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]	0.659 ± 0.406	18586873	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.418 \pm 132.374) \times 10^{-2}$	18586873	0.263	0.464	1.119×10^{-2}	-84.2	228
sulfurdioxide total vertical column precision [DU]	0.618 ± 0.991	18586873	0.222	0.404	0.326	3.994×10^{-2}	32.7
sulfurdioxide slant column density corrected [DU]	$(2.009 \pm 37.398) \times 10^{-2}$	18586873	0.242	0.356	9.412×10^{-3}	-24.5	118
sulfurdioxide slant column density cobra [DU]	$(1.995 \pm 36.616) \times 10^{-2}$	18586873	0.242	0.356	9.412×10^{-3}	-24.5	54.4
sulfurdioxide slant column density cobra precision [DU]	0.290 ± 0.141	18586873	0.188	0.148	0.245	8.387×10^{-2}	18.1
sulfurdioxide slant column density window1 [DU]	0.192 ± 0.693	18586873	0.225	0.735	0.205	-38.5	84.7
sulfurdioxide slant column density window1 precision [DU]	0.290 ± 0.141	18586873	0.188	0.148	0.245	8.387×10^{-2}	18.1
sulfurdioxide slant column density corrected win1 [DU]	$(4.789 \pm 67.994) \times 10^{-2}$	18586873	2.500×10^{-2}	0.713	2.818×10^{-2}	-38.5	85.2
background so2 slant column offset window1 [DU]	-0.144 ± 0.188	18586873	-0.260	0.215	-0.176	-1.34	8.01
sulfurdioxide slant column density window2 [DU]	1.69 ± 9.05	18586873	1.25	11.4	1.42	-755	1.192×10^{3}
sulfurdioxide slant column density window2 precision [DU]	8.04 ± 2.17	18586873	7.43	2.56	7.71	2.02	393
sulfurdioxide slant column density corrected win2 [DU]	0.243 ± 8.742	18586873	0.250	11.0	0.258	-755	1.192×10^{3}
background so2 slant column offset window2 [DU]	-1.45 ± 2.92	18586873	0.750	3.59	-0.422	-18.4	7.13
sulfurdioxide slant column density window3 [DU]	-11.1 ± 24.2	18586873	-11.8	30.8	-11.2	-1.113×10^{3}	2.977×10^{3}
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 12.9	18586873	22.5	9.55	24.3	9.17	1.471×10^{3}
sulfurdioxide slant column density corrected win3 [DU]	-6.95 ± 23.20	18586873	-8.40	29.4	-7.02	-1.119×10^{3}	2.977×10^{3}
background so2 slant column offset window3 [DU]	4.20 ± 7.39	18586873	-0.560	12.0	3.53	-18.9	30.6
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	18586873	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.764 \pm 10.212) \times 10^{-2}$	18586873	1.800×10^{-2}	1.910×10^{-2}	1.723×10^{-2}	1.953×10^{-4}	3.37
fitted radiance shift [nm]	$(-4.540 \pm 25.241) \times 10^{-4}$	18586873	-5.000×10^{-4}	1.802×10^{-3}	-4.528×10^{-4}	-5.958×10^{-2}	5.613×10^{-2}
fitted radiance squeeze [1]	$(-2.737 \pm 18.923) \times 10^{-5}$	18586873	-1.000×10^{-5}	2.048×10^{-4}	-2.042×10^{-5}	-1.527×10^{-2}	2.069×10^{-2}
fitted root mean square [1]	$(1.277 \pm 0.580) \times 10^{-3}$	18586873	9.250×10^{-4}	5.922×10^{-4}	1.097×10^{-3}	3.168×10^{-4}	4.887×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.818 ± 0.450	18586873	0.740	0.553	0.754	5.000×10^{-2}	2.91
sulfurdioxide total air mass factor polluted precision [1]	0.117 ± 0.137	18586873	3.500×10^{-2}	0.119	6.399×10^{-2}	2.500×10^{-3}	1.80
sulfurdioxide clear air mass factor polluted [1]	0.713 ± 0.357	18586873	0.580	0.393	0.668	3.530×10^{-2}	2.91
number of spectral points in retrieval [1]	73.4 ± 0.5	18586873	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}	0.110	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.08	−1.02	−0.582	−0.377	−0.217	0.248	0.425	0.660	1.18	3.69
sulfurdioxide total vertical column precision [DU]	9.611×10^{-2}	0.131	0.157	0.181	0.214	0.617	0.887	1.24	1.96	5.11
sulfurdioxide slant column density corrected [DU]	−0.864	−0.488	−0.350	−0.260	−0.167	0.189	0.289	0.388	0.550	1.06
sulfurdioxide slant column density cobra [DU]	−0.864	−0.488	−0.350	−0.260	−0.167	0.189	0.289	0.388	0.550	1.06
sulfurdioxide slant column density cobra precision [DU]	0.135	0.162	0.175	0.185	0.199	0.346	0.400	0.453	0.546	0.812
sulfurdioxide slant column density window1 [DU]	−1.73	−0.881	−0.571	−0.371	−0.168	0.567	0.756	0.940	1.22	2.00
sulfurdioxide slant column density window1 precision [DU]	0.135	0.162	0.175	0.185	0.199	0.346	0.400	0.453	0.546	0.812
sulfurdioxide slant column density corrected win1 [DU]	−1.67	−0.942	−0.679	−0.506	−0.323	0.390	0.590	0.790	1.11	2.01
background so2 slant column offset window1 [DU]	−0.508	−0.342	−0.314	−0.295	−0.272	-5.669×10^{-2}	1.708×10^{-2}	9.054×10^{-2}	0.192	0.425
sulfurdioxide slant column density window2 [DU]	−19.1	−12.5	−9.30	−6.89	−4.17	7.25	10.3	13.0	16.8	24.9
sulfurdioxide slant column density window2 precision [DU]	4.29	5.18	5.70	6.11	6.59	9.15	10.0	10.8	12.0	14.4
sulfurdioxide slant column density corrected win2 [DU]	−21.1	−13.9	−10.5	−8.05	−5.27	5.77	8.53	11.0	14.4	21.5
background so2 slant column offset window2 [DU]	−9.84	−7.66	−6.01	−4.54	−2.94	0.646	0.899	1.11	1.48	3.27
sulfurdioxide slant column density window3 [DU]	−70.8	−50.8	−41.2	−34.2	−26.5	4.27	12.2	19.3	28.8	47.4
sulfurdioxide slant column density window3 precision [DU]	13.6	16.1	17.8	19.2	20.7	30.2	34.7	40.5	52.2	83.0
sulfurdioxide slant column density corrected win3 [DU]	−64.4	−44.8	−35.6	−28.9	−21.6	7.78	15.3	22.0	31.1	49.3
background so2 slant column offset window3 [DU]	−9.85	−6.46	−5.11	−3.74	−1.76	10.2	12.5	14.2	16.2	19.9
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	1.012×10^{-3}	3.305×10^{-3}	5.522×10^{-3}	7.787×10^{-3}	1.066×10^{-2}	2.976×10^{-2}	4.327×10^{-2}	6.238×10^{-2}	0.114	0.436
fitted radiance shift [nm]	-8.038×10^{-3}	-4.194×10^{-3}	-2.848×10^{-3}	-2.074×10^{-3}	-1.398×10^{-3}	4.041×10^{-4}	1.098×10^{-3}	1.961×10^{-3}	3.446×10^{-3}	7.458×10^{-3}
fitted radiance squeeze [1]	-5.765×10^{-4}	-3.306×10^{-4}	-2.406×10^{-4}	-1.832×10^{-4}	-1.252×10^{-4}	7.964×10^{-5}	1.313×10^{-4}	1.804×10^{-4}	2.538×10^{-4}	4.441×10^{-4}
fitted root mean square [1]	5.785×10^{-4}	7.126×10^{-4}	7.840×10^{-4}	8.382×10^{-4}	9.053×10^{-4}	1.498×10^{-3}	1.732×10^{-3}	1.966×10^{-3}	2.384×10^{-3}	3.390×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.964×10^{-2}	0.198	0.296	0.386	0.498	1.05	1.25	1.44	1.70	2.19
sulfurdioxide total air mass factor polluted precision [1]	9.275×10^{-3}	1.590×10^{-2}	2.176×10^{-2}	2.716×10^{-2}	3.483×10^{-2}	0.153	0.208	0.267	0.374	0.664
sulfurdioxide clear air mass factor polluted [1]	0.155	0.261	0.337	0.404	0.482	0.875	0.975	1.08	1.25	2.28
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]	0.686 ± 0.398	8608022	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(7.370 \pm 178.630) \times 10^{-2}$	8608022	0.596	1.566×10^{-2}	-69.7	228	-0.272	0.324
sulfurdioxide total vertical column precision [DU]	0.856 ± 1.312	8608022	0.663	0.442	5.090×10^{-2}	32.7	0.248	0.911
sulfurdioxide slant column density corrected [DU]	$(2.781 \pm 43.888) \times 10^{-2}$	8608022	0.393	1.190×10^{-2}	-11.3	118	-0.182	0.211
sulfurdioxide slant column density cobra [DU]	$(2.752 \pm 42.495) \times 10^{-2}$	8608022	0.393	1.190×10^{-2}	-11.3	54.4	-0.182	0.211
sulfurdioxide slant column density cobra precision [DU]	0.325 ± 0.165	8608022	0.184	0.276	8.907×10^{-2}	14.2	0.210	0.394
sulfurdioxide slant column density window1 [DU]	0.229 ± 0.788	8608022	0.802	0.242	-12.7	54.6	-0.162	0.640
sulfurdioxide slant column density window1 precision [DU]	0.325 ± 0.165	8608022	0.184	0.276	8.907×10^{-2}	14.2	0.210	0.394
sulfurdioxide slant column density corrected win1 [DU]	$(7.618 \pm 77.971) \times 10^{-2}$	8608022	0.789	4.751×10^{-2}	-11.6	54.4	-0.337	0.452
background so2 slant column offset window1 [DU]	-0.153 ± 0.204	8608022	0.208	-0.192	-1.33	8.01	-0.280	-7.199×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.47 ± 9.54	8608022	12.2	2.12	-133	180	-3.81	8.37
sulfurdioxide slant column density window2 precision [DU]	8.38 ± 2.17	8608022	2.70	8.03	2.22	159	6.86	9.57
sulfurdioxide slant column density corrected win2 [DU]	$(4.609 \pm 909.182) \times 10^{-2}$	8608022	11.6	8.316×10^{-2}	-141	172	-5.72	5.85
background so2 slant column offset window2 [DU]	-2.42 ± 3.54	8608022	5.90	-1.20	-18.4	6.77	-5.34	0.562
sulfurdioxide slant column density window3 [DU]	-14.0 ± 24.6	8608022	31.5	-13.9	-196	157	-29.6	1.91
sulfurdioxide slant column density window3 precision [DU]	28.4 ± 12.5	8608022	9.47	25.0	9.83	228	21.4	30.9
sulfurdioxide slant column density corrected win3 [DU]	-6.90 ± 23.70	8608022	30.1	-6.77	-180	160	-21.8	8.25
background so2 slant column offset window3 [DU]	7.07 ± 6.98	8608022	12.1	7.03	-13.6	30.6	0.799	12.9
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.25	8608022	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.775 \pm 14.528) \times 10^{-2}$	8608022	3.776×10^{-2}	1.951×10^{-2}	1.953×10^{-4}	3.37	1.051×10^{-2}	4.827×10^{-2}
fitted radiance shift [nm]	$(-2.966 \pm 24.505) \times 10^{-4}$	8608022	1.652×10^{-3}	-3.111×10^{-4}	-4.132×10^{-2}	3.691×10^{-2}	-1.147×10^{-3}	5.051×10^{-4}
fitted radiance squeeze [1]	$(-1.299 \pm 21.747) \times 10^{-5}$	8608022	2.239×10^{-4}	-4.689×10^{-6}	-1.219×10^{-2}	2.069×10^{-2}	-1.183×10^{-4}	1.056×10^{-4}
fitted root mean square [1]	$(1.418 \pm 0.687) \times 10^{-3}$	8608022	7.226×10^{-4}	1.200×10^{-3}	3.463×10^{-4}	4.081×10^{-2}	9.559×10^{-4}	1.679×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.707 ± 0.409	8608022	0.506	0.652	5.000×10^{-2}	2.90	0.408	0.914
sulfurdioxide total air mass factor polluted precision [1]	$(9.811 \pm 14.179) \times 10^{-2}$	8608022	8.557×10^{-2}	4.785×10^{-2}	2.500×10^{-3}	1.80	2.769×10^{-2}	0.113
sulfurdioxide clear air mass factor polluted [1]	0.607 ± 0.279	8608022	0.417	0.585	3.530×10^{-2}	2.59	0.386	0.803
number of spectral points in retrieval [1]	73.5 ± 0.5	8608022	1.000	73.0	53.0	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]	0.636 ± 0.412	9978851	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(1.872 \pm 71.407) \times 10^{-2}$	9978851	0.388	8.421×10^{-3}	-84.2	95.6	-0.184	0.204
sulfurdioxide total vertical column precision [DU]	0.413 ± 0.504	9978851	0.260	0.275	3.994×10^{-2}	31.9	0.194	0.454
sulfurdioxide slant column density corrected [DU]	$(1.343 \pm 30.702) \times 10^{-2}$	9978851	0.329	7.593×10^{-3}	-24.5	38.1	-0.156	0.173
sulfurdioxide slant column density cobra [DU]	$(1.342 \pm 30.638) \times 10^{-2}$	9978851	0.329	7.593×10^{-3}	-24.5	36.0	-0.156	0.173
sulfurdioxide slant column density cobra precision [DU]	0.261 ± 0.106	9978851	0.116	0.227	8.387×10^{-2}	18.1	0.191	0.307
sulfurdioxide slant column density window1 [DU]	0.160 ± 0.598	9978851	0.683	0.177	-38.5	84.7	-0.173	0.511
sulfurdioxide slant column density window1 precision [DU]	0.261 ± 0.106	9978851	0.116	0.227	8.387×10^{-2}	18.1	0.191	0.307
sulfurdioxide slant column density corrected win1 [DU]	$(2.349 \pm 57.914) \times 10^{-2}$	9978851	0.657	1.412×10^{-2}	-38.5	85.2	-0.312	0.345
background so2 slant column offset window1 [DU]	-0.136 ± 0.173	9978851	0.221	-0.164	-1.34	1.78	-0.264	-4.359×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.02 ± 8.55	9978851	10.8	0.891	-755	1.192×10^{3}	-4.44	6.34
sulfurdioxide slant column density window2 precision [DU]	7.75 ± 2.12	9978851	2.40	7.46	2.02	393	6.39	8.79
sulfurdioxide slant column density corrected win2 [DU]	0.413 ± 8.426	9978851	10.6	0.397	-755	1.192×10^{3}	-4.91	5.71
background so2 slant column offset window2 [DU]	-0.605 ± 1.885	9978851	2.42	-6.910×10^{-2}	-9.82	7.13	-1.73	0.690
sulfurdioxide slant column density window3 [DU]	-8.71 ± 23.63	9978851	29.9	-9.13	-1.113×10^{3}	2.977×10^{3}	-23.8	6.16
sulfurdioxide slant column density window3 precision [DU]	27.3 ± 13.2	9978851	9.51	23.7	9.17	1.471×10^{3}	20.1	29.6
sulfurdioxide slant column density corrected win3 [DU]	-6.98 ± 22.75	9978851	28.7	-7.22	-1.119×10^{3}	2.977×10^{3}	-21.4	7.38
background so2 slant column offset window3 [DU]	1.72 ± 6.82	9978851	11.5	0.687	-18.9	25.0	-4.06	7.45
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	9978851	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.028 \pm 2.384) \times 10^{-2}$	9978851	1.280×10^{-2}	1.623×10^{-2}	7.684×10^{-4}	1.63	1.075×10^{-2}	2.354×10^{-2}
fitted radiance shift [nm]	$(-5.898 \pm 25.782) \times 10^{-4}$	9978851	1.893×10^{-3}	-5.927×10^{-4}	-5.958×10^{-2}	5.613×10^{-2}	-1.593×10^{-3}	2.996×10^{-4}
fitted radiance squeeze [1]	$(-3.977 \pm 15.991) \times 10^{-5}$	9978851	1.897×10^{-4}	-3.200×10^{-5}	-1.527×10^{-2}	1.419×10^{-2}	-1.301×10^{-4}	5.956×10^{-5}
fitted root mean square [1]	$(1.156 \pm 0.434) \times 10^{-3}$	9978851	4.795×10^{-4}	1.034×10^{-3}	3.168×10^{-4}	4.887×10^{-2}	8.714×10^{-4}	1.351×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.915 ± 0.462	9978851	0.570	0.841	5.000×10^{-2}	2.91	0.591	1.16
sulfurdioxide total air mass factor polluted precision [1]	0.134 ± 0.130	9978851	0.141	8.806×10^{-2}	4.937×10^{-3}	1.44	4.253×10^{-2}	0.184
sulfurdioxide clear air mass factor polluted [1]	0.804 ± 0.390	9978851	0.377	0.726	0.146	2.91	0.557	0.934
number of spectral points in retrieval [1]	73.4 ± 0.5	9978851	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]	0.687 ± 0.400	13714938	0.740	1.000	0.0	1.000	0.260	1.000
sulfurdioxide total vertical column [DU]	$(3.311 \pm 111.182) \times 10^{-2}$	13714938	0.435	9.386×10^{-3}	-84.2	108	-0.206	0.230
sulfurdioxide total vertical column precision [DU]	0.532 ± 0.817	13714938	0.329	0.302	5.156×10^{-2}	31.9	0.210	0.539
sulfurdioxide slant column density corrected [DU]	$(1.614 \pm 34.886) \times 10^{-2}$	13714938	0.341	7.888×10^{-3}	-24.5	56.9	-0.161	0.180
sulfurdioxide slant column density cobra [DU]	$(1.601 \pm 34.219) \times 10^{-2}$	13714938	0.341	7.888×10^{-3}	-24.5	39.6	-0.161	0.180
sulfurdioxide slant column density cobra precision [DU]	0.277 ± 0.133	13714938	0.132	0.233	8.485×10^{-2}	18.1	0.194	0.326
sulfurdioxide slant column density window1 [DU]	0.182 ± 0.659	13714938	0.704	0.196	-38.5	84.7	-0.162	0.542
sulfurdioxide slant column density window1 precision [DU]	0.277 ± 0.133	13714938	0.132	0.233	8.485×10^{-2}	18.1	0.194	0.326
sulfurdioxide slant column density corrected win1 [DU]	$(3.265 \pm 64.577) \times 10^{-2}$	13714938	0.684	1.773×10^{-2}	-38.5	85.2	-0.321	0.364
background so2 slant column offset window1 [DU]	-0.149 ± 0.179	13714938	0.209	-0.177	-1.22	7.70	-0.272	-6.294×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.34 ± 8.82	13714938	11.1	1.10	-755	1.192×10^{3}	-4.35	6.75
sulfurdioxide slant column density window2 precision [DU]	7.89 ± 2.09	13714938	2.48	7.56	2.02	316	6.48	8.97
sulfurdioxide slant column density corrected win2 [DU]	0.300 ± 8.562	13714938	10.8	0.295	-755	1.192×10^{3}	-5.13	5.71
background so2 slant column offset window2 [DU]	-1.04 ± 2.54	13714938	2.89	-0.249	-14.4	7.13	-2.21	0.678
sulfurdioxide slant column density window3 [DU]	-8.48 ± 23.97	13714938	30.5	-8.69	-1.113×10^{3}	168	-23.7	6.81
sulfurdioxide slant column density window3 precision [DU]	27.3 ± 12.6	13714938	9.38	23.9	9.17	227	20.4	29.8
sulfurdioxide slant column density corrected win3 [DU]	-5.02 ± 22.74	13714938	29.0	-5.32	-1.119×10^{3}	159	-19.6	9.43
background so2 slant column offset window3 [DU]	3.46 ± 6.98	13714938	11.0	2.69	-18.9	29.9	-2.05	8.93
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	13714938	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.569 \pm 6.145) \times 10^{-2}$	13714938	1.374×10^{-2}	1.658×10^{-2}	3.068×10^{-4}	2.70	1.120×10^{-2}	2.494×10^{-2}
fitted radiance shift [nm]	$(-4.496 \pm 24.420) \times 10^{-4}$	13714938	1.816×10^{-3}	-4.288×10^{-4}	-5.958×10^{-2}	5.613×10^{-2}	-1.399×10^{-3}	4.170×10^{-4}
fitted radiance squeeze [1]	$(-3.397 \pm 17.772) \times 10^{-5}$	13714938	1.956×10^{-4}	-2.401×10^{-5}	-1.450×10^{-2}	2.069×10^{-2}	-1.249×10^{-4}	7.068×10^{-5}
fitted root mean square [1]	$(1.225 \pm 0.557) \times 10^{-3}$	13714938	5.261×10^{-4}	1.051×10^{-3}	3.168×10^{-4}	4.887×10^{-2}	8.845×10^{-4}	1.411×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.823 ± 0.398	13714938	0.499	0.783	5.000×10^{-2}	2.90	0.546	1.04
sulfurdioxide total air mass factor polluted precision [1]	0.113 ± 0.117	13714938	0.111	6.661×10^{-2}	2.500×10^{-3}	1.44	3.850×10^{-2}	0.150
sulfurdioxide clear air mass factor polluted [1]	0.717 ± 0.274	13714938	0.358	0.694	4.524×10^{-2}	2.59	0.522	0.880
number of spectral points in retrieval [1]	73.4 ± 0.5	13714938	1.000	73.0	71.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.612 ± 0.414	3807200	0.810	1.000	0.0	1.000	0.190	1.000
sulfurdioxide total vertical column [DU]	$(6.171 \pm 154.430) \times 10^{-2}$	3807200	0.532	1.530×10^{-2}	-57.6	228	-0.240	0.292
sulfurdioxide total vertical column precision [DU]	0.758 ± 1.170	3807200	0.604	0.395	3.994×10^{-2}	32.6	0.221	0.825
sulfurdioxide slant column density corrected [DU]	$(2.780 \pm 40.177) \times 10^{-2}$	3807200	0.390	1.329×10^{-2}	-7.80	118	-0.179	0.211
sulfurdioxide slant column density cobra [DU]	$(2.771 \pm 39.381) \times 10^{-2}$	3807200	0.390	1.329×10^{-2}	-7.80	23.1	-0.179	0.211
sulfurdioxide slant column density cobra precision [DU]	0.312 ± 0.136	3807200	0.154	0.280	8.637×10^{-2}	12.5	0.215	0.370
sulfurdioxide slant column density window1 [DU]	0.226 ± 0.732	3807200	0.805	0.236	-19.1	32.4	-0.172	0.633
sulfurdioxide slant column density window1 precision [DU]	0.312 ± 0.136	3807200	0.154	0.280	8.637×10^{-2}	12.5	0.215	0.370
sulfurdioxide slant column density corrected win1 [DU]	$(8.430 \pm 71.550) \times 10^{-2}$	3807200	0.776	5.891×10^{-2}	-19.2	32.4	-0.320	0.456
background so2 slant column offset window1 [DU]	-0.142 ± 0.196	3807200	0.225	-0.184	-1.34	4.50	-0.277	-5.200×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.23 ± 9.42	3807200	12.1	2.05	-568	932	-3.89	8.17
sulfurdioxide slant column density window2 precision [DU]	8.39 ± 2.31	3807200	2.59	8.06	2.31	393	6.93	9.51
sulfurdioxide slant column density corrected win2 [DU]	$(7.994 \pm 914.384) \times 10^{-2}$	3807200	11.5	0.144	-568	931	-5.66	5.88
background so2 slant column offset window2 [DU]	-2.15 ± 3.35	3807200	5.31	-0.888	-18.4	7.13	-4.72	0.595
sulfurdioxide slant column density window3 [DU]	-18.6 ± 23.5	3807200	29.6	-18.2	-577	2.977×10^{3}	-33.2	-3.57
sulfurdioxide slant column density window3 precision [DU]	29.1 ± 14.0	3807200	9.80	25.3	9.90	1.471×10^{3}	21.5	31.3
sulfurdioxide slant column density corrected win3 [DU]	-13.0 ± 23.7	3807200	29.8	-12.5	-583	2.977×10^{3}	-27.6	2.15
background so2 slant column offset window3 [DU]	5.55 ± 7.96	3807200	13.7	5.75	-18.9	30.6	-1.28	12.4
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.30	3807200	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.967 \pm 16.033) \times 10^{-2}$	3807200	5.168×10^{-2}	2.380×10^{-2}	1.953×10^{-4}	3.37	8.421×10^{-3}	6.010×10^{-2}
fitted radiance shift [nm]	$(-4.631 \pm 27.735) \times 10^{-4}$	3807200	1.685×10^{-3}	-5.247×10^{-4}	-4.912×10^{-2}	4.227×10^{-2}	-1.363×10^{-3}	3.217×10^{-4}
fitted radiance squeeze [1]	$(-7.855 \pm 2019.001) \times 10^{-7}$	3807200	2.262×10^{-4}	-4.594×10^{-6}	-1.527×10^{-2}	1.419×10^{-2}	-1.166×10^{-4}	1.096×10^{-4}
fitted root mean square [1]	$(1.361 \pm 0.548) \times 10^{-3}$	3807200	6.143×10^{-4}	1.232×10^{-3}	3.422×10^{-4}	4.487×10^{-2}	9.861×10^{-4}	1.600×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.841 ± 0.592	3807200	0.734	0.659	5.000×10^{-2}	2.91	0.406	1.14
sulfurdioxide total air mass factor polluted precision [1]	0.132 ± 0.184	3807200	0.142	5.284×10^{-2}	2.500×10^{-3}	1.80	2.616×10^{-2}	0.168
sulfurdioxide clear air mass factor polluted [1]	0.742 ± 0.557	3807200	0.498	0.591	3.530×10^{-2}	2.91	0.378	0.875
number of spectral points in retrieval [1]	73.4 ± 0.5	3807200	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

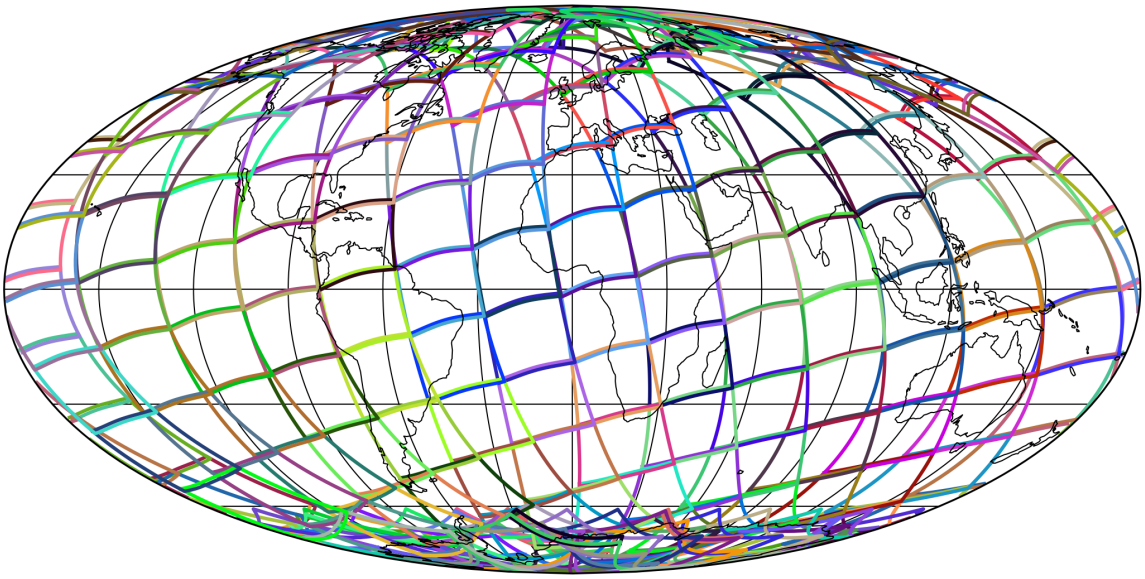

Figure 1: Outline of the granules.

4 Input data monitoring

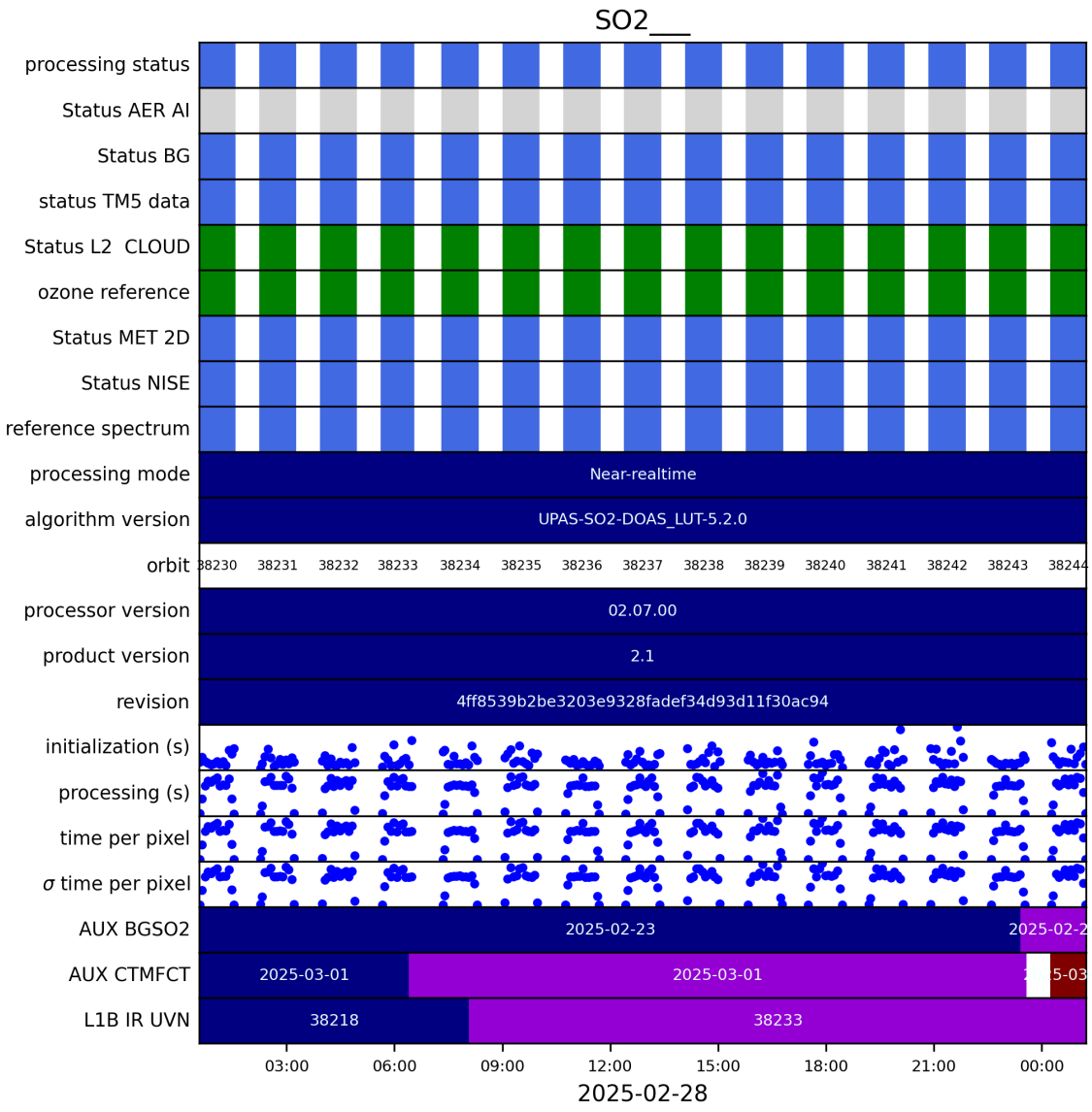

Figure 2: Input data per granule

5 Warnings and errors

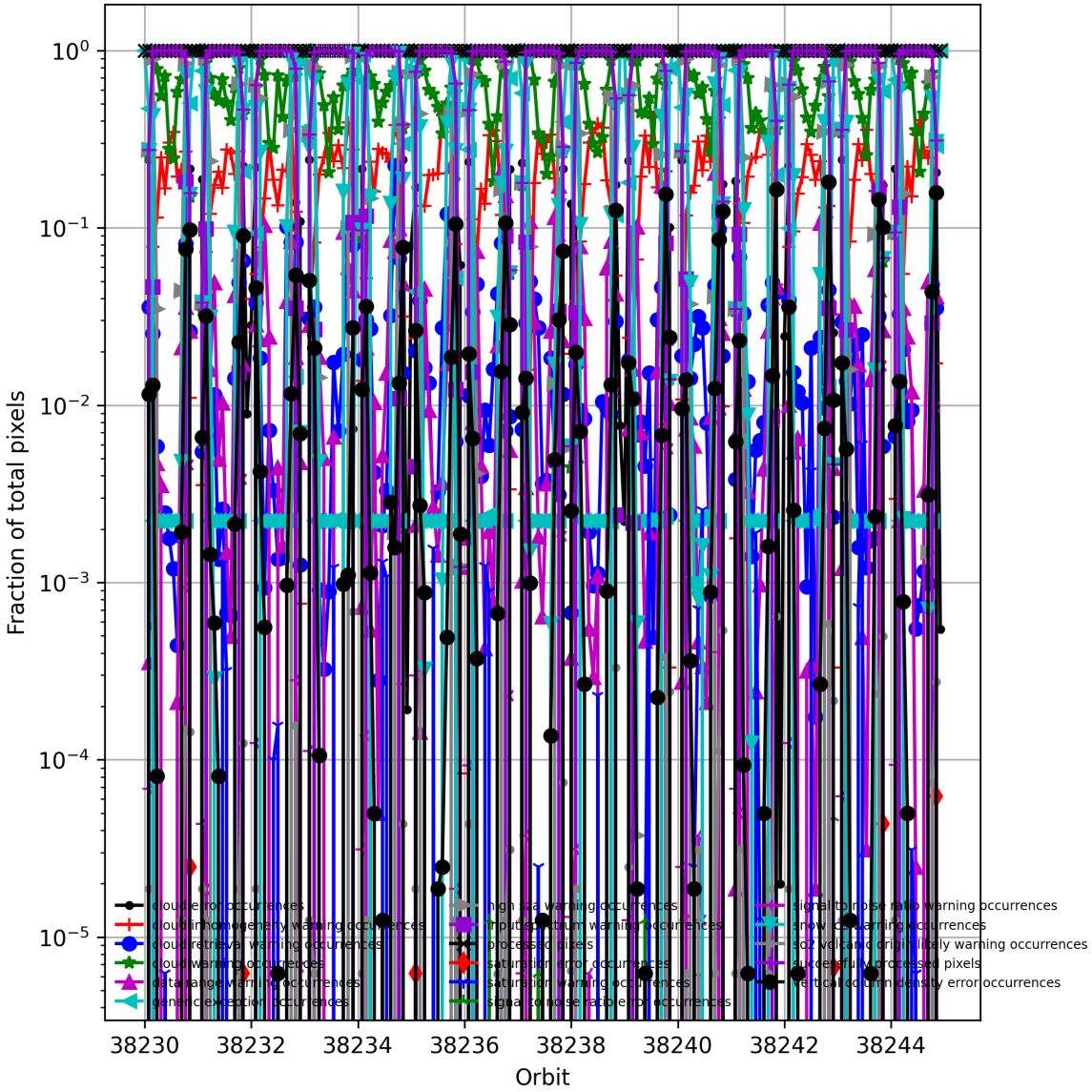

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

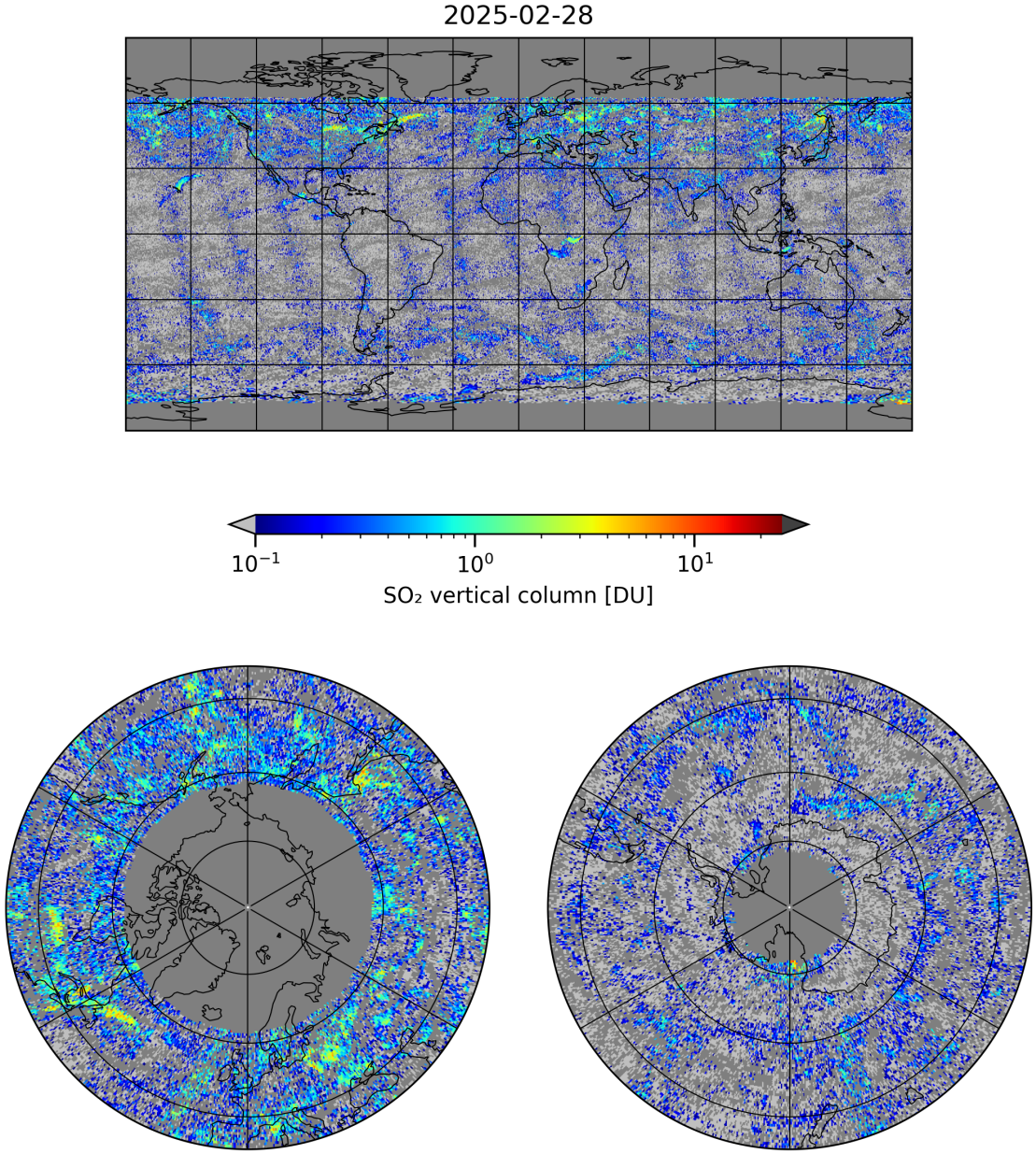

Figure 4: Map of "SO_2 vertical column" for 2025-02-28 to 2025-03-01

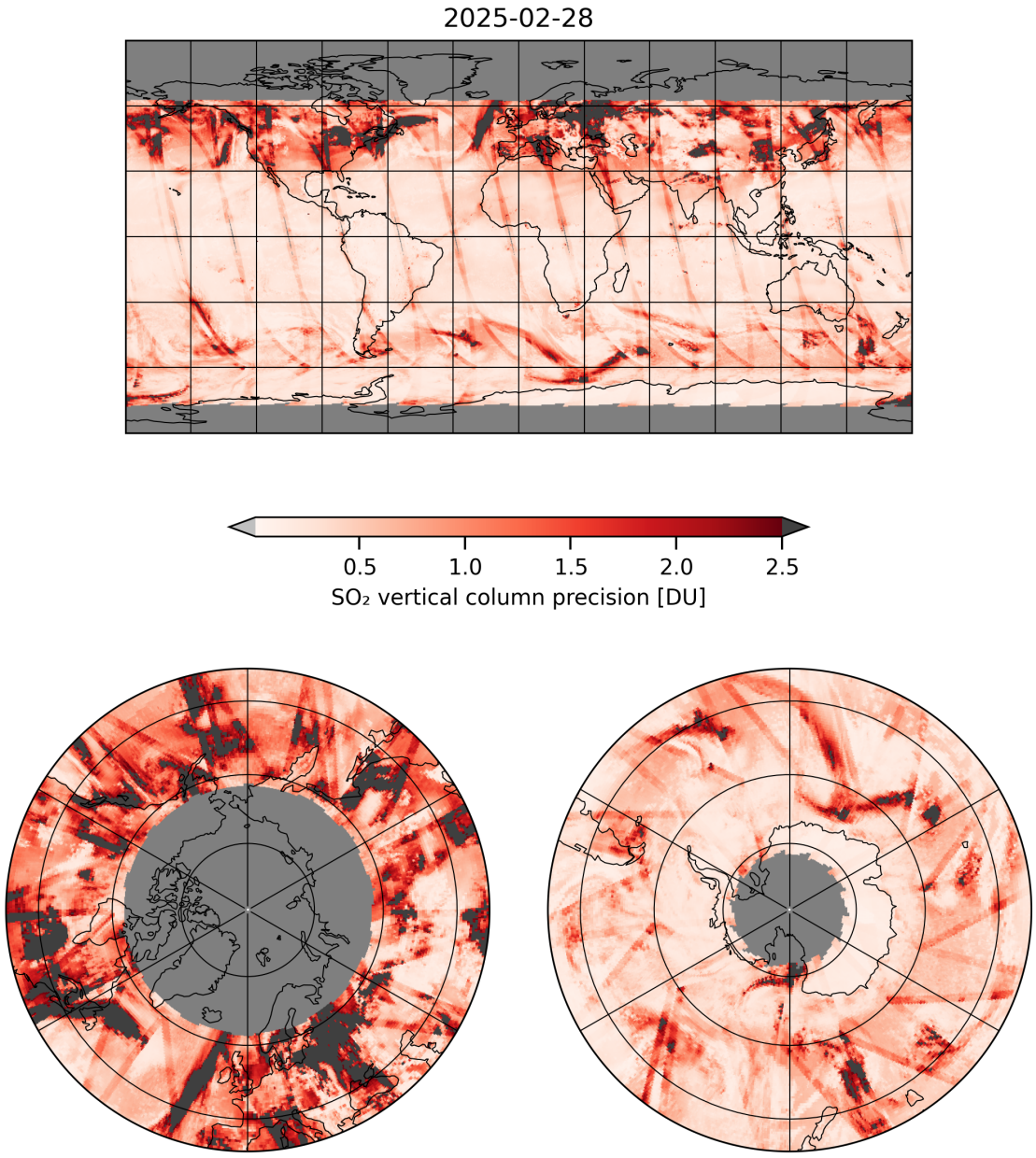

Figure 5: Map of "SO_2 vertical column precision" for 2025-02-28 to 2025-03-01

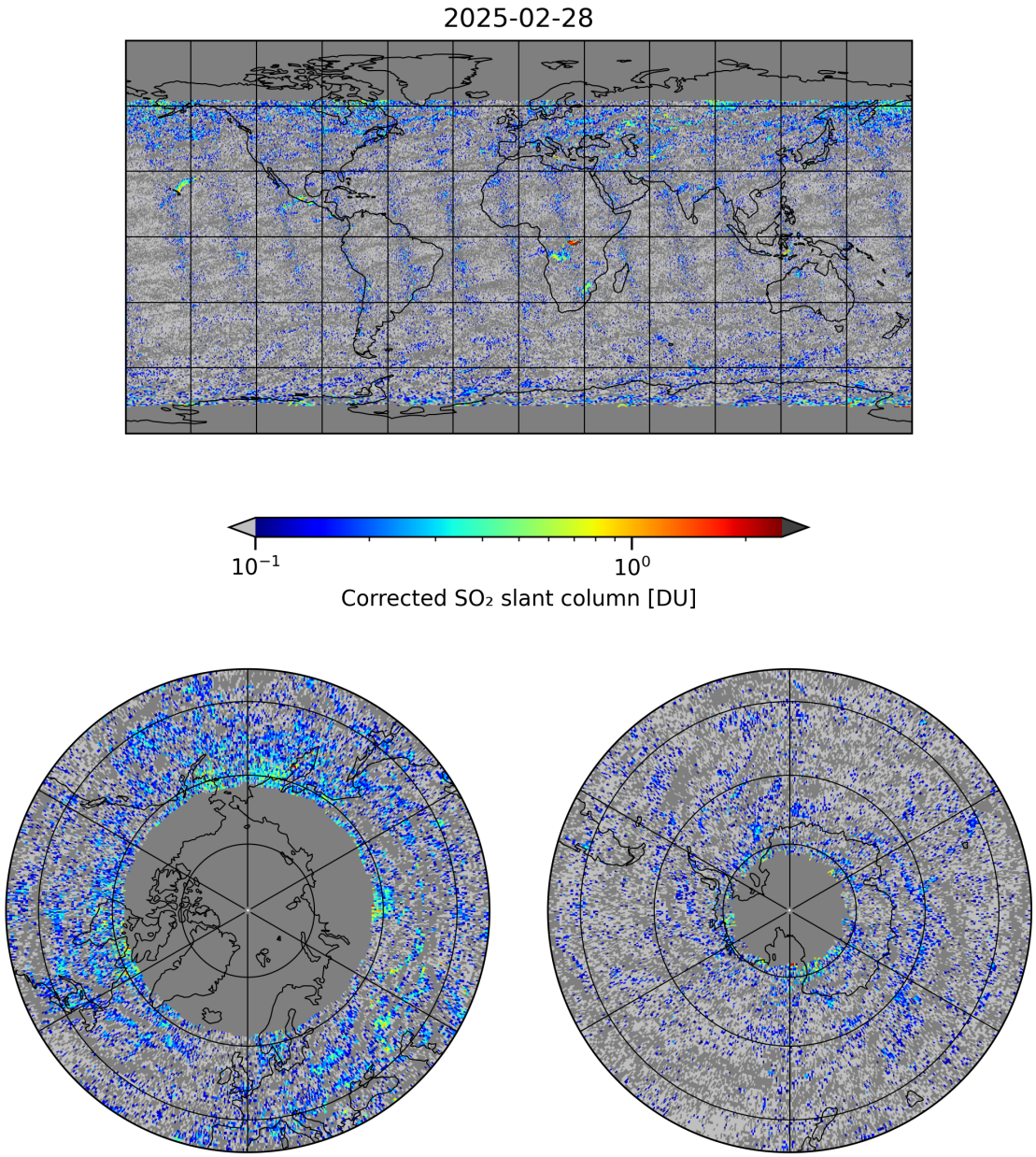

Figure 6: Map of "Corrected SO_2 slant column" for 2025-02-28 to 2025-03-01

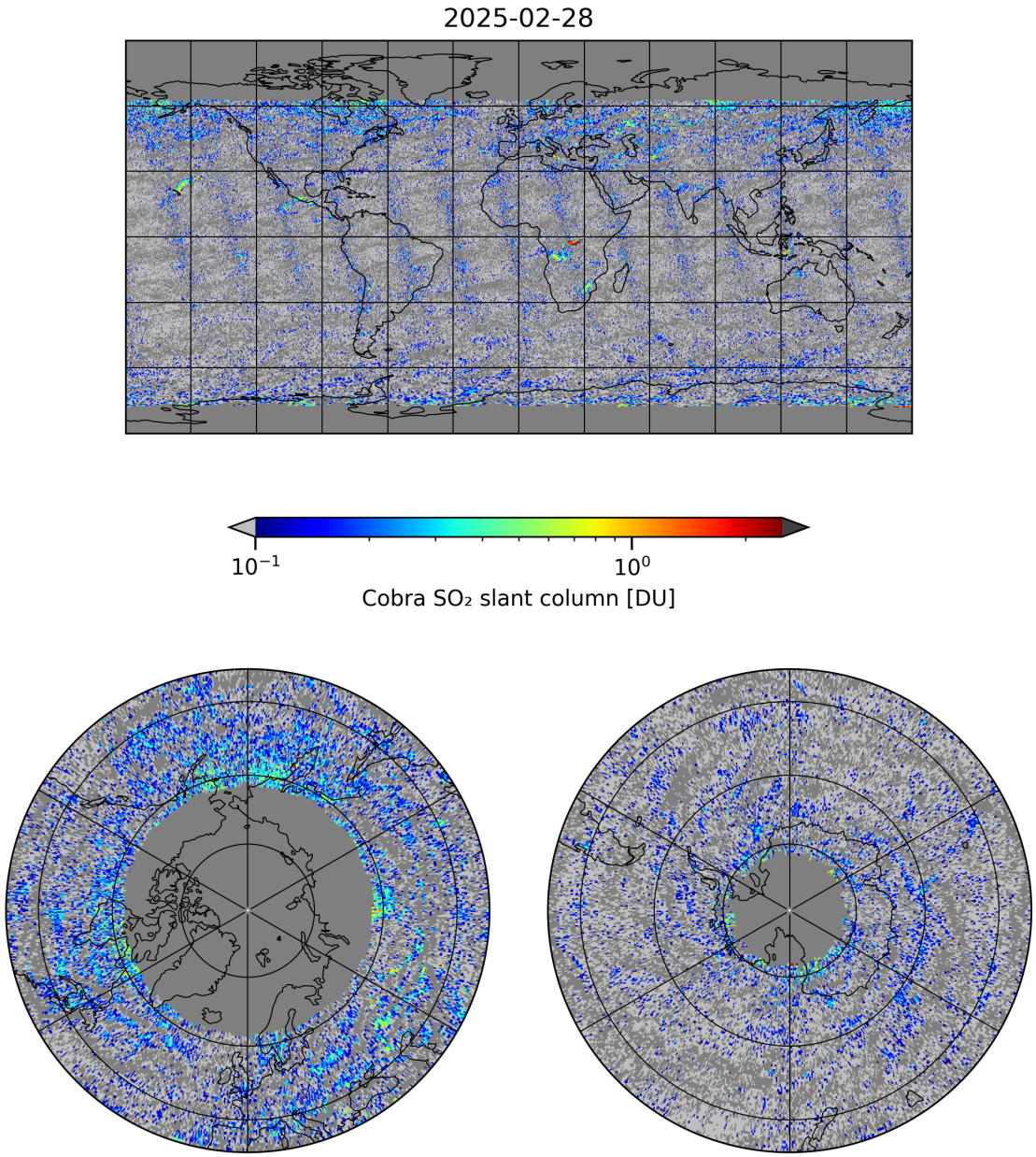

Figure 7: Map of "Cobra SO_2 slant column" for 2025-02-28 to 2025-03-01

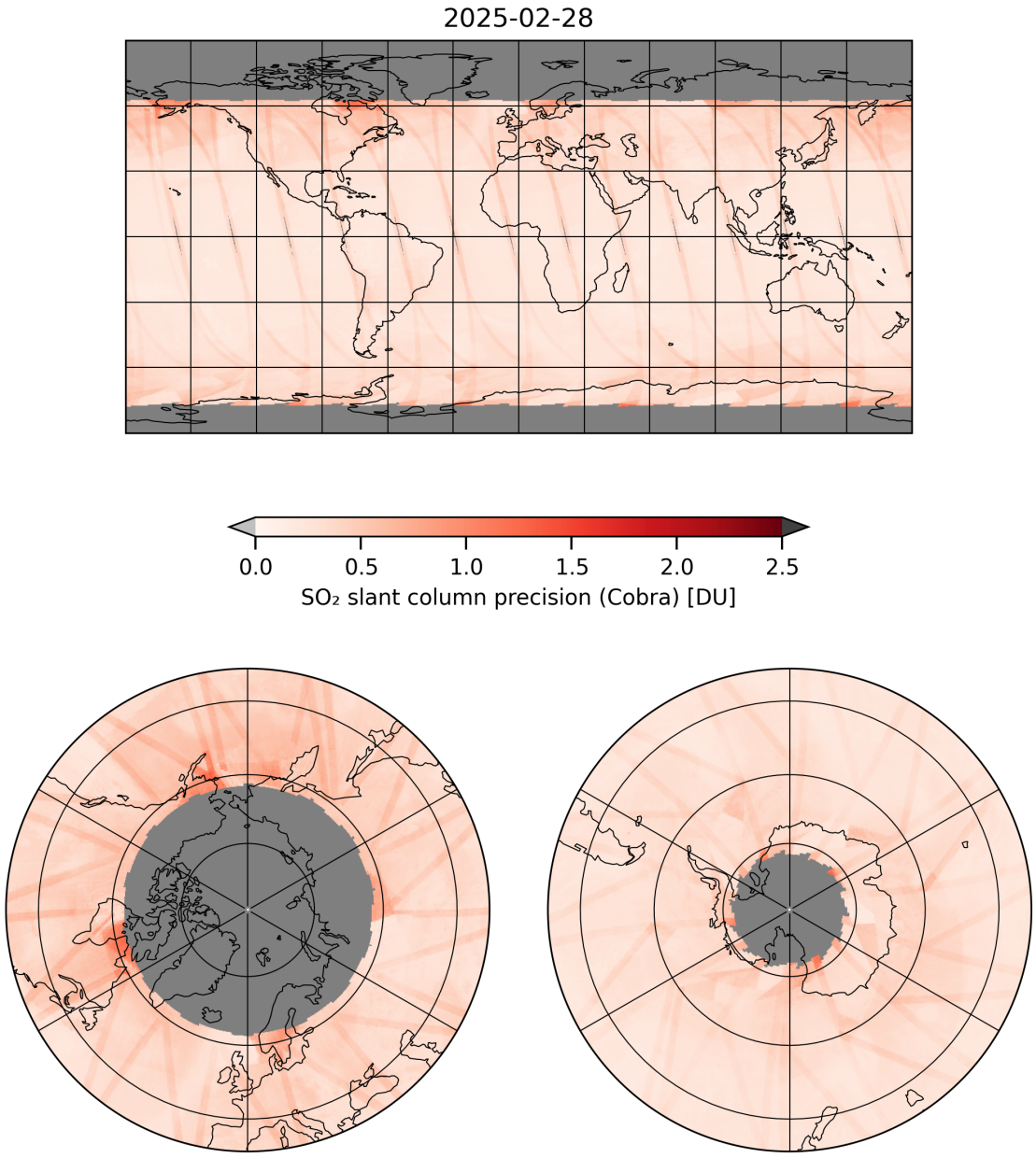

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-02-28 to 2025-03-01

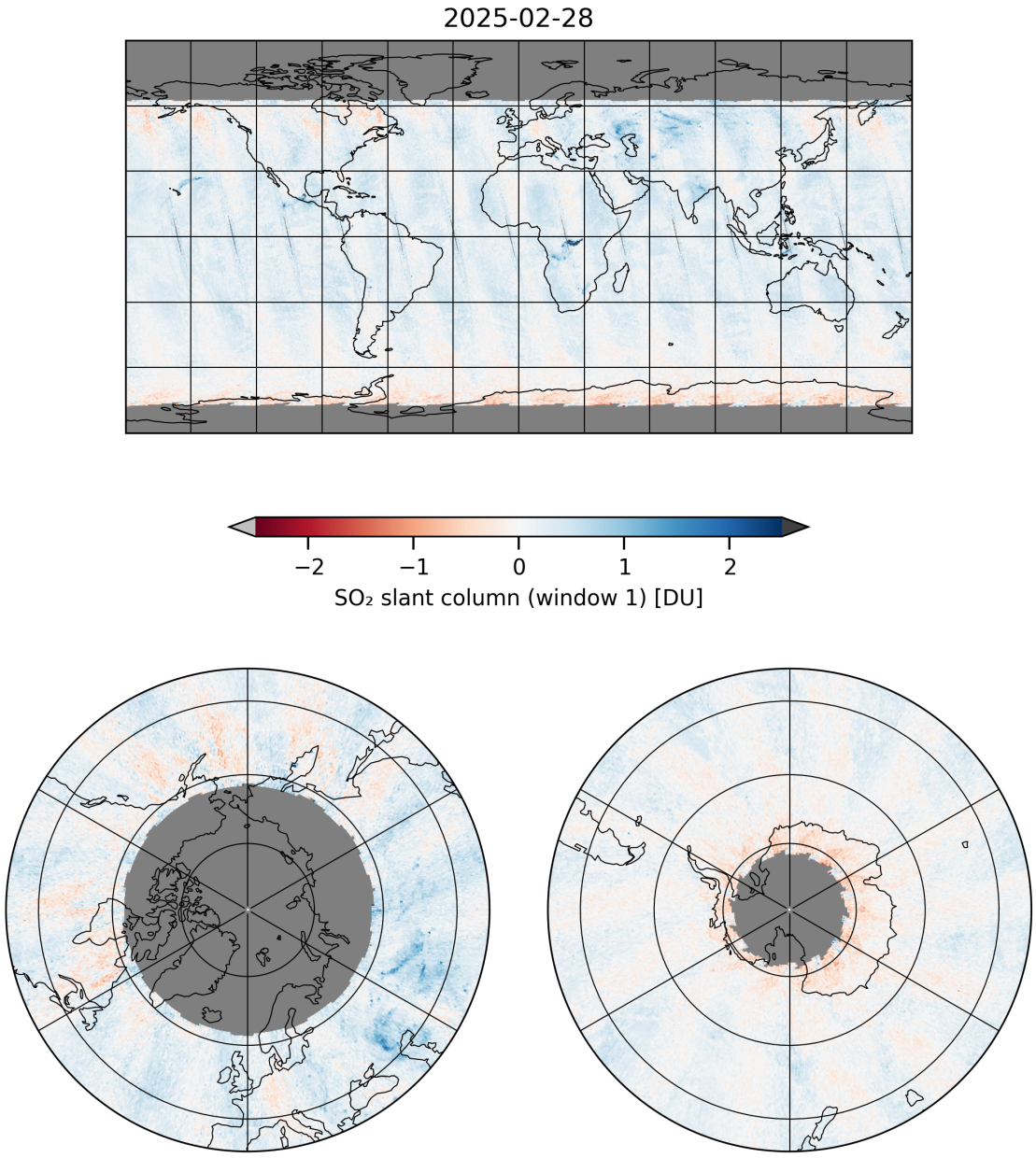

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-02-28 to 2025-03-01

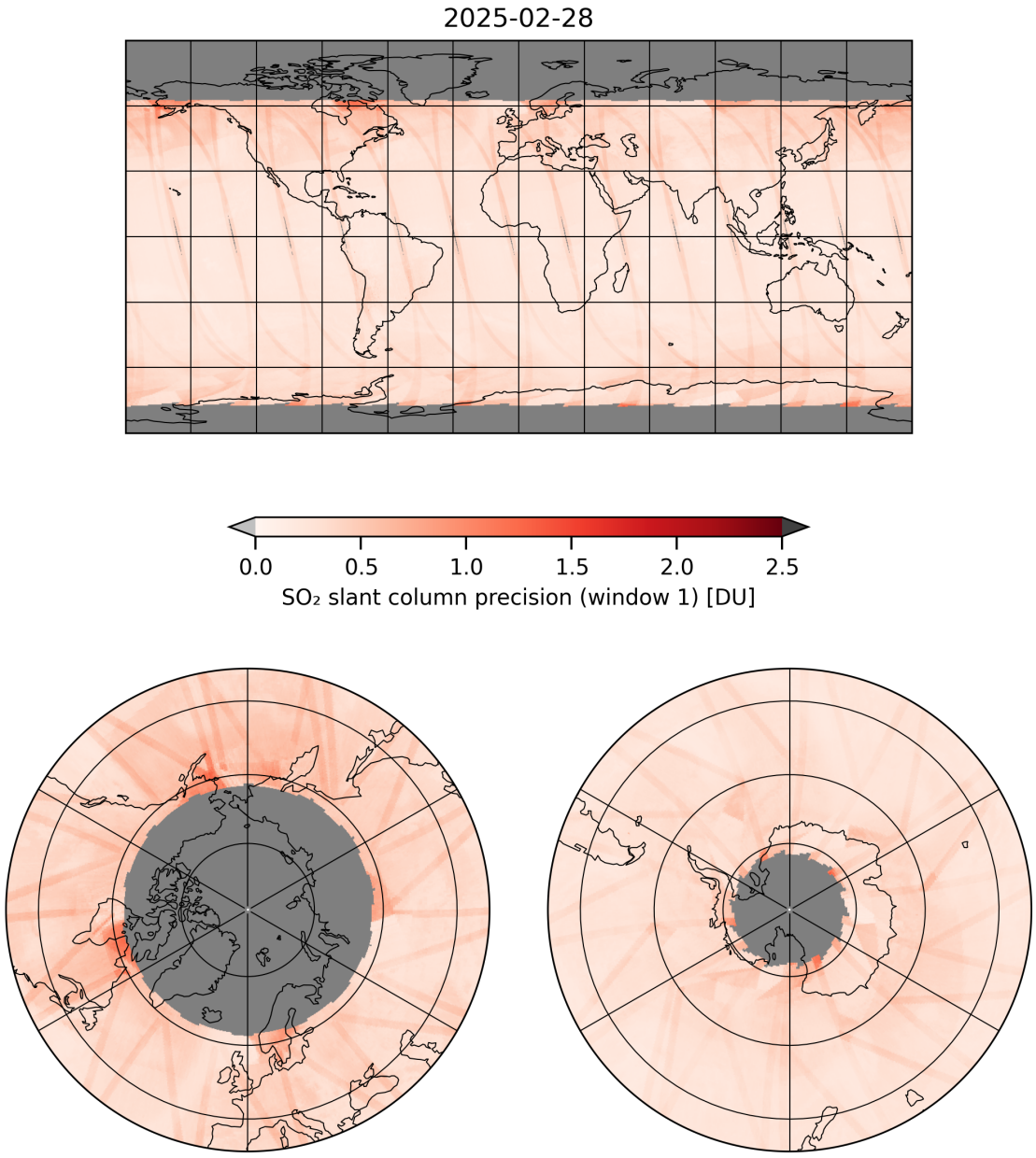

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-02-28 to 2025-03-01

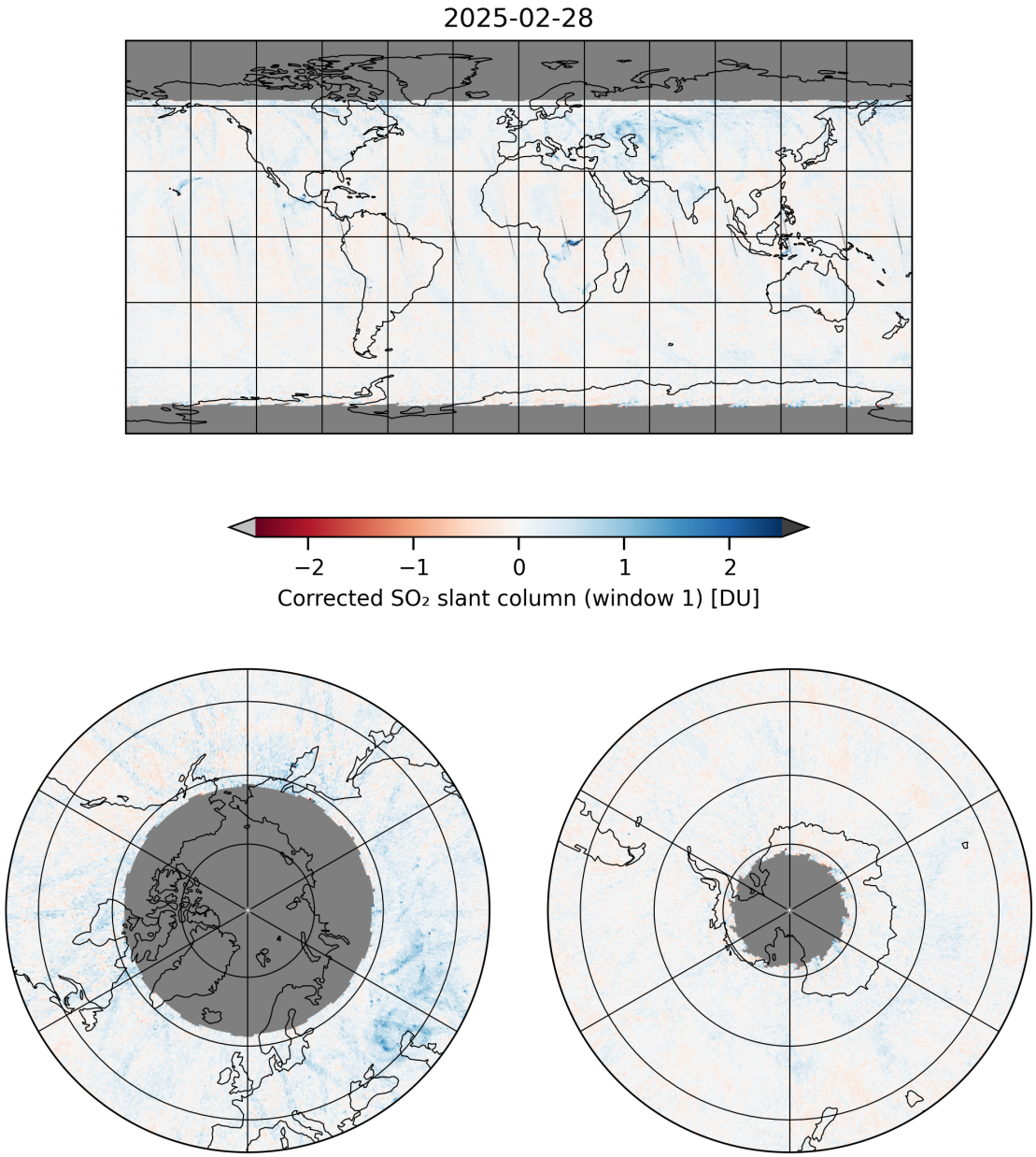

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-02-28 to 2025-03-01

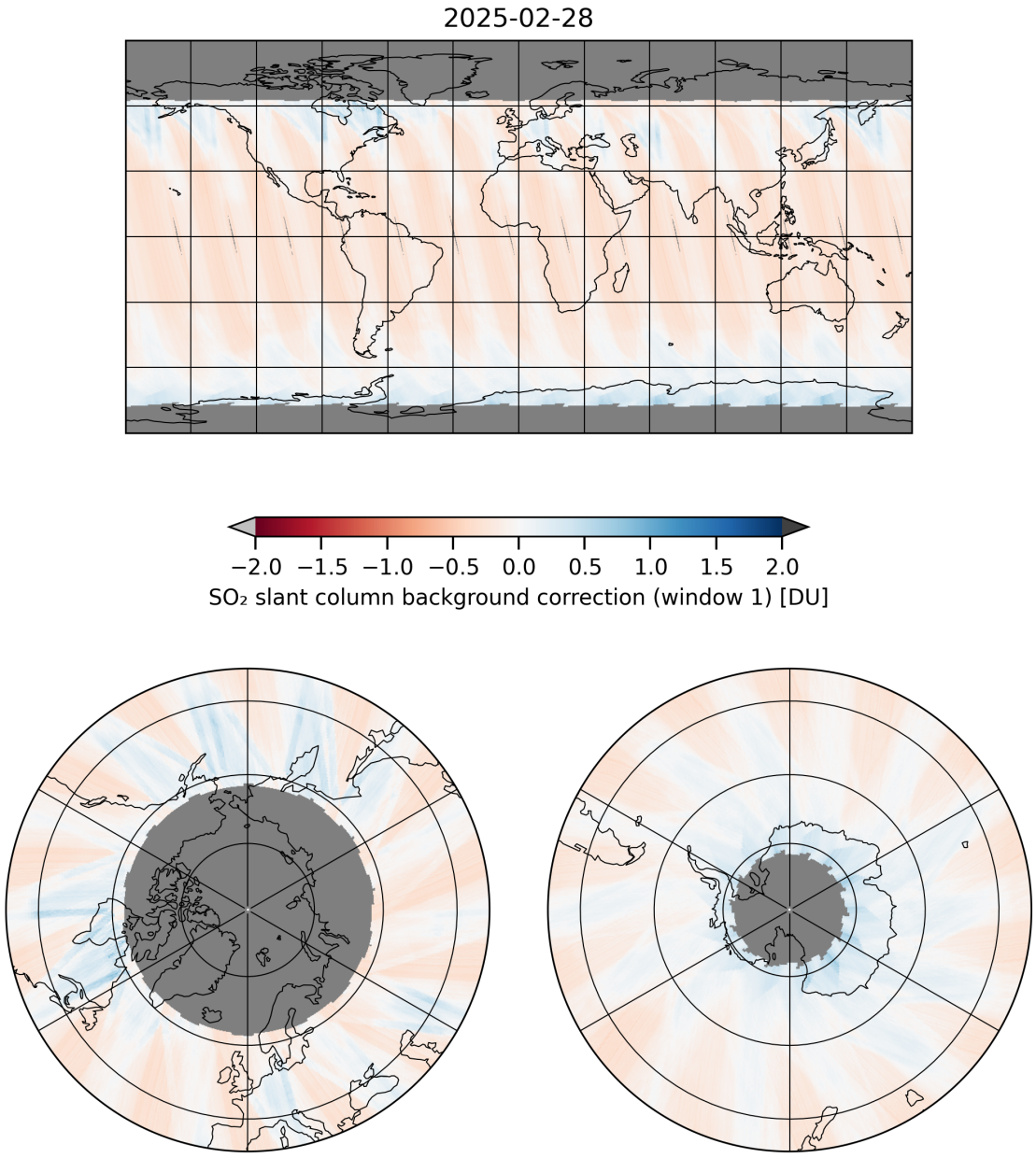

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-02-28 to 2025-03-01

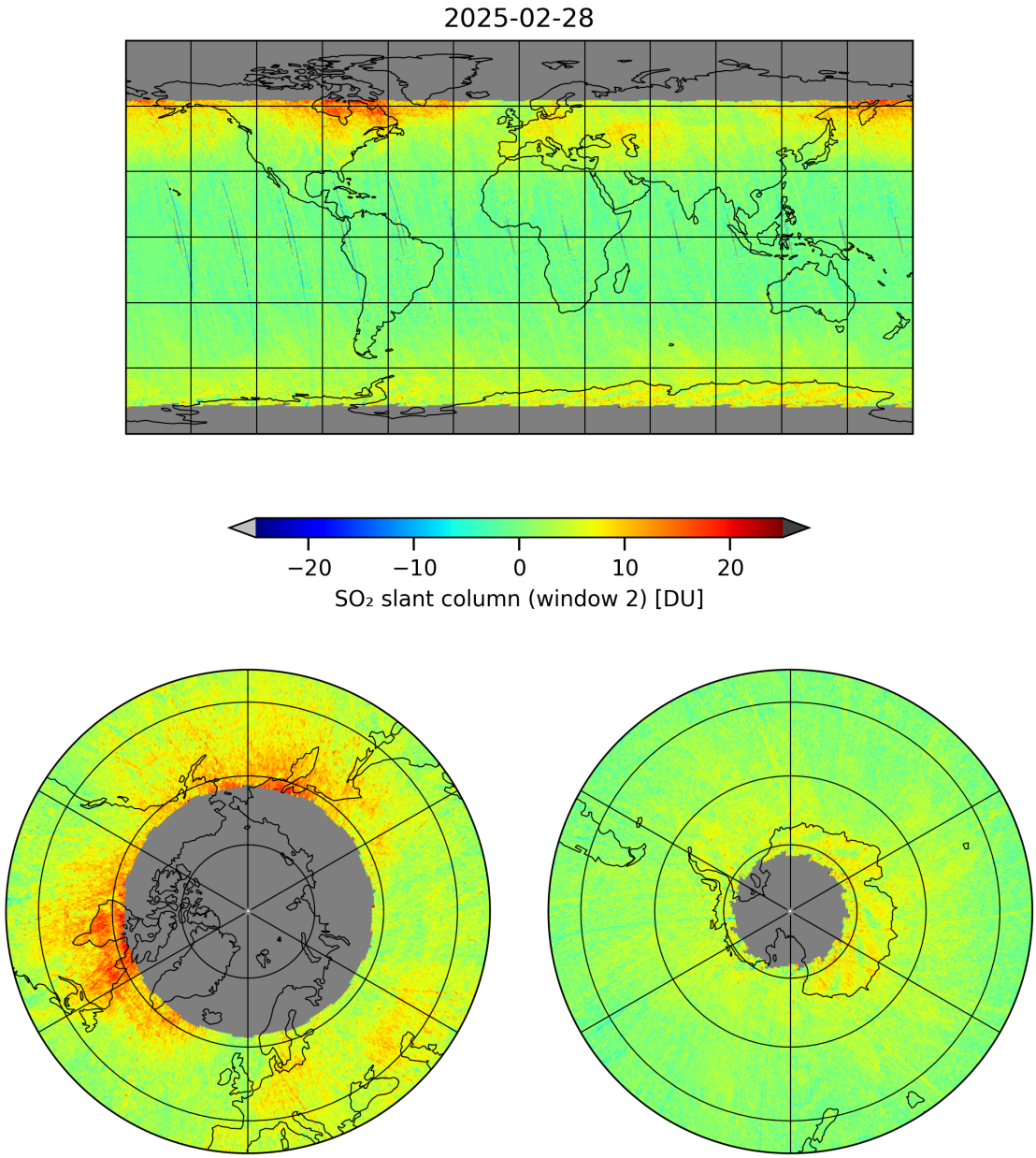

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-02-28 to 2025-03-01

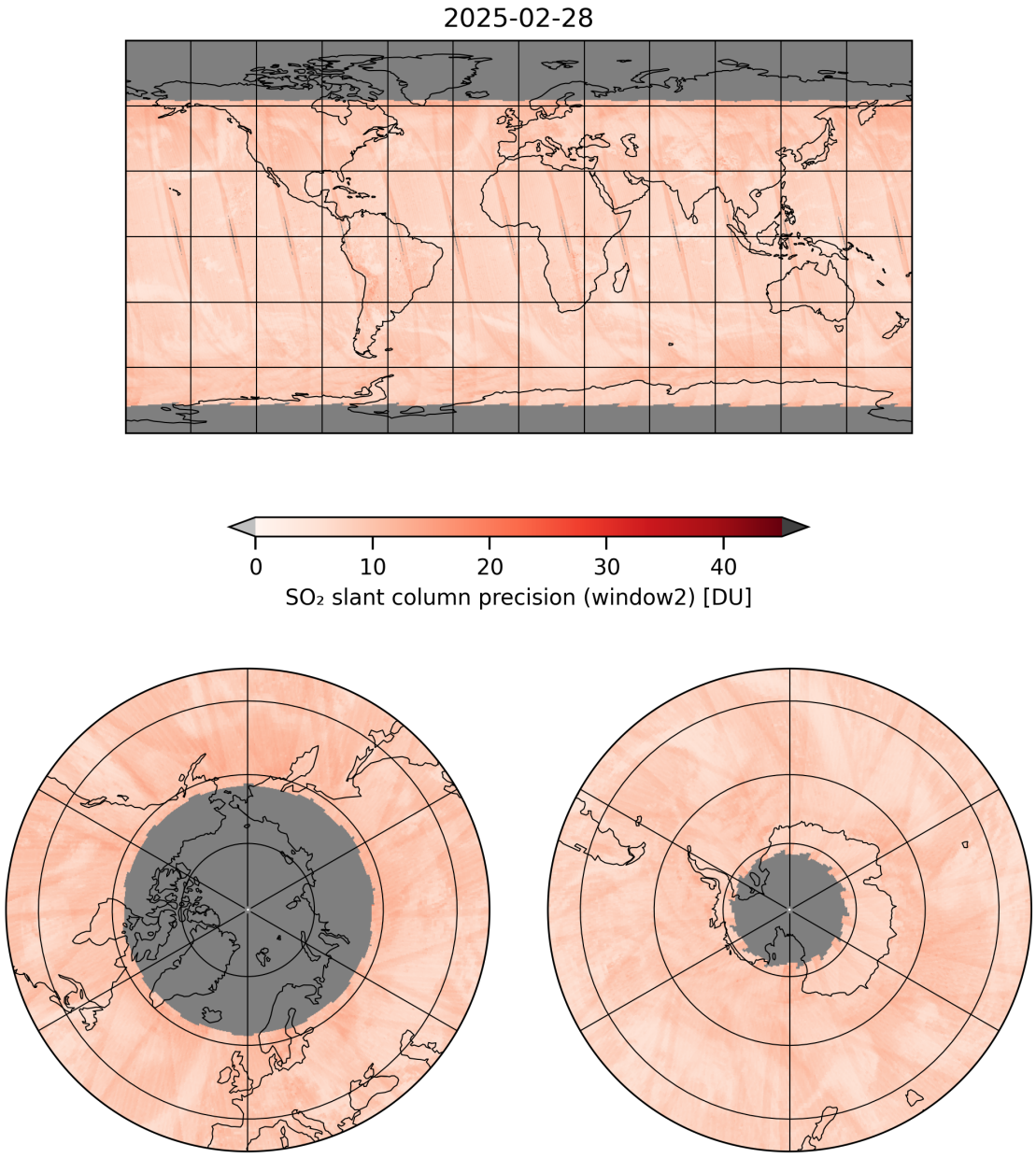

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-02-28 to 2025-03-01

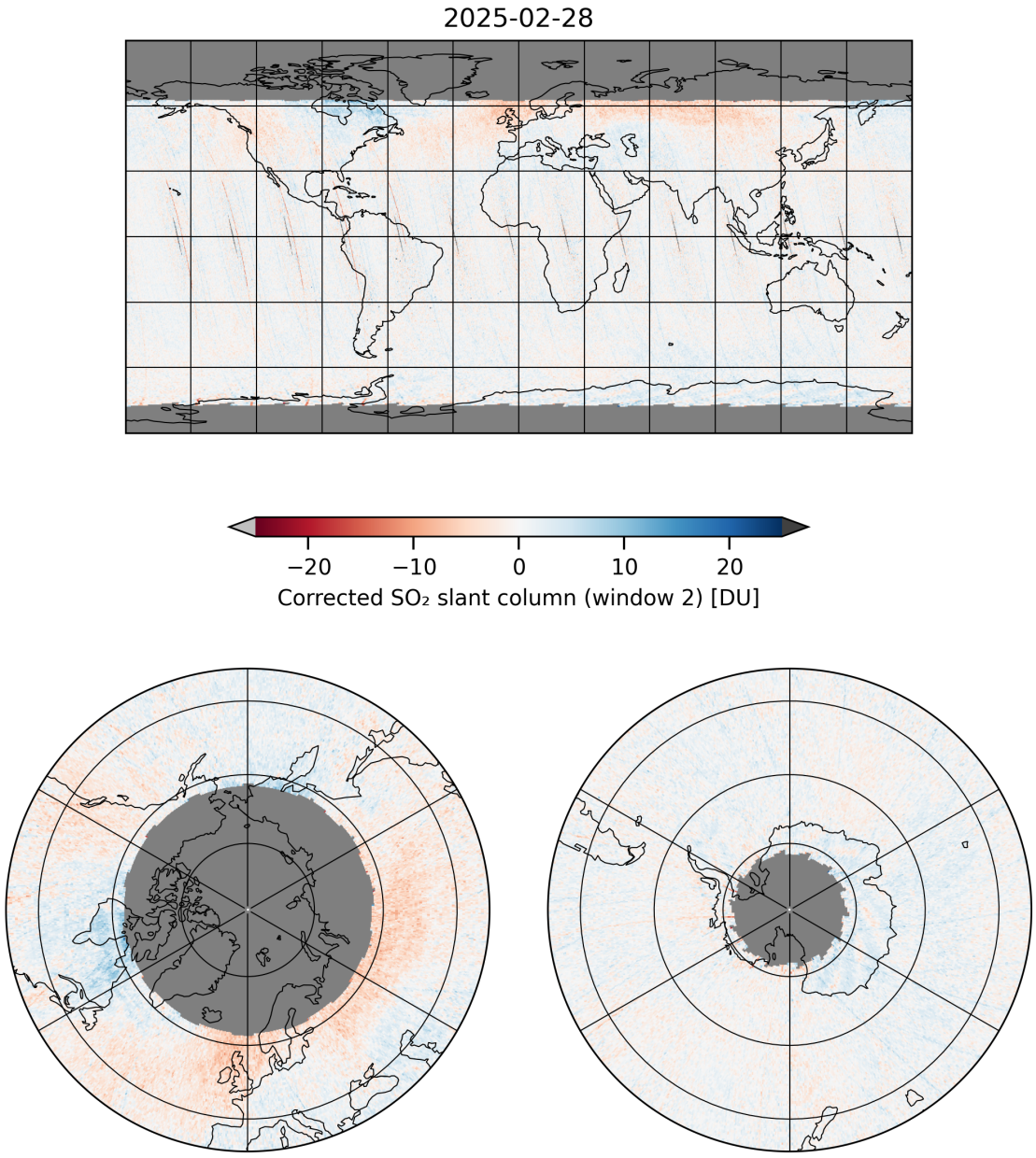

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-02-28 to 2025-03-01

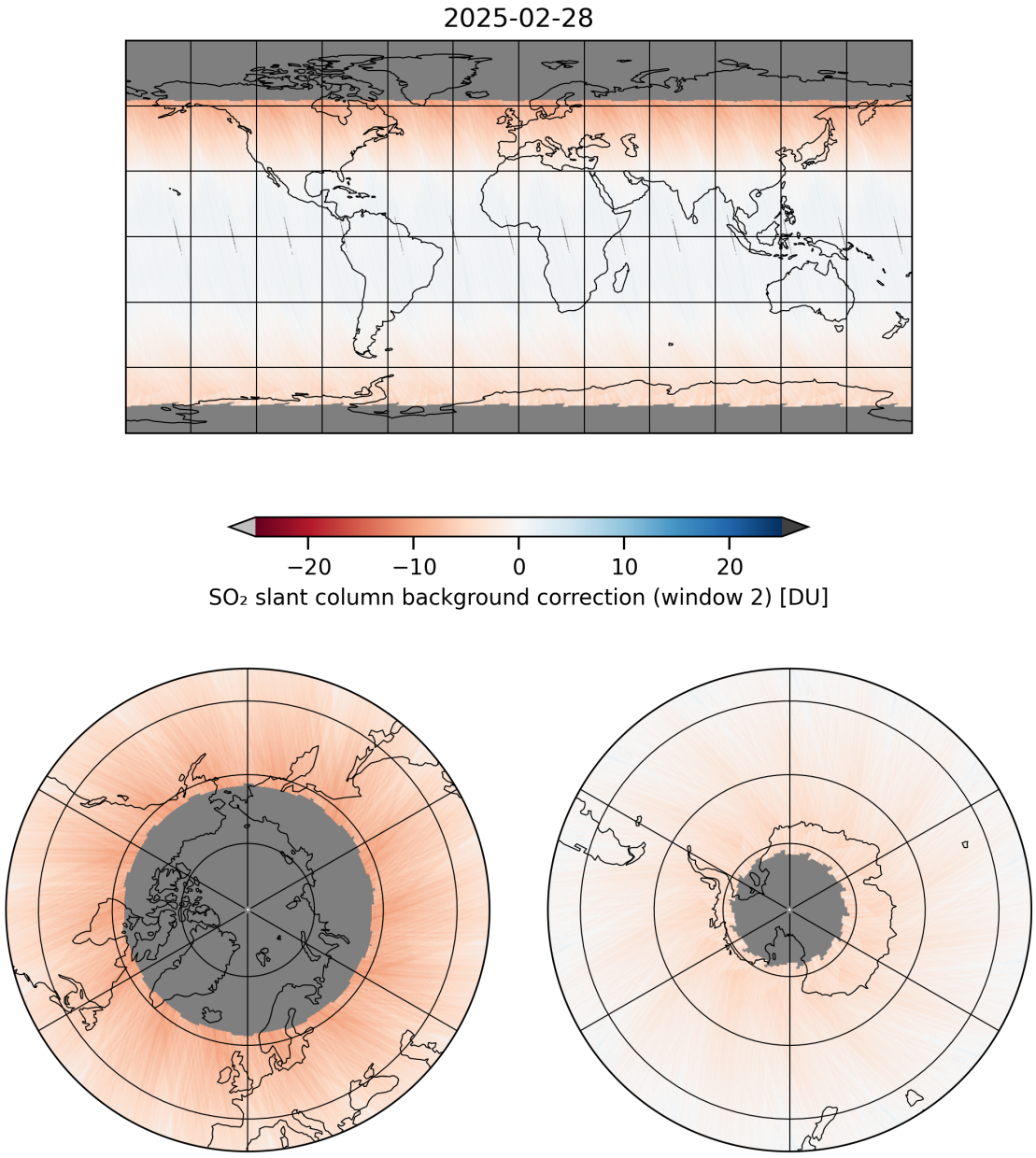

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-02-28 to 2025-03-01

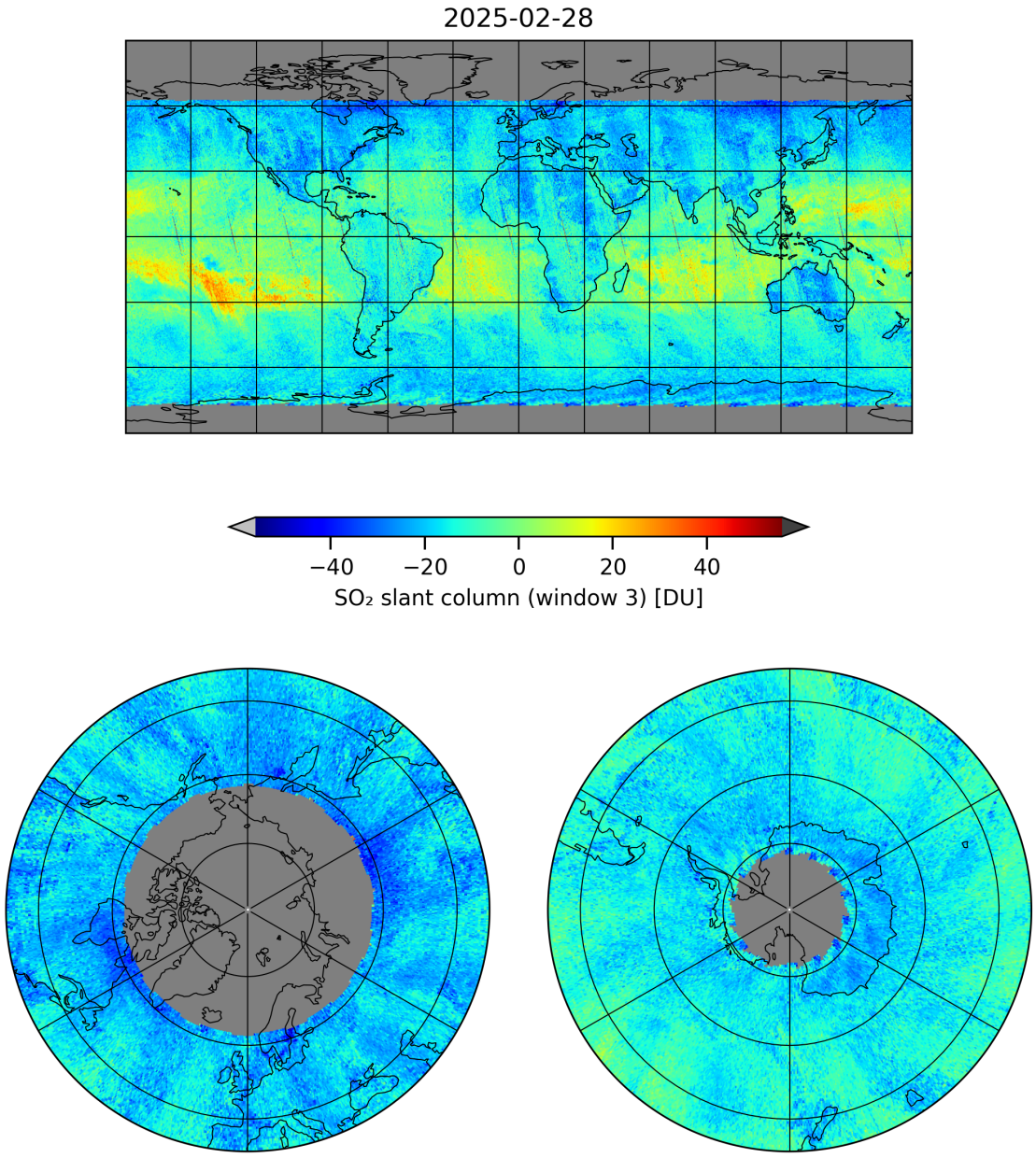

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-02-28 to 2025-03-01

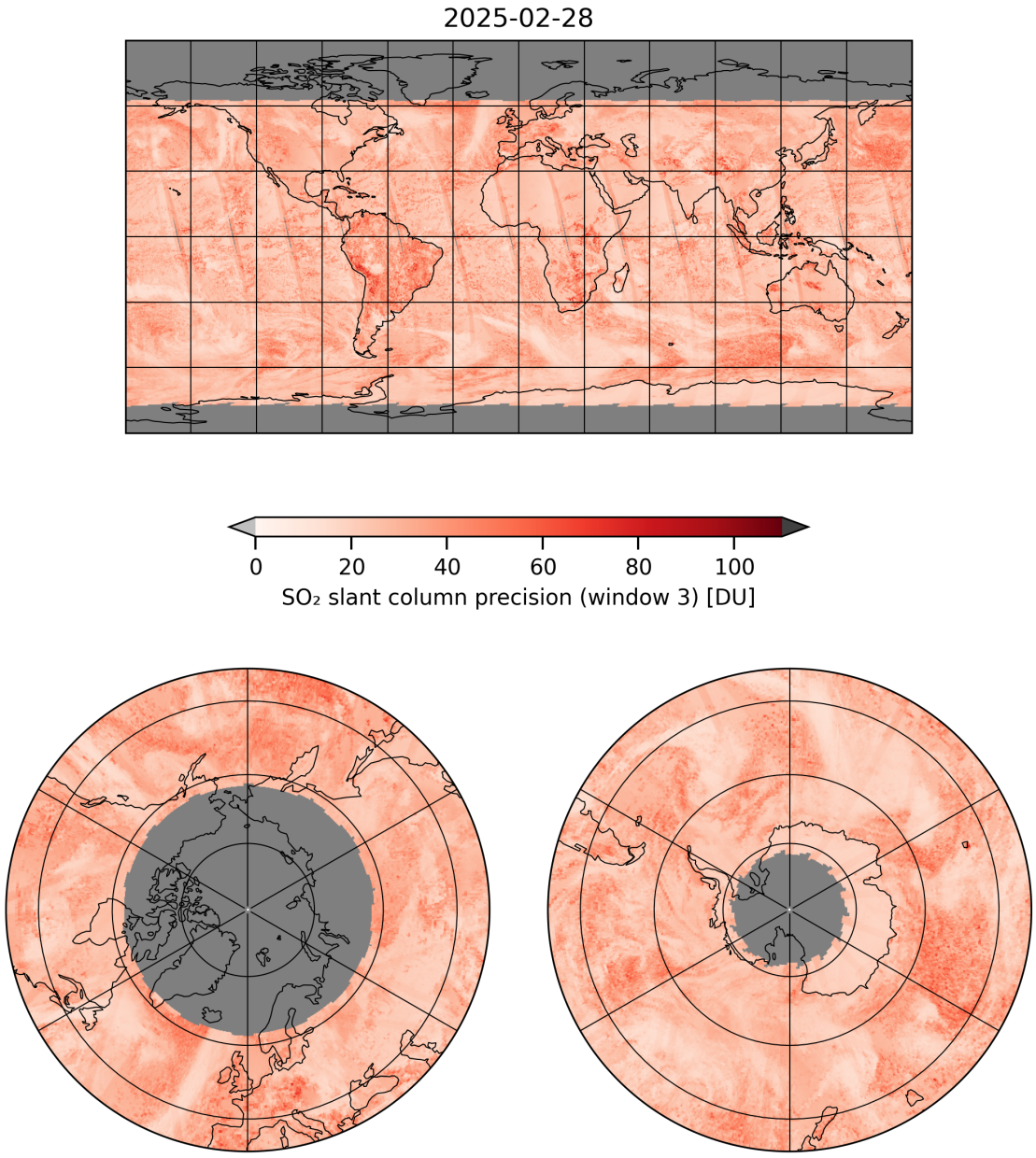

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-02-28 to 2025-03-01

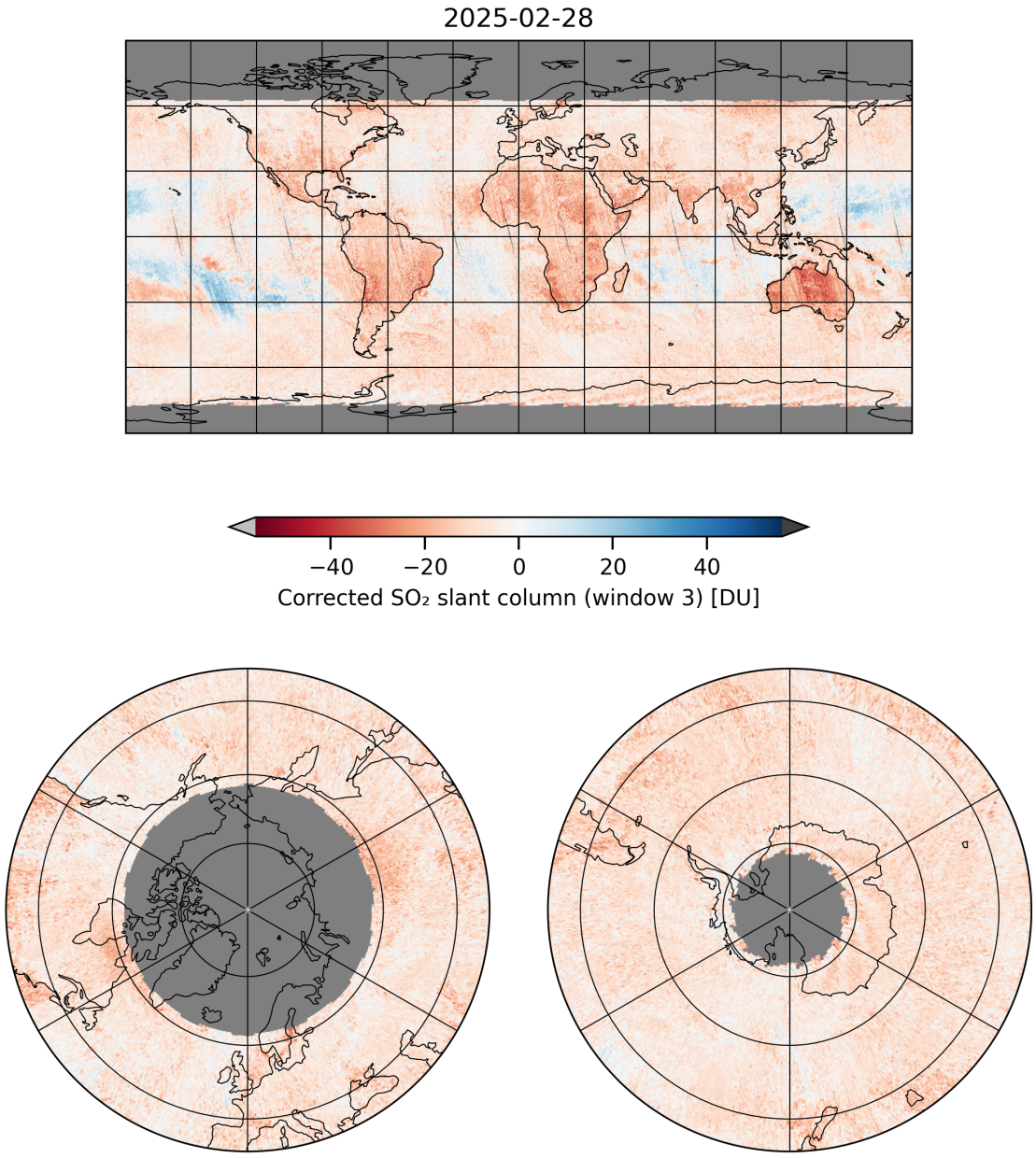

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-02-28 to 2025-03-01

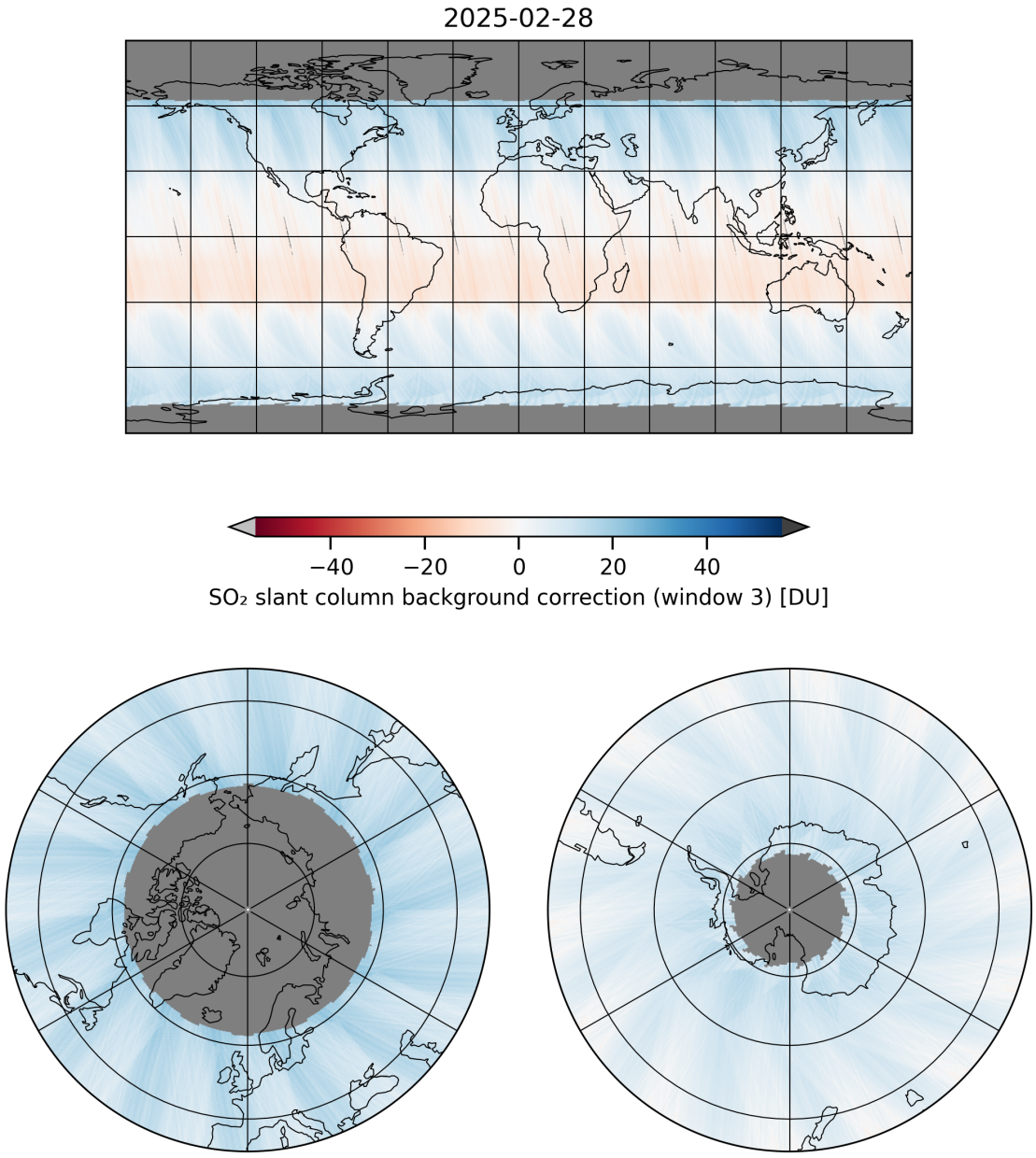

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-02-28 to 2025-03-01

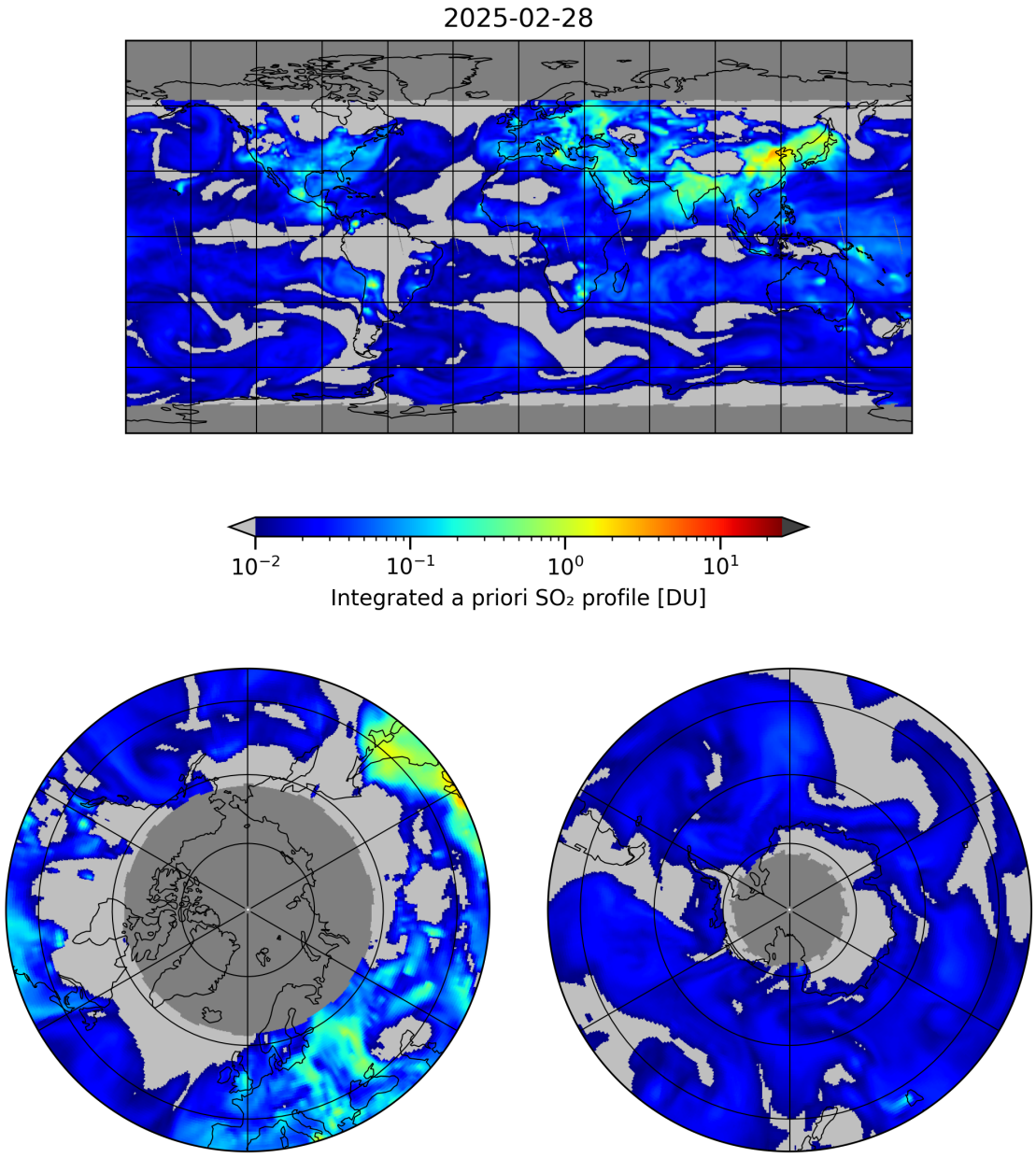

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-02-28 to 2025-03-01

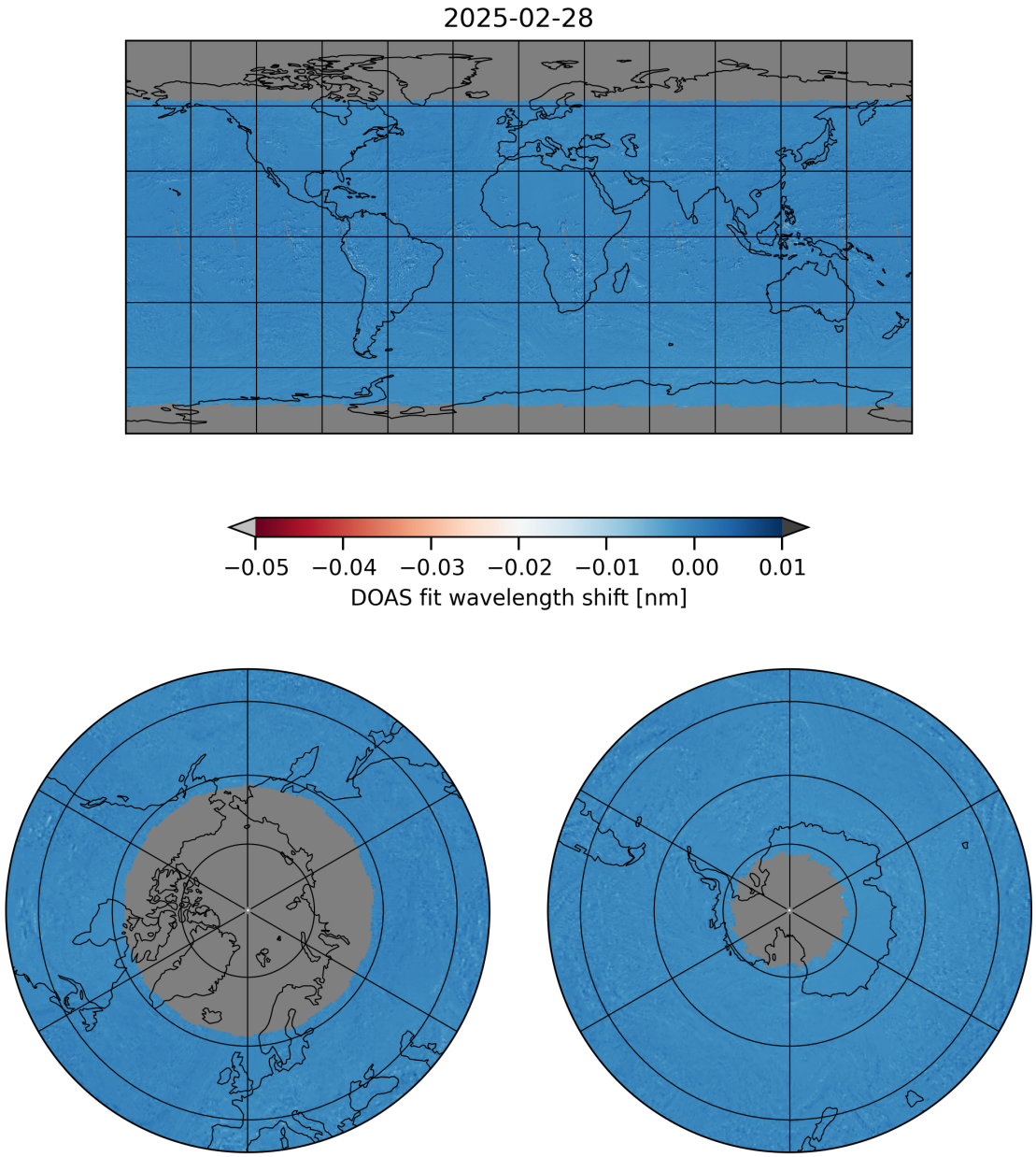

Figure 22: Map of “DOAS fit wavelength shift” for 2025-02-28 to 2025-03-01

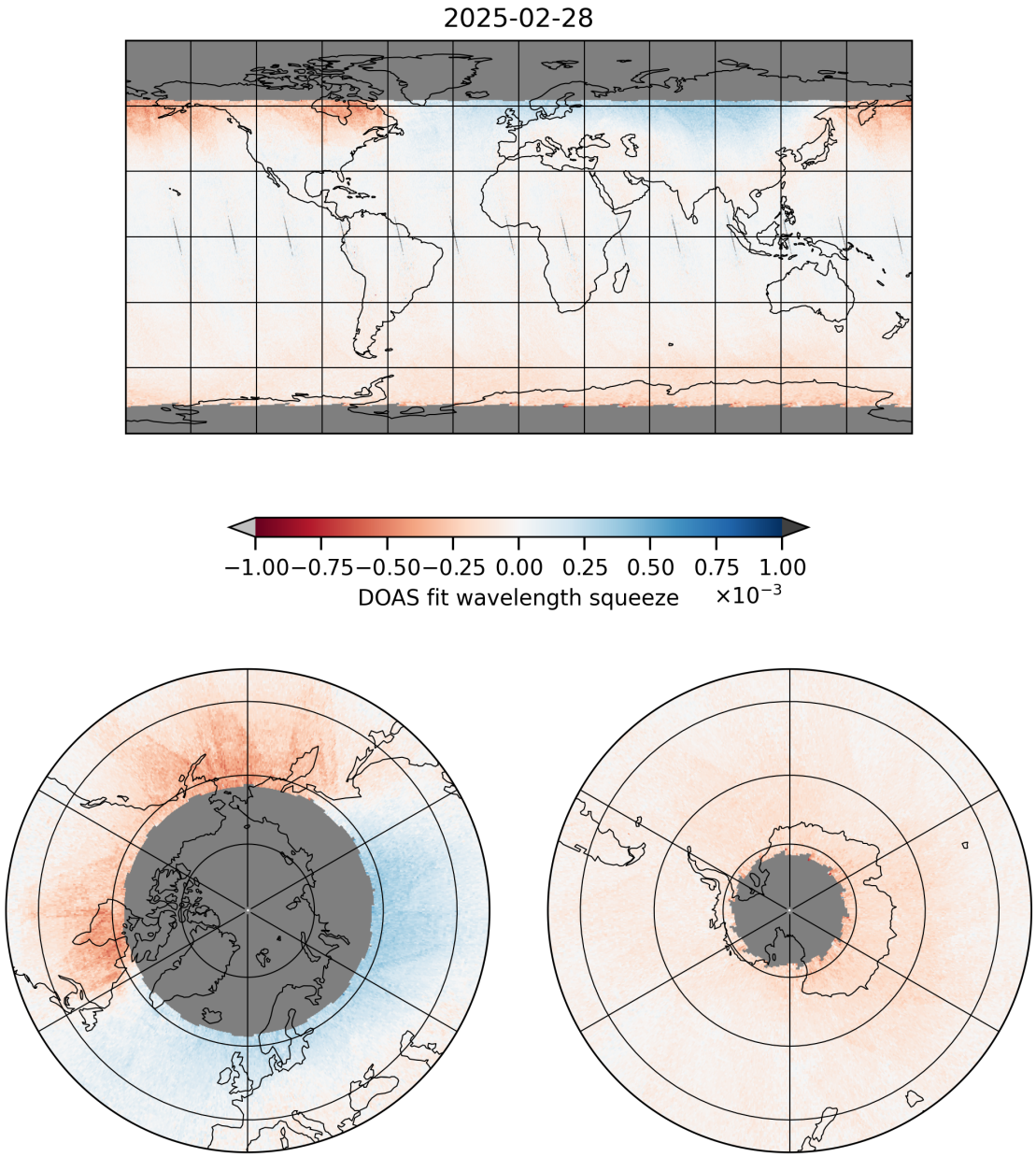

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-02-28 to 2025-03-01

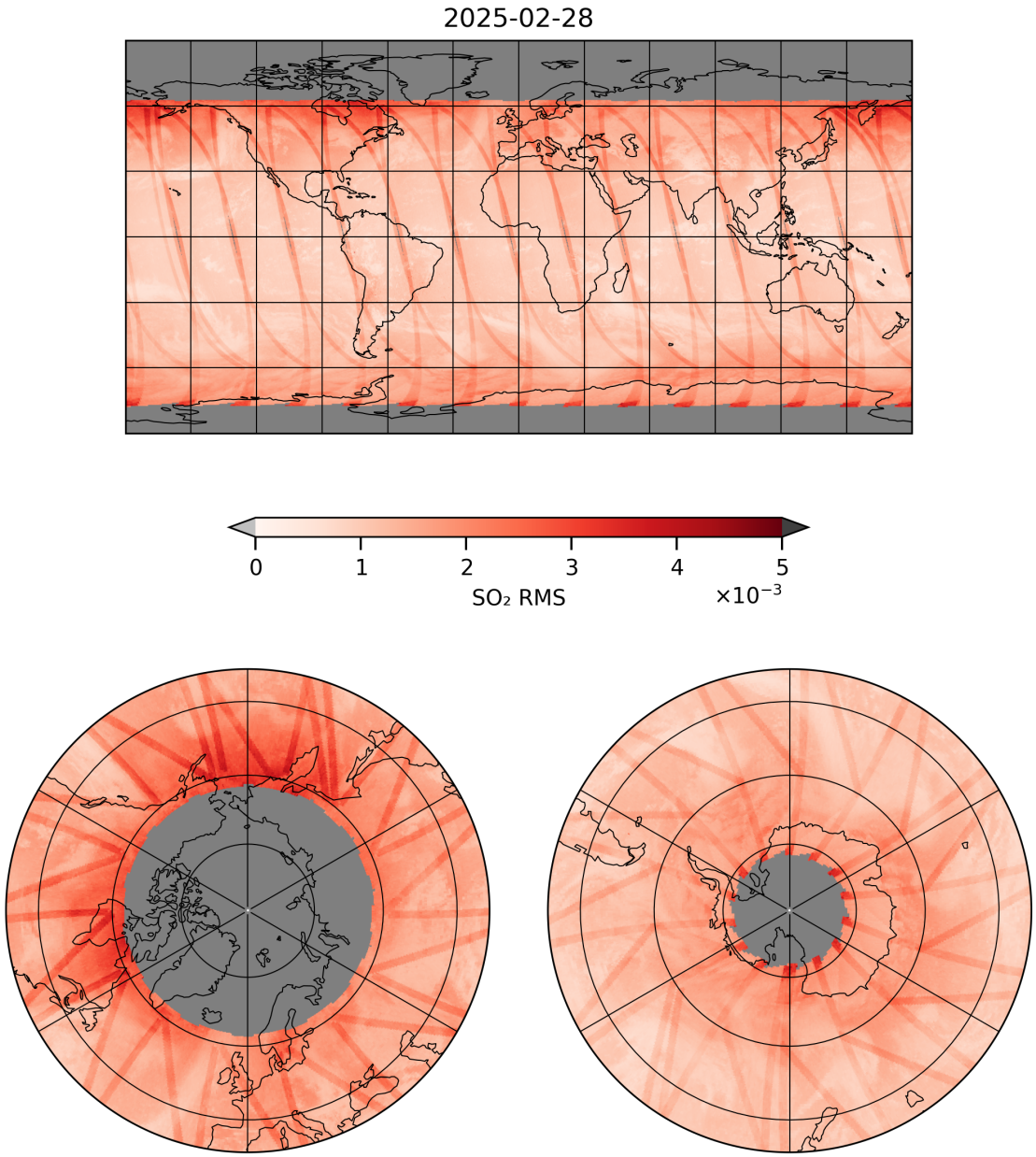

Figure 24: Map of "SO_2 RMS" for 2025-02-28 to 2025-03-01

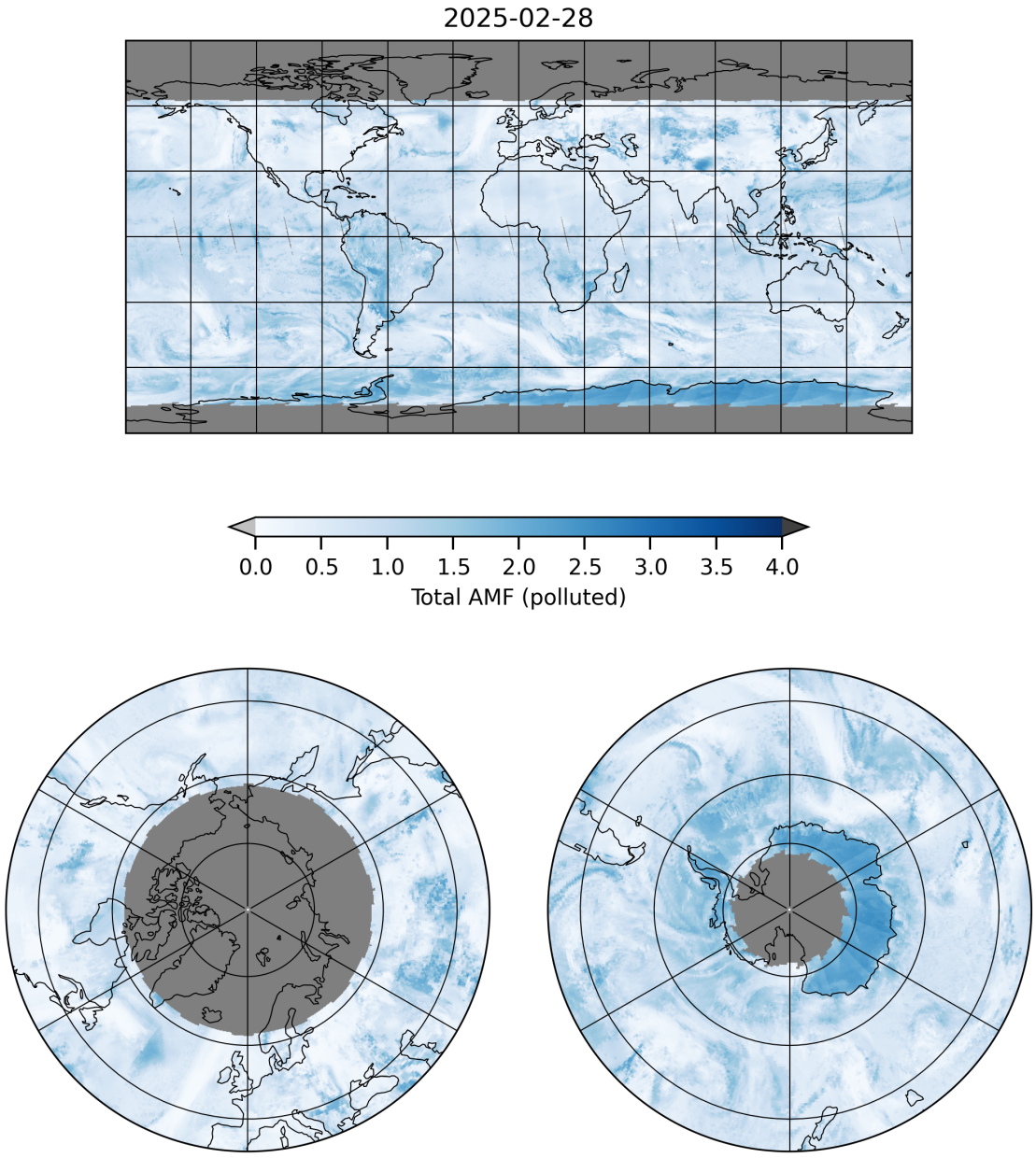

Figure 25: Map of “Total AMF (polluted)” for 2025-02-28 to 2025-03-01

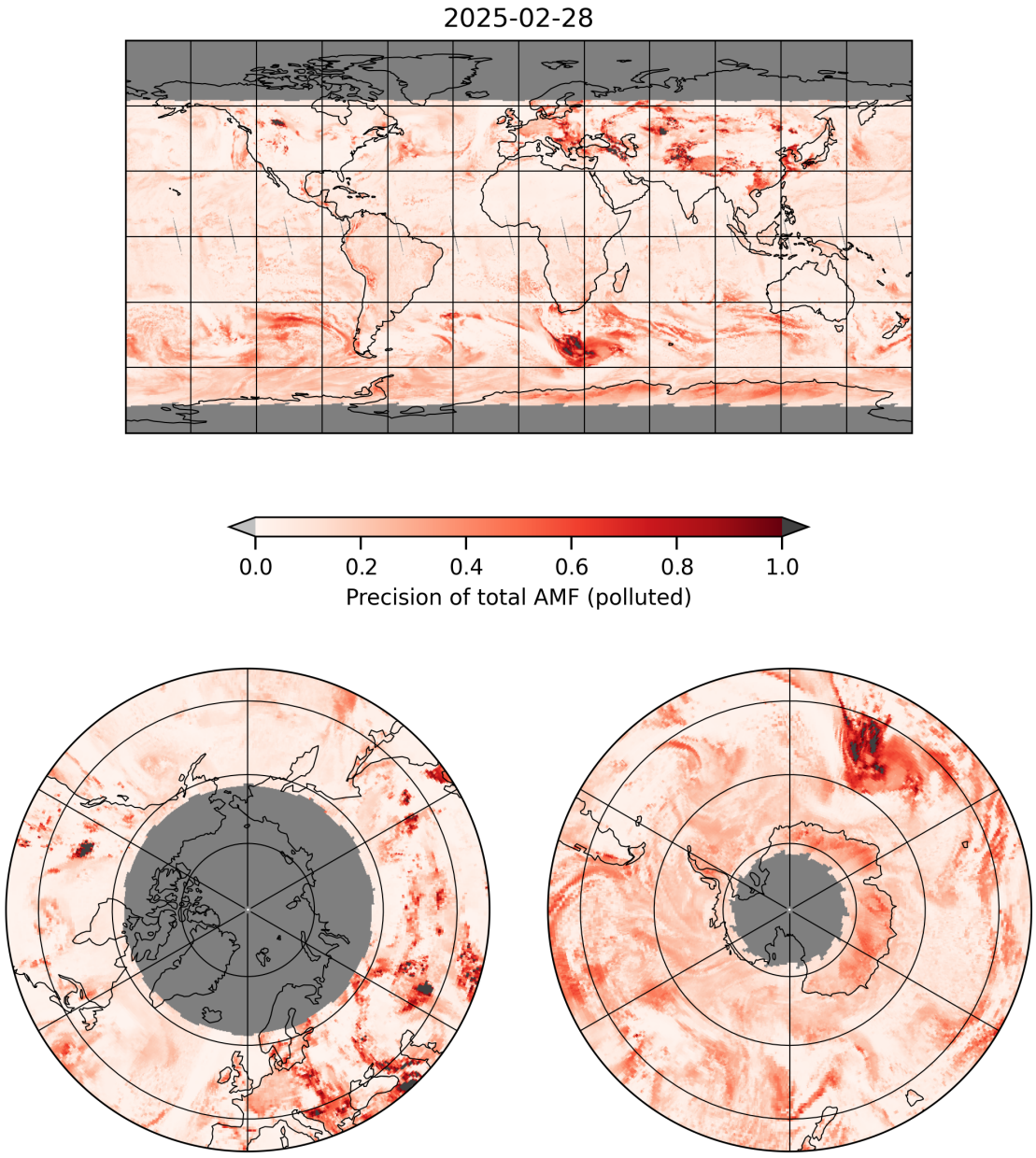

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-02-28 to 2025-03-01

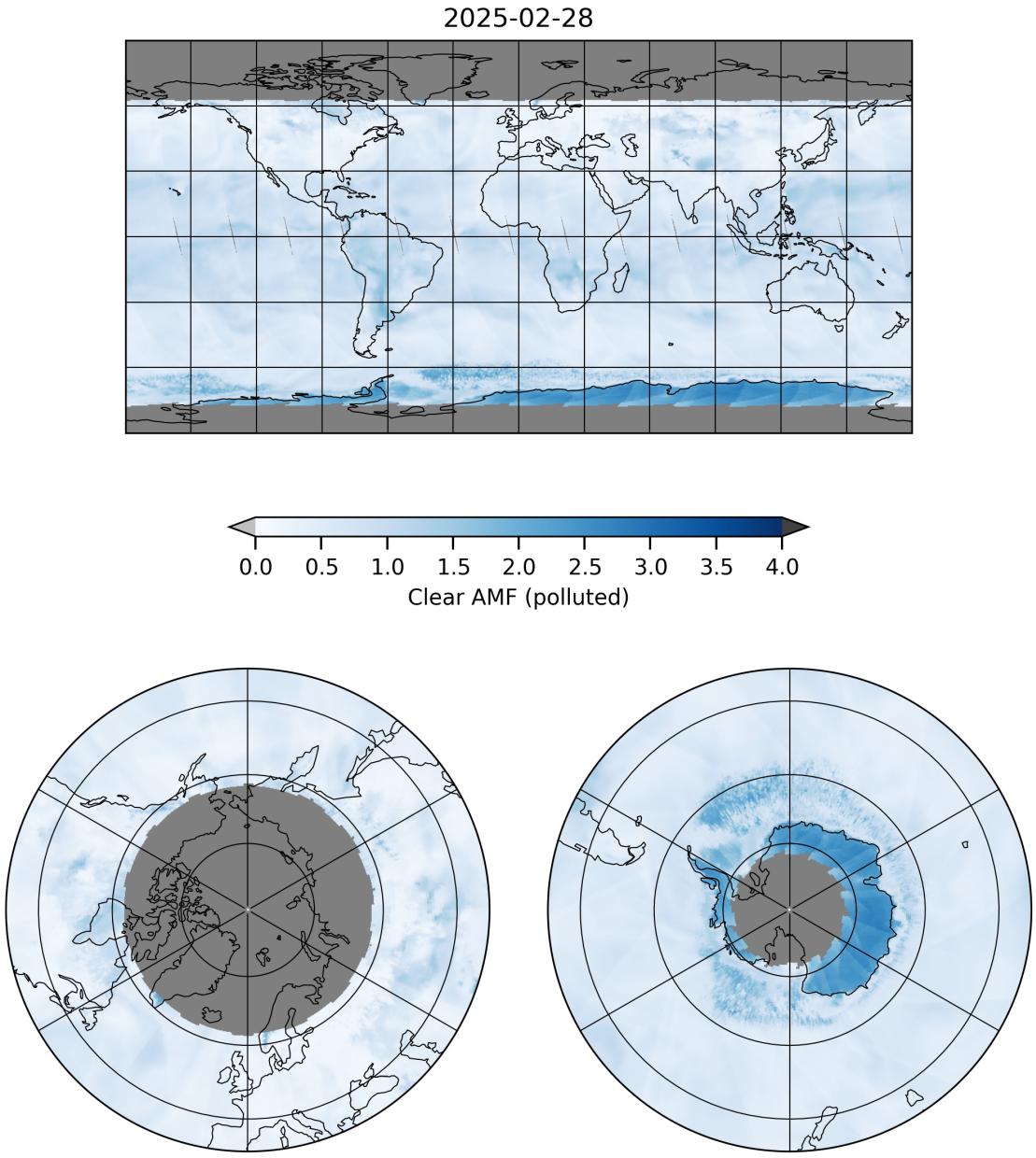

Figure 27: Map of “Clear AMF (polluted)” for 2025-02-28 to 2025-03-01

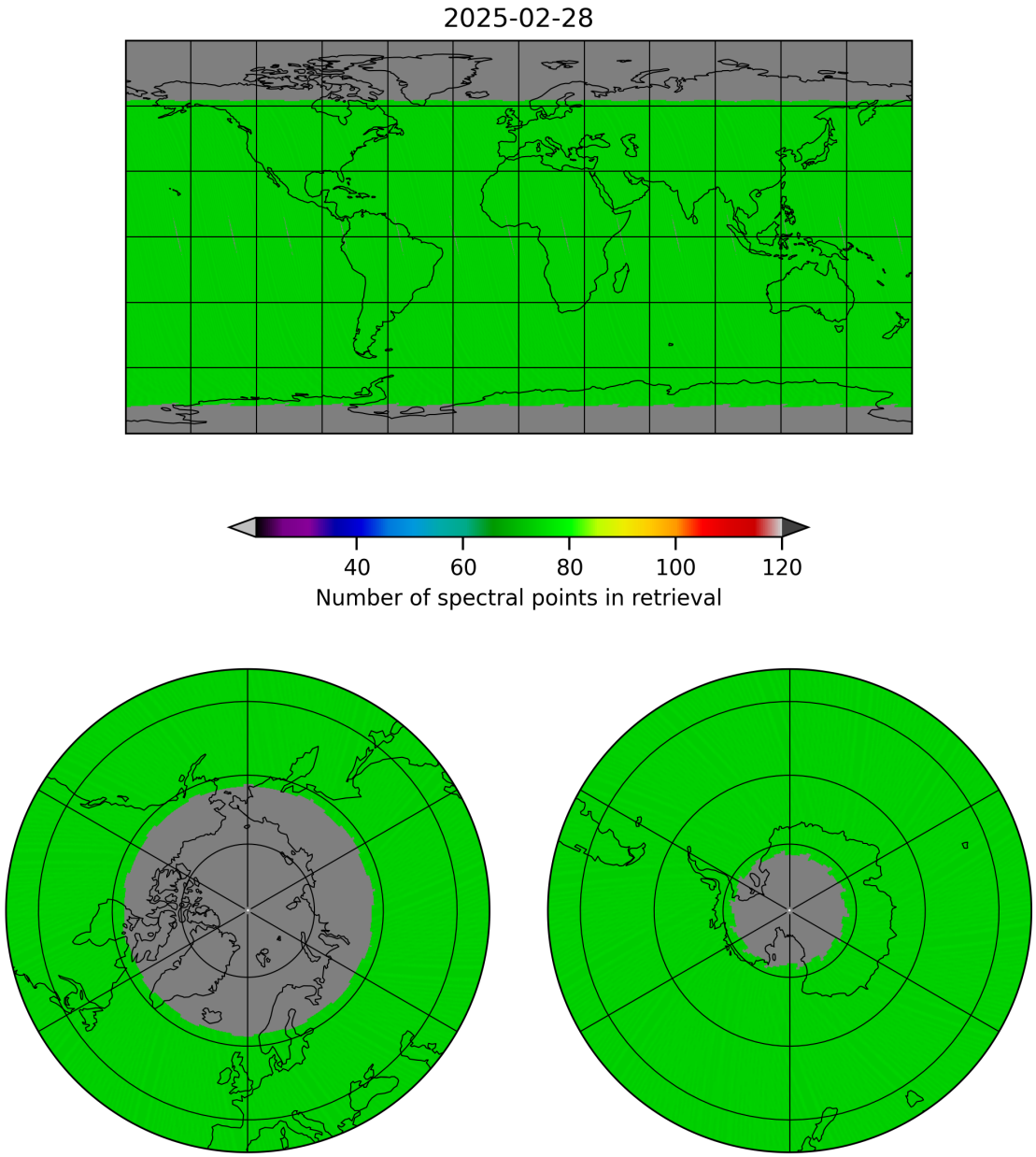

Figure 28: Map of “Number of spectral points in retrieval” for 2025-02-28 to 2025-03-01

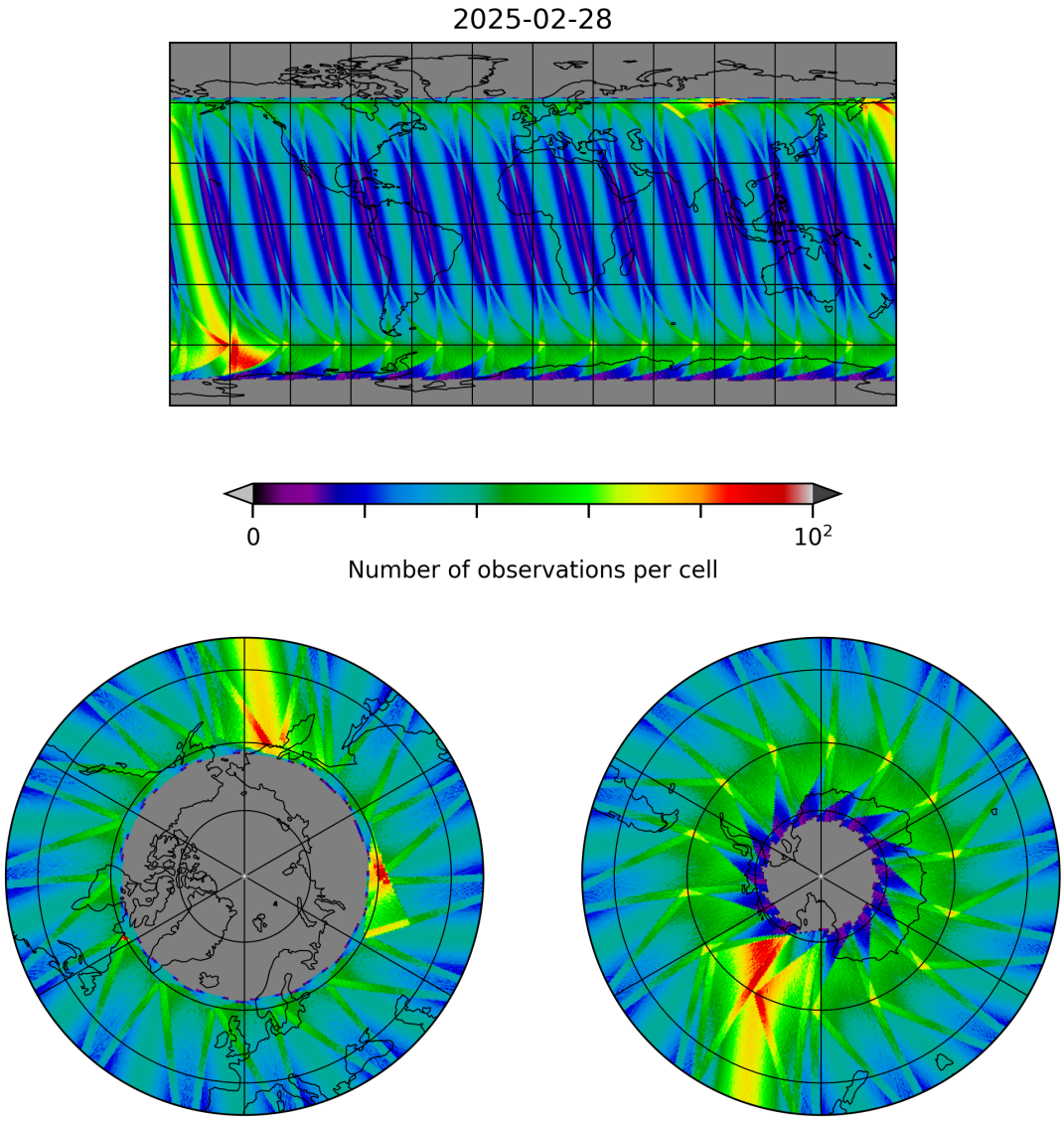

Figure 29: Map of the number of observations for 2025-02-28 to 2025-03-01

7 Zonal average

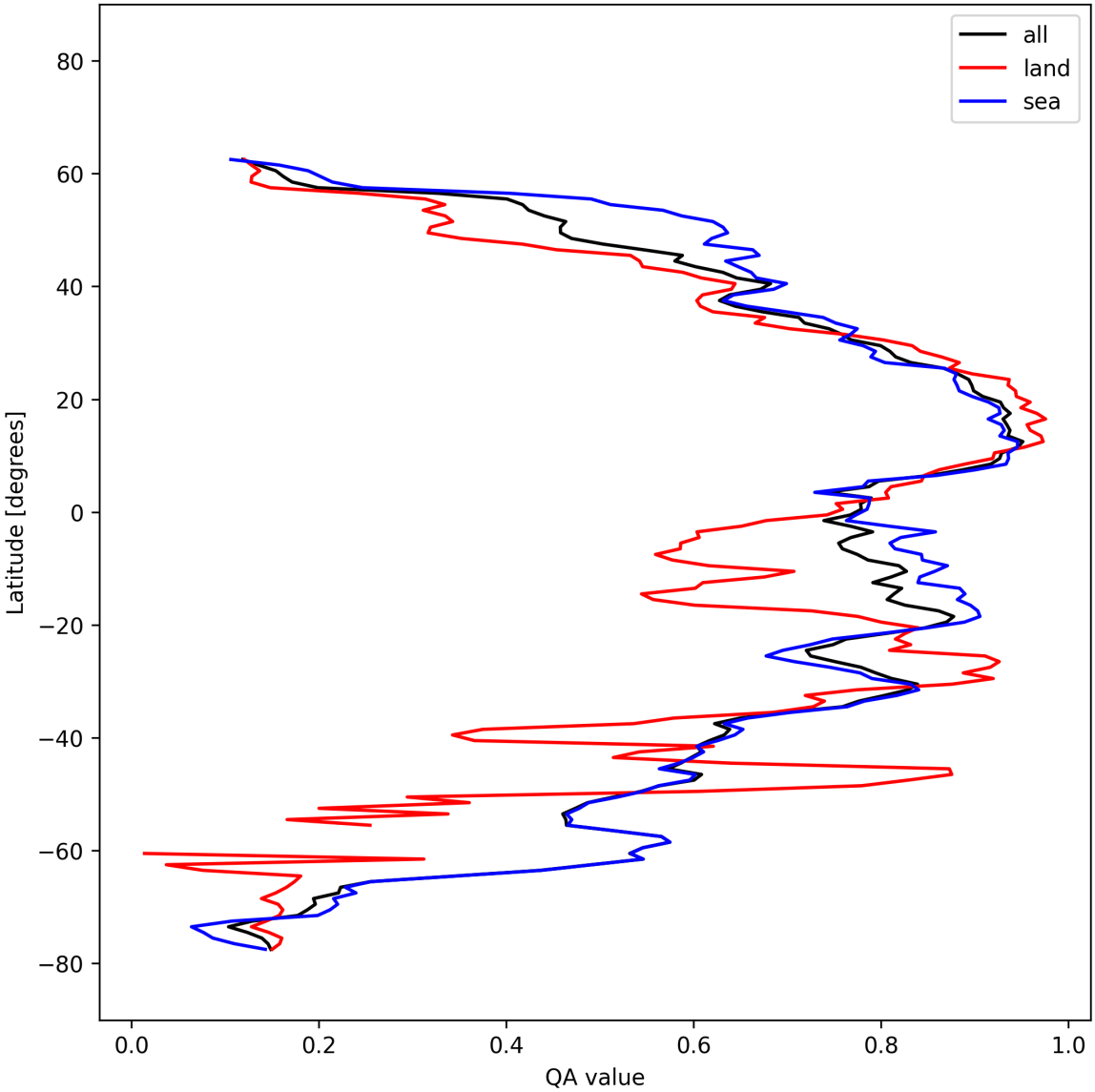

Figure 30: Zonal average of “QA value” for 2025-02-28 to 2025-03-01.

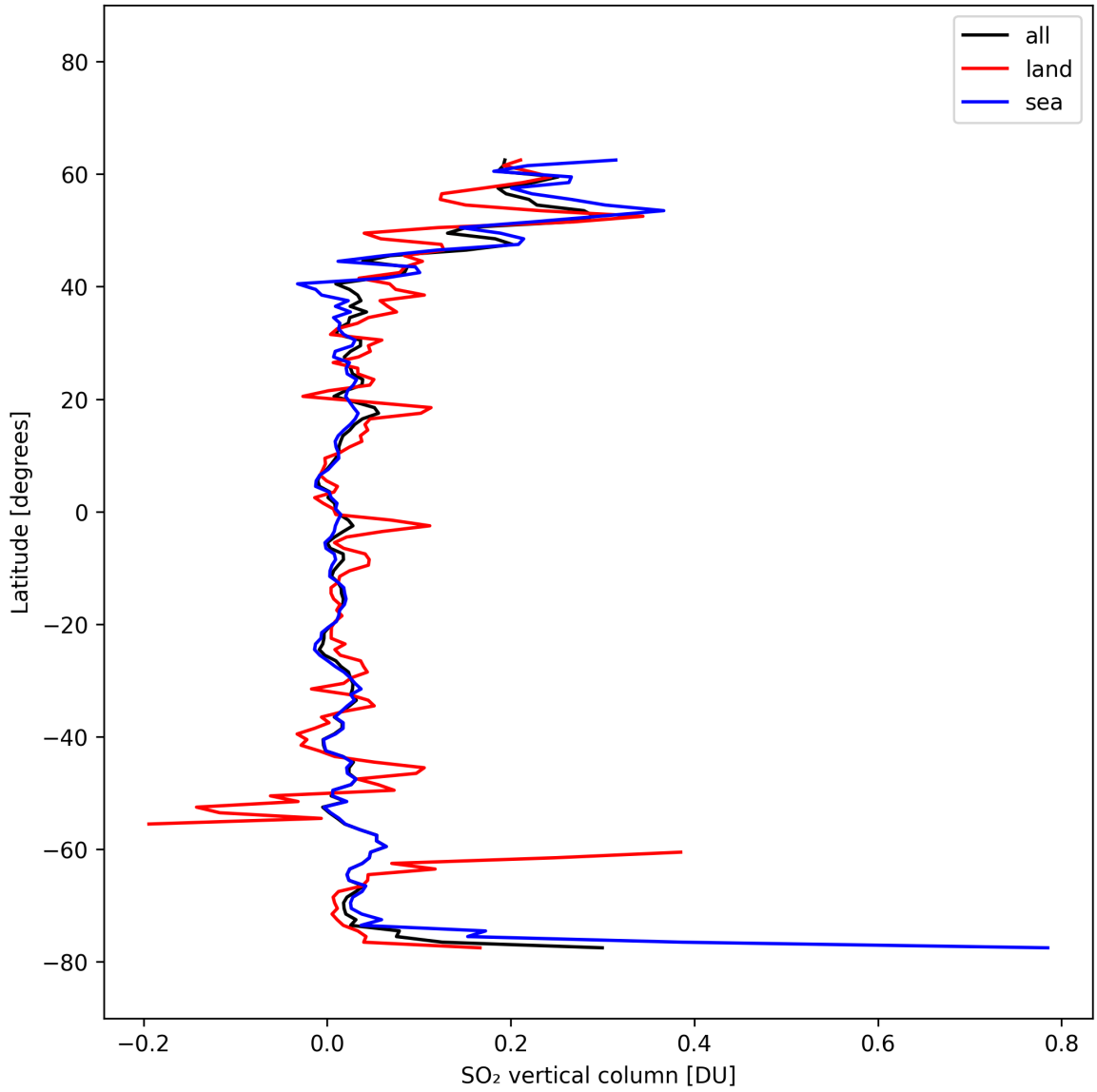

Figure 31: Zonal average of "SO_2 vertical column" for 2025-02-28 to 2025-03-01.

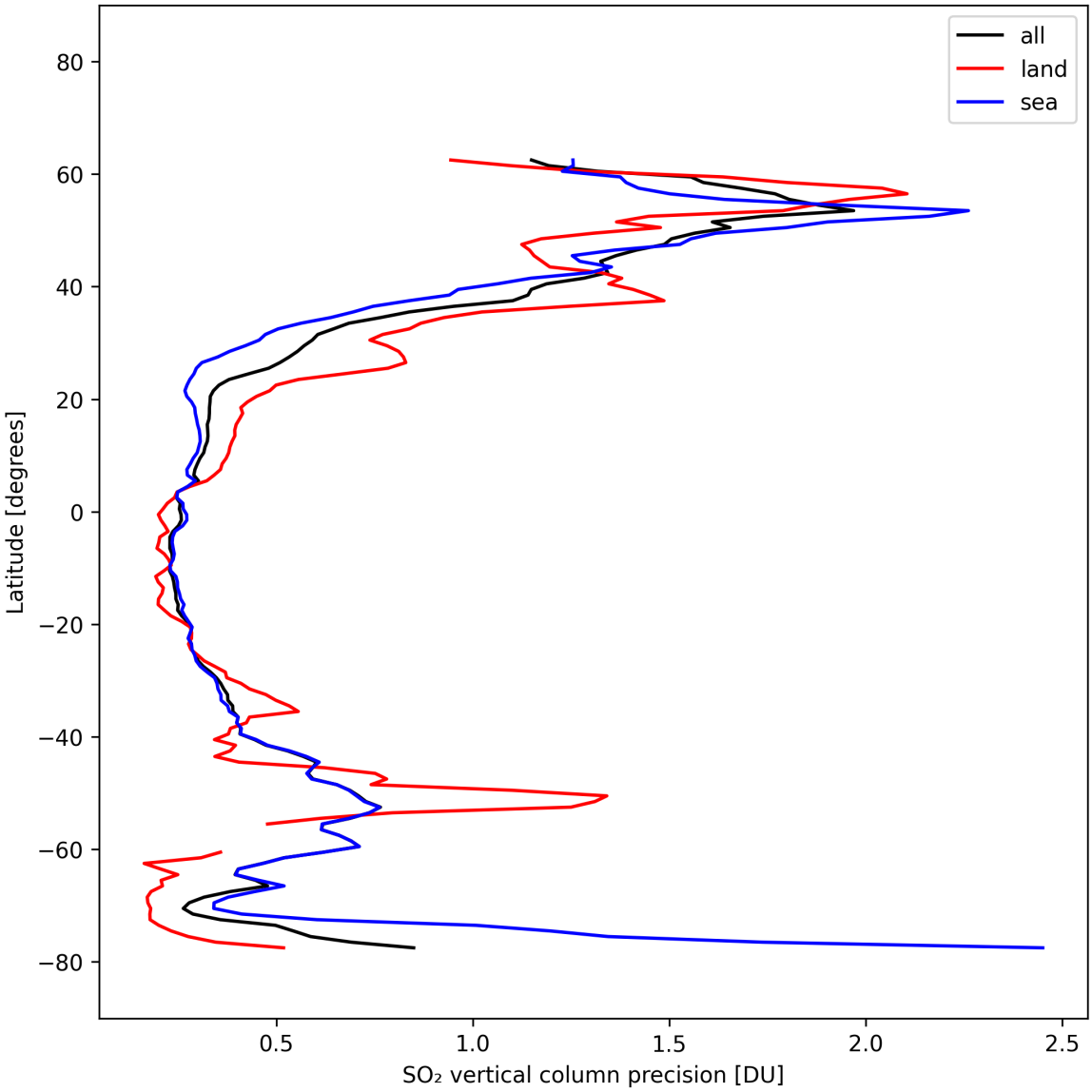

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-02-28 to 2025-03-01.

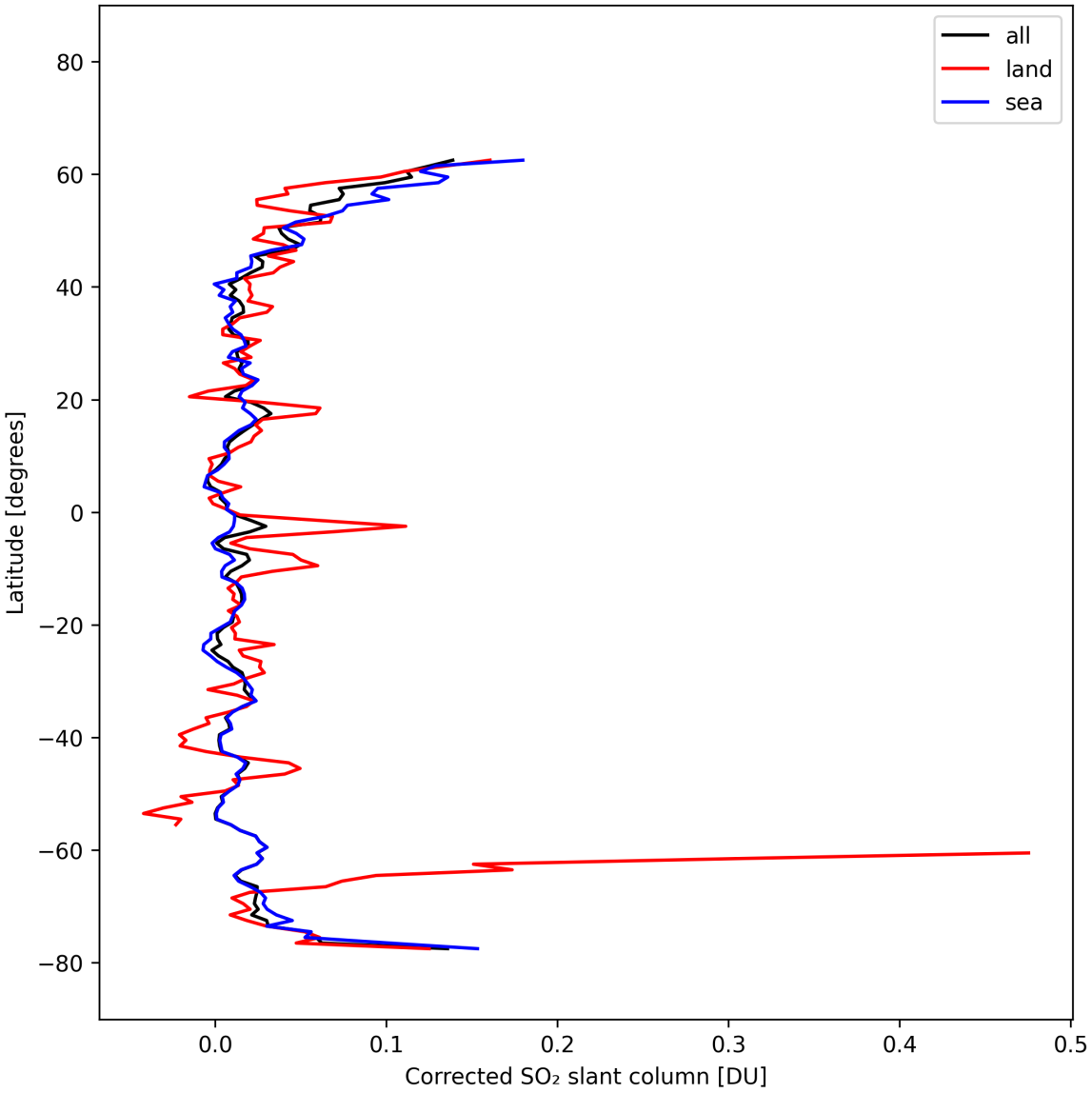

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-02-28 to 2025-03-01.

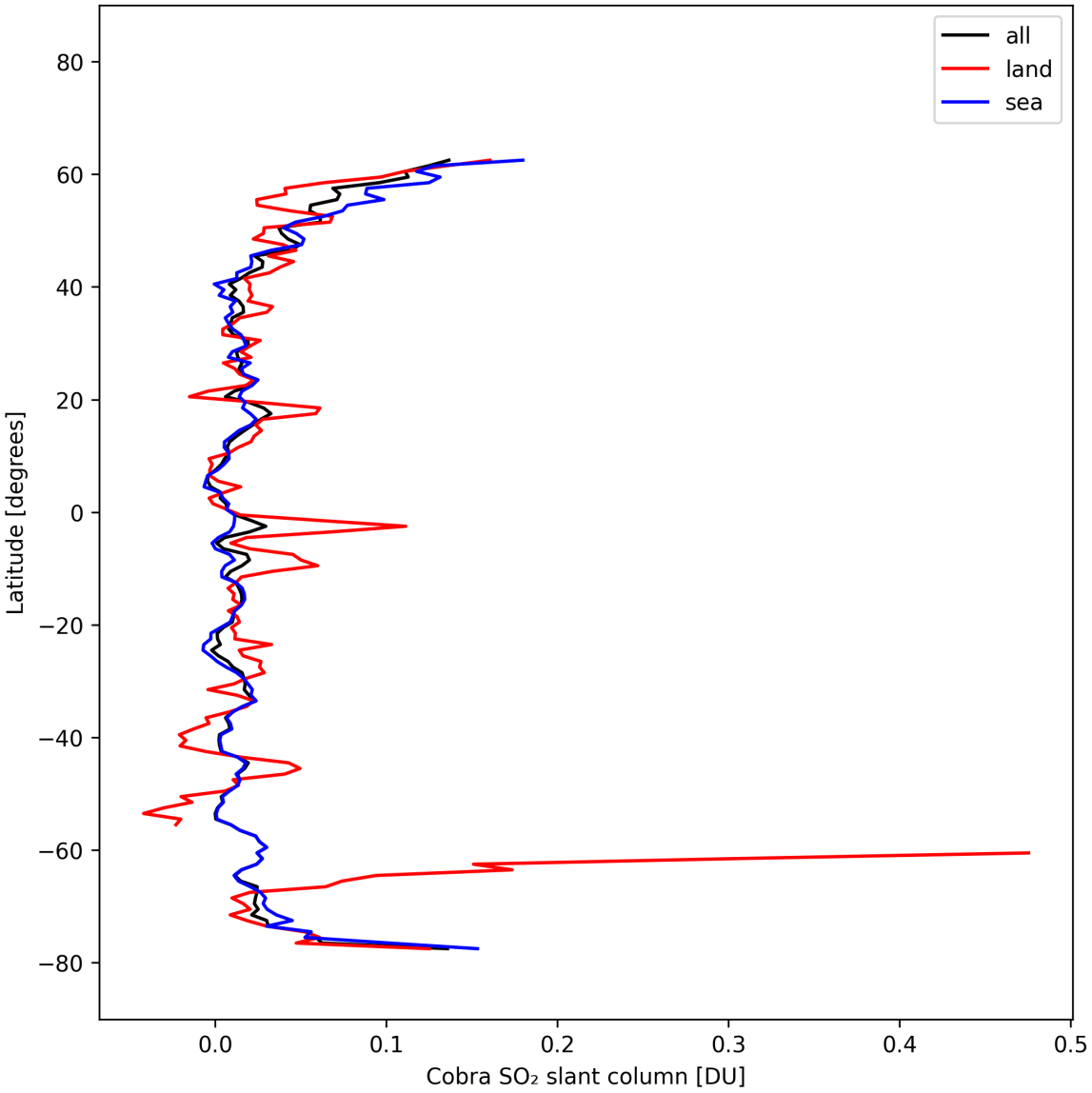

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-02-28 to 2025-03-01.

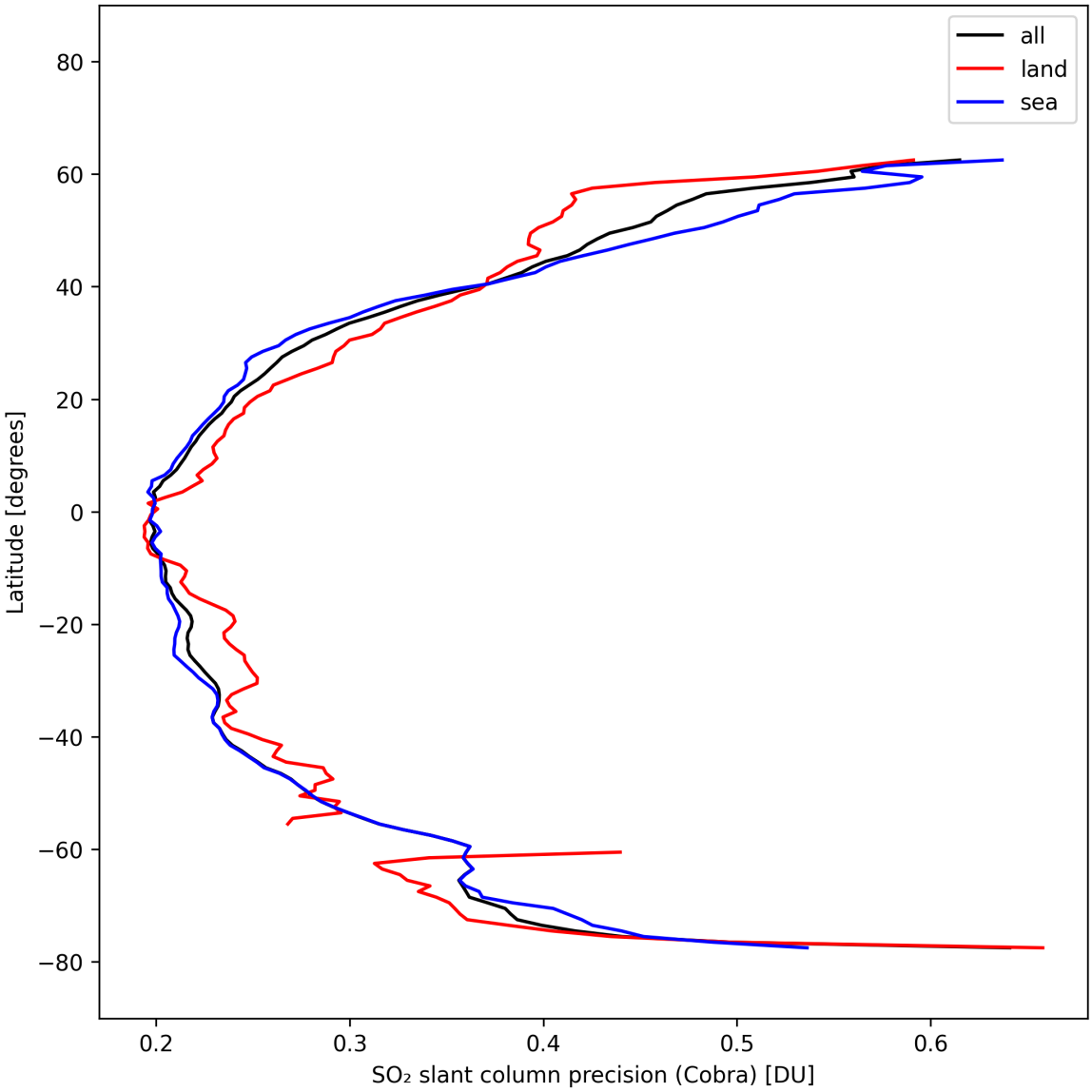

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-02-28 to 2025-03-01.

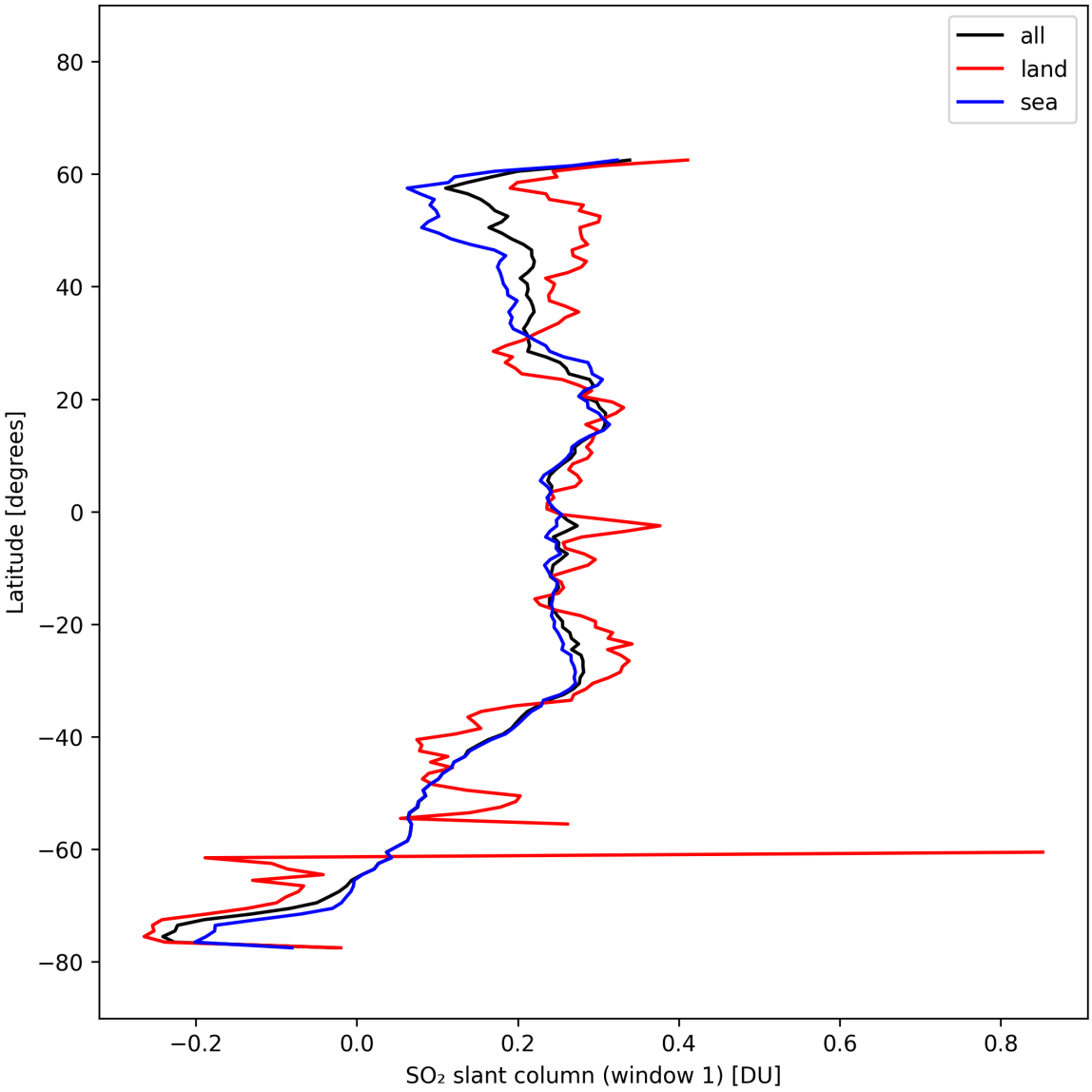

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-02-28 to 2025-03-01.

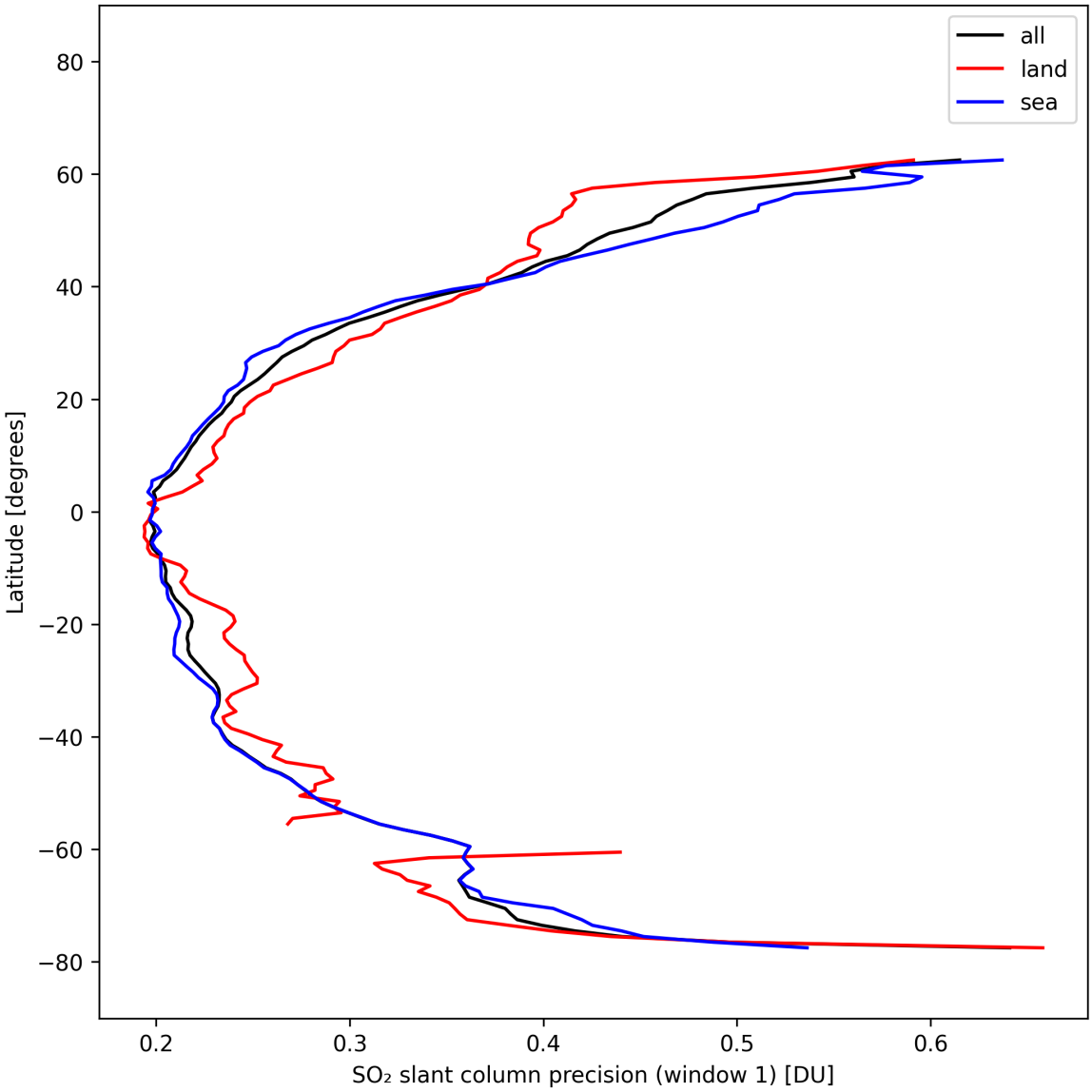

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-02-28 to 2025-03-01.

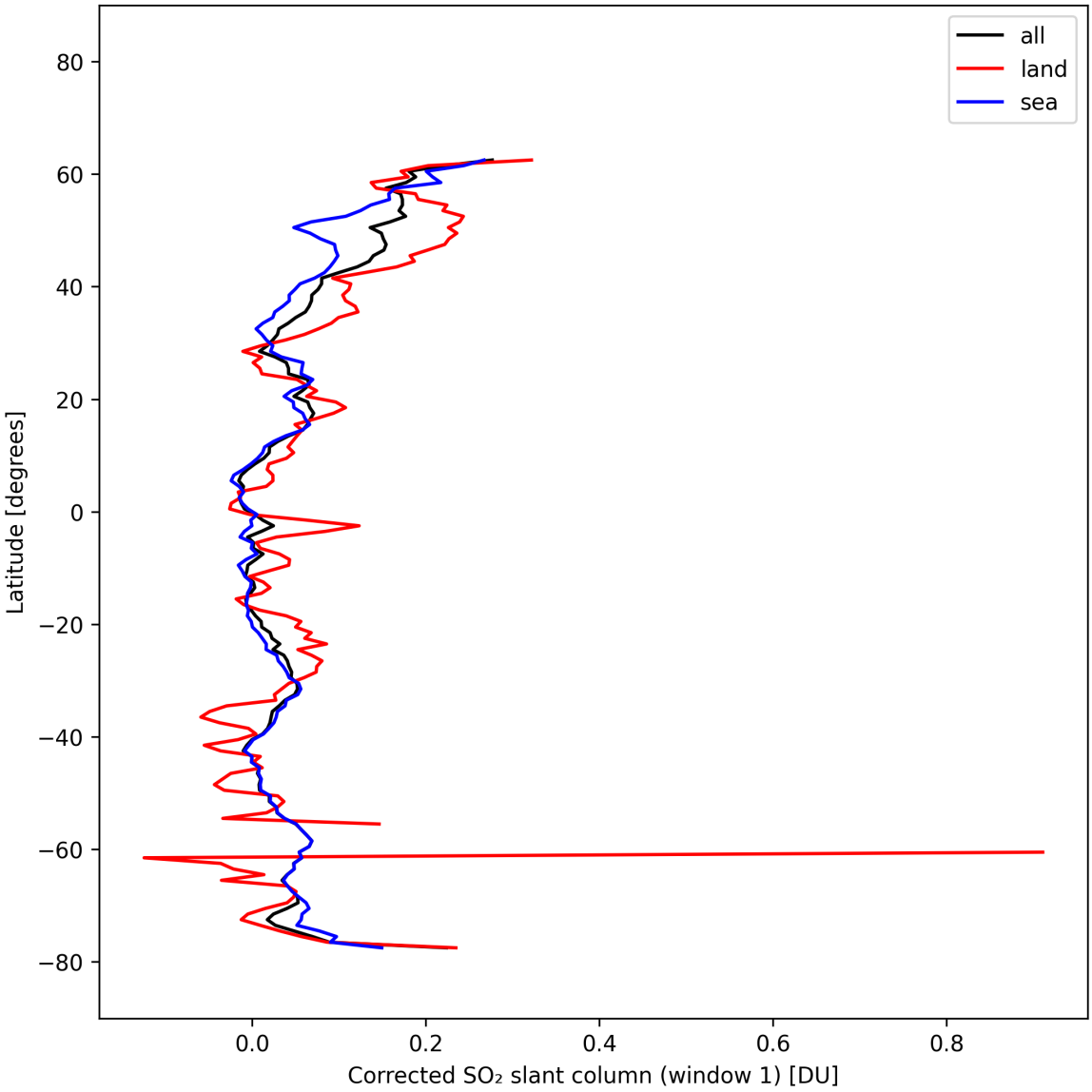

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-02-28 to 2025-03-01.

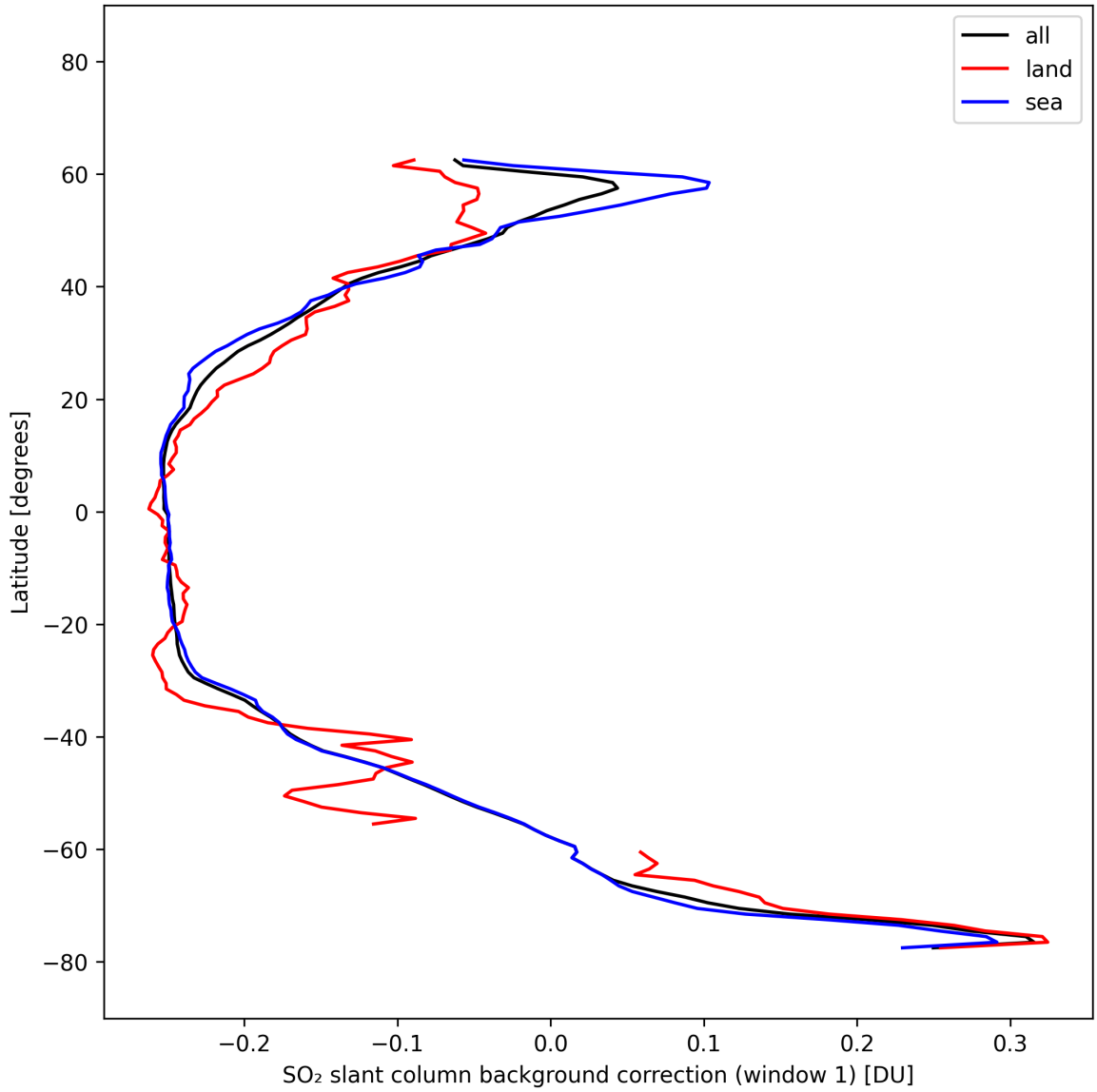

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-02-28 to 2025-03-01.

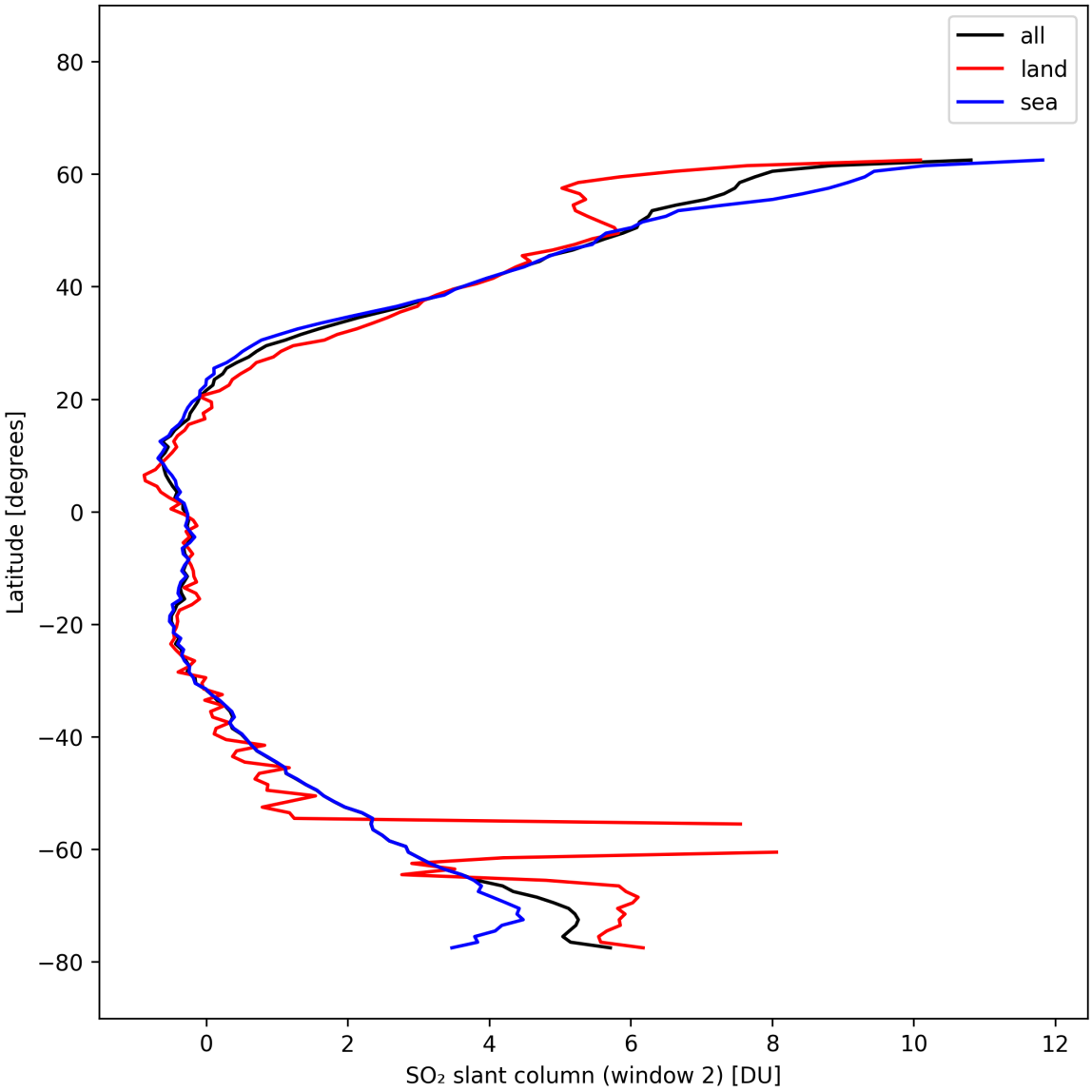

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-02-28 to 2025-03-01.

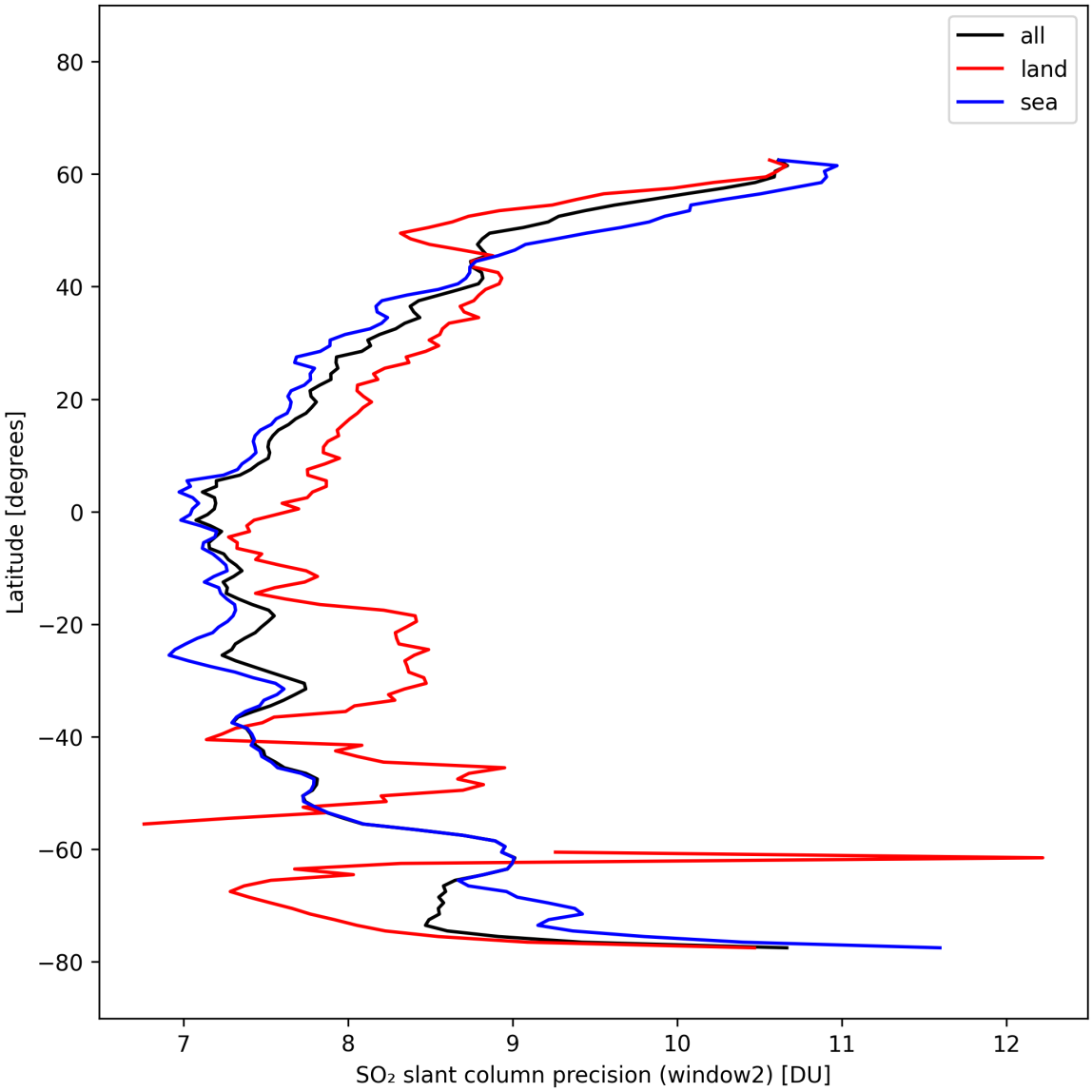

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-02-28 to 2025-03-01.

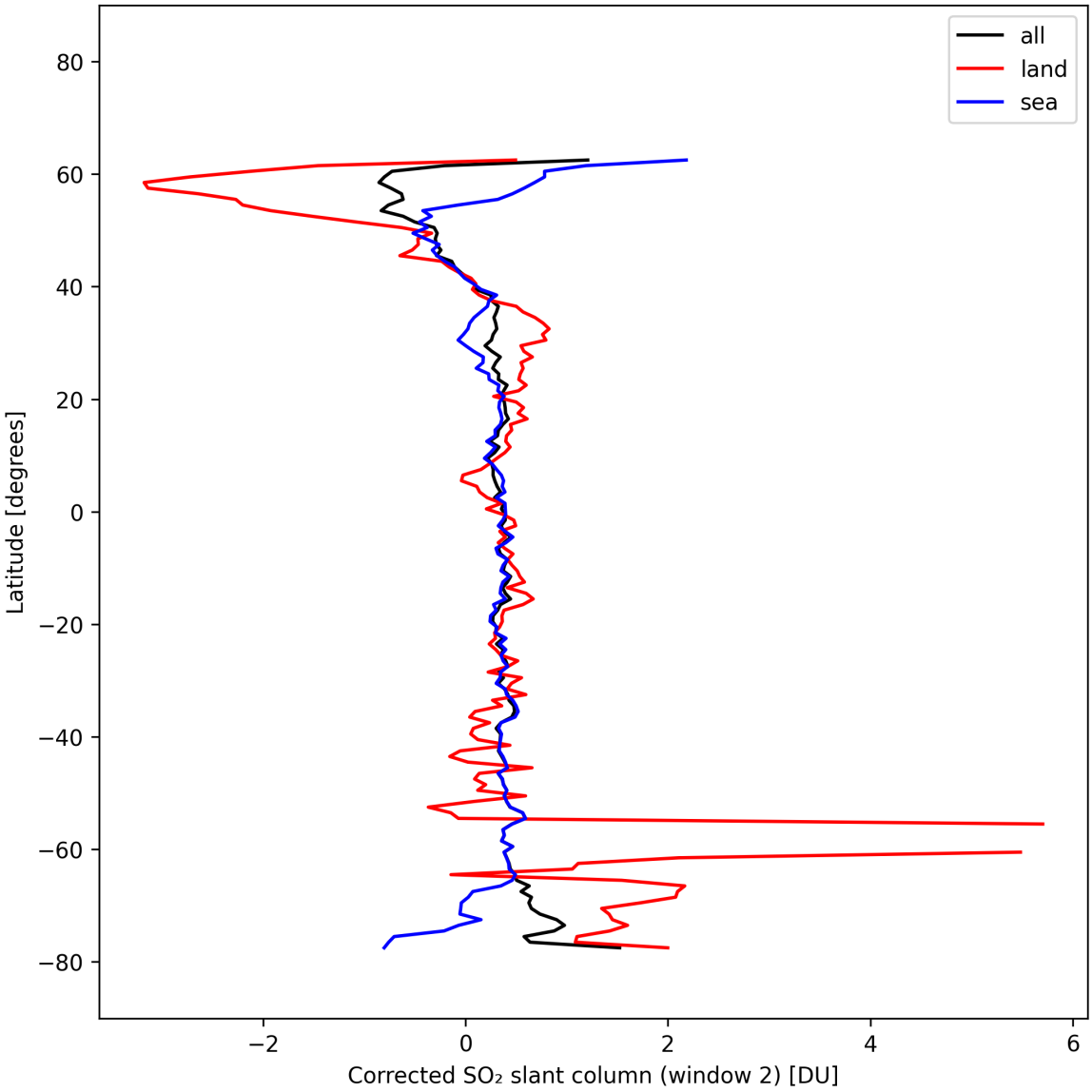

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-02-28 to 2025-03-01.

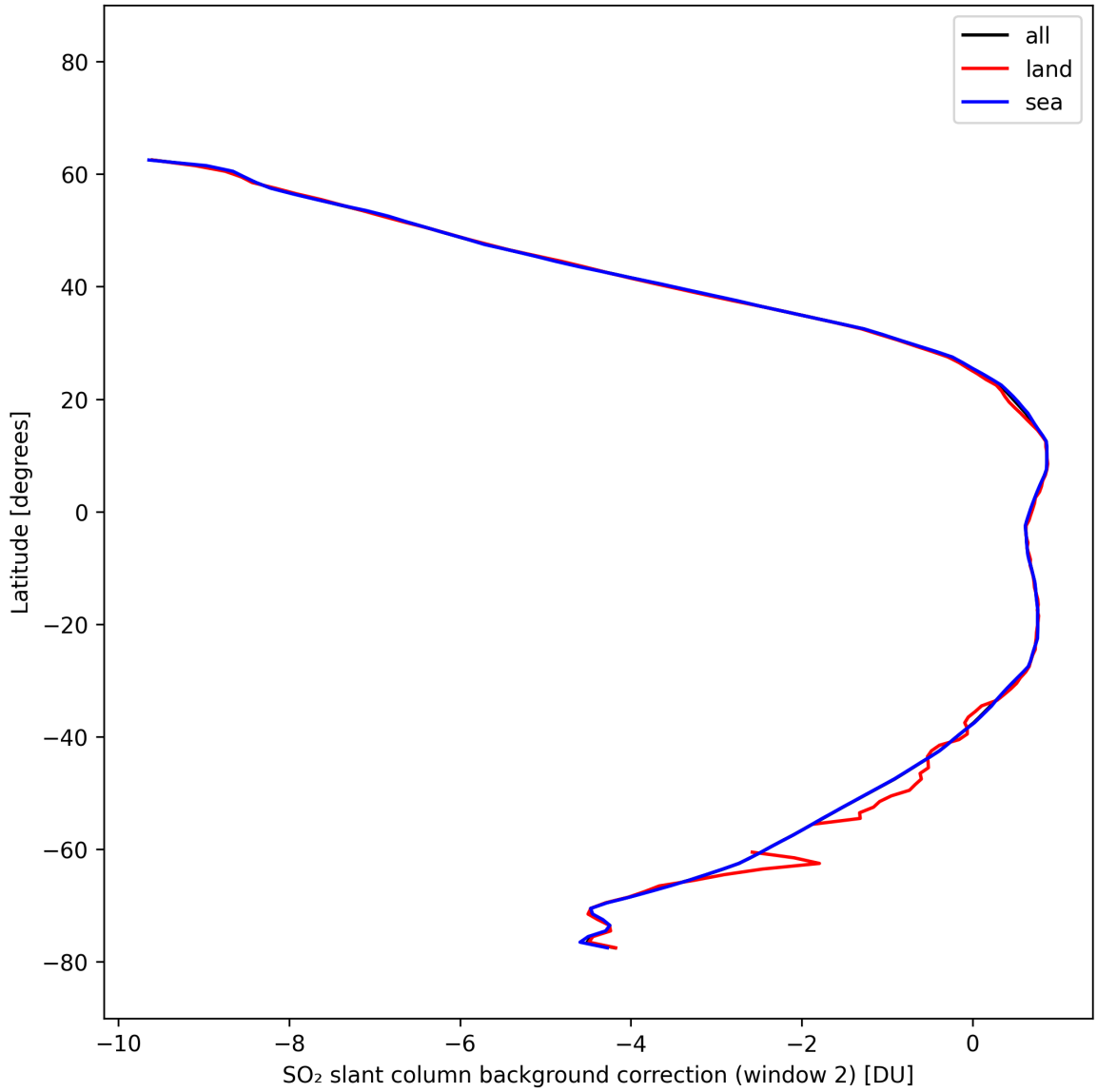

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-02-28 to 2025-03-01.

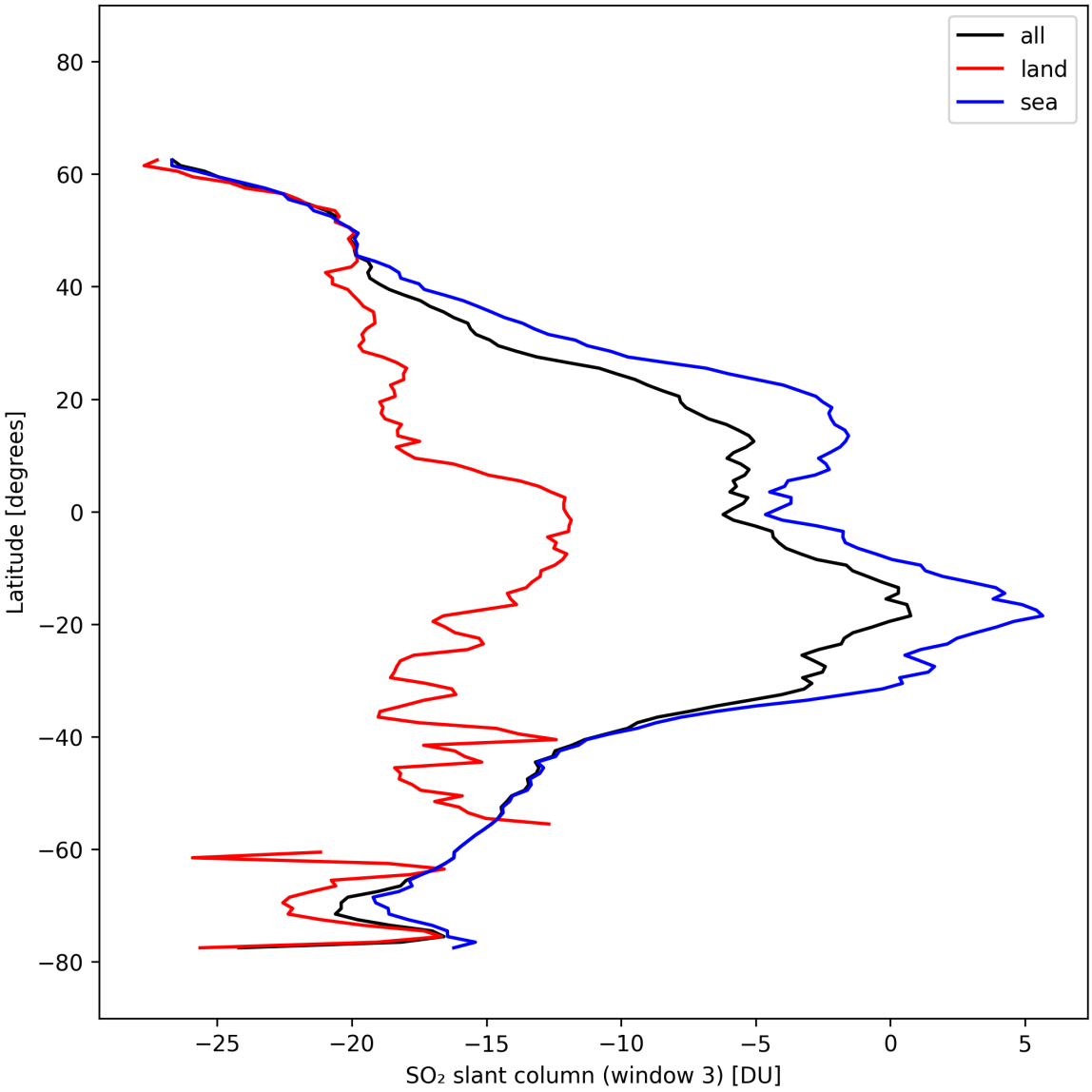

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-02-28 to 2025-03-01.

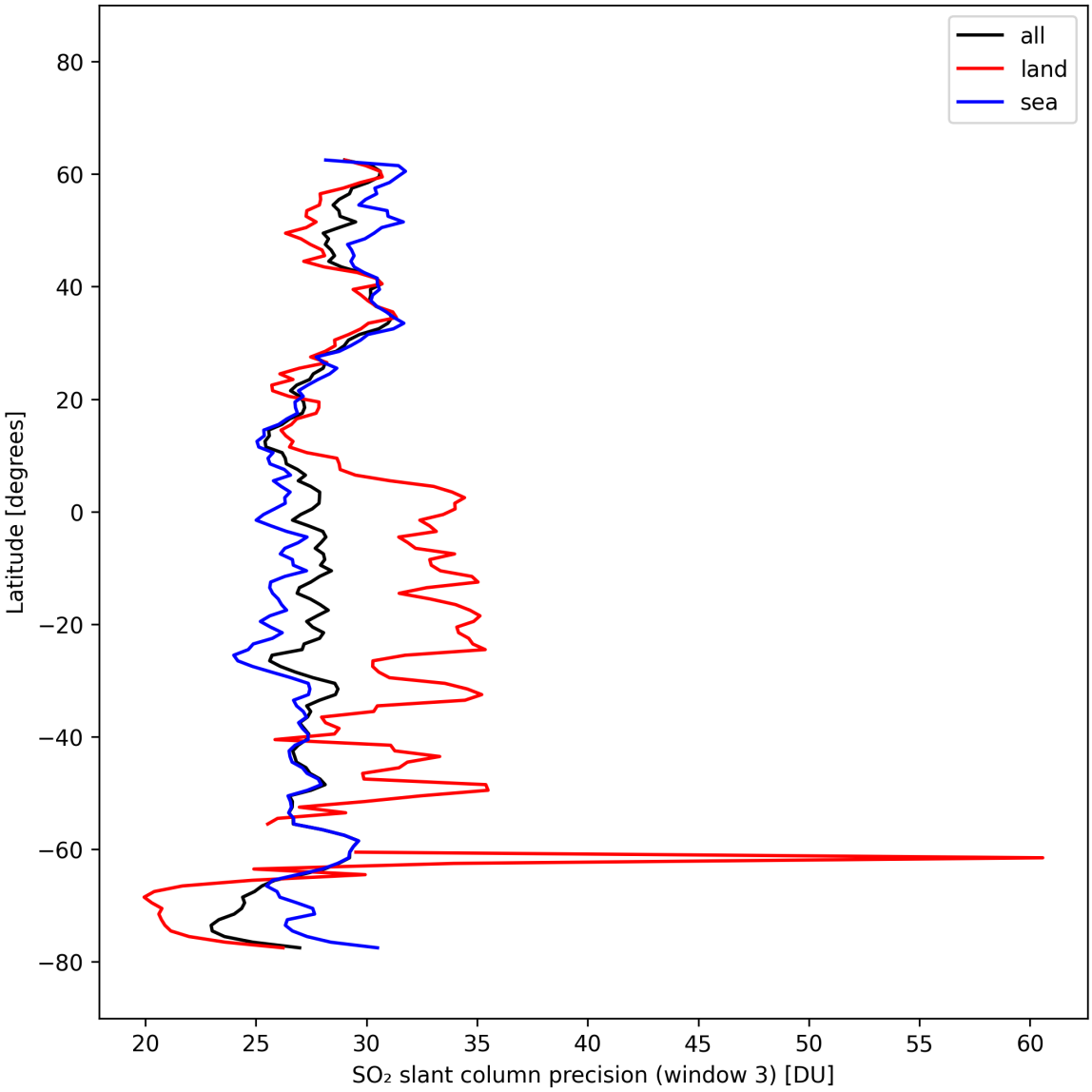

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-02-28 to 2025-03-01.

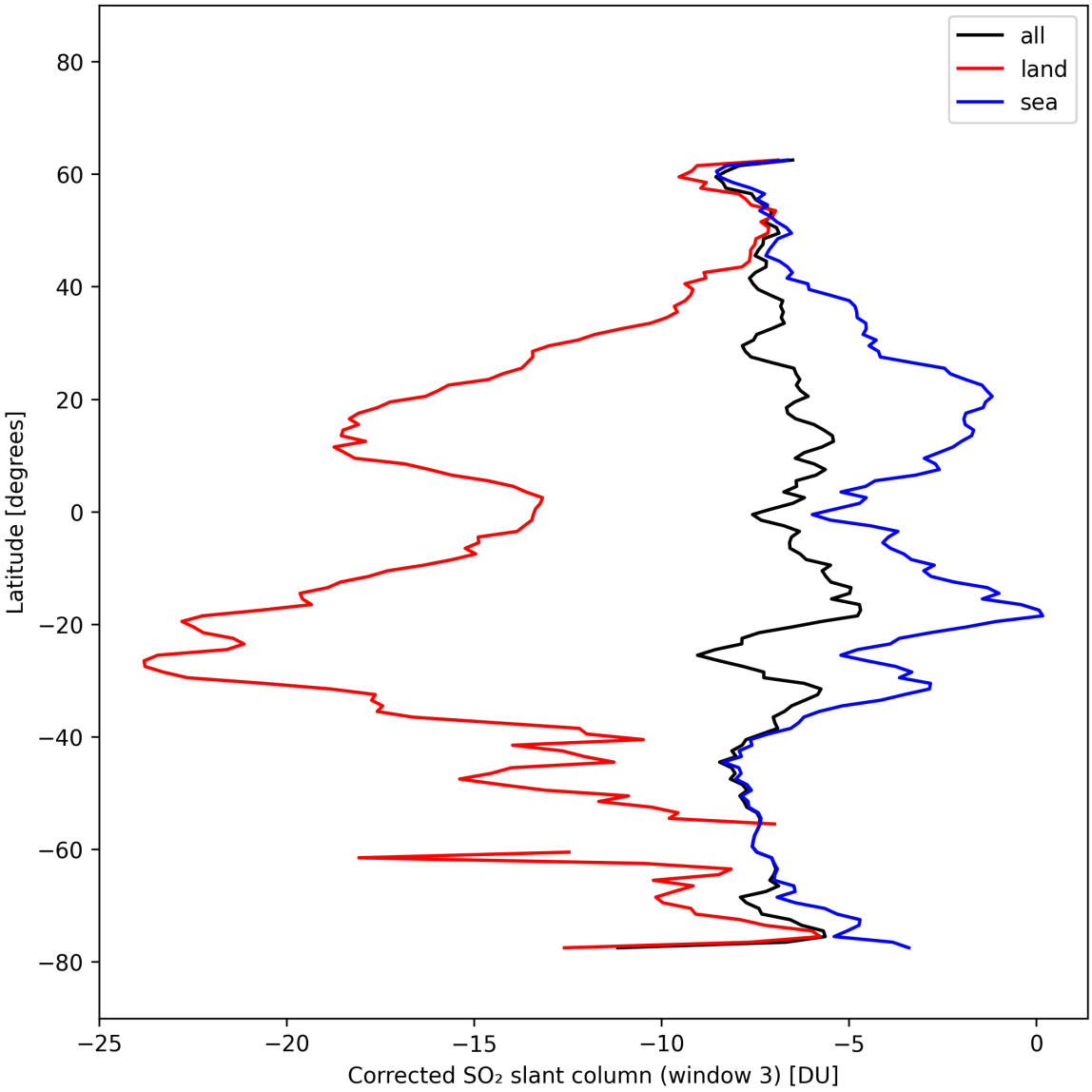

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-02-28 to 2025-03-01.

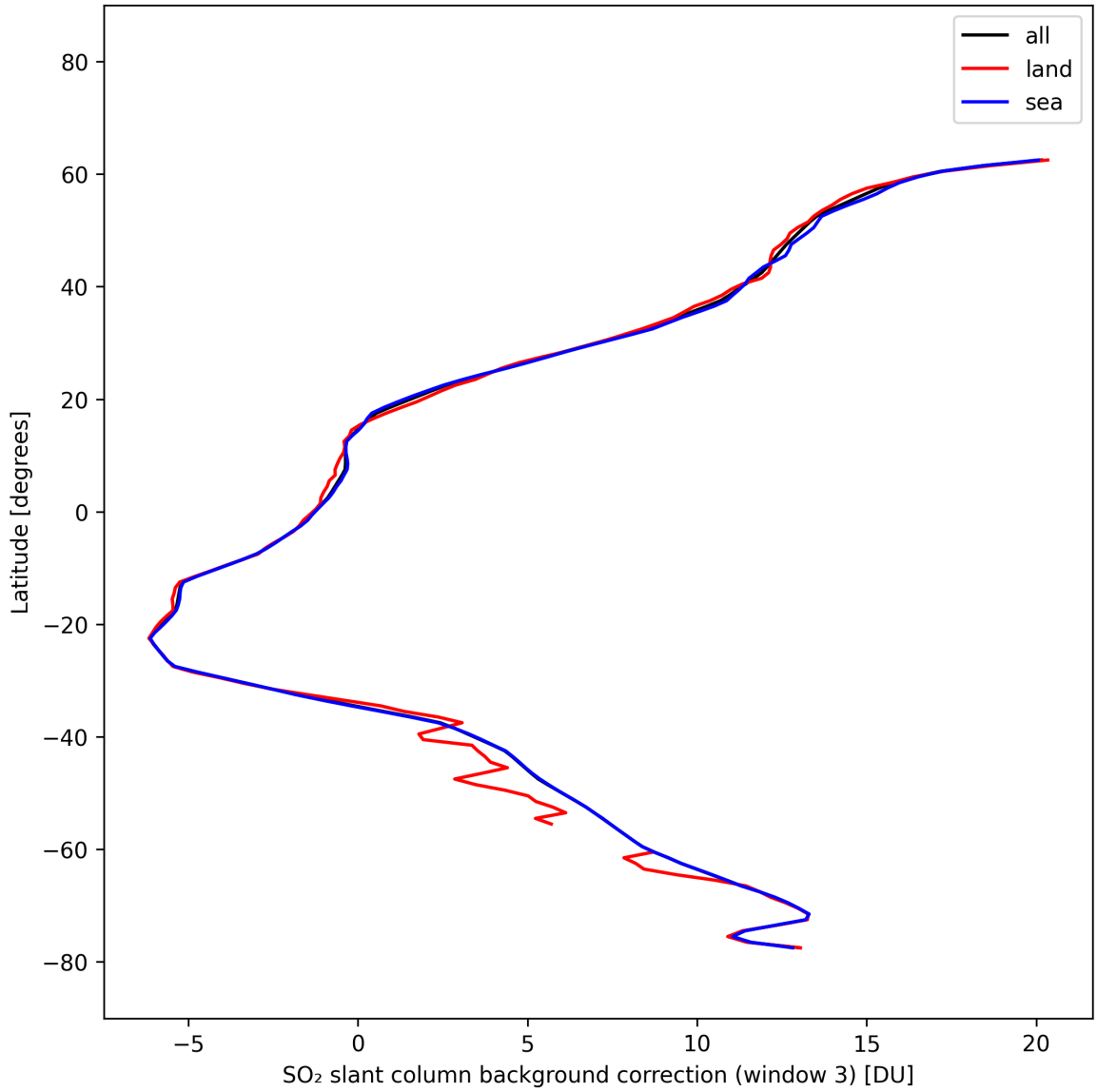

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-02-28 to 2025-03-01.

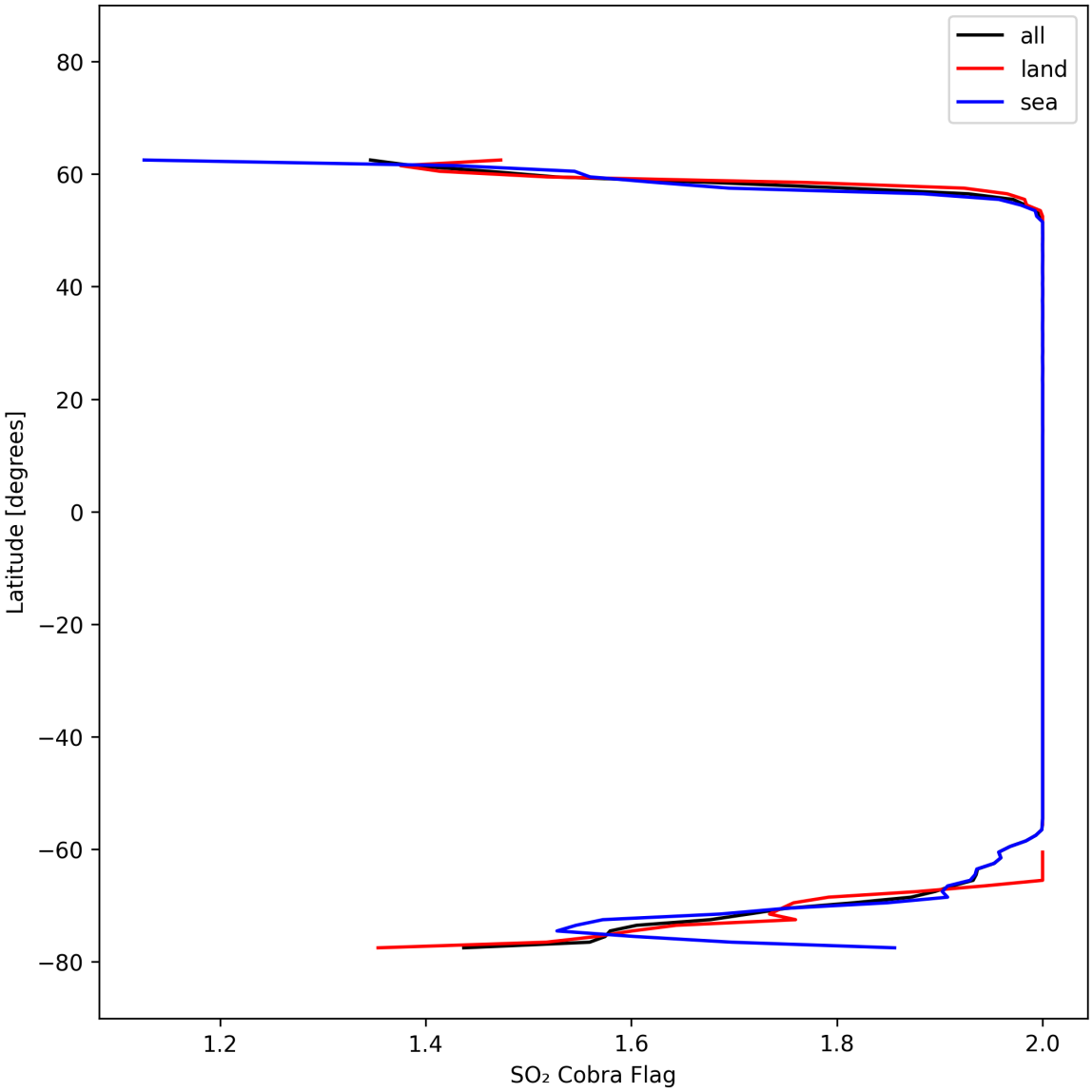

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-02-28 to 2025-03-01.

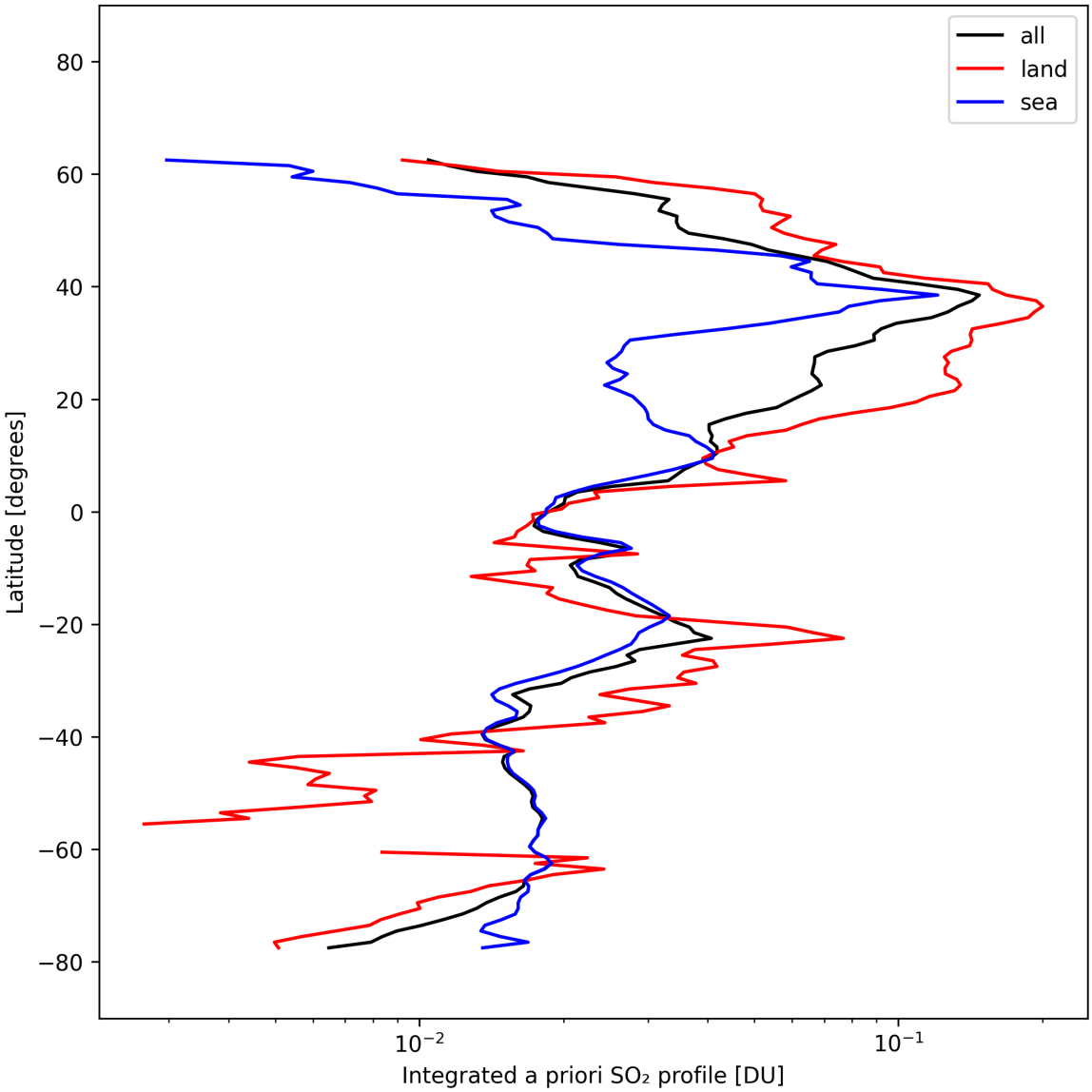

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-02-28 to 2025-03-01.

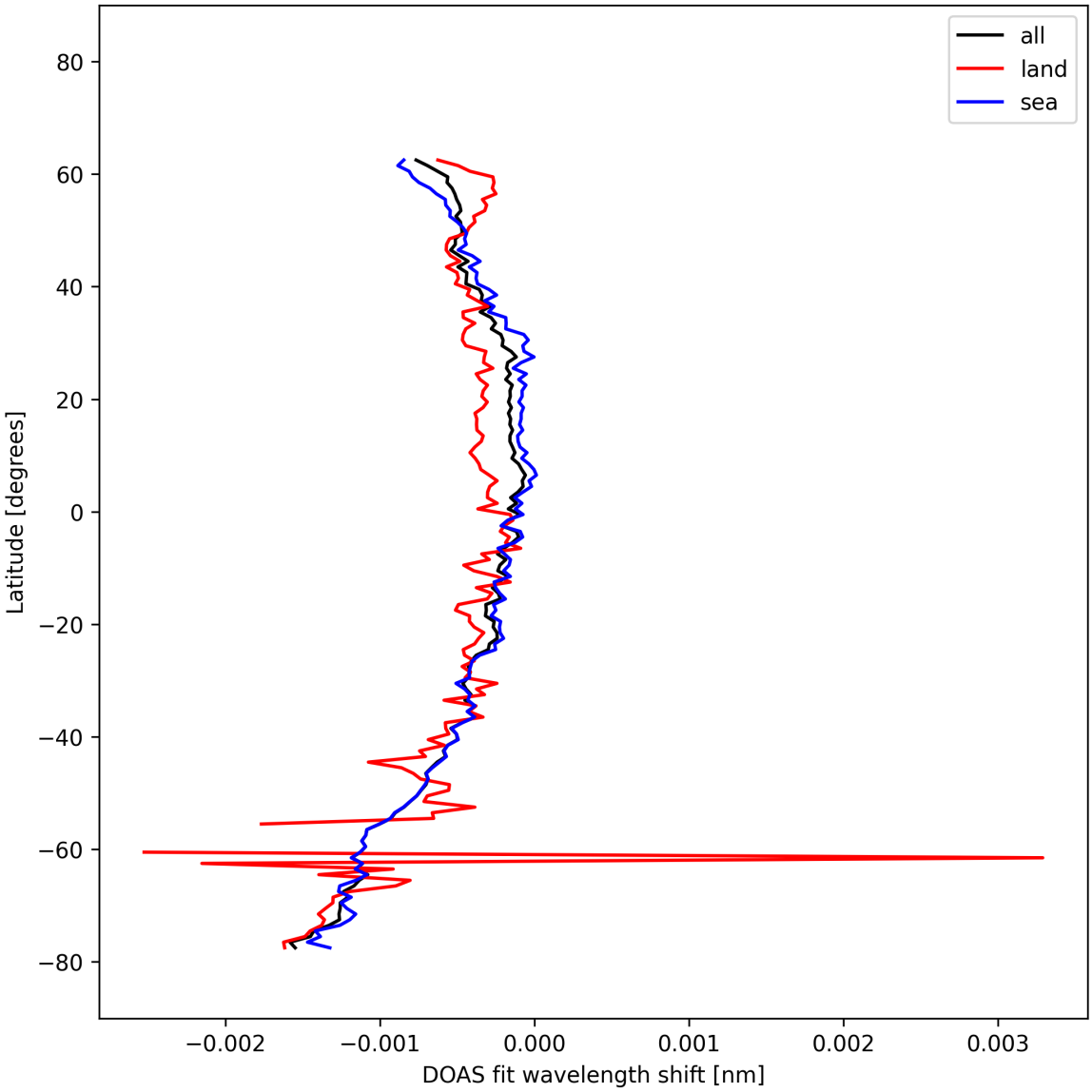

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-02-28 to 2025-03-01.

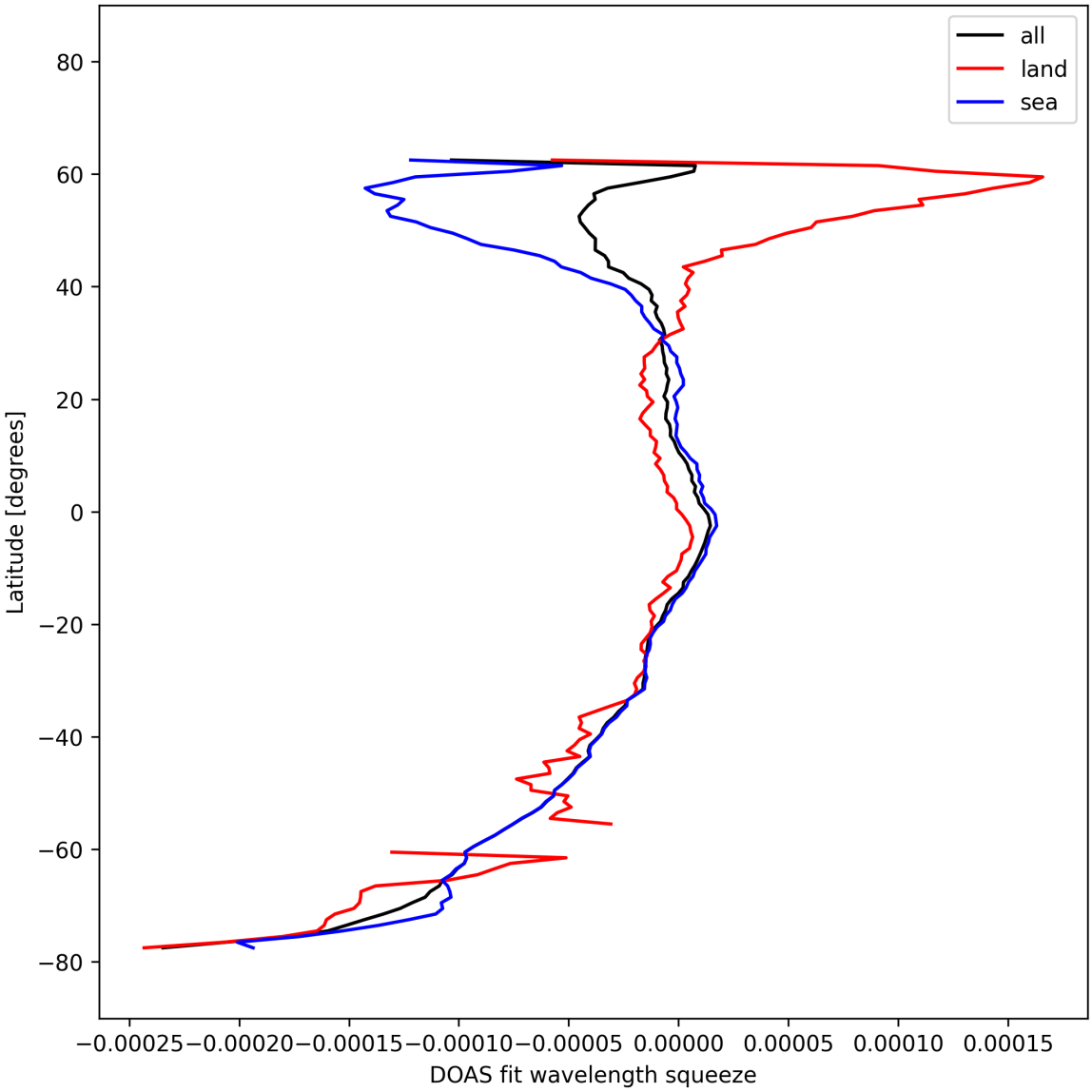

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-02-28 to 2025-03-01.

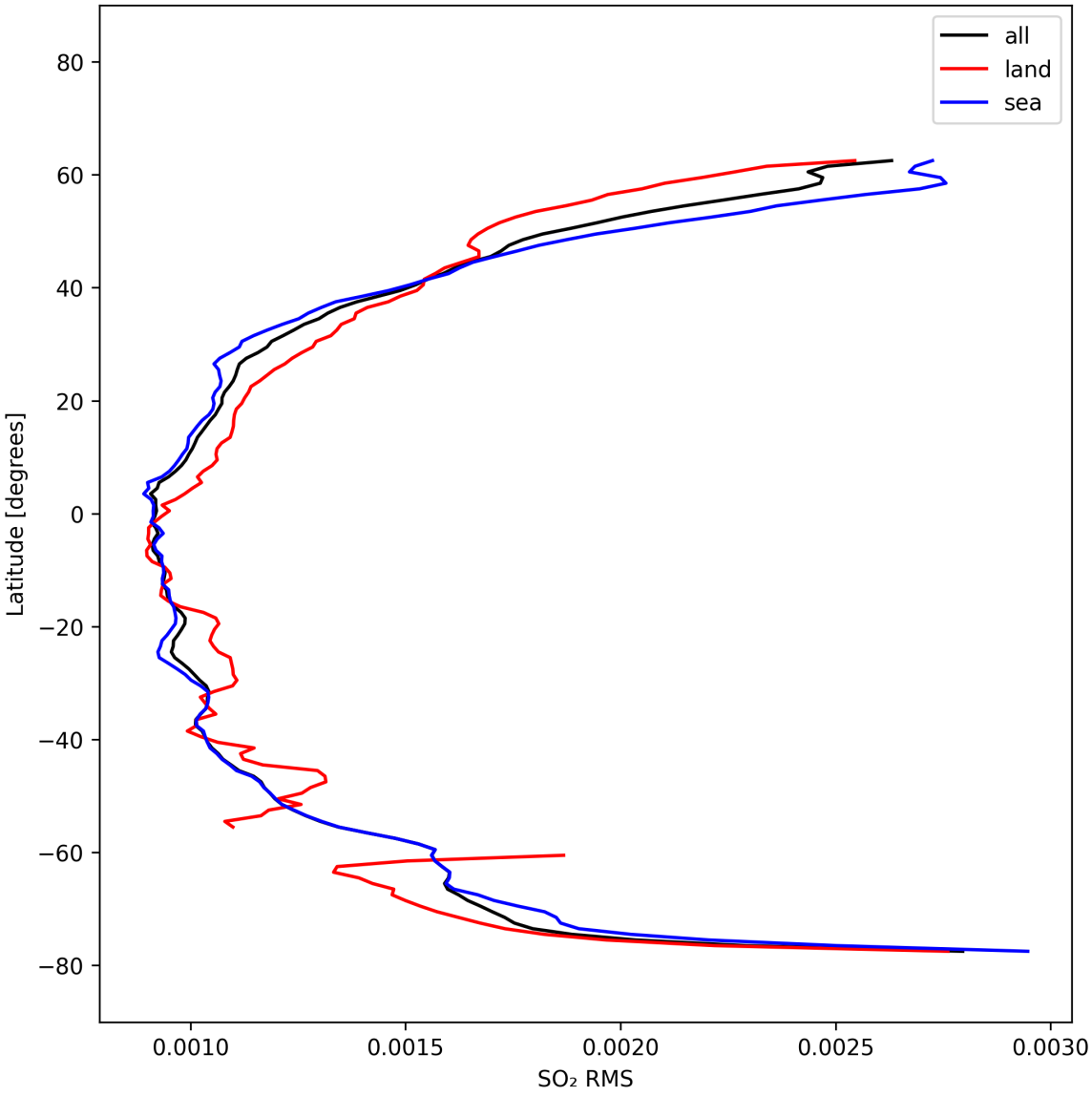

Figure 52: Zonal average of "SO_2 RMS" for 2025-02-28 to 2025-03-01.

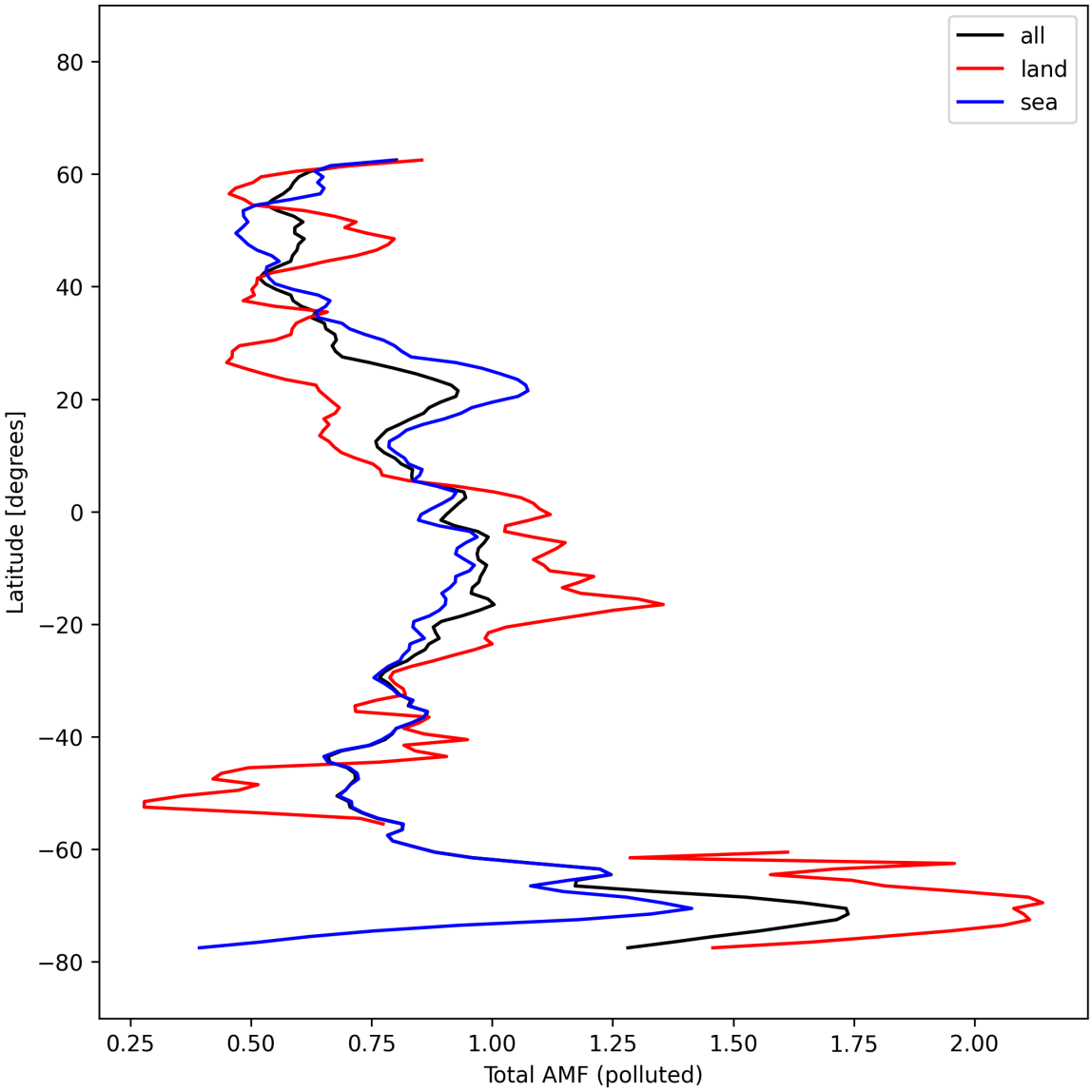

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-02-28 to 2025-03-01.

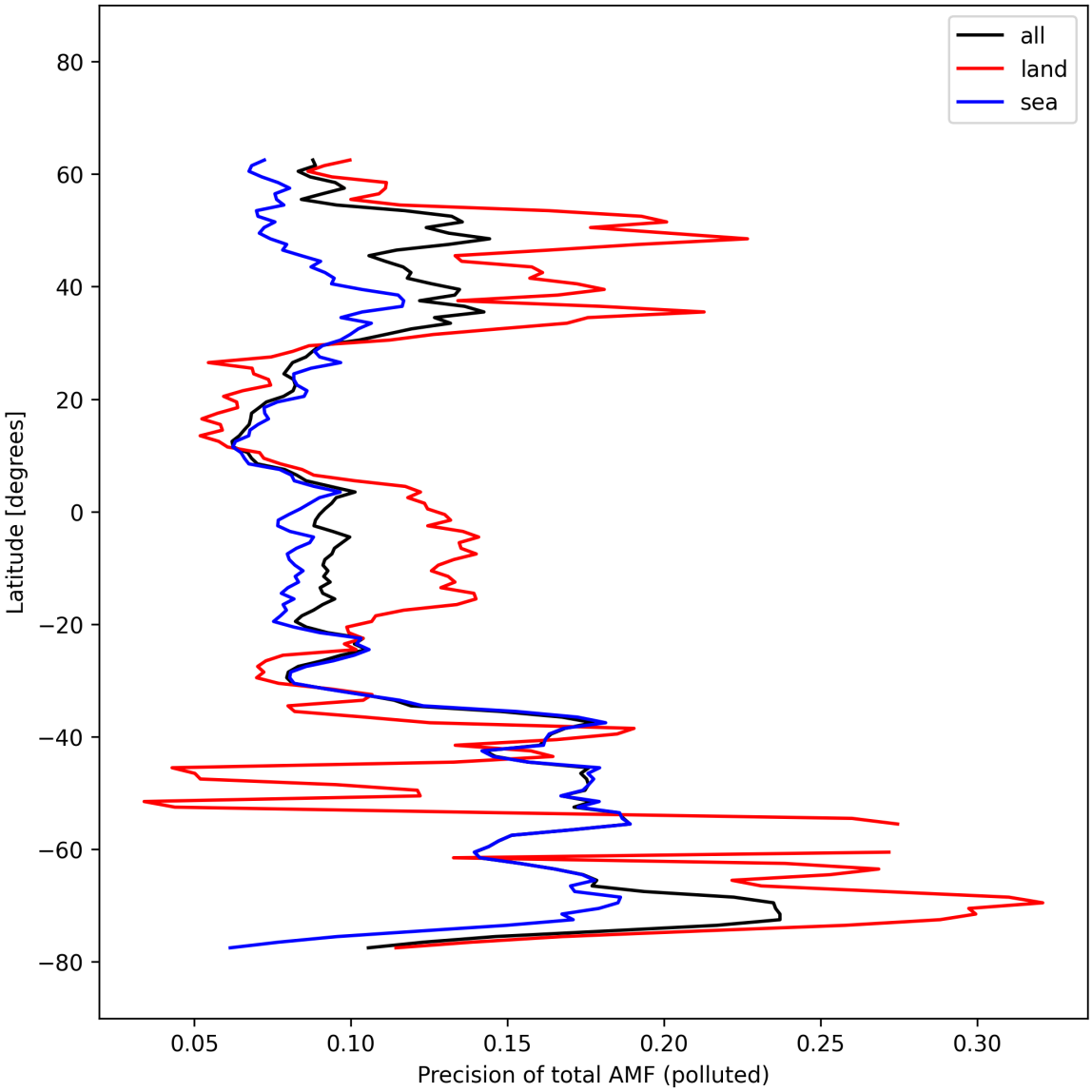

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-02-28 to 2025-03-01.

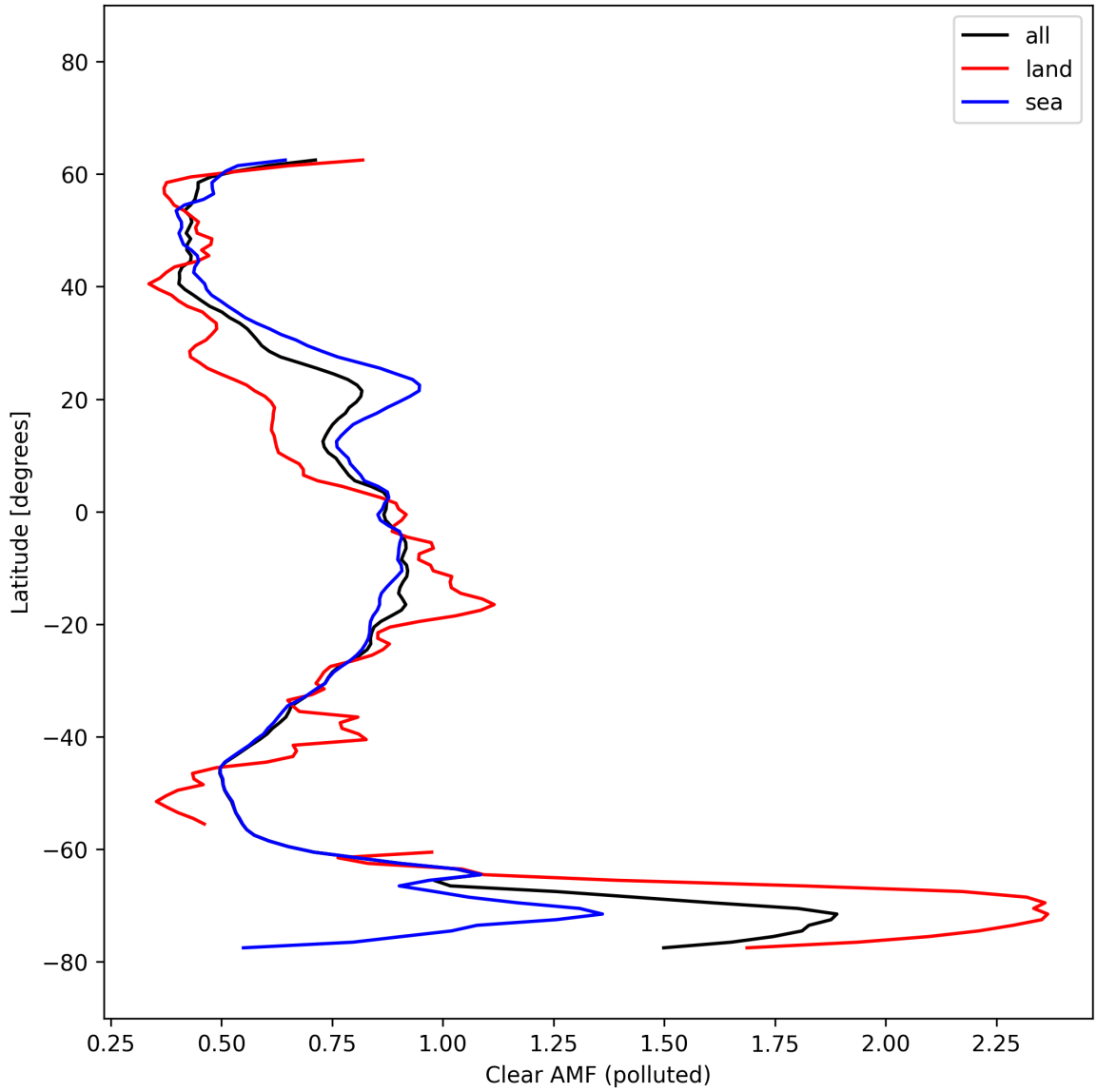

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-02-28 to 2025-03-01.

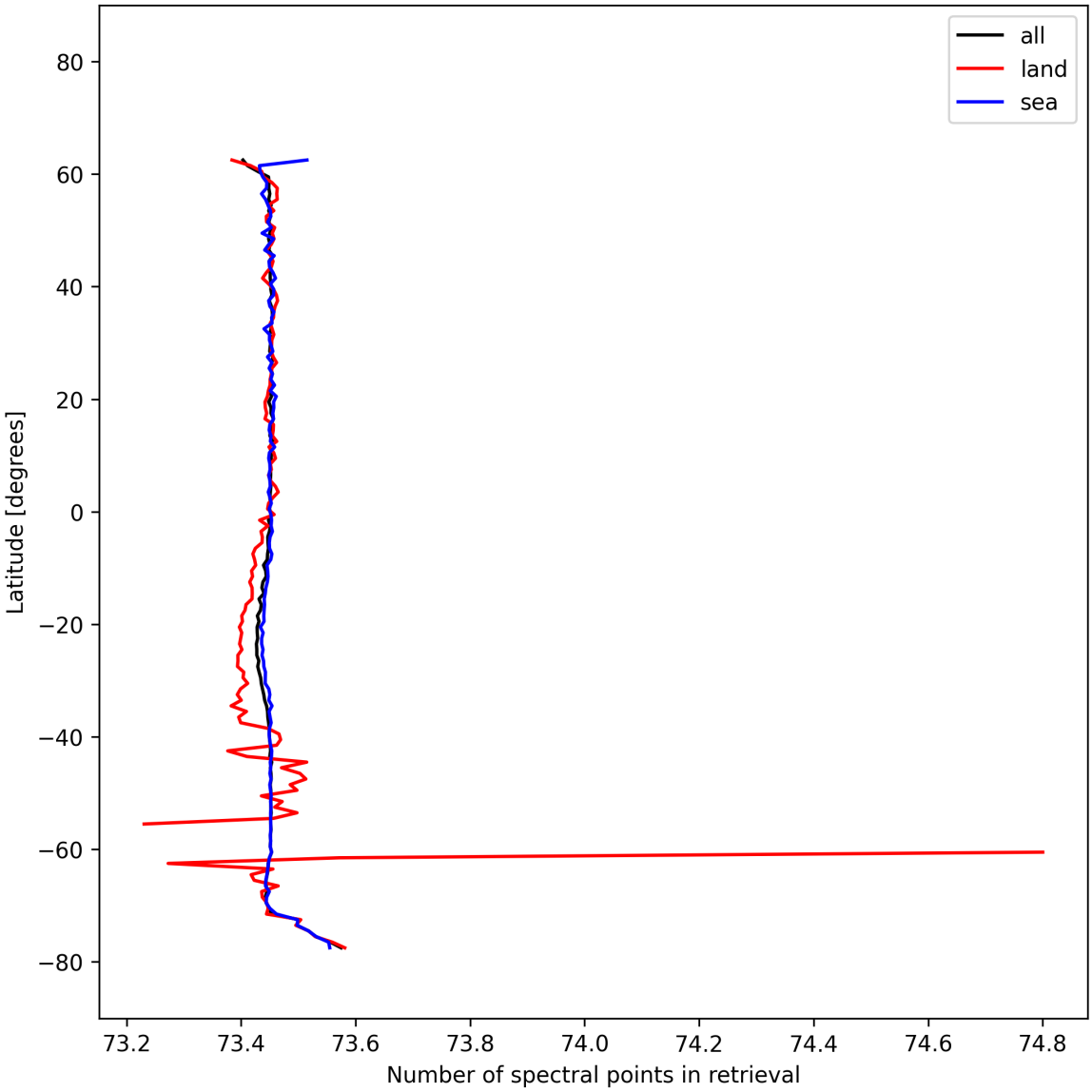

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-02-28 to 2025-03-01.

8 Histograms

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

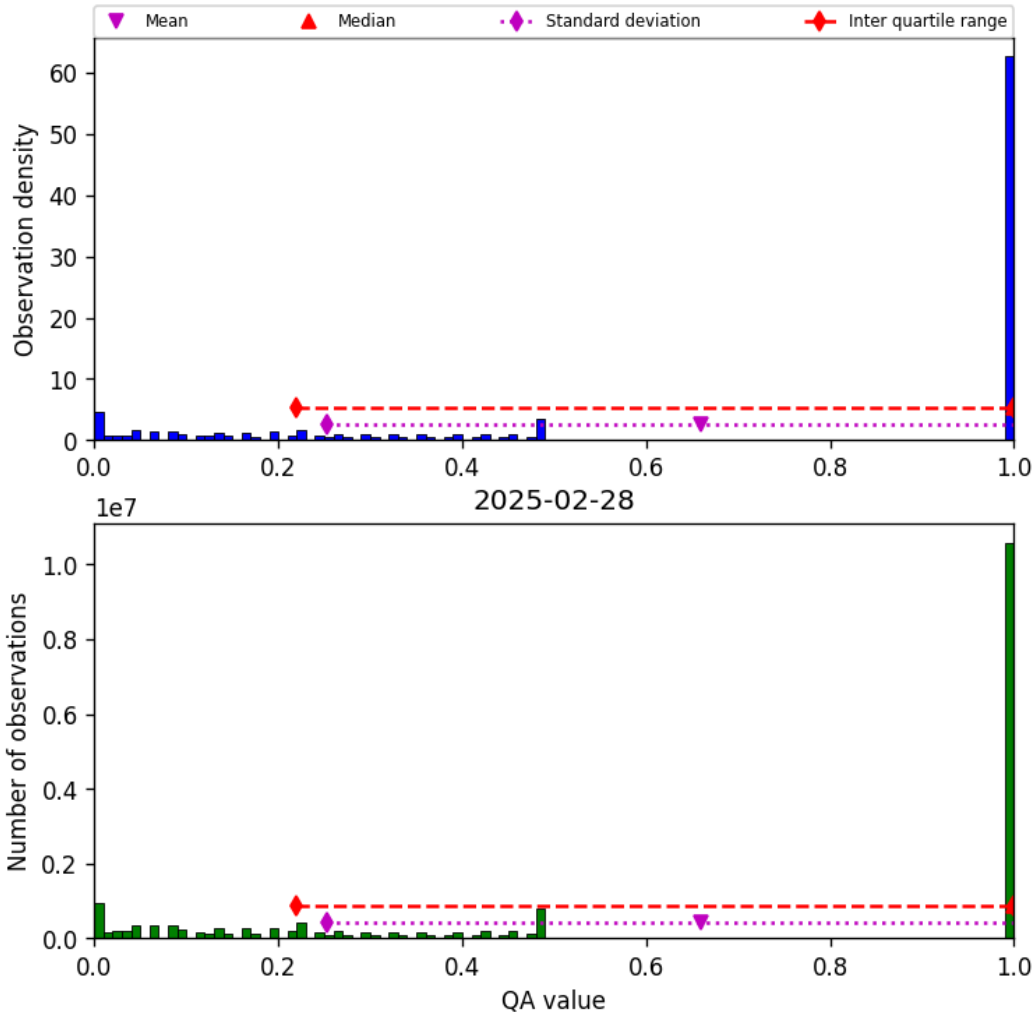

Figure 57: Histogram of “QA value” for 2025-02-28 to 2025-03-01

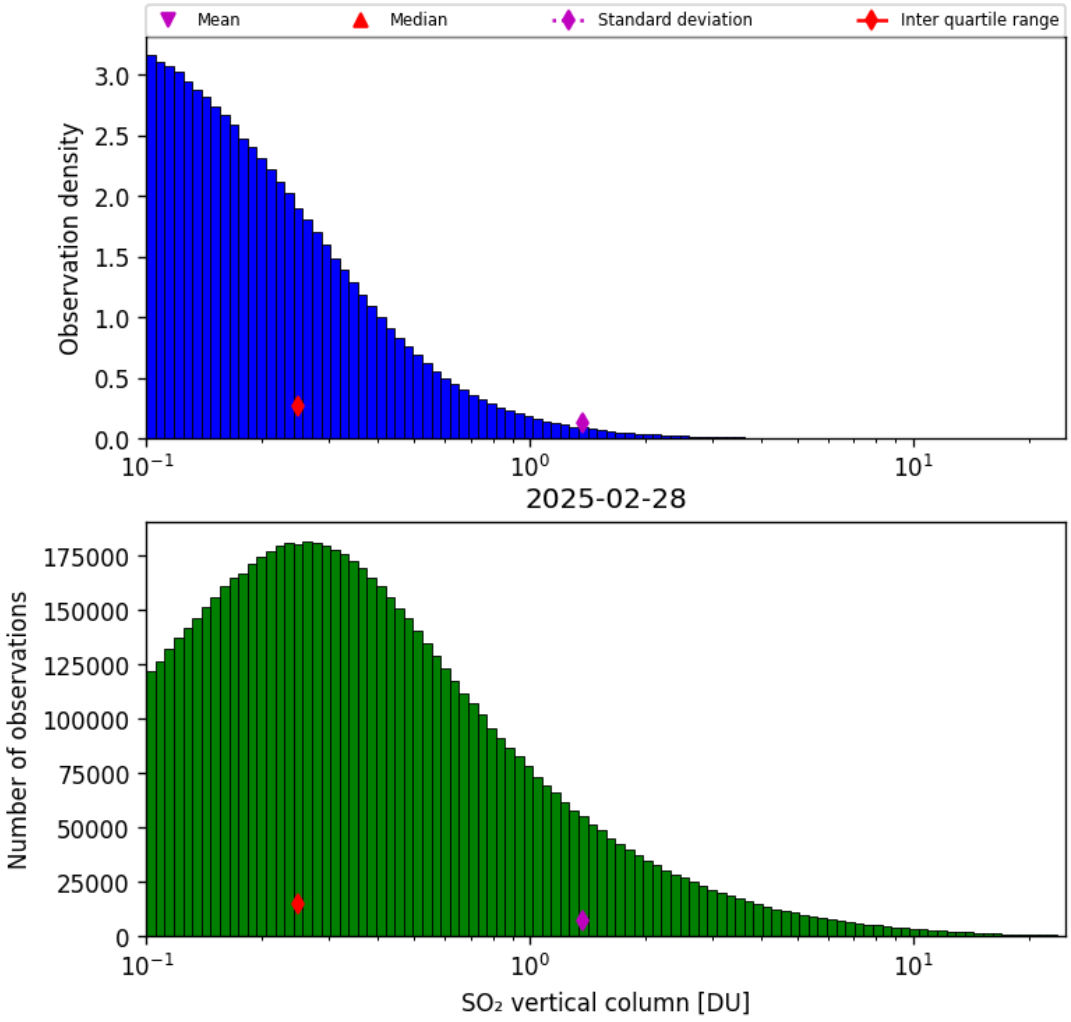

Figure 58: Histogram of "SO_2 vertical column" for 2025-02-28 to 2025-03-01

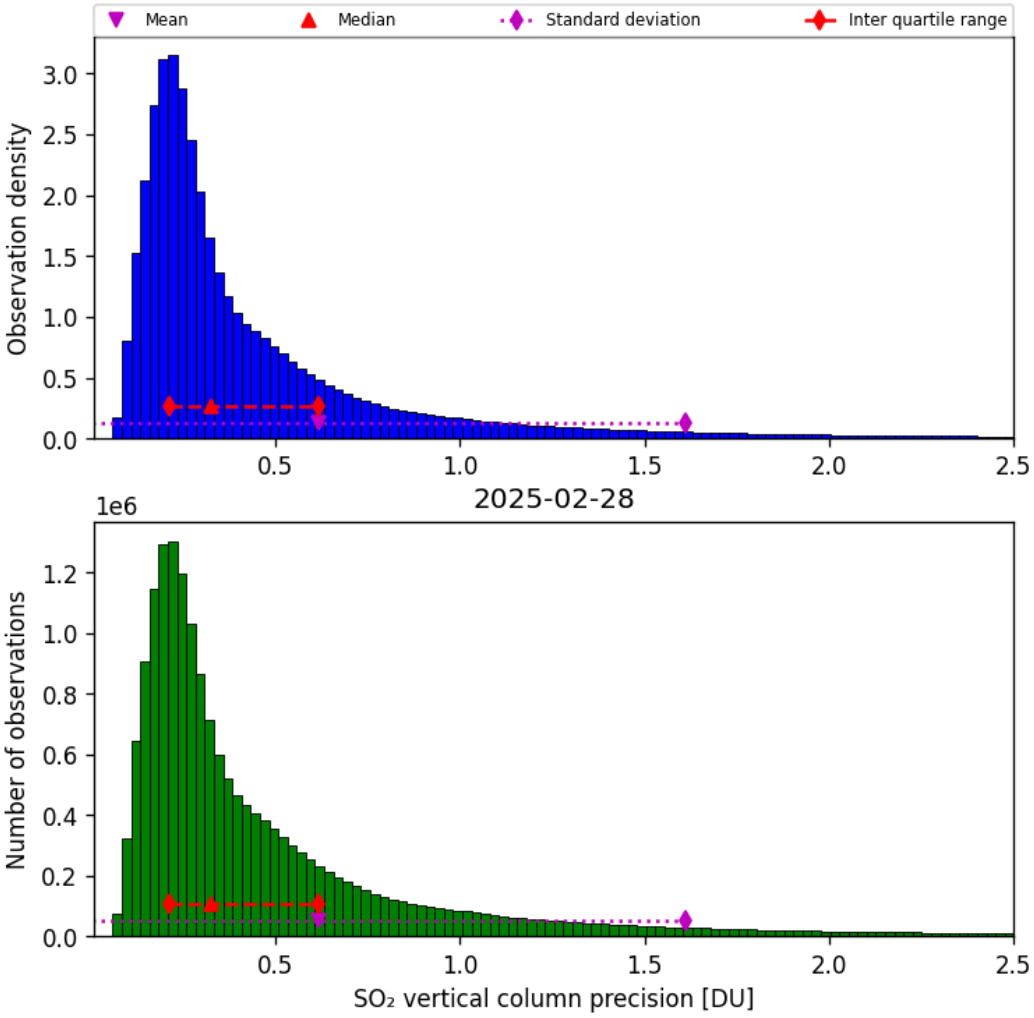

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-02-28 to 2025-03-01

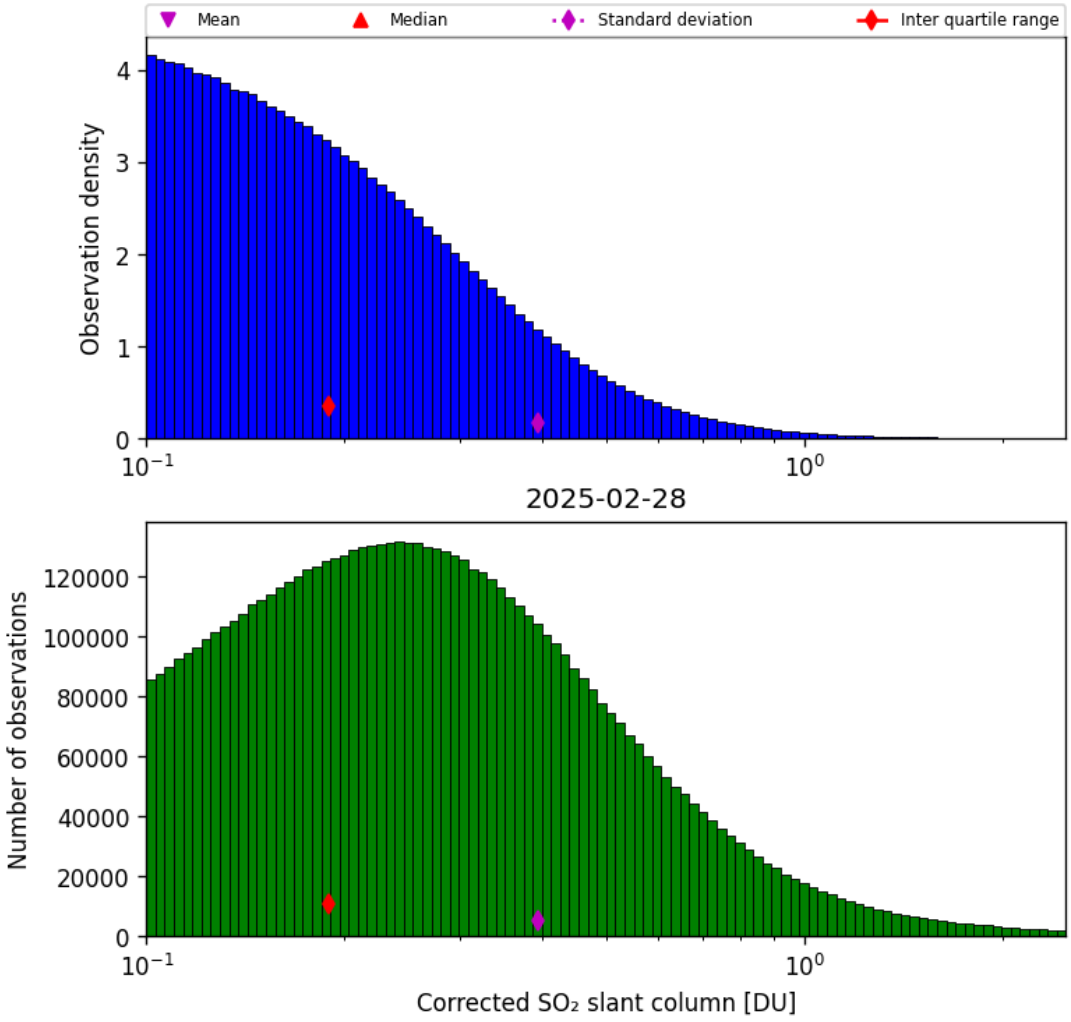

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-02-28 to 2025-03-01

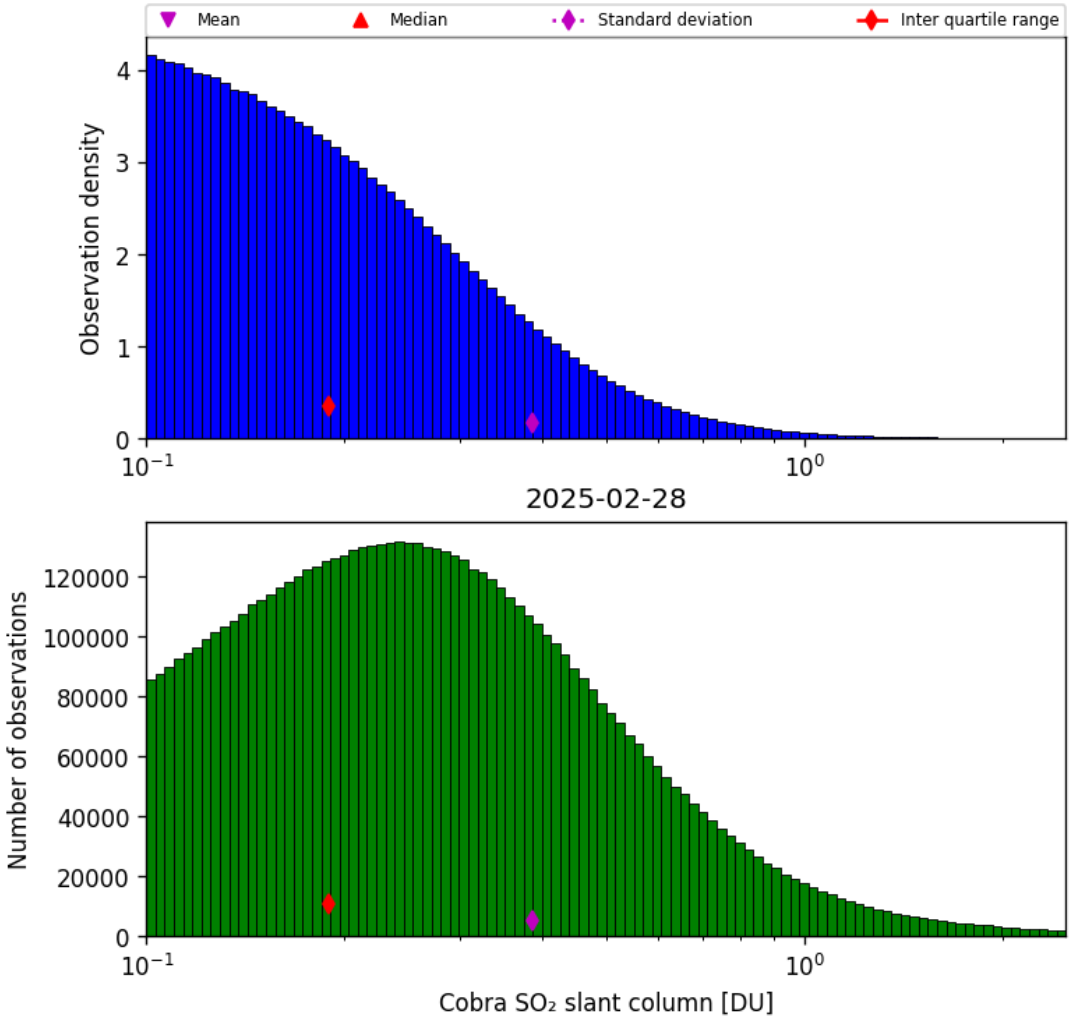

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-02-28 to 2025-03-01

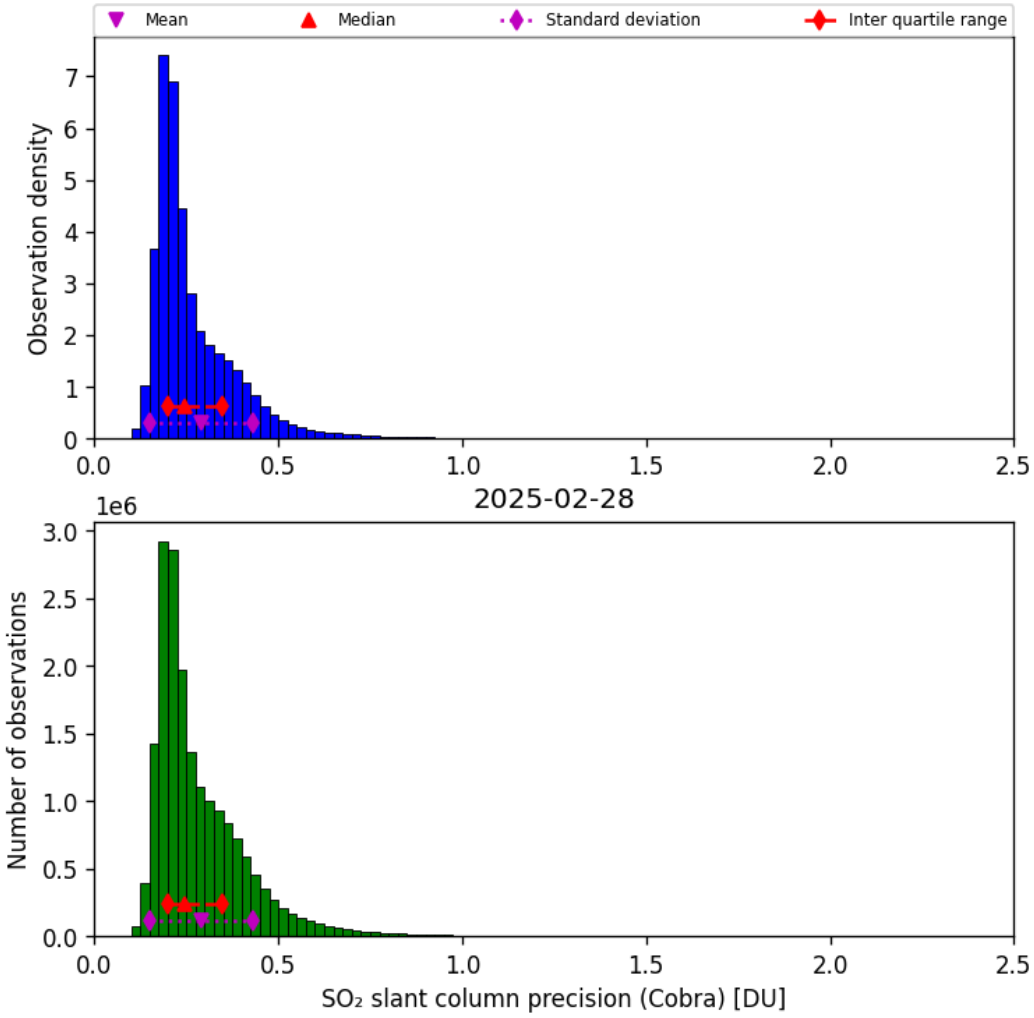

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-02-28 to 2025-03-01

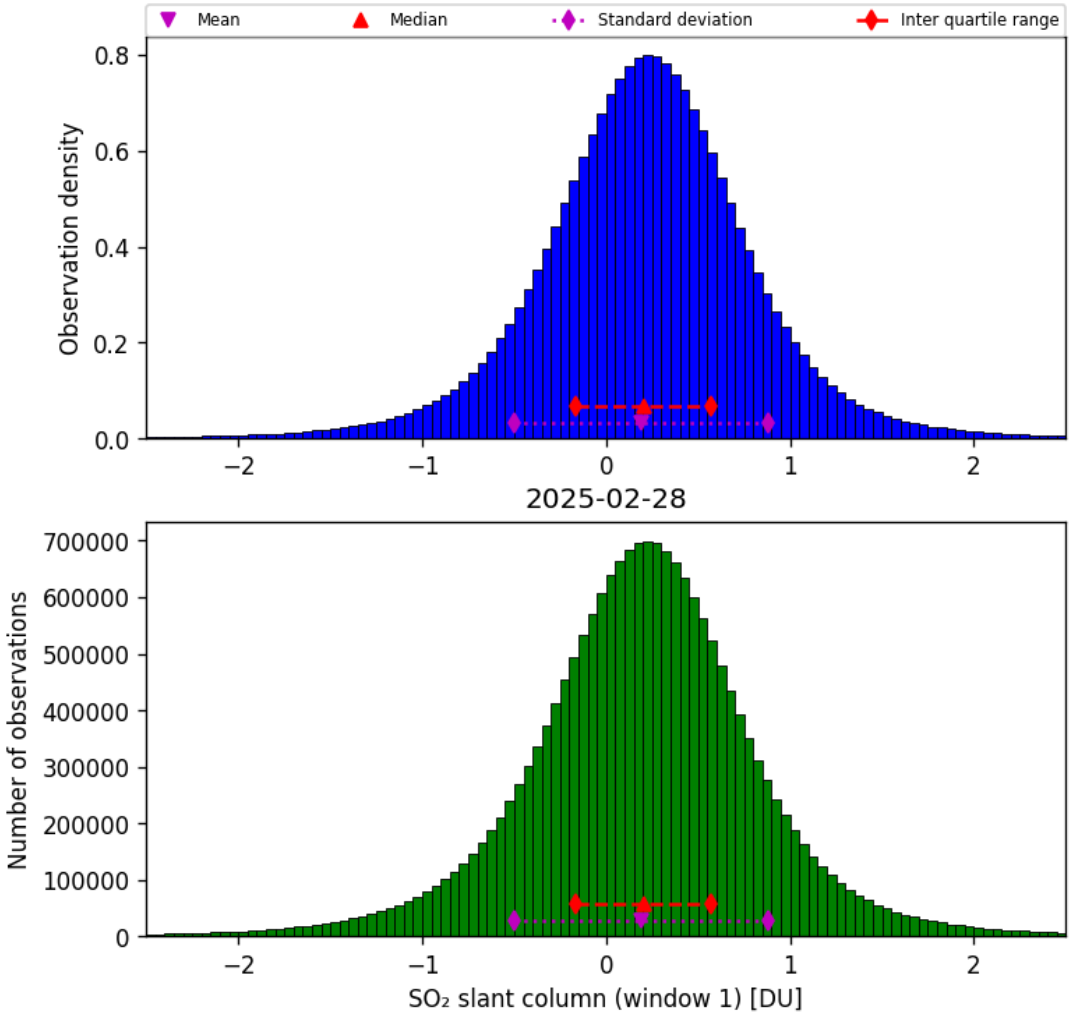

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-02-28 to 2025-03-01

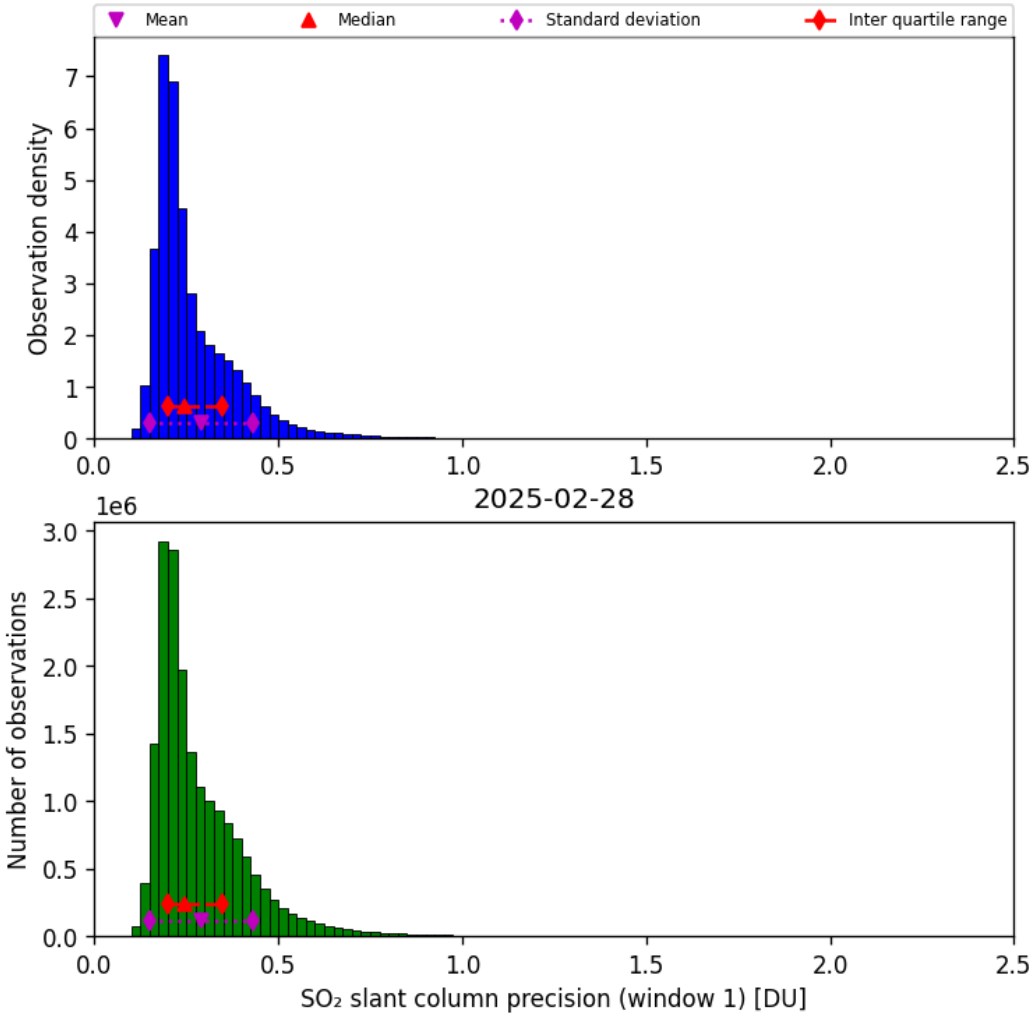

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-02-28 to 2025-03-01

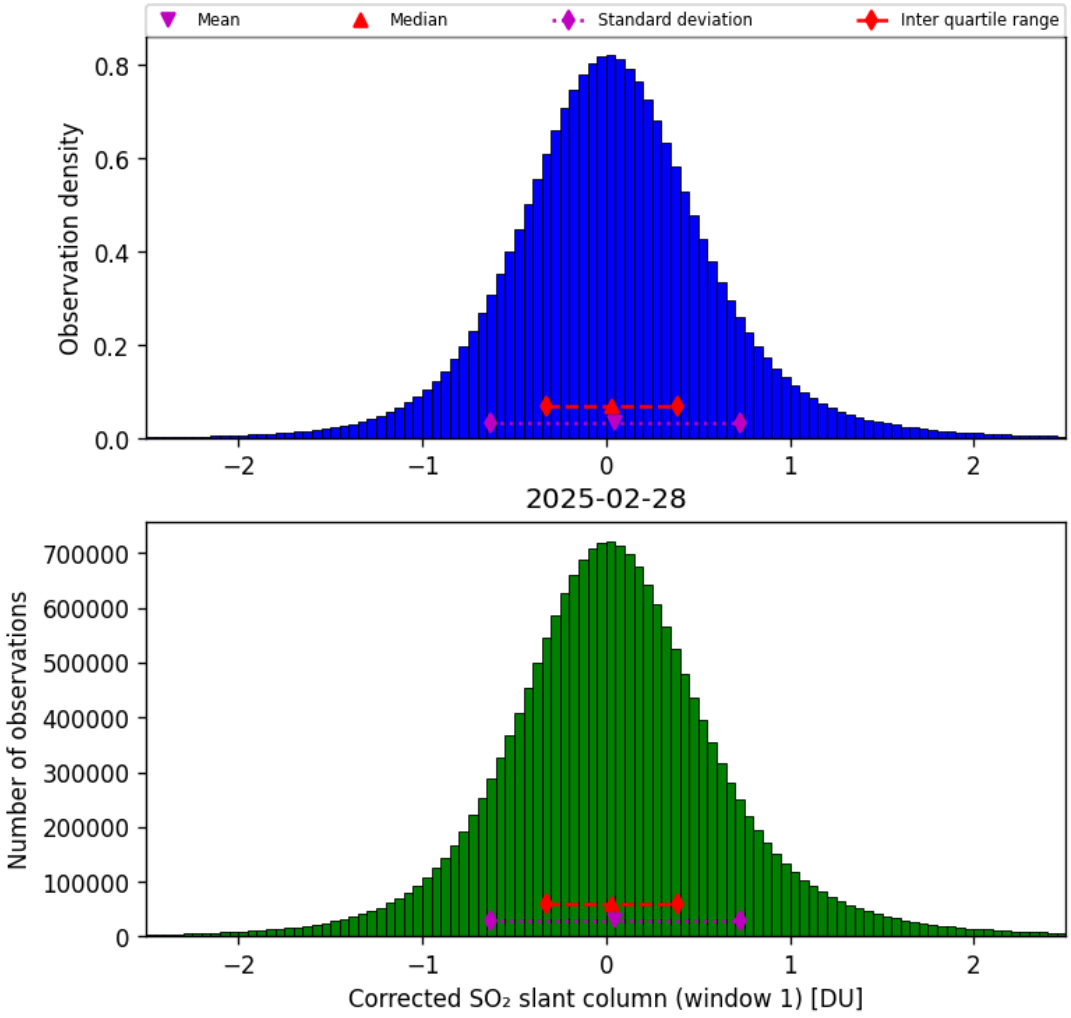

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-02-28 to 2025-03-01

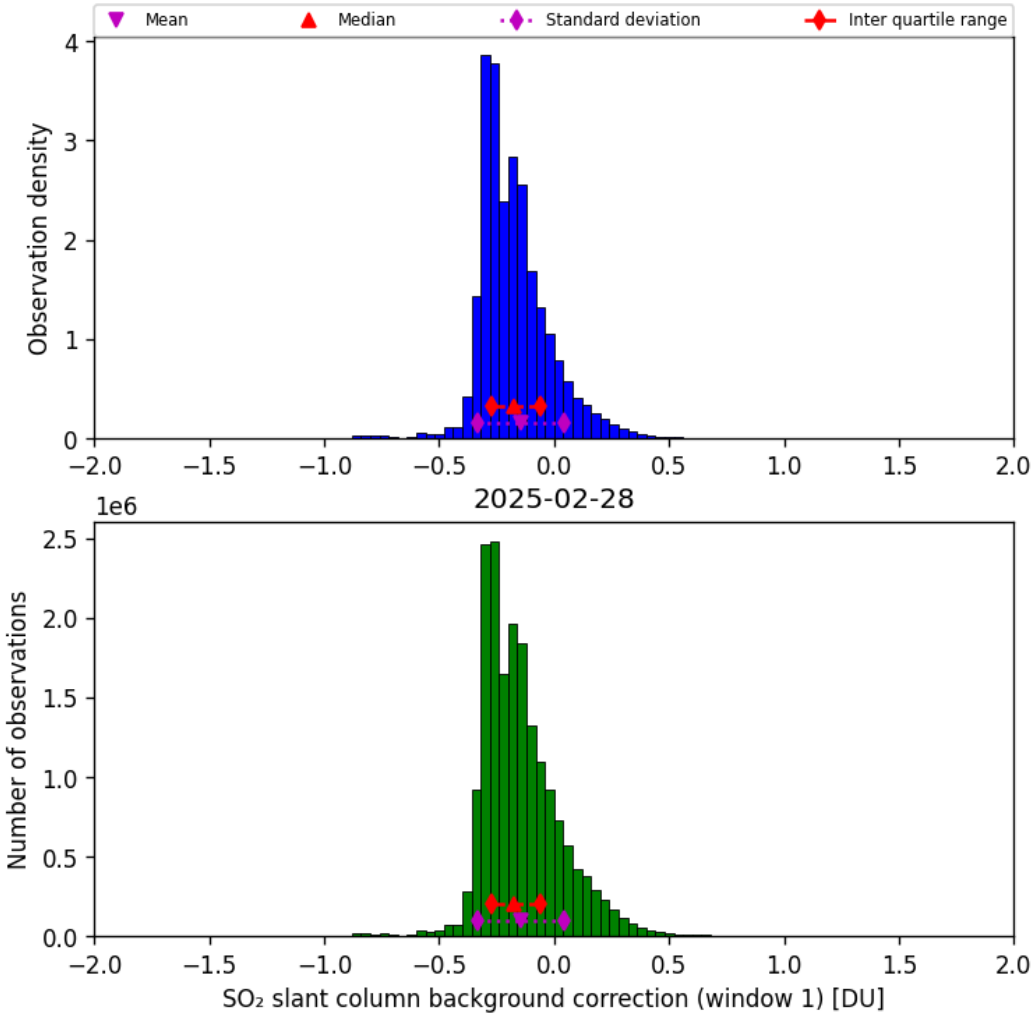

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-02-28 to 2025-03-01

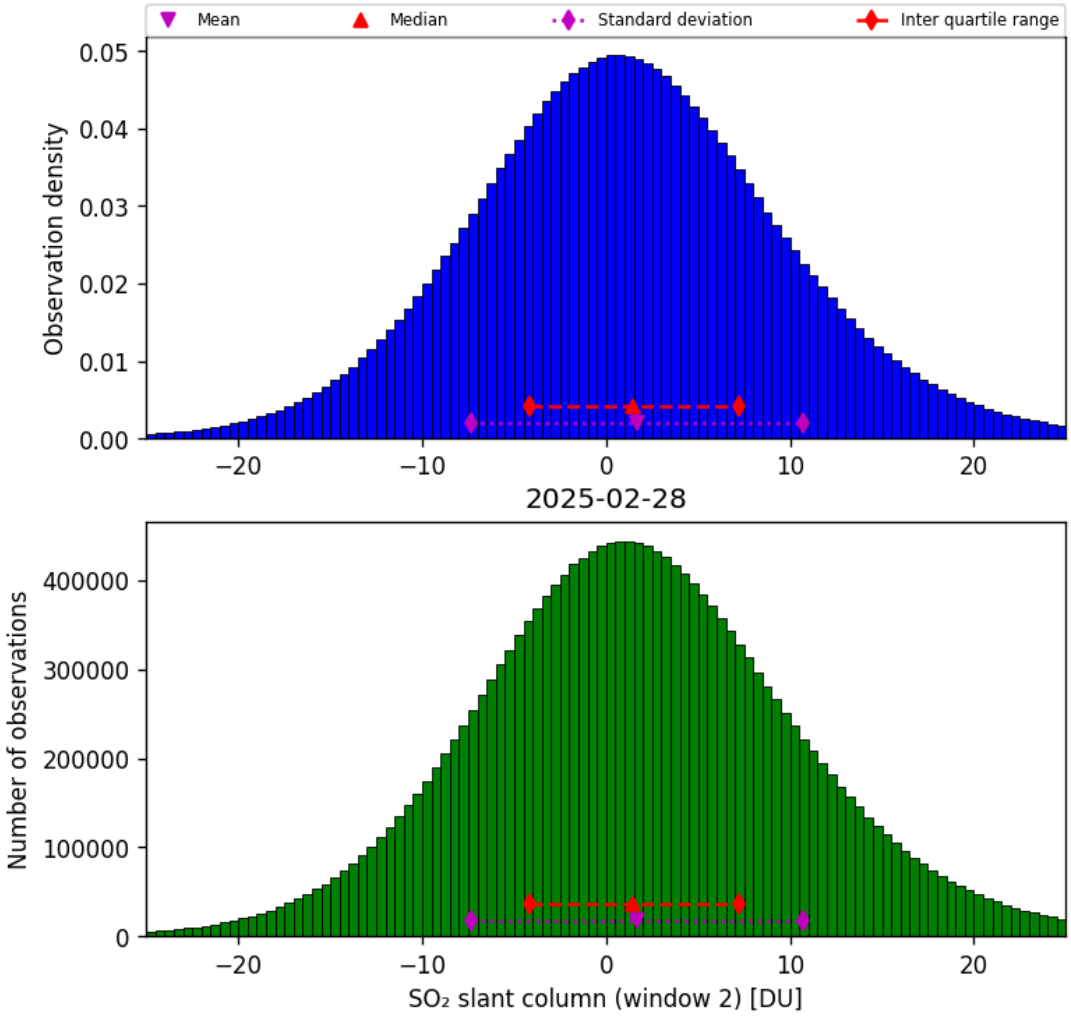

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-02-28 to 2025-03-01

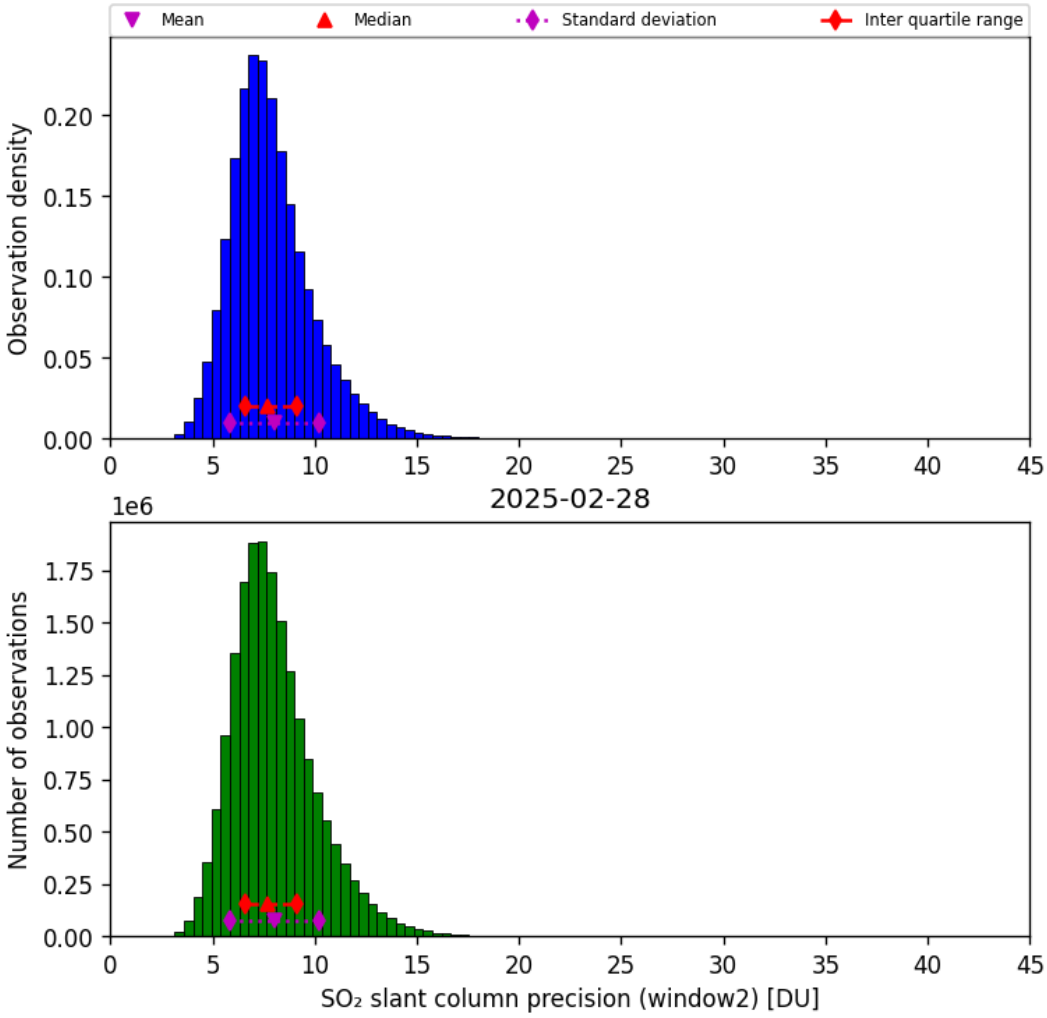

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-02-28 to 2025-03-01

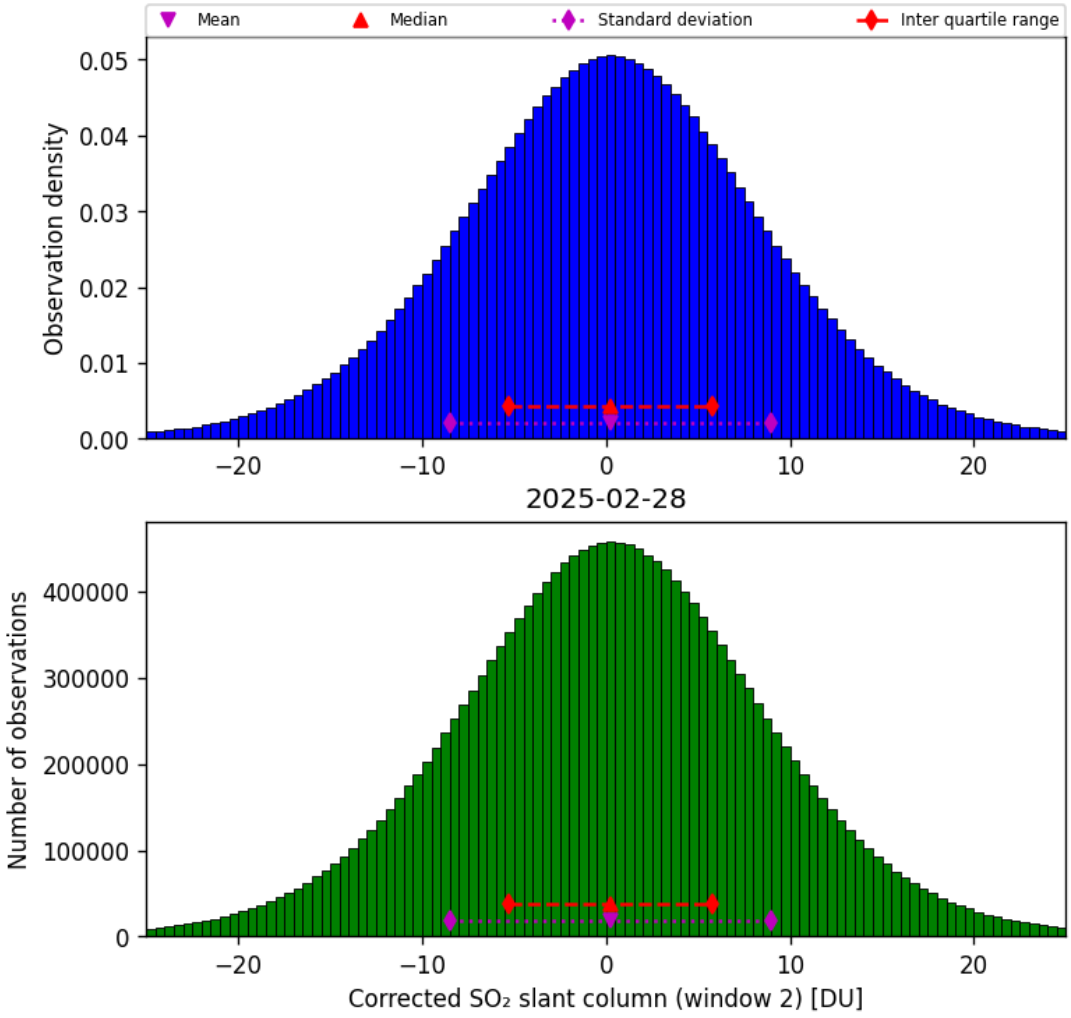

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-02-28 to 2025-03-01

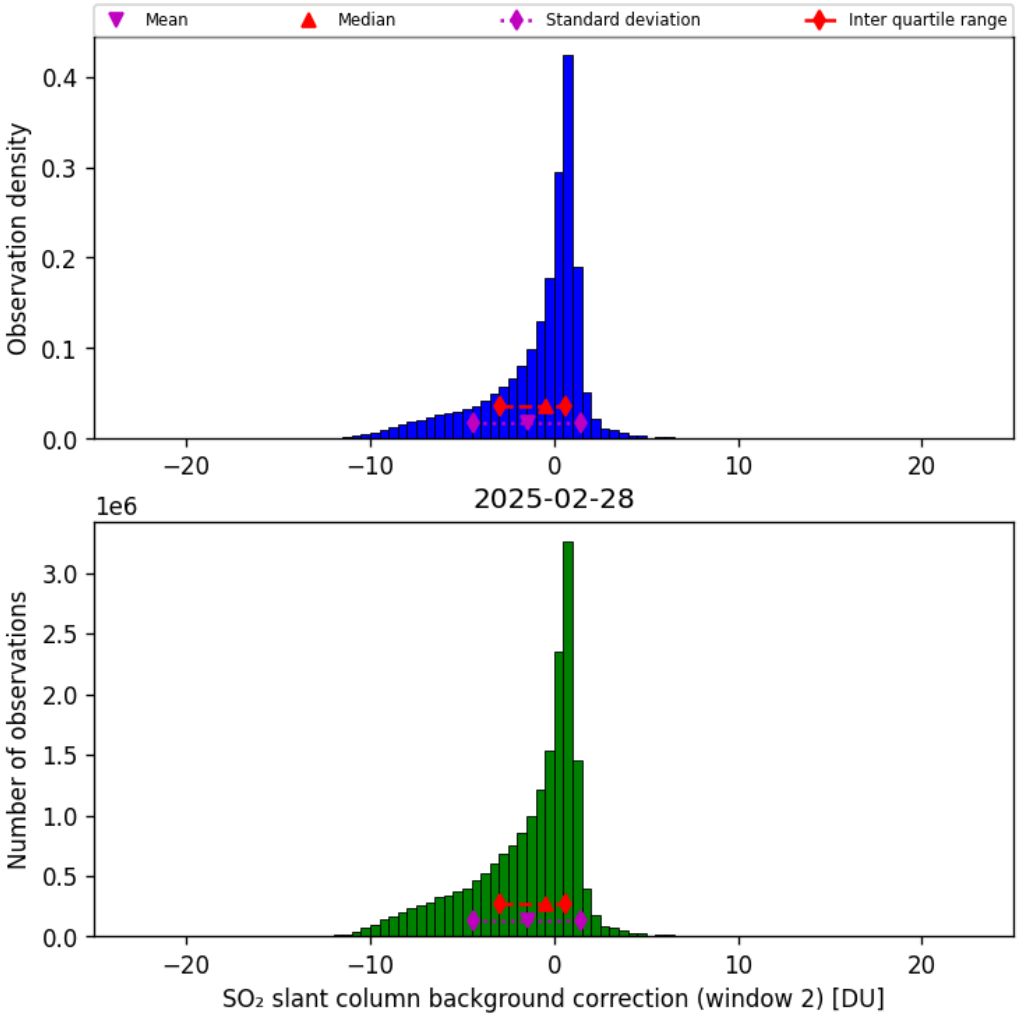

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-02-28 to 2025-03-01

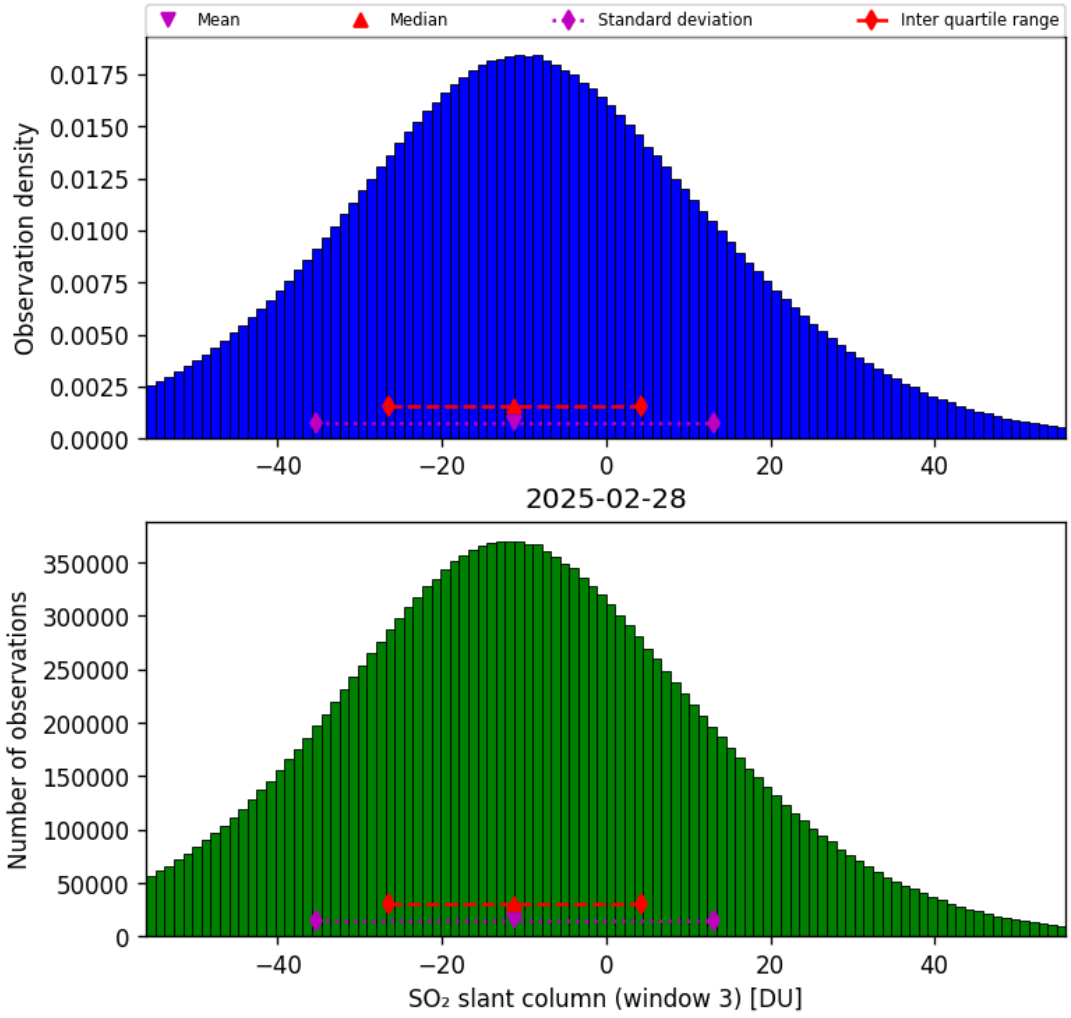

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-02-28 to 2025-03-01

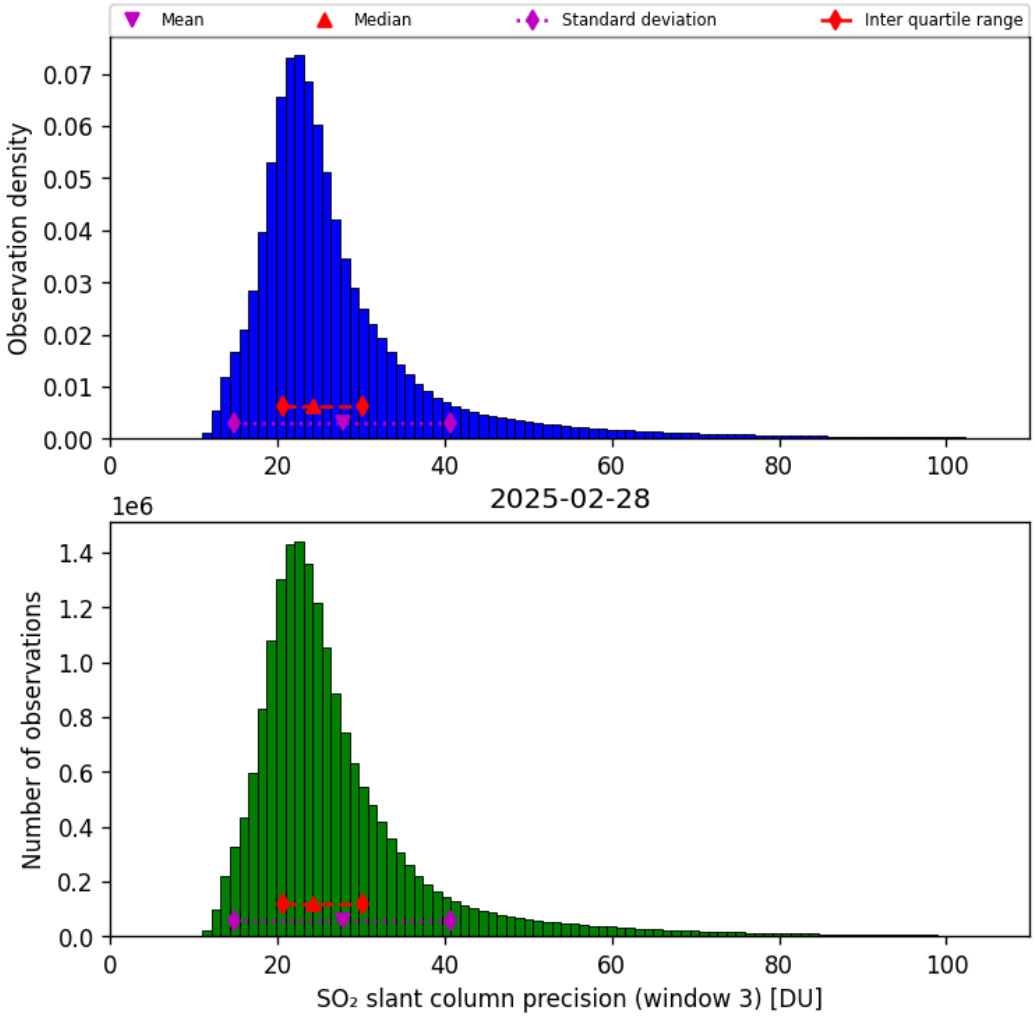

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-02-28 to 2025-03-01

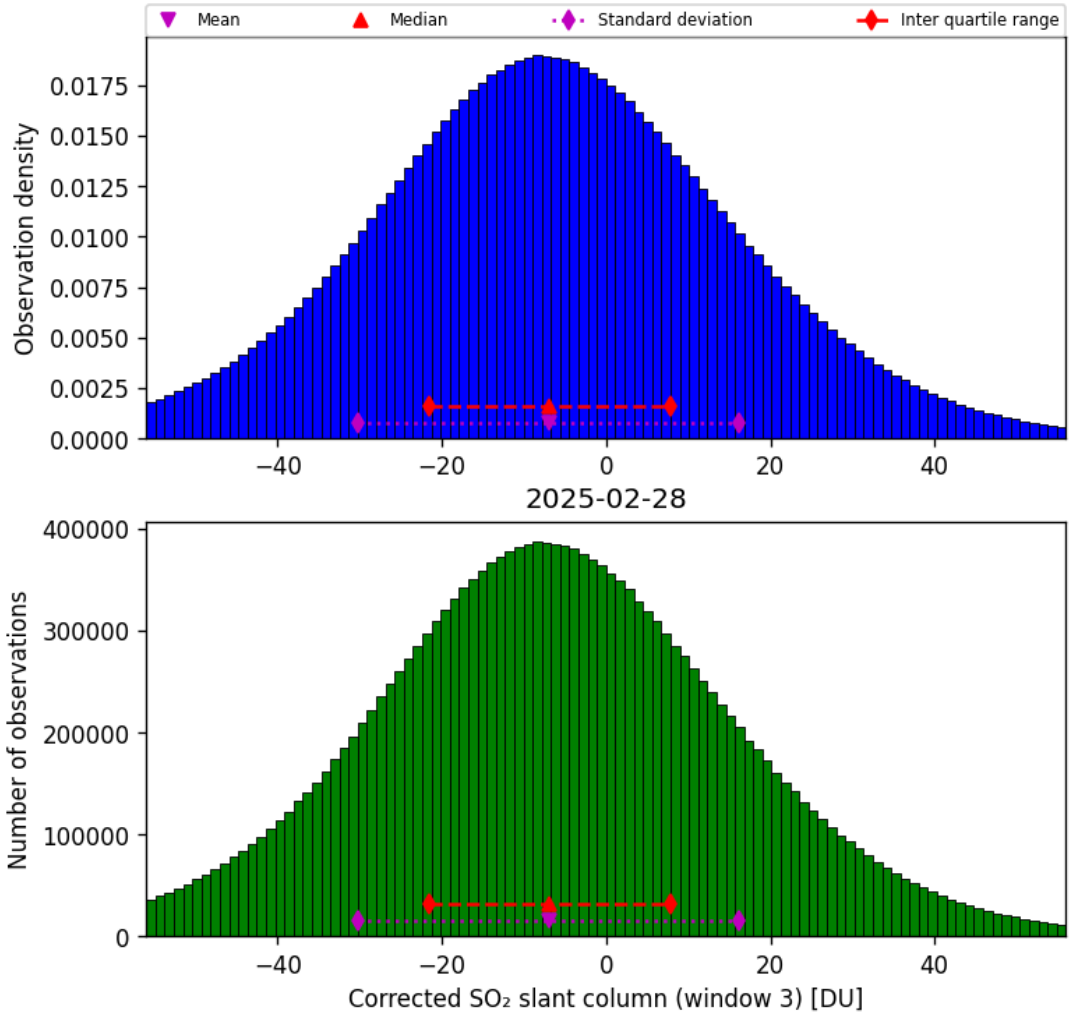

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-02-28 to 2025-03-01

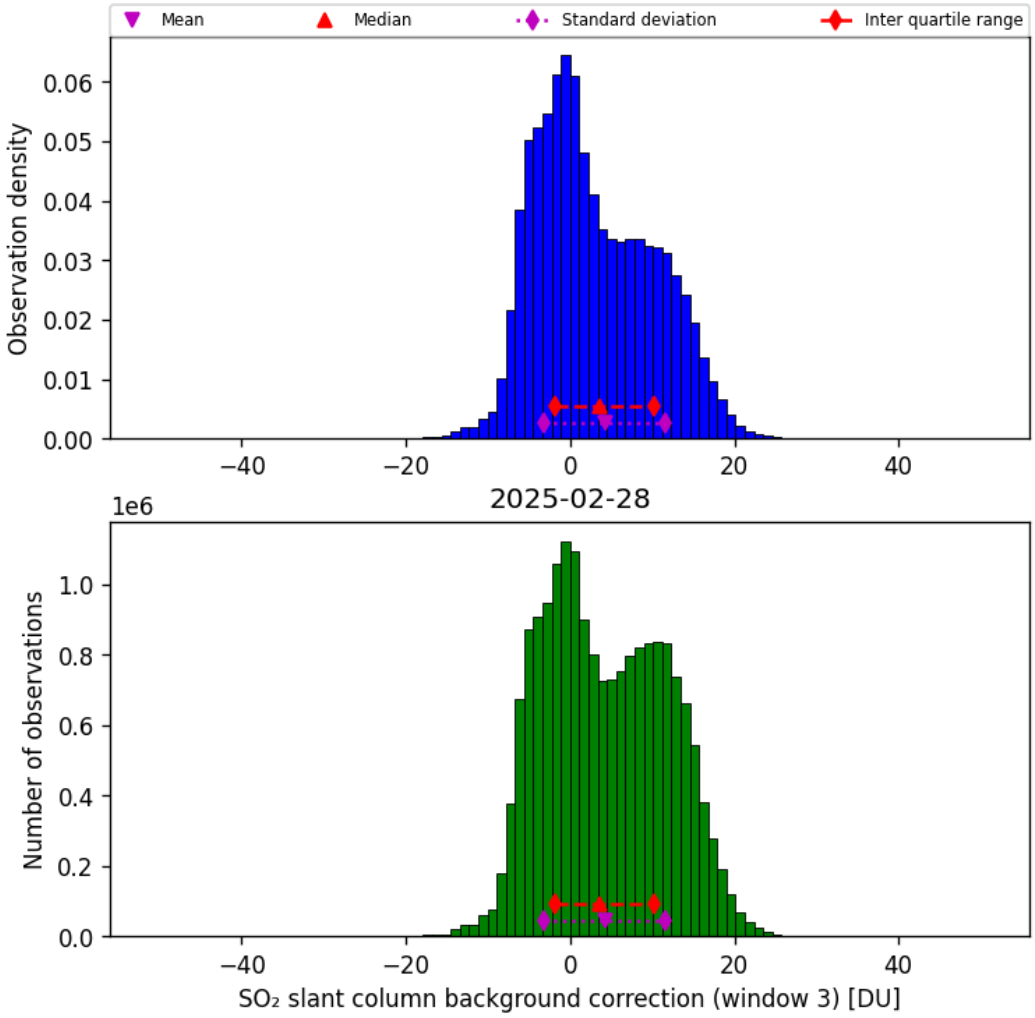

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-02-28 to 2025-03-01

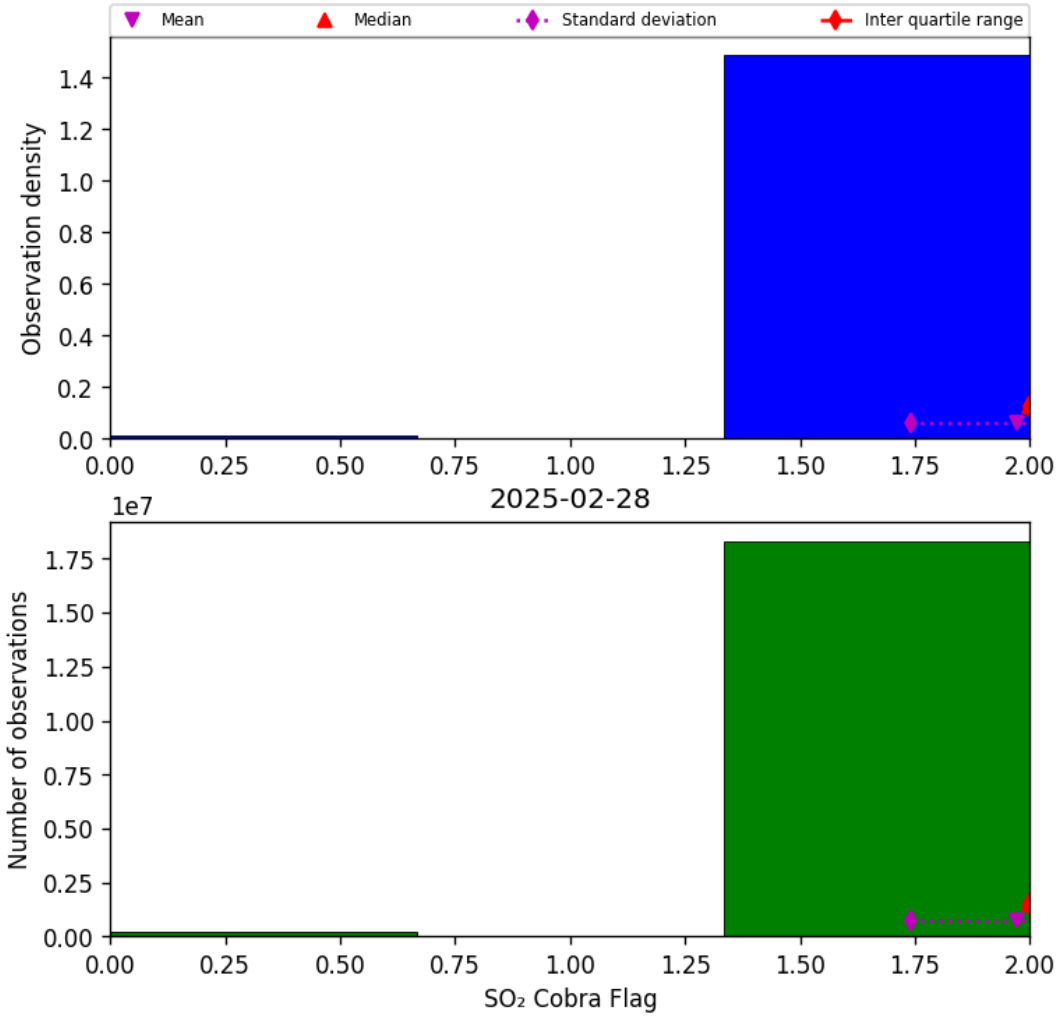

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-02-28 to 2025-03-01

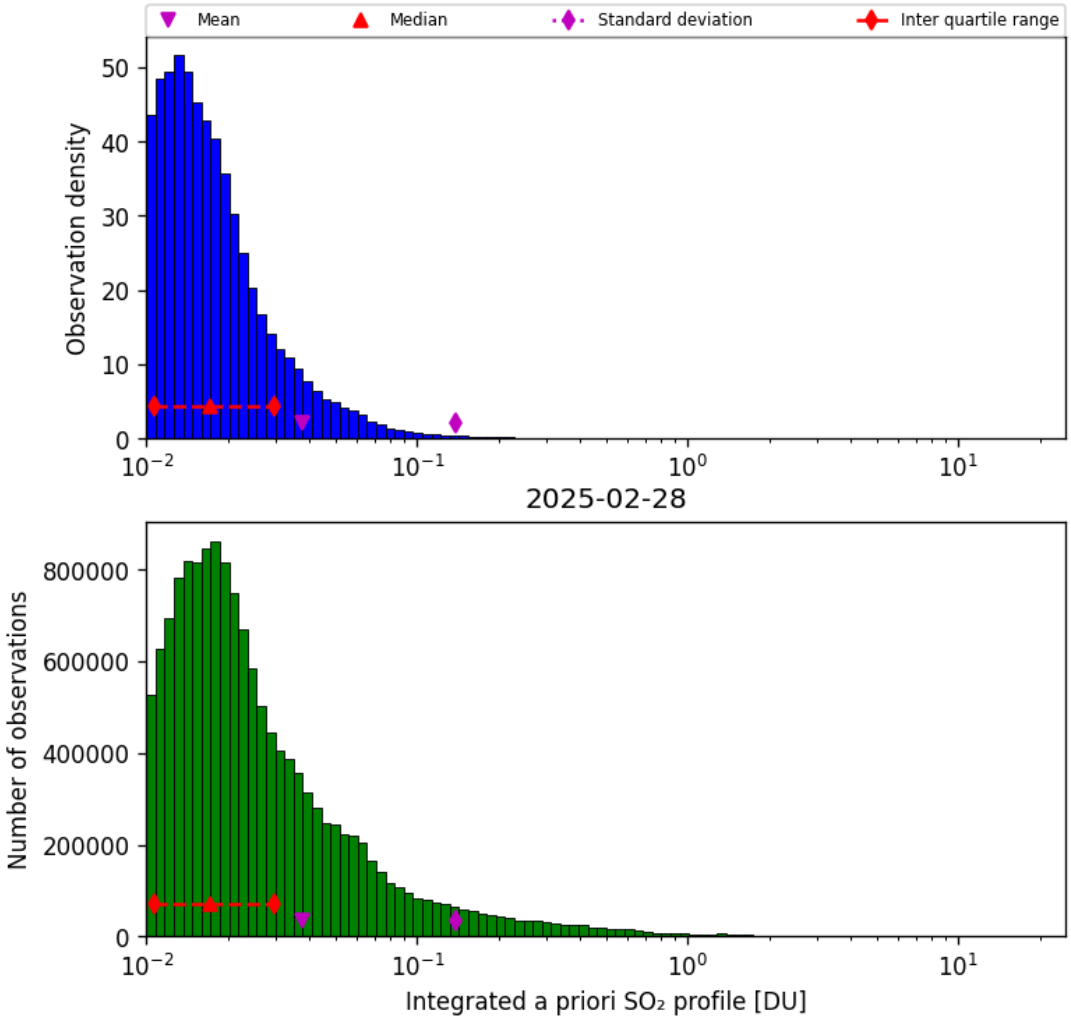

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-02-28 to 2025-03-01

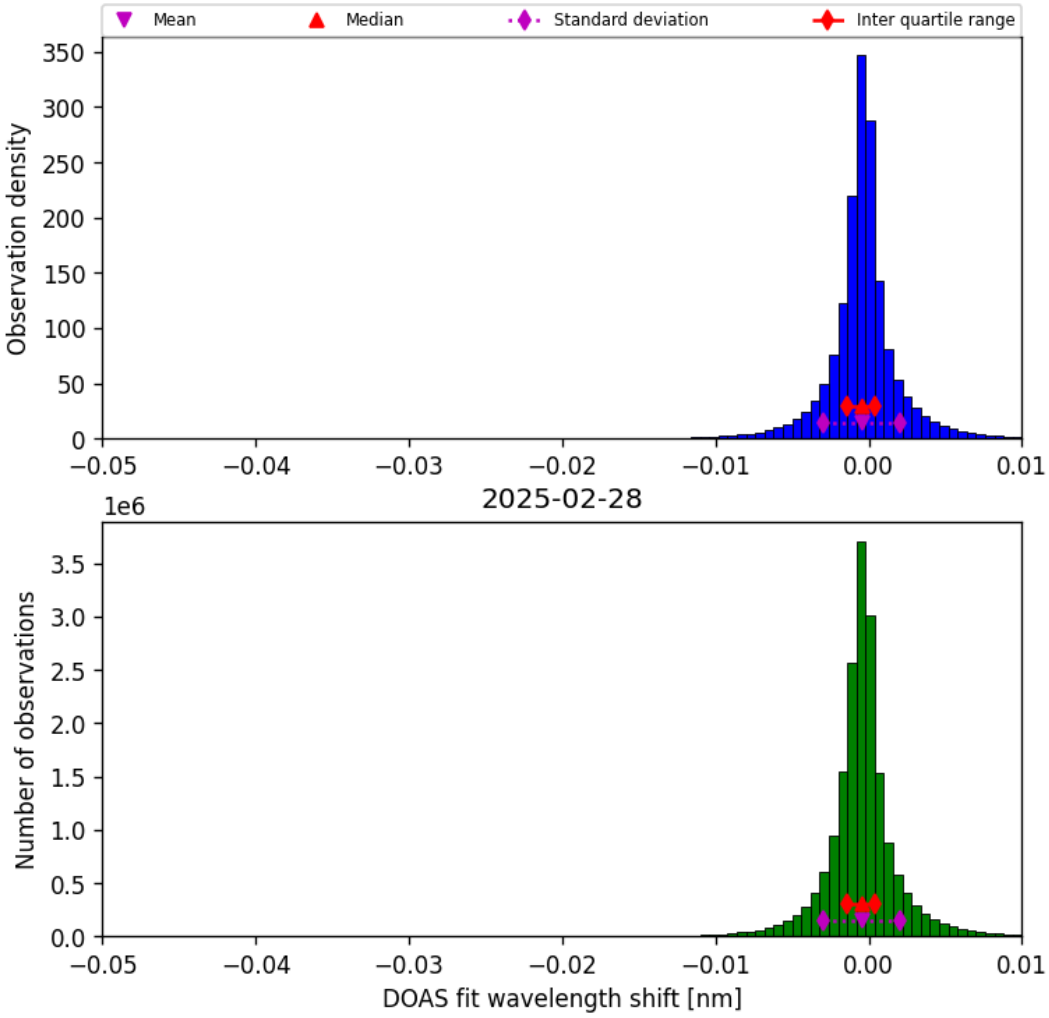

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-02-28 to 2025-03-01

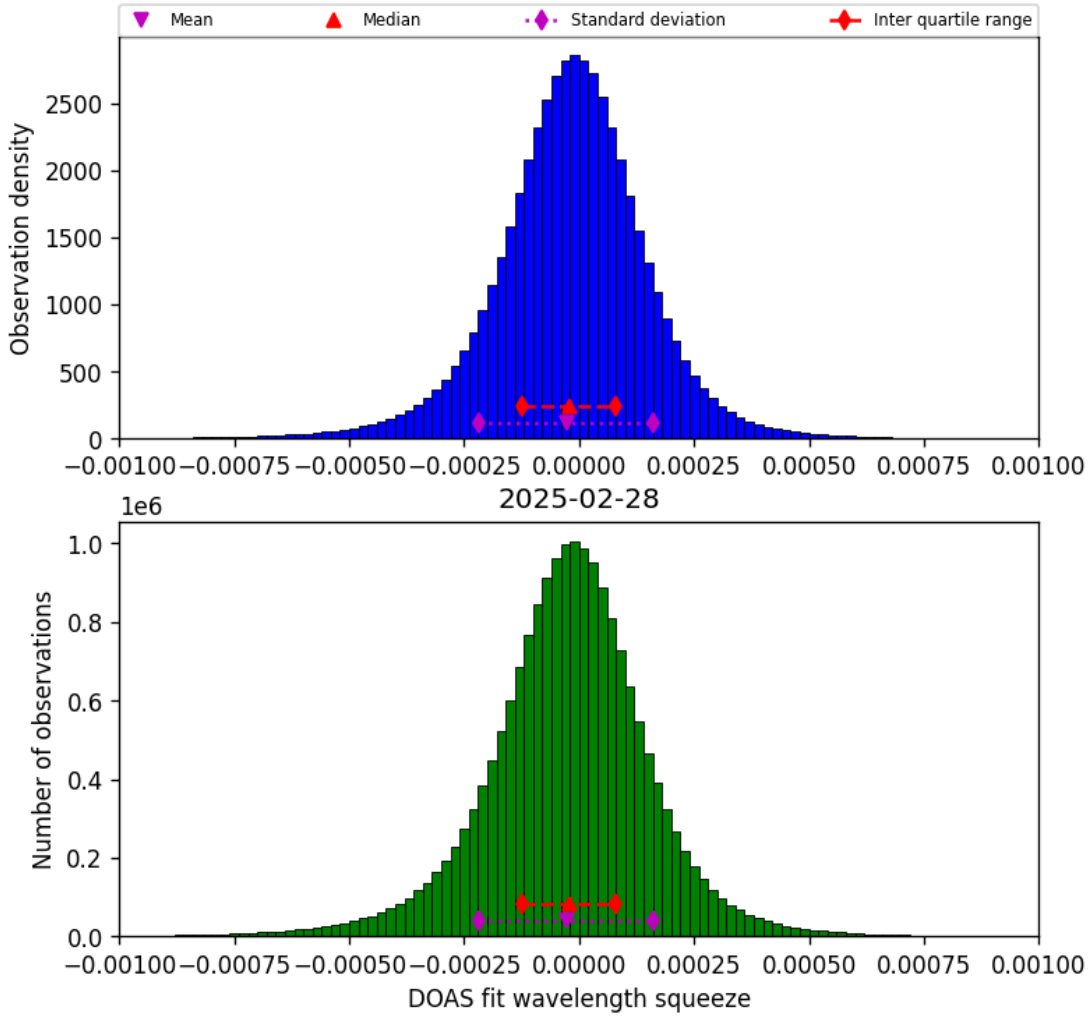

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-02-28 to 2025-03-01

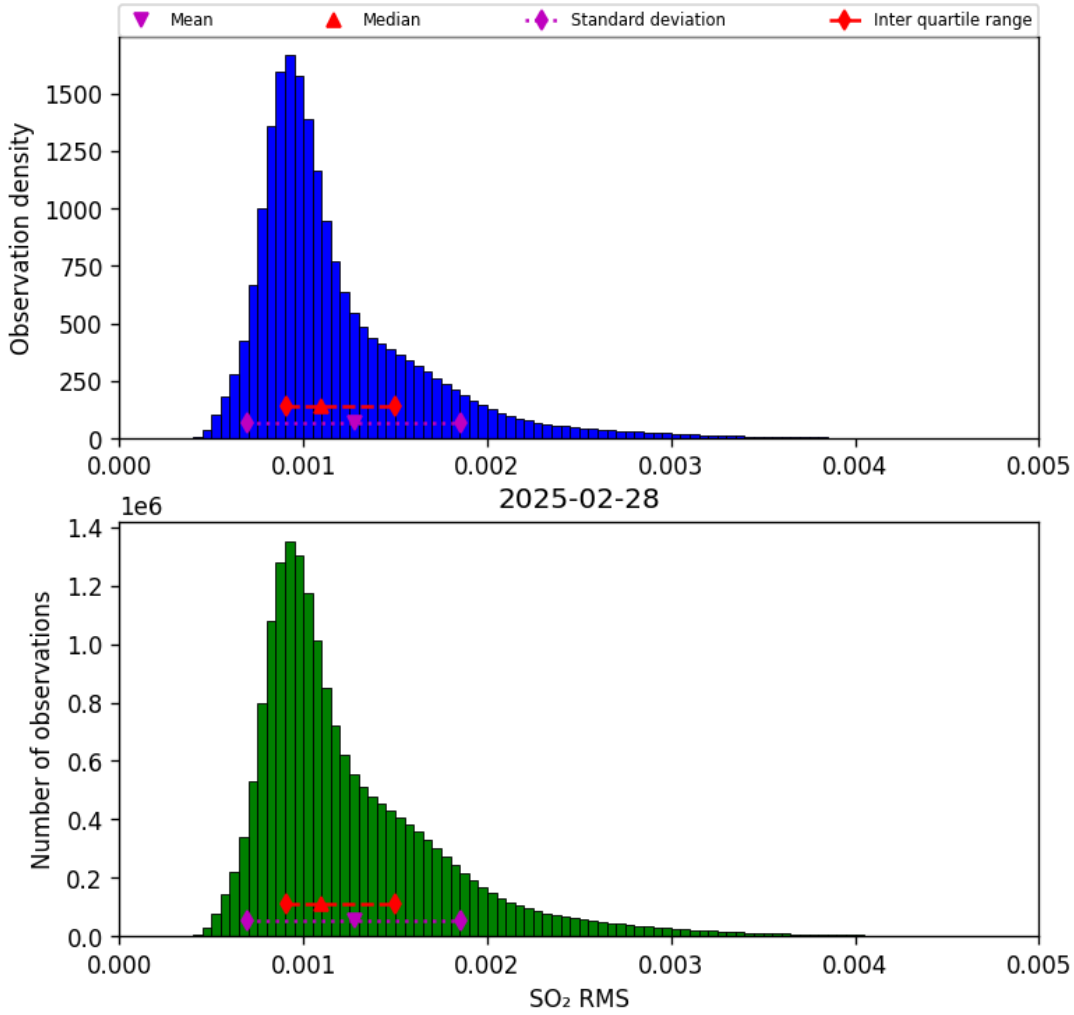

Figure 79: Histogram of "SO_2 RMS" for 2025-02-28 to 2025-03-01

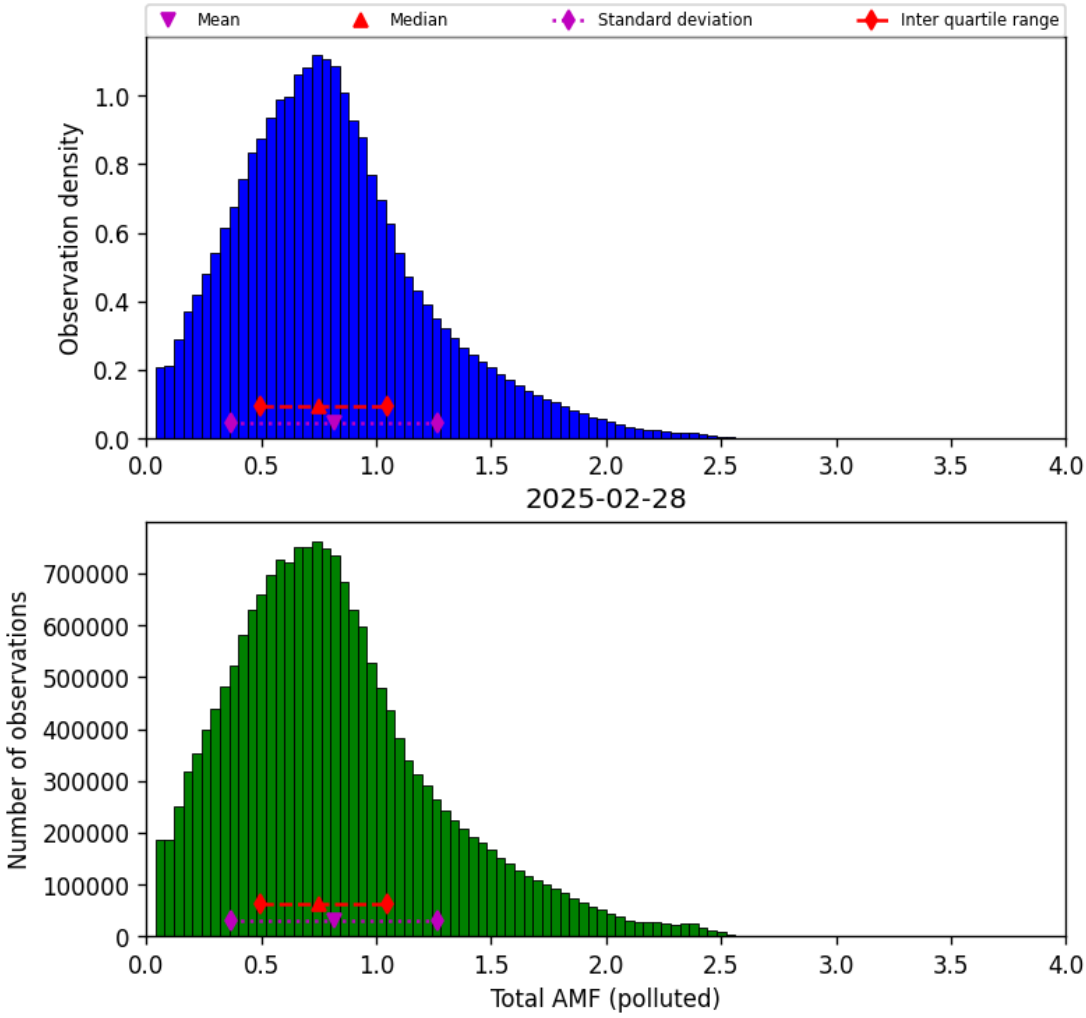

Figure 80: Histogram of “Total AMF (polluted)” for 2025-02-28 to 2025-03-01

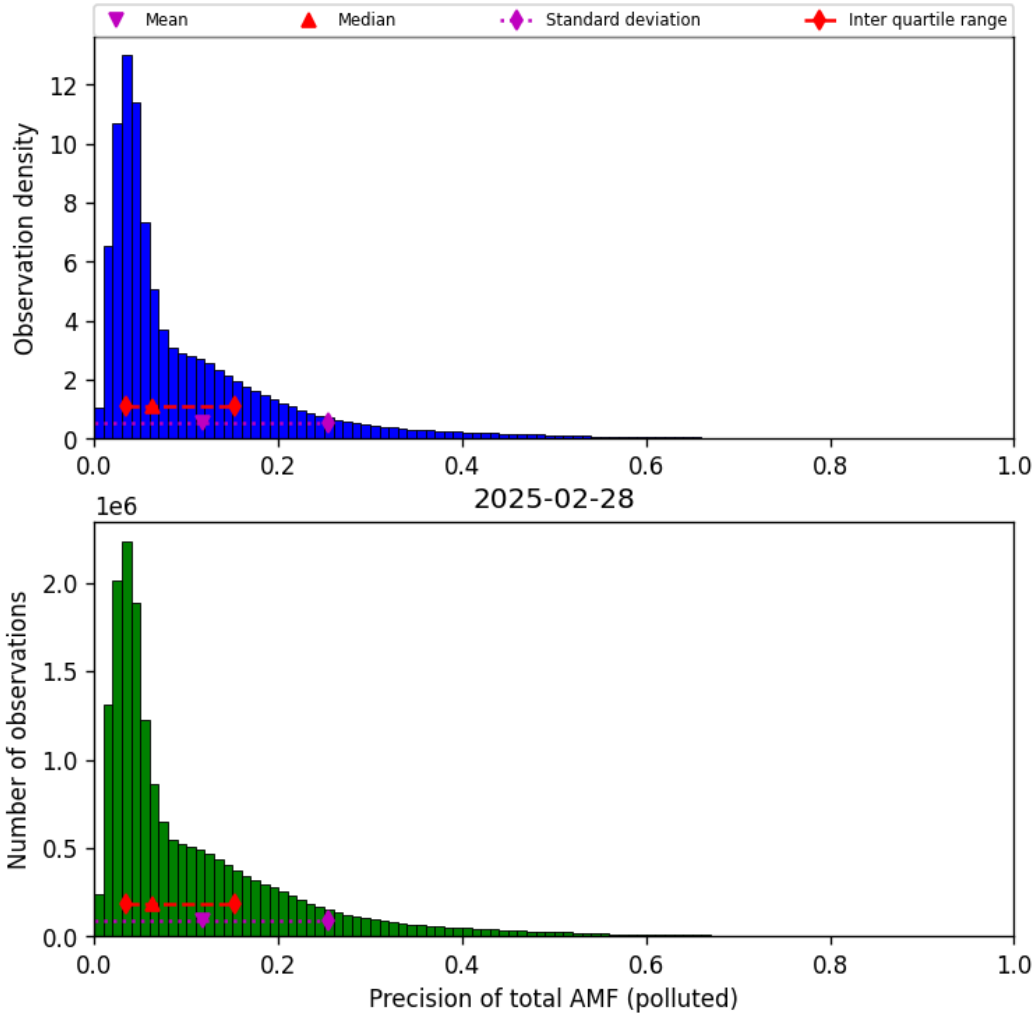

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-02-28 to 2025-03-01

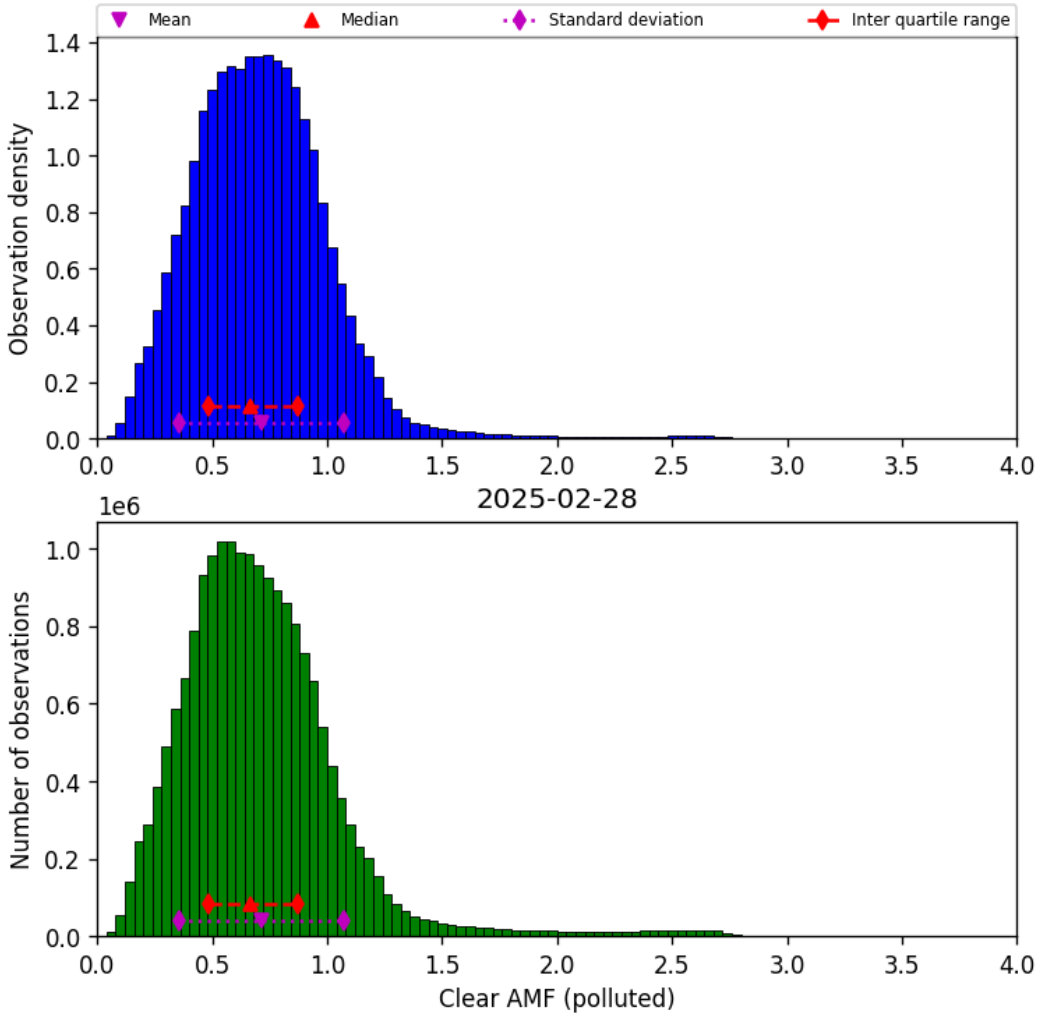

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-02-28 to 2025-03-01

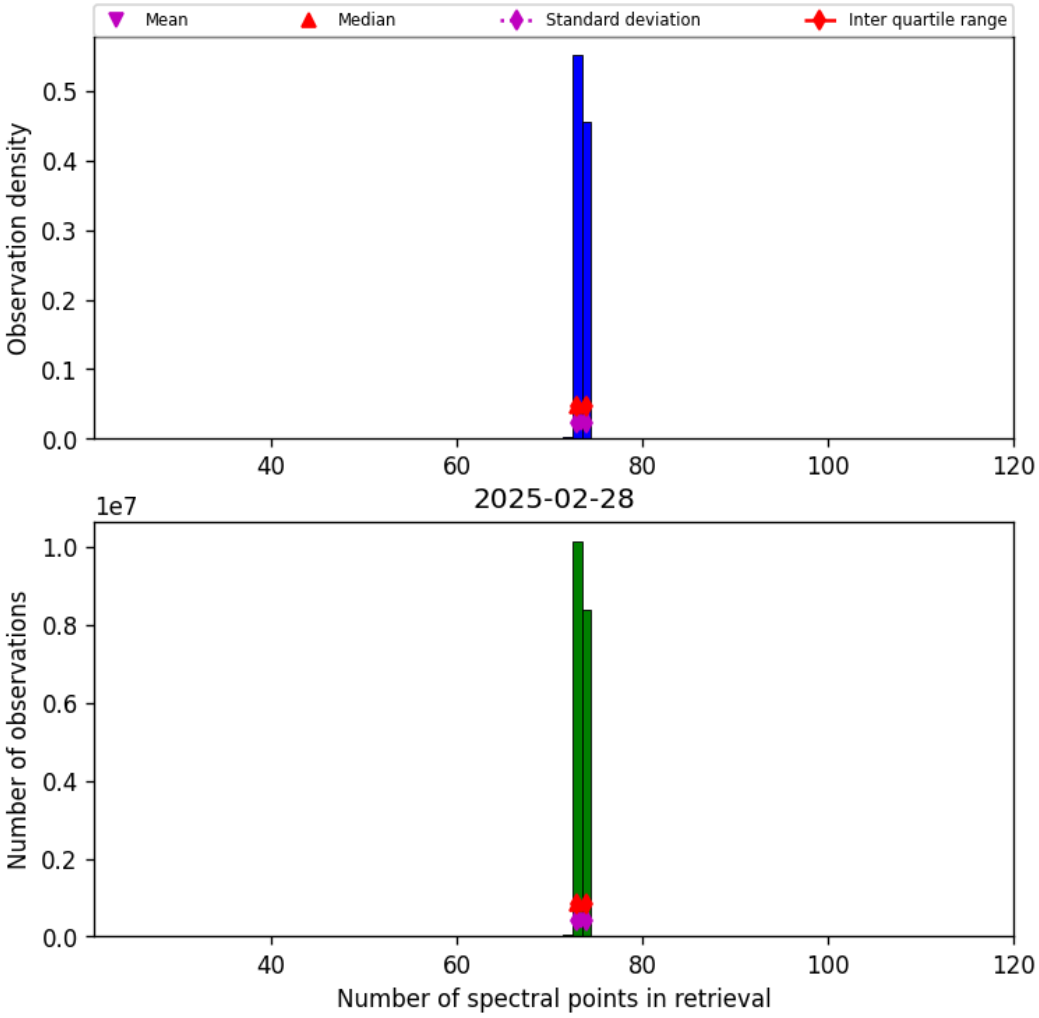

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-02-28 to 2025-03-01

9 Along track statistics

The TROPOMI instrument uses different binned detector rows for different viewing directions. In this section statistics are presented for each of the binned rows in the instrument.

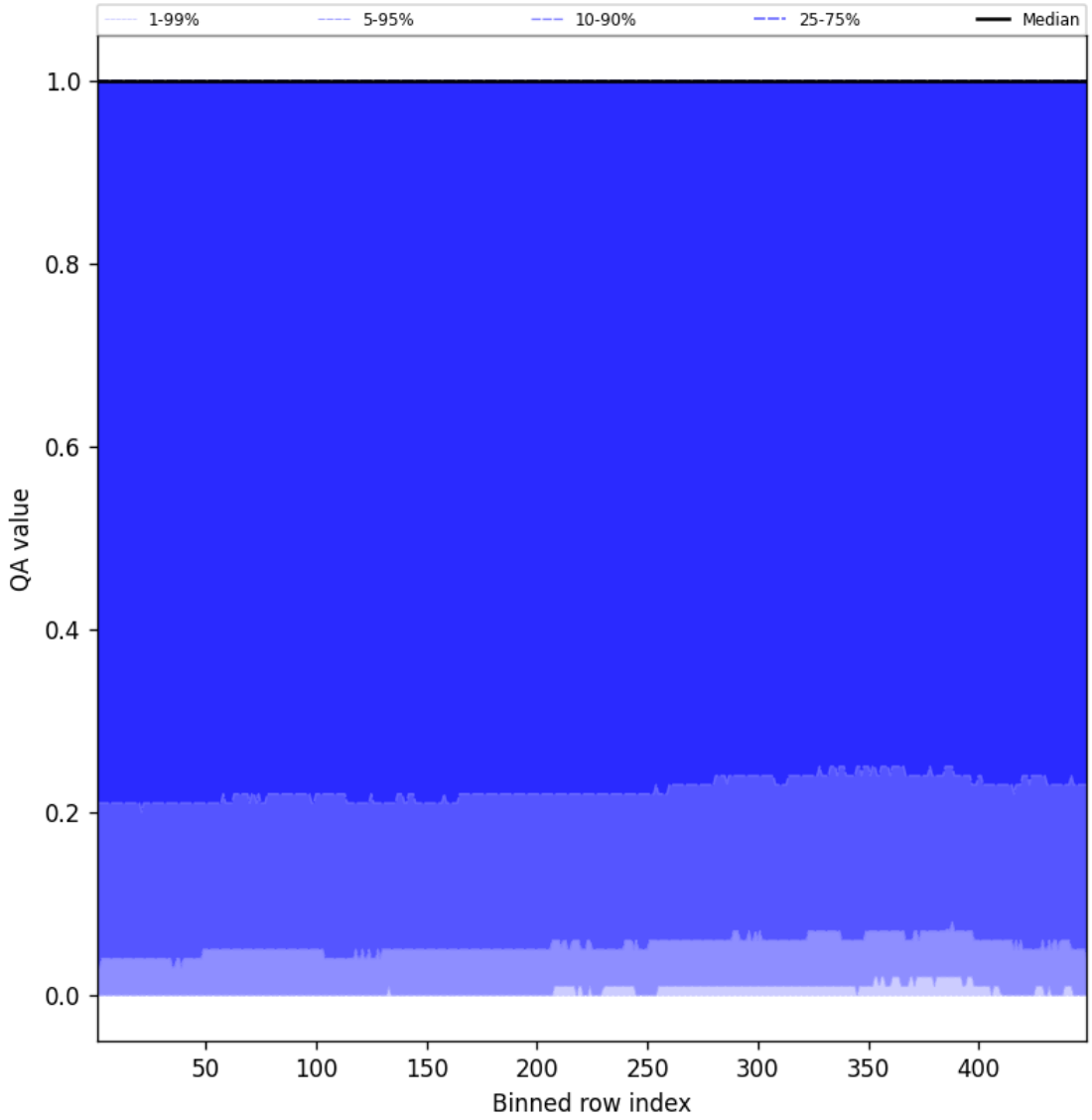

Figure 84: Along track statistics of “QA value” for 2025-02-28 to 2025-03-01

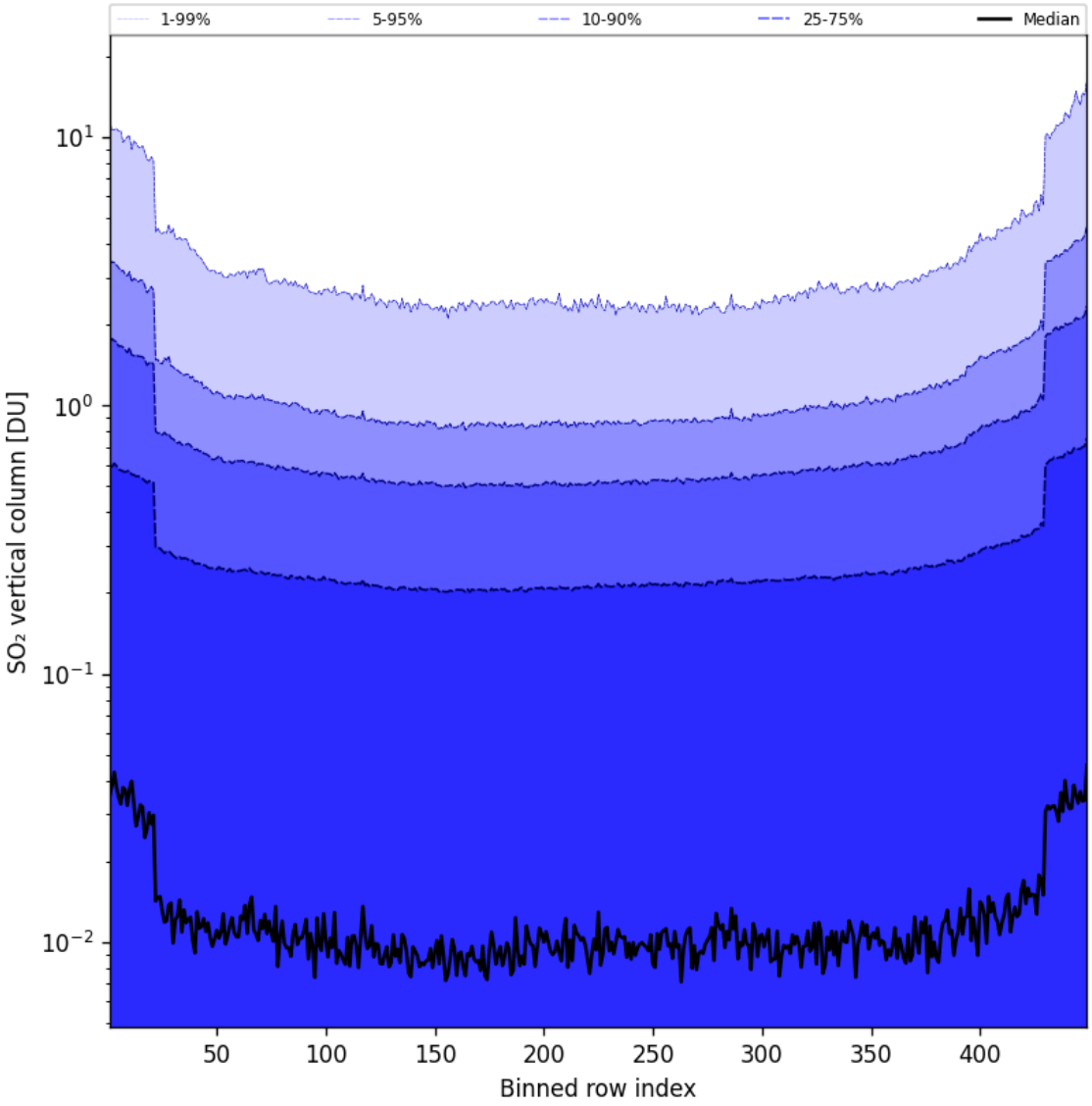

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-02-28 to 2025-03-01

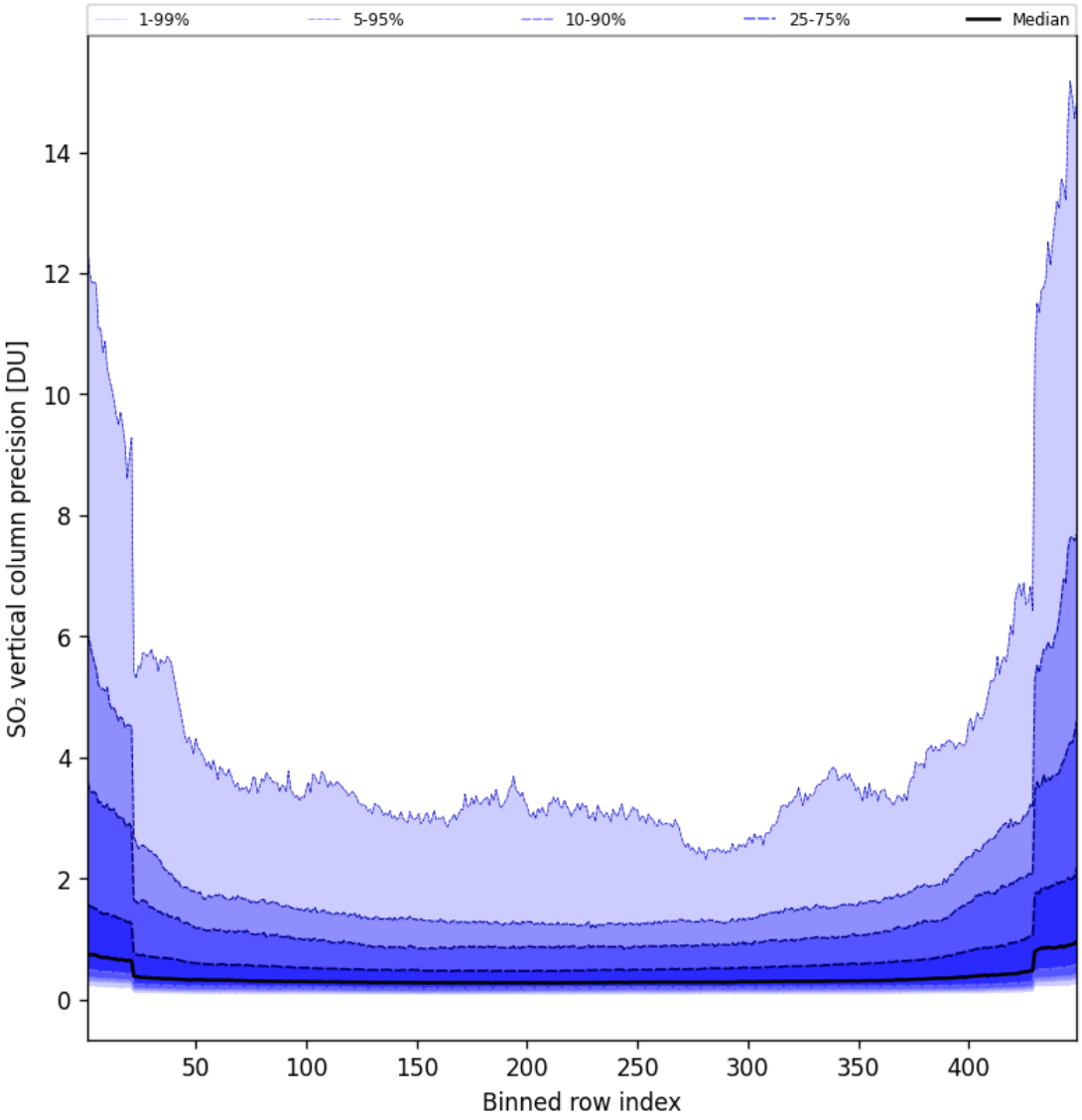

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-02-28 to 2025-03-01

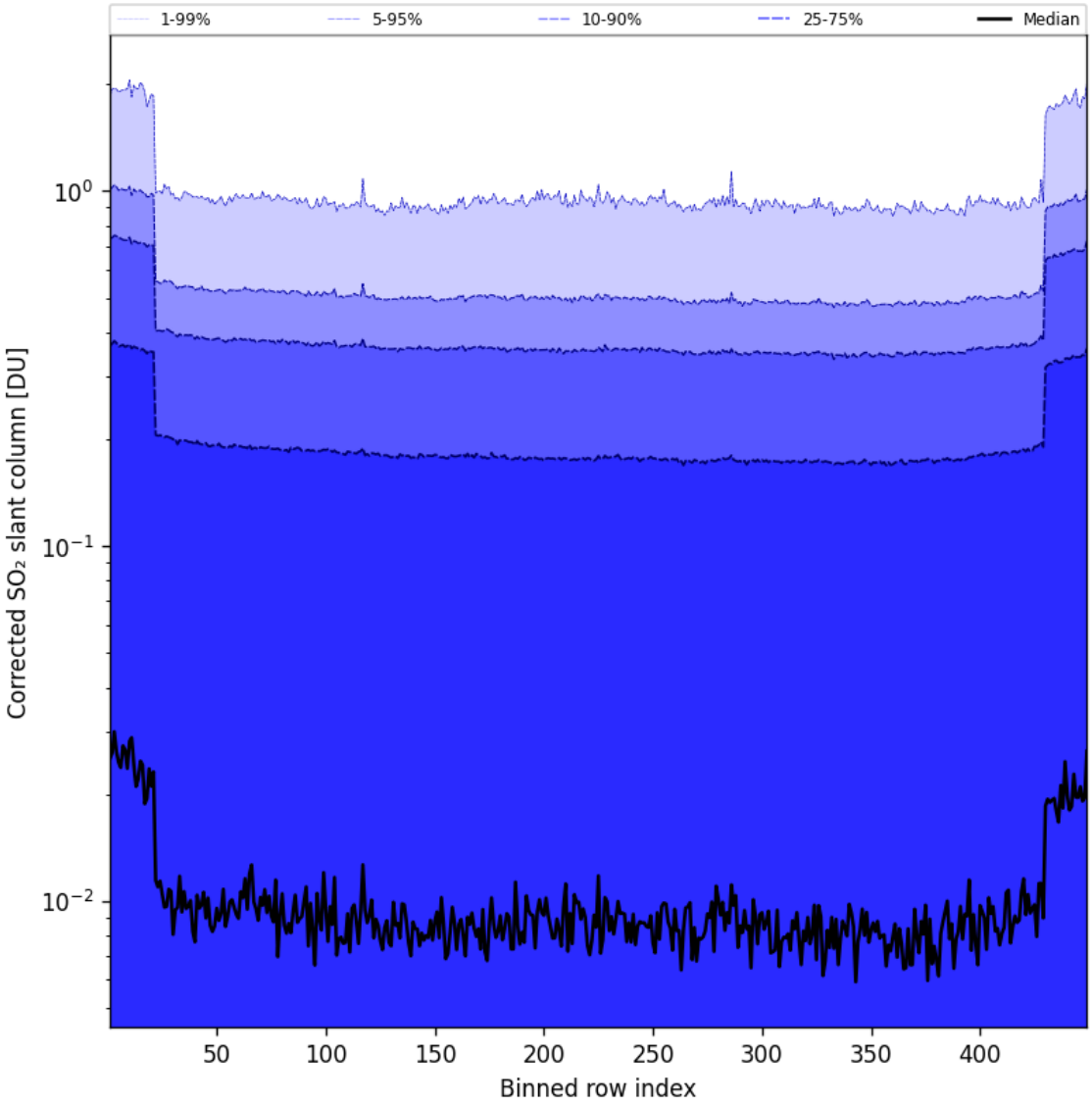

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-02-28 to 2025-03-01

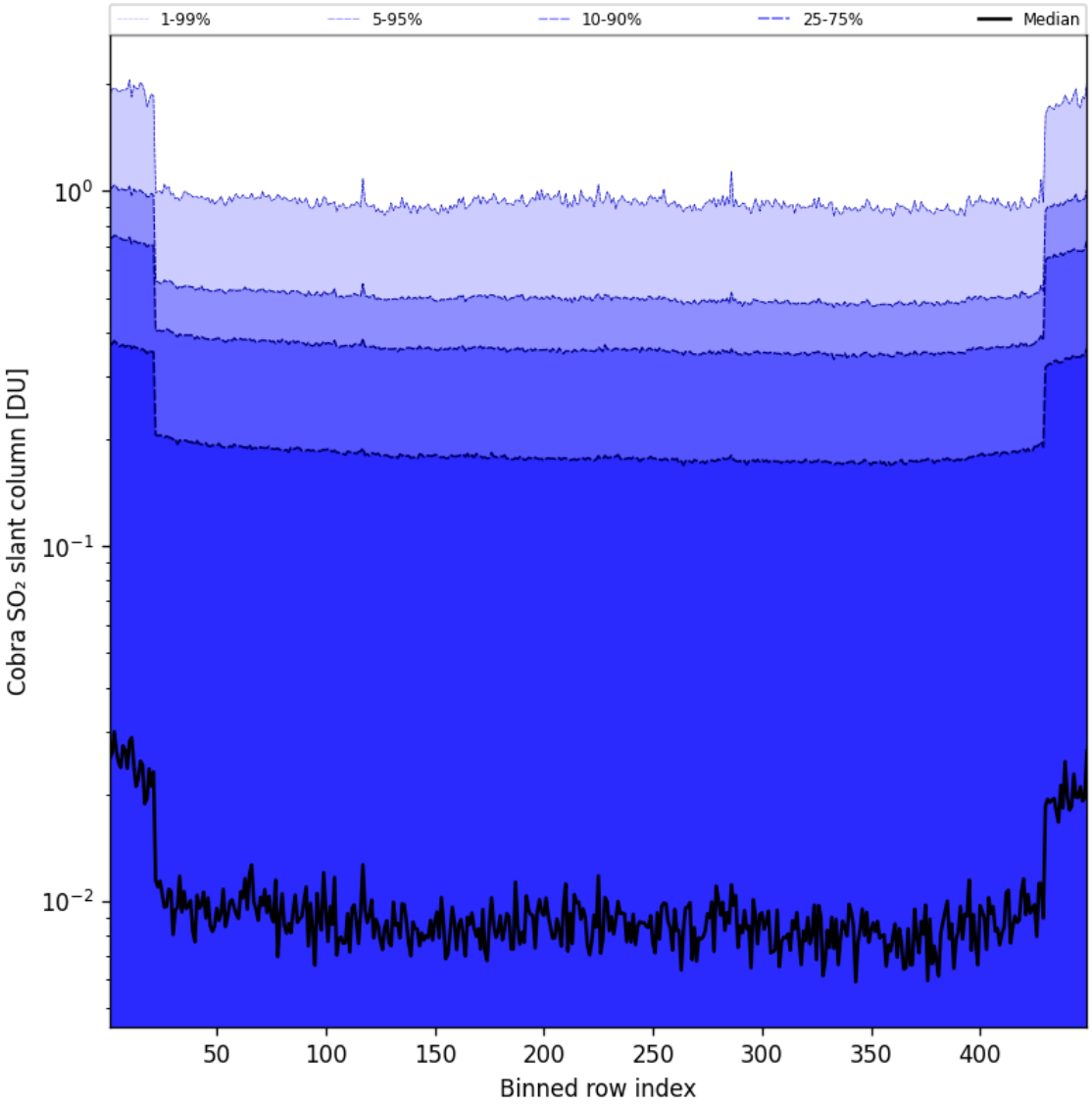

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-02-28 to 2025-03-01

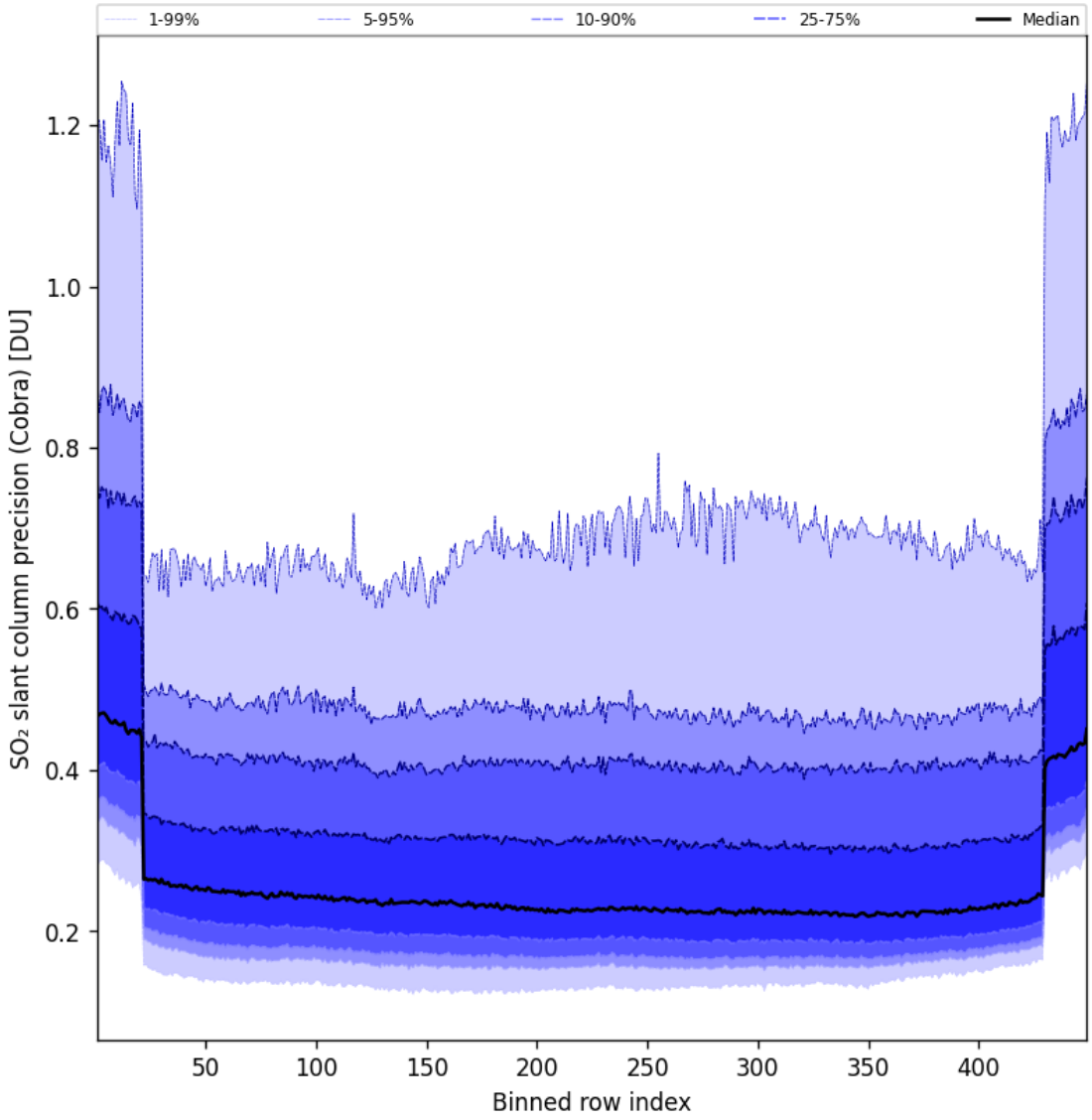

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-02-28 to 2025-03-01

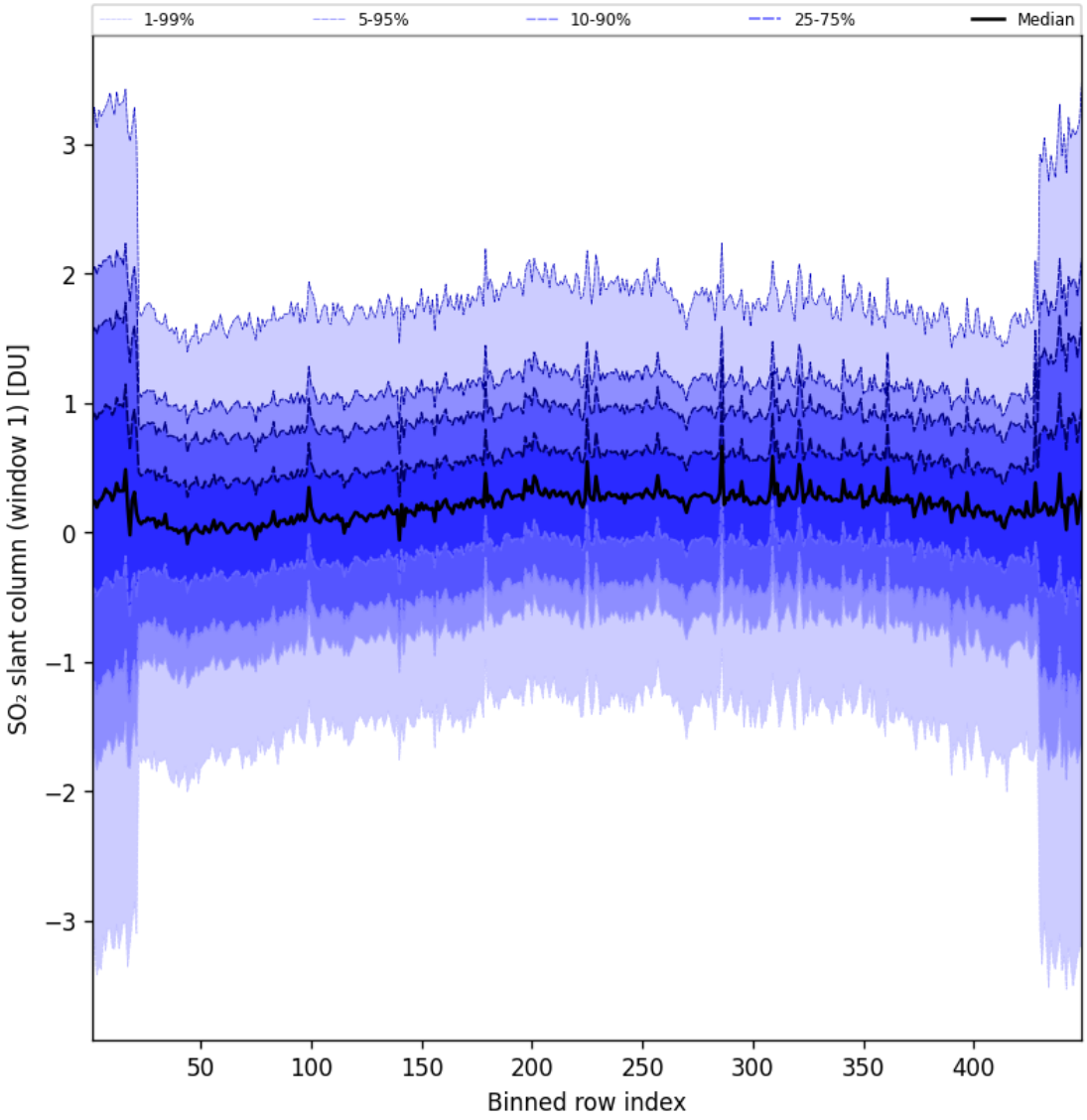

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-02-28 to 2025-03-01

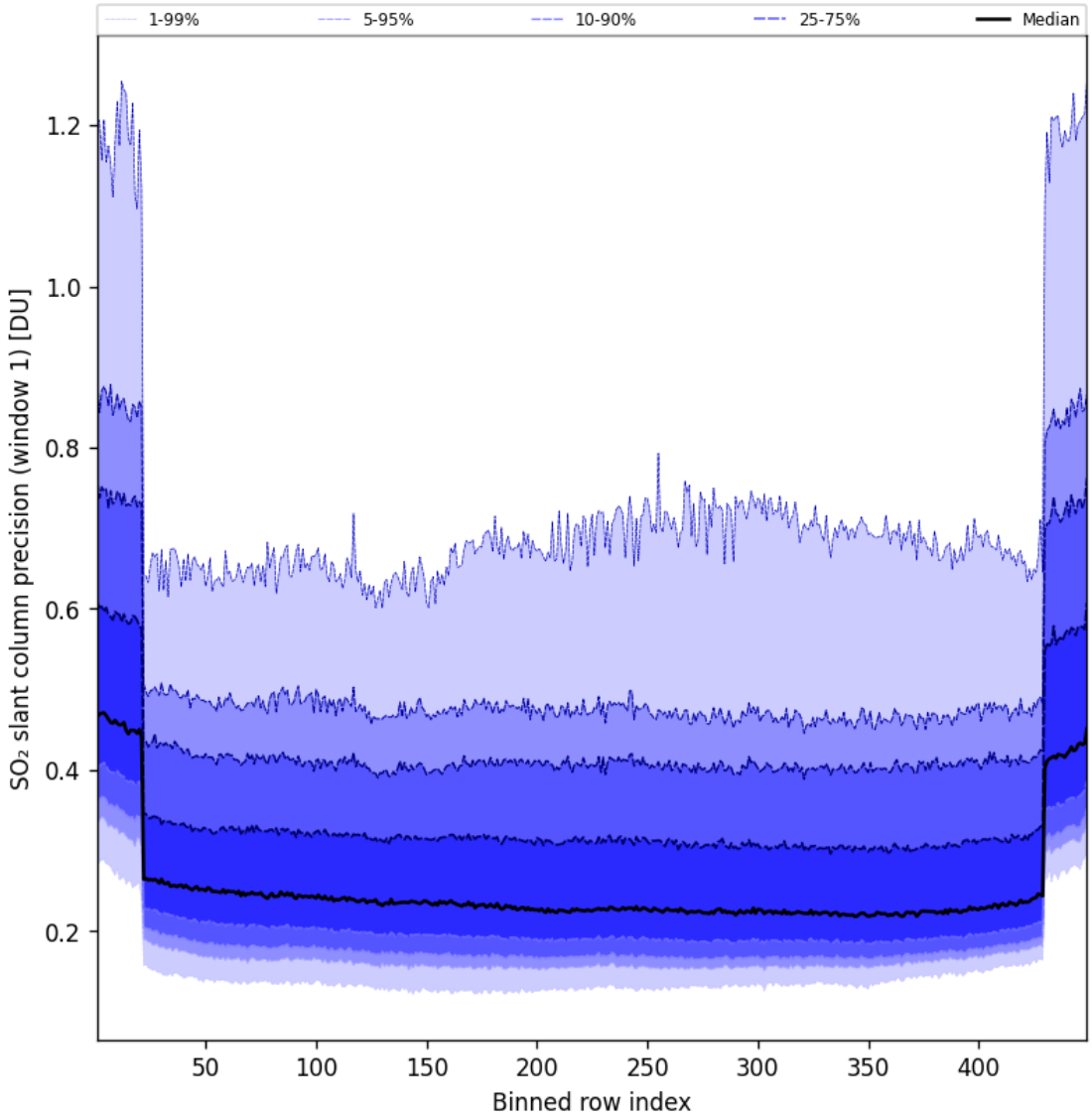

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-02-28 to 2025-03-01

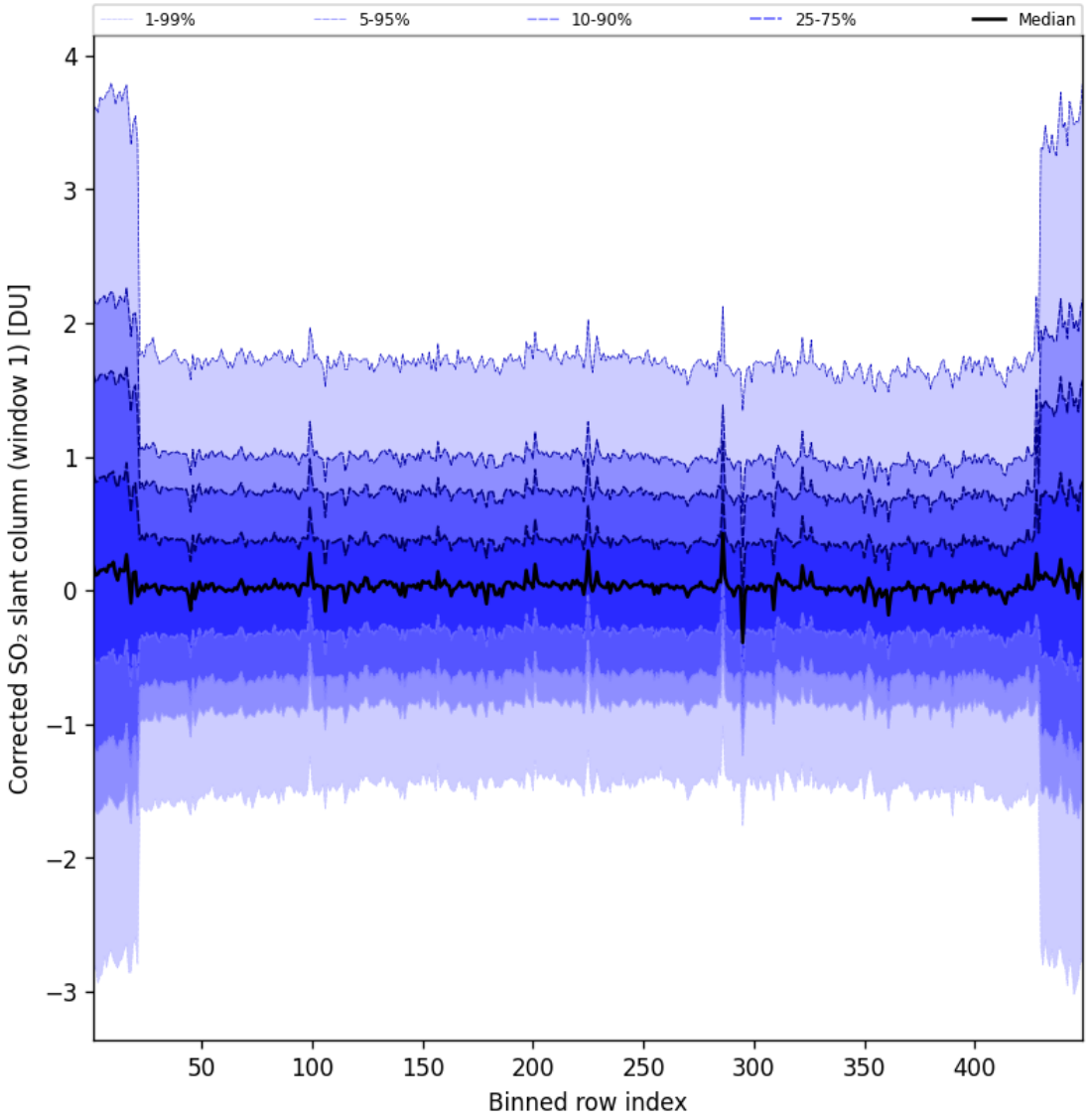

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-02-28 to 2025-03-01

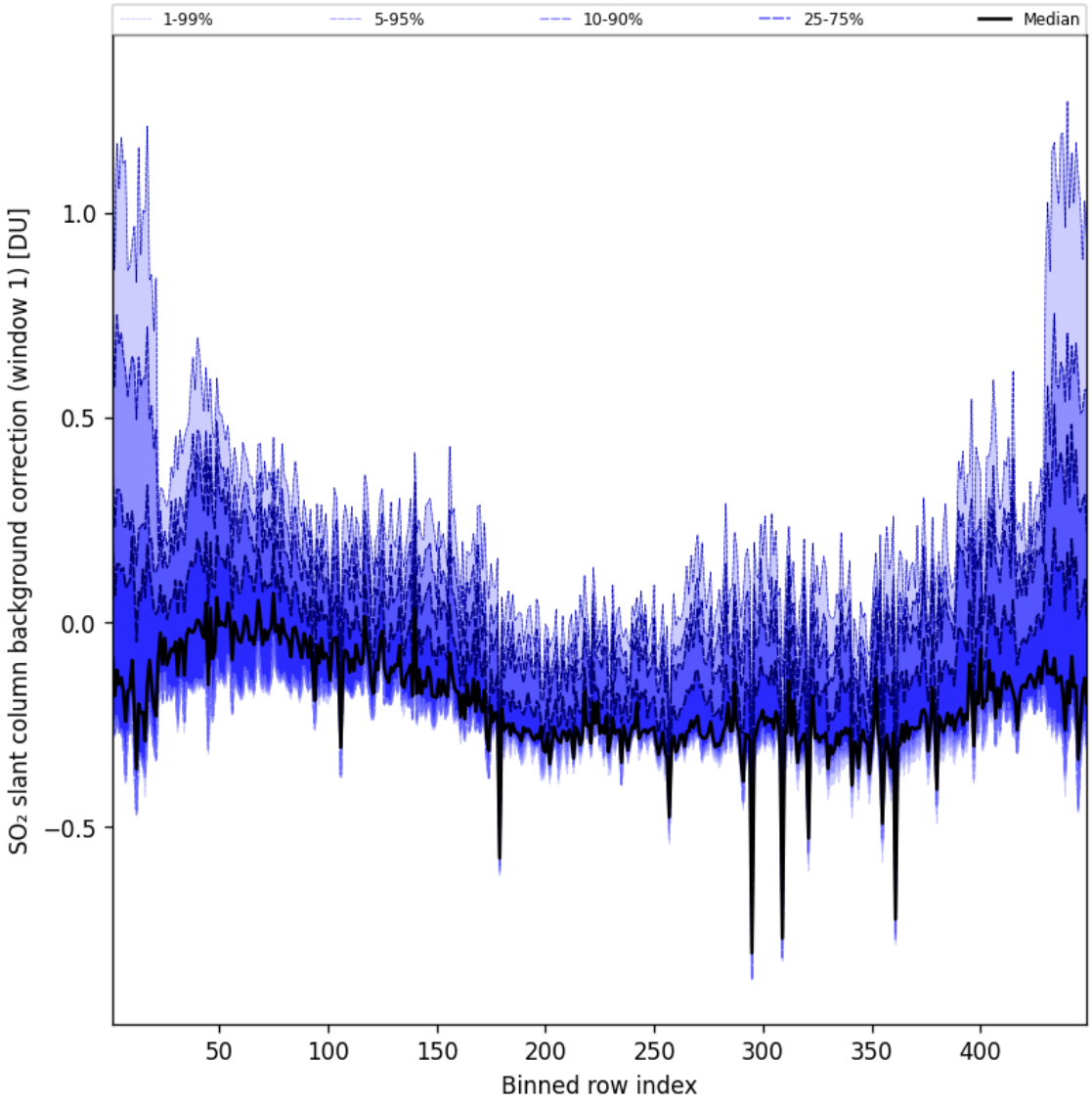

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-02-28 to 2025-03-01

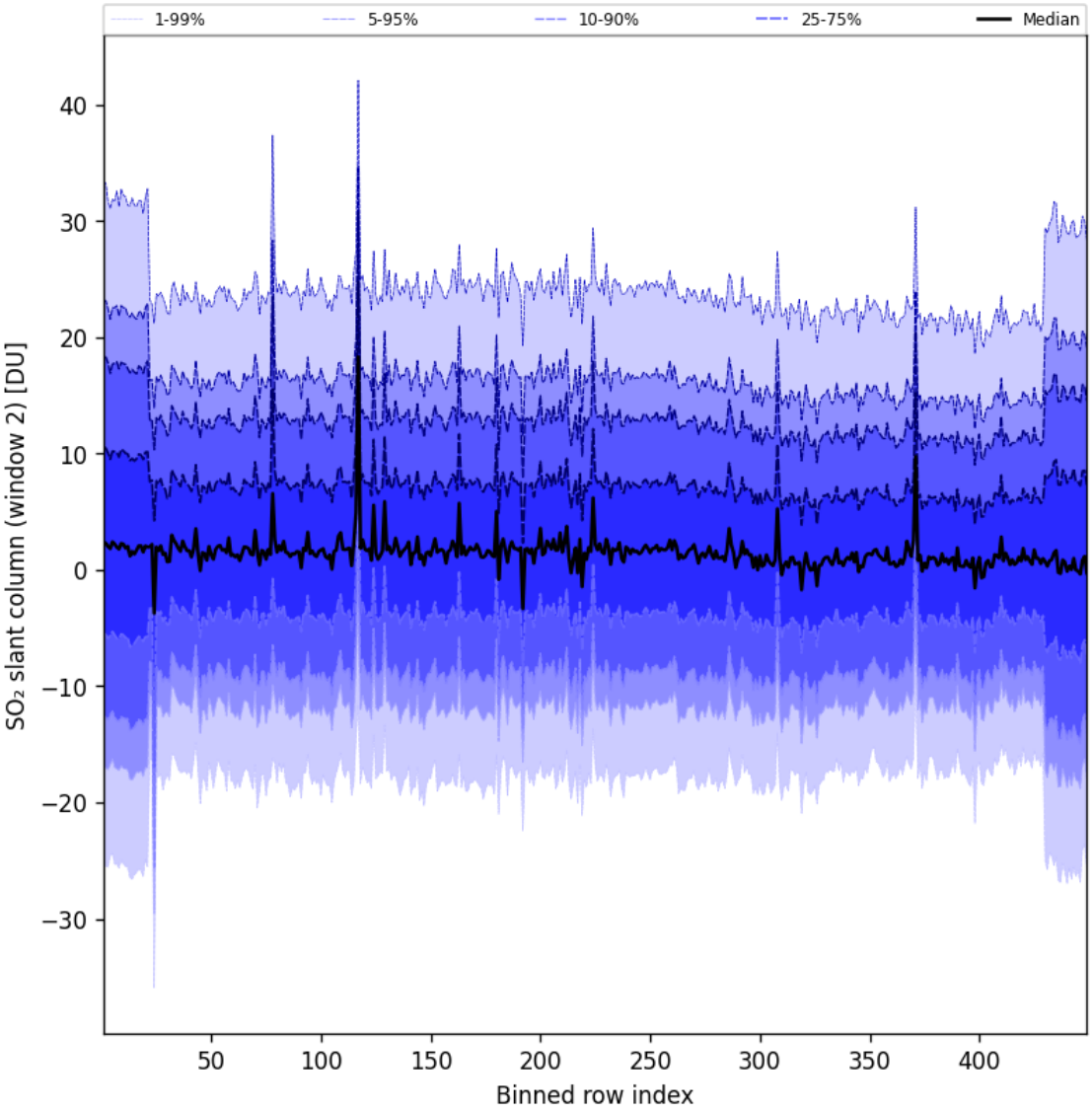

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-02-28 to 2025-03-01

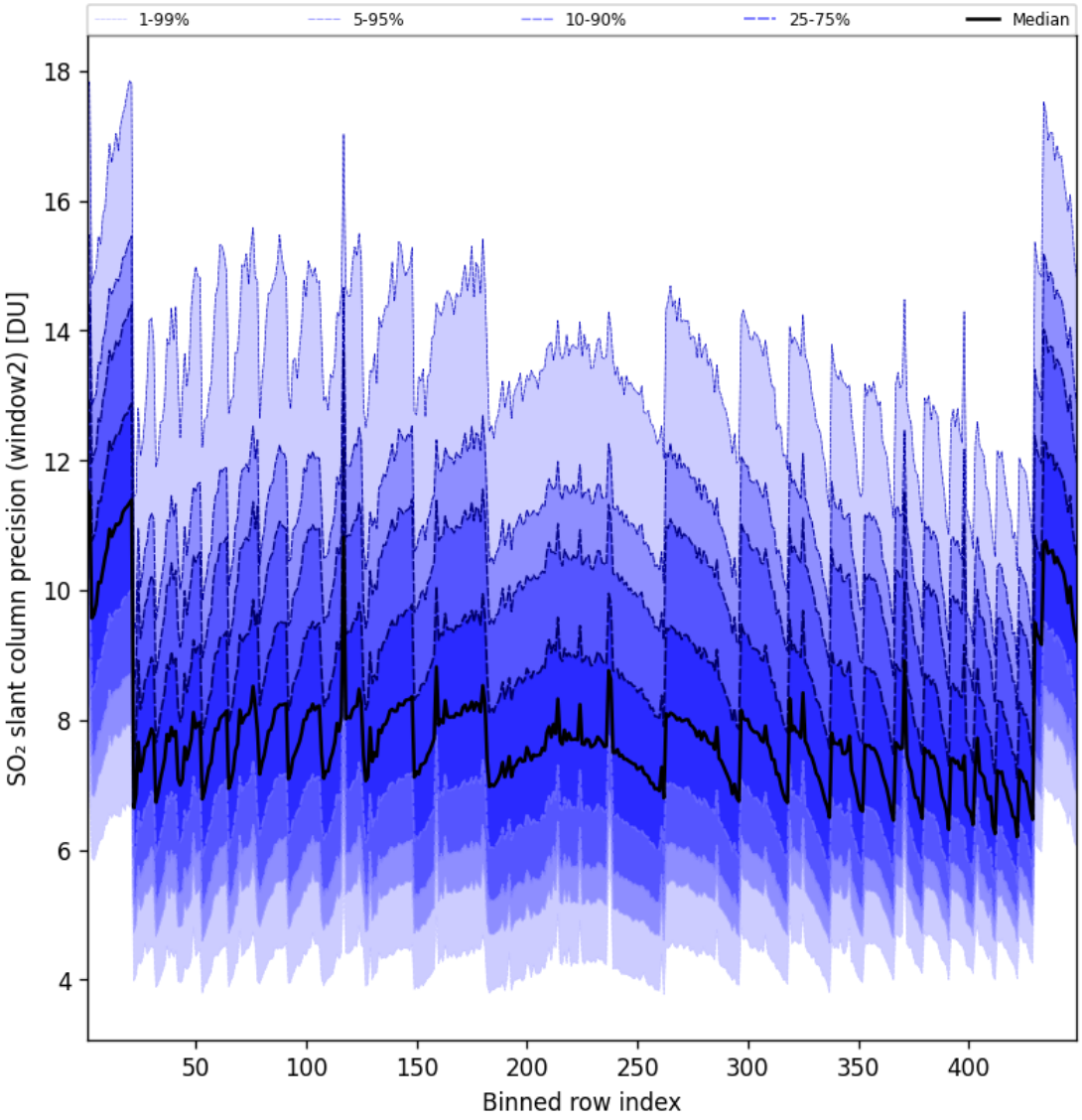

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-02-28 to 2025-03-01

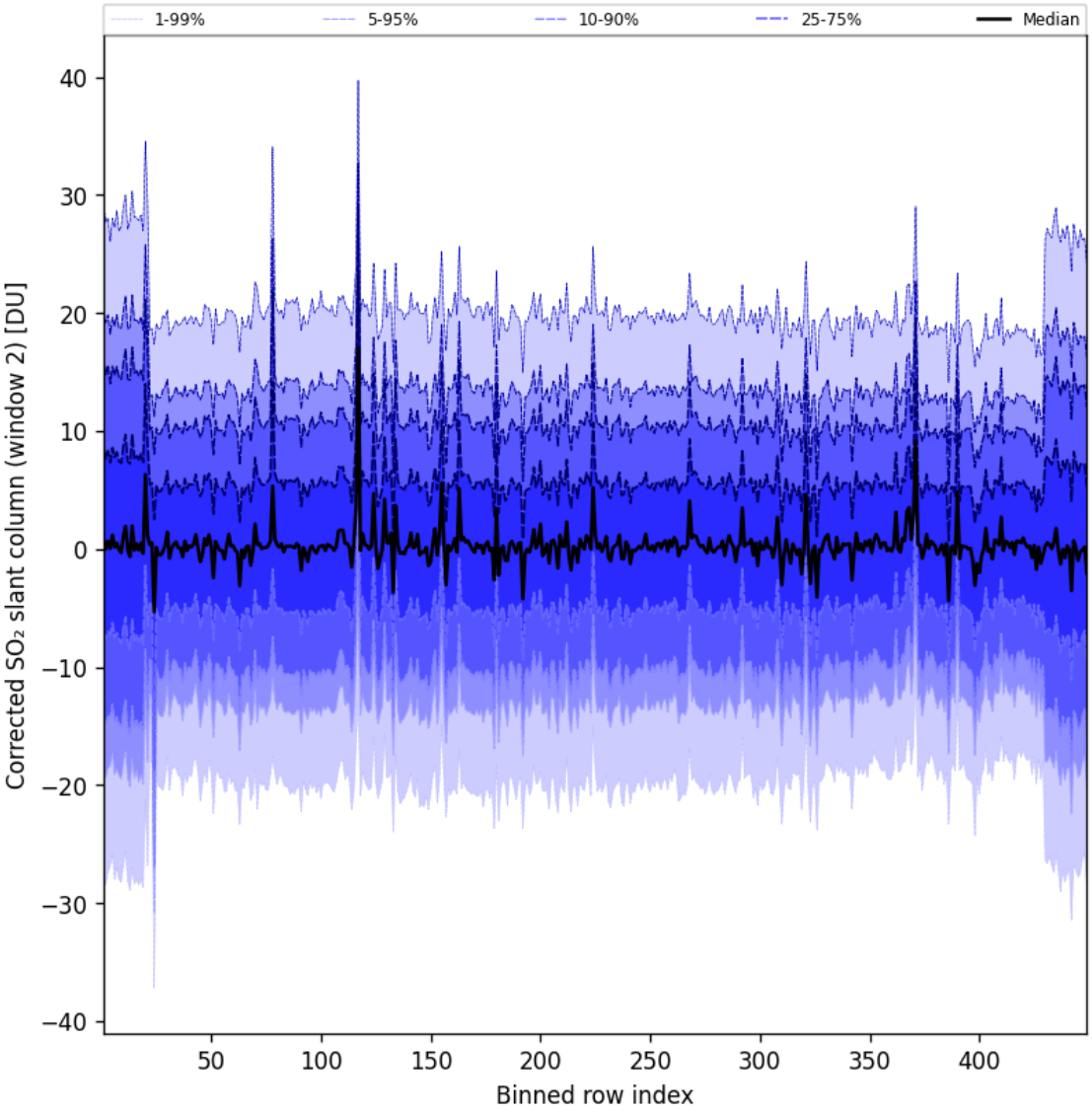

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-02-28 to 2025-03-01

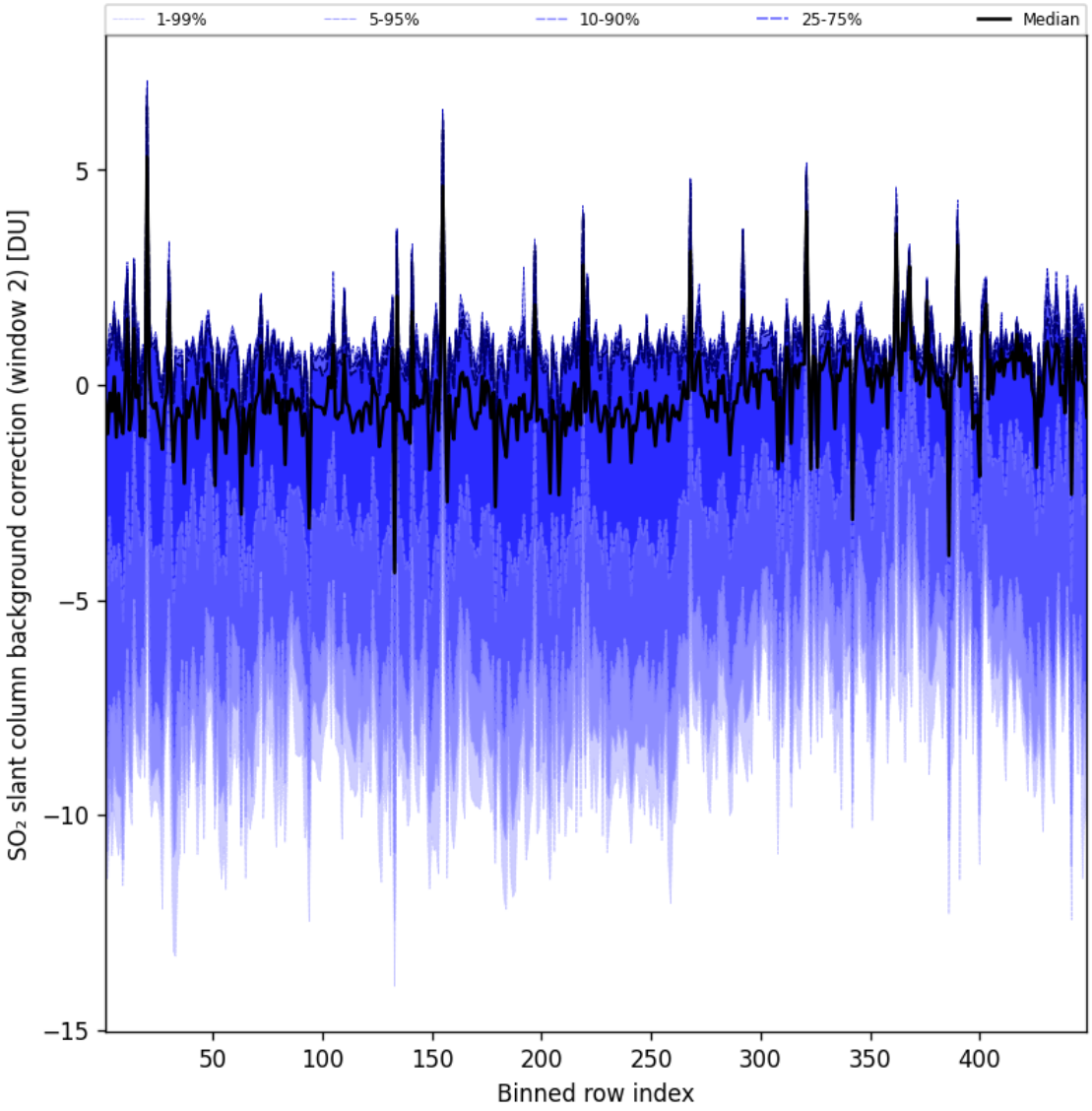

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-02-28 to 2025-03-01

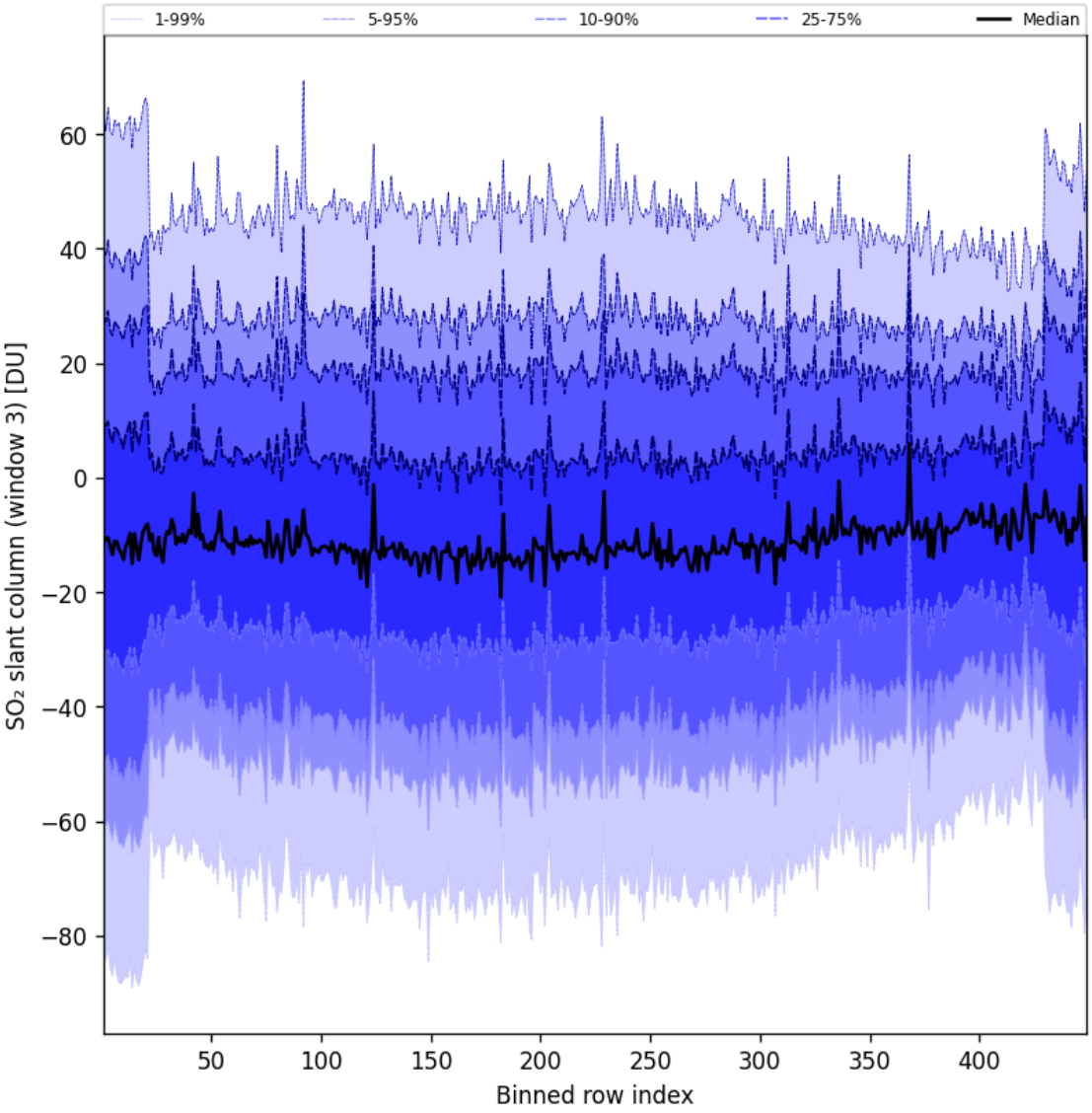

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-02-28 to 2025-03-01

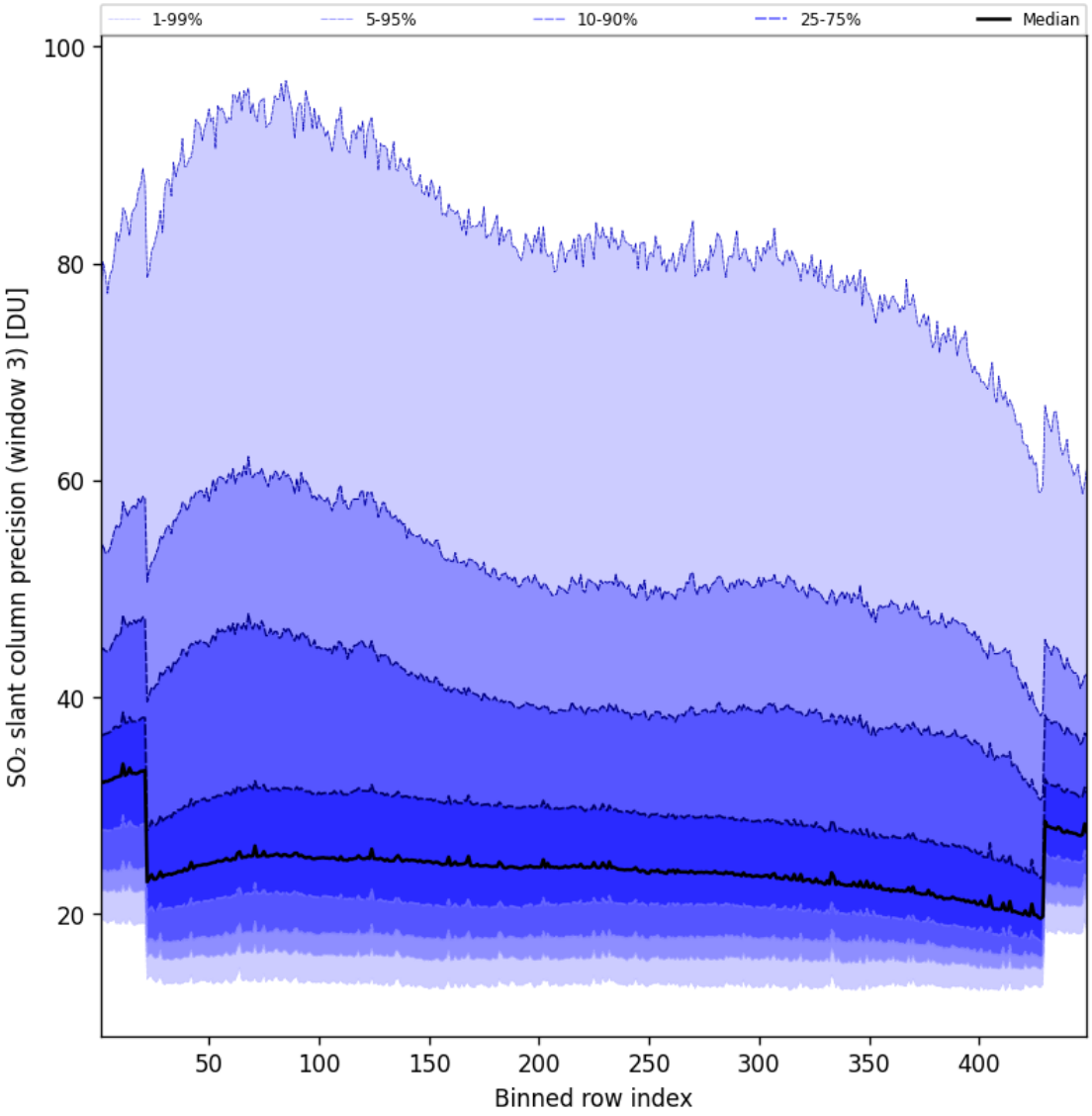

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-02-28 to 2025-03-01

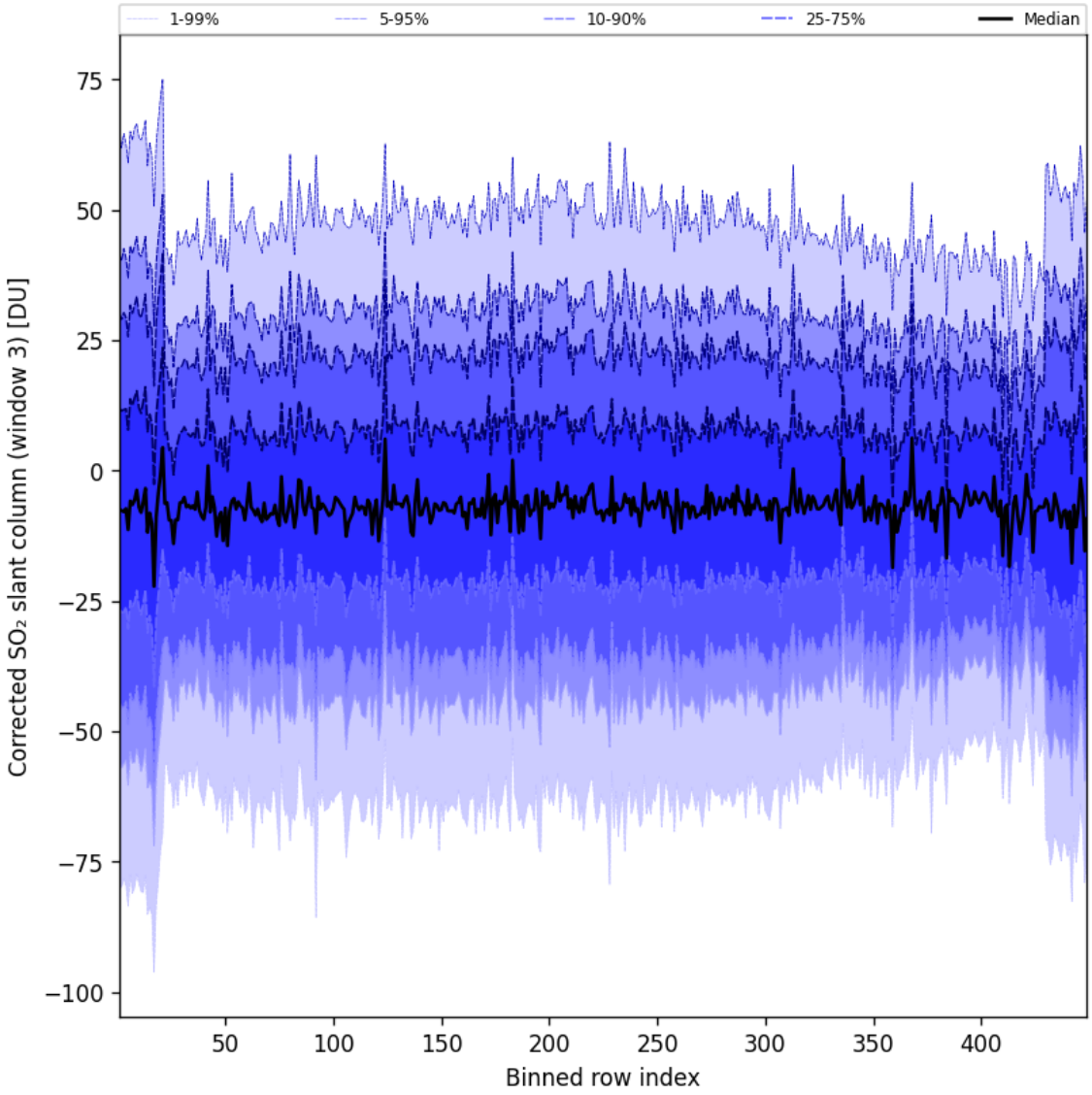

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-02-28 to 2025-03-01

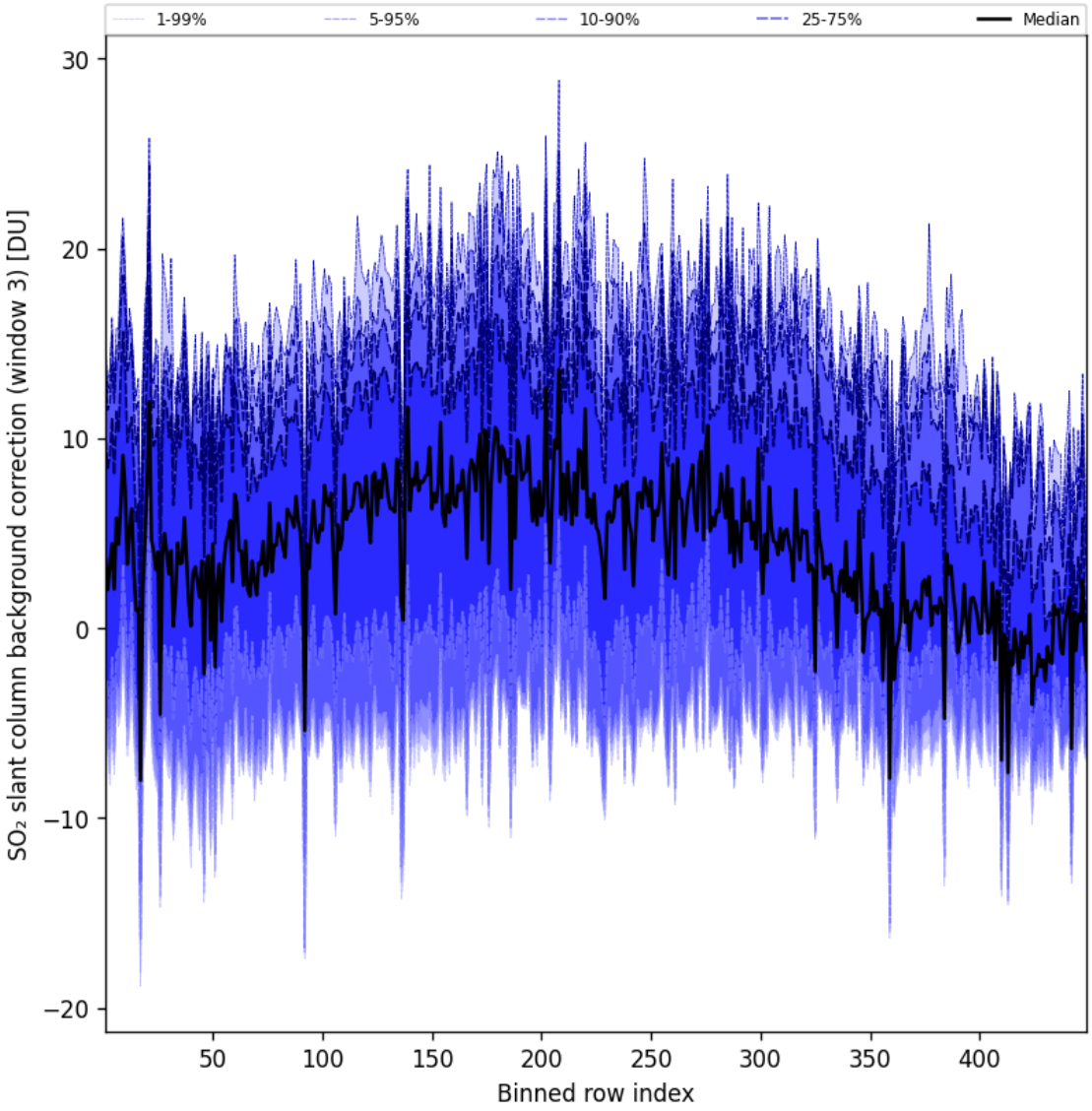

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-02-28 to 2025-03-01

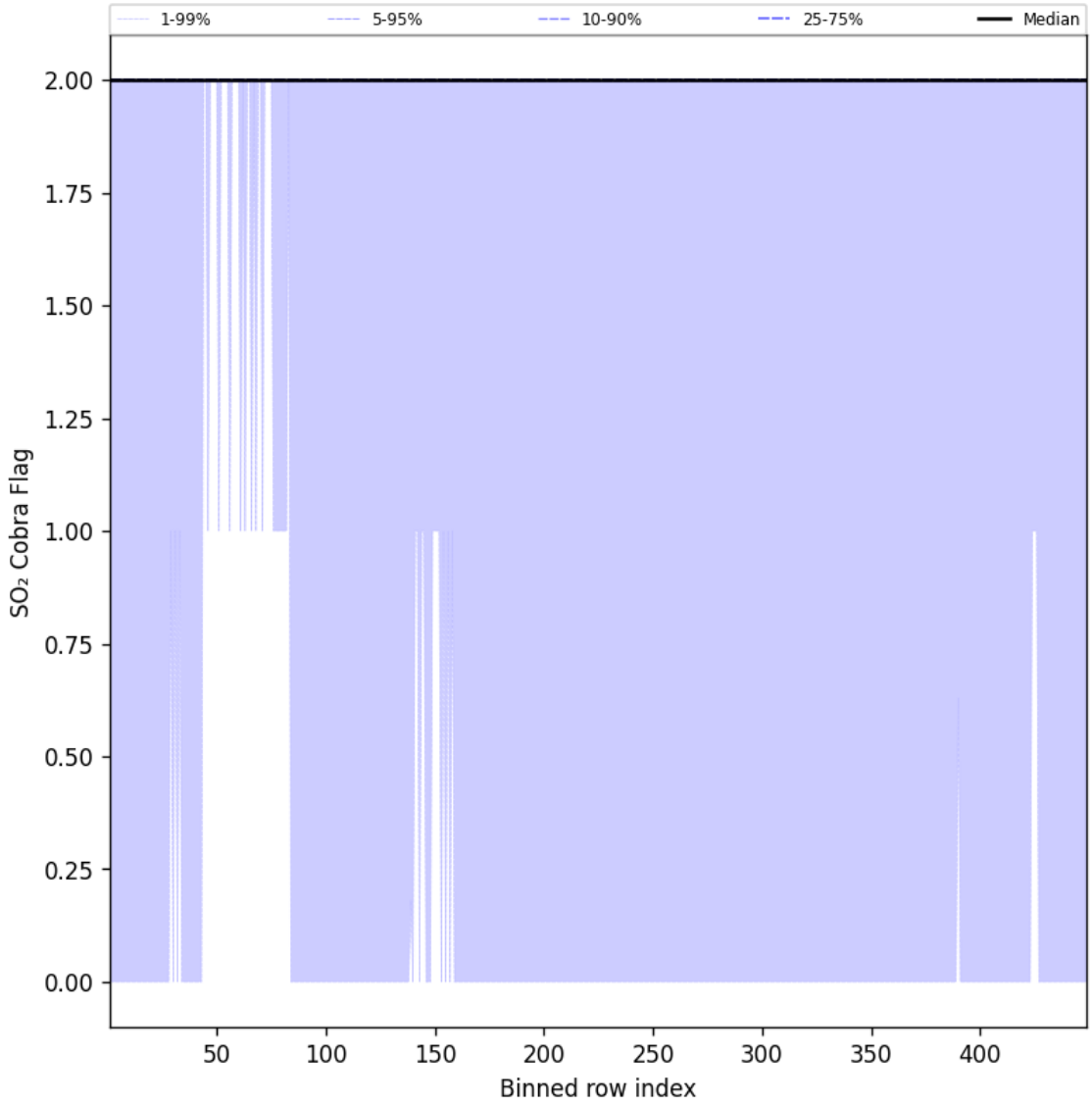

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-02-28 to 2025-03-01

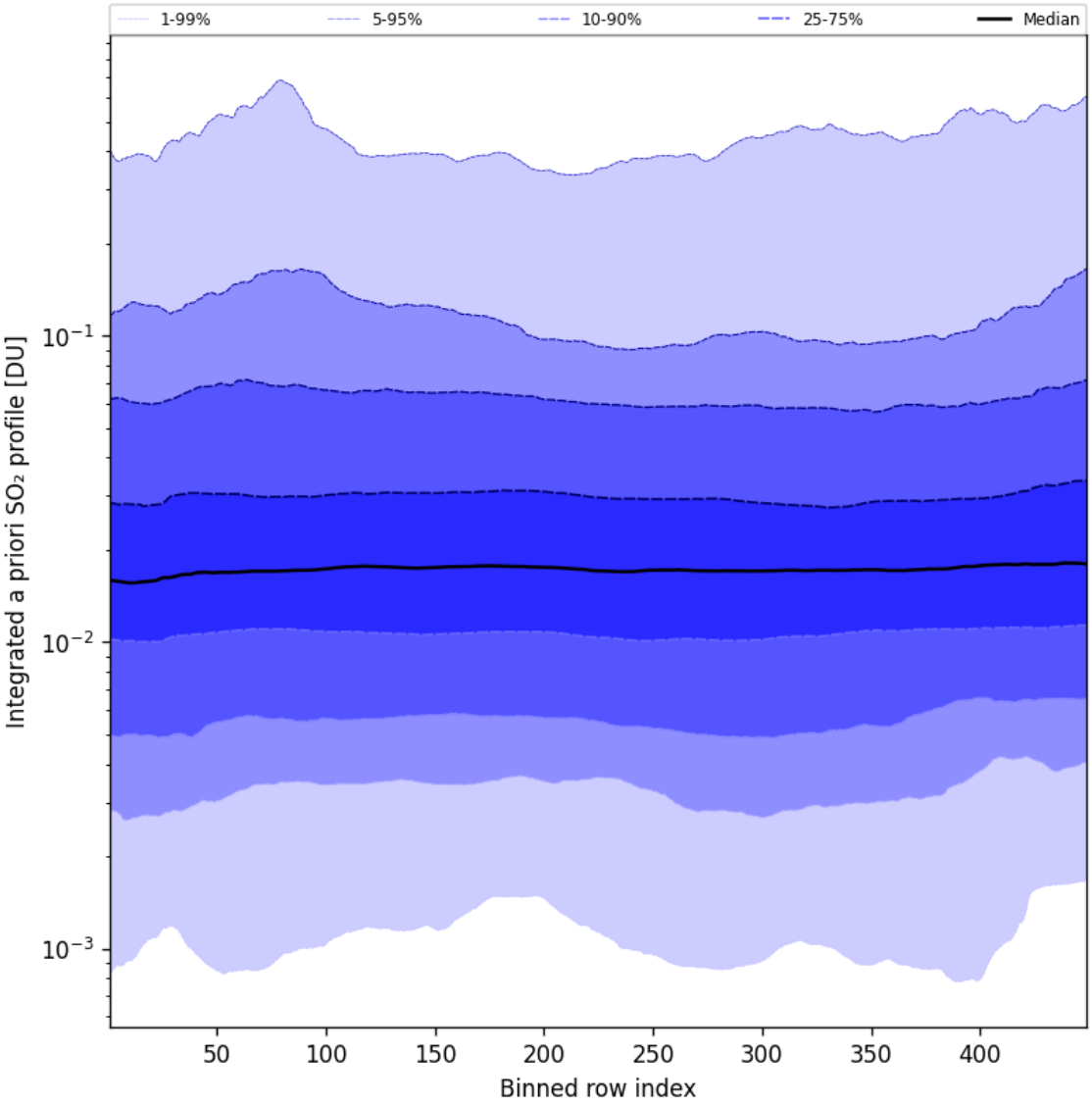

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-02-28 to 2025-03-01

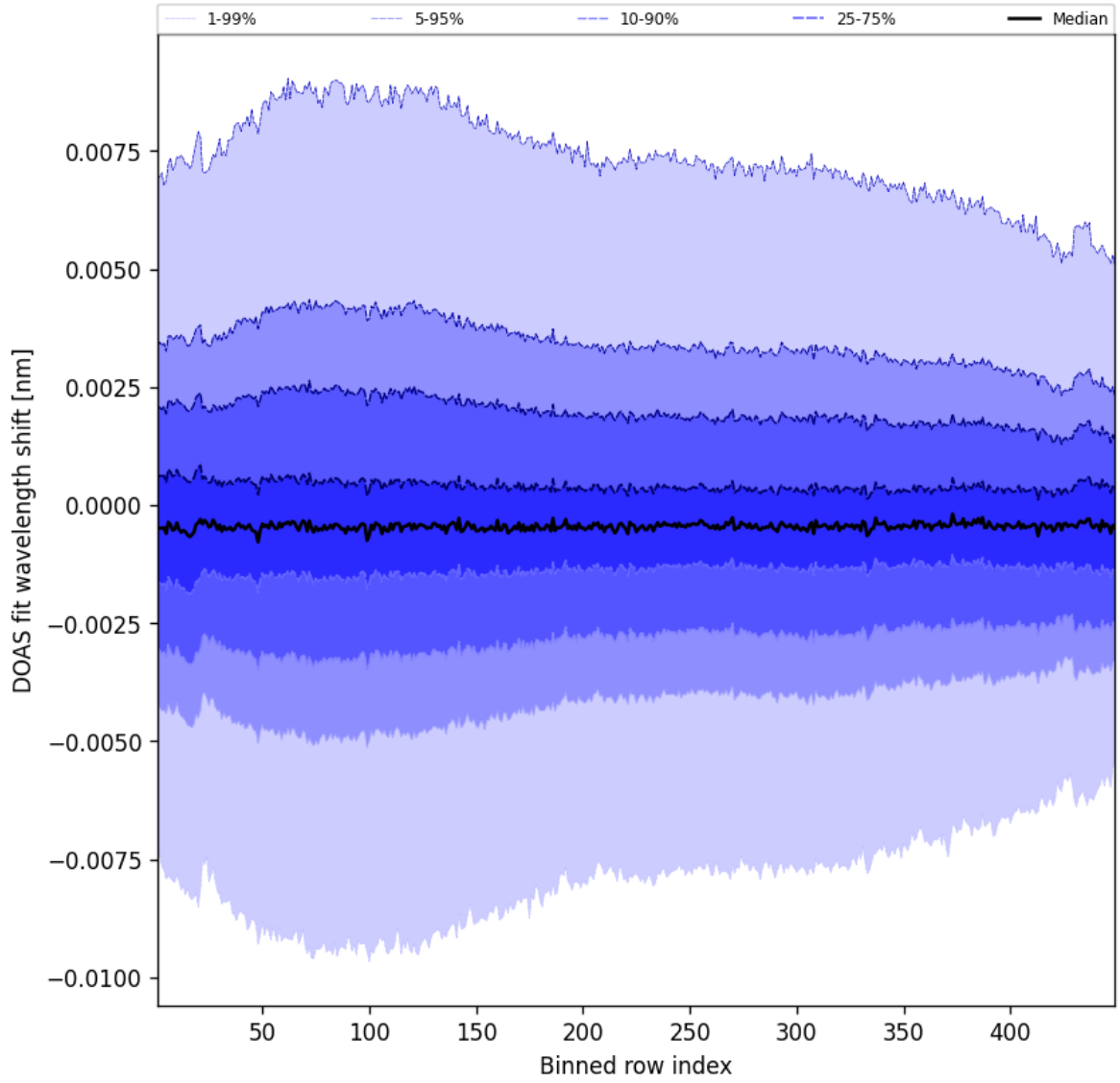

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-02-28 to 2025-03-01

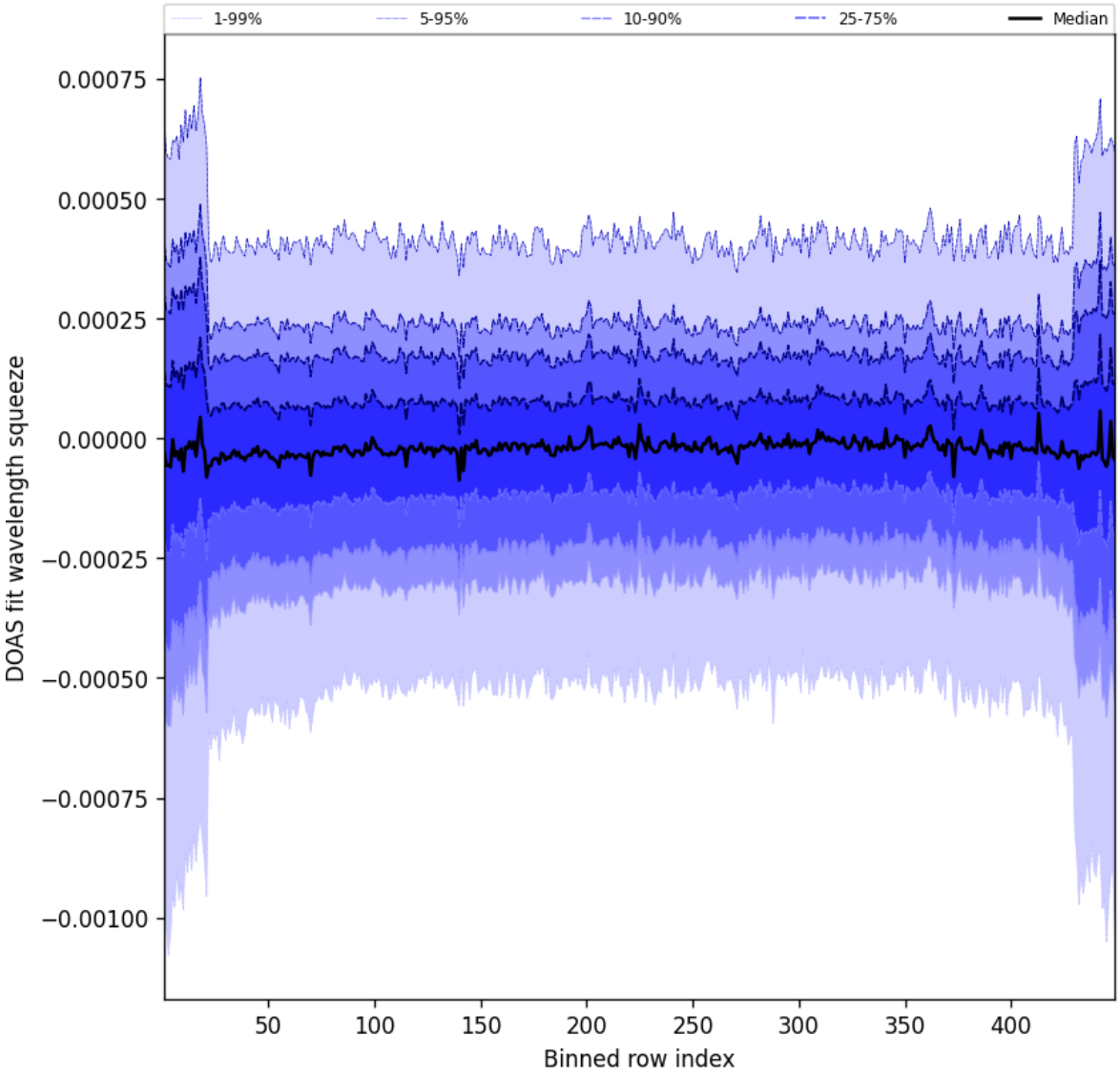

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-02-28 to 2025-03-01

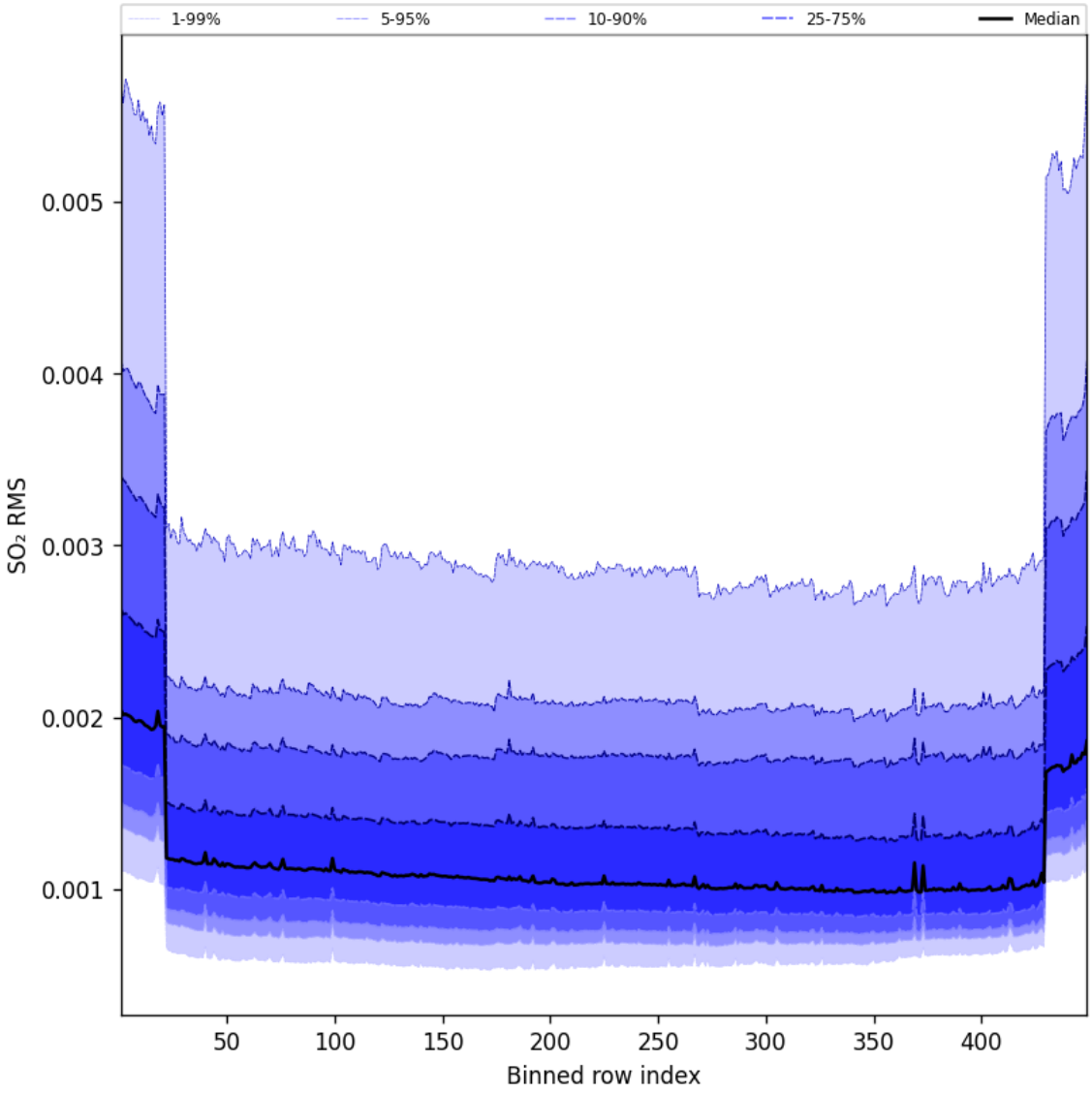

Figure 106: Along track statistics of "SO_2 RMS" for 2025-02-28 to 2025-03-01

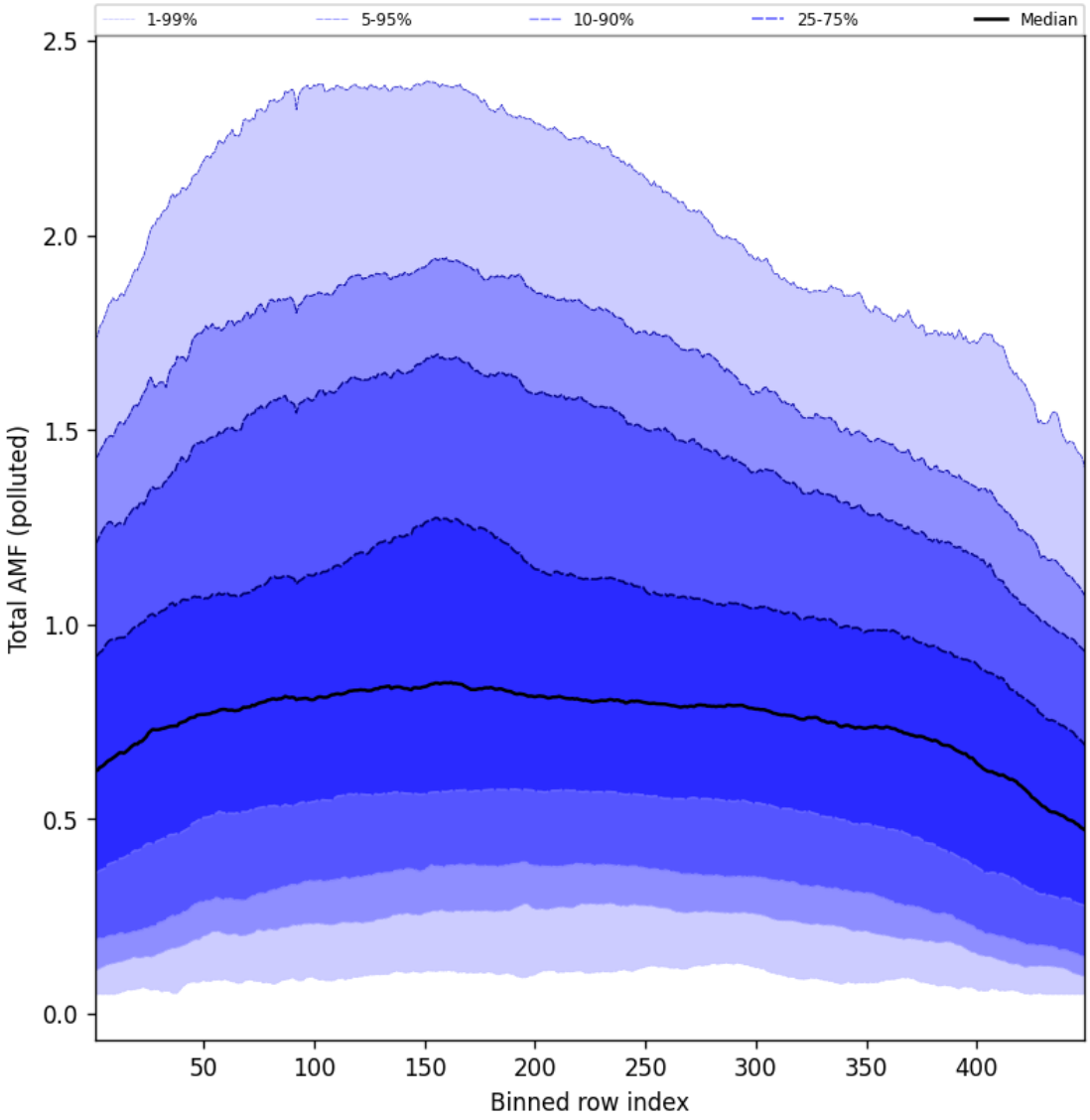

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-02-28 to 2025-03-01

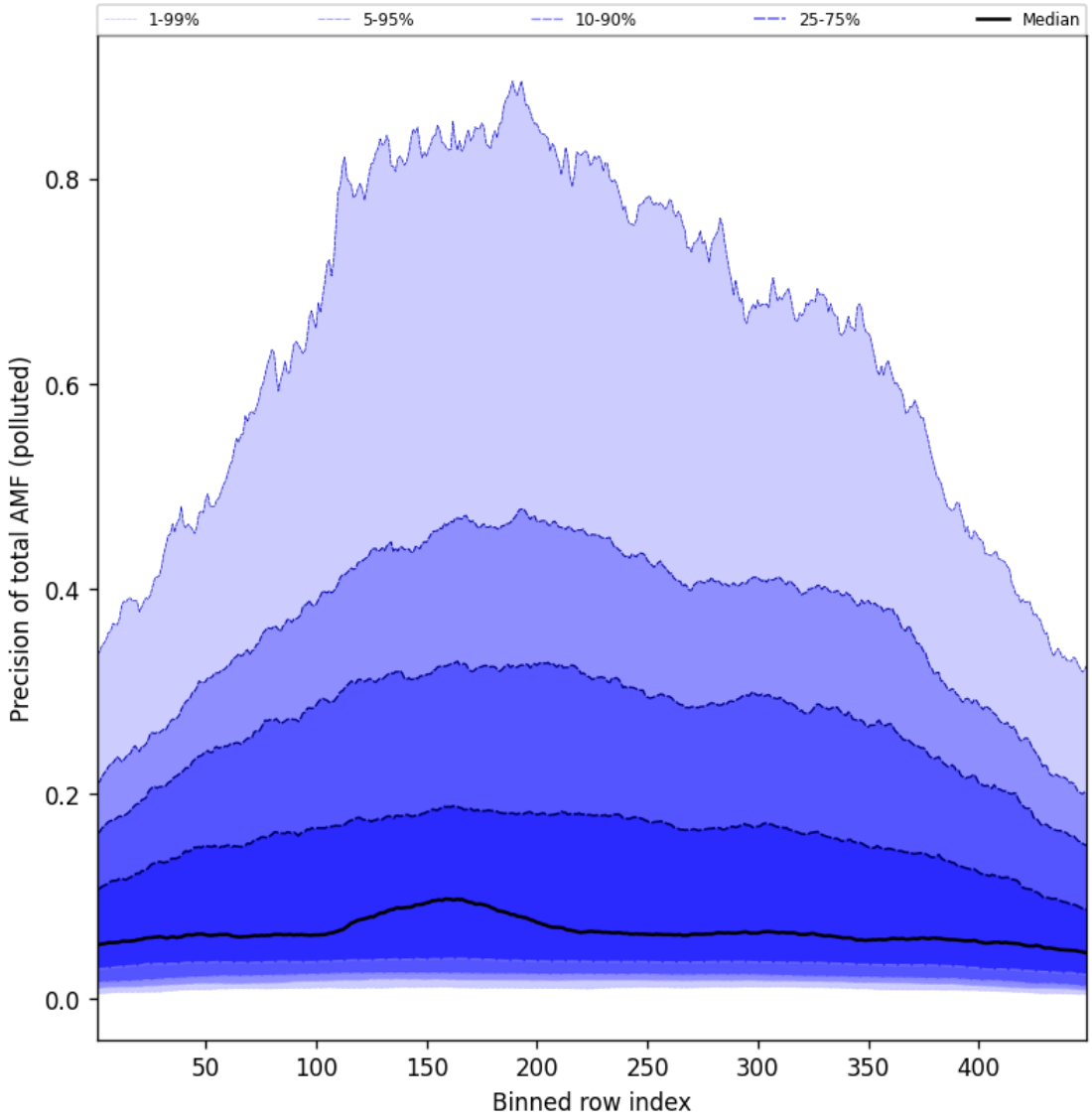

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-02-28 to 2025-03-01

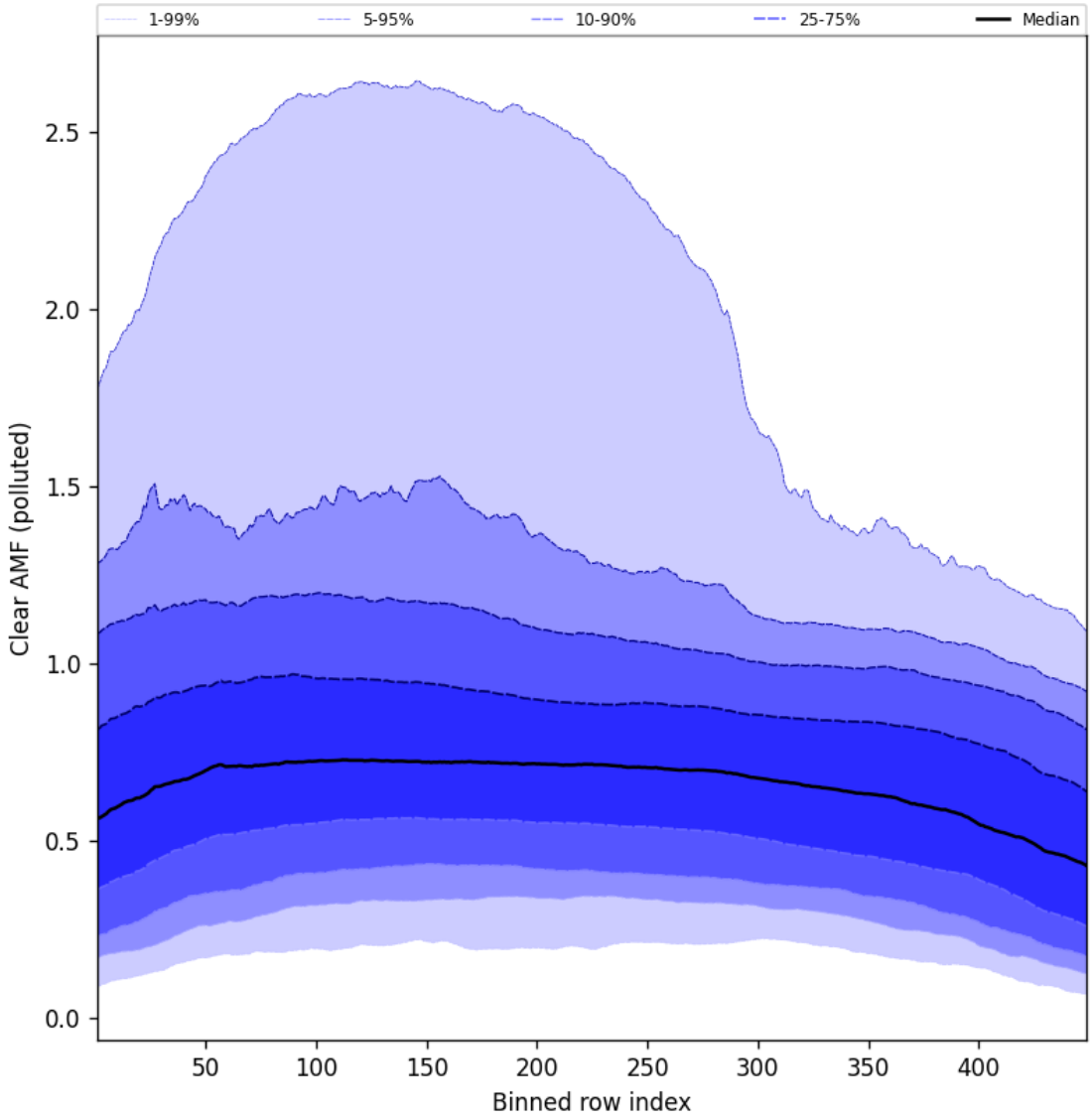

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-02-28 to 2025-03-01

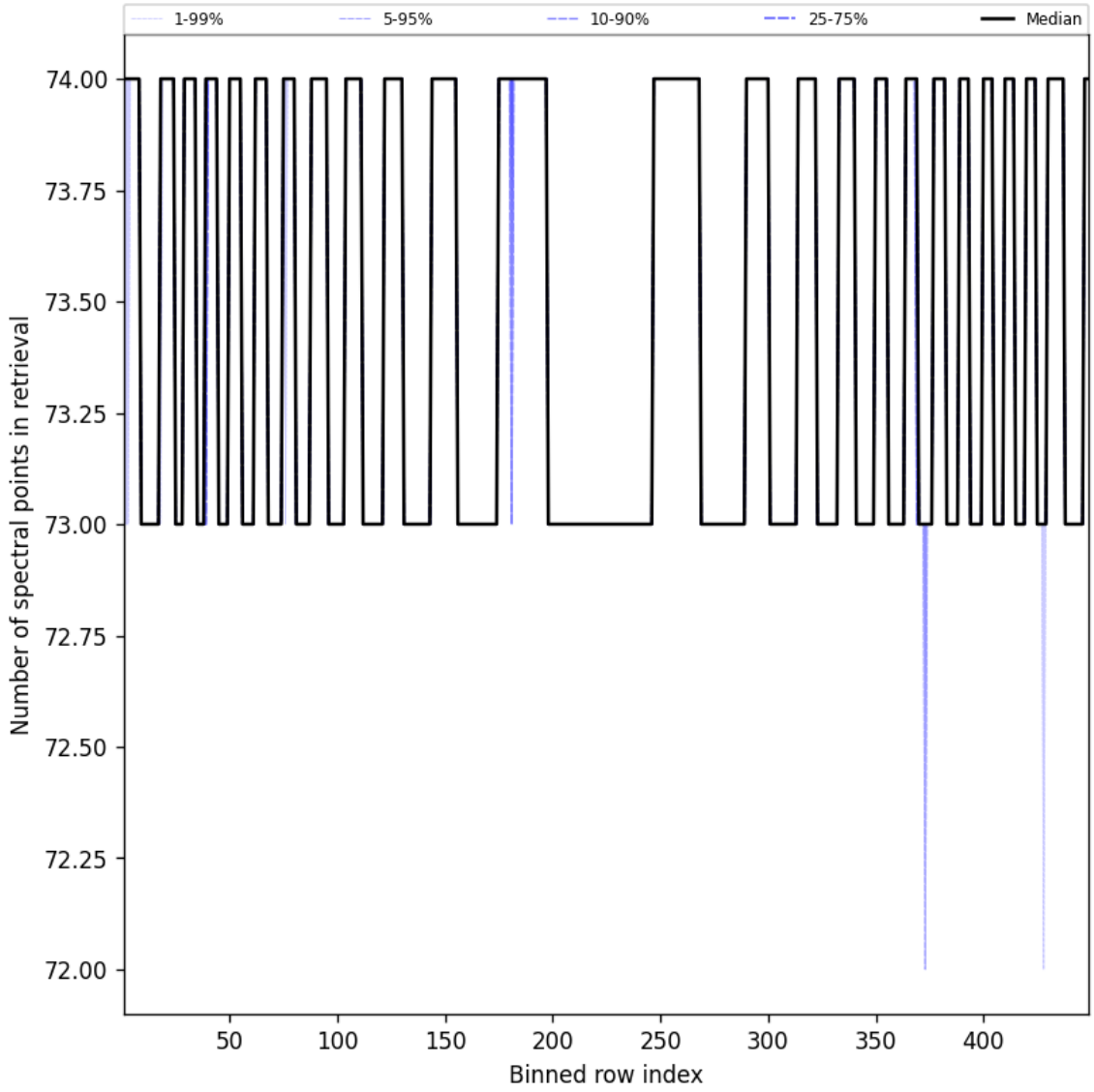

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-02-28 to 2025-03-01

10 Coincidence density

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

Contents

1 Short Introduction **1**
1.1 The list of parameters . . . 1

2 Definitions **1**

3 Granule outlines **8**

4 Input data monitoring **9**

5 Warnings and errors **10**

6 World maps **11**

7 Zonal average **37**

8 Histograms **64**

9 Along track statistics **91**

10 Coincidence density **118**

11 Copyright information of 'PyCAMA' **118**

List of Figures

1 Outline of the granules. . . . 8
2 Input data per granule . . . 9
3 Fraction of pixels with specific warnings and errors during processing . . . 10
4 Map of "SO_2 vertical column" for 2025-02-28 to 2025-03-01 . . . 11
5 Map of "SO_2 vertical column precision" for 2025-02-28 to 2025-03-01 . . . 12
6 Map of "Corrected SO_2 slant column" for 2025-02-28 to 2025-03-01 . . . 13
7 Map of "Cobra SO_2 slant column" for 2025-02-28 to 2025-03-01 . . . 14
8 Map of "SO_2 slant column precision (Cobra)" for 2025-02-28 to 2025-03-01 . . . 15
9 Map of "SO_2 slant column (window 1)" for 2025-02-28 to 2025-03-01 . . . 16
10 Map of "SO_2 slant column precision (window 1)" for 2025-02-28 to 2025-03-01 . . . 17
11 Map of "Corrected SO_2 slant column (window 1)" for 2025-02-28 to 2025-03-01 . . . 18
12 Map of "SO_2 slant column background correction (window 1)" for 2025-02-28 to 2025-03-01 . . . 19
13 Map of "SO_2 slant column (window 2)" for 2025-02-28 to 2025-03-01 . . . 20
14 Map of "SO_2 slant column precision (window2)" for 2025-02-28 to 2025-03-01 . . . 21
15 Map of "Corrected SO_2 slant column (window 2)" for 2025-02-28 to 2025-03-01 . . . 22
16 Map of "SO_2 slant column background correction (window 2)" for 2025-02-28 to 2025-03-01 . . . 23
17 Map of "SO_2 slant column (window 3)" for 2025-02-28 to 2025-03-01 . . . 24
18 Map of "SO_2 slant column precision (window 3)" for 2025-02-28 to 2025-03-01 . . . 25
19 Map of "Corrected SO_2 slant column (window 3)" for 2025-02-28 to 2025-03-01 . . . 26
20 Map of "SO_2 slant column background correction (window 3)" for 2025-02-28 to 2025-03-01 . . . 27
21 Map of "Integrated a priori SO_2 profile" for 2025-02-28 to 2025-03-01 . . . 28
22 Map of "DOAS fit wavelength shift" for 2025-02-28 to 2025-03-01 . . . 29
23 Map of "DOAS fit wavelength squeeze" for 2025-02-28 to 2025-03-01 . . . 30
24 Map of "SO_2 RMS" for 2025-02-28 to 2025-03-01 . . . 31
25 Map of "Total AMF (polluted)" for 2025-02-28 to 2025-03-01 . . . 32
26 Map of "Precision of total AMF (polluted)" for 2025-02-28 to 2025-03-01 . . . 33
27 Map of "Clear AMF (polluted)" for 2025-02-28 to 2025-03-01 . . . 34
28 Map of "Number of spectral points in retrieval" for 2025-02-28 to 2025-03-01 . . . 35
29 Map of the number of observations for 2025-02-28 to 2025-03-01 . . . 36

30 Zonal average of “QA value” for 2025-02-28 to 2025-03-01. 37
31 Zonal average of “SO_2 vertical column” for 2025-02-28 to 2025-03-01. 38
32 Zonal average of “SO_2 vertical column precision” for 2025-02-28 to 2025-03-01. 39
33 Zonal average of “Corrected SO_2 slant column” for 2025-02-28 to 2025-03-01. 40
34 Zonal average of “Cobra SO_2 slant column” for 2025-02-28 to 2025-03-01. 41
35 Zonal average of “SO_2 slant column precision (Cobra)” for 2025-02-28 to 2025-03-01. 42
36 Zonal average of “SO_2 slant column (window 1)” for 2025-02-28 to 2025-03-01. 43
37 Zonal average of “SO_2 slant column precision (window 1)” for 2025-02-28 to 2025-03-01. 44
38 Zonal average of “Corrected SO_2 slant column (window 1)” for 2025-02-28 to 2025-03-01. 45
39 Zonal average of “SO_2 slant column background correction (window 1)” for 2025-02-28 to 2025-03-01. . . 46
40 Zonal average of “SO_2 slant column (window 2)” for 2025-02-28 to 2025-03-01. 47
41 Zonal average of “SO_2 slant column precision (window2)” for 2025-02-28 to 2025-03-01. 48
42 Zonal average of “Corrected SO_2 slant column (window 2)” for 2025-02-28 to 2025-03-01. 49
43 Zonal average of “SO_2 slant column background correction (window 2)” for 2025-02-28 to 2025-03-01. . . 50
44 Zonal average of “SO_2 slant column (window 3)” for 2025-02-28 to 2025-03-01. 51
45 Zonal average of “SO_2 slant column precision (window 3)” for 2025-02-28 to 2025-03-01. 52
46 Zonal average of “Corrected SO_2 slant column (window 3)” for 2025-02-28 to 2025-03-01. 53
47 Zonal average of “SO_2 slant column background correction (window 3)” for 2025-02-28 to 2025-03-01. . . 54
48 Zonal average of “SO_2 Cobra Flag” for 2025-02-28 to 2025-03-01. 55
49 Zonal average of “Integrated a priori SO_2 profile” for 2025-02-28 to 2025-03-01. 56
50 Zonal average of “DOAS fit wavelength shift” for 2025-02-28 to 2025-03-01. 57
51 Zonal average of “DOAS fit wavelength squeeze” for 2025-02-28 to 2025-03-01. 58
52 Zonal average of “SO_2 RMS” for 2025-02-28 to 2025-03-01. 59
53 Zonal average of “Total AMF (polluted)” for 2025-02-28 to 2025-03-01. 60
54 Zonal average of “Precision of total AMF (polluted)” for 2025-02-28 to 2025-03-01. 61
55 Zonal average of “Clear AMF (polluted)” for 2025-02-28 to 2025-03-01. 62
56 Zonal average of “Number of spectral points in retrieval” for 2025-02-28 to 2025-03-01. 63
57 Histogram of “QA value” for 2025-02-28 to 2025-03-01 64
58 Histogram of “SO_2 vertical column” for 2025-02-28 to 2025-03-01 65
59 Histogram of “SO_2 vertical column precision” for 2025-02-28 to 2025-03-01 66
60 Histogram of “Corrected SO_2 slant column” for 2025-02-28 to 2025-03-01 67
61 Histogram of “Cobra SO_2 slant column” for 2025-02-28 to 2025-03-01 68
62 Histogram of “SO_2 slant column precision (Cobra)” for 2025-02-28 to 2025-03-01 69
63 Histogram of “SO_2 slant column (window 1)” for 2025-02-28 to 2025-03-01 70
64 Histogram of “SO_2 slant column precision (window 1)” for 2025-02-28 to 2025-03-01 71
65 Histogram of “Corrected SO_2 slant column (window 1)” for 2025-02-28 to 2025-03-01 72
66 Histogram of “SO_2 slant column background correction (window 1)” for 2025-02-28 to 2025-03-01 73
67 Histogram of “SO_2 slant column (window 2)” for 2025-02-28 to 2025-03-01 74
68 Histogram of “SO_2 slant column precision (window2)” for 2025-02-28 to 2025-03-01 75
69 Histogram of “Corrected SO_2 slant column (window 2)” for 2025-02-28 to 2025-03-01 76
70 Histogram of “SO_2 slant column background correction (window 2)” for 2025-02-28 to 2025-03-01 77
71 Histogram of “SO_2 slant column (window 3)” for 2025-02-28 to 2025-03-01 78
72 Histogram of “SO_2 slant column precision (window 3)” for 2025-02-28 to 2025-03-01 79
73 Histogram of “Corrected SO_2 slant column (window 3)” for 2025-02-28 to 2025-03-01 80
74 Histogram of “SO_2 slant column background correction (window 3)” for 2025-02-28 to 2025-03-01 81
75 Histogram of “SO_2 Cobra Flag” for 2025-02-28 to 2025-03-01 82
76 Histogram of “Integrated a priori SO_2 profile” for 2025-02-28 to 2025-03-01 83
77 Histogram of “DOAS fit wavelength shift” for 2025-02-28 to 2025-03-01 84
78 Histogram of “DOAS fit wavelength squeeze” for 2025-02-28 to 2025-03-01 85
79 Histogram of “SO_2 RMS” for 2025-02-28 to 2025-03-01 86
80 Histogram of “Total AMF (polluted)” for 2025-02-28 to 2025-03-01 87
81 Histogram of “Precision of total AMF (polluted)” for 2025-02-28 to 2025-03-01 88
82 Histogram of “Clear AMF (polluted)” for 2025-02-28 to 2025-03-01 89
83 Histogram of “Number of spectral points in retrieval” for 2025-02-28 to 2025-03-01 90
84 Along track statistics of “QA value” for 2025-02-28 to 2025-03-01 91
85 Along track statistics of “SO_2 vertical column” for 2025-02-28 to 2025-03-01 92
86 Along track statistics of “SO_2 vertical column precision” for 2025-02-28 to 2025-03-01 93
87 Along track statistics of “Corrected SO_2 slant column” for 2025-02-28 to 2025-03-01 94
88 Along track statistics of “Cobra SO_2 slant column” for 2025-02-28 to 2025-03-01 95
89 Along track statistics of “SO_2 slant column precision (Cobra)” for 2025-02-28 to 2025-03-01 96
90 Along track statistics of “SO_2 slant column (window 1)” for 2025-02-28 to 2025-03-01 97
91 Along track statistics of “SO_2 slant column precision (window 1)” for 2025-02-28 to 2025-03-01 98

92 Along track statistics of "Corrected SO_2 slant column (window 1)" for 2025-02-28 to 2025-03-01 99
93 Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-02-28 to 2025-03-01 100
94 Along track statistics of "SO_2 slant column (window 2)" for 2025-02-28 to 2025-03-01 101
95 Along track statistics of "SO_2 slant column precision (window2)" for 2025-02-28 to 2025-03-01 102
96 Along track statistics of "Corrected SO_2 slant column (window 2)" for 2025-02-28 to 2025-03-01 103
97 Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-02-28 to 2025-03-01 104
98 Along track statistics of "SO_2 slant column (window 3)" for 2025-02-28 to 2025-03-01 105
99 Along track statistics of "SO_2 slant column precision (window 3)" for 2025-02-28 to 2025-03-01 106
100 Along track statistics of "Corrected SO_2 slant column (window 3)" for 2025-02-28 to 2025-03-01 107
101 Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-02-28 to 2025-03-01 108
102 Along track statistics of "SO_2 Cobra Flag" for 2025-02-28 to 2025-03-01 109
103 Along track statistics of "Integrated a priori SO_2 profile" for 2025-02-28 to 2025-03-01 110
104 Along track statistics of "DOAS fit wavelength shift" for 2025-02-28 to 2025-03-01 111
105 Along track statistics of "DOAS fit wavelength squeeze" for 2025-02-28 to 2025-03-01 112
106 Along track statistics of "SO_2 RMS" for 2025-02-28 to 2025-03-01 113
107 Along track statistics of "Total AMF (polluted)" for 2025-02-28 to 2025-03-01 114
108 Along track statistics of "Precision of total AMF (polluted)" for 2025-02-28 to 2025-03-01 115
109 Along track statistics of "Clear AMF (polluted)" for 2025-02-28 to 2025-03-01 116
110 Along track statistics of "Number of spectral points in retrieval" for 2025-02-28 to 2025-03-01 117

List of Tables

1 Parameterlist and basic statistics for the analysis 2
2 Percentile ranges 3
3 Parameterlist and basic statistics for the analysis for observations in the northern hemisphere 4
4 Parameterlist and basic statistics for the analysis for observations in the southern hemisphere 5
5 Parameterlist and basic statistics for the analysis for observations over water 6
6 Parameterlist and basic statistics for the analysis for observations over land 7

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