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]	0.634 ± 0.403	17293072	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.273 \pm 135.110) \times 10^{-2}$	17293072	0.263	0.482	1.195×10^{-2}	-200	610
sulfurdioxide total vertical column precision [DU]	0.615 ± 0.961	17293072	0.222	0.394	0.345	4.438×10^{-2}	58.4
sulfurdioxide slant column density corrected [DU]	$(2.205 \pm 41.607) \times 10^{-2}$	17293072	0.242	0.368	9.949×10^{-3}	-19.0	228
sulfurdioxide slant column density cobra [DU]	$(2.174 \pm 39.161) \times 10^{-2}$	17293072	0.242	0.368	9.949×10^{-3}	-19.0	55.9
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.150	17293072	0.213	0.158	0.254	8.246×10^{-2}	20.2
sulfurdioxide slant column density window1 [DU]	0.183 ± 0.731	17293072	0.225	0.748	0.204	-71.4	95.5
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.150	17293072	0.213	0.158	0.254	8.246×10^{-2}	20.2
sulfurdioxide slant column density corrected win1 [DU]	$(5.034 \pm 71.829) \times 10^{-2}$	17293072	2.500×10^{-2}	0.730	2.872×10^{-2}	-71.4	95.5
background so2 slant column offset window1 [DU]	-0.132 ± 0.198	17293072	-0.260	0.215	-0.182	-1.01	4.69
sulfurdioxide slant column density window2 [DU]	2.77 ± 9.24	17293072	1.75	11.7	2.48	-1.742×10^{3}	1.180×10^{3}
sulfurdioxide slant column density window2 precision [DU]	8.11 ± 2.23	17293072	7.43	2.53	7.78	2.15	704
sulfurdioxide slant column density corrected win2 [DU]	1.24 ± 8.86	17293072	1.25	11.1	1.20	-1.742×10^{3}	1.180×10^{3}
background so2 slant column offset window2 [DU]	-1.53 ± 3.09	17293072	0.750	3.76	-0.496	-16.7	11.5
sulfurdioxide slant column density window3 [DU]	-14.8 ± 23.8	17293072	-16.2	30.2	-15.0	-325	346
sulfurdioxide slant column density window3 precision [DU]	28.0 ± 13.2	17293072	22.5	9.67	24.4	9.41	978
sulfurdioxide slant column density corrected win3 [DU]	-6.84 ± 22.92	17293072	-6.16	28.9	-6.83	-322	346
background so2 slant column offset window3 [DU]	7.95 ± 7.37	17293072	1.68	12.3	7.35	-14.6	42.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	17293072	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.136 \pm 7.374) \times 10^{-2}$	17293072	1.664×10^{-2}	1.710×10^{-2}	1.487×10^{-2}	3.409×10^{-4}	1.76
fitted radiance shift [nm]	$(-3.395 \pm 26.331) \times 10^{-4}$	17293072	-5.000×10^{-4}	2.004×10^{-3}	-3.427×10^{-4}	-8.758×10^{-2}	4.837×10^{-2}
fitted radiance squeeze [1]	$(-3.849 \pm 19.632) \times 10^{-5}$	17293072	-1.000×10^{-5}	2.076×10^{-4}	-2.228×10^{-5}	-1.892×10^{-2}	1.614×10^{-2}
fitted root mean square [1]	$(1.316 \pm 0.623) \times 10^{-3}$	17293072	9.750×10^{-4}	6.089×10^{-4}	1.123×10^{-3}	3.177×10^{-4}	6.987×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.814 ± 0.413	17293072	0.580	0.549	0.777	5.000×10^{-2}	2.85
sulfurdioxide total air mass factor polluted precision [1]	0.115 ± 0.126	17293072	3.500×10^{-2}	0.117	6.638×10^{-2}	2.500×10^{-3}	1.70
sulfurdioxide clear air mass factor polluted [1]	0.687 ± 0.280	17293072	0.580	0.376	0.655	1.872×10^{-2}	2.87
number of spectral points in retrieval [1]	73.4 ± 0.5	17293072	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]	−3.00	−1.02	−0.591	−0.388	−0.225	0.258	0.437	0.669	1.17	3.54
sulfurdioxide total vertical column precision [DU]	0.102	0.139	0.166	0.190	0.223	0.617	0.860	1.21	1.90	4.78
sulfurdioxide slant column density corrected [DU]	−0.903	−0.507	−0.362	−0.269	−0.172	0.196	0.299	0.403	0.573	1.13
sulfurdioxide slant column density cobra [DU]	−0.903	−0.507	−0.362	−0.269	−0.172	0.196	0.299	0.403	0.573	1.13
sulfurdioxide slant column density cobra precision [DU]	0.139	0.165	0.178	0.189	0.204	0.362	0.419	0.471	0.564	0.865
sulfurdioxide slant column density window1 [DU]	−1.91	−0.944	−0.601	−0.389	−0.178	0.570	0.762	0.947	1.23	2.04
sulfurdioxide slant column density window1 precision [DU]	0.139	0.165	0.178	0.189	0.204	0.362	0.419	0.471	0.564	0.865
sulfurdioxide slant column density corrected win1 [DU]	−1.77	−0.977	−0.699	−0.518	−0.330	0.400	0.606	0.813	1.15	2.14
background so2 slant column offset window1 [DU]	−0.398	−0.329	−0.307	−0.289	−0.266	-5.129×10^{-2}	2.860×10^{-2}	0.109	0.233	0.552
sulfurdioxide slant column density window2 [DU]	−18.3	−11.7	−8.43	−5.99	−3.22	8.44	11.5	14.3	18.2	26.4
sulfurdioxide slant column density window2 precision [DU]	4.30	5.20	5.74	6.16	6.66	9.19	10.0	10.9	12.1	14.8
sulfurdioxide slant column density corrected win2 [DU]	−20.0	−13.0	−9.62	−7.13	−4.36	6.77	9.58	12.1	15.6	23.1
background so2 slant column offset window2 [DU]	−10.5	−7.92	−6.19	−4.81	−3.14	0.620	0.928	1.19	1.65	3.40
sulfurdioxide slant column density window3 [DU]	−73.1	−53.4	−44.2	−37.4	−29.9	0.270	8.13	15.2	24.7	43.4
sulfurdioxide slant column density window3 precision [DU]	13.3	15.9	17.8	19.2	20.7	30.4	35.2	41.4	53.1	84.0
sulfurdioxide slant column density corrected win3 [DU]	−63.9	−44.3	−35.1	−28.5	−21.2	7.69	15.1	21.7	30.6	48.7
background so2 slant column offset window3 [DU]	−5.38	−2.18	−0.910	0.196	1.65	14.0	16.3	18.1	20.2	23.4
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]	1.165×10^{-3}	2.148×10^{-3}	3.336×10^{-3}	5.215×10^{-3}	8.173×10^{-3}	2.527×10^{-2}	3.484×10^{-2}	5.373×10^{-2}	0.106	0.369
fitted radiance shift [nm]	-8.143×10^{-3}	-4.256×10^{-3}	-2.889×10^{-3}	-2.089×10^{-3}	-1.369×10^{-3}	6.355×10^{-4}	1.355×10^{-3}	2.189×10^{-3}	3.681×10^{-3}	7.817×10^{-3}
fitted radiance squeeze [1]	-6.624×10^{-4}	-3.703×10^{-4}	-2.597×10^{-4}	-1.937×10^{-4}	-1.306×10^{-4}	7.698×10^{-5}	1.263×10^{-4}	1.714×10^{-4}	2.347×10^{-4}	3.811×10^{-4}
fitted root mean square [1]	5.871×10^{-4}	7.234×10^{-4}	7.984×10^{-4}	8.553×10^{-4}	9.254×10^{-4}	1.534×10^{-3}	1.805×10^{-3}	2.070×10^{-3}	2.480×10^{-3}	3.610×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.509×10^{-2}	0.201	0.301	0.397	0.515	1.06	1.23	1.38	1.58	1.90
sulfurdioxide total air mass factor polluted precision [1]	8.978×10^{-3}	1.602×10^{-2}	2.261×10^{-2}	2.869×10^{-2}	3.659×10^{-2}	0.153	0.207	0.265	0.357	0.614
sulfurdioxide clear air mass factor polluted [1]	0.168	0.269	0.344	0.410	0.490	0.866	0.966	1.05	1.17	1.47
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]	0.623 ± 0.402	9552280	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(5.791 \pm 169.503) \times 10^{-2}$	9552280	0.557	1.304×10^{-2}	-200	610	-0.258	0.299
sulfurdioxide total vertical column precision [DU]	0.767 ± 1.196	9552280	0.532	0.404	4.614×10^{-2}	58.4	0.245	0.776
sulfurdioxide slant column density corrected [DU]	$(2.524 \pm 43.651) \times 10^{-2}$	9552280	0.385	1.008×10^{-2}	-19.0	71.7	-0.180	0.205
sulfurdioxide slant column density cobra [DU]	$(2.493 \pm 42.124) \times 10^{-2}$	9552280	0.385	1.008×10^{-2}	-19.0	24.4	-0.180	0.205
sulfurdioxide slant column density cobra precision [DU]	0.322 ± 0.170	9552280	0.192	0.267	8.711×10^{-2}	12.5	0.205	0.397
sulfurdioxide slant column density window1 [DU]	0.173 ± 0.796	9552280	0.782	0.201	-19.0	71.4	-0.198	0.584
sulfurdioxide slant column density window1 precision [DU]	0.322 ± 0.170	9552280	0.192	0.267	8.711×10^{-2}	12.5	0.205	0.397
sulfurdioxide slant column density corrected win1 [DU]	$(5.823 \pm 78.294) \times 10^{-2}$	9552280	0.767	2.967×10^{-2}	-19.0	71.2	-0.344	0.422
background so2 slant column offset window1 [DU]	-0.115 ± 0.228	9552280	0.238	-0.178	-0.639	4.69	-0.266	-2.805×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.49 ± 9.29	9552280	11.9	3.15	-130	117	-2.62	9.24
sulfurdioxide slant column density window2 precision [DU]	8.03 ± 2.14	9552280	2.50	7.71	2.36	118	6.60	9.10
sulfurdioxide slant column density corrected win2 [DU]	1.16 ± 8.72	9552280	11.0	1.14	-137	114	-4.38	6.66
background so2 slant column offset window2 [DU]	-2.33 ± 3.60	9552280	5.67	-1.27	-16.7	11.5	-5.05	0.621
sulfurdioxide slant column density window3 [DU]	-16.9 ± 23.1	9552280	29.2	-17.1	-325	166	-31.6	-2.36
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 12.4	9552280	8.78	23.5	9.41	978	20.3	29.1
sulfurdioxide slant column density corrected win3 [DU]	-6.52 ± 22.22	9552280	27.9	-6.42	-322	181	-20.4	7.53
background so2 slant column offset window3 [DU]	10.4 ± 7.3	9552280	12.9	11.1	-13.0	42.2	3.55	16.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	9552280	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.151 \pm 9.496) \times 10^{-2}$	9552280	2.684×10^{-2}	1.476×10^{-2}	3.409×10^{-4}	1.76	5.820×10^{-3}	3.266×10^{-2}
fitted radiance shift [nm]	$(-2.287 \pm 24.585) \times 10^{-4}$	9552280	1.807×10^{-3}	-2.271×10^{-4}	-4.465×10^{-2}	3.795×10^{-2}	-1.150×10^{-3}	6.571×10^{-4}
fitted radiance squeeze [1]	$(-6.135 \pm 21.640) \times 10^{-5}$	9552280	2.225×10^{-4}	-3.445×10^{-5}	-7.388×10^{-3}	1.192×10^{-2}	-1.545×10^{-4}	6.803×10^{-5}
fitted root mean square [1]	$(1.398 \pm 0.716) \times 10^{-3}$	9552280	7.380×10^{-4}	1.165×10^{-3}	3.177×10^{-4}	4.988×10^{-2}	9.286×10^{-4}	1.667×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.750 ± 0.417	9552280	0.559	0.697	5.000×10^{-2}	2.85	0.437	0.996
sulfurdioxide total air mass factor polluted precision [1]	0.110 ± 0.141	9552280	0.102	5.543×10^{-2}	2.500×10^{-3}	1.70	3.065×10^{-2}	0.133
sulfurdioxide clear air mass factor polluted [1]	0.637 ± 0.294	9552280	0.420	0.599	1.872×10^{-2}	2.87	0.411	0.831
number of spectral points in retrieval [1]	73.4 ± 0.5	9552280	1.000	73.0	52.0	74.0	73.0	74.0

Table 4: Parameterlist and basic statistics for the analysis for observations in the southern hemisphere

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.648 ± 0.404	7740792	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.399 \pm 72.937) \times 10^{-2}$	7740792	0.413	1.091×10^{-2}	-44.0	179	-0.193	0.219
sulfurdioxide total vertical column precision [DU]	0.426 ± 0.484	7740792	0.274	0.293	4.438×10^{-2}	25.8	0.206	0.480
sulfurdioxide slant column density corrected [DU]	$(1.813 \pm 38.933) \times 10^{-2}$	7740792	0.350	9.798×10^{-3}	-13.8	228	-0.164	0.186
sulfurdioxide slant column density cobra [DU]	$(1.780 \pm 35.158) \times 10^{-2}$	7740792	0.350	9.798×10^{-3}	-13.8	55.9	-0.164	0.186
sulfurdioxide slant column density cobra precision [DU]	0.277 ± 0.117	7740792	0.114	0.244	8.246×10^{-2}	20.2	0.204	0.318
sulfurdioxide slant column density window1 [DU]	0.194 ± 0.641	7740792	0.710	0.207	-71.4	95.5	-0.155	0.555
sulfurdioxide slant column density window1 precision [DU]	0.277 ± 0.117	7740792	0.114	0.244	8.246×10^{-2}	20.2	0.204	0.318
sulfurdioxide slant column density corrected win1 [DU]	$(4.060 \pm 62.928) \times 10^{-2}$	7740792	0.689	2.767×10^{-2}	-71.4	95.5	-0.314	0.375
background so2 slant column offset window1 [DU]	-0.154 ± 0.150	7740792	0.186	-0.185	-1.01	2.61	-0.266	-7.973×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.88 ± 9.11	7740792	11.4	1.70	-1.742×10^{3}	1.180×10^{3}	-3.91	7.45
sulfurdioxide slant column density window2 precision [DU]	8.22 ± 2.33	7740792	2.57	7.87	2.15	704	6.74	9.31
sulfurdioxide slant column density corrected win2 [DU]	1.33 ± 9.03	7740792	11.2	1.27	-1.742×10^{3}	1.180×10^{3}	-4.33	6.91
background so2 slant column offset window2 [DU]	-0.543 ± 1.901	7740792	2.13	-0.175	-12.1	11.3	-1.51	0.618
sulfurdioxide slant column density window3 [DU]	-12.2 ± 24.4	7740792	31.0	-12.3	-318	346	-27.6	3.39
sulfurdioxide slant column density window3 precision [DU]	29.3 ± 14.0	7740792	10.5	25.5	9.66	231	21.4	32.0
sulfurdioxide slant column density corrected win3 [DU]	-7.23 ± 23.75	7740792	30.2	-7.39	-309	346	-22.3	7.92
background so2 slant column offset window3 [DU]	4.94 ± 6.24	7740792	10.3	3.46	-14.6	25.3	-0.116	10.2
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	7740792	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.884 \pm 2.716) \times 10^{-2}$	7740792	1.155×10^{-2}	1.494×10^{-2}	9.801×10^{-4}	1.62	9.971×10^{-3}	2.152×10^{-2}
fitted radiance shift [nm]	$(-4.762 \pm 28.277) \times 10^{-4}$	7740792	2.239×10^{-3}	-5.136×10^{-4}	-8.758×10^{-2}	4.837×10^{-2}	-1.640×10^{-3}	5.989×10^{-4}
fitted radiance squeeze [1]	$(-1.028 \pm 16.394) \times 10^{-5}$	7740792	1.933×10^{-4}	-8.823×10^{-6}	-1.892×10^{-2}	1.614×10^{-2}	-1.061×10^{-4}	8.723×10^{-5}
fitted root mean square [1]	$(1.216 \pm 0.464) \times 10^{-3}$	7740792	4.643×10^{-4}	1.089×10^{-3}	3.382×10^{-4}	6.987×10^{-2}	9.218×10^{-4}	1.386×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.893 ± 0.392	7740792	0.517	0.859	5.000×10^{-2}	2.80	0.615	1.13
sulfurdioxide total air mass factor polluted precision [1]	0.123 ± 0.105	7740792	0.128	8.387×10^{-2}	4.152×10^{-3}	1.23	4.439×10^{-2}	0.173
sulfurdioxide clear air mass factor polluted [1]	0.748 ± 0.249	7740792	0.336	0.702	0.142	2.32	0.568	0.904
number of spectral points in retrieval [1]	73.4 ± 0.5	7740792	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]	0.672 ± 0.401	11796980	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(2.559 \pm 95.580) \times 10^{-2}$	11796980	0.441	1.008×10^{-2}	-154	135	-0.208	0.233
sulfurdioxide total vertical column precision [DU]	0.501 ± 0.689	11796980	0.319	0.311	4.614×10^{-2}	51.4	0.214	0.533
sulfurdioxide slant column density corrected [DU]	$(1.658 \pm 36.466) \times 10^{-2}$	11796980	0.353	8.587×10^{-3}	-19.0	71.7	-0.167	0.187
sulfurdioxide slant column density cobra [DU]	$(1.646 \pm 35.699) \times 10^{-2}$	11796980	0.353	8.587×10^{-3}	-19.0	55.9	-0.167	0.187
sulfurdioxide slant column density cobra precision [DU]	0.287 ± 0.140	11796980	0.133	0.242	8.246×10^{-2}	20.2	0.201	0.334
sulfurdioxide slant column density window1 [DU]	0.188 ± 0.670	11796980	0.719	0.206	-55.1	64.3	-0.161	0.559
sulfurdioxide slant column density window1 precision [DU]	0.287 ± 0.140	11796980	0.133	0.242	8.246×10^{-2}	20.2	0.201	0.334
sulfurdioxide slant column density corrected win1 [DU]	$(4.036 \pm 65.919) \times 10^{-2}$	11796980	0.702	2.510×10^{-2}	-55.1	64.3	-0.322	0.381
background so2 slant column offset window1 [DU]	-0.148 ± 0.171	11796980	0.200	-0.187	-1.01	2.61	-0.267	-6.736×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.30 ± 9.04	11796980	11.4	2.05	-1.742×10^{3}	1.180×10^{3}	-3.53	7.82
sulfurdioxide slant column density window2 precision [DU]	8.01 ± 2.16	11796980	2.48	7.67	2.15	454	6.59	9.07
sulfurdioxide slant column density corrected win2 [DU]	1.27 ± 8.80	11796980	11.0	1.22	-1.742×10^{3}	1.180×10^{3}	-4.29	6.75
background so2 slant column offset window2 [DU]	-1.03 ± 2.67	11796980	2.86	-0.272	-16.7	11.5	-2.17	0.689
sulfurdioxide slant column density window3 [DU]	-11.9 ± 23.9	11796980	30.5	-12.1	-318	346	-27.1	3.37
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 12.2	11796980	9.18	24.1	9.41	215	20.7	29.8
sulfurdioxide slant column density corrected win3 [DU]	-4.96 ± 22.84	11796980	29.1	-5.15	-309	346	-19.5	9.55
background so2 slant column offset window3 [DU]	6.90 ± 6.89	11796980	11.0	5.86	-14.6	42.2	1.27	12.3
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	11796980	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.165 \pm 3.761) \times 10^{-2}$	11796980	1.300×10^{-2}	1.479×10^{-2}	4.812×10^{-4}	1.39	9.262×10^{-3}	2.226×10^{-2}
fitted radiance shift [nm]	$(-3.811 \pm 24.233) \times 10^{-4}$	11796980	1.871×10^{-3}	-3.604×10^{-4}	-8.758×10^{-2}	4.837×10^{-2}	-1.342×10^{-3}	5.298×10^{-4}
fitted radiance squeeze [1]	$(-2.174 \pm 17.809) \times 10^{-5}$	11796980	1.954×10^{-4}	-1.290×10^{-5}	-1.892×10^{-2}	1.531×10^{-2}	-1.128×10^{-4}	8.259×10^{-5}
fitted root mean square [1]	$(1.254 \pm 0.558) \times 10^{-3}$	11796980	5.207×10^{-4}	1.081×10^{-3}	3.256×10^{-4}	6.987×10^{-2}	9.103×10^{-4}	1.431×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.842 ± 0.379	11796980	0.493	0.817	5.000×10^{-2}	2.77	0.575	1.07
sulfurdioxide total air mass factor polluted precision [1]	0.113 ± 0.111	11796980	0.109	6.976×10^{-2}	2.500×10^{-3}	1.49	4.120×10^{-2}	0.150
sulfurdioxide clear air mass factor polluted [1]	0.712 ± 0.248	11796980	0.338	0.684	3.111×10^{-2}	2.52	0.538	0.875
number of spectral points in retrieval [1]	73.4 ± 0.5	11796980	1.000	73.0	52.0	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]	0.595 ± 0.407	3906206	0.810	0.490	0.0	1.000	0.190	1.000
sulfurdioxide total vertical column [DU]	$(7.103 \pm 176.976) \times 10^{-2}$	3906206	0.556	1.504×10^{-2}	-116	491	-0.253	0.303
sulfurdioxide total vertical column precision [DU]	0.783 ± 1.250	3906206	0.538	0.403	4.438×10^{-2}	56.9	0.249	0.787
sulfurdioxide slant column density corrected [DU]	$(3.159 \pm 48.758) \times 10^{-2}$	3906206	0.378	1.192×10^{-2}	-15.9	228	-0.174	0.204
sulfurdioxide slant column density cobra [DU]	$(3.084 \pm 42.880) \times 10^{-2}$	3906206	0.378	1.192×10^{-2}	-15.9	40.6	-0.174	0.204
sulfurdioxide slant column density cobra precision [DU]	0.308 ± 0.149	3906206	0.168	0.264	8.775×10^{-2}	18.4	0.208	0.376
sulfurdioxide slant column density window1 [DU]	0.203 ± 0.776	3906206	0.762	0.218	-71.4	95.5	-0.169	0.593
sulfurdioxide slant column density window1 precision [DU]	0.308 ± 0.149	3906206	0.168	0.264	8.775×10^{-2}	18.4	0.208	0.376
sulfurdioxide slant column density corrected win1 [DU]	$(6.571 \pm 76.422) \times 10^{-2}$	3906206	0.743	3.378×10^{-2}	-71.4	95.5	-0.329	0.414
background so2 slant column offset window1 [DU]	-0.137 ± 0.212	3906206	0.203	-0.195	-0.639	3.42	-0.271	-6.773×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.99 ± 9.42	3906206	11.9	2.71	-674	571	-3.13	8.82
sulfurdioxide slant column density window2 precision [DU]	8.29 ± 2.40	3906206	2.59	7.99	2.46	704	6.80	9.39
sulfurdioxide slant column density corrected win2 [DU]	1.14 ± 8.95	3906206	11.3	1.10	-673	573	-4.51	6.74
background so2 slant column offset window2 [DU]	-1.84 ± 3.32	3906206	4.69	-0.566	-16.5	11.5	-4.08	0.606
sulfurdioxide slant column density window3 [DU]	-20.7 ± 22.7	3906206	28.6	-20.4	-325	276	-34.9	-6.29
sulfurdioxide slant column density window3 precision [DU]	30.0 ± 16.0	3906206	11.4	25.4	9.65	978	21.1	32.4
sulfurdioxide slant column density corrected win3 [DU]	-11.9 ± 23.0	3906206	28.8	-11.4	-322	276	-26.0	2.75
background so2 slant column offset window3 [DU]	8.80 ± 7.67	3906206	13.4	8.60	-14.6	41.2	1.99	15.4
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.12	3906206	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.405 \pm 11.143) \times 10^{-2}$	3906206	4.193×10^{-2}	1.775×10^{-2}	3.446×10^{-4}	1.75	5.981×10^{-3}	4.791×10^{-2}
fitted radiance shift [nm]	$(-1.633 \pm 32.253) \times 10^{-4}$	3906206	2.401×10^{-3}	-1.993×10^{-4}	-3.917×10^{-2}	4.046×10^{-2}	-1.380×10^{-3}	1.021×10^{-3}
fitted radiance squeeze [1]	$(-5.168 \pm 20.490) \times 10^{-5}$	3906206	2.193×10^{-4}	-3.214×10^{-5}	-1.183×10^{-2}	1.614×10^{-2}	-1.481×10^{-4}	7.122×10^{-5}
fitted root mean square [1]	$(1.345 \pm 0.643) \times 10^{-3}$	3906206	6.217×10^{-4}	1.165×10^{-3}	3.177×10^{-4}	6.077×10^{-2}	9.447×10^{-4}	1.566×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.762 ± 0.475	3906206	0.648	0.647	5.000×10^{-2}	2.85	0.410	1.06
sulfurdioxide total air mass factor polluted precision [1]	0.125 ± 0.156	3906206	0.142	6.089×10^{-2}	2.500×10^{-3}	1.70	2.779×10^{-2}	0.170
sulfurdioxide clear air mass factor polluted [1]	0.631 ± 0.319	3906206	0.422	0.574	3.647×10^{-2}	2.87	0.393	0.816
number of spectral points in retrieval [1]	73.4 ± 0.5	3906206	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

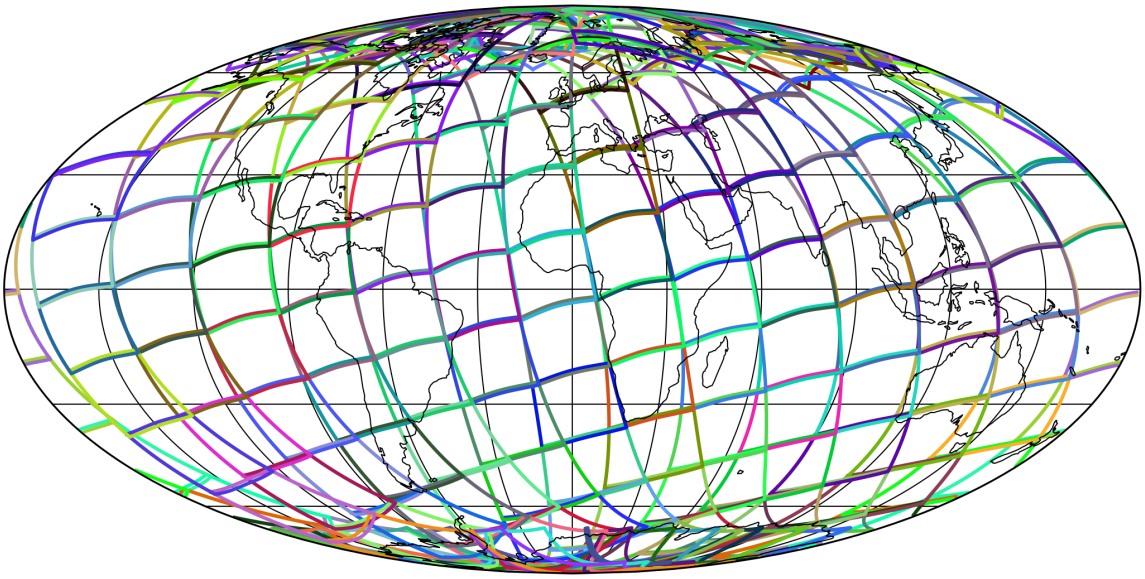

Figure 1: Outline of the granules.

4 Input data monitoring

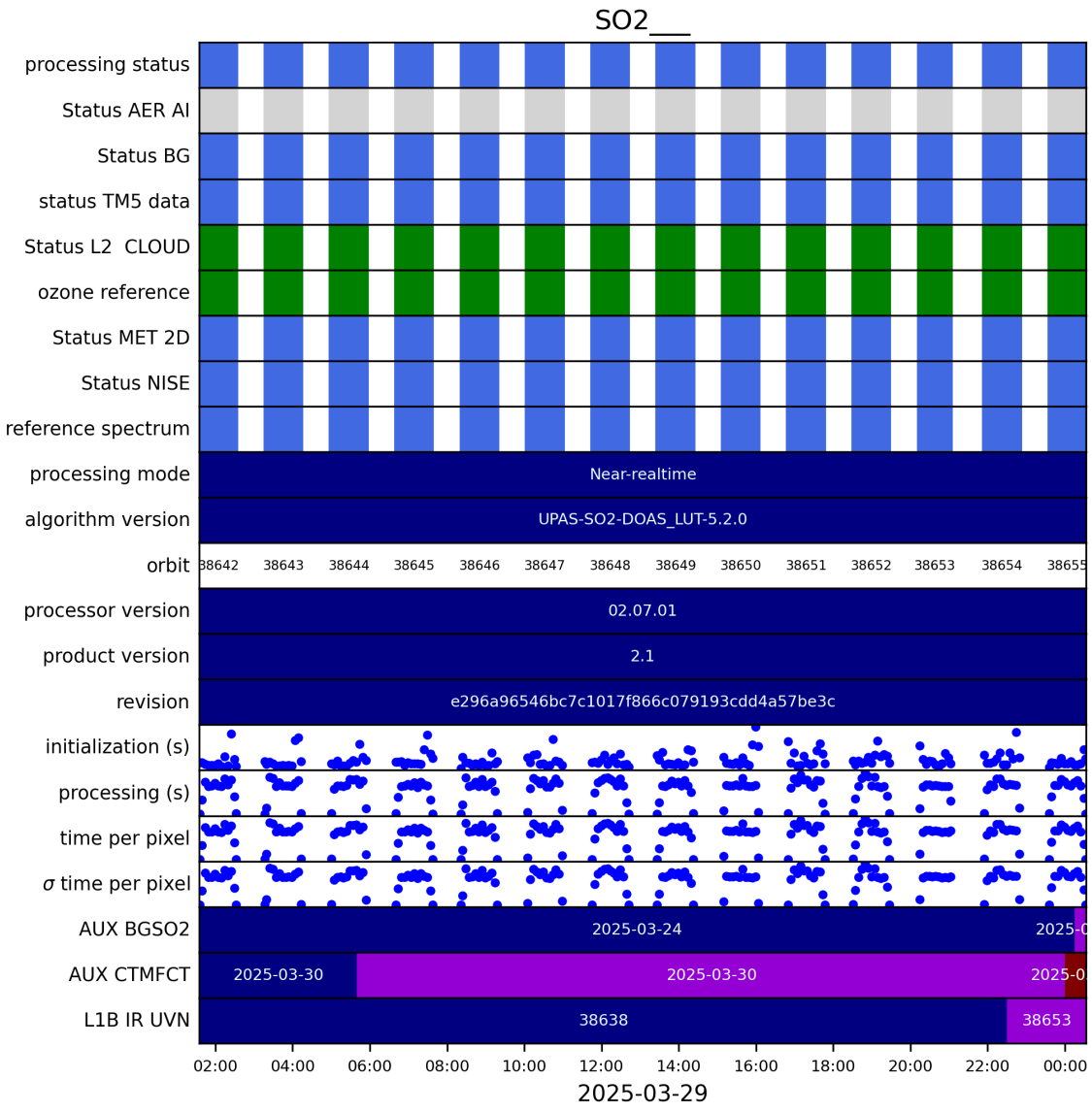

Figure 2: Input data per granule

5 Warnings and errors

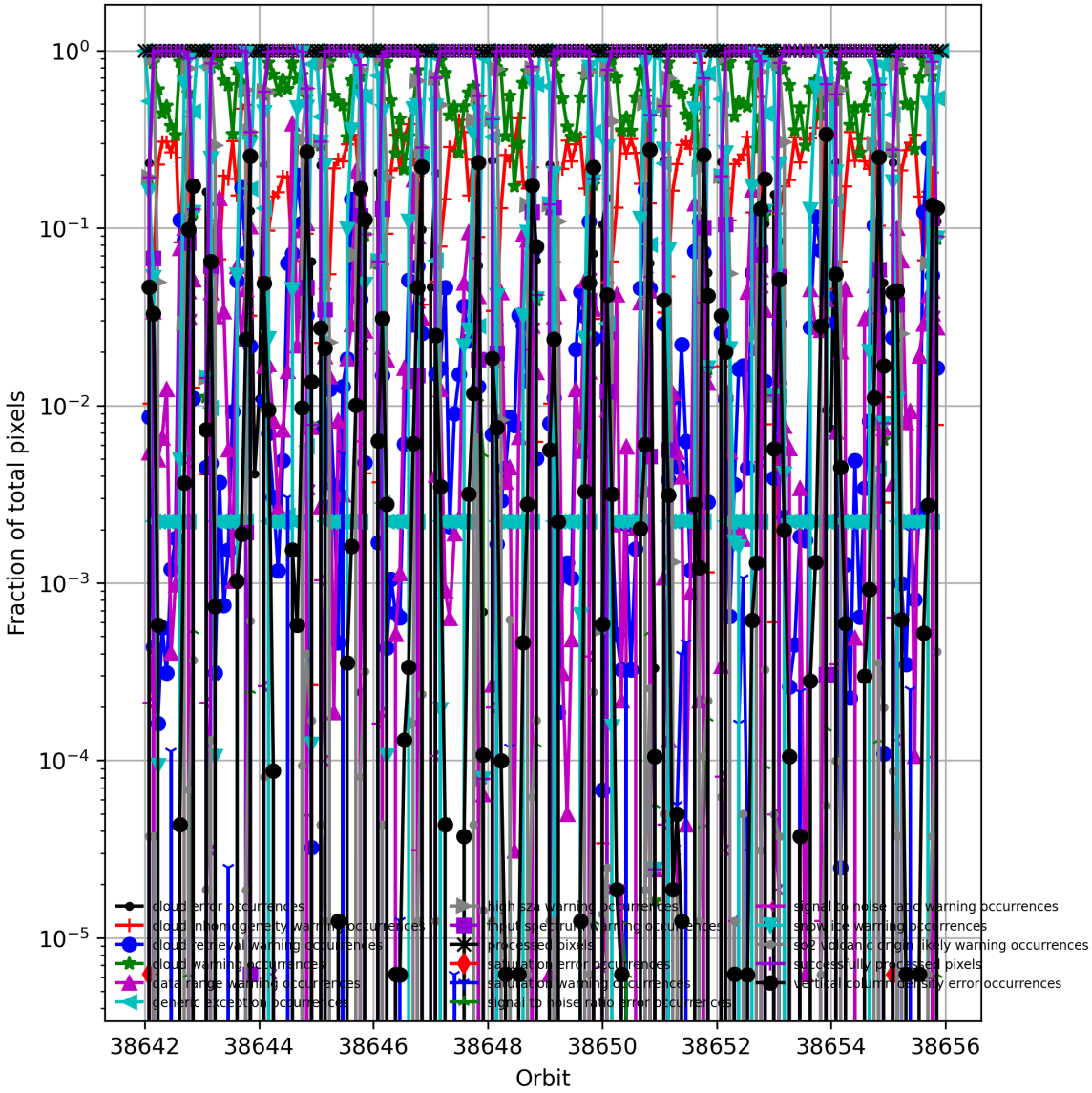

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

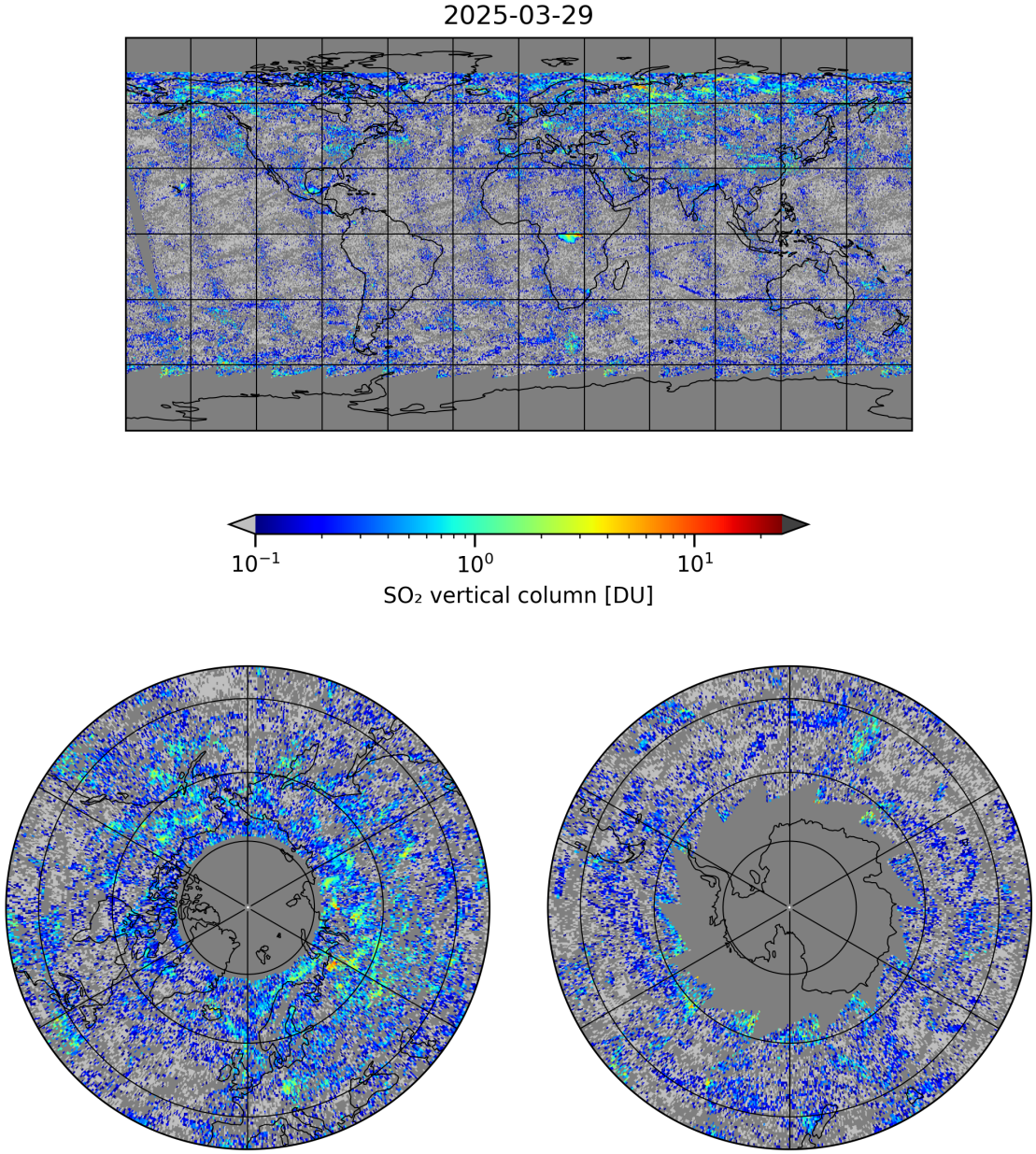

Figure 4: Map of "SO_2 vertical column" for 2025-03-29 to 2025-03-30

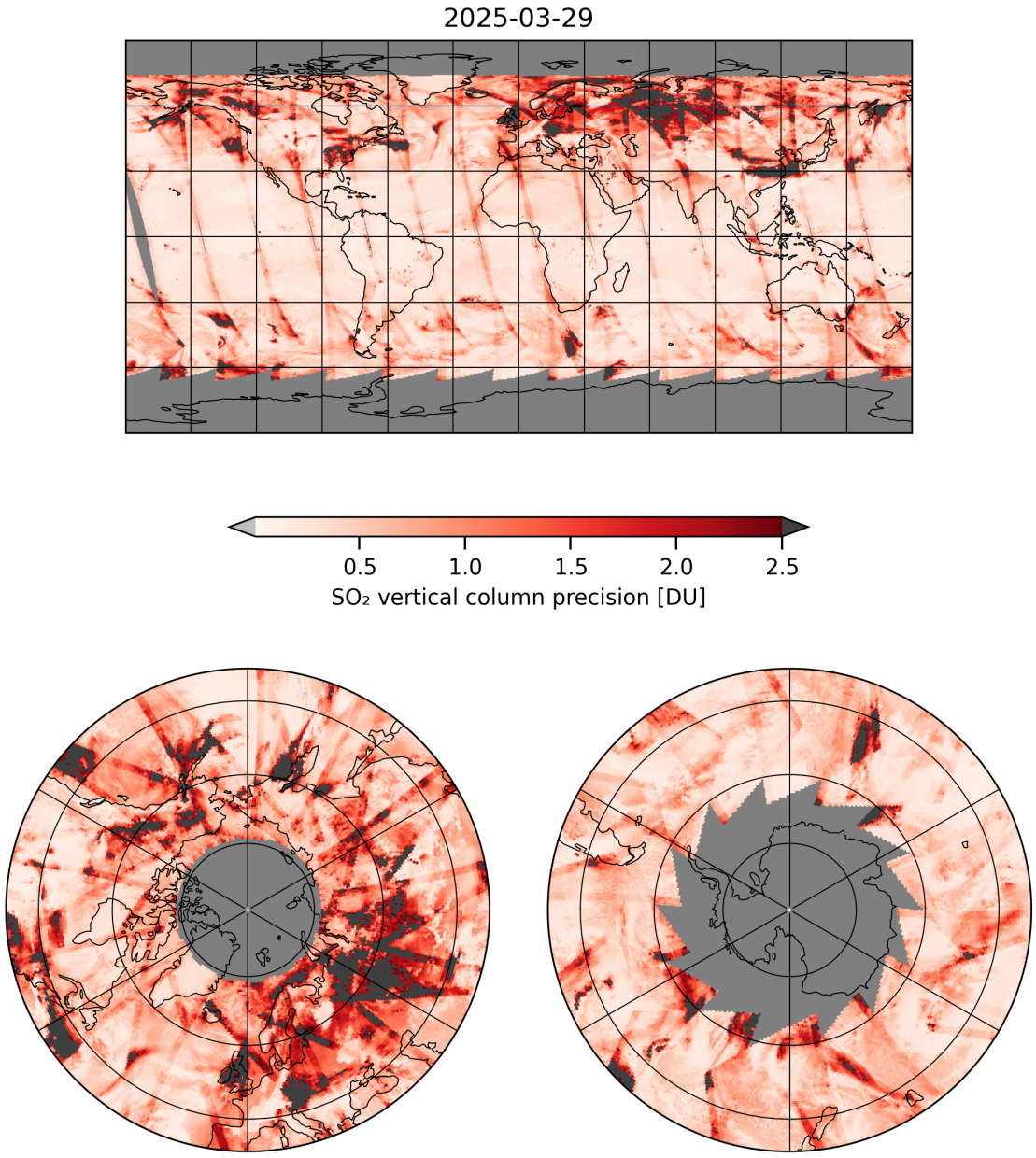

Figure 5: Map of "SO_2 vertical column precision" for 2025-03-29 to 2025-03-30

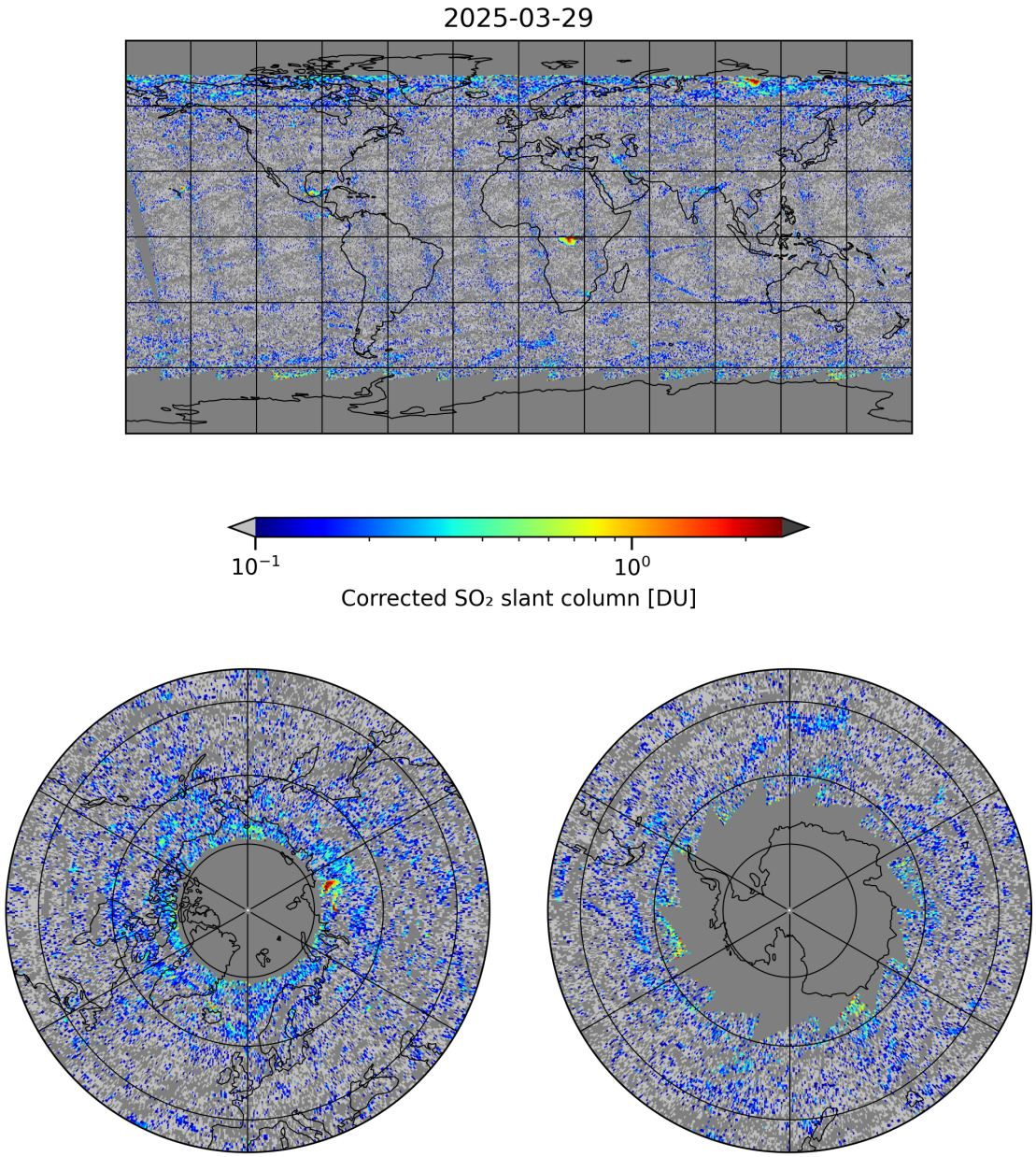

Figure 6: Map of “Corrected SO_2 slant column” for 2025-03-29 to 2025-03-30

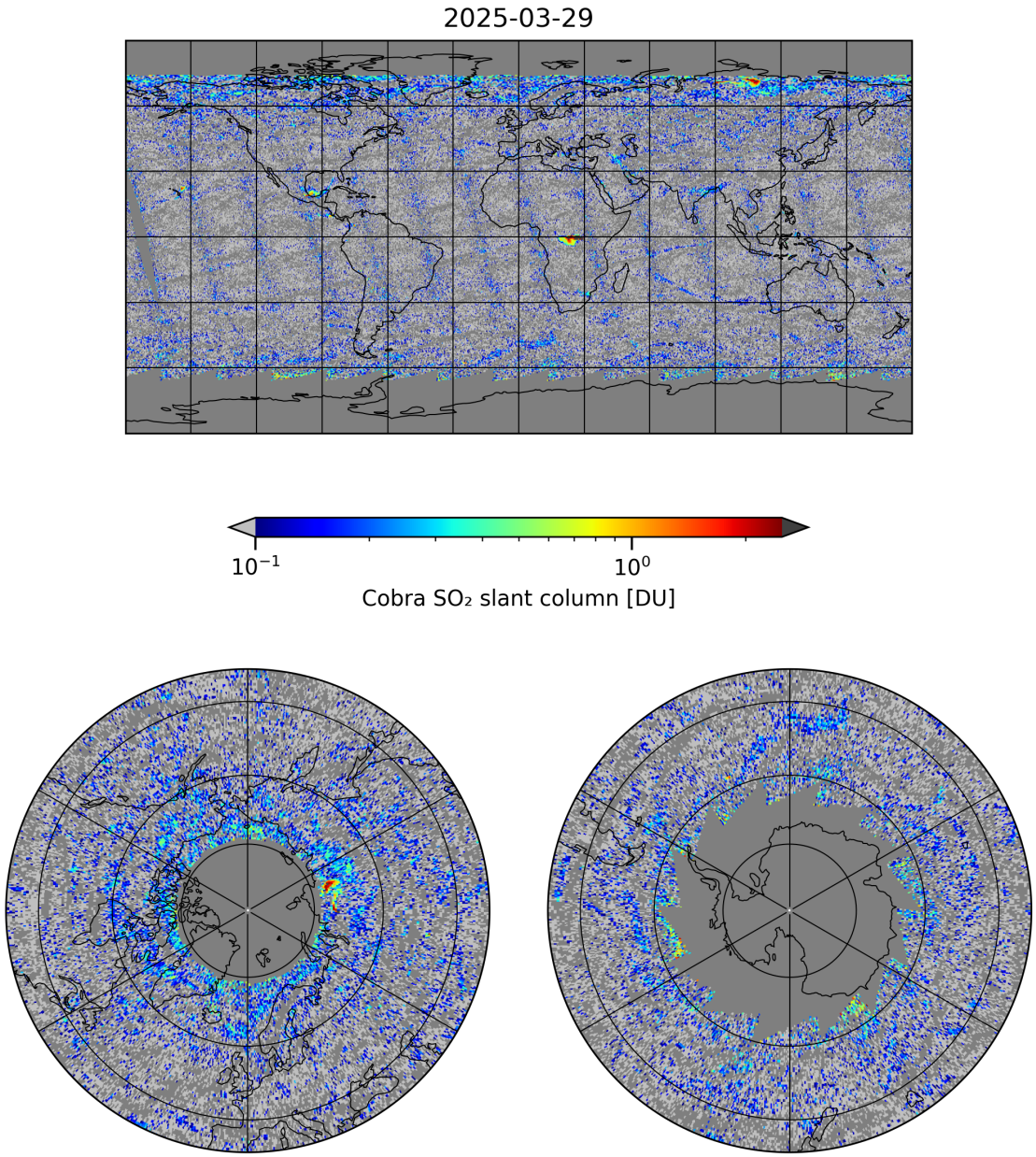

Figure 7: Map of "Cobra SO_2 slant column" for 2025-03-29 to 2025-03-30

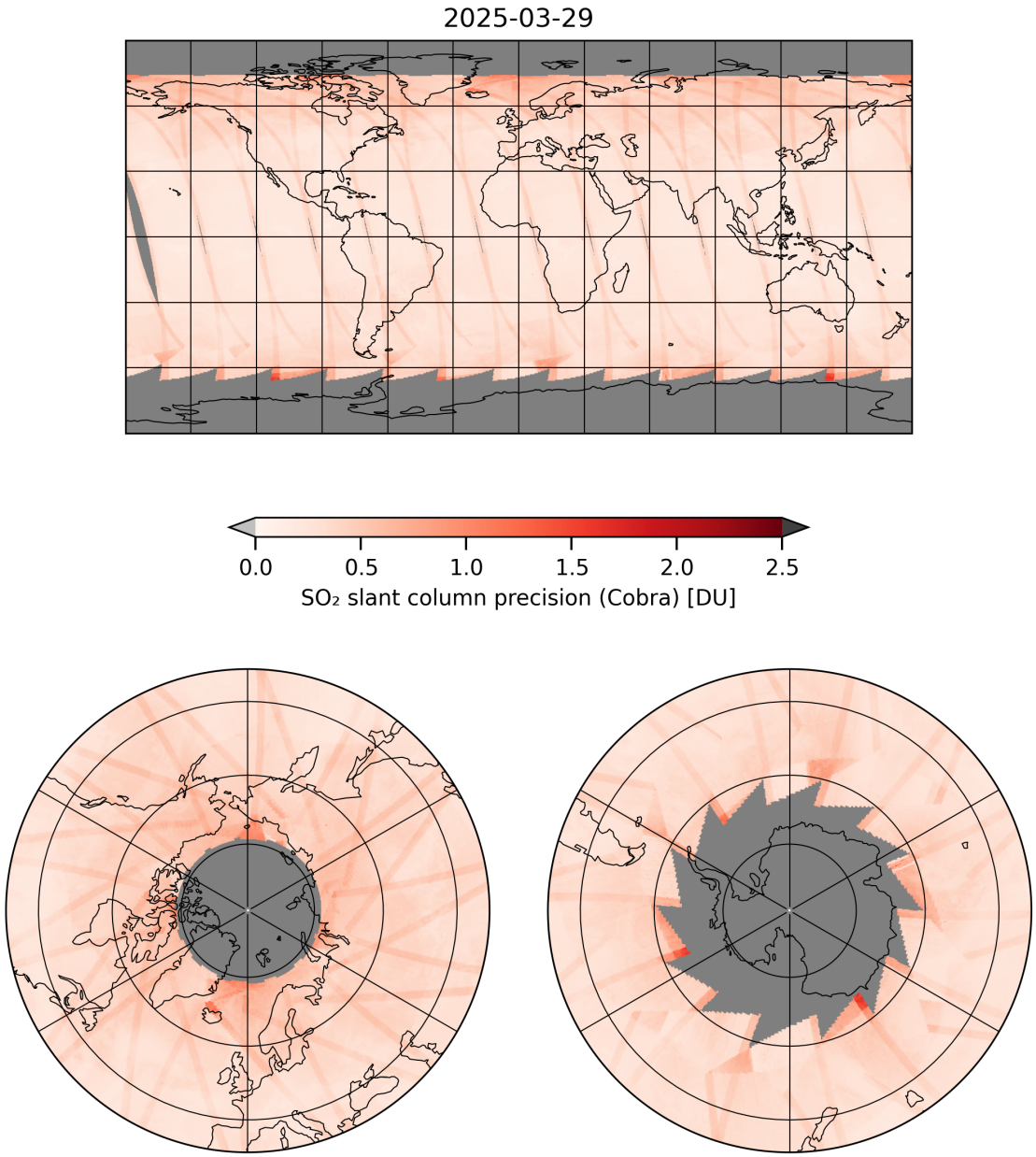

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-03-29 to 2025-03-30

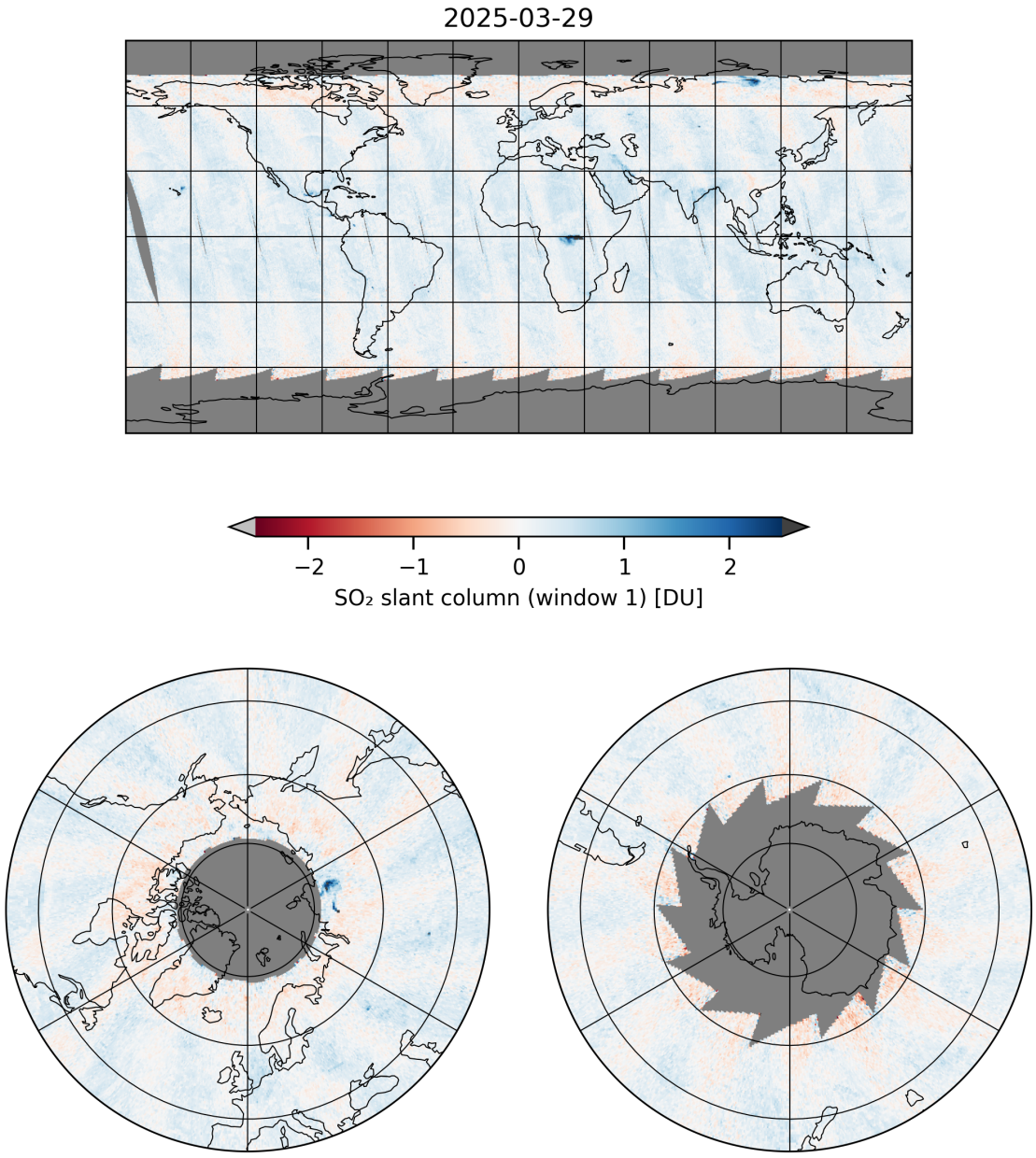

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-03-29 to 2025-03-30

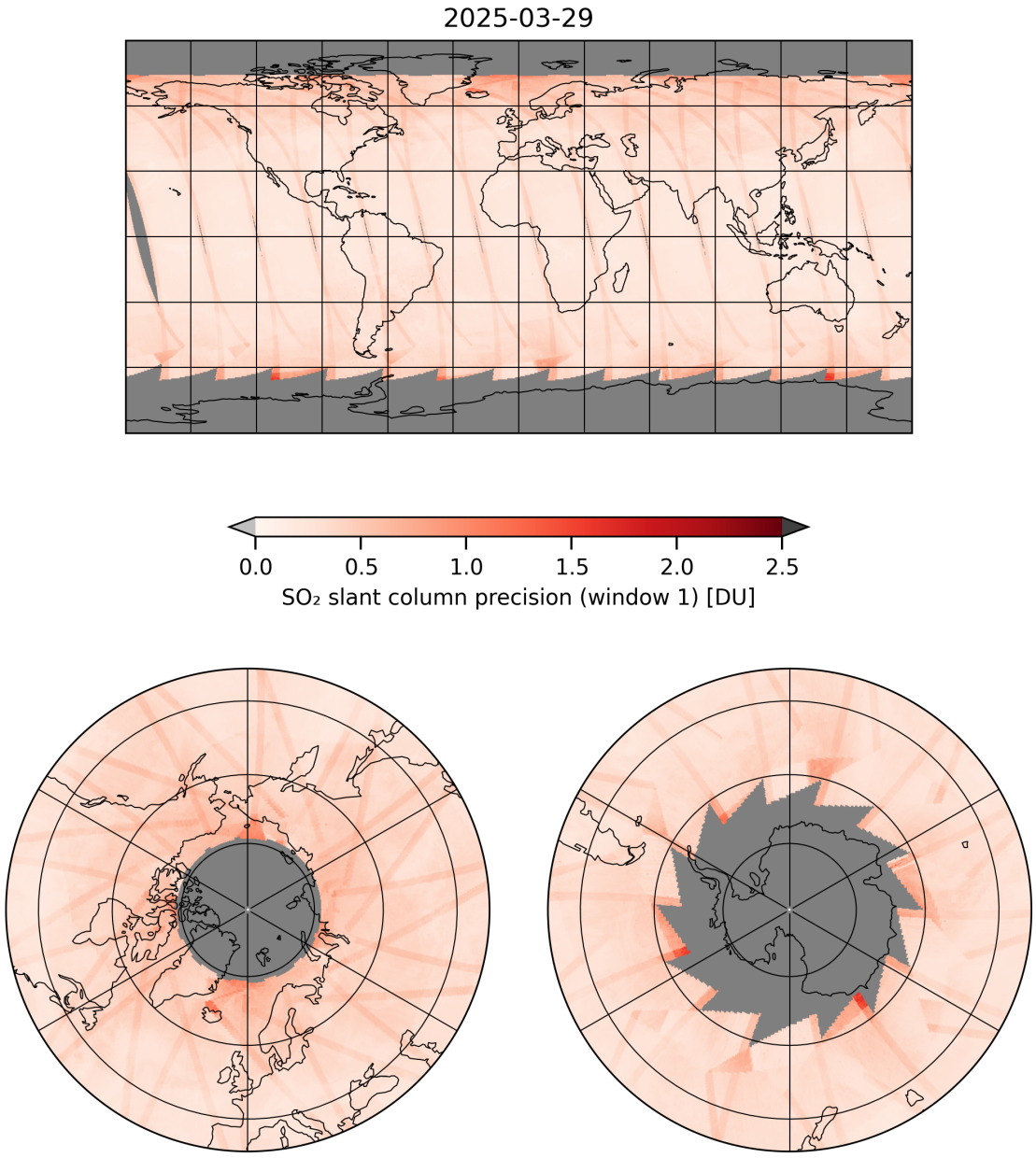

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-03-29 to 2025-03-30

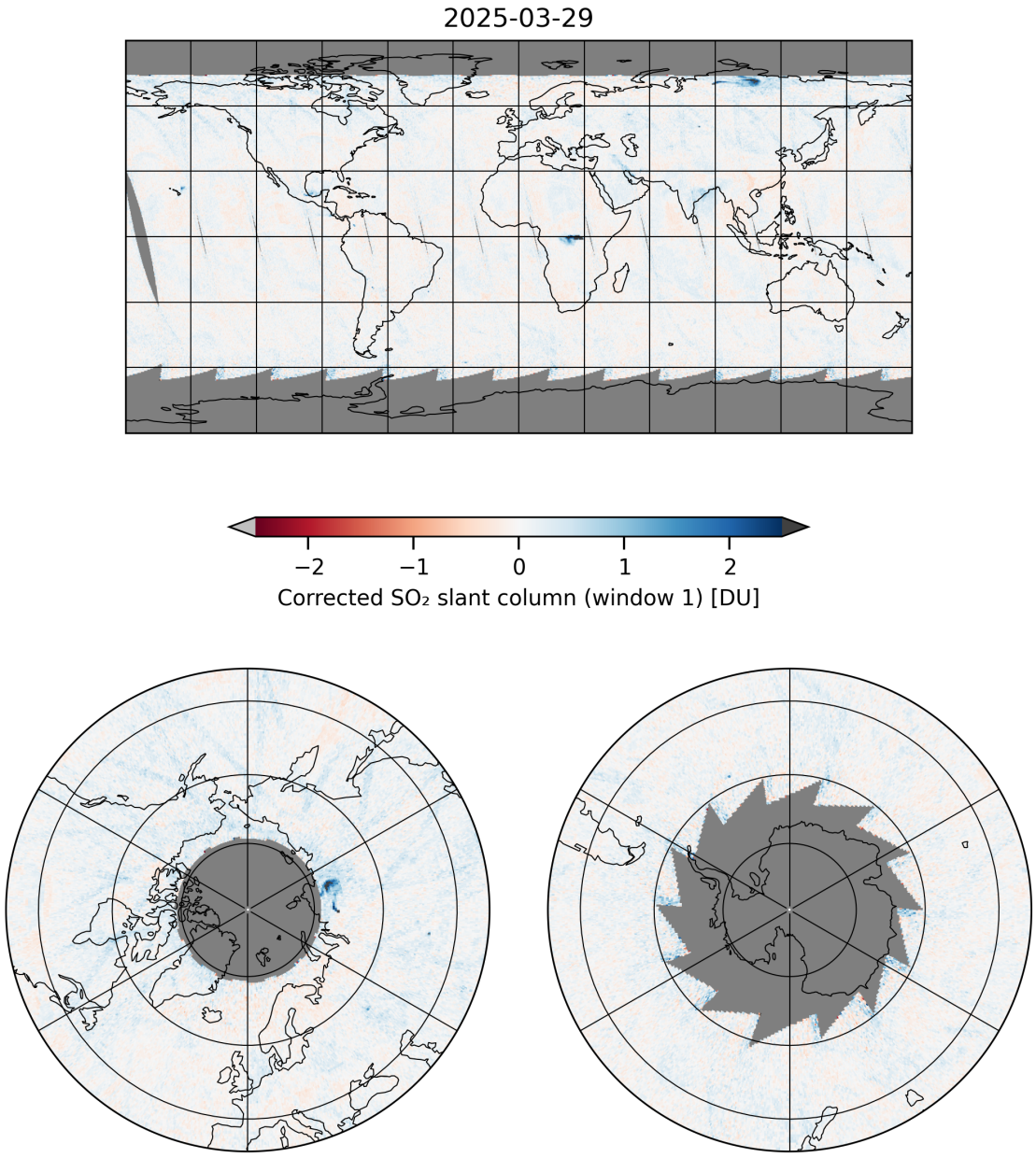

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-03-29 to 2025-03-30

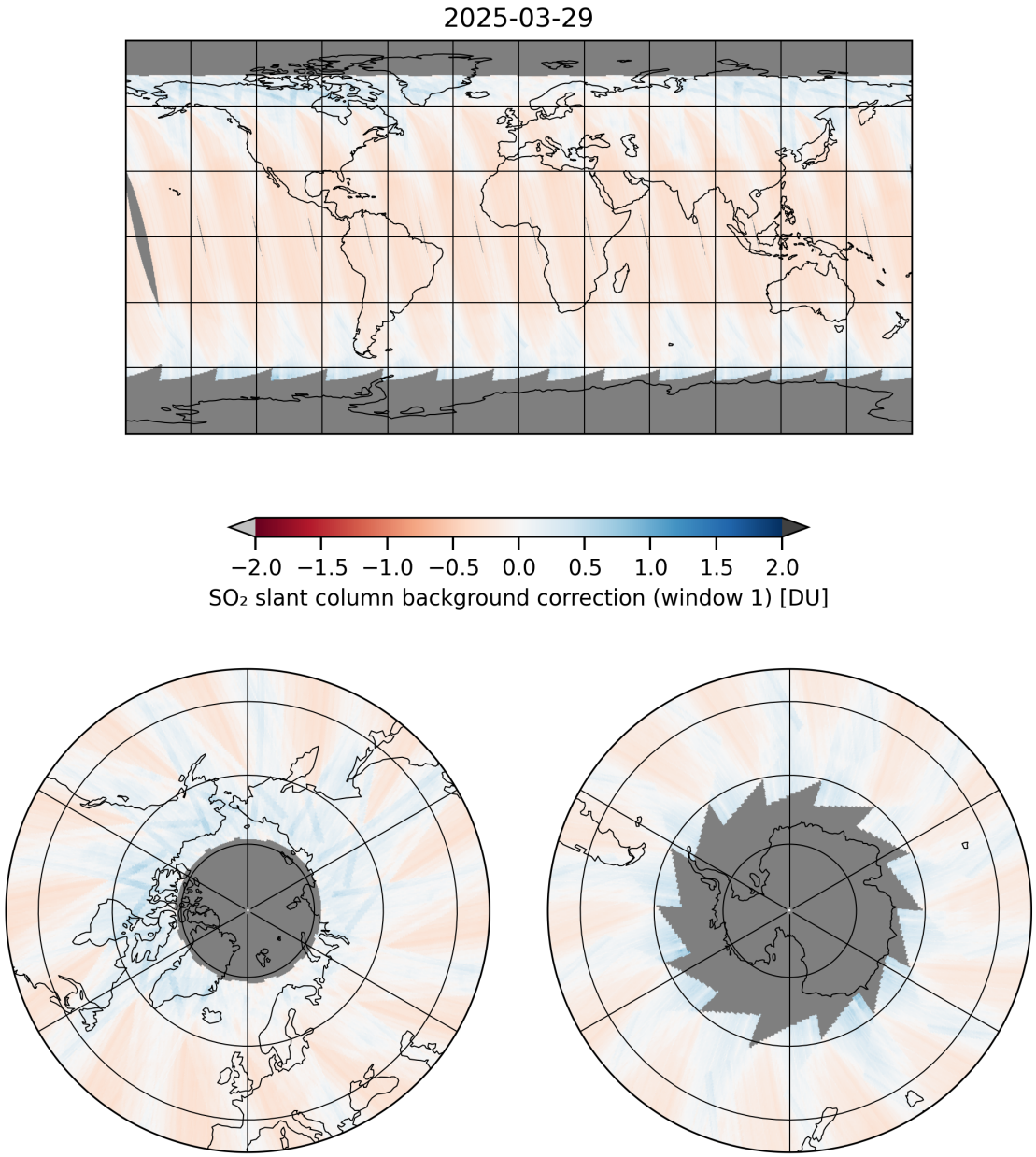

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-03-29 to 2025-03-30

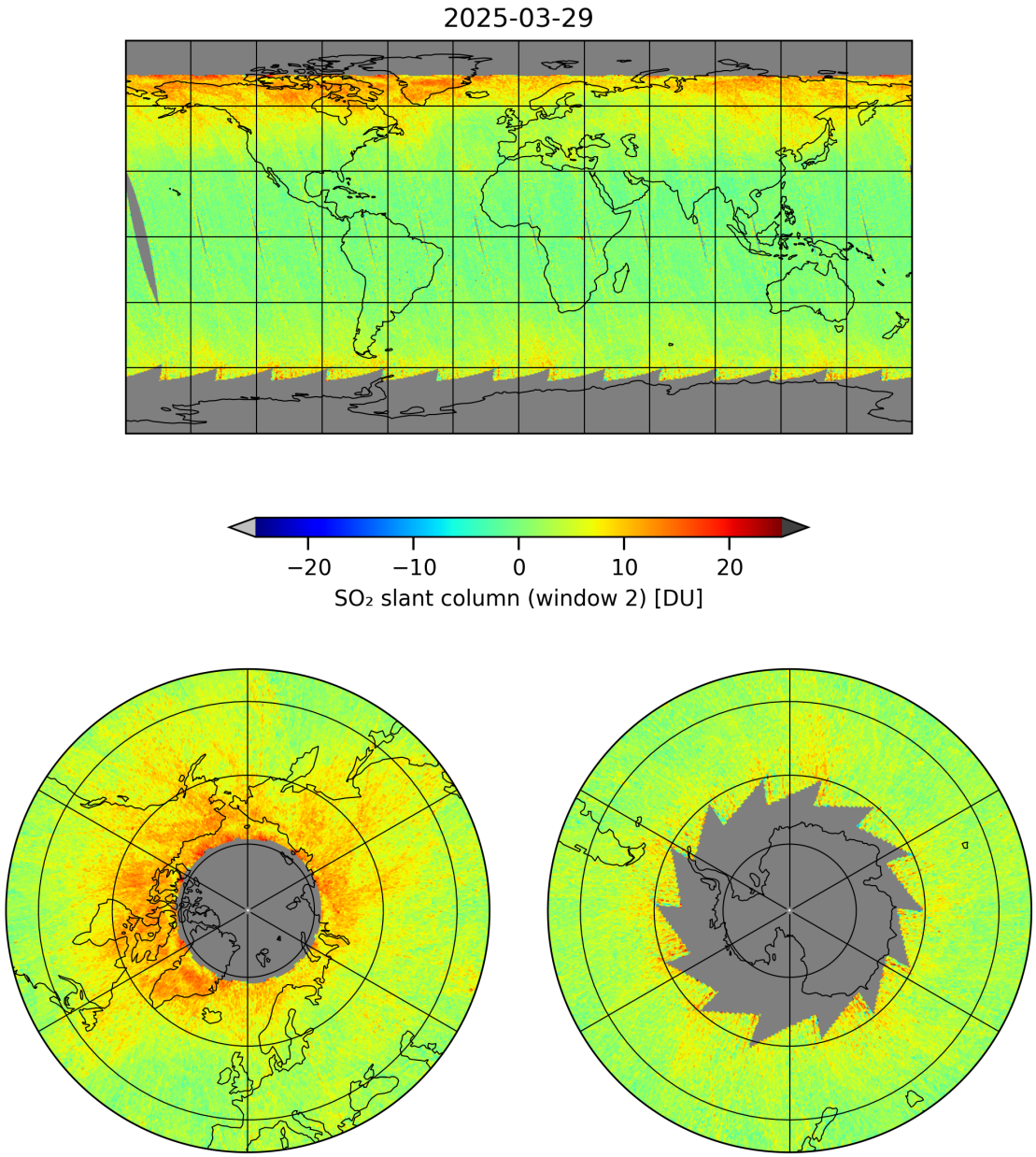

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-03-29 to 2025-03-30

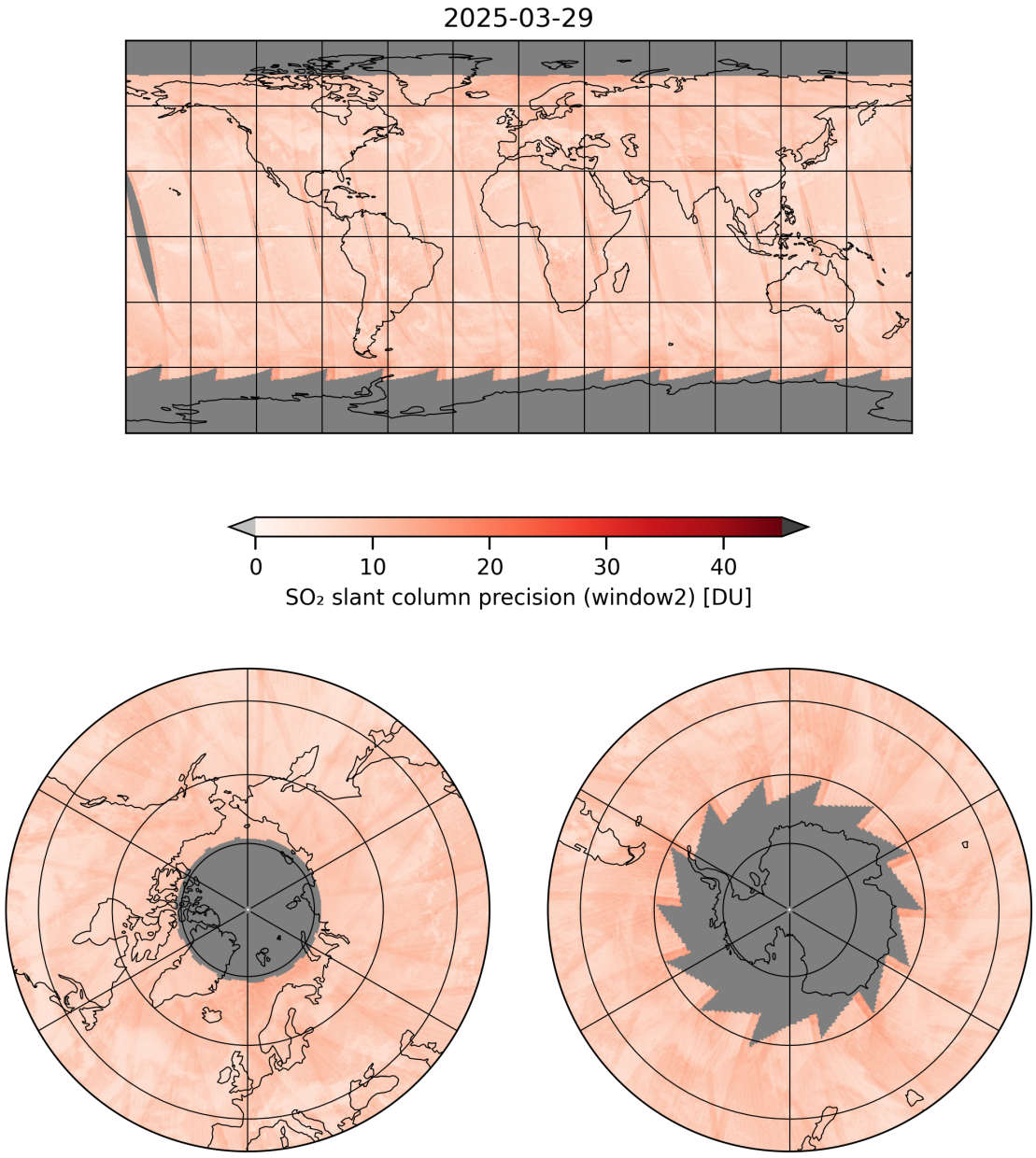

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-03-29 to 2025-03-30

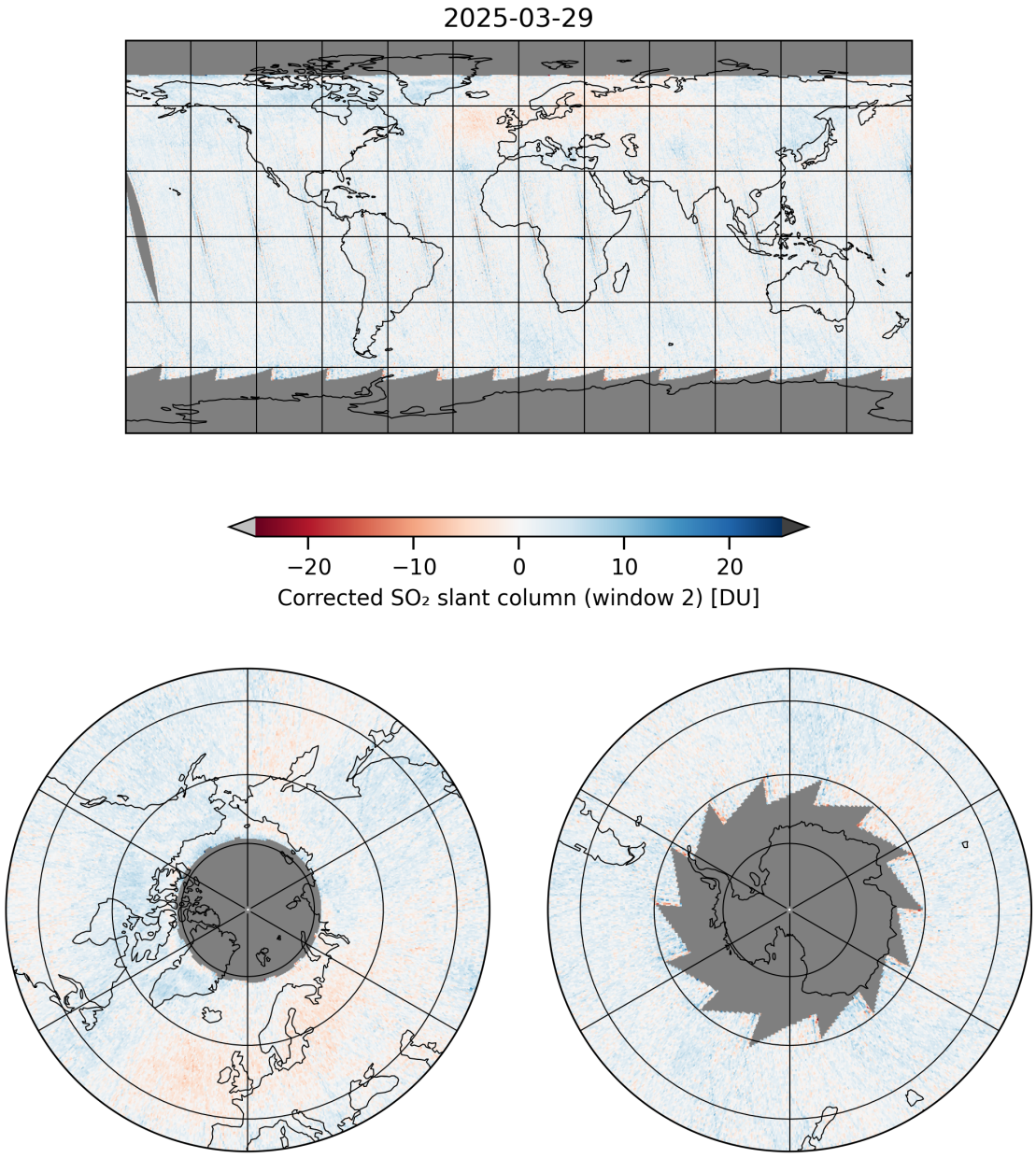

Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-03-29 to 2025-03-30

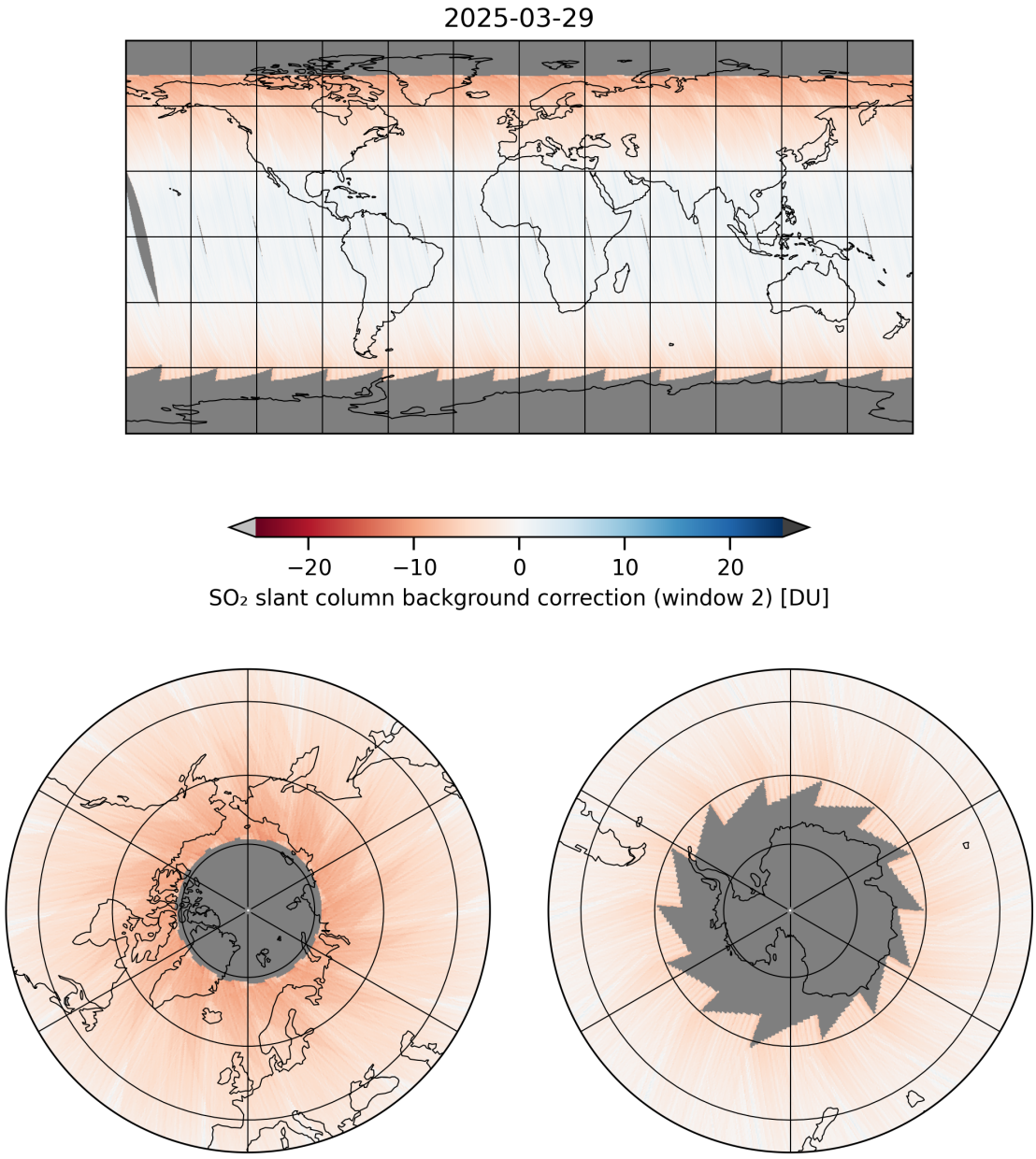

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-03-29 to 2025-03-30

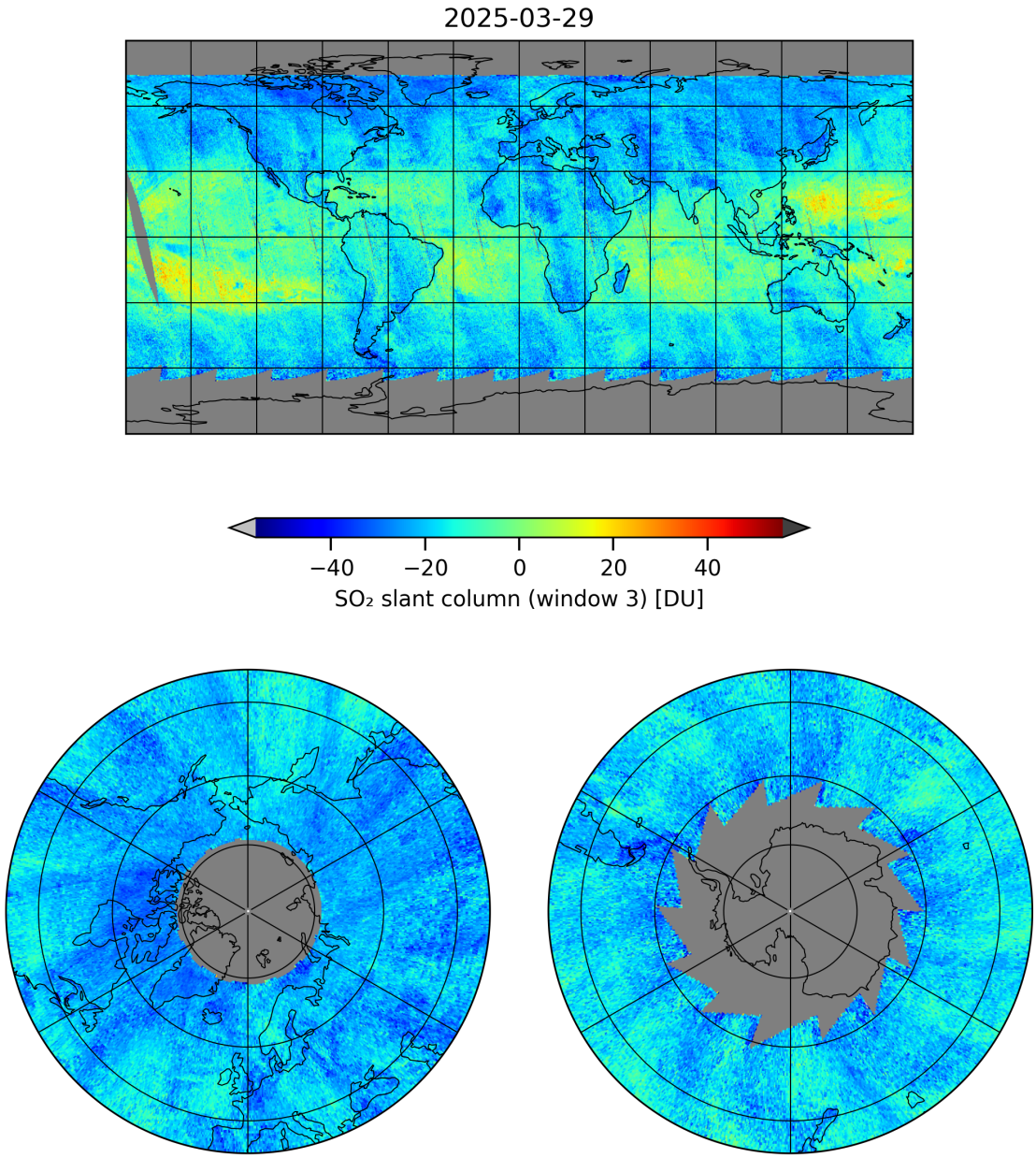

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-03-29 to 2025-03-30

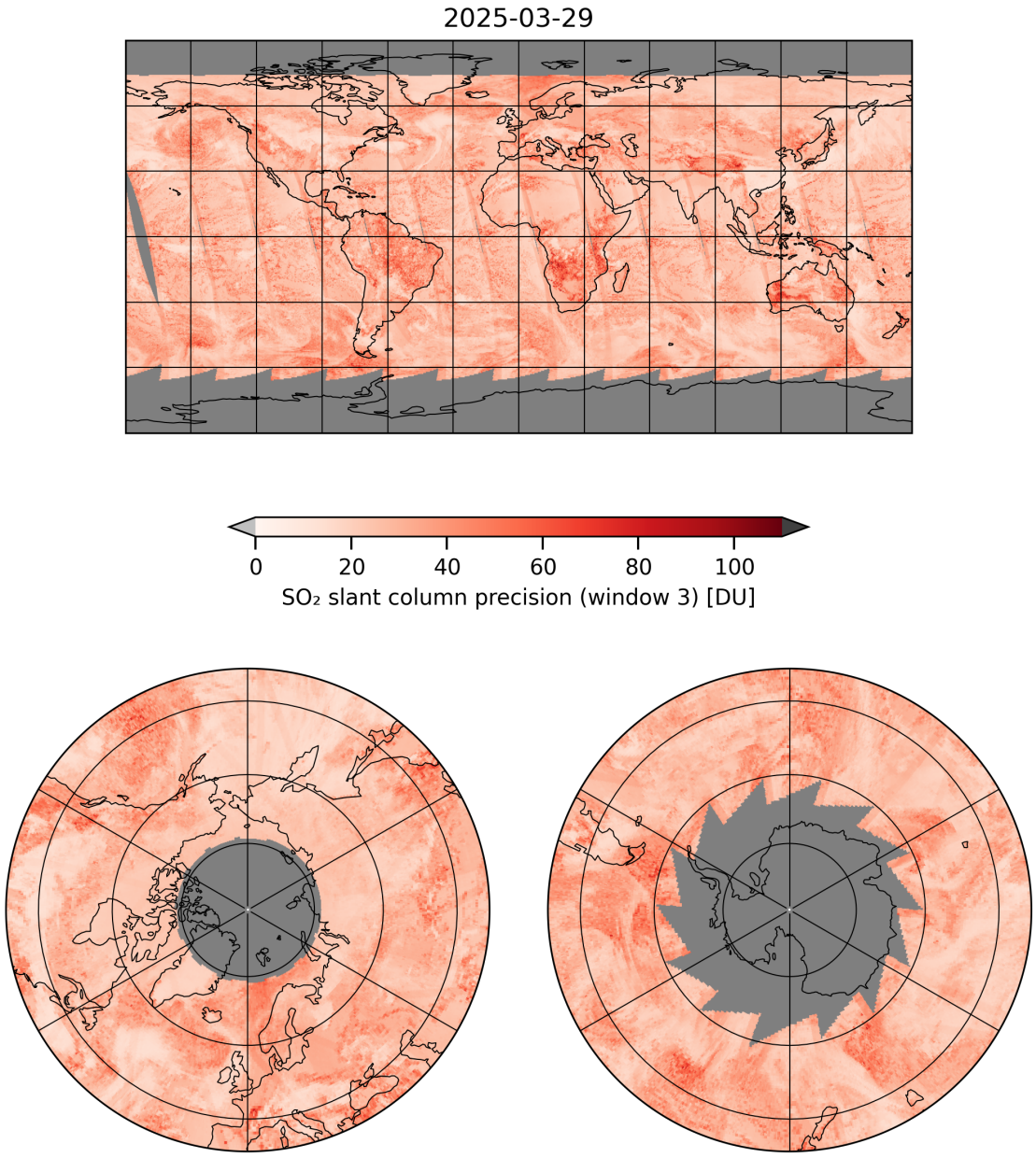

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-03-29 to 2025-03-30

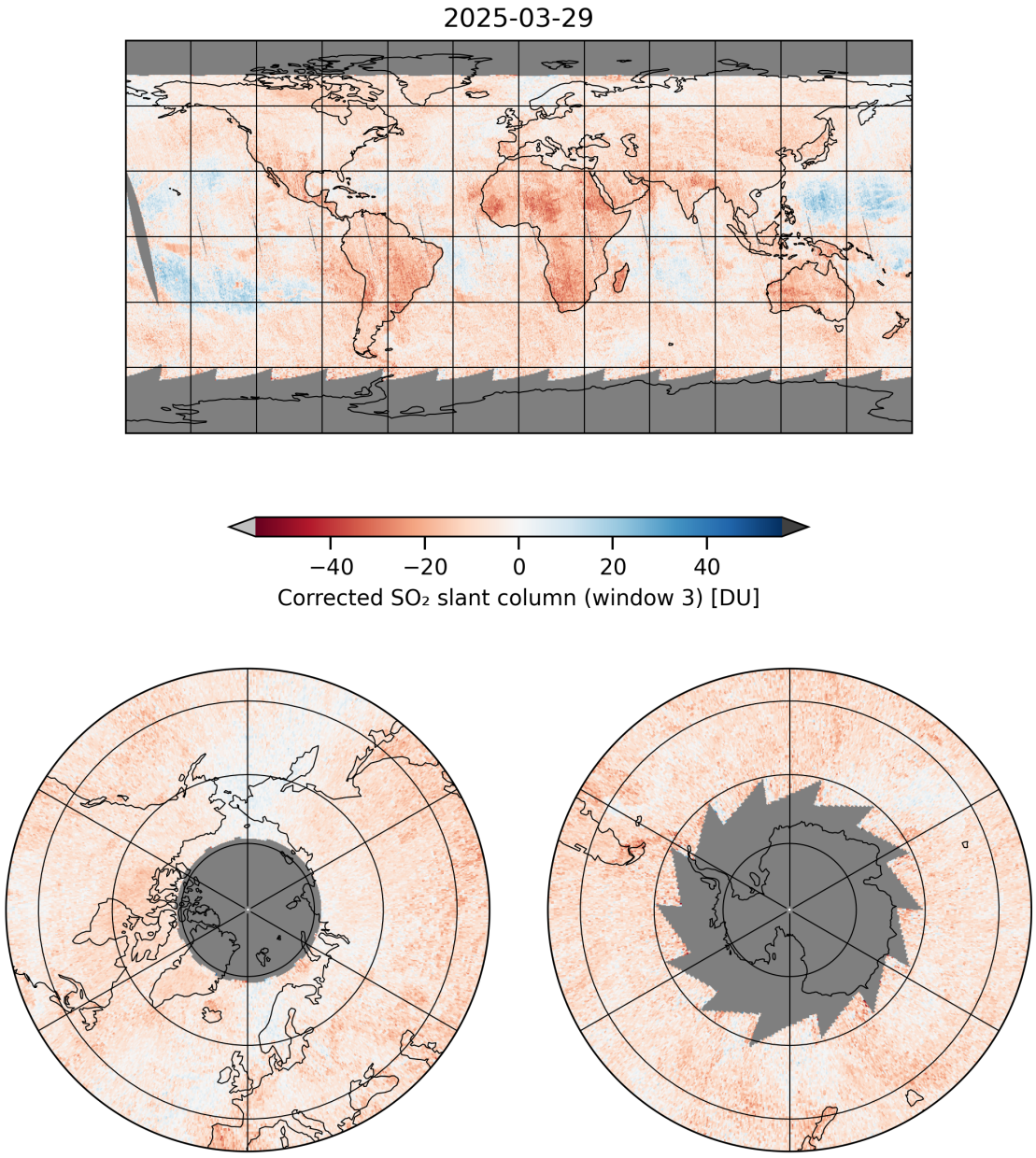

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-03-29 to 2025-03-30

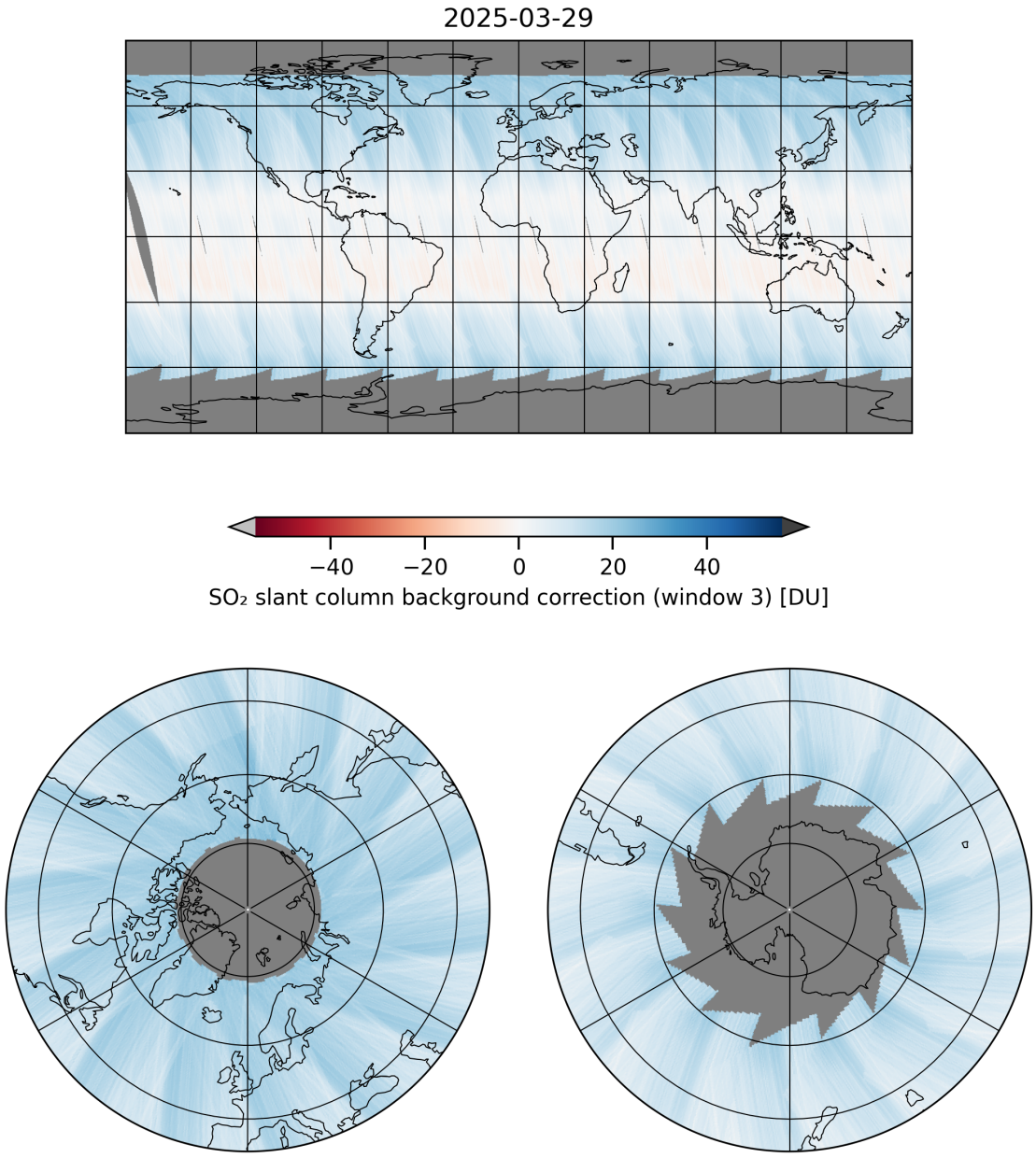

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-03-29 to 2025-03-30

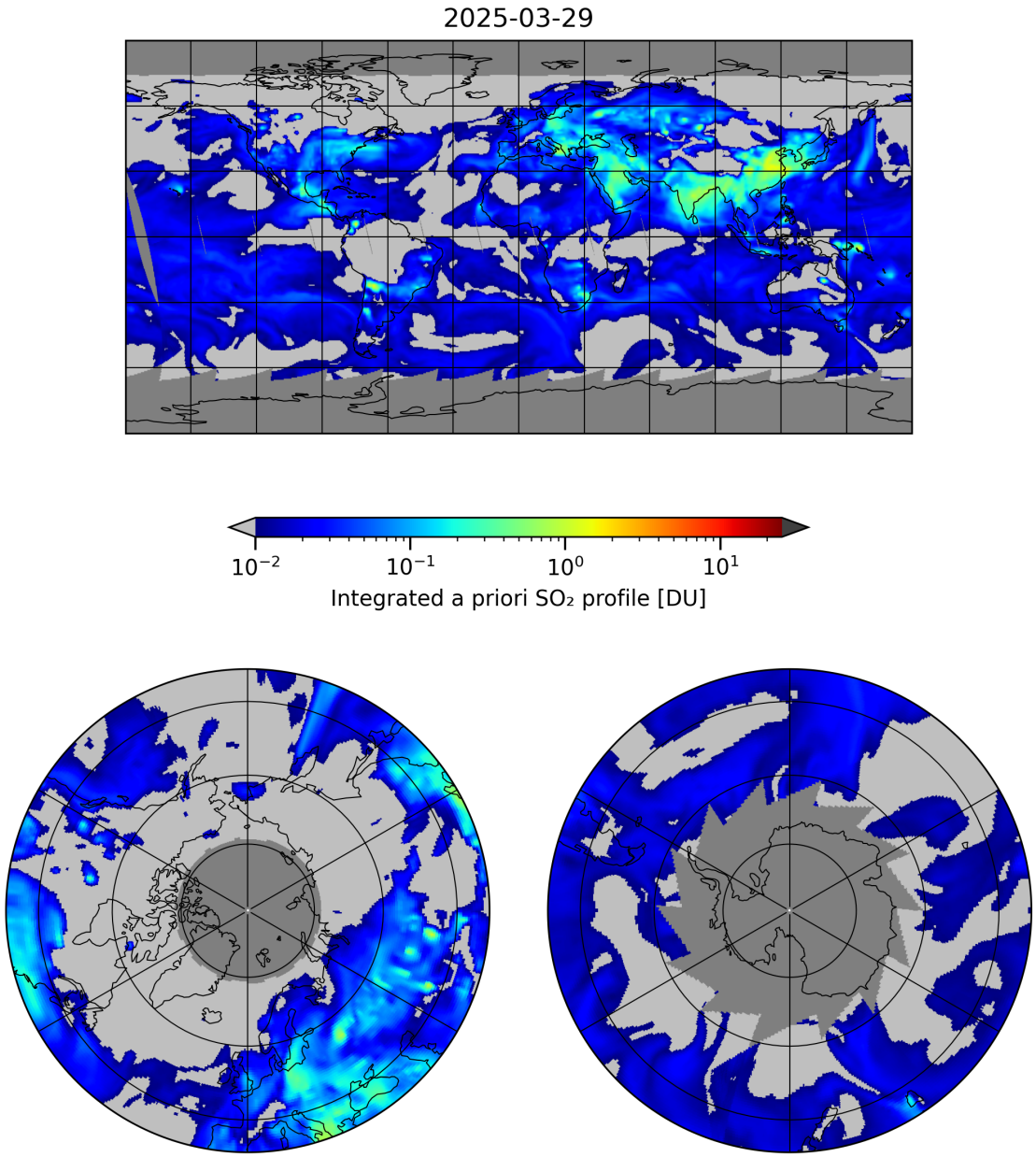

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-03-29 to 2025-03-30

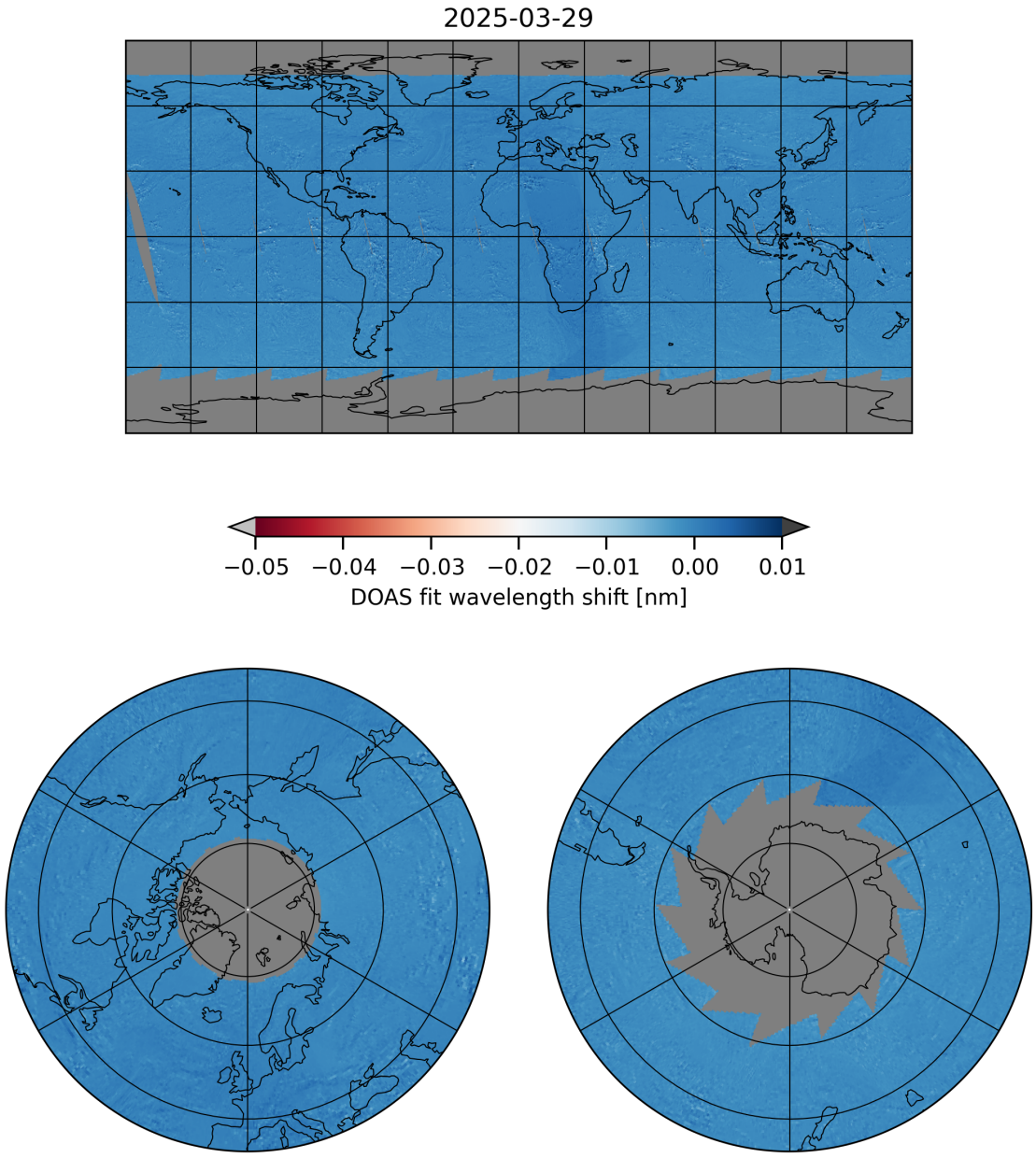

Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-29 to 2025-03-30

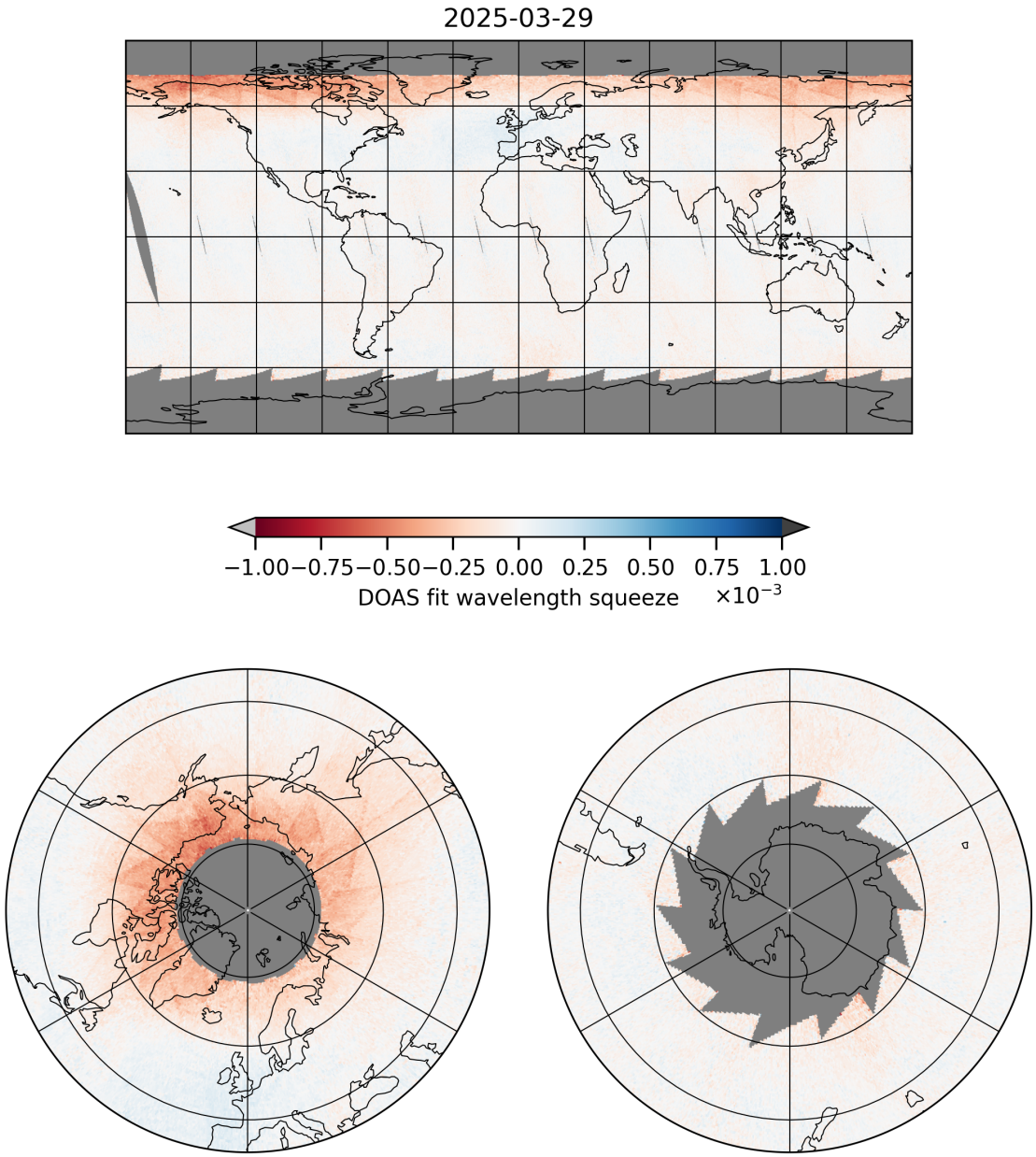

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-29 to 2025-03-30

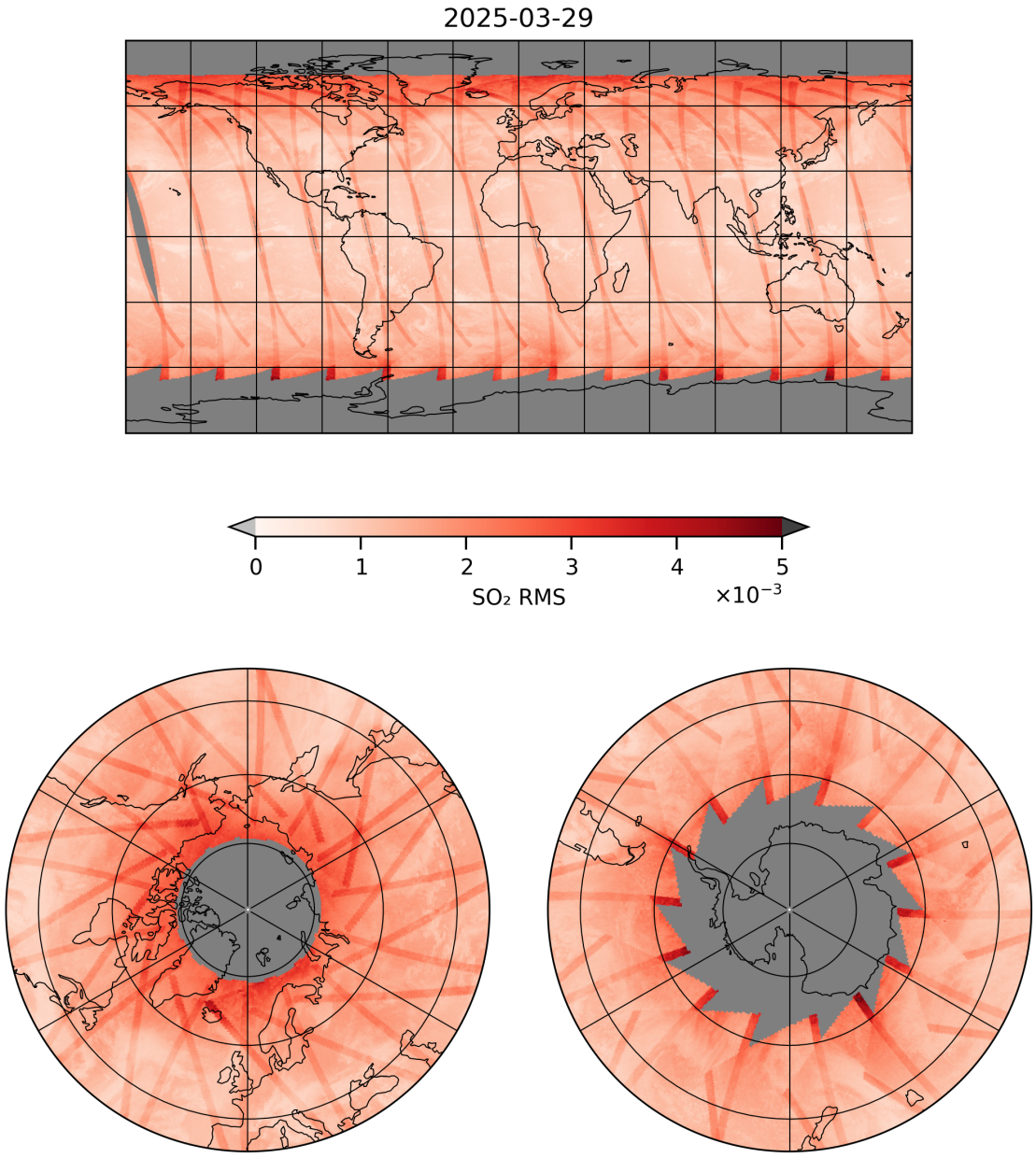

Figure 24: Map of "SO_2 RMS" for 2025-03-29 to 2025-03-30

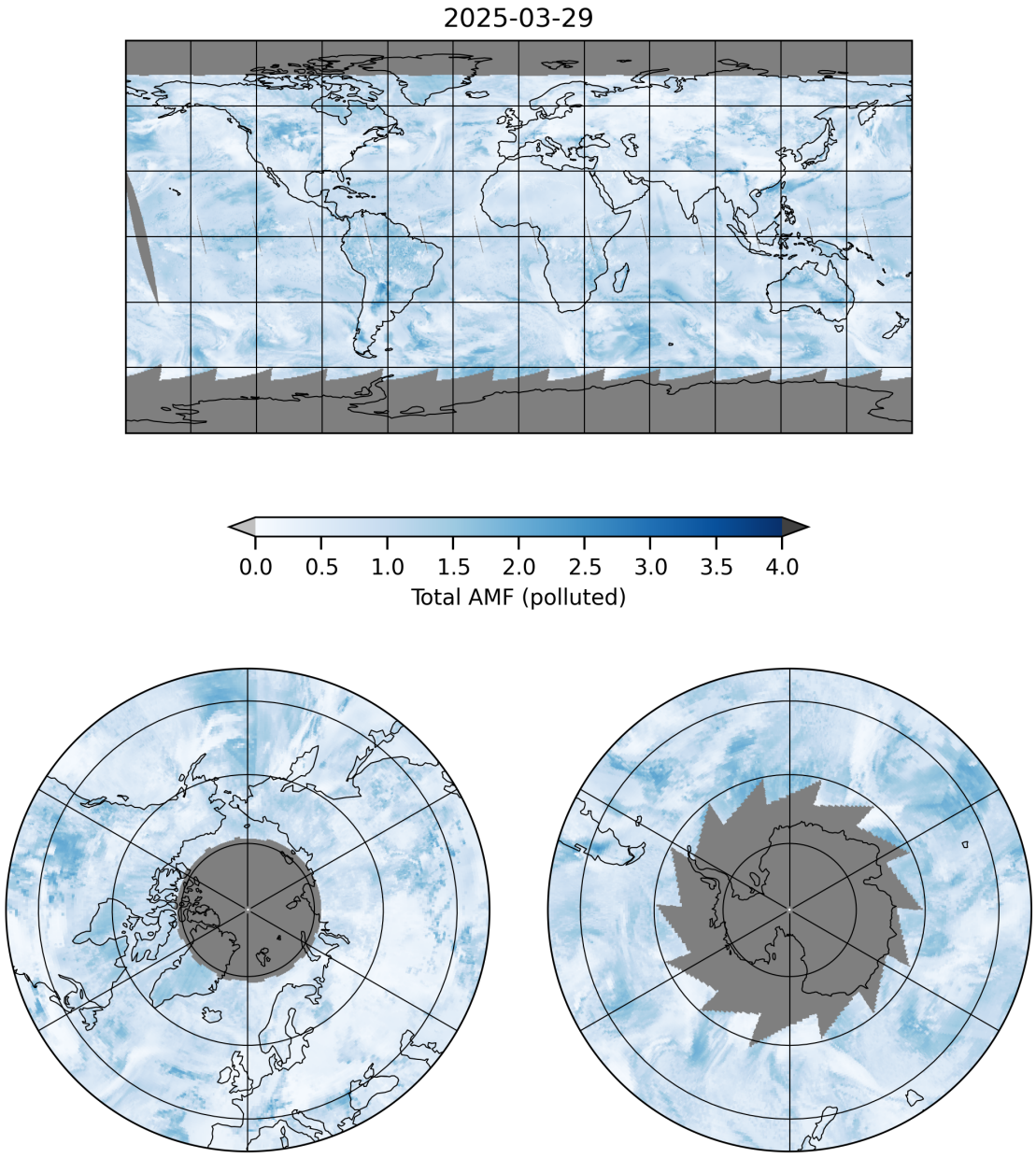

Figure 25: Map of “Total AMF (polluted)” for 2025-03-29 to 2025-03-30

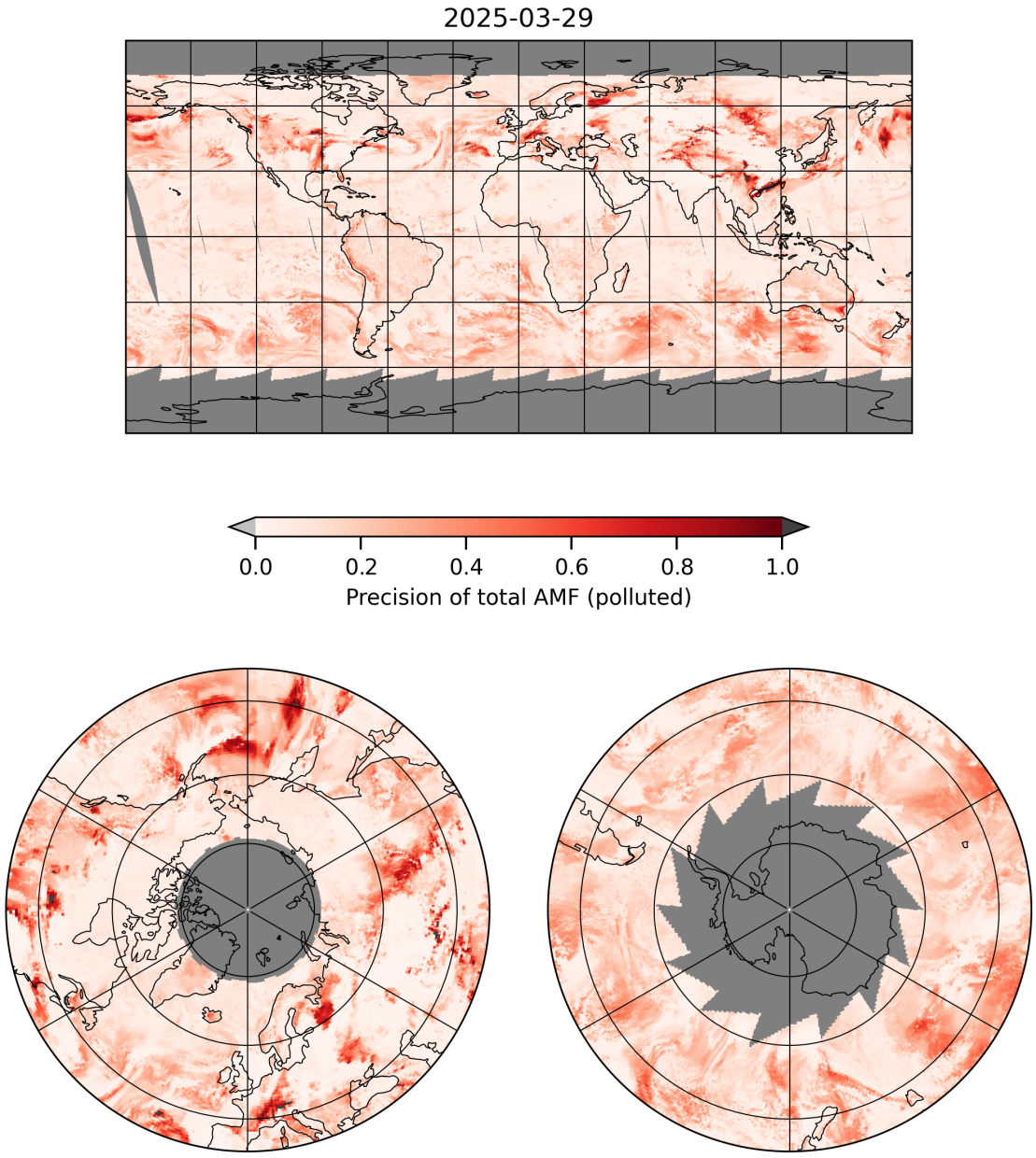

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-29 to 2025-03-30

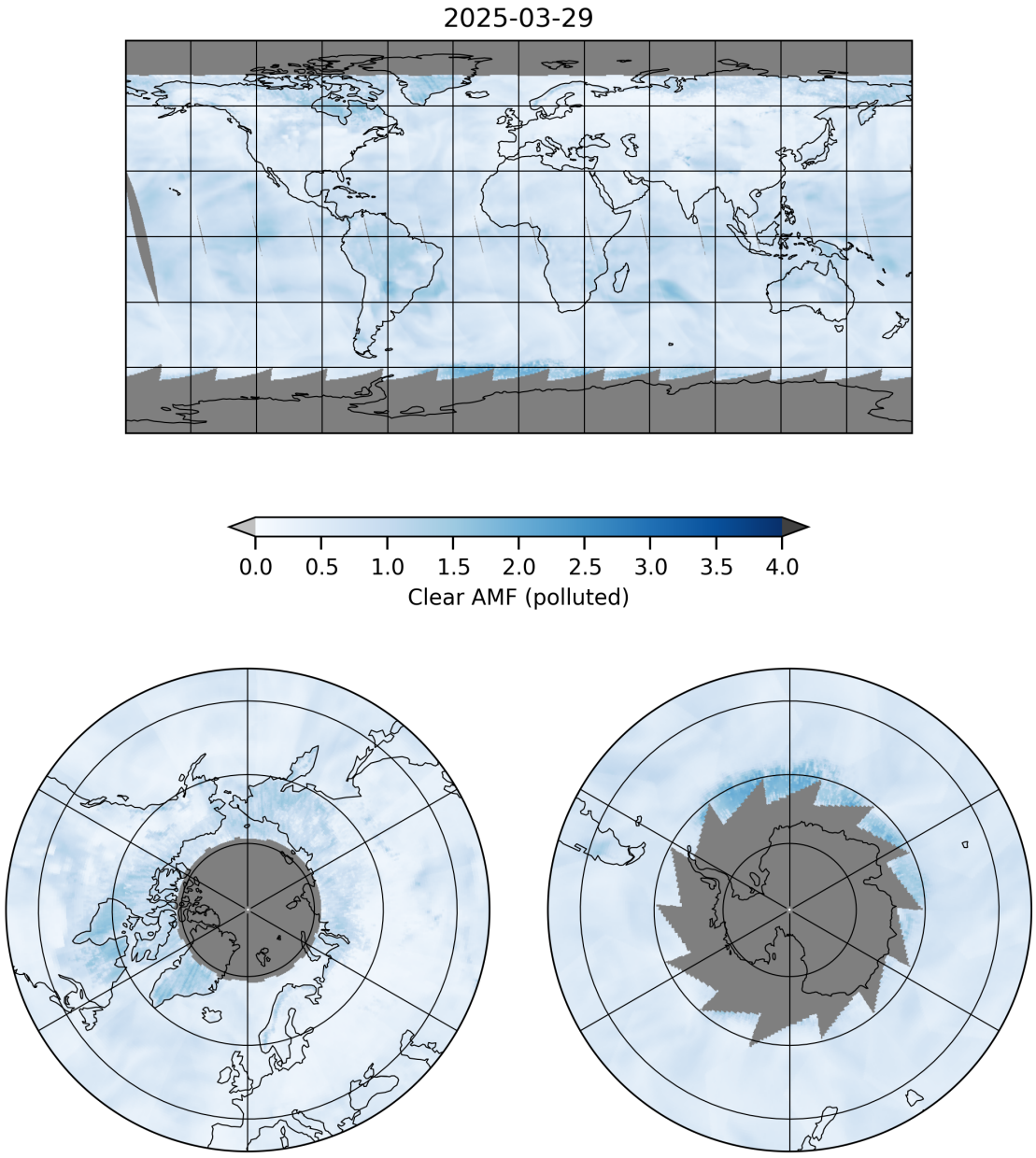

Figure 27: Map of “Clear AMF (polluted)” for 2025-03-29 to 2025-03-30

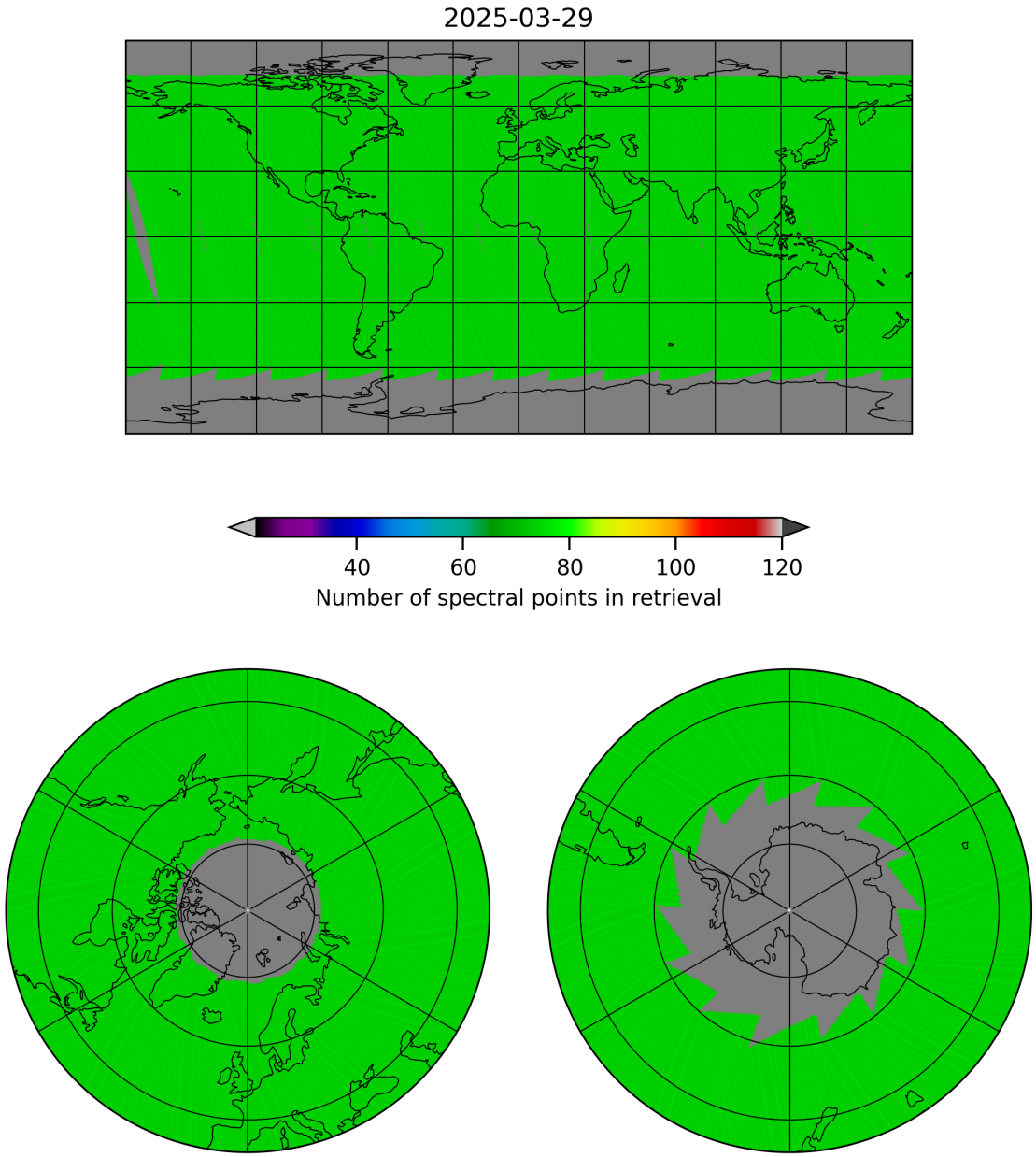

Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-29 to 2025-03-30

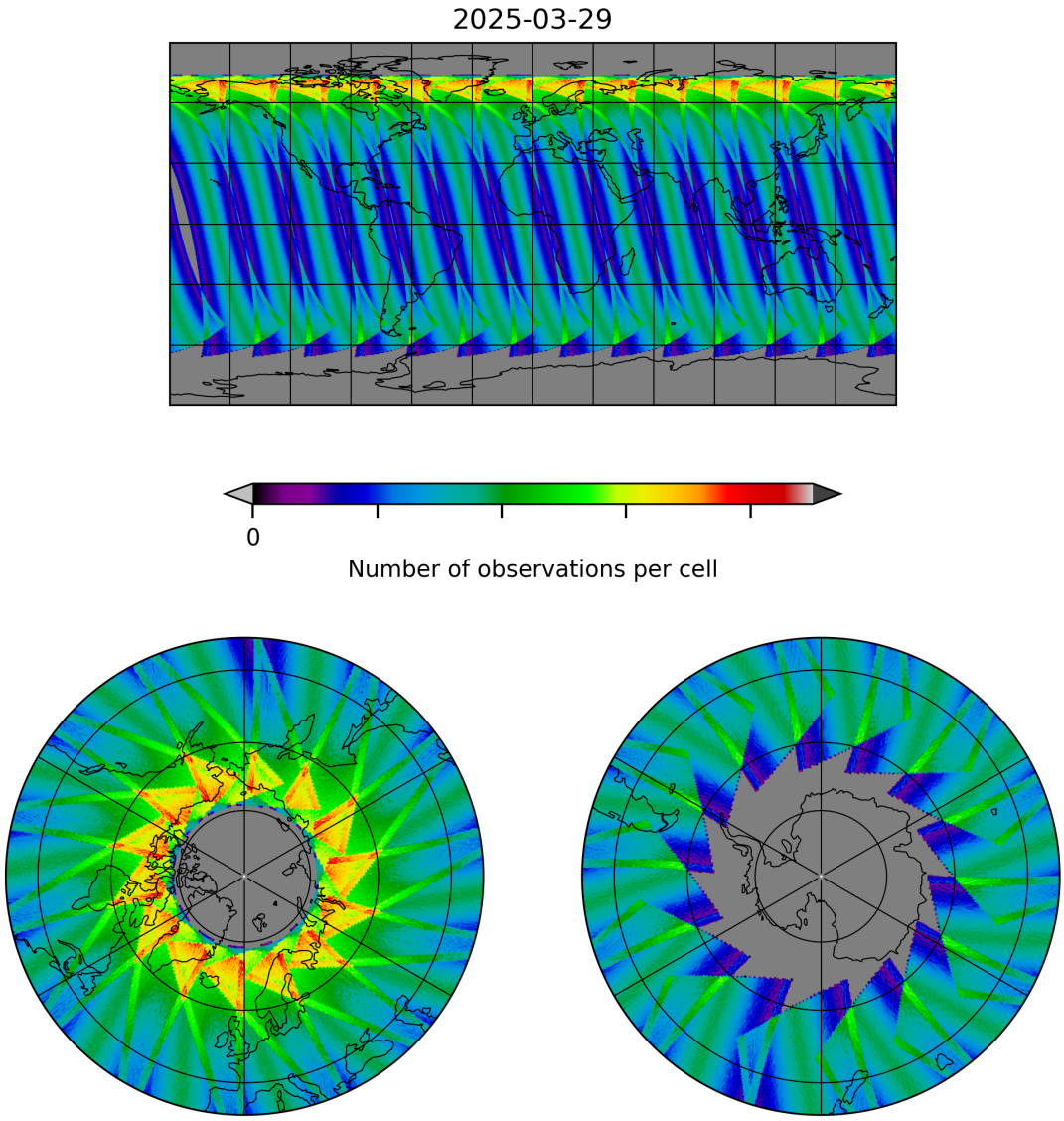

Figure 29: Map of the number of observations for 2025-03-29 to 2025-03-30

7 Zonal average

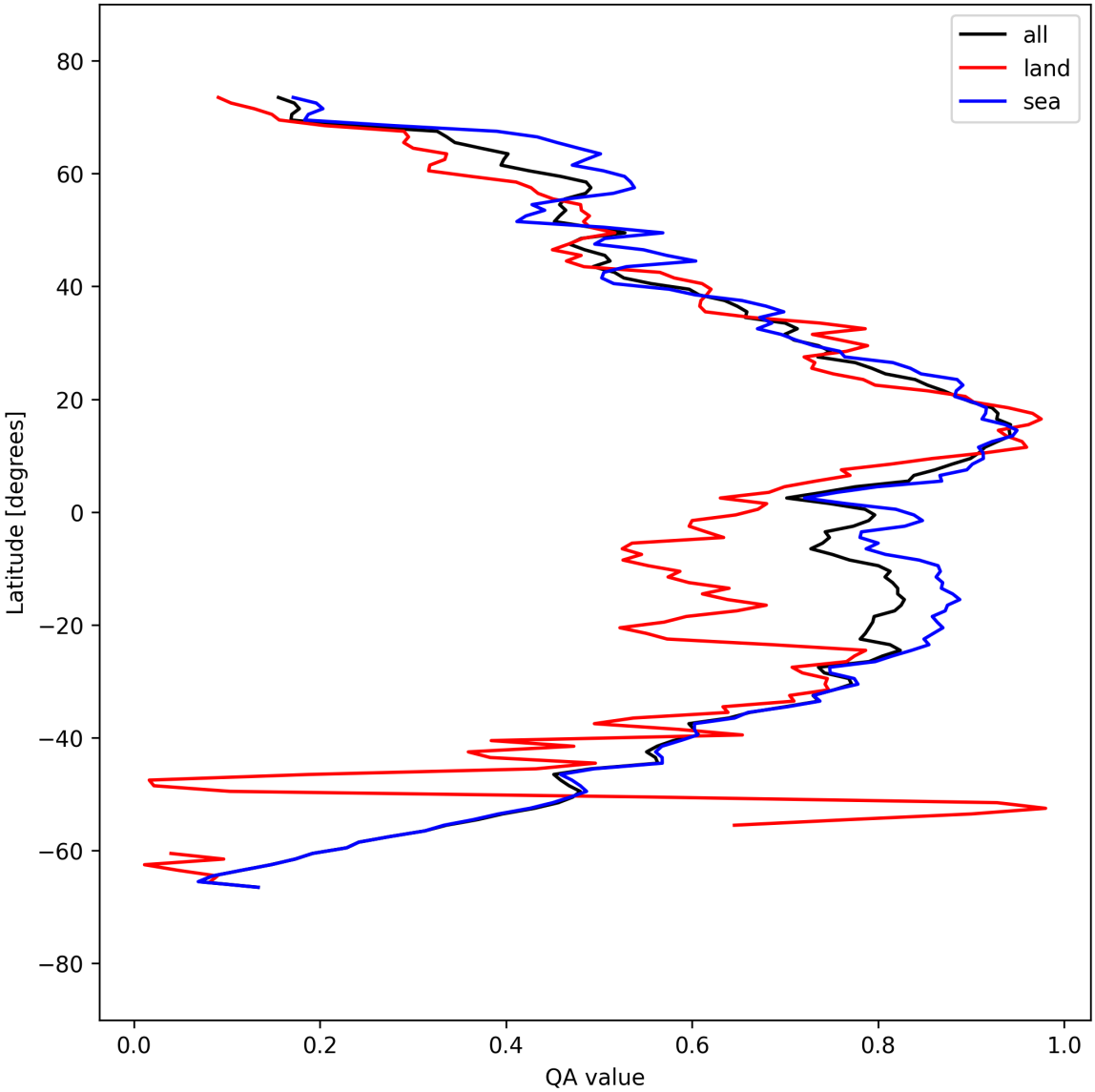

Figure 30: Zonal average of “QA value” for 2025-03-29 to 2025-03-30.

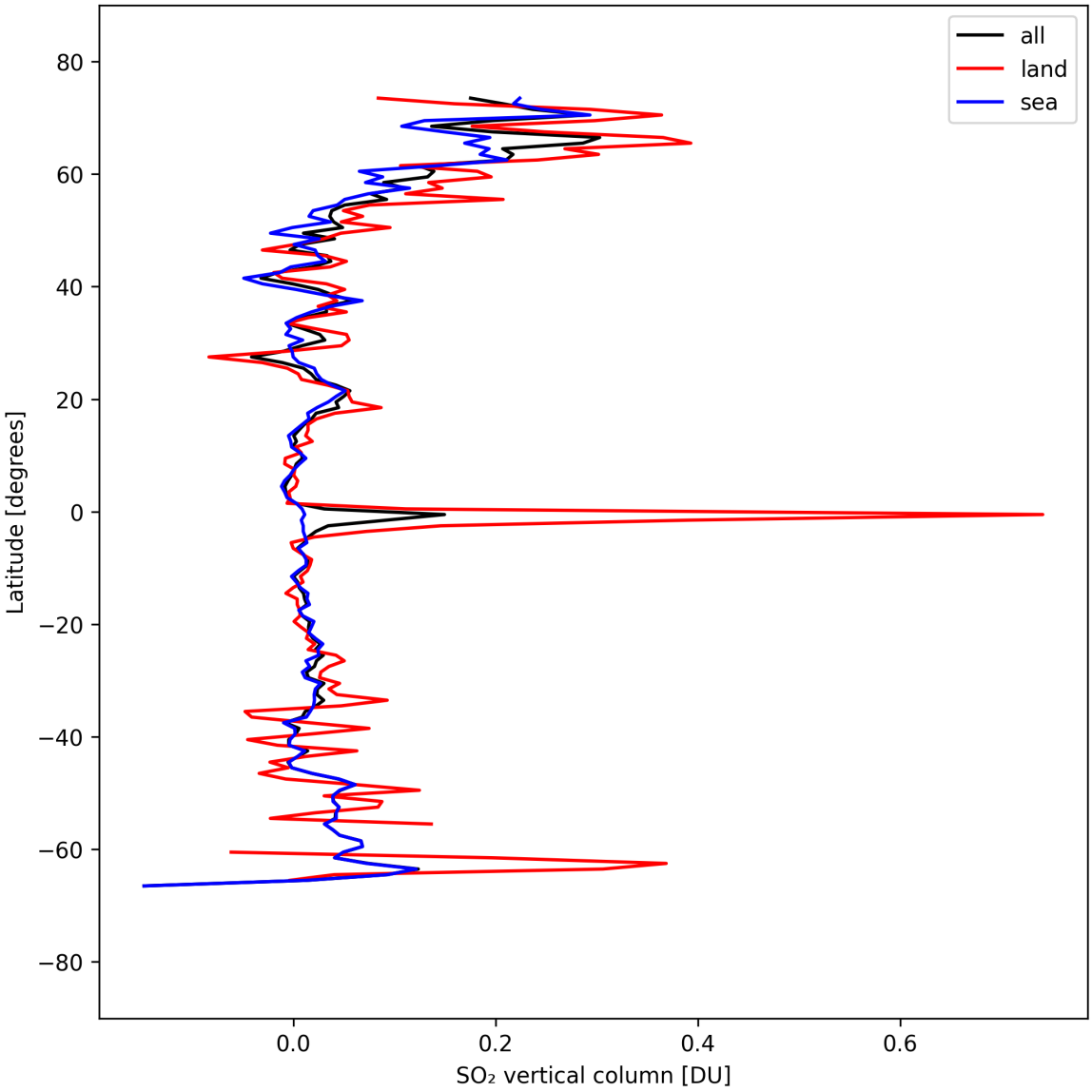

Figure 31: Zonal average of "SO_2 vertical column" for 2025-03-29 to 2025-03-30.

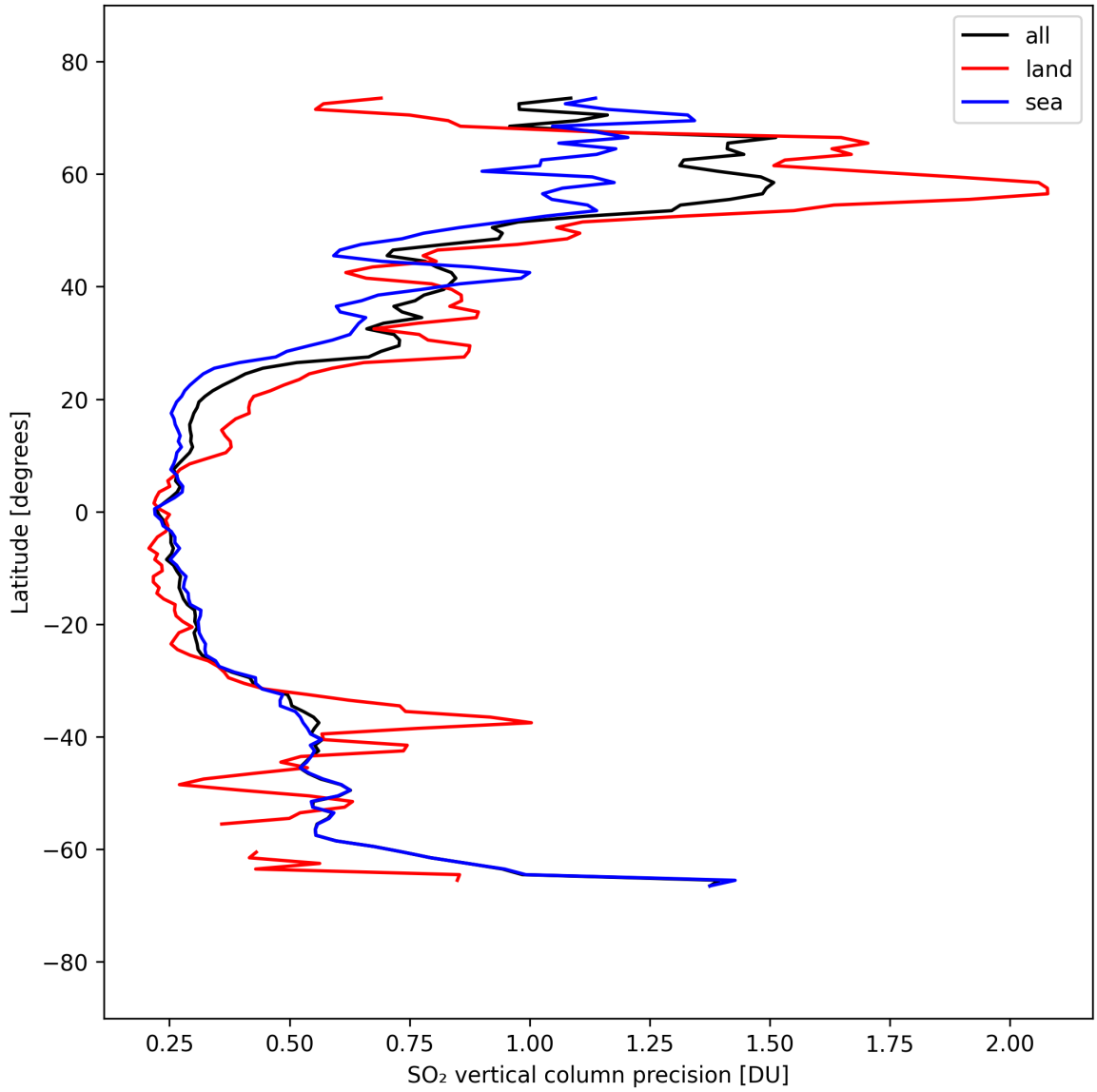

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-03-29 to 2025-03-30.

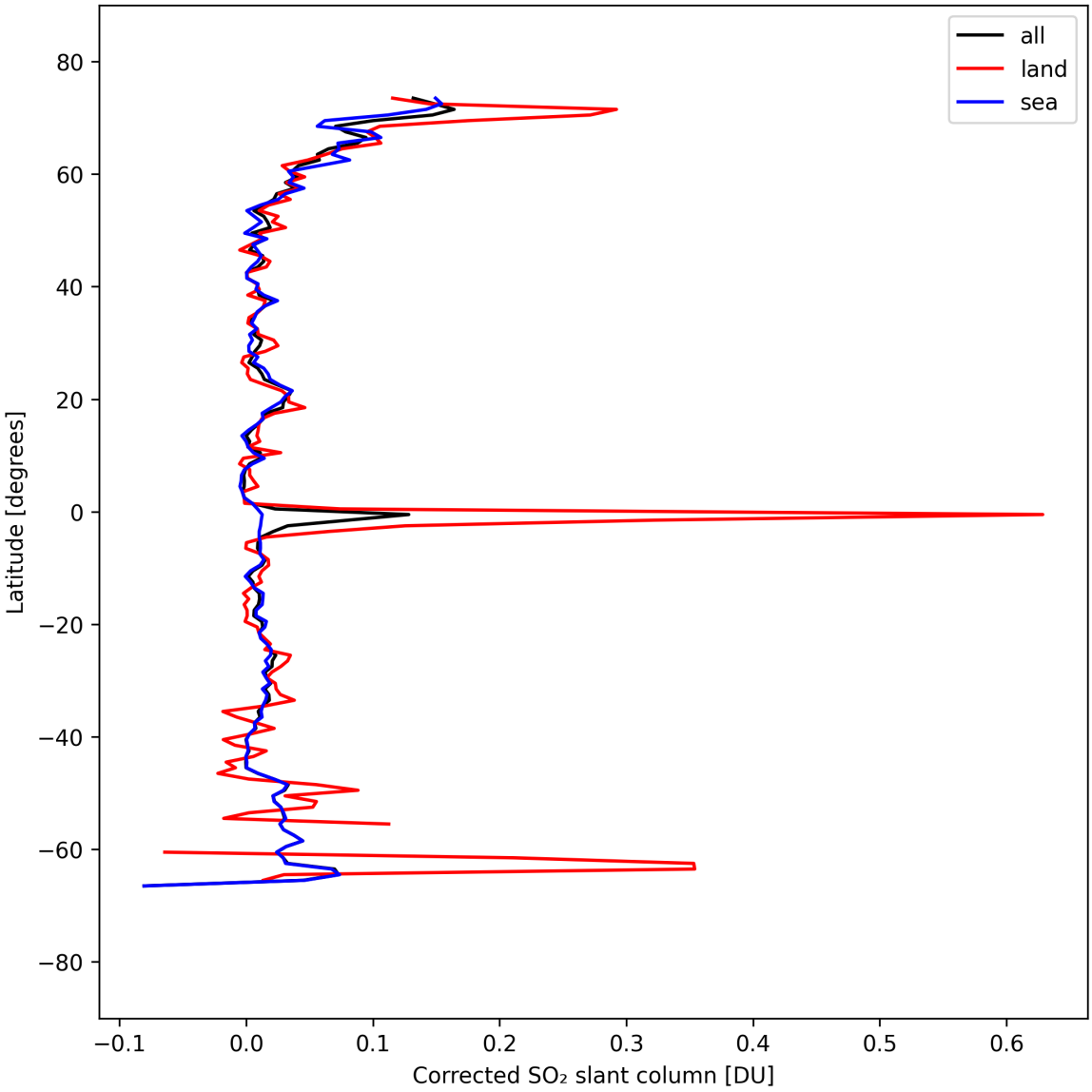

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-03-29 to 2025-03-30.

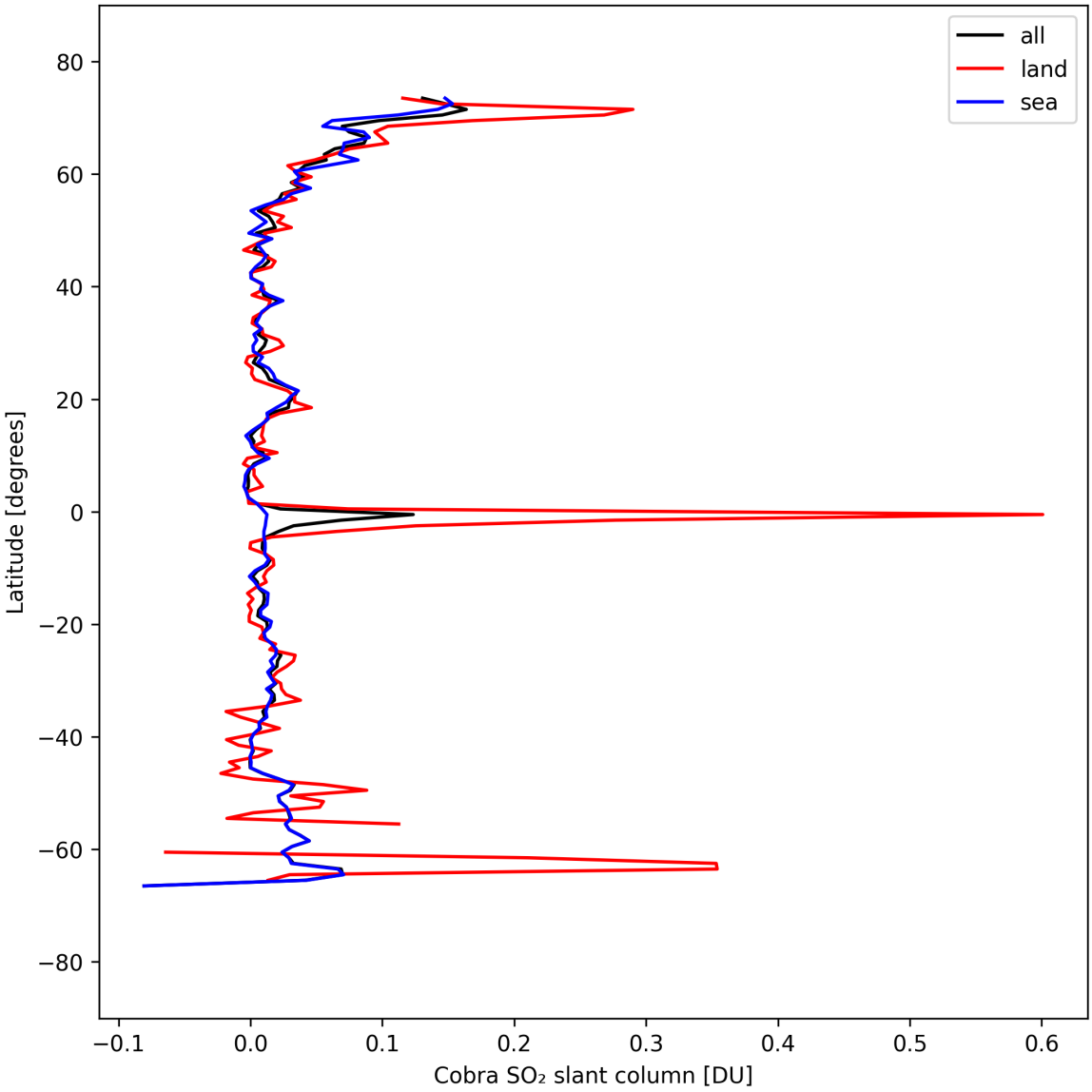

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-03-29 to 2025-03-30.

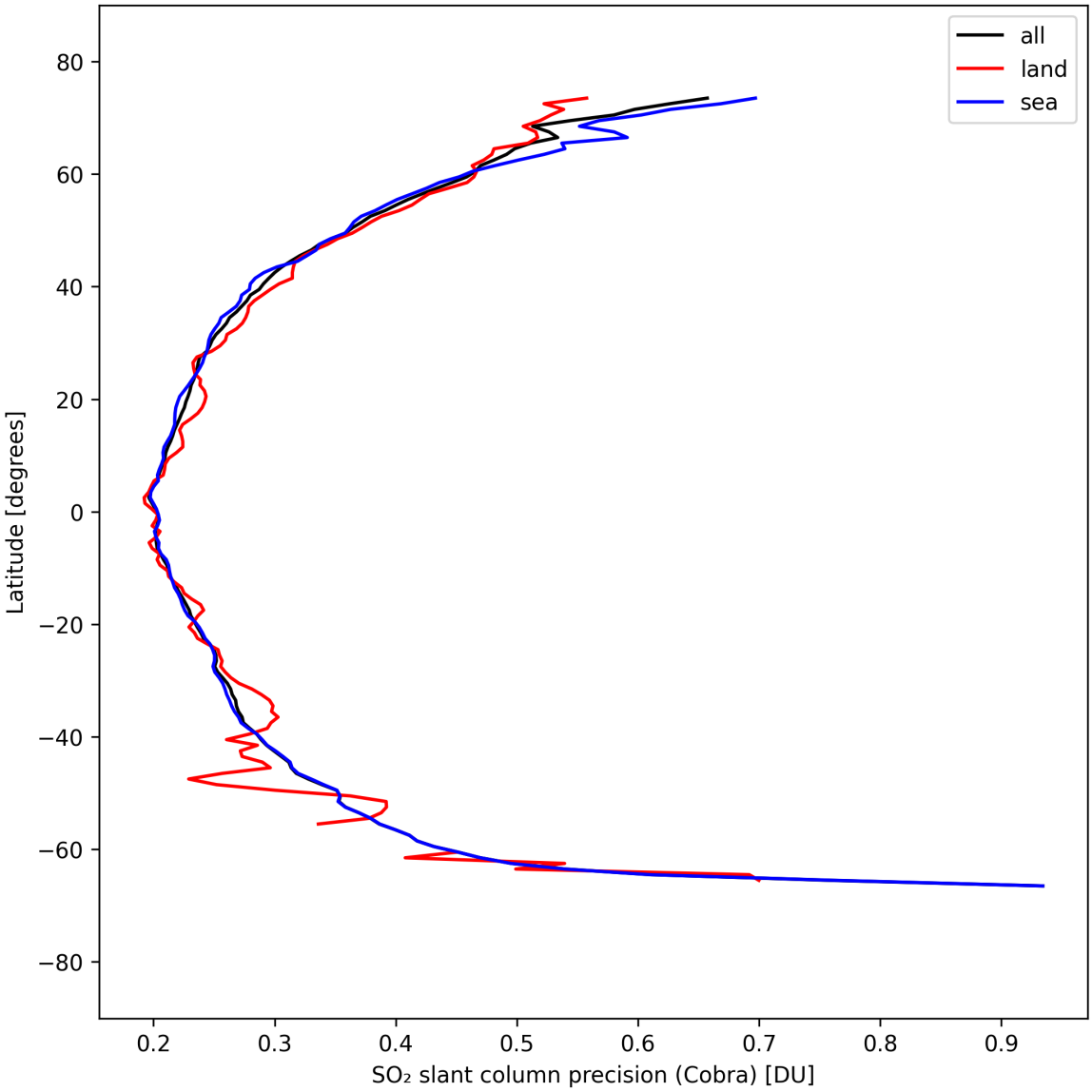

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-03-29 to 2025-03-30.

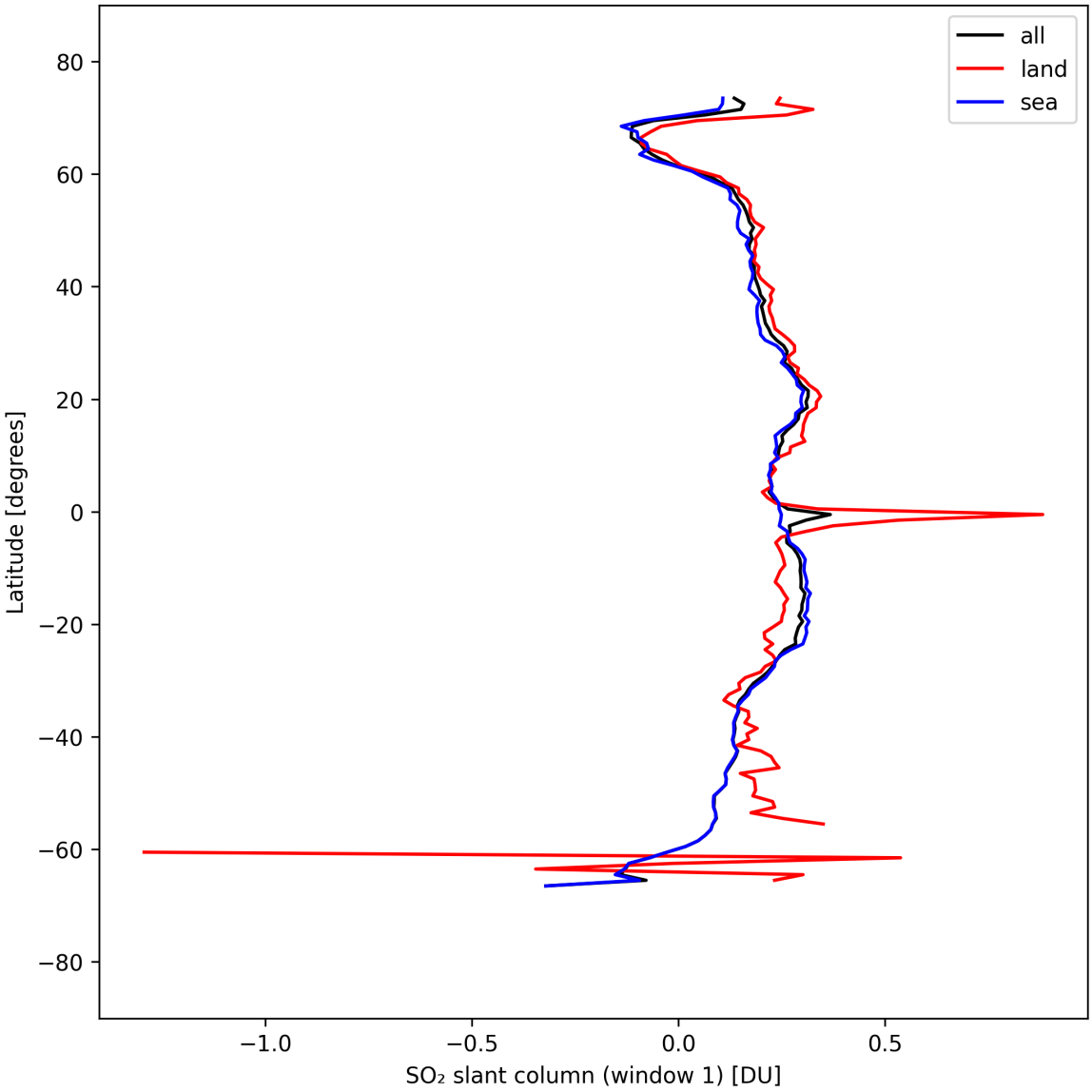

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-03-29 to 2025-03-30.

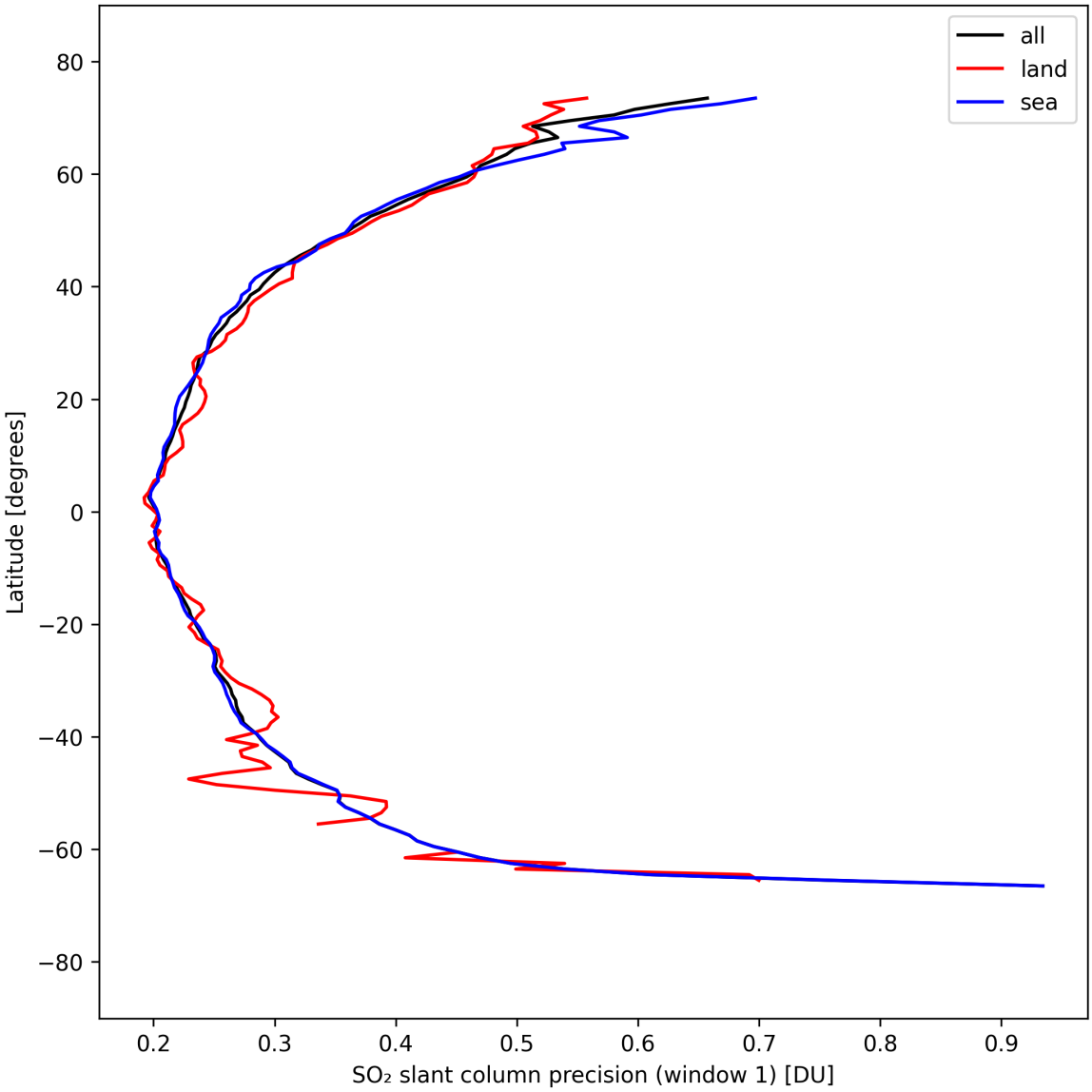

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-03-29 to 2025-03-30.

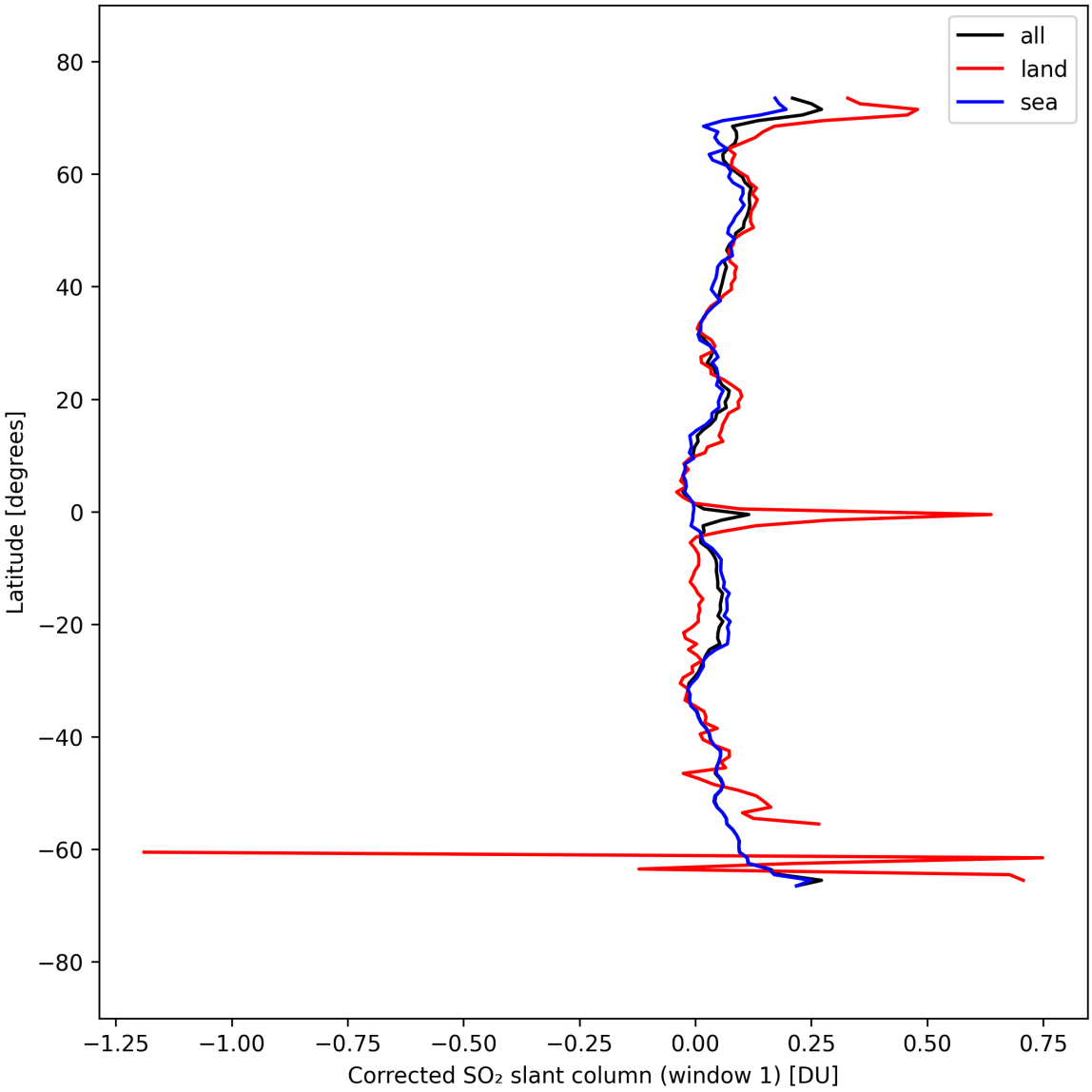

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-03-29 to 2025-03-30.

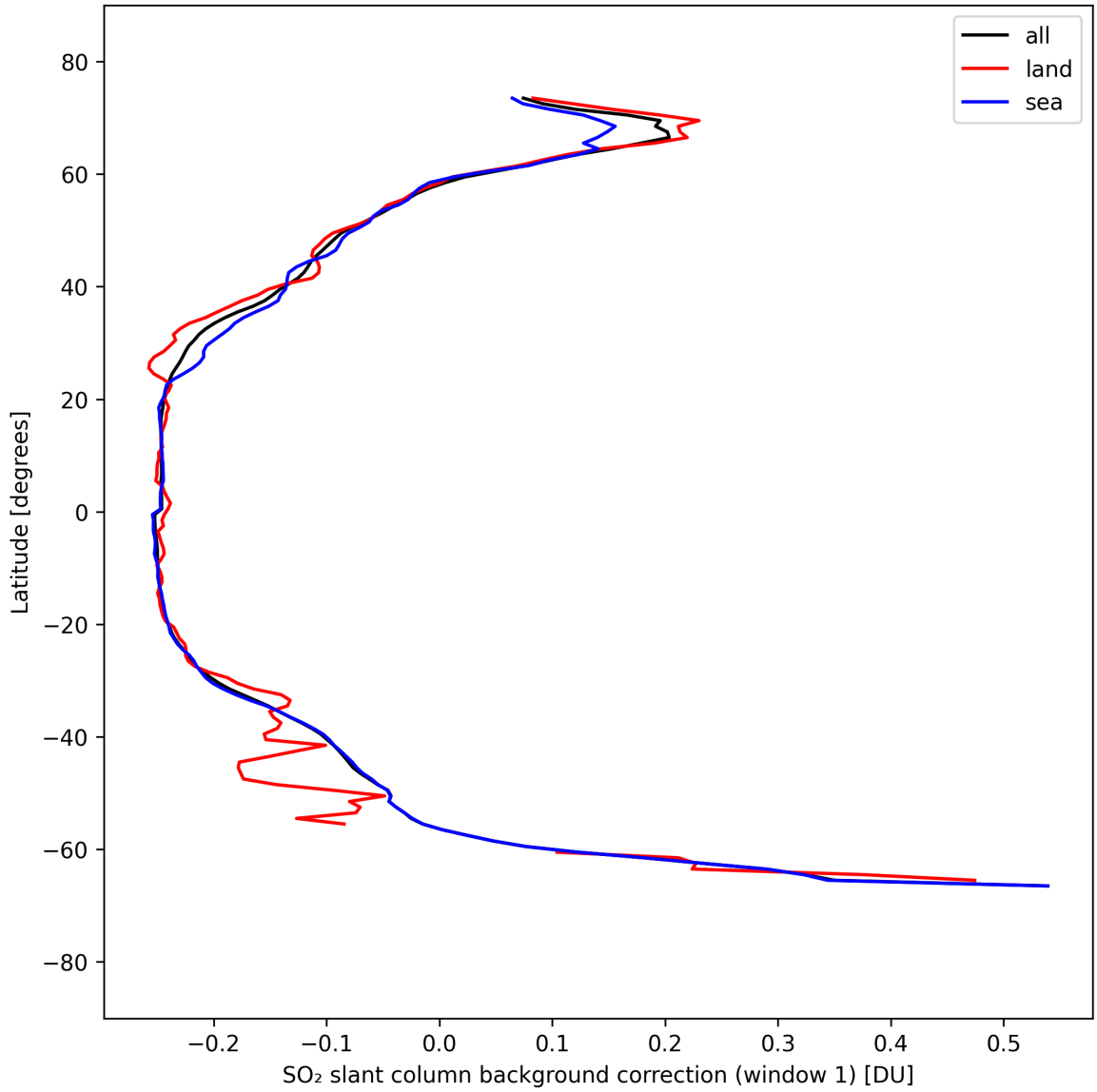

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-03-29 to 2025-03-30.

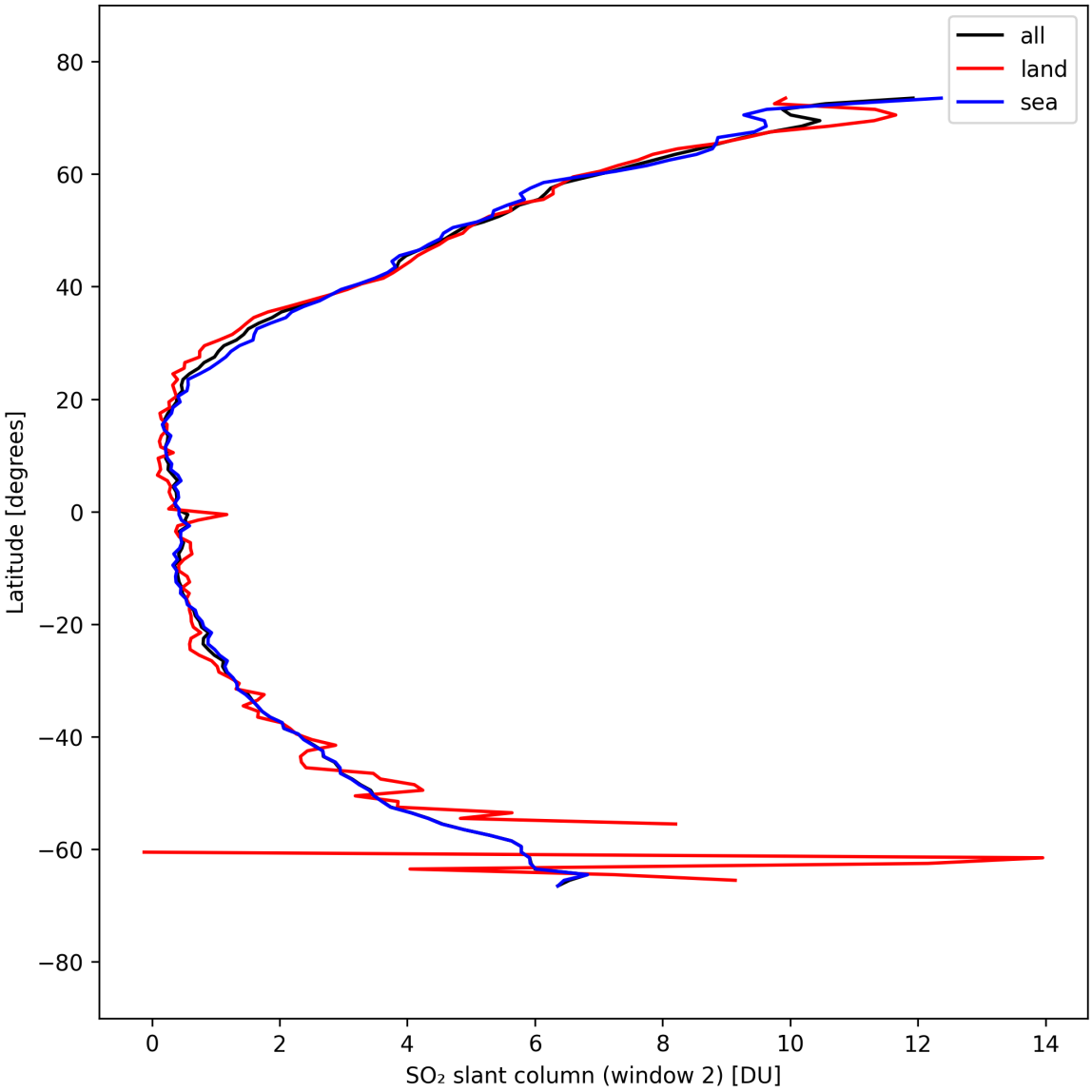

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-03-29 to 2025-03-30.

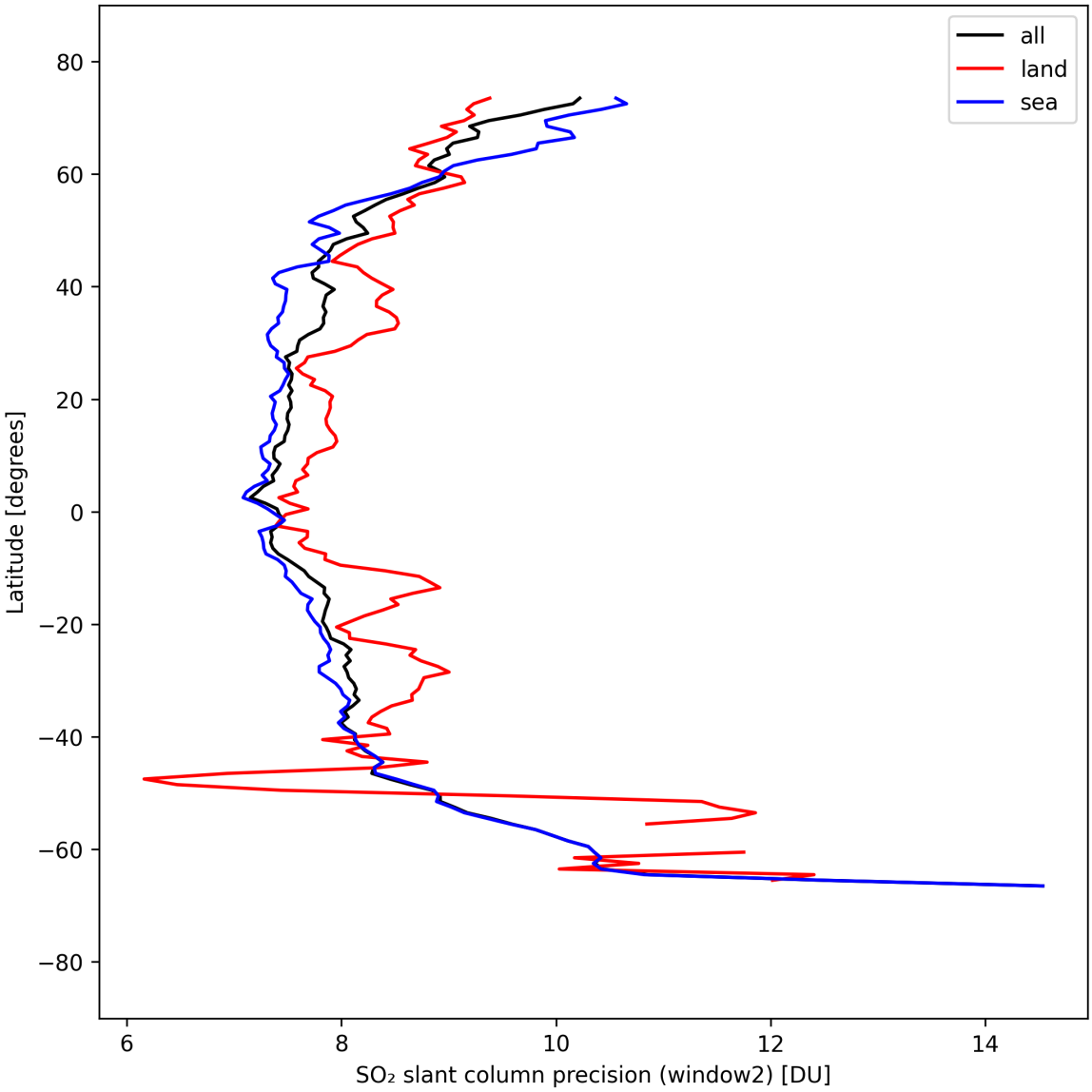

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-03-29 to 2025-03-30.

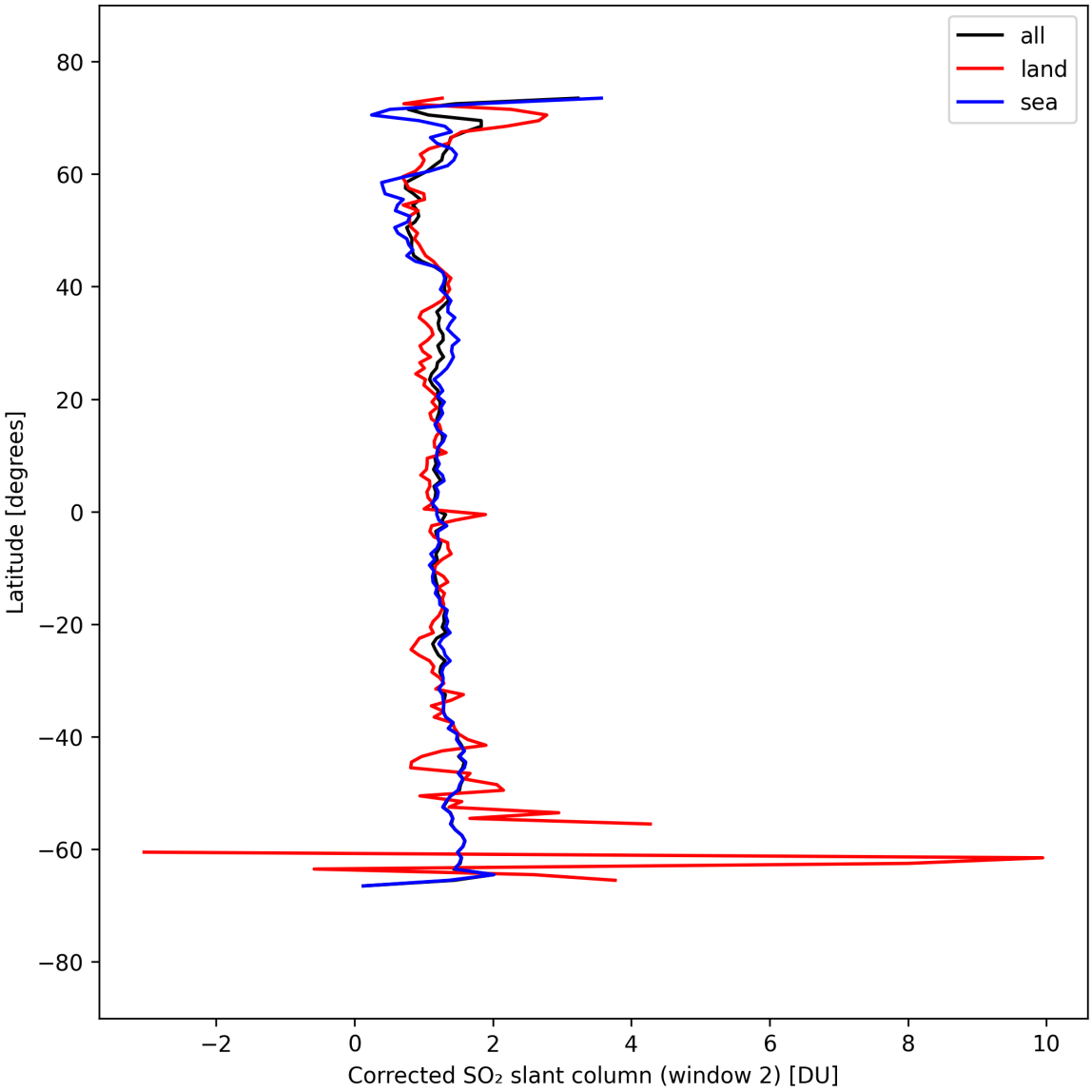

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-03-29 to 2025-03-30.

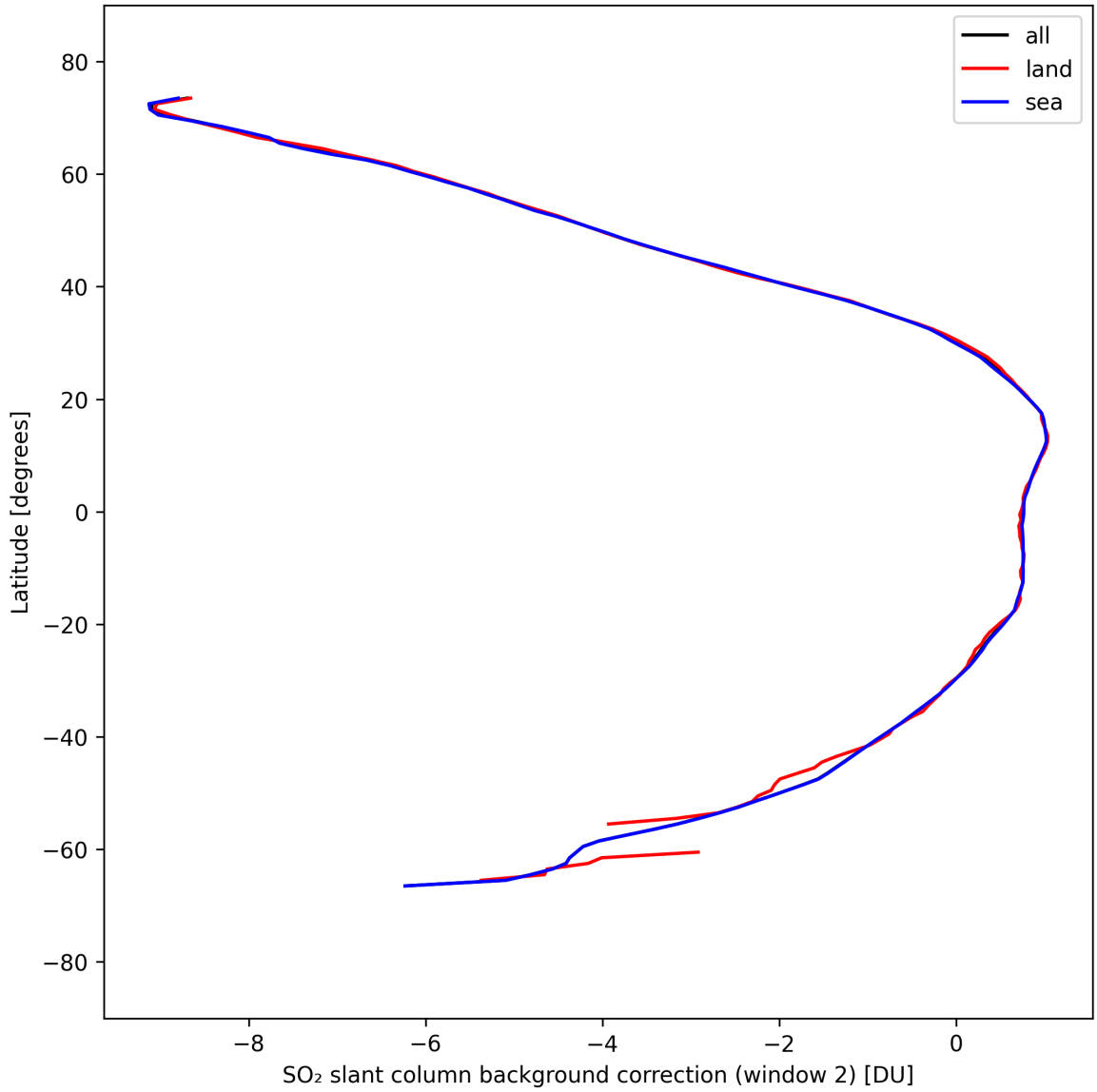

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-03-29 to 2025-03-30.

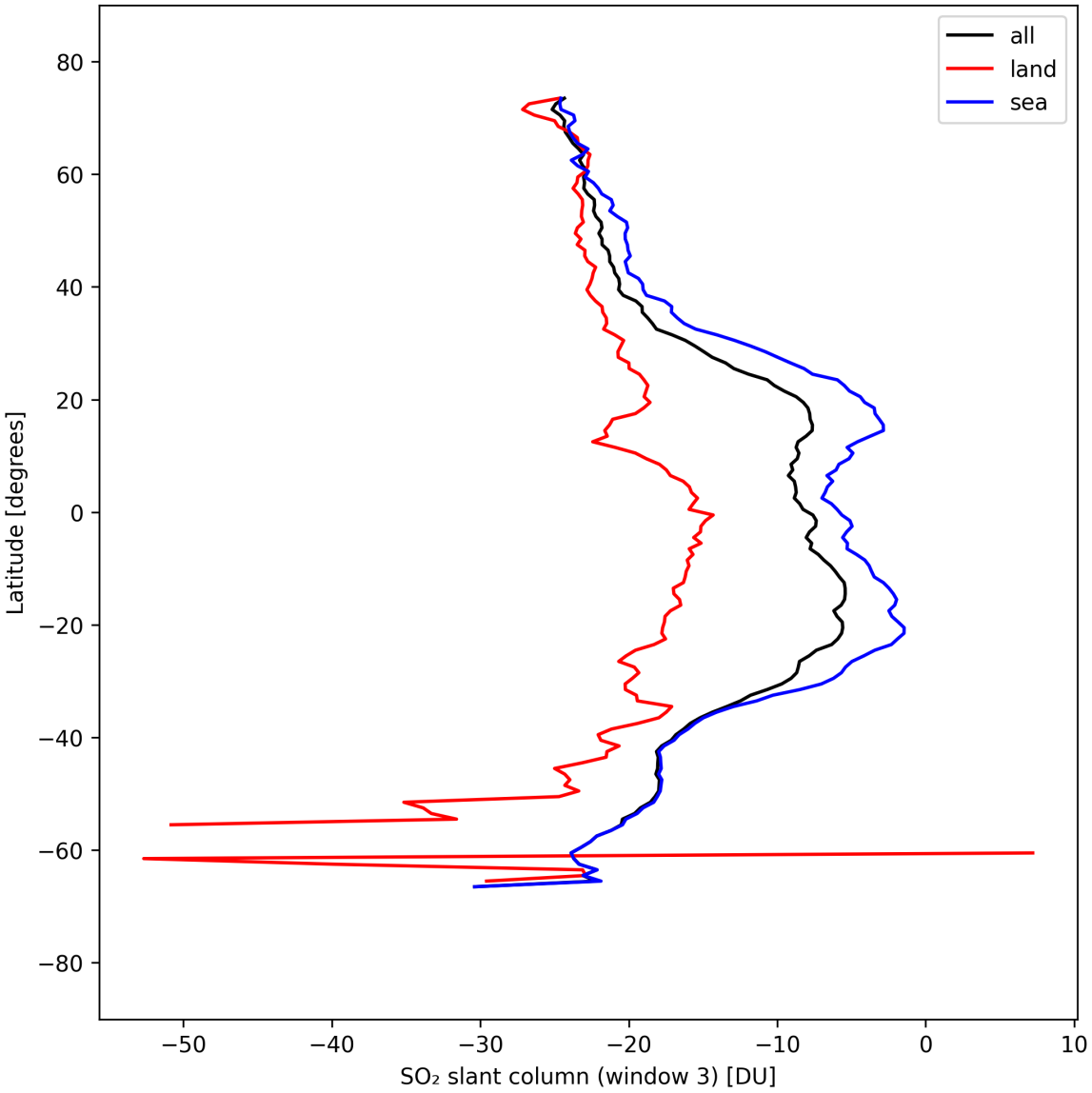

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-03-29 to 2025-03-30.

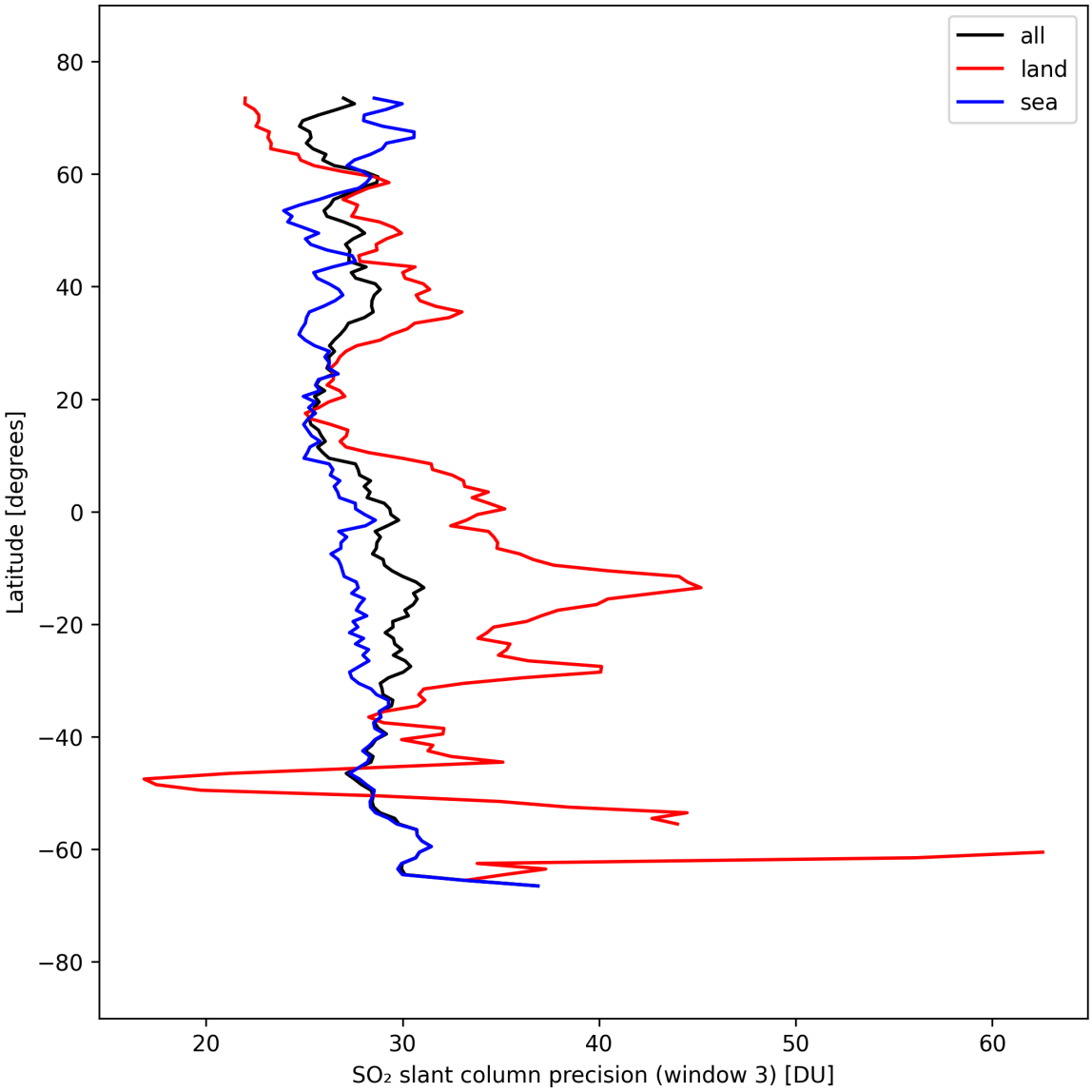

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-03-29 to 2025-03-30.

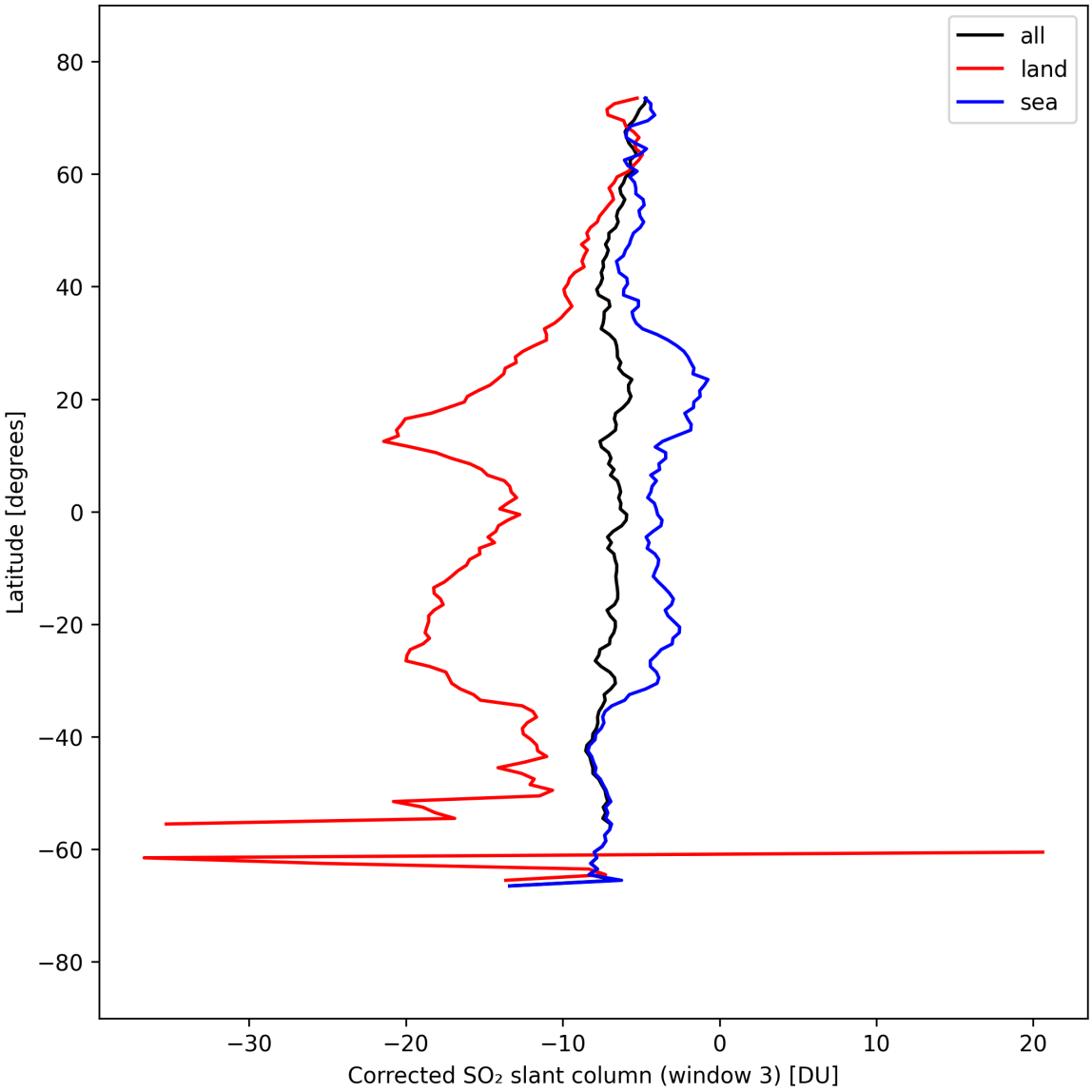

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-03-29 to 2025-03-30.

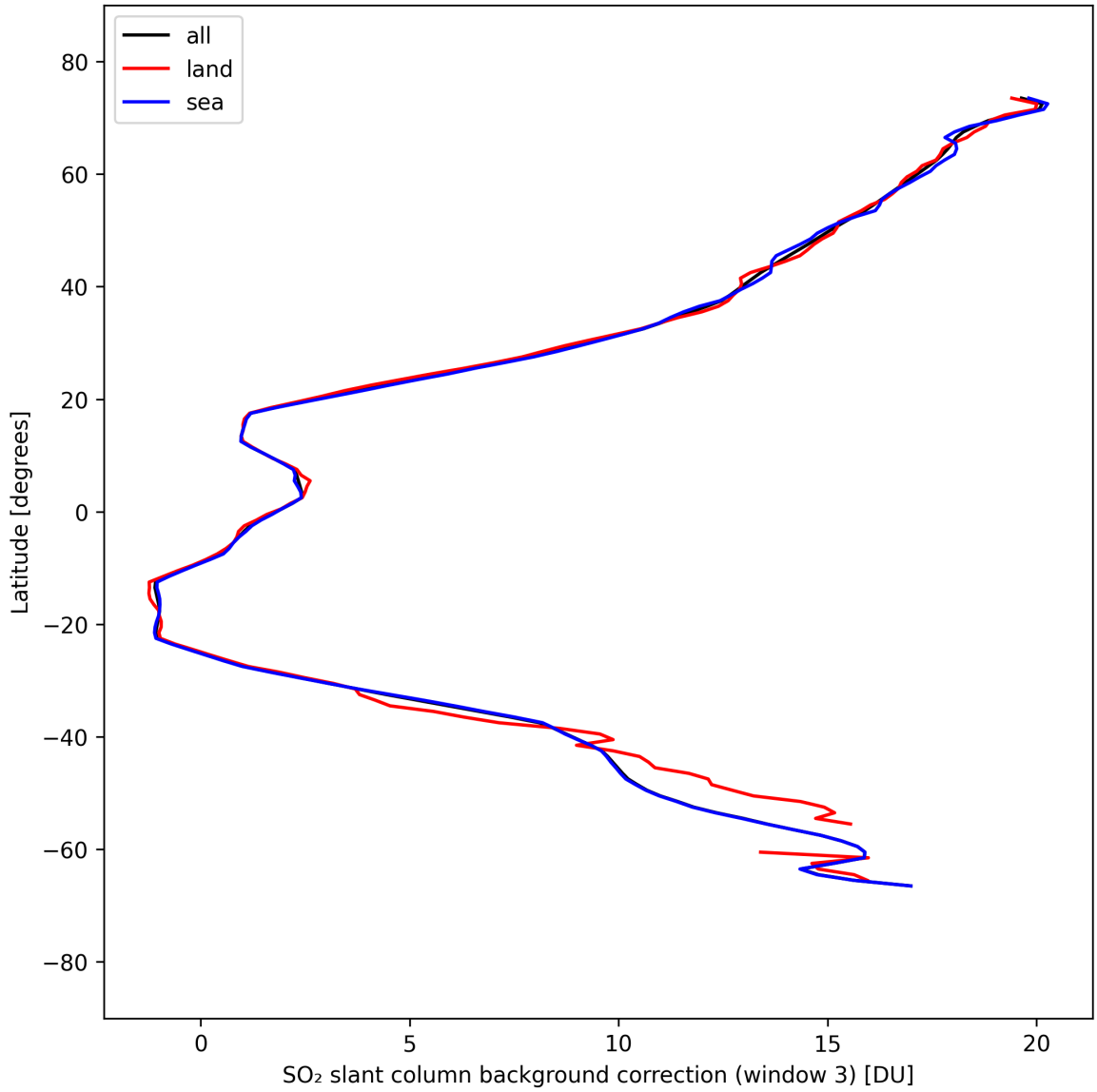

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-03-29 to 2025-03-30.

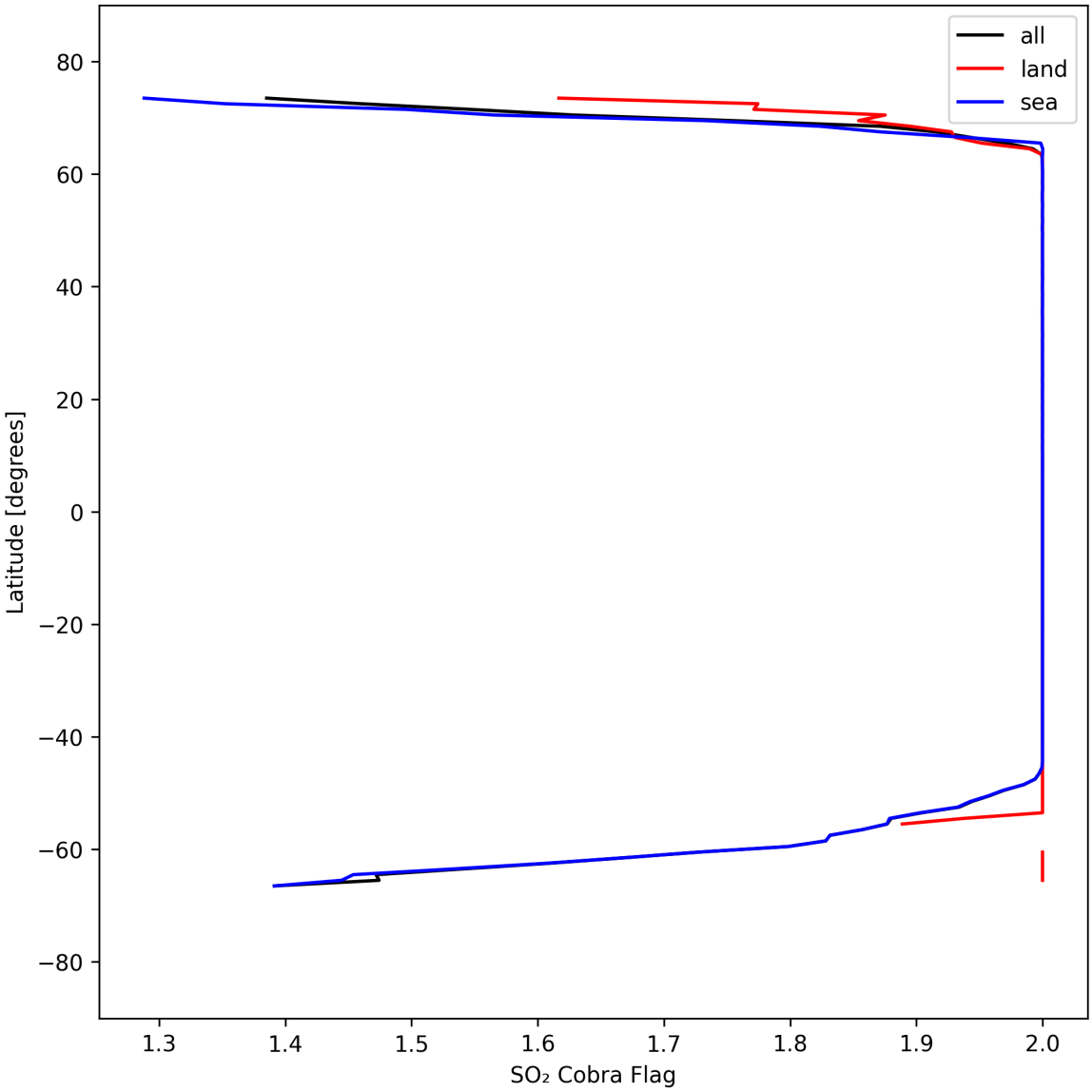

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-03-29 to 2025-03-30.

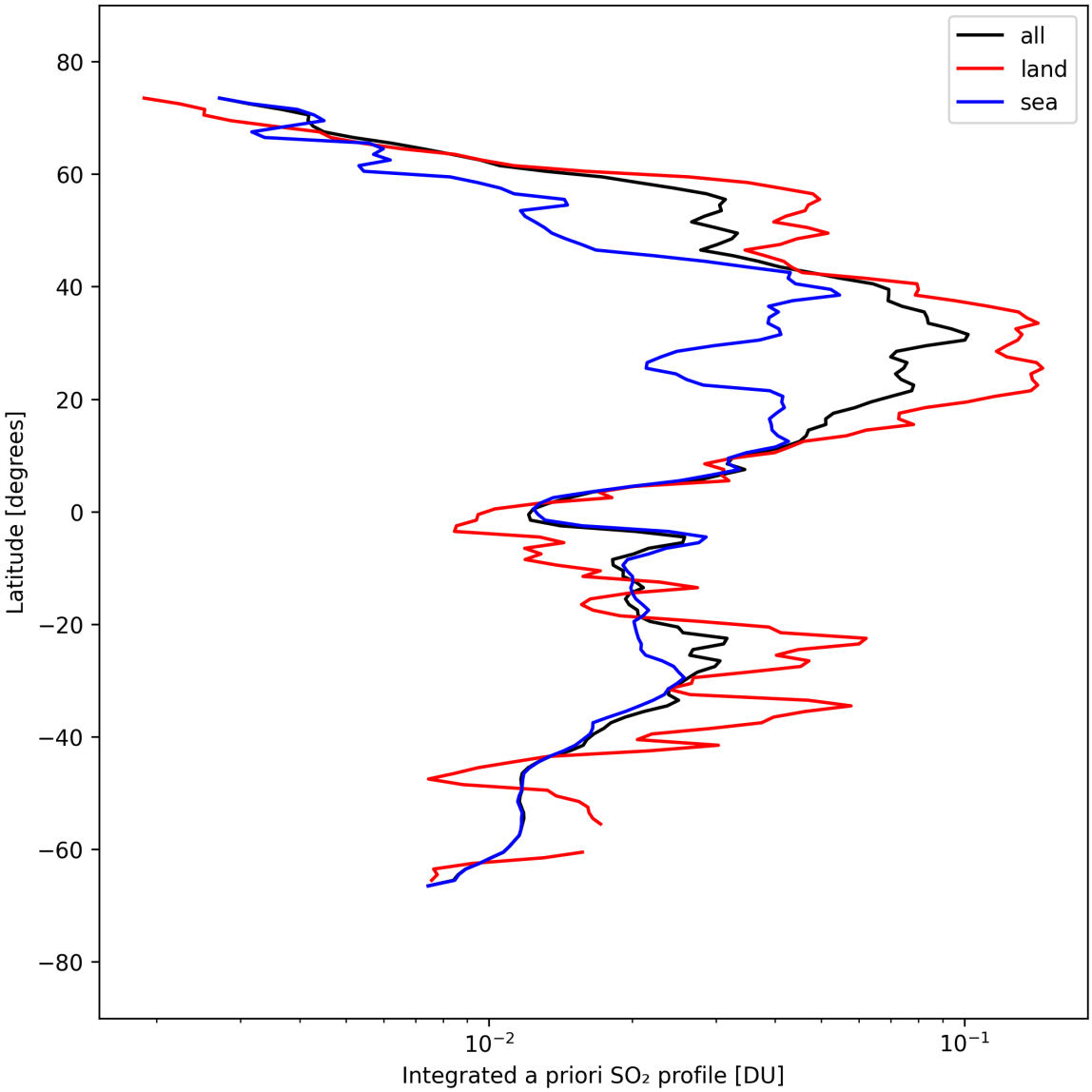

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-03-29 to 2025-03-30.

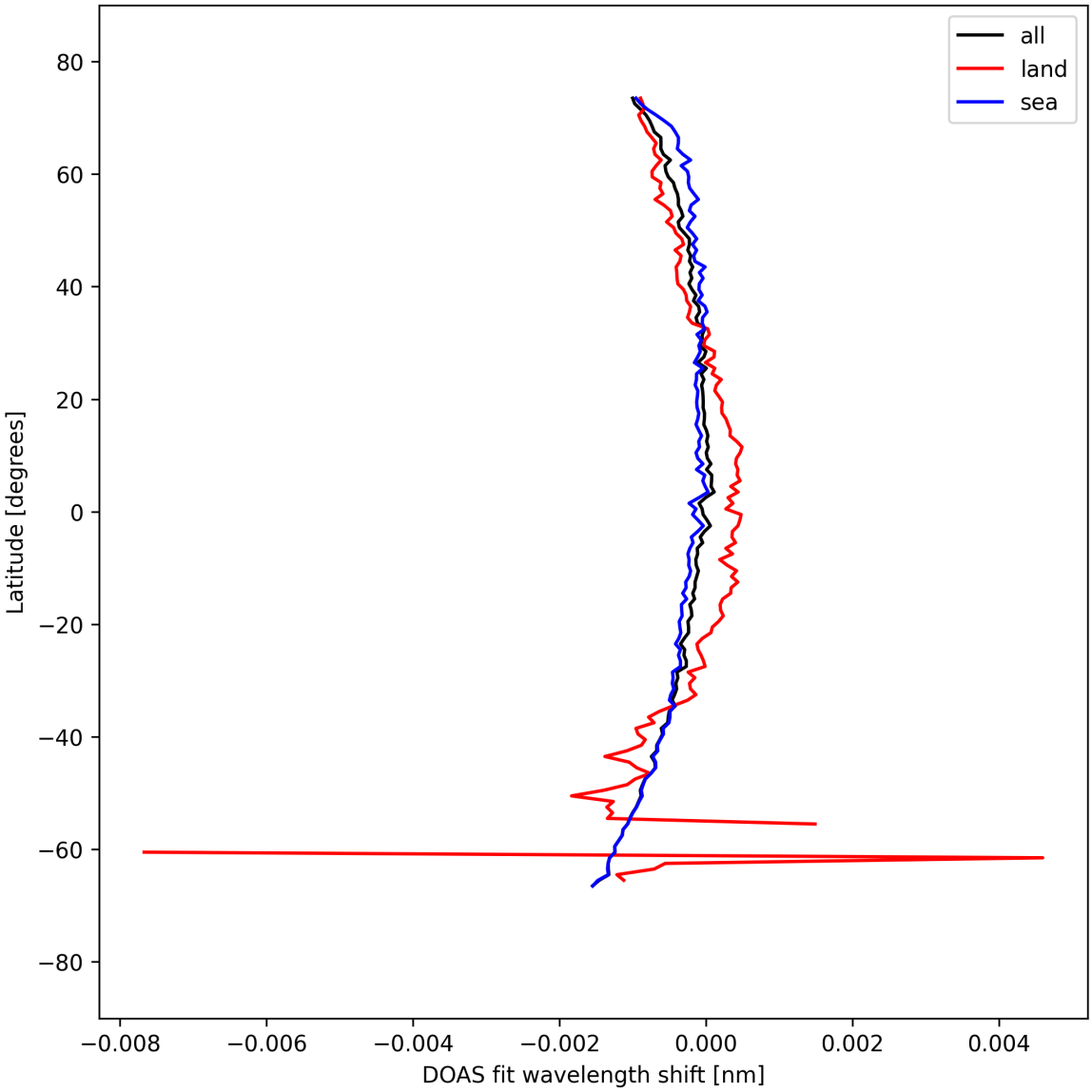

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-29 to 2025-03-30.

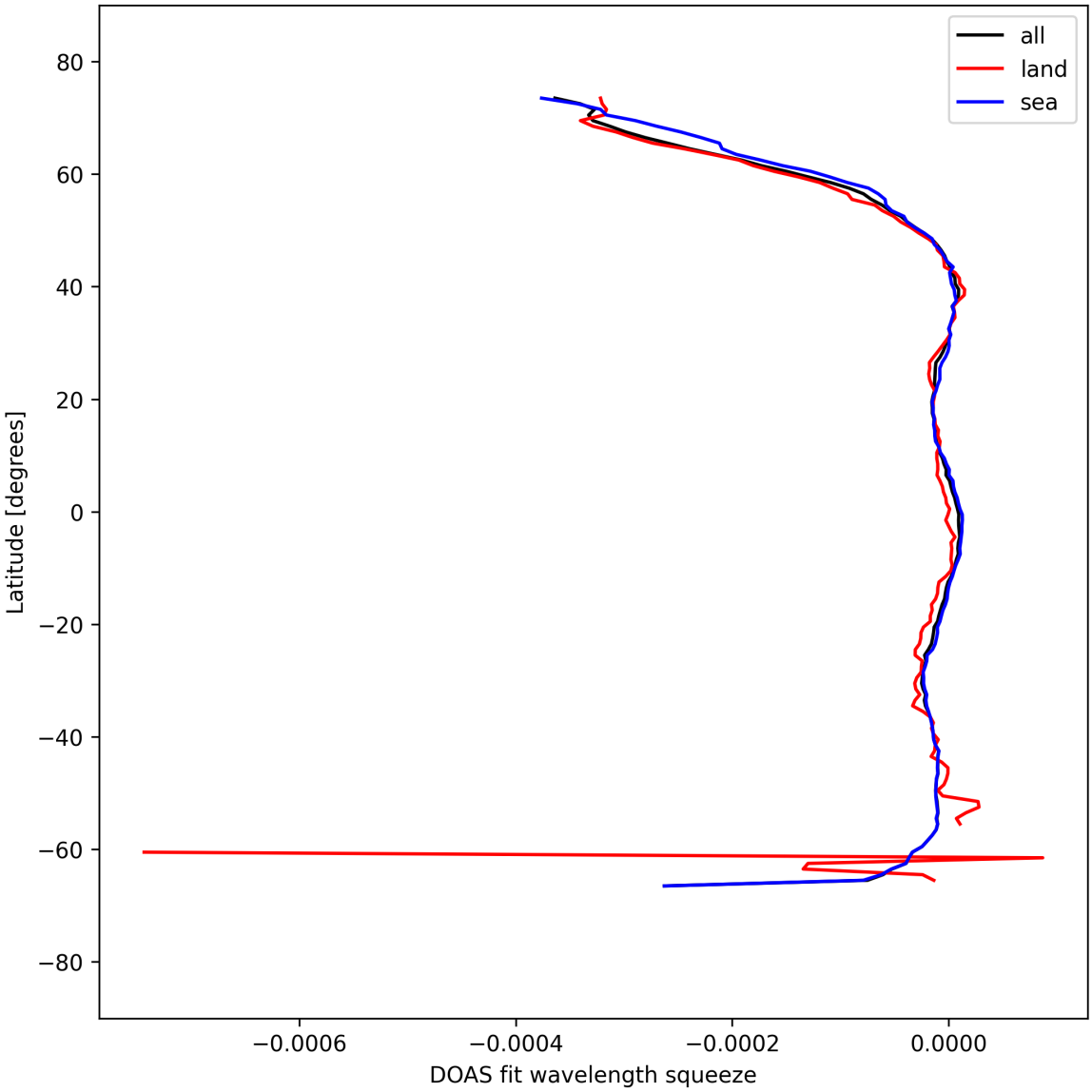

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-29 to 2025-03-30.

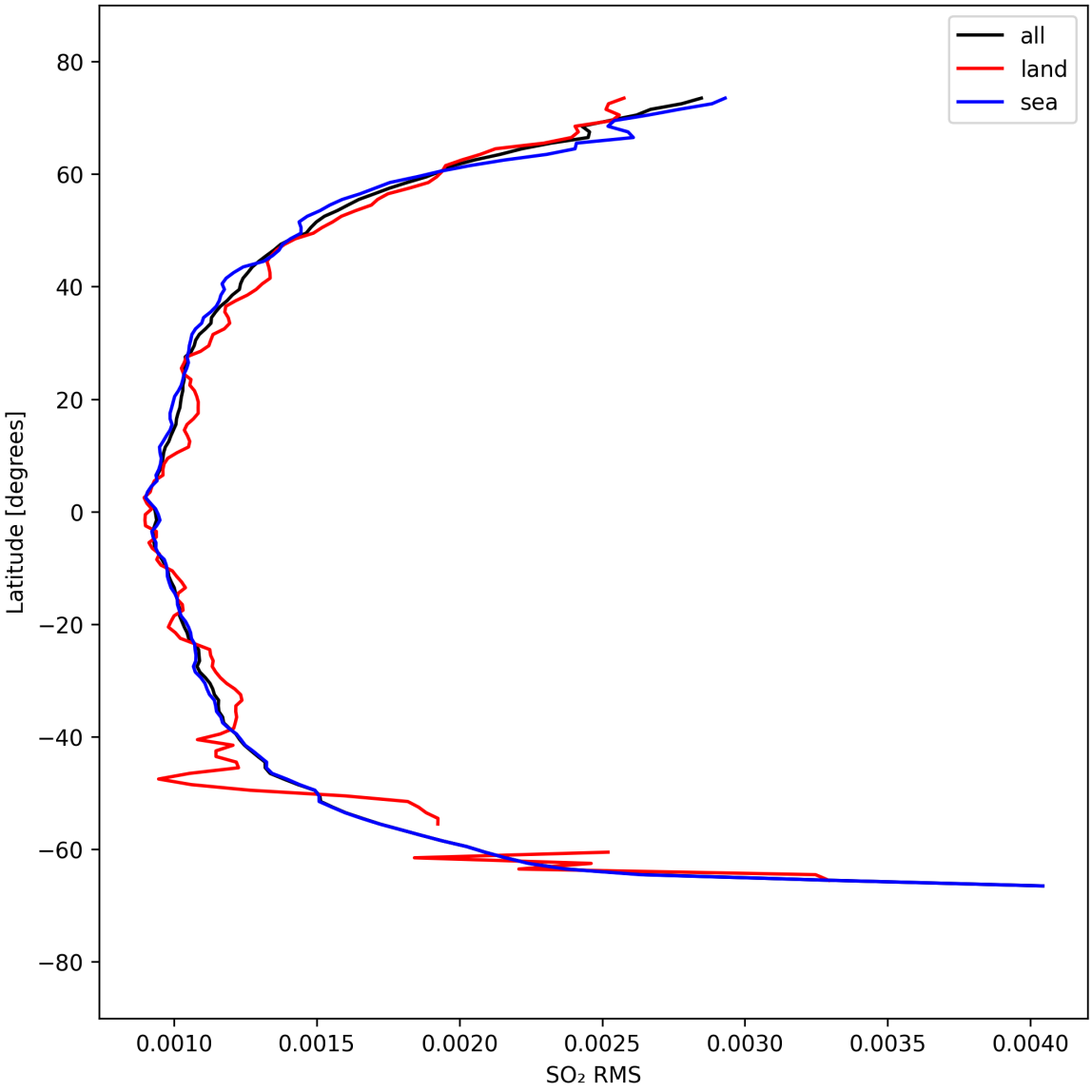

Figure 52: Zonal average of "SO_2 RMS" for 2025-03-29 to 2025-03-30.

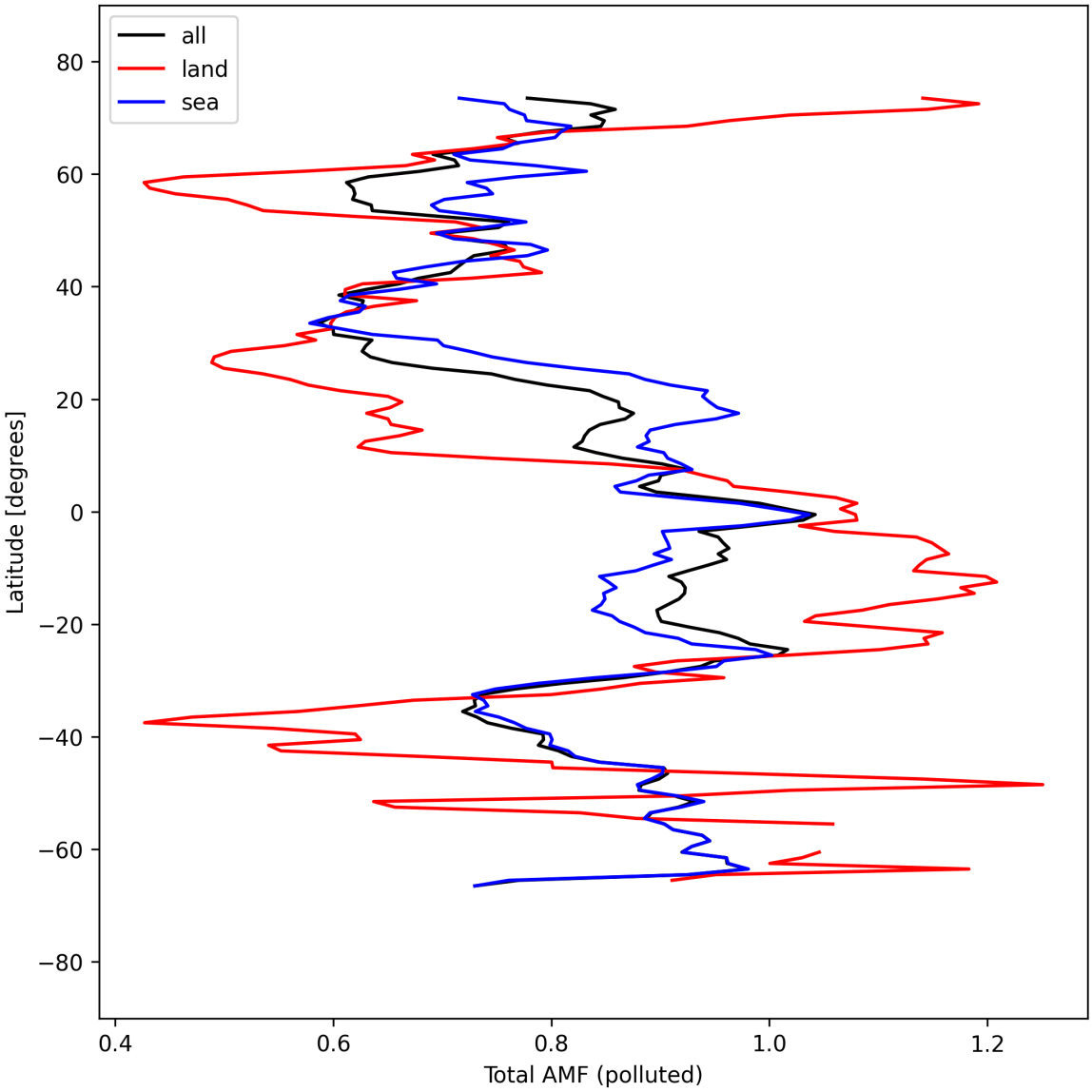

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-29 to 2025-03-30.

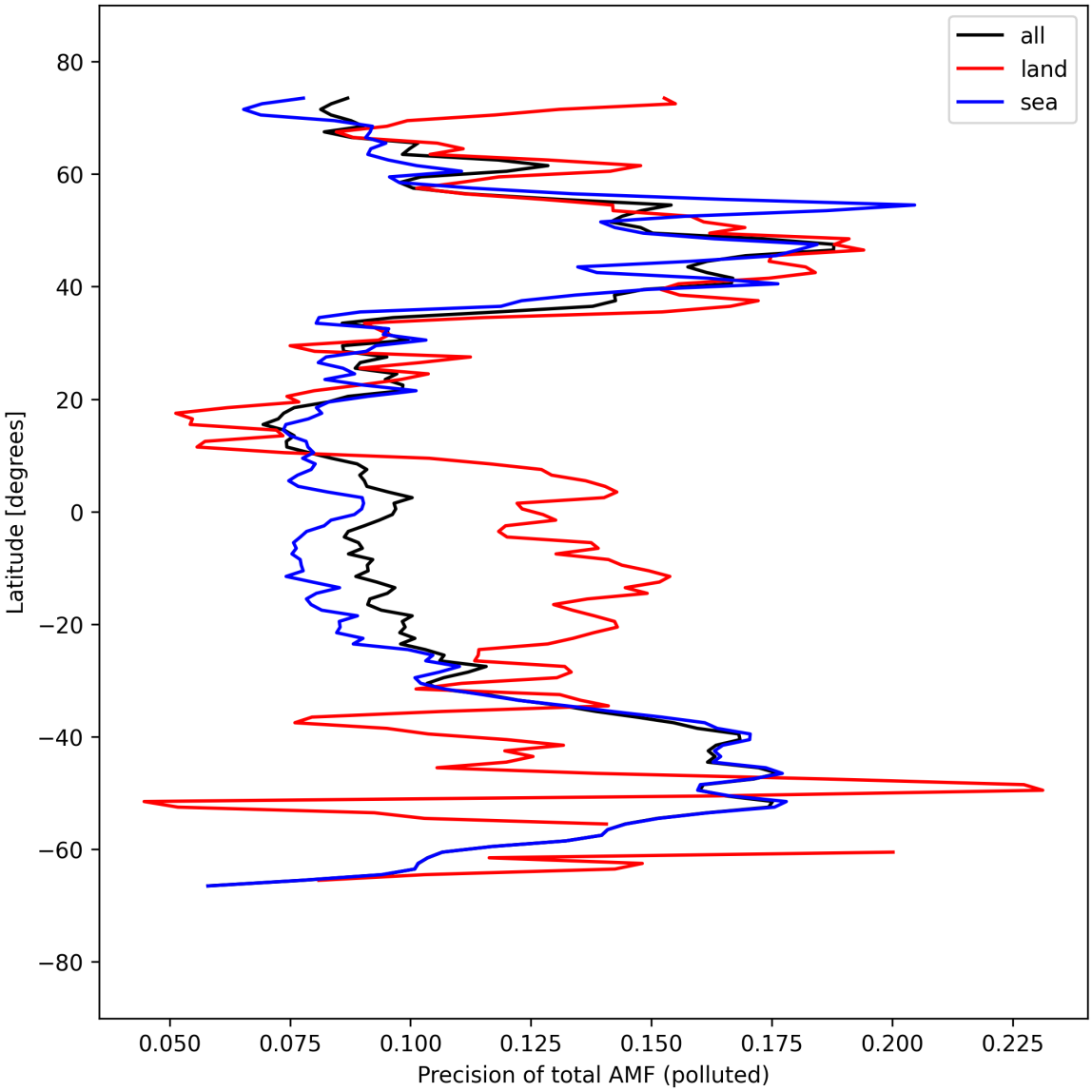

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-29 to 2025-03-30.

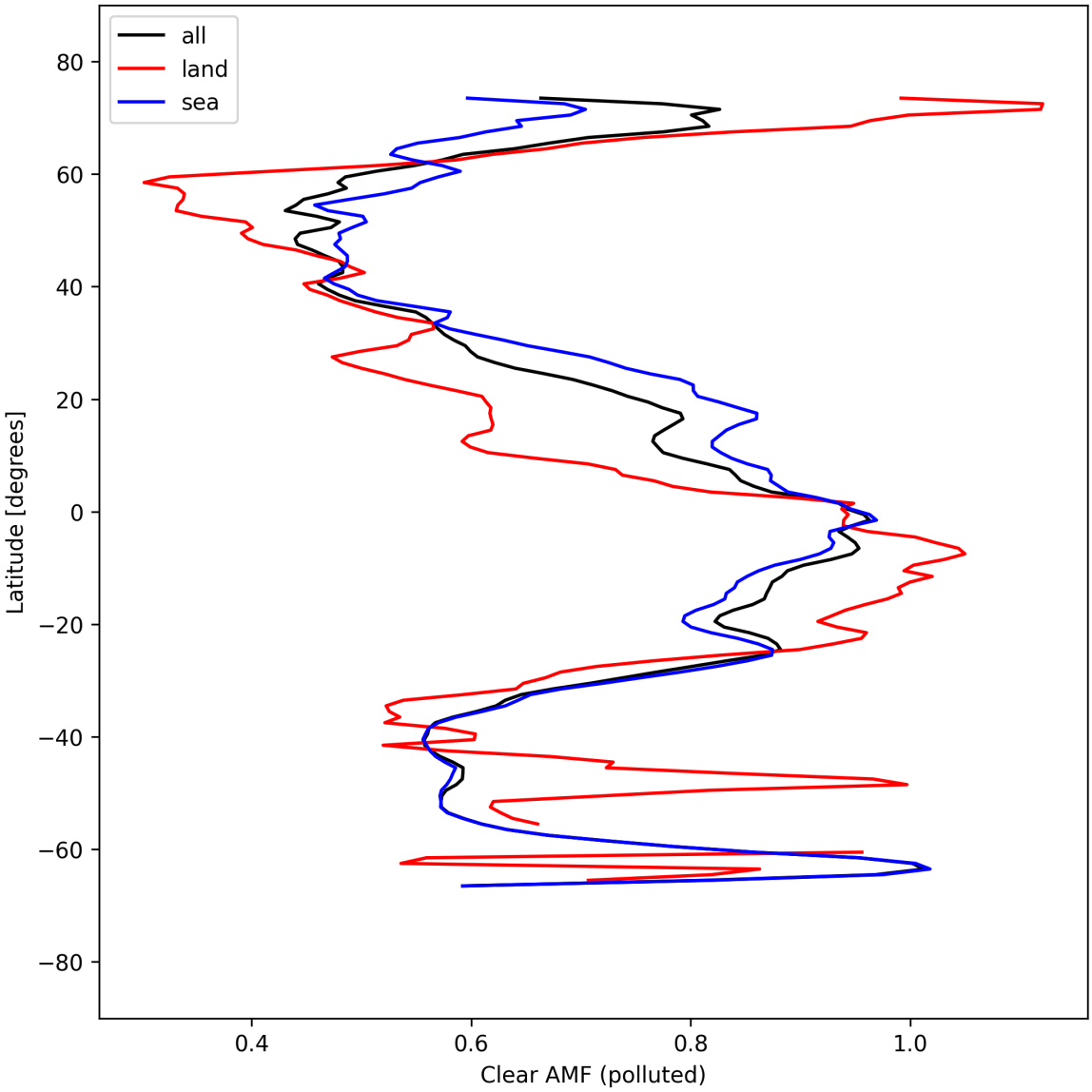

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-29 to 2025-03-30.

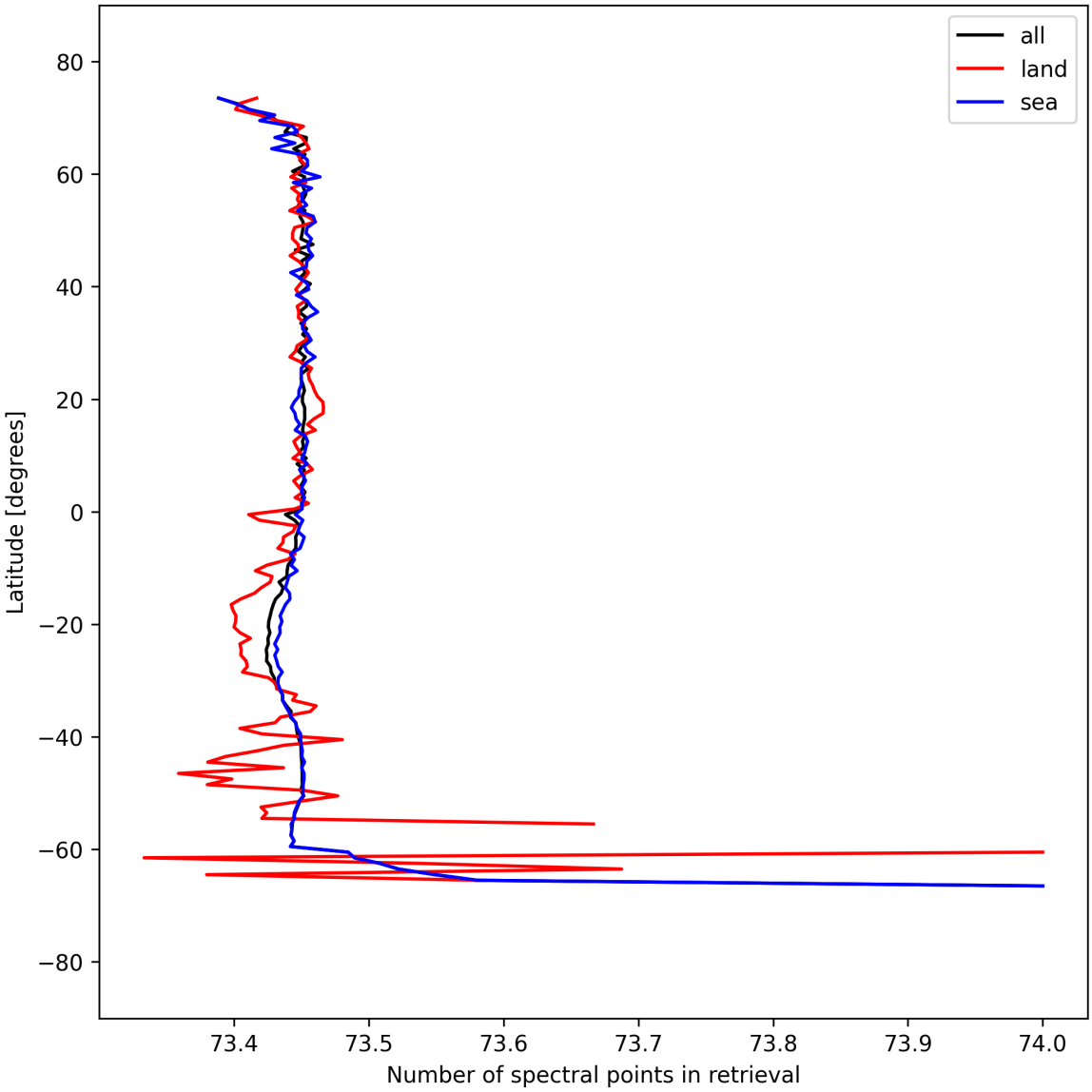

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-29 to 2025-03-30.

8 Histograms

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

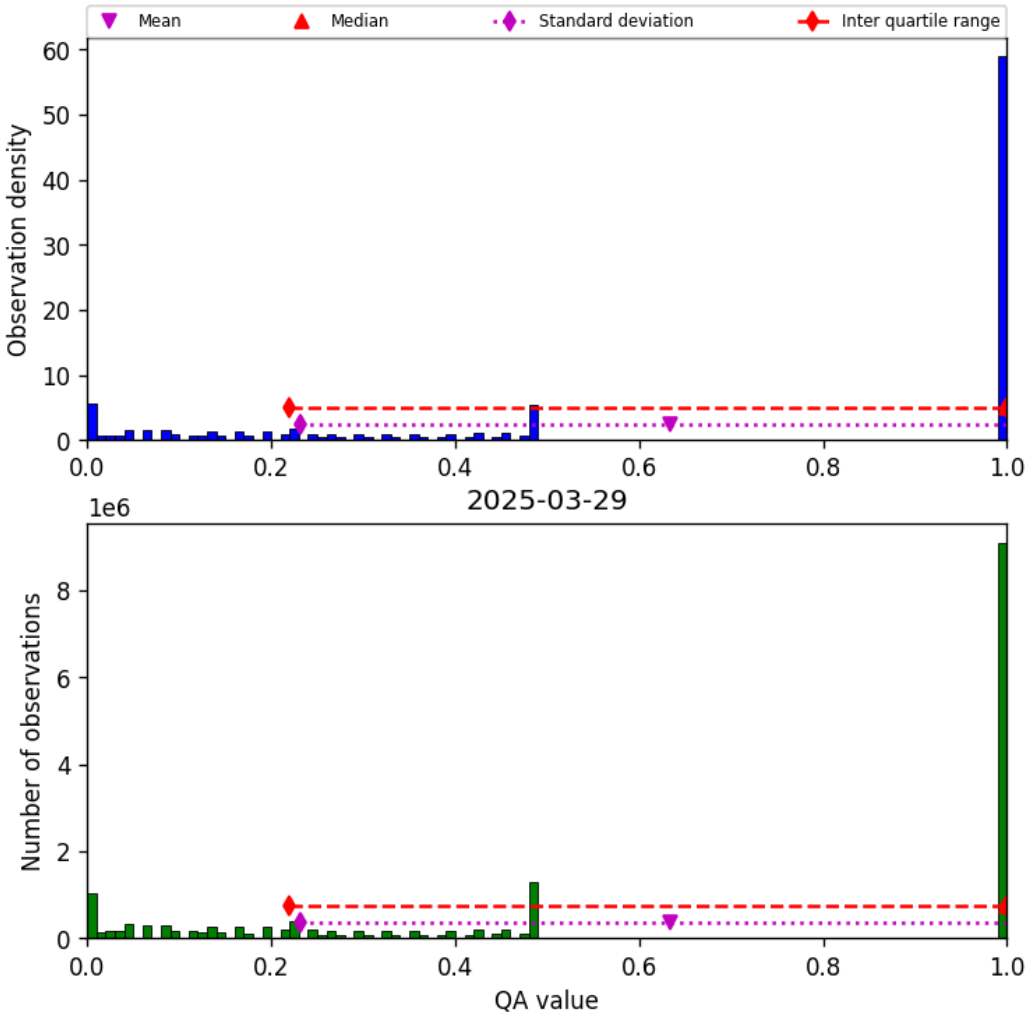

Figure 57: Histogram of “QA value” for 2025-03-29 to 2025-03-30

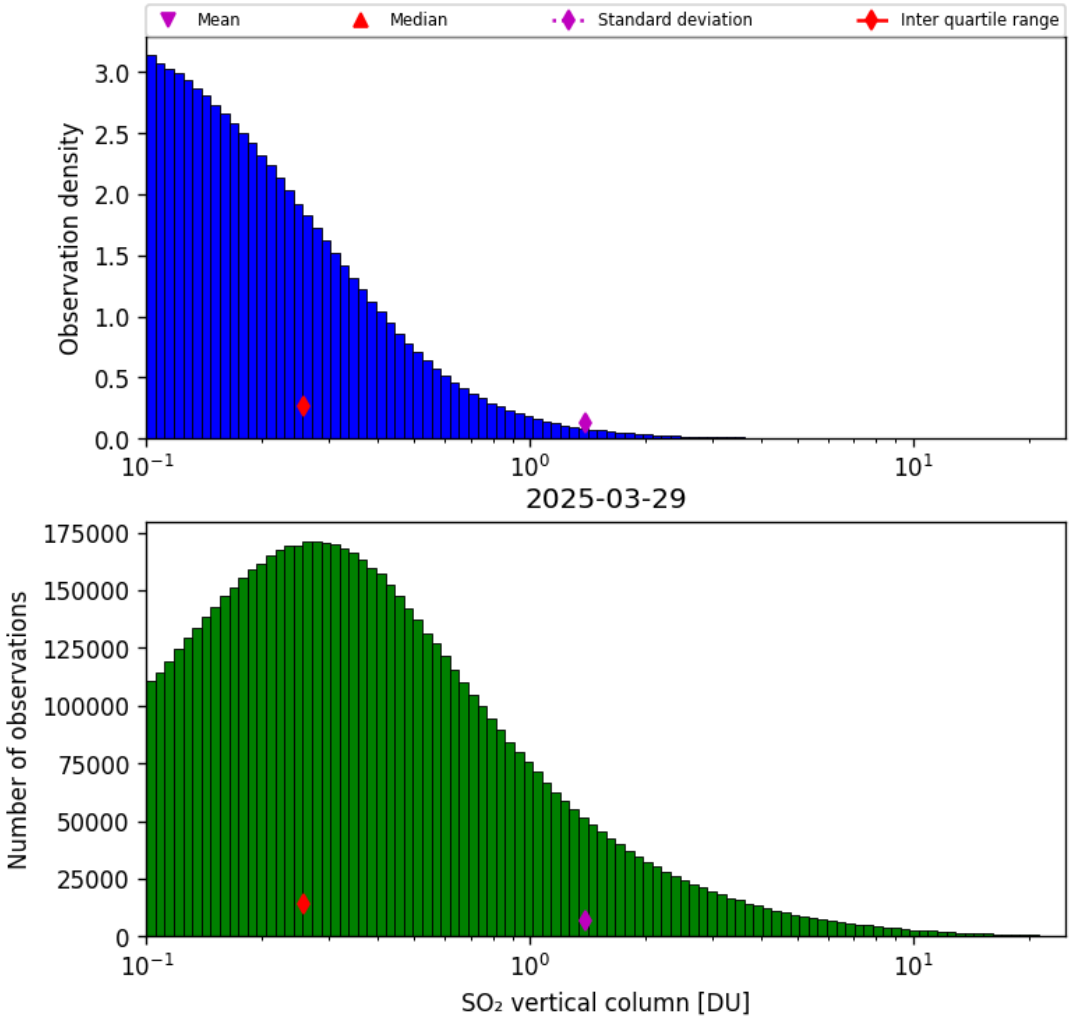

Figure 58: Histogram of "SO_2 vertical column" for 2025-03-29 to 2025-03-30

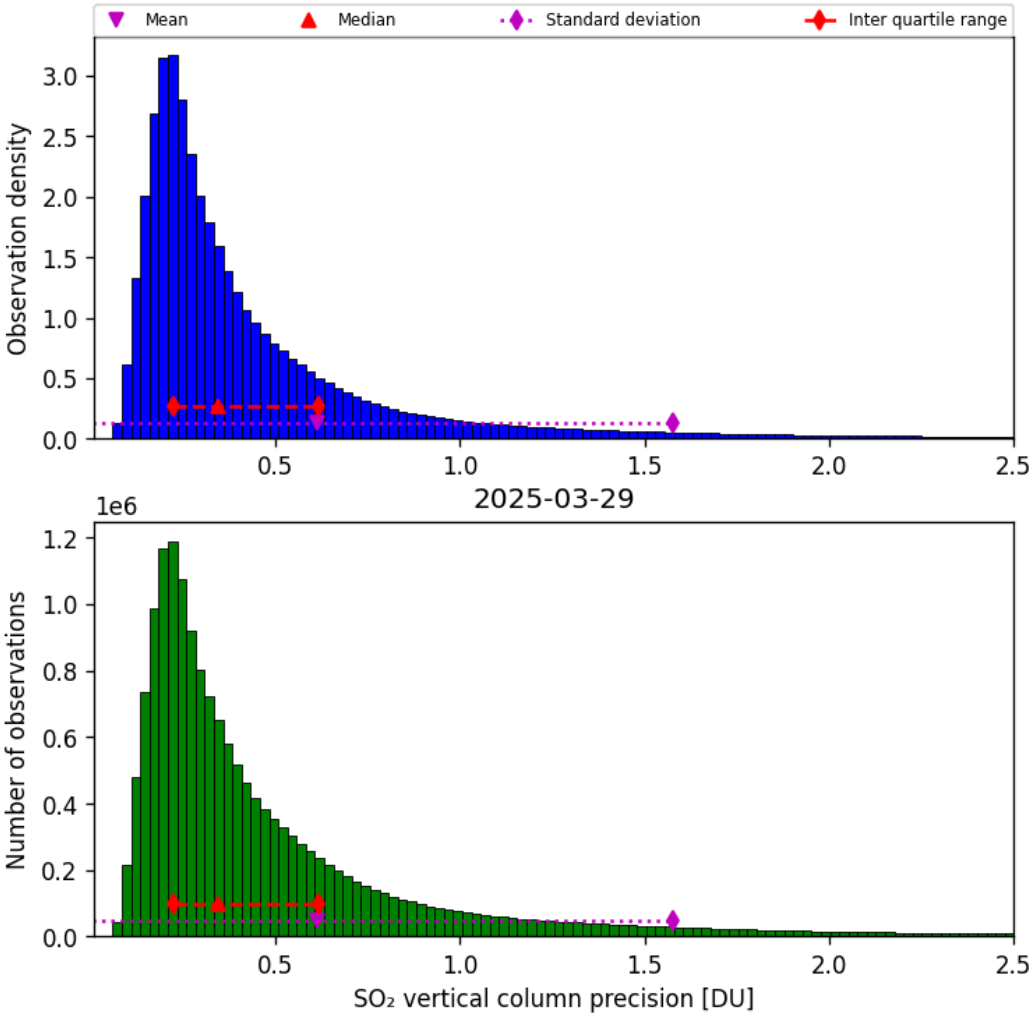

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-03-29 to 2025-03-30

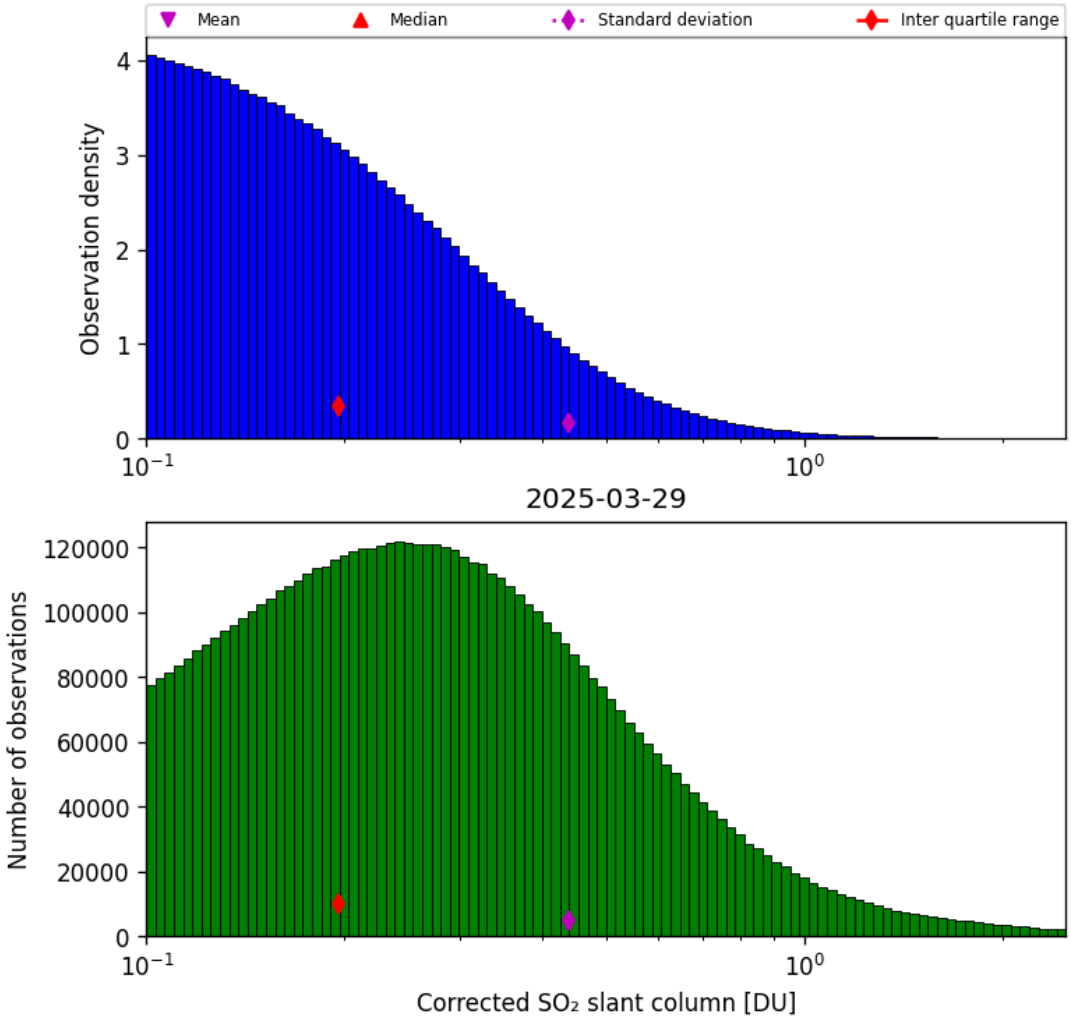

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-03-29 to 2025-03-30

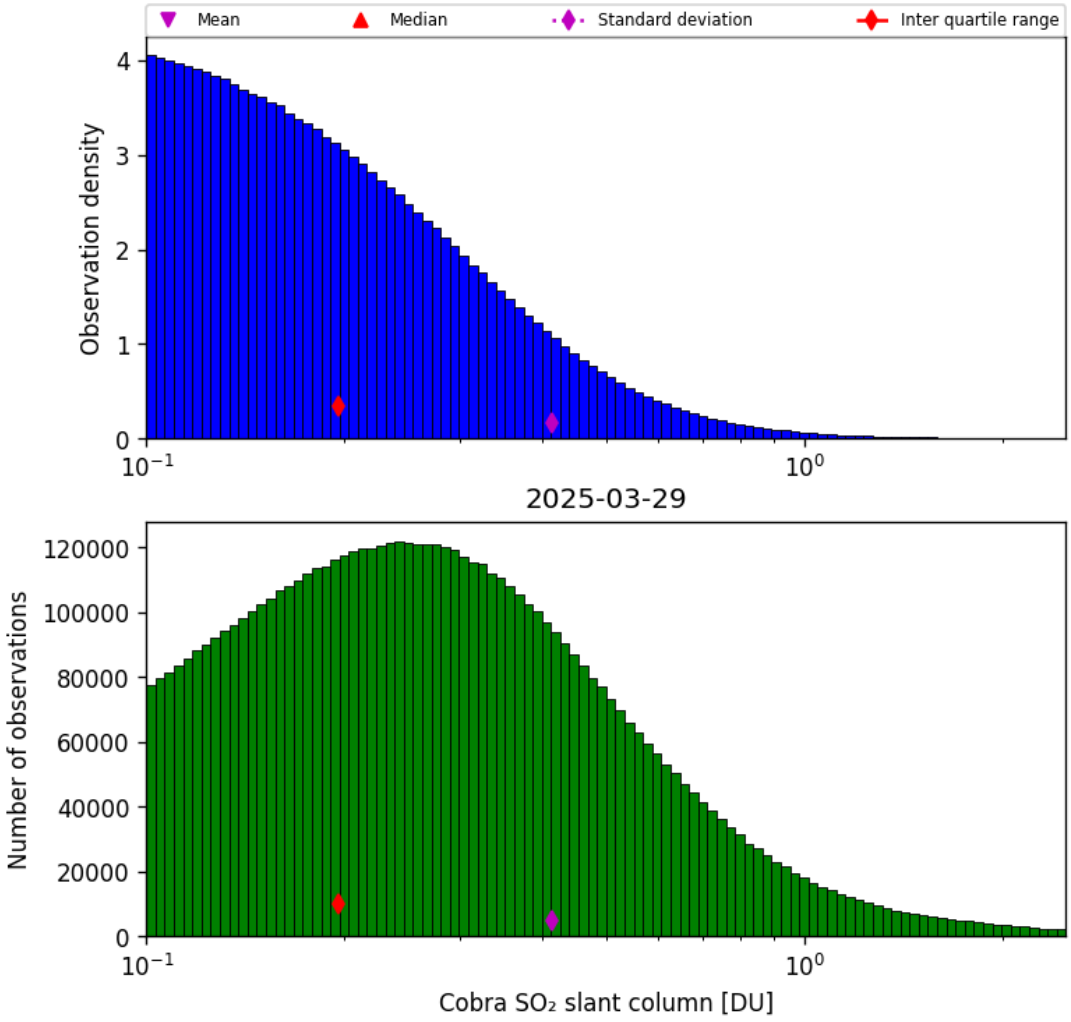

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-03-29 to 2025-03-30

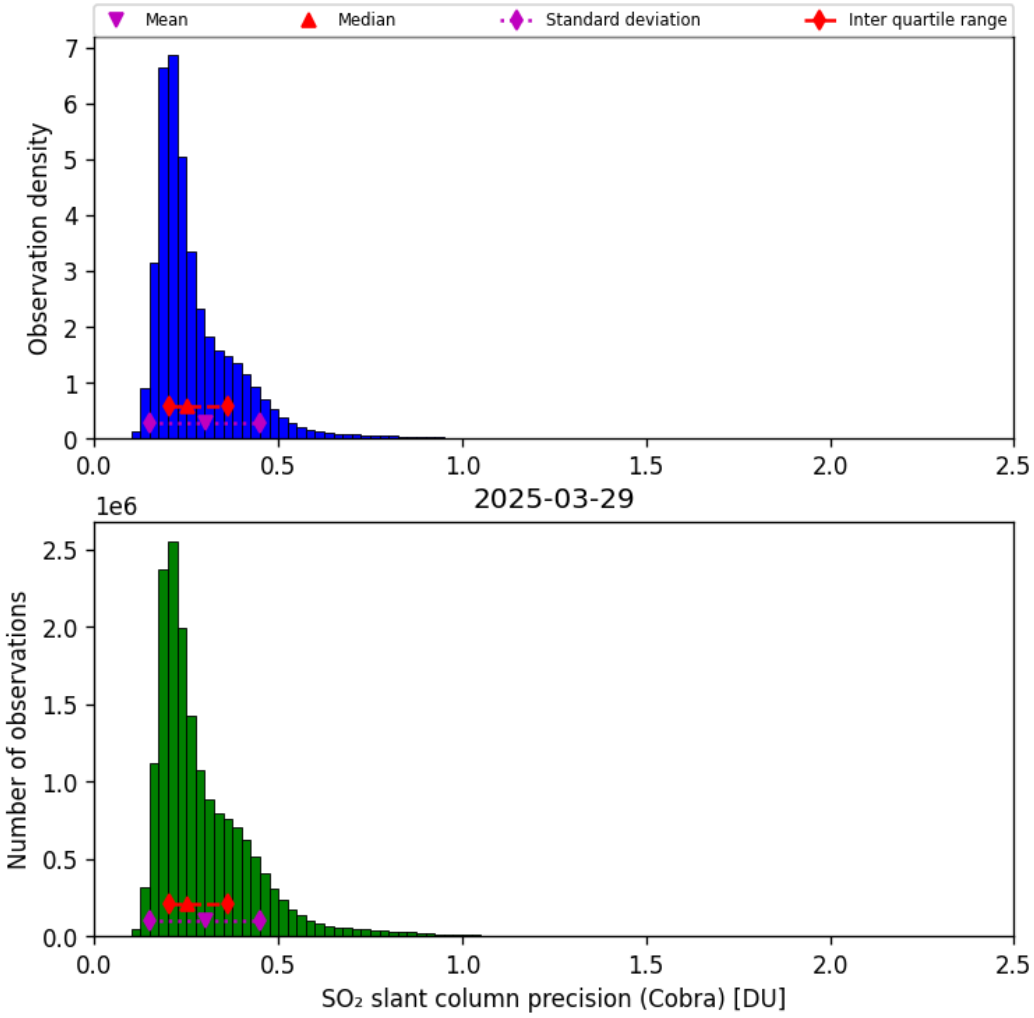

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-03-29 to 2025-03-30

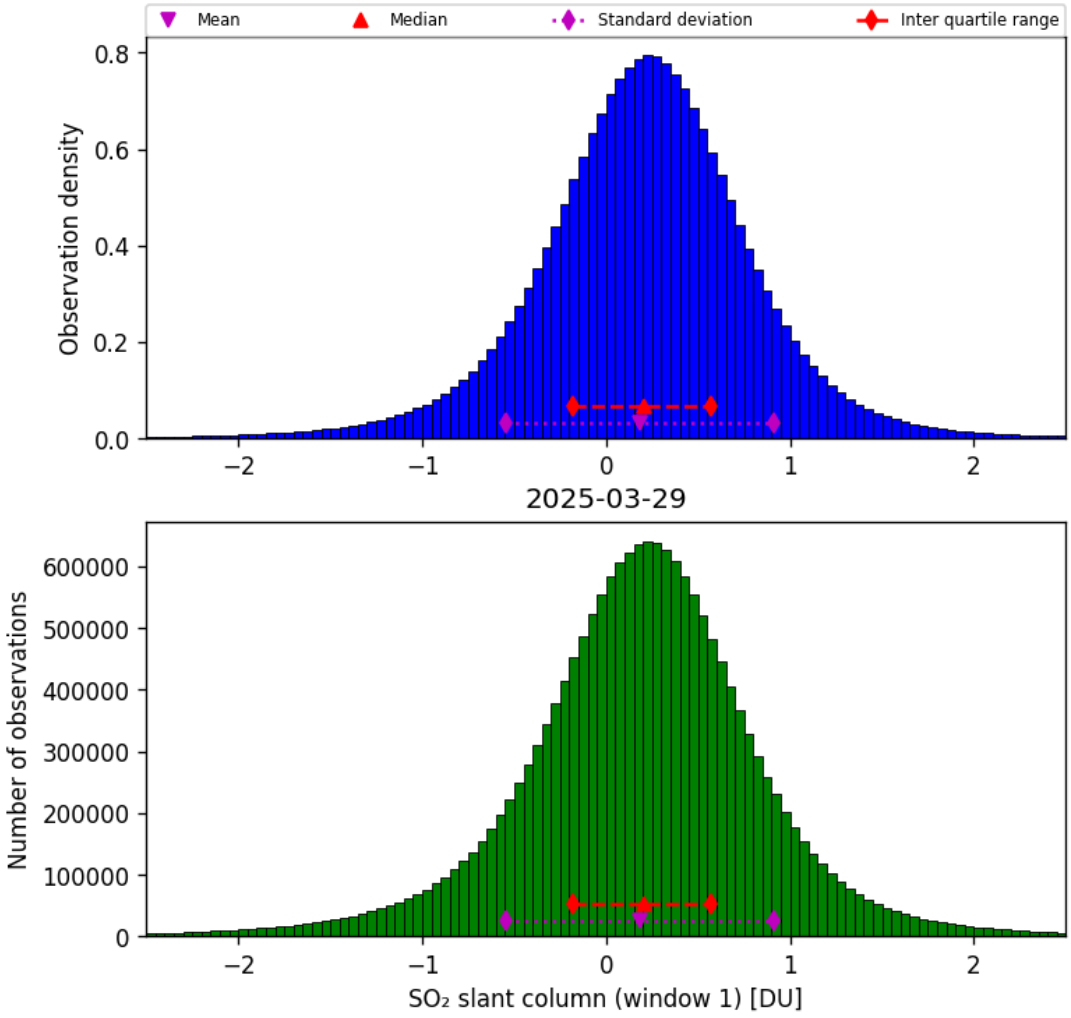

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-03-29 to 2025-03-30

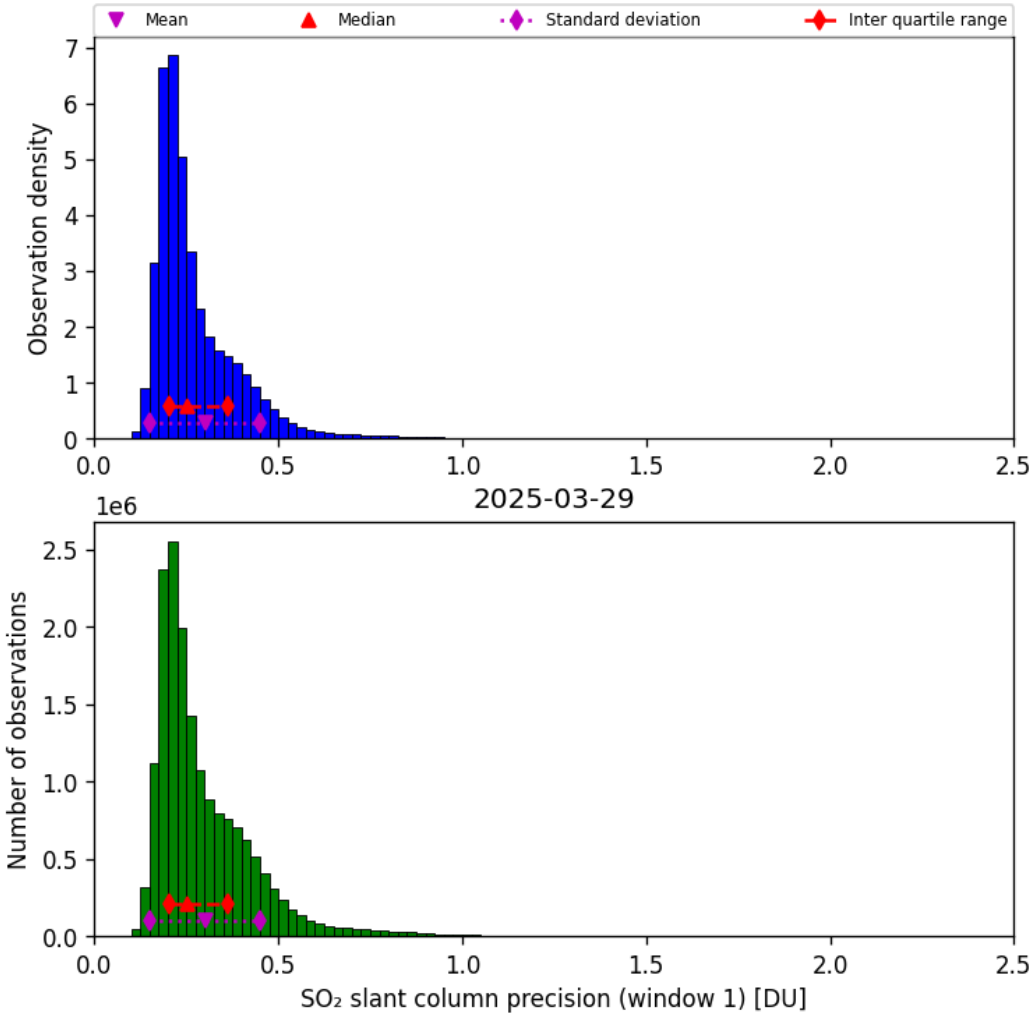

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-03-29 to 2025-03-30

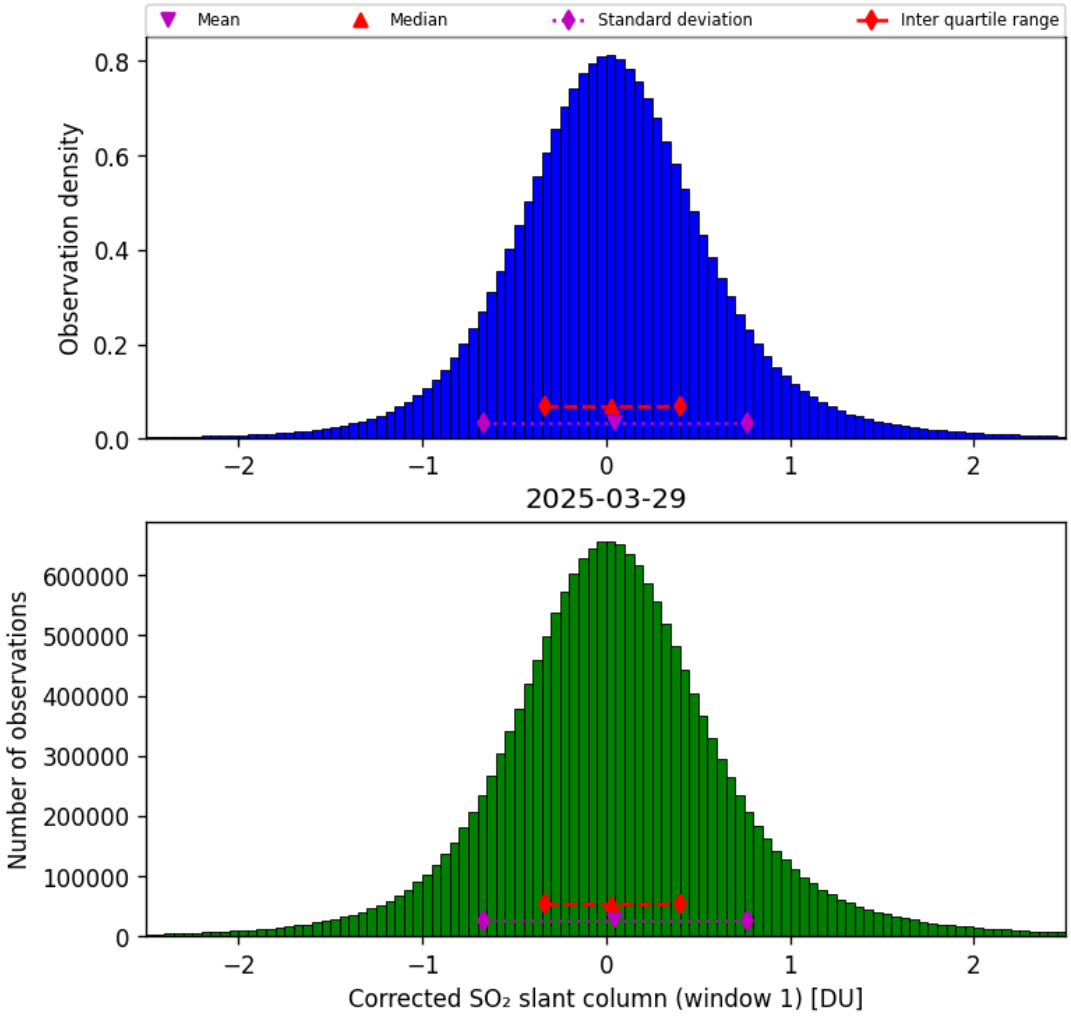

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-03-29 to 2025-03-30

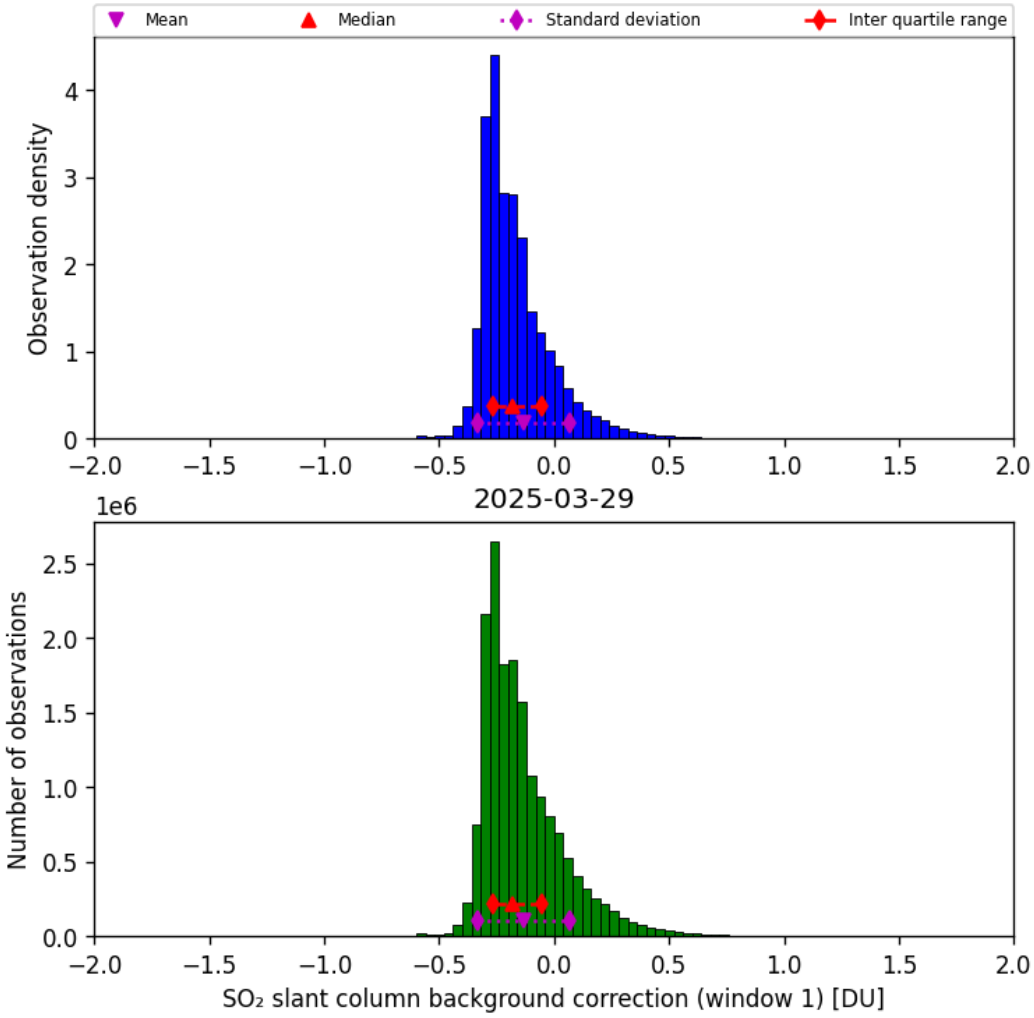

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-03-29 to 2025-03-30

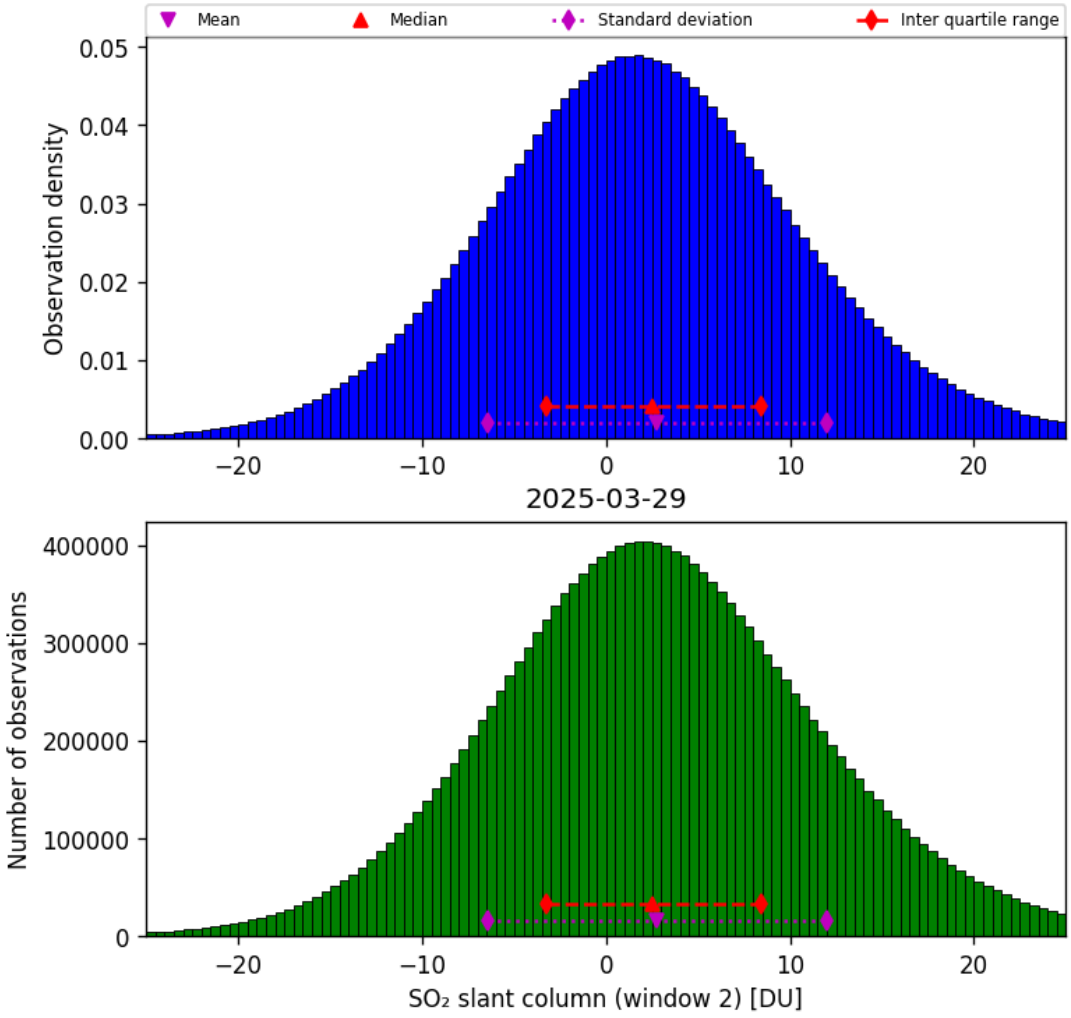

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-03-29 to 2025-03-30

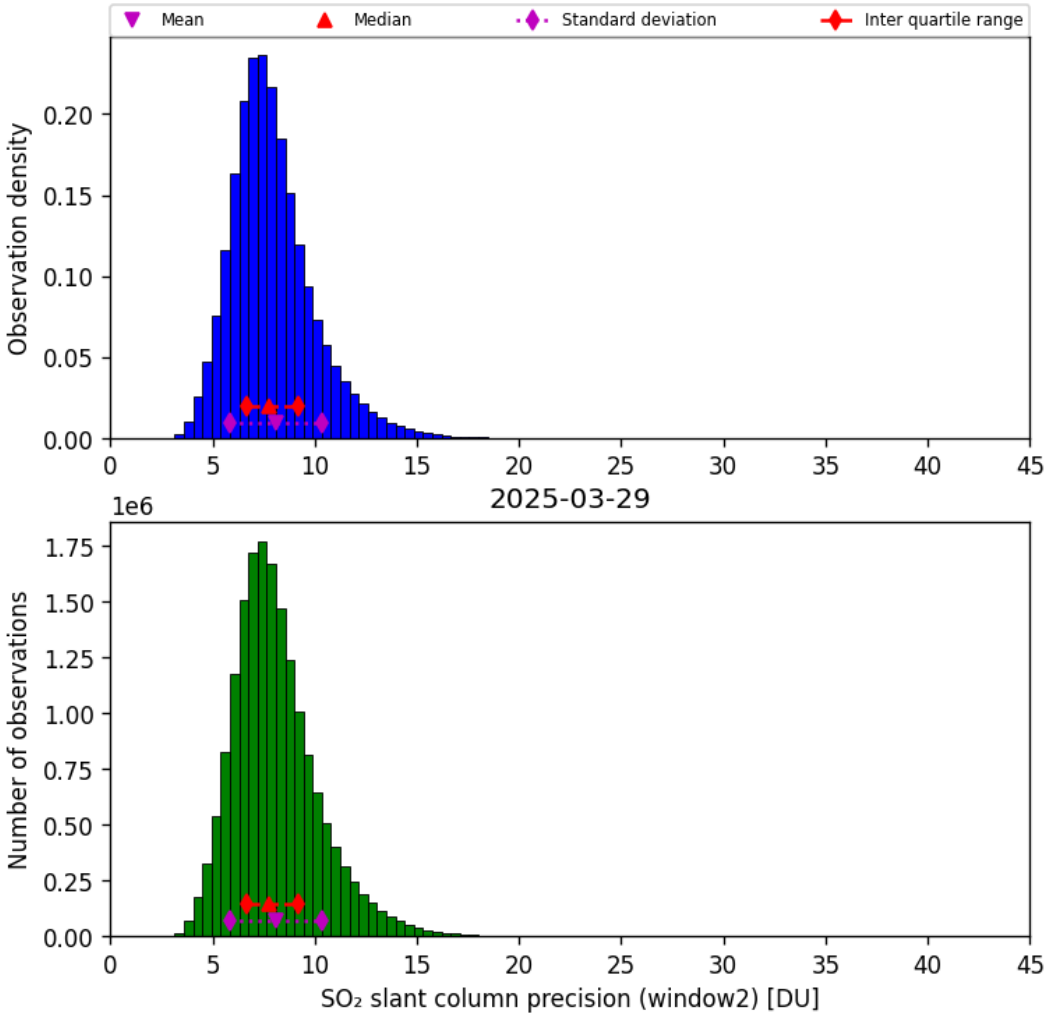

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-03-29 to 2025-03-30

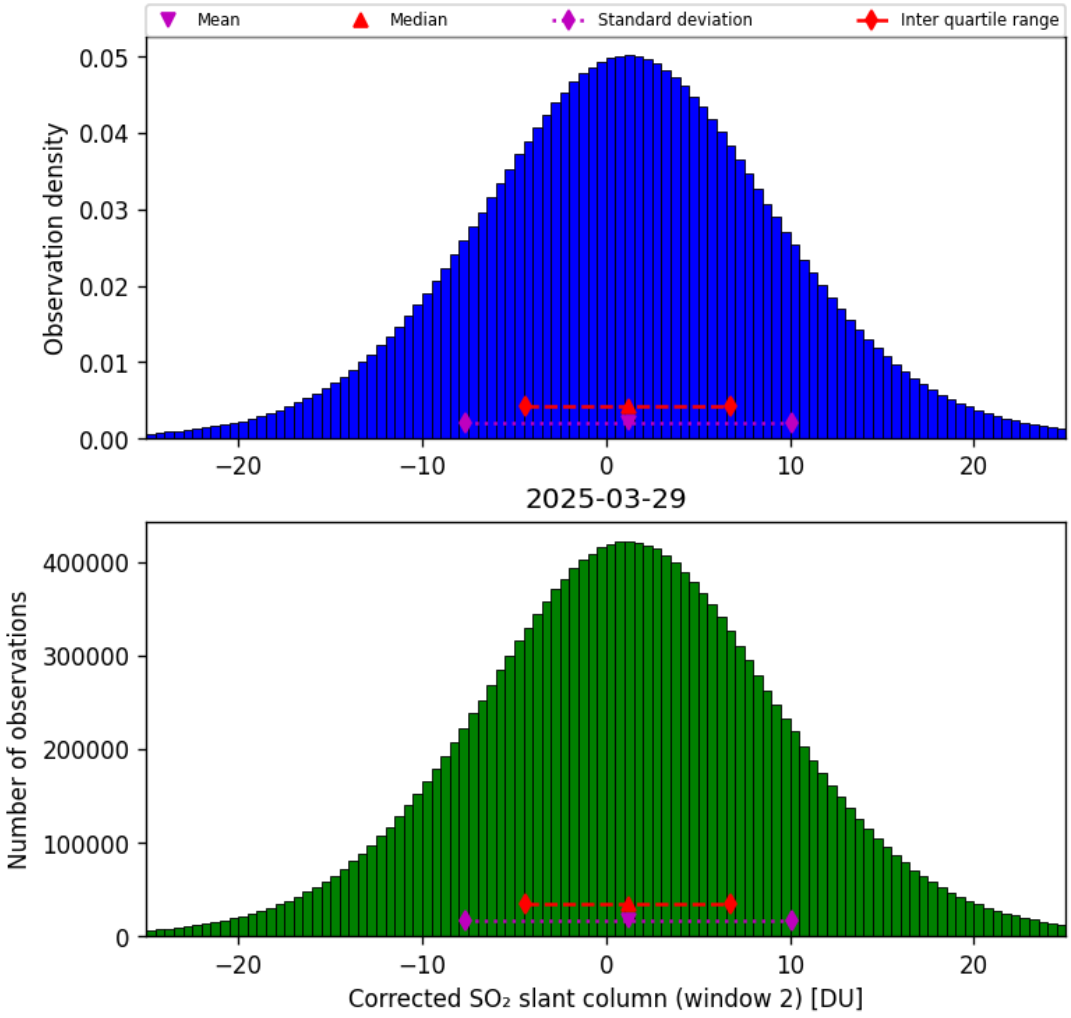

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-03-29 to 2025-03-30

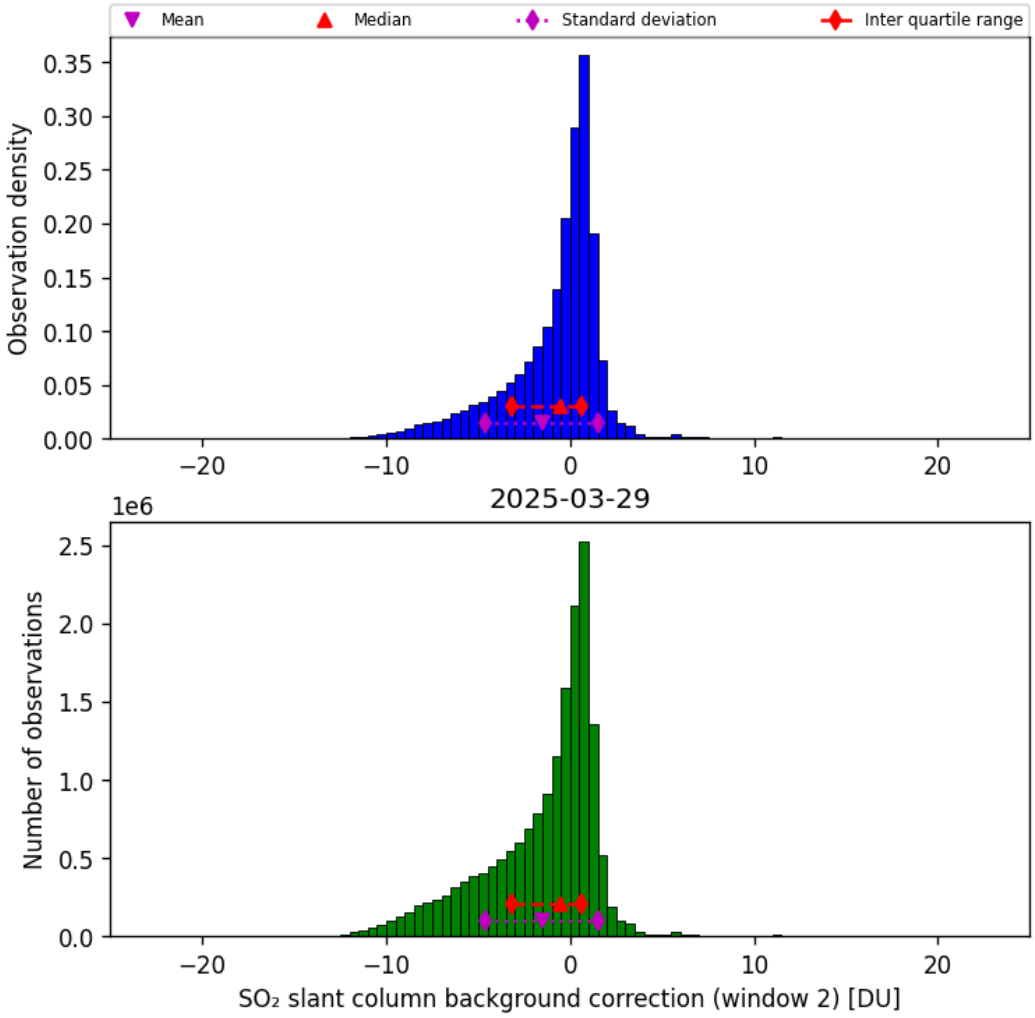

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-03-29 to 2025-03-30

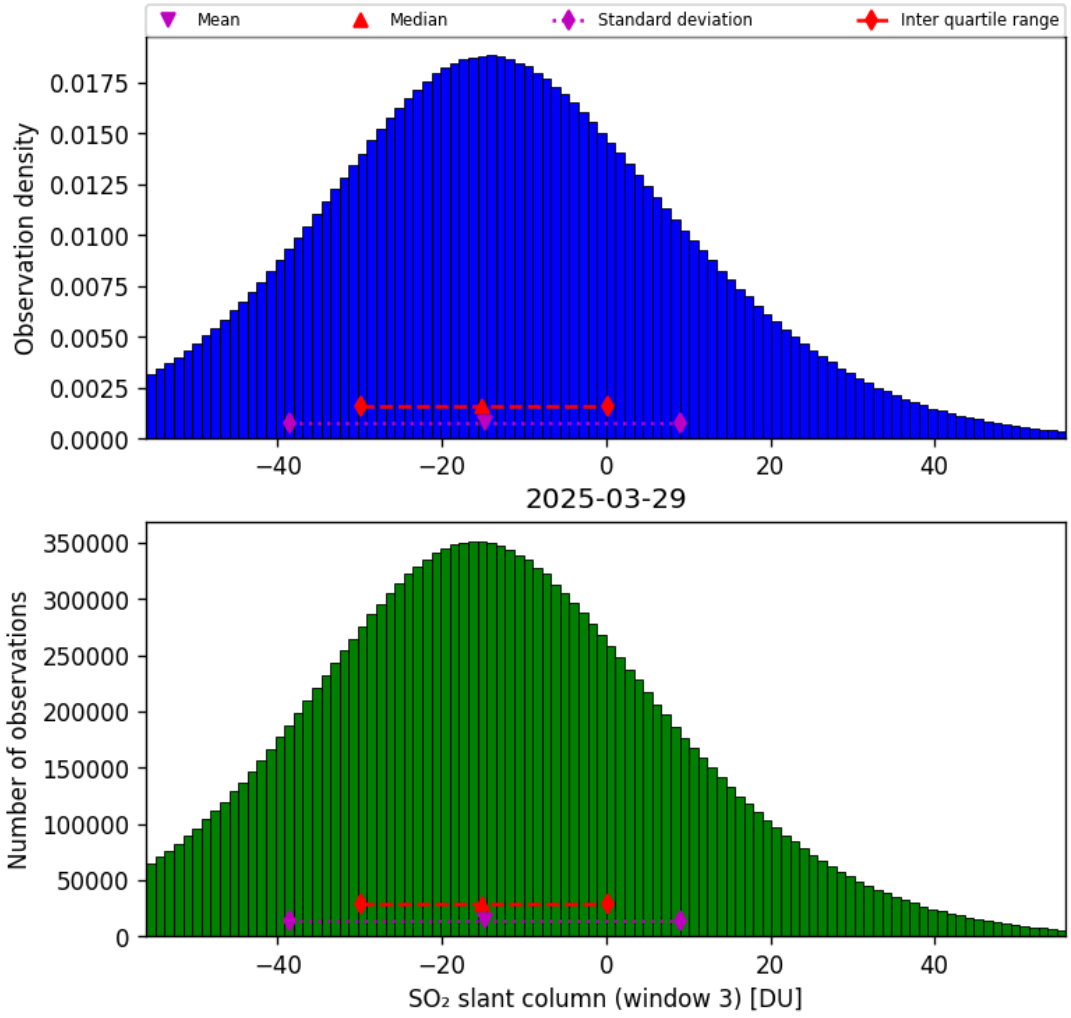

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-03-29 to 2025-03-30

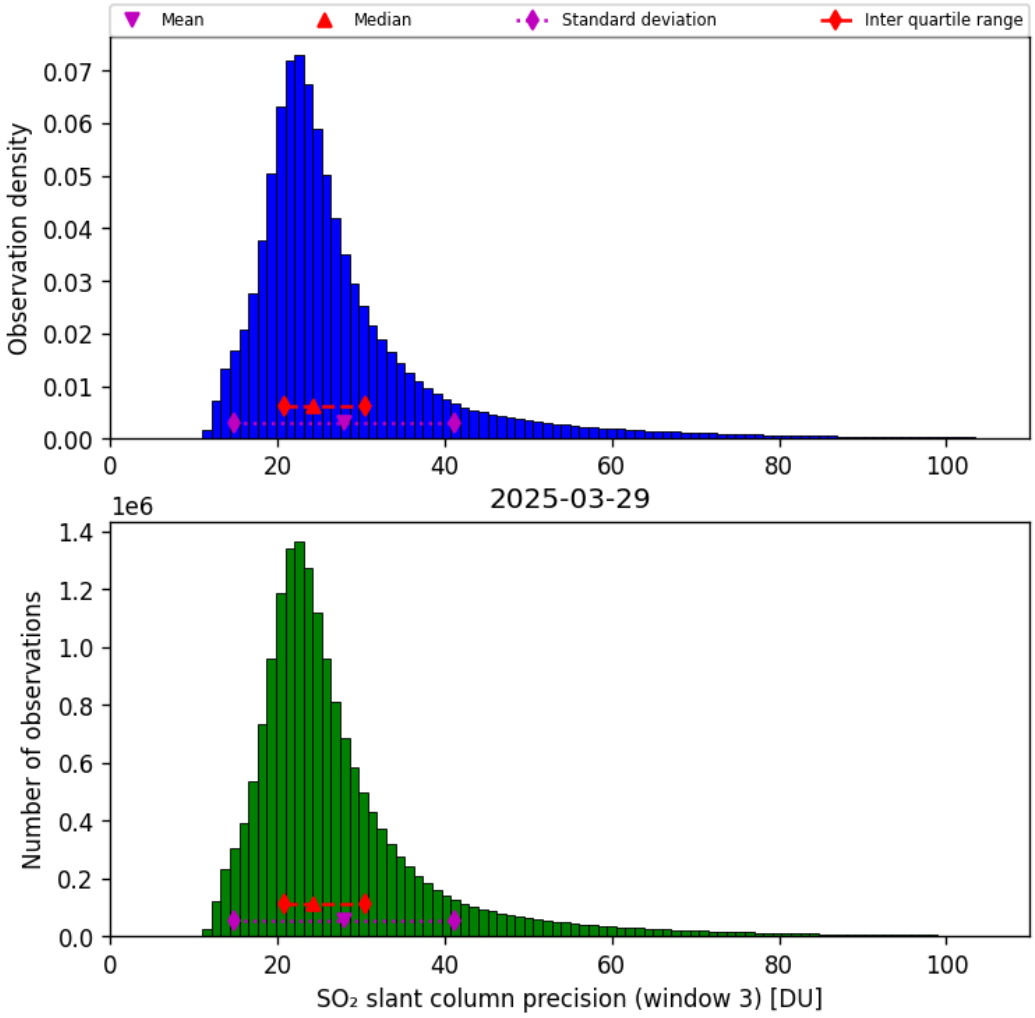

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-03-29 to 2025-03-30

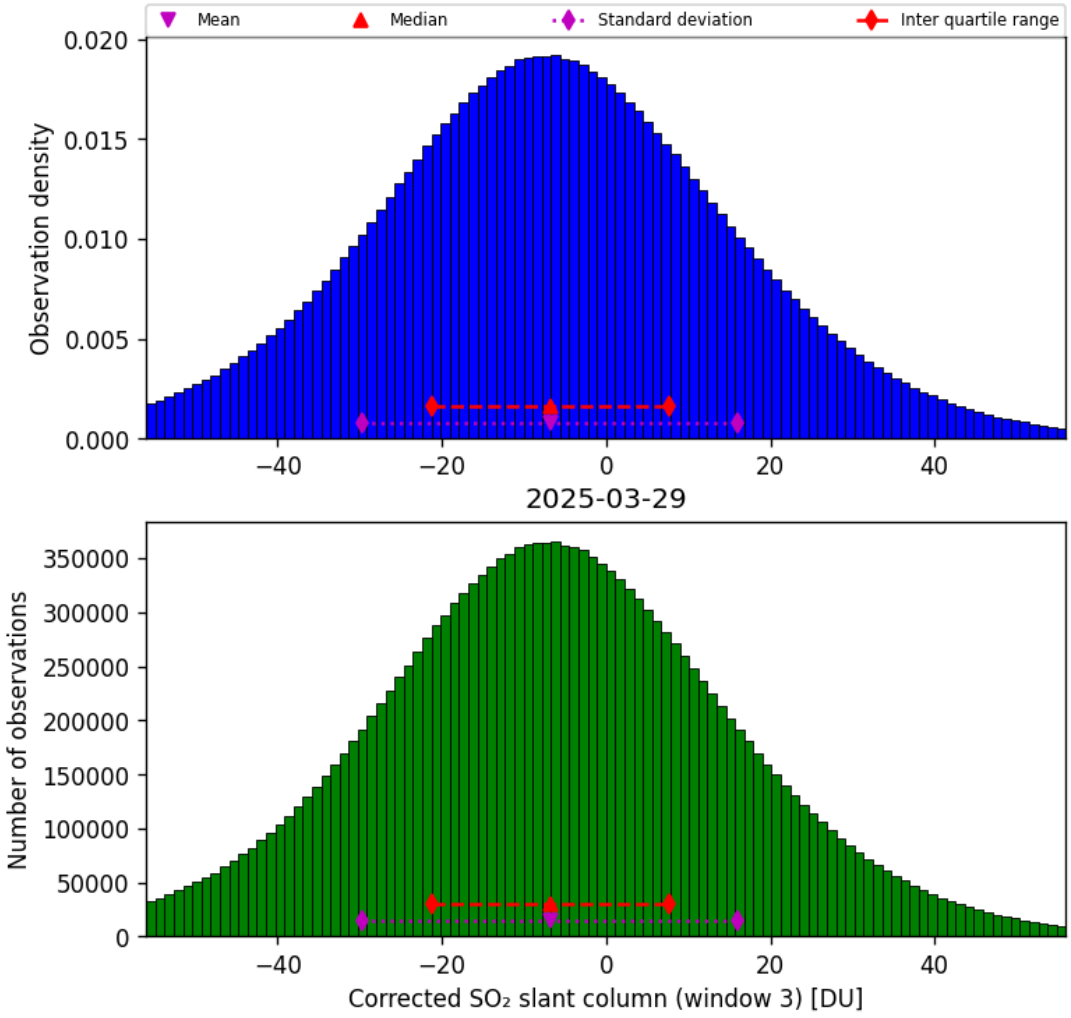

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-03-29 to 2025-03-30

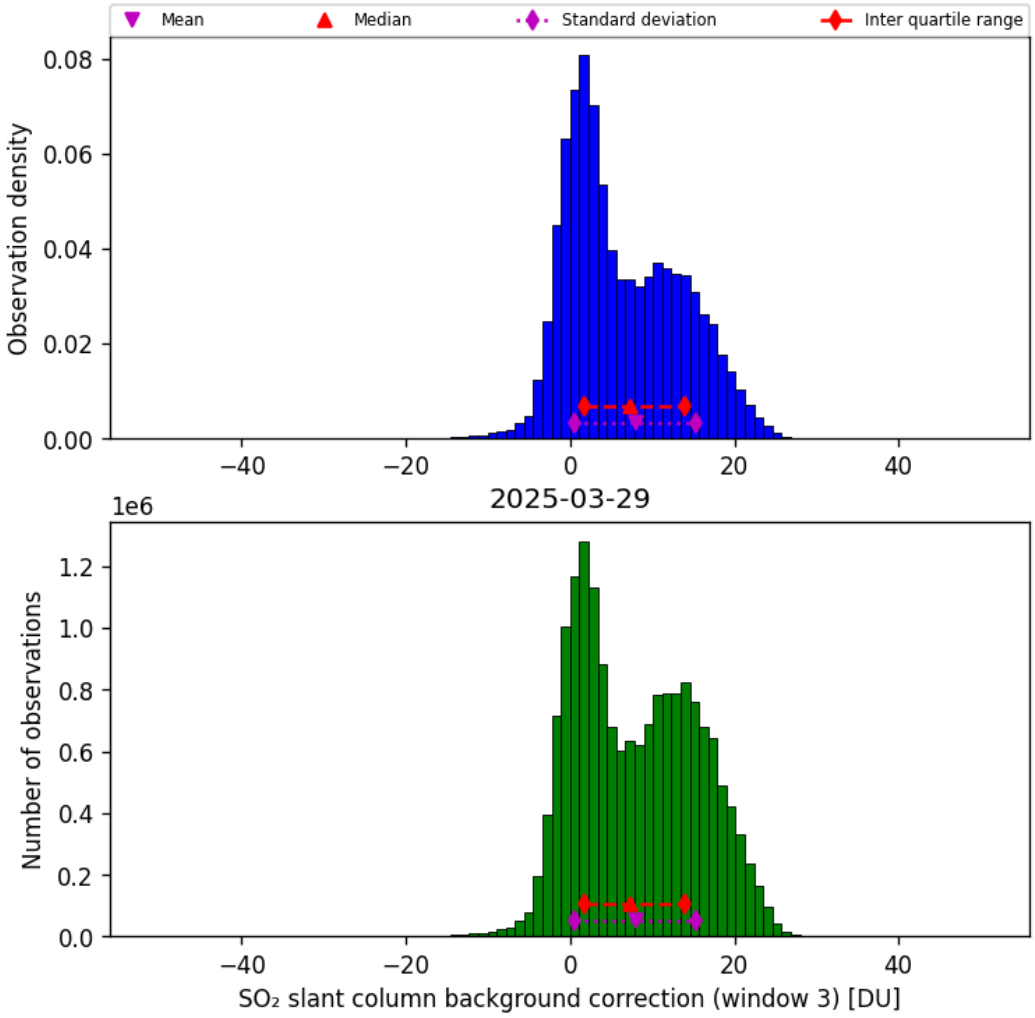

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-03-29 to 2025-03-30

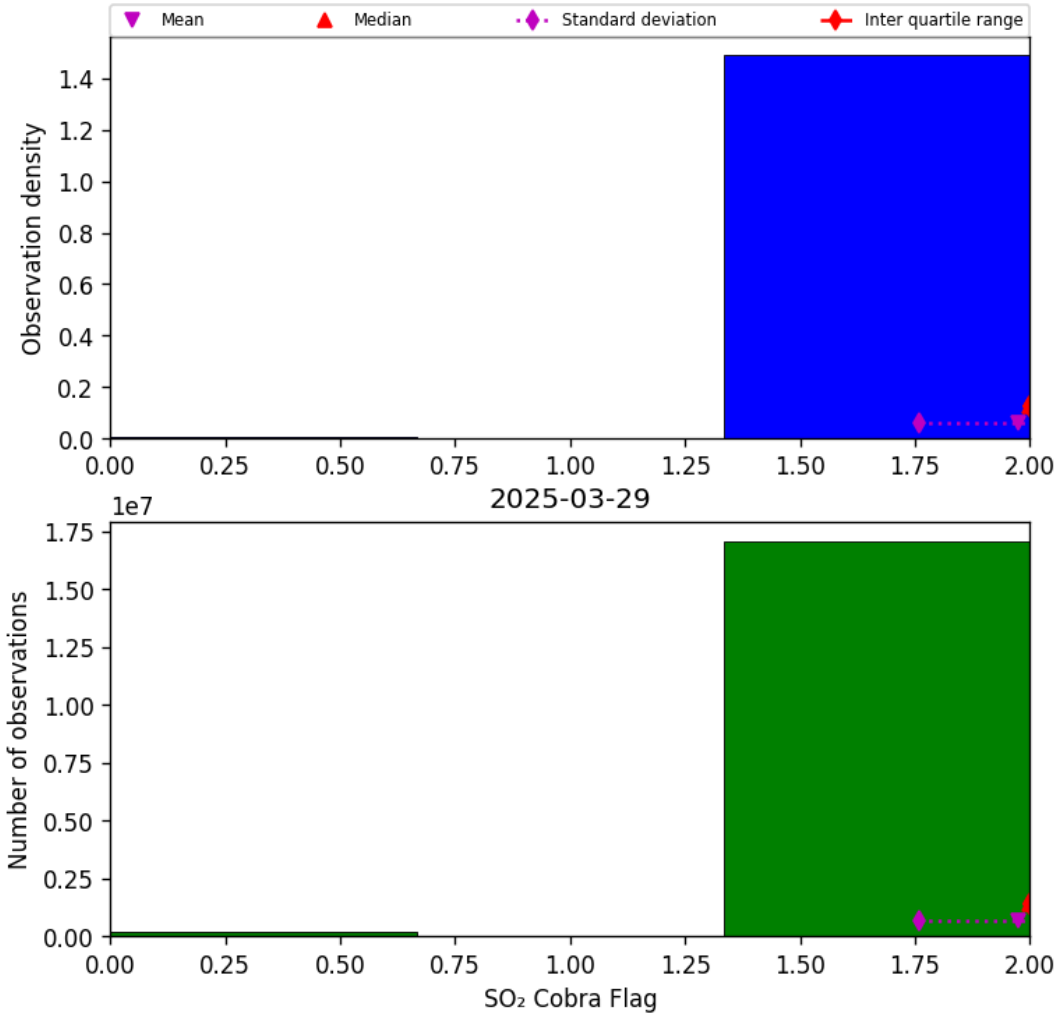

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-03-29 to 2025-03-30

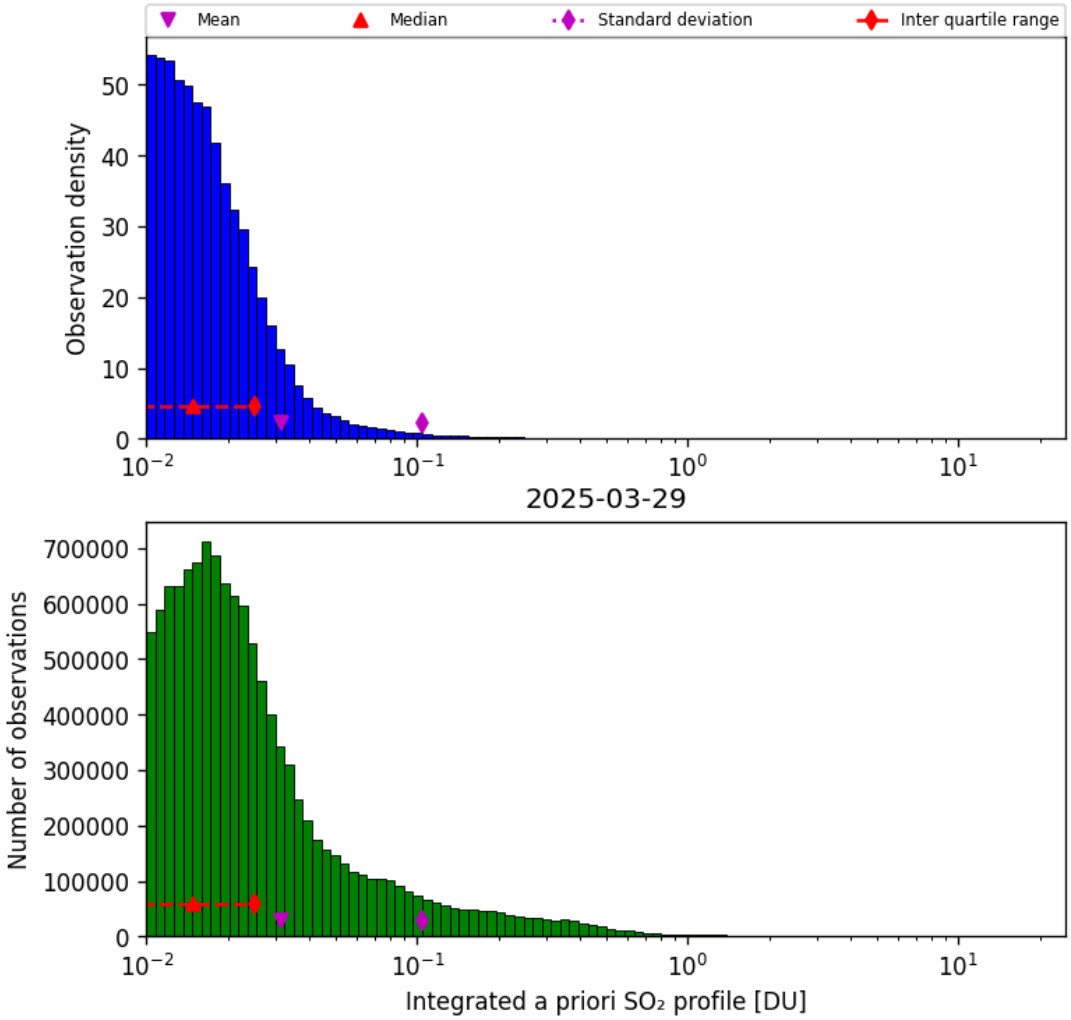

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-03-29 to 2025-03-30

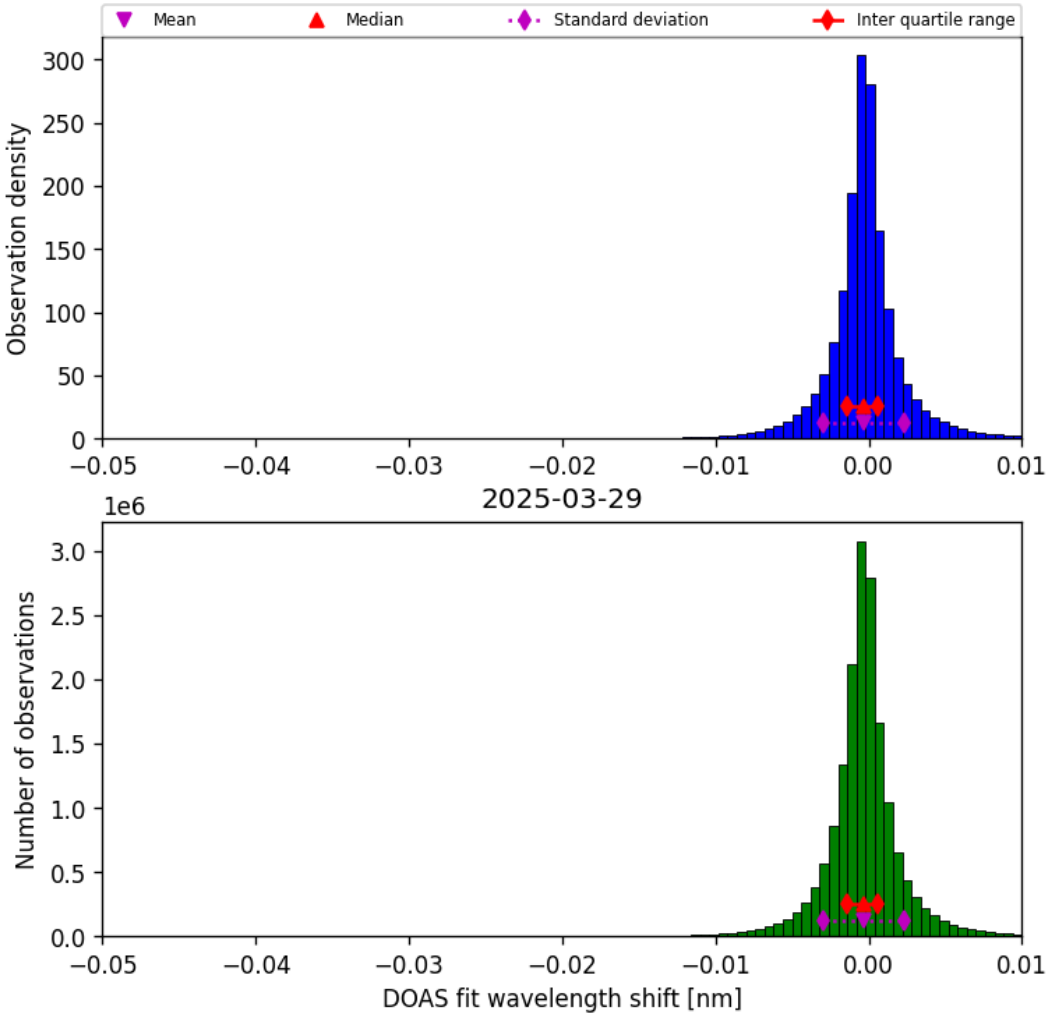

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-29 to 2025-03-30

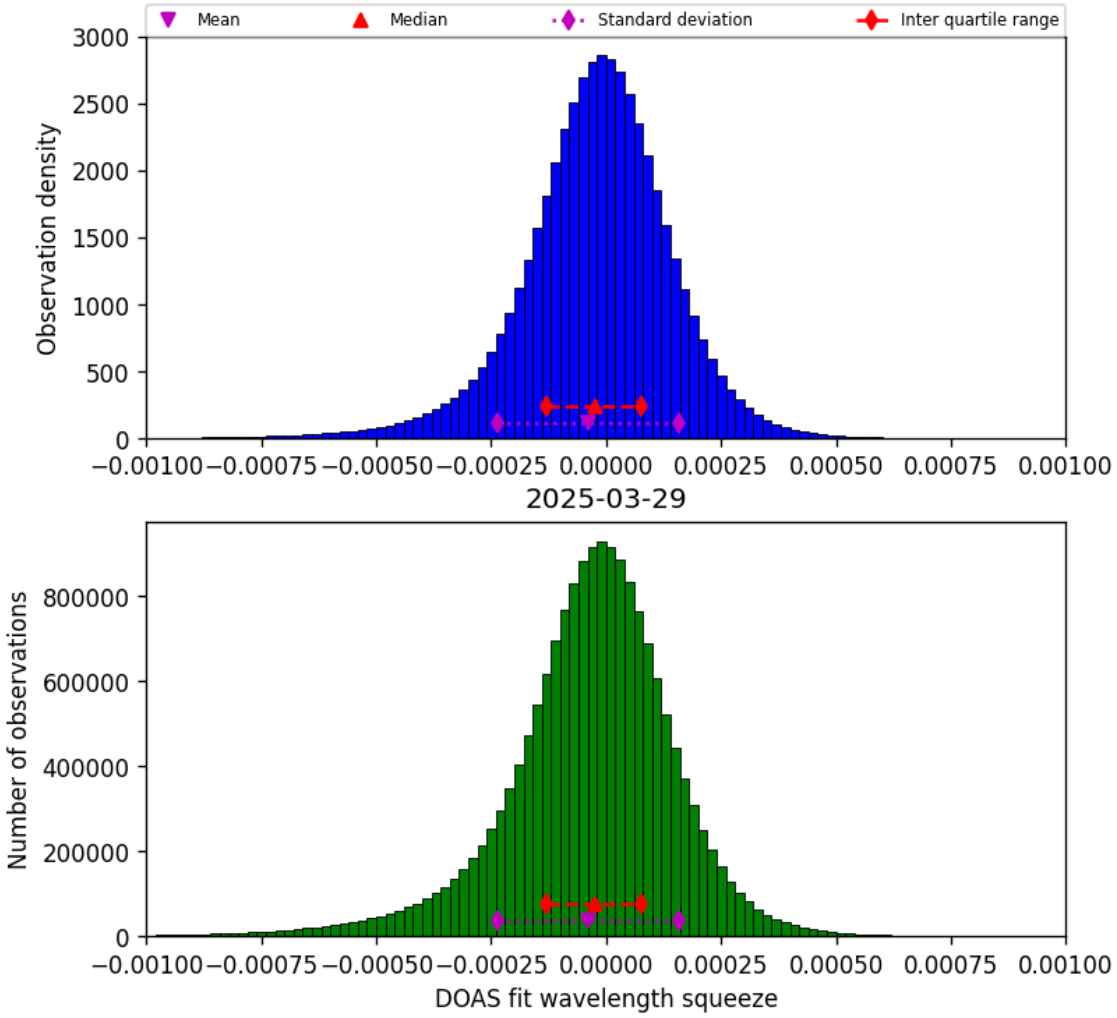

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-29 to 2025-03-30

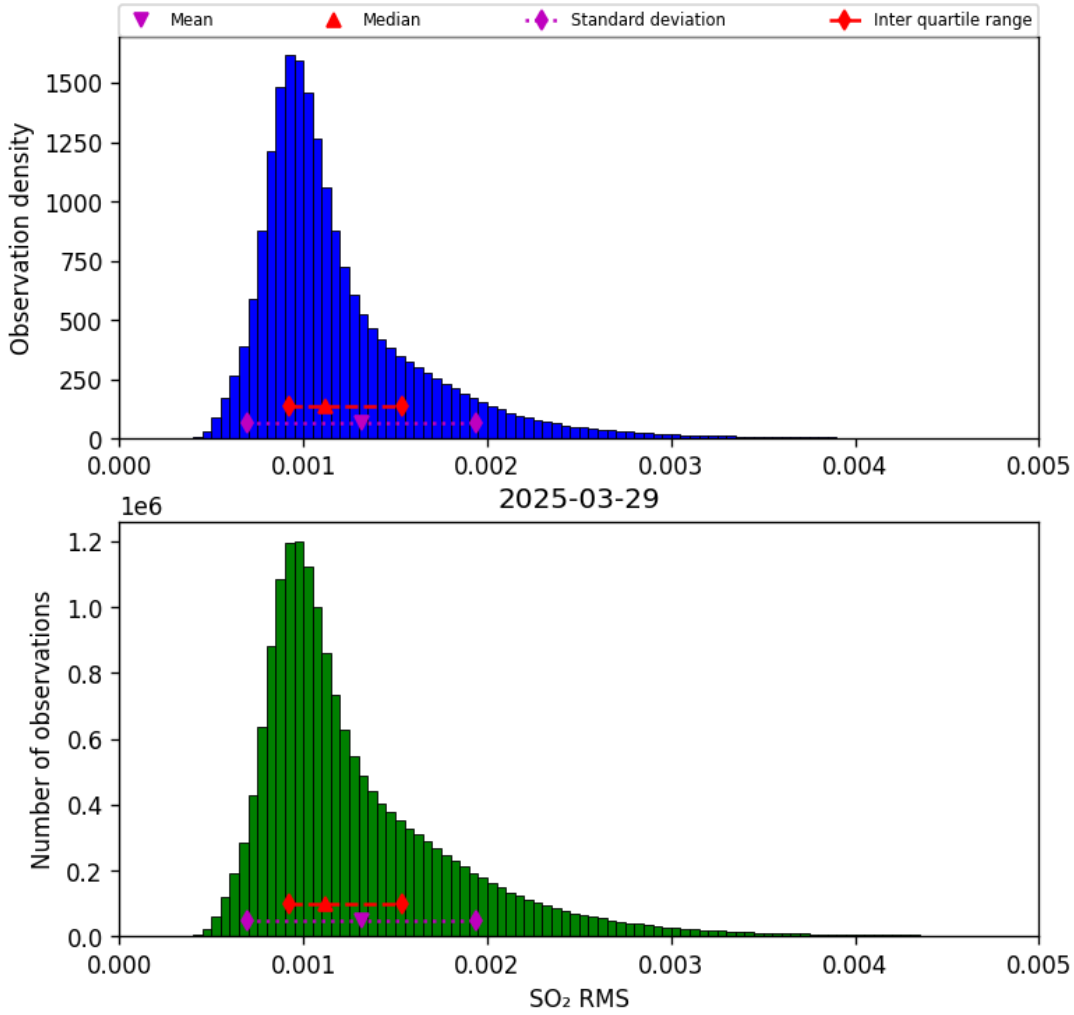

Figure 79: Histogram of "SO_2 RMS" for 2025-03-29 to 2025-03-30

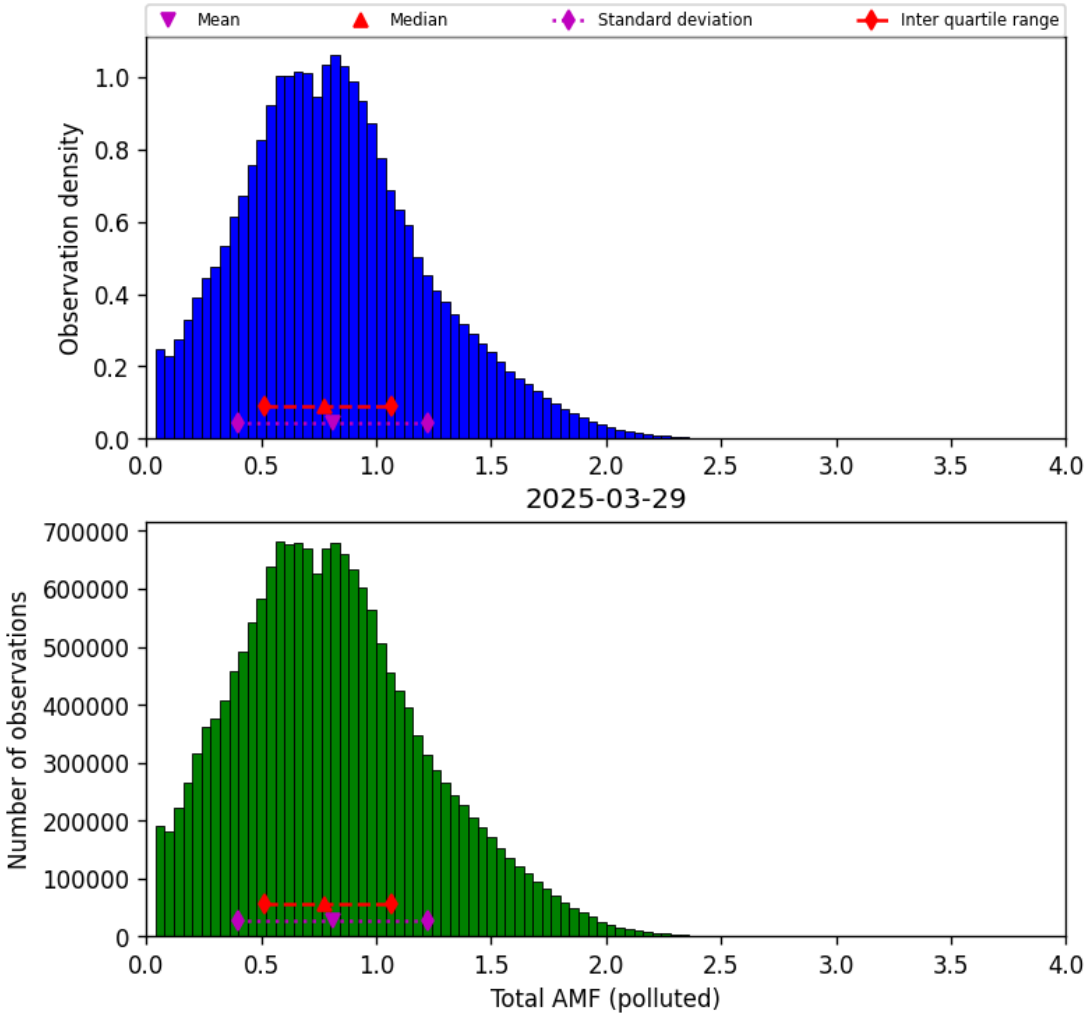

Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-29 to 2025-03-30

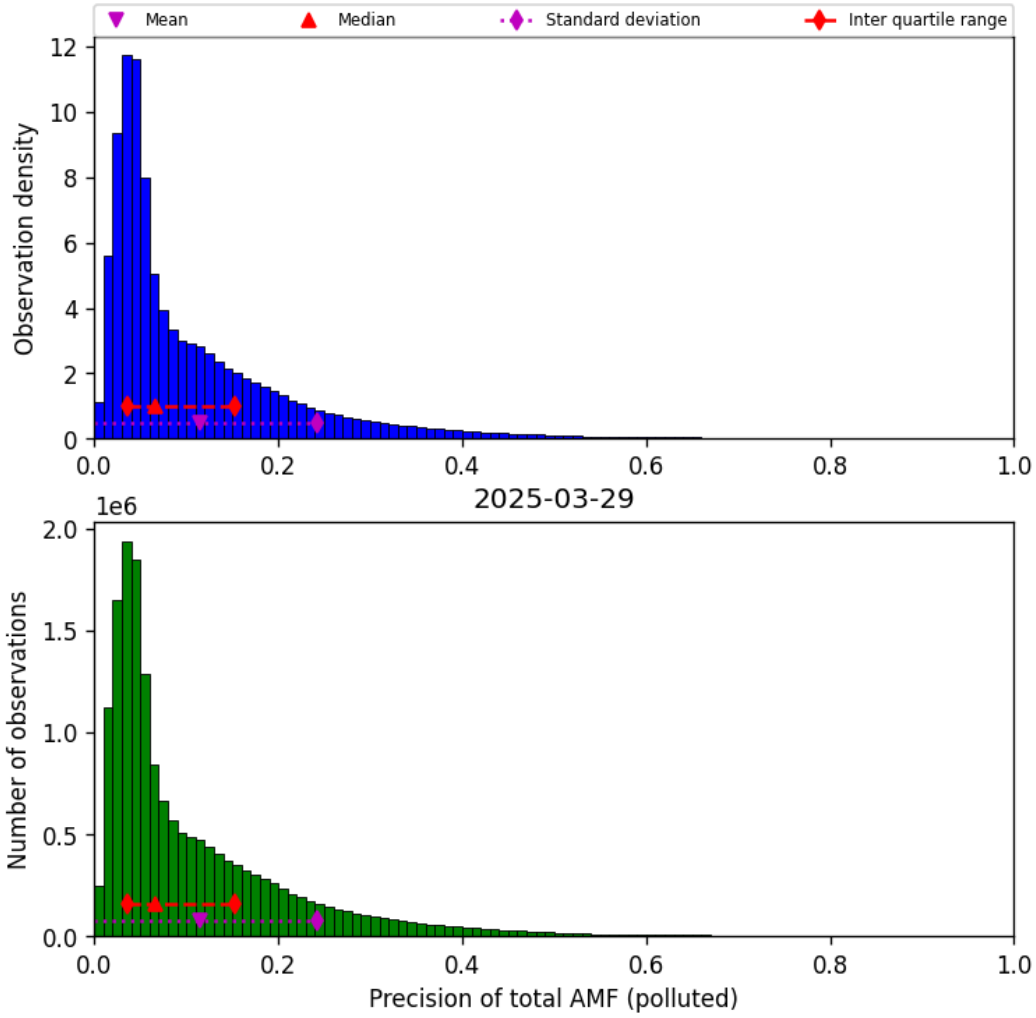

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-29 to 2025-03-30

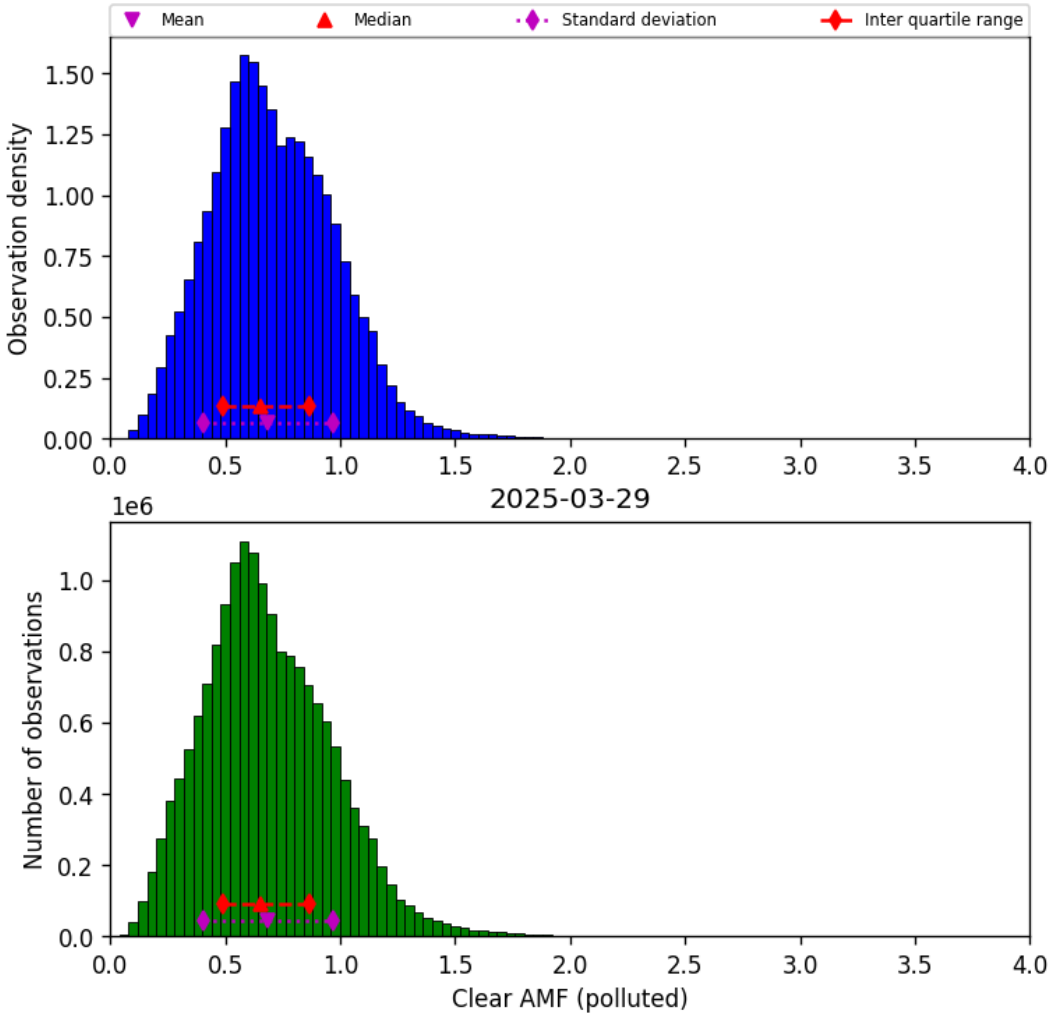

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-03-29 to 2025-03-30

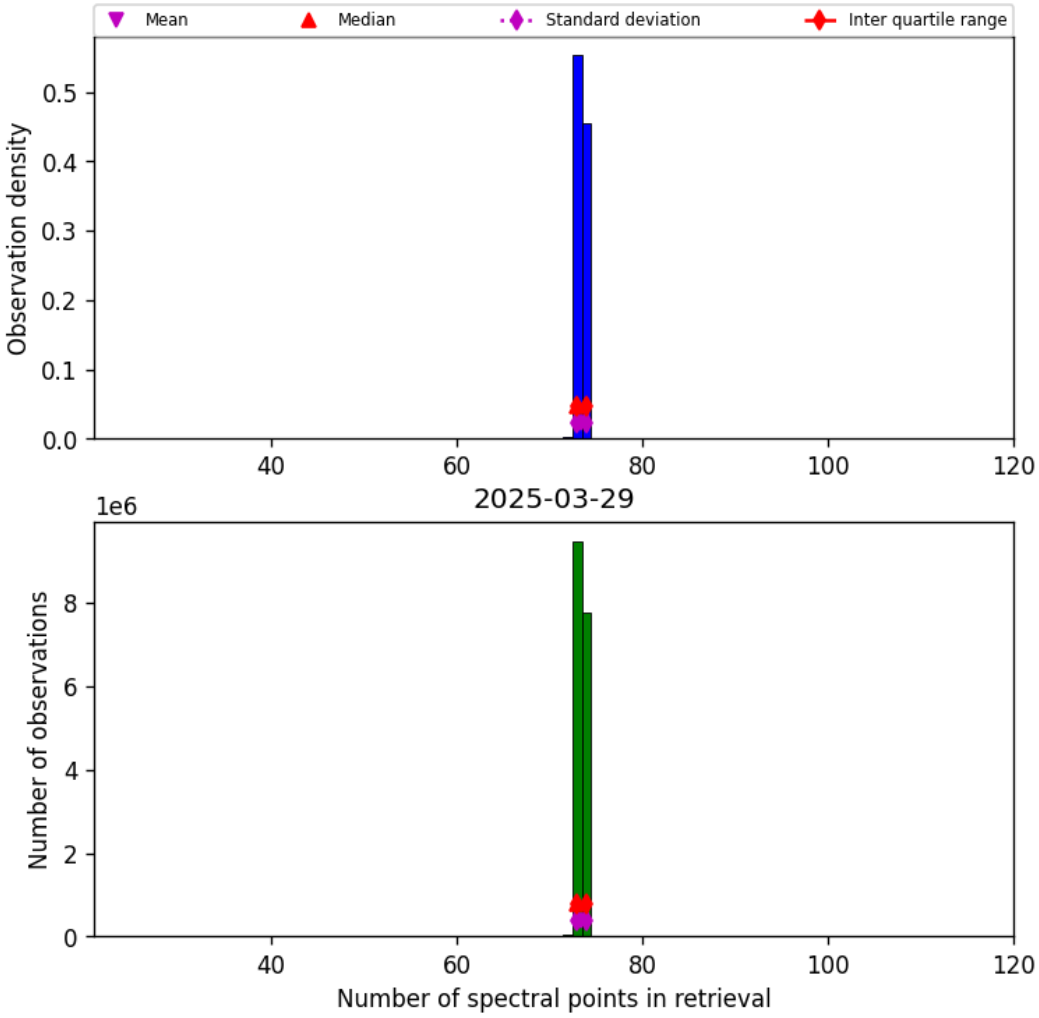

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-29 to 2025-03-30

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.

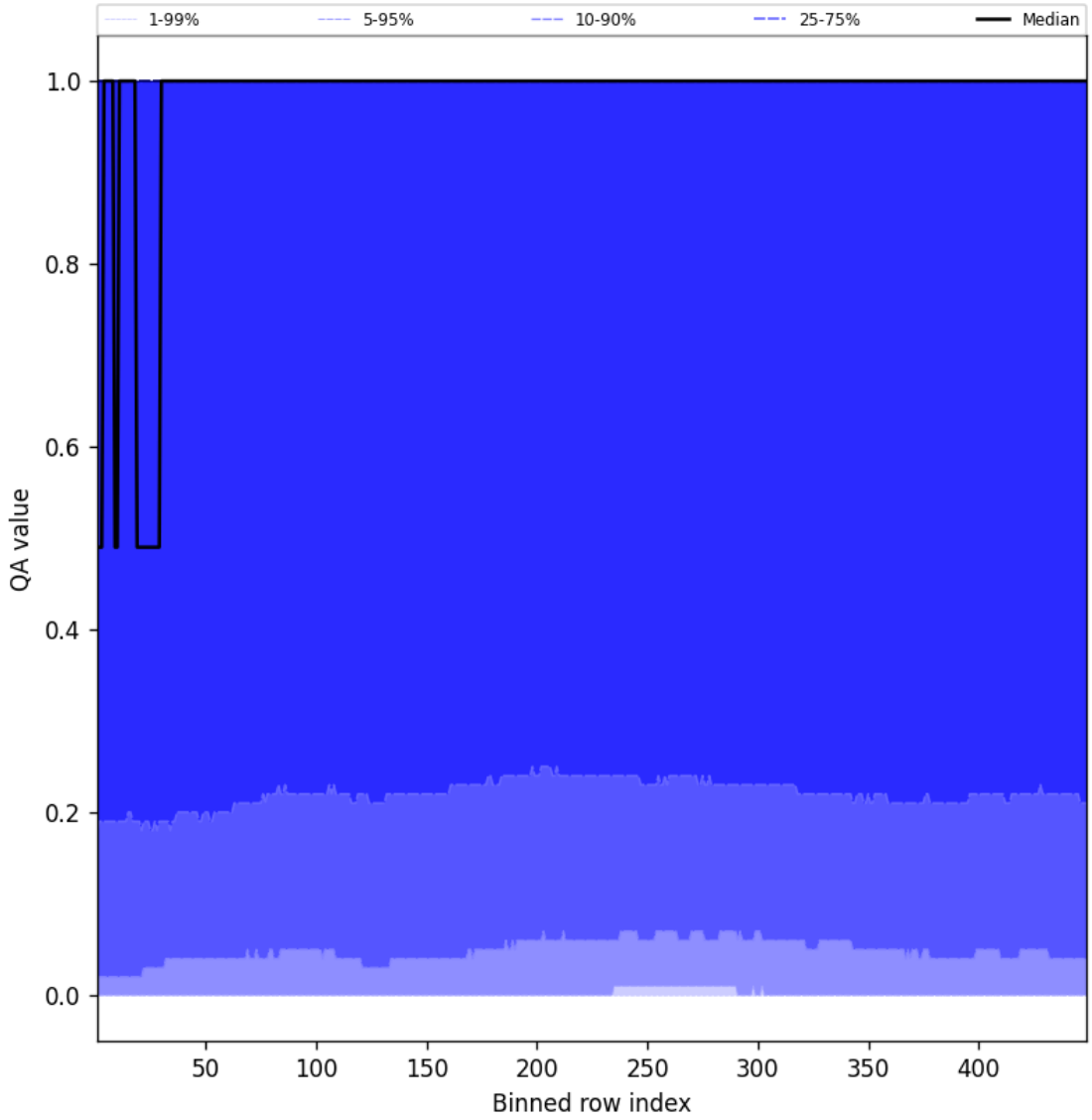

Figure 84: Along track statistics of “QA value” for 2025-03-29 to 2025-03-30

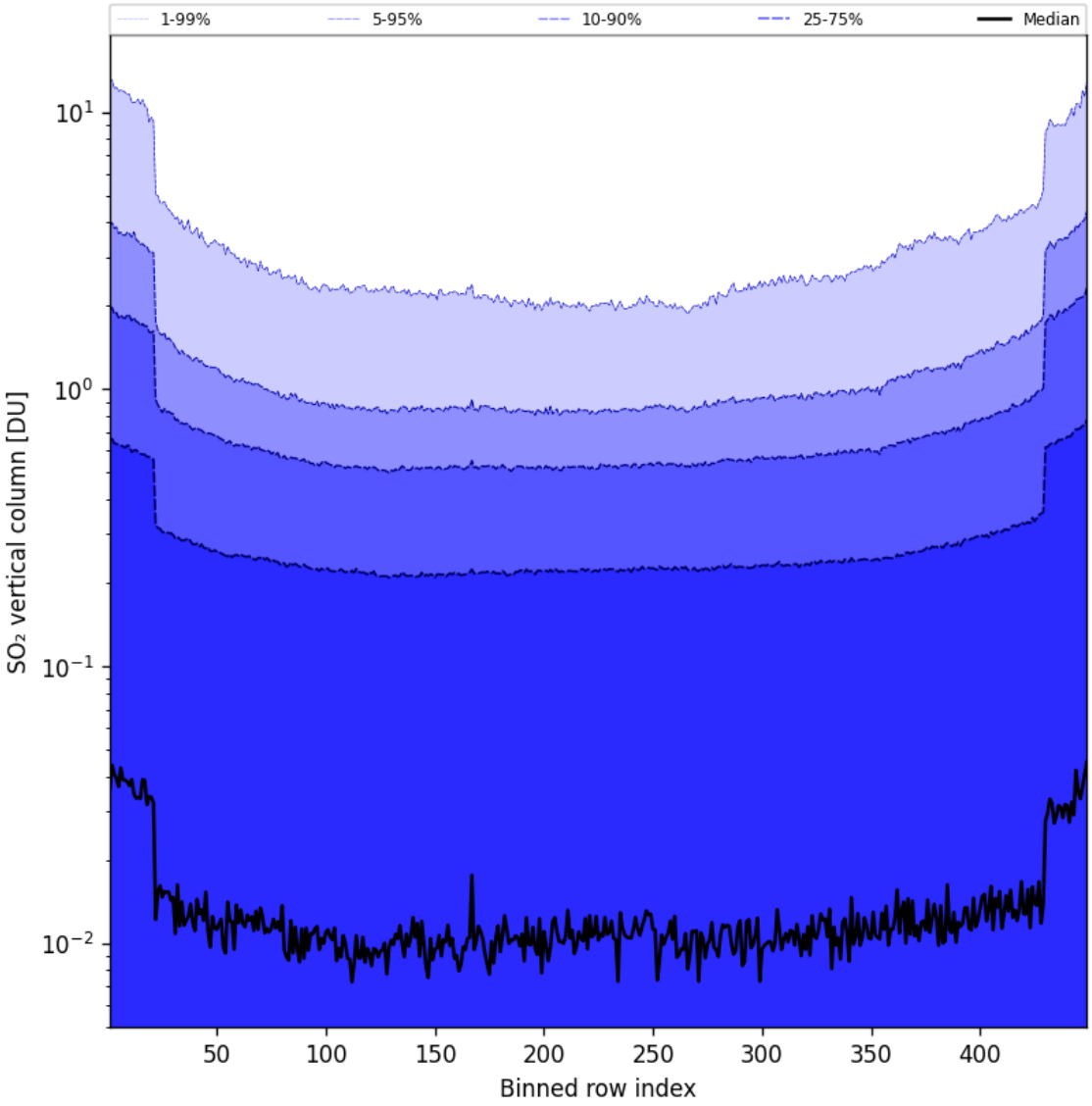

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-03-29 to 2025-03-30

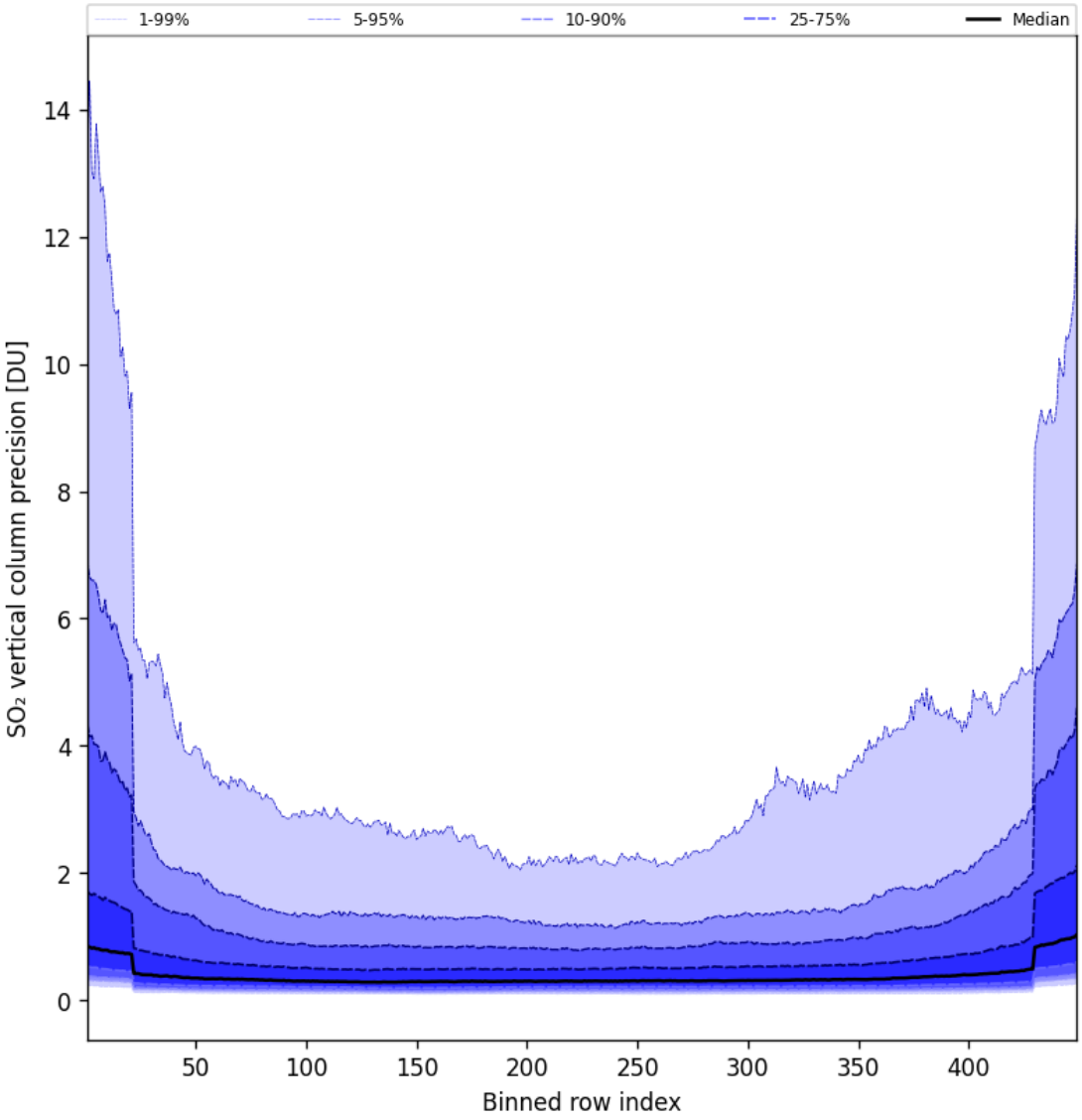

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-03-29 to 2025-03-30

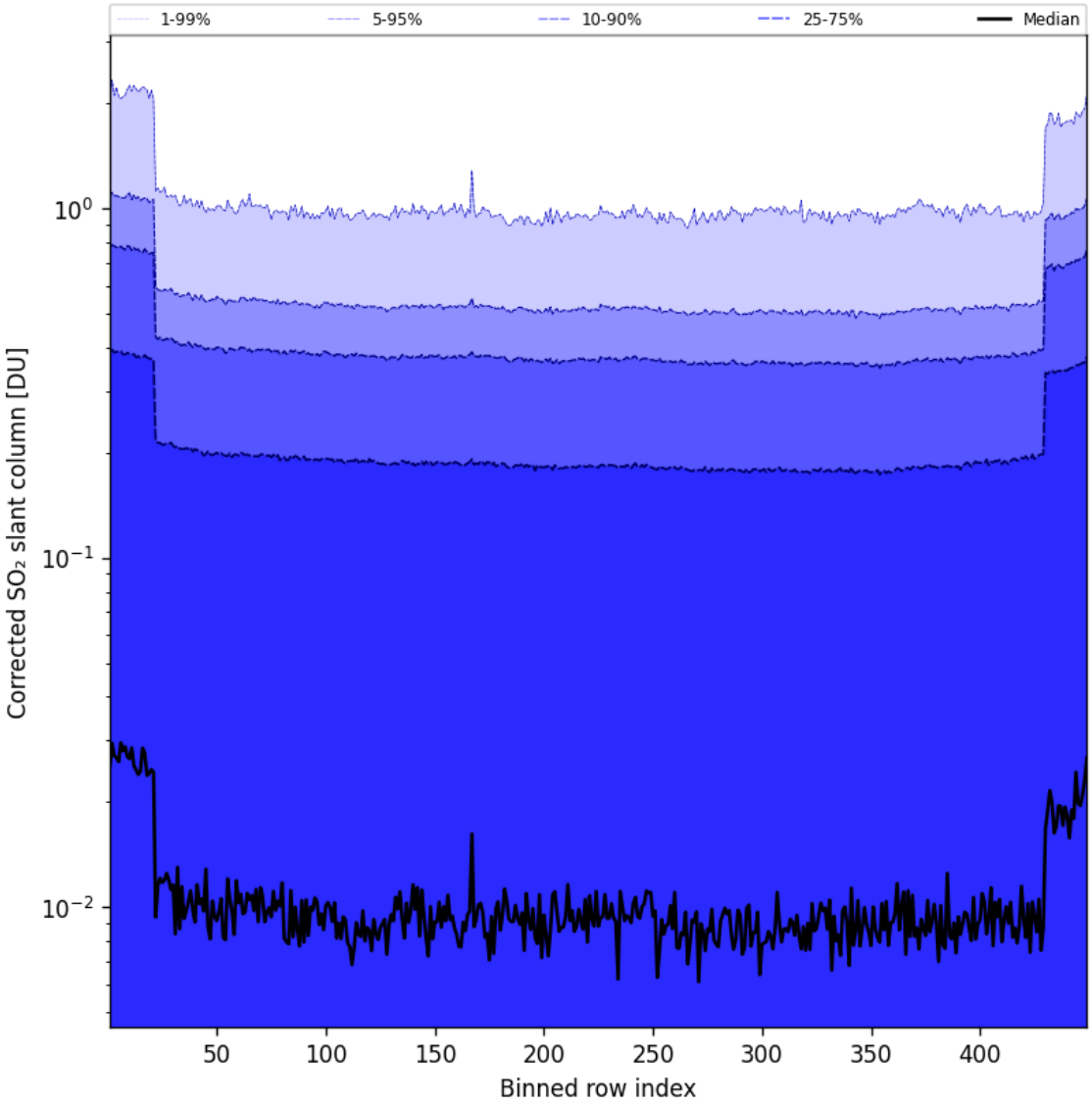

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-03-29 to 2025-03-30

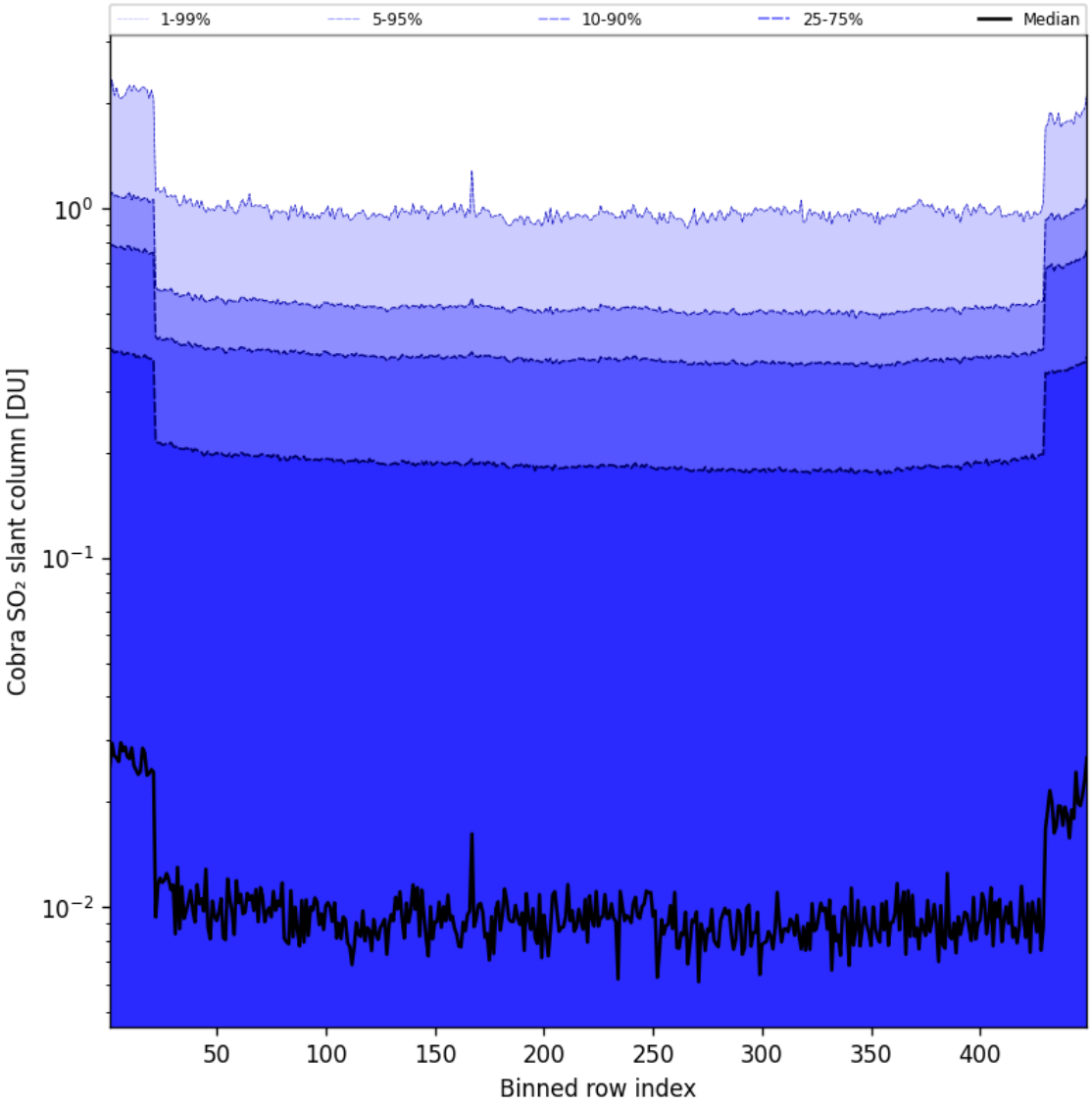

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-03-29 to 2025-03-30

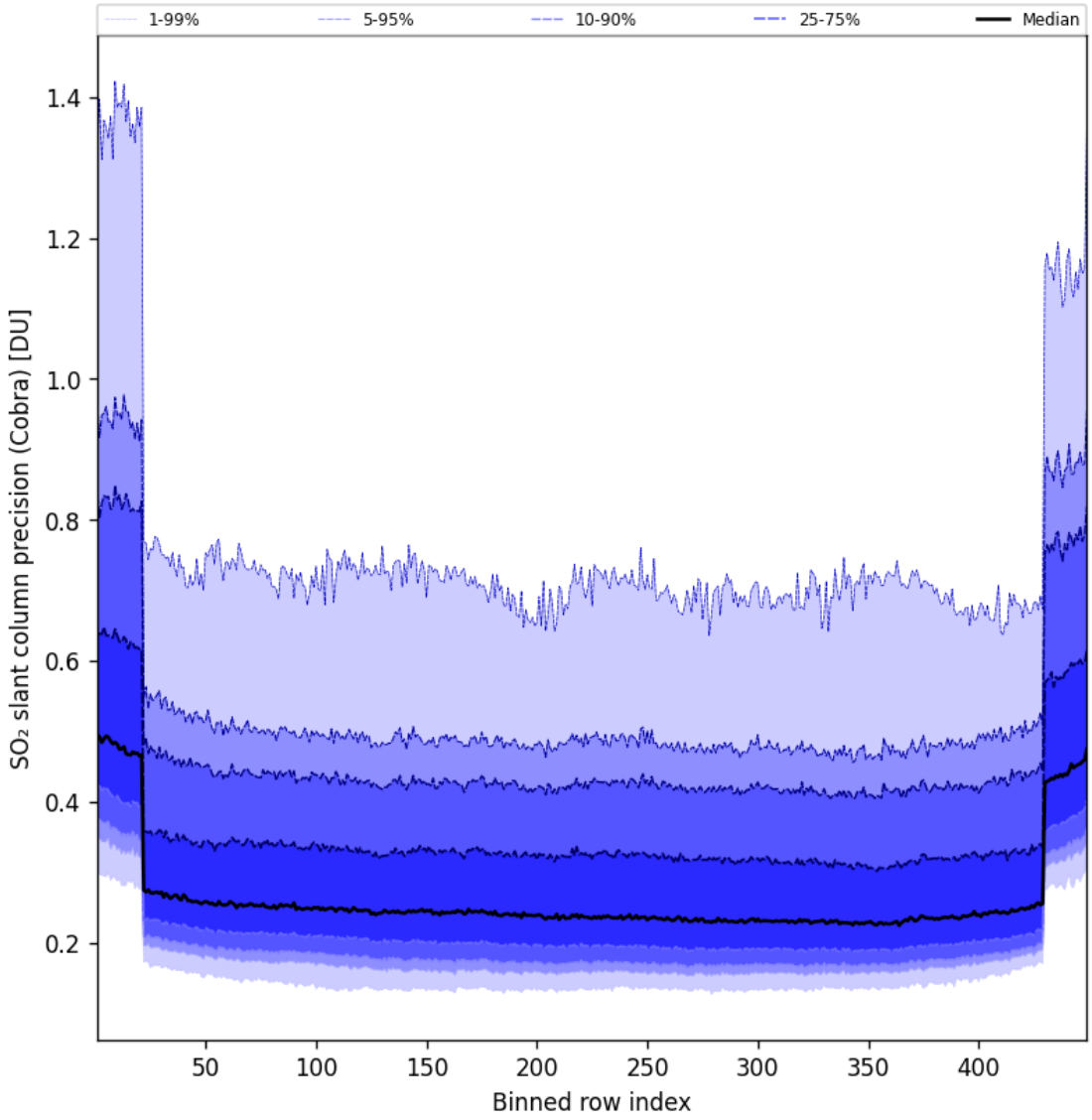

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-03-29 to 2025-03-30

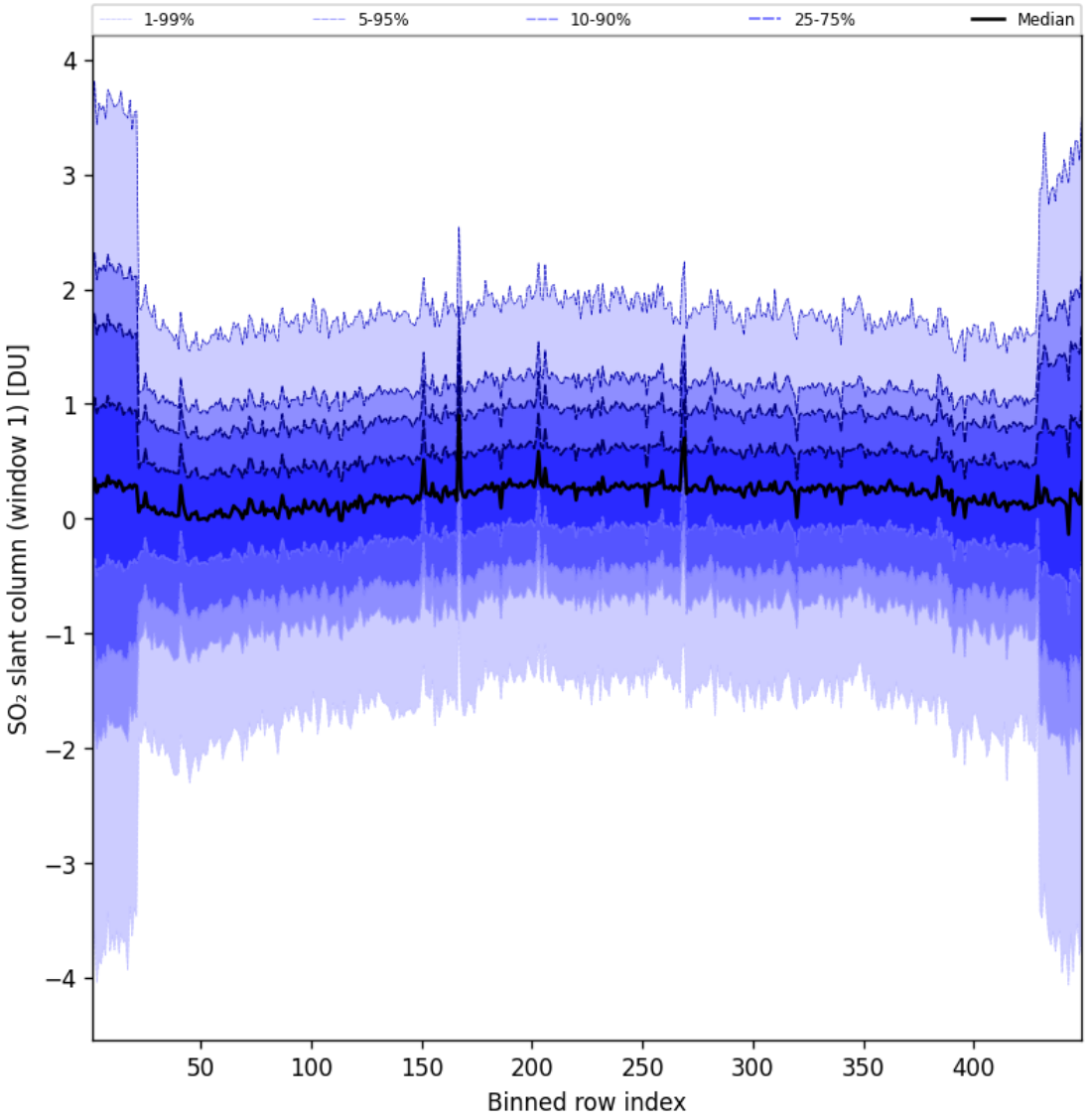

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-03-29 to 2025-03-30

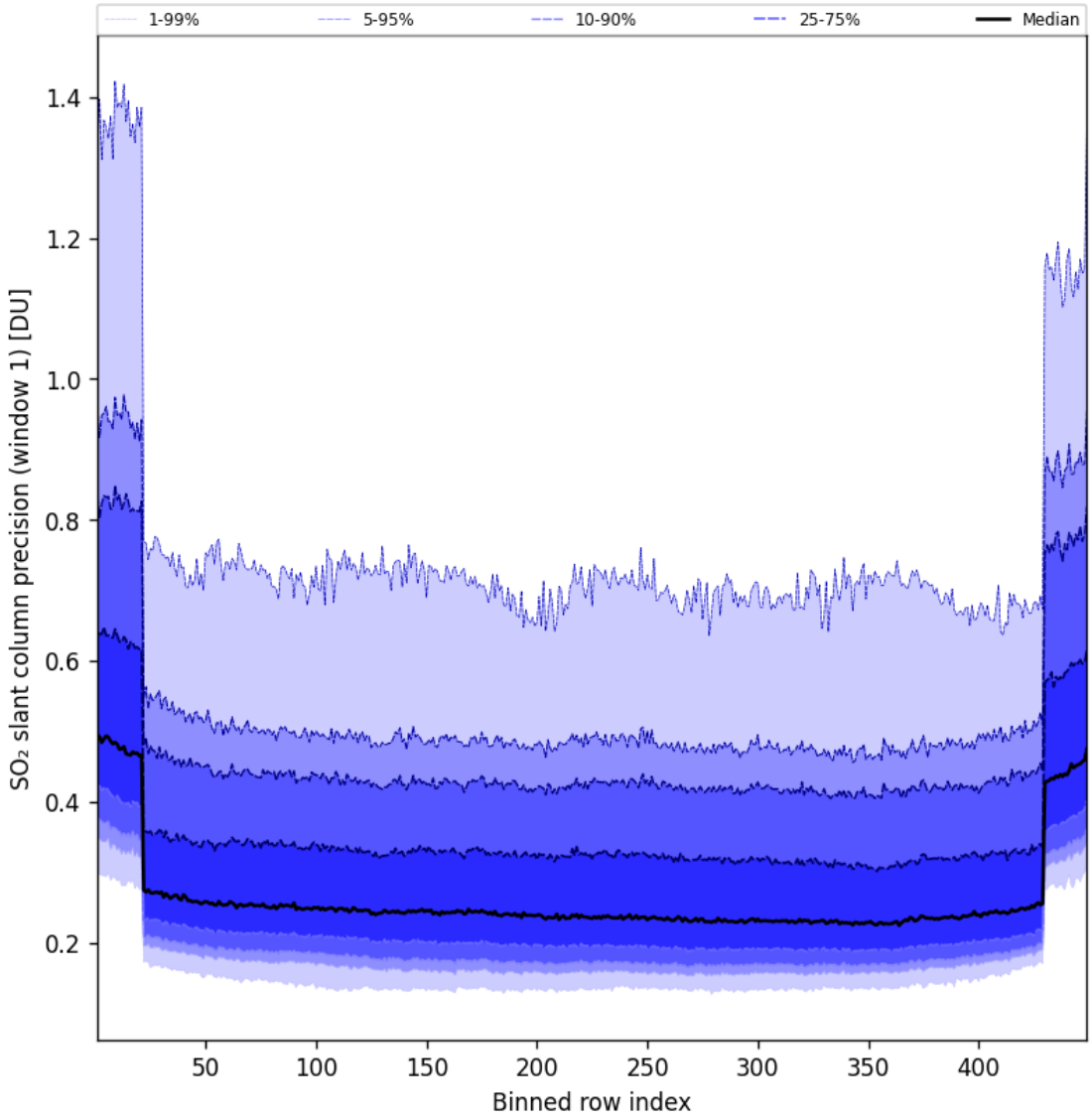

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-03-29 to 2025-03-30

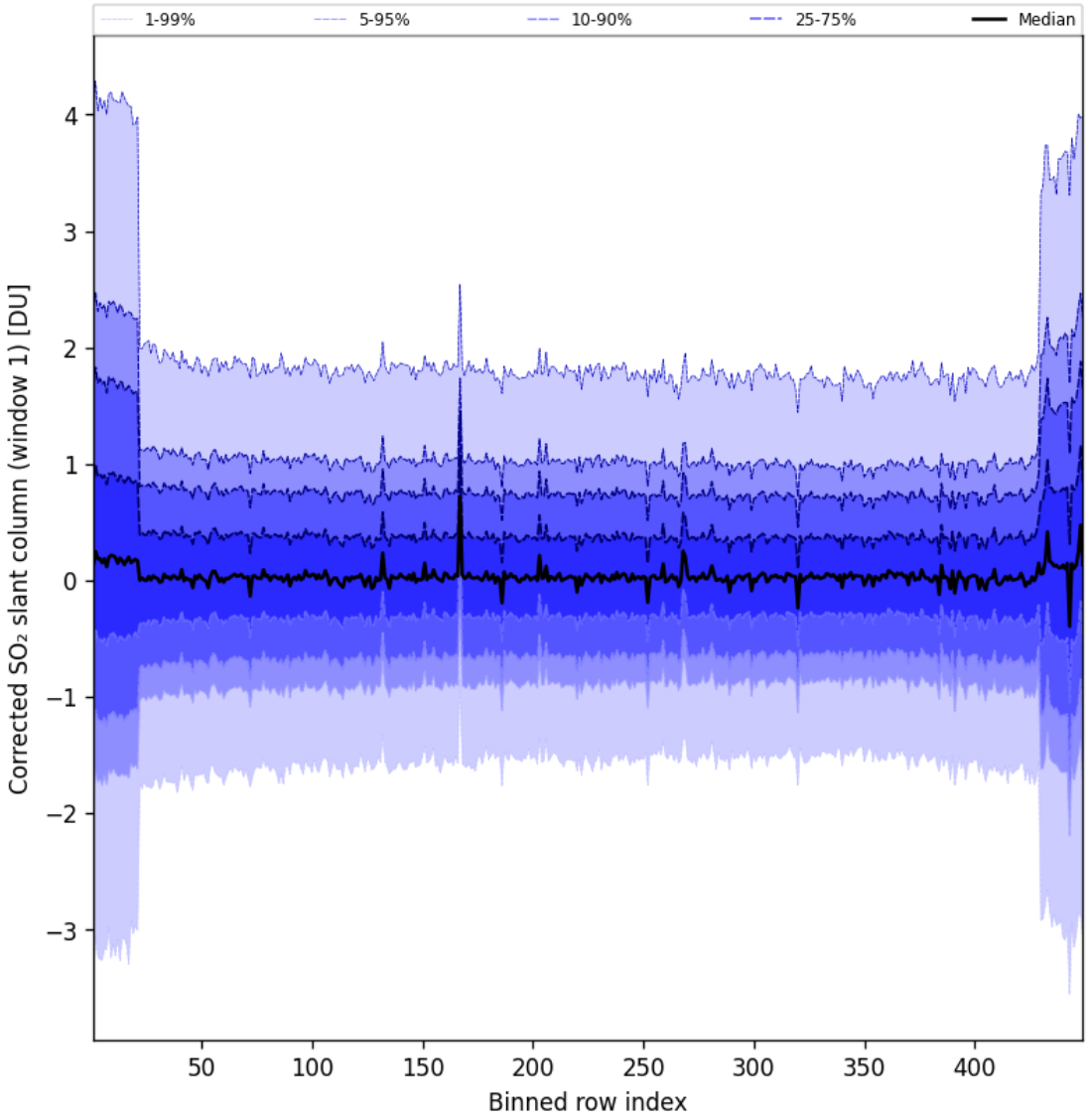

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-03-29 to 2025-03-30

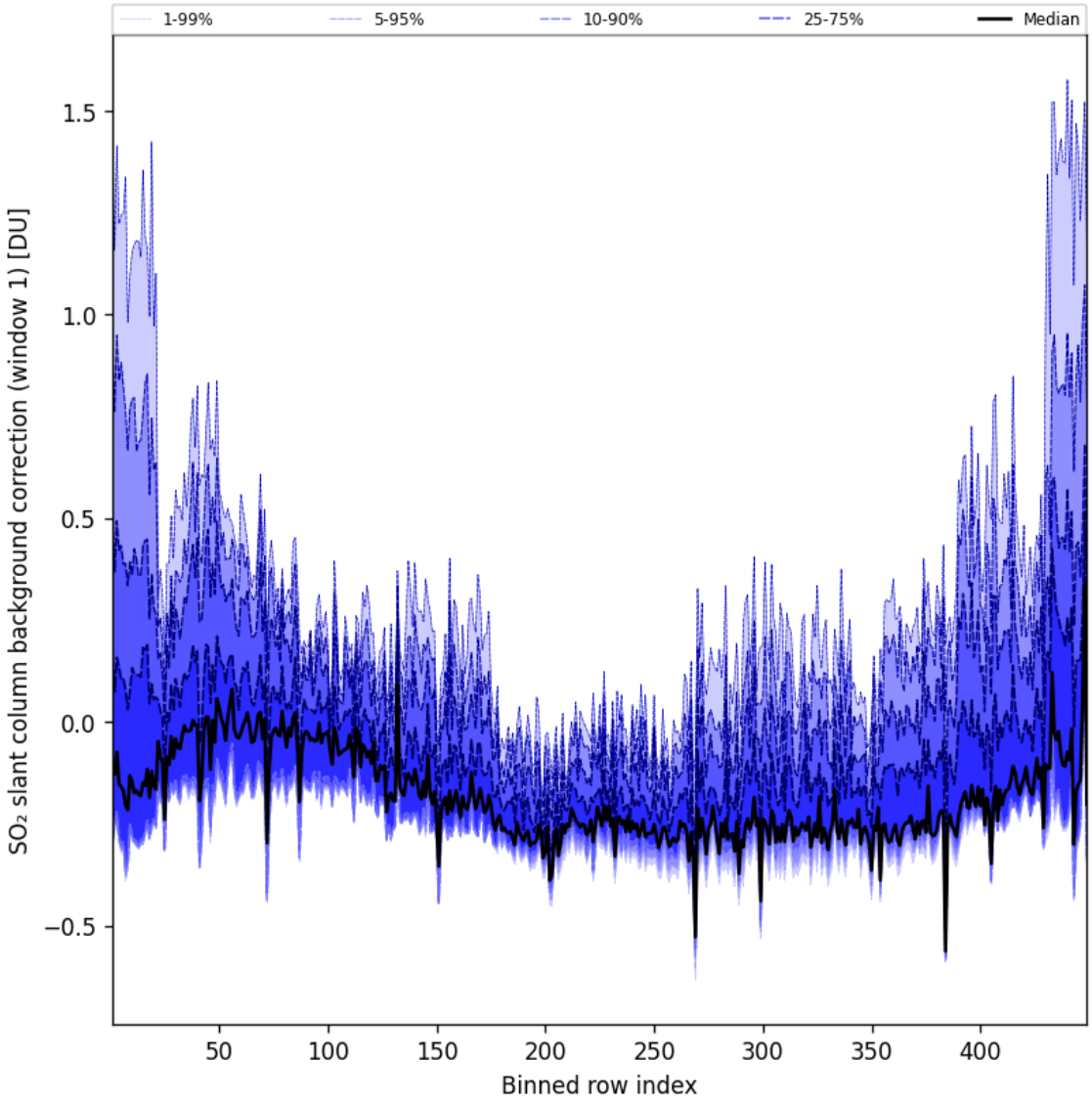

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-03-29 to 2025-03-30

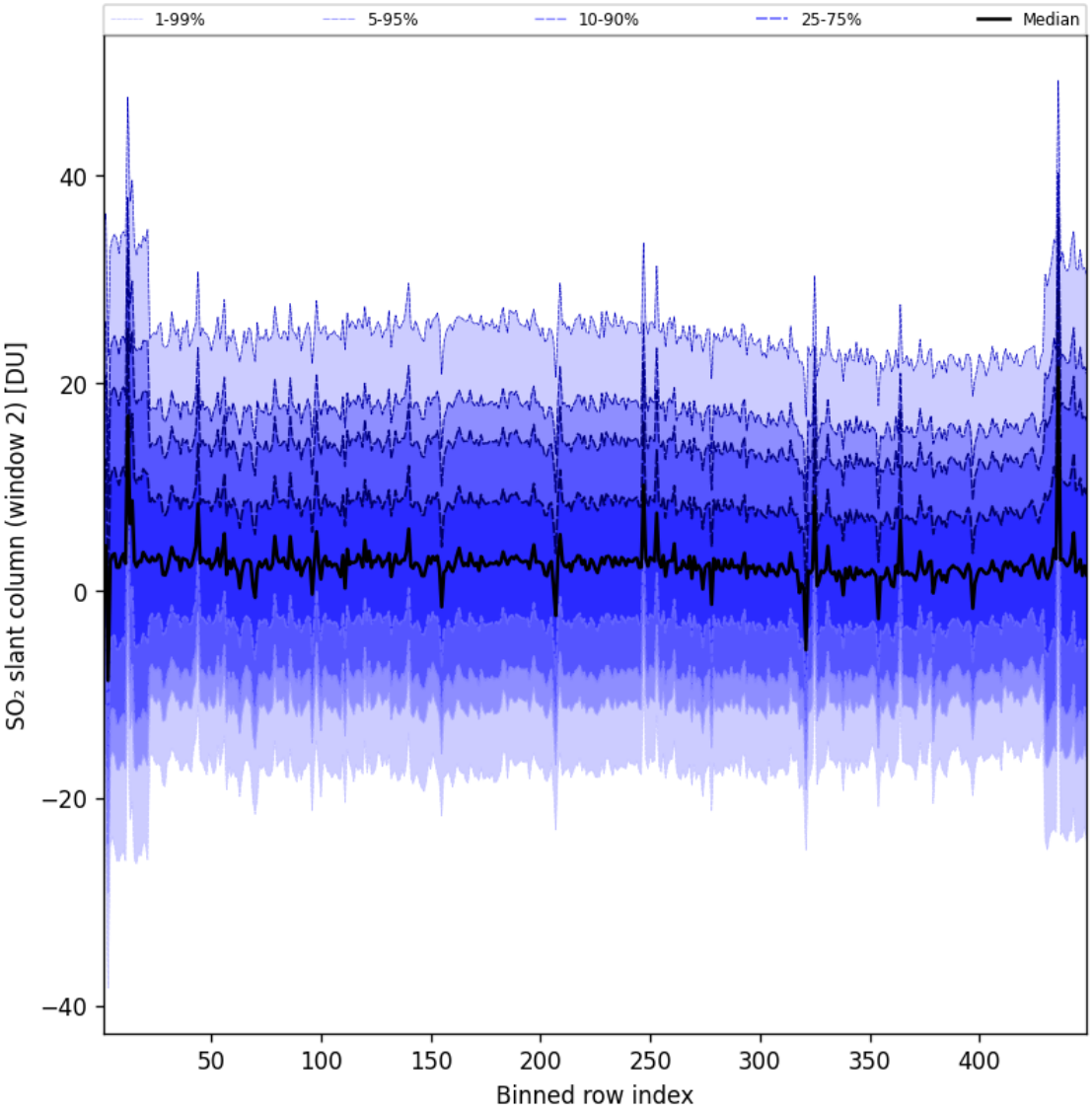

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-03-29 to 2025-03-30

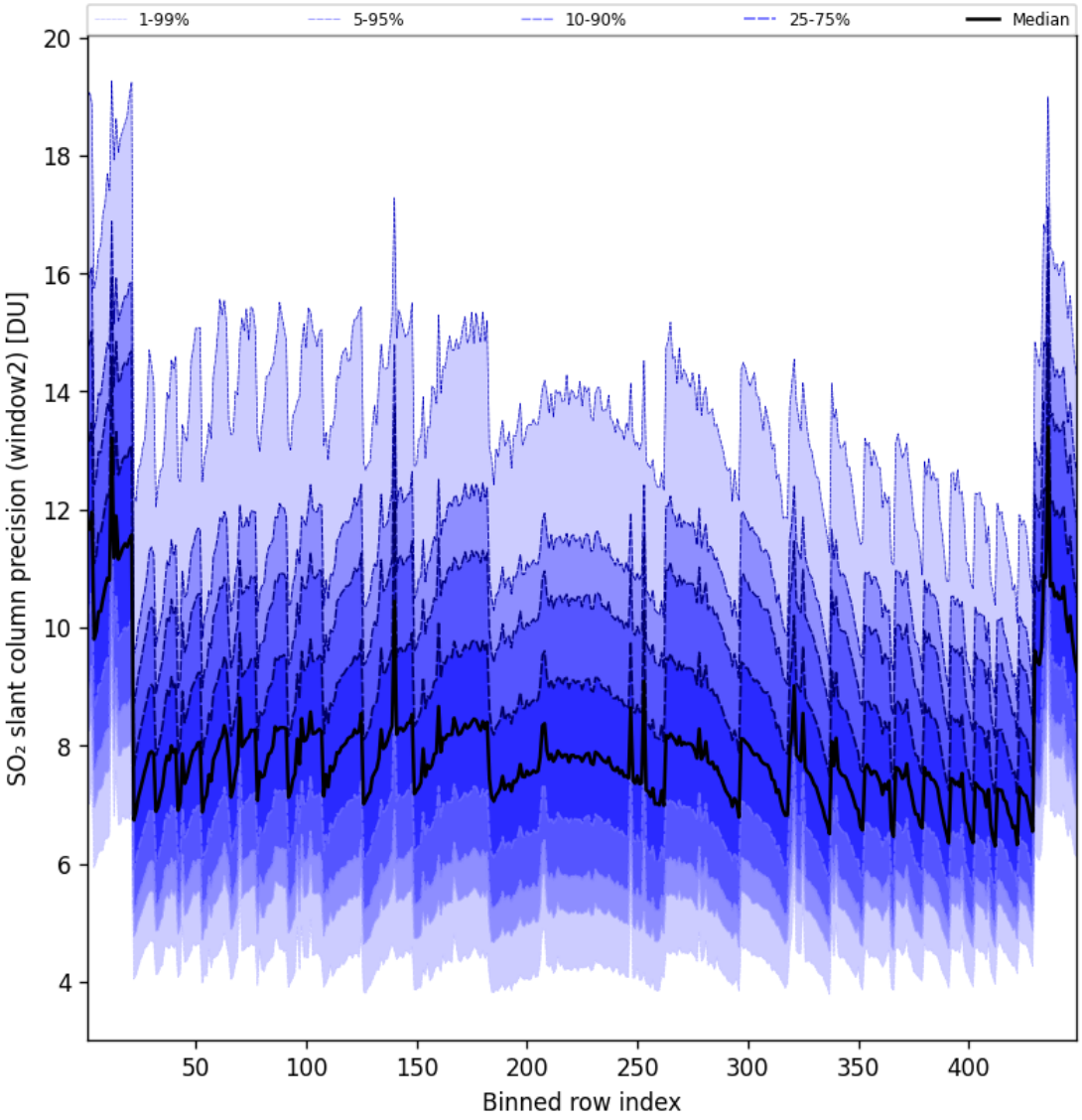

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-03-29 to 2025-03-30

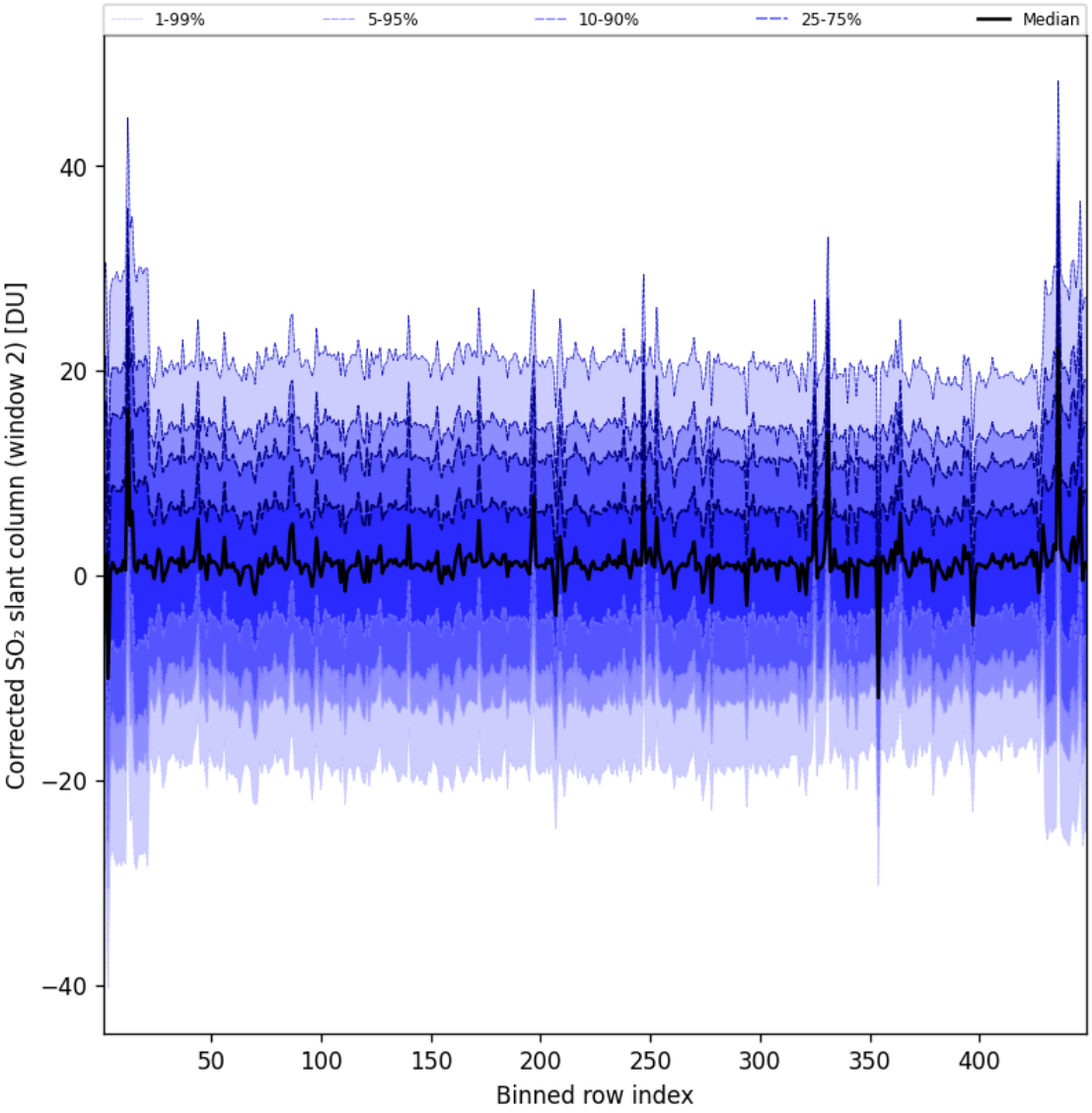

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-03-29 to 2025-03-30

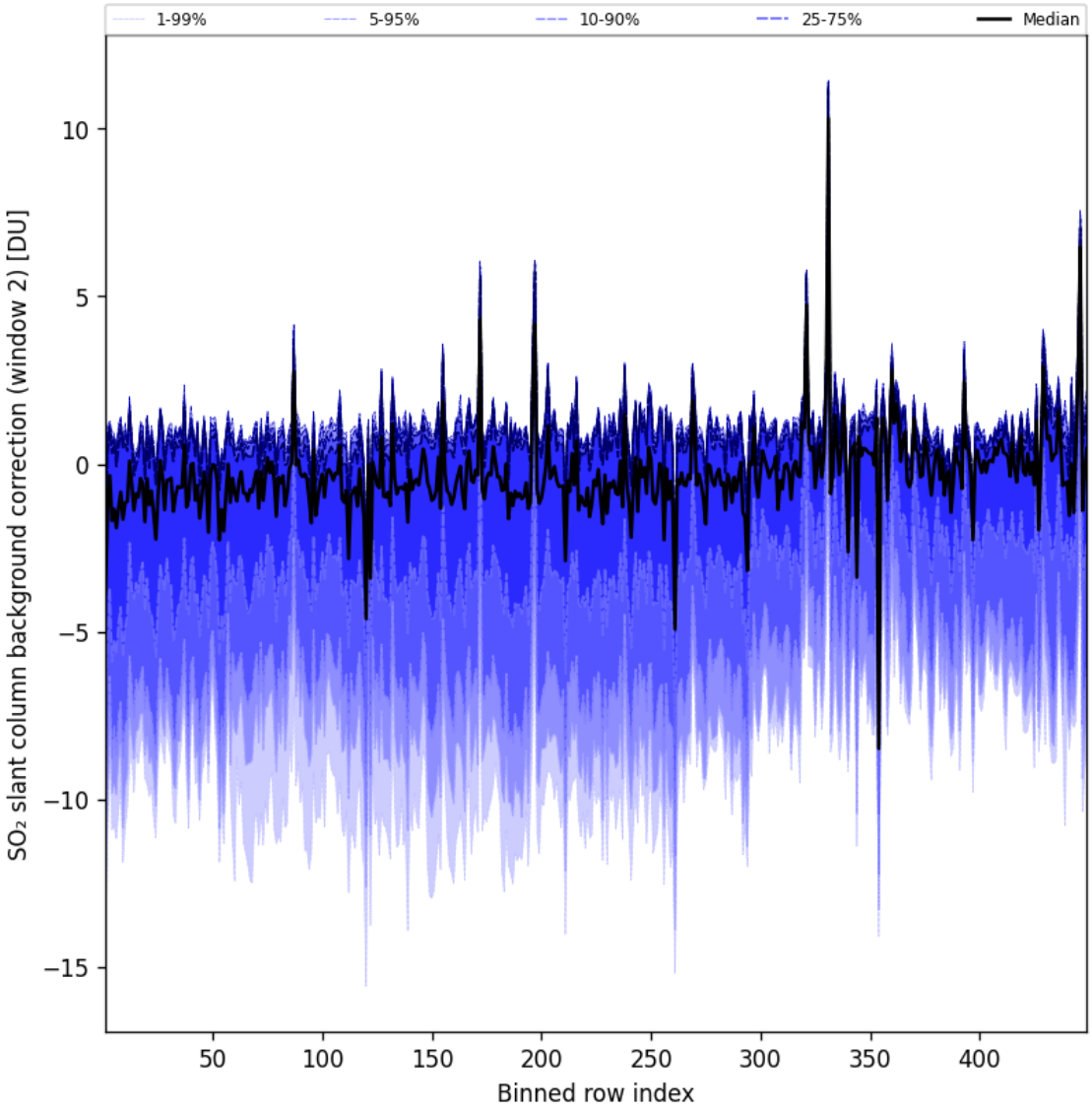

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-03-29 to 2025-03-30

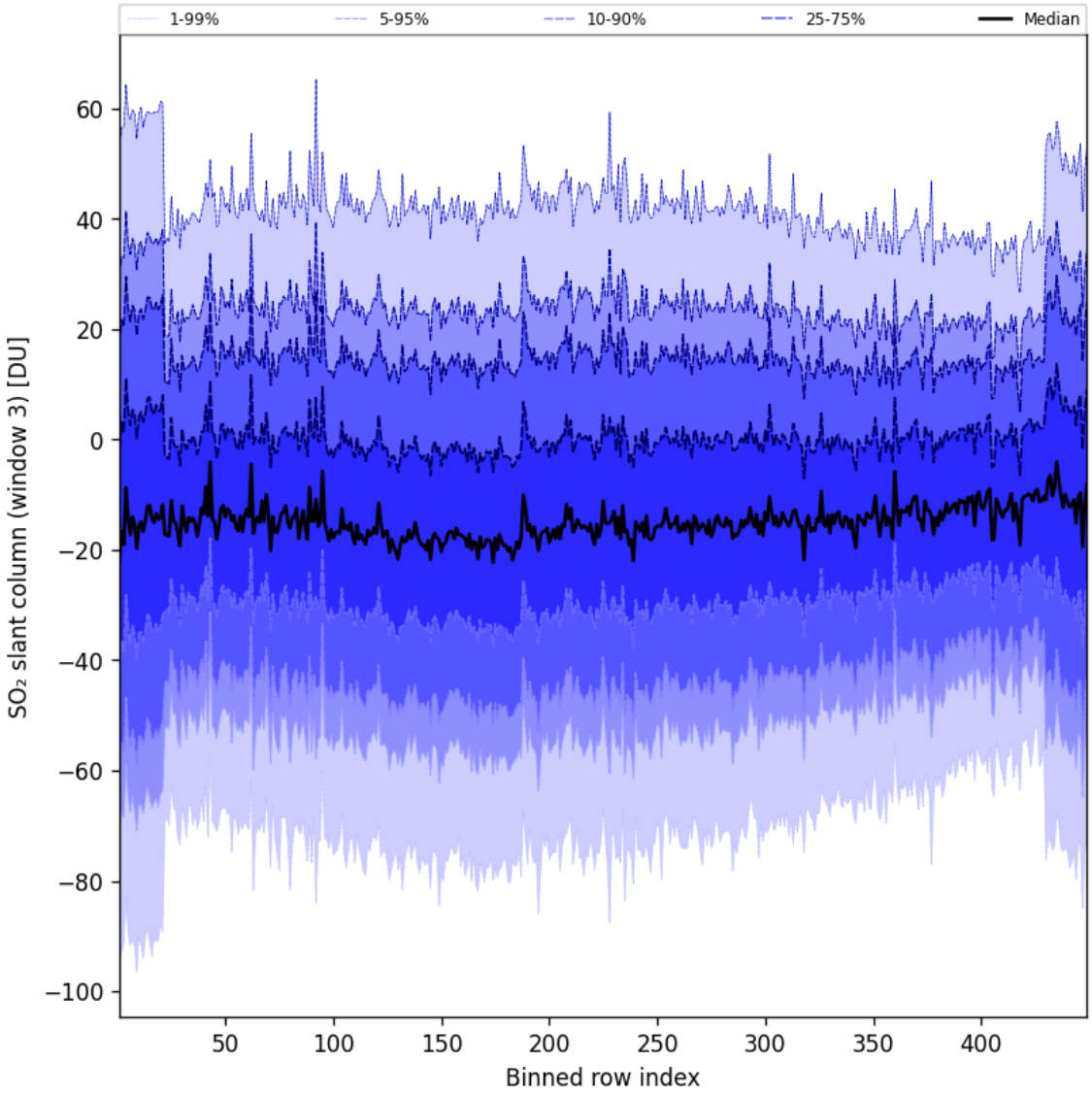

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-03-29 to 2025-03-30

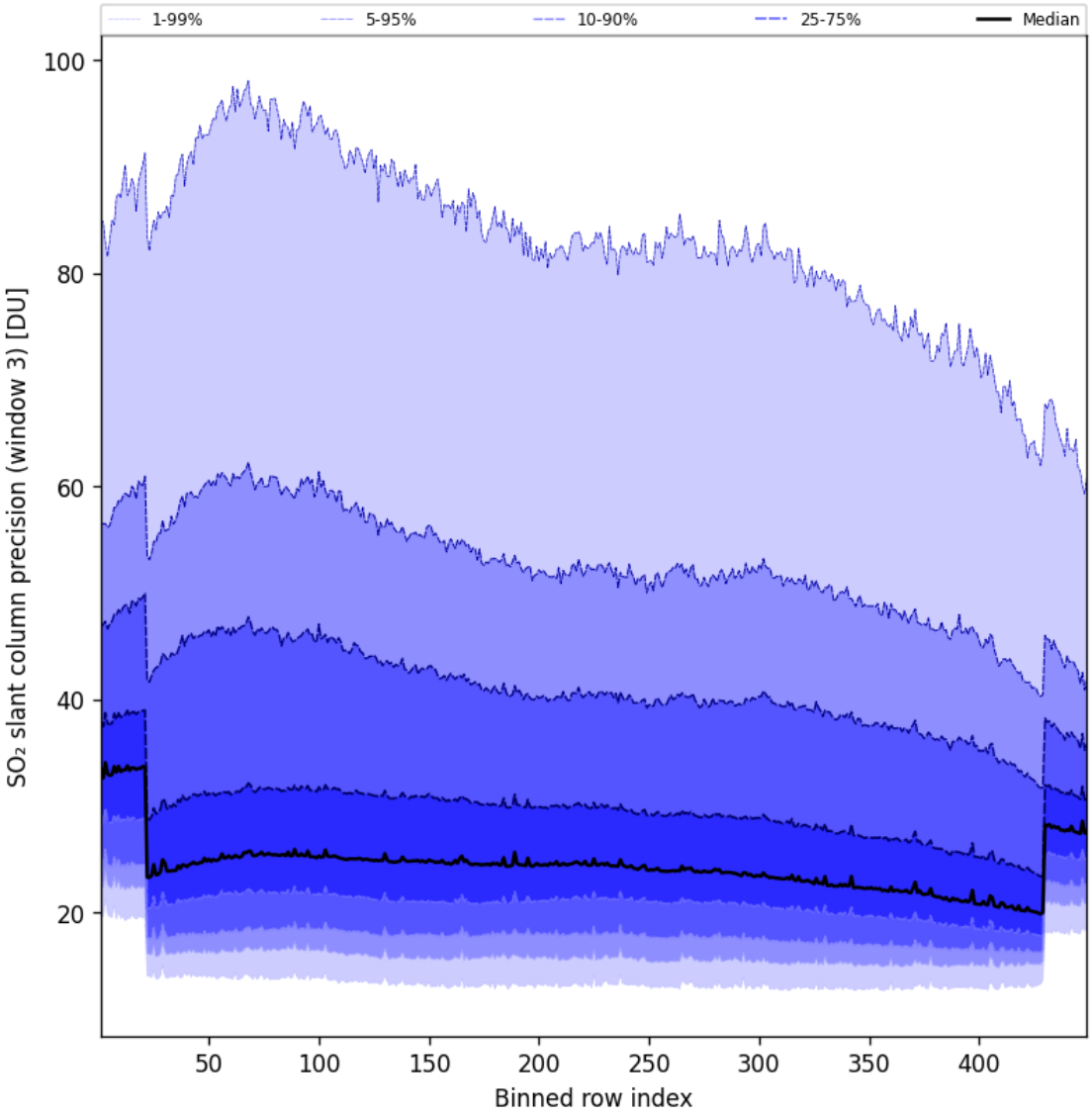

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-03-29 to 2025-03-30

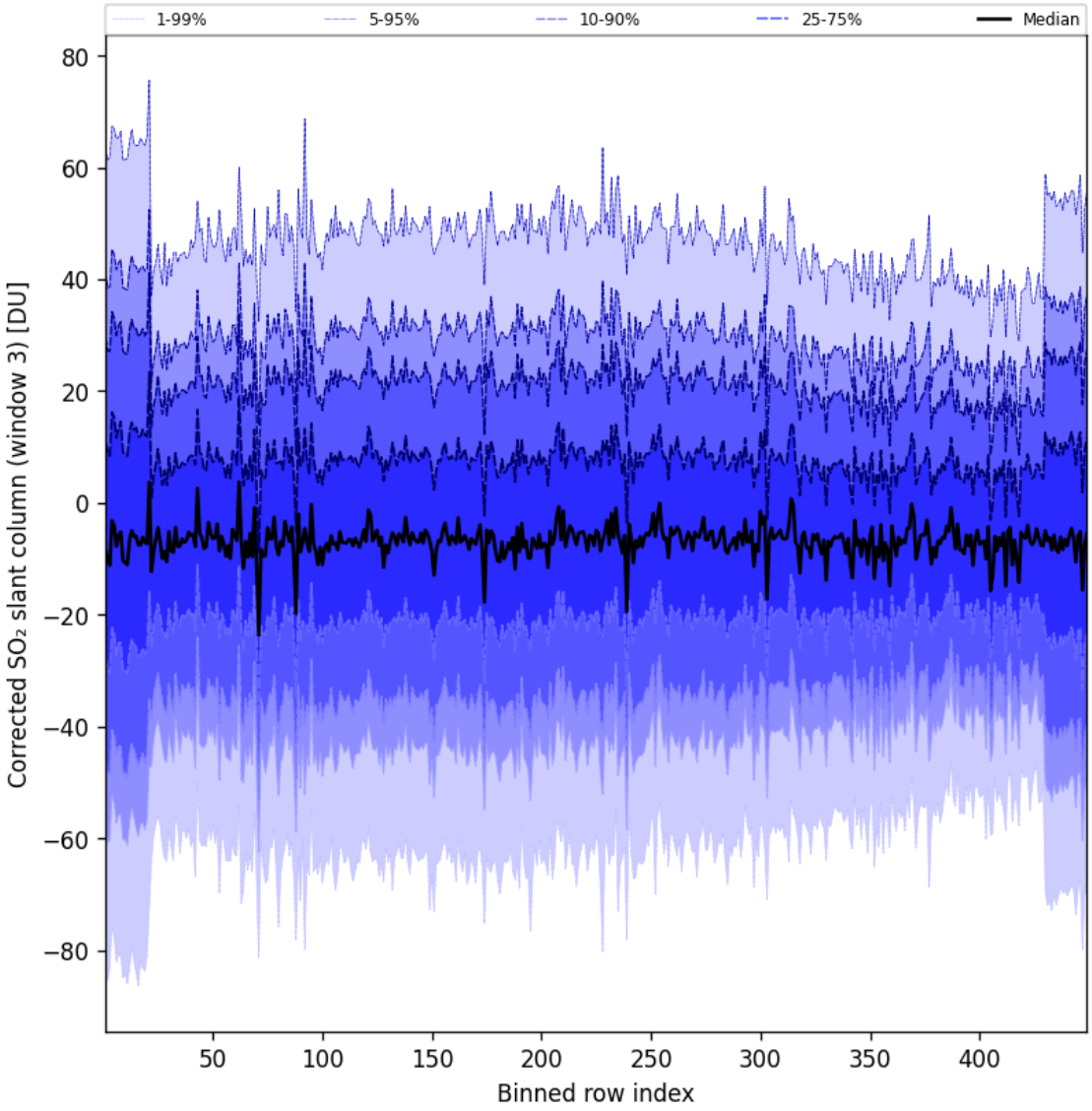

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-03-29 to 2025-03-30

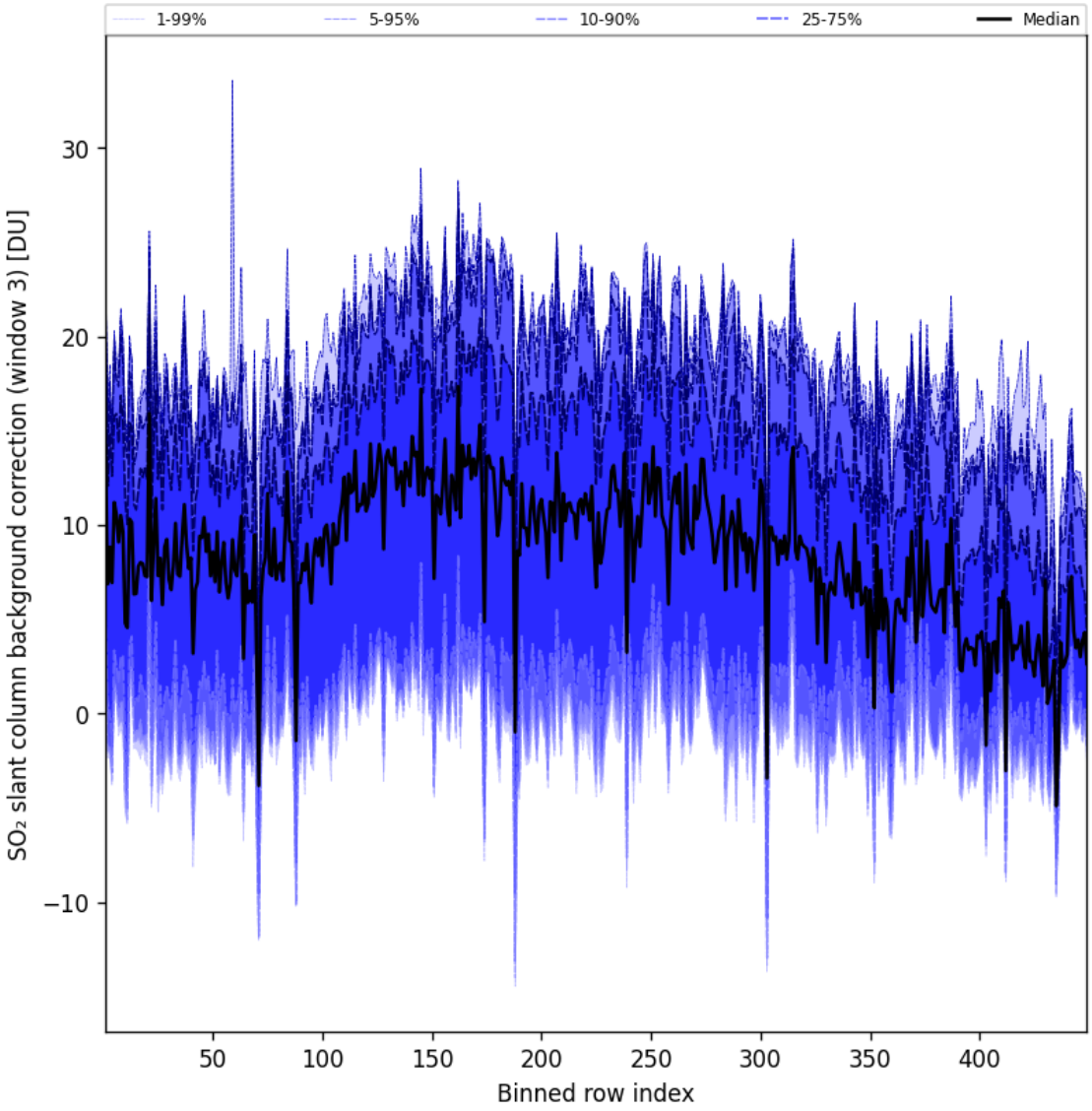

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-03-29 to 2025-03-30

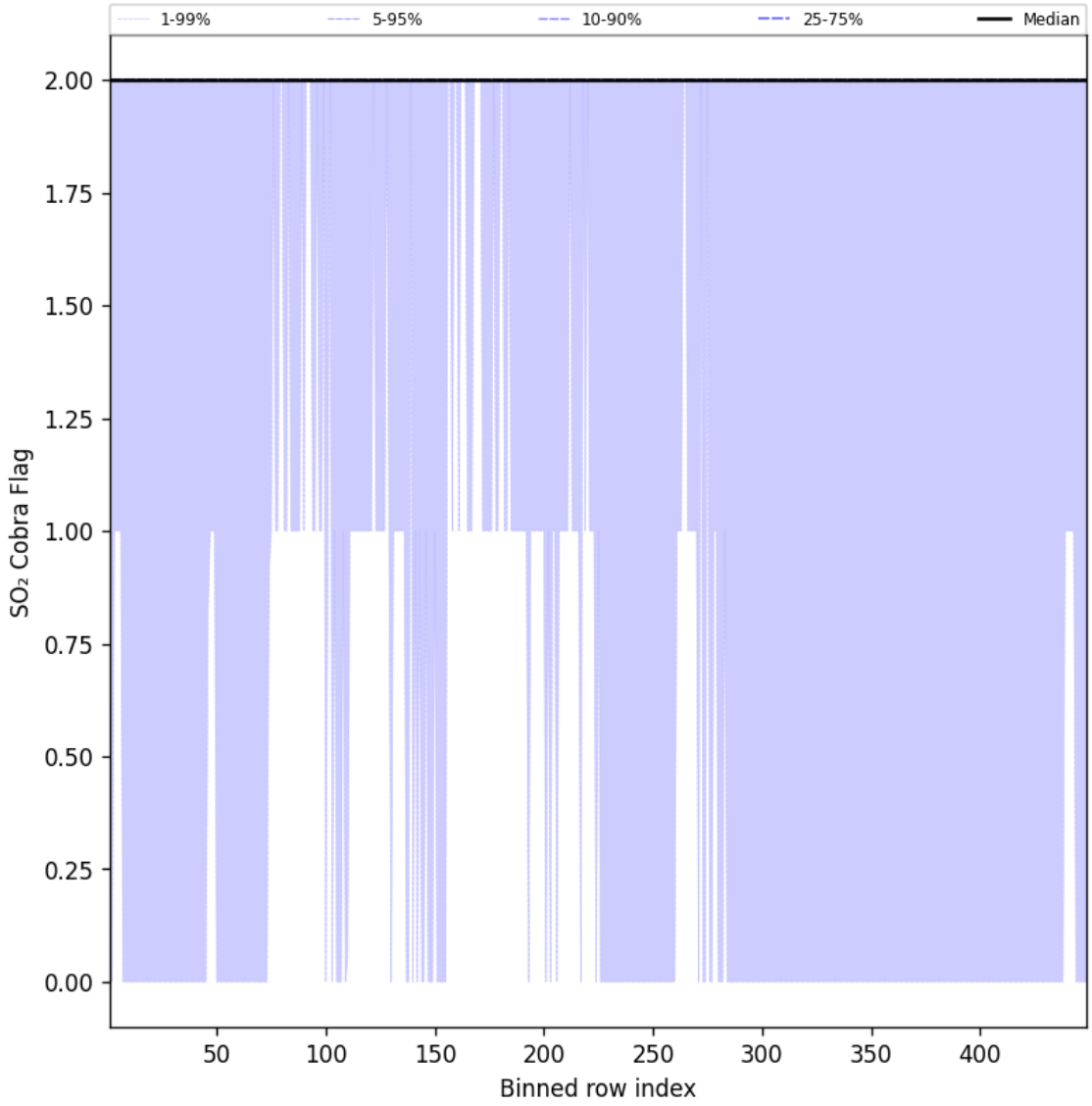

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-03-29 to 2025-03-30

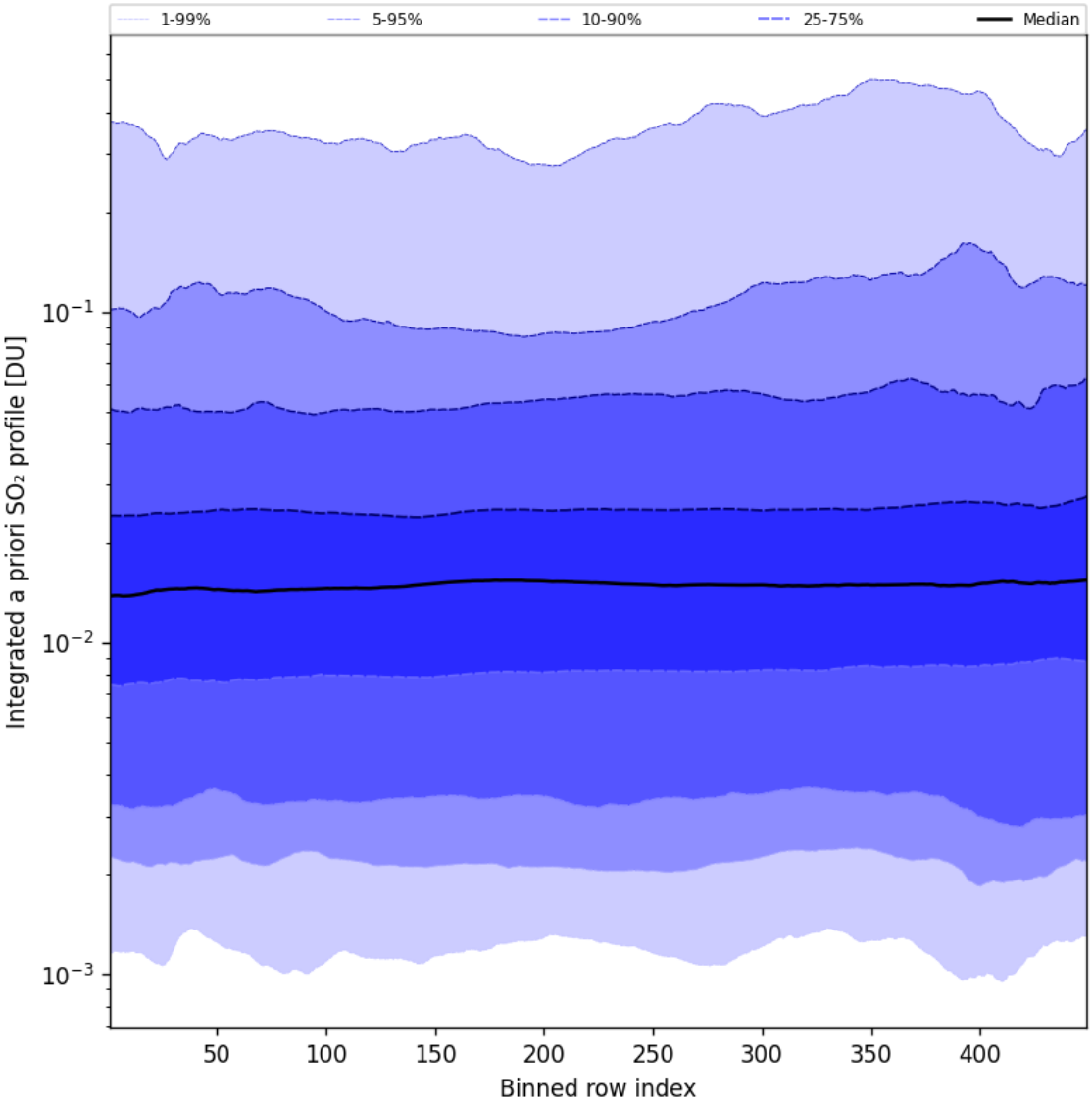

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-03-29 to 2025-03-30

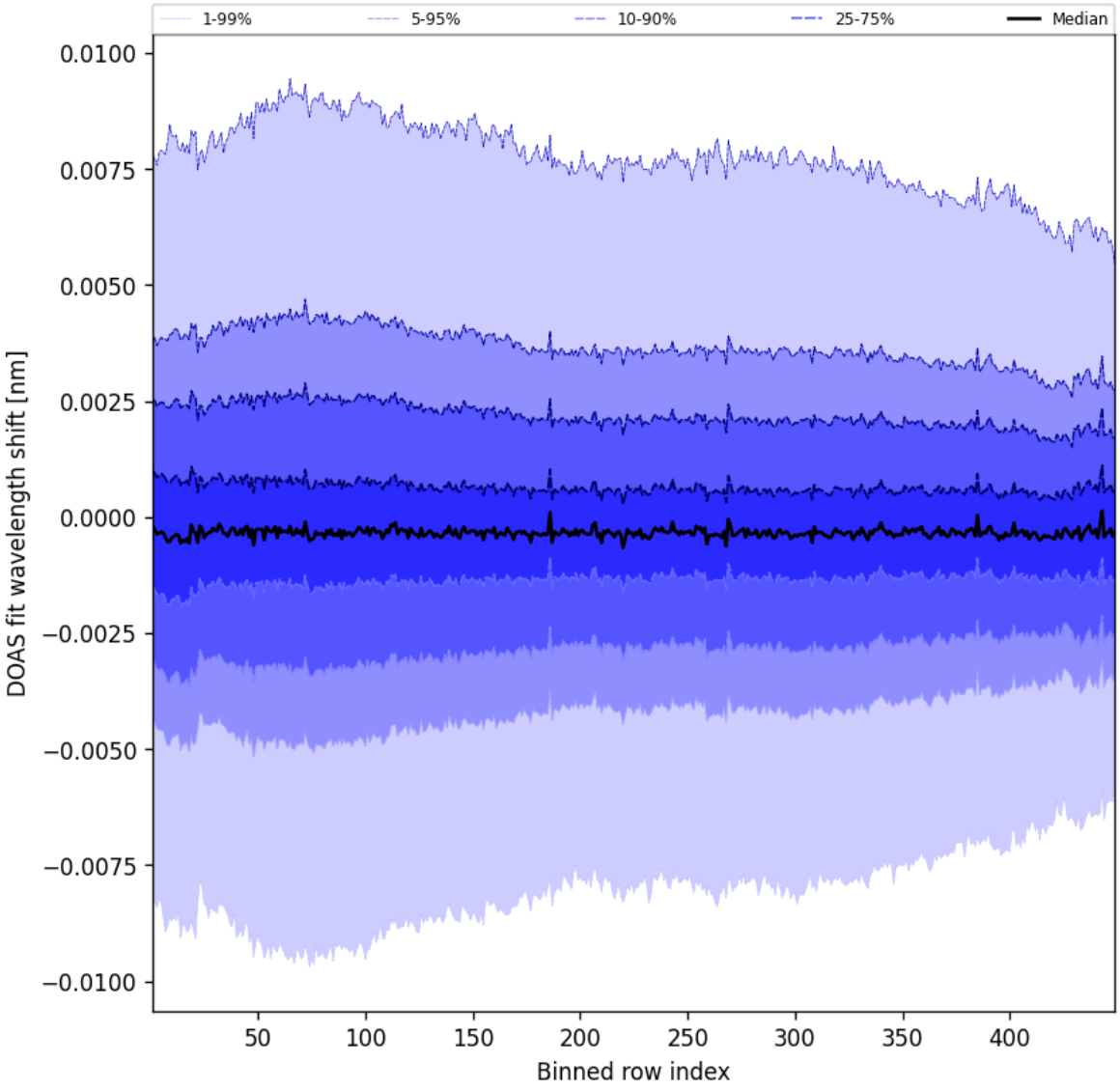

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-03-29 to 2025-03-30

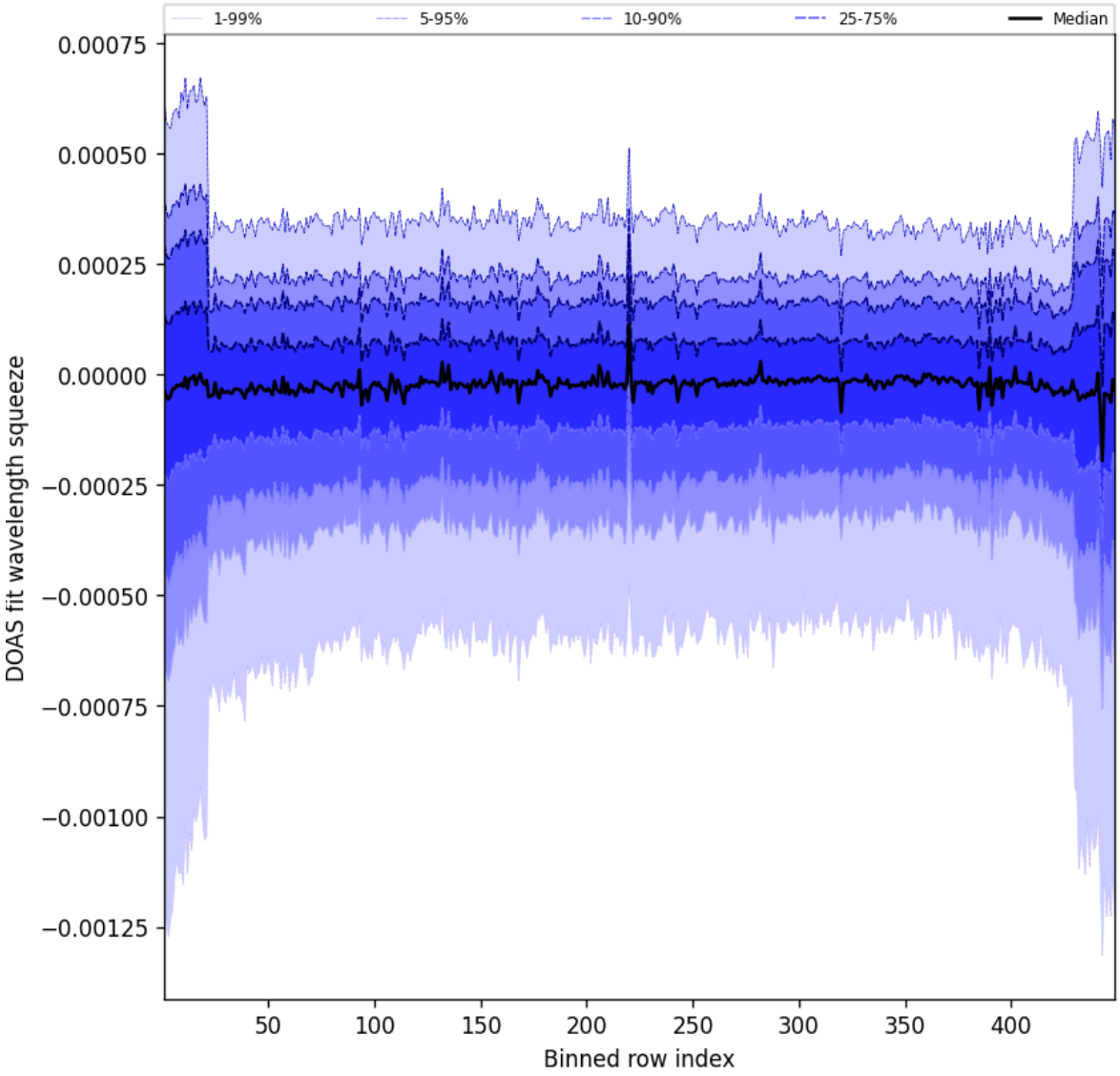

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-03-29 to 2025-03-30

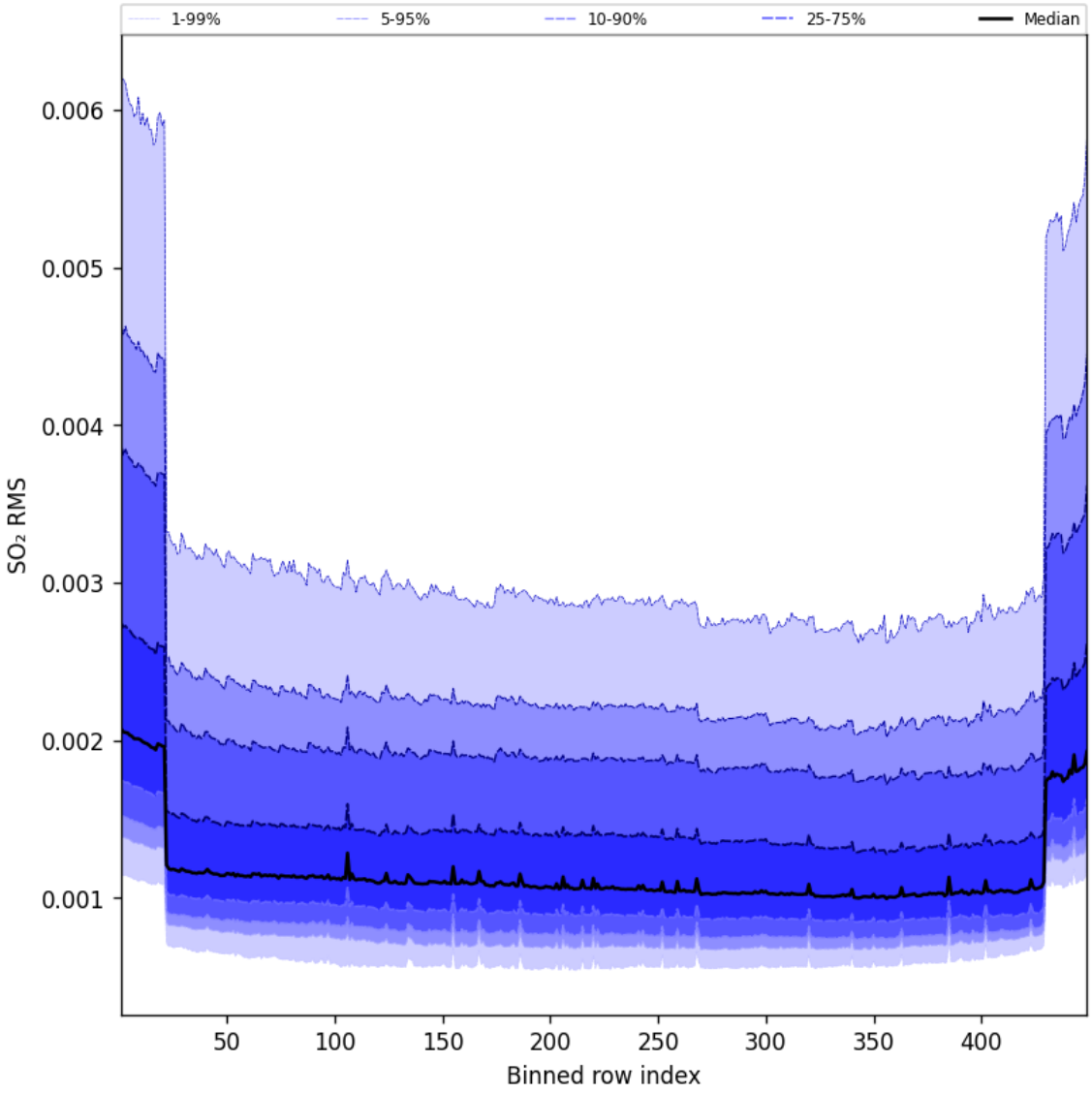

Figure 106: Along track statistics of "SO_2 RMS" for 2025-03-29 to 2025-03-30

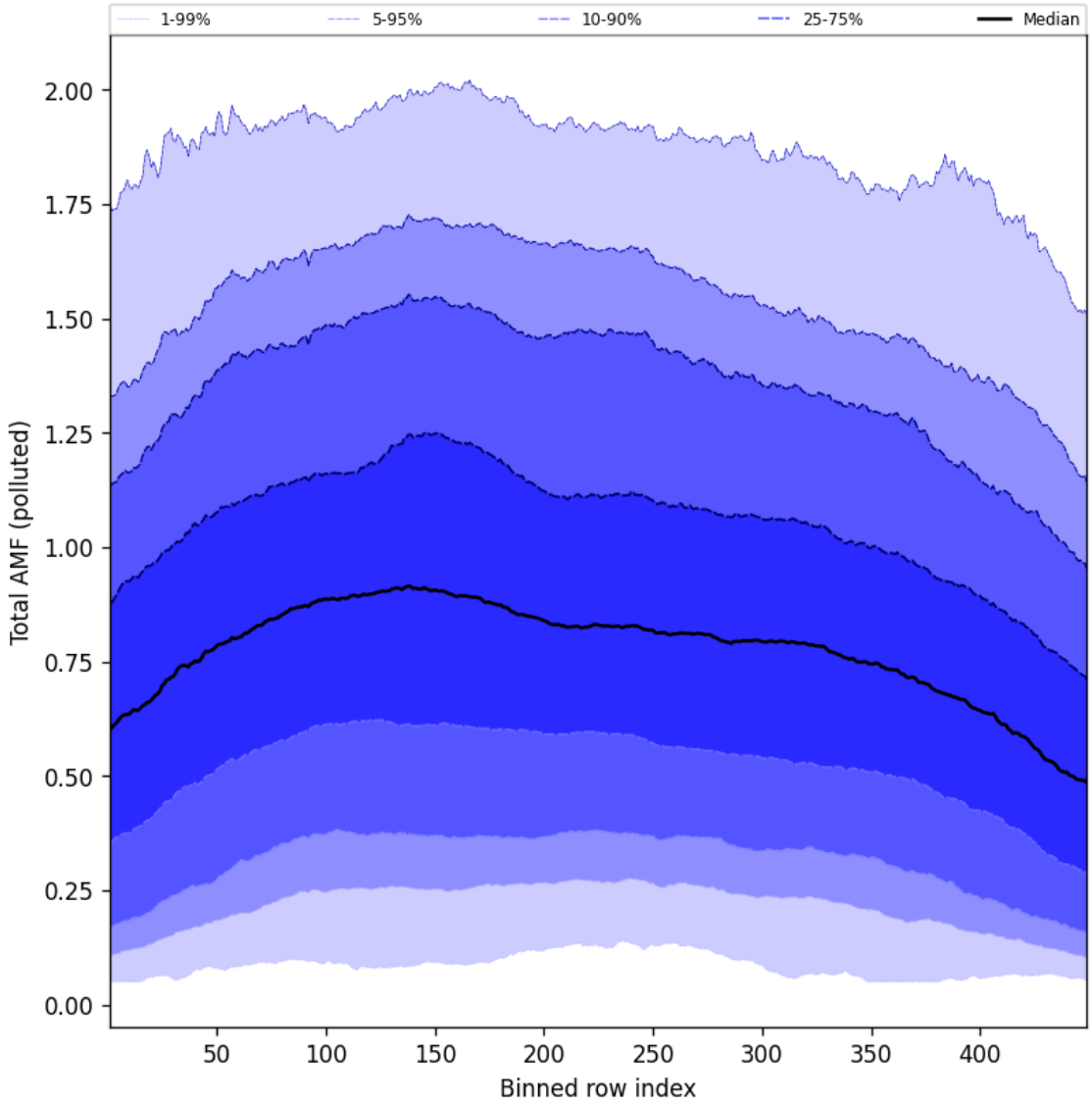

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-29 to 2025-03-30

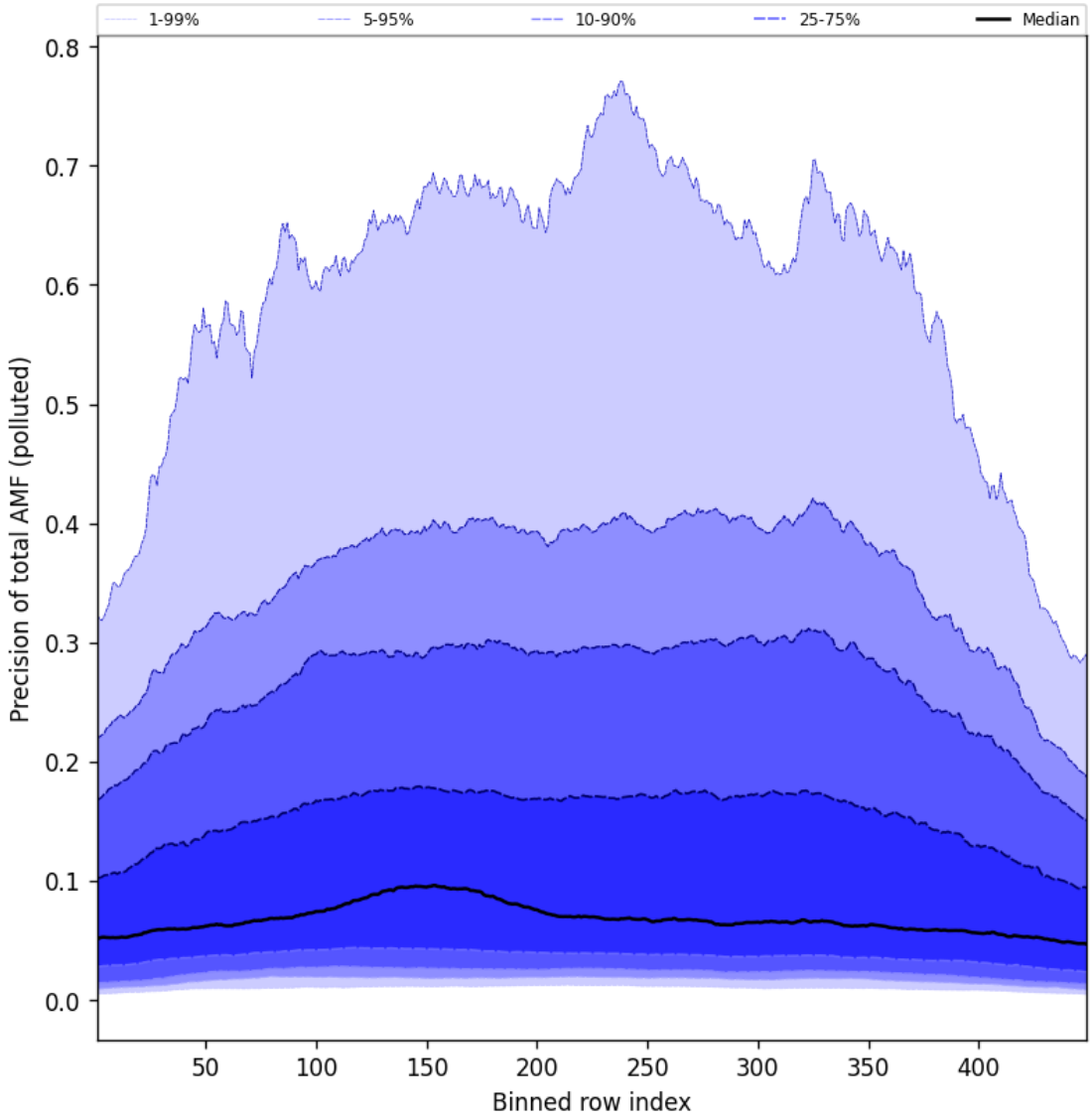

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-29 to 2025-03-30

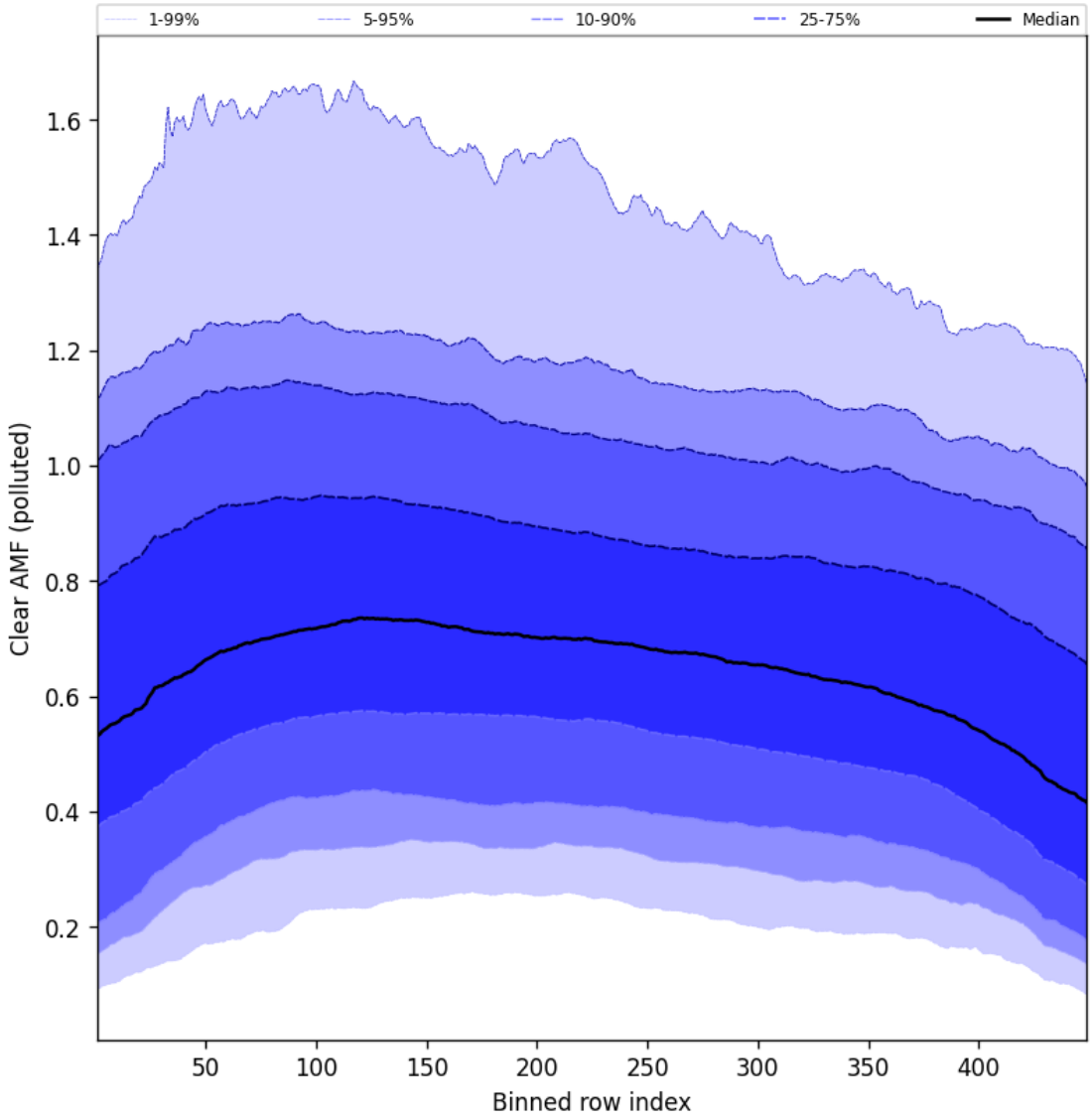

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-29 to 2025-03-30

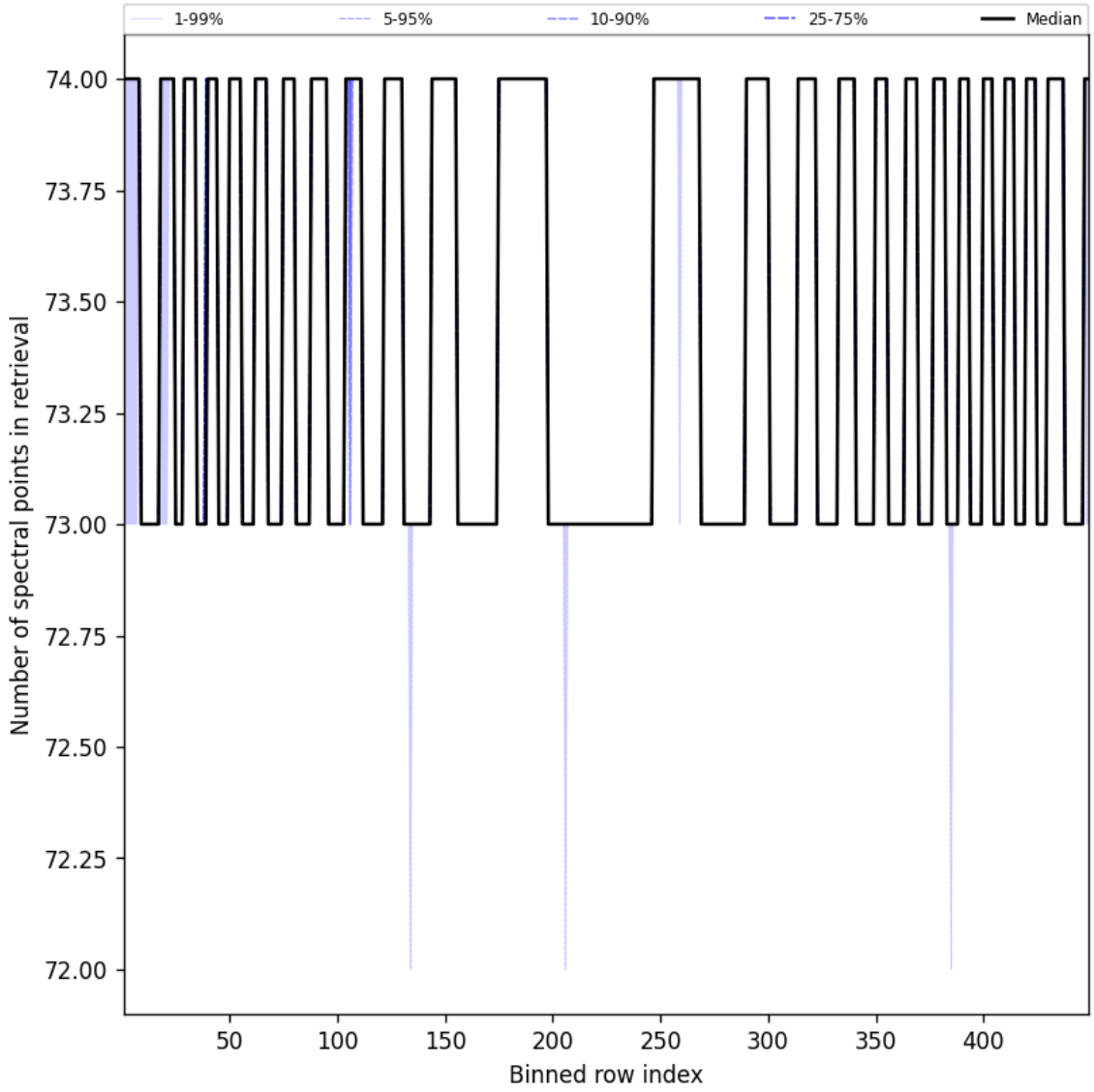

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-29 to 2025-03-30

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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