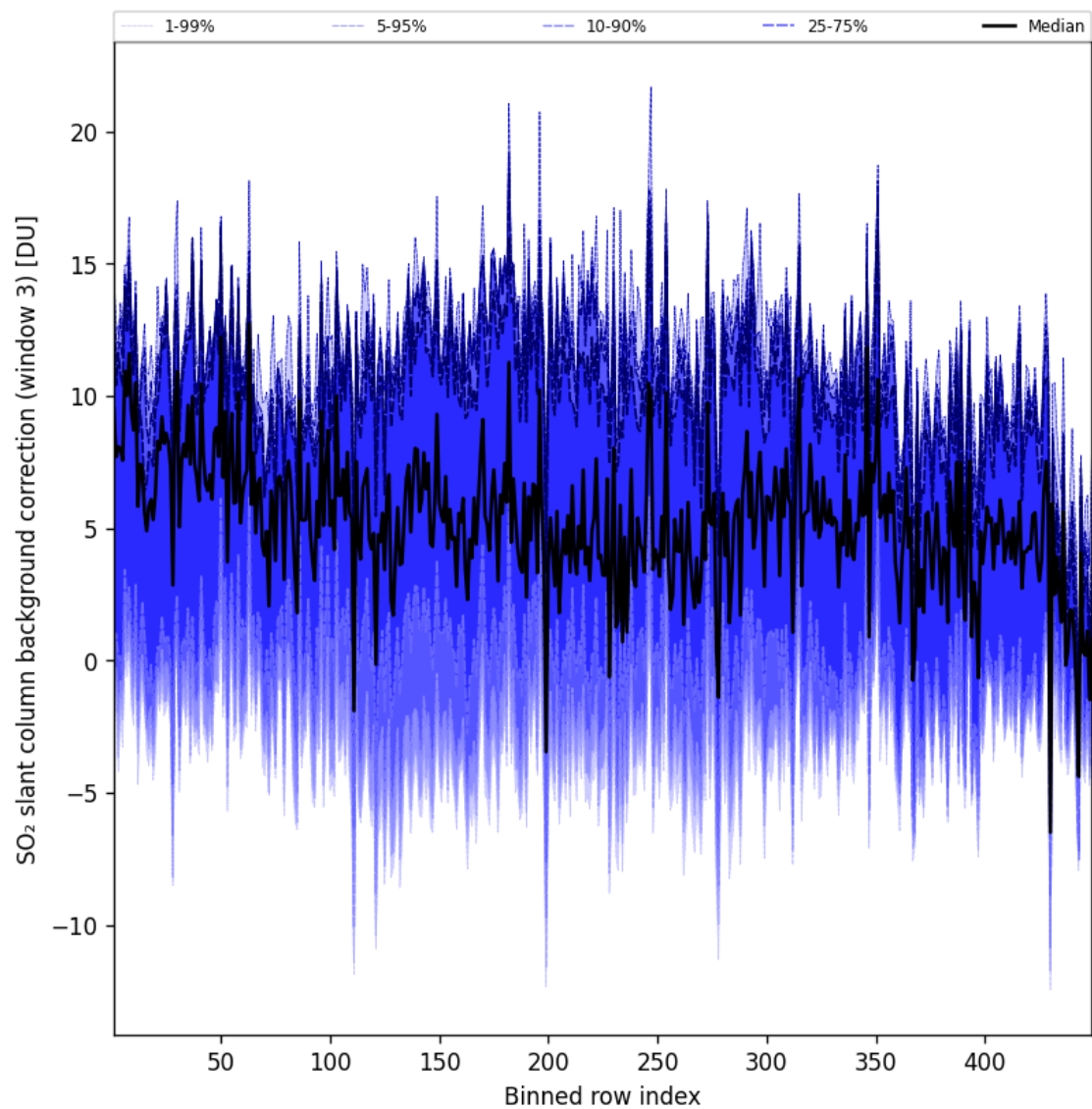


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-05-15 to 2025-05-16

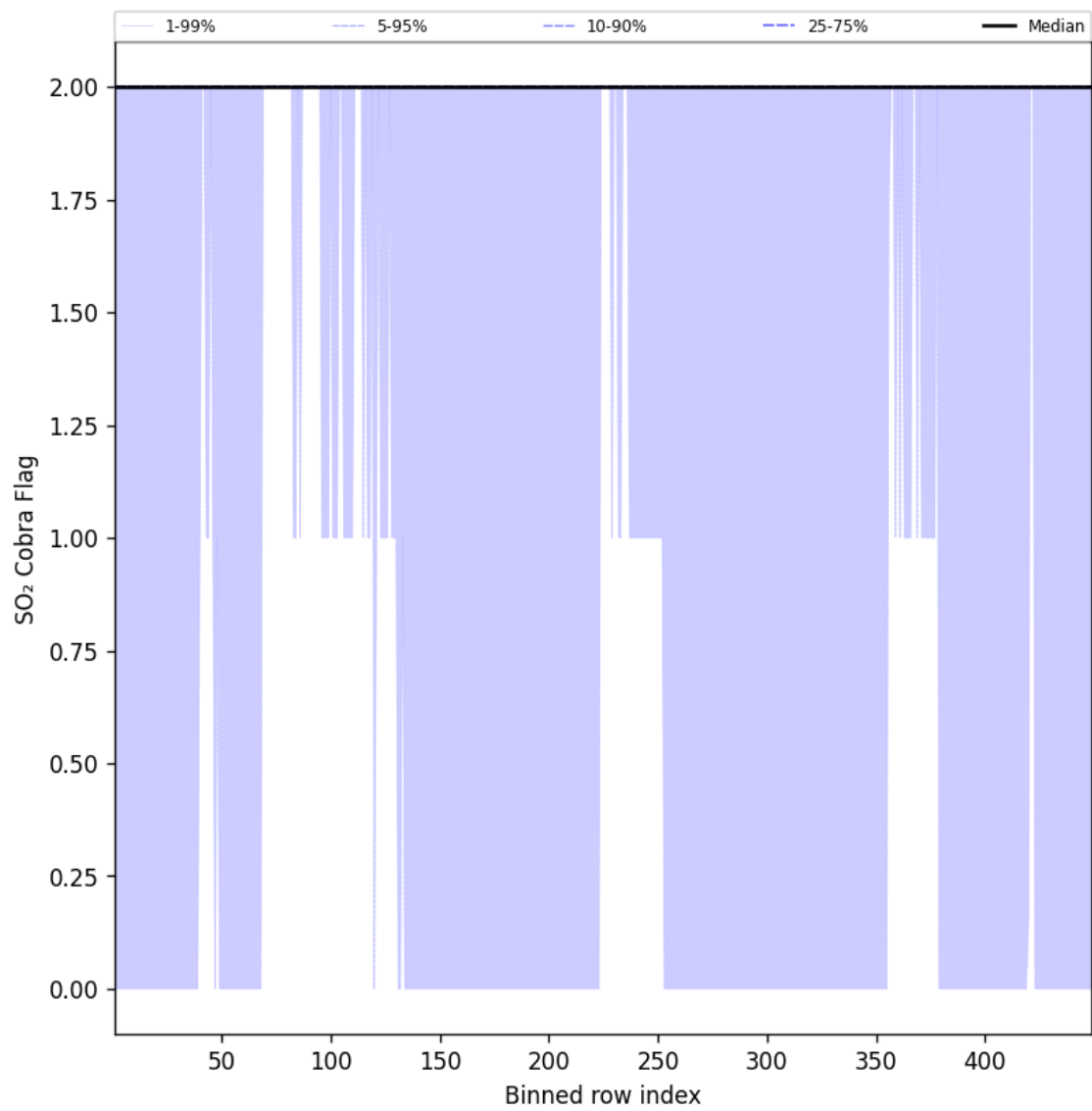


Figure 102: Along track statistics of "SO₂ Cobra Flag" for 2025-05-15 to 2025-05-16

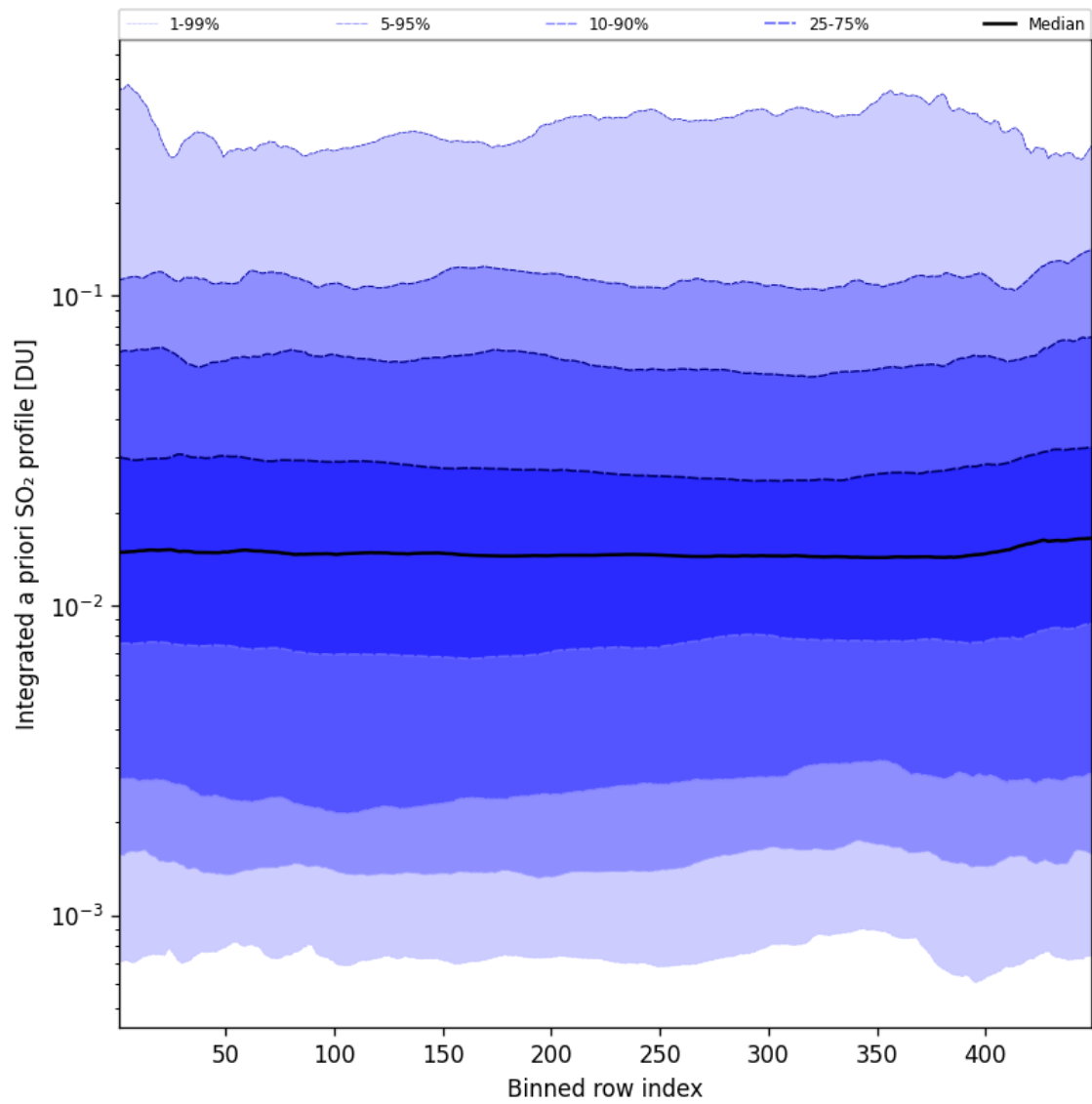


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-05-15 to 2025-05-16

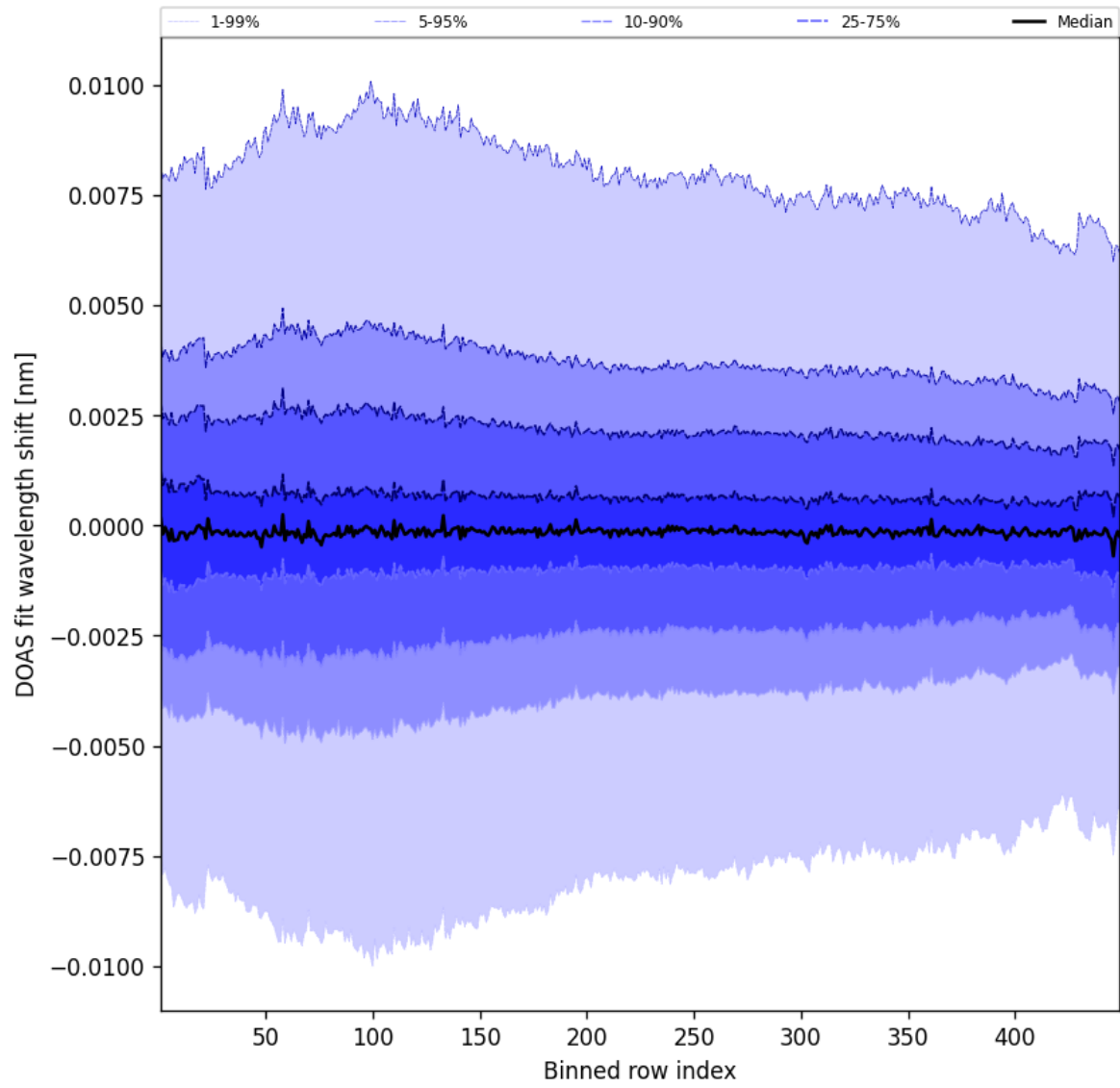


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-05-15 to 2025-05-16

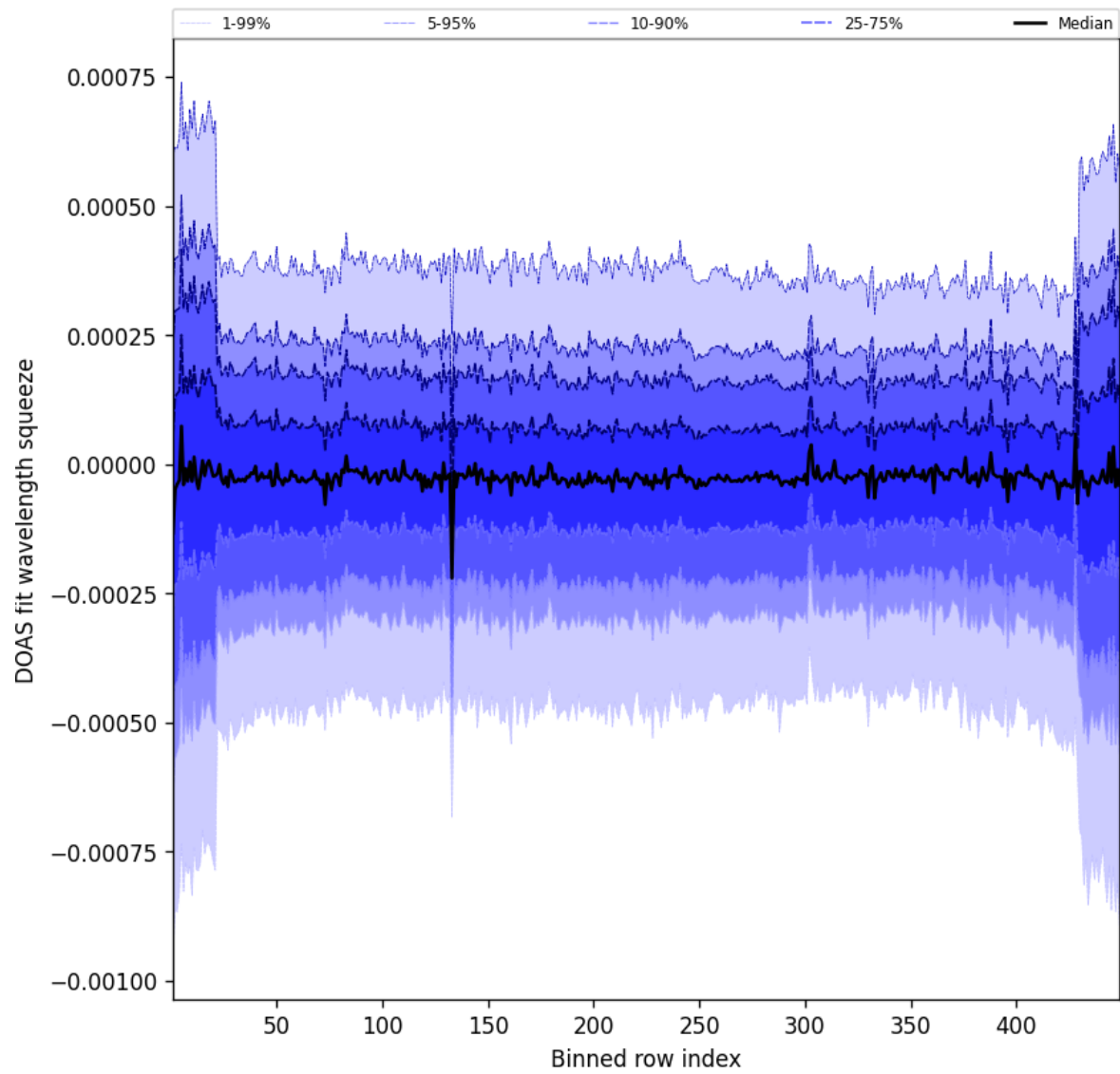


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-05-15 to 2025-05-16

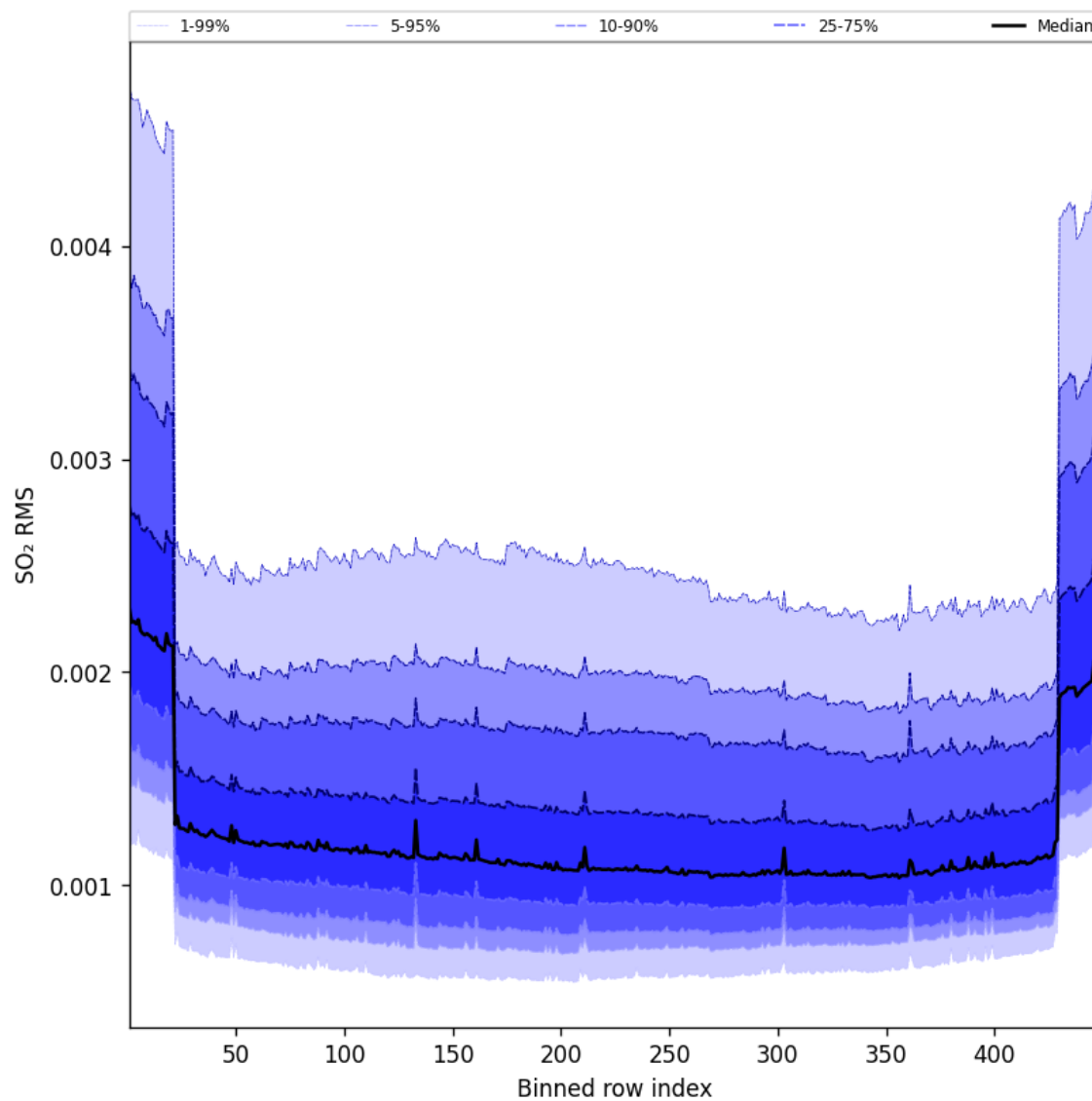


Figure 106: Along track statistics of “SO₂ RMS” for 2025-05-15 to 2025-05-16

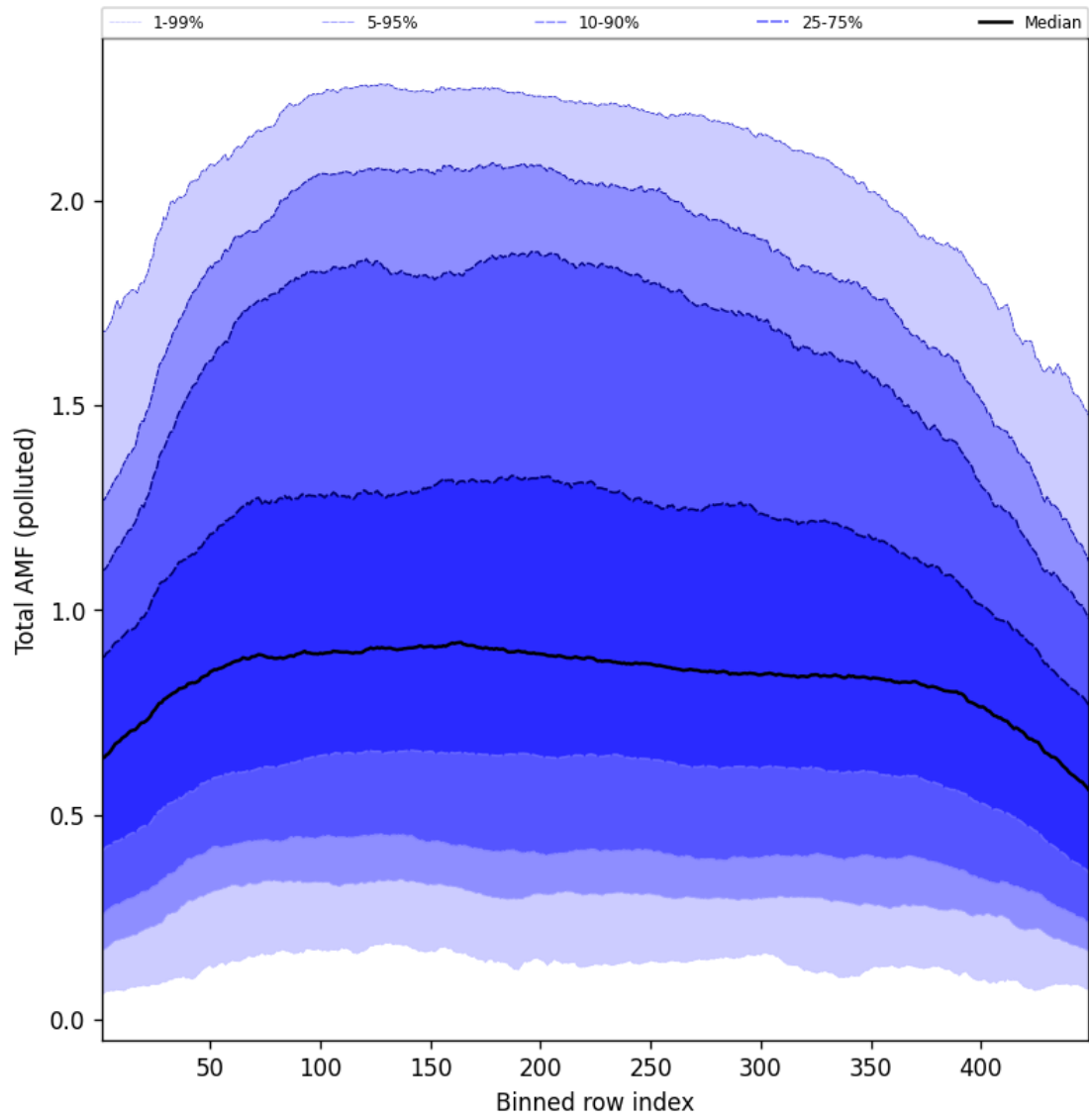


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-05-15 to 2025-05-16

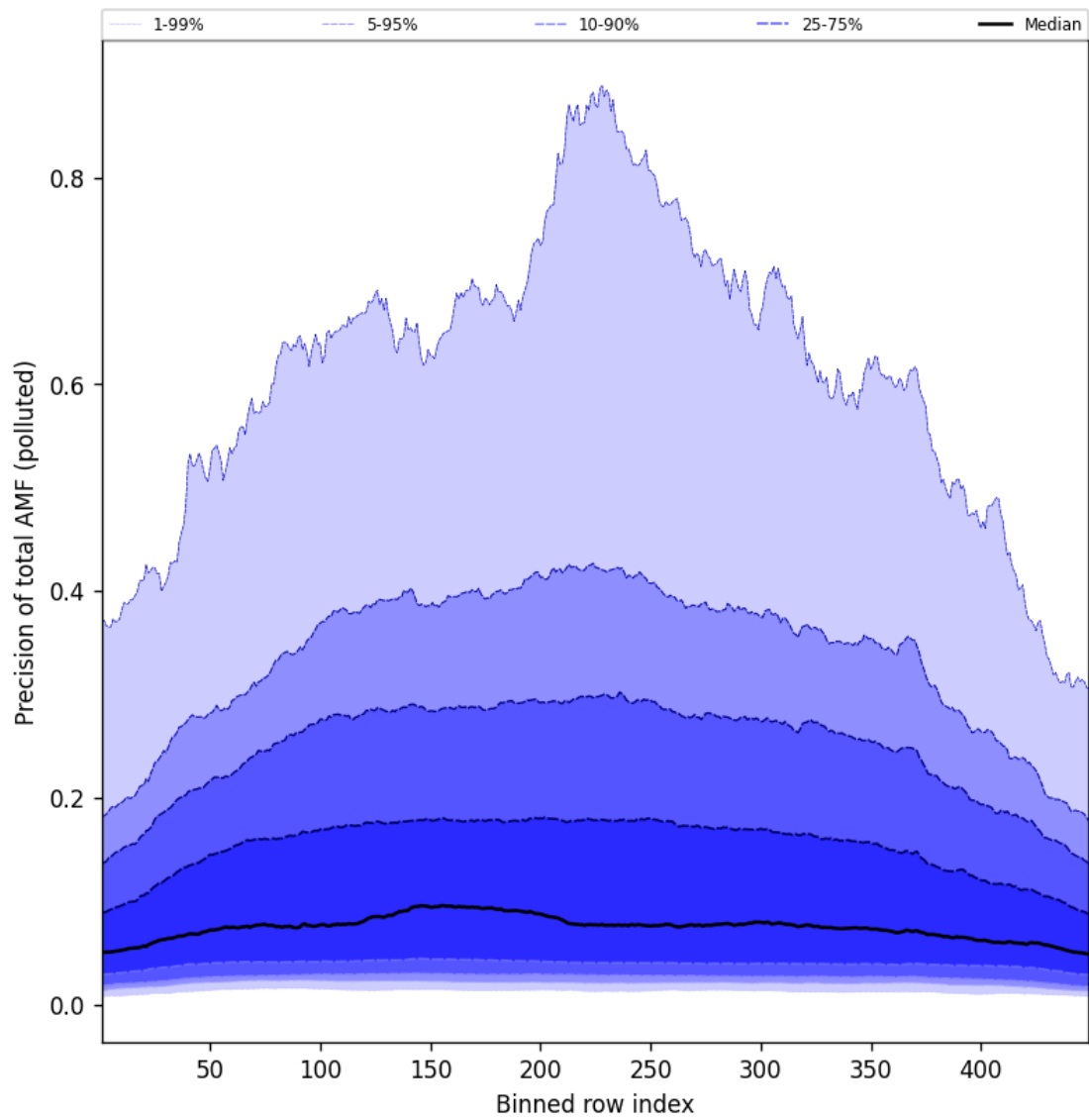


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-05-15 to 2025-05-16

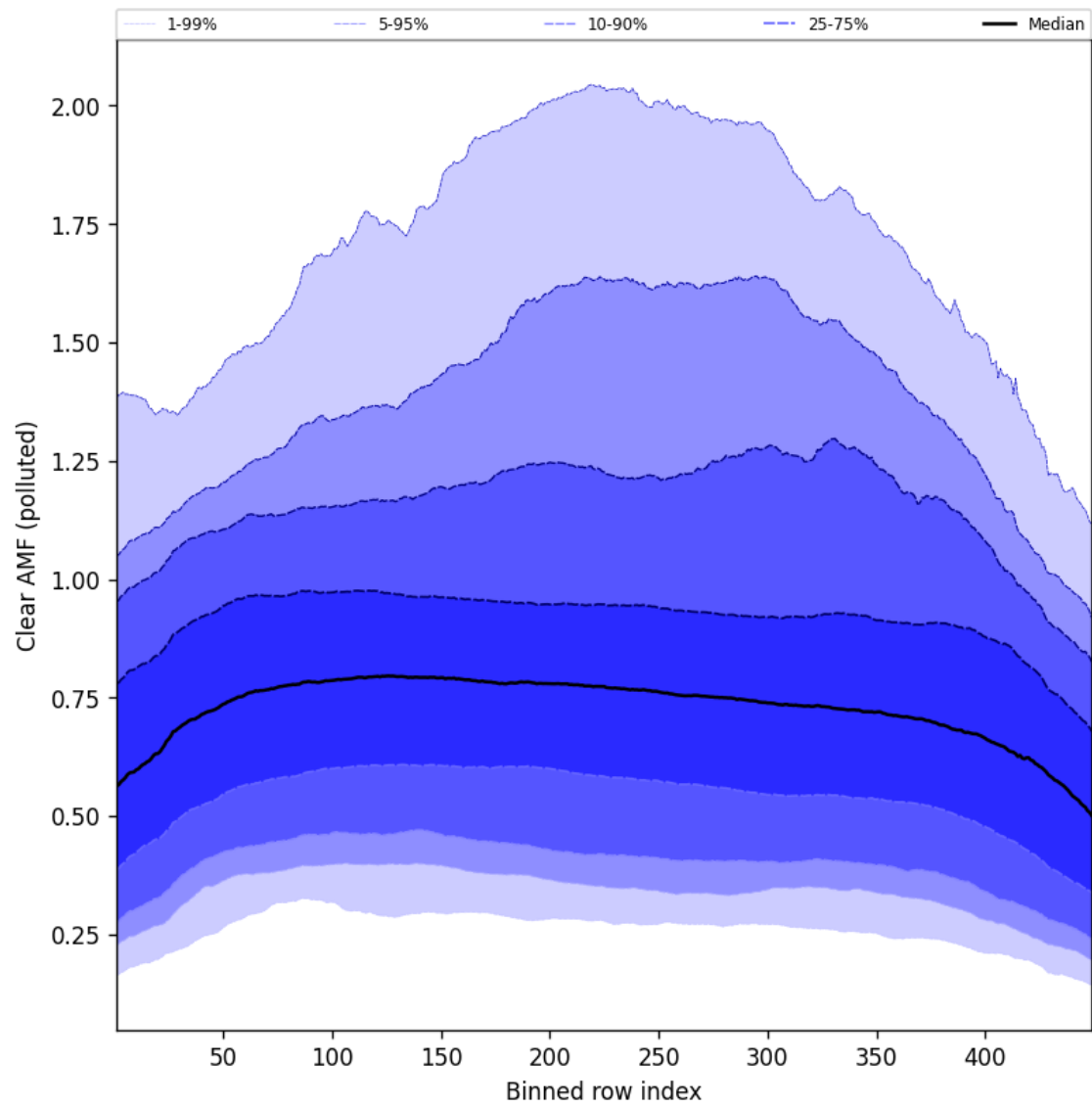


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-05-15 to 2025-05-16

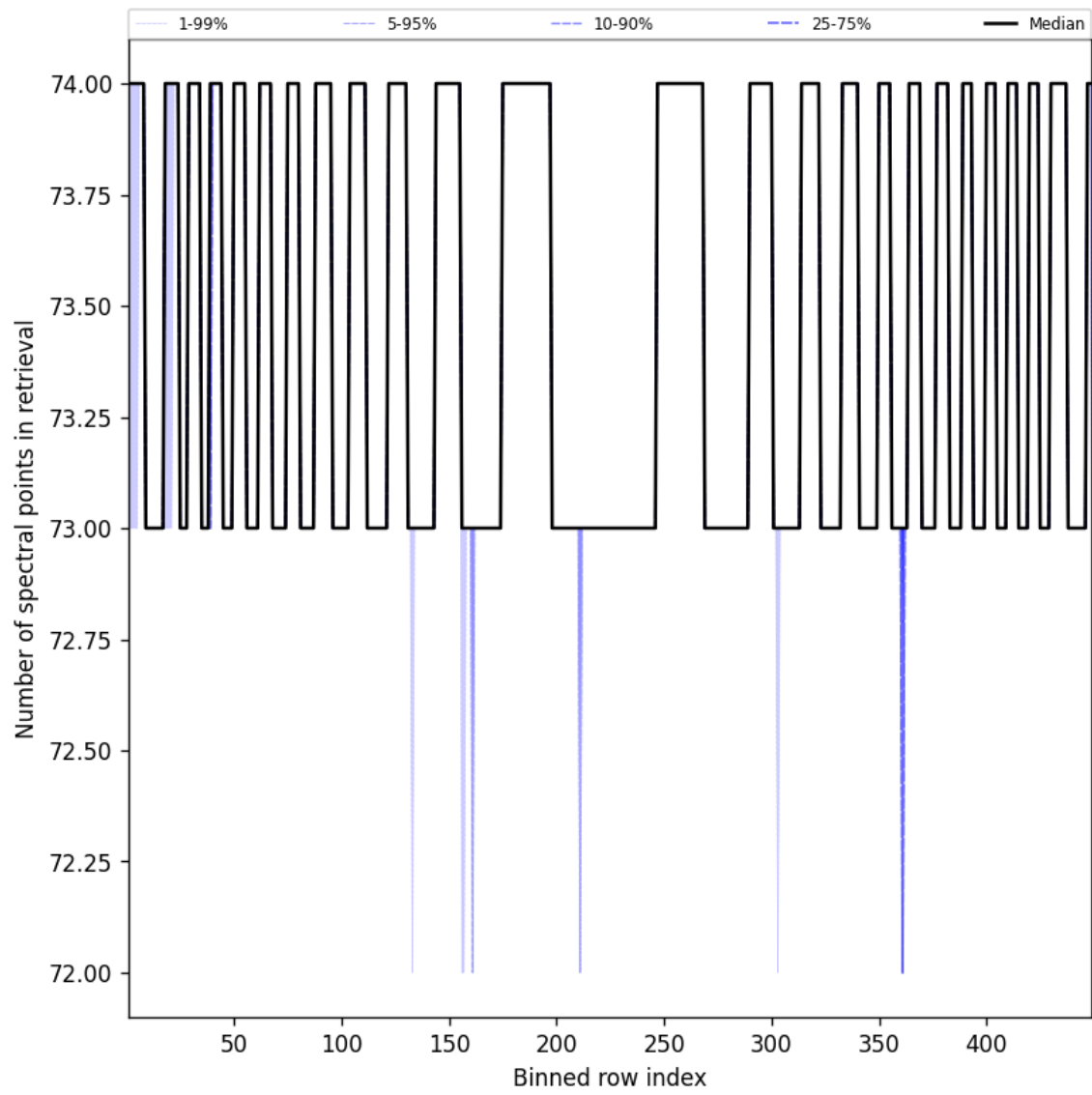


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-05-15 to 2025-05-16

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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