PyCAMA report generated by tropl2-proc

tropl2-proc

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1 Short Introduction

1.1 The list of parameters

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

2 Definitions

The averages shown here are *unweighed* averages:

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

with N the number of observations in the dataset.

The spread of the measurements is indicated with the variance $V(x)$, or rather the standard deviation $\sigma(x) = \sqrt{V(x)}$.

$$V(x) = \frac{1}{N-1}\sum_{i=1}^{N}(x_i - \overline{x})^2 \tag{2}$$

We also report the more robust statistics median, minimum, maximum, various percentiles and inter quartile range.

The median m is the value of parameter x for which half of the observations of x is smaller than m:

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^{m} f(x)\,\mathrm{d}x = \frac{1}{2} \tag{3}$$

with $f(x)$ the probability density function.

The median is a special case of a percentile. Instead of ½ in equation 3, other threshold values can be used. We report results for 1 %, 5 %, 10 %, 15.9 %, 25 %, 75 %, 84.1 %, 90 %, 95 % and 99 %. The inter quartile range is the difference between the 75 % and 25 % percentiles. Similarly the minimum and maximum values correspond to the 0 % and 100 % percentiles respectively.

For normally distributed parameters the mean and median are the same, while the $\mu \pm \sigma$ values and the 15.9 % and 84.1 % percentiles coincide.

To get a measure for the relation of one variable $x_{(k)}$ with another $x_{(l)}$, we calculate the covariance matrix C_{kl}.

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1}\sum_{i=1}^{N}(x_{(k),i} - \overline{x_{(k)}})(x_{(l),i} - \overline{x_{(l)}}) \tag{4}$$

Rather than a dimensionally dependent covariance, it is often easier to interpret a correlation matrix R_{kl}, a matrix of Pearson's r coefficients:

$$R_{kl} = R(x_{(k)}, x_{(l)}) = \frac{C_{kl}}{\sqrt{C_{kk}C_{ll}}} = \frac{C_{kl}}{\sqrt{V(x_k)V(x_l)}} \tag{5}$$

The diagonal elements of the covariance matrix are the variances of the elements, $V(x_{(k)}) = C_{kk}$ and obviously $R_{kk} = 1$.

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm\sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.649 ± 0.407	18544603	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.562 \pm 138.381) \times 10^{-2}$	18544603	0.263	0.484	1.158×10^{-2}	-149	199
sulfurdioxide total vertical column precision [DU]	0.634 ± 0.993	18544603	0.197	0.439	0.348	4.646×10^{-2}	71.2
sulfurdioxide slant column density corrected [DU]	$(2.152 \pm 39.337) \times 10^{-2}$	18544603	0.258	0.363	9.557×10^{-3}	-31.3	59.7
sulfurdioxide slant column density cobra [DU]	$(2.128 \pm 38.156) \times 10^{-2}$	18544603	0.258	0.363	9.557×10^{-3}	-31.3	43.9
sulfurdioxide slant column density cobra precision [DU]	0.298 ± 0.150	18544603	0.188	0.154	0.251	7.931×10^{-2}	19.4
sulfurdioxide slant column density window1 [DU]	0.232 ± 0.721	18544603	0.275	0.739	0.256	-73.5	104
sulfurdioxide slant column density window1 precision [DU]	0.298 ± 0.150	18544603	0.188	0.154	0.251	7.931×10^{-2}	19.4
sulfurdioxide slant column density corrected win1 [DU]	$(6.849 \pm 70.777) \times 10^{-2}$	18544603	2.500×10^{-2}	0.718	4.854×10^{-2}	-73.5	104
background so2 slant column offset window1 [DU]	-0.164 ± 0.209	18544603	-0.300	0.213	-0.220	-1.49	4.15
sulfurdioxide slant column density window2 [DU]	3.71 ± 9.08	18544603	3.25	11.5	3.44	-1.030×10^{3}	1.036×10^{3}
sulfurdioxide slant column density window2 precision [DU]	8.10 ± 2.22	18544603	7.43	2.57	7.78	2.06	640
sulfurdioxide slant column density corrected win2 [DU]	0.636 ± 8.771	18544603	0.750	11.1	0.657	-1.032×10^{3}	1.033×10^{3}
background so2 slant column offset window2 [DU]	-3.07 ± 2.92	18544603	-0.750	3.88	-2.08	-27.4	4.91
sulfurdioxide slant column density window3 [DU]	-19.6 ± 24.4	18544603	-20.7	31.0	-19.9	-980	492
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 13.1	18544603	22.5	9.34	24.9	10.00	239
sulfurdioxide slant column density corrected win3 [DU]	-3.53 ± 23.40	18544603	-3.92	29.6	-3.63	-969	500
background so2 slant column offset window3 [DU]	16.1 ± 7.6	18544603	9.52	12.5	15.4	-10.4	48.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	18544603	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.061 \pm 6.694) \times 10^{-2}$	18544603	1.664×10^{-2}	1.721×10^{-2}	1.546×10^{-2}	1.333×10^{-4}	1.86
fitted radiance shift [nm]	$(-5.717 \pm 26.056) \times 10^{-4}$	18544603	-5.000×10^{-4}	1.873×10^{-3}	-5.553×10^{-4}	-4.817×10^{-2}	4.706×10^{-2}
fitted radiance squeeze [1]	$(-4.011 \pm 20.335) \times 10^{-5}$	18544603	-1.000×10^{-5}	2.069×10^{-4}	-2.212×10^{-5}	-1.505×10^{-2}	1.500×10^{-2}
fitted root mean square [1]	$(1.309 \pm 0.626) \times 10^{-3}$	18544603	9.250×10^{-4}	6.125×10^{-4}	1.110×10^{-3}	3.124×10^{-4}	5.880×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.800 ± 0.422	18544603	0.620	0.552	0.757	5.000×10^{-2}	2.89
sulfurdioxide total air mass factor polluted precision [1]	0.113 ± 0.129	18544603	3.500×10^{-2}	0.113	6.362×10^{-2}	2.500×10^{-3}	1.94
sulfurdioxide clear air mass factor polluted [1]	0.692 ± 0.303	18544603	0.540	0.405	0.656	3.137×10^{-2}	3.16
number of spectral points in retrieval [1]	73.4 ± 0.5	18544603	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	4.000×10^{-2}	0.110	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.11	−1.07	−0.613	−0.395	−0.226	0.258	0.444	0.691	1.22	3.72
sulfurdioxide total vertical column precision [DU]	9.895×10^{-2}	0.137	0.163	0.186	0.218	0.656	0.924	1.26	1.97	4.90
sulfurdioxide slant column density corrected [DU]	−0.894	−0.501	−0.358	−0.265	−0.170	0.193	0.295	0.397	0.566	1.12
sulfurdioxide slant column density cobra [DU]	−0.894	−0.501	−0.358	−0.265	−0.170	0.193	0.295	0.397	0.566	1.12
sulfurdioxide slant column density cobra precision [DU]	0.136	0.162	0.175	0.186	0.200	0.354	0.413	0.474	0.572	0.857
sulfurdioxide slant column density window1 [DU]	−1.85	−0.884	−0.543	−0.332	−0.122	0.617	0.804	0.984	1.26	2.06
sulfurdioxide slant column density window1 precision [DU]	0.136	0.162	0.175	0.186	0.200	0.354	0.413	0.474	0.572	0.857
sulfurdioxide slant column density corrected win1 [DU]	−1.72	−0.947	−0.672	−0.492	−0.306	0.412	0.613	0.816	1.15	2.15
background so2 slant column offset window1 [DU]	−0.420	−0.362	−0.338	−0.321	−0.299	-8.601×10^{-2}	-3.831×10^{-3}	8.158×10^{-2}	0.210	0.567
sulfurdioxide slant column density window2 [DU]	−17.1	−10.6	−7.36	−4.94	−2.20	9.31	12.3	15.1	18.9	27.0
sulfurdioxide slant column density window2 precision [DU]	4.28	5.19	5.72	6.14	6.64	9.22	10.1	10.9	12.0	14.6
sulfurdioxide slant column density corrected win2 [DU]	−20.7	−13.6	−10.2	−7.70	−4.91	6.20	8.97	11.4	14.8	21.9
background so2 slant column offset window2 [DU]	−11.2	−8.69	−7.29	−6.25	−4.83	−0.956	−0.650	−0.388	3.385×10^{-2}	1.57
sulfurdioxide slant column density window3 [DU]	−79.1	−59.2	−49.7	−42.8	−35.1	−4.18	3.94	11.3	21.1	40.3
sulfurdioxide slant column density window3 precision [DU]	14.0	16.3	18.1	19.6	21.2	30.6	35.2	41.1	52.9	84.6
sulfurdioxide slant column density corrected win3 [DU]	−61.3	−41.7	−32.4	−25.7	−18.3	11.3	18.9	25.7	34.9	53.4
background so2 slant column offset window3 [DU]	1.83	5.36	6.77	8.09	9.73	22.3	24.7	26.5	28.7	32.1
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]	1.610×10^{-3}	3.085×10^{-3}	4.920×10^{-3}	6.715×10^{-3}	9.037×10^{-3}	2.624×10^{-2}	3.428×10^{-2}	4.813×10^{-2}	0.100	0.347
fitted radiance shift [nm]	-8.434×10^{-3}	-4.426×10^{-3}	-3.051×10^{-3}	-2.252×10^{-3}	-1.540×10^{-3}	3.327×10^{-4}	1.027×10^{-3}	1.888×10^{-3}	3.383×10^{-3}	7.551×10^{-3}
fitted radiance squeeze [1]	-7.205×10^{-4}	-3.778×10^{-4}	-2.604×10^{-4}	-1.933×10^{-4}	-1.302×10^{-4}	7.675×10^{-5}	1.262×10^{-4}	1.717×10^{-4}	2.362×10^{-4}	3.889×10^{-4}
fitted root mean square [1]	5.833×10^{-4}	7.182×10^{-4}	7.913×10^{-4}	8.472×10^{-4}	9.161×10^{-4}	1.528×10^{-3}	1.791×10^{-3}	2.049×10^{-3}	2.492×10^{-3}	3.627×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.048×10^{-2}	0.195	0.290	0.377	0.488	1.04	1.20	1.37	1.60	1.98
sulfurdioxide total air mass factor polluted precision [1]	9.381×10^{-3}	1.589×10^{-2}	2.167×10^{-2}	2.732×10^{-2}	3.540×10^{-2}	0.148	0.200	0.254	0.354	0.593
sulfurdioxide clear air mass factor polluted [1]	0.172	0.270	0.337	0.397	0.475	0.880	0.981	1.06	1.17	1.69
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]	0.647 ± 0.406	9488736	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(7.017 \pm 177.795) \times 10^{-2}$	9488736	0.574	1.429×10^{-2}	-149	199	-0.264	0.310
sulfurdioxide total vertical column precision [DU]	0.811 ± 1.255	9488736	0.635	0.431	4.718×10^{-2}	71.2	0.236	0.871
sulfurdioxide slant column density corrected [DU]	$(2.814 \pm 44.491) \times 10^{-2}$	9488736	0.387	1.109×10^{-2}	-13.1	54.9	-0.179	0.208
sulfurdioxide slant column density cobra [DU]	$(2.776 \pm 42.902) \times 10^{-2}$	9488736	0.387	1.109×10^{-2}	-13.1	17.8	-0.179	0.208
sulfurdioxide slant column density cobra precision [DU]	0.325 ± 0.174	9488736	0.186	0.273	7.931×10^{-2}	7.57	0.206	0.392
sulfurdioxide slant column density window1 [DU]	0.236 ± 0.803	9488736	0.788	0.267	-46.8	25.0	-0.137	0.651
sulfurdioxide slant column density window1 precision [DU]	0.325 ± 0.174	9488736	0.186	0.273	7.931×10^{-2}	7.57	0.206	0.392
sulfurdioxide slant column density corrected win1 [DU]	$(8.503 \pm 79.037) \times 10^{-2}$	9488736	0.770	5.590×10^{-2}	-46.8	26.2	-0.322	0.448
background so2 slant column offset window1 [DU]	-0.151 ± 0.248	9488736	0.239	-0.222	-1.47	4.15	-0.309	-7.002×10^{-2}
sulfurdioxide slant column density window2 [DU]	4.43 ± 9.28	9488736	11.9	4.11	-202	245	-1.68	10.2
sulfurdioxide slant column density window2 precision [DU]	8.16 ± 2.14	9488736	2.60	7.85	2.06	392	6.70	9.30
sulfurdioxide slant column density corrected win2 [DU]	0.592 ± 8.823	9488736	11.2	0.625	-209	245	-5.01	6.22
background so2 slant column offset window2 [DU]	-3.83 ± 3.35	9488736	5.39	-3.00	-27.4	4.91	-6.40	-1.01
sulfurdioxide slant column density window3 [DU]	-22.2 ± 24.0	9488736	30.4	-22.4	-193	159	-37.4	-7.01
sulfurdioxide slant column density window3 precision [DU]	27.7 ± 12.6	9488736	8.81	24.4	10.00	233	21.0	29.8
sulfurdioxide slant column density corrected win3 [DU]	-3.38 ± 23.01	9488736	29.0	-3.30	-181	188	-17.8	11.2
background so2 slant column offset window3 [DU]	18.8 ± 7.4	9488736	13.1	19.1	-8.47	48.9	11.9	25.0
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	9488736	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.192 \pm 8.861) \times 10^{-2}$	9488736	2.519×10^{-2}	1.695×10^{-2}	1.333×10^{-4}	1.75	7.918×10^{-3}	3.311×10^{-2}
fitted radiance shift [nm]	$(-4.271 \pm 24.913) \times 10^{-4}$	9488736	1.726×10^{-3}	-4.250×10^{-4}	-4.472×10^{-2}	4.041×10^{-2}	-1.310×10^{-3}	4.158×10^{-4}
fitted radiance squeeze [1]	$(-5.654 \pm 23.436) \times 10^{-5}$	9488736	2.262×10^{-4}	-2.671×10^{-5}	-1.152×10^{-2}	1.258×10^{-2}	-1.482×10^{-4}	7.803×10^{-5}
fitted root mean square [1]	$(1.416 \pm 0.730) \times 10^{-3}$	9488736	7.406×10^{-4}	1.177×10^{-3}	3.279×10^{-4}	3.409×10^{-2}	9.391×10^{-4}	1.680×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.732 ± 0.421	9488736	0.571	0.671	5.000×10^{-2}	2.89	0.411	0.982
sulfurdioxide total air mass factor polluted precision [1]	0.108 ± 0.146	9488736	0.101	5.522×10^{-2}	2.500×10^{-3}	1.94	2.928×10^{-2}	0.130
sulfurdioxide clear air mass factor polluted [1]	0.628 ± 0.305	9488736	0.464	0.570	3.137×10^{-2}	3.01	0.388	0.852
number of spectral points in retrieval [1]	73.5 ± 0.5	9488736	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]	0.651 ± 0.410	9055867	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(1.990 \pm 77.967) \times 10^{-2}$	9055867	0.415	9.287×10^{-3}	-54.4	87.2	-0.197	0.219
sulfurdioxide total vertical column precision [DU]	0.450 ± 0.551	9055867	0.290	0.293	4.646×10^{-2}	28.2	0.205	0.495
sulfurdioxide slant column density corrected [DU]	$(1.458 \pm 33.071) \times 10^{-2}$	9055867	0.340	8.109×10^{-3}	-31.3	59.7	-0.161	0.179
sulfurdioxide slant column density cobra [DU]	$(1.448 \pm 32.434) \times 10^{-2}$	9055867	0.340	8.109×10^{-3}	-31.3	43.9	-0.161	0.179
sulfurdioxide slant column density cobra precision [DU]	0.271 ± 0.114	9055867	0.121	0.235	8.377×10^{-2}	19.4	0.196	0.317
sulfurdioxide slant column density window1 [DU]	0.228 ± 0.623	9055867	0.692	0.245	-73.5	104	-0.108	0.584
sulfurdioxide slant column density window1 precision [DU]	0.271 ± 0.114	9055867	0.121	0.235	8.377×10^{-2}	19.4	0.196	0.317
sulfurdioxide slant column density corrected win1 [DU]	$(5.116 \pm 60.884) \times 10^{-2}$	9055867	0.671	4.167×10^{-2}	-73.5	104	-0.292	0.379
background so2 slant column offset window1 [DU]	-0.177 ± 0.157	9055867	0.189	-0.218	-1.49	4.04	-0.291	-0.102
sulfurdioxide slant column density window2 [DU]	2.95 ± 8.81	9055867	11.1	2.79	-1.030×10^{3}	1.036×10^{3}	-2.69	8.40
sulfurdioxide slant column density window2 precision [DU]	8.04 ± 2.29	9055867	2.54	7.71	2.12	640	6.59	9.13
sulfurdioxide slant column density corrected win2 [DU]	0.683 ± 8.717	9055867	11.0	0.691	-1.032×10^{3}	1.033×10^{3}	-4.81	6.18
background so2 slant column offset window2 [DU]	-2.27 ± 2.10	9055867	2.36	-1.72	-24.1	4.63	-3.28	-0.917
sulfurdioxide slant column density window3 [DU]	-16.9 ± 24.6	9055867	31.2	-17.3	-980	492	-32.6	-1.36
sulfurdioxide slant column density window3 precision [DU]	28.9 ± 13.5	9055867	9.83	25.4	10.2	239	21.5	31.3
sulfurdioxide slant column density corrected win3 [DU]	-3.69 ± 23.81	9055867	30.3	-4.00	-969	500	-18.9	11.4
background so2 slant column offset window3 [DU]	13.2 ± 6.7	9055867	11.2	11.8	-10.4	36.4	7.73	19.0
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	9055867	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.876 \pm 2.597) \times 10^{-2}$	9055867	1.187×10^{-2}	1.470×10^{-2}	8.522×10^{-4}	1.86	9.790×10^{-3}	2.166×10^{-2}
fitted radiance shift [nm]	$(-7.233 \pm 27.119) \times 10^{-4}$	9055867	1.998×10^{-3}	-7.122×10^{-4}	-4.817×10^{-2}	4.706×10^{-2}	-1.772×10^{-3}	2.259×10^{-4}
fitted radiance squeeze [1]	$(-2.289 \pm 16.294) \times 10^{-5}$	9055867	1.907×10^{-4}	-1.793×10^{-5}	-1.505×10^{-2}	1.500×10^{-2}	-1.151×10^{-4}	7.555×10^{-5}
fitted root mean square [1]	$(1.196 \pm 0.469) \times 10^{-3}$	9055867	4.785×10^{-4}	1.062×10^{-3}	3.124×10^{-4}	5.880×10^{-2}	8.962×10^{-4}	1.375×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.870 ± 0.411	9055867	0.508	0.823	5.000×10^{-2}	2.89	0.589	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.118 ± 0.108	9055867	0.123	7.439×10^{-2}	5.494×10^{-3}	1.24	4.087×10^{-2}	0.164
sulfurdioxide clear air mass factor polluted [1]	0.758 ± 0.285	9055867	0.339	0.712	0.138	3.16	0.567	0.906
number of spectral points in retrieval [1]	73.4 ± 0.5	9055867	1.000	73.0	52.0	74.0	73.0	74.0

Table 5: Parameterlist and basic statistics for the analysis for observations over water

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.686 ± 0.400	13299277	0.740	1.000	0.0	1.000	0.260	1.000
sulfurdioxide total vertical column [DU]	$(2.852 \pm 101.933) \times 10^{-2}$	13299277	0.444	9.464×10^{-3}	-105	102	-0.210	0.234
sulfurdioxide total vertical column precision [DU]	0.524 ± 0.739	13299277	0.346	0.312	4.801×10^{-2}	33.5	0.210	0.557
sulfurdioxide slant column density corrected [DU]	$(1.557 \pm 33.977) \times 10^{-2}$	13299277	0.347	7.950×10^{-3}	-12.1	59.7	-0.164	0.183
sulfurdioxide slant column density cobra [DU]	$(1.550 \pm 33.593) \times 10^{-2}$	13299277	0.347	7.950×10^{-3}	-12.1	43.9	-0.164	0.183
sulfurdioxide slant column density cobra precision [DU]	0.281 ± 0.128	13299277	0.136	0.239	7.931×10^{-2}	19.4	0.197	0.333
sulfurdioxide slant column density window1 [DU]	0.236 ± 0.658	13299277	0.709	0.256	-46.8	104	-0.106	0.603
sulfurdioxide slant column density window1 precision [DU]	0.281 ± 0.128	13299277	0.136	0.239	7.931×10^{-2}	19.4	0.197	0.333
sulfurdioxide slant column density corrected win1 [DU]	$(5.847 \pm 64.514) \times 10^{-2}$	13299277	0.690	4.408×10^{-2}	-46.8	104	-0.298	0.392
background so2 slant column offset window1 [DU]	-0.178 ± 0.182	13299277	0.199	-0.224	-1.49	3.42	-0.300	-0.100
sulfurdioxide slant column density window2 [DU]	3.29 ± 8.83	13299277	11.2	3.08	-1.030×10^3	1.036×10^3	-2.44	8.77
sulfurdioxide slant column density window2 precision [DU]	7.97 ± 2.12	13299277	2.47	7.64	2.06	640	6.56	9.04
sulfurdioxide slant column density corrected win2 [DU]	0.638 ± 8.620	13299277	11.0	0.657	-1.032×10^3	1.033×10^3	-4.83	6.12
background so2 slant column offset window2 [DU]	-2.65 ± 2.55	13299277	3.09	-1.88	-27.4	4.91	-4.00	-0.911
sulfurdioxide slant column density window3 [DU]	-16.7 ± 24.4	13299277	31.1	-17.1	-980	492	-32.3	-1.16
sulfurdioxide slant column density window3 precision [DU]	27.9 ± 12.4	13299277	9.06	24.7	10.00	224	21.2	30.2
sulfurdioxide slant column density corrected win3 [DU]	-1.50 ± 23.15	13299277	29.6	-1.85	-969	500	-16.4	13.2
background so2 slant column offset window3 [DU]	15.2 ± 7.1	13299277	11.4	14.2	-10.4	40.7	9.44	20.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	13299277	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.065 \pm 2.902) \times 10^{-2}$	13299277	1.343×10^{-2}	1.505×10^{-2}	5.204×10^{-4}	1.27	9.711×10^{-3}	2.314×10^{-2}
fitted radiance shift [nm]	$(-5.499 \pm 24.666) \times 10^{-4}$	13299277	1.848×10^{-3}	-5.224×10^{-4}	-4.244×10^{-2}	4.041×10^{-2}	-1.506×10^{-3}	3.422×10^{-4}
fitted radiance squeeze [1]	$(-2.732 \pm 18.079) \times 10^{-5}$	13299277	1.964×10^{-4}	-1.635×10^{-5}	-1.505×10^{-2}	1.424×10^{-2}	-1.176×10^{-4}	7.885×10^{-5}
fitted root mean square [1]	$(1.239 \pm 0.542) \times 10^{-3}$	13299277	5.344×10^{-4}	1.070×10^{-3}	3.279×10^{-4}	5.880×10^{-2}	9.003×10^{-4}	1.435×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.823 ± 0.389	13299277	0.498	0.798	5.000×10^{-2}	2.53	0.549	1.05
sulfurdioxide total air mass factor polluted precision [1]	0.109 ± 0.105	13299277	0.106	6.666×10^{-2}	3.418×10^{-3}	1.38	3.950×10^{-2}	0.145
sulfurdioxide clear air mass factor polluted [1]	0.720 ± 0.279	13299277	0.371	0.688	5.199×10^{-2}	2.48	0.525	0.896
number of spectral points in retrieval [1]	73.5 ± 0.5	13299277	1.000	73.0	70.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.602 ± 0.413	3862682	0.820	0.490	0.0	1.000	0.180	1.000
sulfurdioxide total vertical column [DU]	$(7.298 \pm 181.587) \times 10^{-2}$	3862682	0.579	1.534×10^{-2}	-149	187	-0.263	0.316
sulfurdioxide total vertical column precision [DU]	0.820 ± 1.268	3862682	0.636	0.444	4.646×10^{-2}	71.2	0.246	0.883
sulfurdioxide slant column density corrected [DU]	$(3.114 \pm 47.636) \times 10^{-2}$	3862682	0.387	1.235×10^{-2}	-31.3	51.7	-0.178	0.209
sulfurdioxide slant column density cobra [DU]	$(3.042 \pm 44.672) \times 10^{-2}$	3862682	0.387	1.235×10^{-2}	-31.3	43.9	-0.178	0.209
sulfurdioxide slant column density cobra precision [DU]	0.322 ± 0.177	3862682	0.170	0.272	8.756×10^{-2}	13.2	0.209	0.379
sulfurdioxide slant column density window1 [DU]	0.243 ± 0.798	3862682	0.781	0.271	-73.5	89.5	-0.130	0.651
sulfurdioxide slant column density window1 precision [DU]	0.322 ± 0.177	3862682	0.170	0.272	8.756×10^{-2}	13.2	0.209	0.379
sulfurdioxide slant column density corrected win1 [DU]	$(8.564 \pm 78.368) \times 10^{-2}$	3862682	0.757	5.951×10^{-2}	-73.5	89.5	-0.314	0.444
background so2 slant column offset window1 [DU]	-0.157 ± 0.236	3862682	0.219	-0.227	-1.49	4.15	-0.305	-8.618×10^{-2}
sulfurdioxide slant column density window2 [DU]	4.17 ± 9.47	3862682	12.0	3.90	-919	703	-1.96	10.0
sulfurdioxide slant column density window2 precision [DU]	8.38 ± 2.42	3862682	2.64	8.10	2.12	599	6.88	9.52
sulfurdioxide slant column density corrected win2 [DU]	0.627 ± 9.072	3862682	11.4	0.662	-922	702	-5.08	6.35
background so2 slant column offset window2 [DU]	-3.54 ± 3.29	3862682	5.02	-2.31	-27.4	4.40	-5.98	-0.967
sulfurdioxide slant column density window3 [DU]	-26.8 ± 23.2	3862682	29.2	-26.4	-672	235	-41.3	-12.0
sulfurdioxide slant column density window3 precision [DU]	29.9 ± 15.1	3862682	10.1	25.8	10.3	239	21.7	31.8
sulfurdioxide slant column density corrected win3 [DU]	-9.70 ± 23.53	3862682	29.6	-9.18	-659	242	-24.3	5.39
background so2 slant column offset window3 [DU]	17.1 ± 8.2	3862682	14.1	16.9	-7.01	48.9	10.0	24.1
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.26	3862682	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.724 \pm 11.074) \times 10^{-2}$	3862682	4.105×10^{-2}	1.996×10^{-2}	1.333×10^{-4}	1.86	7.029×10^{-3}	4.808×10^{-2}
fitted radiance shift [nm]	$(-6.194 \pm 30.367) \times 10^{-4}$	3862682	1.880×10^{-3}	-6.376×10^{-4}	-4.817×10^{-2}	4.706×10^{-2}	-1.596×10^{-3}	2.835×10^{-4}
fitted radiance squeeze [1]	$(-5.666 \pm 22.644) \times 10^{-5}$	3862682	2.224×10^{-4}	-3.157×10^{-5}	-1.367×10^{-2}	1.500×10^{-2}	-1.492×10^{-4}	7.319×10^{-5}
fitted root mean square [1]	$(1.395 \pm 0.704) \times 10^{-3}$	3862682	6.593×10^{-4}	1.188×10^{-3}	3.405×10^{-4}	5.262×10^{-2}	9.555×10^{-4}	1.615×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.758 ± 0.496	3862682	0.630	0.635	5.000×10^{-2}	2.89	0.388	1.02
sulfurdioxide total air mass factor polluted precision [1]	0.126 ± 0.180	3862682	0.135	5.153×10^{-2}	2.500×10^{-3}	1.94	2.449×10^{-2}	0.160
sulfurdioxide clear air mass factor polluted [1]	0.624 ± 0.338	3862682	0.448	0.551	3.139×10^{-2}	3.16	0.367	0.815
number of spectral points in retrieval [1]	73.4 ± 0.5	3862682	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

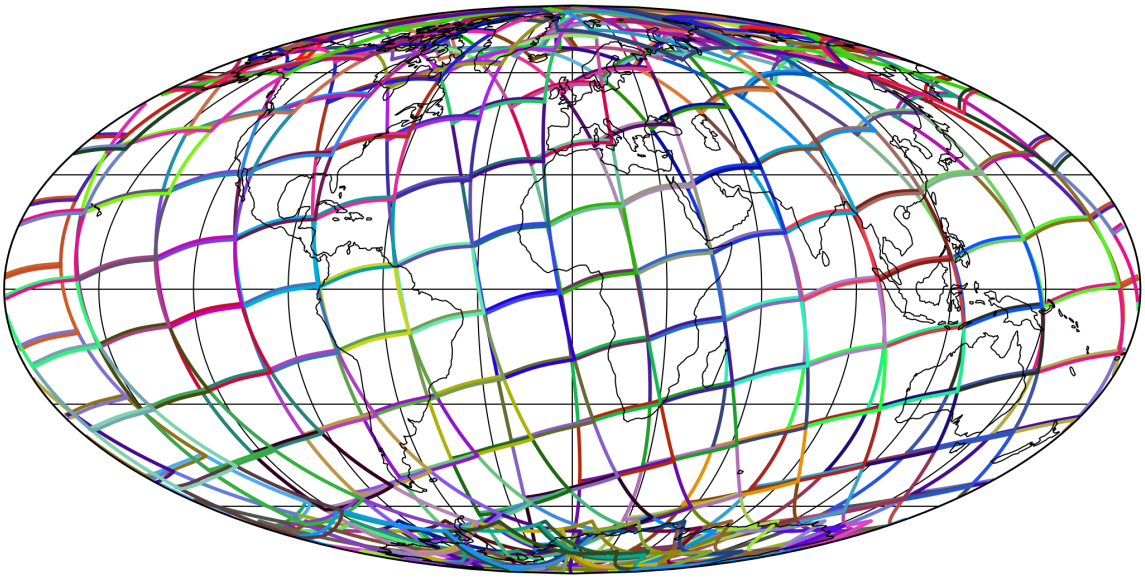


Figure 1: Outline of the granules.

4 Input data monitoring

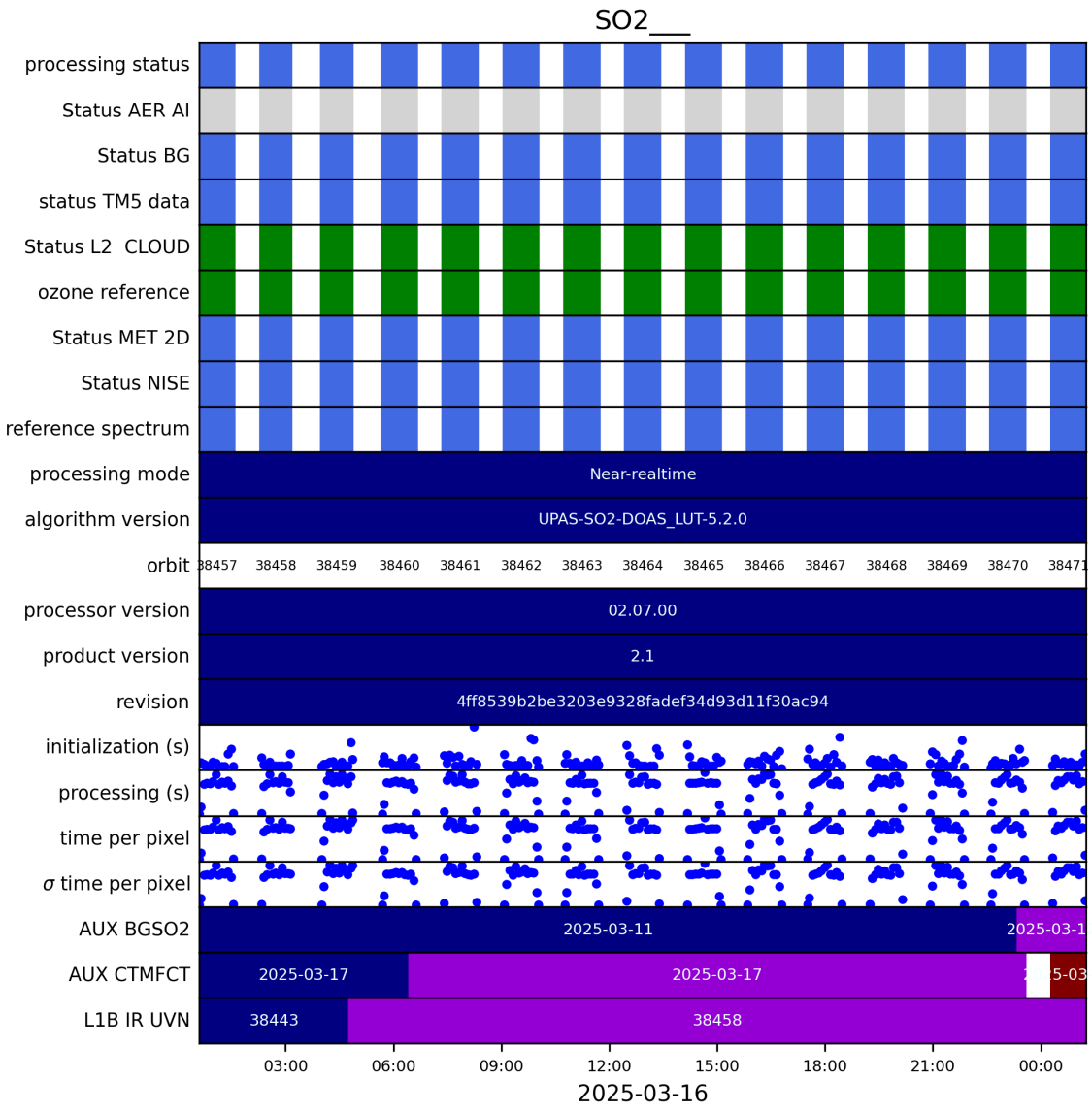


Figure 2: Input data per granule

5 Warnings and errors

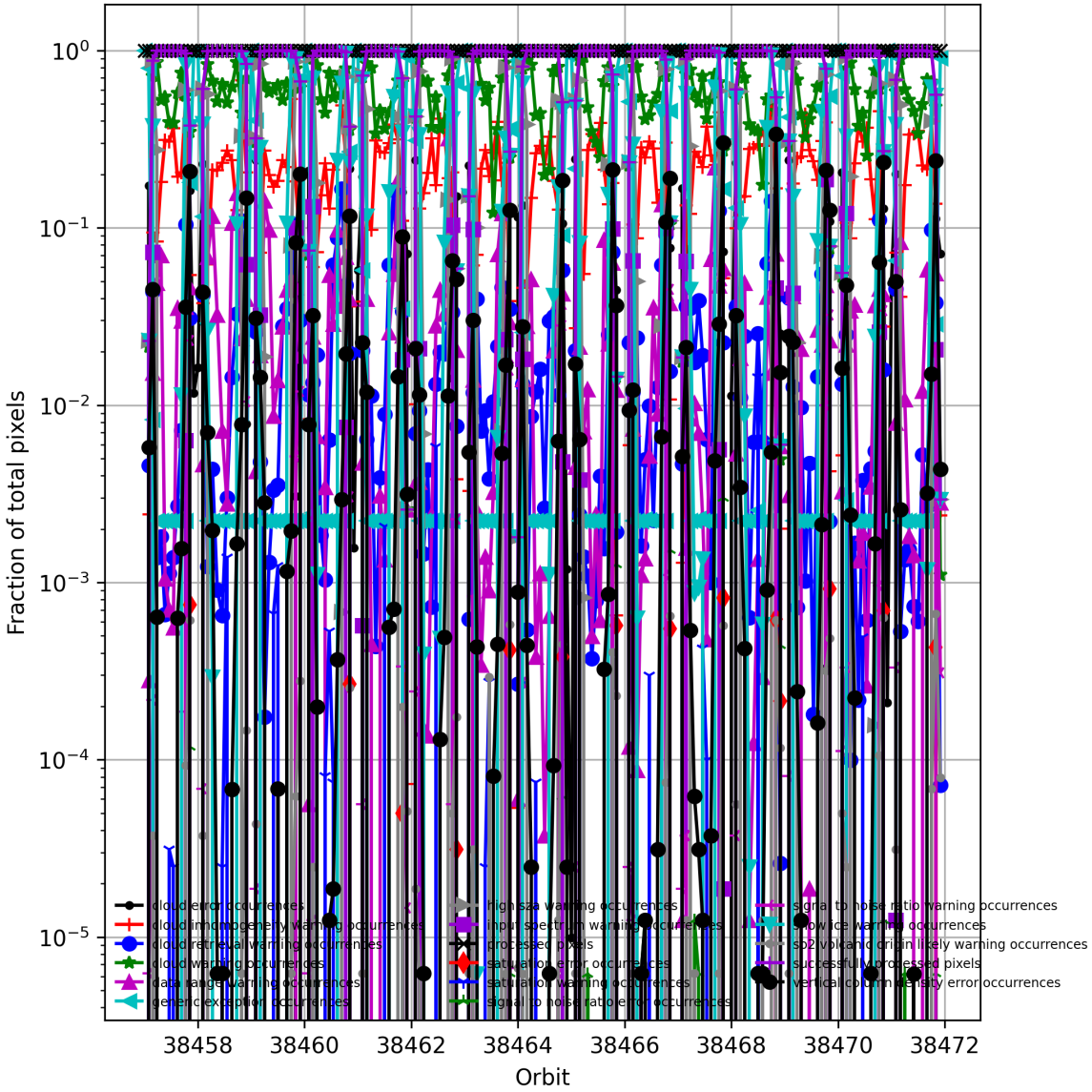


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

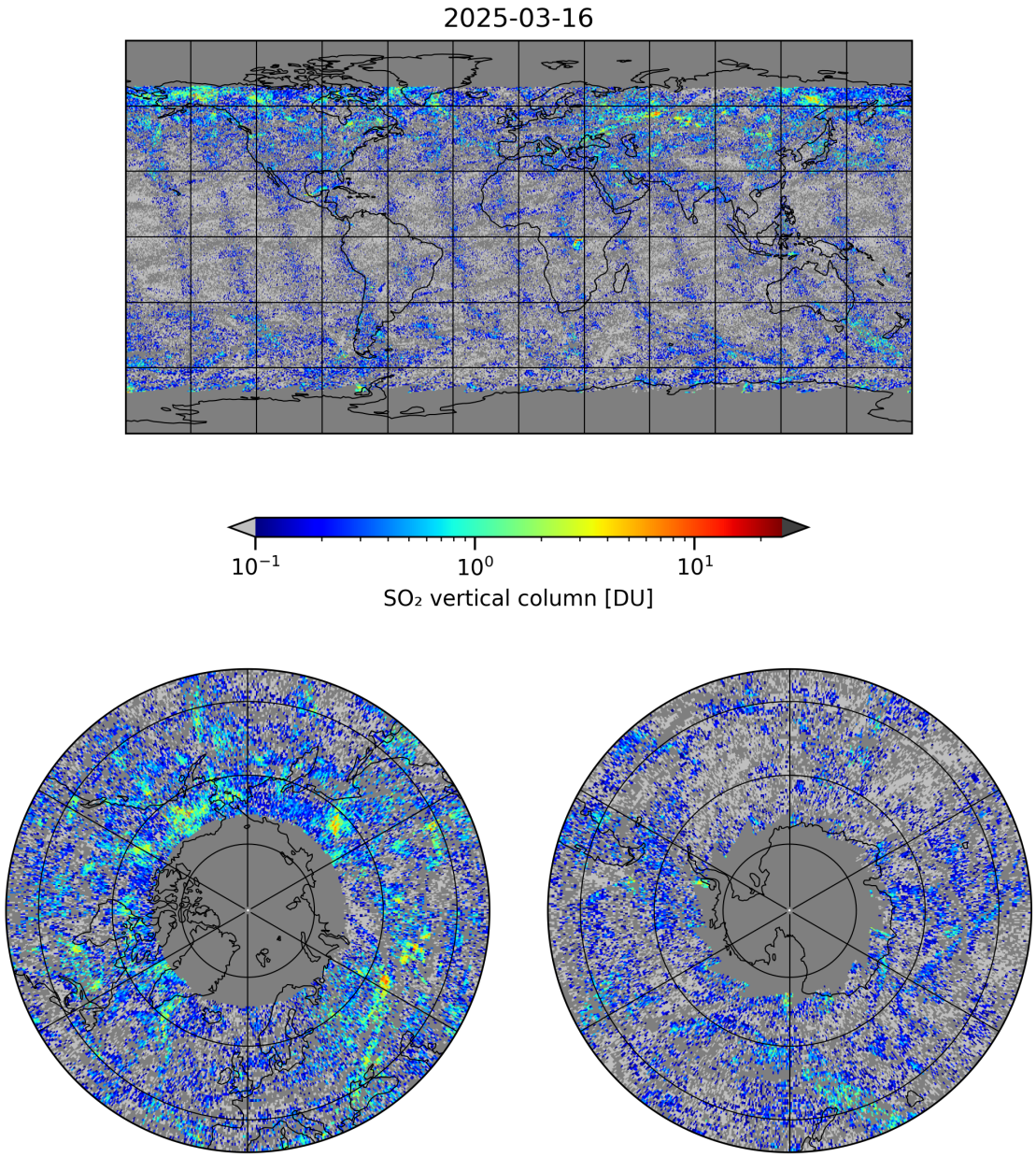


Figure 4: Map of "SO_2 vertical column" for 2025-03-16 to 2025-03-17

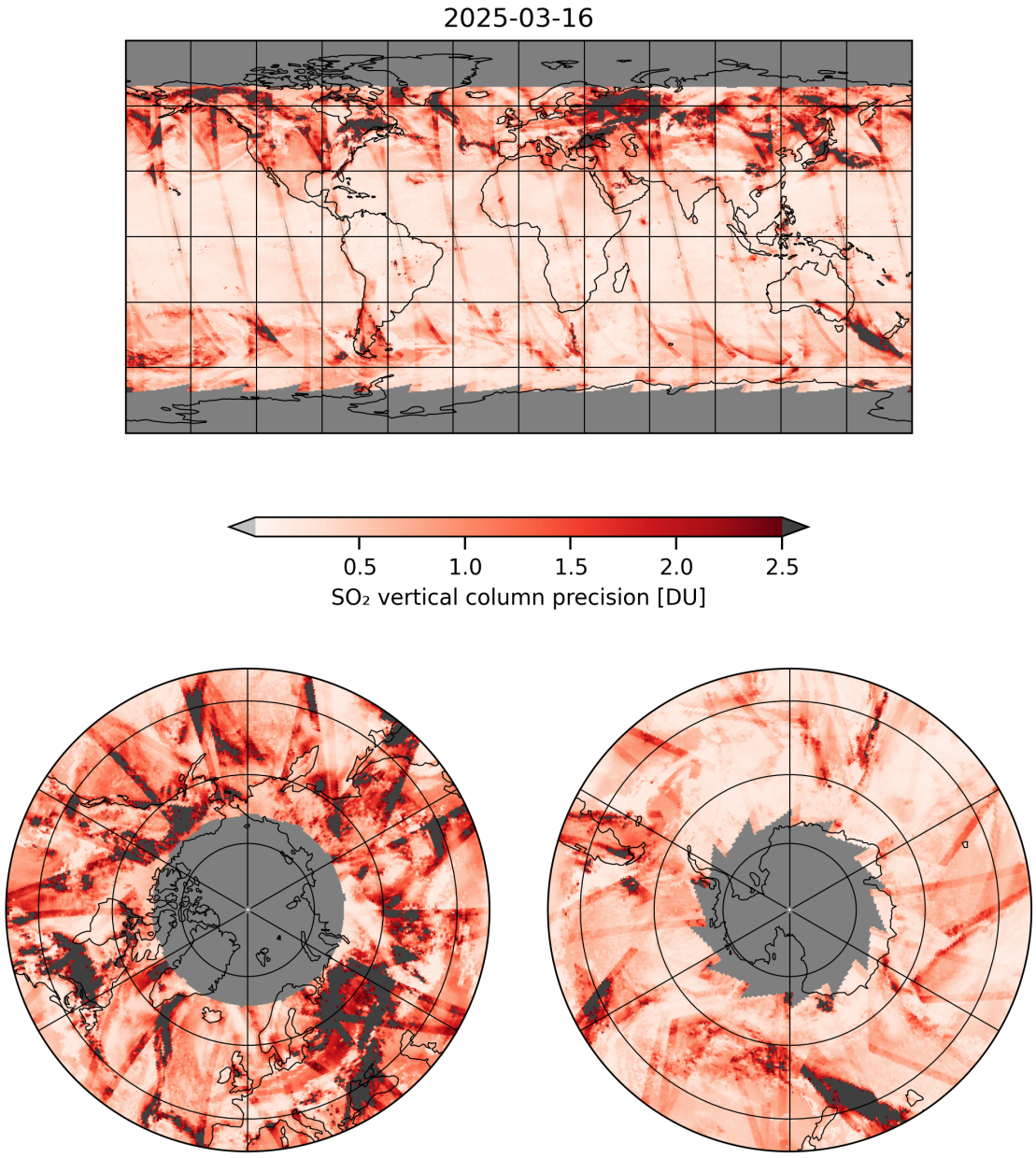


Figure 5: Map of "SO_2 vertical column precision" for 2025-03-16 to 2025-03-17

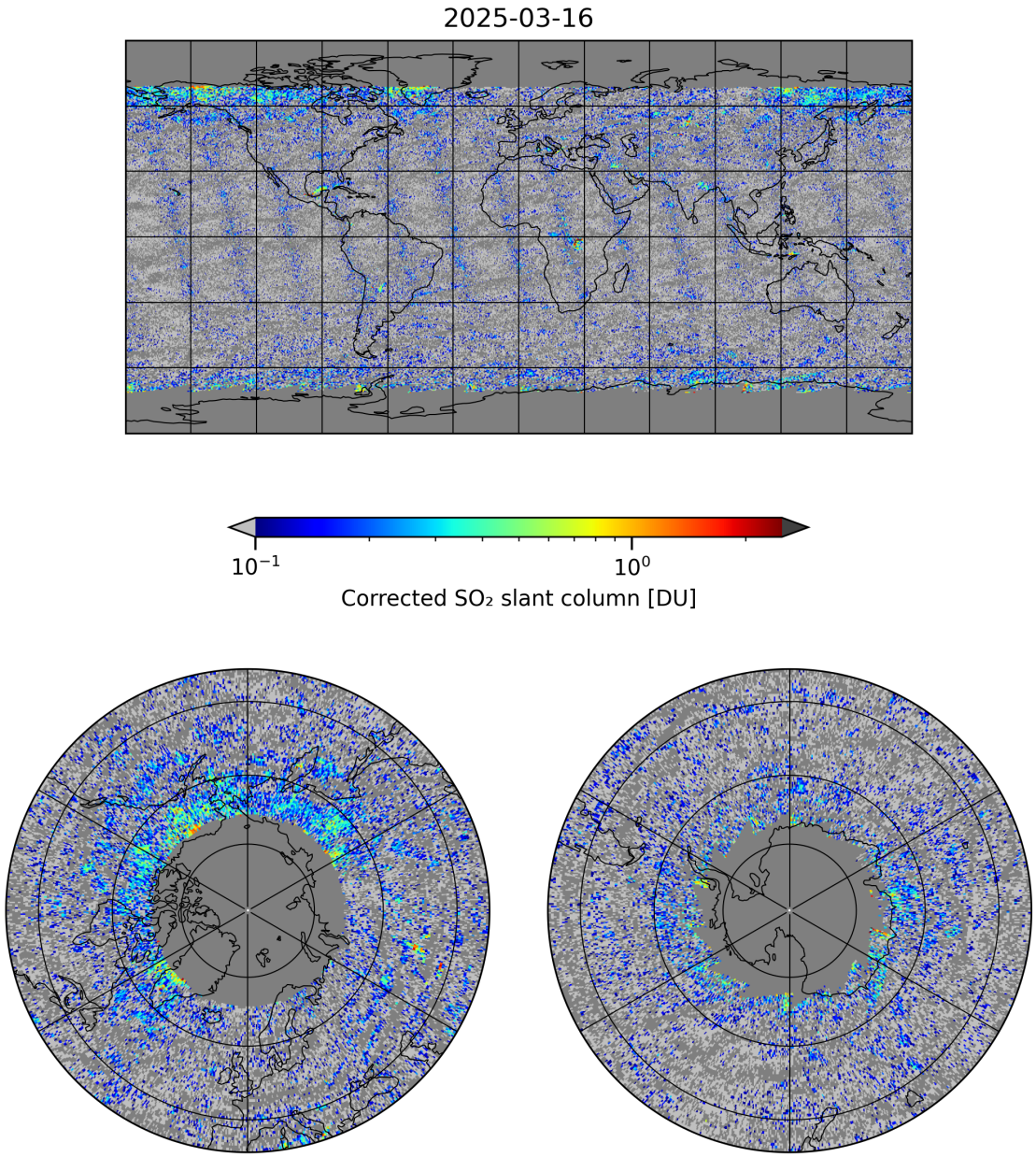


Figure 6: Map of "Corrected SO_2 slant column" for 2025-03-16 to 2025-03-17

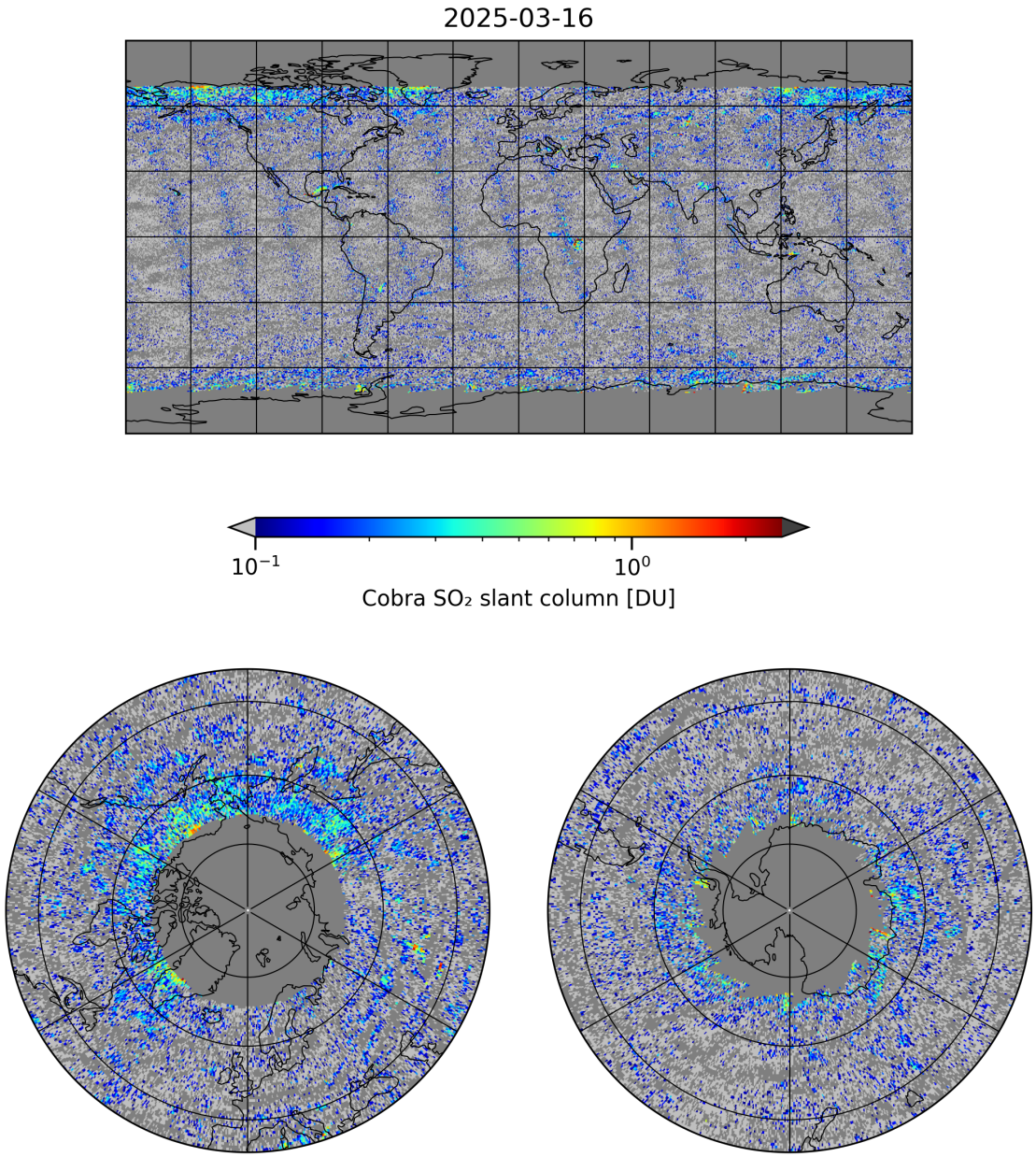


Figure 7: Map of "Cobra SO_2 slant column" for 2025-03-16 to 2025-03-17

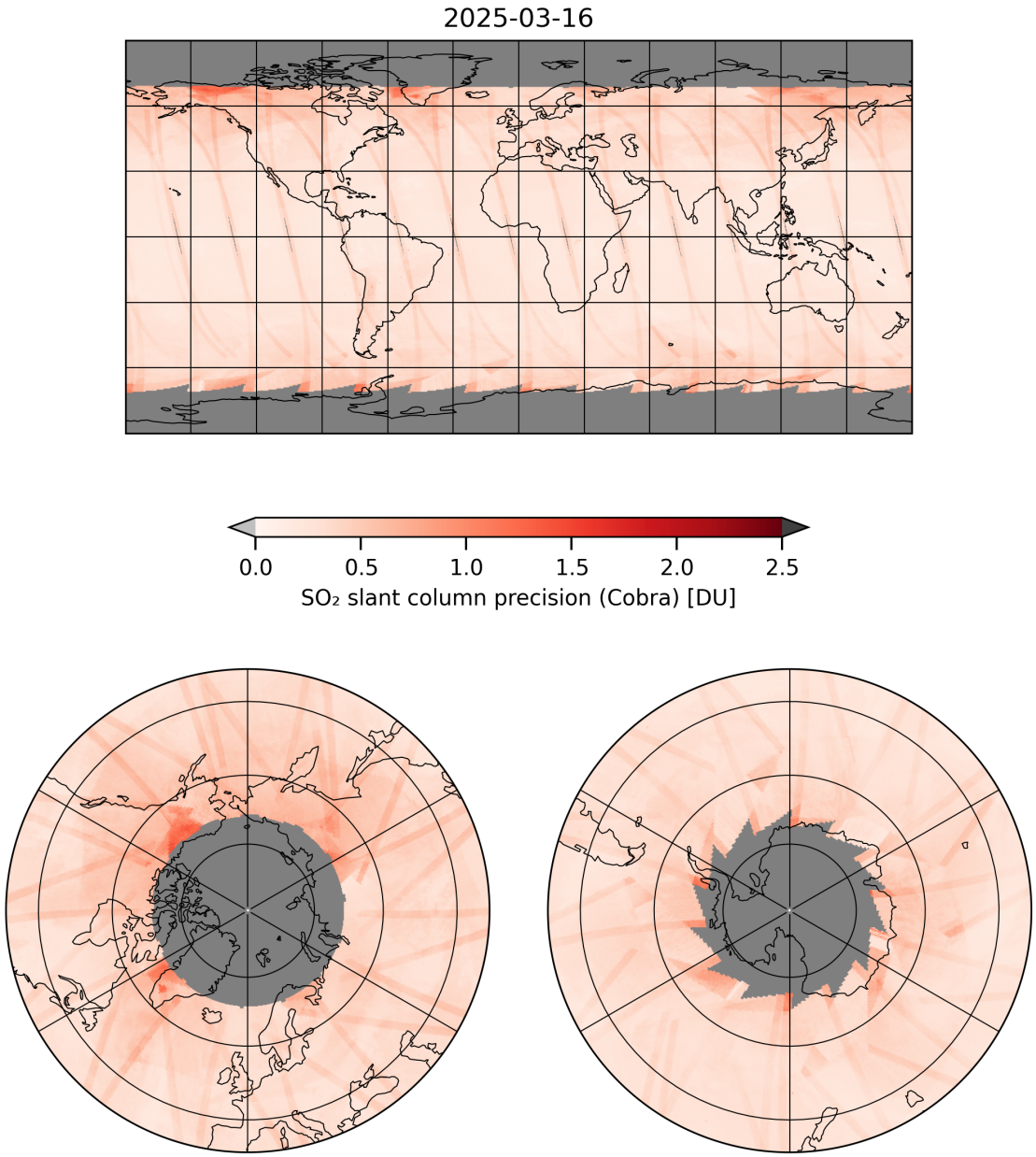


Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-03-16 to 2025-03-17

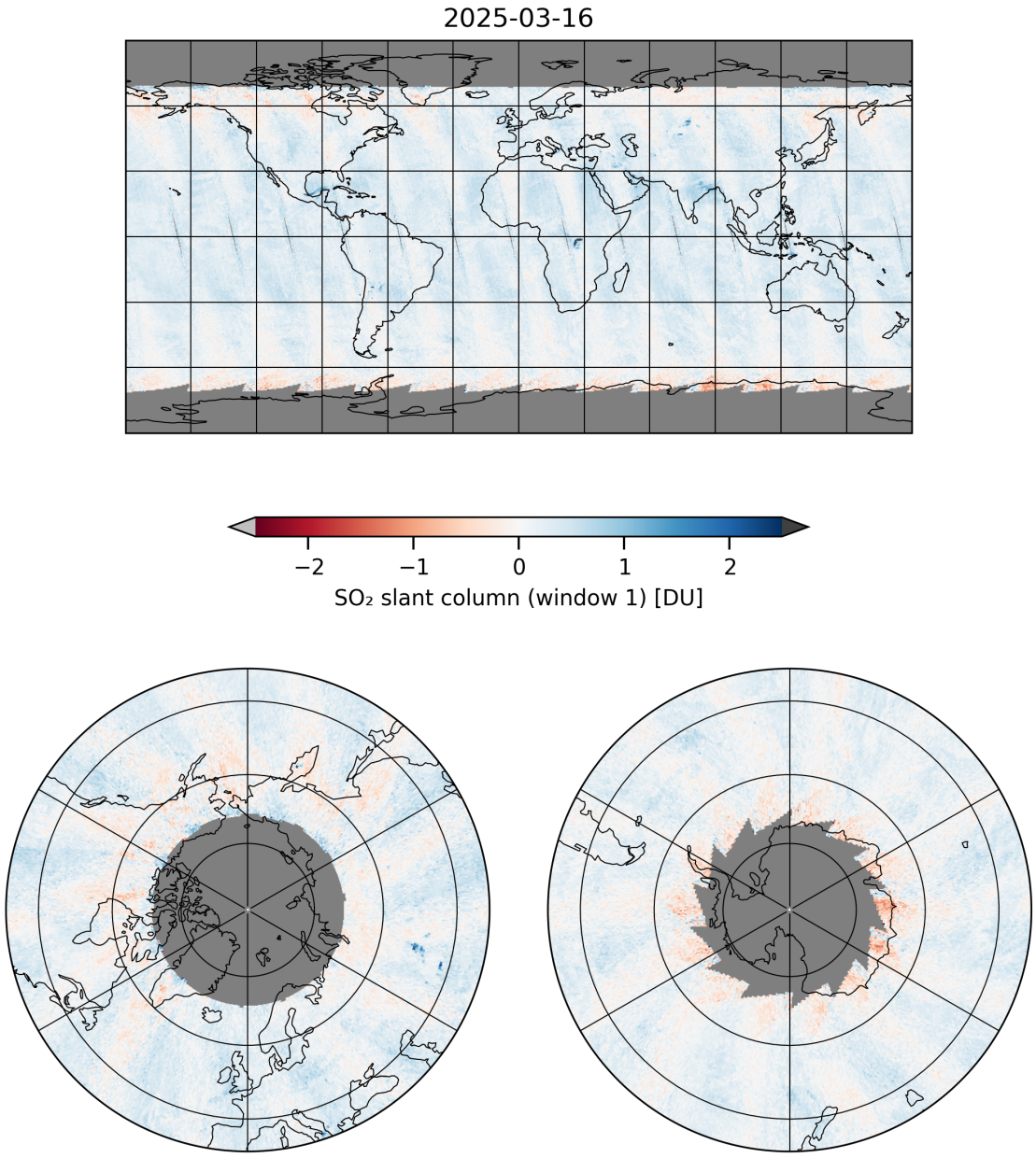


Figure 9: Map of "SO_2 slant column (window 1)" for 2025-03-16 to 2025-03-17

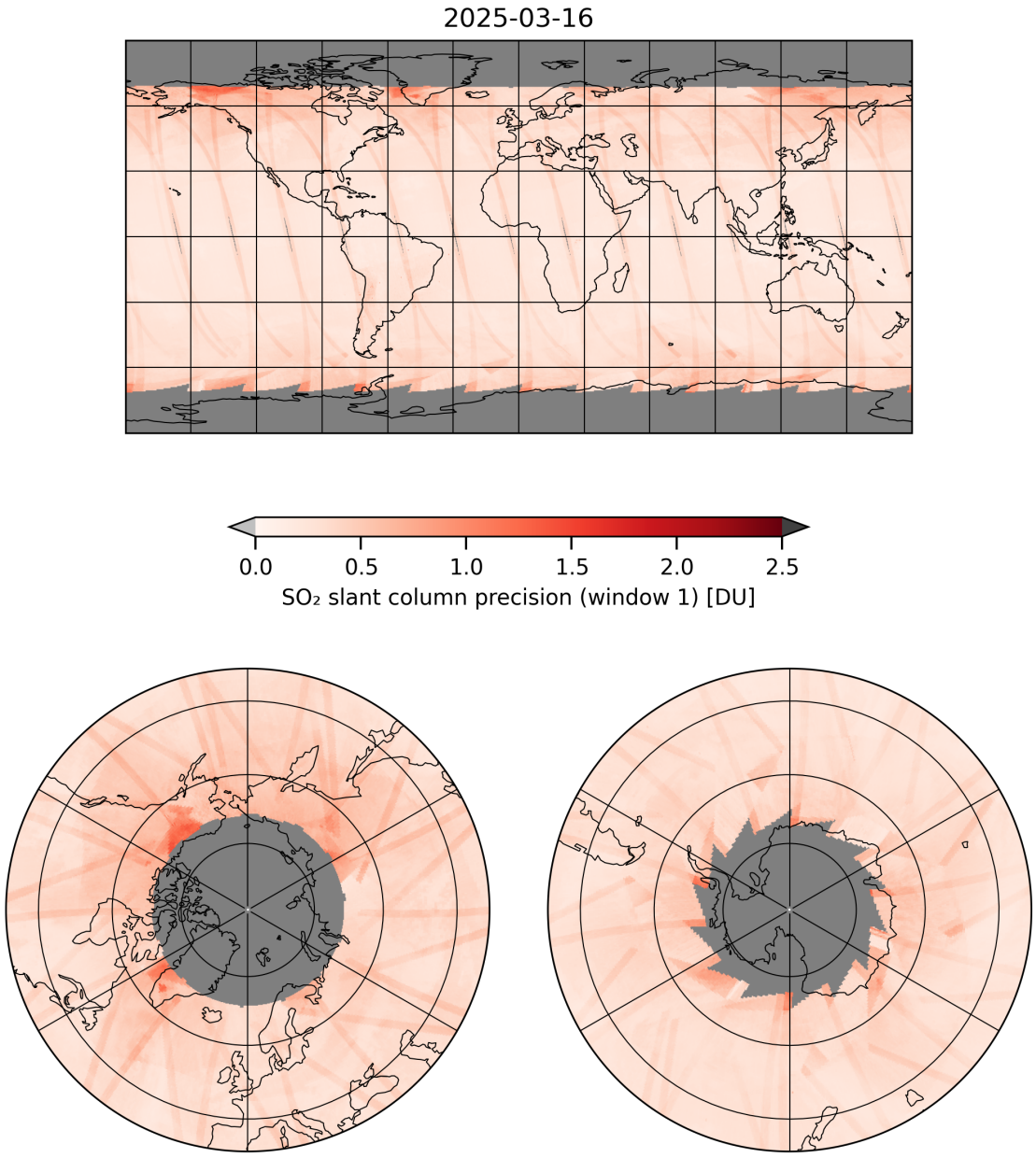


Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-03-16 to 2025-03-17

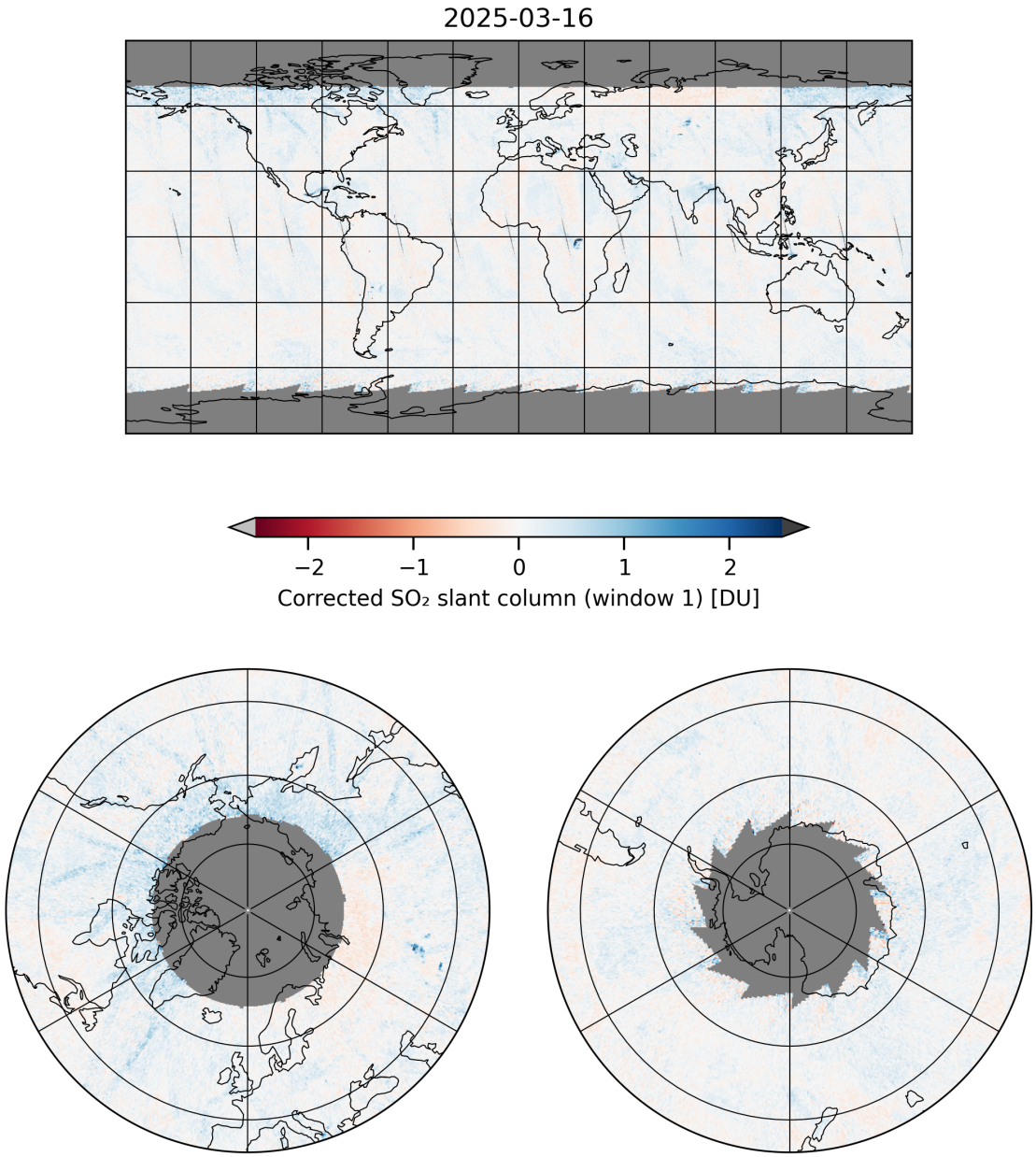


Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-03-16 to 2025-03-17

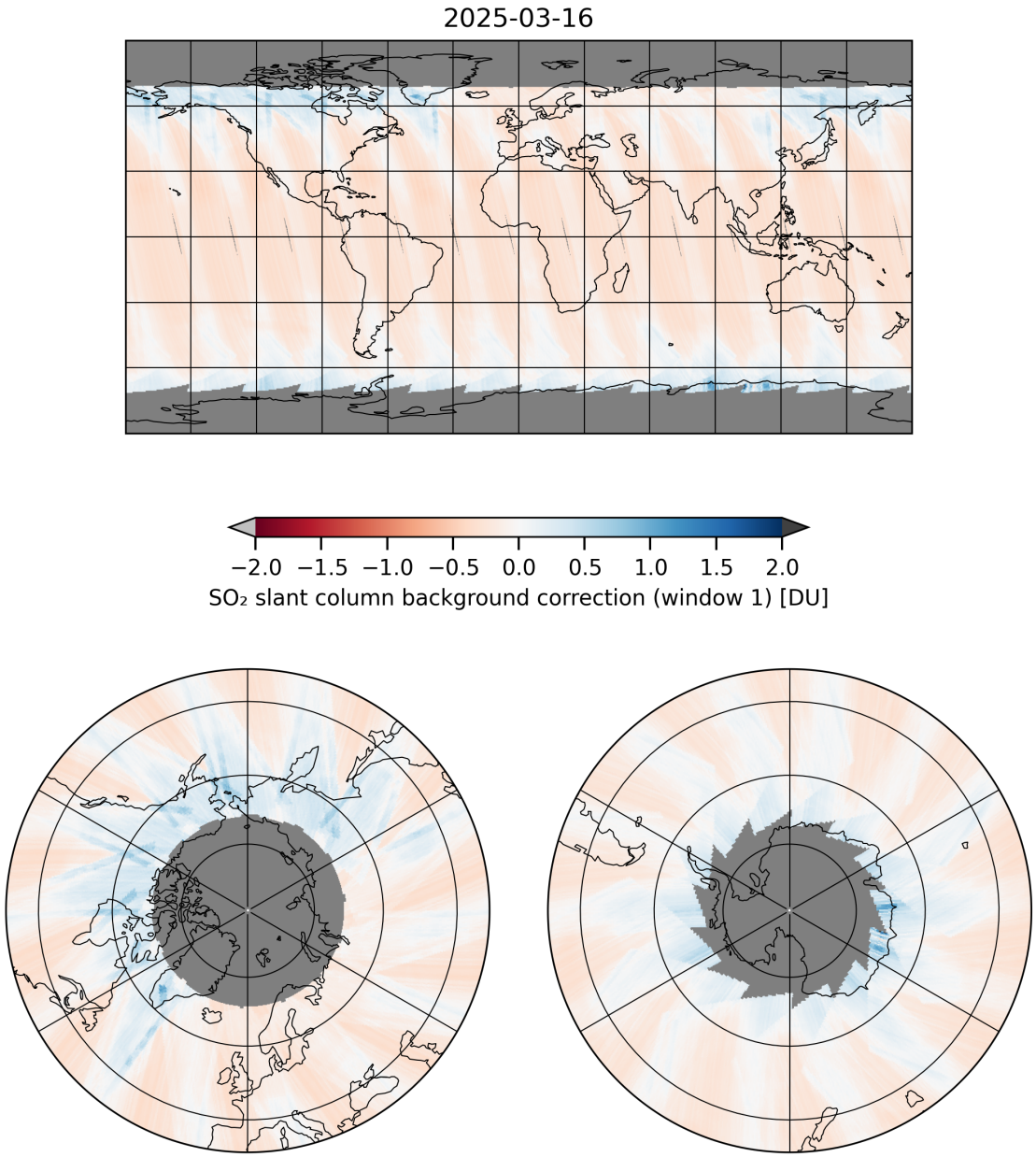


Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-03-16 to 2025-03-17

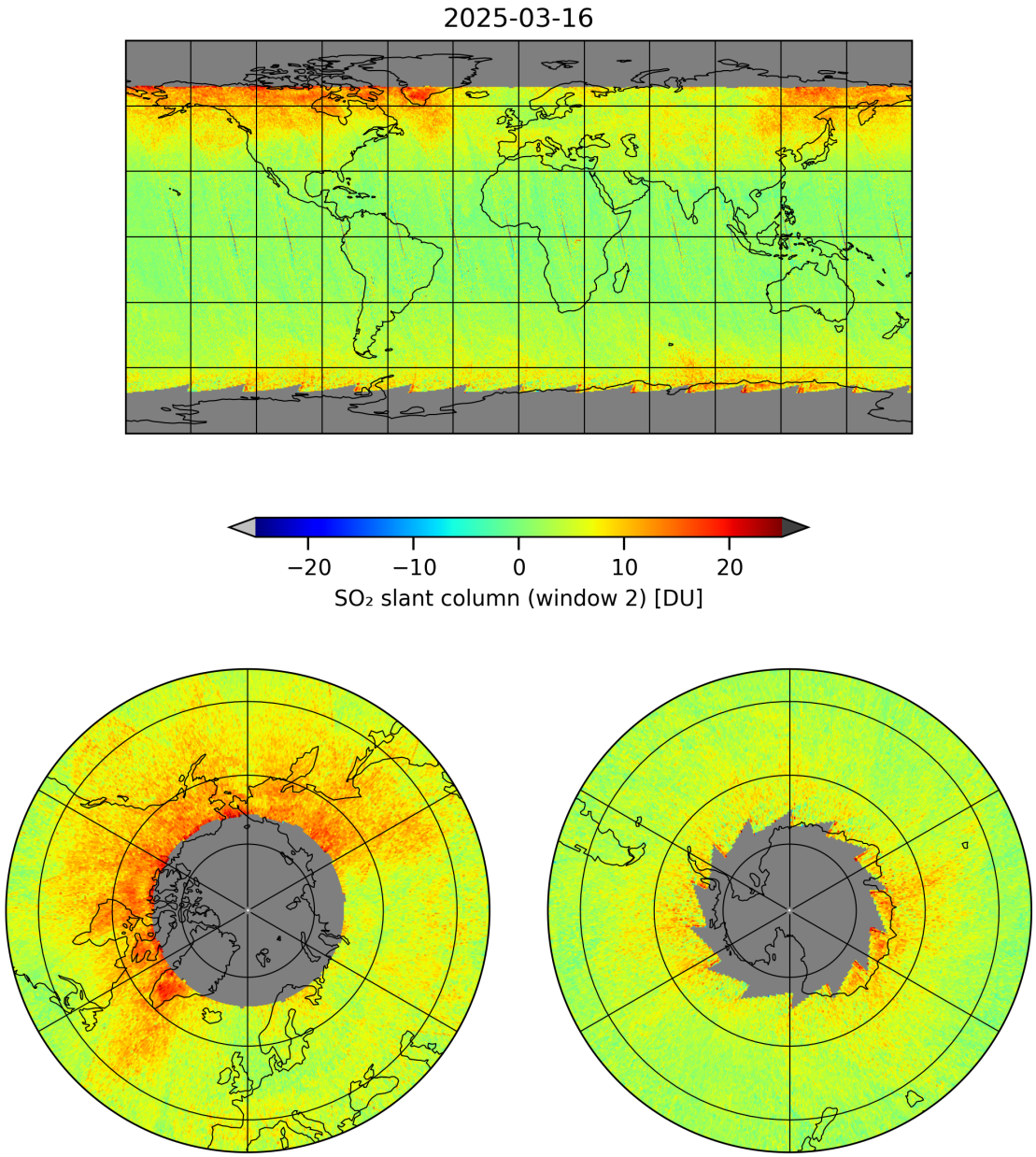


Figure 13: Map of "SO_2 slant column (window 2)" for 2025-03-16 to 2025-03-17

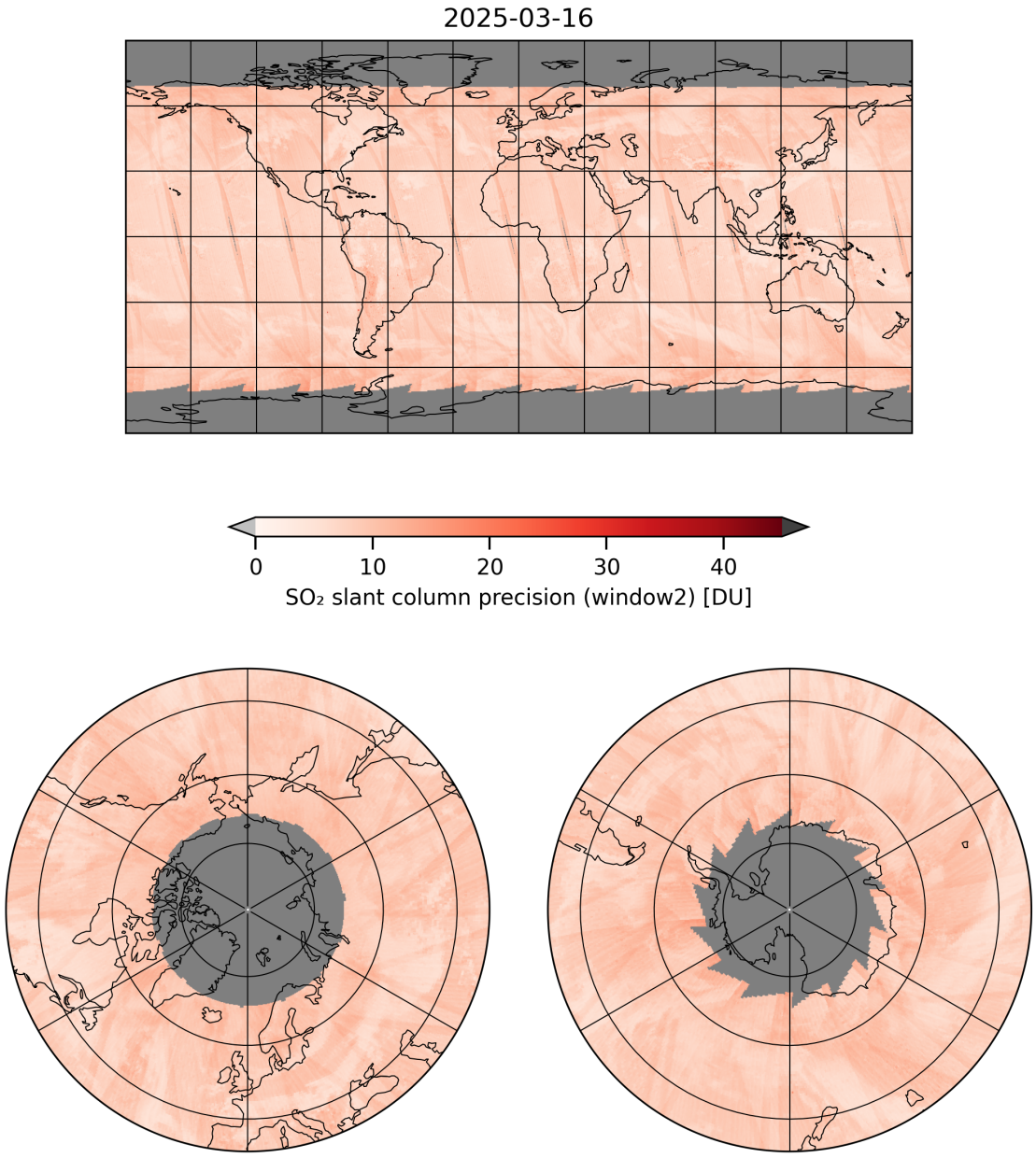


Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-03-16 to 2025-03-17

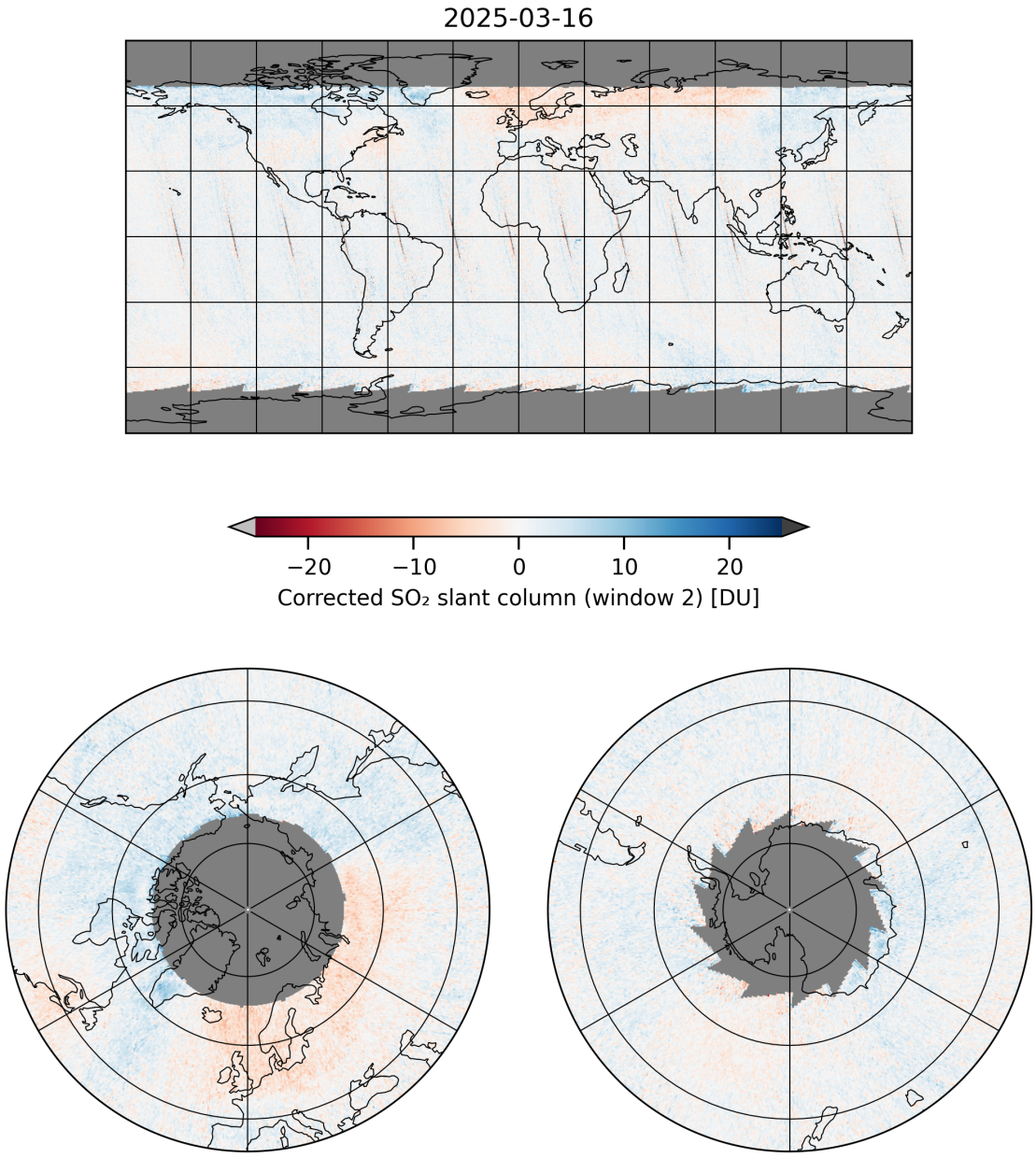


Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-03-16 to 2025-03-17

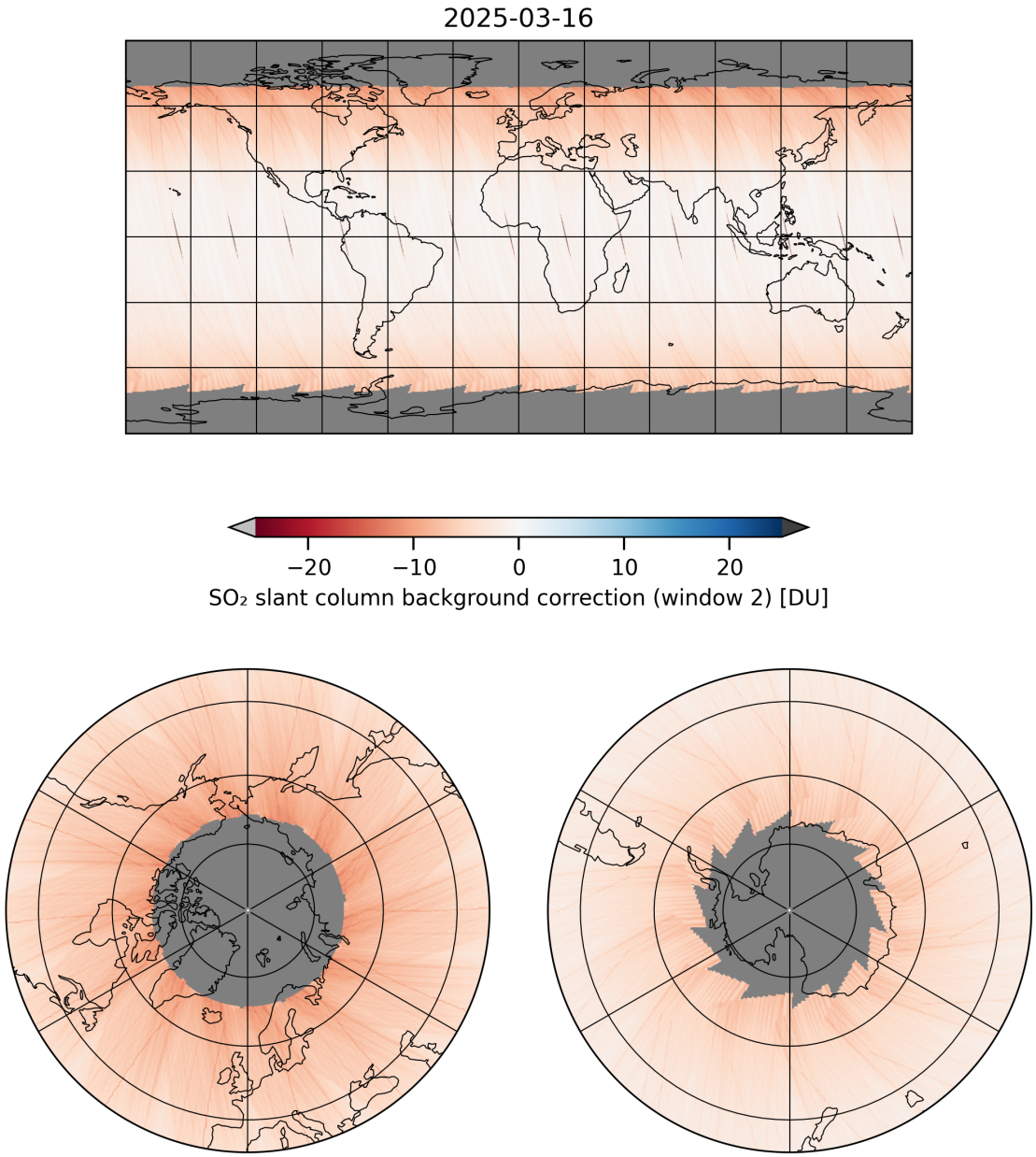


Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-03-16 to 2025-03-17

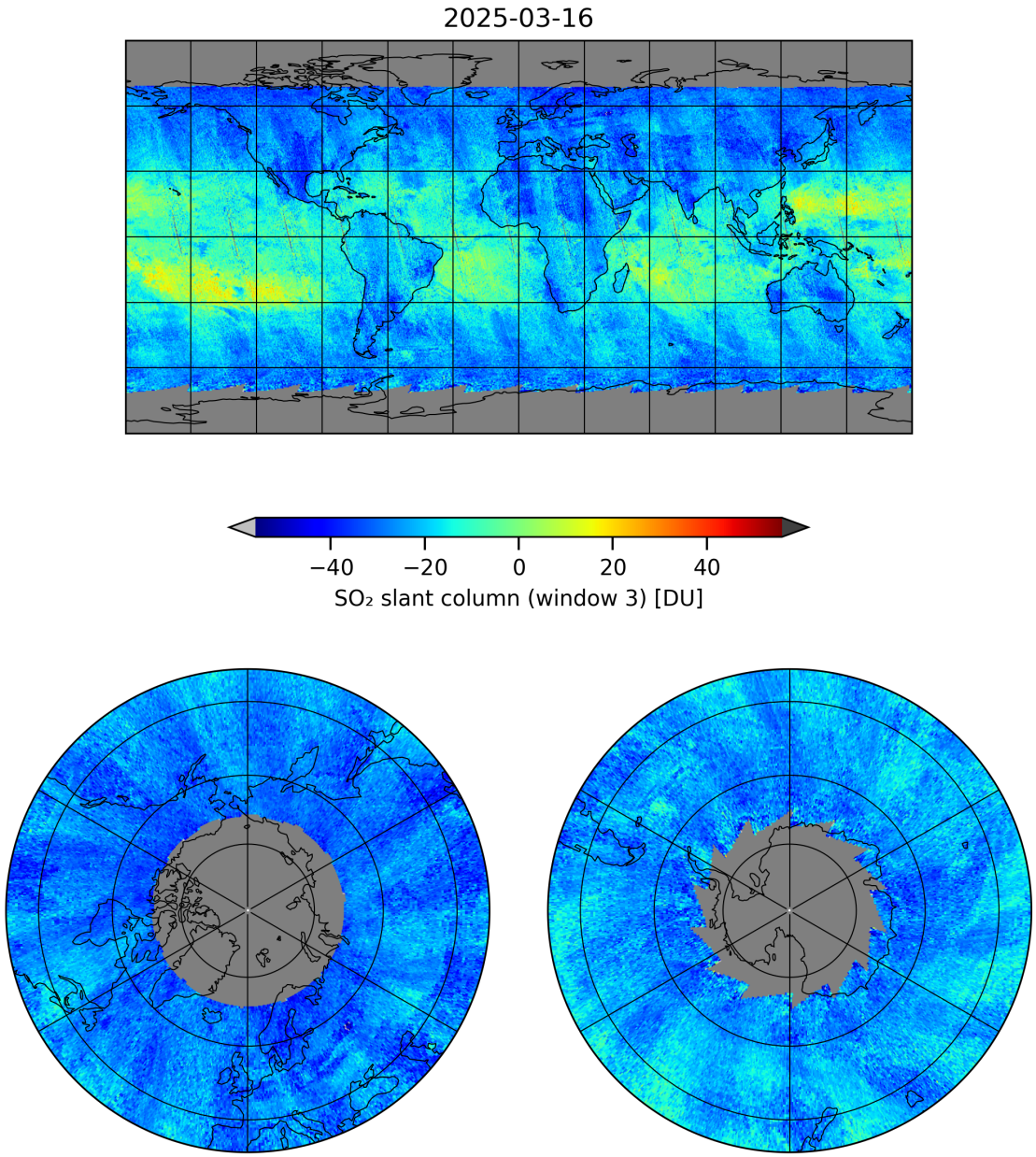


Figure 17: Map of "SO_2 slant column (window 3)" for 2025-03-16 to 2025-03-17

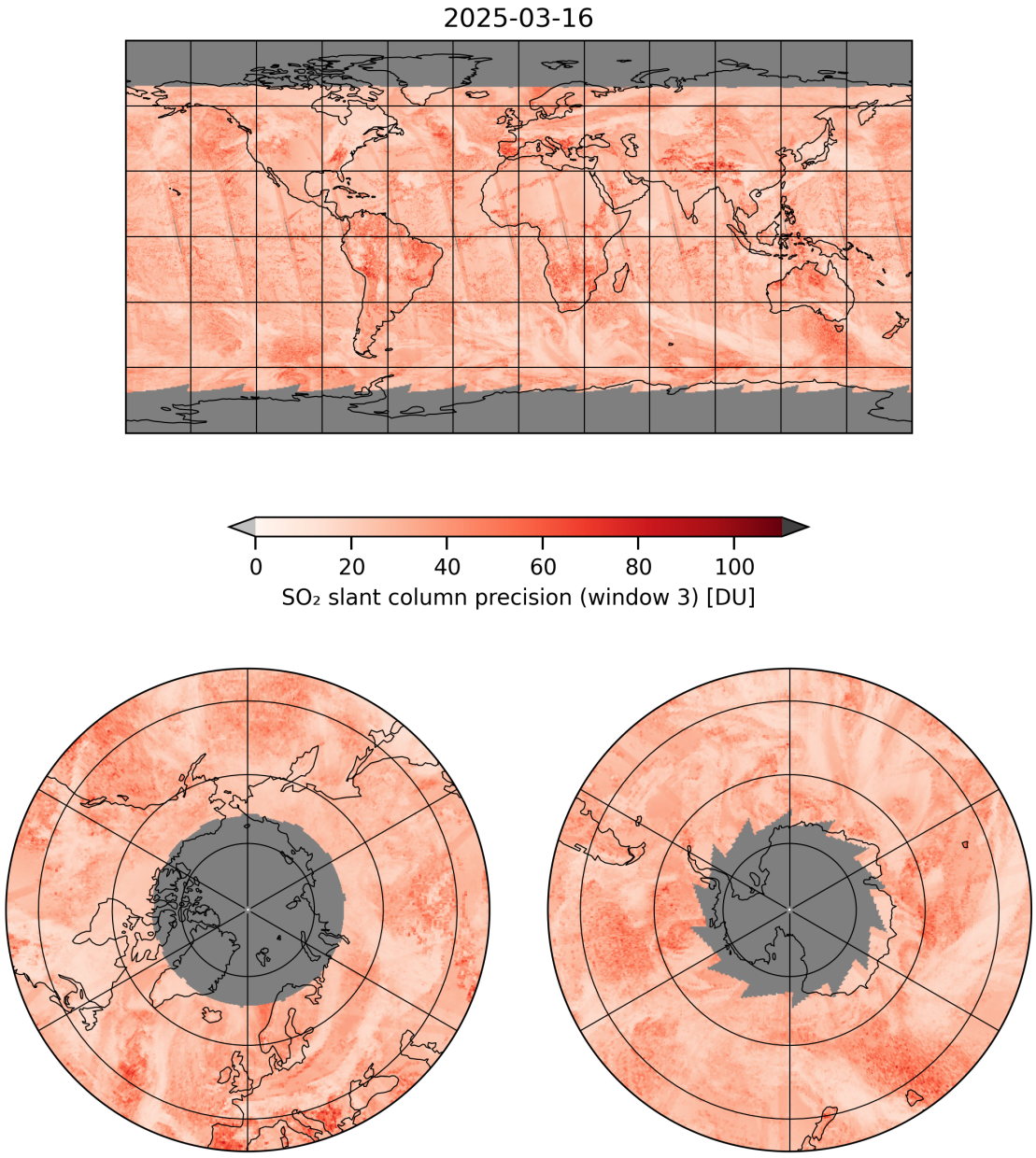


Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-03-16 to 2025-03-17

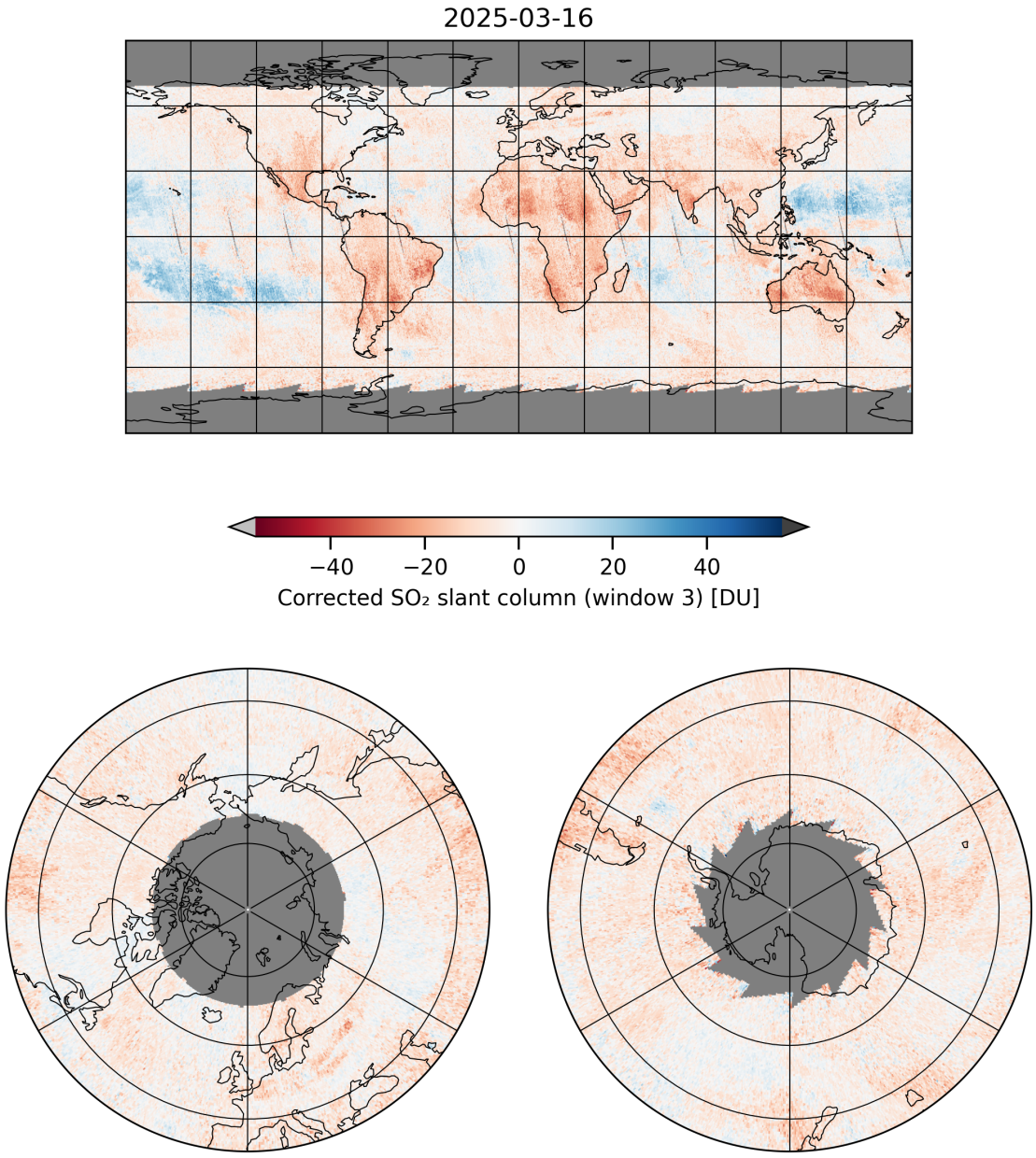


Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-03-16 to 2025-03-17

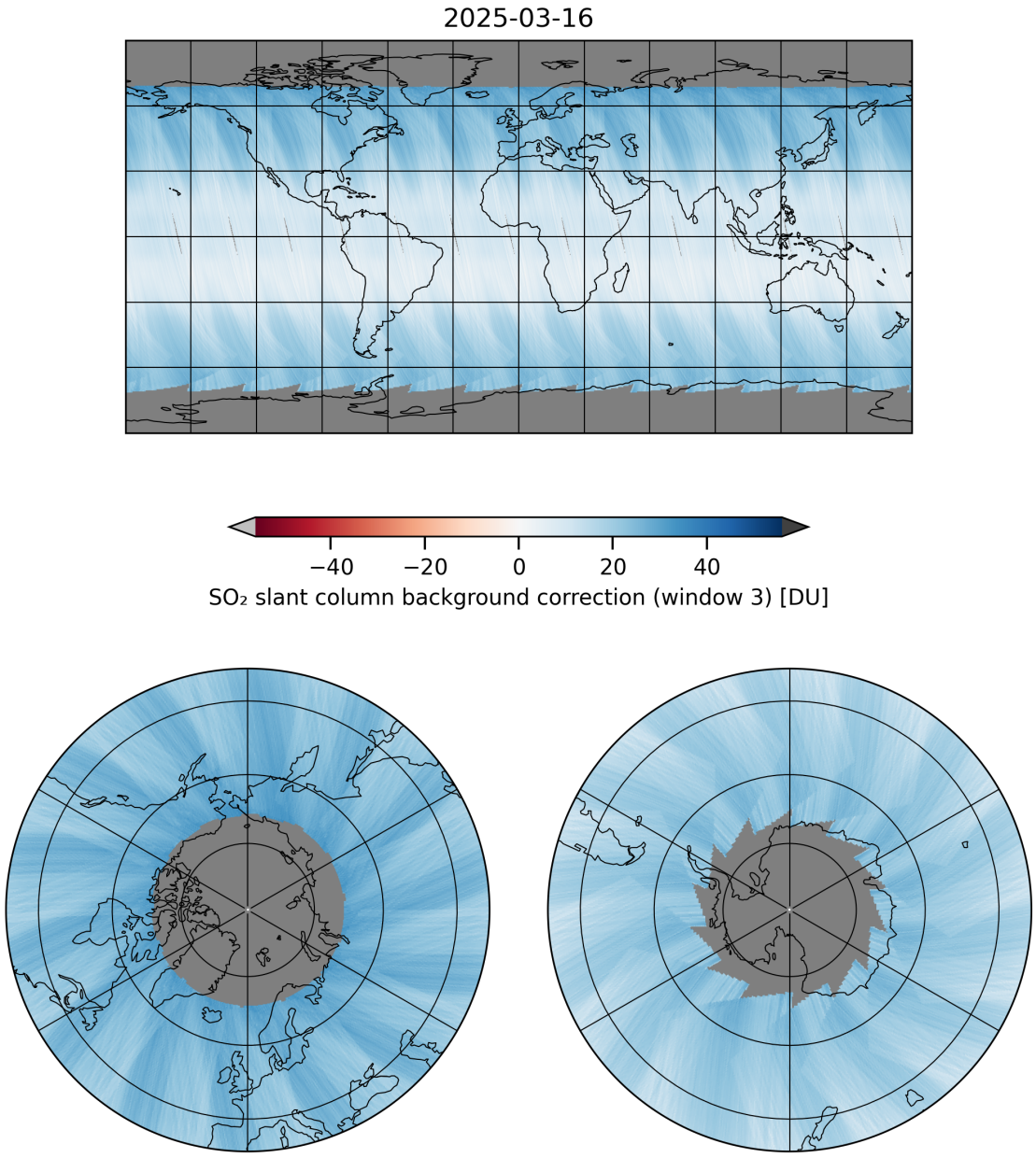


Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-03-16 to 2025-03-17

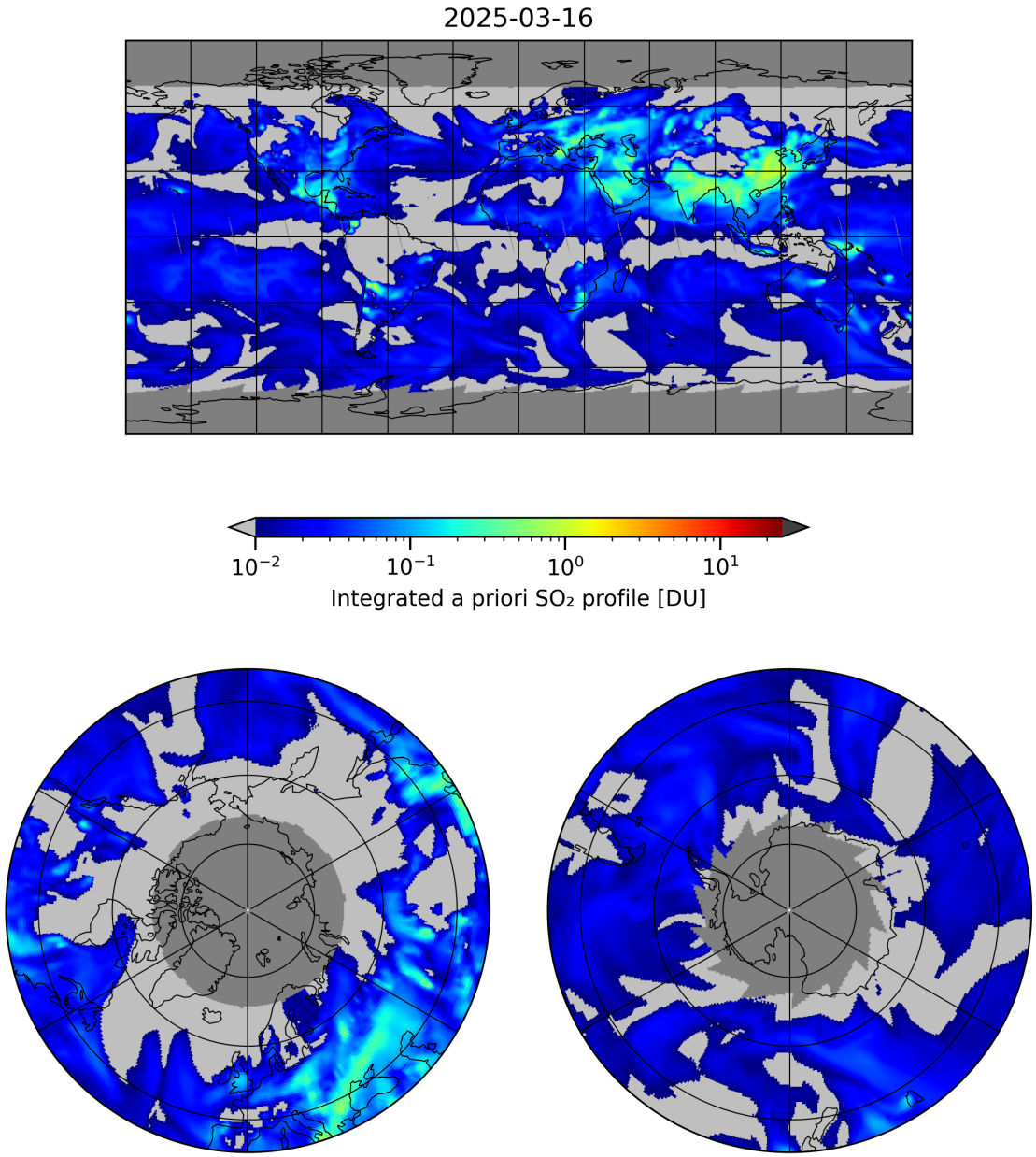


Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-03-16 to 2025-03-17

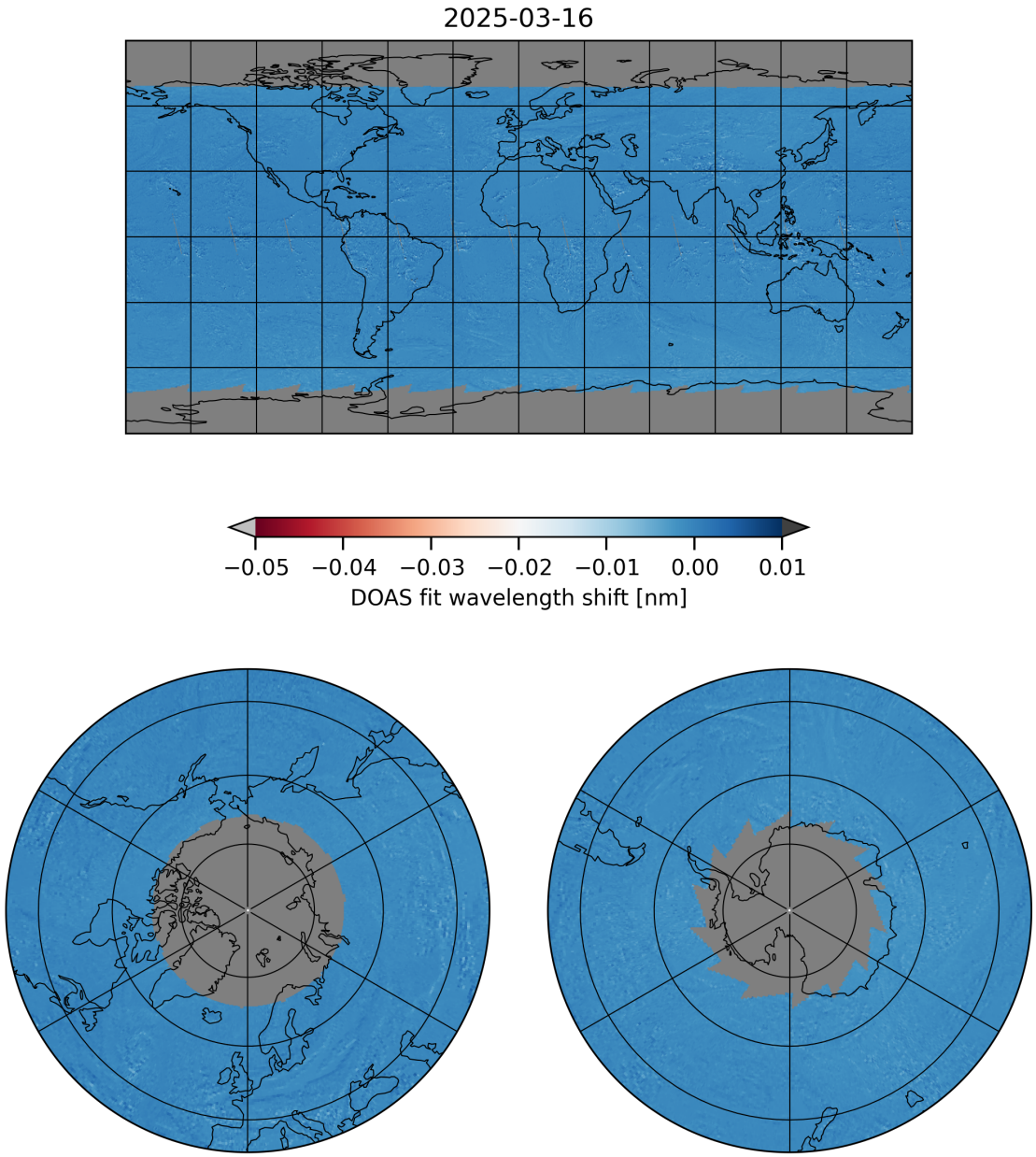


Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-16 to 2025-03-17

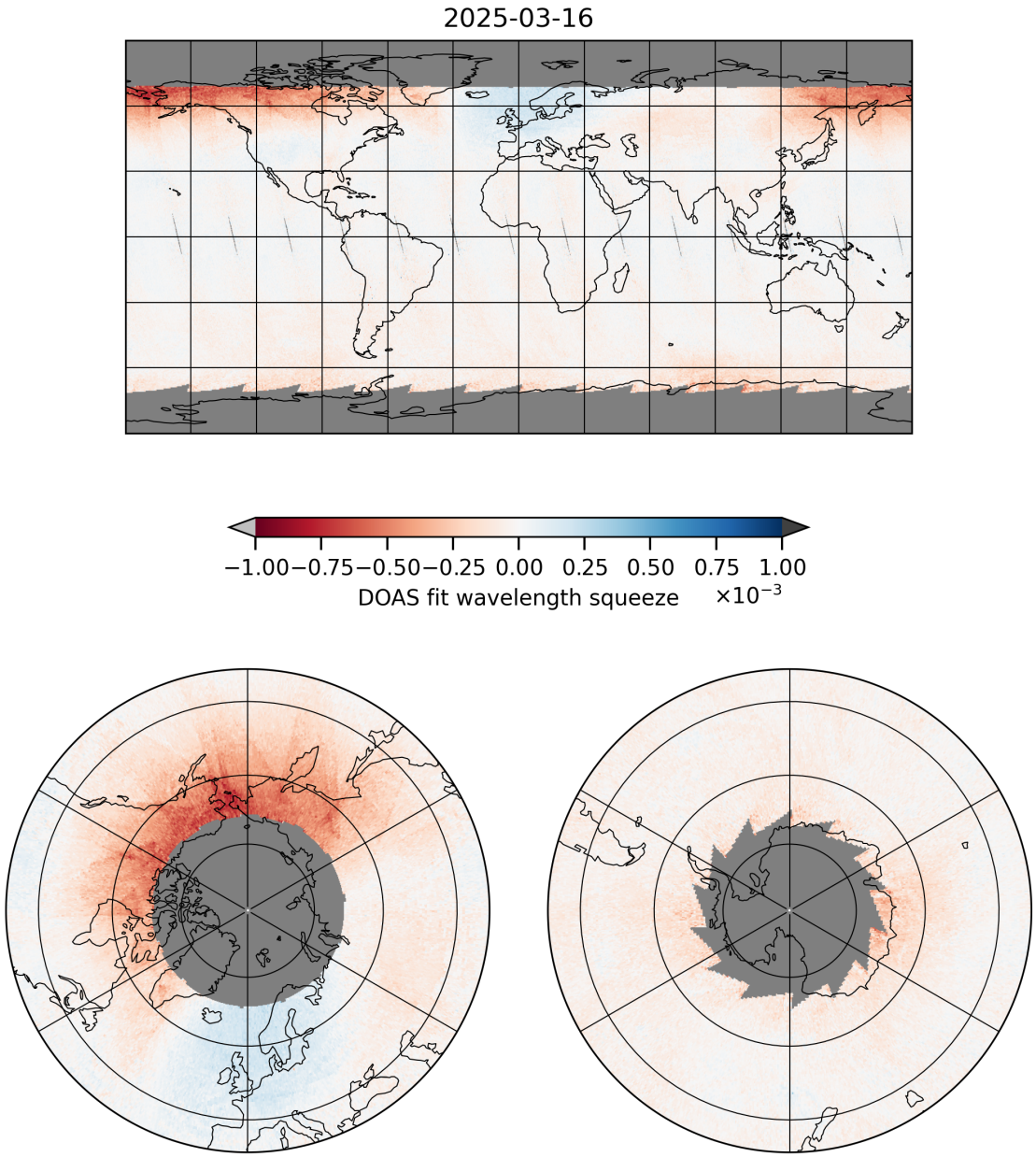


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-16 to 2025-03-17

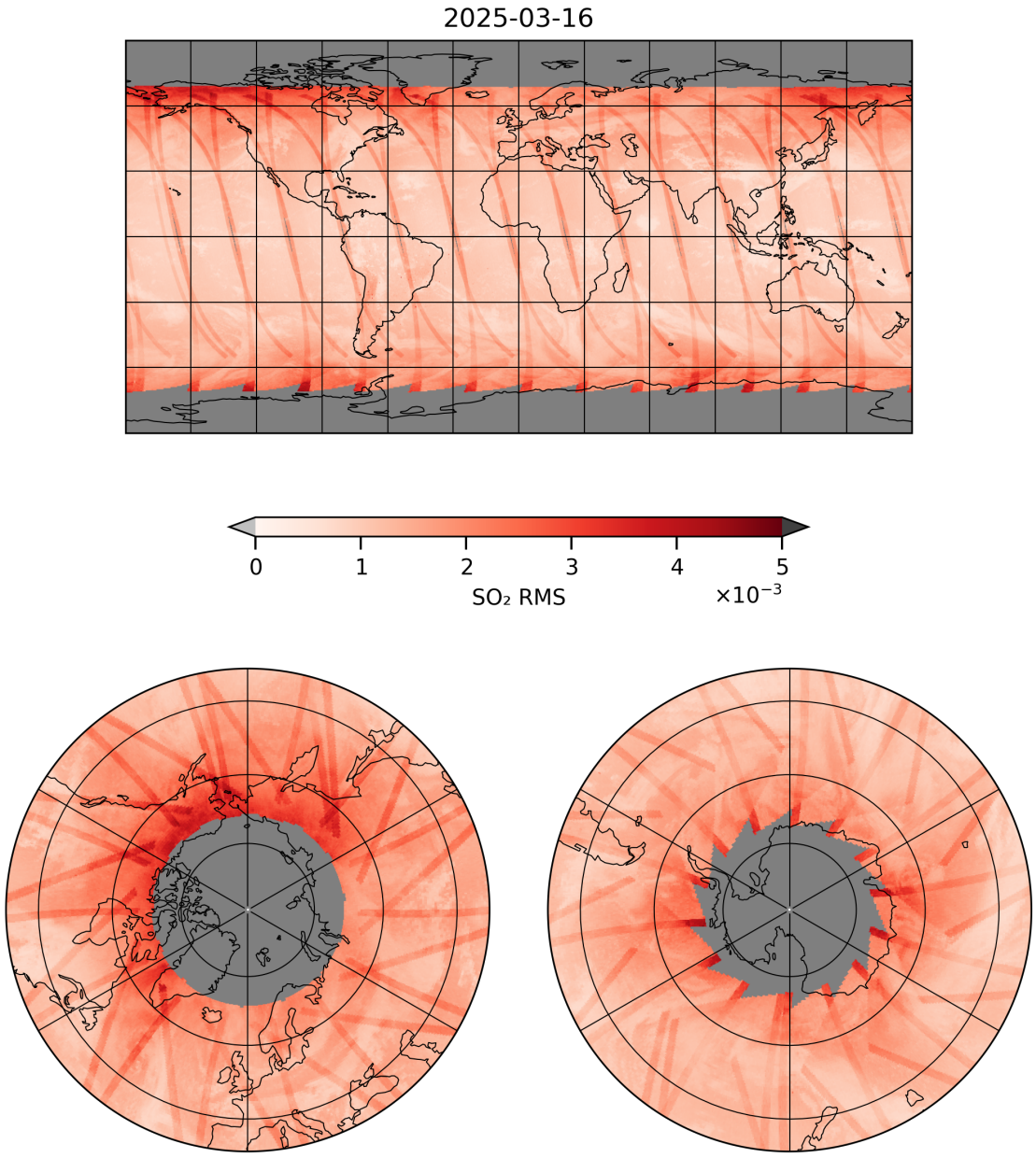


Figure 24: Map of "SO_2 RMS" for 2025-03-16 to 2025-03-17

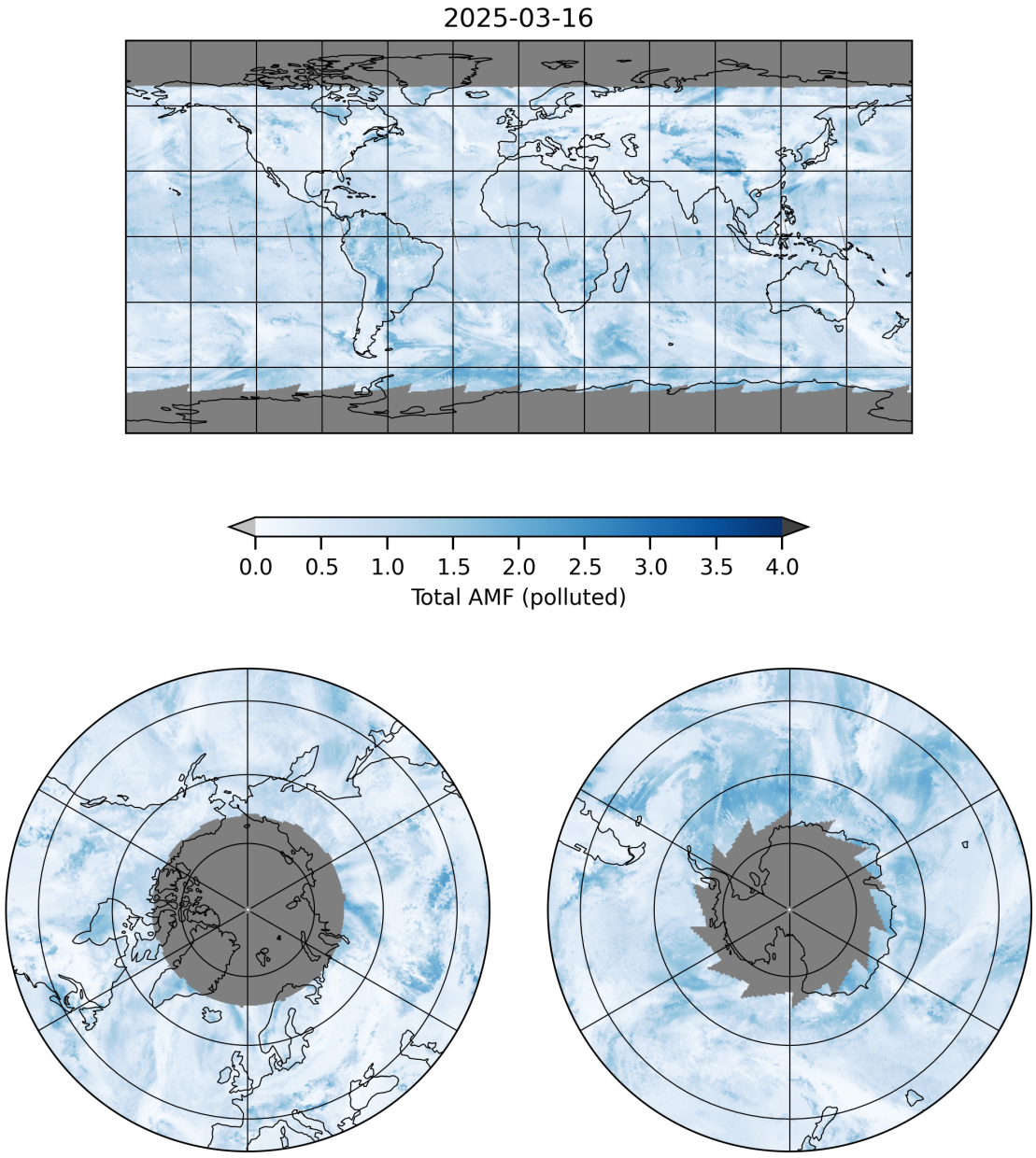


Figure 25: Map of “Total AMF (polluted)” for 2025-03-16 to 2025-03-17

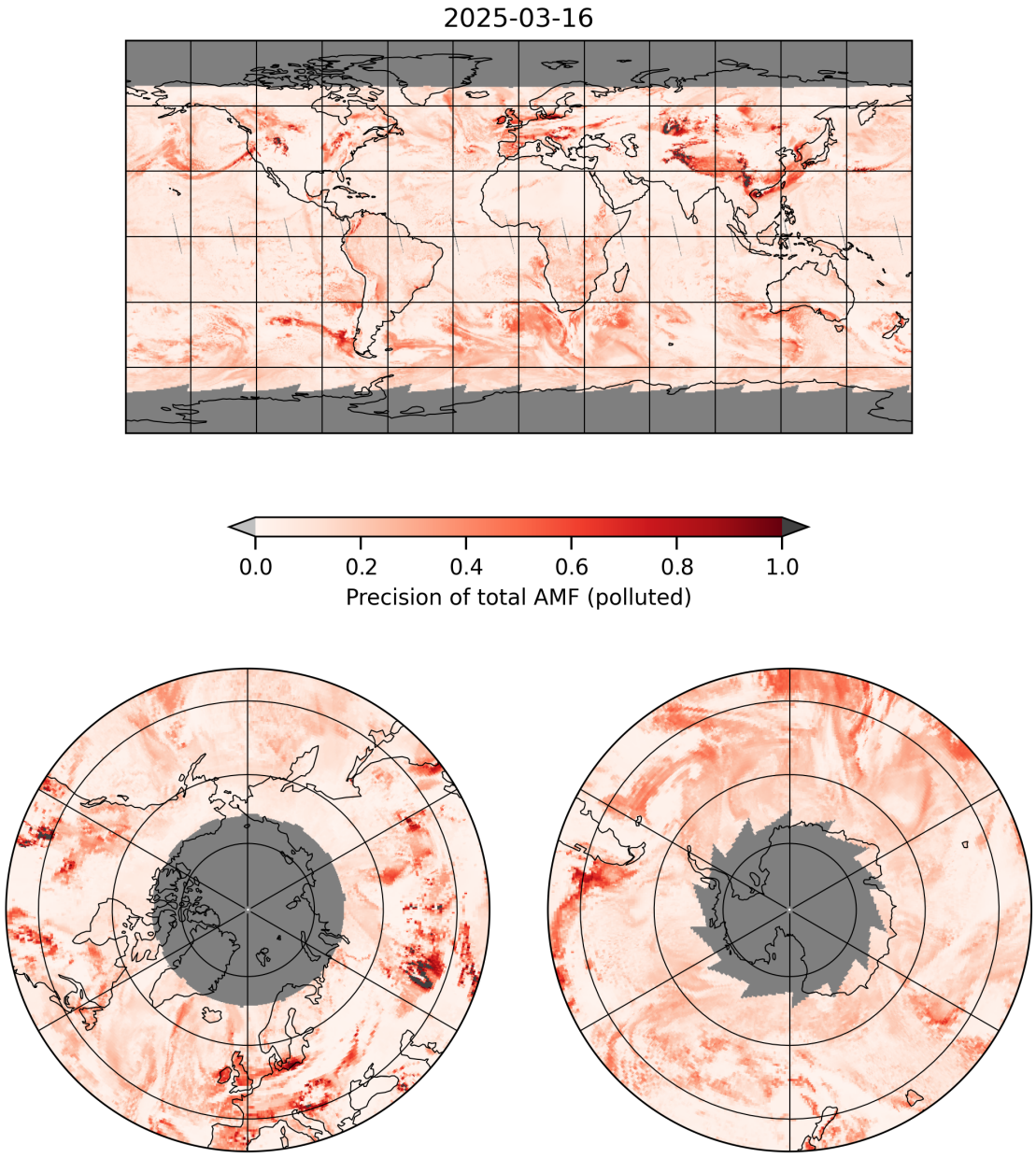


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-16 to 2025-03-17

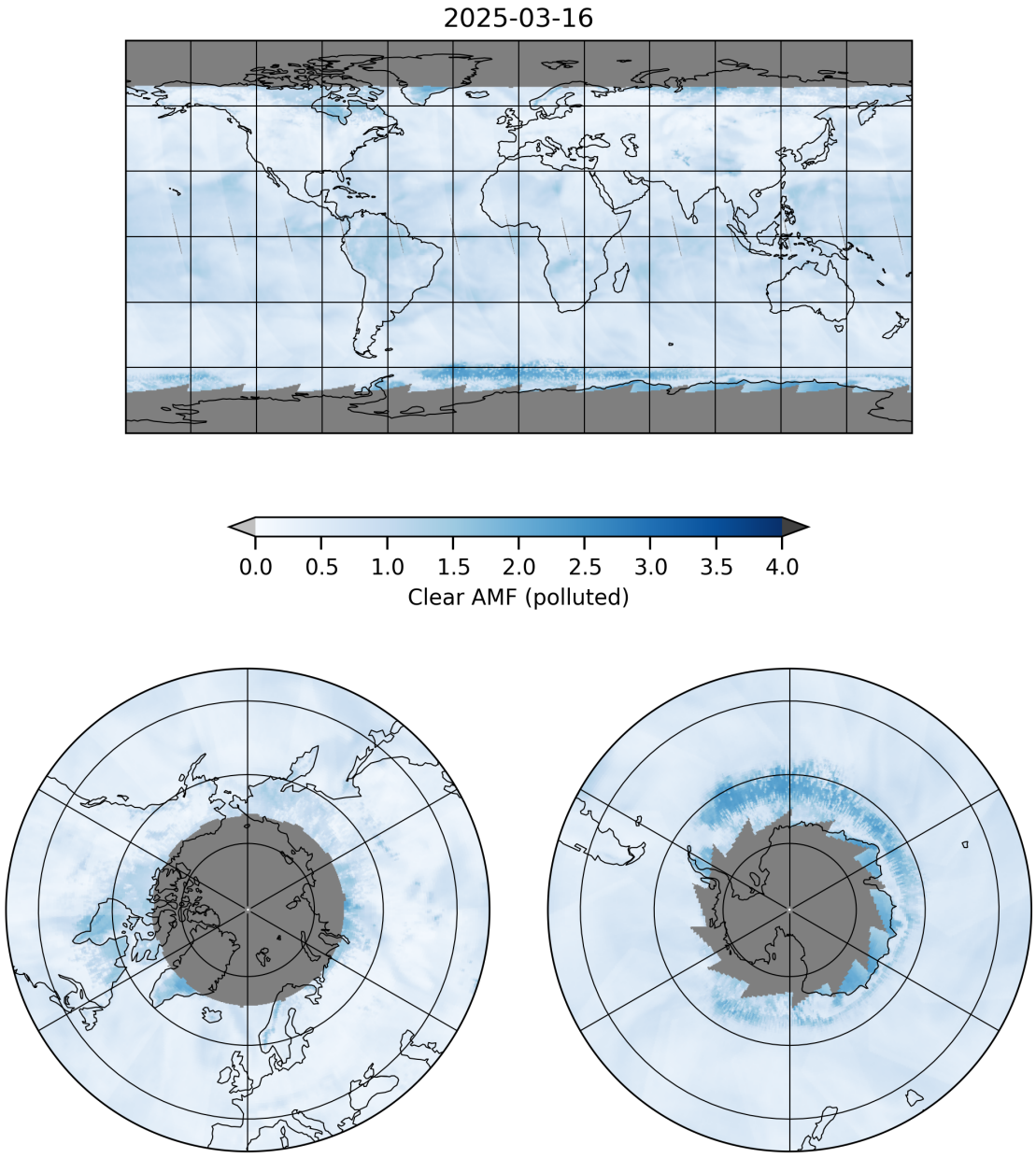


Figure 27: Map of “Clear AMF (polluted)” for 2025-03-16 to 2025-03-17

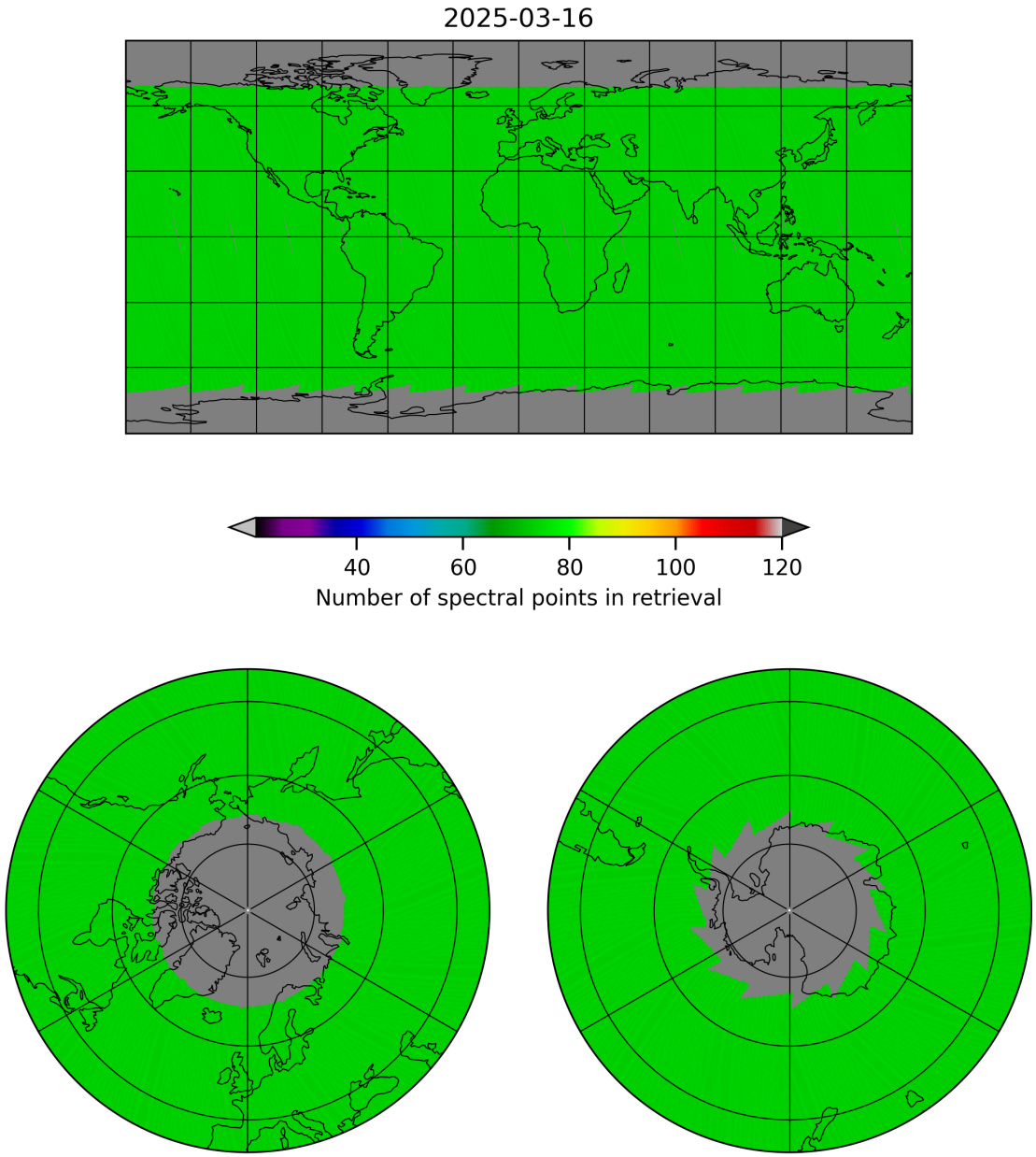


Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-16 to 2025-03-17

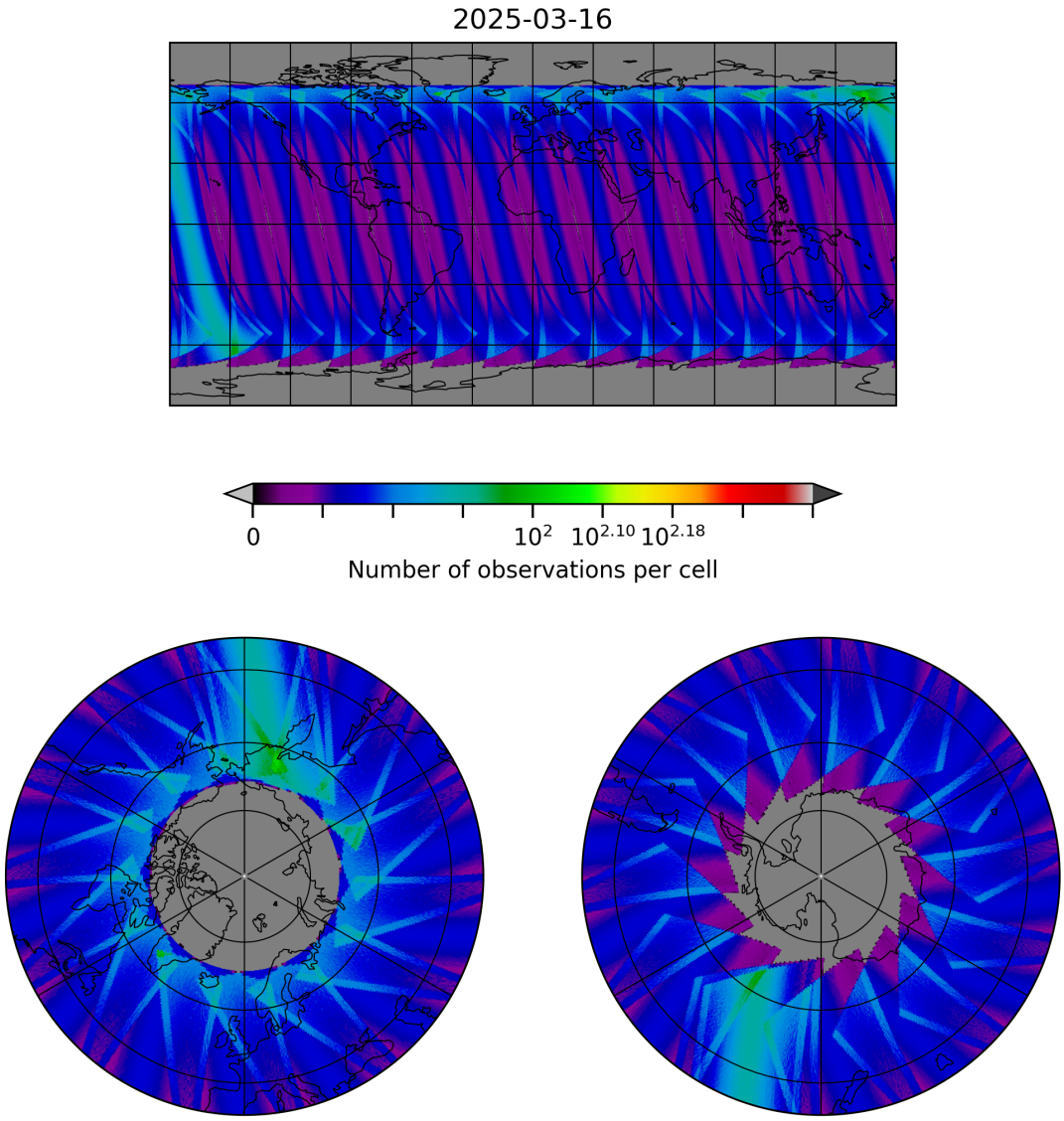


Figure 29: Map of the number of observations for 2025-03-16 to 2025-03-17

7 Zonal average

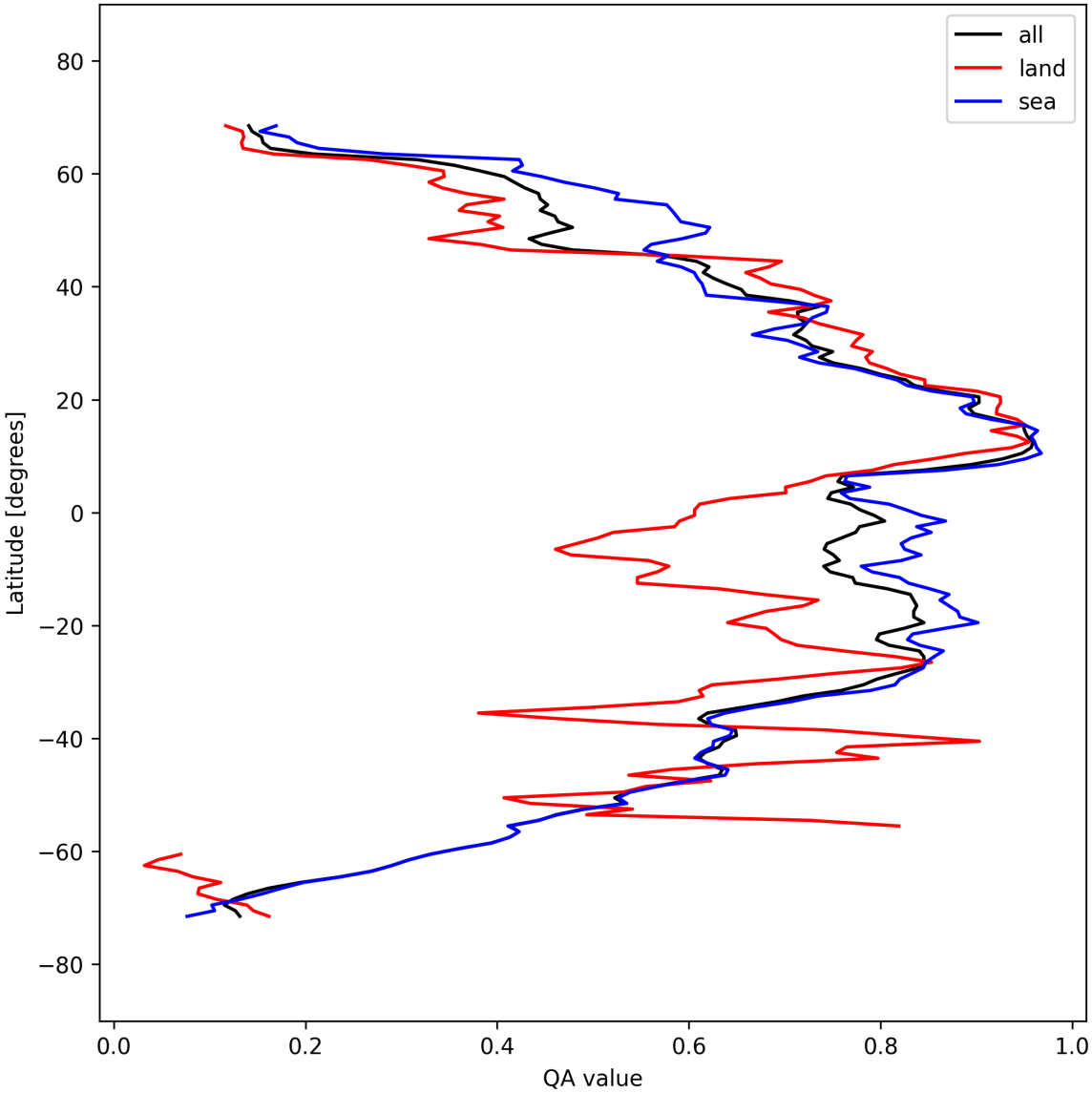


Figure 30: Zonal average of “QA value” for 2025-03-16 to 2025-03-17.

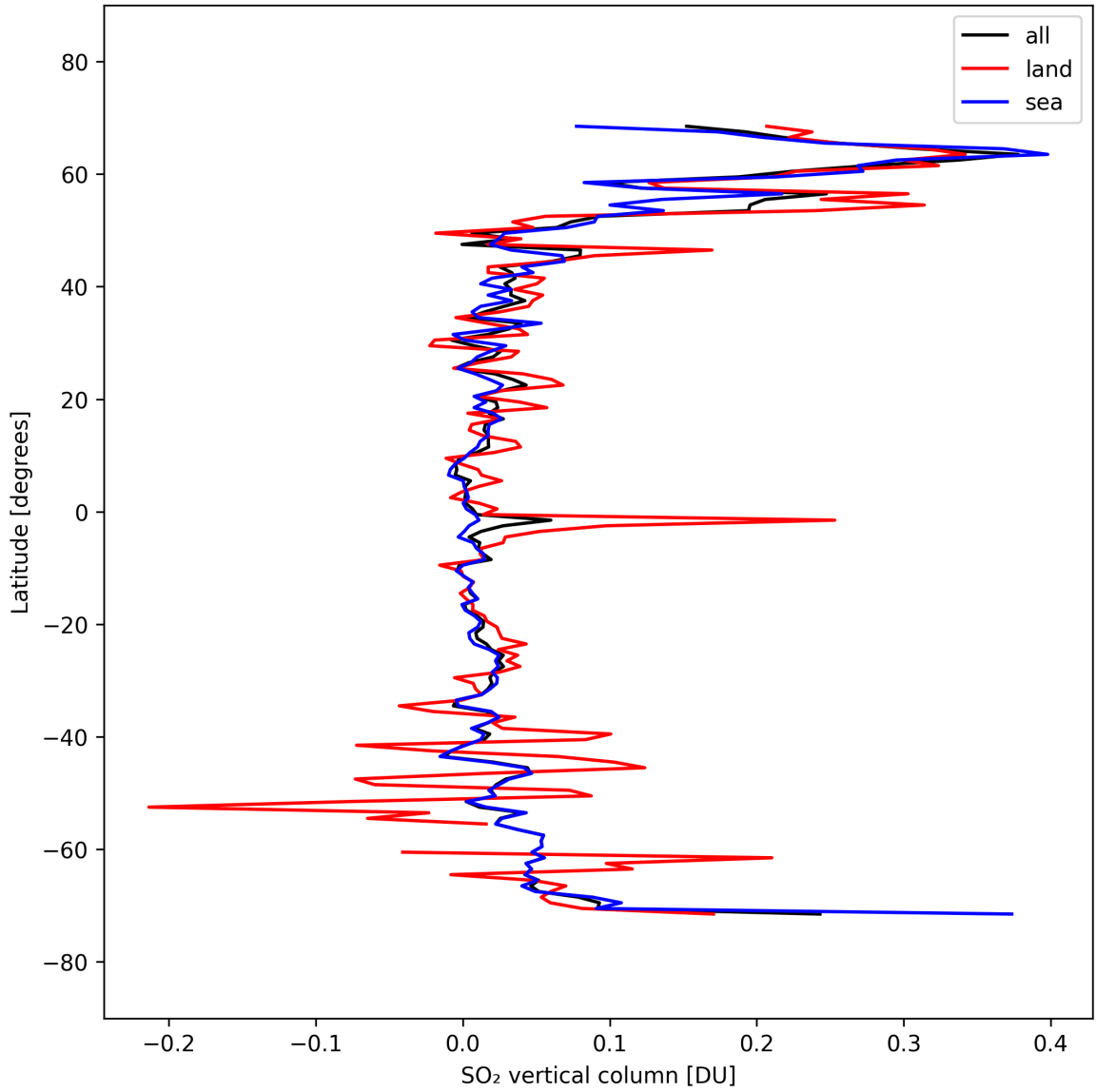


Figure 31: Zonal average of "SO_2 vertical column" for 2025-03-16 to 2025-03-17.

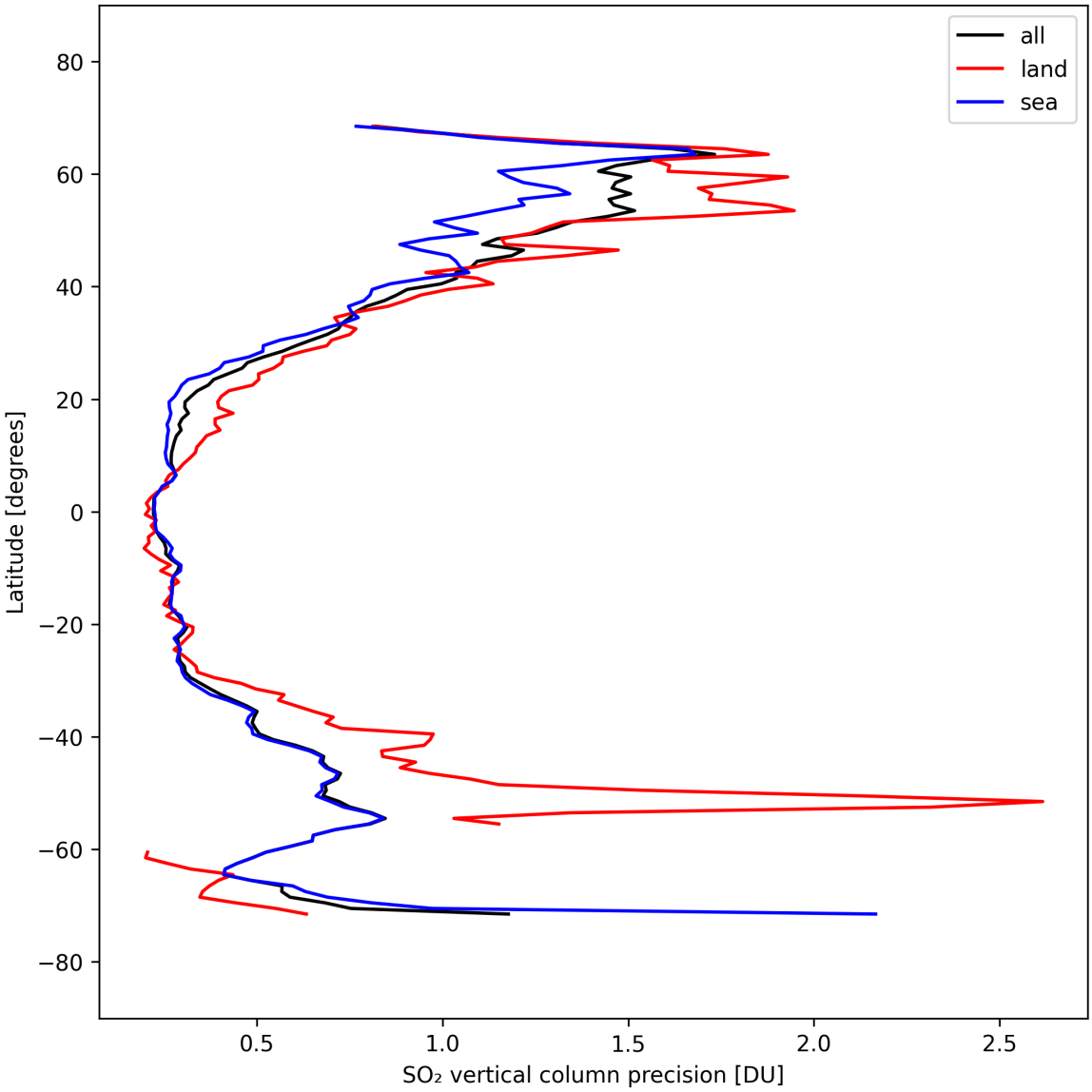


Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-03-16 to 2025-03-17.

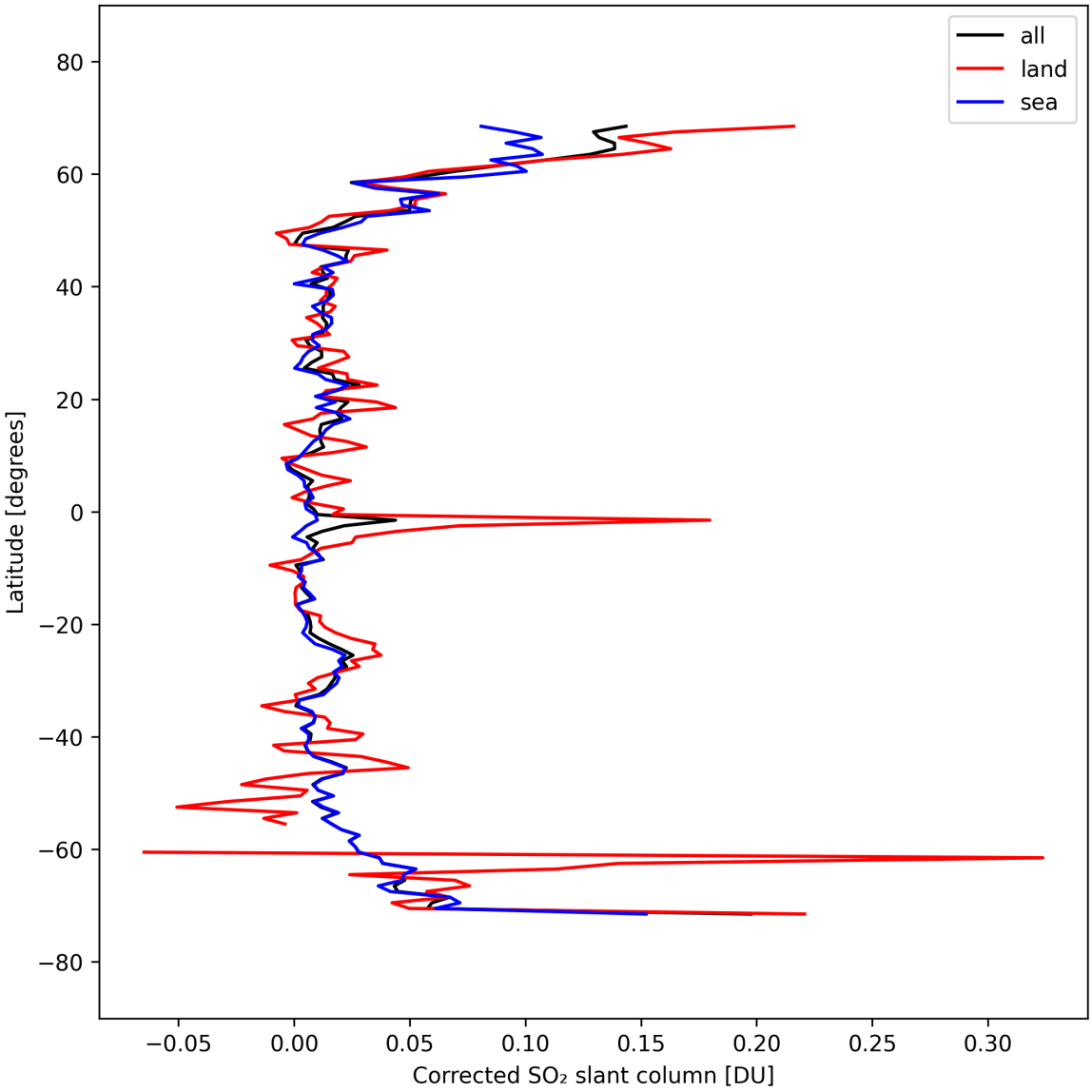


Figure 33: Zonal average of "Corrected SO_2 slant column" for 2025-03-16 to 2025-03-17.

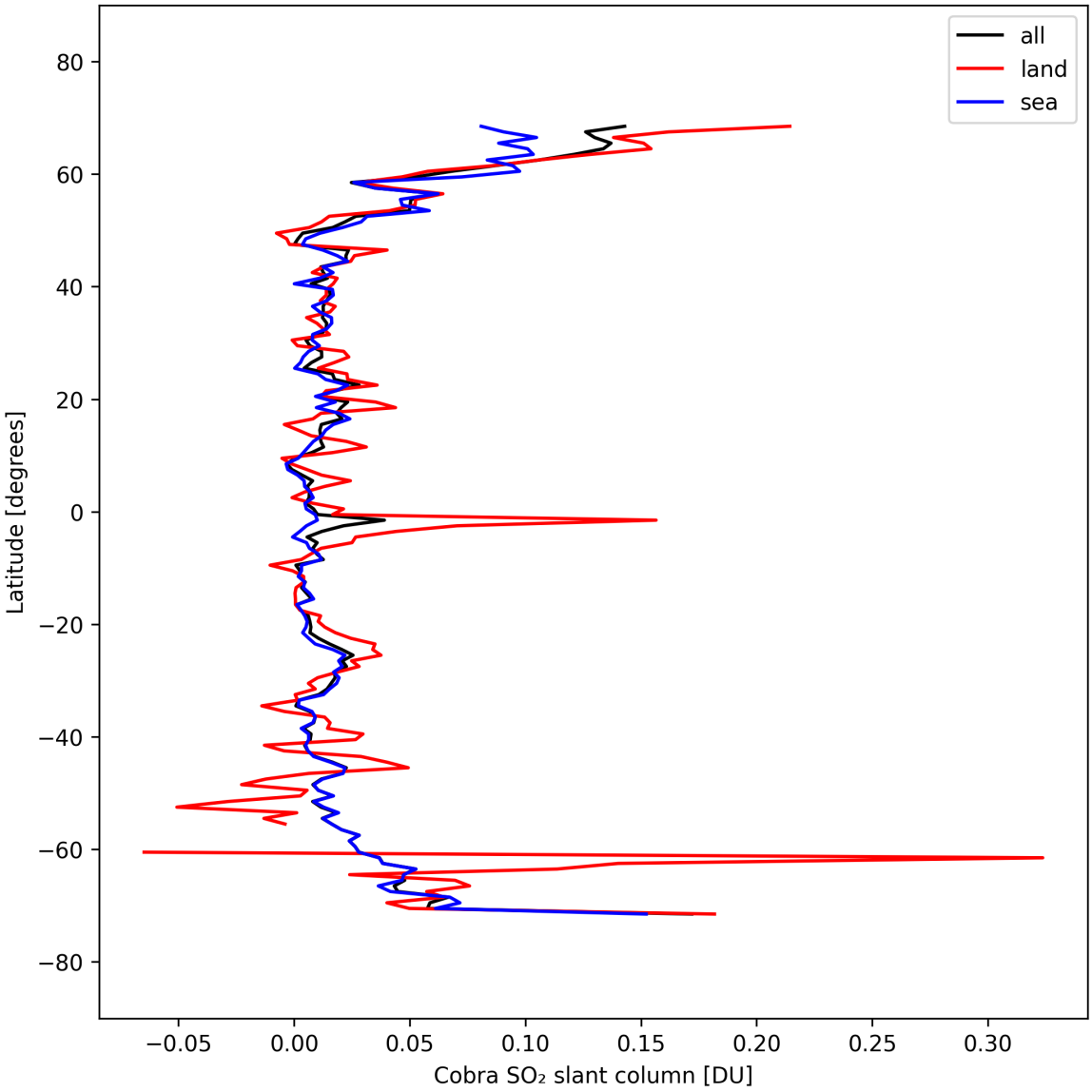


Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-03-16 to 2025-03-17.

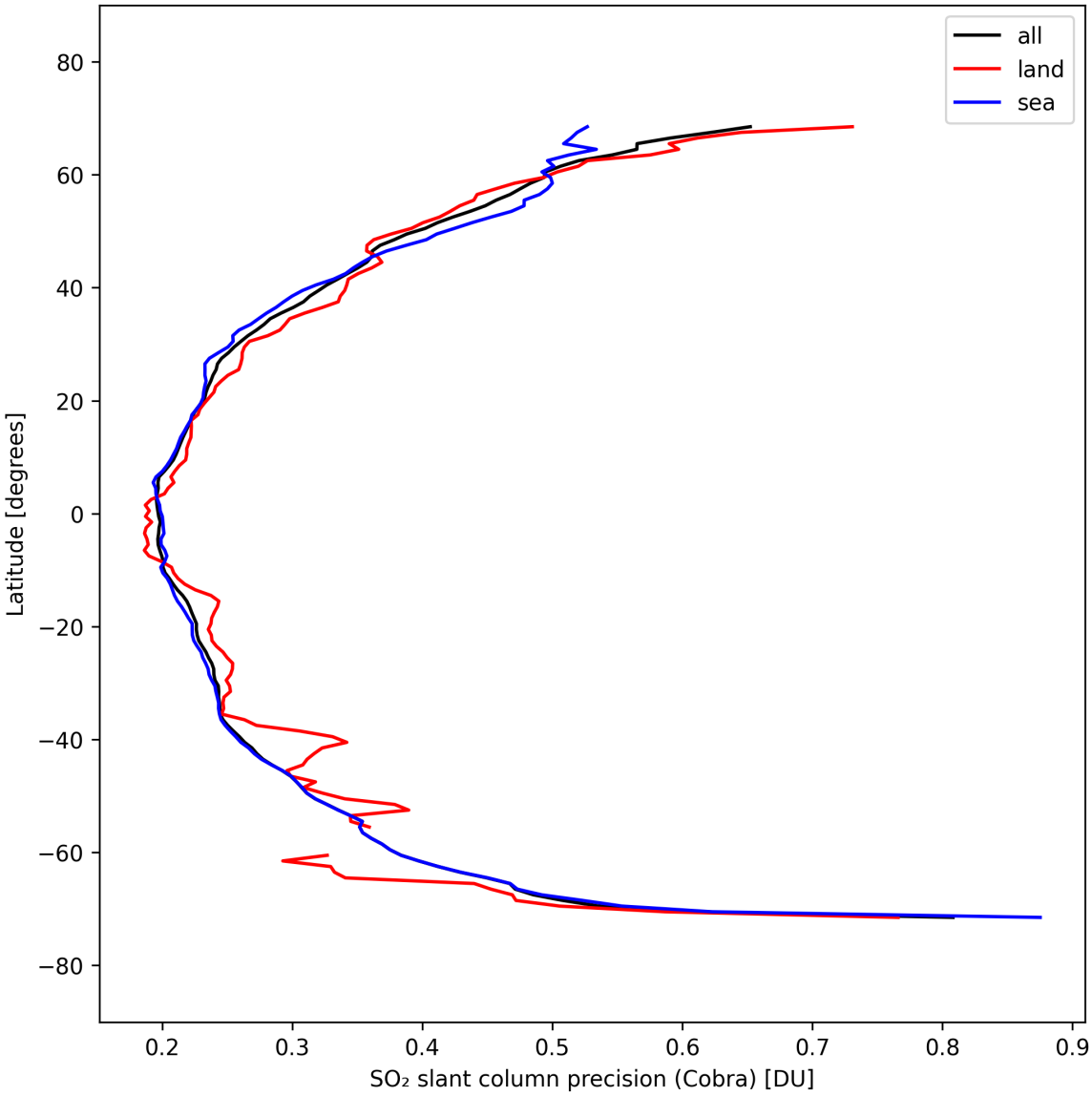


Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-03-16 to 2025-03-17.

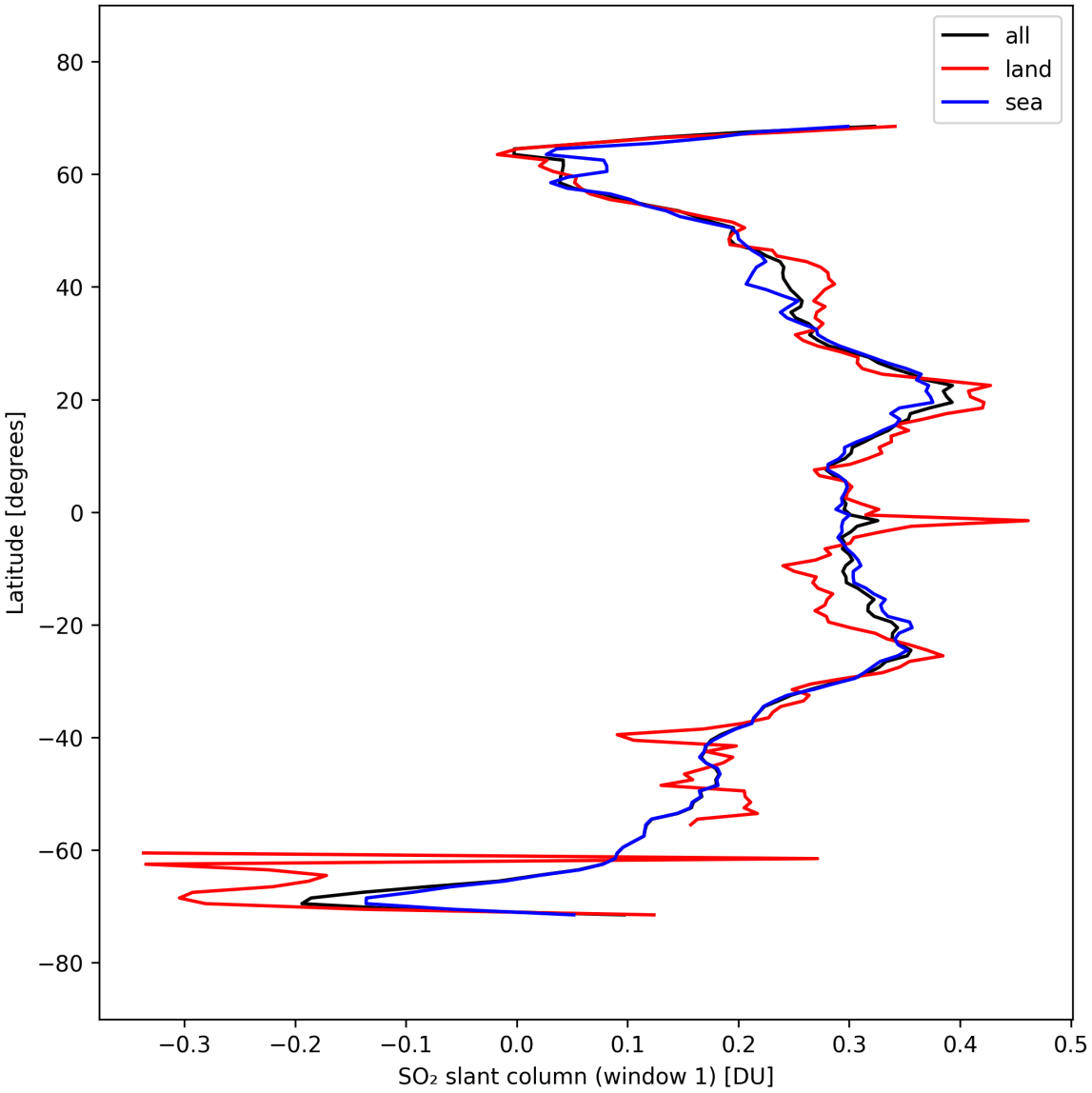


Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-03-16 to 2025-03-17.

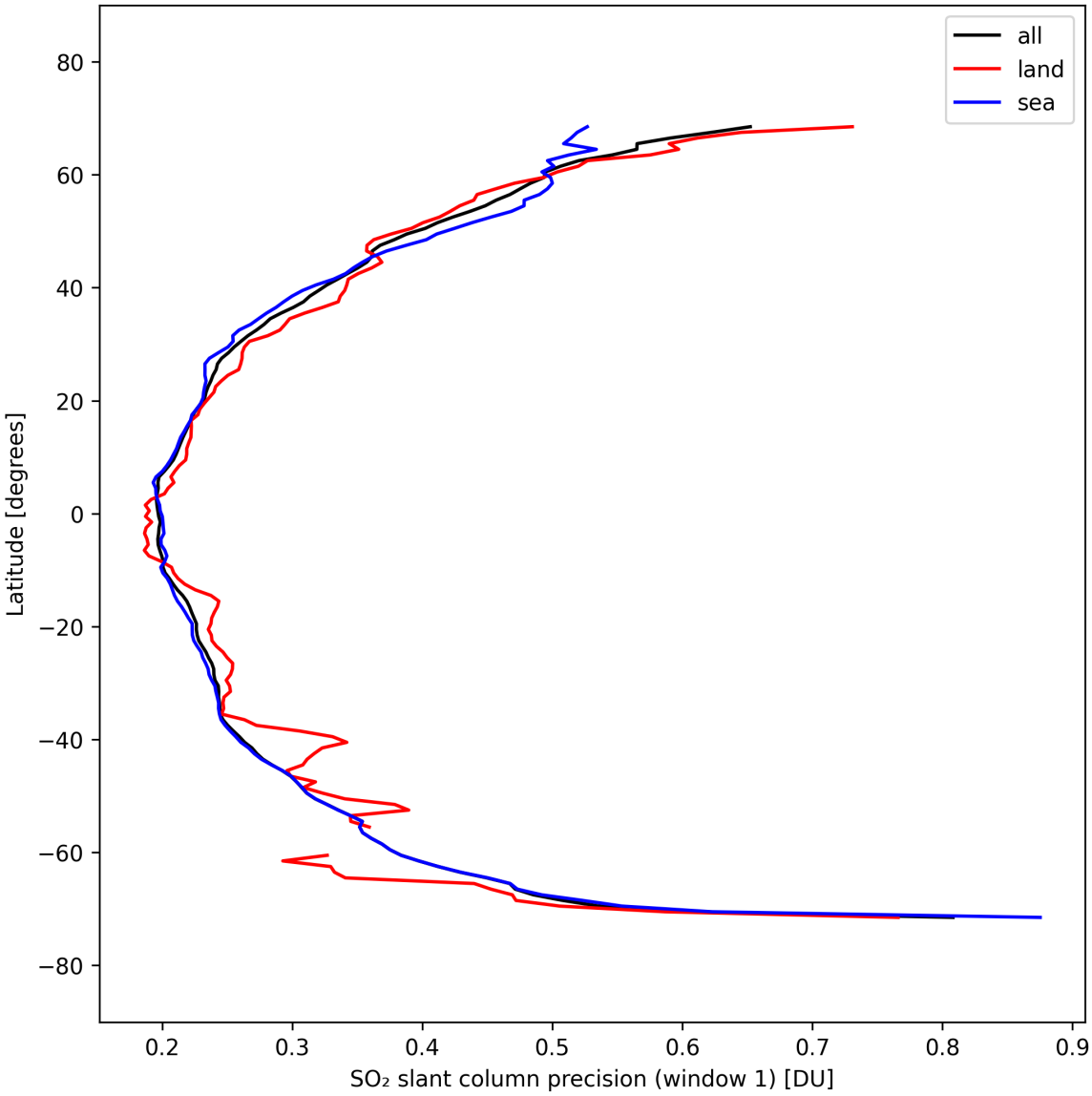


Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-03-16 to 2025-03-17.

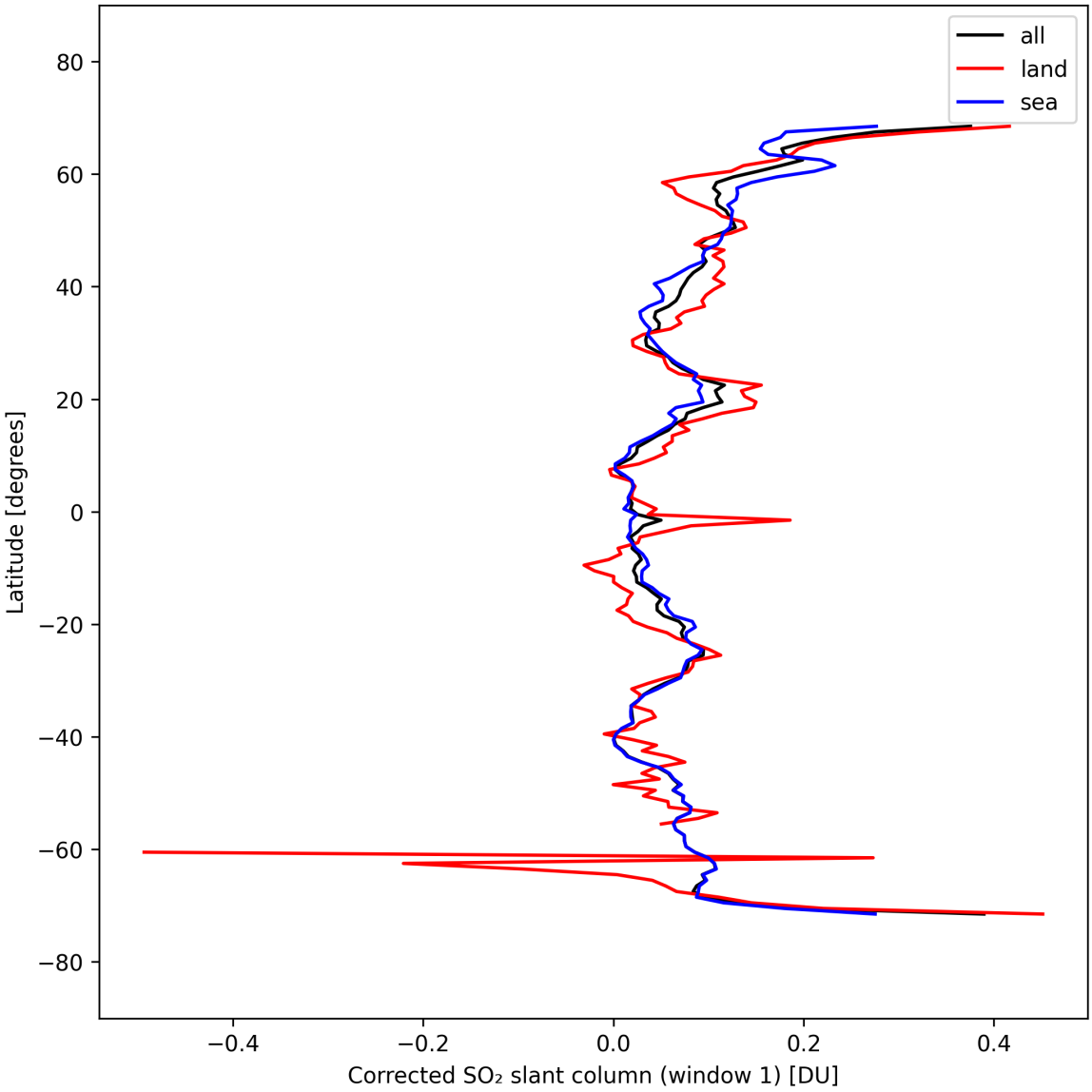


Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-03-16 to 2025-03-17.

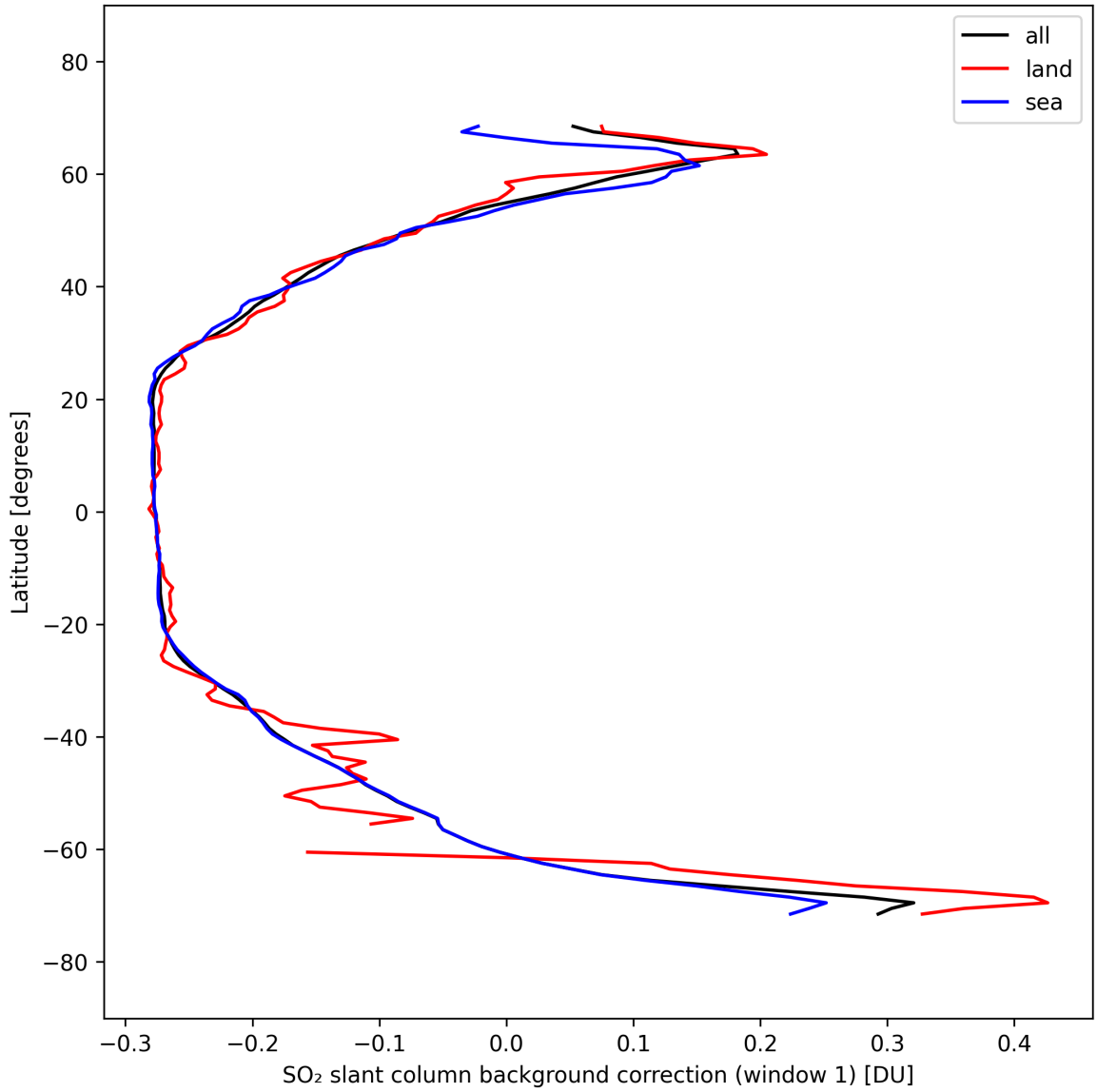


Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-03-16 to 2025-03-17.

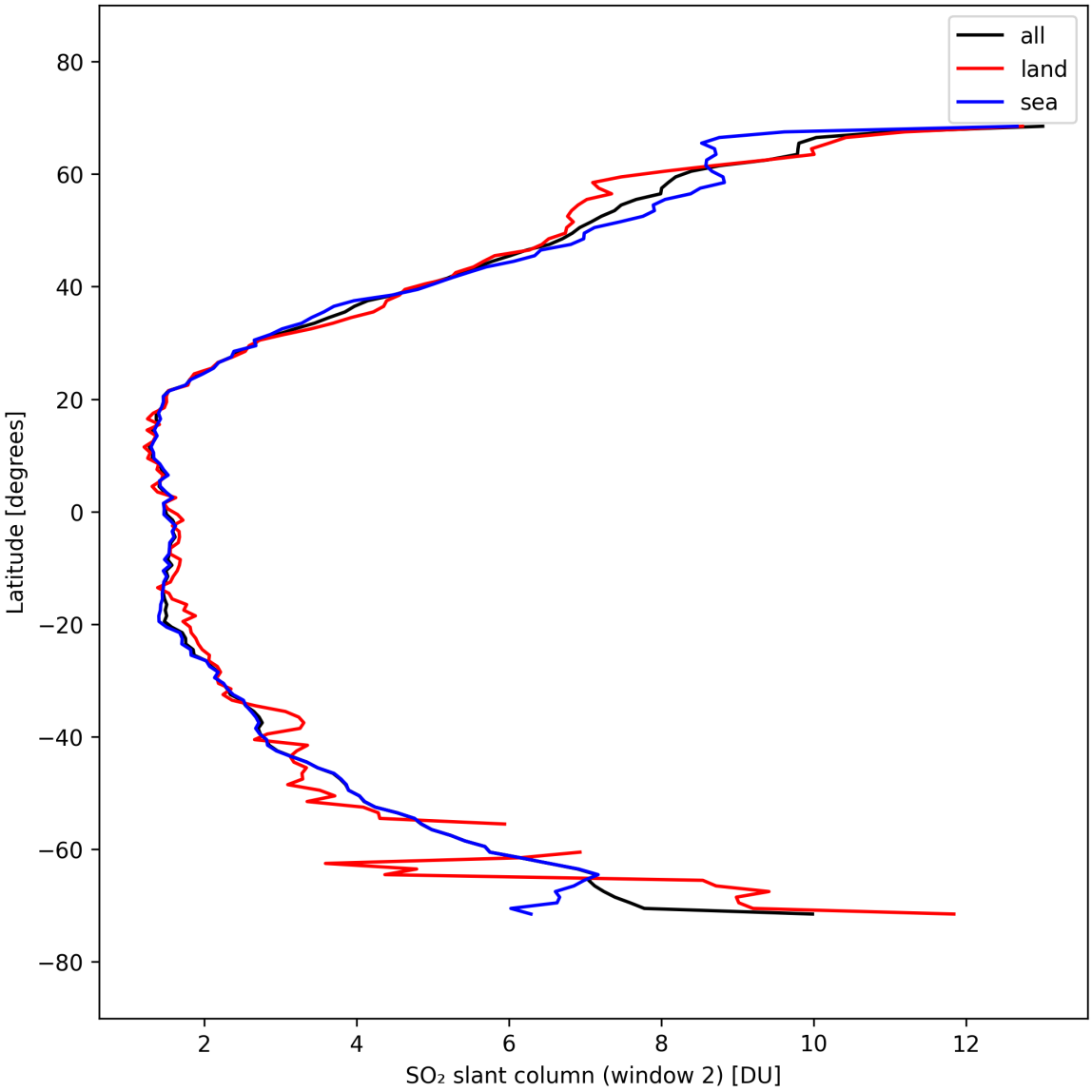


Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-03-16 to 2025-03-17.

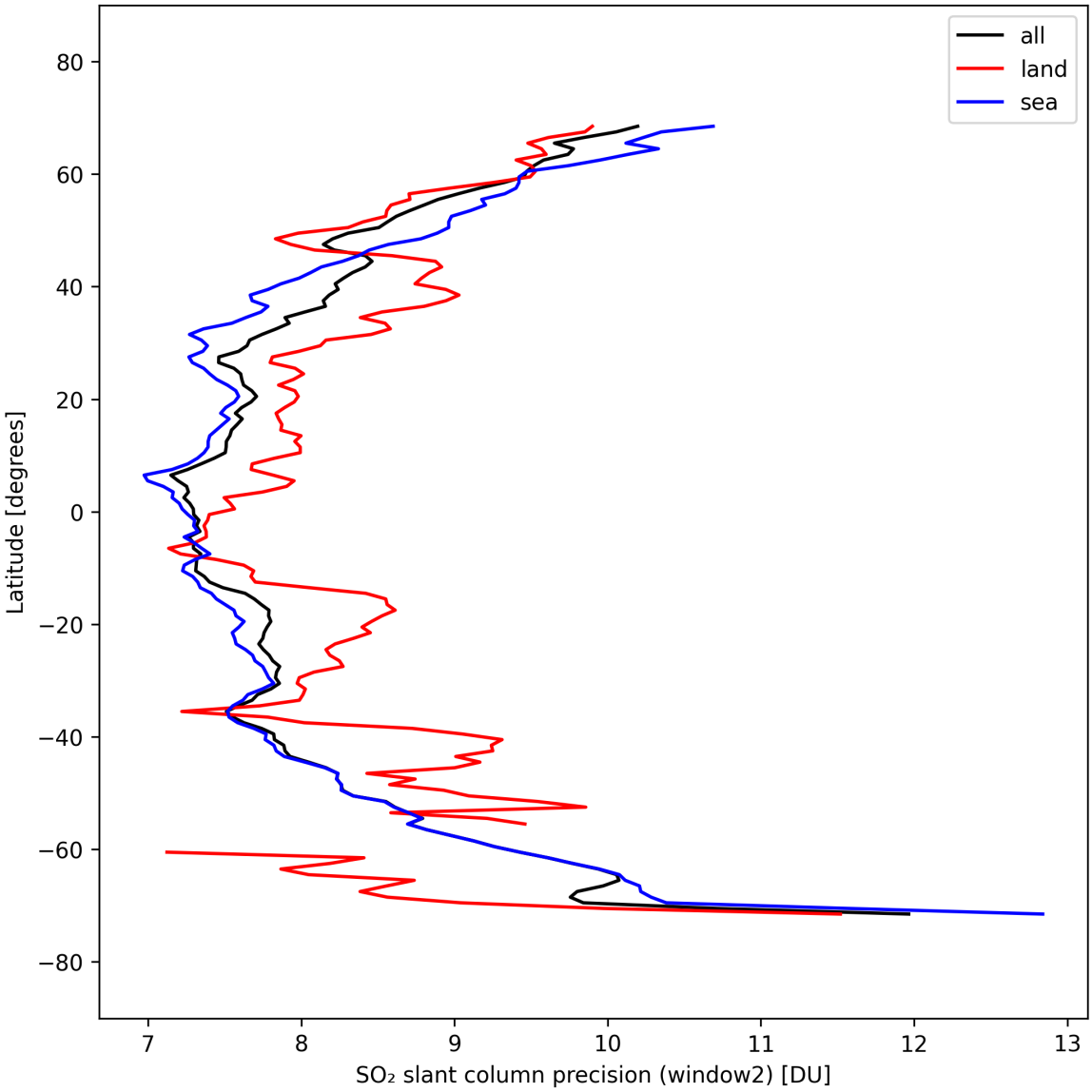


Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-03-16 to 2025-03-17.

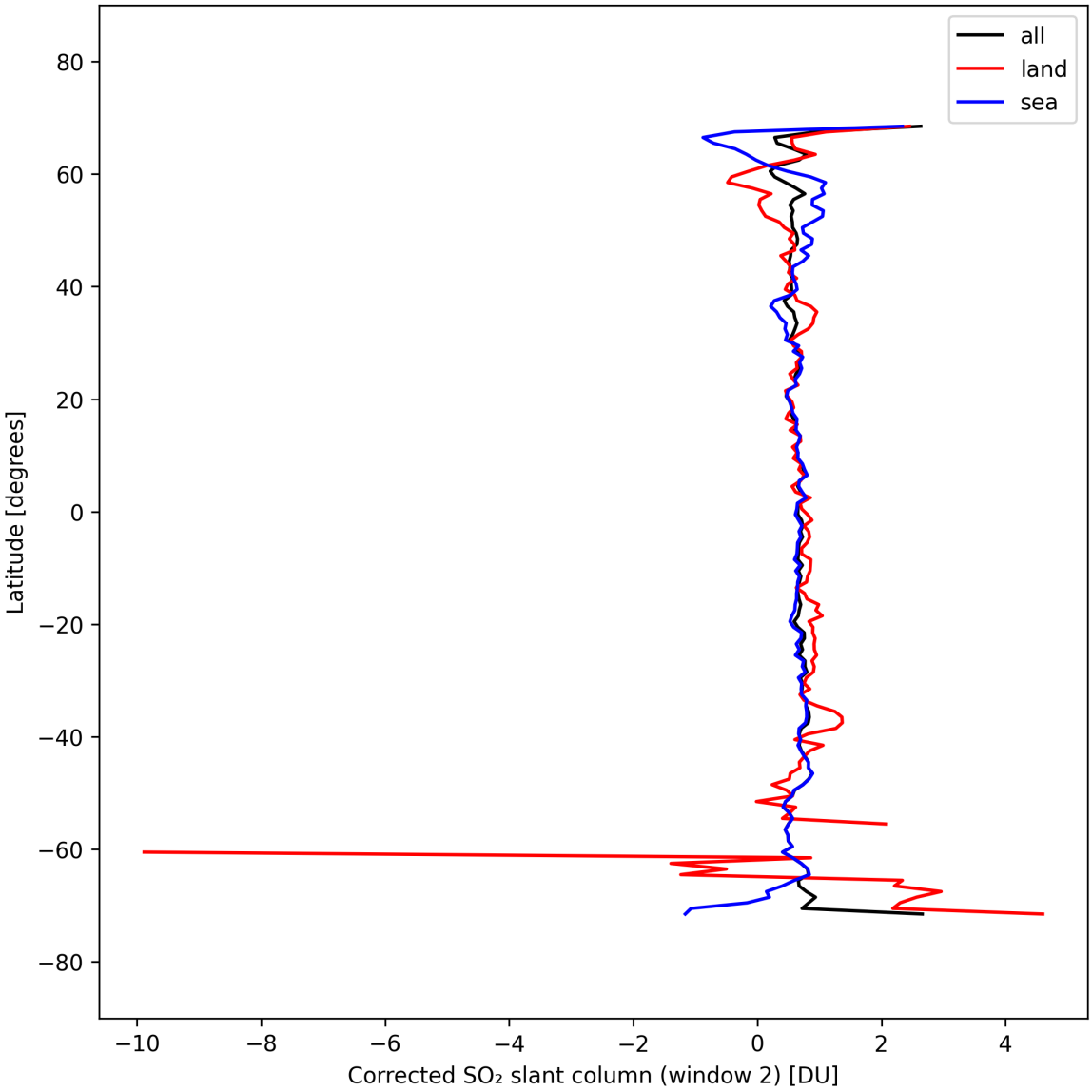


Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-03-16 to 2025-03-17.

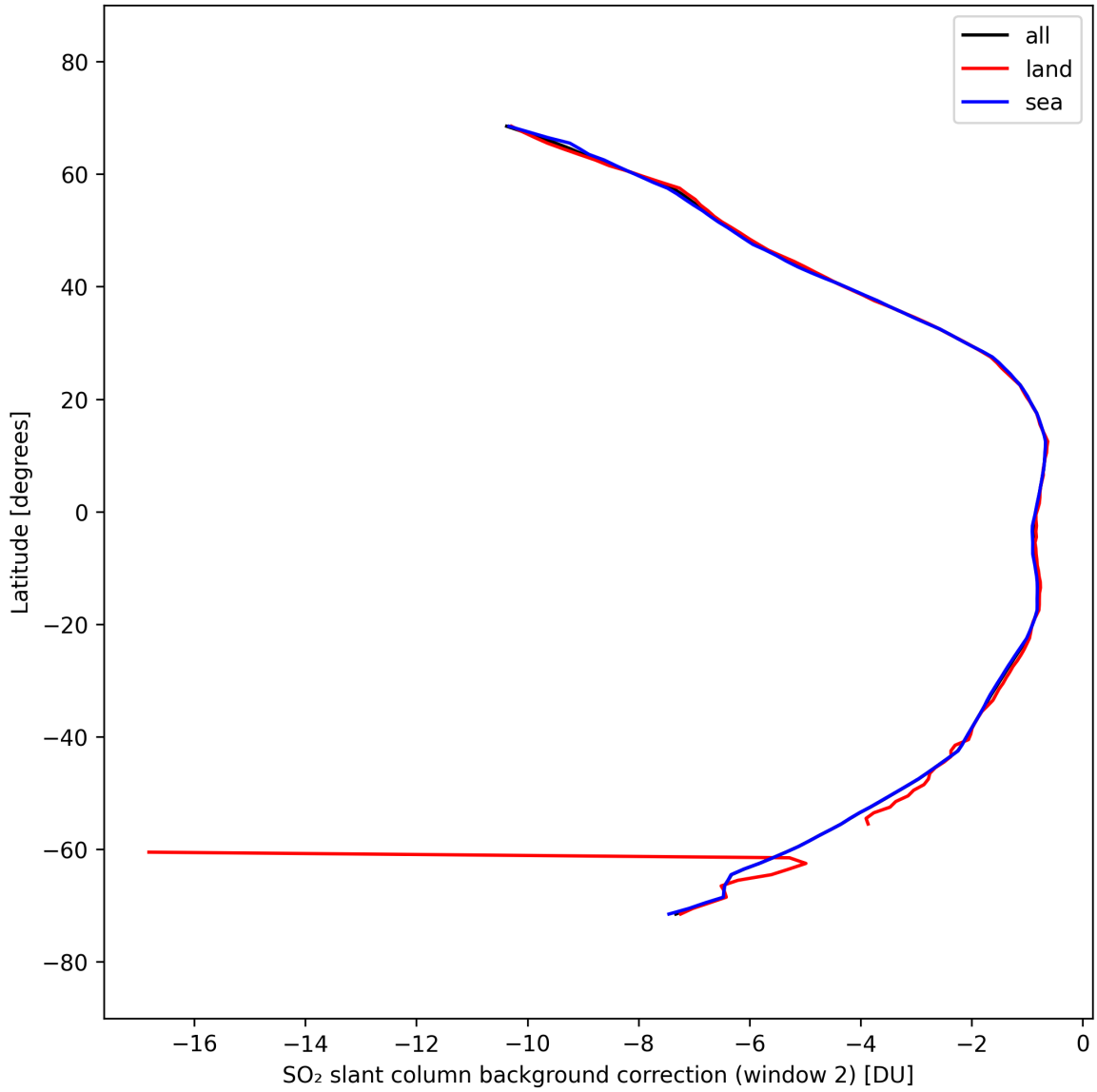


Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-03-16 to 2025-03-17.

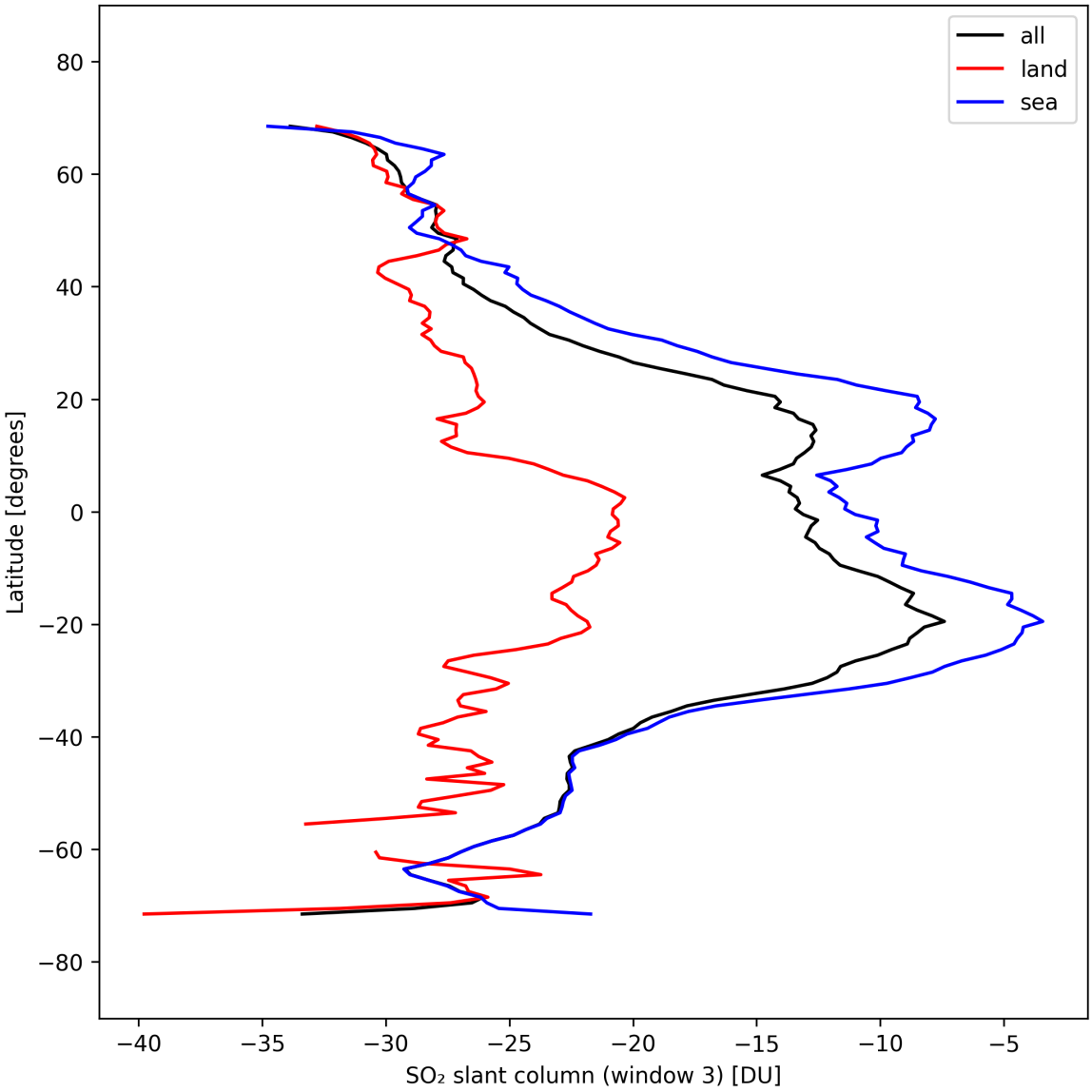


Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-03-16 to 2025-03-17.

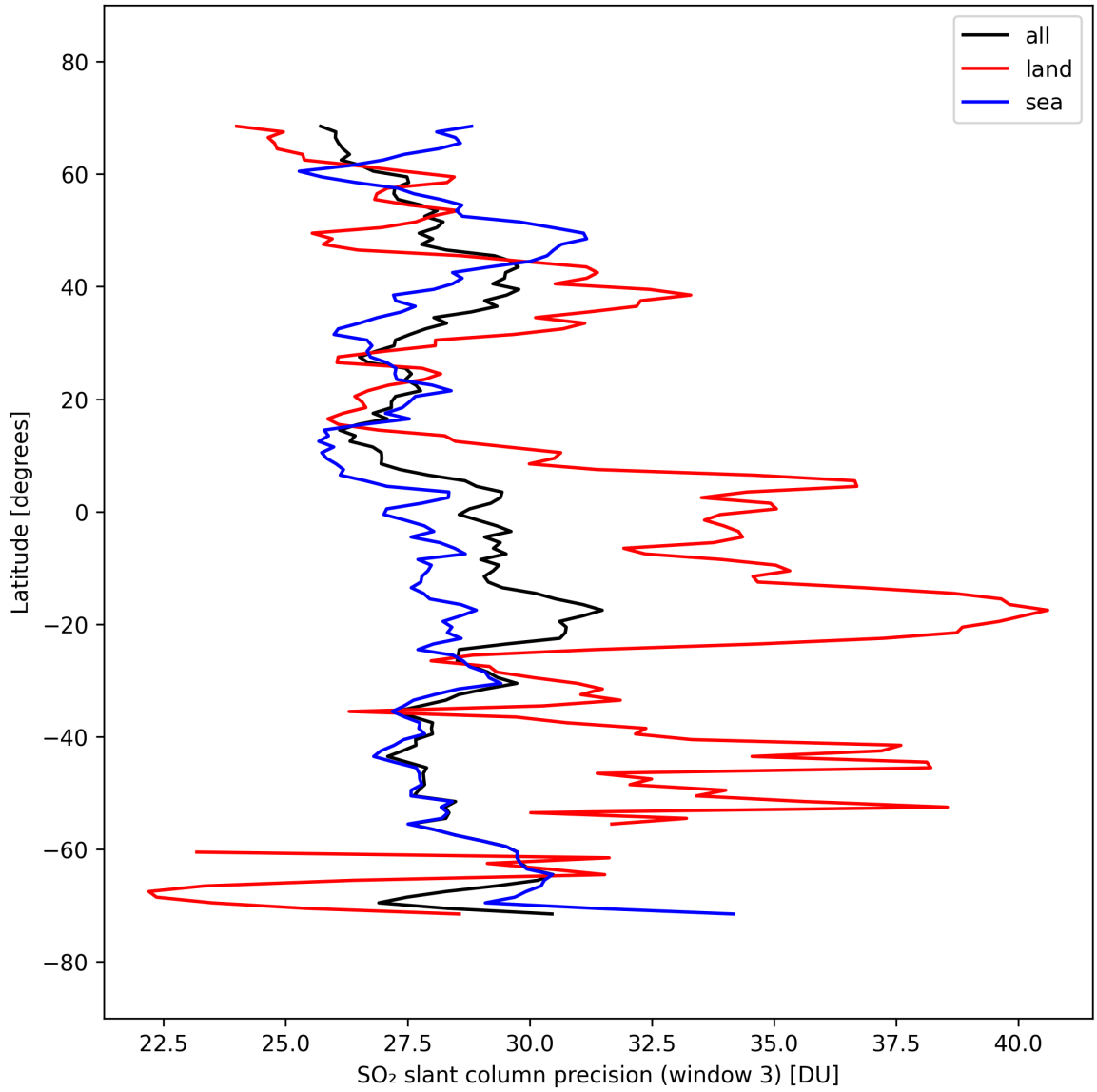


Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-03-16 to 2025-03-17.

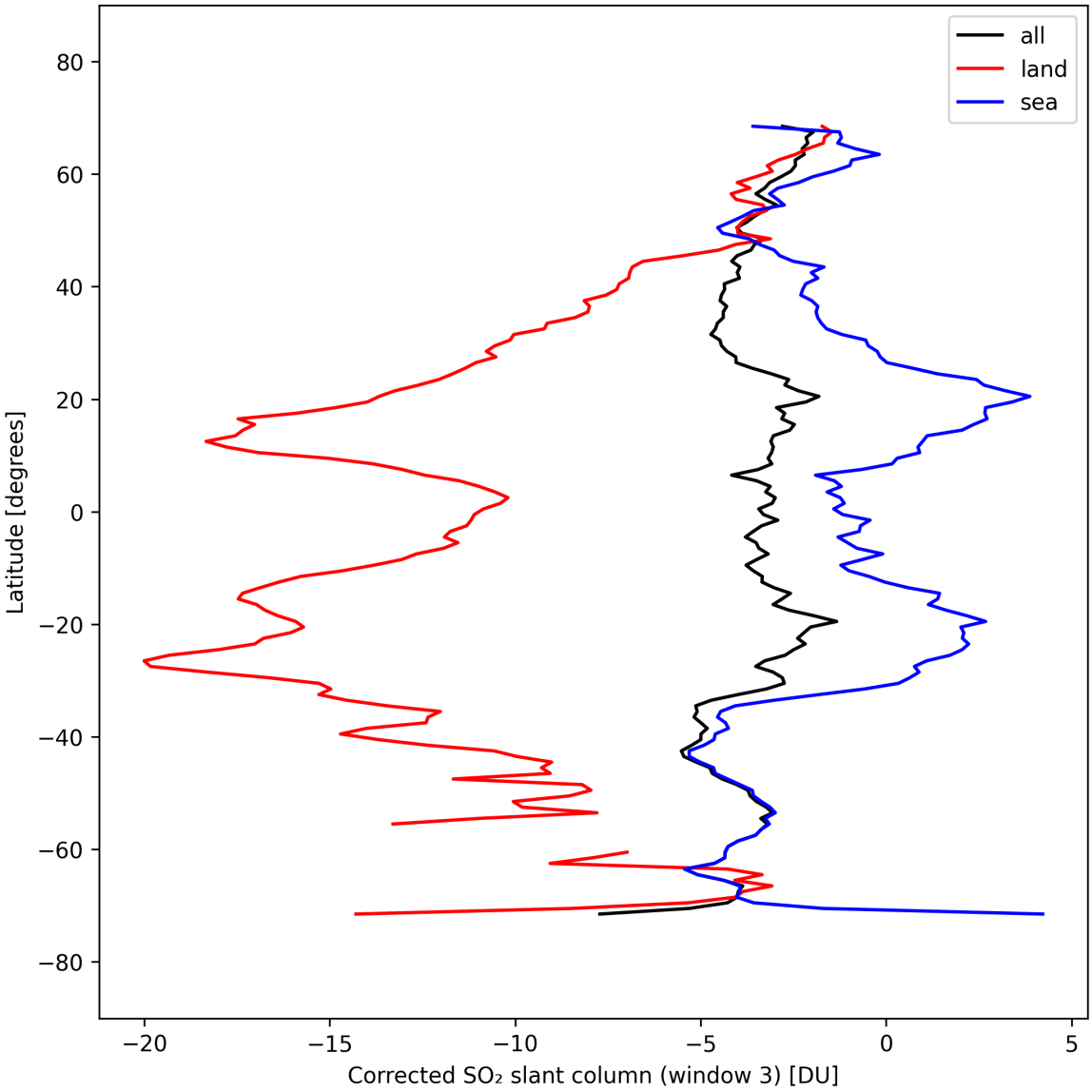


Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-03-16 to 2025-03-17.

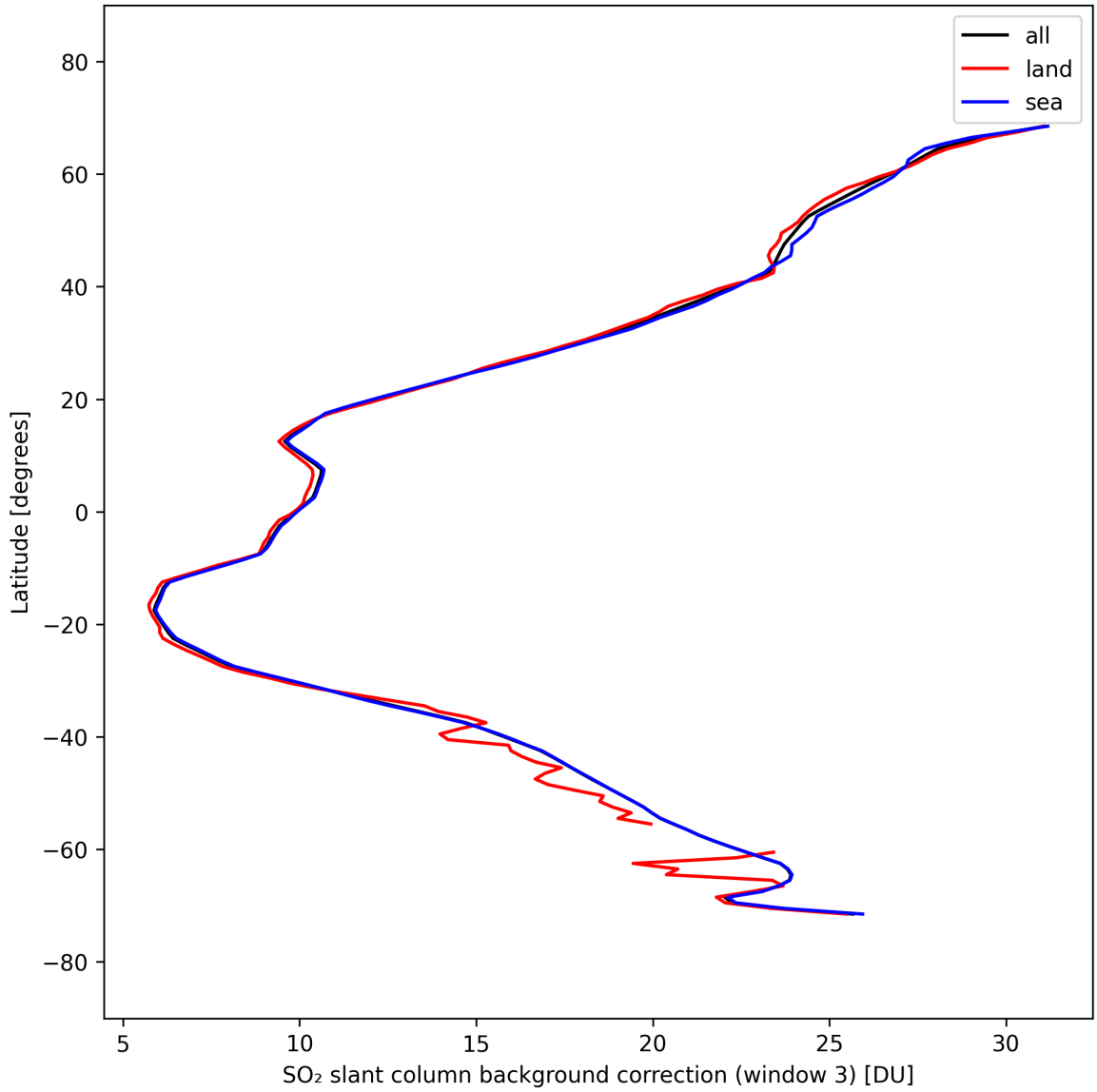


Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-03-16 to 2025-03-17.

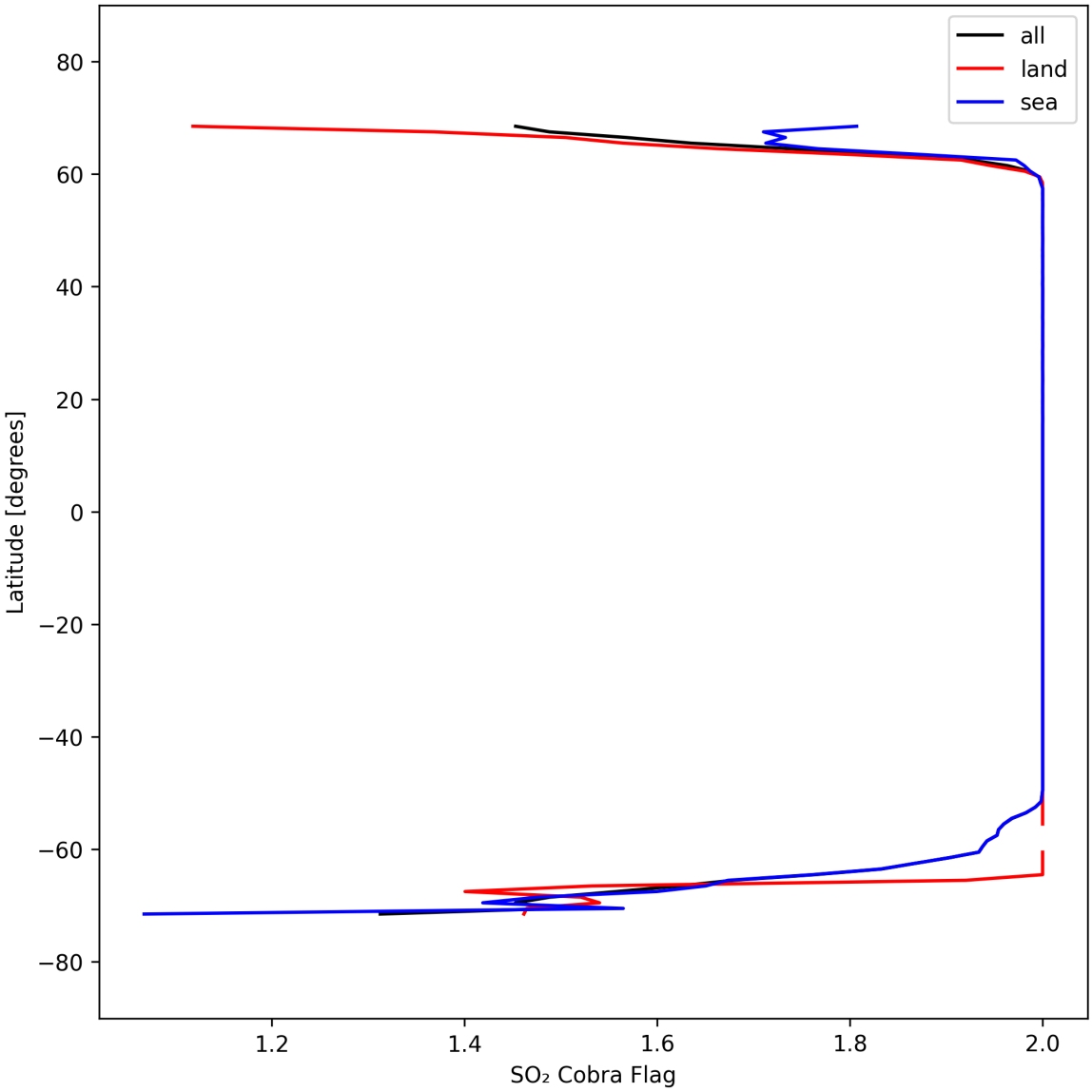


Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-03-16 to 2025-03-17.

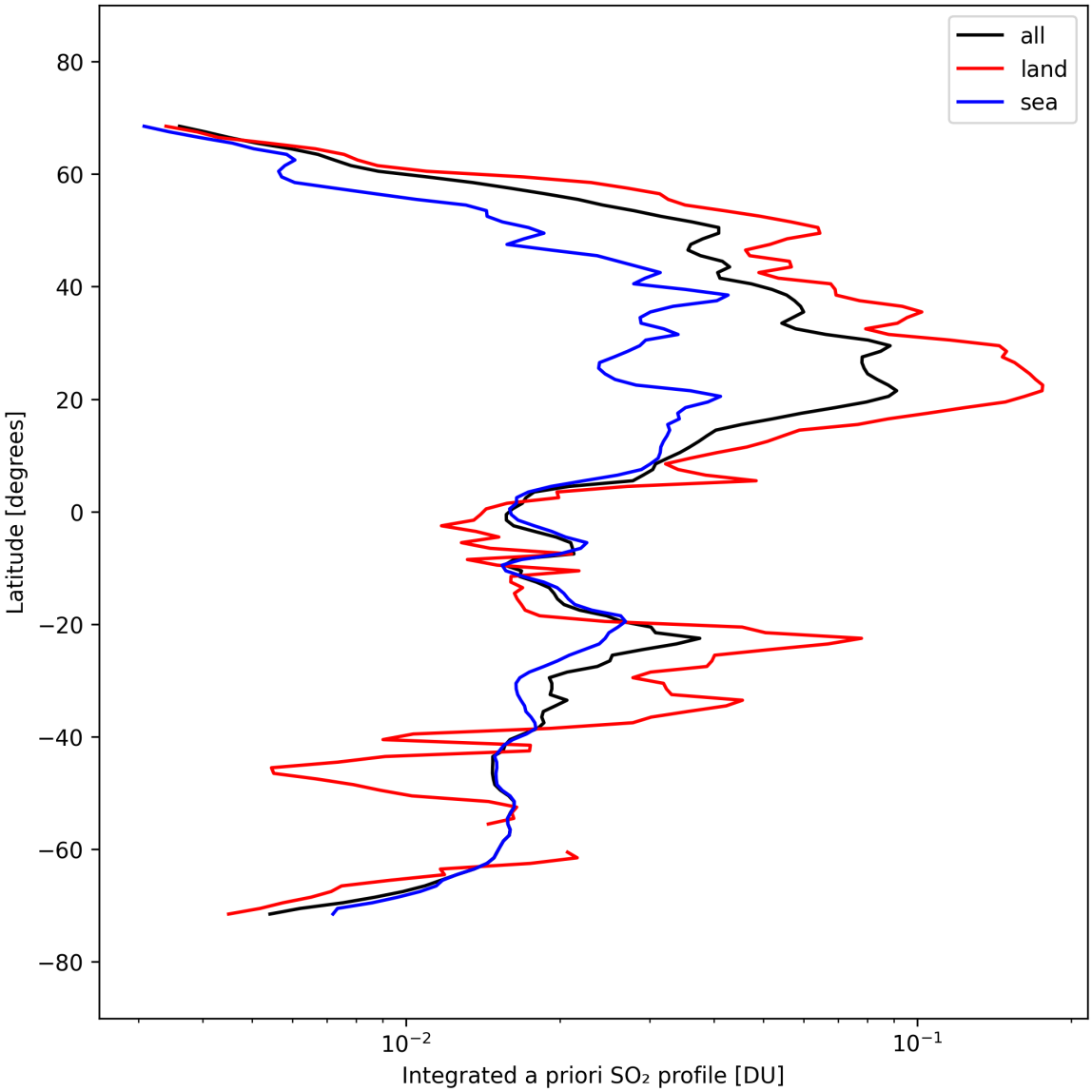


Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-03-16 to 2025-03-17.

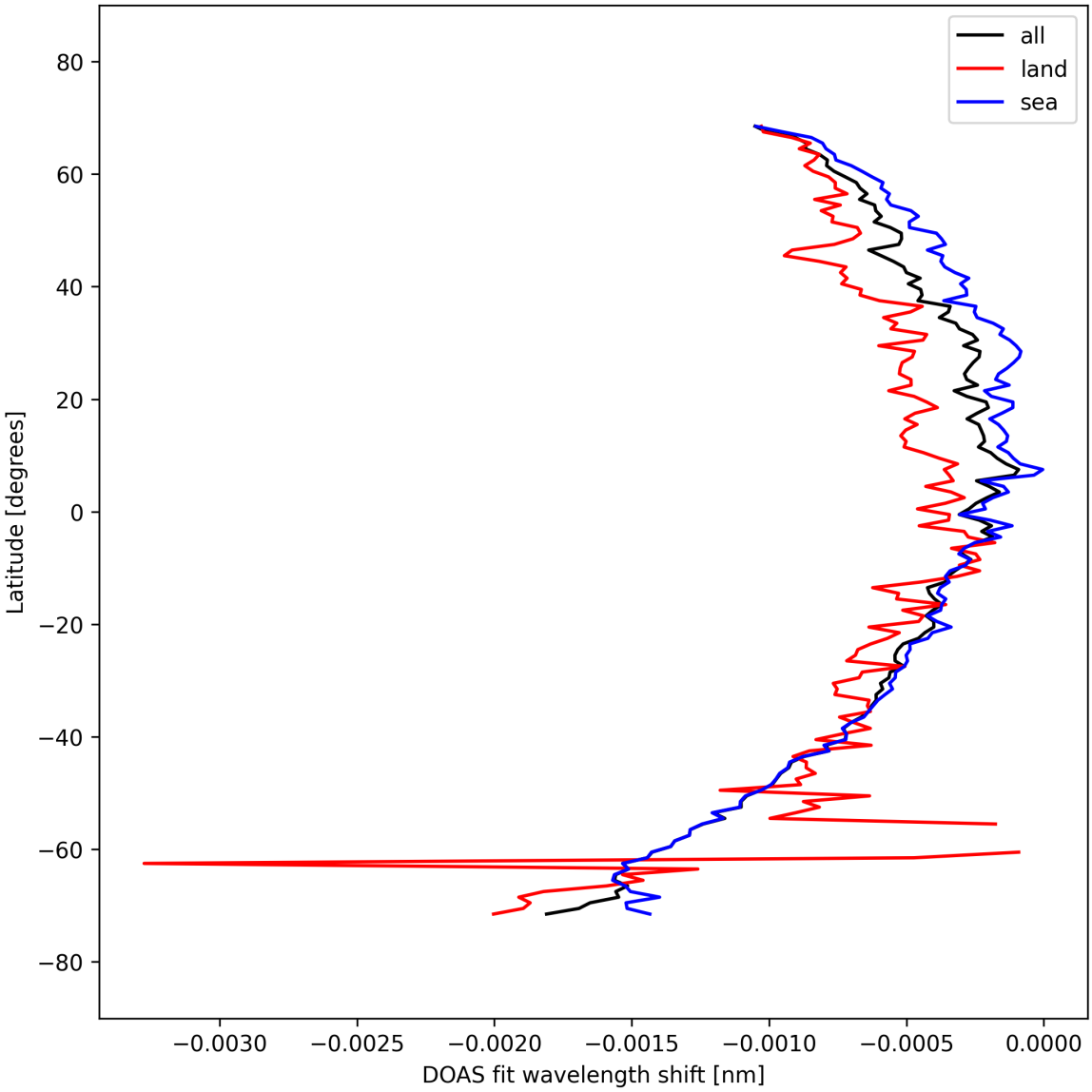


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-16 to 2025-03-17.

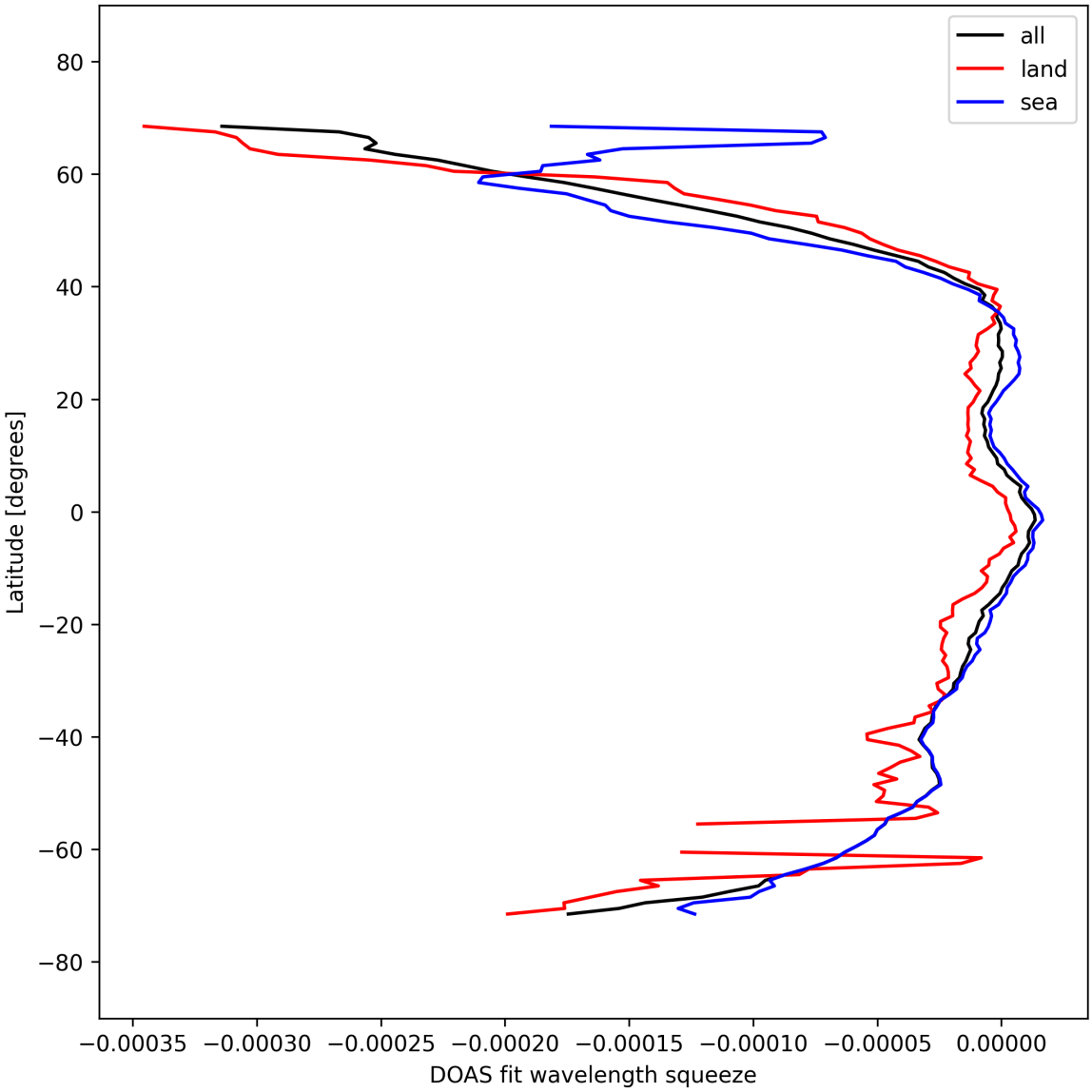


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-16 to 2025-03-17.

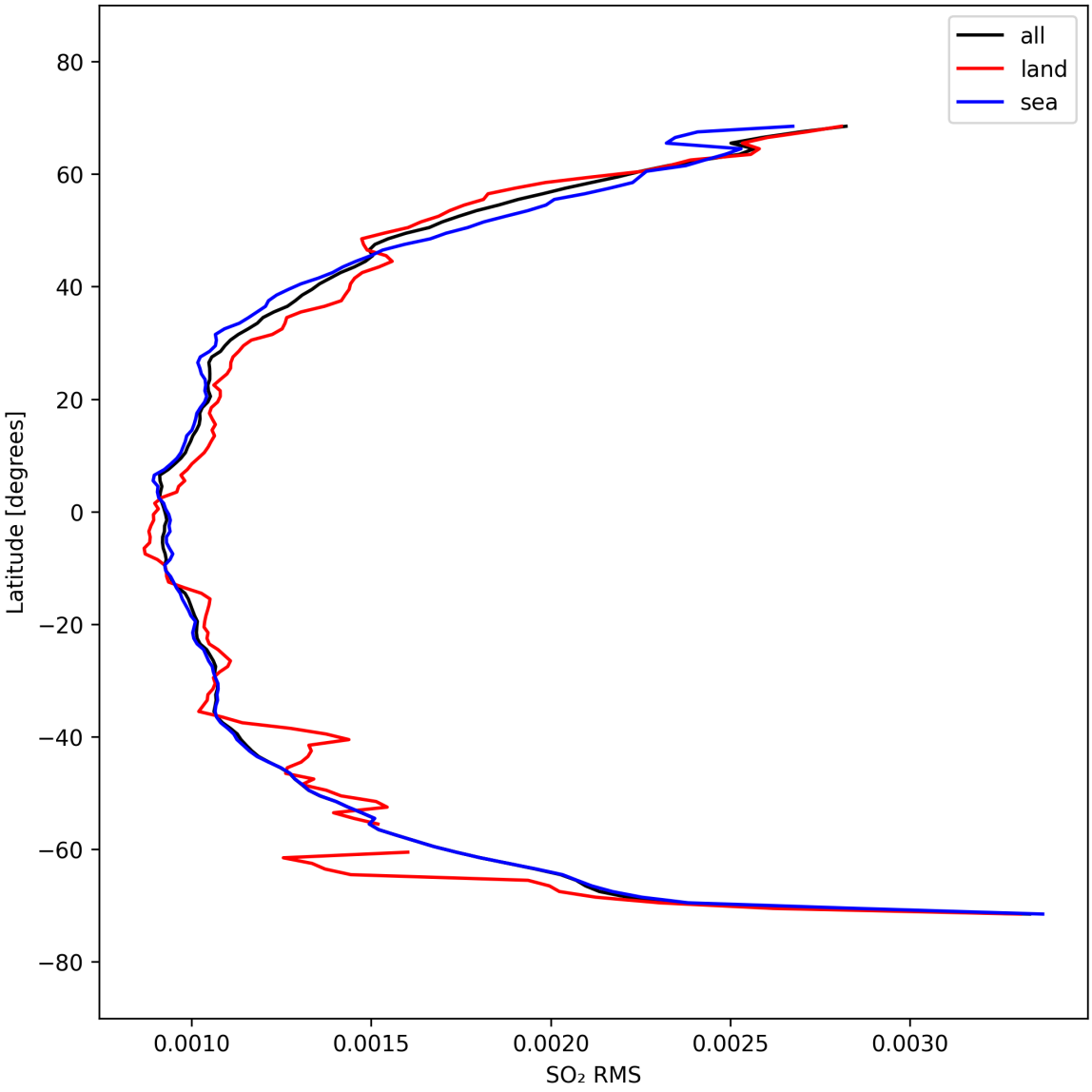


Figure 52: Zonal average of "SO_2 RMS" for 2025-03-16 to 2025-03-17.

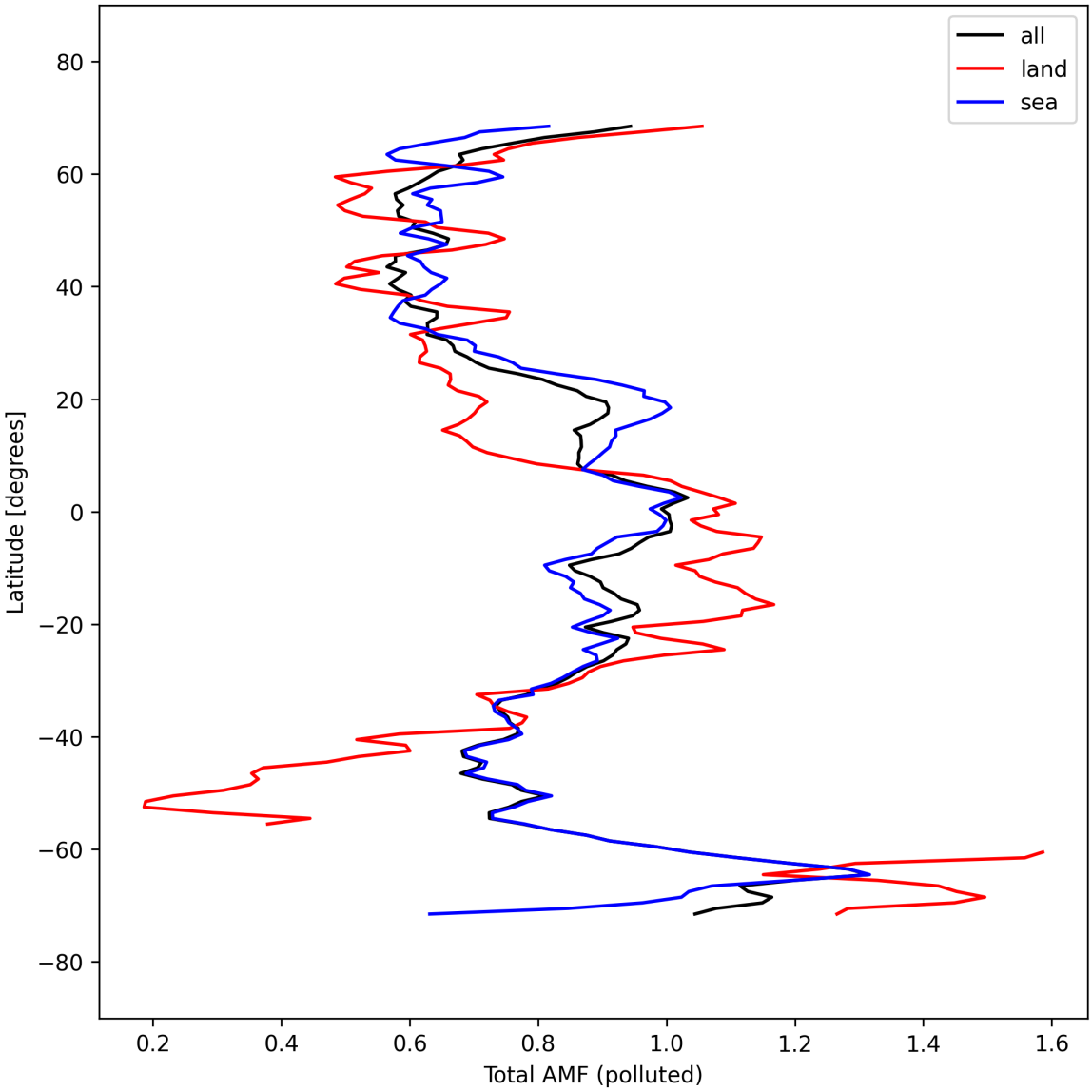


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-16 to 2025-03-17.

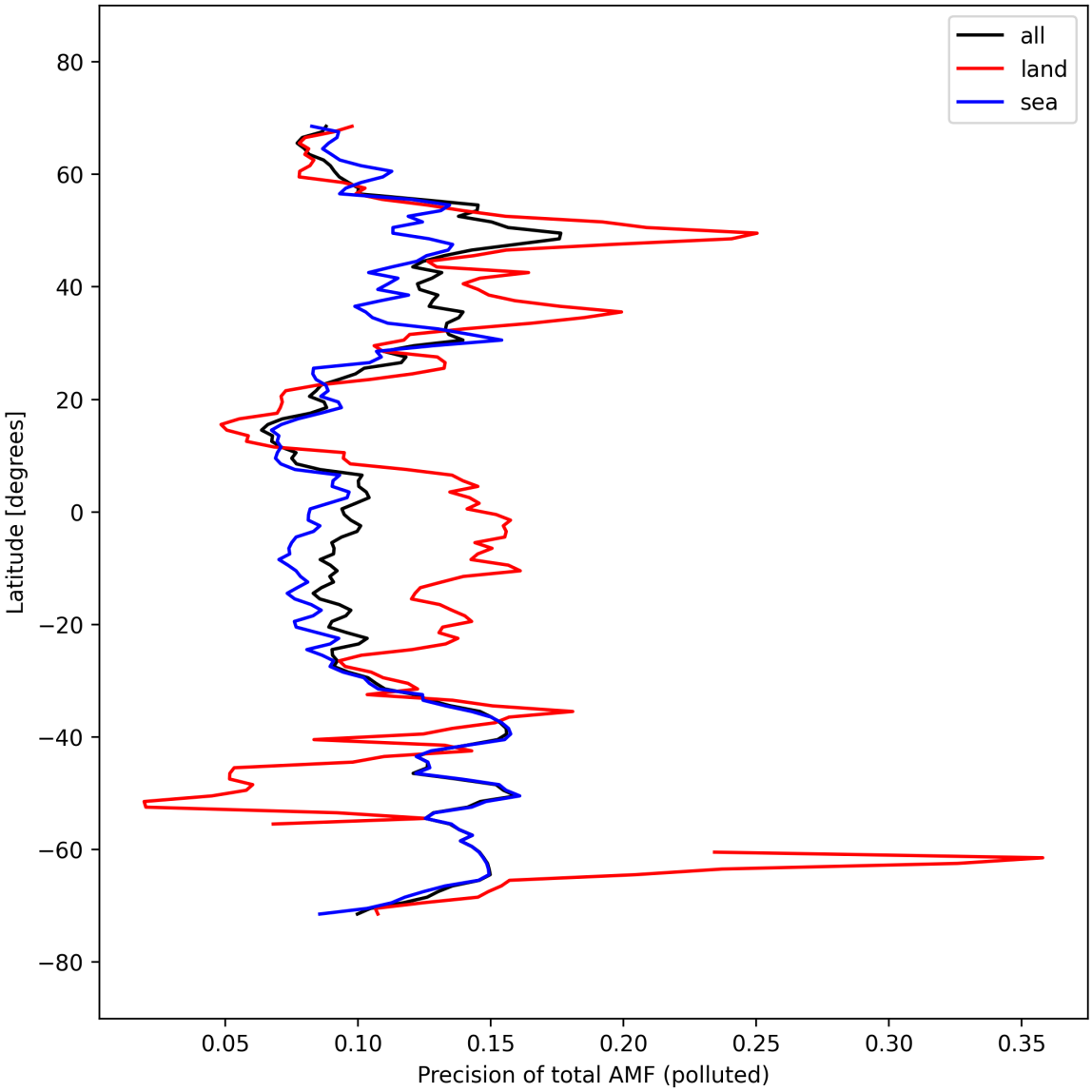


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-16 to 2025-03-17.

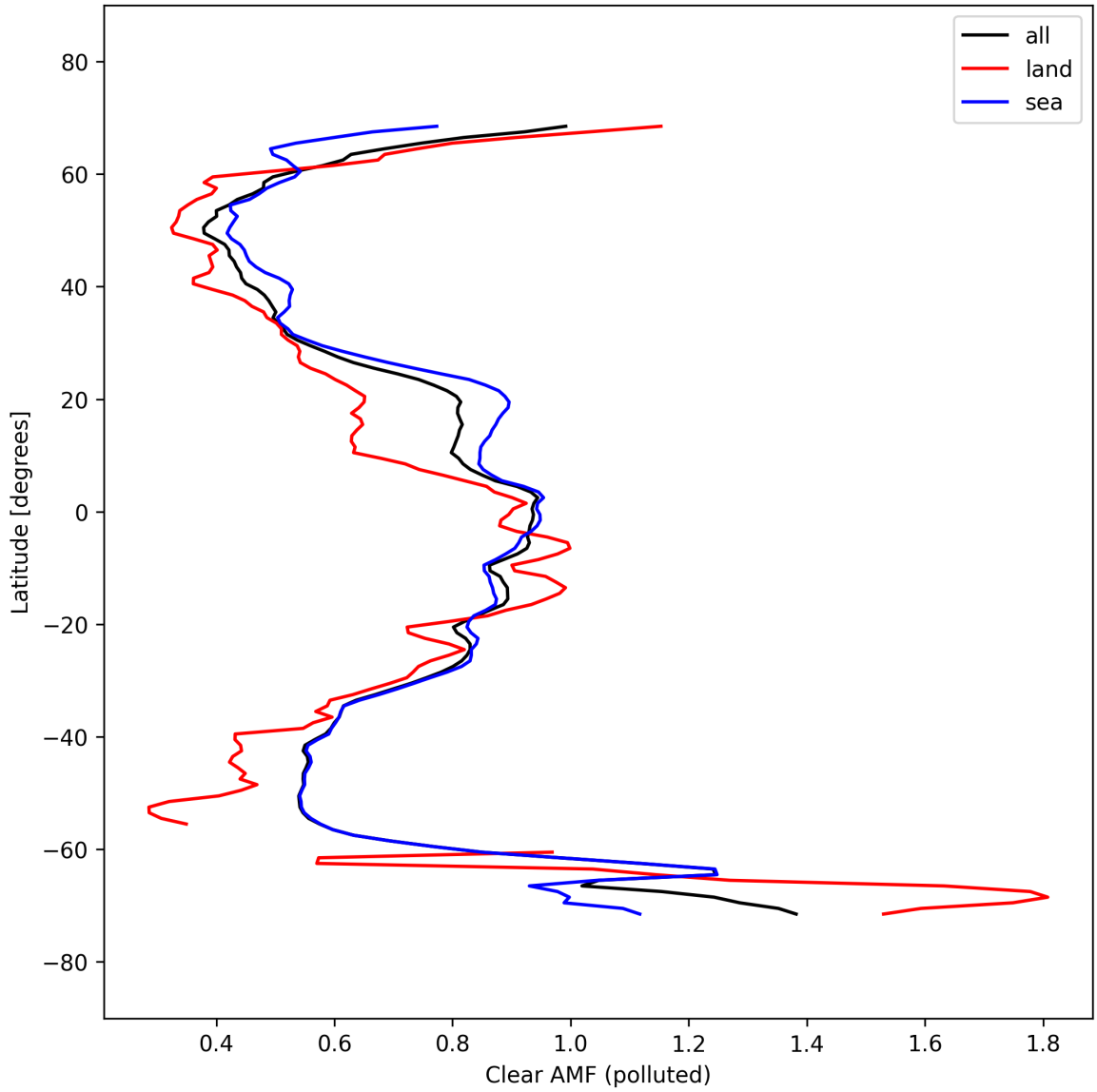


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-16 to 2025-03-17.

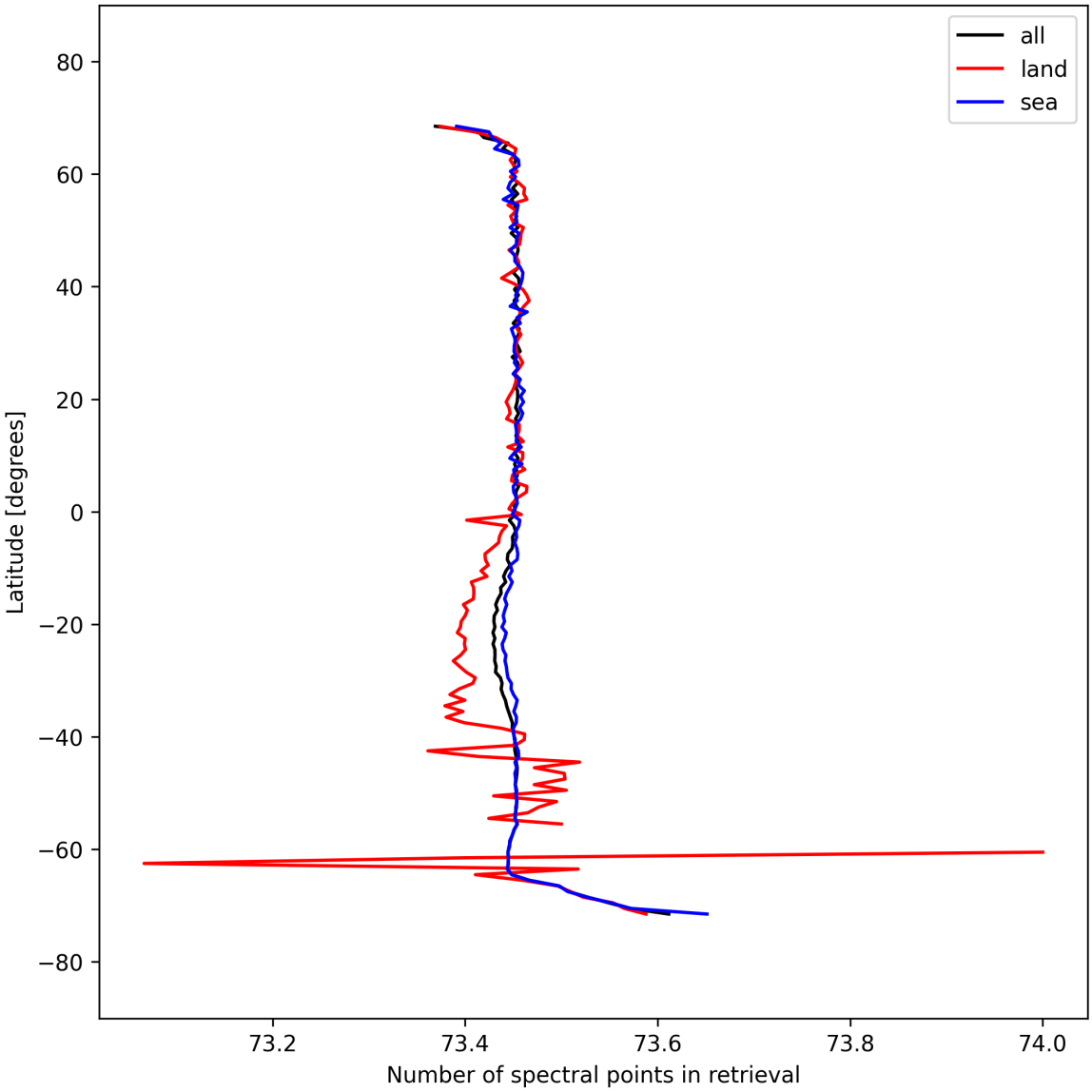


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-16 to 2025-03-17.

8 Histograms

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

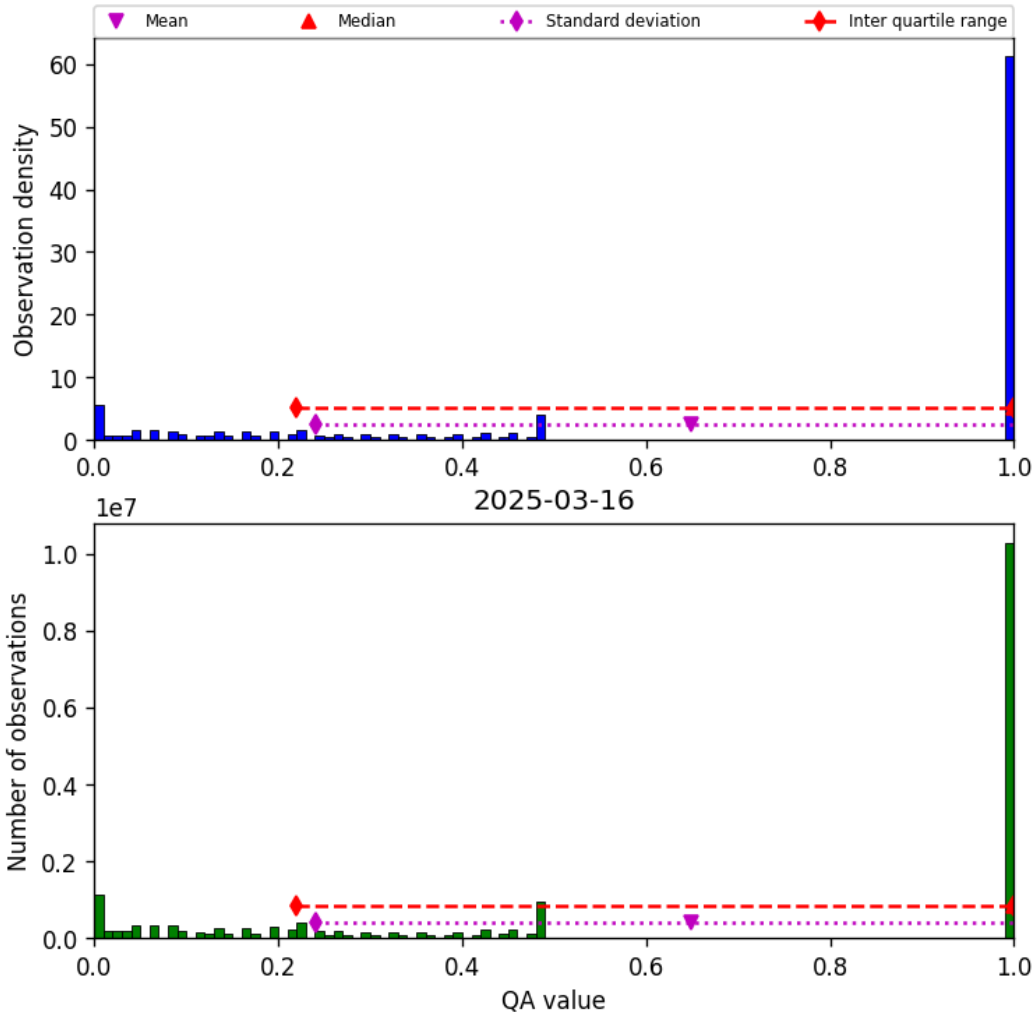


Figure 57: Histogram of “QA value” for 2025-03-16 to 2025-03-17

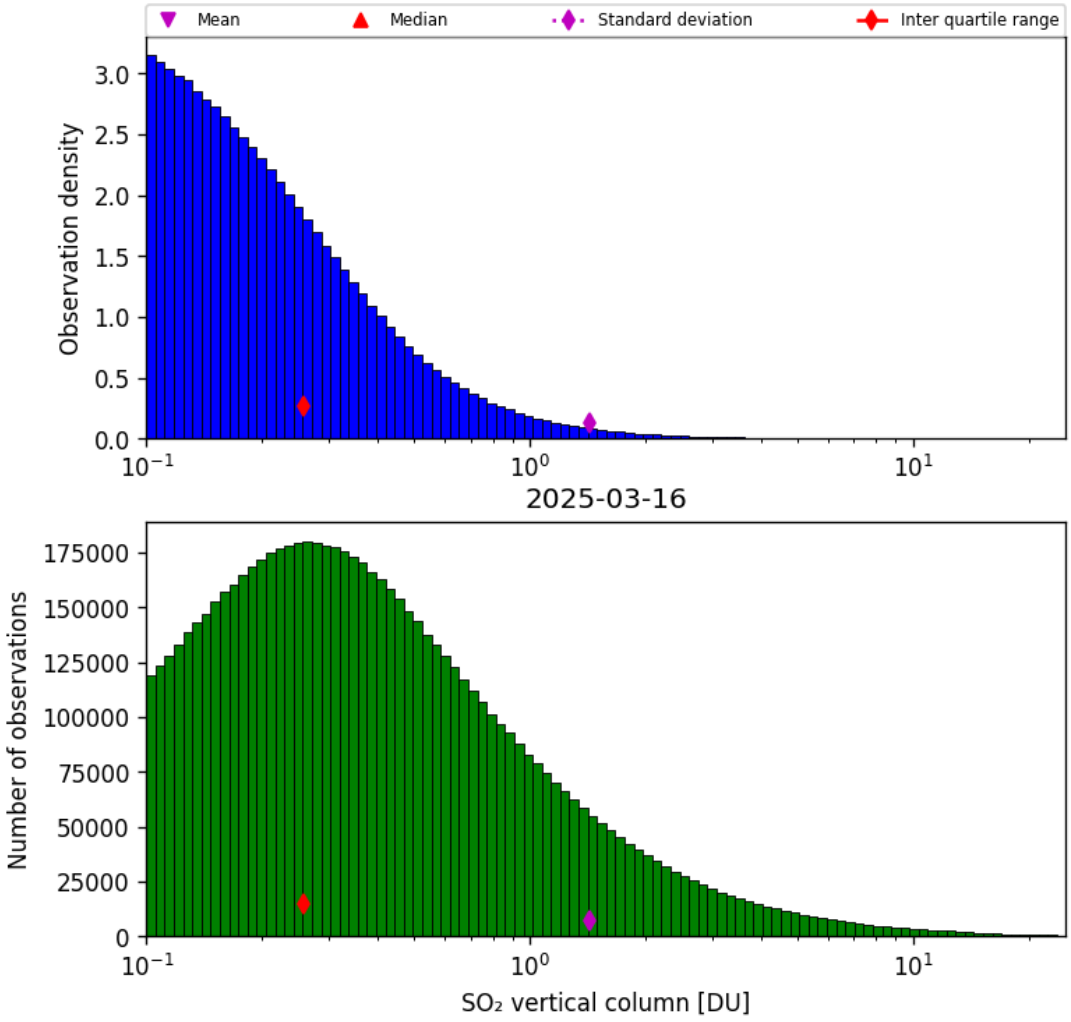


Figure 58: Histogram of "SO_2 vertical column" for 2025-03-16 to 2025-03-17

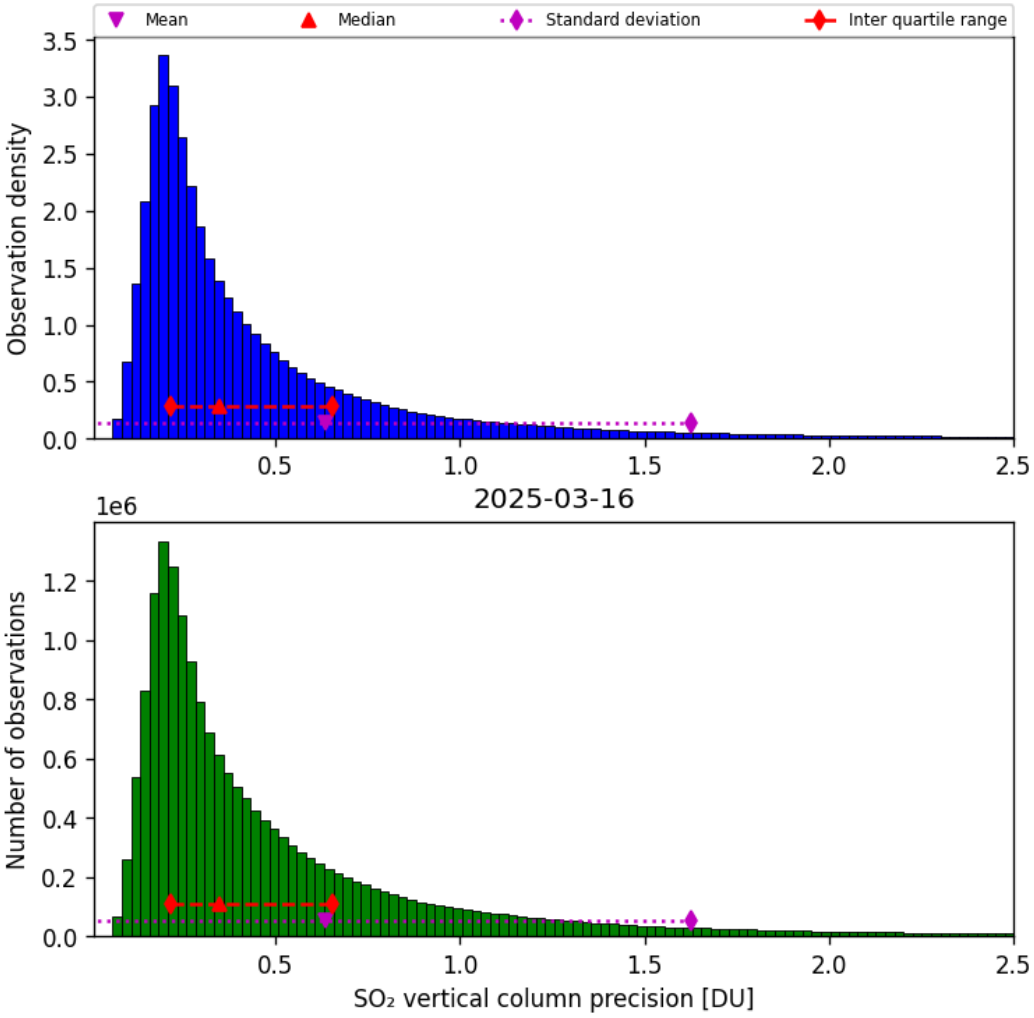


Figure 59: Histogram of "SO_2 vertical column precision" for 2025-03-16 to 2025-03-17

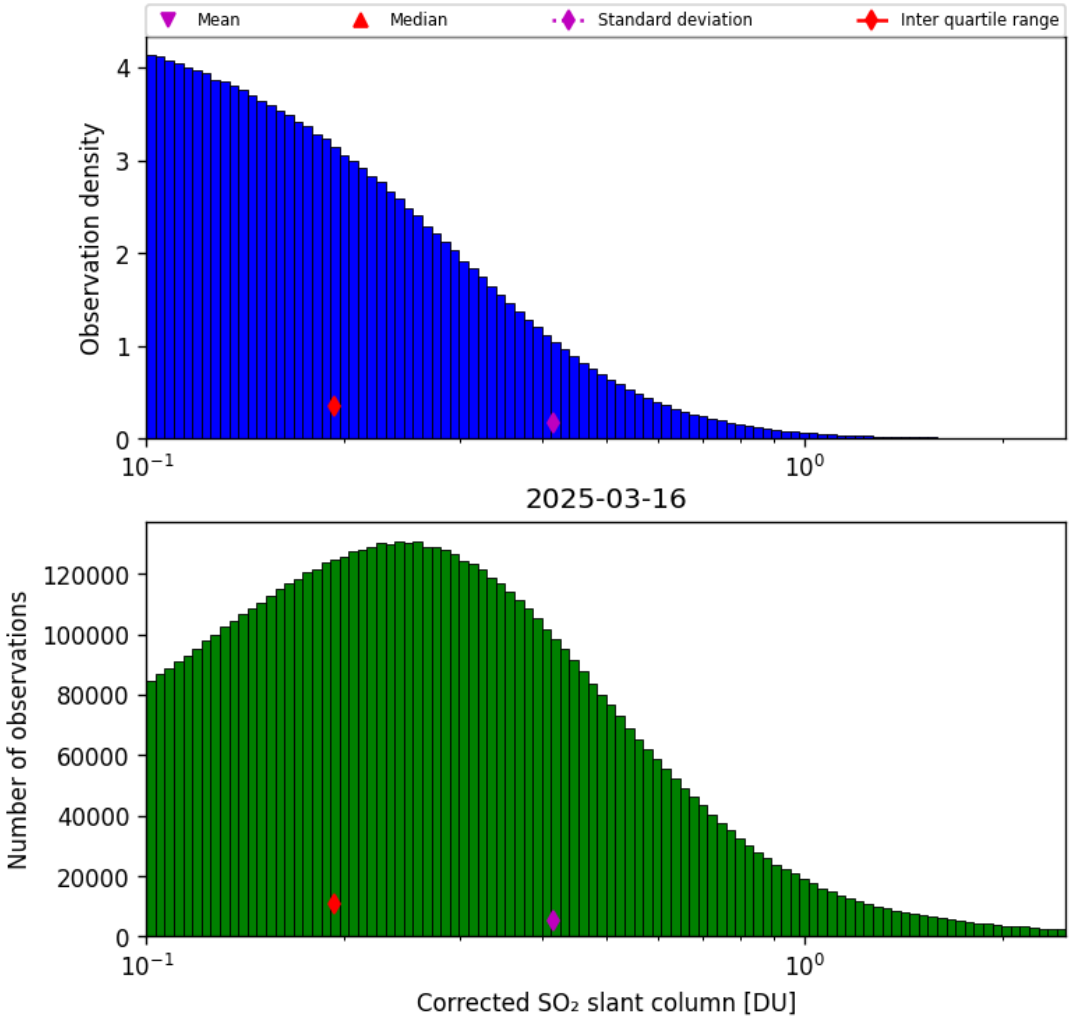


Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-03-16 to 2025-03-17

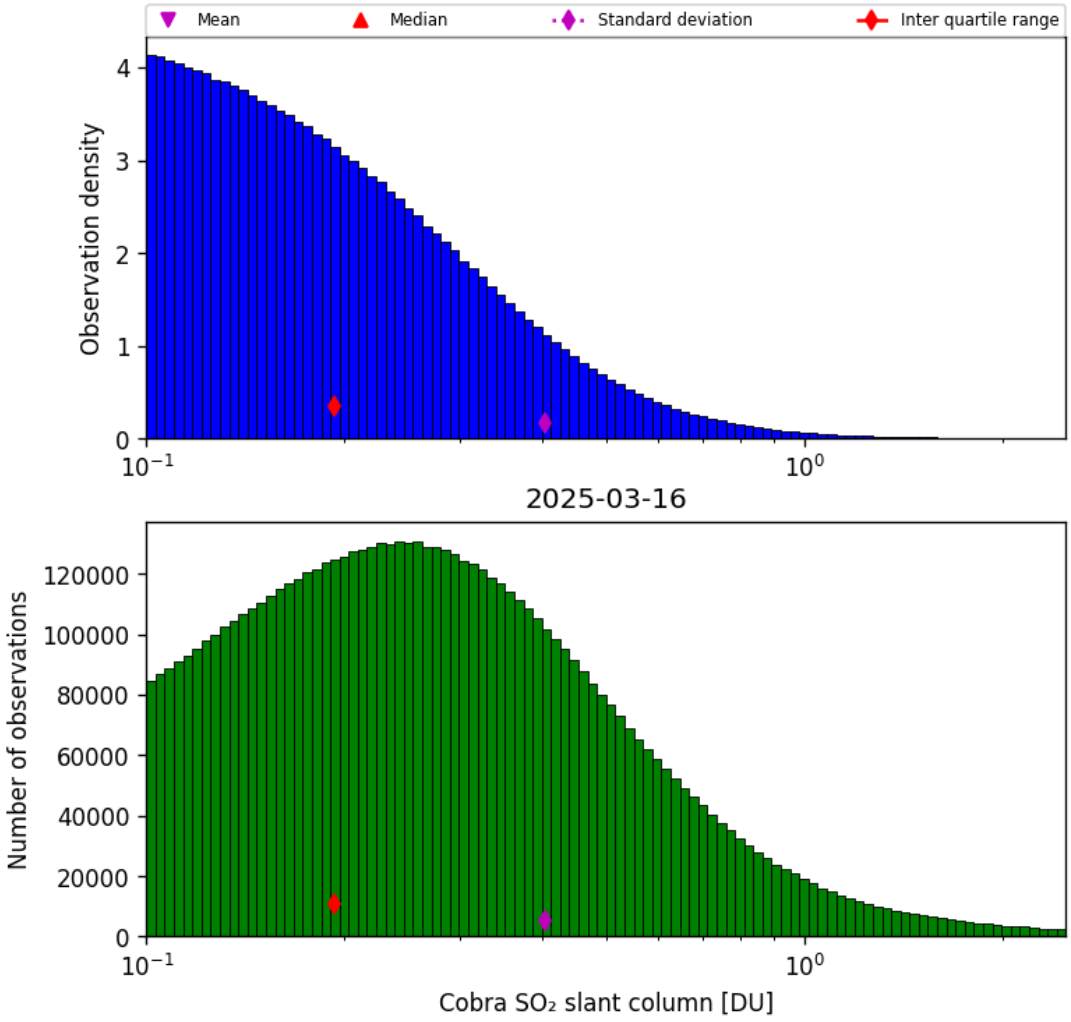


Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-03-16 to 2025-03-17

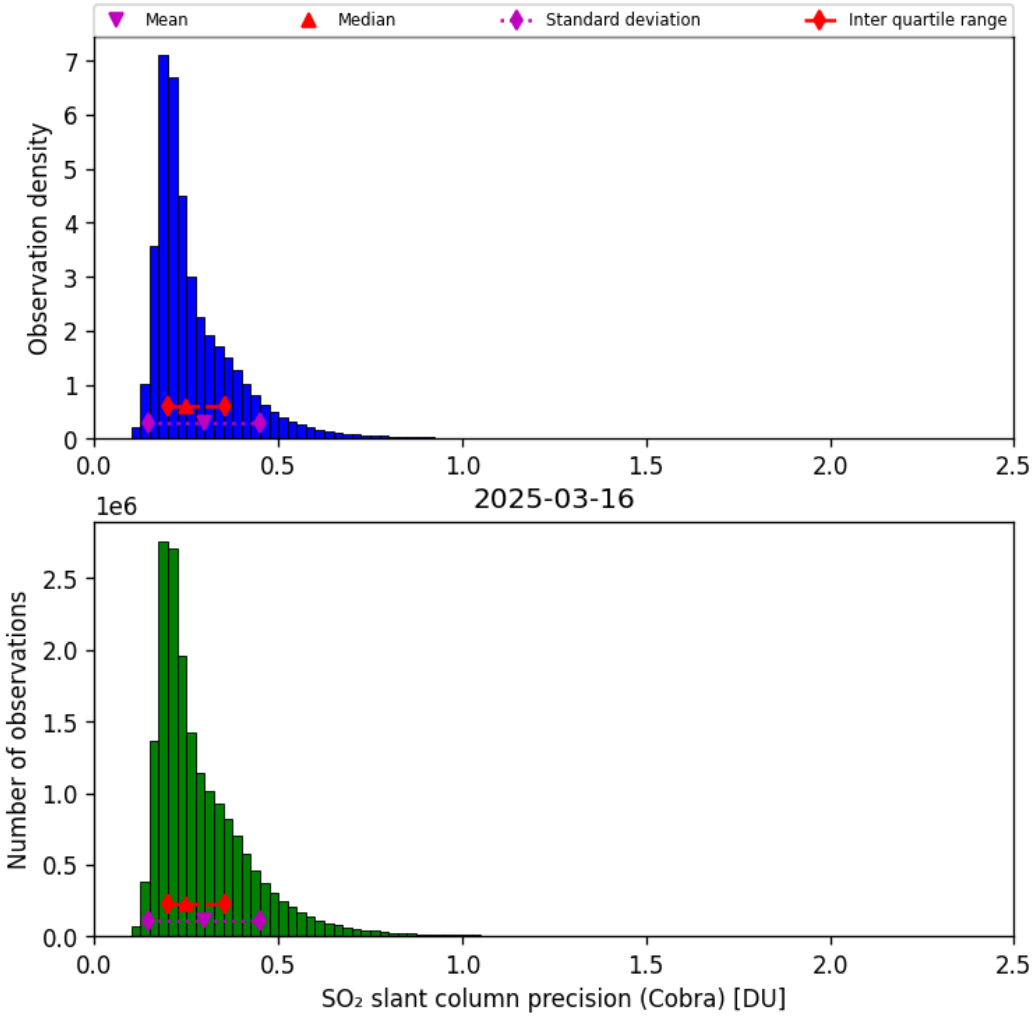


Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-03-16 to 2025-03-17

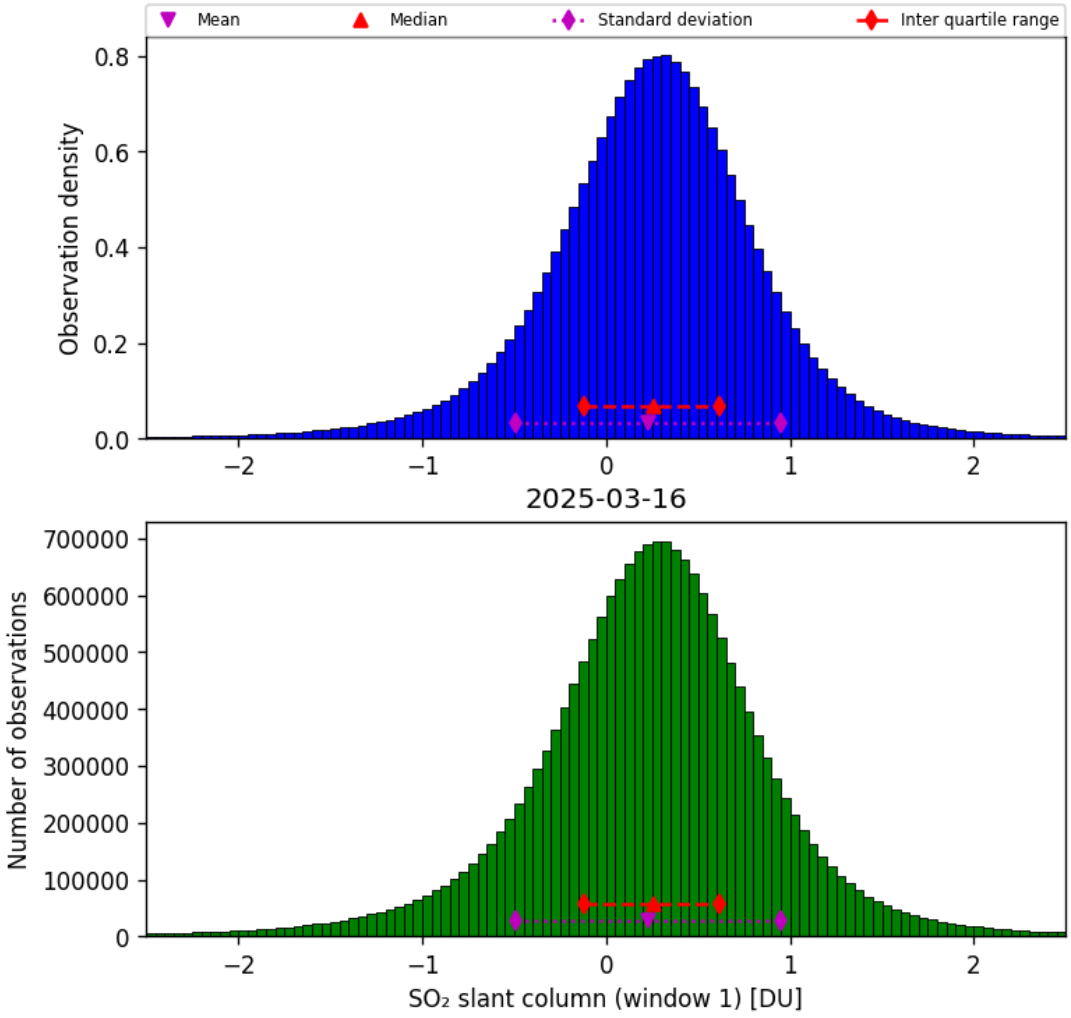


Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-03-16 to 2025-03-17

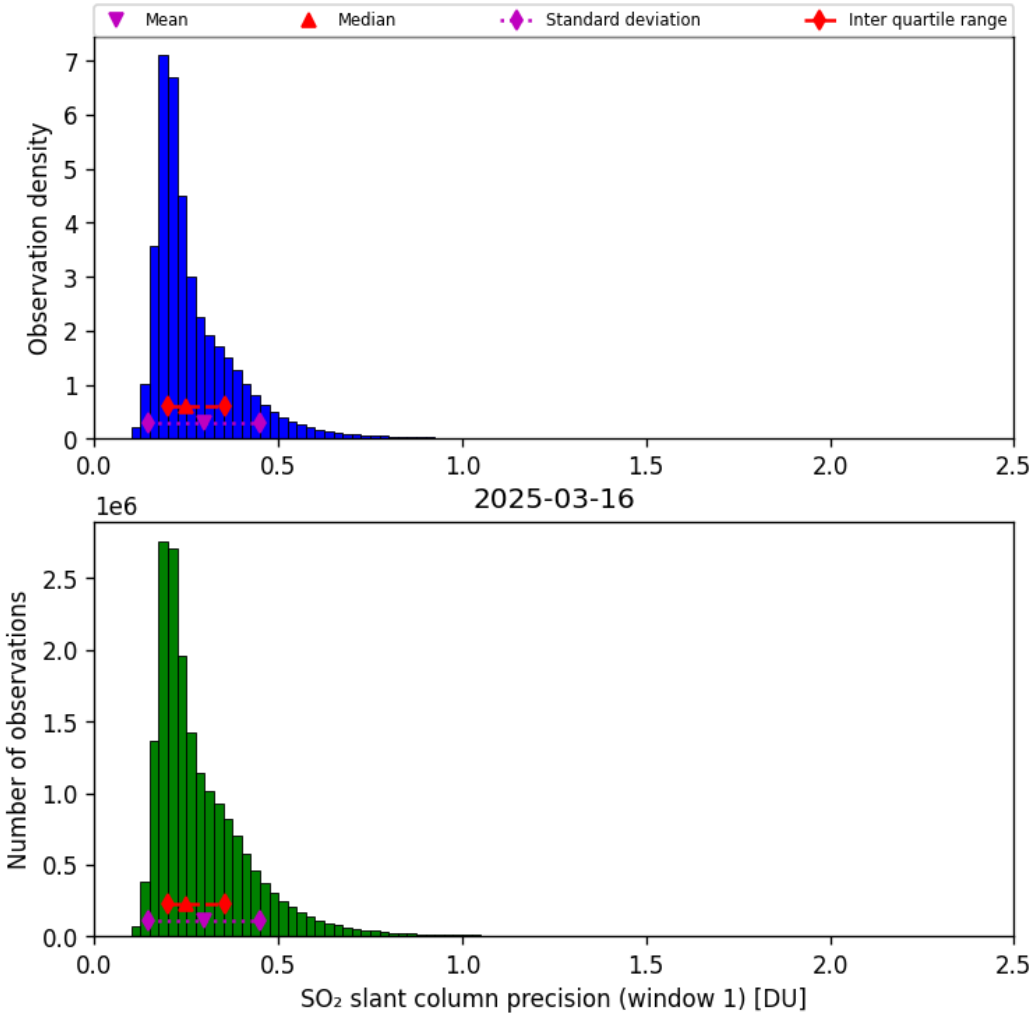


Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-03-16 to 2025-03-17

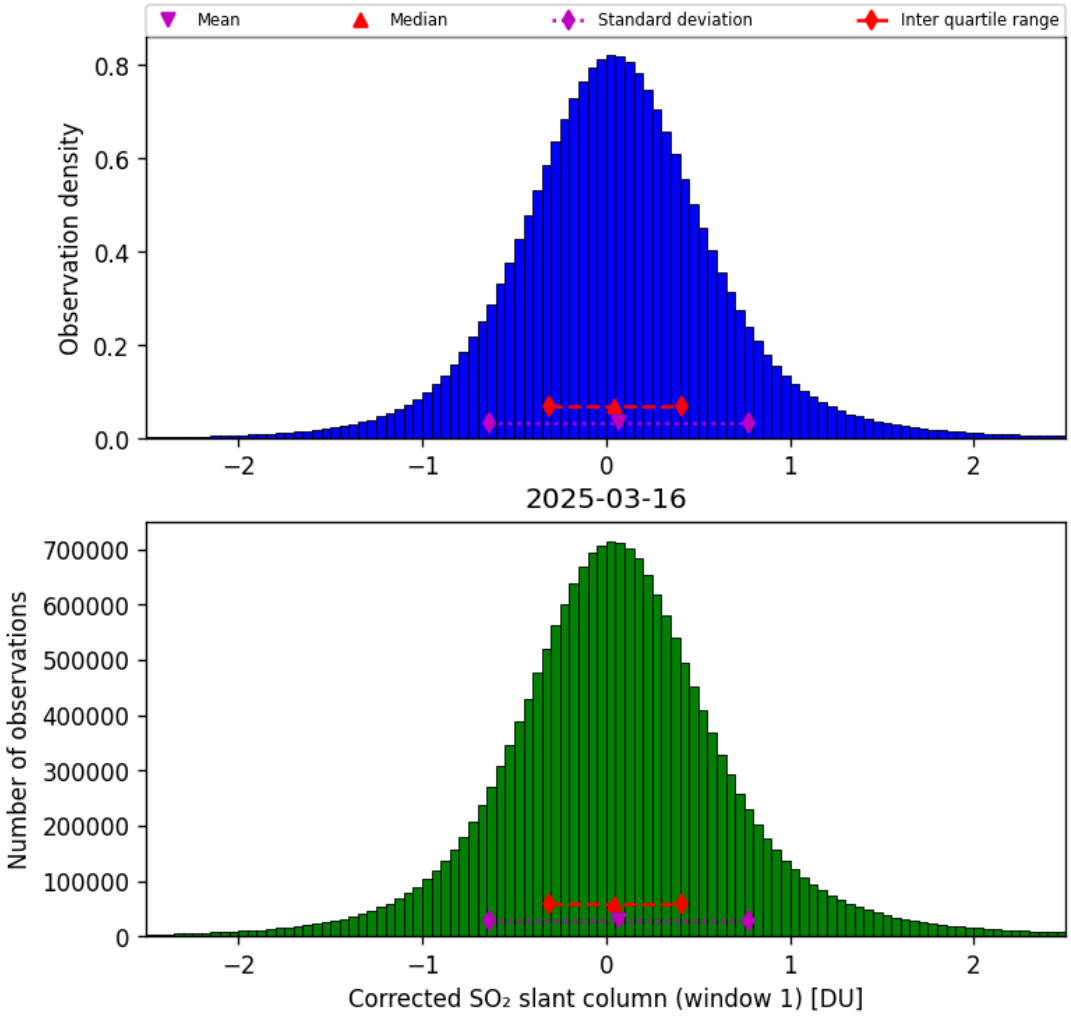


Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-03-16 to 2025-03-17

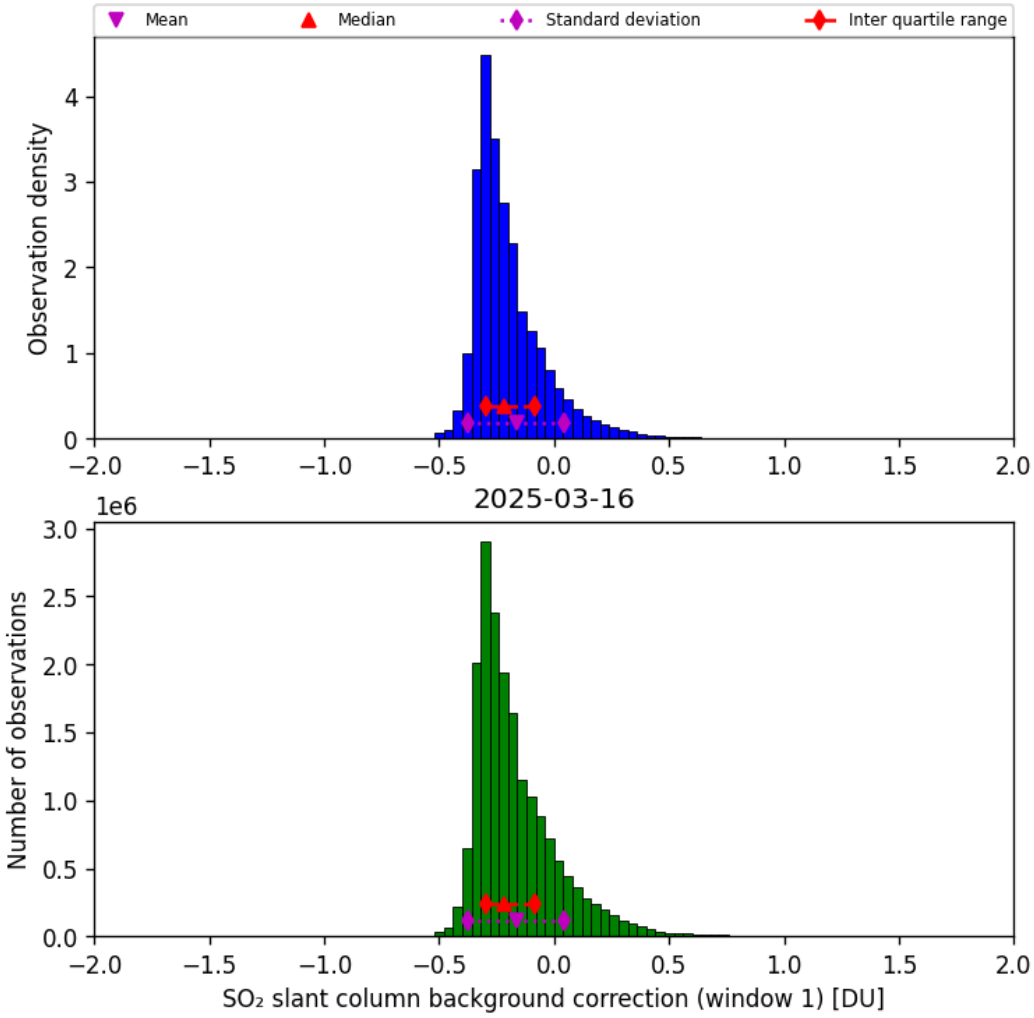


Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-03-16 to 2025-03-17

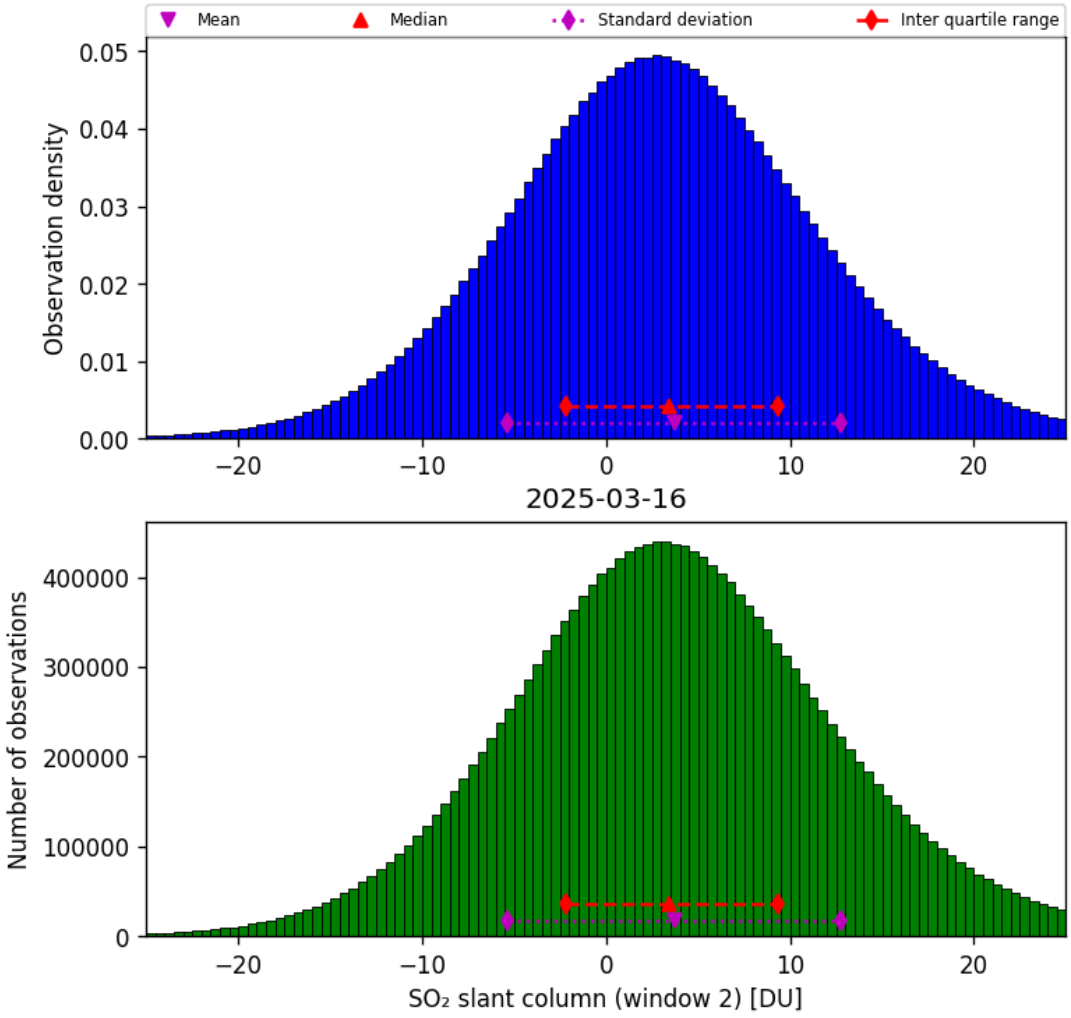


Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-03-16 to 2025-03-17

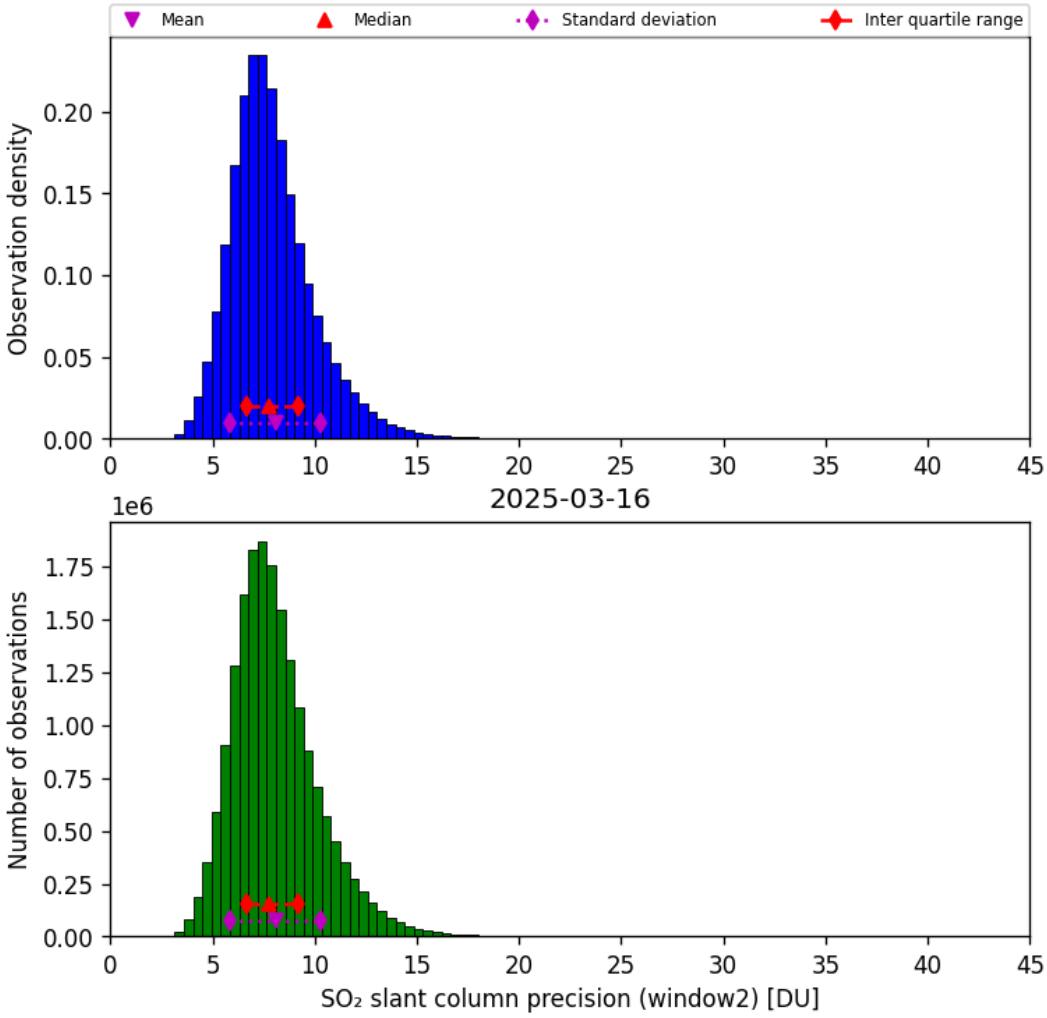


Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-03-16 to 2025-03-17

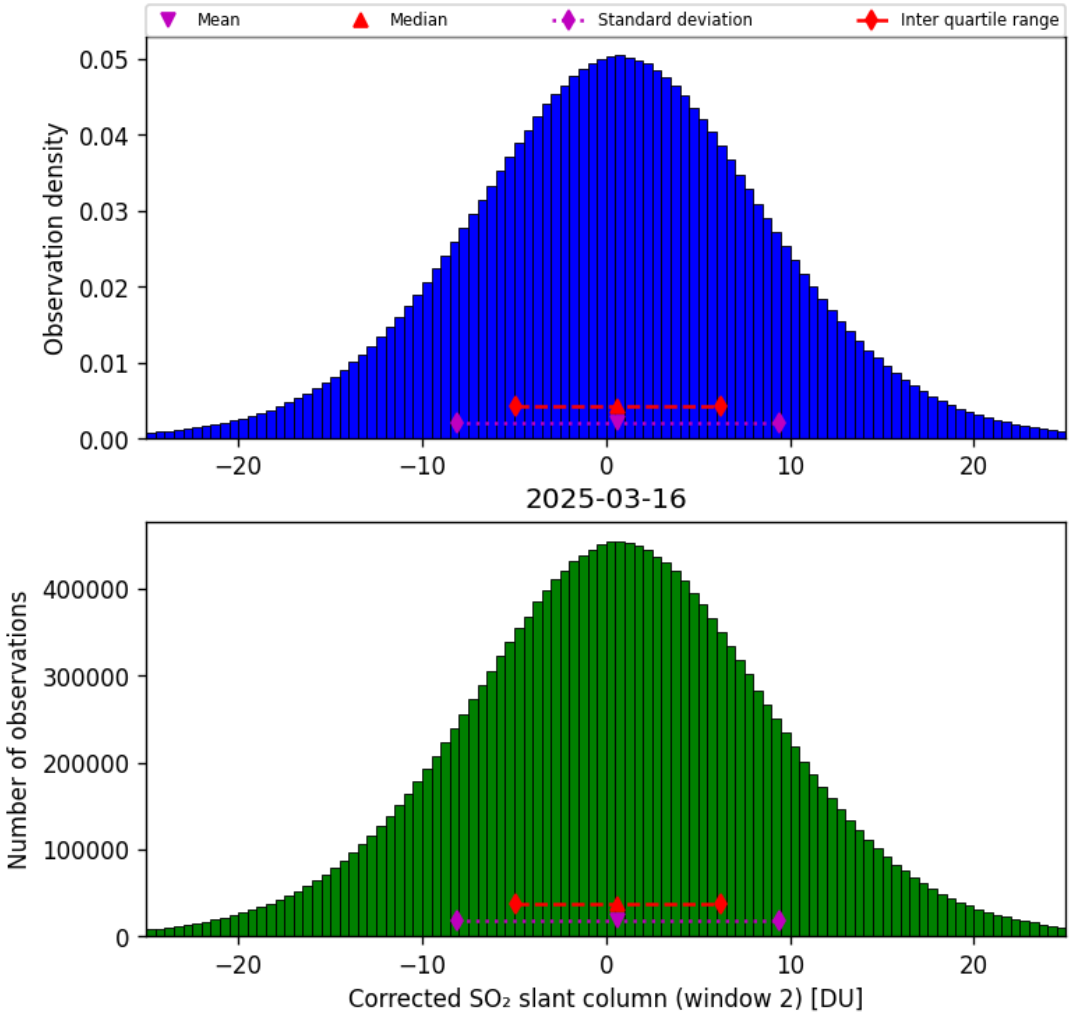


Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-03-16 to 2025-03-17

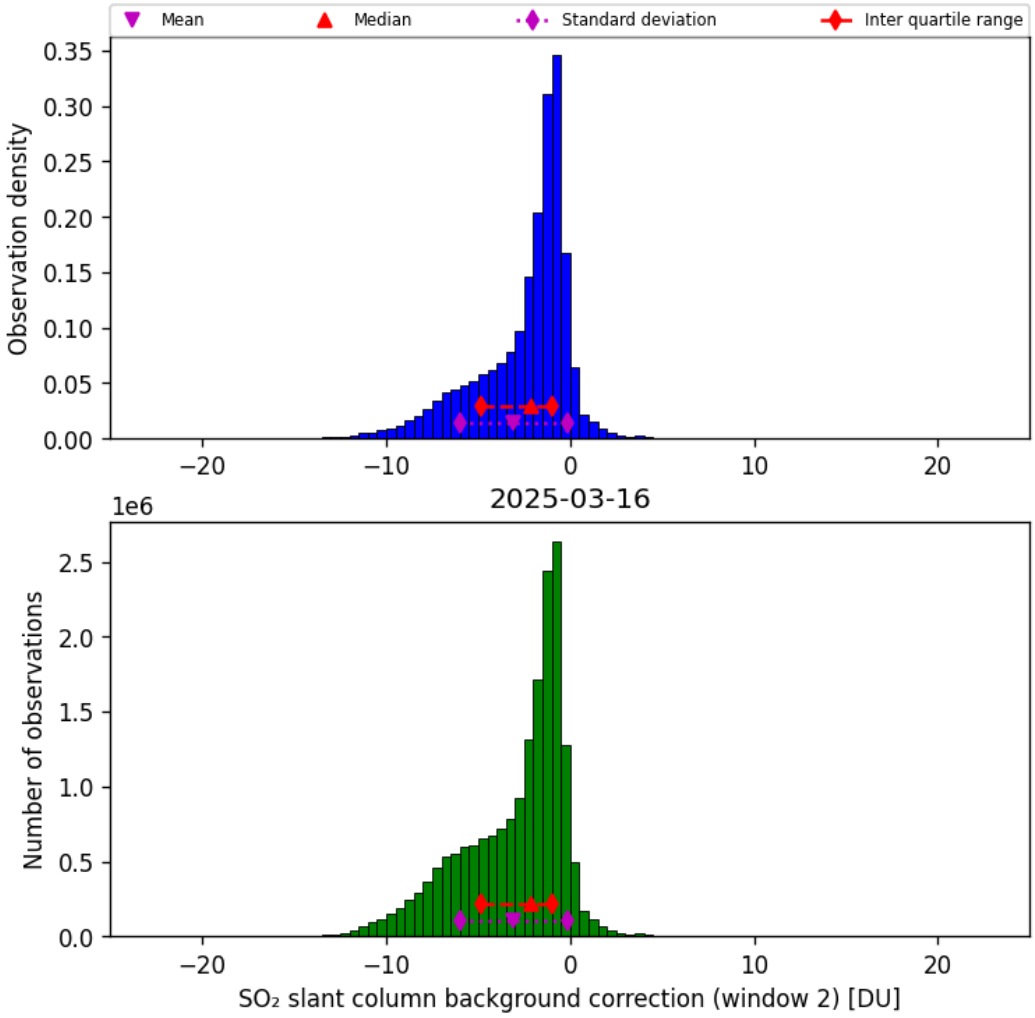


Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-03-16 to 2025-03-17

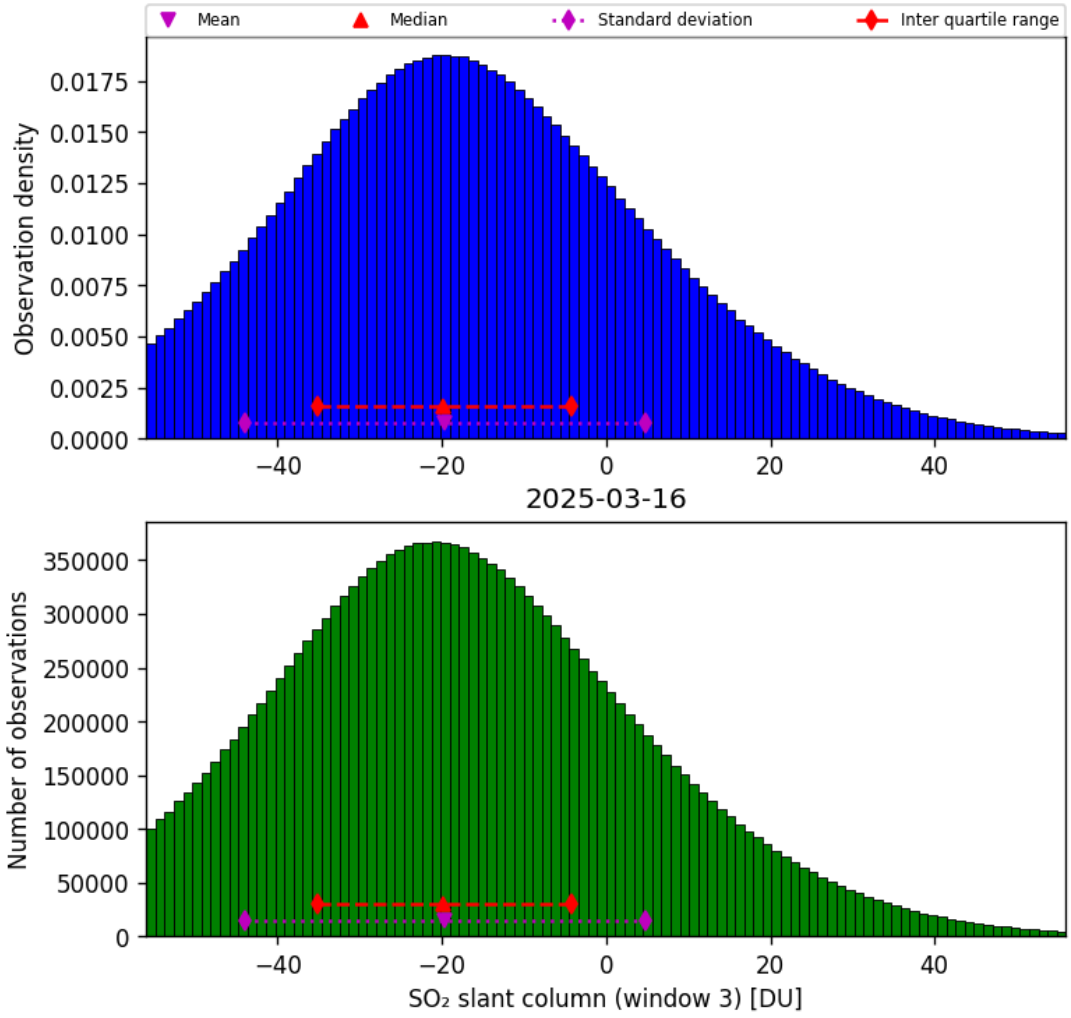


Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-03-16 to 2025-03-17

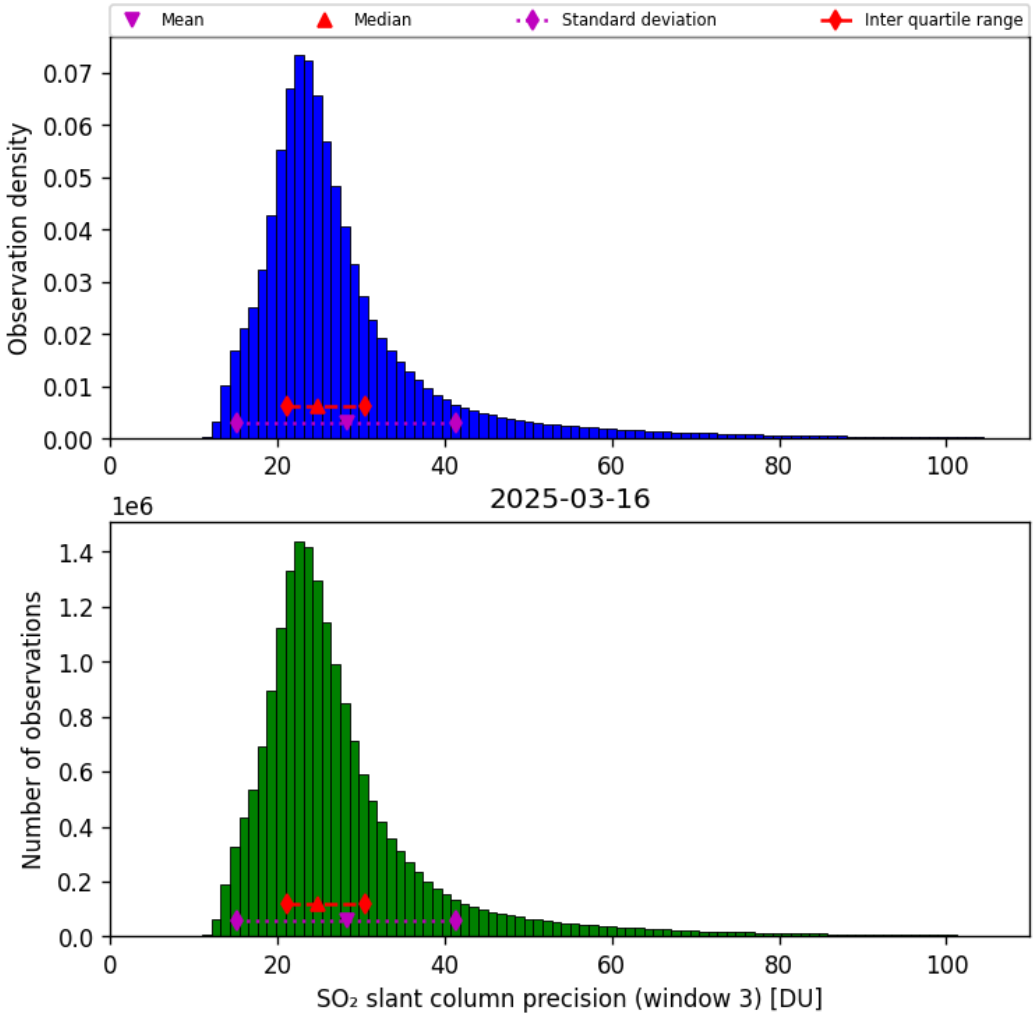


Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-03-16 to 2025-03-17

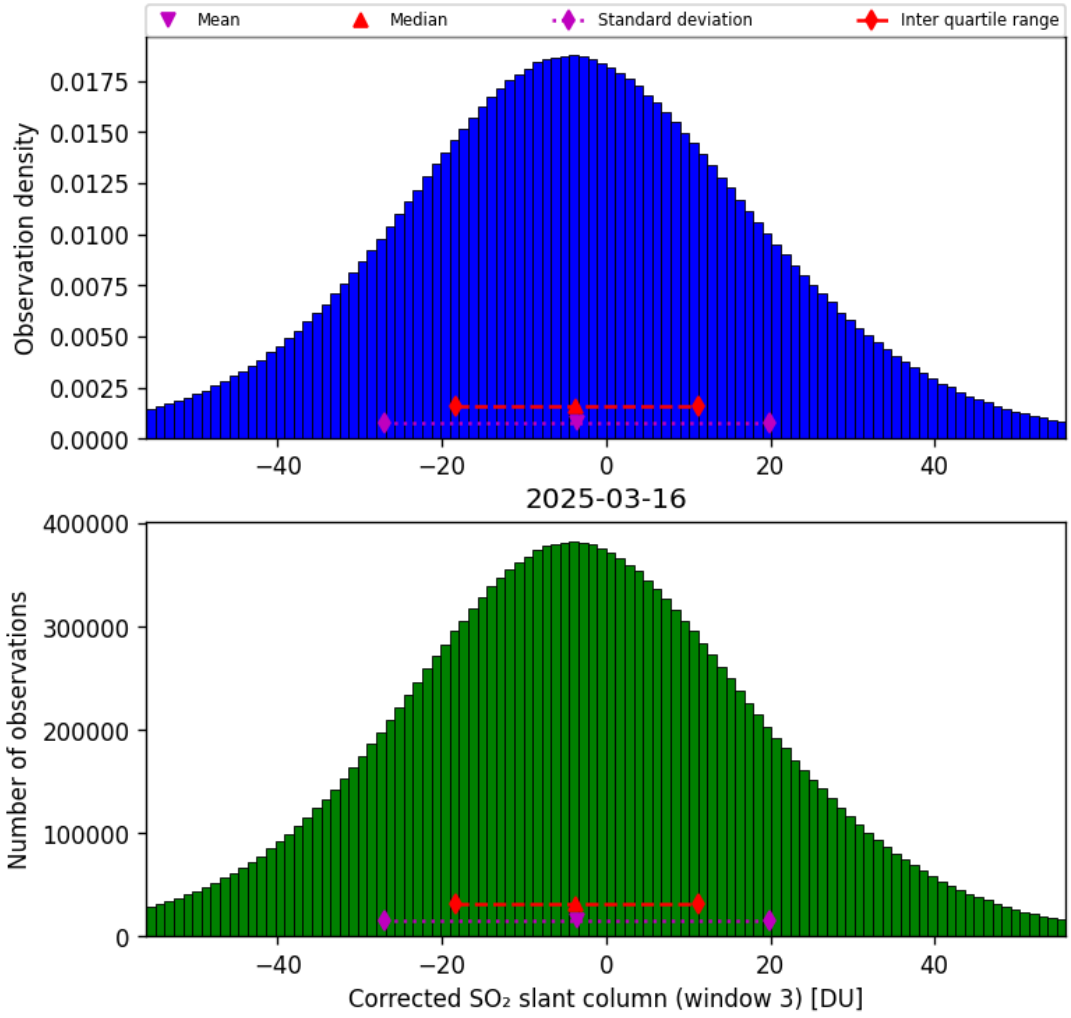


Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-03-16 to 2025-03-17

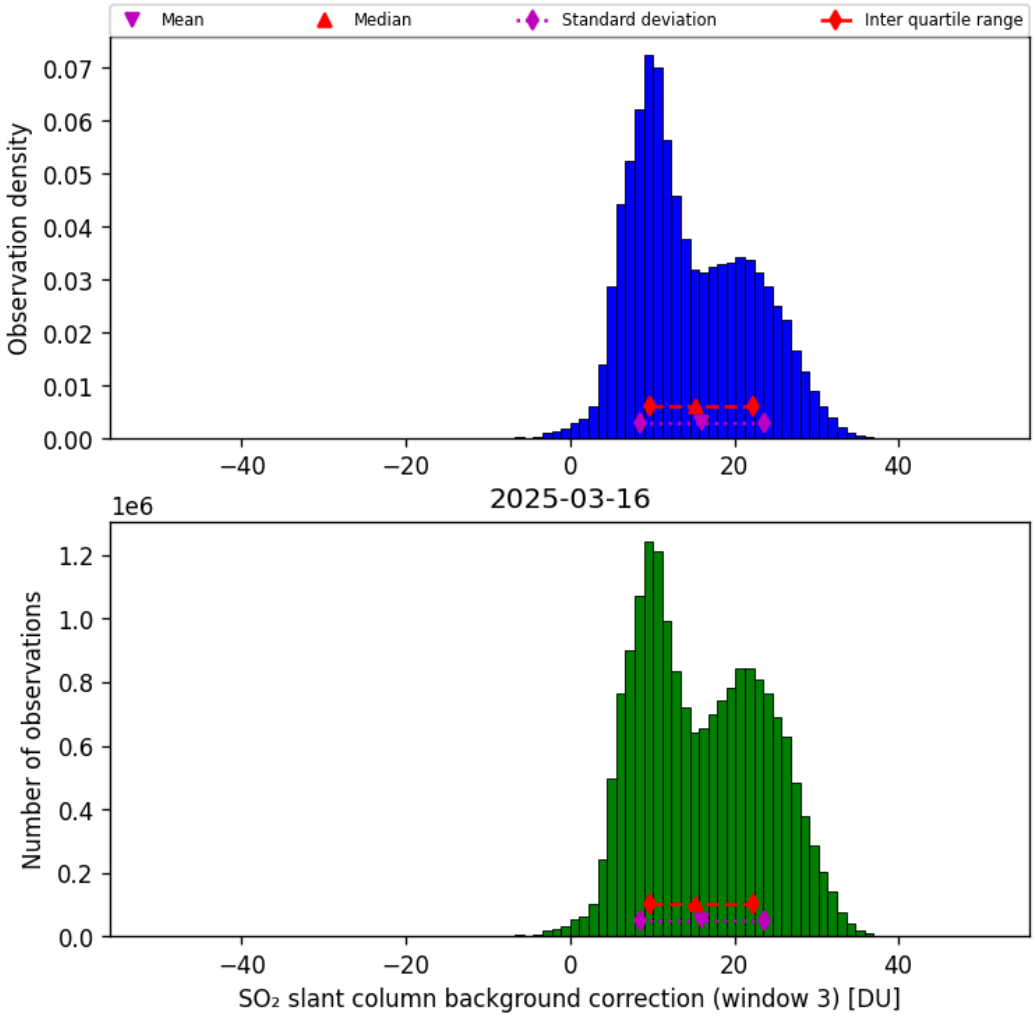


Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-03-16 to 2025-03-17

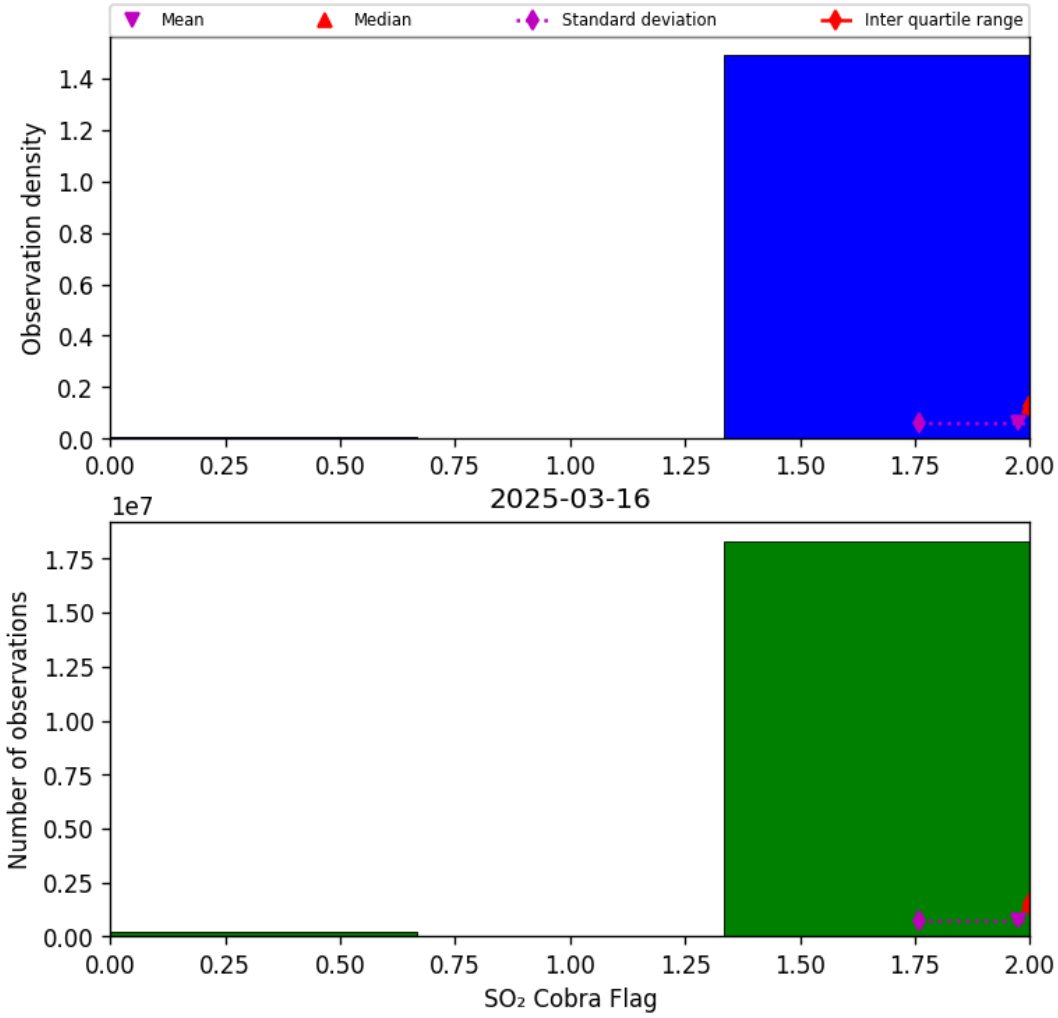


Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-03-16 to 2025-03-17

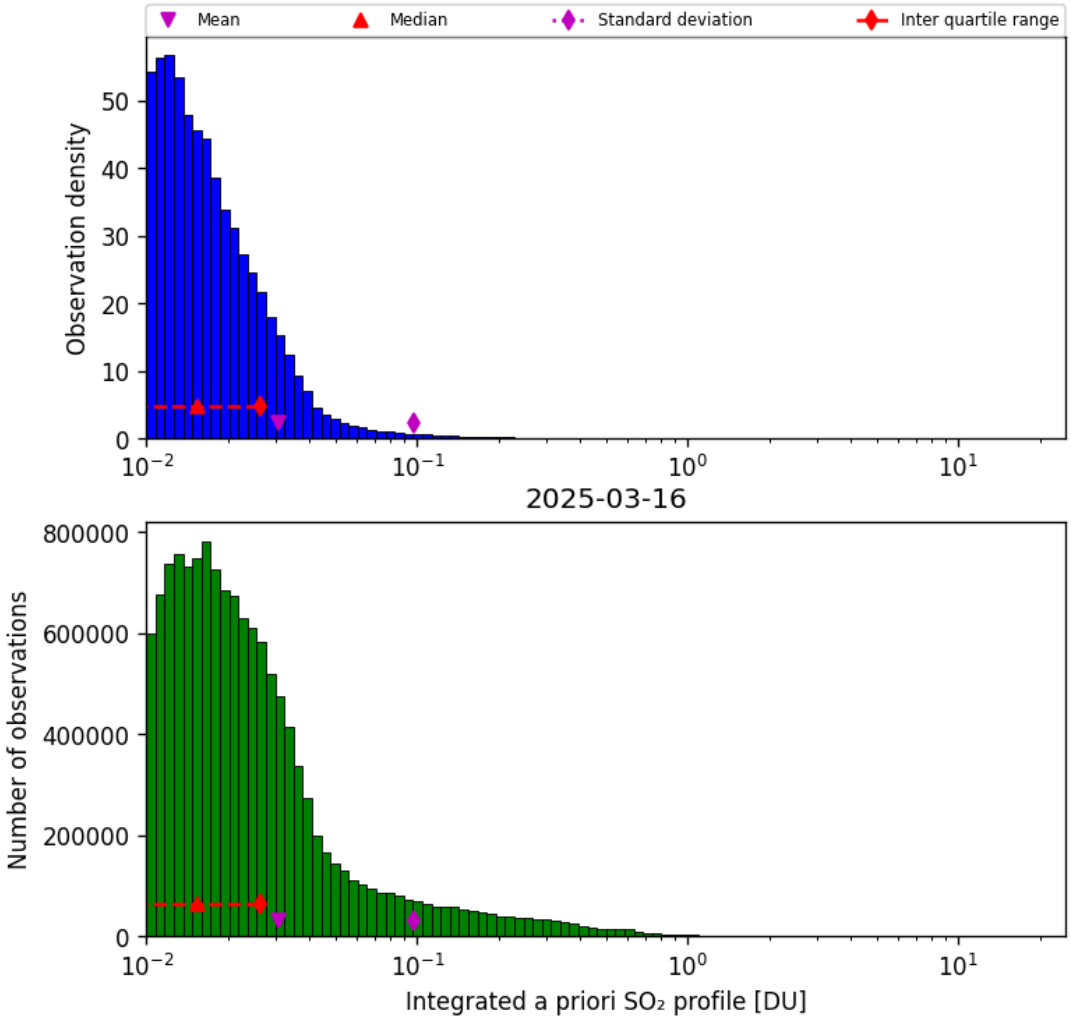


Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-03-16 to 2025-03-17

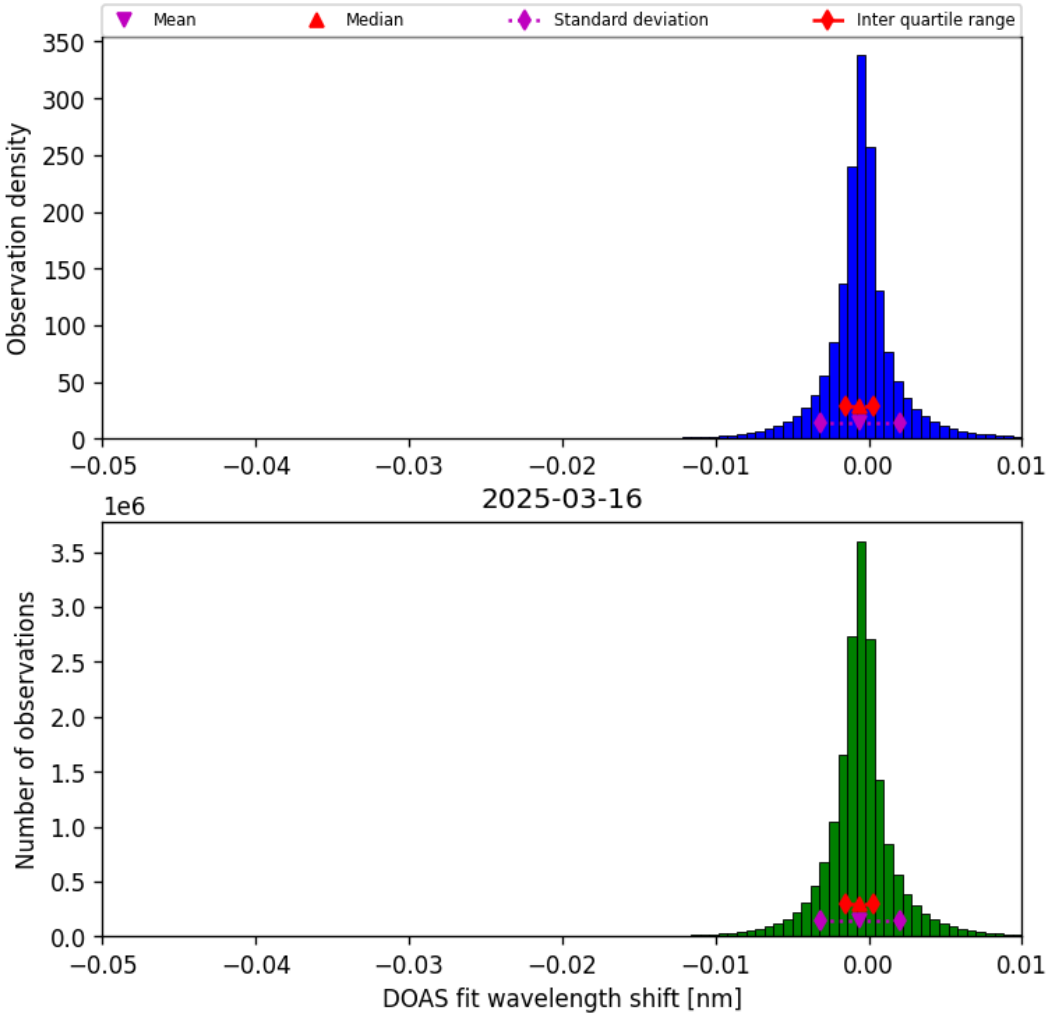


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-16 to 2025-03-17

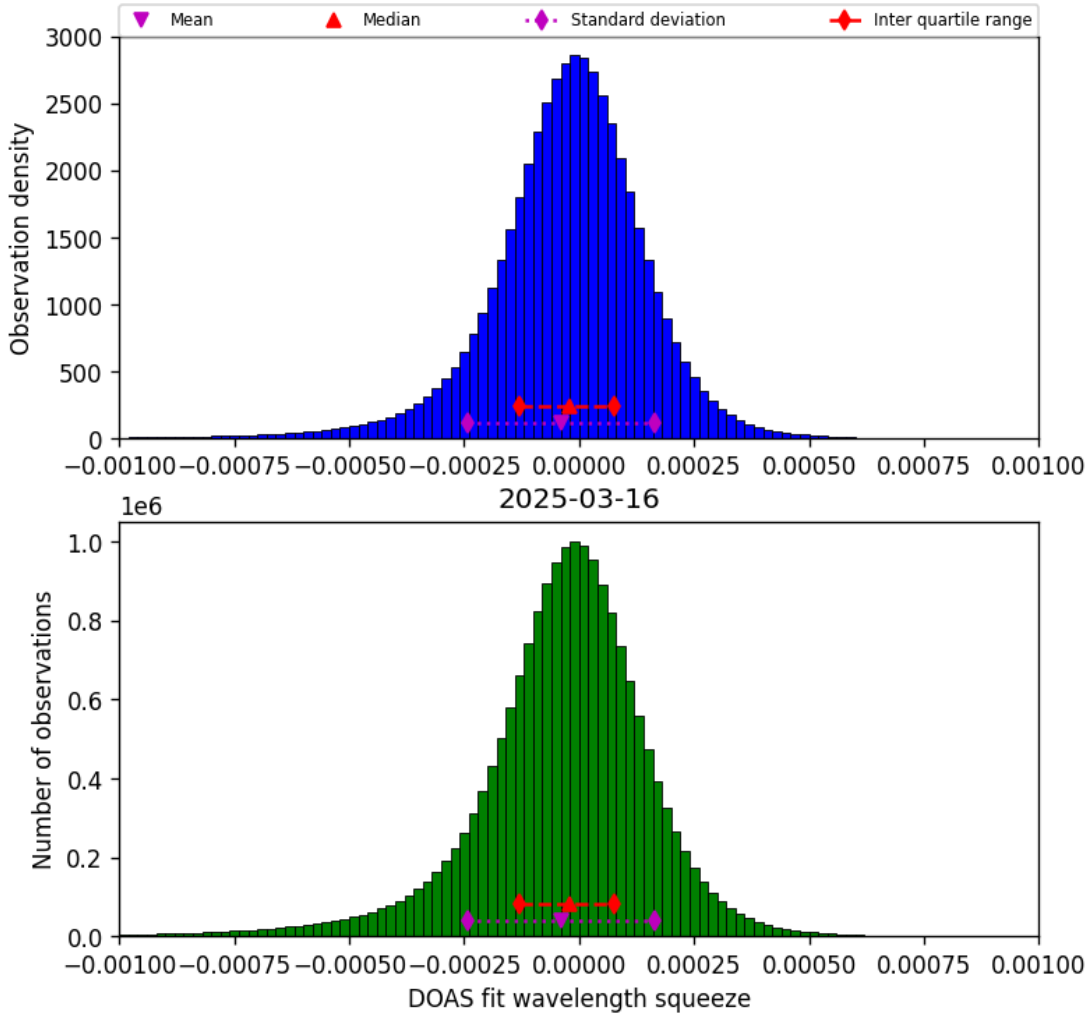


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-16 to 2025-03-17

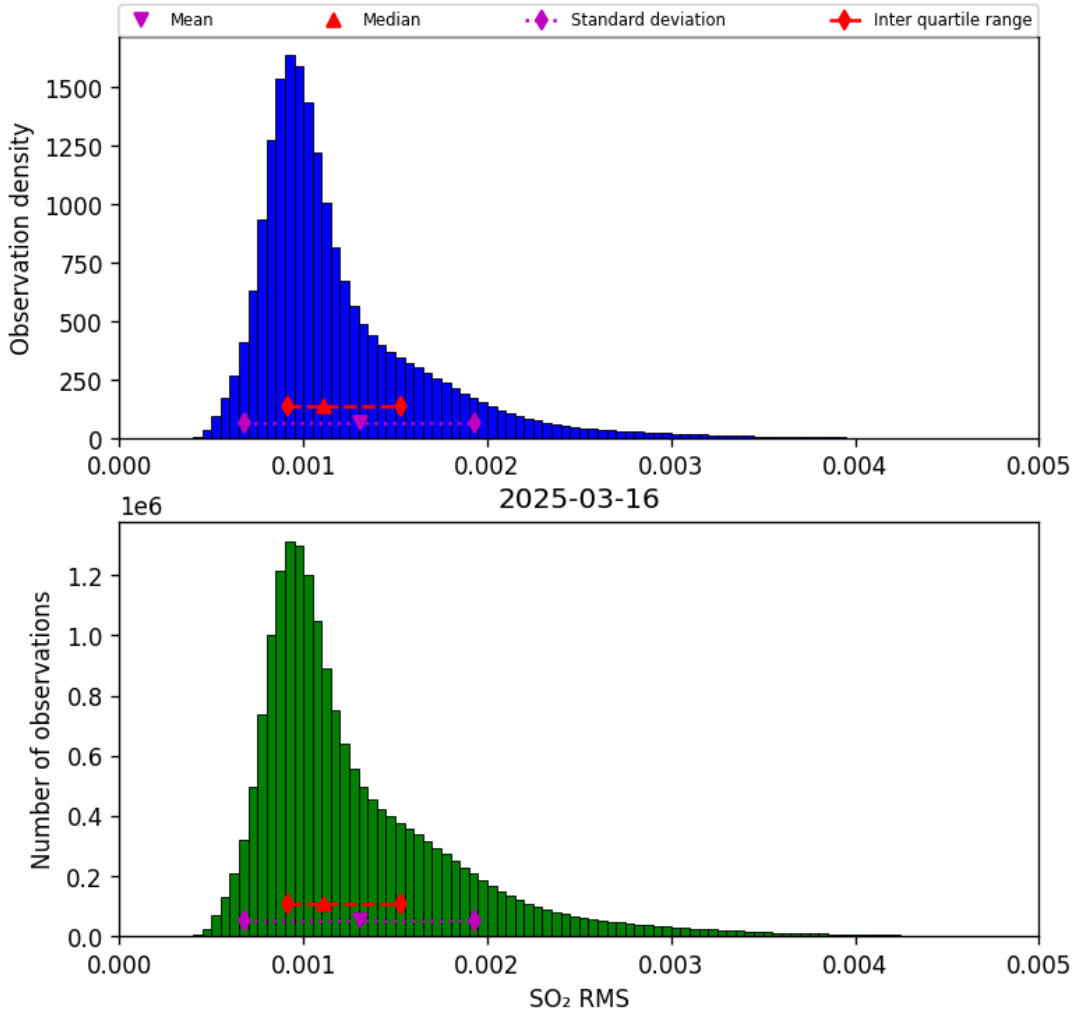


Figure 79: Histogram of "SO_2 RMS" for 2025-03-16 to 2025-03-17

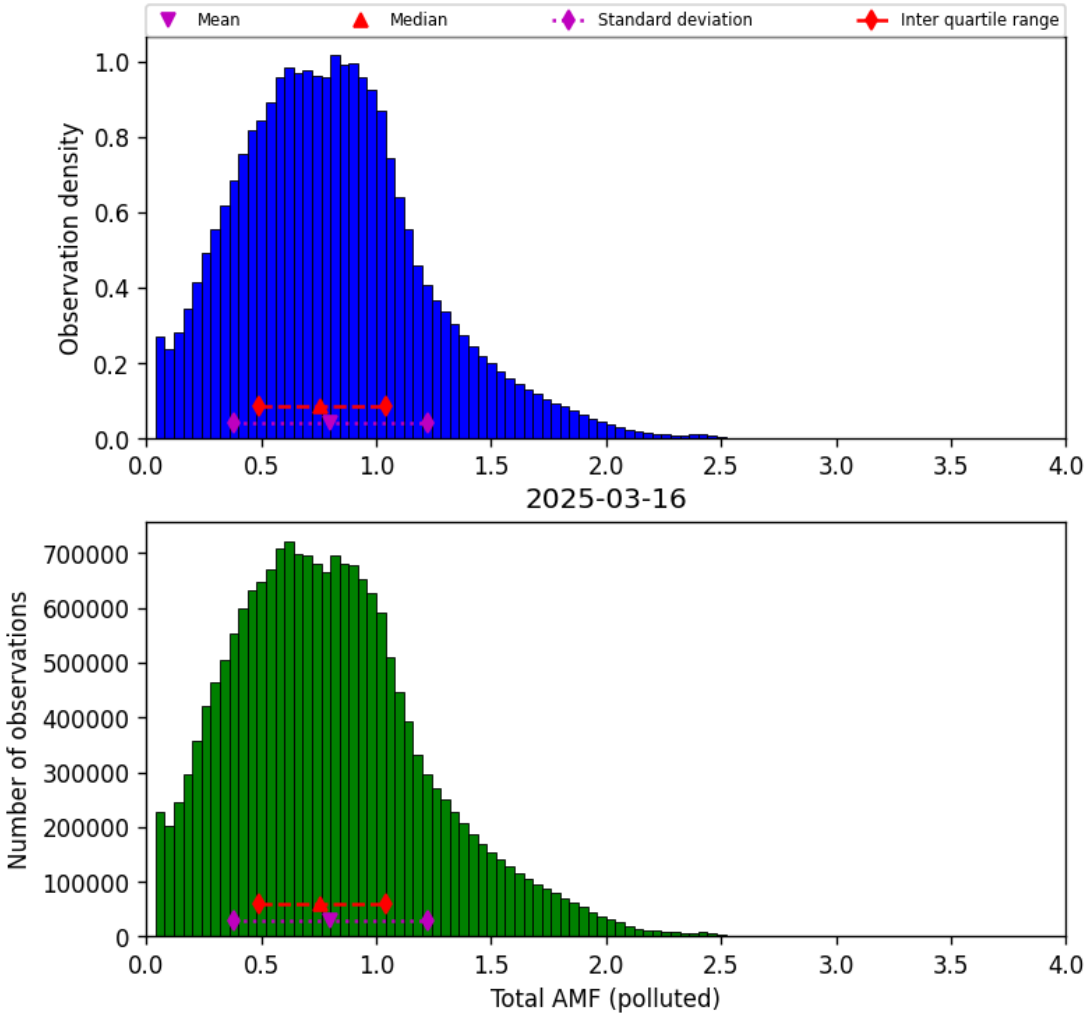


Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-16 to 2025-03-17

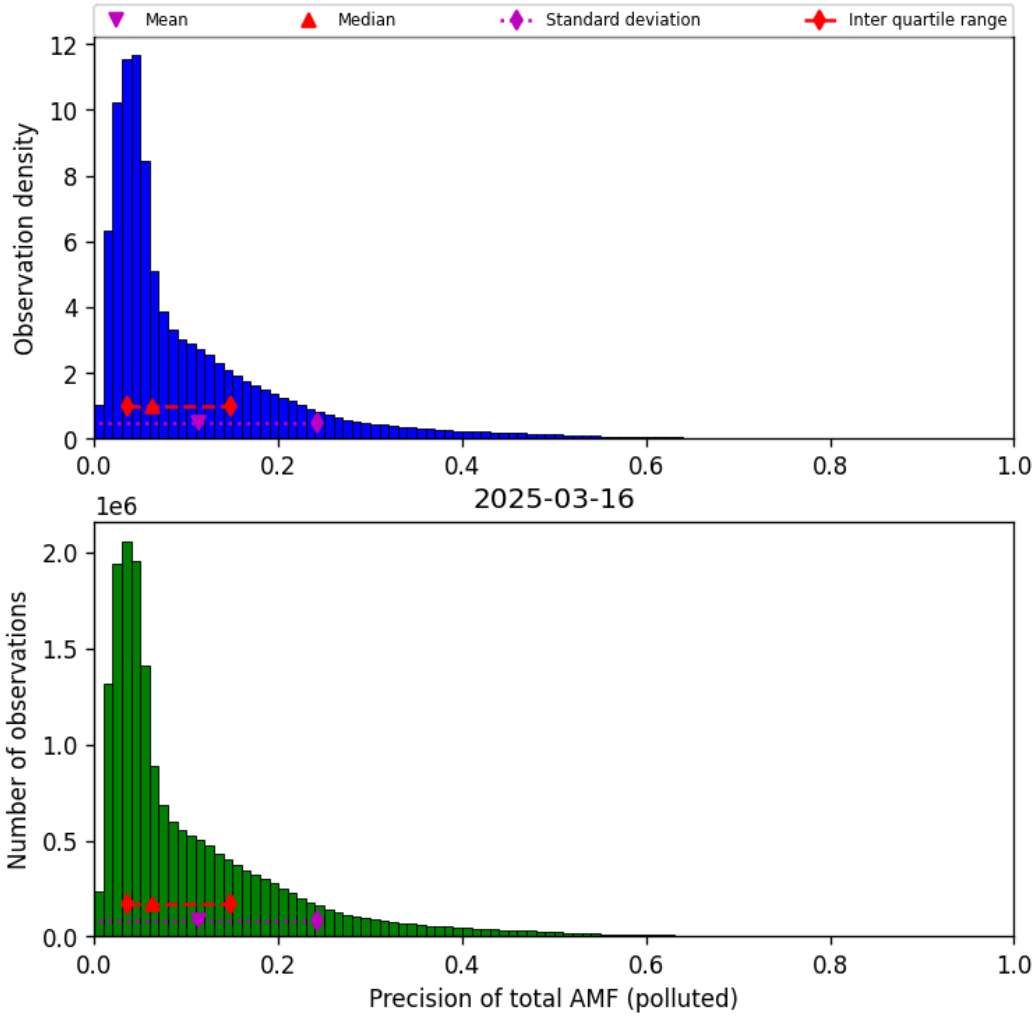


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-16 to 2025-03-17

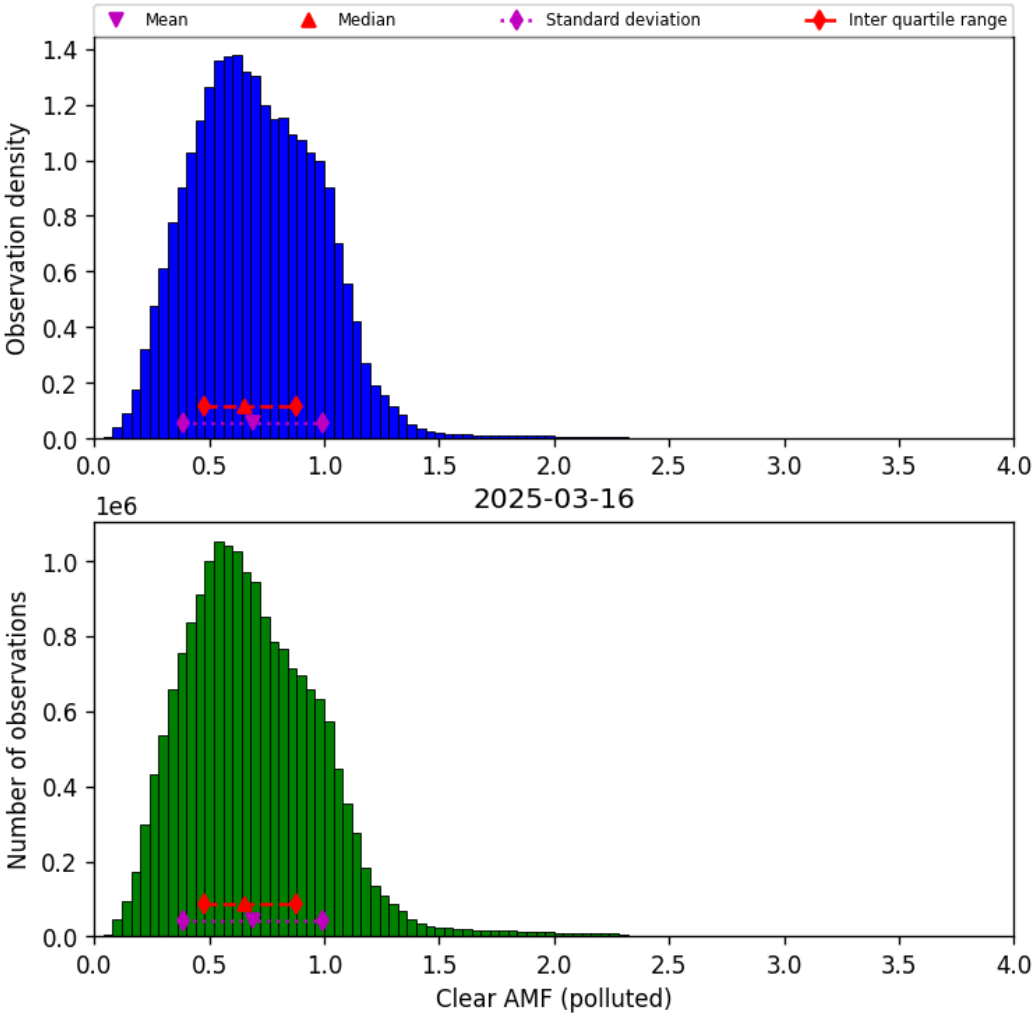


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-03-16 to 2025-03-17

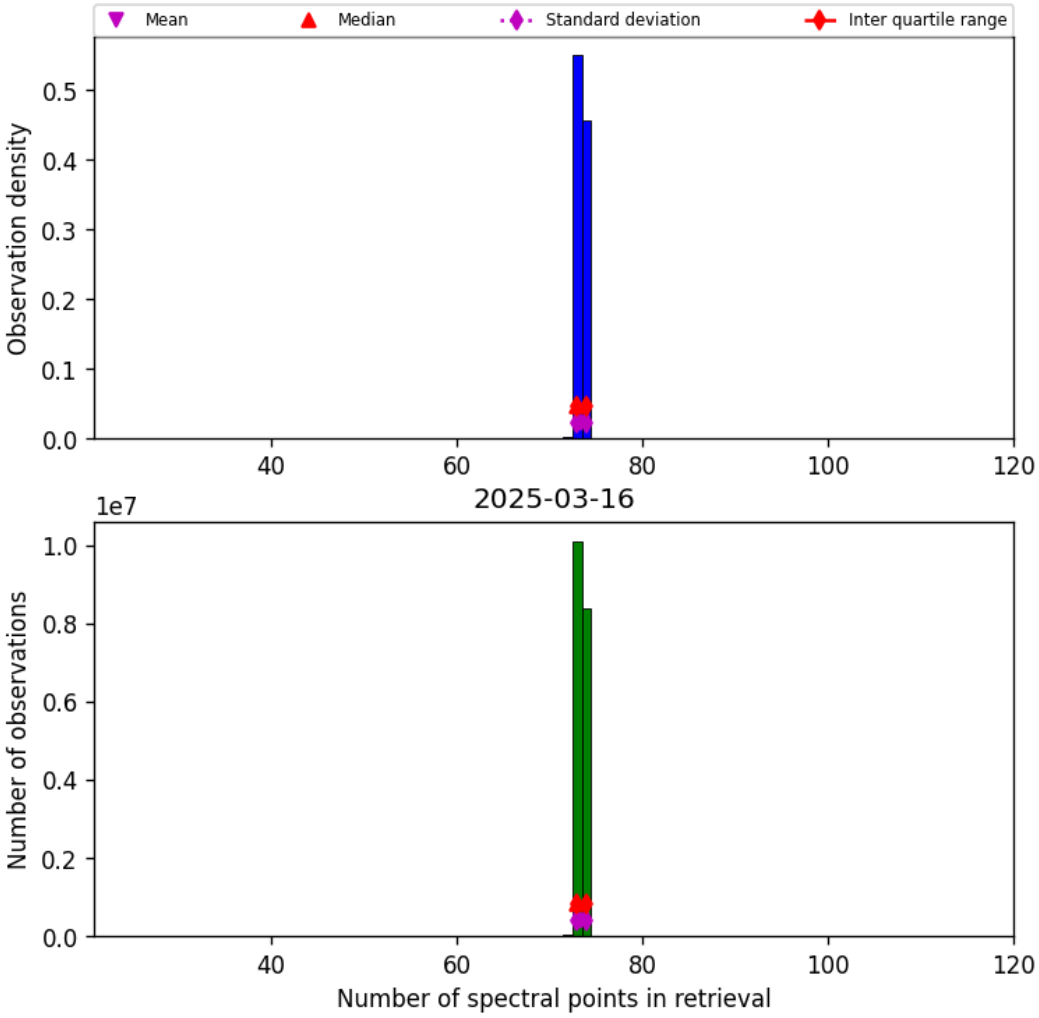


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-16 to 2025-03-17

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.

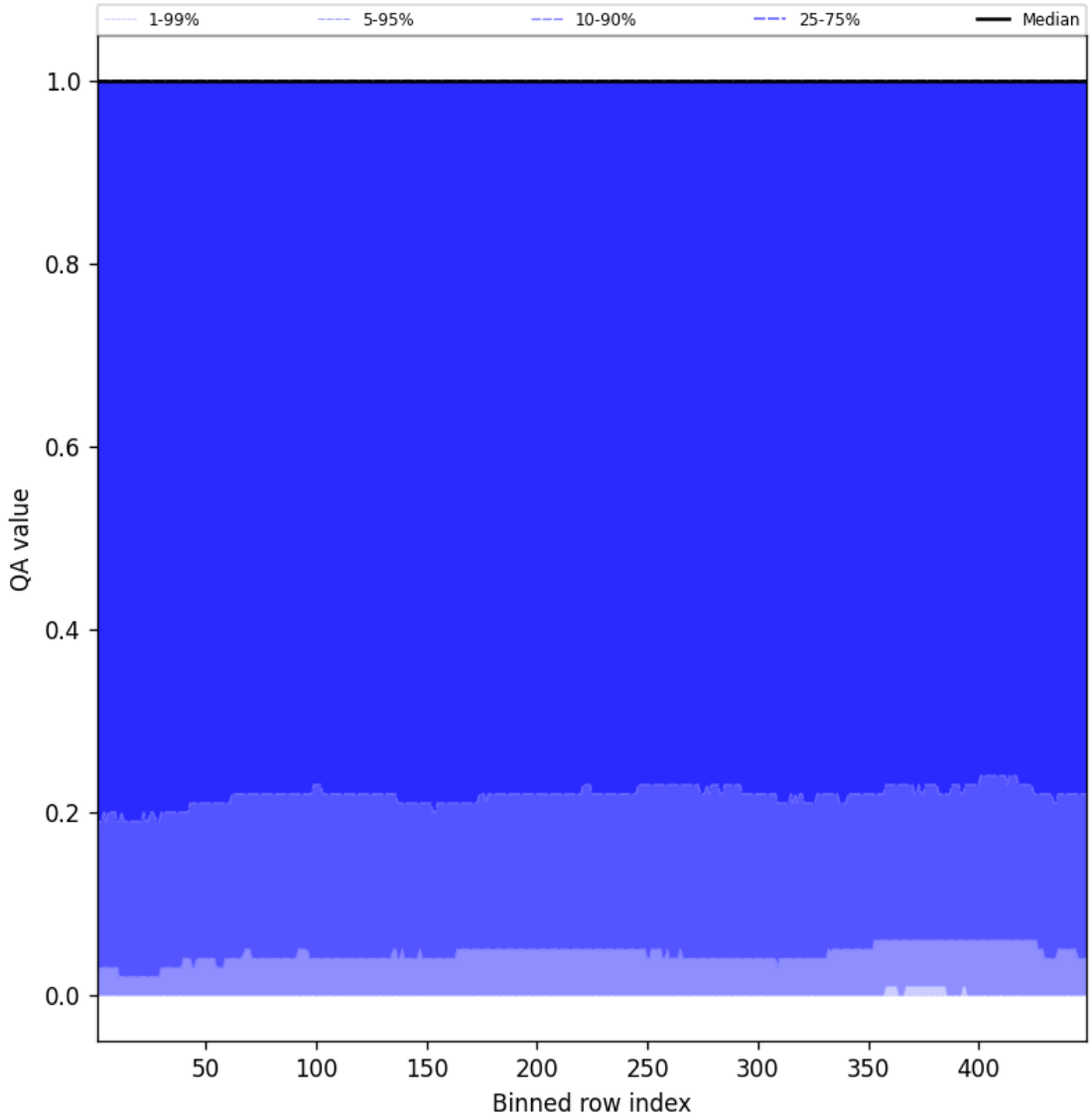


Figure 84: Along track statistics of “QA value” for 2025-03-16 to 2025-03-17

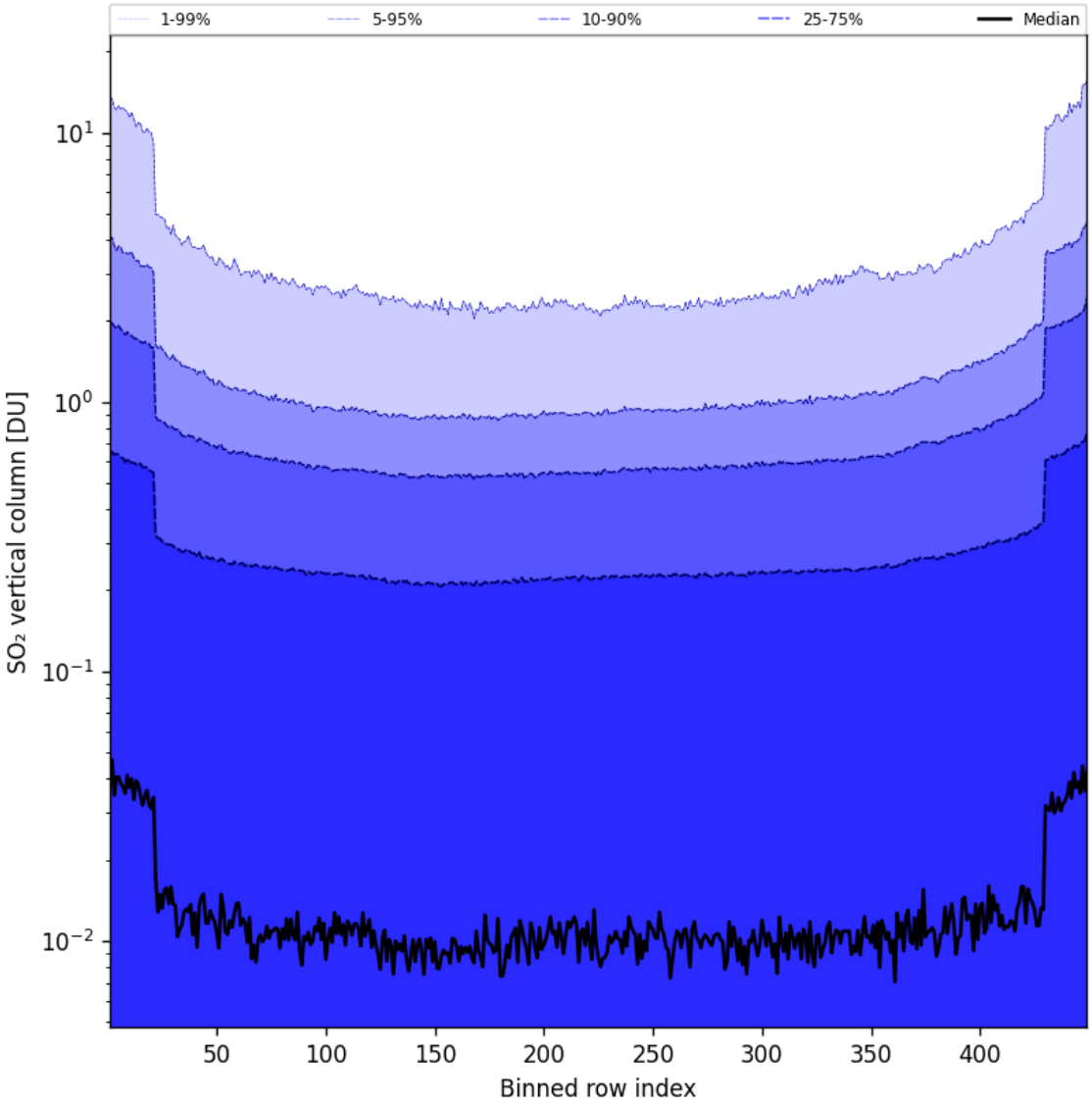


Figure 85: Along track statistics of "SO_2 vertical column" for 2025-03-16 to 2025-03-17

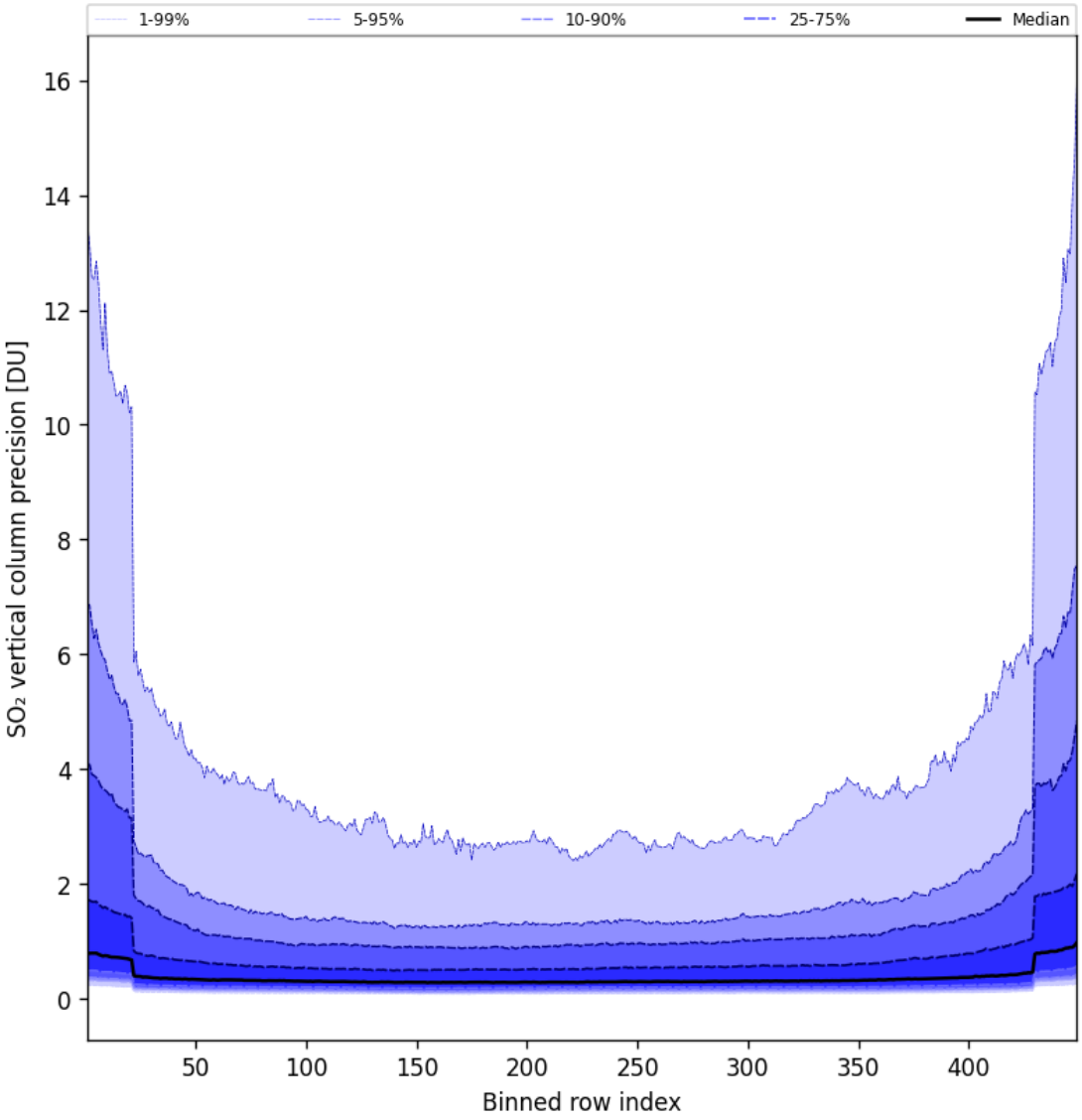


Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-03-16 to 2025-03-17

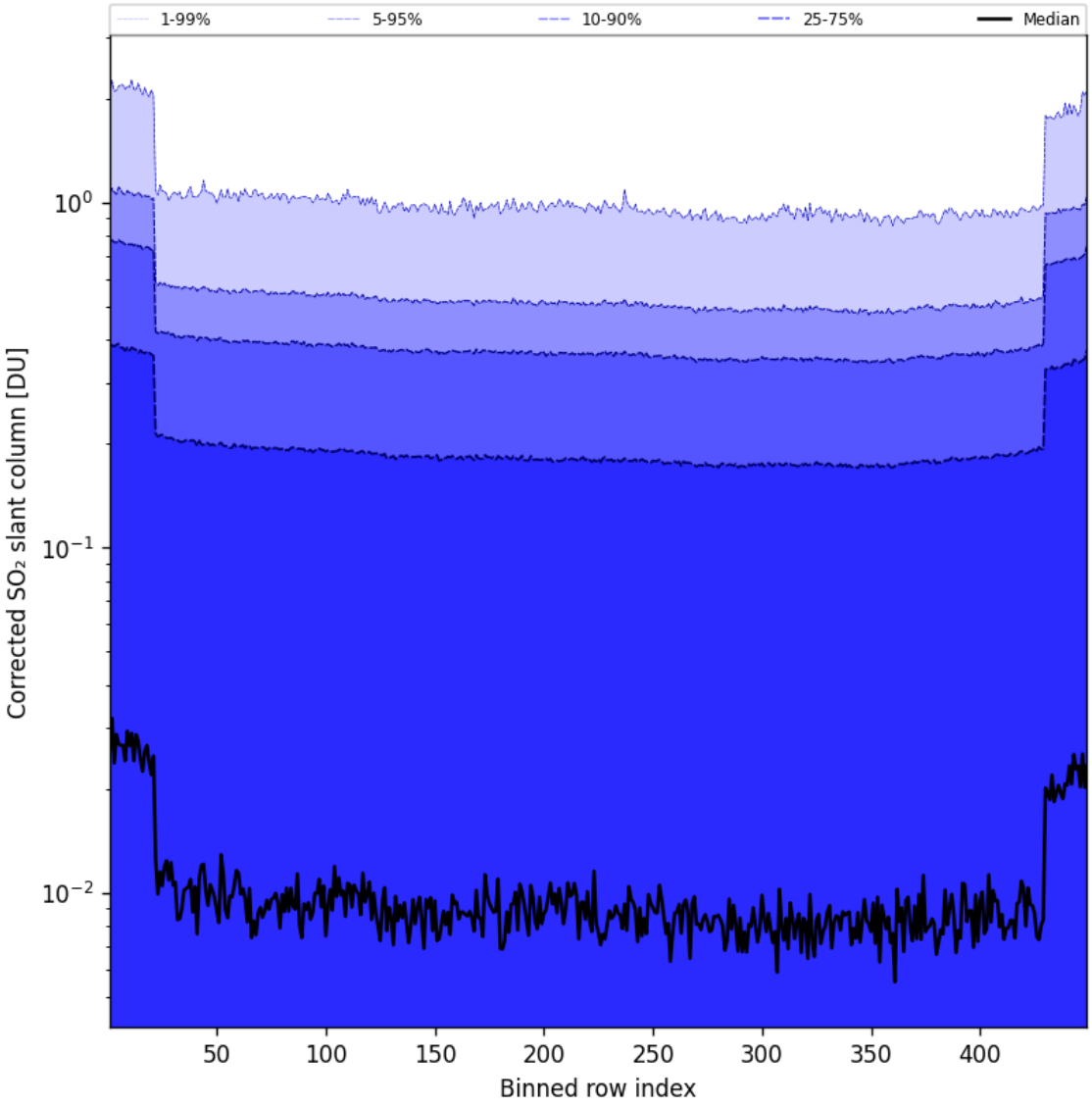


Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-03-16 to 2025-03-17

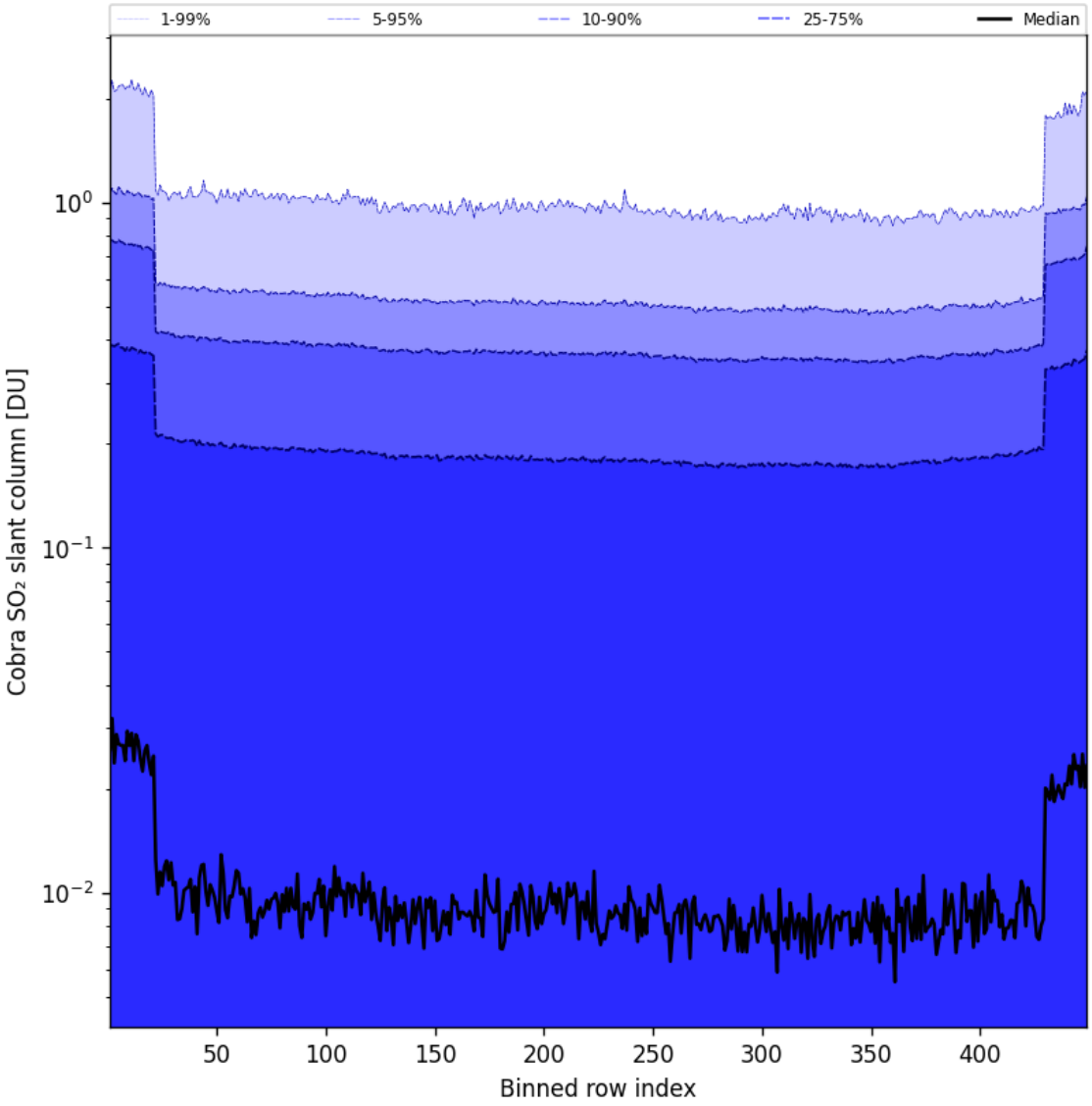


Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-03-16 to 2025-03-17

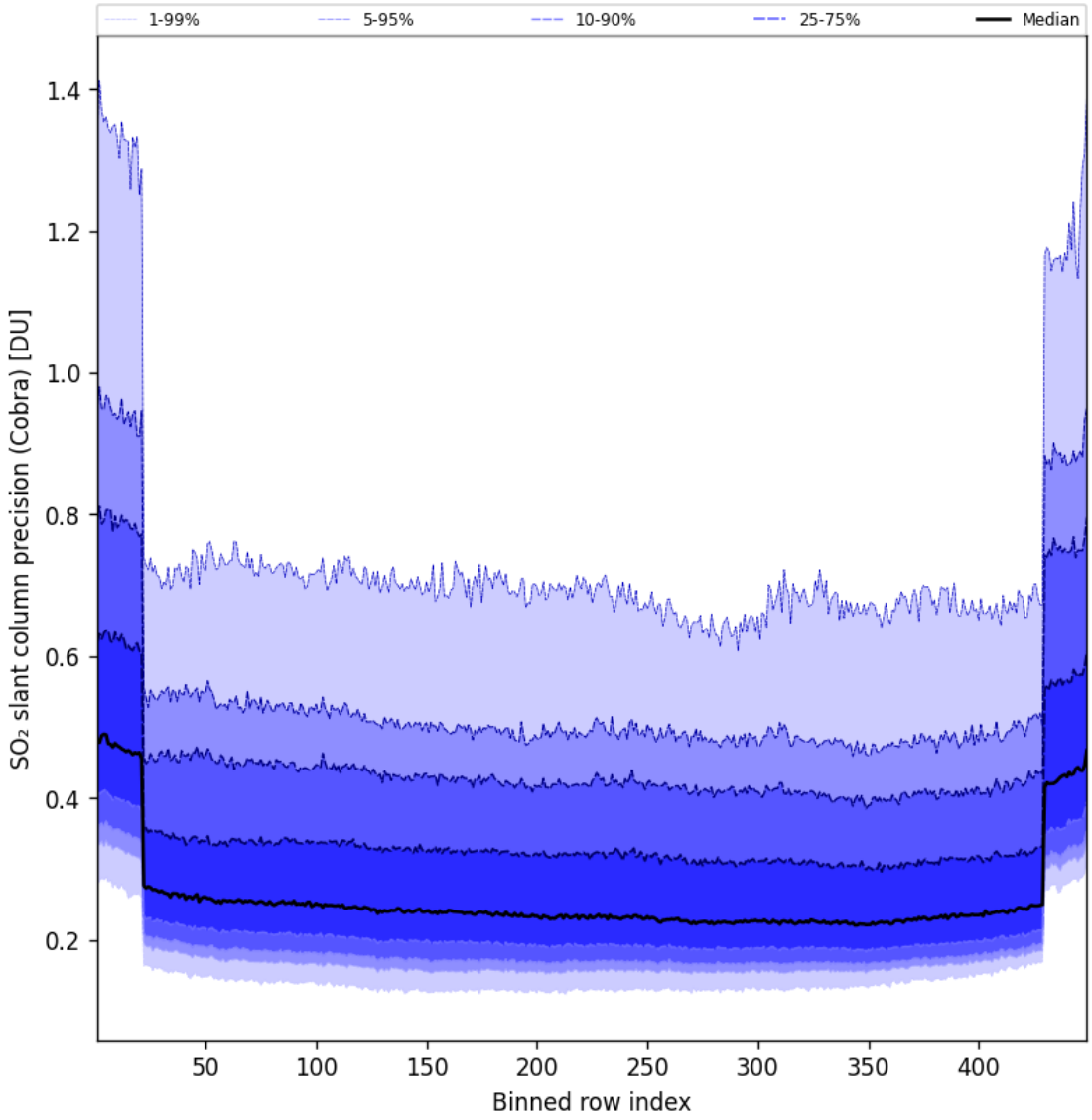


Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-03-16 to 2025-03-17

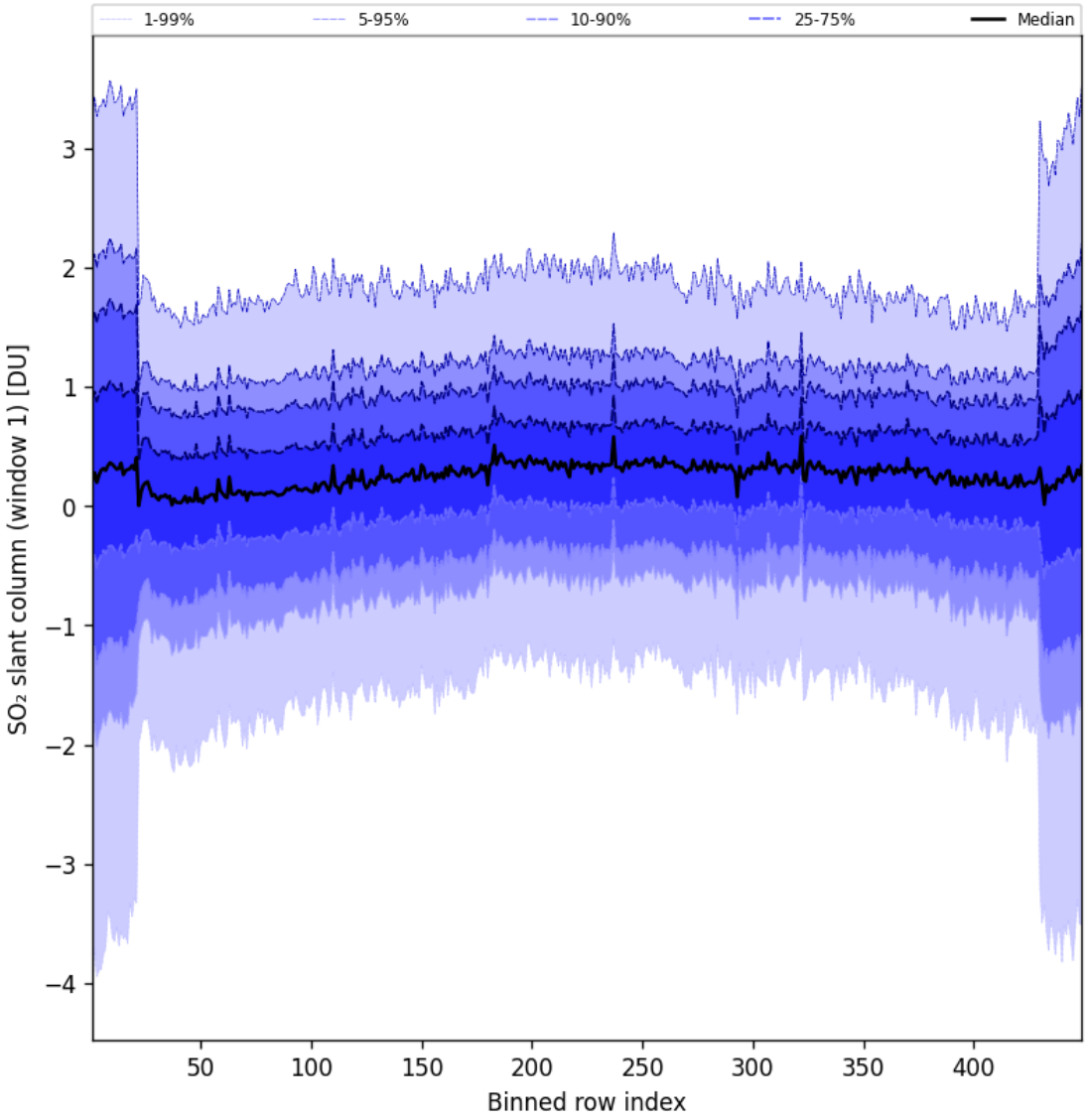


Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-03-16 to 2025-03-17

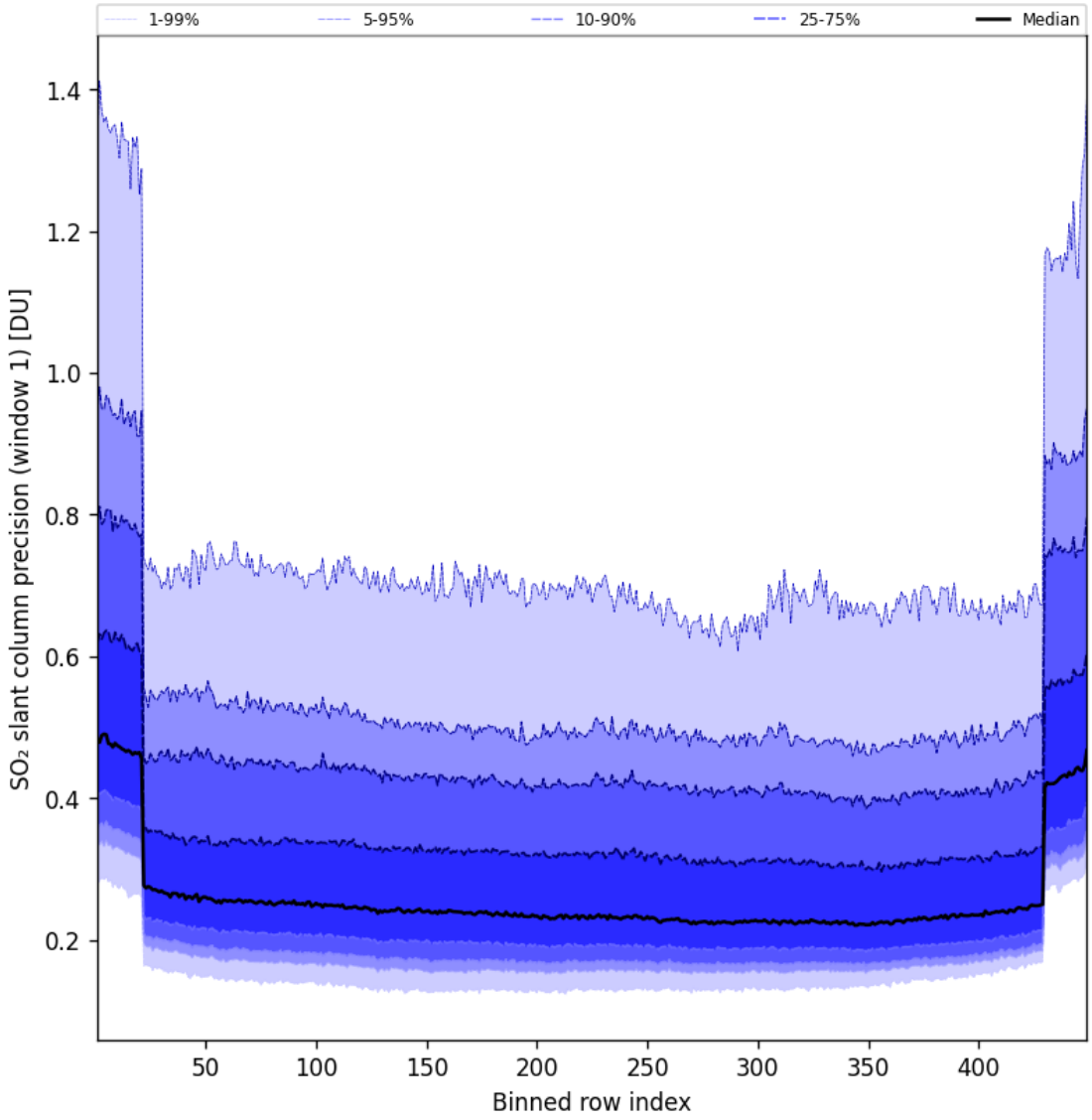


Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-03-16 to 2025-03-17

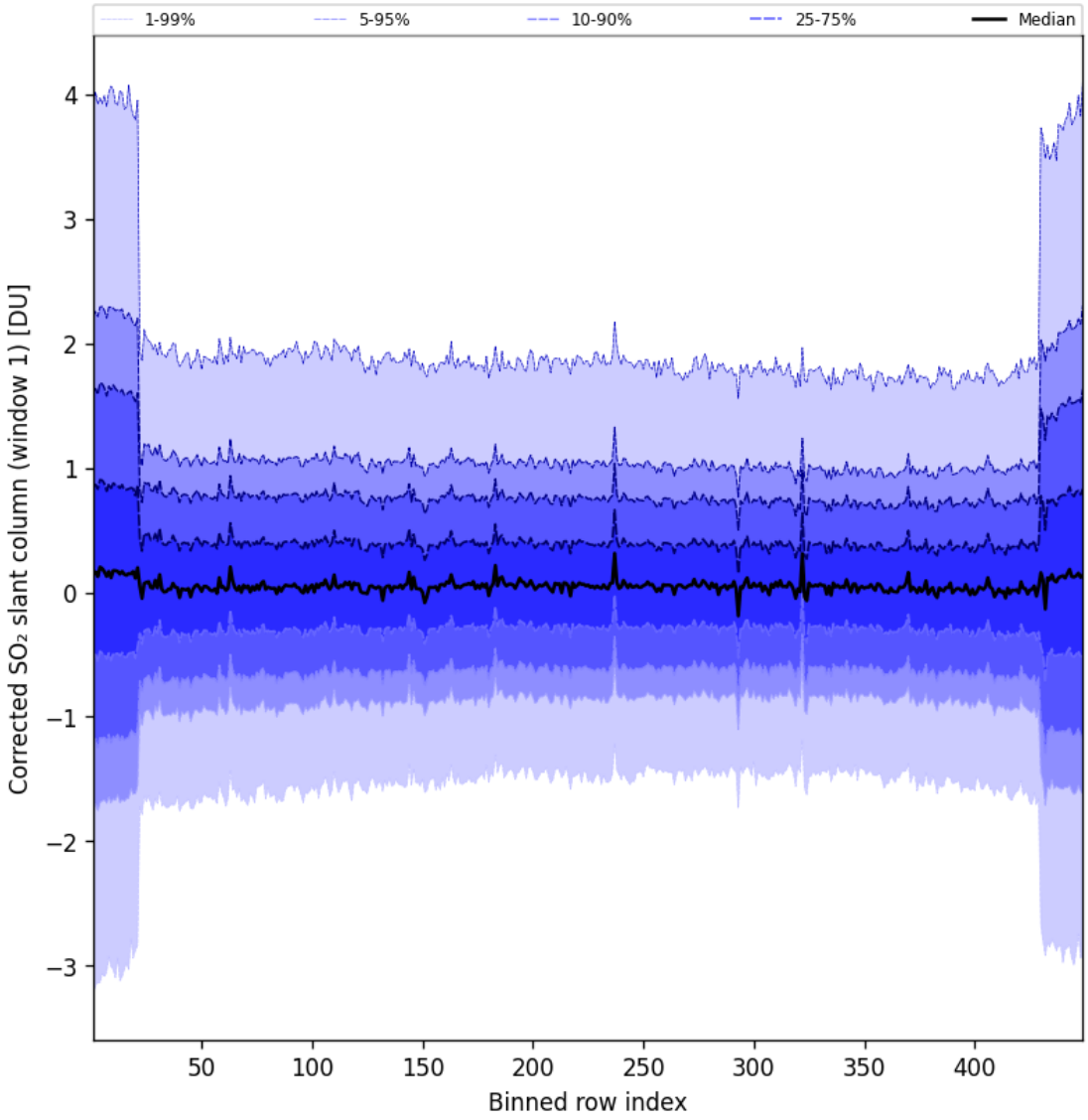


Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-03-16 to 2025-03-17

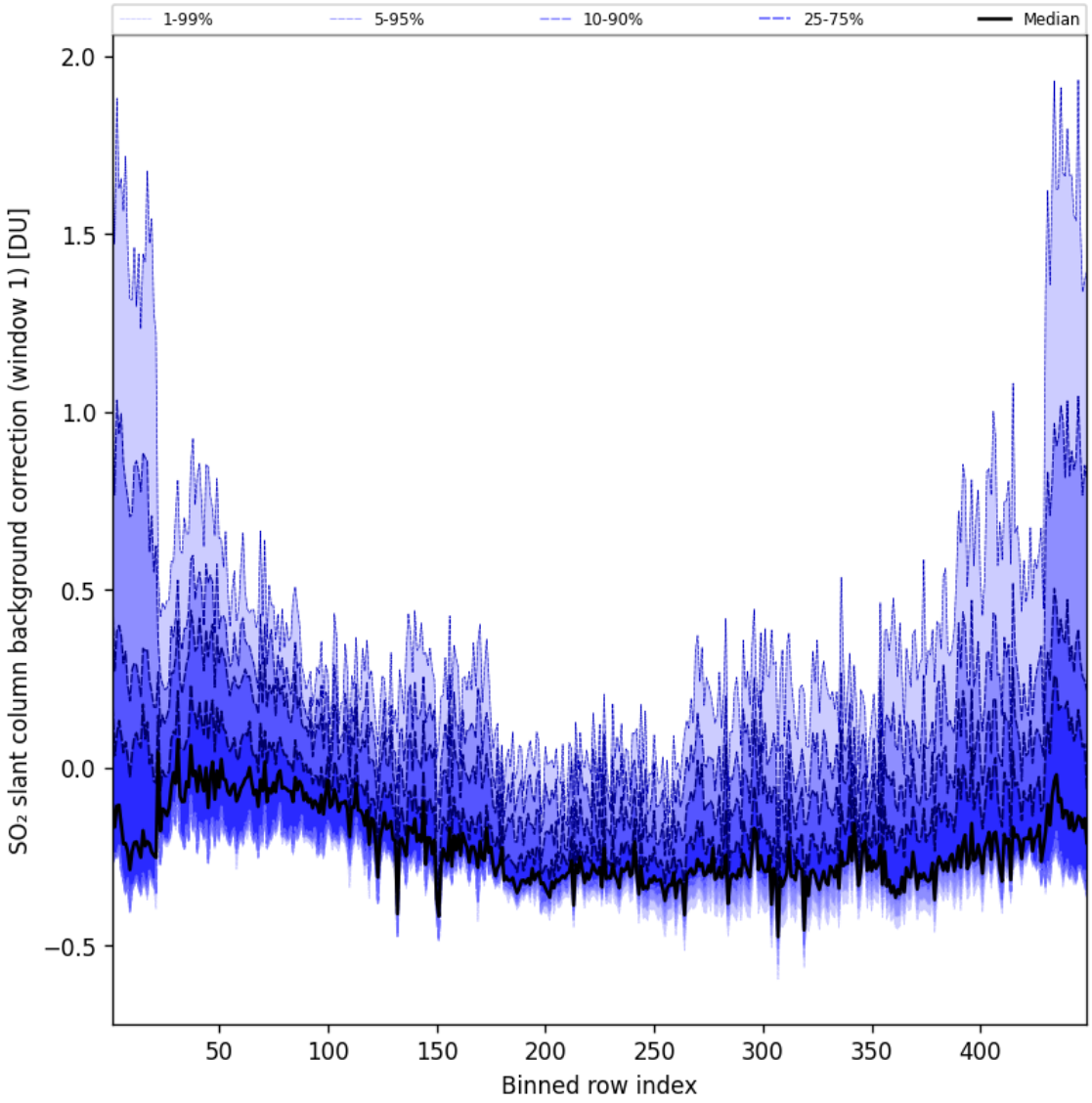


Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-03-16 to 2025-03-17

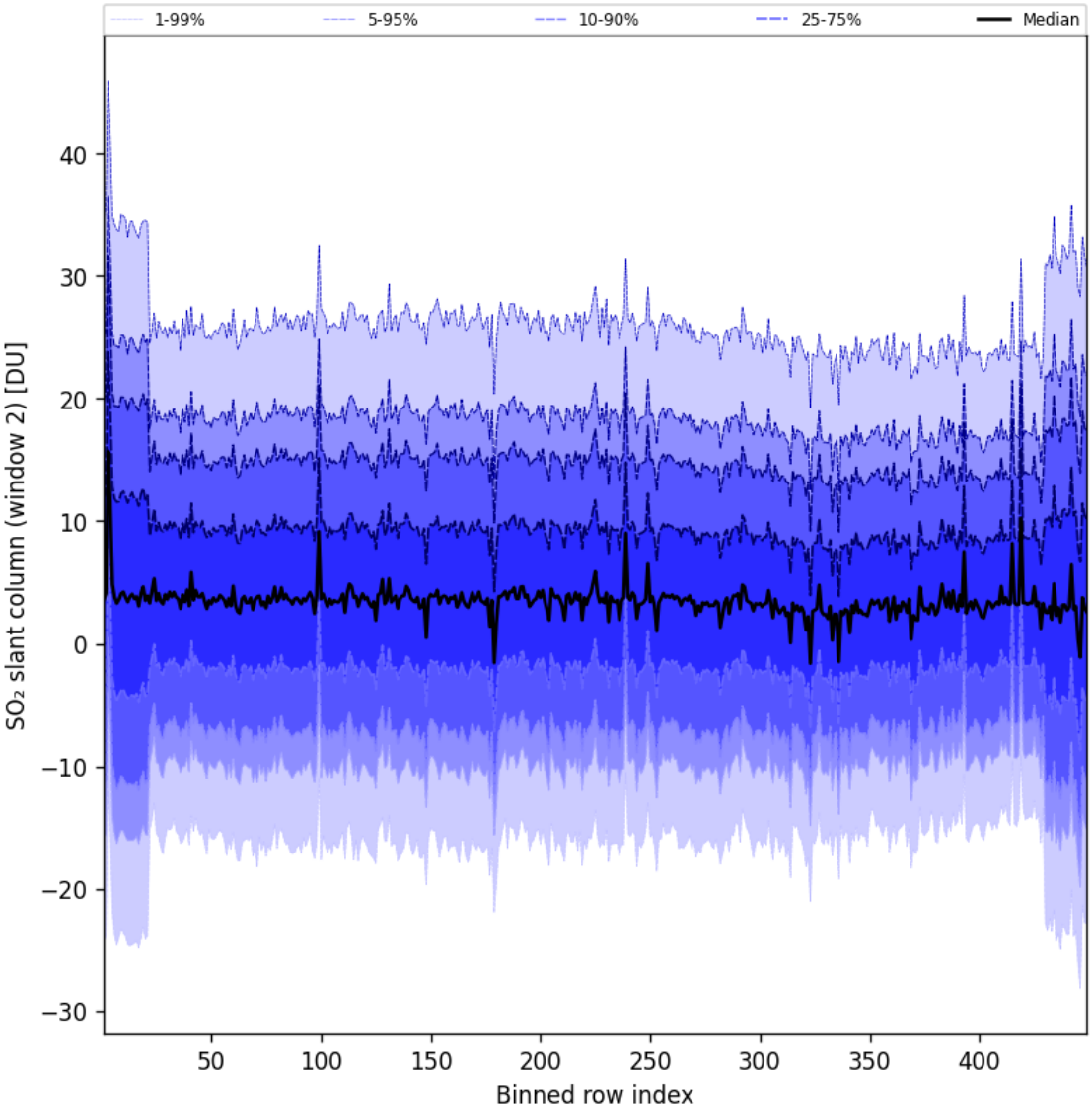


Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-03-16 to 2025-03-17

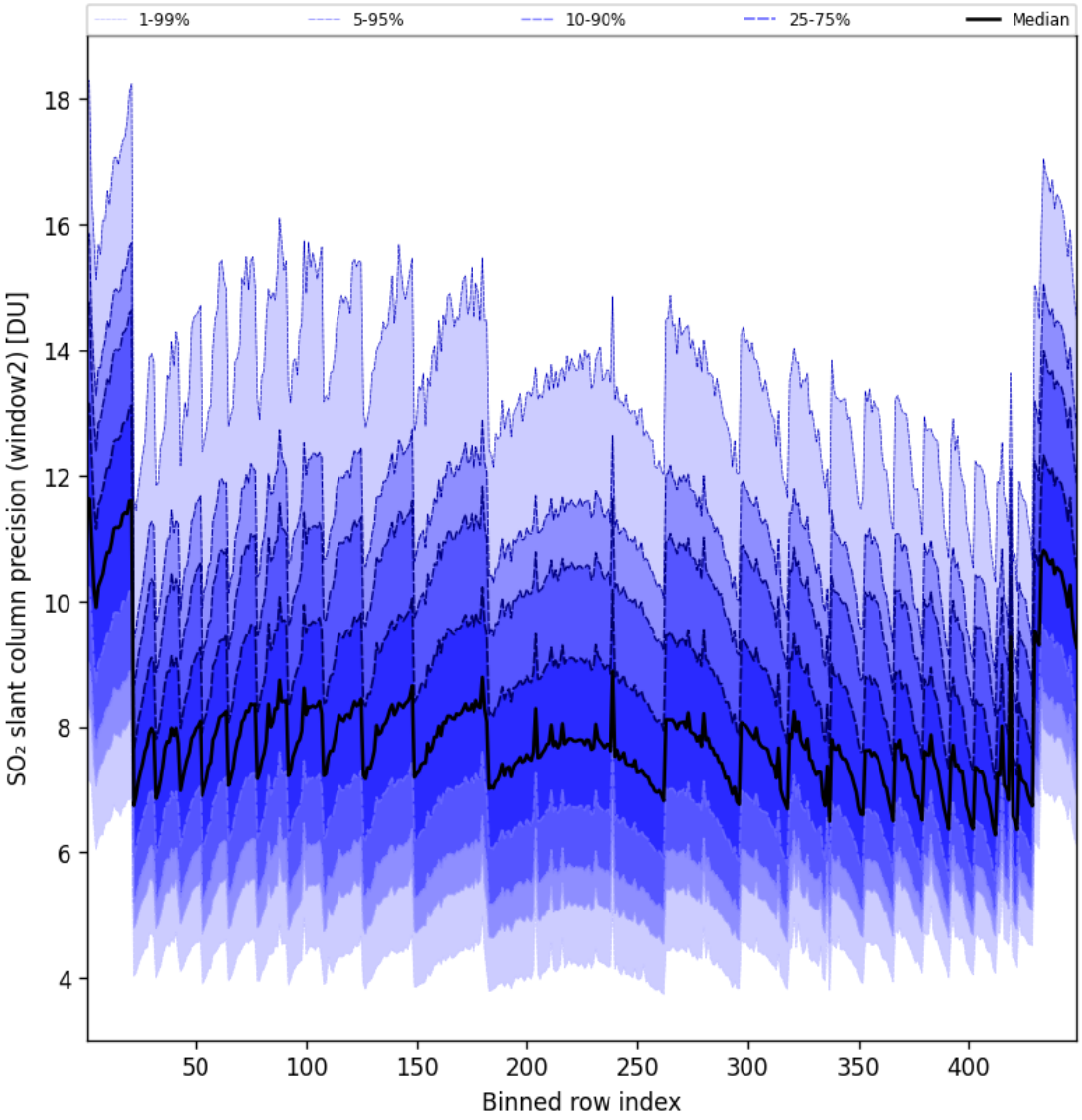


Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-03-16 to 2025-03-17

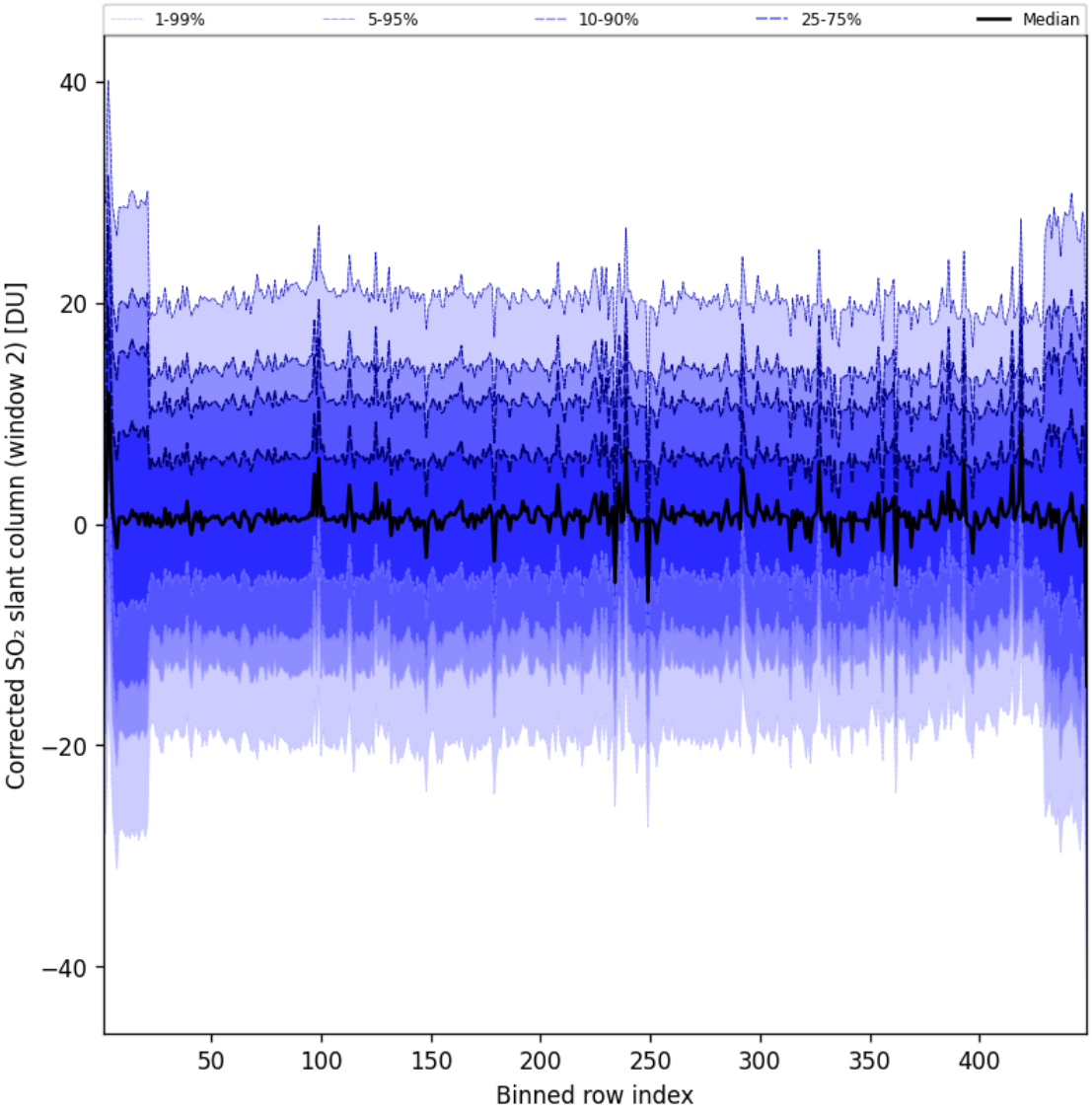


Figure 96: Along track statistics of "Corrected SO_2 slant column (window 2)" for 2025-03-16 to 2025-03-17

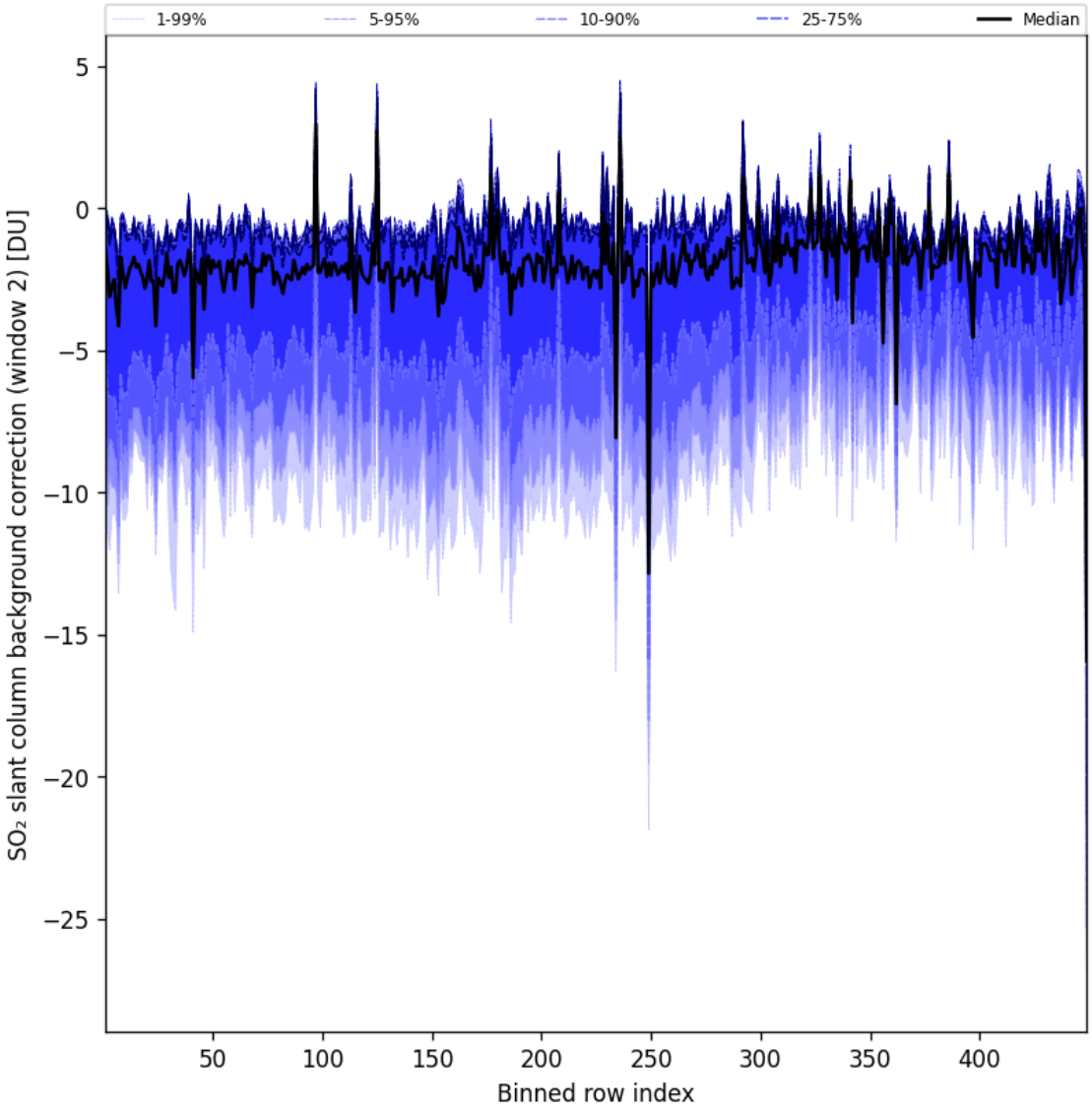


Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-03-16 to 2025-03-17

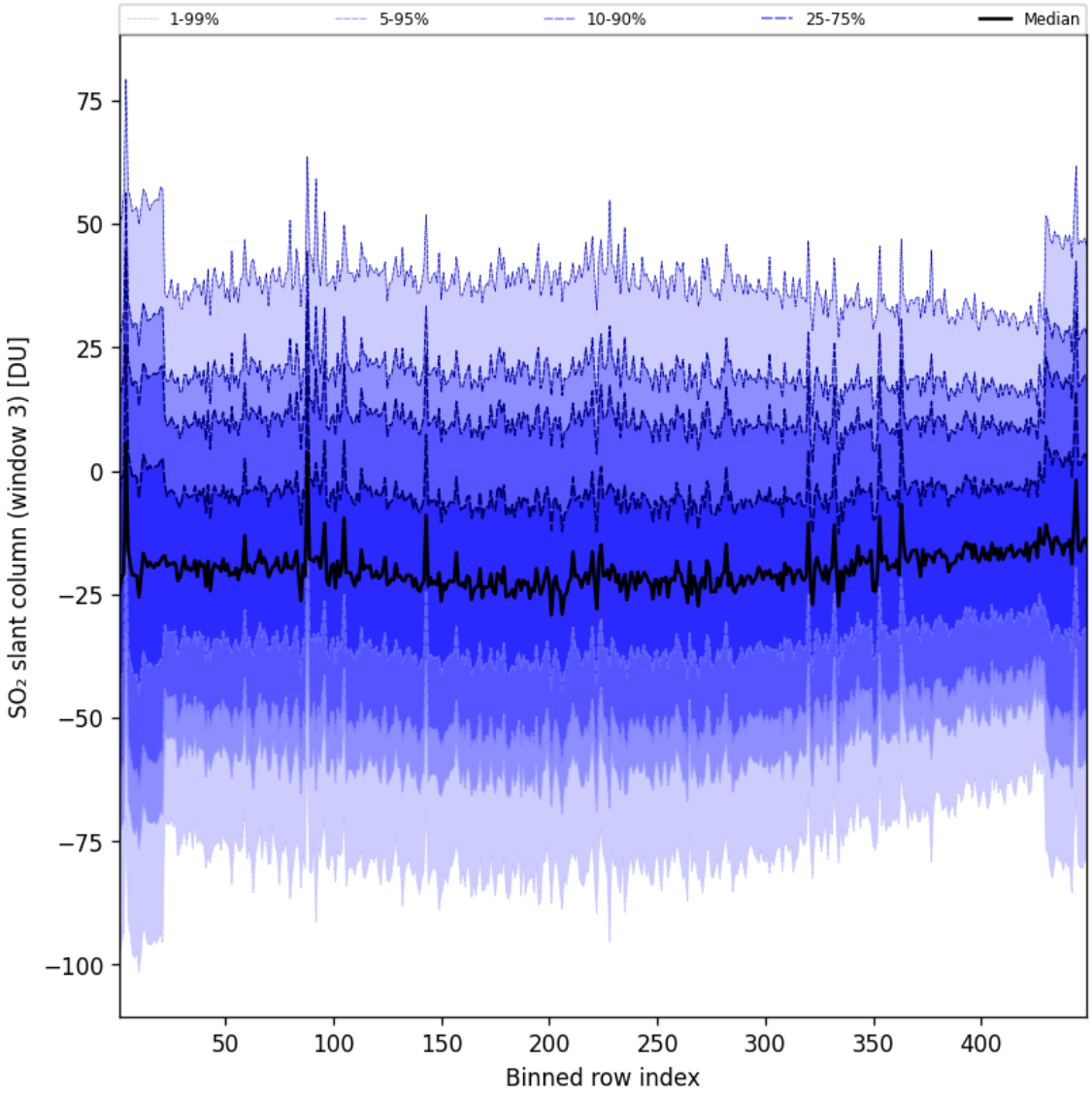


Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-03-16 to 2025-03-17

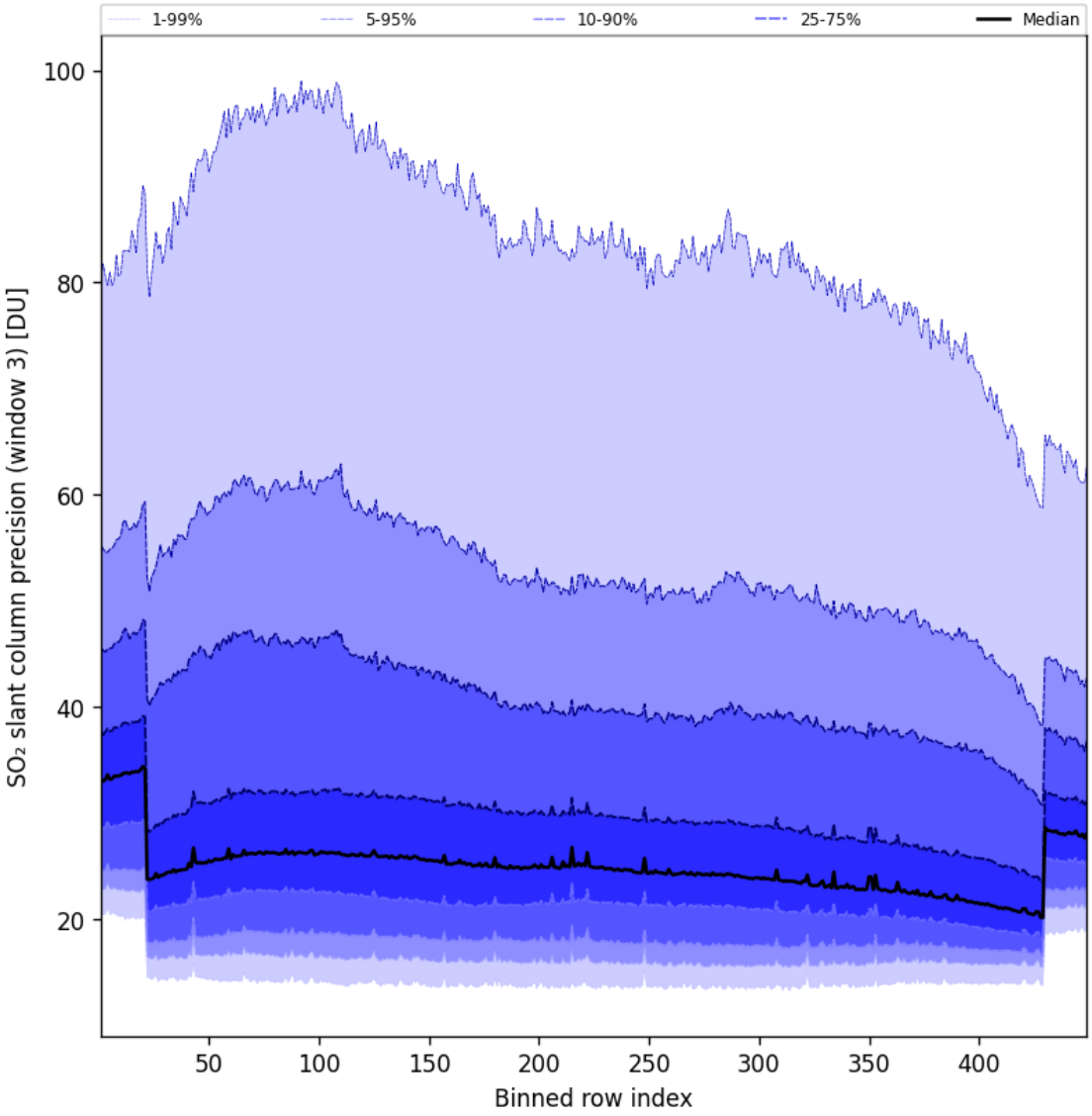


Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-03-16 to 2025-03-17

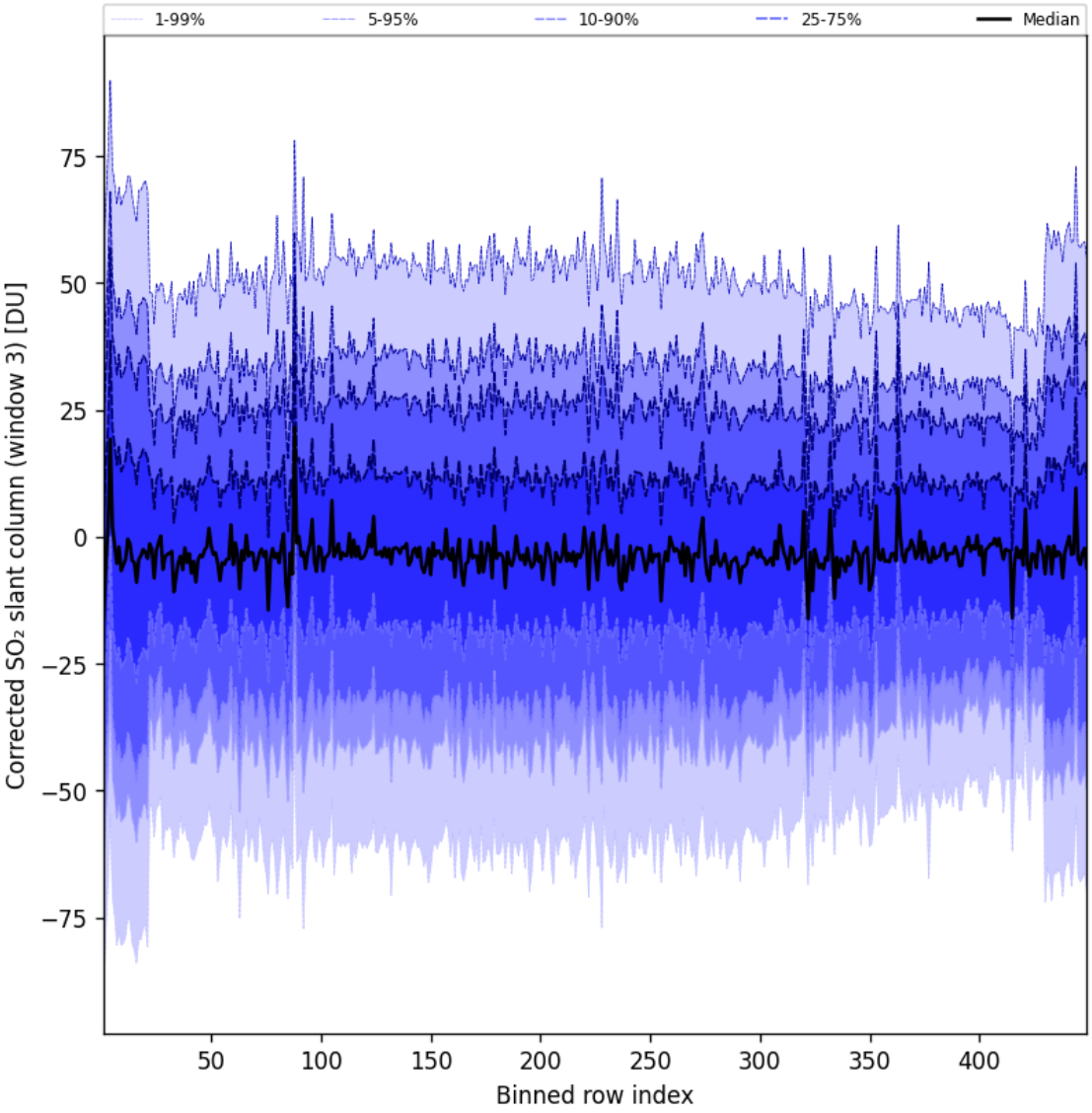


Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-03-16 to 2025-03-17

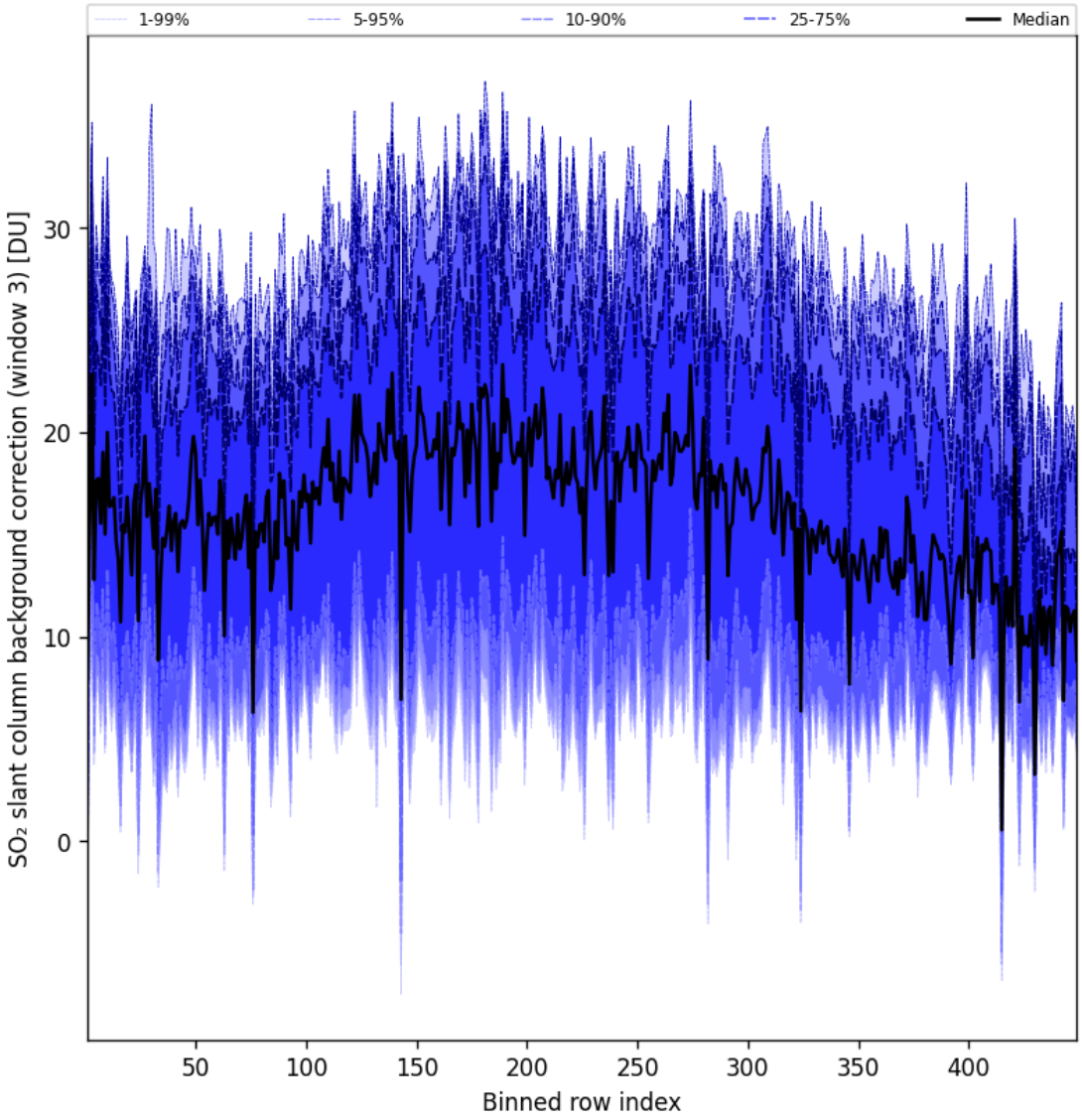
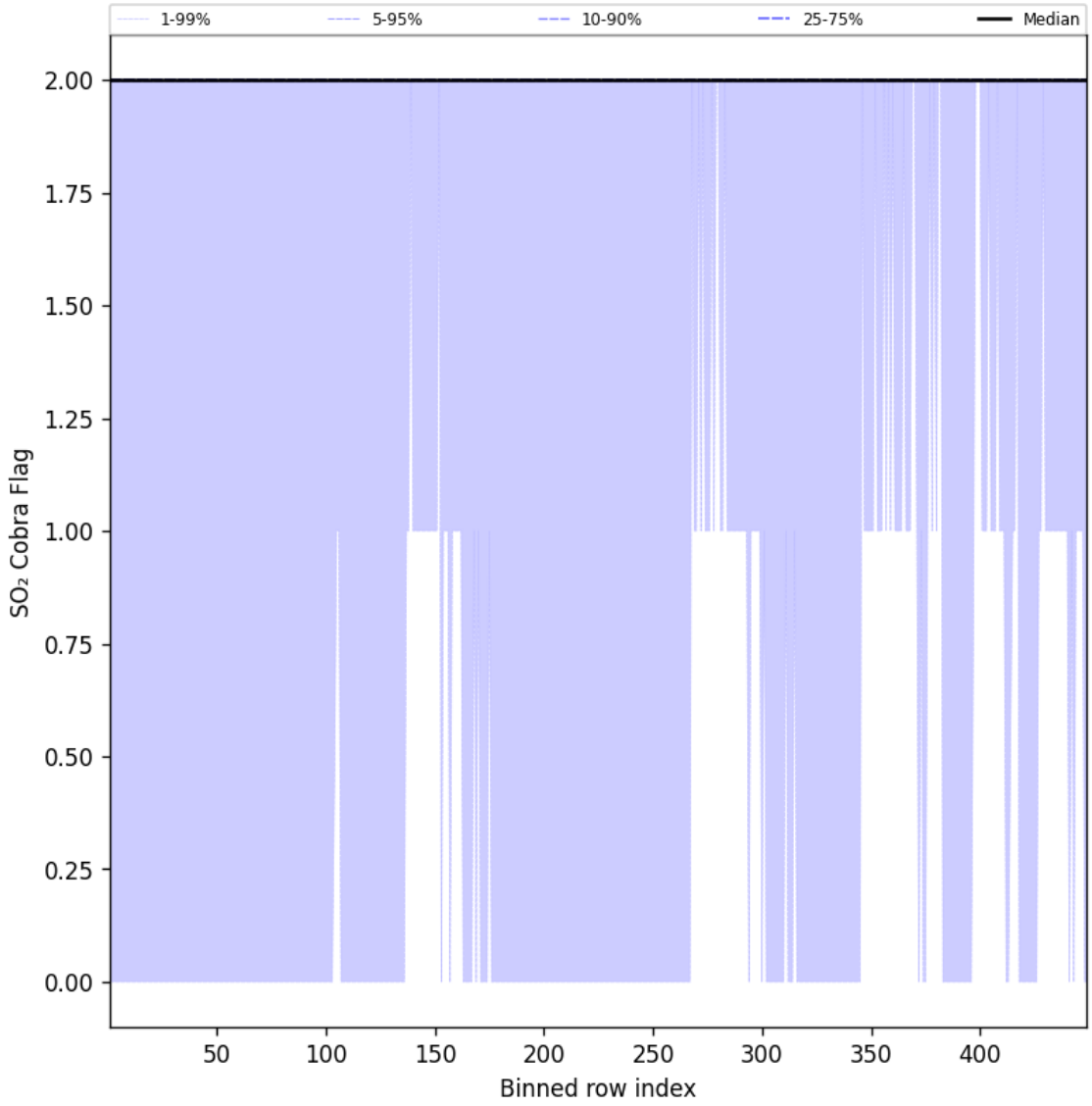


Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-03-16 to 2025-03-17



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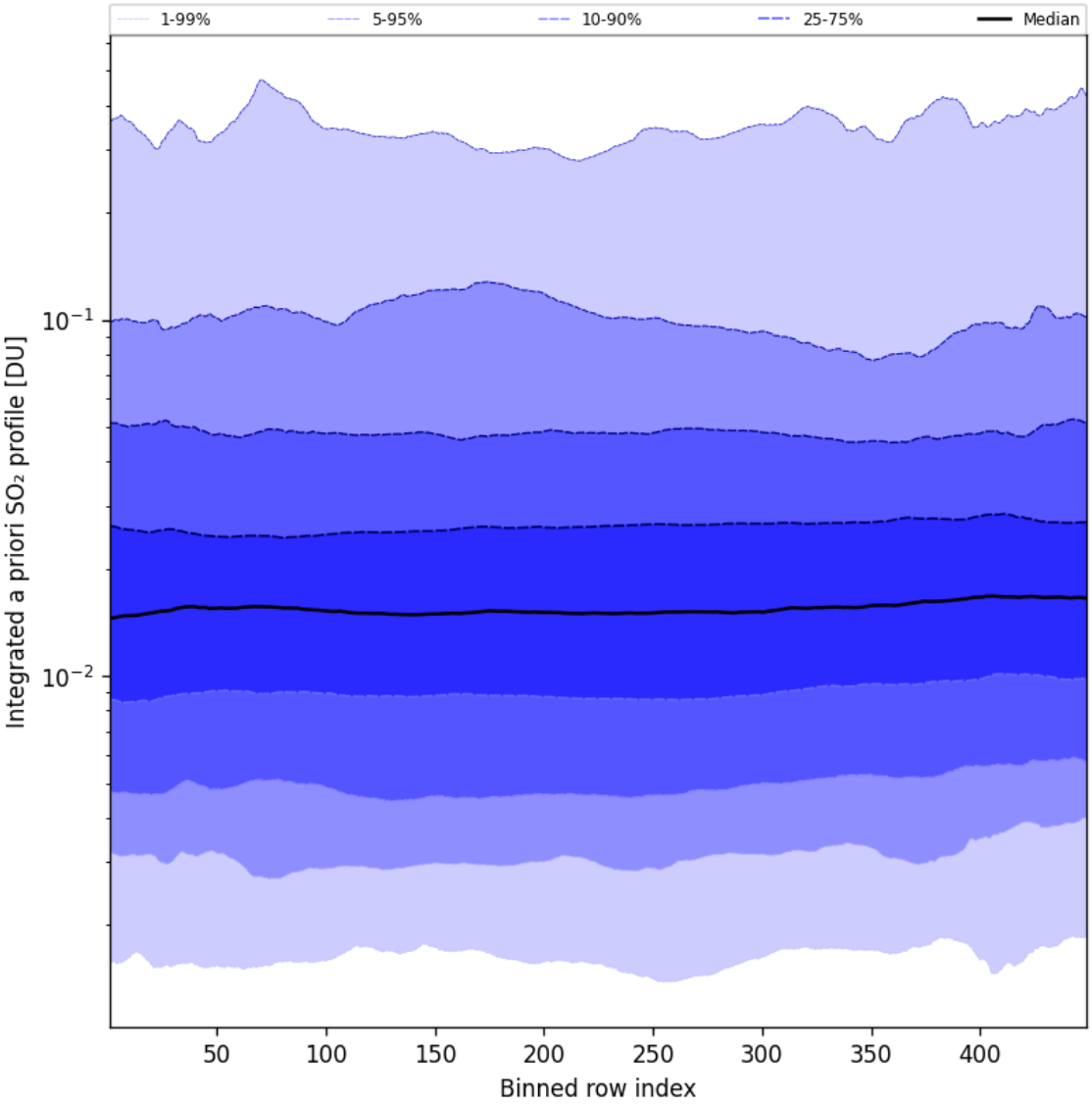
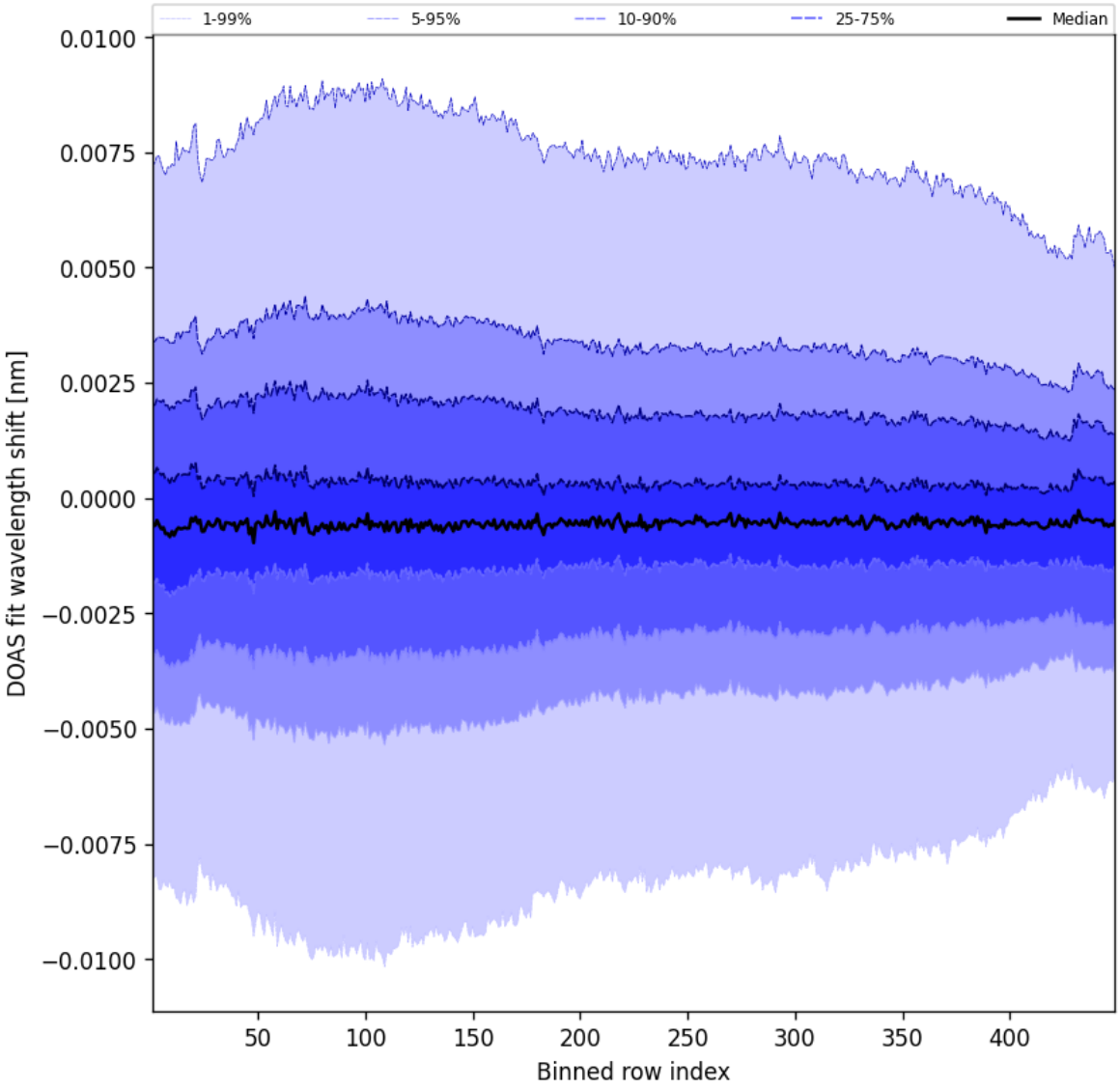


Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-03-16 to 2025-03-17



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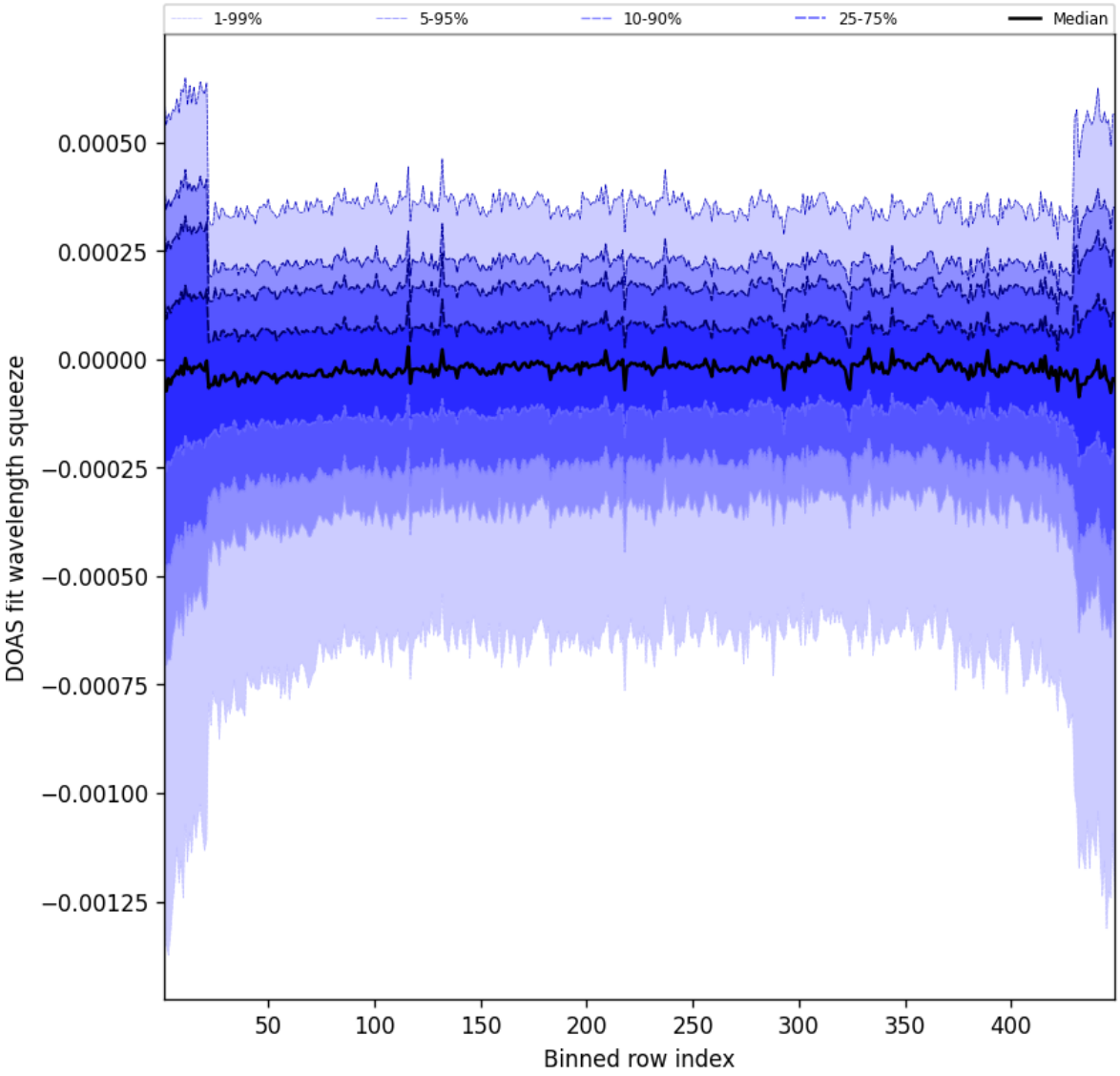

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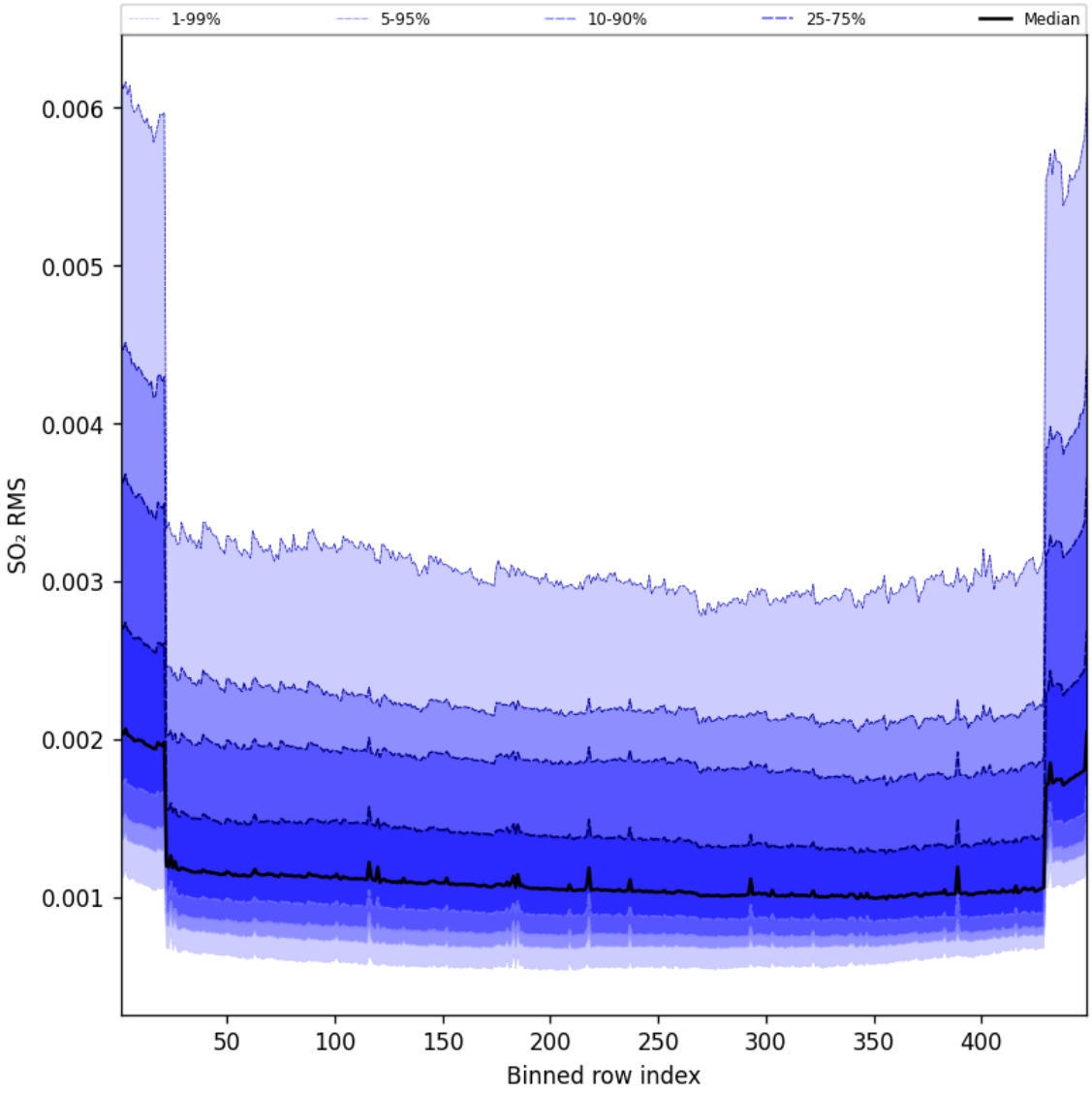

Figure 106: Along track statistics of "SO_2 RMS" for 2025-03-16 to 2025-03-17

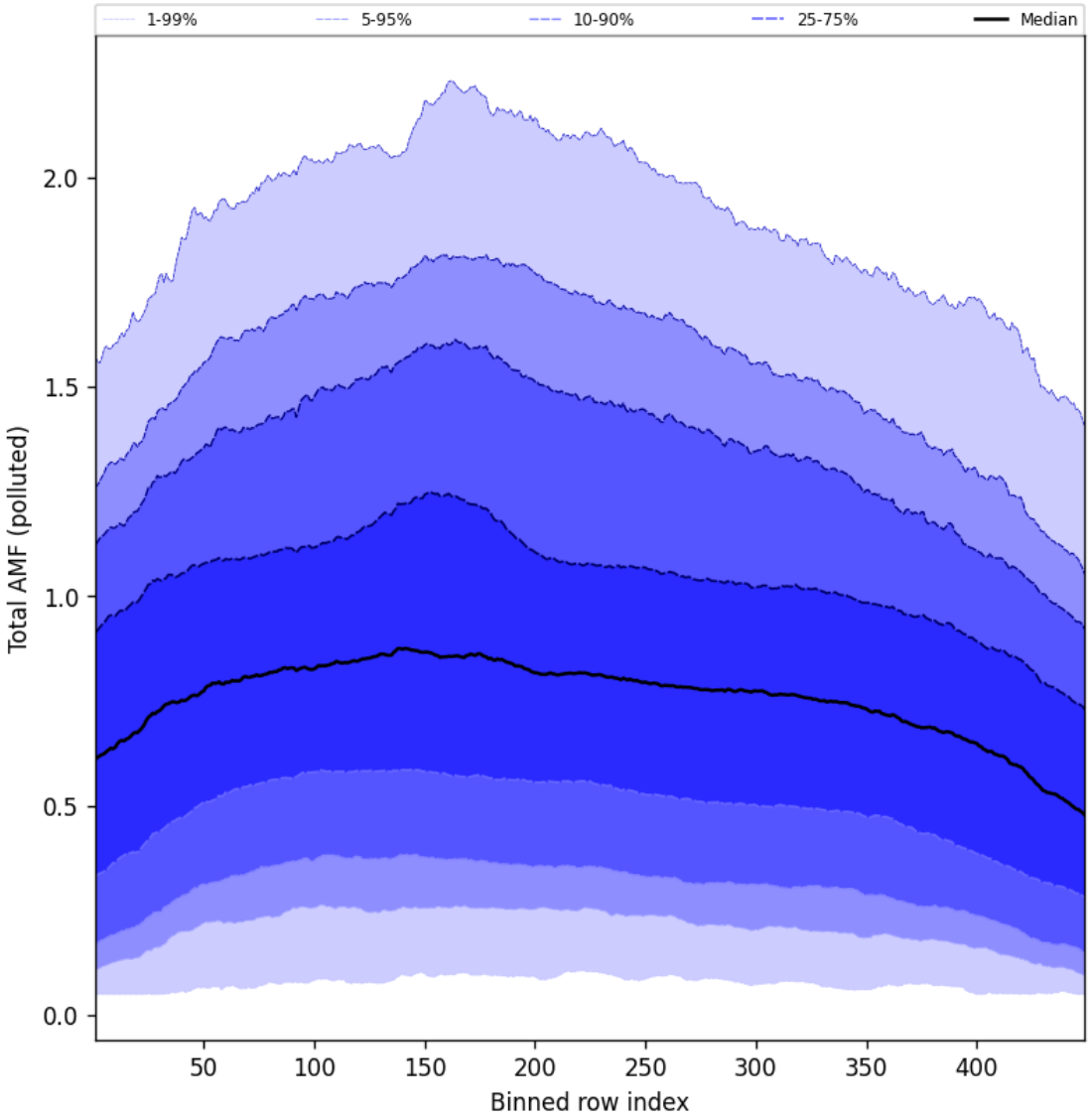

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-16 to 2025-03-17

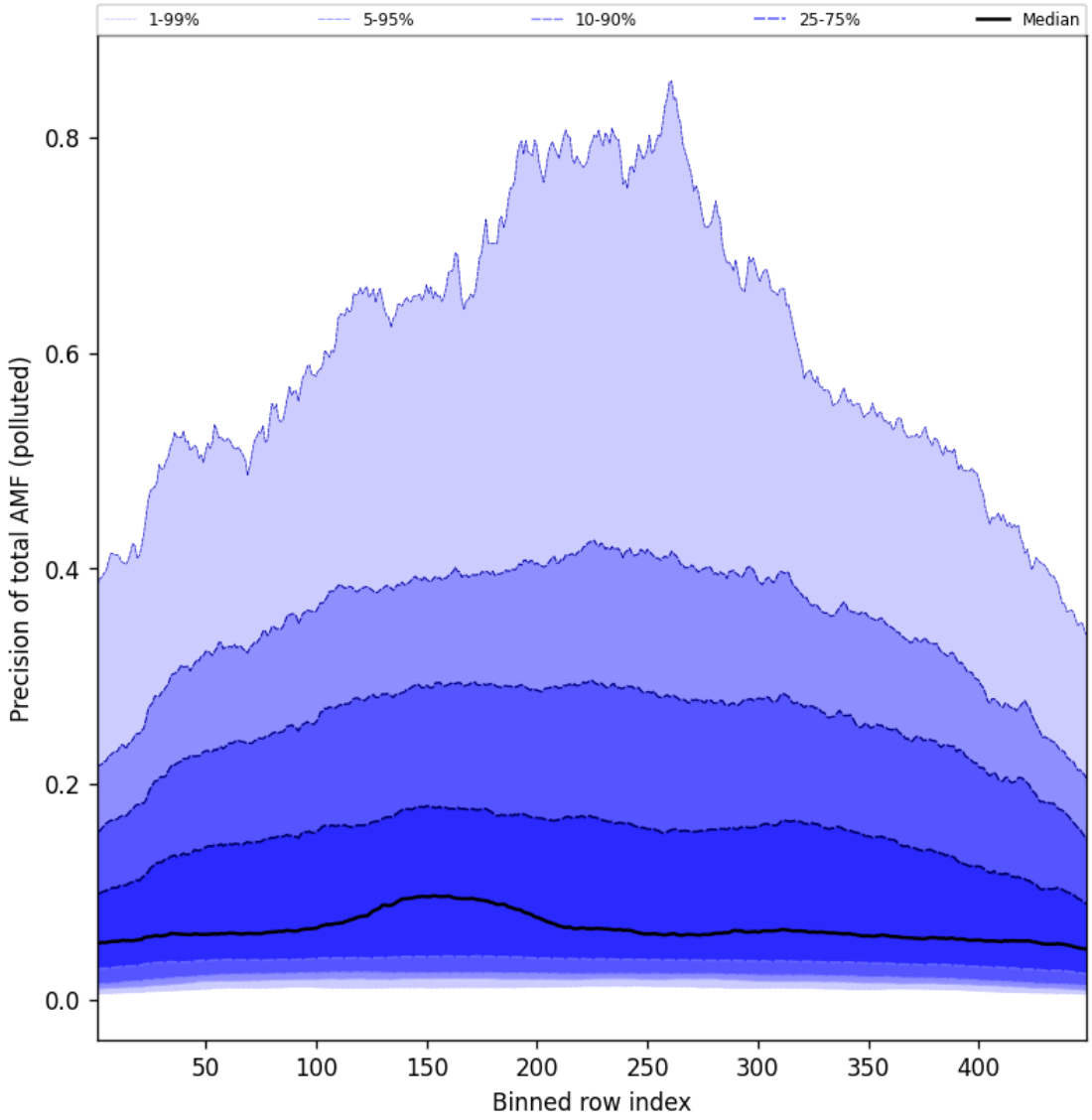

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-16 to 2025-03-17

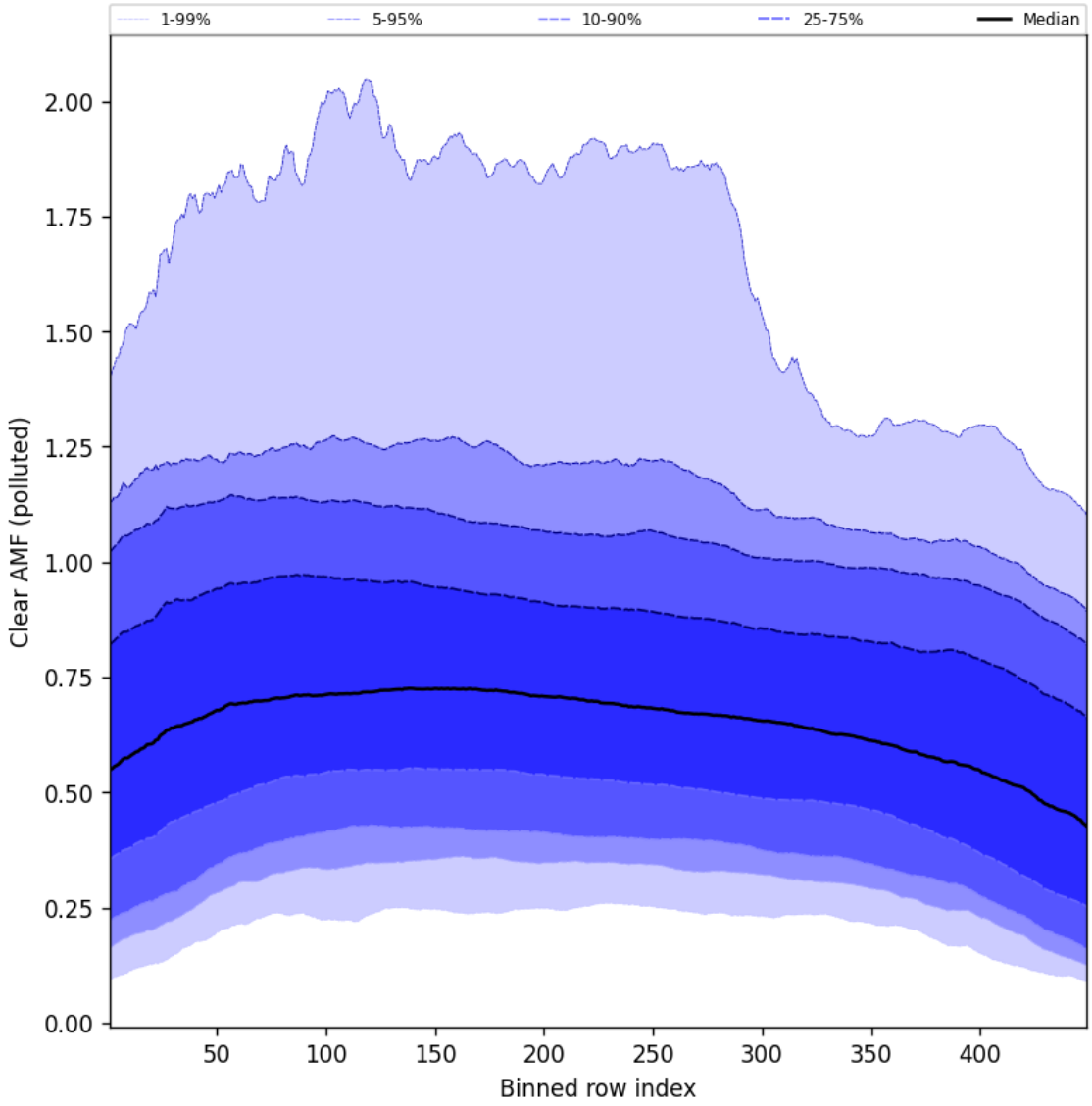

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-16 to 2025-03-17

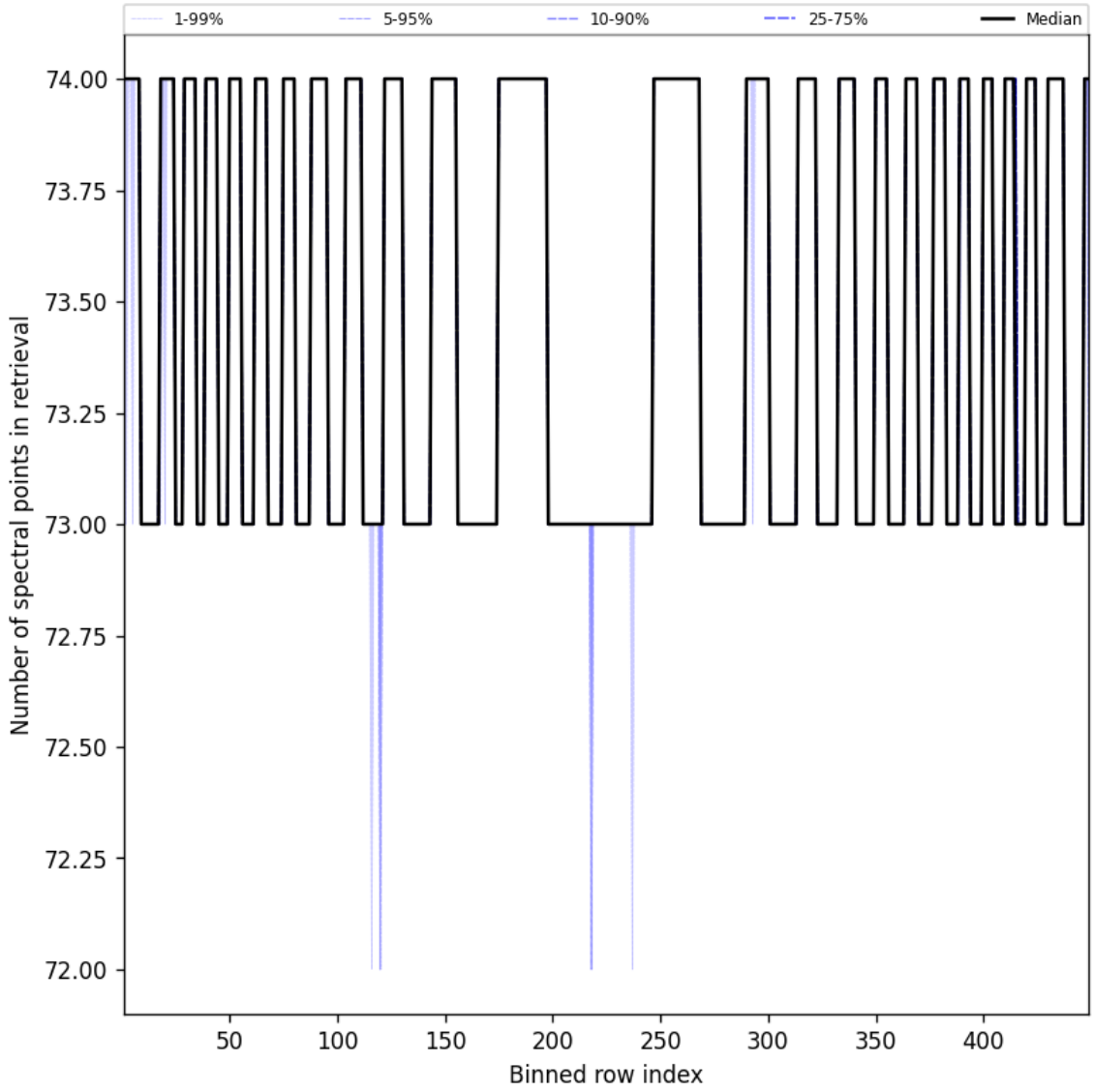

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-16 to 2025-03-17

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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