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]	0.633 ± 0.410	17403316	0.995	0.790	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.686 \pm 112.540) \times 10^{-2}$	17403316	0.249	0.437	9.965×10^{-3}	-66.2	1.649×10^{3}
sulfurdioxide total vertical column precision [DU]	0.492 ± 0.655	17403316	0.222	0.321	0.317	4.184×10^{-2}	869
sulfurdioxide slant column density corrected [DU]	$(1.870 \pm 56.012) \times 10^{-2}$	17403316	0.258	0.375	9.279×10^{-3}	-45.8	1.302×10^{3}
sulfurdioxide slant column density cobra [DU]	$(1.823 \pm 37.241) \times 10^{-2}$	17403316	0.258	0.375	9.279×10^{-3}	-45.8	79.7
sulfurdioxide slant column density cobra precision [DU]	0.300 ± 0.133	17403316	0.213	0.128	0.261	8.066×10^{-2}	40.0
sulfurdioxide slant column density window1 [DU]	0.105 ± 0.691	17403316	0.125	0.754	0.107	-77.1	98.2
sulfurdioxide slant column density window1 precision [DU]	0.300 ± 0.133	17403316	0.213	0.128	0.261	8.066×10^{-2}	40.0
sulfurdioxide slant column density corrected win1 [DU]	$(2.458 \pm 68.208) \times 10^{-2}$	17403316	-2.500×10^{-2}	0.739	5.996×10^{-3}	-77.1	97.8
background so2 slant column offset window1 [DU]	$(-8.057 \pm 13.130) \times 10^{-2}$	17403316	-0.180	0.161	-0.107	-0.965	3.58
sulfurdioxide slant column density window2 [DU]	1.15 ± 9.09	17403316	1.25	11.2	1.10	-3.168×10^{3}	1.317×10^{3}
sulfurdioxide slant column density window2 precision [DU]	8.14 ± 2.44	17403316	7.43	2.68	7.77	2.17	720
sulfurdioxide slant column density corrected win2 [DU]	-0.397 ± 8.994	17403316	0.250	11.1	-0.369	-3.168×10^{3}	1.317×10^{3}
background so2 slant column offset window2 [DU]	-1.55 ± 2.04	17403316	0.250	2.96	-1.18	-10.4	10.8
sulfurdioxide slant column density window3 [DU]	-10.6 ± 23.8	17403316	-11.8	29.2	-10.6	-1.710×10^{3}	495
sulfurdioxide slant column density window3 precision [DU]	28.0 ± 13.2	17403316	22.5	10.3	24.5	9.17	329
sulfurdioxide slant column density corrected win3 [DU]	-3.33 ± 23.35	17403316	-2.80	28.7	-3.06	-1.703×10^{3}	502
background so2 slant column offset window3 [DU]	7.23 ± 5.08	17403316	11.8	8.47	7.33	-11.9	25.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17403316	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.151 \pm 7.154) \times 10^{-2}$	17403316	1.217×10^{-2}	2.221×10^{-2}	1.425×10^{-2}	1.891×10^{-4}	2.50
fitted radiance shift [nm]	$(-2.375 \pm 25.166) \times 10^{-4}$	17403316	1.000×10^{-4}	1.668×10^{-3}	-2.314×10^{-4}	-0.110	6.163×10^{-2}
fitted radiance squeeze [1]	$(-3.563 \pm 18.787) \times 10^{-5}$	17403316	-3.000×10^{-5}	2.157×10^{-4}	-3.054×10^{-5}	-1.970×10^{-2}	4.371×10^{-2}
fitted root mean square [1]	$(1.300 \pm 0.527) \times 10^{-3}$	17403316	1.025×10^{-3}	5.203×10^{-4}	1.156×10^{-3}	3.152×10^{-4}	8.380×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.945 ± 0.531	17403316	0.740	0.632	0.826	5.000×10^{-2}	2.88
sulfurdioxide total air mass factor polluted precision [1]	0.118 ± 0.128	17403316	3.500×10^{-2}	0.117	7.570×10^{-2}	3.272×10^{-3}	1.99
sulfurdioxide clear air mass factor polluted [1]	0.792 ± 0.405	17403316	0.620	0.412	0.716	6.544×10^{-2}	2.88
number of spectral points in retrieval [1]	73.4 ± 0.5	17403316	73.0	1.000	73.0	52.0	156

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]	−2.16	−0.840	−0.517	−0.349	−0.206	0.231	0.384	0.567	0.927	2.44
sulfurdioxide total vertical column precision [DU]	9.628×10^{-2}	0.125	0.151	0.177	0.213	0.535	0.715	0.928	1.36	3.19
sulfurdioxide slant column density corrected [DU]	−0.868	−0.502	−0.365	−0.274	−0.177	0.199	0.301	0.400	0.555	1.02
sulfurdioxide slant column density cobra [DU]	−0.868	−0.502	−0.365	−0.274	−0.177	0.199	0.301	0.400	0.555	1.02
sulfurdioxide slant column density cobra precision [DU]	0.146	0.174	0.189	0.201	0.216	0.344	0.399	0.455	0.553	0.772
sulfurdioxide slant column density window1 [DU]	−1.69	−0.956	−0.668	−0.475	−0.272	0.481	0.677	0.865	1.15	1.93
sulfurdioxide slant column density window1 precision [DU]	0.146	0.174	0.189	0.201	0.216	0.344	0.399	0.455	0.553	0.772
sulfurdioxide slant column density corrected win1 [DU]	−1.65	−0.982	−0.722	−0.545	−0.358	0.381	0.584	0.782	1.09	1.93
background so2 slant column offset window1 [DU]	−0.303	−0.240	−0.213	−0.197	−0.175	-1.365×10^{-2}	4.471×10^{-2}	9.622×10^{-2}	0.171	0.328
sulfurdioxide slant column density window2 [DU]	−20.3	−13.2	−9.81	−7.30	−4.50	6.74	9.58	12.1	15.7	23.3
sulfurdioxide slant column density window2 precision [DU]	4.24	5.08	5.62	6.06	6.59	9.27	10.2	11.1	12.4	15.2
sulfurdioxide slant column density corrected win2 [DU]	−22.1	−14.7	−11.3	−8.74	−5.93	5.16	7.92	10.4	13.8	21.1
background so2 slant column offset window2 [DU]	−6.62	−5.33	−4.48	−3.78	−2.92	4.225×10^{-2}	0.342	0.574	0.900	2.33
sulfurdioxide slant column density window3 [DU]	−71.1	−49.4	−39.5	−32.6	−25.1	4.12	11.8	18.8	28.4	47.7
sulfurdioxide slant column density window3 precision [DU]	13.3	15.7	17.6	19.1	20.7	31.0	35.5	40.8	52.1	83.9
sulfurdioxide slant column density corrected win3 [DU]	−63.5	−42.0	−32.0	−25.0	−17.5	11.2	18.5	25.2	34.3	53.3
background so2 slant column offset window3 [DU]	−3.48	−0.608	0.738	1.79	3.07	11.5	12.7	13.7	14.9	16.9
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]	4.441×10^{-4}	7.706×10^{-4}	1.250×10^{-3}	2.154×10^{-3}	6.181×10^{-3}	2.839×10^{-2}	4.368×10^{-2}	6.946×10^{-2}	0.111	0.320
fitted radiance shift [nm]	-7.970×10^{-3}	-3.934×10^{-3}	-2.518×10^{-3}	-1.730×10^{-3}	-1.089×10^{-3}	5.792×10^{-4}	1.216×10^{-3}	2.035×10^{-3}	3.507×10^{-3}	7.656×10^{-3}
fitted radiance squeeze [1]	-5.347×10^{-4}	-3.386×10^{-4}	-2.565×10^{-4}	-2.003×10^{-4}	-1.410×10^{-4}	7.471×10^{-5}	1.283×10^{-4}	1.782×10^{-4}	2.502×10^{-4}	4.254×10^{-4}
fitted root mean square [1]	5.973×10^{-4}	7.440×10^{-4}	8.307×10^{-4}	8.945×10^{-4}	9.687×10^{-4}	1.489×10^{-3}	1.733×10^{-3}	1.968×10^{-3}	2.307×10^{-3}	3.183×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.681×10^{-2}	0.261	0.371	0.458	0.574	1.21	1.50	1.78	2.07	2.38
sulfurdioxide total air mass factor polluted precision [1]	1.004×10^{-2}	1.917×10^{-2}	2.520×10^{-2}	3.102×10^{-2}	3.872×10^{-2}	0.156	0.197	0.246	0.348	0.666
sulfurdioxide clear air mass factor polluted [1]	0.228	0.318	0.380	0.439	0.520	0.932	1.07	1.32	1.70	2.22
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]	0.575 ± 0.420	12077532	0.860	0.490	0.0	1.000	0.140	1.000
sulfurdioxide total vertical column [DU]	$(2.264 \pm 92.645) \times 10^{-2}$	12077532	0.404	8.388×10^{-3}	-44.7	275	-0.191	0.212
sulfurdioxide total vertical column precision [DU]	0.471 ± 0.660	12077532	0.292	0.291	4.184×10^{-2}	55.0	0.196	0.488
sulfurdioxide slant column density corrected [DU]	$(1.692 \pm 37.602) \times 10^{-2}$	12077532	0.356	7.968×10^{-3}	-9.27	192	-0.168	0.187
sulfurdioxide slant column density cobra [DU]	$(1.665 \pm 35.419) \times 10^{-2}$	12077532	0.356	7.968×10^{-3}	-9.27	62.1	-0.168	0.187
sulfurdioxide slant column density cobra precision [DU]	0.282 ± 0.122	12077532	0.110	0.246	8.066×10^{-2}	25.0	0.208	0.318
sulfurdioxide slant column density window1 [DU]	$(9.196 \pm 65.713) \times 10^{-2}$	12077532	0.720	9.882×10^{-2}	-17.2	43.7	-0.266	0.454
sulfurdioxide slant column density window1 precision [DU]	0.282 ± 0.122	12077532	0.110	0.246	8.066×10^{-2}	25.0	0.208	0.318
sulfurdioxide slant column density corrected win1 [DU]	$(1.606 \pm 64.424) \times 10^{-2}$	12077532	0.701	2.483×10^{-4}	-17.2	43.6	-0.346	0.355
background so2 slant column offset window1 [DU]	$(-7.590 \pm 14.216) \times 10^{-2}$	12077532	0.191	-0.108	-0.413	2.46	-0.184	7.500×10^{-3}
sulfurdioxide slant column density window2 [DU]	1.09 ± 8.42	12077532	10.6	1.10	-3.168×10^{3}	149	-4.22	6.41
sulfurdioxide slant column density window2 precision [DU]	7.64 ± 2.09	12077532	2.32	7.34	2.17	623	6.27	8.59
sulfurdioxide slant column density corrected win2 [DU]	-0.534 ± 8.312	12077532	10.5	-0.470	-3.168×10^{3}	144	-5.73	4.73
background so2 slant column offset window2 [DU]	-1.63 ± 2.13	12077532	3.28	-1.38	-9.97	10.8	-3.13	0.146
sulfurdioxide slant column density window3 [DU]	-10.6 ± 21.9	12077532	27.1	-10.9	-259	423	-24.3	2.83
sulfurdioxide slant column density window3 precision [DU]	26.2 ± 13.0	12077532	8.14	22.8	9.17	329	19.7	27.8
sulfurdioxide slant column density corrected win3 [DU]	-3.12 ± 21.41	12077532	26.5	-2.94	-261	422	-16.3	10.3
background so2 slant column offset window3 [DU]	7.52 ± 5.32	12077532	9.22	8.73	-11.9	20.6	2.73	12.0
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	12077532	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.387 \pm 8.132) \times 10^{-2}$	12077532	2.797×10^{-2}	1.154×10^{-2}	1.891×10^{-4}	2.50	2.555×10^{-3}	3.053×10^{-2}
fitted radiance shift [nm]	$(-1.013 \pm 25.294) \times 10^{-4}$	12077532	1.572×10^{-3}	-1.167×10^{-4}	-4.044×10^{-2}	4.426×10^{-2}	-8.994×10^{-4}	6.726×10^{-4}
fitted radiance squeeze [1]	$(-6.243 \pm 17.592) \times 10^{-5}$	12077532	2.084×10^{-4}	-5.001×10^{-5}	-1.425×10^{-2}	1.081×10^{-2}	-1.596×10^{-4}	4.878×10^{-5}
fitted root mean square [1]	$(1.235 \pm 0.496) \times 10^{-3}$	12077532	4.511×10^{-4}	1.102×10^{-3}	3.152×10^{-4}	3.771×10^{-2}	9.331×10^{-4}	1.384×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.992 ± 0.586	12077532	0.792	0.846	5.000×10^{-2}	2.88	0.563	1.35
sulfurdioxide total air mass factor polluted precision [1]	0.131 ± 0.142	12077532	0.129	8.848×10^{-2}	3.276×10^{-3}	1.99	4.071×10^{-2}	0.169
sulfurdioxide clear air mass factor polluted [1]	0.825 ± 0.461	12077532	0.488	0.716	6.768×10^{-2}	2.88	0.496	0.984
number of spectral points in retrieval [1]	73.5 ± 0.5	12077532	1.000	73.0	52.0	156	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]	0.765 ± 0.352	5325784	0.560	1.000	0.0	1.000	0.440	1.000
sulfurdioxide total vertical column [DU]	$(3.643 \pm 148.056) \times 10^{-2}$	5325784	0.526	1.462×10^{-2}	-66.2	1.649×10^{3}	-0.245	0.282
sulfurdioxide total vertical column precision [DU]	0.539 ± 0.641	5325784	0.373	0.376	4.793×10^{-2}	869	0.261	0.634
sulfurdioxide slant column density corrected [DU]	$(2.275 \pm 83.936) \times 10^{-2}$	5325784	0.427	1.275×10^{-2}	-45.8	1.302×10^{3}	-0.199	0.228
sulfurdioxide slant column density cobra [DU]	$(2.183 \pm 41.071) \times 10^{-2}$	5325784	0.427	1.275×10^{-2}	-45.8	79.7	-0.199	0.228
sulfurdioxide slant column density cobra precision [DU]	0.339 ± 0.148	5325784	0.153	0.300	0.100	40.0	0.244	0.397
sulfurdioxide slant column density window1 [DU]	0.135 ± 0.760	5325784	0.840	0.129	-77.1	98.2	-0.289	0.551
sulfurdioxide slant column density window1 precision [DU]	0.339 ± 0.148	5325784	0.153	0.300	0.100	40.0	0.244	0.397
sulfurdioxide slant column density corrected win1 [DU]	$(4.390 \pm 76.060) \times 10^{-2}$	5325784	0.836	2.142×10^{-2}	-77.1	97.8	-0.389	0.447
background so2 slant column offset window1 [DU]	$(-9.115 \pm 10.171) \times 10^{-2}$	5325784	9.922×10^{-2}	-0.106	-0.965	3.58	-0.149	-5.022×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.29 ± 10.46	5325784	12.8	1.12	-2.120×10^{3}	1.317×10^{3}	-5.23	7.61
sulfurdioxide slant column density window2 precision [DU]	9.29 ± 2.76	5325784	2.92	8.93	2.34	720	7.64	10.6
sulfurdioxide slant column density corrected win2 [DU]	$(-8.697 \pm 1036.721) \times 10^{-2}$	5325784	12.7	-9.040×10^{-2}	-2.114×10^{3}	1.317×10^{3}	-6.46	6.27
background so2 slant column offset window2 [DU]	-1.37 ± 1.81	5325784	2.26	-0.928	-10.4	10.4	-2.37	-0.119
sulfurdioxide slant column density window3 [DU]	-10.4 ± 27.5	5325784	34.8	-9.75	-1.710×10^{3}	495	-27.4	7.42
sulfurdioxide slant column density window3 precision [DU]	32.0 ± 12.6	5325784	10.5	29.1	10.2	288	24.7	35.2
sulfurdioxide slant column density corrected win3 [DU]	-3.81 ± 27.24	5325784	34.5	-3.39	-1.703×10^{3}	502	-20.8	13.7
background so2 slant column offset window3 [DU]	6.58 ± 4.42	5325784	5.88	5.70	-9.91	25.5	3.58	9.46
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	5325784	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.615 \pm 4.106) \times 10^{-2}$	5325784	1.422×10^{-2}	1.702×10^{-2}	1.440×10^{-3}	1.26	1.210×10^{-2}	2.632×10^{-2}
fitted radiance shift [nm]	$(-5.465 \pm 24.596) \times 10^{-4}$	5325784	1.778×10^{-3}	-5.307×10^{-4}	-0.110	6.163×10^{-2}	-1.465×10^{-3}	3.128×10^{-4}
fitted radiance squeeze [1]	$(2.515 \pm 19.957) \times 10^{-5}$	5325784	2.292×10^{-4}	1.882×10^{-5}	-1.970×10^{-2}	4.371×10^{-2}	-9.336×10^{-5}	1.359×10^{-4}
fitted root mean square [1]	$(1.449 \pm 0.562) \times 10^{-3}$	5325784	6.280×10^{-4}	1.300×10^{-3}	3.827×10^{-4}	8.380×10^{-2}	1.075×10^{-3}	1.702×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.837 ± 0.356	5325784	0.428	0.791	5.000×10^{-2}	2.54	0.596	1.02
sulfurdioxide total air mass factor polluted precision [1]	$(9.001 \pm 8.202) \times 10^{-2}$	5325784	8.390×10^{-2}	5.585×10^{-2}	3.272×10^{-3}	1.28	3.630×10^{-2}	0.120
sulfurdioxide clear air mass factor polluted [1]	0.718 ± 0.216	5325784	0.290	0.717	6.544×10^{-2}	1.60	0.570	0.860
number of spectral points in retrieval [1]	73.4 ± 0.5	5325784	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]	0.651 ± 0.397	11296167	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(2.368 \pm 87.276) \times 10^{-2}$	11296167	0.434	1.016×10^{-2}	-46.2	1.014×10^{3}	-0.205	0.230
sulfurdioxide total vertical column precision [DU]	0.479 ± 0.642	11296167	0.301	0.304	5.032×10^{-2}	869	0.216	0.517
sulfurdioxide slant column density corrected [DU]	$(1.668 \pm 43.508) \times 10^{-2}$	11296167	0.377	9.365×10^{-3}	-39.6	760	-0.177	0.200
sulfurdioxide slant column density cobra [DU]	$(1.652 \pm 36.095) \times 10^{-2}$	11296167	0.377	9.365×10^{-3}	-39.6	62.1	-0.177	0.200
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.132	11296167	0.139	0.263	8.066×10^{-2}	25.0	0.215	0.354
sulfurdioxide slant column density window1 [DU]	0.101 ± 0.688	11296167	0.762	0.110	-61.8	64.0	-0.276	0.486
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.132	11296167	0.139	0.263	8.066×10^{-2}	25.0	0.215	0.354
sulfurdioxide slant column density corrected win1 [DU]	$(2.625 \pm 67.735) \times 10^{-2}$	11296167	0.746	1.065×10^{-2}	-61.8	65.2	-0.357	0.388
background so2 slant column offset window1 [DU]	$(-7.509 \pm 13.698) \times 10^{-2}$	11296167	0.172	-0.106	-0.526	3.58	-0.174	-1.760×10^{-3}
sulfurdioxide slant column density window2 [DU]	1.19 ± 9.10	11296167	11.3	1.10	-3.168×10^{3}	890	-4.49	6.76
sulfurdioxide slant column density window2 precision [DU]	8.10 ± 2.31	11296167	2.61	7.74	2.17	720	6.61	9.21
sulfurdioxide slant column density corrected win2 [DU]	-0.346 ± 8.985	11296167	11.1	-0.324	-3.168×10^{3}	889	-5.89	5.21
background so2 slant column offset window2 [DU]	-1.54 ± 2.13	11296167	3.13	-0.990	-10.4	10.8	-3.03	9.659×10^{-2}
sulfurdioxide slant column density window3 [DU]	-8.03 ± 23.63	11296167	29.4	-8.31	-736	495	-22.7	6.65
sulfurdioxide slant column density window3 precision [DU]	27.1 ± 11.3	11296167	9.25	24.2	9.40	237	20.7	30.0
sulfurdioxide slant column density corrected win3 [DU]	-1.09 ± 22.98	11296167	28.6	-1.14	-727	502	-15.3	13.2
background so2 slant column offset window3 [DU]	6.94 ± 5.14	11296167	8.50	6.50	-11.9	25.5	2.83	11.3
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	11296167	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.079 \pm 3.455) \times 10^{-2}$	11296167	1.561×10^{-2}	1.328×10^{-2}	2.231×10^{-4}	1.44	7.350×10^{-3}	2.296×10^{-2}
fitted radiance shift [nm]	$(-2.639 \pm 22.084) \times 10^{-4}$	11296167	1.611×10^{-3}	-2.395×10^{-4}	-0.110	3.458×10^{-2}	-1.080×10^{-3}	5.307×10^{-4}
fitted radiance squeeze [1]	$(-2.811 \pm 18.883) \times 10^{-5}$	11296167	2.165×10^{-4}	-2.251×10^{-5}	-1.915×10^{-2}	1.890×10^{-2}	-1.338×10^{-4}	8.274×10^{-5}
fitted root mean square [1]	$(1.313 \pm 0.531) \times 10^{-3}$	11296167	5.727×10^{-4}	1.161×10^{-3}	3.429×10^{-4}	7.749×10^{-2}	9.640×10^{-4}	1.537×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.943 ± 0.493	11296167	0.566	0.853	5.000×10^{-2}	2.84	0.615	1.18
sulfurdioxide total air mass factor polluted precision [1]	0.108 ± 0.115	11296167	9.595×10^{-2}	7.071×10^{-2}	3.711×10^{-3}	1.79	4.117×10^{-2}	0.137
sulfurdioxide clear air mass factor polluted [1]	0.820 ± 0.402	11296167	0.388	0.756	6.768×10^{-2}	2.75	0.561	0.950
number of spectral points in retrieval [1]	73.4 ± 0.5	11296167	1.000	73.0	53.0	74.0	73.0	74.0

Table 6: Parameterlist and basic statistics for the analysis for observations over land

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.648 ± 0.424	4241439	0.830	1.000	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(2.903 \pm 156.559) \times 10^{-2}$	4241439	0.453	9.336×10^{-3}	-66.2	1.649×10^{3}	-0.213	0.239
sulfurdioxide total vertical column precision [DU]	0.506 ± 0.591	4241439	0.352	0.356	4.184×10^{-2}	170	0.214	0.567
sulfurdioxide slant column density corrected [DU]	$(2.013 \pm 81.929) \times 10^{-2}$	4241439	0.366	8.607×10^{-3}	-45.8	1.302×10^{3}	-0.173	0.193
sulfurdioxide slant column density cobra [DU]	$(1.912 \pm 37.431) \times 10^{-2}$	4241439	0.366	8.607×10^{-3}	-45.8	79.7	-0.173	0.193
sulfurdioxide slant column density cobra precision [DU]	0.290 ± 0.132	4241439	0.104	0.253	9.388×10^{-2}	40.0	0.216	0.320
sulfurdioxide slant column density window1 [DU]	0.132 ± 0.676	4241439	0.727	0.122	-77.1	98.2	-0.239	0.488
sulfurdioxide slant column density window1 precision [DU]	0.290 ± 0.132	4241439	0.104	0.253	9.388×10^{-2}	40.0	0.216	0.320
sulfurdioxide slant column density corrected win1 [DU]	$(2.628 \pm 67.064) \times 10^{-2}$	4241439	0.716	4.269×10^{-3}	-77.1	97.8	-0.347	0.369
background so2 slant column offset window1 [DU]	-0.106 ± 0.118	4241439	0.130	-0.126	-0.965	1.97	-0.185	-5.515×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.914 ± 9.219	4241439	11.3	0.929	-829	1.317×10^{3}	-4.76	6.58
sulfurdioxide slant column density window2 precision [DU]	8.31 ± 2.69	4241439	2.82	7.93	2.36	687	6.66	9.48
sulfurdioxide slant column density corrected win2 [DU]	-0.350 ± 9.129	4241439	11.2	-0.322	-832	1.317×10^{3}	-5.92	5.24
background so2 slant column offset window2 [DU]	-1.26 ± 1.83	4241439	2.44	-0.957	-10.4	7.99	-2.35	8.371×10^{-2}
sulfurdioxide slant column density window3 [DU]	-15.5 ± 23.9	4241439	29.1	-14.9	-1.710×10^{3}	423	-29.7	-0.621
sulfurdioxide slant column density window3 precision [DU]	30.3 ± 16.2	4241439	12.4	25.9	9.17	329	21.2	33.7
sulfurdioxide slant column density corrected win3 [DU]	-8.61 ± 24.02	4241439	29.3	-7.68	-1.703×10^{3}	422	-22.8	6.49
background so2 slant column offset window3 [DU]	6.94 ± 4.95	4241439	8.24	6.96	-10.5	23.6	2.93	11.2
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.13	4241439	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.730 \pm 11.289) \times 10^{-2}$	4241439	5.679×10^{-2}	2.387×10^{-2}	1.891×10^{-4}	2.50	6.598×10^{-3}	6.338×10^{-2}
fitted radiance shift [nm]	$(-2.058 \pm 30.618) \times 10^{-4}$	4241439	1.702×10^{-3}	-2.400×10^{-4}	-8.343×10^{-2}	6.163×10^{-2}	-1.088×10^{-3}	6.148×10^{-4}
fitted radiance squeeze [1]	$(-3.707 \pm 18.325) \times 10^{-5}$	4241439	2.093×10^{-4}	-3.391×10^{-5}	-1.970×10^{-2}	4.371×10^{-2}	-1.399×10^{-4}	6.937×10^{-5}
fitted root mean square [1]	$(1.257 \pm 0.498) \times 10^{-3}$	4241439	4.249×10^{-4}	1.135×10^{-3}	3.152×10^{-4}	8.380×10^{-2}	9.688×10^{-4}	1.394×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.914 ± 0.580	4241439	0.672	0.720	5.000×10^{-2}	2.88	0.508	1.18
sulfurdioxide total air mass factor polluted precision [1]	0.133 ± 0.150	4241439	0.156	8.018×10^{-2}	3.272×10^{-3}	1.99	3.157×10^{-2}	0.188
sulfurdioxide clear air mass factor polluted [1]	0.723 ± 0.390	4241439	0.359	0.625	6.544×10^{-2}	2.88	0.475	0.833
number of spectral points in retrieval [1]	73.4 ± 0.5	4241439	1.000	73.0	52.0	156	73.0	74.0

3 Granule outlines

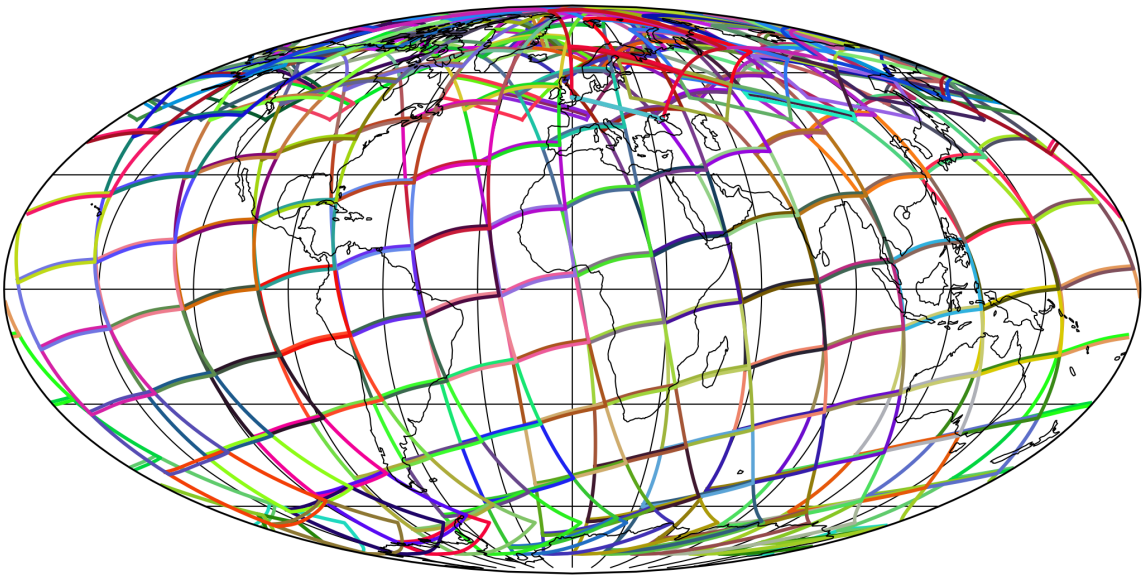


Figure 1: Outline of the granules.

4 Input data monitoring

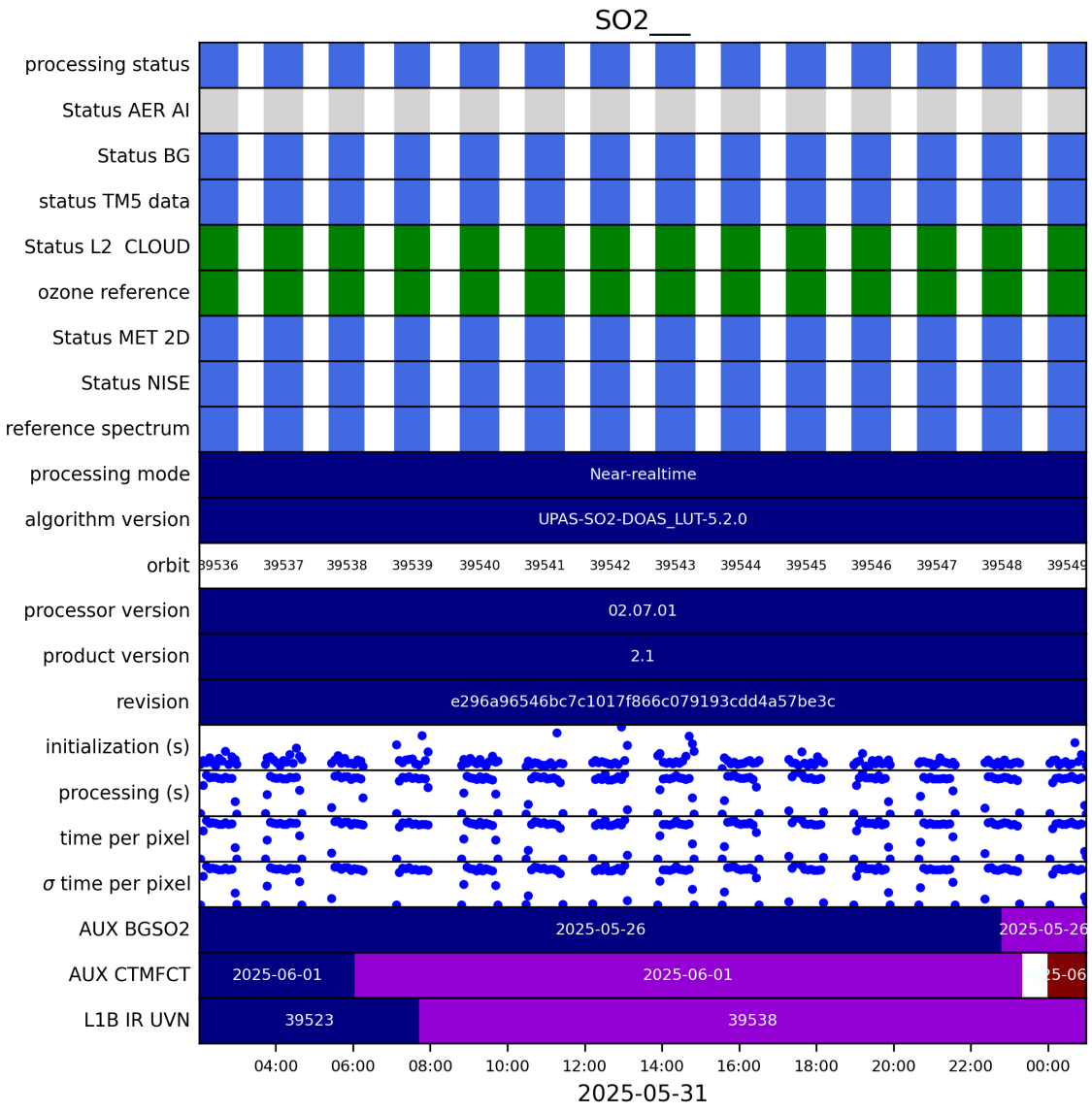


Figure 2: Input data per granule

5 Warnings and errors

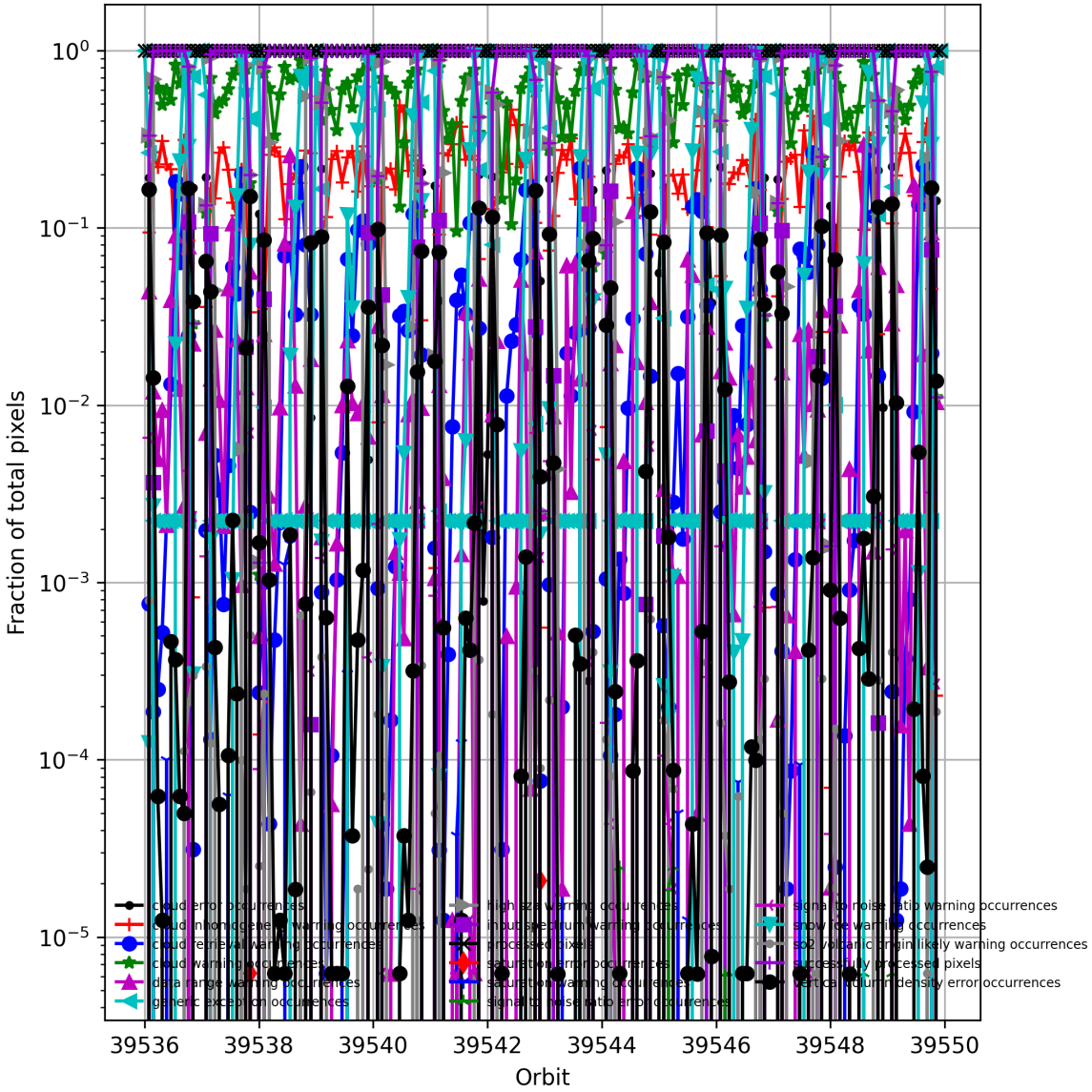


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

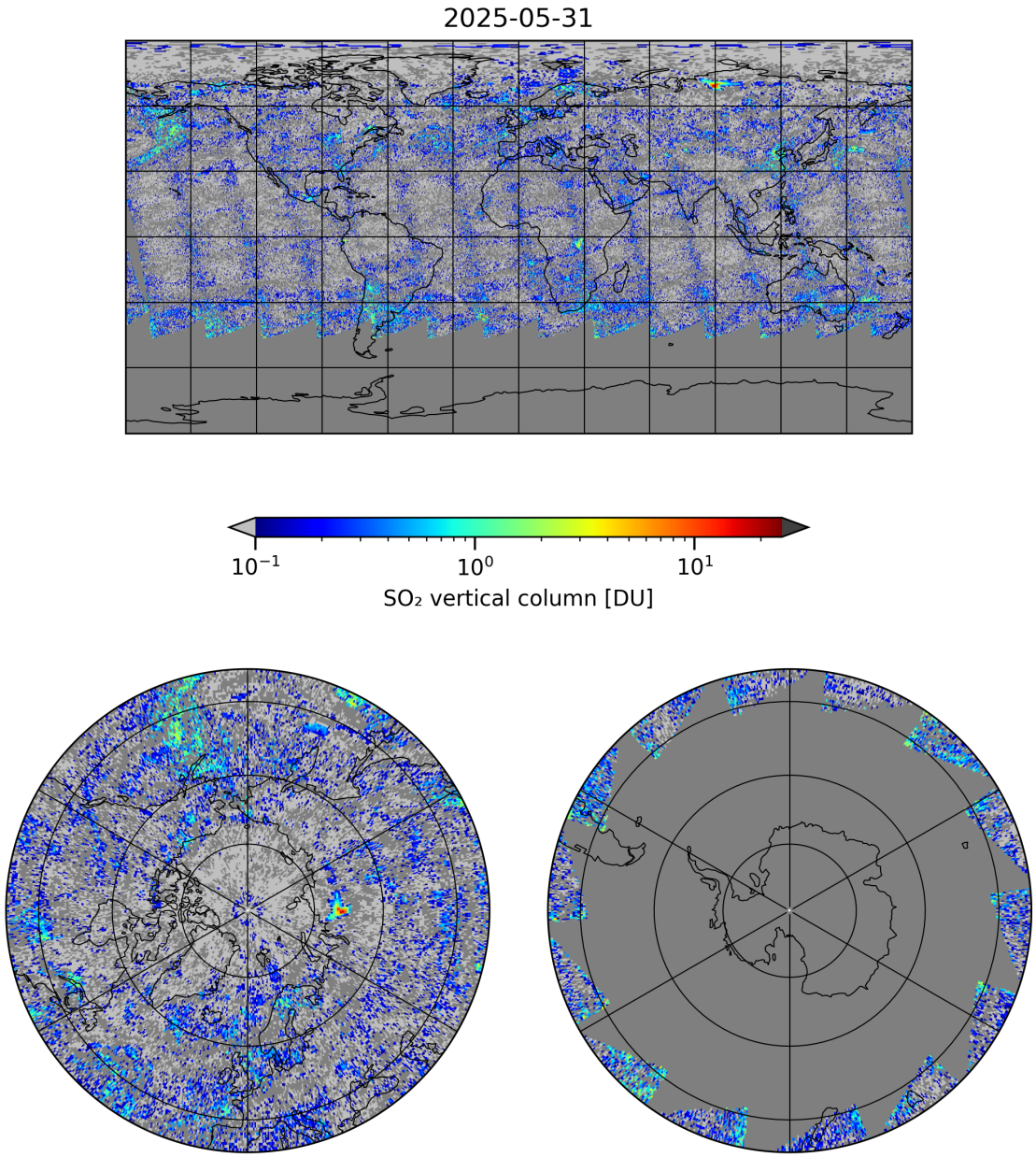


Figure 4: Map of "SO_2 vertical column" for 2025-05-31 to 2025-06-01

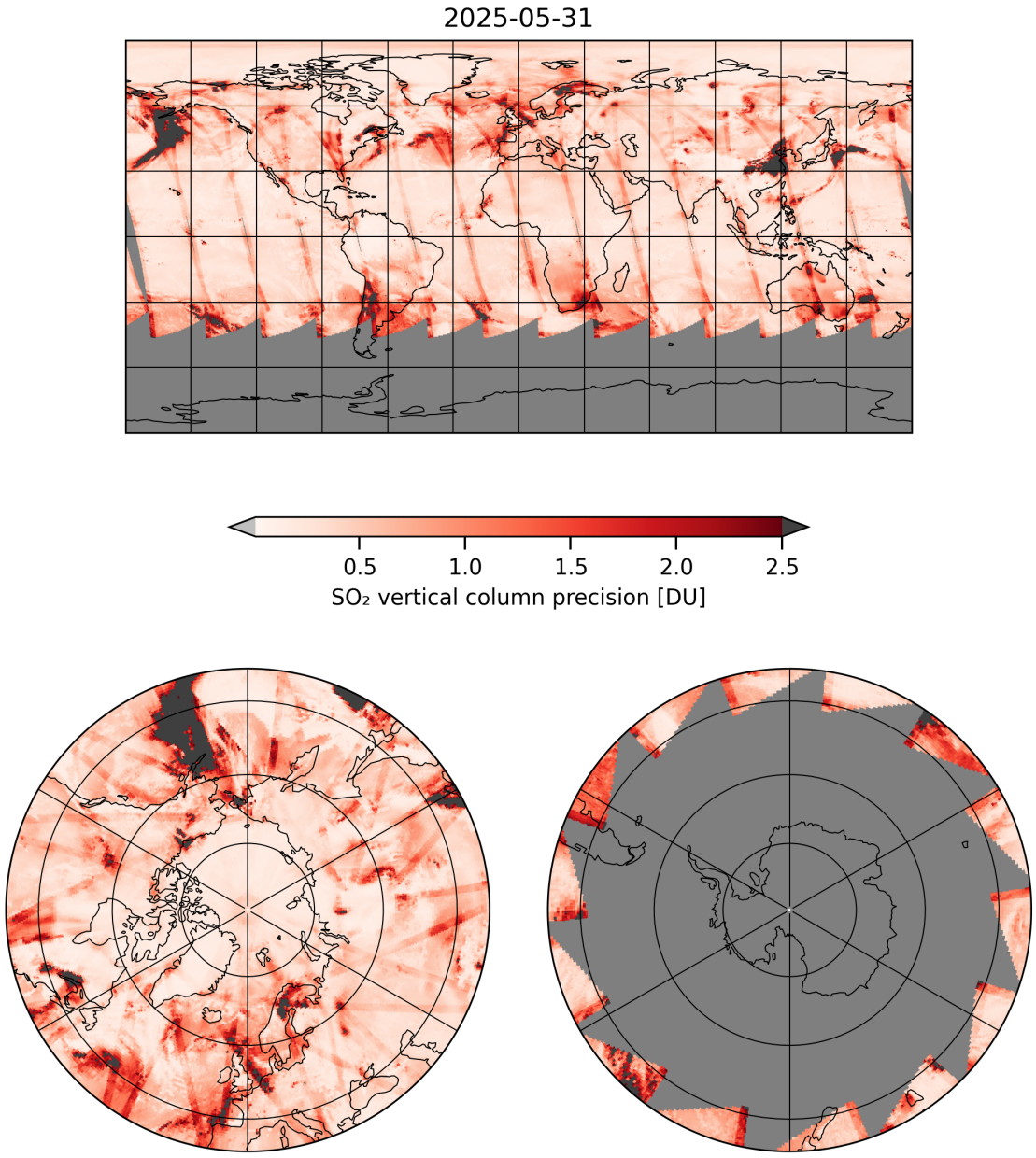


Figure 5: Map of "SO_2 vertical column precision" for 2025-05-31 to 2025-06-01

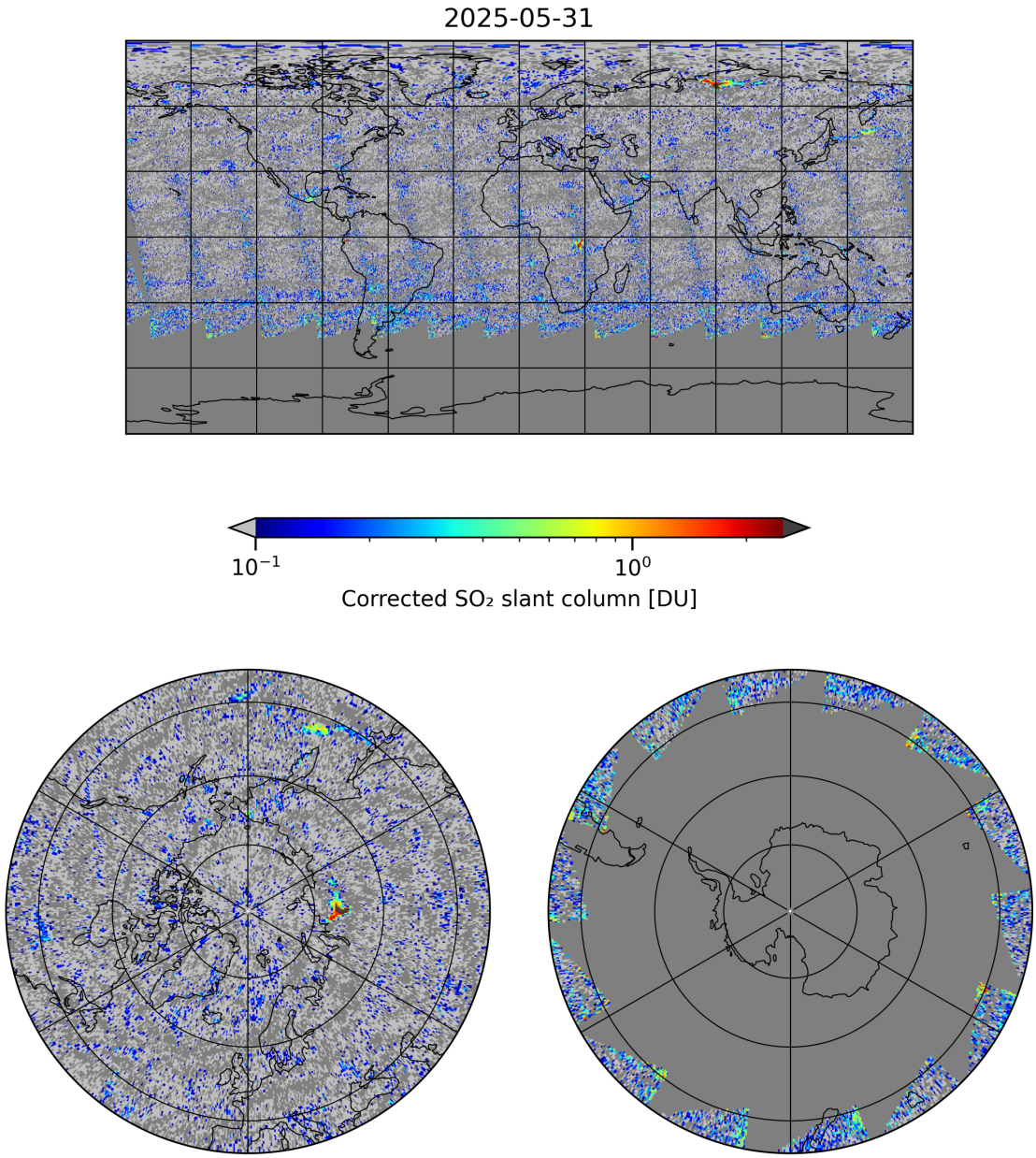


Figure 6: Map of “Corrected SO_2 slant column” for 2025-05-31 to 2025-06-01

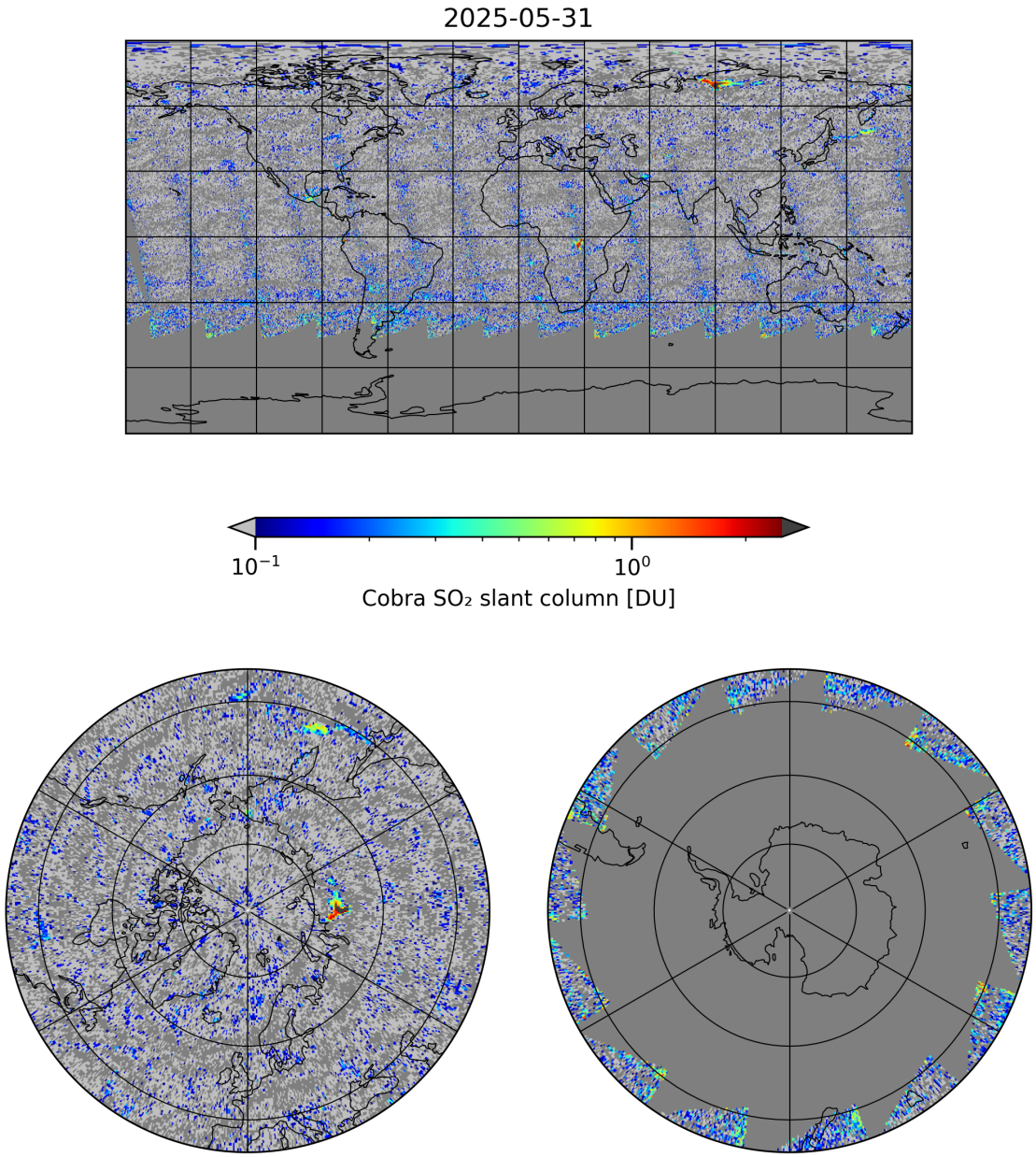


Figure 7: Map of “Cobra SO_2 slant column” for 2025-05-31 to 2025-06-01

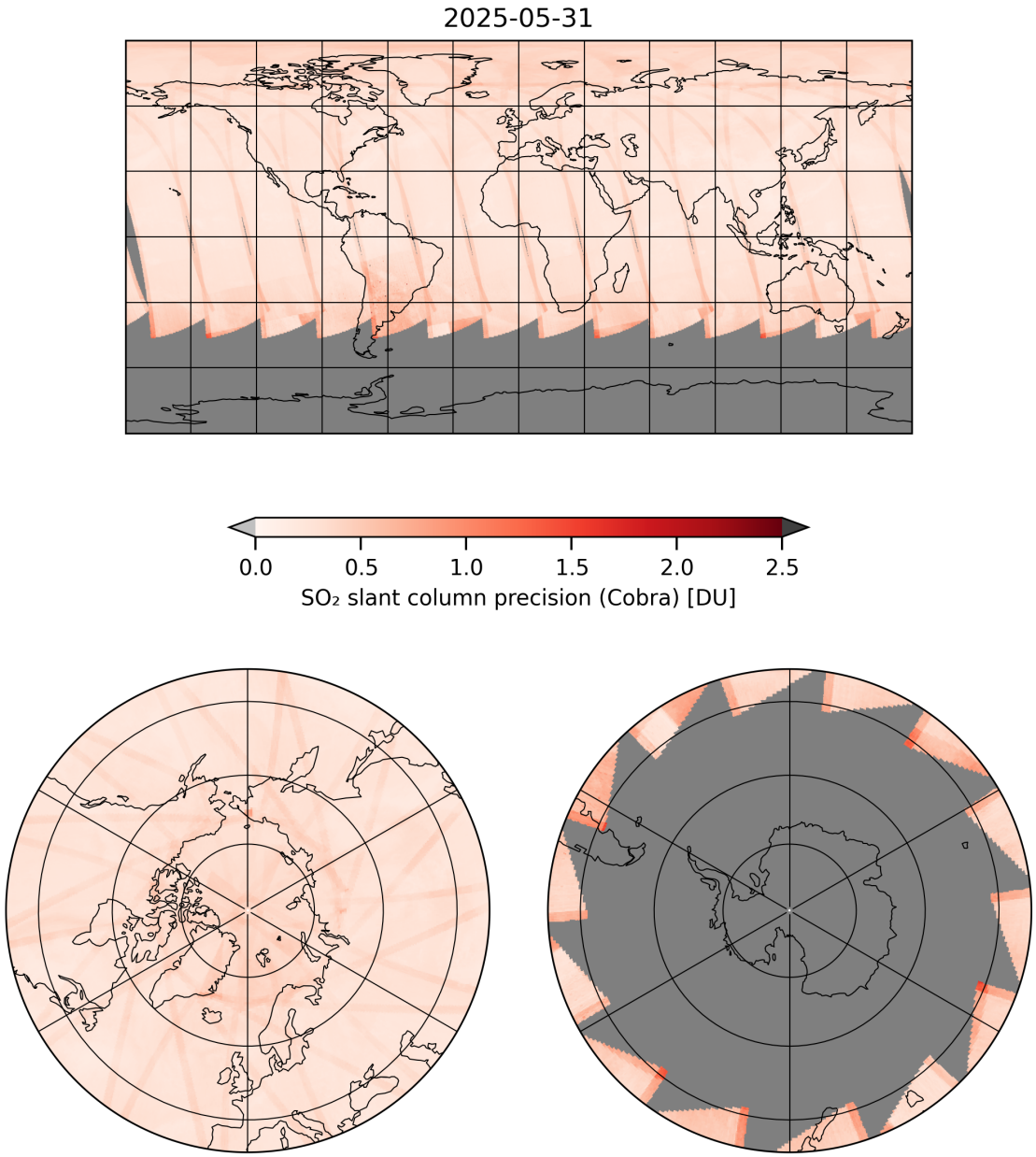


Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-05-31 to 2025-06-01

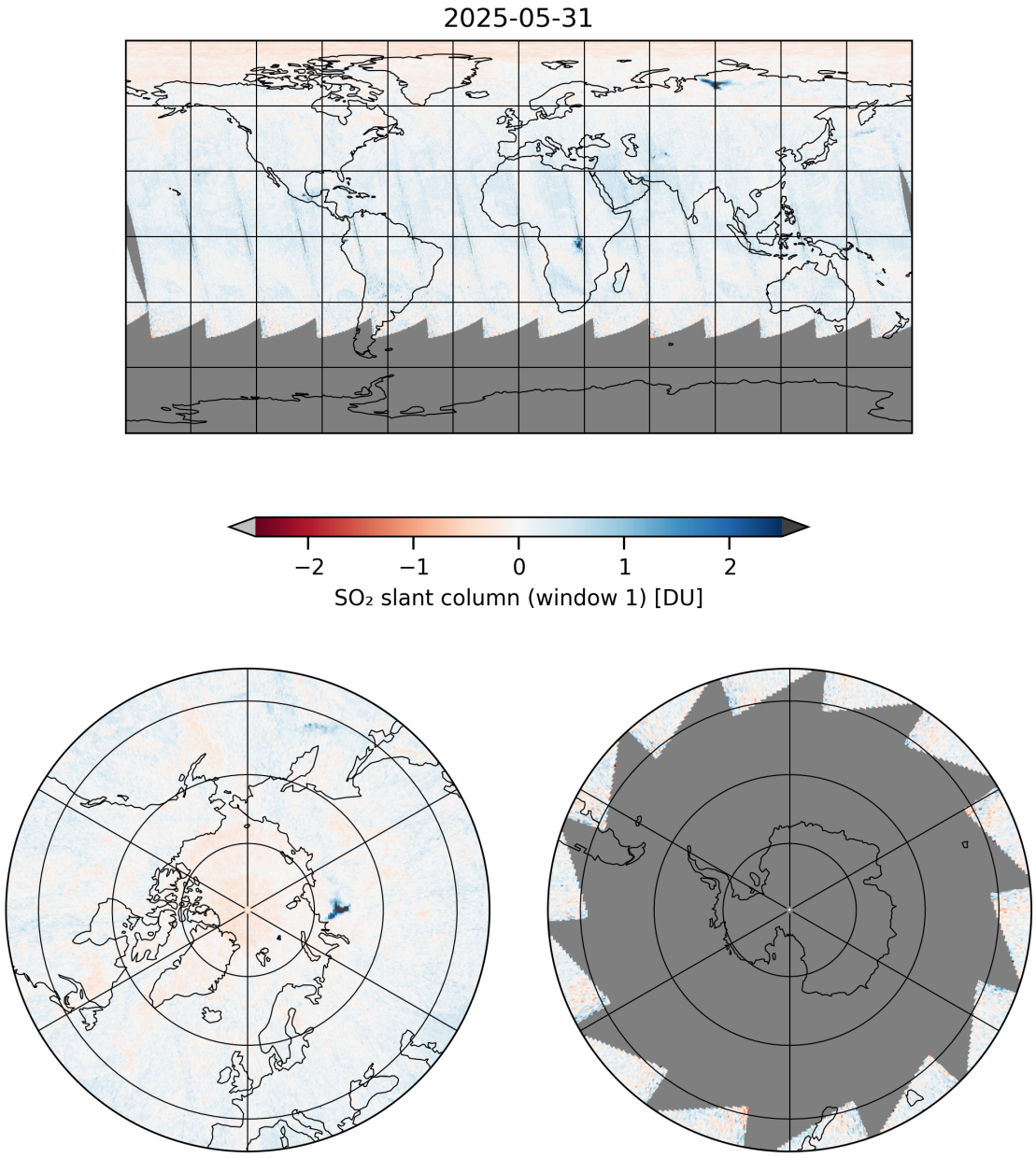


Figure 9: Map of "SO_2 slant column (window 1)" for 2025-05-31 to 2025-06-01

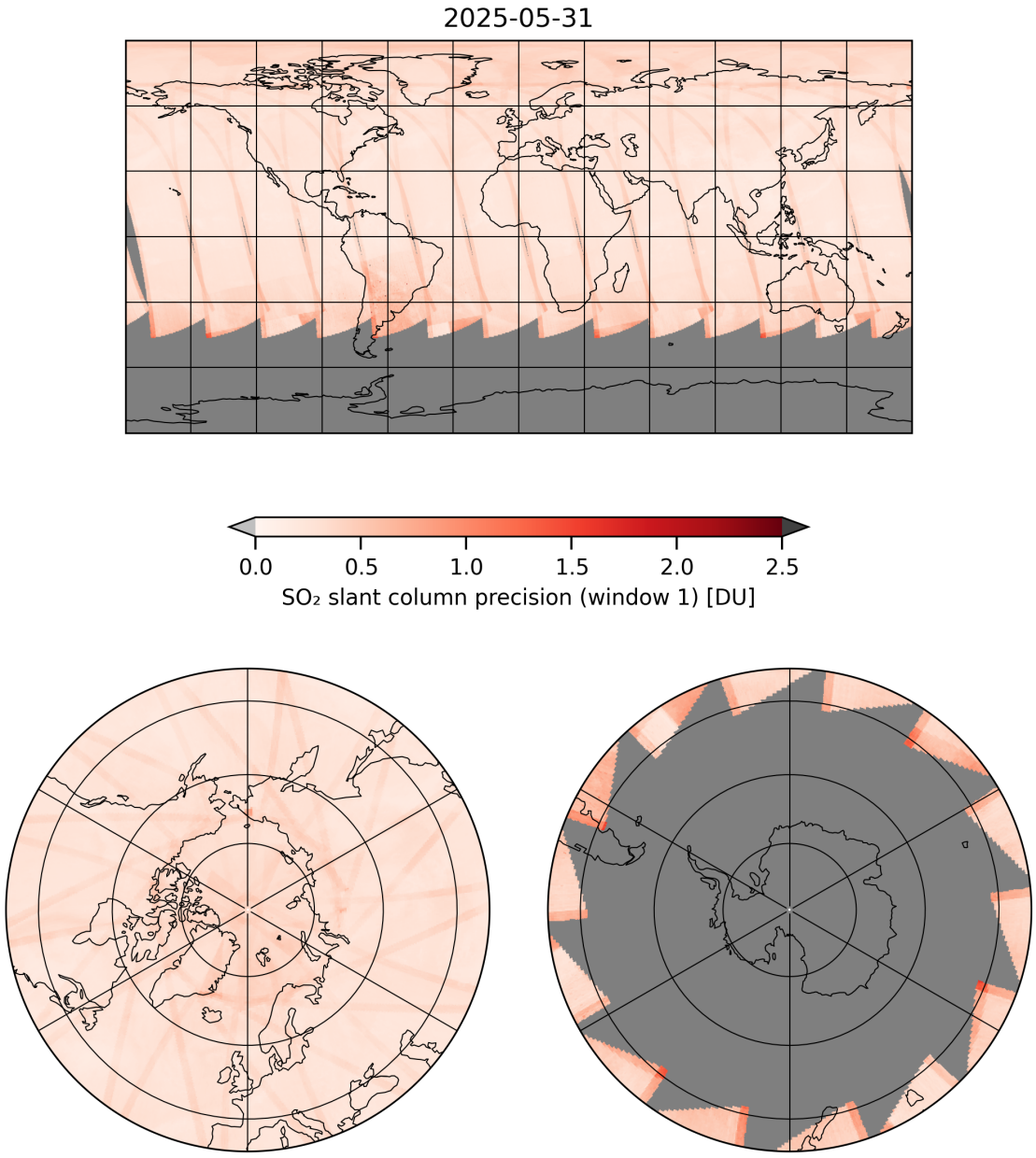


Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-05-31 to 2025-06-01

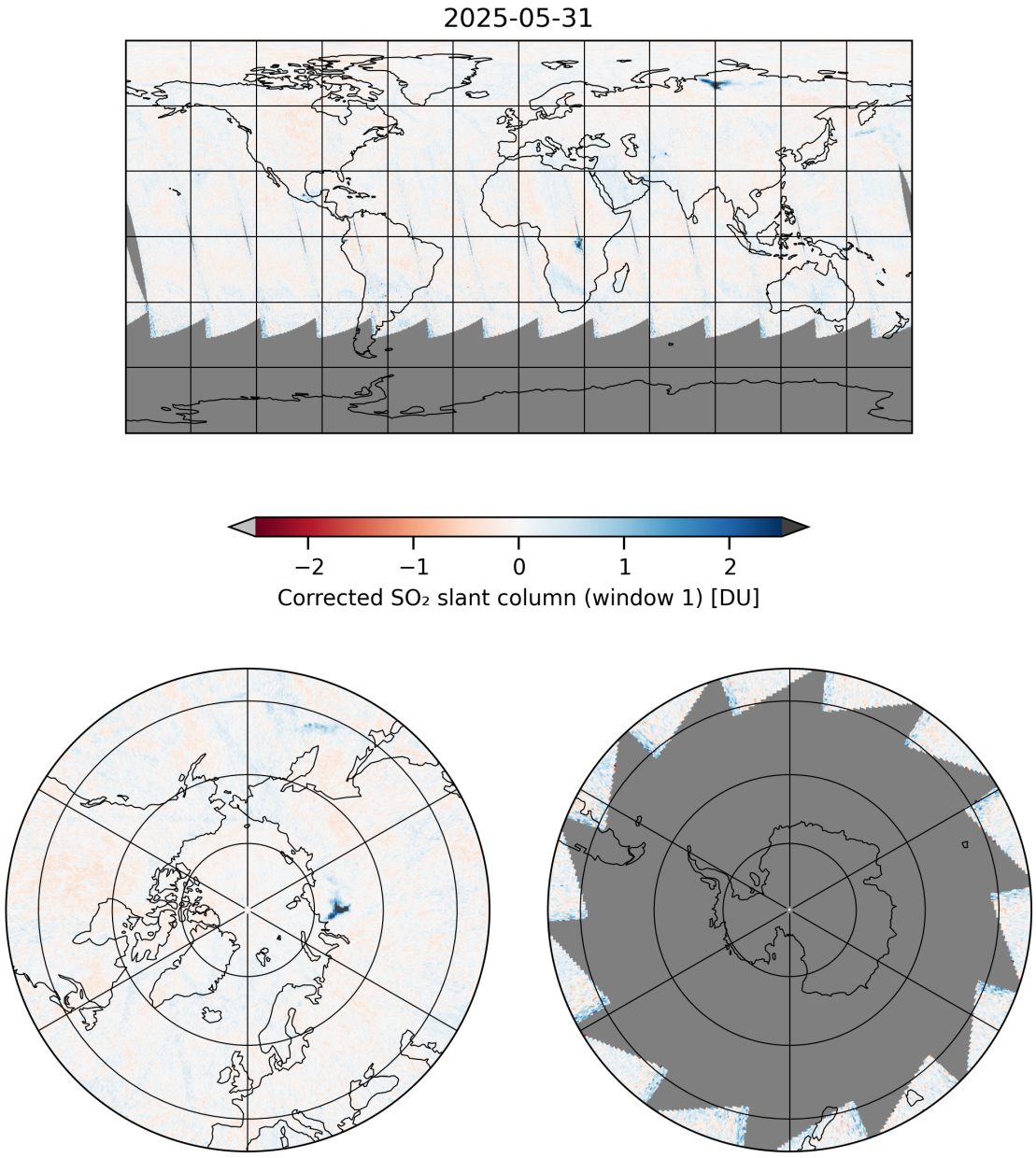


Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-05-31 to 2025-06-01

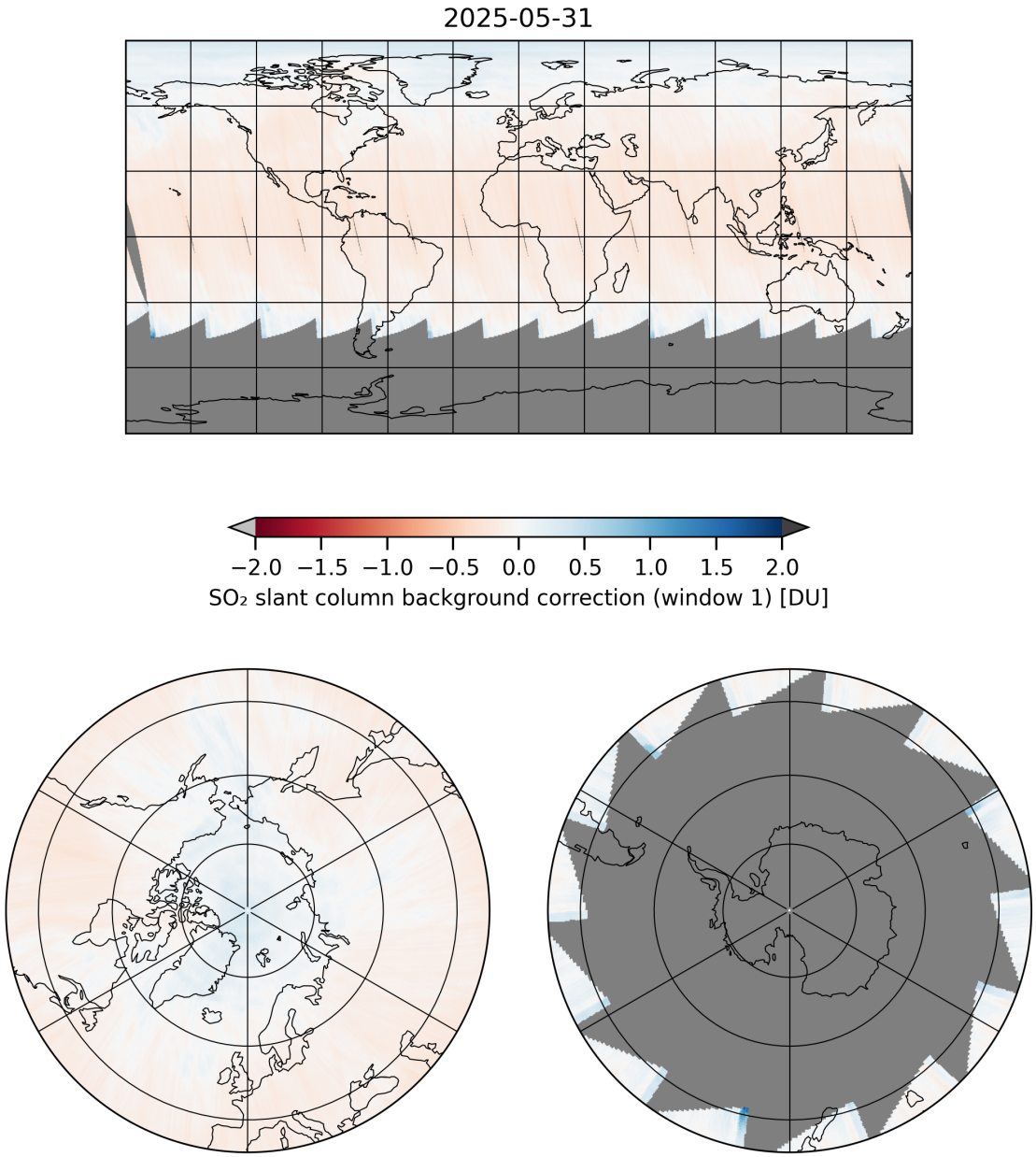


Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-05-31 to 2025-06-01

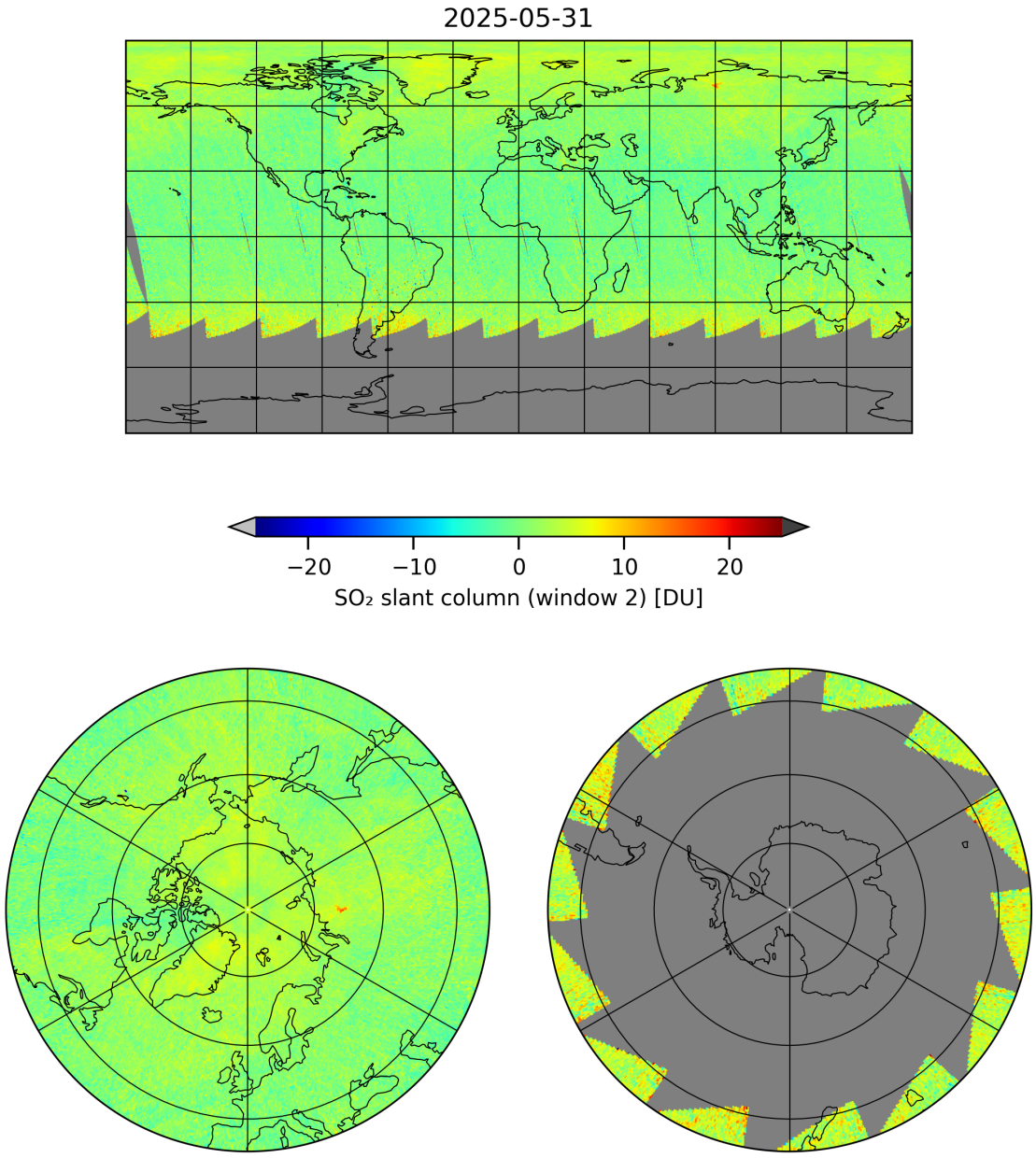


Figure 13: Map of "SO_2 slant column (window 2)" for 2025-05-31 to 2025-06-01

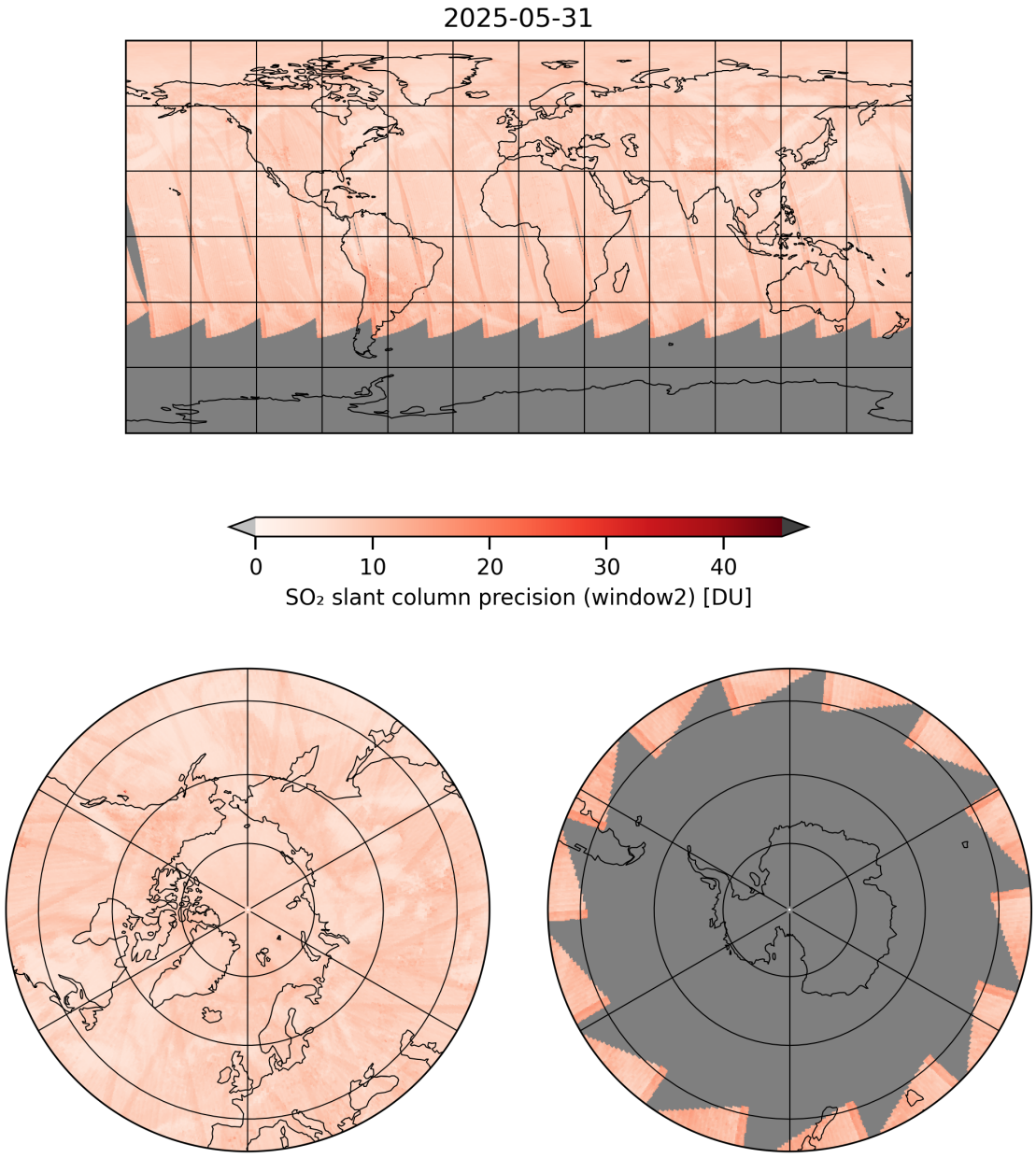


Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-05-31 to 2025-06-01

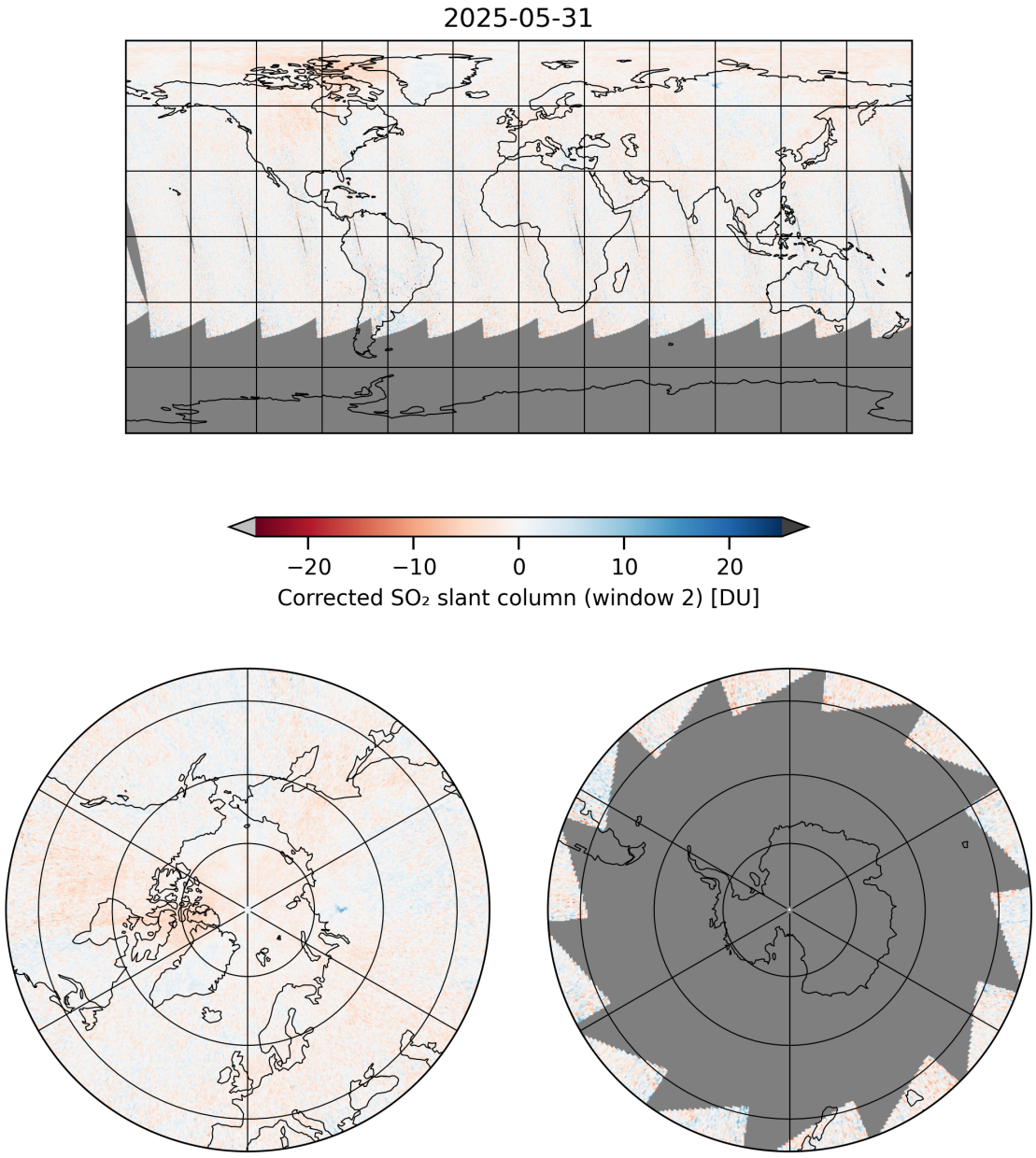


Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-05-31 to 2025-06-01

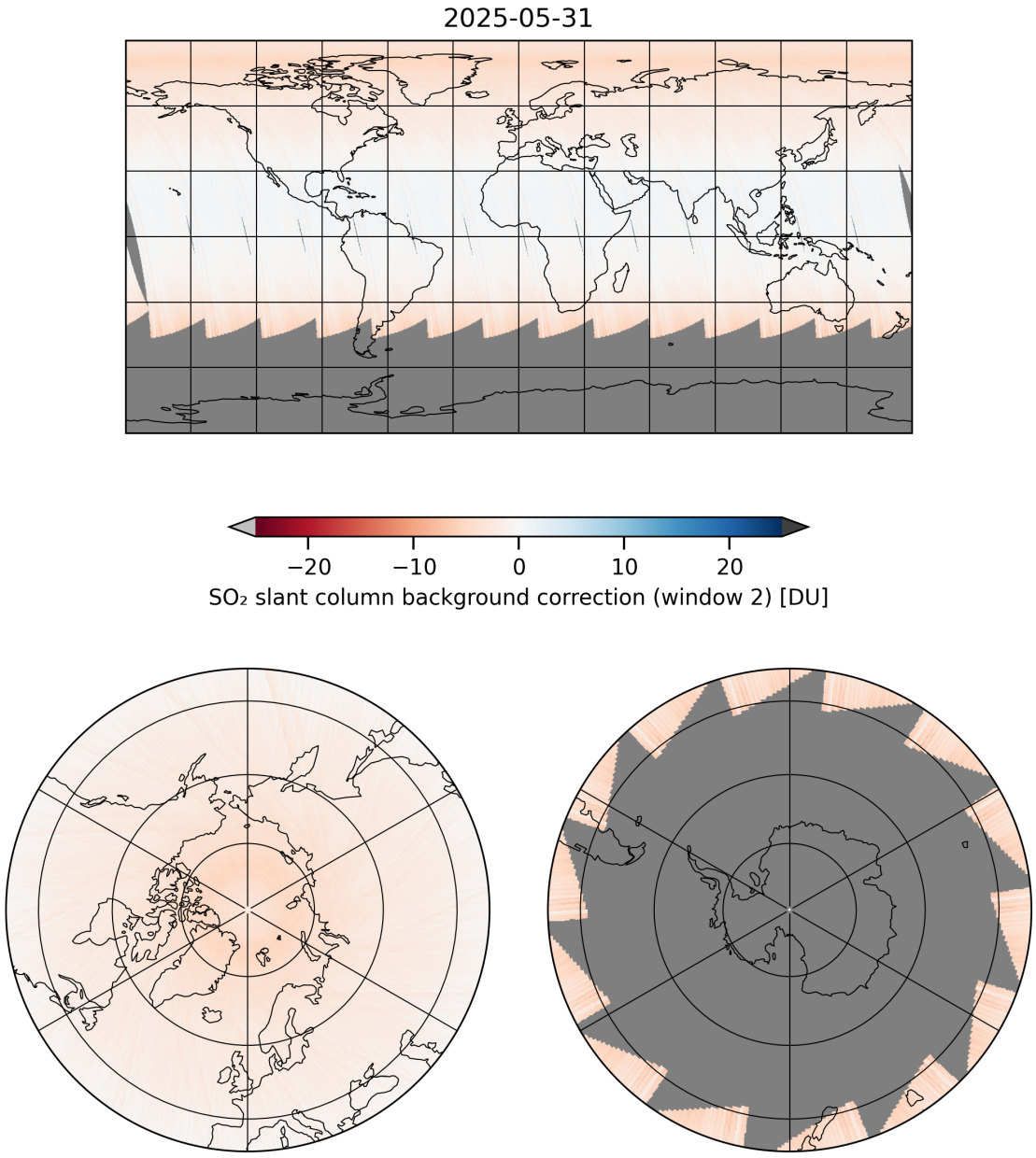


Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-05-31 to 2025-06-01

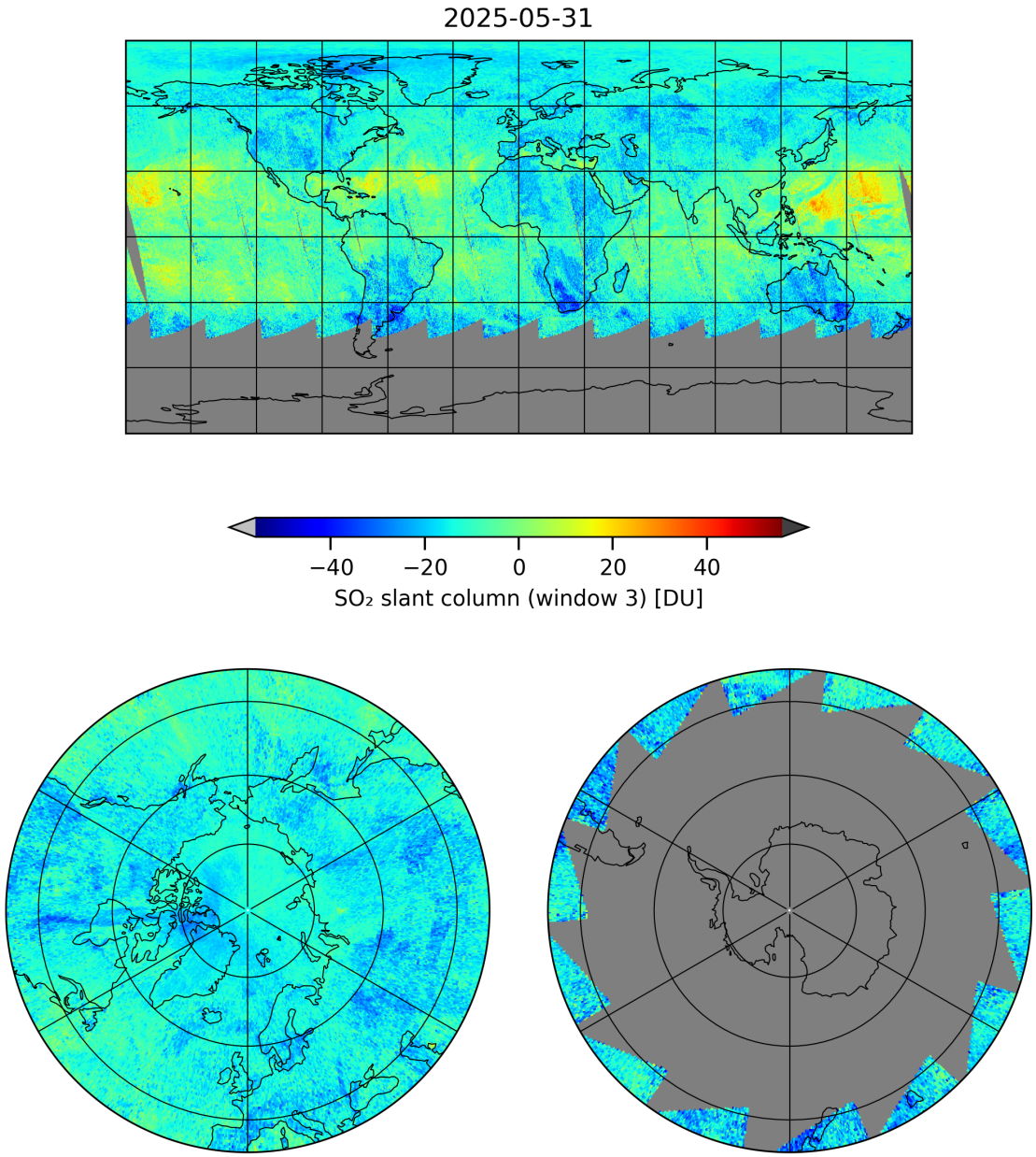


Figure 17: Map of "SO_2 slant column (window 3)" for 2025-05-31 to 2025-06-01

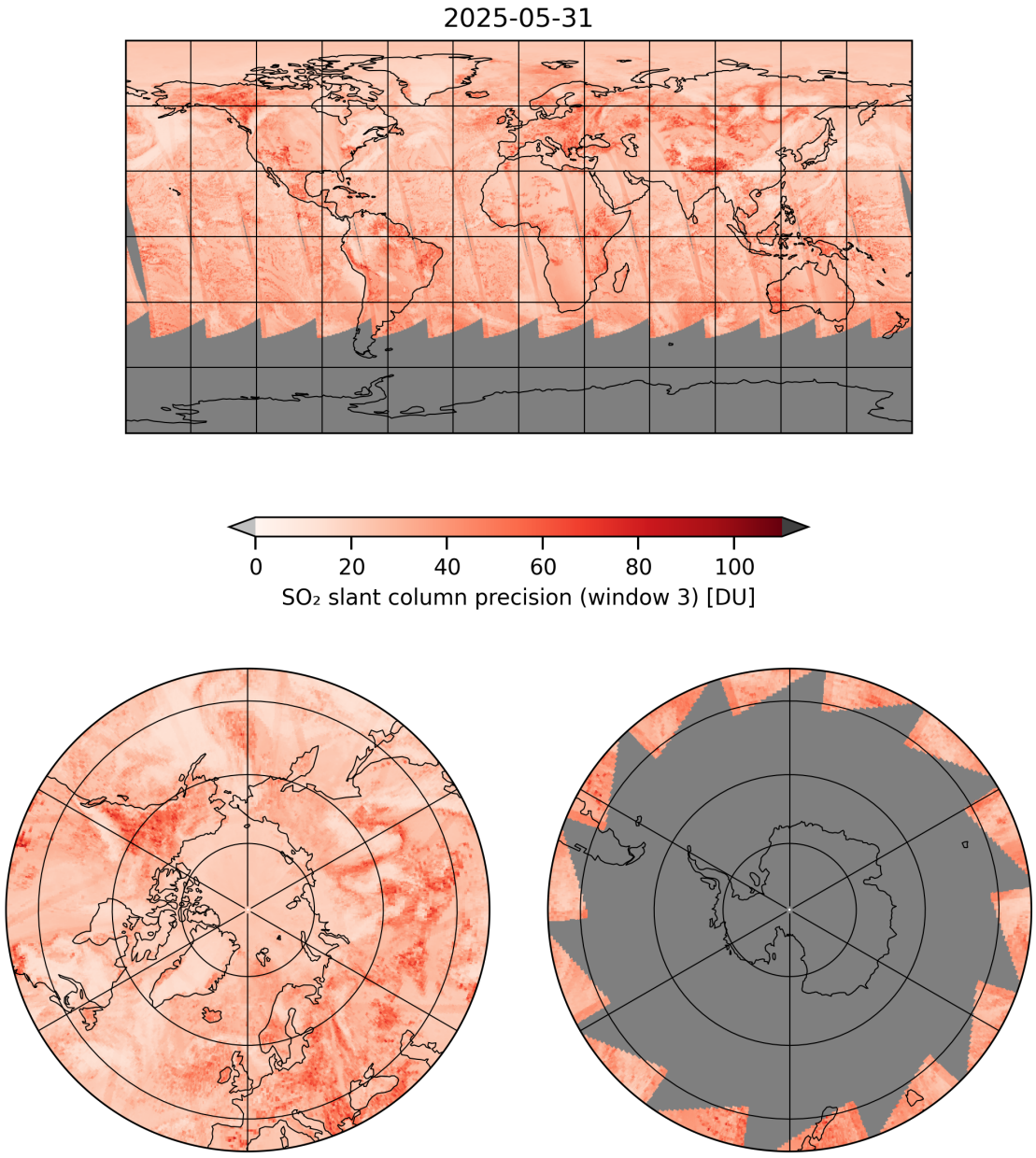


Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-05-31 to 2025-06-01

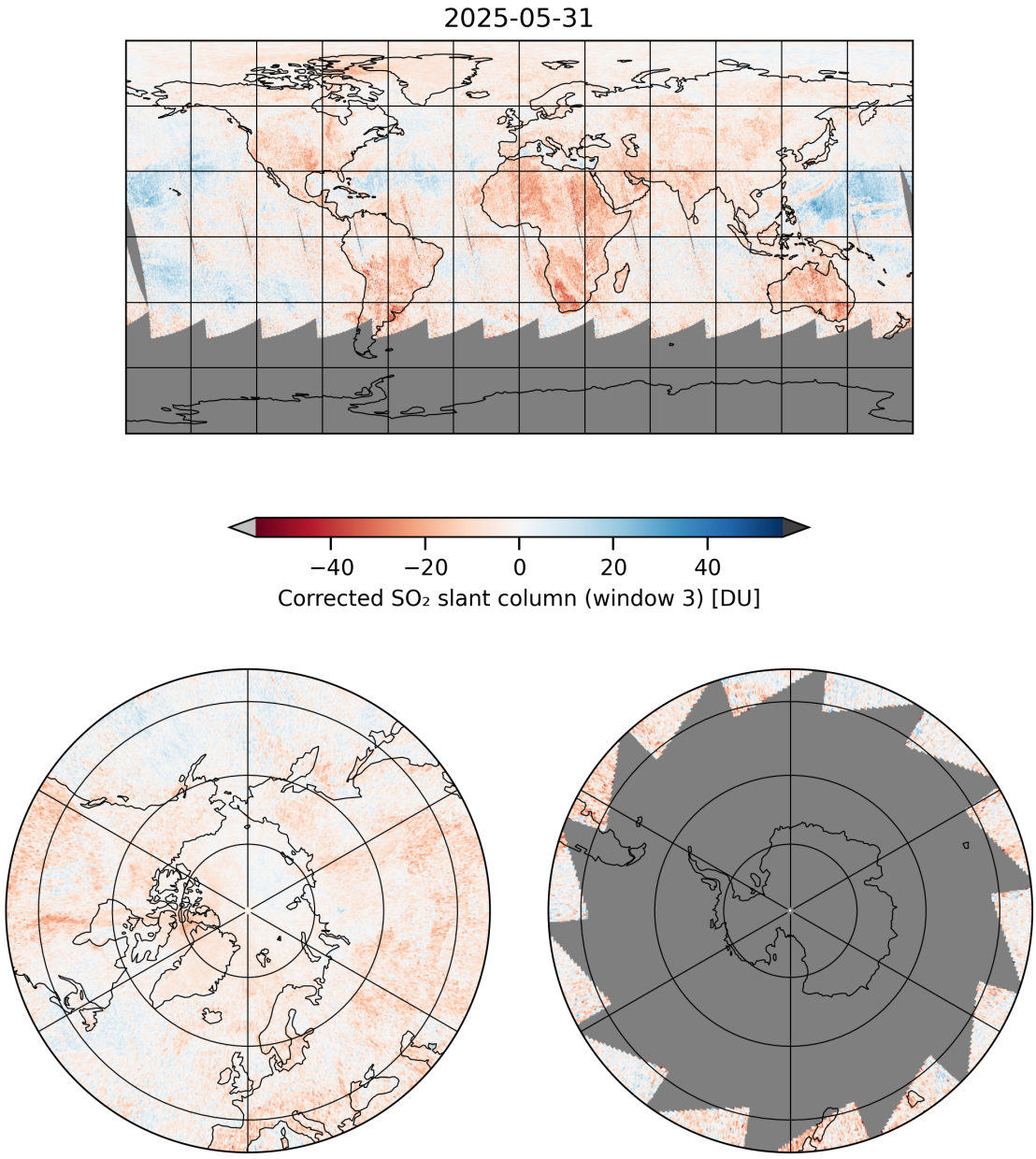


Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-05-31 to 2025-06-01

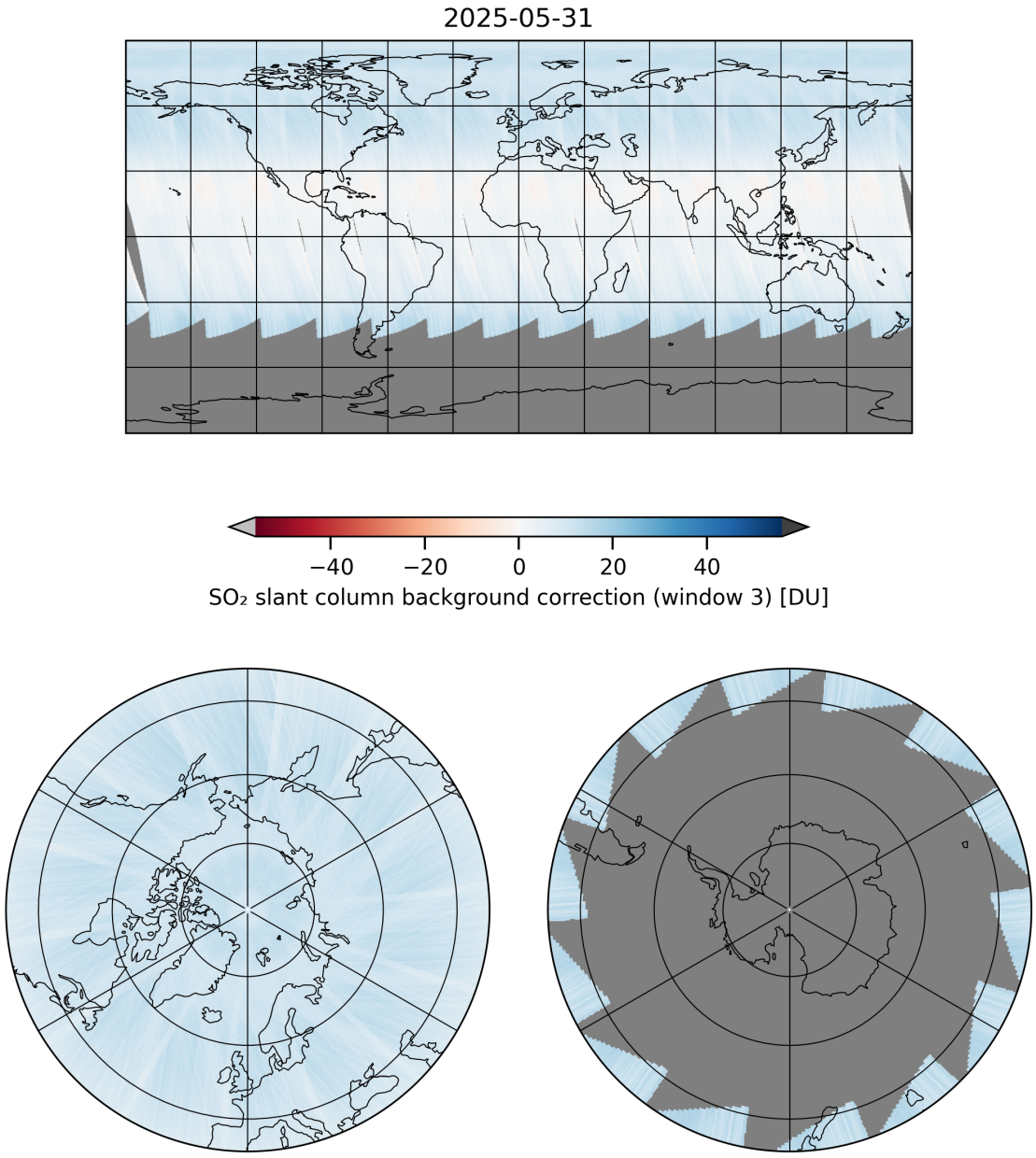


Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-05-31 to 2025-06-01

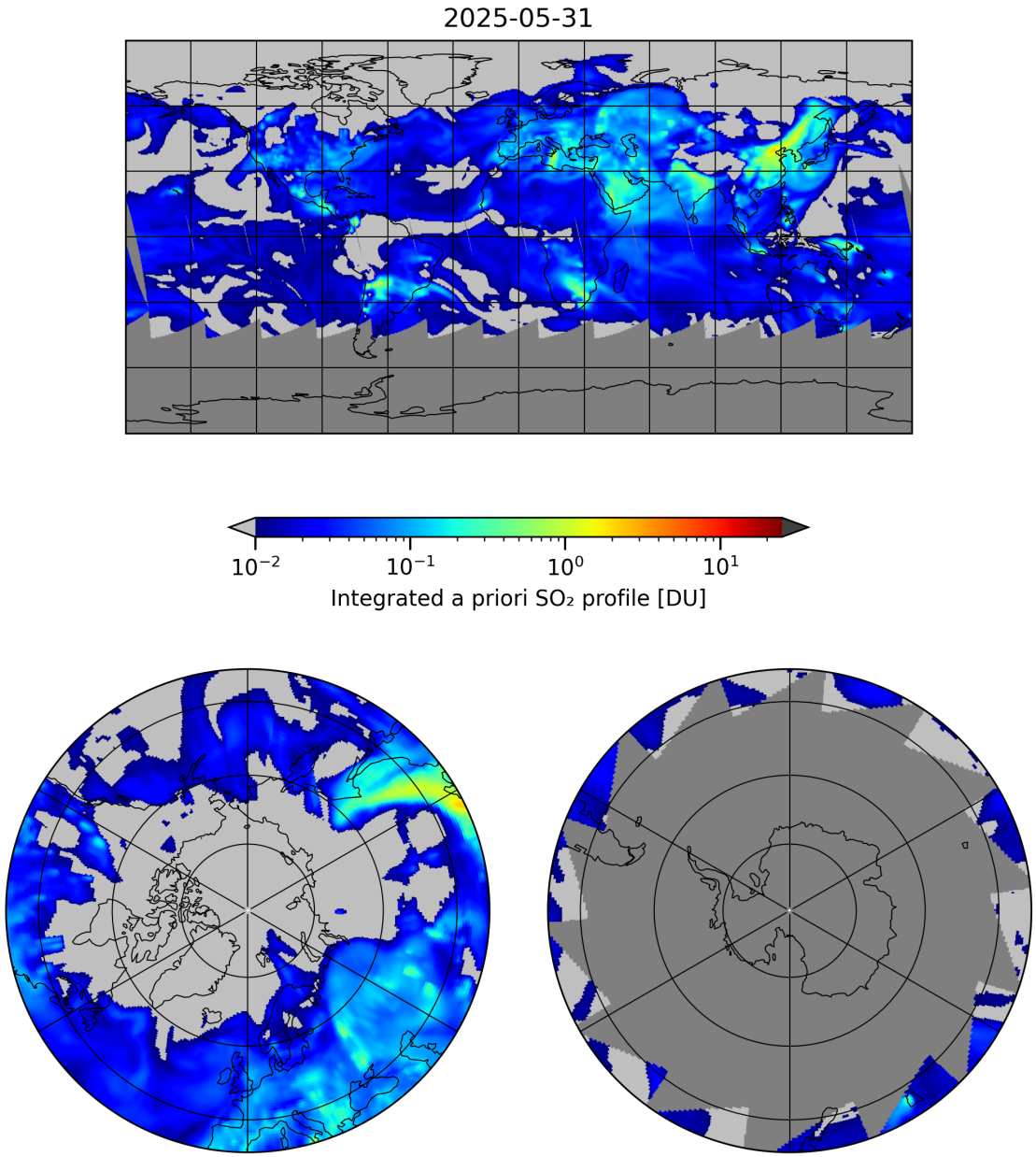


Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-05-31 to 2025-06-01

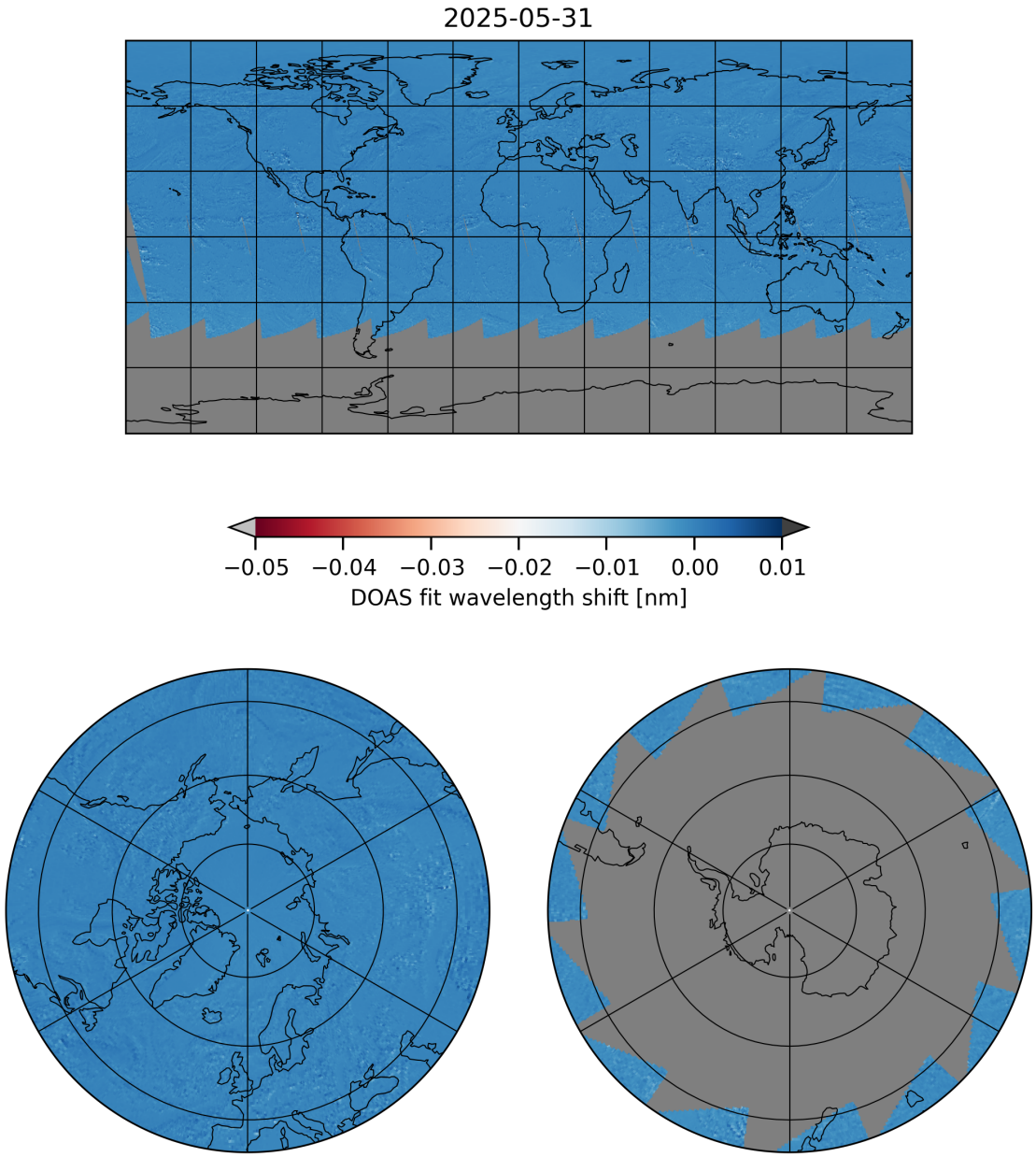


Figure 22: Map of “DOAS fit wavelength shift” for 2025-05-31 to 2025-06-01

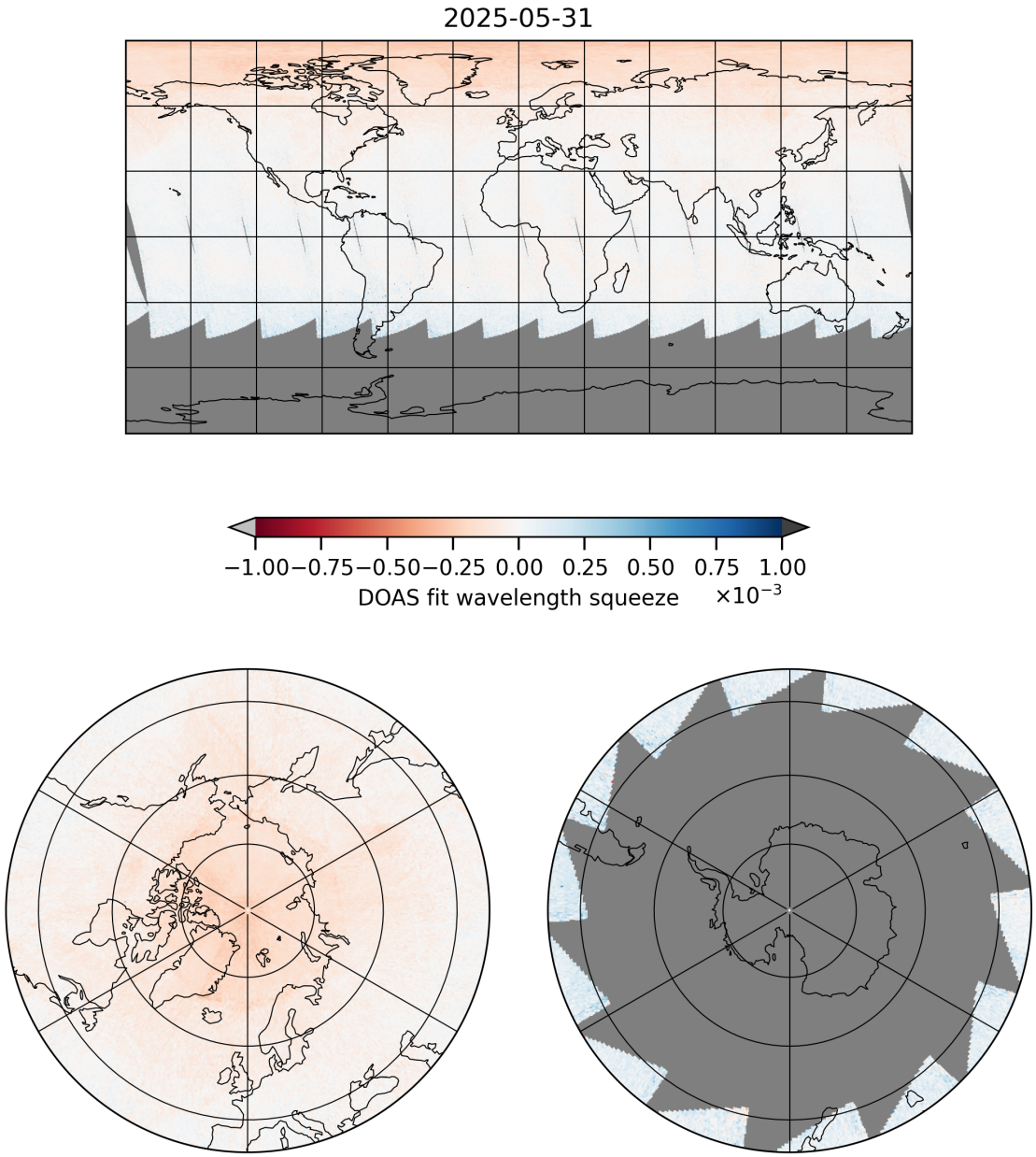


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-05-31 to 2025-06-01

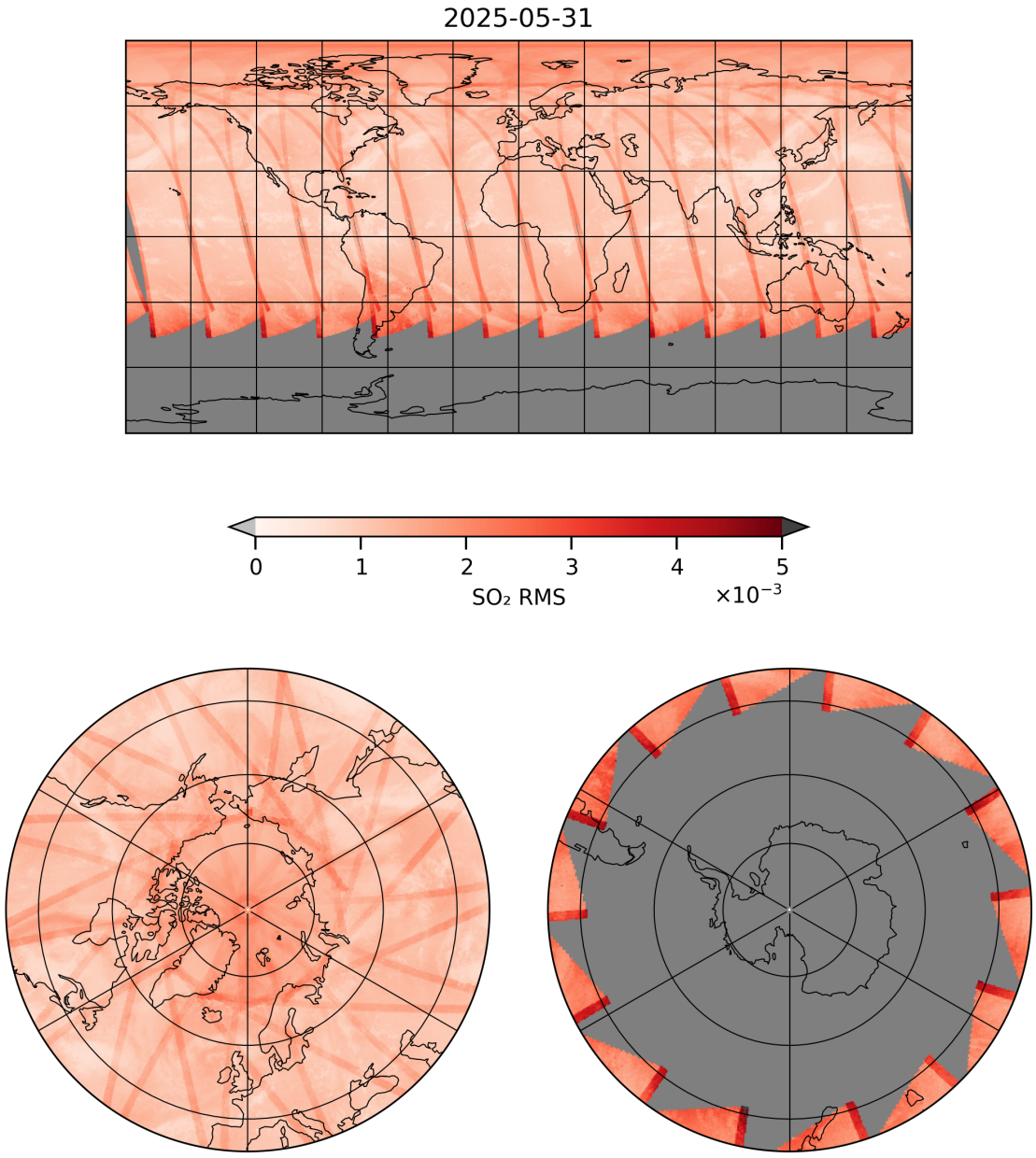


Figure 24: Map of "SO_2 RMS" for 2025-05-31 to 2025-06-01

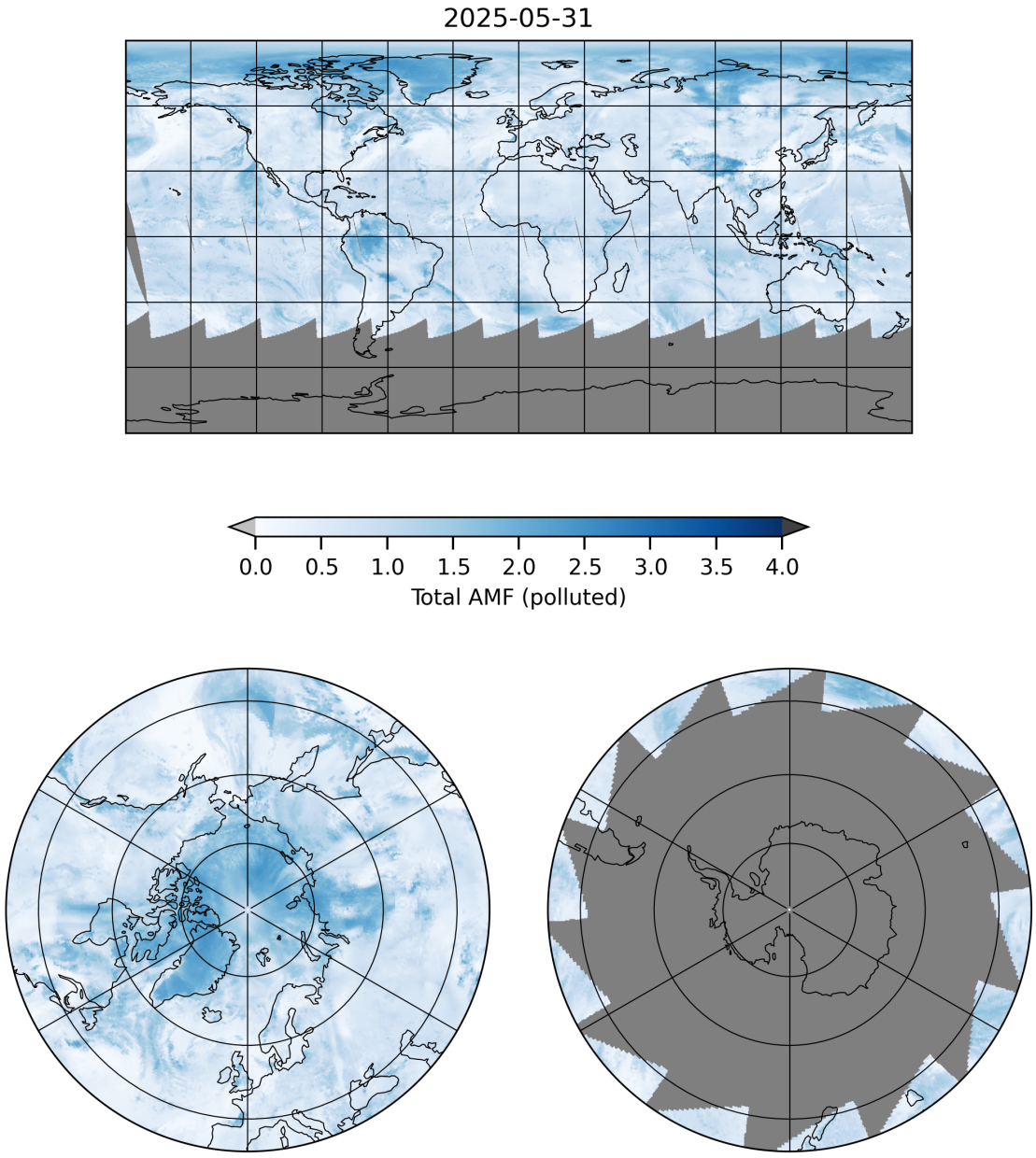


Figure 25: Map of “Total AMF (polluted)” for 2025-05-31 to 2025-06-01

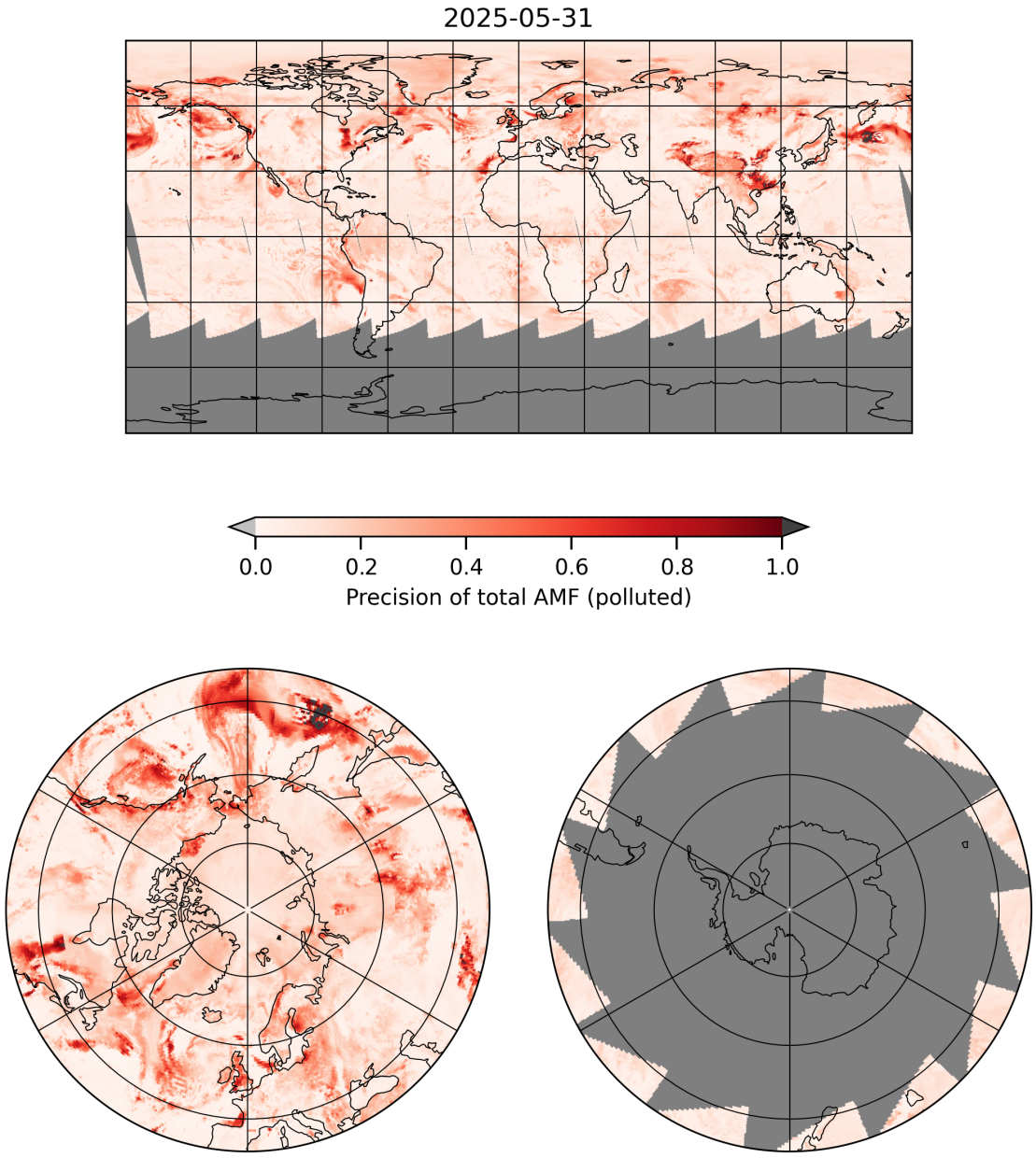


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-05-31 to 2025-06-01

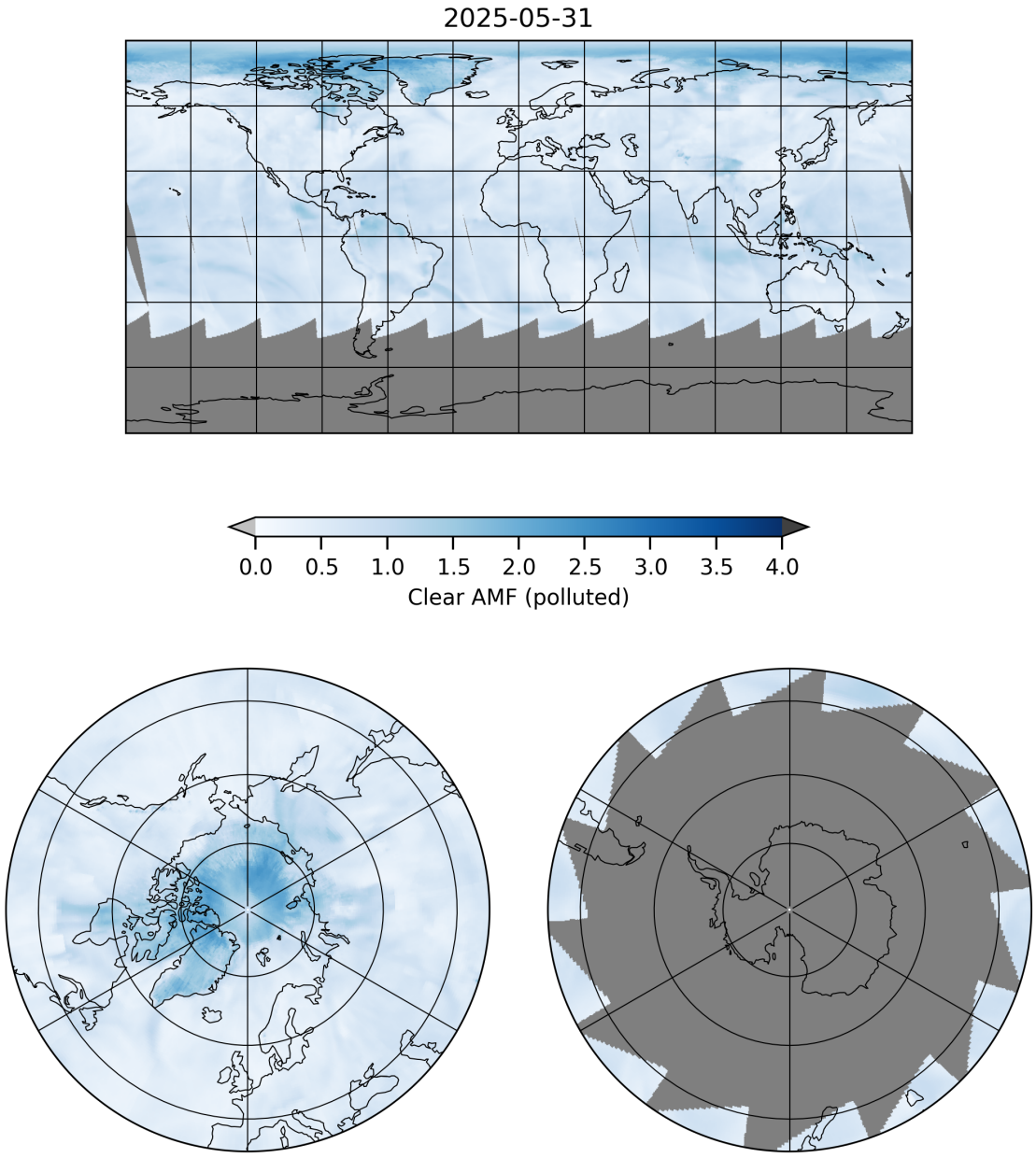


Figure 27: Map of “Clear AMF (polluted)” for 2025-05-31 to 2025-06-01

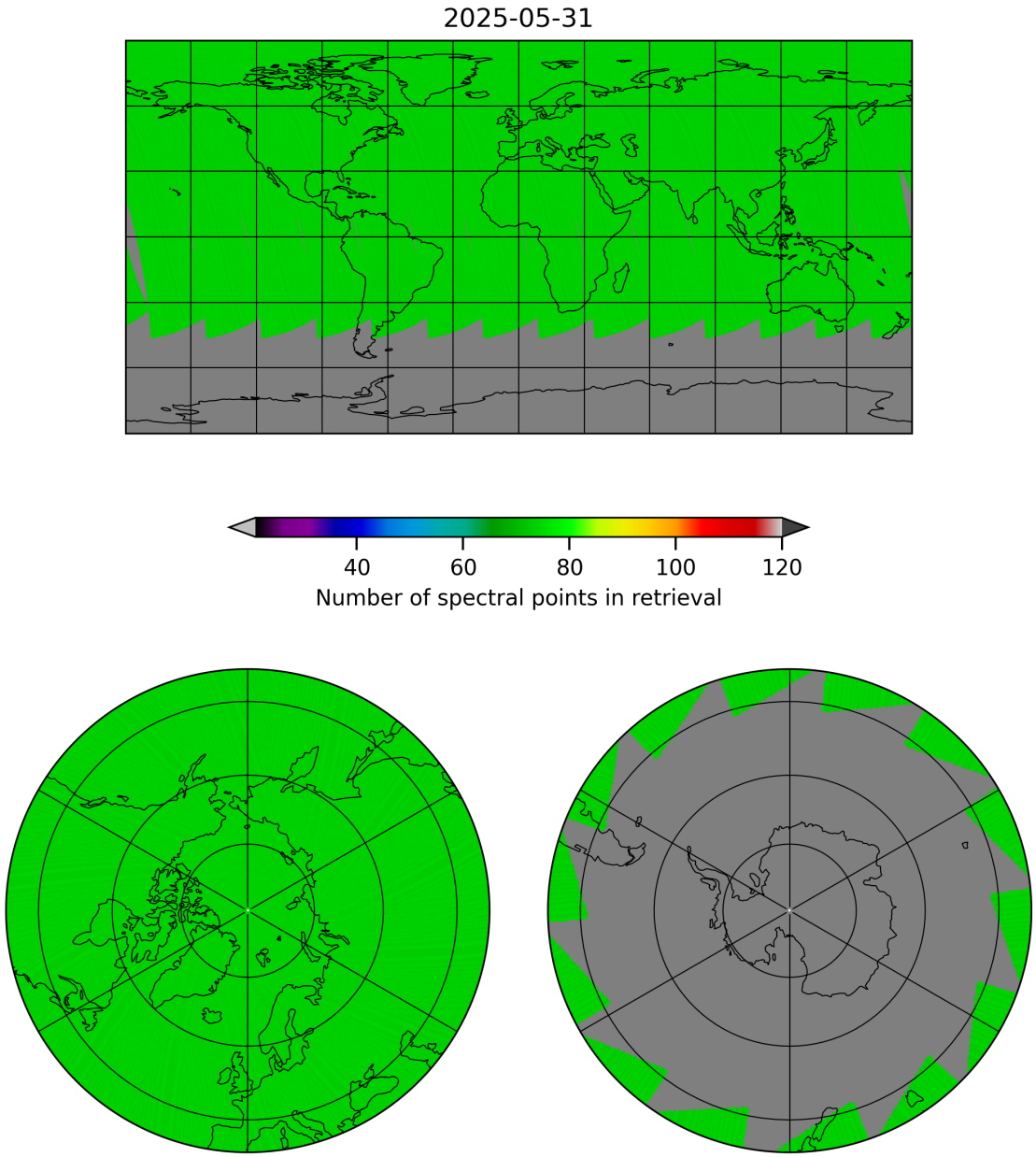


Figure 28: Map of “Number of spectral points in retrieval” for 2025-05-31 to 2025-06-01

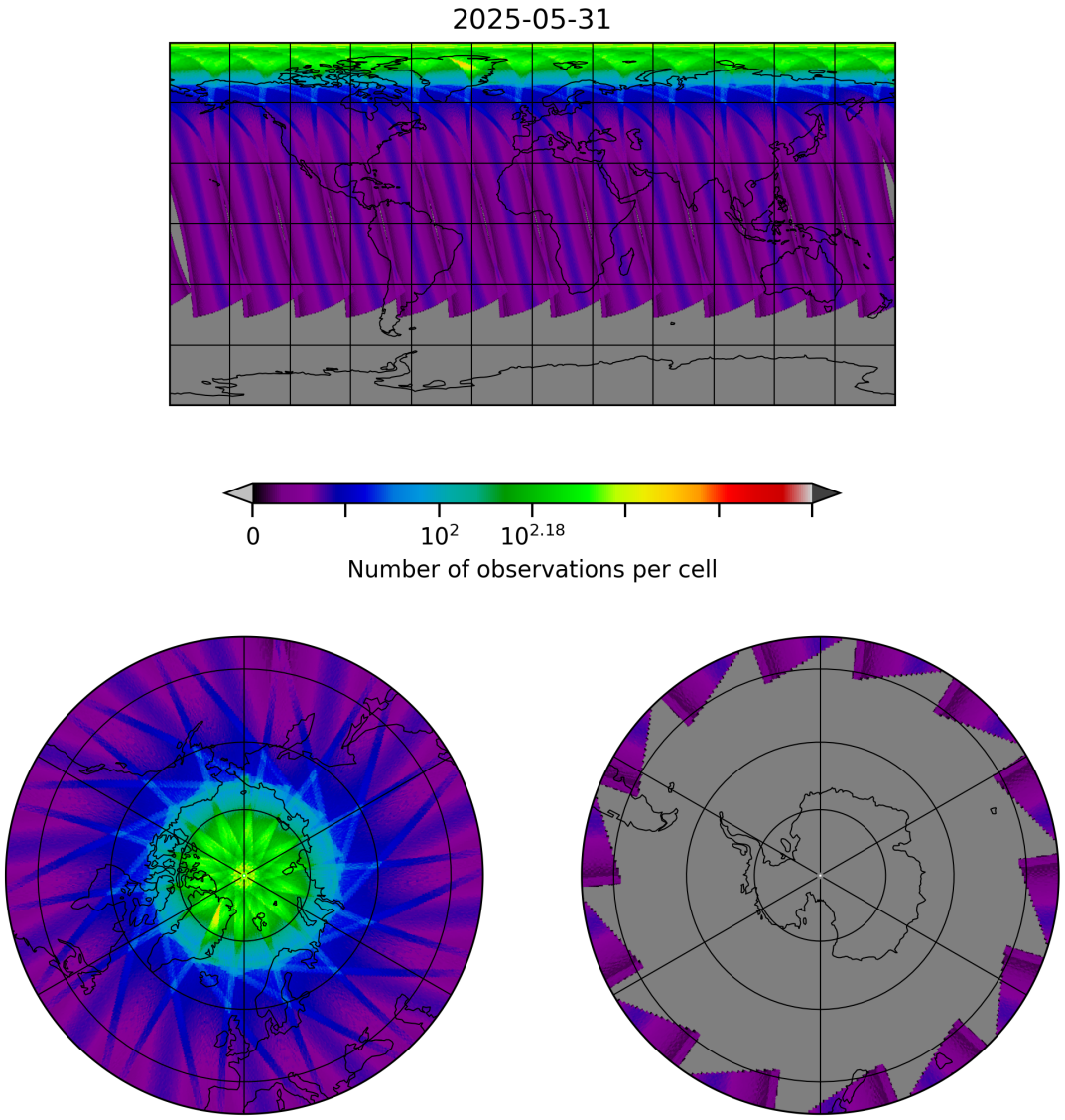


Figure 29: Map of the number of observations for 2025-05-31 to 2025-06-01

7 Zonal average

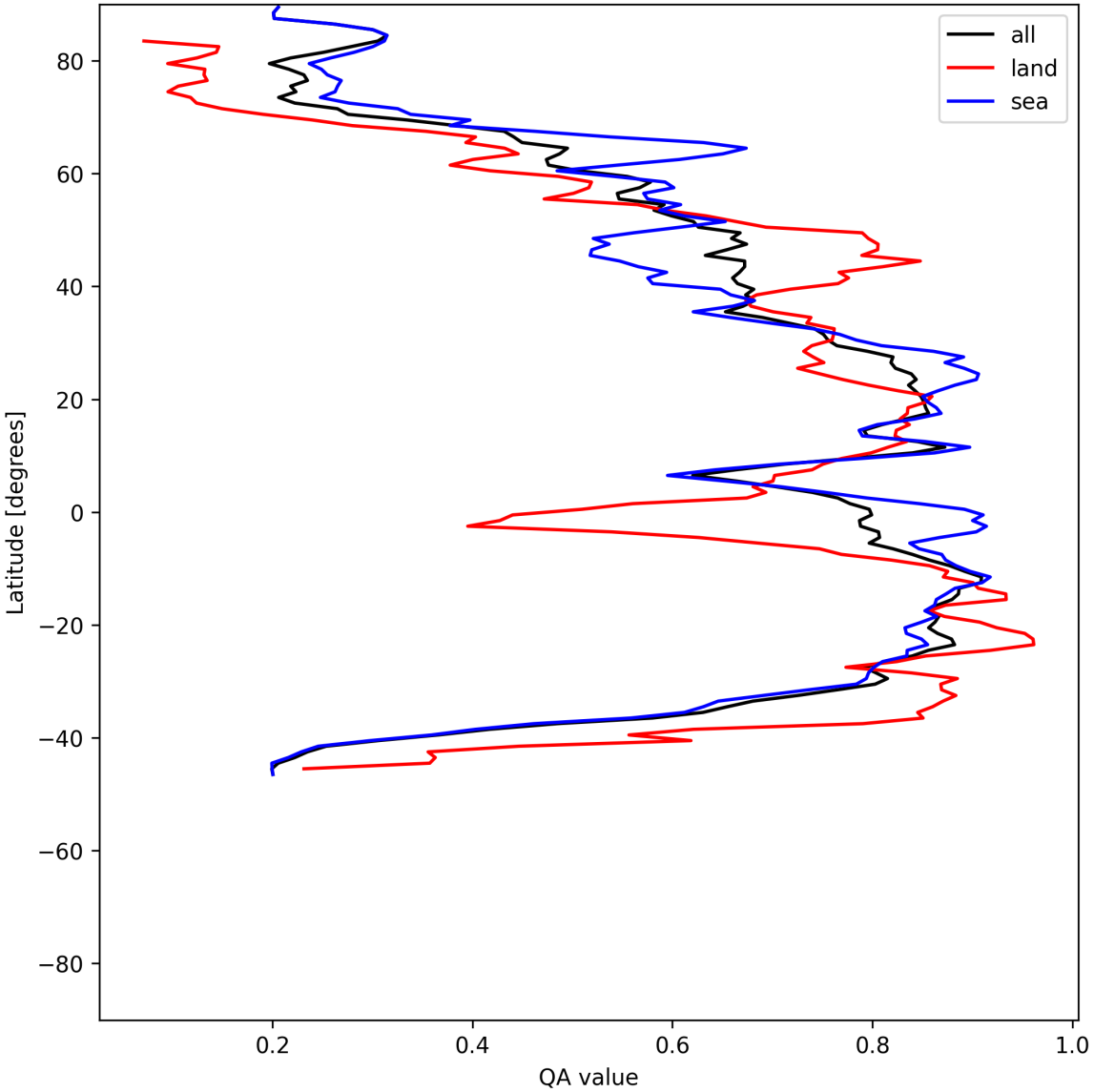


Figure 30: Zonal average of “QA value” for 2025-05-31 to 2025-06-01.

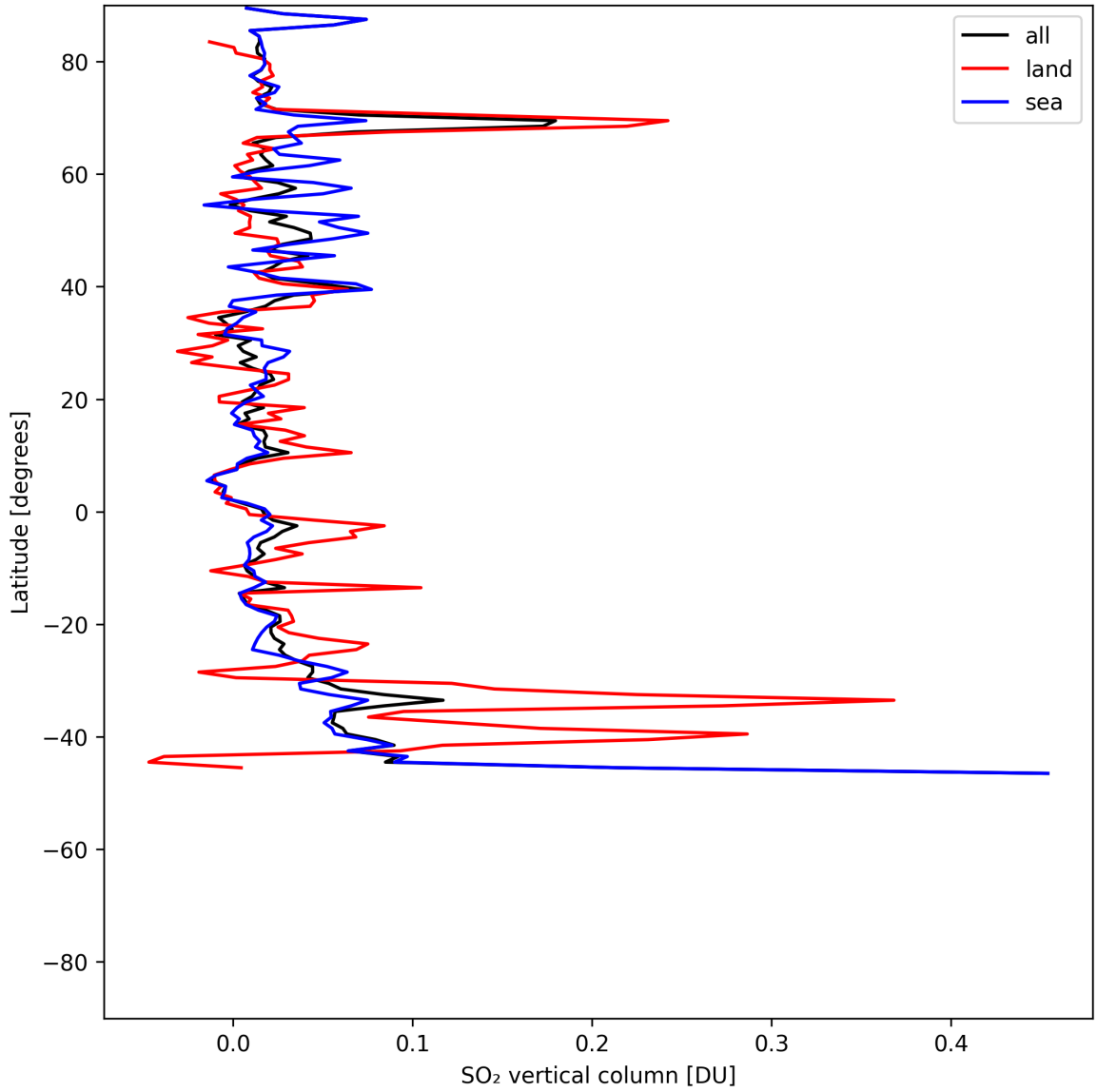


Figure 31: Zonal average of "SO_2 vertical column" for 2025-05-31 to 2025-06-01.

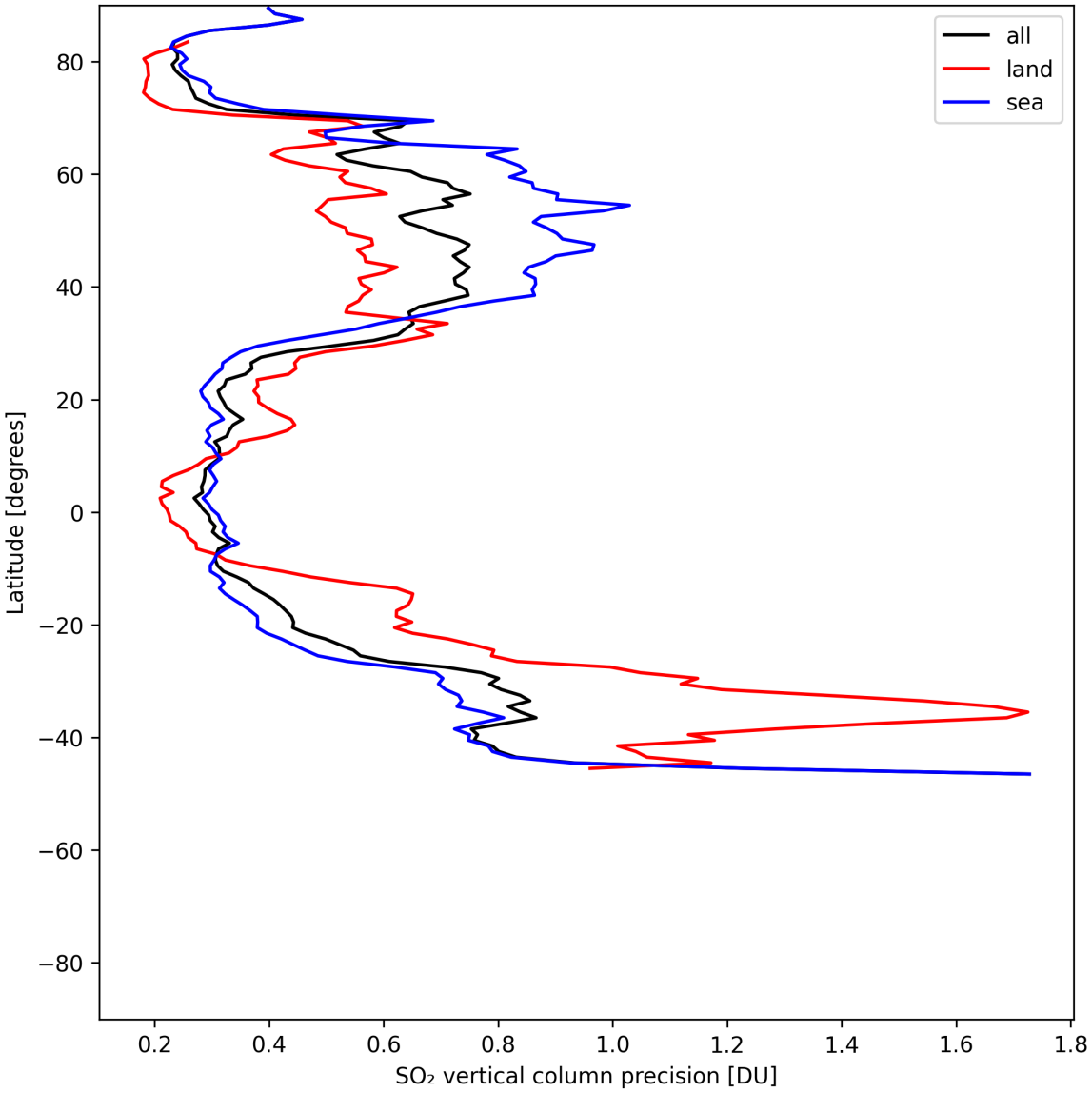


Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-05-31 to 2025-06-01.

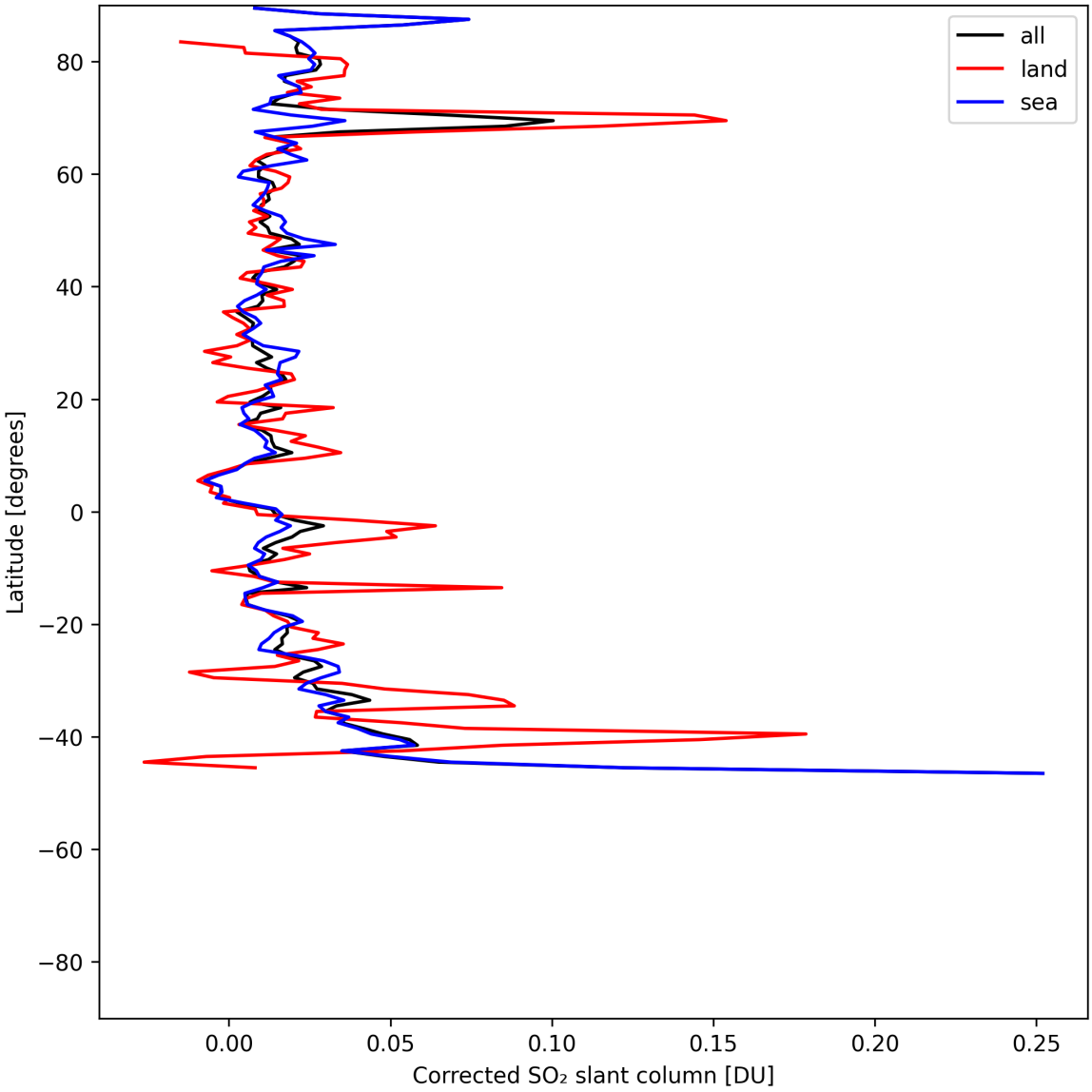


Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-05-31 to 2025-06-01.

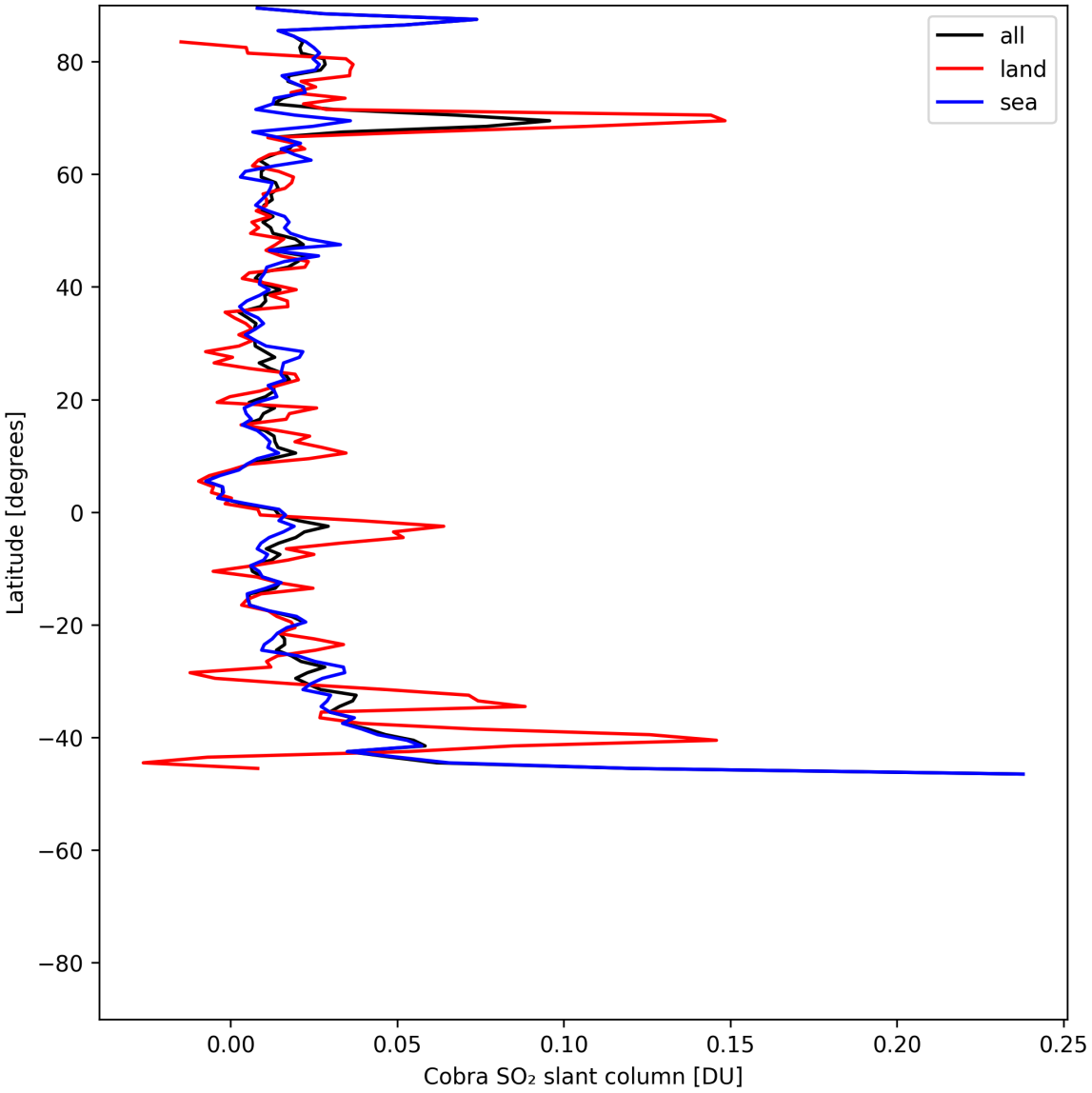


Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-05-31 to 2025-06-01.

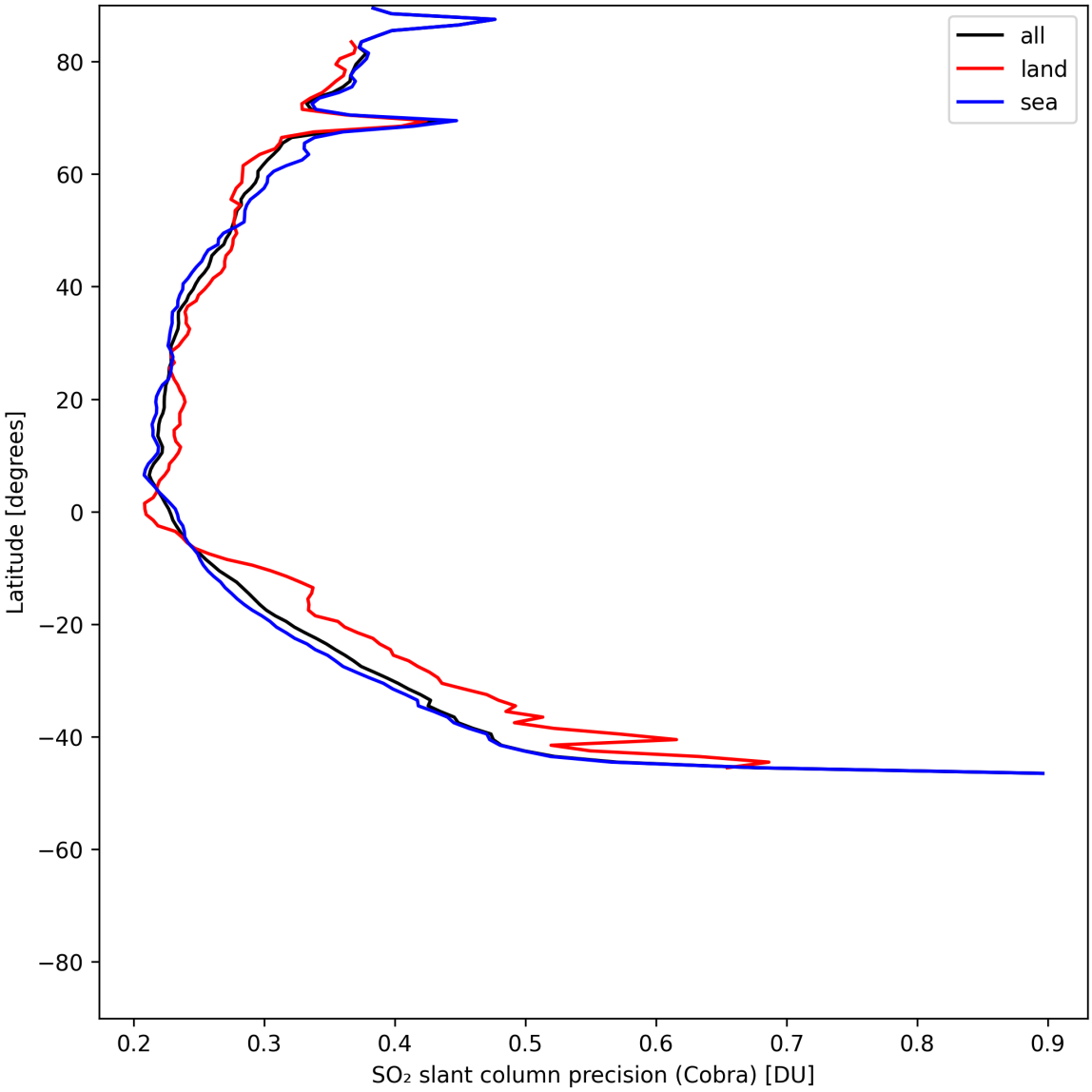


Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-05-31 to 2025-06-01.

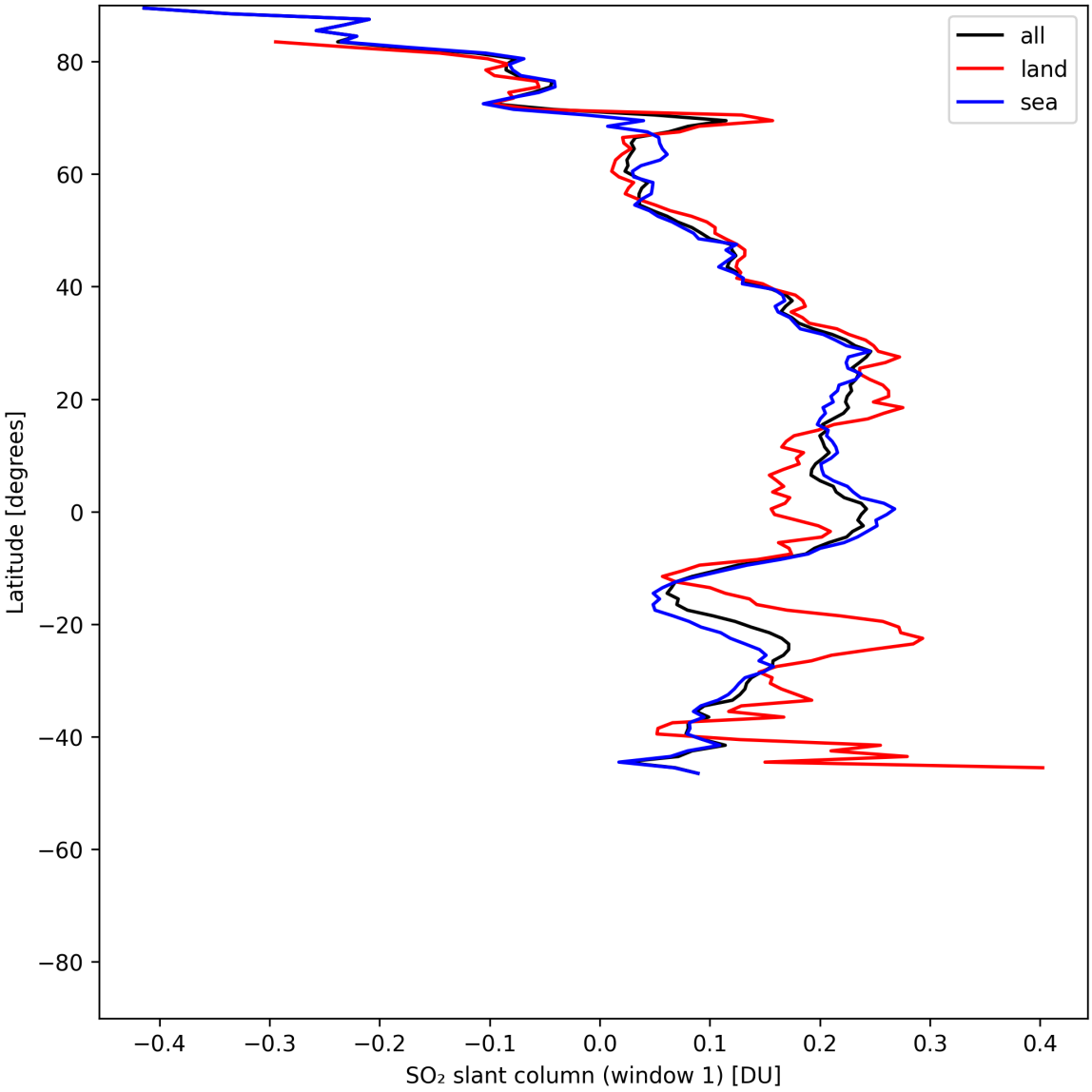


Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-05-31 to 2025-06-01.

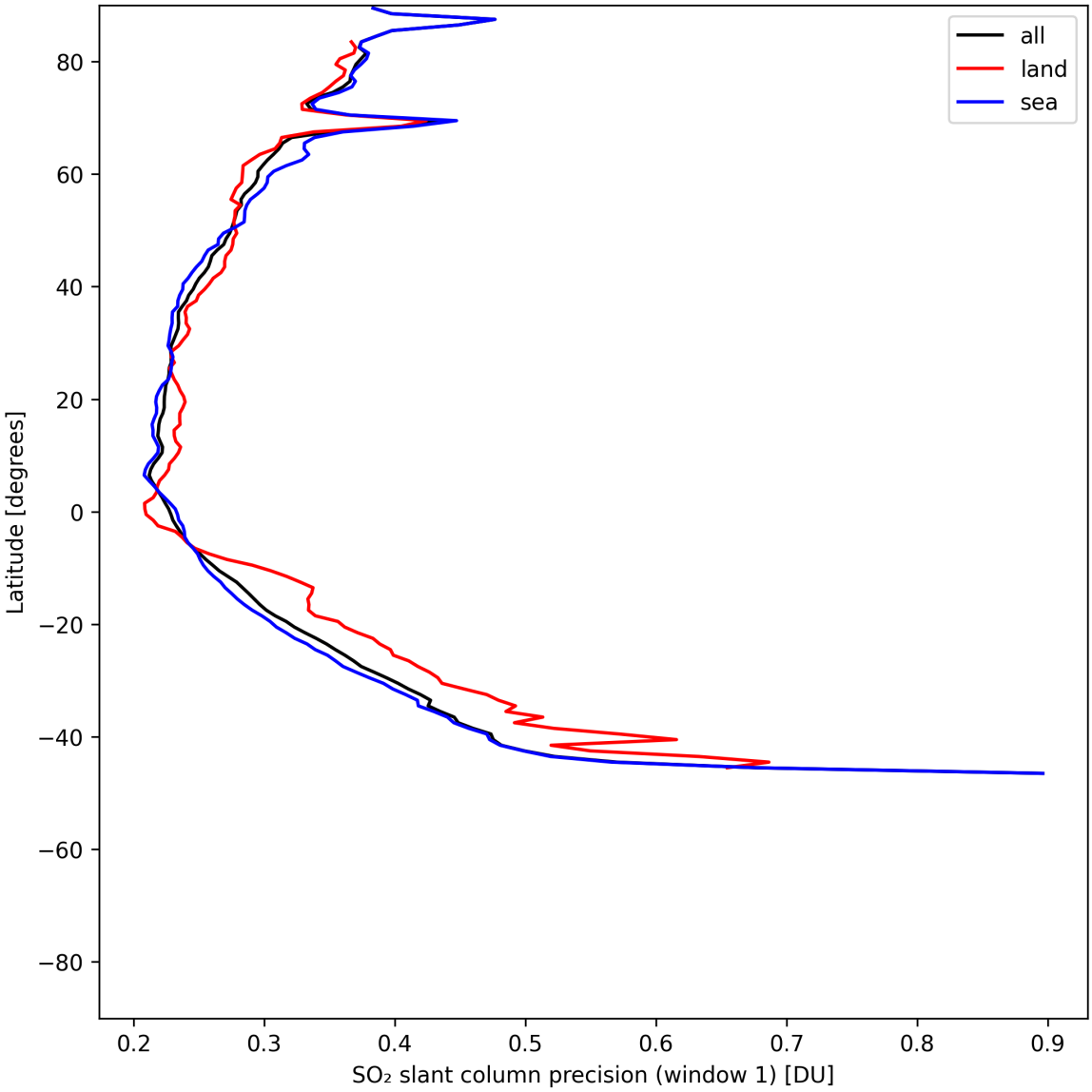


Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-05-31 to 2025-06-01.

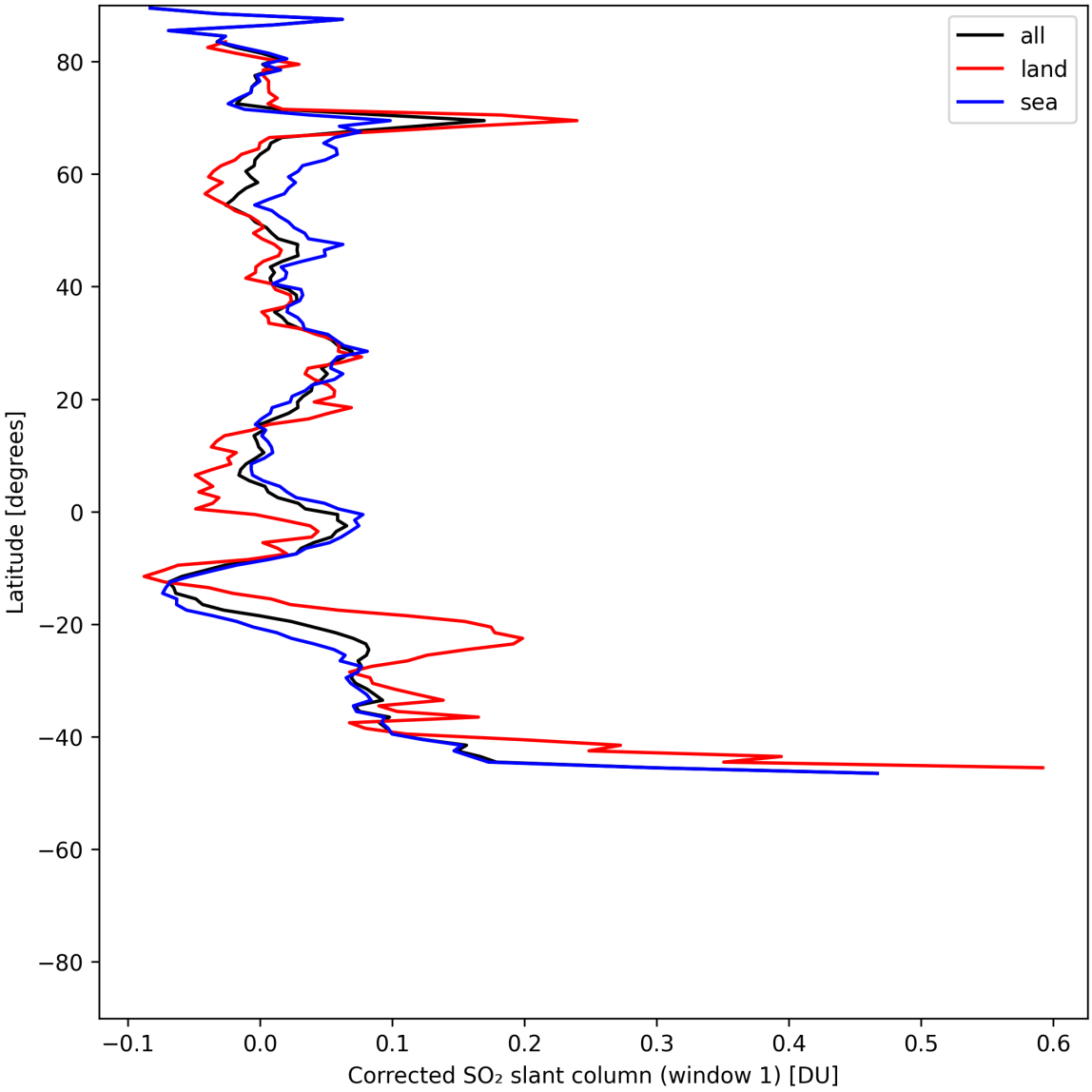


Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-05-31 to 2025-06-01.

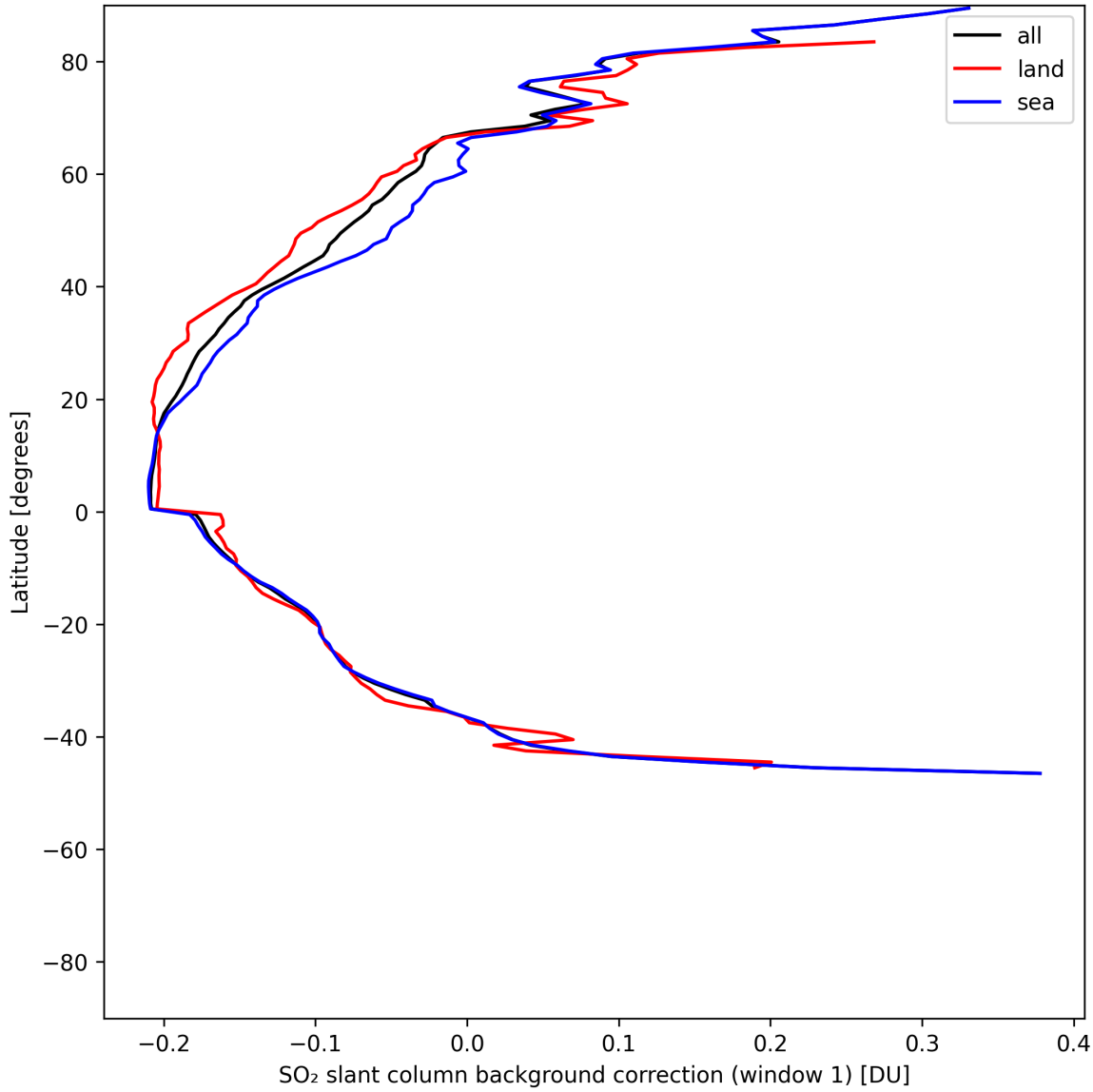


Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-05-31 to 2025-06-01.

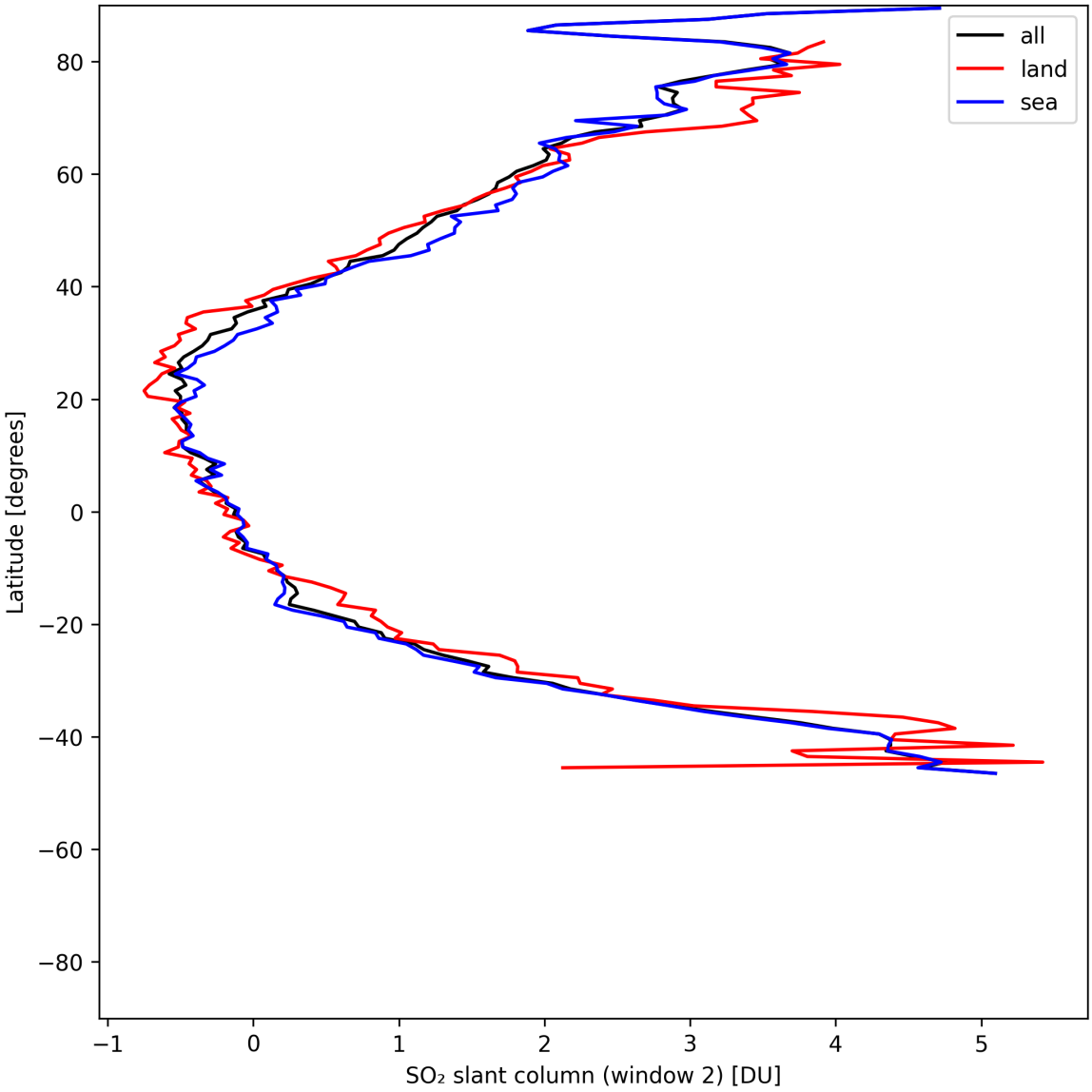


Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-05-31 to 2025-06-01.

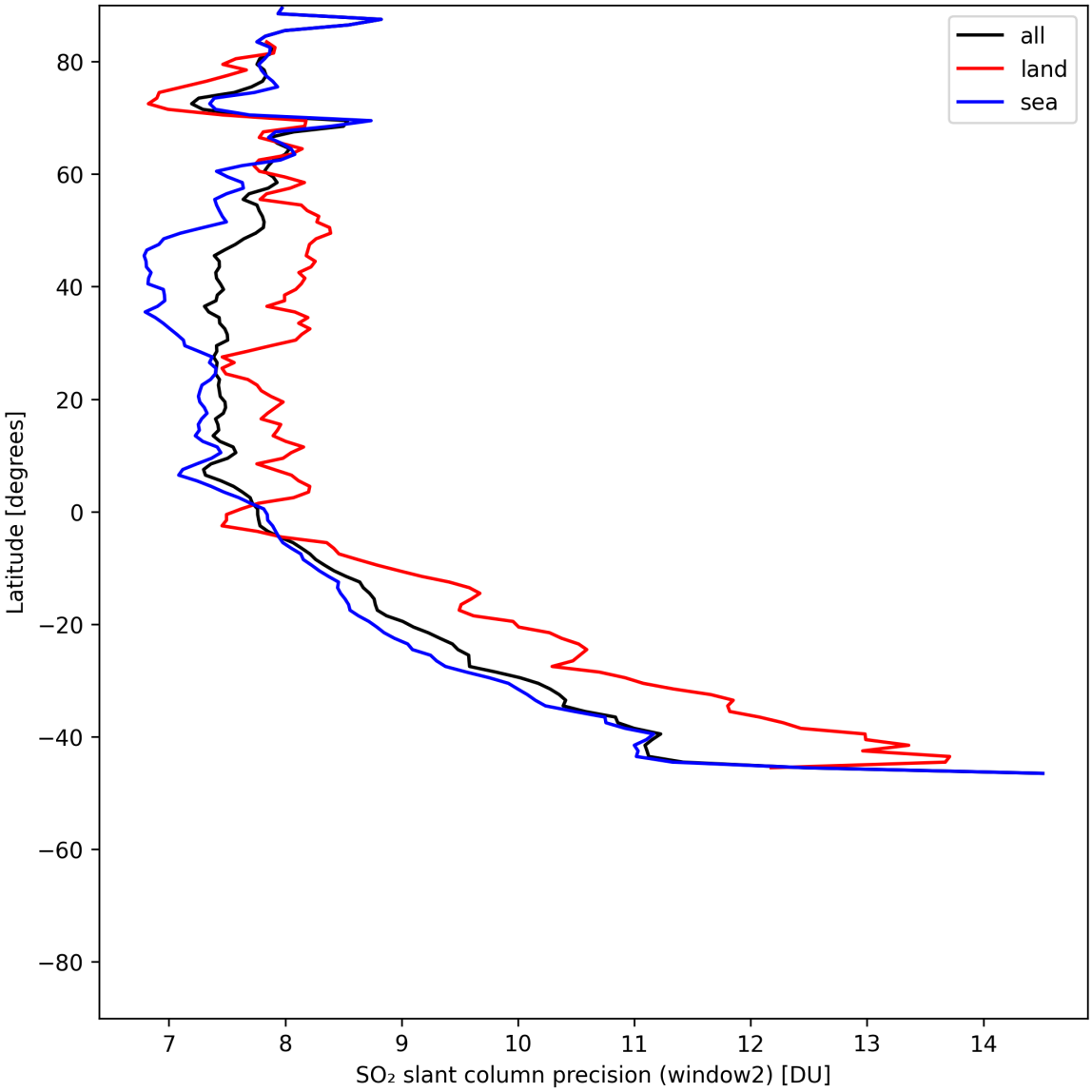


Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-05-31 to 2025-06-01.

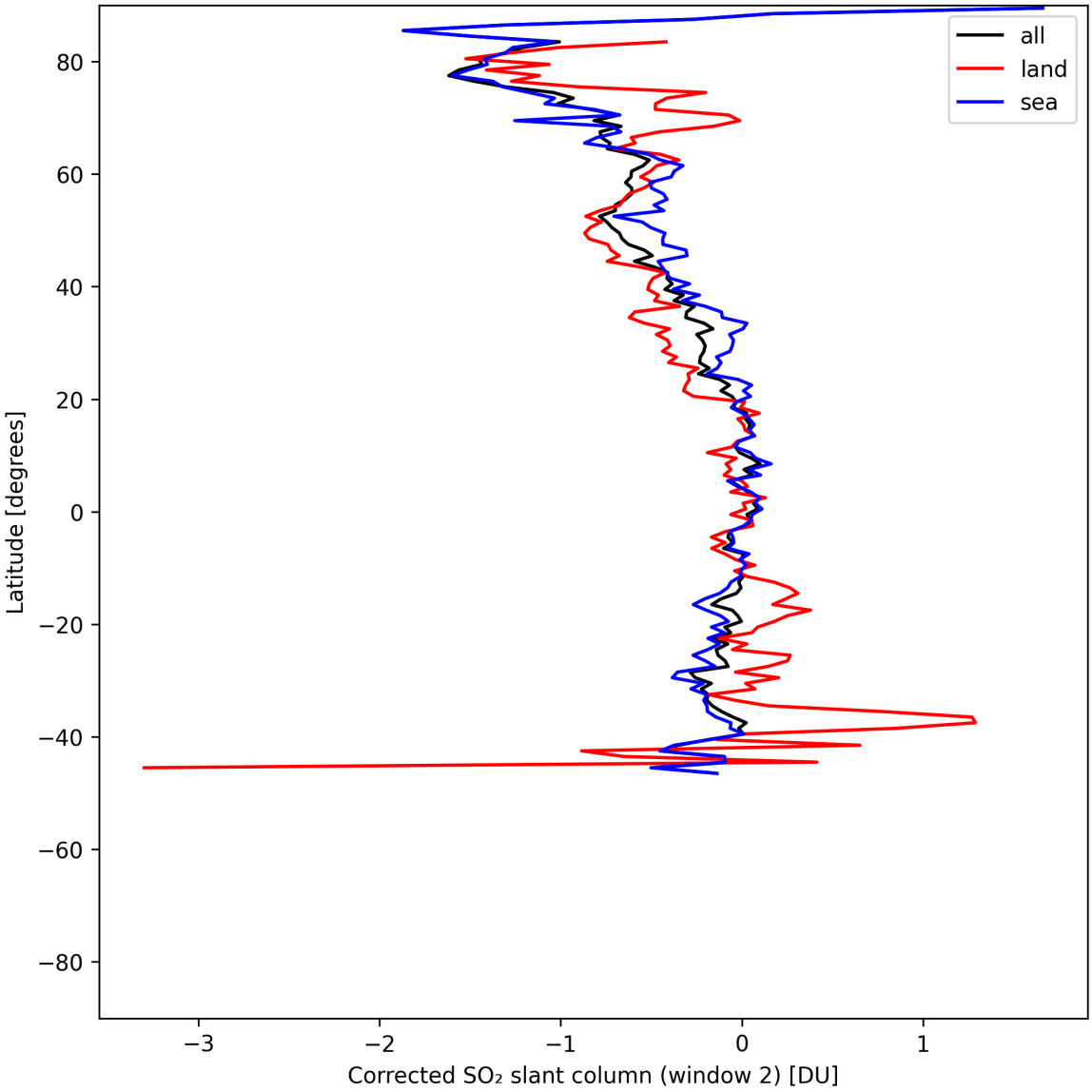


Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-05-31 to 2025-06-01.

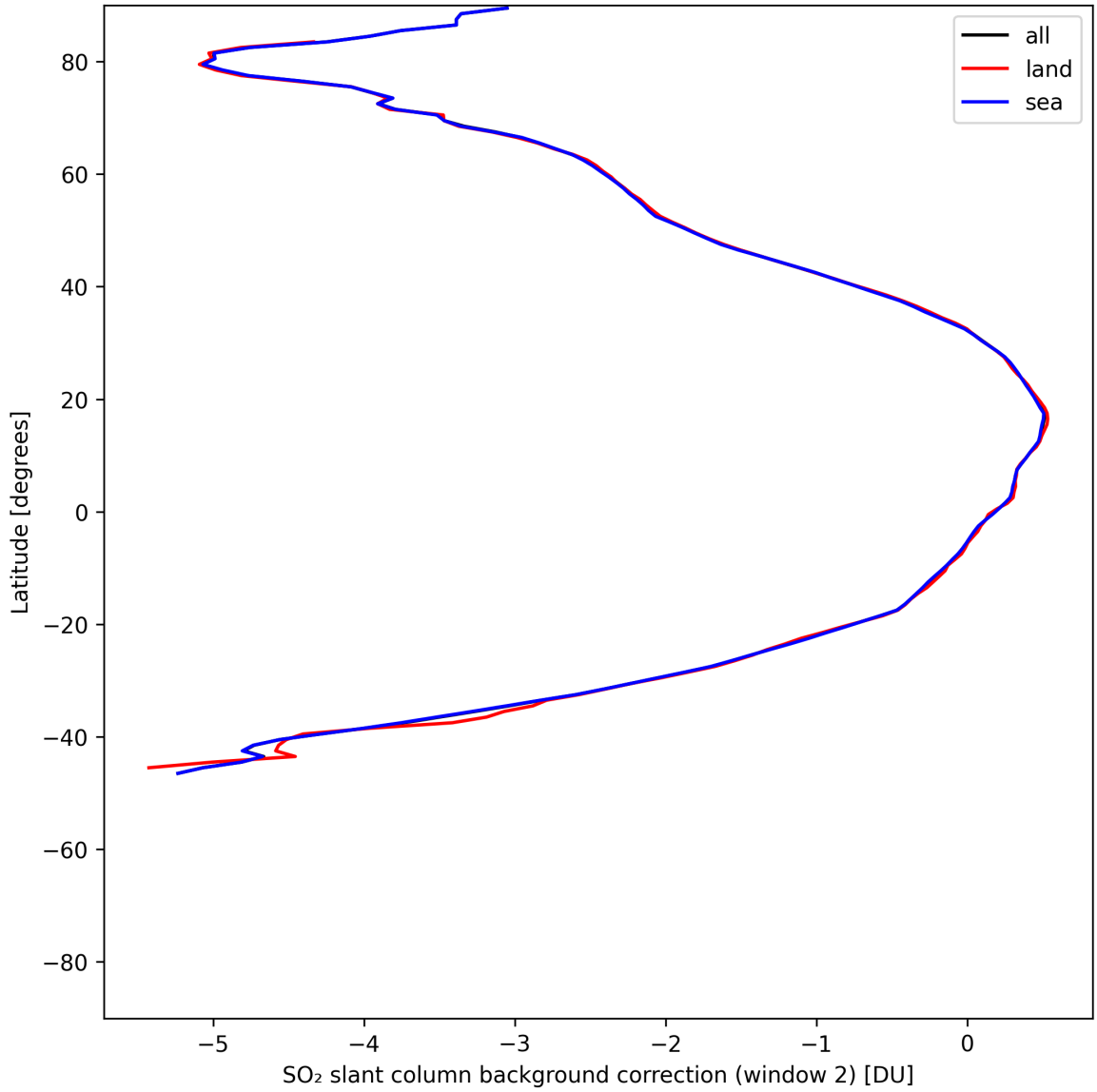


Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-05-31 to 2025-06-01.

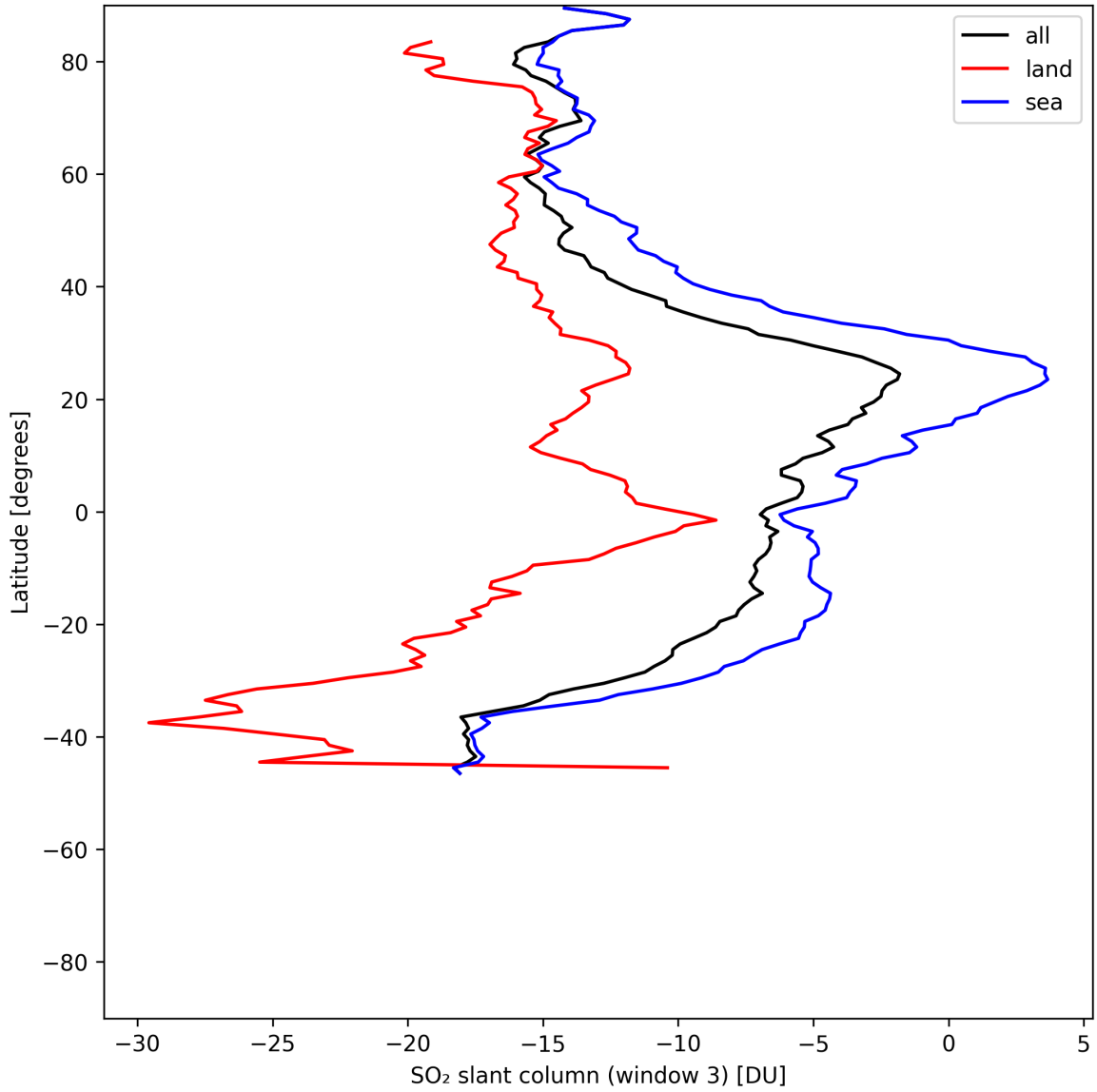


Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-05-31 to 2025-06-01.

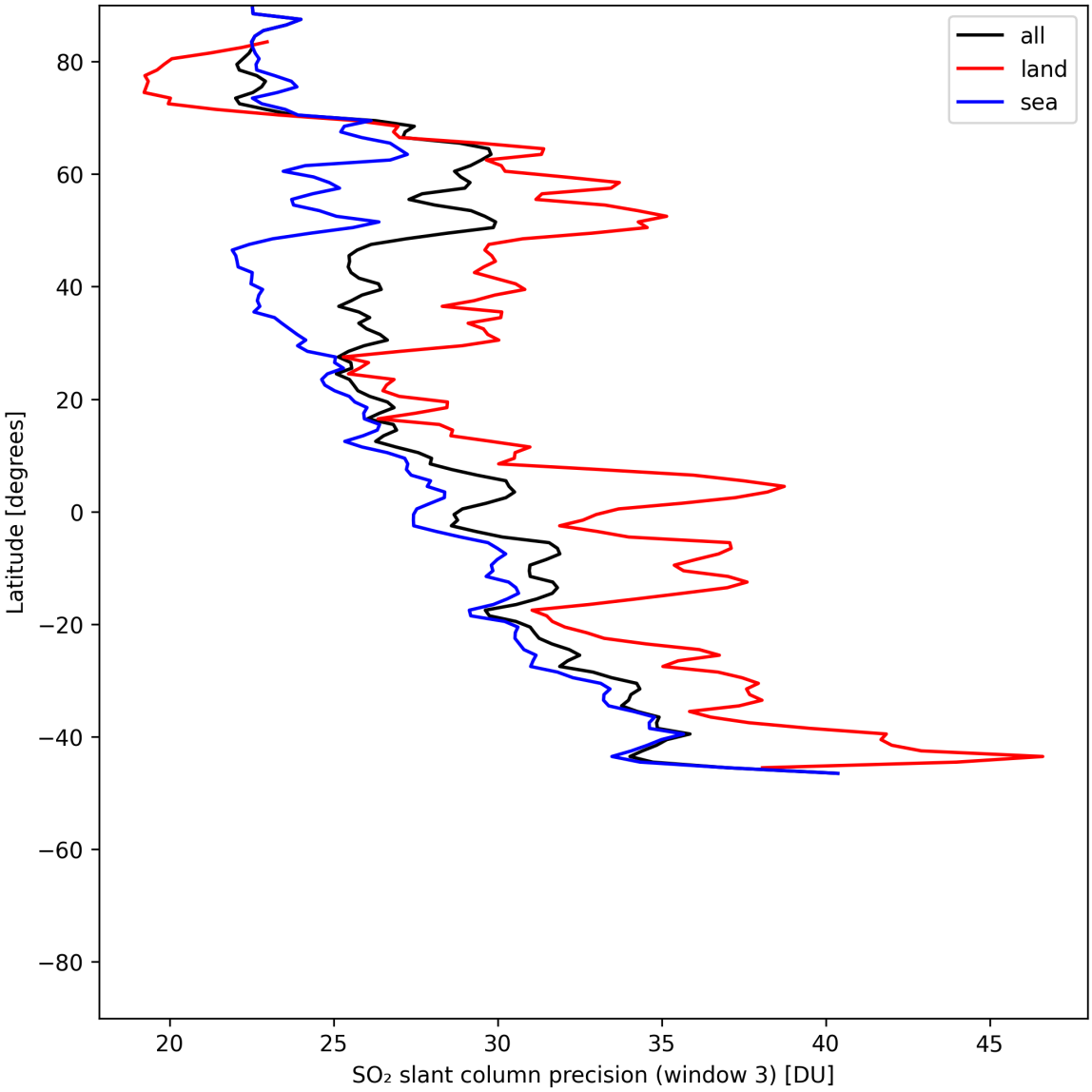


Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-05-31 to 2025-06-01.

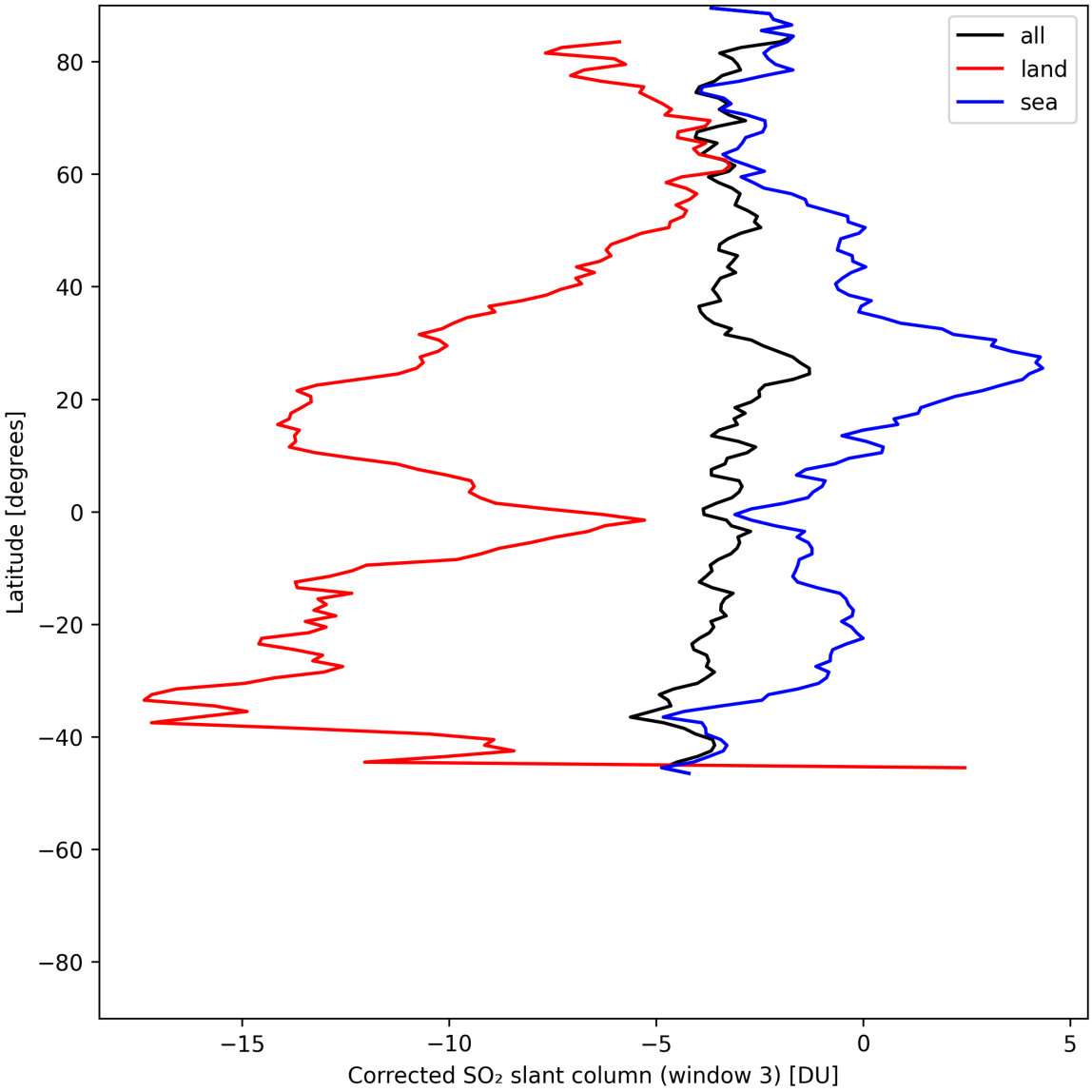


Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-05-31 to 2025-06-01.

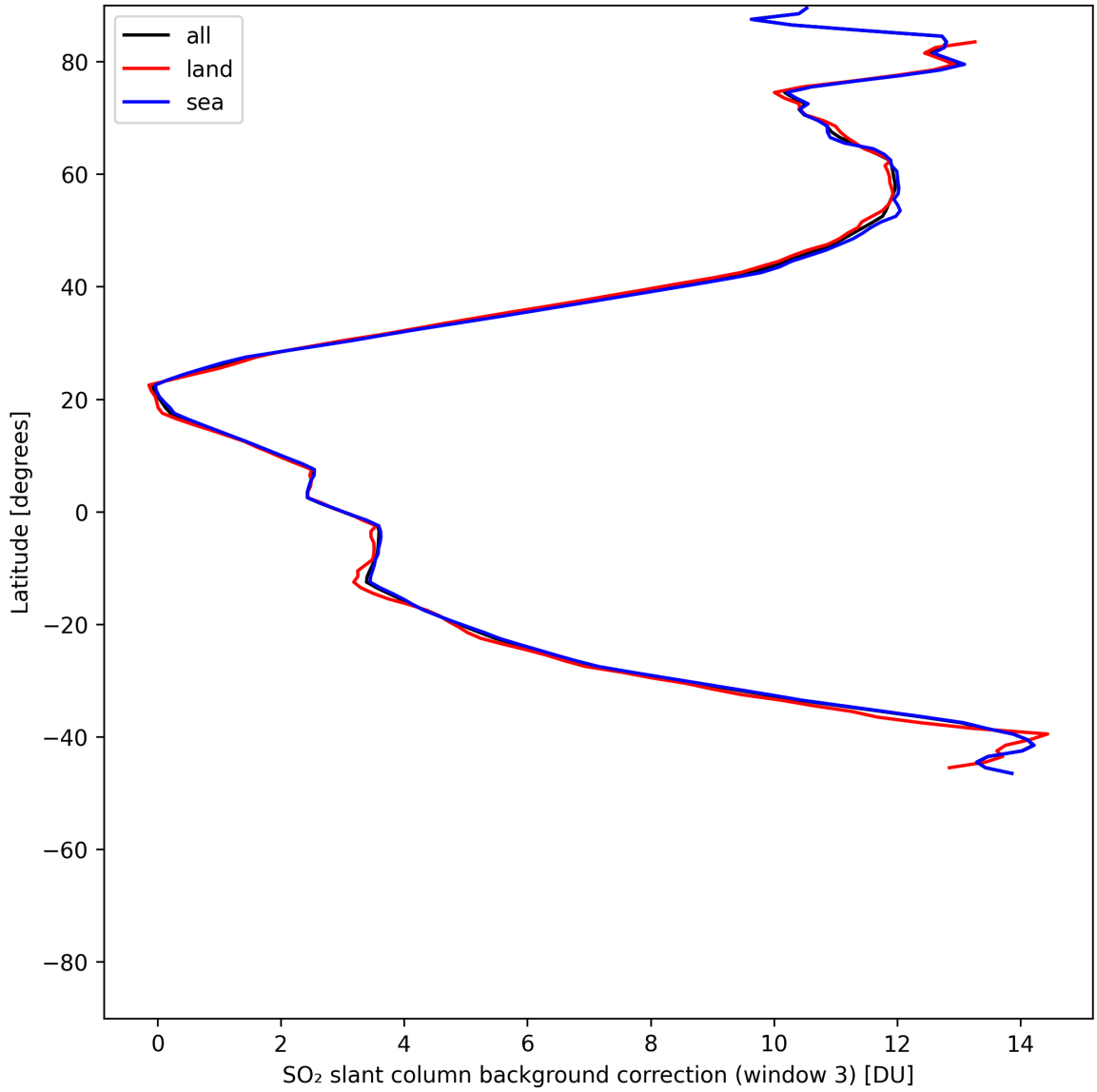


Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-05-31 to 2025-06-01.

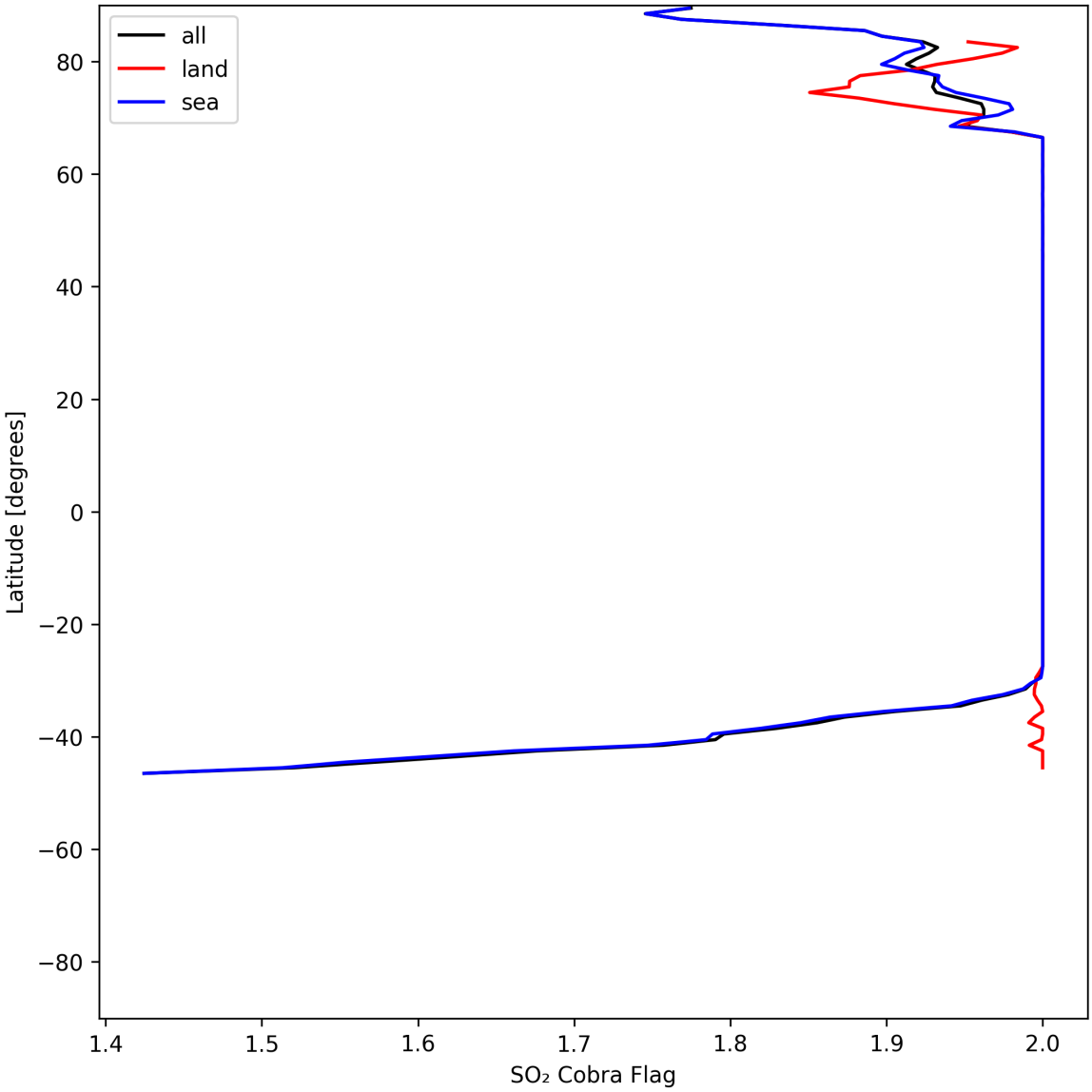


Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-05-31 to 2025-06-01.

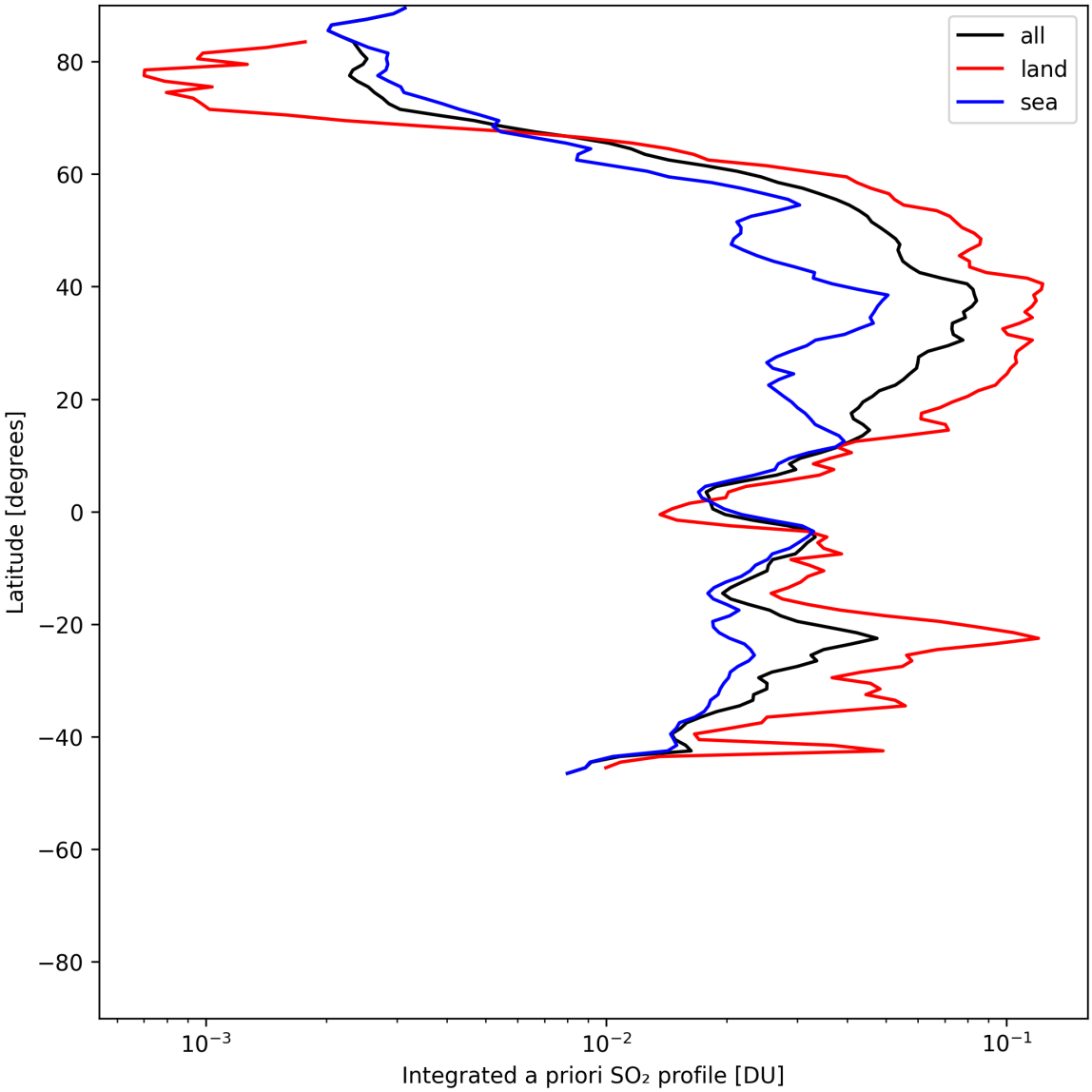


Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-05-31 to 2025-06-01.

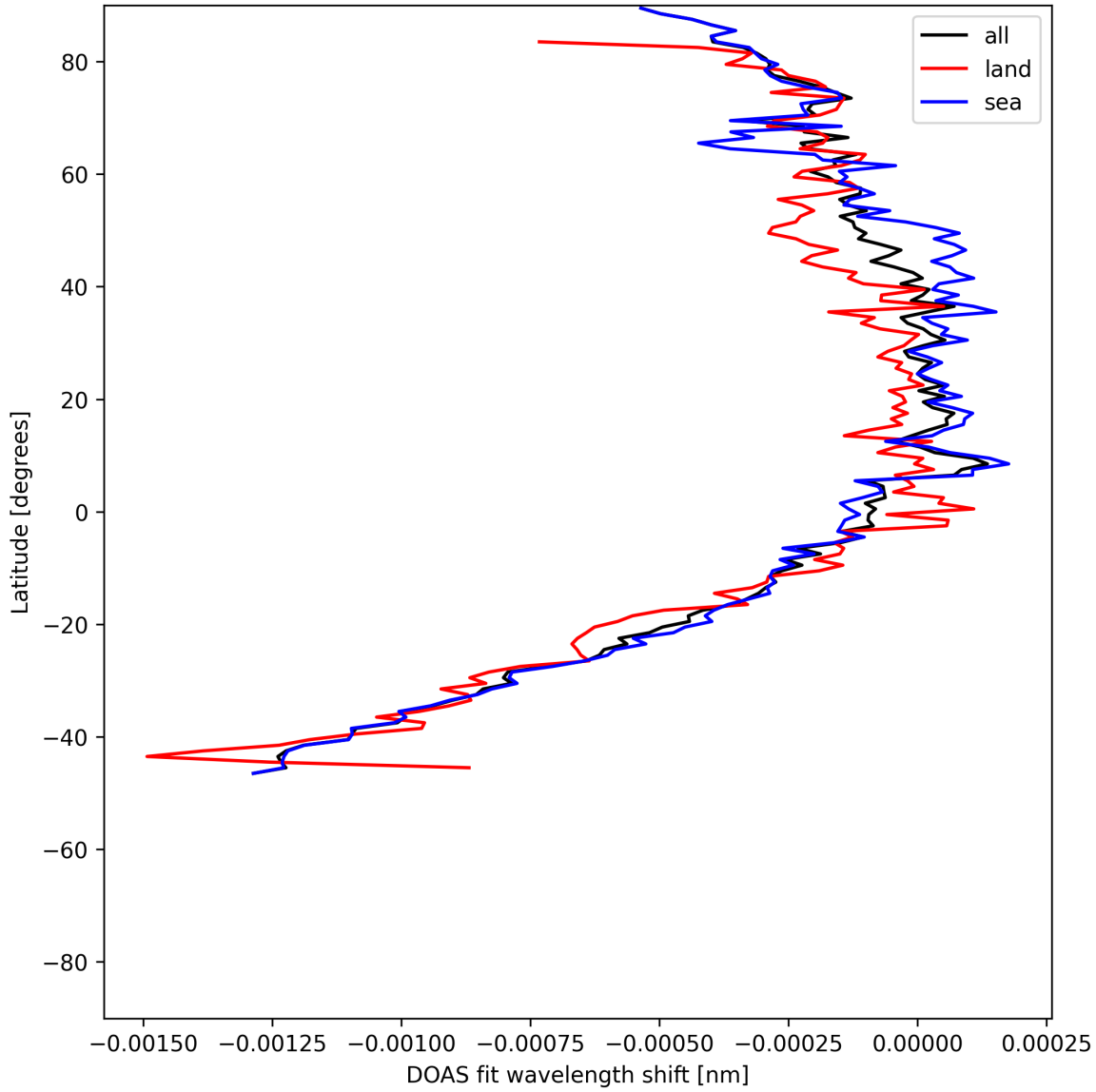


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-05-31 to 2025-06-01.

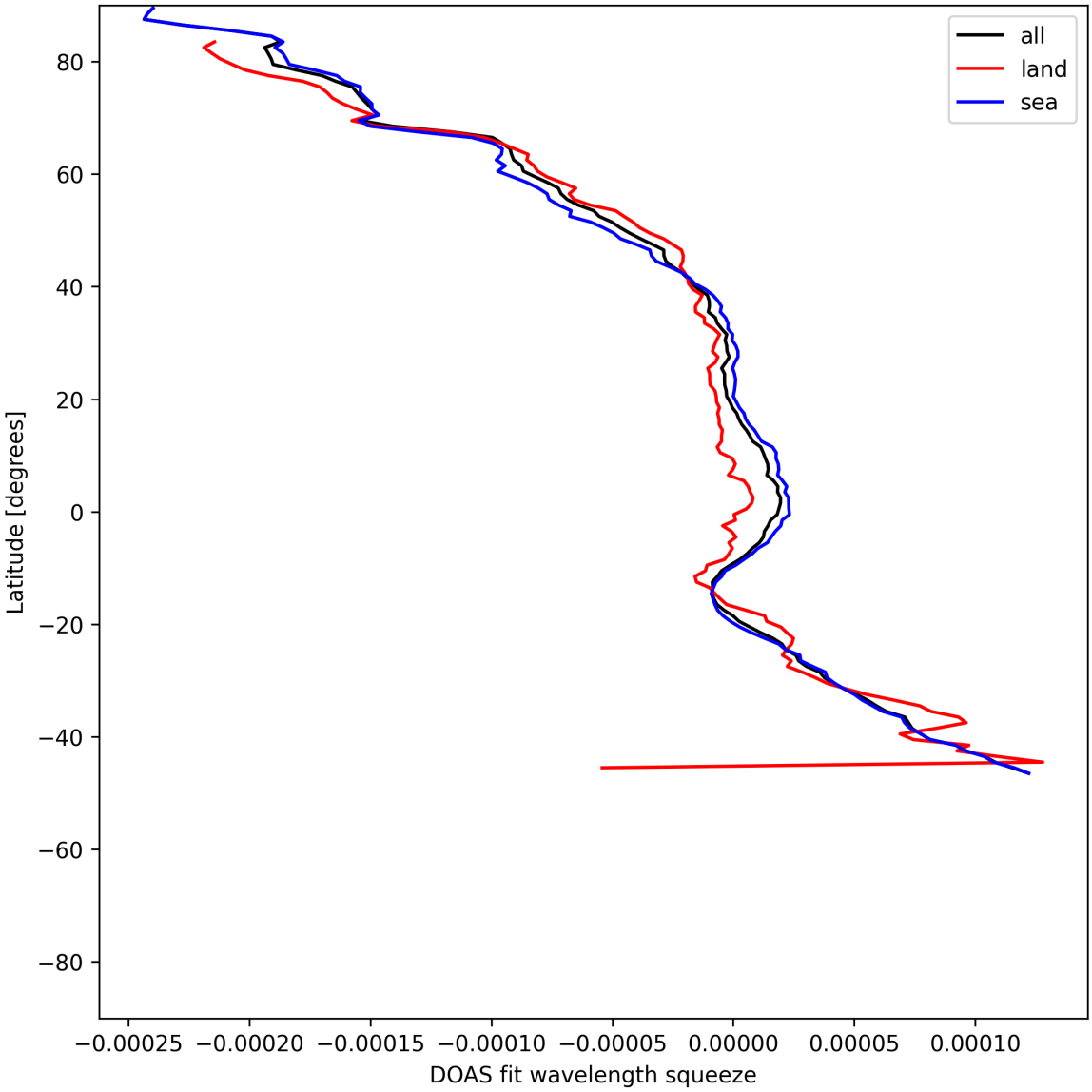


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-05-31 to 2025-06-01.

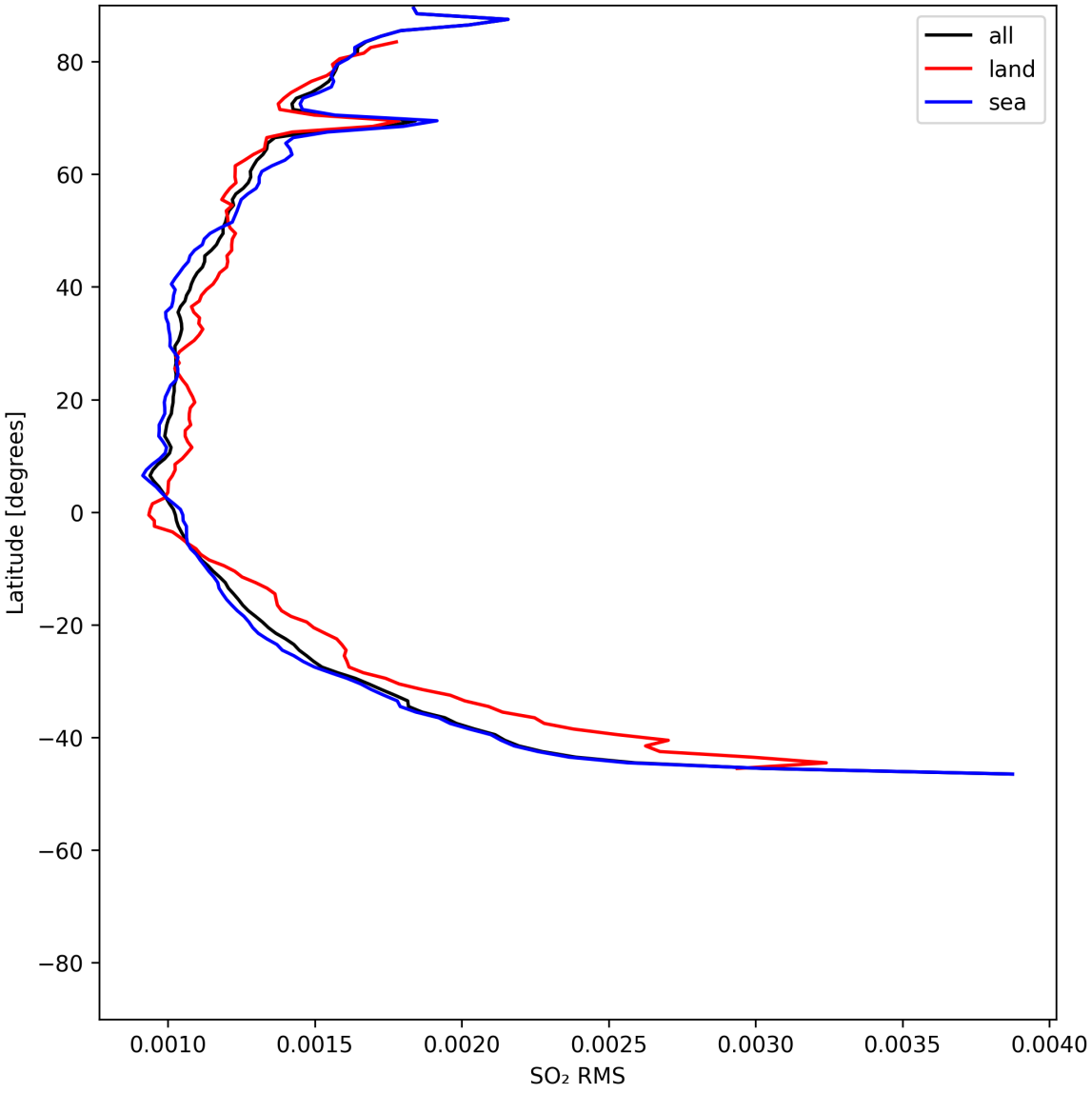


Figure 52: Zonal average of "SO_2 RMS" for 2025-05-31 to 2025-06-01.

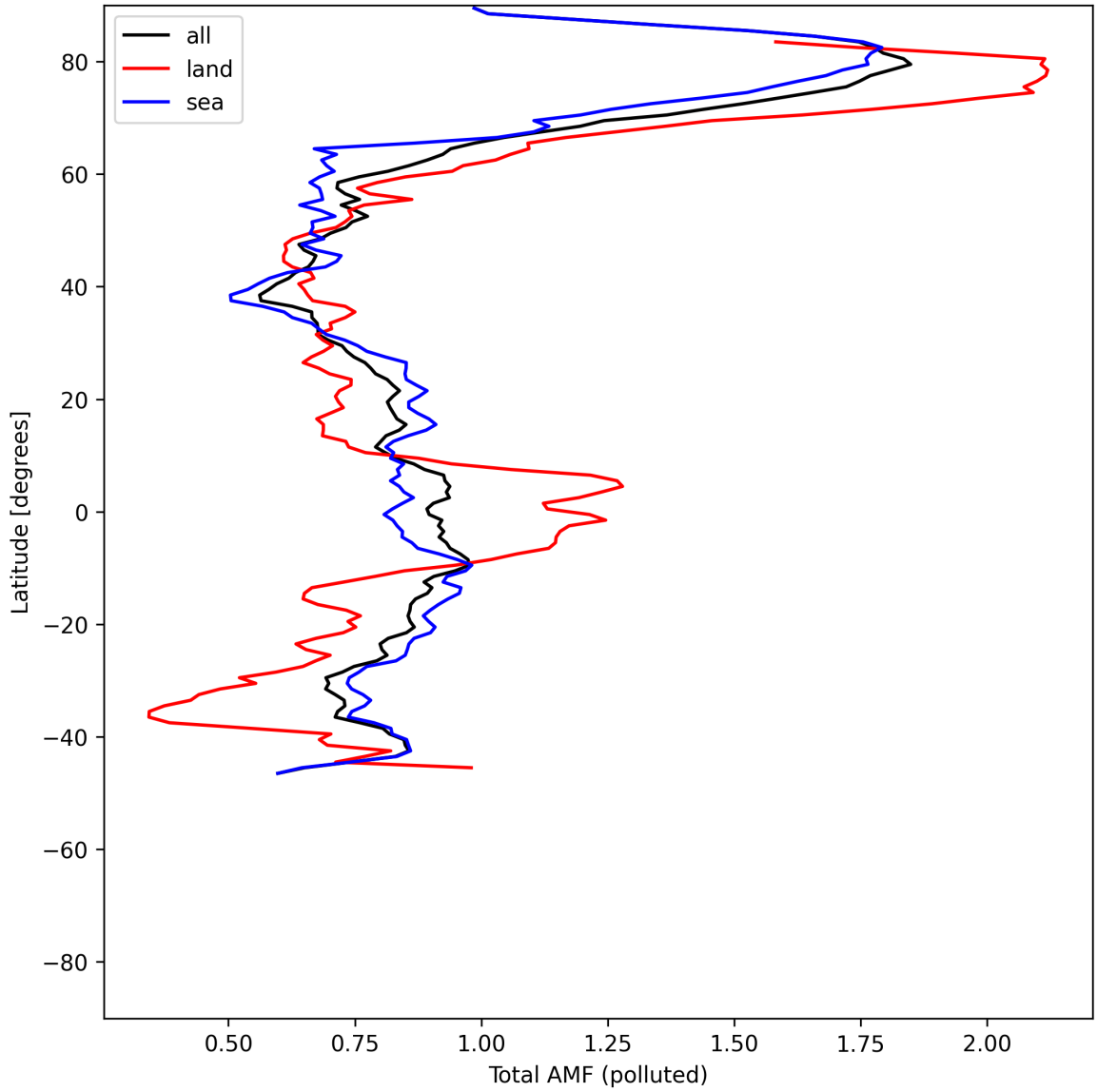


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-05-31 to 2025-06-01.

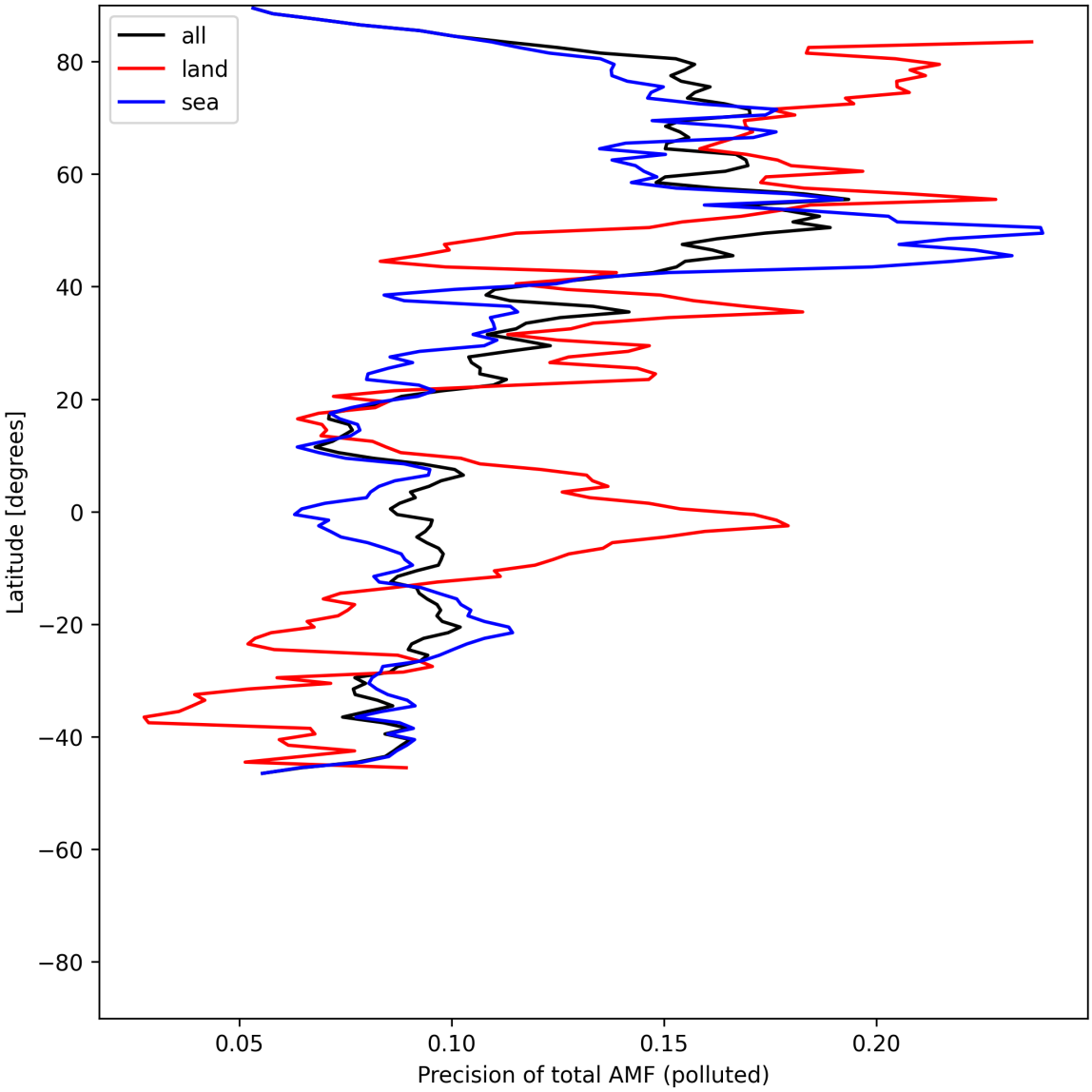


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-05-31 to 2025-06-01.

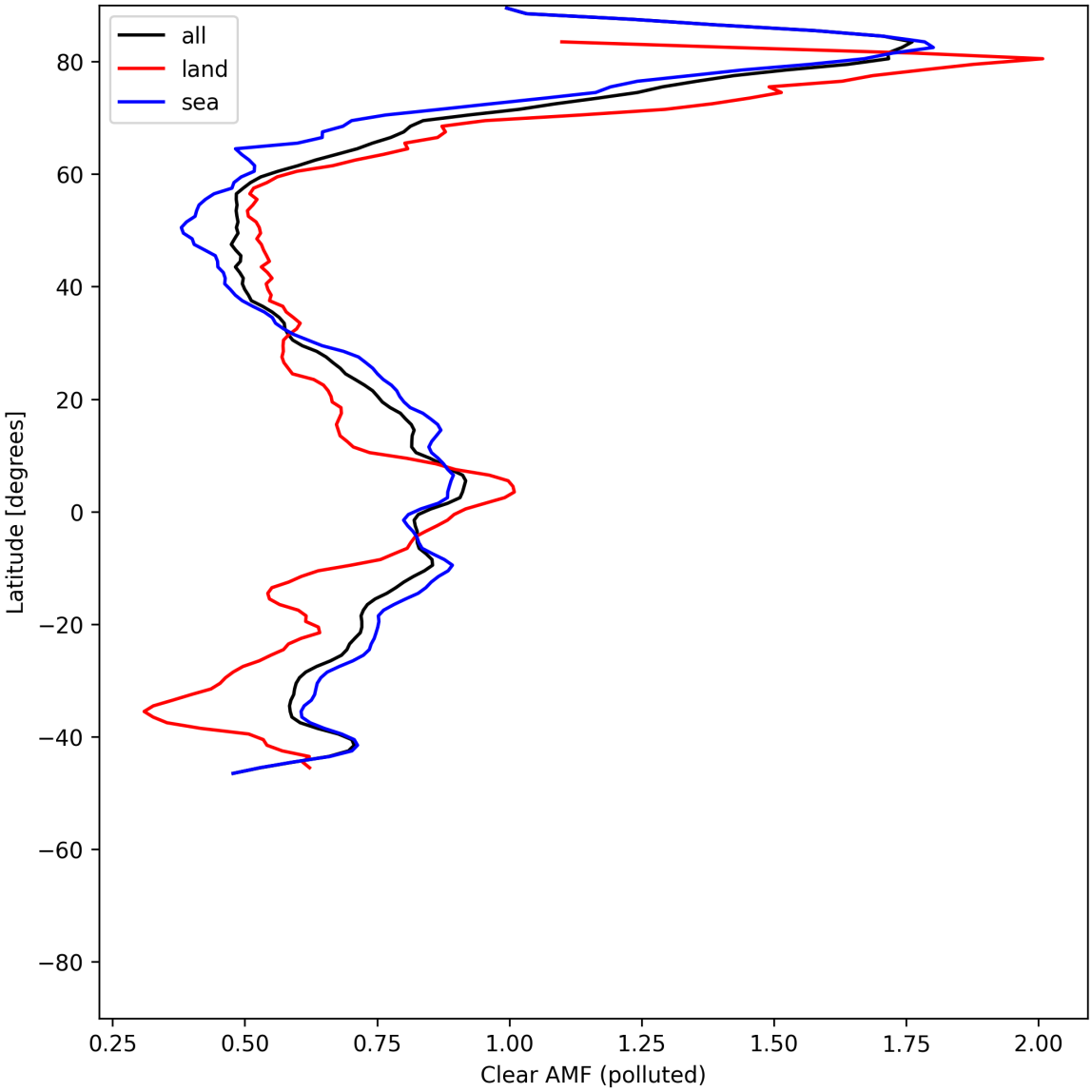


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-05-31 to 2025-06-01.

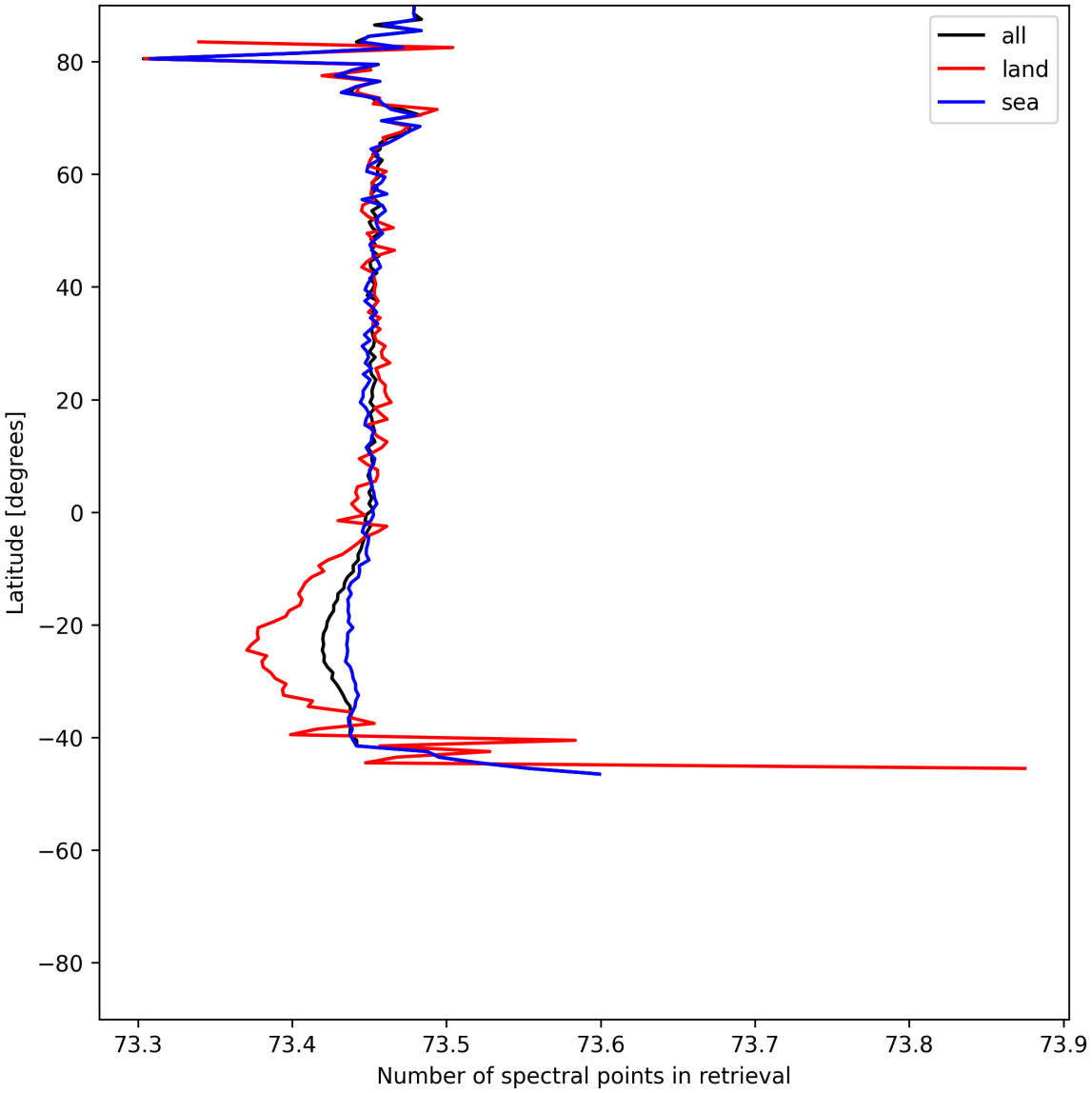


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-05-31 to 2025-06-01.

8 Histograms

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

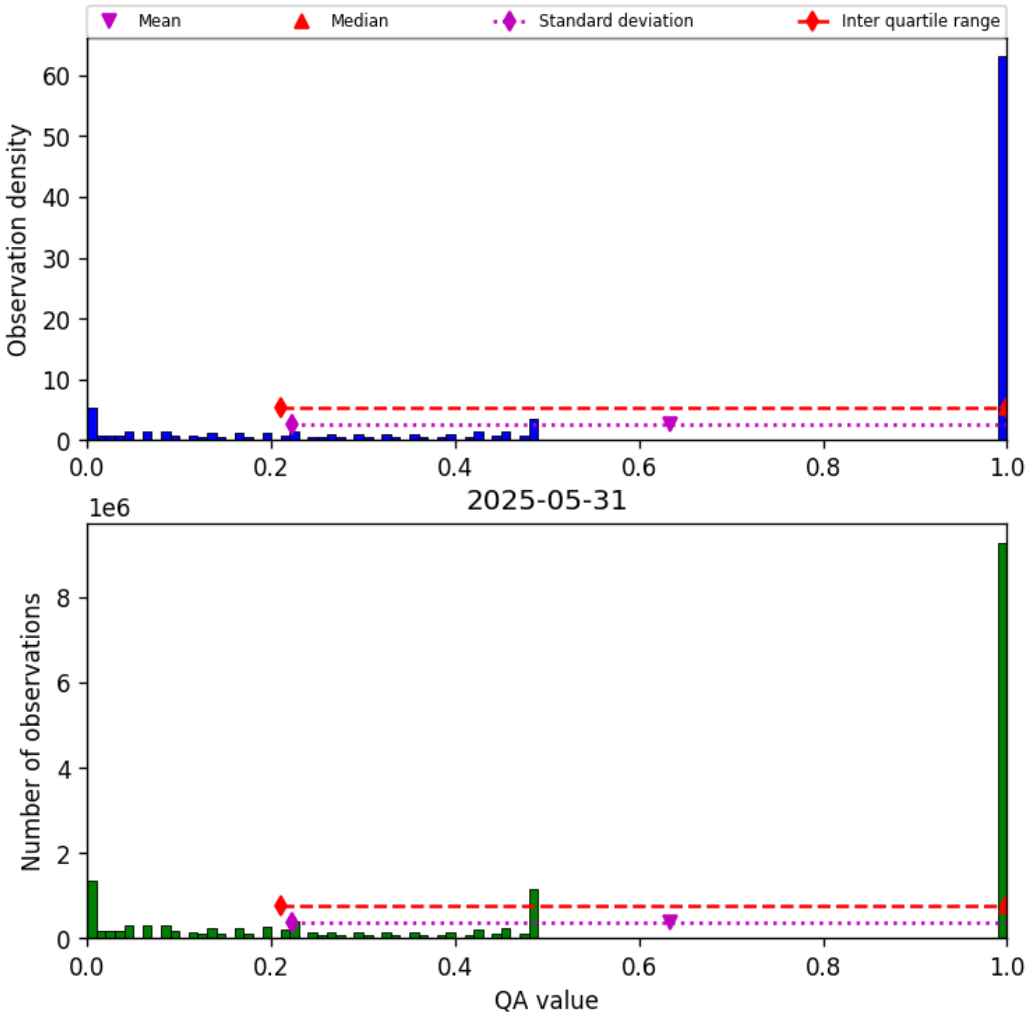


Figure 57: Histogram of “QA value” for 2025-05-31 to 2025-06-01

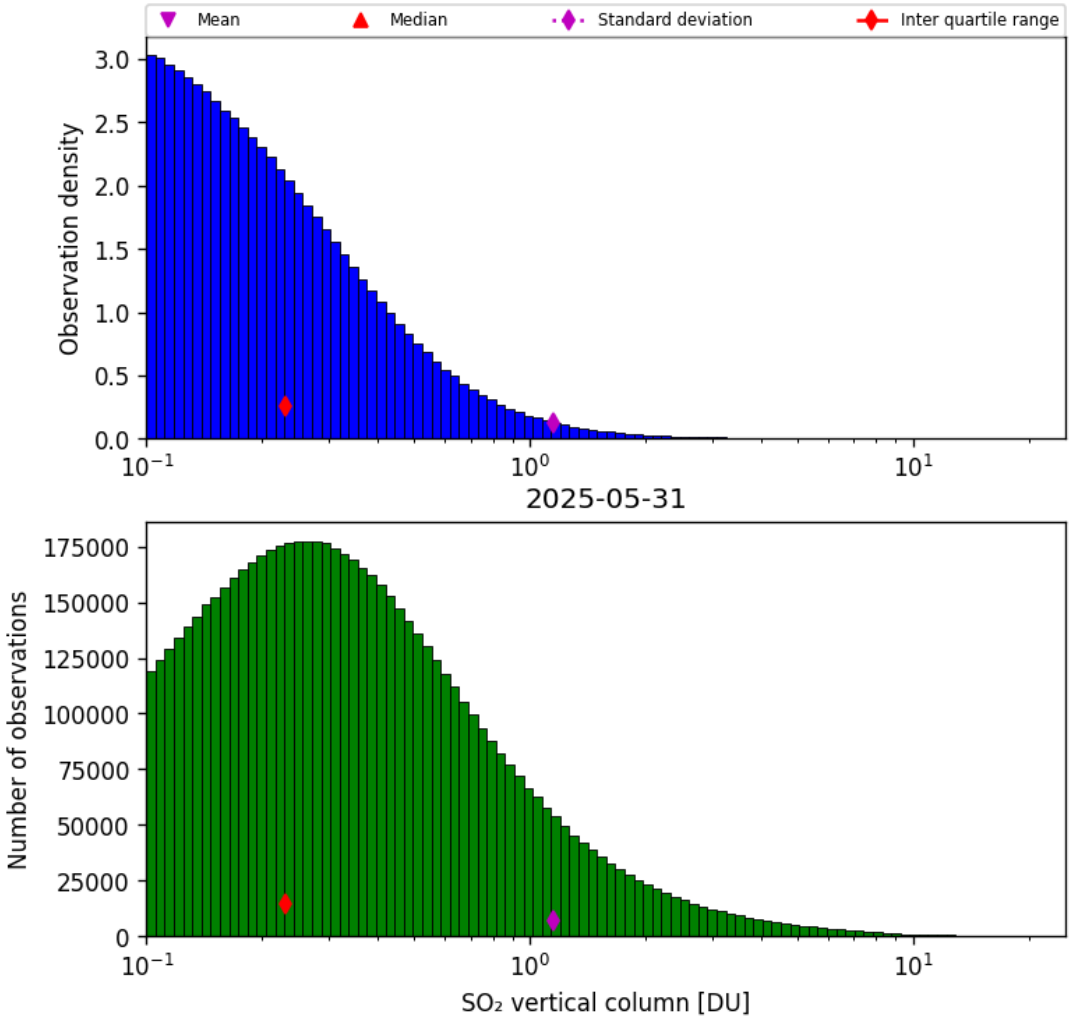


Figure 58: Histogram of "SO_2 vertical column" for 2025-05-31 to 2025-06-01

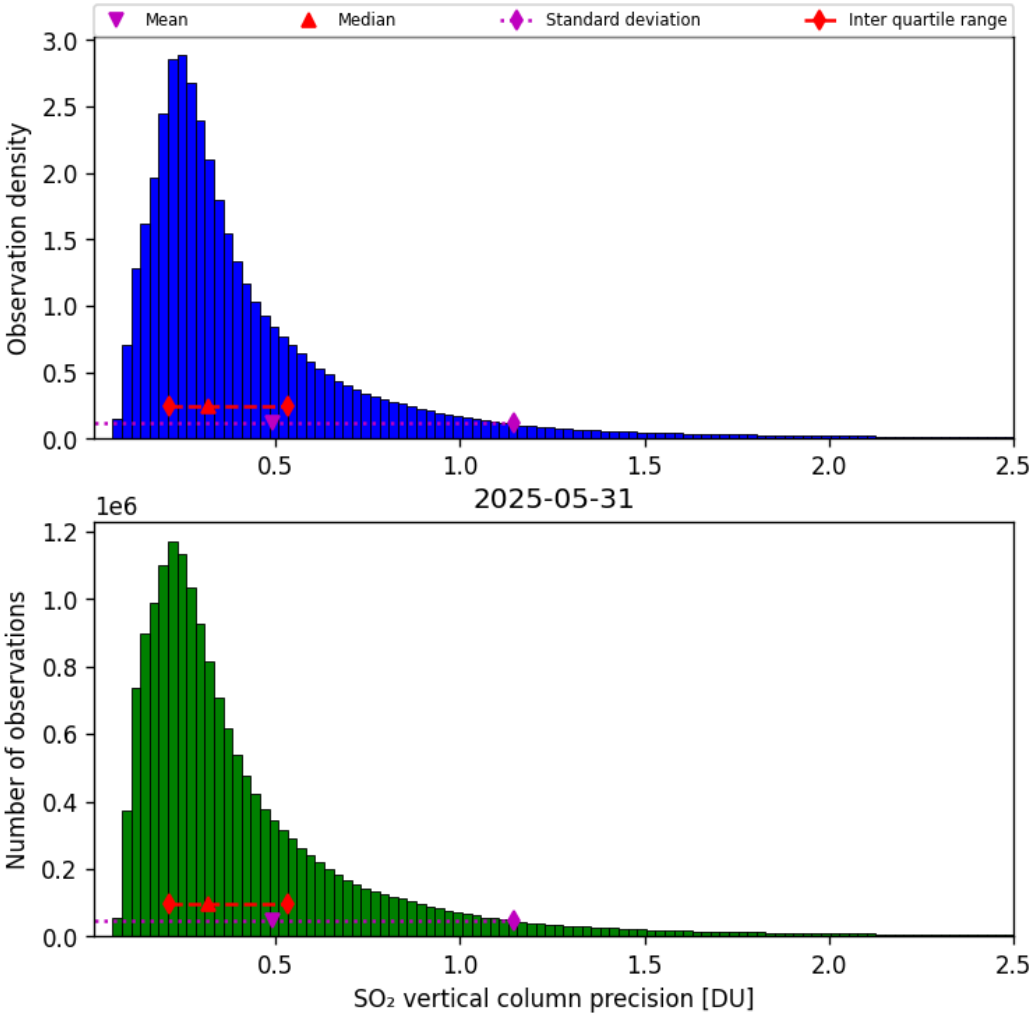


Figure 59: Histogram of "SO_2 vertical column precision" for 2025-05-31 to 2025-06-01

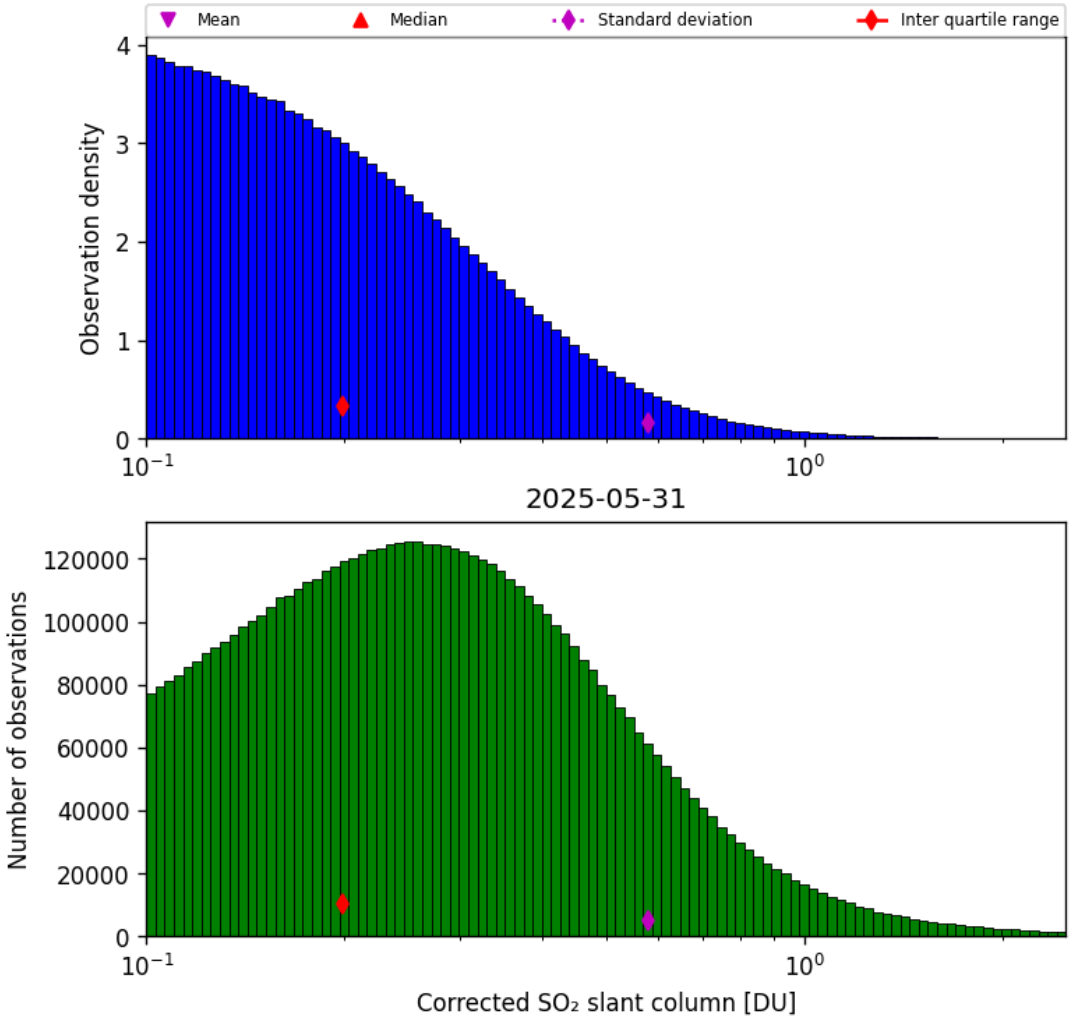


Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-05-31 to 2025-06-01

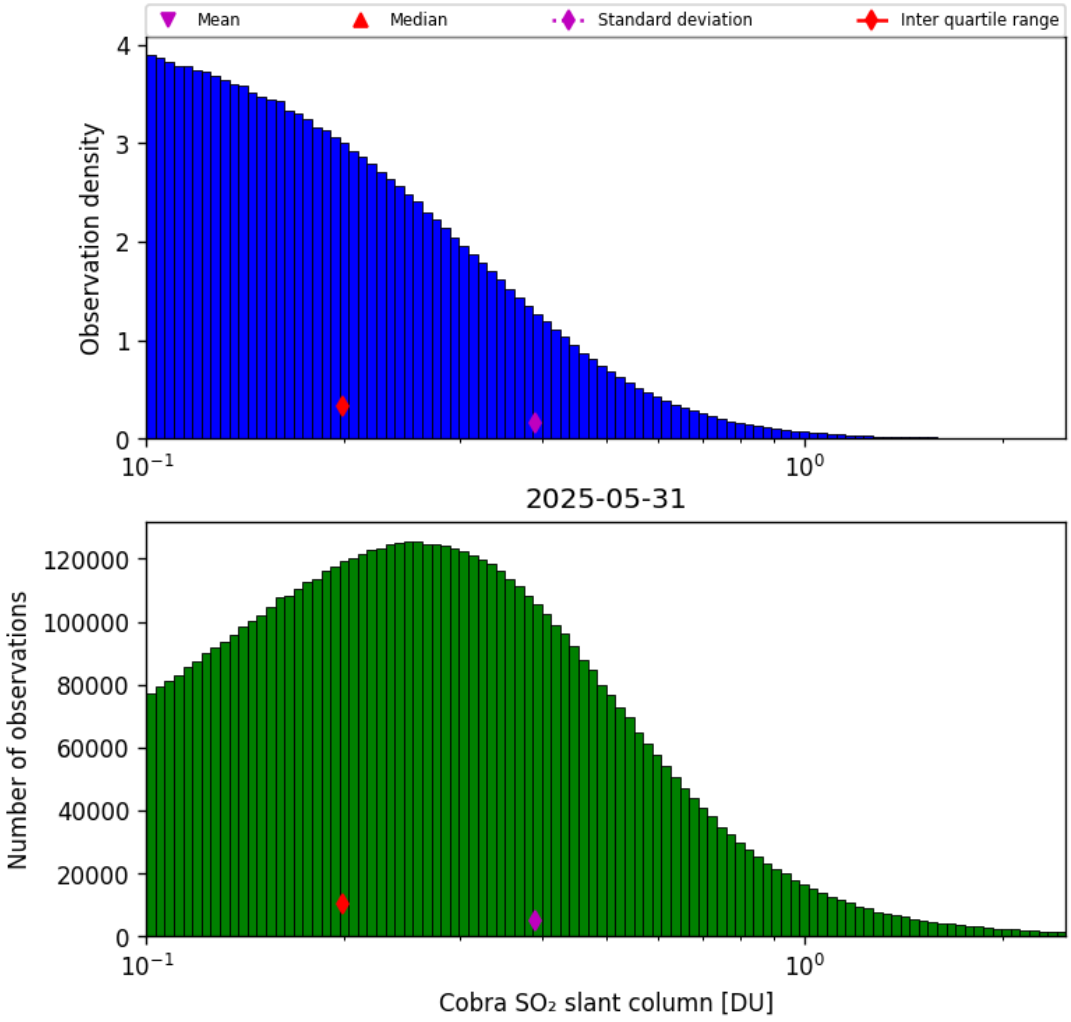


Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-05-31 to 2025-06-01

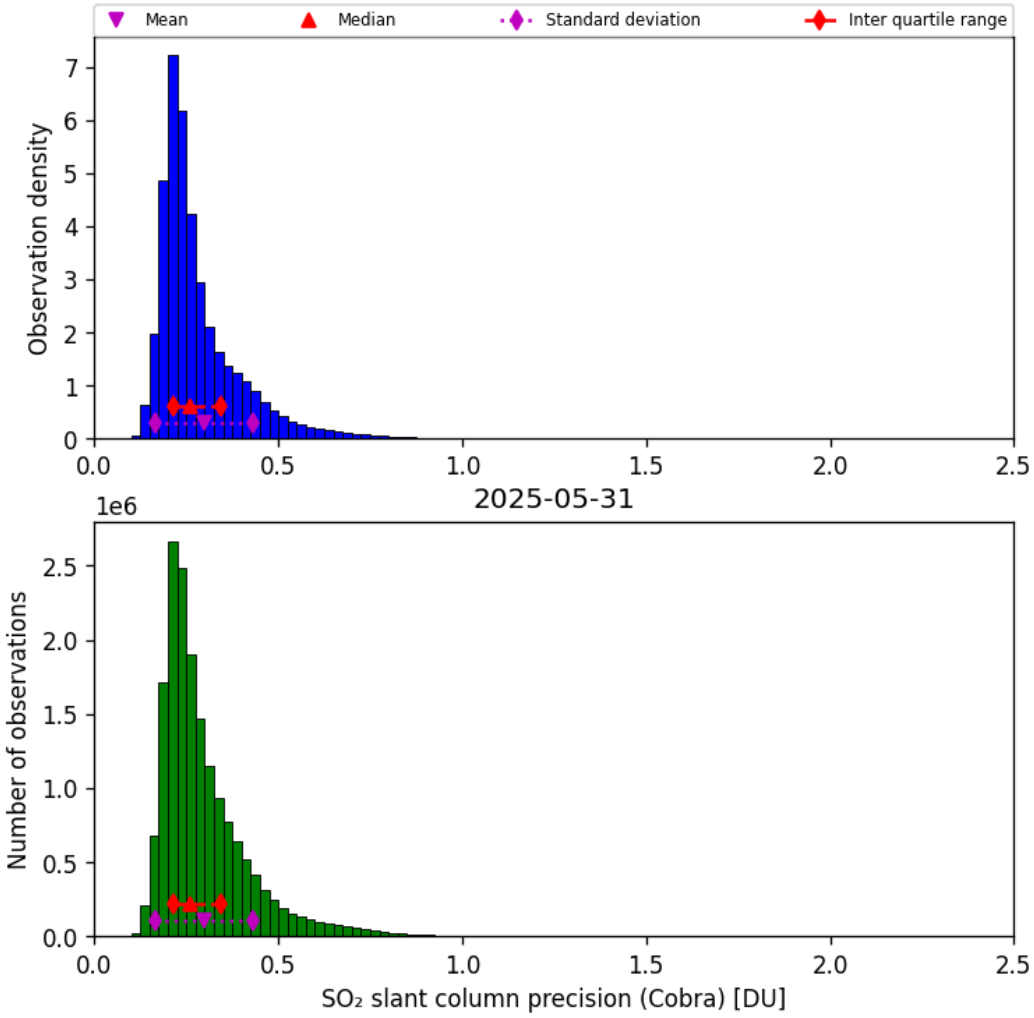


Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-05-31 to 2025-06-01

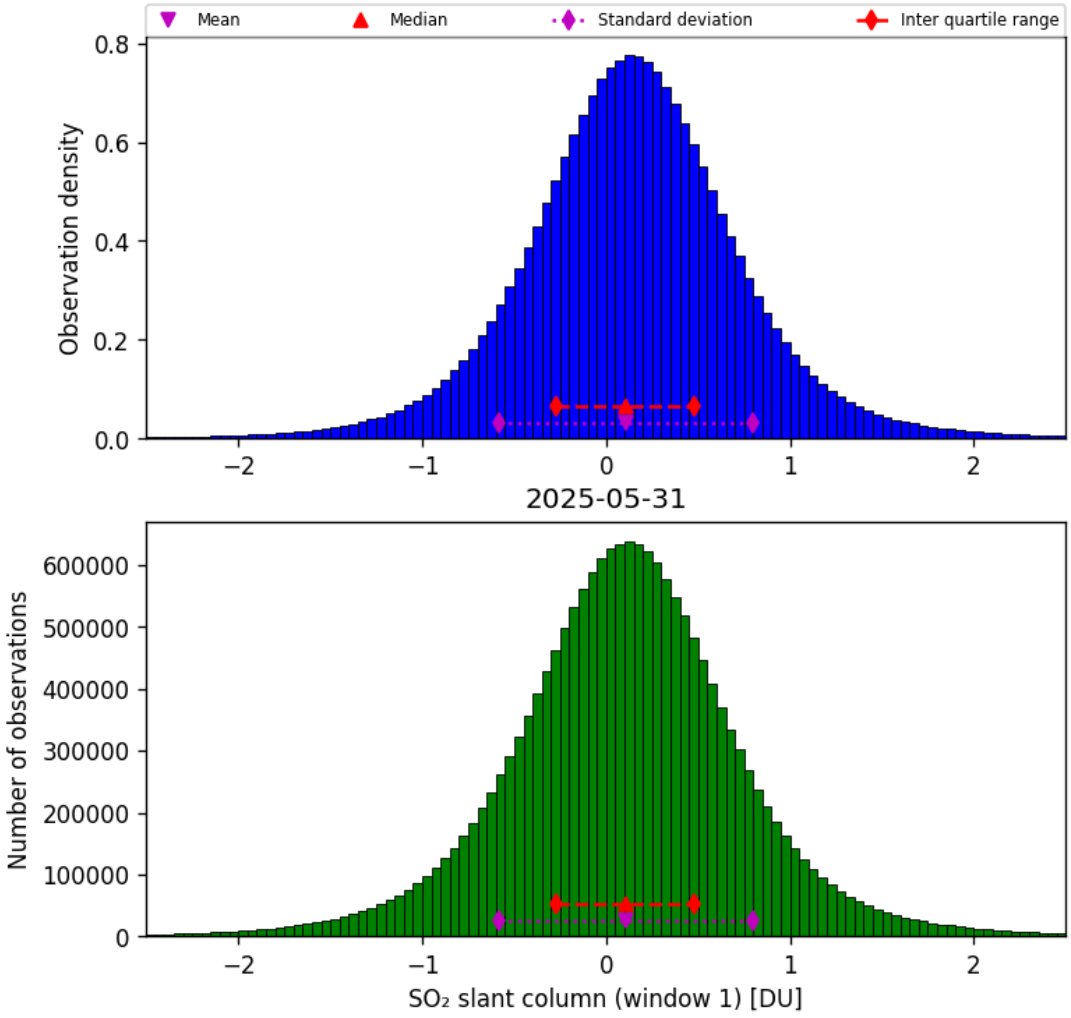


Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-05-31 to 2025-06-01

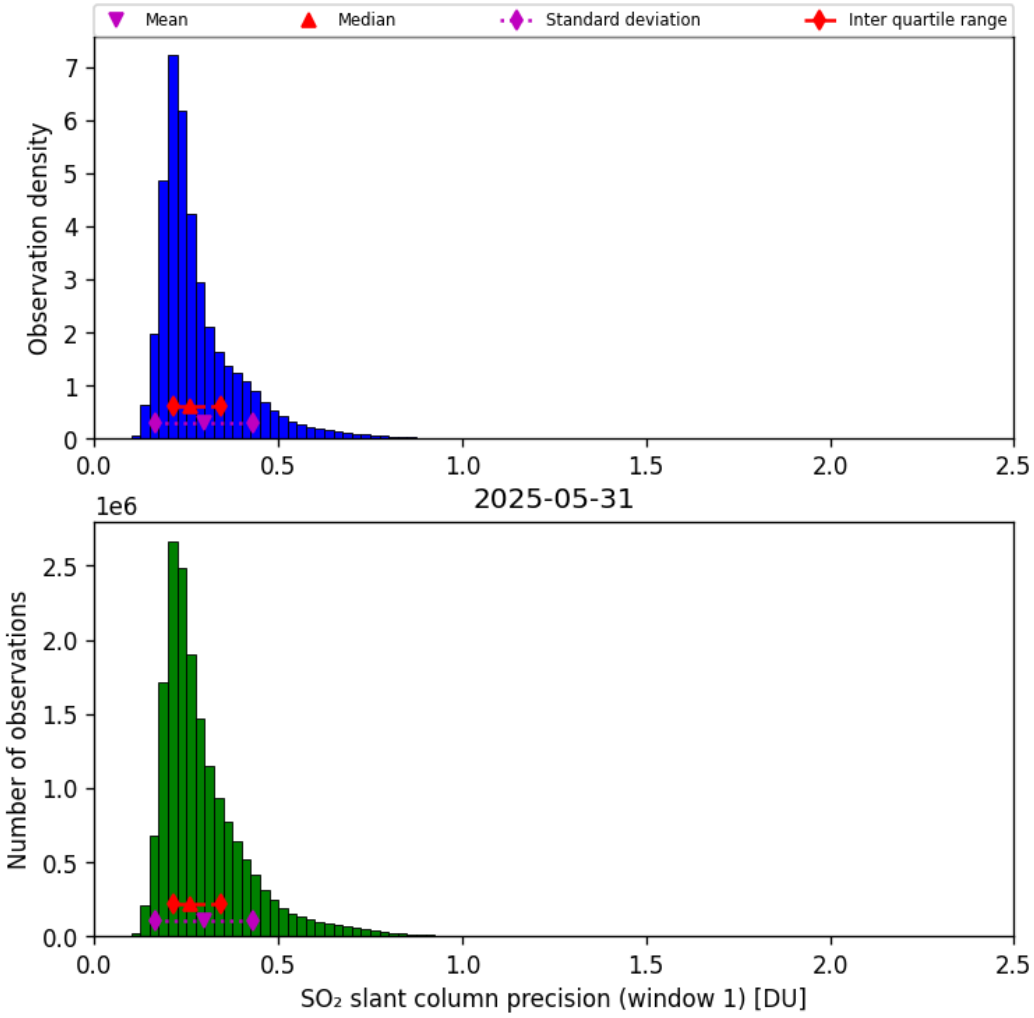


Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-05-31 to 2025-06-01

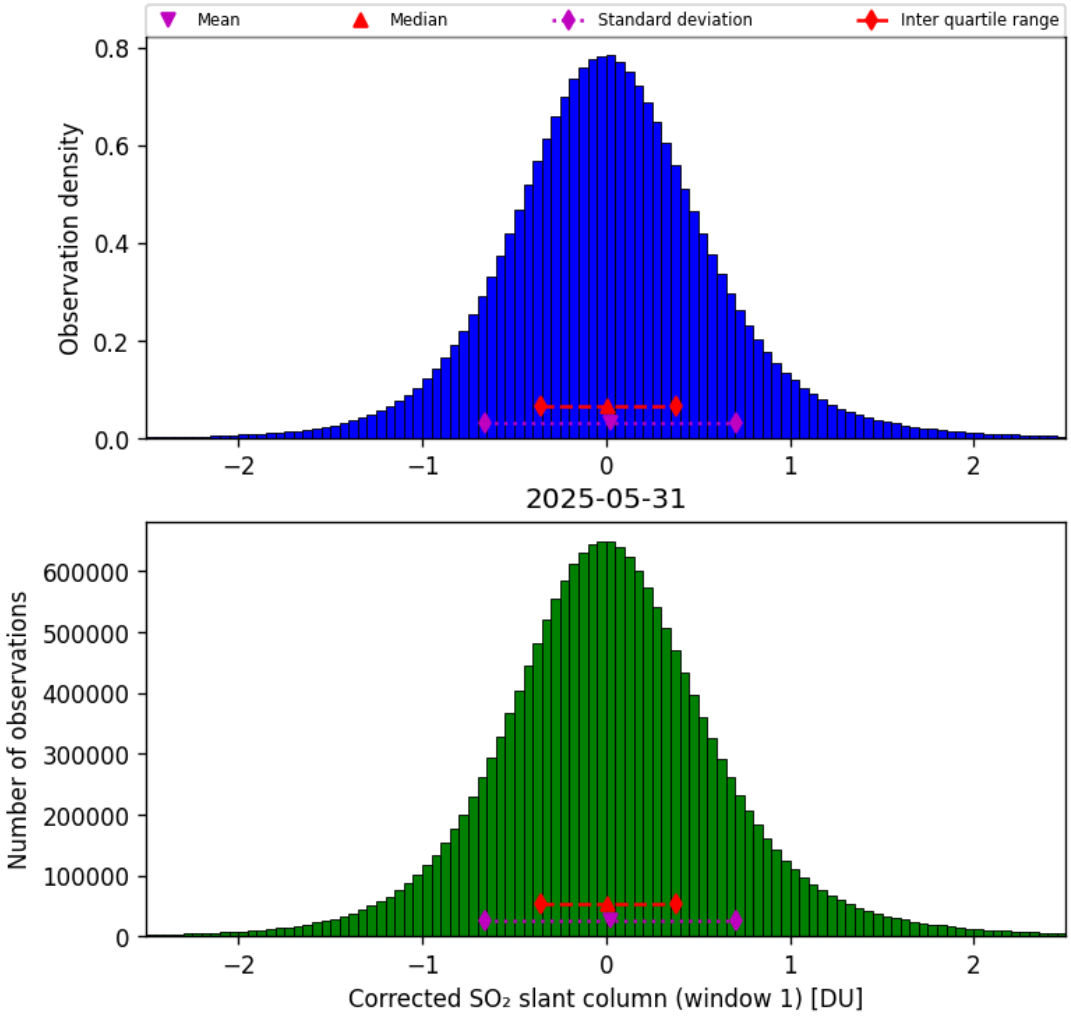


Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-05-31 to 2025-06-01

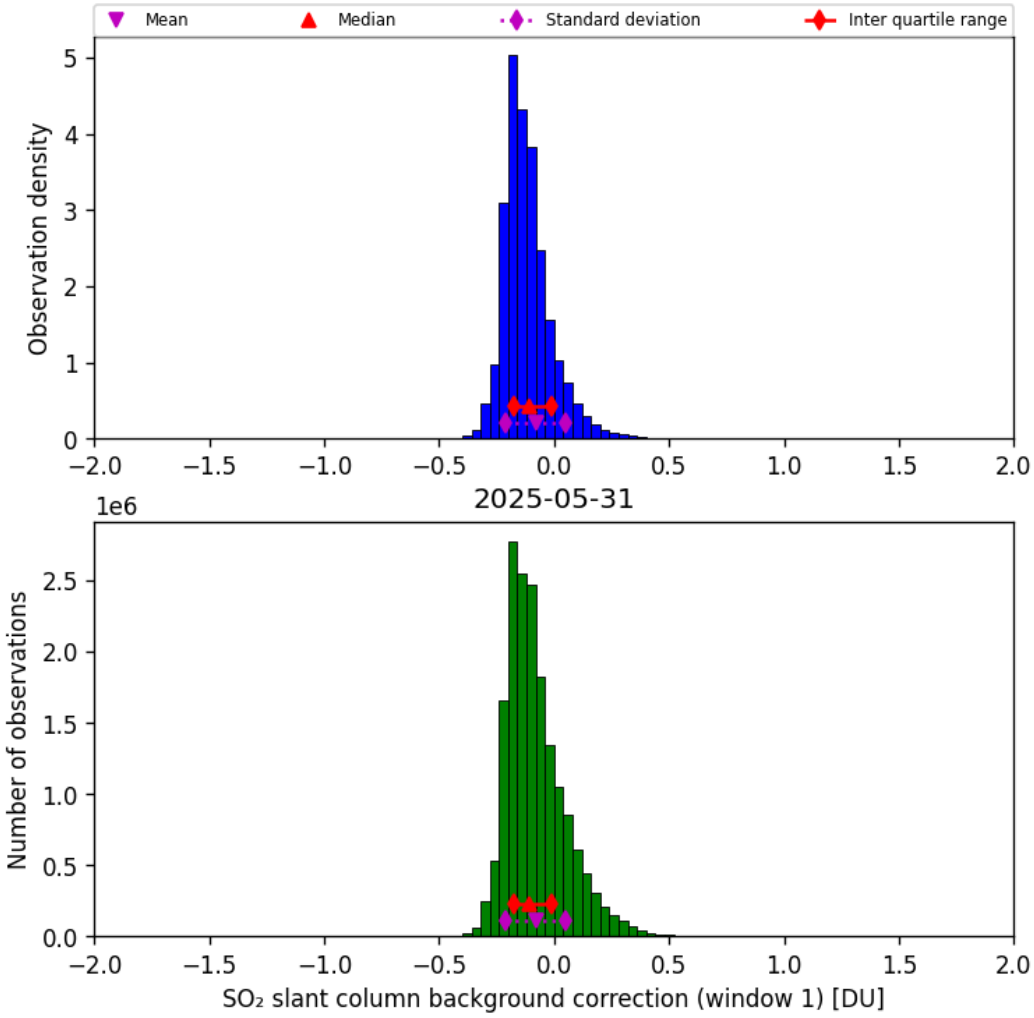


Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-05-31 to 2025-06-01

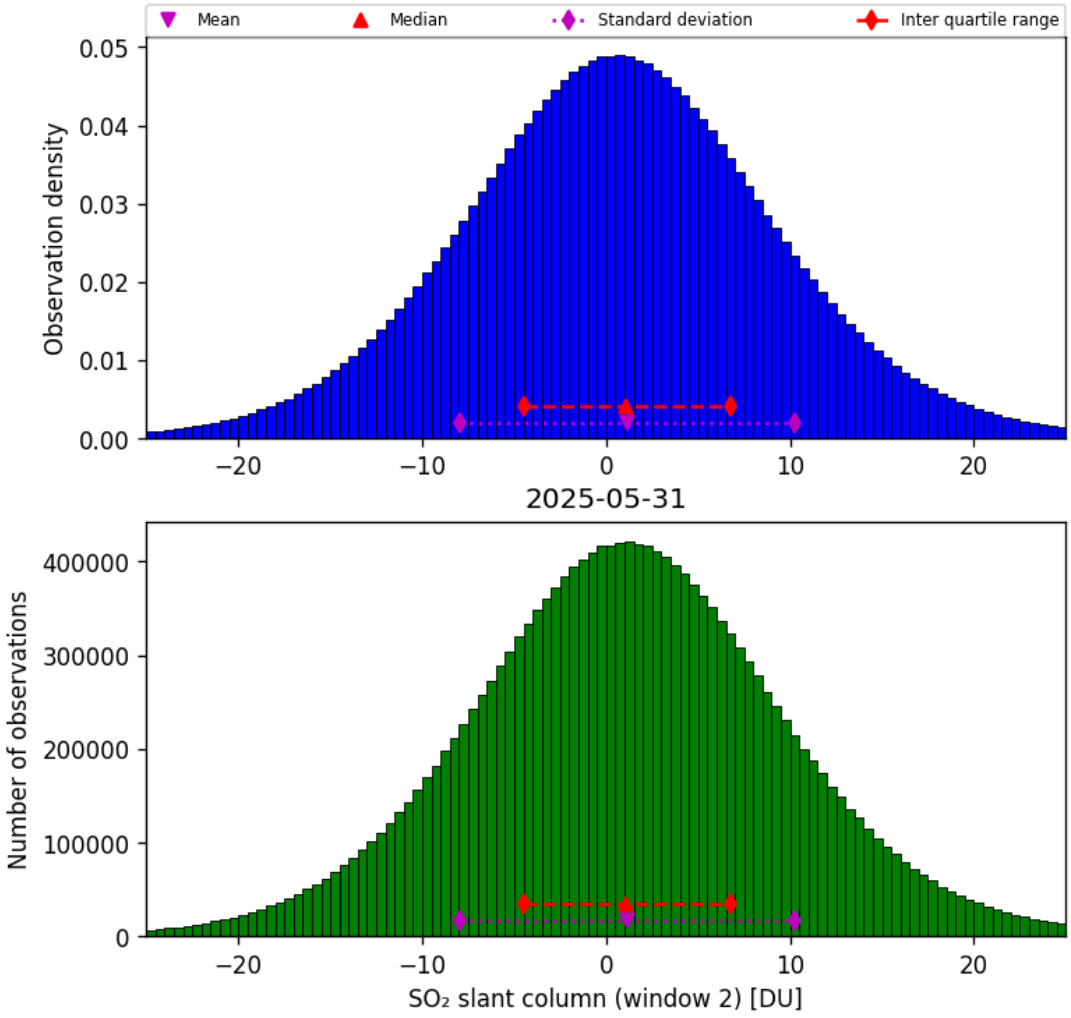


Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-05-31 to 2025-06-01

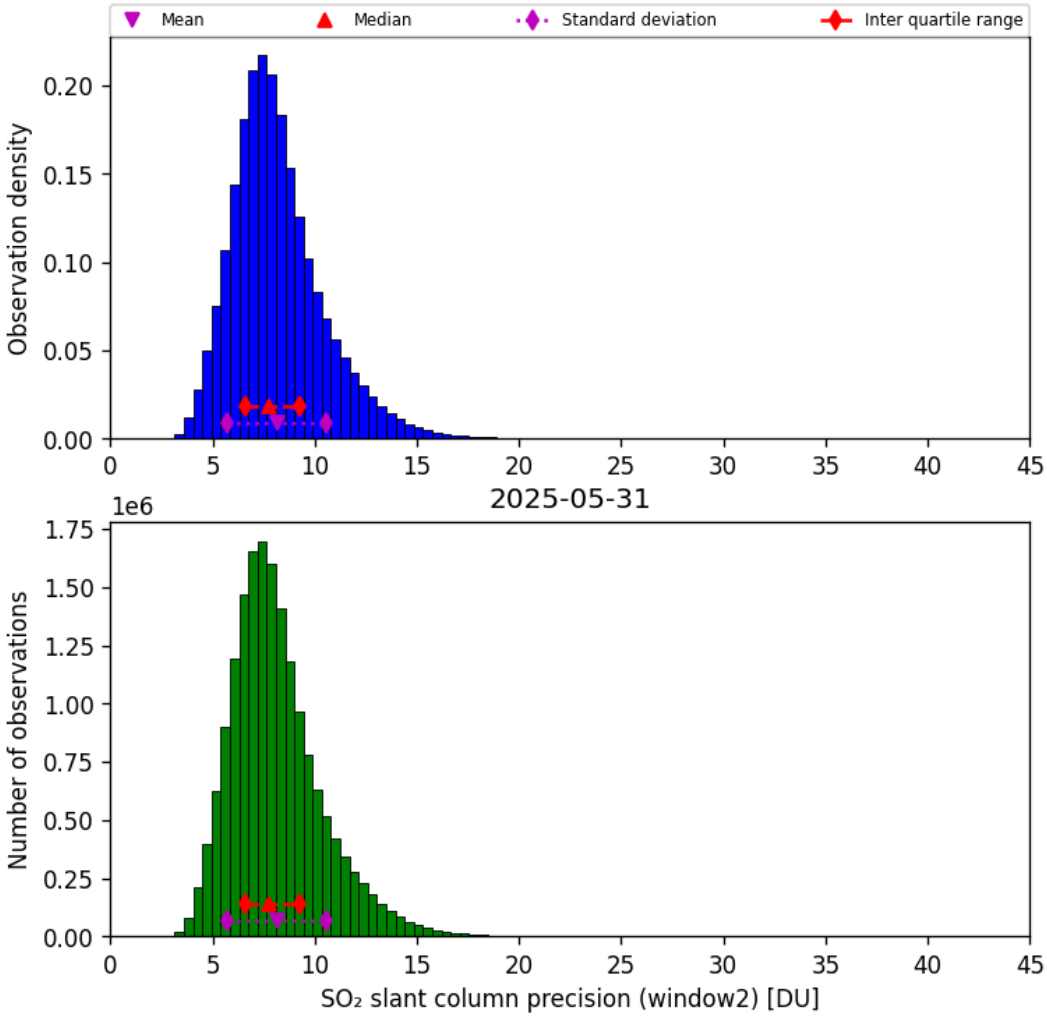


Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-05-31 to 2025-06-01

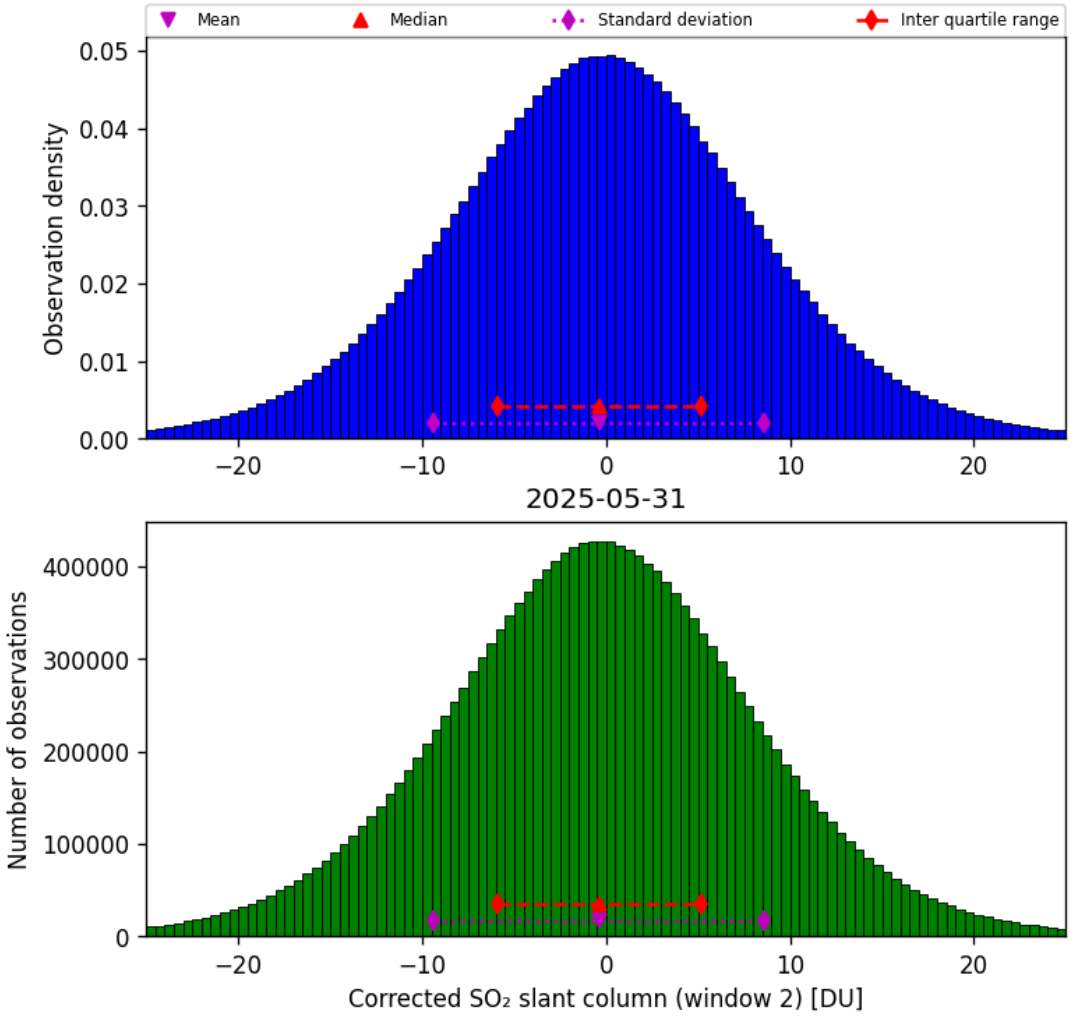


Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-05-31 to 2025-06-01

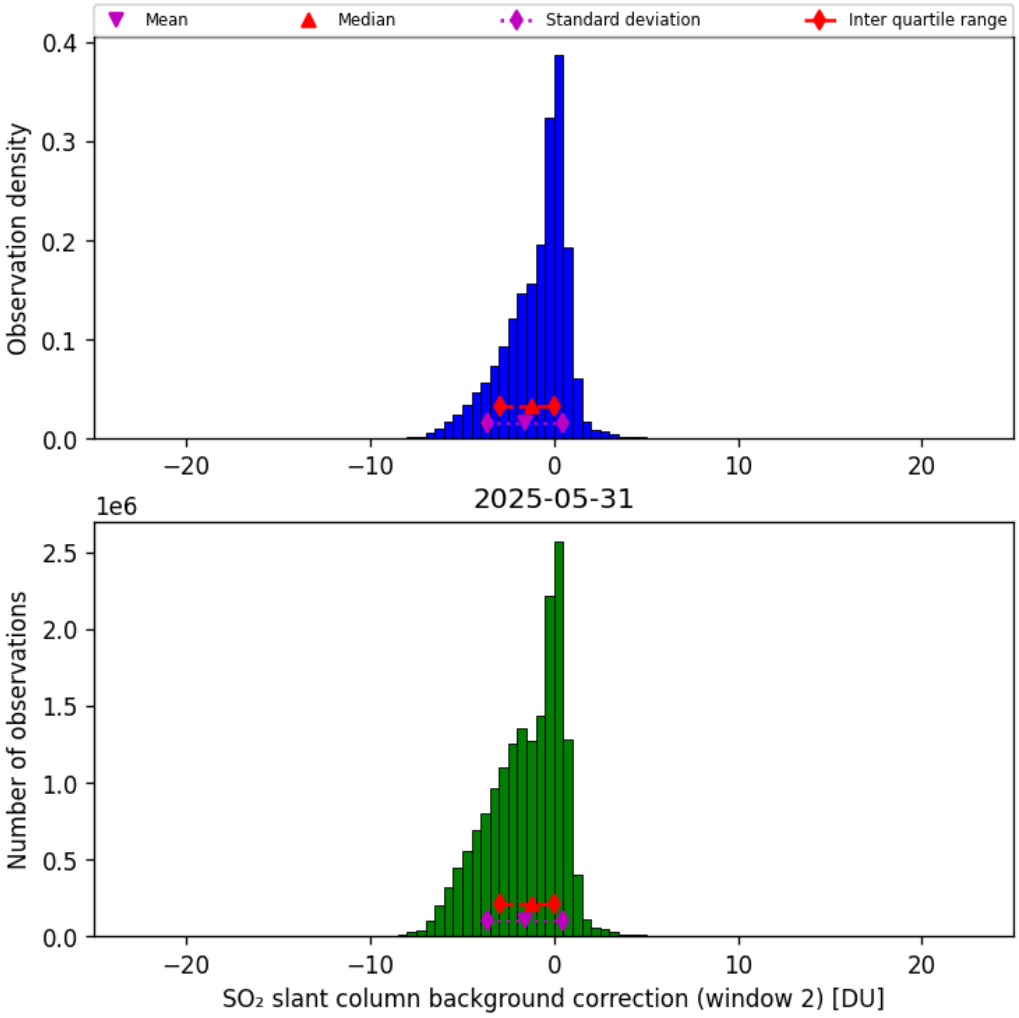


Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-05-31 to 2025-06-01

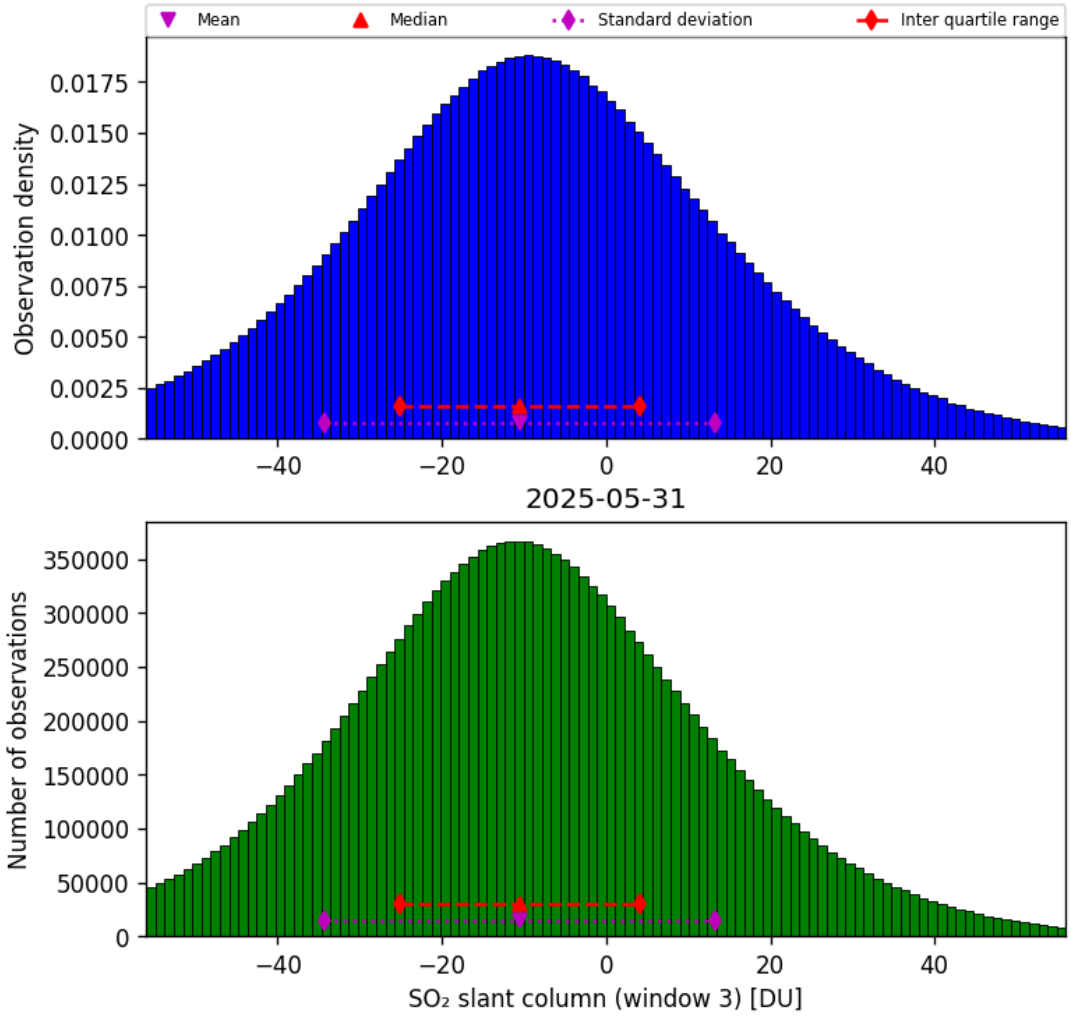


Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-05-31 to 2025-06-01

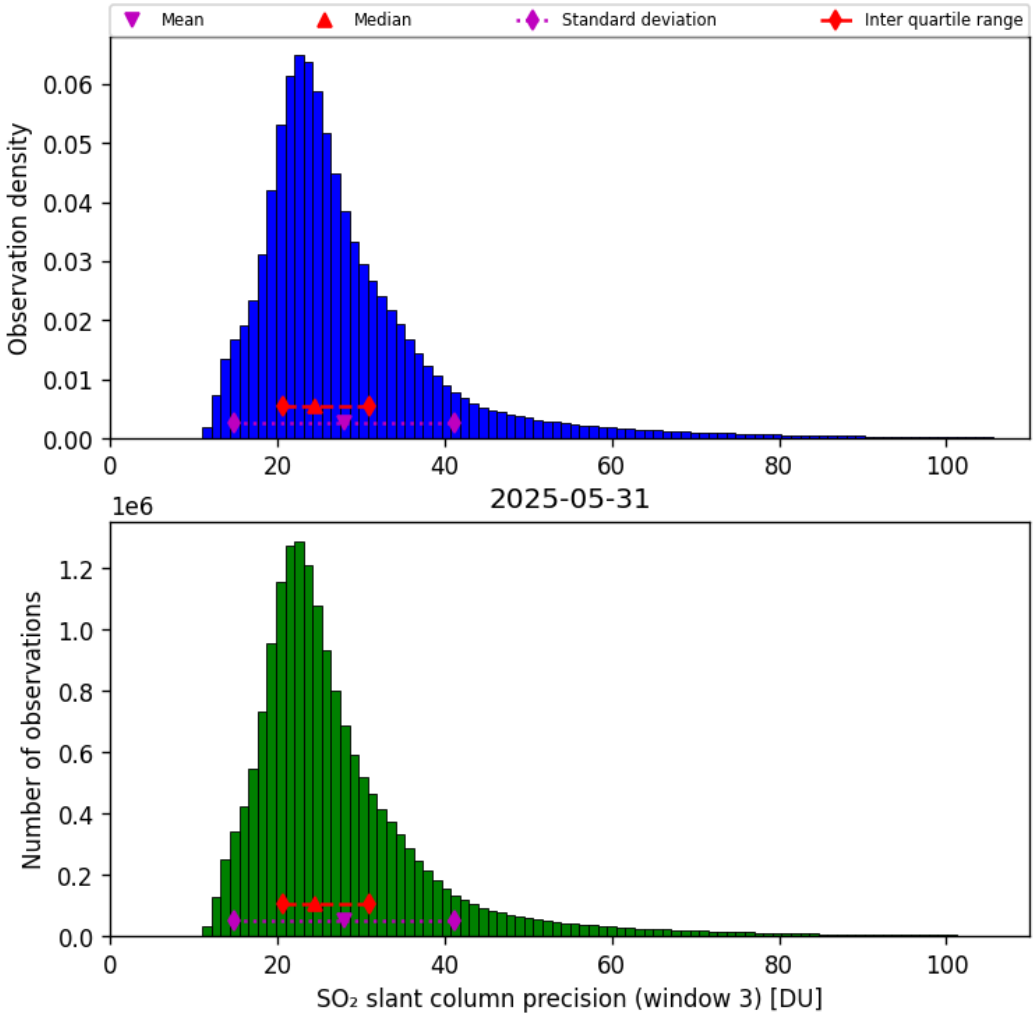


Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-05-31 to 2025-06-01

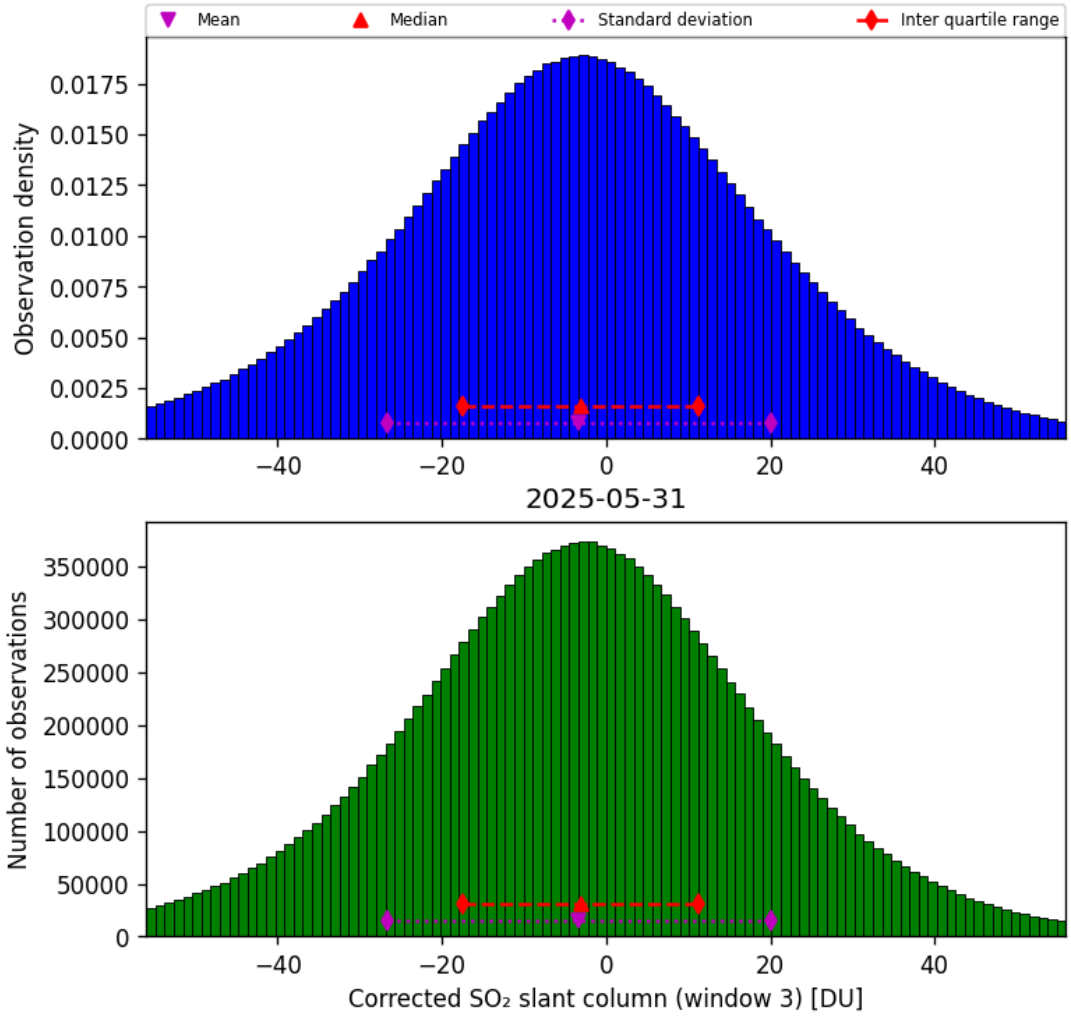


Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-05-31 to 2025-06-01

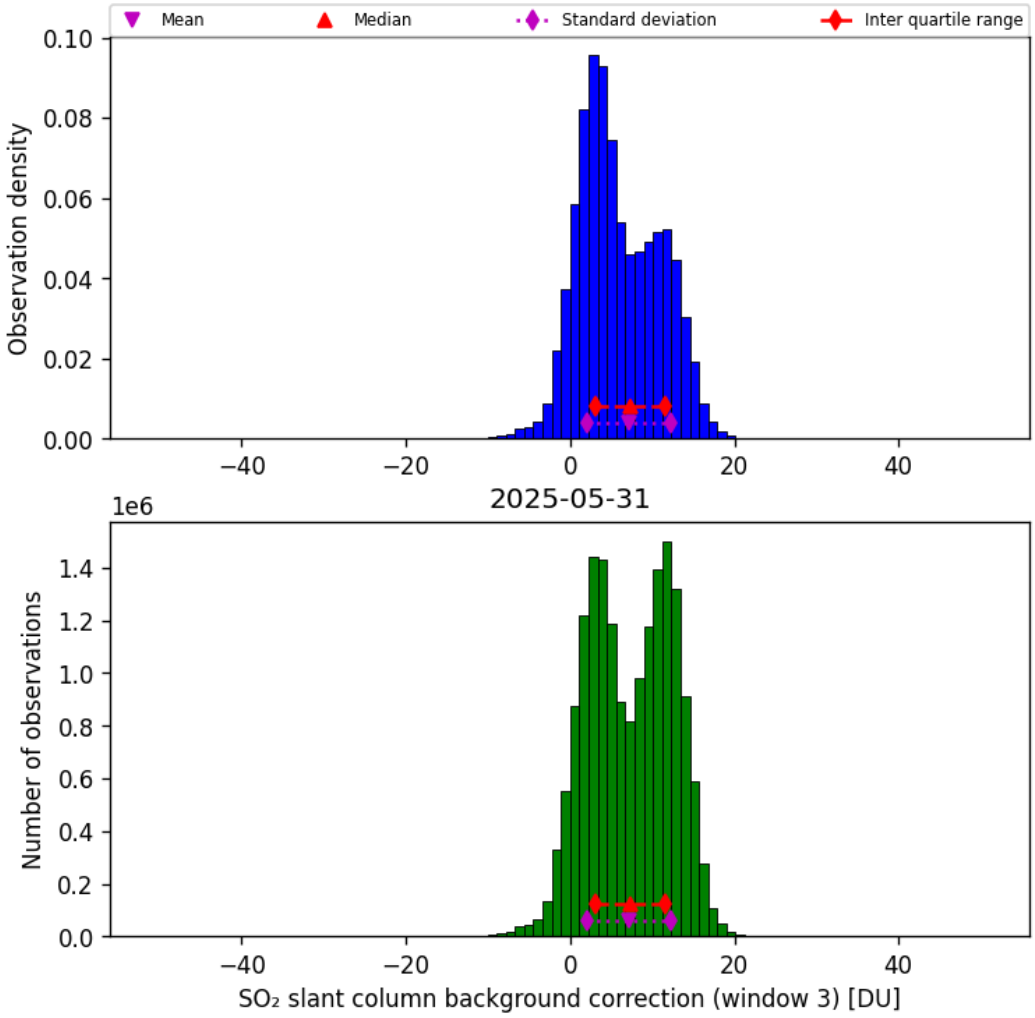


Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-05-31 to 2025-06-01

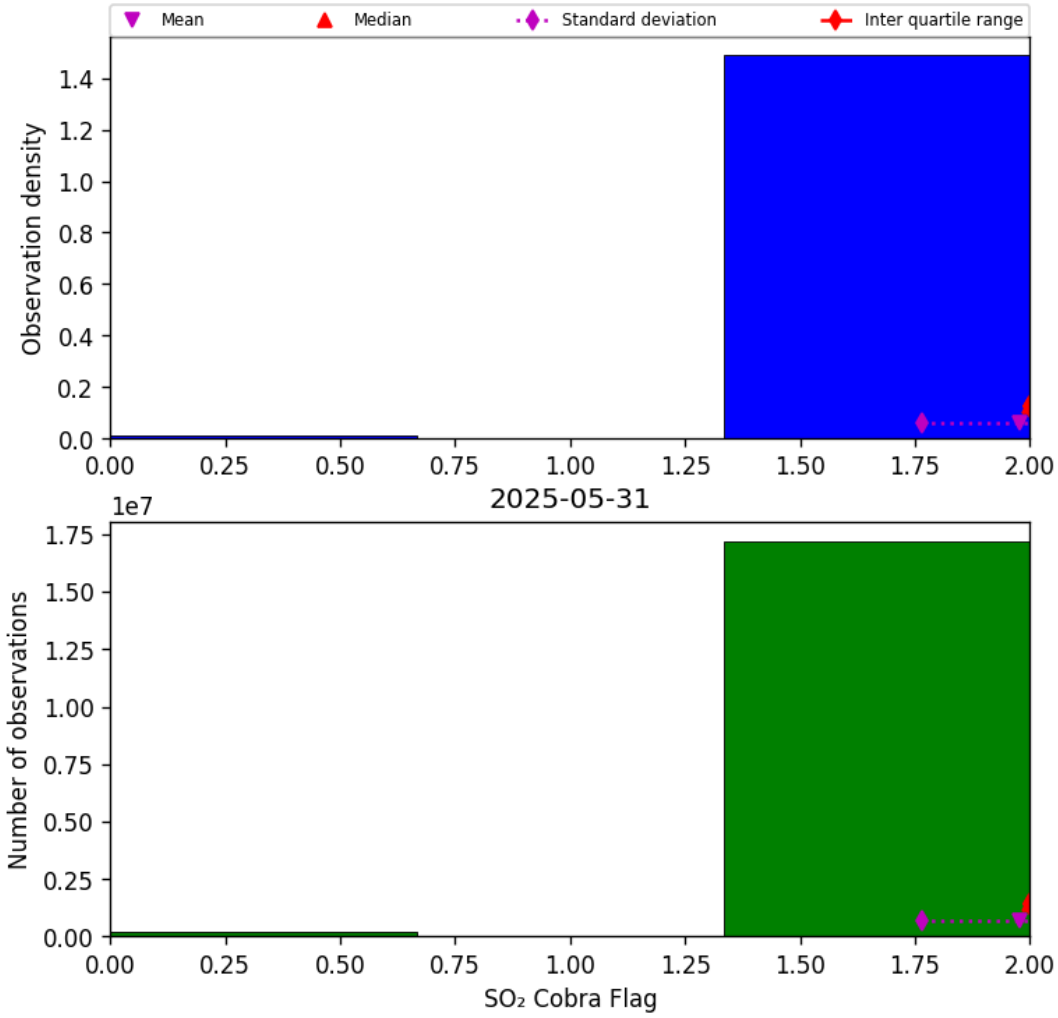


Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-05-31 to 2025-06-01

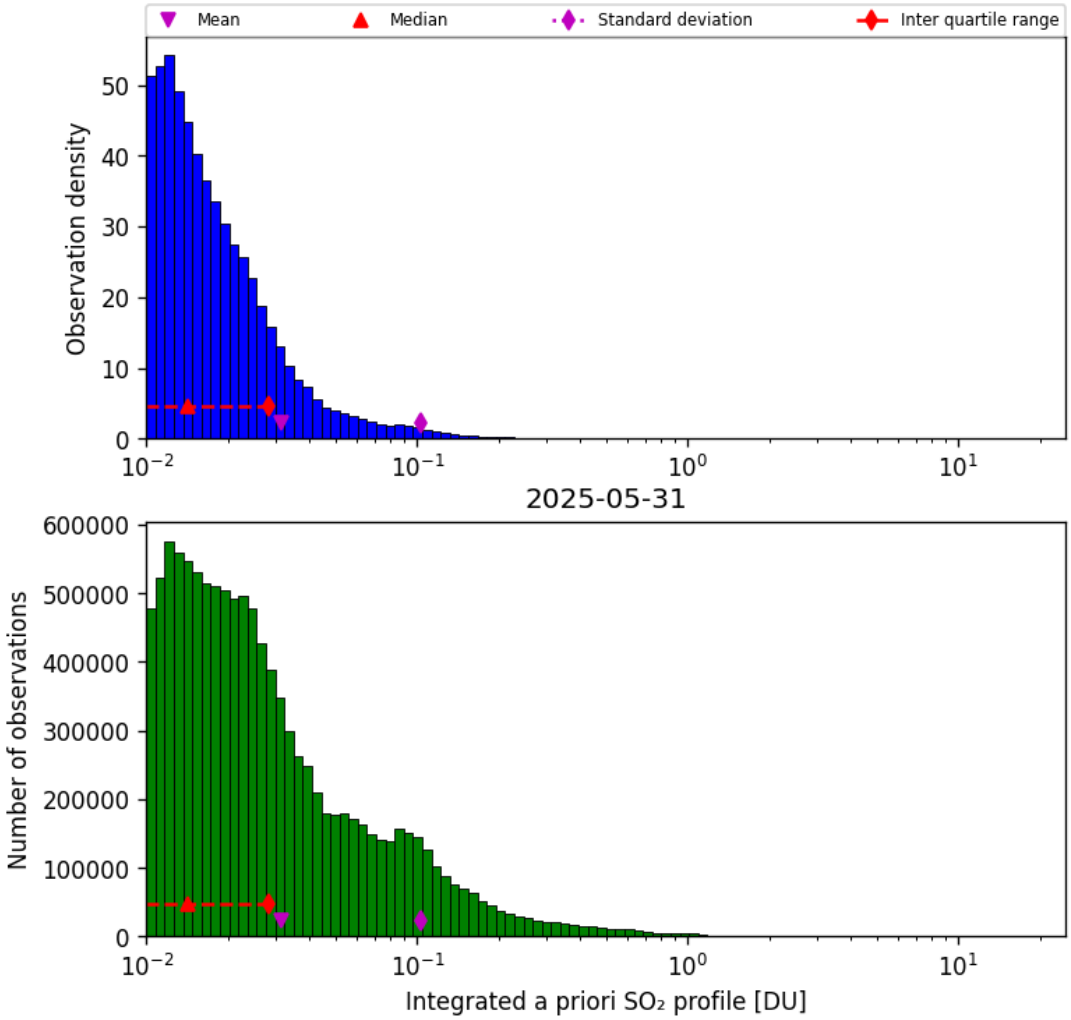


Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-05-31 to 2025-06-01

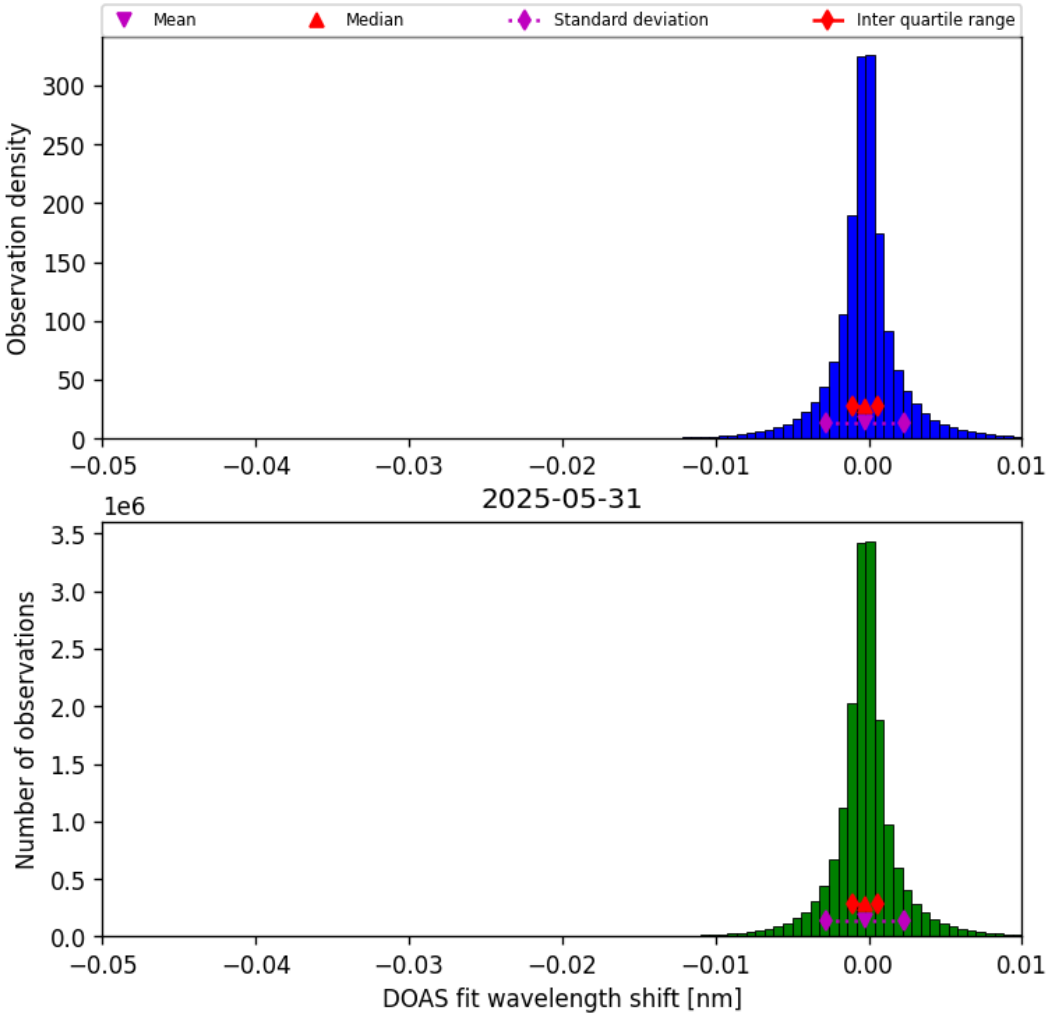


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-05-31 to 2025-06-01

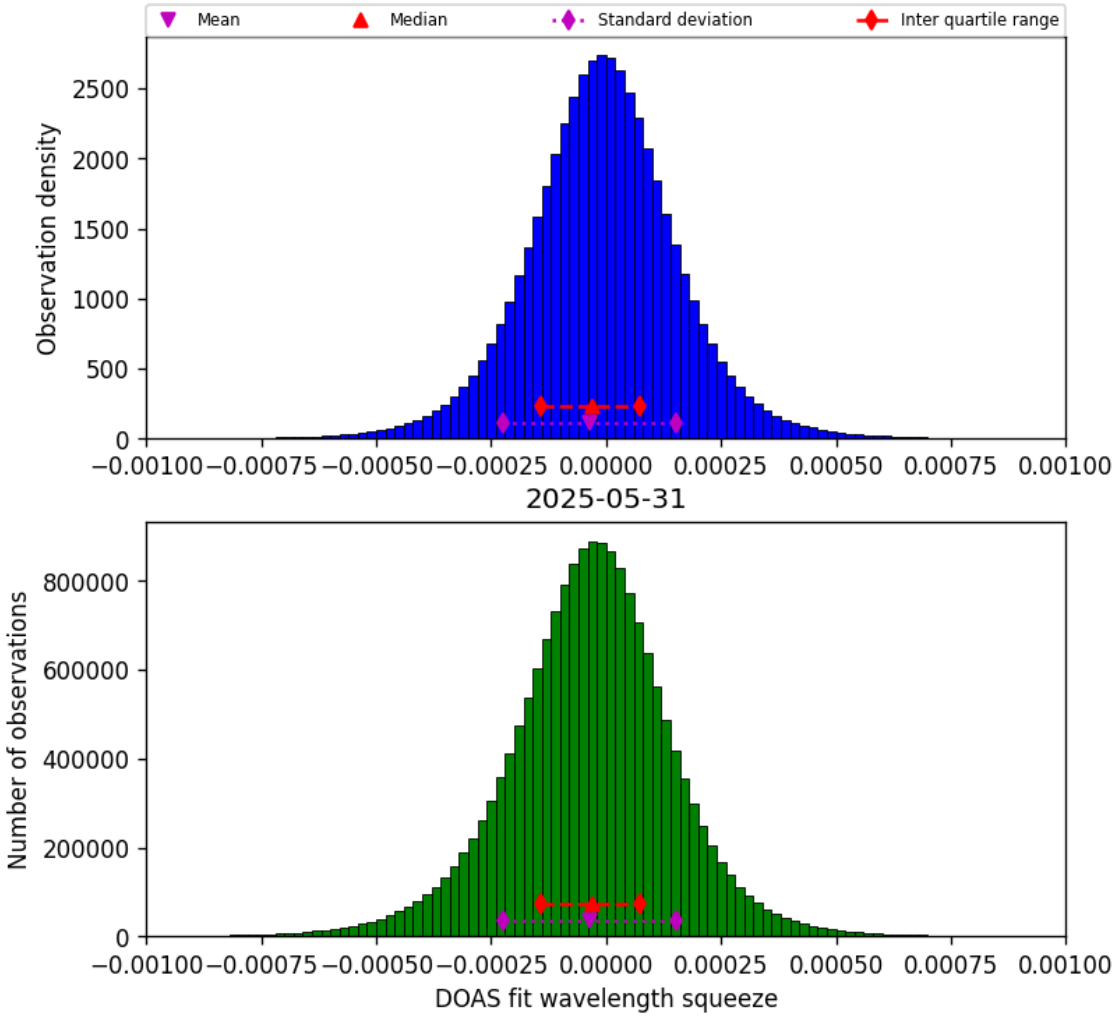


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-05-31 to 2025-06-01

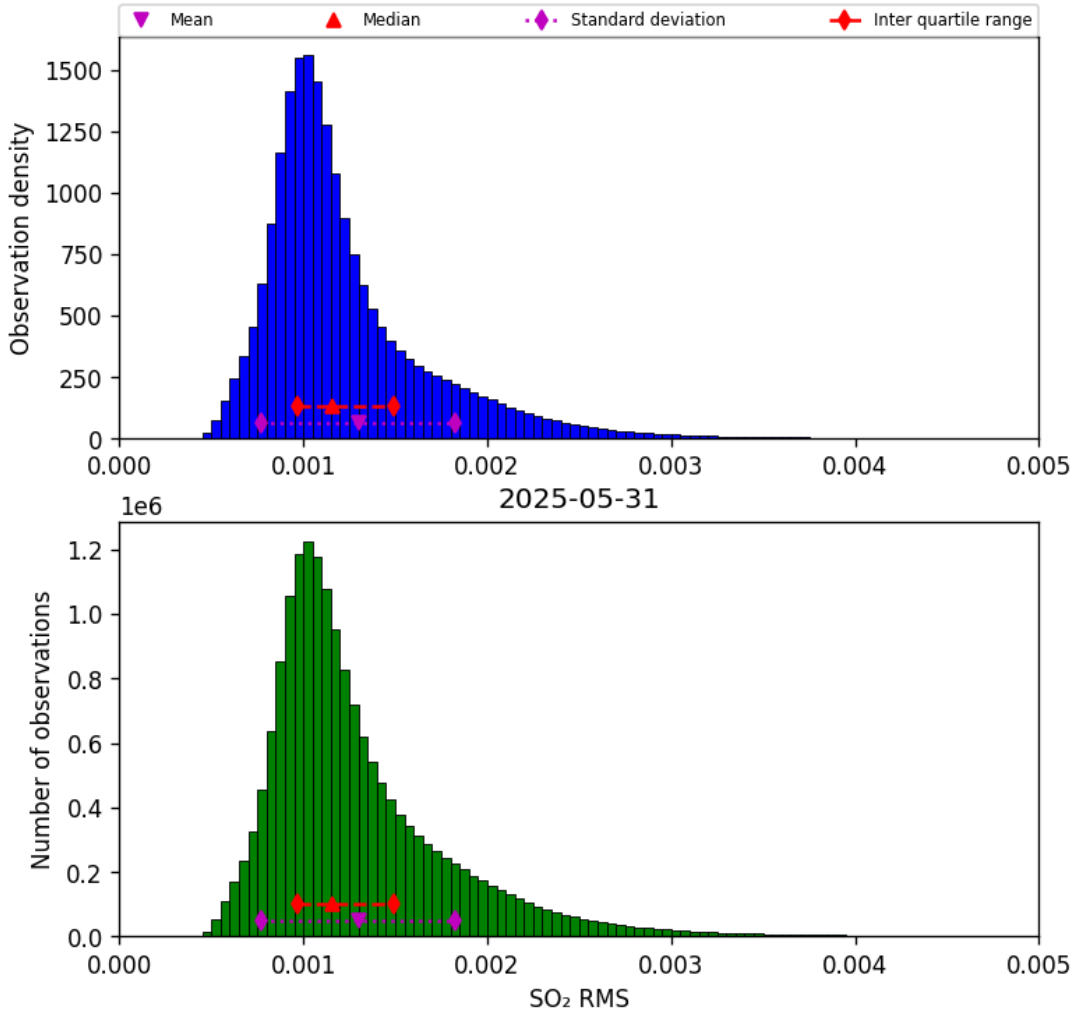


Figure 79: Histogram of "SO_2 RMS" for 2025-05-31 to 2025-06-01

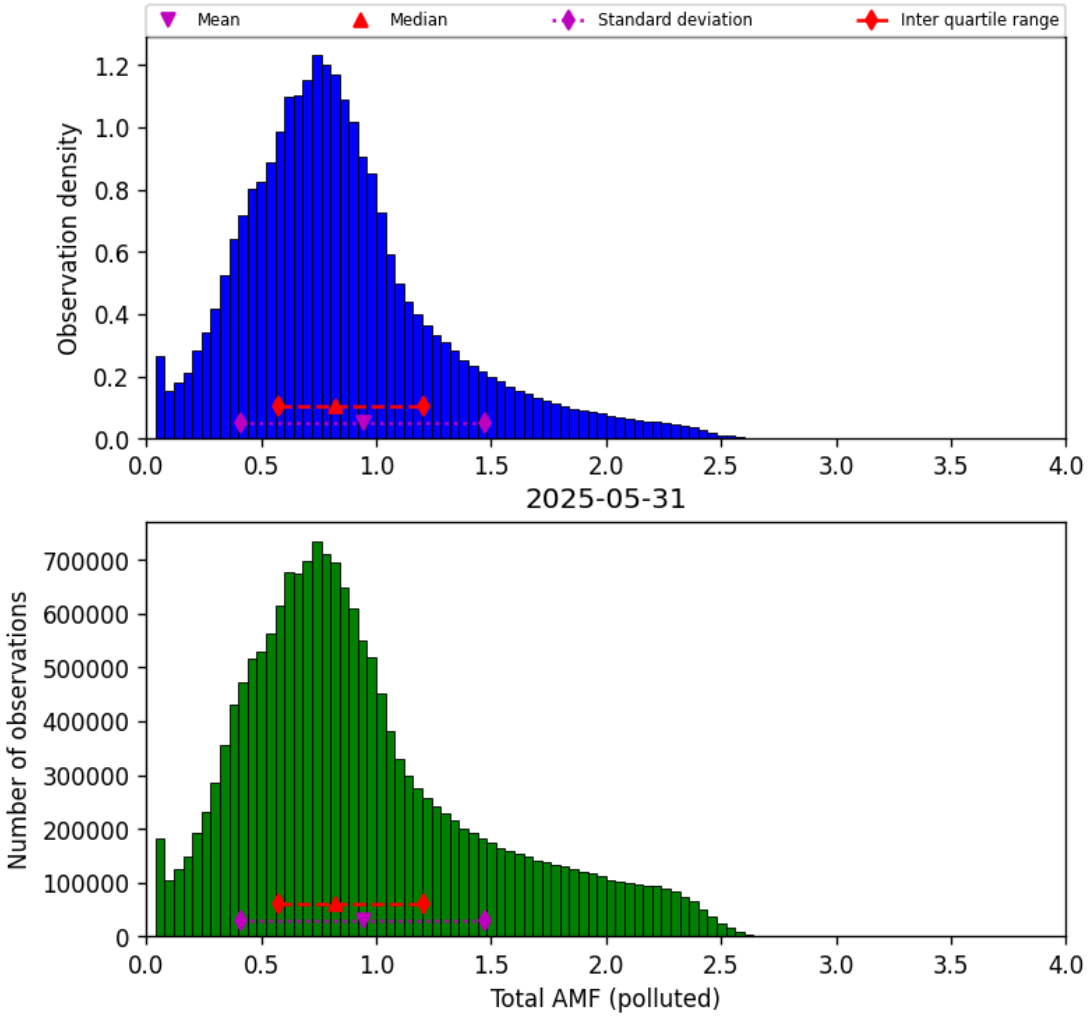


Figure 80: Histogram of “Total AMF (polluted)” for 2025-05-31 to 2025-06-01

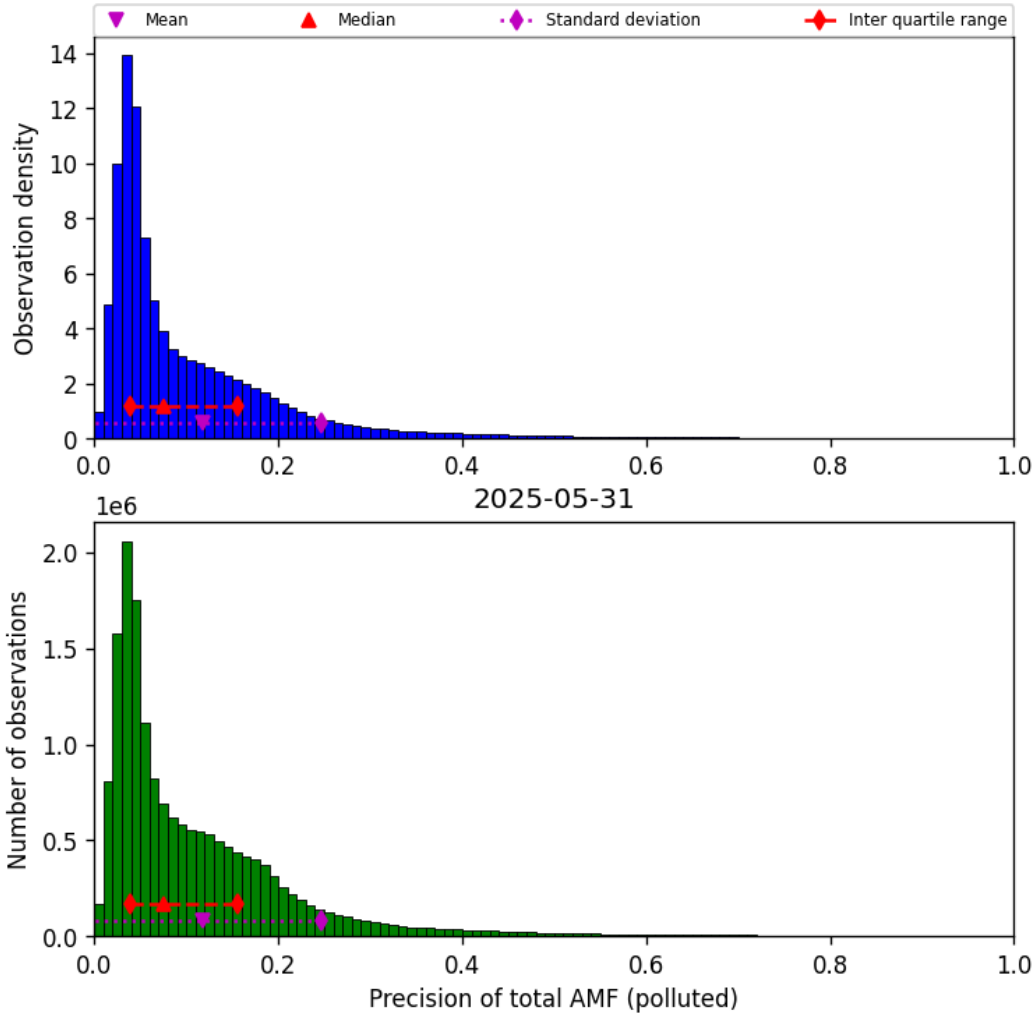


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-05-31 to 2025-06-01

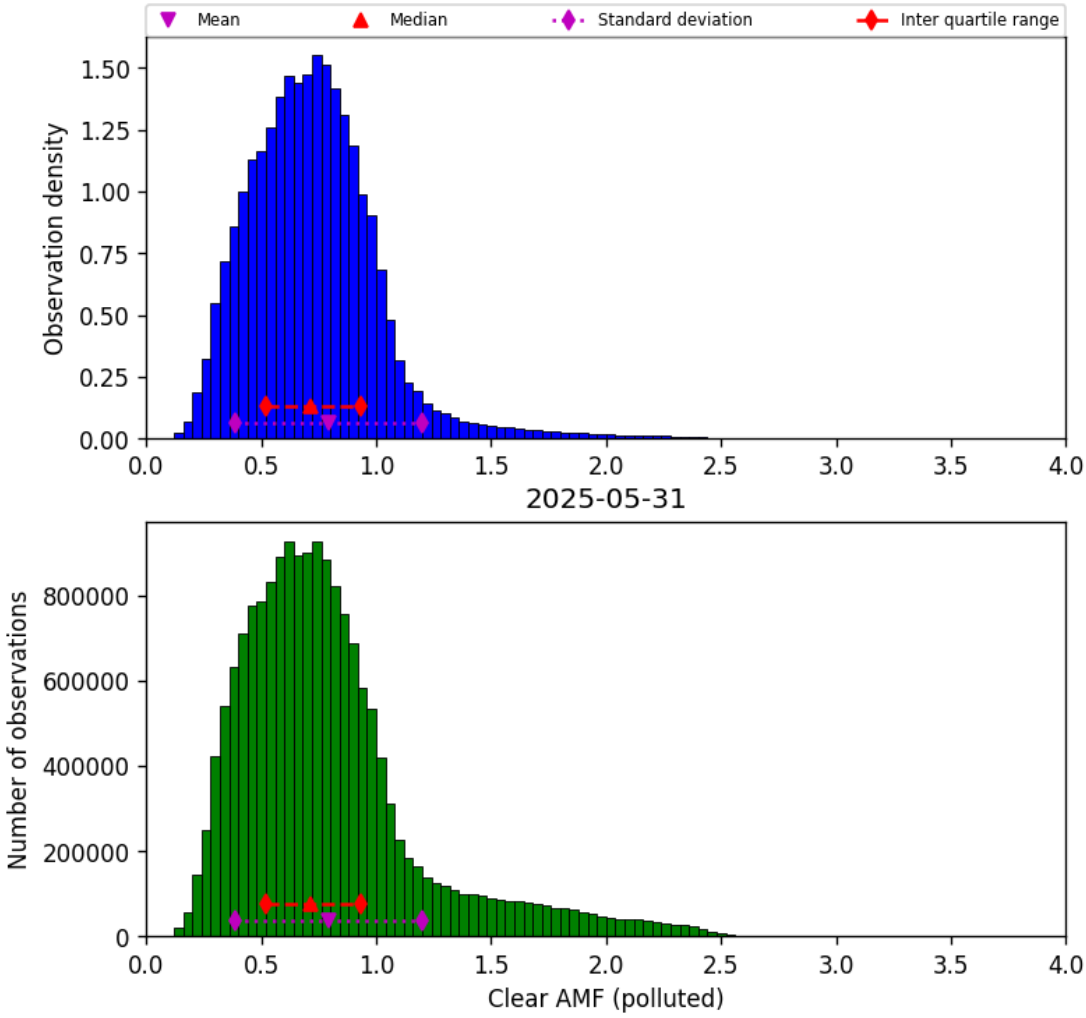


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-05-31 to 2025-06-01

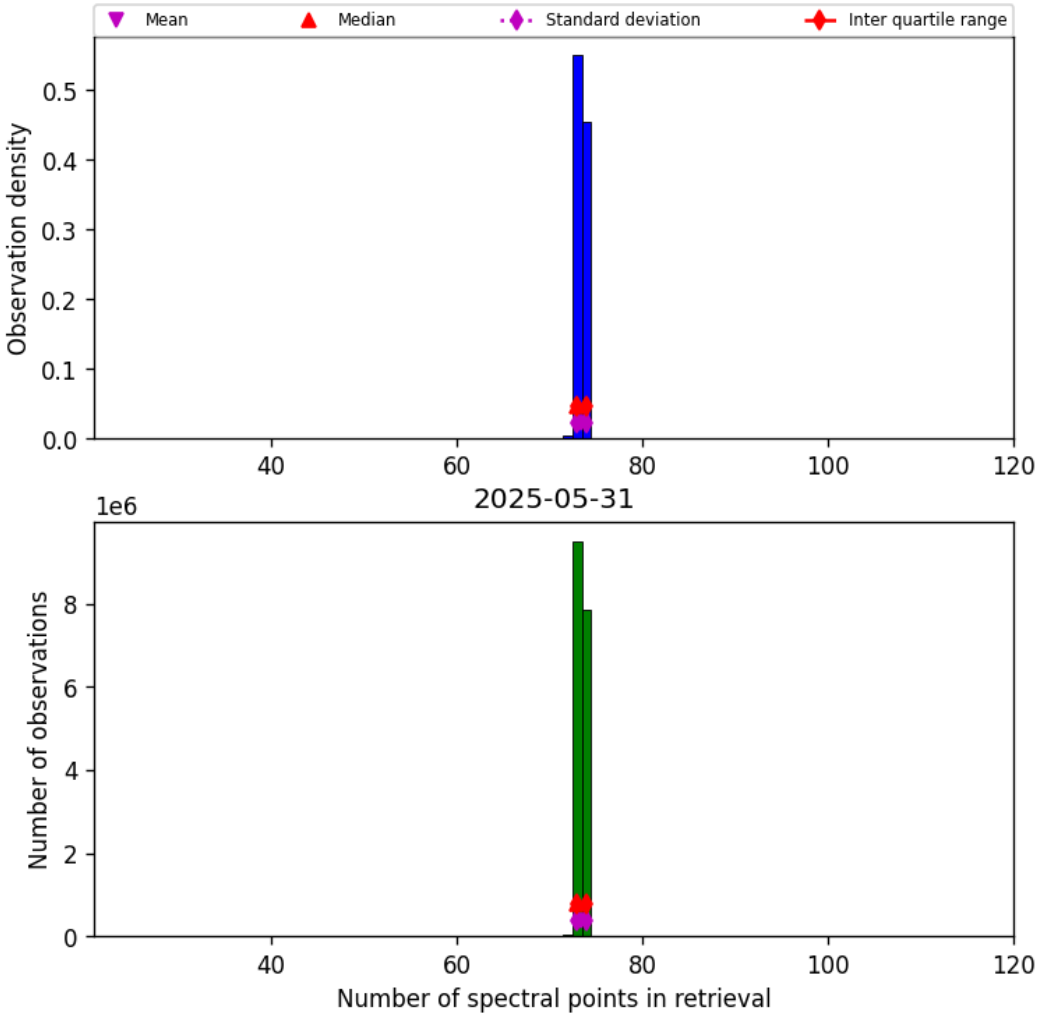


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-05-31 to 2025-06-01

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.

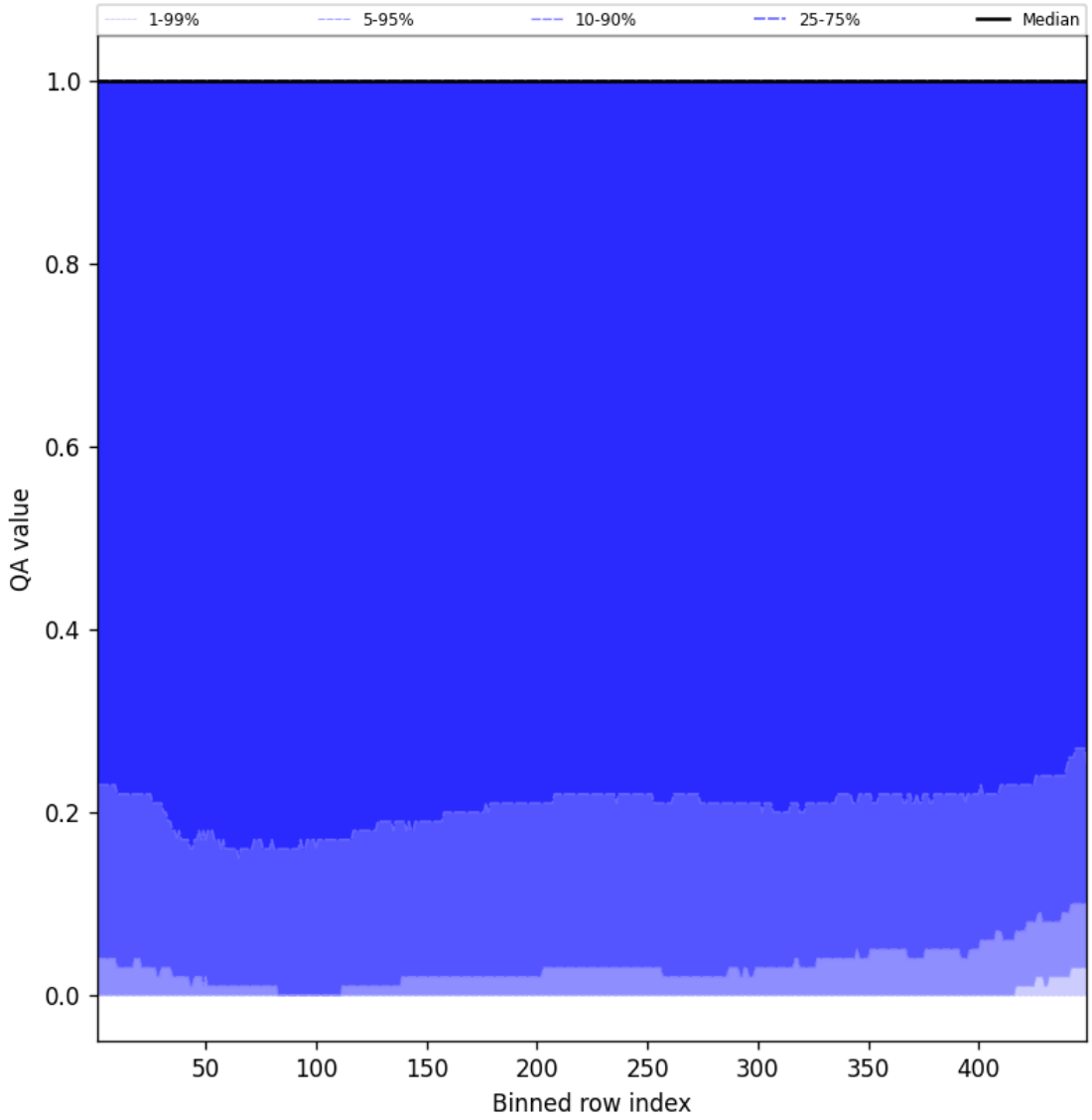


Figure 84: Along track statistics of “QA value” for 2025-05-31 to 2025-06-01

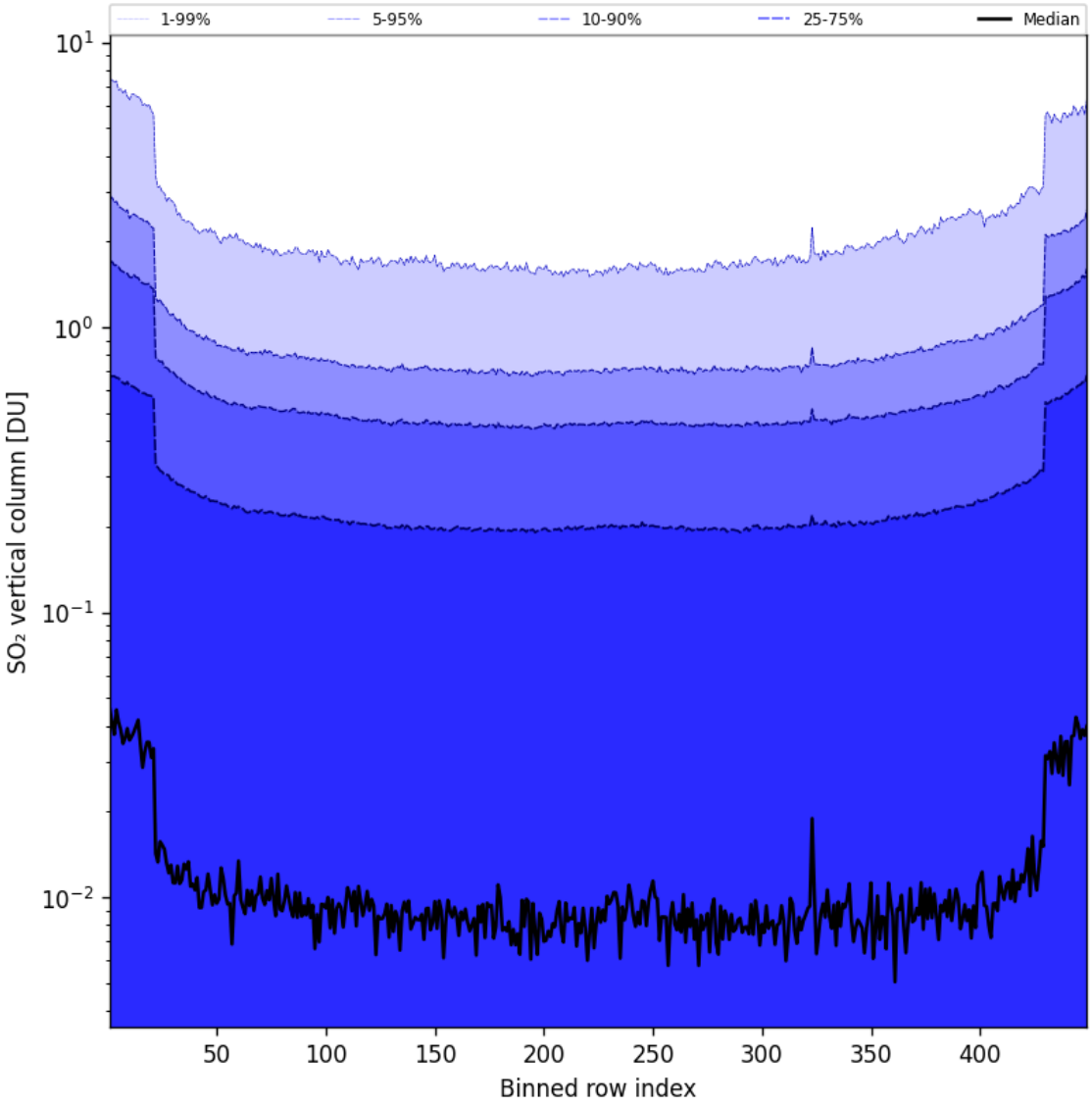


Figure 85: Along track statistics of "SO_2 vertical column" for 2025-05-31 to 2025-06-01

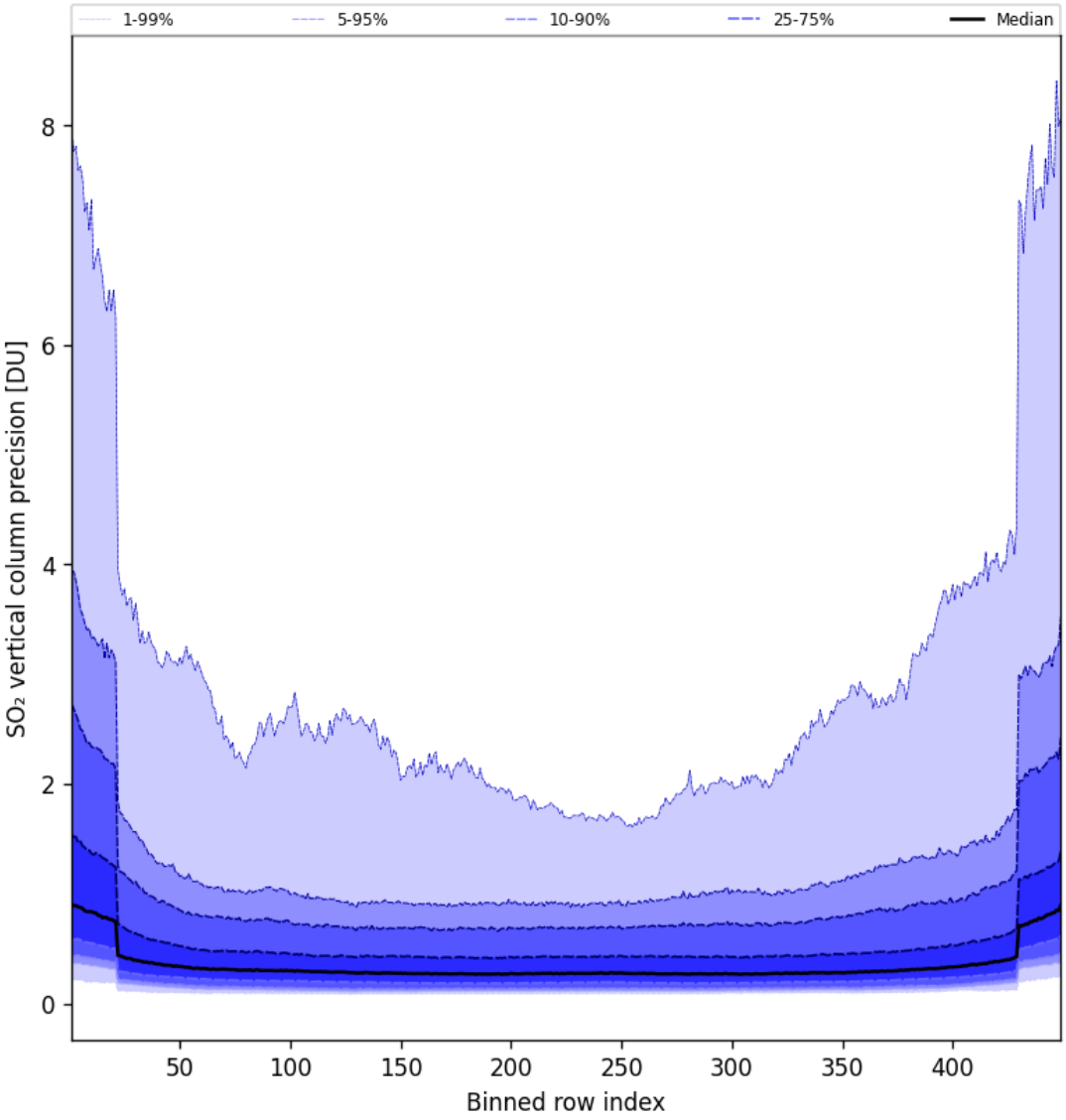


Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-05-31 to 2025-06-01

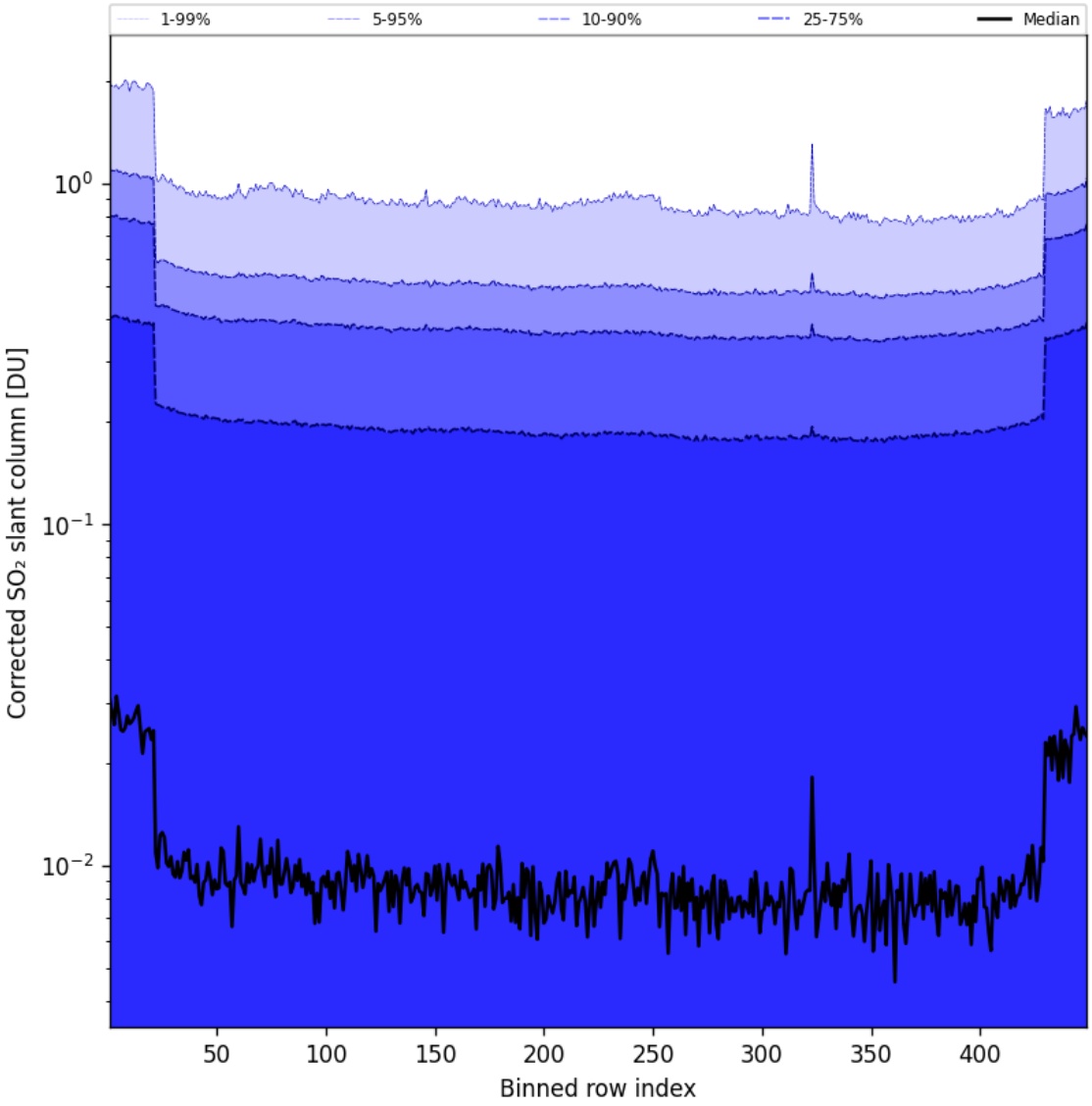


Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-05-31 to 2025-06-01

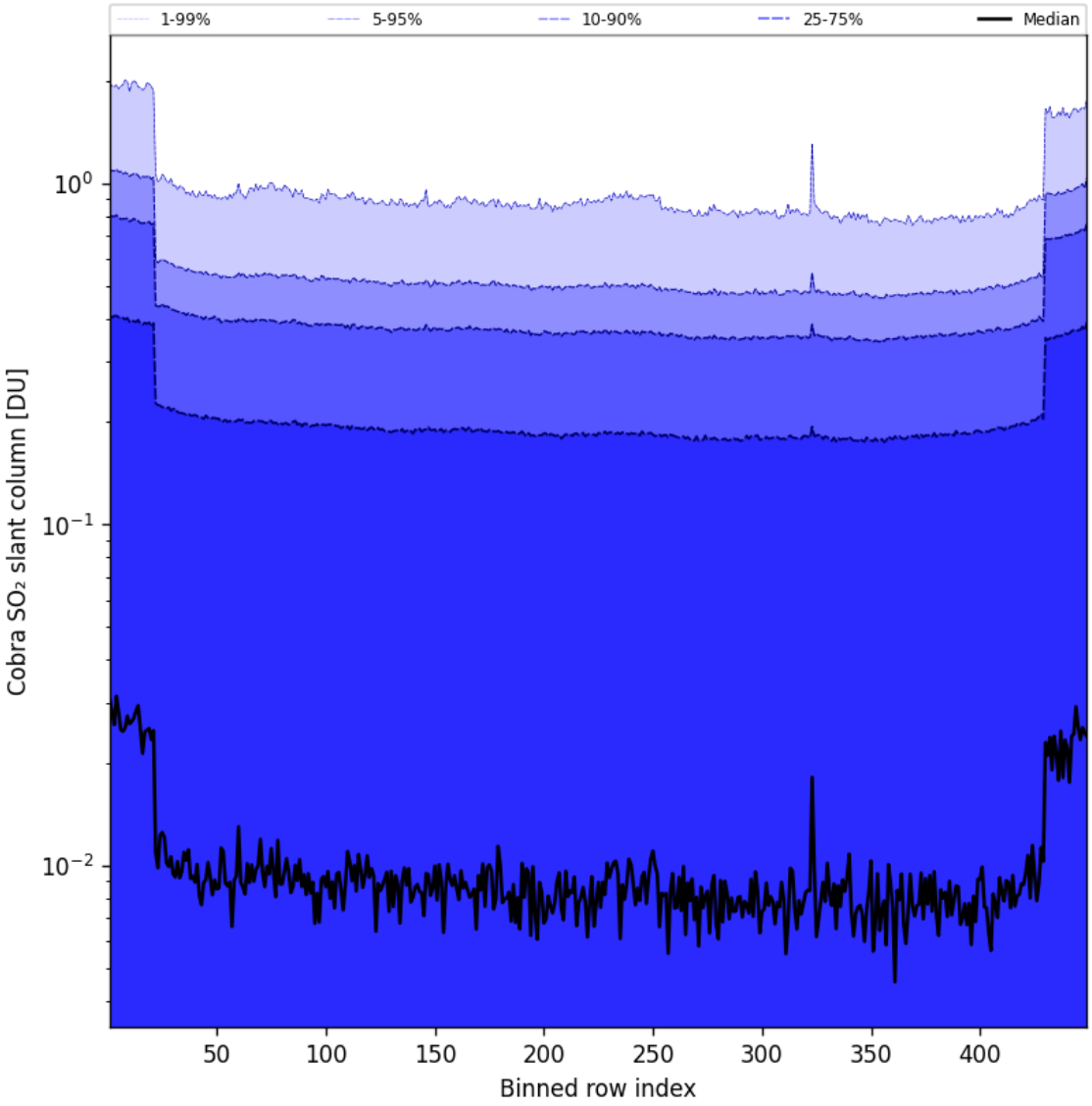


Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-05-31 to 2025-06-01

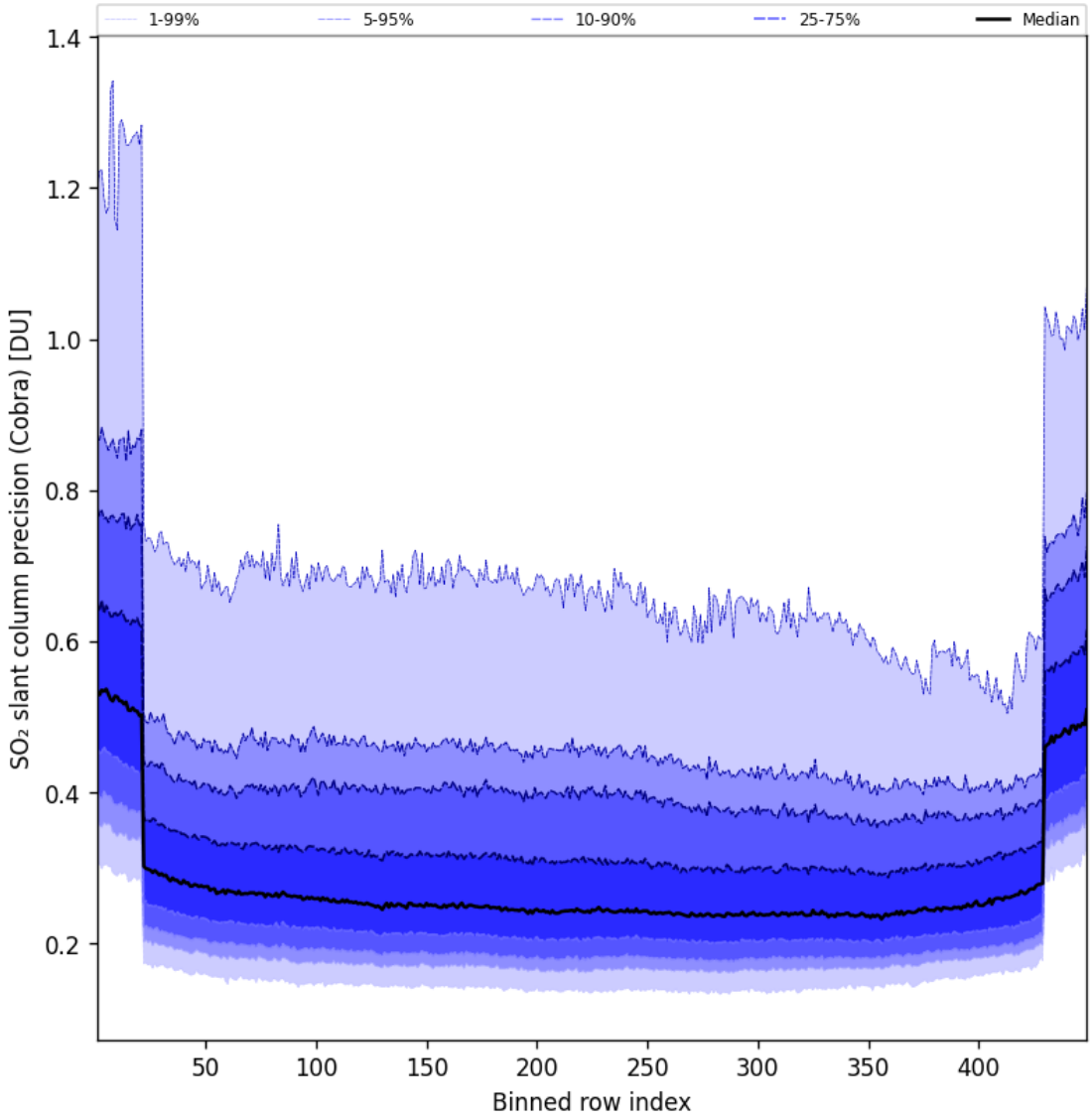


Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-05-31 to 2025-06-01

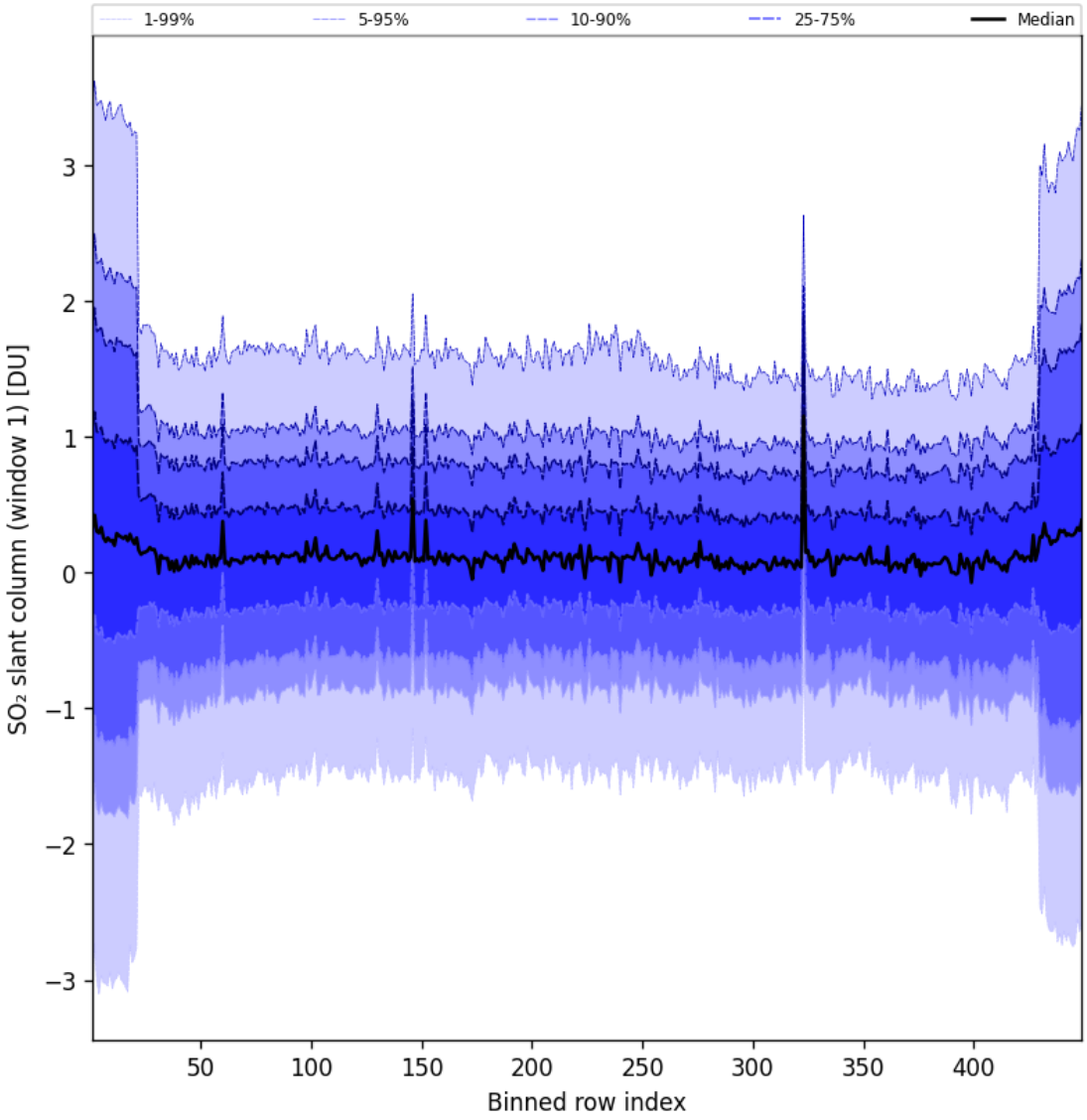


Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-05-31 to 2025-06-01

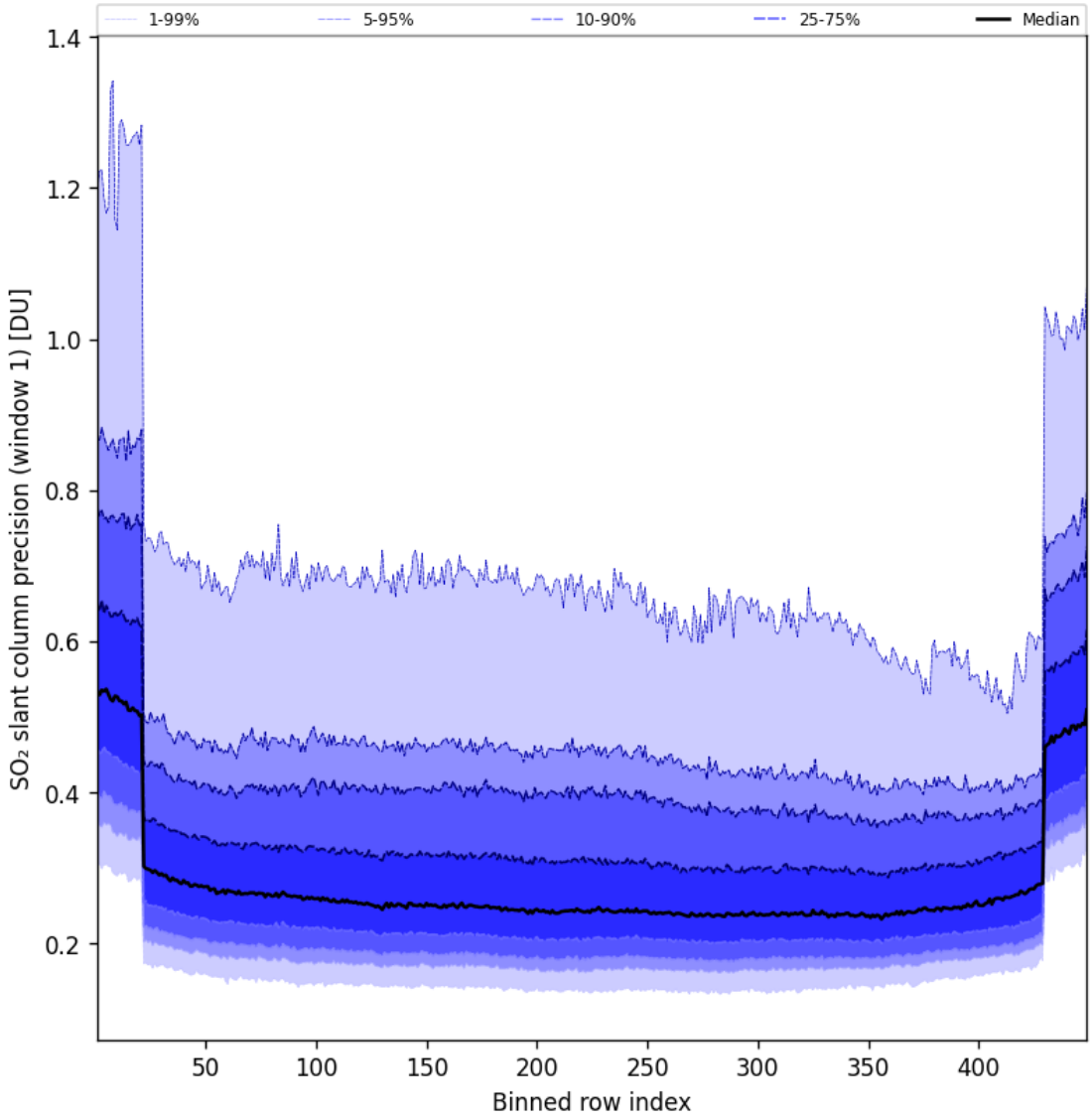


Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-05-31 to 2025-06-01

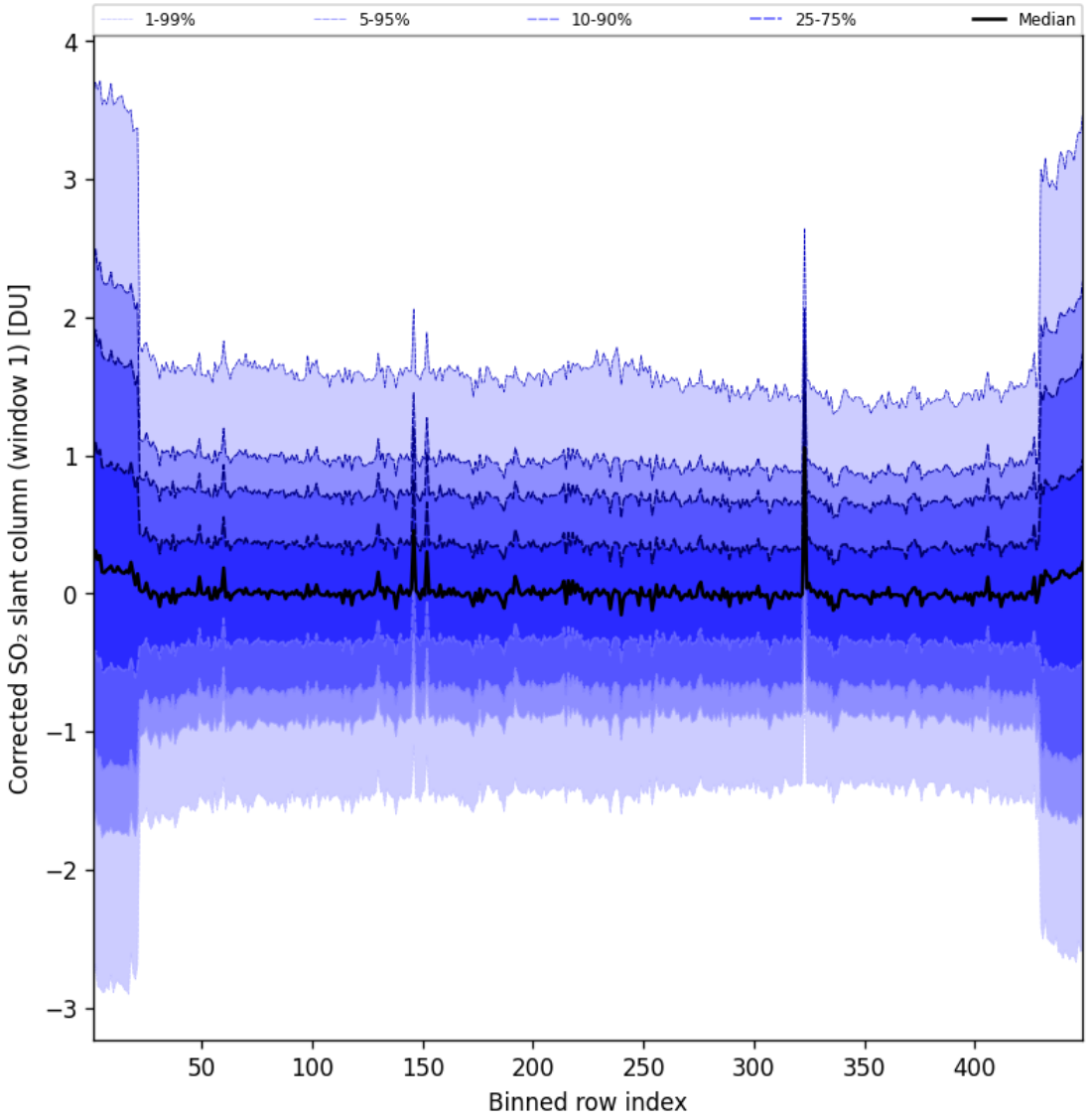


Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-05-31 to 2025-06-01

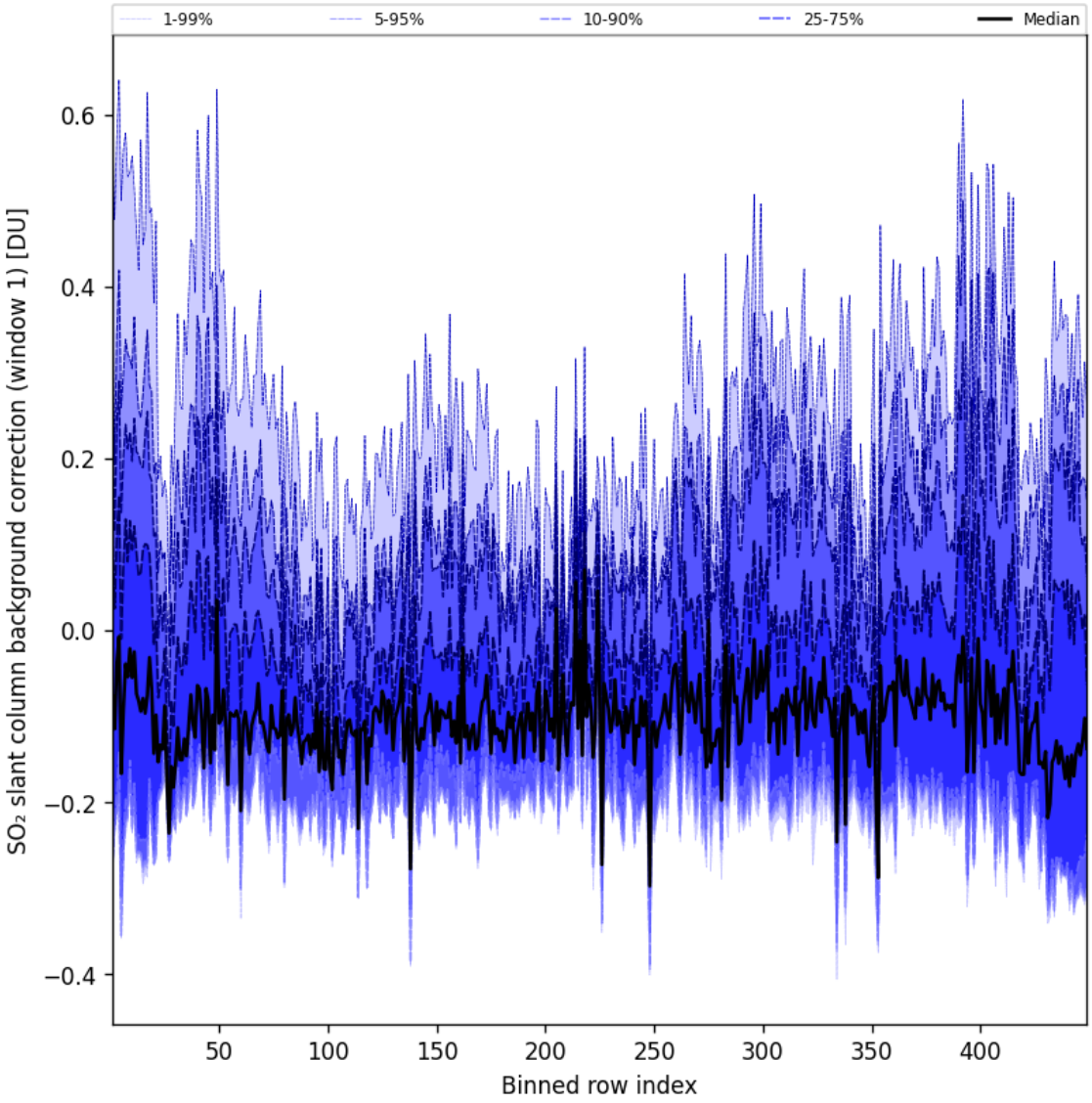


Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-05-31 to 2025-06-01

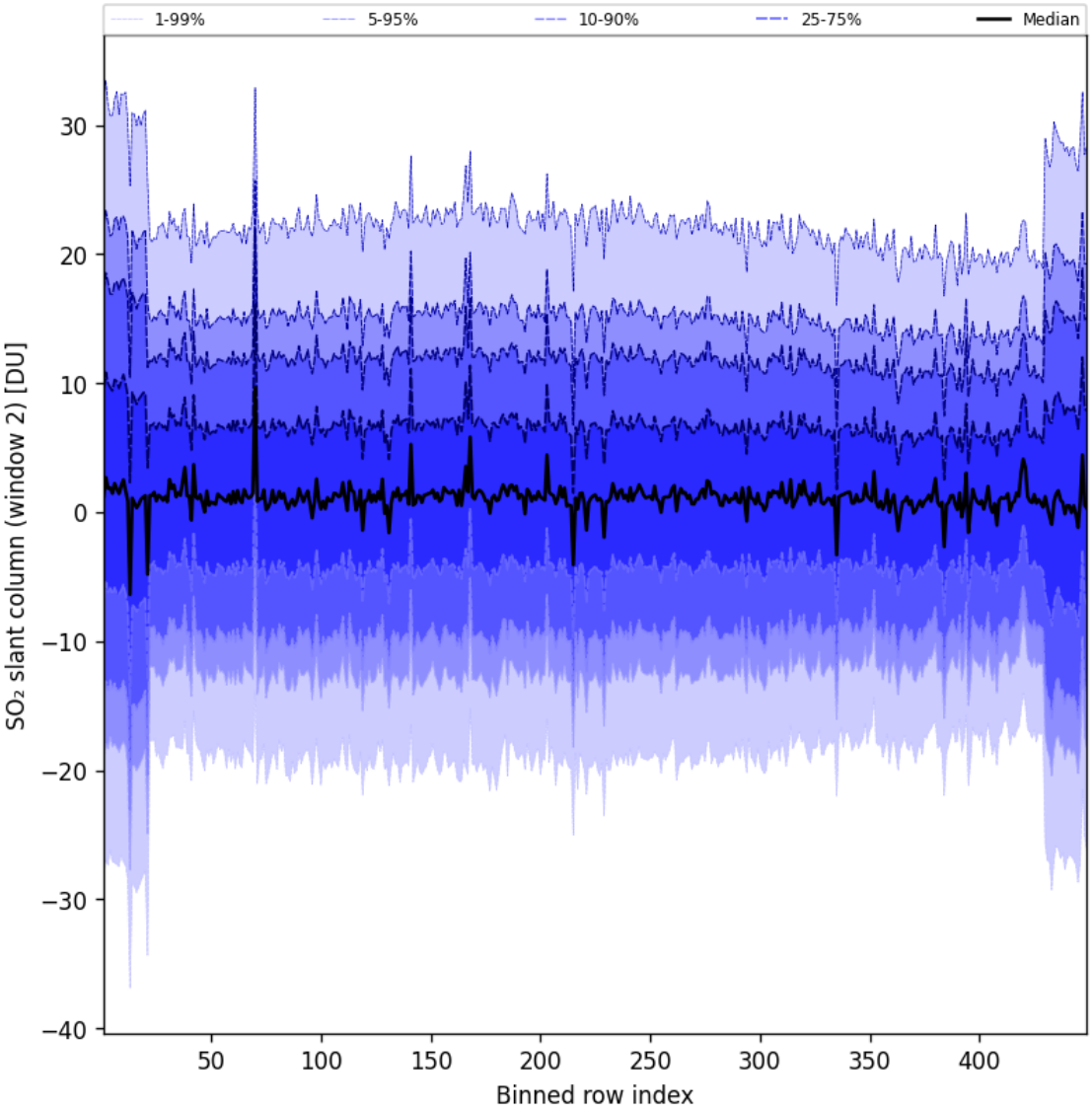


Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-05-31 to 2025-06-01

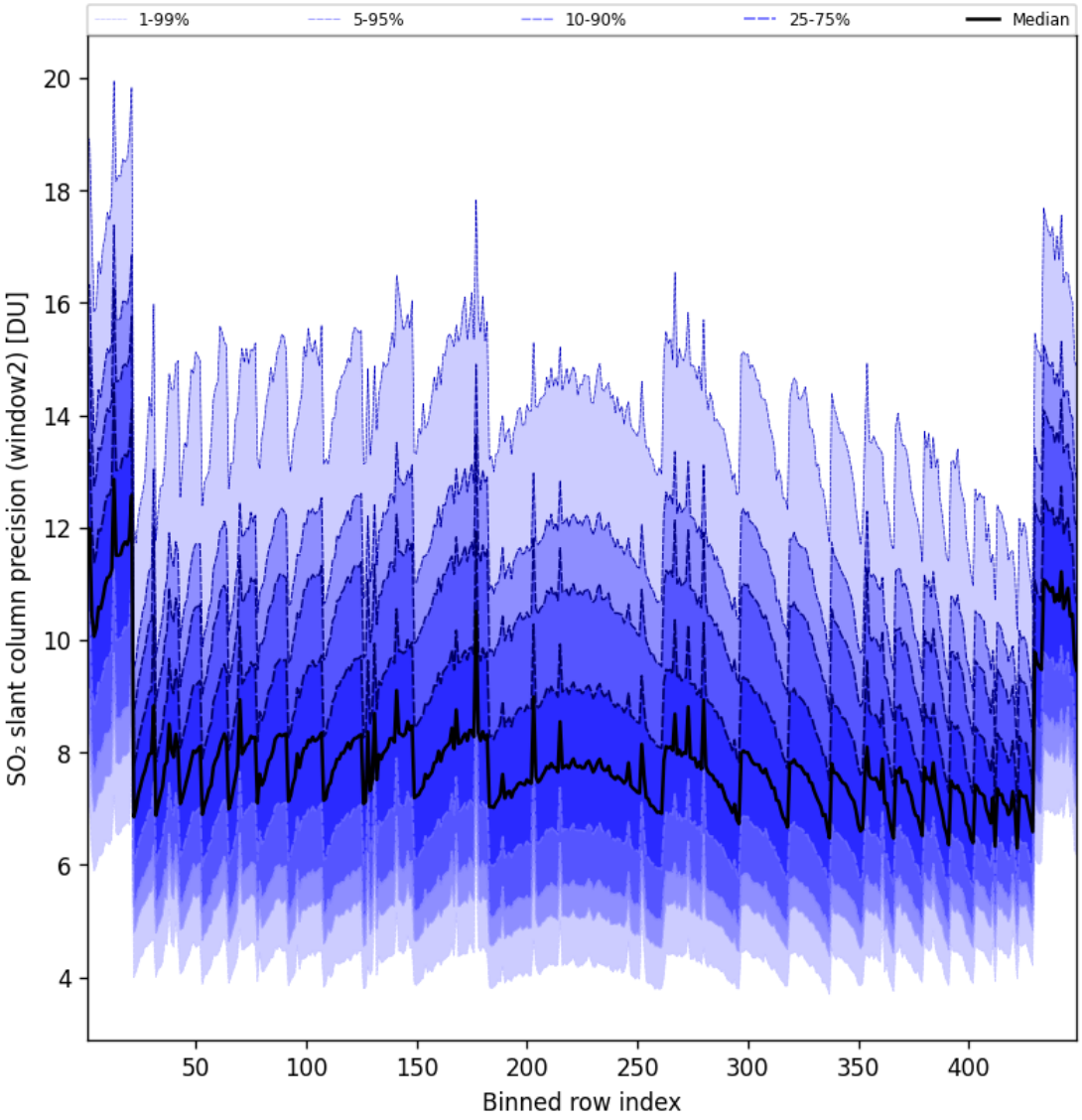


Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-05-31 to 2025-06-01

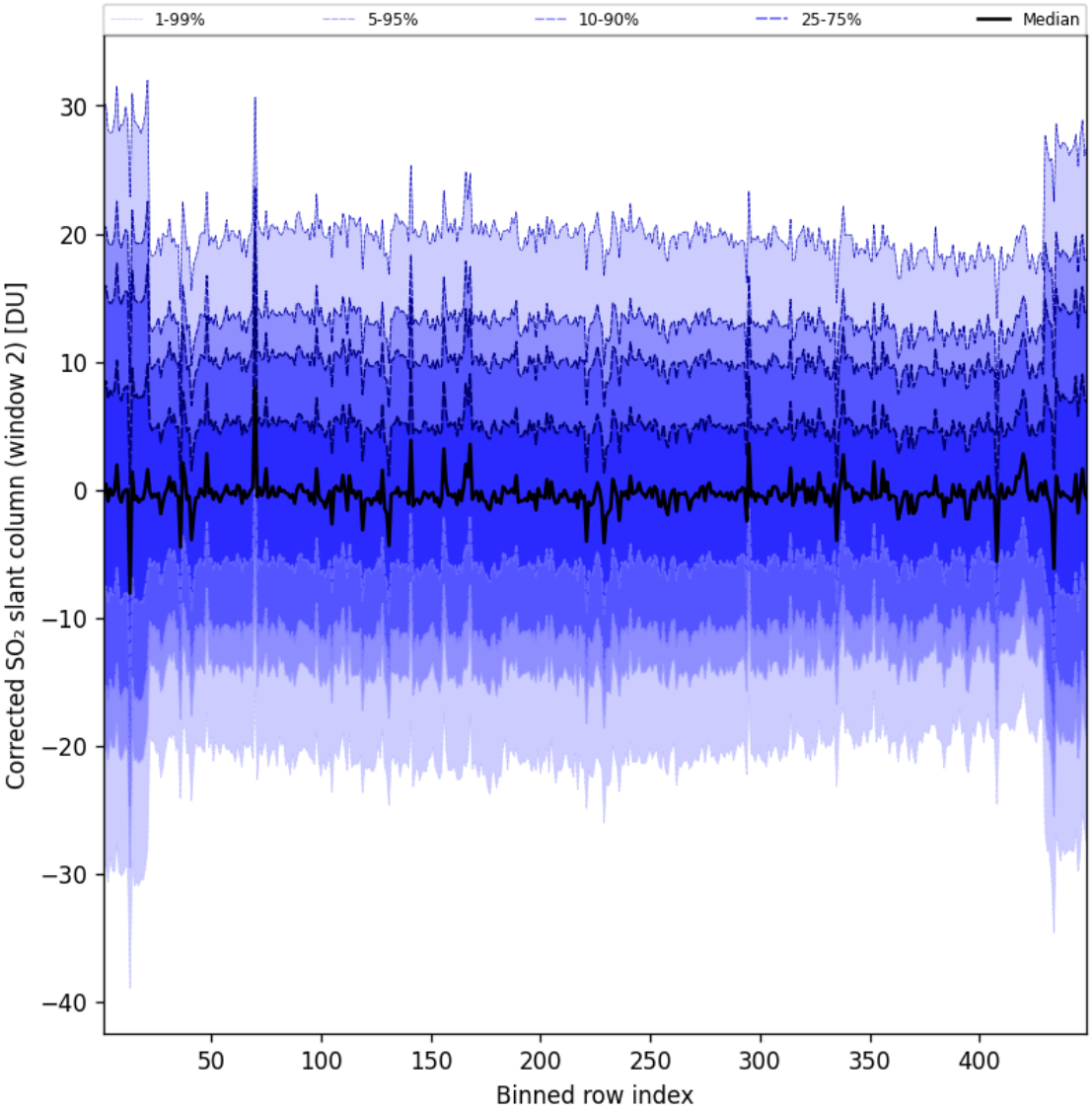


Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-05-31 to 2025-06-01

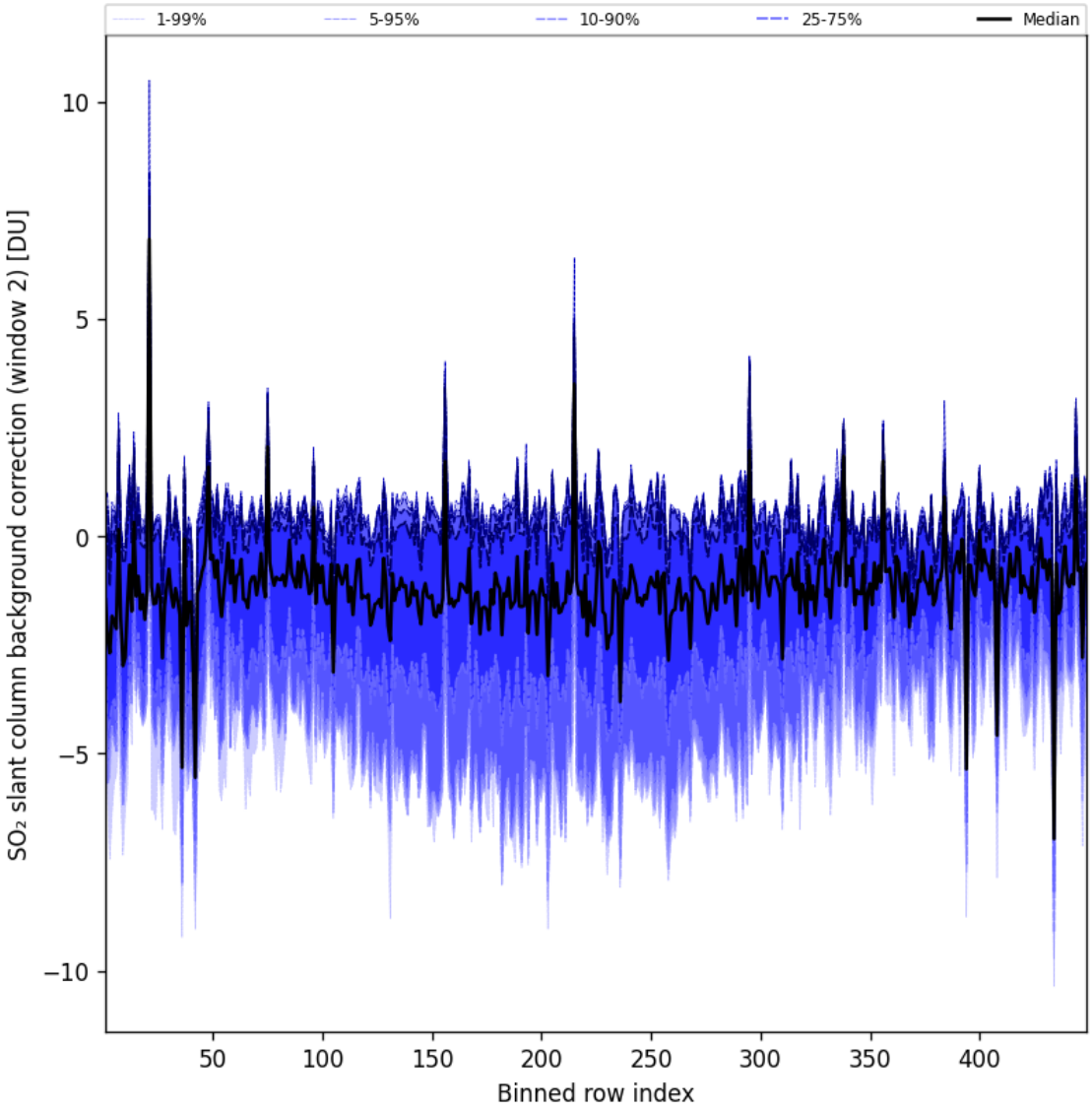


Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-05-31 to 2025-06-01

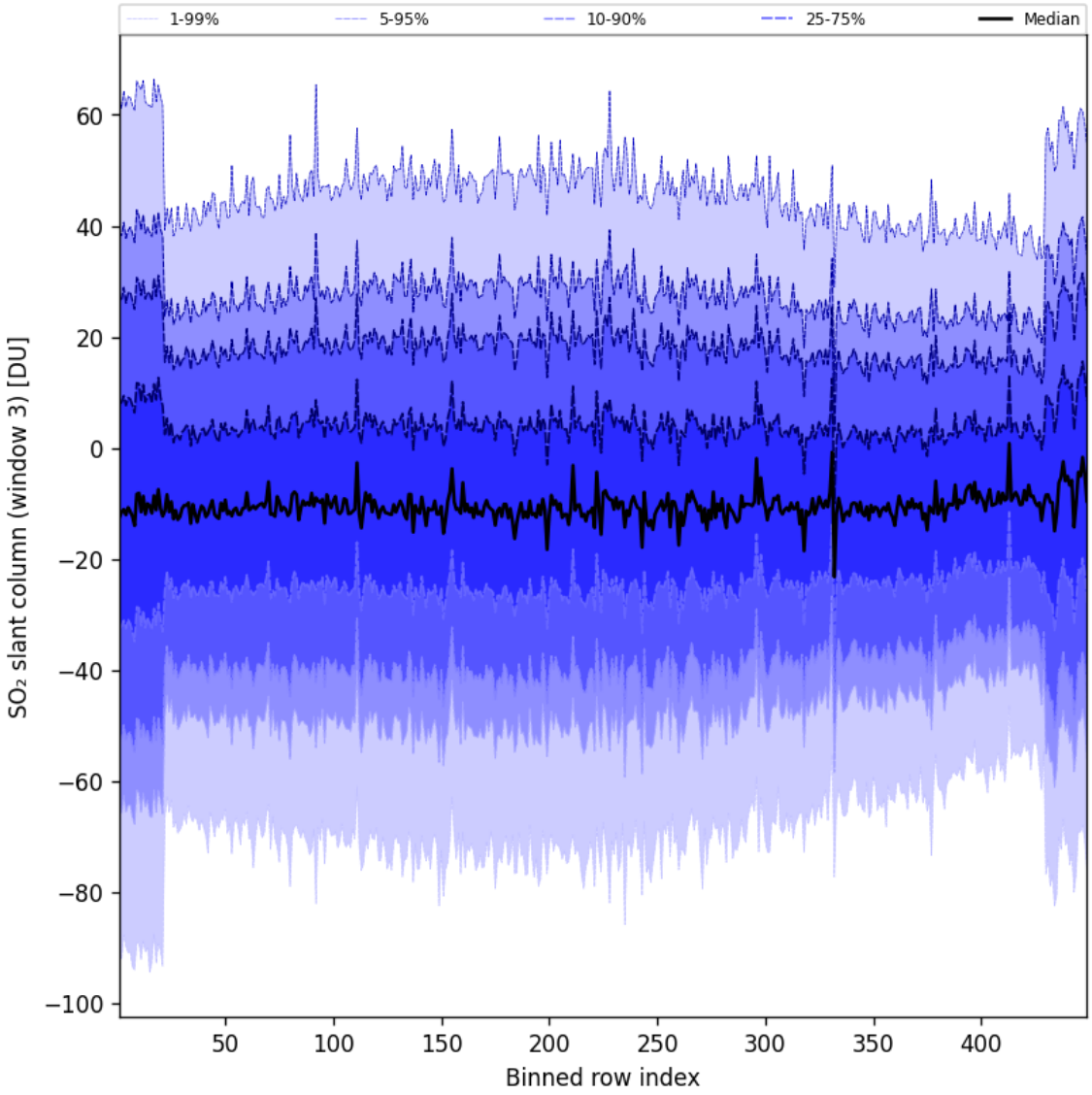


Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-05-31 to 2025-06-01

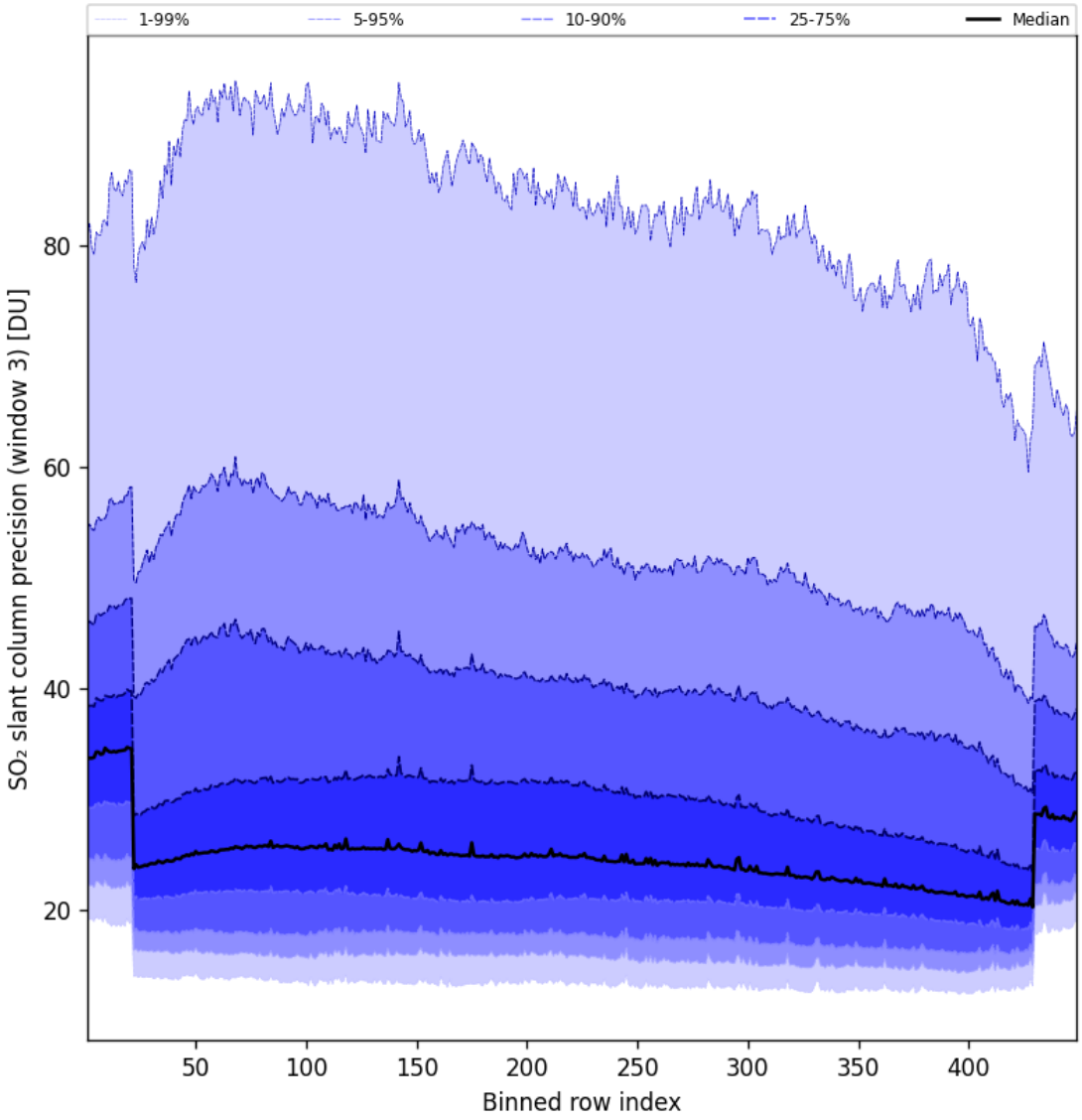


Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-05-31 to 2025-06-01

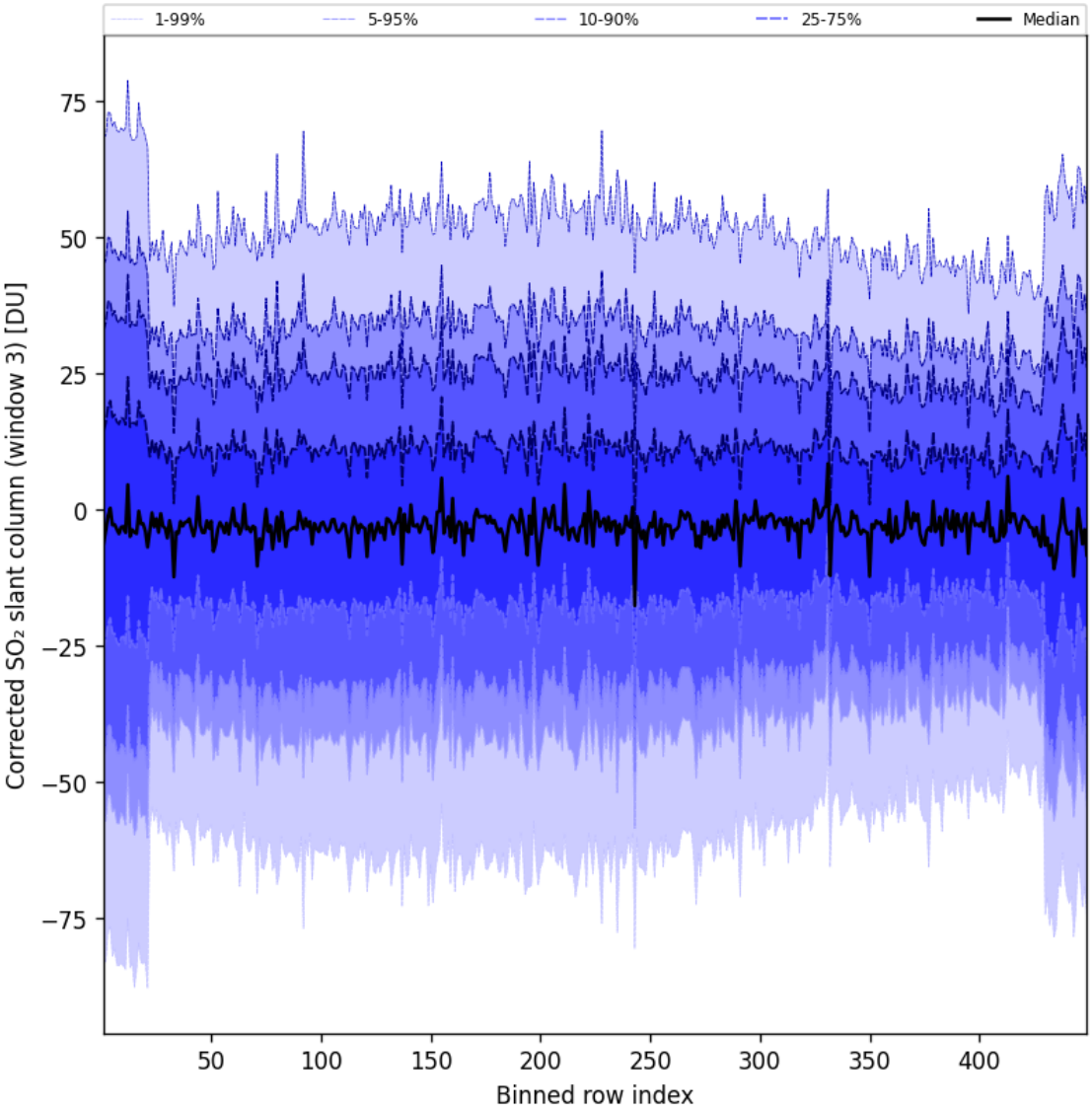


Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-05-31 to 2025-06-01

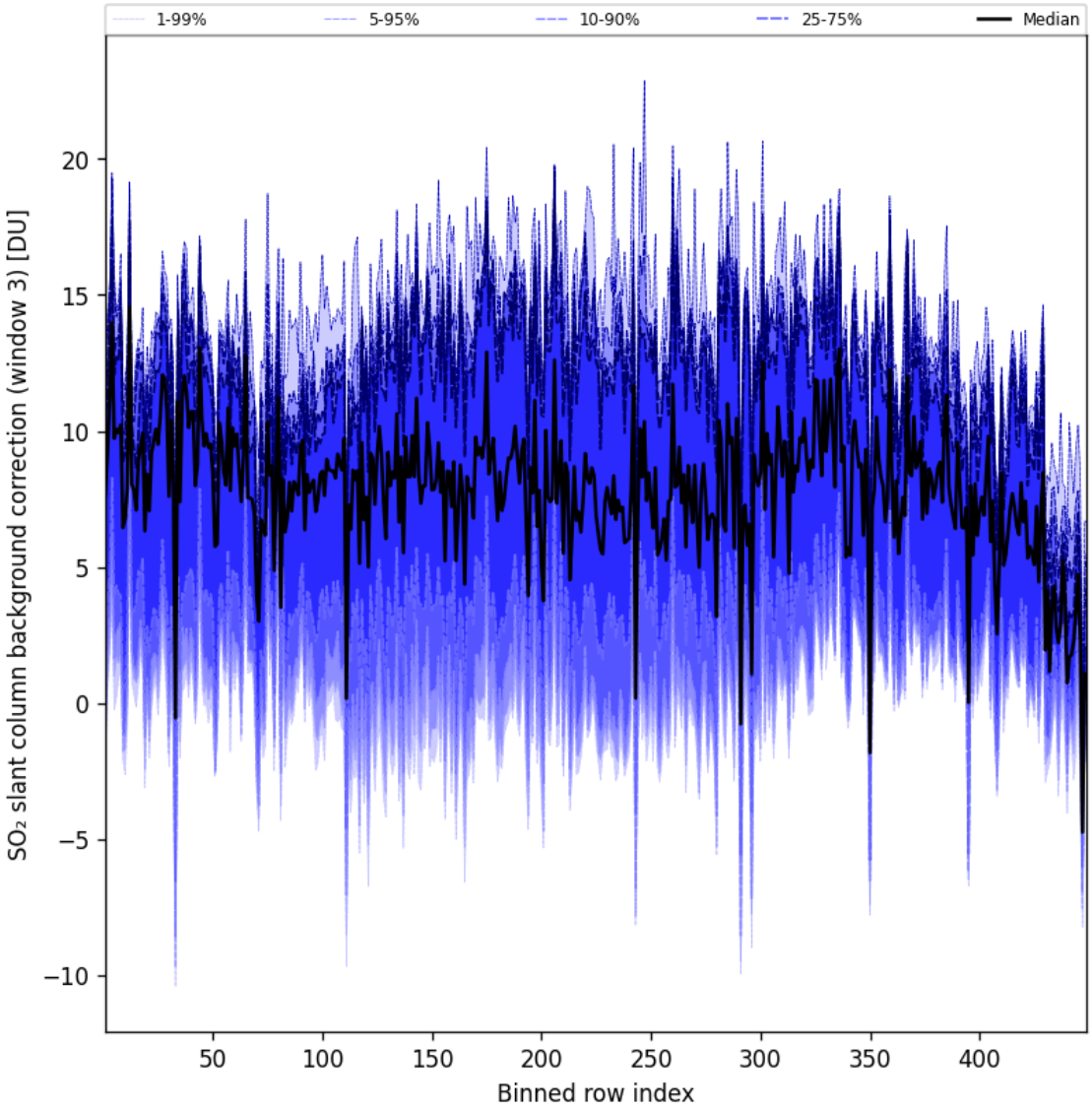


Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-05-31 to 2025-06-01

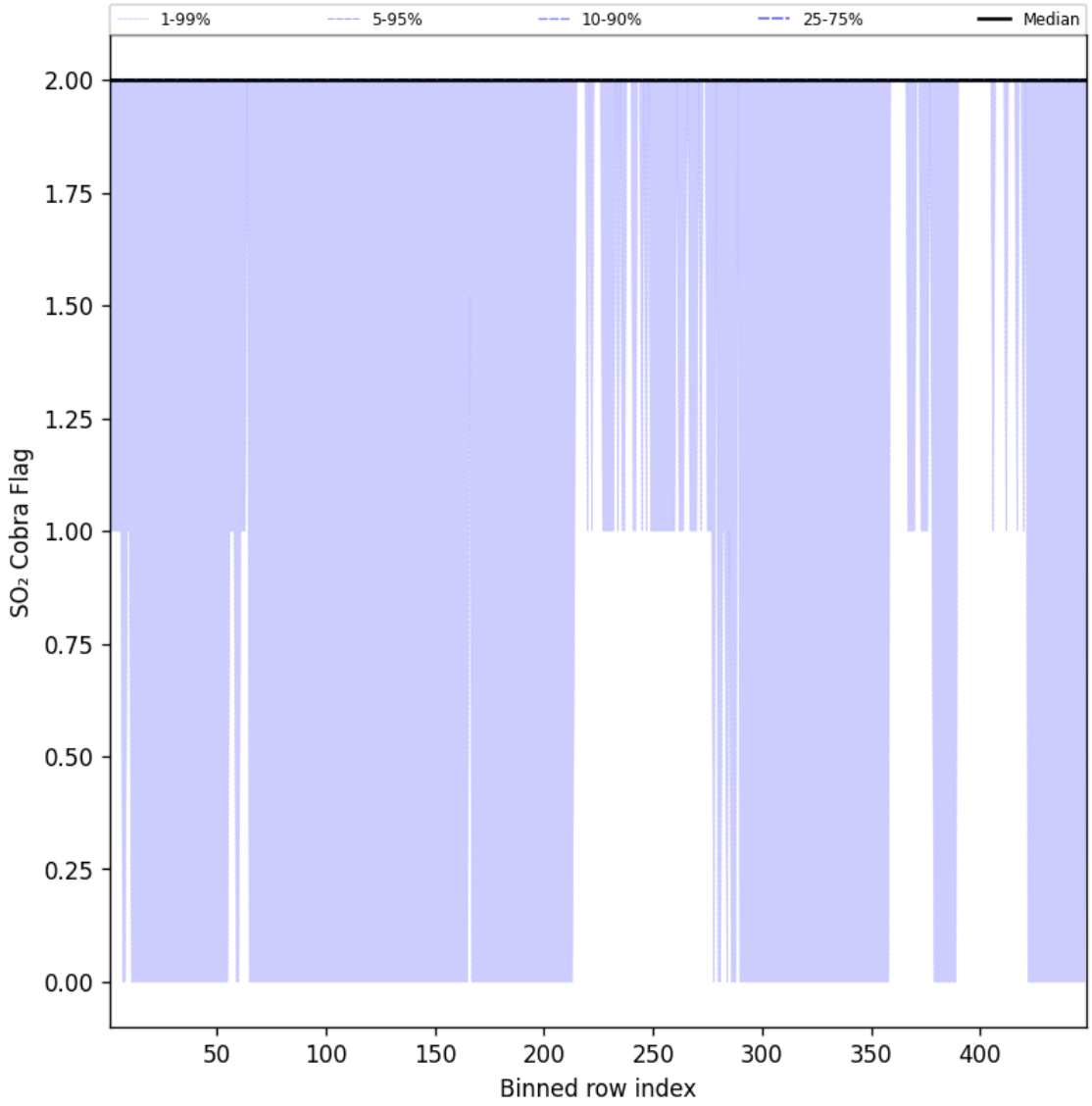


Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-05-31 to 2025-06-01

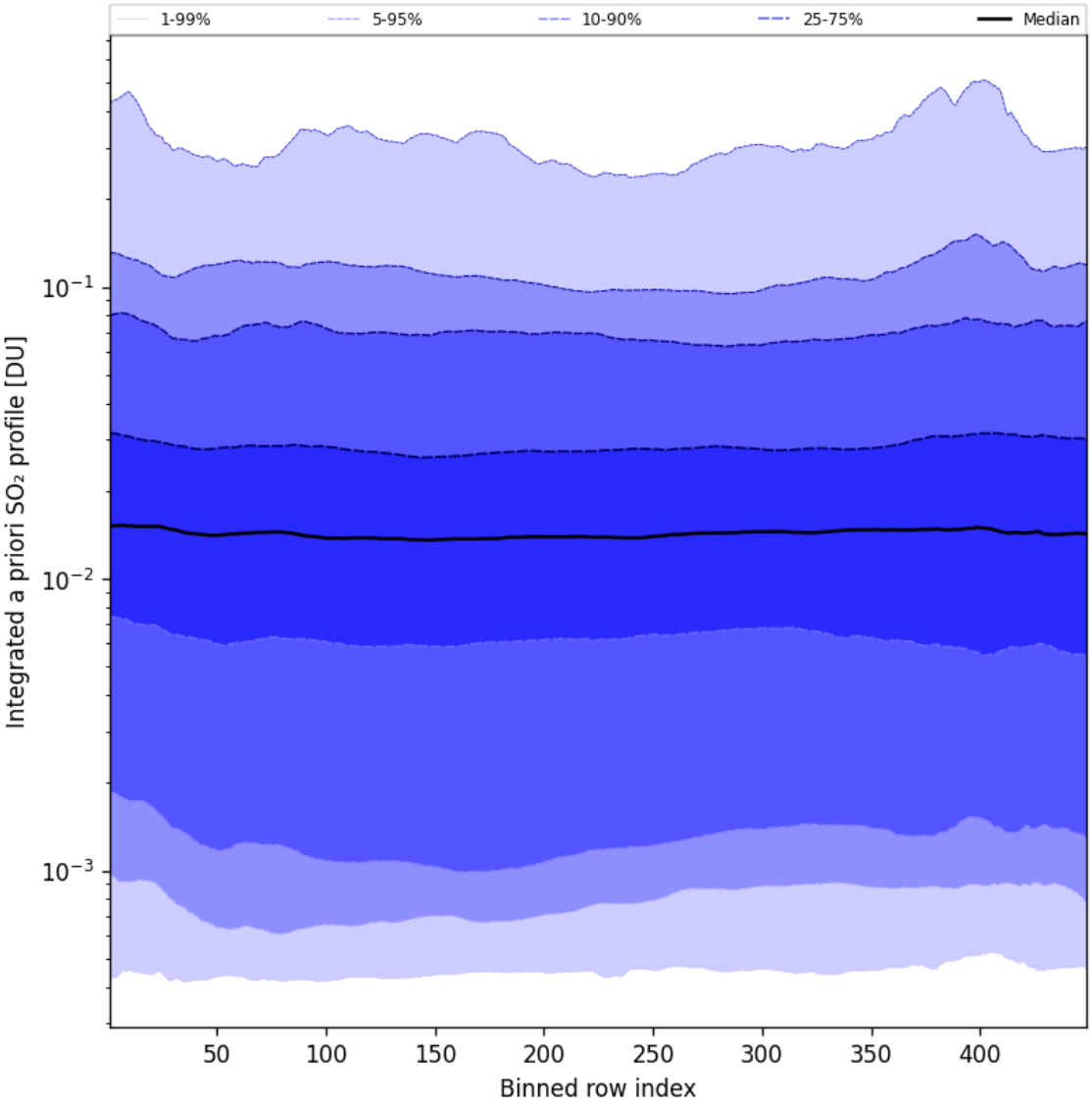
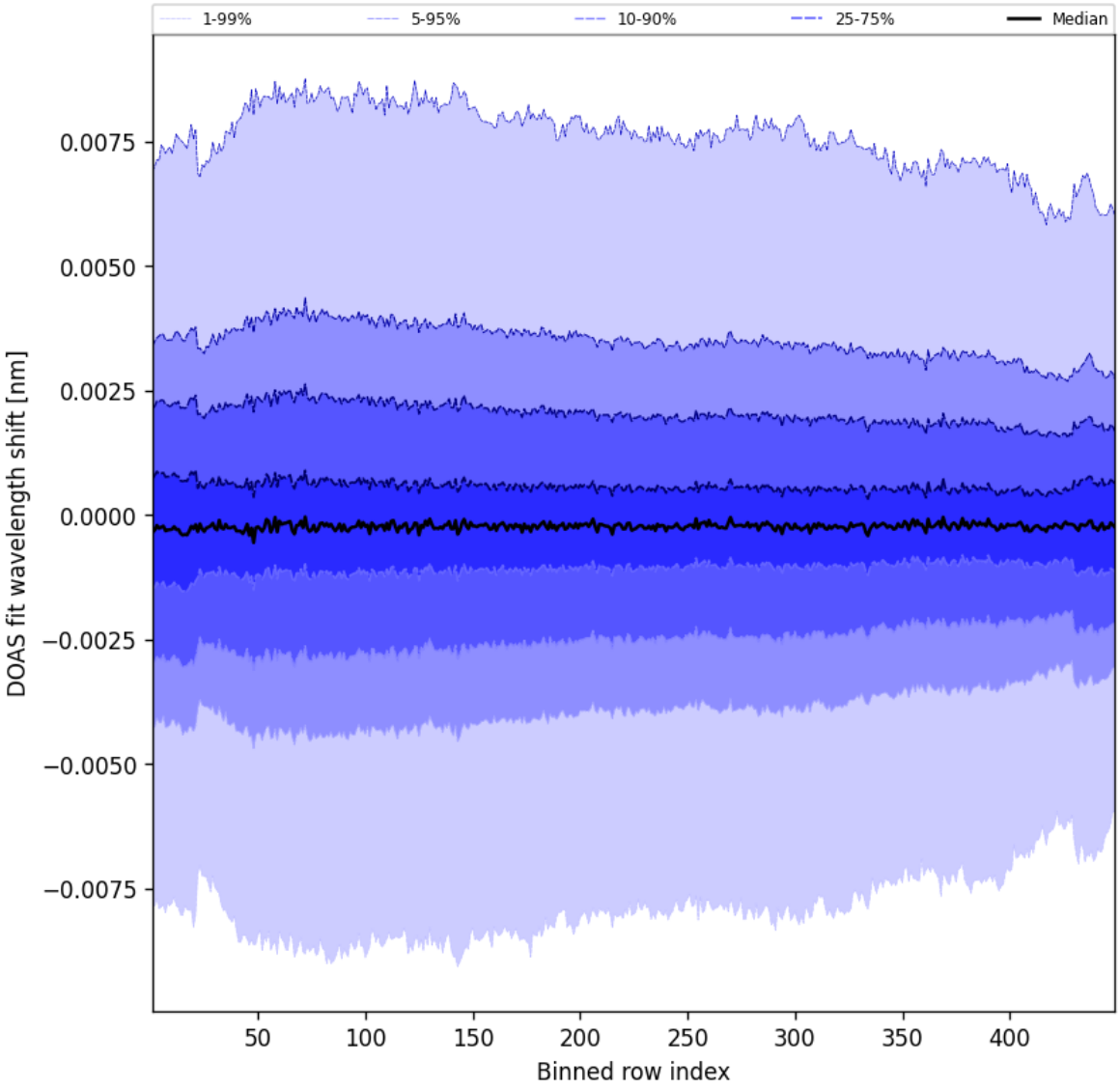


Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-05-31 to 2025-06-01



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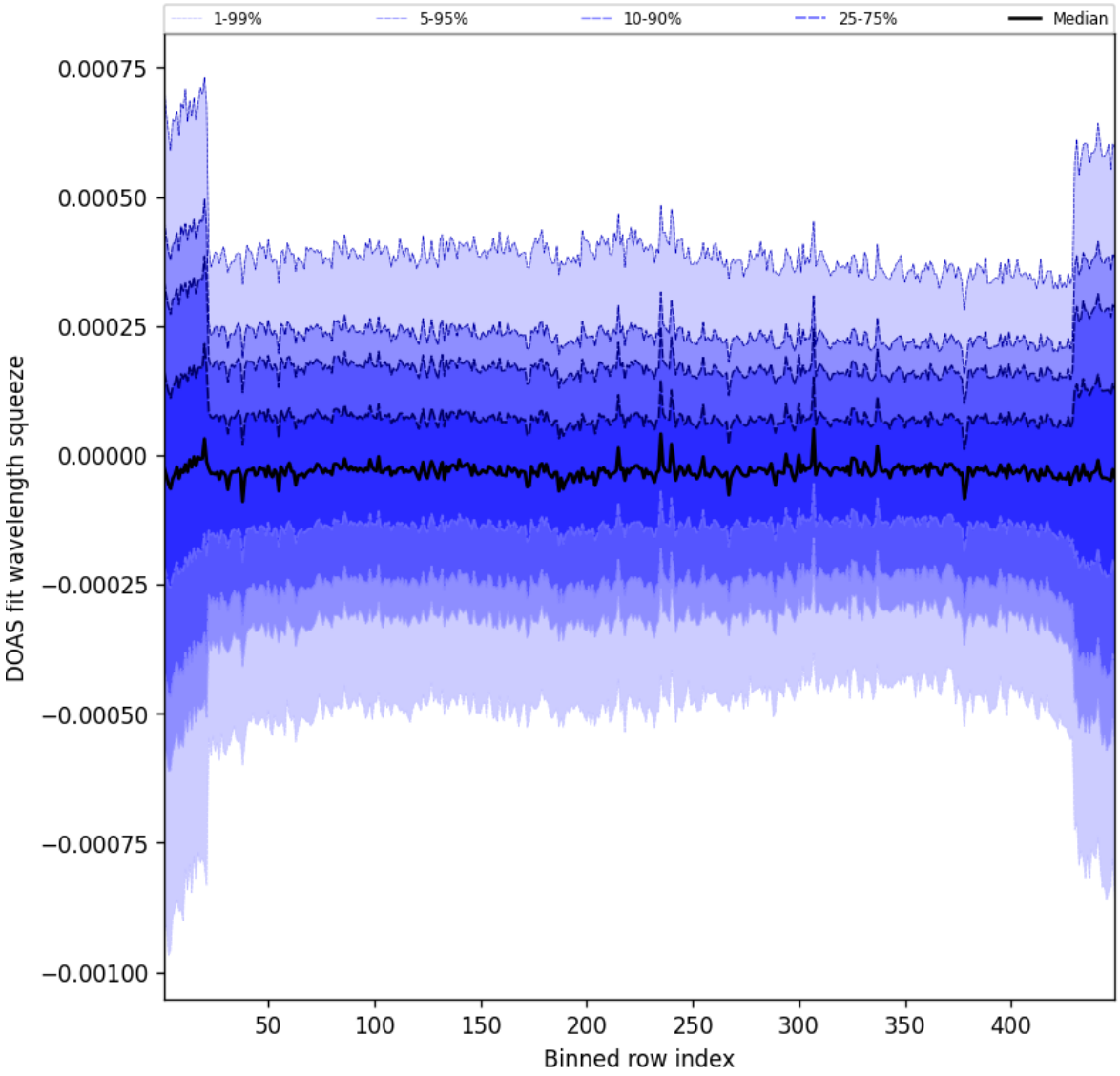

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-05-31 to 2025-06-01

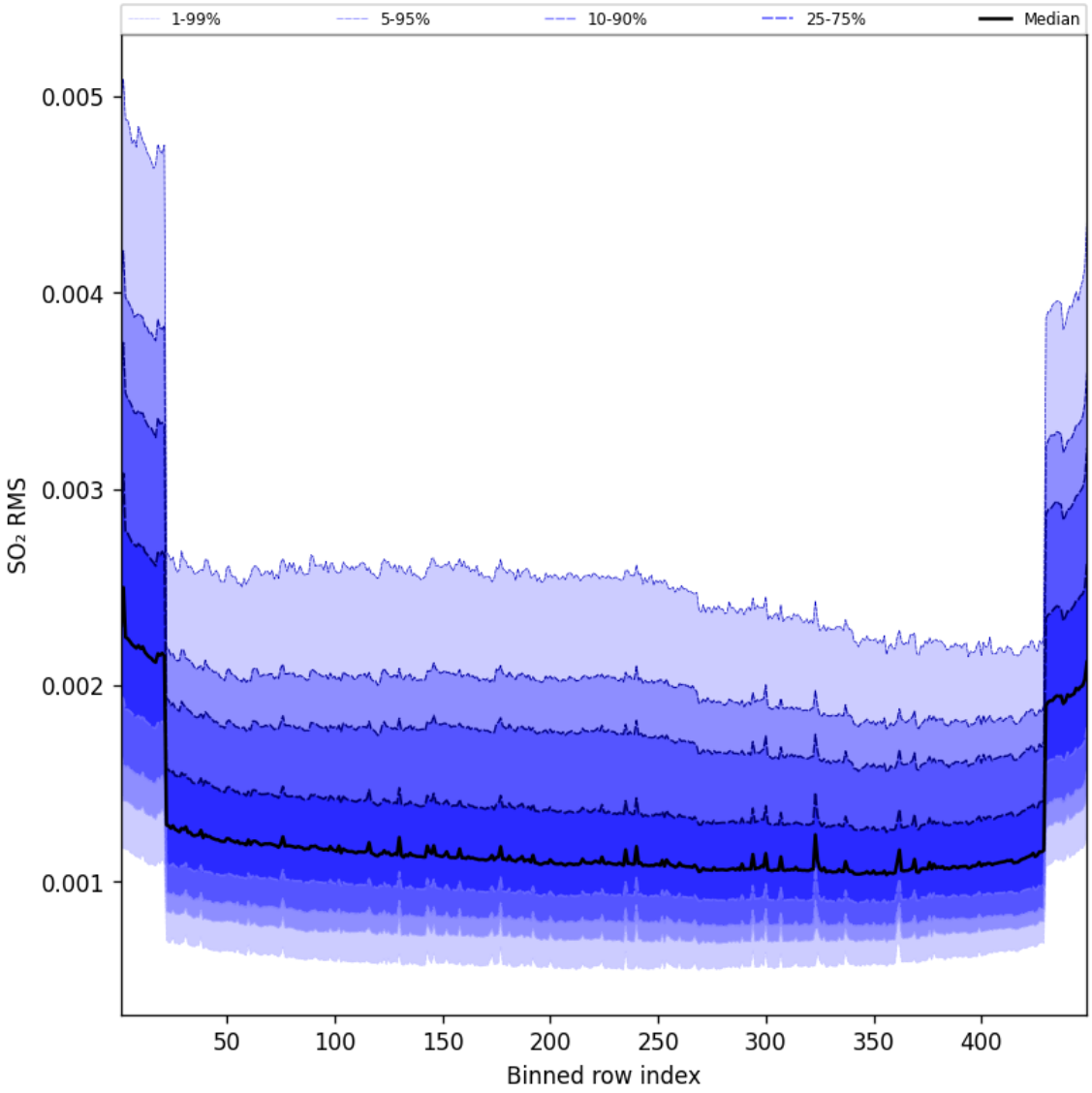

Figure 106: Along track statistics of "SO_2 RMS" for 2025-05-31 to 2025-06-01

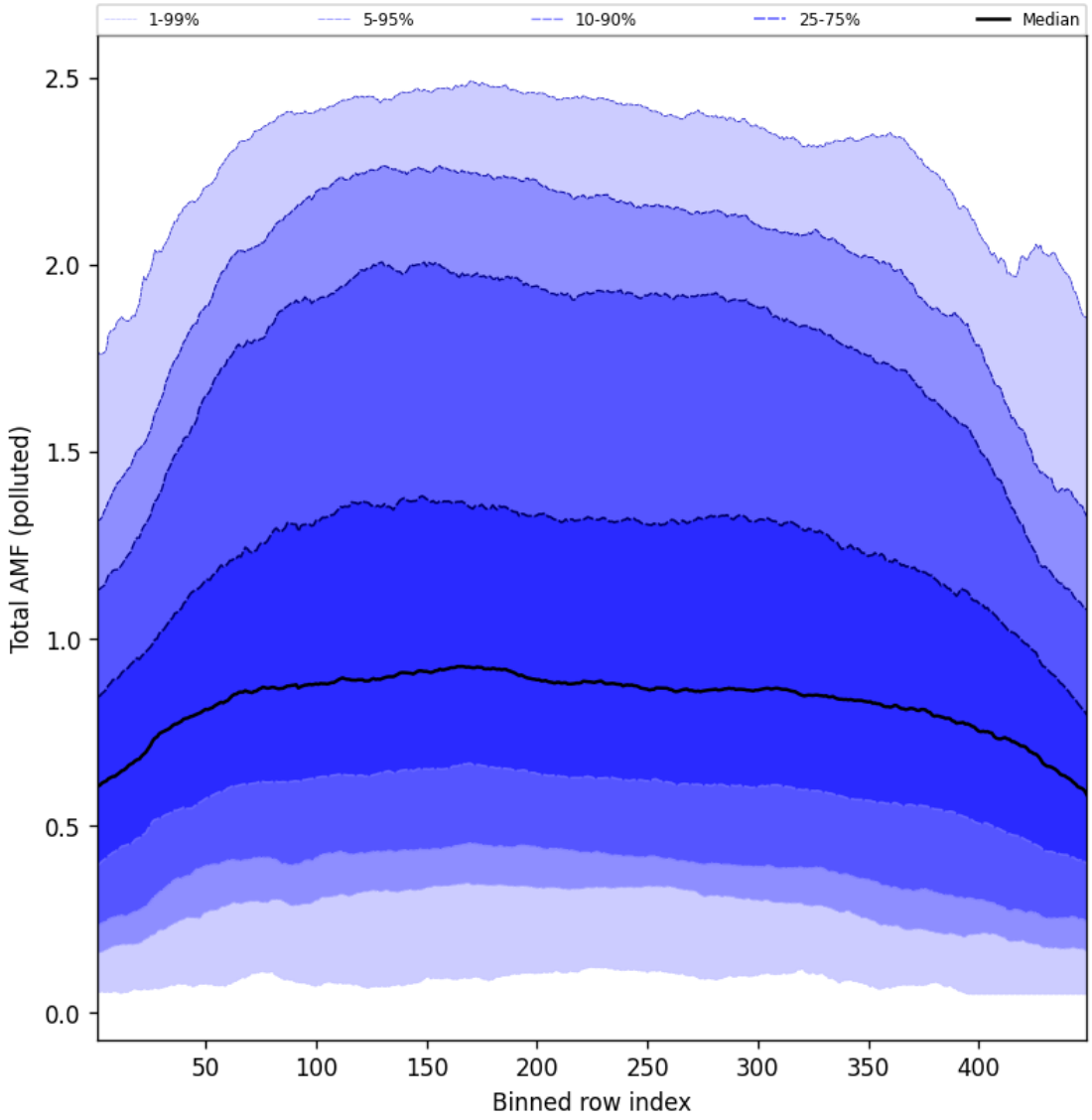

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-05-31 to 2025-06-01

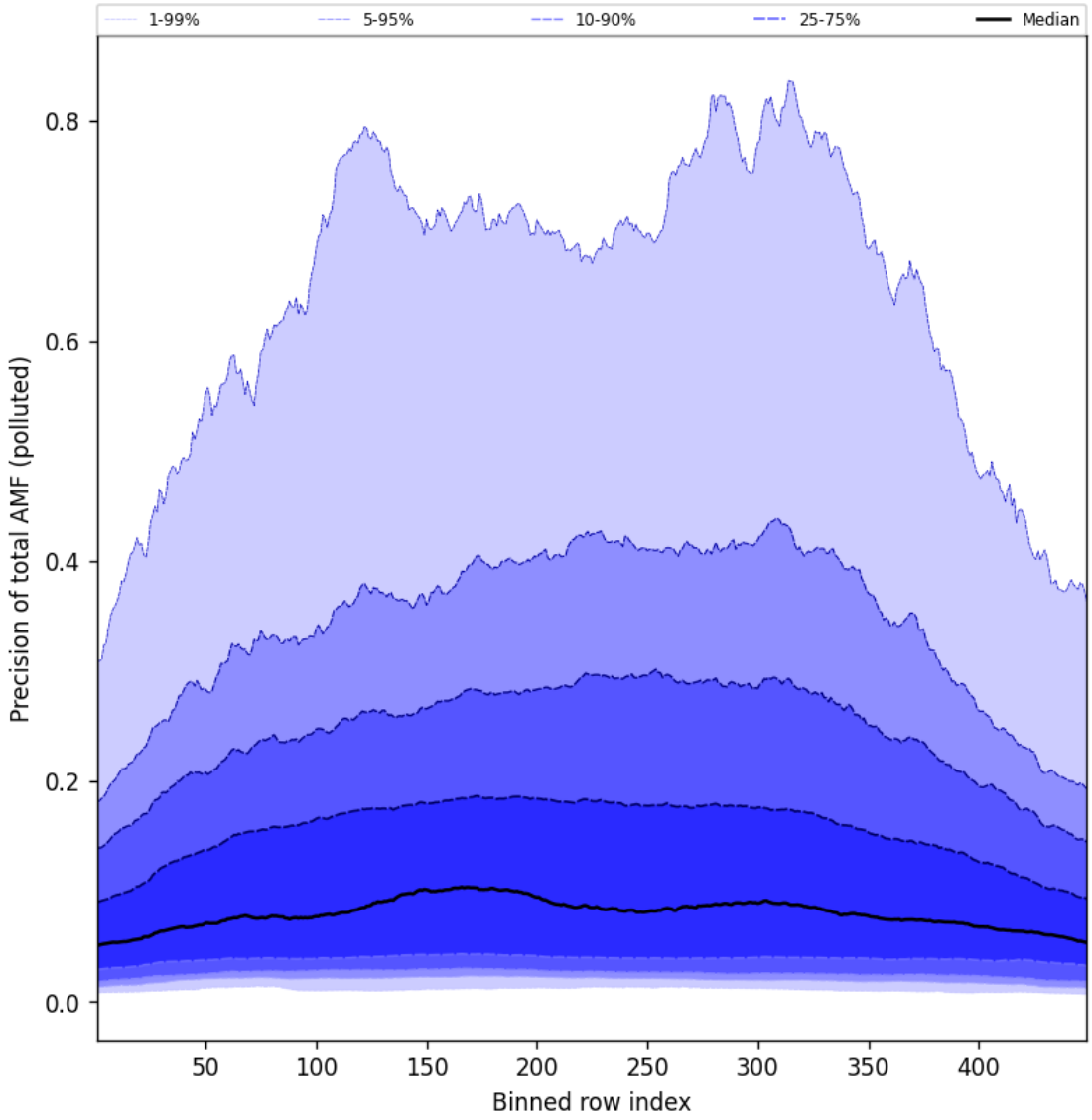

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-05-31 to 2025-06-01

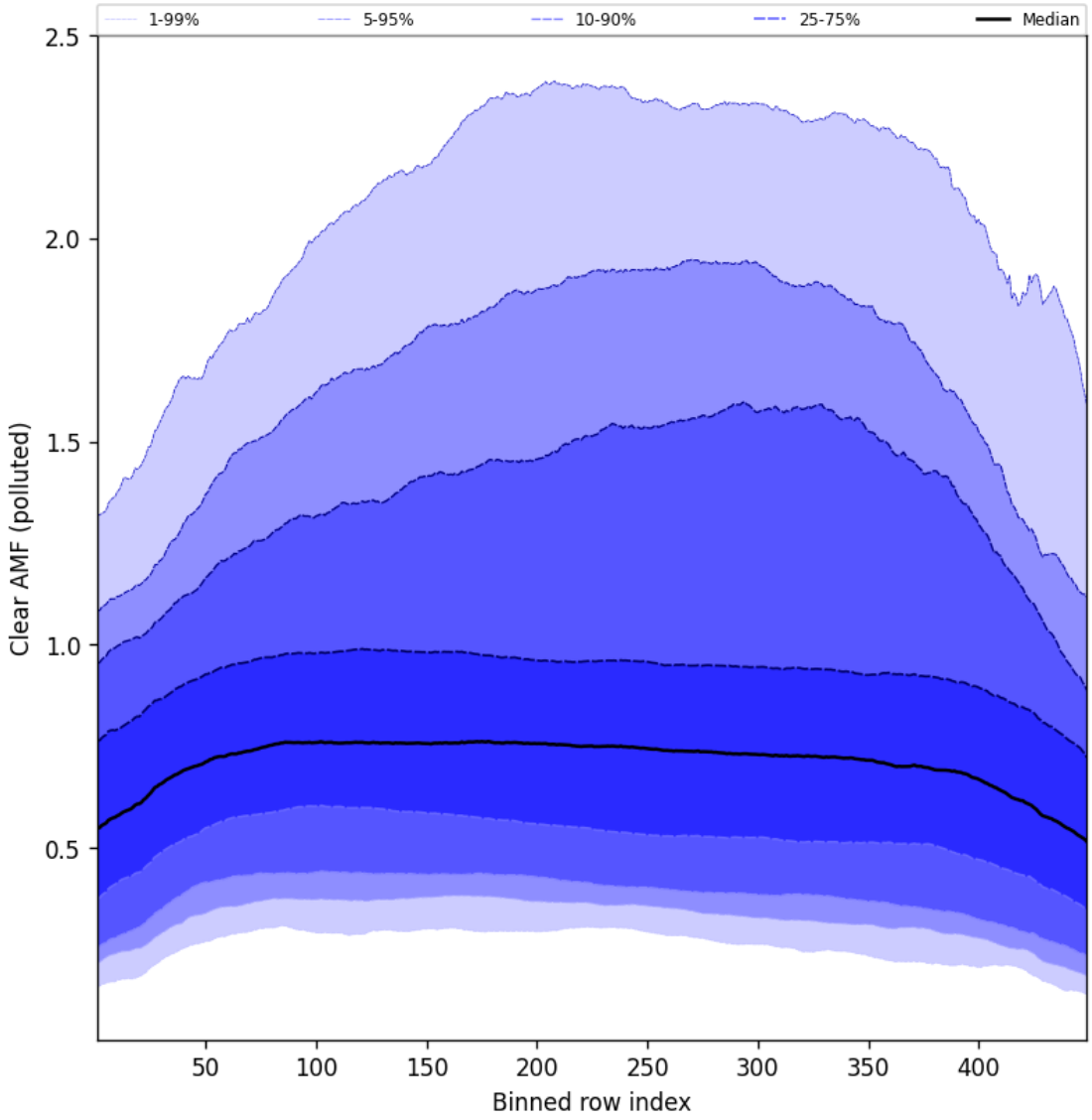

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-05-31 to 2025-06-01

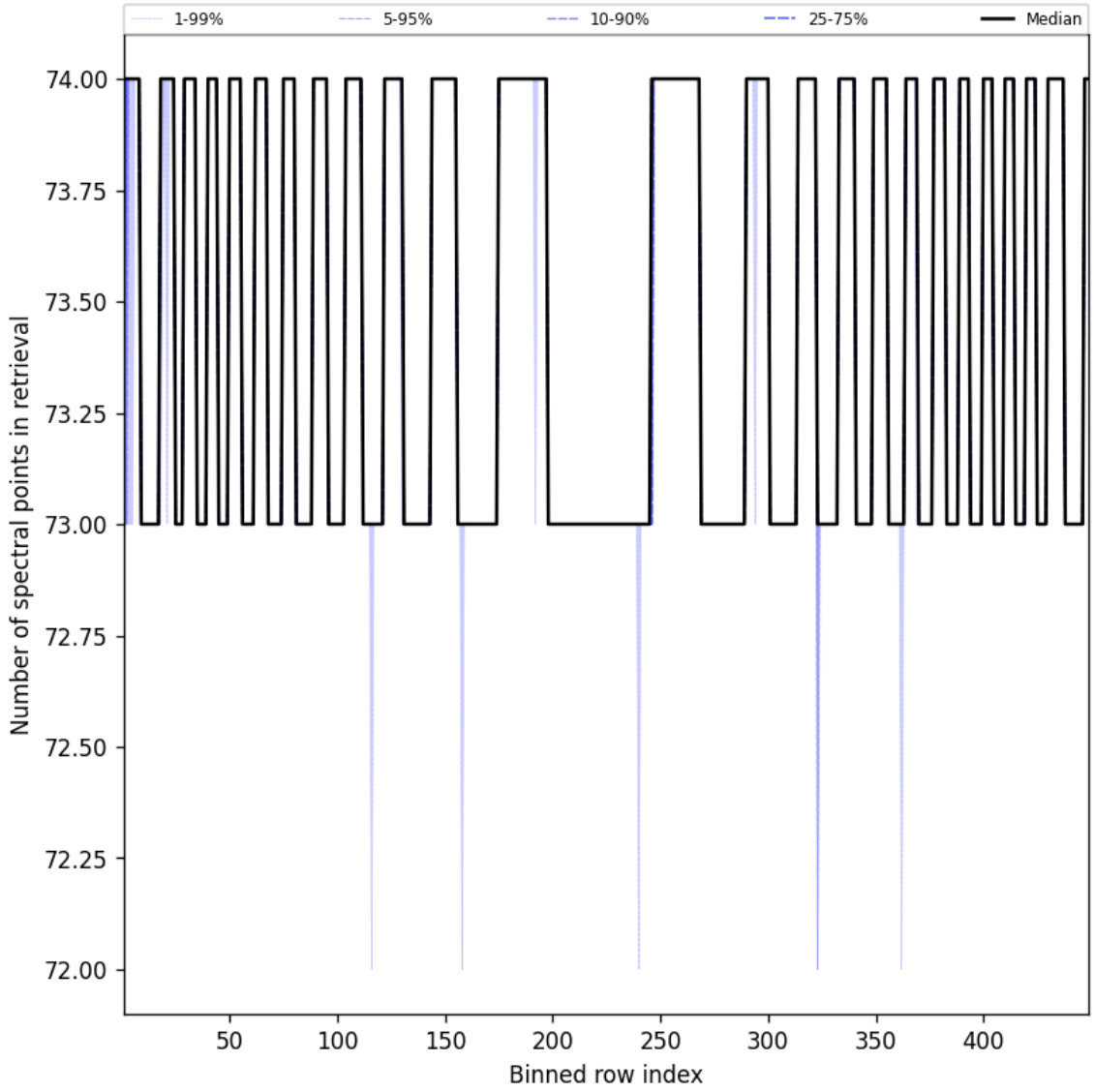

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-05-31 to 2025-06-01

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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