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]	0.649 ± 0.398	18531470	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.203 \pm 98.402) \times 10^{-2}$	18531470	0.263	0.459	1.080×10^{-2}	-96.2	535
sulfurdioxide total vertical column precision [DU]	0.528 ± 0.692	18531470	0.222	0.338	0.325	4.232×10^{-2}	56.2
sulfurdioxide slant column density corrected [DU]	$(2.017 \pm 42.228) \times 10^{-2}$	18531470	0.267	0.373	9.426×10^{-3}	-11.3	420
sulfurdioxide slant column density cobra [DU]	$(1.982 \pm 38.309) \times 10^{-2}$	18531470	0.267	0.373	9.426×10^{-3}	-11.3	48.0
sulfurdioxide slant column density cobra precision [DU]	0.301 ± 0.138	18531470	0.213	0.145	0.262	8.554×10^{-2}	18.5
sulfurdioxide slant column density window1 [DU]	0.166 ± 0.710	18531470	0.225	0.750	0.180	-106	83.4
sulfurdioxide slant column density window1 precision [DU]	0.301 ± 0.138	18531470	0.213	0.145	0.262	8.554×10^{-2}	18.5
sulfurdioxide slant column density corrected win1 [DU]	$(4.519 \pm 70.253) \times 10^{-2}$	18531470	2.500×10^{-2}	0.736	2.588×10^{-2}	-106	83.4
background so2 slant column offset window1 [DU]	-0.121 ± 0.165	18531470	-0.220	0.173	-0.156	-0.830	6.33
sulfurdioxide slant column density window2 [DU]	2.61 ± 9.18	18531470	1.75	11.7	2.44	-1.485×10^3	1.859×10^3
sulfurdioxide slant column density window2 precision [DU]	8.11 ± 2.26	18531470	7.43	2.52	7.77	2.14	835
sulfurdioxide slant column density corrected win2 [DU]	0.606 ± 8.737	18531470	0.750	11.1	0.618	-1.485×10^3	1.854×10^3
background so2 slant column offset window2 [DU]	-2.00 ± 3.18	18531470	0.750	4.08	-0.921	-23.9	11.8
sulfurdioxide slant column density window3 [DU]	-11.5 ± 24.0	18531470	-12.9	30.2	-11.9	-2.751×10^3	1.122×10^3
sulfurdioxide slant column density window3 precision [DU]	27.9 ± 13.2	18531470	22.5	9.69	24.3	9.13	1.486×10^3
sulfurdioxide slant column density corrected win3 [DU]	-4.20 ± 23.06	18531470	-3.92	28.8	-4.16	-2.750×10^3	1.122×10^3
background so2 slant column offset window3 [DU]	7.30 ± 6.68	18531470	0.560	11.7	7.07	-12.3	28.7
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	18531470	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(2.936 \pm 6.135) \times 10^{-2}$	18531470	1.217×10^{-2}	1.609×10^{-2}	1.334×10^{-2}	1.580×10^{-4}	1.69
fitted radiance shift [nm]	$(-4.149 \pm 25.562) \times 10^{-4}$	18531470	-5.000×10^{-4}	1.761×10^{-3}	-3.945×10^{-4}	-6.060×10^{-2}	3.897×10^{-2}
fitted radiance squeeze [1]	$(-2.345 \pm 18.228) \times 10^{-5}$	18531470	-1.000×10^{-5}	2.042×10^{-4}	-1.588×10^{-5}	-1.683×10^{-2}	1.686×10^{-2}
fitted root mean square [1]	$(1.312 \pm 0.570) \times 10^{-3}$	18531470	9.750×10^{-4}	5.737×10^{-4}	1.148×10^{-3}	2.146×10^{-4}	6.008×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.864 ± 0.421	18531470	0.900	0.540	0.826	5.000×10^{-2}	2.87
sulfurdioxide total air mass factor polluted precision [1]	0.105 ± 0.109	18531470	4.500×10^{-2}	9.685×10^{-2}	6.620×10^{-2}	2.501×10^{-3}	1.76
sulfurdioxide clear air mass factor polluted [1]	0.740 ± 0.299	18531470	0.700	0.402	0.720	4.999×10^{-2}	2.77
number of spectral points in retrieval [1]	73.4 ± 0.5	18531470	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	5.000×10^{-2}	0.120	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.38	−0.892	−0.539	−0.363	−0.215	0.244	0.404	0.600	1.00	2.79
sulfurdioxide total vertical column precision [DU]	0.104	0.142	0.169	0.191	0.221	0.559	0.767	1.01	1.52	3.51
sulfurdioxide slant column density corrected [DU]	−0.883	−0.506	−0.365	−0.272	−0.175	0.198	0.301	0.403	0.566	1.07
sulfurdioxide slant column density cobra [DU]	−0.883	−0.506	−0.365	−0.272	−0.175	0.198	0.301	0.403	0.566	1.07
sulfurdioxide slant column density cobra precision [DU]	0.143	0.169	0.183	0.194	0.209	0.355	0.406	0.459	0.559	0.818
sulfurdioxide slant column density window1 [DU]	−1.80	−0.930	−0.613	−0.408	−0.201	0.549	0.742	0.926	1.21	1.99
sulfurdioxide slant column density window1 precision [DU]	0.143	0.169	0.183	0.194	0.209	0.355	0.406	0.459	0.559	0.818
sulfurdioxide slant column density corrected win1 [DU]	−1.71	−0.977	−0.706	−0.526	−0.337	0.399	0.604	0.805	1.12	2.04
background so2 slant column offset window1 [DU]	−0.388	−0.297	−0.273	−0.253	−0.227	-5.310×10^{-2}	6.635×10^{-3}	7.432×10^{-2}	0.191	0.462
sulfurdioxide slant column density window2 [DU]	−18.7	−12.0	−8.64	−6.15	−3.33	8.37	11.4	14.1	17.7	25.4
sulfurdioxide slant column density window2 precision [DU]	4.28	5.21	5.75	6.17	6.66	9.18	10.0	10.9	12.1	14.9
sulfurdioxide slant column density corrected win2 [DU]	−20.5	−13.5	−10.2	−7.69	−4.92	6.14	8.89	11.4	14.7	21.7
background so2 slant column offset window2 [DU]	−10.9	−8.63	−6.94	−5.45	−3.71	0.364	0.657	0.866	1.14	2.89
sulfurdioxide slant column density window3 [DU]	−70.1	−50.1	−40.8	−34.1	−26.7	3.54	11.6	18.8	28.5	47.4
sulfurdioxide slant column density window3 precision [DU]	13.2	15.8	17.7	19.1	20.7	30.4	35.1	41.0	52.8	84.1
sulfurdioxide slant column density corrected win3 [DU]	−62.2	−42.0	−32.6	−25.8	−18.5	10.3	17.7	24.4	33.4	51.8
background so2 slant column offset window3 [DU]	−4.22	−1.62	−0.686	9.367×10^{-2}	1.18	12.9	14.7	16.3	18.1	21.2
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	7.314×10^{-4}	1.977×10^{-3}	3.465×10^{-3}	5.495×10^{-3}	8.019×10^{-3}	2.411×10^{-2}	3.585×10^{-2}	5.900×10^{-2}	0.105	0.326
fitted radiance shift [nm]	-8.190×10^{-3}	-4.220×10^{-3}	-2.815×10^{-3}	-2.014×10^{-3}	-1.327×10^{-3}	4.343×10^{-4}	1.101×10^{-3}	1.962×10^{-3}	3.472×10^{-3}	7.604×10^{-3}
fitted radiance squeeze [1]	-5.495×10^{-4}	-3.194×10^{-4}	-2.333×10^{-4}	-1.773×10^{-4}	-1.203×10^{-4}	8.395×10^{-5}	1.347×10^{-4}	1.816×10^{-4}	2.481×10^{-4}	4.055×10^{-4}
fitted root mean square [1]	5.936×10^{-4}	7.388×10^{-4}	8.161×10^{-4}	8.744×10^{-4}	9.461×10^{-4}	1.520×10^{-3}	1.764×10^{-3}	2.009×10^{-3}	2.392×10^{-3}	3.436×10^{-3}
sulfurdioxide total air mass factor polluted [1]	8.950×10^{-2}	0.247	0.354	0.444	0.562	1.10	1.28	1.44	1.66	2.02
sulfurdioxide total air mass factor polluted precision [1]	1.037×10^{-2}	1.850×10^{-2}	2.465×10^{-2}	3.081×10^{-2}	3.892×10^{-2}	0.136	0.177	0.220	0.299	0.548
sulfurdioxide clear air mass factor polluted [1]	0.205	0.304	0.373	0.438	0.524	0.926	1.02	1.10	1.23	1.66
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]	0.612 ± 0.400	11020181	0.790	0.490	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(3.681 \pm 112.019) \times 10^{-2}$	11020181	0.474	1.052×10^{-2}	-96.2	145	-0.222	0.252
sulfurdioxide total vertical column precision [DU]	0.586 ± 0.815	11020181	0.393	0.338	4.473×10^{-2}	40.5	0.218	0.611
sulfurdioxide slant column density corrected [DU]	$(2.168 \pm 40.585) \times 10^{-2}$	11020181	0.377	9.133×10^{-3}	-11.3	72.8	-0.177	0.200
sulfurdioxide slant column density cobra [DU]	$(2.144 \pm 39.435) \times 10^{-2}$	11020181	0.377	9.133×10^{-3}	-11.3	20.3	-0.177	0.200
sulfurdioxide slant column density cobra precision [DU]	0.309 ± 0.149	11020181	0.164	0.264	8.554×10^{-2}	11.7	0.206	0.370
sulfurdioxide slant column density window1 [DU]	0.162 ± 0.740	11020181	0.761	0.180	-99.2	83.4	-0.207	0.554
sulfurdioxide slant column density window1 precision [DU]	0.309 ± 0.149	11020181	0.164	0.264	8.554×10^{-2}	11.7	0.206	0.370
sulfurdioxide slant column density corrected win1 [DU]	$(5.166 \pm 73.187) \times 10^{-2}$	11020181	0.747	2.852×10^{-2}	-99.2	83.4	-0.339	0.409
background so2 slant column offset window1 [DU]	-0.110 ± 0.186	11020181	0.187	-0.157	-0.734	2.63	-0.230	-4.260×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.26 ± 8.99	11020181	11.6	3.08	-1.007×10^{3}	1.859×10^{3}	-2.62	8.94
sulfurdioxide slant column density window2 precision [DU]	7.82 ± 2.10	11020181	2.32	7.49	2.14	602	6.46	8.78
sulfurdioxide slant column density corrected win2 [DU]	0.494 ± 8.368	11020181	10.7	0.537	-1.013×10^{3}	1.854×10^{3}	-4.83	5.86
background so2 slant column offset window2 [DU]	-2.77 ± 3.66	11020181	5.94	-1.78	-23.9	11.8	-5.54	0.401
sulfurdioxide slant column density window3 [DU]	-13.0 ± 22.8	11020181	28.7	-13.6	-2.751×10^{3}	314	-27.6	1.11
sulfurdioxide slant column density window3 precision [DU]	26.2 ± 12.4	11020181	8.03	22.9	9.13	1.486×10^{3}	19.9	27.9
sulfurdioxide slant column density corrected win3 [DU]	-3.84 ± 21.70	11020181	27.1	-3.80	-2.750×10^{3}	315	-17.3	9.76
background so2 slant column offset window3 [DU]	9.17 ± 6.82	11020181	12.2	10.5	-11.9	28.7	2.47	14.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	11020181	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.764 \pm 7.457) \times 10^{-2}$	11020181	2.534×10^{-2}	1.539×10^{-2}	1.580×10^{-4}	1.69	7.088×10^{-3}	3.243×10^{-2}
fitted radiance shift [nm]	$(-2.749 \pm 23.940) \times 10^{-4}$	11020181	1.562×10^{-3}	-2.726×10^{-4}	-3.852×10^{-2}	3.883×10^{-2}	-1.082×10^{-3}	4.805×10^{-4}
fitted radiance squeeze [1]	$(-4.213 \pm 18.664) \times 10^{-5}$	11020181	2.053×10^{-4}	-2.807×10^{-5}	-1.209×10^{-2}	1.268×10^{-2}	-1.352×10^{-4}	7.004×10^{-5}
fitted root mean square [1]	$(1.341 \pm 0.622) \times 10^{-3}$	11020181	6.297×10^{-4}	1.147×10^{-3}	3.210×10^{-4}	6.008×10^{-2}	9.358×10^{-4}	1.565×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.865 ± 0.459	11020181	0.630	0.813	5.000×10^{-2}	2.87	0.517	1.15
sulfurdioxide total air mass factor polluted precision [1]	0.109 ± 0.125	11020181	9.981×10^{-2}	6.585×10^{-2}	2.501×10^{-3}	1.76	3.593×10^{-2}	0.136
sulfurdioxide clear air mass factor polluted [1]	0.722 ± 0.339	11020181	0.461	0.682	4.999×10^{-2}	2.77	0.462	0.924
number of spectral points in retrieval [1]	73.5 ± 0.5	11020181	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]	0.703 ± 0.389	7511289	0.690	1.000	0.0	1.000	0.310	1.000
sulfurdioxide total vertical column [DU]	$(2.502 \pm 74.017) \times 10^{-2}$	7511289	0.440	1.118×10^{-2}	-63.9	535	-0.207	0.234
sulfurdioxide total vertical column precision [DU]	0.443 ± 0.442	7511289	0.274	0.311	4.232×10^{-2}	56.2	0.224	0.498
sulfurdioxide slant column density corrected [DU]	$(1.796 \pm 44.527) \times 10^{-2}$	7511289	0.367	9.835×10^{-3}	-11.1	420	-0.172	0.195
sulfurdioxide slant column density cobra [DU]	$(1.744 \pm 36.592) \times 10^{-2}$	7511289	0.367	9.835×10^{-3}	-11.1	48.0	-0.172	0.195
sulfurdioxide slant column density cobra precision [DU]	0.290 ± 0.120	7511289	0.120	0.259	8.613×10^{-2}	18.5	0.214	0.334
sulfurdioxide slant column density window1 [DU]	0.172 ± 0.663	7511289	0.734	0.179	-106	62.3	-0.192	0.542
sulfurdioxide slant column density window1 precision [DU]	0.290 ± 0.120	7511289	0.120	0.259	8.613×10^{-2}	18.5	0.214	0.334
sulfurdioxide slant column density corrected win1 [DU]	$(3.569 \pm 65.699) \times 10^{-2}$	7511289	0.720	2.214×10^{-2}	-106	62.3	-0.334	0.386
background so2 slant column offset window1 [DU]	-0.137 ± 0.126	7511289	0.155	-0.156	-0.830	6.33	-0.221	-6.619×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.65 ± 9.36	7511289	11.8	1.48	-1.485×10^{3}	996	-4.32	7.44
sulfurdioxide slant column density window2 precision [DU]	8.55 ± 2.41	7511289	2.67	8.23	2.21	835	7.04	9.71
sulfurdioxide slant column density corrected win2 [DU]	0.769 ± 9.248	7511289	11.6	0.746	-1.485×10^{3}	991	-5.07	6.57
background so2 slant column offset window2 [DU]	-0.877 ± 1.808	7511289	2.15	-0.502	-12.4	11.6	-1.83	0.323
sulfurdioxide slant column density window3 [DU]	-9.29 ± 25.46	7511289	32.2	-9.15	-921	1.122×10^{3}	-25.2	7.00
sulfurdioxide slant column density window3 precision [DU]	30.3 ± 13.9	7511289	10.6	26.8	9.58	384	22.6	33.2
sulfurdioxide slant column density corrected win3 [DU]	-4.73 ± 24.91	7511289	31.6	-4.79	-922	1.122×10^{3}	-20.4	11.2
background so2 slant column offset window3 [DU]	4.56 ± 5.39	7511289	8.84	3.09	-12.3	26.4	0.247	9.09
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	7511289	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.721 \pm 2.964) \times 10^{-2}$	7511289	8.735×10^{-3}	1.216×10^{-2}	8.047×10^{-4}	1.29	8.697×10^{-3}	1.743×10^{-2}
fitted radiance shift [nm]	$(-6.204 \pm 27.642) \times 10^{-4}$	7511289	2.023×10^{-3}	-6.186×10^{-4}	-6.060×10^{-2}	3.897×10^{-2}	-1.685×10^{-3}	3.377×10^{-4}
fitted radiance squeeze [1]	$(3.961 \pm 172.056) \times 10^{-6}$	7511289	2.030×10^{-4}	2.026×10^{-6}	-1.683×10^{-2}	1.686×10^{-2}	-9.882×10^{-5}	1.042×10^{-4}
fitted root mean square [1]	$(1.270 \pm 0.481) \times 10^{-3}$	7511289	4.982×10^{-4}	1.149×10^{-3}	2.146×10^{-4}	5.191×10^{-2}	9.620×10^{-4}	1.460×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.863 ± 0.359	7511289	0.437	0.838	5.000×10^{-2}	2.63	0.621	1.06
sulfurdioxide total air mass factor polluted precision [1]	$(9.834 \pm 7.903) \times 10^{-2}$	7511289	9.340×10^{-2}	6.668×10^{-2}	6.290×10^{-3}	1.11	4.240×10^{-2}	0.136
sulfurdioxide clear air mass factor polluted [1]	0.768 ± 0.224	7511289	0.328	0.761	0.115	1.78	0.601	0.928
number of spectral points in retrieval [1]	73.4 ± 0.5	7511289	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]	0.686 ± 0.393	12663294	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(2.367 \pm 78.348) \times 10^{-2}$	12663294	0.428	9.196×10^{-3}	-67.0	258	-0.203	0.226
sulfurdioxide total vertical column precision [DU]	0.458 ± 0.528	12663294	0.283	0.298	5.242×10^{-2}	43.0	0.214	0.497
sulfurdioxide slant column density corrected [DU]	$(1.575 \pm 35.900) \times 10^{-2}$	12663294	0.362	8.192×10^{-3}	-11.3	84.3	-0.171	0.191
sulfurdioxide slant column density cobra [DU]	$(1.570 \pm 35.586) \times 10^{-2}$	12663294	0.362	8.192×10^{-3}	-11.3	32.8	-0.171	0.191
sulfurdioxide slant column density cobra precision [DU]	0.294 ± 0.135	12663294	0.138	0.251	8.613×10^{-2}	11.4	0.205	0.344
sulfurdioxide slant column density window1 [DU]	0.168 ± 0.681	12663294	0.733	0.183	-99.2	62.3	-0.189	0.544
sulfurdioxide slant column density window1 precision [DU]	0.294 ± 0.135	12663294	0.138	0.251	8.613×10^{-2}	11.4	0.205	0.344
sulfurdioxide slant column density corrected win1 [DU]	$(3.883 \pm 67.237) \times 10^{-2}$	12663294	0.721	2.402×10^{-2}	-99.2	62.3	-0.332	0.389
background so2 slant column offset window1 [DU]	-0.130 ± 0.153	12663294	0.168	-0.160	-0.830	2.85	-0.229	-6.060×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.20 ± 9.11	12663294	11.6	2.00	-1.286×10^{3}	1.859×10^{3}	-3.69	7.87
sulfurdioxide slant column density window2 precision [DU]	8.12 ± 2.22	12663294	2.53	7.78	2.14	835	6.68	9.21
sulfurdioxide slant column density corrected win2 [DU]	0.629 ± 8.759	12663294	11.1	0.634	-1.285×10^{3}	1.854×10^{3}	-4.93	6.18
background so2 slant column offset window2 [DU]	-1.57 ± 2.91	12663294	3.22	-0.656	-23.8	11.8	-2.78	0.434
sulfurdioxide slant column density window3 [DU]	-8.56 ± 24.30	12663294	31.0	-8.91	-921	1.122×10^{3}	-24.1	6.93
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 12.4	12663294	9.41	24.4	9.34	384	21.0	30.4
sulfurdioxide slant column density corrected win3 [DU]	-2.09 ± 23.13	12663294	29.3	-2.25	-922	1.122×10^{3}	-16.7	12.6
background so2 slant column offset window3 [DU]	6.47 ± 6.44	12663294	10.9	5.43	-12.3	28.7	0.870	11.7
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	12663294	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.074 \pm 3.649) \times 10^{-2}$	12663294	1.176×10^{-2}	1.292×10^{-2}	3.029×10^{-4}	1.62	8.648×10^{-3}	2.041×10^{-2}
fitted radiance shift [nm]	$(-4.361 \pm 24.227) \times 10^{-4}$	12663294	1.767×10^{-3}	-3.991×10^{-4}	-4.509×10^{-2}	3.883×10^{-2}	-1.350×10^{-3}	4.174×10^{-4}
fitted radiance squeeze [1]	$(-1.395 \pm 17.852) \times 10^{-5}$	12663294	1.997×10^{-4}	-8.078×10^{-6}	-1.395×10^{-2}	1.609×10^{-2}	-1.093×10^{-4}	9.032×10^{-5}
fitted root mean square [1]	$(1.287 \pm 0.555) \times 10^{-3}$	12663294	5.630×10^{-4}	1.112×10^{-3}	3.391×10^{-4}	6.008×10^{-2}	9.299×10^{-4}	1.493×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.883 ± 0.375	12663294	0.464	0.863	5.000×10^{-2}	2.58	0.631	1.09
sulfurdioxide total air mass factor polluted precision [1]	$(9.819 \pm 8.943) \times 10^{-2}$	12663294	8.625×10^{-2}	6.669×10^{-2}	3.841×10^{-3}	1.74	4.263×10^{-2}	0.129
sulfurdioxide clear air mass factor polluted [1]	0.762 ± 0.254	12663294	0.352	0.756	7.390×10^{-2}	2.33	0.579	0.931
number of spectral points in retrieval [1]	73.4 ± 0.5	12663294	1.000	73.0	70.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.610 ± 0.409	4117485	0.820	0.490	0.0	1.000	0.180	1.000
sulfurdioxide total vertical column [DU]	$(4.035 \pm 118.133) \times 10^{-2}$	4117485	0.522	1.319×10^{-2}	-63.9	182	-0.242	0.280
sulfurdioxide total vertical column precision [DU]	0.637 ± 0.867	4117485	0.426	0.386	4.232×10^{-2}	56.2	0.244	0.671
sulfurdioxide slant column density corrected [DU]	$(2.550 \pm 49.656) \times 10^{-2}$	4117485	0.376	1.075×10^{-2}	-9.53	249	-0.175	0.201
sulfurdioxide slant column density cobra [DU]	$(2.459 \pm 41.550) \times 10^{-2}$	4117485	0.376	1.075×10^{-2}	-9.53	48.0	-0.175	0.201
sulfurdioxide slant column density cobra precision [DU]	0.301 ± 0.134	4117485	0.136	0.266	8.554×10^{-2}	18.5	0.214	0.350
sulfurdioxide slant column density window1 [DU]	0.178 ± 0.724	4117485	0.744	0.185	-106	83.4	-0.191	0.553
sulfurdioxide slant column density window1 precision [DU]	0.301 ± 0.134	4117485	0.136	0.266	8.554×10^{-2}	18.5	0.214	0.350
sulfurdioxide slant column density corrected win1 [DU]	$(4.906 \pm 71.839) \times 10^{-2}$	4117485	0.731	2.507×10^{-2}	-106	83.4	-0.334	0.397
background so2 slant column offset window1 [DU]	-0.129 ± 0.165	4117485	0.159	-0.166	-0.625	2.63	-0.232	-7.222×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.75 ± 9.21	4117485	11.7	2.67	-1.485×10^{3}	529	-3.14	8.57
sulfurdioxide slant column density window2 precision [DU]	8.12 ± 2.40	4117485	2.53	7.79	2.21	528	6.64	9.17
sulfurdioxide slant column density corrected win2 [DU]	0.569 ± 8.744	4117485	11.0	0.589	-1.485×10^{3}	528	-4.92	6.07
background so2 slant column offset window2 [DU]	-2.18 ± 3.26	4117485	4.68	-0.992	-23.7	11.5	-4.33	0.347
sulfurdioxide slant column density window3 [DU]	-17.7 ± 22.5	4117485	27.9	-17.4	-2.751×10^{3}	293	-31.4	-3.58
sulfurdioxide slant column density window3 precision [DU]	28.8 ± 15.4	4117485	11.0	24.6	9.21	741	20.3	31.2
sulfurdioxide slant column density corrected win3 [DU]	-9.84 ± 22.79	4117485	28.1	-9.05	-2.750×10^{3}	306	-23.5	4.62
background so2 slant column offset window3 [DU]	7.82 ± 6.74	4117485	12.1	8.06	-12.3	28.2	1.45	13.6
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.17	4117485	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.071 \pm 9.318) \times 10^{-2}$	4117485	4.477×10^{-2}	1.768×10^{-2}	1.580×10^{-4}	1.63	7.339×10^{-3}	5.211×10^{-2}
fitted radiance shift [nm]	$(-3.389 \pm 29.803) \times 10^{-4}$	4117485	1.776×10^{-3}	-3.561×10^{-4}	-6.060×10^{-2}	3.897×10^{-2}	-1.262×10^{-3}	5.143×10^{-4}
fitted radiance squeeze [1]	$(-3.274 \pm 17.874) \times 10^{-5}$	4117485	2.038×10^{-4}	-2.560×10^{-5}	-1.307×10^{-2}	1.686×10^{-2}	-1.299×10^{-4}	7.394×10^{-5}
fitted root mean square [1]	$(1.295 \pm 0.550) \times 10^{-3}$	4117485	5.037×10^{-4}	1.165×10^{-3}	2.146×10^{-4}	5.191×10^{-2}	9.617×10^{-4}	1.465×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.813 ± 0.499	4117485	0.637	0.682	5.000×10^{-2}	2.87	0.454	1.09
sulfurdioxide total air mass factor polluted precision [1]	0.121 ± 0.143	4117485	0.131	6.407×10^{-2}	2.873×10^{-3}	1.74	3.005×10^{-2}	0.161
sulfurdioxide clear air mass factor polluted [1]	0.686 ± 0.353	4117485	0.441	0.613	5.163×10^{-2}	2.77	0.427	0.868
number of spectral points in retrieval [1]	73.4 ± 0.5	4117485	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

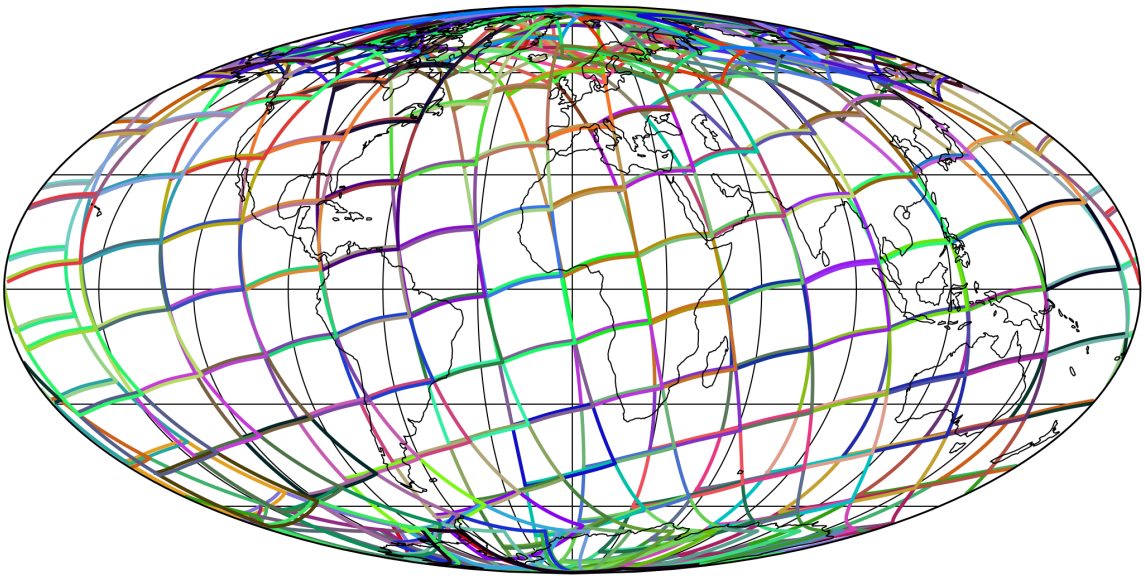

Figure 1: Outline of the granules.

4 Input data monitoring

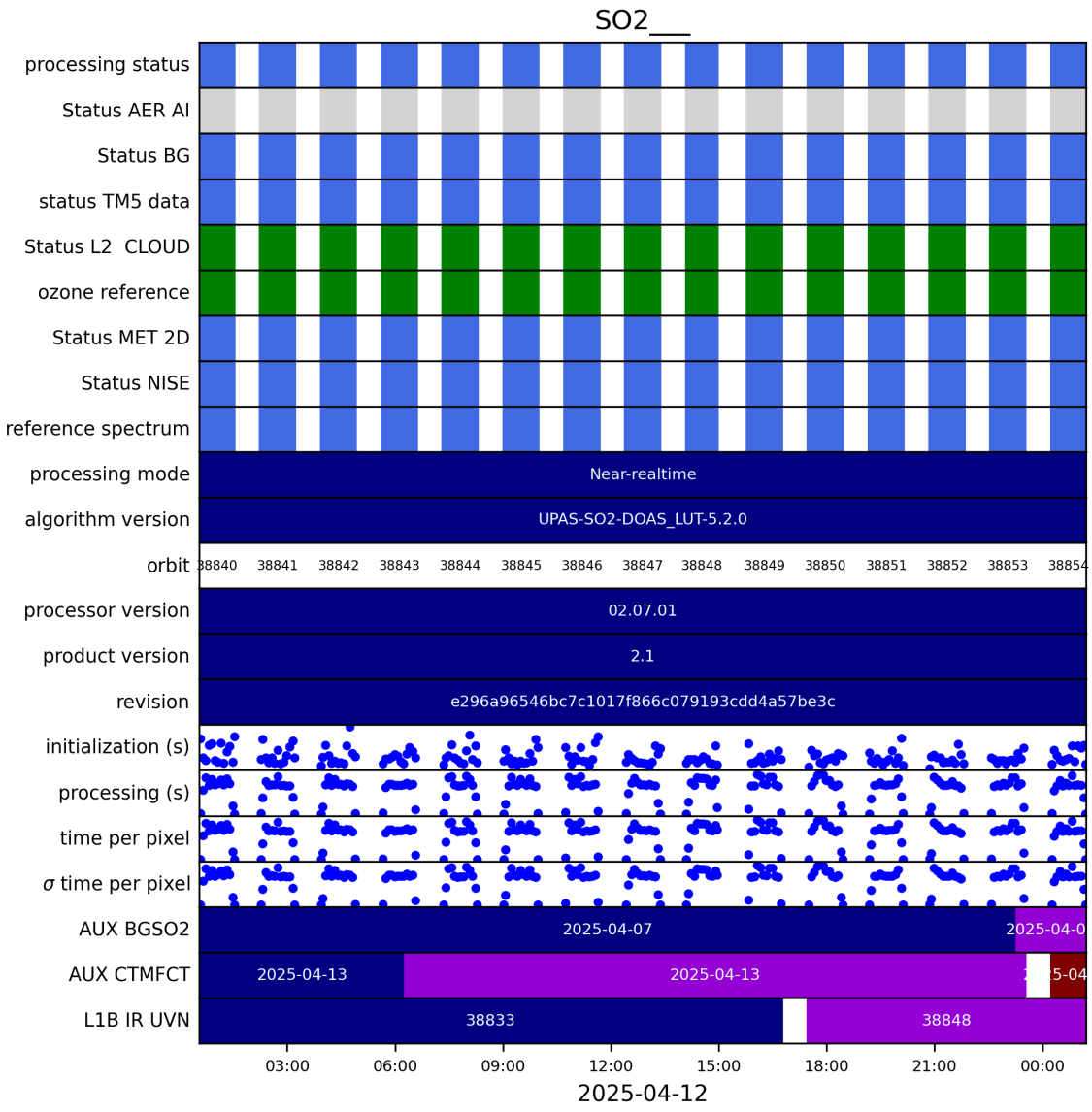

Figure 2: Input data per granule

5 Warnings and errors

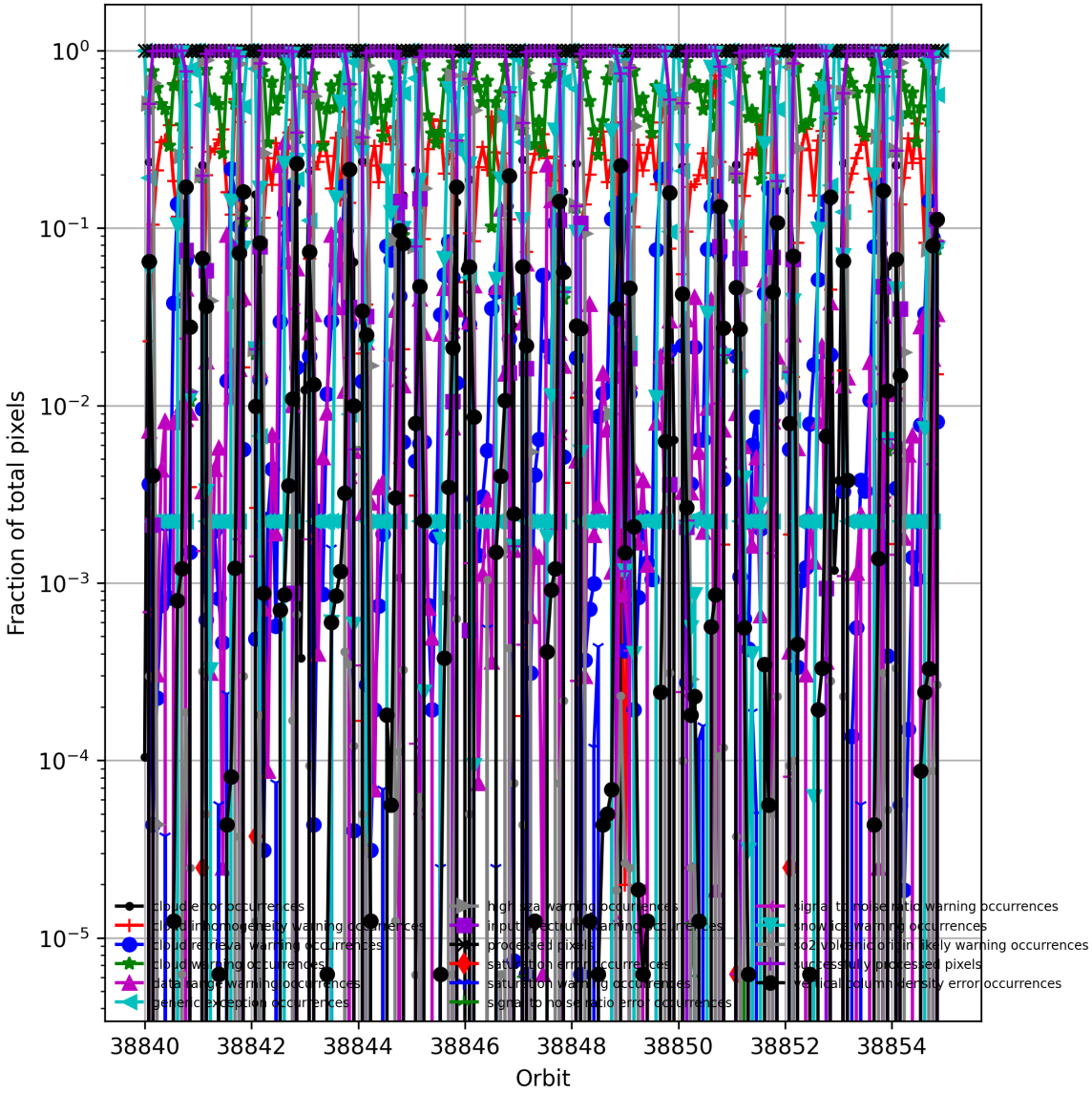

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

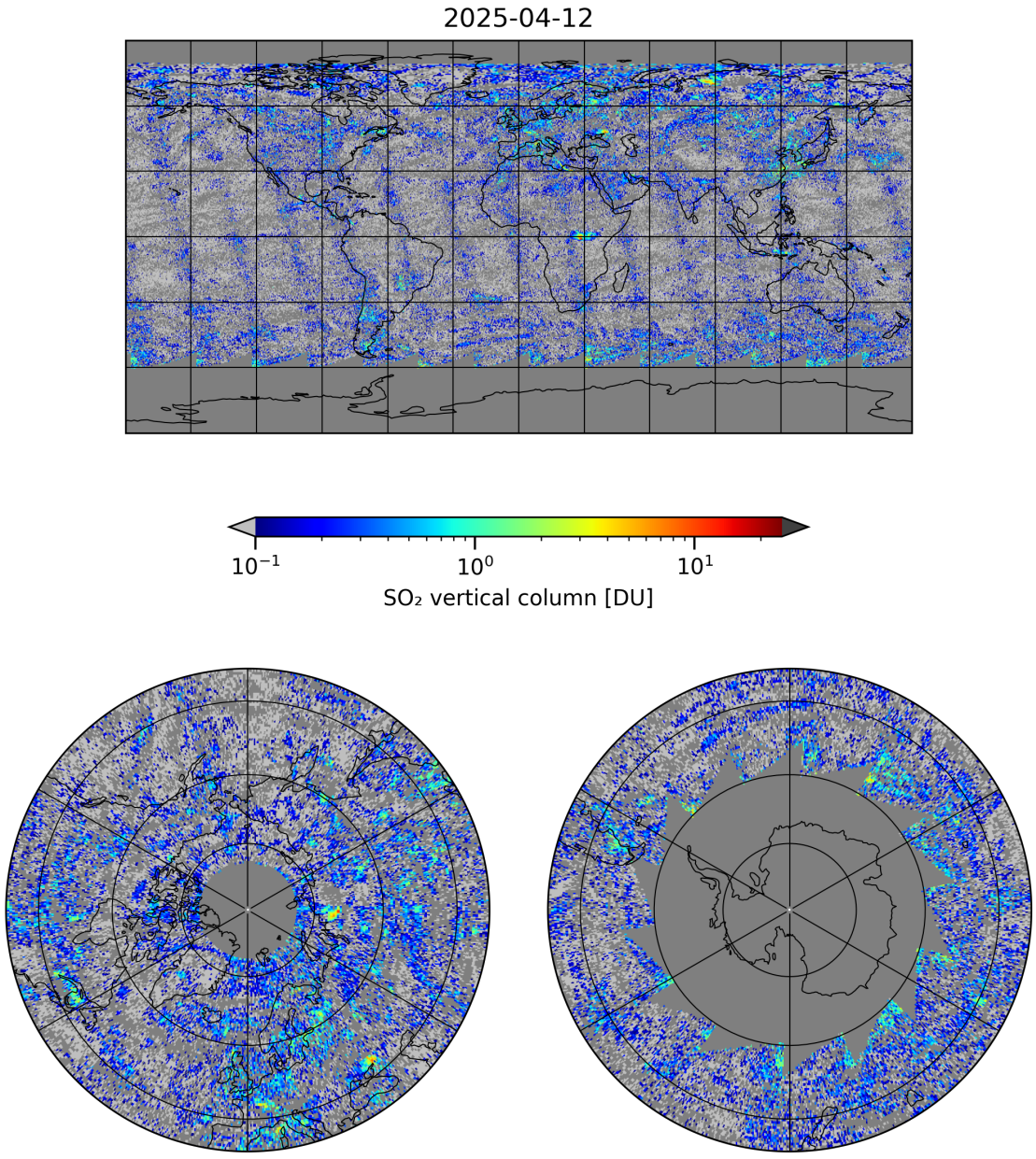

Figure 4: Map of "SO_2 vertical column" for 2025-04-12 to 2025-04-13

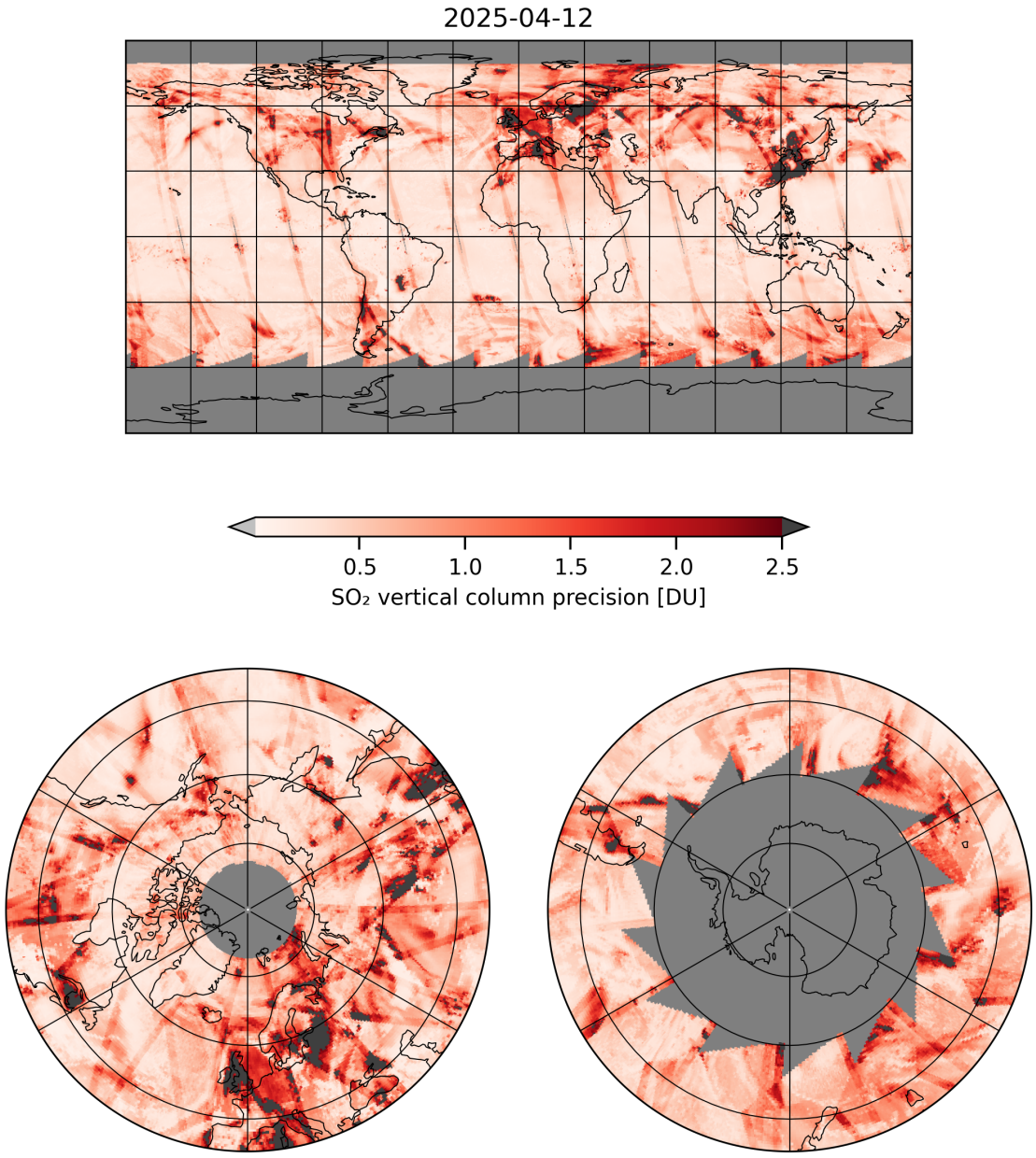

Figure 5: Map of "SO_2 vertical column precision" for 2025-04-12 to 2025-04-13

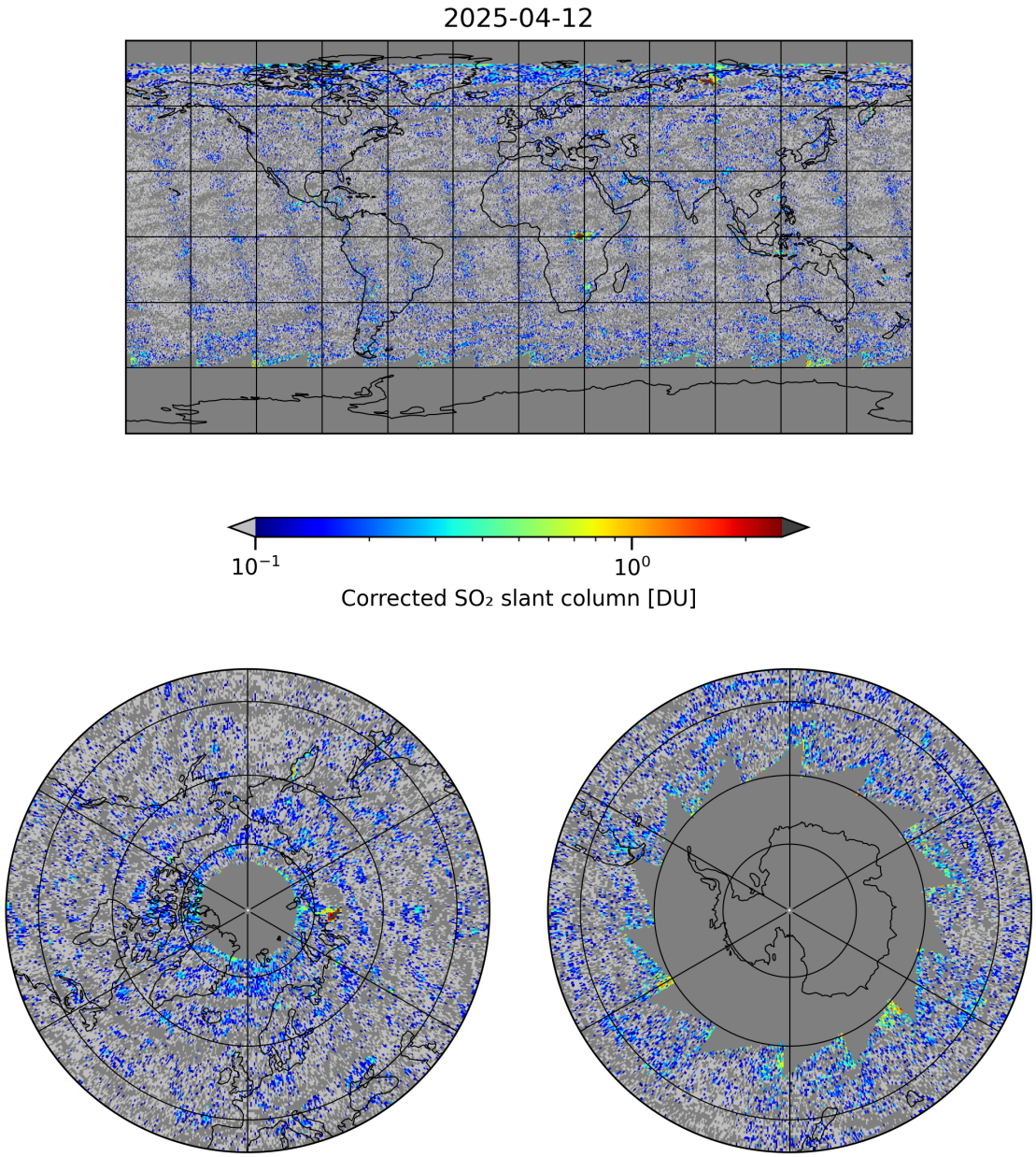

Figure 6: Map of "Corrected SO_2 slant column" for 2025-04-12 to 2025-04-13

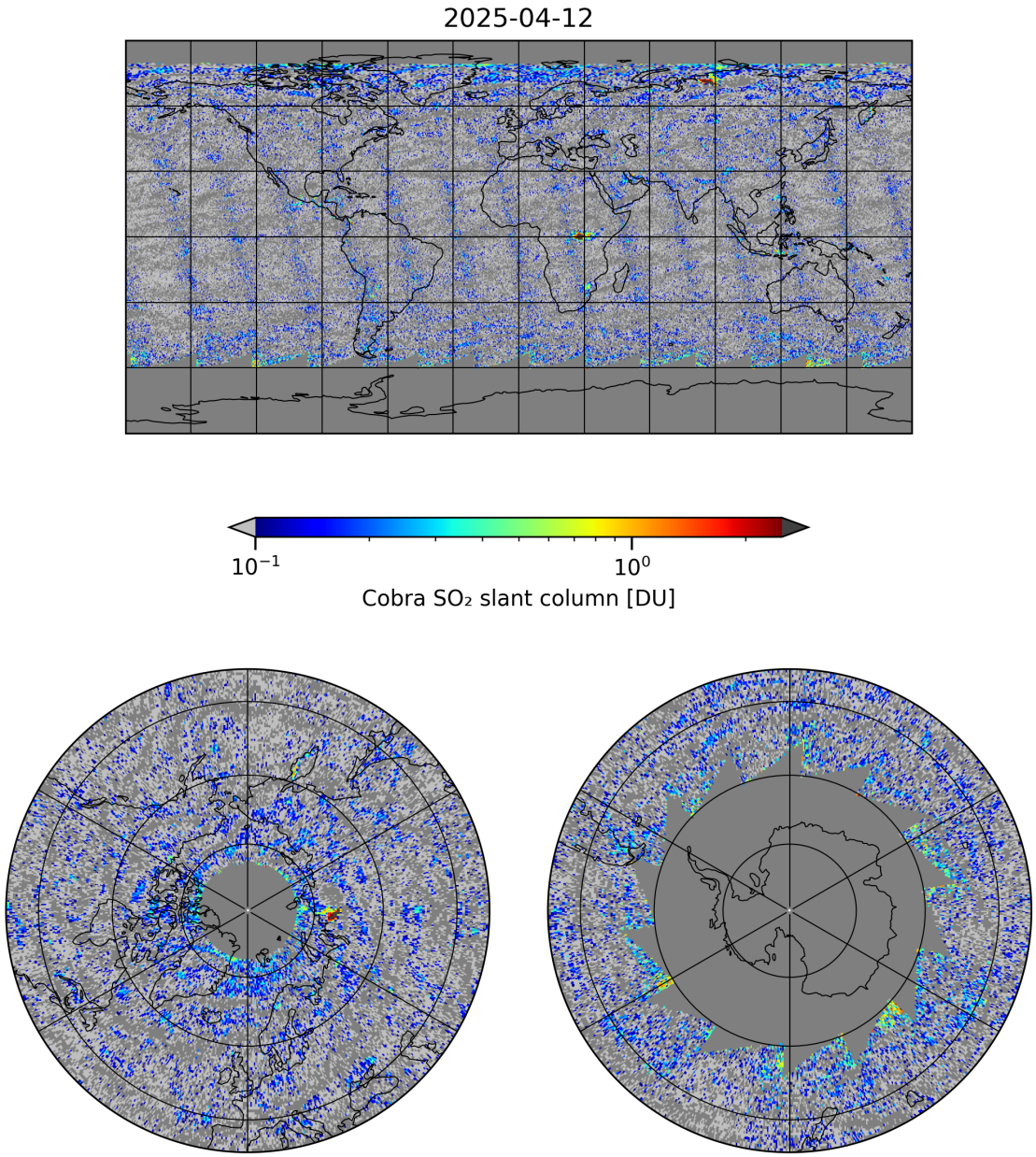

Figure 7: Map of "Cobra SO_2 slant column" for 2025-04-12 to 2025-04-13

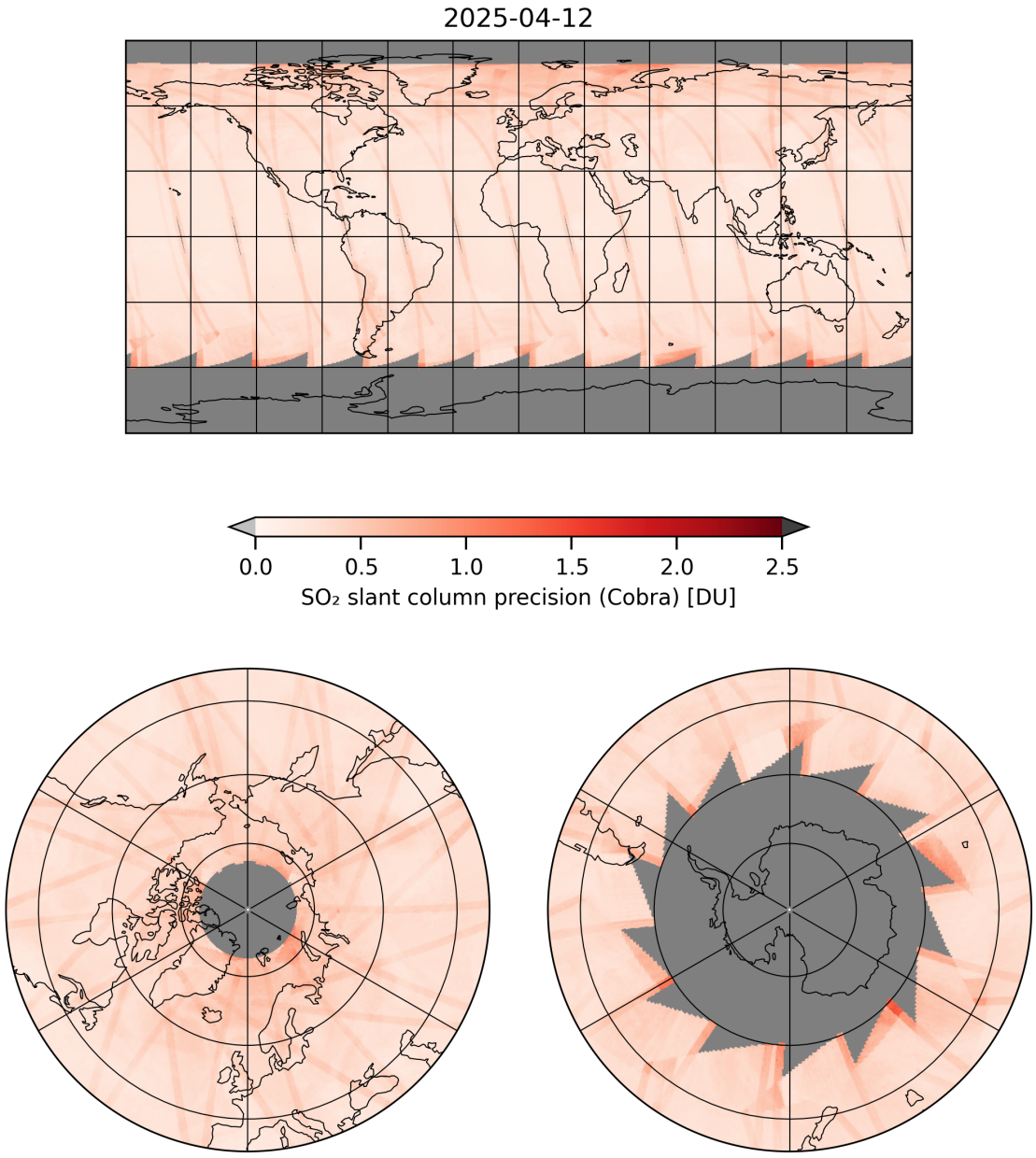

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-04-12 to 2025-04-13

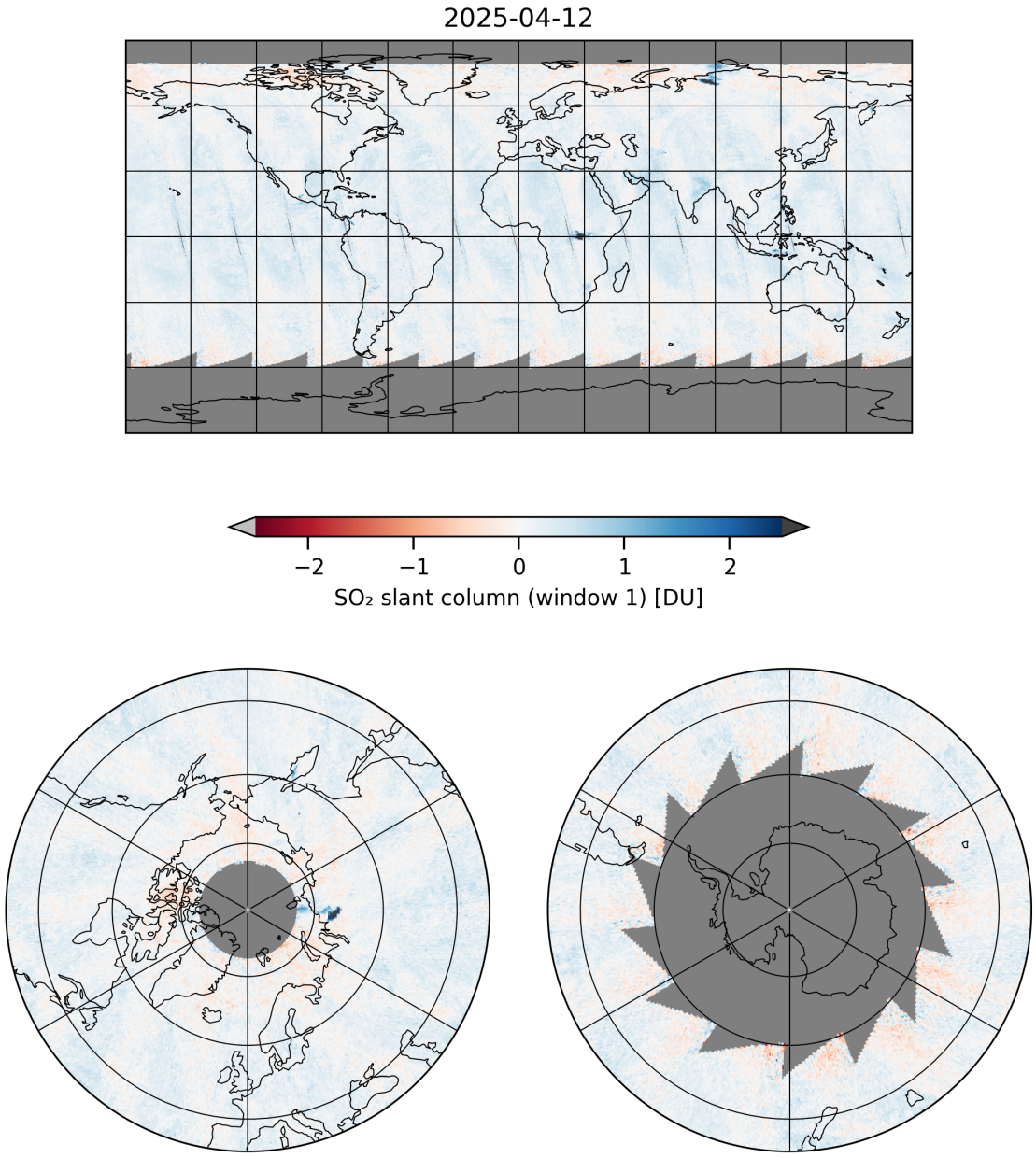

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-04-12 to 2025-04-13

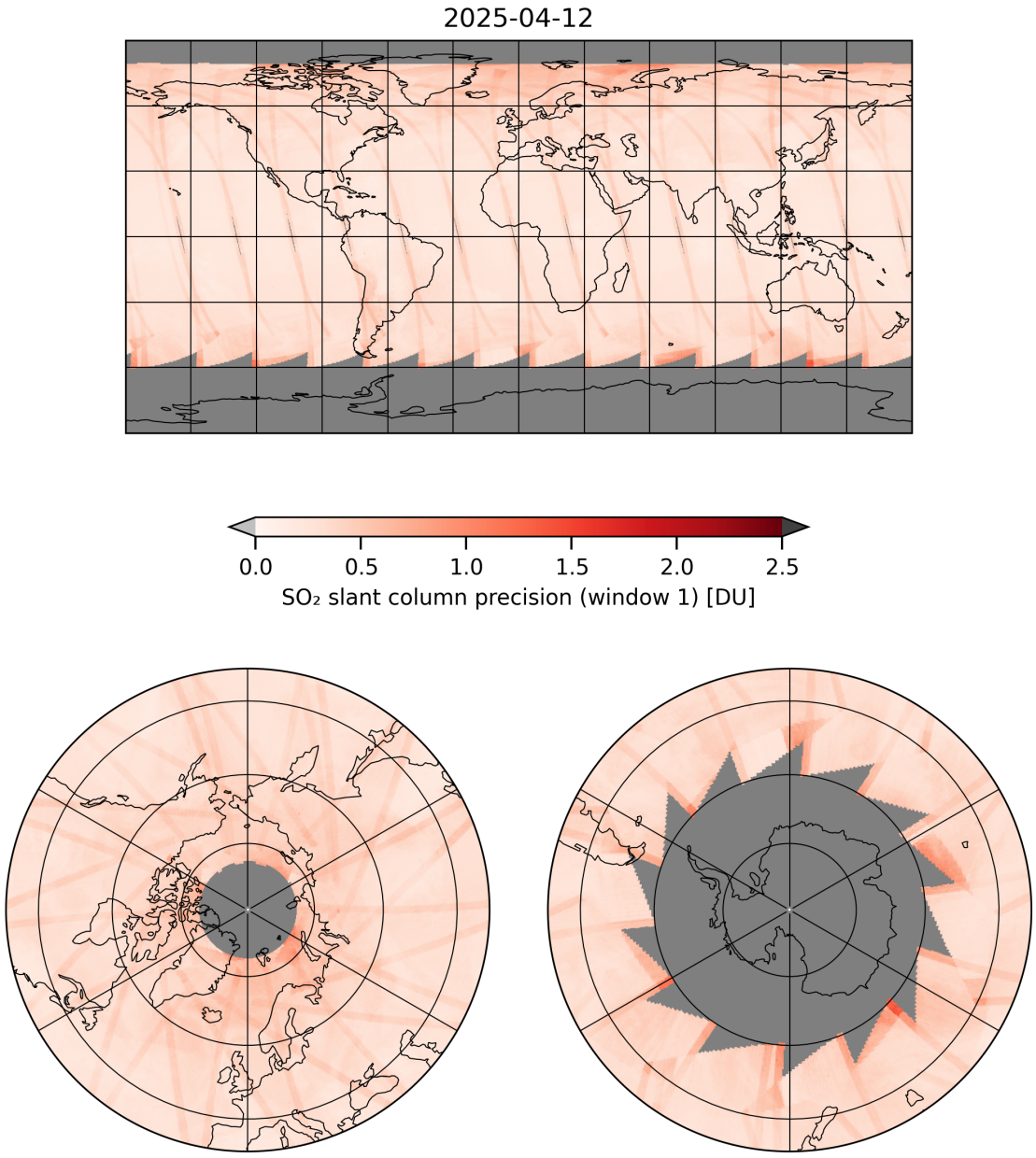

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-04-12 to 2025-04-13

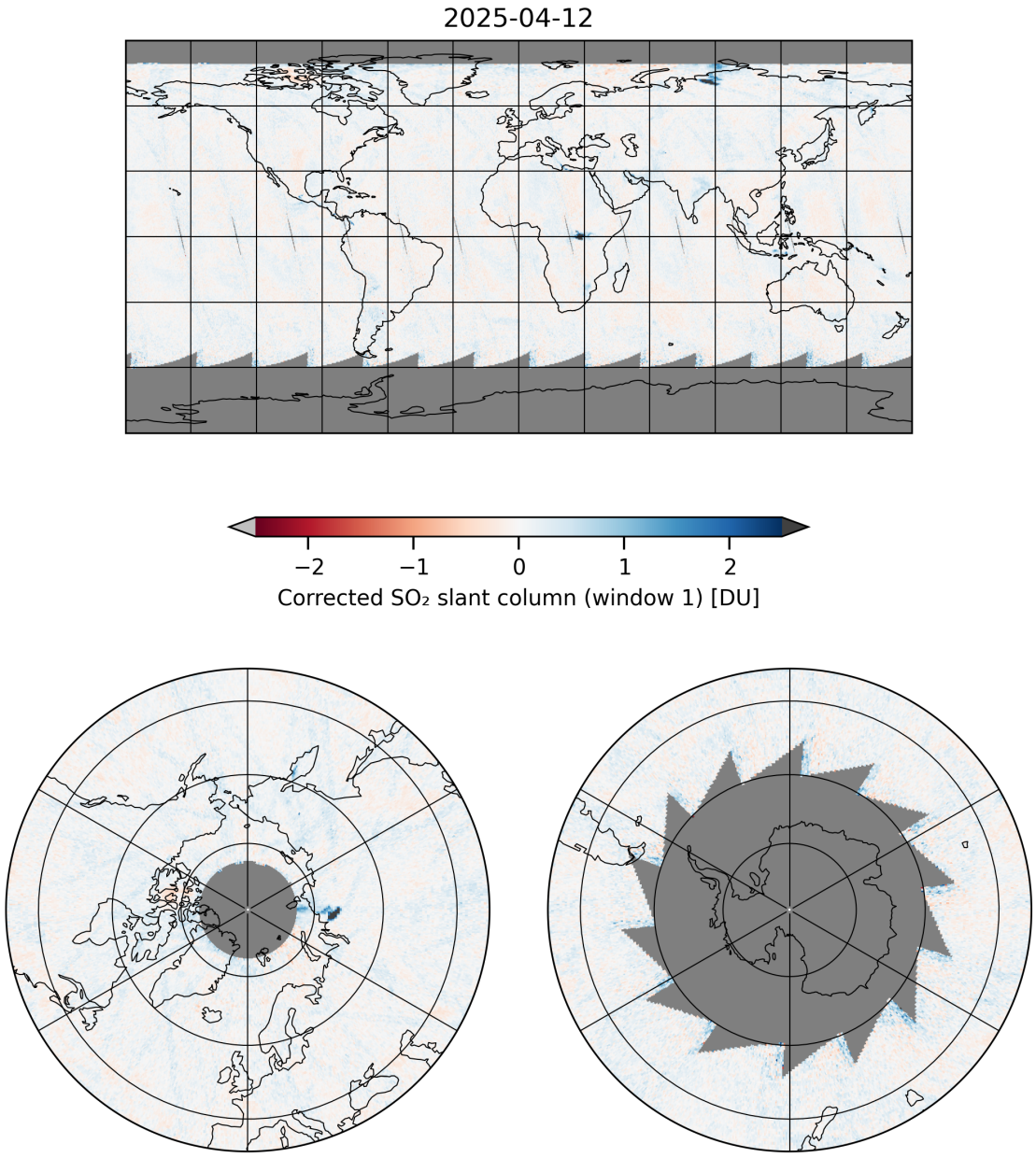

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-04-12 to 2025-04-13

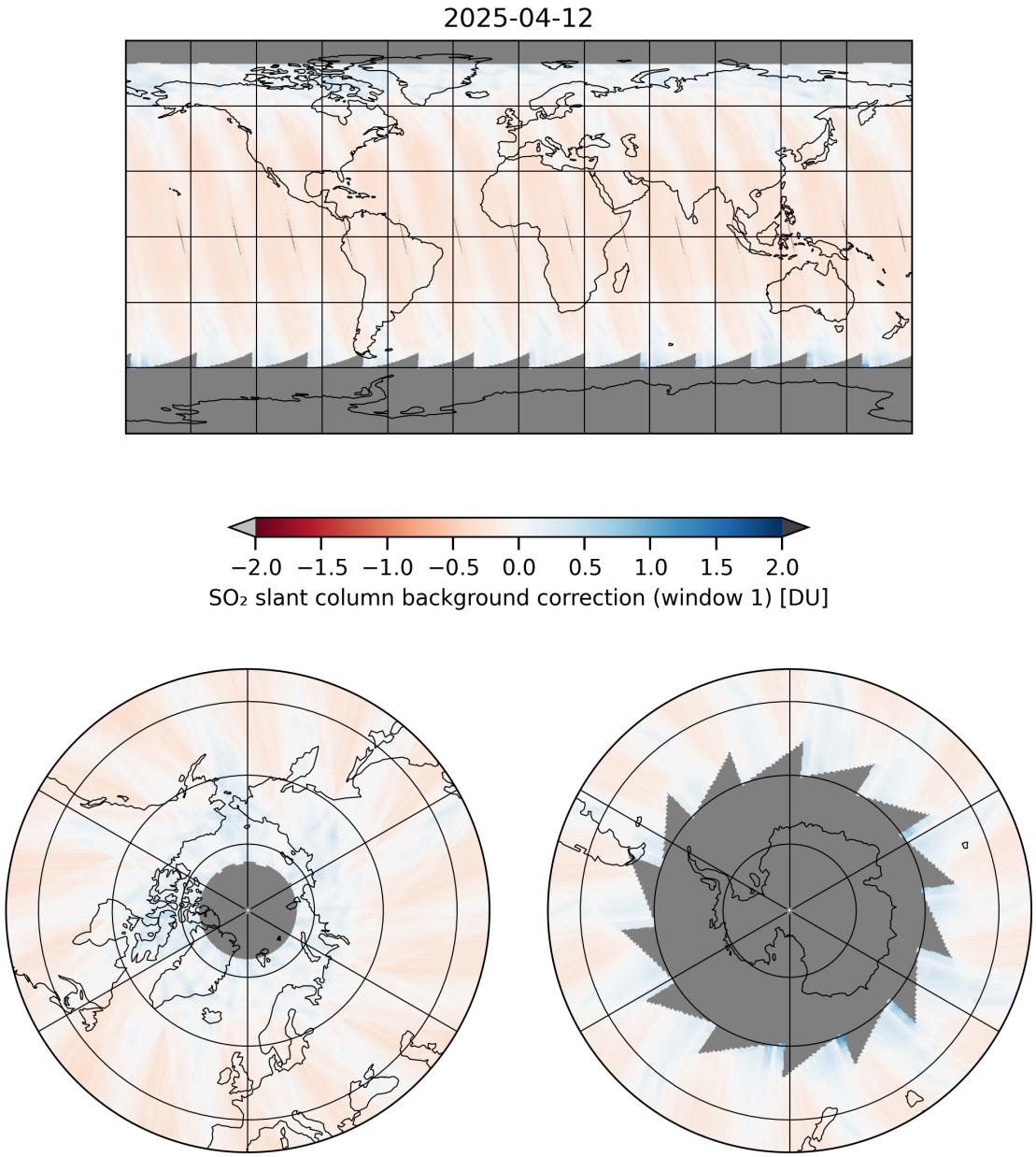

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-04-12 to 2025-04-13

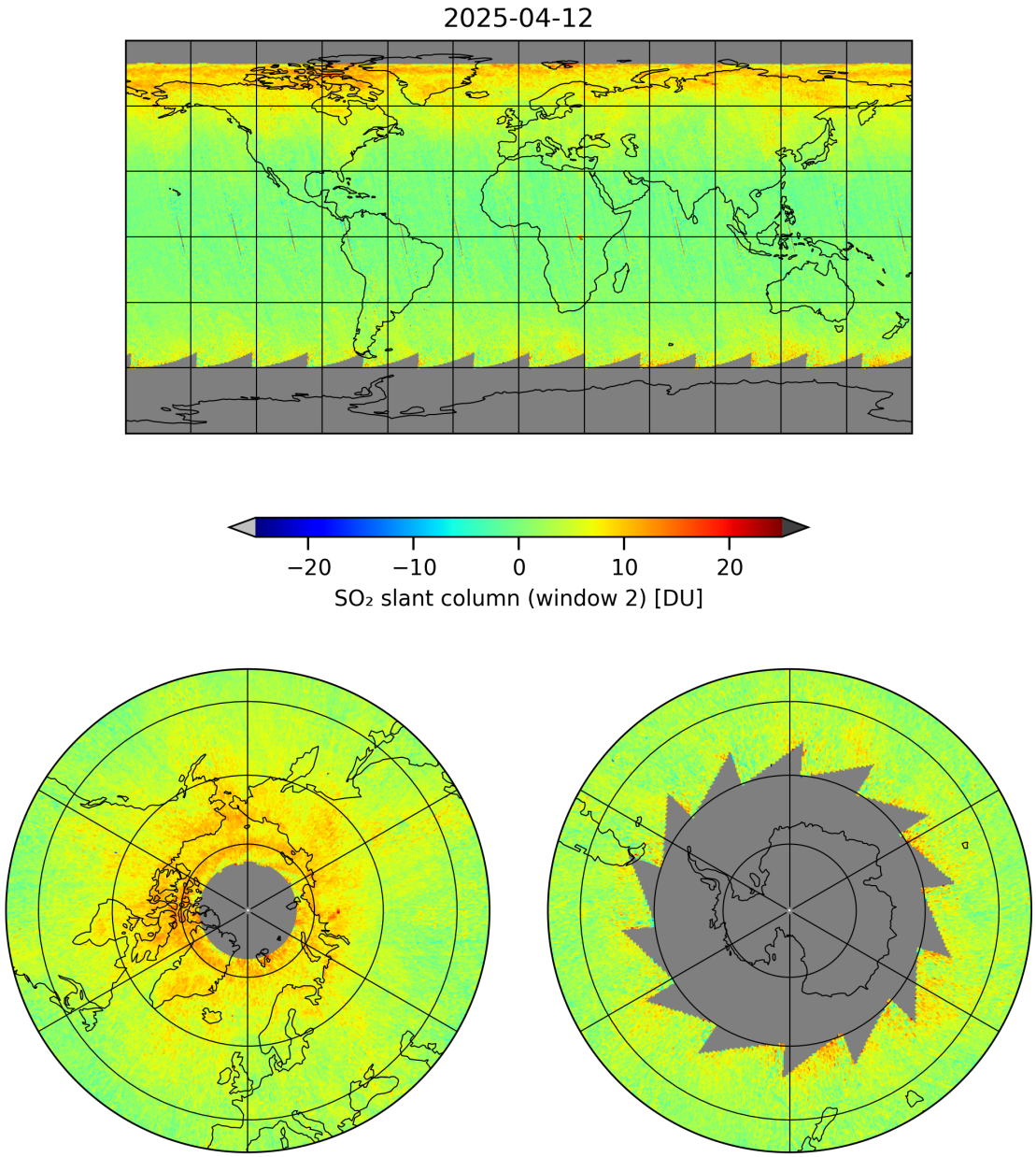

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-04-12 to 2025-04-13

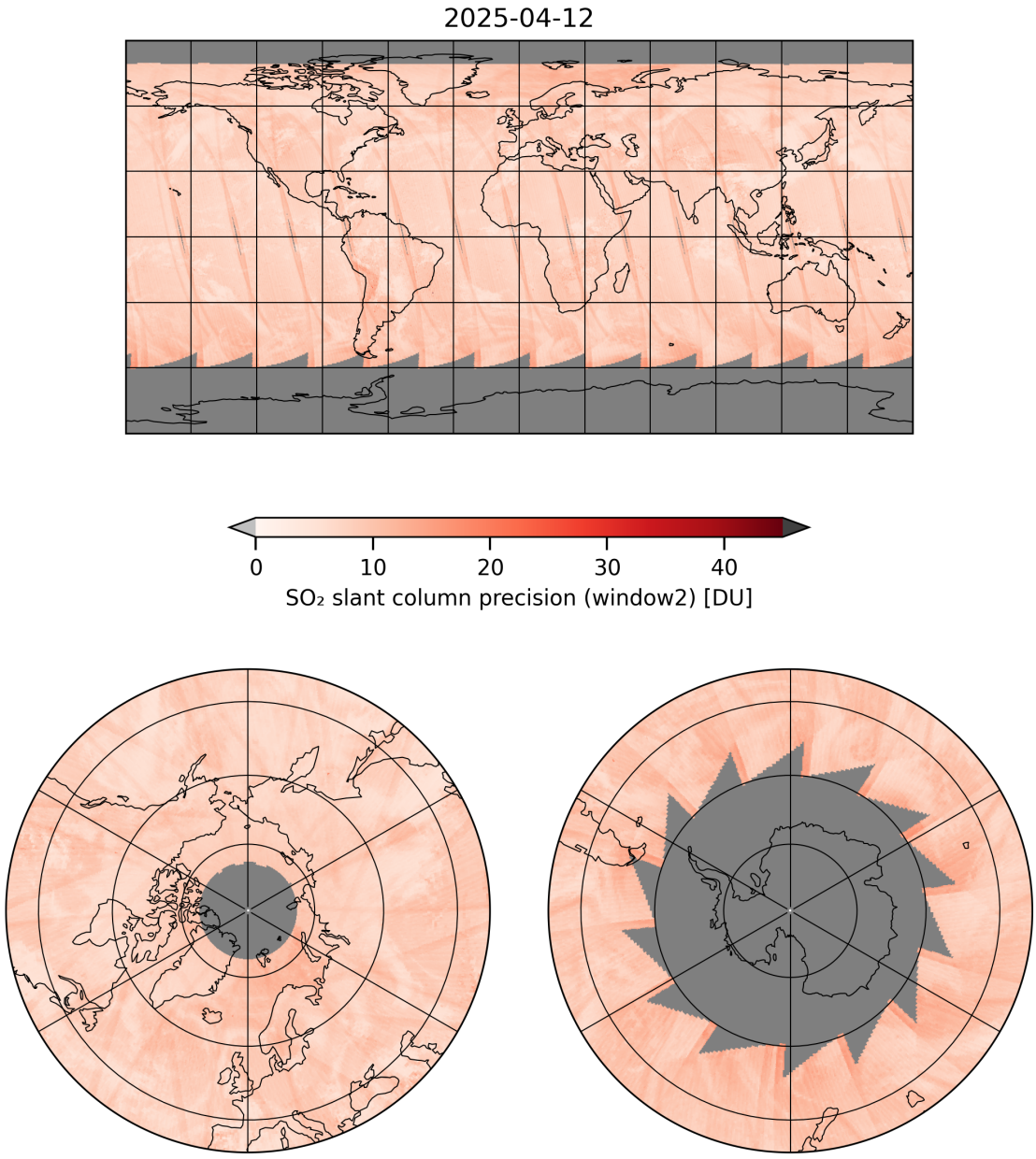

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-04-12 to 2025-04-13

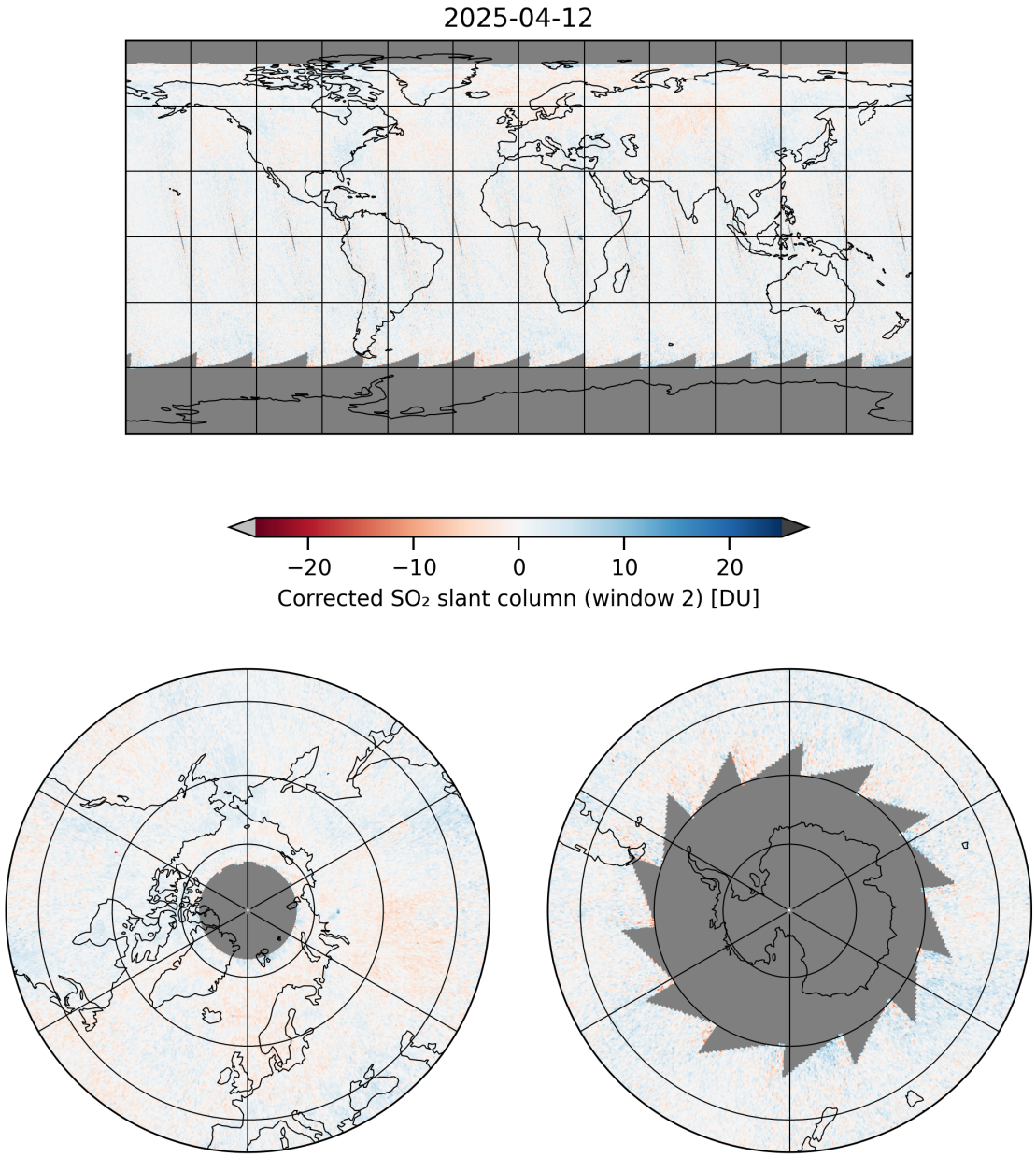

Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-04-12 to 2025-04-13

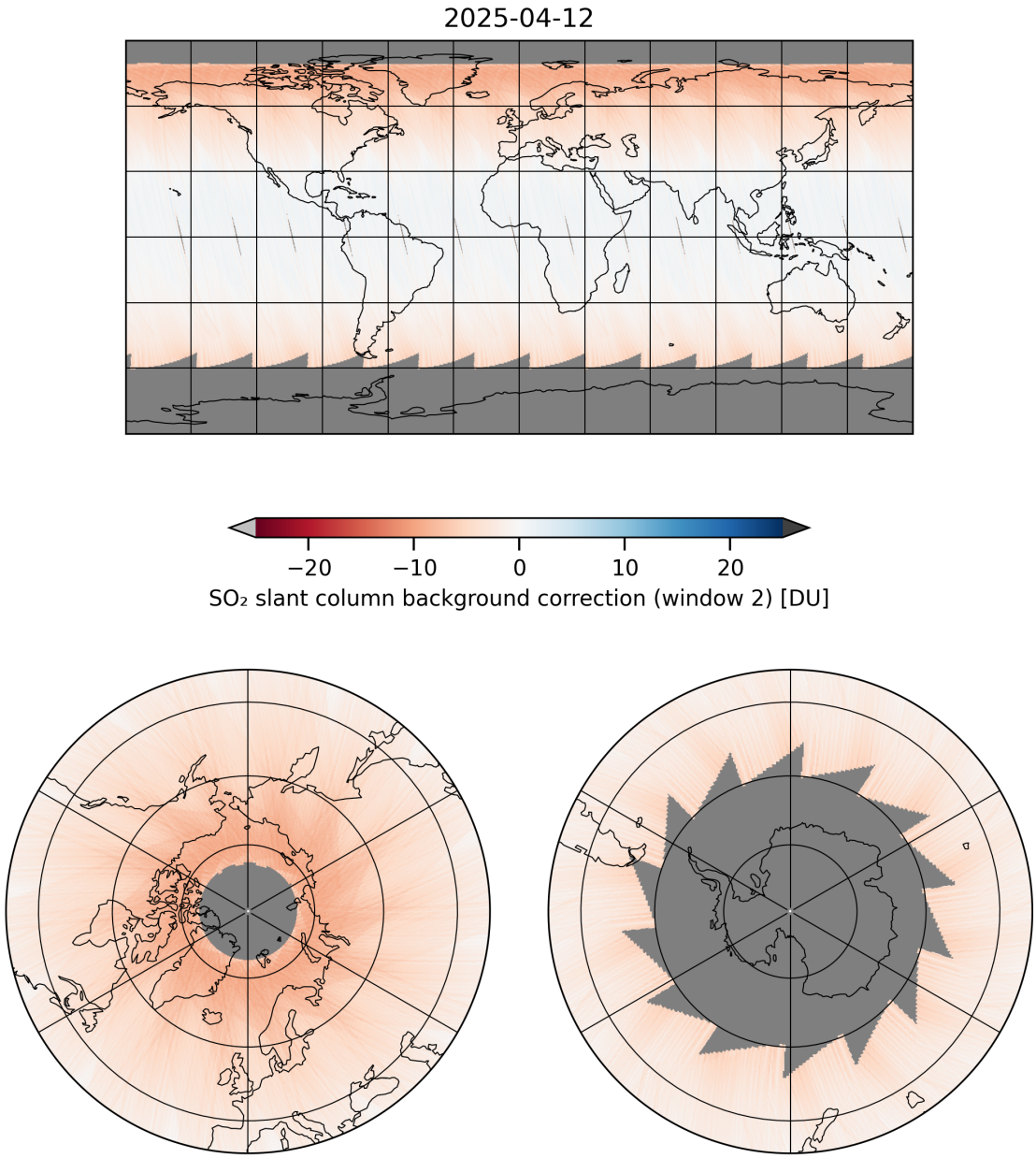

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-04-12 to 2025-04-13

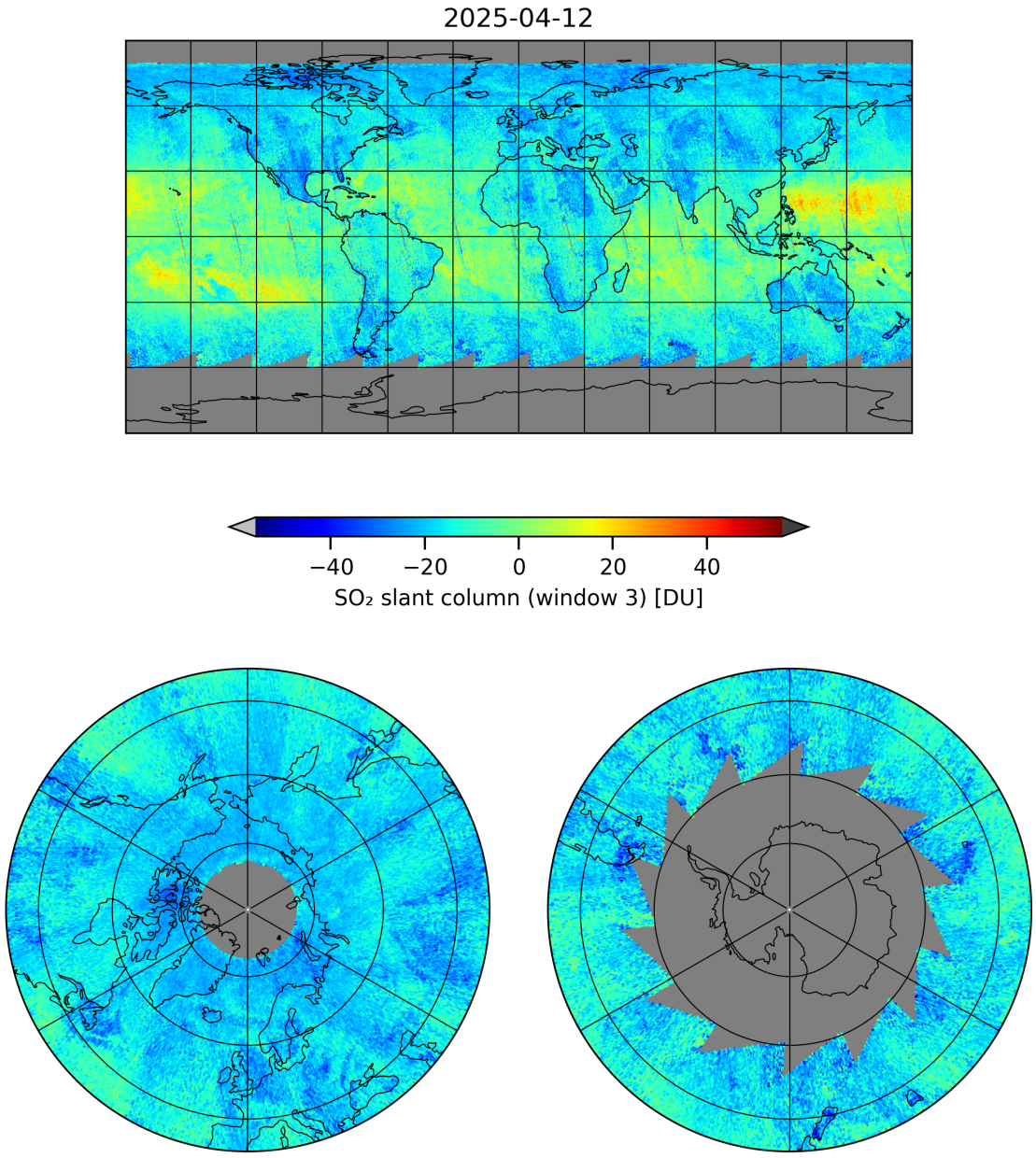

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-04-12 to 2025-04-13

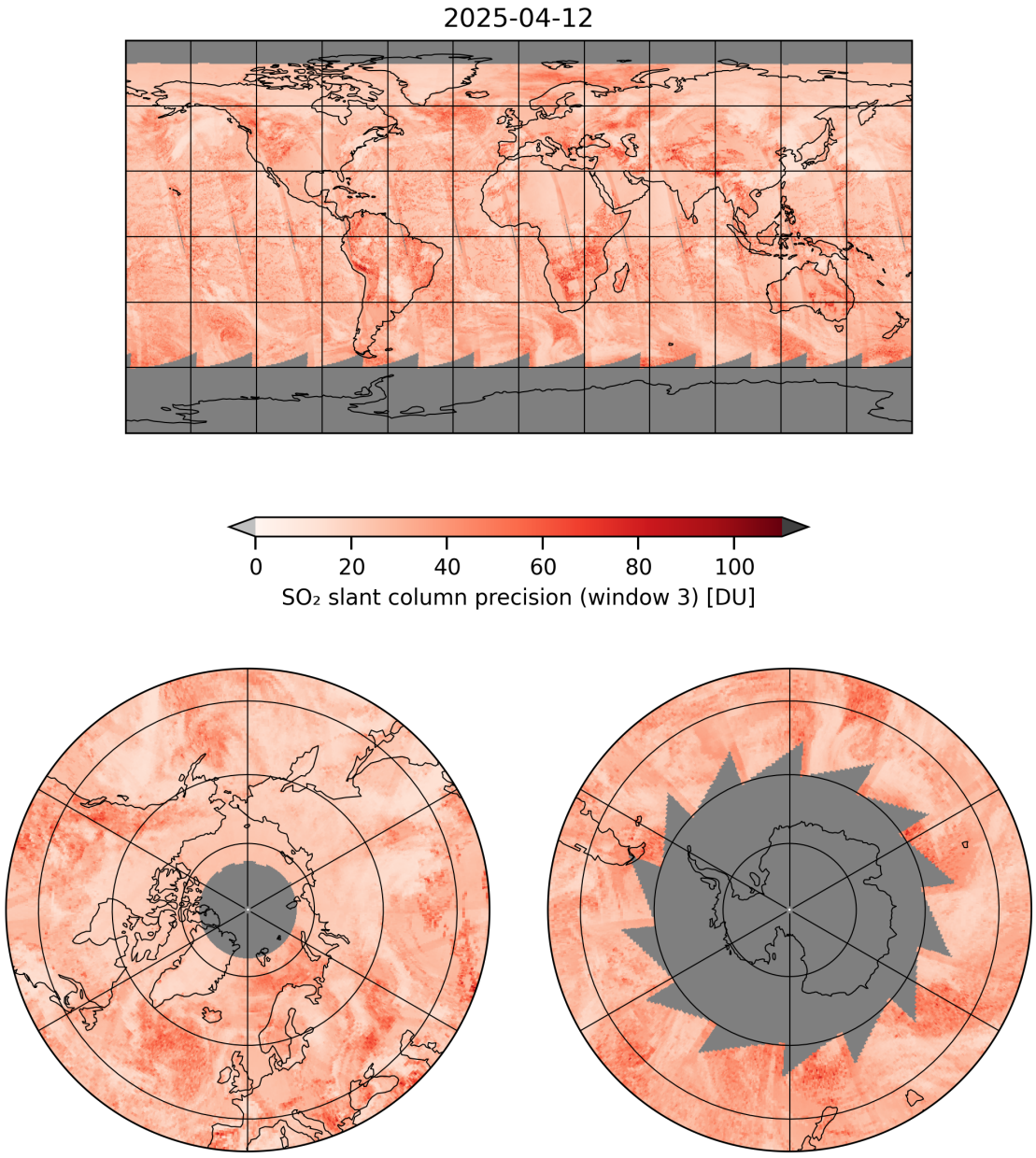

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-04-12 to 2025-04-13

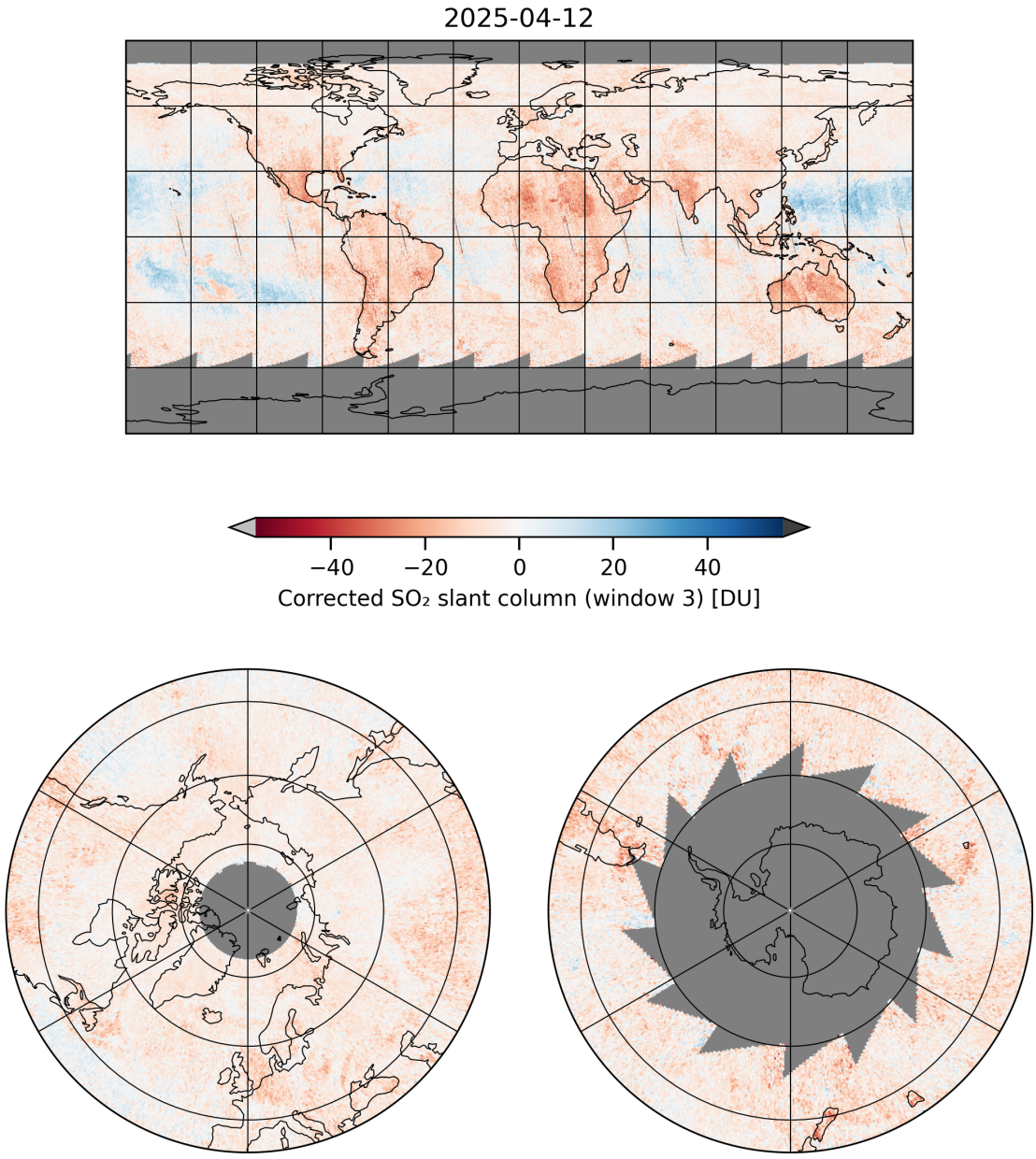

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-04-12 to 2025-04-13

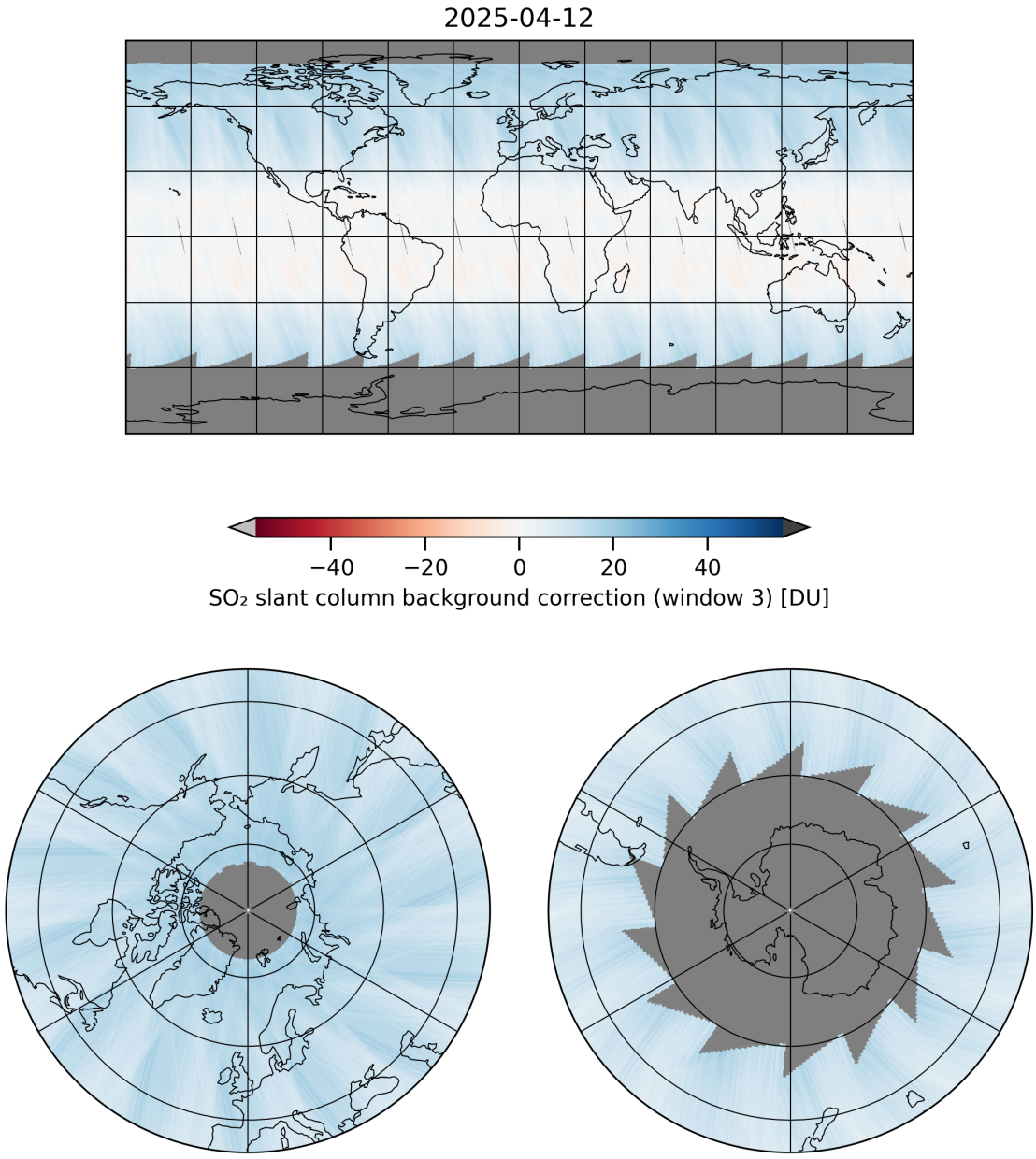

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-04-12 to 2025-04-13

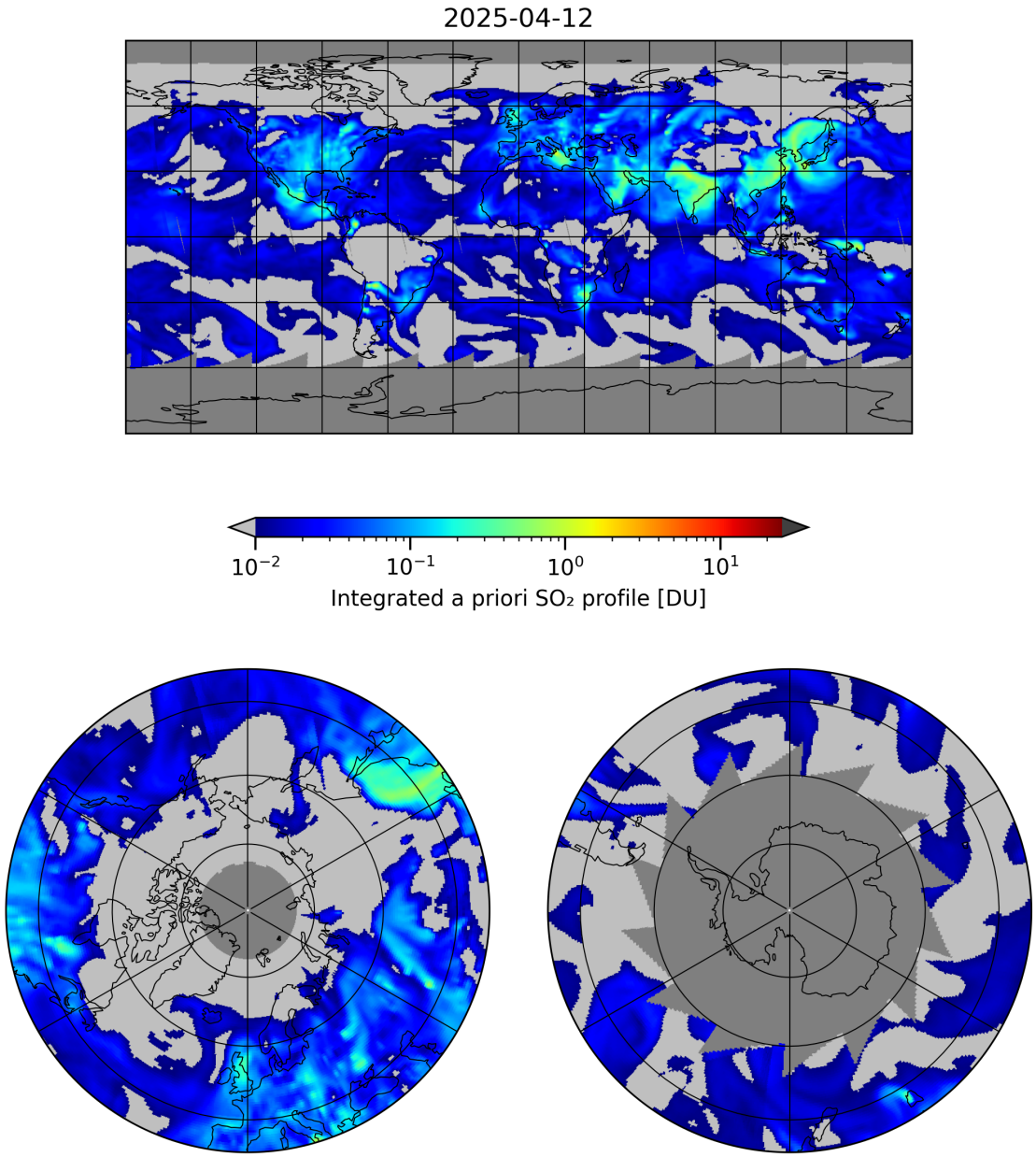

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-04-12 to 2025-04-13

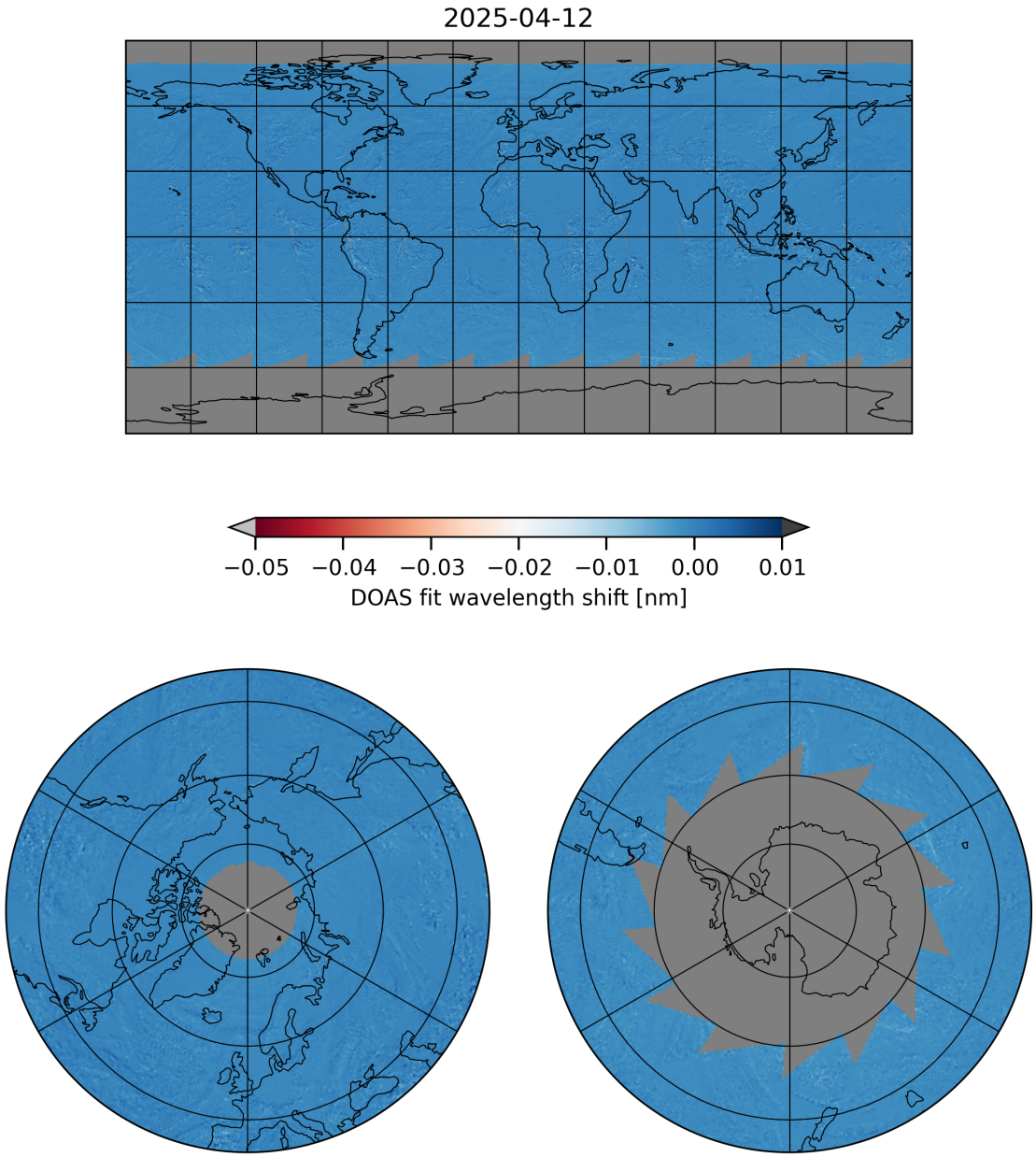

Figure 22: Map of “DOAS fit wavelength shift” for 2025-04-12 to 2025-04-13

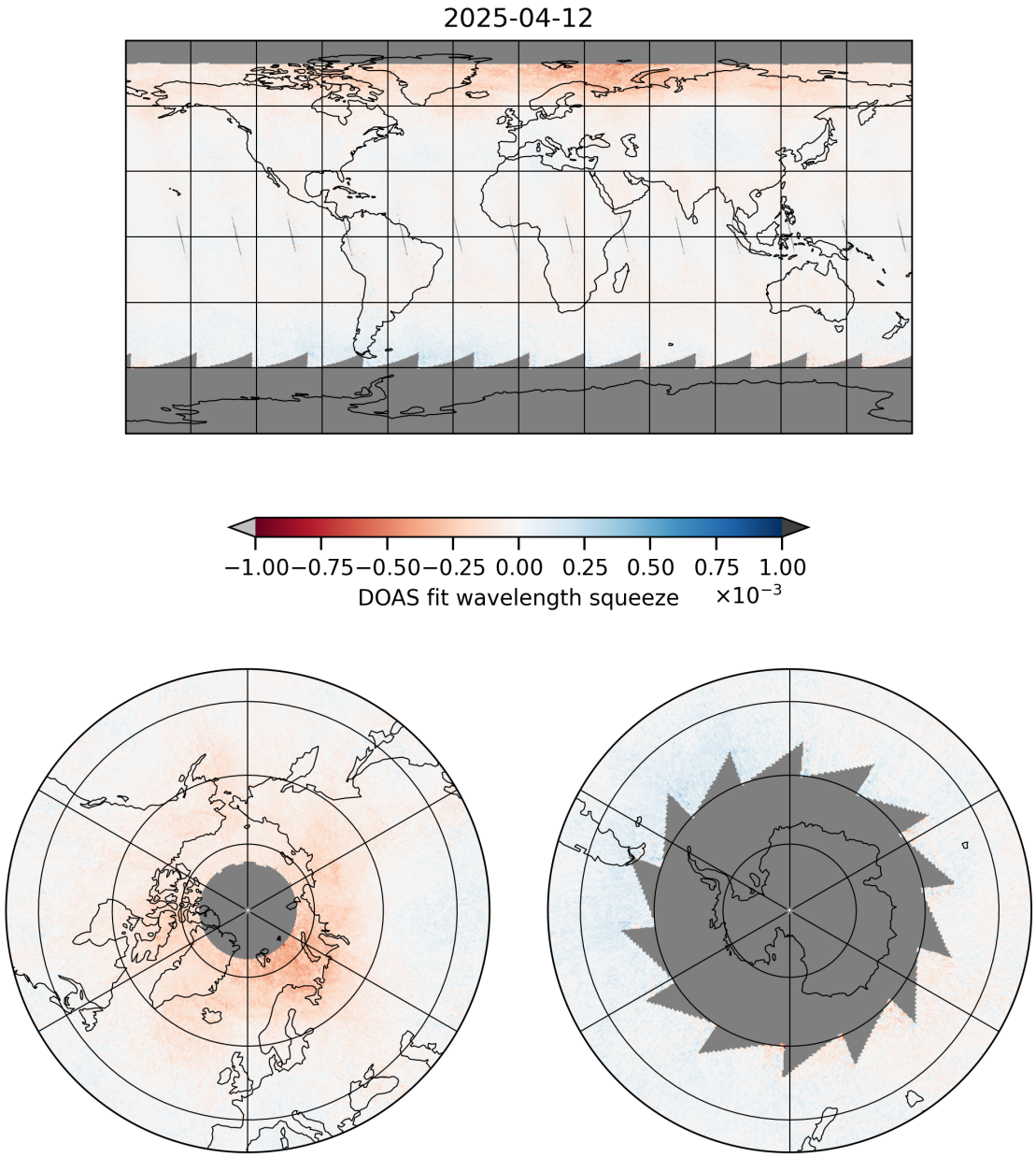

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-04-12 to 2025-04-13

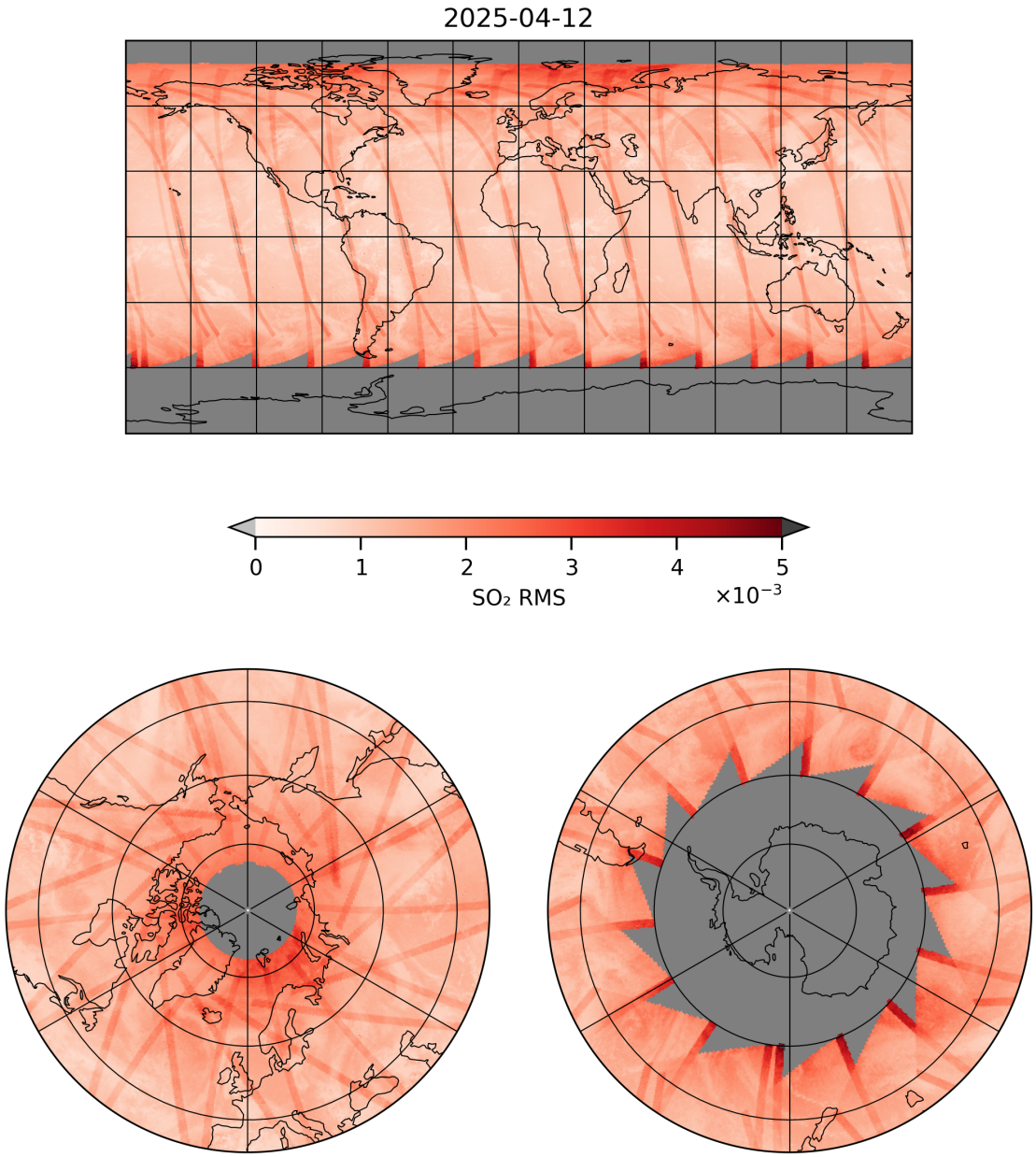

Figure 24: Map of "SO_2 RMS" for 2025-04-12 to 2025-04-13

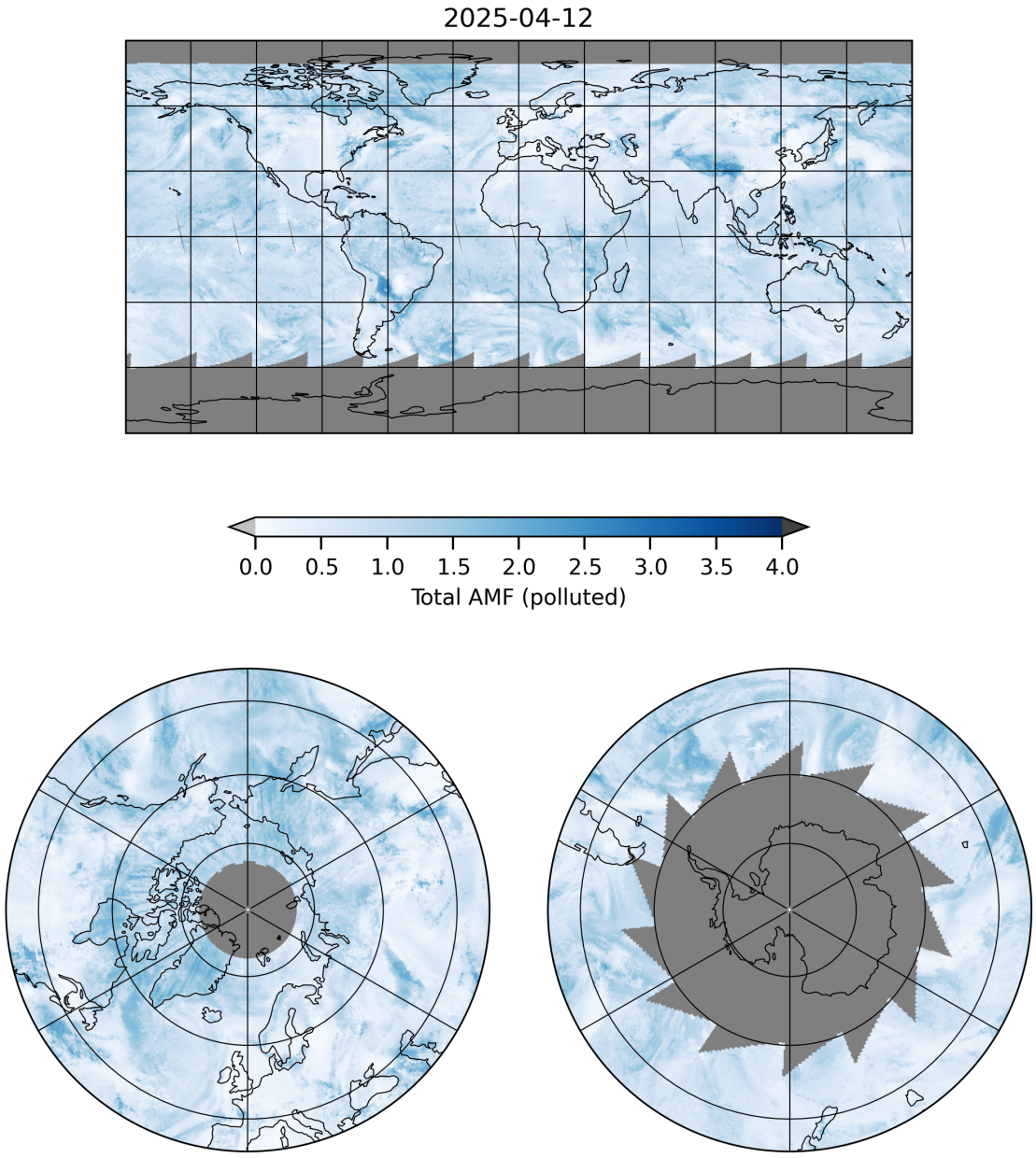

Figure 25: Map of “Total AMF (polluted)” for 2025-04-12 to 2025-04-13

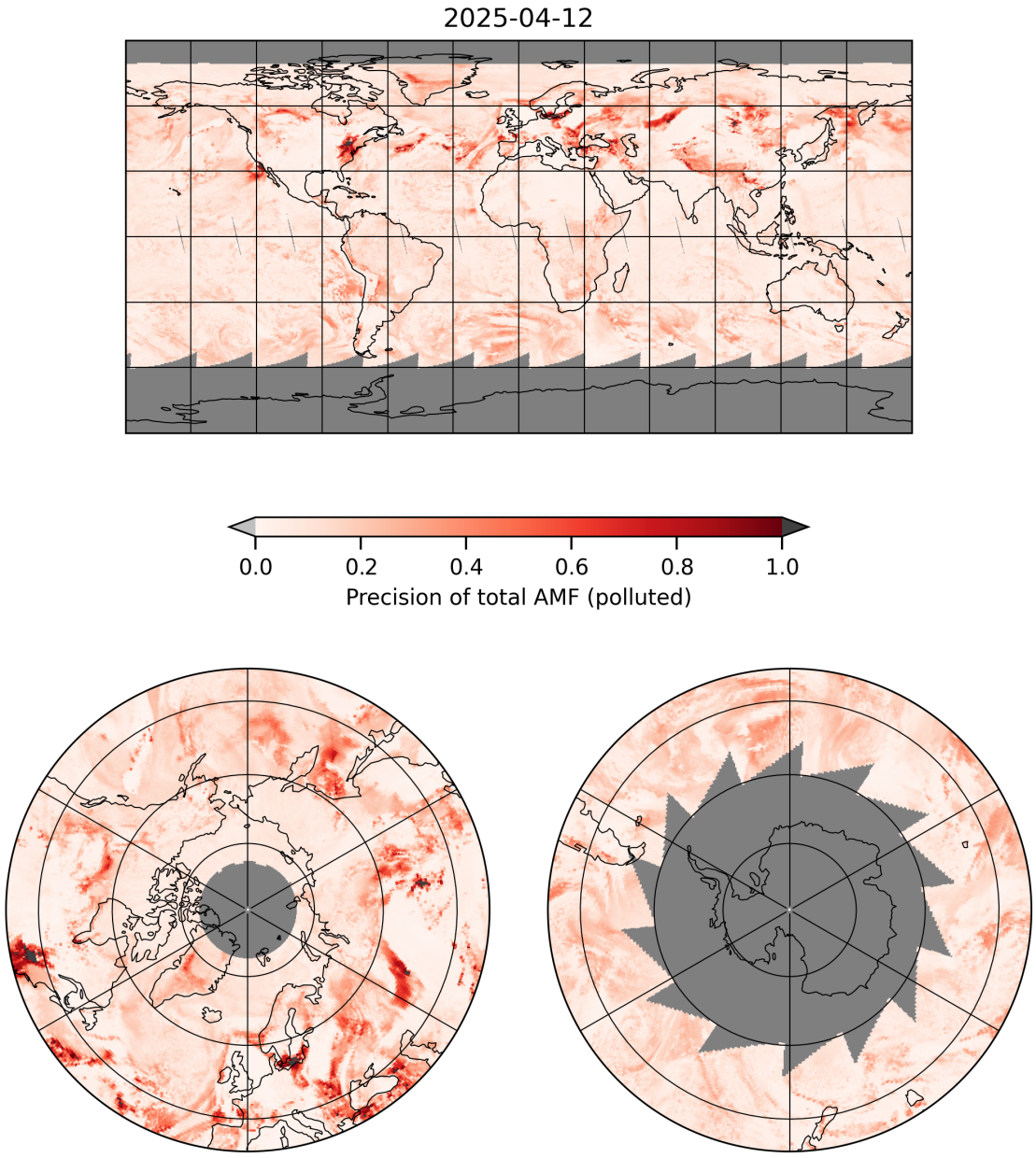

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-04-12 to 2025-04-13

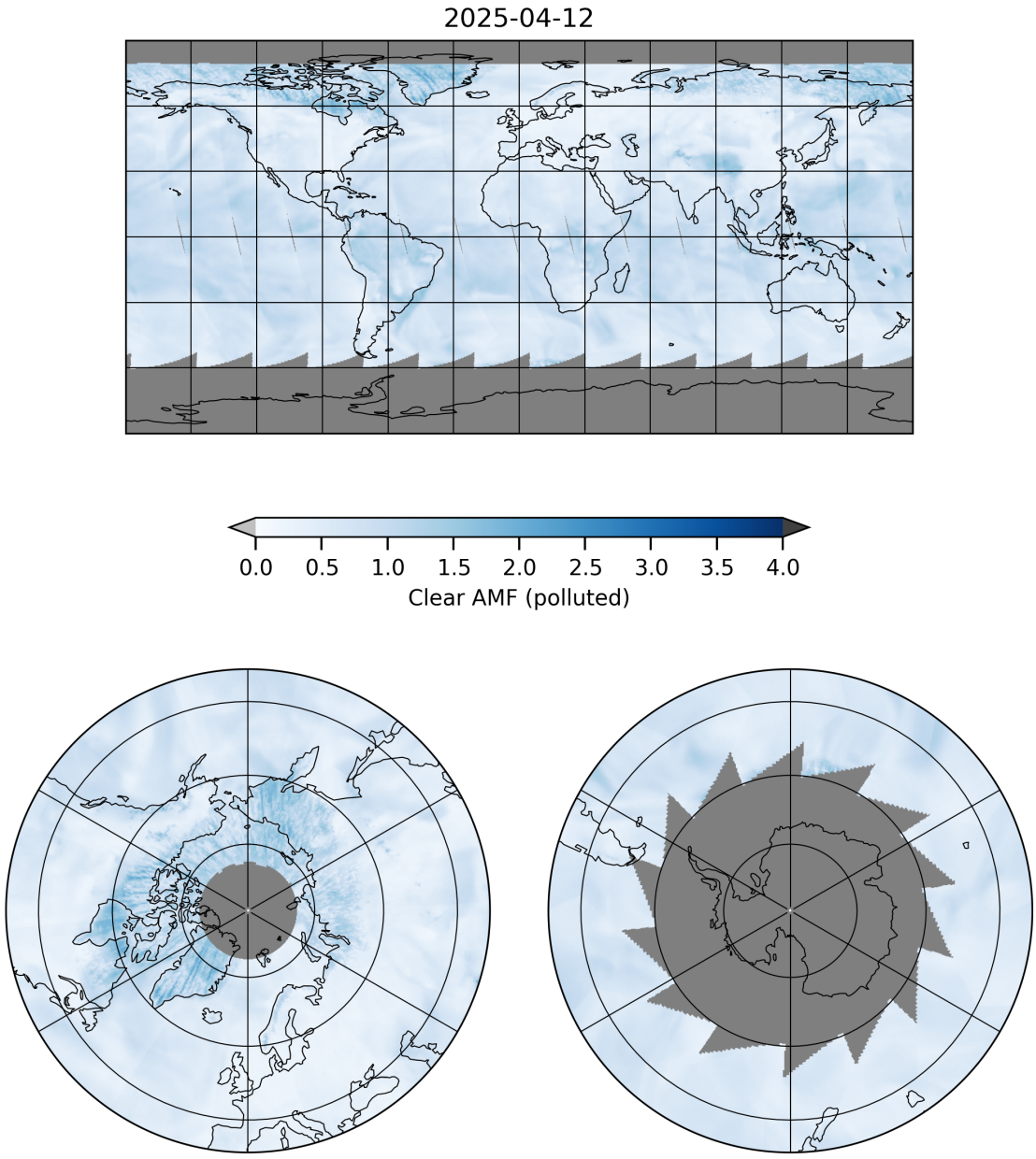

Figure 27: Map of “Clear AMF (polluted)” for 2025-04-12 to 2025-04-13

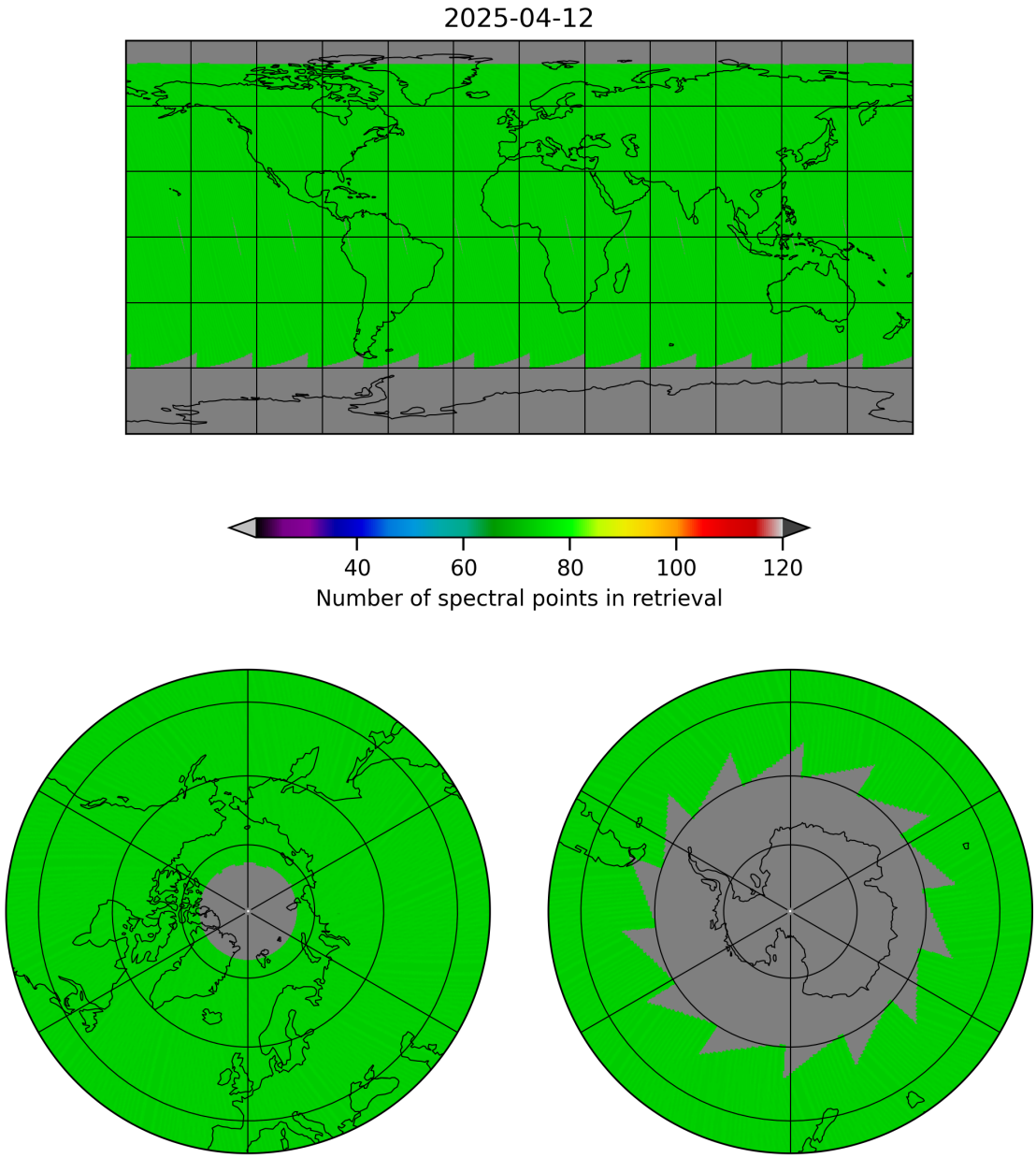

Figure 28: Map of “Number of spectral points in retrieval” for 2025-04-12 to 2025-04-13

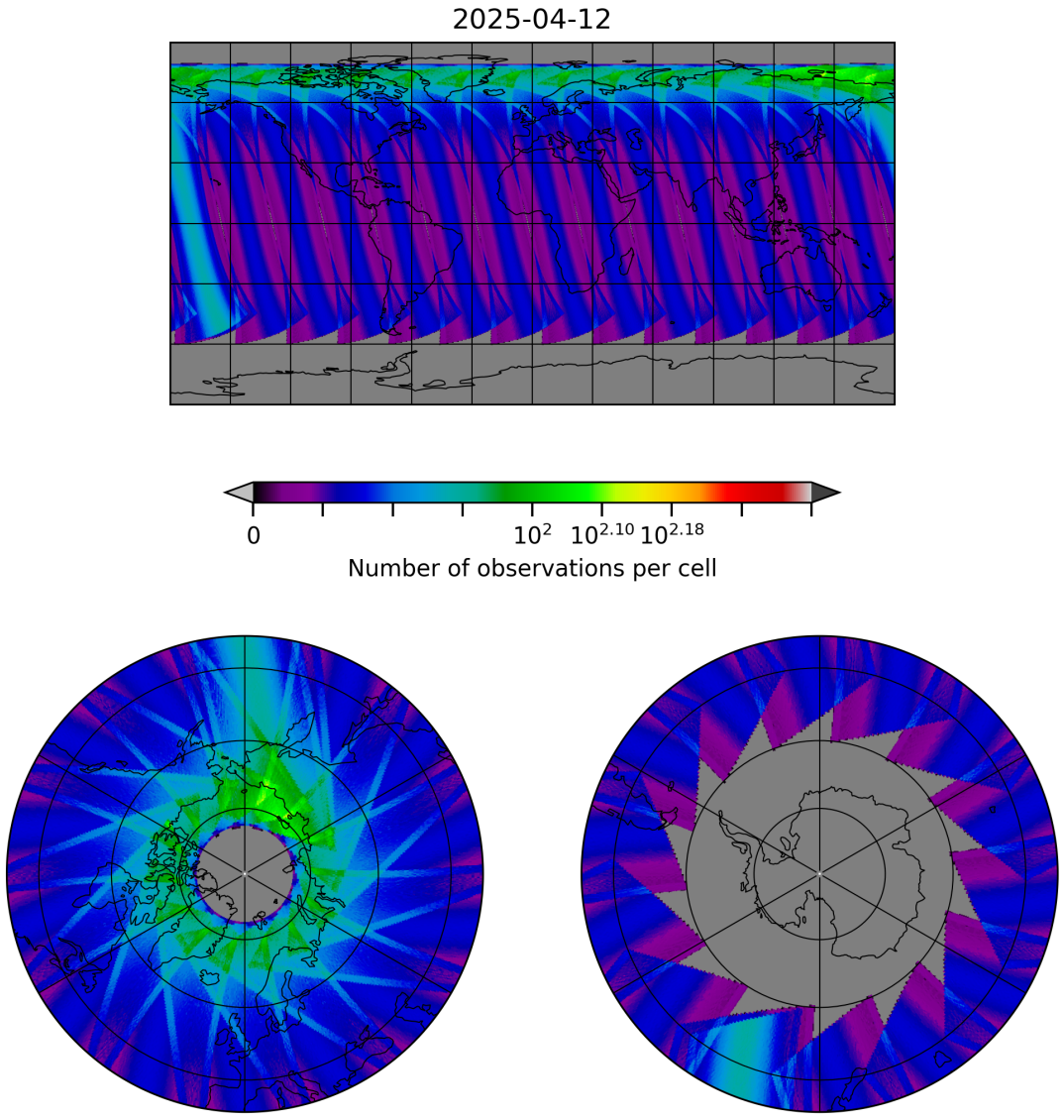

Figure 29: Map of the number of observations for 2025-04-12 to 2025-04-13

7 Zonal average

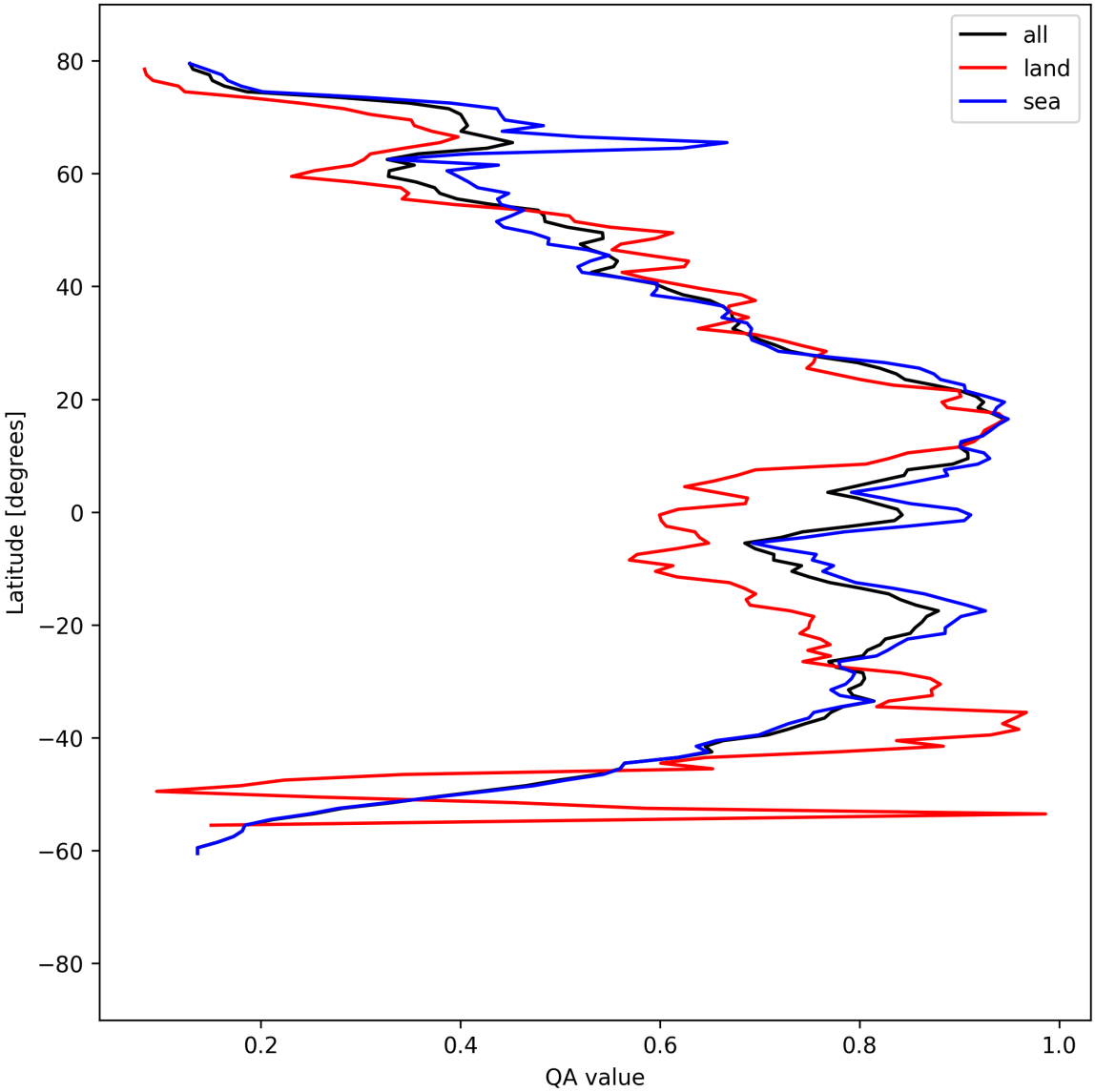

Figure 30: Zonal average of “QA value” for 2025-04-12 to 2025-04-13.

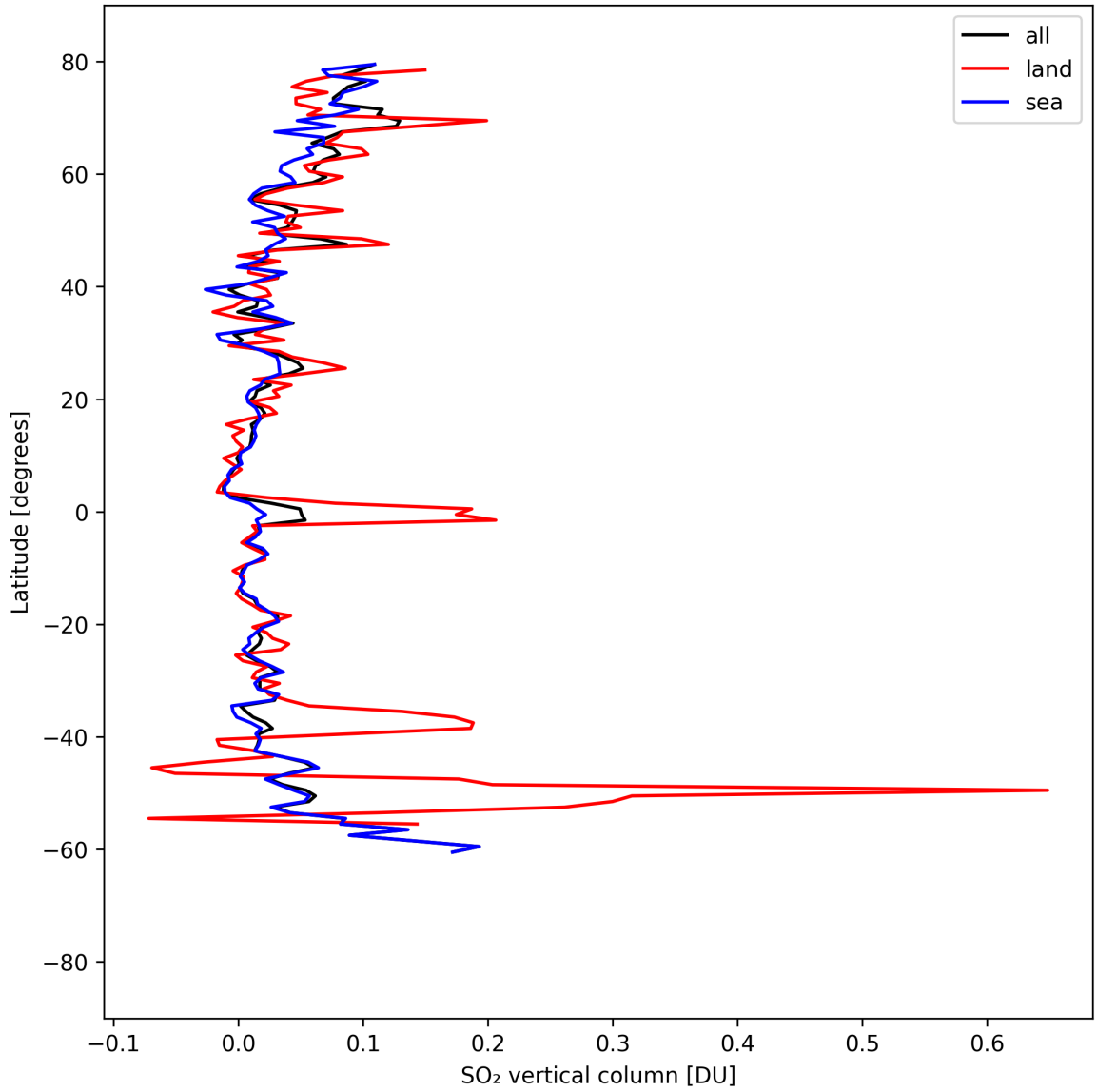

Figure 31: Zonal average of "SO_2 vertical column" for 2025-04-12 to 2025-04-13.

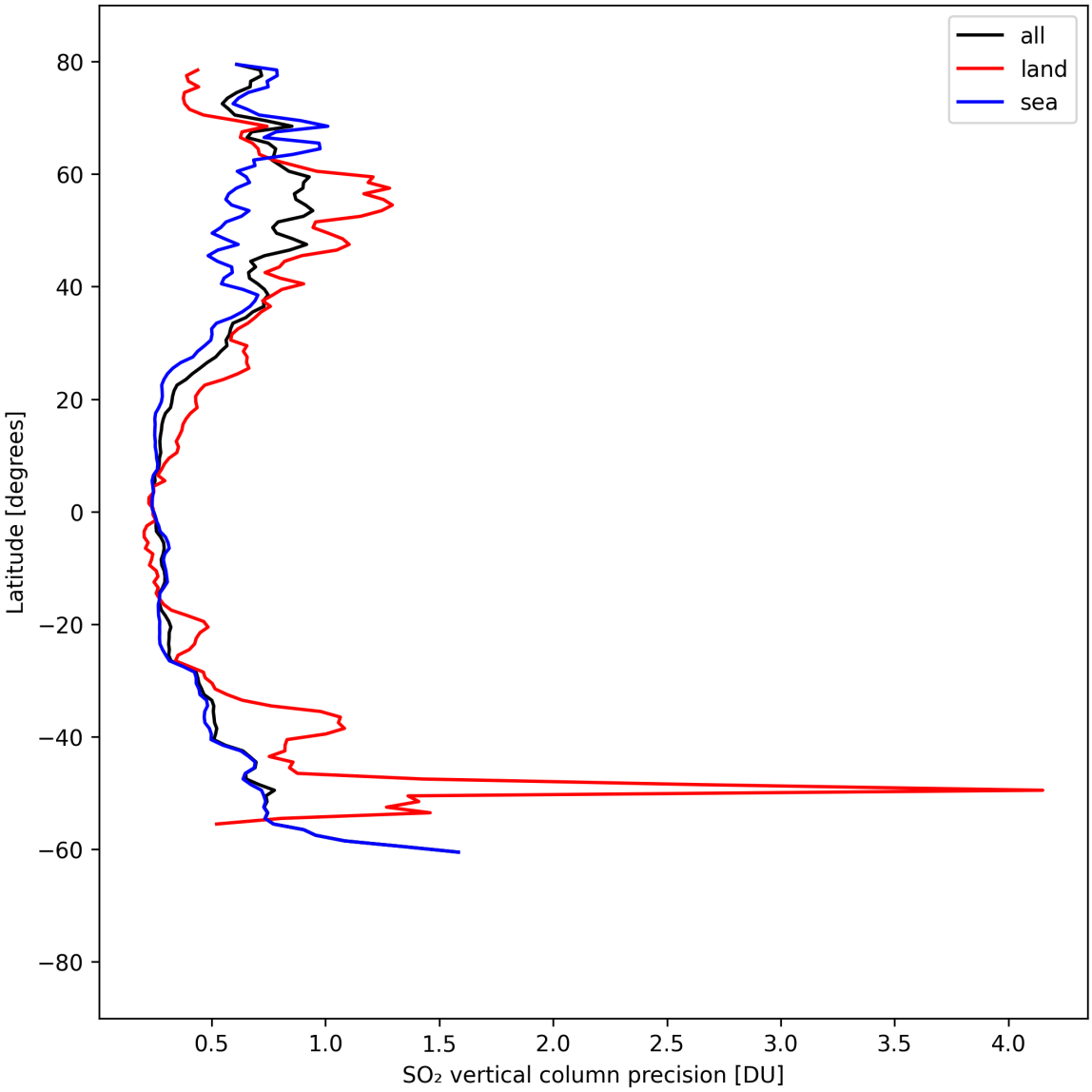

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-04-12 to 2025-04-13.

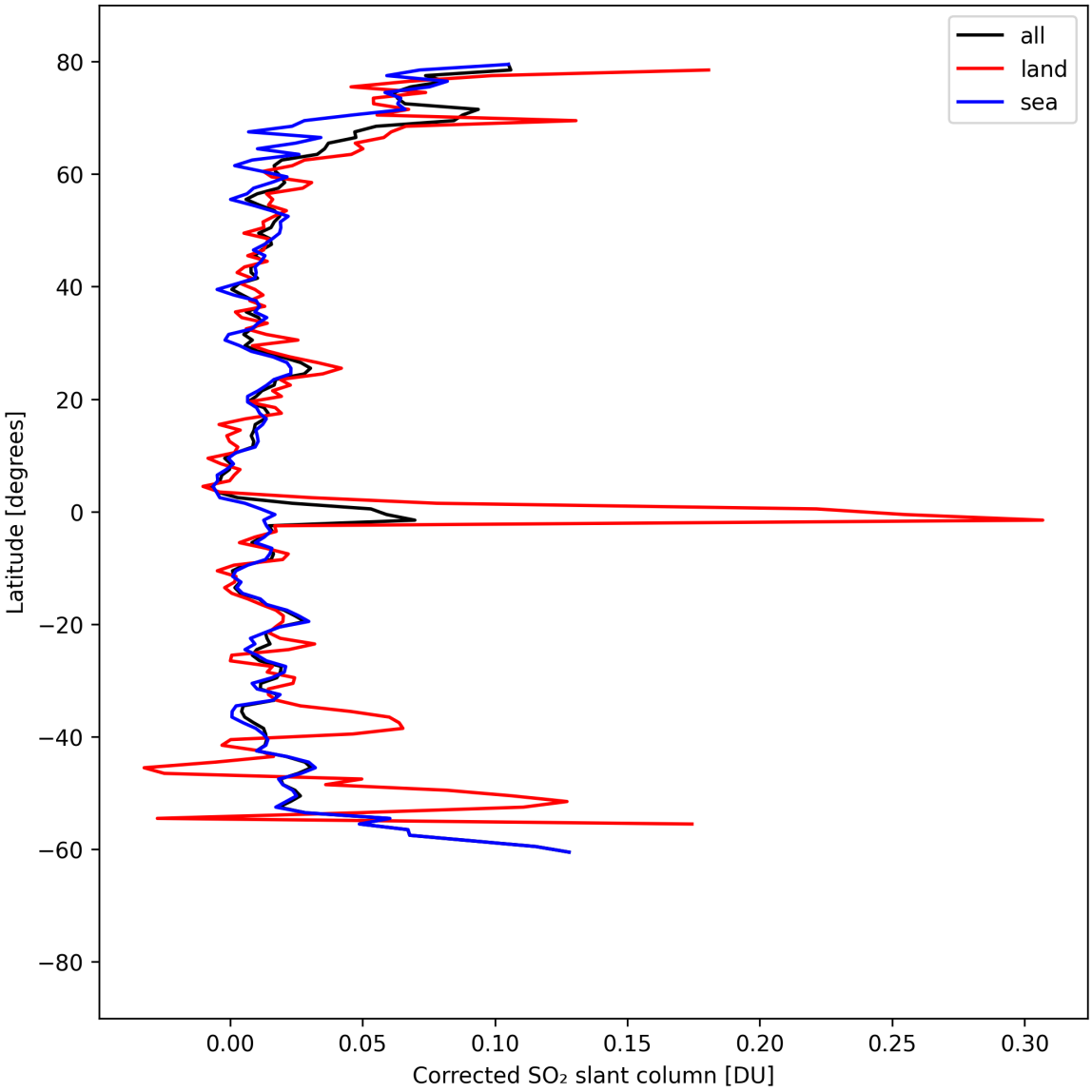

Figure 33: Zonal average of "Corrected SO_2 slant column" for 2025-04-12 to 2025-04-13.

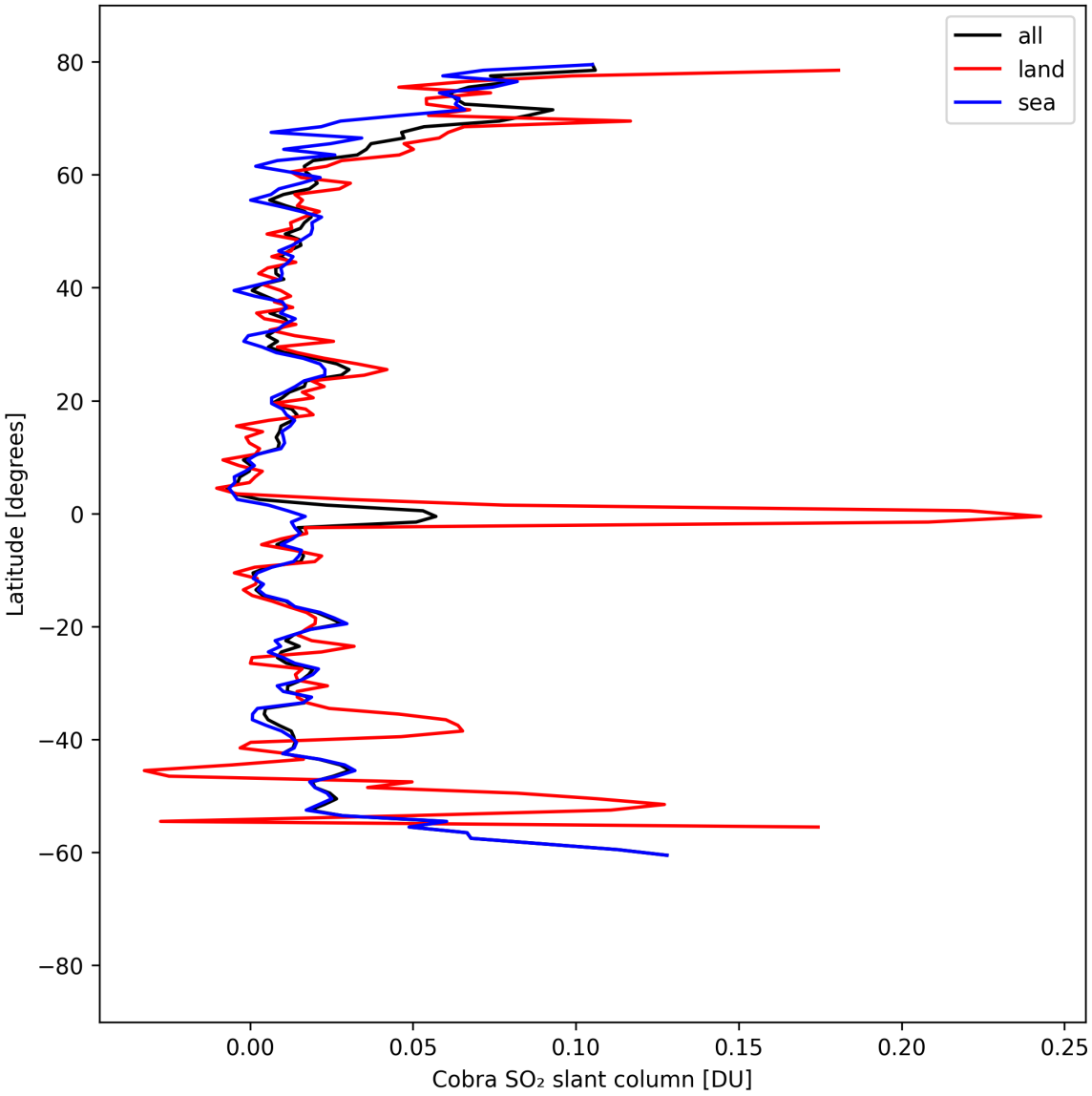

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-04-12 to 2025-04-13.

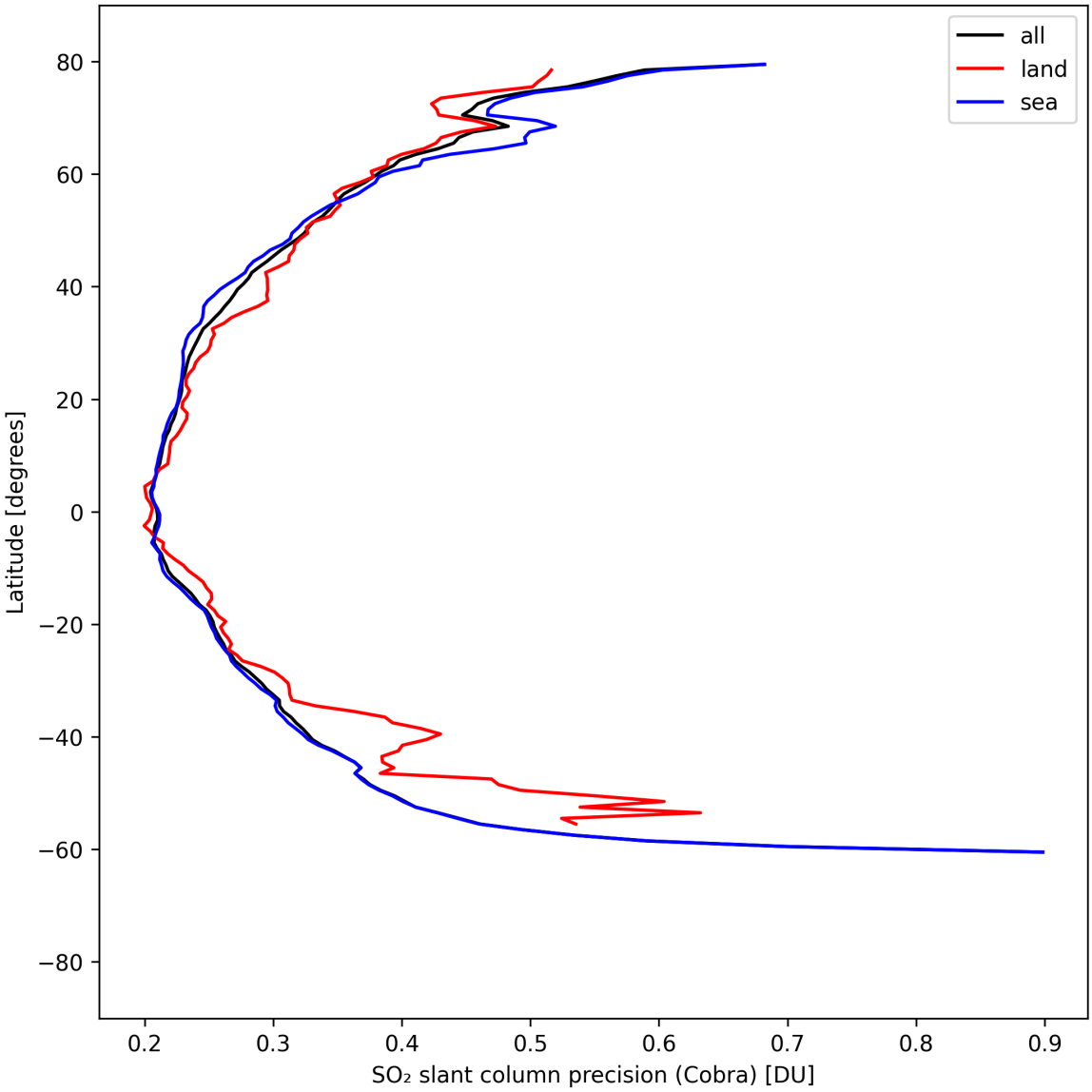

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-04-12 to 2025-04-13.

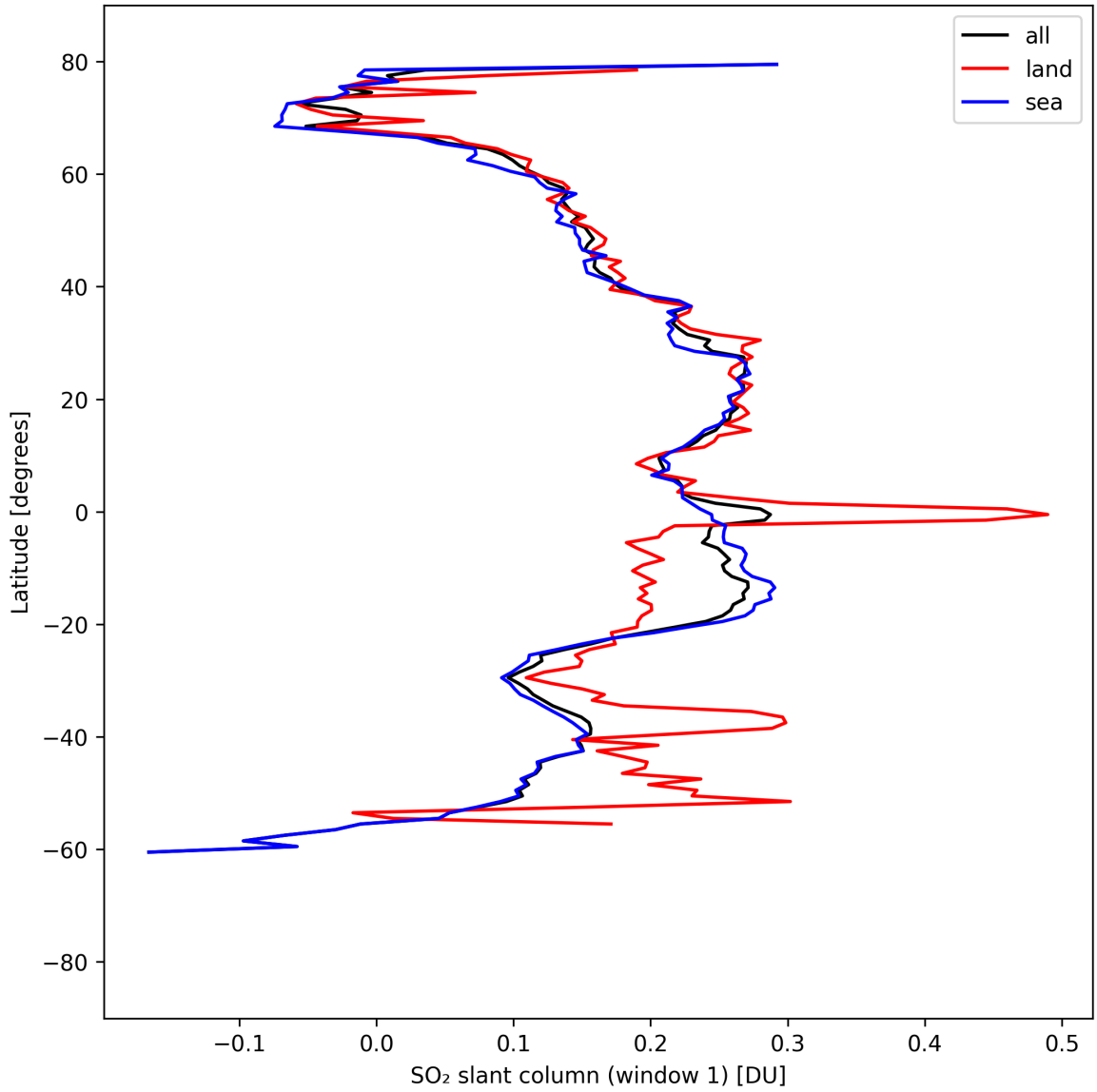

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-04-12 to 2025-04-13.

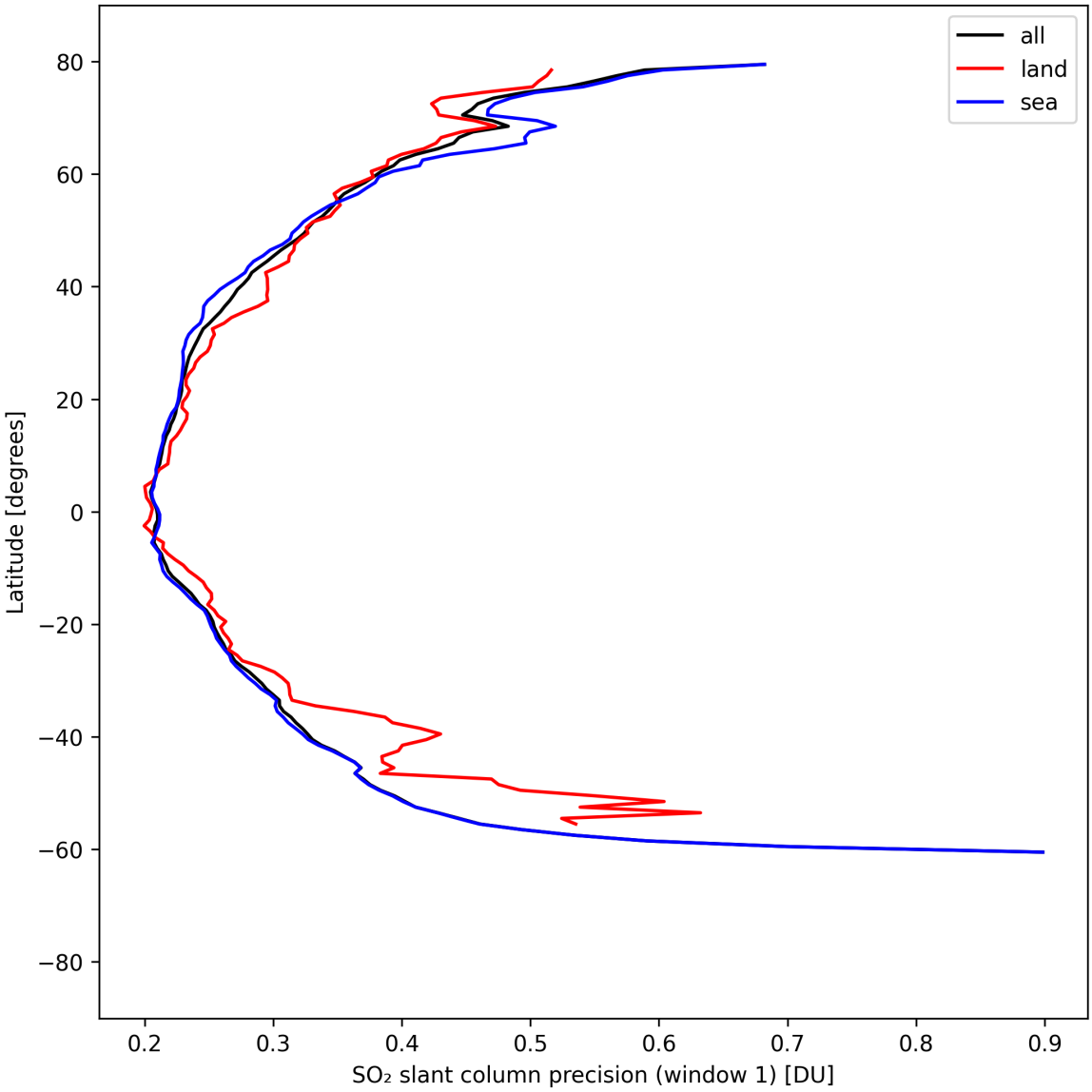

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-04-12 to 2025-04-13.

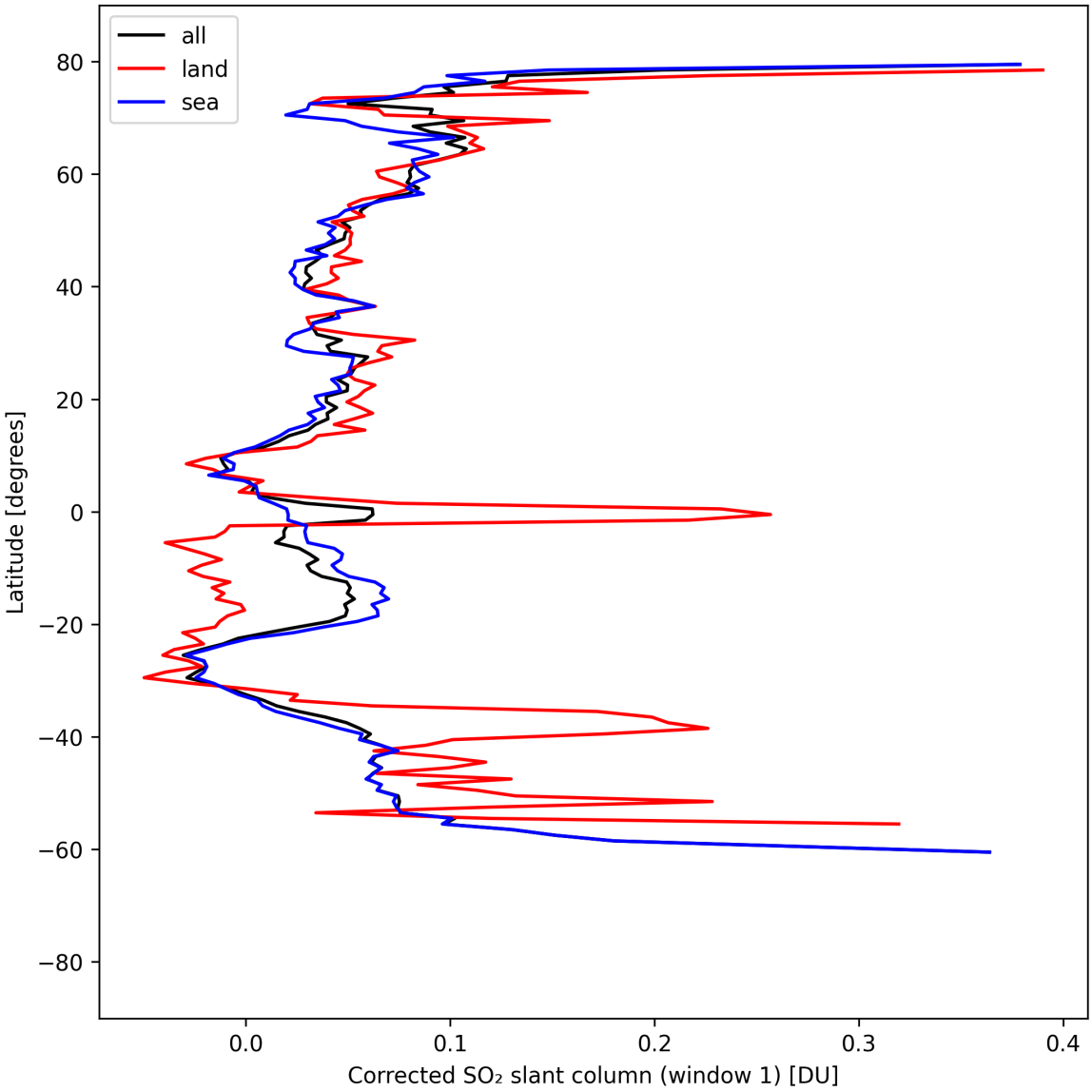

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-04-12 to 2025-04-13.

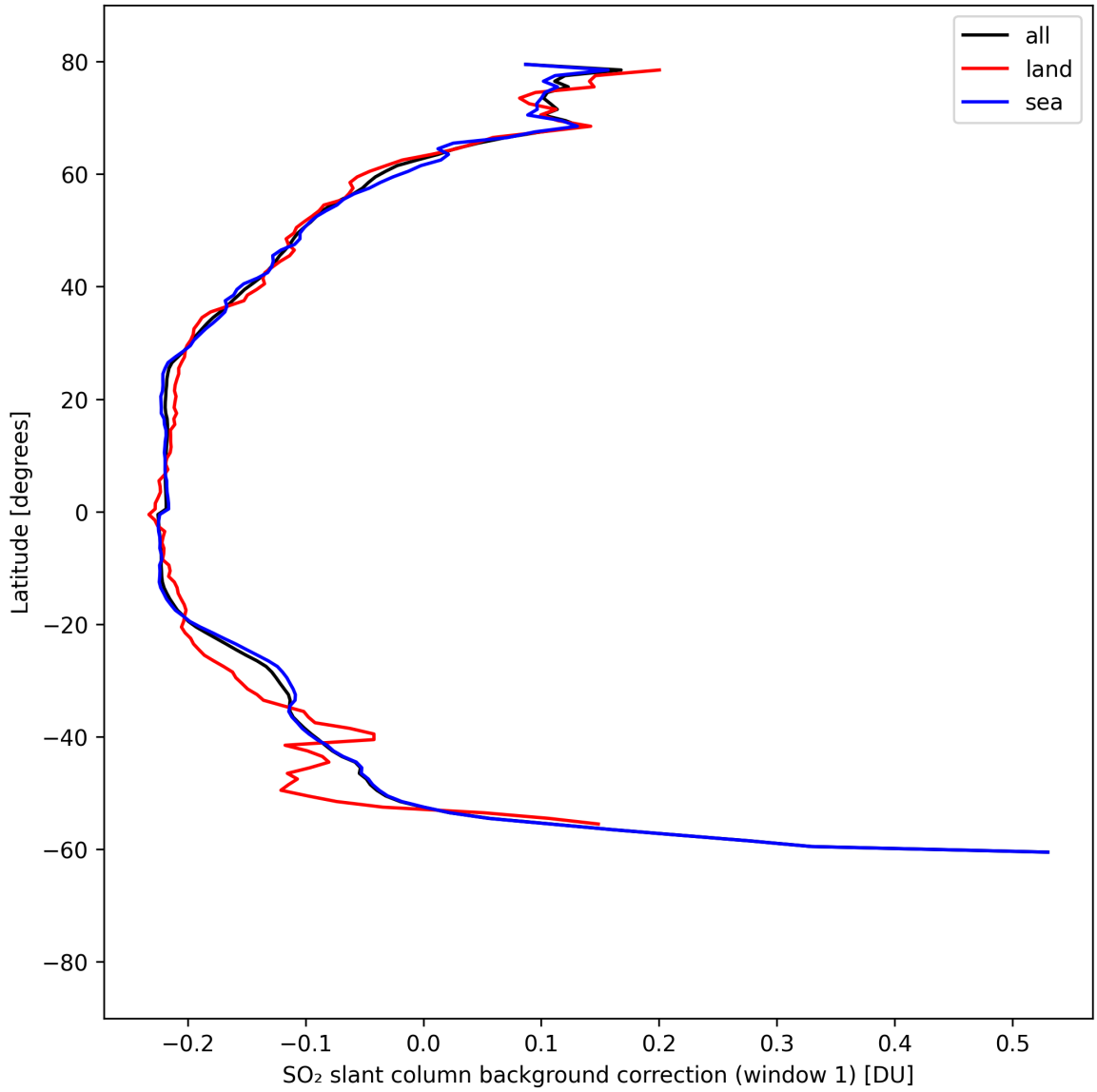

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-04-12 to 2025-04-13.

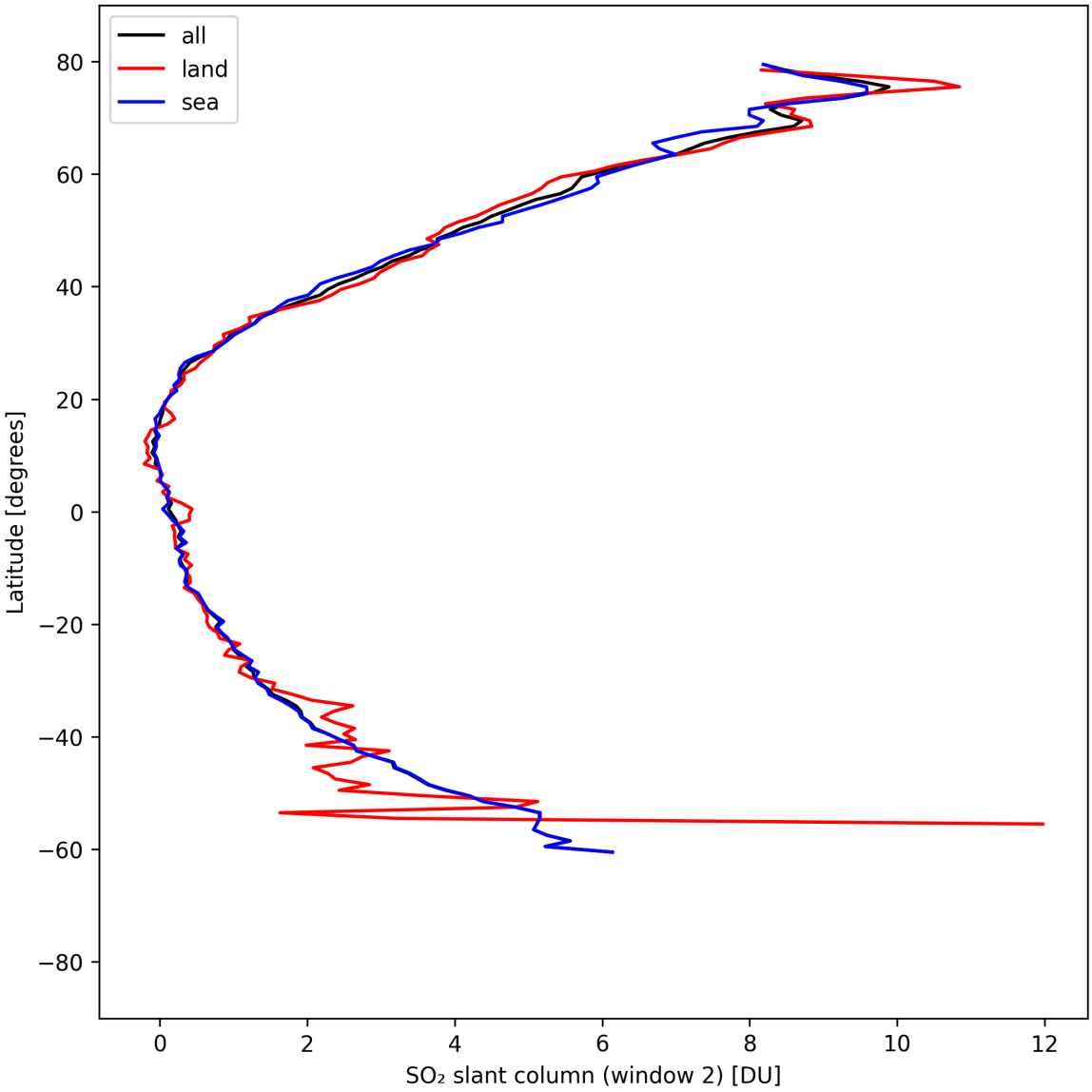

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-04-12 to 2025-04-13.

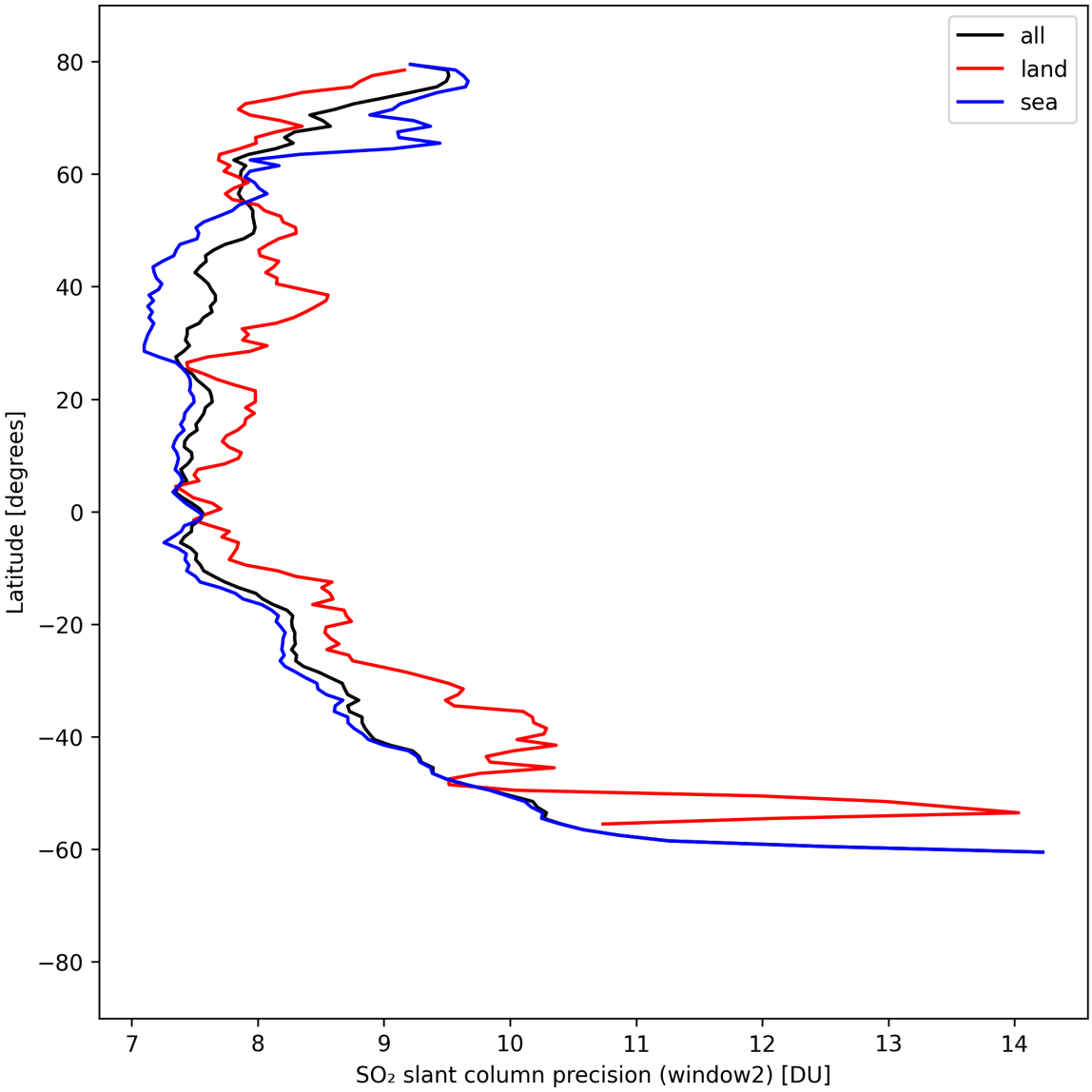

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-04-12 to 2025-04-13.

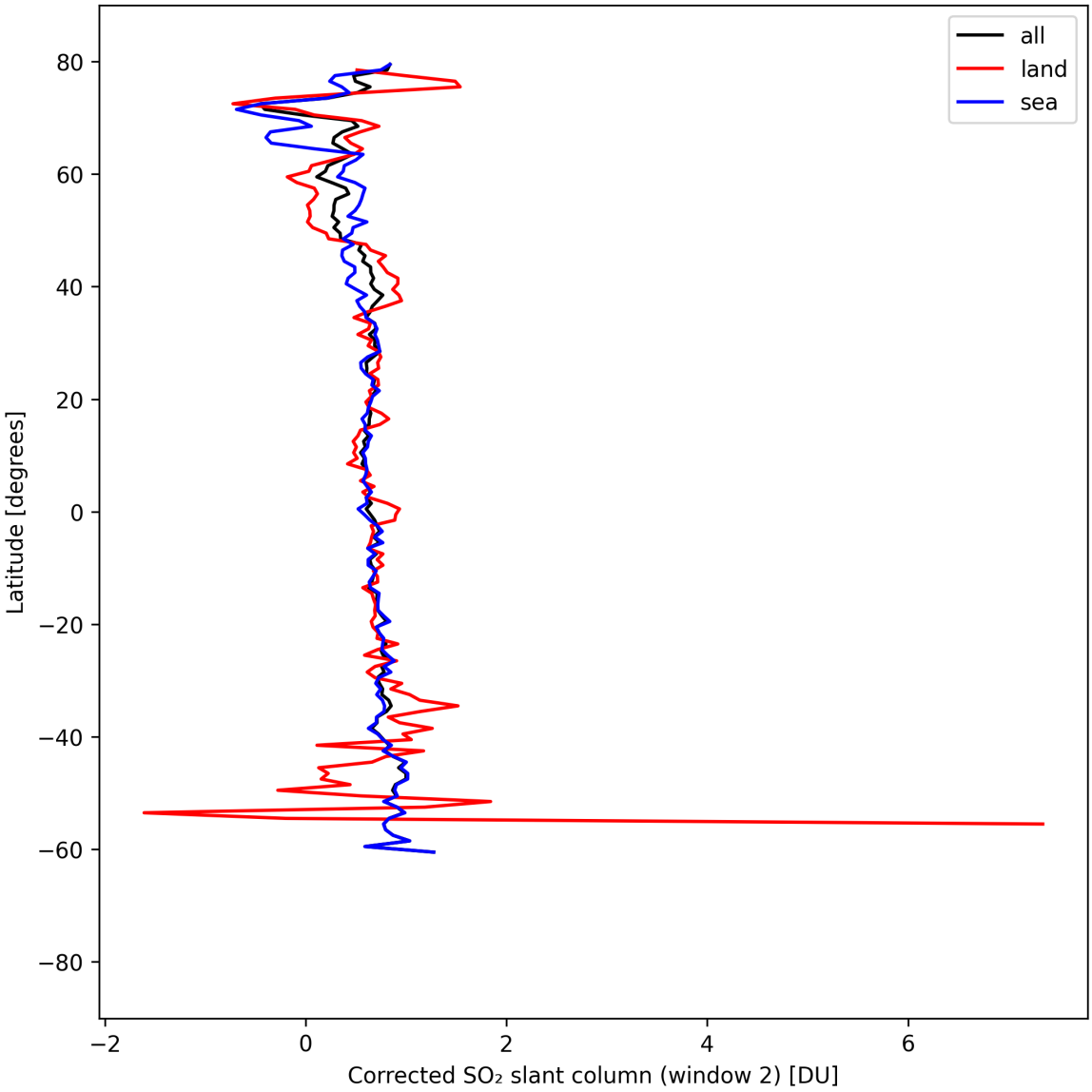

Figure 42: Zonal average of “Corrected SO_2 slant column (window 2)” for 2025-04-12 to 2025-04-13.

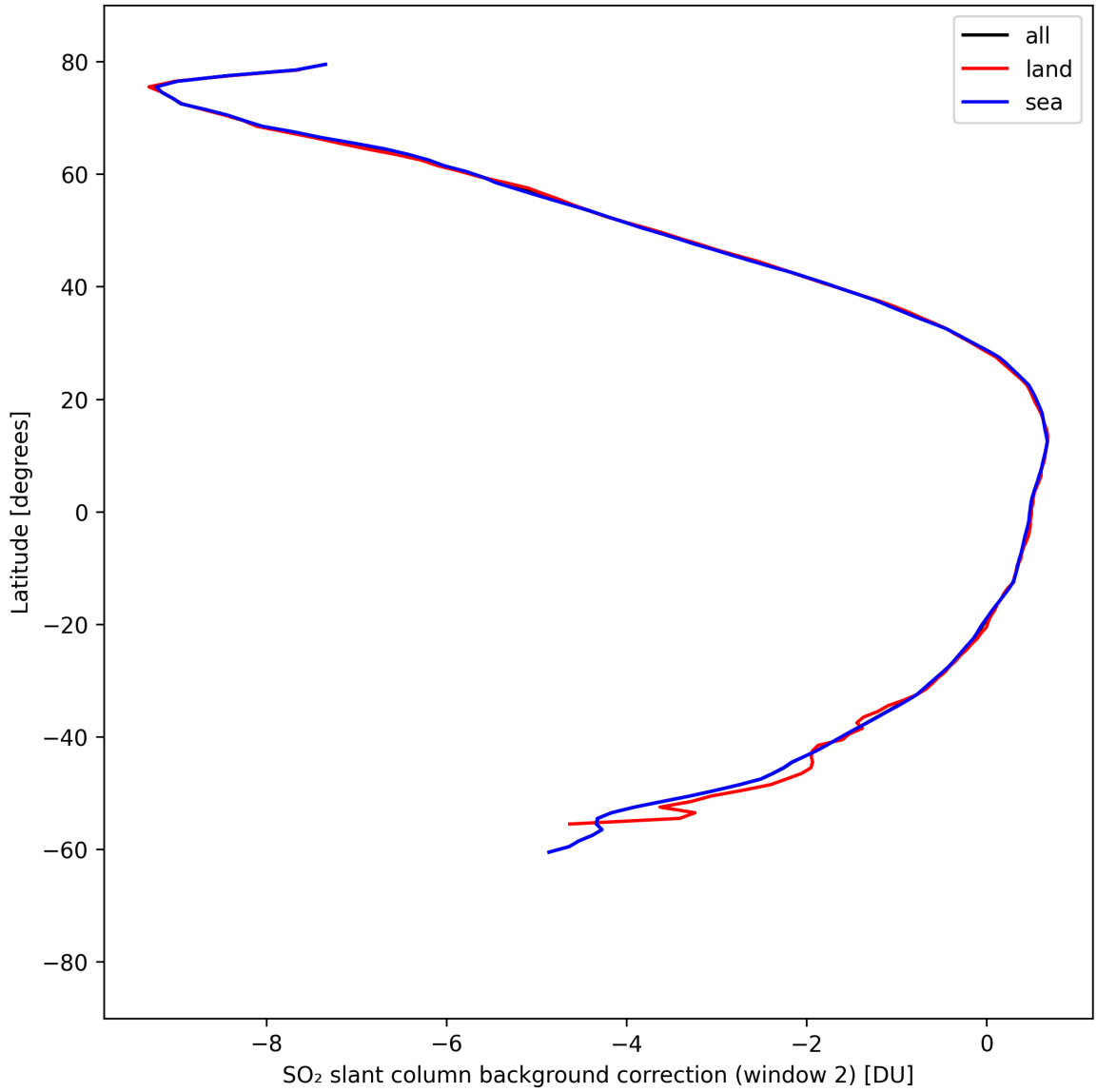

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-04-12 to 2025-04-13.

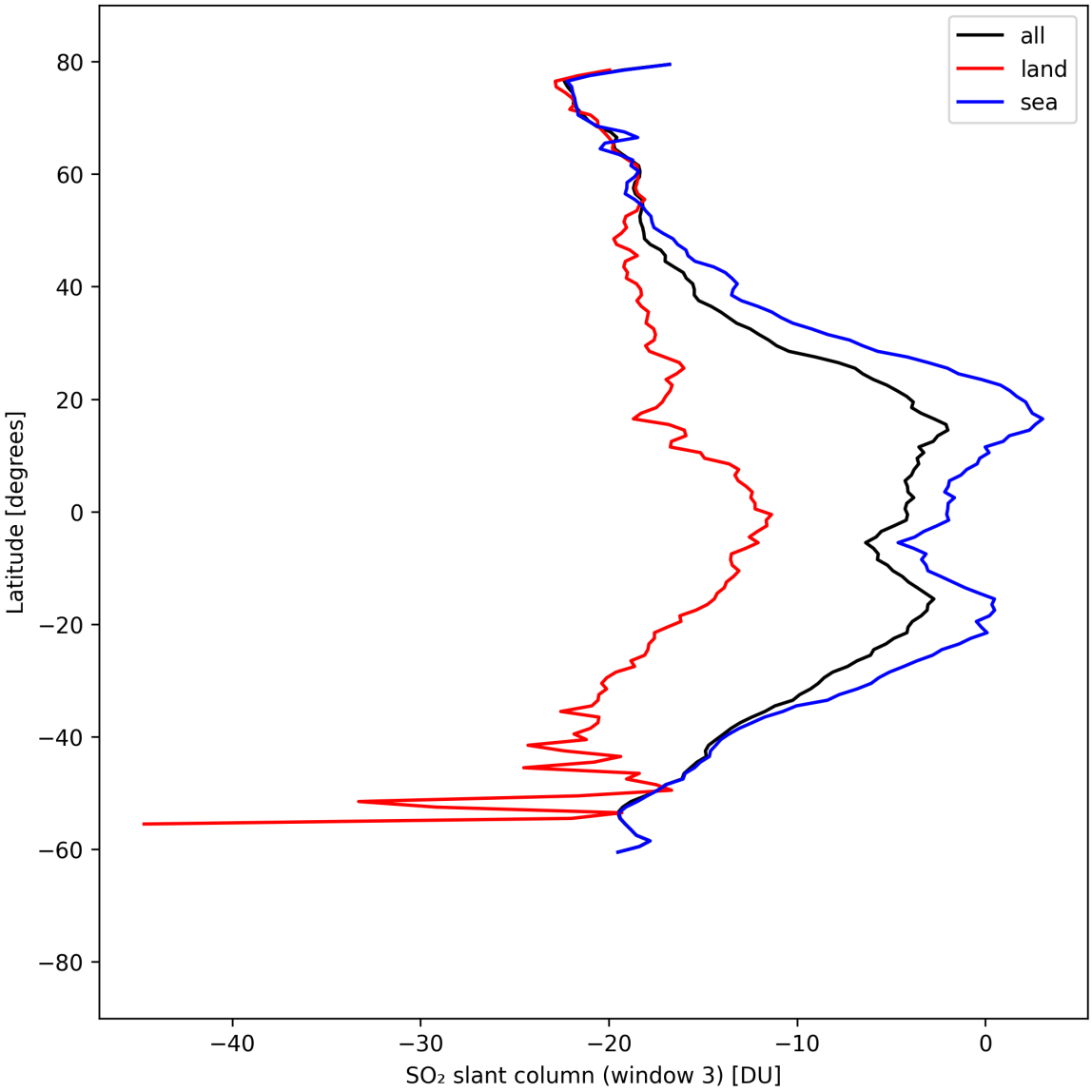

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-04-12 to 2025-04-13.

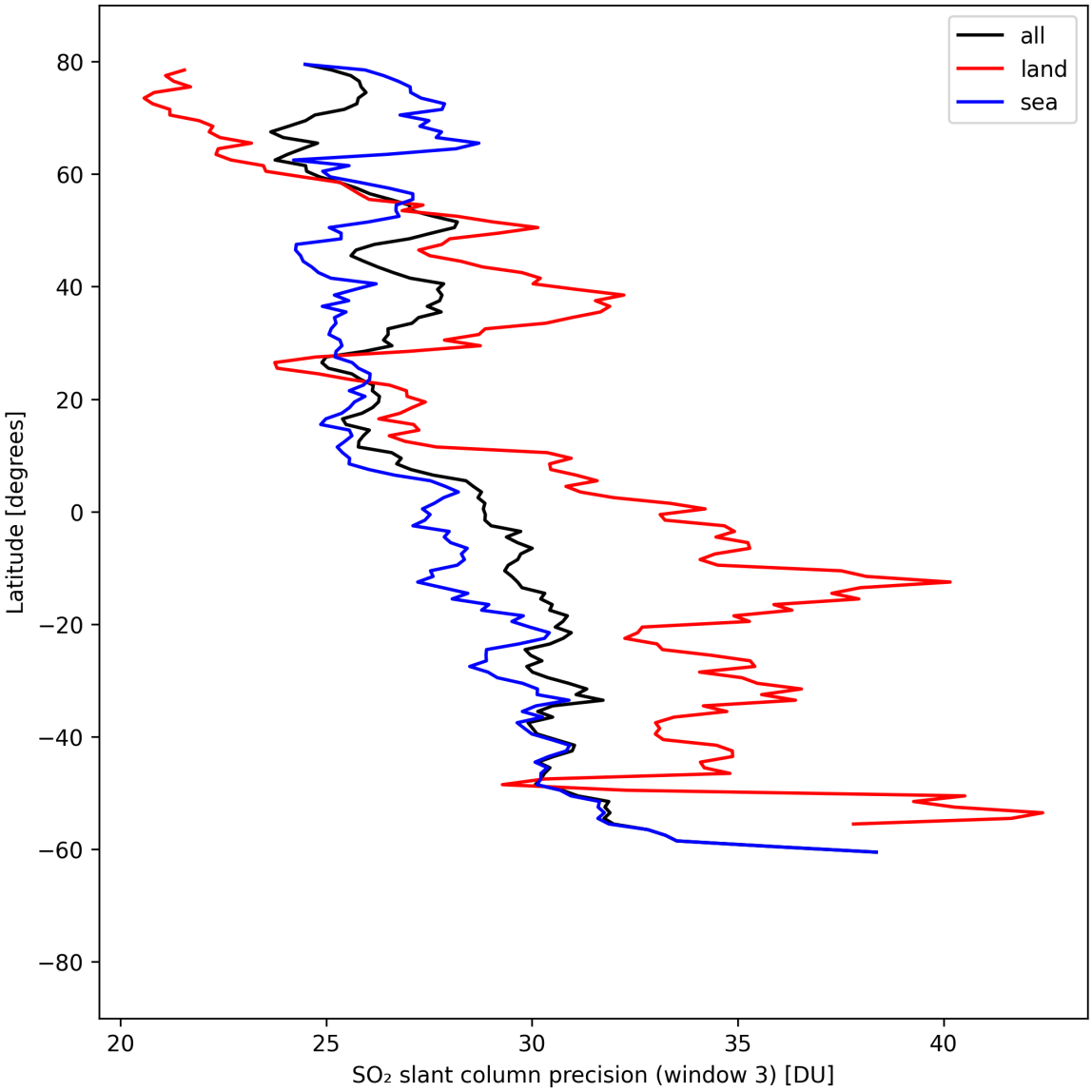

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-04-12 to 2025-04-13.

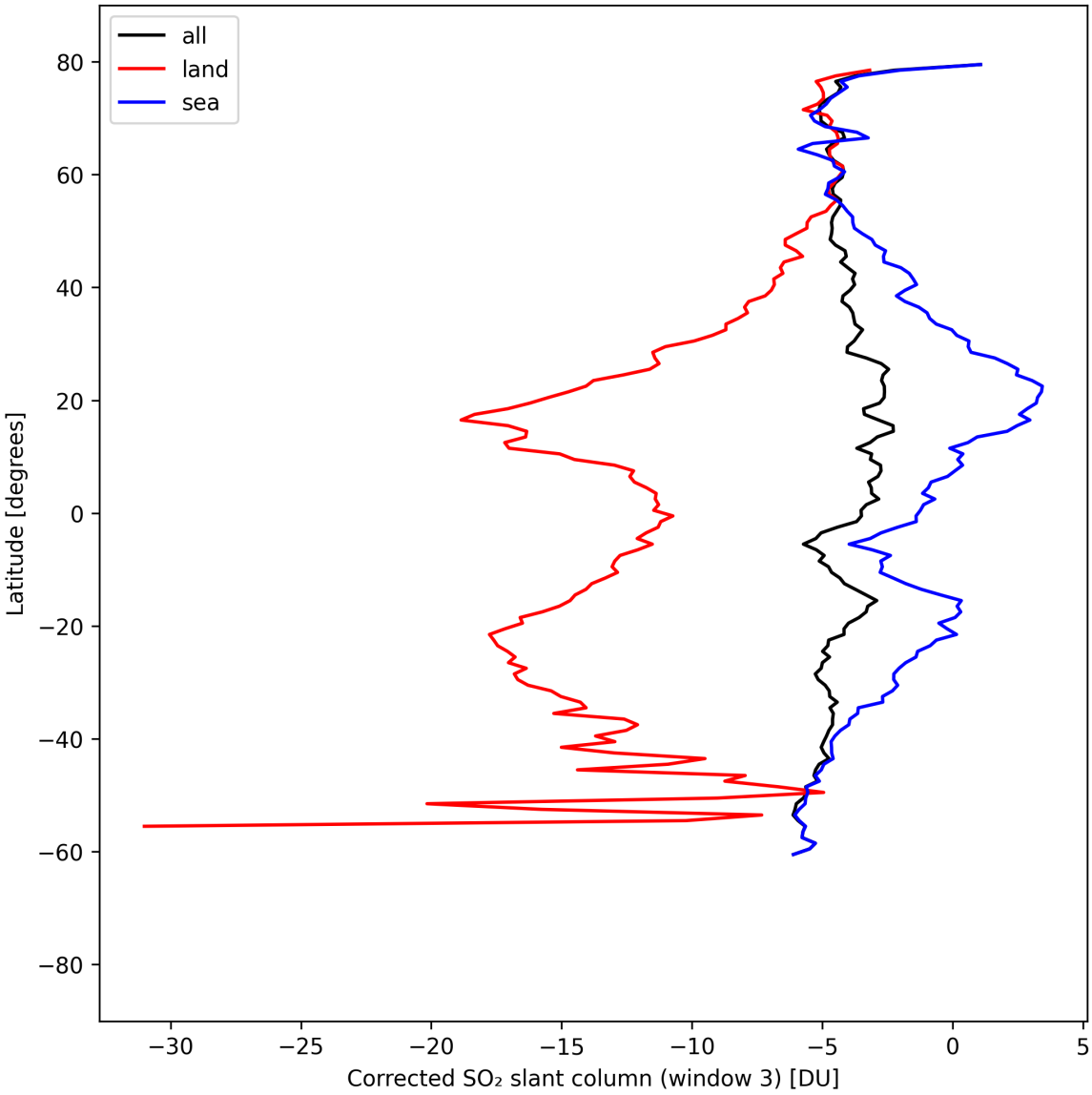

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-04-12 to 2025-04-13.

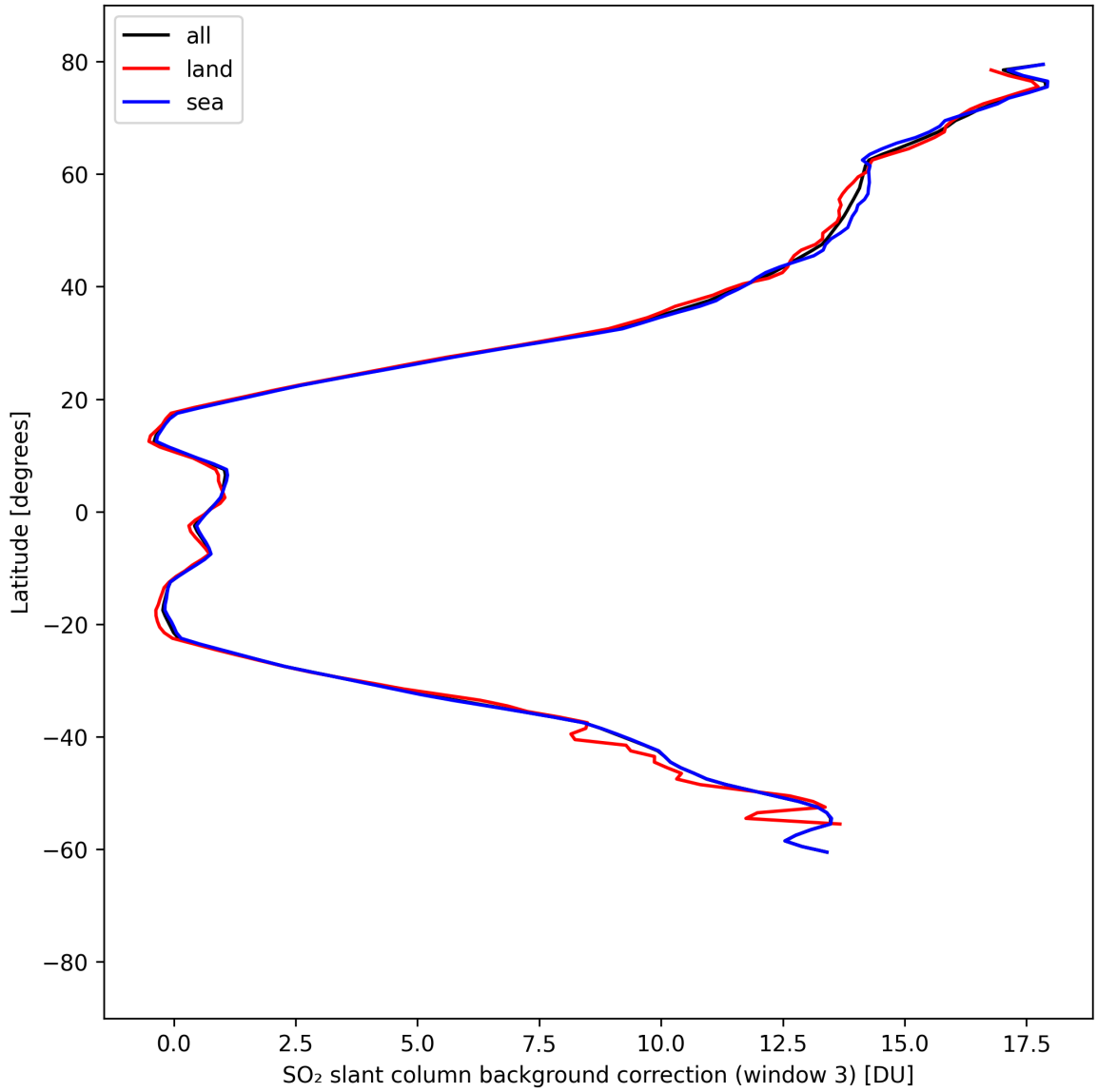

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-04-12 to 2025-04-13.

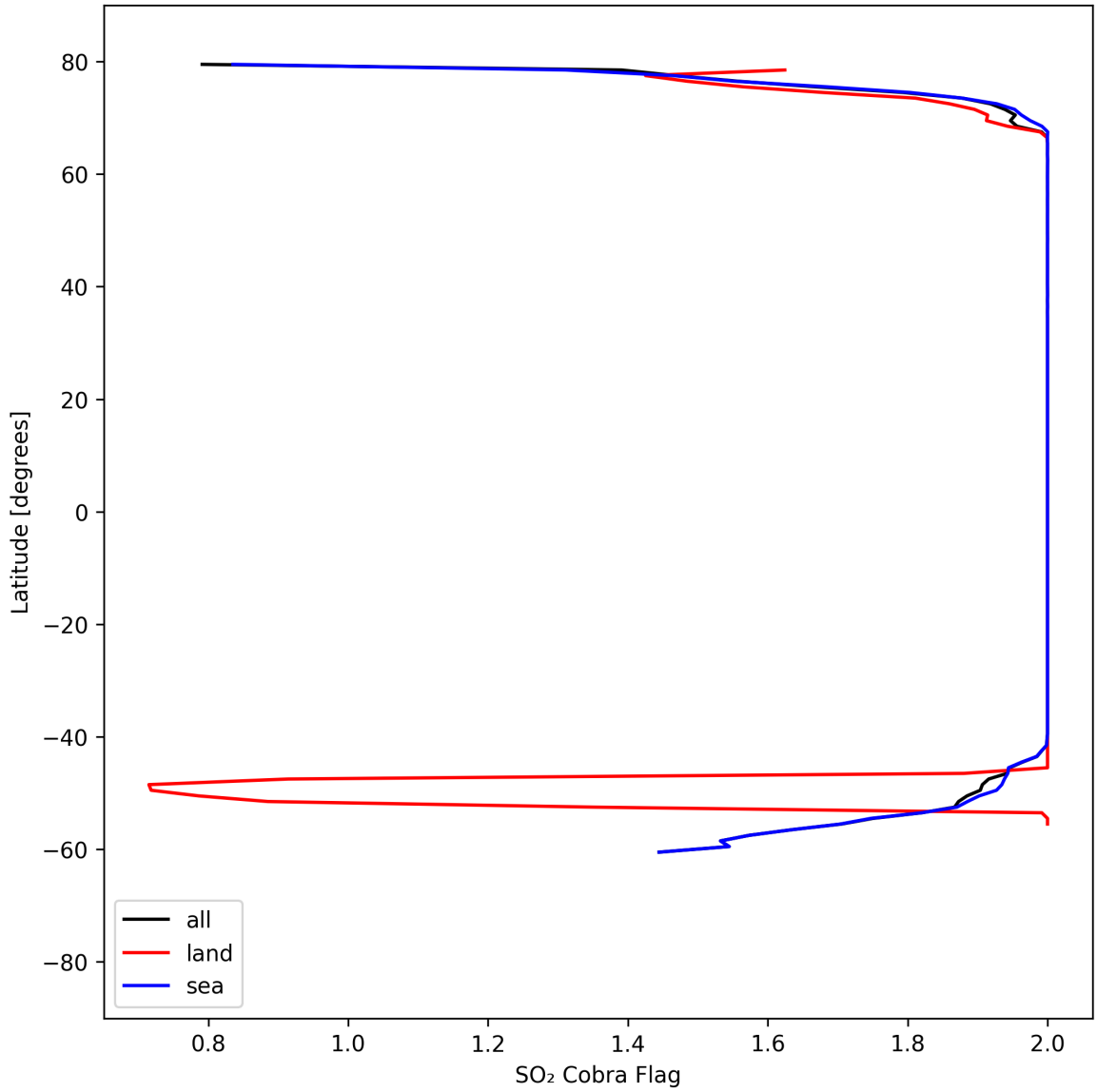

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-04-12 to 2025-04-13.

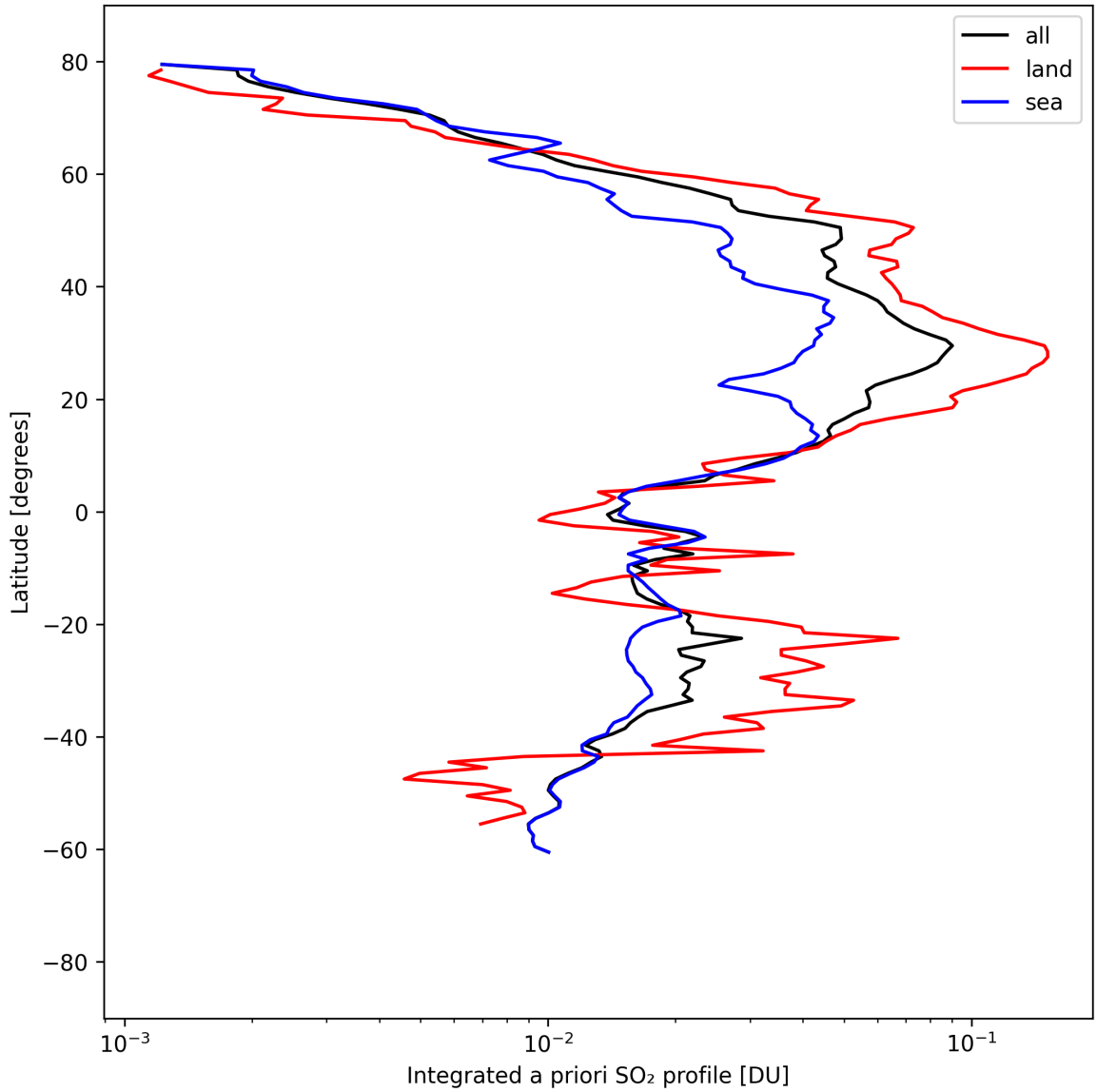

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-04-12 to 2025-04-13.

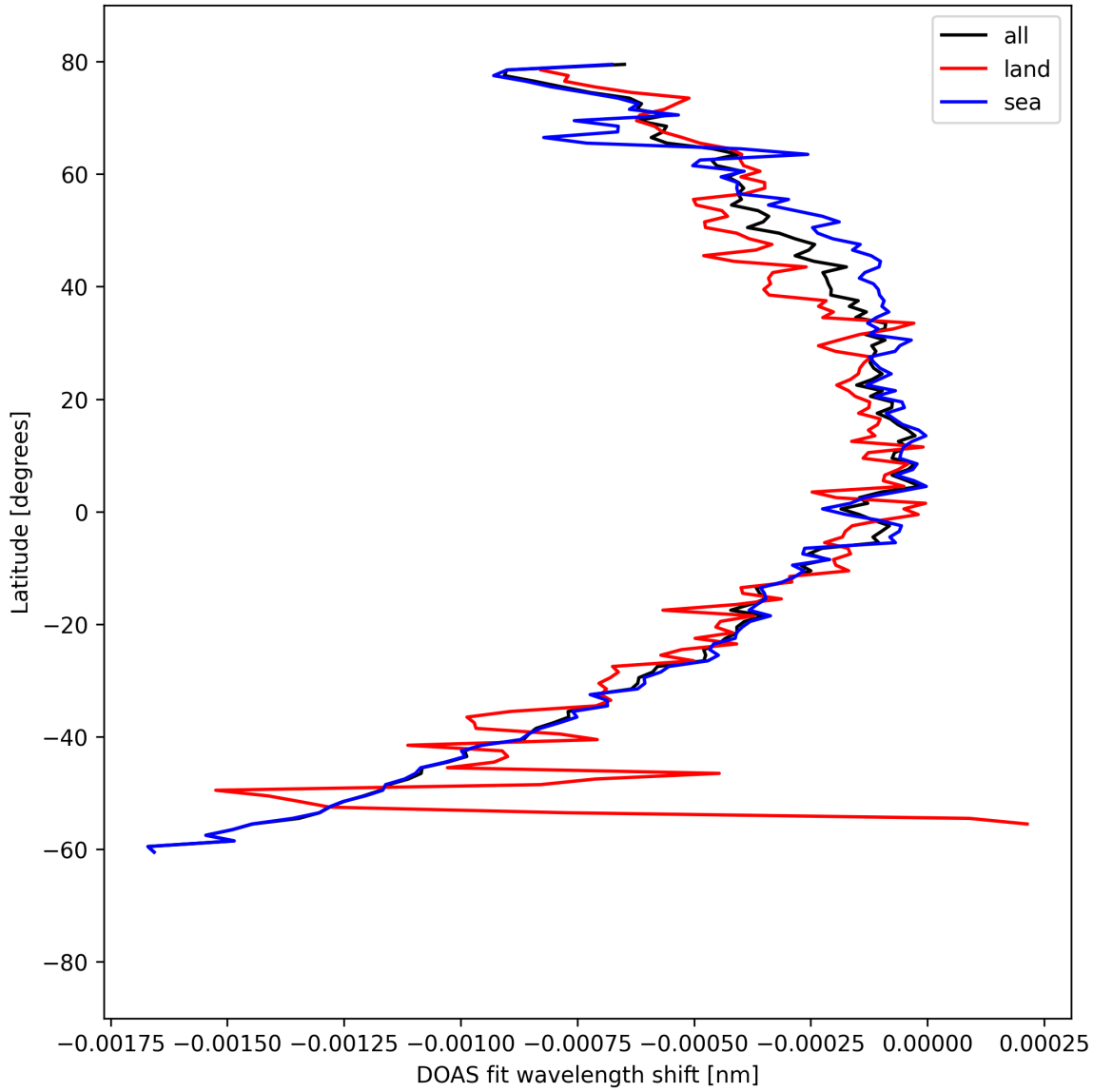

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-04-12 to 2025-04-13.

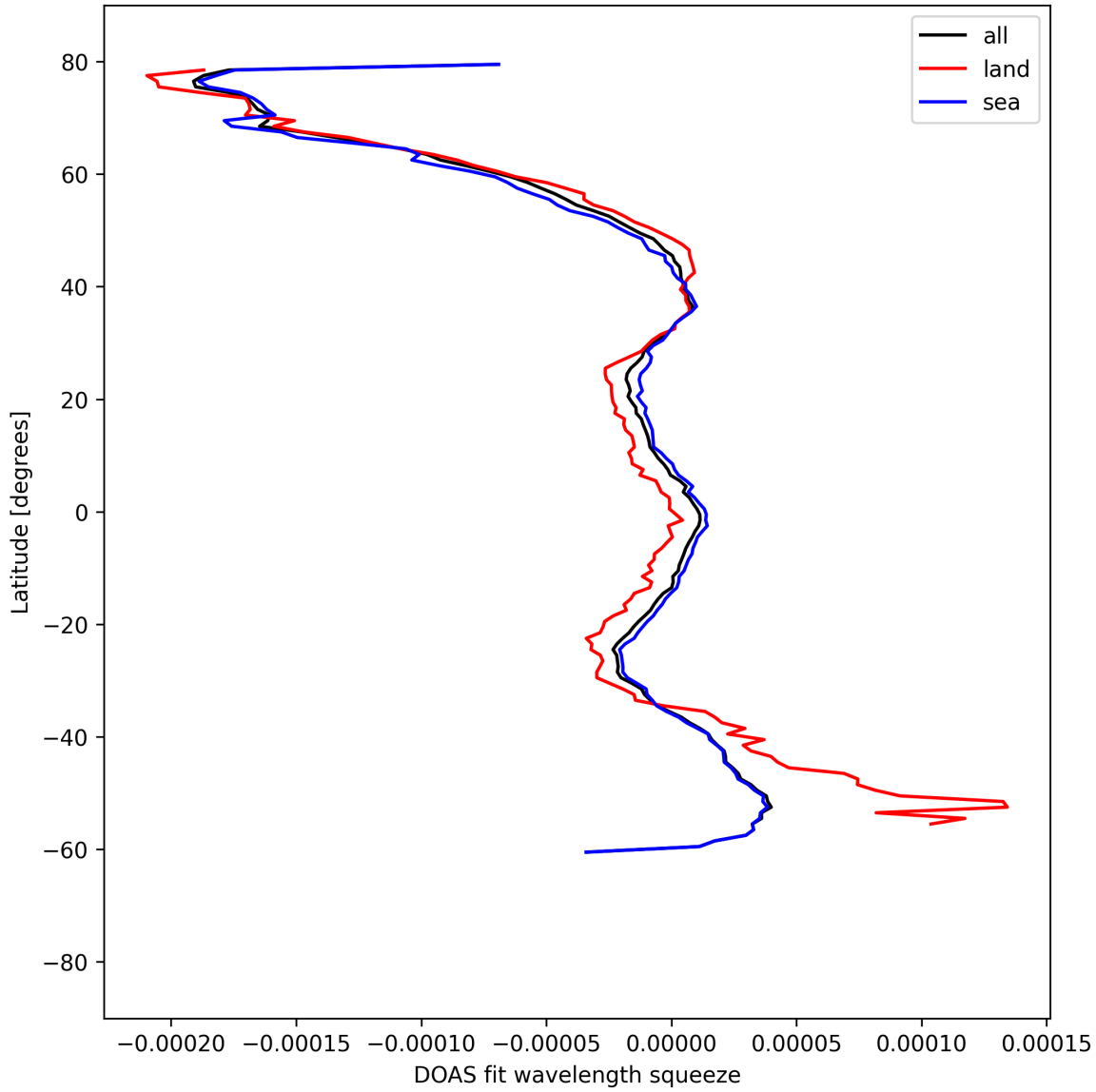

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-04-12 to 2025-04-13.

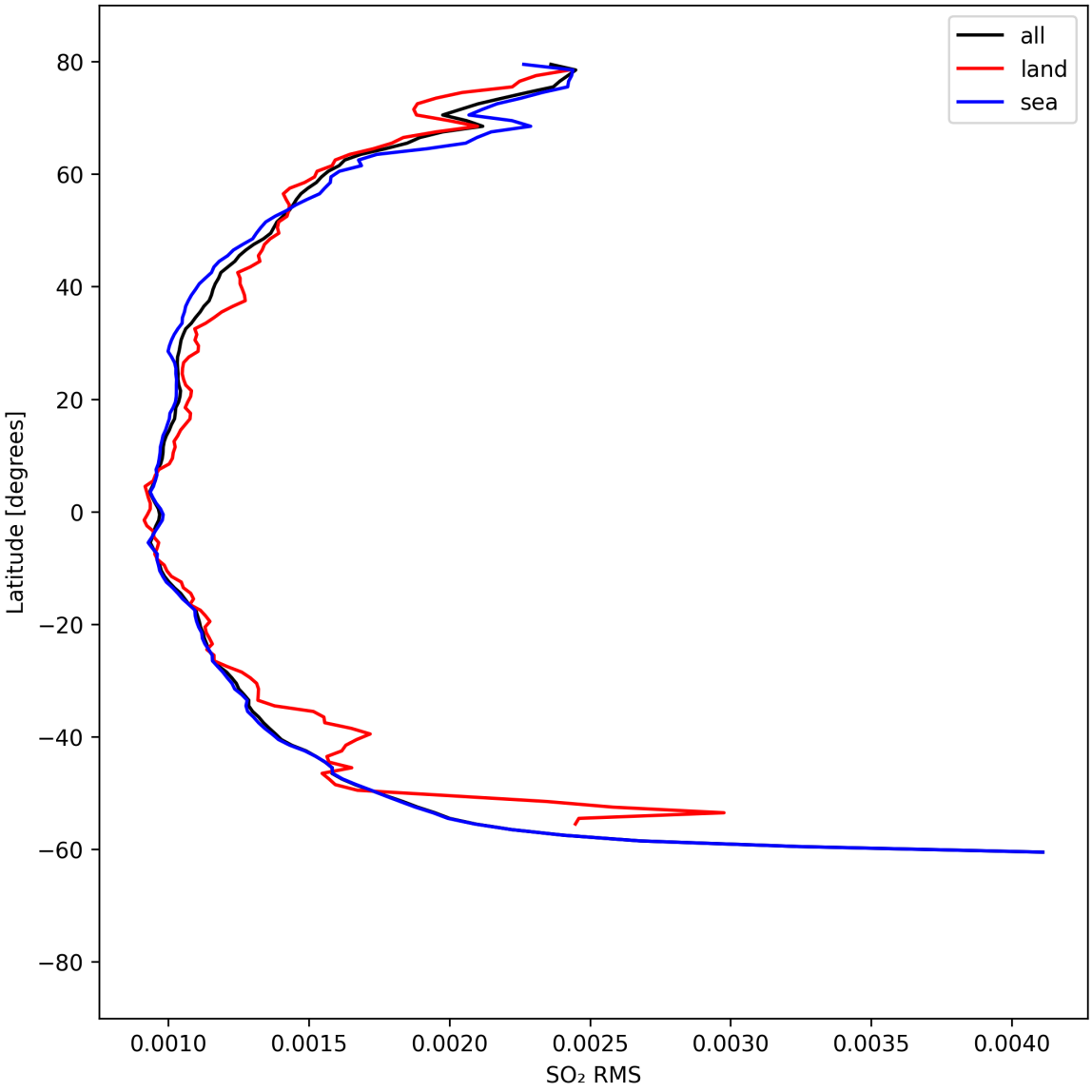

Figure 52: Zonal average of "SO_2 RMS" for 2025-04-12 to 2025-04-13.

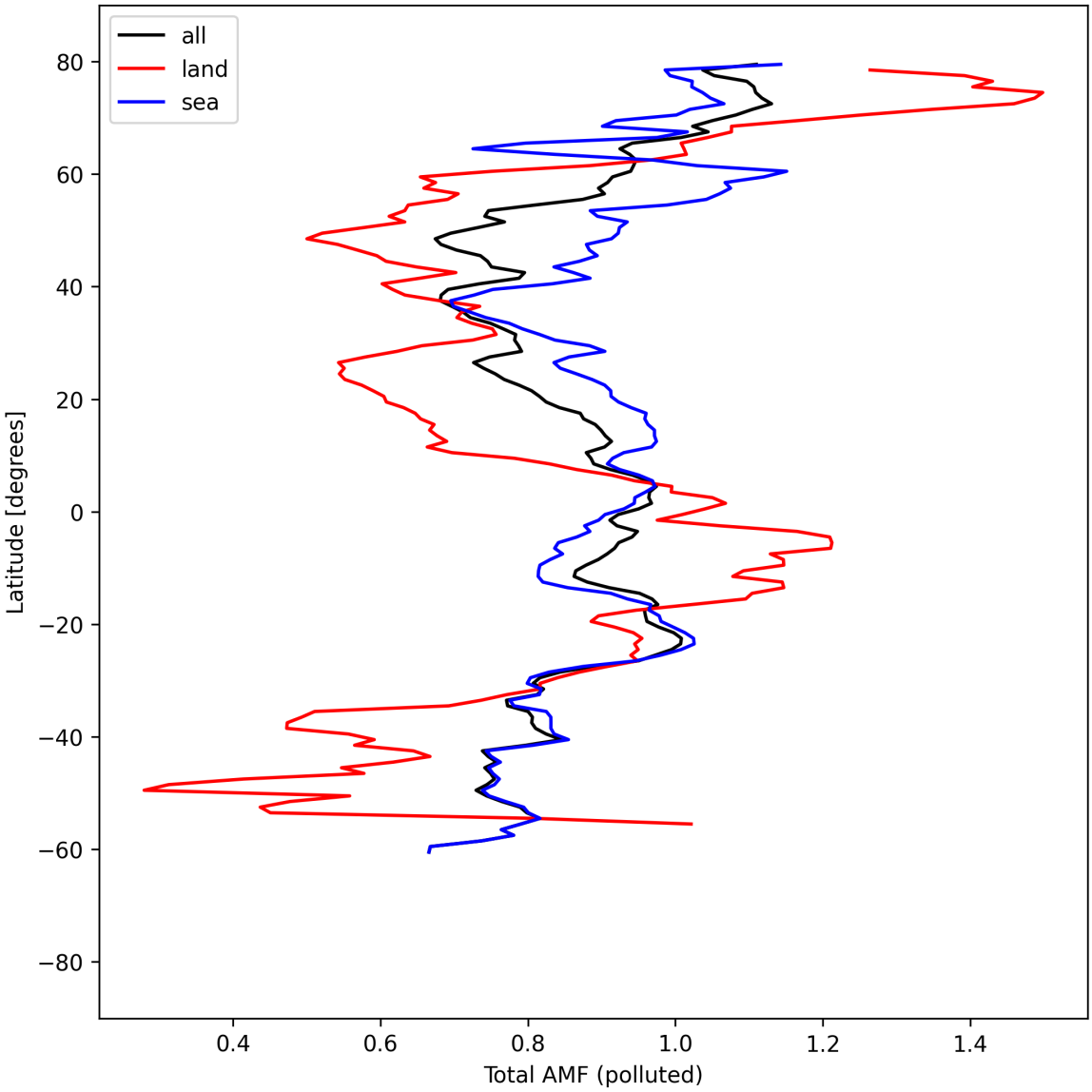

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-04-12 to 2025-04-13.

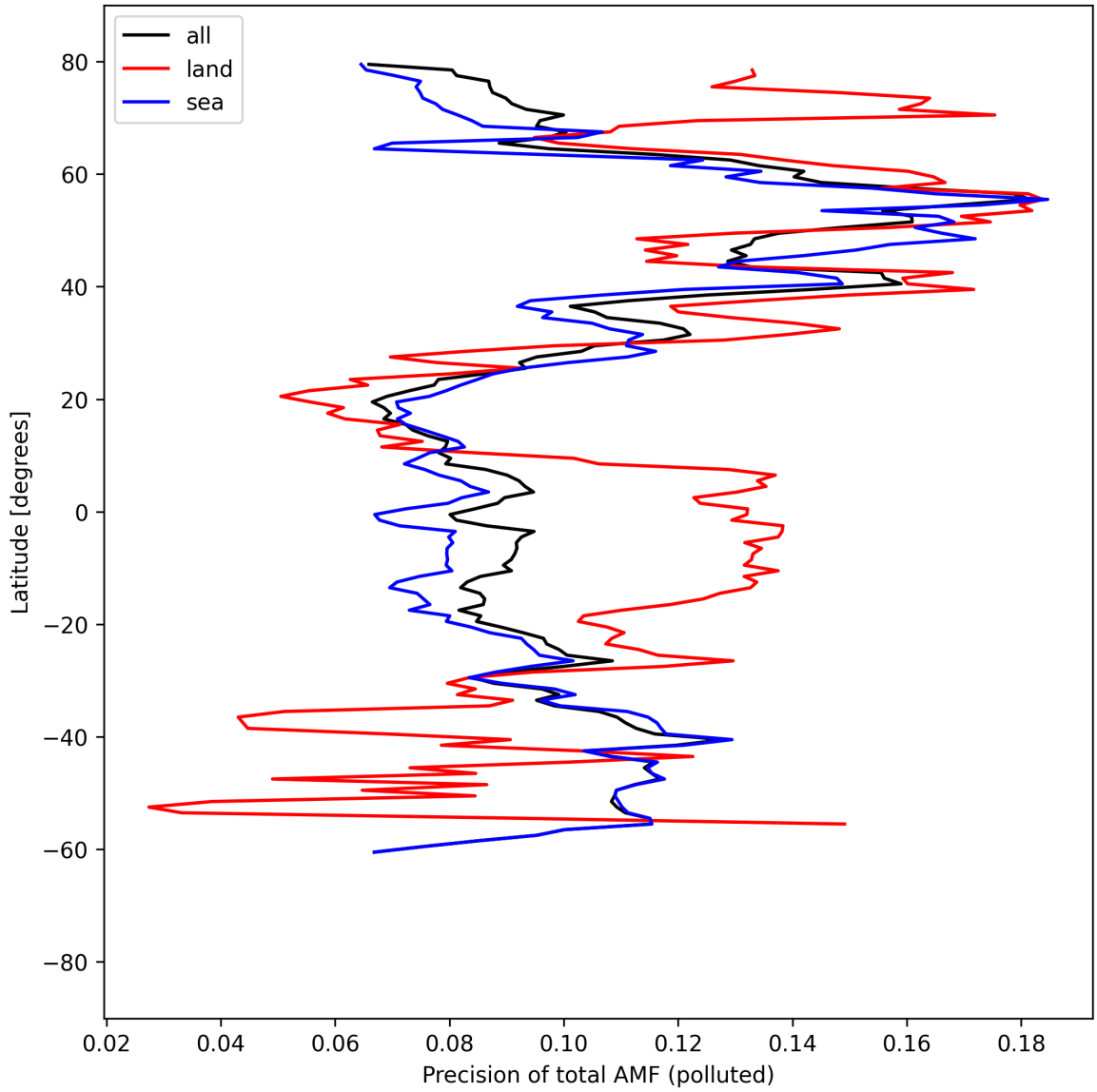

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-04-12 to 2025-04-13.

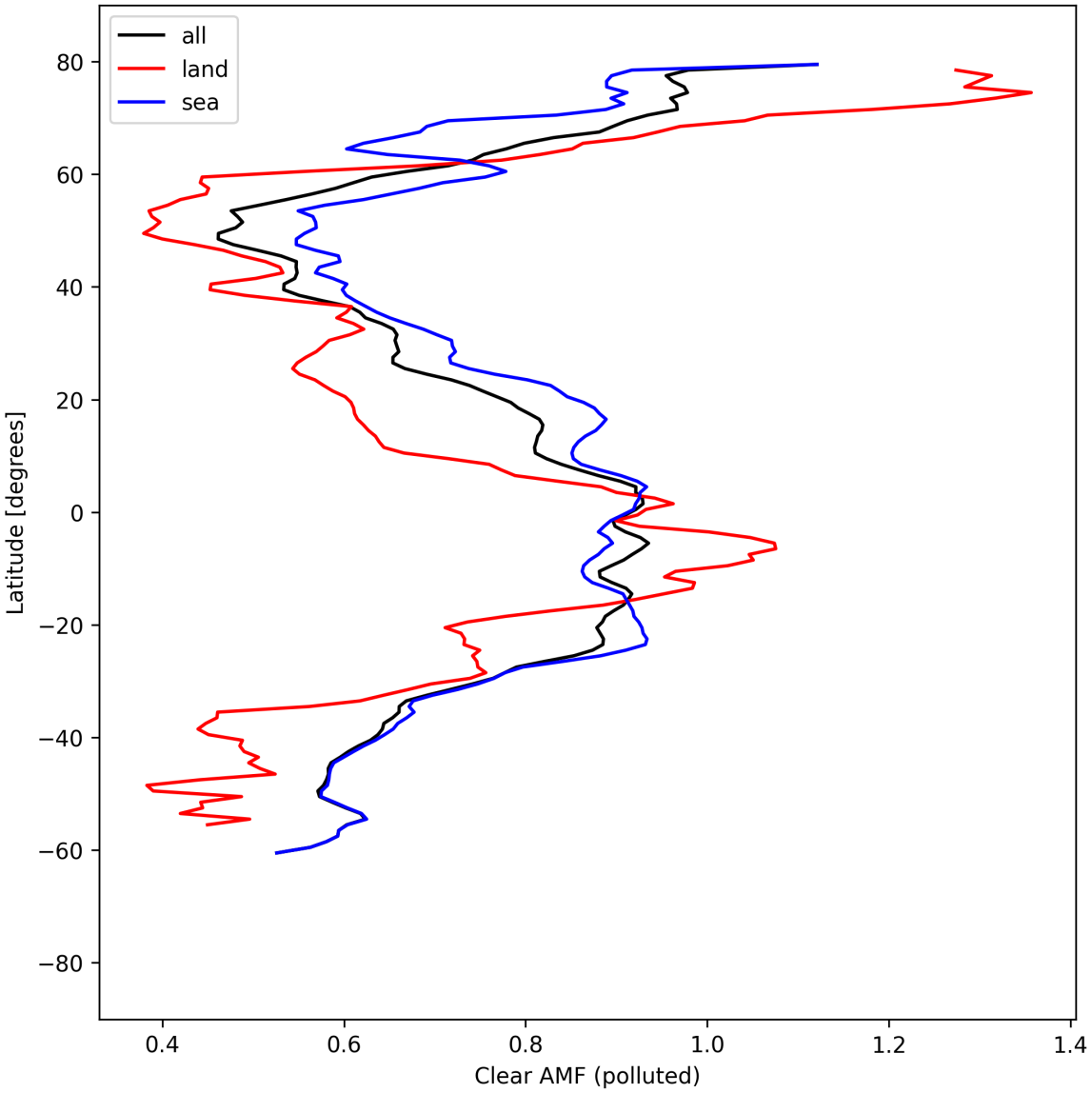

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-04-12 to 2025-04-13.

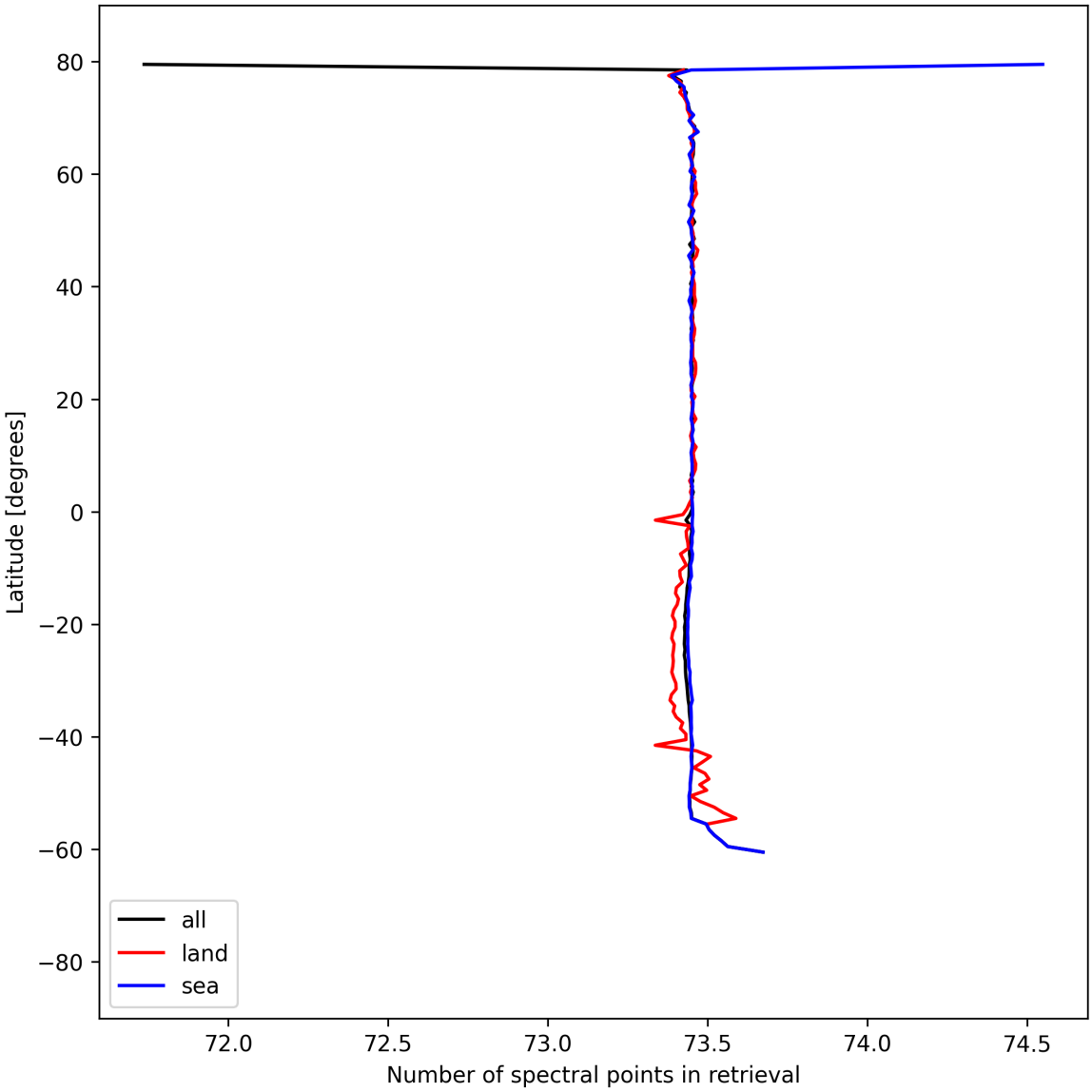

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-04-12 to 2025-04-13.

8 Histograms

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

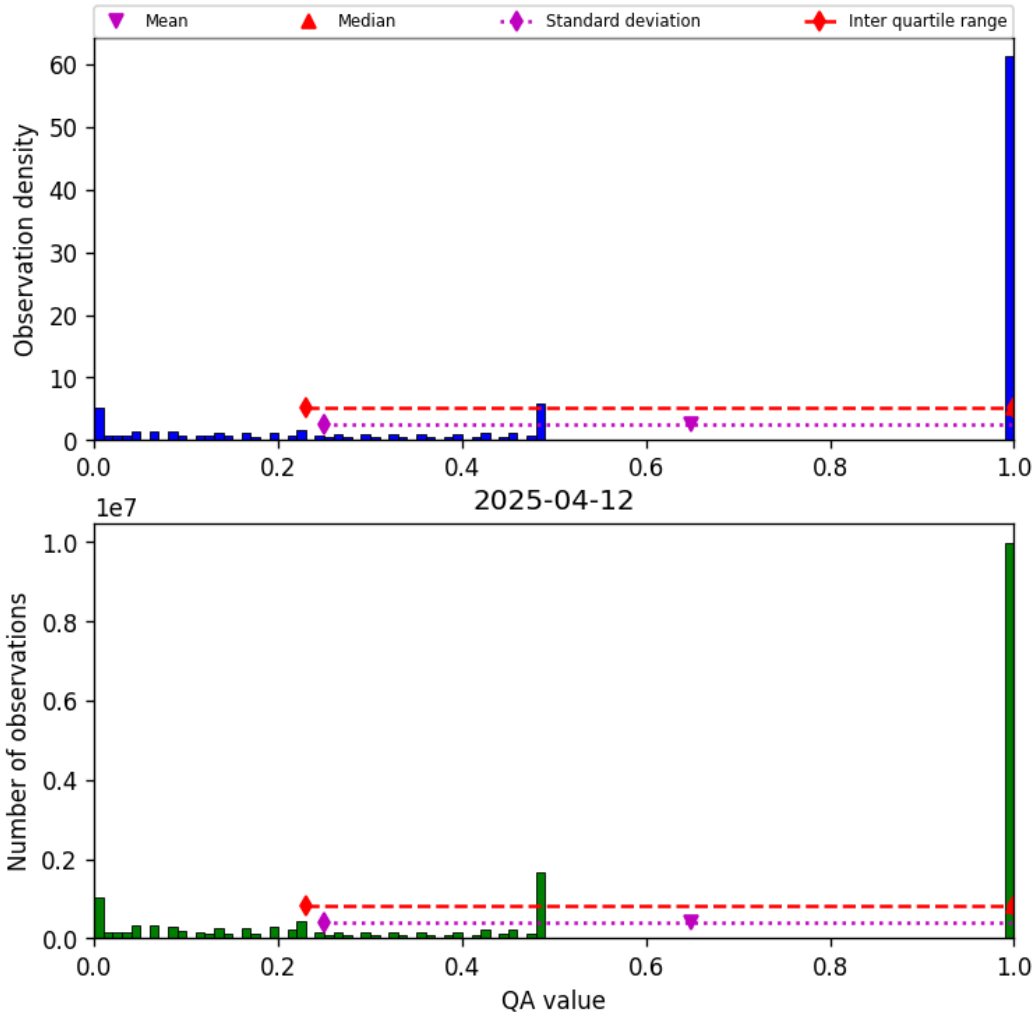

Figure 57: Histogram of “QA value” for 2025-04-12 to 2025-04-13

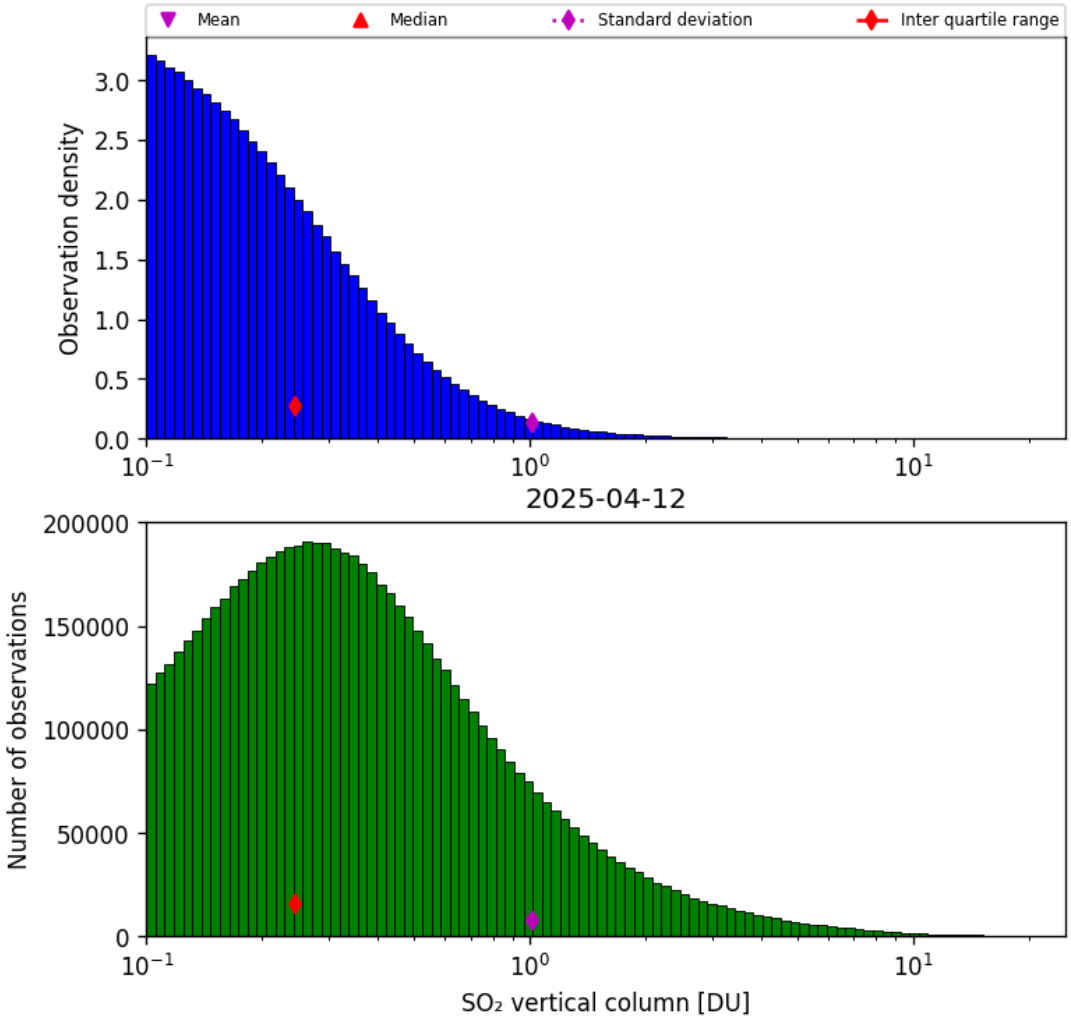

Figure 58: Histogram of "SO_2 vertical column" for 2025-04-12 to 2025-04-13

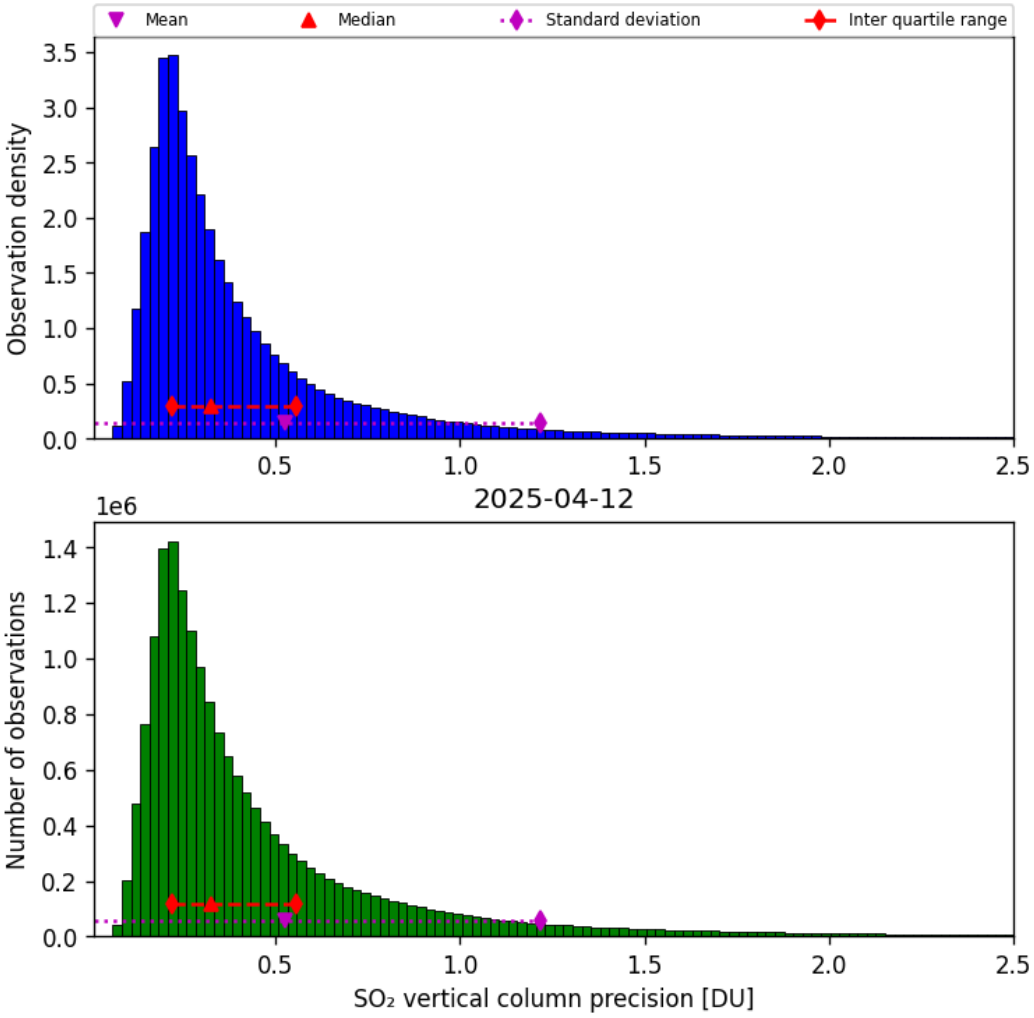

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-04-12 to 2025-04-13

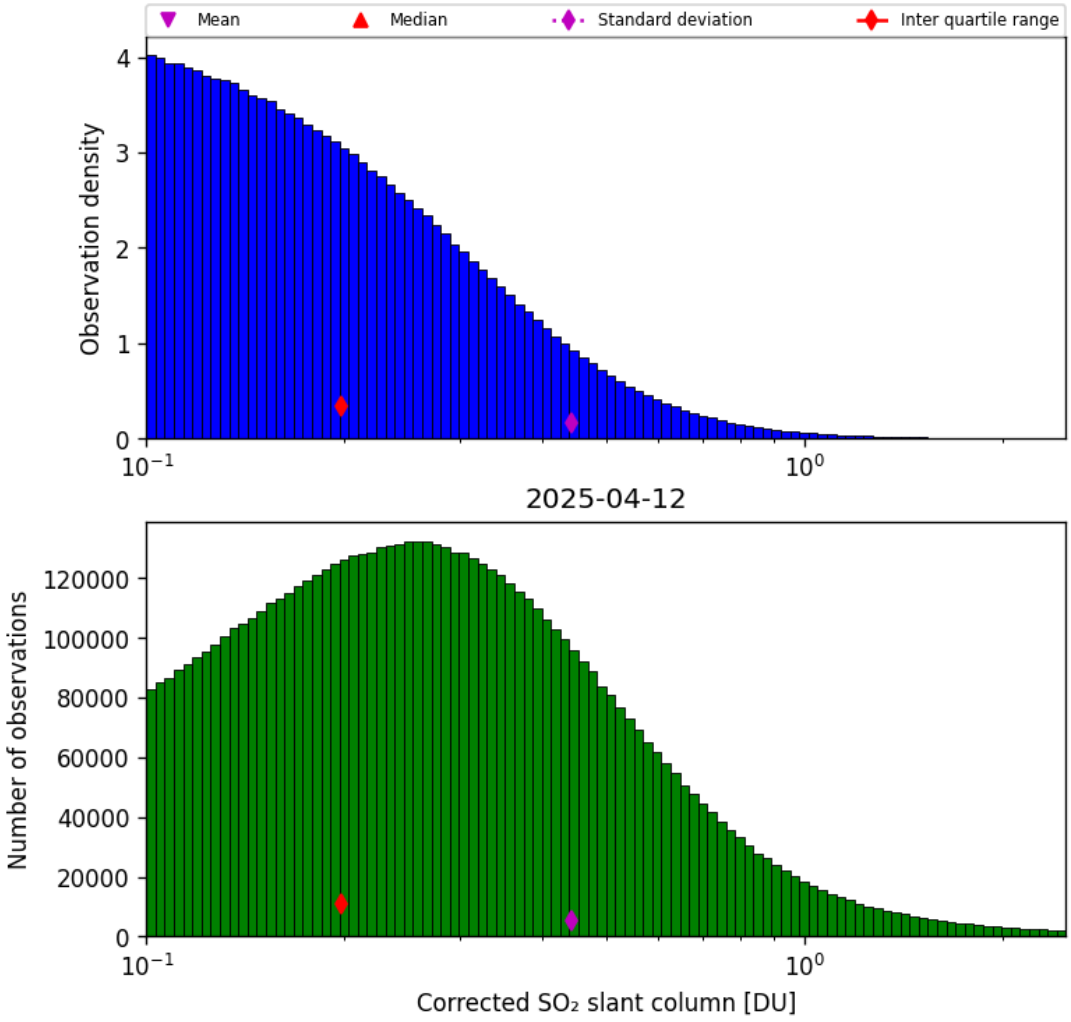

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-04-12 to 2025-04-13

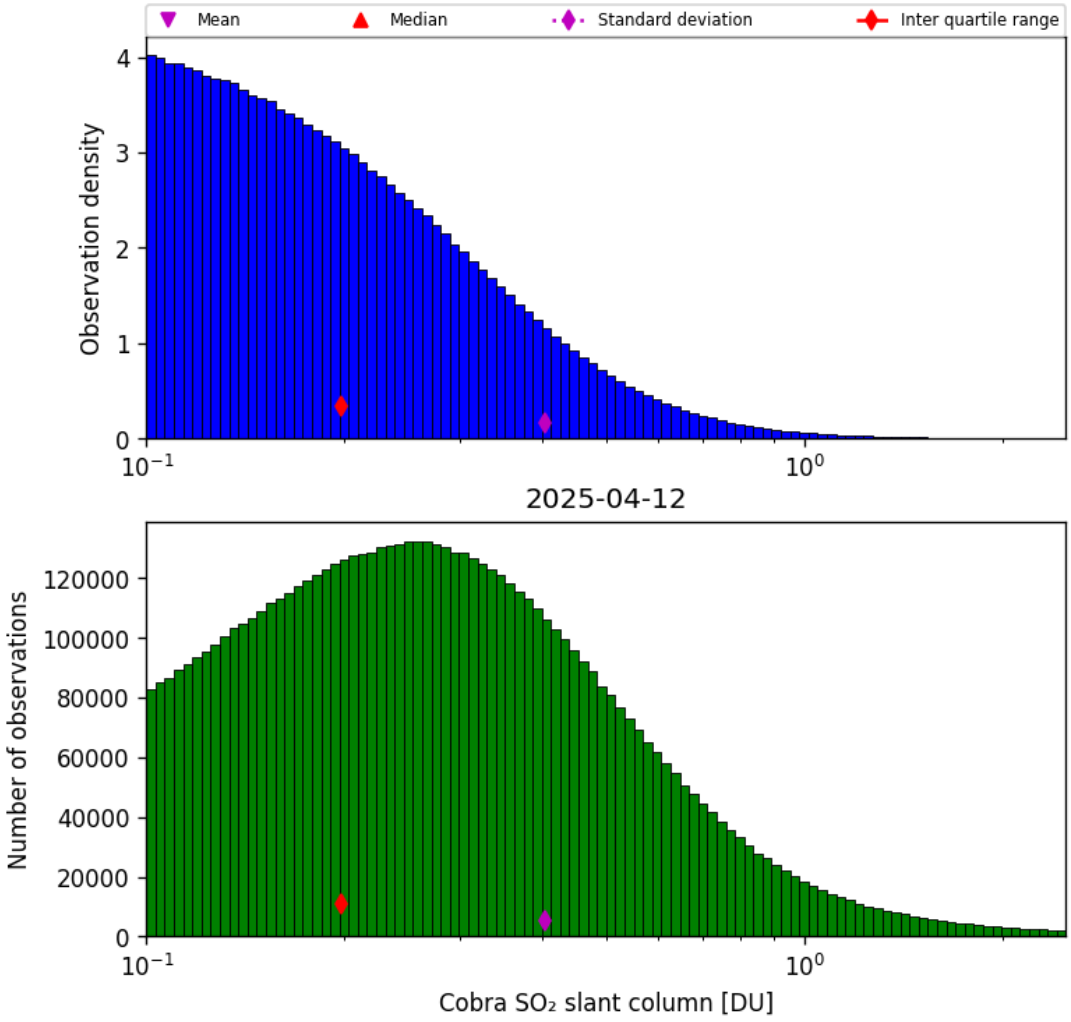

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-04-12 to 2025-04-13

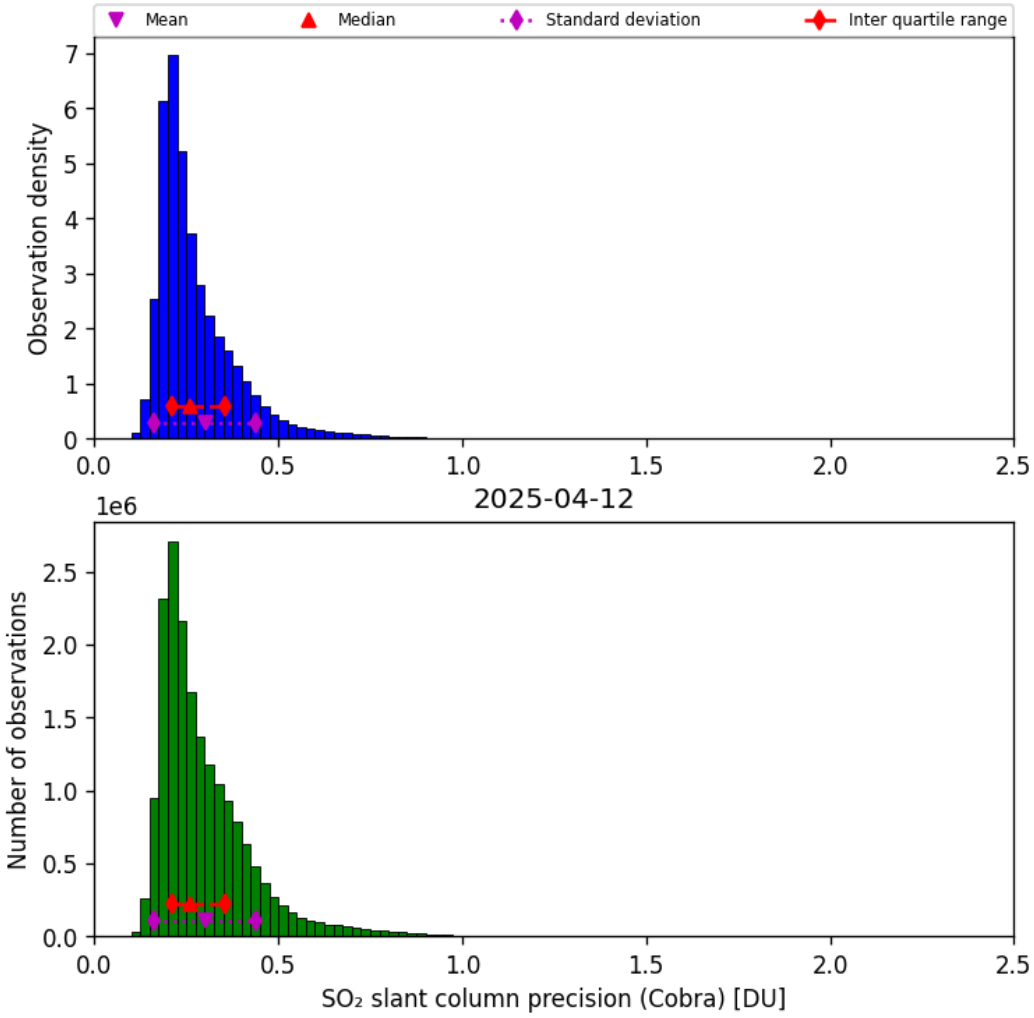

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-04-12 to 2025-04-13

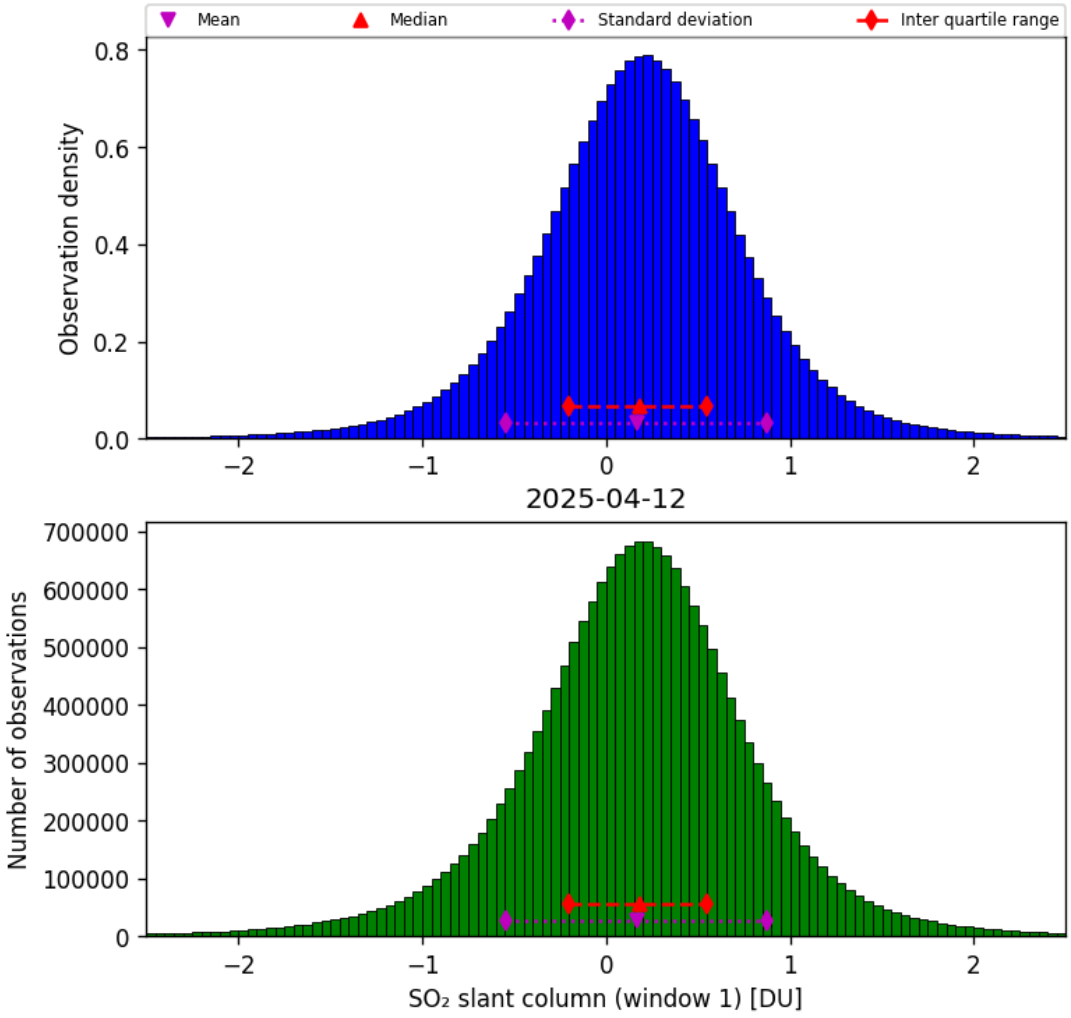

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-04-12 to 2025-04-13

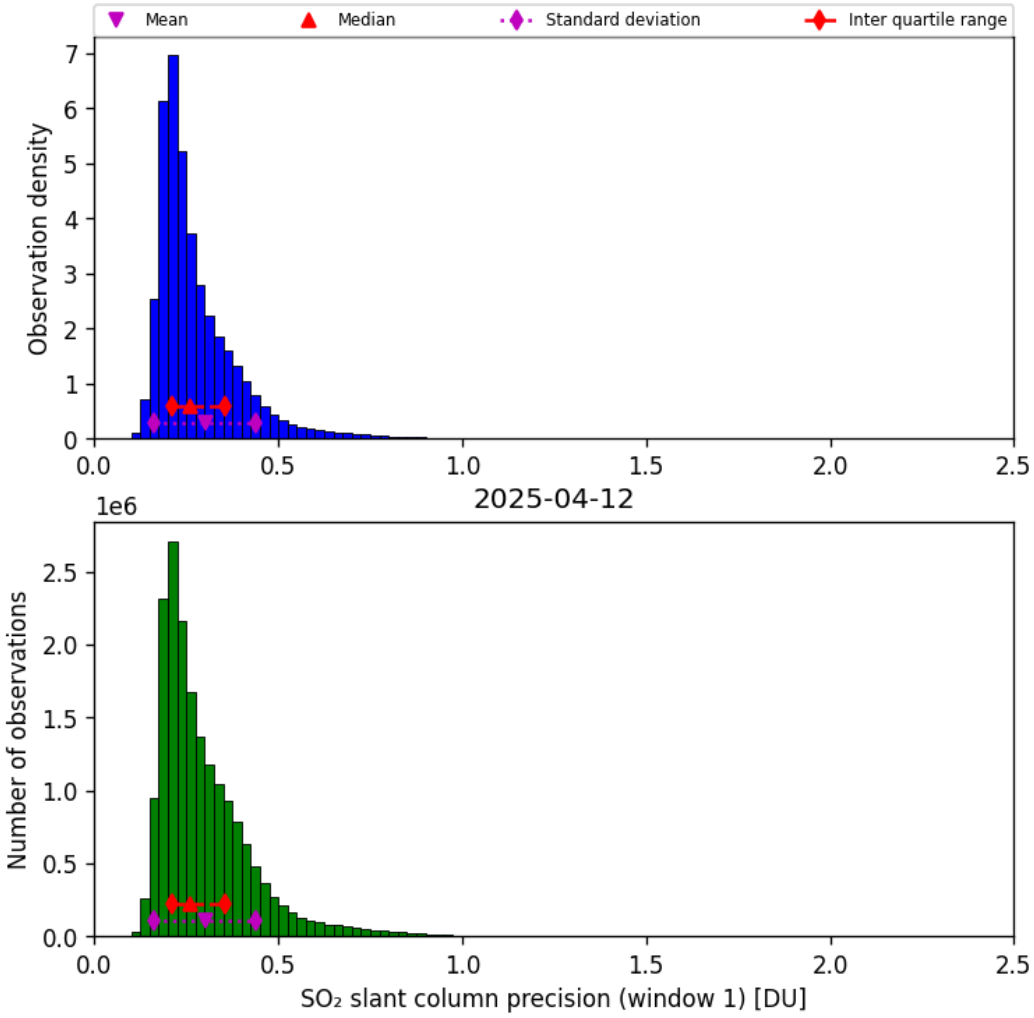

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-04-12 to 2025-04-13

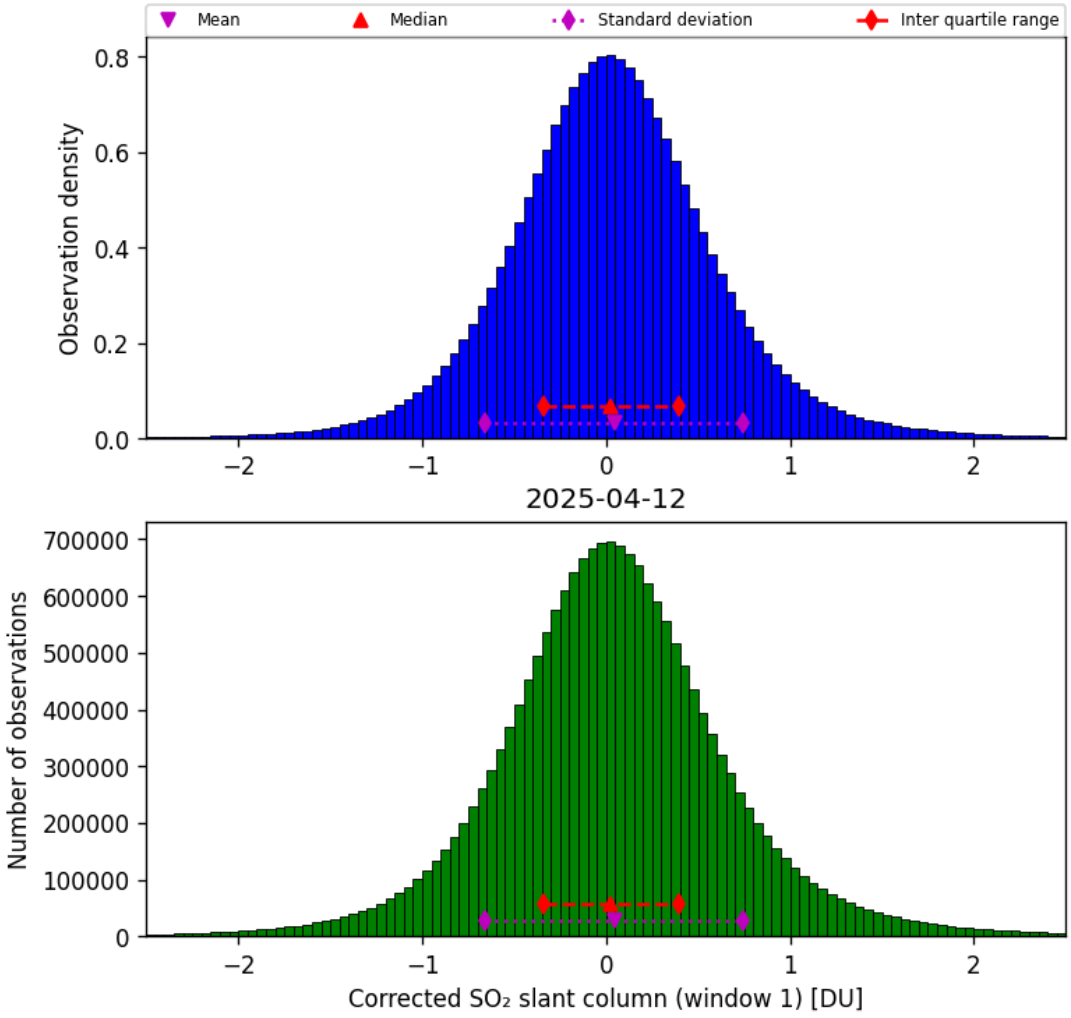

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-04-12 to 2025-04-13

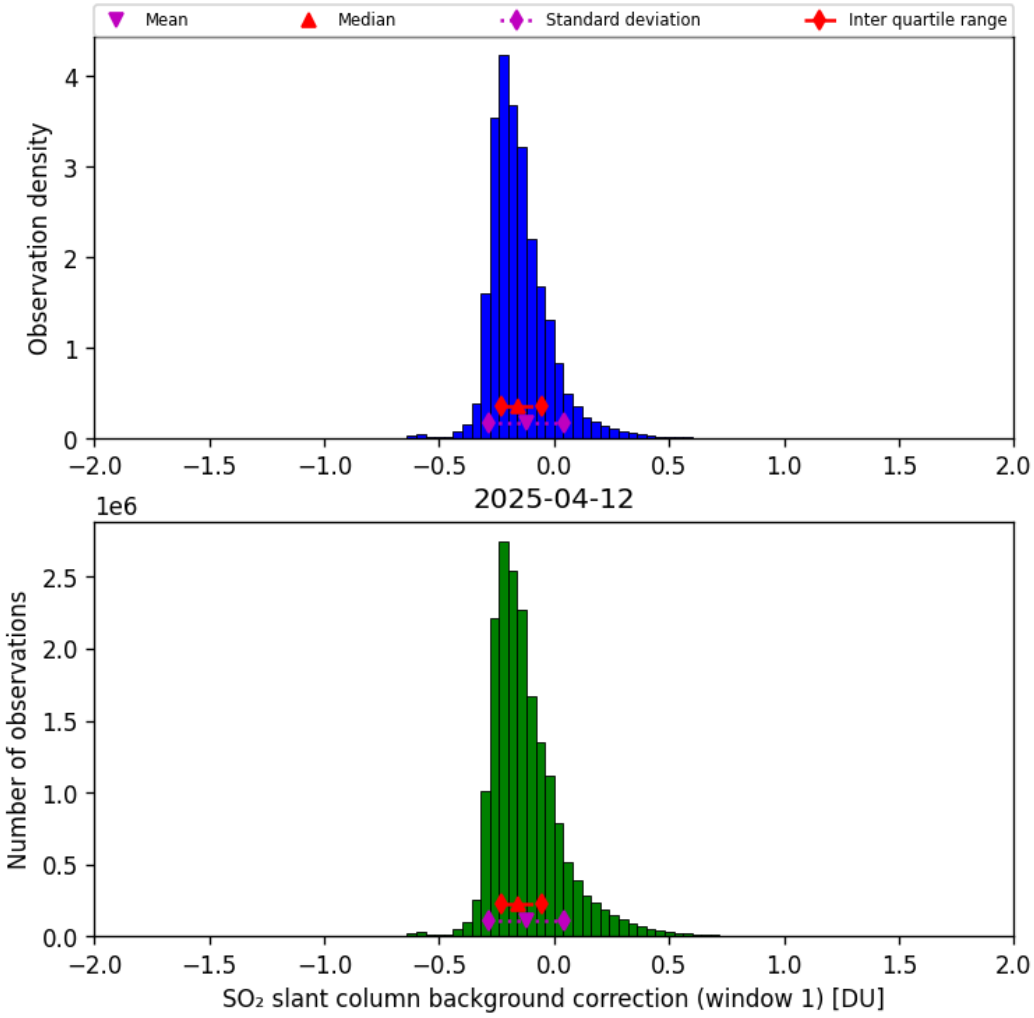

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-04-12 to 2025-04-13

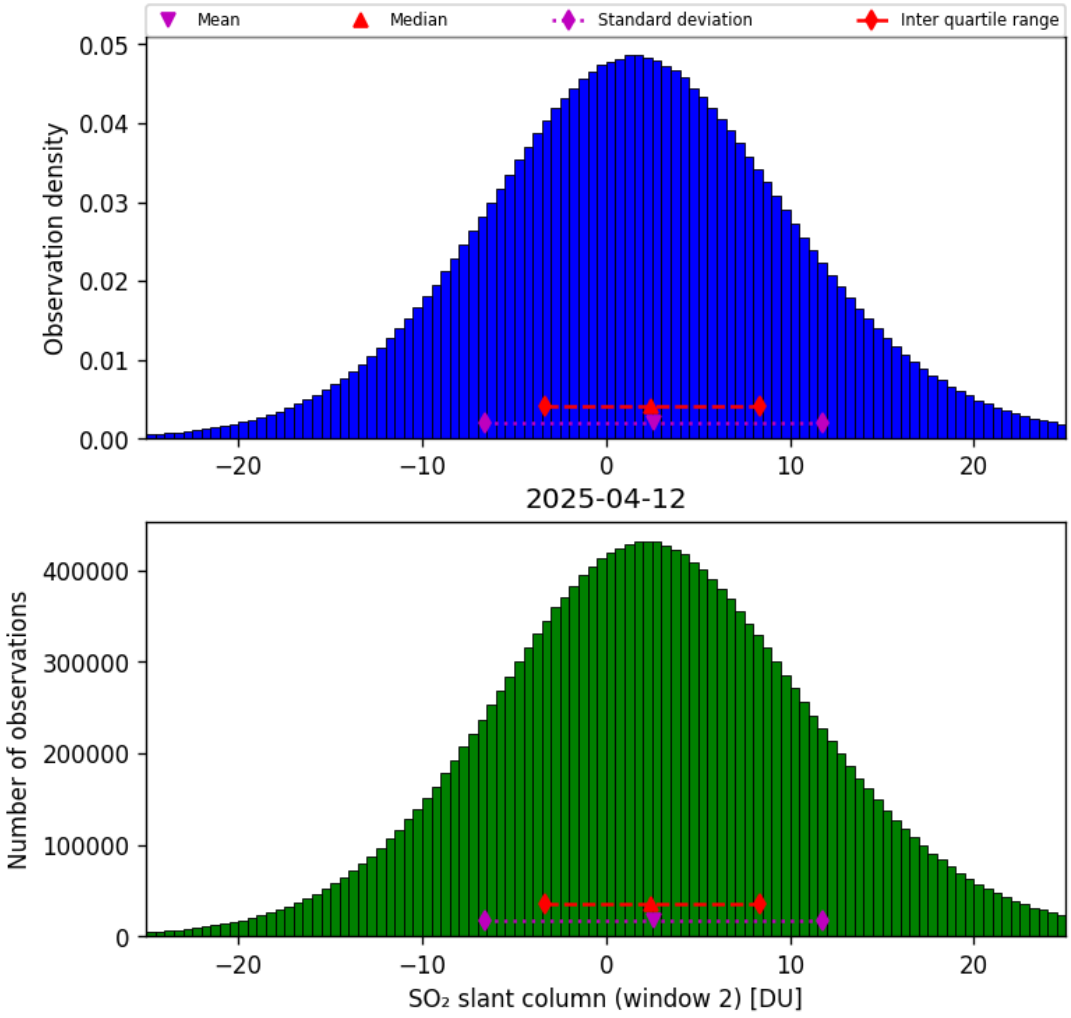

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-04-12 to 2025-04-13

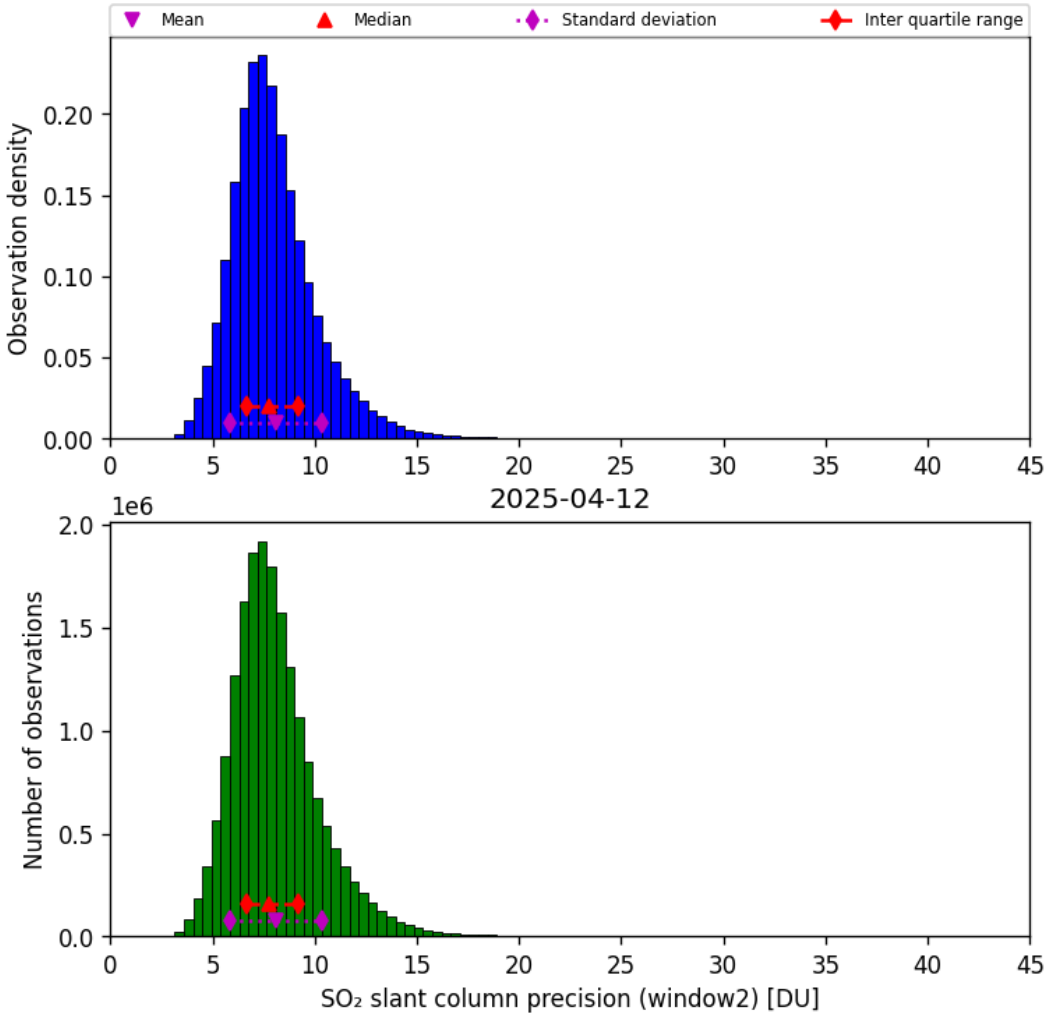

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-04-12 to 2025-04-13

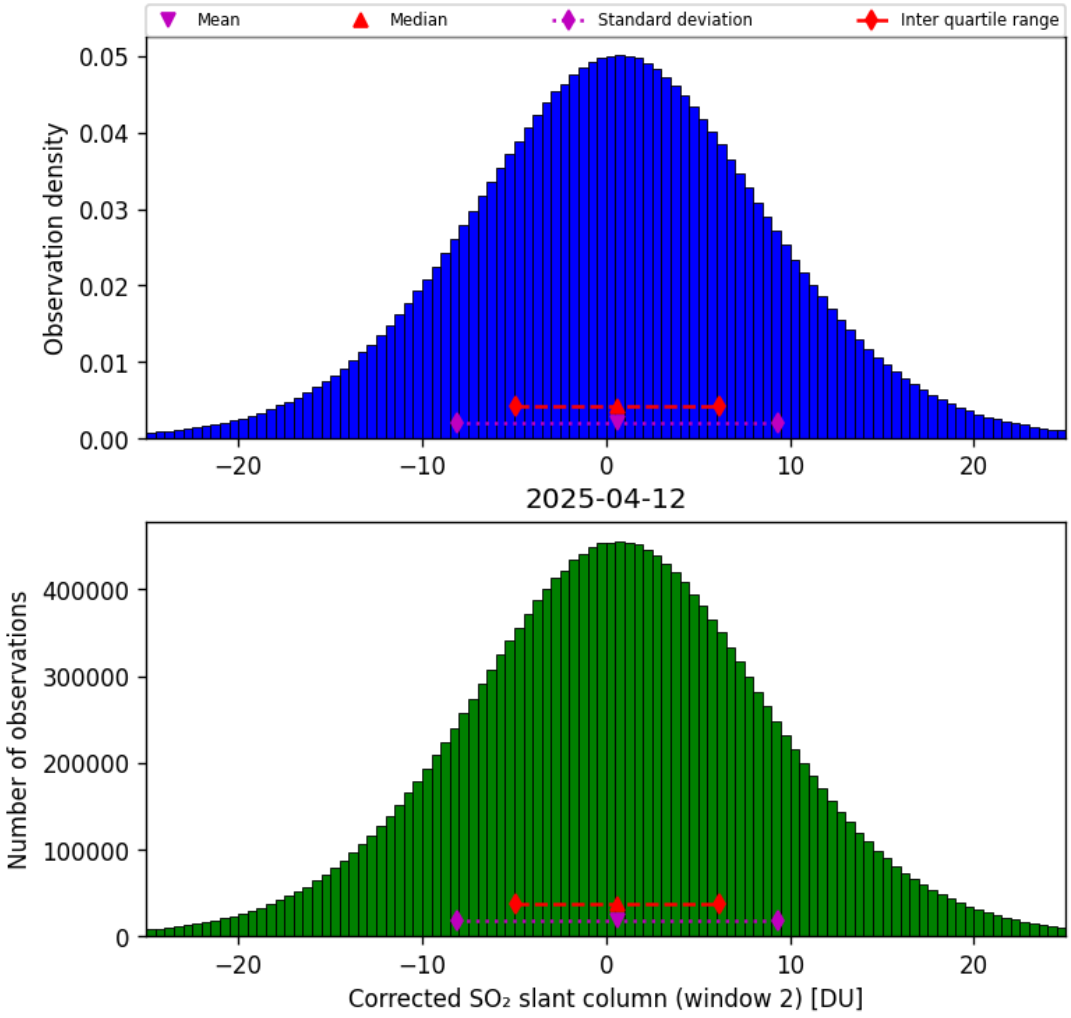

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-04-12 to 2025-04-13

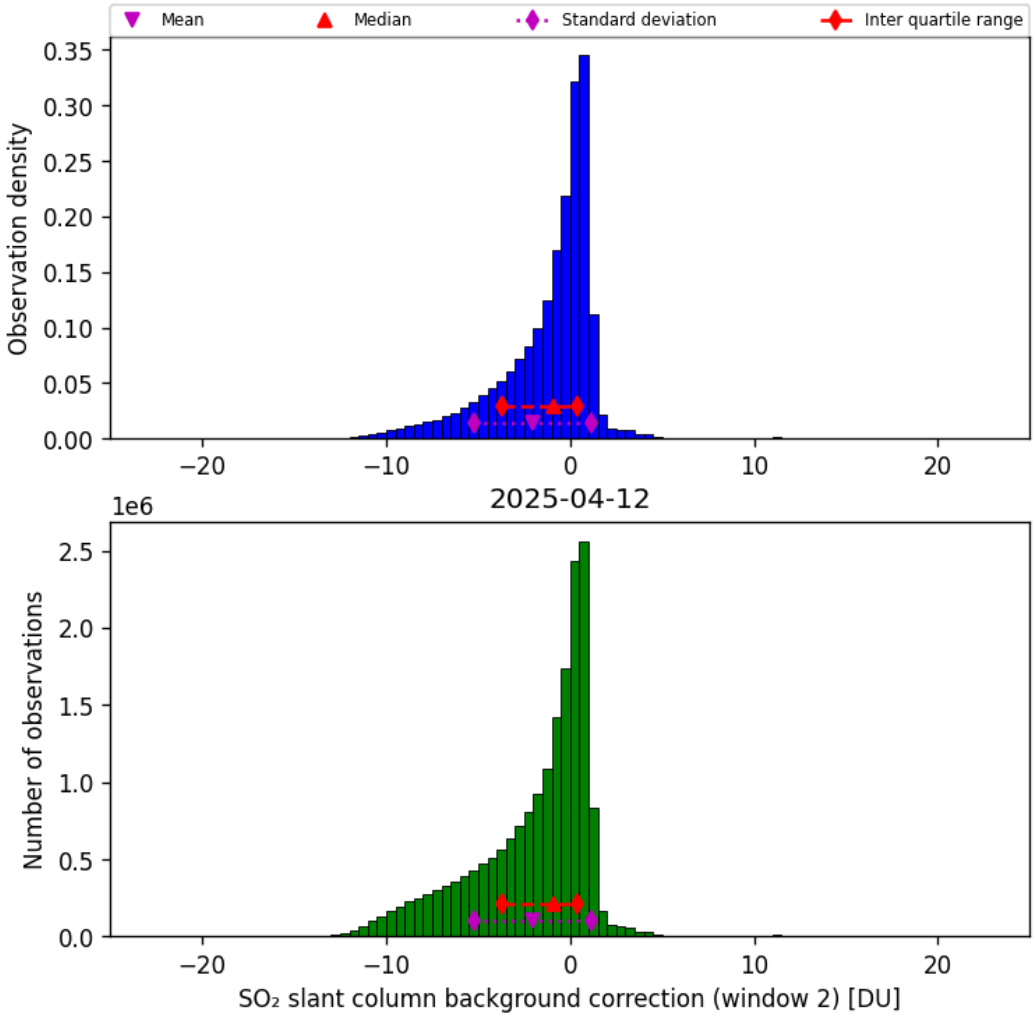

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-04-12 to 2025-04-13

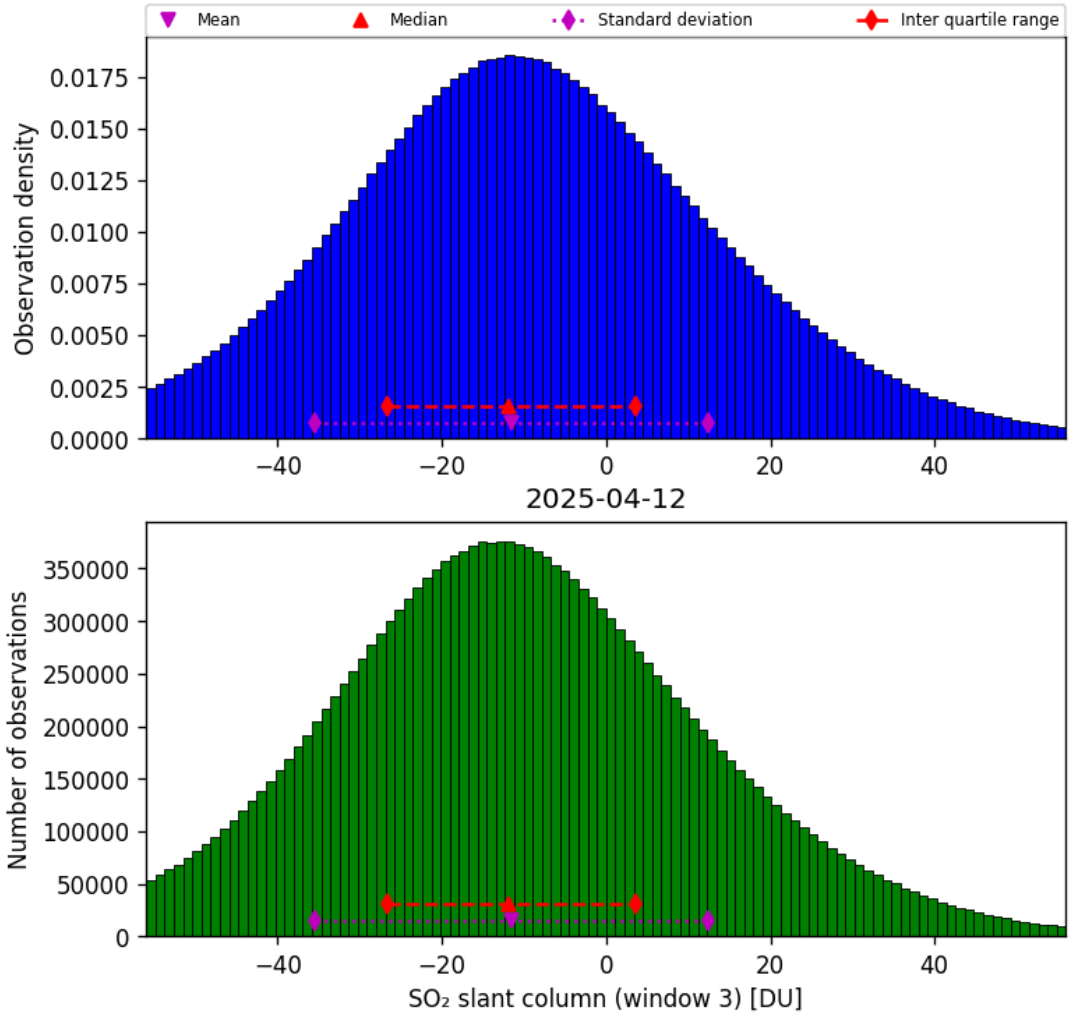

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-04-12 to 2025-04-13

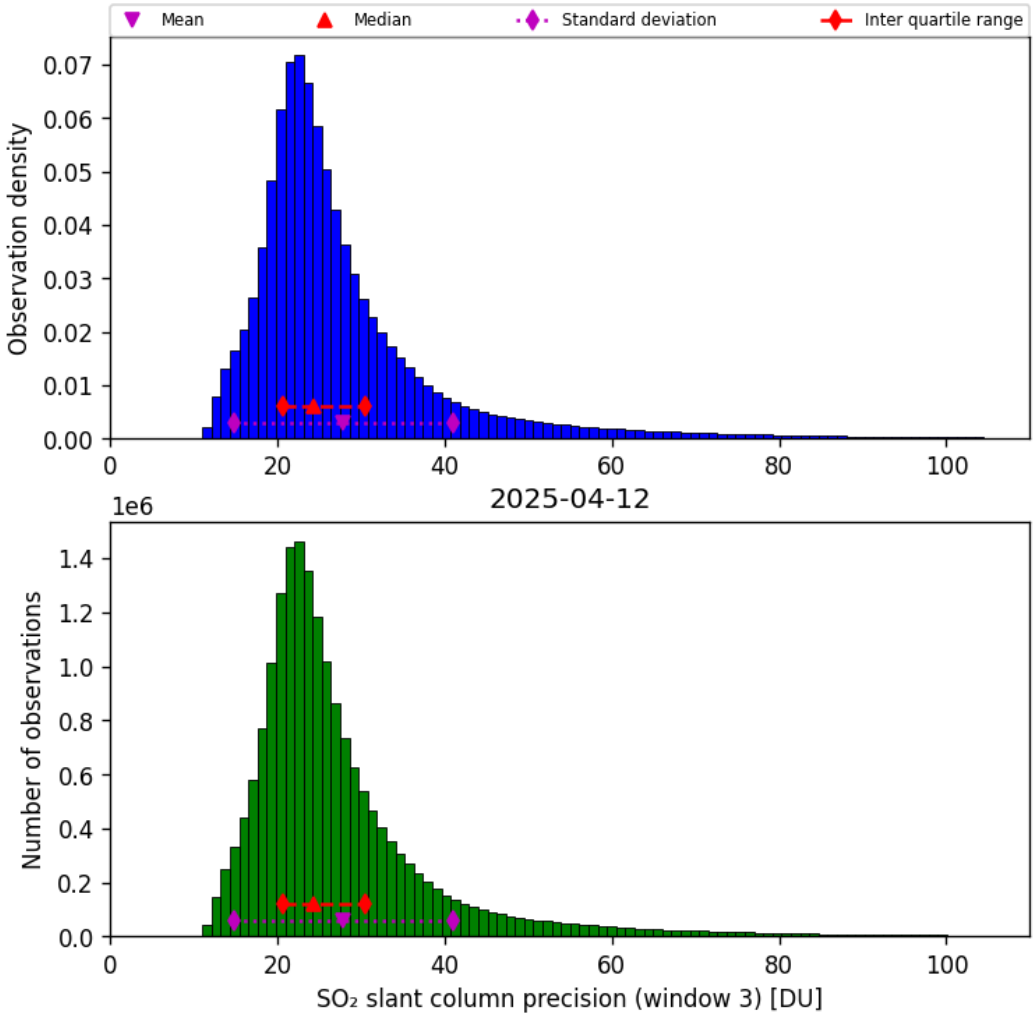

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-04-12 to 2025-04-13

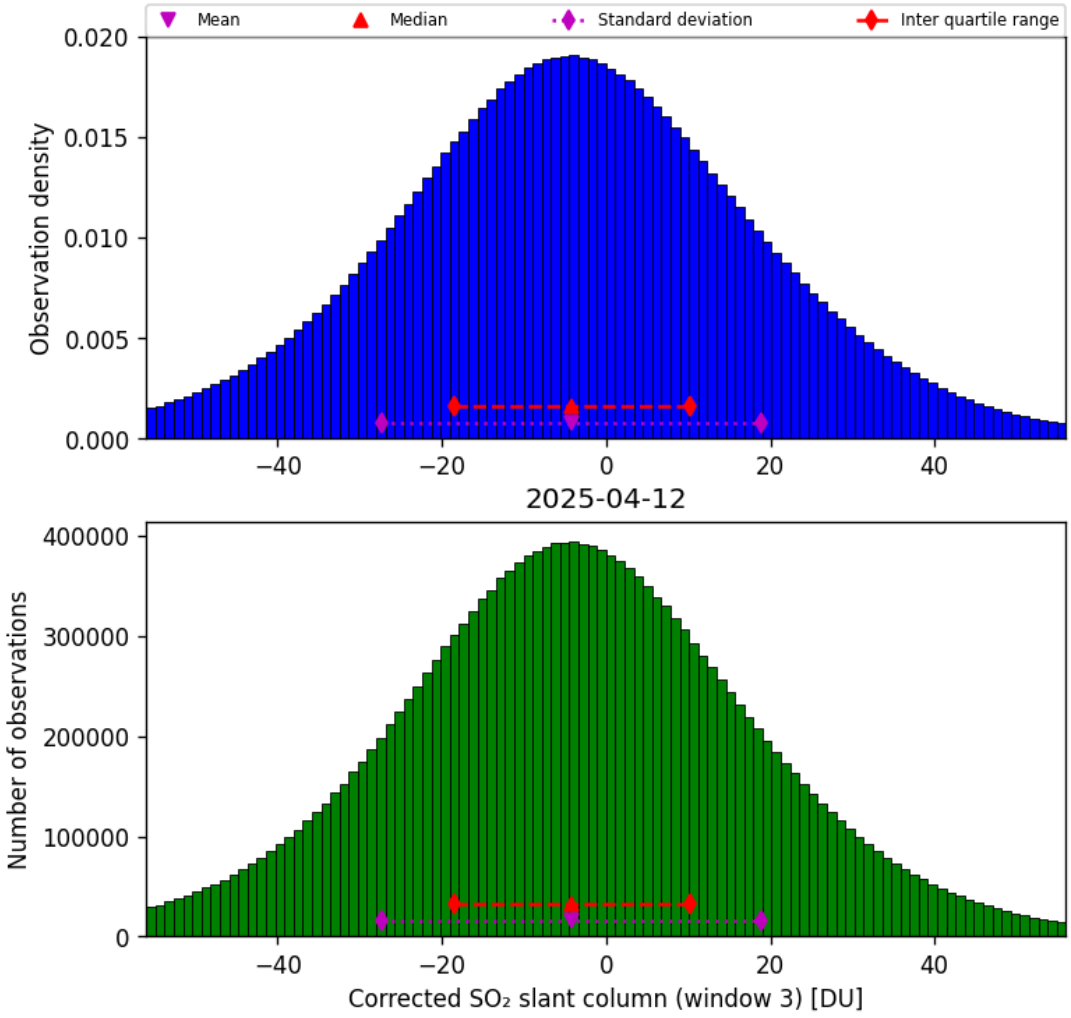

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-04-12 to 2025-04-13

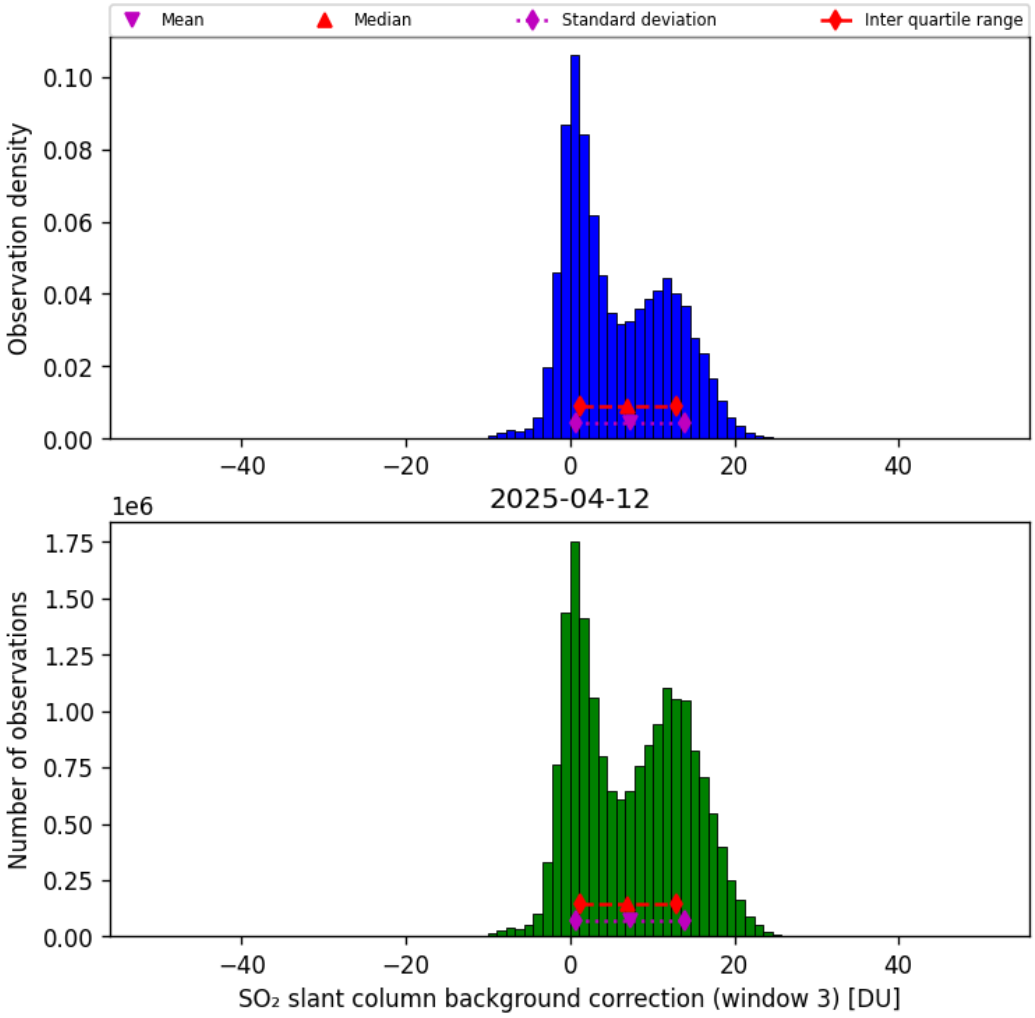

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-04-12 to 2025-04-13

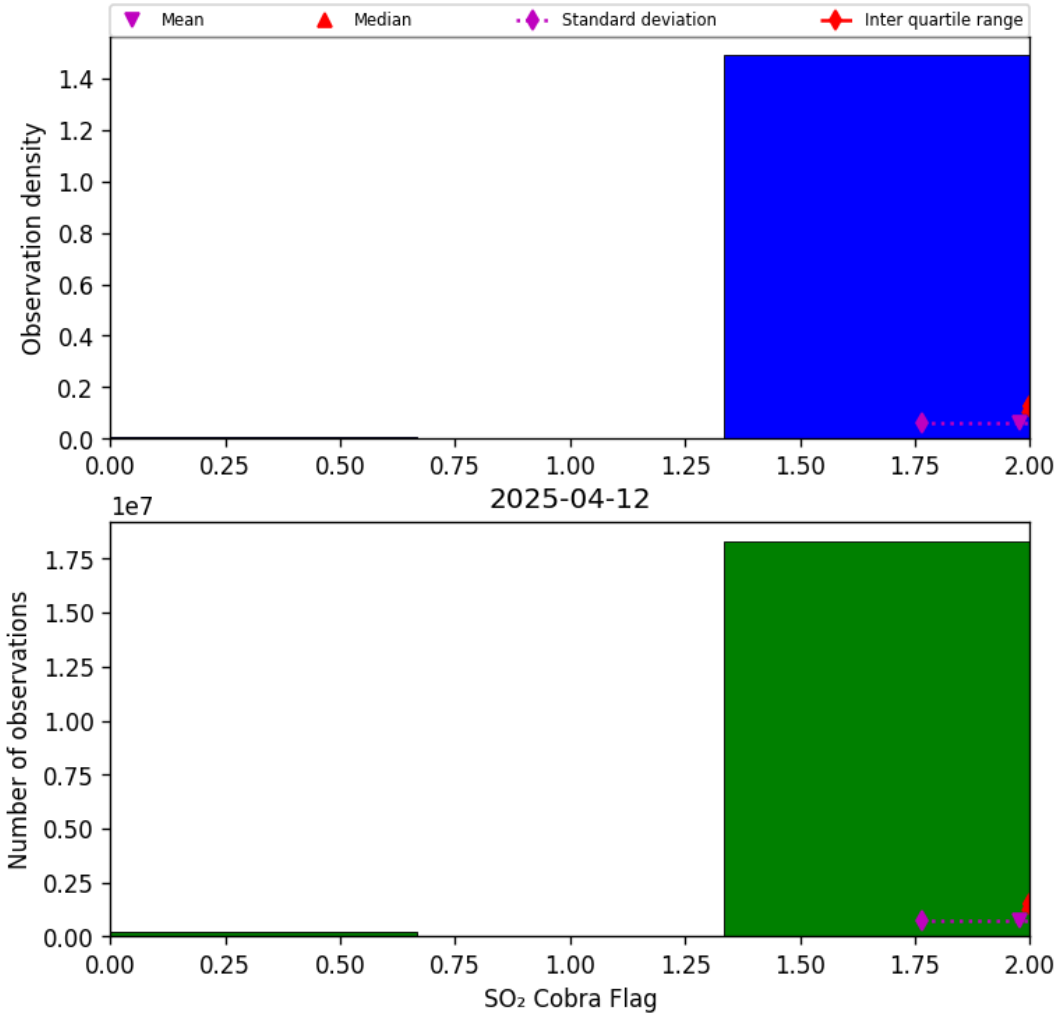

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-04-12 to 2025-04-13

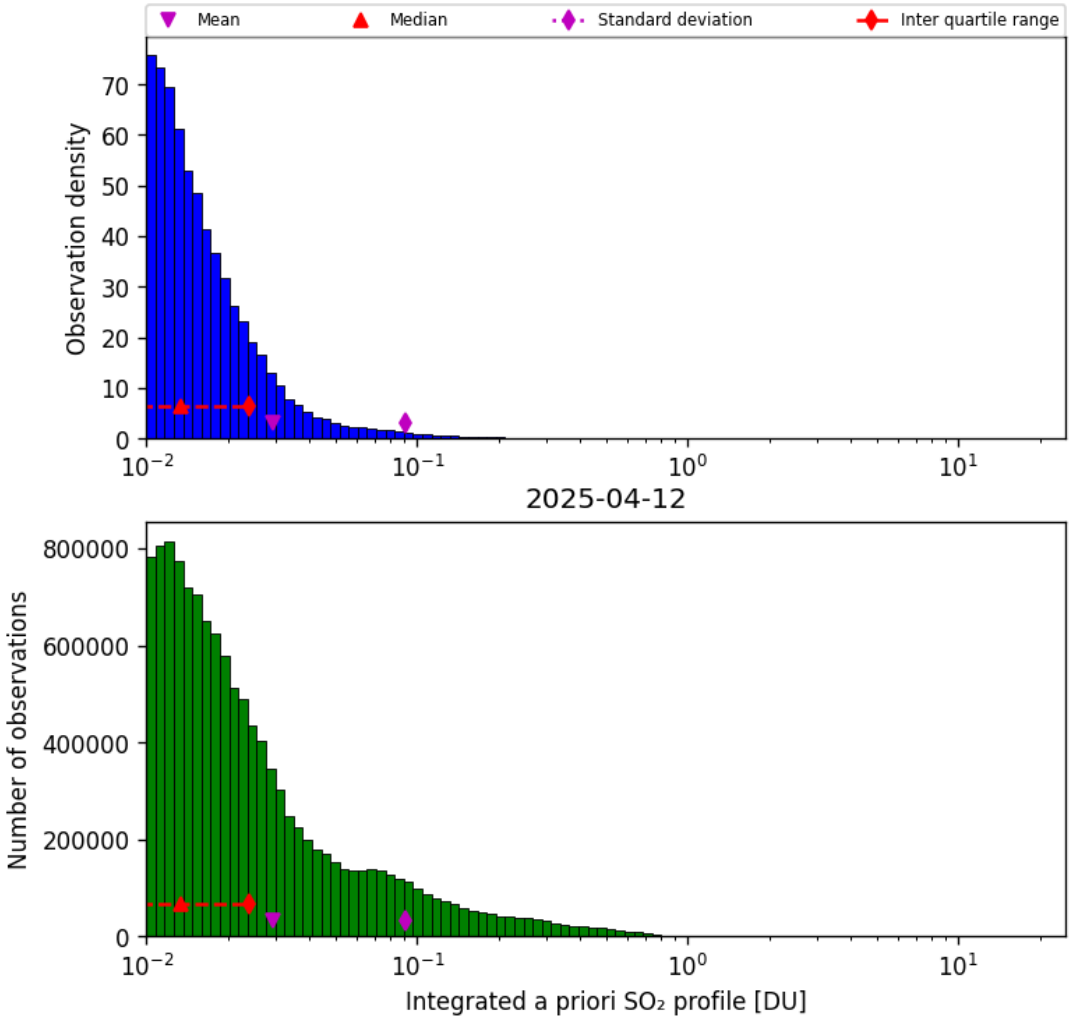

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-04-12 to 2025-04-13

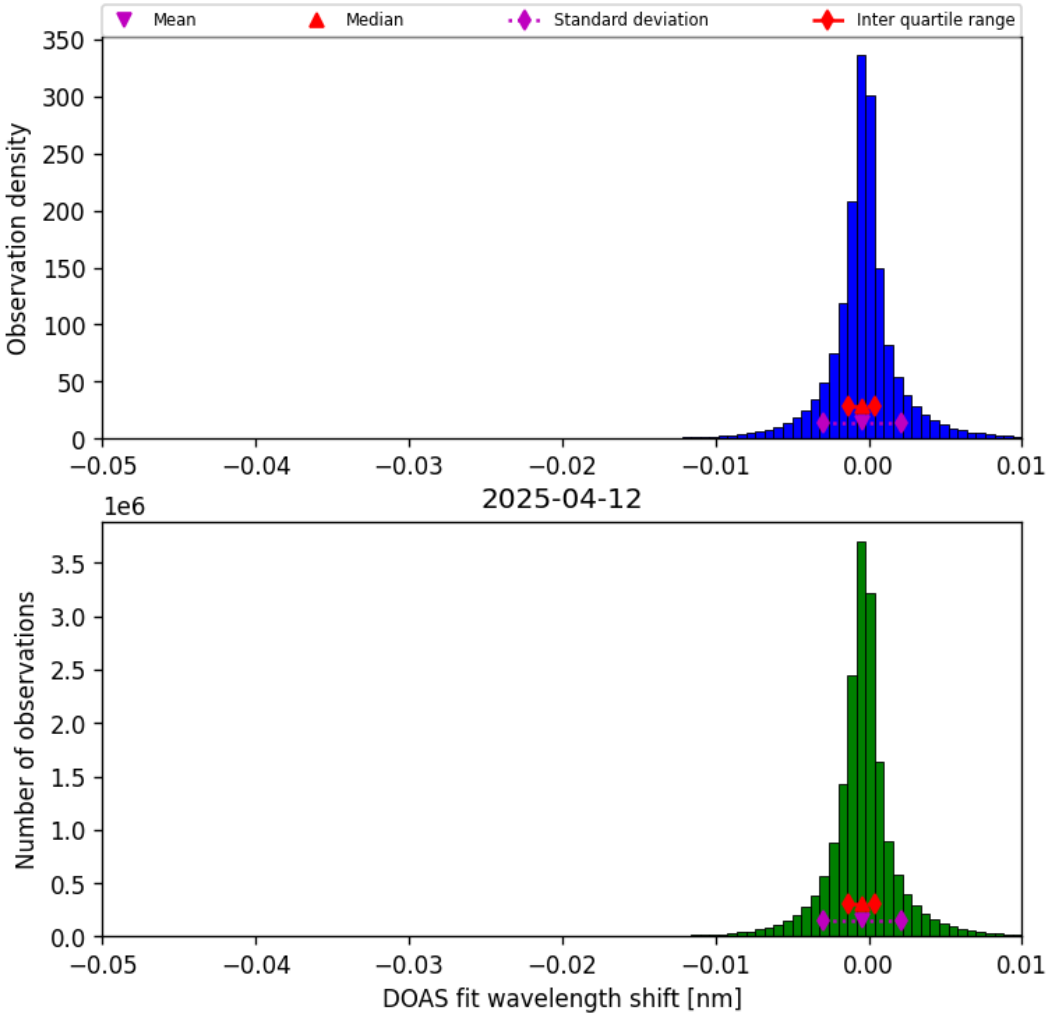

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-04-12 to 2025-04-13

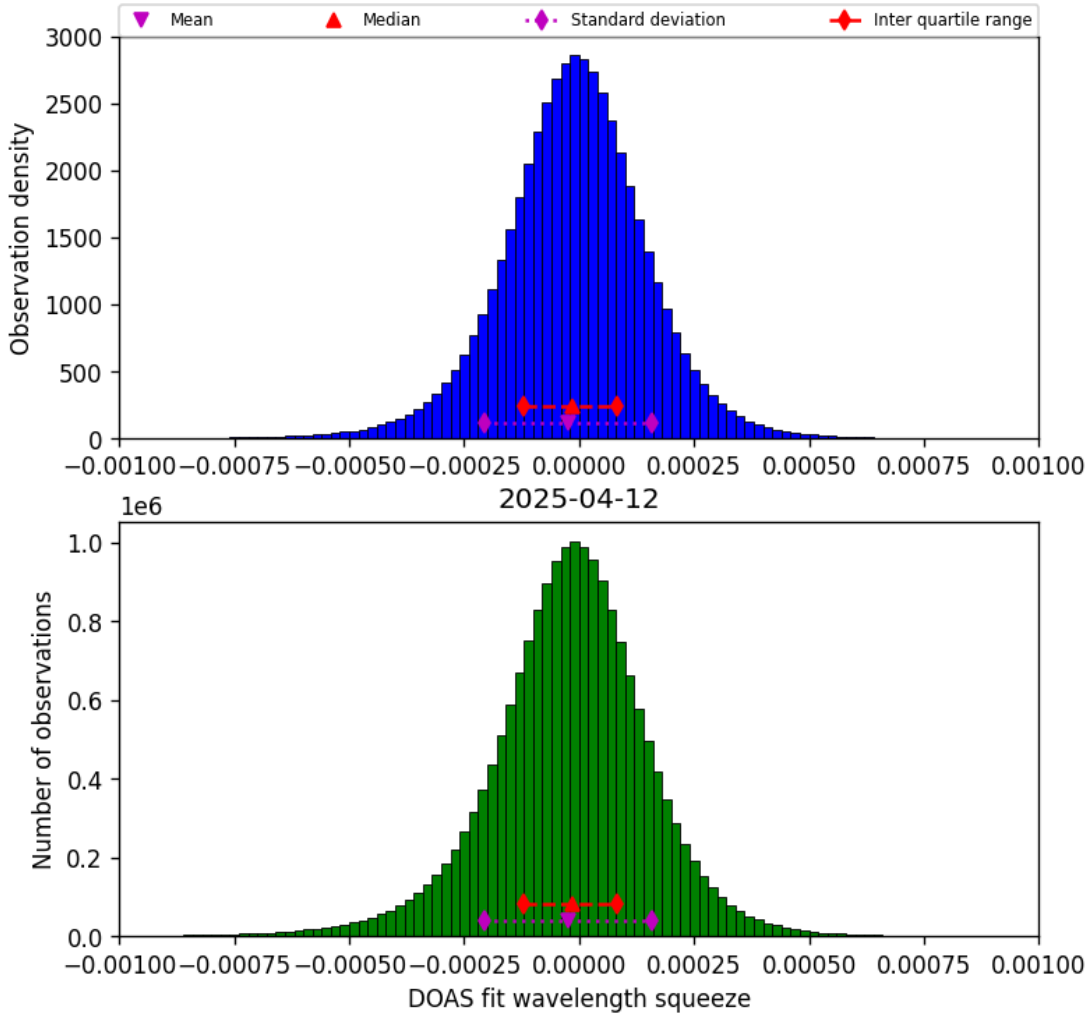

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-04-12 to 2025-04-13

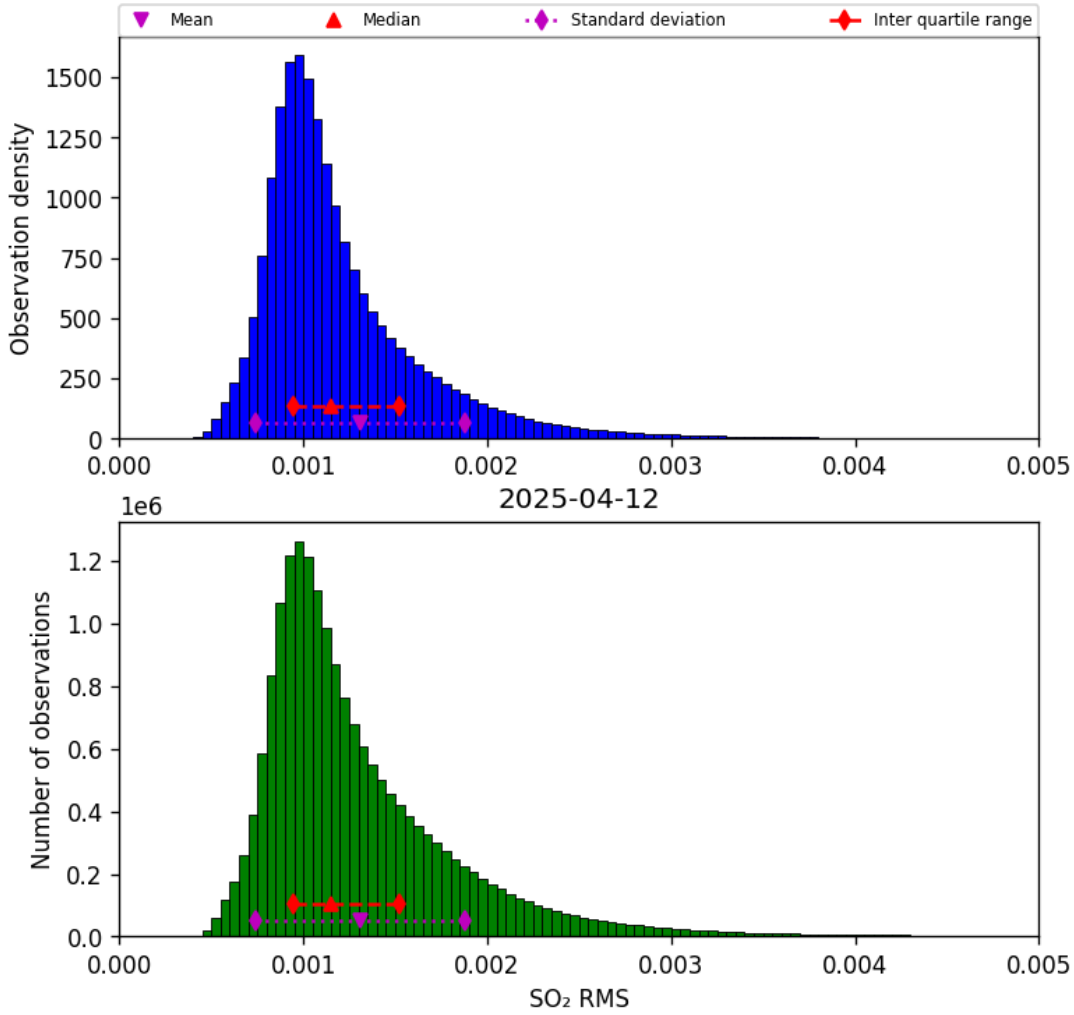

Figure 79: Histogram of "SO_2 RMS" for 2025-04-12 to 2025-04-13

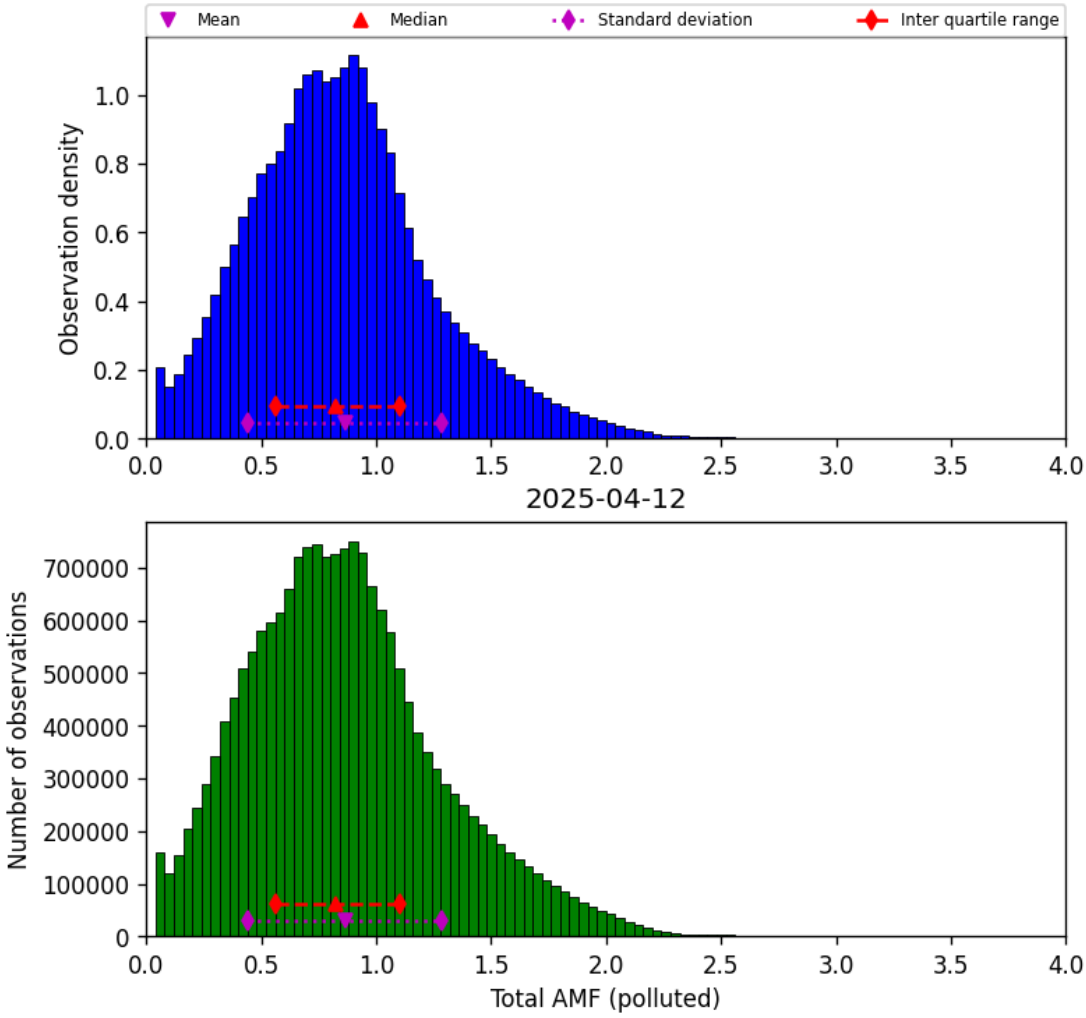

Figure 80: Histogram of “Total AMF (polluted)” for 2025-04-12 to 2025-04-13

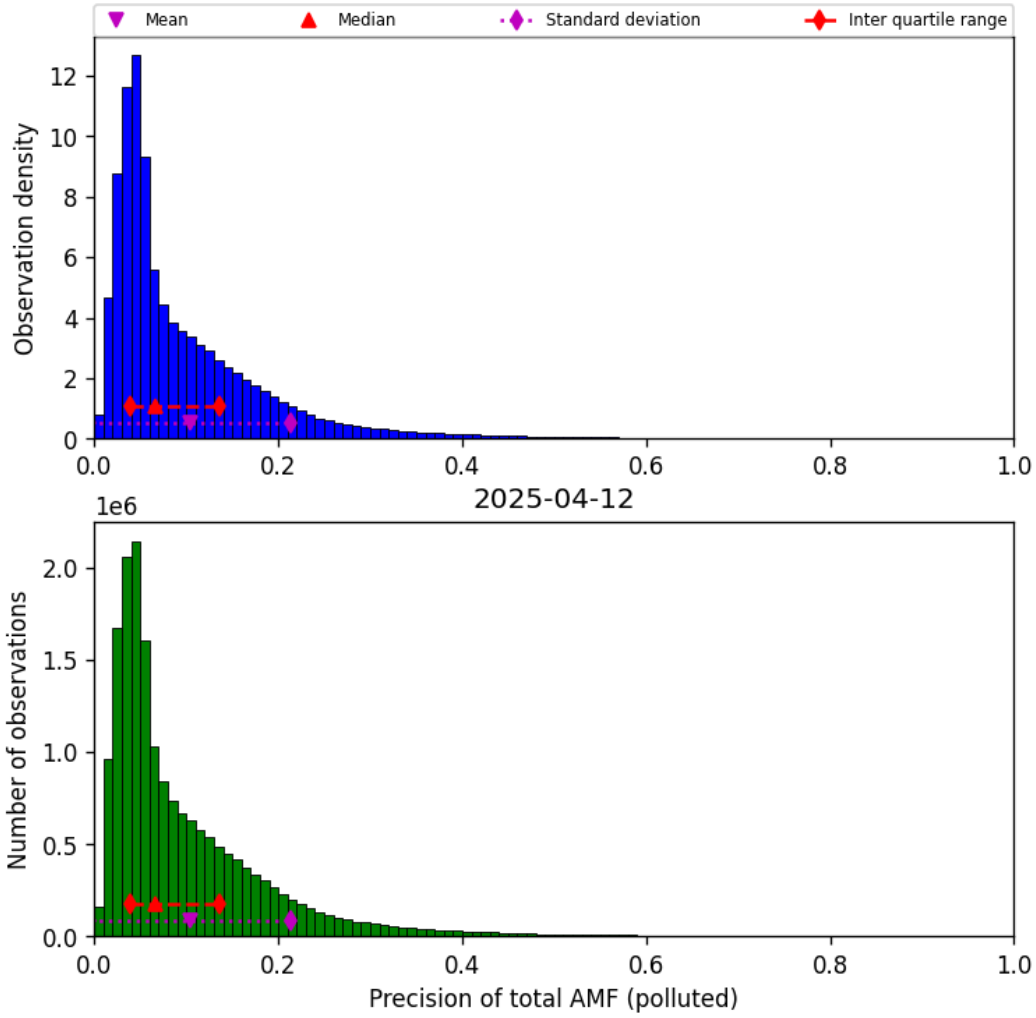

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-04-12 to 2025-04-13

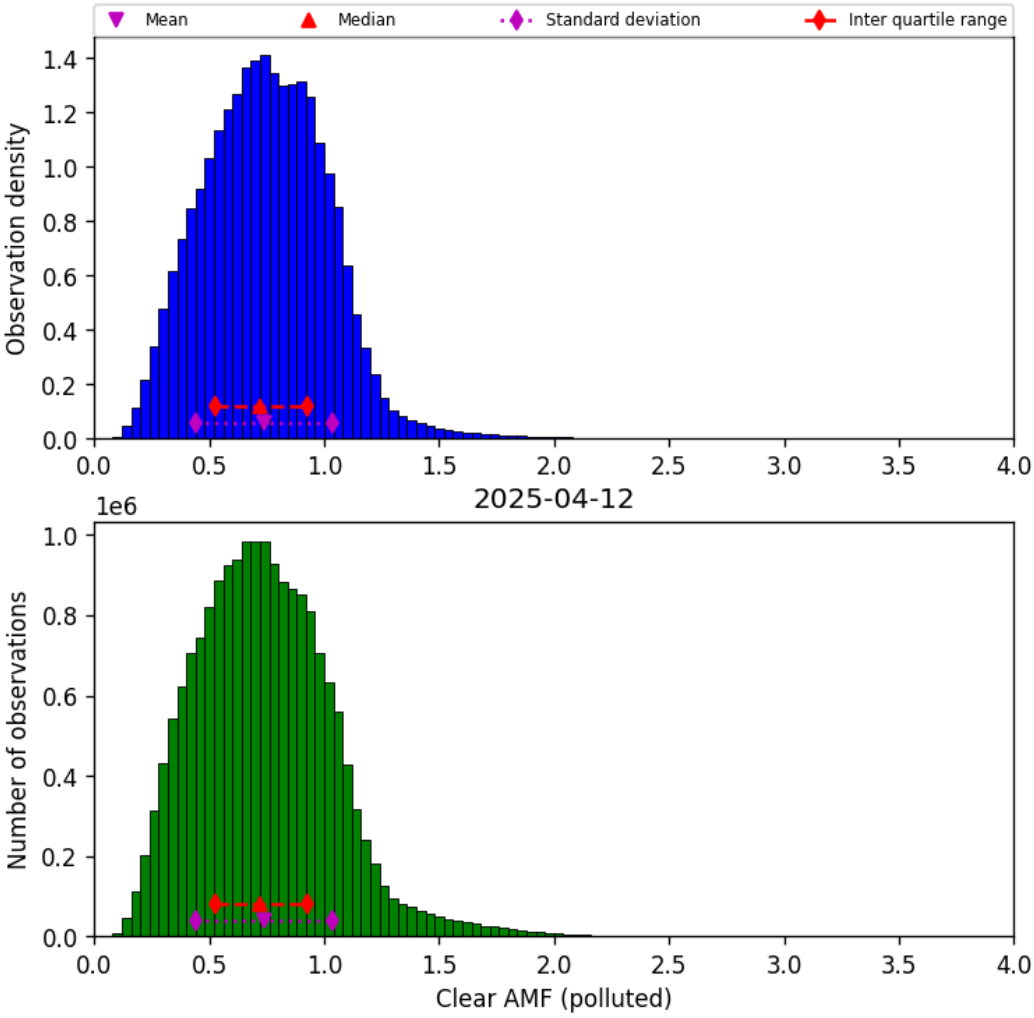

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-04-12 to 2025-04-13

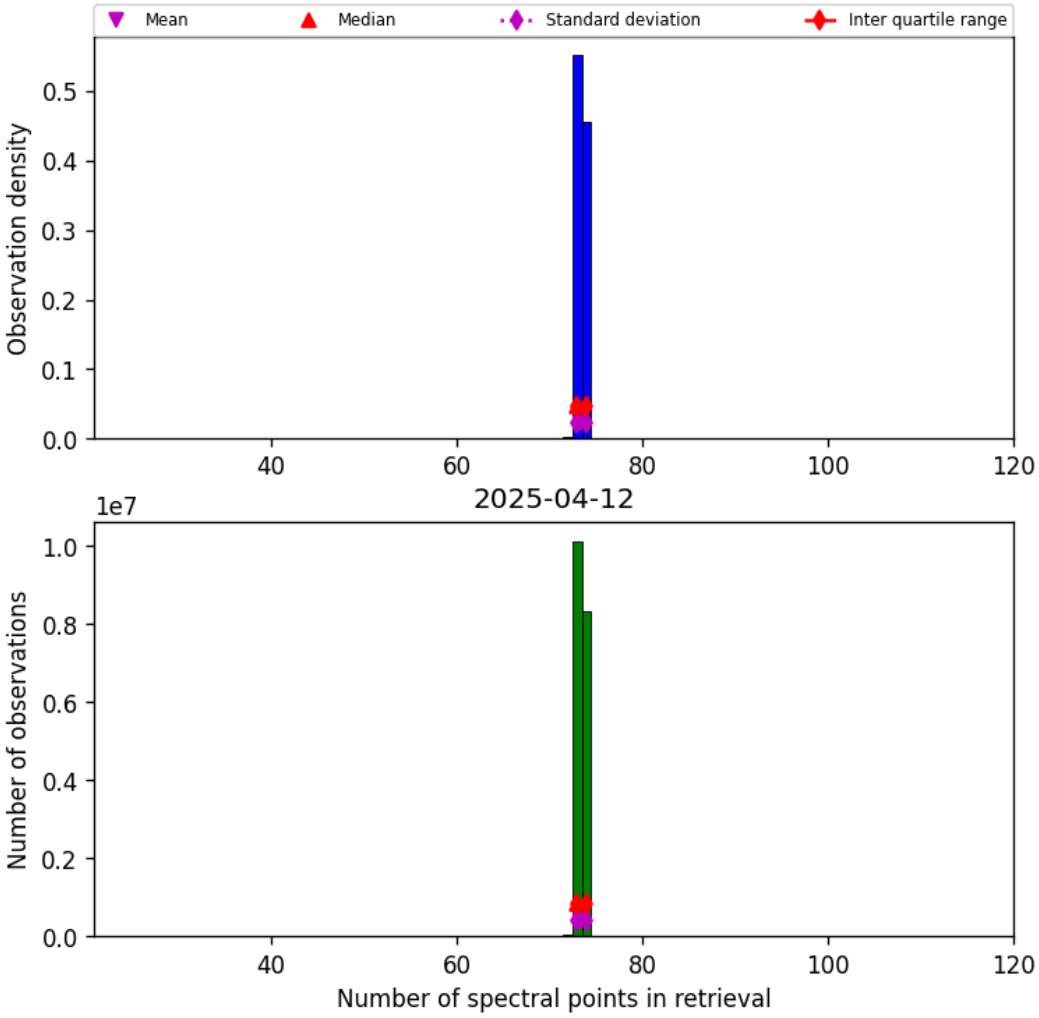

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-04-12 to 2025-04-13

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.

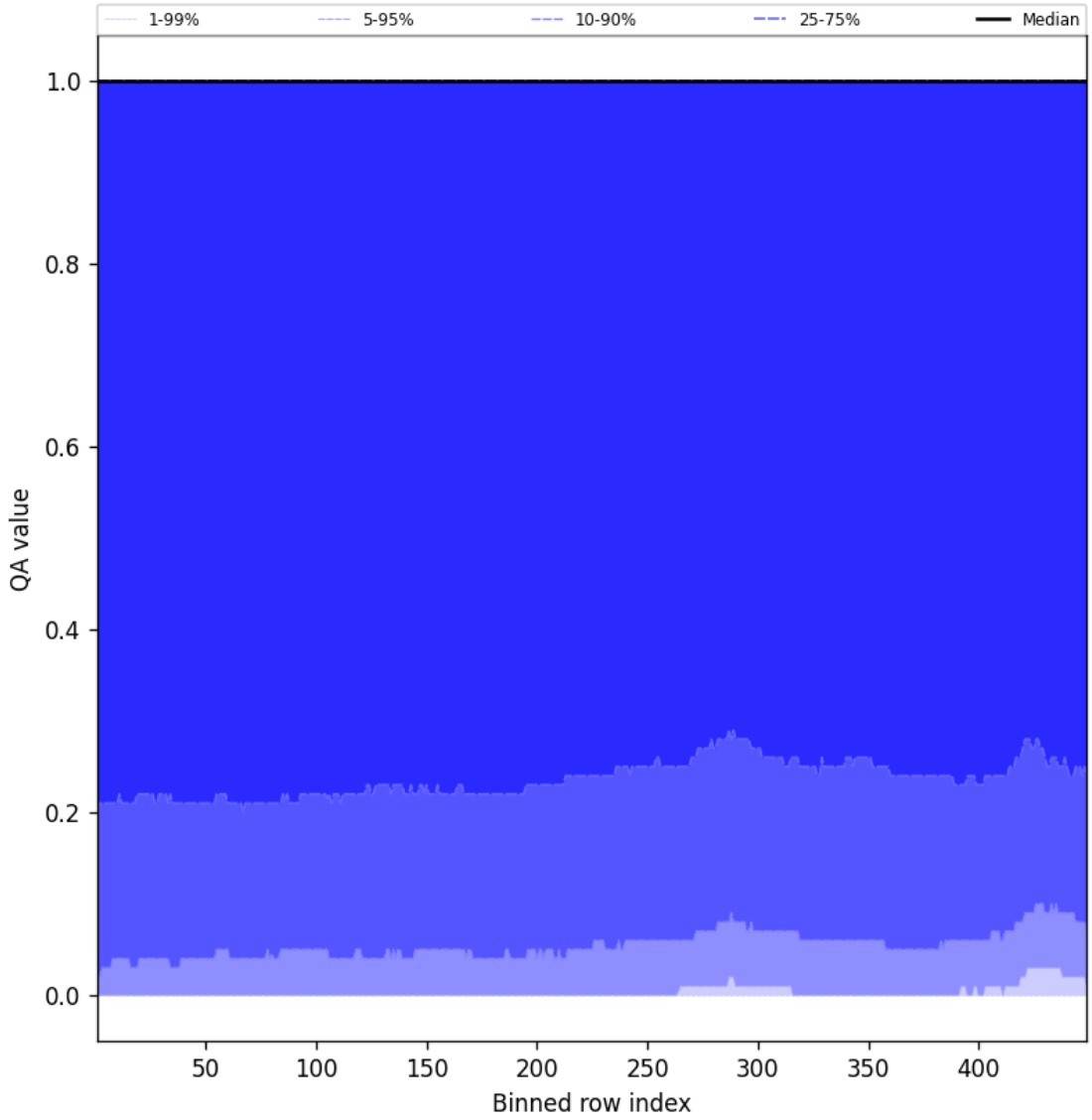

Figure 84: Along track statistics of “QA value” for 2025-04-12 to 2025-04-13

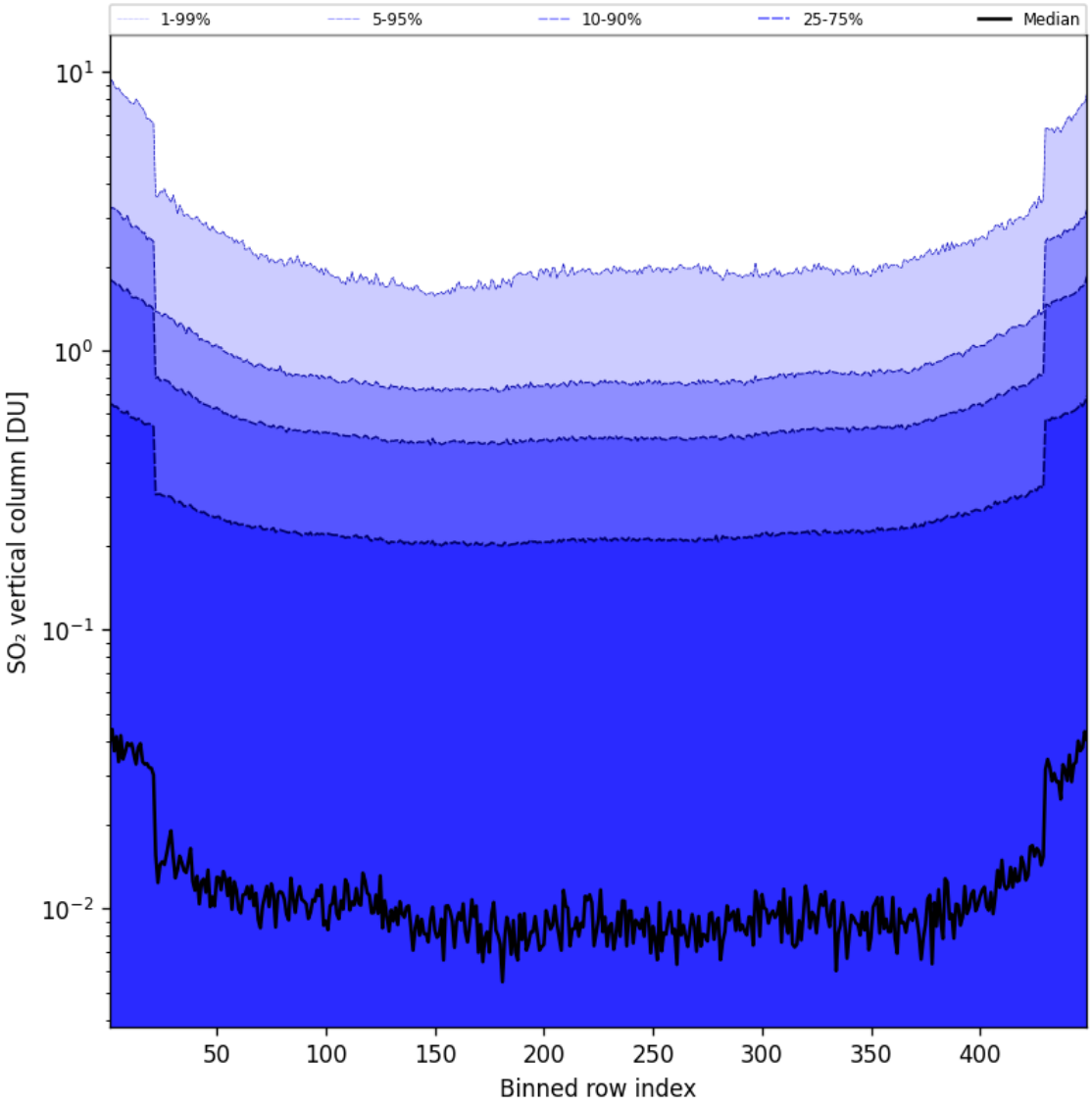

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-04-12 to 2025-04-13

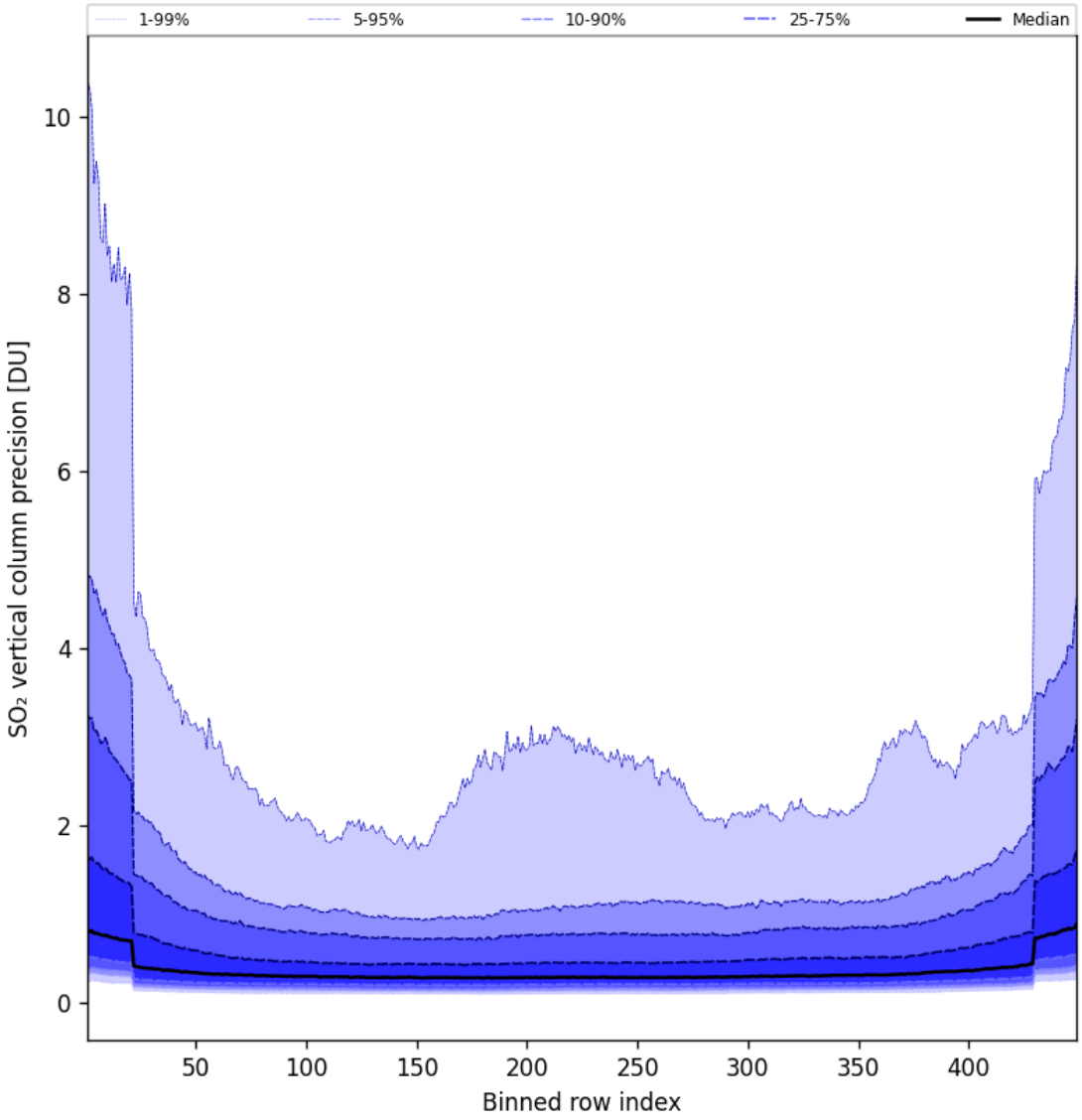

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-04-12 to 2025-04-13

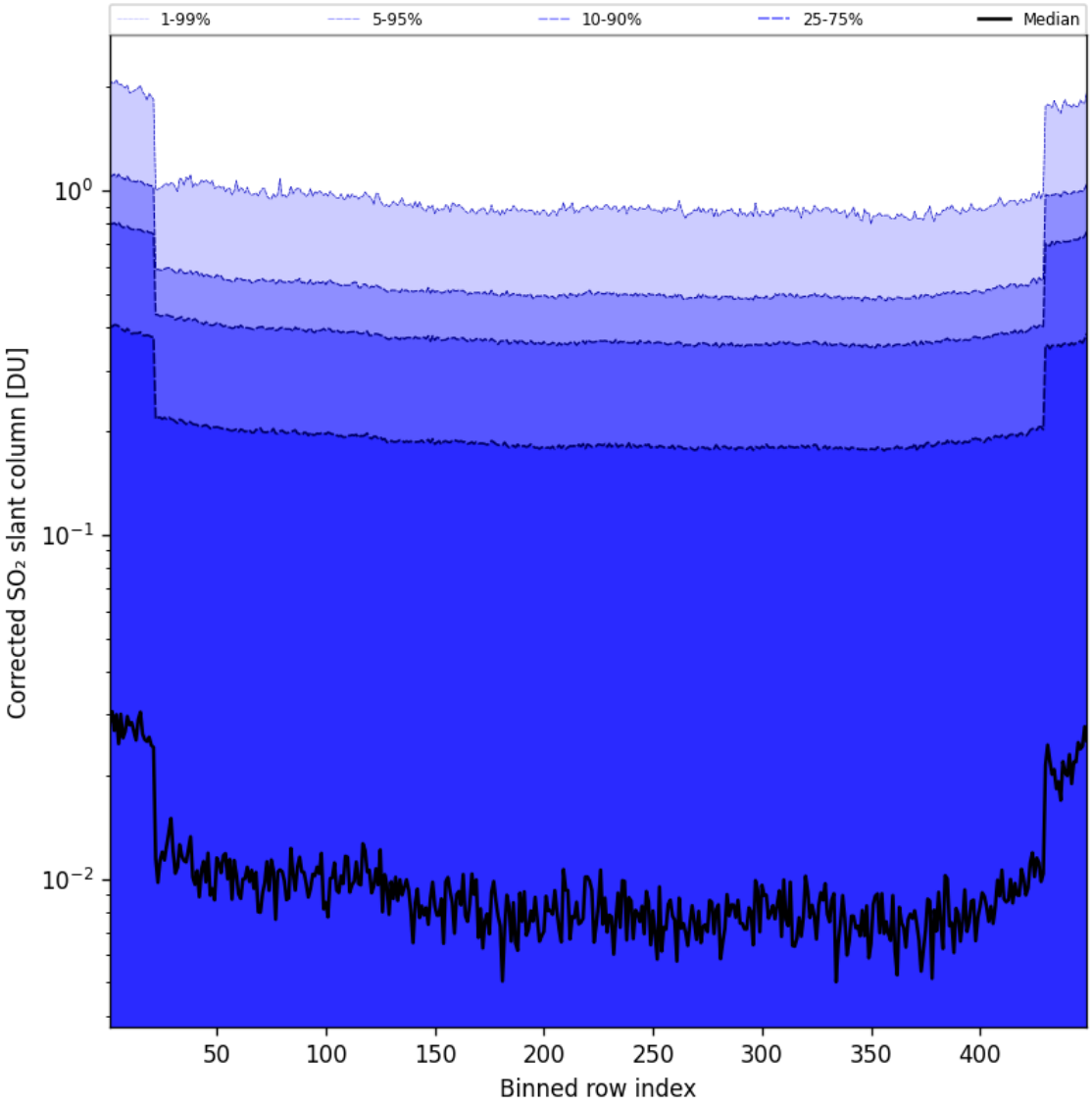

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-04-12 to 2025-04-13

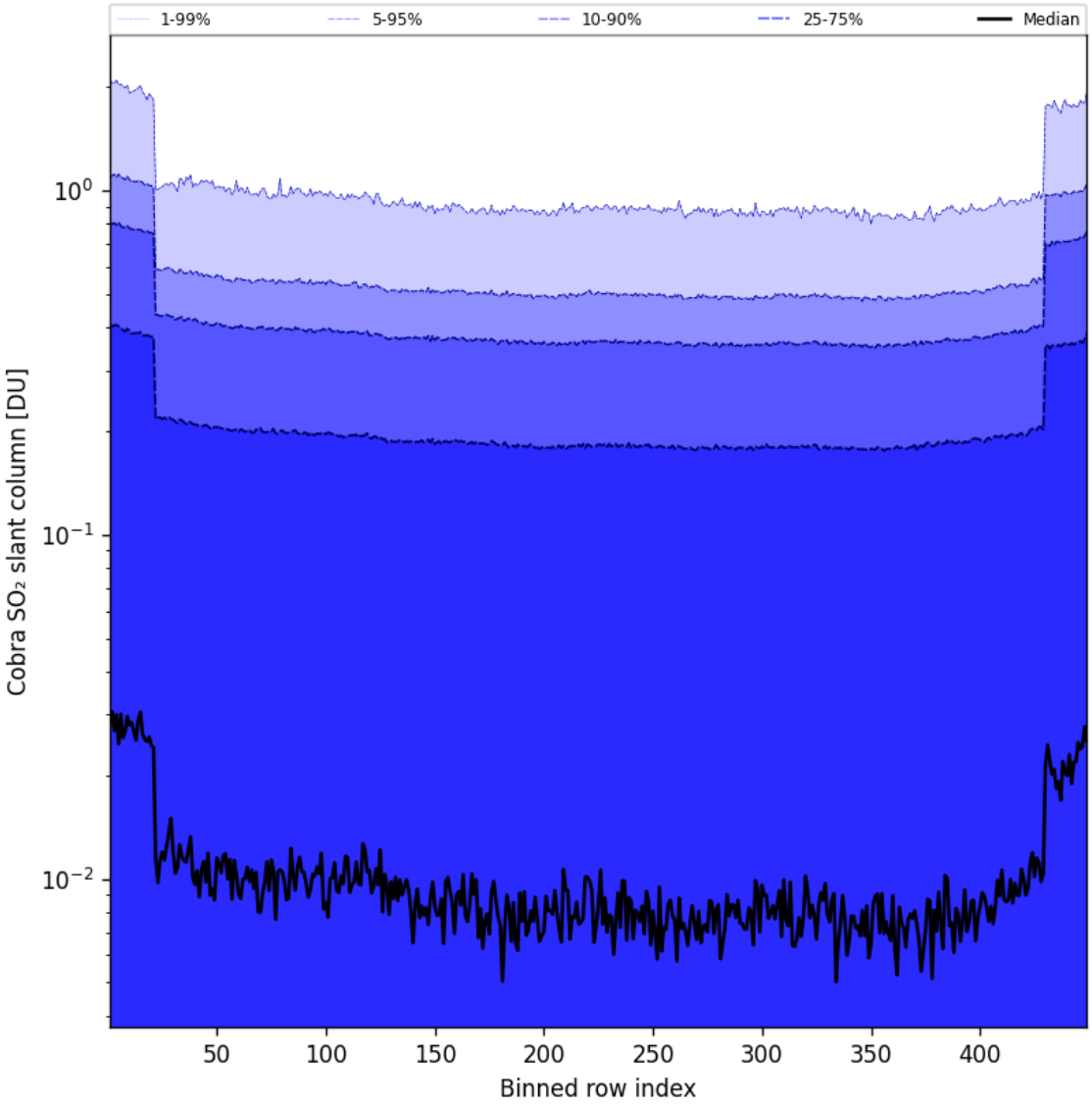

Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-04-12 to 2025-04-13

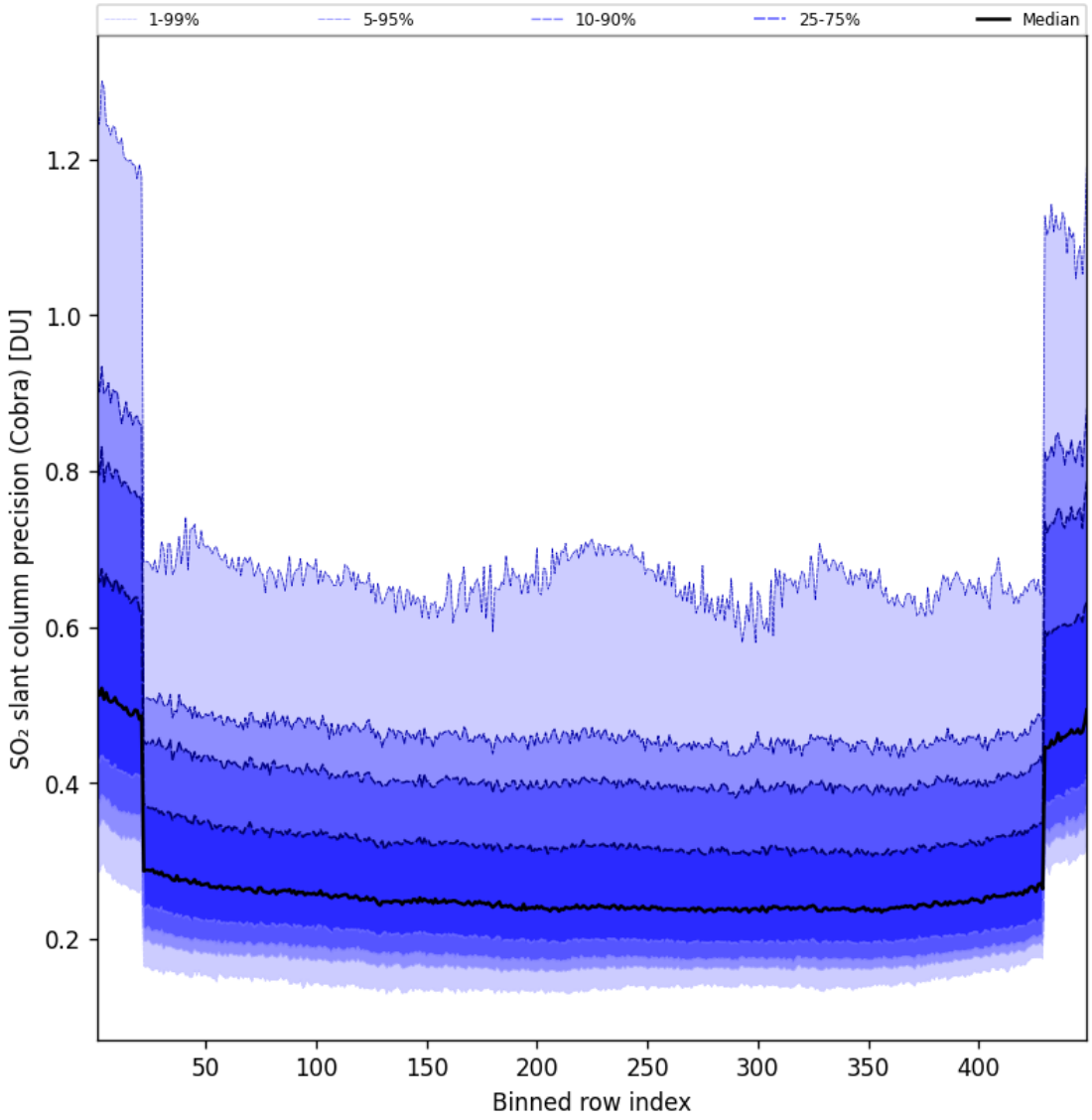

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-04-12 to 2025-04-13

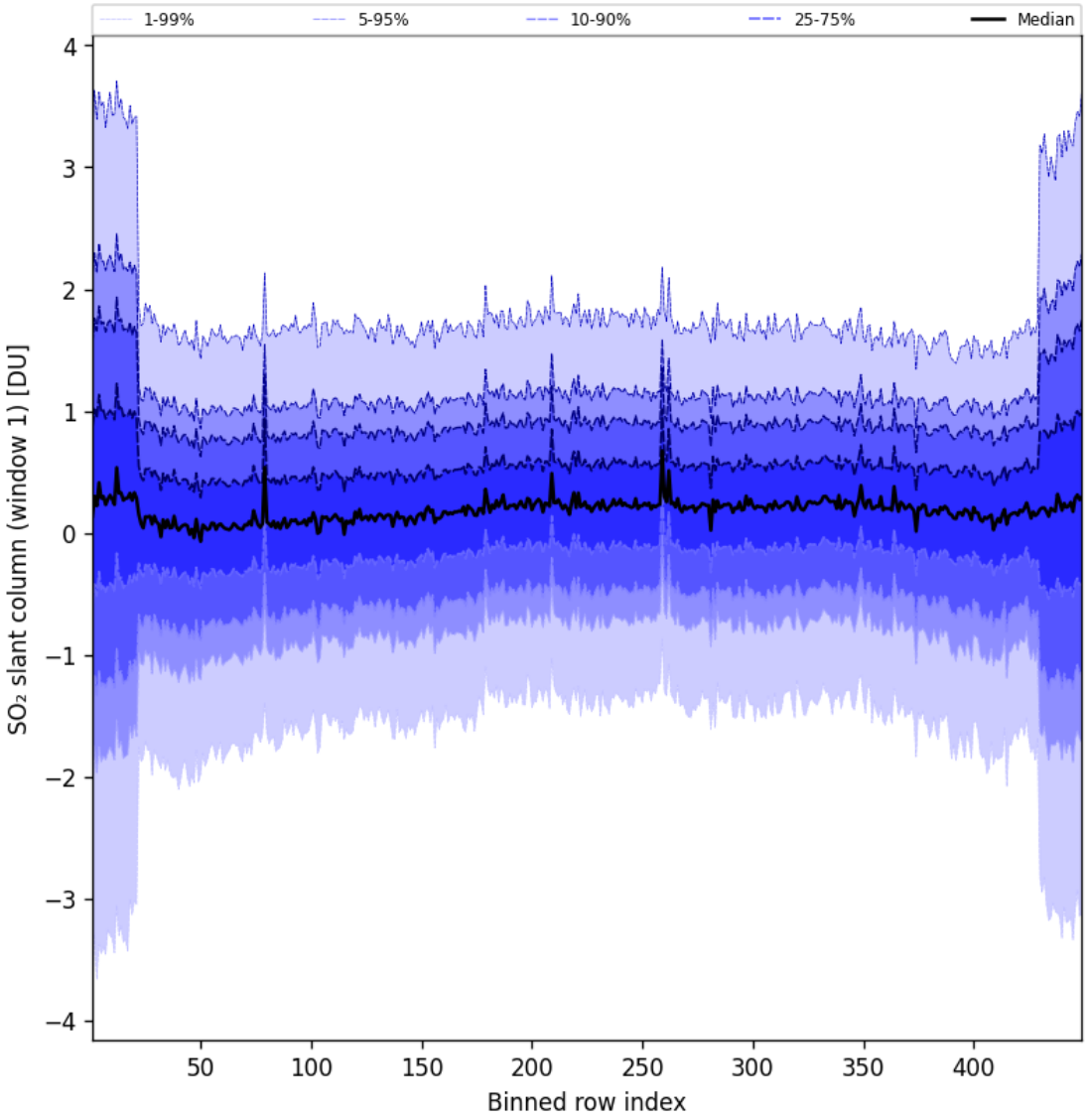

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-04-12 to 2025-04-13

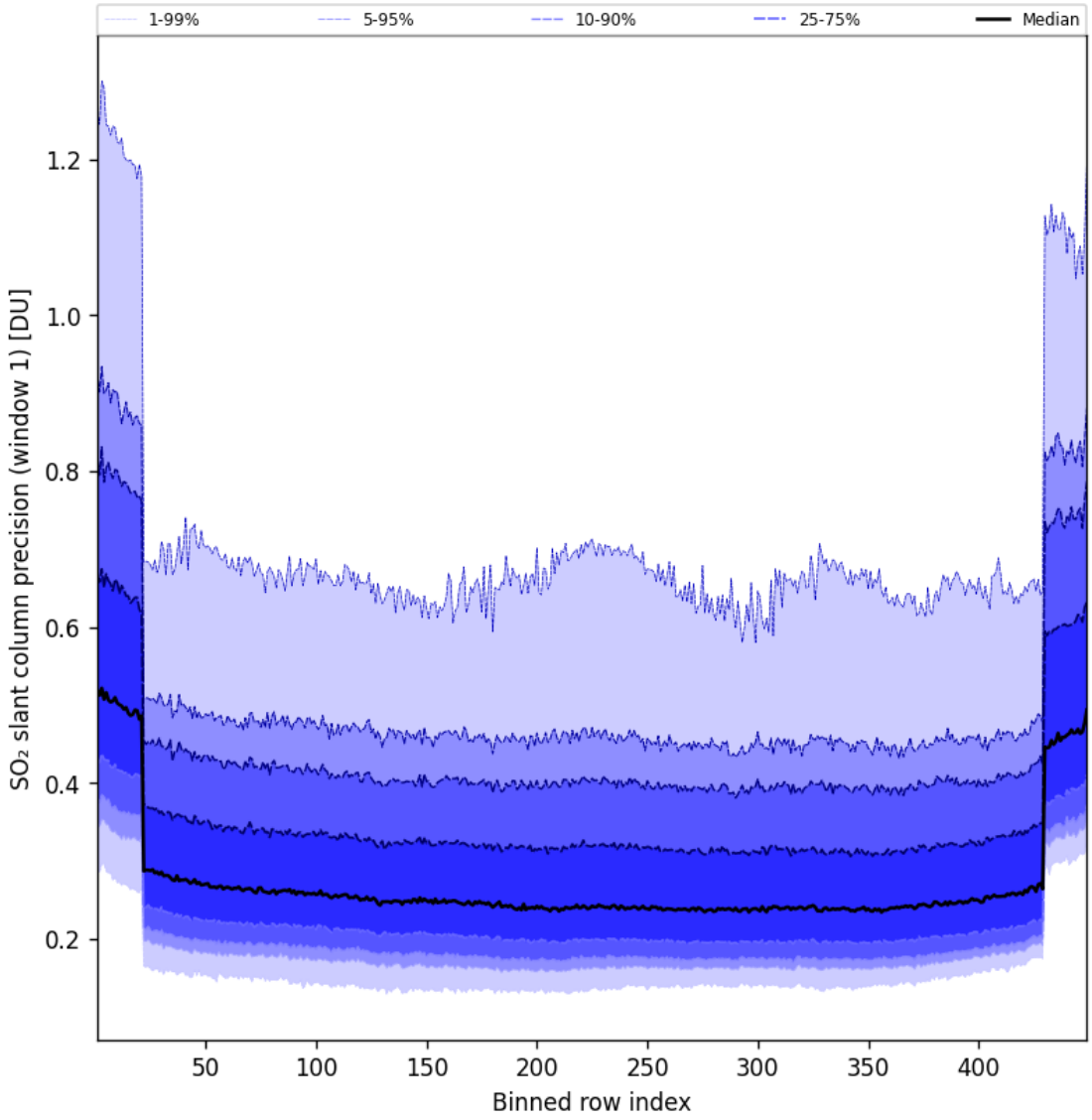

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-04-12 to 2025-04-13

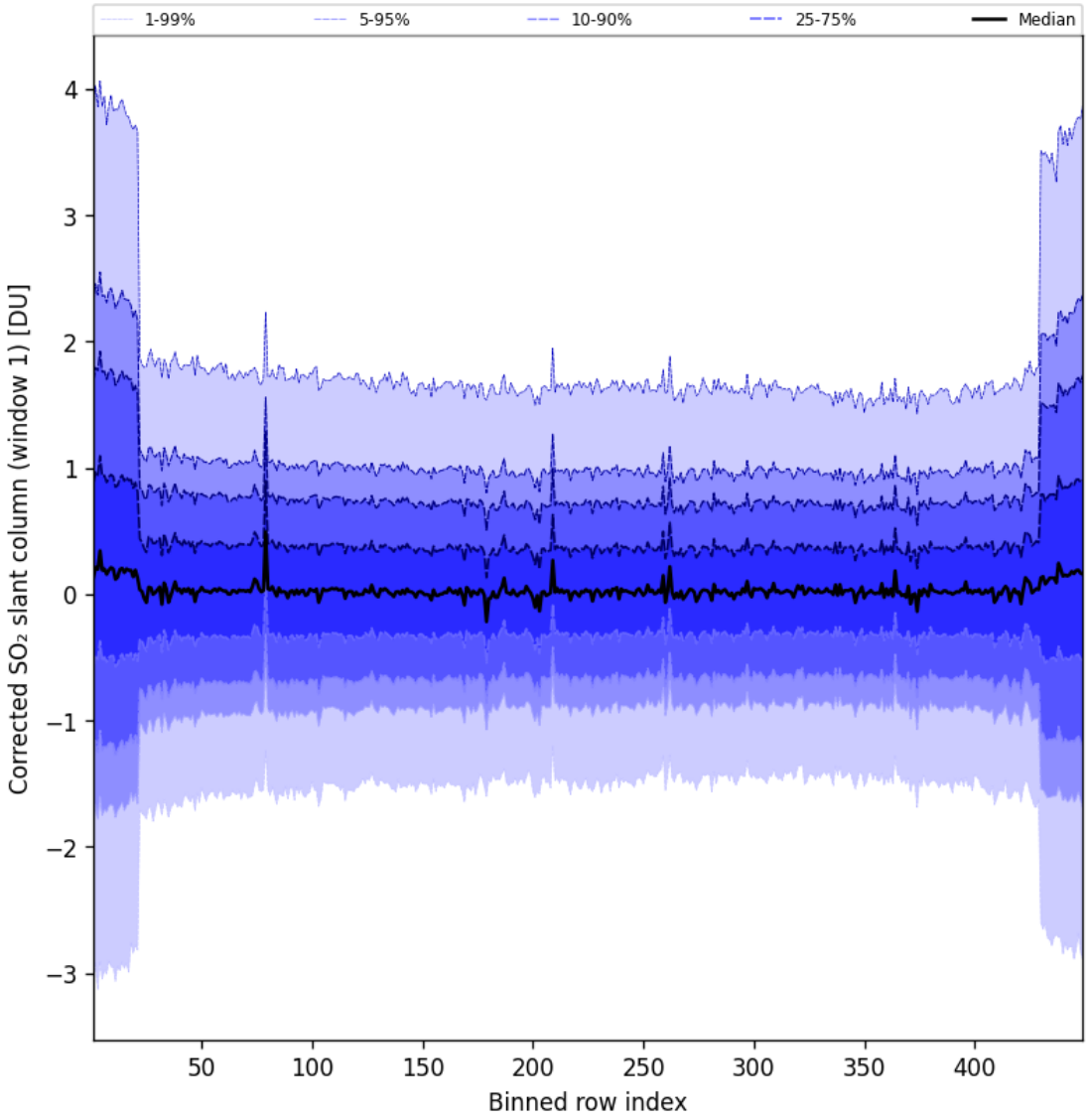

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-04-12 to 2025-04-13

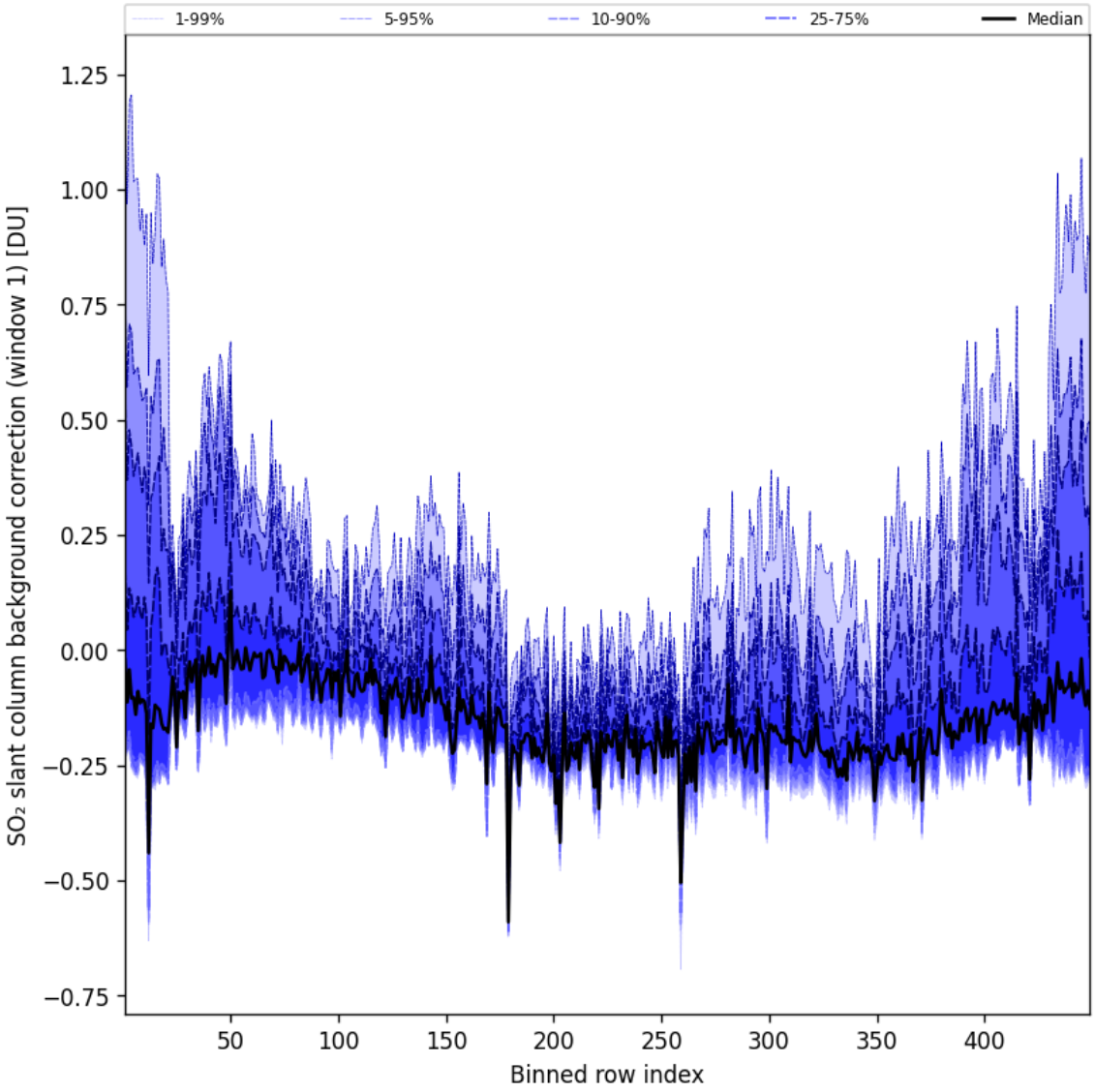

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-04-12 to 2025-04-13

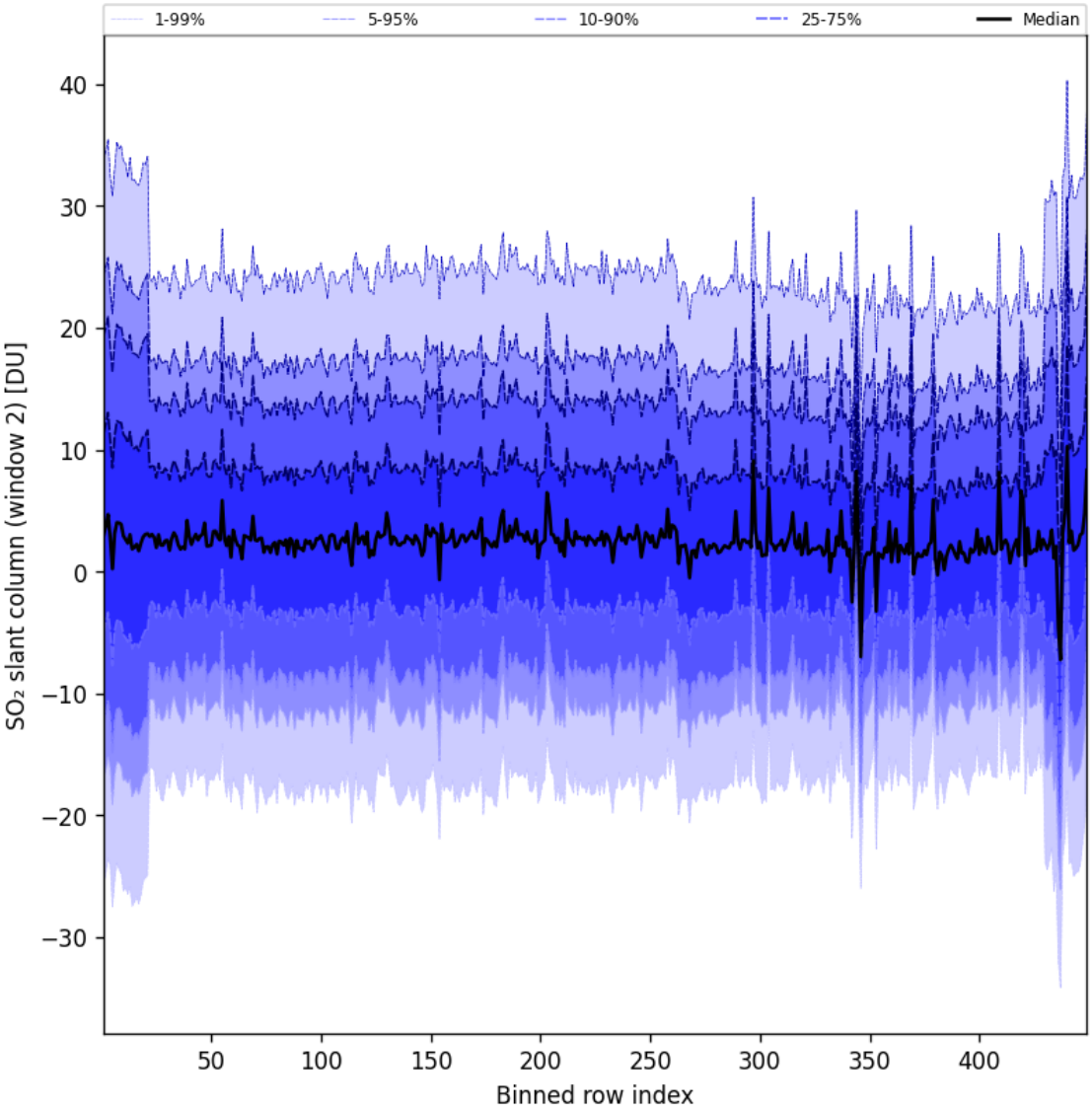

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-04-12 to 2025-04-13

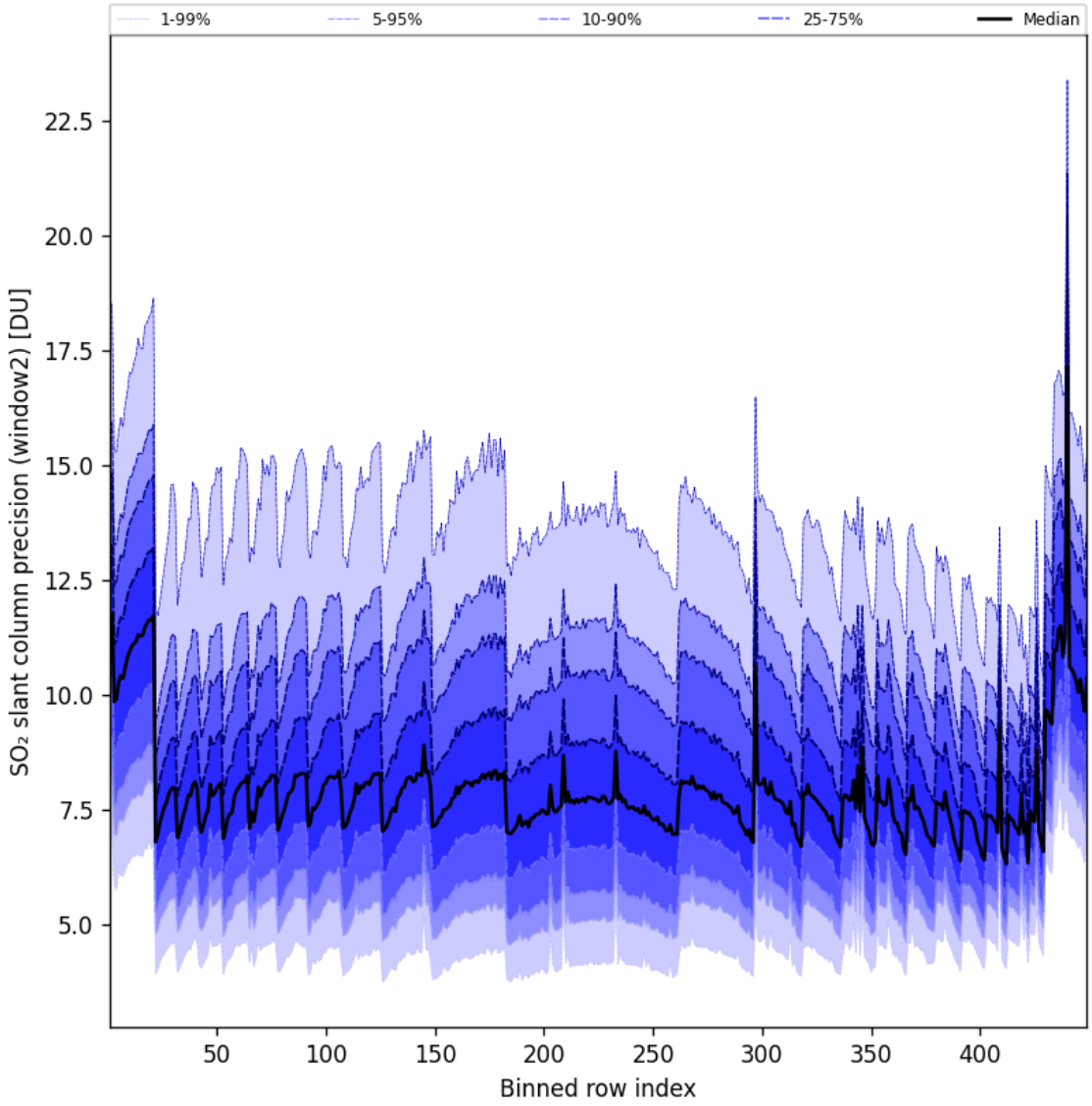

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-04-12 to 2025-04-13

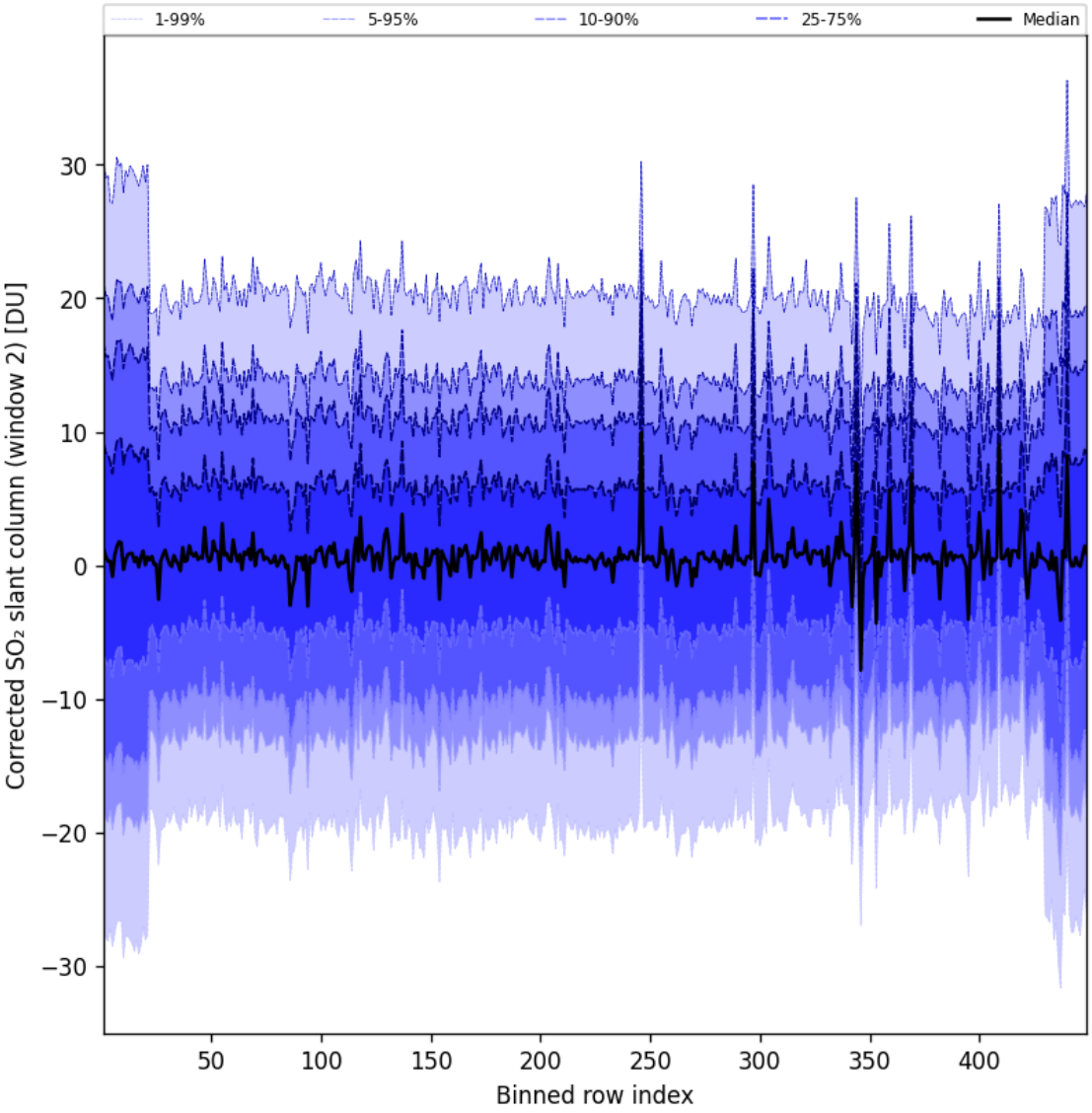

Figure 96: Along track statistics of "Corrected SO_2 slant column (window 2)" for 2025-04-12 to 2025-04-13

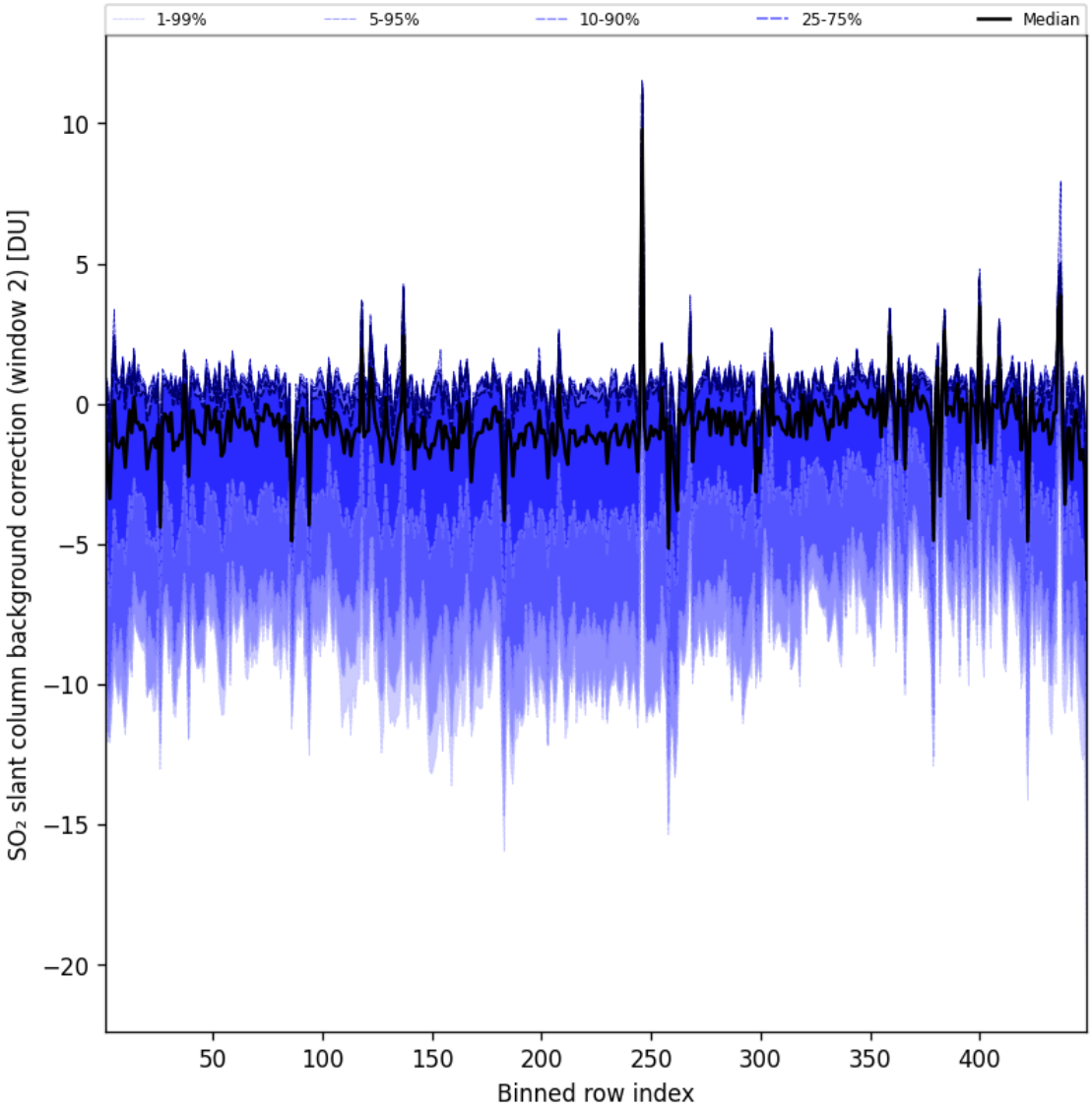

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-04-12 to 2025-04-13

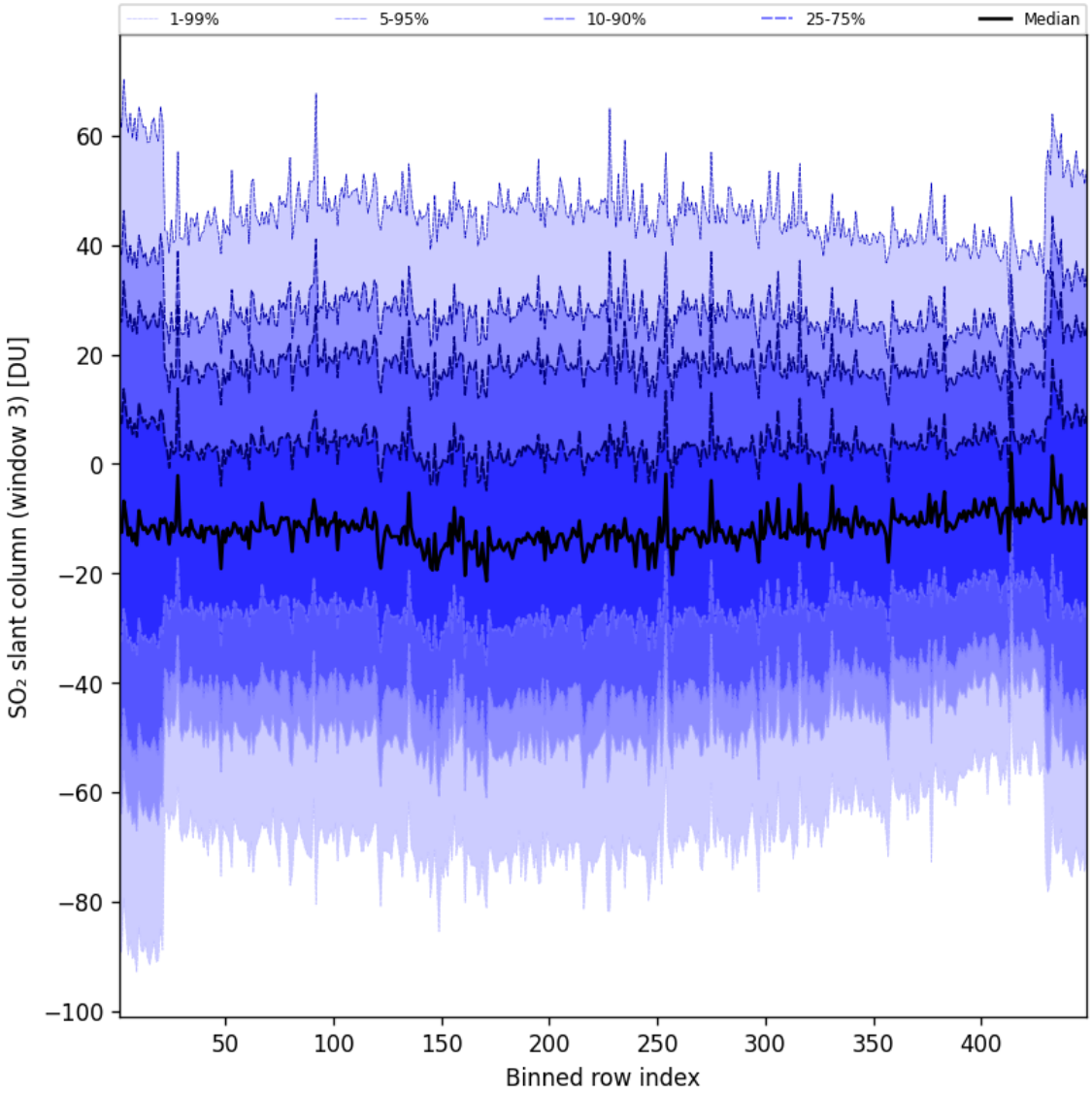

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-04-12 to 2025-04-13

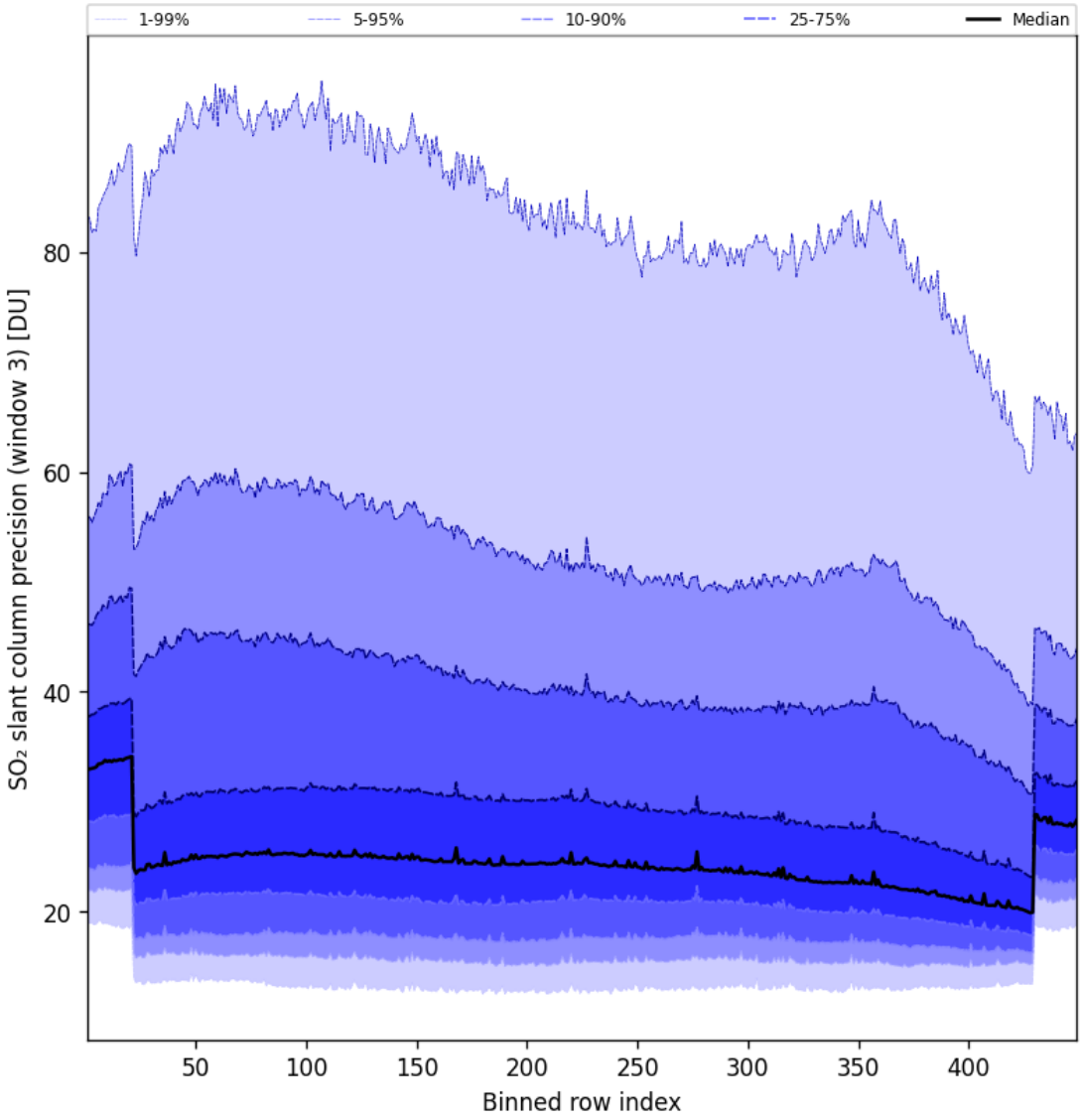

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-04-12 to 2025-04-13

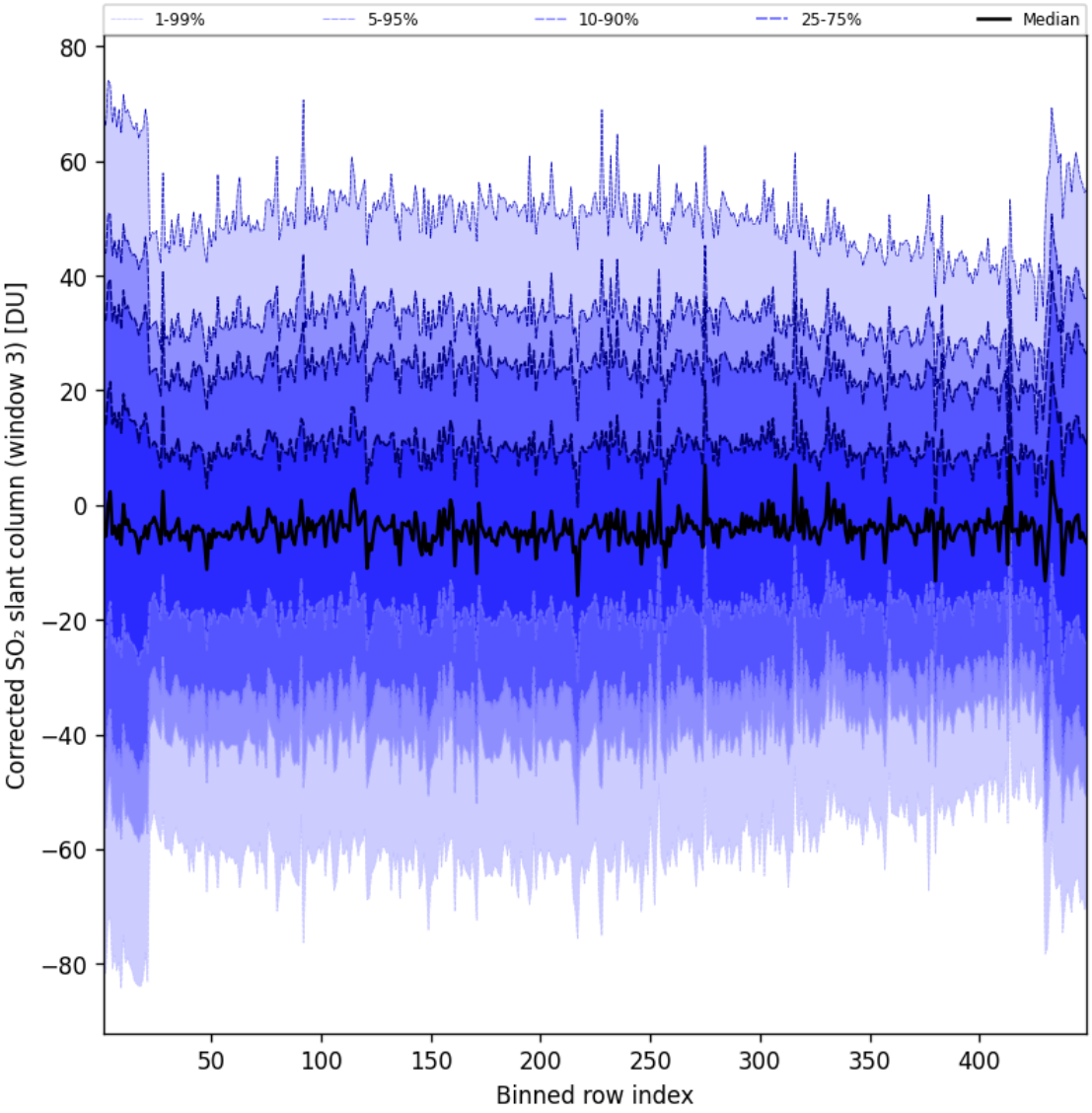

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-04-12 to 2025-04-13

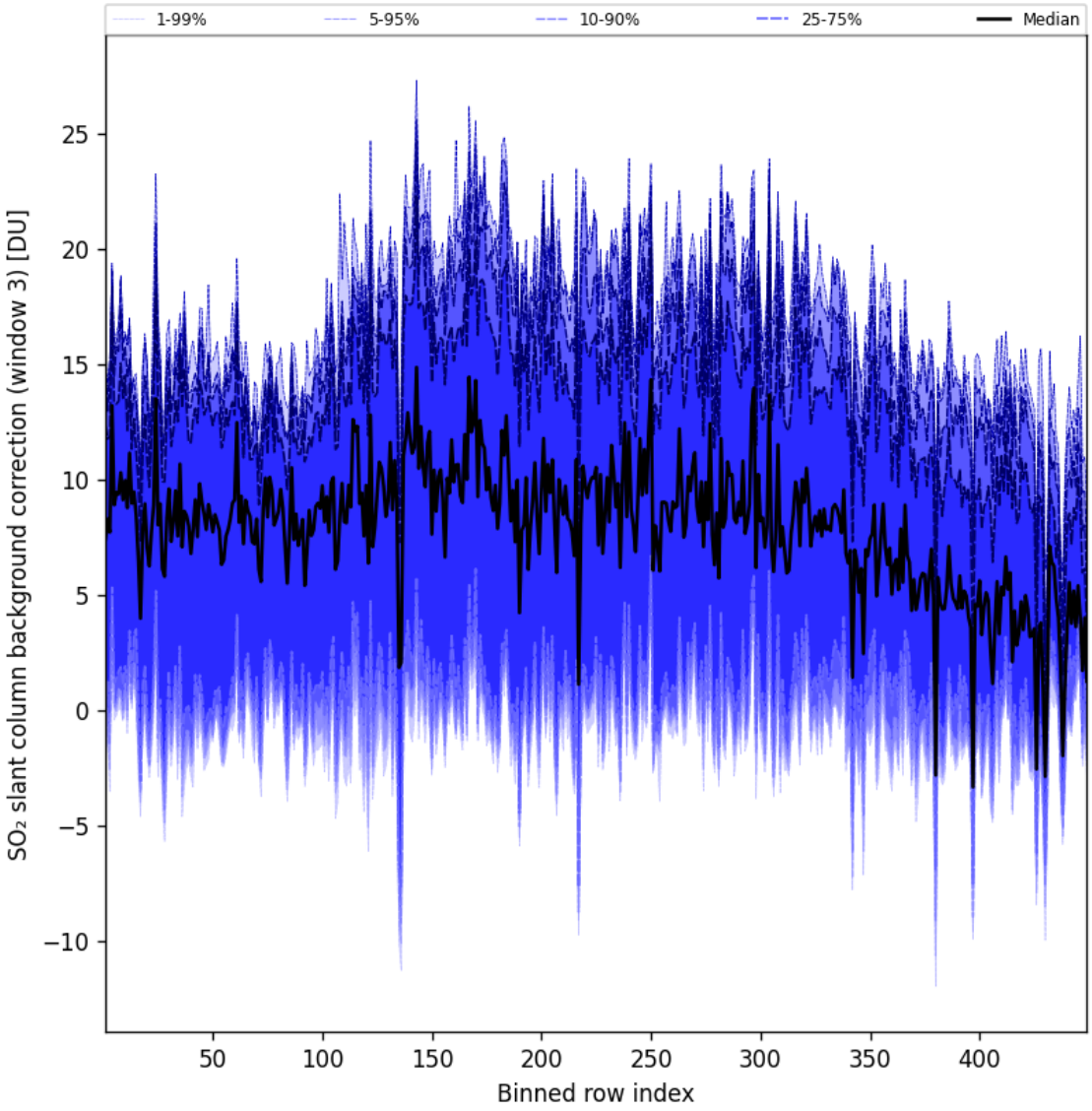

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-04-12 to 2025-04-13

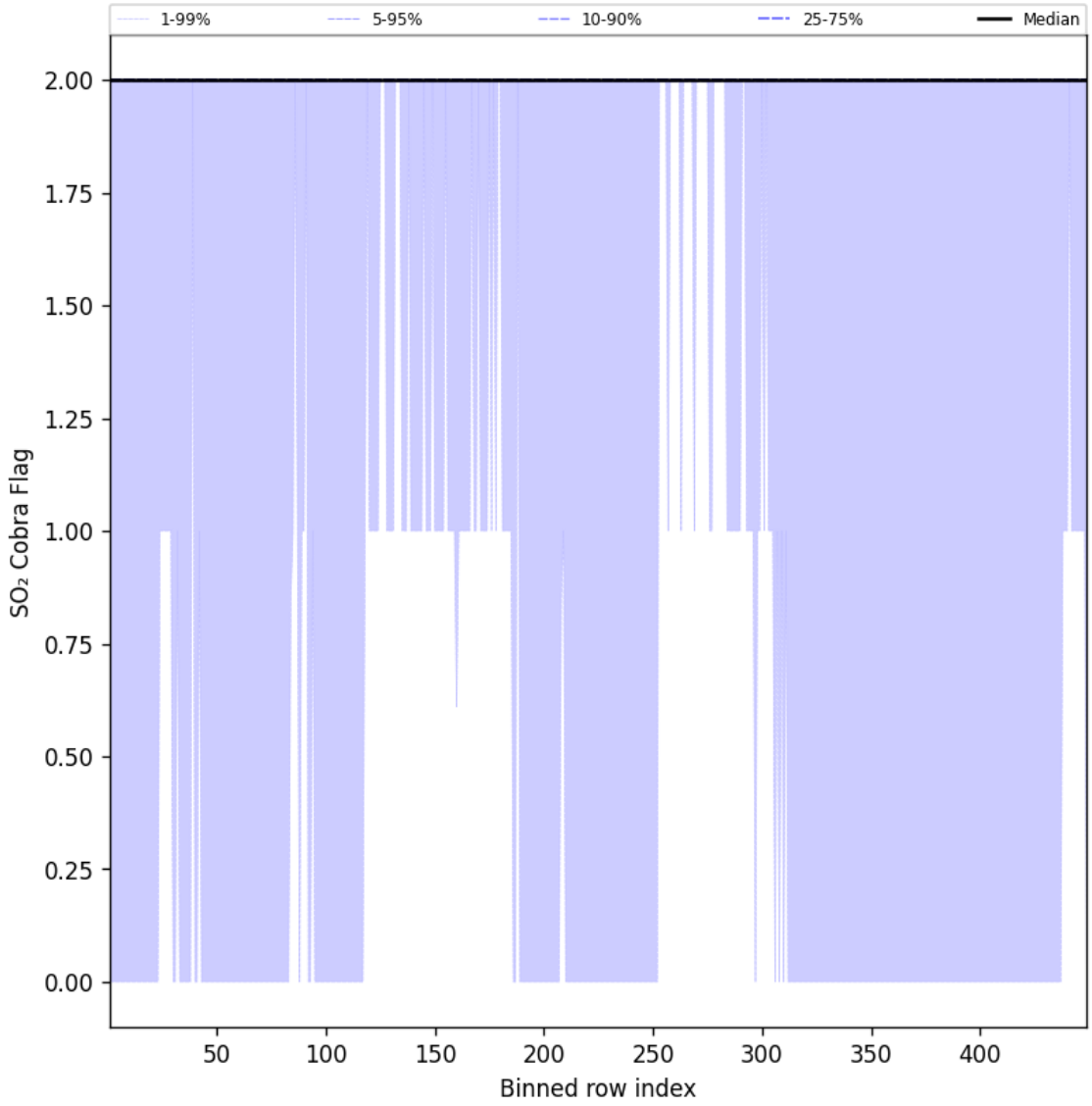

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-04-12 to 2025-04-13

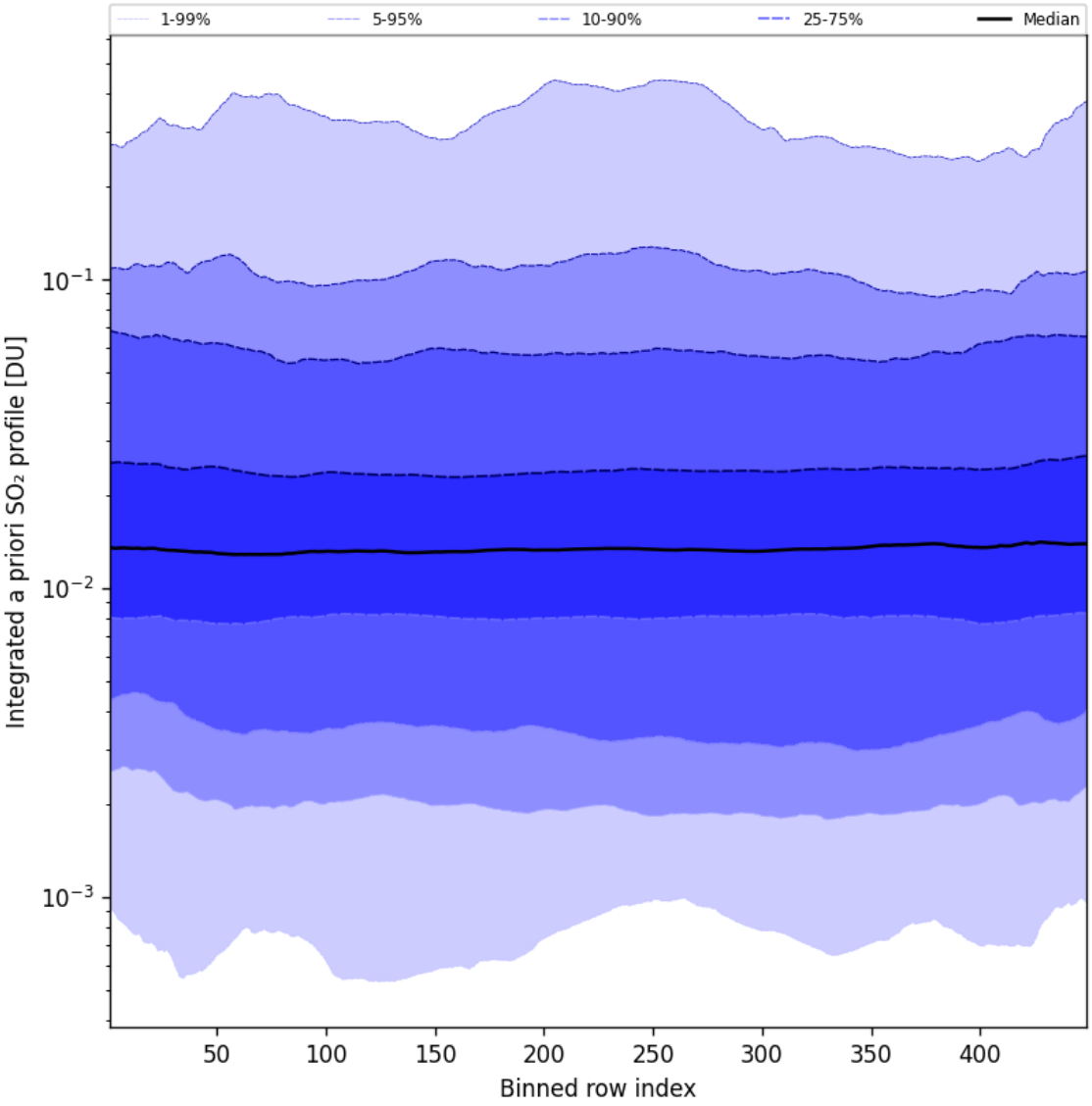

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-04-12 to 2025-04-13

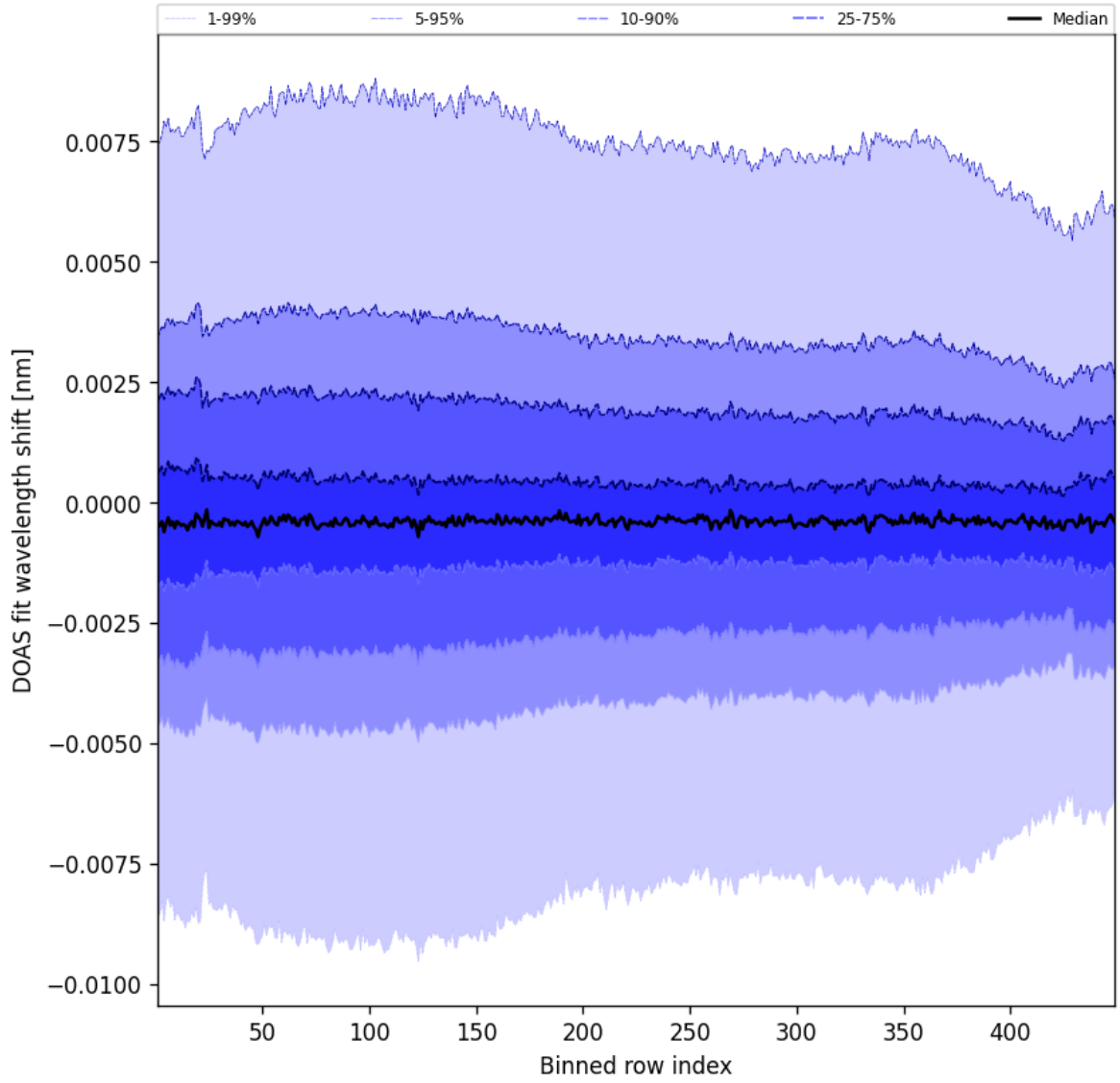

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-04-12 to 2025-04-13

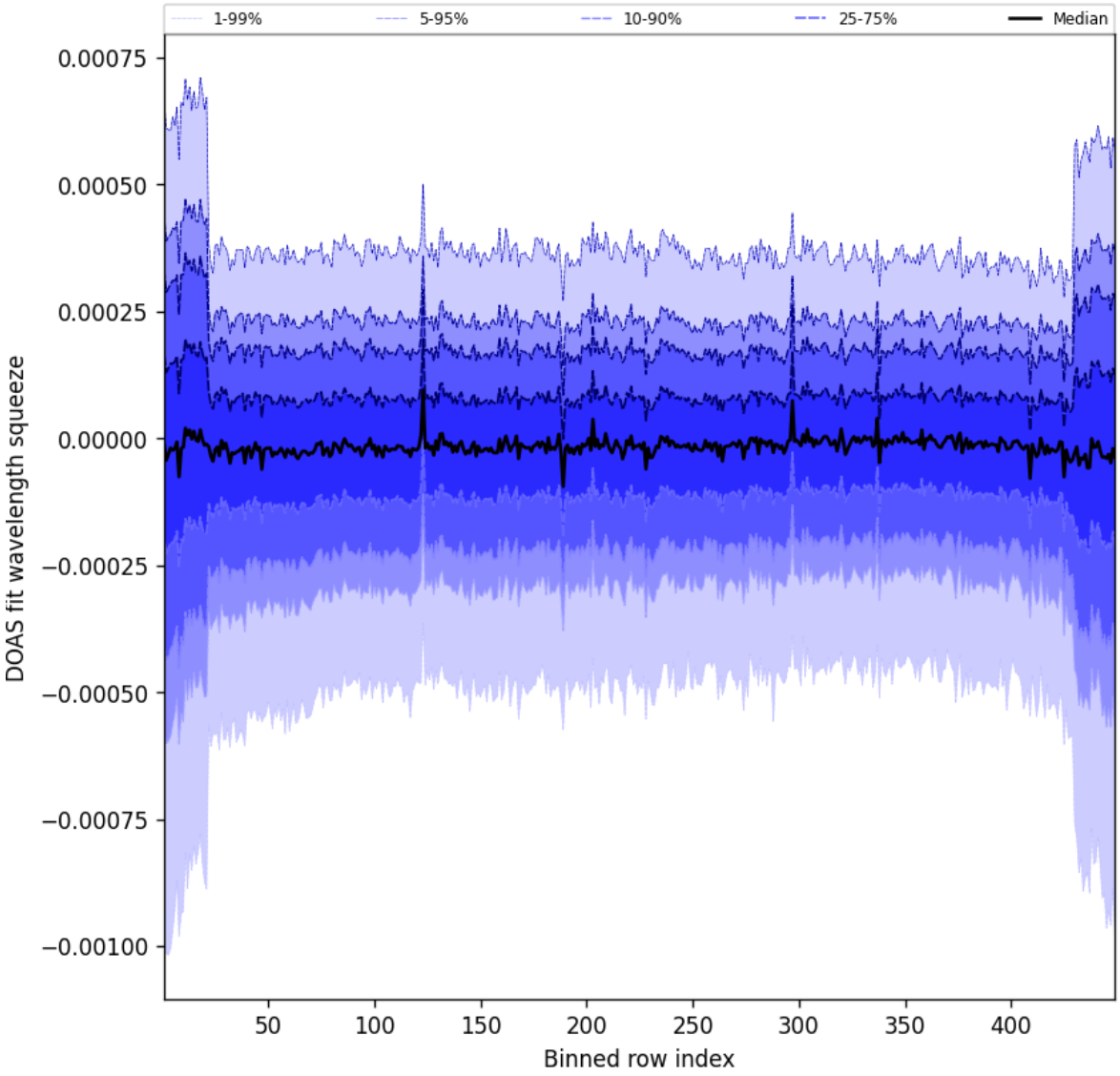

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-04-12 to 2025-04-13

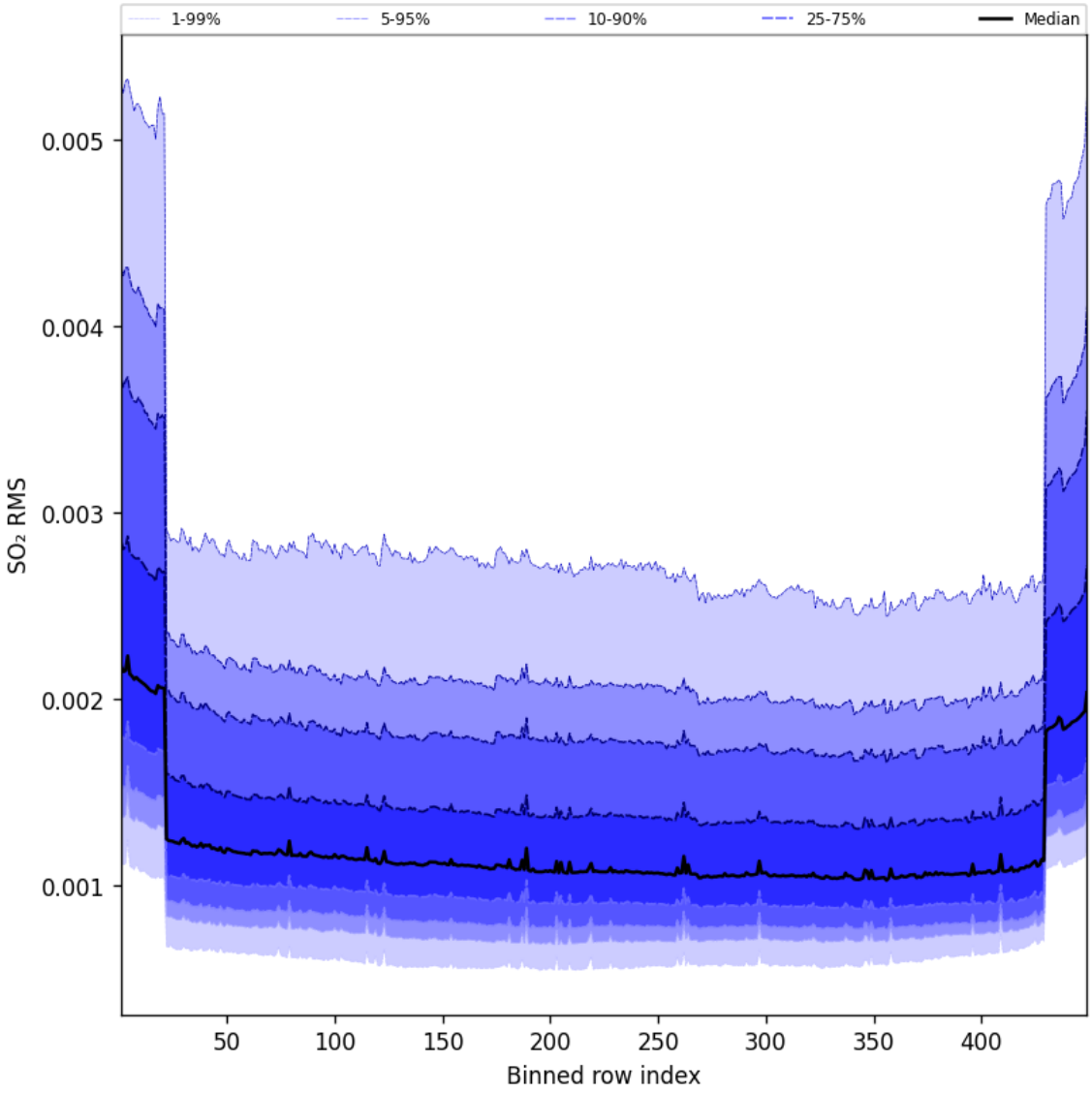

Figure 106: Along track statistics of "SO_2 RMS" for 2025-04-12 to 2025-04-13

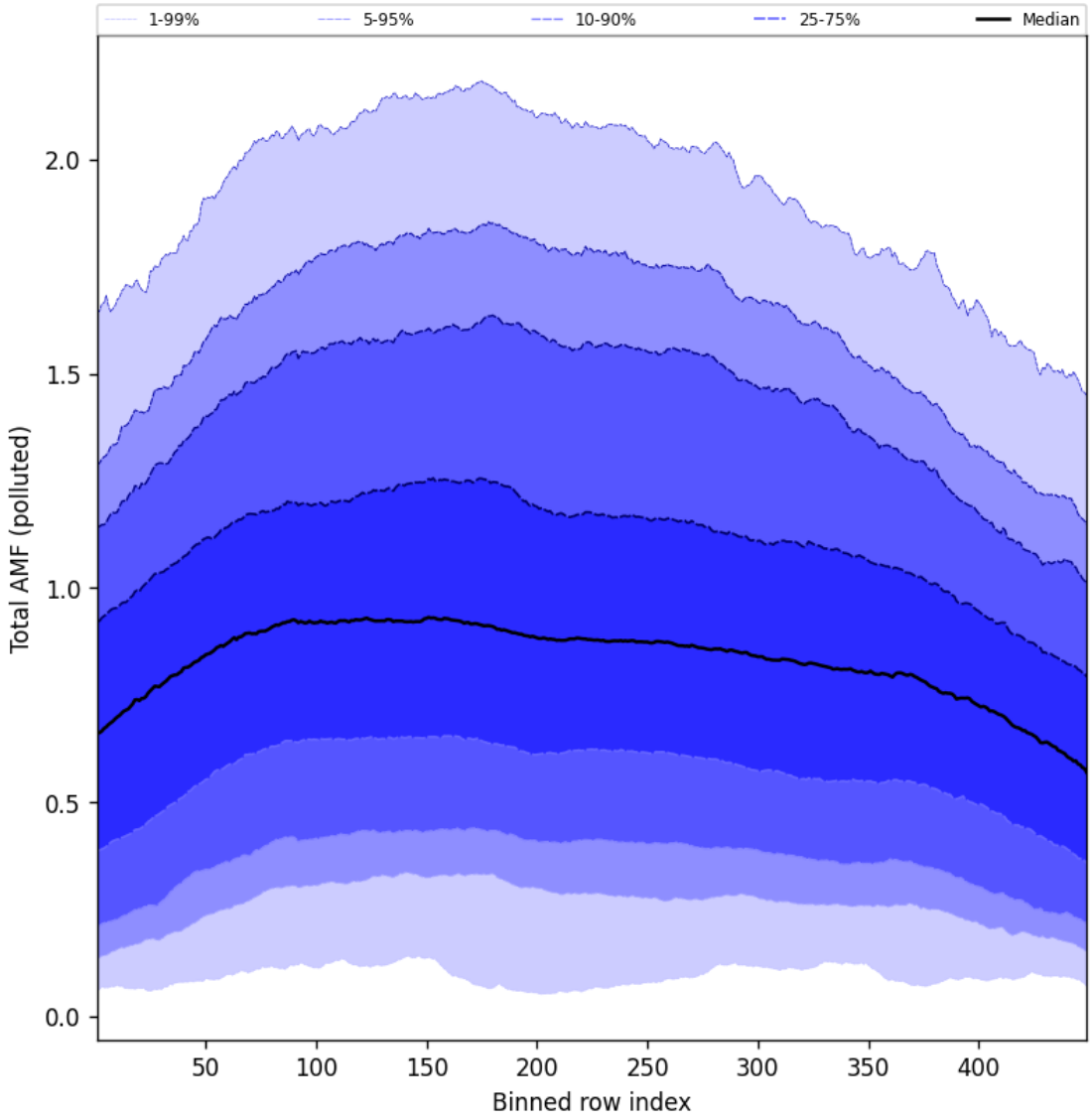

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-04-12 to 2025-04-13

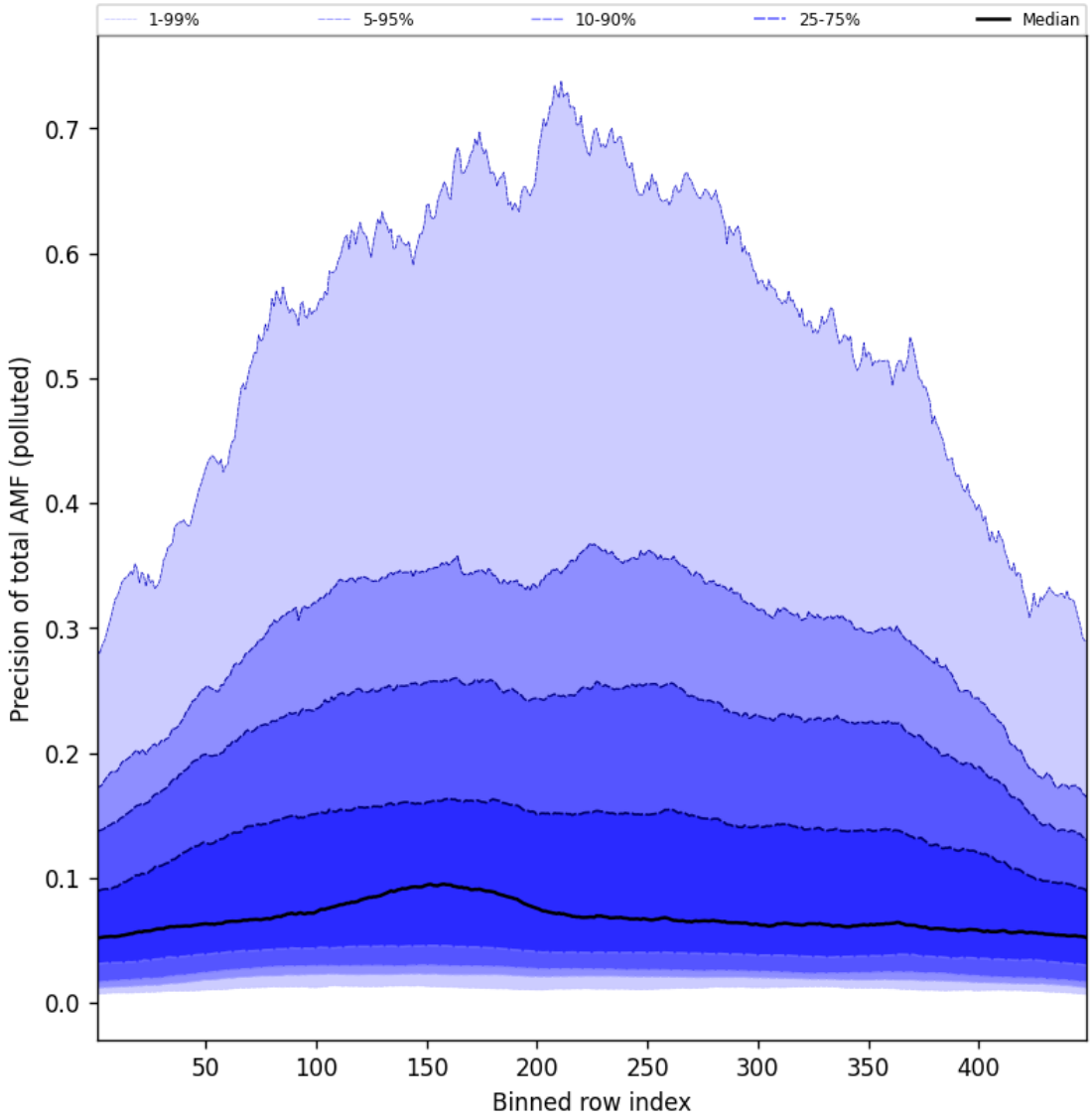

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-04-12 to 2025-04-13

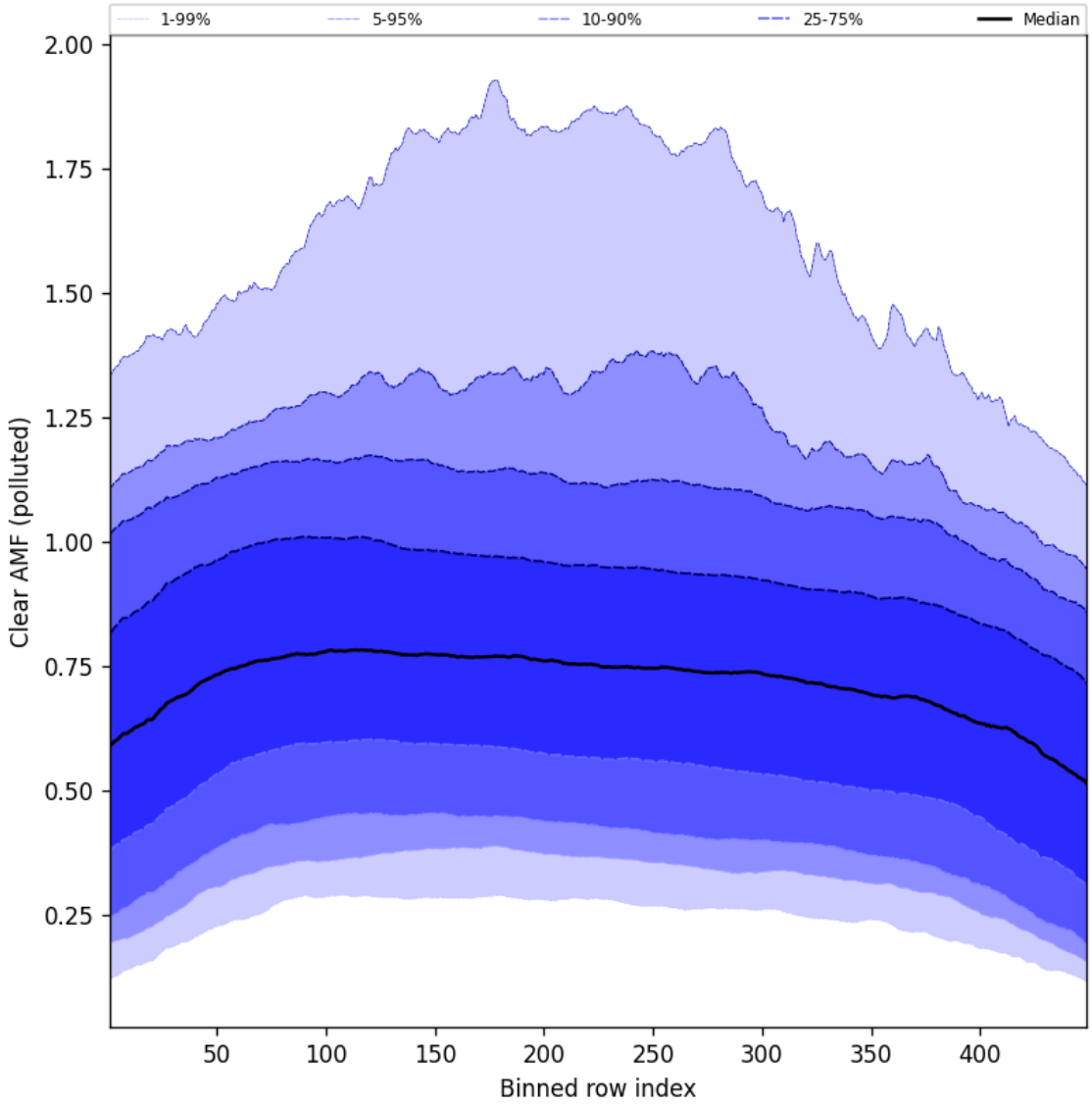

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-04-12 to 2025-04-13

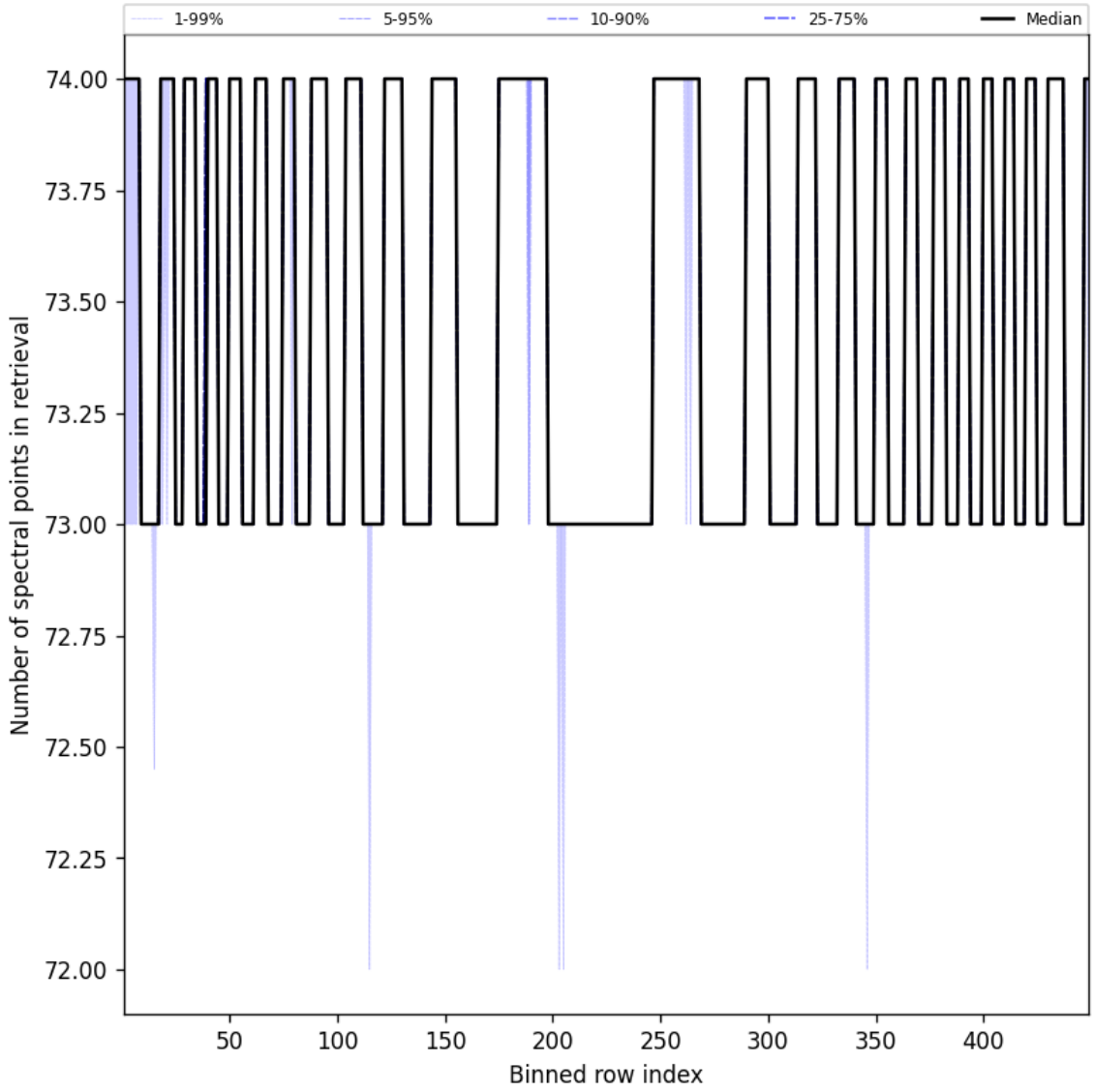

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-04-12 to 2025-04-13

10 Coincidence density

To investigate the relation between parameters scatter density plots are produced. These include some 'hidden' parameters, latitude and the solar- and viewing geometries, in addition to all configured parameters. All combinations of pairs of parameters are included *once*, in one direction alone.

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11 Copyright information of 'PyCAMA'

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