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]	0.614 ± 0.416	17379263	0.995	0.810	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.593 \pm 98.161) \times 10^{-2}$	17379263	0.235	0.430	9.289×10^{-3}	-129	756
sulfurdioxide total vertical column precision [DU]	0.496 ± 0.694	17379263	0.197	0.325	0.314	4.542×10^{-2}	274
sulfurdioxide slant column density corrected [DU]	$(1.749 \pm 44.245) \times 10^{-2}$	17379263	0.276	0.370	8.707×10^{-3}	-42.6	795
sulfurdioxide slant column density cobra [DU]	$(1.728 \pm 36.284) \times 10^{-2}$	17379263	0.276	0.370	8.707×10^{-3}	-42.6	58.0
sulfurdioxide slant column density cobra precision [DU]	0.295 ± 0.129	17379263	0.213	0.124	0.259	8.091×10^{-2}	45.8
sulfurdioxide slant column density window1 [DU]	0.108 ± 0.674	17379263	0.125	0.739	0.112	-80.7	106
sulfurdioxide slant column density window1 precision [DU]	0.295 ± 0.129	17379263	0.213	0.124	0.259	8.091×10^{-2}	45.8
sulfurdioxide slant column density corrected win1 [DU]	$(5.984 \pm 665.668) \times 10^{-3}$	17379263	-2.500×10^{-2}	0.725	-1.084×10^{-2}	-80.7	106
background so2 slant column offset window1 [DU]	-0.102 ± 0.138	17379263	-0.140	0.163	-0.127	-1.38	6.78
sulfurdioxide slant column density window2 [DU]	1.24 ± 8.89	17379263	1.25	11.2	1.19	-842	892
sulfurdioxide slant column density window2 precision [DU]	8.05 ± 2.38	17379263	7.43	2.65	7.70	2.27	824
sulfurdioxide slant column density corrected win2 [DU]	-0.829 ± 8.726	17379263	-0.750	10.9	-0.831	-844	891
background so2 slant column offset window2 [DU]	-2.07 ± 2.16	17379263	-0.250	3.01	-1.68	-14.6	15.4
sulfurdioxide slant column density window3 [DU]	-6.15 ± 23.56	17379263	-7.28	28.9	-6.32	-4.165×10^{3}	3.647×10^{3}
sulfurdioxide slant column density window3 precision [DU]	28.4 ± 13.8	17379263	22.5	10.5	24.6	9.81	1.189×10^{3}
sulfurdioxide slant column density corrected win3 [DU]	4.13 ± 23.07	17379263	3.92	28.2	4.29	-4.160×10^{3}	3.650×10^{3}
background so2 slant column offset window3 [DU]	10.3 ± 5.2	17379263	14.0	8.31	10.4	-11.0	28.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	17379263	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.097 \pm 7.190) \times 10^{-2}$	17379263	1.423×10^{-2}	2.154×10^{-2}	1.450×10^{-2}	2.191×10^{-4}	2.14
fitted radiance shift [nm]	$(-9.762 \pm 263.707) \times 10^{-5}$	17379263	1.000×10^{-4}	1.737×10^{-3}	-8.969×10^{-5}	-5.409×10^{-2}	9.934×10^{-2}
fitted radiance squeeze [1]	$(-3.557 \pm 18.496) \times 10^{-5}$	17379263	-3.000×10^{-5}	2.128×10^{-4}	-3.019×10^{-5}	-1.984×10^{-2}	7.597×10^{-2}
fitted root mean square [1]	$(1.282 \pm 0.513) \times 10^{-3}$	17379263	1.025×10^{-3}	5.081×10^{-4}	1.145×10^{-3}	3.405×10^{-4}	0.113
sulfurdioxide total air mass factor polluted [1]	0.947 ± 0.528	17379263	0.700	0.649	0.840	5.000×10^{-2}	2.82
sulfurdioxide total air mass factor polluted precision [1]	0.117 ± 0.121	17379263	3.500×10^{-2}	0.112	7.822×10^{-2}	3.535×10^{-3}	1.83
sulfurdioxide clear air mass factor polluted [1]	0.795 ± 0.379	17379263	0.660	0.442	0.731	7.378×10^{-2}	2.67
number of spectral points in retrieval [1]	73.4 ± 0.5	17379263	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	1.000×10^{-2}	7.000×10^{-2}	0.190	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.21	−0.839	−0.513	−0.345	−0.203	0.227	0.379	0.562	0.926	2.51
sulfurdioxide total vertical column precision [DU]	9.492×10^{-2}	0.123	0.148	0.172	0.207	0.532	0.710	0.926	1.36	3.34
sulfurdioxide slant column density corrected [DU]	−0.846	−0.494	−0.360	−0.270	−0.175	0.196	0.295	0.393	0.543	0.994
sulfurdioxide slant column density cobra [DU]	−0.846	−0.494	−0.360	−0.270	−0.175	0.196	0.295	0.393	0.543	0.994
sulfurdioxide slant column density cobra precision [DU]	0.144	0.172	0.187	0.199	0.214	0.338	0.391	0.444	0.537	0.755
sulfurdioxide slant column density window1 [DU]	−1.67	−0.934	−0.650	−0.460	−0.261	0.478	0.669	0.852	1.12	1.88
sulfurdioxide slant column density window1 precision [DU]	0.144	0.172	0.187	0.199	0.214	0.338	0.391	0.444	0.537	0.755
sulfurdioxide slant column density corrected win1 [DU]	−1.64	−0.981	−0.726	−0.553	−0.368	0.356	0.555	0.747	1.04	1.86
background so2 slant column offset window1 [DU]	−0.365	−0.264	−0.236	−0.219	−0.195	-3.239×10^{-2}	2.282×10^{-2}	7.621×10^{-2}	0.155	0.321
sulfurdioxide slant column density window2 [DU]	−20.0	−13.0	−9.67	−7.18	−4.40	6.80	9.63	12.2	15.7	23.1
sulfurdioxide slant column density window2 precision [DU]	4.23	5.04	5.57	6.00	6.52	9.17	10.1	11.0	12.2	14.9
sulfurdioxide slant column density corrected win2 [DU]	−22.0	−14.9	−11.5	−9.05	−6.30	4.62	7.37	9.84	13.2	20.5
background so2 slant column offset window2 [DU]	−7.24	−5.93	−5.06	−4.32	−3.49	−0.475	−0.173	8.127×10^{-2}	0.461	2.22
sulfurdioxide slant column density window3 [DU]	−65.6	−44.3	−34.7	−27.9	−20.6	8.30	16.0	23.1	32.7	52.0
sulfurdioxide slant column density window3 precision [DU]	13.5	15.8	17.6	19.1	20.7	31.2	36.1	42.2	54.5	86.7
sulfurdioxide slant column density corrected win3 [DU]	−54.8	−33.8	−24.1	−17.2	−9.85	18.4	25.7	32.3	41.5	60.4
background so2 slant column offset window3 [DU]	−0.675	2.32	3.69	4.77	6.10	14.4	15.7	16.8	18.3	20.9
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	4.342×10^{-4}	6.635×10^{-4}	1.400×10^{-3}	2.717×10^{-3}	6.742×10^{-3}	2.828×10^{-2}	4.107×10^{-2}	6.267×10^{-2}	0.104	0.328
fitted radiance shift [nm]	-8.170×10^{-3}	-4.022×10^{-3}	-2.533×10^{-3}	-1.688×10^{-3}	-9.891×10^{-4}	7.476×10^{-4}	1.444×10^{-3}	2.335×10^{-3}	3.894×10^{-3}	8.171×10^{-3}
fitted radiance squeeze [1]	-5.280×10^{-4}	-3.349×10^{-4}	-2.537×10^{-4}	-1.979×10^{-4}	-1.392×10^{-4}	7.367×10^{-5}	1.264×10^{-4}	1.753×10^{-4}	2.454×10^{-4}	4.134×10^{-4}
fitted root mean square [1]	5.964×10^{-4}	7.326×10^{-4}	8.188×10^{-4}	8.832×10^{-4}	9.574×10^{-4}	1.466×10^{-3}	1.699×10^{-3}	1.932×10^{-3}	2.264×10^{-3}	3.114×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.587×10^{-2}	0.243	0.360	0.452	0.567	1.22	1.52	1.80	2.04	2.29
sulfurdioxide total air mass factor polluted precision [1]	1.037×10^{-2}	1.914×10^{-2}	2.518×10^{-2}	3.140×10^{-2}	3.981×10^{-2}	0.151	0.193	0.245	0.343	0.593
sulfurdioxide clear air mass factor polluted [1]	0.232	0.323	0.386	0.444	0.526	0.968	1.10	1.28	1.60	2.04
number of spectral points in retrieval [1]	73.0	73.0	73.0	73.0	73.0	74.0	74.0	74.0	74.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.562 ± 0.423	11967016	0.880	0.490	0.0	1.000	0.120	1.000
sulfurdioxide total vertical column [DU]	$(2.001 \pm 88.781) \times 10^{-2}$	11967016	0.392	7.505×10^{-3}	-79.5	277	-0.186	0.205
sulfurdioxide total vertical column precision [DU]	0.461 ± 0.669	11967016	0.304	0.280	4.542×10^{-2}	145	0.188	0.492
sulfurdioxide slant column density corrected [DU]	$(1.494 \pm 34.561) \times 10^{-2}$	11967016	0.353	7.292×10^{-3}	-9.92	46.5	-0.168	0.185
sulfurdioxide slant column density cobra [DU]	$(1.483 \pm 33.896) \times 10^{-2}$	11967016	0.353	7.292×10^{-3}	-9.92	26.9	-0.168	0.185
sulfurdioxide slant column density cobra precision [DU]	0.279 ± 0.116	11967016	0.109	0.246	8.091×10^{-2}	11.5	0.207	0.316
sulfurdioxide slant column density window1 [DU]	$(9.554 \pm 64.128) \times 10^{-2}$	11967016	0.710	0.103	-13.1	52.0	-0.257	0.454
sulfurdioxide slant column density window1 precision [DU]	0.279 ± 0.116	11967016	0.109	0.246	8.091×10^{-2}	11.5	0.207	0.316
sulfurdioxide slant column density corrected win1 [DU]	$(7.509 \pm 6279.168) \times 10^{-4}$	11967016	0.692	-1.379×10^{-2}	-12.9	51.8	-0.355	0.336
background so2 slant column offset window1 [DU]	$(-9.479 \pm 14.463) \times 10^{-2}$	11967016	0.191	-0.121	-1.24	1.71	-0.203	-1.141×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.31 ± 8.28	11967016	10.6	1.30	-414	386	-4.02	6.62
sulfurdioxide slant column density window2 precision [DU]	7.58 ± 2.05	11967016	2.31	7.29	2.27	269	6.22	8.54
sulfurdioxide slant column density corrected win2 [DU]	-0.870 ± 8.078	11967016	10.3	-0.853	-417	379	-6.03	4.29
background so2 slant column offset window2 [DU]	-2.18 ± 2.27	11967016	3.38	-1.93	-13.8	15.4	-3.76	-0.383
sulfurdioxide slant column density window3 [DU]	-6.31 ± 22.01	11967016	27.0	-6.65	-4.165×10^3	3.647×10^3	-19.9	7.05
sulfurdioxide slant column density window3 precision [DU]	26.7 ± 13.6	11967016	8.48	23.0	9.81	1.189×10^3	19.8	28.3
sulfurdioxide slant column density corrected win3 [DU]	4.23 ± 21.42	11967016	26.3	4.37	-4.160×10^3	3.650×10^3	-8.79	17.5
background so2 slant column offset window3 [DU]	10.5 ± 5.3	11967016	8.93	11.6	-11.0	24.3	5.86	14.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.17	11967016	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.389 \pm 8.166) \times 10^{-2}$	11967016	2.817×10^{-2}	1.249×10^{-2}	2.191×10^{-4}	2.14	3.306×10^{-3}	3.148×10^{-2}
fitted radiance shift [nm]	$(2.992 \pm 262.333) \times 10^{-5}$	11967016	1.596×10^{-3}	1.141×10^{-5}	-4.138×10^{-2}	4.303×10^{-2}	-7.859×10^{-4}	8.098×10^{-4}
fitted radiance squeeze [1]	$(-6.034 \pm 17.374) \times 10^{-5}$	11967016	2.062×10^{-4}	-4.865×10^{-5}	-3.463×10^{-3}	1.214×10^{-2}	-1.569×10^{-4}	4.934×10^{-5}
fitted root mean square [1]	$(1.225 \pm 0.483) \times 10^{-3}$	11967016	4.569×10^{-4}	1.099×10^{-3}	3.405×10^{-4}	2.396×10^{-2}	9.257×10^{-4}	1.383×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.01 ± 0.58	11967016	0.828	0.887	5.000×10^{-2}	2.82	0.556	1.38
sulfurdioxide total air mass factor polluted precision [1]	0.128 ± 0.134	11967016	0.123	8.867×10^{-2}	3.535×10^{-3}	1.83	4.235×10^{-2}	0.165
sulfurdioxide clear air mass factor polluted [1]	0.830 ± 0.430	11967016	0.546	0.757	7.378×10^{-2}	2.67	0.495	1.04
number of spectral points in retrieval [1]	73.5 ± 0.5	11967016	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]	0.729 ± 0.373	5412247	0.610	1.000	0.0	1.000	0.390	1.000
sulfurdioxide total vertical column [DU]	$(3.901 \pm 116.235) \times 10^{-2}$	5412247	0.529	1.468×10^{-2}	-129	756	-0.246	0.283
sulfurdioxide total vertical column precision [DU]	0.574 ± 0.740	5412247	0.348	0.380	5.334×10^{-2}	274	0.265	0.614
sulfurdioxide slant column density corrected [DU]	$(2.315 \pm 60.370) \times 10^{-2}$	5412247	0.415	1.237×10^{-2}	-42.6	795	-0.193	0.221
sulfurdioxide slant column density cobra [DU]	$(2.269 \pm 41.067) \times 10^{-2}$	5412247	0.415	1.237×10^{-2}	-42.6	58.0	-0.193	0.221
sulfurdioxide slant column density cobra precision [DU]	0.330 ± 0.147	5412247	0.146	0.291	0.104	45.8	0.238	0.384
sulfurdioxide slant column density window1 [DU]	0.135 ± 0.742	5412247	0.810	0.133	-80.7	106	-0.272	0.538
sulfurdioxide slant column density window1 precision [DU]	0.330 ± 0.147	5412247	0.146	0.291	0.104	45.8	0.238	0.384
sulfurdioxide slant column density corrected win1 [DU]	$(1.755 \pm 74.222) \times 10^{-2}$	5412247	0.807	-3.182×10^{-3}	-80.7	106	-0.401	0.406
background so2 slant column offset window1 [DU]	-0.117 ± 0.119	5412247	0.106	-0.135	-1.38	6.78	-0.181	-7.485×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.08 ± 10.12	5412247	12.6	0.896	-842	892	-5.32	7.26
sulfurdioxide slant column density window2 precision [DU]	9.09 ± 2.71	5412247	2.89	8.76	2.65	824	7.47	10.4
sulfurdioxide slant column density corrected win2 [DU]	-0.738 ± 10.010	5412247	12.5	-0.772	-844	891	-6.99	5.47
background so2 slant column offset window2 [DU]	-1.82 ± 1.86	5412247	2.16	-1.41	-14.6	15.1	-2.80	-0.644
sulfurdioxide slant column density window3 [DU]	-5.79 ± 26.65	5412247	33.7	-5.41	-651	312	-22.4	11.3
sulfurdioxide slant column density window3 precision [DU]	32.0 ± 13.4	5412247	11.0	28.7	10.4	222	24.3	35.3
sulfurdioxide slant column density corrected win3 [DU]	3.91 ± 26.35	5412247	33.4	4.07	-640	321	-12.6	20.8
background so2 slant column offset window3 [DU]	9.70 ± 4.70	5412247	6.42	8.69	-8.79	28.6	6.39	12.8
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.26	5412247	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.453 \pm 4.237) \times 10^{-2}$	5412247	1.326×10^{-2}	1.664×10^{-2}	1.349×10^{-3}	1.24	1.129×10^{-2}	2.455×10^{-2}
fitted radiance shift [nm]	$(-3.796 \pm 26.455) \times 10^{-4}$	5412247	1.985×10^{-3}	-3.699×10^{-4}	-5.409×10^{-2}	9.934×10^{-2}	-1.416×10^{-3}	5.694×10^{-4}
fitted radiance squeeze [1]	$(1.920 \pm 19.684) \times 10^{-5}$	5412247	2.237×10^{-4}	1.501×10^{-5}	-1.984×10^{-2}	7.597×10^{-2}	-9.516×10^{-5}	1.286×10^{-4}
fitted root mean square [1]	$(1.409 \pm 0.555) \times 10^{-3}$	5412247	5.976×10^{-4}	1.260×10^{-3}	3.887×10^{-4}	0.113	1.044×10^{-3}	1.642×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.816 ± 0.353	5412247	0.435	0.773	5.000×10^{-2}	2.71	0.583	1.02
sulfurdioxide total air mass factor polluted precision [1]	$(9.098 \pm 7.974) \times 10^{-2}$	5412247	8.475×10^{-2}	6.015×10^{-2}	4.222×10^{-3}	1.37	3.681×10^{-2}	0.122
sulfurdioxide clear air mass factor polluted [1]	0.719 ± 0.208	5412247	0.283	0.701	0.120	1.53	0.571	0.854
number of spectral points in retrieval [1]	73.4 ± 0.5	5412247	1.000	73.0	70.0	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]	0.636 ± 0.404	11314934	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(2.387 \pm 90.244) \times 10^{-2}$	11314934	0.424	9.161×10^{-3}	-94.8	637	-0.201	0.223
sulfurdioxide total vertical column precision [DU]	0.470 ± 0.635	11314934	0.293	0.303	4.913×10^{-2}	274	0.209	0.502
sulfurdioxide slant column density corrected [DU]	$(1.644 \pm 43.320) \times 10^{-2}$	11314934	0.372	8.579×10^{-3}	-36.4	795	-0.176	0.196
sulfurdioxide slant column density cobra [DU]	$(1.632 \pm 35.978) \times 10^{-2}$	11314934	0.372	8.579×10^{-3}	-36.4	58.0	-0.176	0.196
sulfurdioxide slant column density cobra precision [DU]	0.298 ± 0.131	11314934	0.137	0.260	8.091×10^{-2}	29.3	0.212	0.350
sulfurdioxide slant column density window1 [DU]	0.104 ± 0.680	11314934	0.748	0.114	-80.7	93.4	-0.265	0.483
sulfurdioxide slant column density window1 precision [DU]	0.298 ± 0.131	11314934	0.137	0.260	8.091×10^{-2}	29.3	0.212	0.350
sulfurdioxide slant column density corrected win1 [DU]	$(5.308 \pm 669.610) \times 10^{-3}$	11314934	0.733	-9.931×10^{-3}	-80.7	94.1	-0.372	0.361
background so2 slant column offset window1 [DU]	$(-9.878 \pm 14.503) \times 10^{-2}$	11314934	0.170	-0.131	-1.38	6.78	-0.197	-2.620×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.23 ± 8.92	11314934	11.3	1.13	-745	864	-4.47	6.79
sulfurdioxide slant column density window2 precision [DU]	8.04 ± 2.26	11314934	2.58	7.69	2.38	608	6.56	9.15
sulfurdioxide slant column density corrected win2 [DU]	-0.807 ± 8.739	11314934	11.0	-0.816	-749	860	-6.31	4.67
background so2 slant column offset window2 [DU]	-2.03 ± 2.24	11314934	3.15	-1.47	-14.6	15.4	-3.56	-0.410
sulfurdioxide slant column density window3 [DU]	-3.61 ± 23.57	11314934	29.3	-4.00	-1.540×10^{3}	1.854×10^{3}	-18.3	11.0
sulfurdioxide slant column density window3 precision [DU]	27.5 ± 12.0	11314934	9.54	24.2	9.81	1.189×10^{3}	20.8	30.3
sulfurdioxide slant column density corrected win3 [DU]	6.37 ± 22.81	11314934	28.3	6.22	-1.537×10^{3}	1.859×10^{3}	-7.78	20.5
background so2 slant column offset window3 [DU]	9.98 ± 5.31	11314934	8.50	9.55	-11.0	28.6	5.76	14.3
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	11314934	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.051 \pm 3.858) \times 10^{-2}$	11314934	1.504×10^{-2}	1.331×10^{-2}	2.319×10^{-4}	1.48	7.356×10^{-3}	2.239×10^{-2}
fitted radiance shift [nm]	$(-1.111 \pm 23.203) \times 10^{-4}$	11314934	1.690×10^{-3}	-9.275×10^{-5}	-5.409×10^{-2}	4.221×10^{-2}	-9.782×10^{-4}	7.116×10^{-4}
fitted radiance squeeze [1]	$(-2.888 \pm 18.701) \times 10^{-5}$	11314934	2.143×10^{-4}	-2.283×10^{-5}	-1.984×10^{-2}	1.497×10^{-2}	-1.330×10^{-4}	8.131×10^{-5}
fitted root mean square [1]	$(1.298 \pm 0.527) \times 10^{-3}$	11314934	5.677×10^{-4}	1.149×10^{-3}	3.447×10^{-4}	6.813×10^{-2}	9.517×10^{-4}	1.519×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.949 ± 0.492	11314934	0.576	0.860	5.000×10^{-2}	2.63	0.614	1.19
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.109	11314934	9.217×10^{-2}	7.412×10^{-2}	3.535×10^{-3}	1.83	4.197×10^{-2}	0.134
sulfurdioxide clear air mass factor polluted [1]	0.824 ± 0.383	11314934	0.409	0.761	7.378×10^{-2}	2.64	0.571	0.980
number of spectral points in retrieval [1]	73.4 ± 0.5	11314934	1.000	73.0	71.0	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]	0.613 ± 0.431	4213137	0.870	1.000	0.0	1.000	0.130	1.000
sulfurdioxide total vertical column [DU]	$(2.844 \pm 108.726) \times 10^{-2}$	4213137	0.442	9.219×10^{-3}	-58.2	756	-0.208	0.234
sulfurdioxide total vertical column precision [DU]	0.535 ± 0.749	4213137	0.366	0.341	4.542×10^{-2}	145	0.205	0.571
sulfurdioxide slant column density corrected [DU]	$(1.906 \pm 48.732) \times 10^{-2}$	4213137	0.359	8.476×10^{-3}	-42.6	615	-0.169	0.189
sulfurdioxide slant column density cobra [DU]	$(1.856 \pm 36.268) \times 10^{-2}$	4213137	0.359	8.476×10^{-3}	-42.6	42.7	-0.169	0.189
sulfurdioxide slant column density cobra precision [DU]	0.282 ± 0.121	4213137	9.694×10^{-2}	0.252	8.754×10^{-2}	45.8	0.214	0.311
sulfurdioxide slant column density window1 [DU]	0.136 ± 0.650	4213137	0.709	0.128	-80.6	106	-0.225	0.483
sulfurdioxide slant column density window1 precision [DU]	0.282 ± 0.121	4213137	9.694×10^{-2}	0.252	8.754×10^{-2}	45.8	0.214	0.311
sulfurdioxide slant column density corrected win1 [DU]	$(8.871 \pm 644.131) \times 10^{-3}$	4213137	0.697	-9.317×10^{-3}	-80.6	106	-0.353	0.344
background so2 slant column offset window1 [DU]	-0.128 ± 0.116	4213137	0.136	-0.142	-0.833	1.80	-0.206	-7.010×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.944 ± 8.932	4213137	11.2	0.971	-842	892	-4.65	6.54
sulfurdioxide slant column density window2 precision [DU]	8.14 ± 2.68	4213137	2.77	7.78	2.27	824	6.52	9.30
sulfurdioxide slant column density corrected win2 [DU]	-0.849 ± 8.800	4213137	10.9	-0.847	-844	891	-6.32	4.61
background so2 slant column offset window2 [DU]	-1.79 ± 1.93	4213137	2.53	-1.47	-13.8	13.2	-2.99	-0.457
sulfurdioxide slant column density window3 [DU]	-11.1 ± 23.3	4213137	28.1	-10.6	-4.165×10^3	3.647×10^3	-24.9	3.26
sulfurdioxide slant column density window3 precision [DU]	30.5 ± 16.8	4213137	12.9	25.7	9.94	1.066×10^3	20.8	33.7
sulfurdioxide slant column density corrected win3 [DU]	-1.00 ± 23.45	4213137	28.5	-0.197	-4.160×10^3	3.650×10^3	-14.9	13.6
background so2 slant column offset window3 [DU]	10.1 ± 4.9	4213137	7.82	10.3	-7.93	28.4	6.14	14.0
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.11	4213137	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.540 \pm 10.762) \times 10^{-2}$	4213137	4.886×10^{-2}	2.397×10^{-2}	2.203×10^{-4}	2.14	8.400×10^{-3}	5.726×10^{-2}
fitted radiance shift [nm]	$(-7.386 \pm 324.945) \times 10^{-5}$	4213137	1.820×10^{-3}	-8.950×10^{-5}	-4.486×10^{-2}	9.934×10^{-2}	-1.010×10^{-3}	8.104×10^{-4}
fitted radiance squeeze [1]	$(-3.739 \pm 17.808) \times 10^{-5}$	4213137	2.047×10^{-4}	-3.416×10^{-5}	-1.369×10^{-2}	7.597×10^{-2}	-1.378×10^{-4}	6.690×10^{-5}
fitted root mean square [1]	$(1.224 \pm 0.461) \times 10^{-3}$	4213137	4.037×10^{-4}	1.119×10^{-3}	3.405×10^{-4}	0.113	9.538×10^{-4}	1.357×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.920 ± 0.574	4213137	0.726	0.769	5.000×10^{-2}	2.82	0.497	1.22
sulfurdioxide total air mass factor polluted precision [1]	0.133 ± 0.139	4213137	0.154	8.764×10^{-2}	4.111×10^{-3}	1.77	3.308×10^{-2}	0.187
sulfurdioxide clear air mass factor polluted [1]	0.736 ± 0.351	4213137	0.445	0.656	9.010×10^{-2}	2.67	0.476	0.921
number of spectral points in retrieval [1]	73.4 ± 0.5	4213137	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

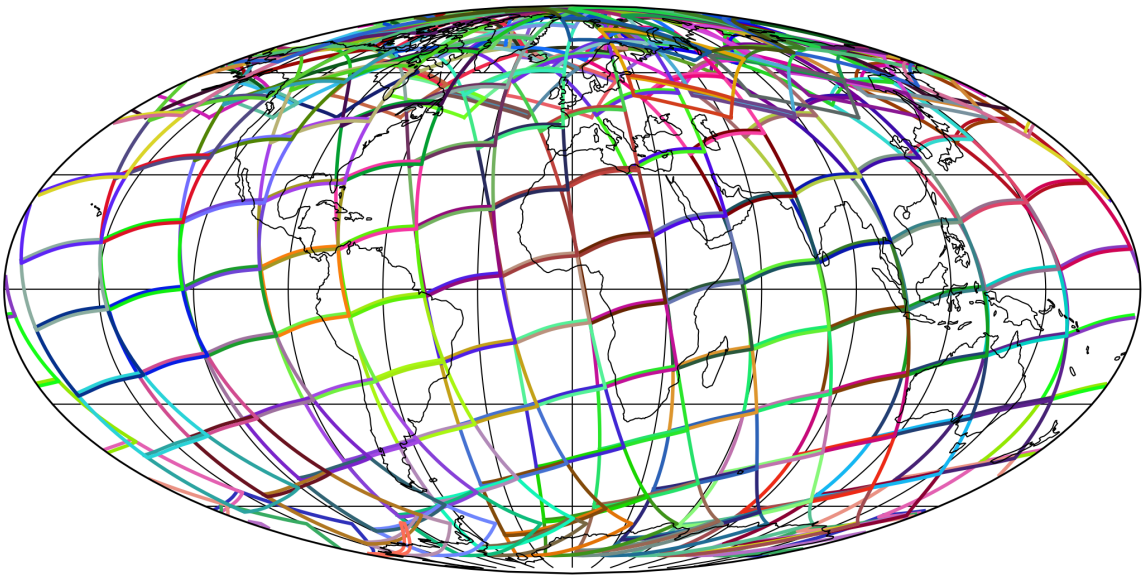


Figure 1: Outline of the granules.

4 Input data monitoring

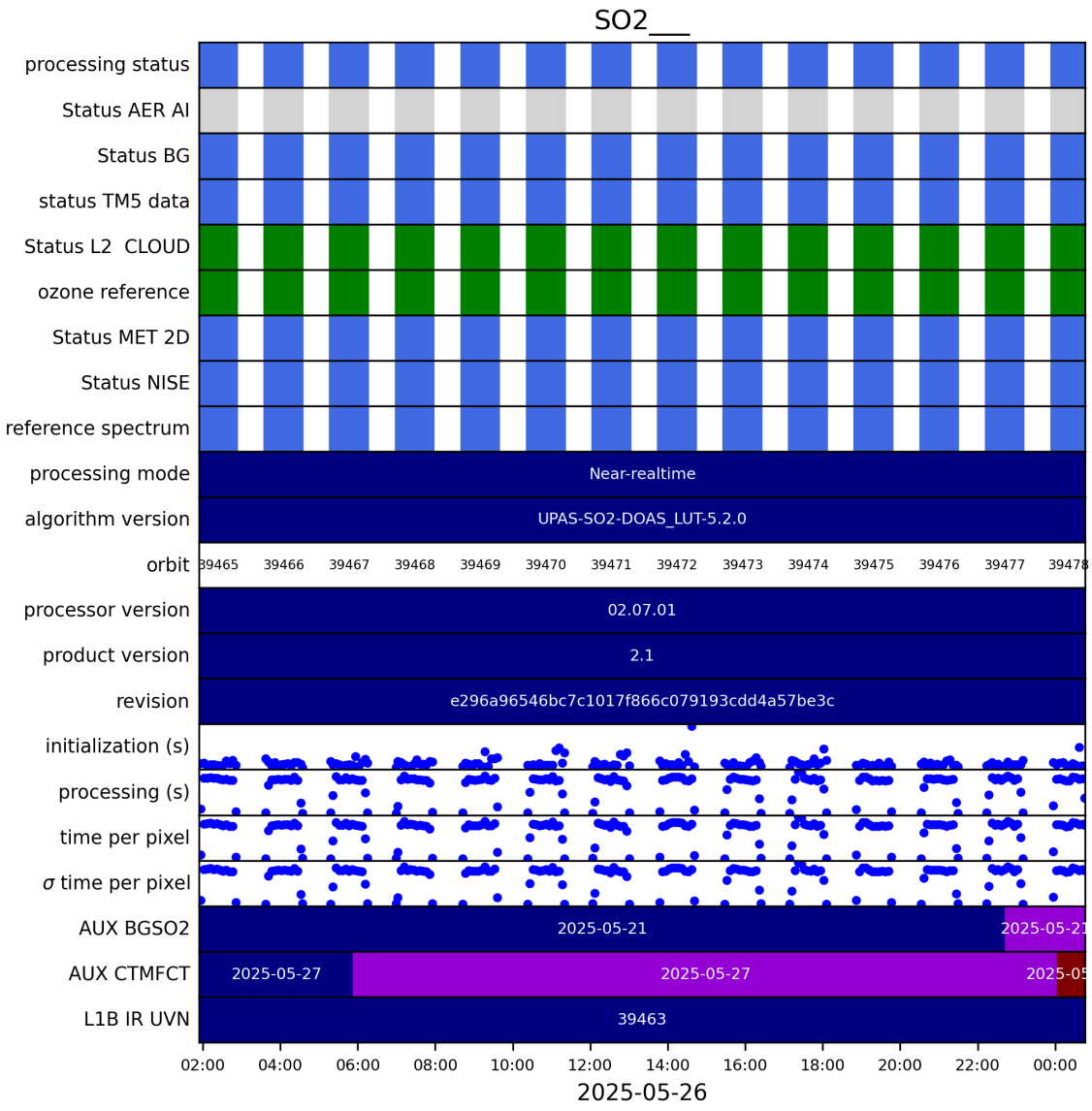


Figure 2: Input data per granule

5 Warnings and errors

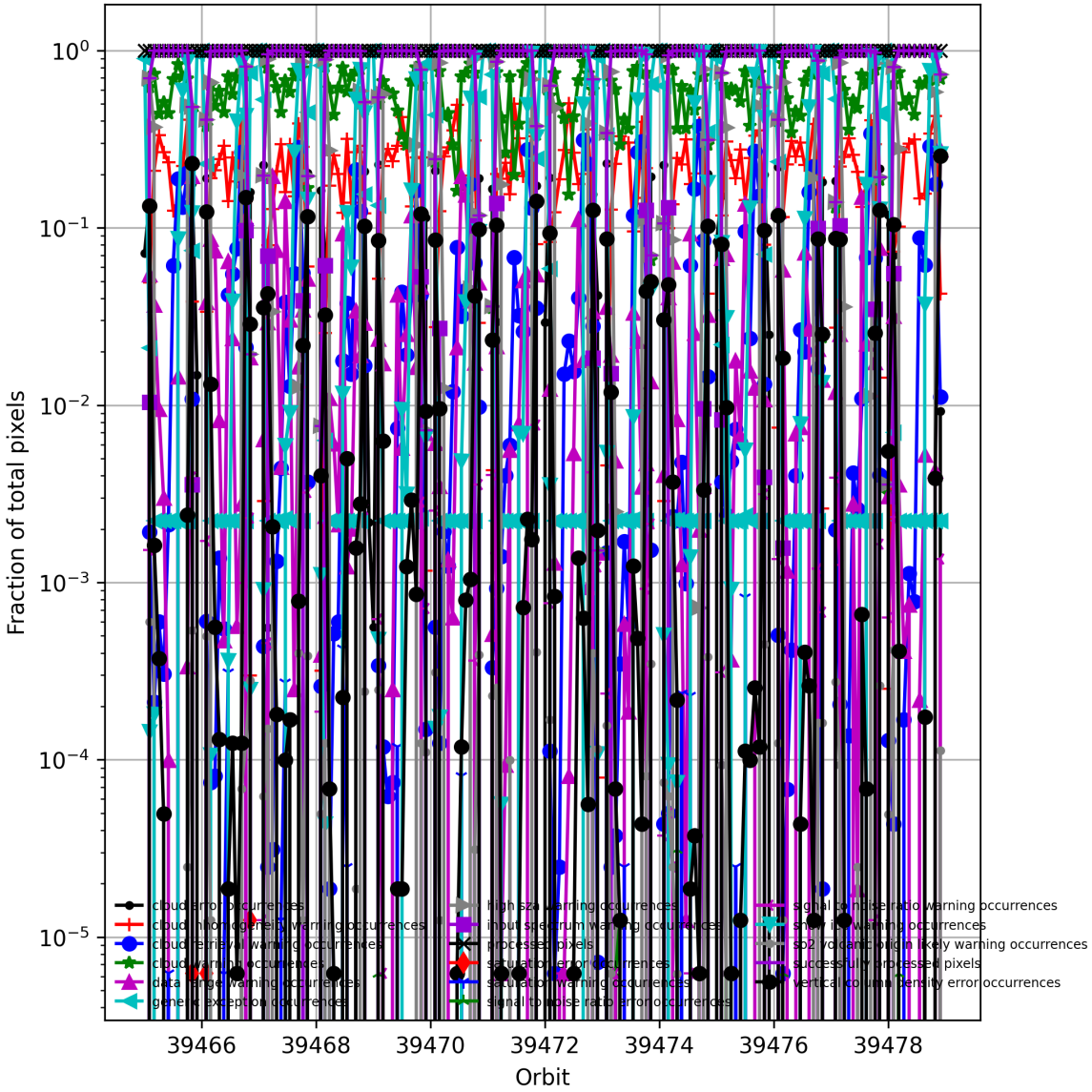


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

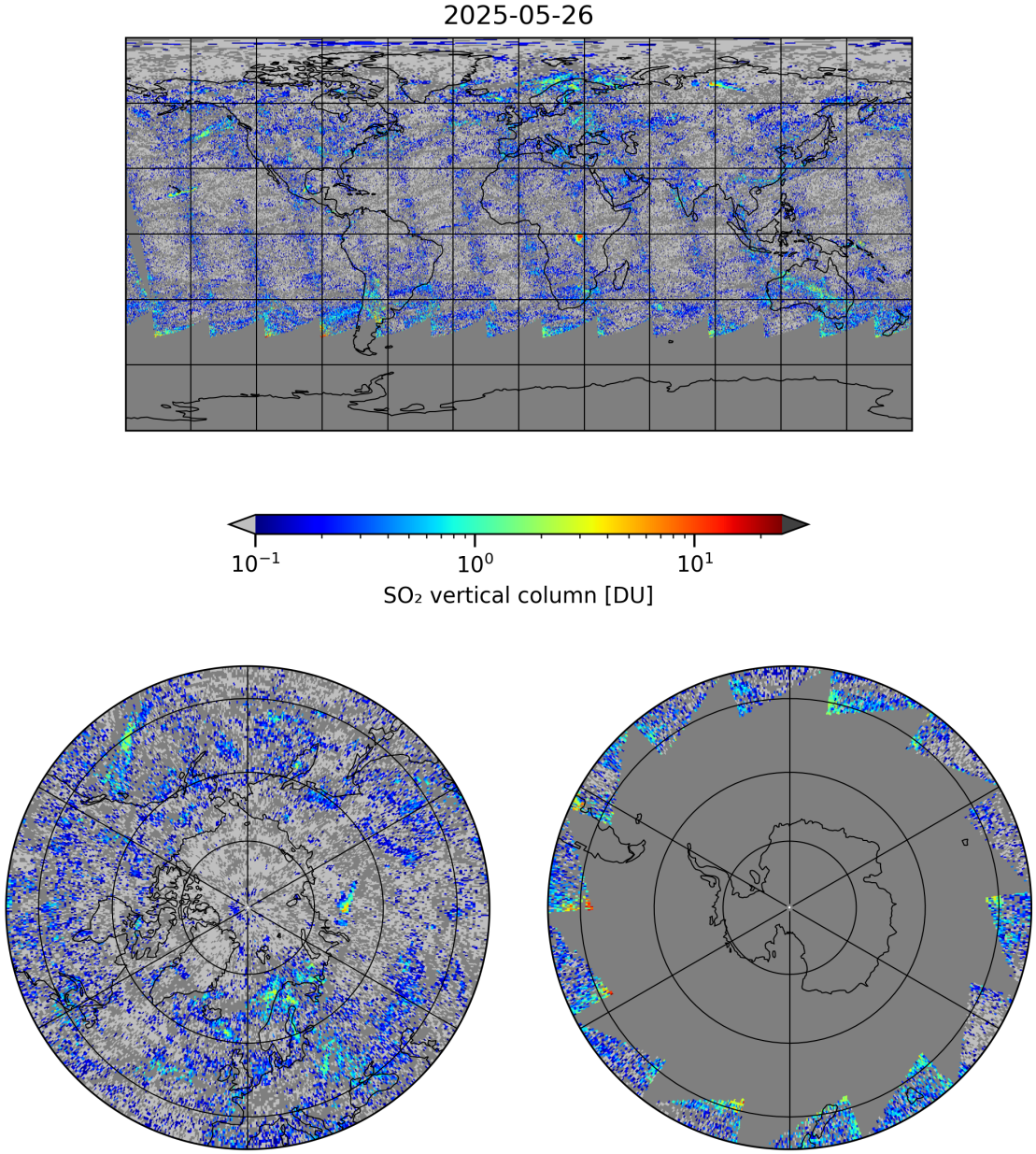


Figure 4: Map of "SO_2 vertical column" for 2025-05-26 to 2025-05-27

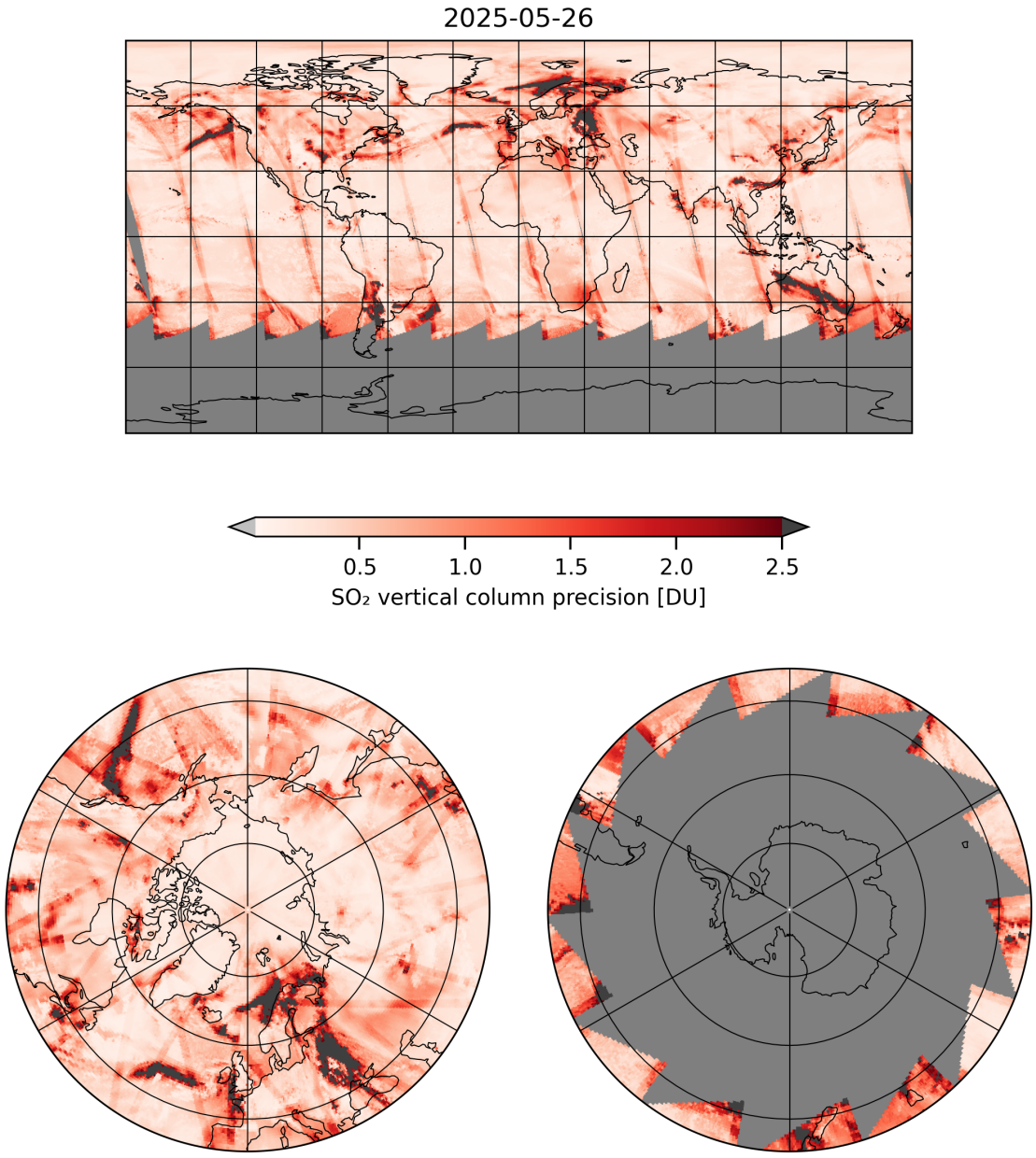


Figure 5: Map of "SO_2 vertical column precision" for 2025-05-26 to 2025-05-27

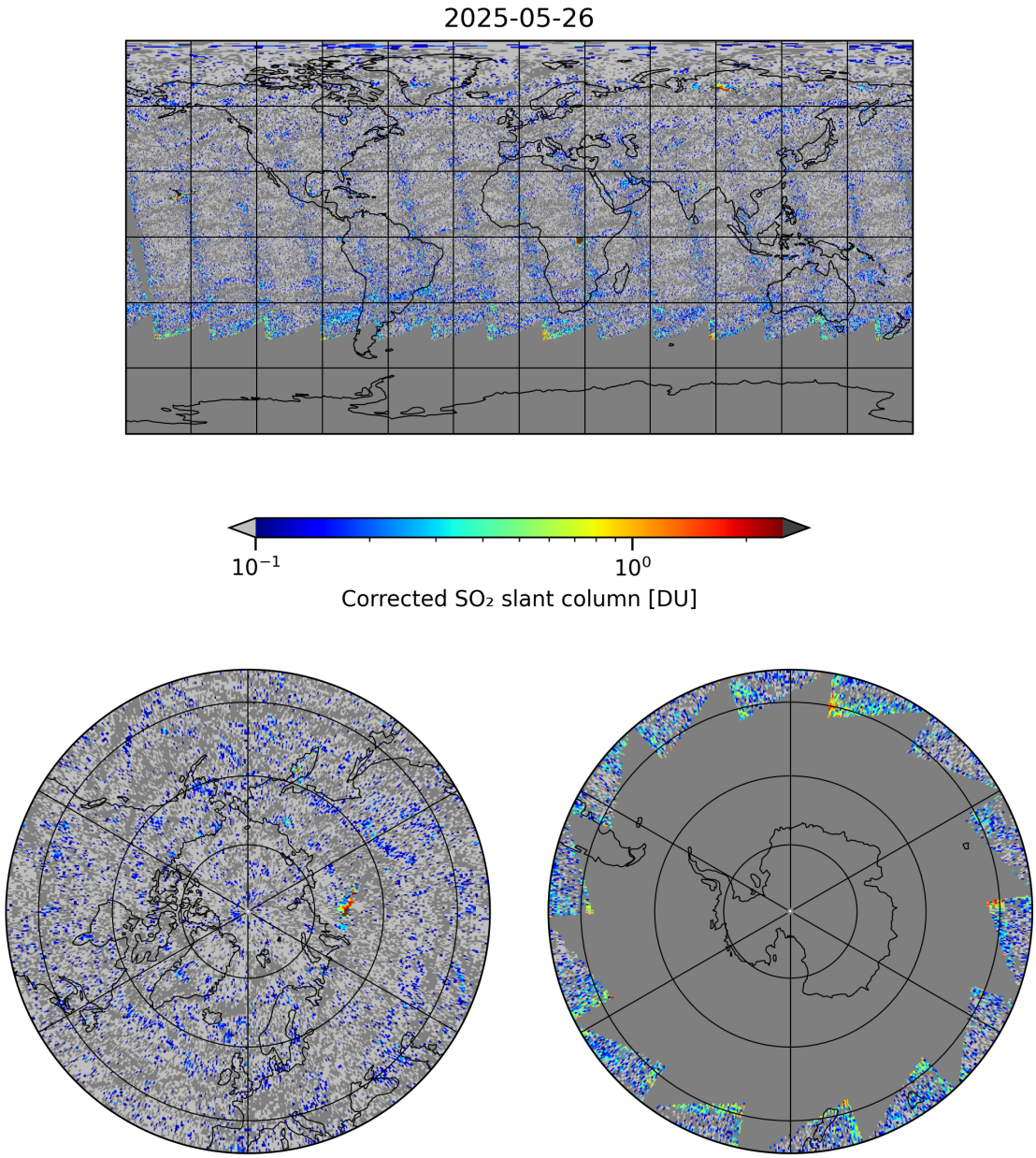


Figure 6: Map of "Corrected SO_2 slant column" for 2025-05-26 to 2025-05-27

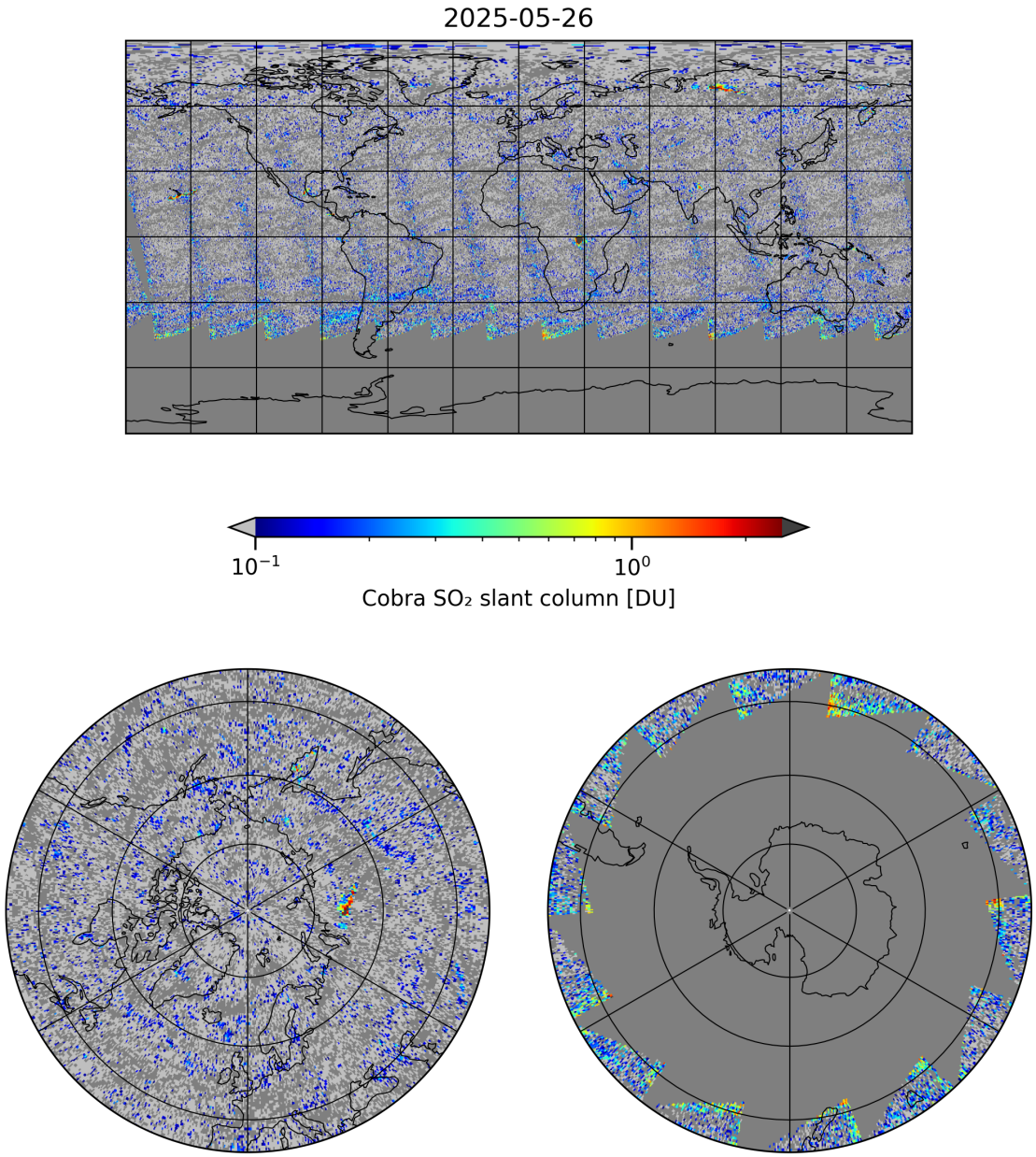


Figure 7: Map of "Cobra SO_2 slant column" for 2025-05-26 to 2025-05-27

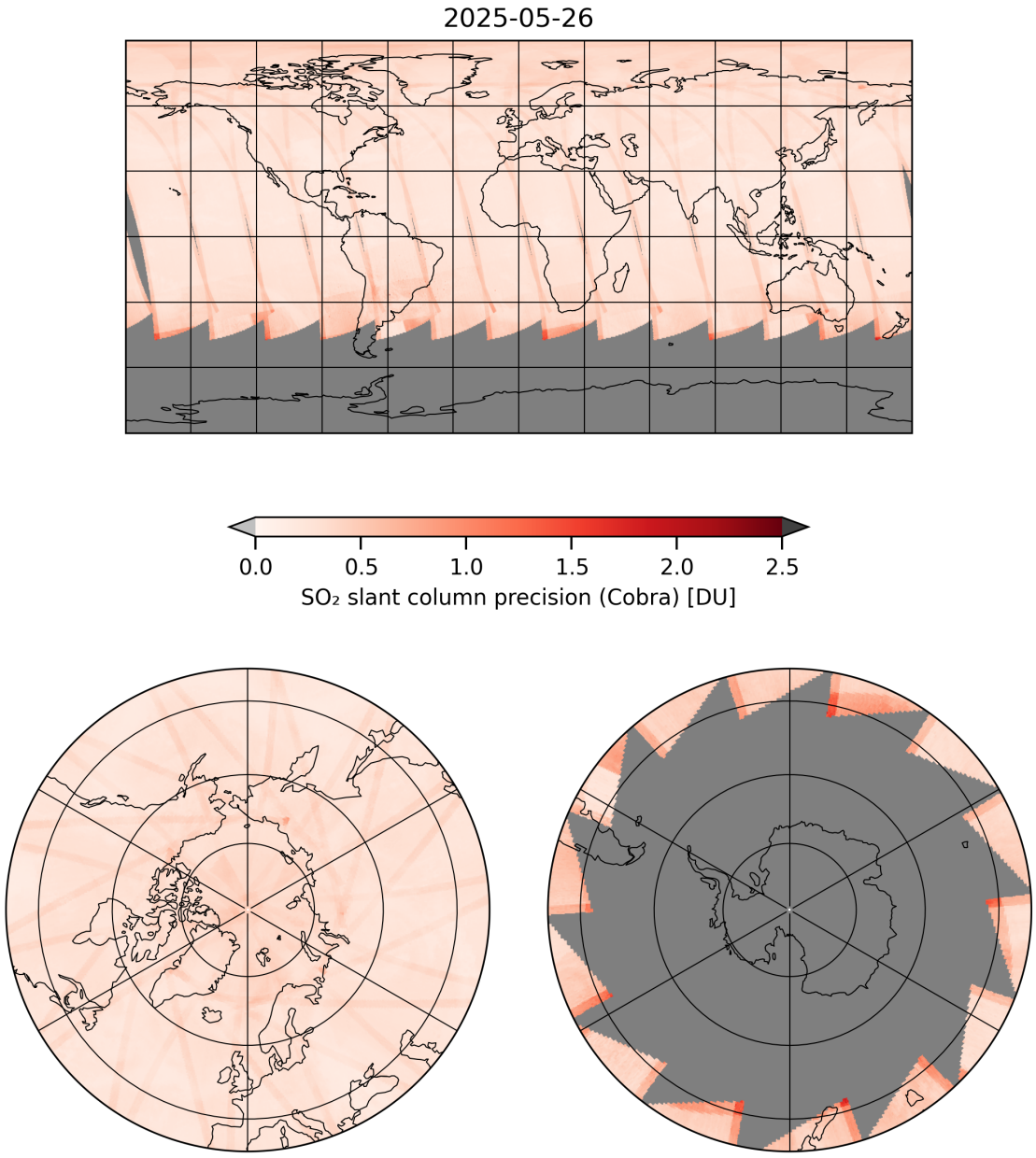


Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-05-26 to 2025-05-27

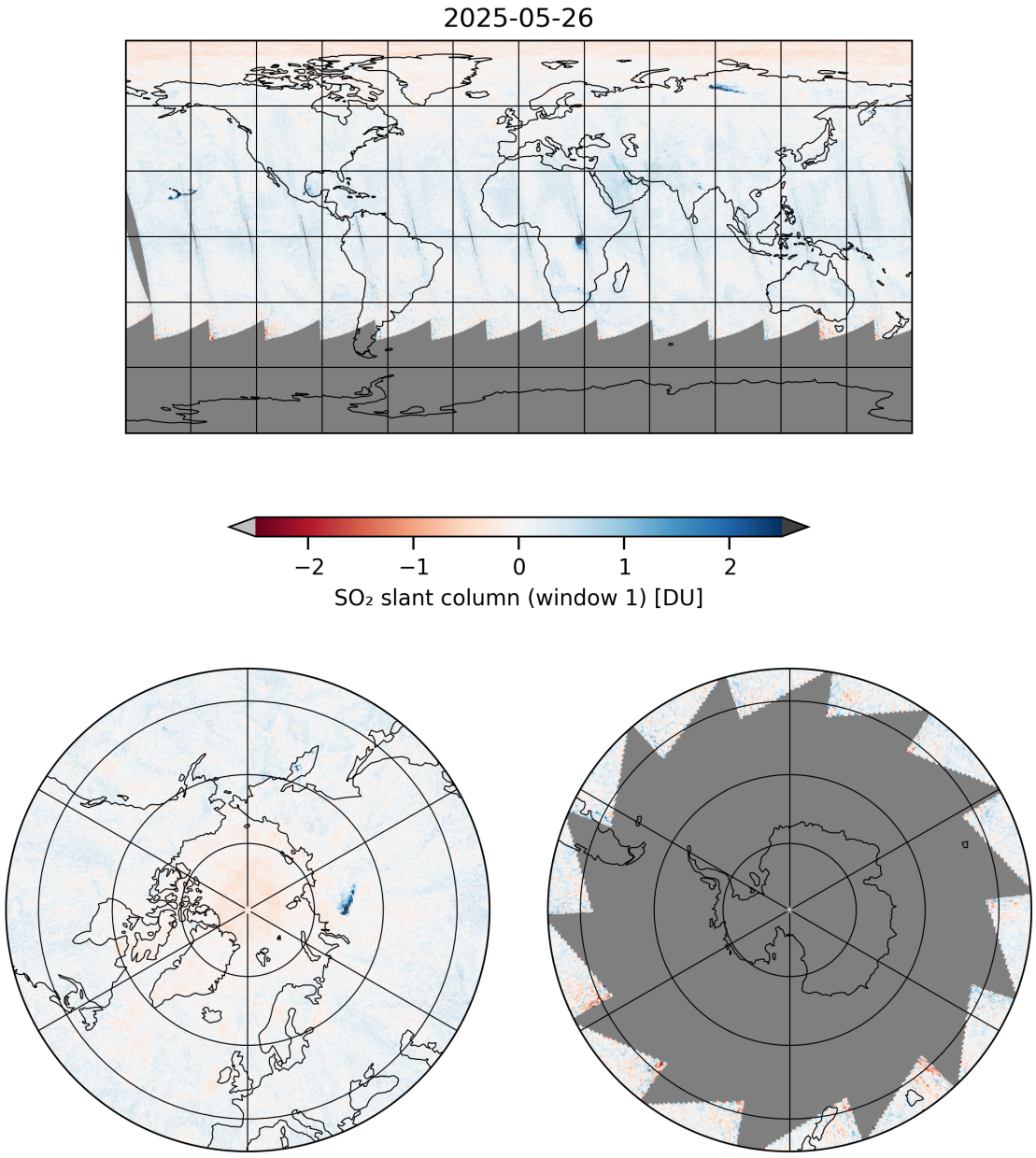


Figure 9: Map of "SO_2 slant column (window 1)" for 2025-05-26 to 2025-05-27

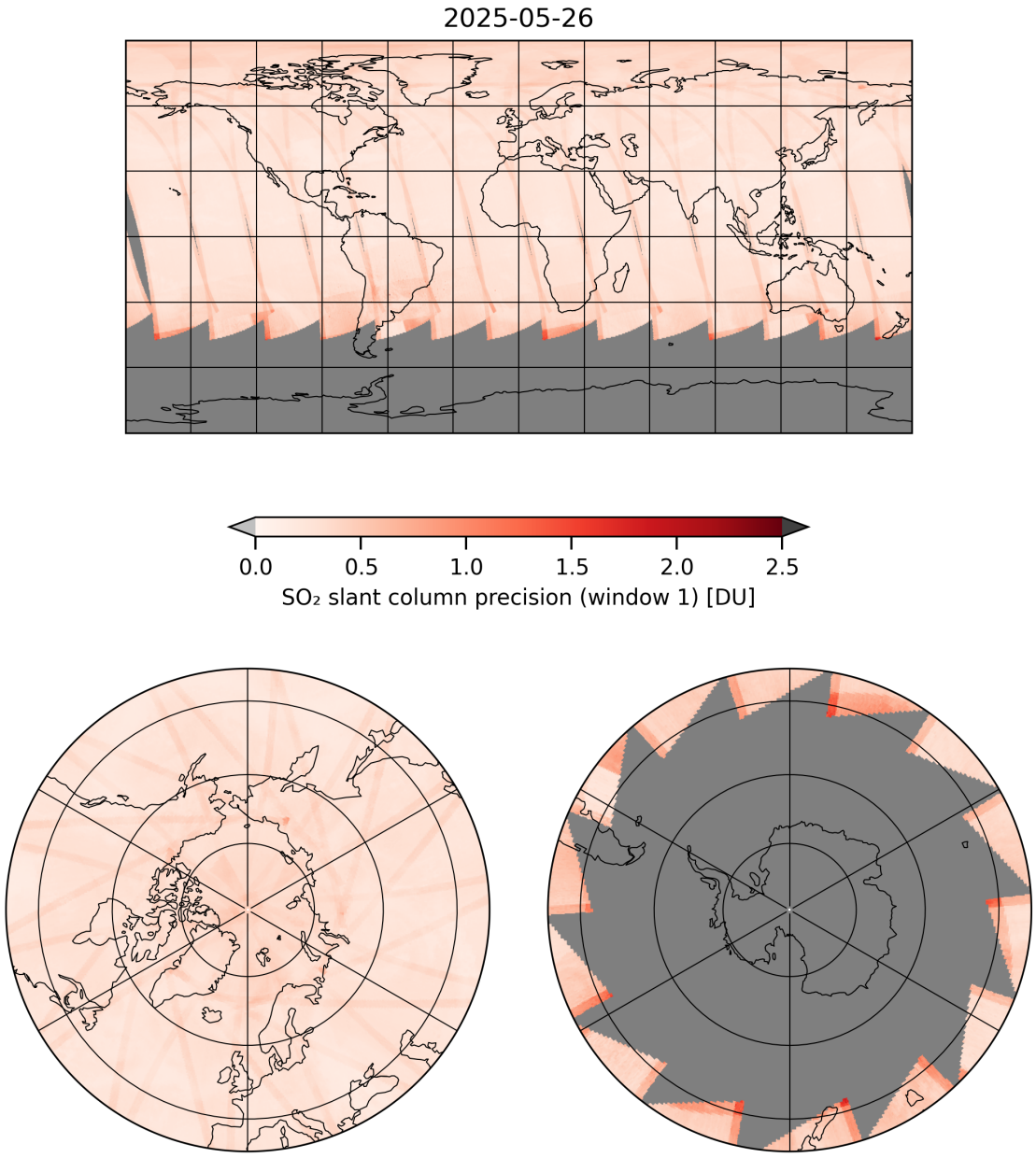


Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-05-26 to 2025-05-27

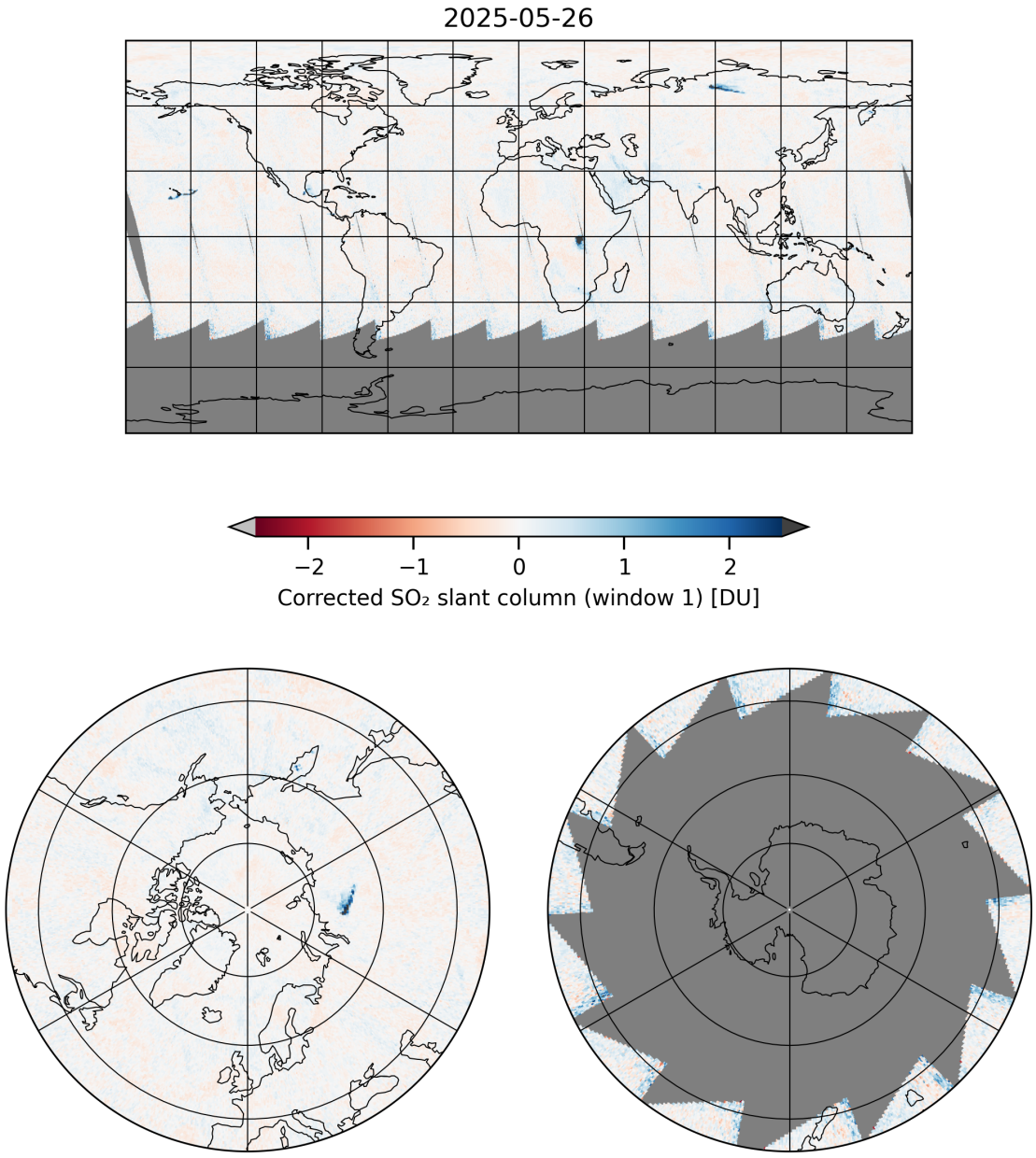


Figure 11: Map of "Corrected SO_2 slant column (window 1)" for 2025-05-26 to 2025-05-27

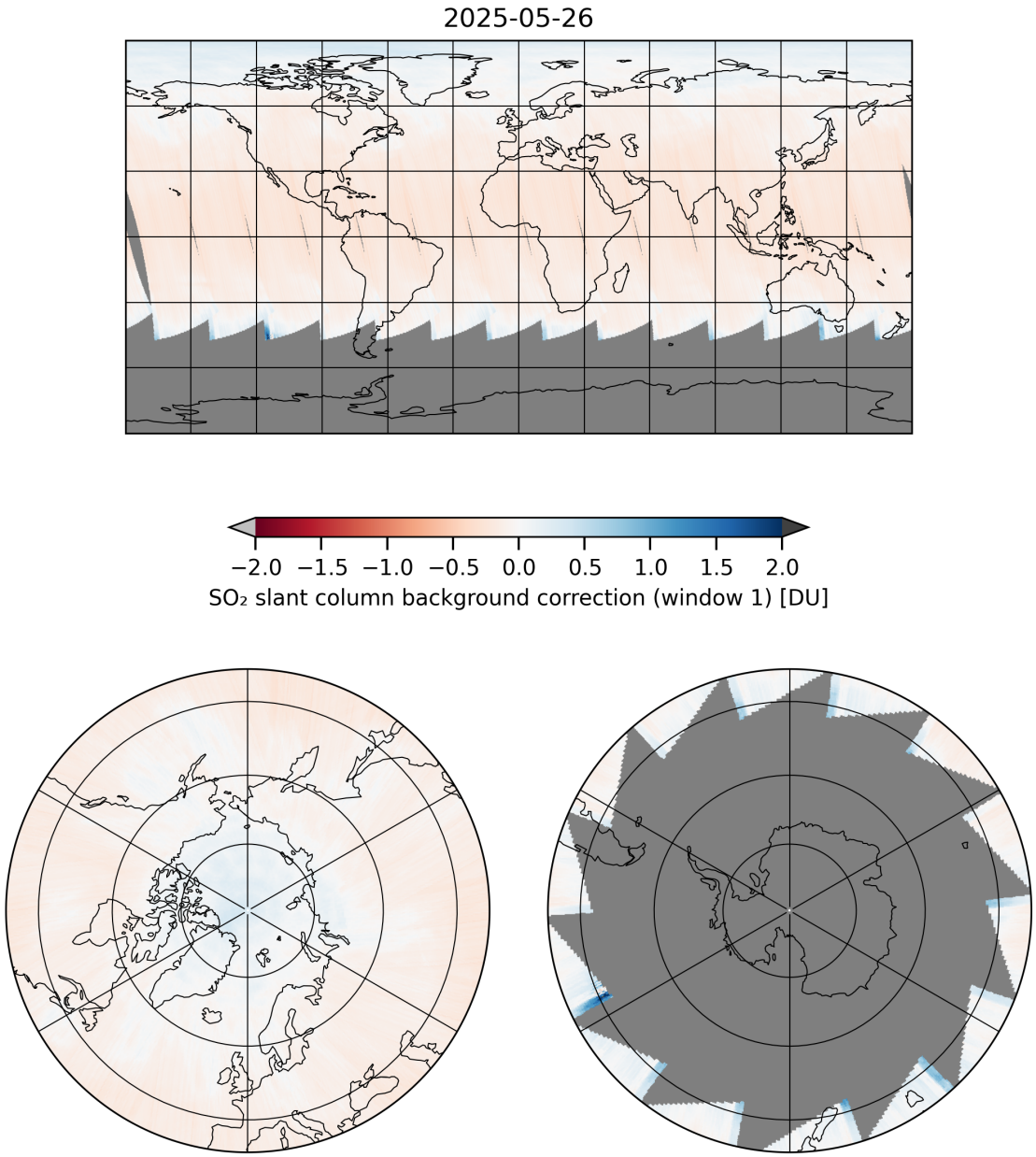


Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-05-26 to 2025-05-27

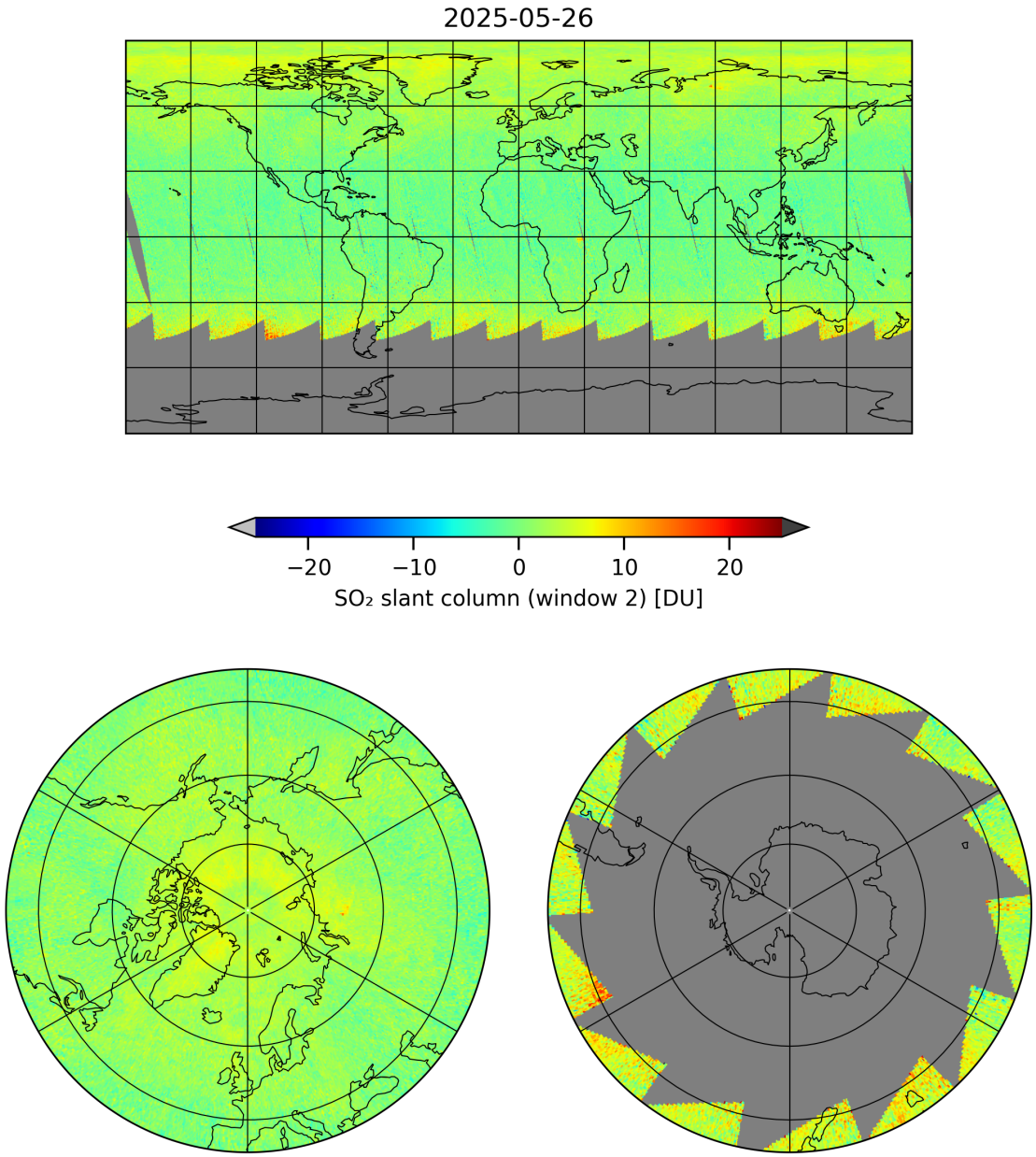


Figure 13: Map of "SO_2 slant column (window 2)" for 2025-05-26 to 2025-05-27

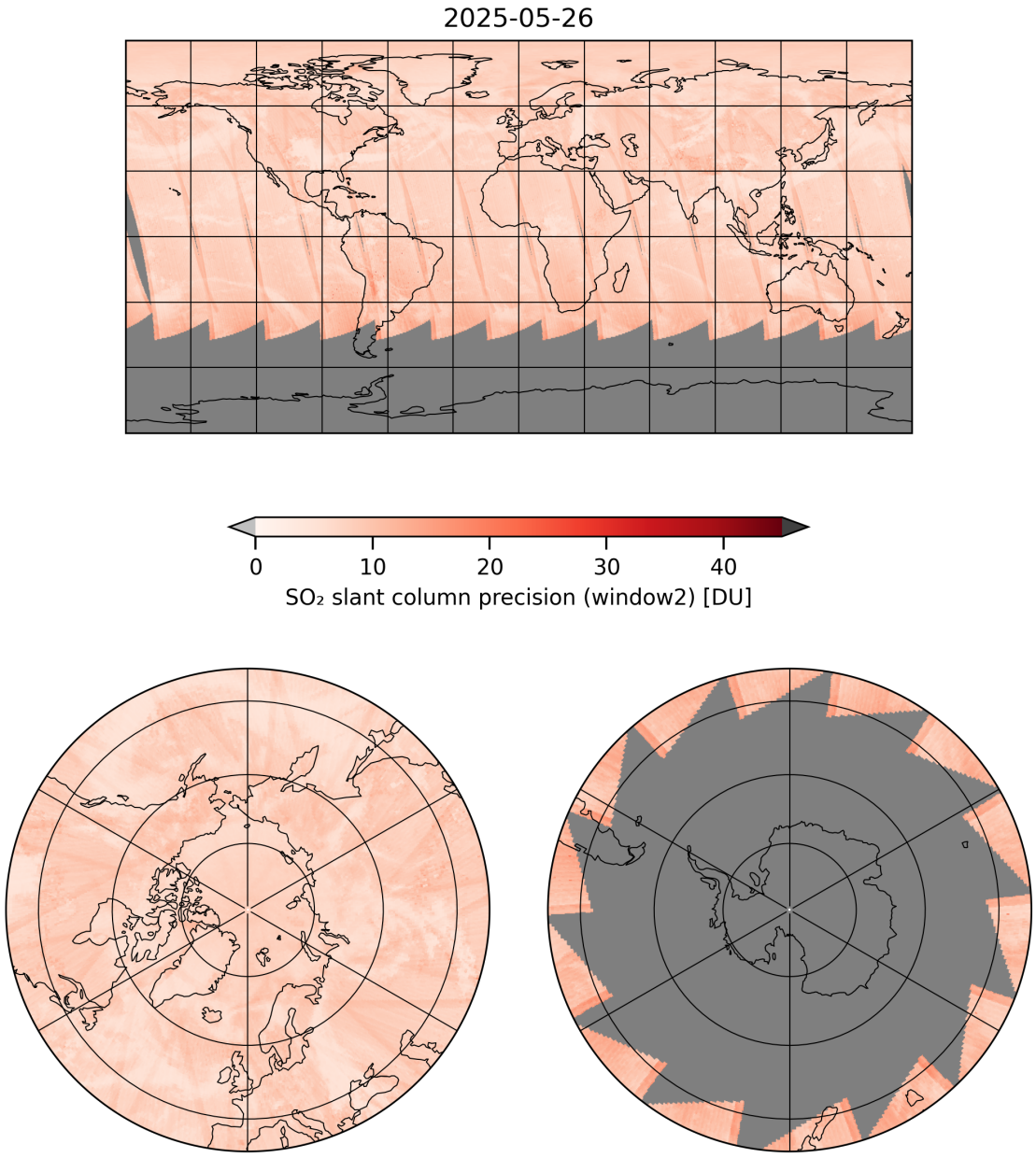


Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-05-26 to 2025-05-27

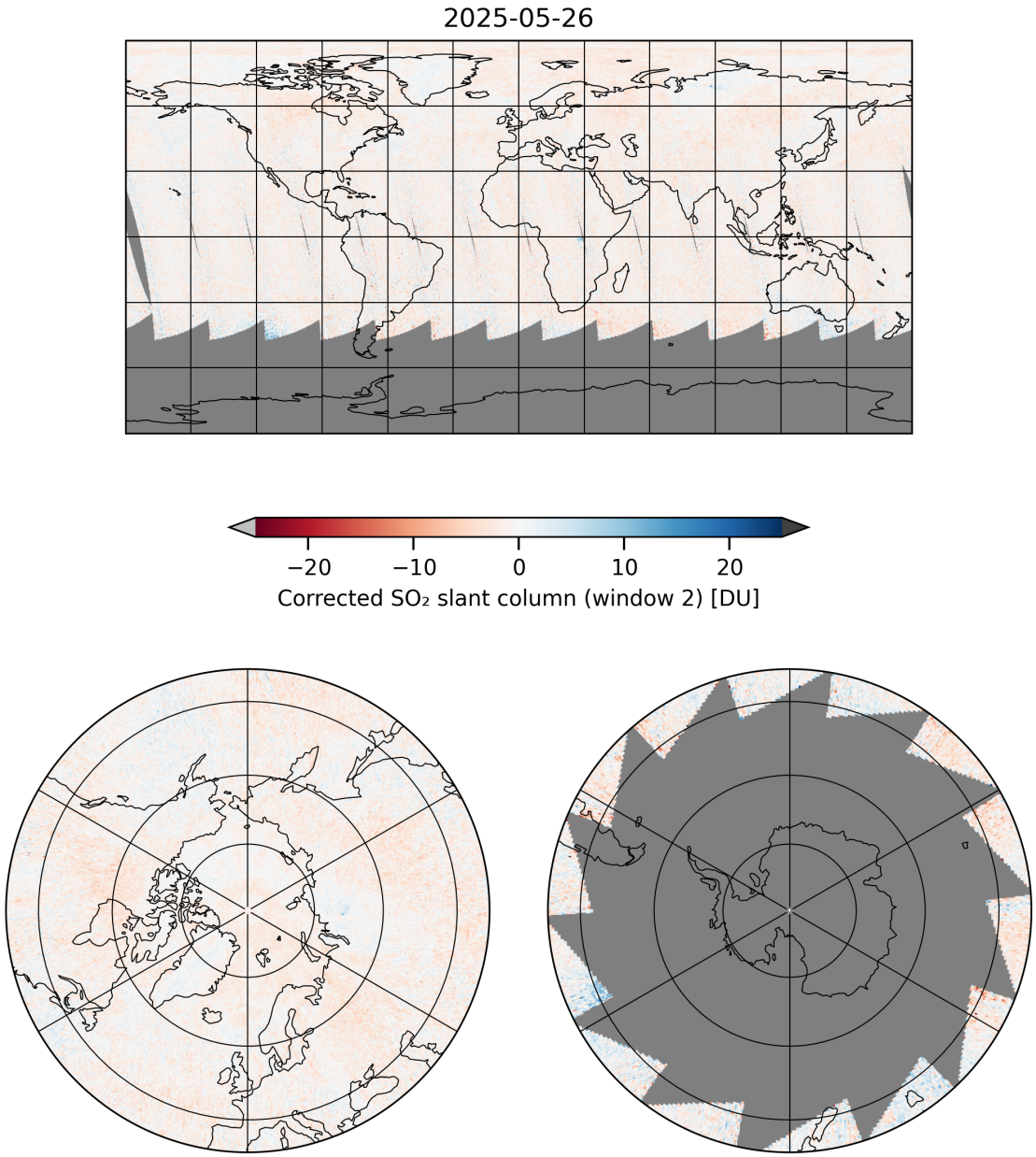


Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-05-26 to 2025-05-27

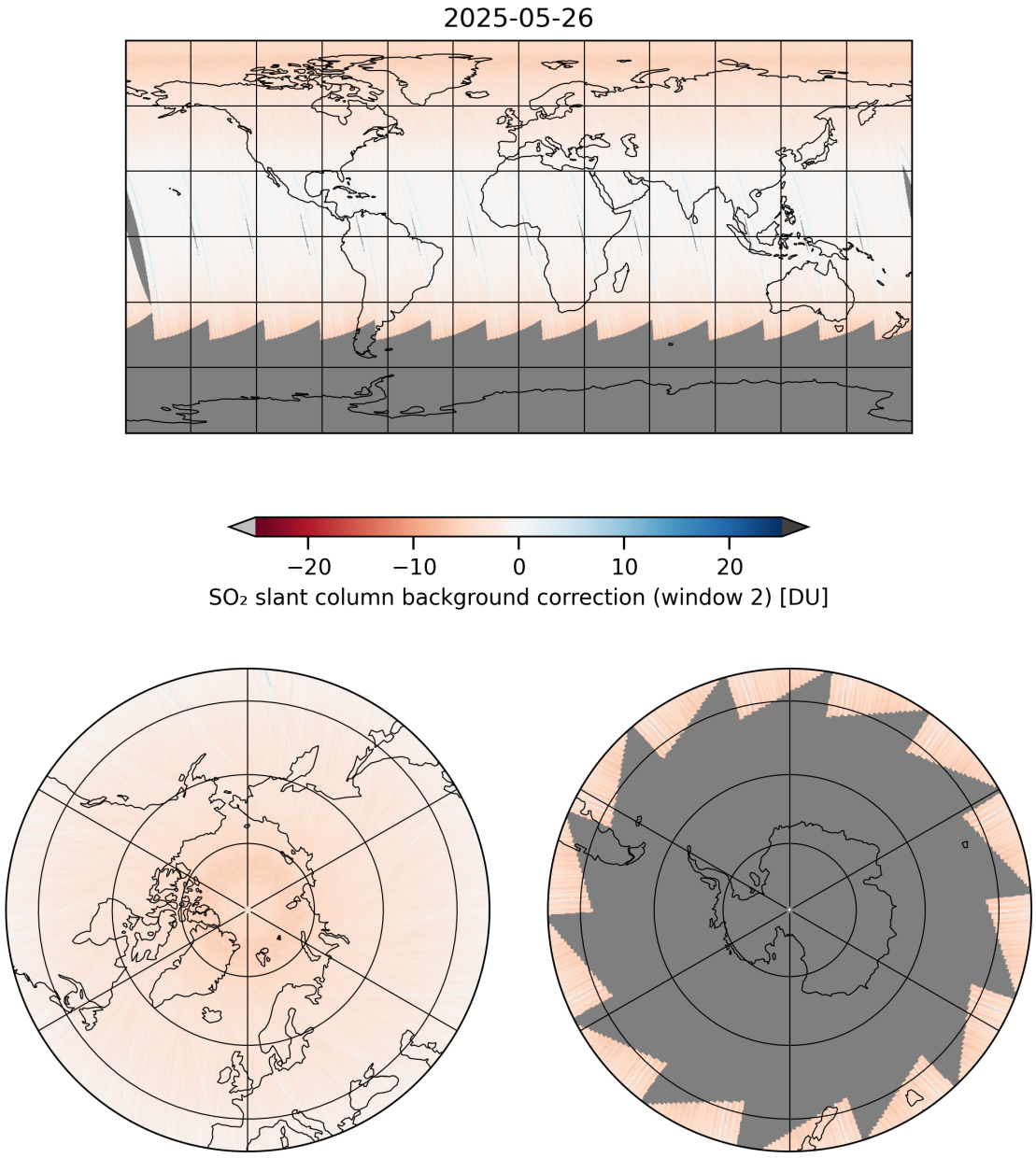


Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-05-26 to 2025-05-27

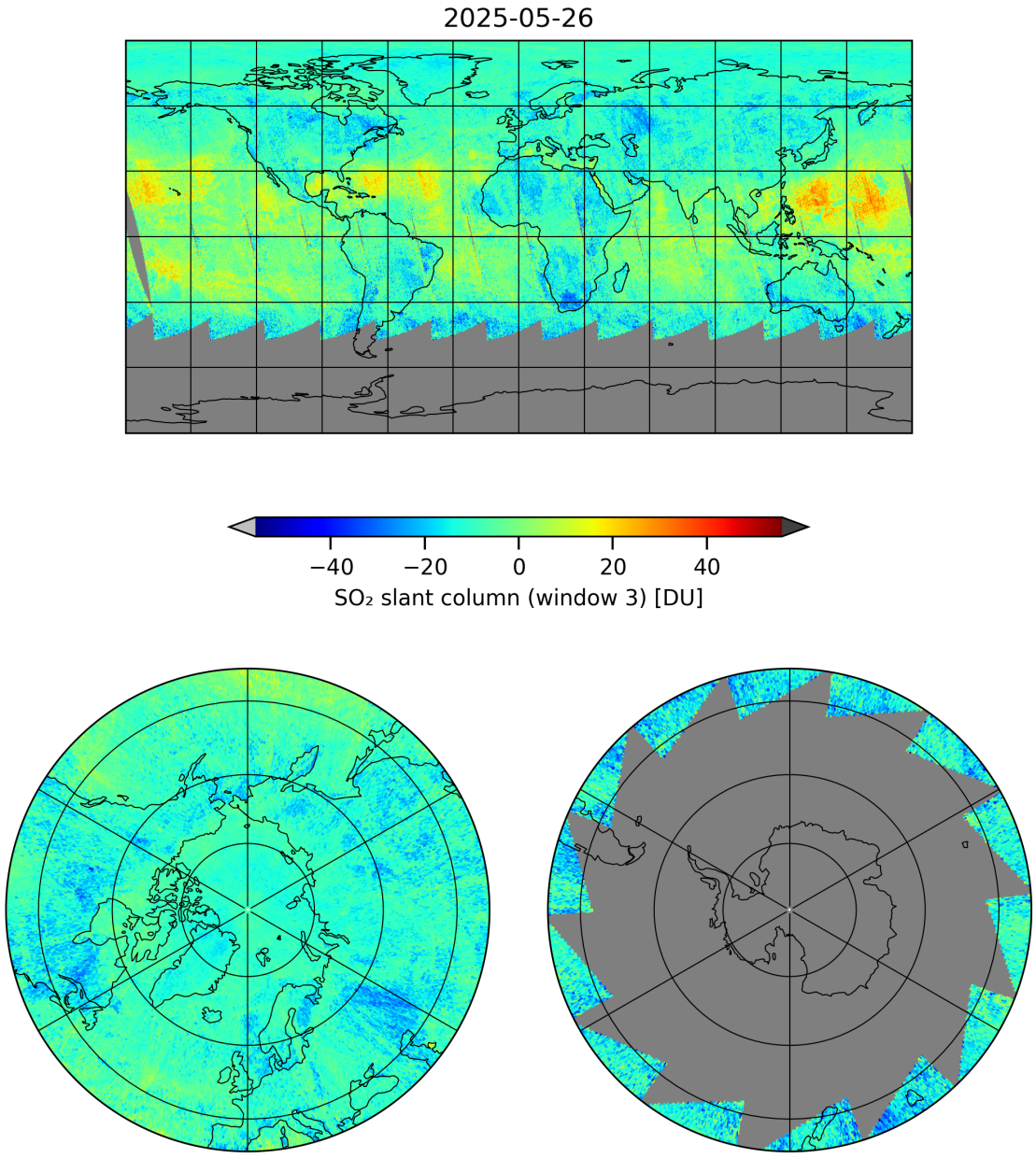


Figure 17: Map of "SO_2 slant column (window 3)" for 2025-05-26 to 2025-05-27

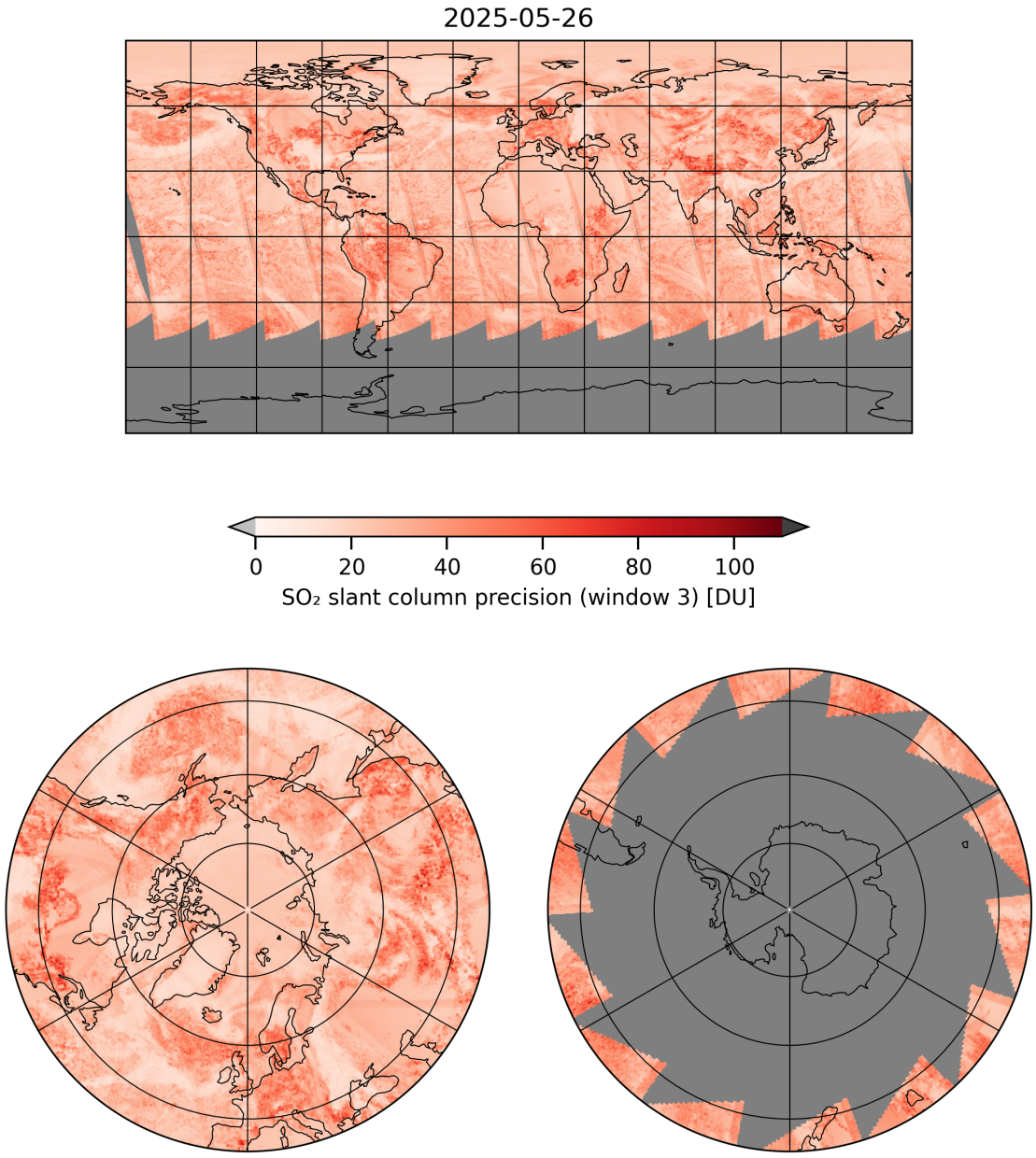


Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-05-26 to 2025-05-27

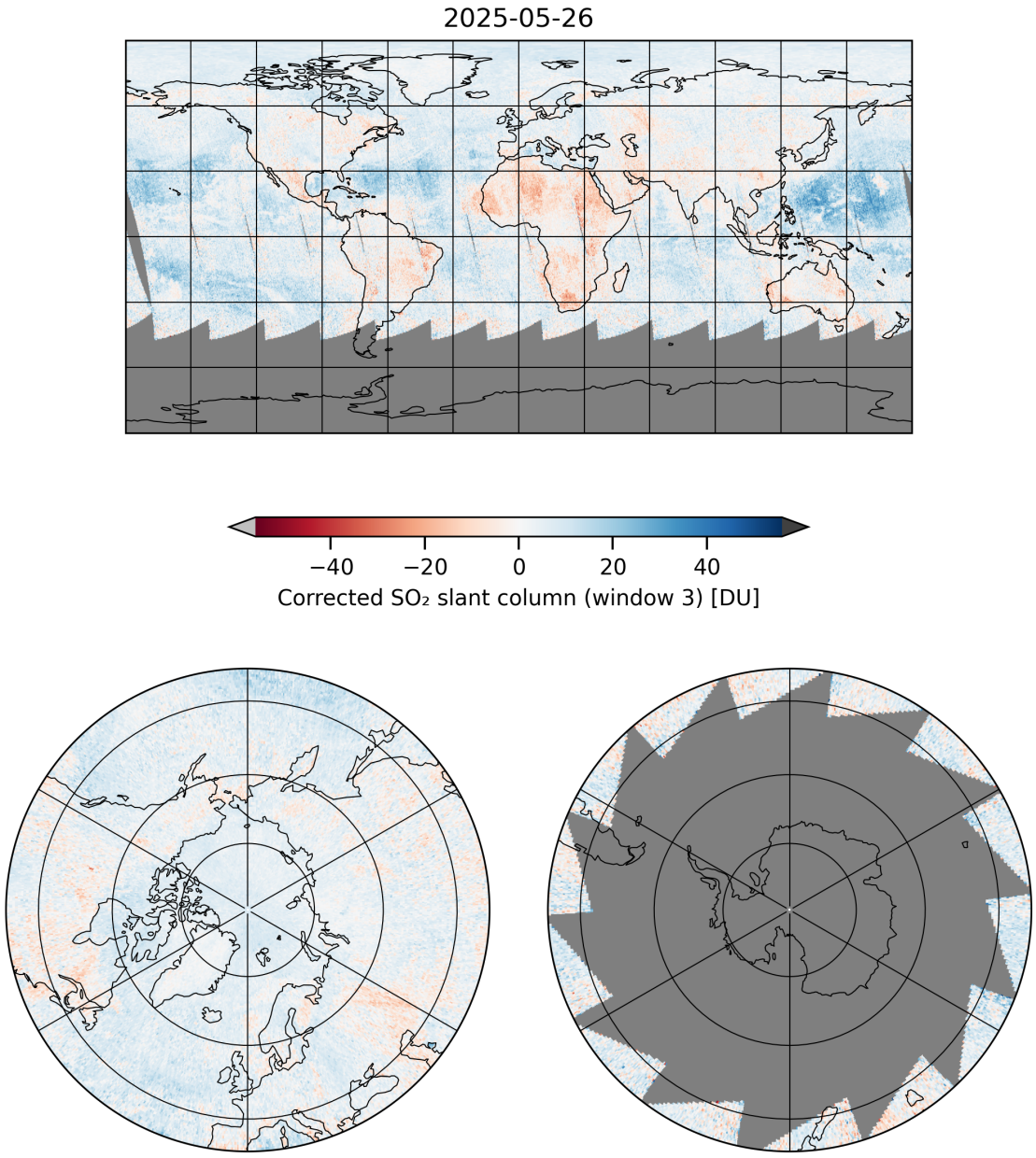


Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-05-26 to 2025-05-27

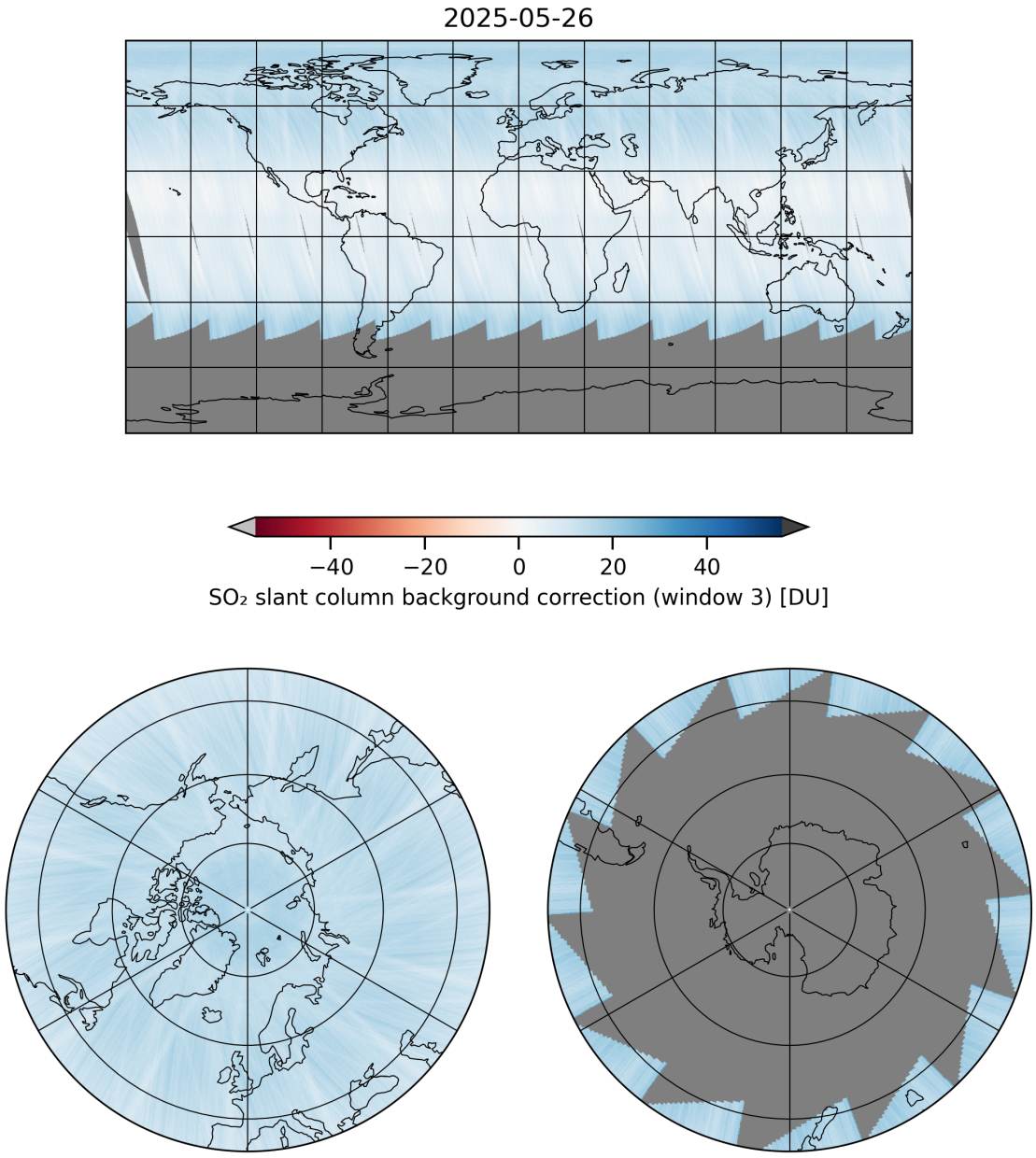


Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-05-26 to 2025-05-27

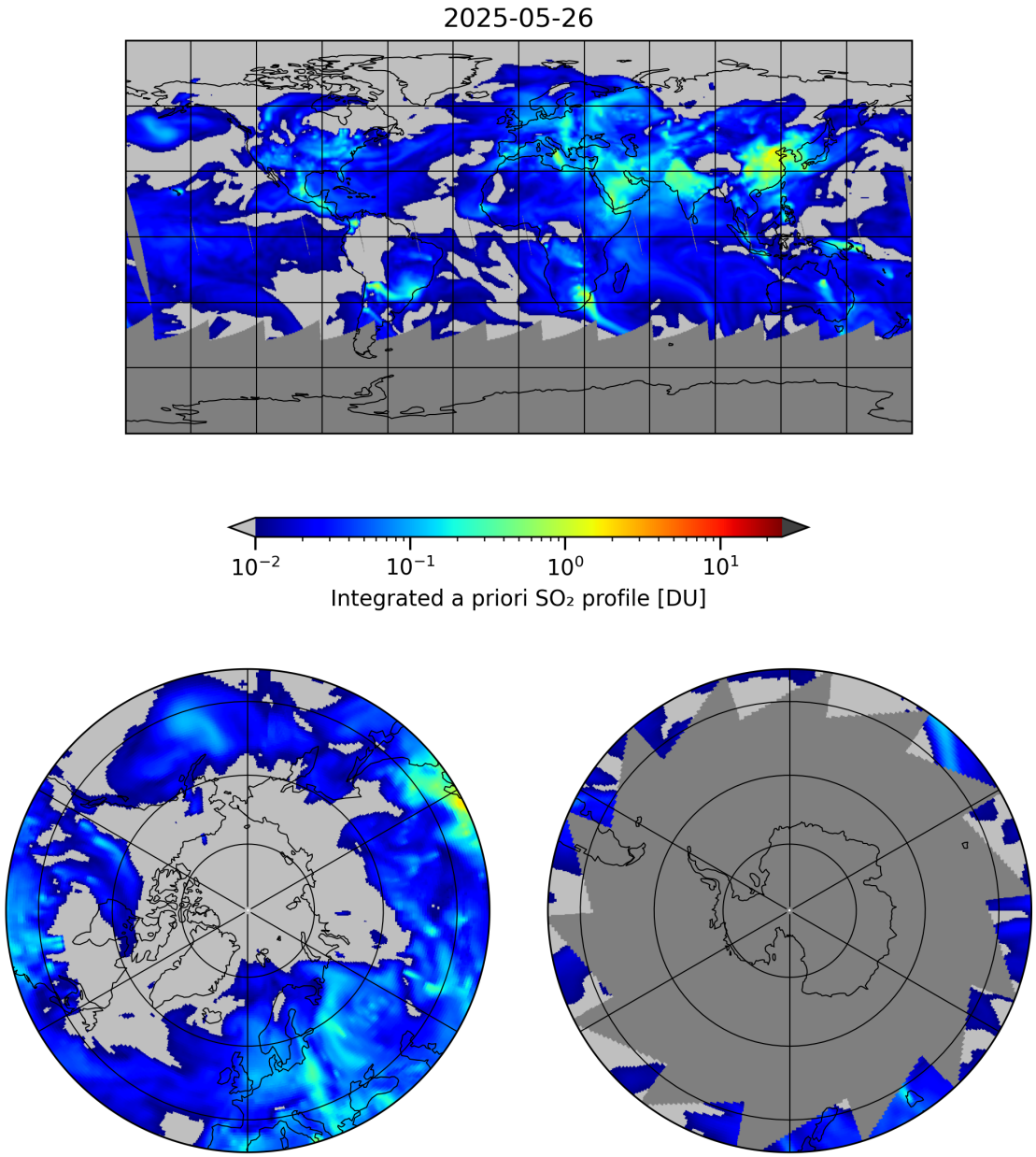


Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-05-26 to 2025-05-27

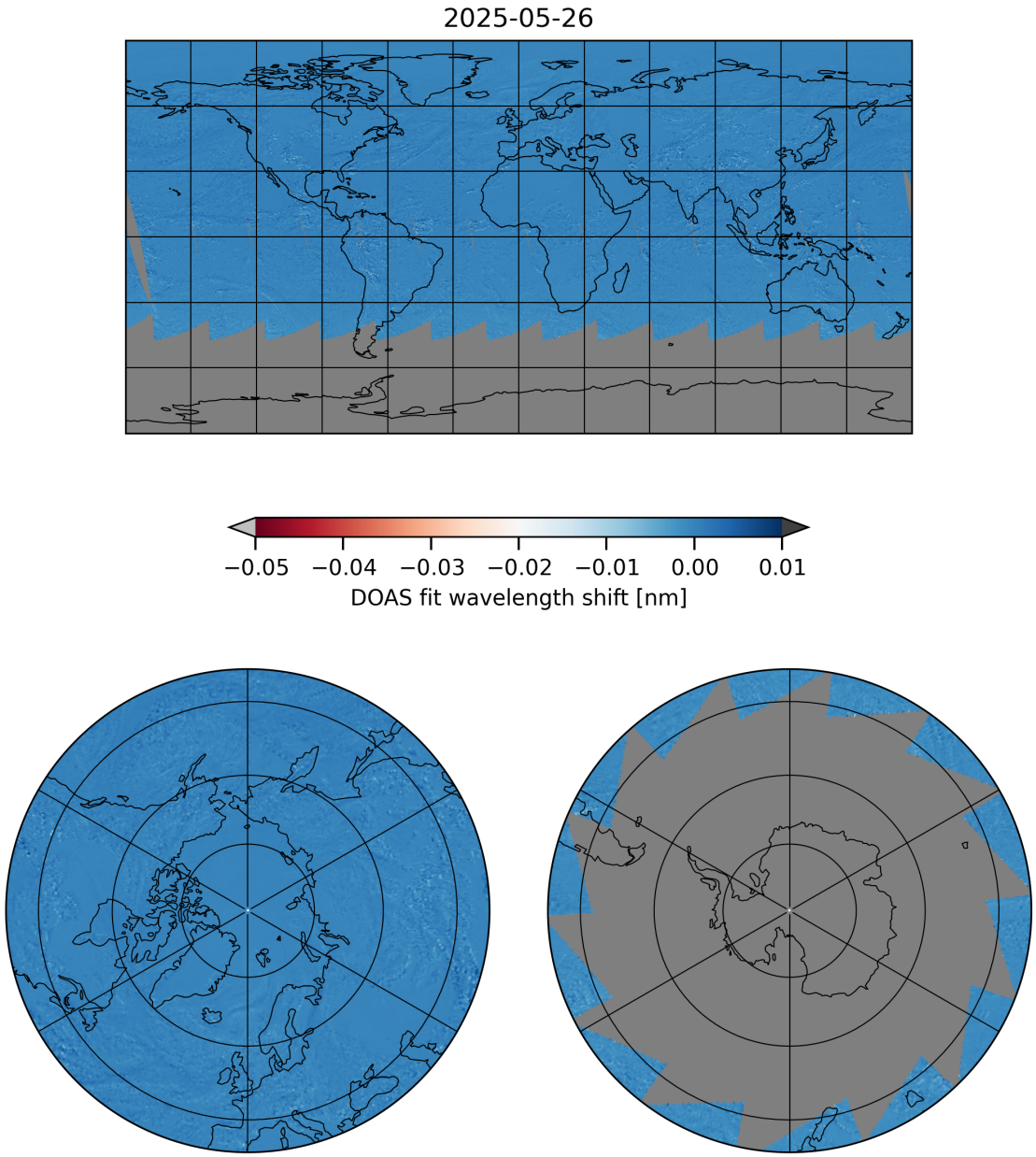


Figure 22: Map of “DOAS fit wavelength shift” for 2025-05-26 to 2025-05-27

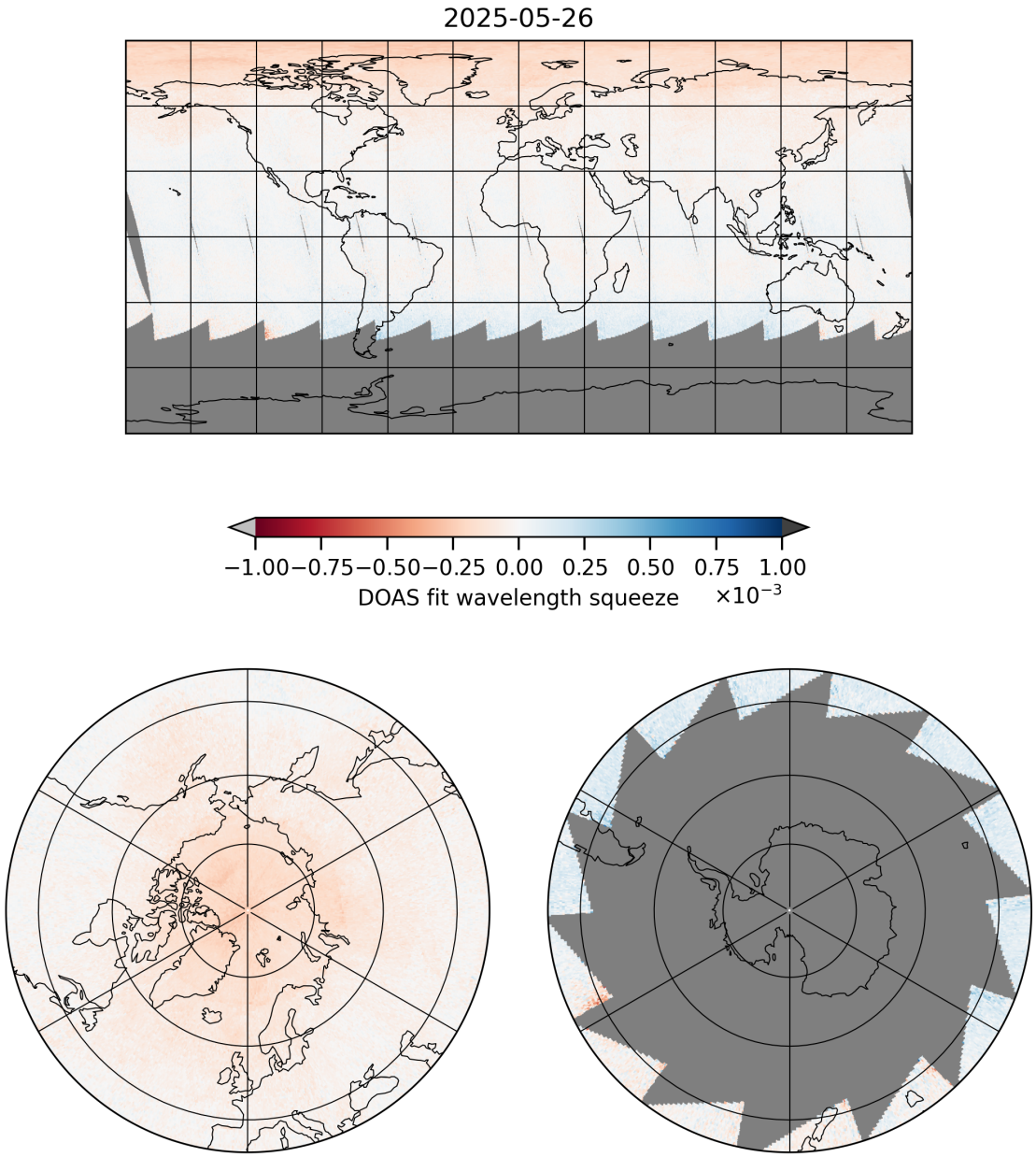


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-05-26 to 2025-05-27

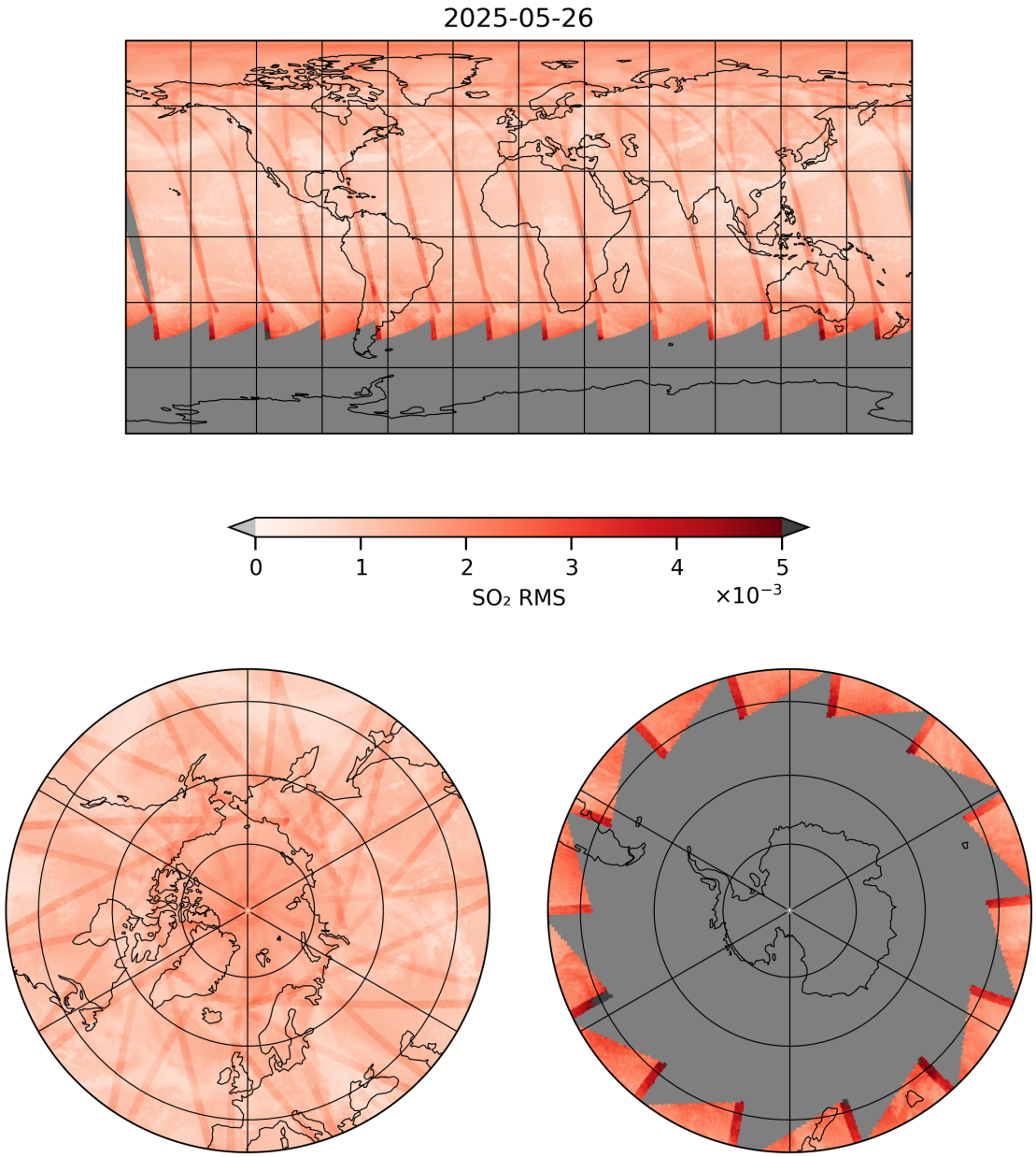


Figure 24: Map of "SO_2 RMS" for 2025-05-26 to 2025-05-27

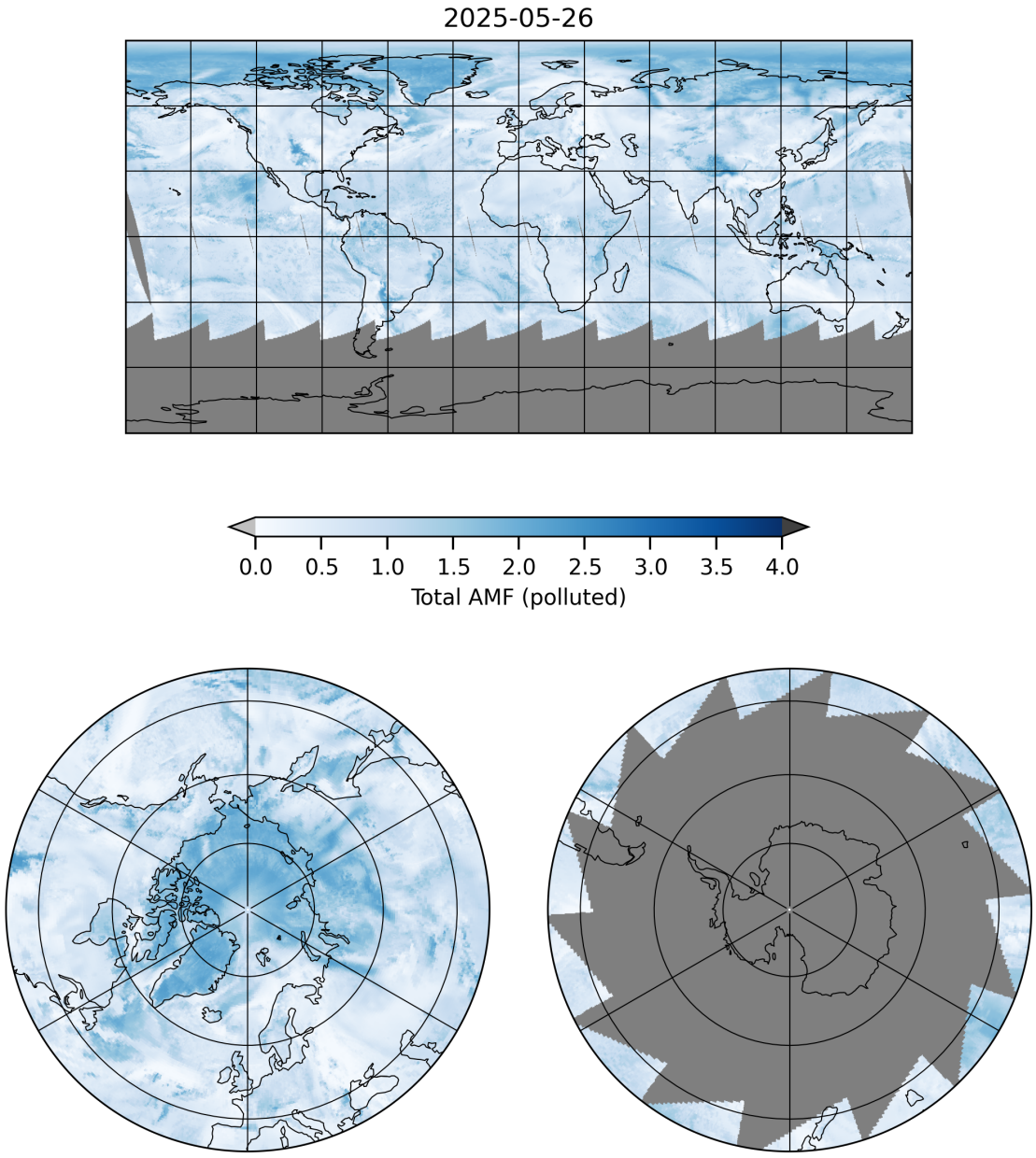


Figure 25: Map of “Total AMF (polluted)” for 2025-05-26 to 2025-05-27

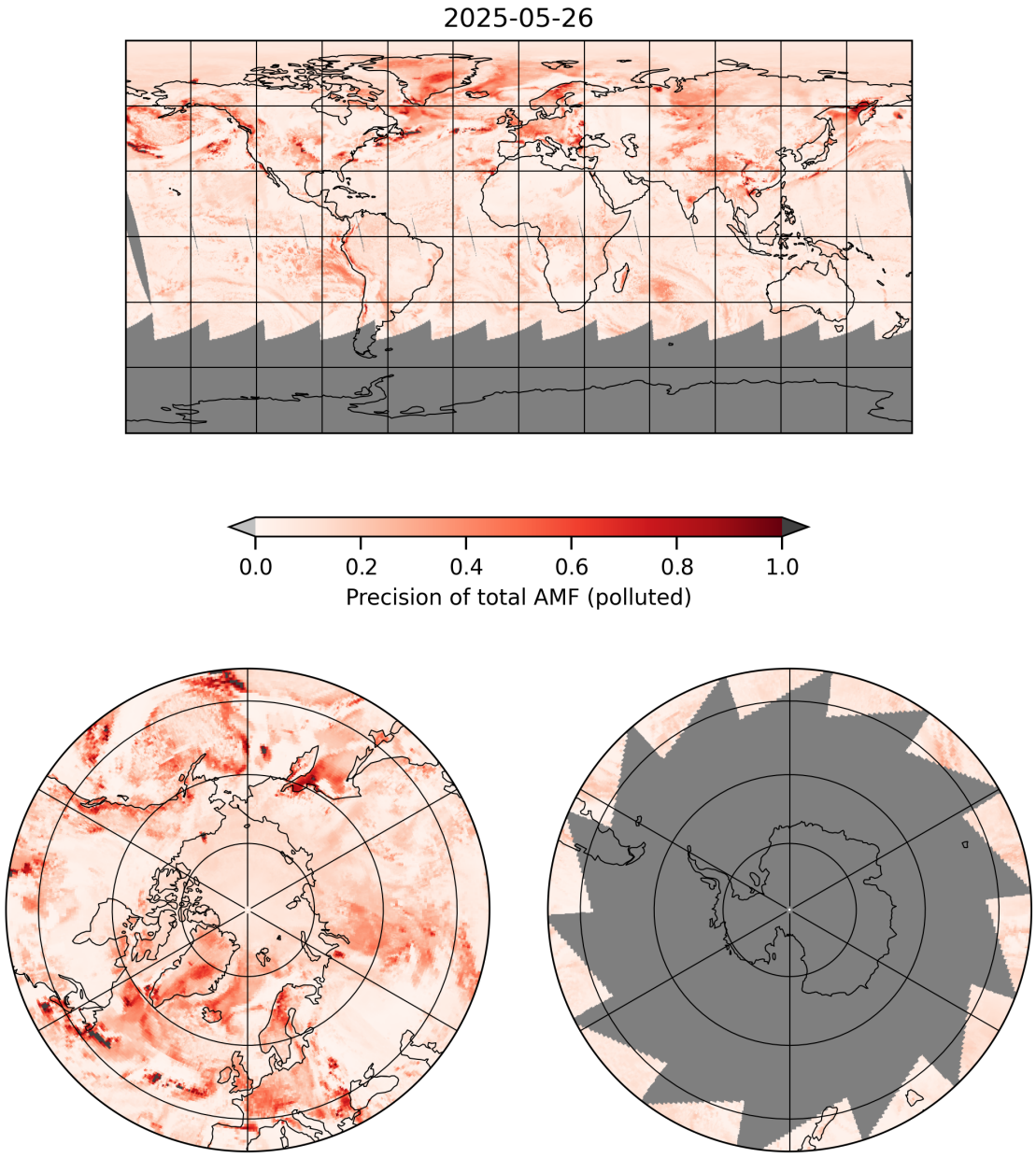


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-05-26 to 2025-05-27

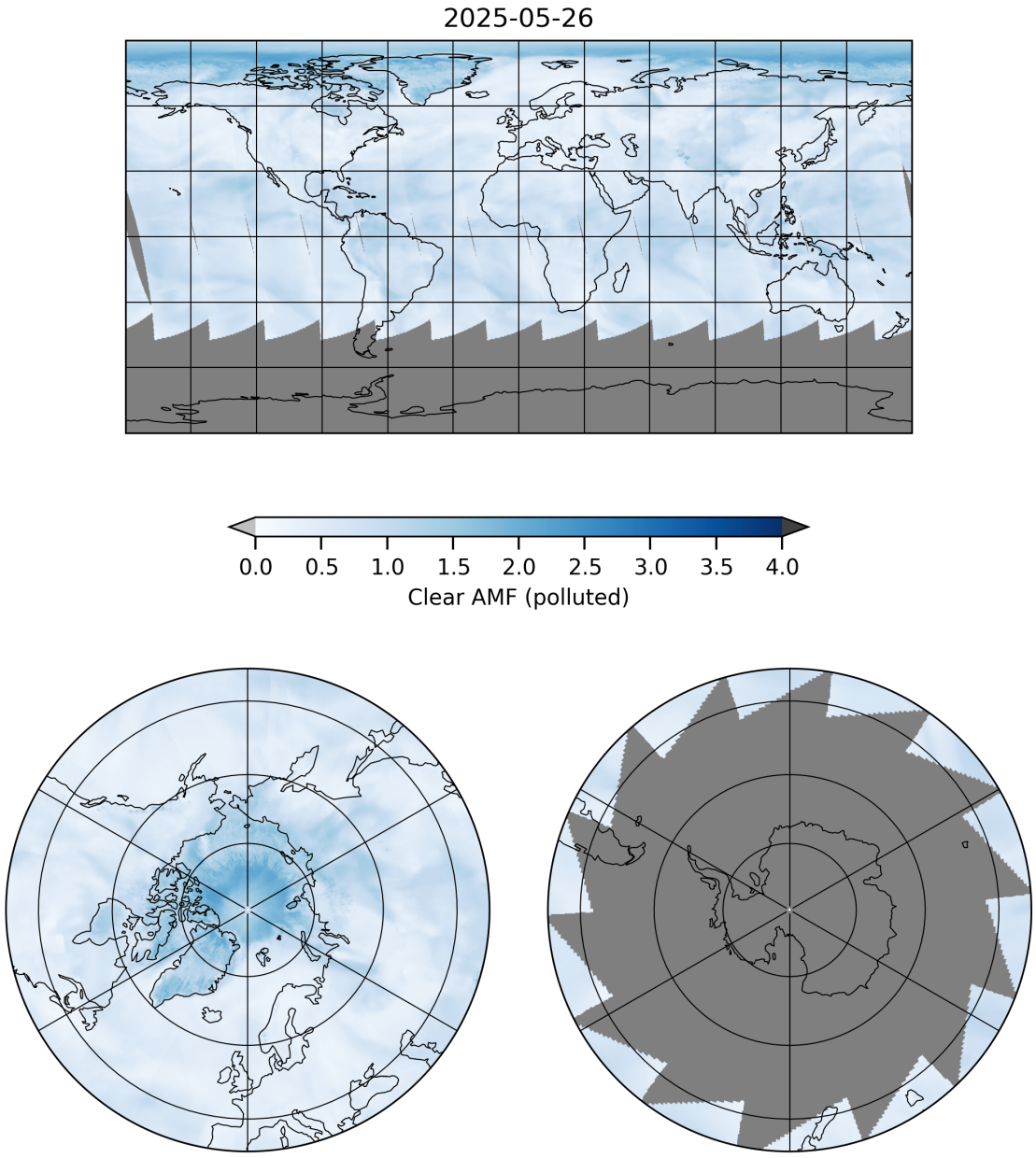


Figure 27: Map of “Clear AMF (polluted)” for 2025-05-26 to 2025-05-27

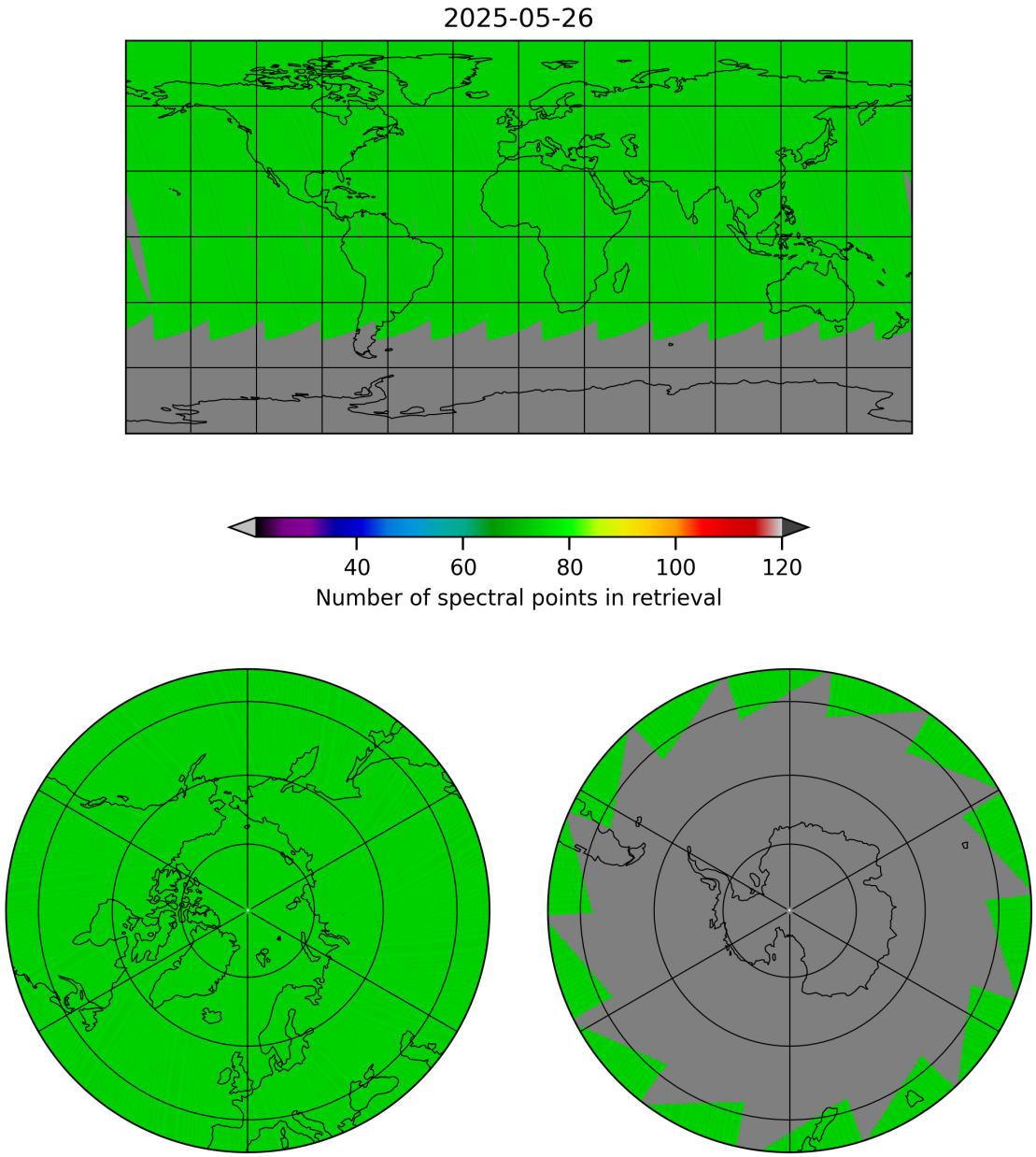


Figure 28: Map of “Number of spectral points in retrieval” for 2025-05-26 to 2025-05-27

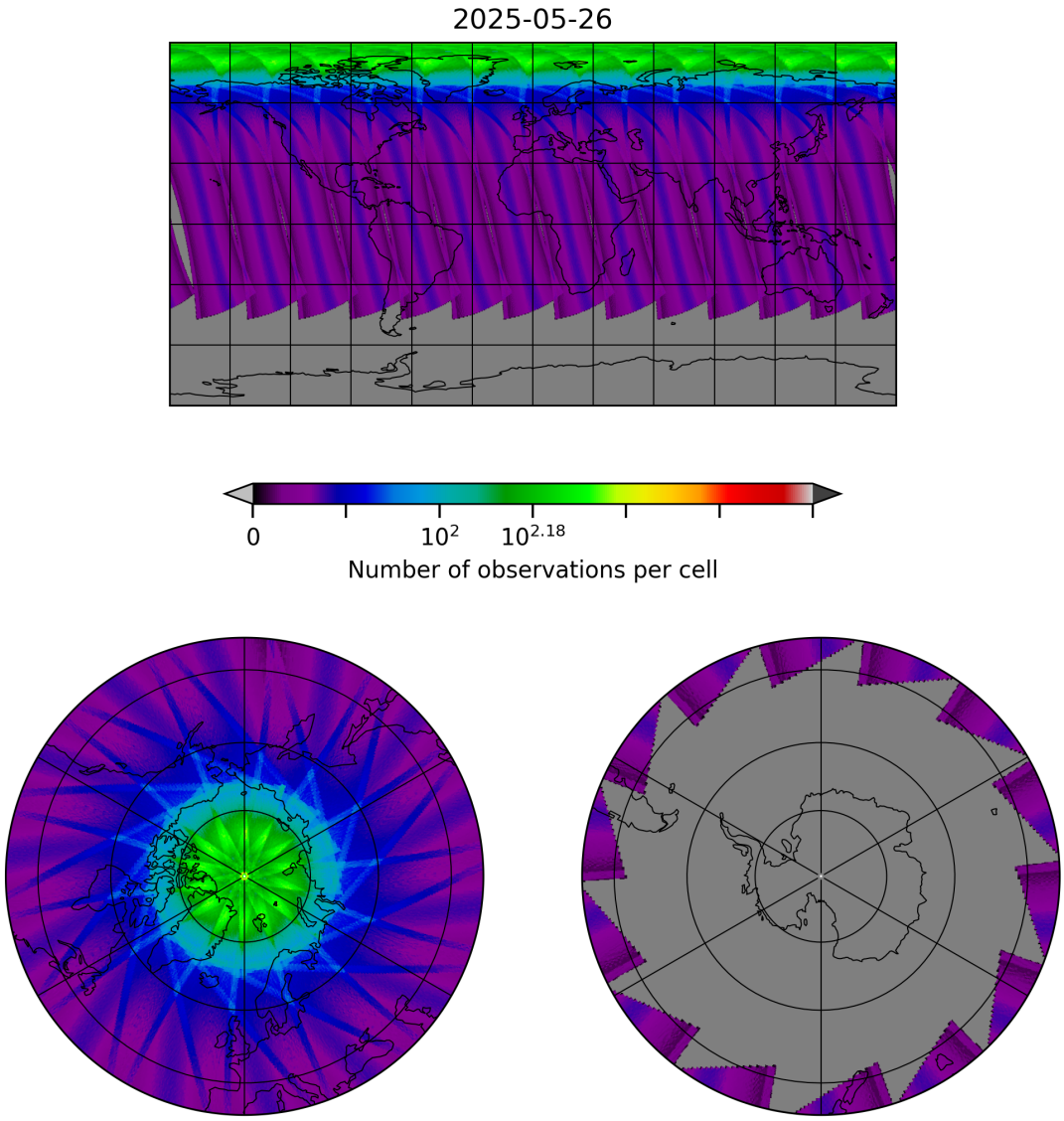


Figure 29: Map of the number of observations for 2025-05-26 to 2025-05-27

7 Zonal average

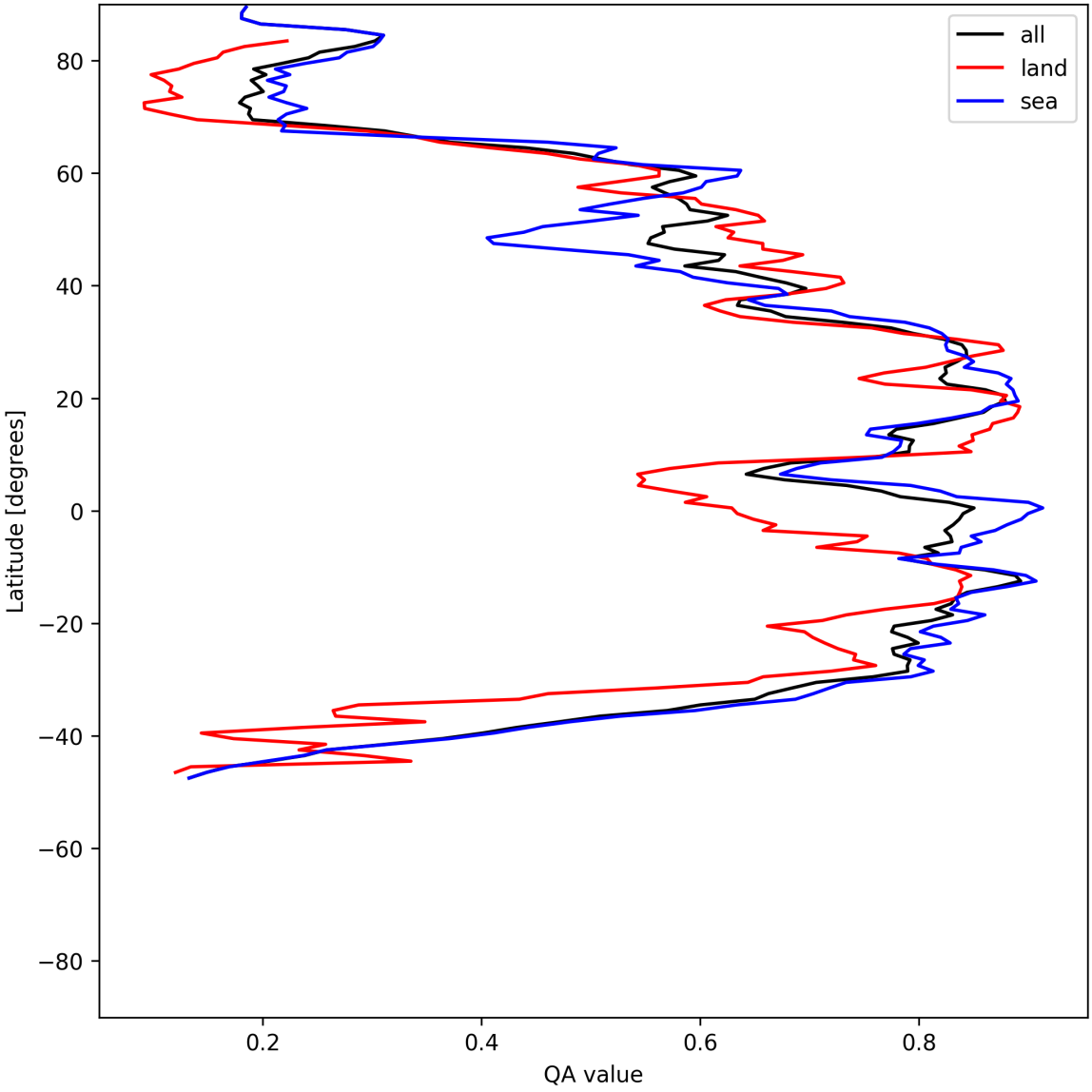


Figure 30: Zonal average of “QA value” for 2025-05-26 to 2025-05-27.

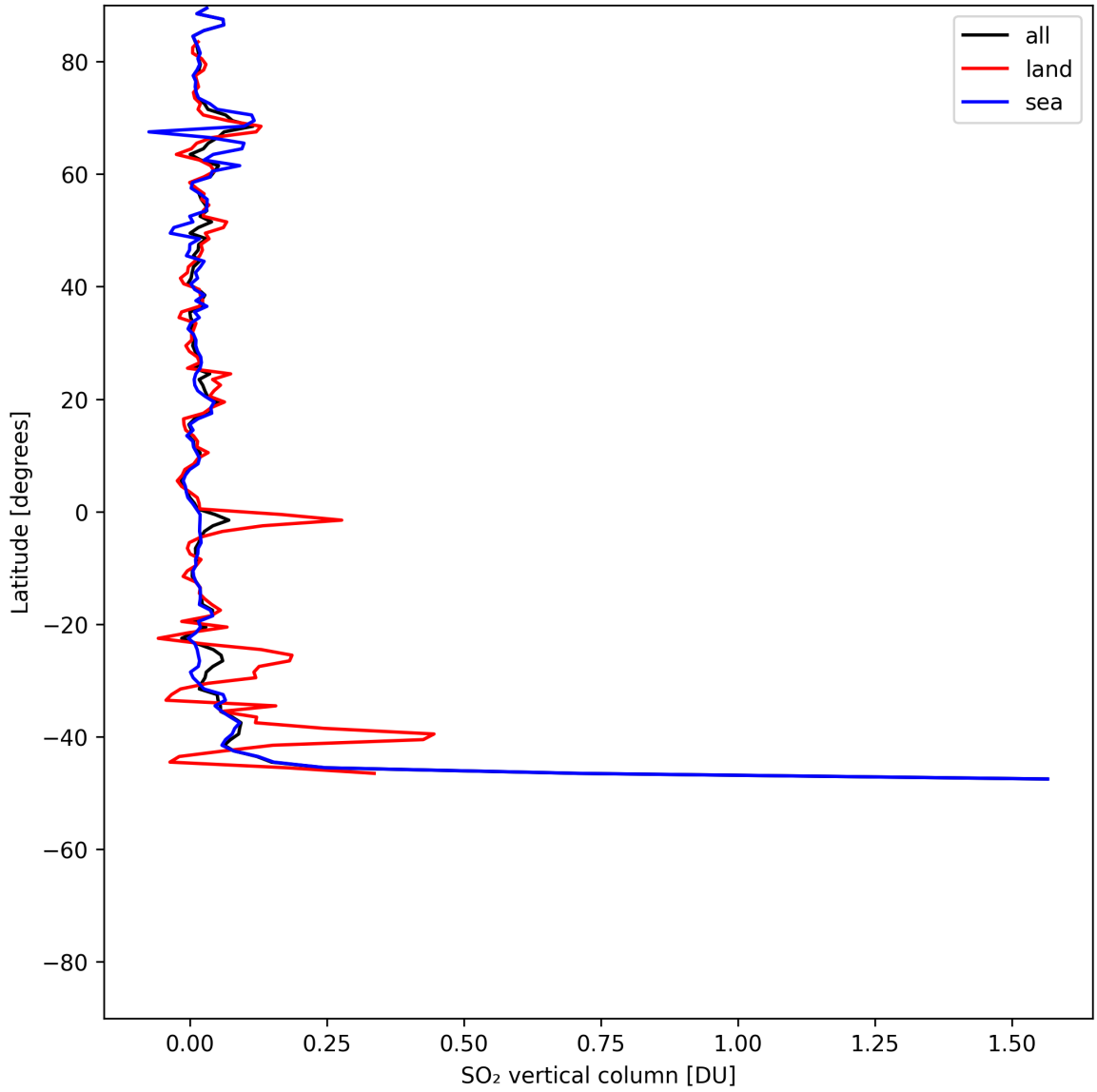


Figure 31: Zonal average of "SO_2 vertical column" for 2025-05-26 to 2025-05-27.

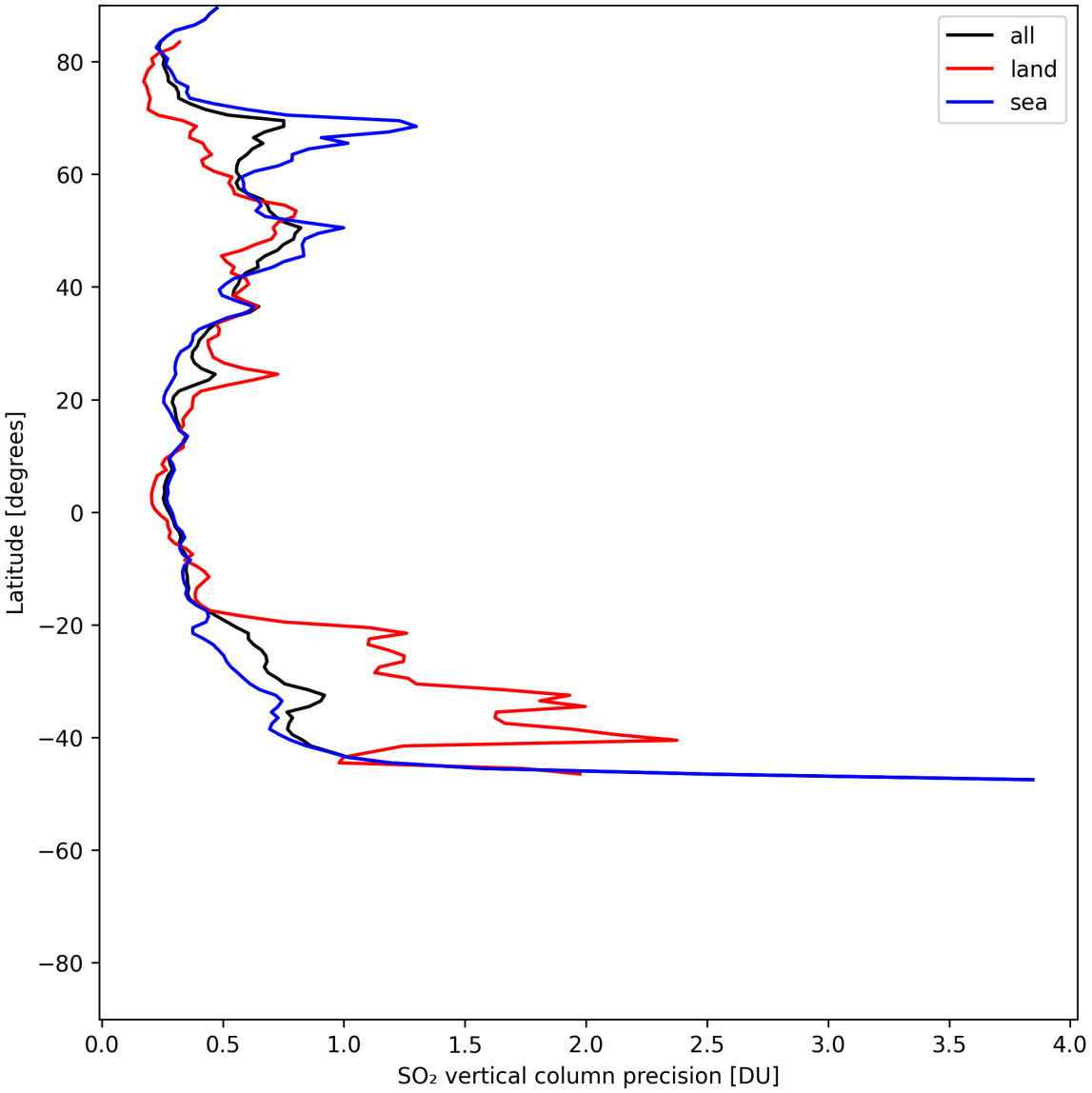


Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-05-26 to 2025-05-27.

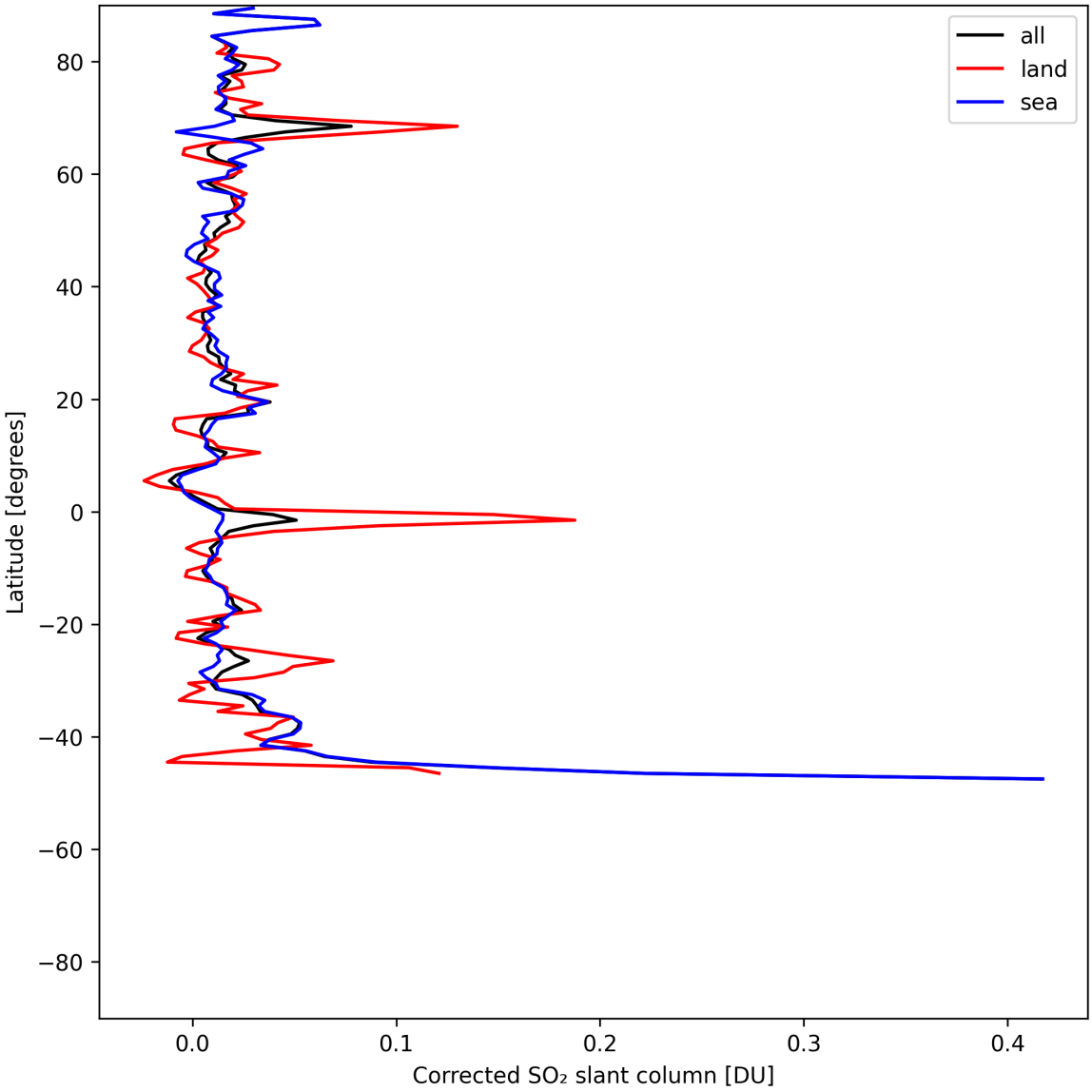


Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-05-26 to 2025-05-27.

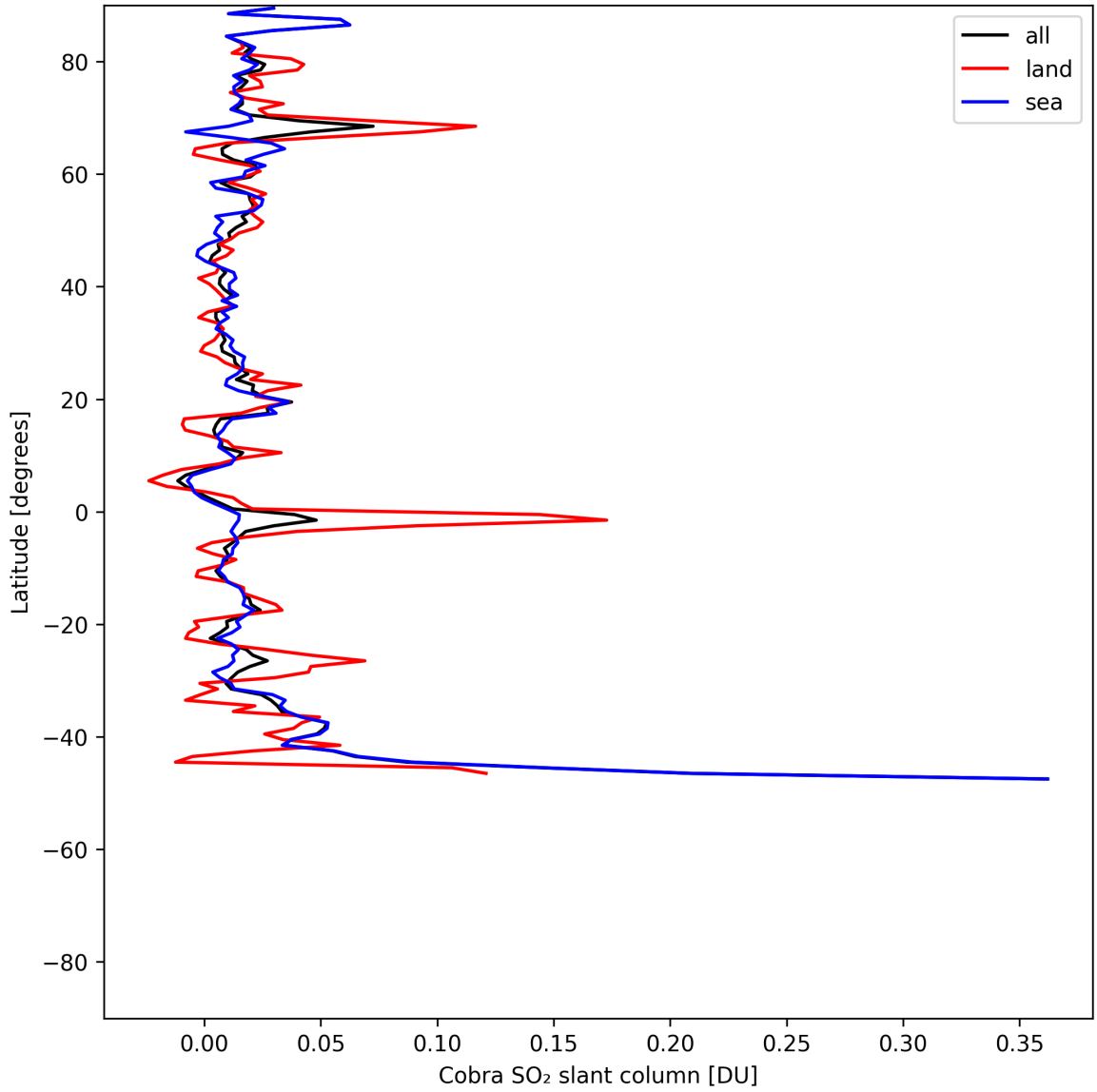


Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-05-26 to 2025-05-27.

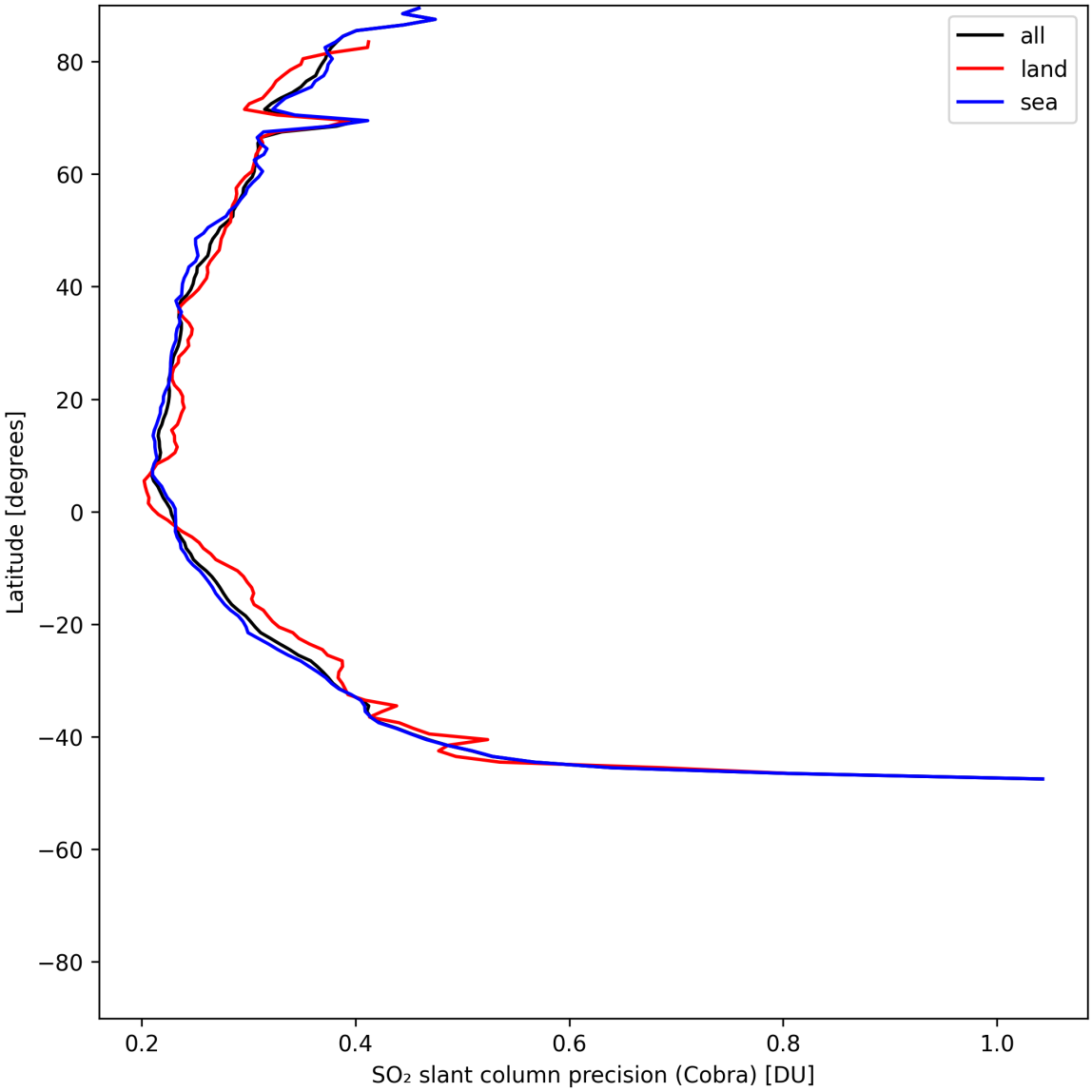


Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-05-26 to 2025-05-27.

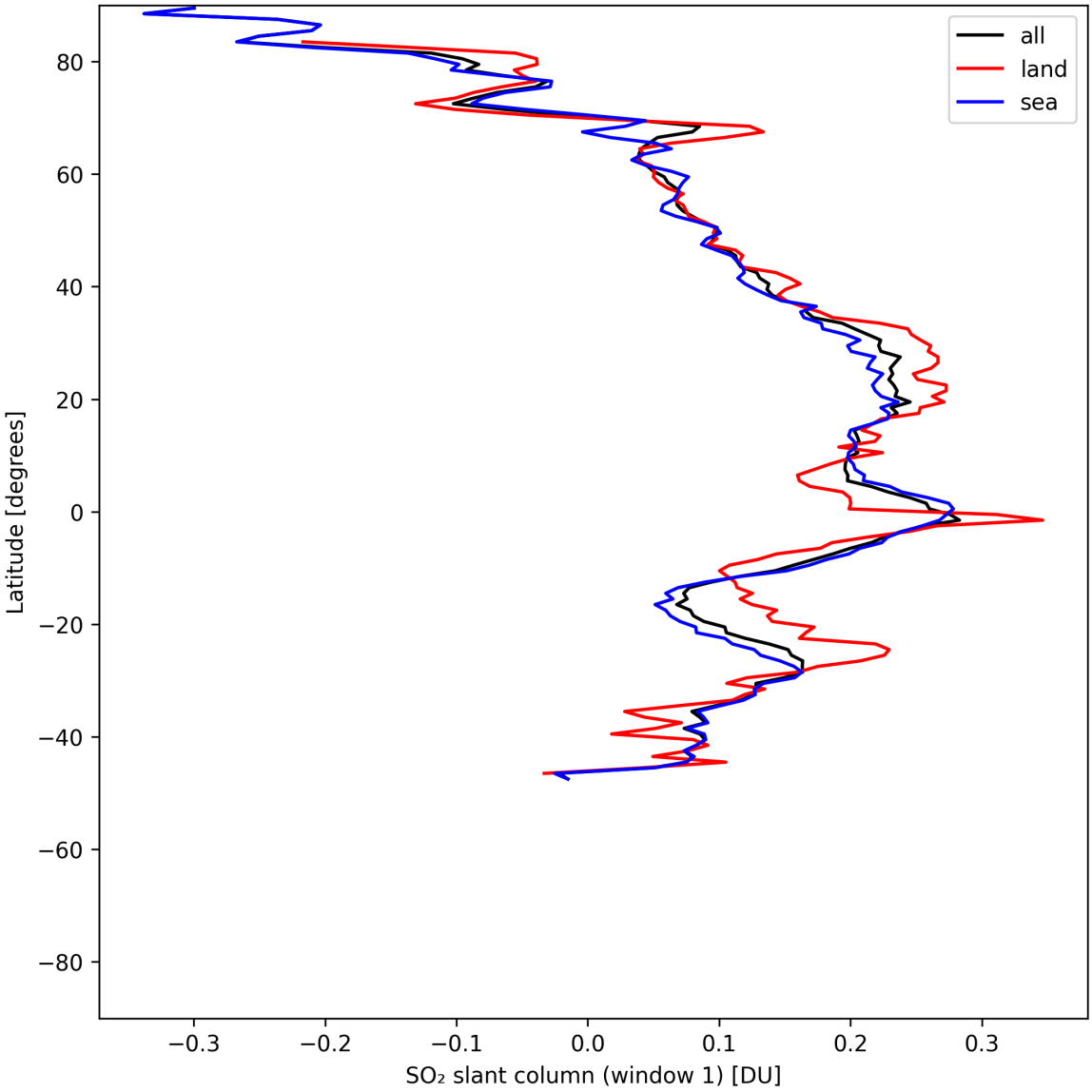


Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-05-26 to 2025-05-27.

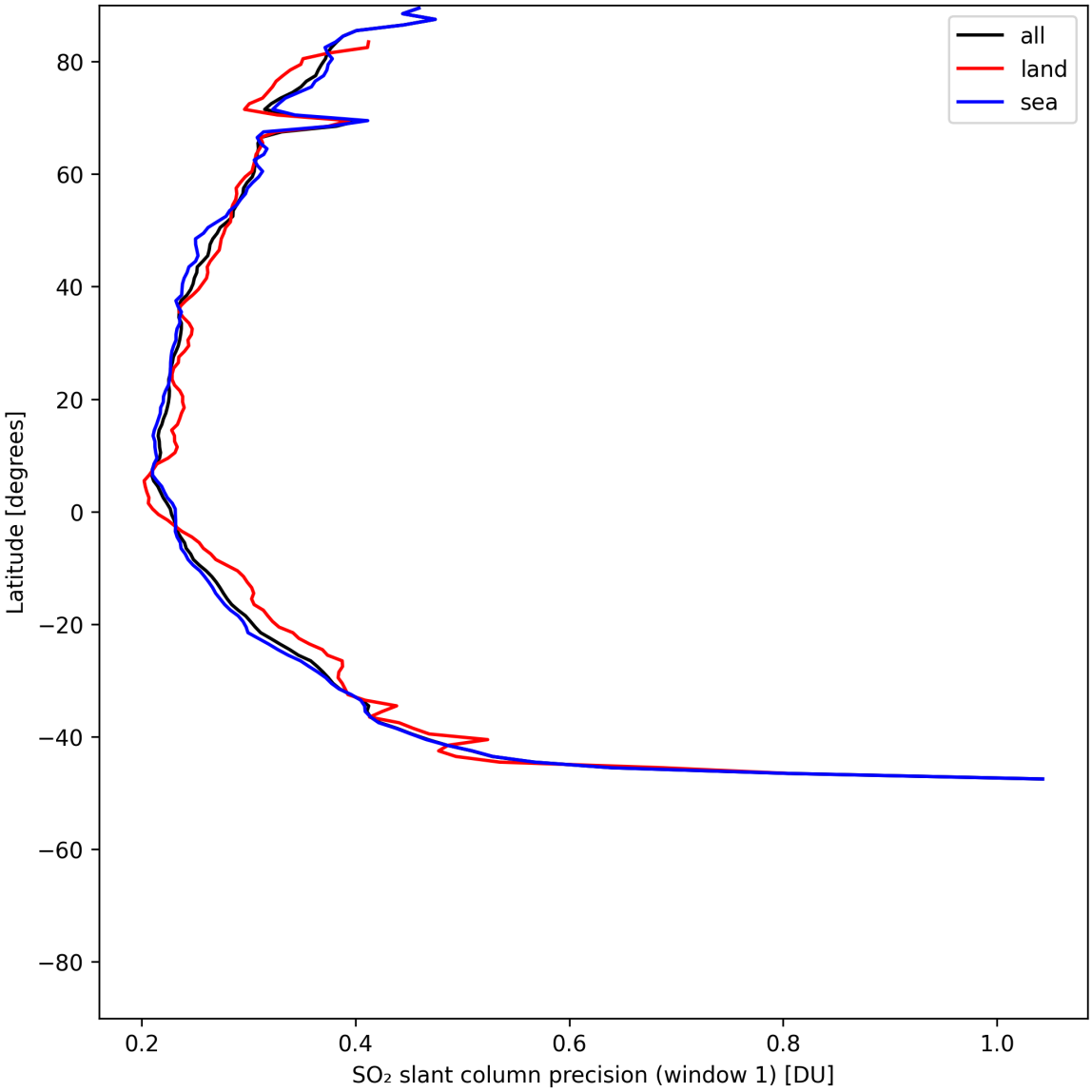


Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-05-26 to 2025-05-27.

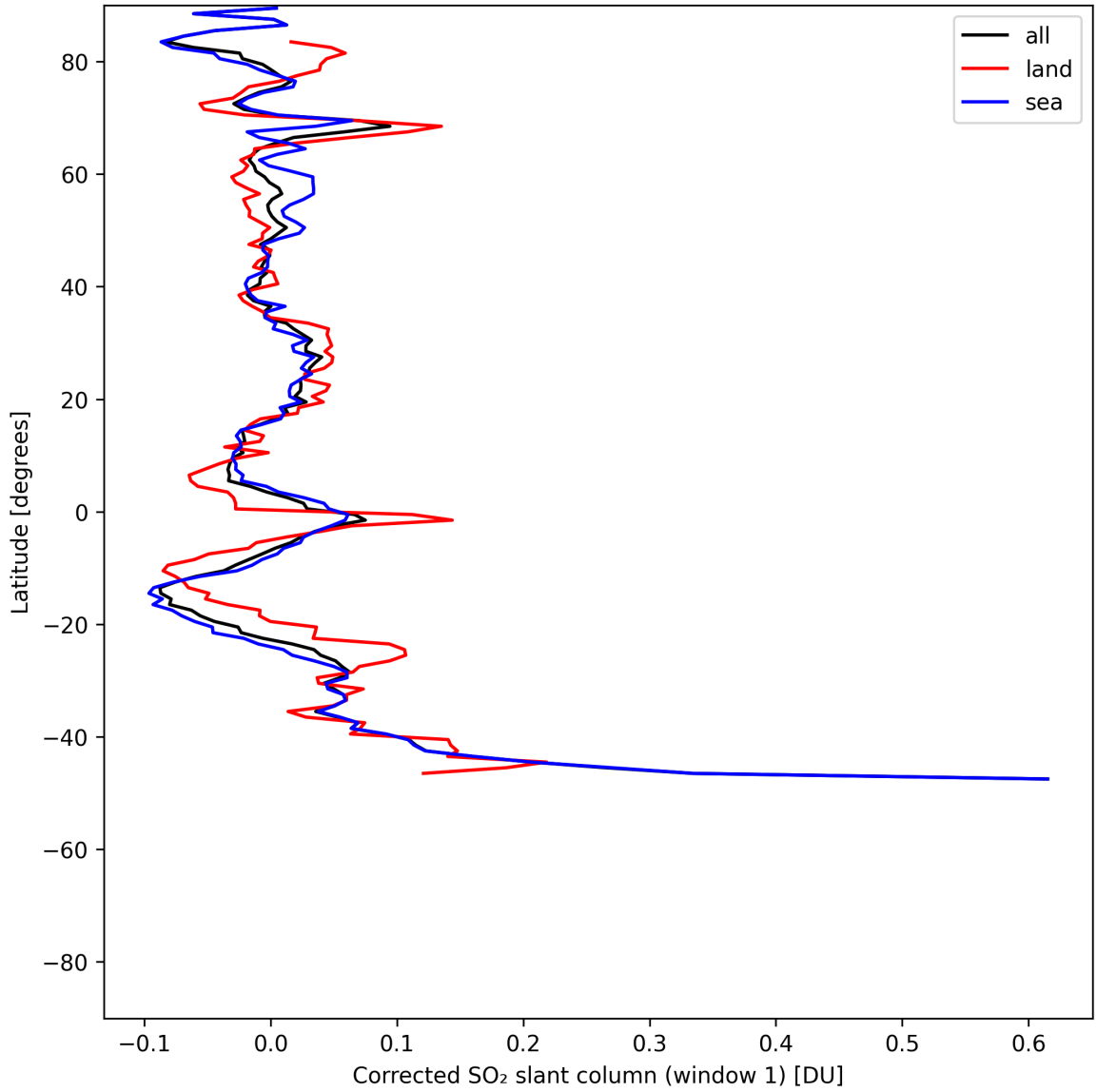


Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-05-26 to 2025-05-27.

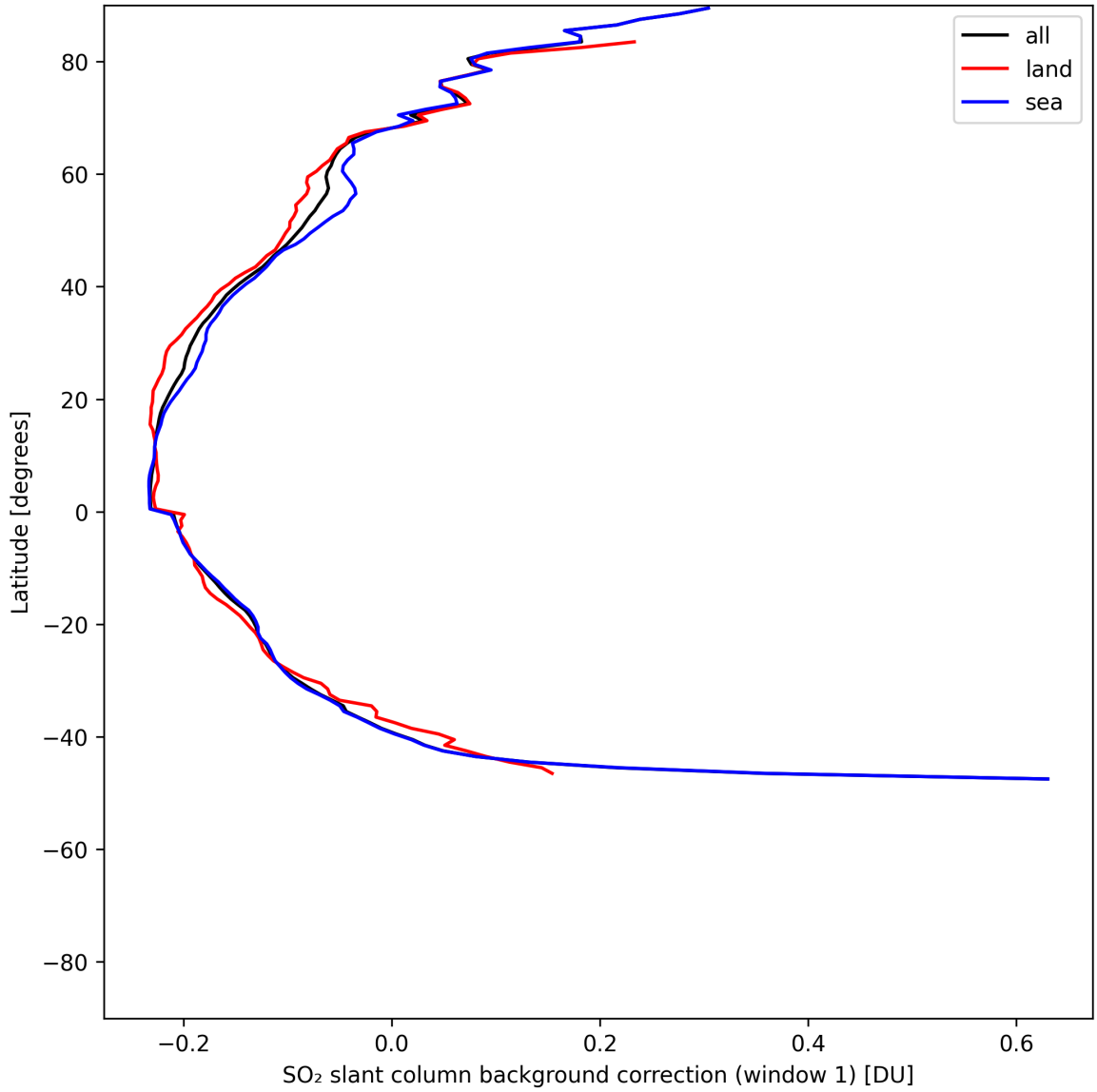


Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-05-26 to 2025-05-27.

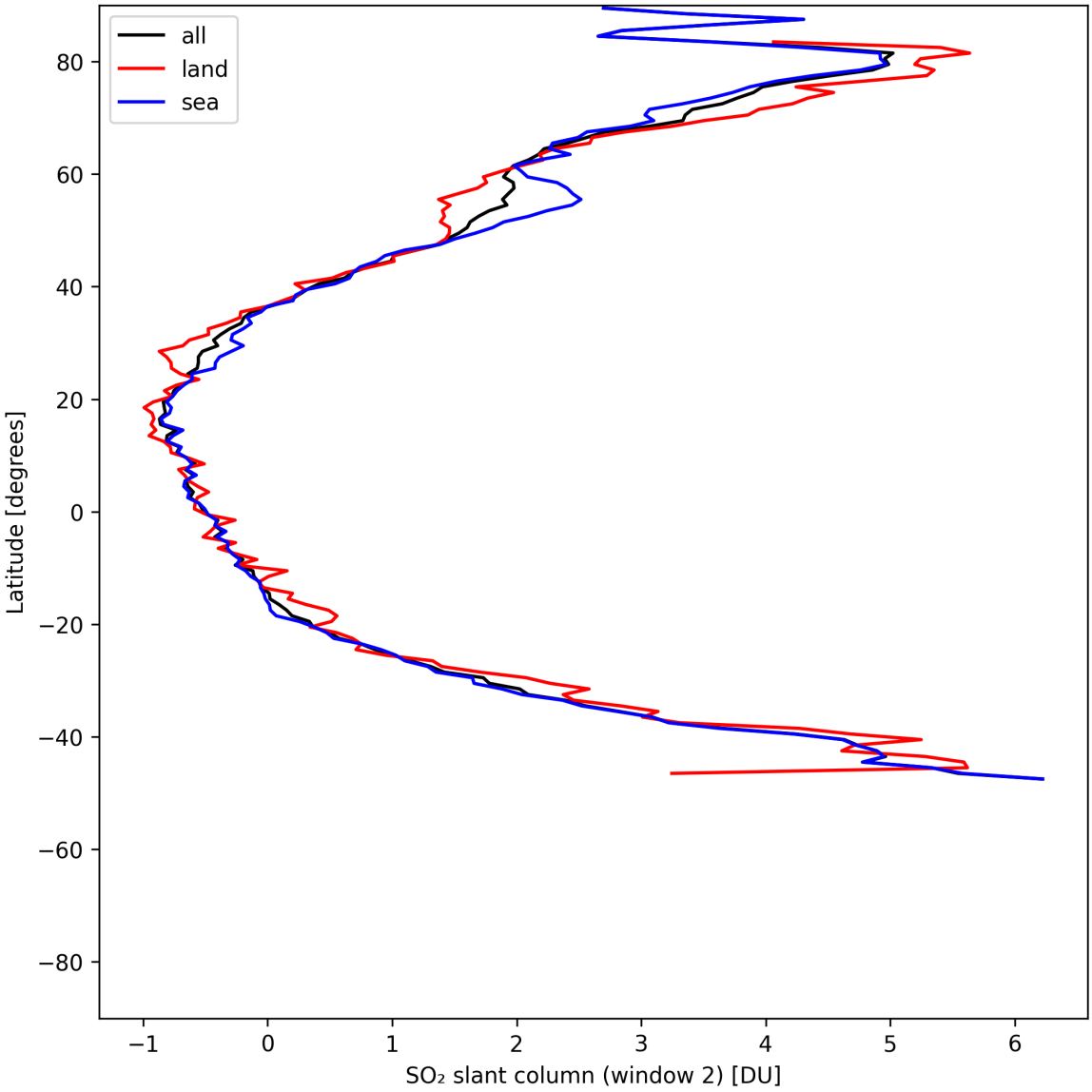


Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-05-26 to 2025-05-27.

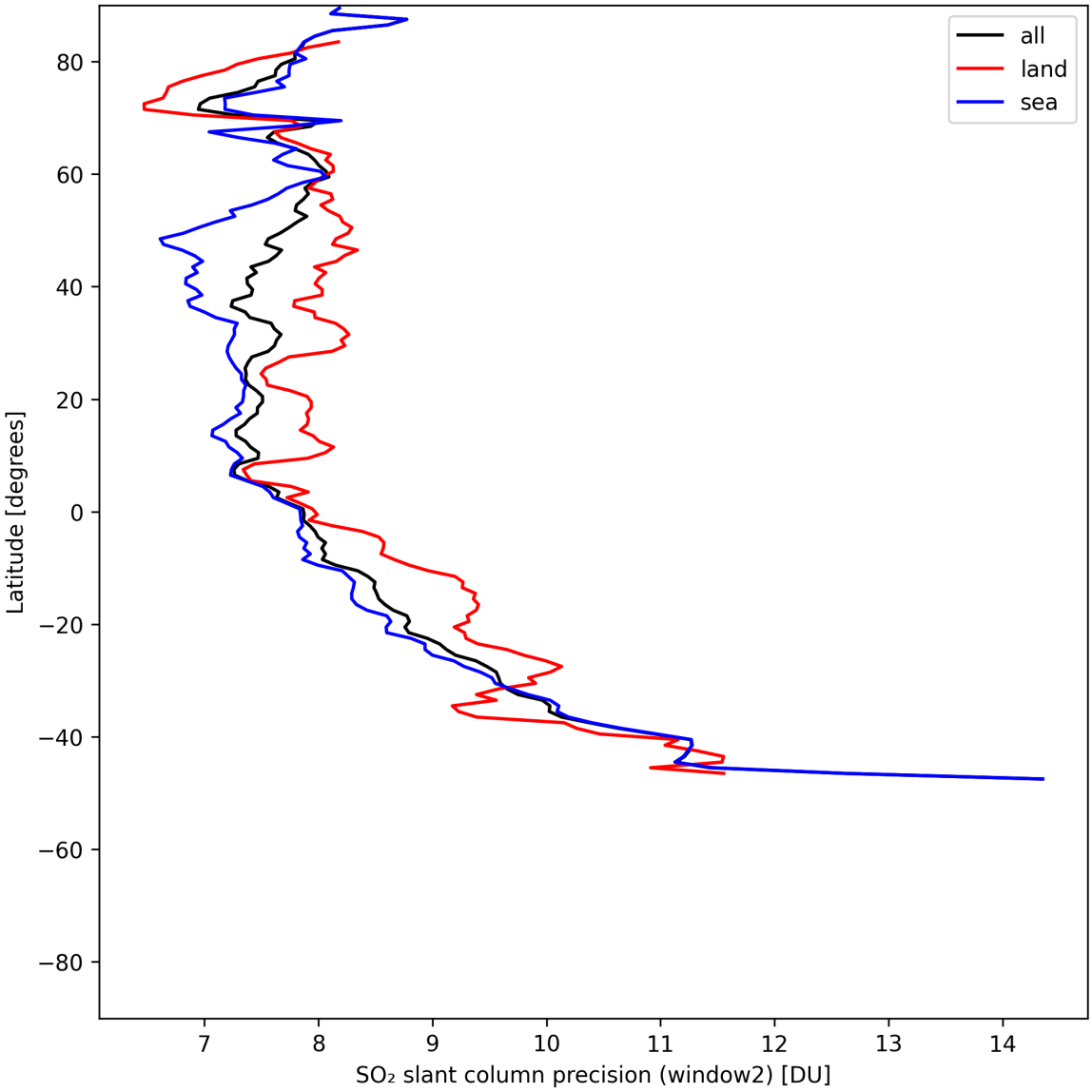


Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-05-26 to 2025-05-27.

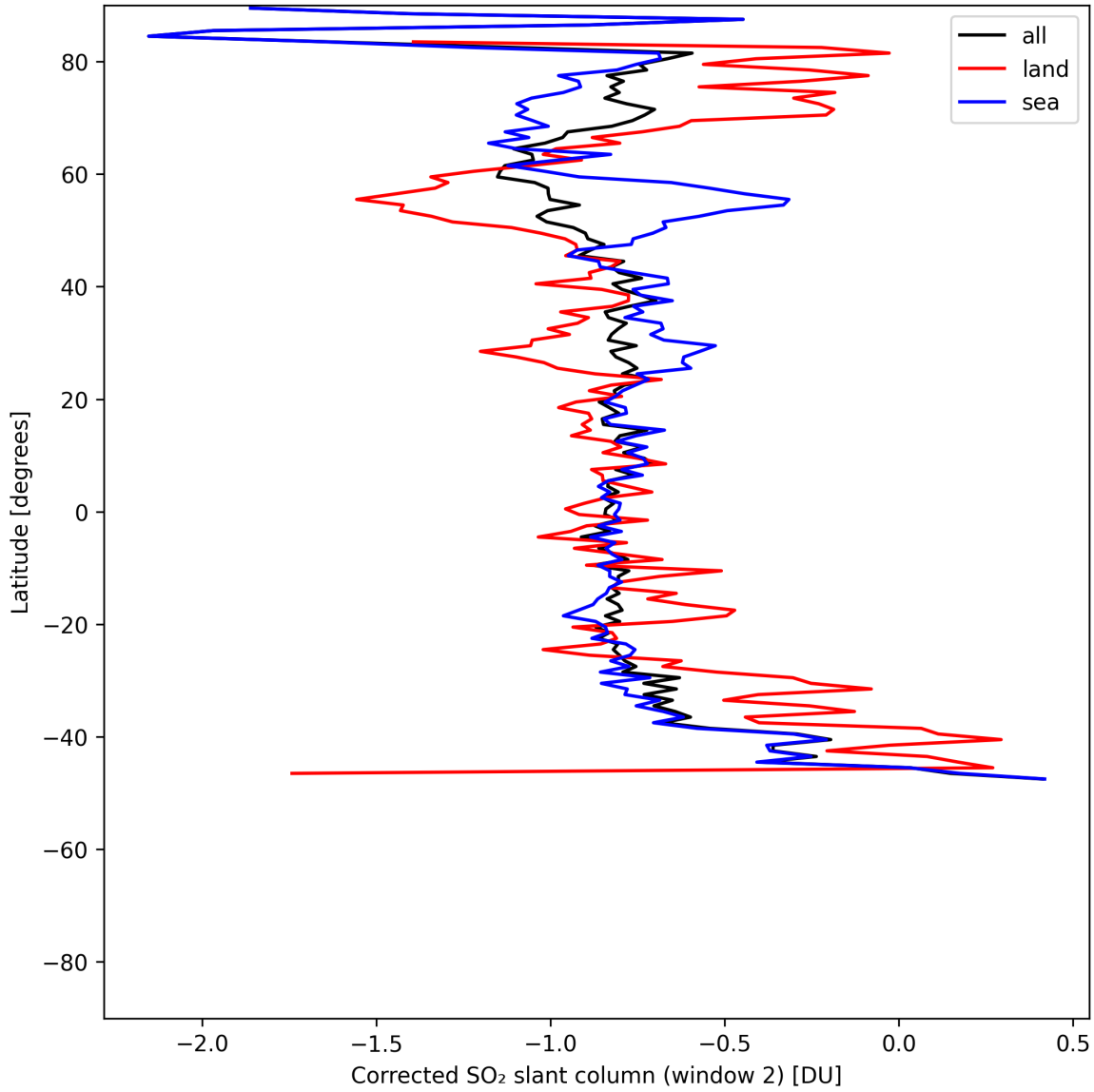


Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-05-26 to 2025-05-27.

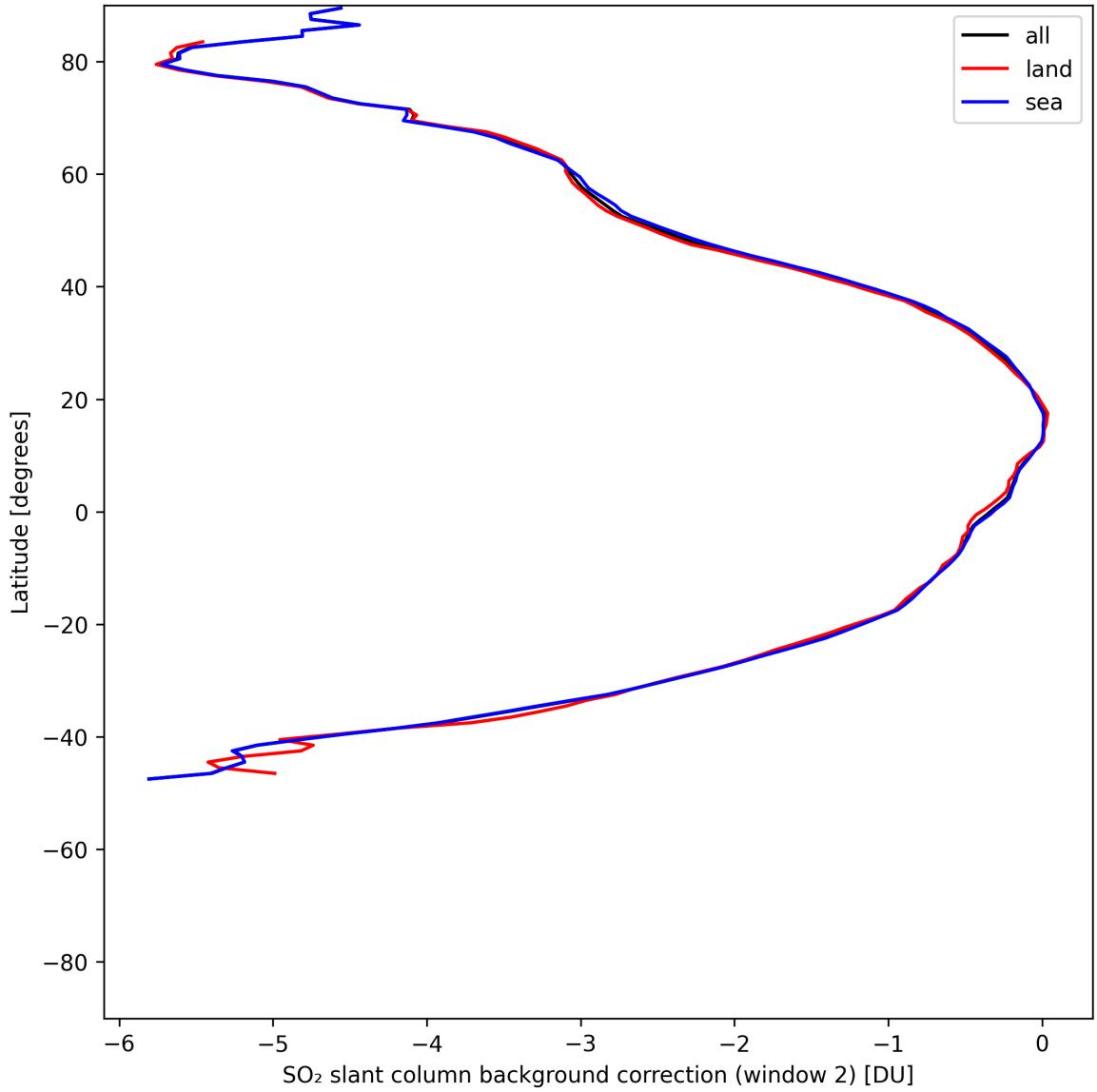


Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-05-26 to 2025-05-27.

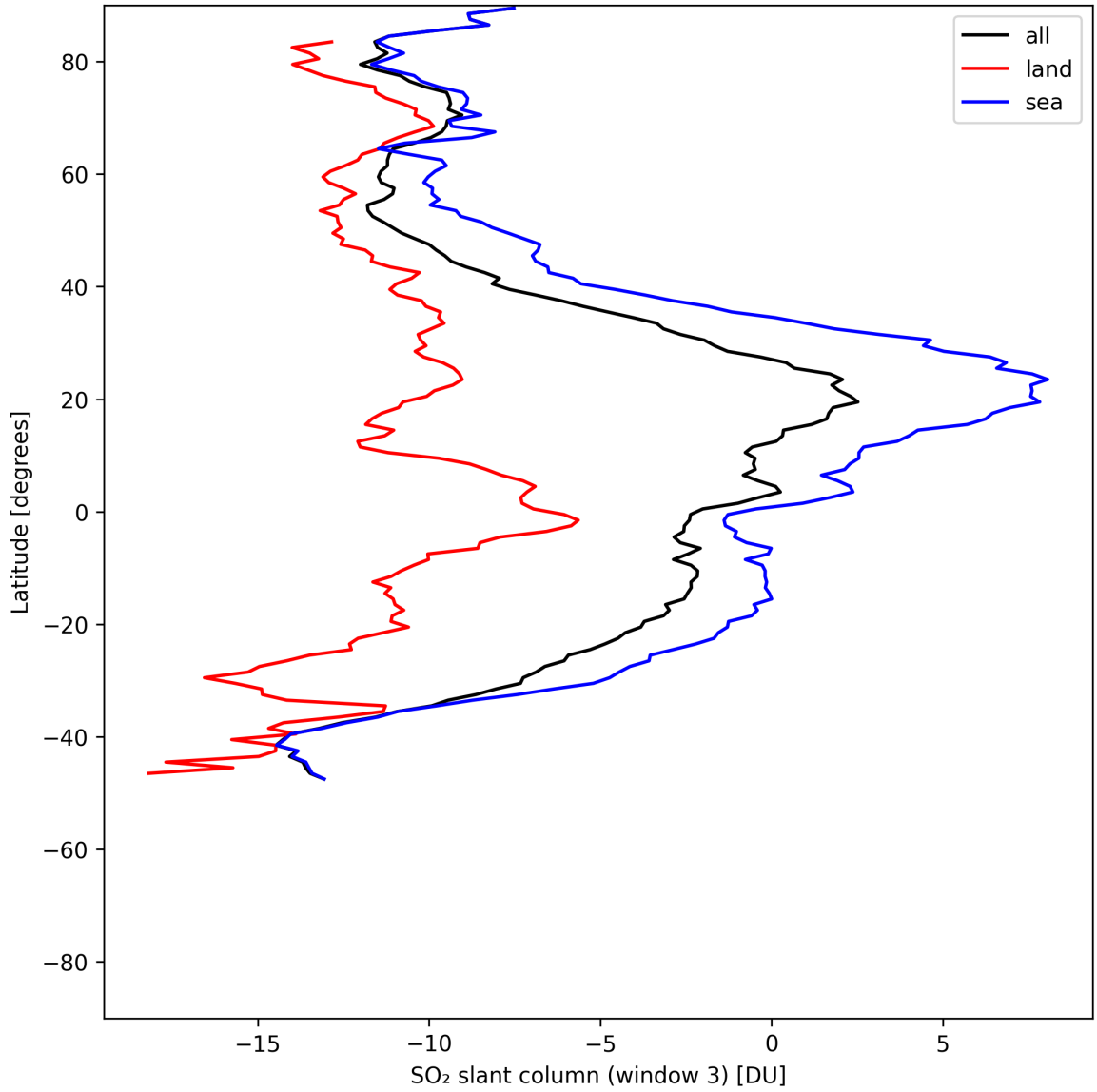


Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-05-26 to 2025-05-27.

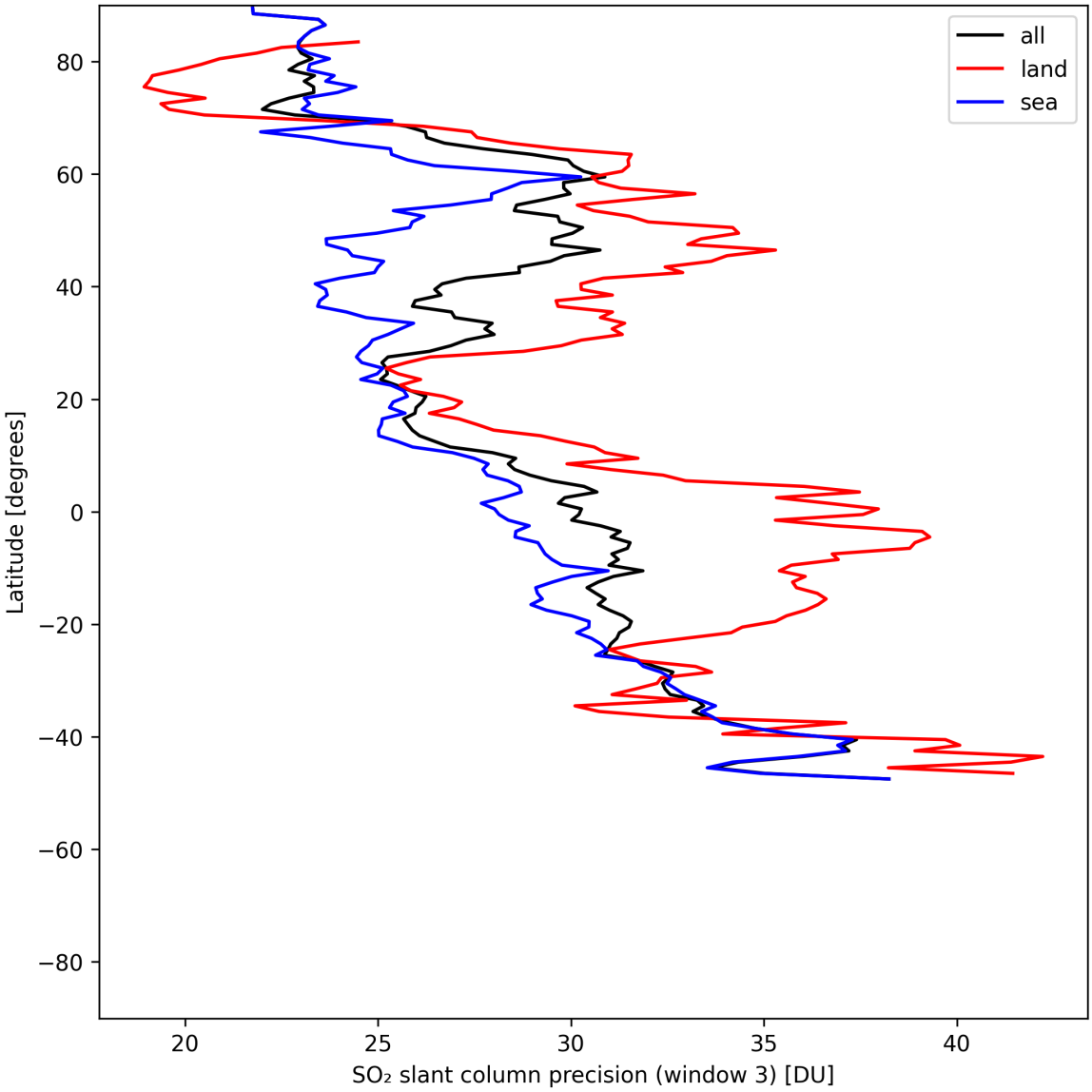


Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-05-26 to 2025-05-27.

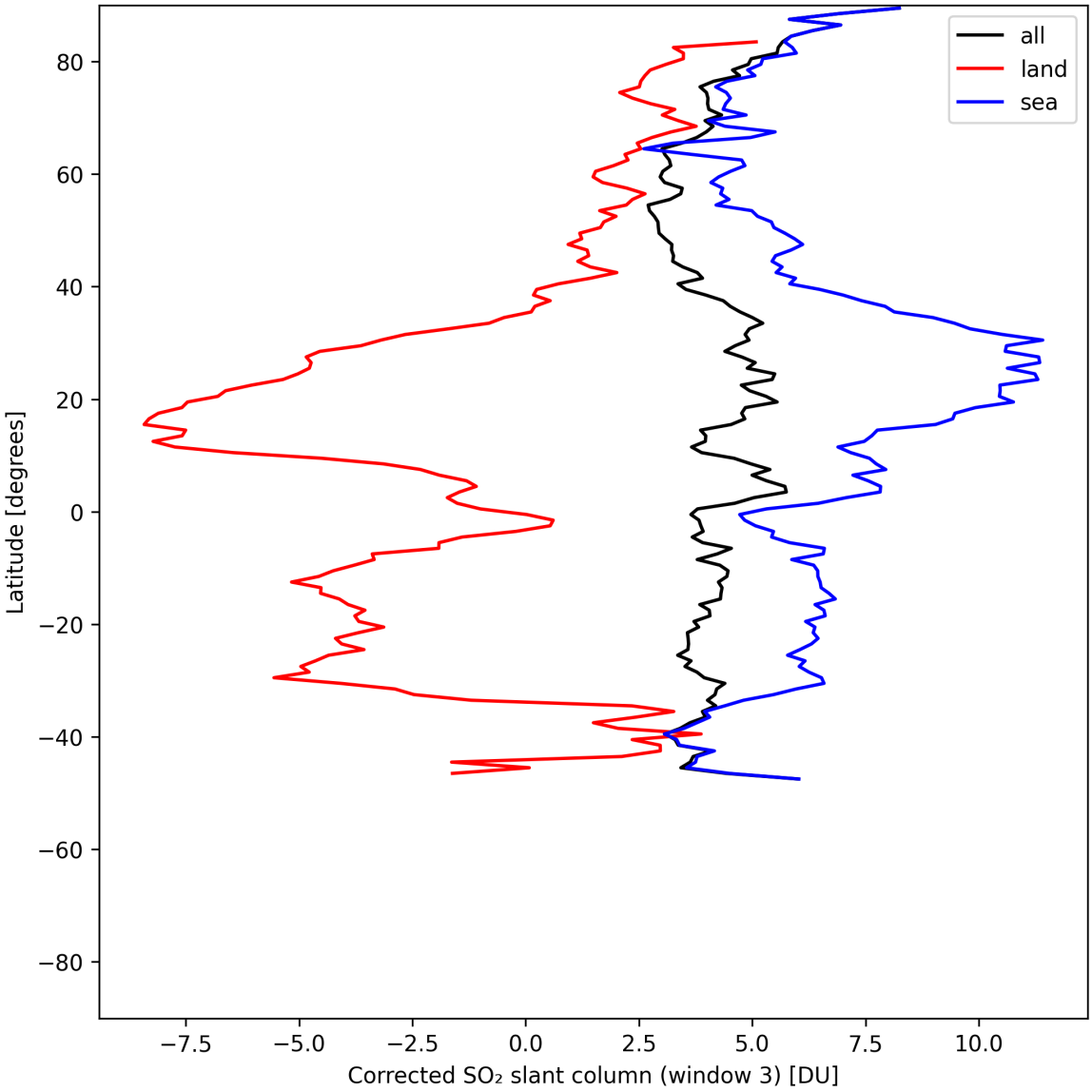


Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-05-26 to 2025-05-27.

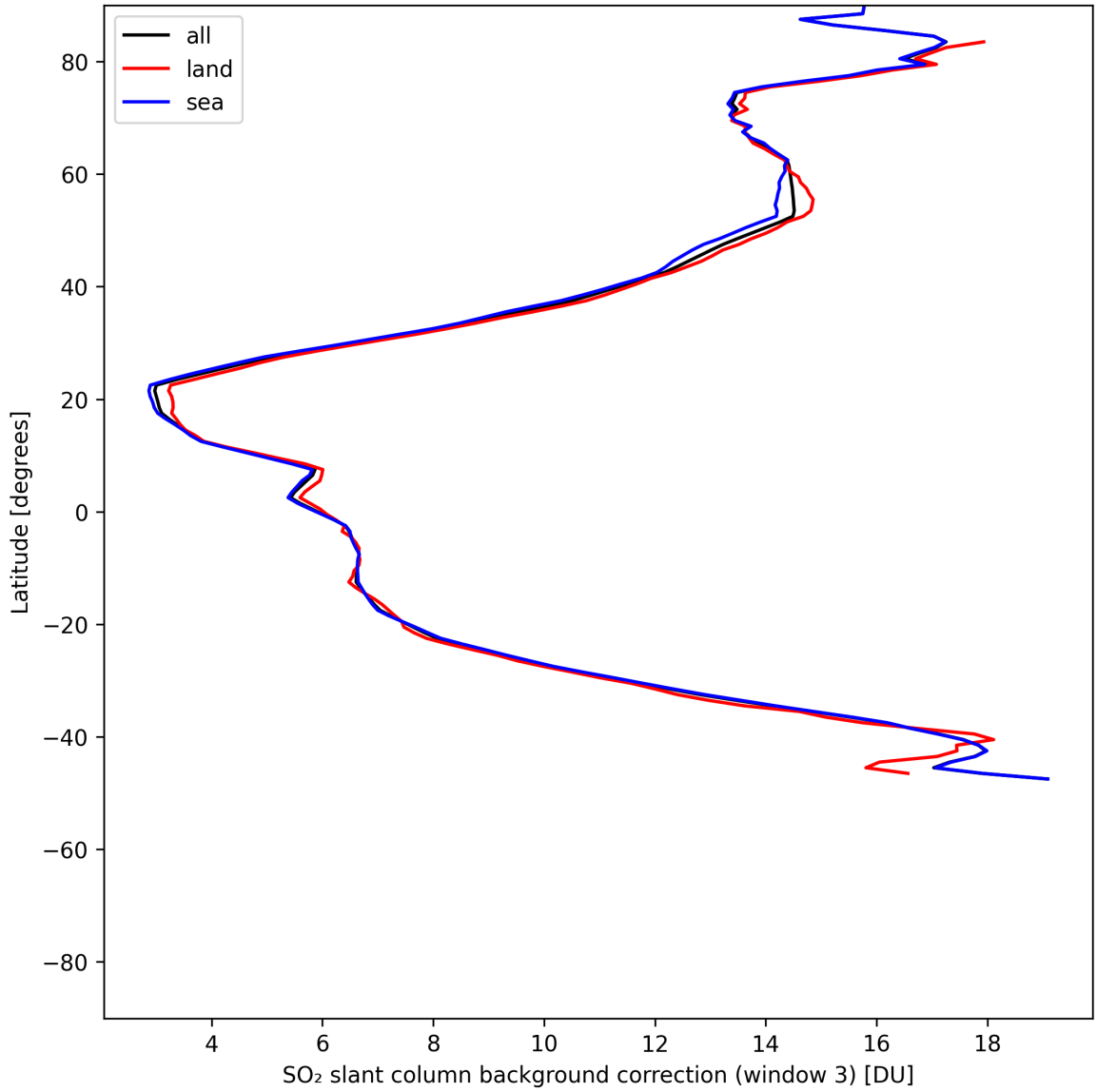


Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-05-26 to 2025-05-27.

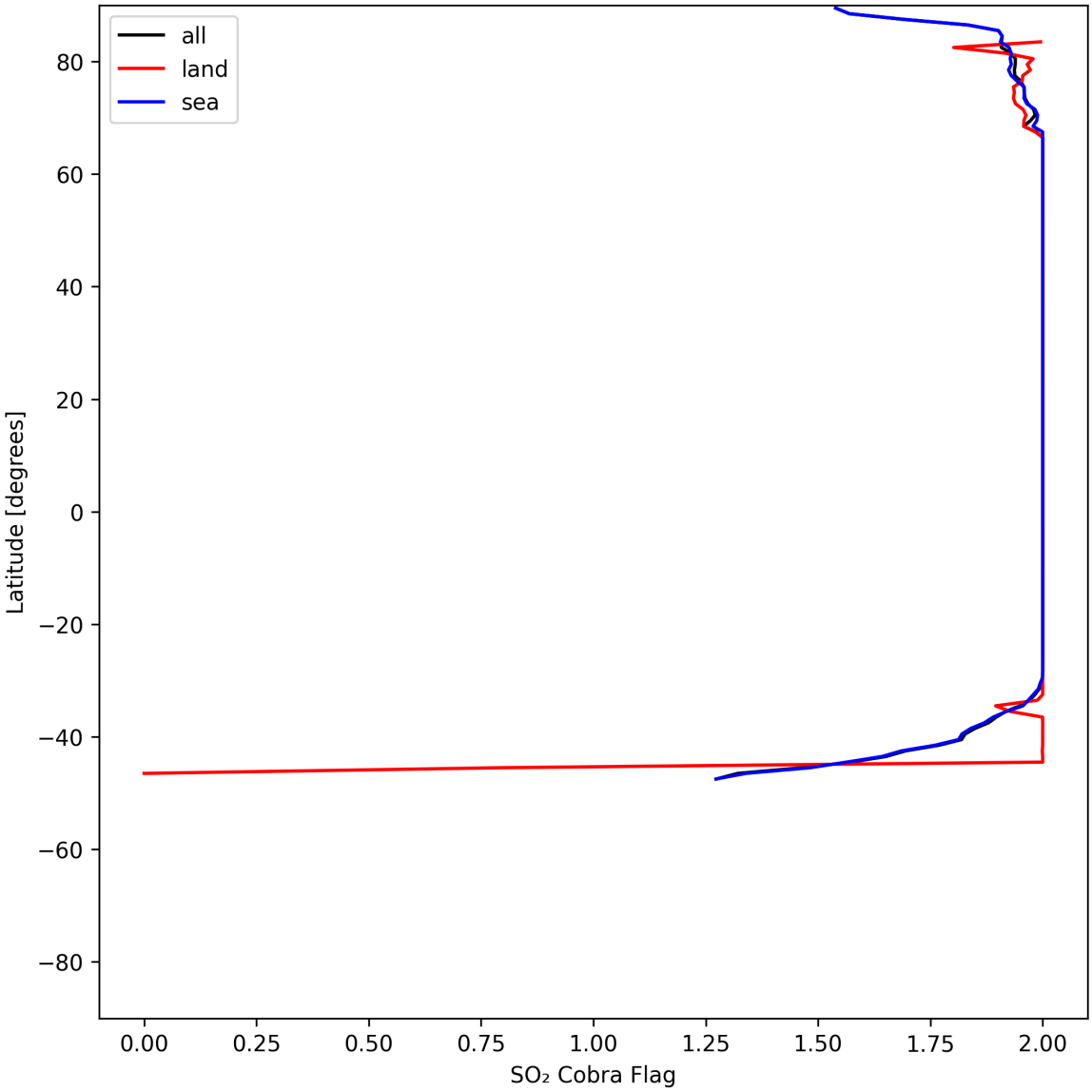


Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-05-26 to 2025-05-27.

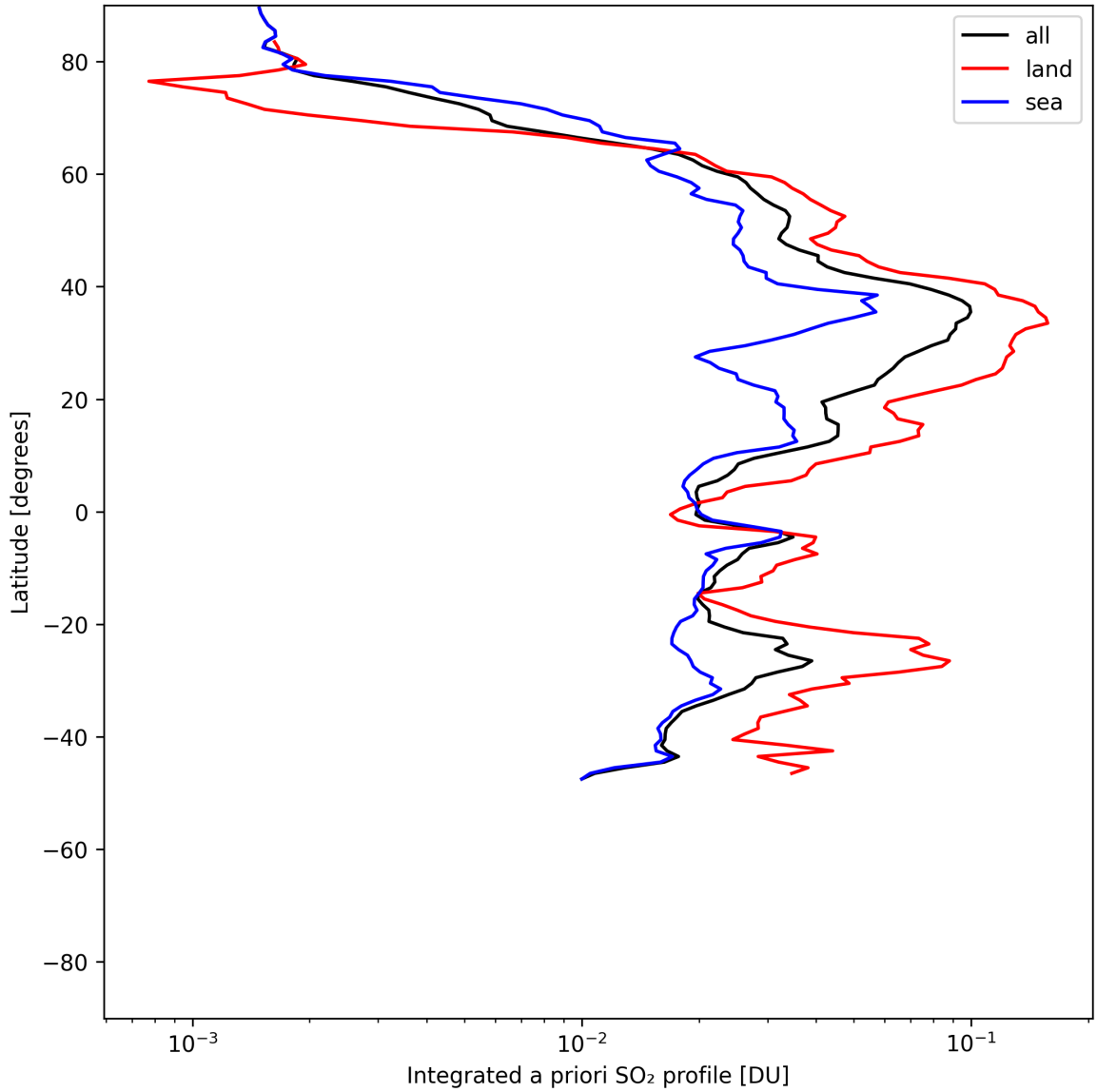


Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-05-26 to 2025-05-27.

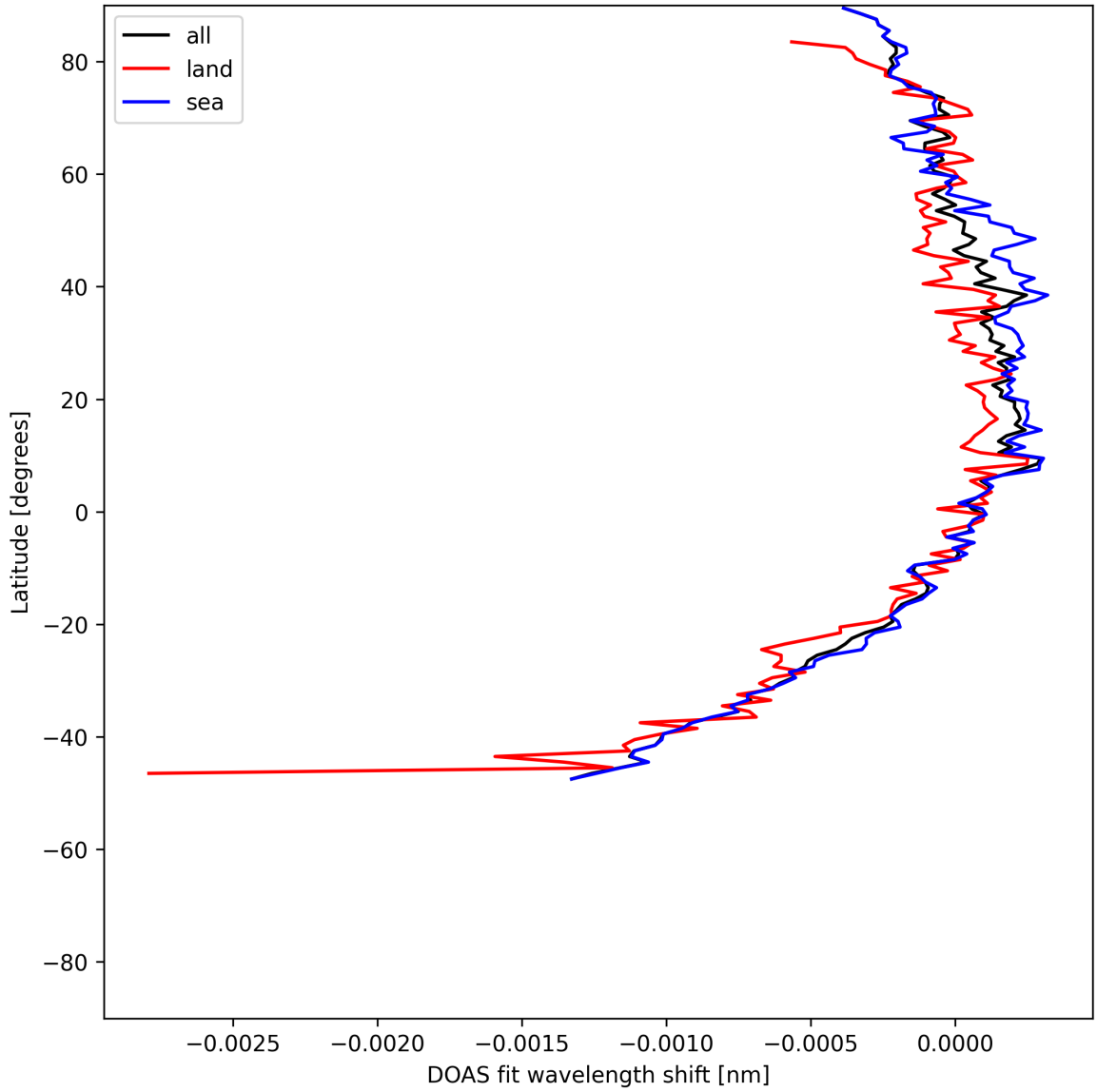


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-05-26 to 2025-05-27.

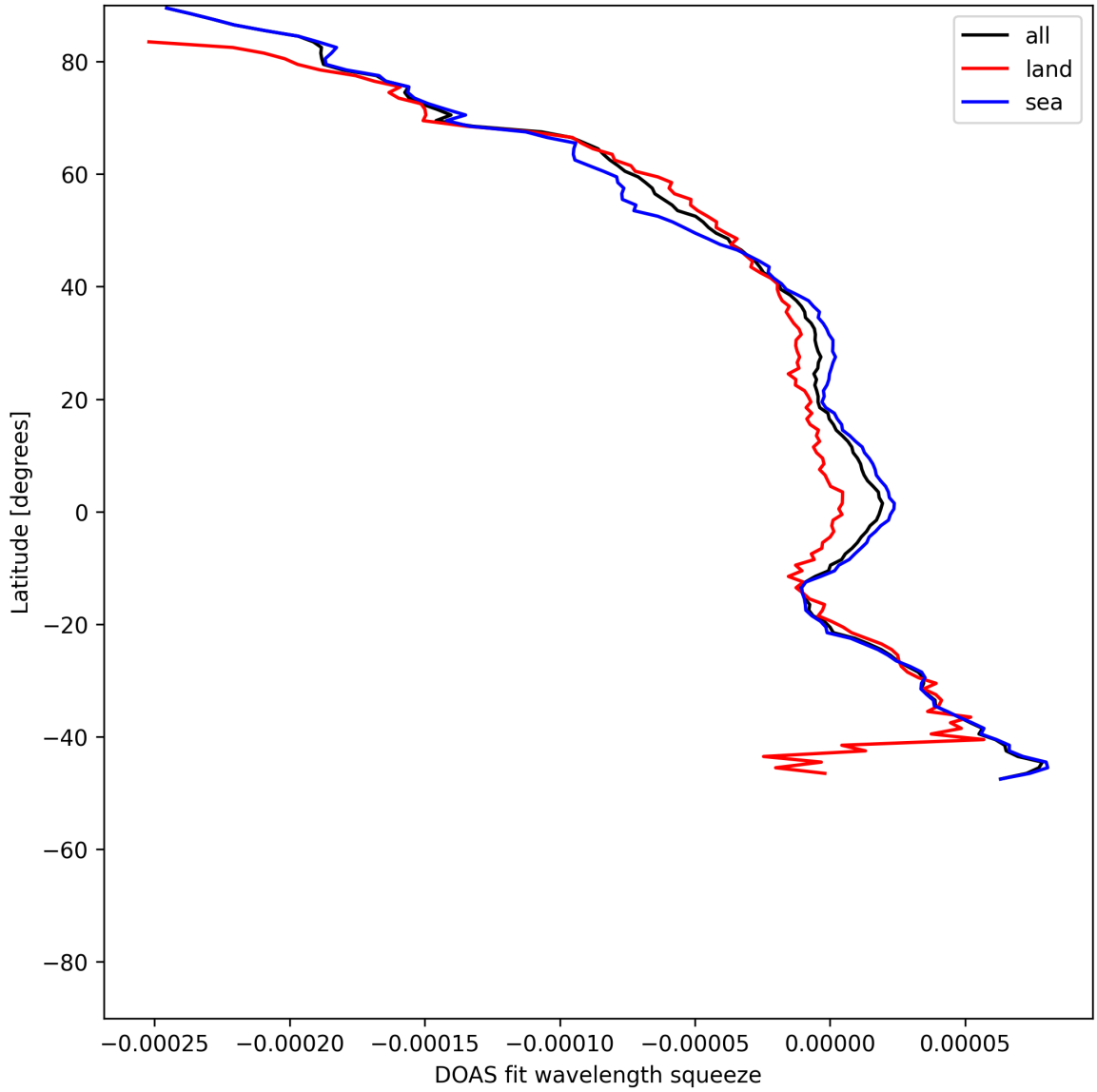


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-05-26 to 2025-05-27.

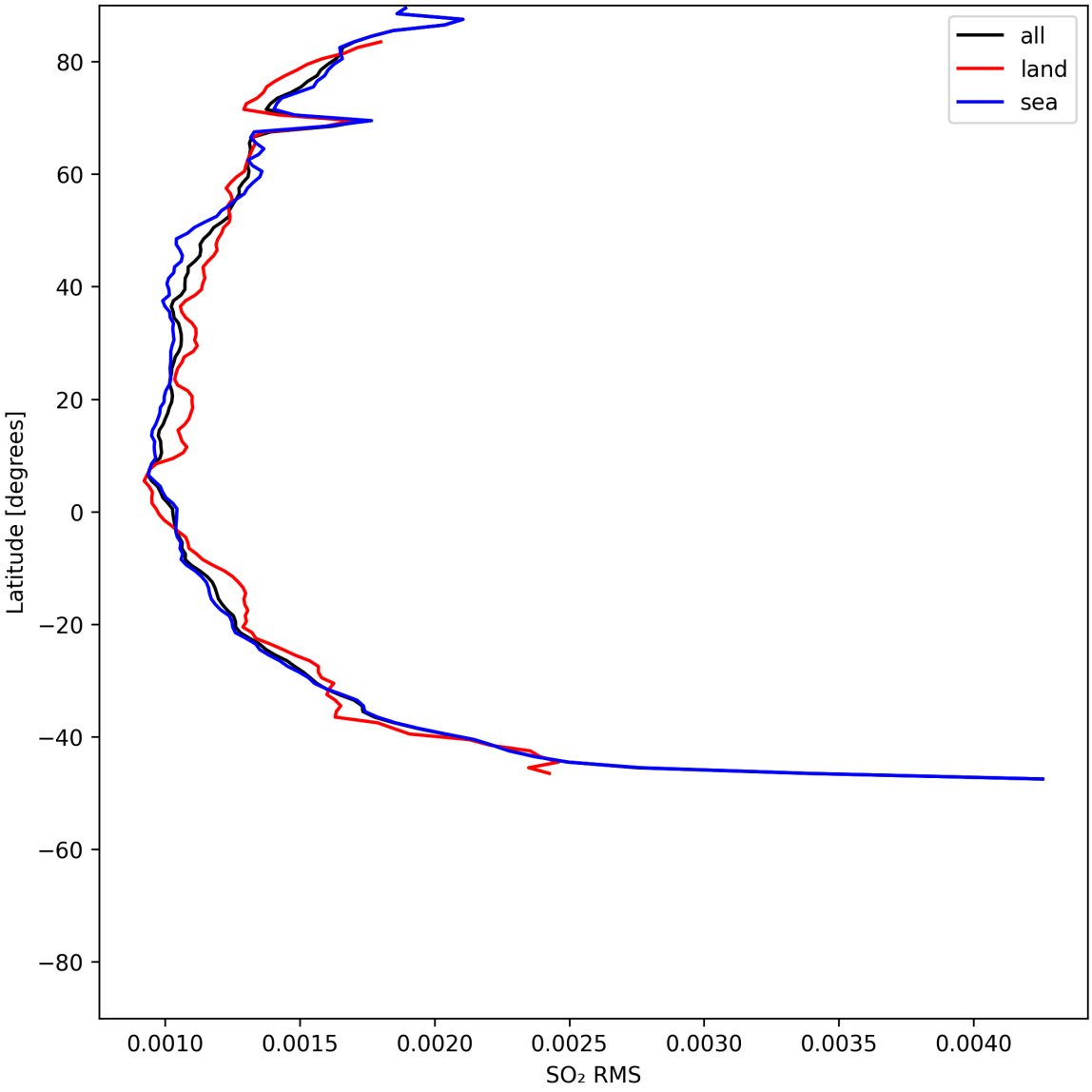


Figure 52: Zonal average of "SO_2 RMS" for 2025-05-26 to 2025-05-27.

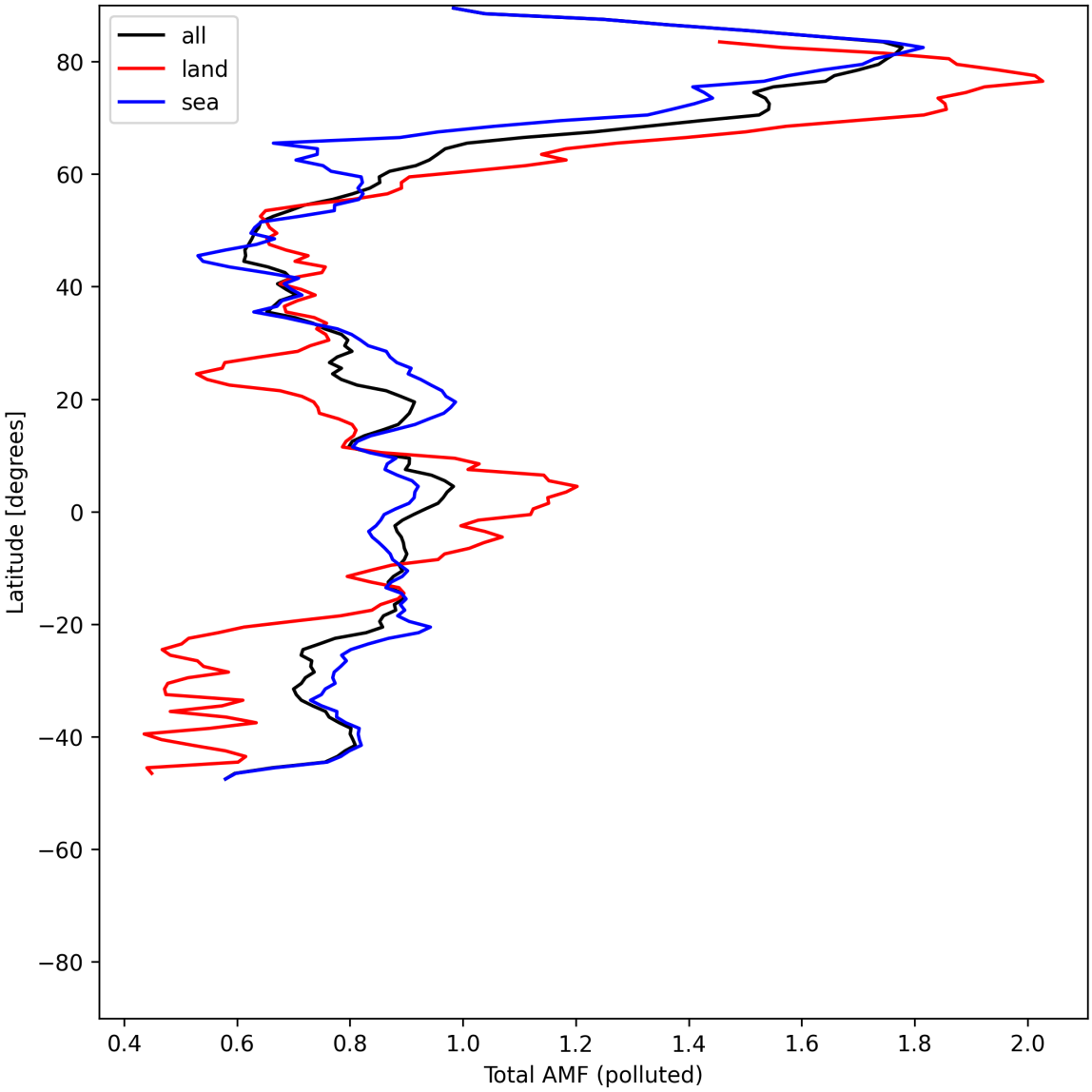


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-05-26 to 2025-05-27.

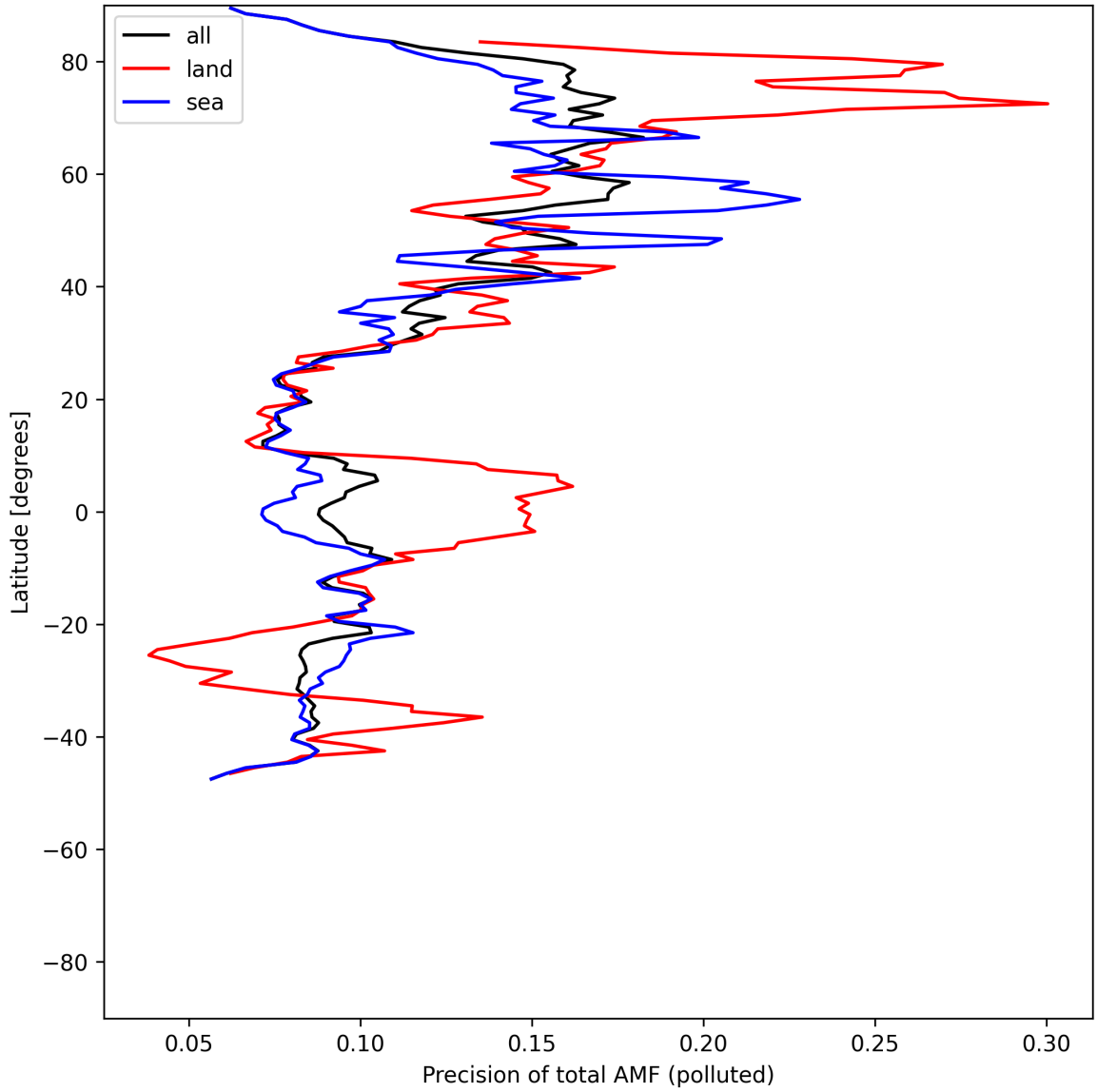


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-05-26 to 2025-05-27.

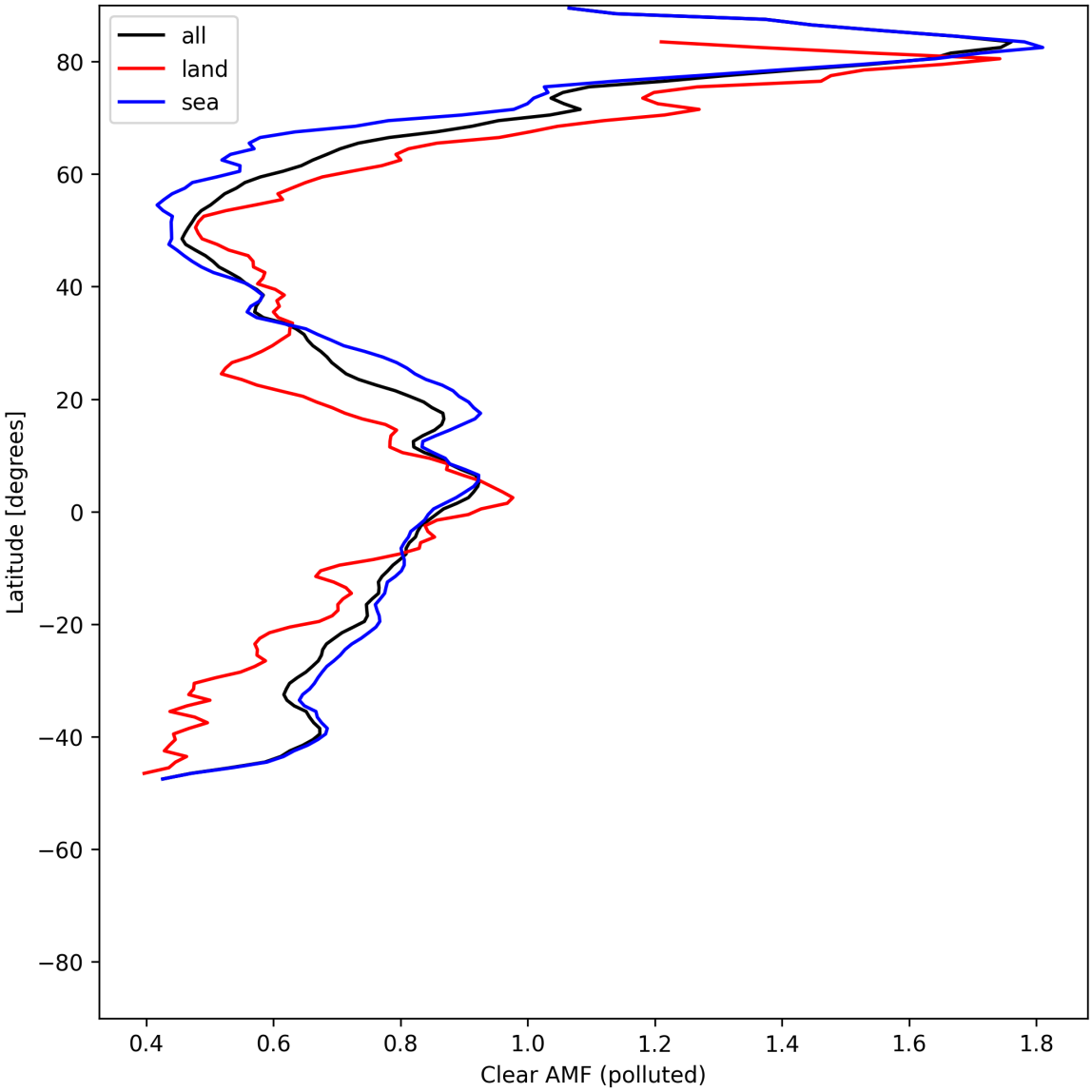


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-05-26 to 2025-05-27.

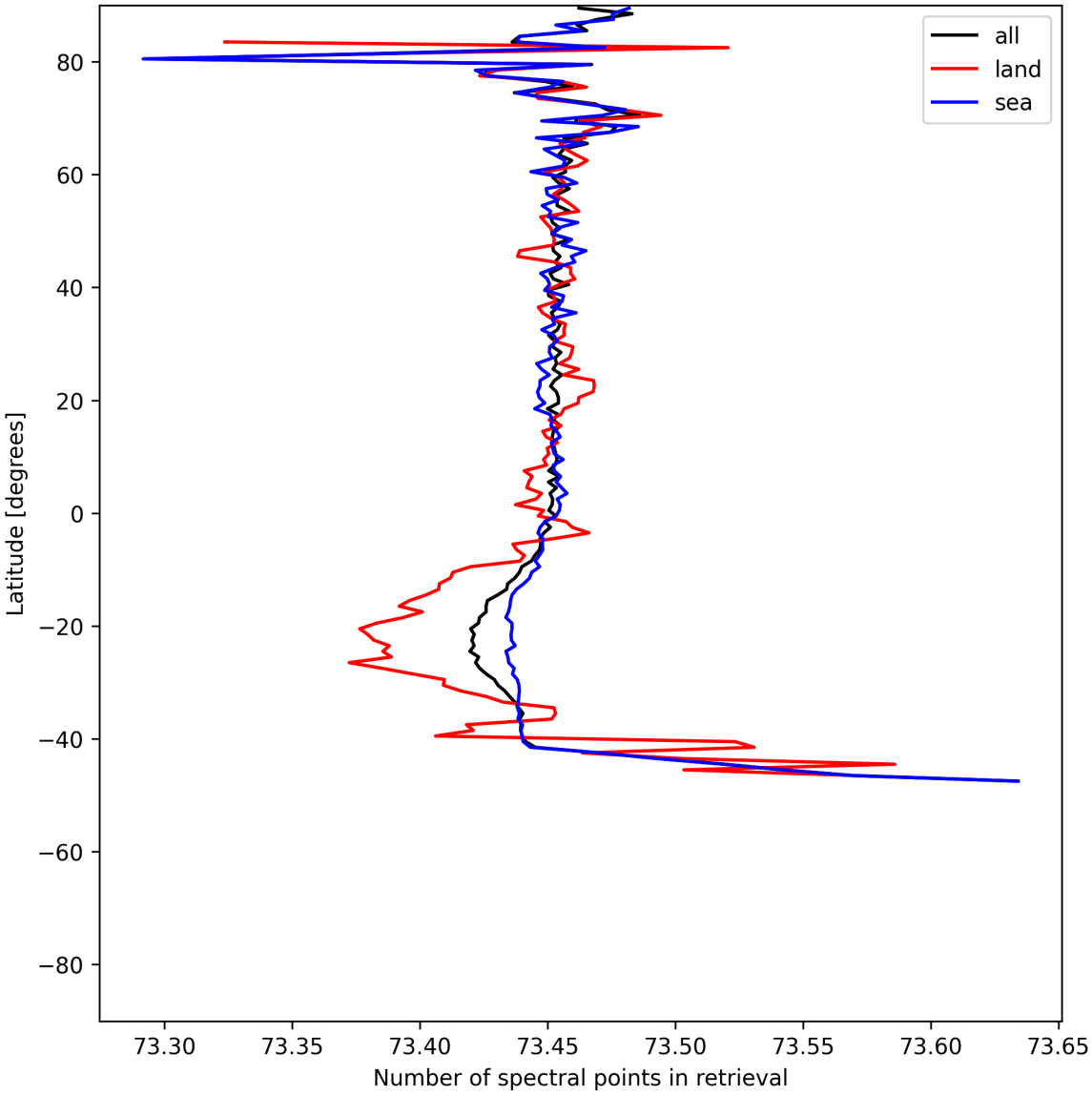


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-05-26 to 2025-05-27.

8 Histograms

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

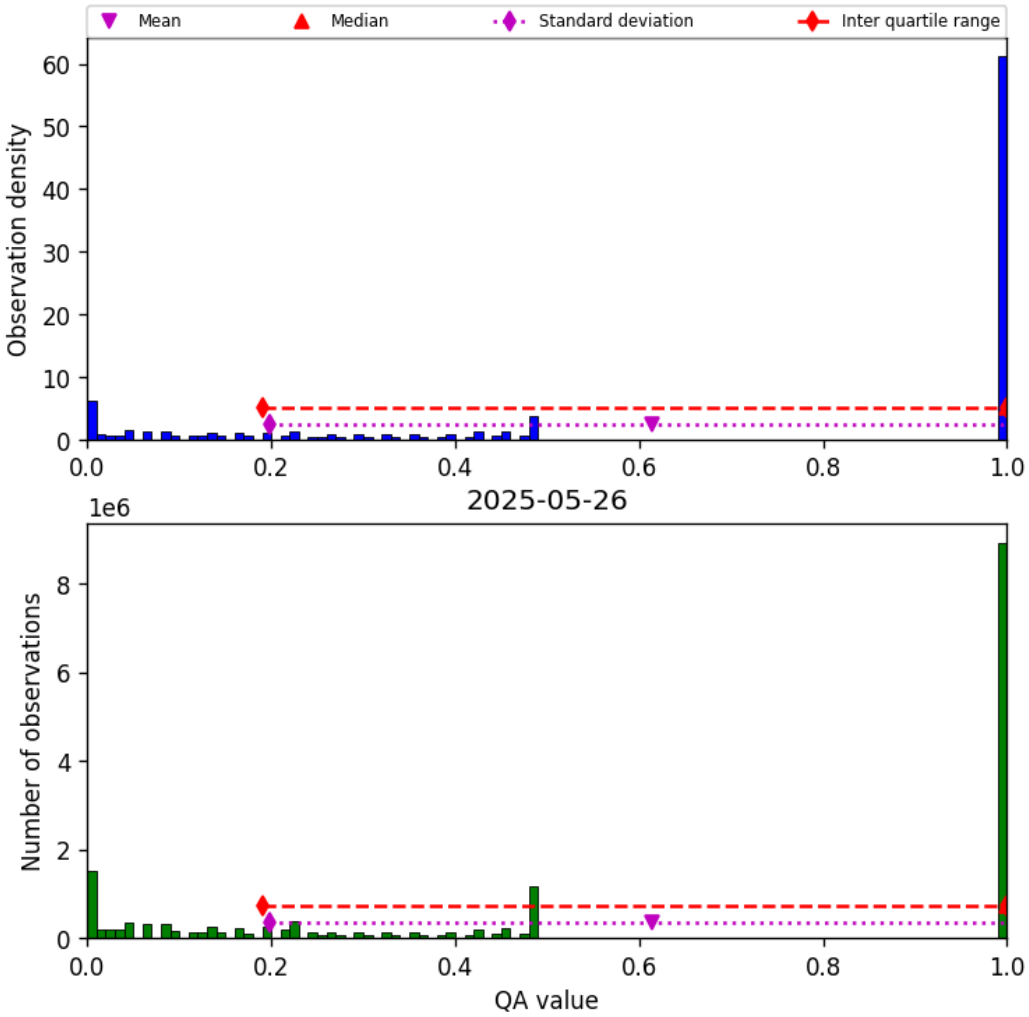


Figure 57: Histogram of “QA value” for 2025-05-26 to 2025-05-27

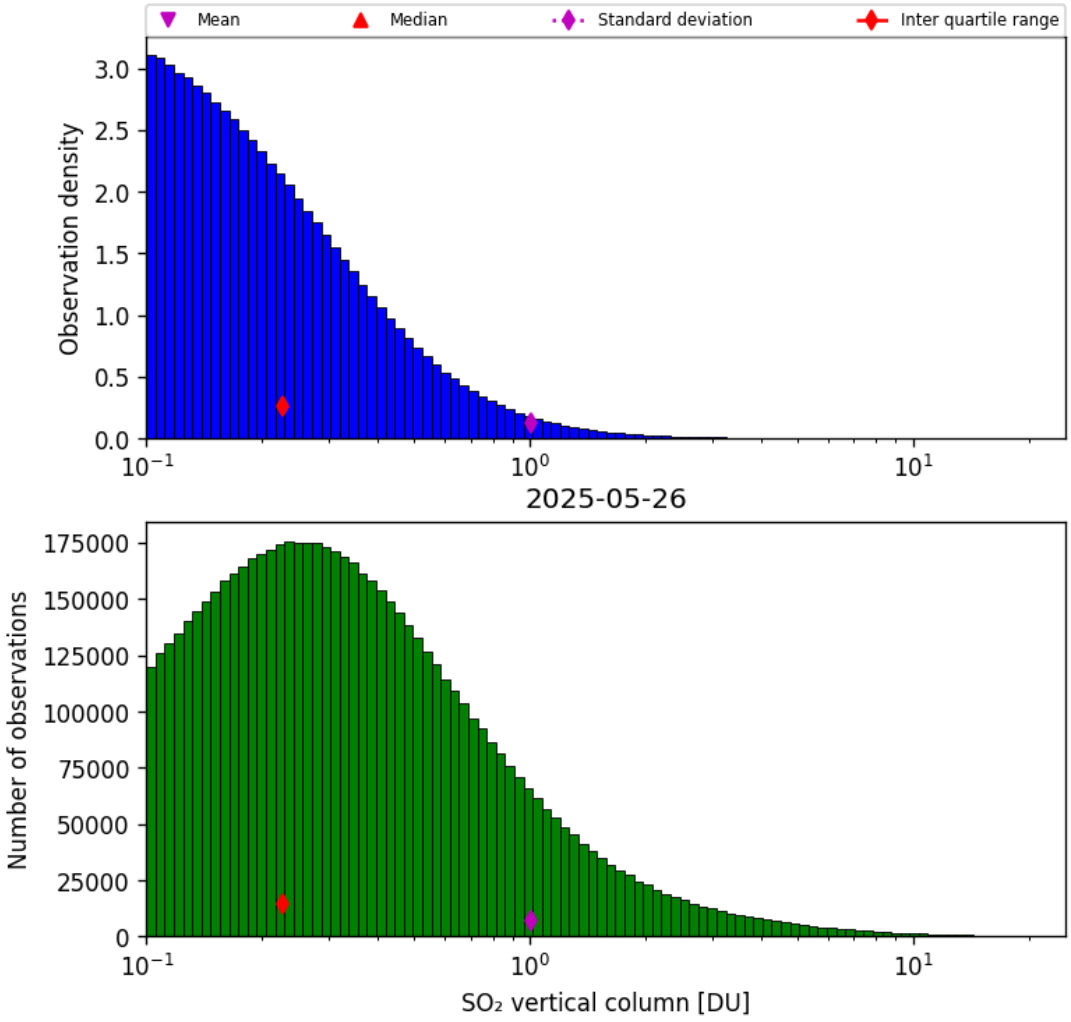


Figure 58: Histogram of "SO_2 vertical column" for 2025-05-26 to 2025-05-27

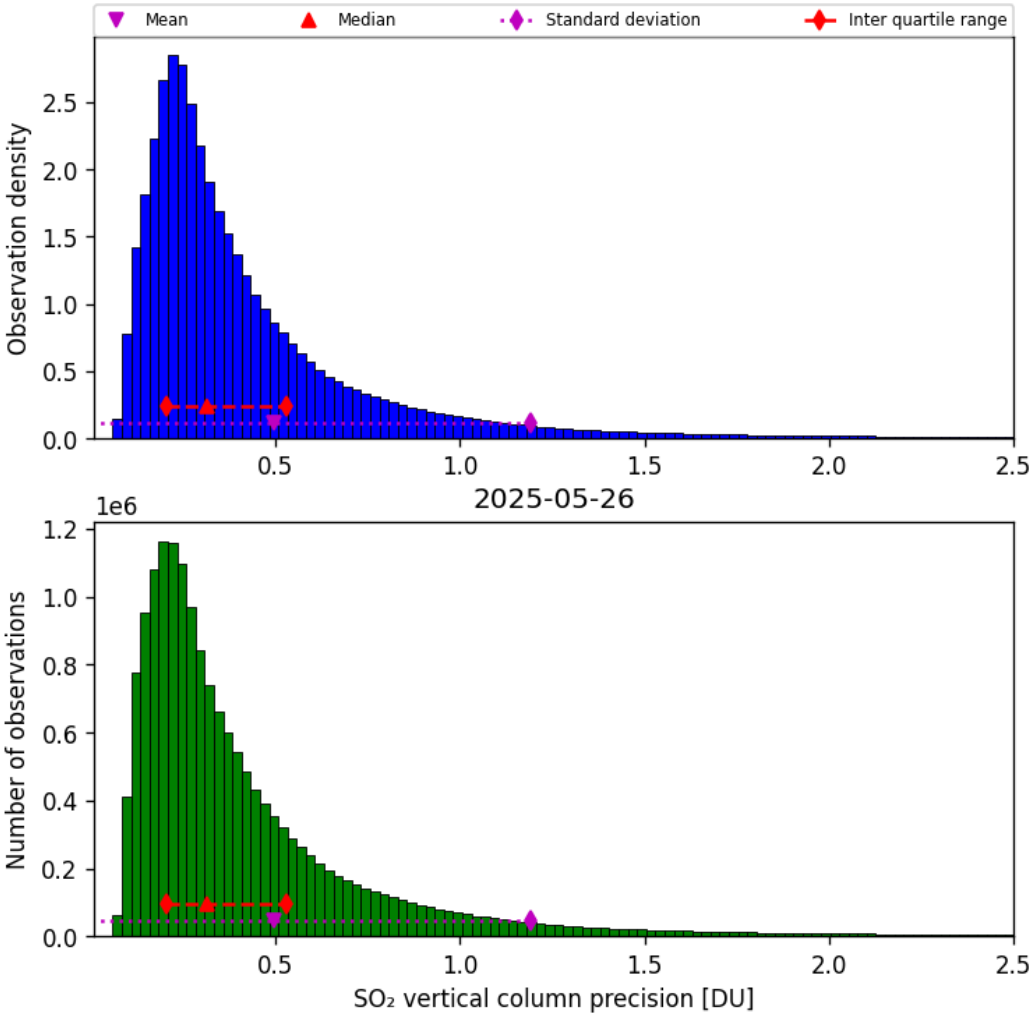


Figure 59: Histogram of "SO_2 vertical column precision" for 2025-05-26 to 2025-05-27

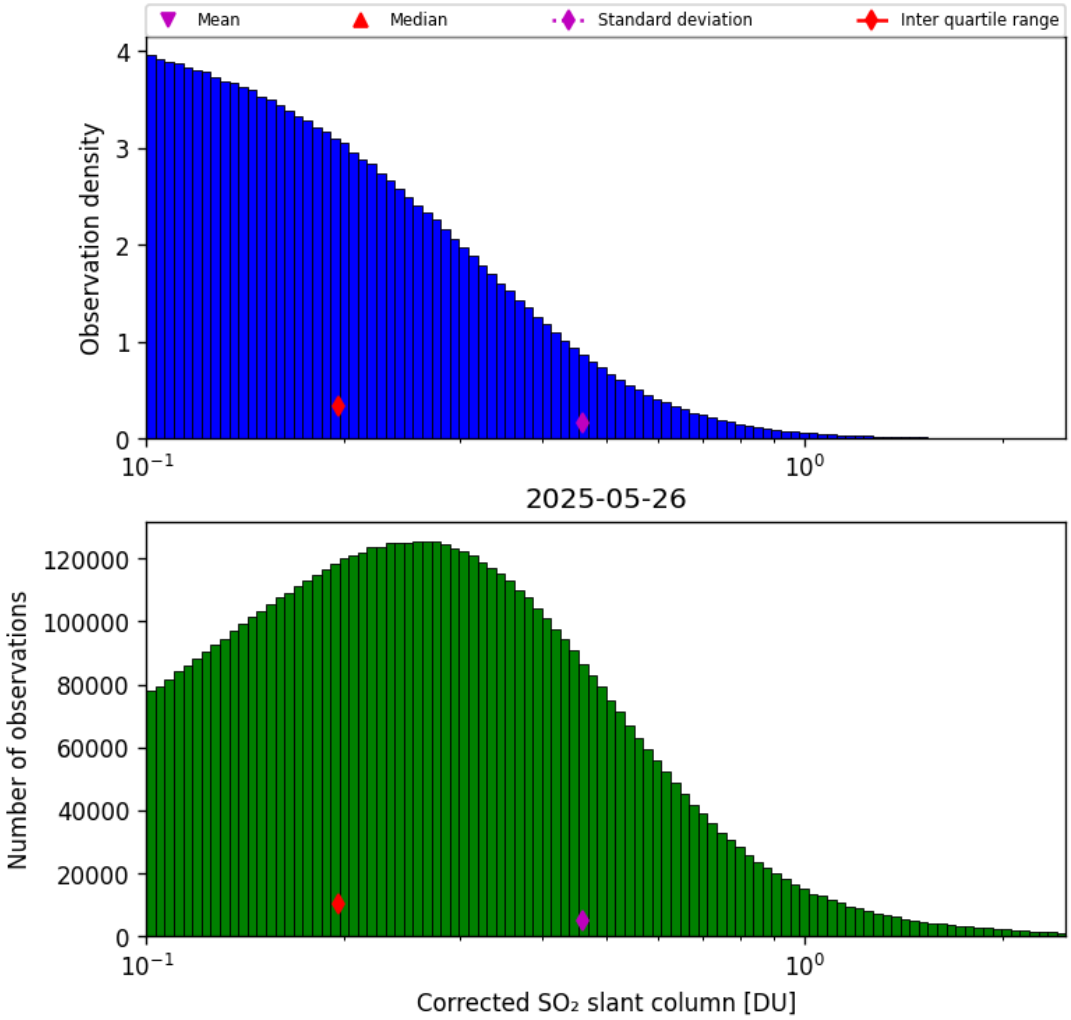


Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-05-26 to 2025-05-27

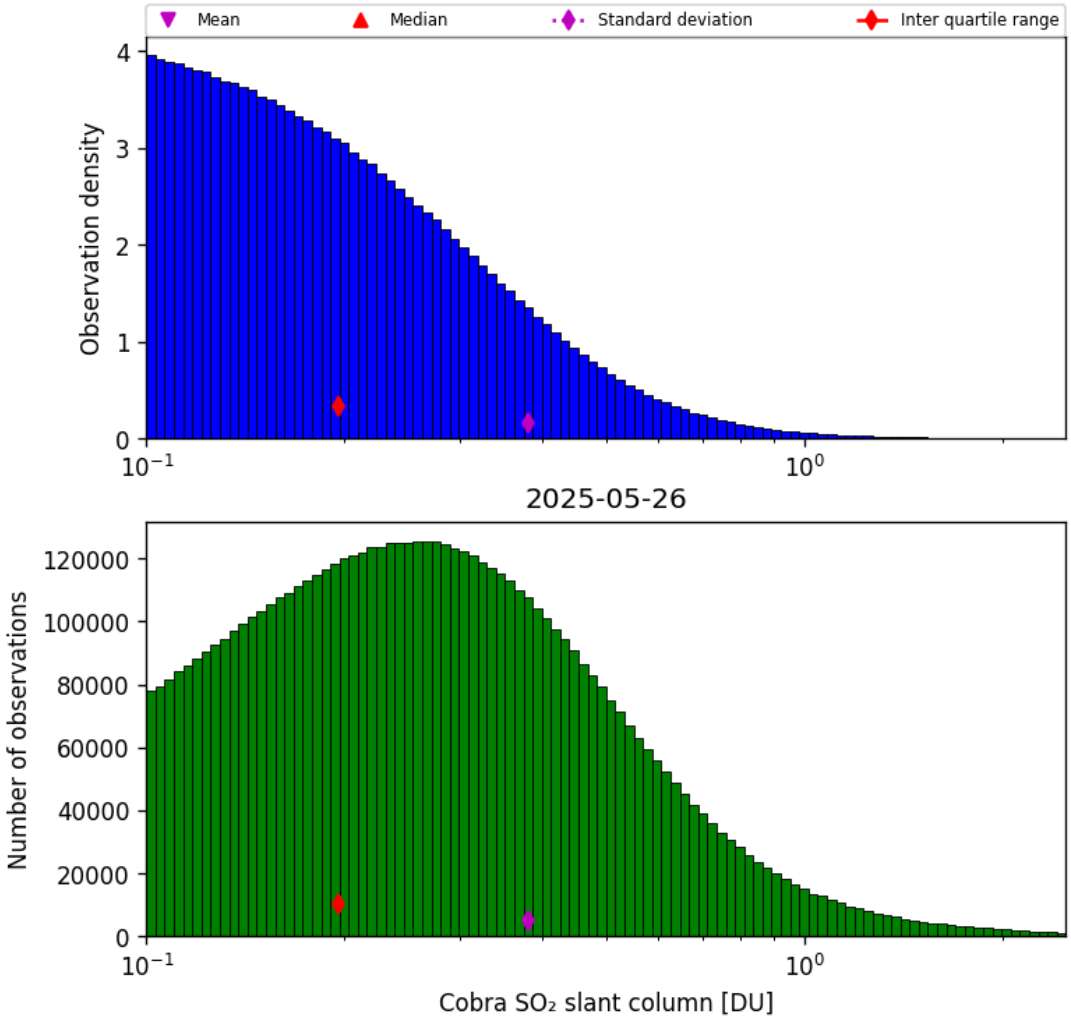


Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-05-26 to 2025-05-27

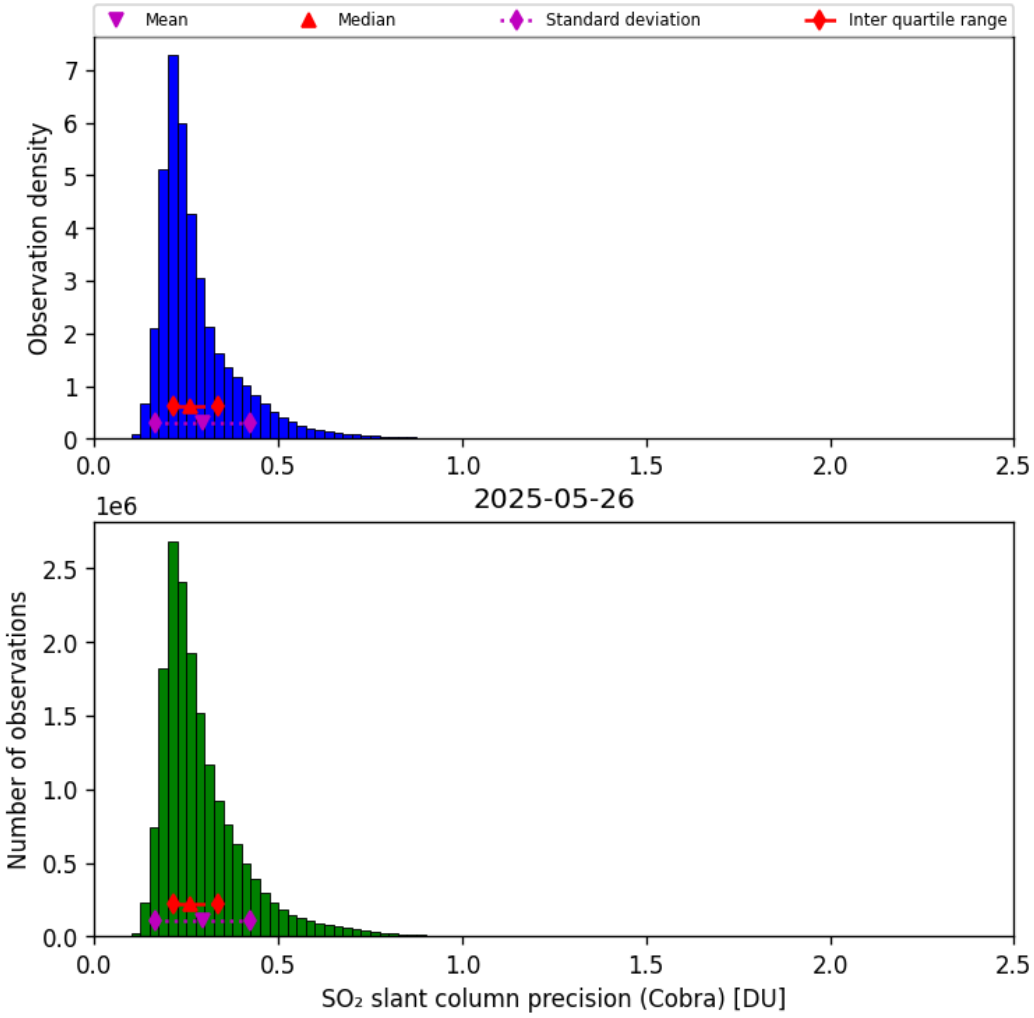


Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-05-26 to 2025-05-27

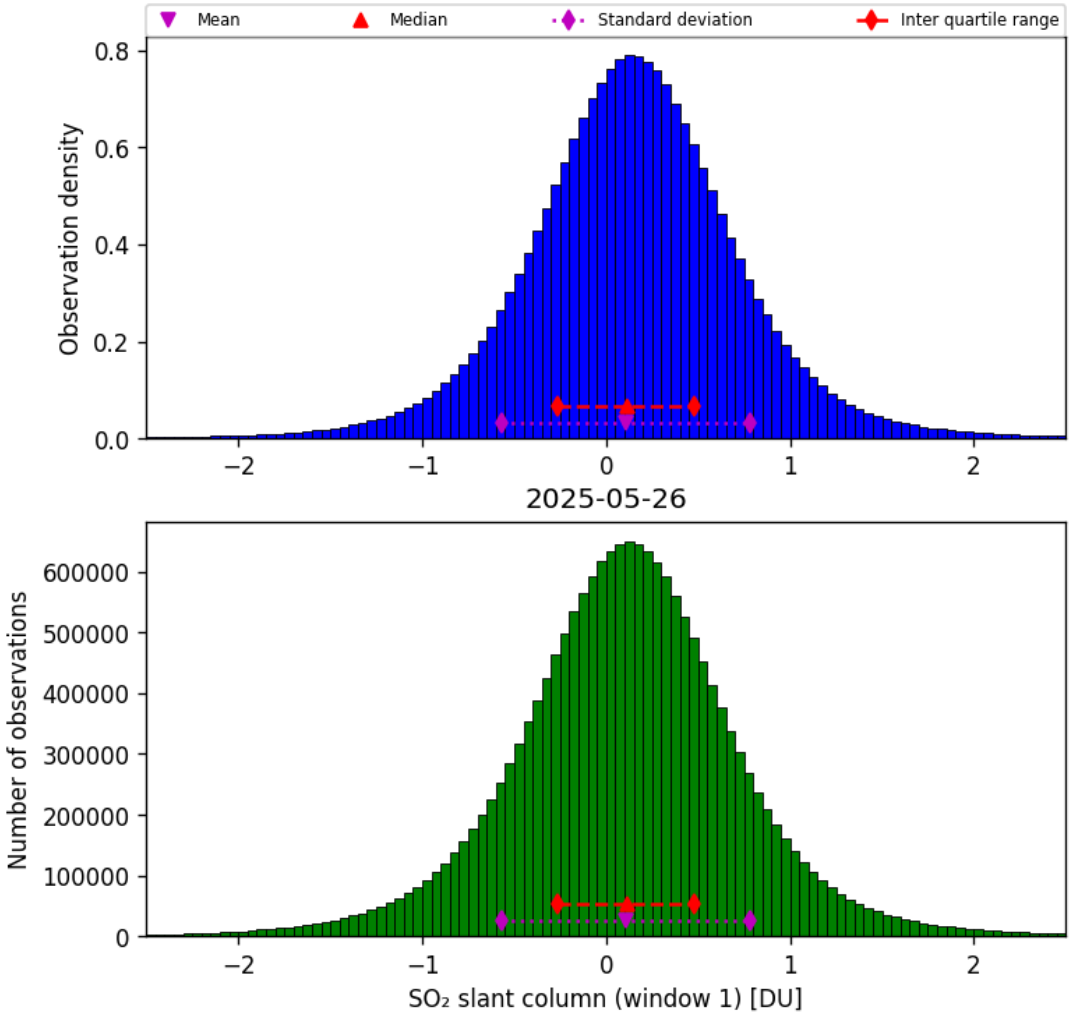


Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-05-26 to 2025-05-27

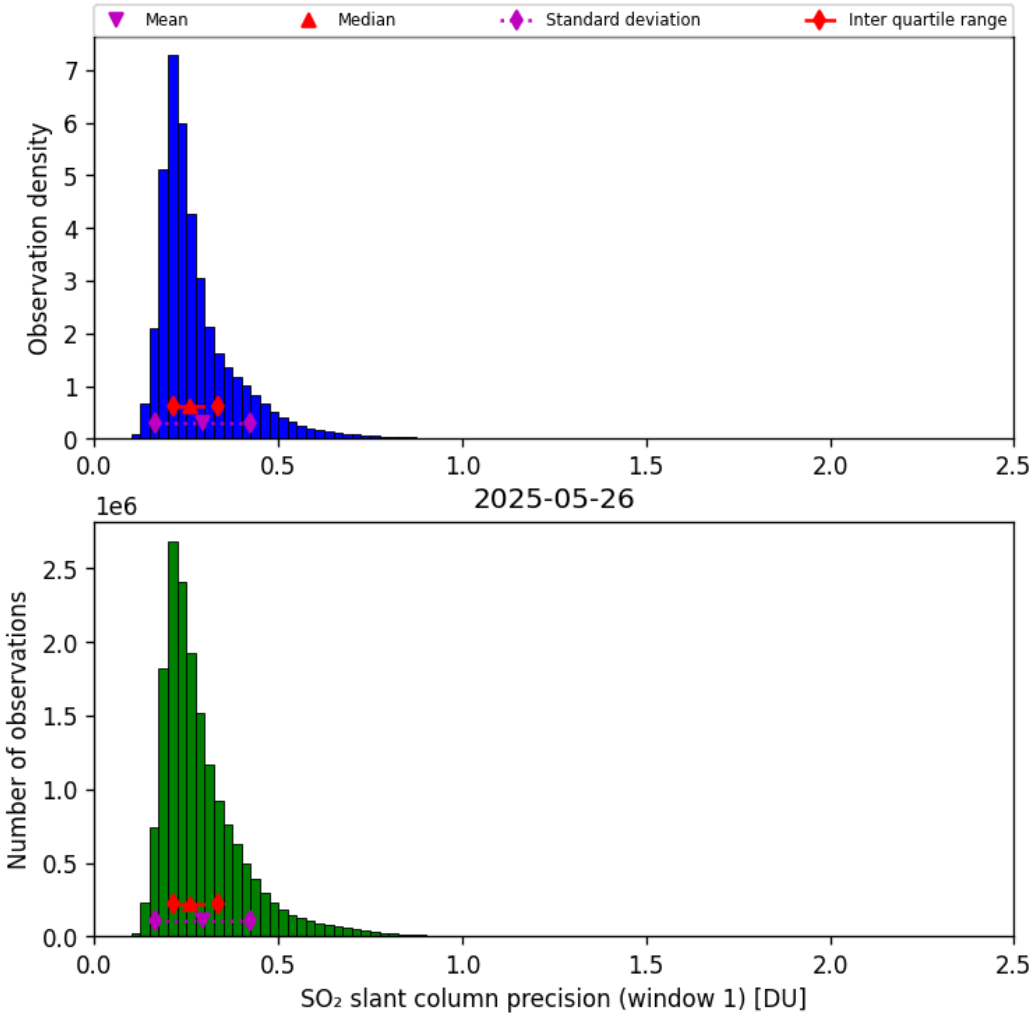


Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-05-26 to 2025-05-27

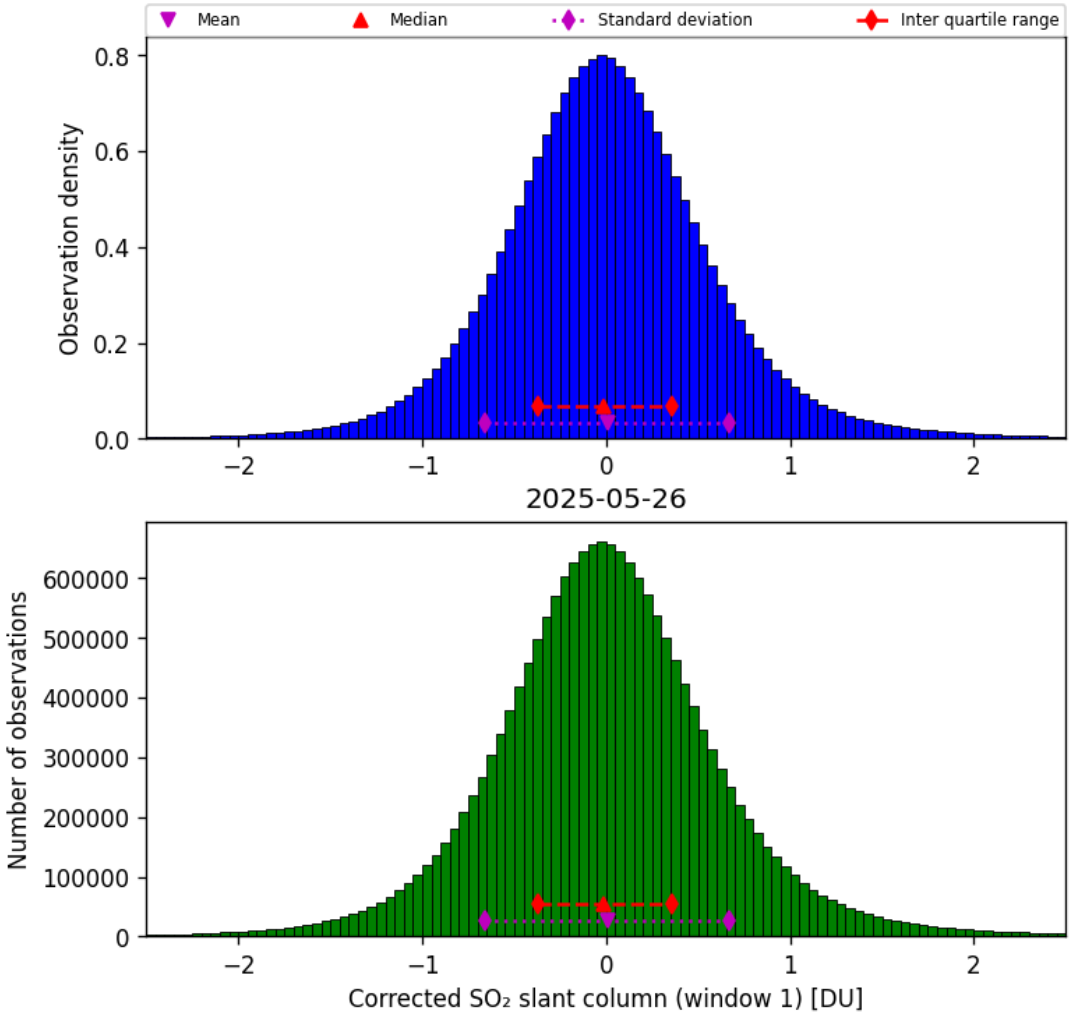


Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-05-26 to 2025-05-27

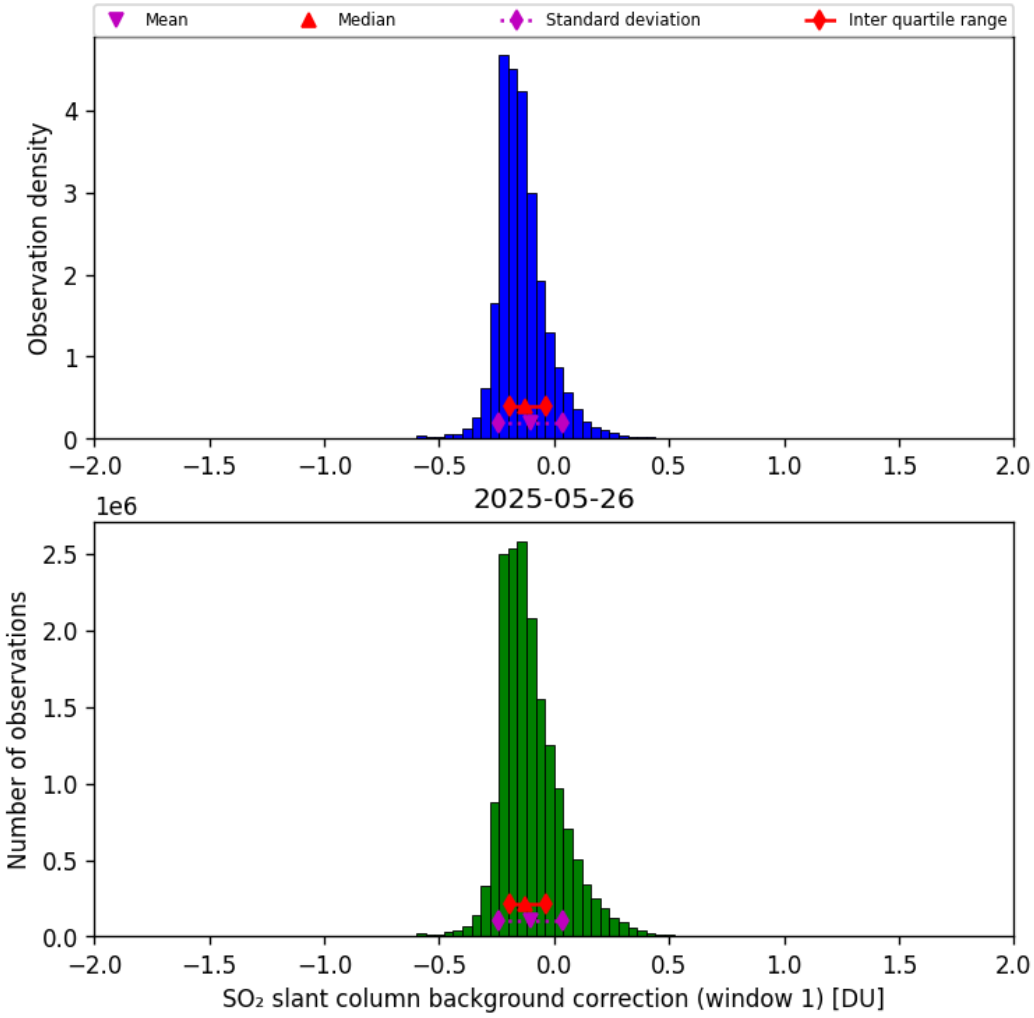


Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-05-26 to 2025-05-27

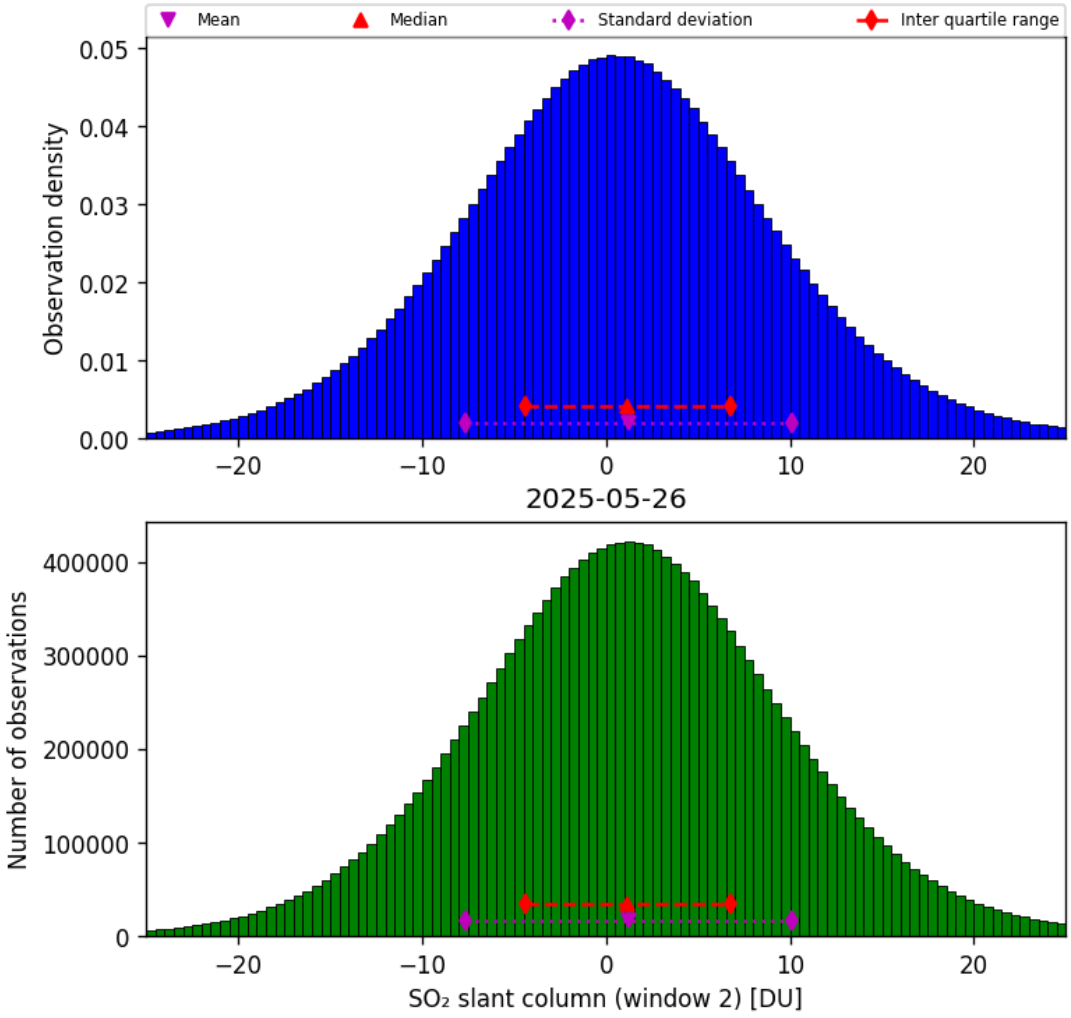


Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-05-26 to 2025-05-27

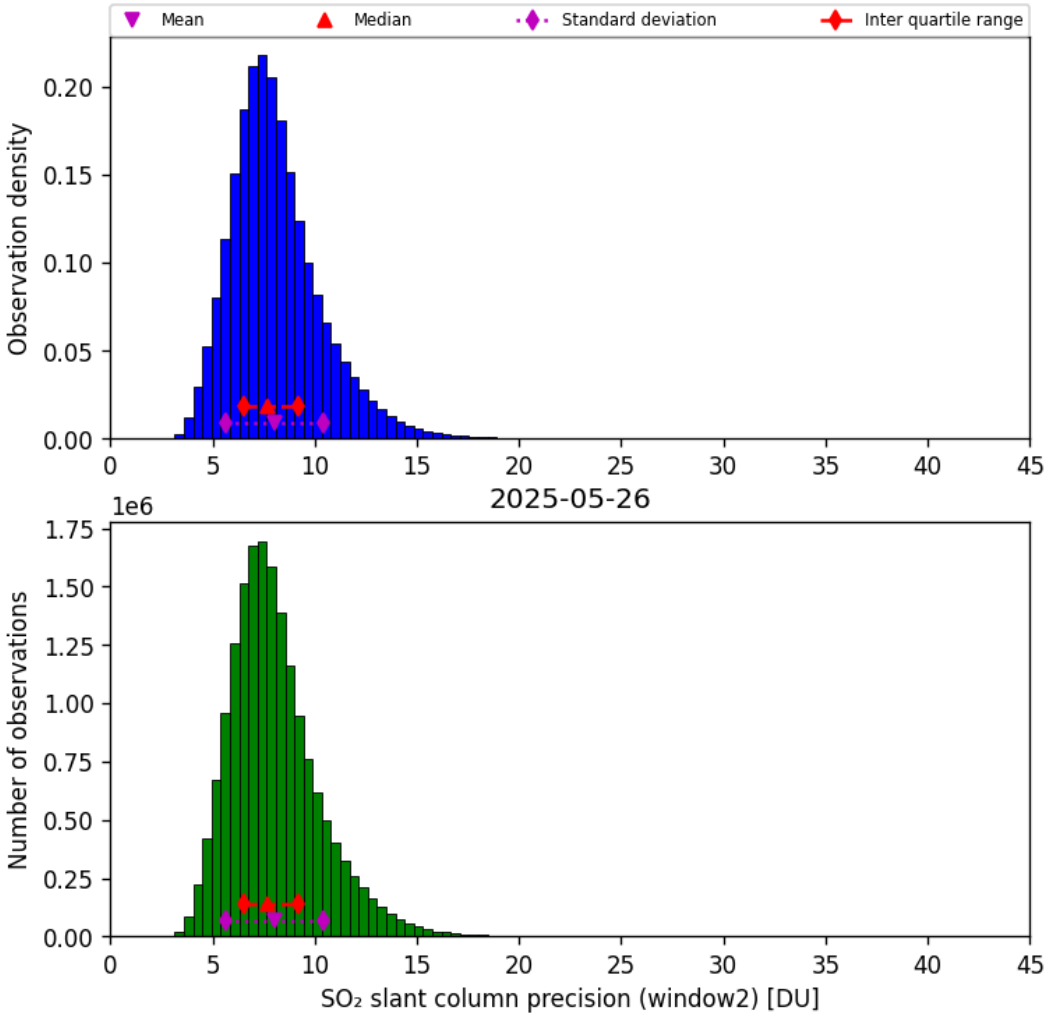


Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-05-26 to 2025-05-27

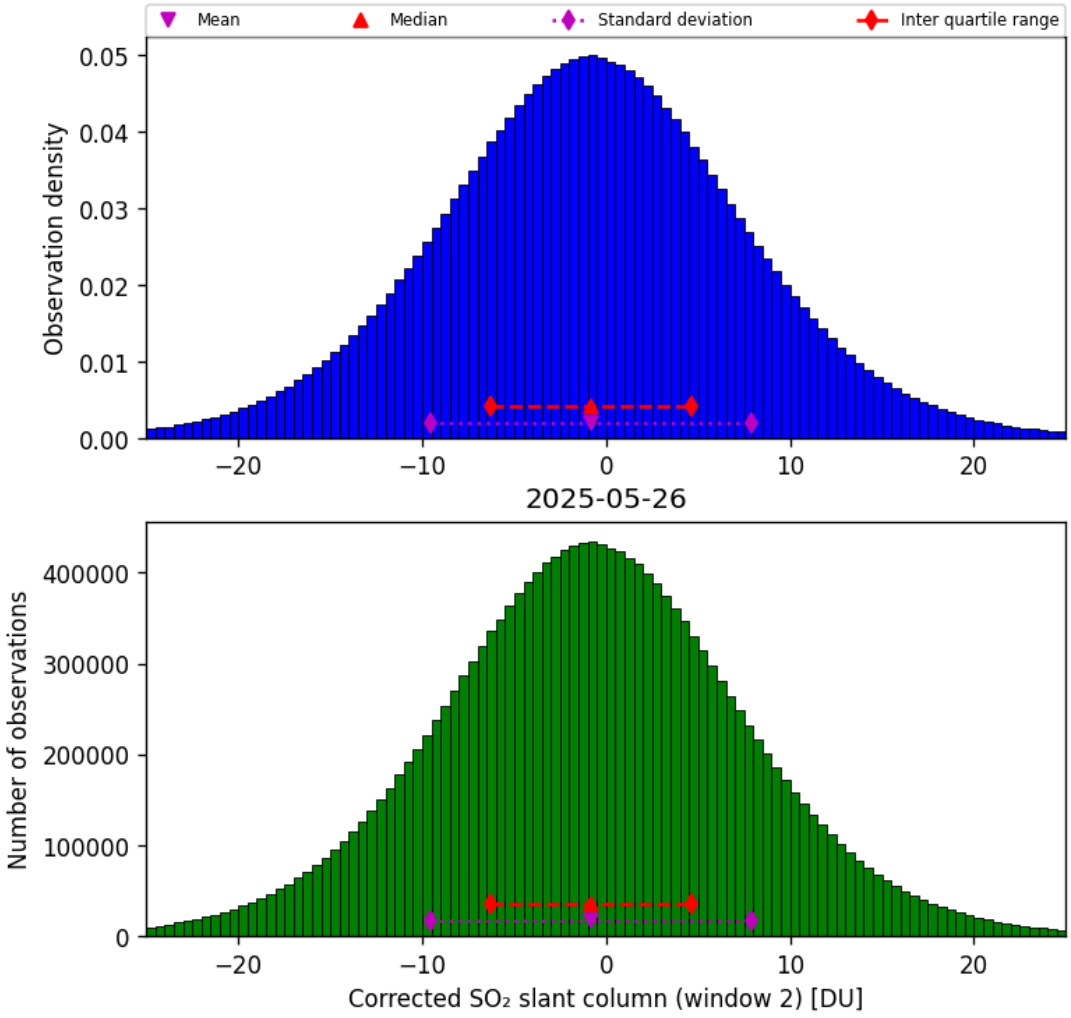


Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-05-26 to 2025-05-27

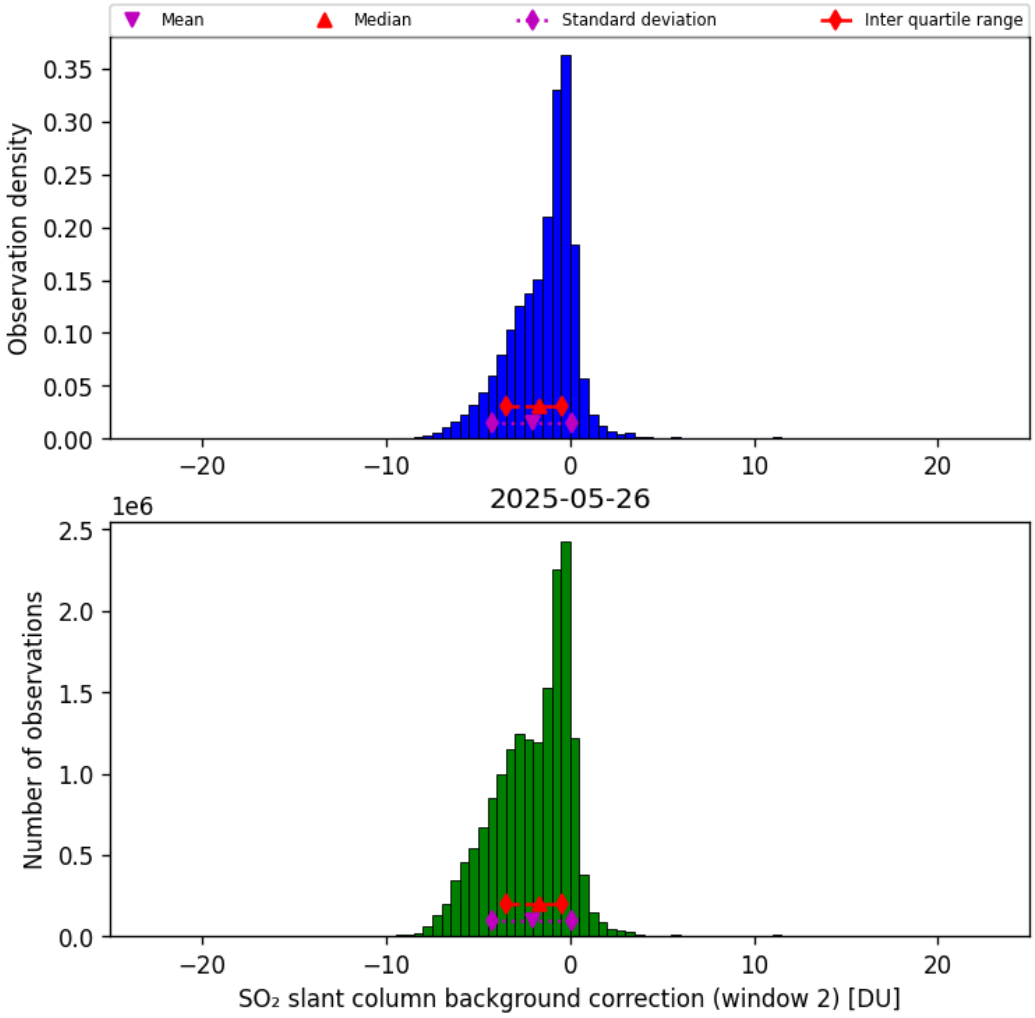


Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-05-26 to 2025-05-27

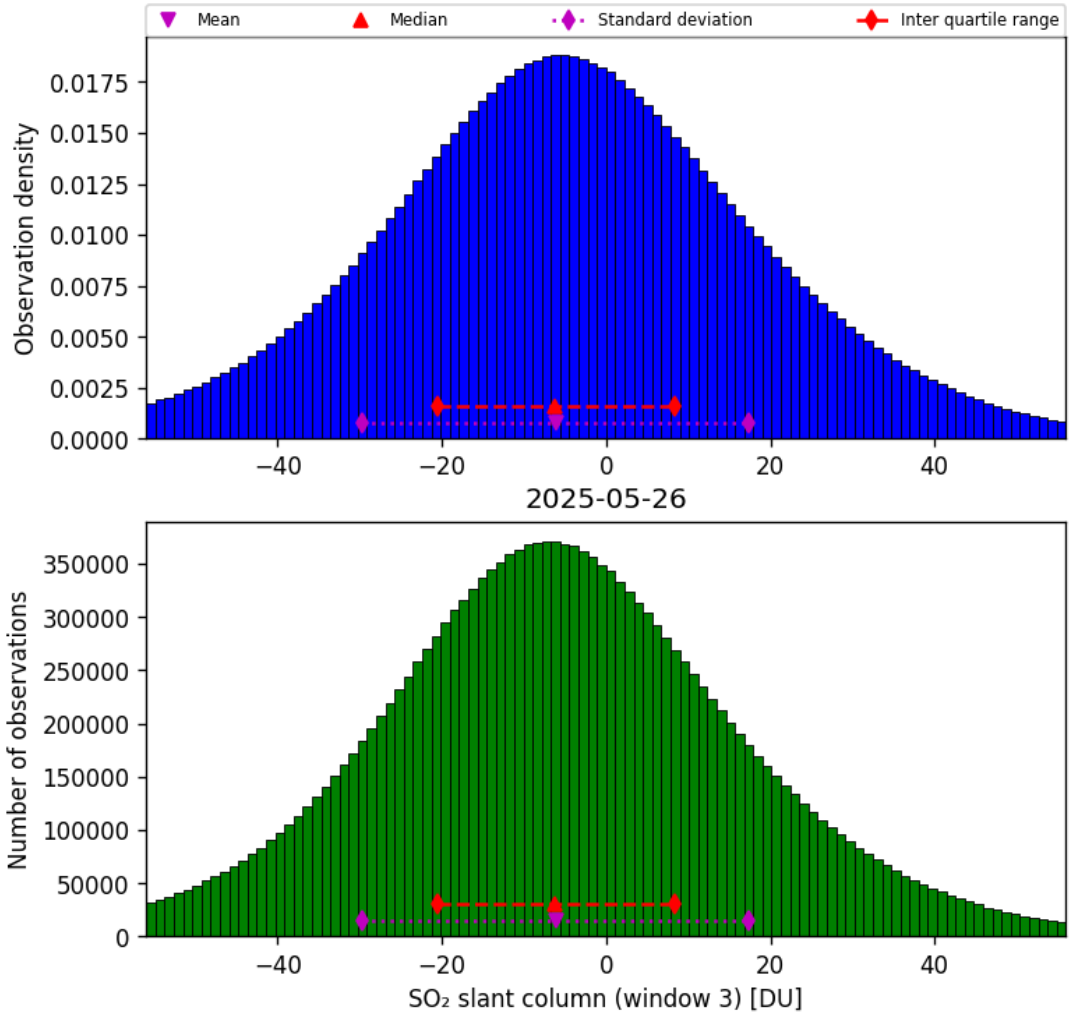


Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-05-26 to 2025-05-27

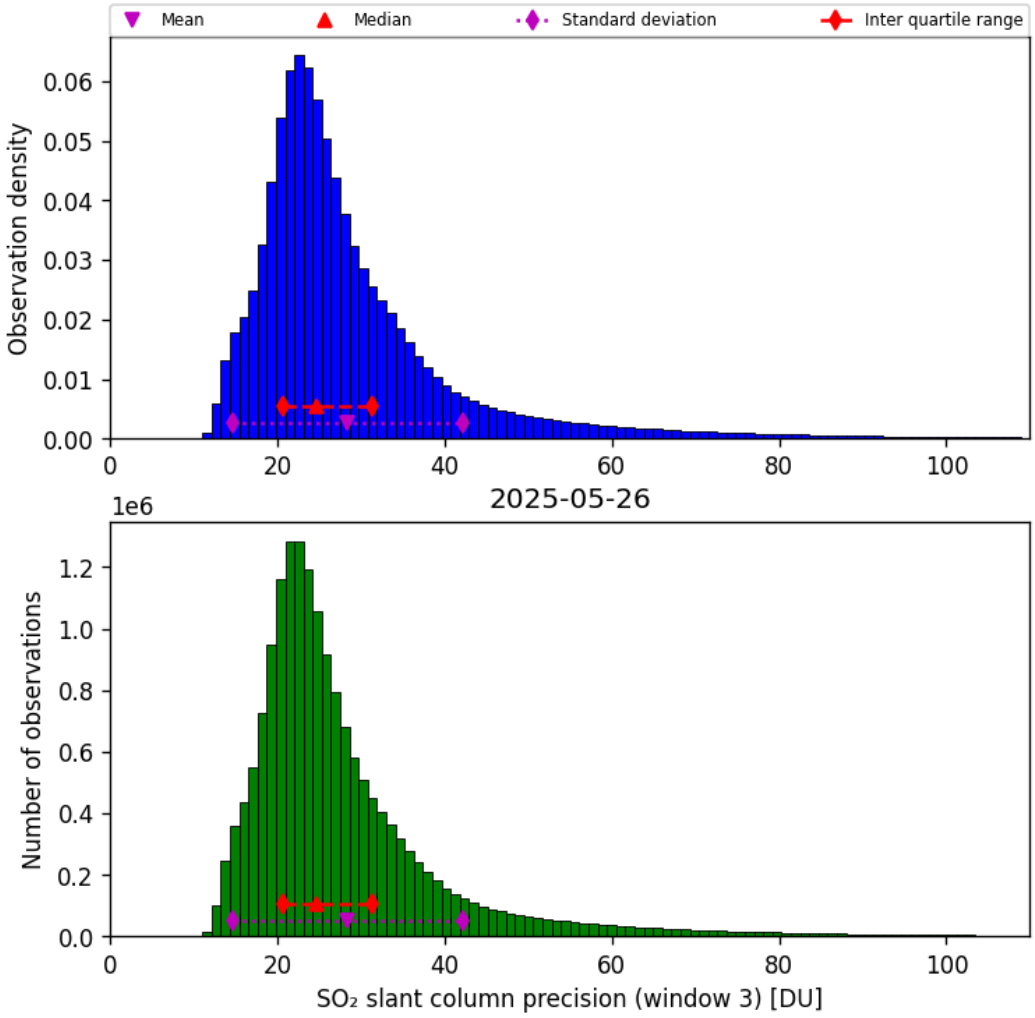


Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-05-26 to 2025-05-27

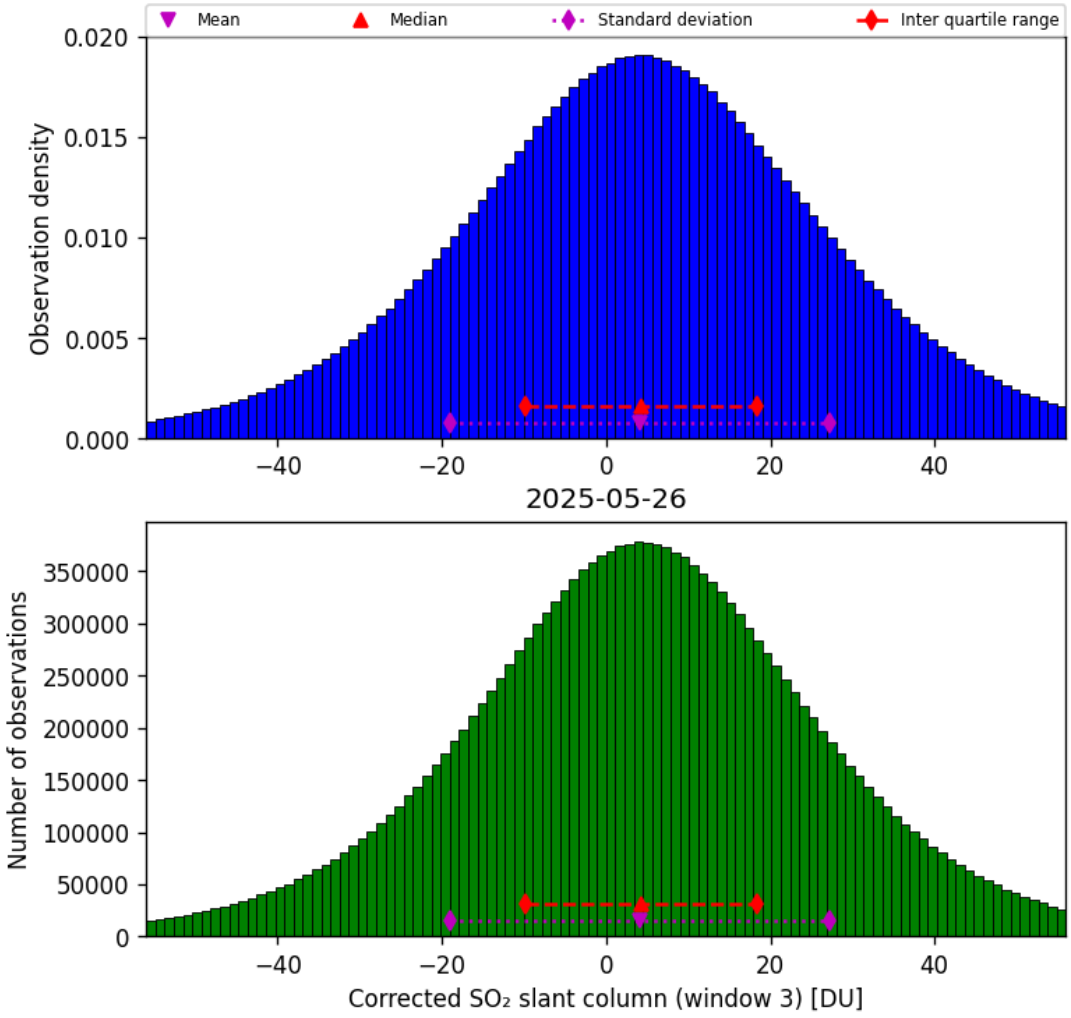


Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-05-26 to 2025-05-27

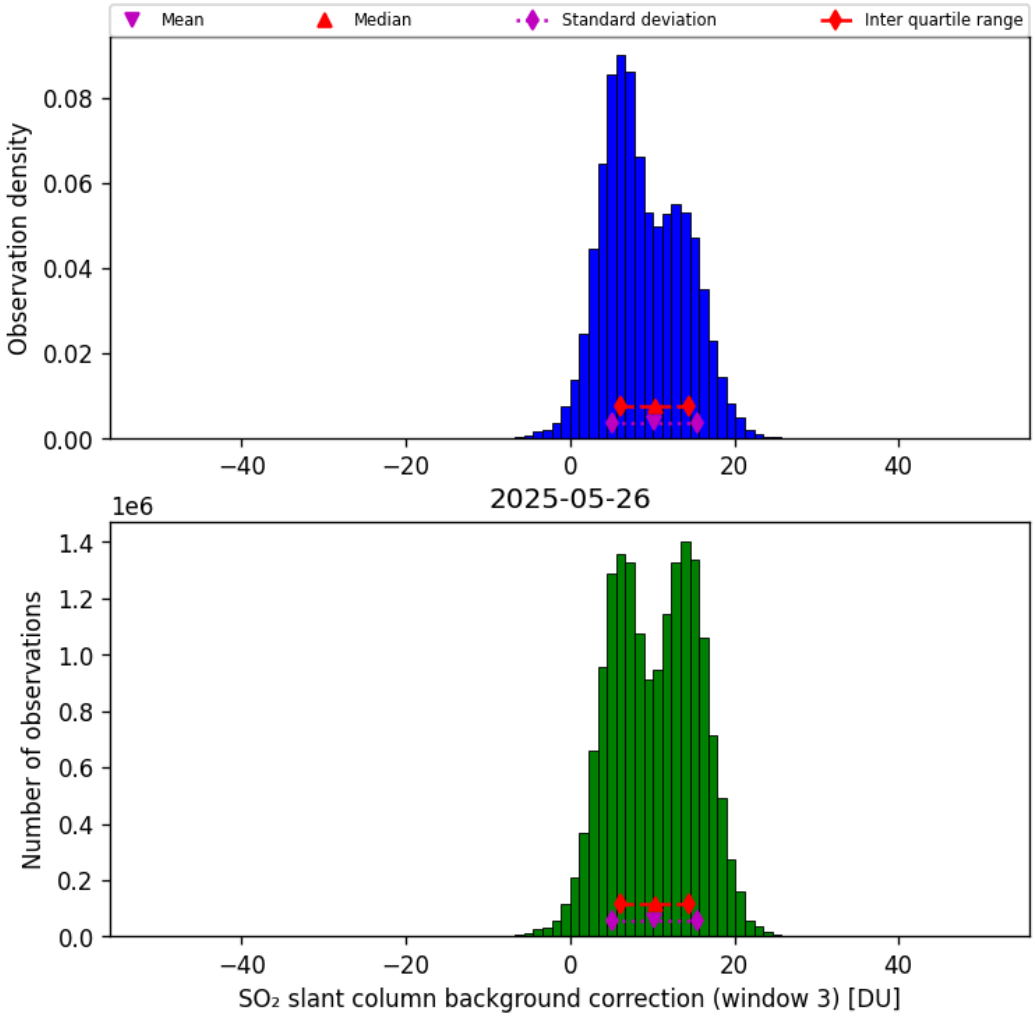


Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-05-26 to 2025-05-27

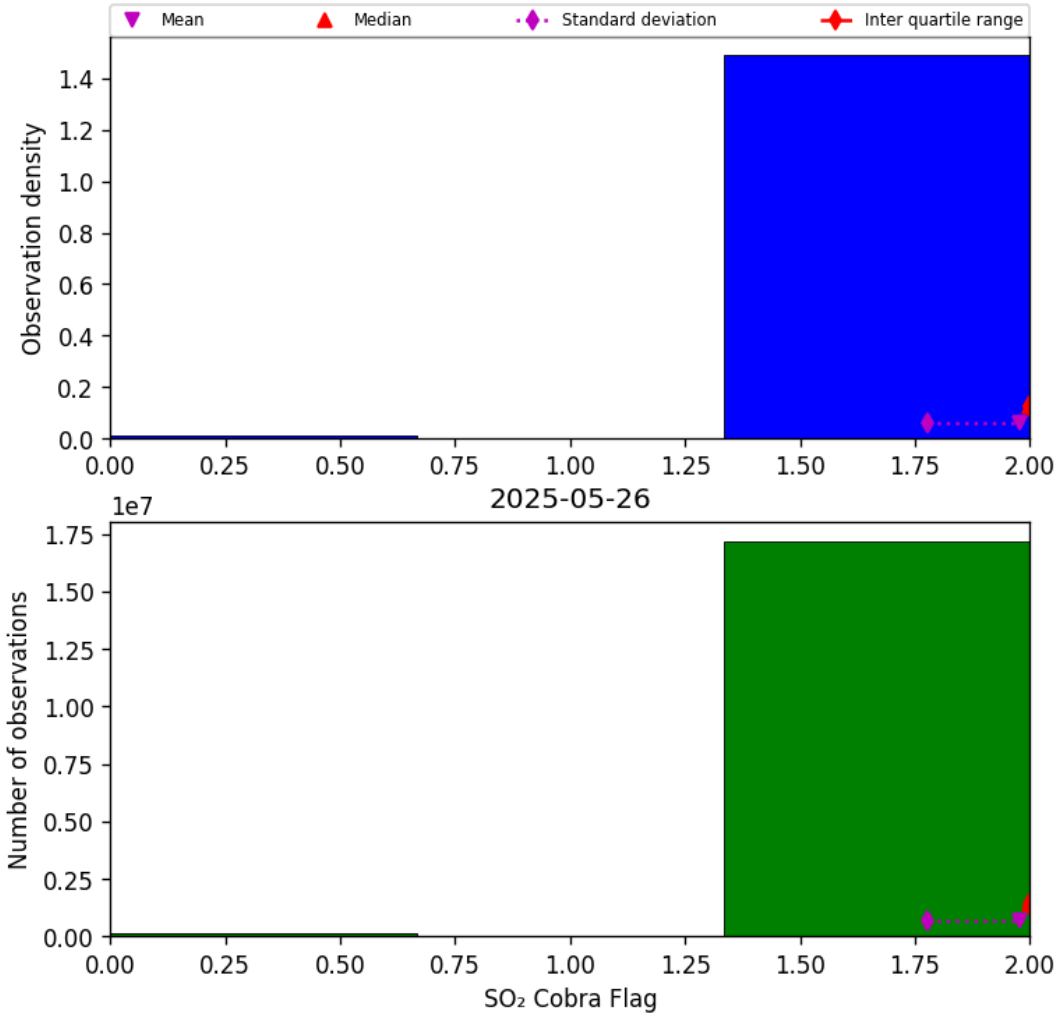


Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-05-26 to 2025-05-27

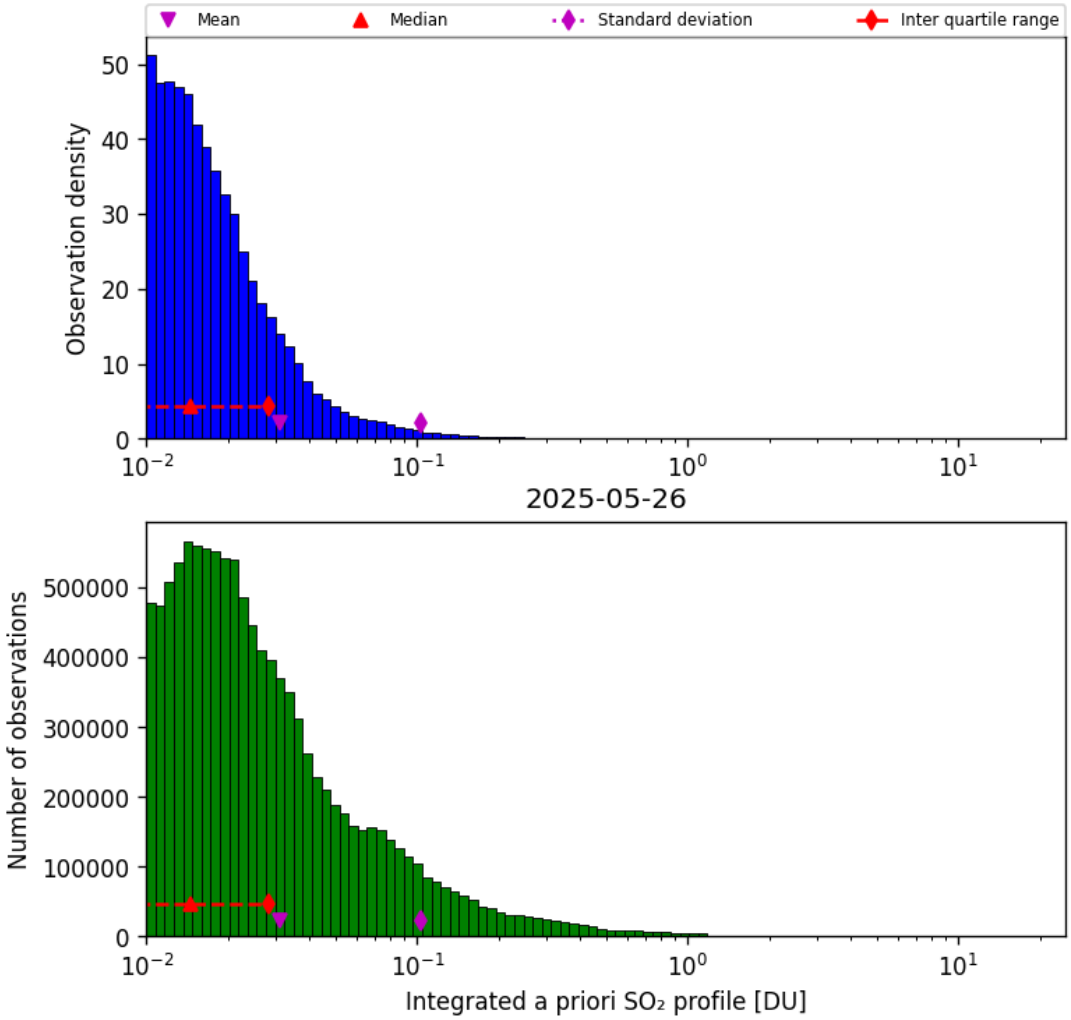


Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-05-26 to 2025-05-27

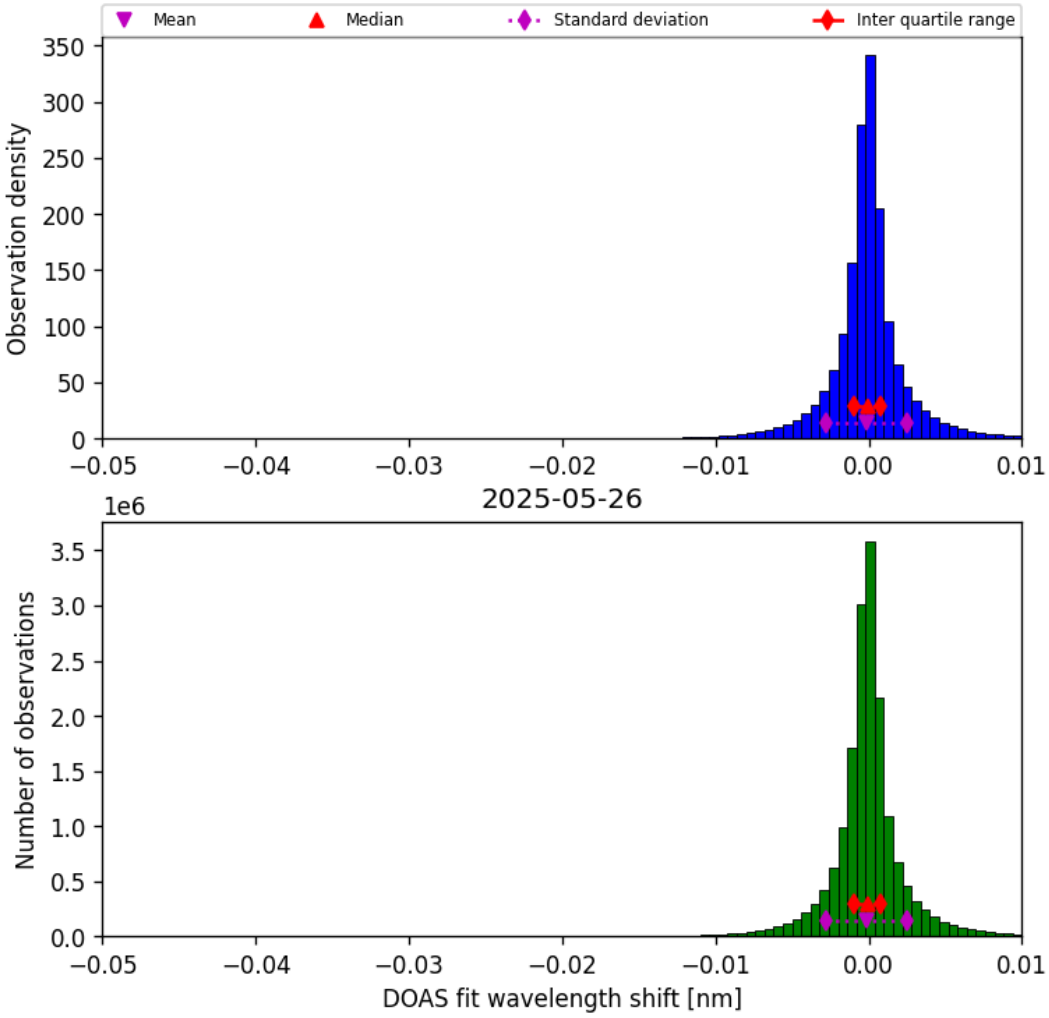


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-05-26 to 2025-05-27

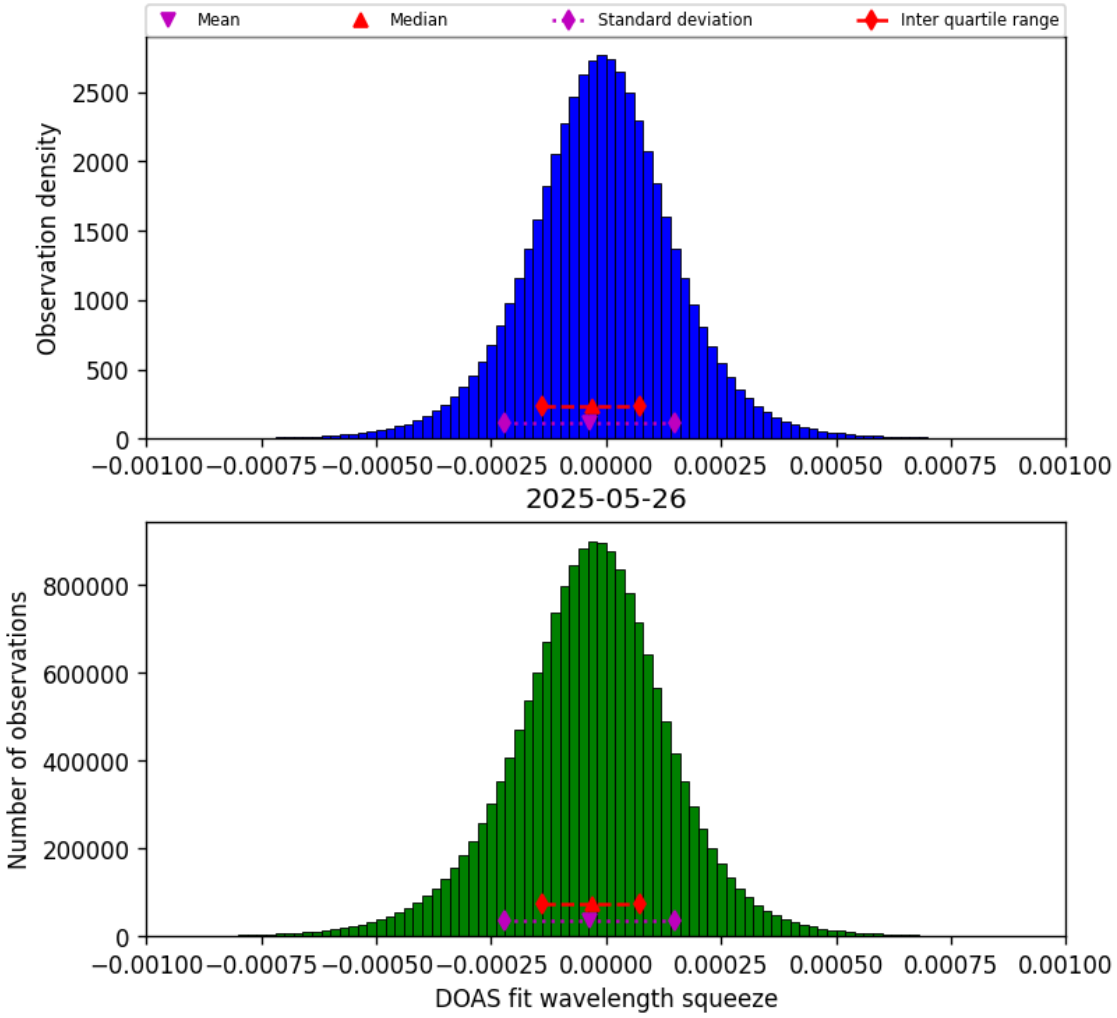


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-05-26 to 2025-05-27

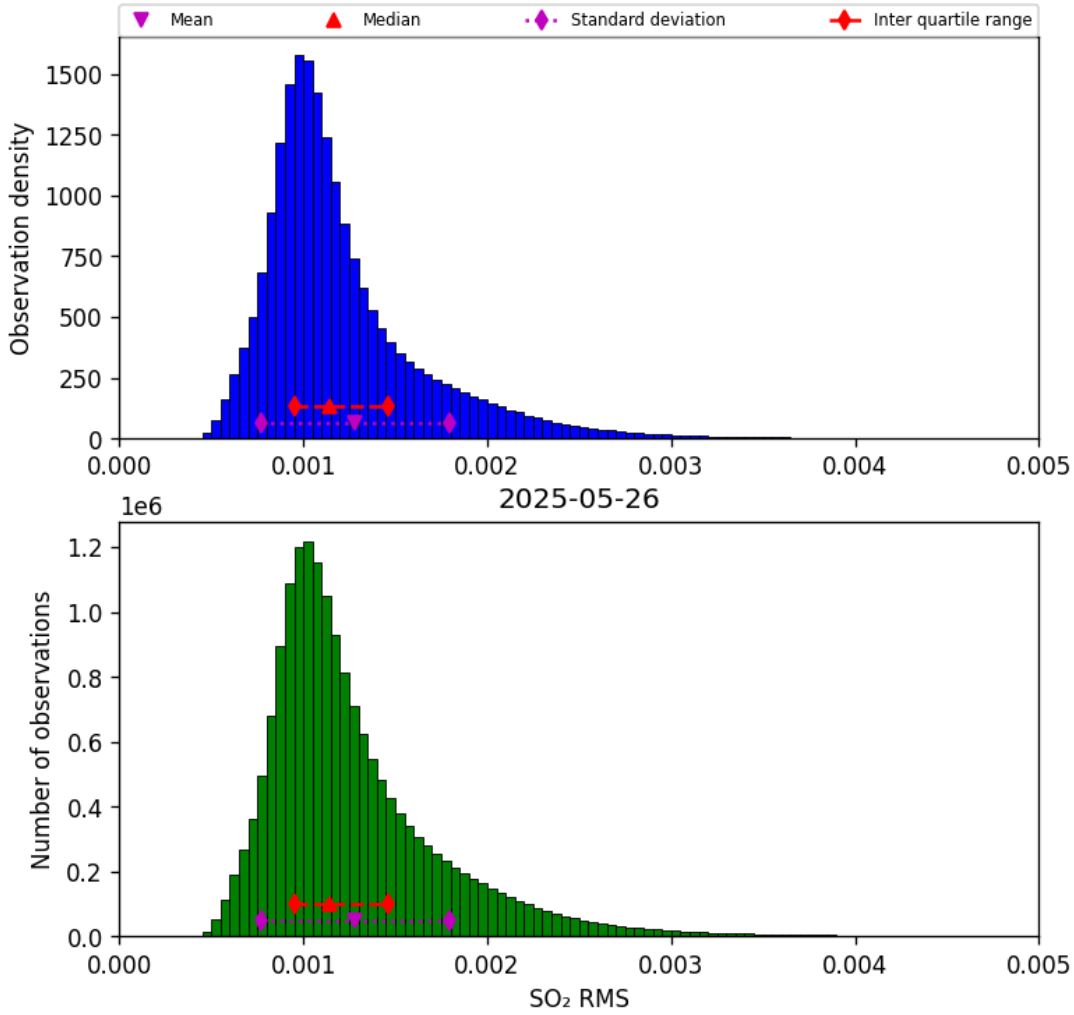


Figure 79: Histogram of "SO_2 RMS" for 2025-05-26 to 2025-05-27

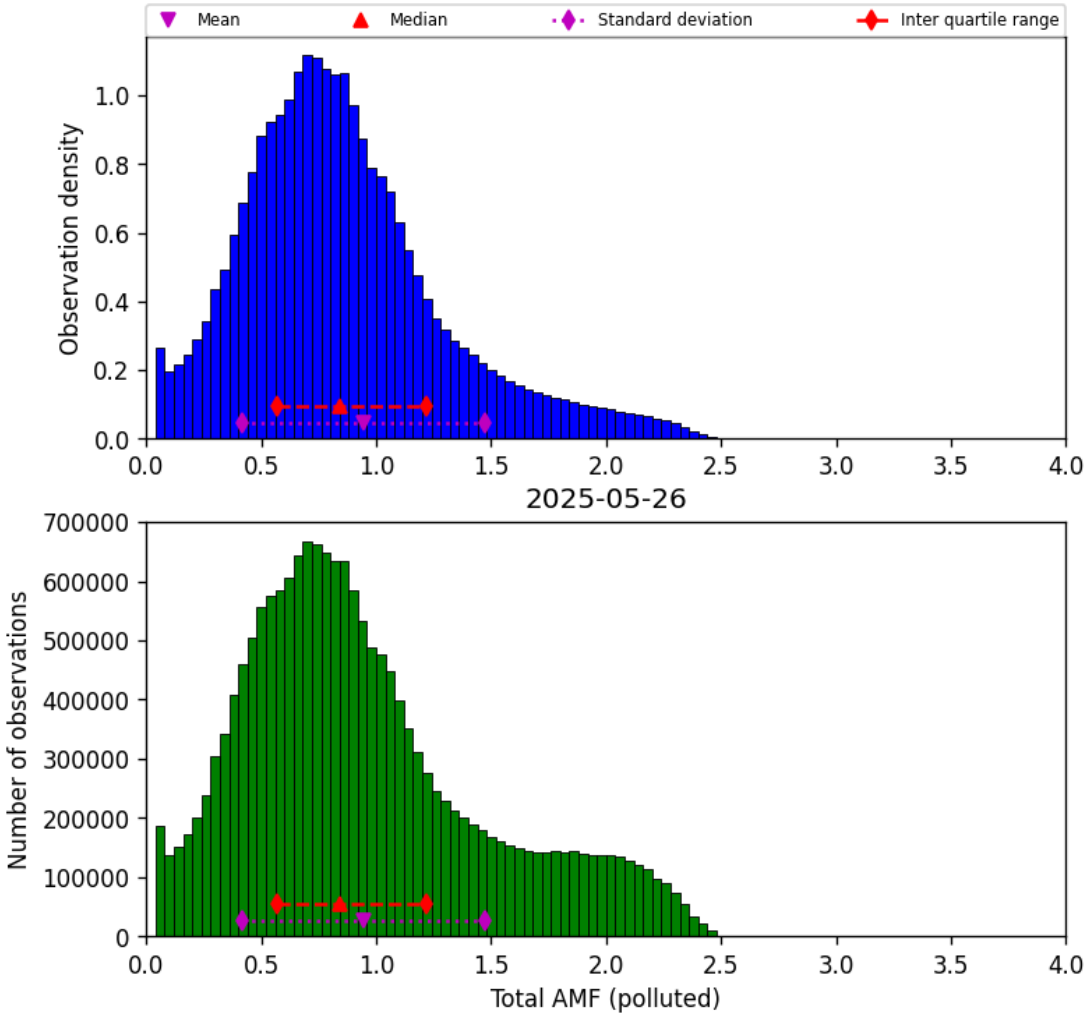


Figure 80: Histogram of “Total AMF (polluted)” for 2025-05-26 to 2025-05-27

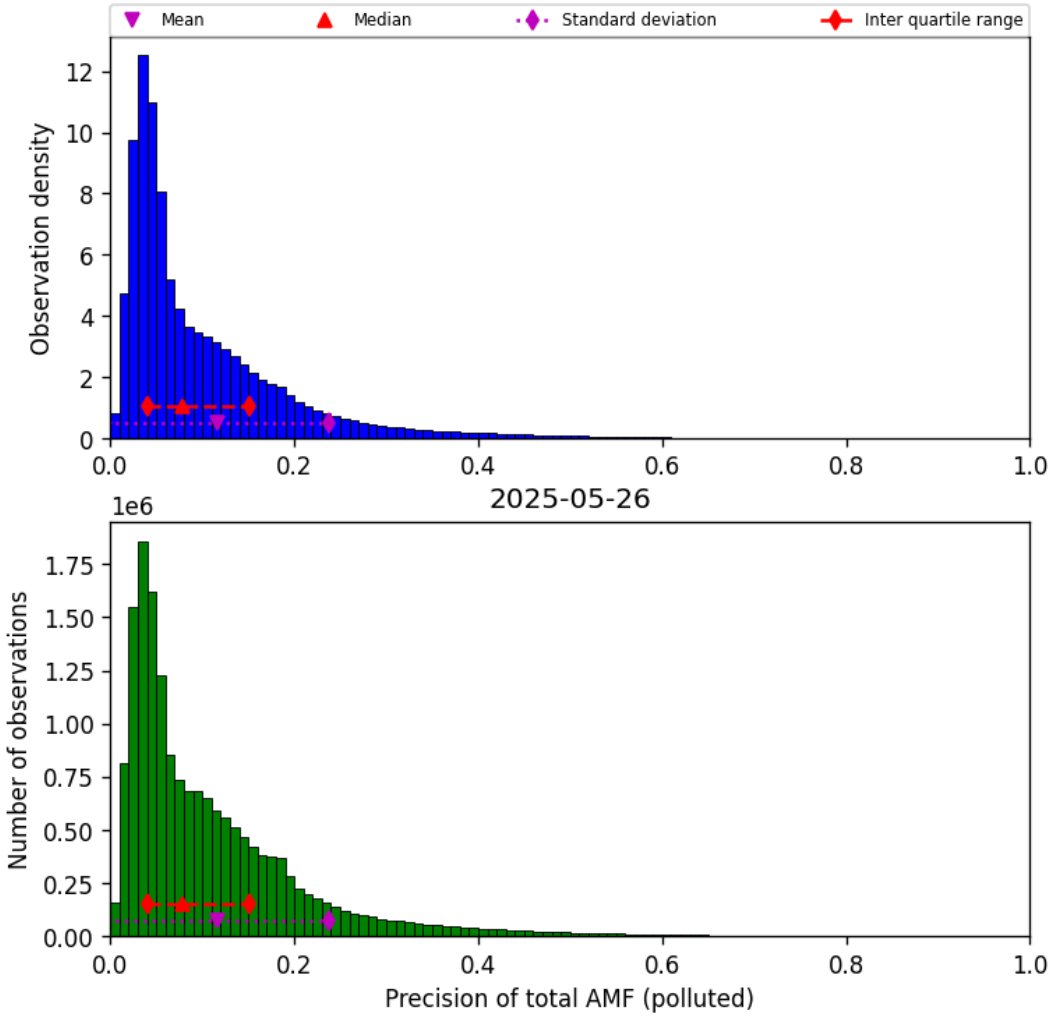


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-05-26 to 2025-05-27

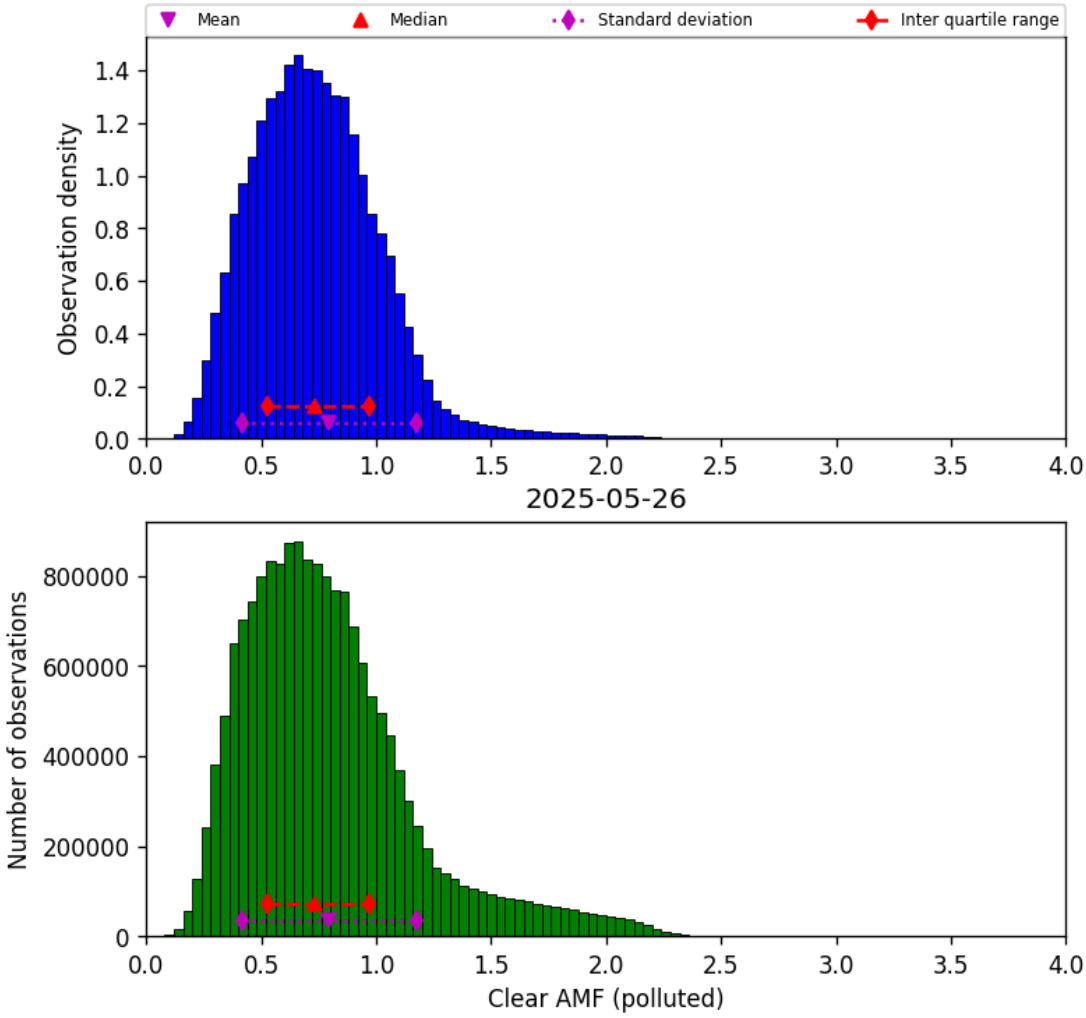


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-05-26 to 2025-05-27

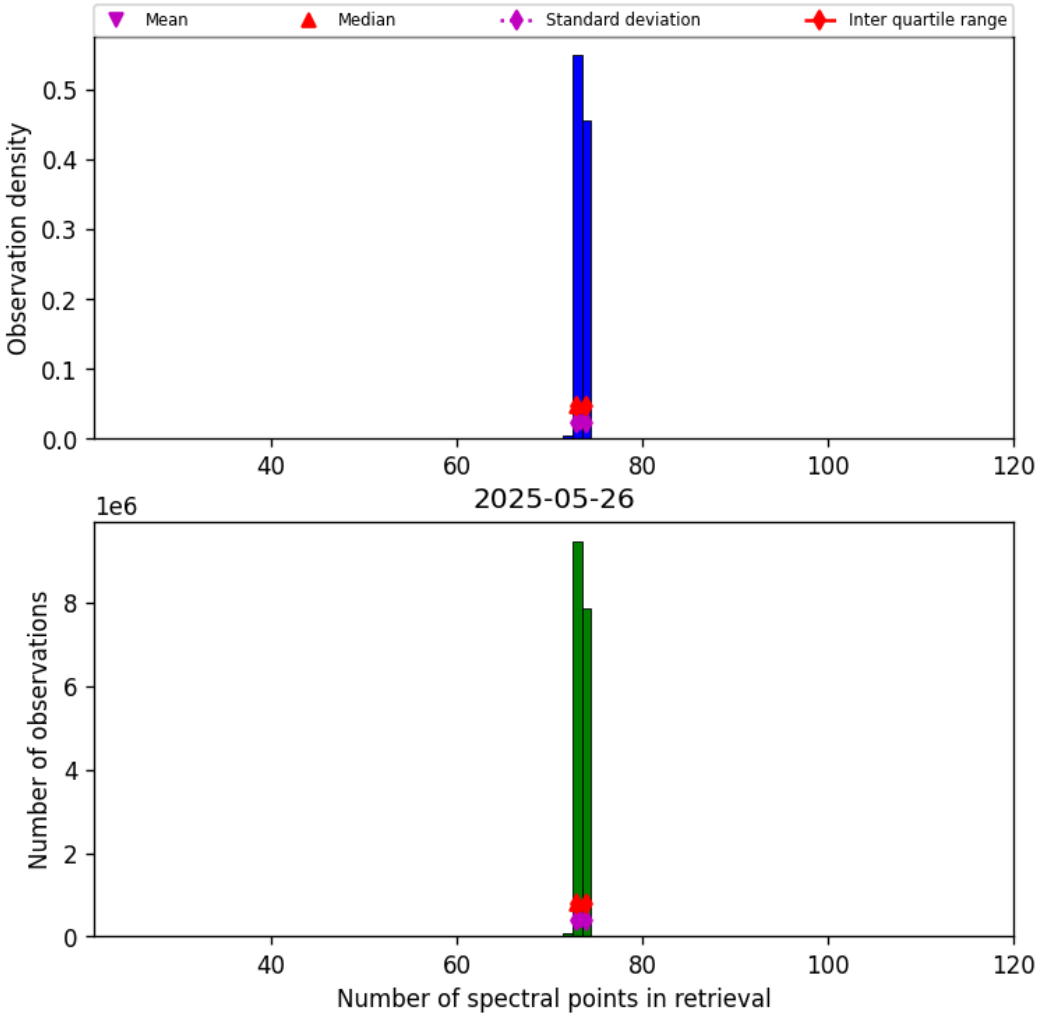


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-05-26 to 2025-05-27

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.

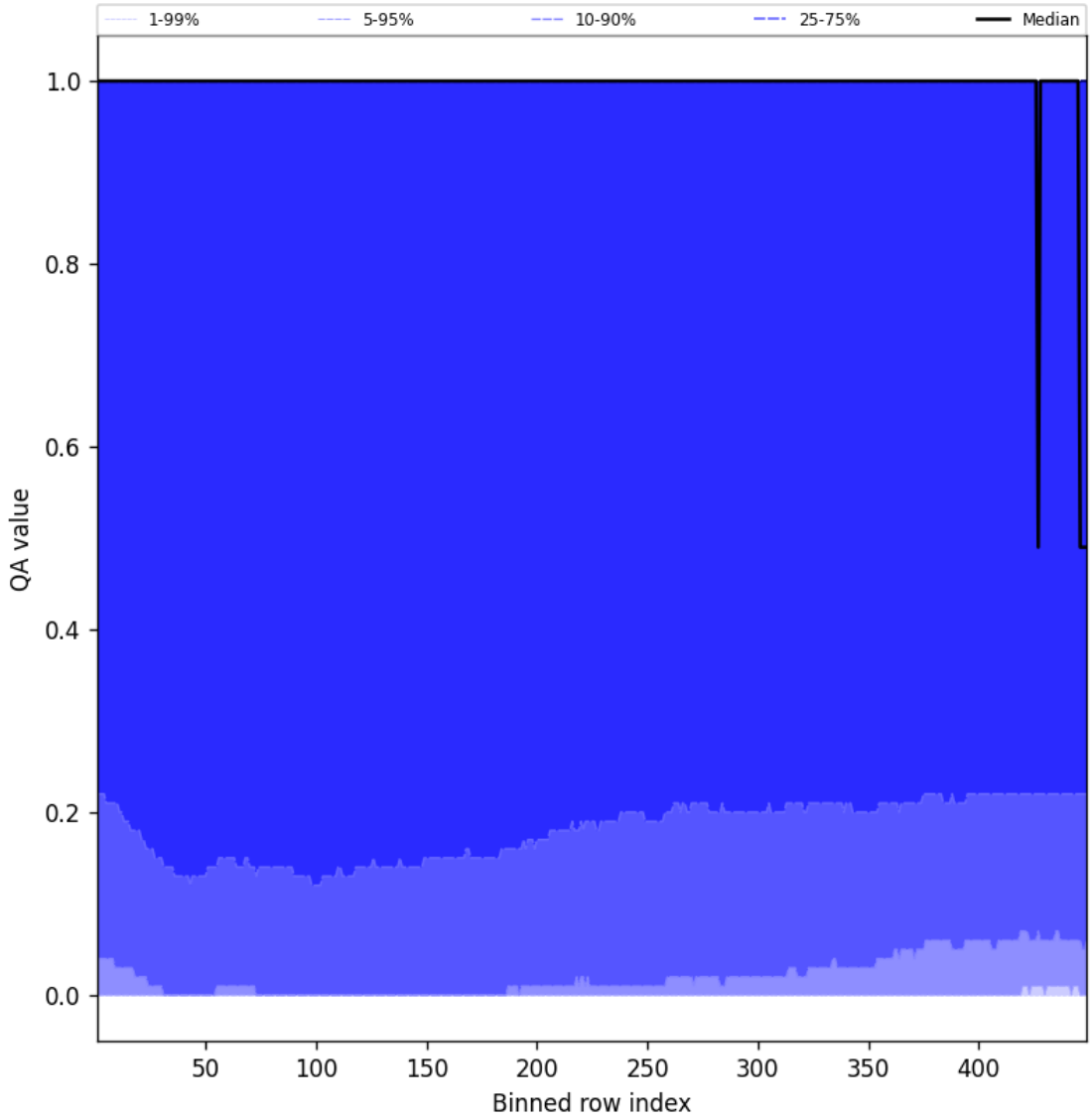


Figure 84: Along track statistics of “QA value” for 2025-05-26 to 2025-05-27

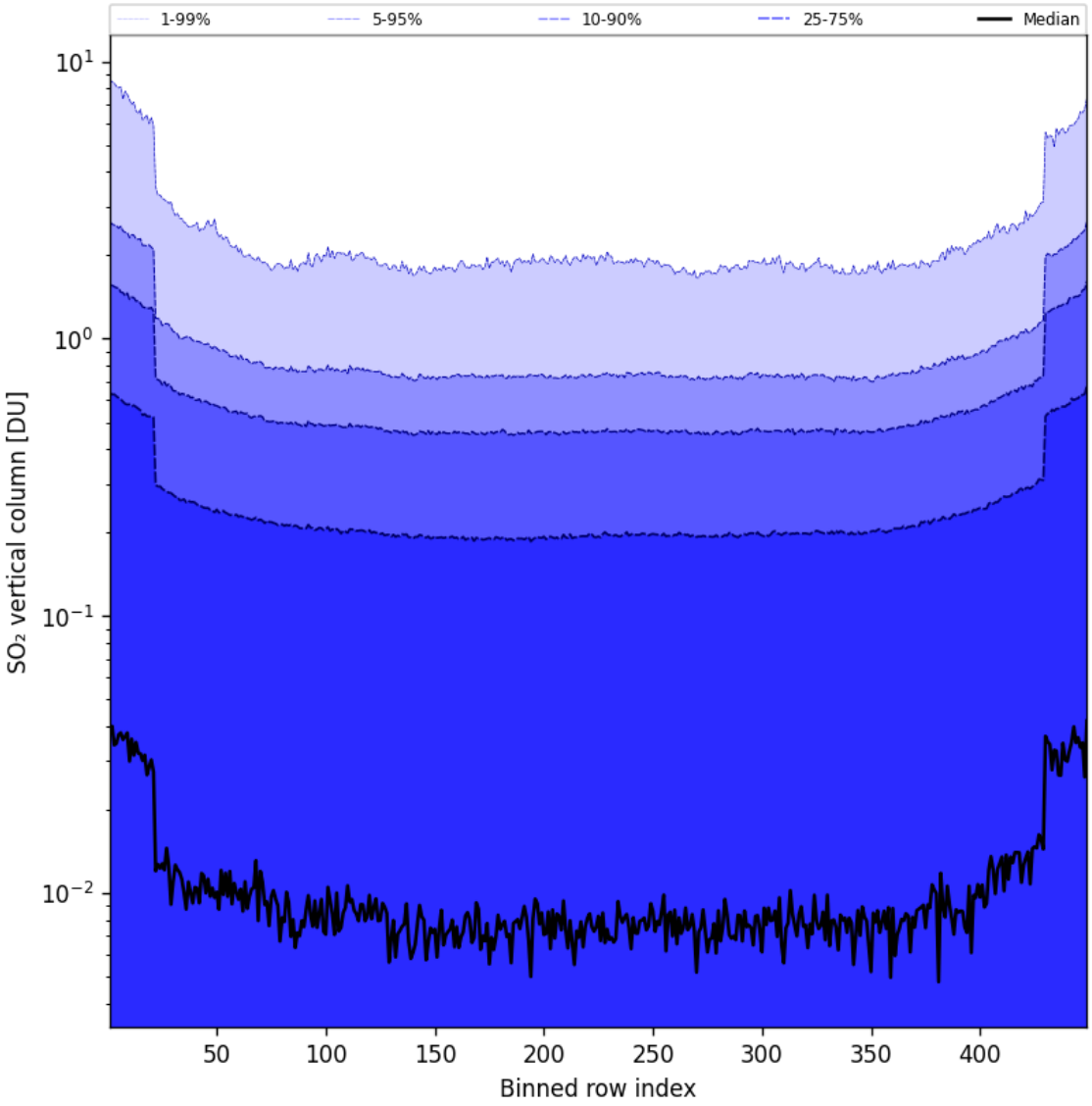


Figure 85: Along track statistics of "SO_2 vertical column" for 2025-05-26 to 2025-05-27

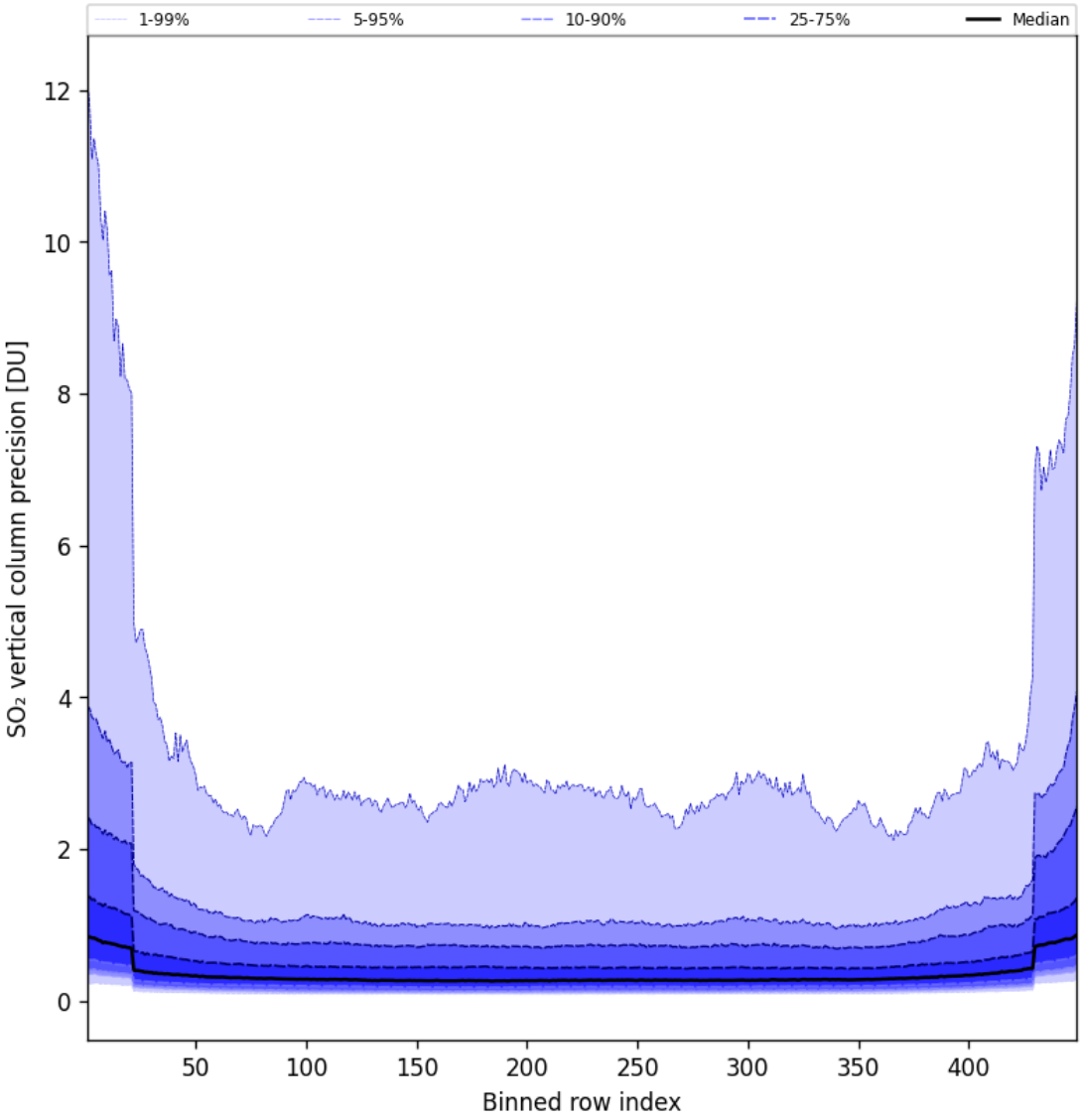


Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-05-26 to 2025-05-27

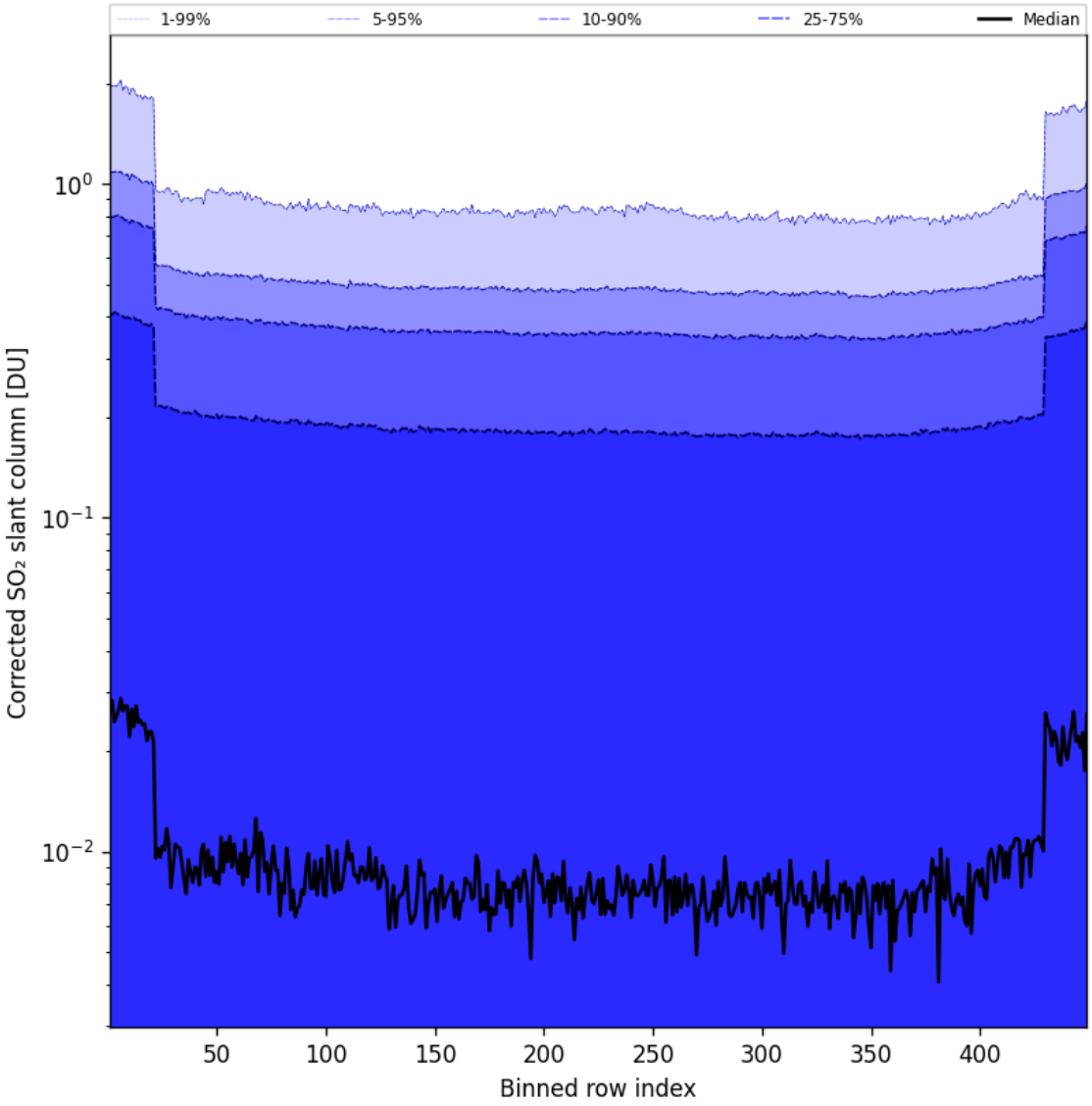


Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-05-26 to 2025-05-27

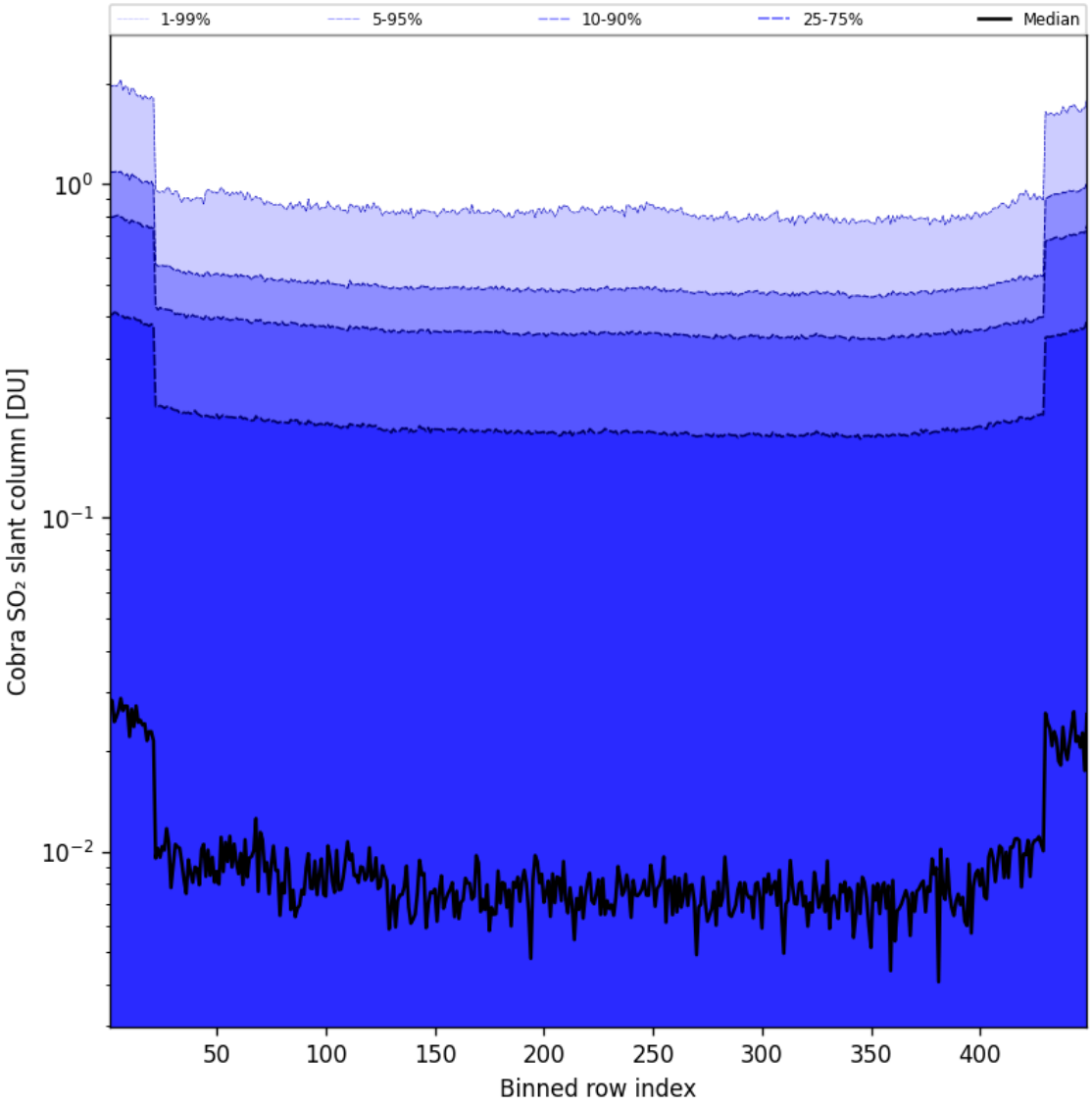


Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-05-26 to 2025-05-27

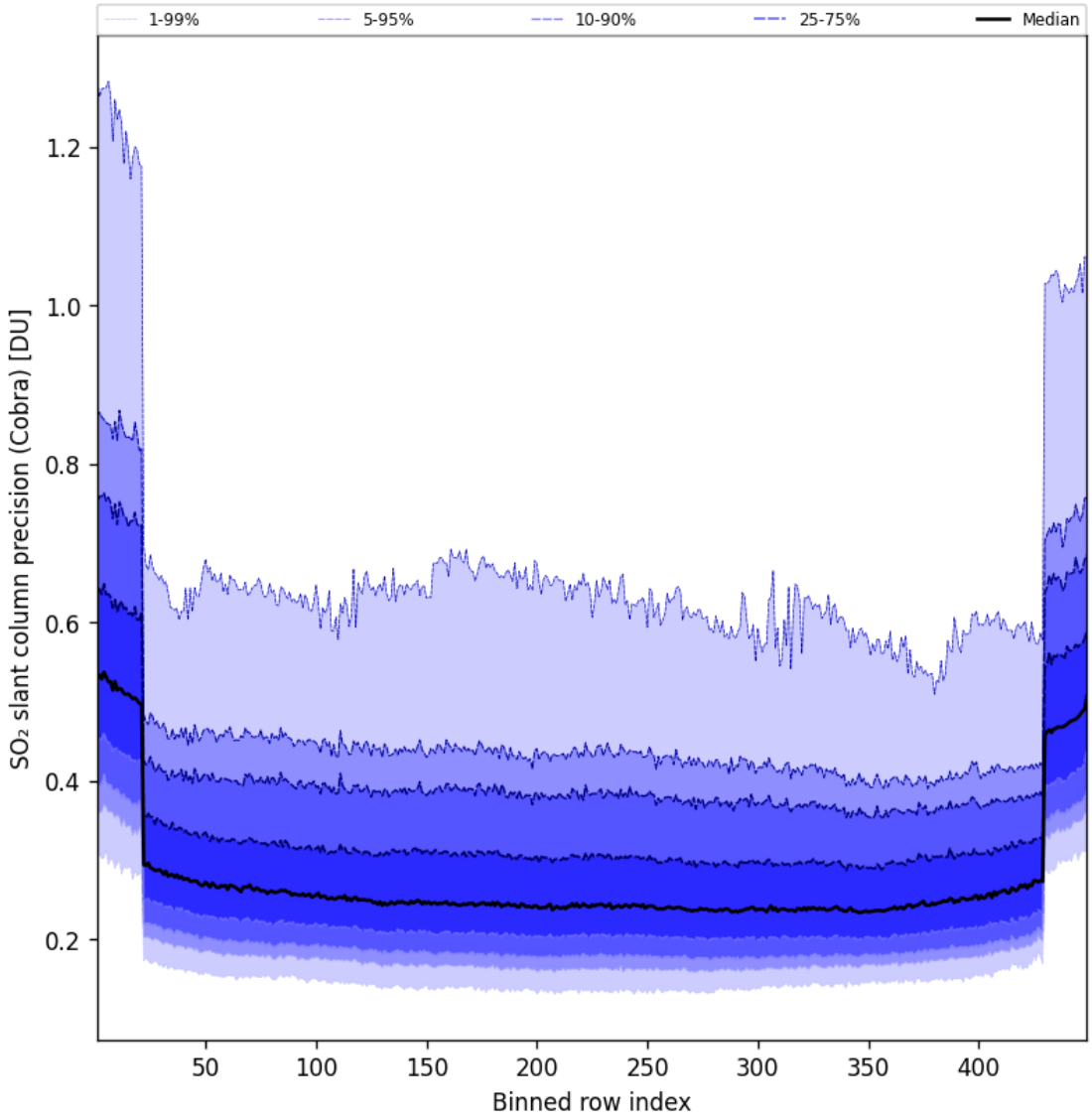


Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-05-26 to 2025-05-27

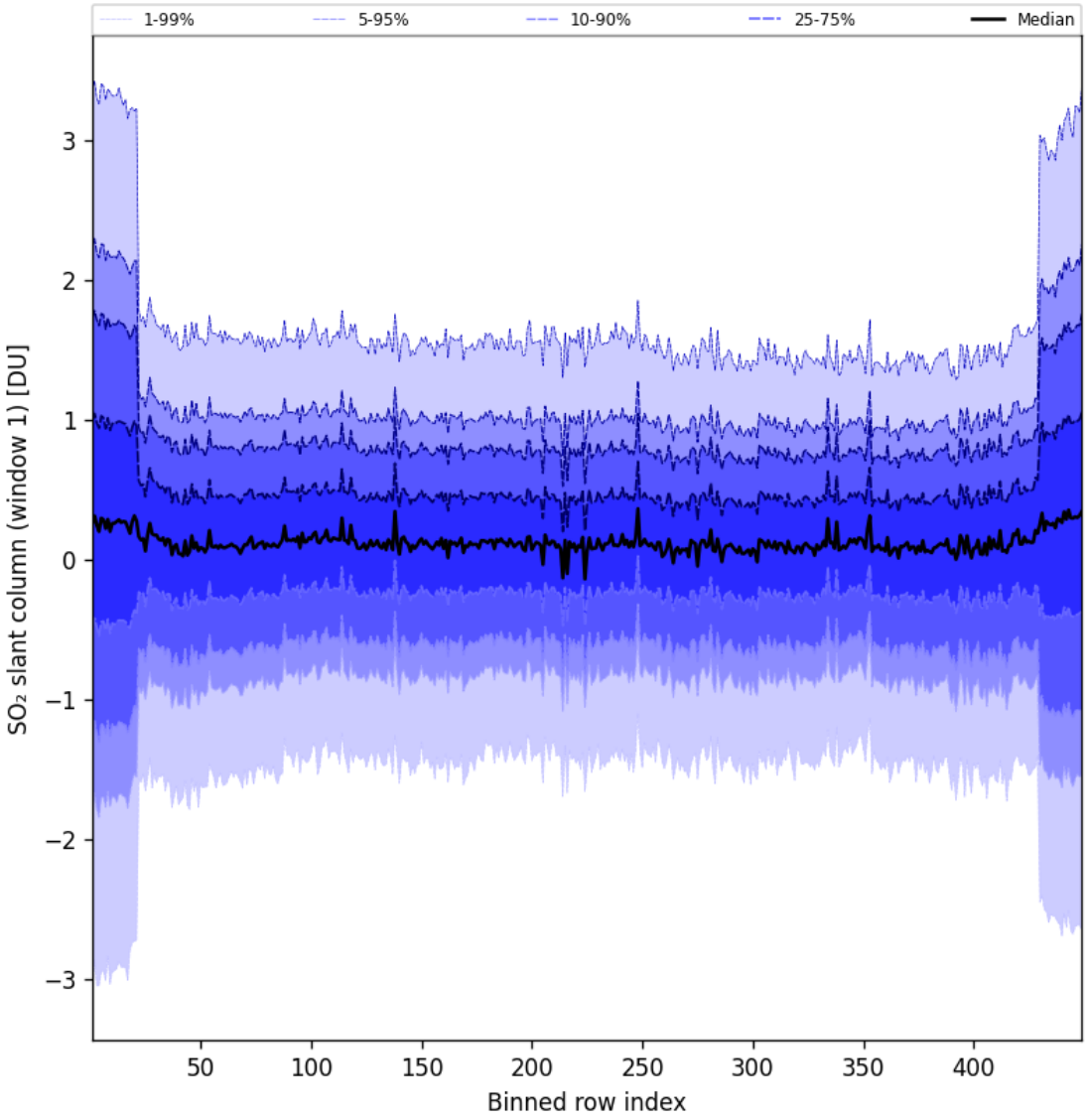


Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-05-26 to 2025-05-27

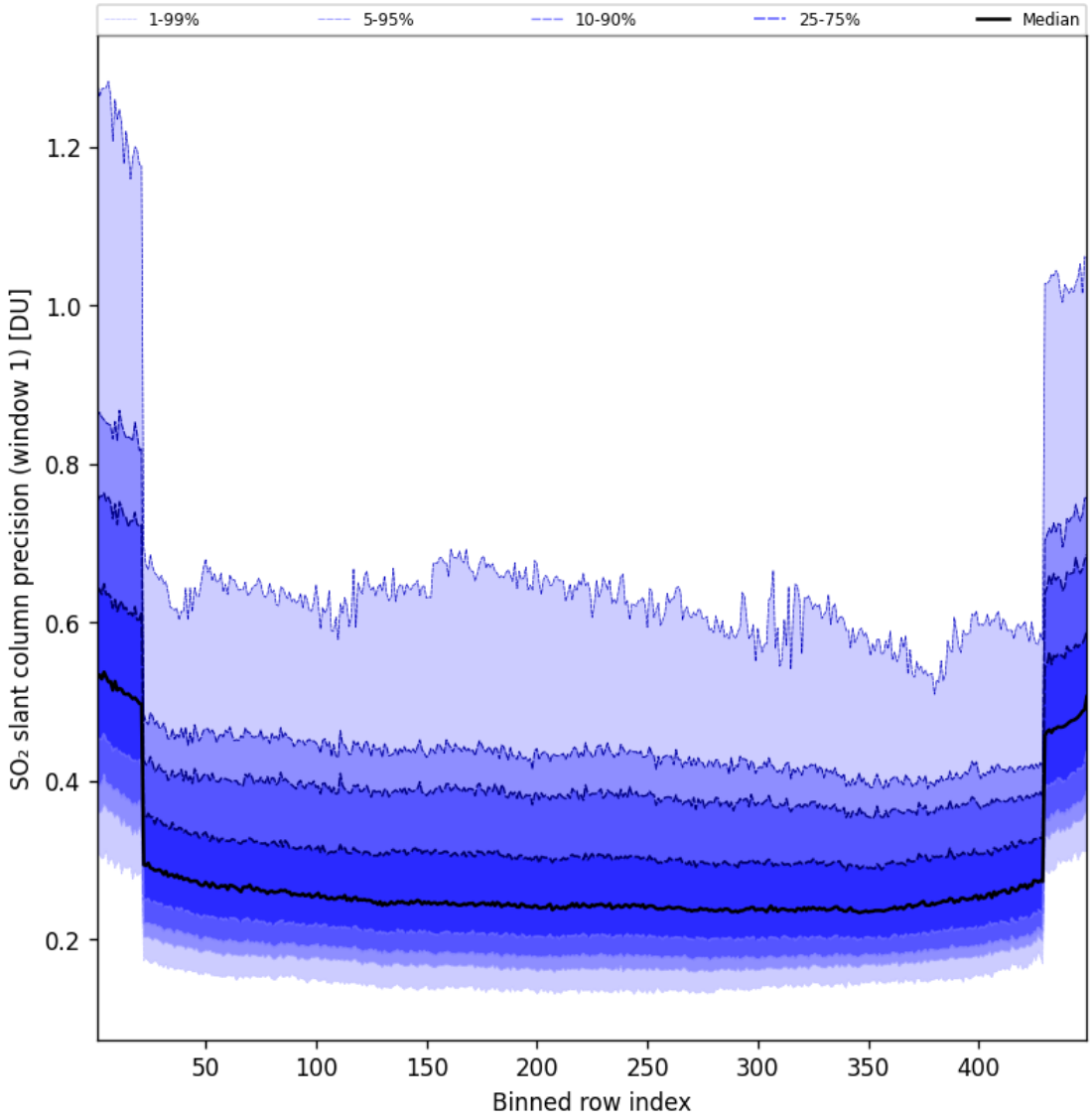


Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-05-26 to 2025-05-27

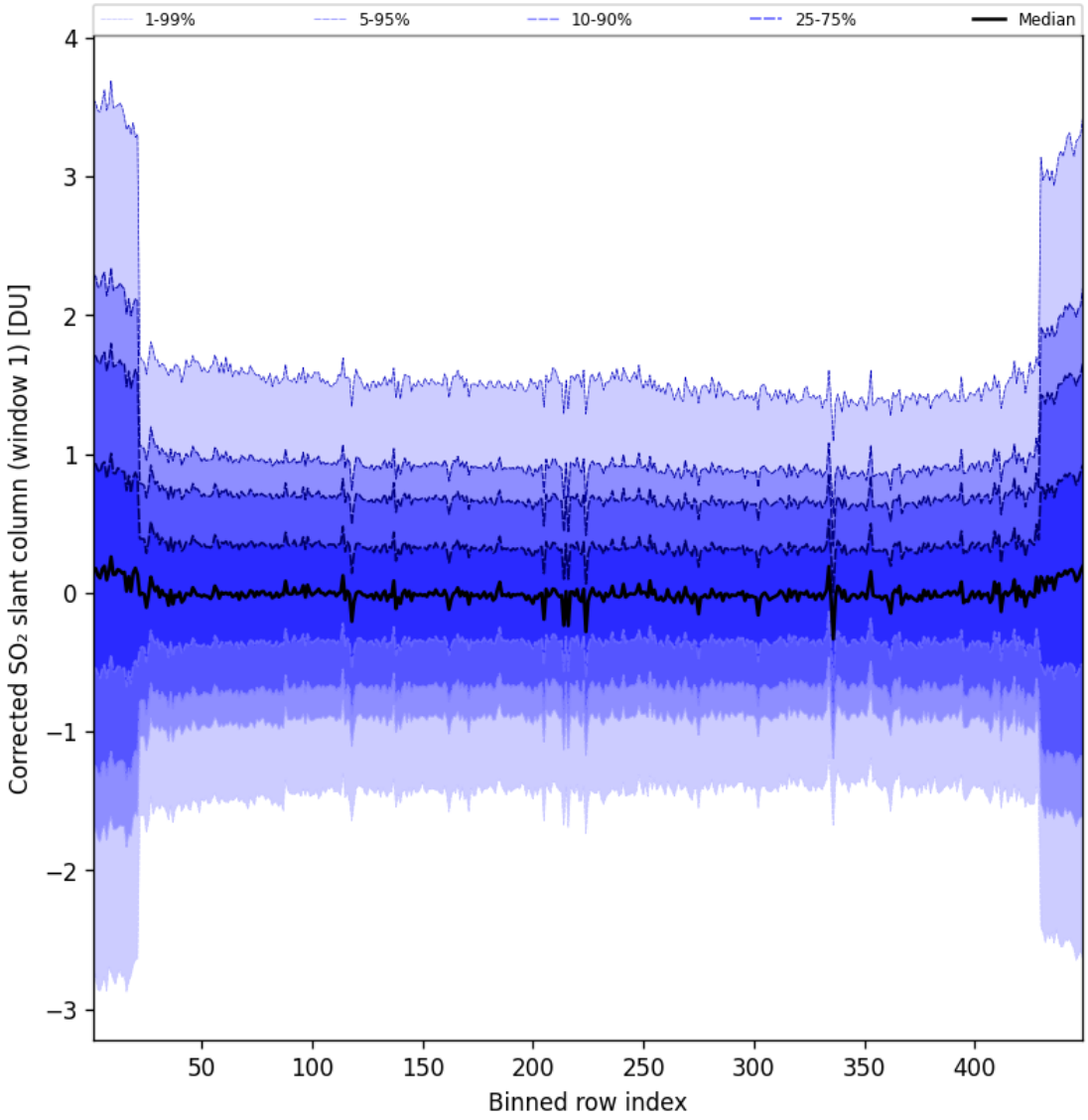


Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-05-26 to 2025-05-27

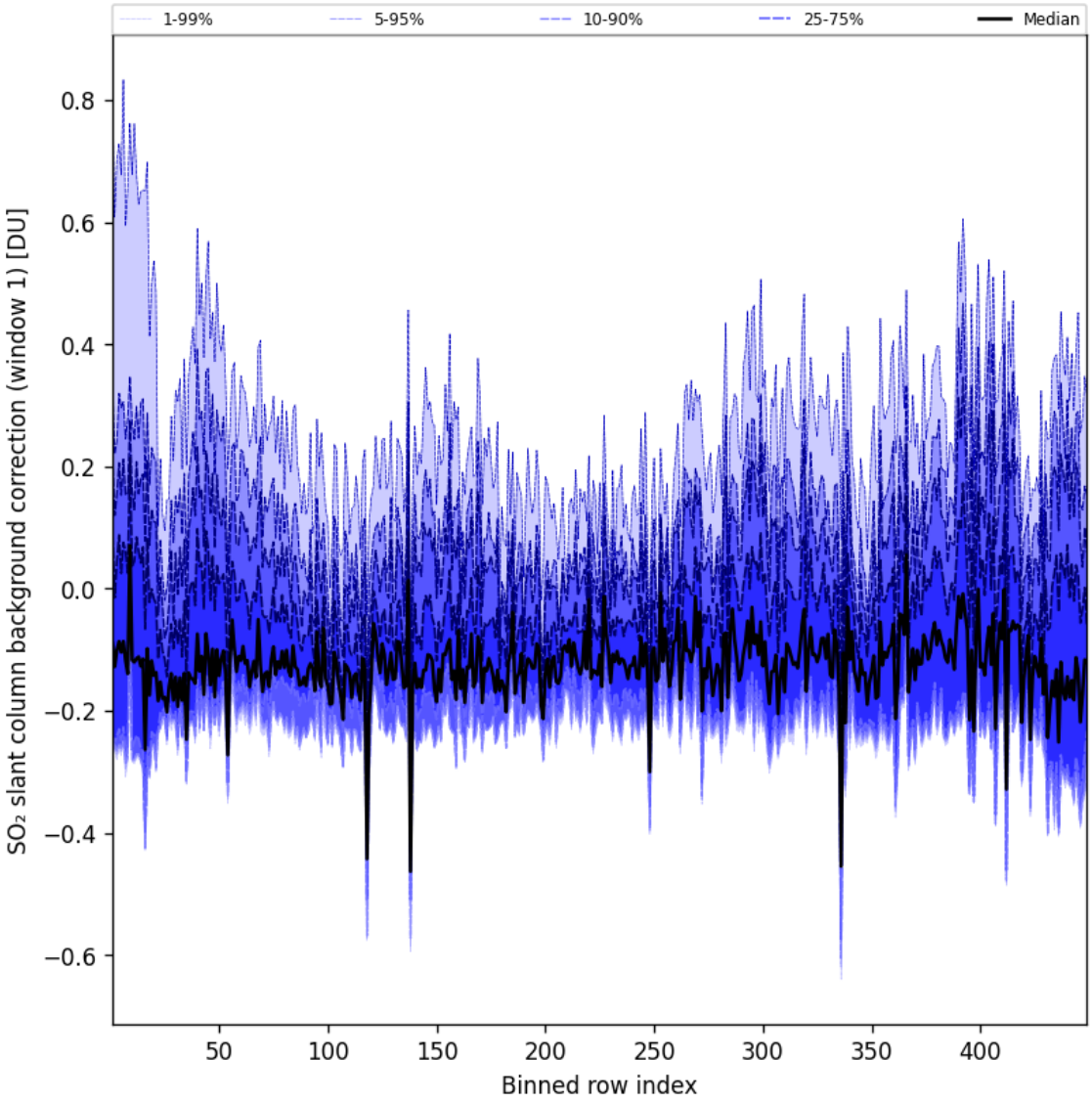


Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-05-26 to 2025-05-27

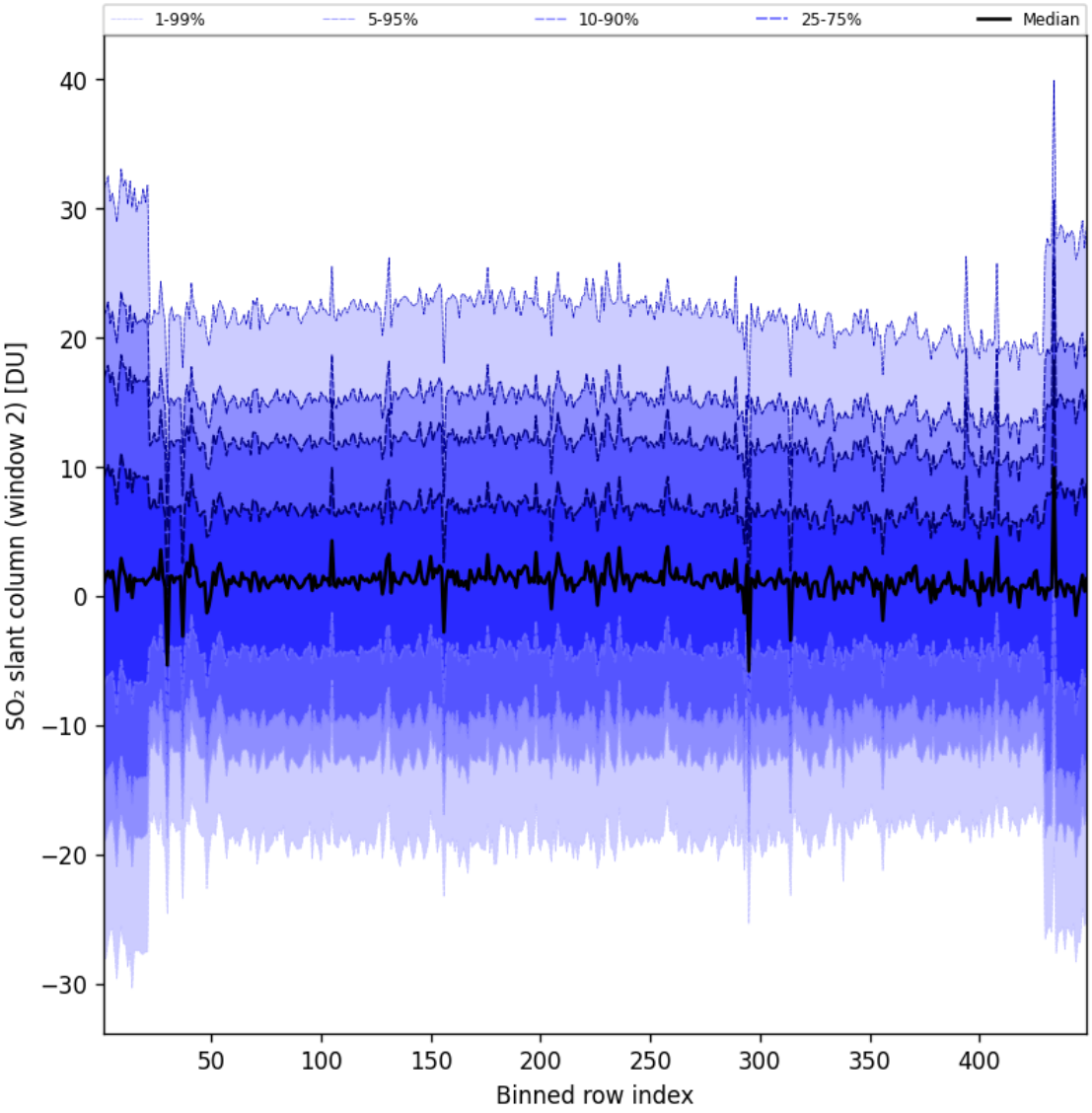


Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-05-26 to 2025-05-27

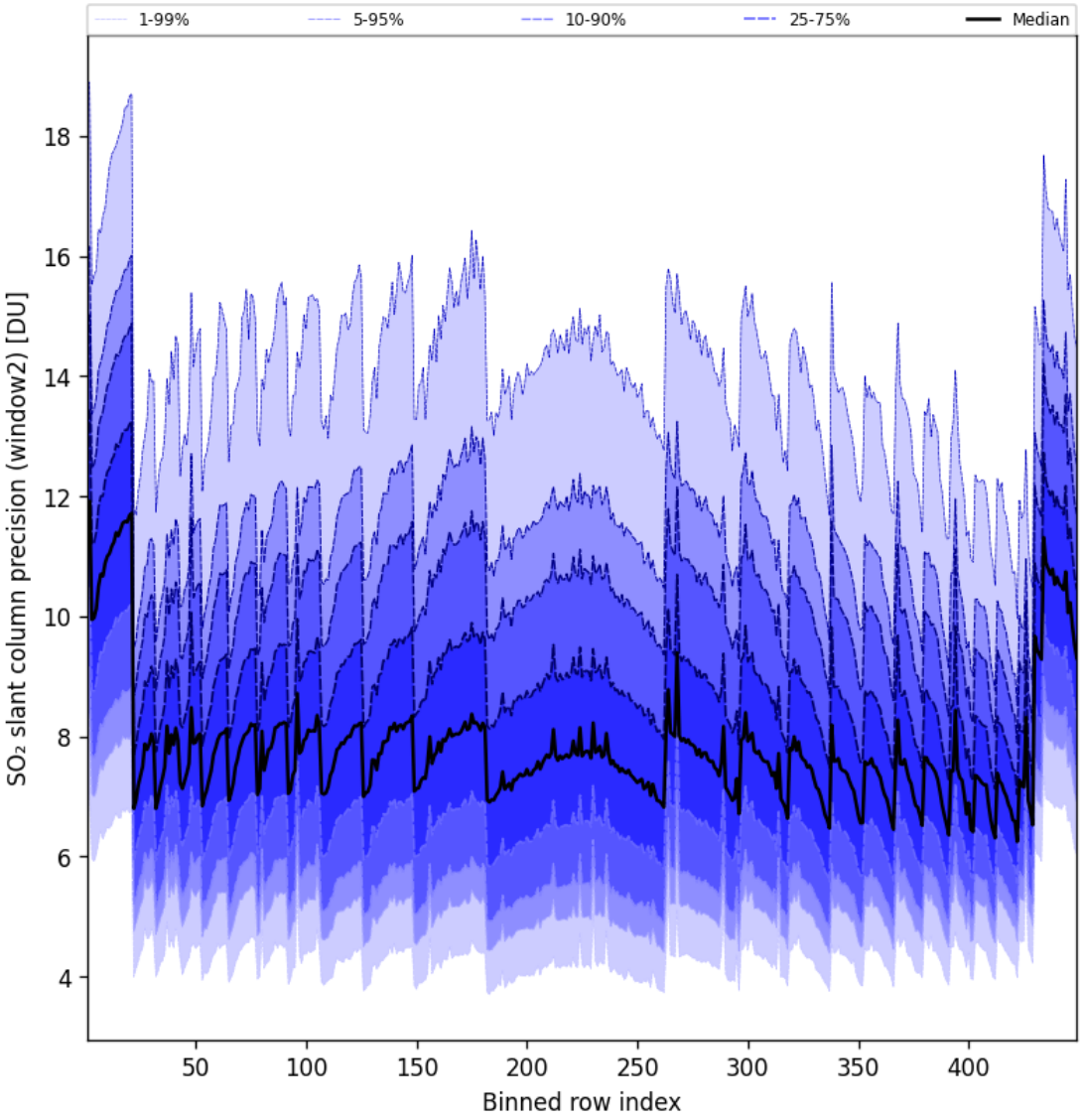


Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-05-26 to 2025-05-27

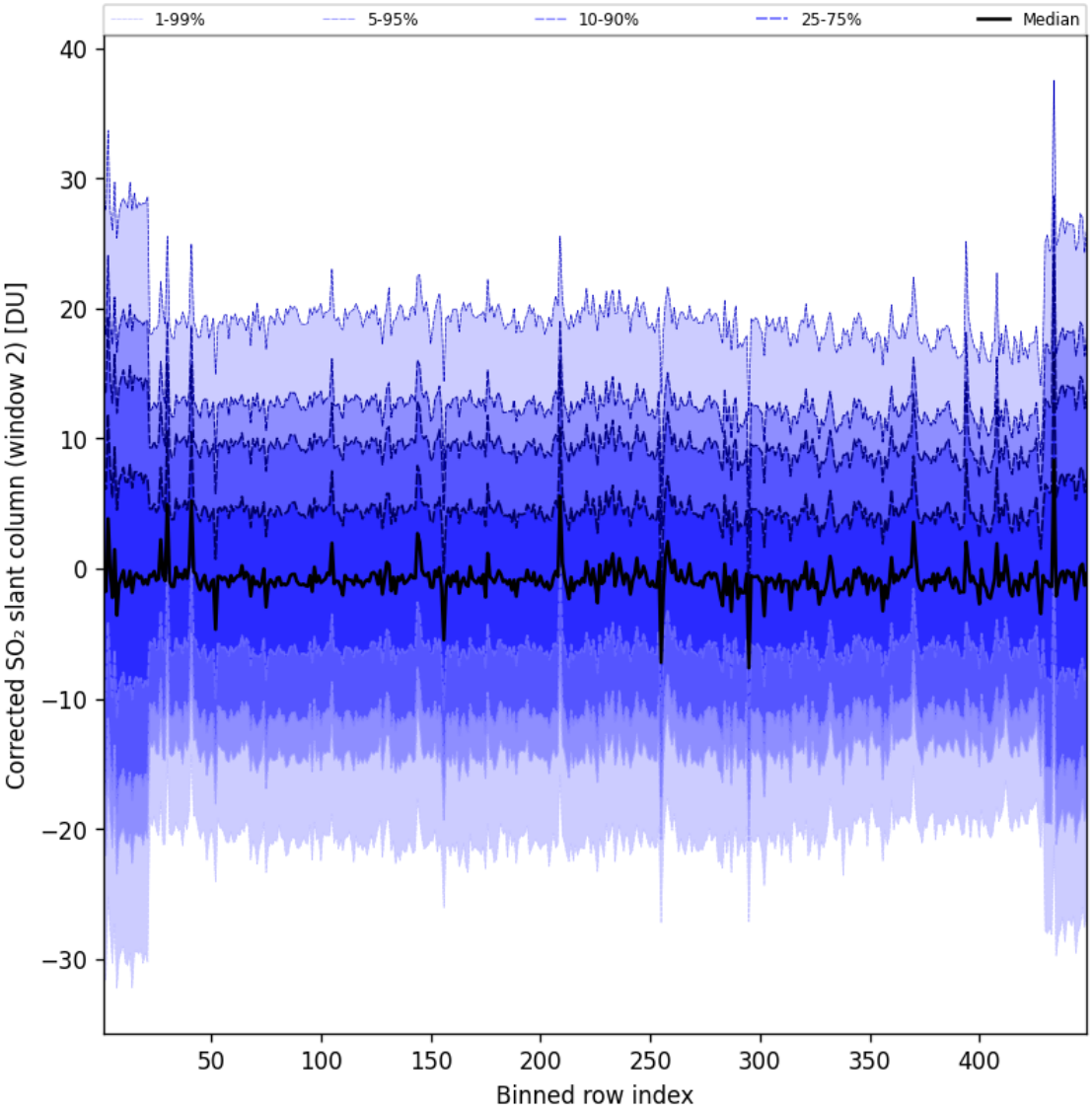


Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-05-26 to 2025-05-27

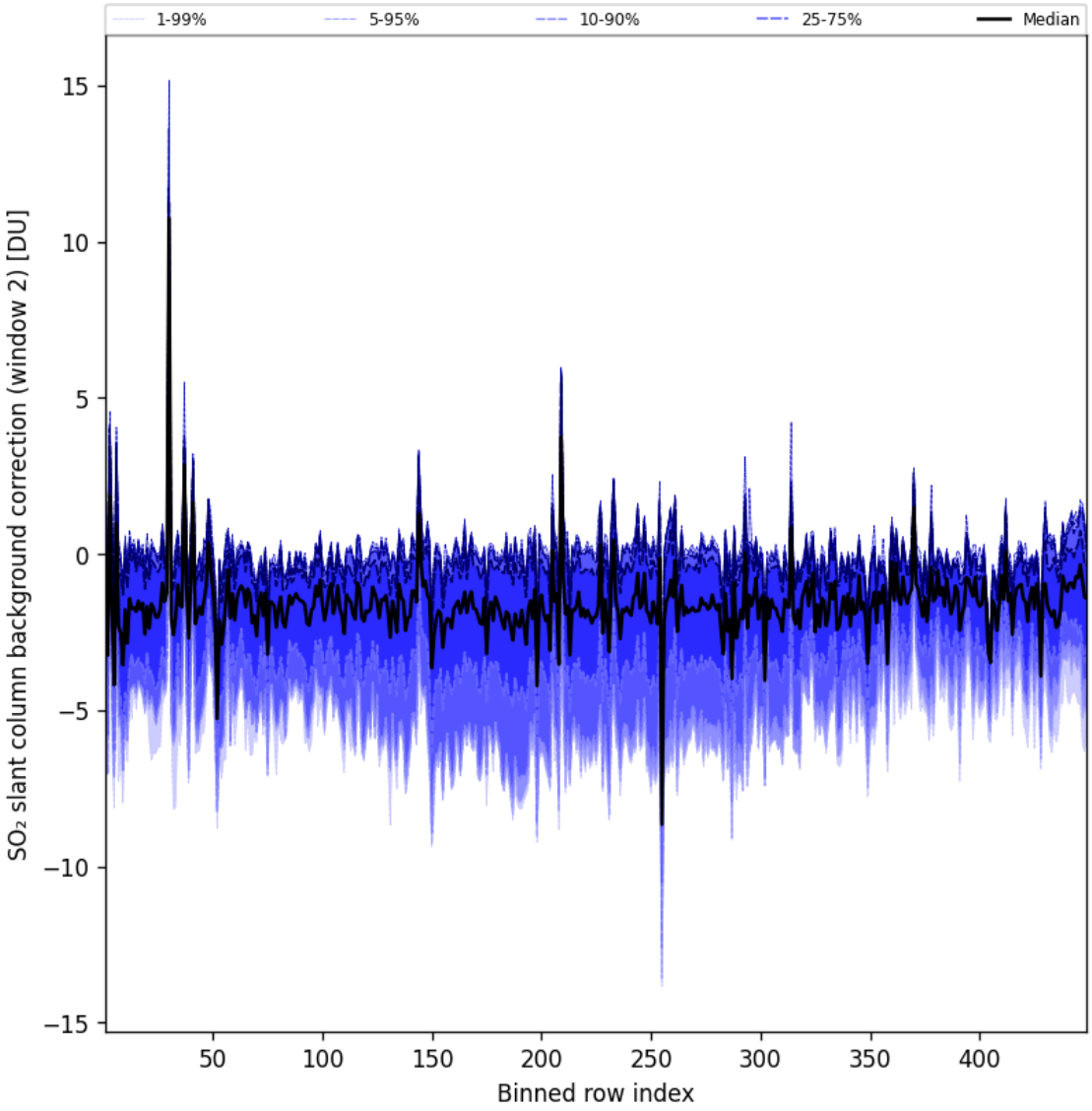


Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-05-26 to 2025-05-27

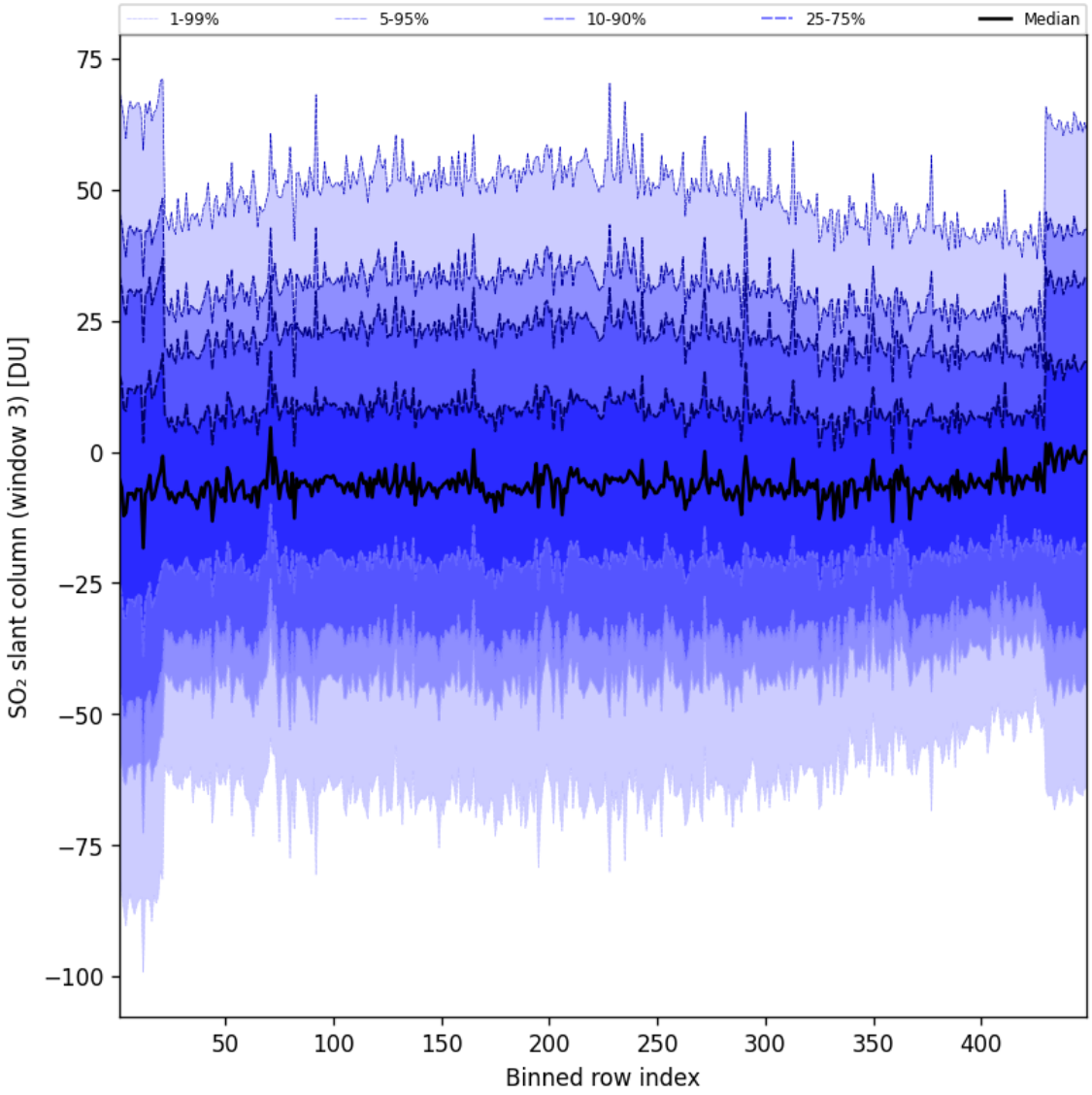
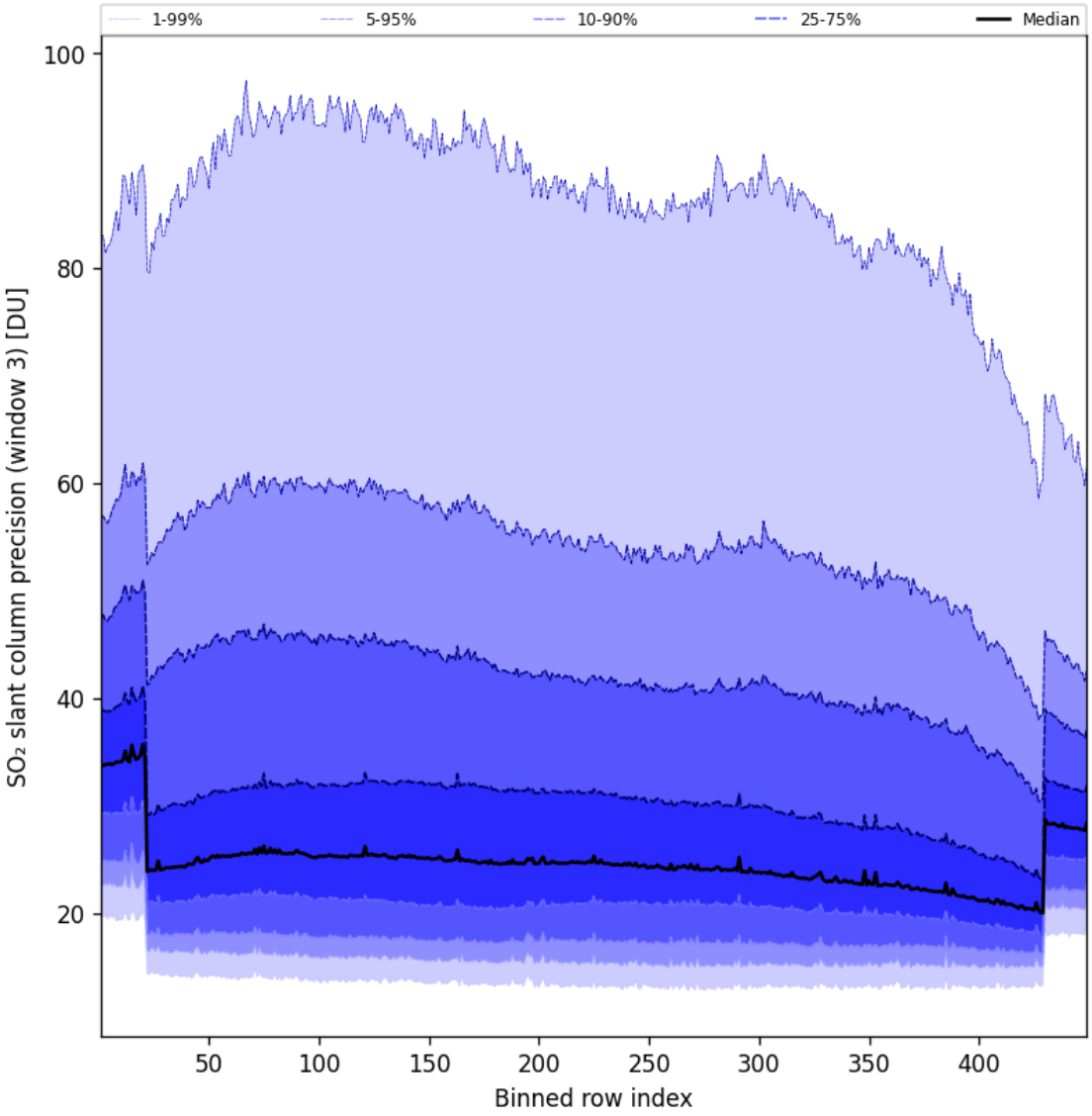


Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-05-26 to 2025-05-27



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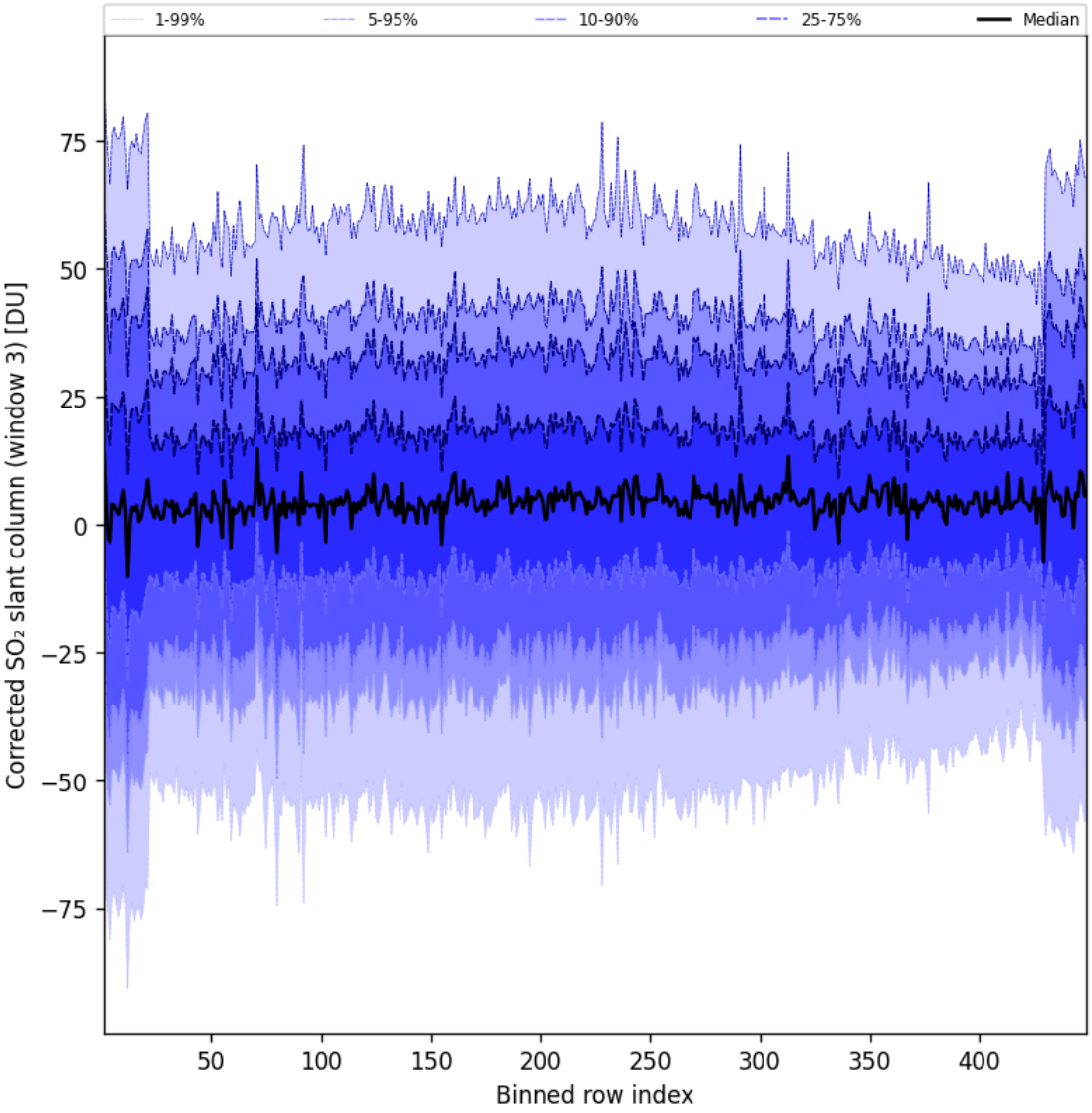


Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-05-26 to 2025-05-27

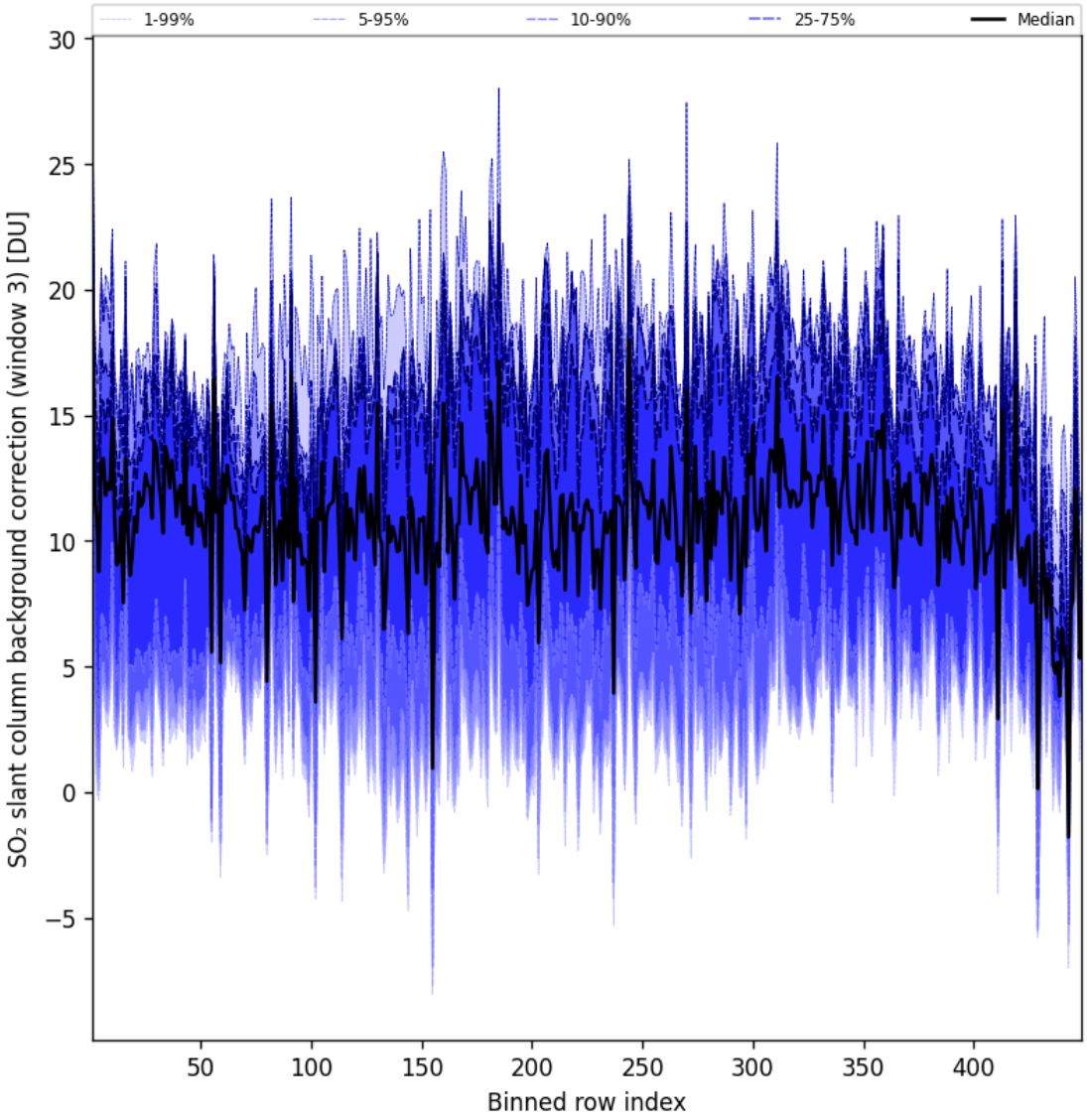
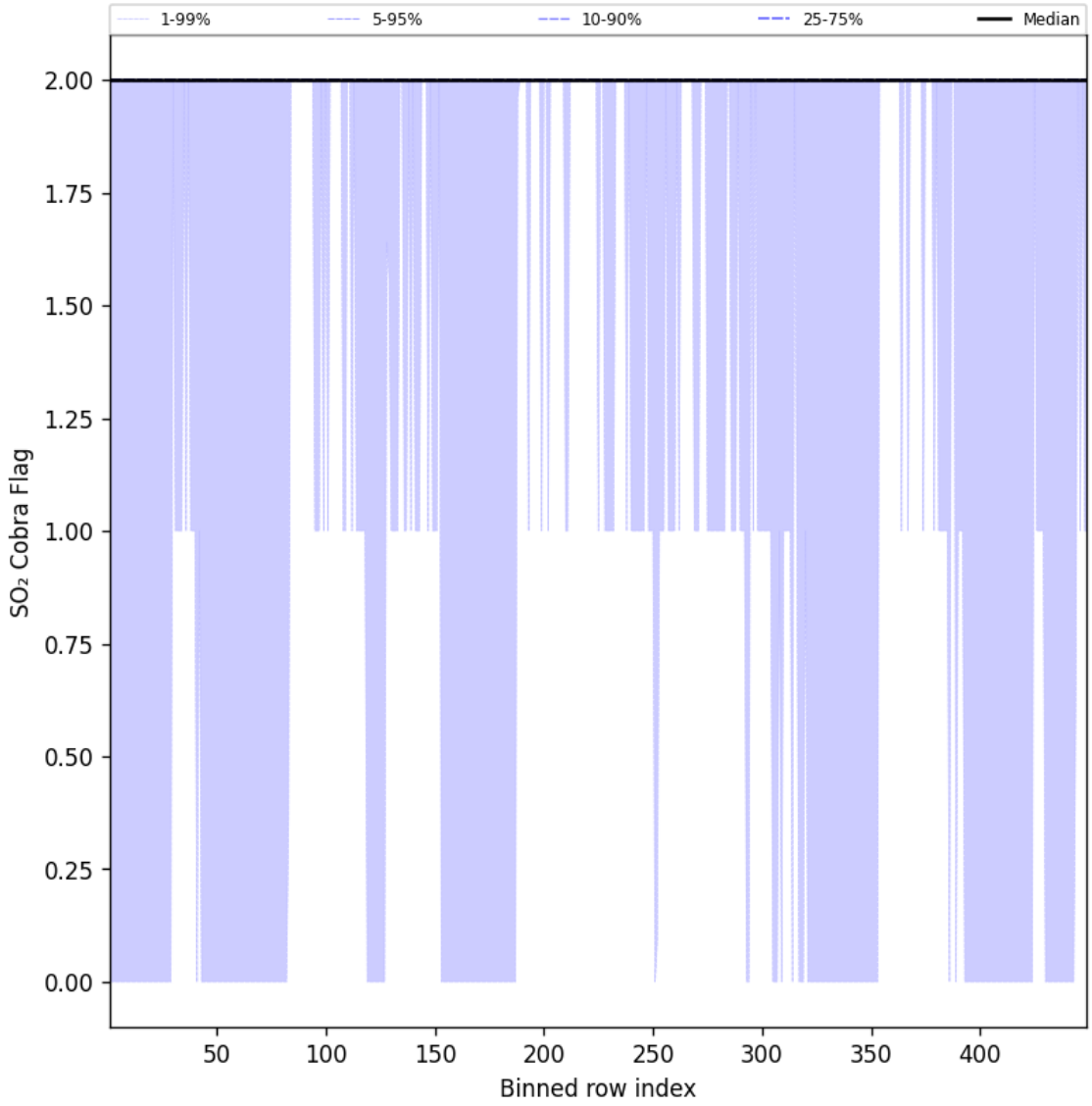


Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-05-26 to 2025-05-27



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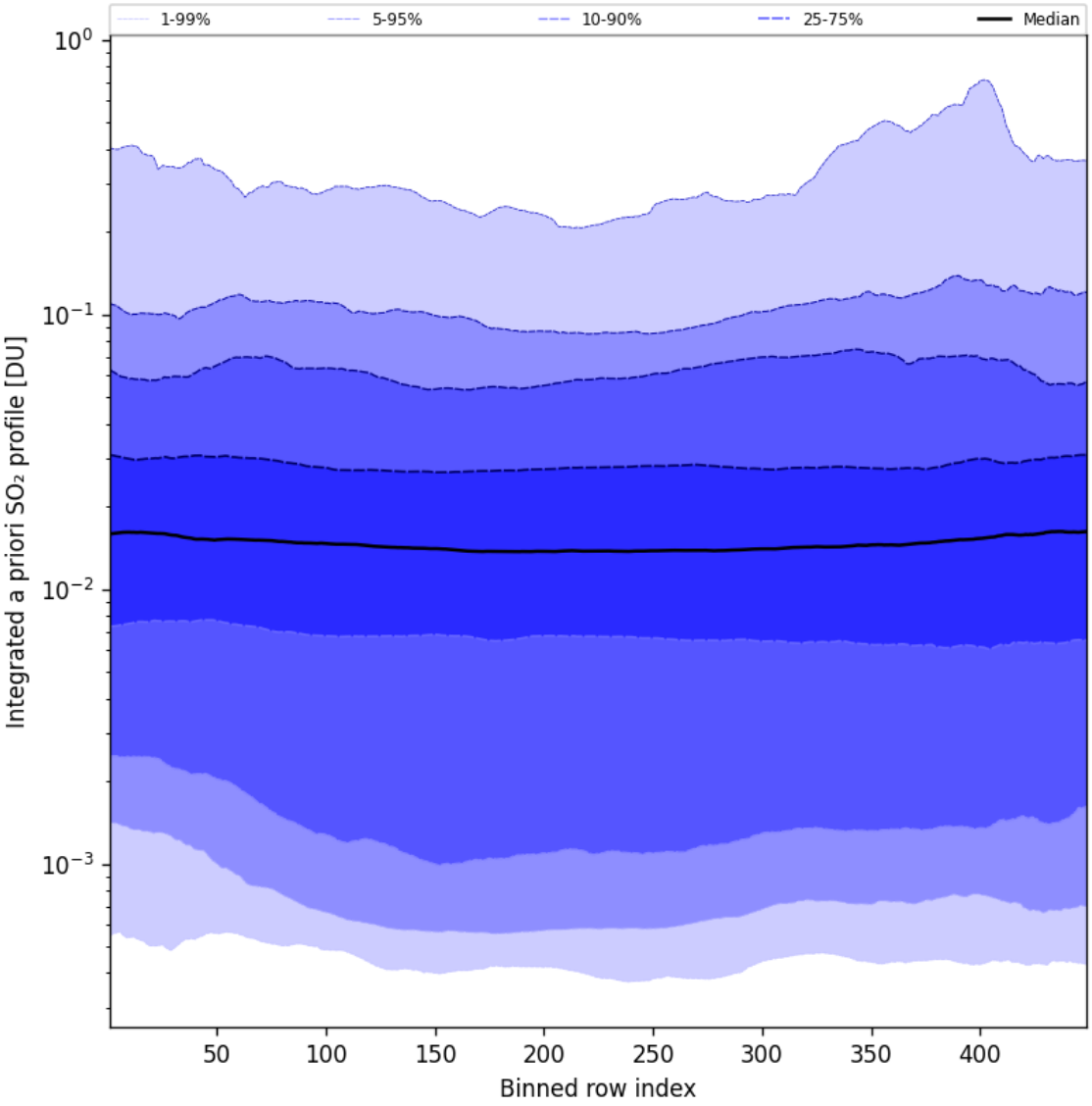
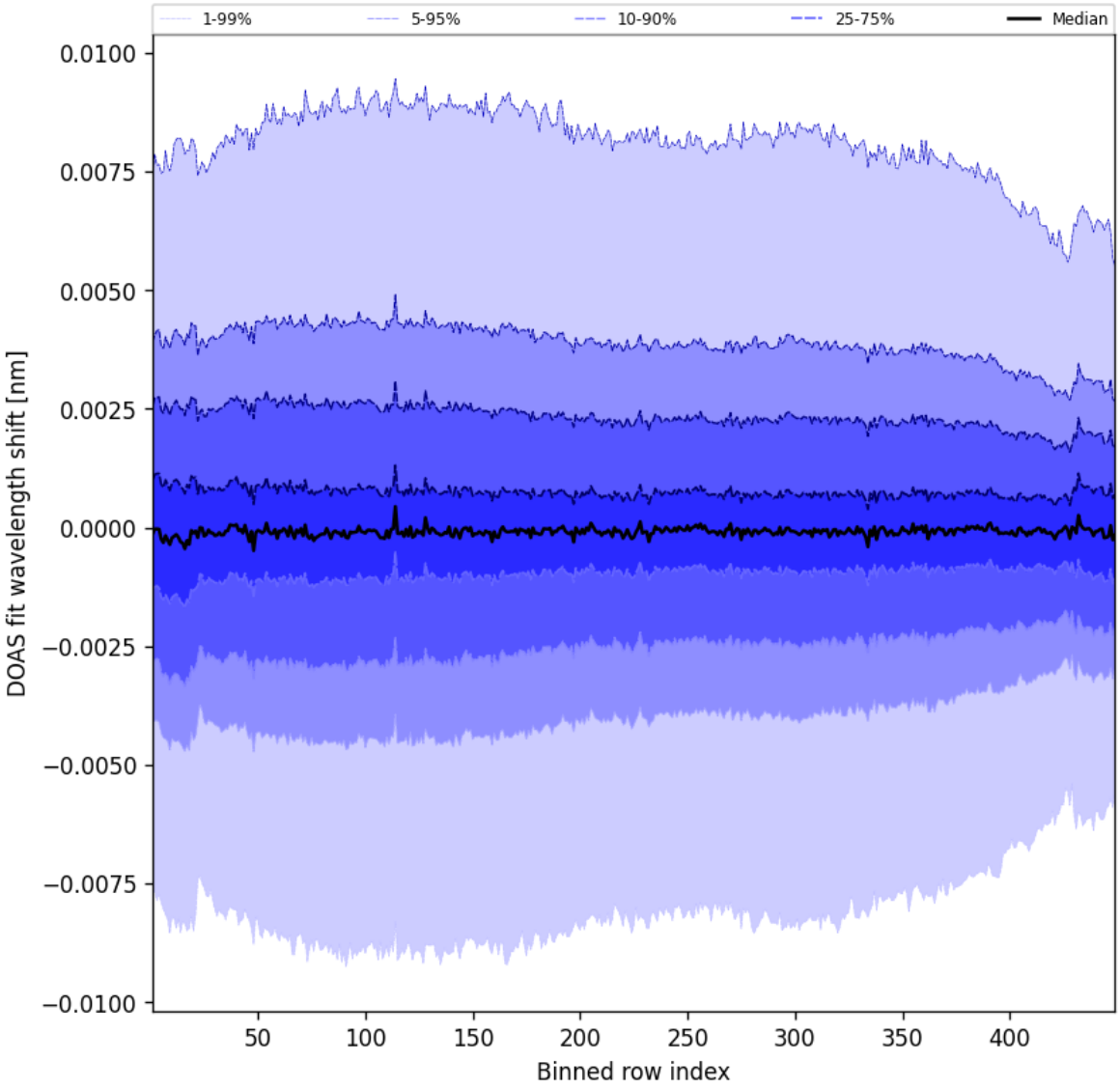


Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-05-26 to 2025-05-27



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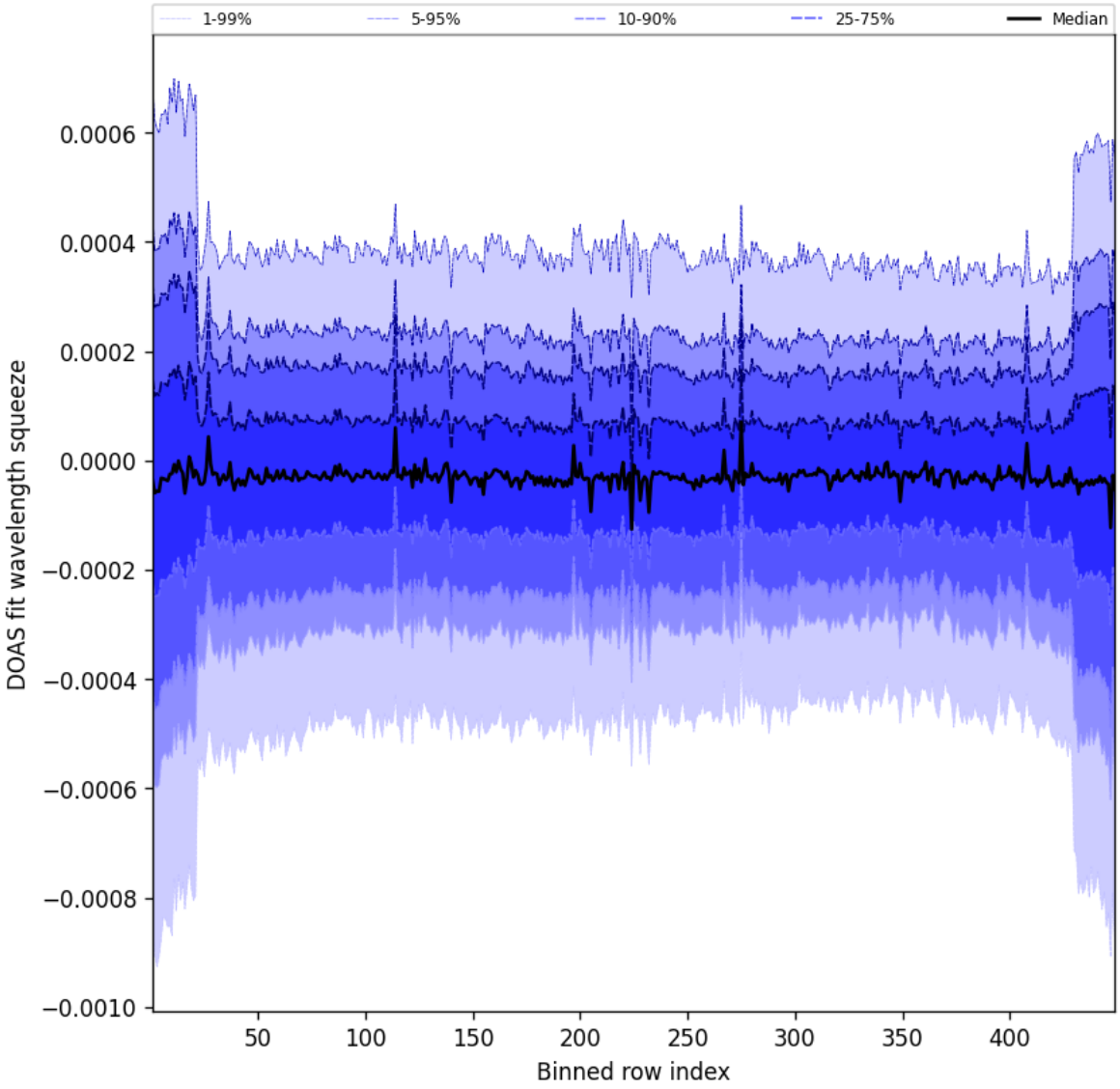

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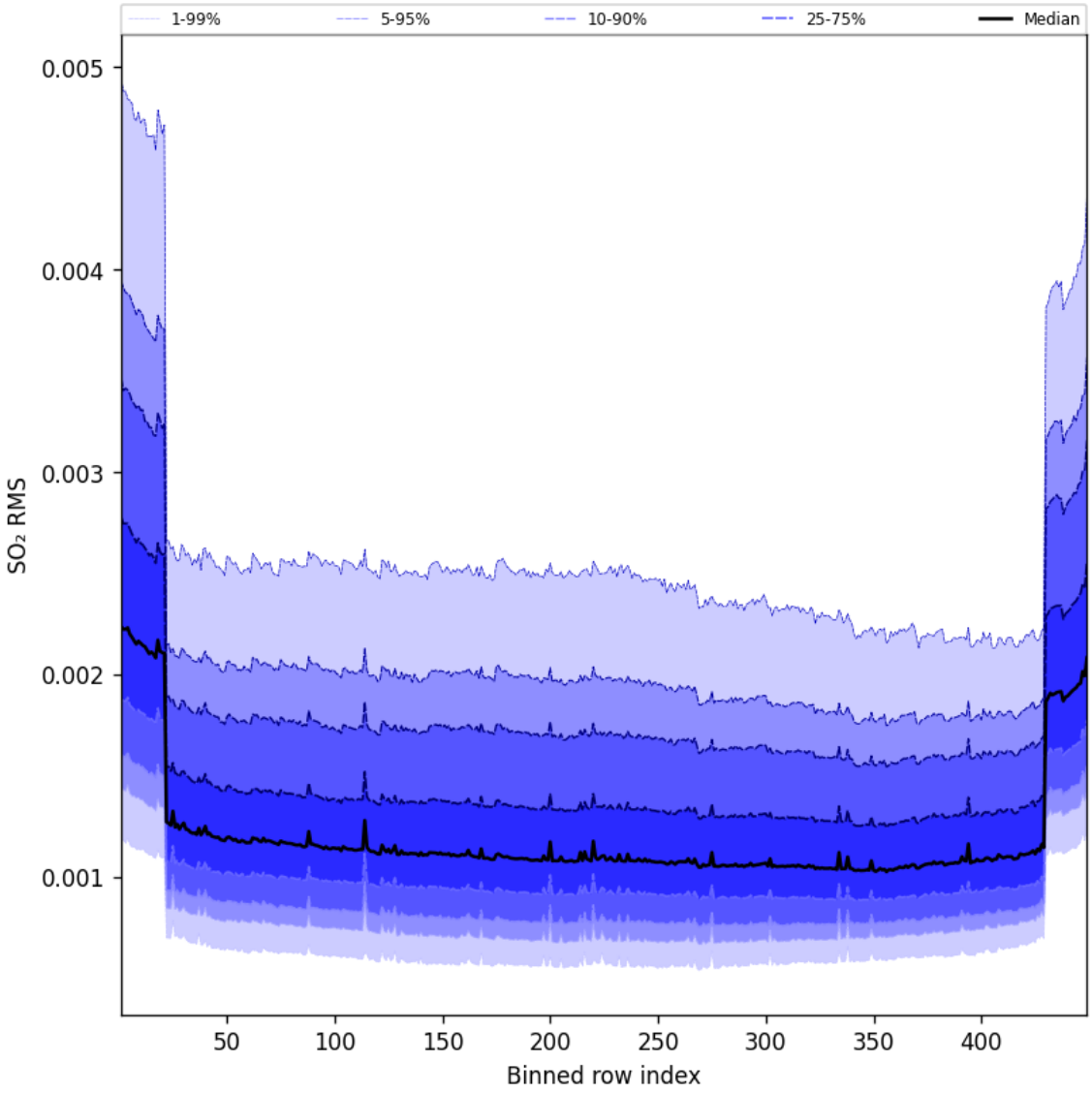

Figure 106: Along track statistics of "SO_2 RMS" for 2025-05-26 to 2025-05-27

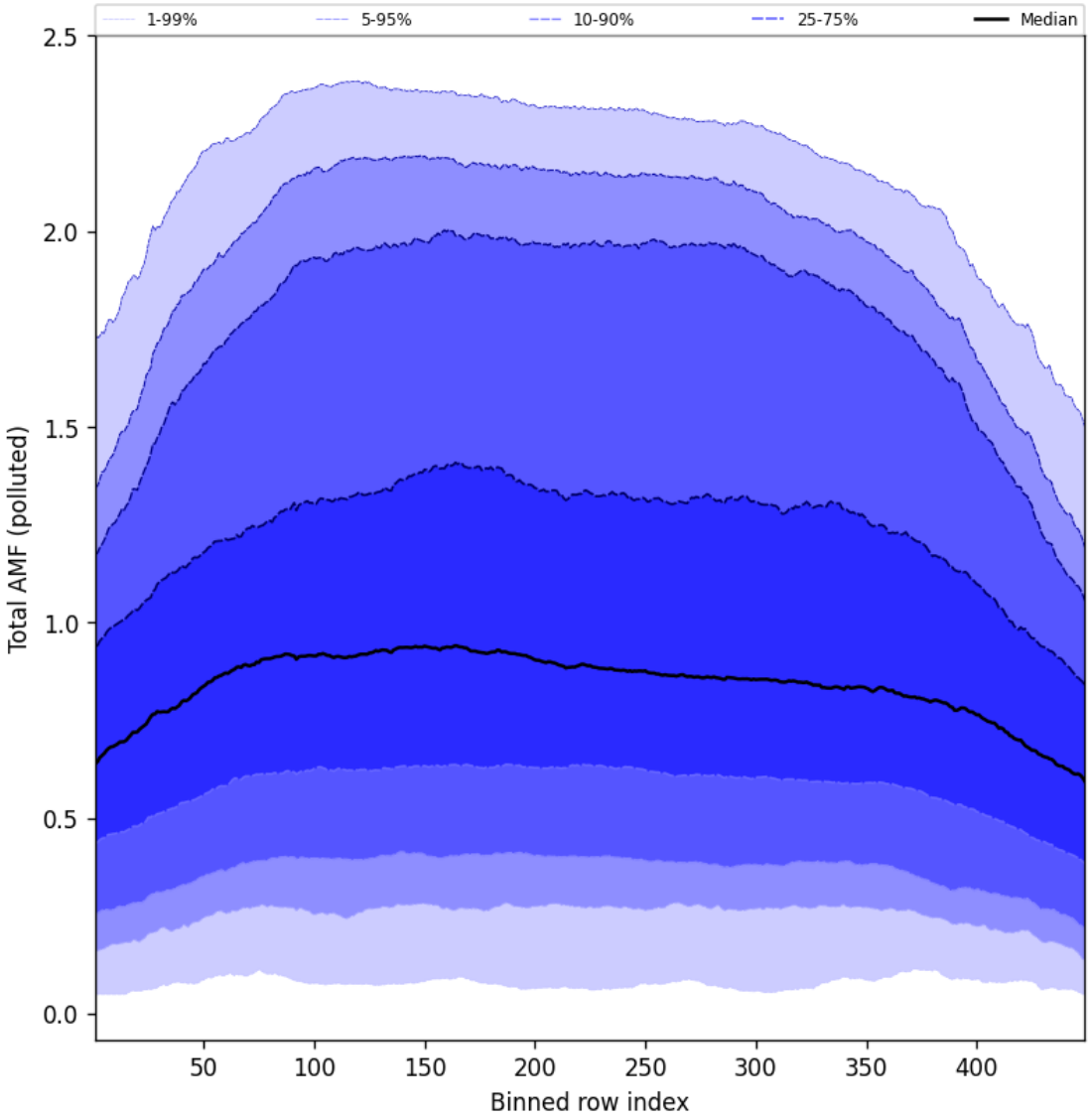

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-05-26 to 2025-05-27

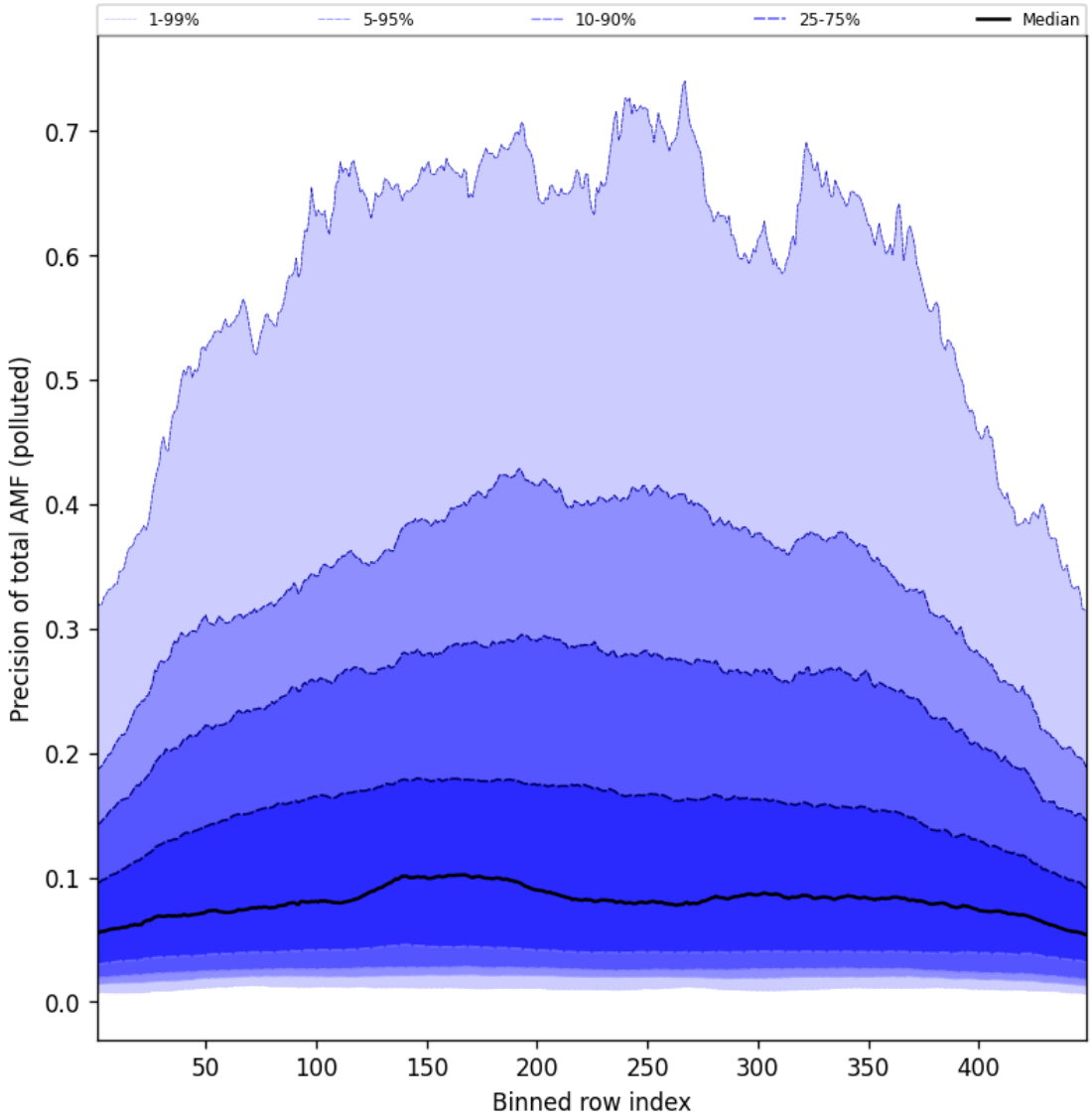

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-05-26 to 2025-05-27

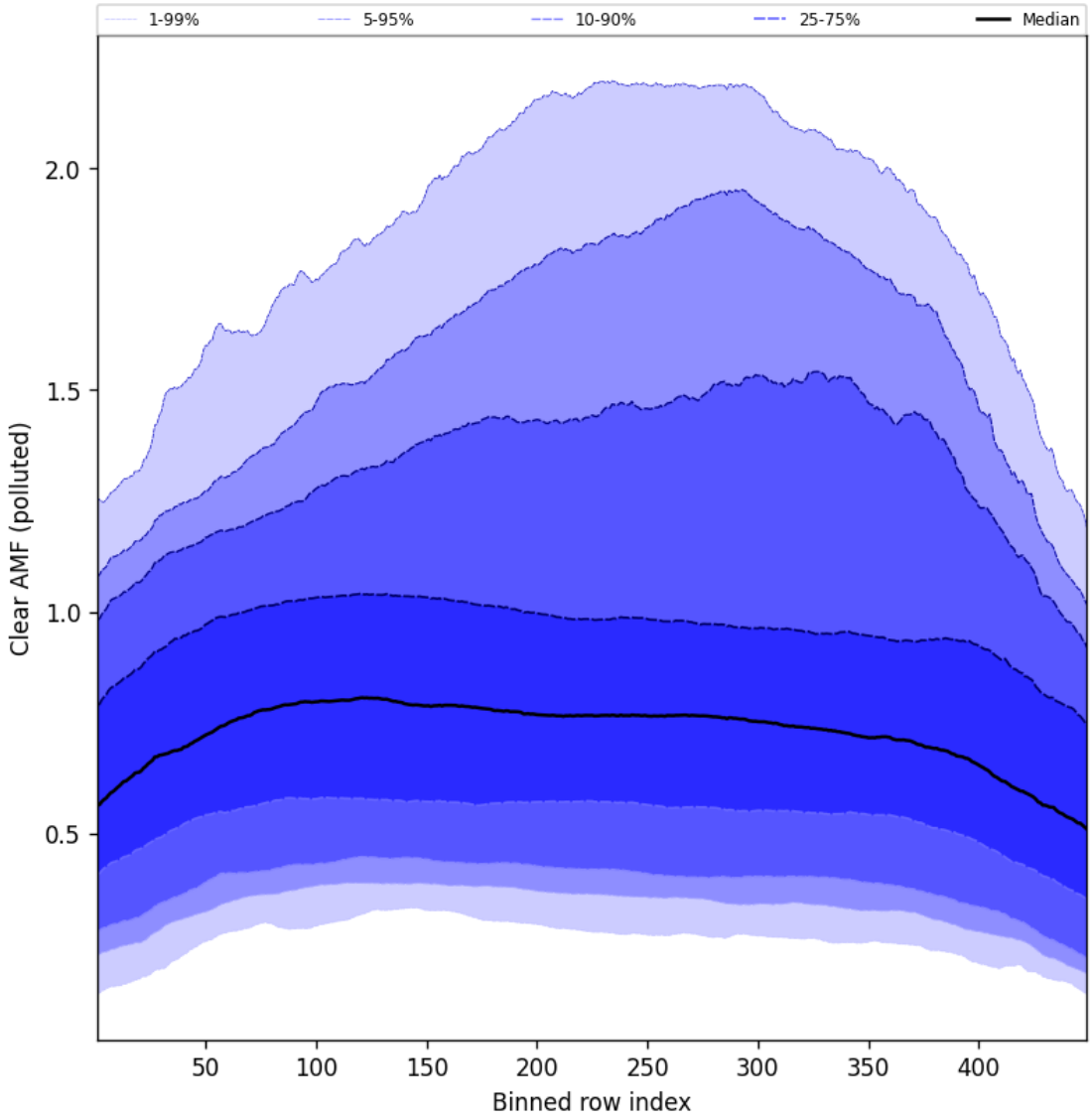

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-05-26 to 2025-05-27

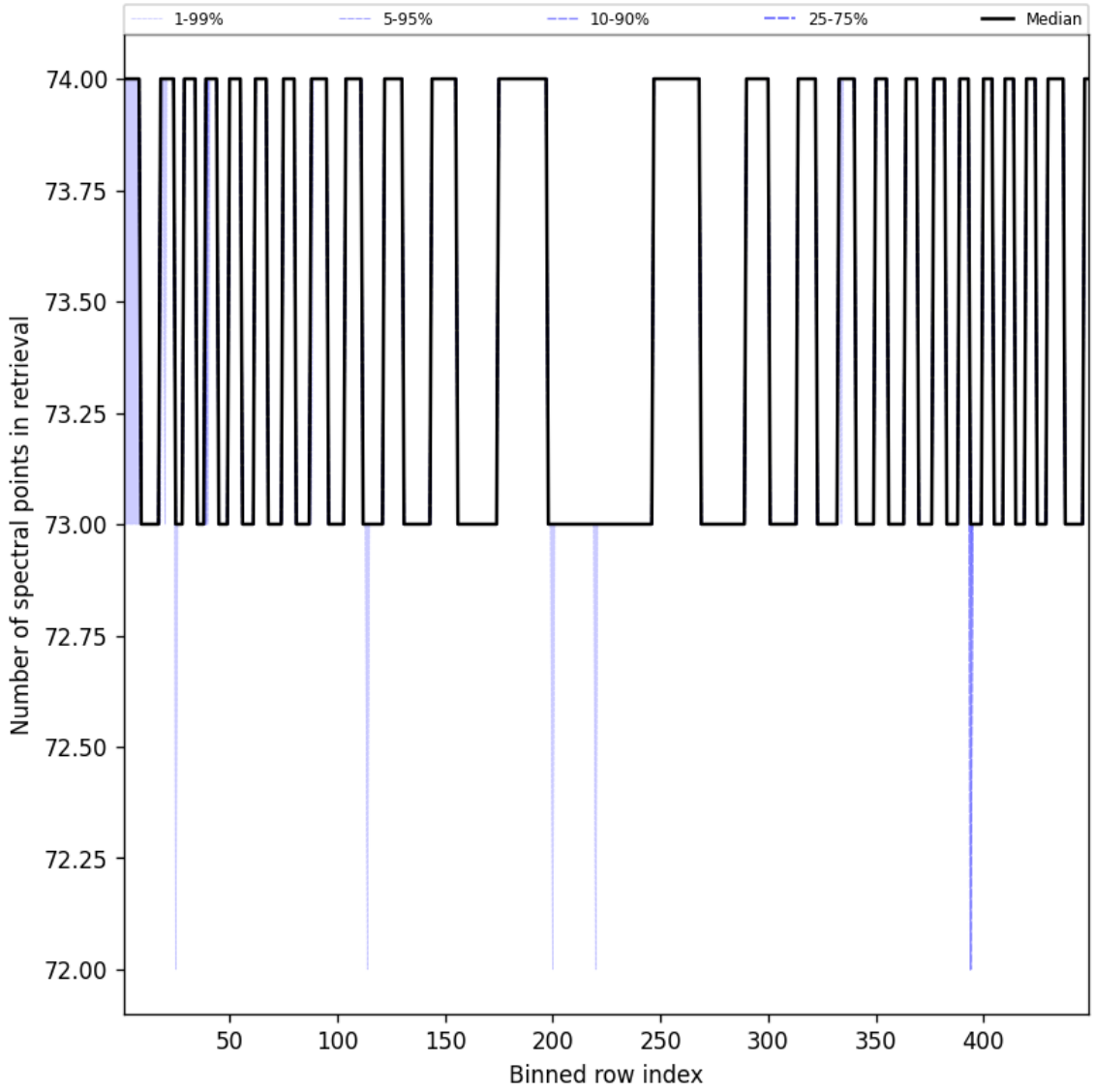

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-05-26 to 2025-05-27

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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