PyCAMA report generated by tropl2-proc

tropl2-proc

2025-04-24 (09:01)

1 Short Introduction

1.1 The list of parameters

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

2 Definitions

The averages shown here are *unweighed* averages:

$$\overline{x} = \frac{1}{N}\sum_{i=1}^{N} x_i \tag{1}$$

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]	0.648 ± 0.400	17336866	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.109 \pm 118.198) \times 10^{-2}$	17336866	0.294	0.473	1.211×10^{-2}	-133	406
sulfurdioxide total vertical column precision [DU]	0.530 ± 0.751	17336866	0.222	0.331	0.342	4.528×10^{-2}	63.5
sulfurdioxide slant column density corrected [DU]	$(2.917 \pm 68.647) \times 10^{-2}$	17336866	0.267	0.378	1.044×10^{-2}	-38.0	558
sulfurdioxide slant column density cobra [DU]	$(2.675 \pm 44.271) \times 10^{-2}$	17336866	0.267	0.378	1.044×10^{-2}	-38.0	64.8
sulfurdioxide slant column density cobra precision [DU]	0.303 ± 0.136	17336866	0.213	0.143	0.265	8.596×10^{-2}	21.7
sulfurdioxide slant column density window1 [DU]	0.184 ± 0.743	17336866	0.225	0.758	0.188	-70.2	110
sulfurdioxide slant column density window1 precision [DU]	0.303 ± 0.136	17336866	0.213	0.143	0.265	8.596×10^{-2}	21.7
sulfurdioxide slant column density corrected win1 [DU]	$(6.762 \pm 73.951) \times 10^{-2}$	17336866	2.500×10^{-2}	0.747	4.146×10^{-2}	-70.2	110
background so2 slant column offset window1 [DU]	-0.117 ± 0.153	17336866	-0.220	0.160	-0.148	-0.953	4.64
sulfurdioxide slant column density window2 [DU]	3.25 ± 9.21	17336866	2.75	11.7	3.11	-1.608×10^{3}	1.542×10^{3}
sulfurdioxide slant column density window2 precision [DU]	8.11 ± 2.25	17336866	7.43	2.51	7.79	2.19	600
sulfurdioxide slant column density corrected win2 [DU]	0.788 ± 8.803	17336866	0.750	11.1	0.803	-1.616×10^{3}	1.542×10^{3}
background so2 slant column offset window2 [DU]	-2.47 ± 3.13	17336866	-0.250	4.00	-1.44	-17.7	9.48
sulfurdioxide slant column density window3 [DU]	-15.1 ± 24.0	17336866	-16.2	30.2	-15.5	-661	980
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 13.6	17336866	22.5	9.70	24.6	9.46	261
sulfurdioxide slant column density corrected win3 [DU]	-5.80 ± 23.20	17336866	-5.04	28.9	-5.71	-654	982
background so2 slant column offset window3 [DU]	9.27 ± 6.68	17336866	3.92	11.1	8.99	-24.5	42.0
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	17336866	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(2.975 \pm 7.004) \times 10^{-2}$	17336866	1.316×10^{-2}	1.690×10^{-2}	1.244×10^{-2}	1.479×10^{-4}	2.33
fitted radiance shift [nm]	$(-3.174 \pm 26.596) \times 10^{-4}$	17336866	-5.000×10^{-4}	1.729×10^{-3}	-2.966×10^{-4}	-5.656×10^{-2}	5.364×10^{-2}
fitted radiance squeeze [1]	$(-1.884 \pm 18.020) \times 10^{-5}$	17336866	-1.000×10^{-5}	2.061×10^{-4}	-1.294×10^{-5}	-1.380×10^{-2}	2.077×10^{-2}
fitted root mean square [1]	$(1.320 \pm 0.550) \times 10^{-3}$	17336866	9.750×10^{-4}	5.608×10^{-4}	1.165×10^{-3}	2.899×10^{-4}	5.503×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.860 ± 0.426	17336866	0.620	0.547	0.800	5.000×10^{-2}	2.76
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.116	17336866	3.500×10^{-2}	9.874×10^{-2}	6.405×10^{-2}	2.648×10^{-3}	1.97
sulfurdioxide clear air mass factor polluted [1]	0.736 ± 0.298	17336866	0.620	0.391	0.707	5.045×10^{-2}	2.64
number of spectral points in retrieval [1]	73.4 ± 0.5	17336866	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	5.000×10^{-2}	0.110	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.30	−0.877	−0.545	−0.370	−0.220	0.253	0.417	0.615	1.01	2.80
sulfurdioxide total vertical column precision [DU]	0.103	0.141	0.171	0.196	0.230	0.561	0.738	0.956	1.43	3.52
sulfurdioxide slant column density corrected [DU]	−0.873	−0.507	−0.367	−0.274	−0.176	0.202	0.306	0.410	0.575	1.14
sulfurdioxide slant column density cobra [DU]	−0.873	−0.507	−0.367	−0.274	−0.176	0.202	0.306	0.410	0.575	1.14
sulfurdioxide slant column density cobra precision [DU]	0.147	0.173	0.187	0.198	0.213	0.356	0.407	0.458	0.550	0.813
sulfurdioxide slant column density window1 [DU]	−1.73	−0.908	−0.601	−0.401	−0.195	0.563	0.760	0.949	1.24	2.08
sulfurdioxide slant column density window1 precision [DU]	0.147	0.173	0.187	0.198	0.213	0.356	0.407	0.458	0.550	0.813
sulfurdioxide slant column density corrected win1 [DU]	−1.66	−0.962	−0.695	−0.516	−0.326	0.421	0.629	0.834	1.16	2.13
background so2 slant column offset window1 [DU]	−0.359	−0.285	−0.260	−0.241	−0.216	-5.637×10^{-2}	1.086×10^{-3}	6.899×10^{-2}	0.175	0.423
sulfurdioxide slant column density window2 [DU]	−18.1	−11.4	−8.04	−5.54	−2.70	9.05	12.0	14.7	18.4	25.9
sulfurdioxide slant column density window2 precision [DU]	4.38	5.25	5.76	6.18	6.67	9.18	10.0	10.8	12.1	14.7
sulfurdioxide slant column density corrected win2 [DU]	−20.4	−13.4	−10.0	−7.55	−4.77	6.35	9.12	11.6	14.9	21.9
background so2 slant column offset window2 [DU]	−11.2	−9.04	−7.28	−5.76	−4.16	−0.154	0.158	0.384	0.702	2.06
sulfurdioxide slant column density window3 [DU]	−73.6	−53.6	−44.3	−37.6	−30.3	-9.508×10^{-2}	7.91	15.2	24.9	44.2
sulfurdioxide slant column density window3 precision [DU]	13.4	16.0	17.9	19.3	20.9	30.6	35.5	41.7	54.1	86.9
sulfurdioxide slant column density corrected win3 [DU]	−64.2	−44.0	−34.4	−27.6	−20.2	8.77	16.1	22.9	32.0	50.6
background so2 slant column offset window3 [DU]	−2.61	9.113×10^{-2}	1.22	2.17	3.57	14.7	16.6	18.1	20.1	23.2
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]	5.805×10^{-4}	1.092×10^{-3}	1.834×10^{-3}	3.660×10^{-3}	6.386×10^{-3}	2.329×10^{-2}	3.599×10^{-2}	6.068×10^{-2}	0.117	0.340
fitted radiance shift [nm]	-8.455×10^{-3}	-4.219×10^{-3}	-2.746×10^{-3}	-1.908×10^{-3}	-1.208×10^{-3}	5.209×10^{-4}	1.195×10^{-3}	2.077×10^{-3}	3.648×10^{-3}	8.062×10^{-3}
fitted radiance squeeze [1]	-5.194×10^{-4}	-3.114×10^{-4}	-2.293×10^{-4}	-1.746×10^{-4}	-1.179×10^{-4}	8.814×10^{-5}	1.395×10^{-4}	1.869×10^{-4}	2.542×10^{-4}	4.136×10^{-4}
fitted root mean square [1]	6.209×10^{-4}	7.582×10^{-4}	8.324×10^{-4}	8.905×10^{-4}	9.630×10^{-4}	1.524×10^{-3}	1.768×10^{-3}	2.006×10^{-3}	2.355×10^{-3}	3.339×10^{-3}
sulfurdioxide total air mass factor polluted [1]	8.497×10^{-2}	0.254	0.363	0.451	0.556	1.10	1.30	1.47	1.67	2.02
sulfurdioxide total air mass factor polluted precision [1]	1.025×10^{-2}	1.910×10^{-2}	2.485×10^{-2}	2.996×10^{-2}	3.738×10^{-2}	0.136	0.181	0.230	0.323	0.583
sulfurdioxide clear air mass factor polluted [1]	0.219	0.311	0.375	0.439	0.522	0.913	1.01	1.11	1.27	1.63
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]	0.613 ± 0.404	10800047	0.790	0.490	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(4.757 \pm 133.625) \times 10^{-2}$	10800047	0.477	1.181×10^{-2}	-133	284	-0.222	0.255
sulfurdioxide total vertical column precision [DU]	0.565 ± 0.851	10800047	0.358	0.346	4.528×10^{-2}	63.5	0.227	0.584
sulfurdioxide slant column density corrected [DU]	$(3.428 \pm 81.072) \times 10^{-2}$	10800047	0.376	1.013×10^{-2}	-8.76	558	-0.175	0.201
sulfurdioxide slant column density cobra [DU]	$(3.052 \pm 47.817) \times 10^{-2}$	10800047	0.376	1.013×10^{-2}	-8.76	64.8	-0.175	0.201
sulfurdioxide slant column density cobra precision [DU]	0.305 ± 0.144	10800047	0.151	0.263	8.596×10^{-2}	12.2	0.209	0.360
sulfurdioxide slant column density window1 [DU]	0.184 ± 0.779	10800047	0.759	0.190	-33.6	110	-0.195	0.564
sulfurdioxide slant column density window1 precision [DU]	0.305 ± 0.144	10800047	0.151	0.263	8.596×10^{-2}	12.2	0.209	0.360
sulfurdioxide slant column density corrected win1 [DU]	$(7.675 \pm 77.569) \times 10^{-2}$	10800047	0.748	4.532×10^{-2}	-33.6	110	-0.321	0.426
background so2 slant column offset window1 [DU]	-0.107 ± 0.170	10800047	0.173	-0.150	-0.722	3.11	-0.219	-4.627×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.83 ± 8.95	10800047	11.5	3.67	-1.608×10^{3}	558	-2.02	9.52
sulfurdioxide slant column density window2 precision [DU]	7.78 ± 2.05	10800047	2.30	7.48	2.19	373	6.44	8.75
sulfurdioxide slant column density corrected win2 [DU]	0.698 ± 8.369	10800047	10.7	0.744	-1.616×10^{3}	558	-4.62	6.07
background so2 slant column offset window2 [DU]	-3.13 ± 3.55	10800047	5.58	-2.21	-17.7	9.48	-5.68	-9.467×10^{-2}
sulfurdioxide slant column density window3 [DU]	-16.3 ± 22.8	10800047	28.5	-16.9	-201	980	-30.8	-2.30
sulfurdioxide slant column density window3 precision [DU]	26.7 ± 13.3	10800047	8.13	23.1	9.46	261	20.0	28.2
sulfurdioxide slant column density corrected win3 [DU]	-5.66 ± 21.85	10800047	27.2	-5.54	-190	982	-19.2	8.04
background so2 slant column offset window3 [DU]	10.7 ± 7.1	10800047	12.3	11.9	-23.1	42.0	4.07	16.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	10800047	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.661 \pm 8.131) \times 10^{-2}$	10800047	2.725×10^{-2}	1.278×10^{-2}	1.479×10^{-4}	1.97	3.910×10^{-3}	3.116×10^{-2}
fitted radiance shift [nm]	$(-1.761 \pm 25.752) \times 10^{-4}$	10800047	1.546×10^{-3}	-1.788×10^{-4}	-4.619×10^{-2}	4.051×10^{-2}	-9.730×10^{-4}	5.735×10^{-4}
fitted radiance squeeze [1]	$(-3.729 \pm 18.058) \times 10^{-5}$	10800047	2.047×10^{-4}	-2.558×10^{-5}	-2.583×10^{-3}	1.421×10^{-2}	-1.321×10^{-4}	7.264×10^{-5}
fitted root mean square [1]	$(1.329 \pm 0.587) \times 10^{-3}$	10800047	5.909×10^{-4}	1.153×10^{-3}	2.899×10^{-4}	5.503×10^{-2}	9.479×10^{-4}	1.539×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.863 ± 0.459	10800047	0.627	0.787	5.000×10^{-2}	2.76	0.521	1.15
sulfurdioxide total air mass factor polluted precision [1]	0.114 ± 0.134	10800047	0.104	6.436×10^{-2}	2.648×10^{-3}	1.97	3.505×10^{-2}	0.139
sulfurdioxide clear air mass factor polluted [1]	0.723 ± 0.339	10800047	0.464	0.670	5.045×10^{-2}	2.64	0.461	0.925
number of spectral points in retrieval [1]	73.5 ± 0.5	10800047	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]	0.706 ± 0.388	6536819	0.680	1.000	0.0	1.000	0.320	1.000
sulfurdioxide total vertical column [DU]	$(3.039 \pm 86.892) \times 10^{-2}$	6536819	0.466	1.257×10^{-2}	-94.6	406	-0.217	0.248
sulfurdioxide total vertical column precision [DU]	0.473 ± 0.542	6536819	0.296	0.335	4.952×10^{-2}	39.5	0.236	0.531
sulfurdioxide slant column density corrected [DU]	$(2.072 \pm 40.471) \times 10^{-2}$	6536819	0.381	1.095×10^{-2}	-38.0	319	-0.178	0.203
sulfurdioxide slant column density cobra [DU]	$(2.053 \pm 37.680) \times 10^{-2}$	6536819	0.381	1.095×10^{-2}	-38.0	49.4	-0.178	0.203
sulfurdioxide slant column density cobra precision [DU]	0.301 ± 0.122	6536819	0.129	0.267	9.085×10^{-2}	21.7	0.220	0.350
sulfurdioxide slant column density window1 [DU]	0.185 ± 0.679	6536819	0.757	0.185	-70.2	61.9	-0.195	0.561
sulfurdioxide slant column density window1 precision [DU]	0.301 ± 0.122	6536819	0.129	0.267	9.085×10^{-2}	21.7	0.220	0.350
sulfurdioxide slant column density corrected win1 [DU]	$(5.253 \pm 67.524) \times 10^{-2}$	6536819	0.746	3.498×10^{-2}	-70.2	61.9	-0.333	0.413
background so2 slant column offset window1 [DU]	-0.132 ± 0.118	6536819	0.142	-0.146	-0.953	4.64	-0.211	-6.948×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.30 ± 9.56	6536819	12.0	2.14	-1.544×10^{3}	1.542×10^{3}	-3.78	8.20
sulfurdioxide slant column density window2 precision [DU]	8.66 ± 2.44	6536819	2.65	8.36	2.35	600	7.16	9.82
sulfurdioxide slant column density corrected win2 [DU]	0.937 ± 9.475	6536819	11.9	0.910	-1.544×10^{3}	1.542×10^{3}	-5.02	6.86
background so2 slant column offset window2 [DU]	-1.37 ± 1.78	6536819	2.07	-0.975	-14.1	9.27	-2.29	-0.223
sulfurdioxide slant column density window3 [DU]	-13.0 ± 25.7	6536819	32.6	-12.8	-661	287	-29.1	3.51
sulfurdioxide slant column density window3 precision [DU]	30.9 ± 13.8	6536819	10.4	27.4	10.2	247	23.2	33.7
sulfurdioxide slant column density corrected win3 [DU]	-6.04 ± 25.26	6536819	32.1	-6.02	-654	291	-22.0	10.1
background so2 slant column offset window3 [DU]	6.94 ± 5.20	6536819	7.60	5.86	-24.5	25.4	3.16	10.8
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	6536819	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.843 \pm 4.337) \times 10^{-2}$	6536819	9.759×10^{-3}	1.220×10^{-2}	8.710×10^{-4}	2.33	8.145×10^{-3}	1.790×10^{-2}
fitted radiance shift [nm]	$(-5.509 \pm 27.776) \times 10^{-4}$	6536819	2.001×10^{-3}	-5.381×10^{-4}	-5.656×10^{-2}	5.364×10^{-2}	-1.602×10^{-3}	3.986×10^{-4}
fitted radiance squeeze [1]	$(1.163 \pm 17.537) \times 10^{-5}$	6536819	2.082×10^{-4}	8.585×10^{-6}	-1.380×10^{-2}	2.077×10^{-2}	-9.443×10^{-5}	1.138×10^{-4}
fitted root mean square [1]	$(1.304 \pm 0.481) \times 10^{-3}$	6536819	5.134×10^{-4}	1.182×10^{-3}	3.119×10^{-4}	5.439×10^{-2}	9.890×10^{-4}	1.502×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.854 ± 0.363	6536819	0.444	0.815	5.000×10^{-2}	2.68	0.607	1.05
sulfurdioxide total air mass factor polluted precision [1]	$(9.466 \pm 7.769) \times 10^{-2}$	6536819	9.200×10^{-2}	6.352×10^{-2}	3.895×10^{-3}	1.34	4.008×10^{-2}	0.132
sulfurdioxide clear air mass factor polluted [1]	0.757 ± 0.211	6536819	0.294	0.745	8.597×10^{-2}	1.83	0.606	0.900
number of spectral points in retrieval [1]	73.4 ± 0.5	6536819	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]	0.683 ± 0.391	11416724	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(3.112 \pm 108.661) \times 10^{-2}$	11416724	0.458	1.078×10^{-2}	-133	284	-0.215	0.243
sulfurdioxide total vertical column precision [DU]	0.495 ± 0.696	11416724	0.308	0.326	5.224×10^{-2}	63.5	0.228	0.537
sulfurdioxide slant column density corrected [DU]	$(2.042 \pm 51.745) \times 10^{-2}$	11416724	0.370	9.268×10^{-3}	-38.0	155	-0.174	0.196
sulfurdioxide slant column density cobra [DU]	$(1.939 \pm 40.007) \times 10^{-2}$	11416724	0.370	9.268×10^{-3}	-38.0	51.6	-0.174	0.196
sulfurdioxide slant column density cobra precision [DU]	0.299 ± 0.135	11416724	0.148	0.256	8.596×10^{-2}	21.7	0.209	0.356
sulfurdioxide slant column density window1 [DU]	0.179 ± 0.712	11416724	0.750	0.190	-70.2	110	-0.190	0.560
sulfurdioxide slant column density window1 precision [DU]	0.299 ± 0.135	11416724	0.148	0.256	8.596×10^{-2}	21.7	0.209	0.356
sulfurdioxide slant column density corrected win1 [DU]	$(5.664 \pm 70.531) \times 10^{-2}$	11416724	0.739	3.910×10^{-2}	-70.2	110	-0.325	0.413
background so2 slant column offset window1 [DU]	-0.123 ± 0.144	11416724	0.158	-0.150	-0.953	4.64	-0.218	-6.000×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.92 ± 9.14	11416724	11.6	2.72	-1.608×10^{3}	1.542×10^{3}	-3.01	8.64
sulfurdioxide slant column density window2 precision [DU]	8.10 ± 2.14	11416724	2.51	7.80	2.19	549	6.69	9.20
sulfurdioxide slant column density corrected win2 [DU]	0.783 ± 8.801	11416724	11.2	0.792	-1.616×10^{3}	1.542×10^{3}	-4.80	6.37
background so2 slant column offset window2 [DU]	-2.14 ± 3.00	11416724	3.29	-1.15	-17.7	9.48	-3.37	-7.846×10^{-2}
sulfurdioxide slant column density window3 [DU]	-12.1 ± 24.2	11416724	30.8	-12.5	-661	203	-27.6	3.21
sulfurdioxide slant column density window3 precision [DU]	27.6 ± 11.8	11416724	9.03	24.5	9.54	261	21.2	30.2
sulfurdioxide slant column density corrected win3 [DU]	-3.59 ± 23.16	11416724	29.3	-3.74	-654	203	-18.2	11.1
background so2 slant column offset window3 [DU]	8.55 ± 6.56	11416724	10.5	7.56	-24.5	42.0	3.19	13.7
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	11416724	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.947 \pm 4.263) \times 10^{-2}$	11416724	1.244×10^{-2}	1.220×10^{-2}	3.089×10^{-4}	2.33	7.107×10^{-3}	1.955×10^{-2}
fitted radiance shift [nm]	$(-3.457 \pm 23.423) \times 10^{-4}$	11416724	1.703×10^{-3}	-3.030×10^{-4}	-4.845×10^{-2}	3.781×10^{-2}	-1.218×10^{-3}	4.851×10^{-4}
fitted radiance squeeze [1]	$(-1.004 \pm 17.790) \times 10^{-5}$	11416724	2.024×10^{-4}	-5.282×10^{-6}	-1.359×10^{-2}	1.421×10^{-2}	-1.079×10^{-4}	9.453×10^{-5}
fitted root mean square [1]	$(1.309 \pm 0.545) \times 10^{-3}$	11416724	5.982×10^{-4}	1.139×10^{-3}	3.362×10^{-4}	5.503×10^{-2}	9.451×10^{-4}	1.543×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.858 ± 0.384	11416724	0.492	0.825	5.000×10^{-2}	2.73	0.590	1.08
sulfurdioxide total air mass factor polluted precision [1]	$(9.587 \pm 9.512) \times 10^{-2}$	11416724	8.256×10^{-2}	6.195×10^{-2}	2.759×10^{-3}	1.72	3.992×10^{-2}	0.122
sulfurdioxide clear air mass factor polluted [1]	0.753 ± 0.268	11416724	0.350	0.742	5.330×10^{-2}	2.64	0.567	0.918
number of spectral points in retrieval [1]	73.4 ± 0.5	11416724	1.000	73.0	52.0	156	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]	0.633 ± 0.412	4137841	0.810	1.000	0.0	1.000	0.190	1.000
sulfurdioxide total vertical column [DU]	$(3.895 \pm 114.764) \times 10^{-2}$	4137841	0.487	1.221×10^{-2}	-58.9	406	-0.226	0.261
sulfurdioxide total vertical column precision [DU]	0.555 ± 0.738	4137841	0.343	0.369	4.528×10^{-2}	39.5	0.234	0.578
sulfurdioxide slant column density corrected [DU]	$(3.162 \pm 88.254) \times 10^{-2}$	4137841	0.376	1.052×10^{-2}	-17.0	558	-0.175	0.201
sulfurdioxide slant column density cobra [DU]	$(2.898 \pm 43.951) \times 10^{-2}$	4137841	0.376	1.052×10^{-2}	-17.0	64.8	-0.175	0.201
sulfurdioxide slant column density cobra precision [DU]	0.297 ± 0.127	4137841	0.118	0.265	9.199×10^{-2}	15.9	0.218	0.336
sulfurdioxide slant column density window1 [DU]	0.203 ± 0.722	4137841	0.741	0.197	-26.7	66.6	-0.175	0.566
sulfurdioxide slant column density window1 precision [DU]	0.297 ± 0.127	4137841	0.118	0.265	9.199×10^{-2}	15.9	0.218	0.336
sulfurdioxide slant column density corrected win1 [DU]	$(7.119 \pm 72.114) \times 10^{-2}$	4137841	0.732	4.104×10^{-2}	-26.7	66.5	-0.319	0.414
background so2 slant column offset window1 [DU]	-0.132 ± 0.146	4137841	0.141	-0.161	-0.749	2.54	-0.222	-8.034×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.17 ± 9.33	4137841	11.8	3.12	-1.544×10^{3}	1.092×10^{3}	-2.77	9.06
sulfurdioxide slant column density window2 precision [DU]	8.25 ± 2.52	4137841	2.51	7.88	2.29	600	6.75	9.27
sulfurdioxide slant column density corrected win2 [DU]	0.756 ± 8.938	4137841	11.2	0.774	-1.544×10^{3}	1.092×10^{3}	-4.82	6.35
background so2 slant column offset window2 [DU]	-2.42 ± 3.02	4137841	4.04	-1.40	-17.7	9.48	-4.21	-0.164
sulfurdioxide slant column density window3 [DU]	-20.6 ± 23.1	4137841	28.7	-20.4	-406	980	-34.9	-6.15
sulfurdioxide slant column density window3 precision [DU]	30.8 ± 17.5	4137841	12.0	25.8	9.46	247	21.0	33.0
sulfurdioxide slant column density corrected win3 [DU]	-11.2 ± 23.4	4137841	29.0	-10.4	-402	982	-25.3	3.68
background so2 slant column offset window3 [DU]	9.44 ± 6.58	4137841	11.1	9.47	-24.5	29.9	3.76	14.9
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.15	4137841	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.316 \pm 9.996) \times 10^{-2}$	4137841	4.800×10^{-2}	1.676×10^{-2}	1.479×10^{-4}	1.78	6.268×10^{-3}	5.427×10^{-2}
fitted radiance shift [nm]	$(-2.370 \pm 34.027) \times 10^{-4}$	4137841	1.842×10^{-3}	-2.641×10^{-4}	-5.656×10^{-2}	5.364×10^{-2}	-1.191×10^{-3}	6.514×10^{-4}
fitted radiance squeeze [1]	$(-2.568 \pm 17.590) \times 10^{-5}$	4137841	2.062×10^{-4}	-2.068×10^{-5}	-1.380×10^{-2}	2.077×10^{-2}	-1.255×10^{-4}	8.079×10^{-5}
fitted root mean square [1]	$(1.283 \pm 0.504) \times 10^{-3}$	4137841	4.451×10^{-4}	1.168×10^{-3}	3.119×10^{-4}	3.795×10^{-2}	9.819×10^{-4}	1.427×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.854 ± 0.487	4137841	0.623	0.713	5.000×10^{-2}	2.76	0.511	1.13
sulfurdioxide total air mass factor polluted precision [1]	0.127 ± 0.145	4137841	0.140	6.944×10^{-2}	3.037×10^{-3}	1.97	3.131×10^{-2}	0.172
sulfurdioxide clear air mass factor polluted [1]	0.699 ± 0.327	4137841	0.397	0.627	5.908×10^{-2}	2.61	0.467	0.863
number of spectral points in retrieval [1]	73.4 ± 0.5	4137841	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

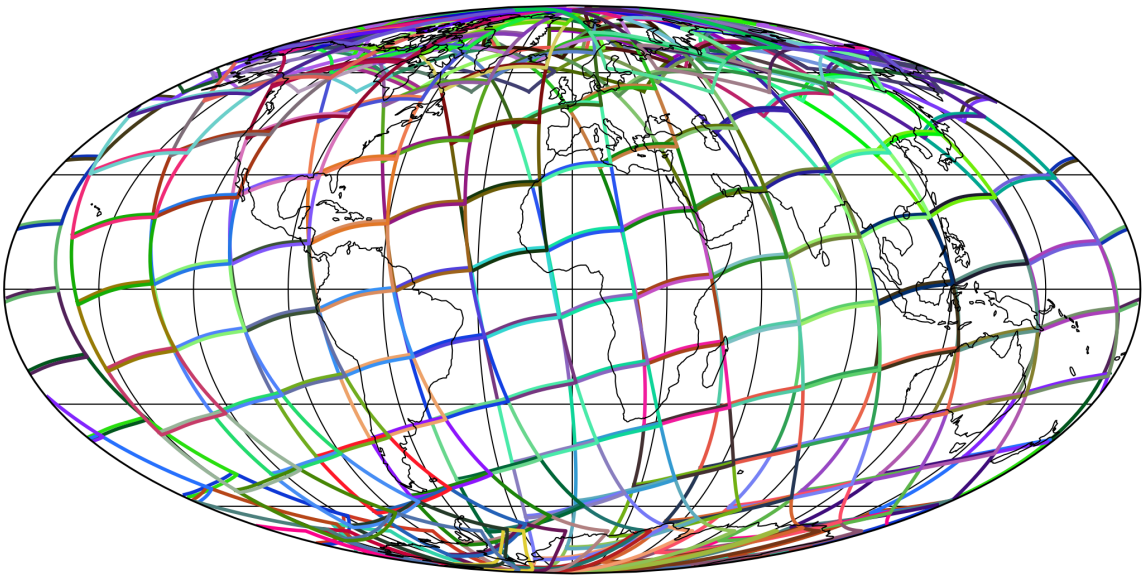

Figure 1: Outline of the granules.

4 Input data monitoring

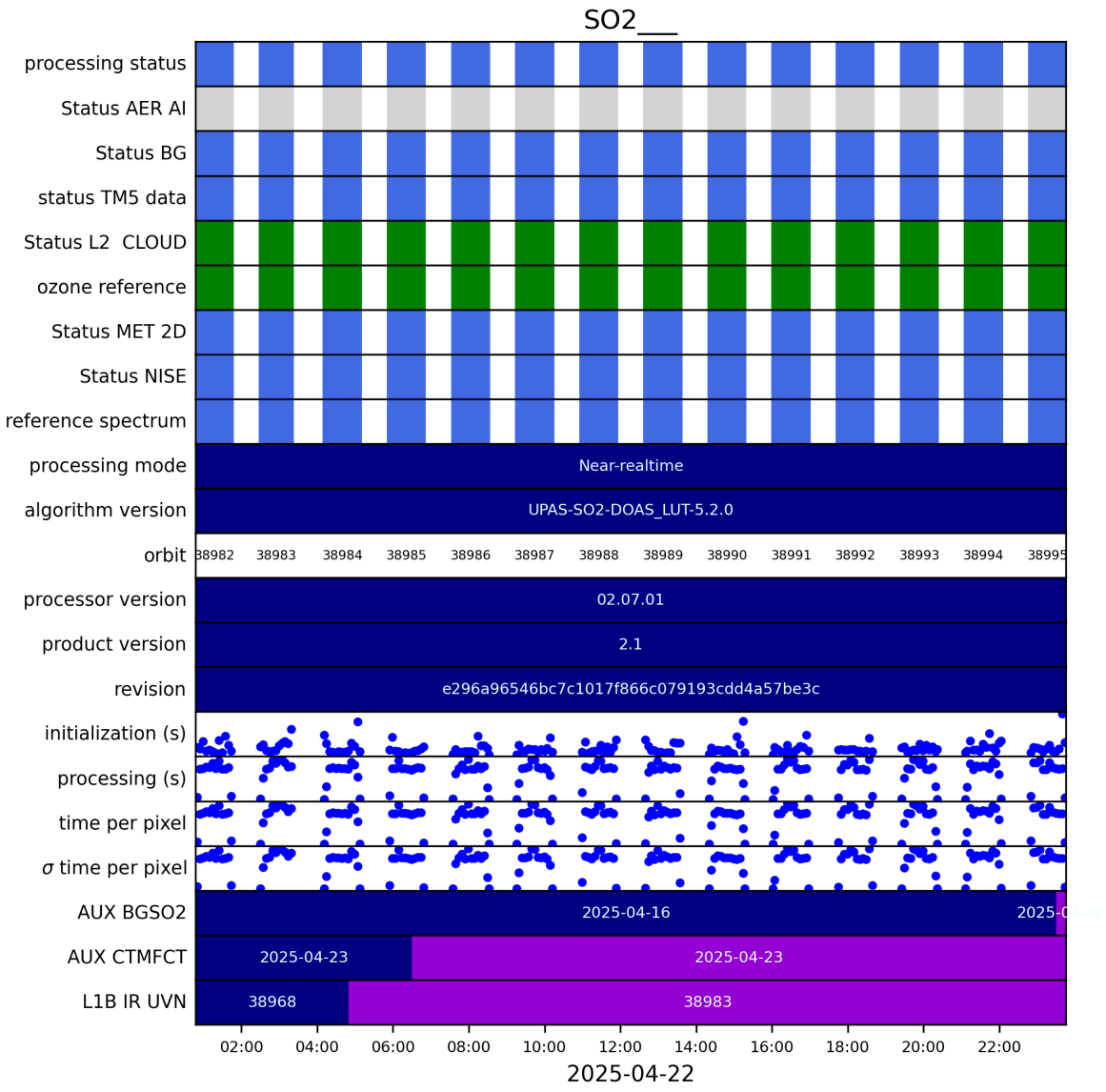

Figure 2: Input data per granule

5 Warnings and errors

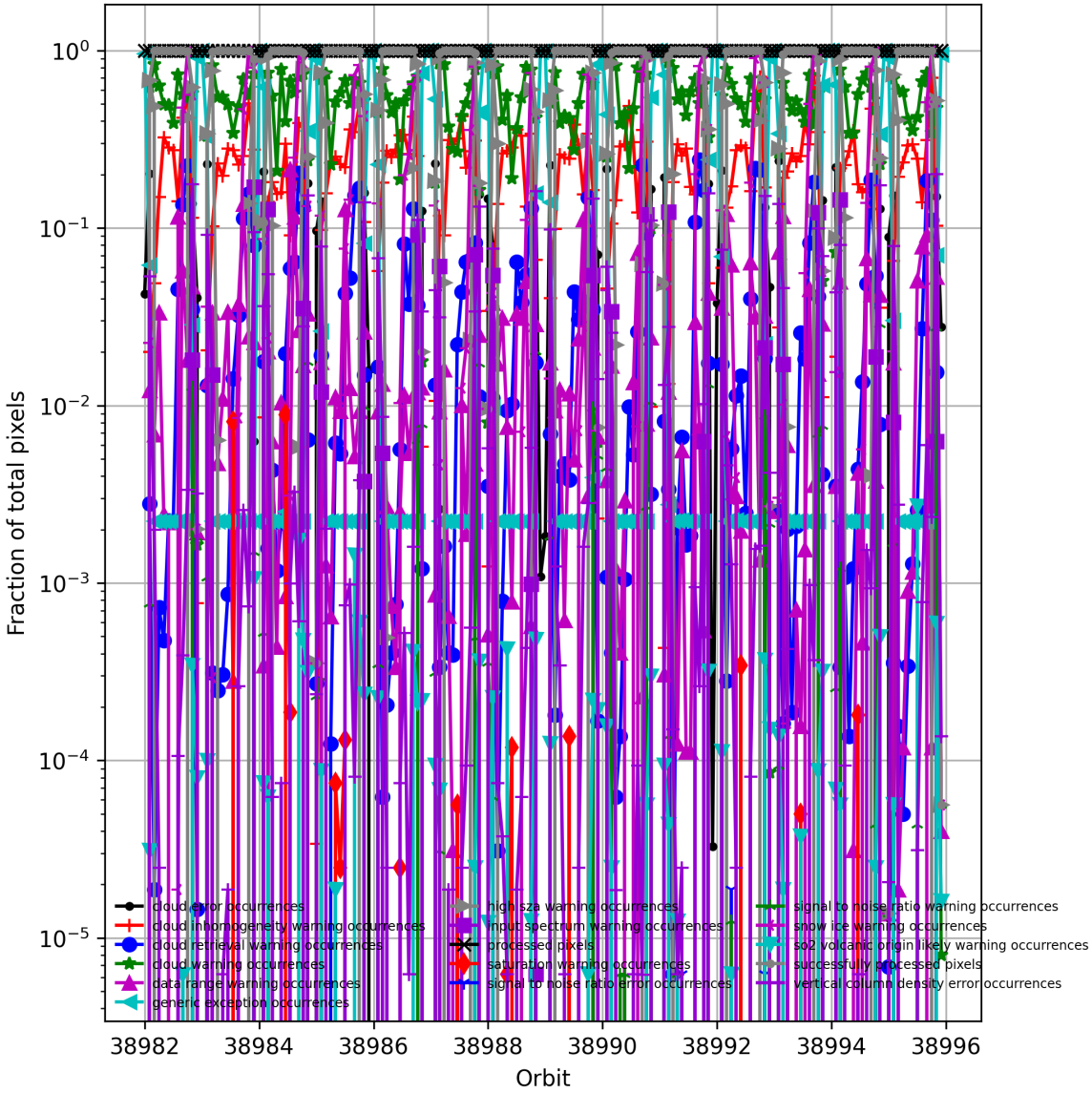

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

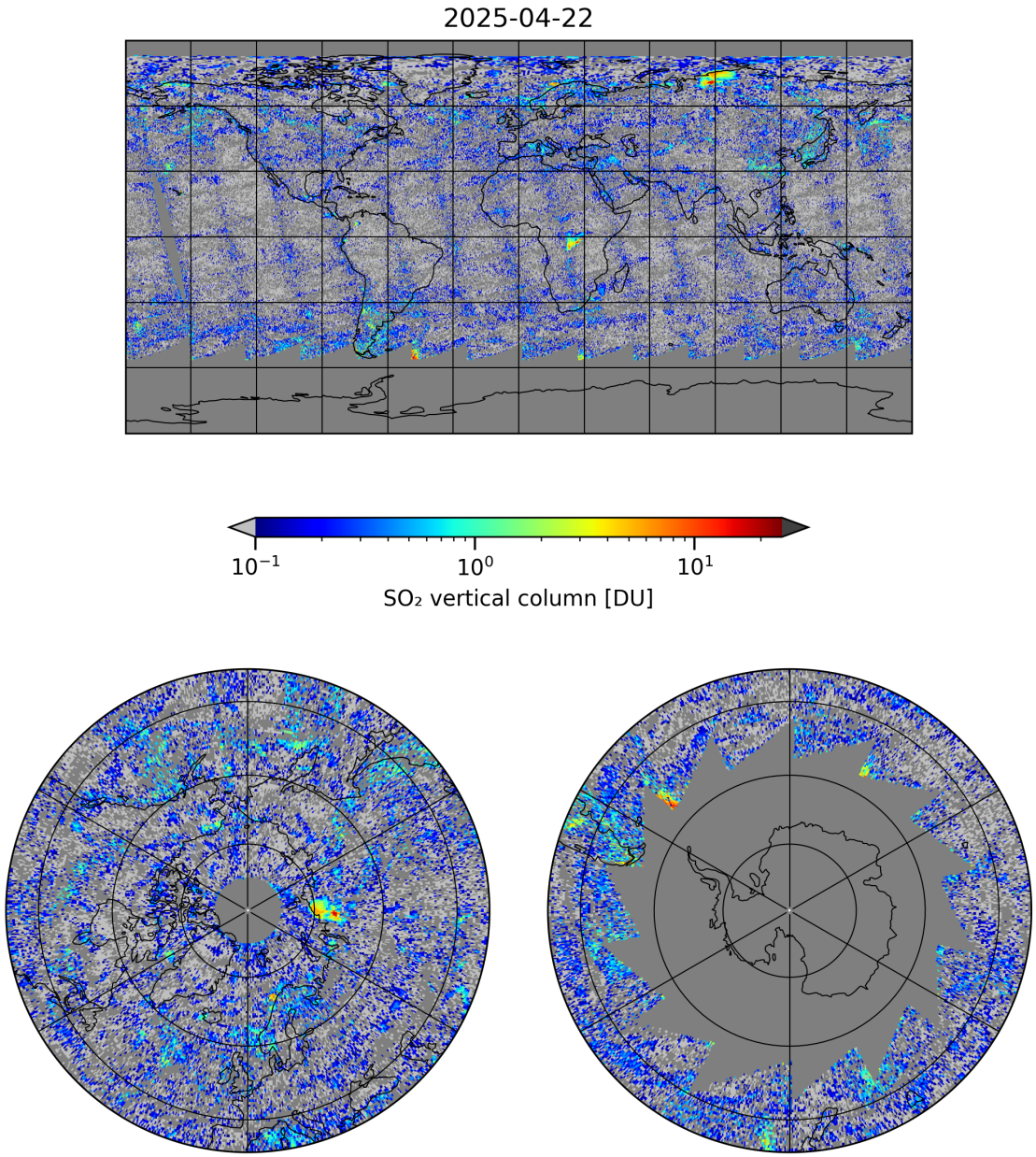

Figure 4: Map of "SO_2 vertical column" for 2025-04-22 to 2025-04-22

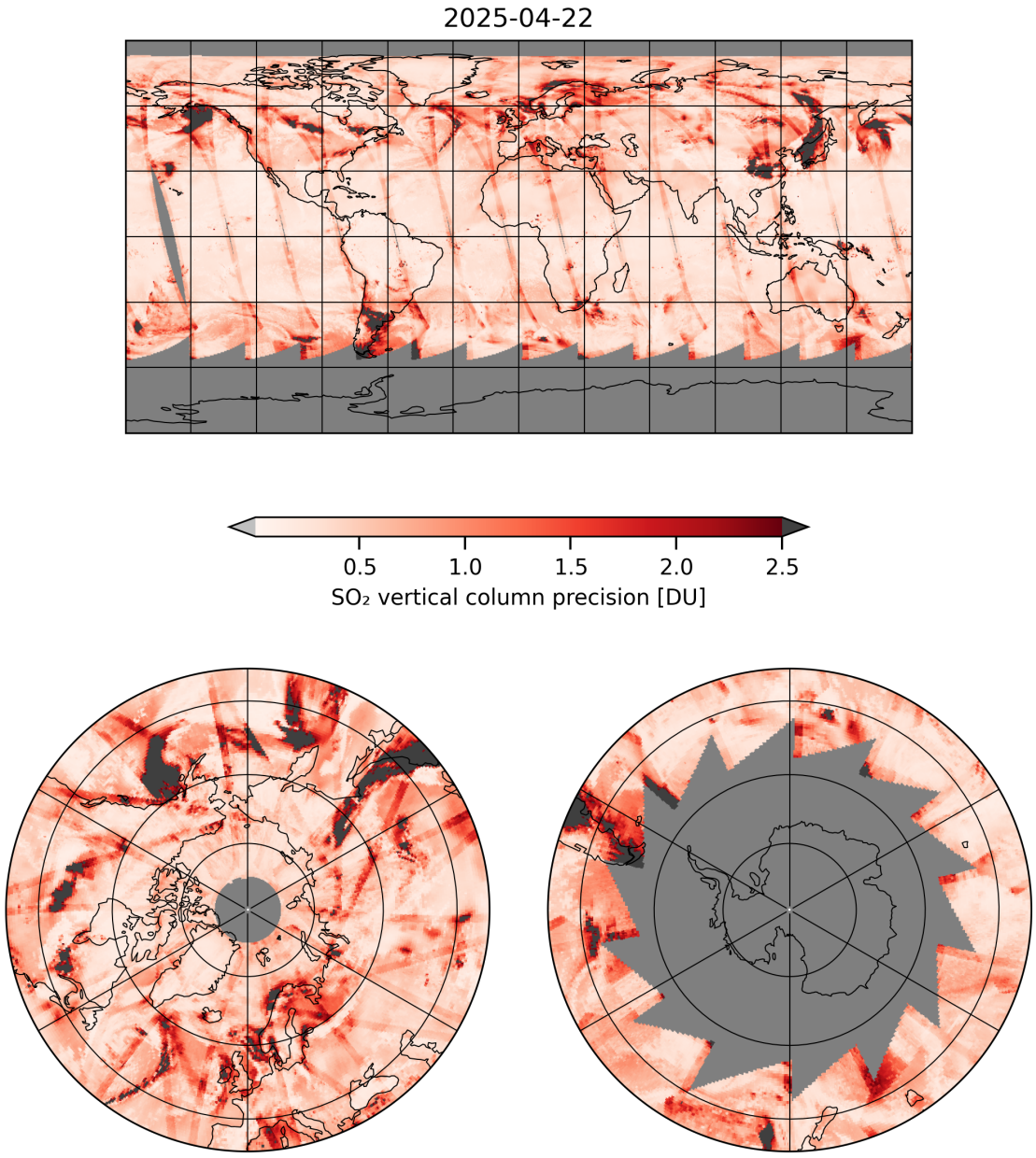

Figure 5: Map of "SO_2 vertical column precision" for 2025-04-22 to 2025-04-22

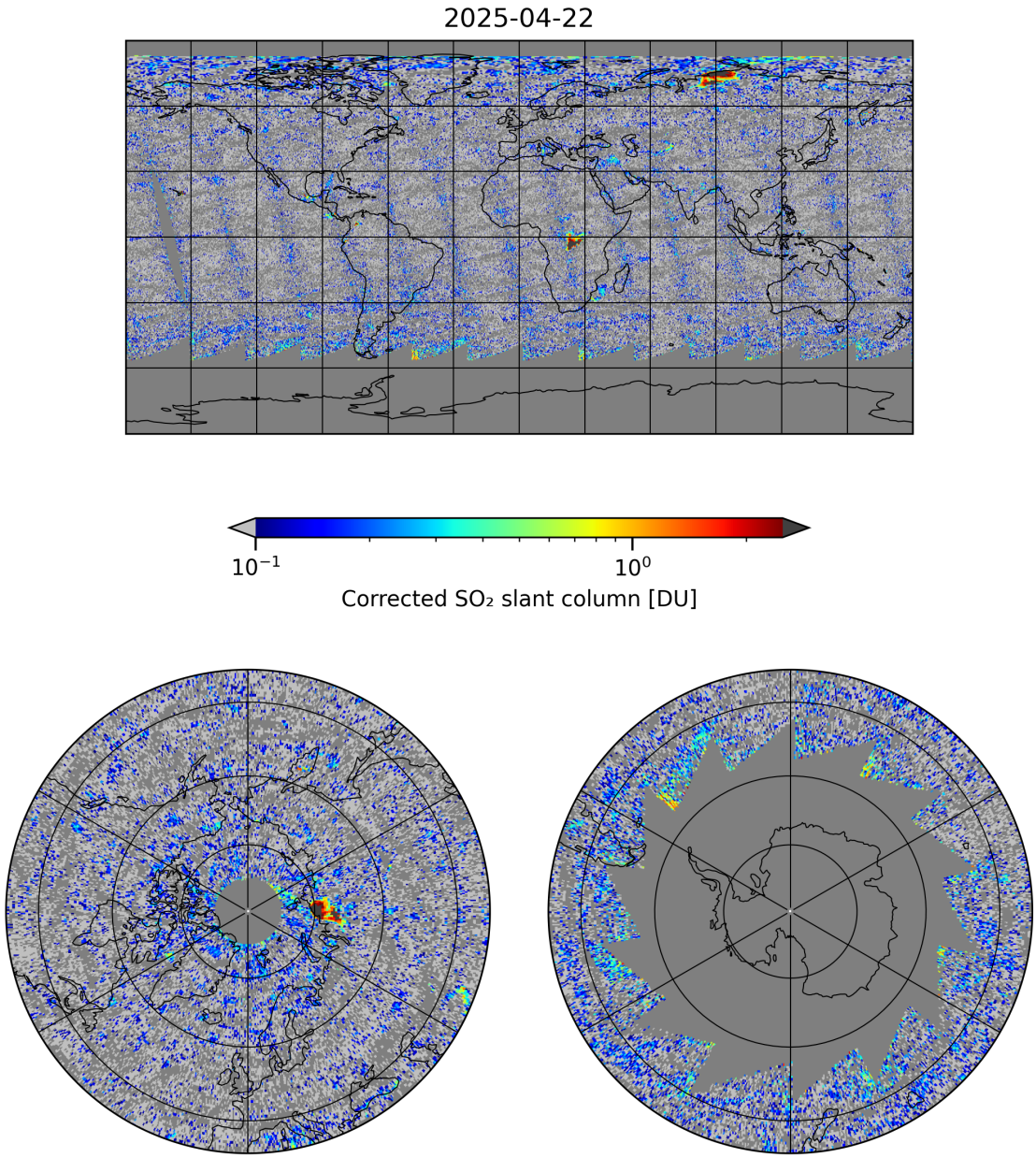

Figure 6: Map of “Corrected SO_2 slant column” for 2025-04-22 to 2025-04-22

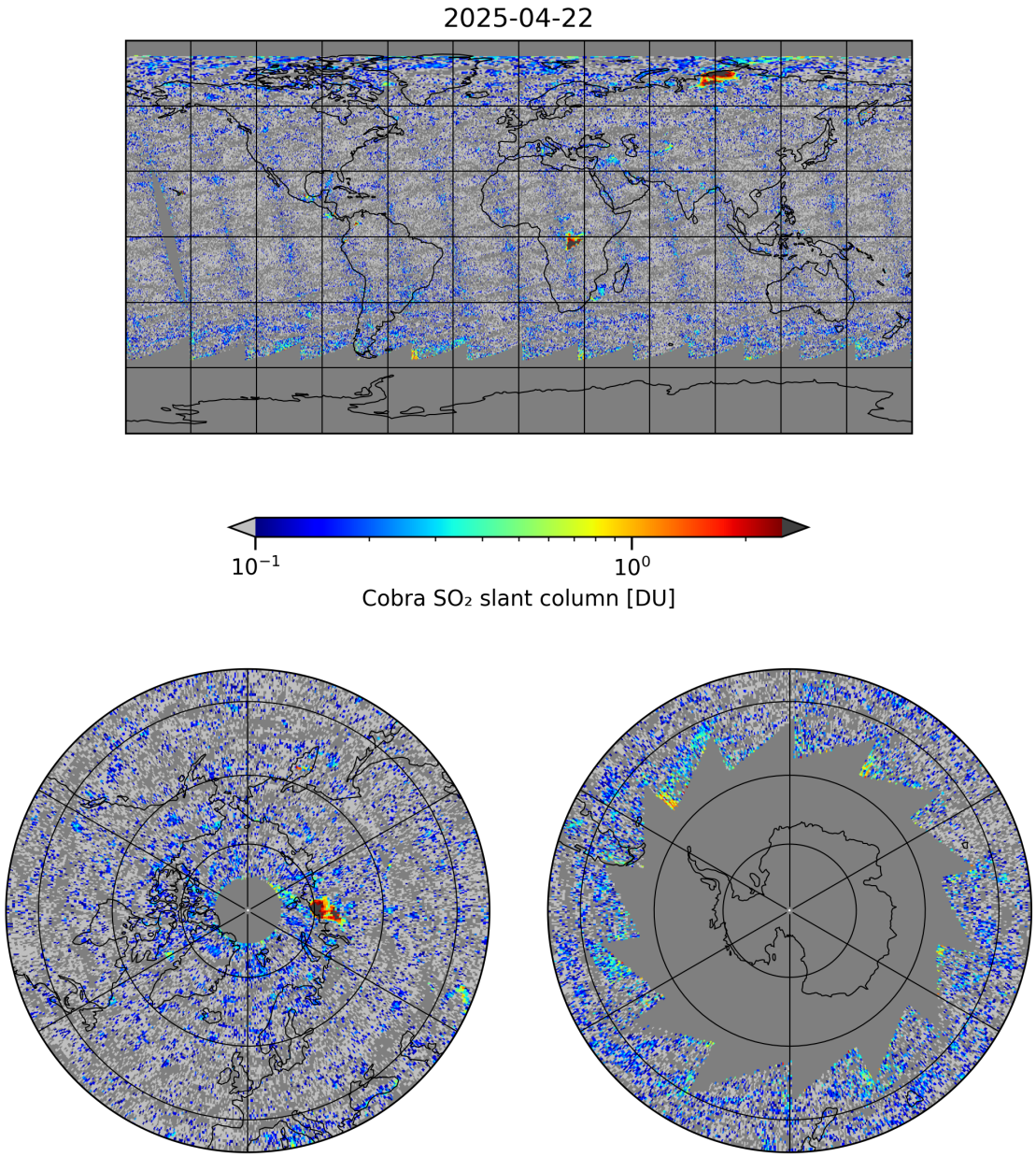

Figure 7: Map of "Cobra SO_2 slant column" for 2025-04-22 to 2025-04-22

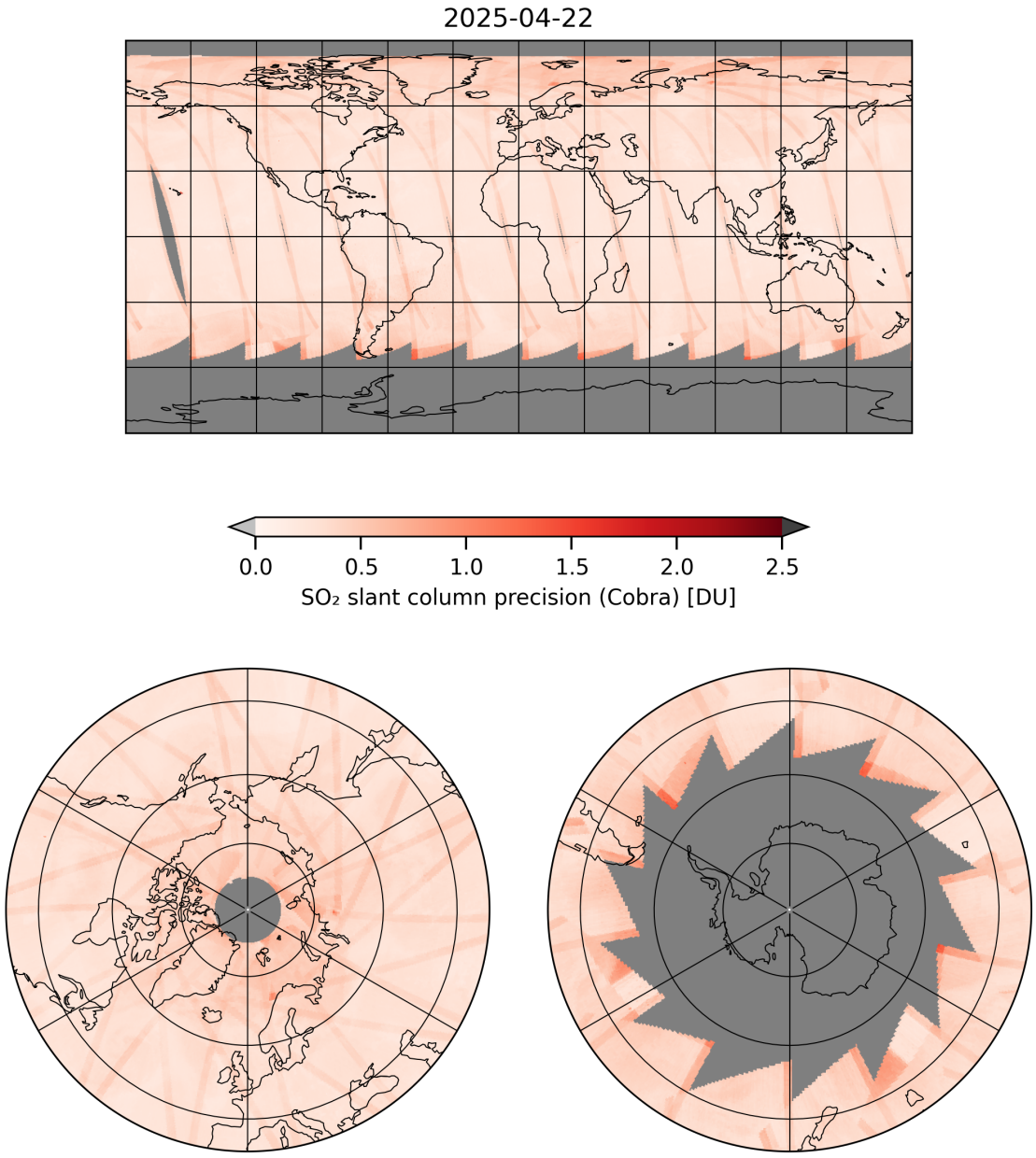

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-04-22 to 2025-04-22

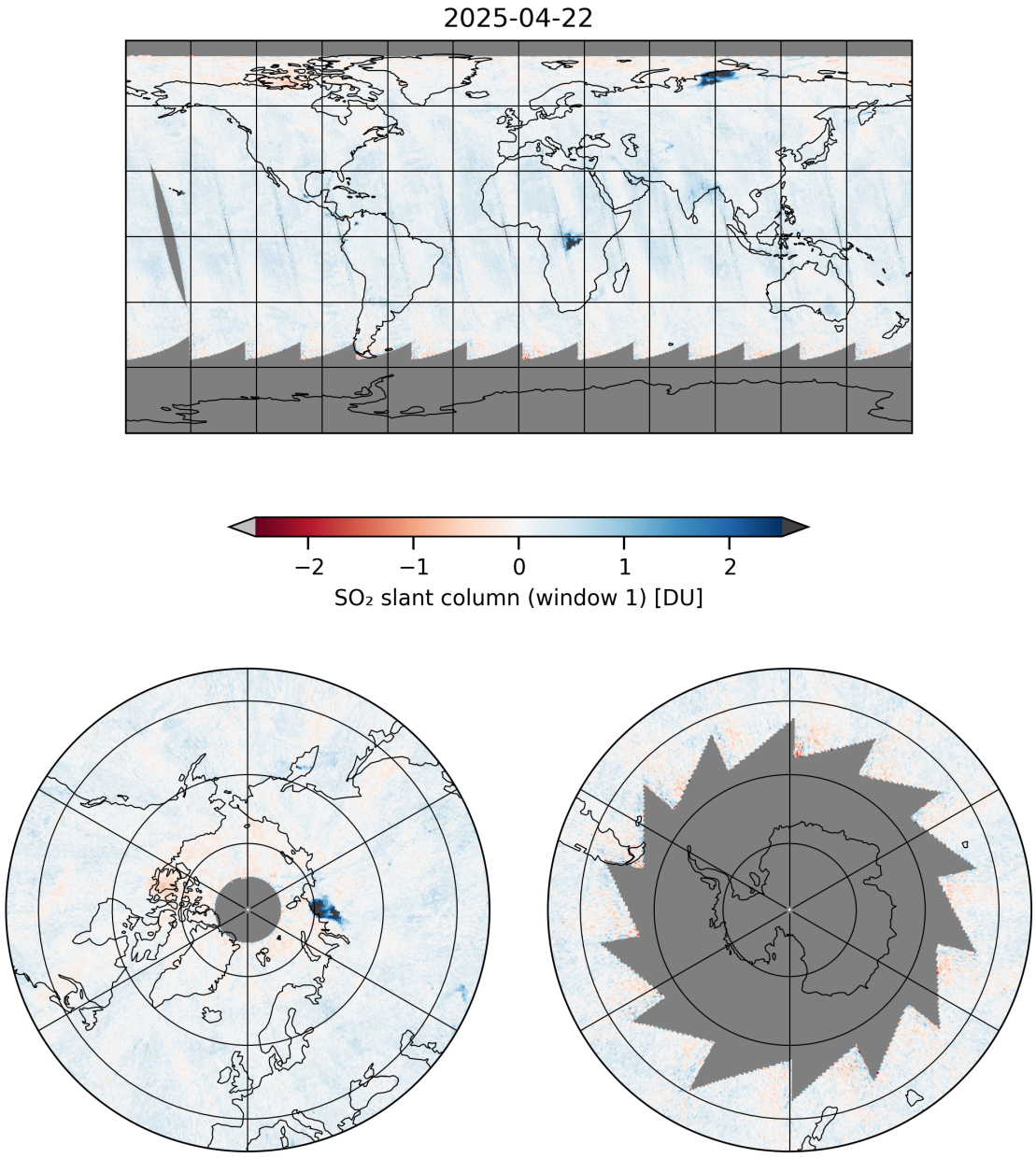

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-04-22 to 2025-04-22

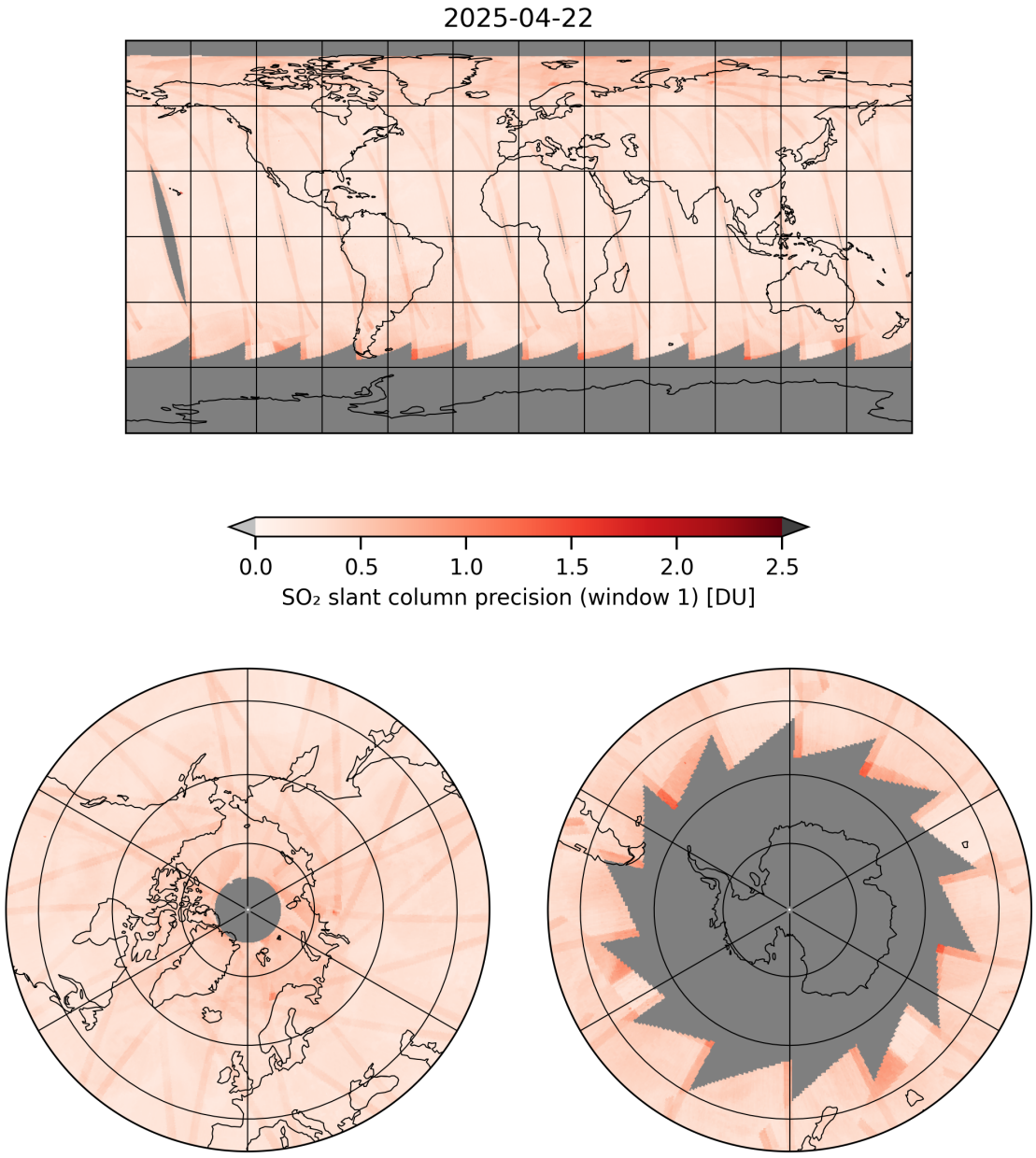

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-04-22 to 2025-04-22

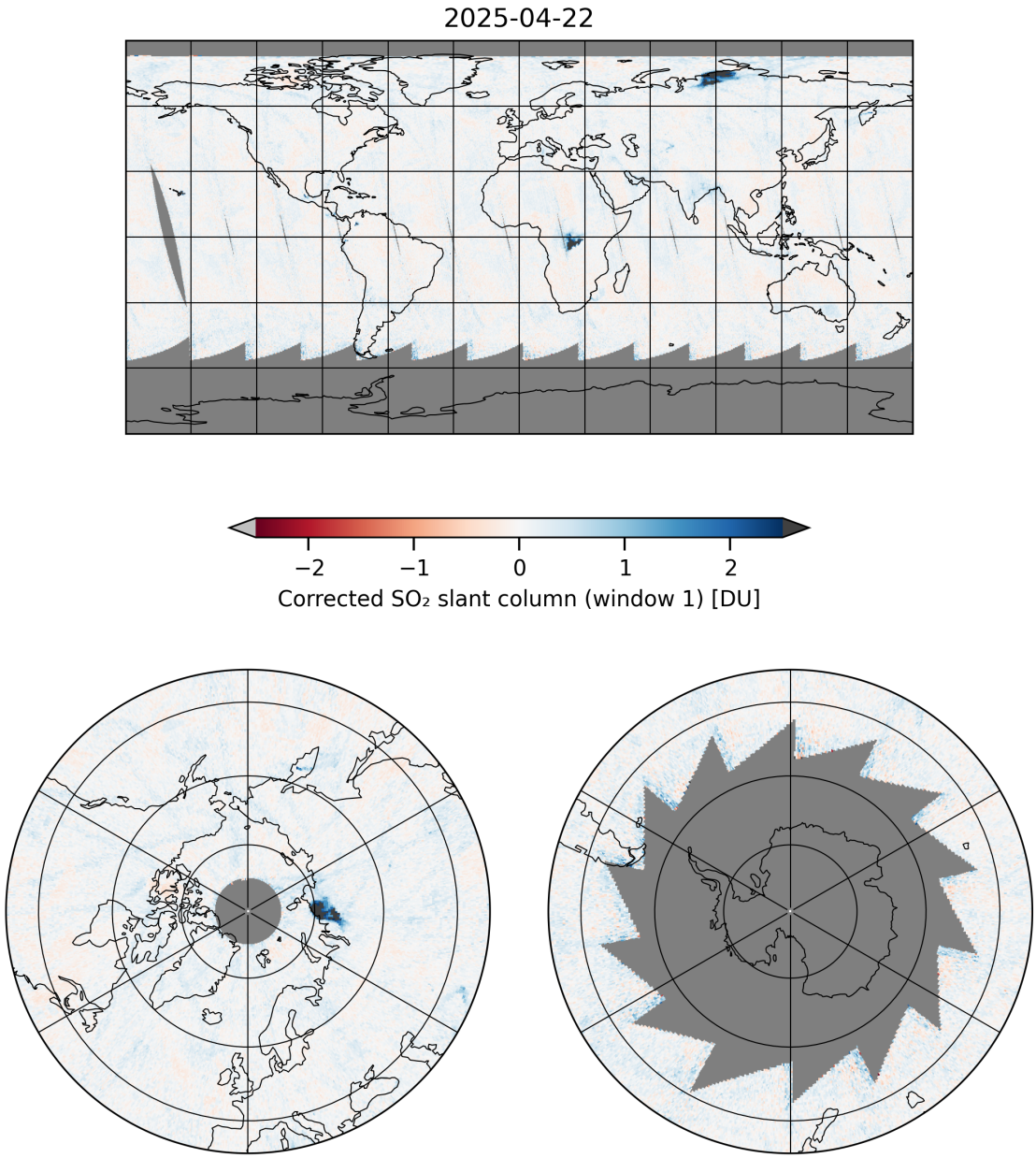

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-04-22 to 2025-04-22

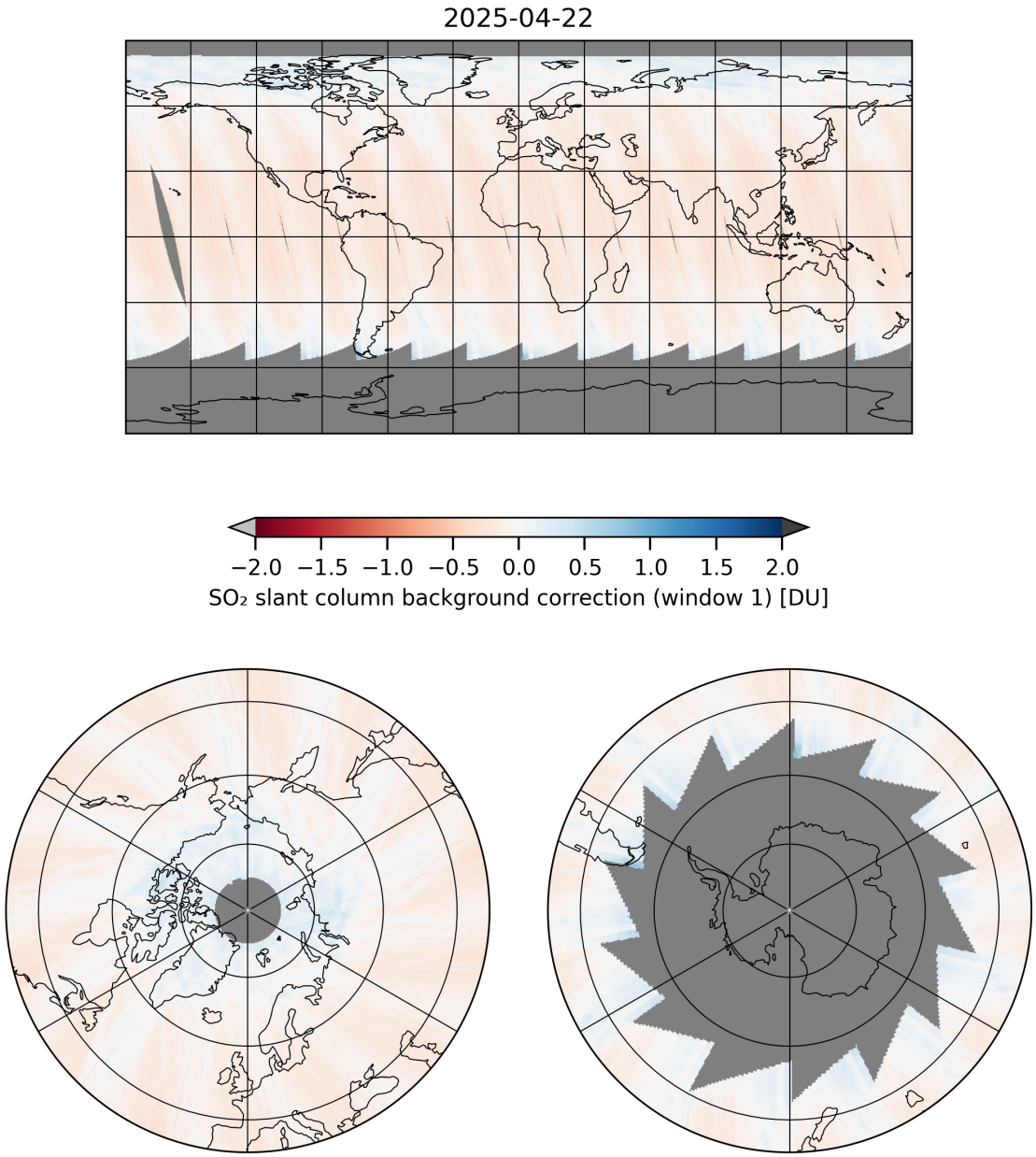

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-04-22 to 2025-04-22

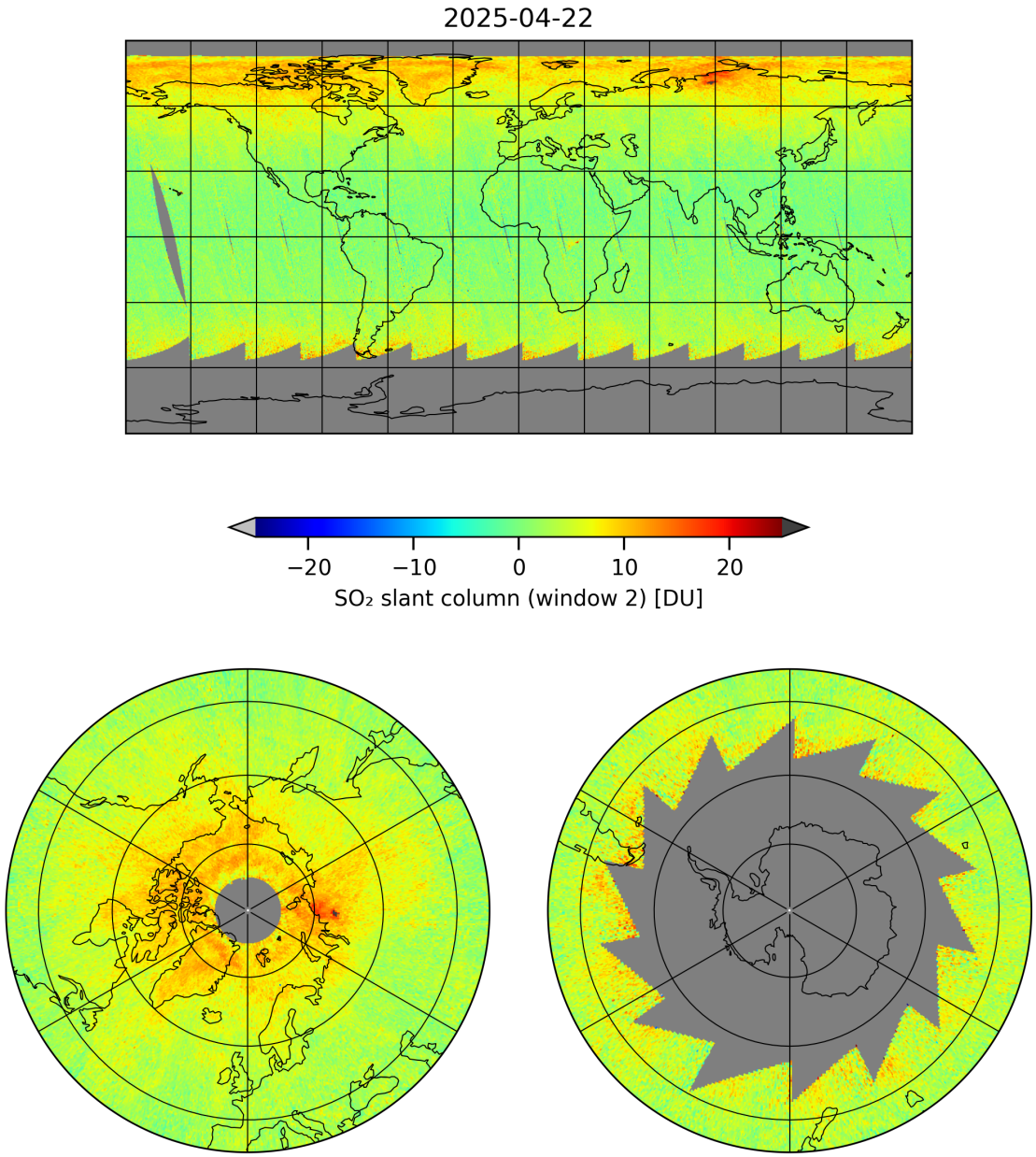

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-04-22 to 2025-04-22

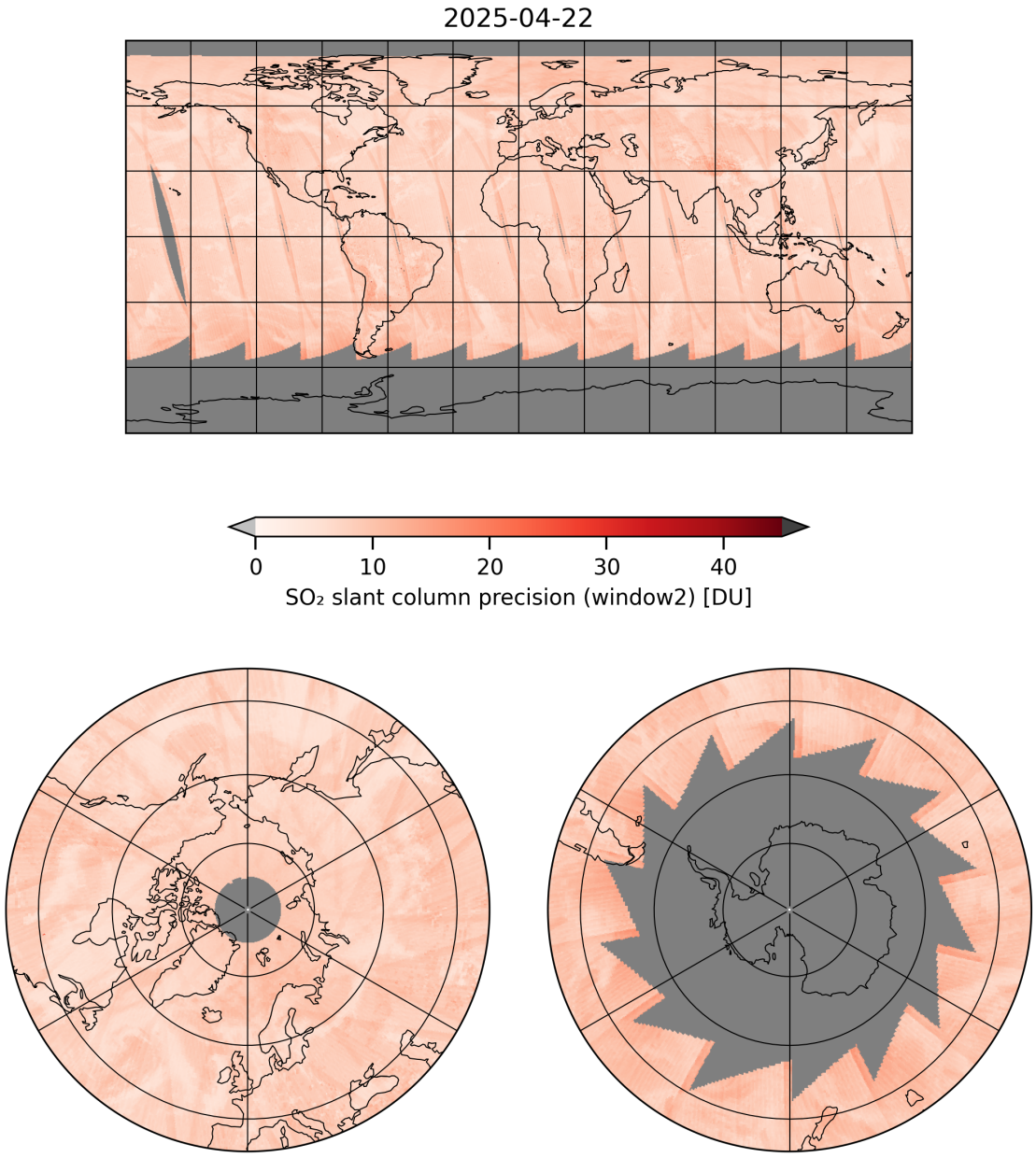

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-04-22 to 2025-04-22

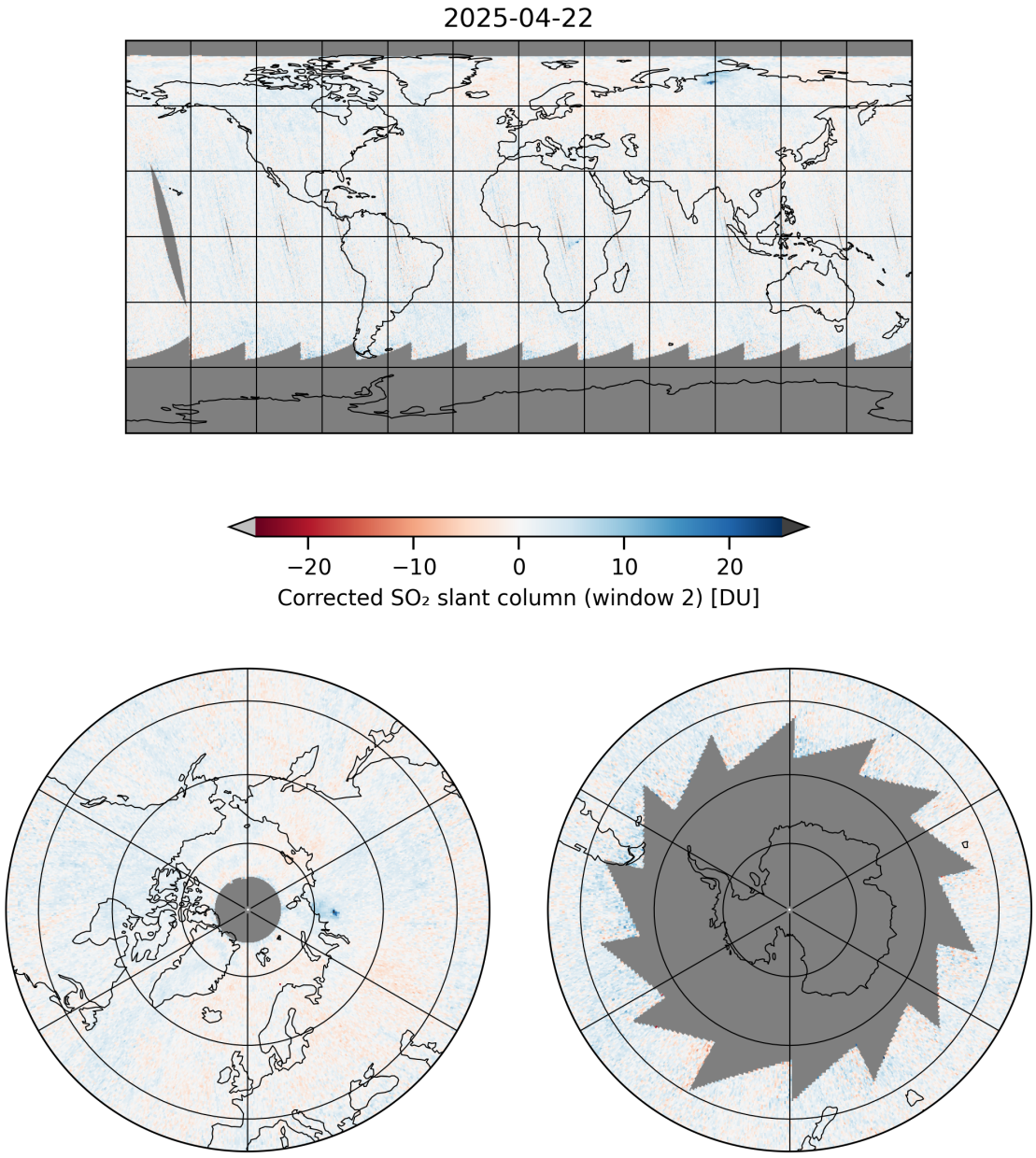

Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-04-22 to 2025-04-22

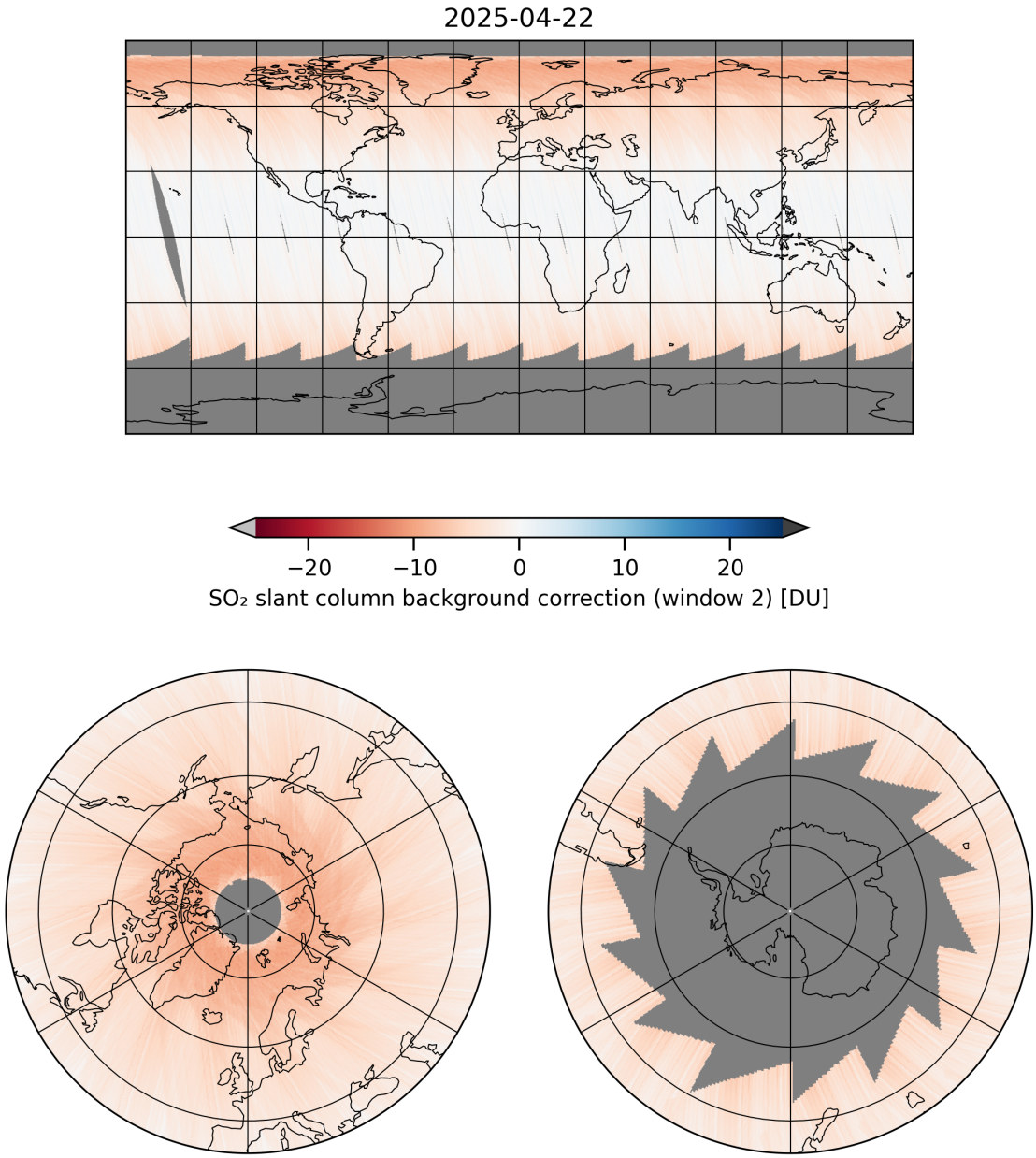

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-04-22 to 2025-04-22

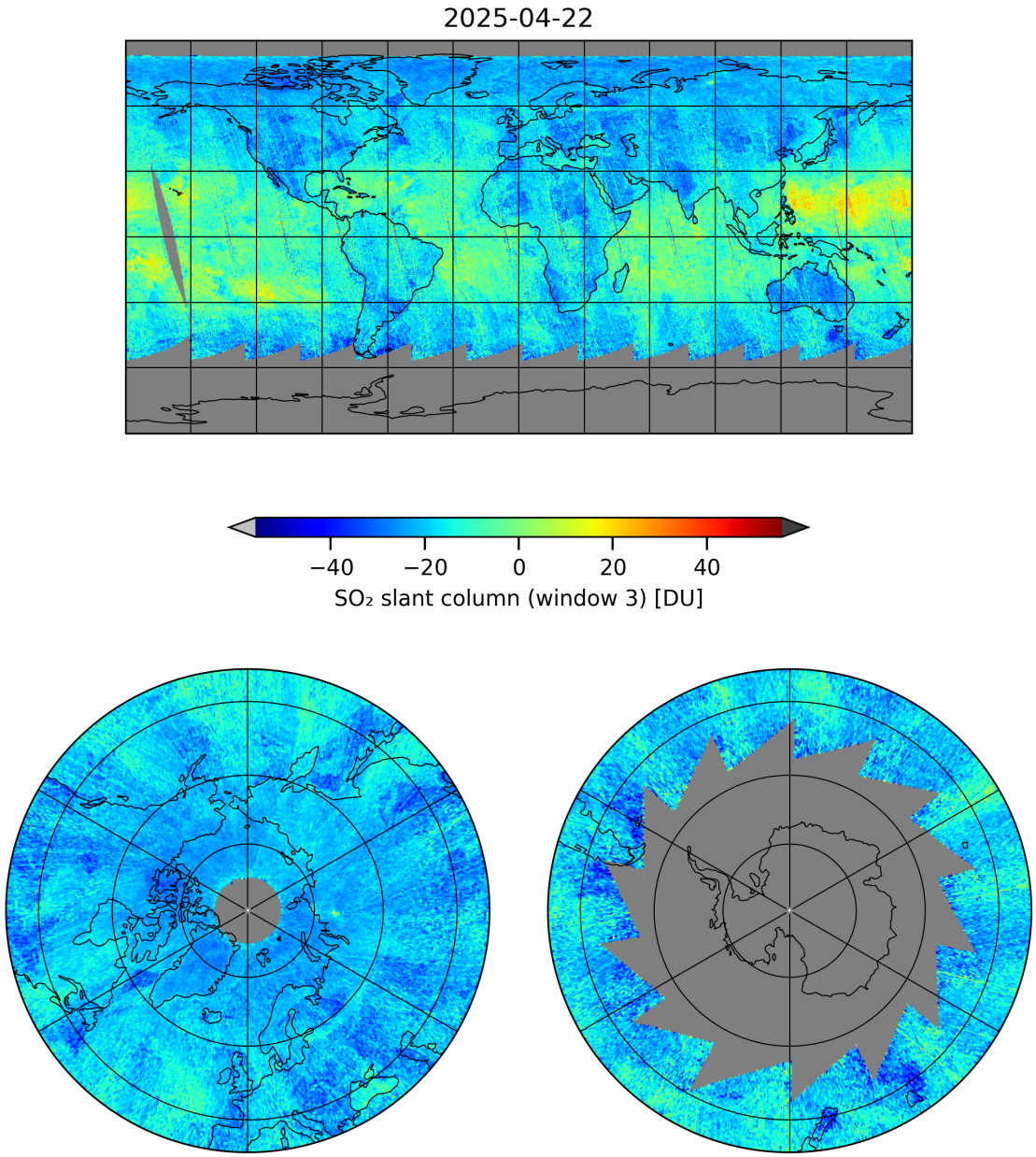

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-04-22 to 2025-04-22

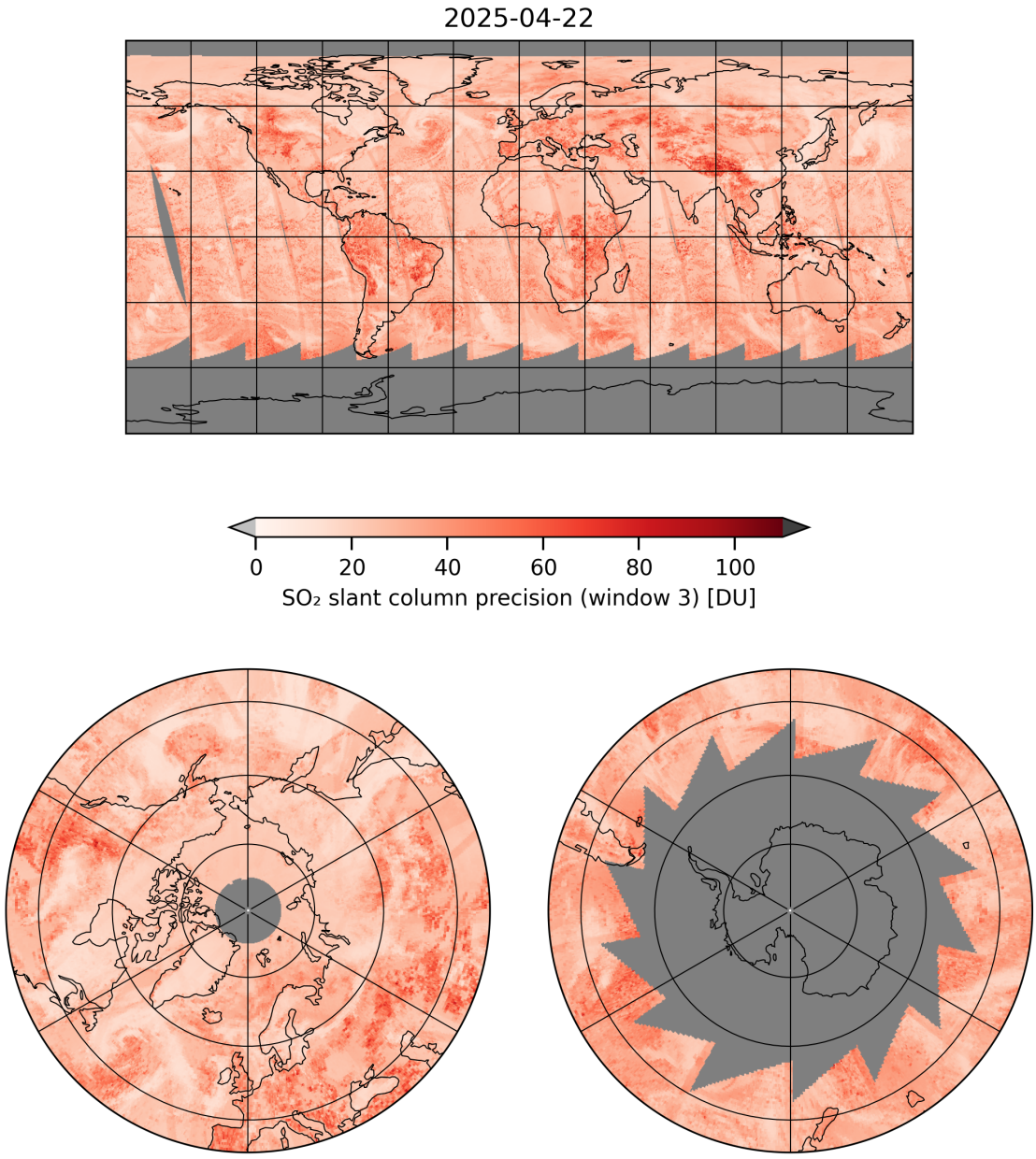

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-04-22 to 2025-04-22

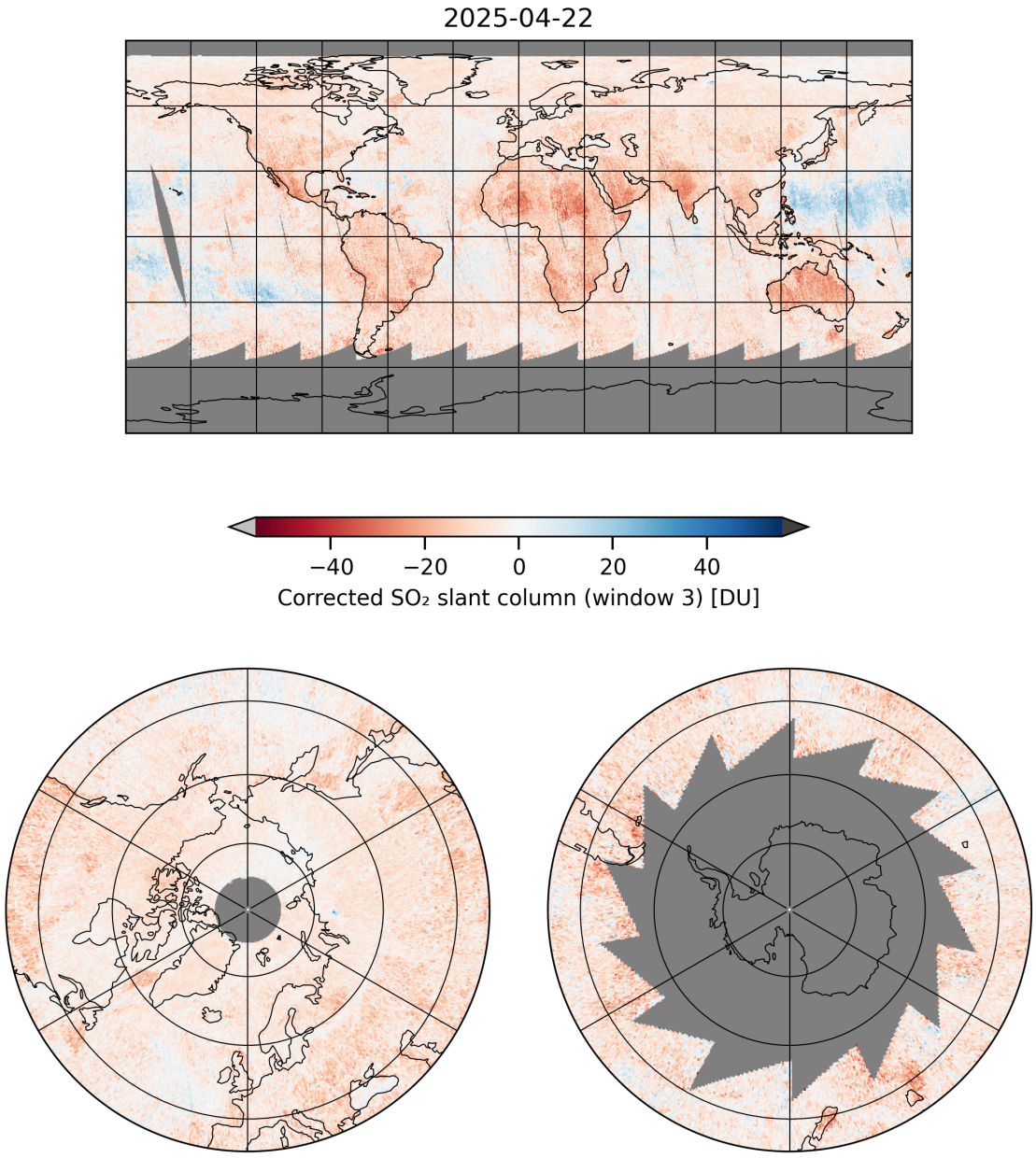

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-04-22 to 2025-04-22

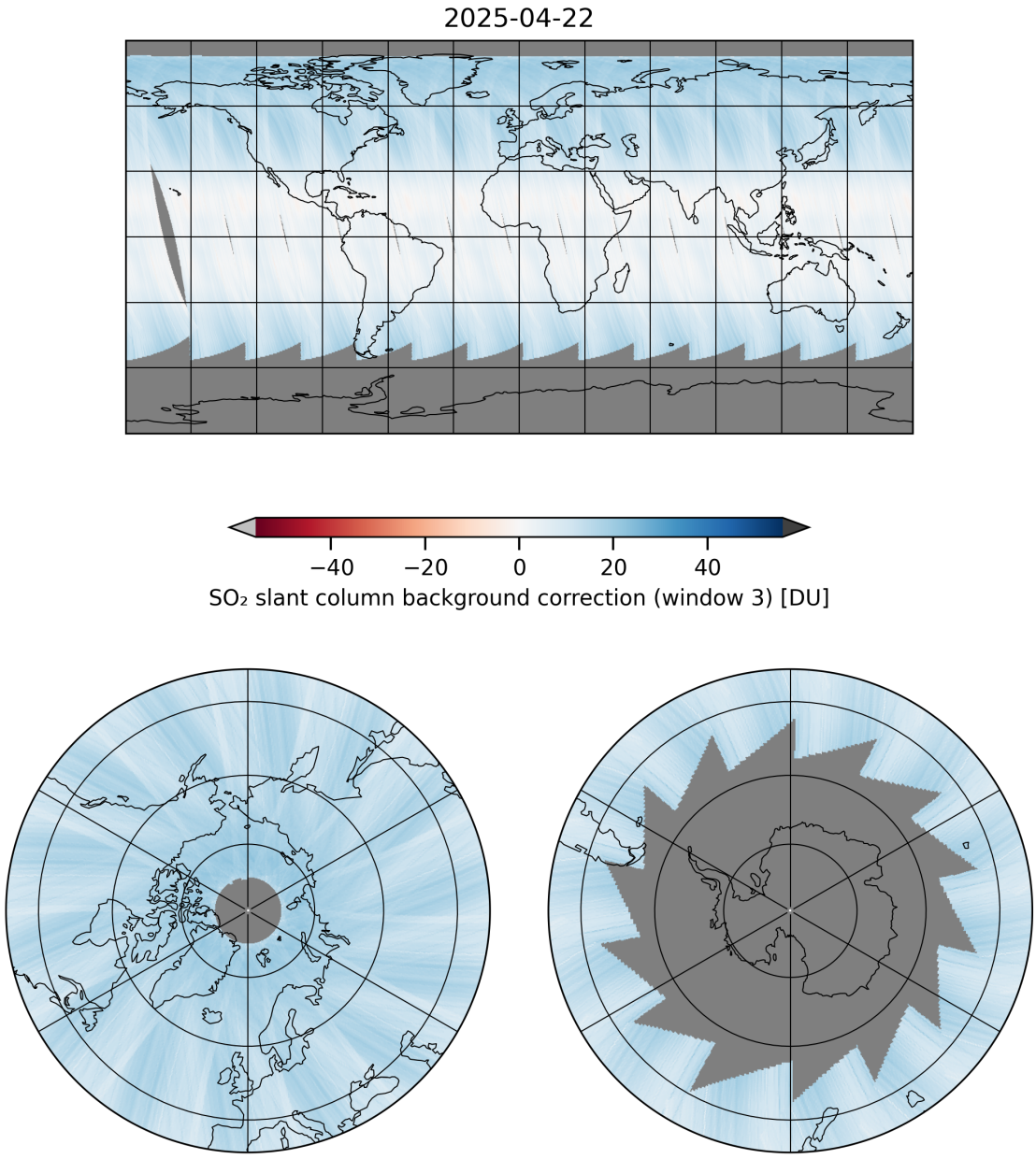

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-04-22 to 2025-04-22

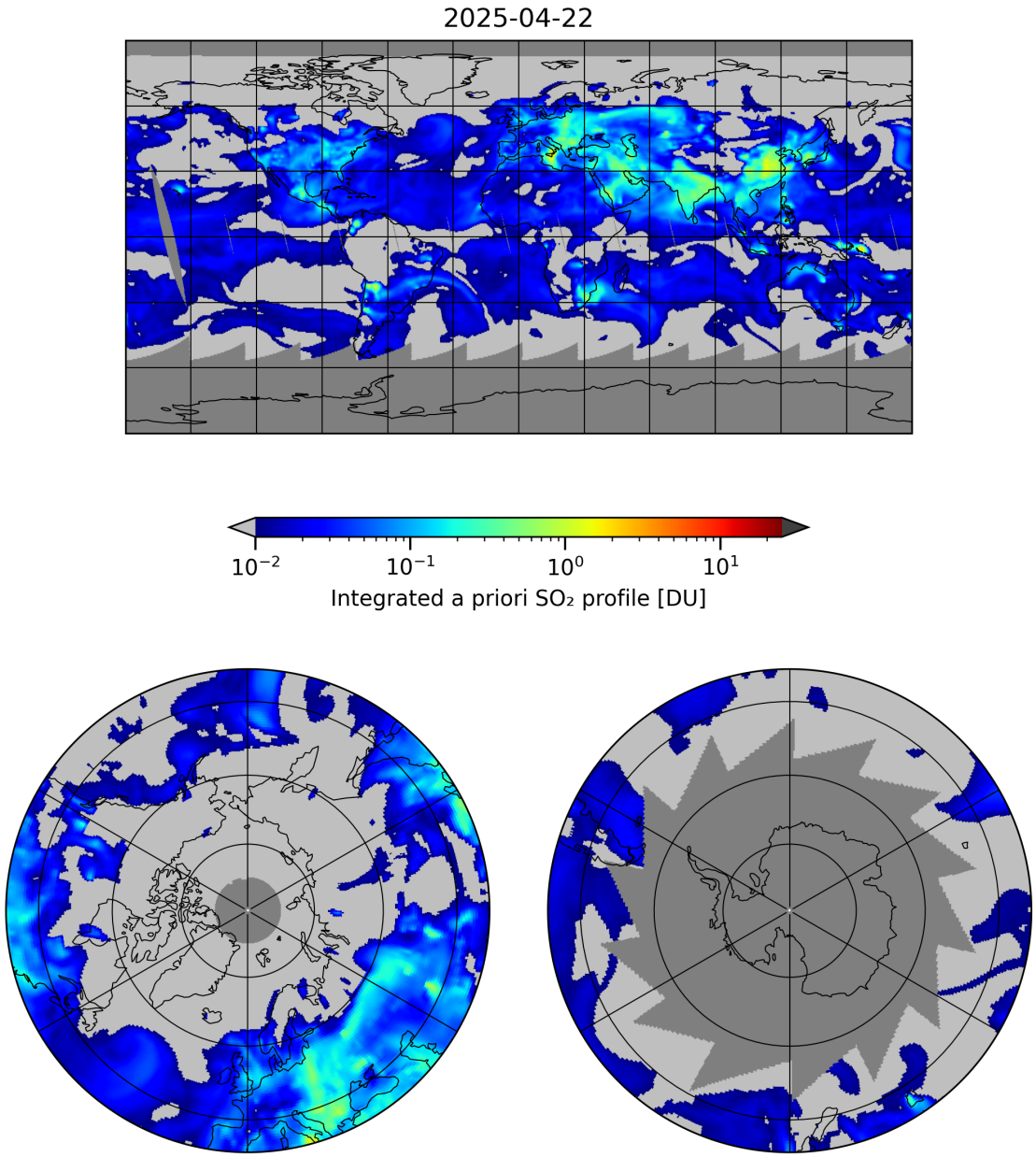

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-04-22 to 2025-04-22

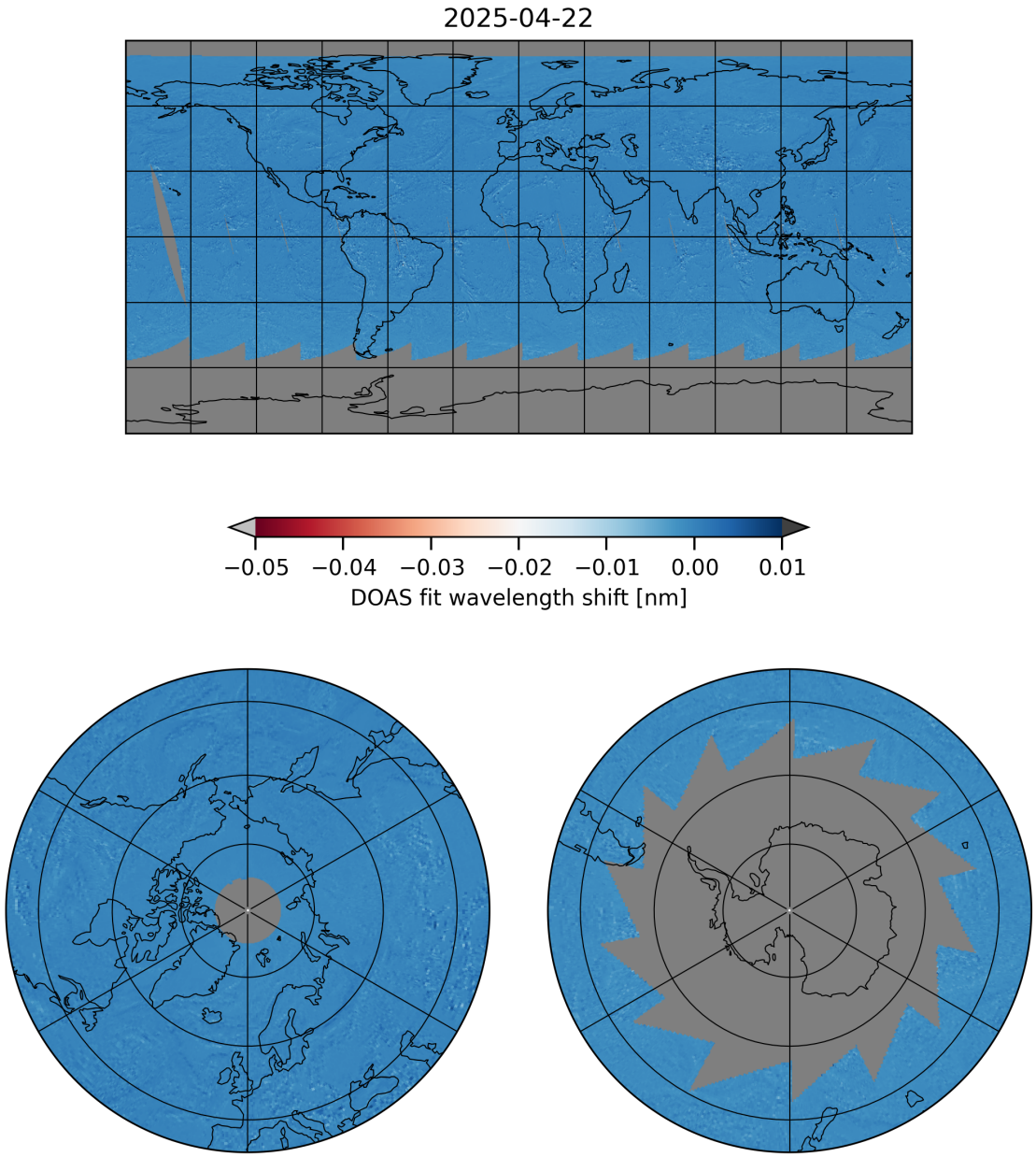

Figure 22: Map of “DOAS fit wavelength shift” for 2025-04-22 to 2025-04-22

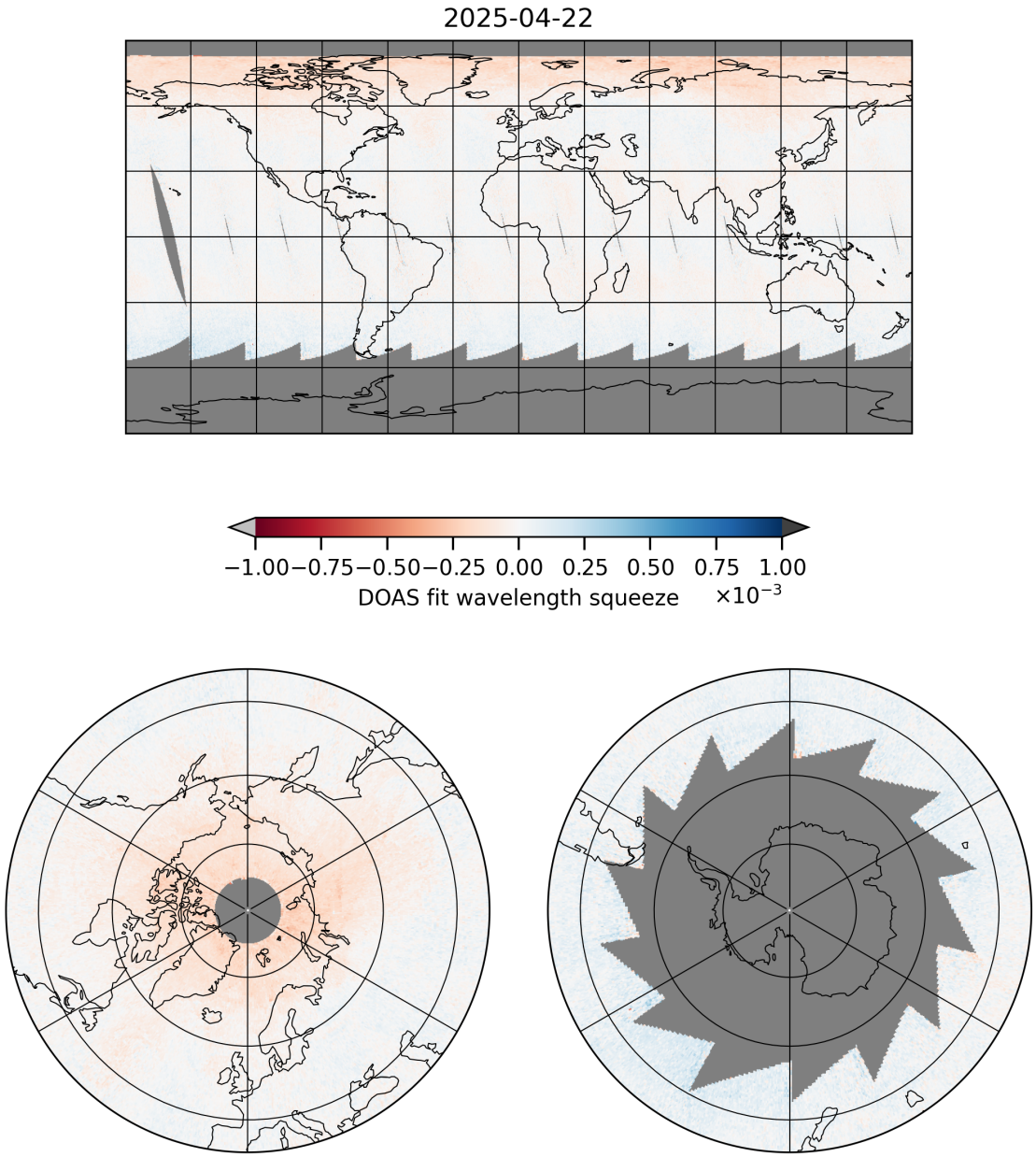

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-04-22 to 2025-04-22

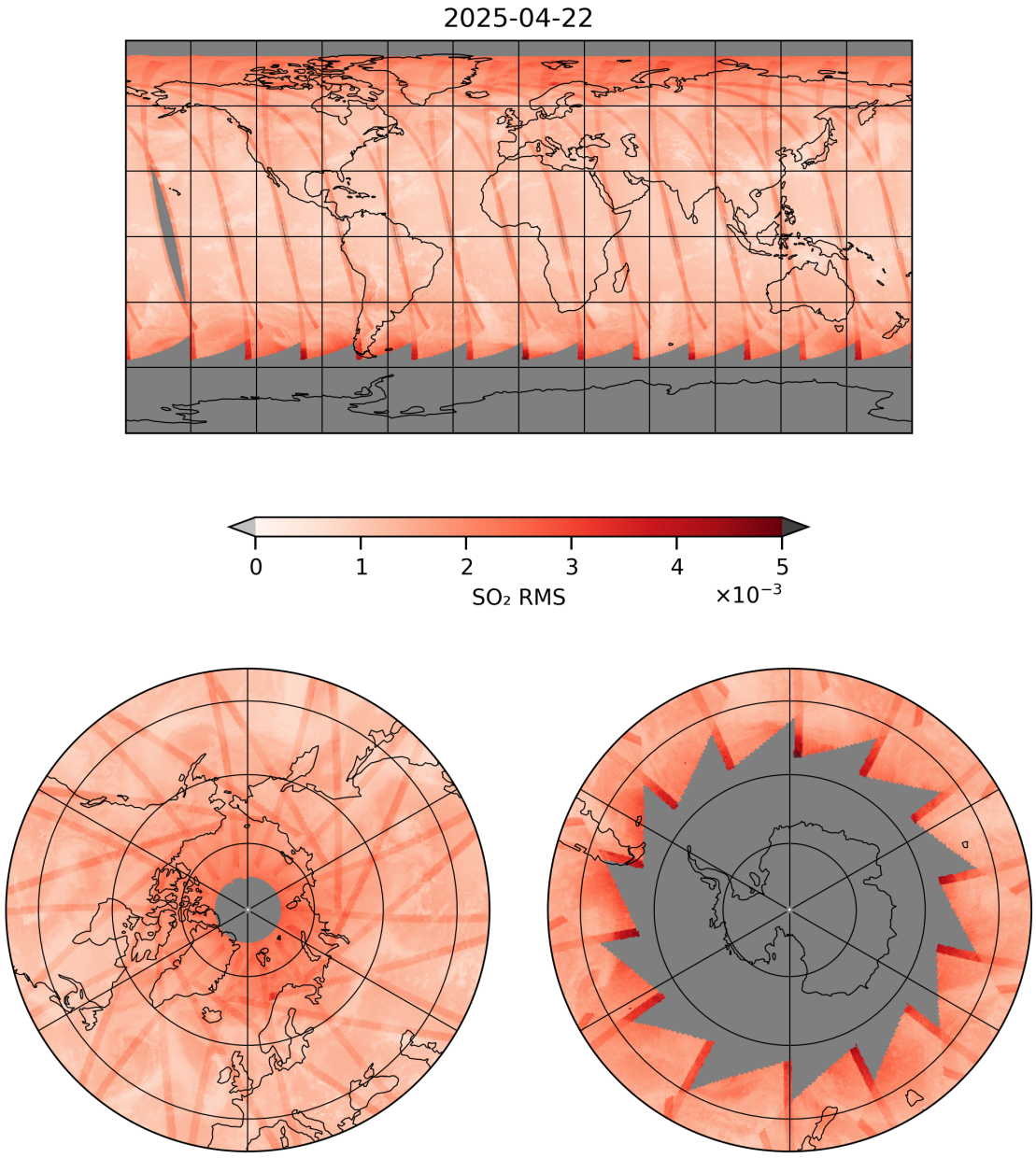

Figure 24: Map of "SO_2 RMS" for 2025-04-22 to 2025-04-22

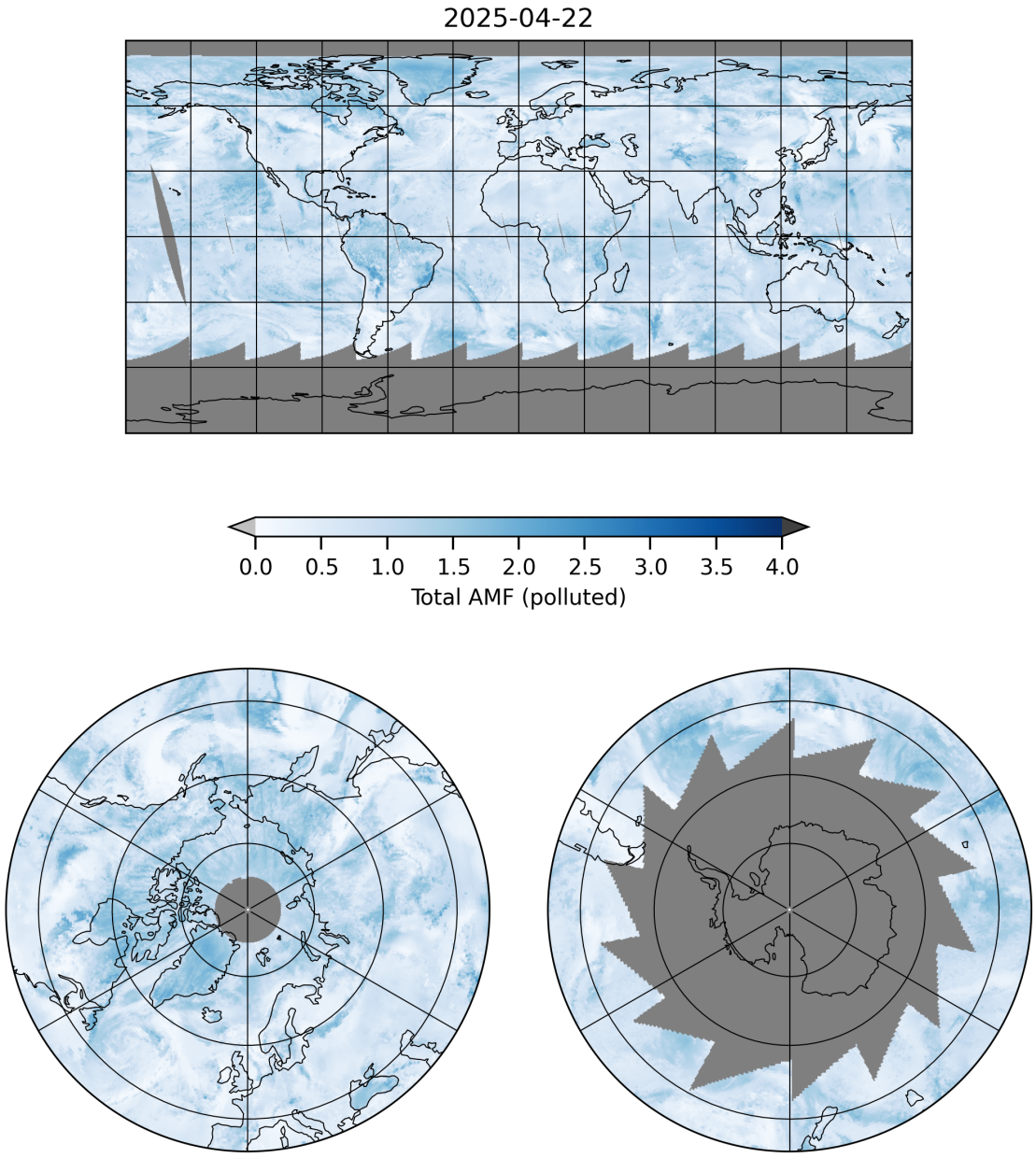

Figure 25: Map of “Total AMF (polluted)” for 2025-04-22 to 2025-04-22

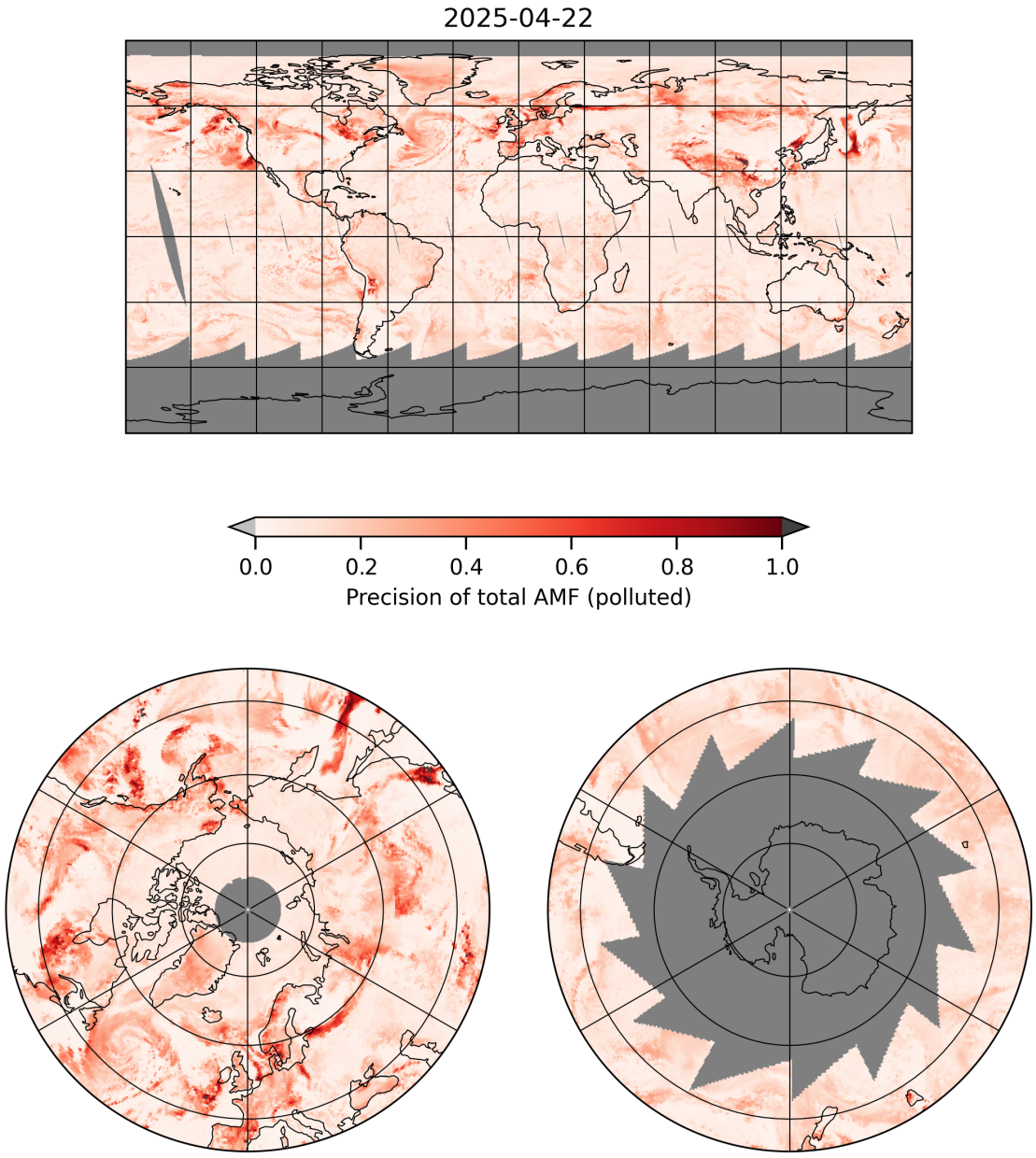

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-04-22 to 2025-04-22

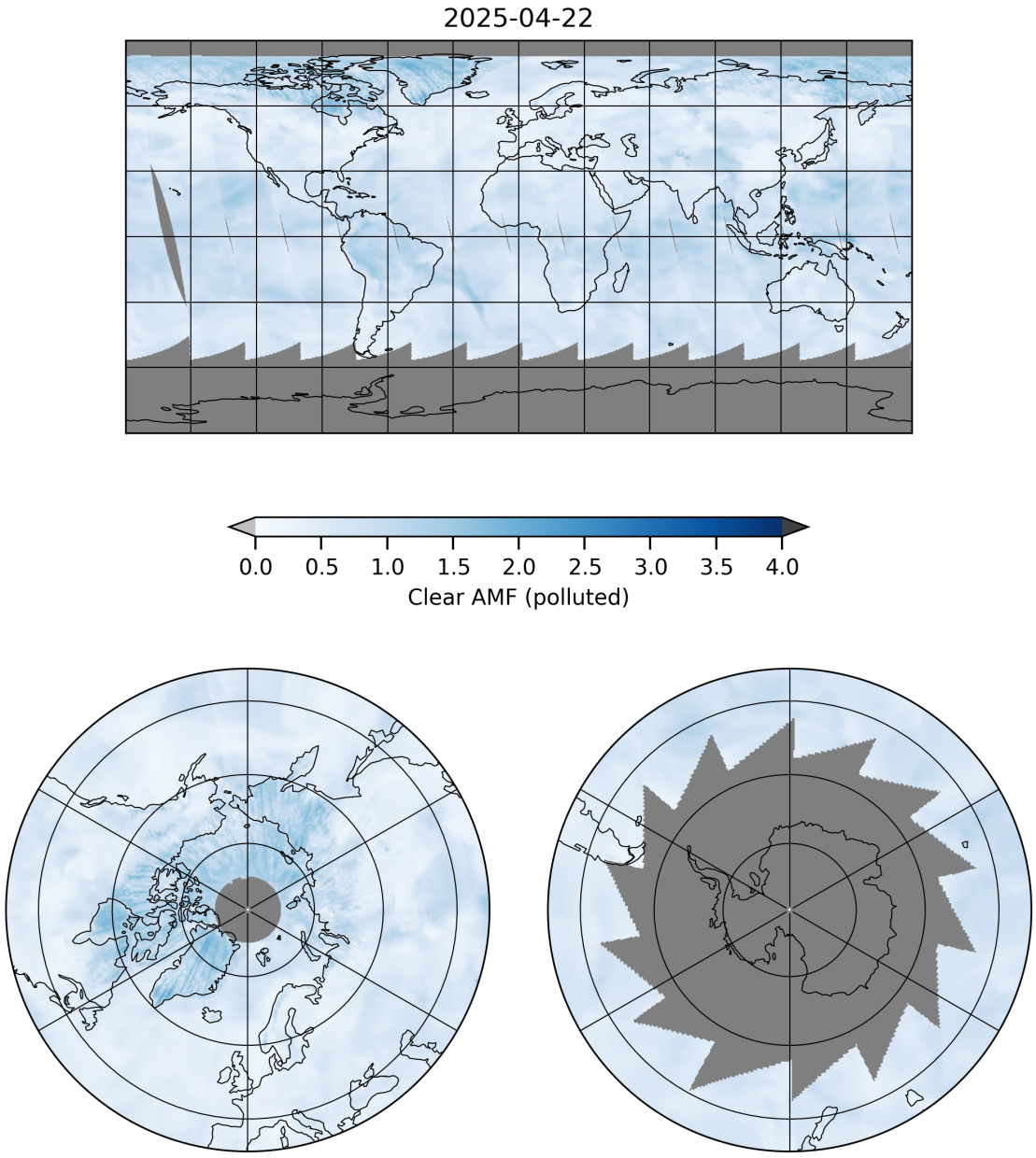

Figure 27: Map of “Clear AMF (polluted)” for 2025-04-22 to 2025-04-22

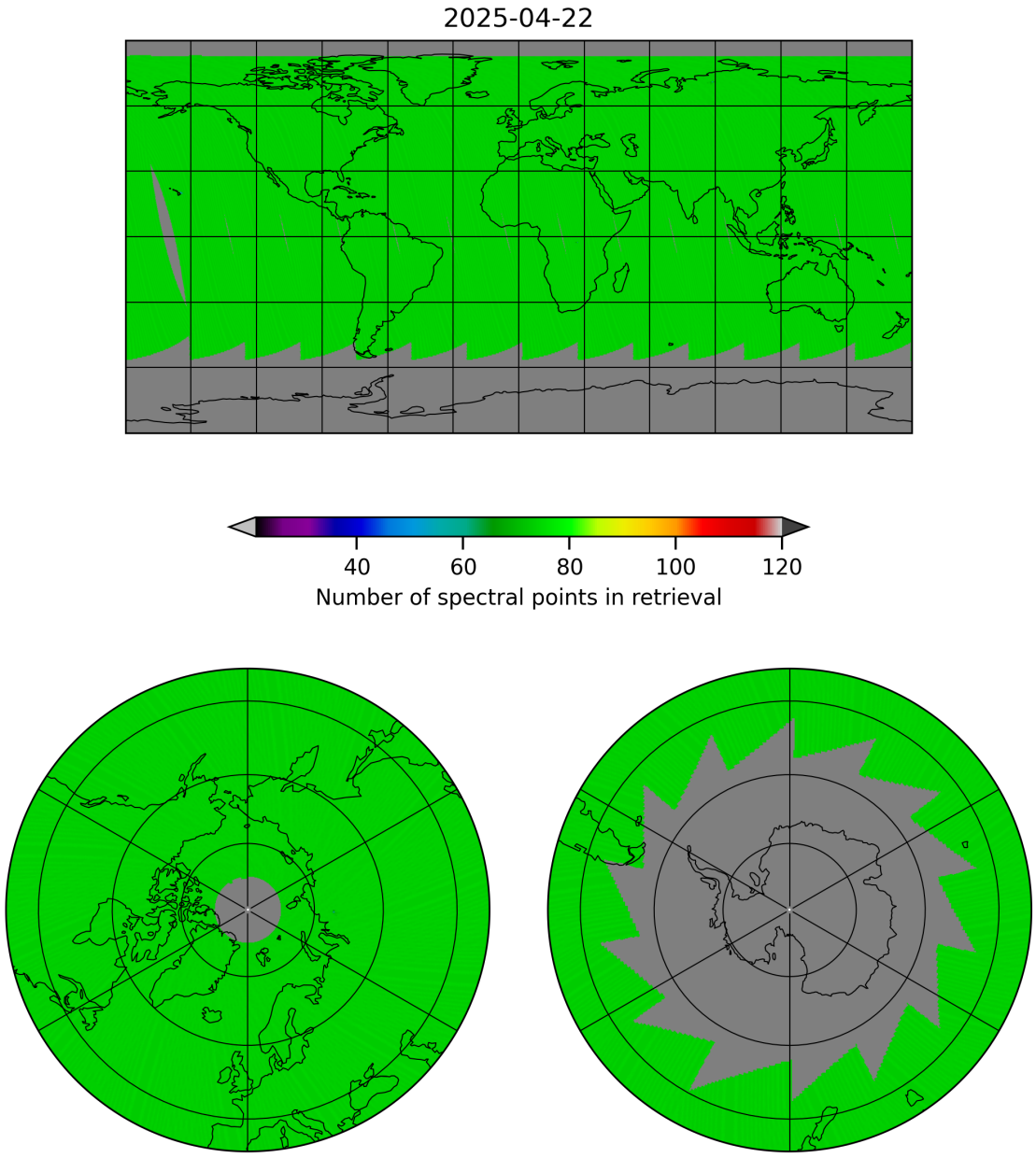

Figure 28: Map of “Number of spectral points in retrieval” for 2025-04-22 to 2025-04-22

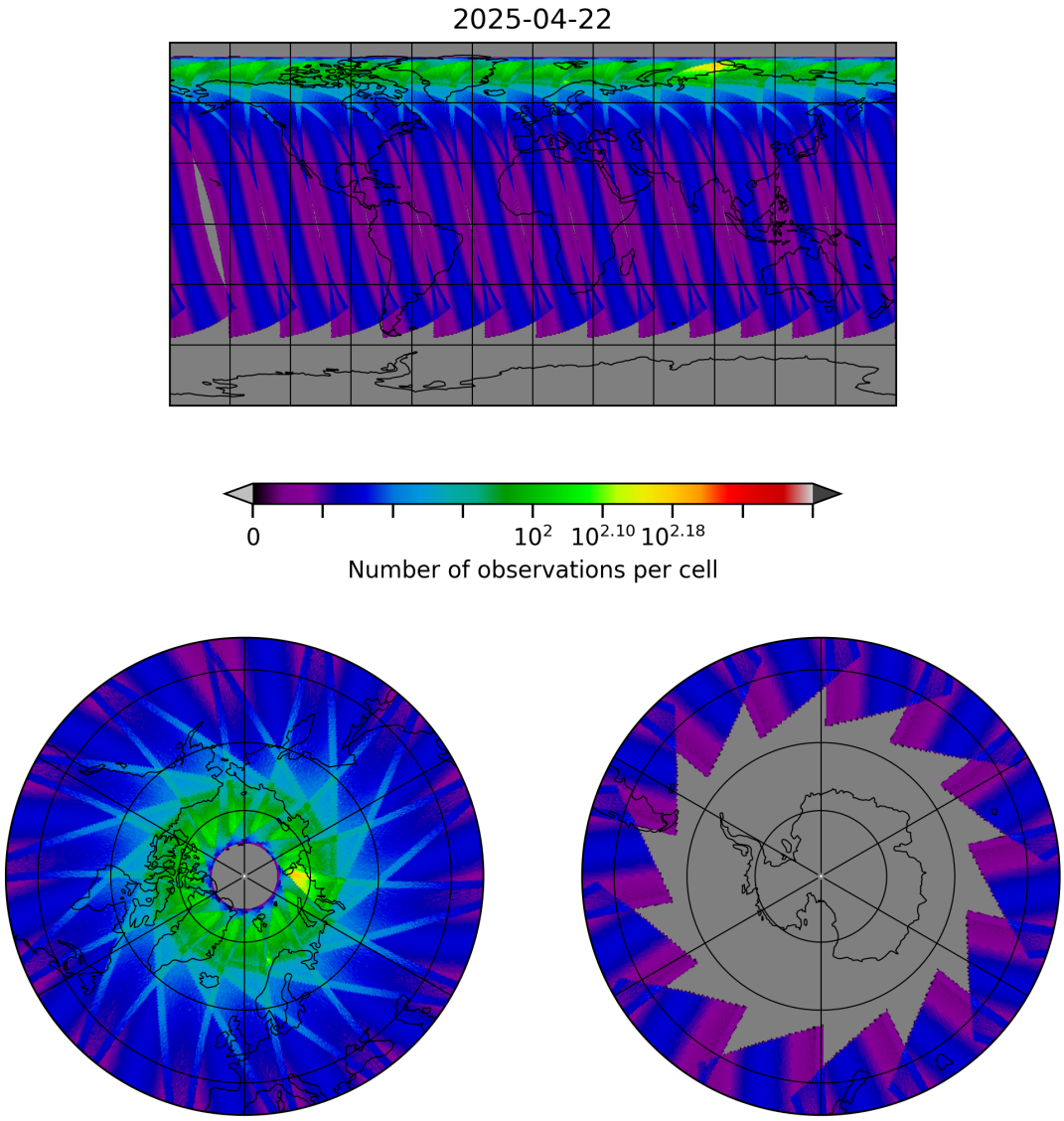

Figure 29: Map of the number of observations for 2025-04-22 to 2025-04-22

7 Zonal average

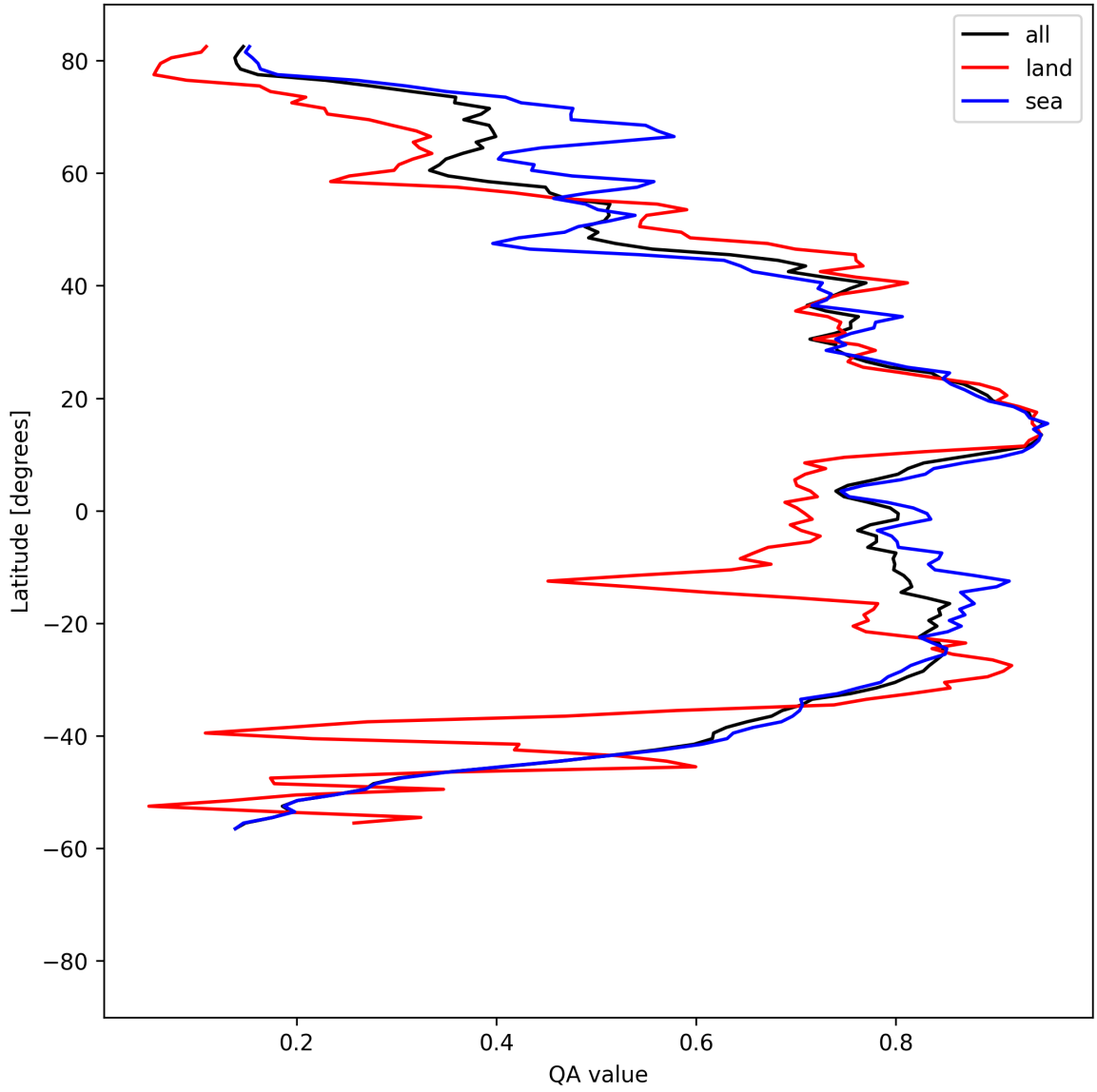

Figure 30: Zonal average of “QA value” for 2025-04-22 to 2025-04-22.

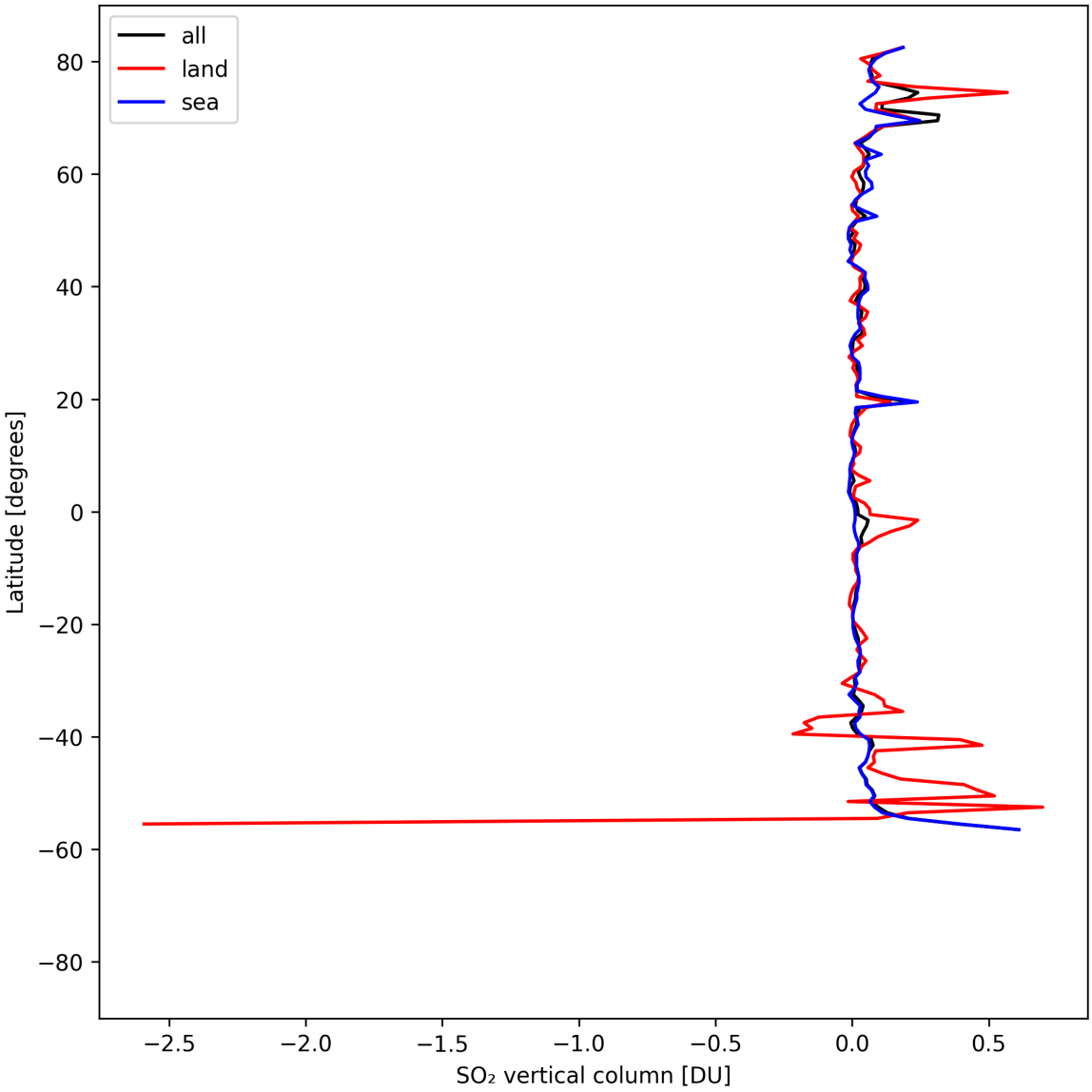

Figure 31: Zonal average of "SO_2 vertical column" for 2025-04-22 to 2025-04-22.

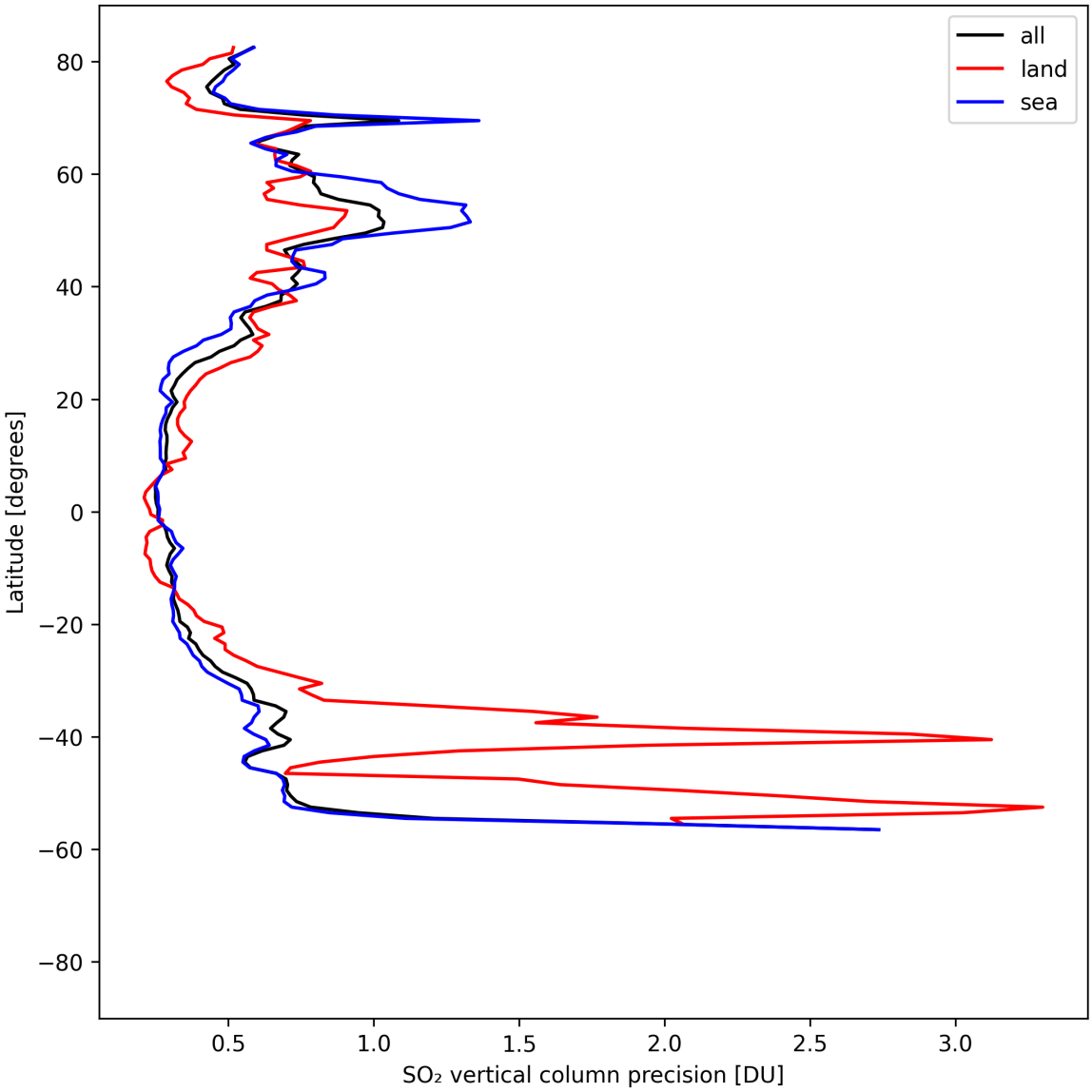

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-04-22 to 2025-04-22.

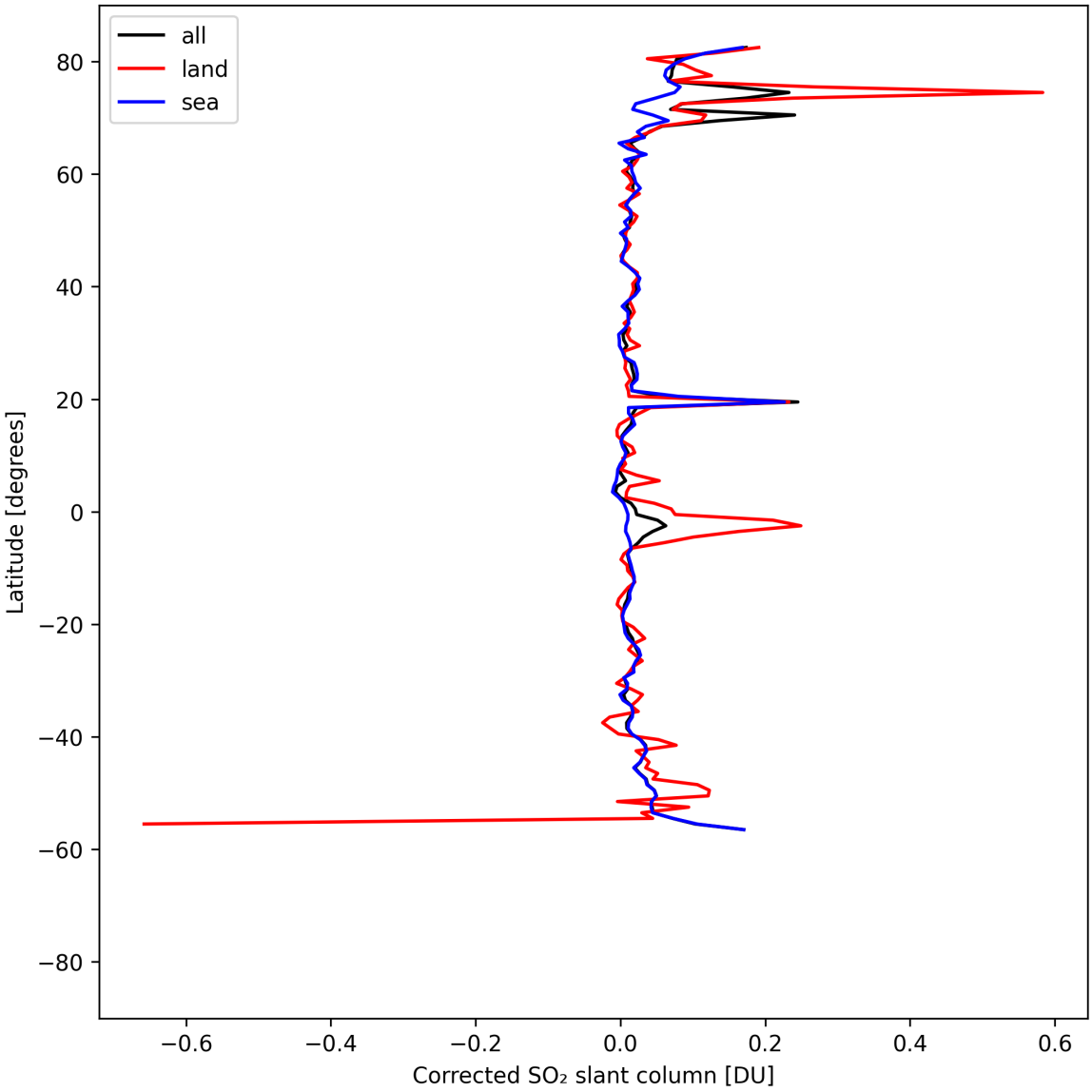

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-04-22 to 2025-04-22.

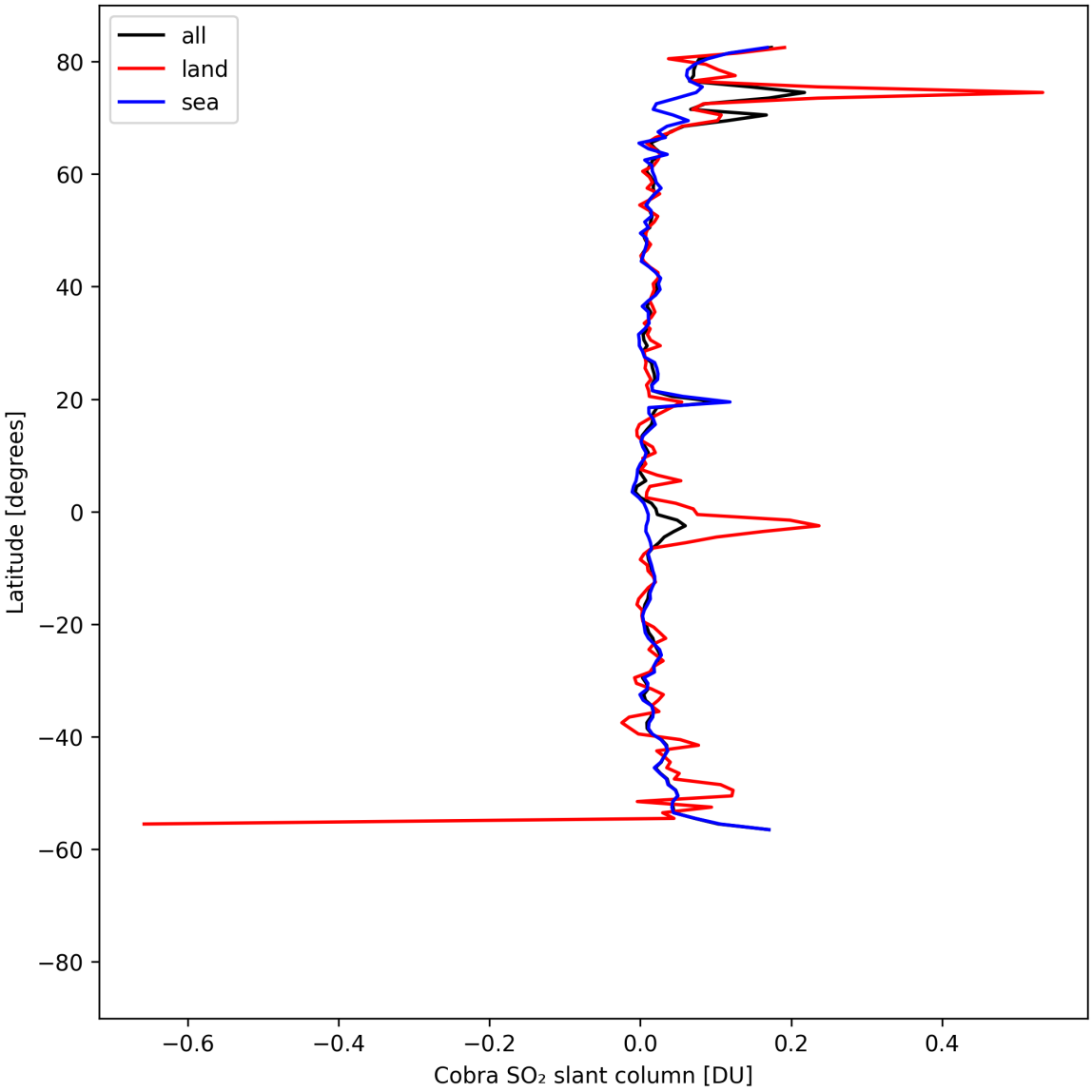

Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-04-22 to 2025-04-22.

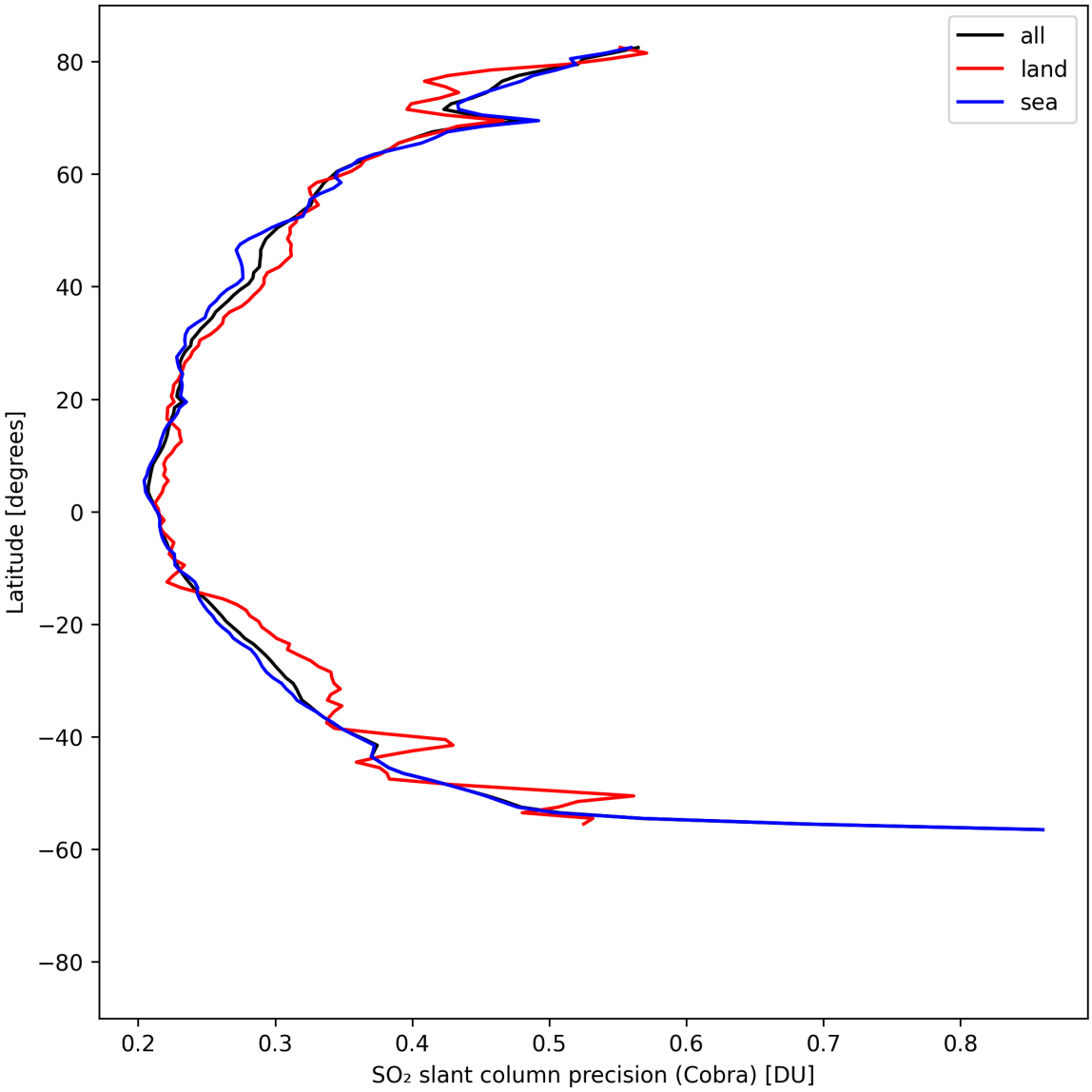

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-04-22 to 2025-04-22.

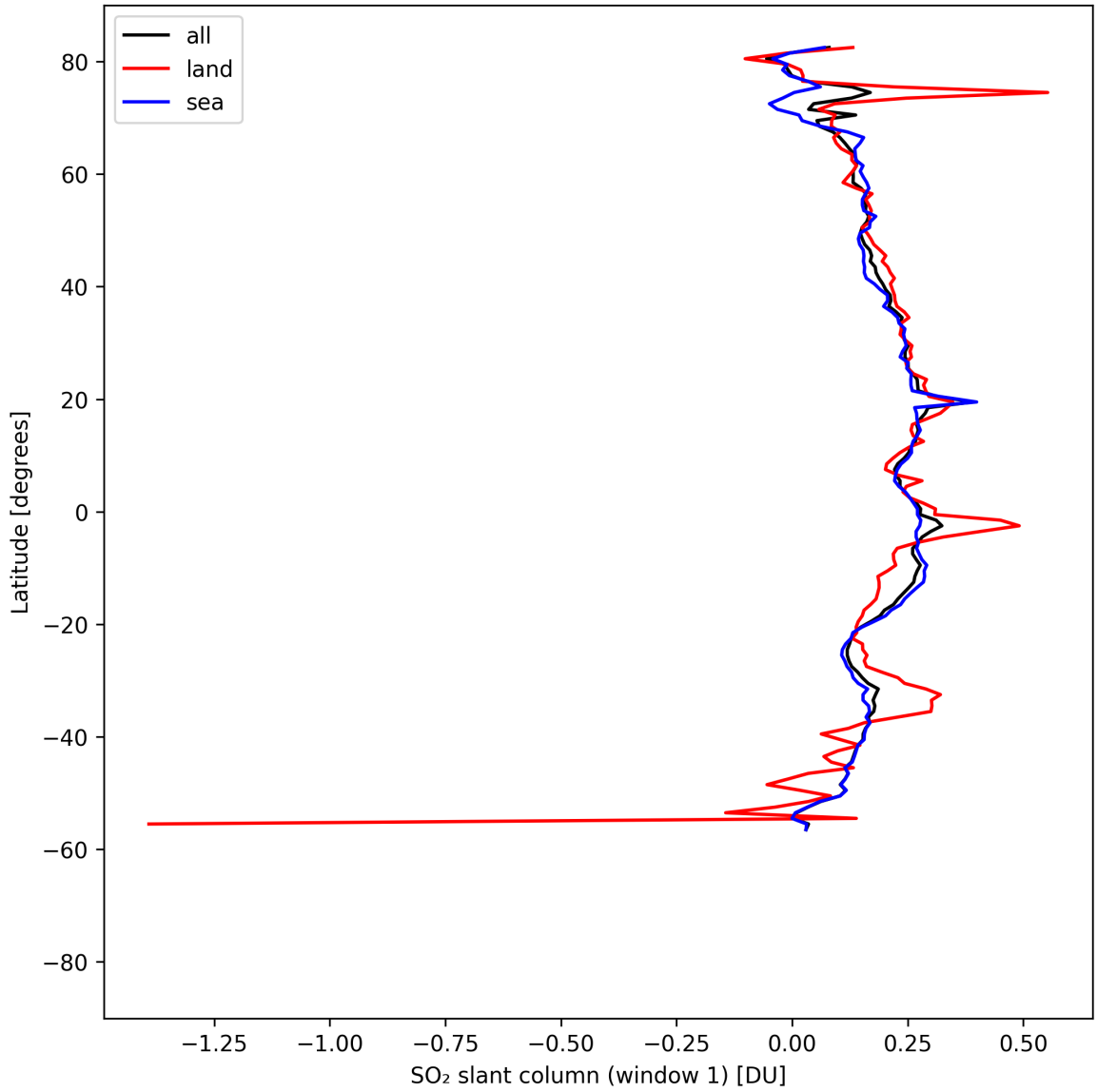

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-04-22 to 2025-04-22.

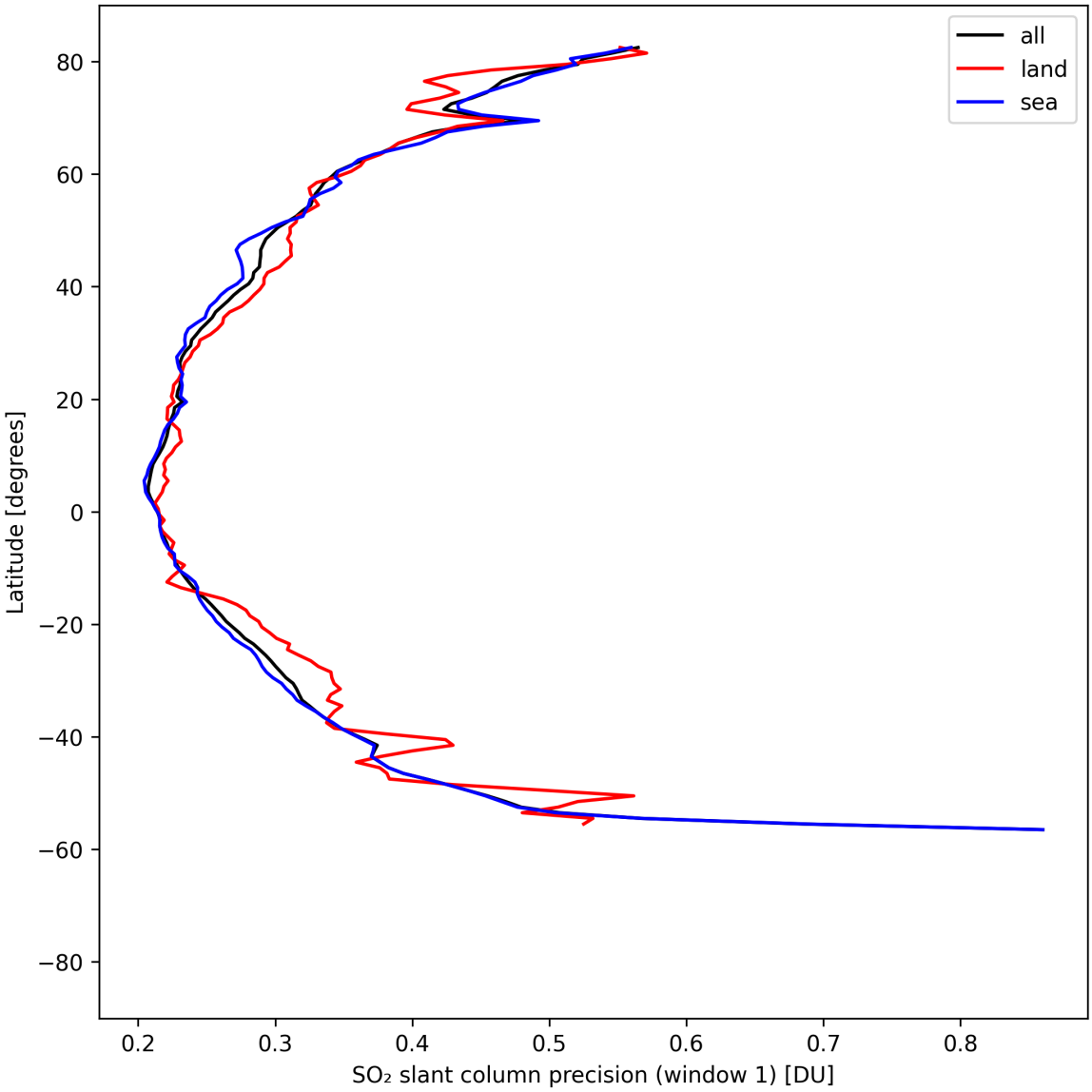

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-04-22 to 2025-04-22.

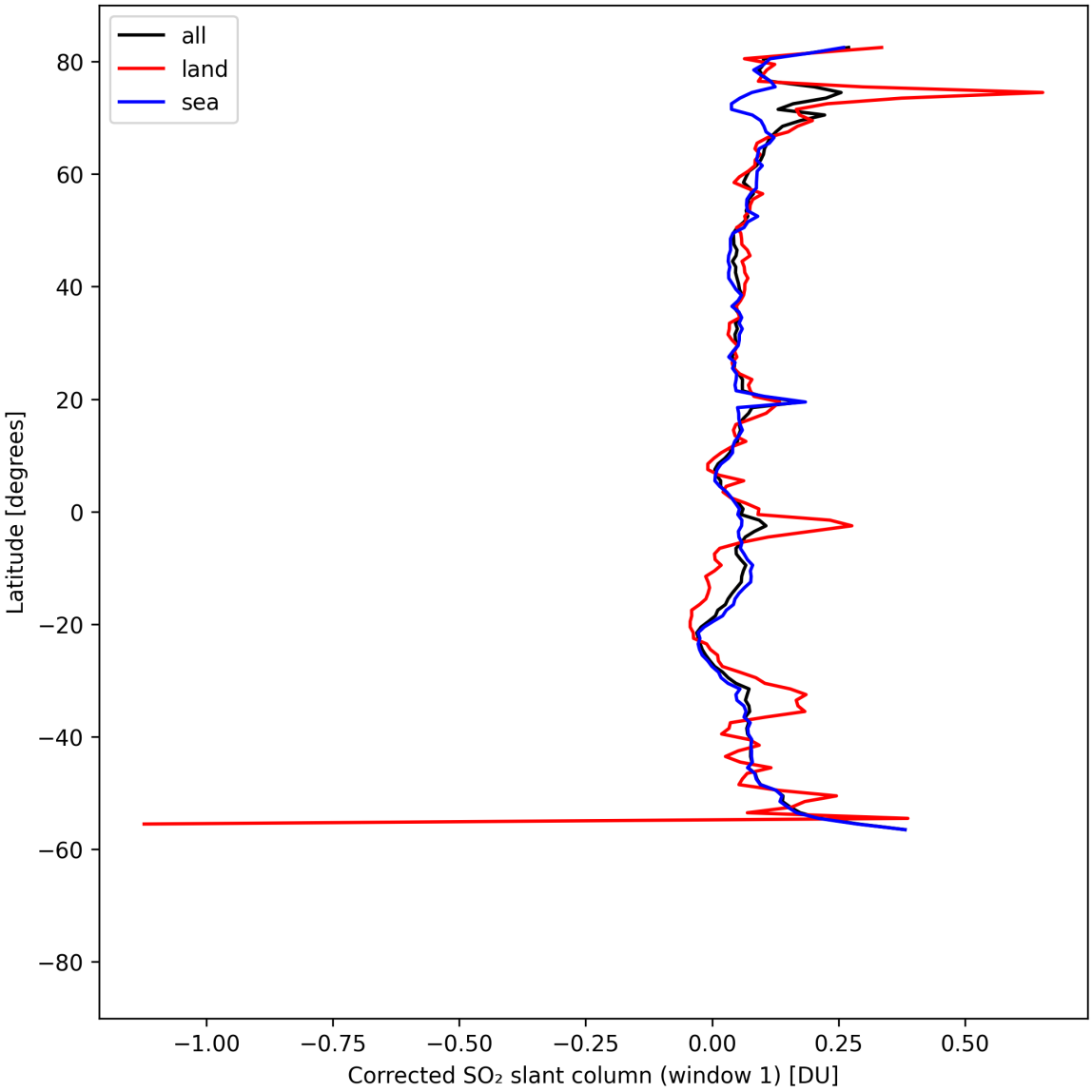

Figure 38: Zonal average of “Corrected SO_2 slant column (window 1)” for 2025-04-22 to 2025-04-22.

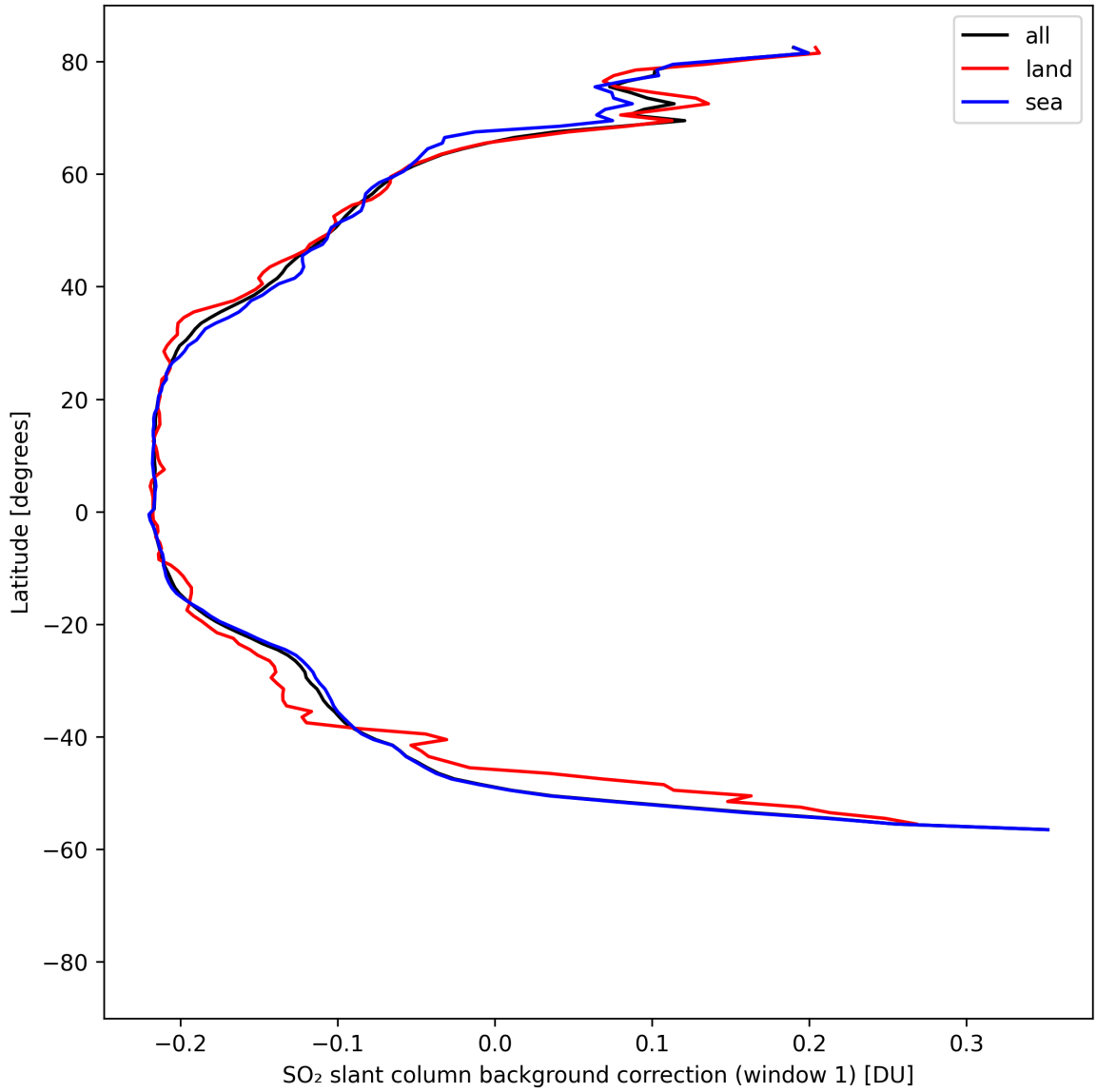

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-04-22 to 2025-04-22.

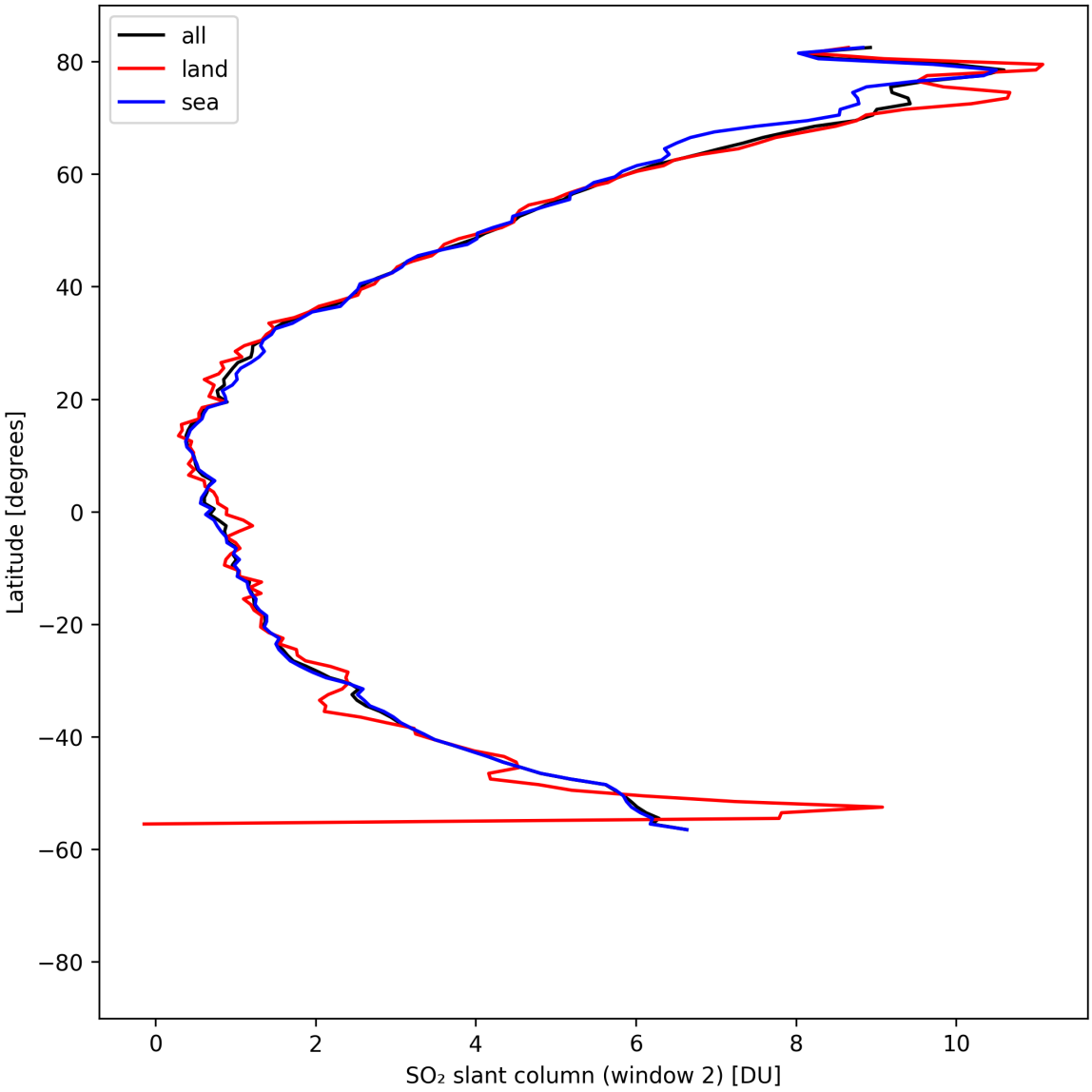

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-04-22 to 2025-04-22.

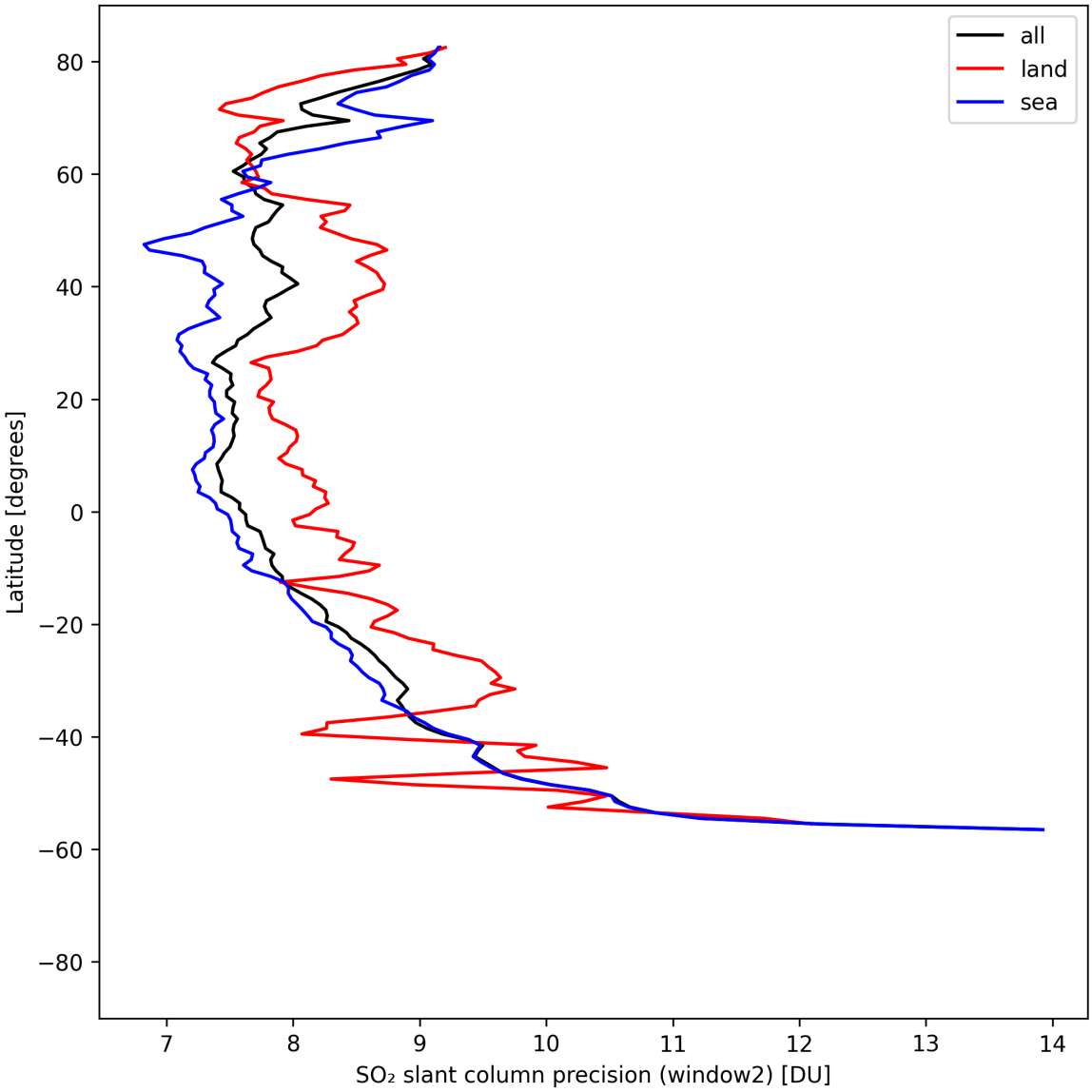

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-04-22 to 2025-04-22.

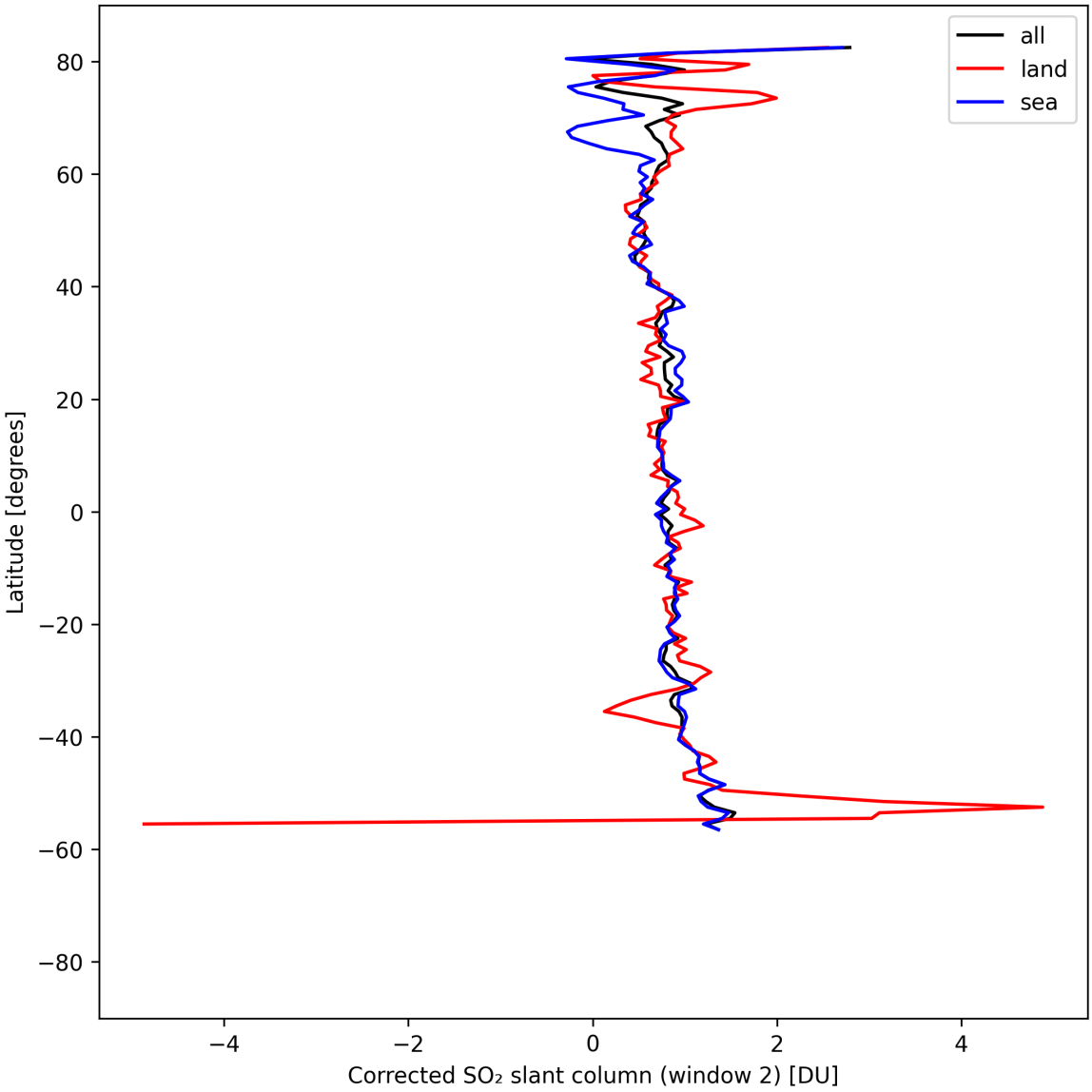

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-04-22 to 2025-04-22.

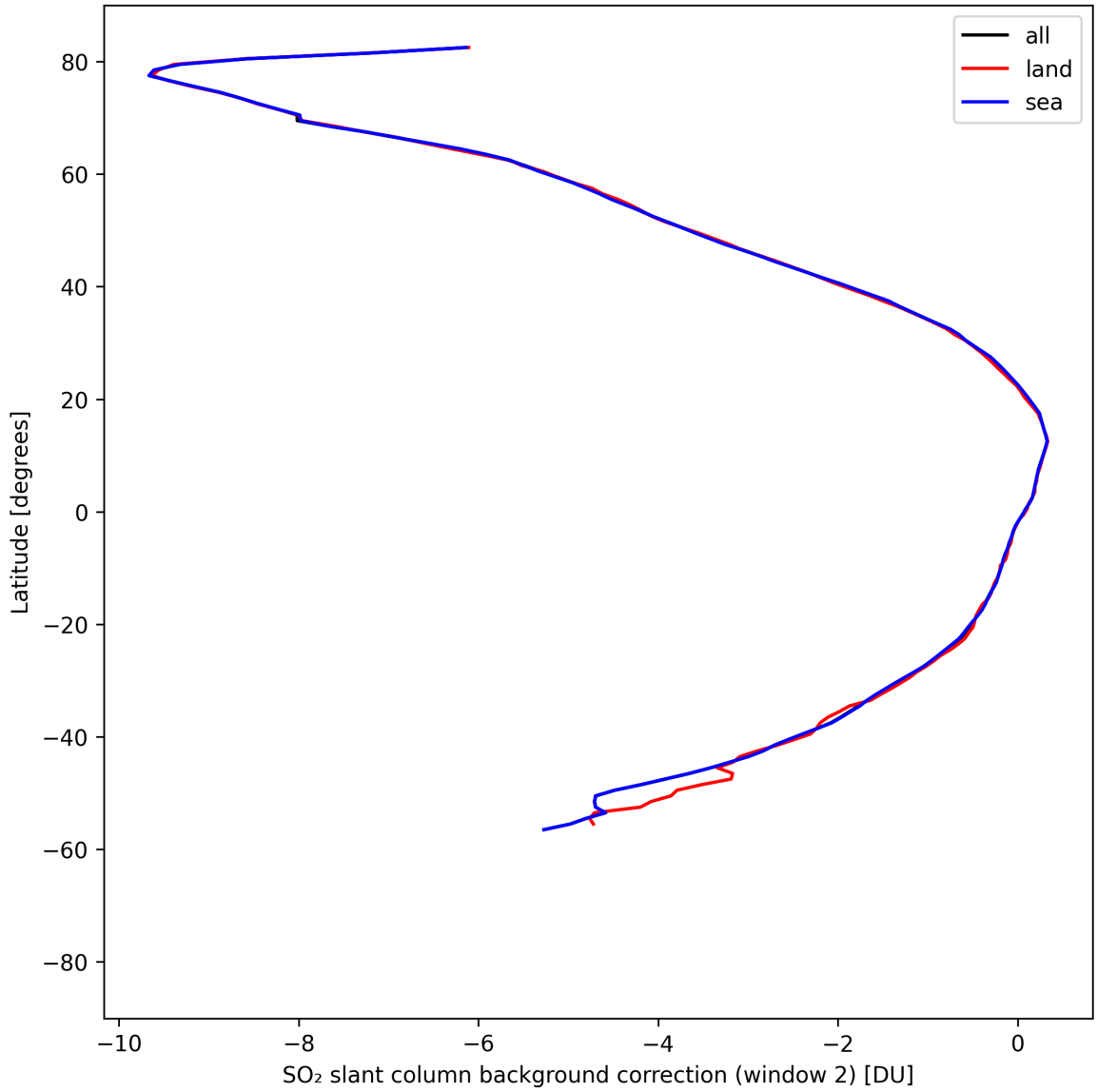

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-04-22 to 2025-04-22.

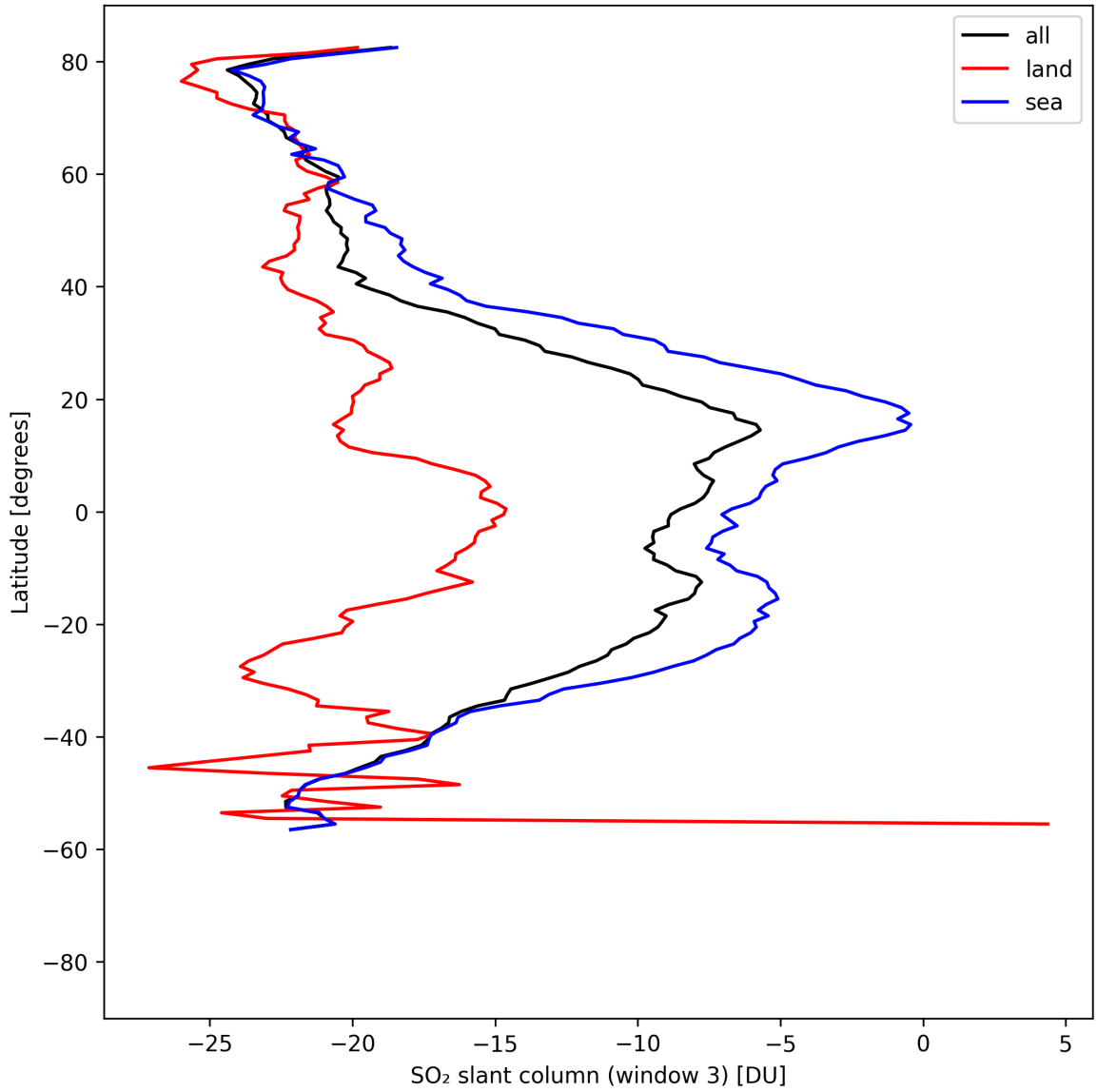

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-04-22 to 2025-04-22.

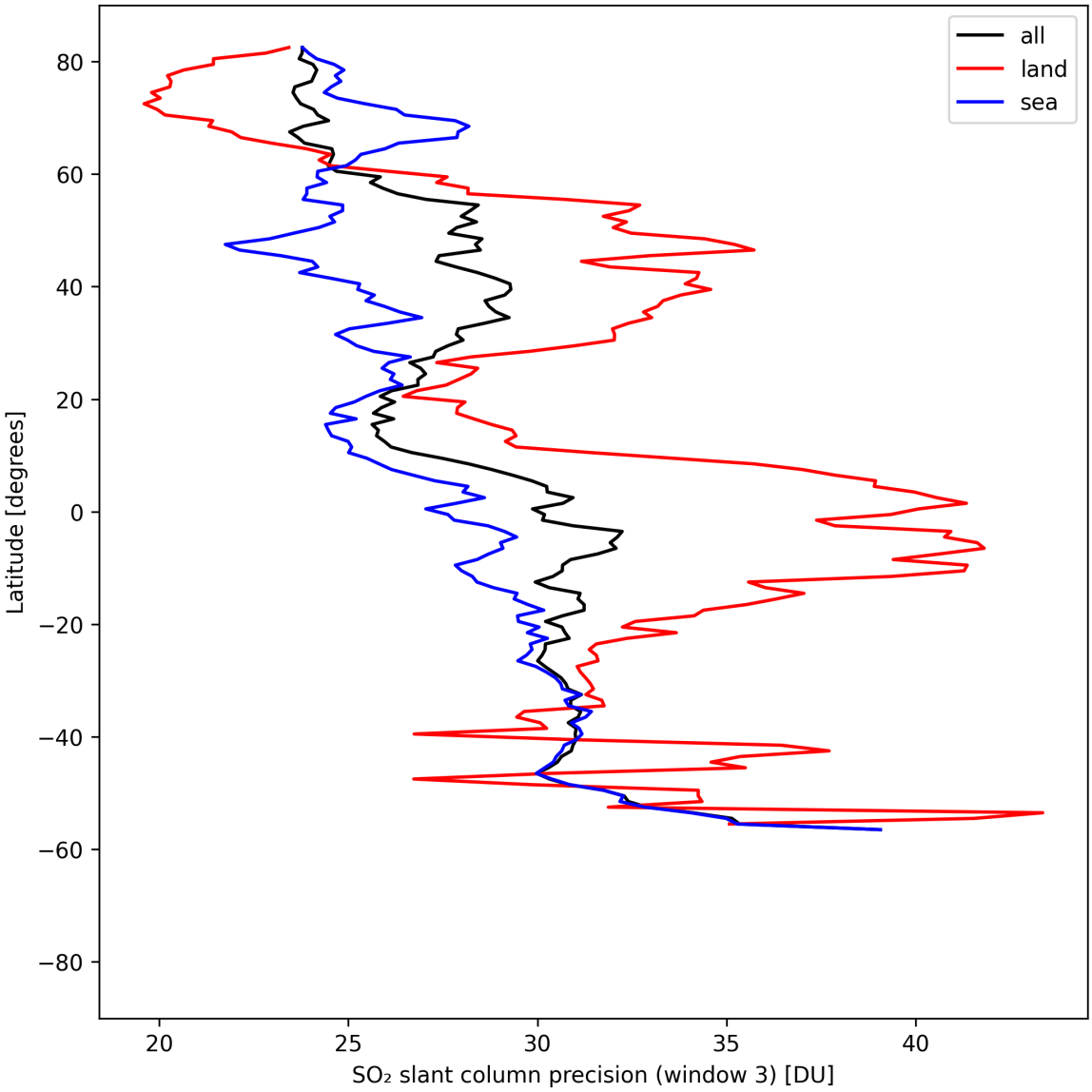

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-04-22 to 2025-04-22.

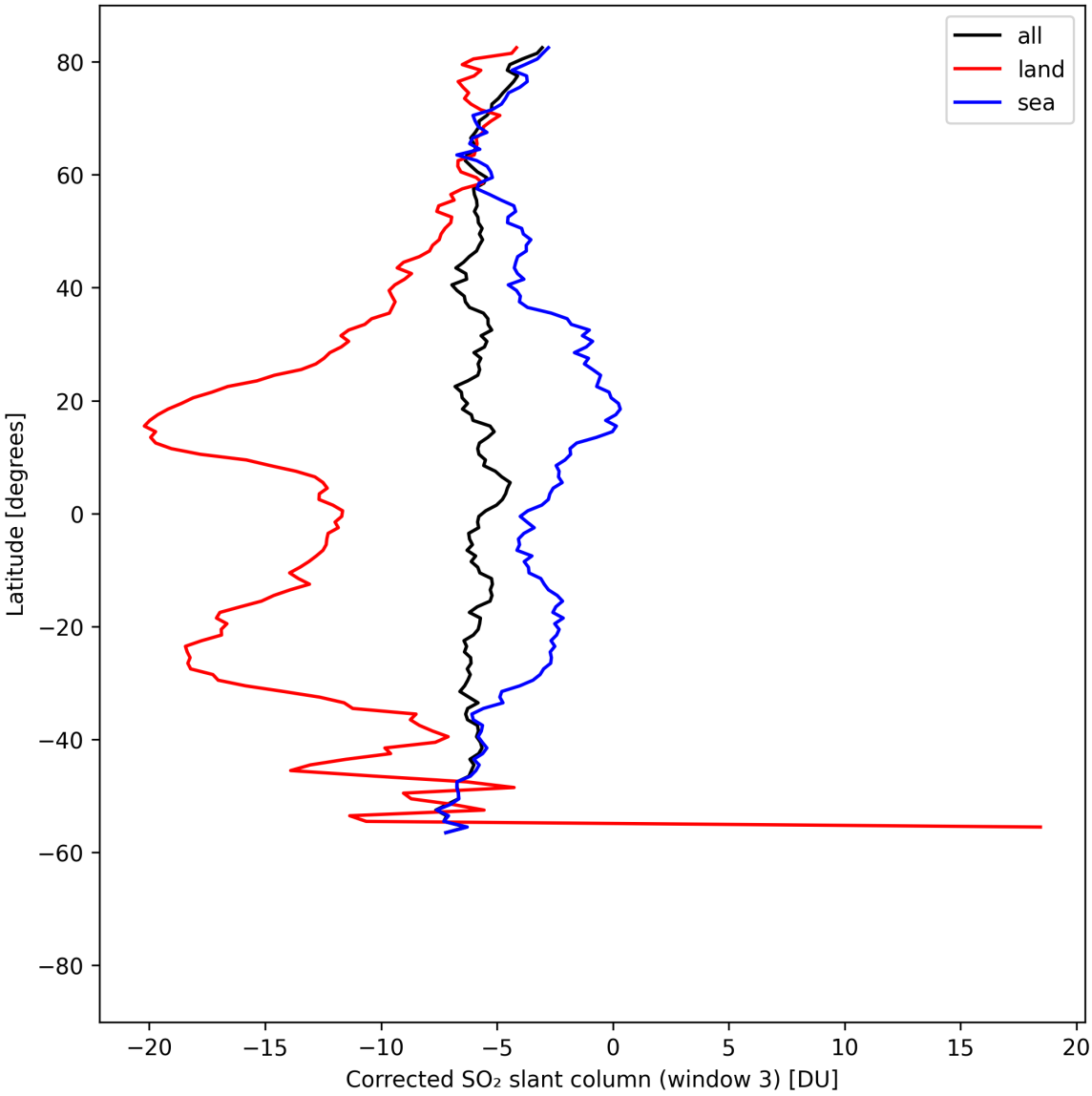

Figure 46: Zonal average of “Corrected SO_2 slant column (window 3)” for 2025-04-22 to 2025-04-22.

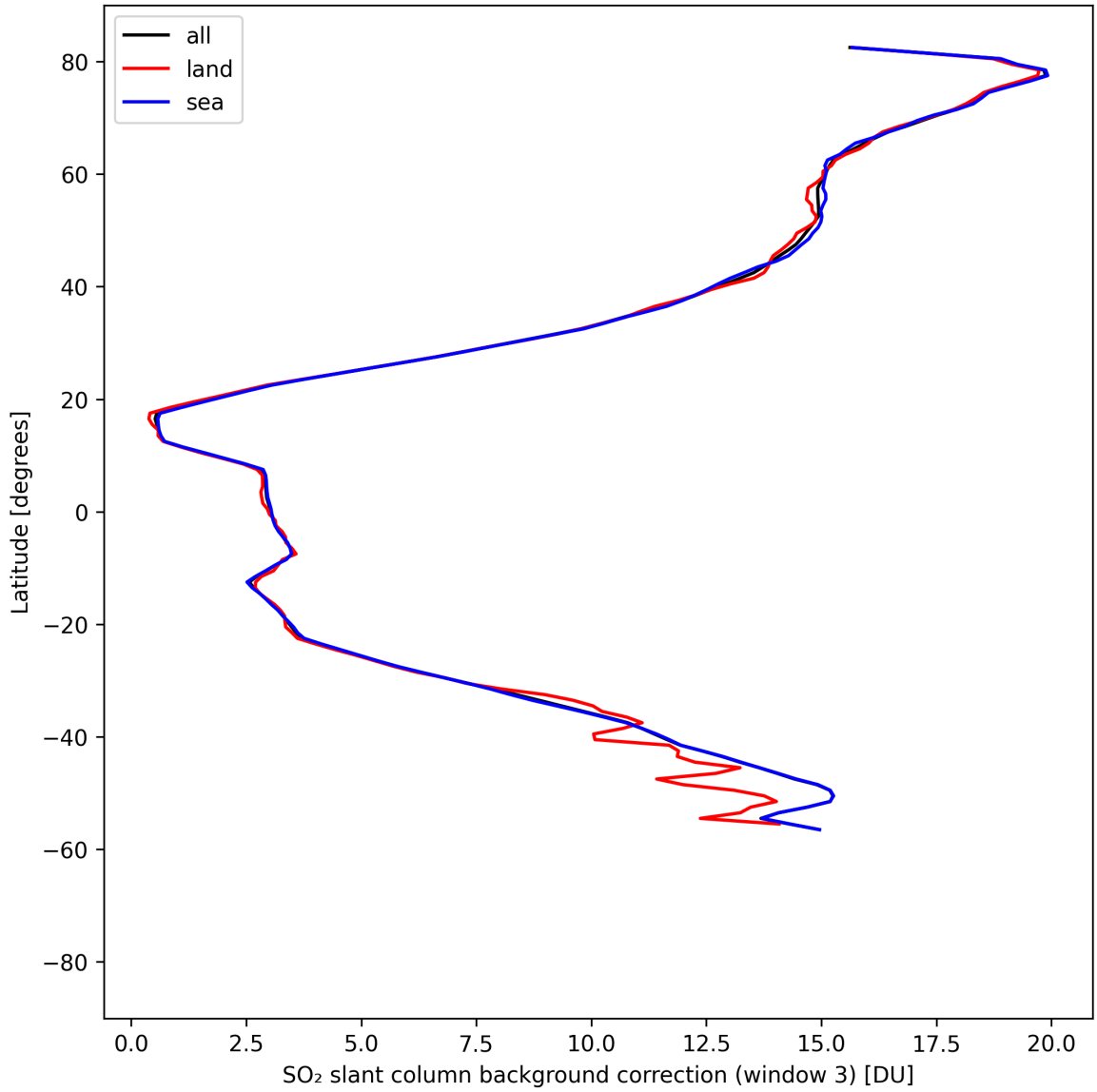

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-04-22 to 2025-04-22.

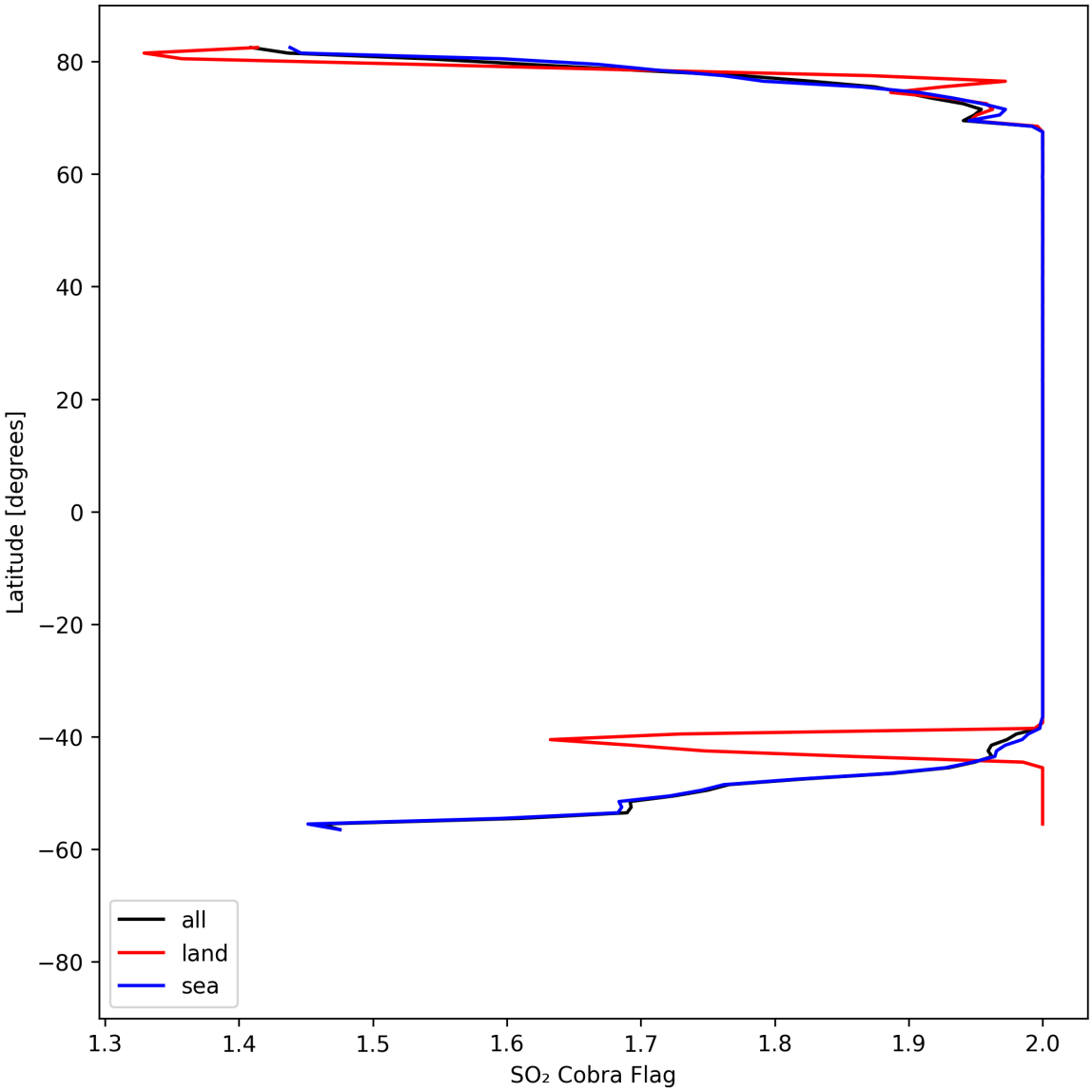

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-04-22 to 2025-04-22.

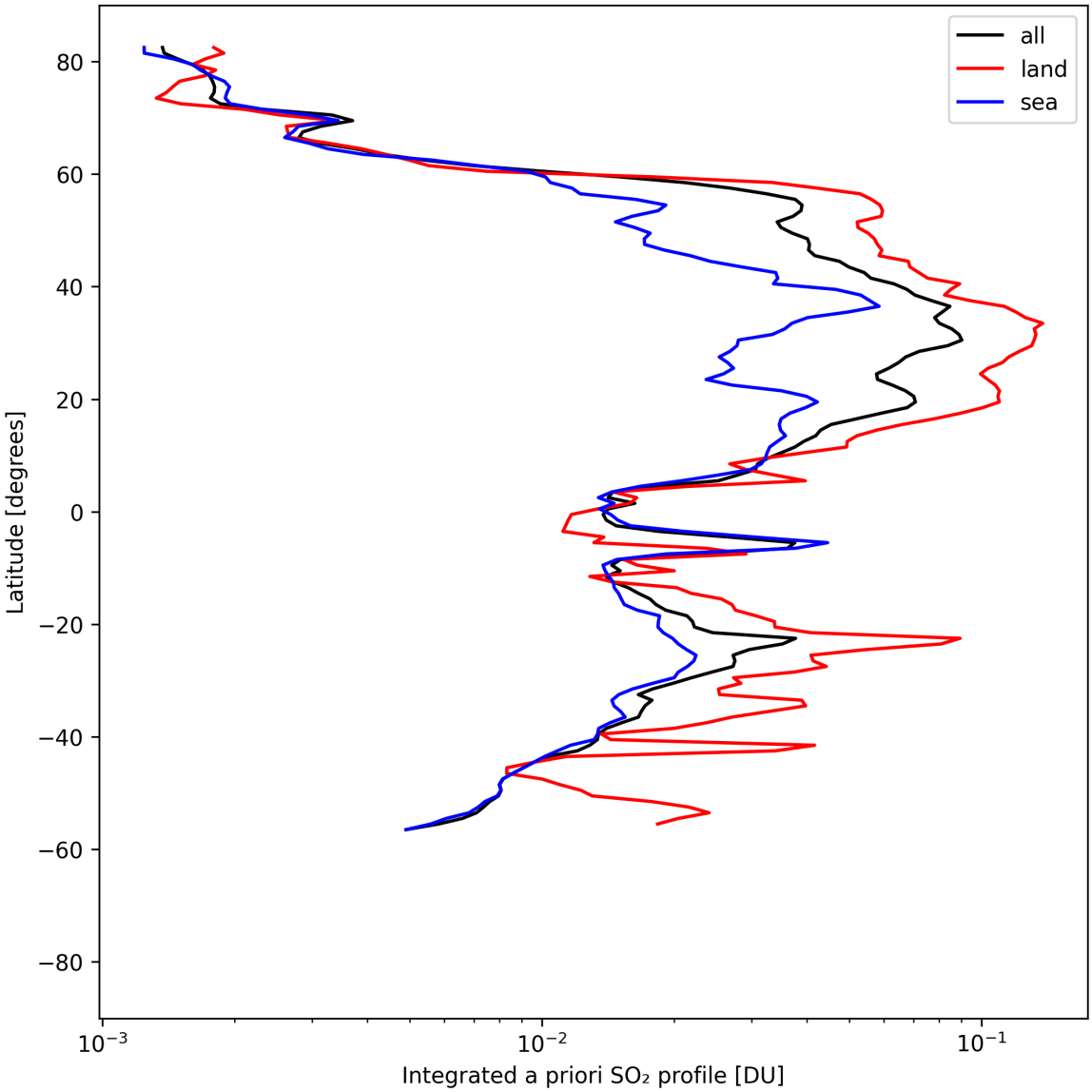

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-04-22 to 2025-04-22.

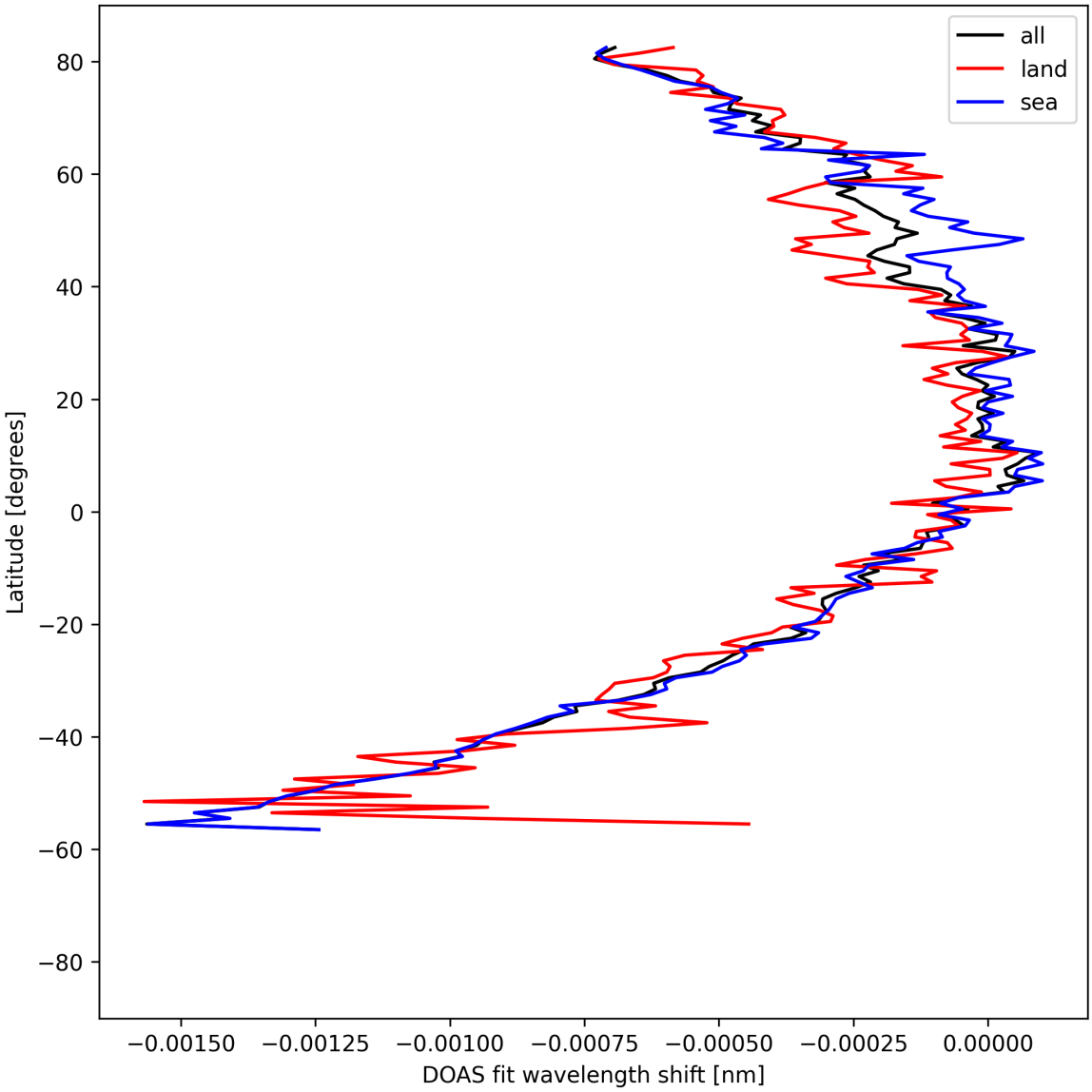

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-04-22 to 2025-04-22.

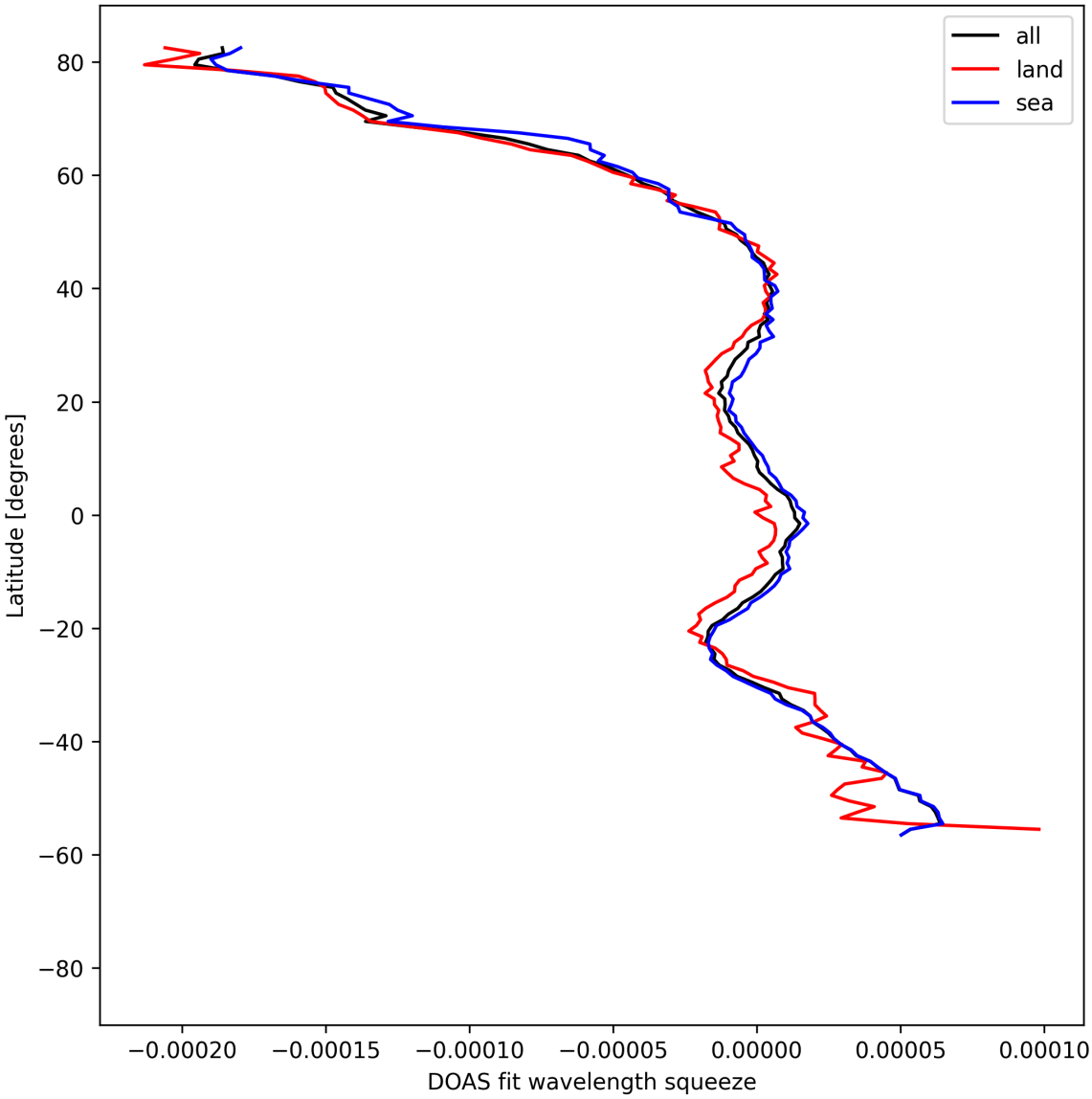

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-04-22 to 2025-04-22.

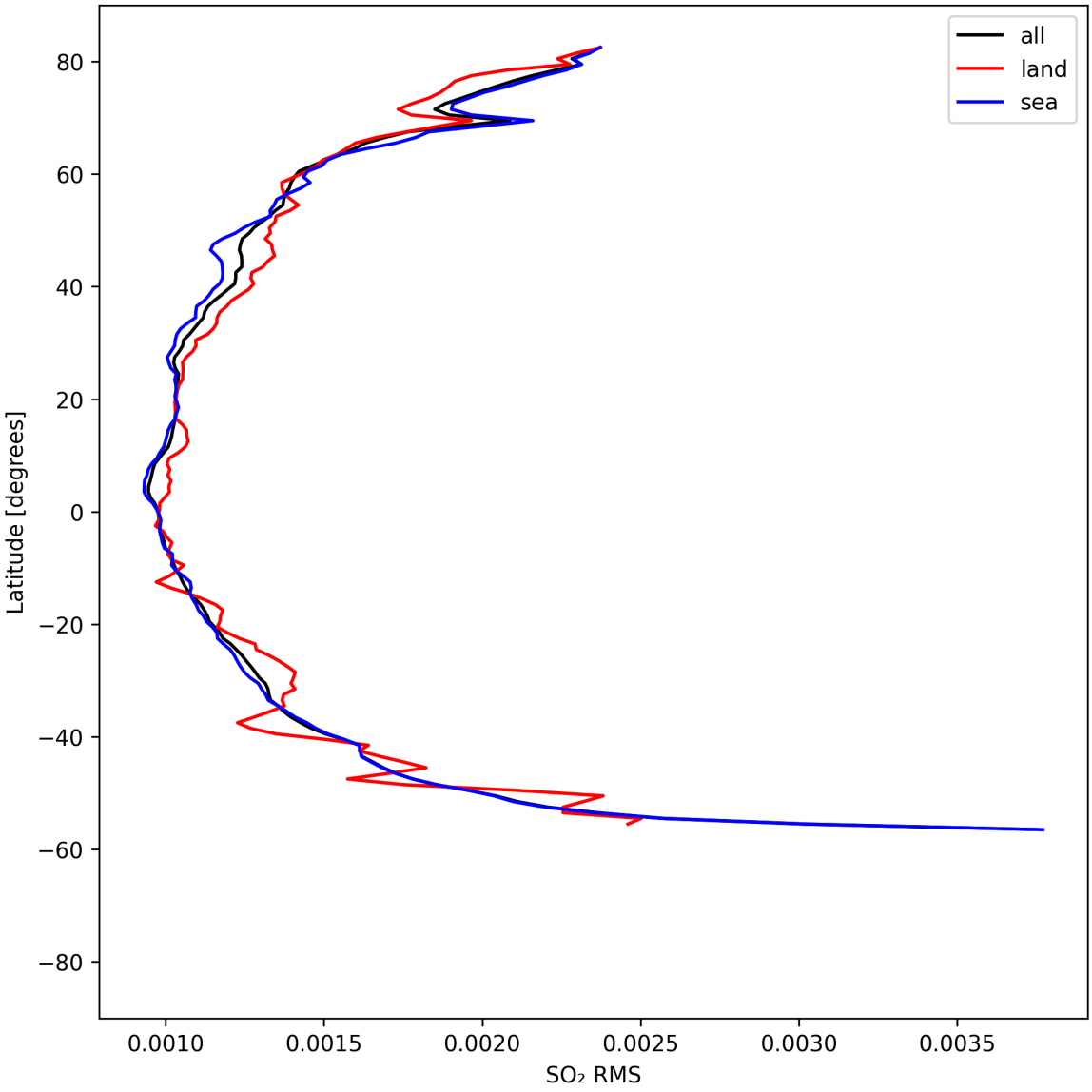

Figure 52: Zonal average of "SO_2 RMS" for 2025-04-22 to 2025-04-22.

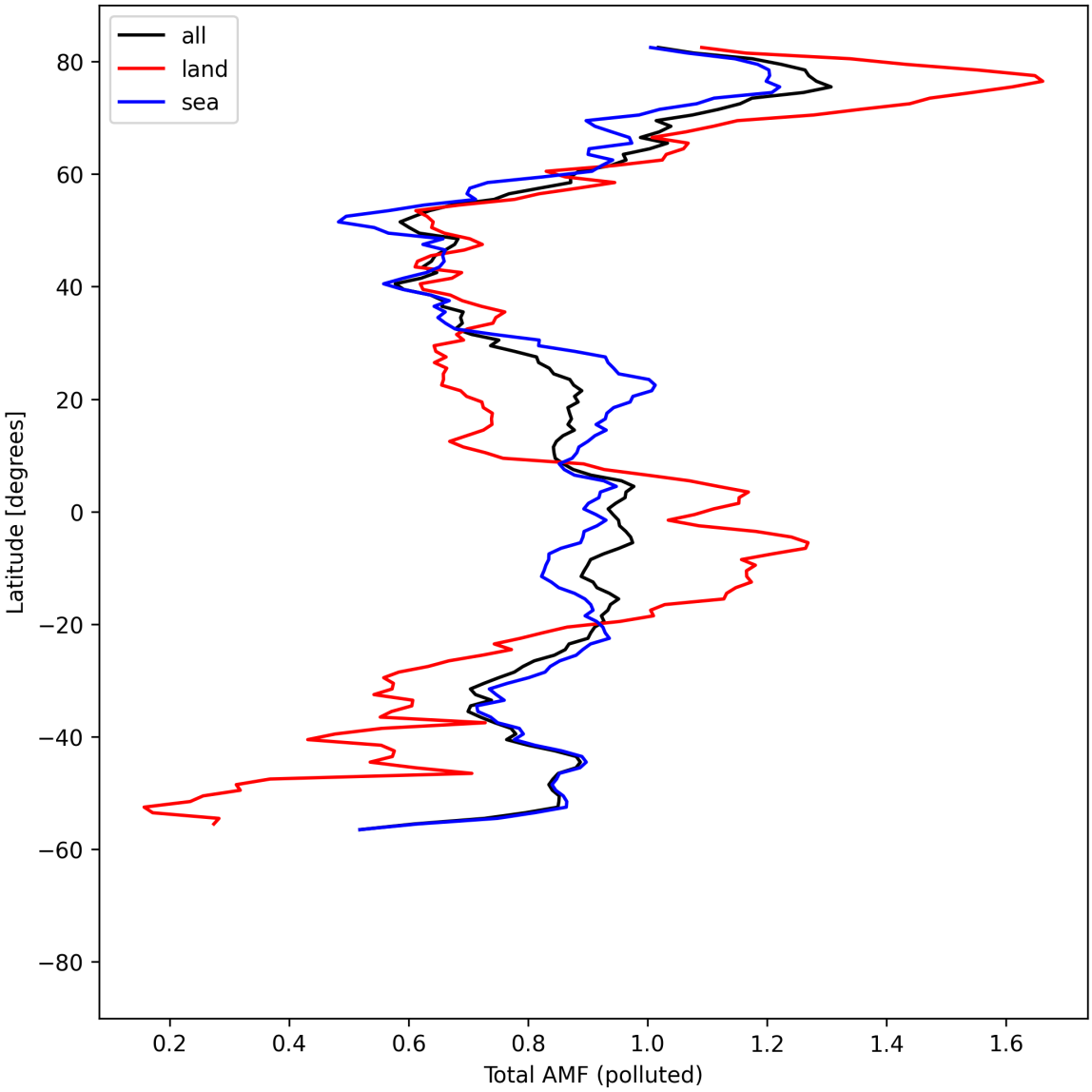

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-04-22 to 2025-04-22.

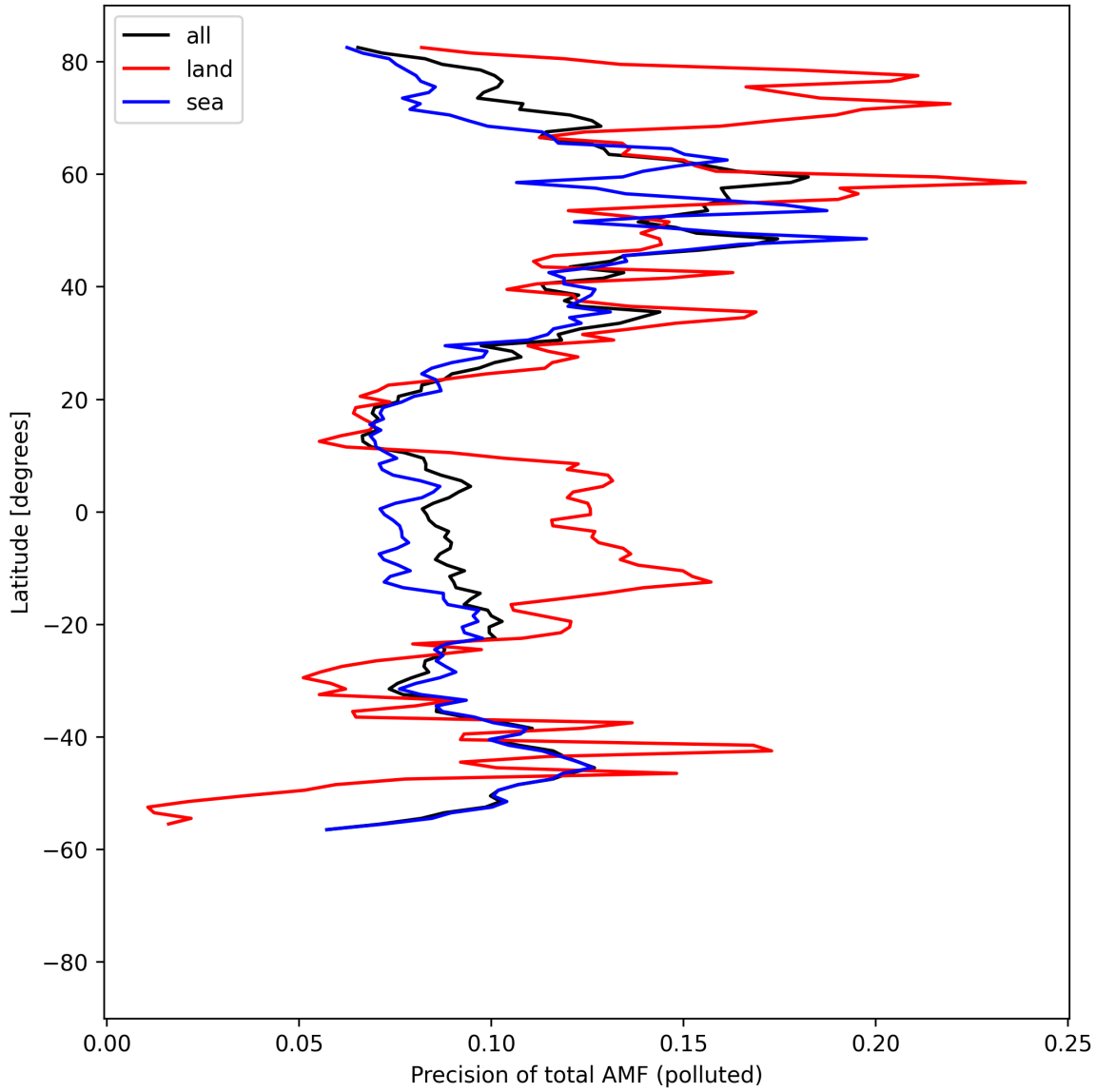

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-04-22 to 2025-04-22.

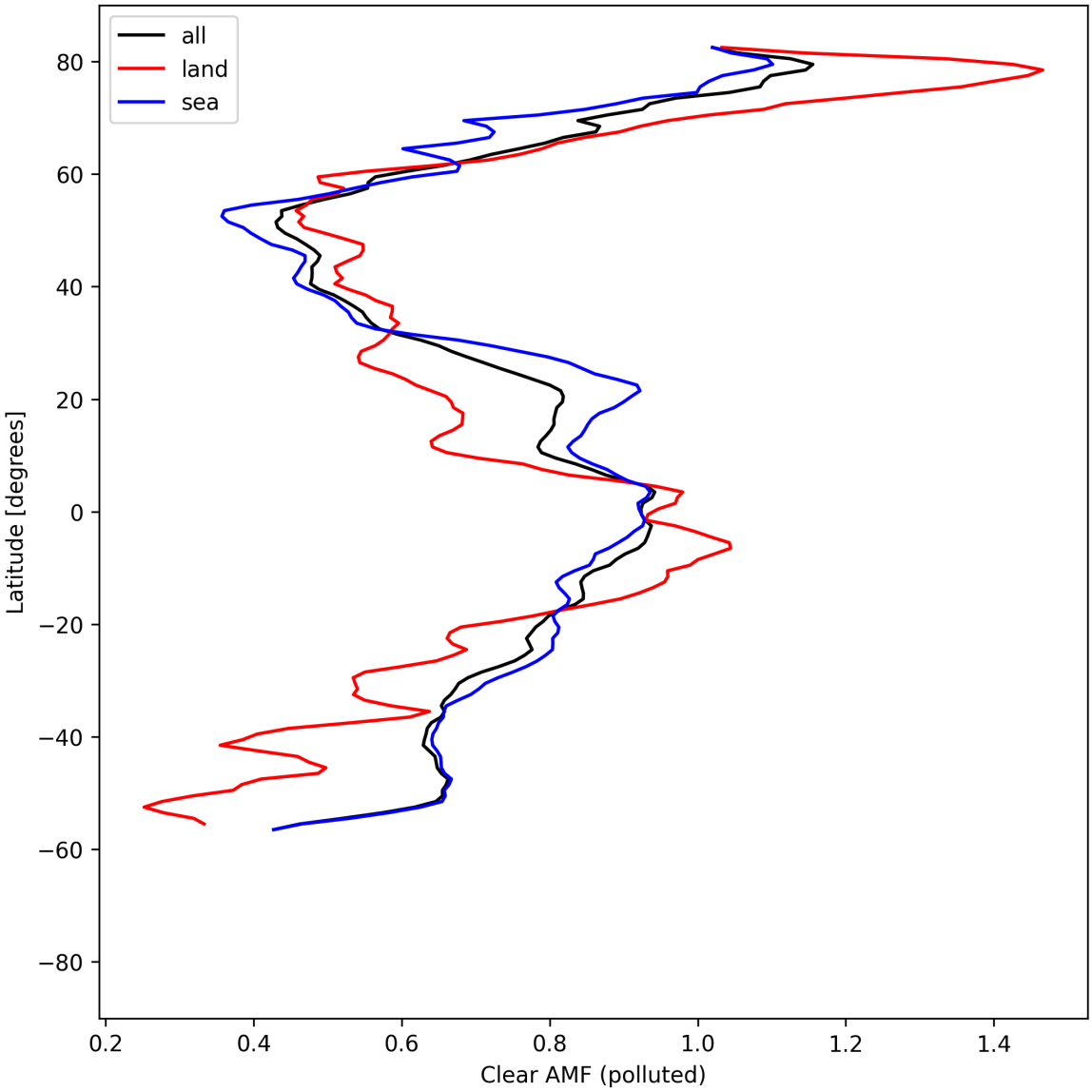

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-04-22 to 2025-04-22.

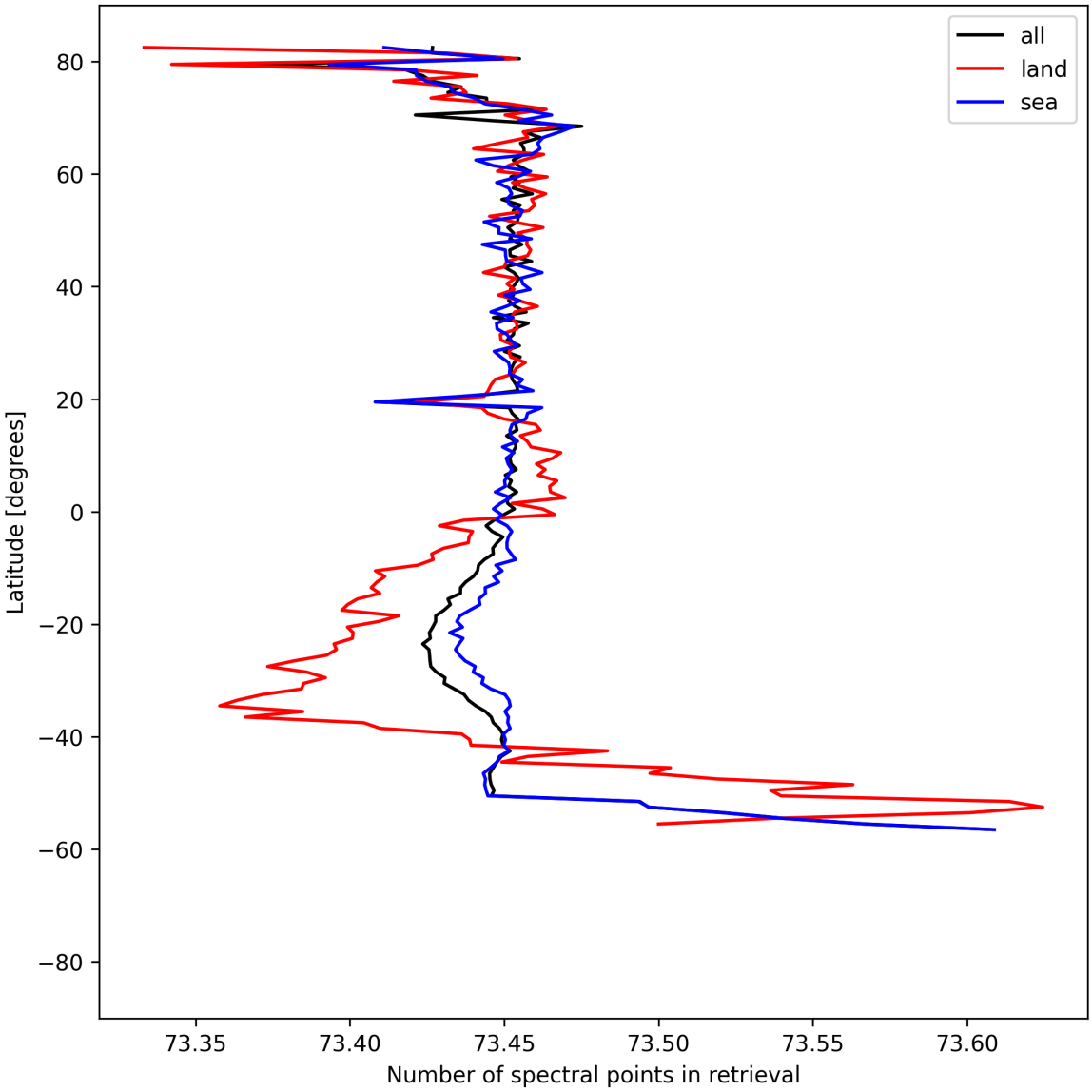

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-04-22 to 2025-04-22.

8 Histograms

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

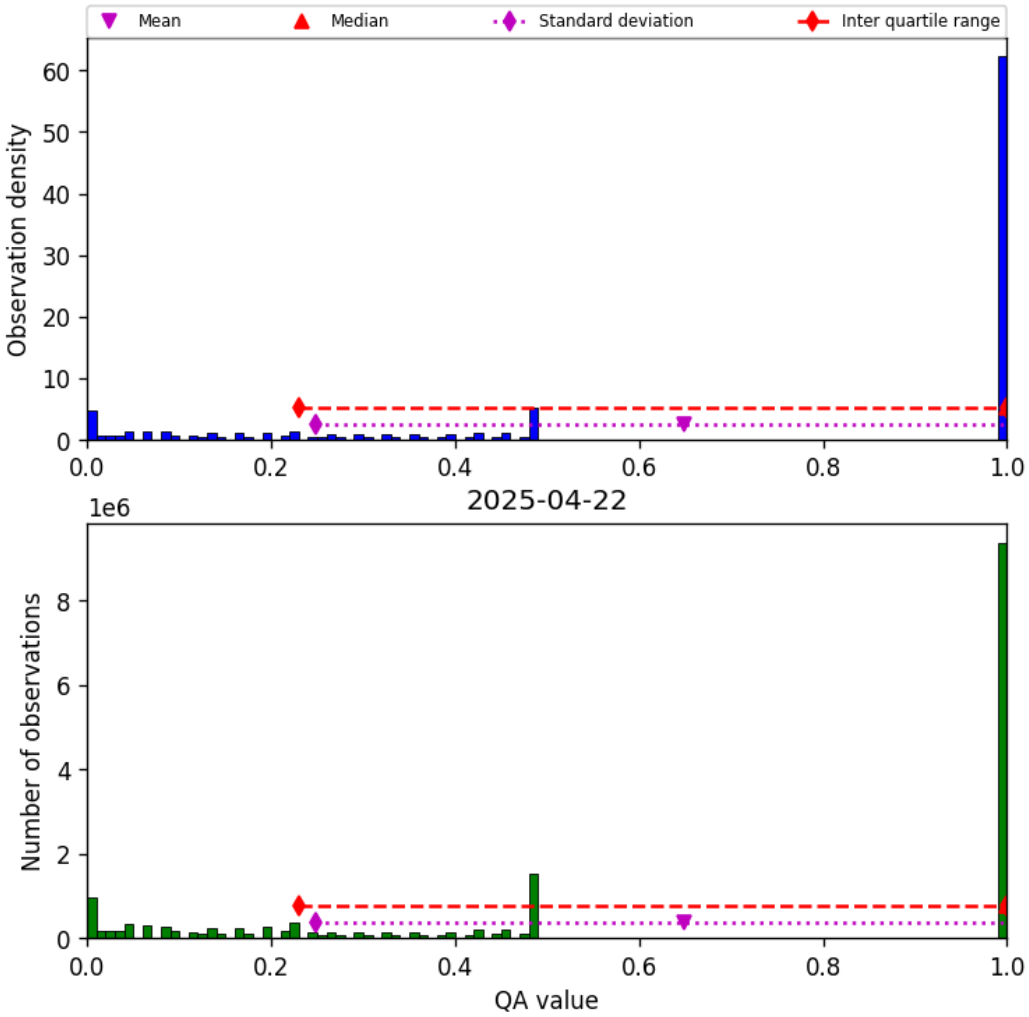

Figure 57: Histogram of “QA value” for 2025-04-22 to 2025-04-22

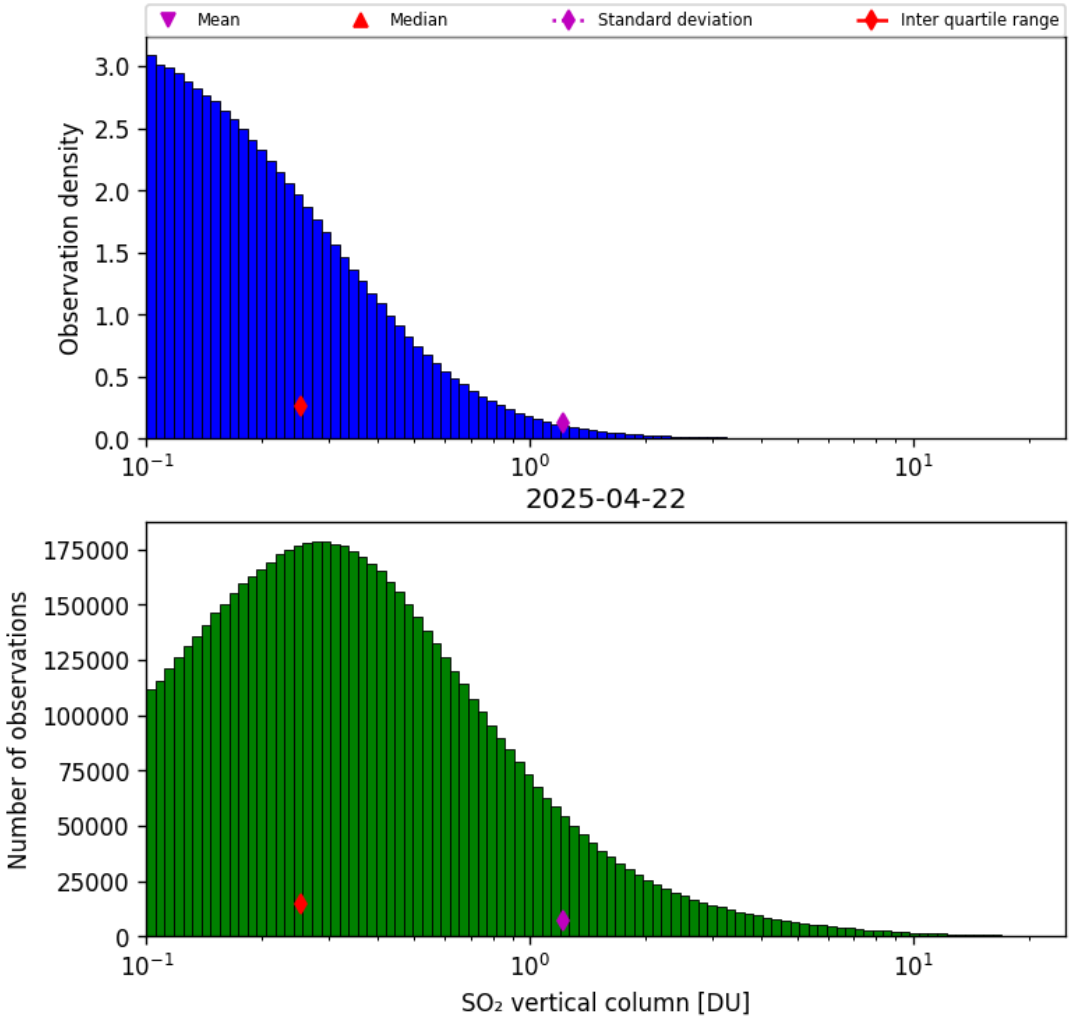

Figure 58: Histogram of "SO_2 vertical column" for 2025-04-22 to 2025-04-22

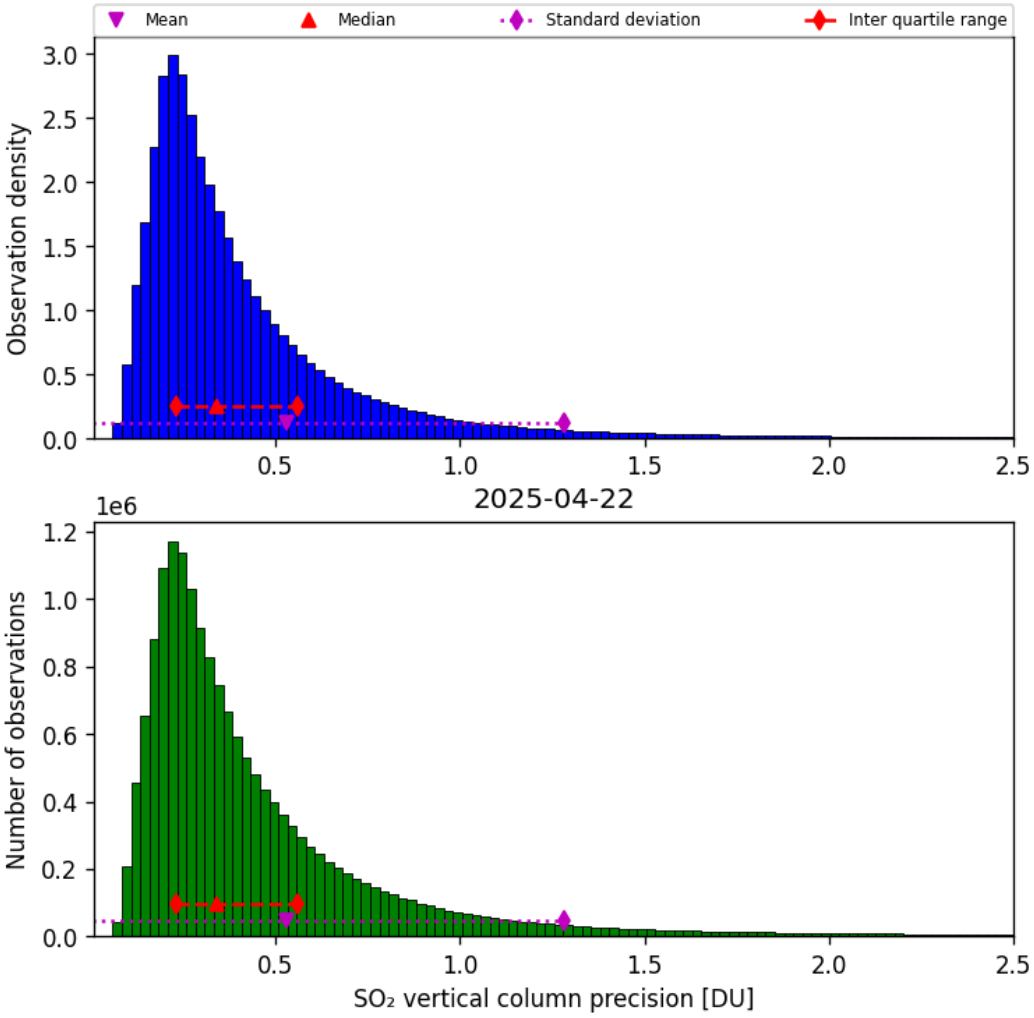

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-04-22 to 2025-04-22

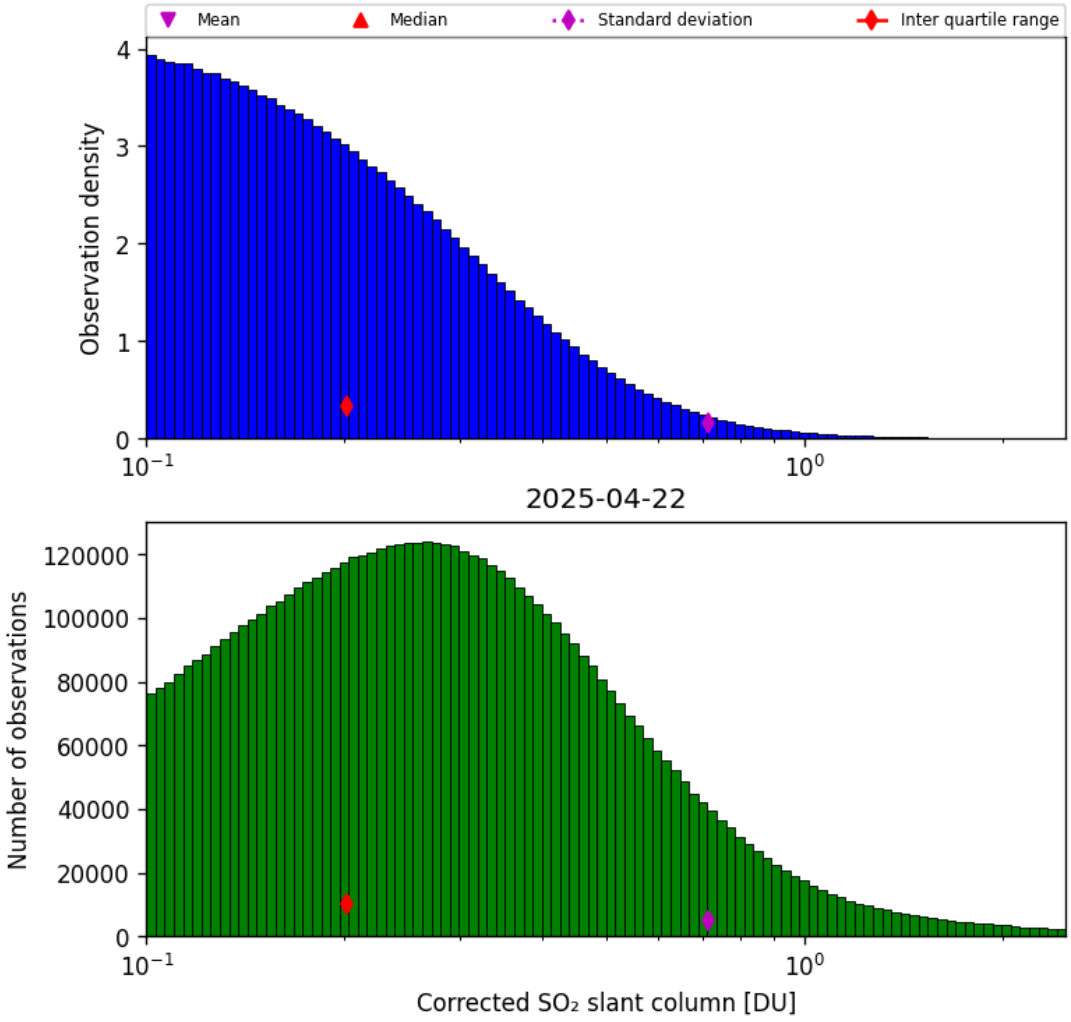

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-04-22 to 2025-04-22

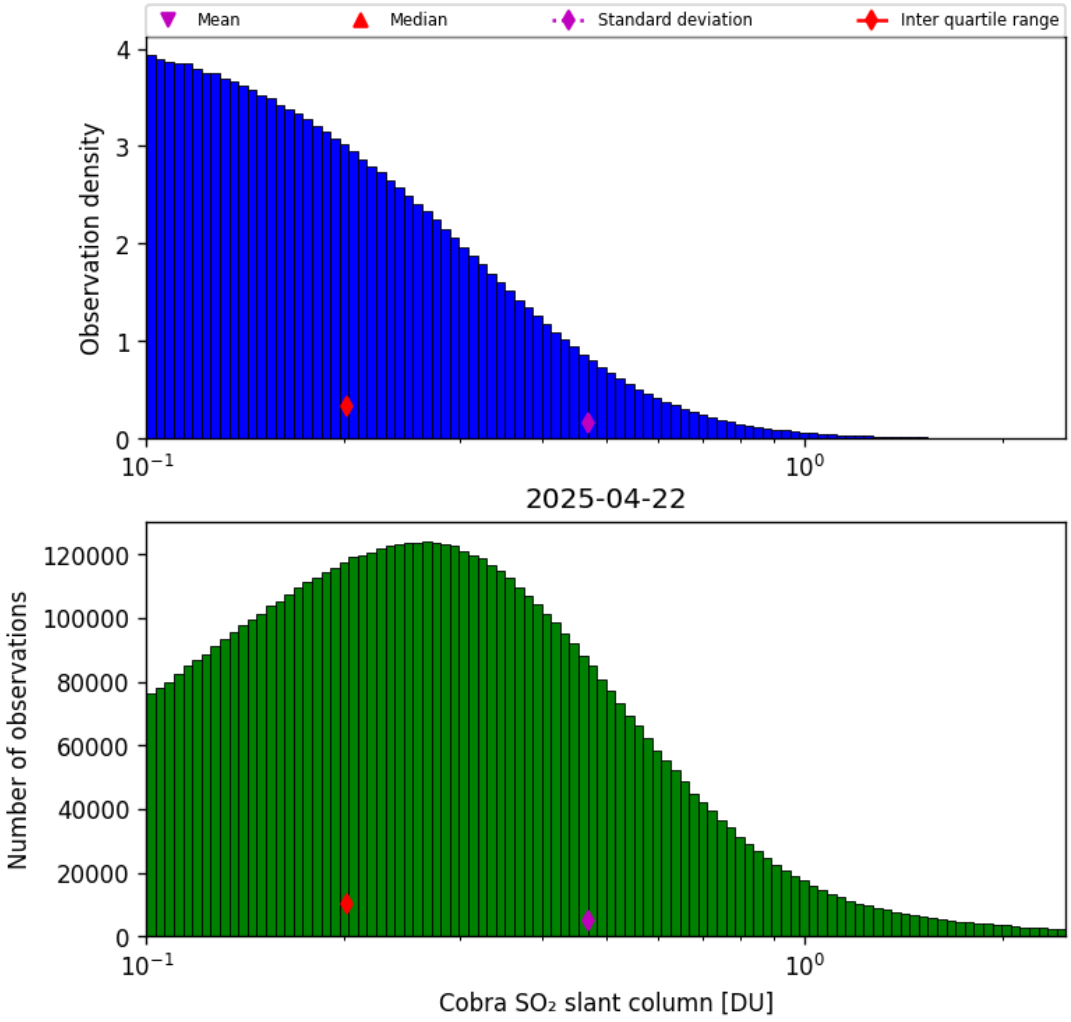

Figure 61: Histogram of “Cobra SO_2 slant column” for 2025-04-22 to 2025-04-22

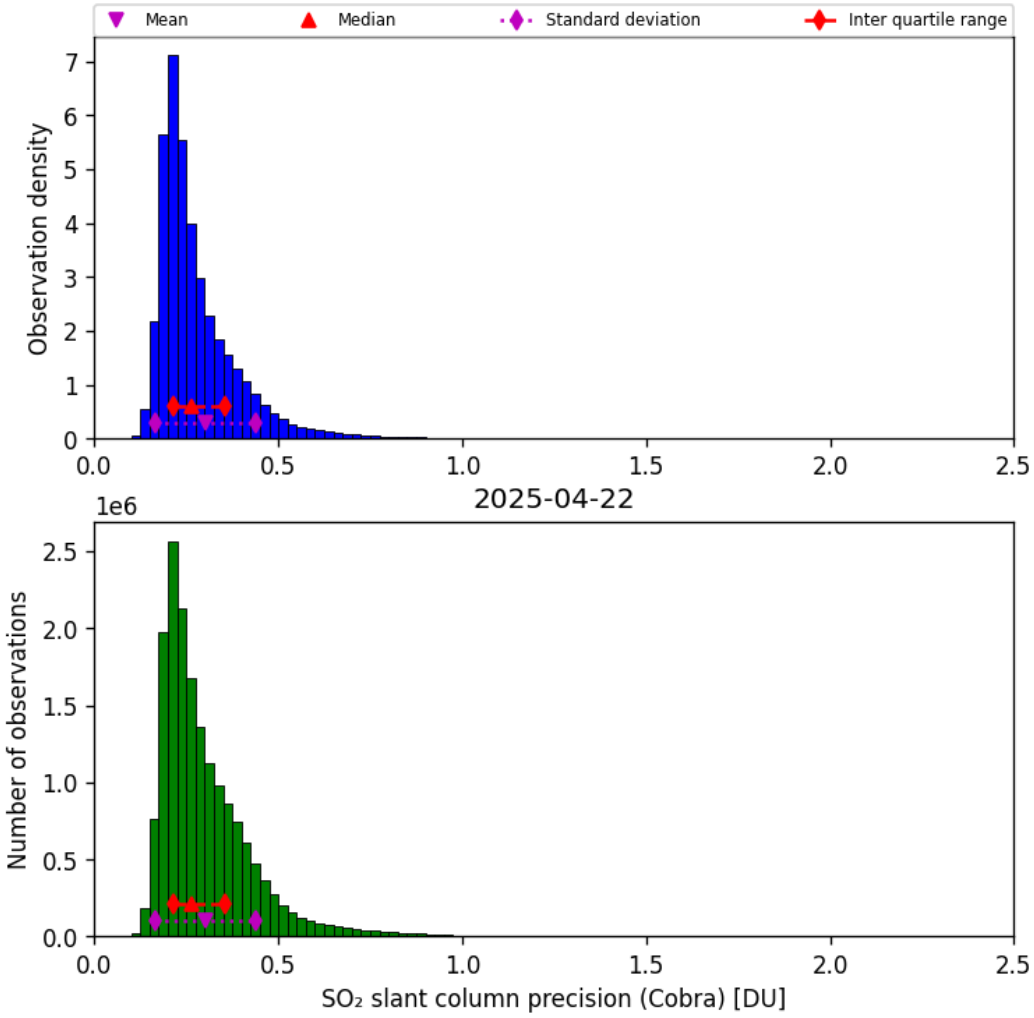

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-04-22 to 2025-04-22

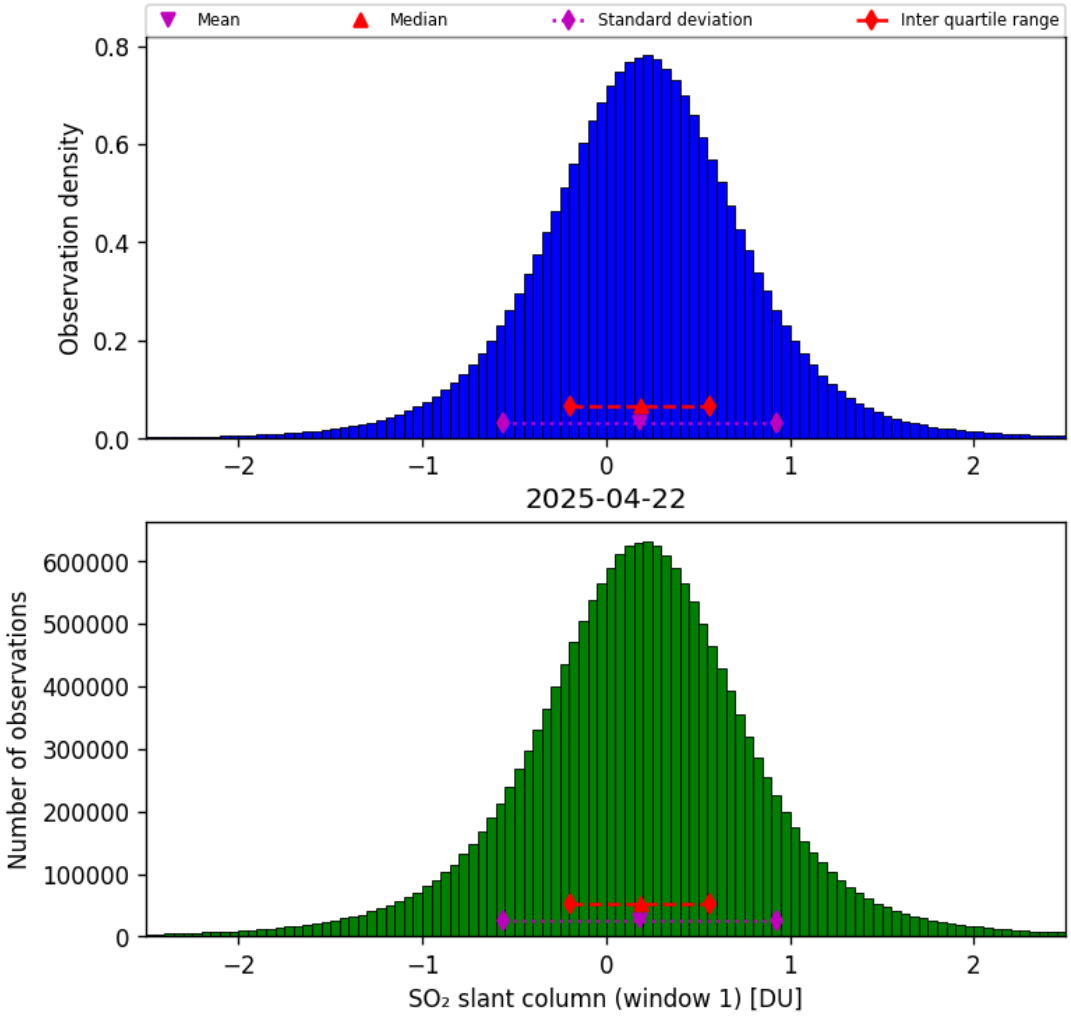

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-04-22 to 2025-04-22

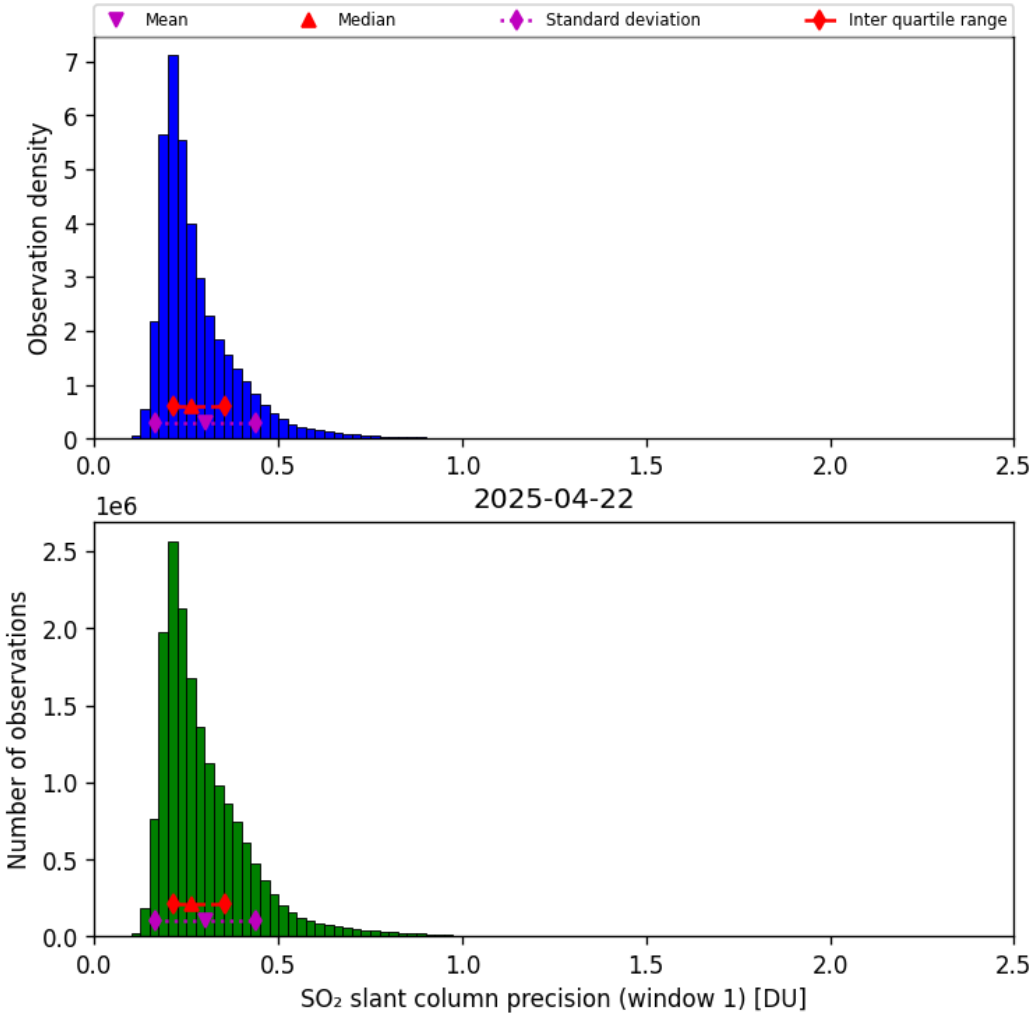

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-04-22 to 2025-04-22

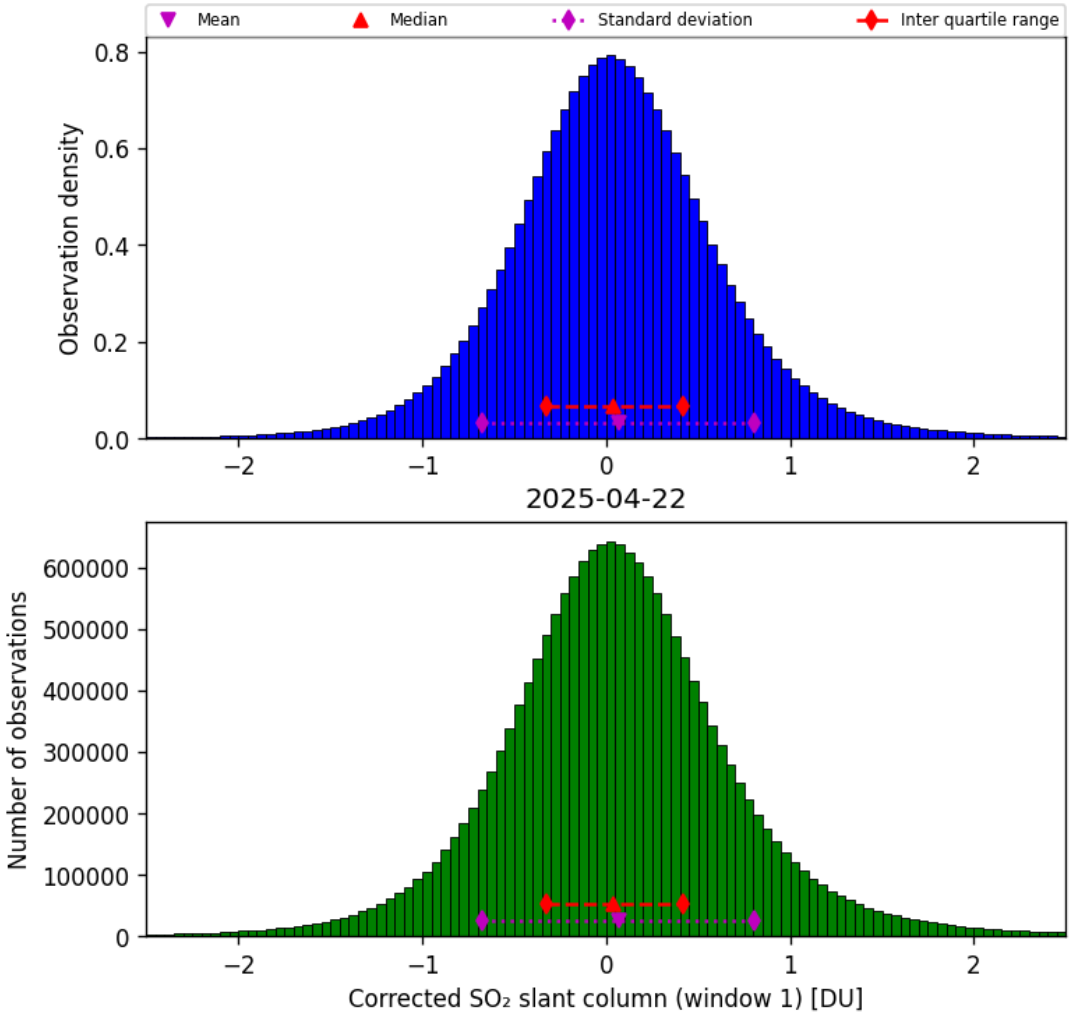

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-04-22 to 2025-04-22

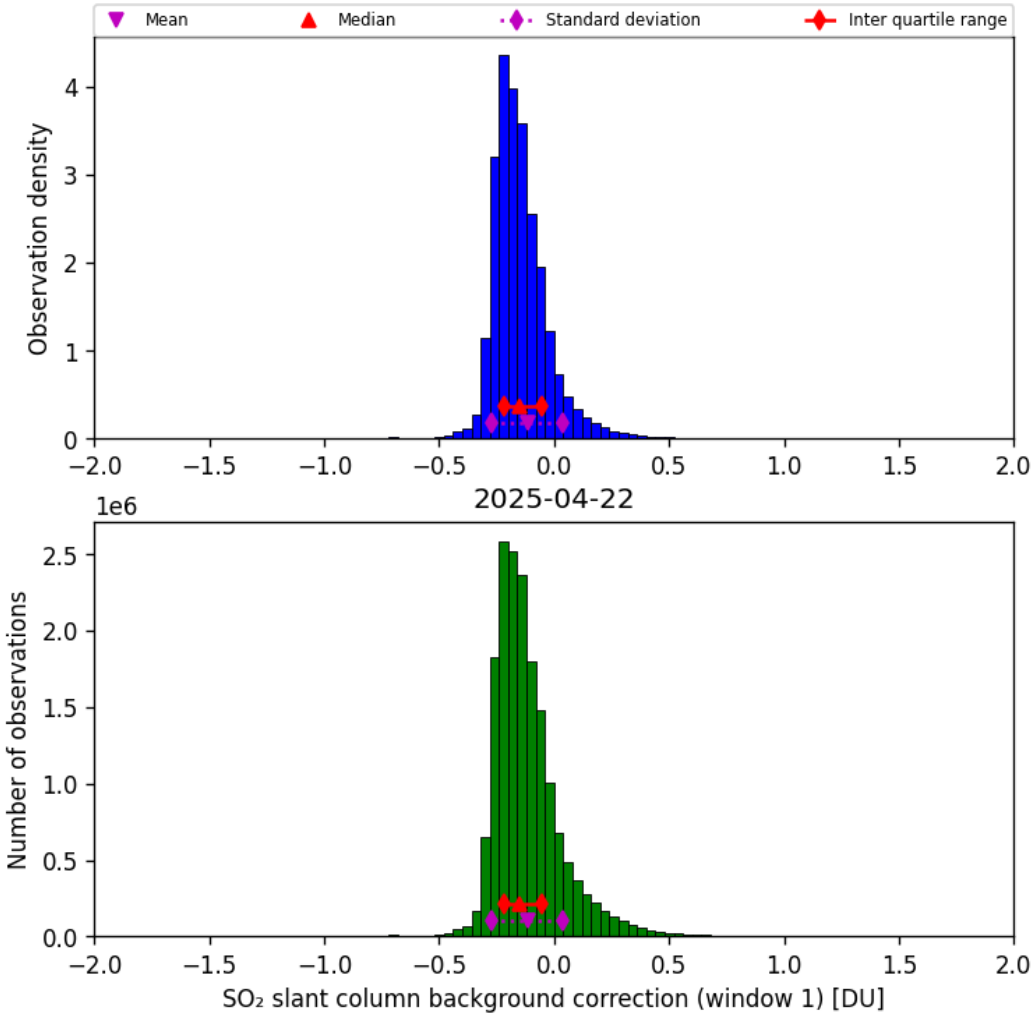

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-04-22 to 2025-04-22

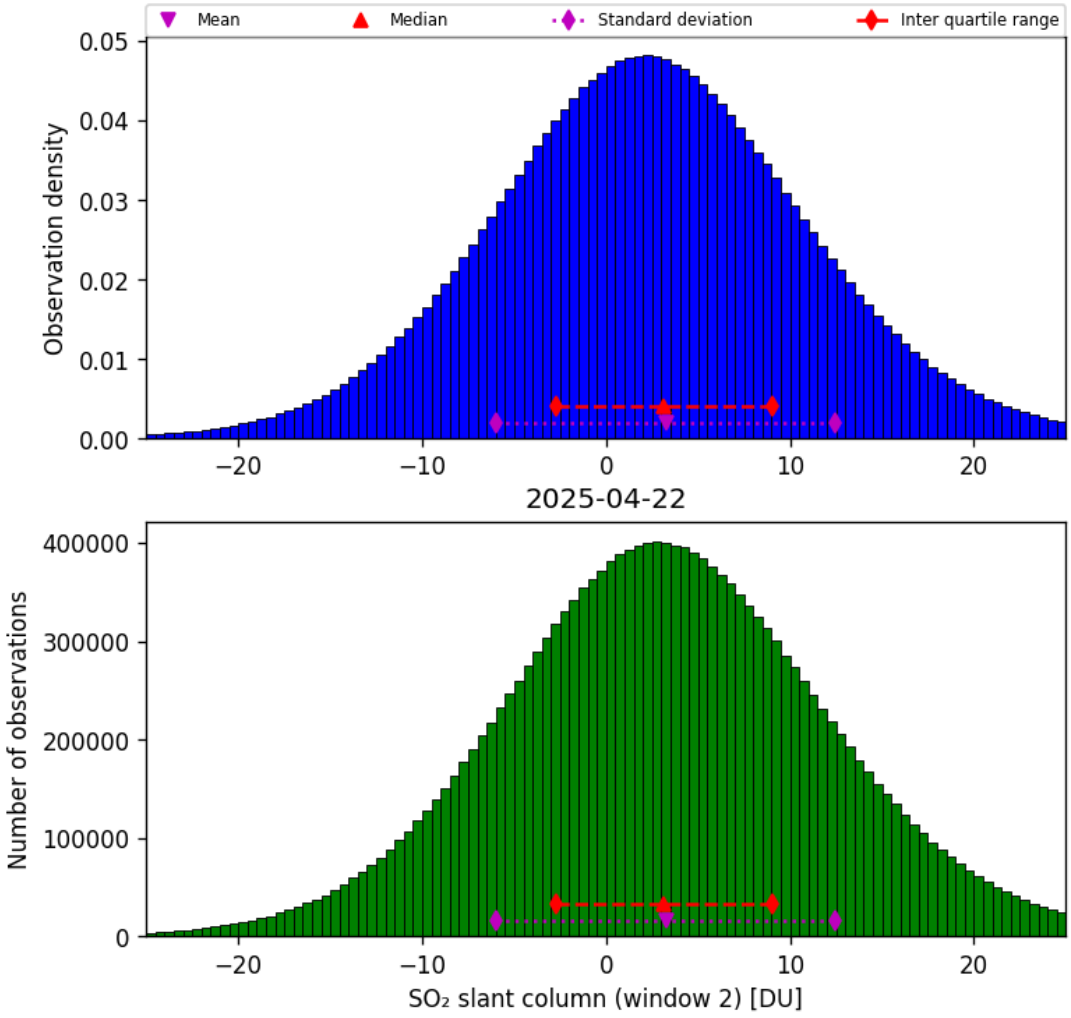

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-04-22 to 2025-04-22

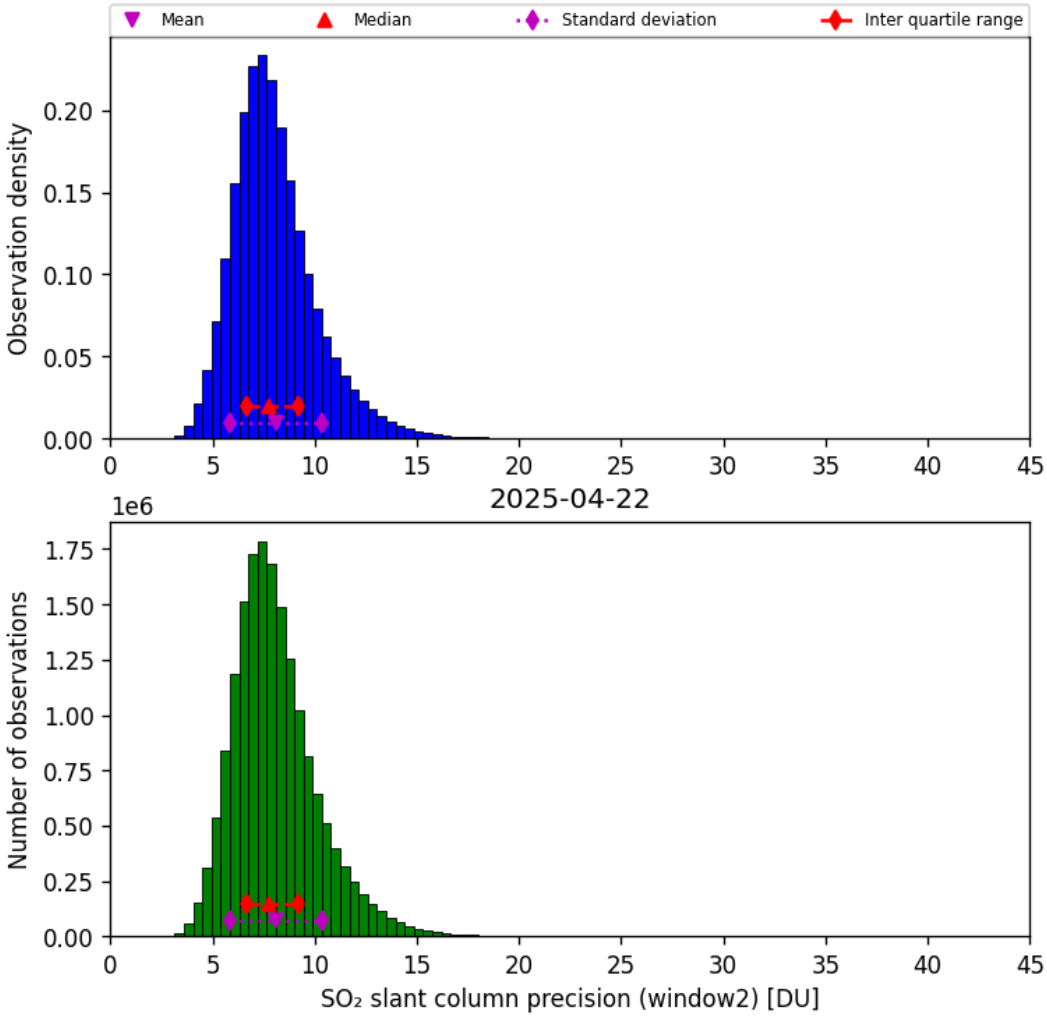

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-04-22 to 2025-04-22

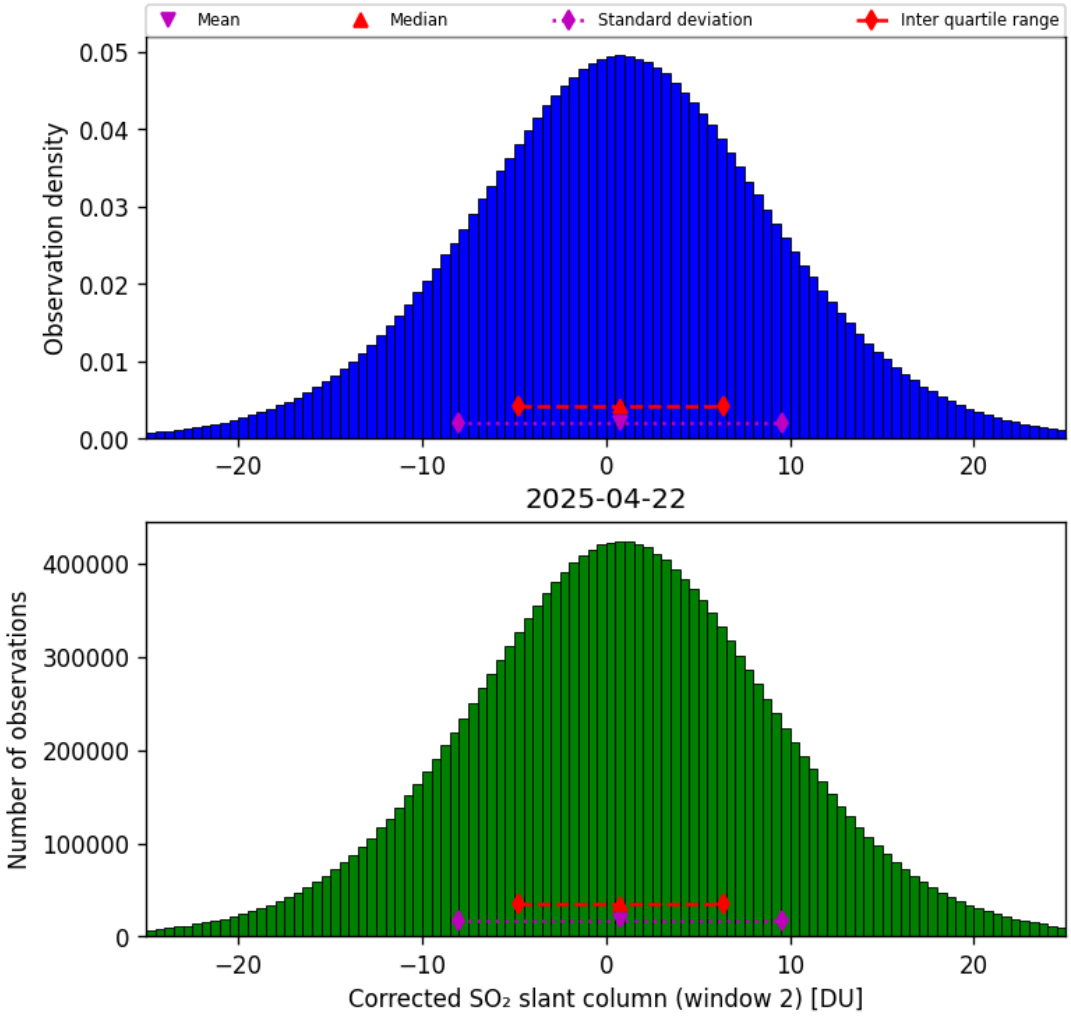

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-04-22 to 2025-04-22

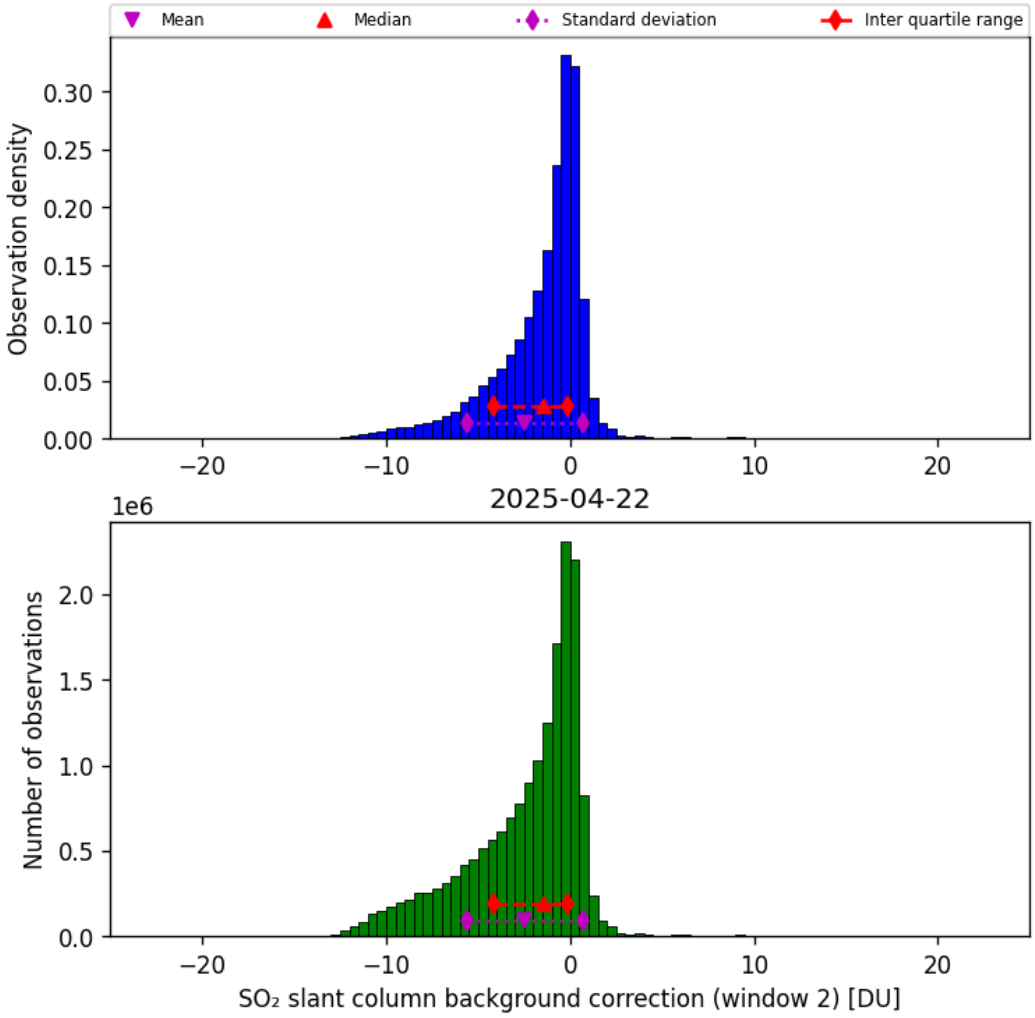

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-04-22 to 2025-04-22

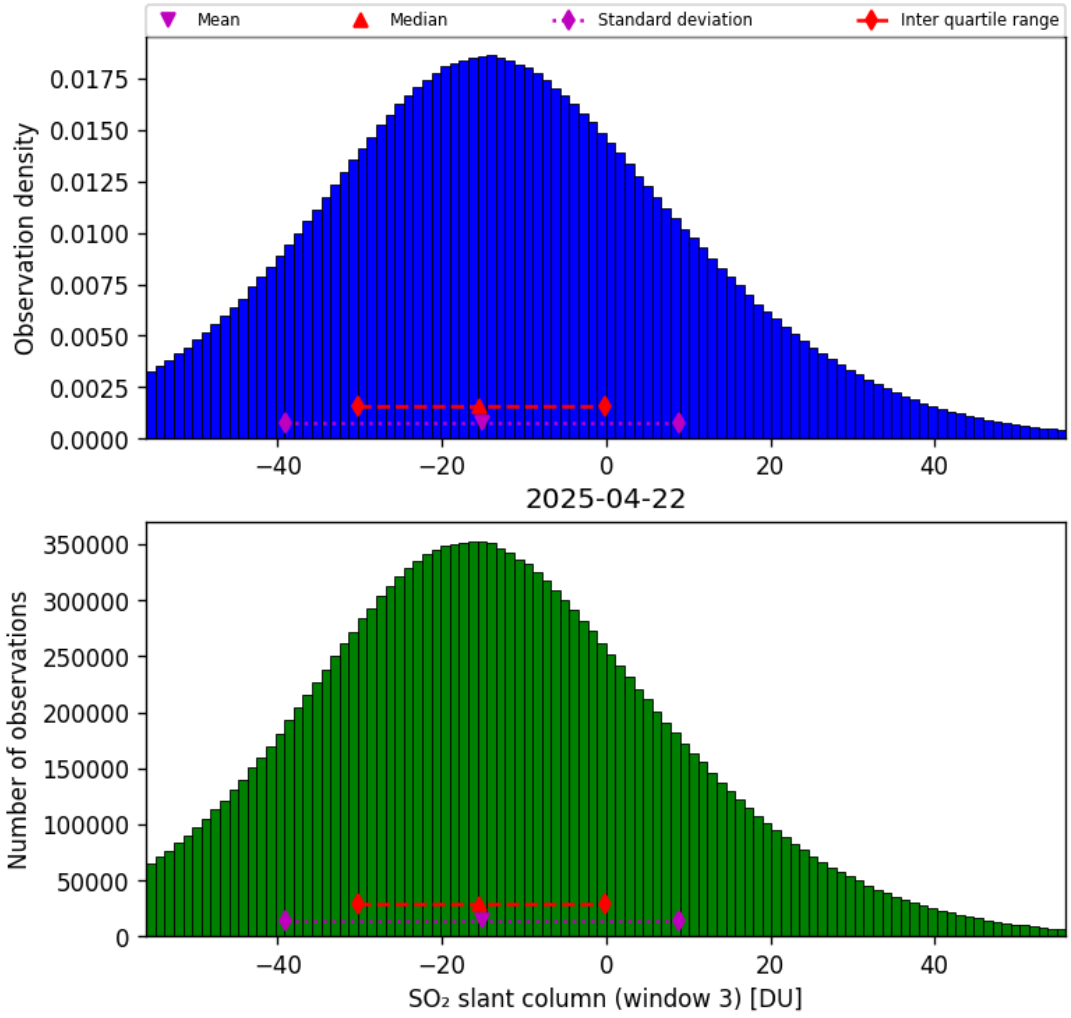

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-04-22 to 2025-04-22

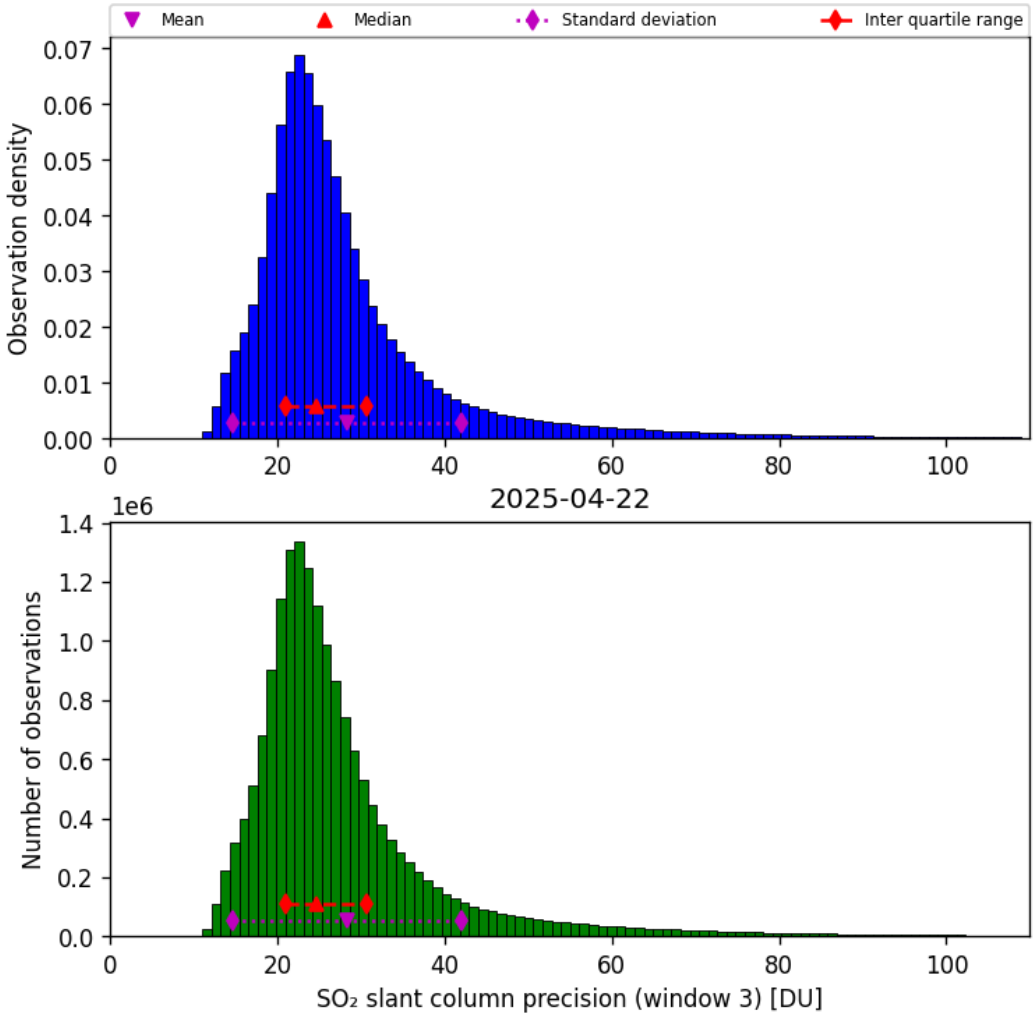

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-04-22 to 2025-04-22

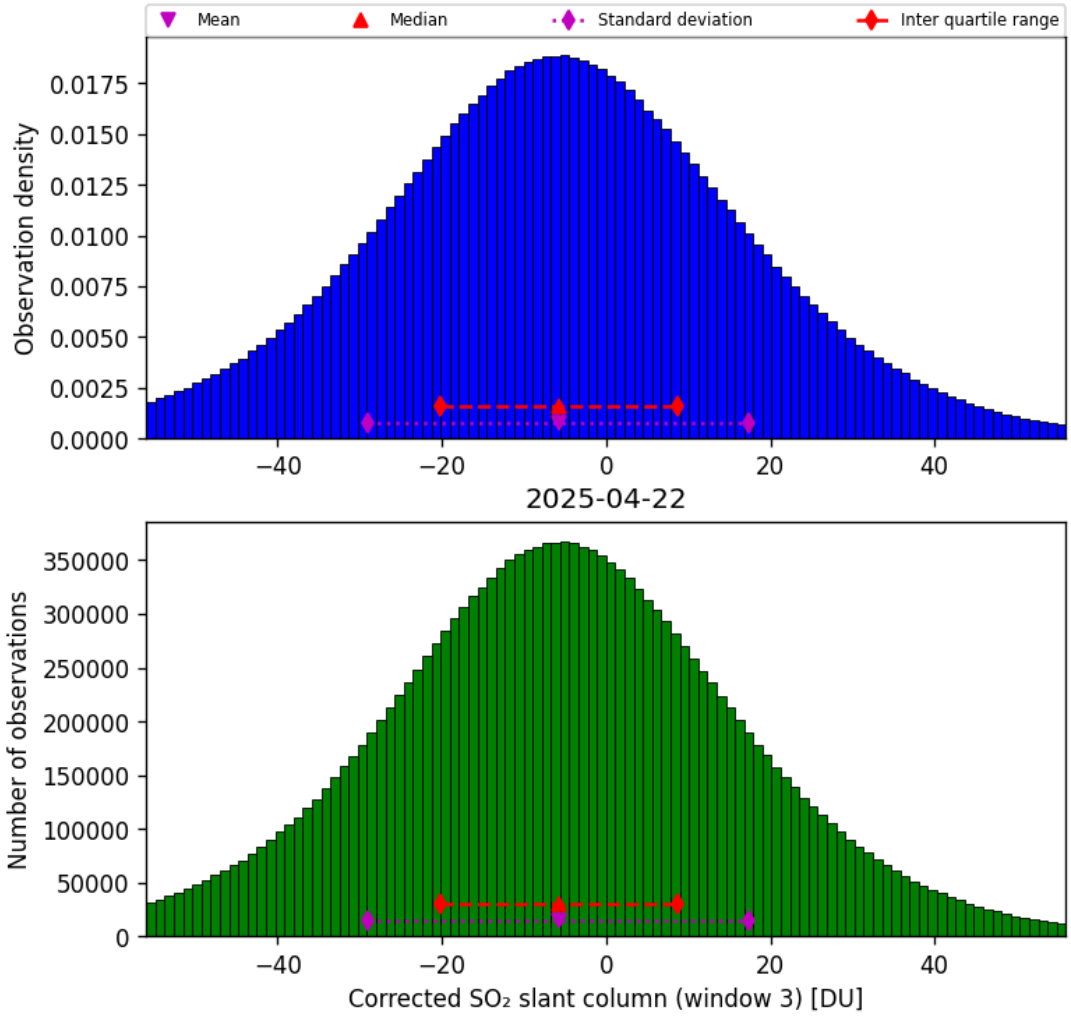

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-04-22 to 2025-04-22

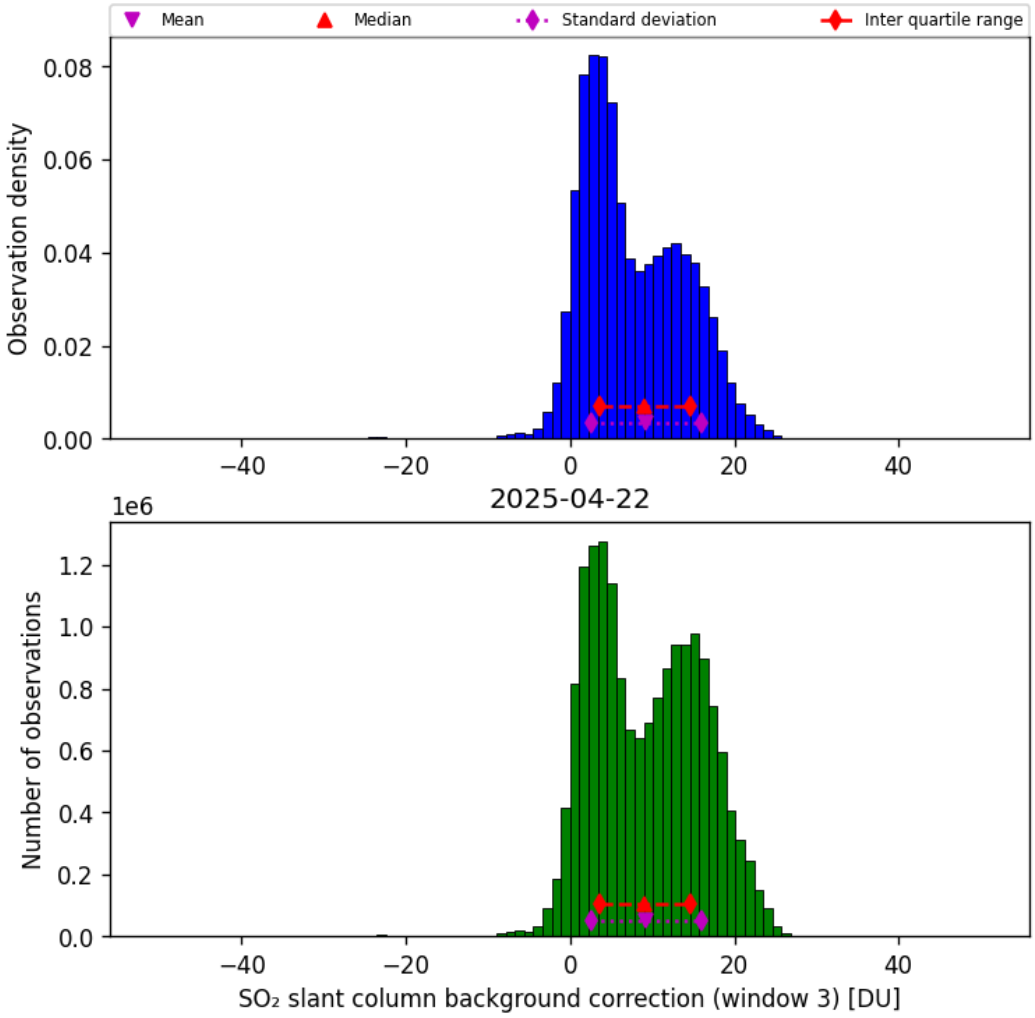

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-04-22 to 2025-04-22

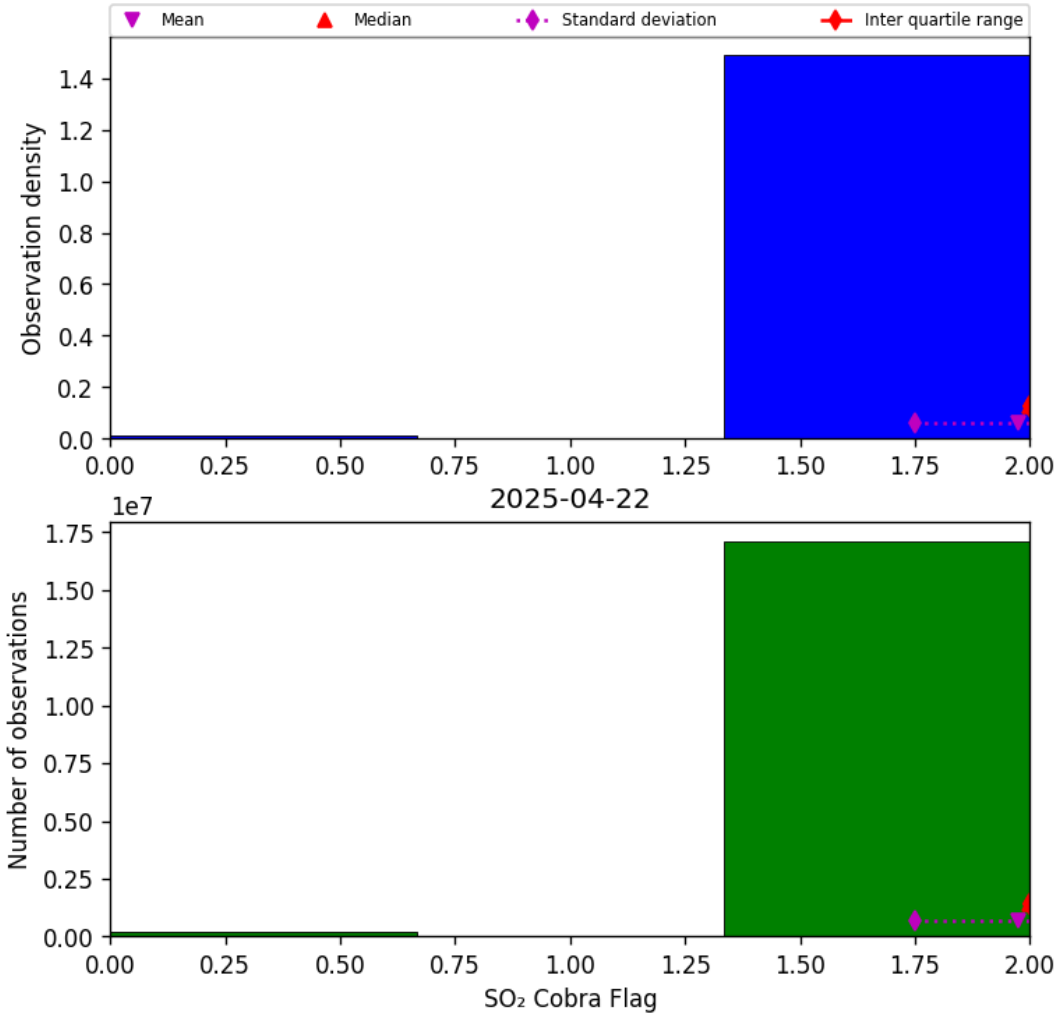

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-04-22 to 2025-04-22

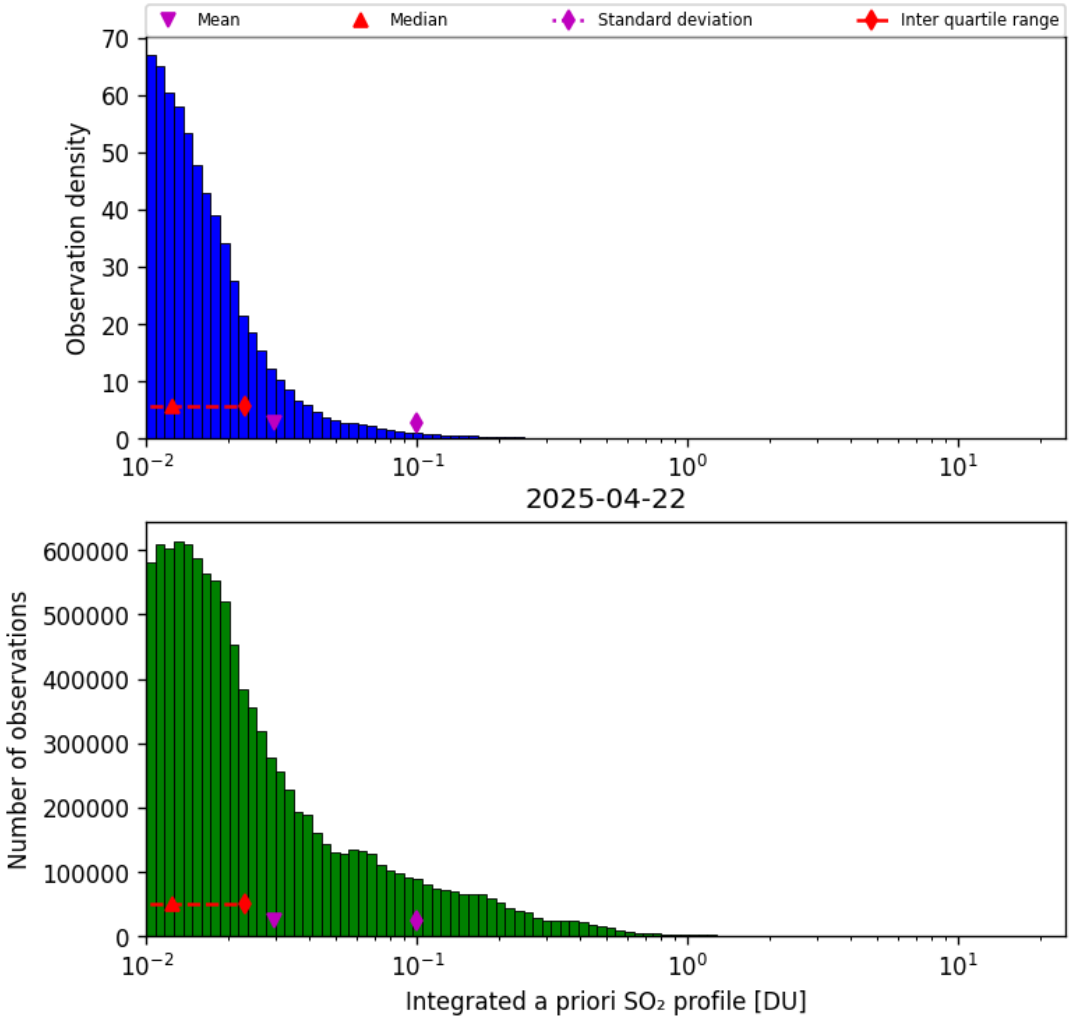

Figure 76: Histogram of “Integrated a priori SO_2 profile” for 2025-04-22 to 2025-04-22

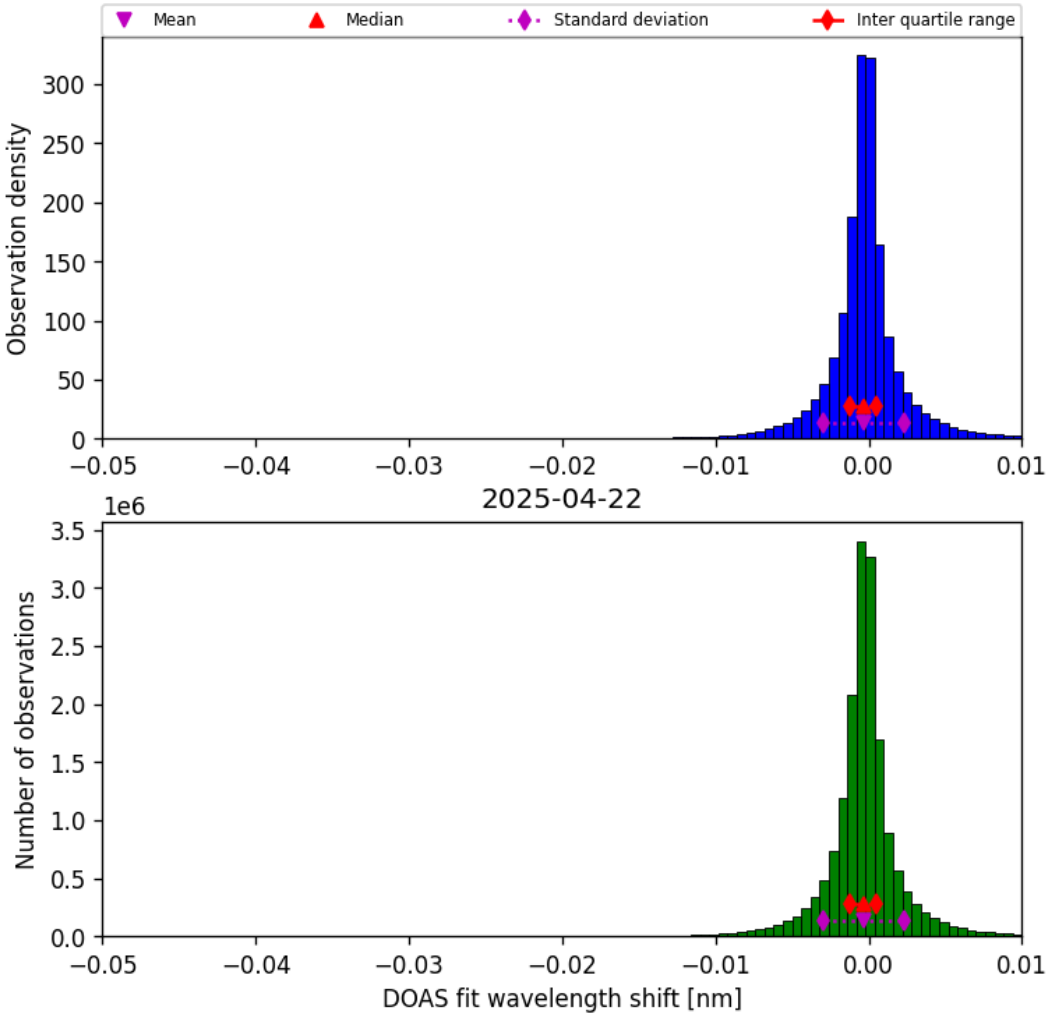

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-04-22 to 2025-04-22

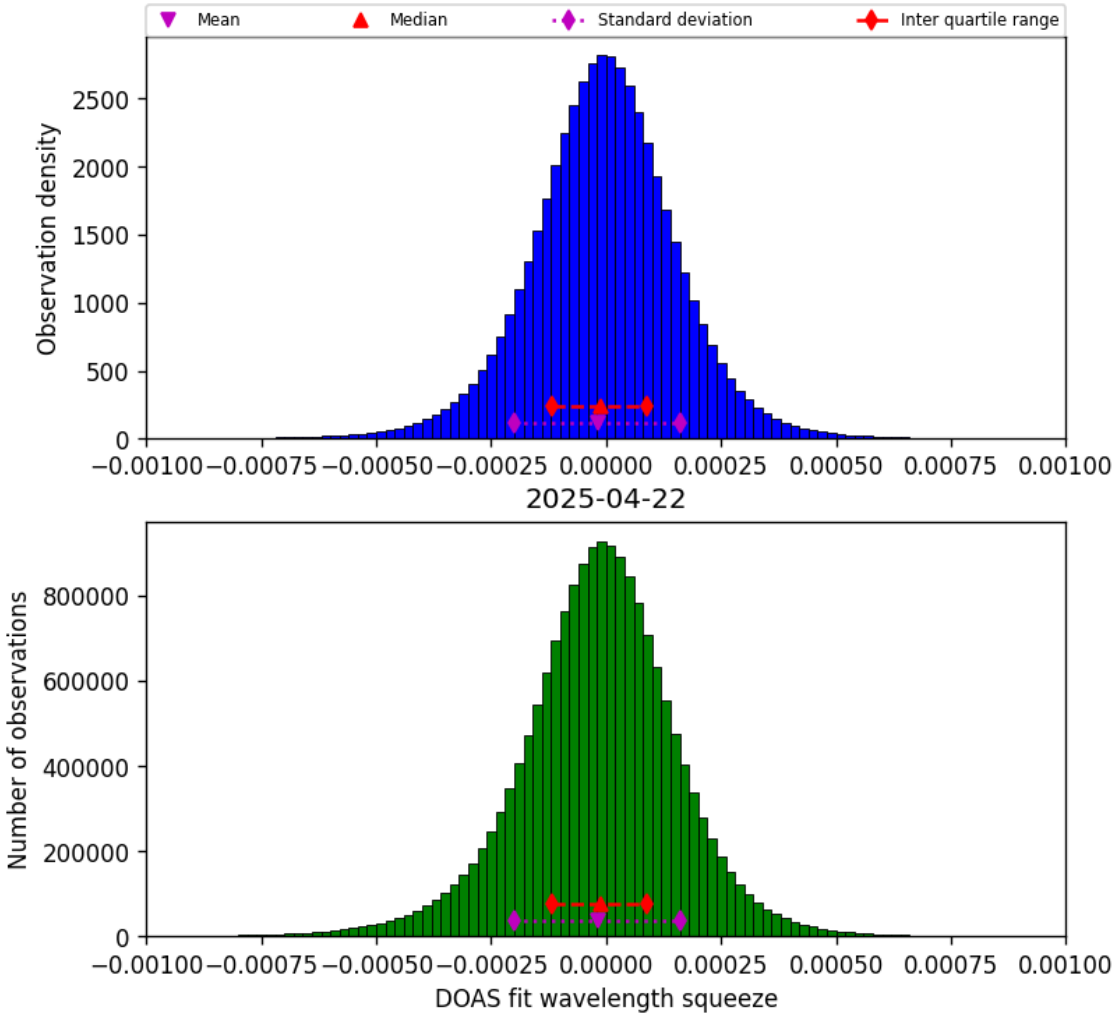

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-04-22 to 2025-04-22

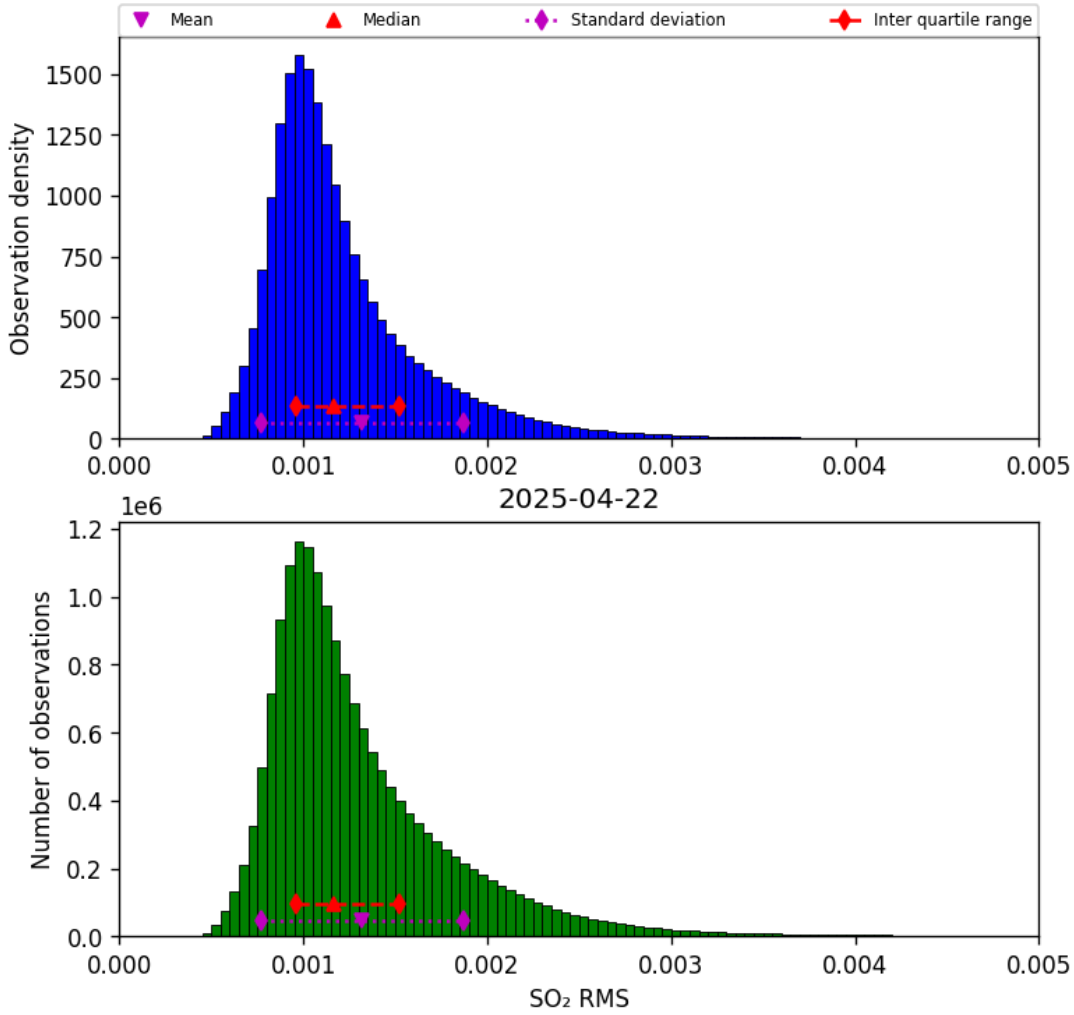

Figure 79: Histogram of "SO_2 RMS" for 2025-04-22 to 2025-04-22

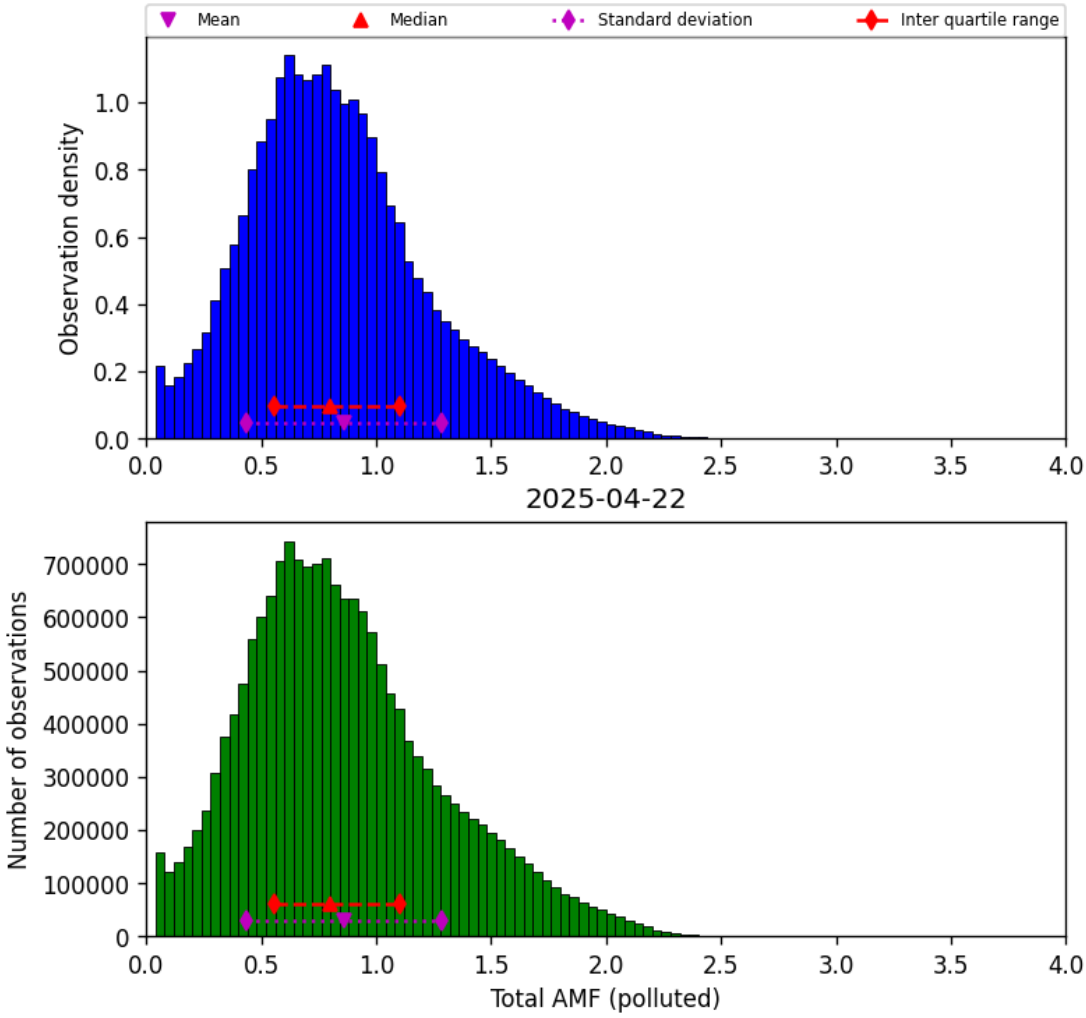

Figure 80: Histogram of “Total AMF (polluted)” for 2025-04-22 to 2025-04-22

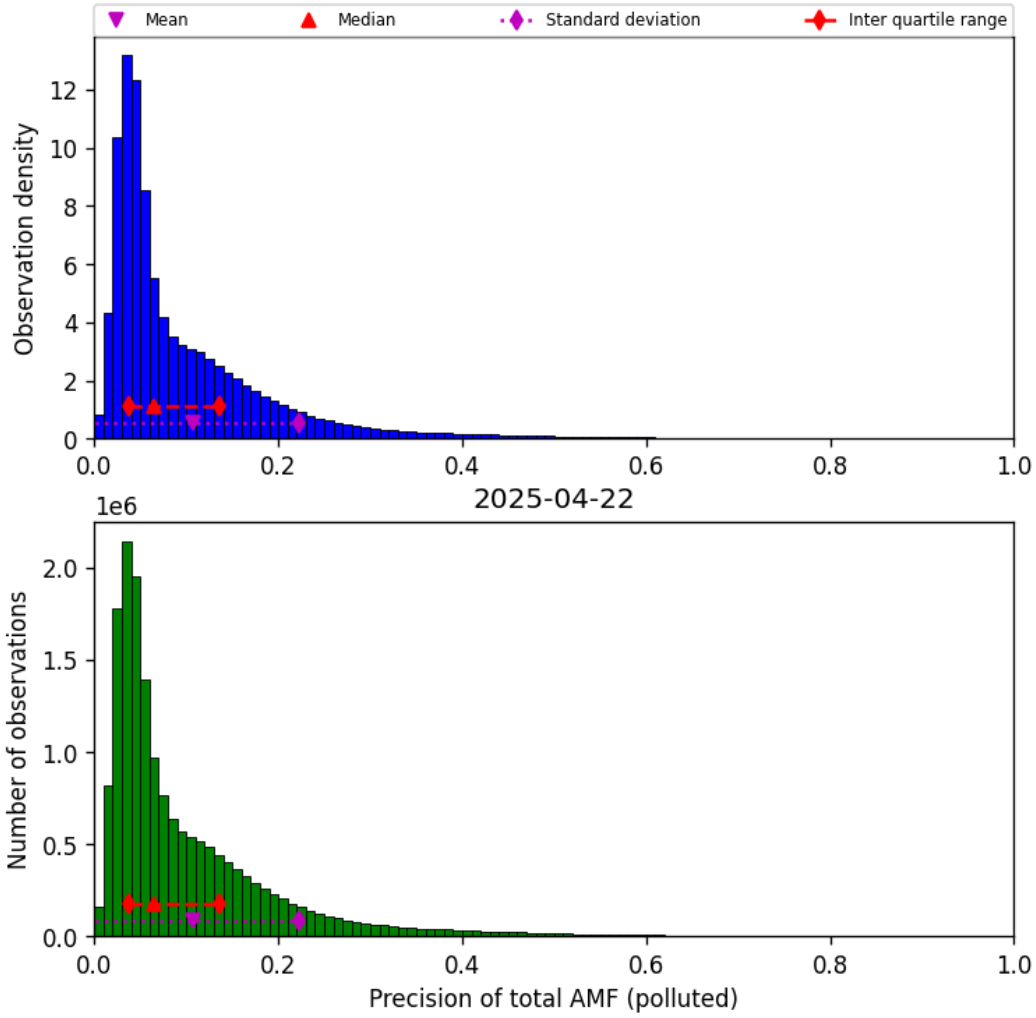

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-04-22 to 2025-04-22

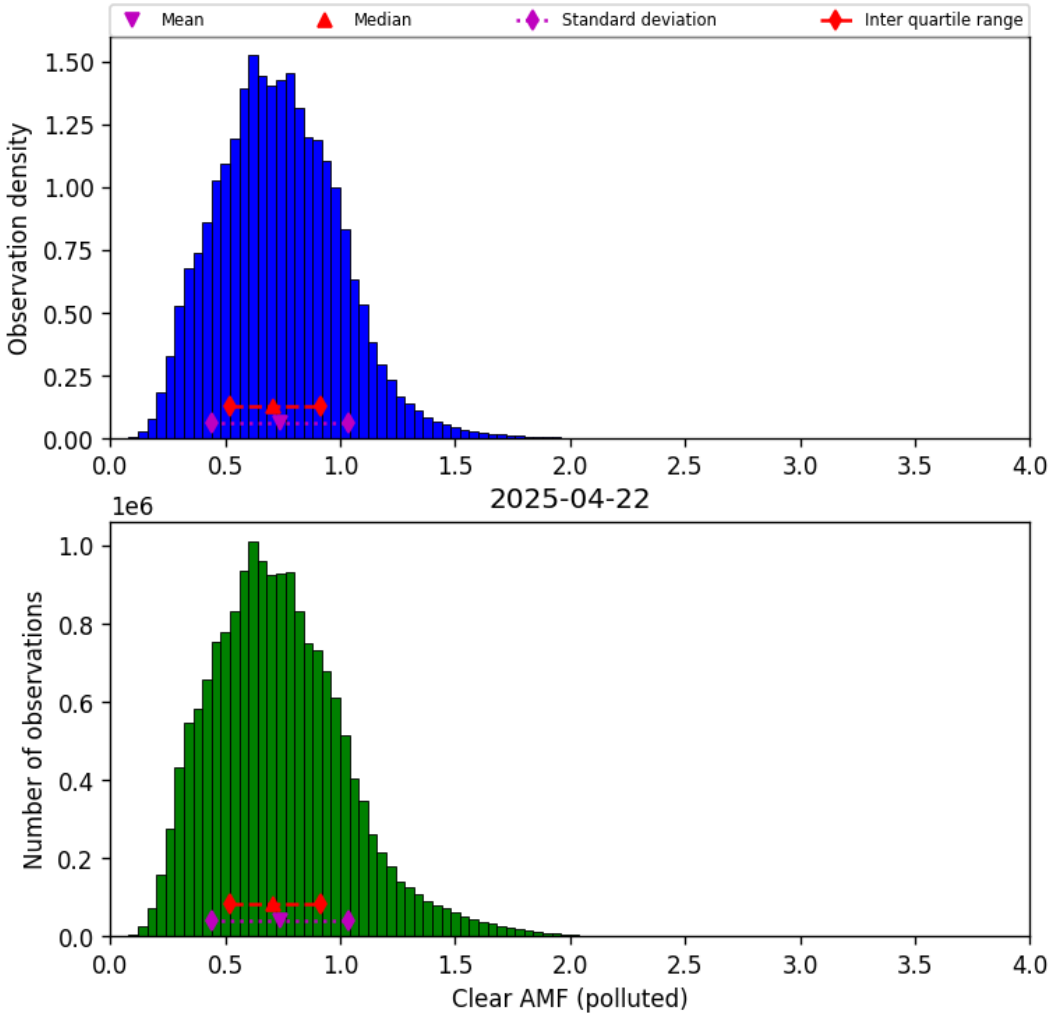

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-04-22 to 2025-04-22

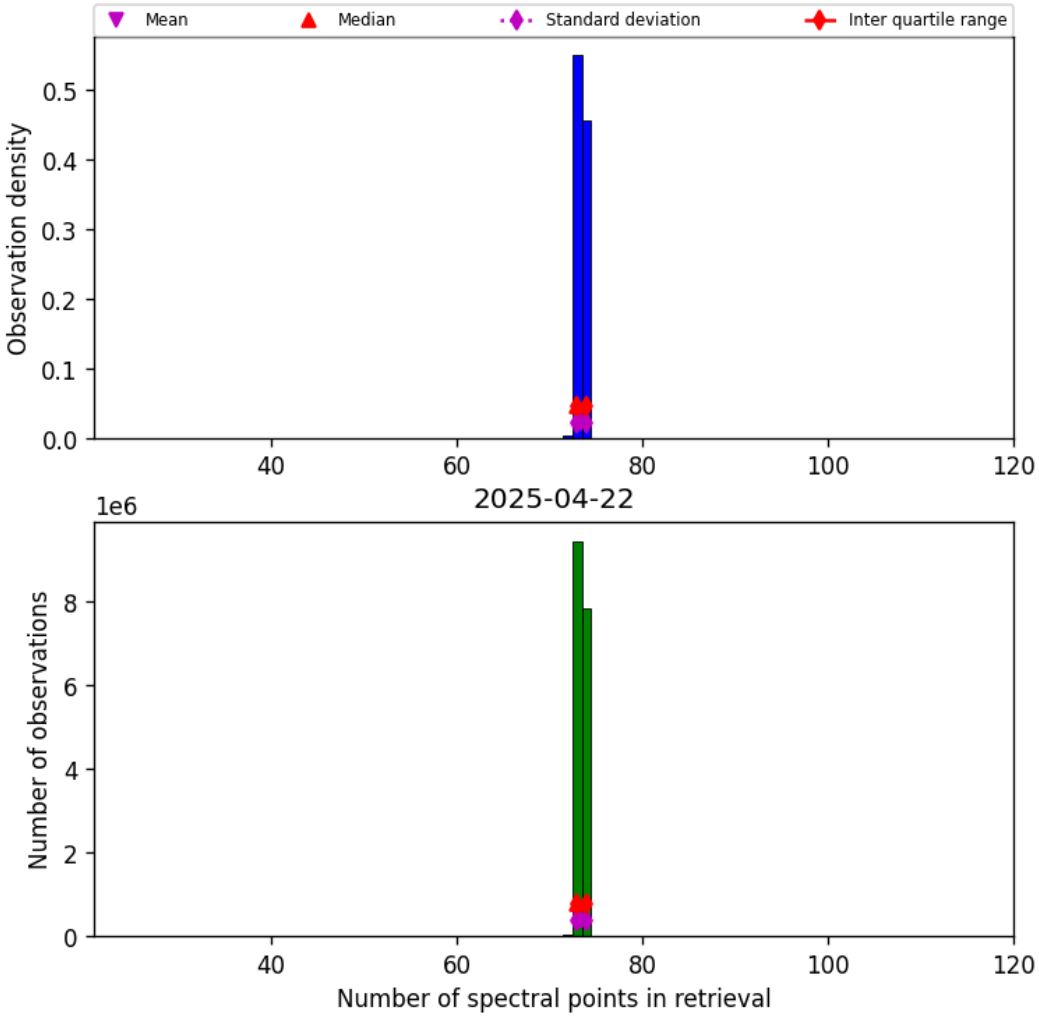

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-04-22 to 2025-04-22

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.

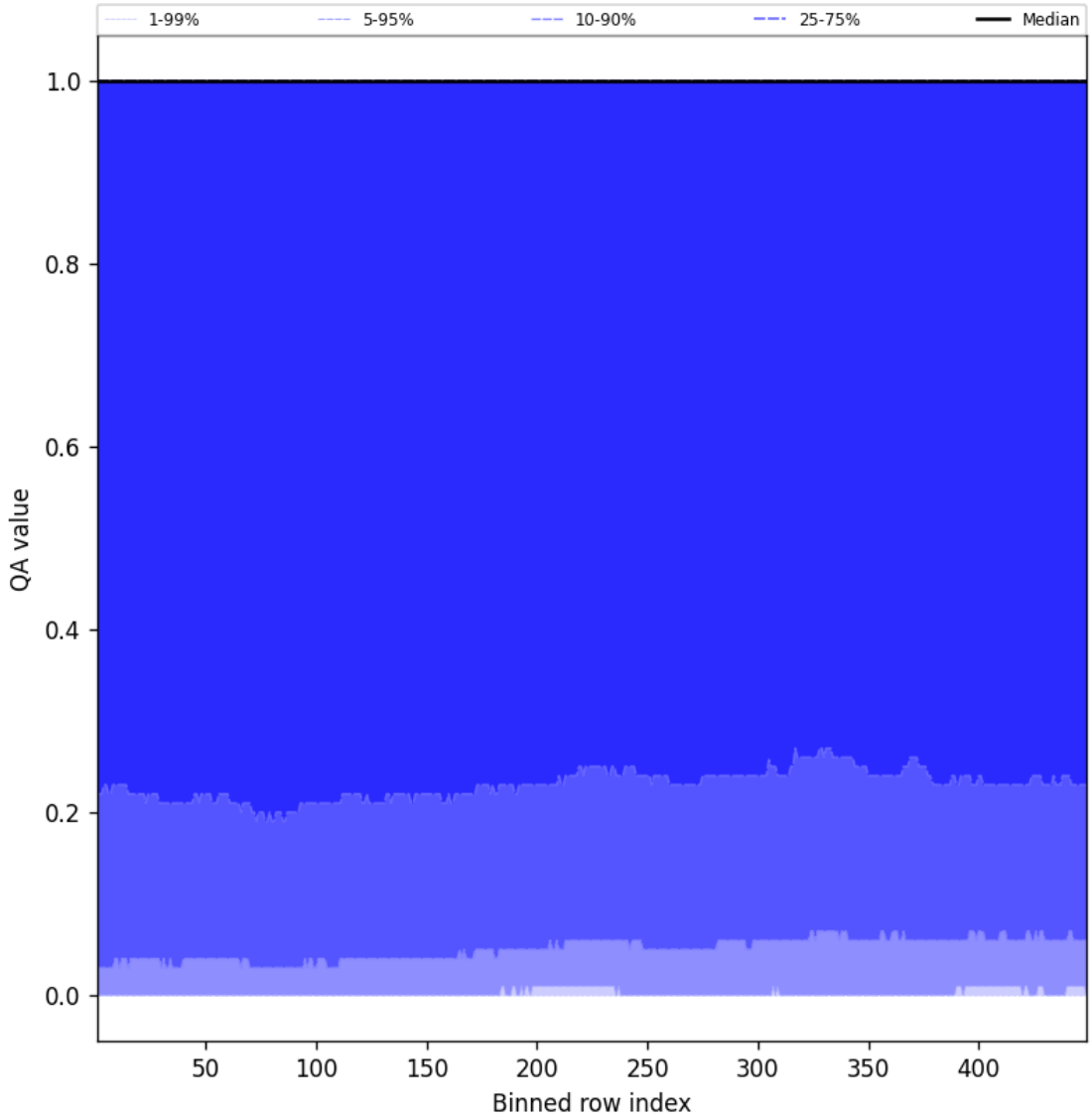

Figure 84: Along track statistics of “QA value” for 2025-04-22 to 2025-04-22

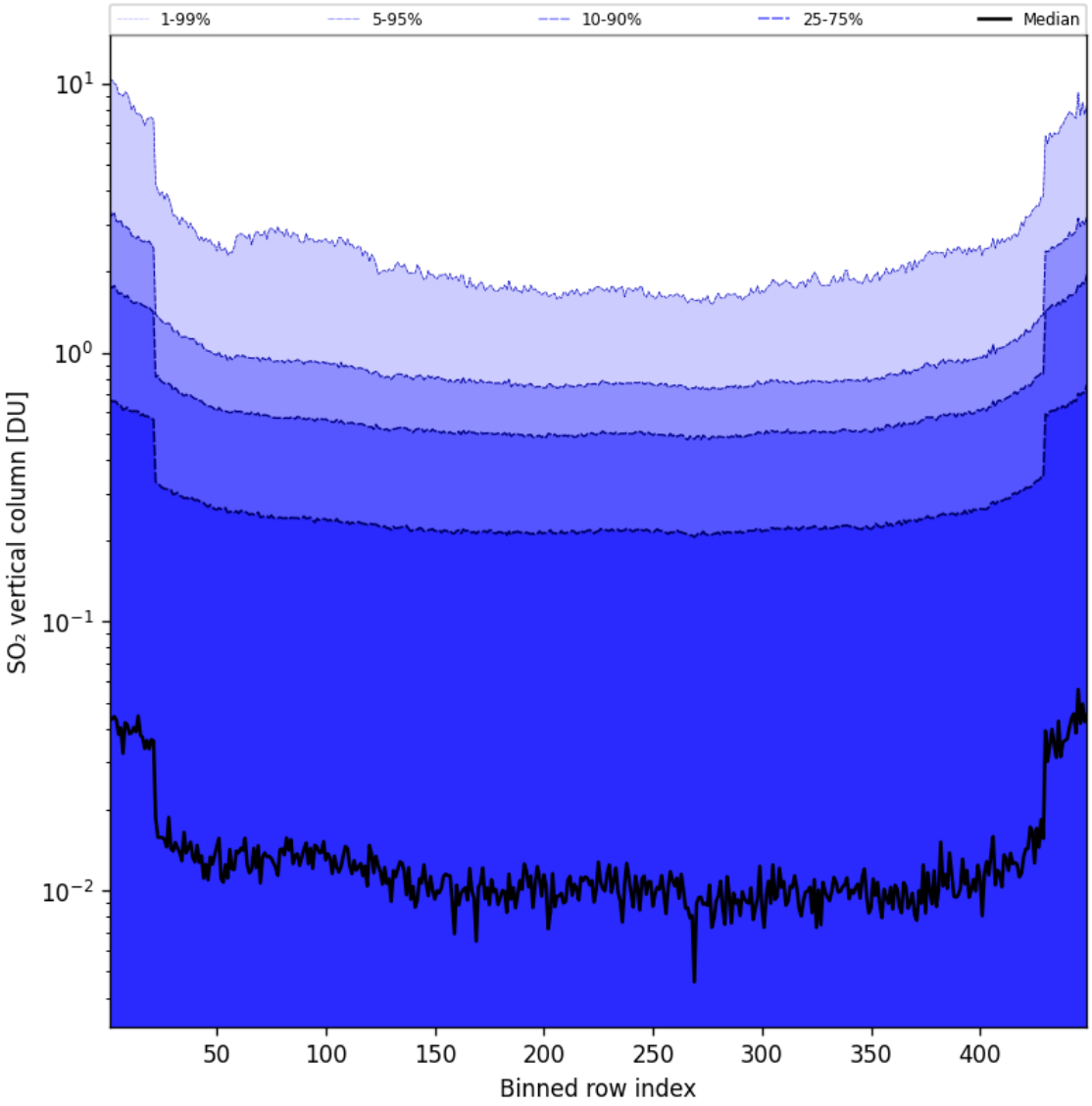

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-04-22 to 2025-04-22

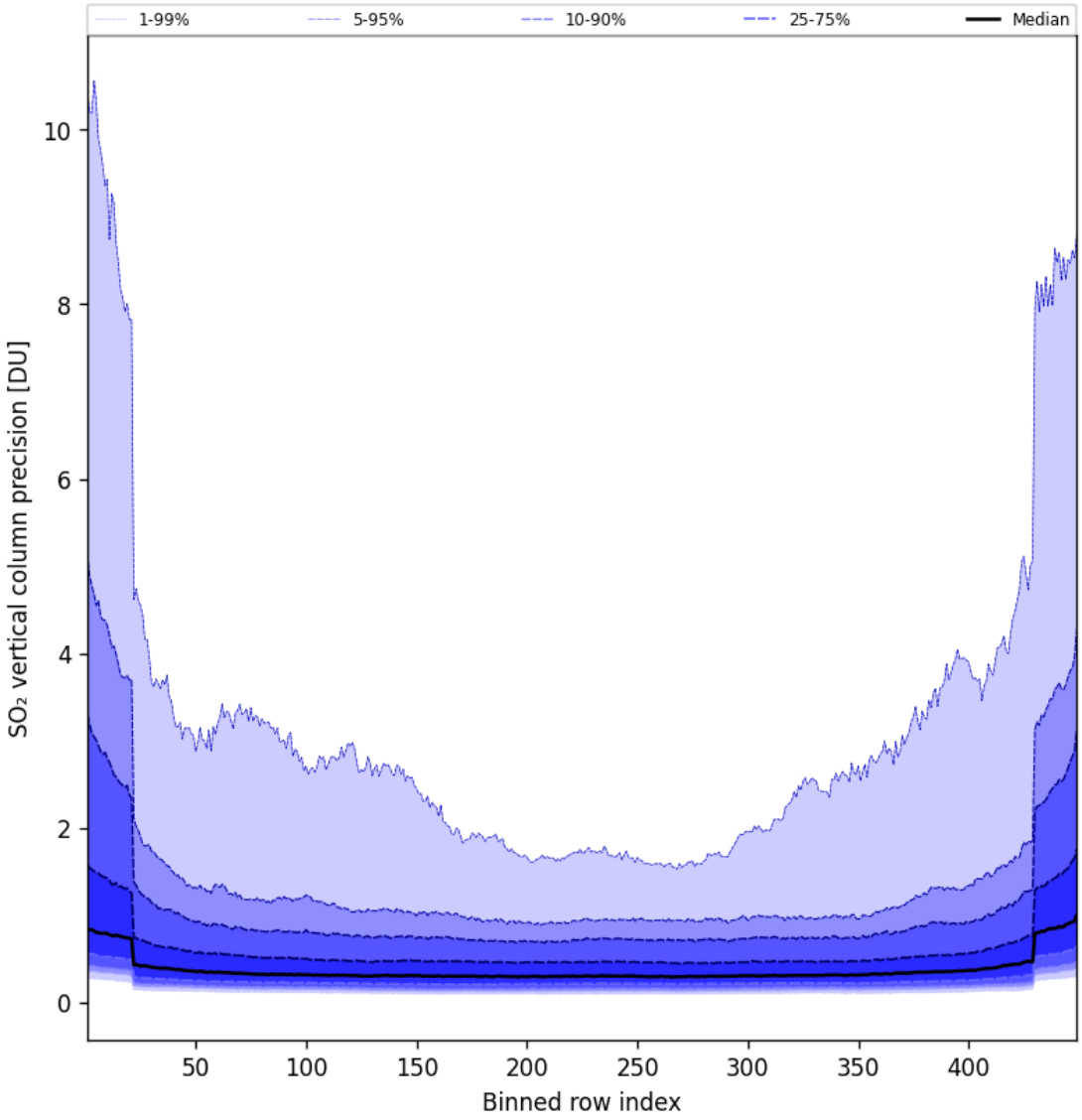

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-04-22 to 2025-04-22

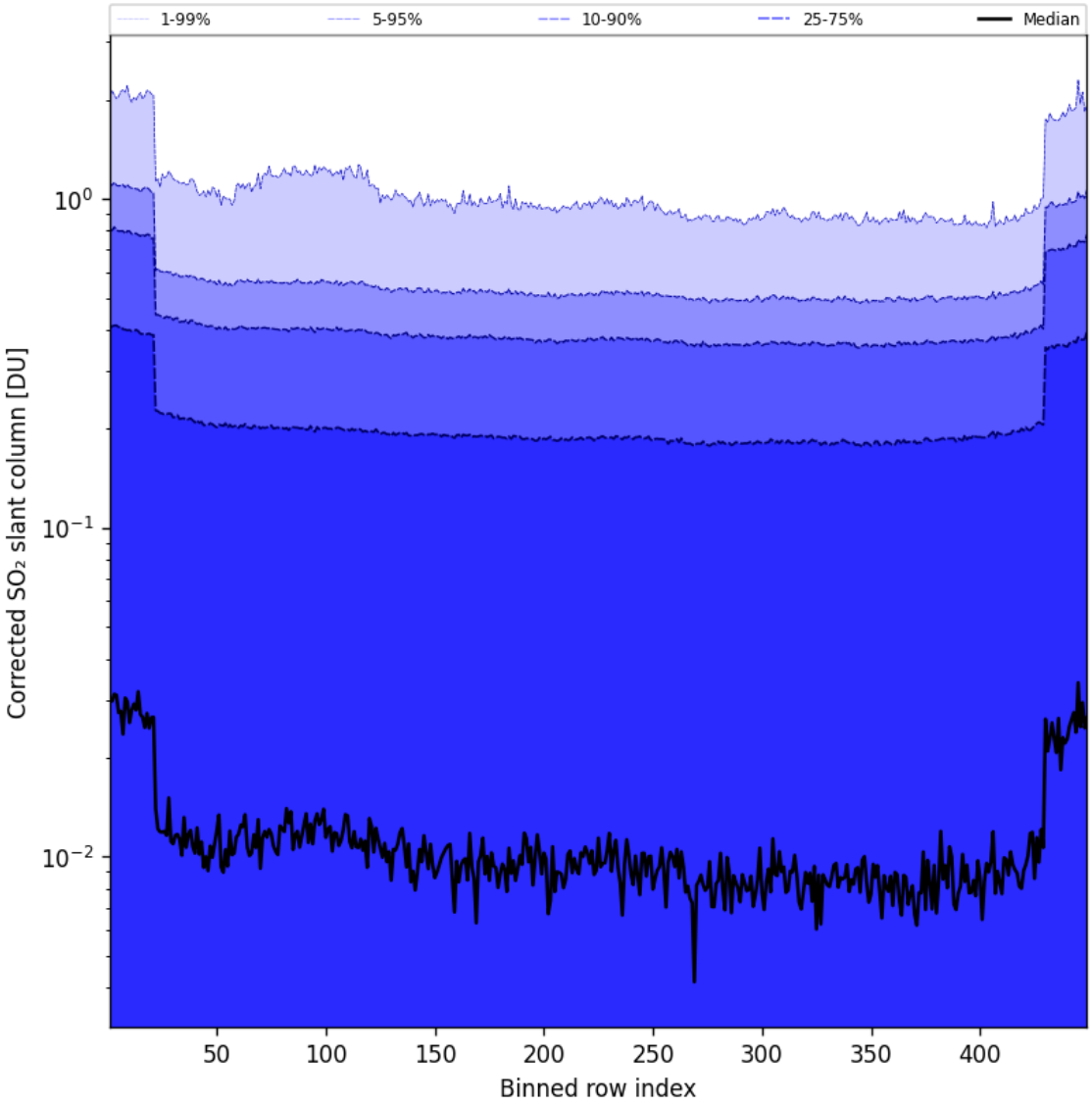

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-04-22 to 2025-04-22

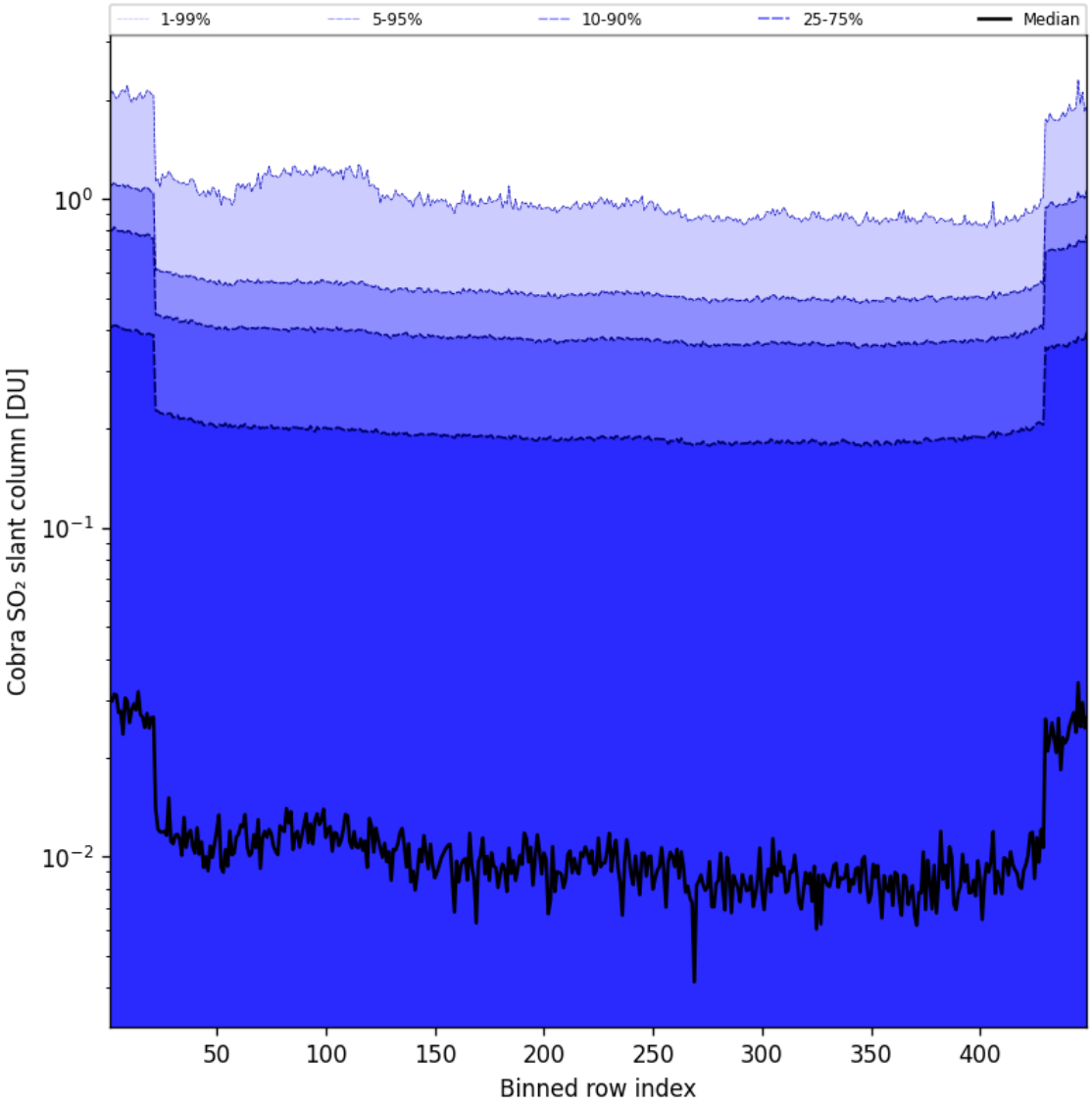

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-04-22 to 2025-04-22

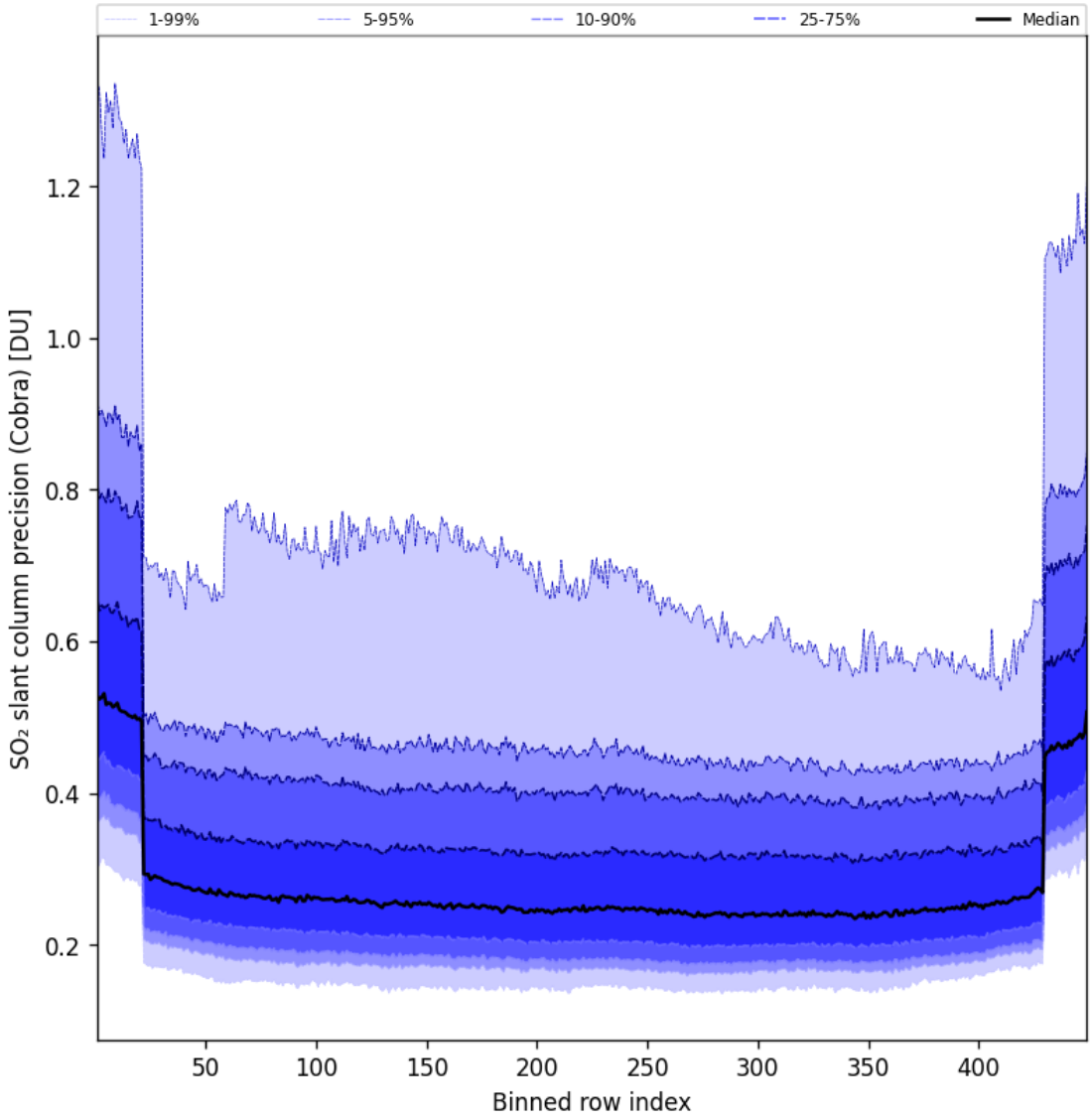

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-04-22 to 2025-04-22

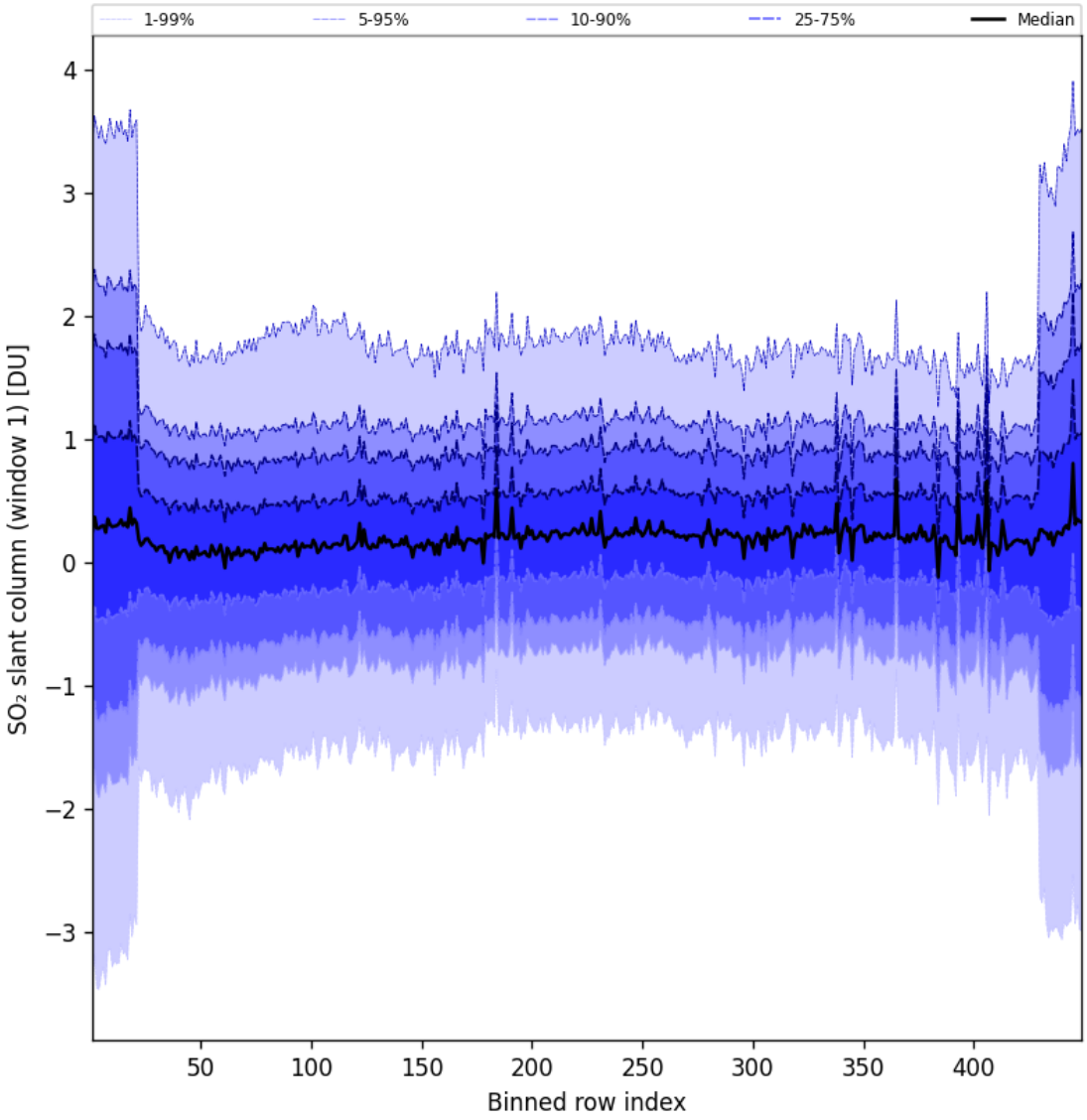

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-04-22 to 2025-04-22

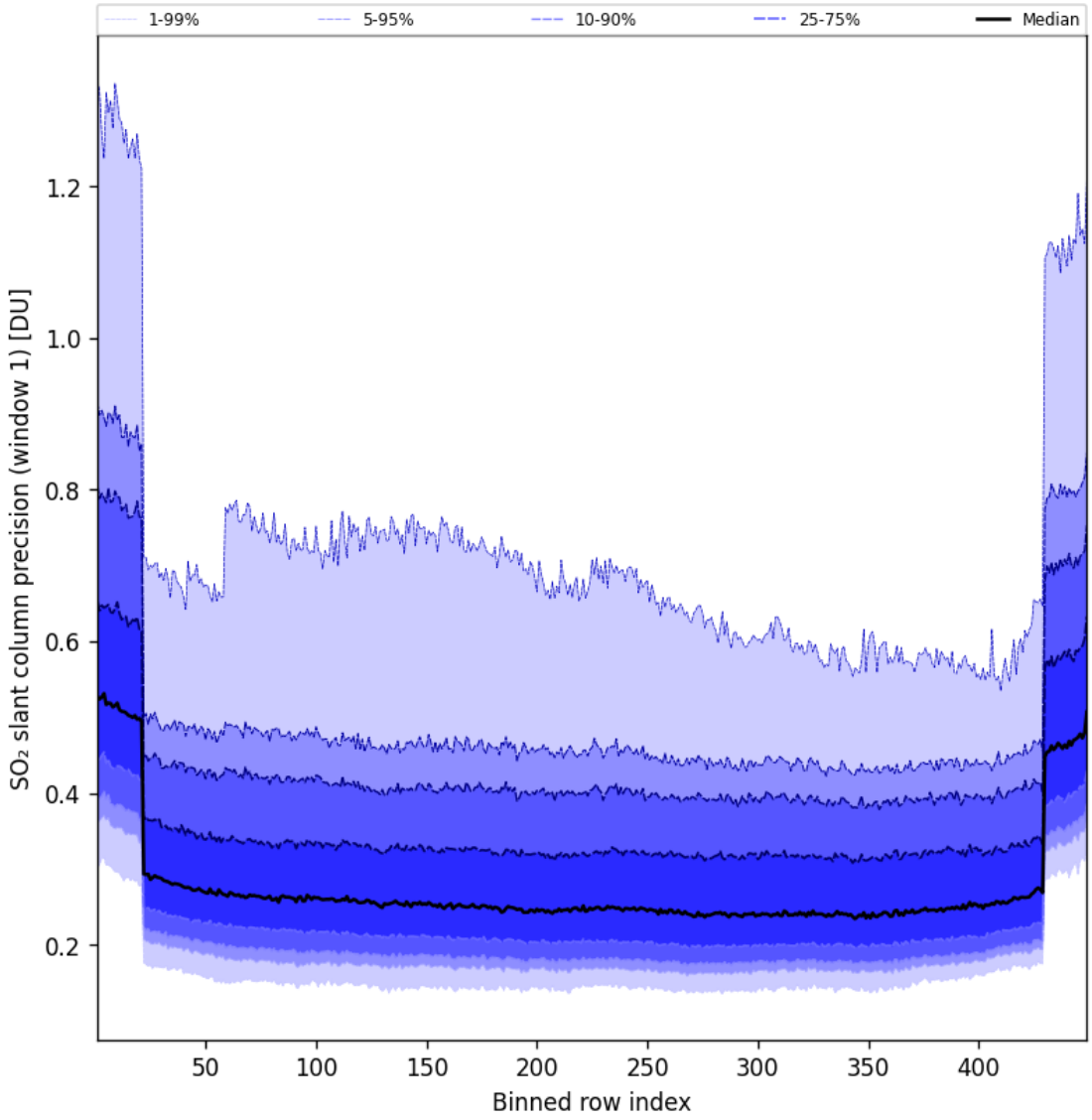

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-04-22 to 2025-04-22

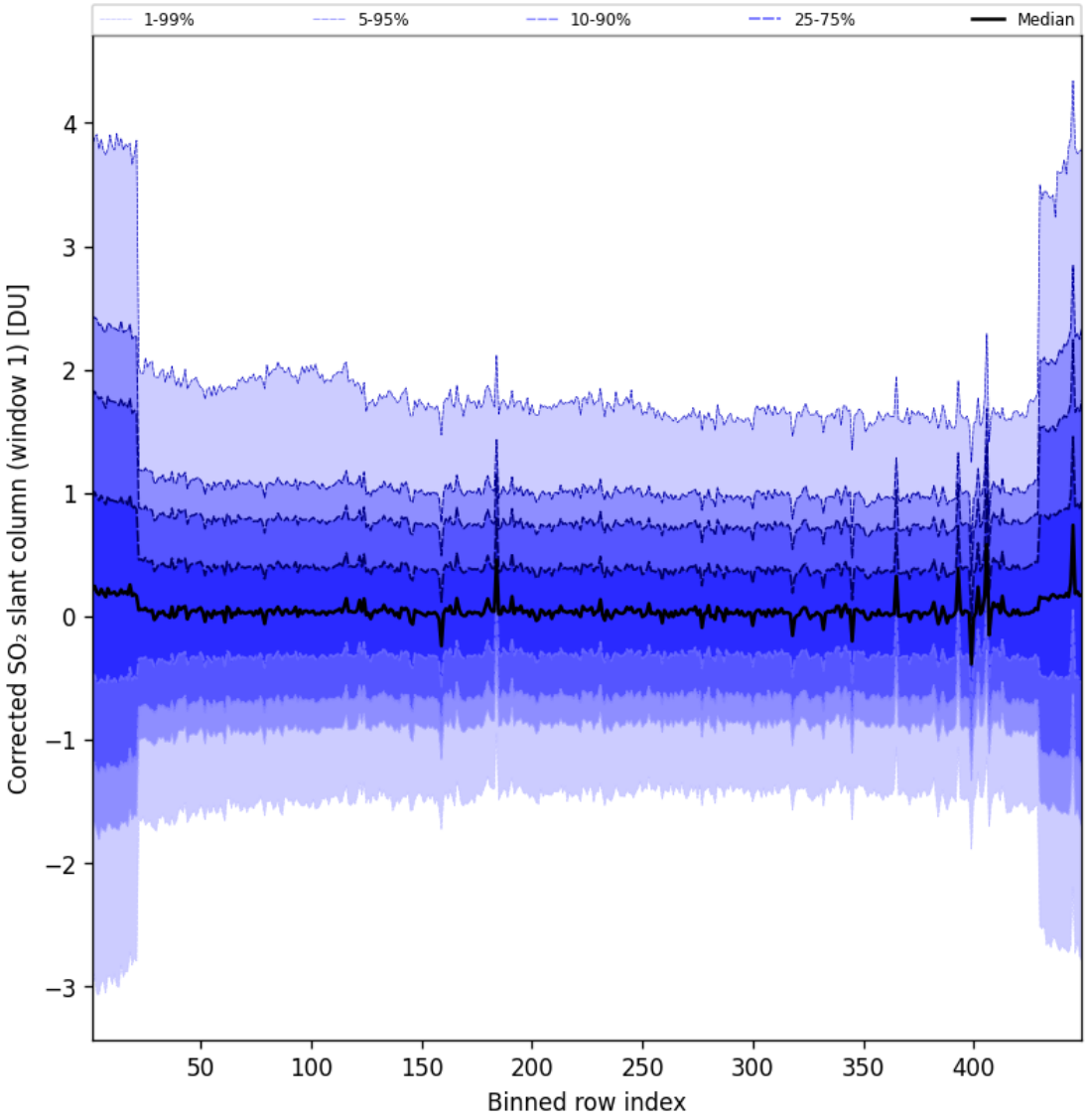

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-04-22 to 2025-04-22

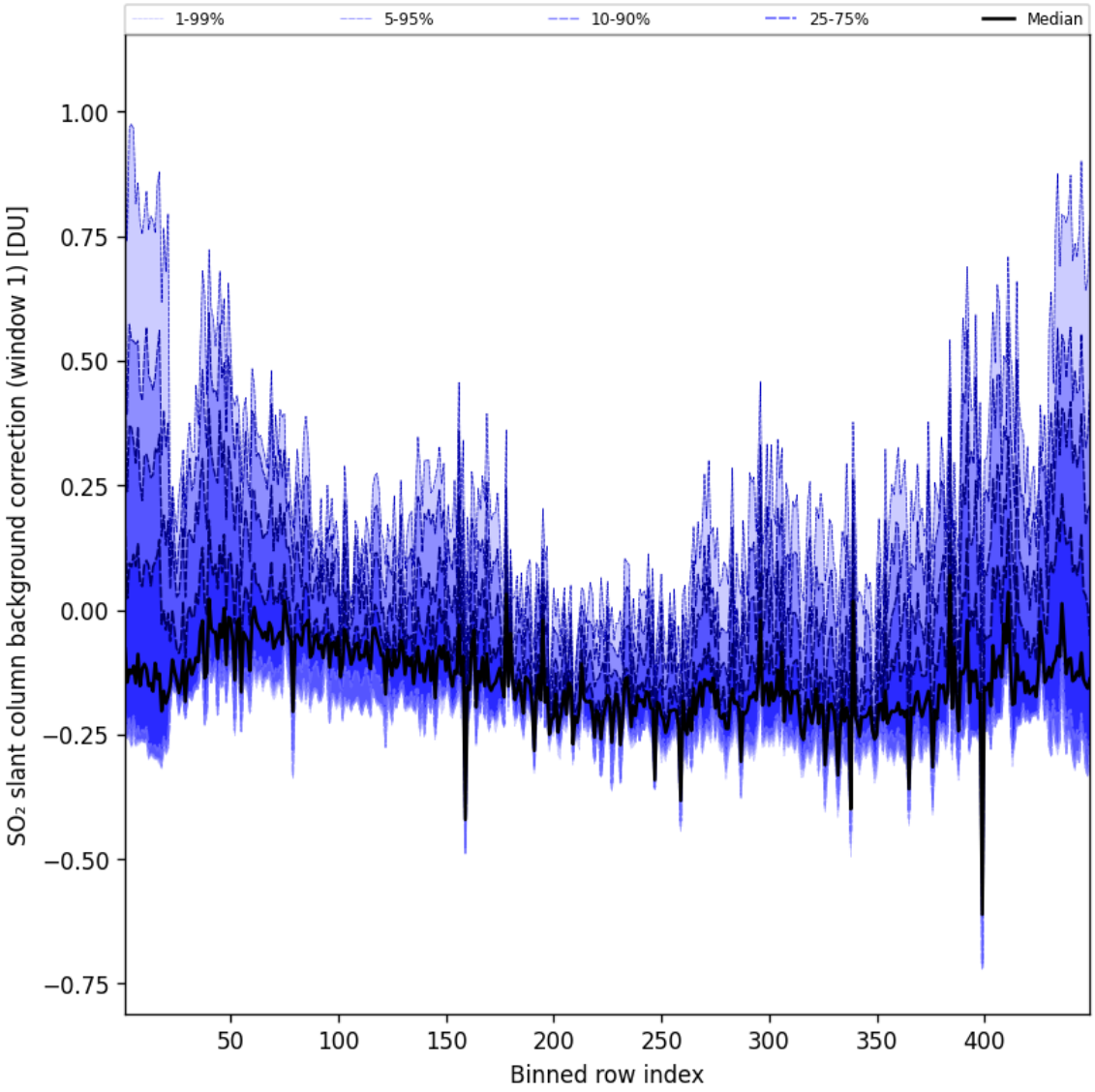

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-04-22 to 2025-04-22

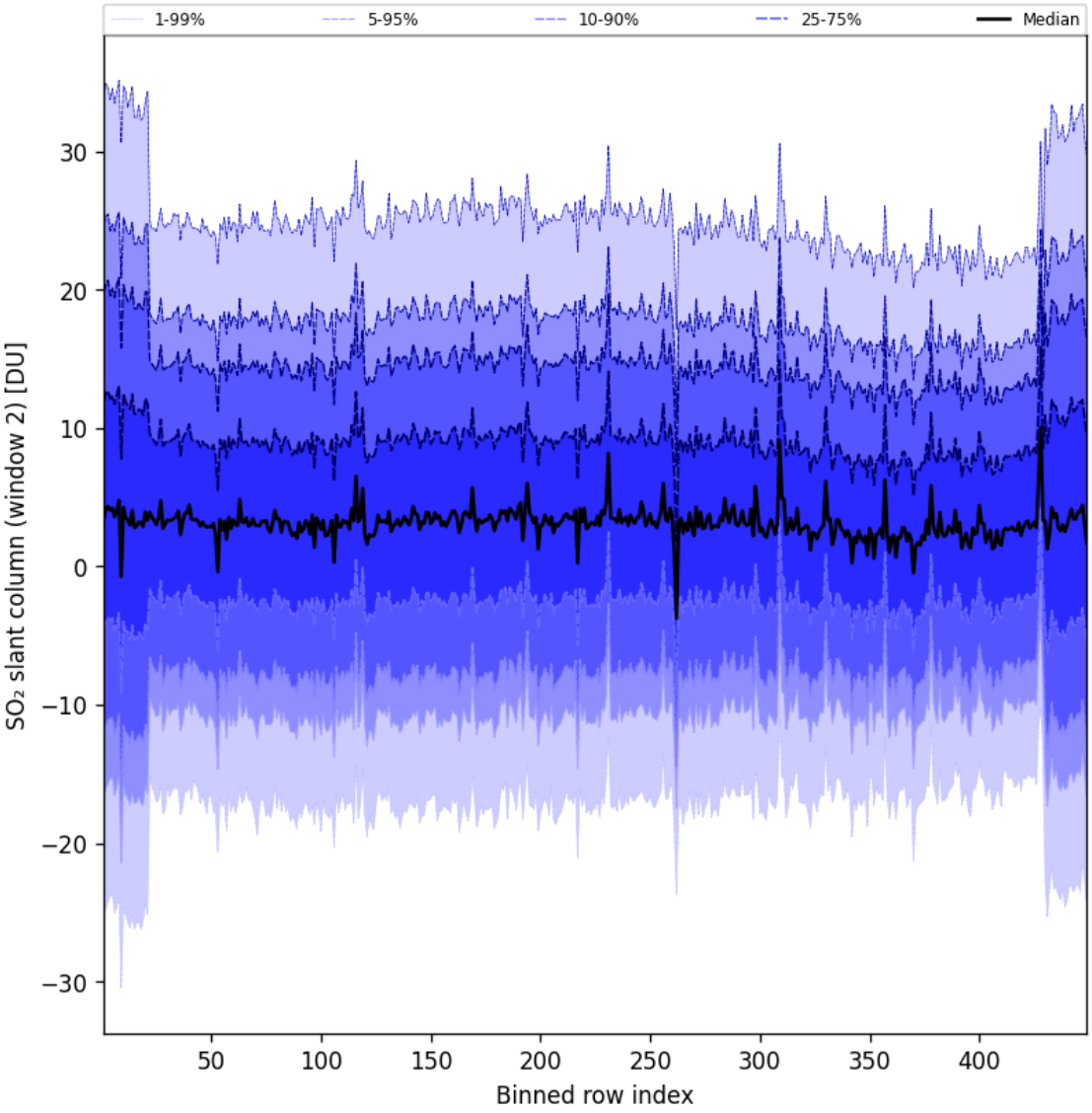

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-04-22 to 2025-04-22

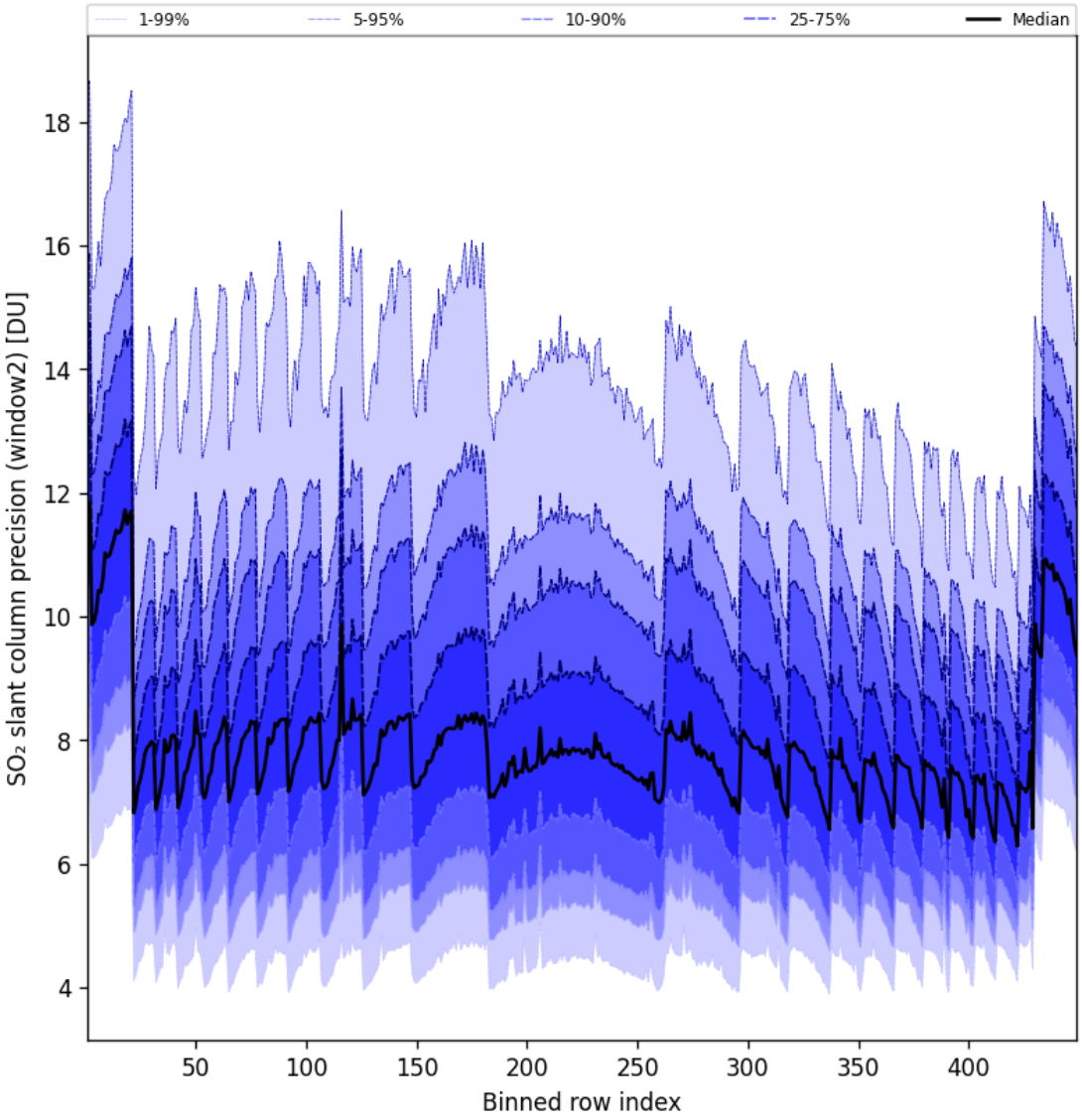

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-04-22 to 2025-04-22

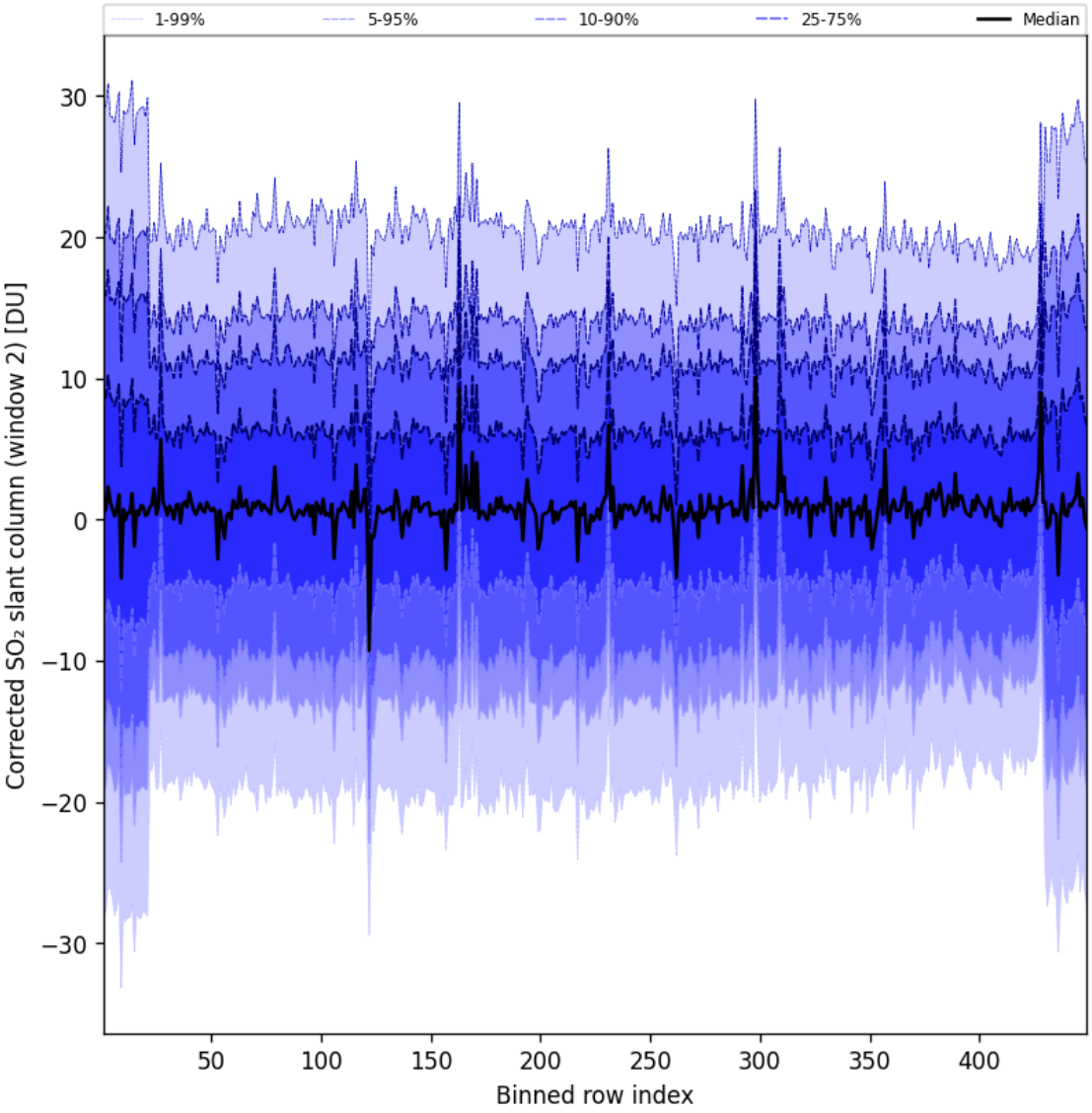

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-04-22 to 2025-04-22

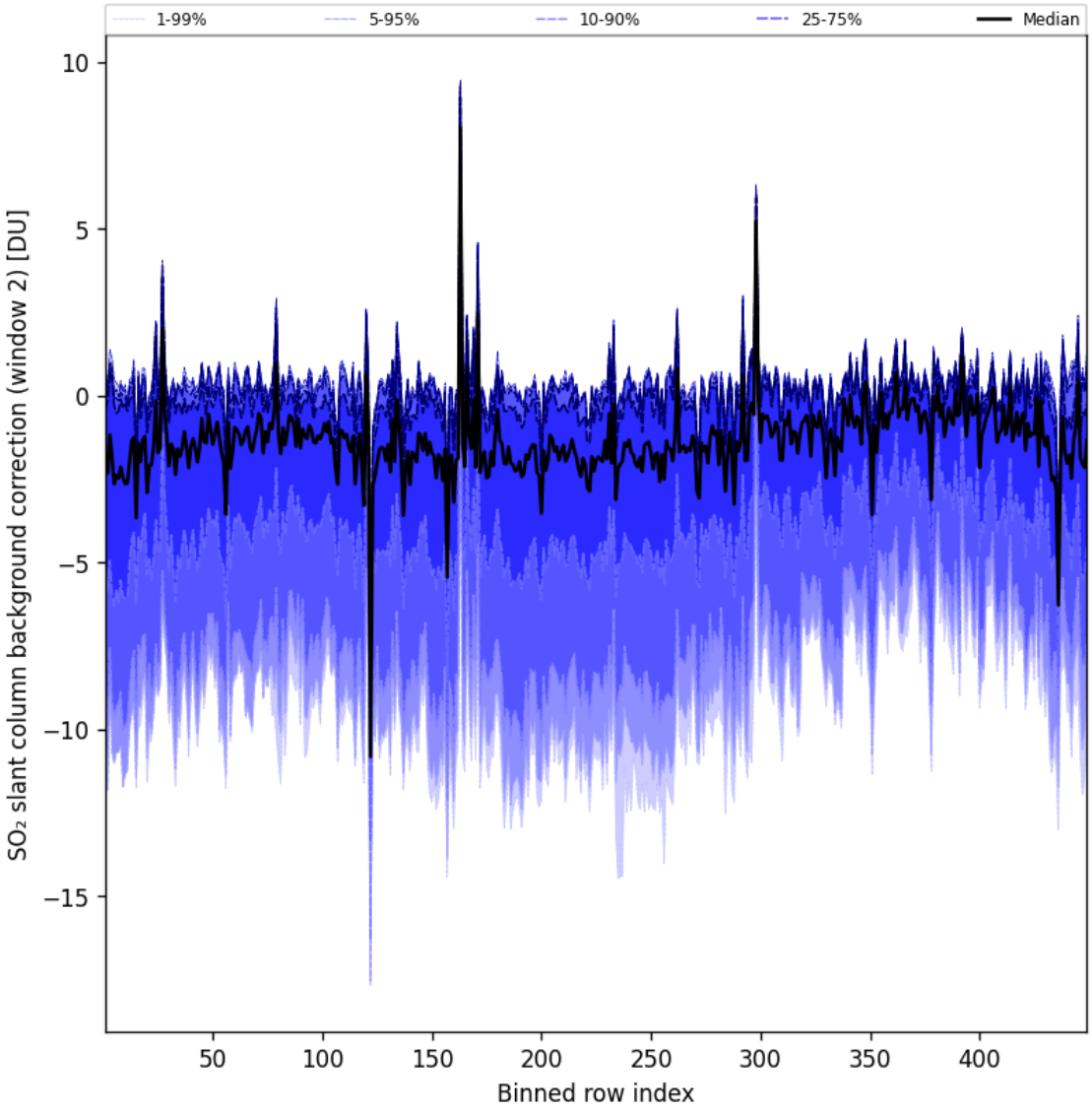

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-04-22 to 2025-04-22

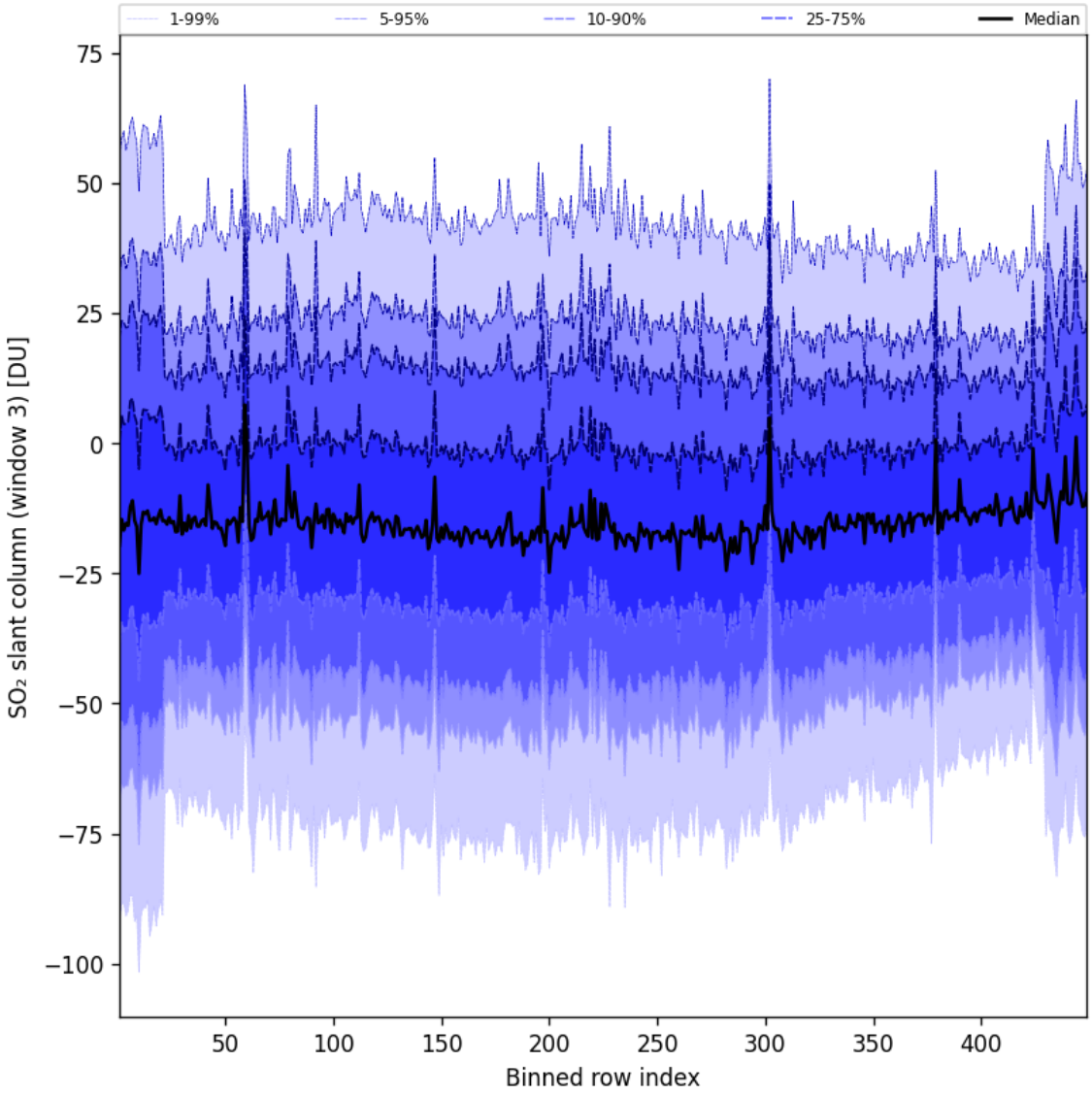

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-04-22 to 2025-04-22

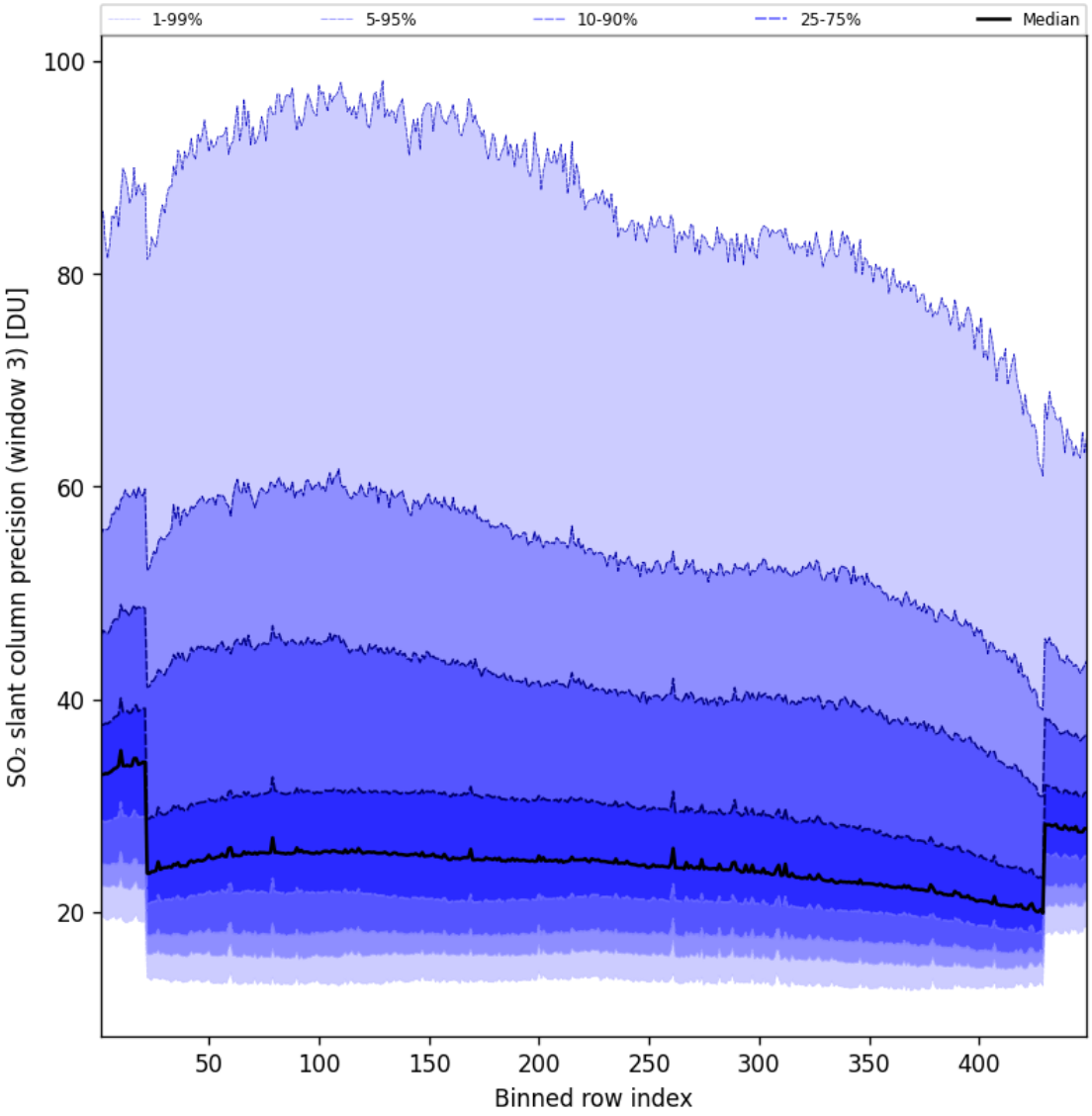

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-04-22 to 2025-04-22

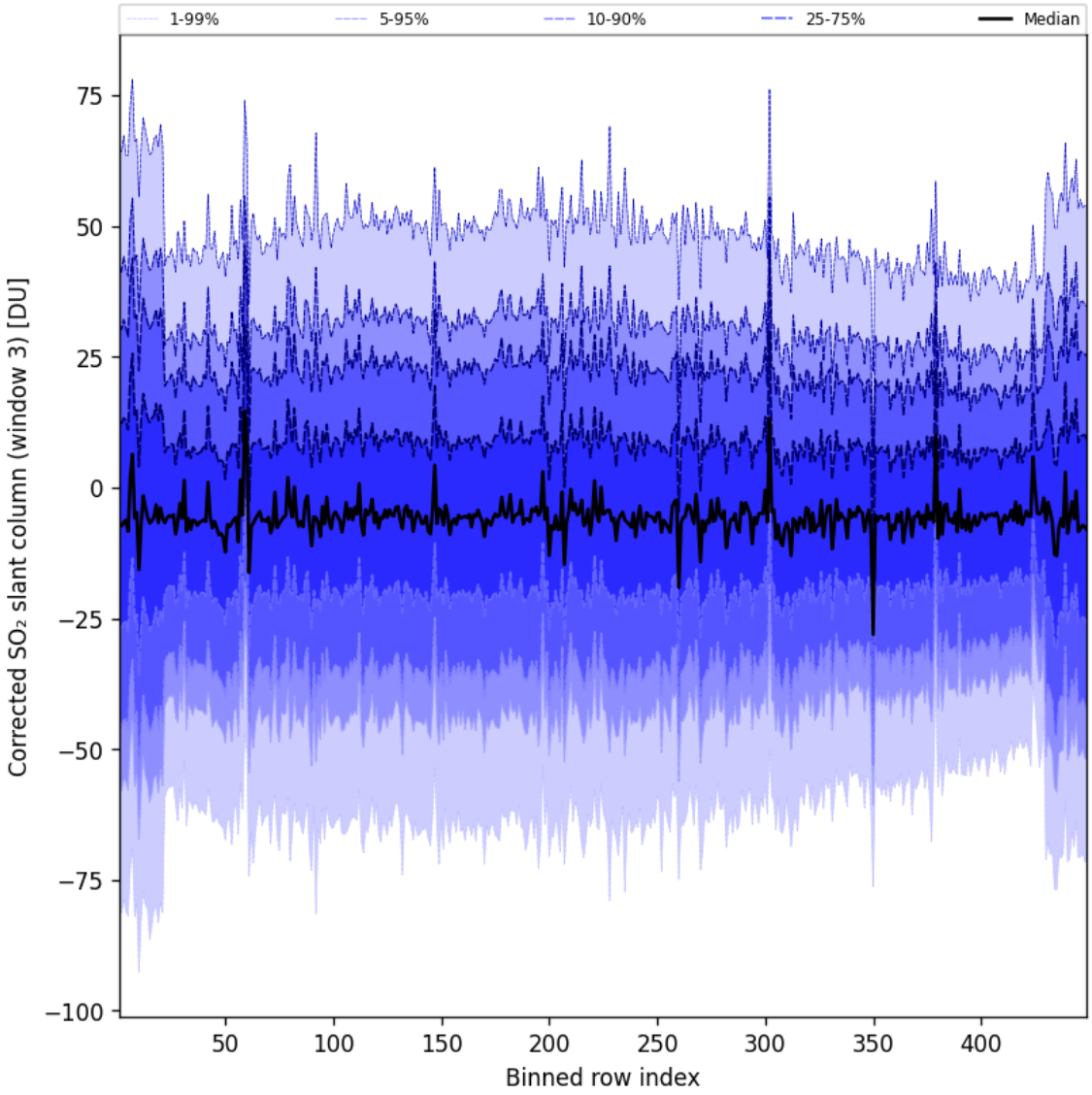

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-04-22 to 2025-04-22

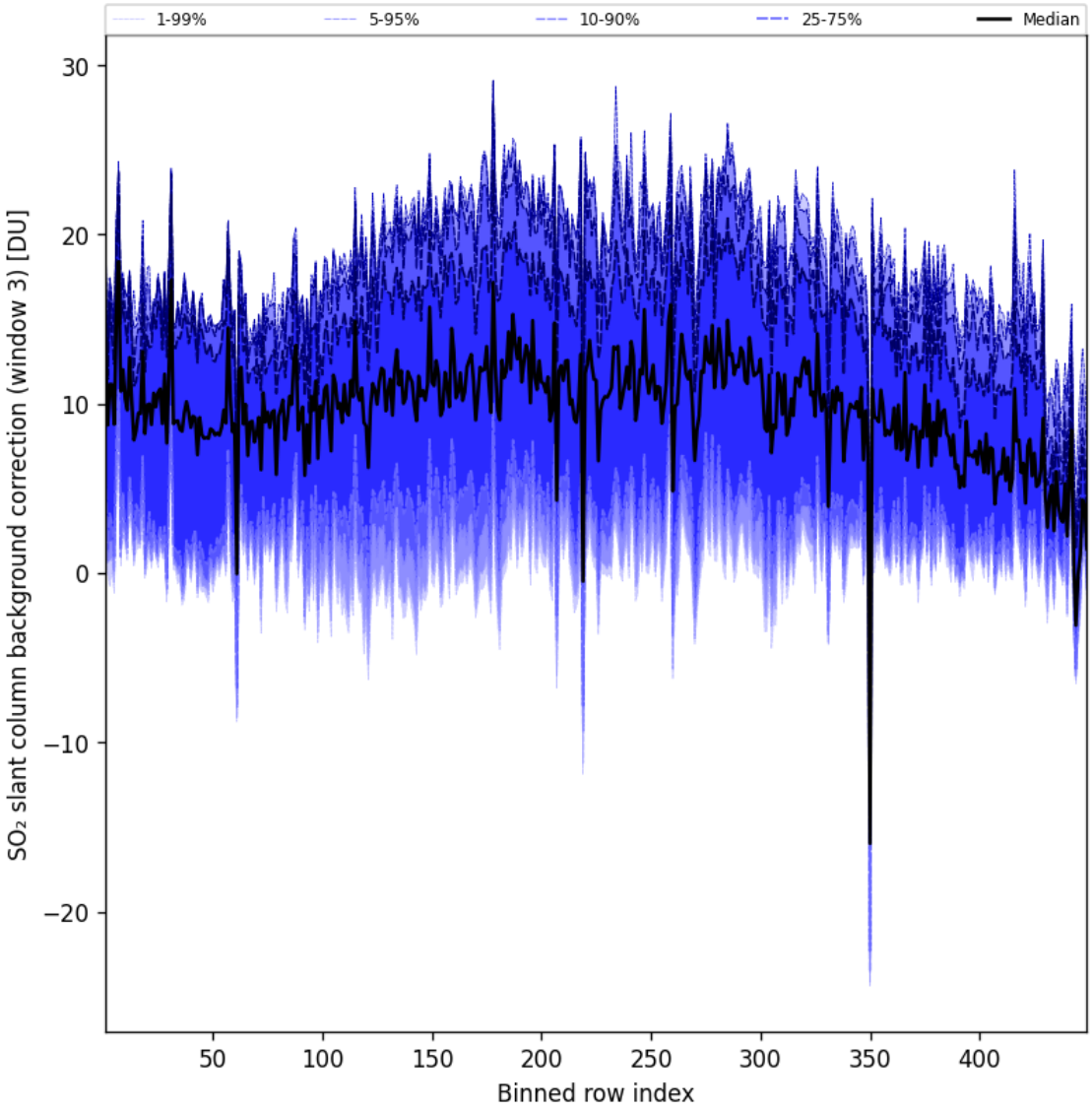

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-04-22 to 2025-04-22

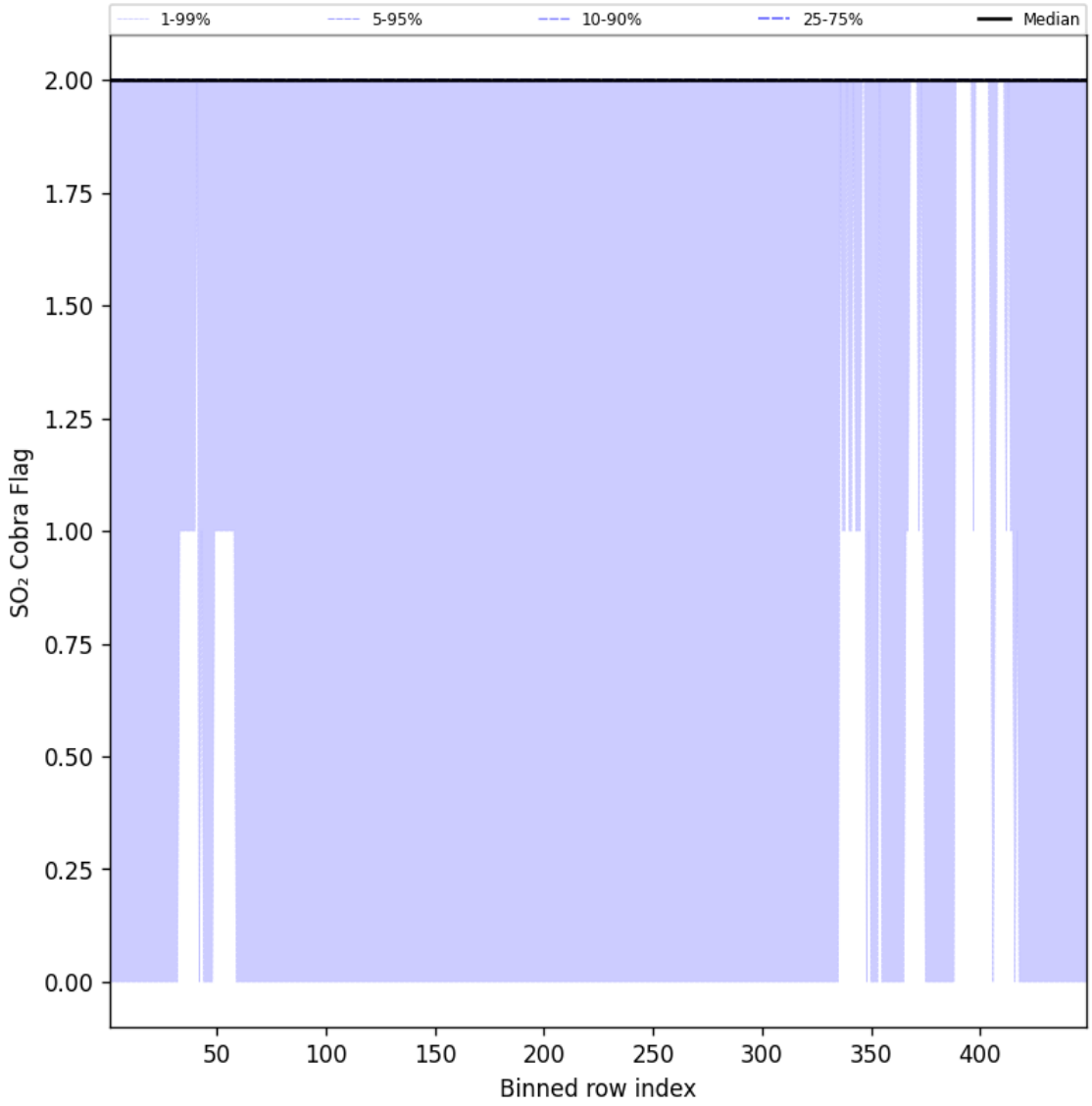

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-04-22 to 2025-04-22

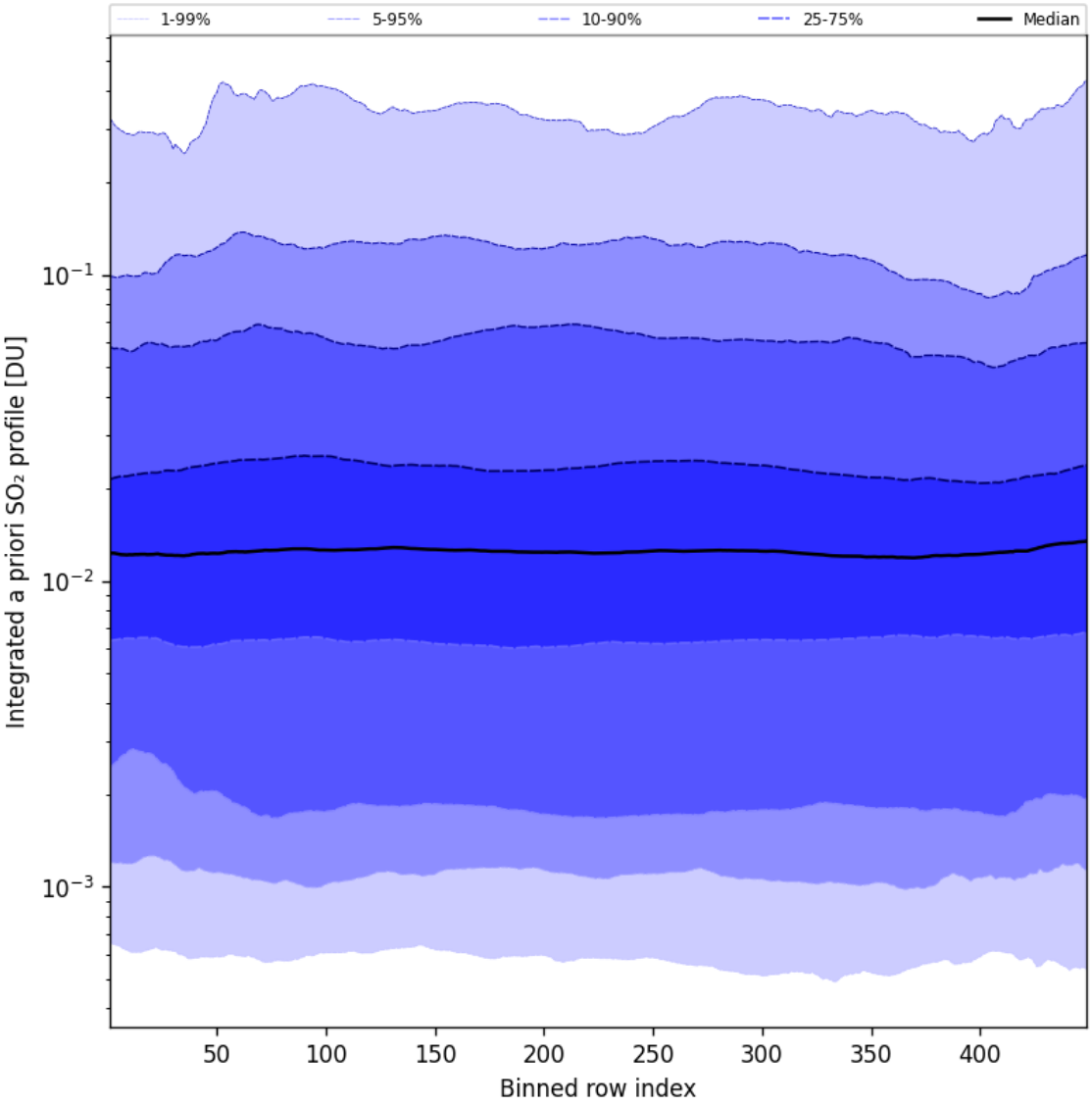

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-04-22 to 2025-04-22

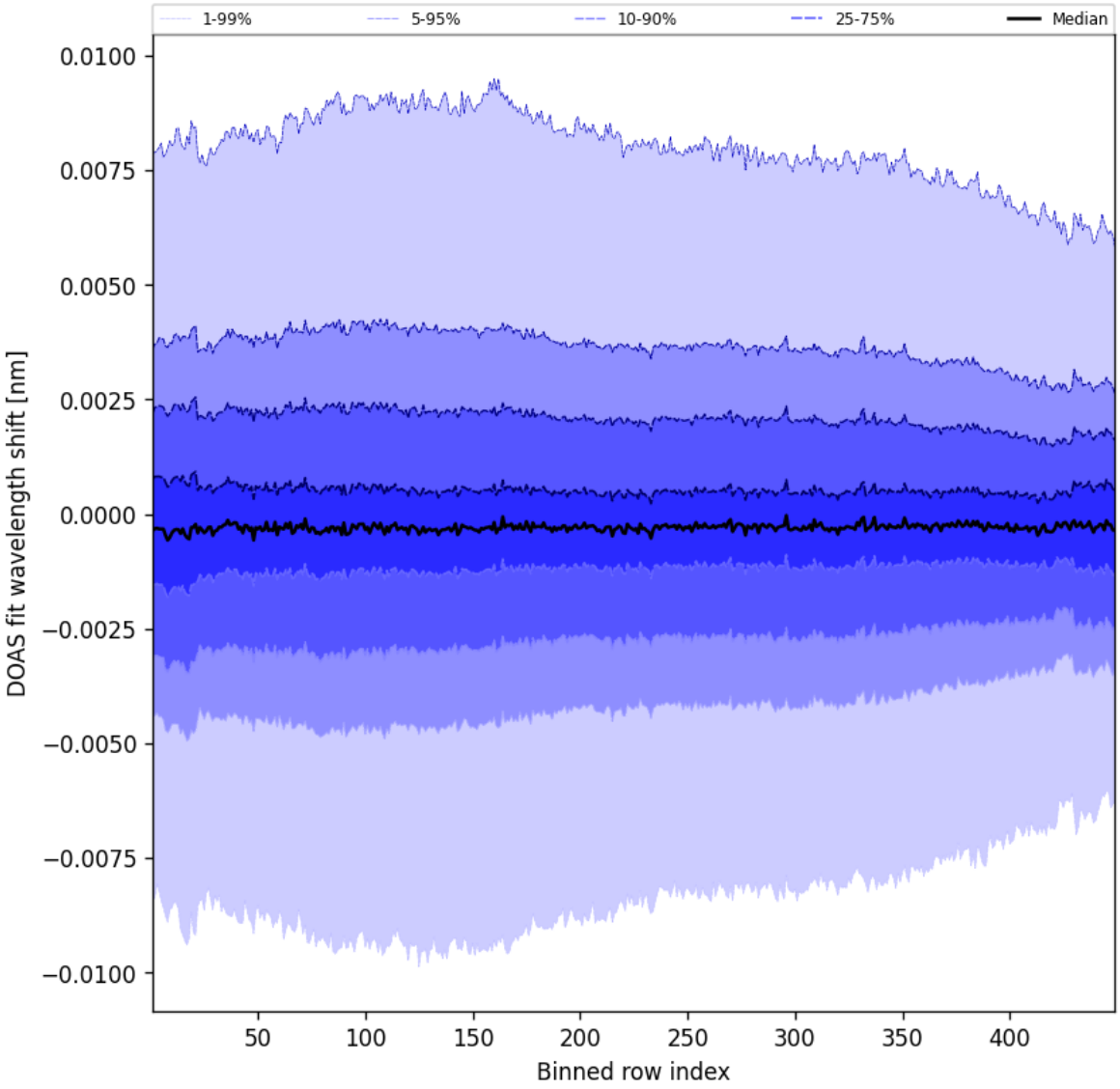

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-04-22 to 2025-04-22

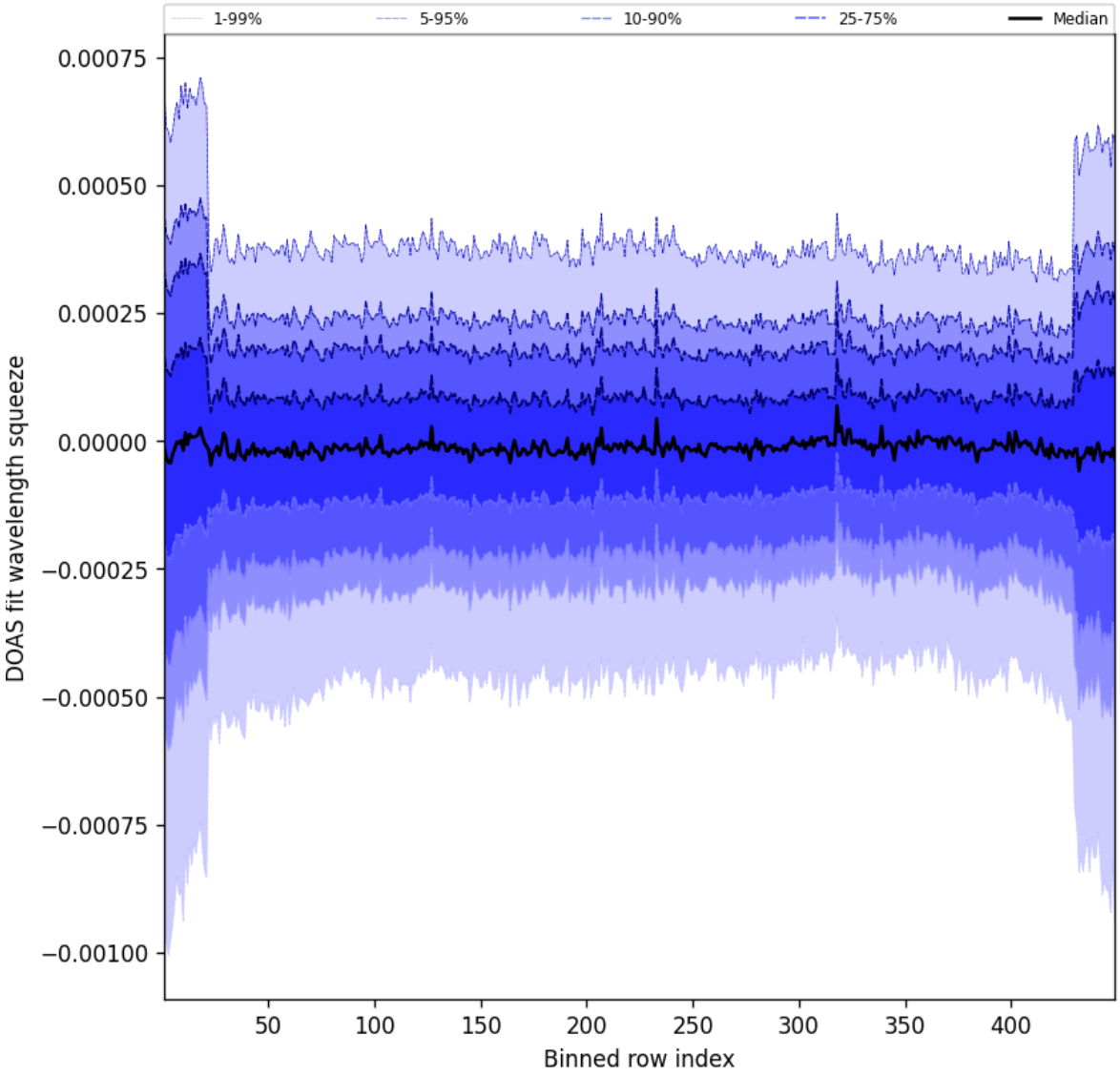

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-04-22 to 2025-04-22

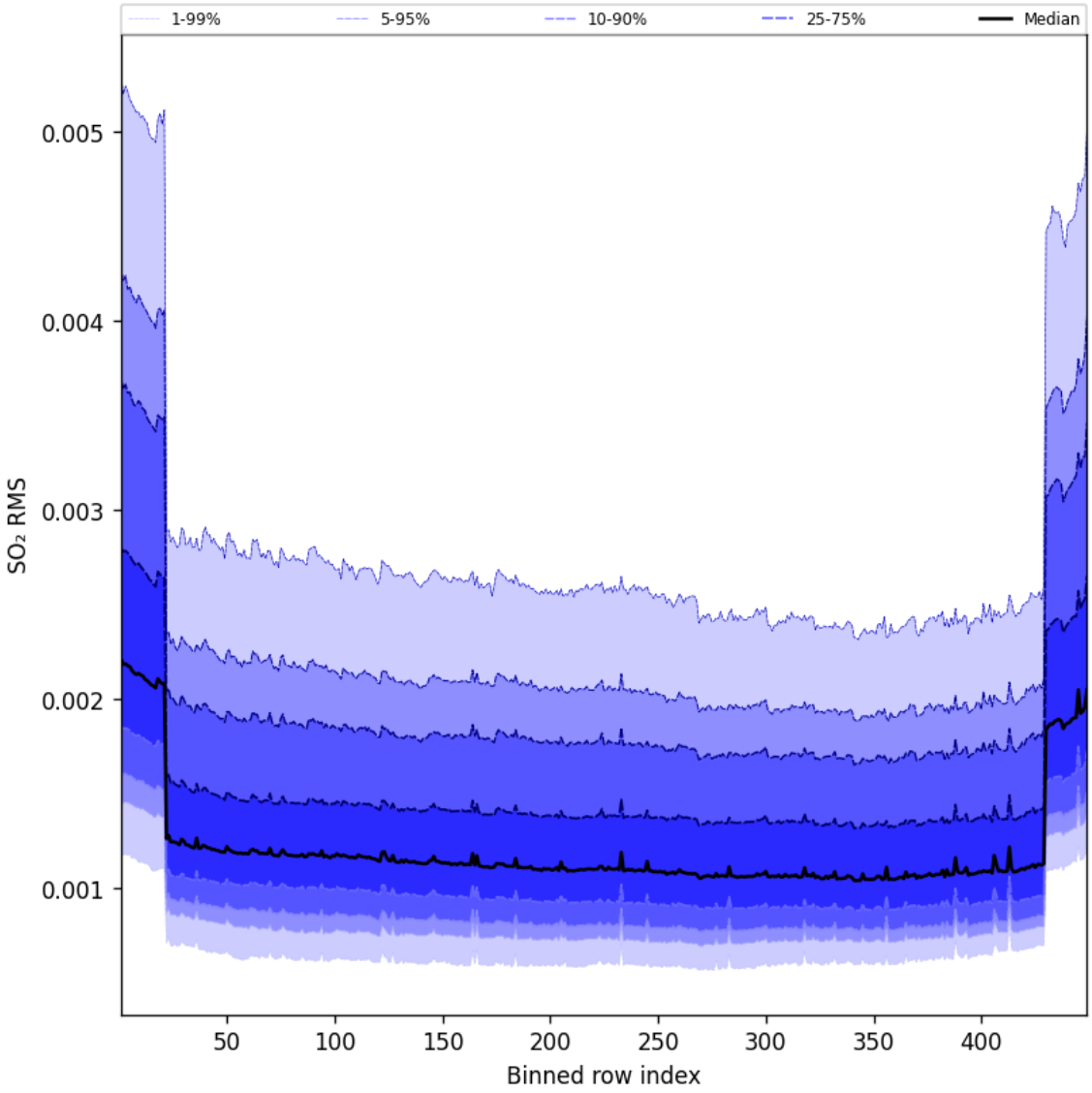

Figure 106: Along track statistics of "SO_2 RMS" for 2025-04-22 to 2025-04-22

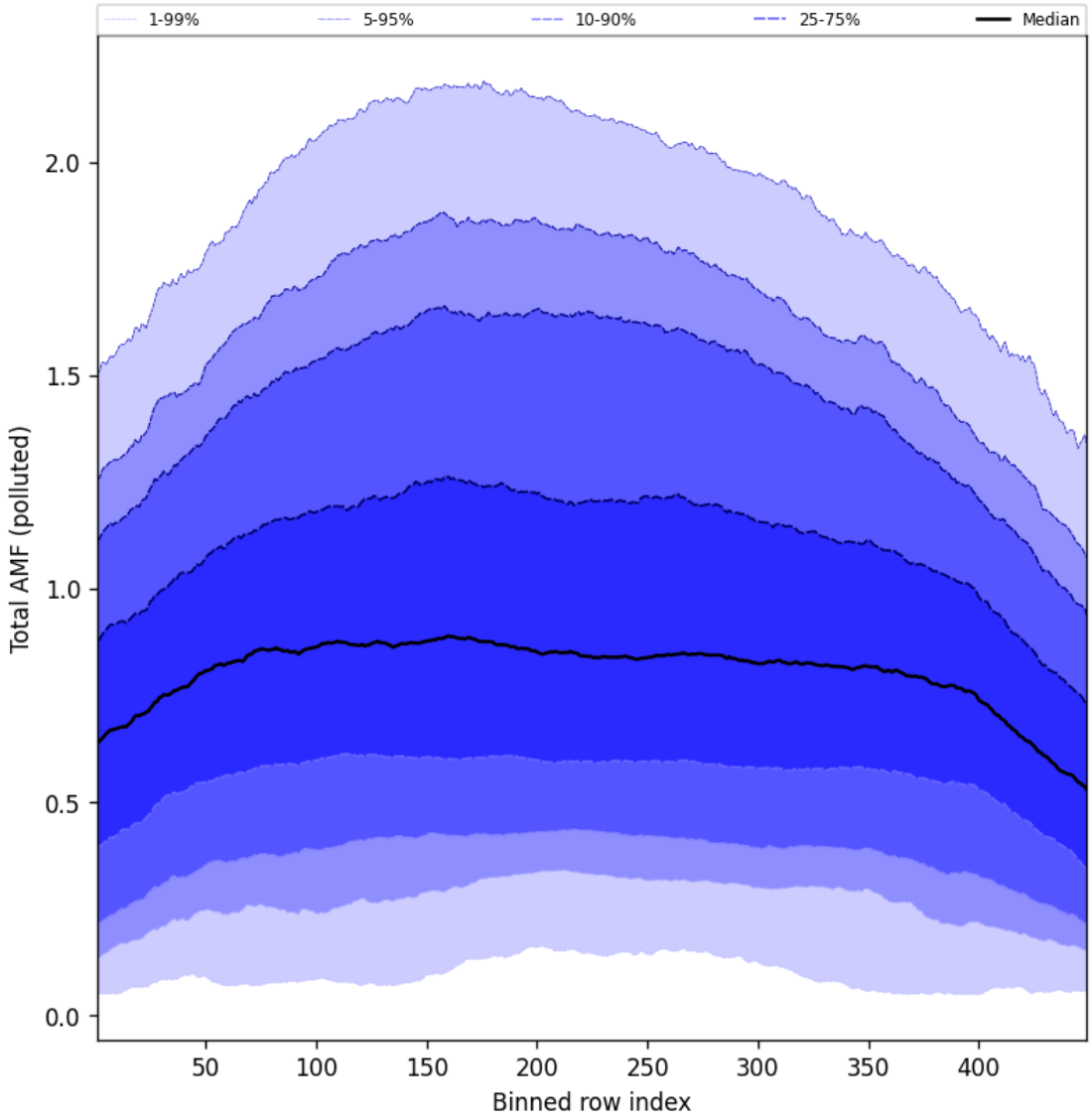

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-04-22 to 2025-04-22

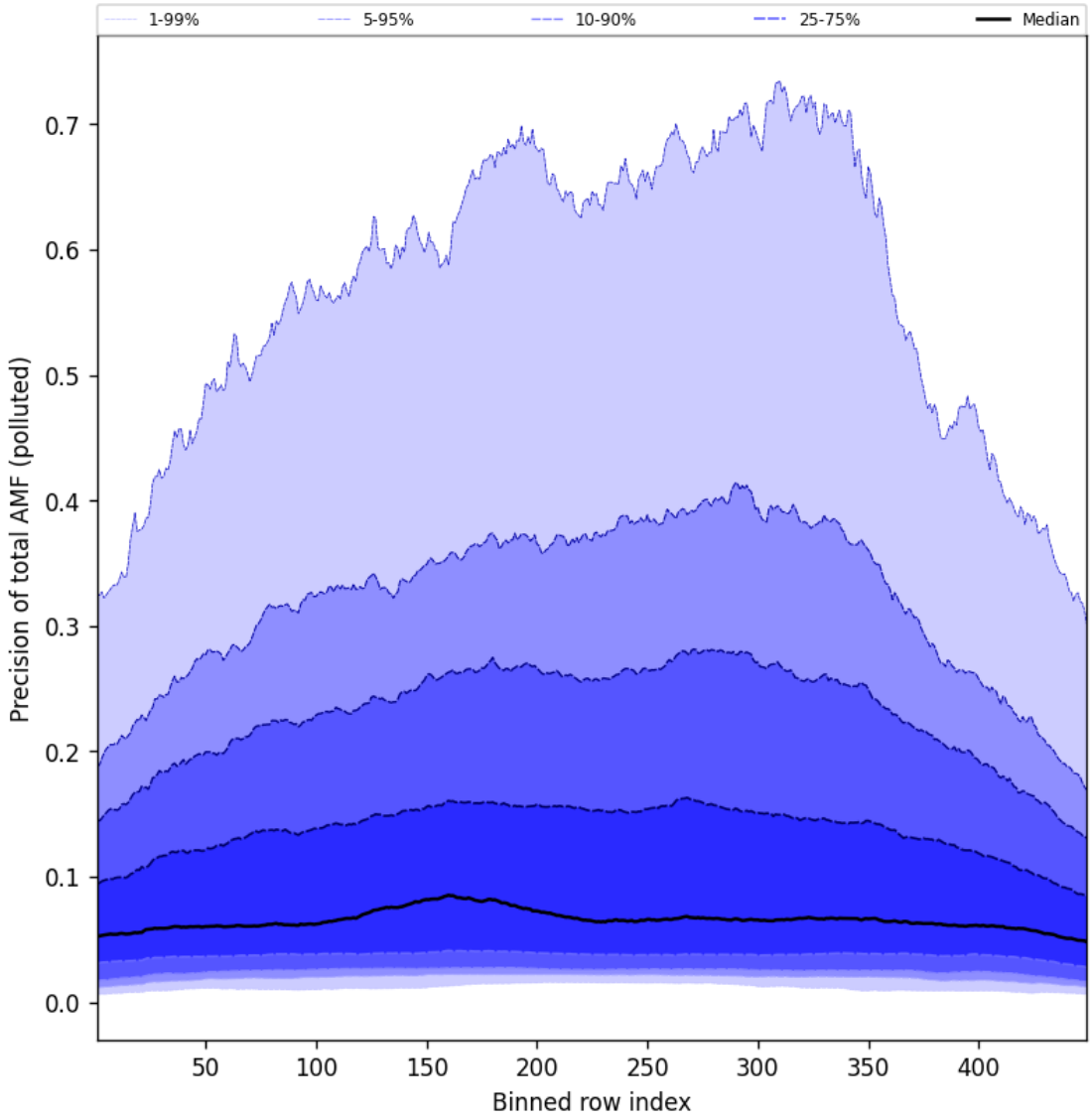

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-04-22 to 2025-04-22

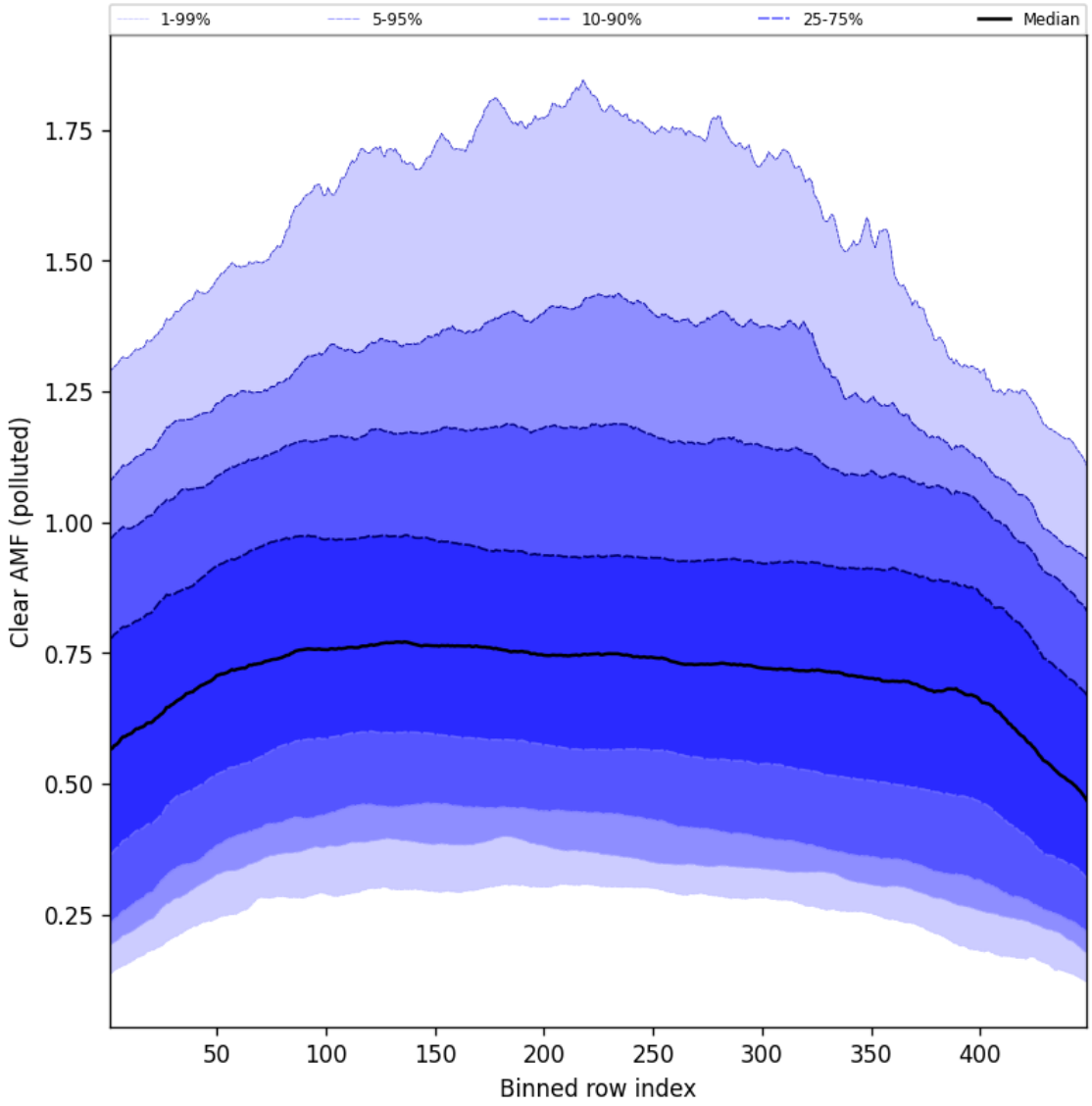

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-04-22 to 2025-04-22

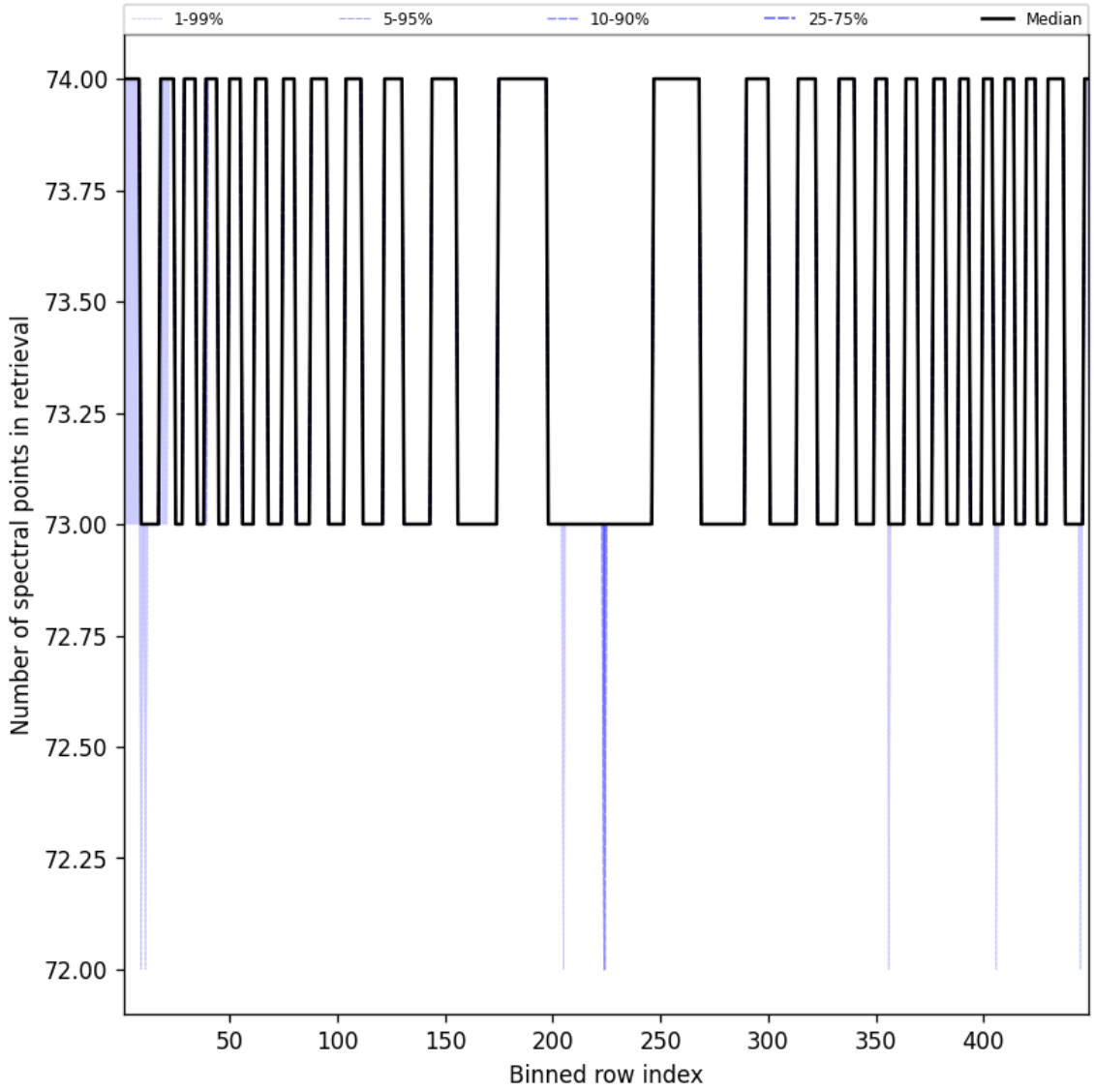

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-04-22 to 2025-04-22

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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