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]	0.625 ± 0.415	17279337	0.995	0.810	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(5.358 \pm 166.636) \times 10^{-2}$	17279337	0.235	0.418	9.453×10^{-3}	-200	242
sulfurdioxide total vertical column precision [DU]	0.604 ± 1.180	17279337	0.222	0.342	0.312	2.533×10^{-2}	222
sulfurdioxide slant column density corrected [DU]	$(1.962 \pm 37.227) \times 10^{-2}$	17279337	0.242	0.340	8.757×10^{-3}	-26.9	143
sulfurdioxide slant column density cobra [DU]	$(1.939 \pm 35.532) \times 10^{-2}$	17279337	0.242	0.340	8.757×10^{-3}	-26.9	41.3
sulfurdioxide slant column density cobra precision [DU]	0.273 ± 0.124	17279337	0.213	0.112	0.234	6.124×10^{-2}	21.1
sulfurdioxide slant column density window1 [DU]	0.168 ± 0.660	17279337	0.225	0.711	0.176	-185	123
sulfurdioxide slant column density window1 precision [DU]	0.273 ± 0.124	17279337	0.213	0.112	0.234	6.124×10^{-2}	21.1
sulfurdioxide slant column density corrected win1 [DU]	$(7.885 \pm 64.158) \times 10^{-2}$	17279337	7.500×10^{-2}	0.679	6.220×10^{-2}	-185	124
background so2 slant column offset window1 [DU]	$(-8.939 \pm 17.976) \times 10^{-2}$	17279337	-0.180	0.219	-0.144	-1.48	6.61
sulfurdioxide slant column density window2 [DU]	3.55 ± 8.62	17279337	3.25	10.8	3.41	-942	1.740×10^{3}
sulfurdioxide slant column density window2 precision [DU]	7.79 ± 2.21	17279337	6.97	2.50	7.42	2.15	563
sulfurdioxide slant column density corrected win2 [DU]	0.758 ± 8.393	17279337	1.25	10.6	0.797	-942	1.738×10^{3}
background so2 slant column offset window2 [DU]	-2.80 ± 2.34	17279337	-1.25	2.62	-2.11	-16.4	4.18
sulfurdioxide slant column density window3 [DU]	-22.2 ± 23.6	17279337	-24.1	29.3	-22.5	-681	718
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 12.3	17279337	23.7	9.50	24.5	10.5	811
sulfurdioxide slant column density corrected win3 [DU]	-8.34 ± 22.77	17279337	-8.40	28.3	-8.47	-678	729
background so2 slant column offset window3 [DU]	13.8 ± 7.0	17279337	14.0	9.97	14.1	-13.6	41.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17279337	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.970 \pm 14.423) \times 10^{-2}$	17279337	2.276×10^{-2}	2.832×10^{-2}	2.323×10^{-2}	3.893×10^{-4}	3.46
fitted radiance shift [nm]	$(-4.869 \pm 24.401) \times 10^{-4}$	17279337	-5.000×10^{-4}	1.664×10^{-3}	-5.259×10^{-4}	-6.535×10^{-2}	4.258×10^{-2}
fitted radiance squeeze [1]	$(-5.747 \pm 18.197) \times 10^{-5}$	17279337	-3.000×10^{-5}	2.133×10^{-4}	-4.885×10^{-5}	-1.675×10^{-2}	2.438×10^{-2}
fitted root mean square [1]	$(1.222 \pm 0.517) \times 10^{-3}$	17279337	9.250×10^{-4}	4.785×10^{-4}	1.077×10^{-3}	2.747×10^{-4}	7.716×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.912 ± 0.619	17279337	0.540	0.643	0.744	5.000×10^{-2}	3.12
sulfurdioxide total air mass factor polluted precision [1]	0.135 ± 0.140	17279337	2.500×10^{-2}	0.160	7.838×10^{-2}	2.500×10^{-3}	1.62
sulfurdioxide clear air mass factor polluted [1]	0.806 ± 0.607	17279337	0.540	0.374	0.640	1.406×10^{-2}	3.13
number of spectral points in retrieval [1]	73.4 ± 0.5	17279337	73.0	1.000	73.0	52.0	156

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	4.000×10^{-2}	9.000×10^{-2}	0.190	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.16	−0.933	−0.533	−0.346	−0.195	0.223	0.387	0.597	1.08	3.97
sulfurdioxide total vertical column precision [DU]	7.871×10^{-2}	0.101	0.124	0.152	0.194	0.537	0.785	1.14	1.95	5.60
sulfurdioxide slant column density corrected [DU]	−0.794	−0.454	−0.330	−0.247	−0.160	0.180	0.273	0.363	0.508	0.979
sulfurdioxide slant column density cobra [DU]	−0.794	−0.454	−0.330	−0.247	−0.160	0.180	0.273	0.363	0.508	0.979
sulfurdioxide slant column density cobra precision [DU]	0.136	0.160	0.173	0.183	0.196	0.308	0.370	0.427	0.508	0.743
sulfurdioxide slant column density window1 [DU]	−1.56	−0.836	−0.562	−0.378	−0.185	0.525	0.706	0.878	1.14	1.89
sulfurdioxide slant column density window1 precision [DU]	0.136	0.160	0.173	0.183	0.196	0.308	0.370	0.427	0.508	0.743
sulfurdioxide slant column density corrected win1 [DU]	−1.50	−0.846	−0.607	−0.446	−0.273	0.405	0.590	0.771	1.05	1.88
background so2 slant column offset window1 [DU]	−0.375	−0.303	−0.271	−0.241	−0.209	1.023×10^{-2}	0.105	0.180	0.262	0.404
sulfurdioxide slant column density window2 [DU]	−16.6	−10.1	−6.95	−4.59	−1.94	8.85	11.6	14.2	17.7	25.6
sulfurdioxide slant column density window2 precision [DU]	4.19	4.98	5.46	5.86	6.33	8.83	9.72	10.6	11.8	14.4
sulfurdioxide slant column density corrected win2 [DU]	−19.8	−12.9	−9.57	−7.17	−4.50	6.05	8.67	11.0	14.2	21.1
background so2 slant column offset window2 [DU]	−10.3	−7.88	−6.06	−4.88	−3.80	−1.17	−0.911	−0.697	−0.370	0.679
sulfurdioxide slant column density window3 [DU]	−80.9	−60.2	−50.8	−44.2	−36.9	−7.57	0.294	7.47	17.1	36.0
sulfurdioxide slant column density window3 precision [DU]	14.2	15.9	17.3	18.6	20.5	30.0	34.3	39.4	49.9	80.0
sulfurdioxide slant column density corrected win3 [DU]	−65.5	−45.4	−36.1	−29.6	−22.5	5.83	13.2	19.9	29.1	47.6
background so2 slant column offset window3 [DU]	−1.42	2.16	4.22	6.23	9.04	19.0	21.1	22.8	24.7	28.0
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]	3.385×10^{-3}	6.218×10^{-3}	8.318×10^{-3}	1.036×10^{-2}	1.320×10^{-2}	4.151×10^{-2}	5.524×10^{-2}	7.510×10^{-2}	0.137	0.520
fitted radiance shift [nm]	-7.804×10^{-3}	-4.037×10^{-3}	-2.713×10^{-3}	-1.968×10^{-3}	-1.361×10^{-3}	3.031×10^{-4}	9.773×10^{-4}	1.820×10^{-3}	3.275×10^{-3}	7.290×10^{-3}
fitted radiance squeeze [1]	-5.503×10^{-4}	-3.587×10^{-4}	-2.775×10^{-4}	-2.205×10^{-4}	-1.600×10^{-4}	5.327×10^{-5}	1.037×10^{-4}	1.498×10^{-4}	2.155×10^{-4}	3.752×10^{-4}
fitted root mean square [1]	5.799×10^{-4}	7.054×10^{-4}	7.788×10^{-4}	8.352×10^{-4}	9.030×10^{-4}	1.381×10^{-3}	1.617×10^{-3}	1.856×10^{-3}	2.212×10^{-3}	3.160×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.976×10^{-2}	0.193	0.295	0.386	0.496	1.14	1.47	1.86	2.36	2.74
sulfurdioxide total air mass factor polluted precision [1]	7.723×10^{-3}	1.524×10^{-2}	2.174×10^{-2}	2.689×10^{-2}	3.384×10^{-2}	0.194	0.262	0.326	0.418	0.615
sulfurdioxide clear air mass factor polluted [1]	0.132	0.255	0.337	0.409	0.486	0.860	1.00	1.31	2.55	2.96
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]	0.713 ± 0.390	6321513	0.690	1.000	0.0	1.000	0.310	1.000
sulfurdioxide total vertical column [DU]	0.115 ± 2.627	6321513	0.651	1.698×10^{-2}	-200	242	-0.298	0.353
sulfurdioxide total vertical column precision [DU]	1.02 ± 1.78	6321513	0.701	0.462	4.946×10^{-2}	222	0.280	0.981
sulfurdioxide slant column density corrected [DU]	$(3.078 \pm 48.186) \times 10^{-2}$	6321513	0.399	1.204×10^{-2}	-12.7	143	-0.185	0.214
sulfurdioxide slant column density cobra [DU]	$(3.019 \pm 44.773) \times 10^{-2}$	6321513	0.399	1.204×10^{-2}	-12.7	41.3	-0.185	0.214
sulfurdioxide slant column density cobra precision [DU]	0.325 ± 0.153	6321513	0.173	0.277	8.586×10^{-2}	21.1	0.219	0.393
sulfurdioxide slant column density window1 [DU]	0.242 ± 0.783	6321513	0.799	0.249	-18.7	123	-0.154	0.645
sulfurdioxide slant column density window1 precision [DU]	0.325 ± 0.153	6321513	0.173	0.277	8.586×10^{-2}	21.1	0.219	0.393
sulfurdioxide slant column density corrected win1 [DU]	0.109 ± 0.780	6321513	0.791	8.130×10^{-2}	-18.9	124	-0.306	0.484
background so2 slant column offset window1 [DU]	-0.134 ± 0.159	6321513	0.153	-0.155	-1.20	6.61	-0.230	-7.754×10^{-2}
sulfurdioxide slant column density window2 [DU]	4.31 ± 9.72	6321513	12.3	3.96	-214	207	-2.04	10.3
sulfurdioxide slant column density window2 precision [DU]	8.70 ± 2.28	6321513	2.85	8.36	2.15	337	7.11	9.96
sulfurdioxide slant column density corrected win2 [DU]	0.699 ± 9.333	6321513	11.9	0.718	-224	202	-5.24	6.65
background so2 slant column offset window2 [DU]	-3.62 ± 2.97	6321513	4.17	-2.44	-16.4	3.99	-5.53	-1.37
sulfurdioxide slant column density window3 [DU]	-25.2 ± 25.7	6321513	32.7	-24.8	-198	166	-41.3	-8.60
sulfurdioxide slant column density window3 precision [DU]	30.3 ± 12.3	6321513	9.29	27.4	10.5	219	23.5	32.8
sulfurdioxide slant column density corrected win3 [DU]	-8.36 ± 25.30	6321513	32.1	-8.17	-182	185	-24.3	7.84
background so2 slant column offset window3 [DU]	16.8 ± 5.9	6321513	9.35	16.4	-7.51	41.6	12.1	21.4
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.26	6321513	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(8.745 \pm 22.958) \times 10^{-2}$	6321513	5.564×10^{-2}	2.764×10^{-2}	5.483×10^{-4}	3.46	1.403×10^{-2}	6.968×10^{-2}
fitted radiance shift [nm]	$(-3.300 \pm 25.043) \times 10^{-4}$	6321513	1.668×10^{-3}	-3.618×10^{-4}	-3.509×10^{-2}	3.725×10^{-2}	-1.192×10^{-3}	4.761×10^{-4}
fitted radiance squeeze [1]	$(-8.158 \pm 193.067) \times 10^{-6}$	6321513	2.153×10^{-4}	-4.069×10^{-6}	-1.675×10^{-2}	1.727×10^{-2}	-1.126×10^{-4}	1.027×10^{-4}
fitted root mean square [1]	$(1.418 \pm 0.644) \times 10^{-3}$	6321513	7.128×10^{-4}	1.210×10^{-3}	3.312×10^{-4}	7.716×10^{-2}	9.854×10^{-4}	1.698×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.652 ± 0.383	6321513	0.506	0.605	5.000×10^{-2}	2.78	0.362	0.868
sulfurdioxide total air mass factor polluted precision [1]	$(8.954 \pm 11.775) \times 10^{-2}$	6321513	8.678×10^{-2}	4.521×10^{-2}	2.500×10^{-3}	1.62	2.481×10^{-2}	0.112
sulfurdioxide clear air mass factor polluted [1]	0.581 ± 0.278	6321513	0.437	0.565	1.406×10^{-2}	1.99	0.349	0.787
number of spectral points in retrieval [1]	73.5 ± 0.5	6321513	1.000	73.0	52.0	156	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.574 ± 0.420	10957824	0.850	0.490	0.0	1.000	0.150	1.000
sulfurdioxide total vertical column [DU]	$(1.806 \pm 62.813) \times 10^{-2}$	10957824	0.335	7.070×10^{-3}	-33.5	43.0	-0.158	0.176
sulfurdioxide total vertical column precision [DU]	0.362 ± 0.446	10957824	0.249	0.257	2.533×10^{-2}	18.0	0.161	0.410
sulfurdioxide slant column density corrected [DU]	$(1.319 \pm 29.065) \times 10^{-2}$	10957824	0.312	7.273×10^{-3}	-26.9	41.3	-0.148	0.164
sulfurdioxide slant column density cobra [DU]	$(1.316 \pm 28.868) \times 10^{-2}$	10957824	0.312	7.273×10^{-3}	-26.9	24.8	-0.148	0.164
sulfurdioxide slant column density cobra precision [DU]	0.243 ± 0.091	10957824	7.992×10^{-2}	0.218	6.124×10^{-2}	15.7	0.188	0.268
sulfurdioxide slant column density window1 [DU]	0.125 ± 0.573	10957824	0.664	0.141	-185	84.3	-0.200	0.464
sulfurdioxide slant column density window1 precision [DU]	0.243 ± 0.091	10957824	7.992×10^{-2}	0.218	6.124×10^{-2}	15.7	0.188	0.268
sulfurdioxide slant column density corrected win1 [DU]	$(6.165 \pm 54.489) \times 10^{-2}$	10957824	0.625	5.339×10^{-2}	-185	84.4	-0.257	0.368
background so2 slant column offset window1 [DU]	$(-6.384 \pm 18.595) \times 10^{-2}$	10957824	0.274	-0.131	-1.48	3.08	-0.203	7.121×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.12 ± 7.89	10957824	10.1	3.14	-942	1.740×10^{3}	-1.89	8.16
sulfurdioxide slant column density window2 precision [DU]	7.26 ± 1.98	10957824	2.07	6.99	2.20	563	6.04	8.11
sulfurdioxide slant column density corrected win2 [DU]	0.792 ± 7.799	10957824	9.89	0.835	-942	1.738×10^{3}	-4.13	5.76
background so2 slant column offset window2 [DU]	-2.32 ± 1.71	10957824	2.30	-1.94	-11.1	4.18	-3.37	-1.07
sulfurdioxide slant column density window3 [DU]	-20.5 ± 22.1	10957824	27.7	-21.5	-681	718	-34.8	-7.03
sulfurdioxide slant column density window3 precision [DU]	25.8 ± 12.0	10957824	8.43	23.0	10.6	811	19.1	27.6
sulfurdioxide slant column density corrected win3 [DU]	-8.33 ± 21.17	10957824	26.4	-8.62	-678	729	-21.6	4.79
background so2 slant column offset window3 [DU]	12.1 ± 6.9	10957824	11.1	12.5	-13.6	30.7	6.49	17.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	10957824	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.793 \pm 3.317) \times 10^{-2}$	10957824	2.257×10^{-2}	2.205×10^{-2}	3.893×10^{-4}	1.99	1.271×10^{-2}	3.527×10^{-2}
fitted radiance shift [nm]	$(-5.774 \pm 23.977) \times 10^{-4}$	10957824	1.630×10^{-3}	-6.208×10^{-4}	-6.535×10^{-2}	4.258×10^{-2}	-1.439×10^{-3}	1.912×10^{-4}
fitted radiance squeeze [1]	$(-8.593 \pm 16.882) \times 10^{-5}$	10957824	2.073×10^{-4}	-7.326×10^{-5}	-1.619×10^{-2}	2.438×10^{-2}	-1.832×10^{-4}	2.407×10^{-5}
fitted root mean square [1]	$(1.108 \pm 0.383) \times 10^{-3}$	10957824	3.806×10^{-4}	1.020×10^{-3}	2.747×10^{-4}	6.736×10^{-2}	8.691×10^{-4}	1.250×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.06 ± 0.68	10957824	0.827	0.845	5.000×10^{-2}	3.12	0.569	1.40
sulfurdioxide total air mass factor polluted precision [1]	0.161 ± 0.146	10957824	0.197	0.118	4.601×10^{-3}	1.60	4.161×10^{-2}	0.238
sulfurdioxide clear air mass factor polluted [1]	0.936 ± 0.700	10957824	0.385	0.671	0.119	3.13	0.536	0.921
number of spectral points in retrieval [1]	73.4 ± 0.5	10957824	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]	0.667 ± 0.404	12240237	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.057 \pm 117.090) \times 10^{-2}$	12240237	0.424	9.184×10^{-3}	-107	133	-0.201	0.224
sulfurdioxide total vertical column precision [DU]	0.514 ± 0.850	12240237	0.283	0.309	4.802×10^{-2}	49.5	0.211	0.494
sulfurdioxide slant column density corrected [DU]	$(1.408 \pm 32.823) \times 10^{-2}$	12240237	0.323	7.593×10^{-3}	-12.7	143	-0.153	0.170
sulfurdioxide slant column density cobra [DU]	$(1.394 \pm 31.382) \times 10^{-2}$	12240237	0.323	7.593×10^{-3}	-12.7	41.3	-0.153	0.170
sulfurdioxide slant column density cobra precision [DU]	0.257 ± 0.111	12240237	9.268×10^{-2}	0.223	8.059×10^{-2}	15.1	0.191	0.284
sulfurdioxide slant column density window1 [DU]	0.186 ± 0.601	12240237	0.666	0.191	-185	123	-0.144	0.521
sulfurdioxide slant column density window1 precision [DU]	0.257 ± 0.111	12240237	9.268×10^{-2}	0.223	8.059×10^{-2}	15.1	0.191	0.284
sulfurdioxide slant column density corrected win1 [DU]	$(6.988 \pm 58.872) \times 10^{-2}$	12240237	0.645	5.810×10^{-2}	-185	124	-0.261	0.384
background so2 slant column offset window1 [DU]	-0.116 ± 0.149	12240237	0.178	-0.154	-1.48	2.64	-0.213	-3.488×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.13 ± 8.31	12240237	10.5	3.04	-583	1.740×10^{3}	-2.18	8.30
sulfurdioxide slant column density window2 precision [DU]	7.60 ± 2.06	12240237	2.31	7.28	2.15	513	6.25	8.56
sulfurdioxide slant column density corrected win2 [DU]	0.687 ± 8.168	12240237	10.4	0.738	-584	1.738×10^{3}	-4.47	5.89
background so2 slant column offset window2 [DU]	-2.45 ± 2.07	12240237	2.09	-1.89	-16.4	4.18	-3.21	-1.12
sulfurdioxide slant column density window3 [DU]	-19.2 ± 23.1	12240237	29.3	-19.8	-508	718	-34.0	-4.69
sulfurdioxide slant column density window3 precision [DU]	27.3 ± 11.8	12240237	8.73	24.4	10.5	265	20.9	29.6
sulfurdioxide slant column density corrected win3 [DU]	-6.30 ± 22.19	12240237	28.1	-6.80	-501	729	-20.5	7.59
background so2 slant column offset window3 [DU]	12.9 ± 6.6	12240237	8.92	13.1	-13.6	41.4	8.48	17.4
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.13	12240237	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.512 \pm 6.858) \times 10^{-2}$	12240237	2.393×10^{-2}	2.349×10^{-2}	6.190×10^{-4}	2.71	1.439×10^{-2}	3.832×10^{-2}
fitted radiance shift [nm]	$(-4.245 \pm 23.954) \times 10^{-4}$	12240237	1.749×10^{-3}	-4.362×10^{-4}	-4.533×10^{-2}	4.258×10^{-2}	-1.327×10^{-3}	4.218×10^{-4}
fitted radiance squeeze [1]	$(-4.907 \pm 16.813) \times 10^{-5}$	12240237	1.970×10^{-4}	-4.164×10^{-5}	-1.675×10^{-2}	2.438×10^{-2}	-1.432×10^{-4}	5.374×10^{-5}
fitted root mean square [1]	$(1.148 \pm 0.459) \times 10^{-3}$	12240237	3.859×10^{-4}	1.023×10^{-3}	2.969×10^{-4}	7.716×10^{-2}	8.761×10^{-4}	1.262×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.811 ± 0.421	12240237	0.499	0.740	5.000×10^{-2}	2.64	0.523	1.02
sulfurdioxide total air mass factor polluted precision [1]	0.127 ± 0.129	12240237	0.141	7.214×10^{-2}	2.500×10^{-3}	1.21	3.647×10^{-2}	0.178
sulfurdioxide clear air mass factor polluted [1]	0.664 ± 0.246	12240237	0.297	0.631	2.413×10^{-2}	2.74	0.504	0.801
number of spectral points in retrieval [1]	73.4 ± 0.5	12240237	1.000	73.0	52.0	156	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.511 ± 0.421	4405138	0.900	0.460	0.0	1.000	0.1000	1.000
sulfurdioxide total vertical column [DU]	$(8.639 \pm 213.235) \times 10^{-2}$	4405138	0.368	9.068×10^{-3}	-119	183	-0.166	0.201
sulfurdioxide total vertical column precision [DU]	0.733 ± 1.530	4405138	0.558	0.300	2.533×10^{-2}	222	0.124	0.682
sulfurdioxide slant column density corrected [DU]	$(3.029 \pm 44.211) \times 10^{-2}$	4405138	0.385	1.159×10^{-2}	-14.3	53.5	-0.178	0.207
sulfurdioxide slant column density cobra [DU]	$(3.001 \pm 42.646) \times 10^{-2}$	4405138	0.385	1.159×10^{-2}	-14.3	35.4	-0.178	0.207
sulfurdioxide slant column density cobra precision [DU]	0.306 ± 0.137	4405138	0.135	0.266	6.124×10^{-2}	21.1	0.219	0.354
sulfurdioxide slant column density window1 [DU]	0.110 ± 0.767	4405138	0.839	0.114	-39.3	47.9	-0.316	0.523
sulfurdioxide slant column density window1 precision [DU]	0.306 ± 0.137	4405138	0.135	0.266	6.124×10^{-2}	21.1	0.219	0.354
sulfurdioxide slant column density corrected win1 [DU]	$(9.581 \pm 73.479) \times 10^{-2}$	4405138	0.768	7.093×10^{-2}	-39.3	47.8	-0.307	0.461
background so2 slant column offset window1 [DU]	$(-1.462 \pm 22.605) \times 10^{-2}$	4405138	0.379	-9.080×10^{-2}	-0.968	5.09	-0.196	0.183
sulfurdioxide slant column density window2 [DU]	4.53 ± 9.12	4405138	11.4	4.41	-942	975	-1.23	10.1
sulfurdioxide slant column density window2 precision [DU]	8.16 ± 2.41	4405138	2.86	7.77	2.31	563	6.52	9.38
sulfurdioxide slant column density corrected win2 [DU]	0.915 ± 8.808	4405138	11.0	0.944	-942	974	-4.56	6.41
background so2 slant column offset window2 [DU]	-3.61 ± 2.61	4405138	3.85	-3.29	-15.1	4.18	-5.23	-1.38
sulfurdioxide slant column density window3 [DU]	-29.6 ± 22.7	4405138	27.5	-29.1	-681	166	-43.1	-15.6
sulfurdioxide slant column density window3 precision [DU]	27.2 ± 13.2	4405138	11.2	24.4	11.0	550	19.1	30.3
sulfurdioxide slant column density corrected win3 [DU]	-13.3 ± 23.1	4405138	28.1	-12.5	-678	185	-26.9	1.21
background so2 slant column offset window3 [DU]	16.3 ± 7.3	4405138	11.1	18.2	-13.6	41.4	10.9	22.0
sulfurdioxide slant column cobra flag [1]	1.94 ± 0.33	4405138	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.446 \pm 21.275) \times 10^{-2}$	4405138	4.529×10^{-2}	1.988×10^{-2}	3.893×10^{-4}	3.46	9.634×10^{-3}	5.493×10^{-2}
fitted radiance shift [nm]	$(-6.621 \pm 24.708) \times 10^{-4}$	4405138	1.361×10^{-3}	-7.434×10^{-4}	-6.535×10^{-2}	3.748×10^{-2}	-1.408×10^{-3}	-4.724×10^{-5}
fitted radiance squeeze [1]	$(-8.381 \pm 20.832) \times 10^{-5}$	4405138	2.593×10^{-4}	-7.930×10^{-5}	-1.286×10^{-2}	1.162×10^{-2}	-2.132×10^{-4}	4.607×10^{-5}
fitted root mean square [1]	$(1.384 \pm 0.559) \times 10^{-3}$	4405138	5.705×10^{-4}	1.255×10^{-3}	2.747×10^{-4}	5.197×10^{-2}	1.029×10^{-3}	1.599×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.23 ± 0.91	4405138	1.78	0.844	5.000×10^{-2}	3.12	0.436	2.22
sulfurdioxide total air mass factor polluted precision [1]	0.160 ± 0.165	4405138	0.211	0.121	2.500×10^{-3}	1.62	2.793×10^{-2}	0.239
sulfurdioxide clear air mass factor polluted [1]	1.24 ± 1.00	4405138	1.98	0.740	1.406×10^{-2}	3.13	0.426	2.40
number of spectral points in retrieval [1]	73.4 ± 0.5	4405138	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

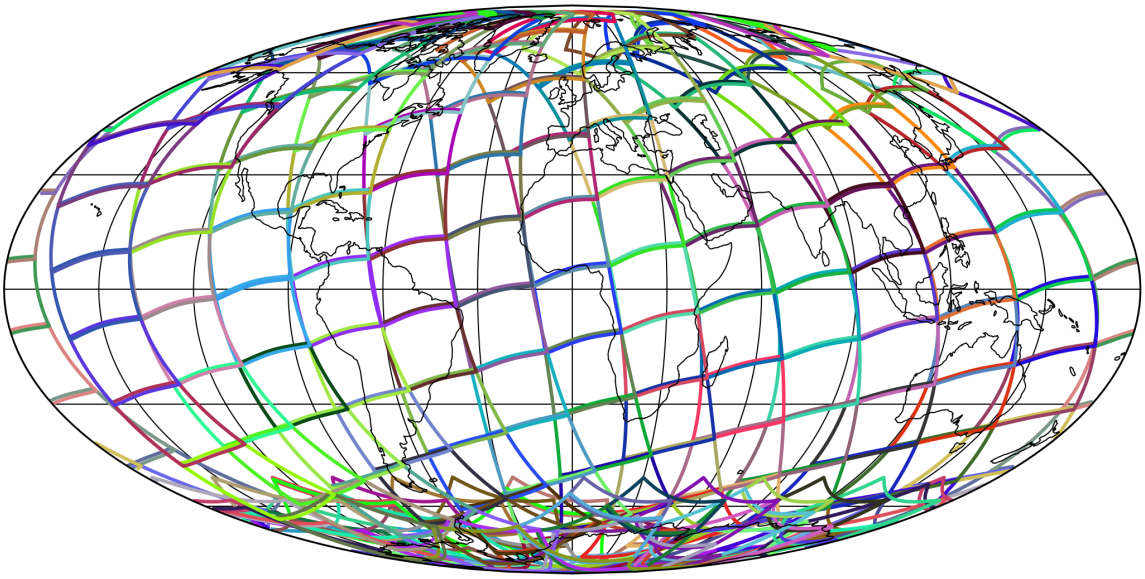

Figure 1: Outline of the granules.

4 Input data monitoring

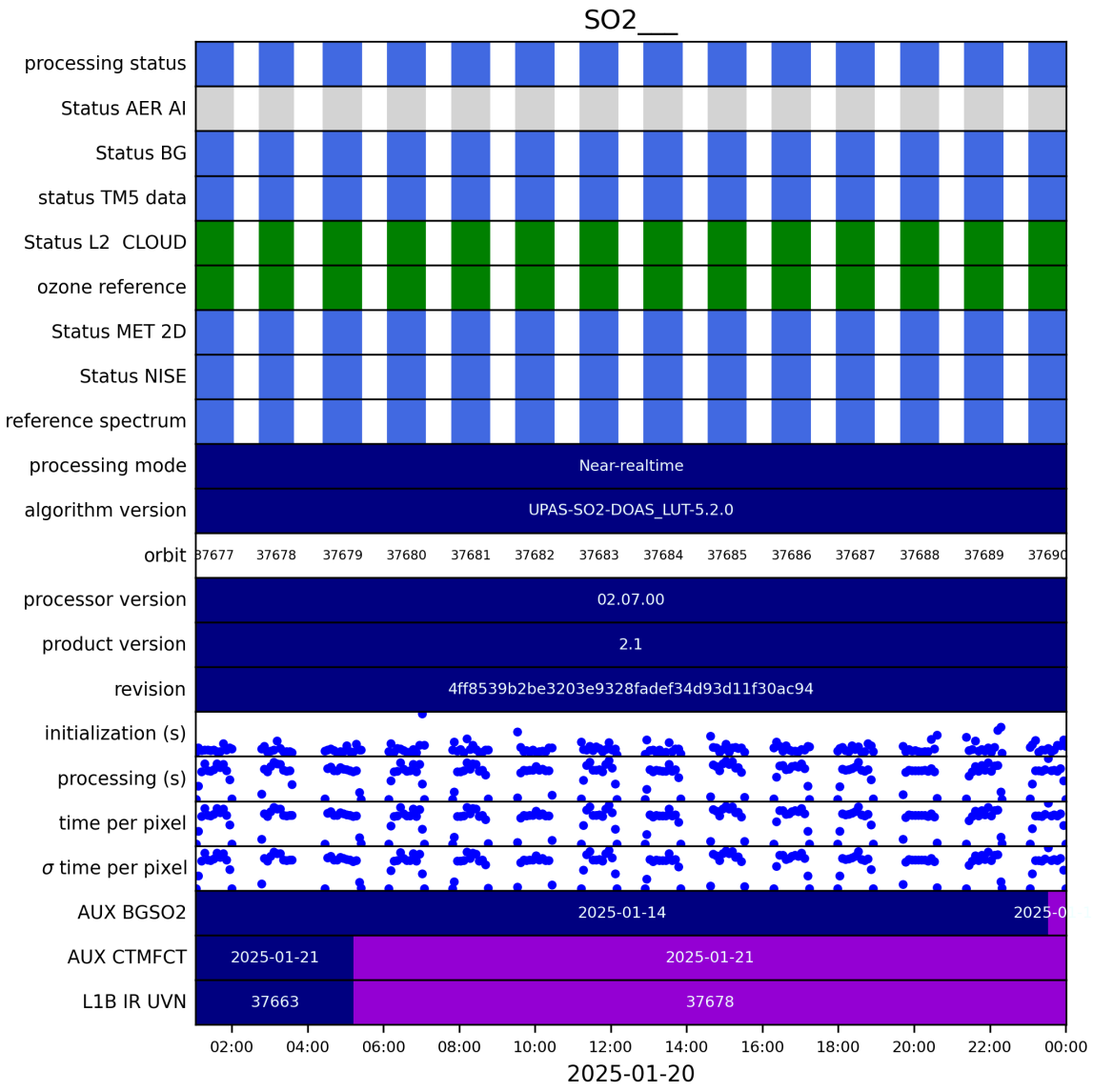

Figure 2: Input data per granule

5 Warnings and errors

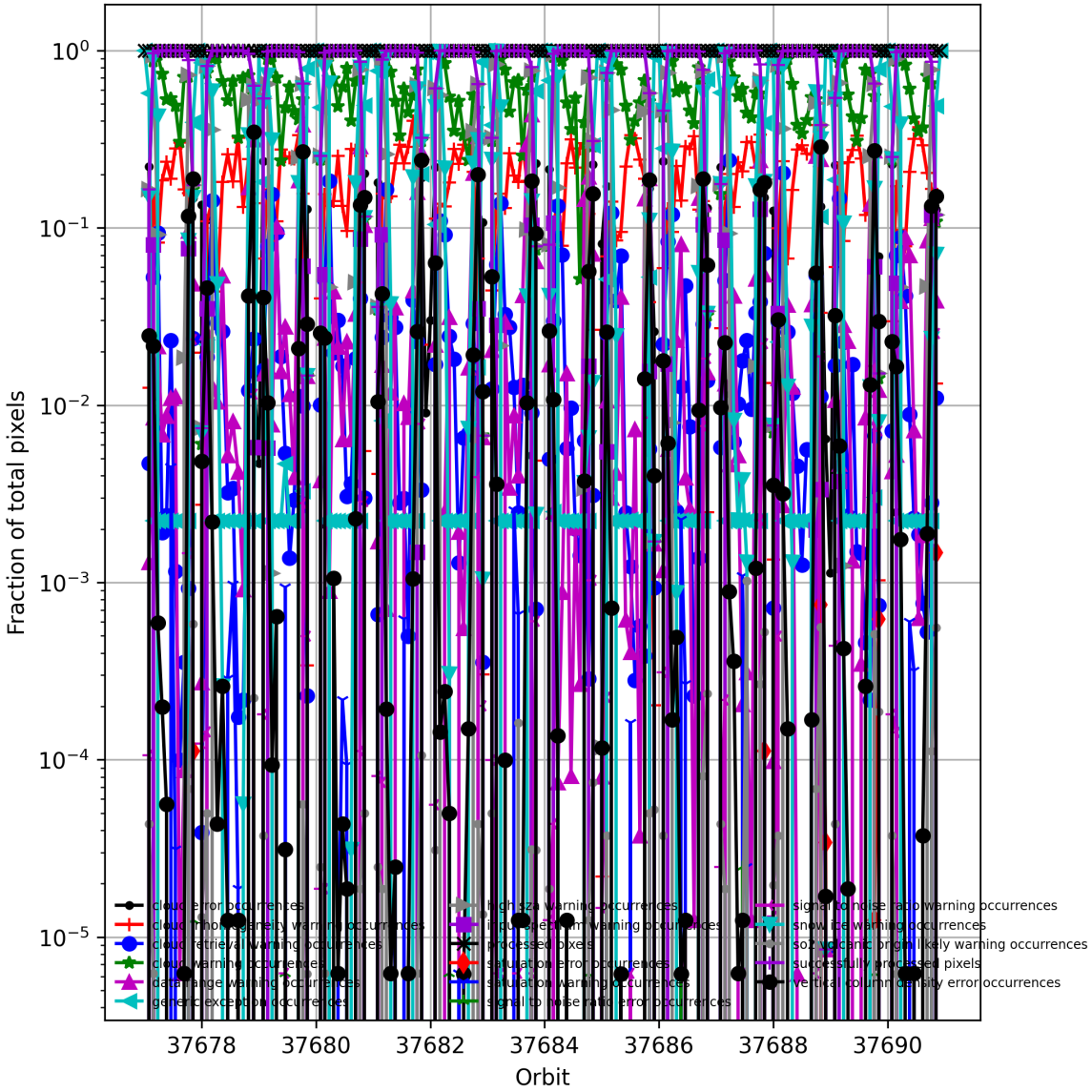

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

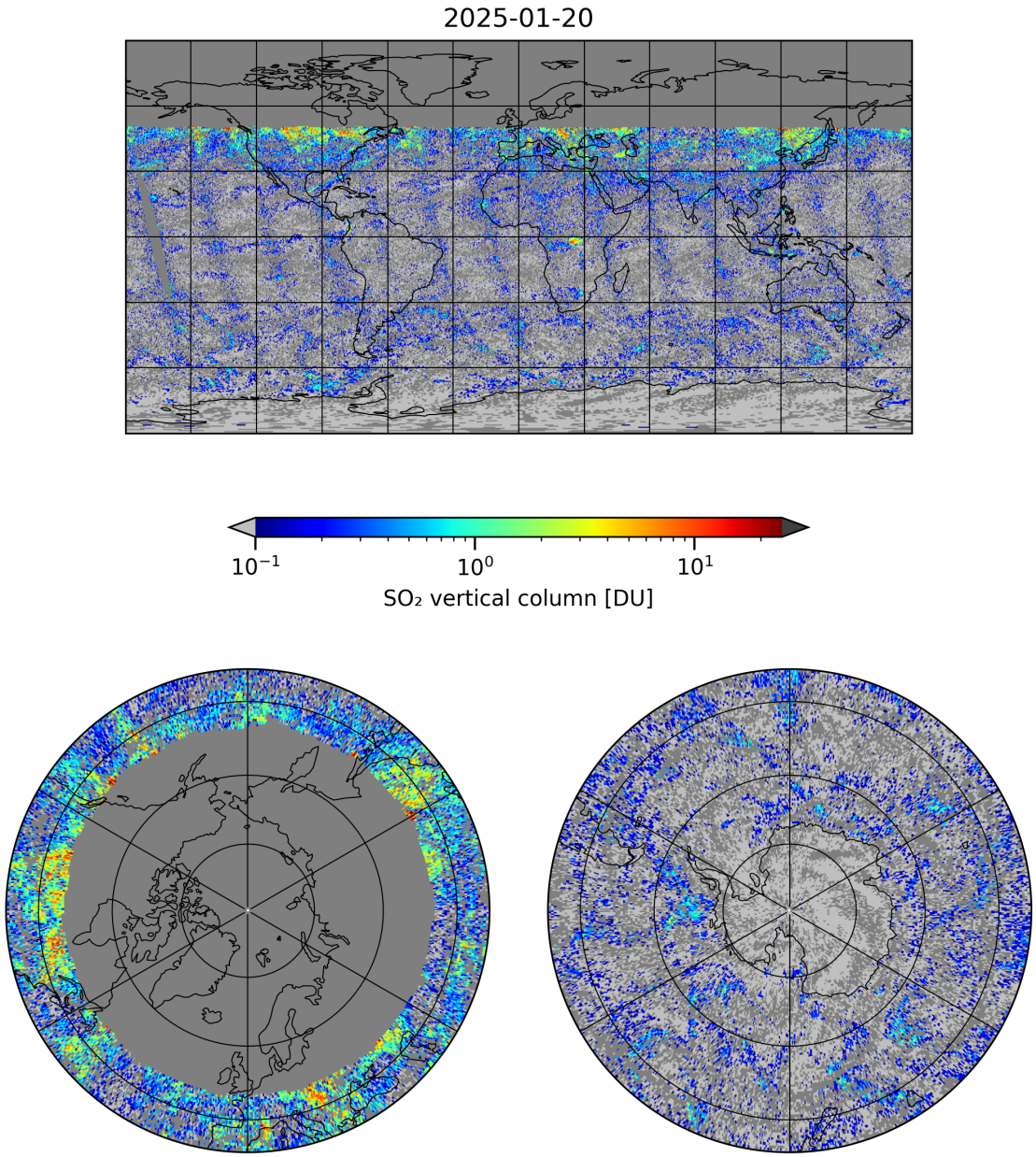

Figure 4: Map of "SO_2 vertical column" for 2025-01-20 to 2025-01-21

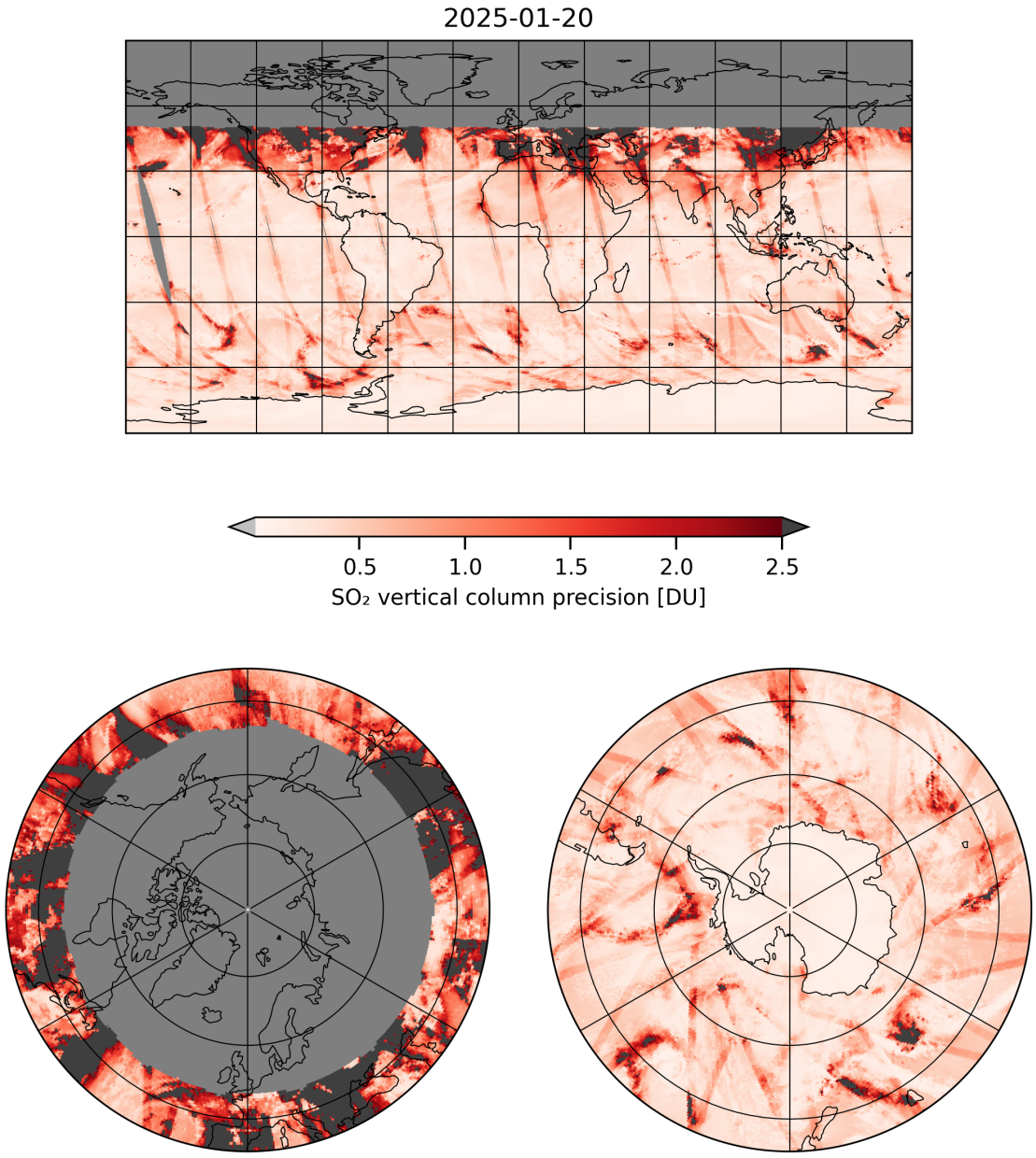

Figure 5: Map of "SO_2 vertical column precision" for 2025-01-20 to 2025-01-21

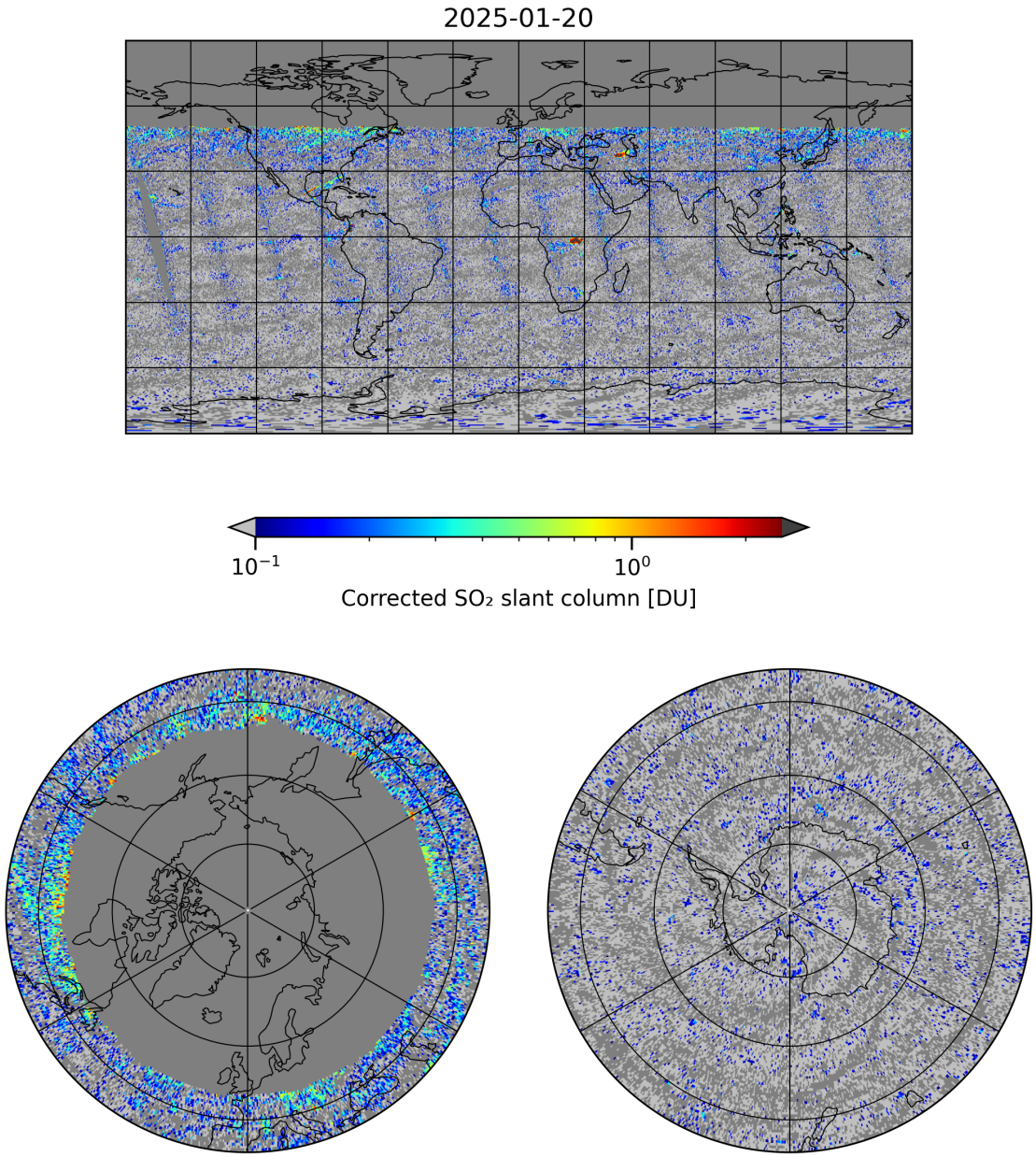

Figure 6: Map of "Corrected SO_2 slant column" for 2025-01-20 to 2025-01-21

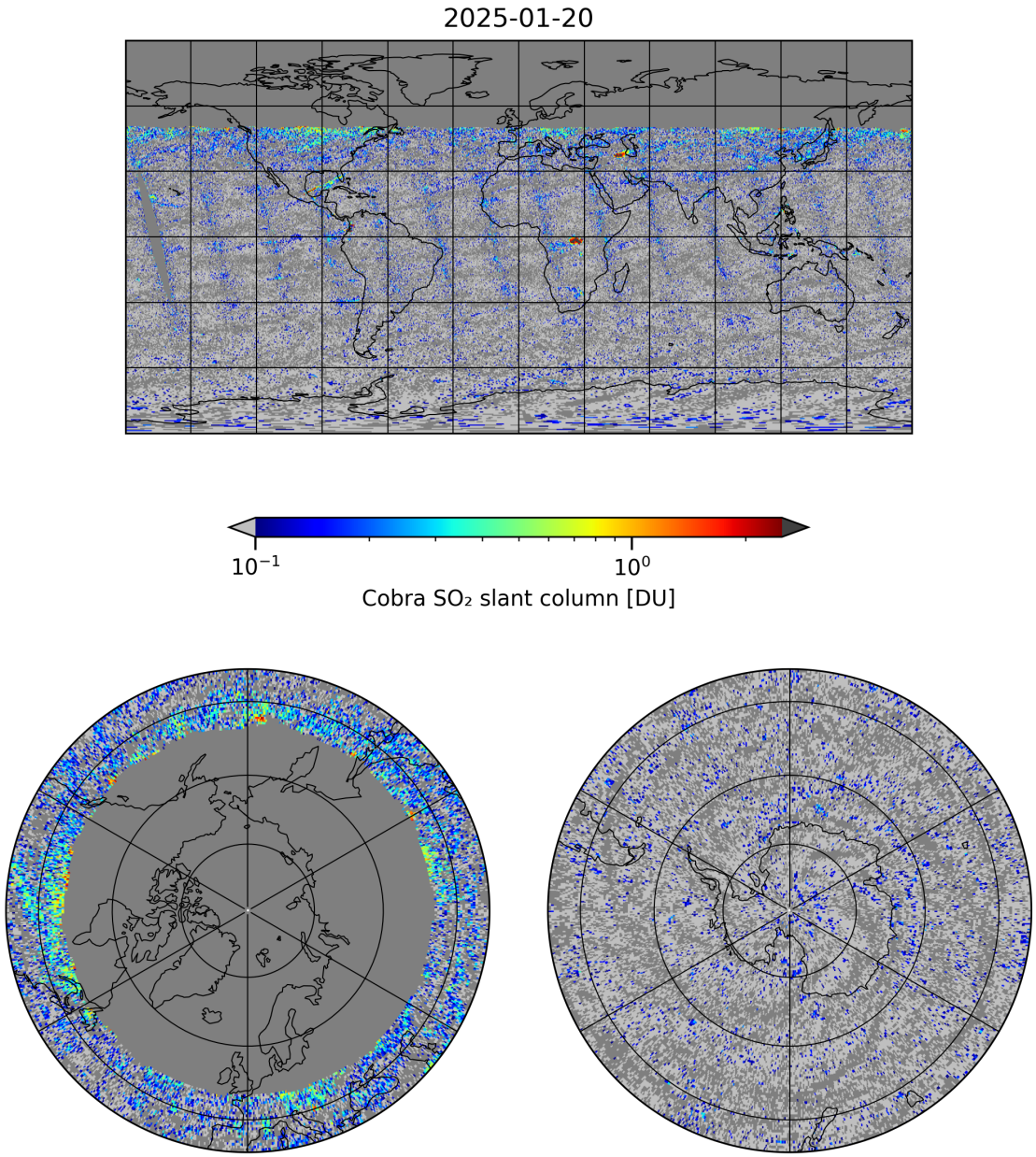

Figure 7: Map of "Cobra SO_2 slant column" for 2025-01-20 to 2025-01-21

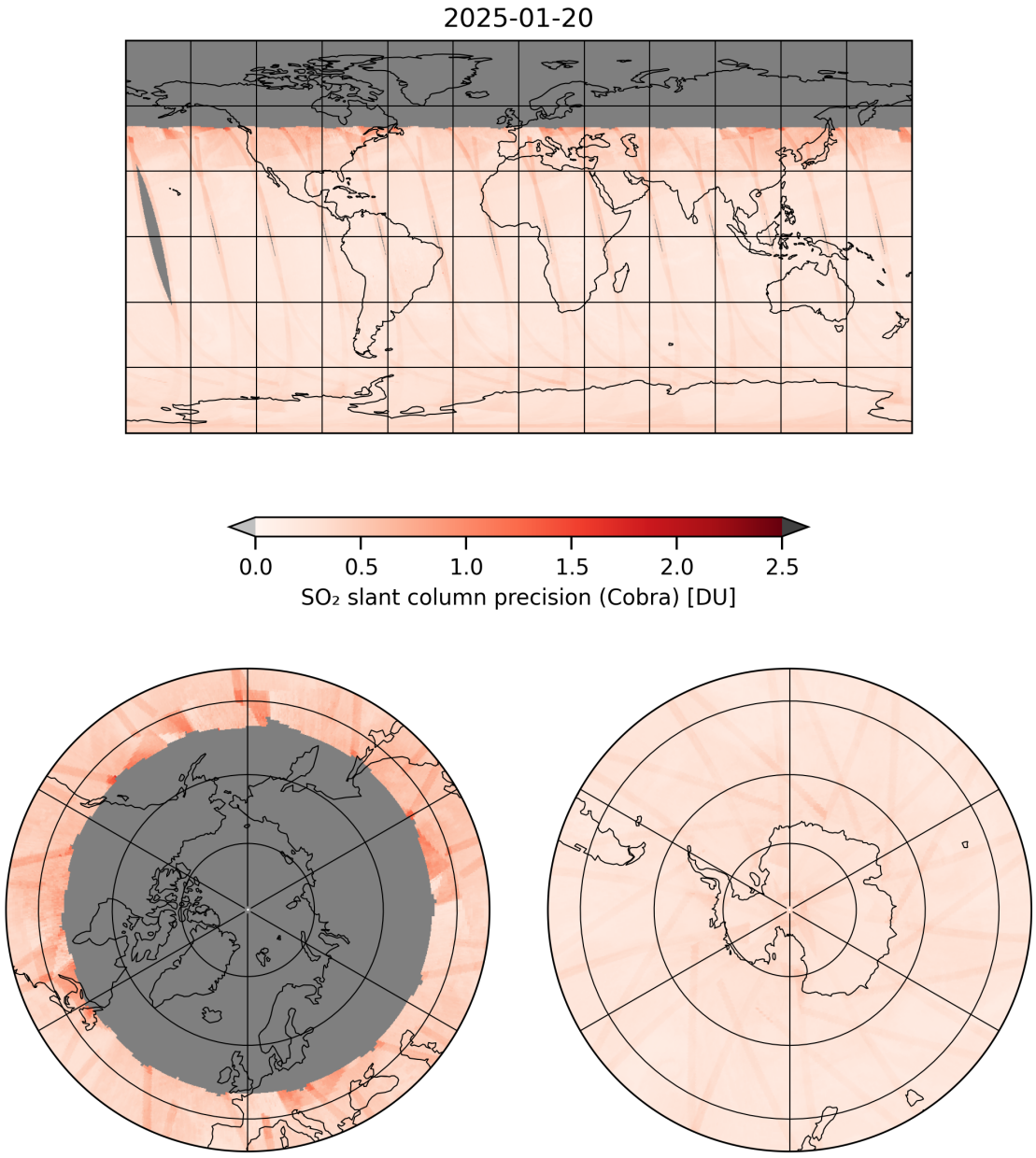

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-01-20 to 2025-01-21

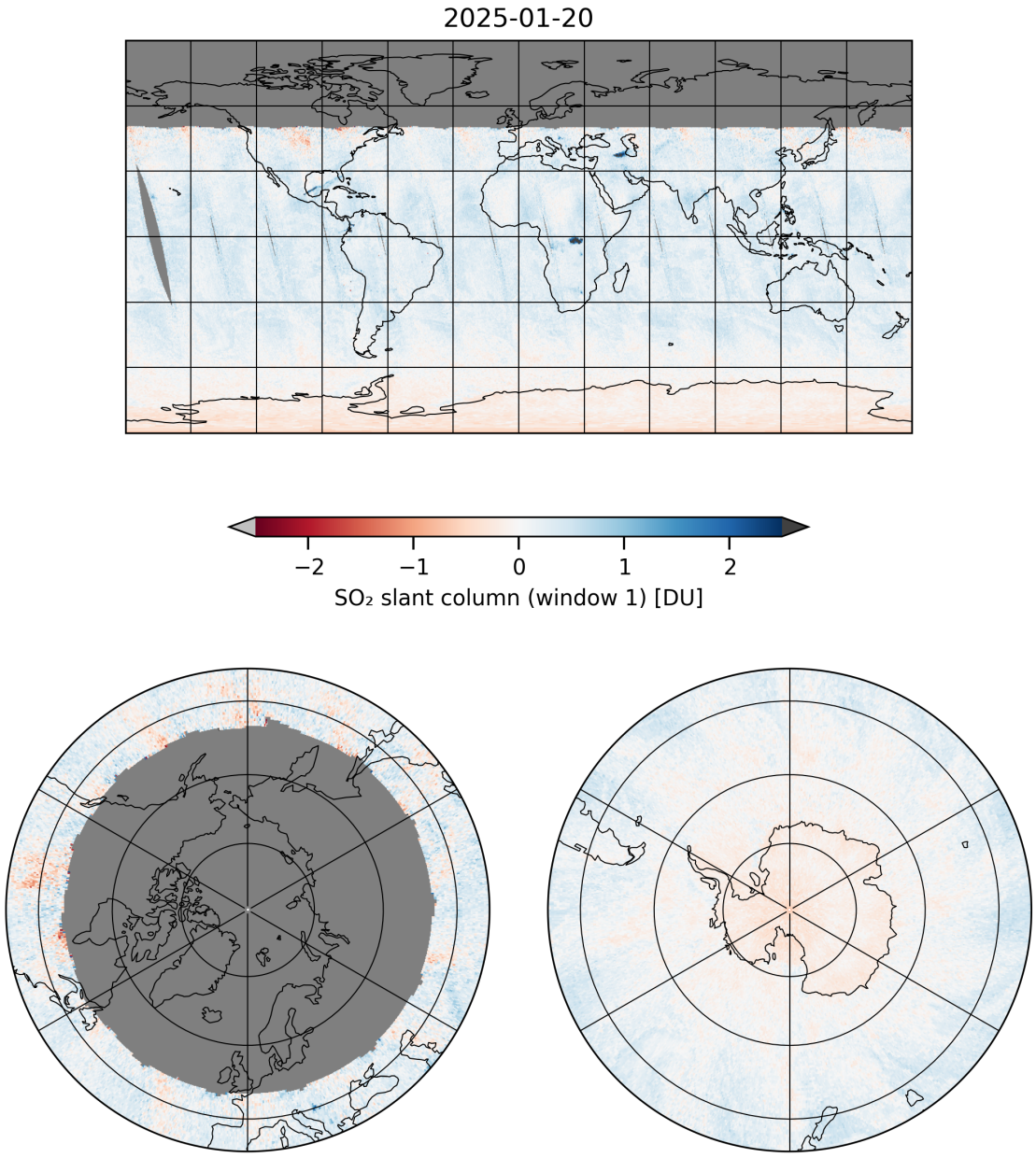

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-01-20 to 2025-01-21

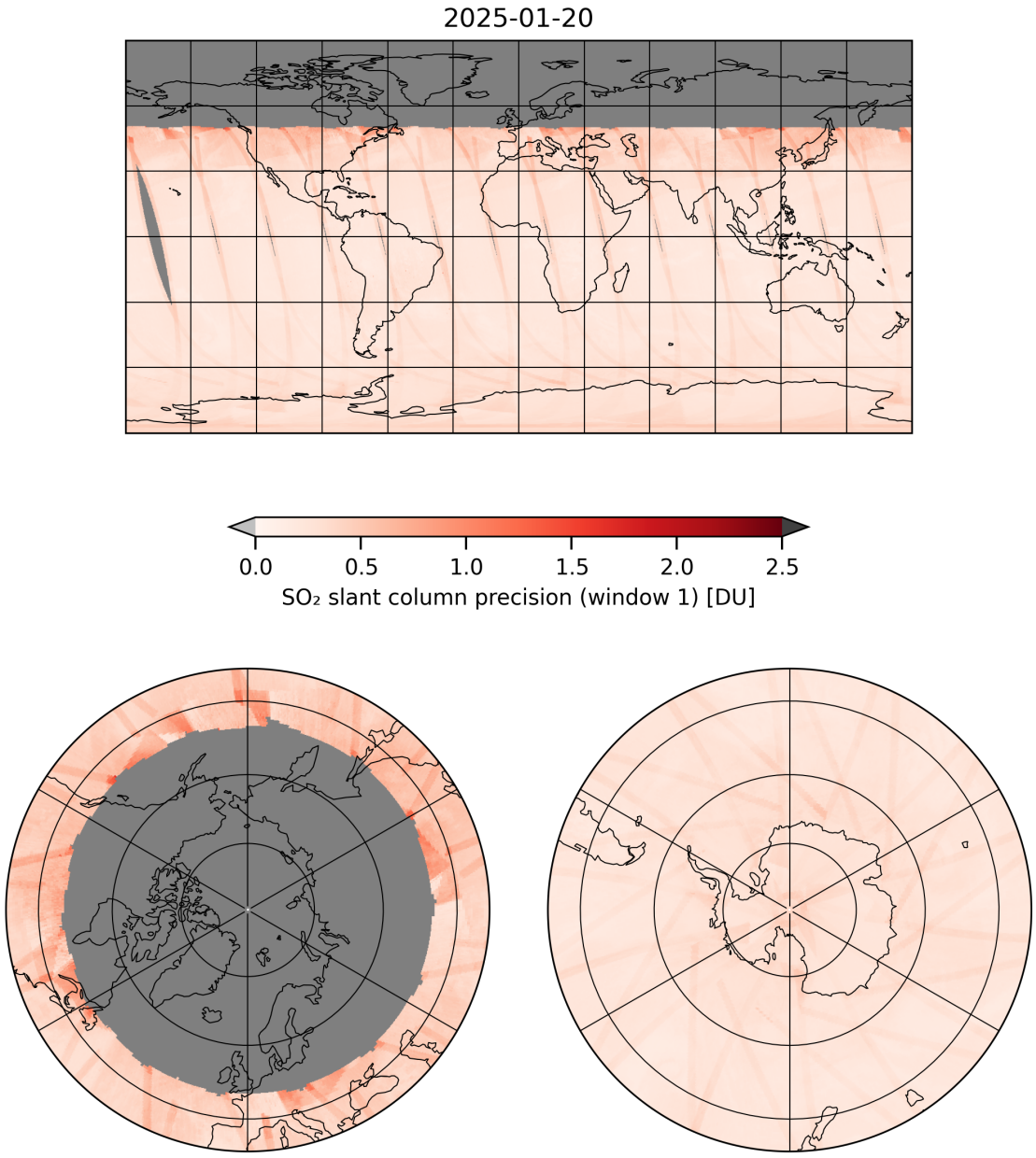

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-01-20 to 2025-01-21

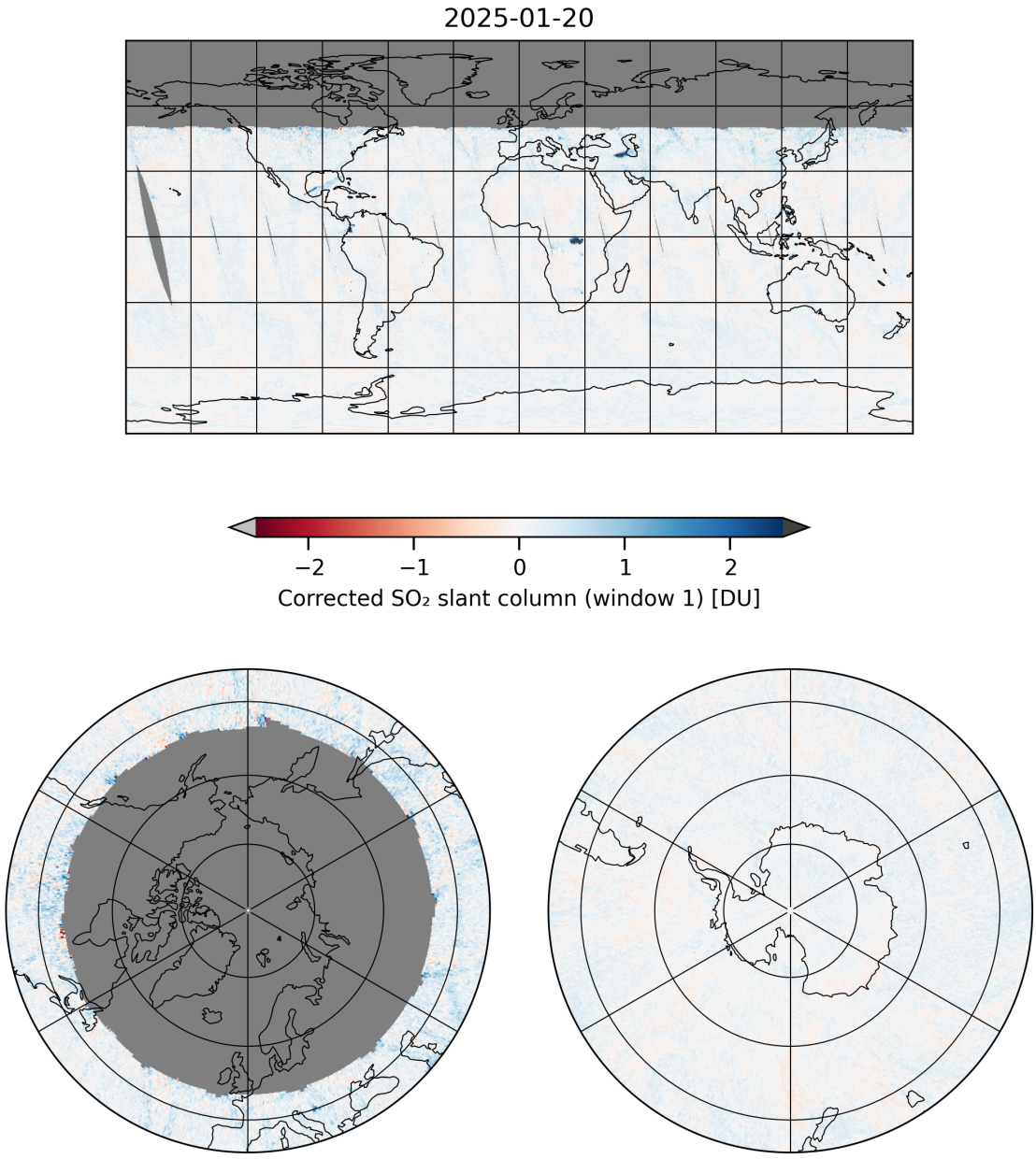

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-01-20 to 2025-01-21

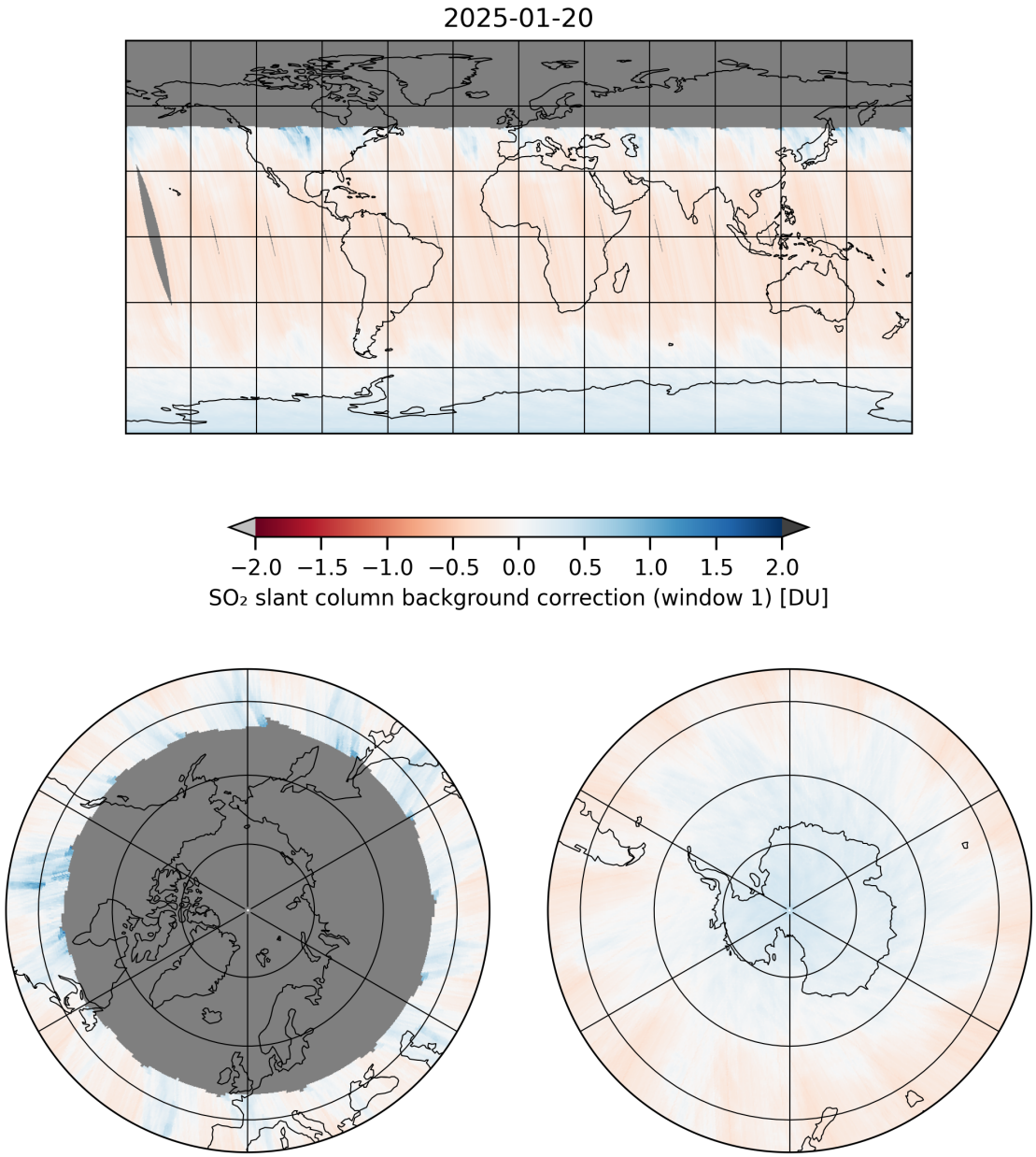

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-01-20 to 2025-01-21

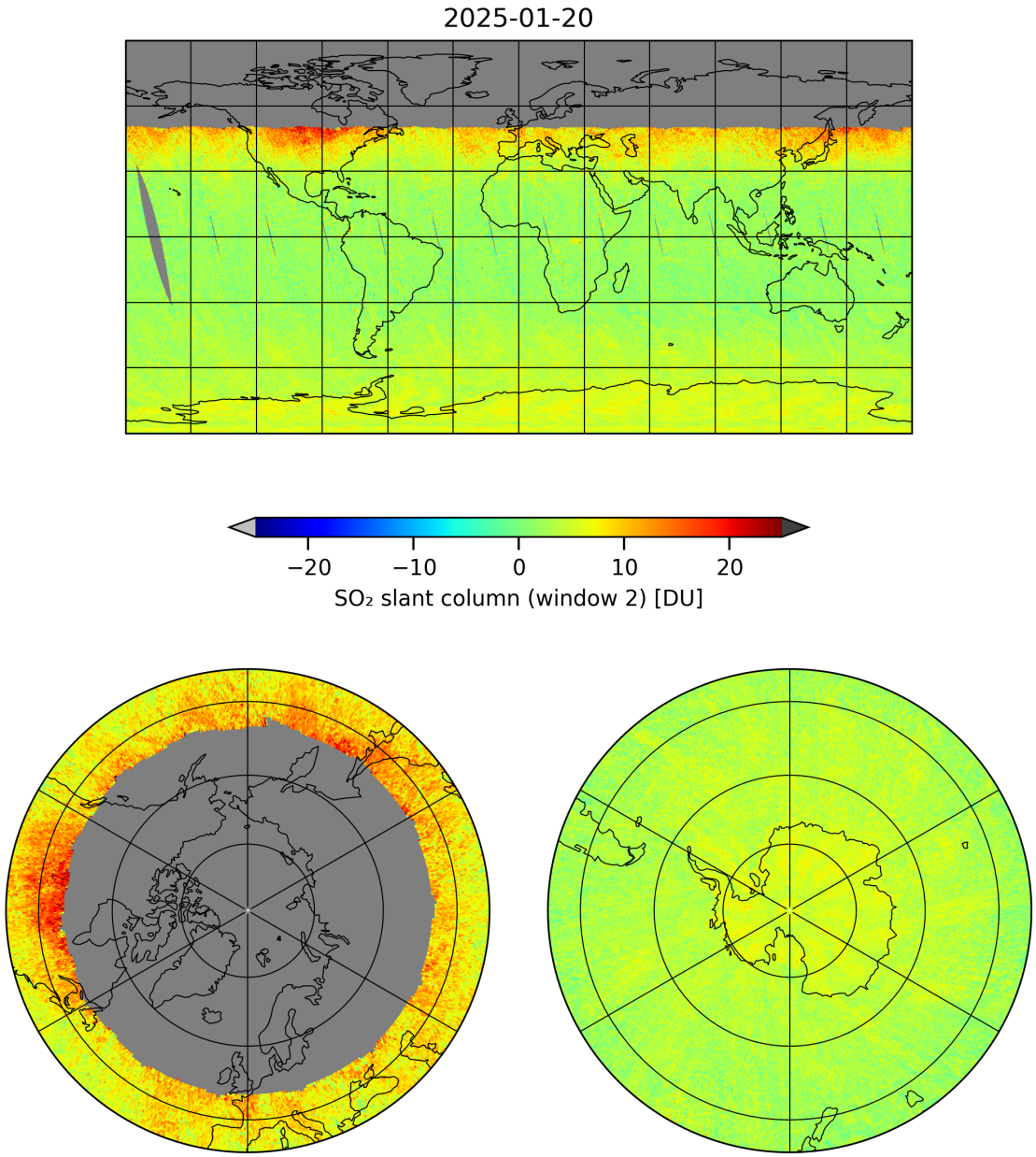

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-01-20 to 2025-01-21

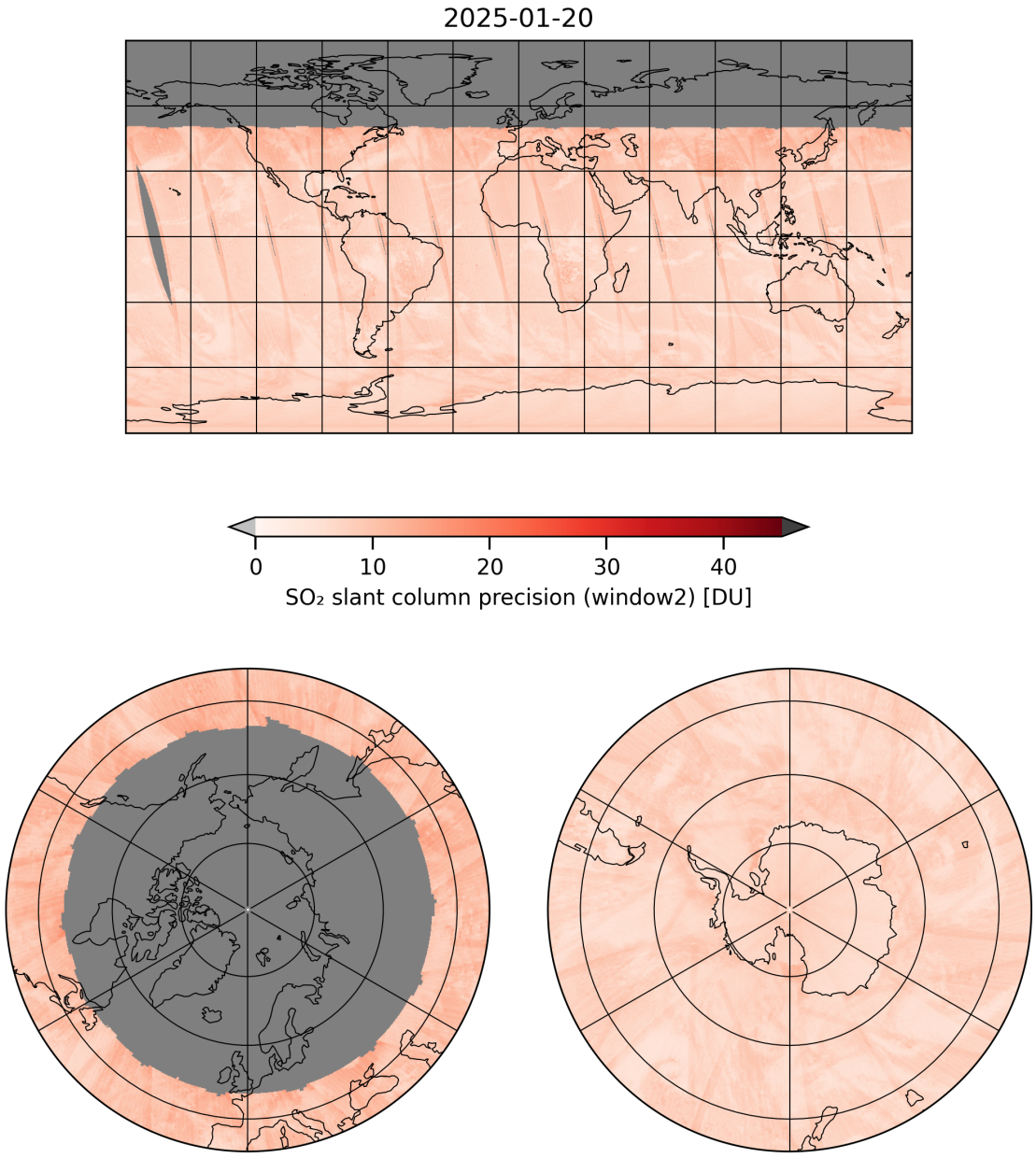

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-01-20 to 2025-01-21

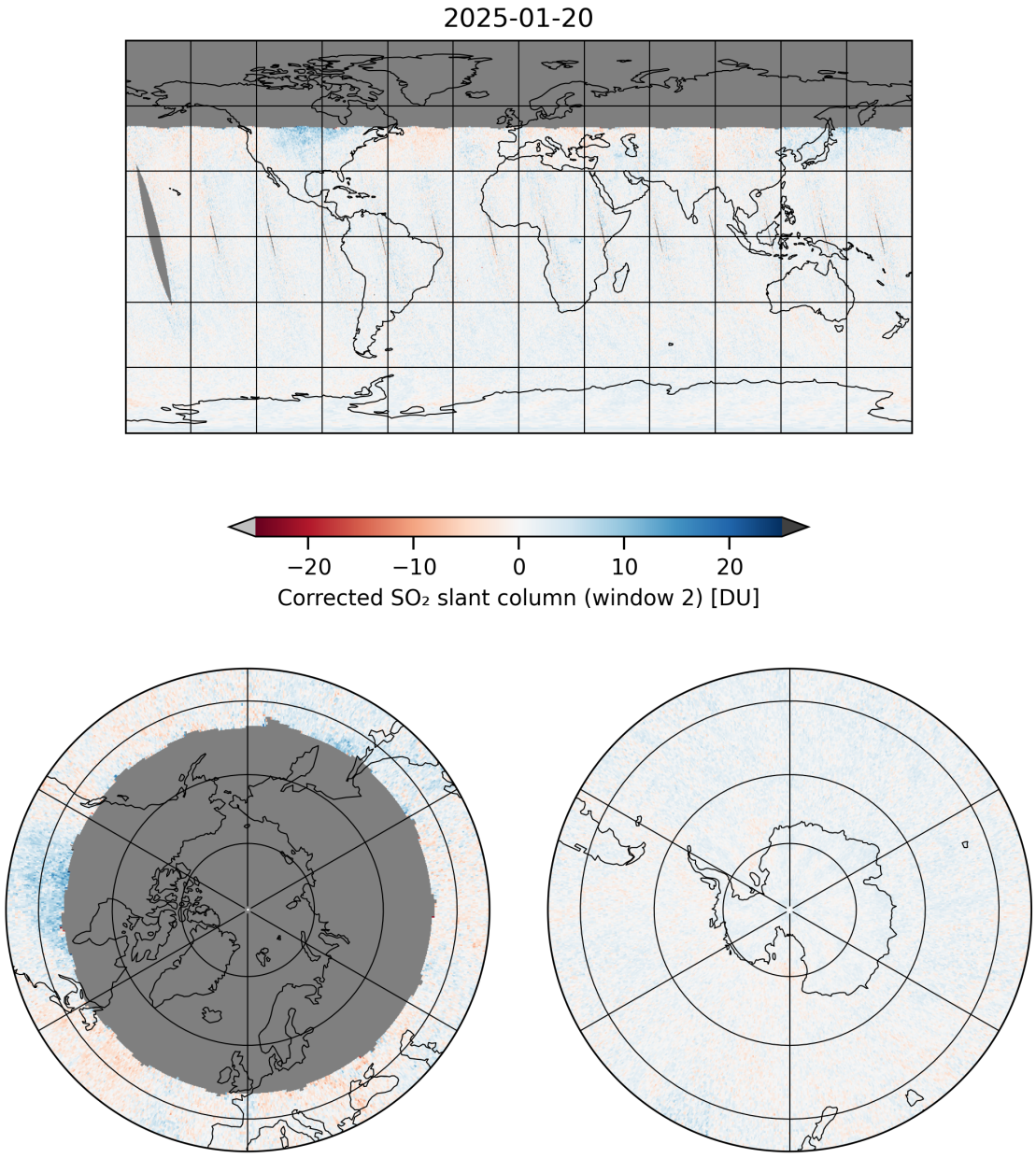

Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-01-20 to 2025-01-21

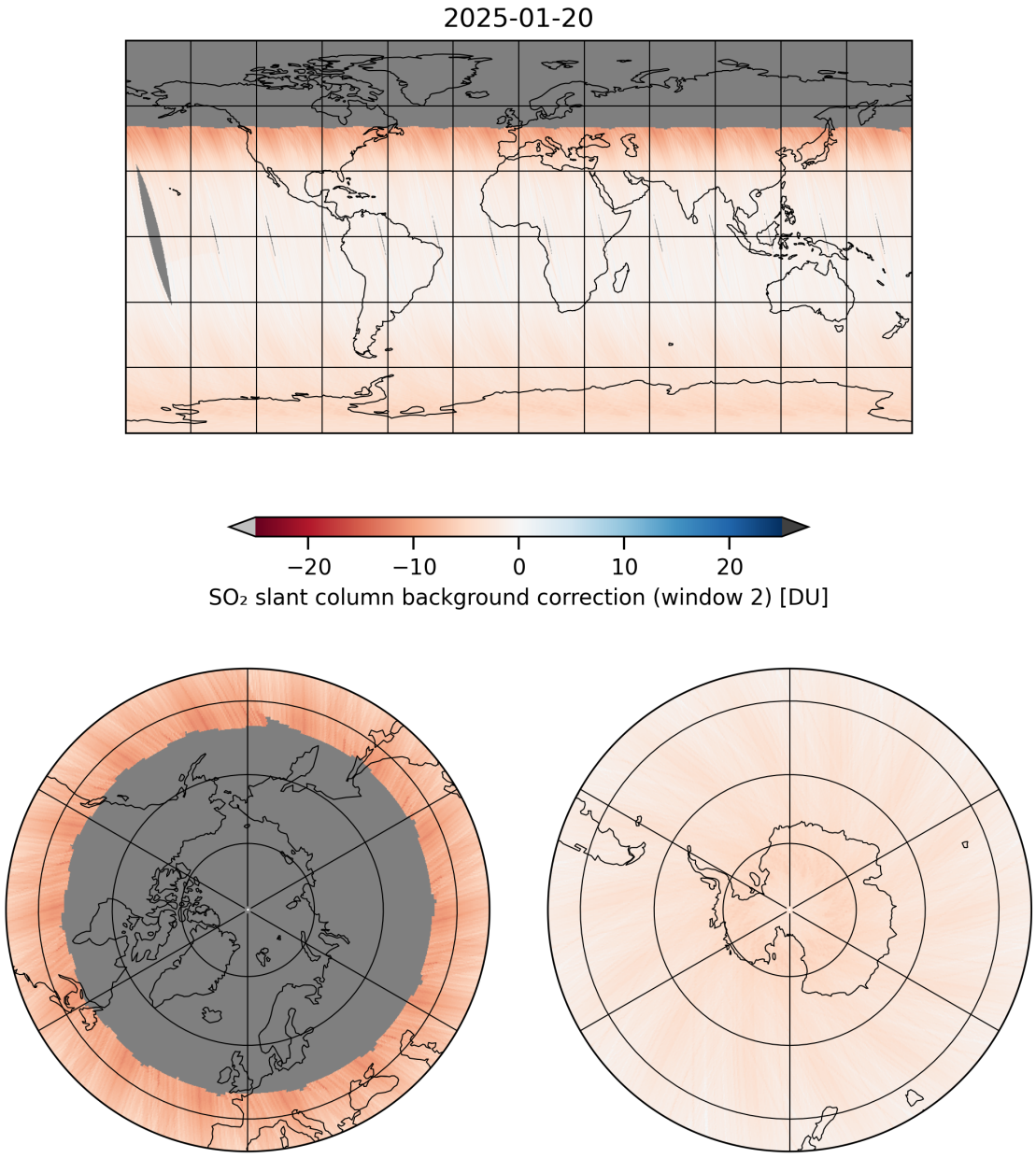

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-01-20 to 2025-01-21

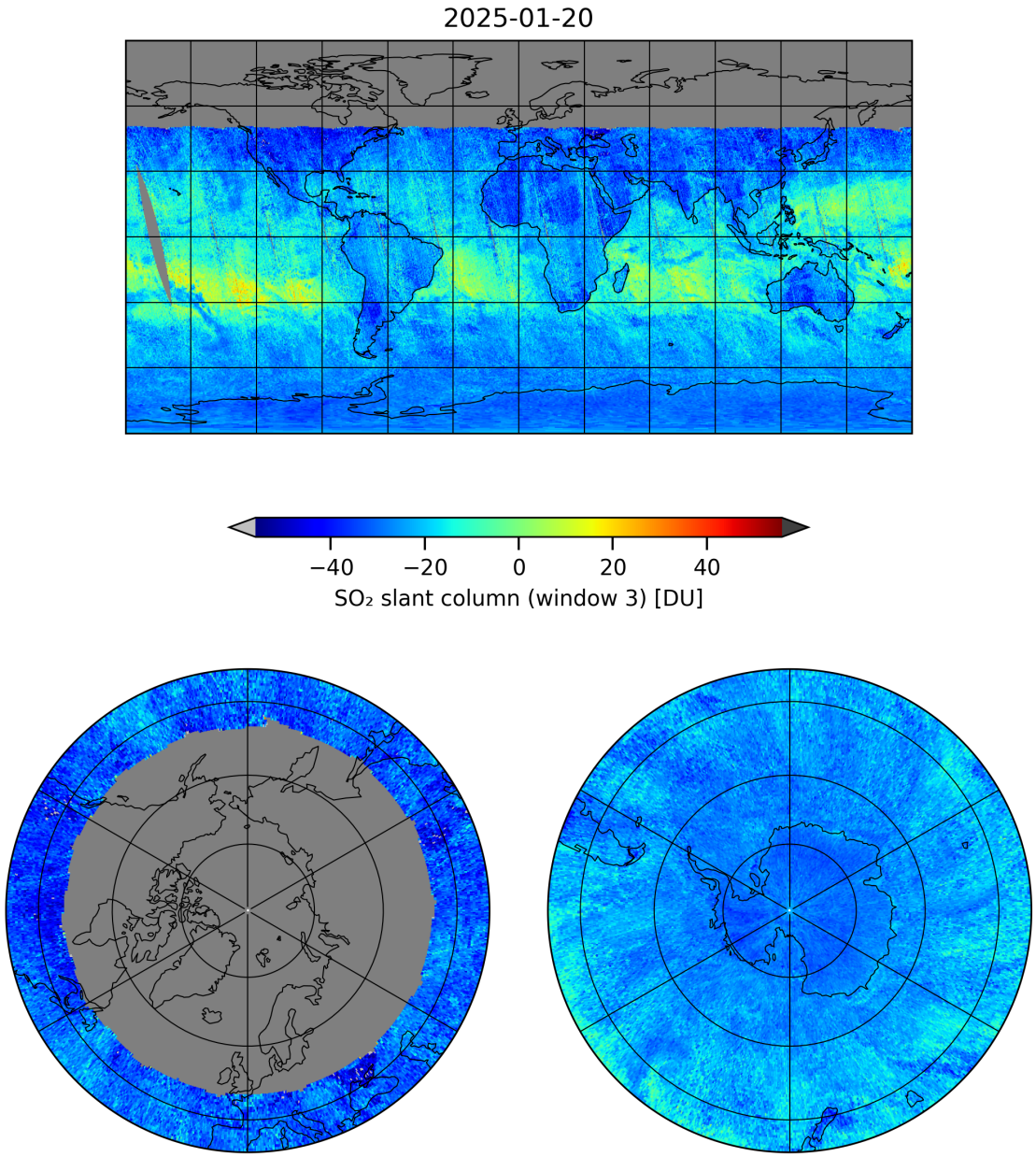

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-01-20 to 2025-01-21

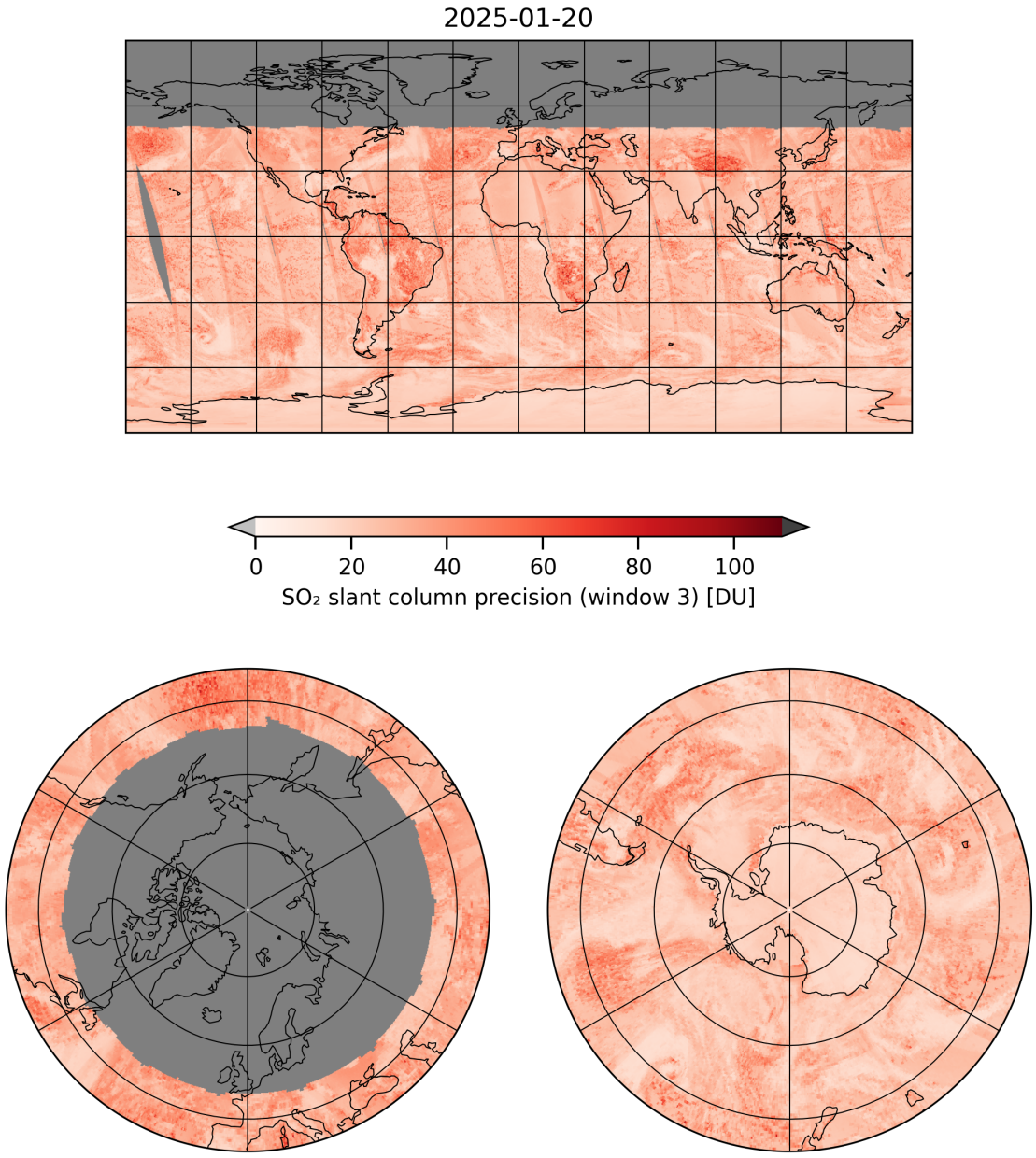

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-01-20 to 2025-01-21

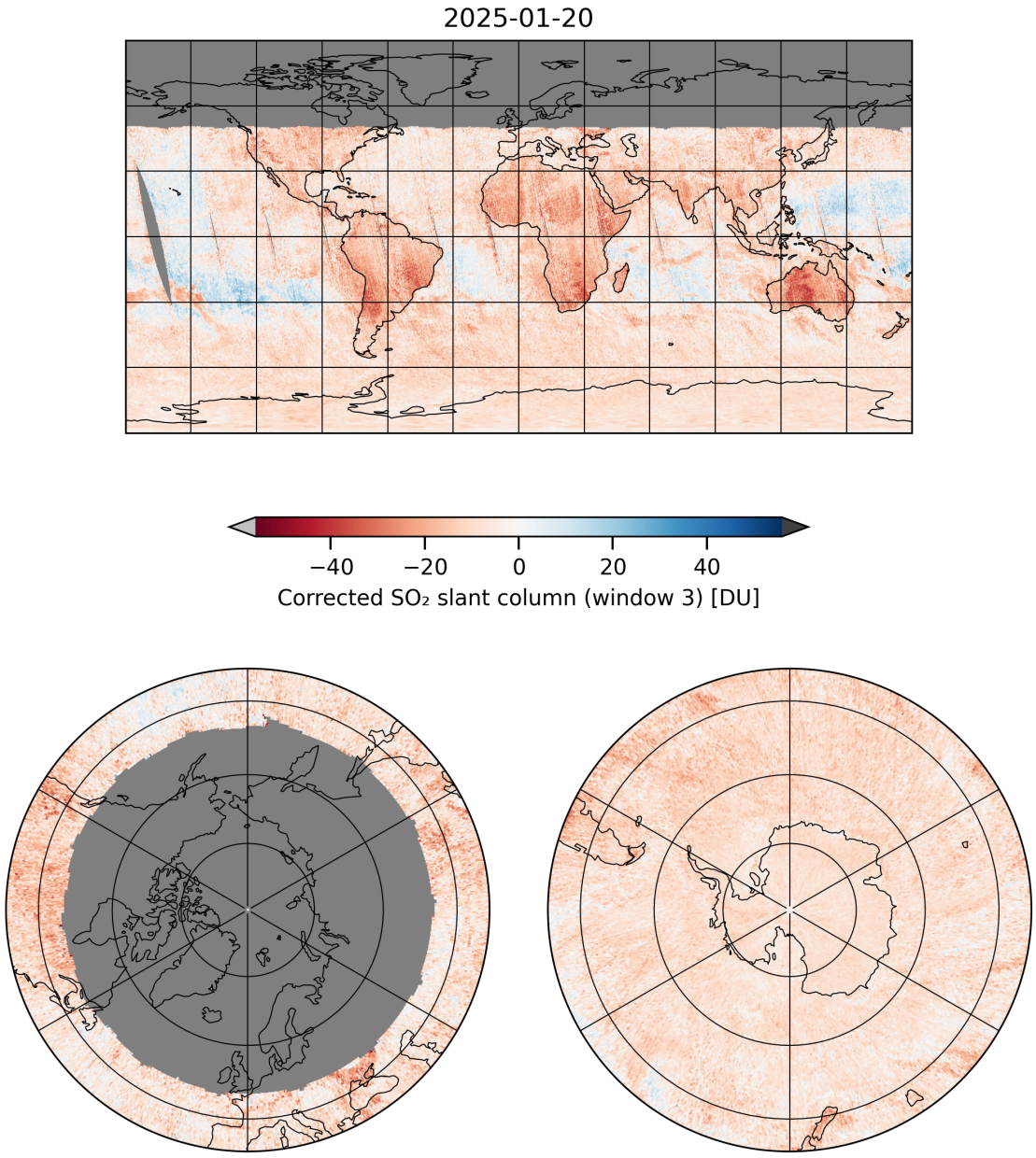

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-01-20 to 2025-01-21

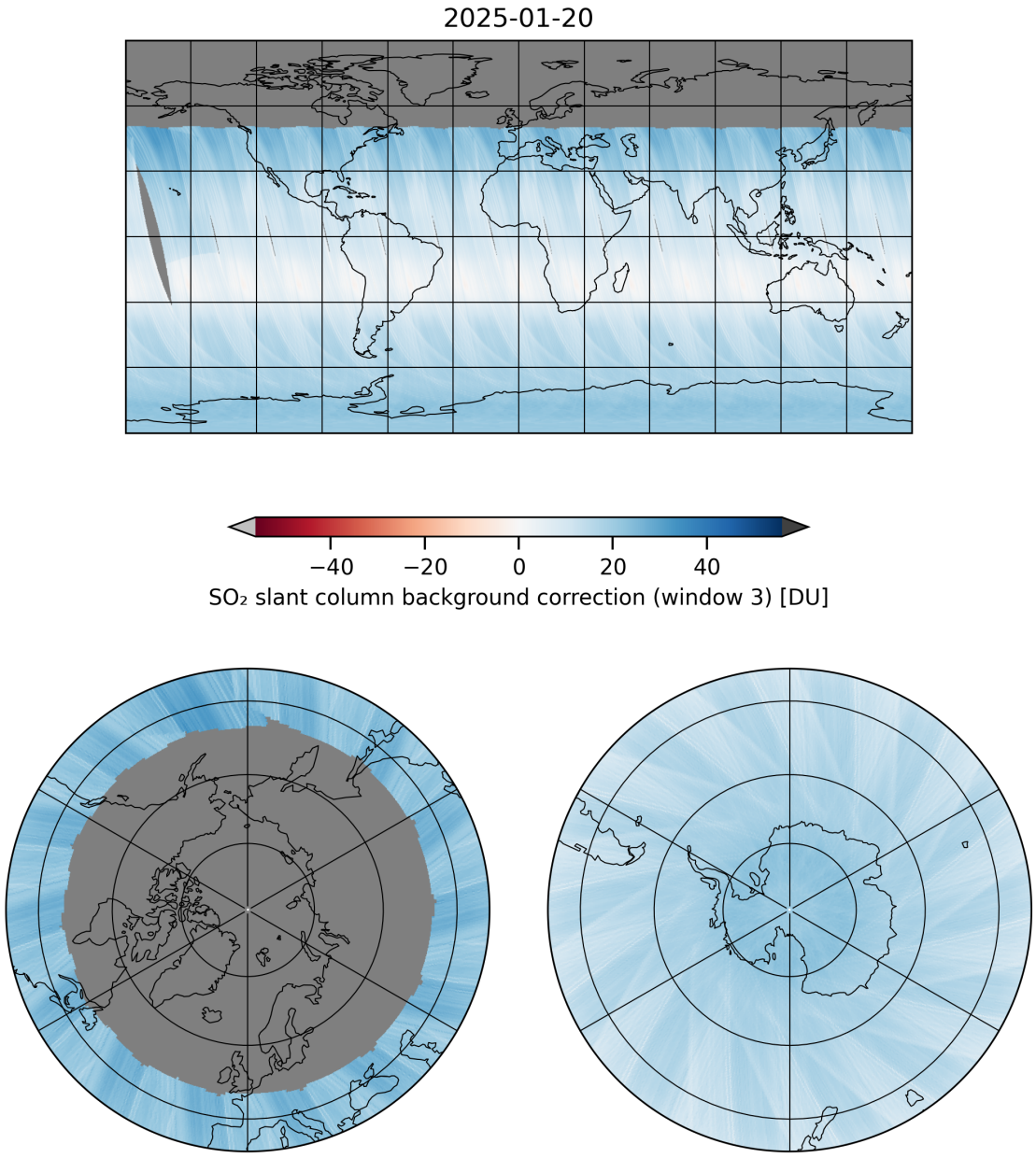

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-01-20 to 2025-01-21

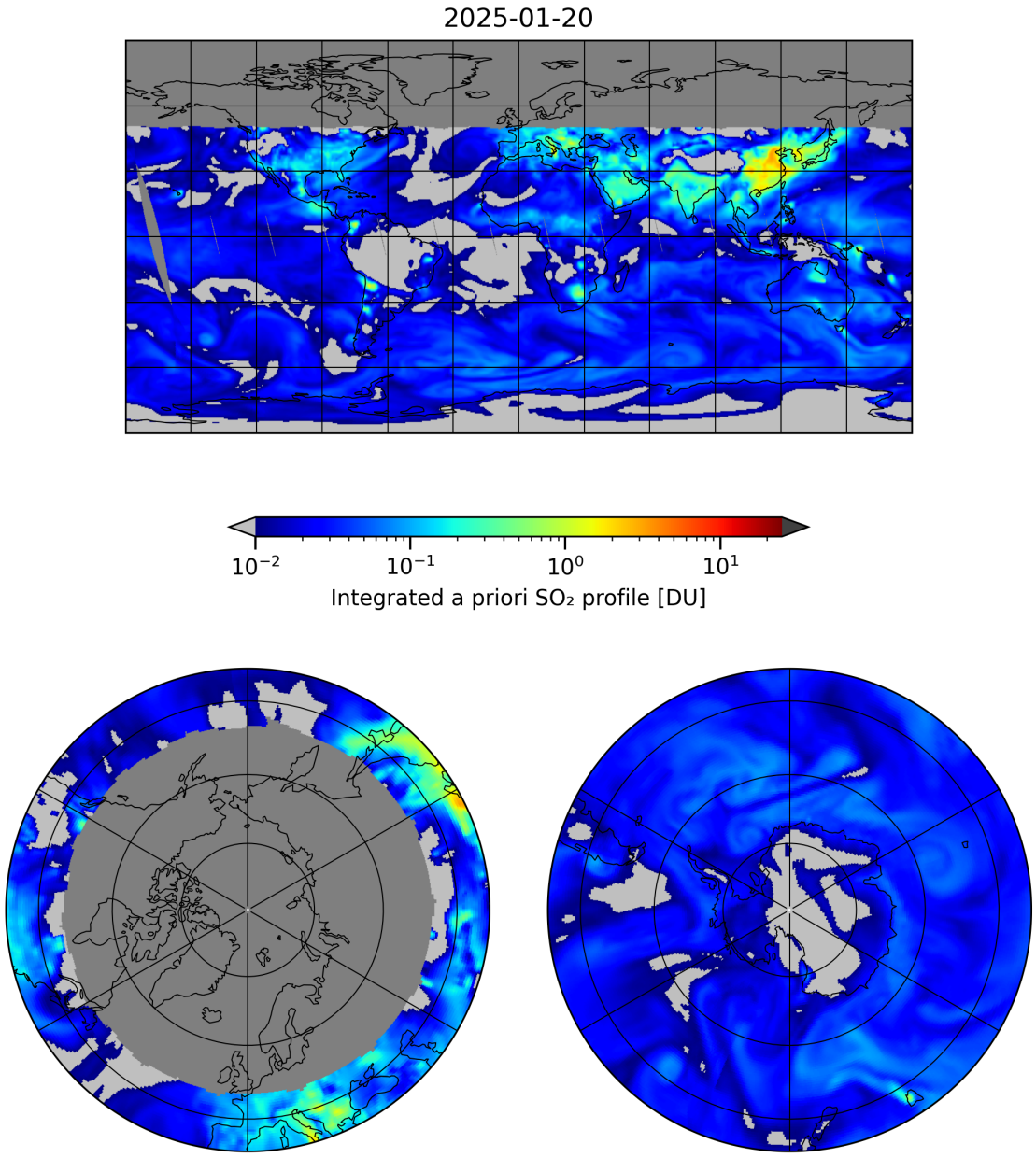

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-01-20 to 2025-01-21

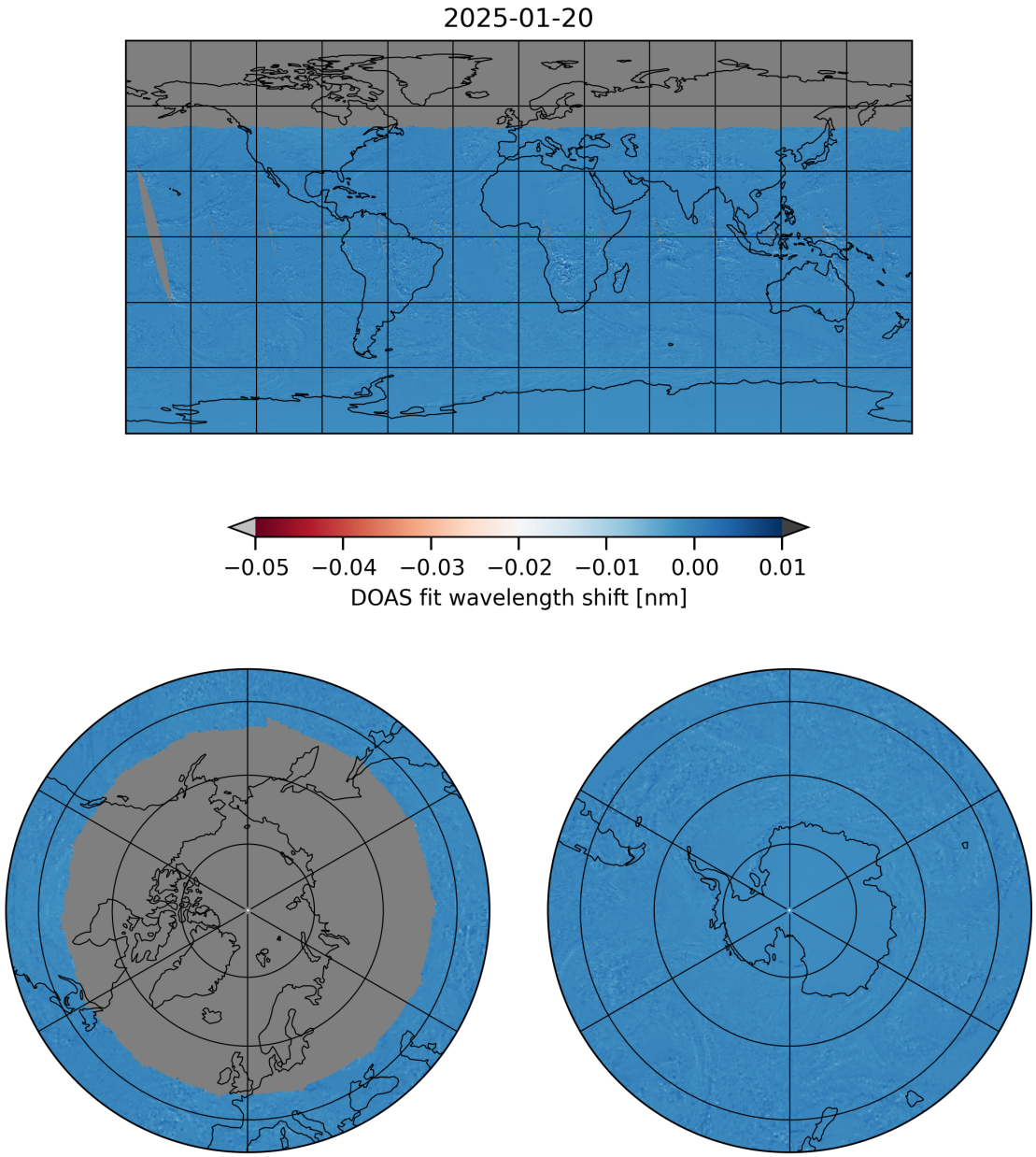

Figure 22: Map of “DOAS fit wavelength shift” for 2025-01-20 to 2025-01-21

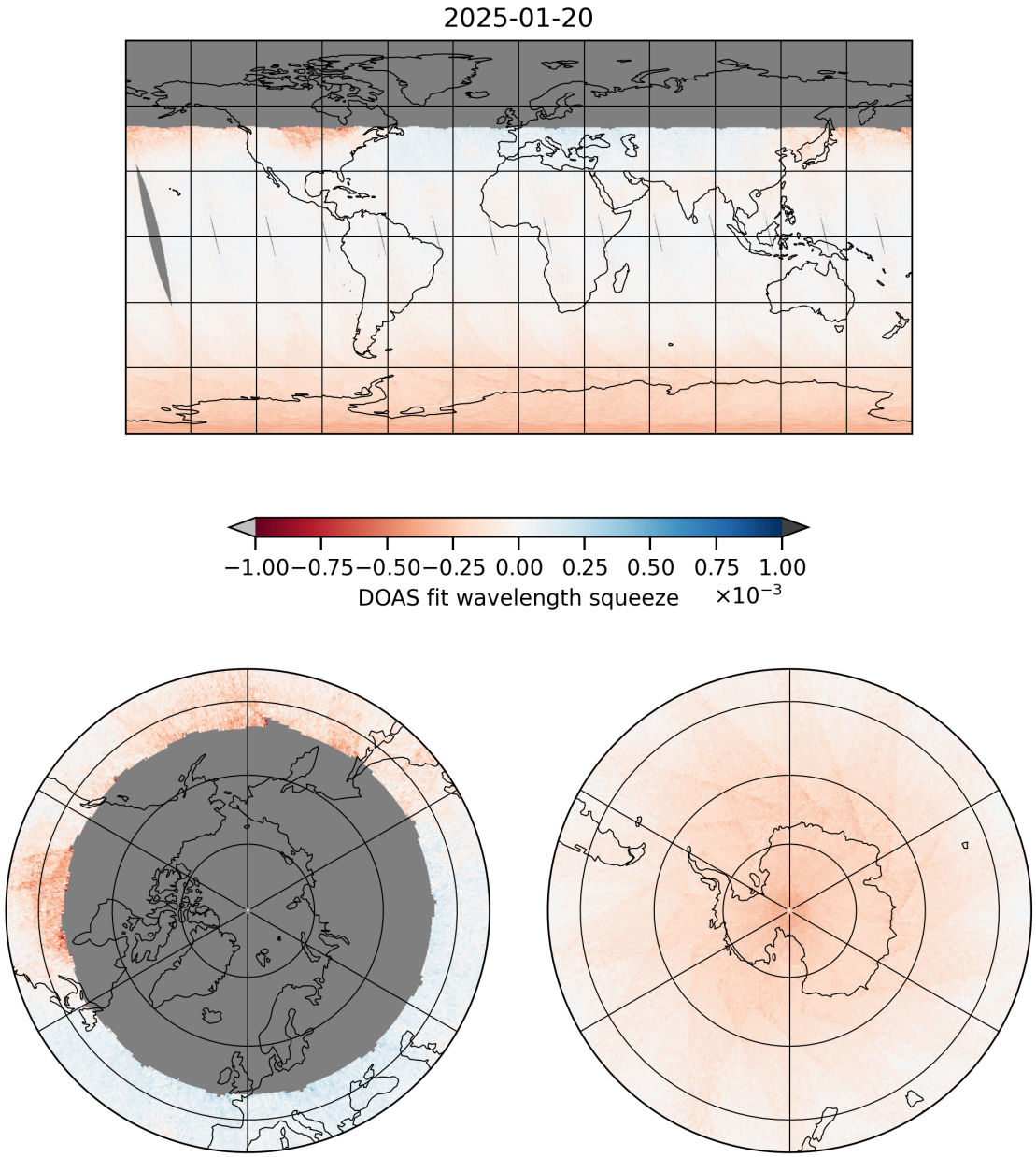

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-01-20 to 2025-01-21

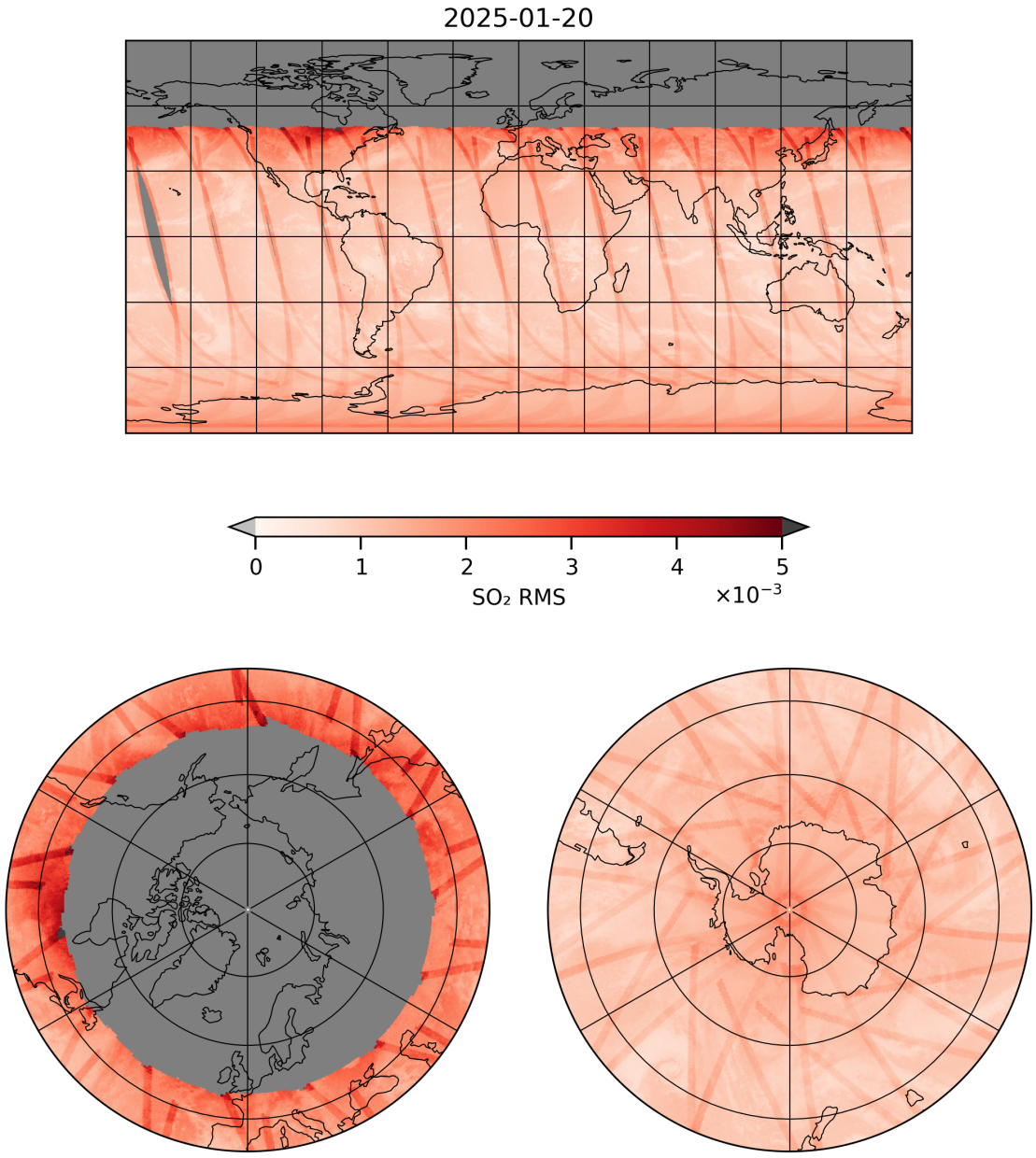

Figure 24: Map of "SO_2 RMS" for 2025-01-20 to 2025-01-21

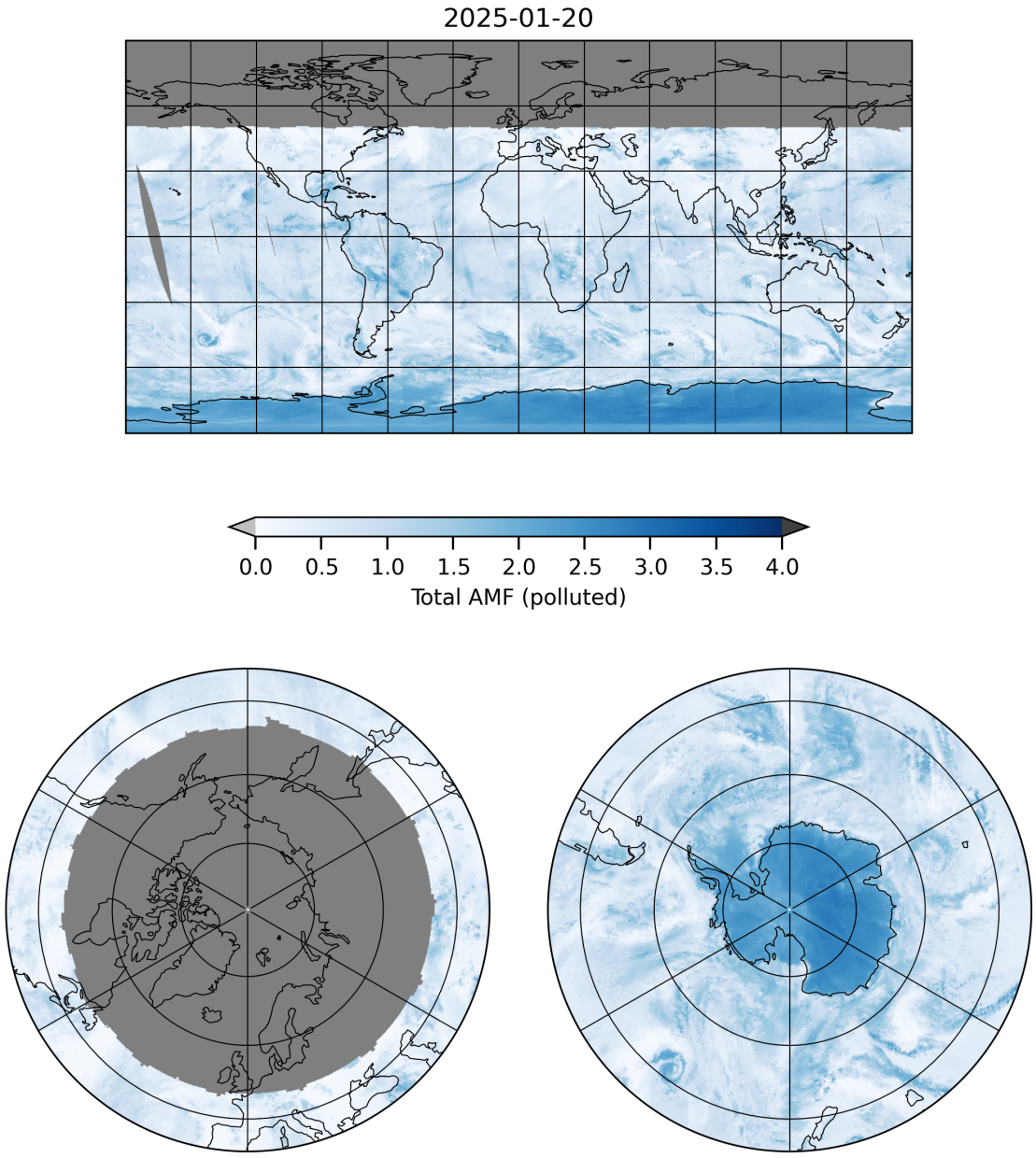

Figure 25: Map of “Total AMF (polluted)” for 2025-01-20 to 2025-01-21

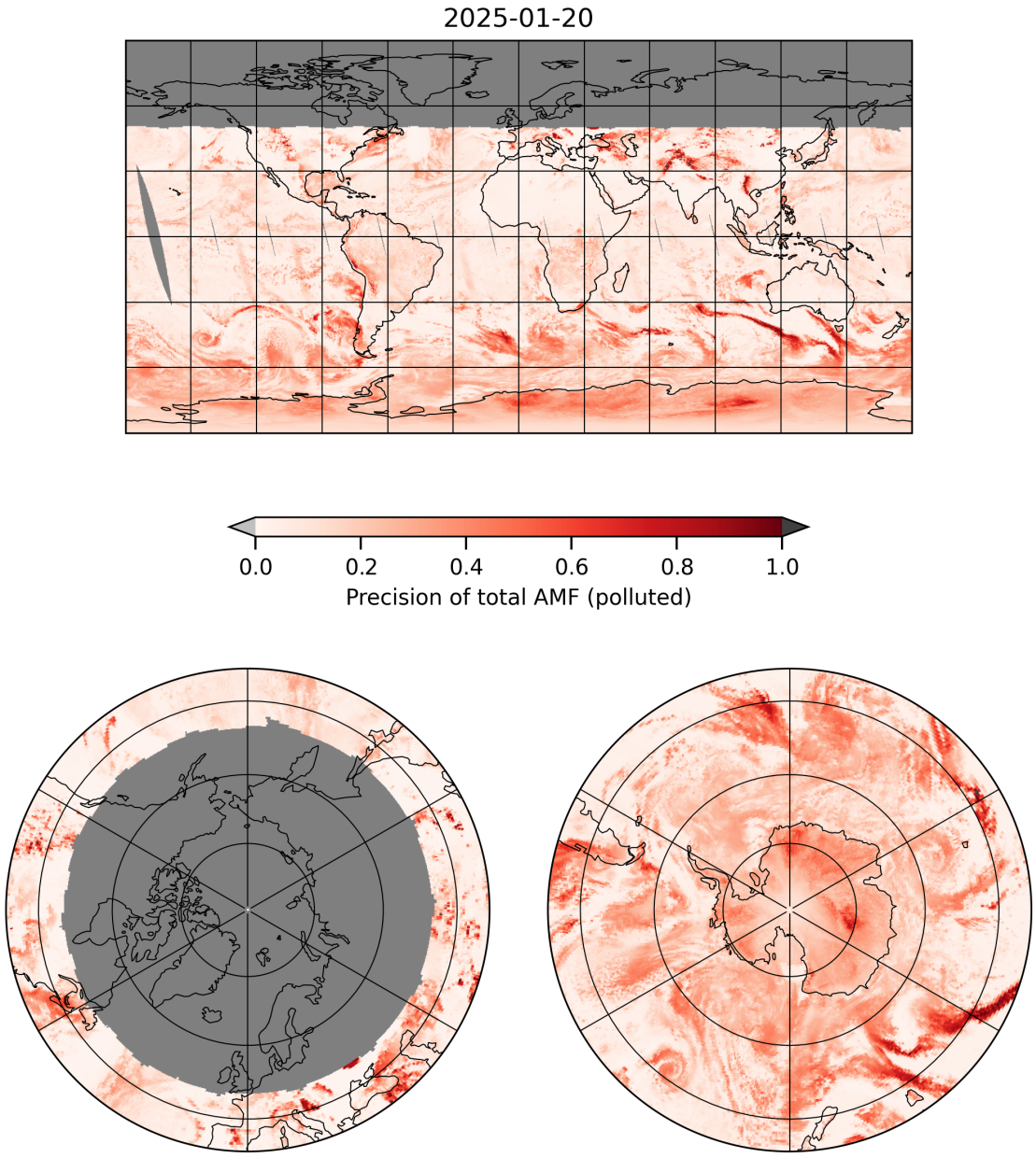

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-01-20 to 2025-01-21

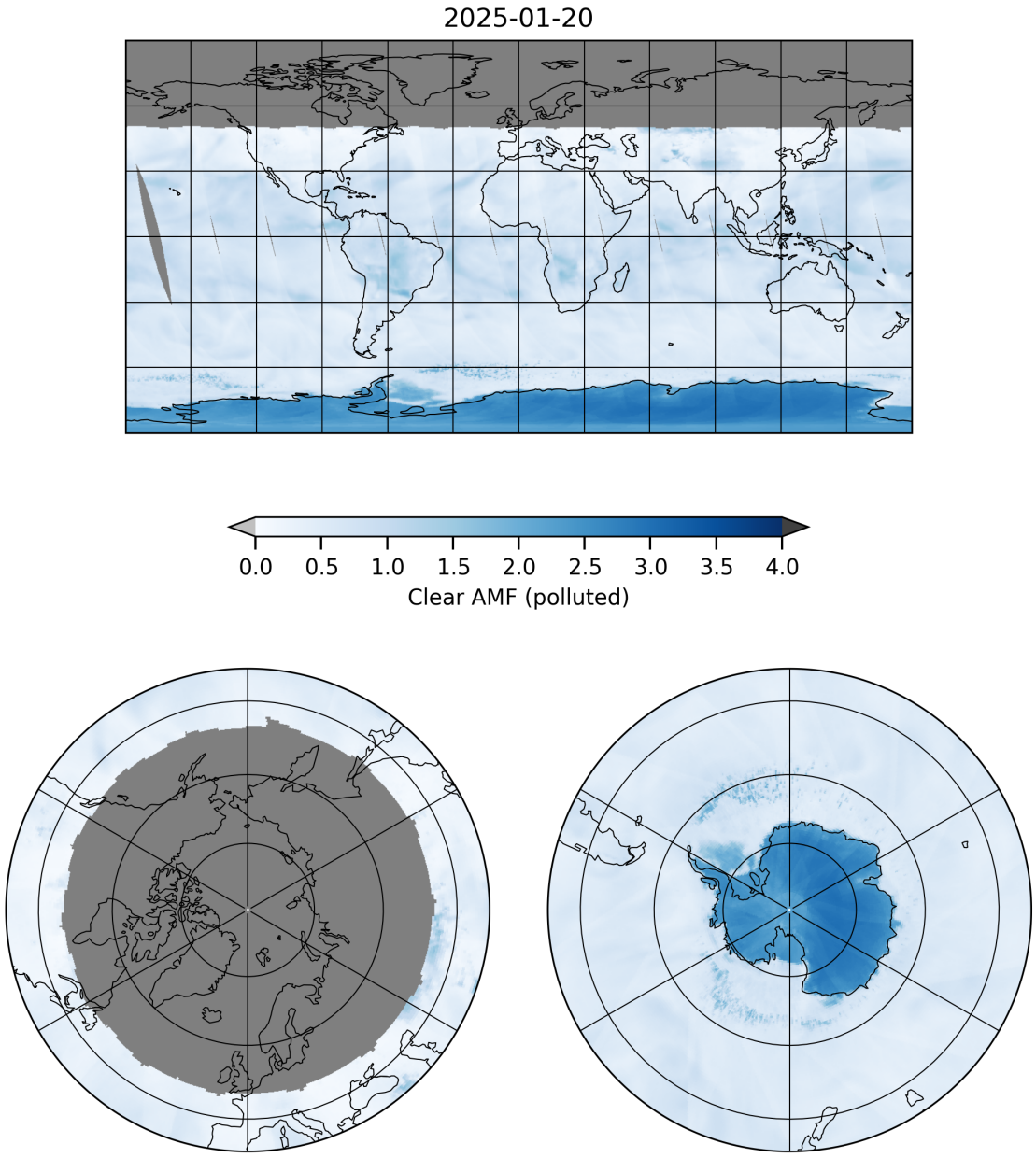

Figure 27: Map of “Clear AMF (polluted)” for 2025-01-20 to 2025-01-21

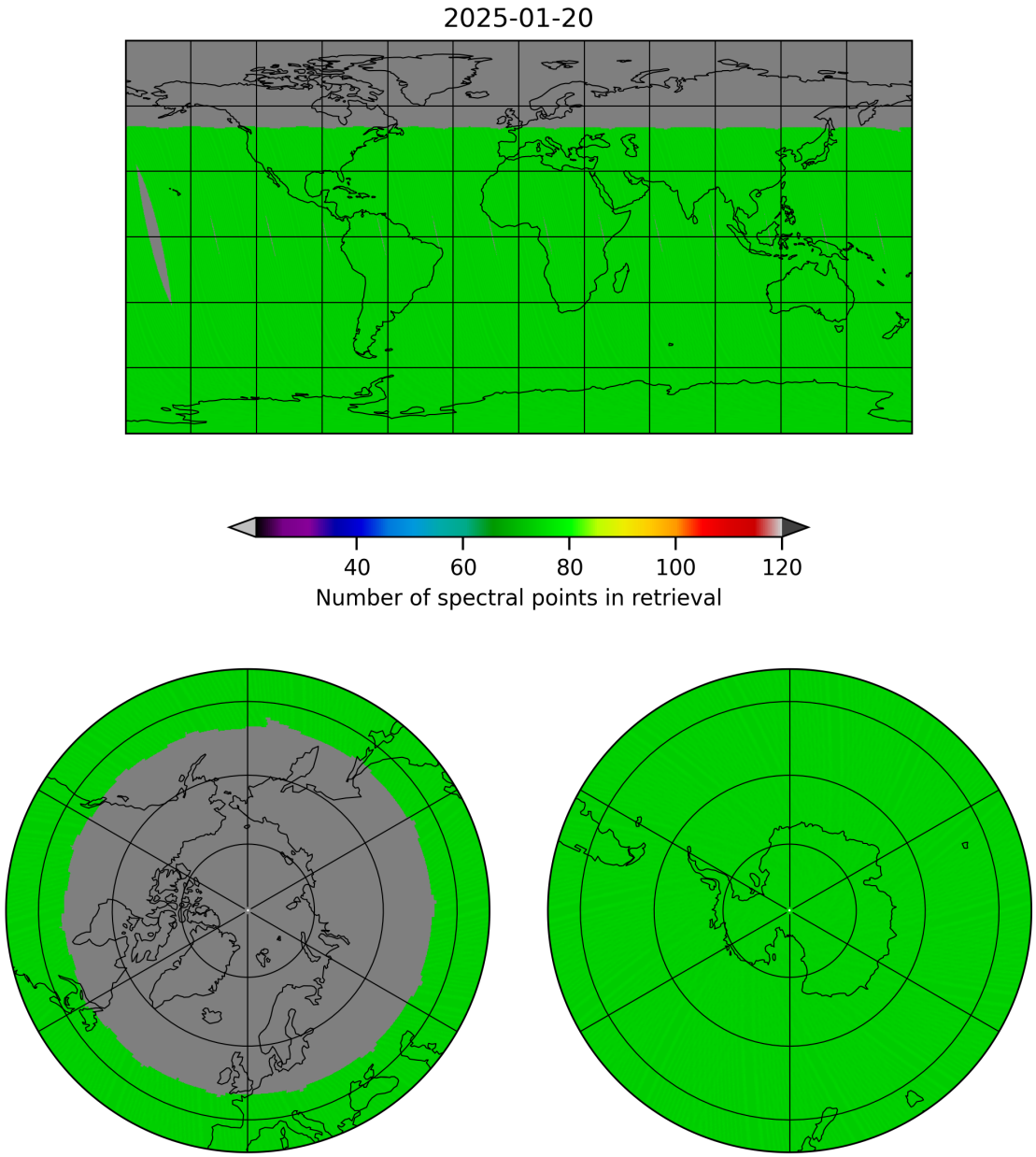

Figure 28: Map of “Number of spectral points in retrieval” for 2025-01-20 to 2025-01-21

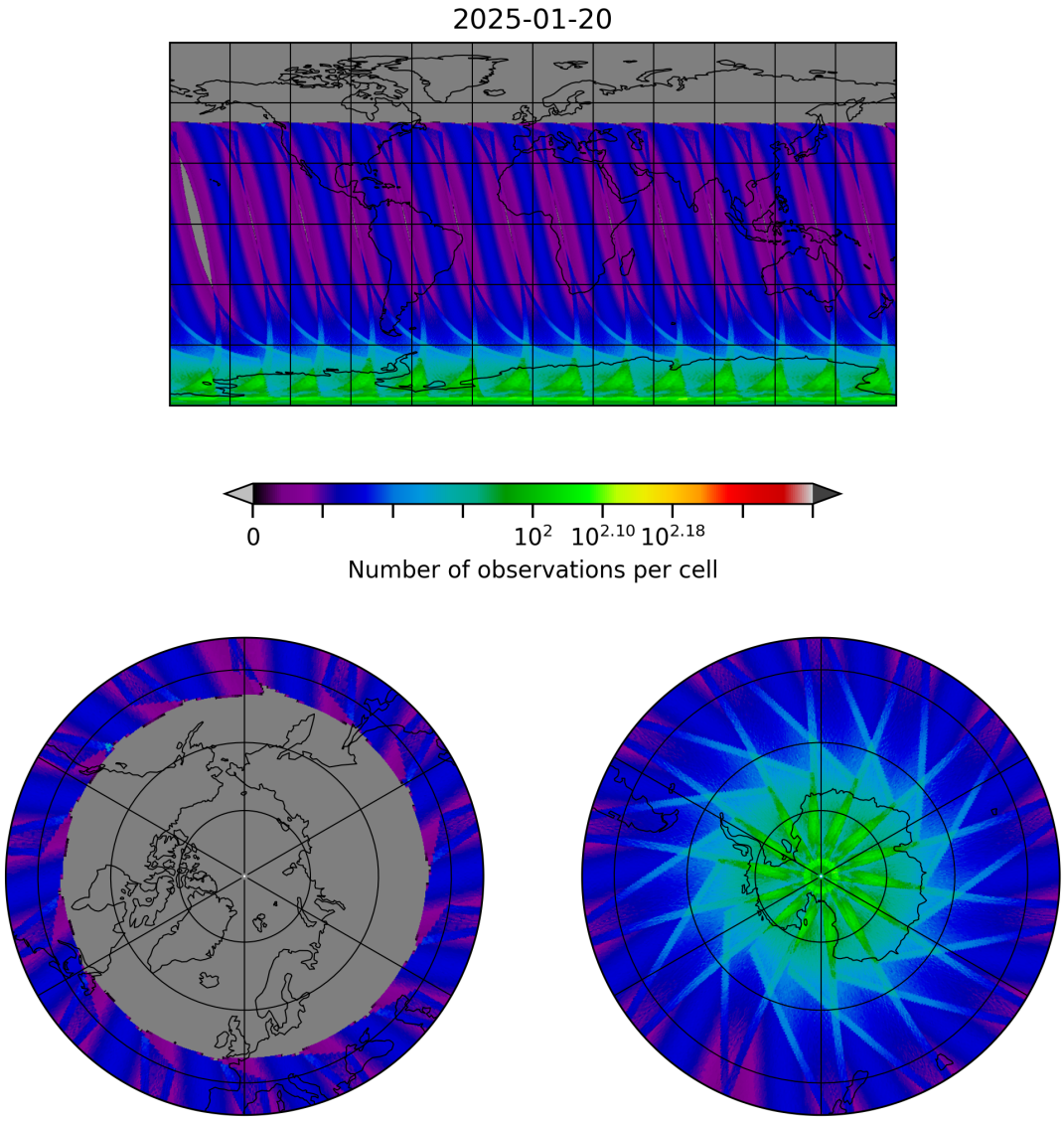

Figure 29: Map of the number of observations for 2025-01-20 to 2025-01-21

7 Zonal average

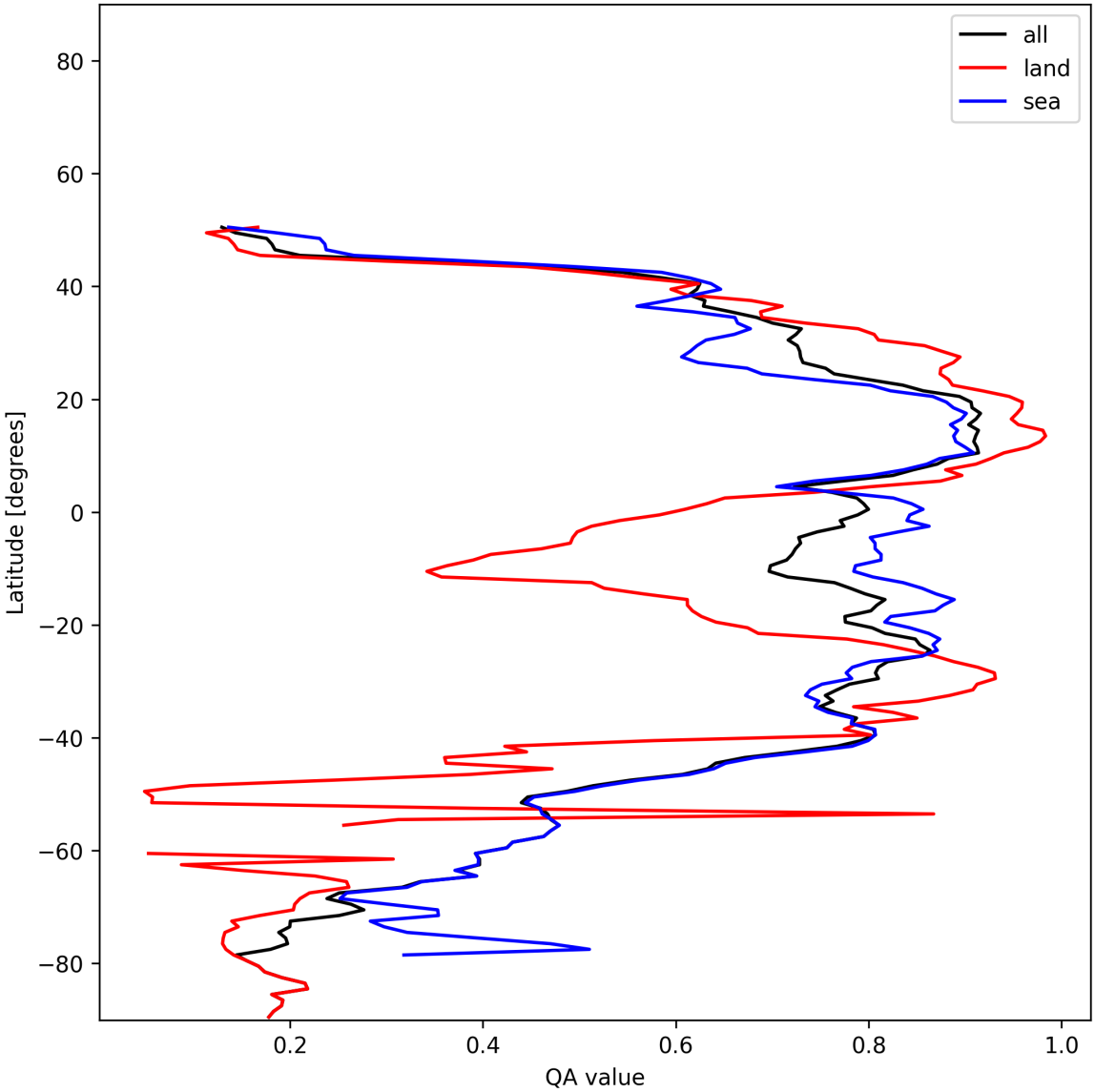

Figure 30: Zonal average of “QA value” for 2025-01-20 to 2025-01-21.

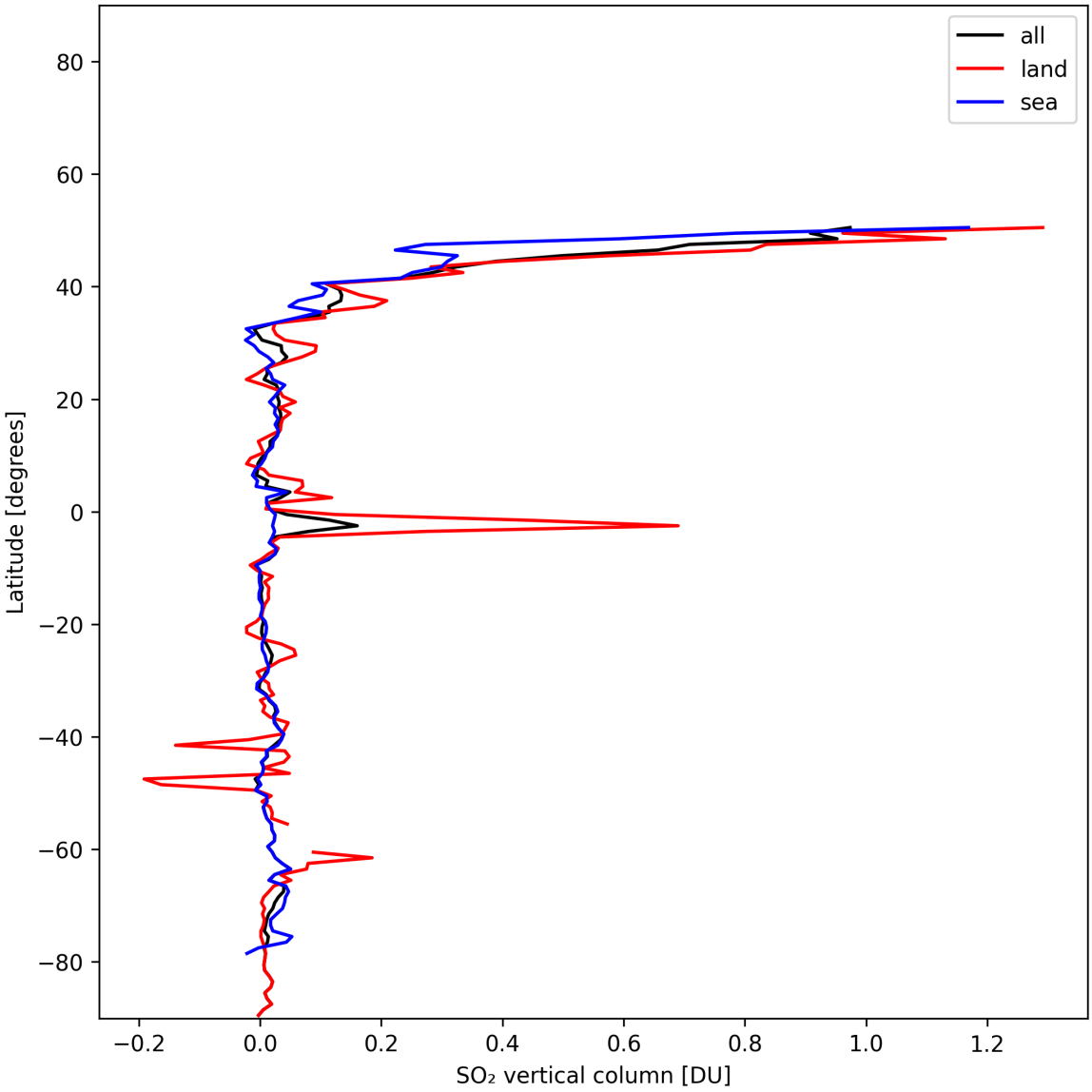

Figure 31: Zonal average of "SO_2 vertical column" for 2025-01-20 to 2025-01-21.

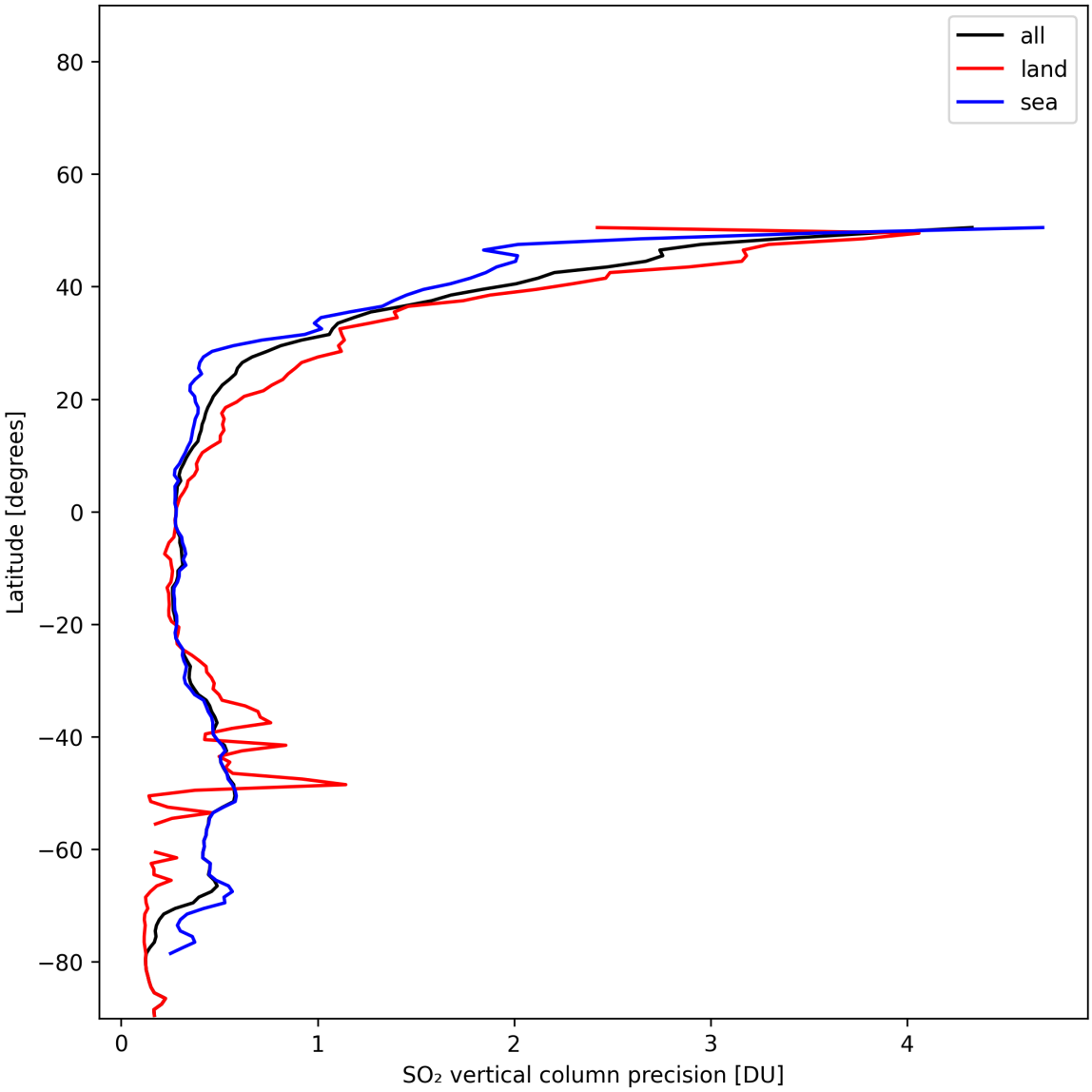

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-01-20 to 2025-01-21.

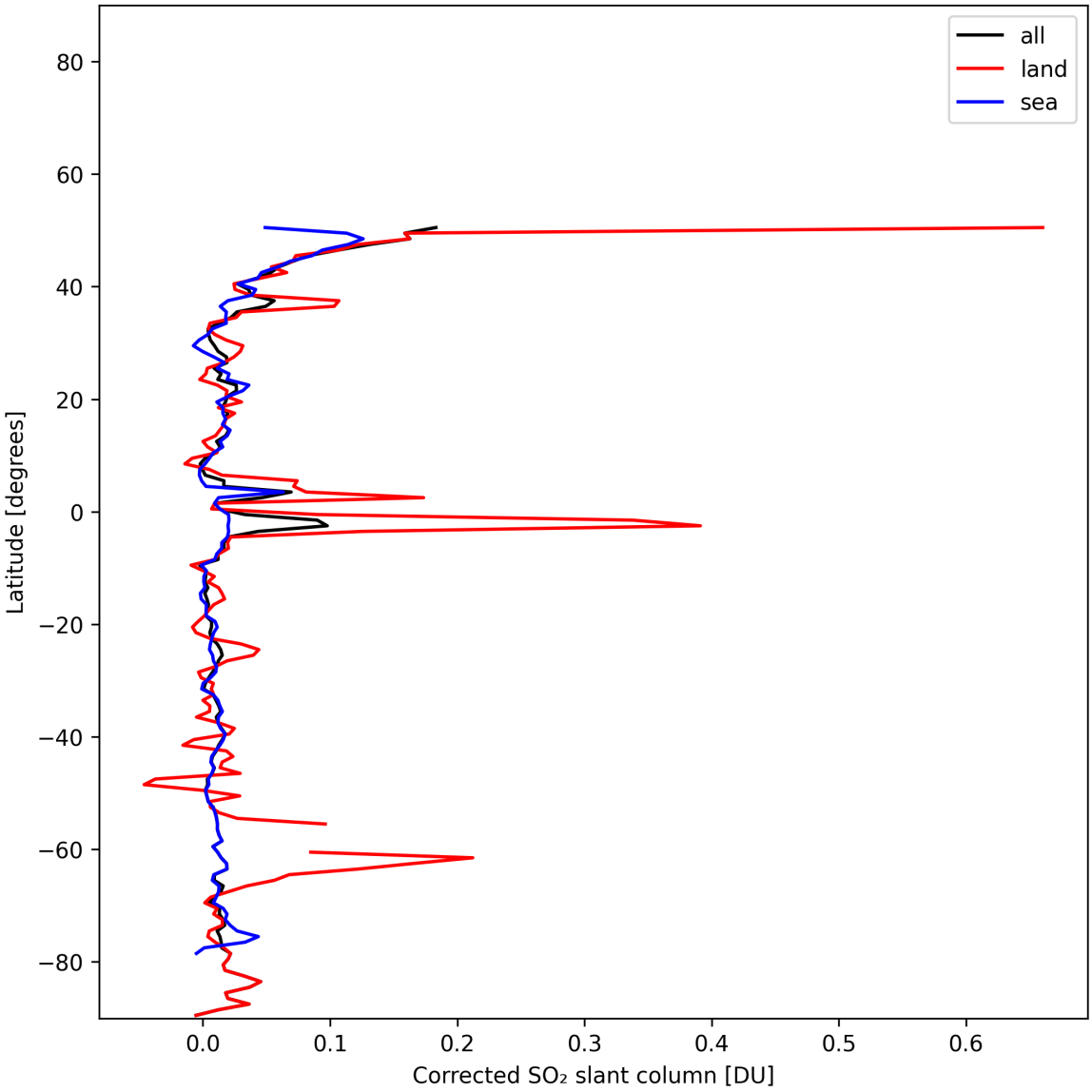

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-01-20 to 2025-01-21.

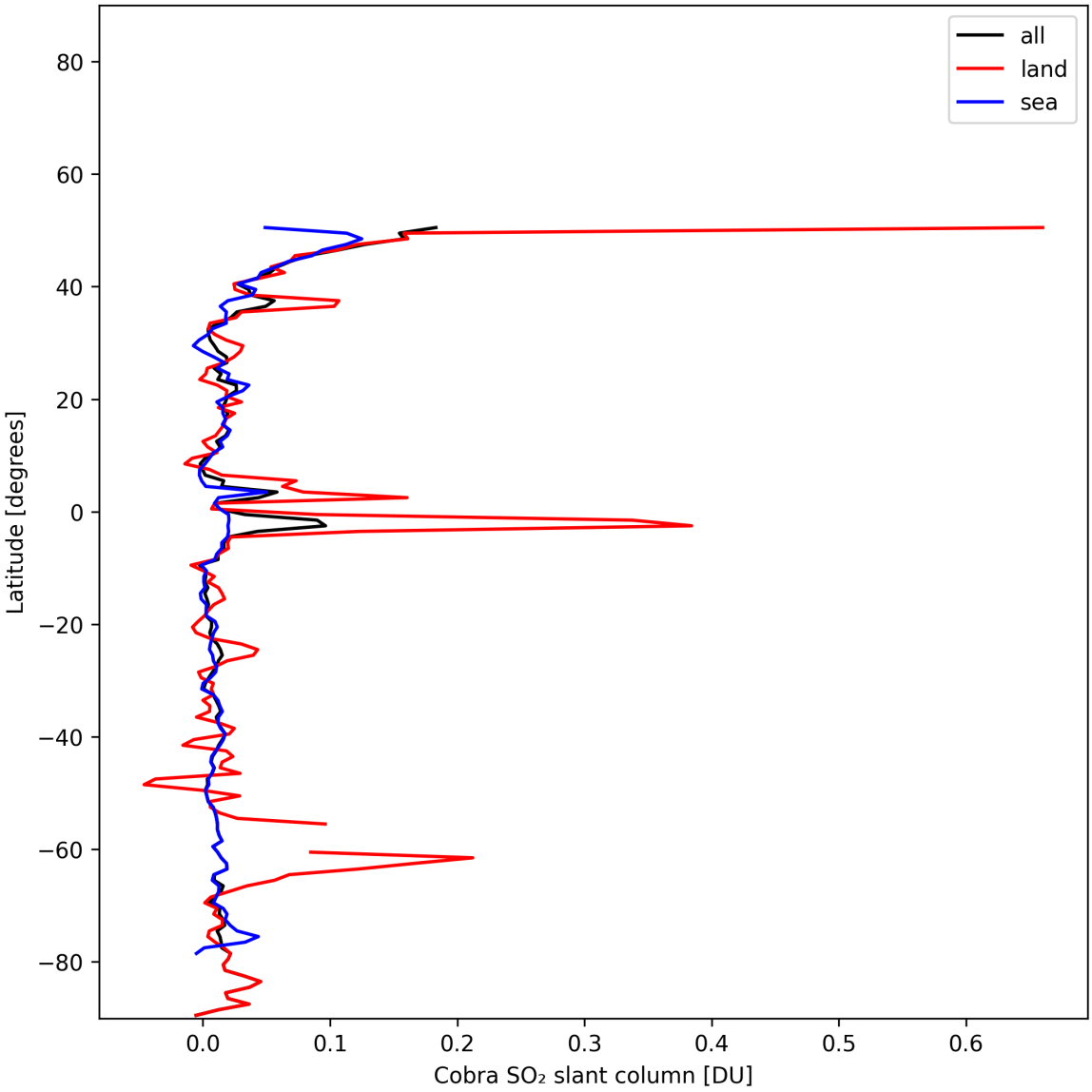

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-01-20 to 2025-01-21.

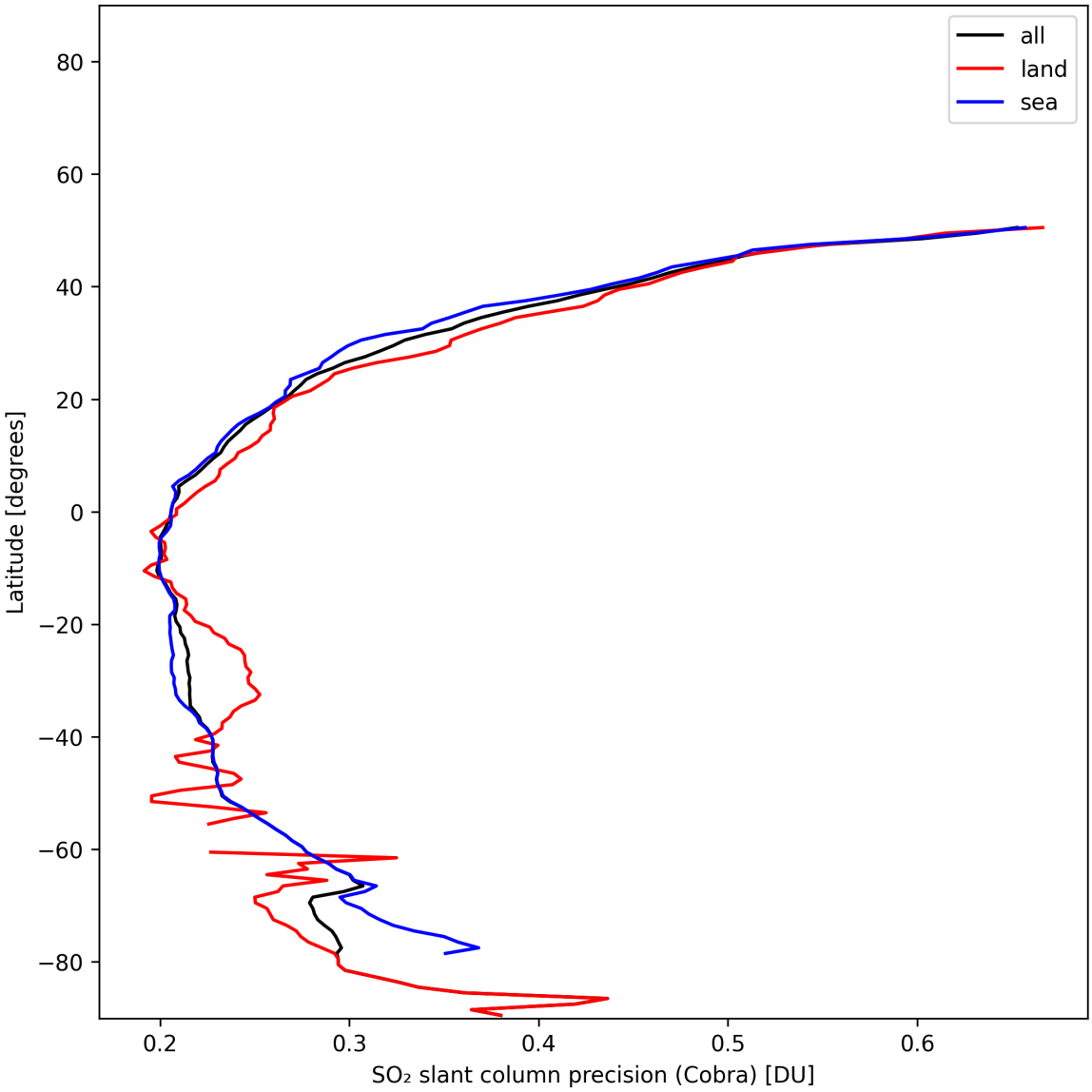

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-01-20 to 2025-01-21.

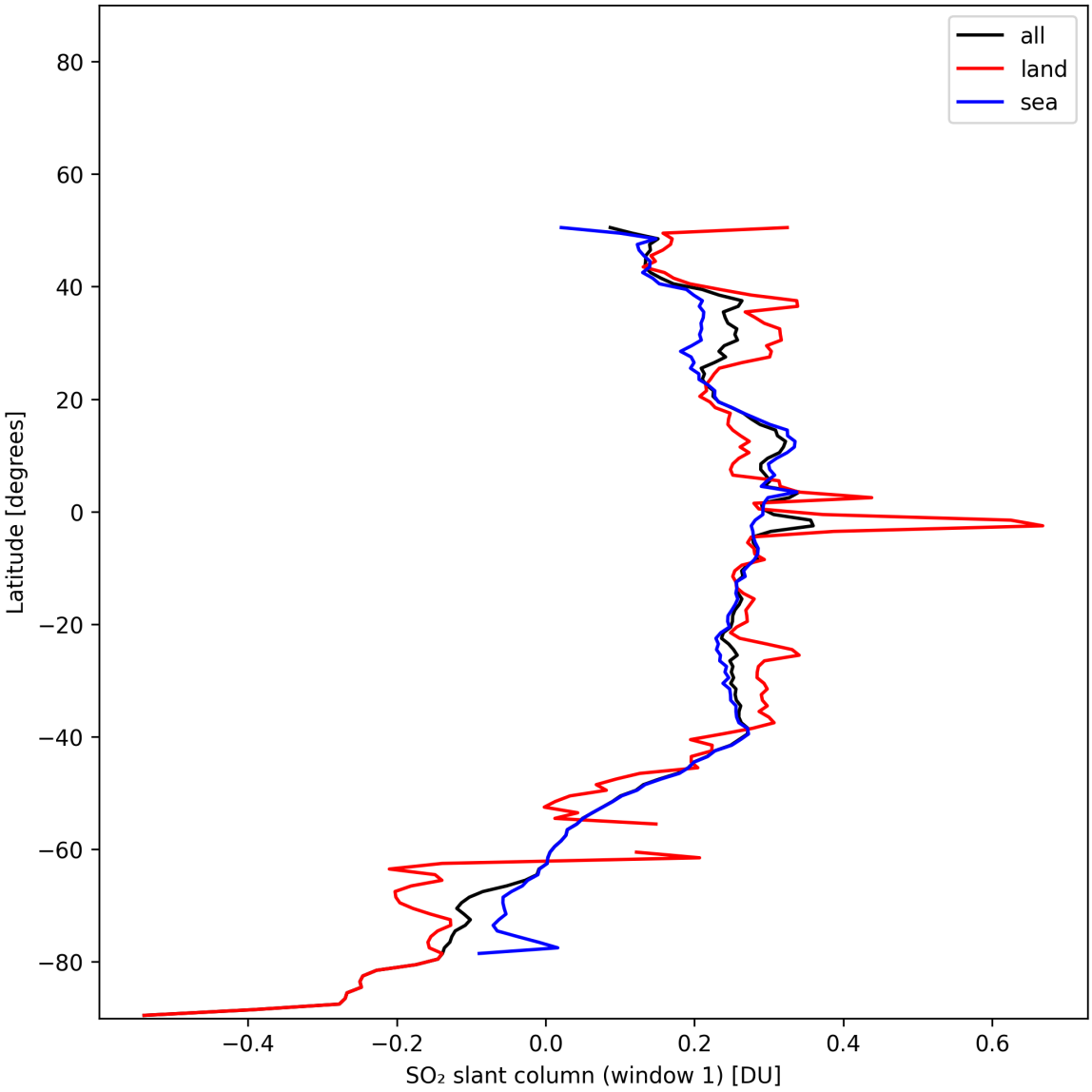

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-01-20 to 2025-01-21.

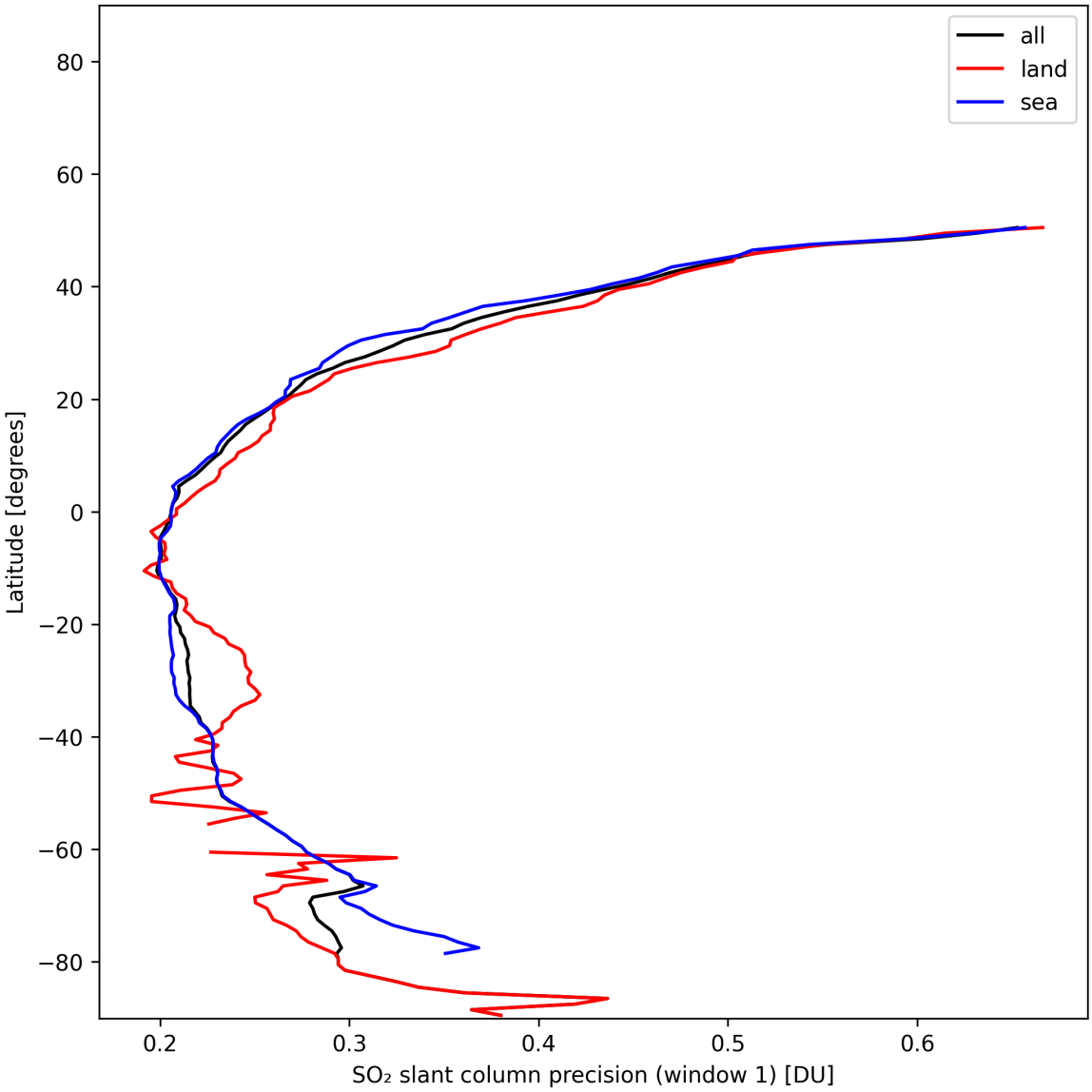

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-01-20 to 2025-01-21.

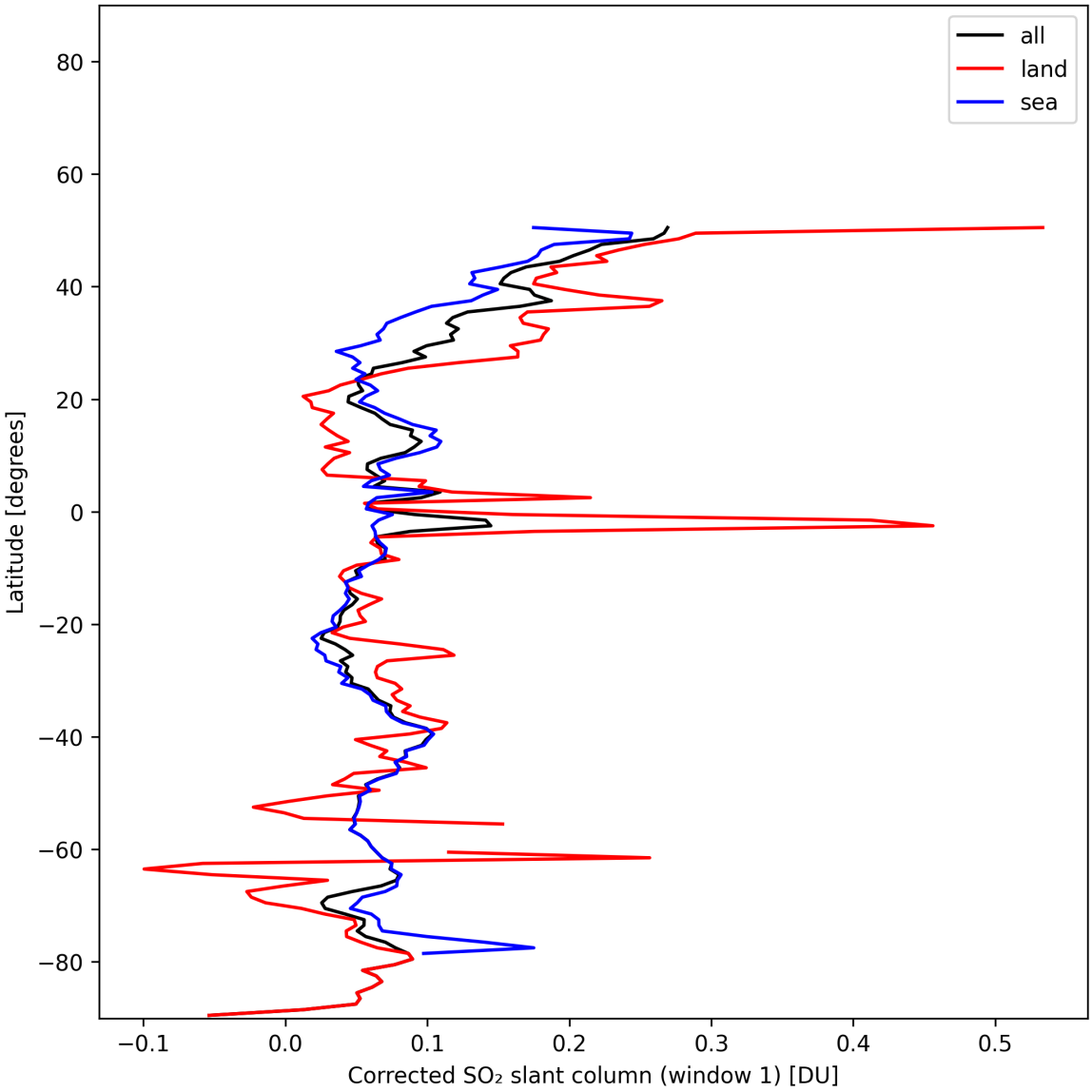

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-01-20 to 2025-01-21.

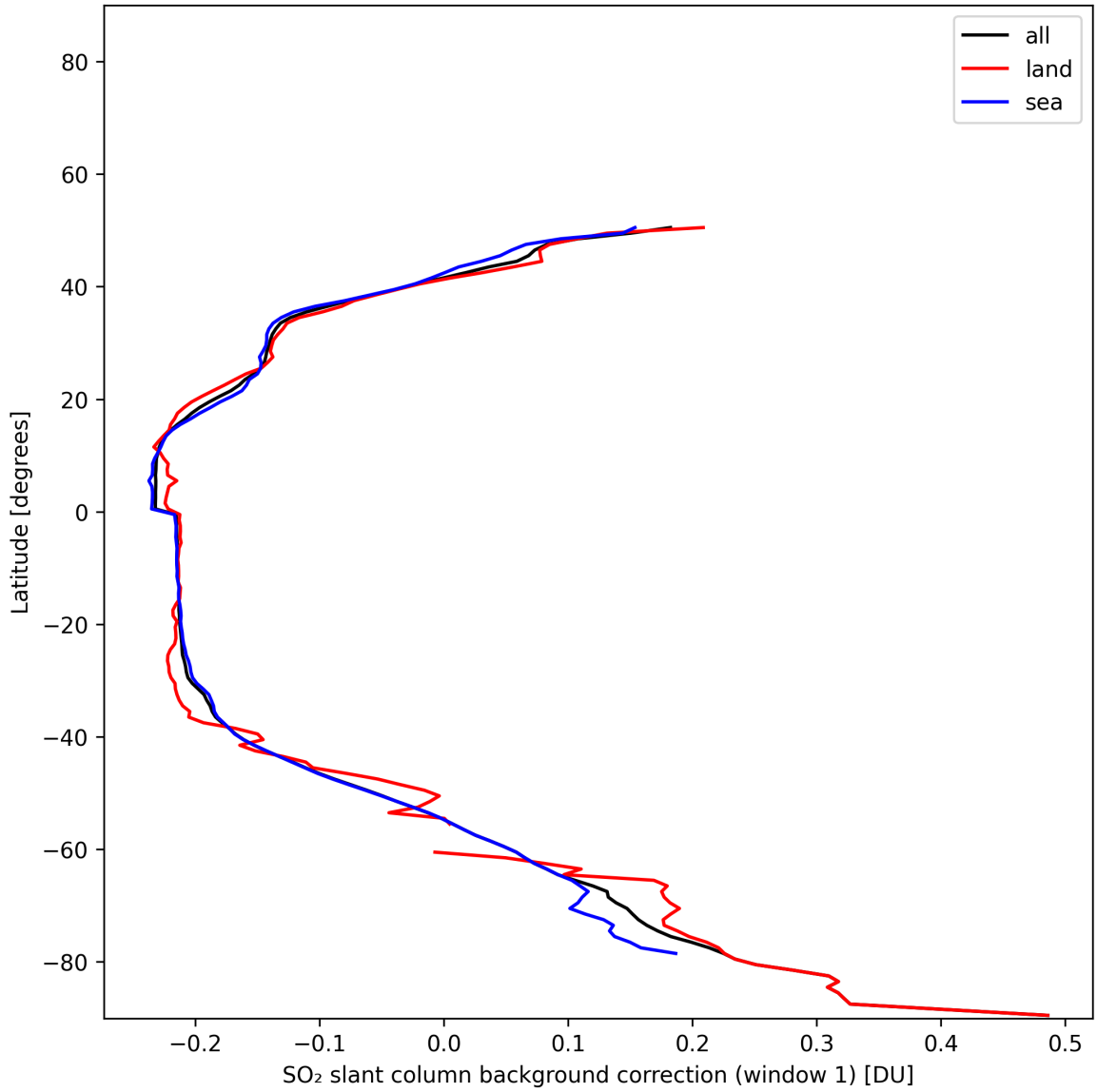

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-01-20 to 2025-01-21.

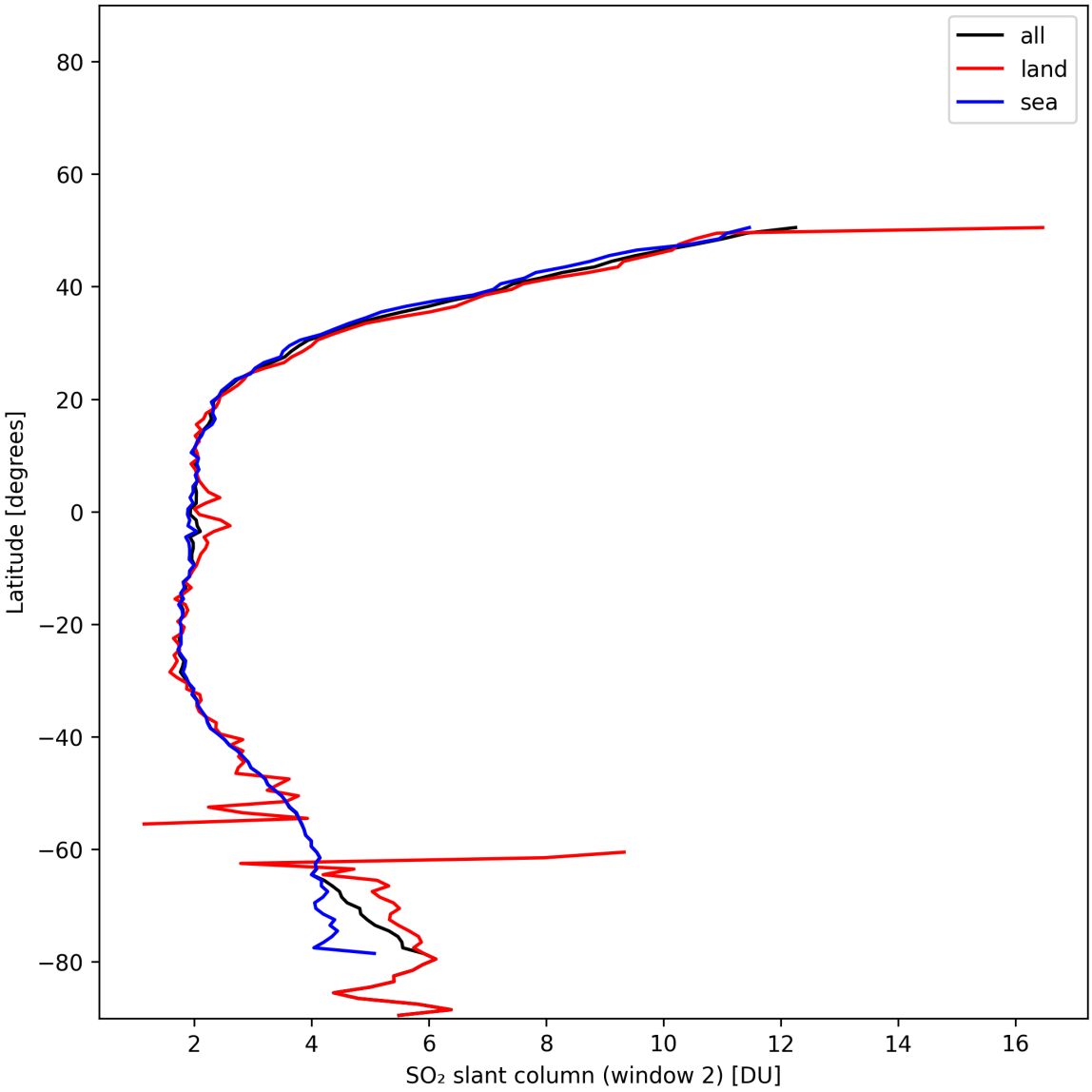

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-01-20 to 2025-01-21.

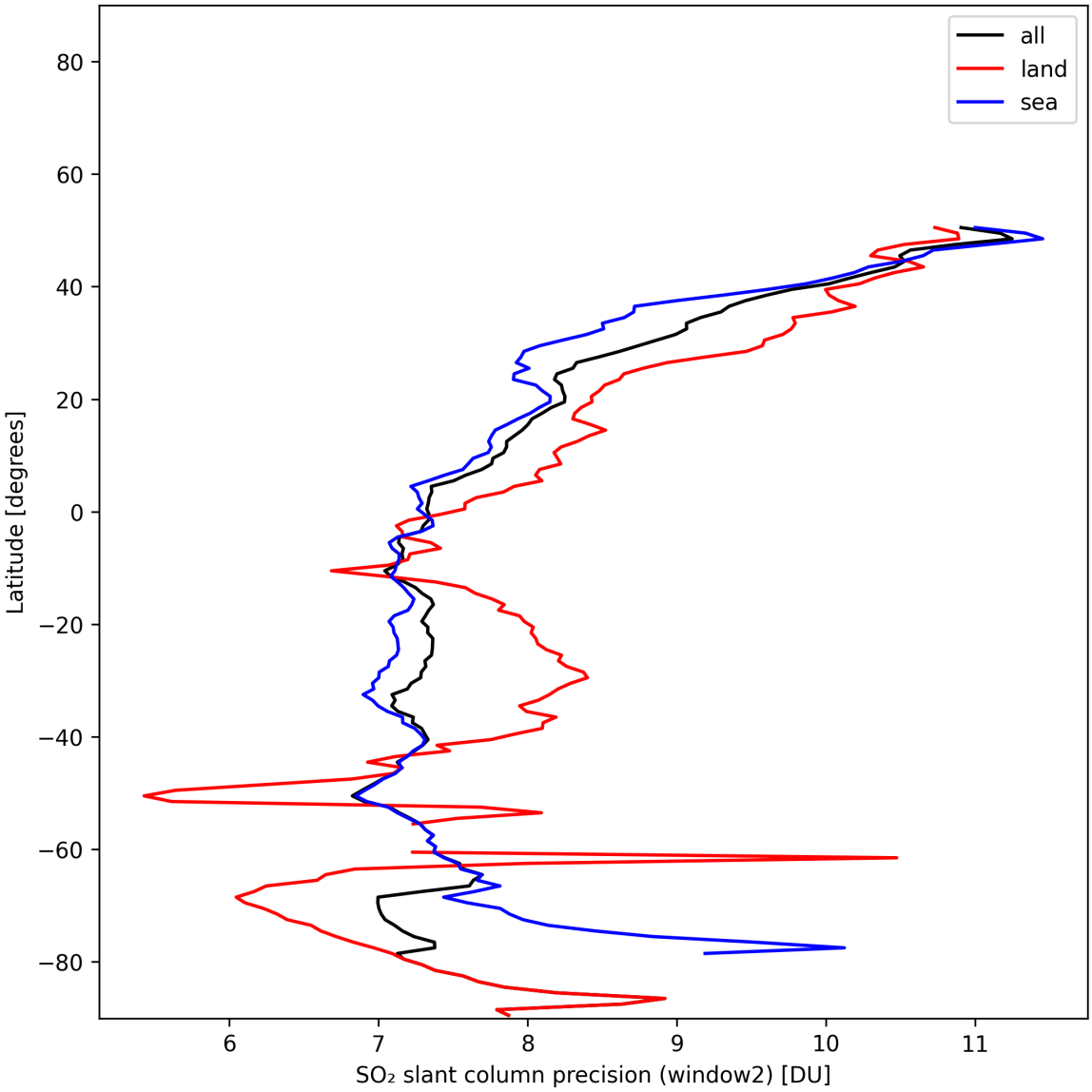

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-01-20 to 2025-01-21.

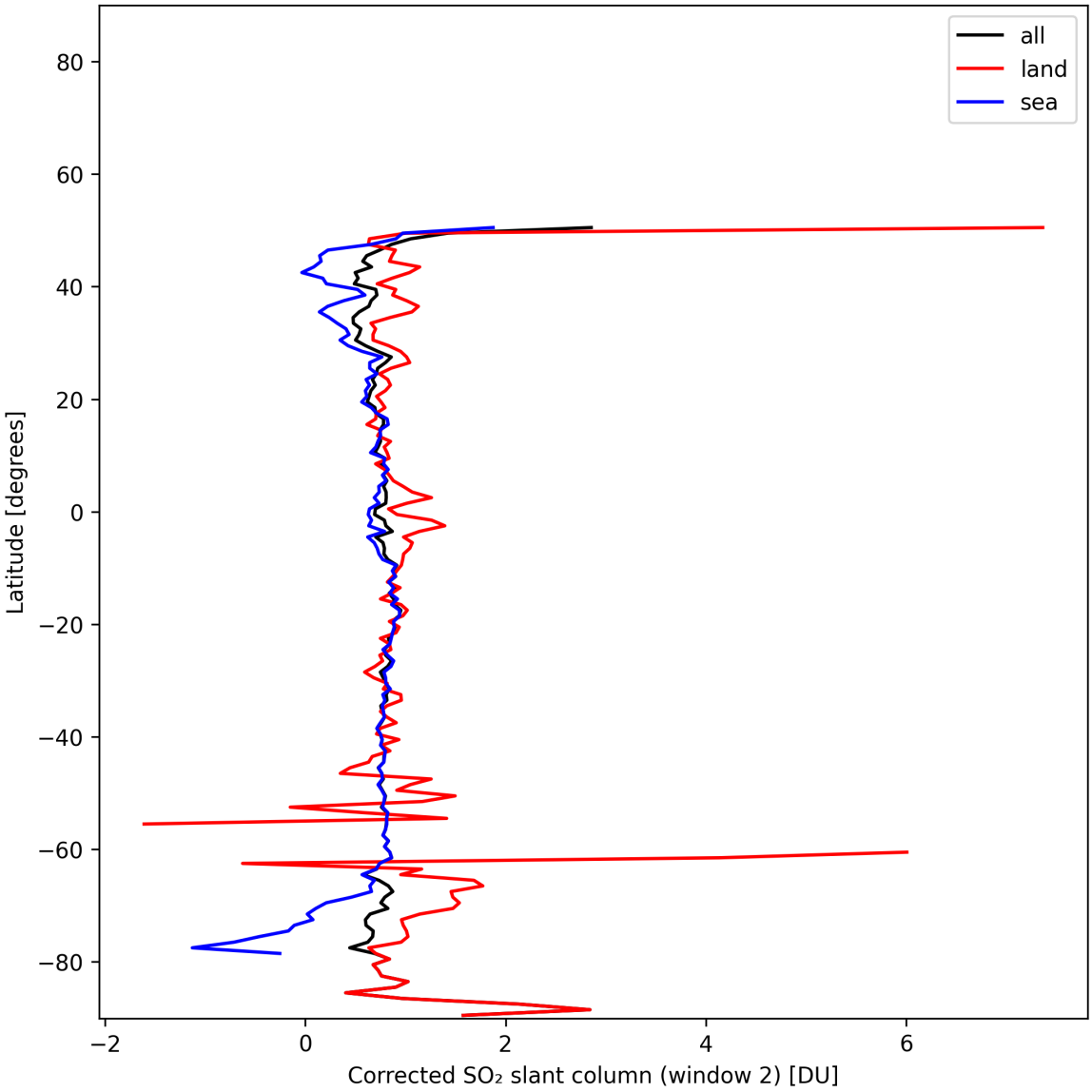

Figure 42: Zonal average of “Corrected SO_2 slant column (window 2)” for 2025-01-20 to 2025-01-21.

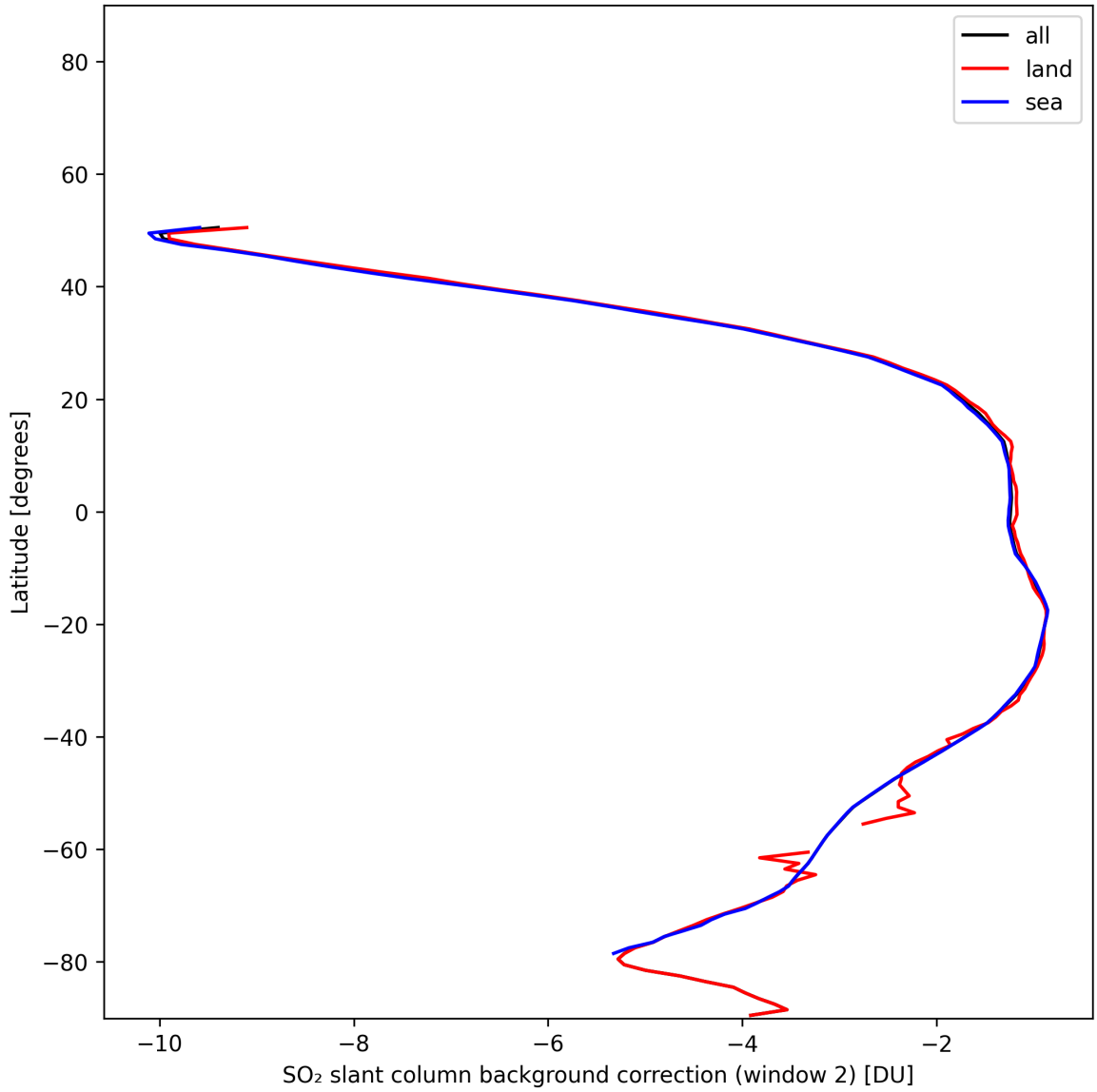

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-01-20 to 2025-01-21.

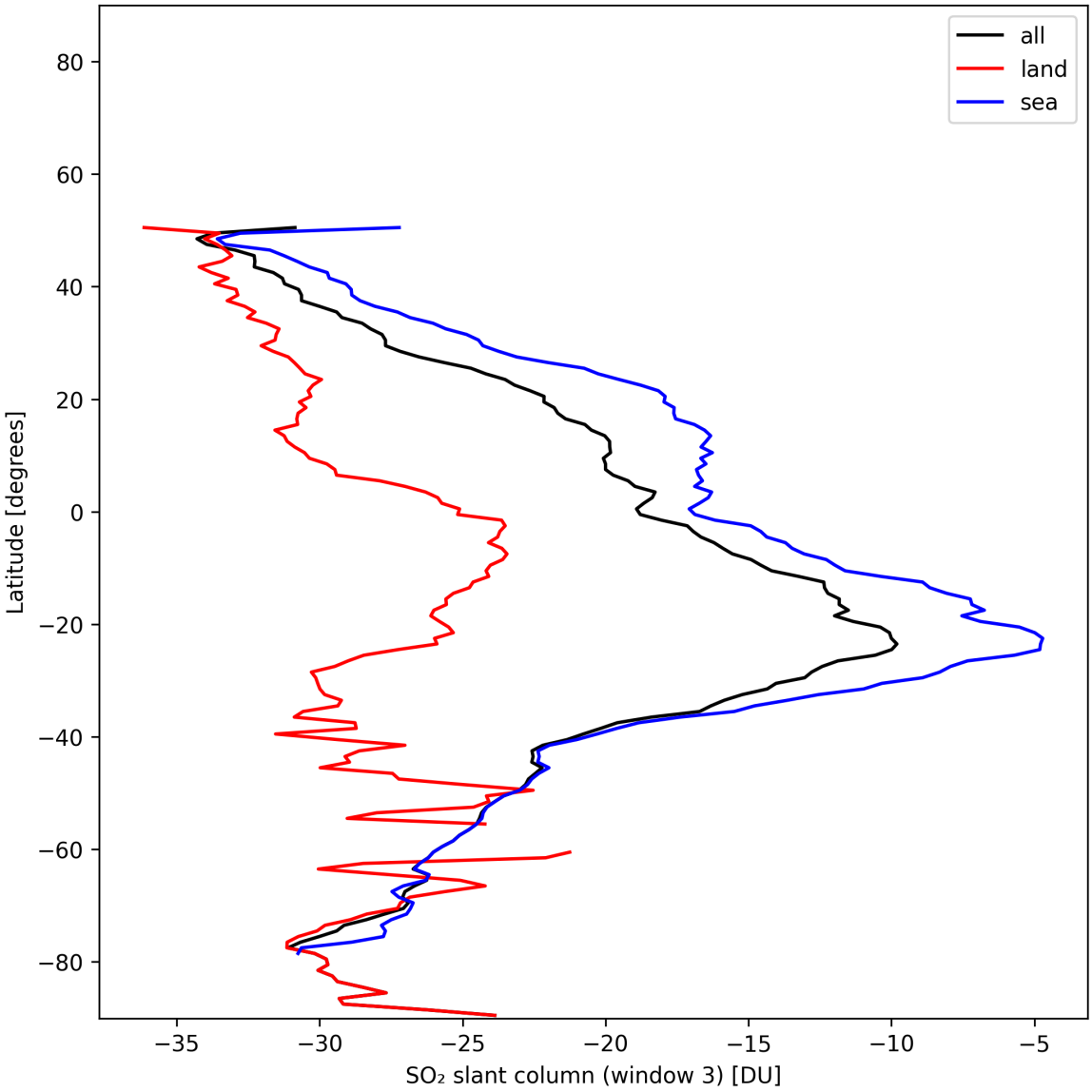

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-01-20 to 2025-01-21.

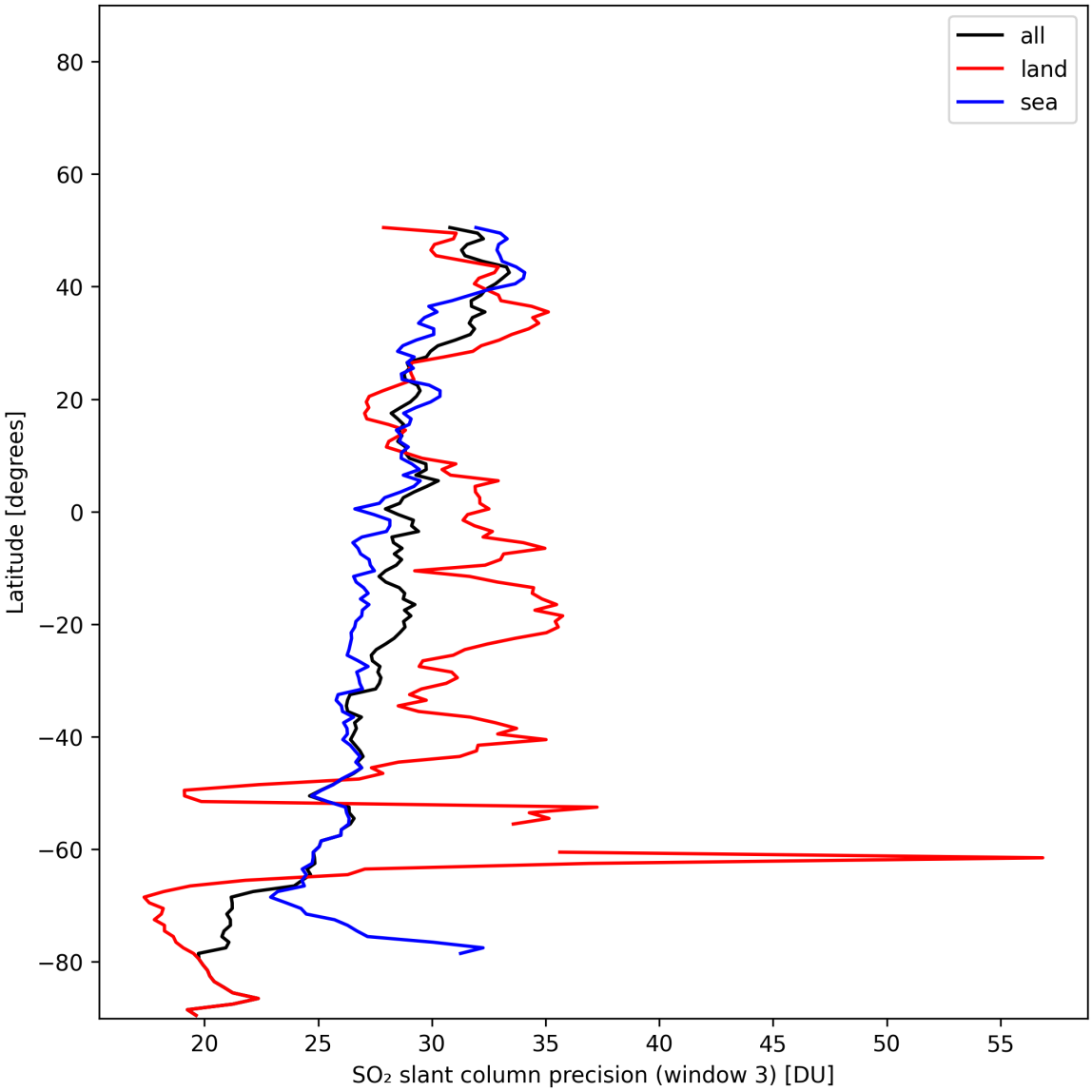

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-01-20 to 2025-01-21.

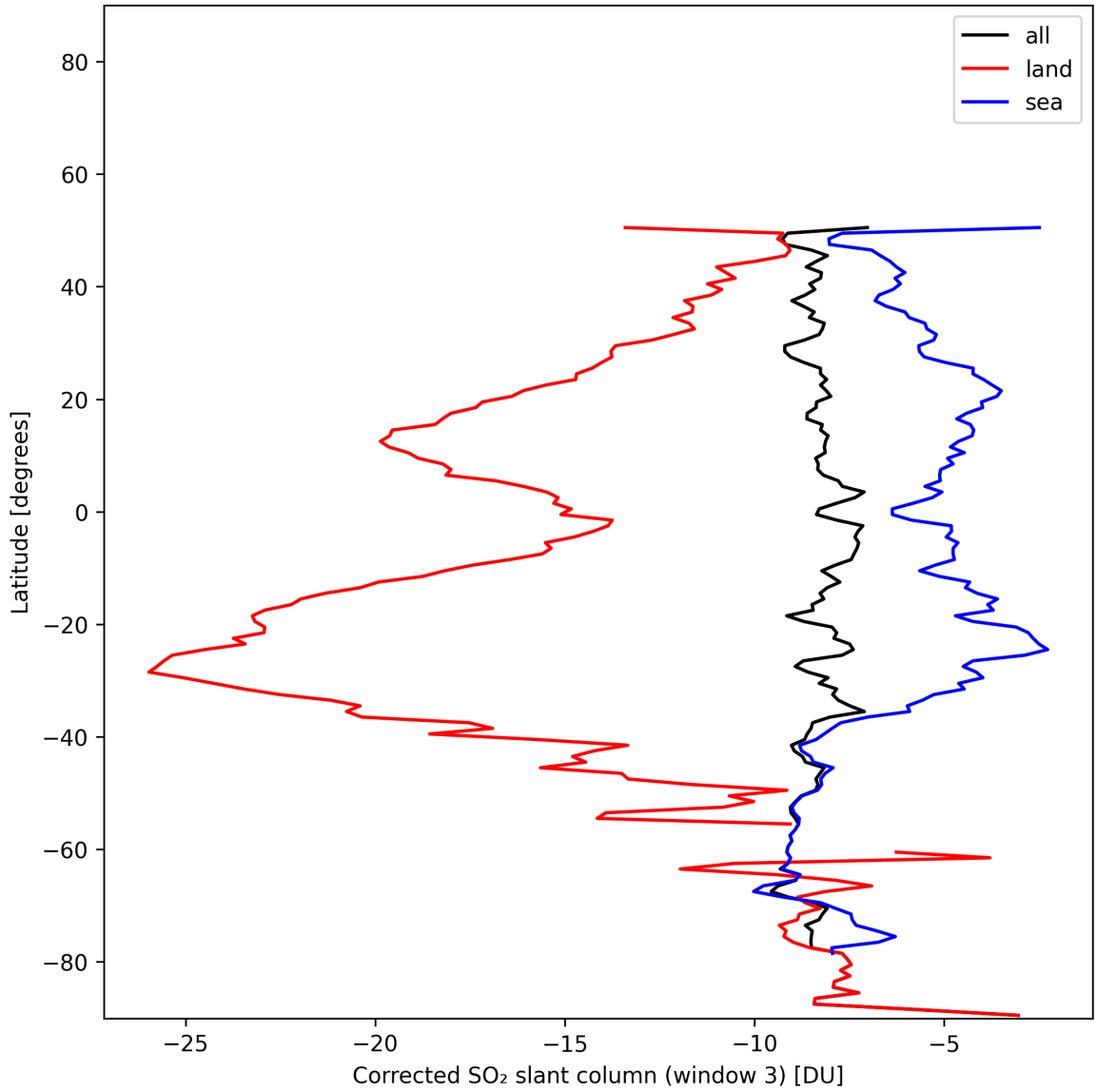

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-01-20 to 2025-01-21.

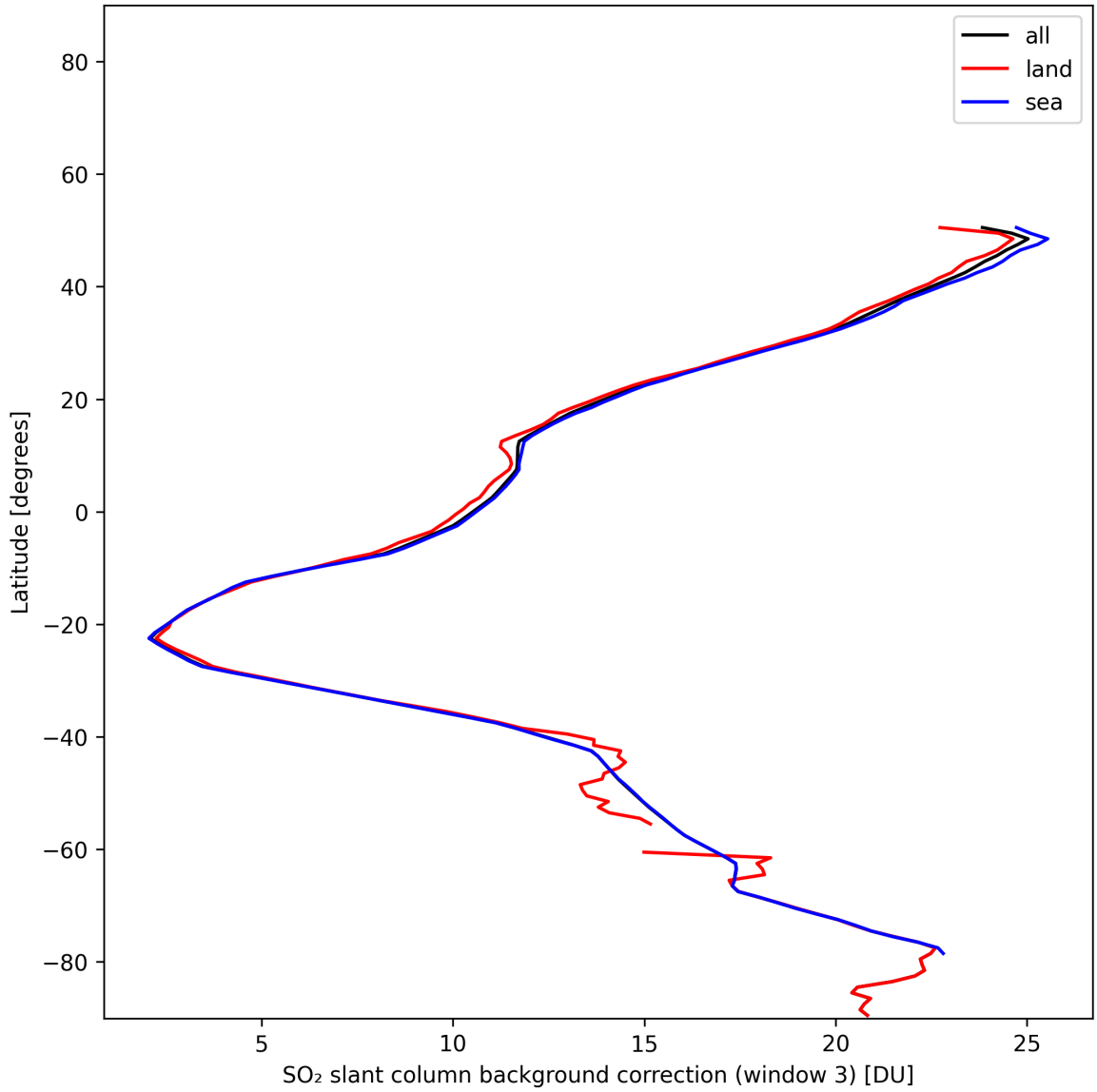

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-01-20 to 2025-01-21.

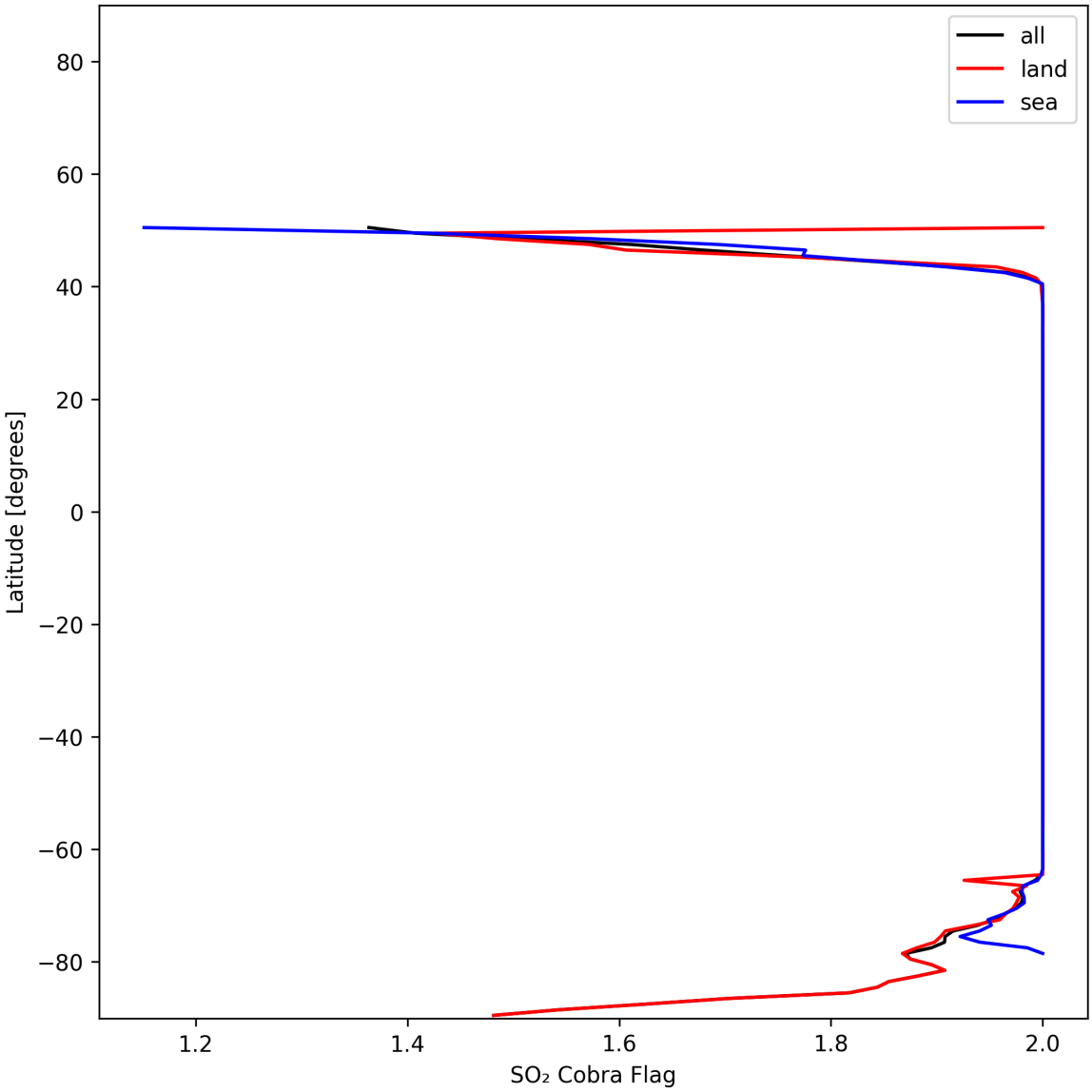

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-01-20 to 2025-01-21.

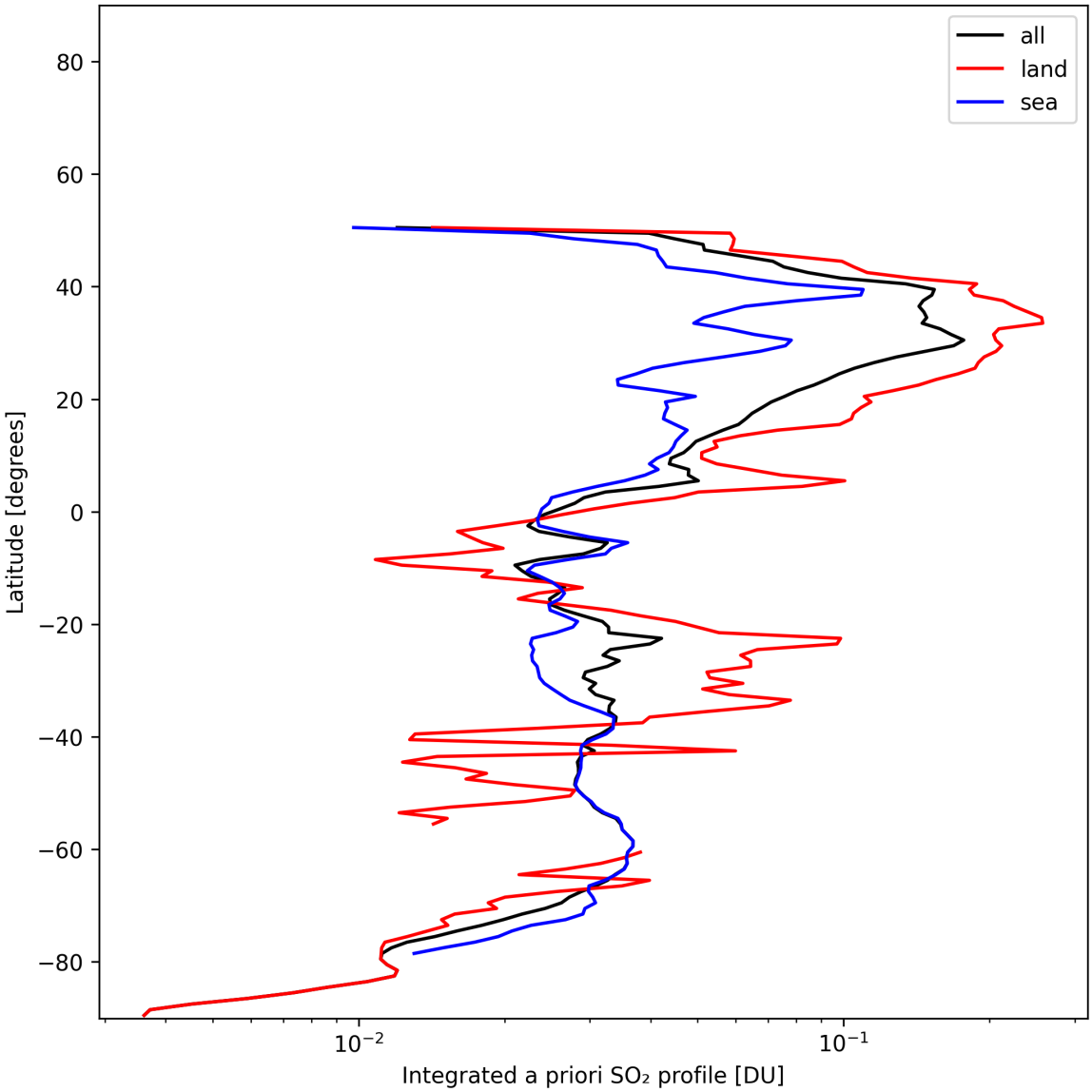

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-01-20 to 2025-01-21.

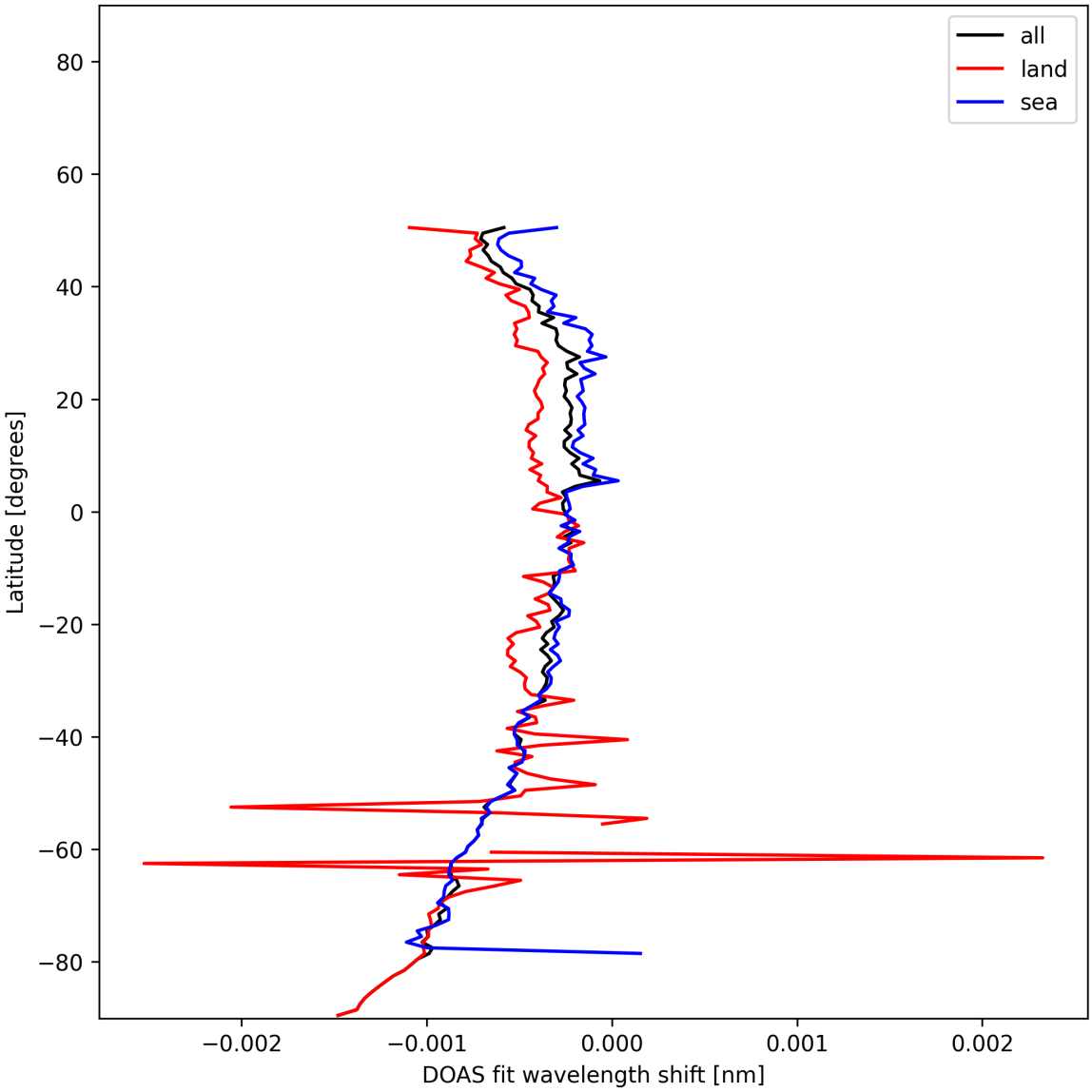

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-01-20 to 2025-01-21.

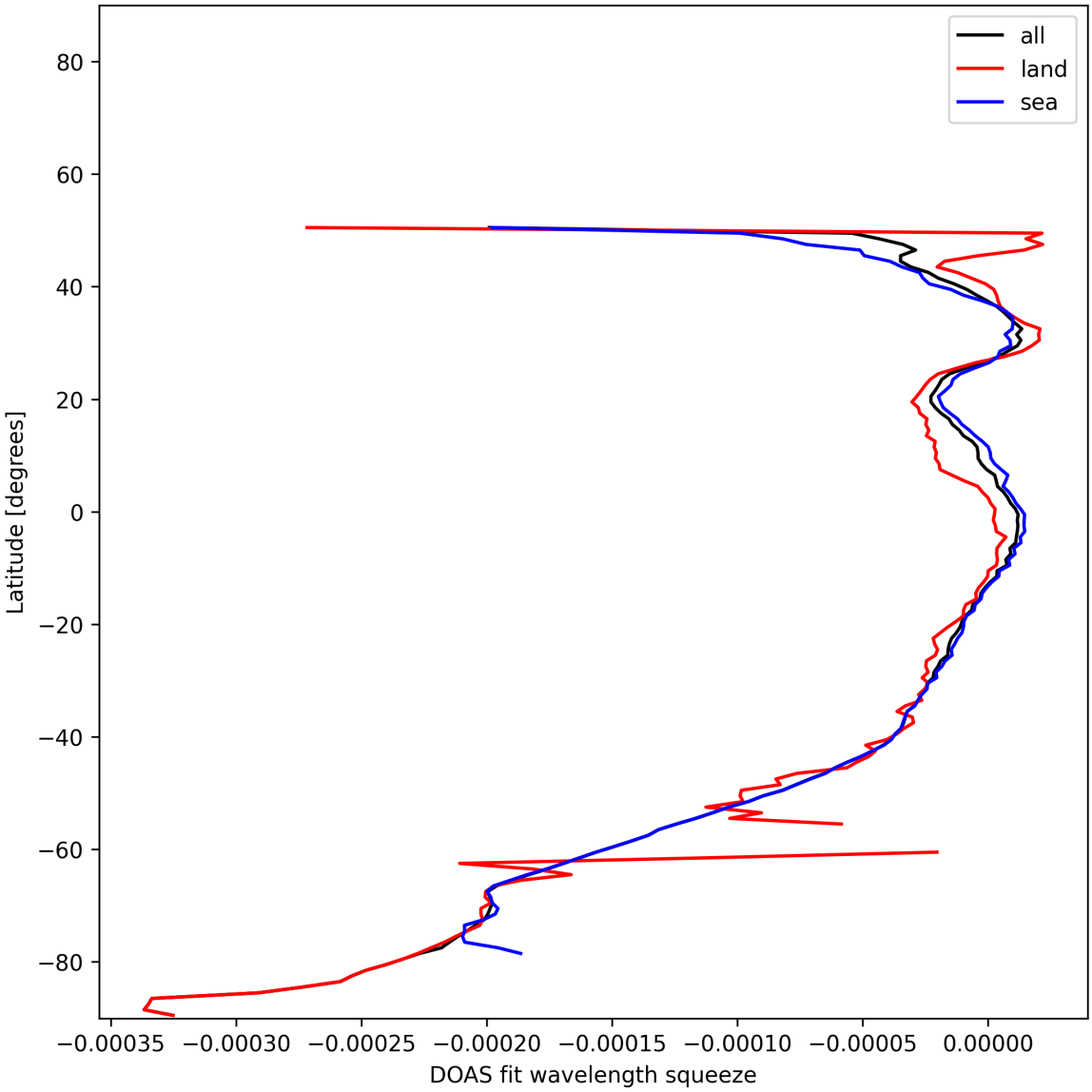

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-01-20 to 2025-01-21.

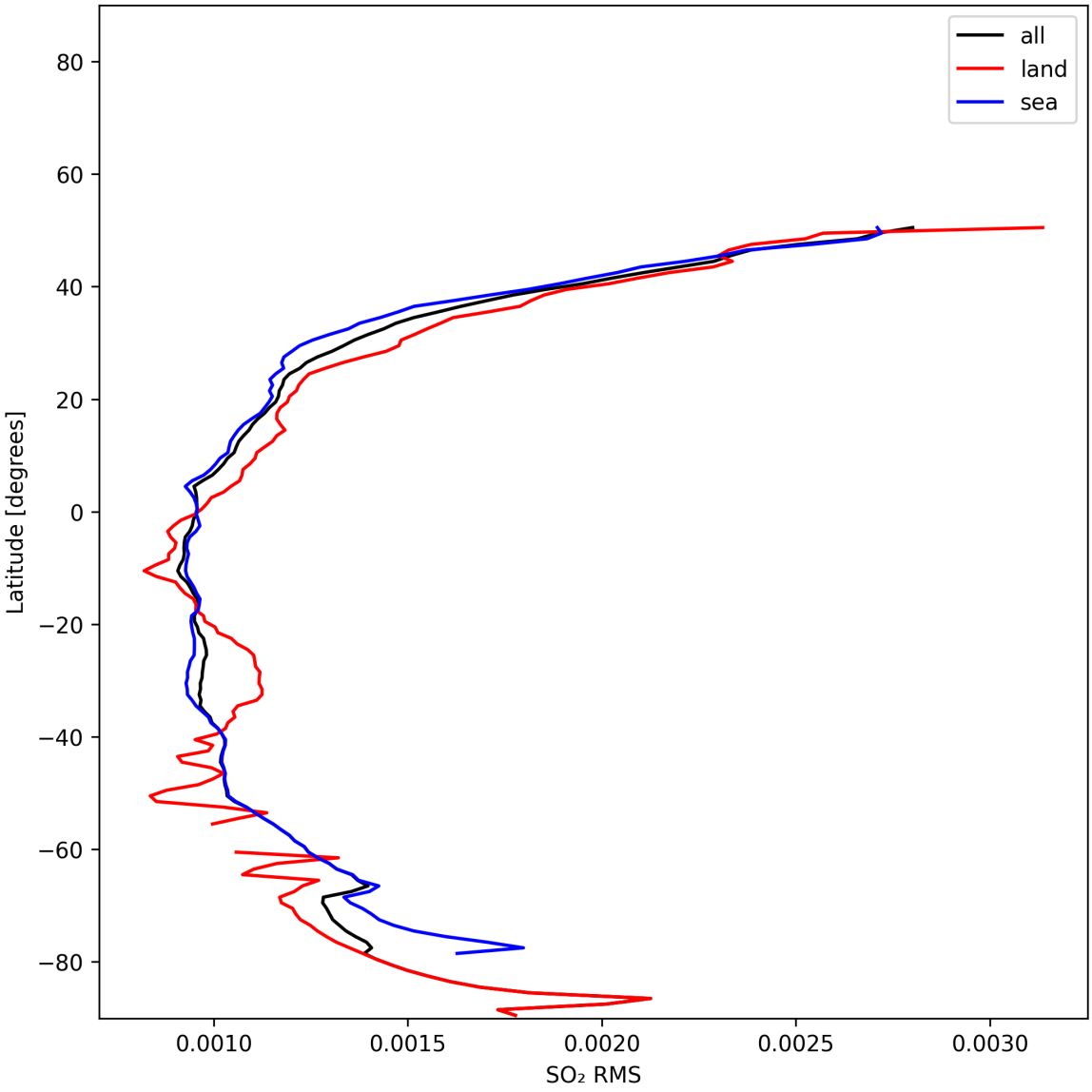

Figure 52: Zonal average of "SO_2 RMS" for 2025-01-20 to 2025-01-21.

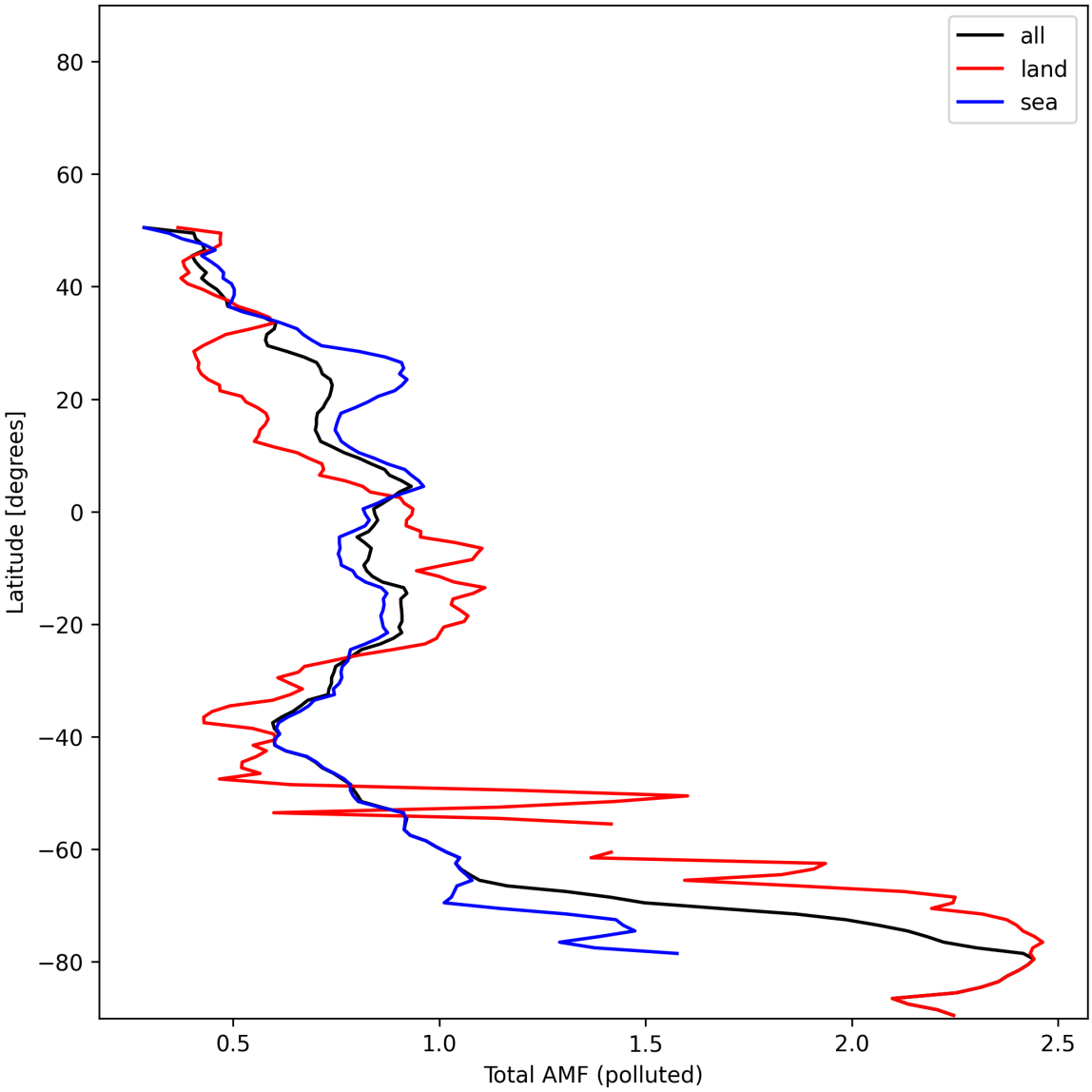

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-01-20 to 2025-01-21.

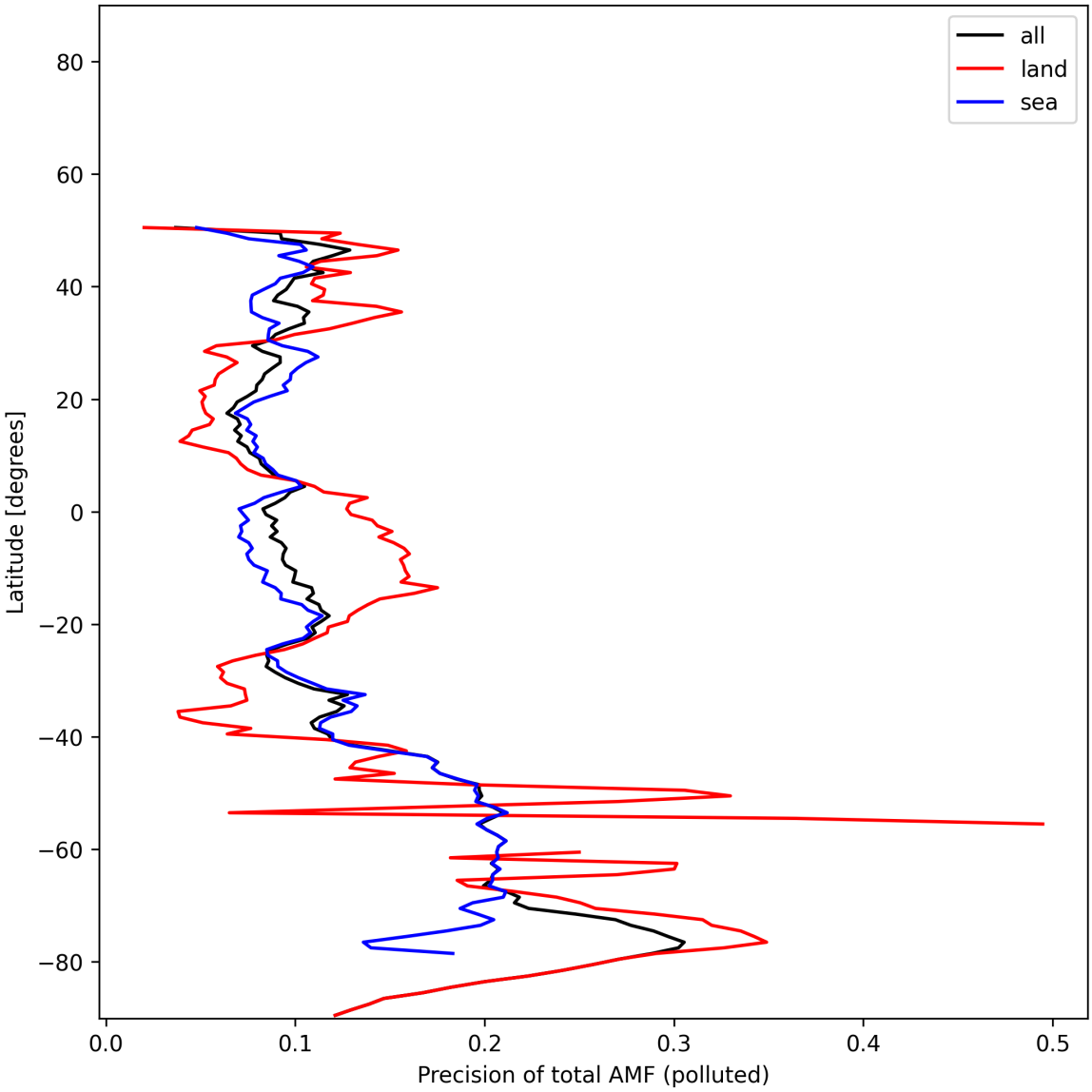

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-01-20 to 2025-01-21.

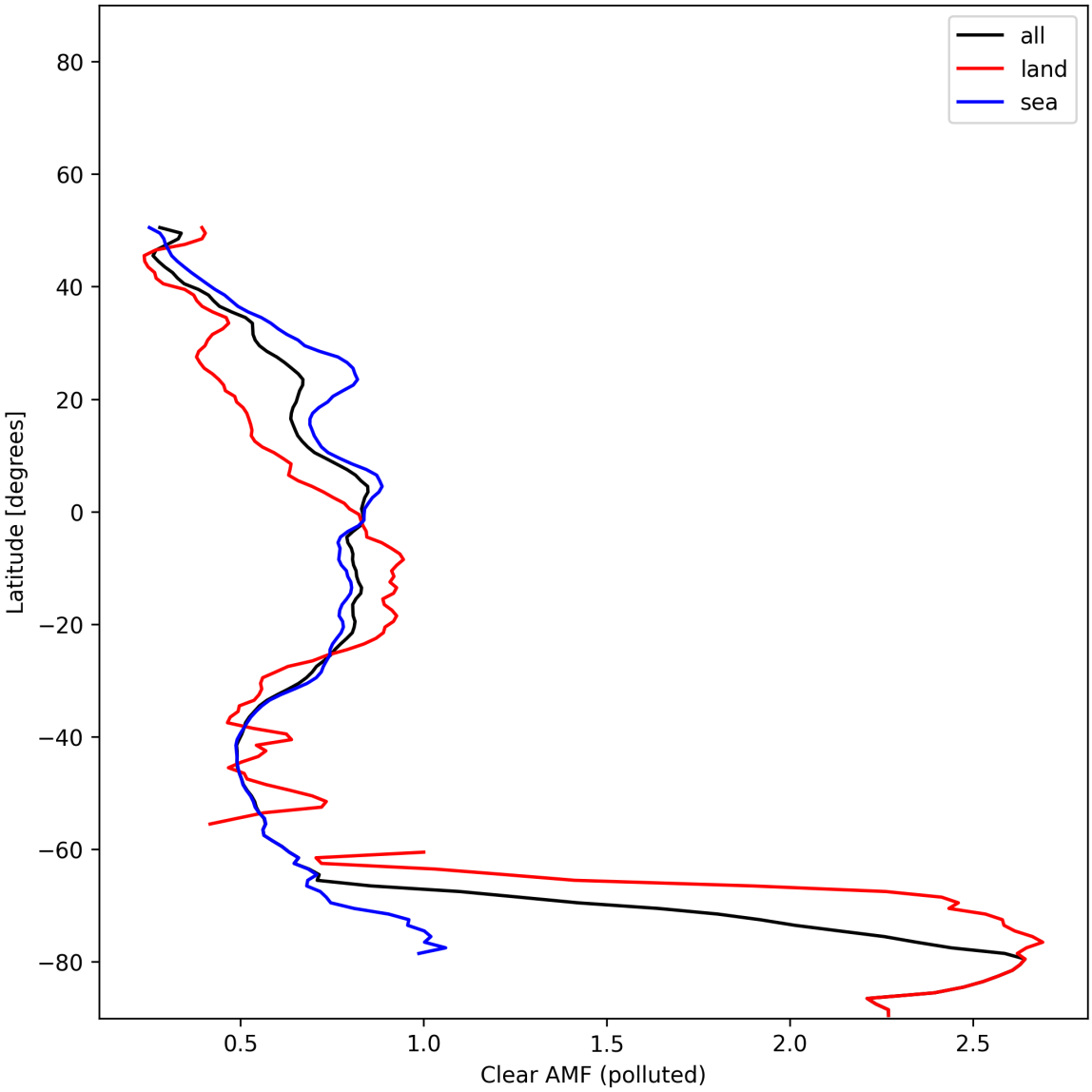

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-01-20 to 2025-01-21.

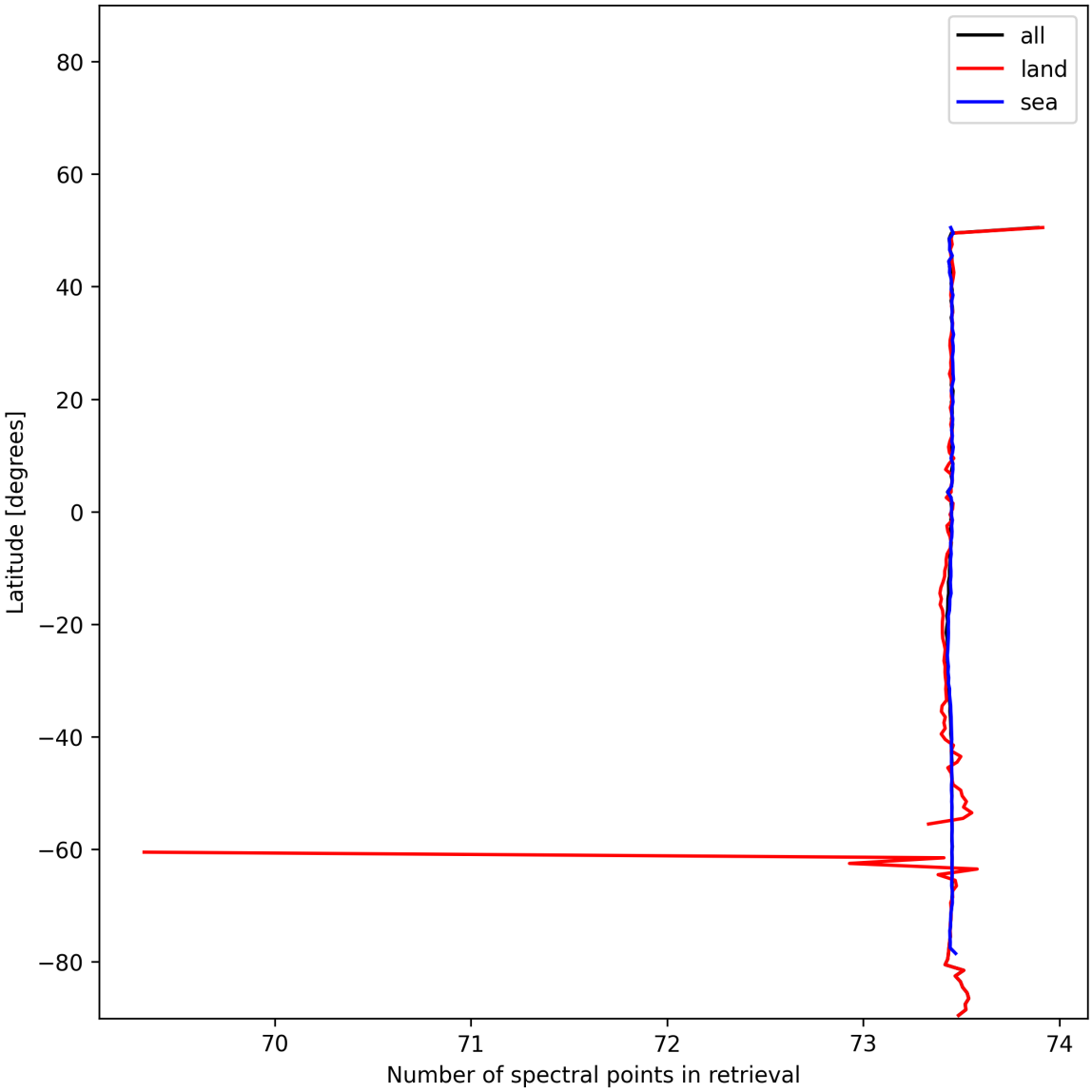

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-01-20 to 2025-01-21.

8 Histograms

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

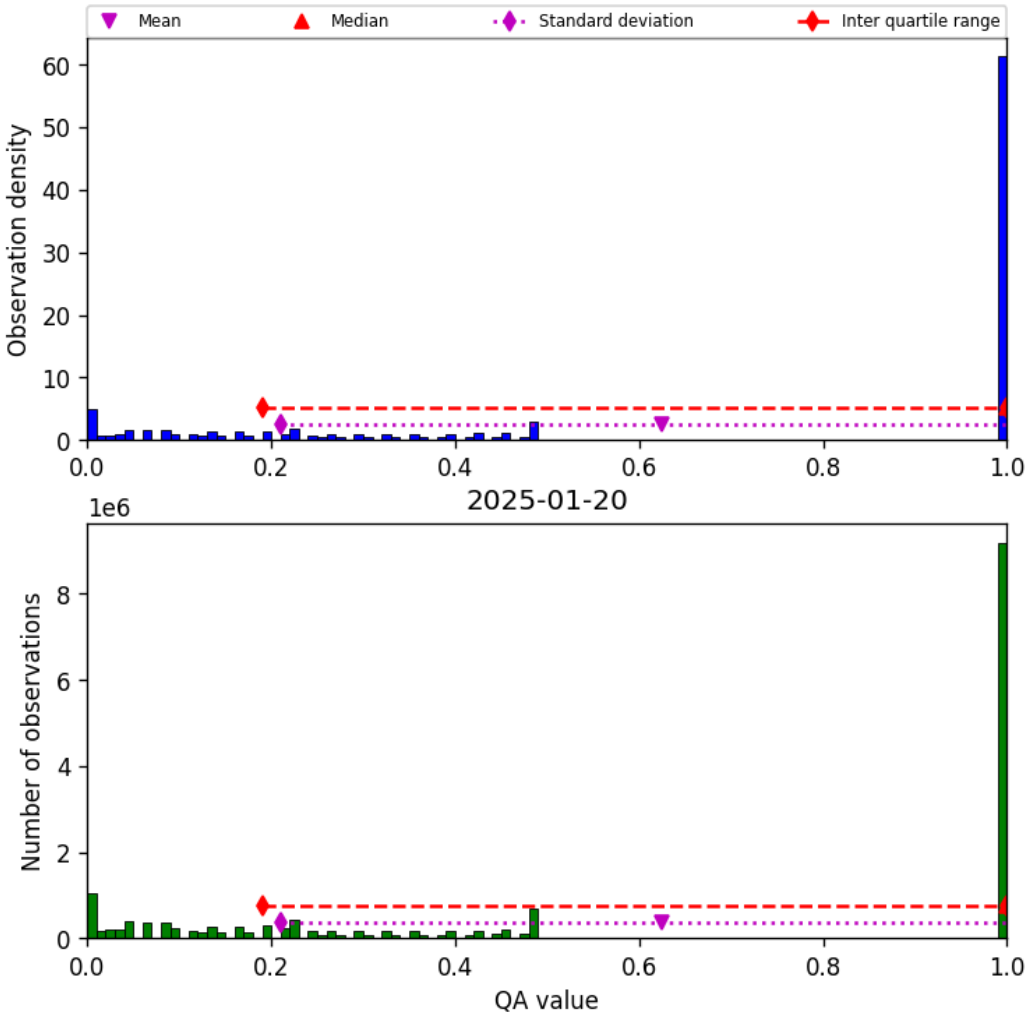

Figure 57: Histogram of “QA value” for 2025-01-20 to 2025-01-21

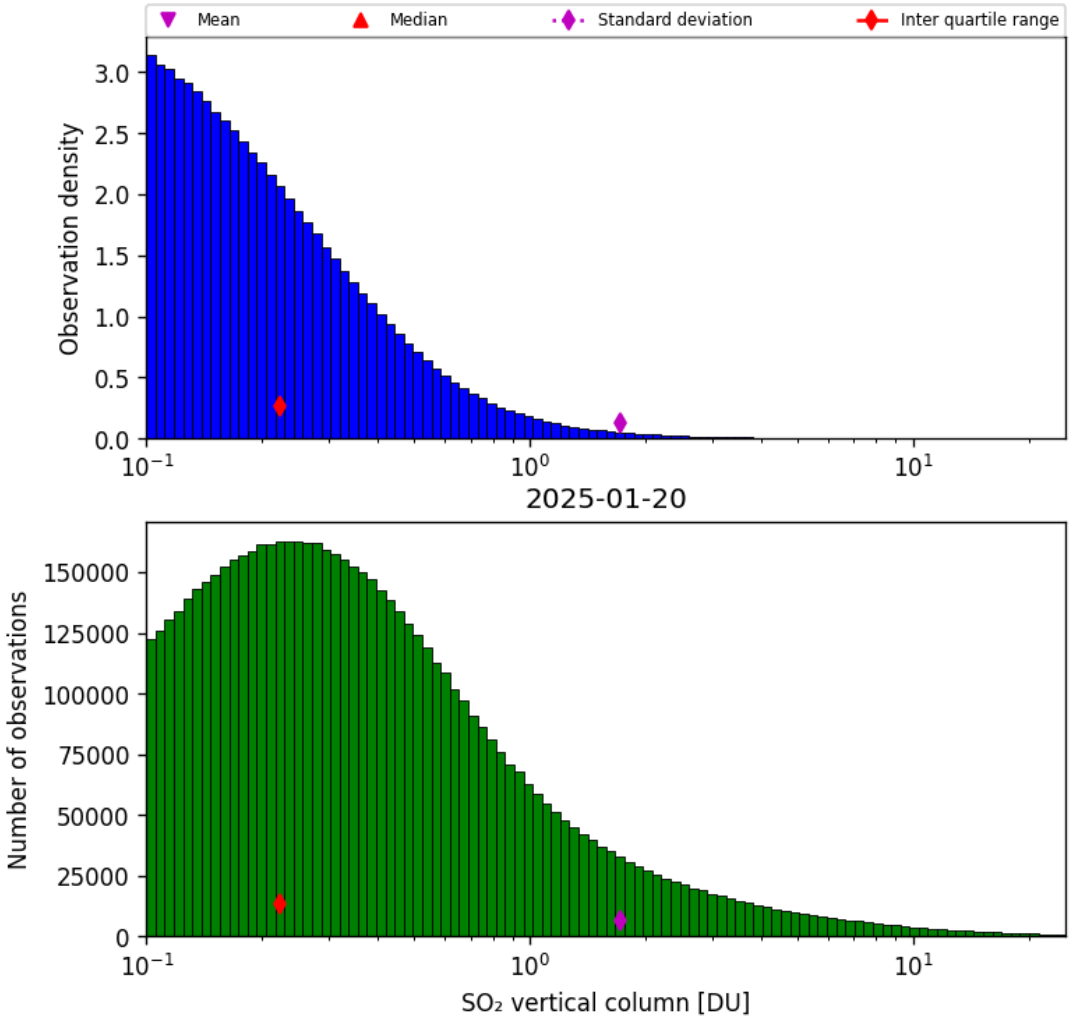

Figure 58: Histogram of "SO_2 vertical column" for 2025-01-20 to 2025-01-21

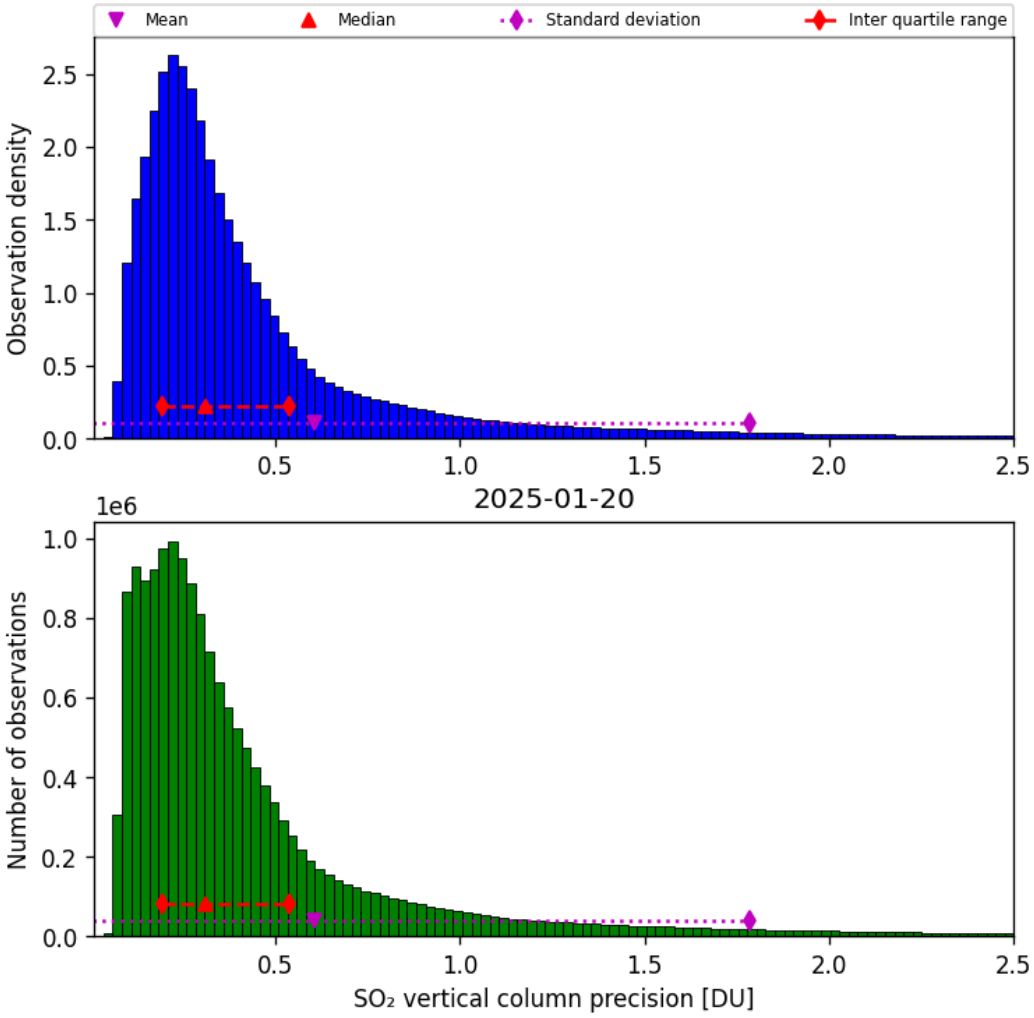

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-01-20 to 2025-01-21

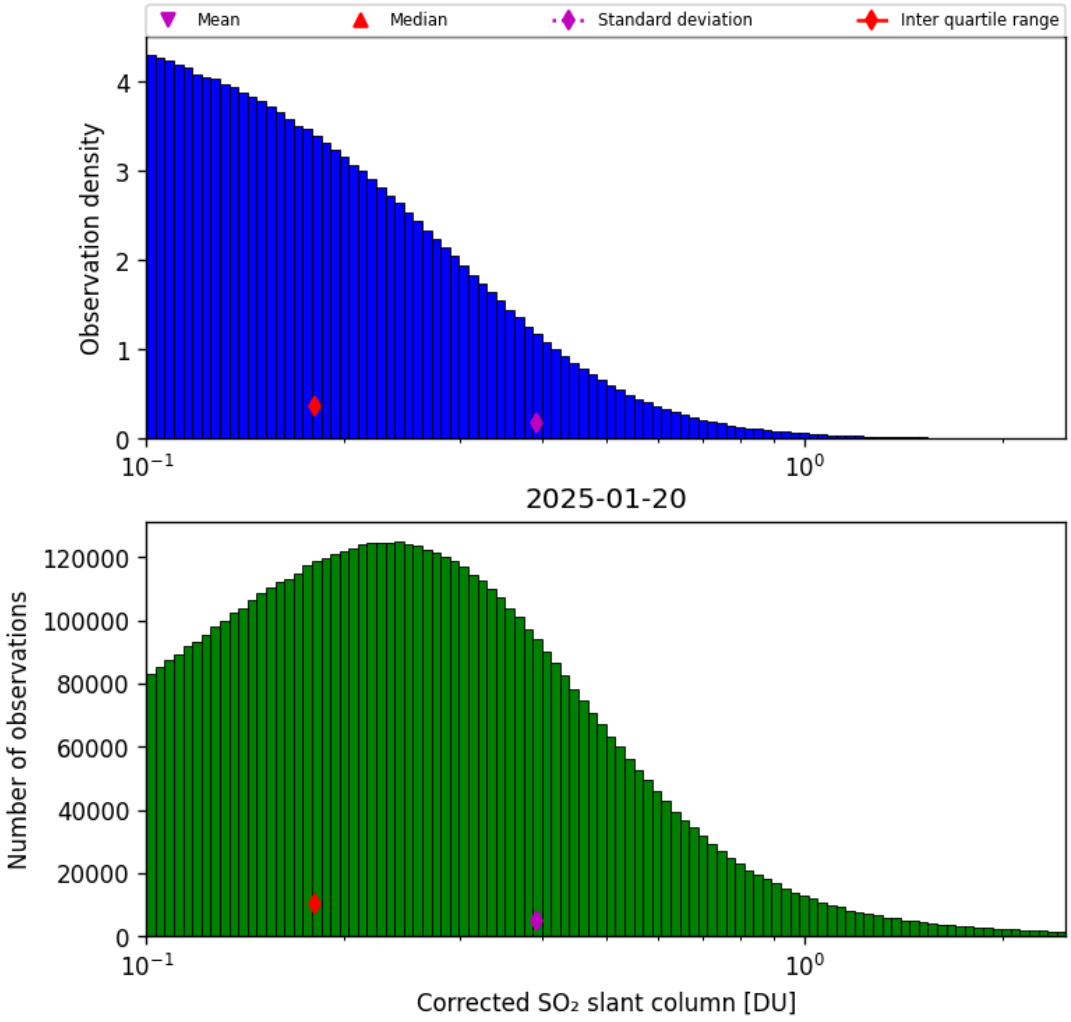

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-01-20 to 2025-01-21

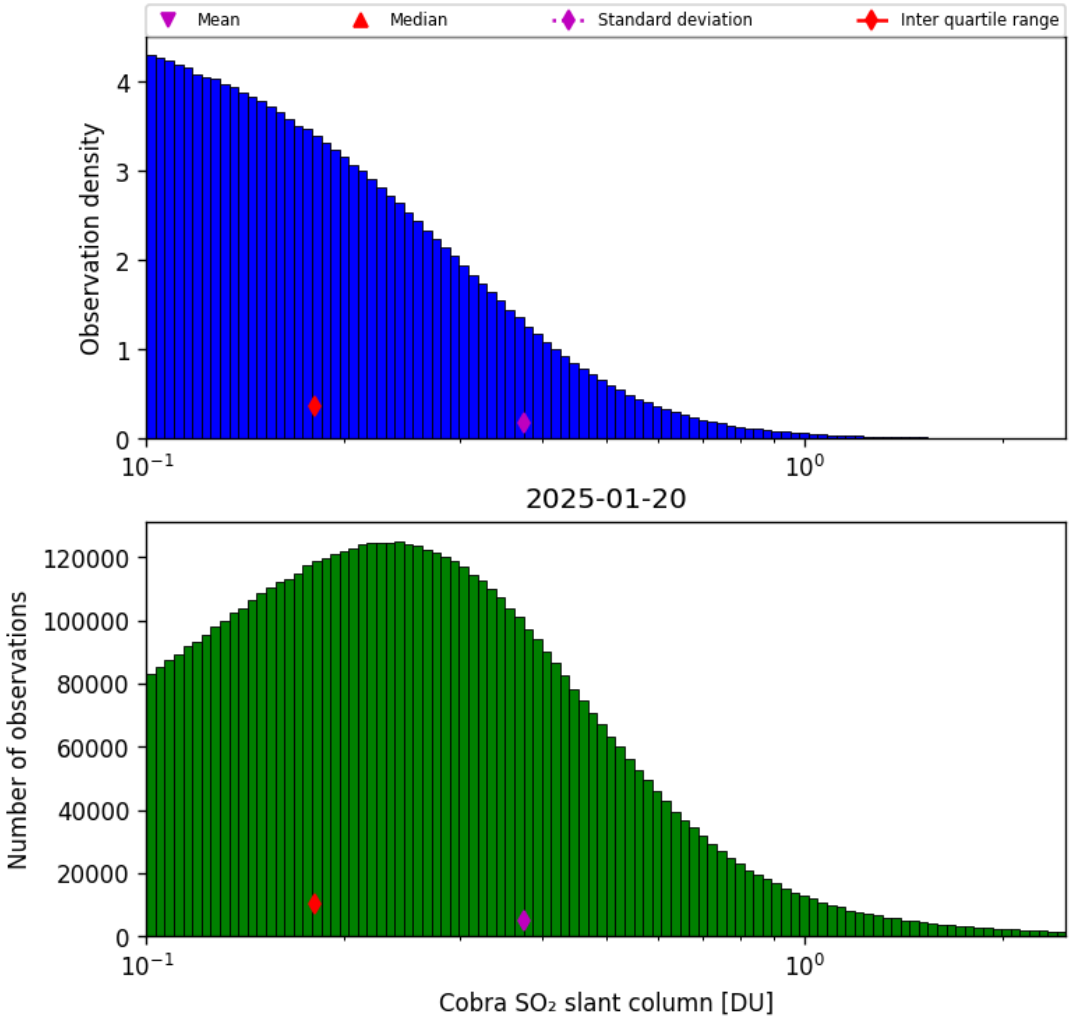

Figure 61: Histogram of “Cobra SO_2 slant column” for 2025-01-20 to 2025-01-21

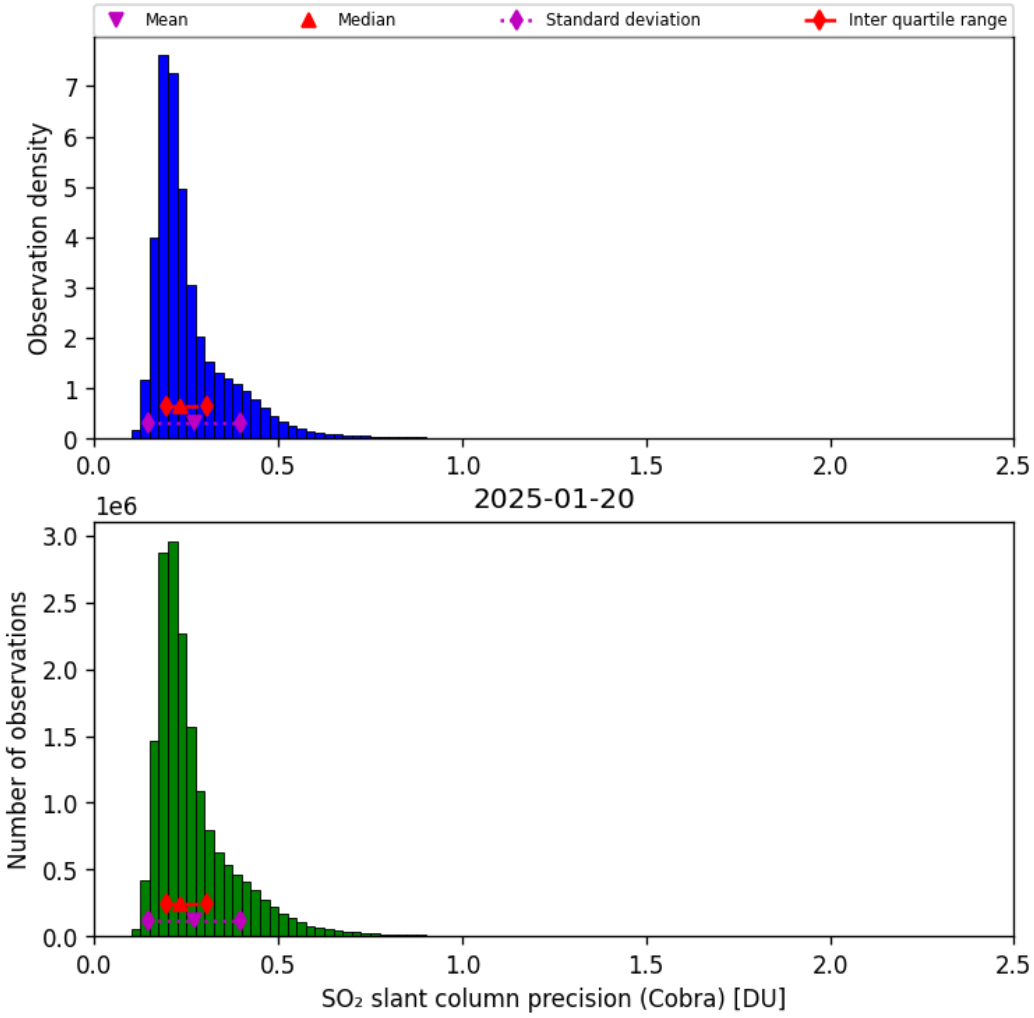

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-01-20 to 2025-01-21

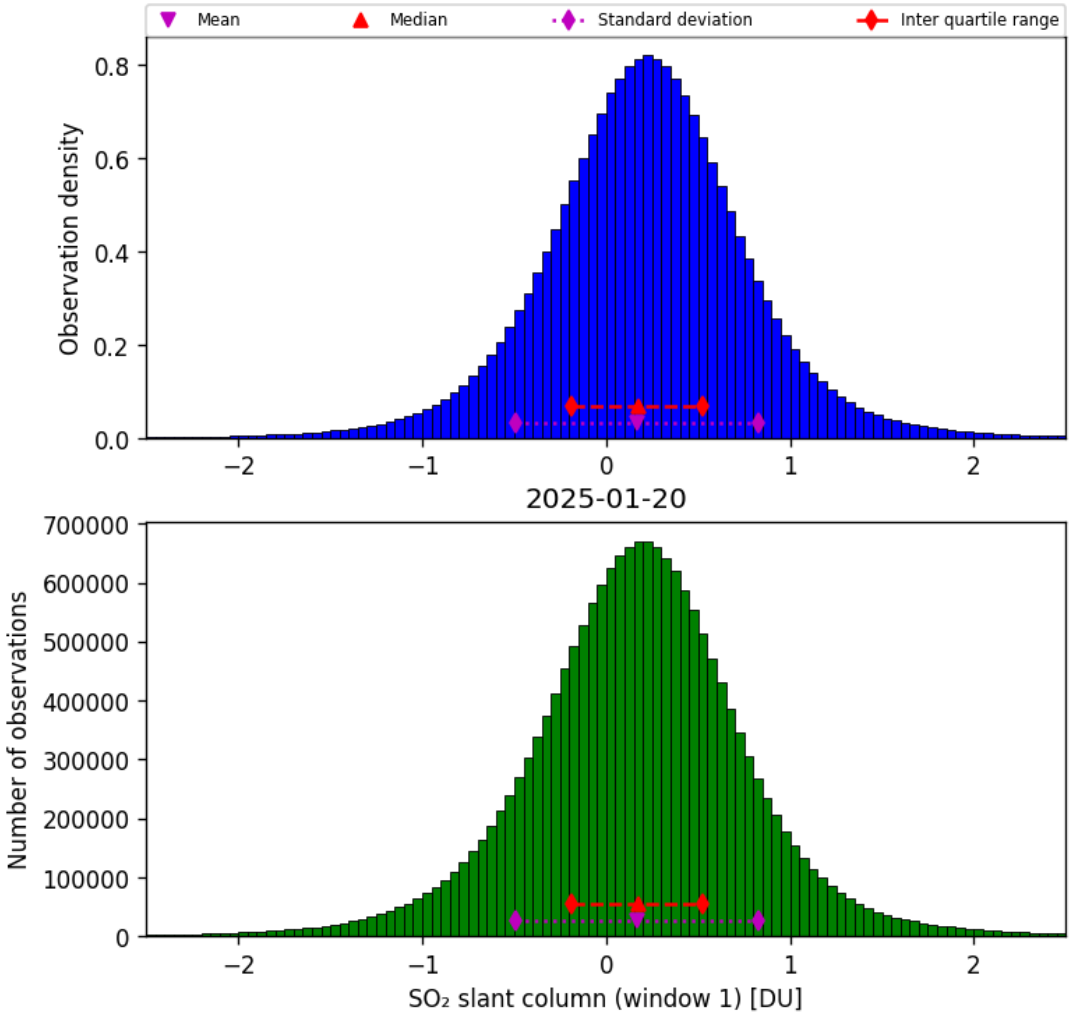

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-01-20 to 2025-01-21

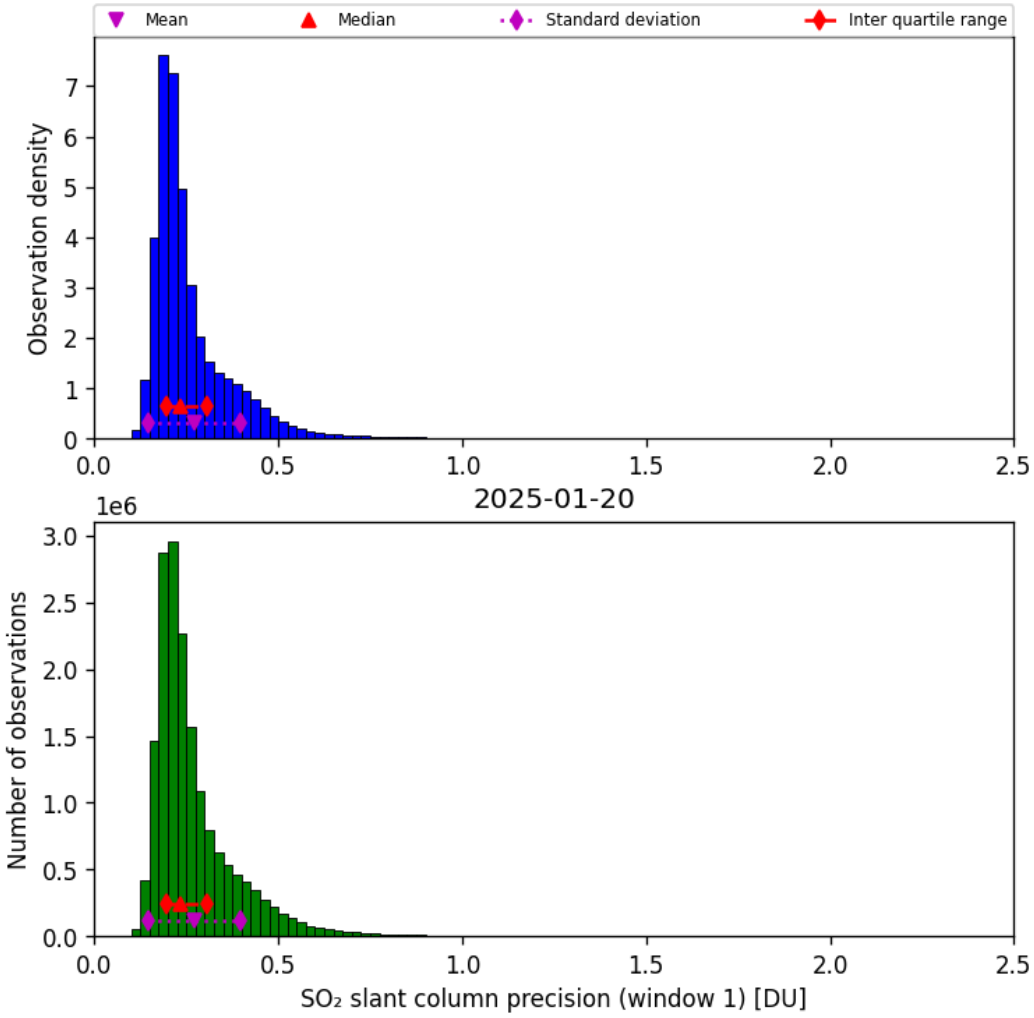

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-01-20 to 2025-01-21

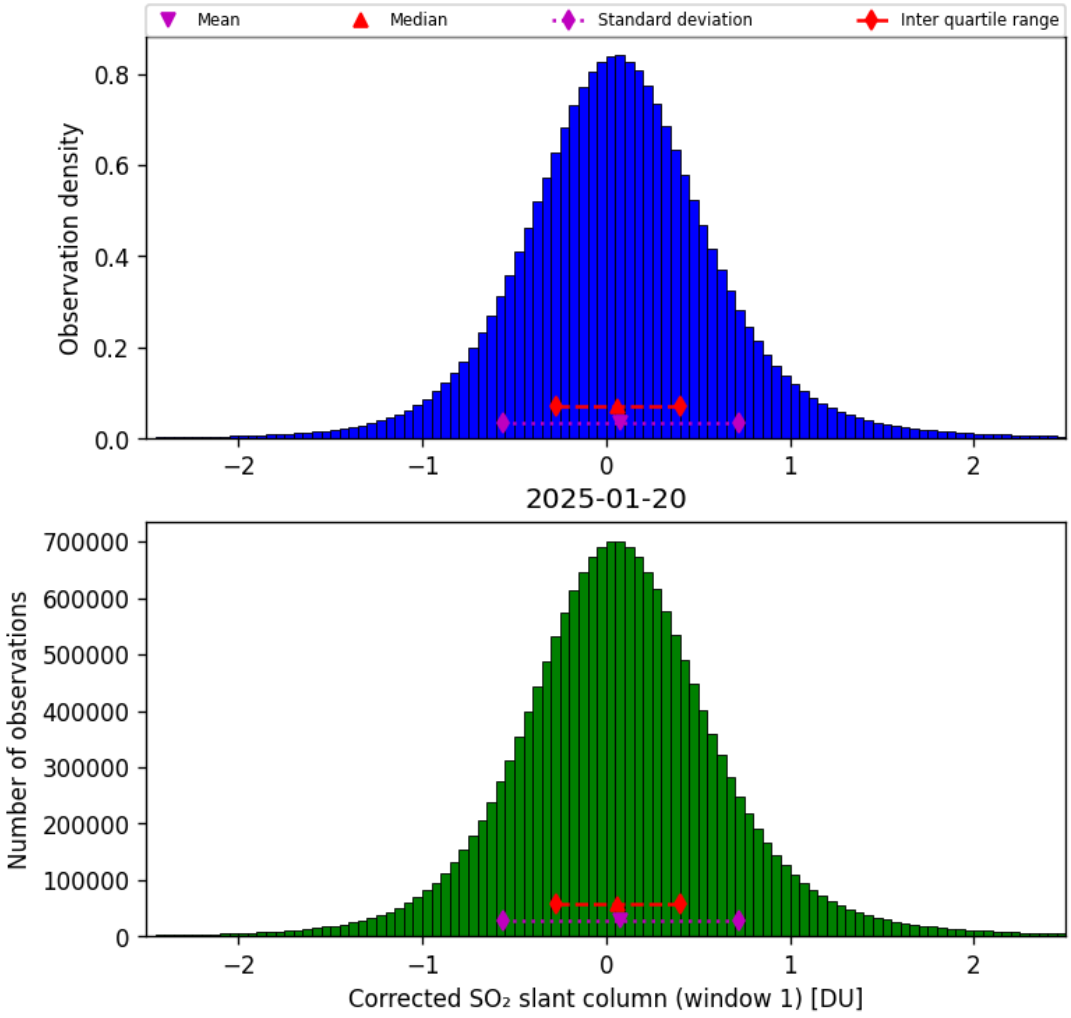

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-01-20 to 2025-01-21

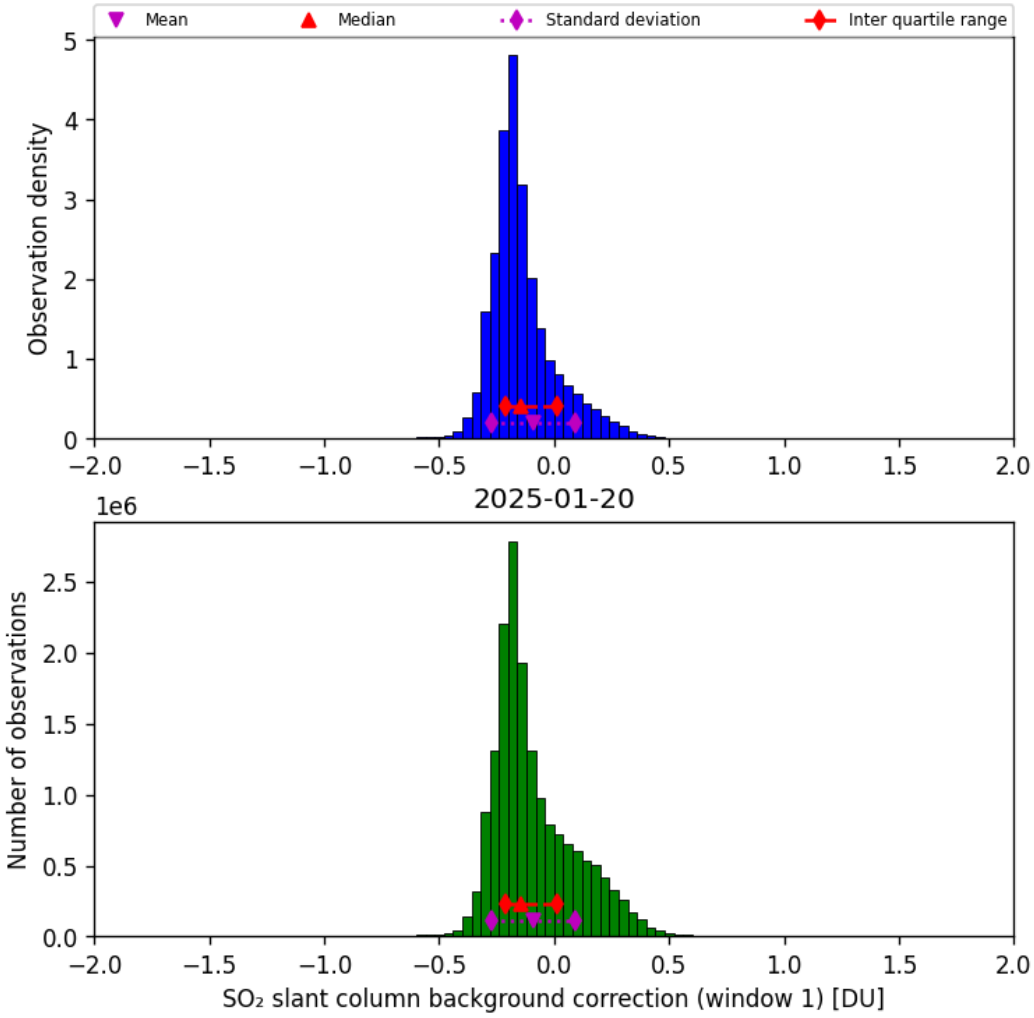

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-01-20 to 2025-01-21

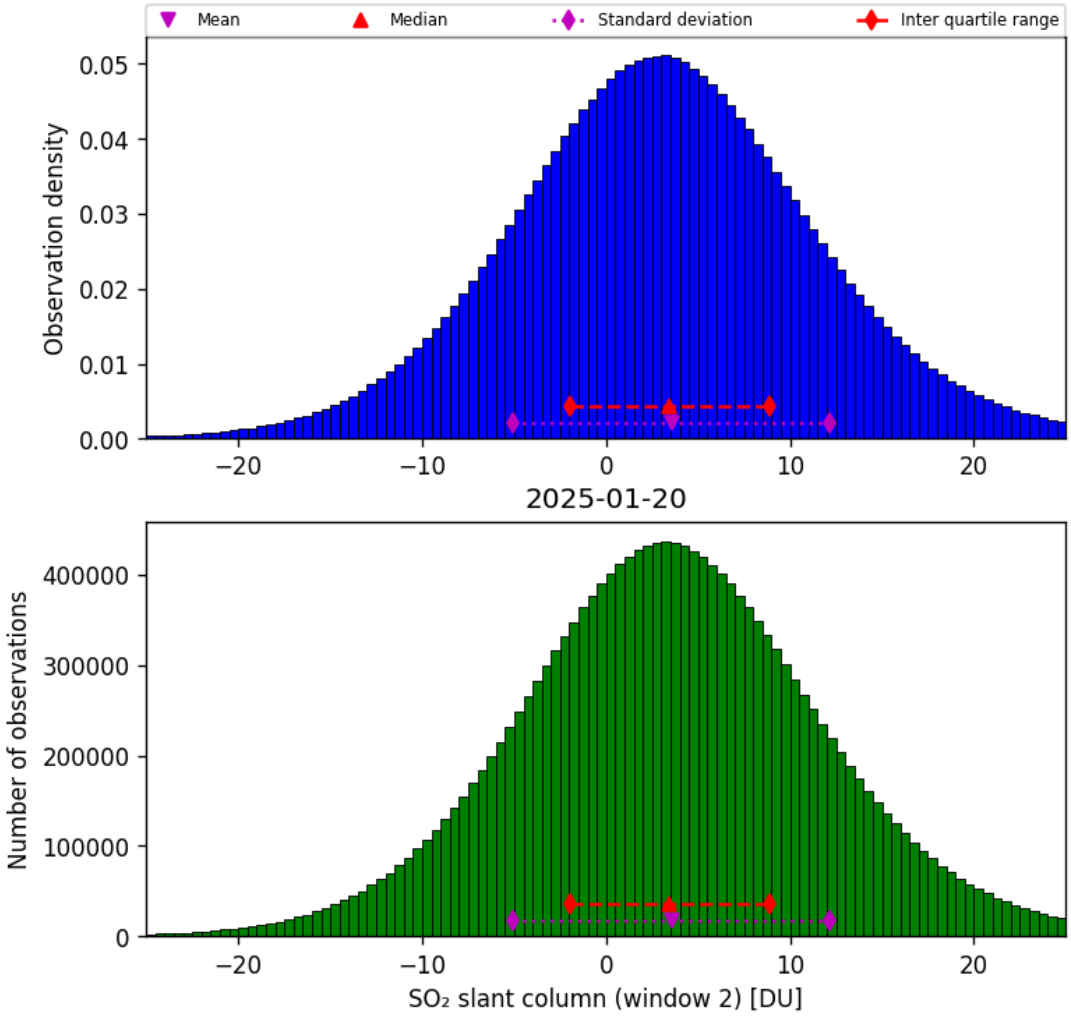

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-01-20 to 2025-01-21

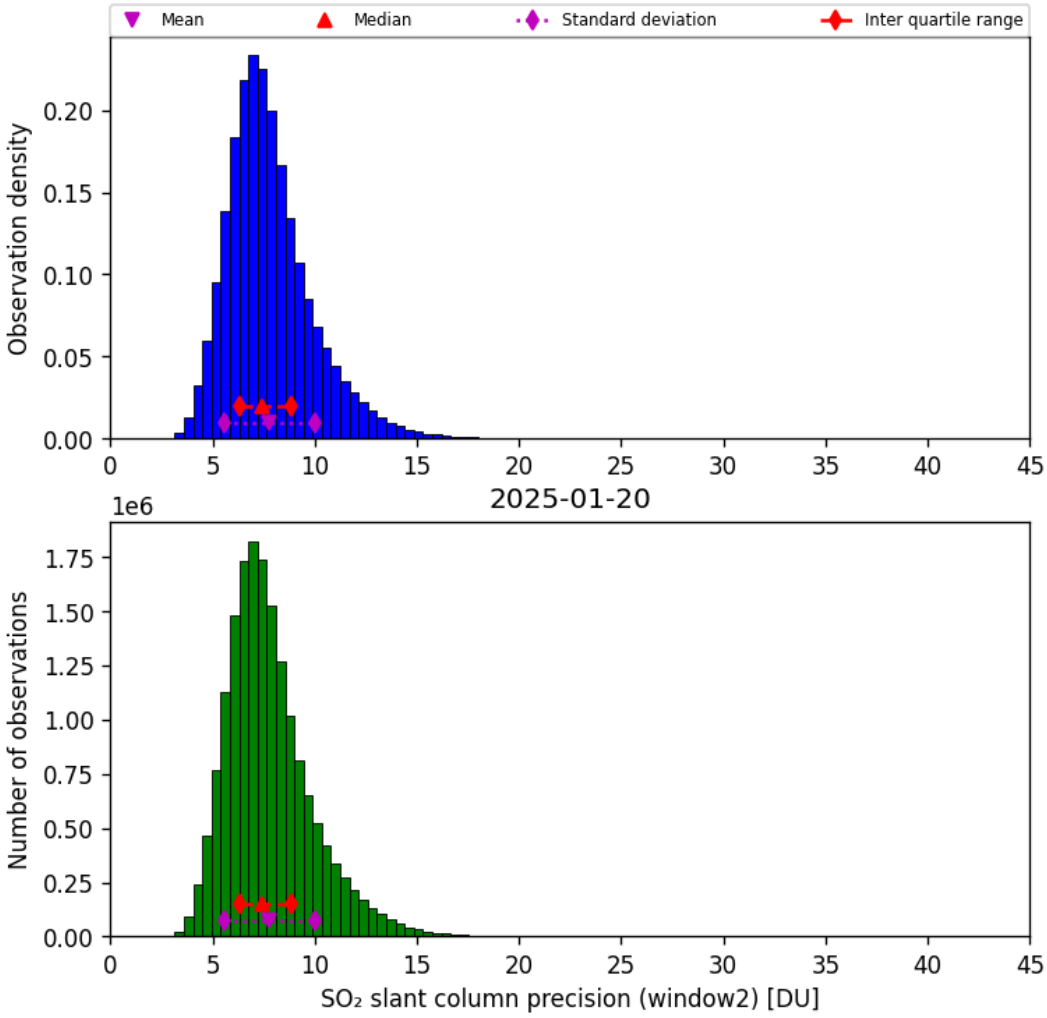

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-01-20 to 2025-01-21

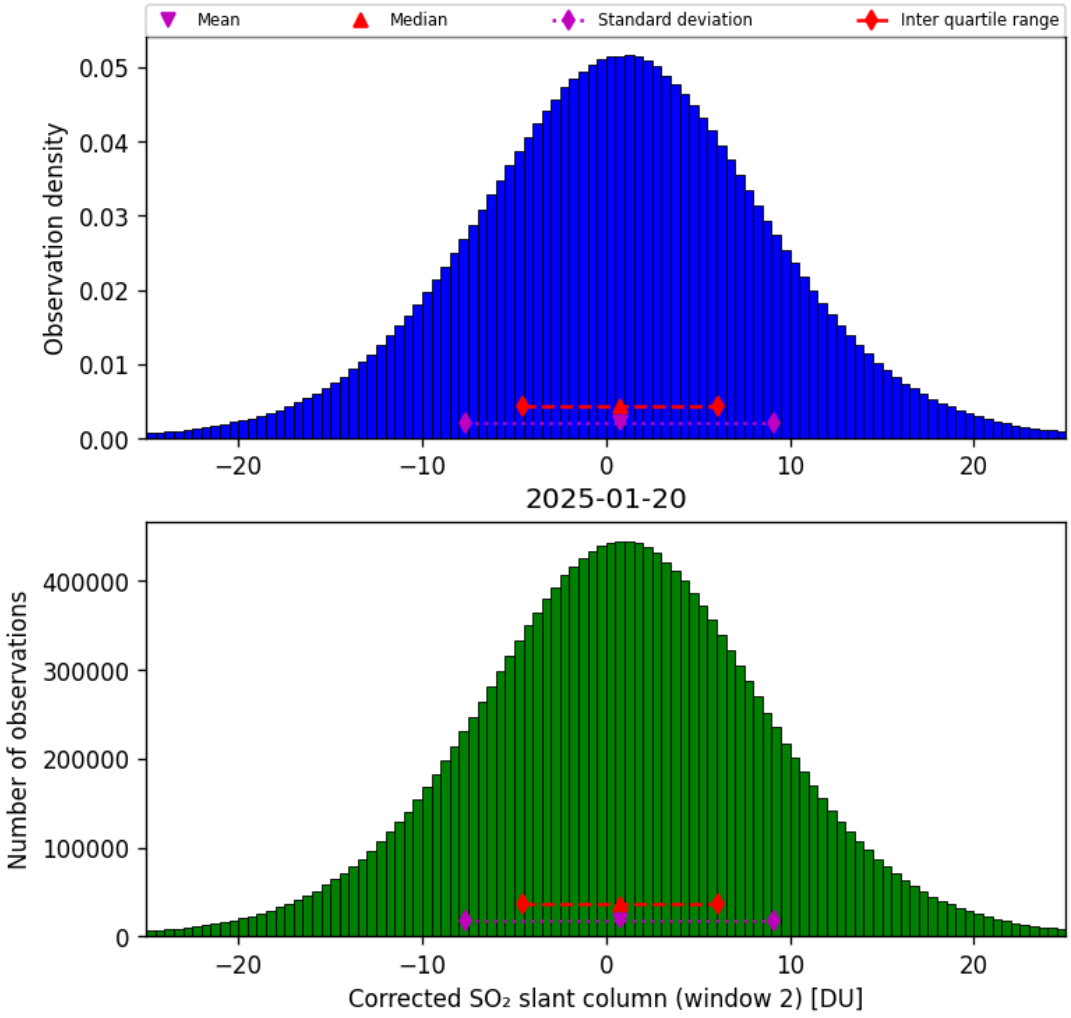

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-01-20 to 2025-01-21

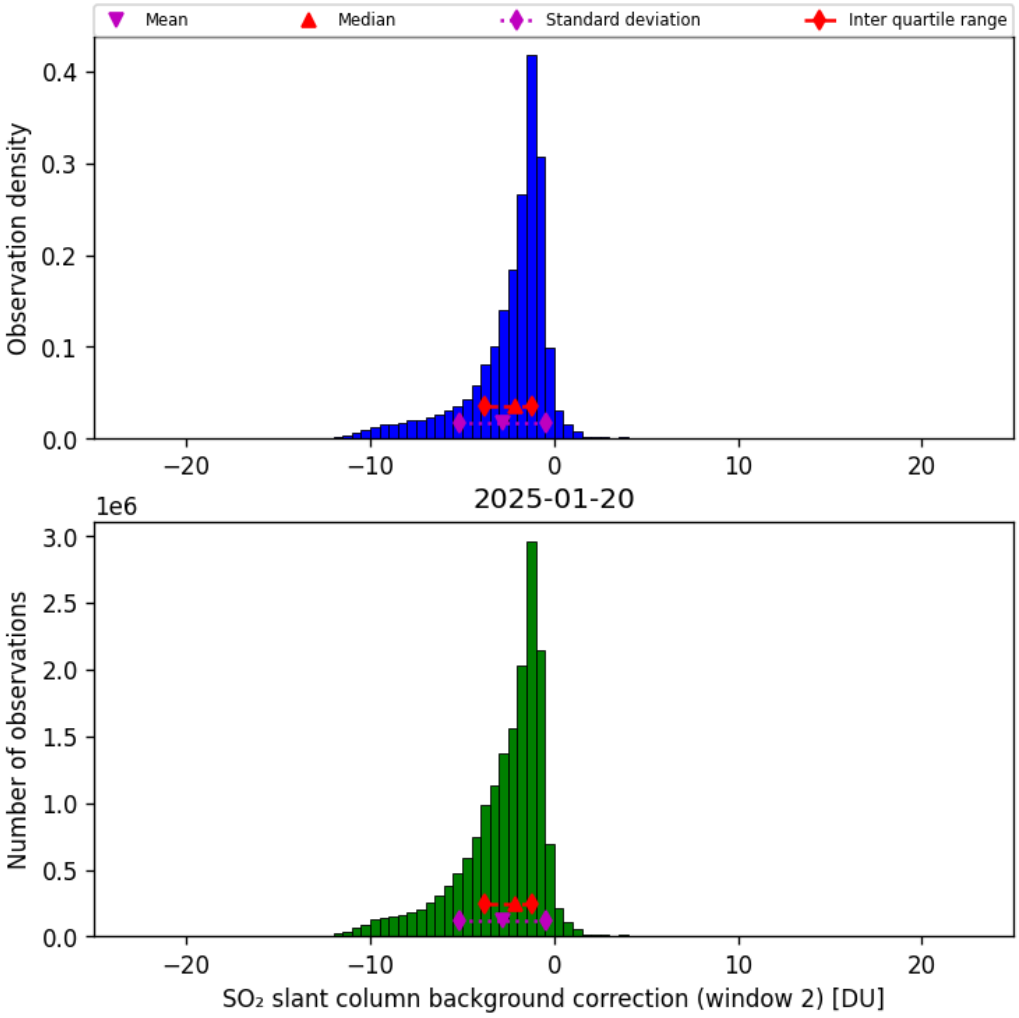

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-01-20 to 2025-01-21

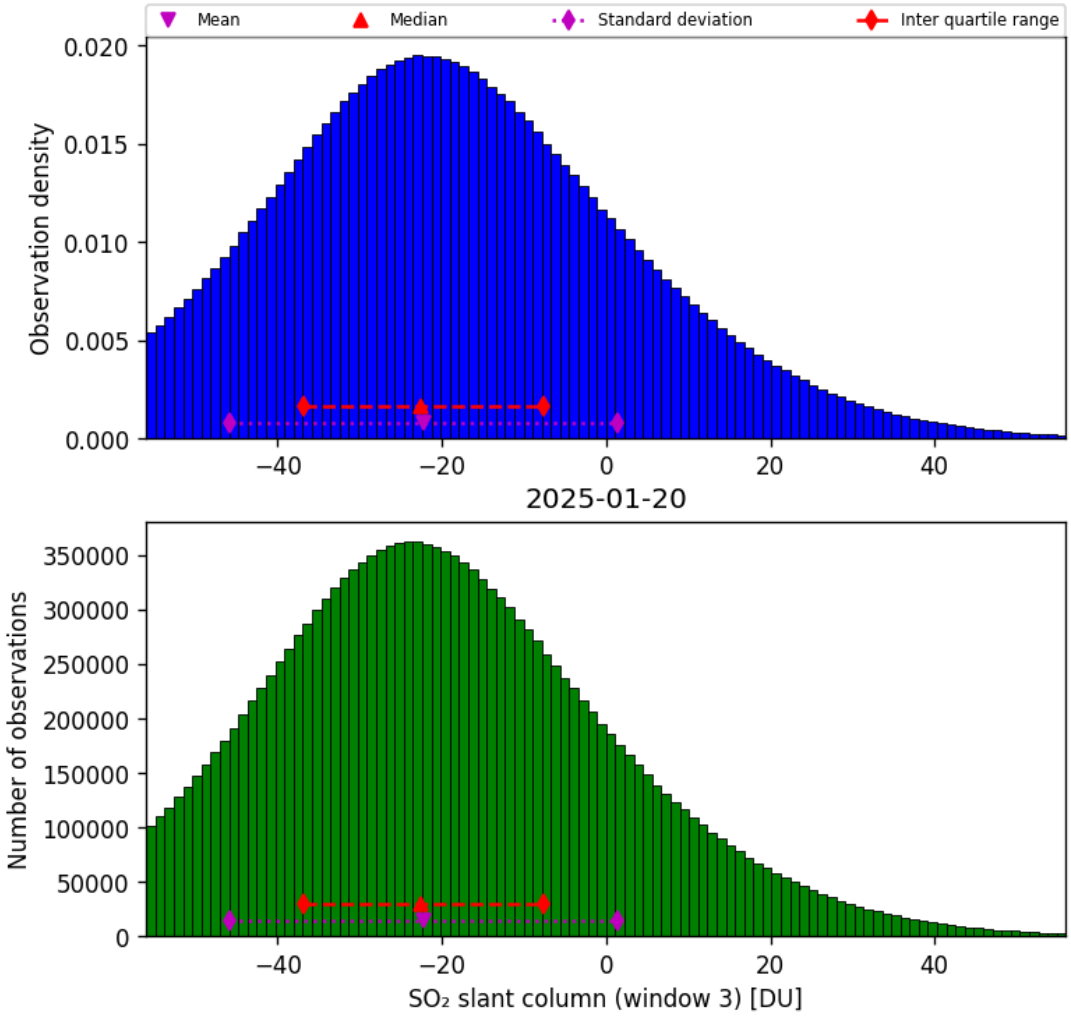

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-01-20 to 2025-01-21

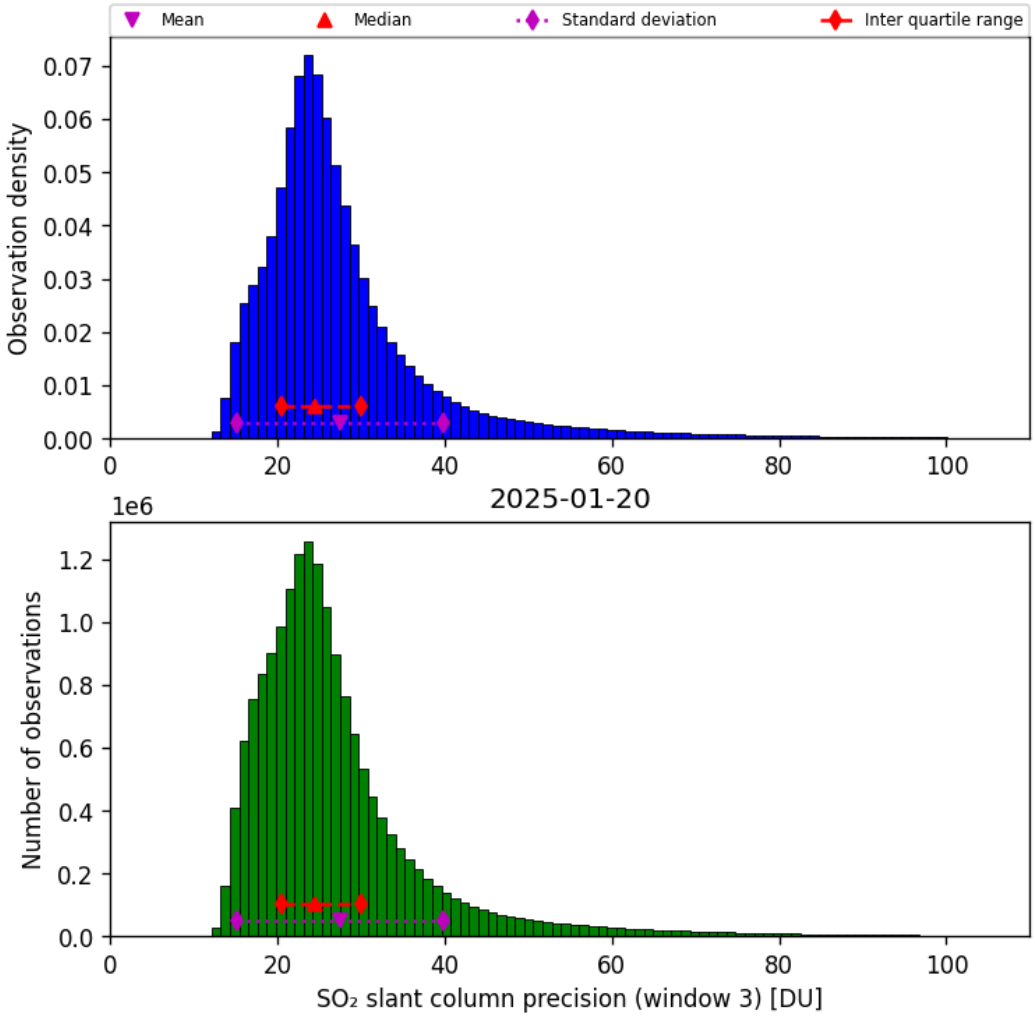

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-01-20 to 2025-01-21

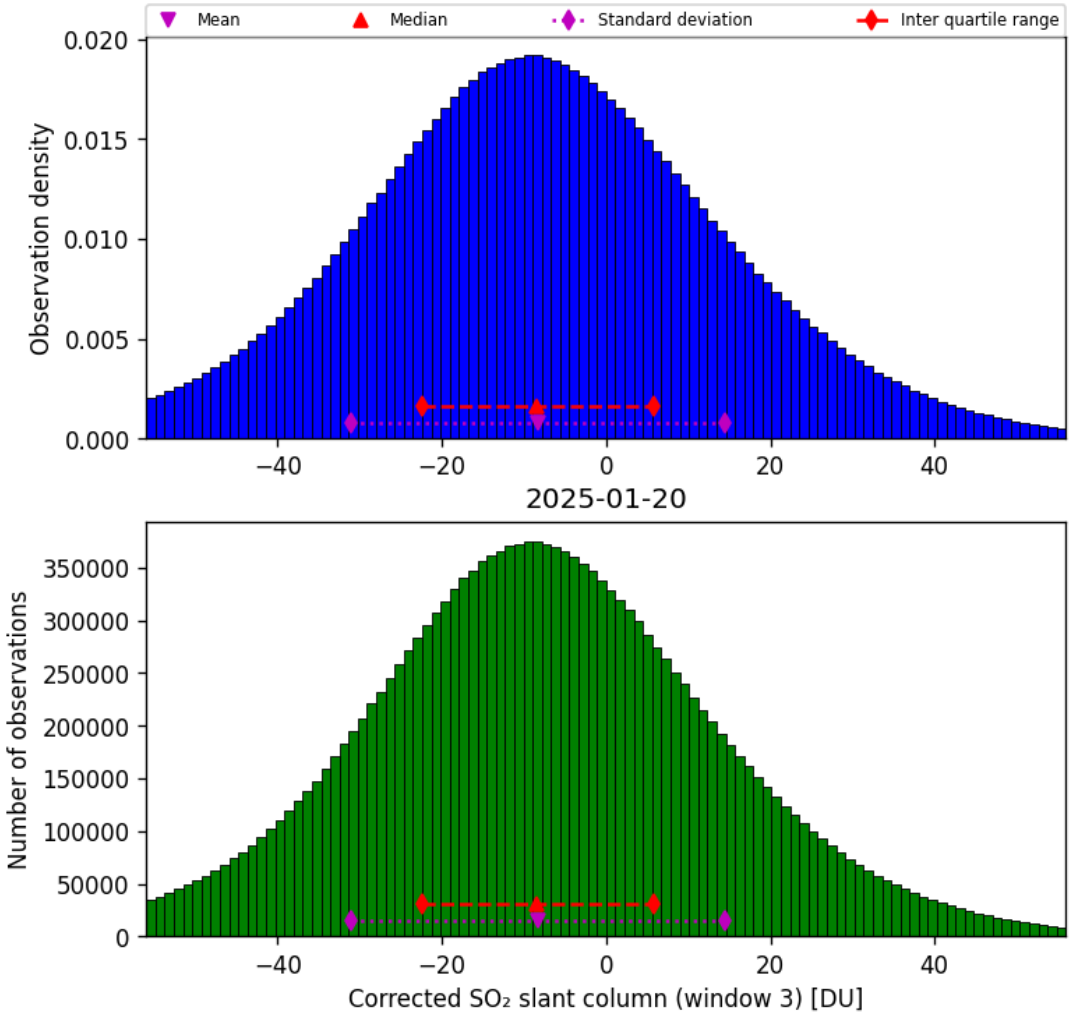

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-01-20 to 2025-01-21

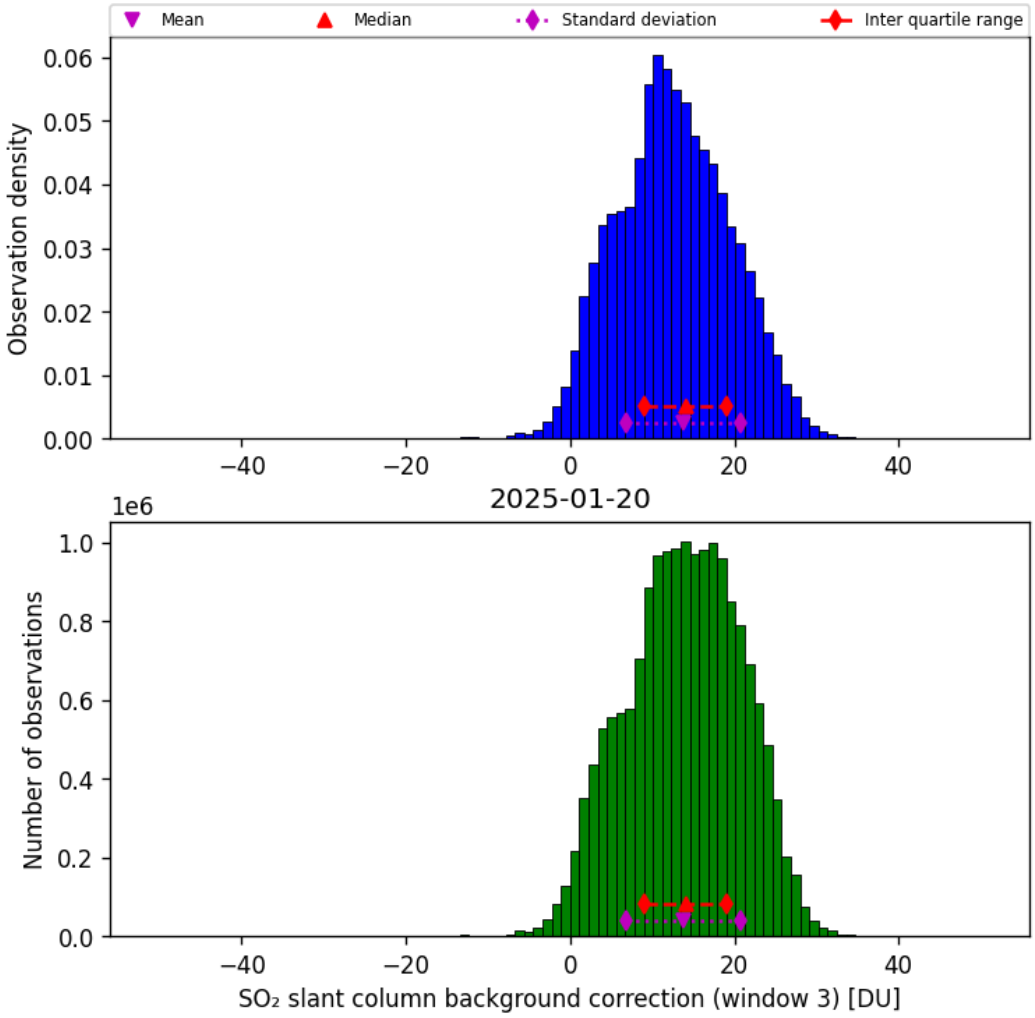

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-01-20 to 2025-01-21

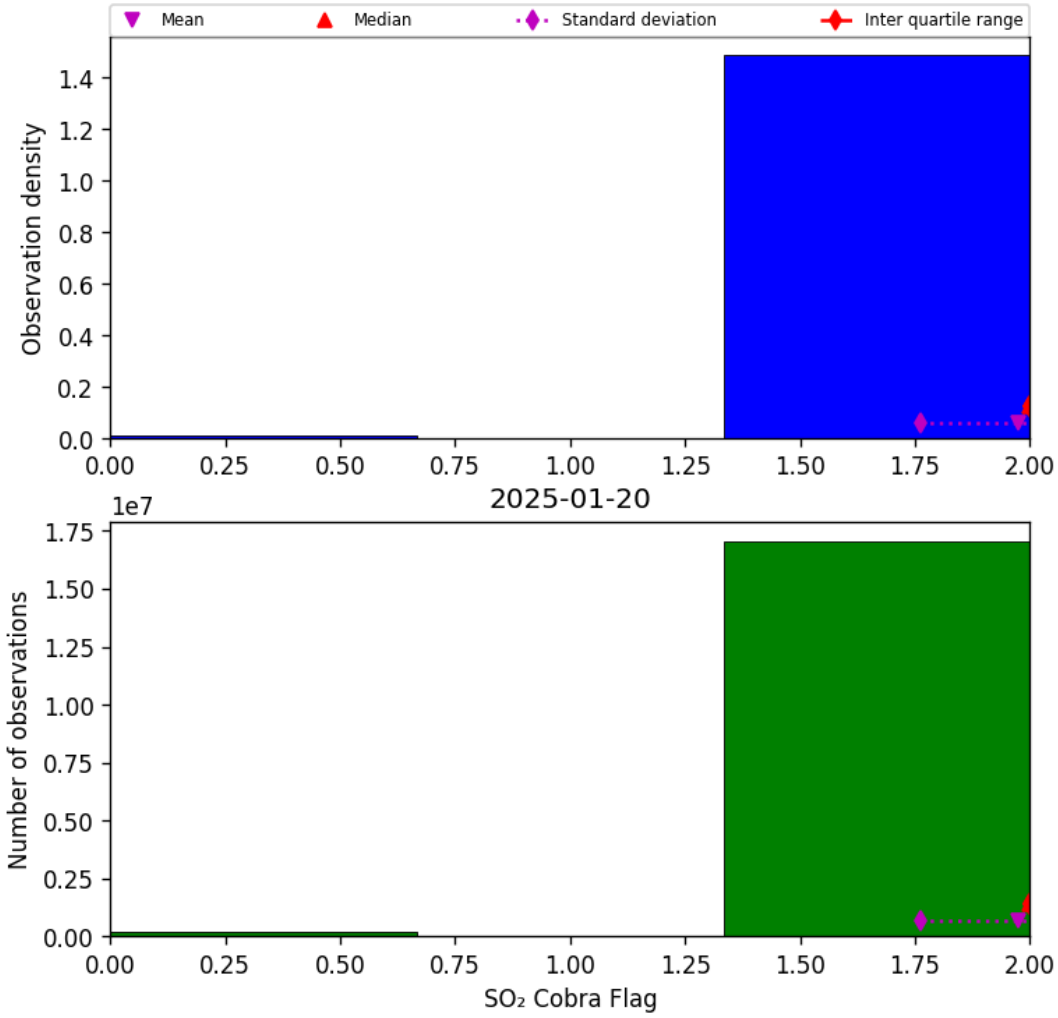

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-01-20 to 2025-01-21

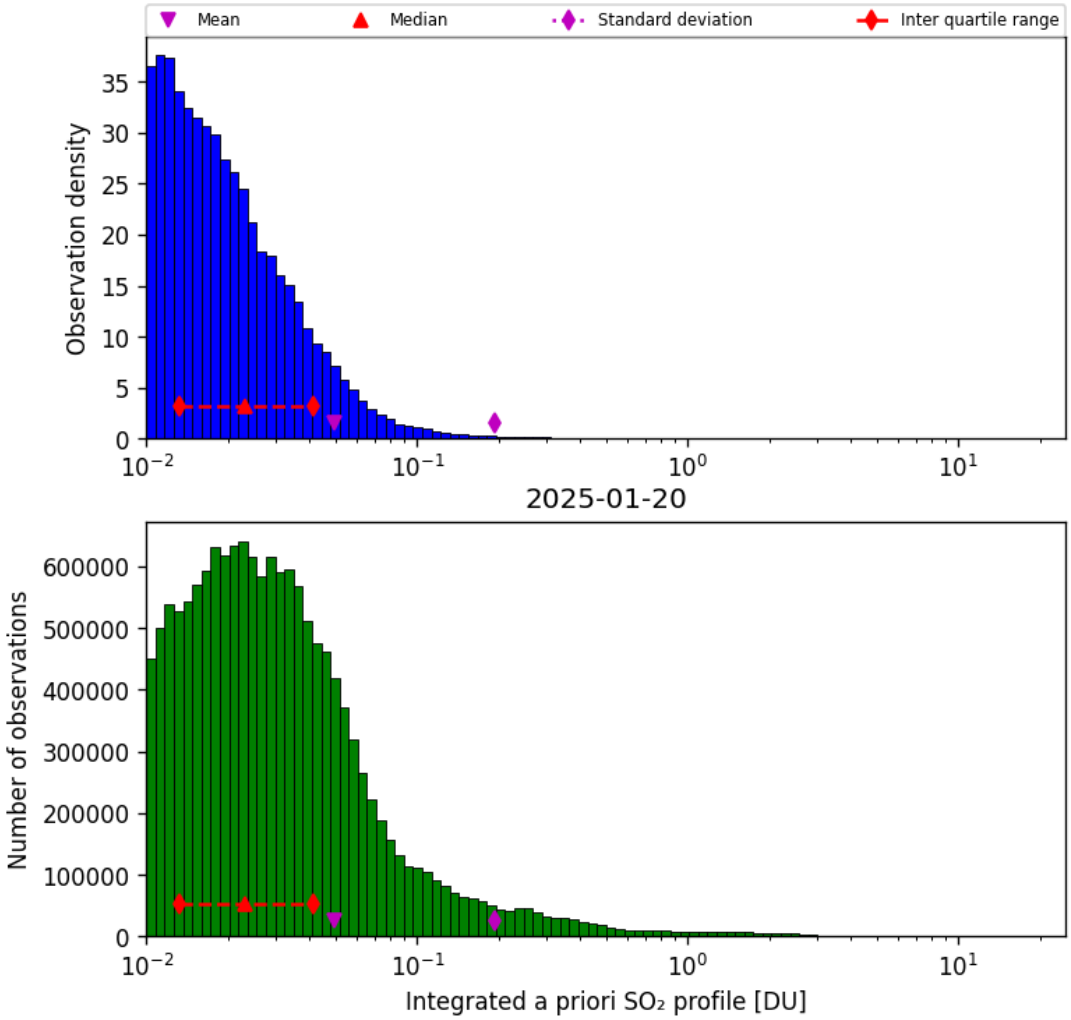

Figure 76: Histogram of “Integrated a priori SO_2 profile” for 2025-01-20 to 2025-01-21

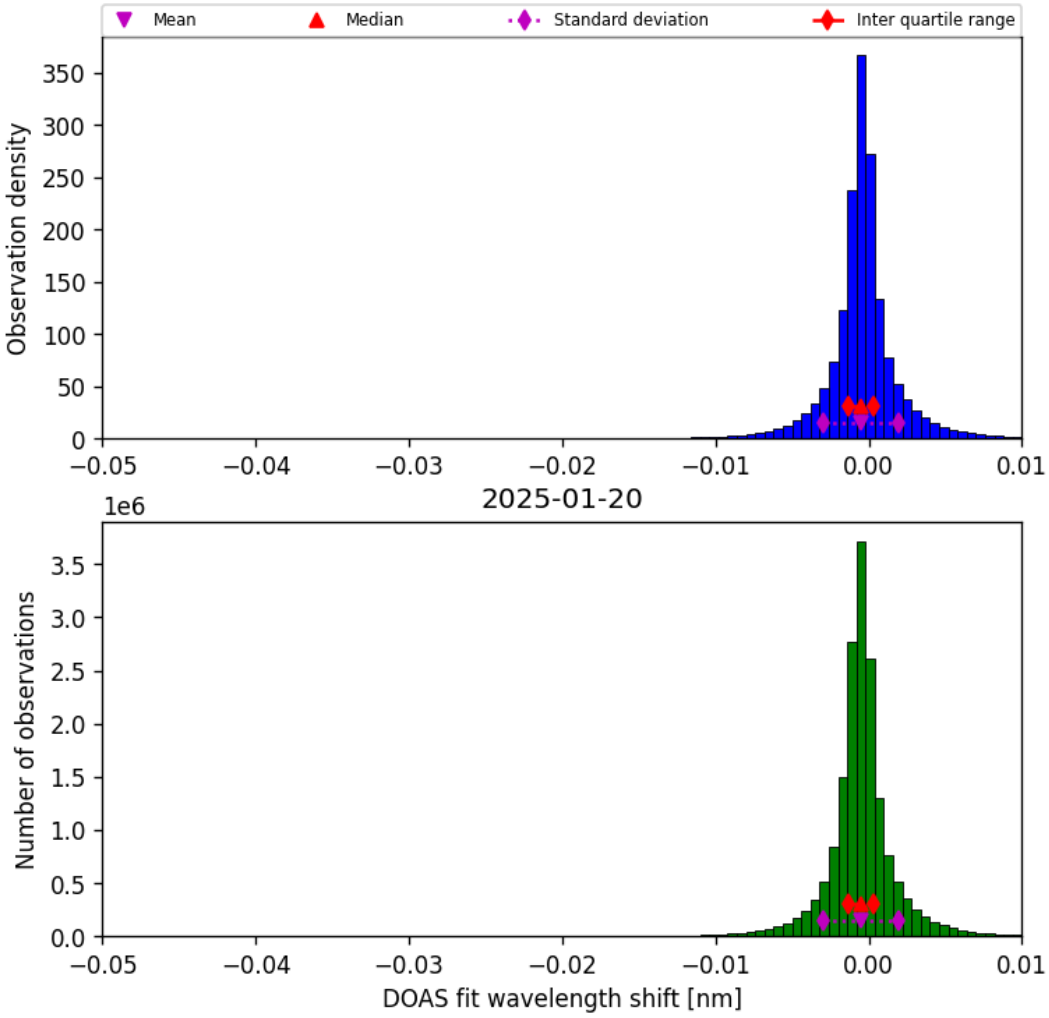

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-01-20 to 2025-01-21

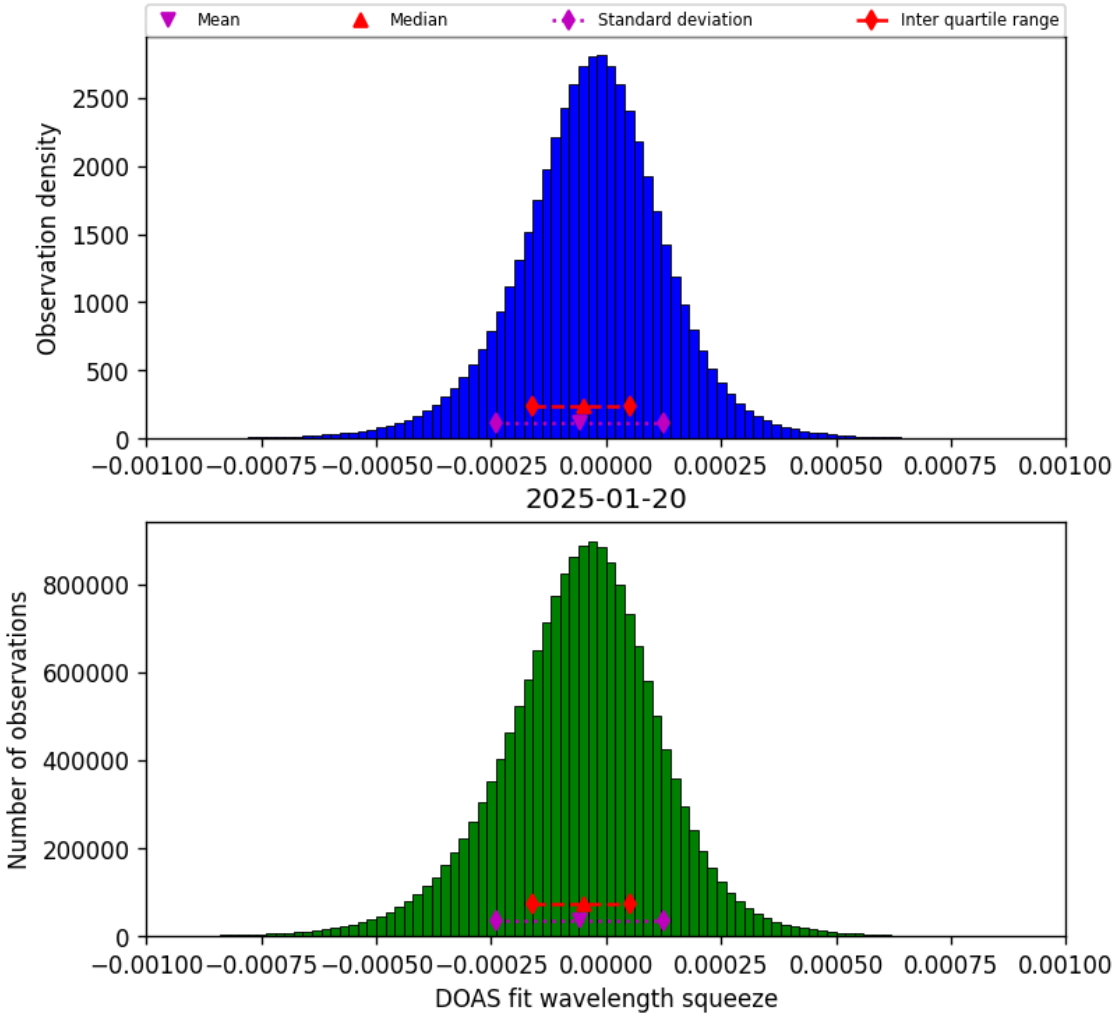

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-01-20 to 2025-01-21

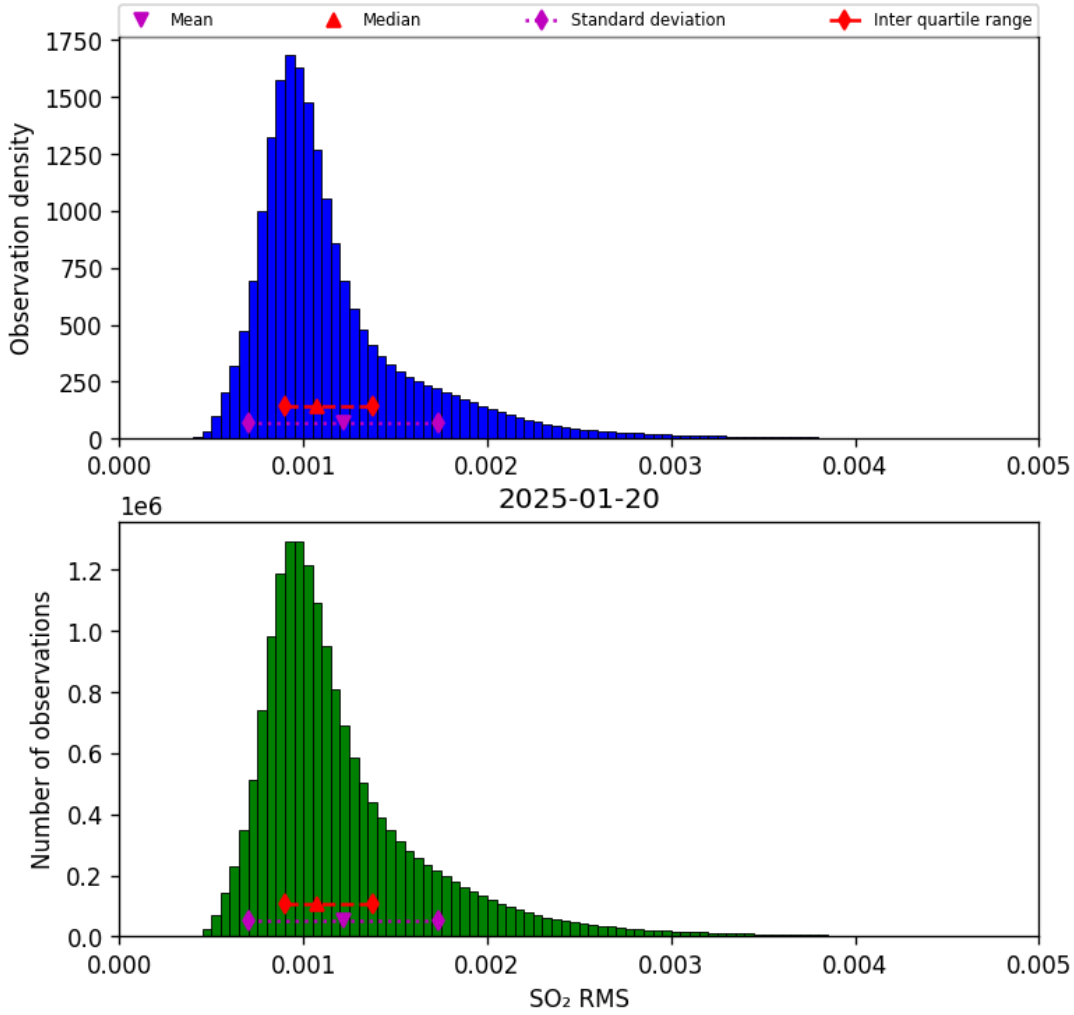

Figure 79: Histogram of "SO_2 RMS" for 2025-01-20 to 2025-01-21

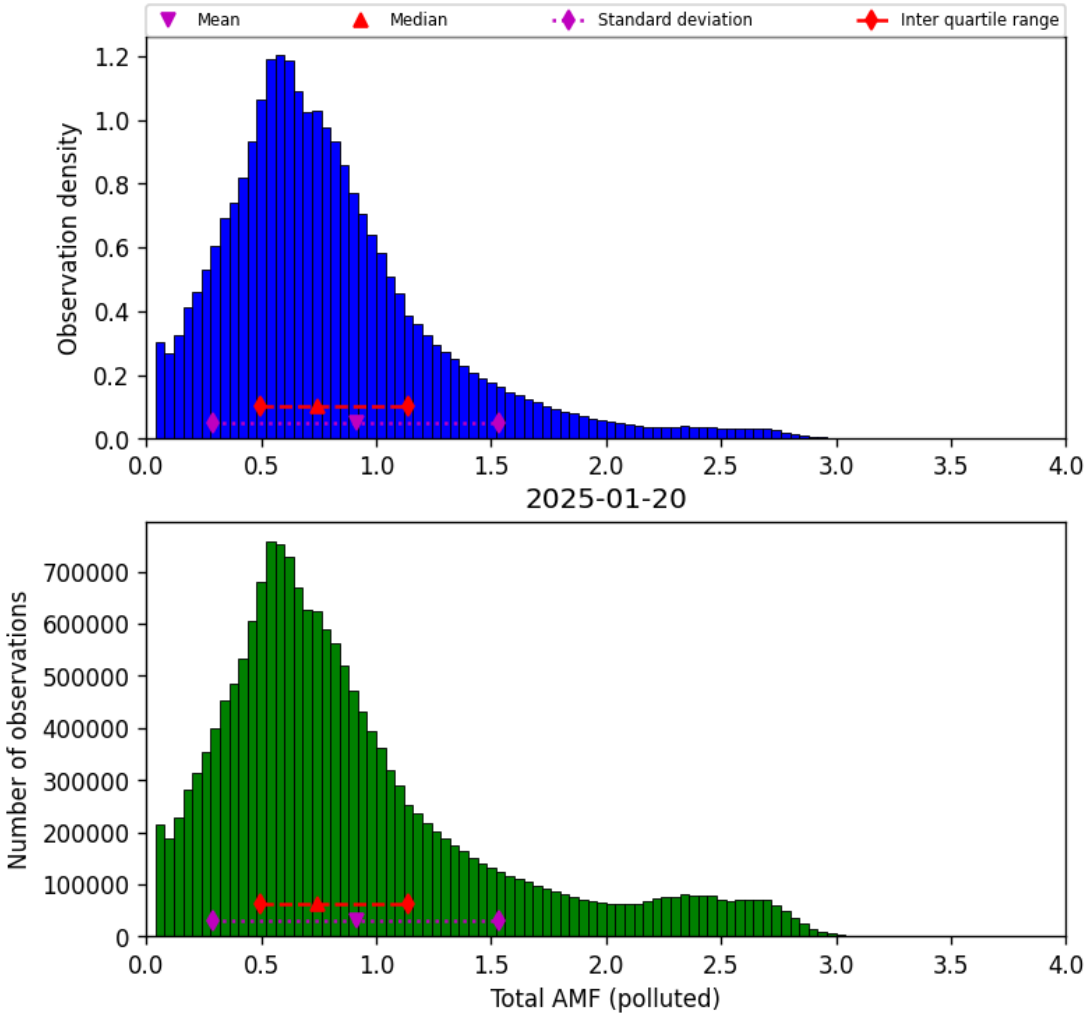

Figure 80: Histogram of “Total AMF (polluted)” for 2025-01-20 to 2025-01-21

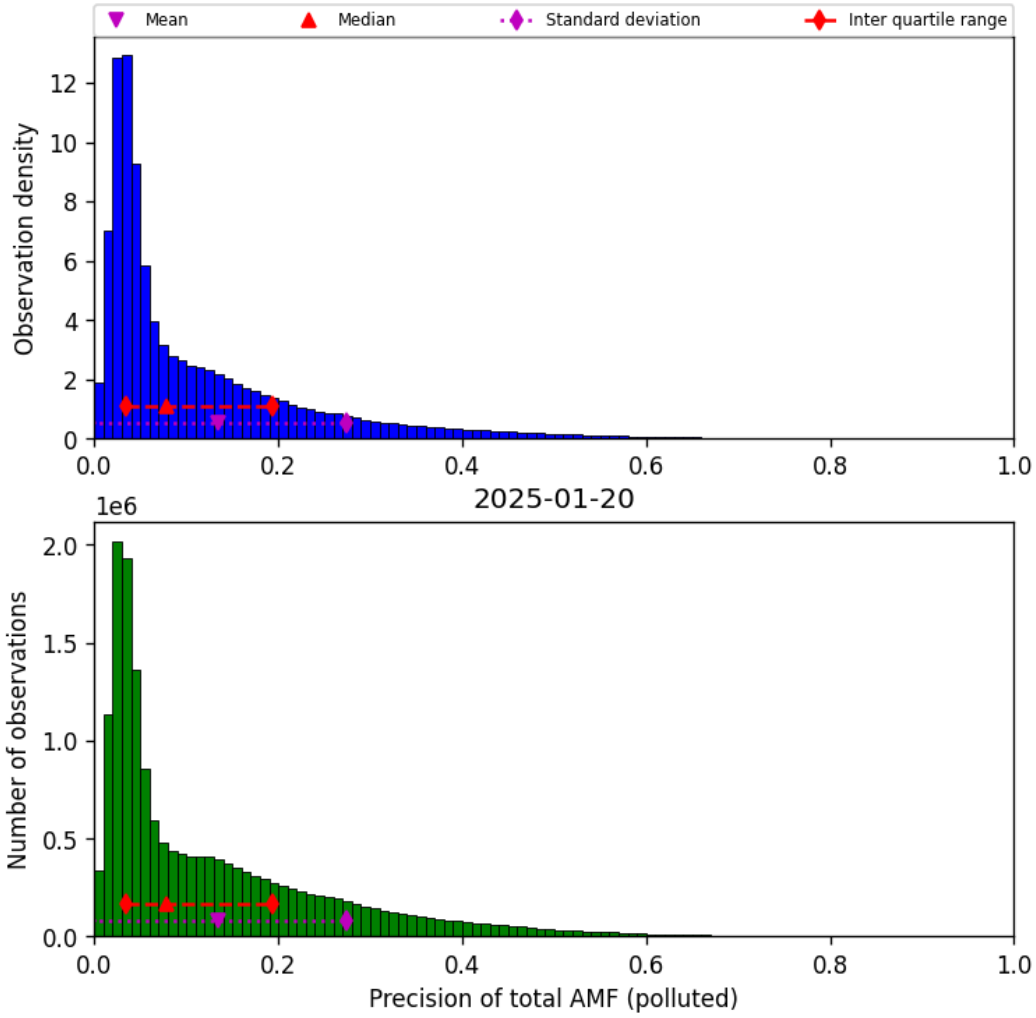

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-01-20 to 2025-01-21

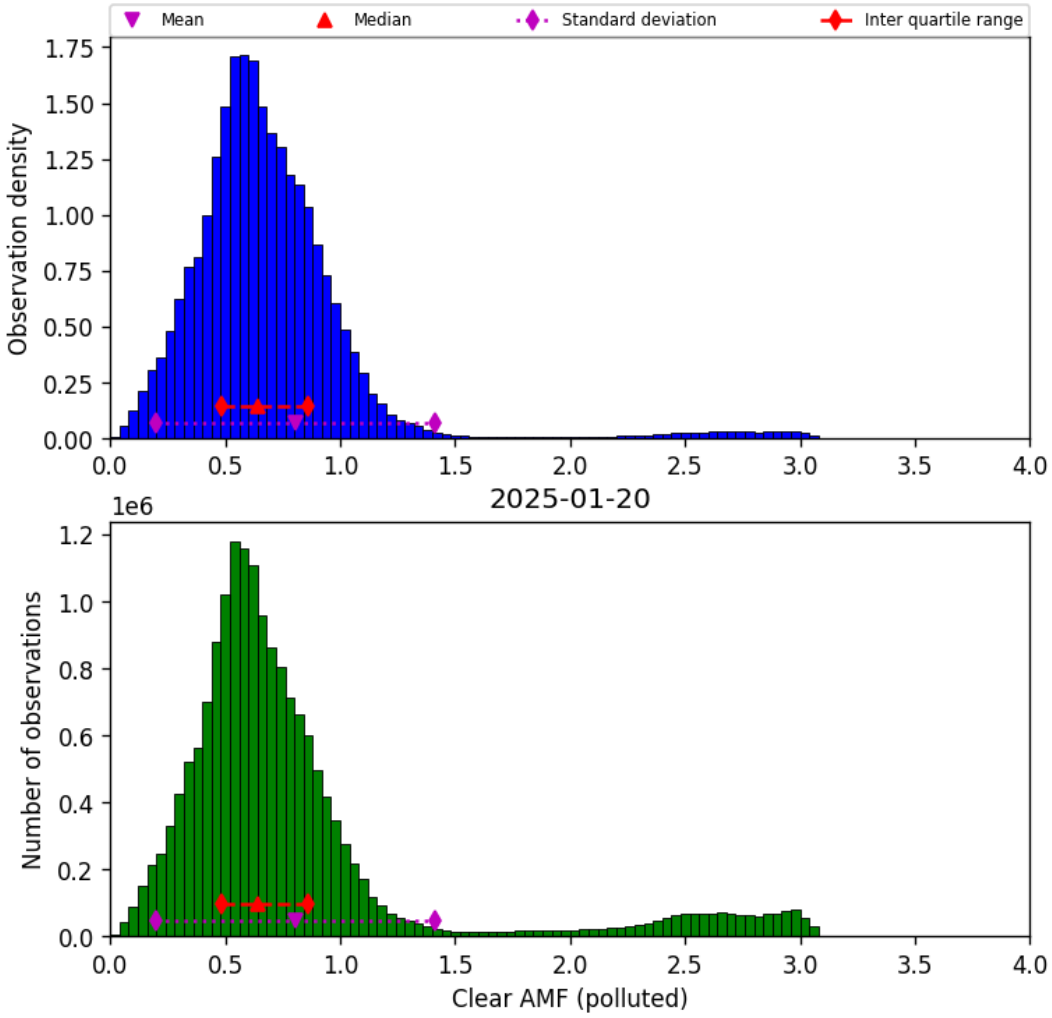

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-01-20 to 2025-01-21

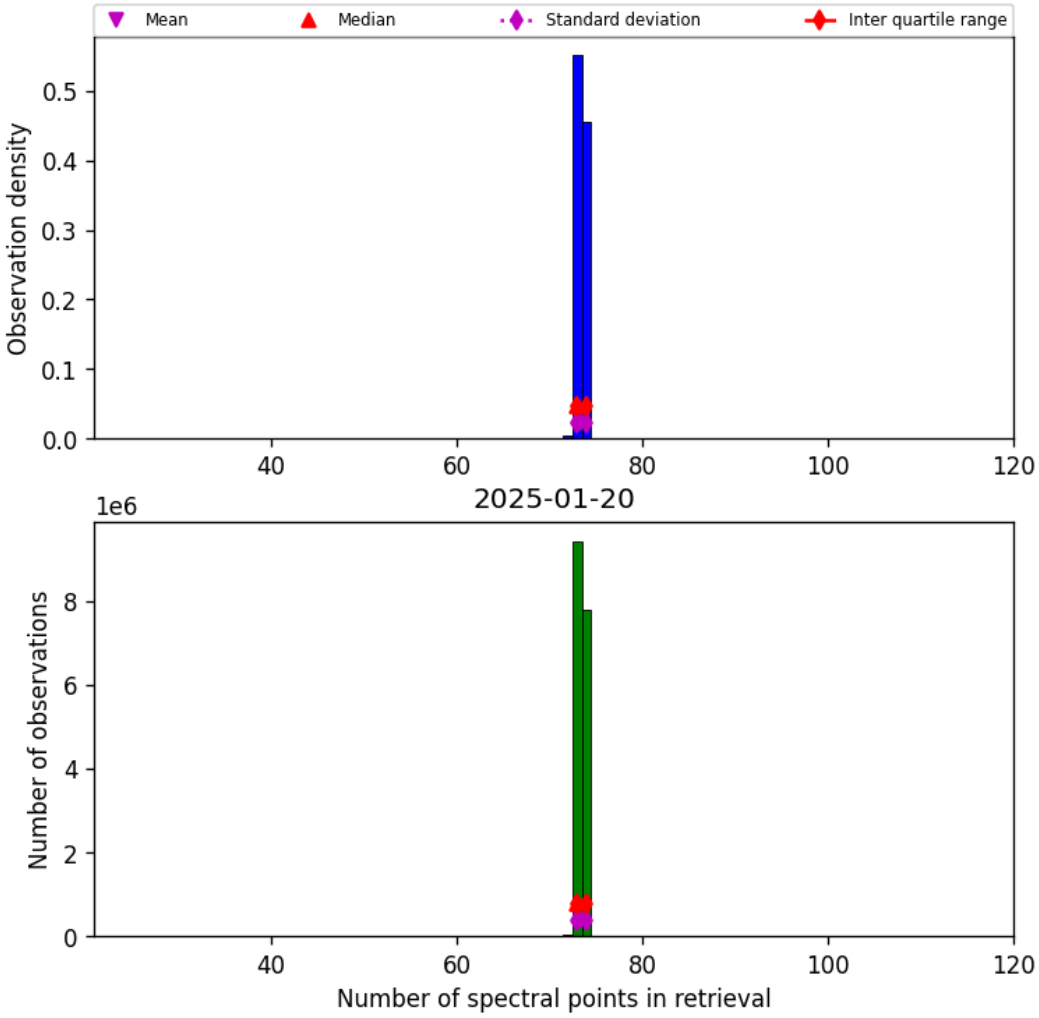

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-01-20 to 2025-01-21

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.

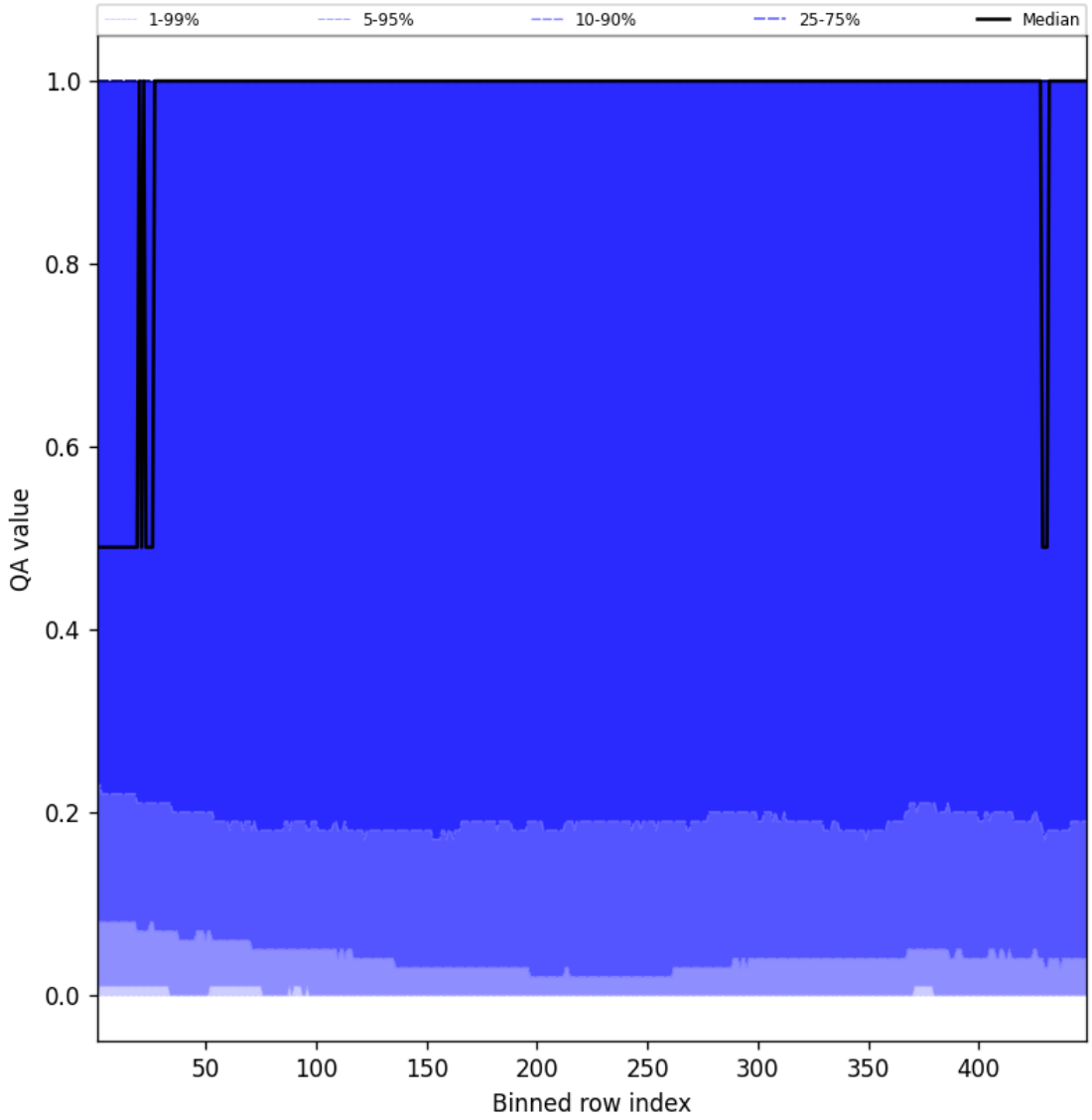

Figure 84: Along track statistics of “QA value” for 2025-01-20 to 2025-01-21

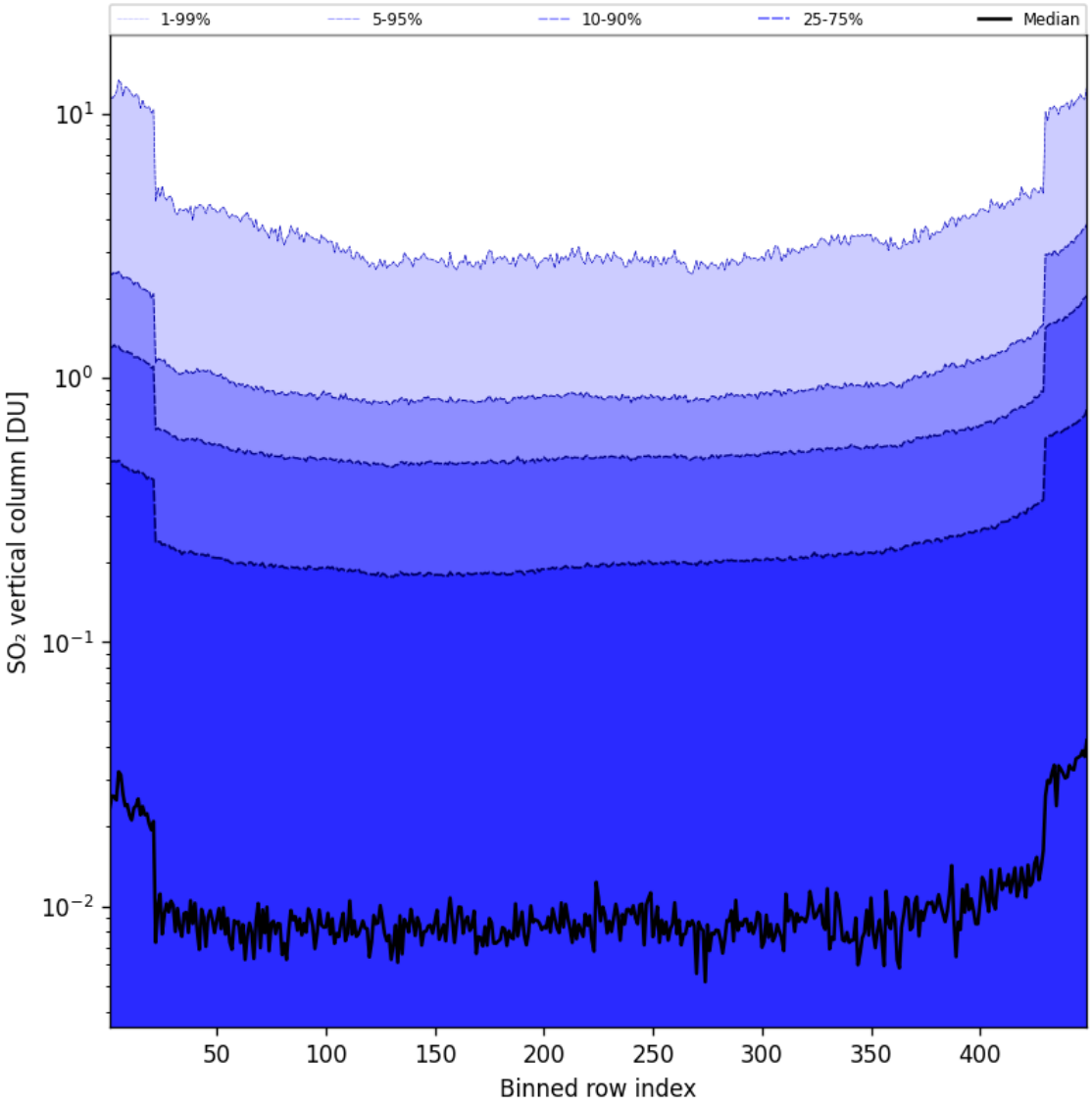

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-01-20 to 2025-01-21

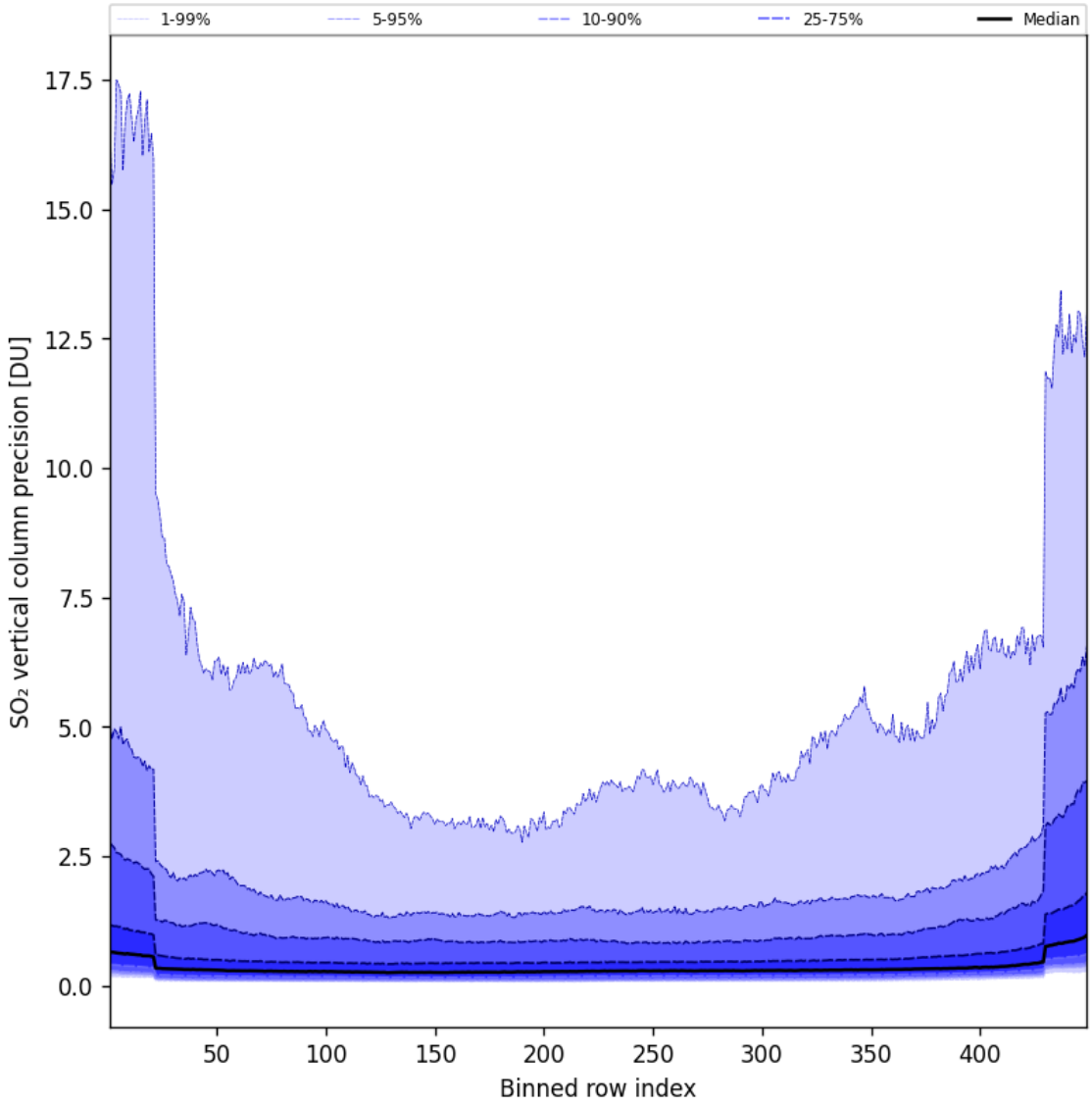

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-01-20 to 2025-01-21

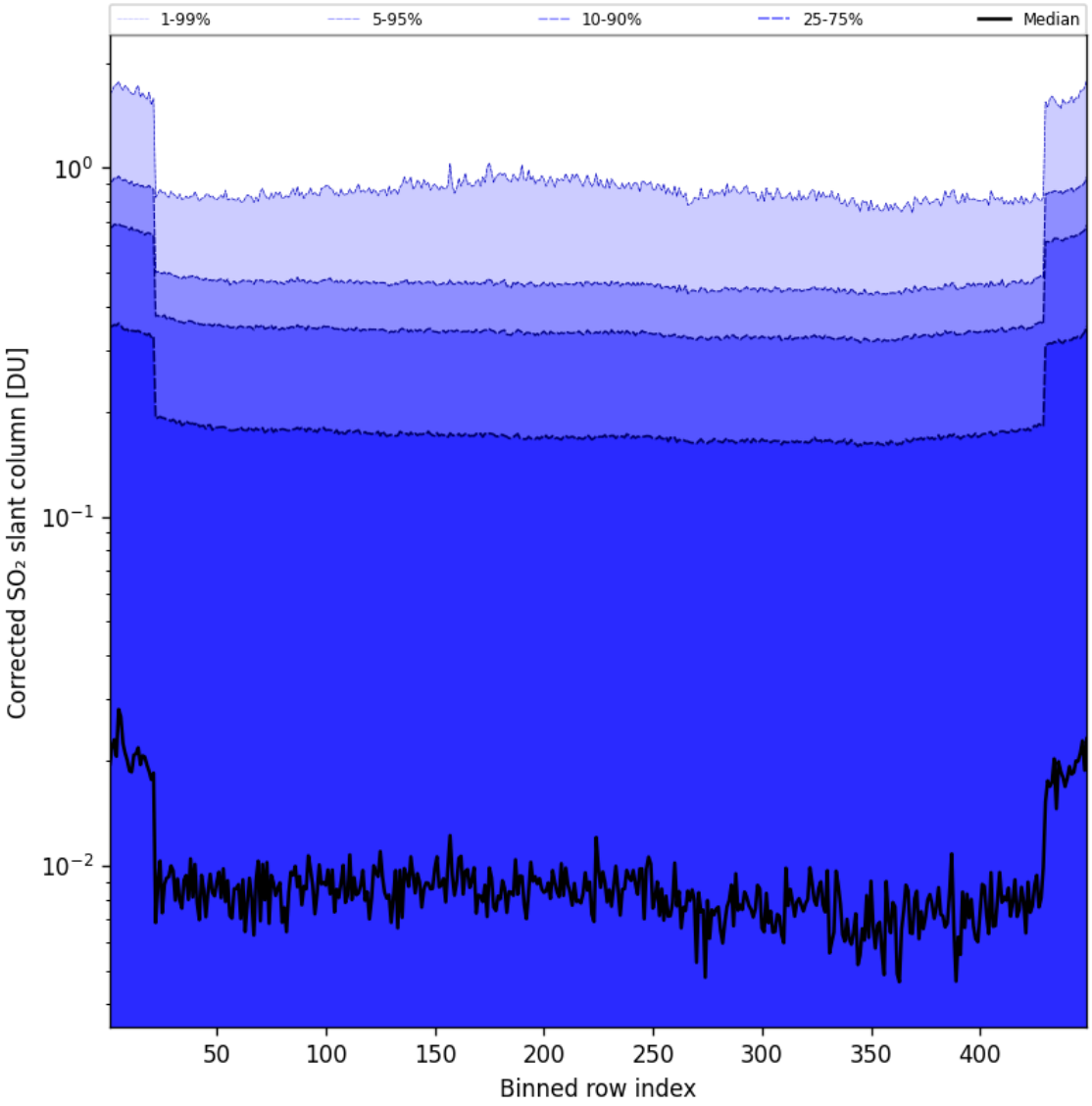

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-01-20 to 2025-01-21

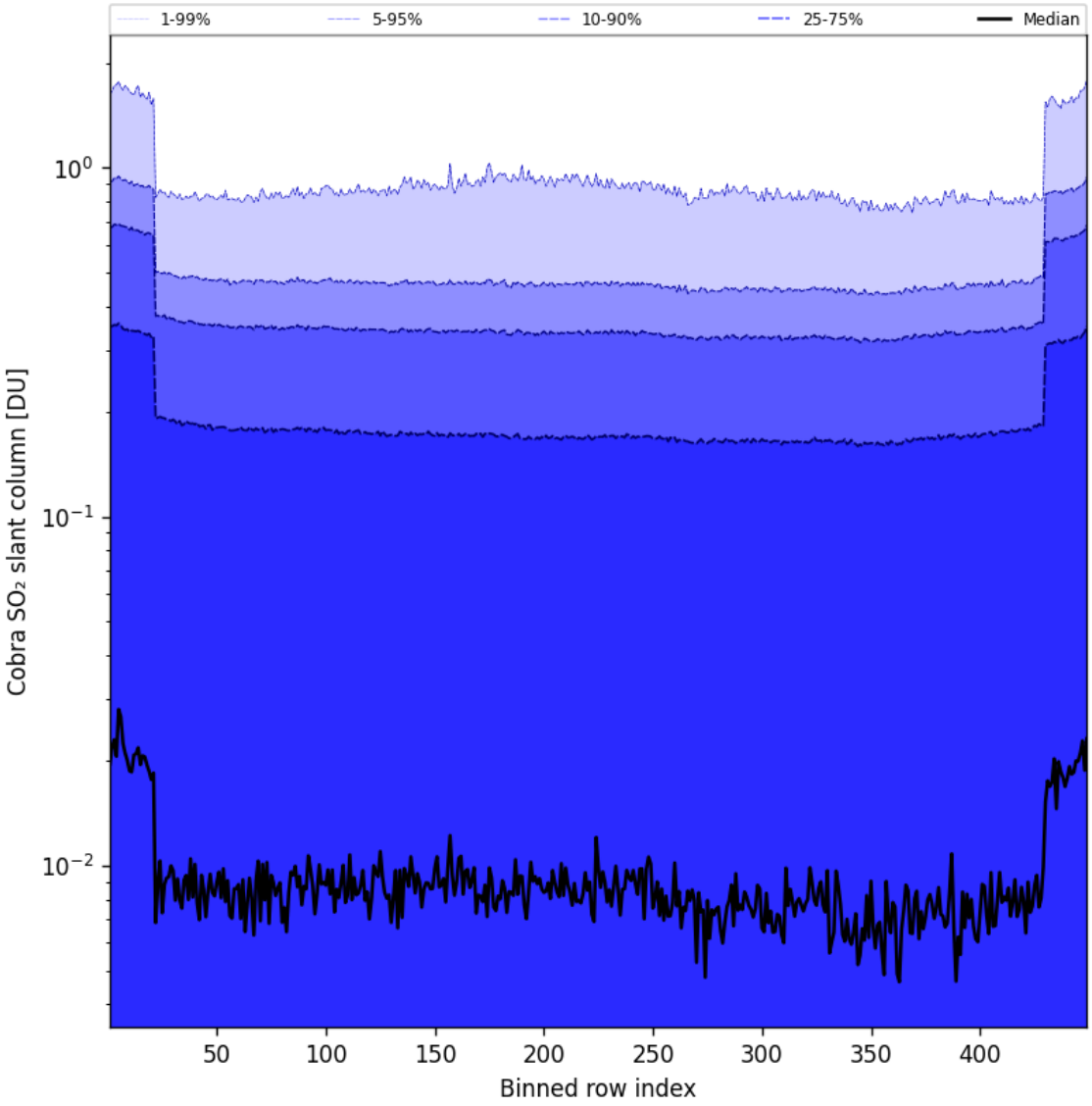

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-01-20 to 2025-01-21

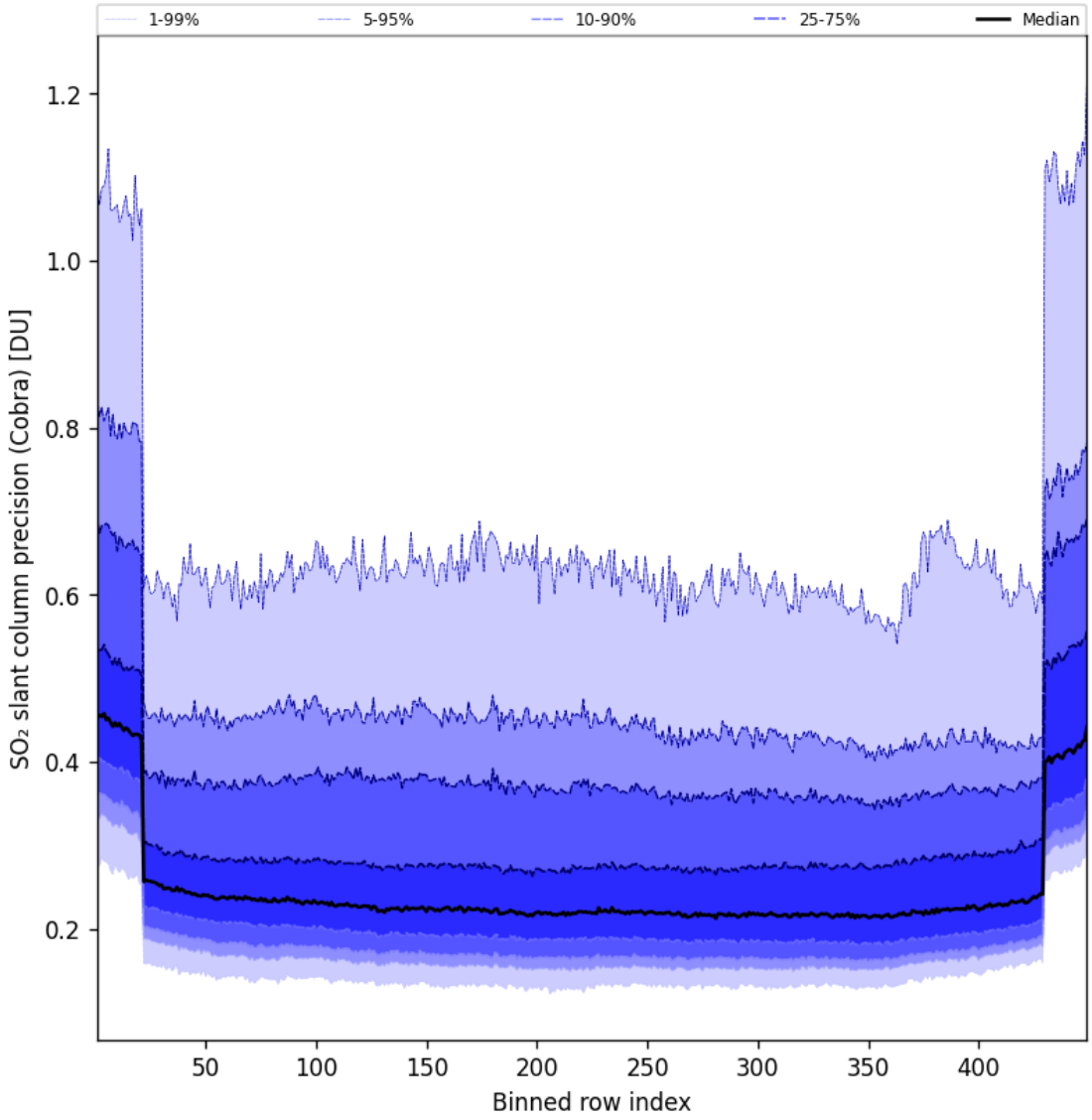

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-01-20 to 2025-01-21

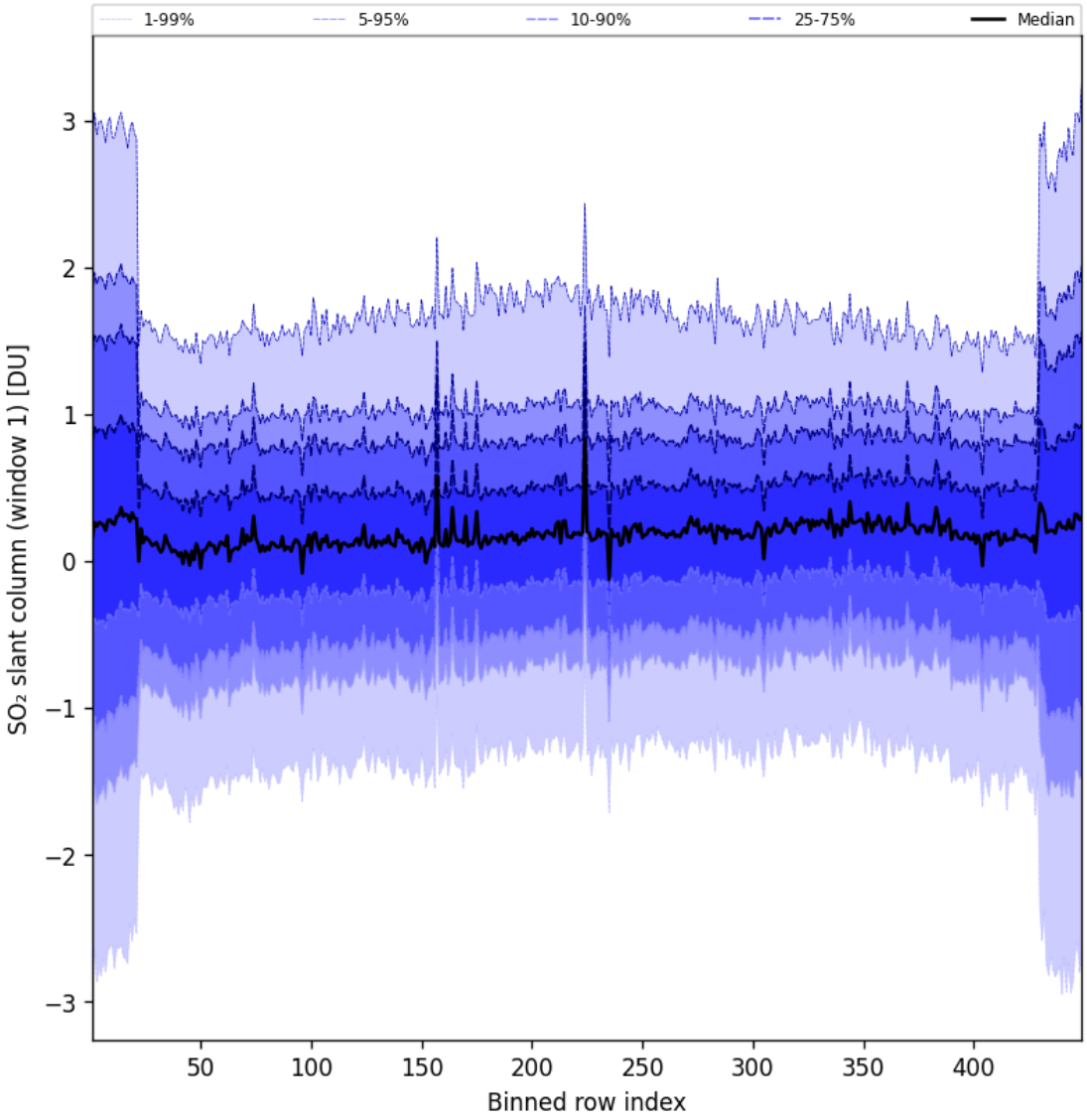

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-01-20 to 2025-01-21

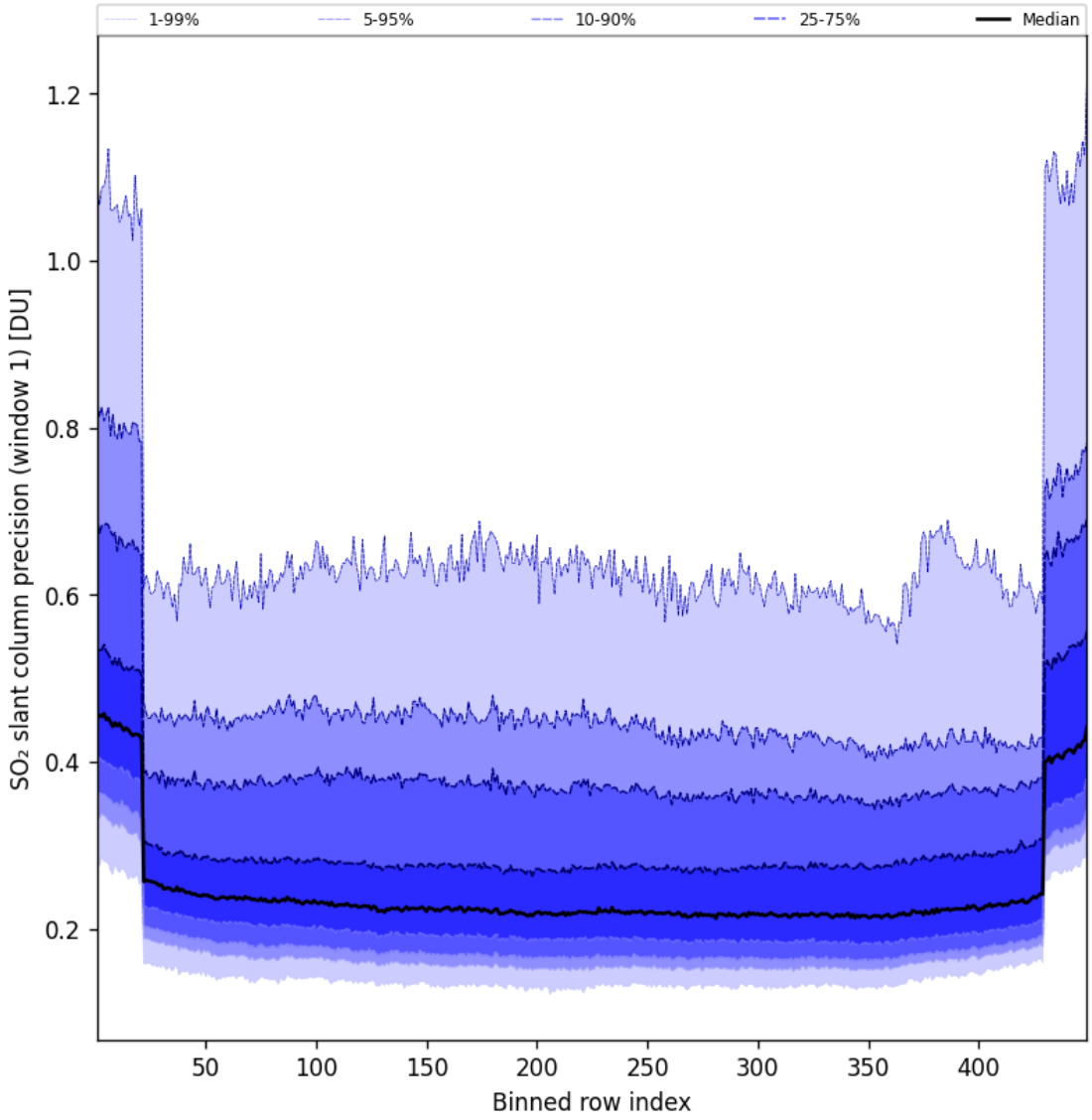

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-01-20 to 2025-01-21

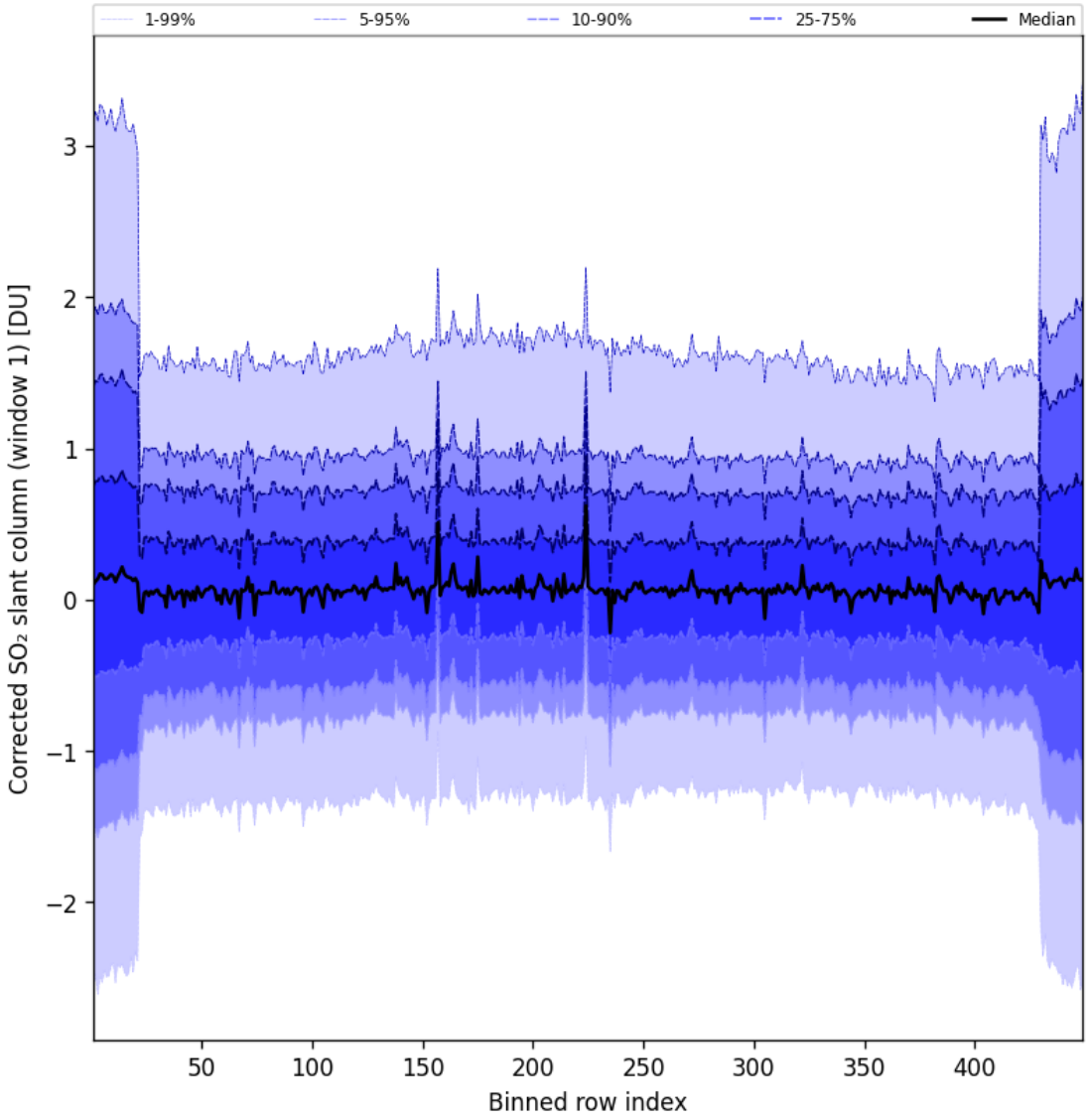

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-01-20 to 2025-01-21

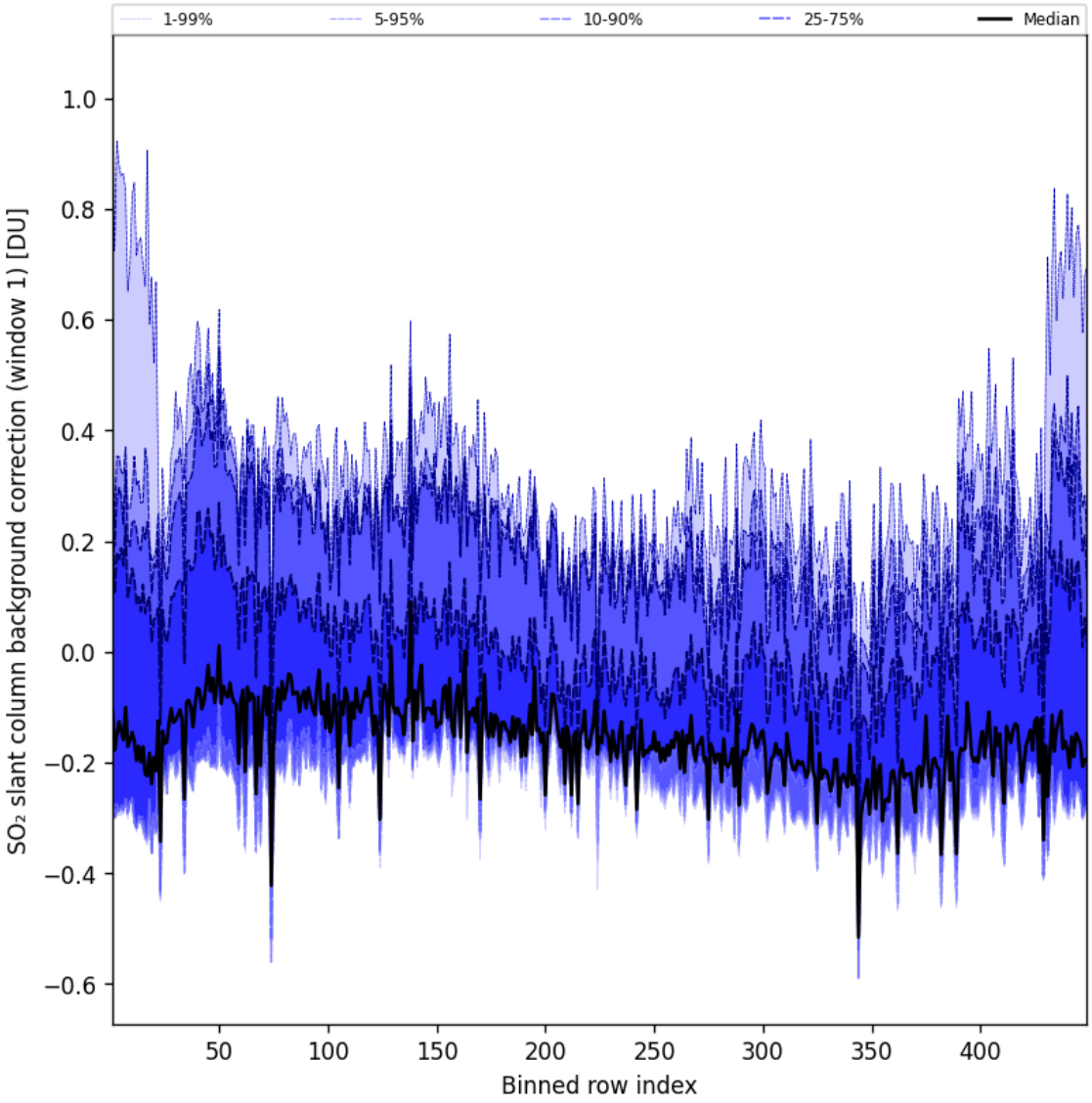

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-01-20 to 2025-01-21

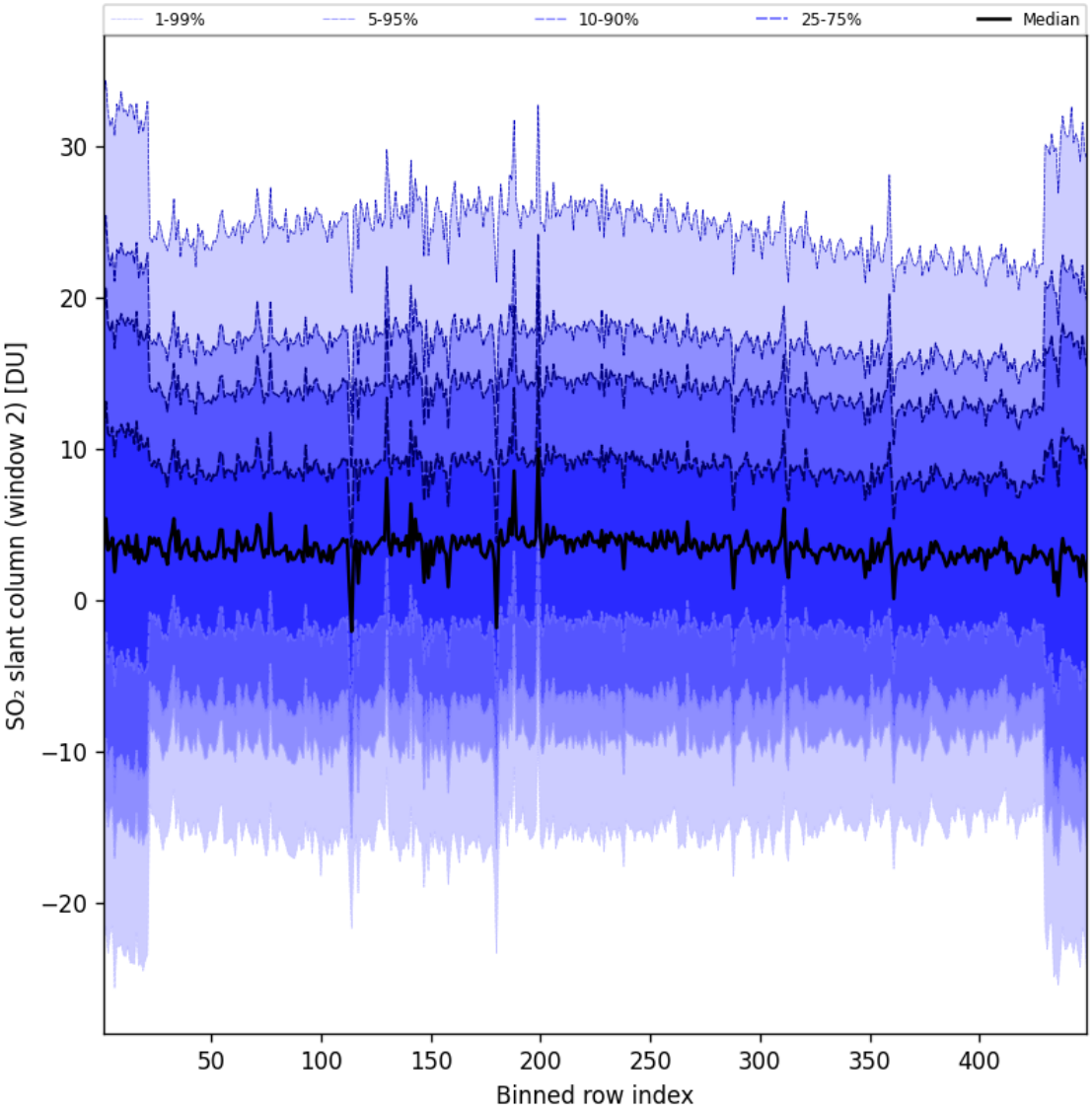

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-01-20 to 2025-01-21

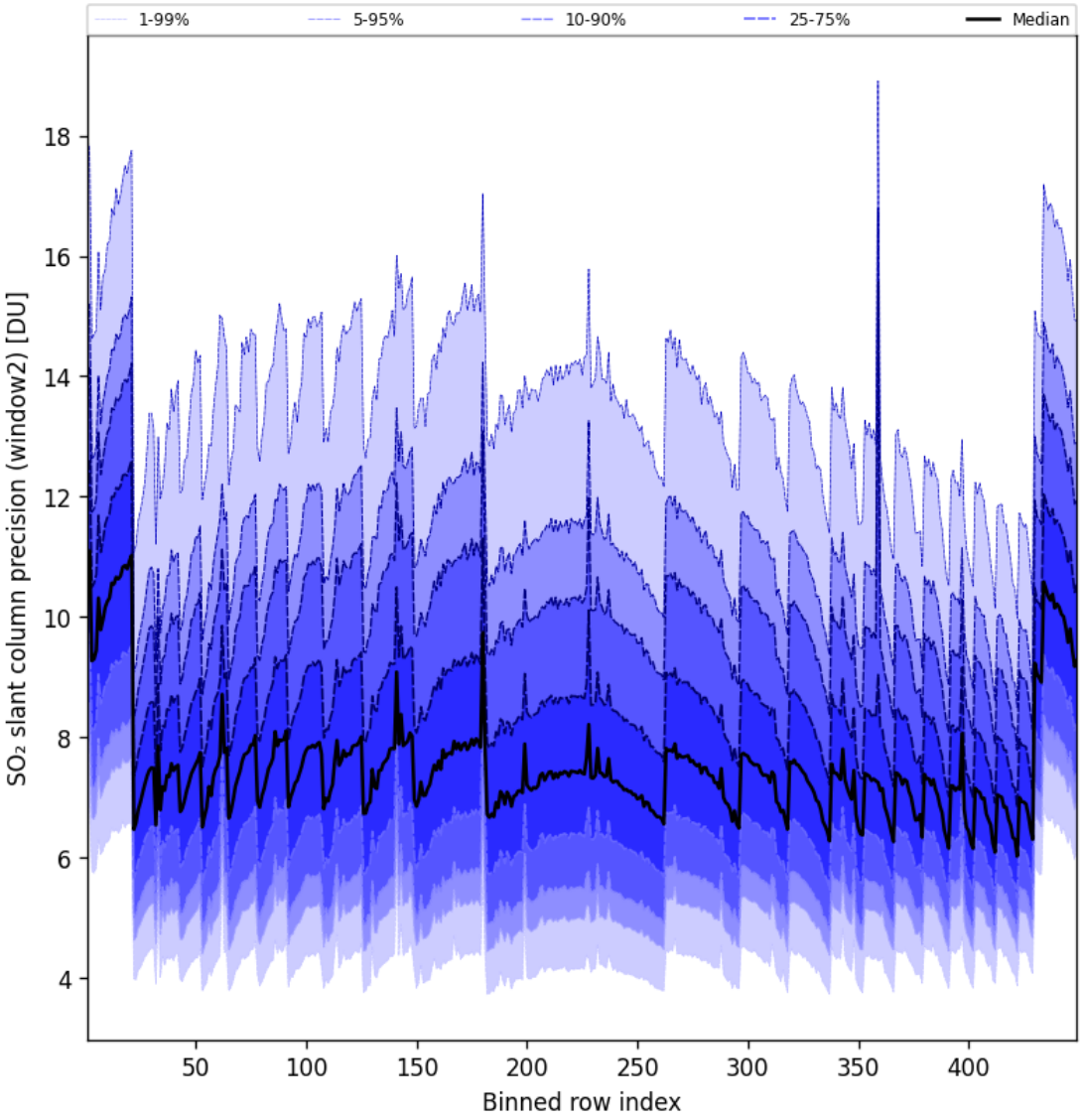

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-01-20 to 2025-01-21

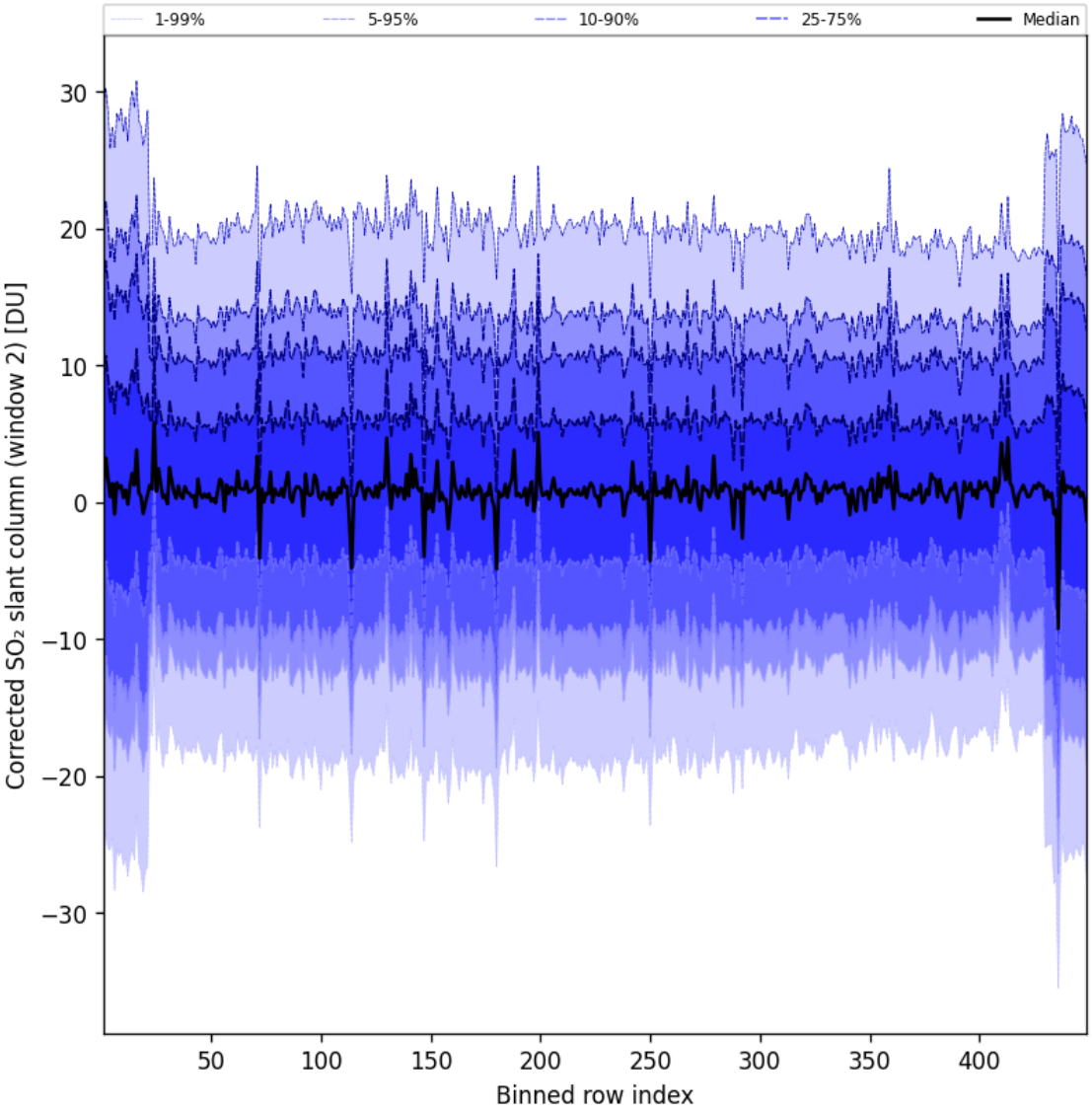

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-01-20 to 2025-01-21

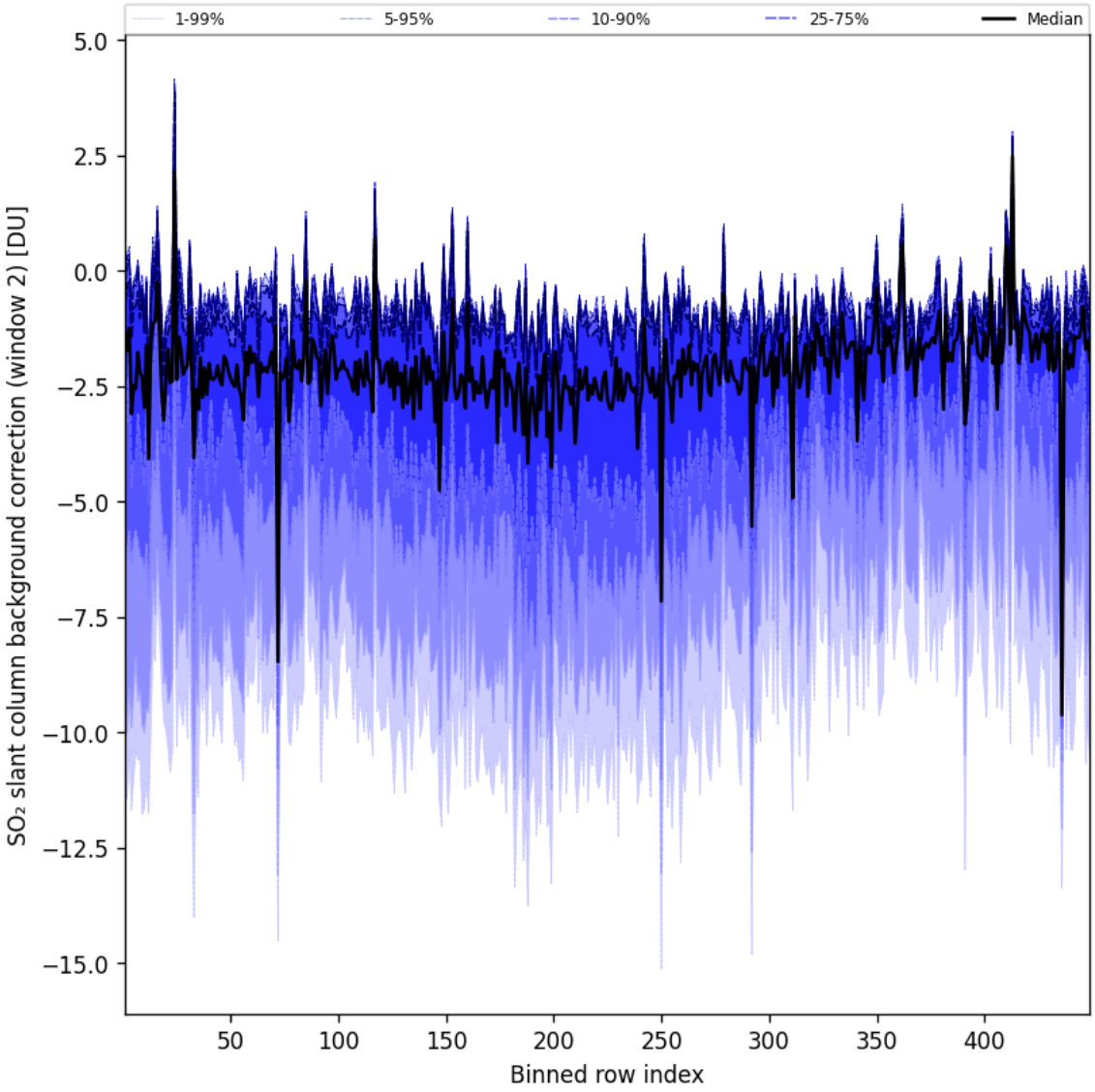

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-01-20 to 2025-01-21

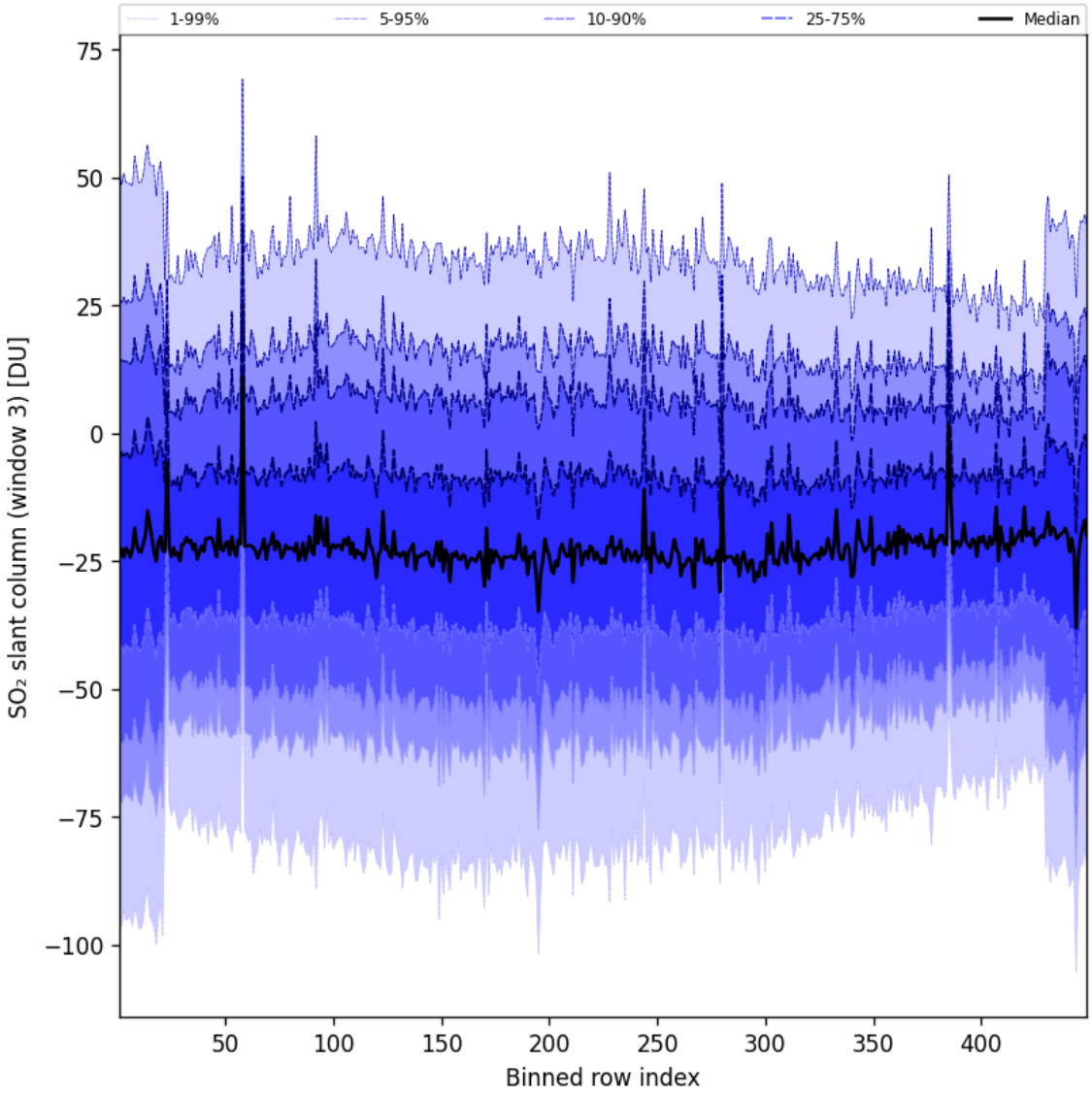

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-01-20 to 2025-01-21

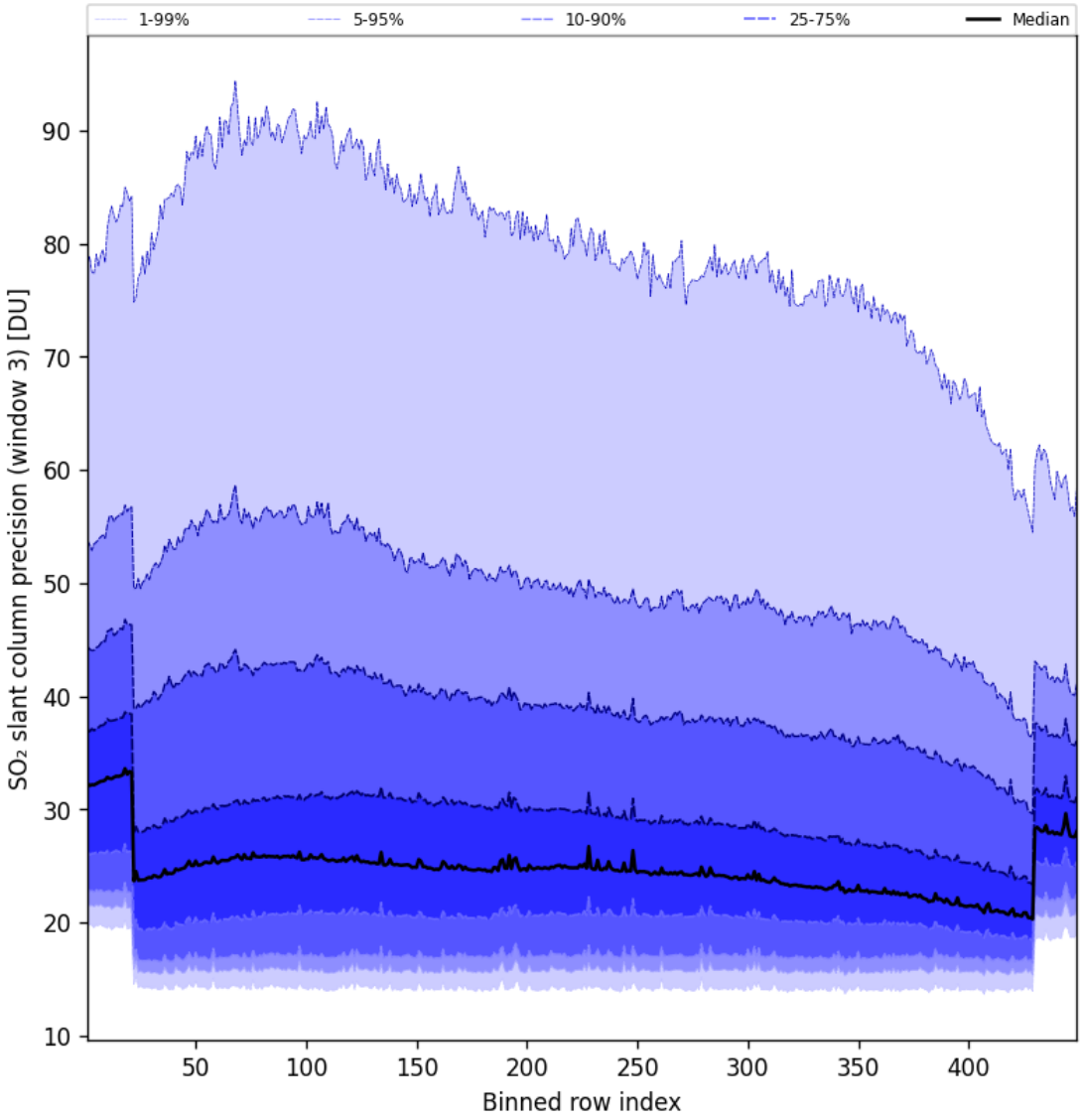

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-01-20 to 2025-01-21

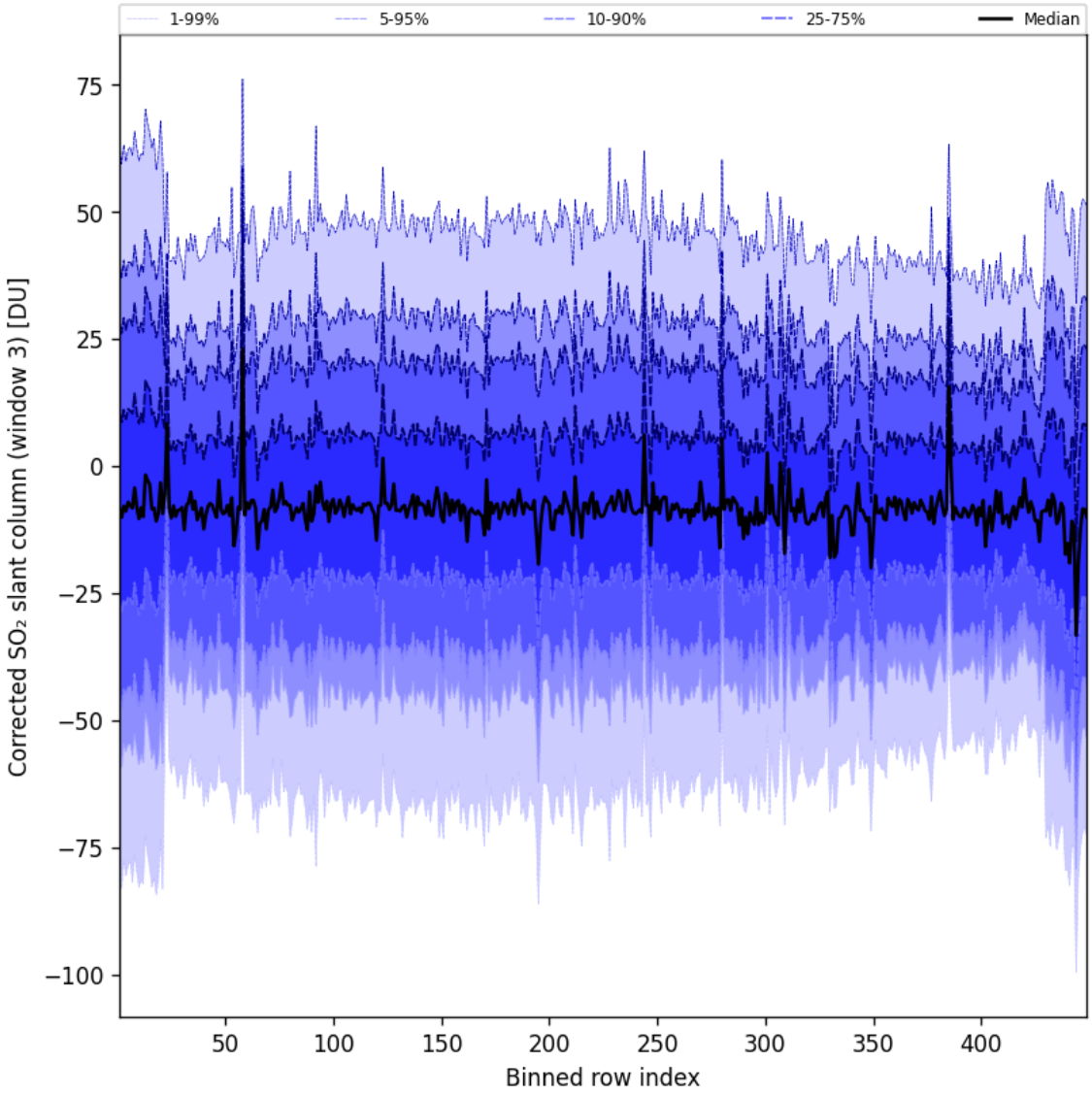

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-01-20 to 2025-01-21

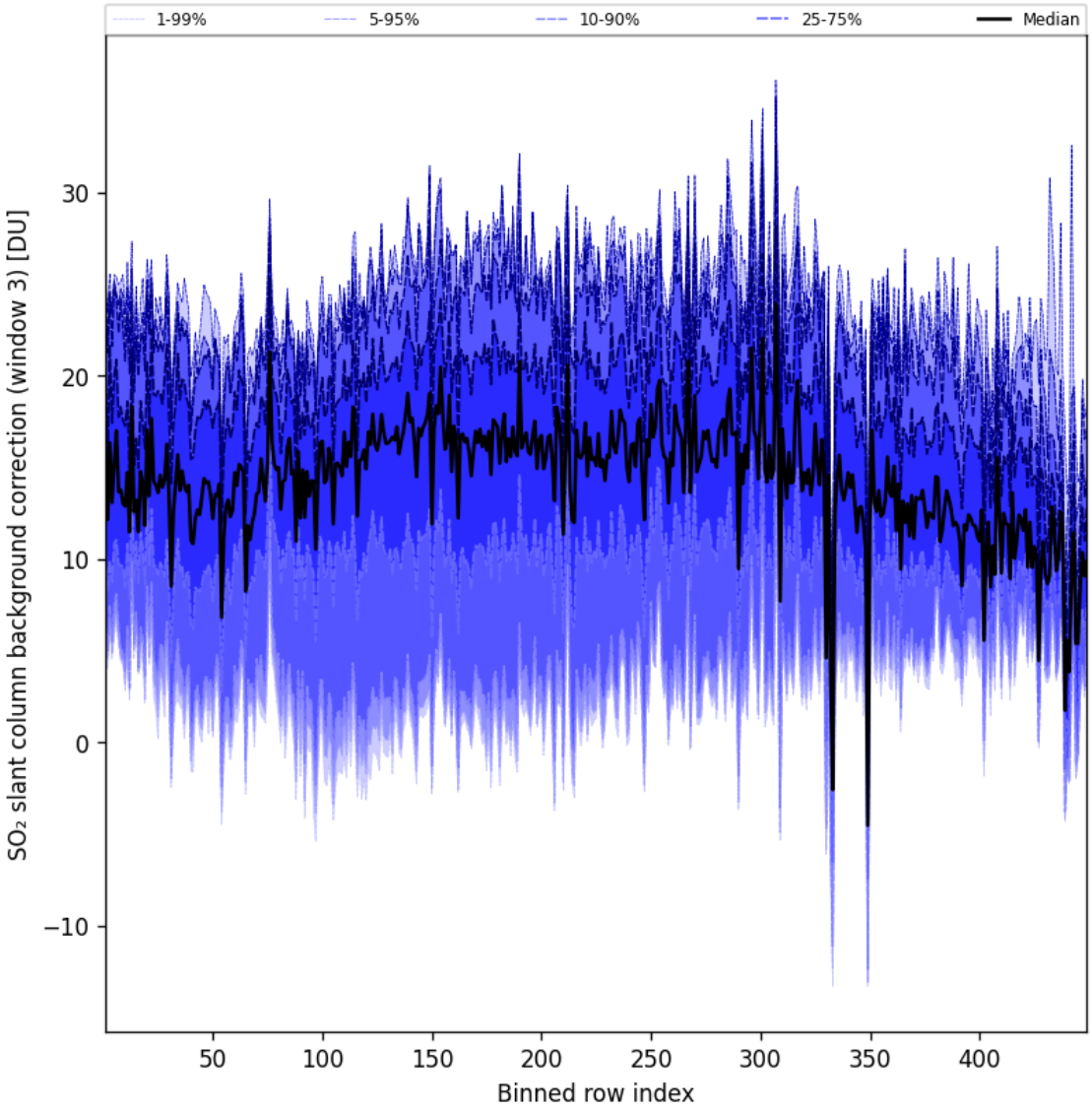

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-01-20 to 2025-01-21

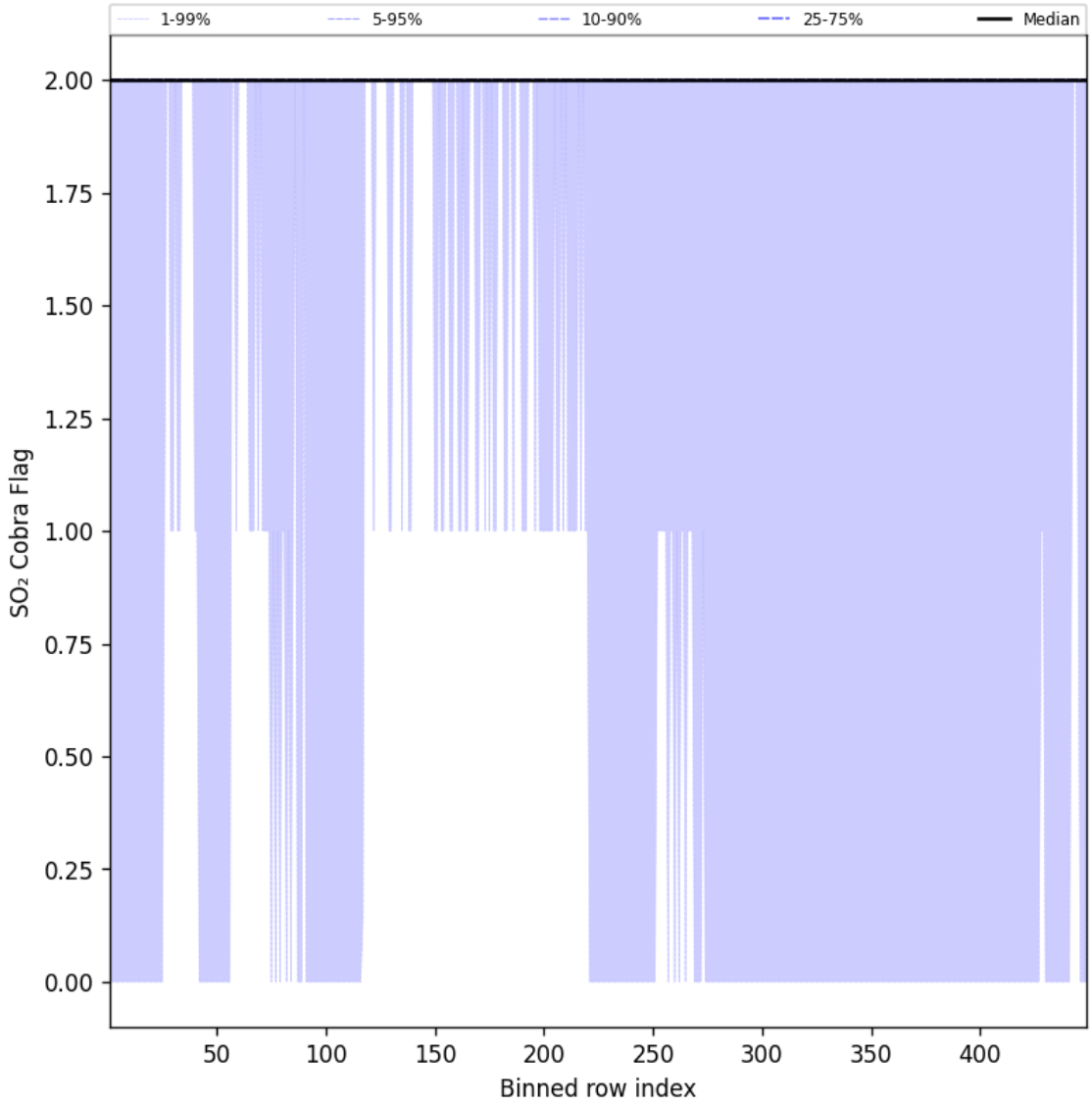

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-01-20 to 2025-01-21

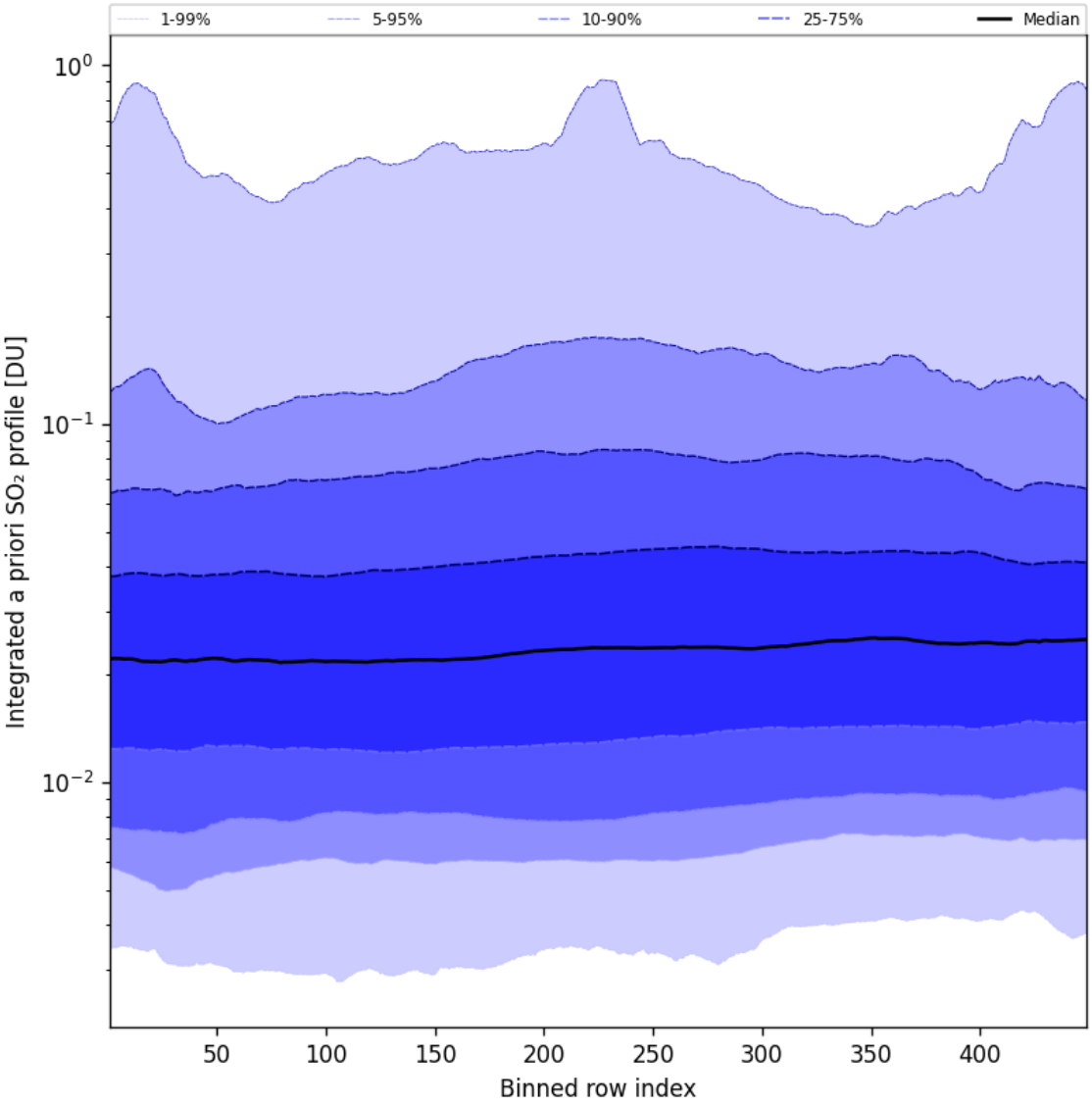

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-01-20 to 2025-01-21

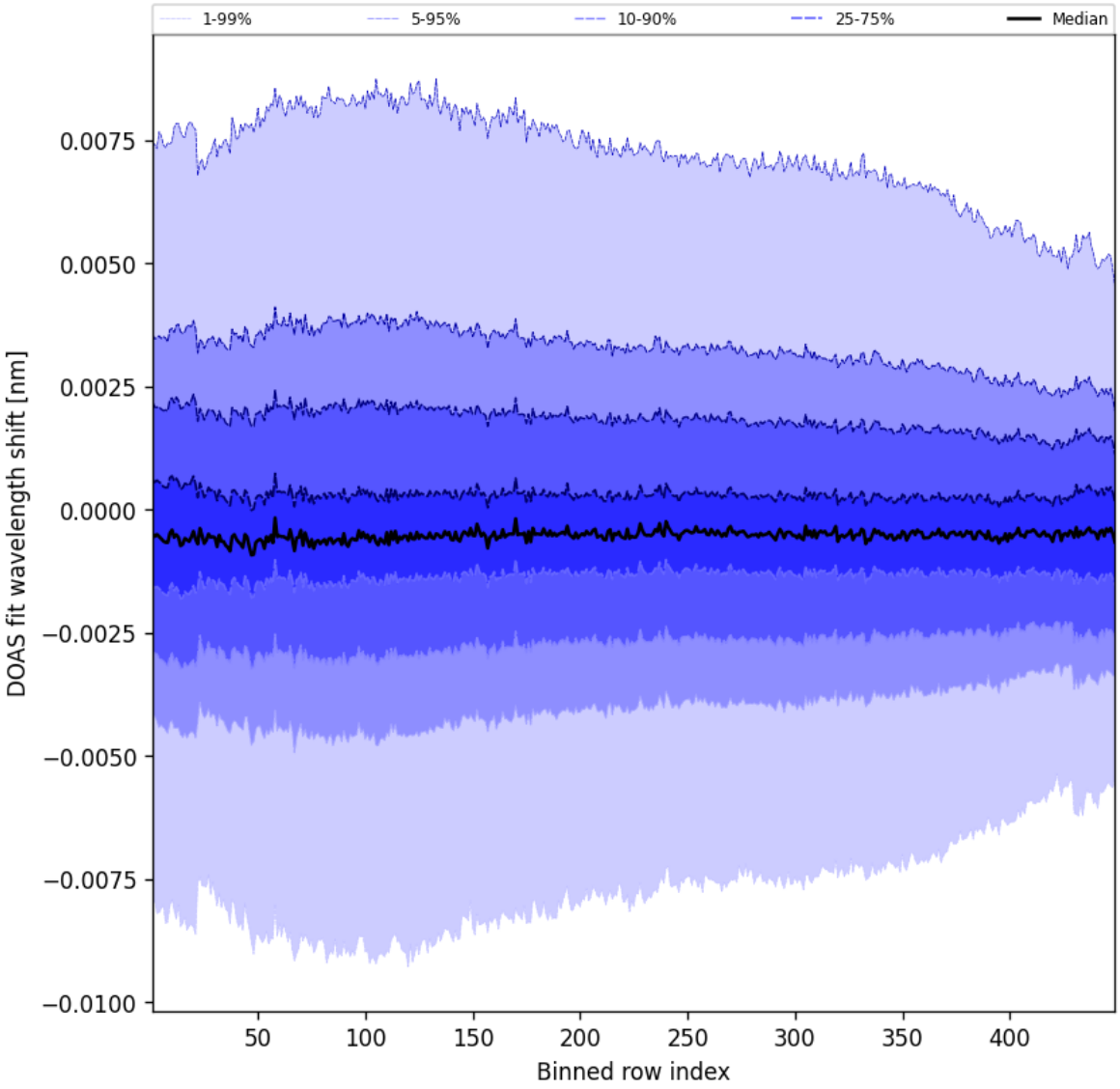

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-01-20 to 2025-01-21

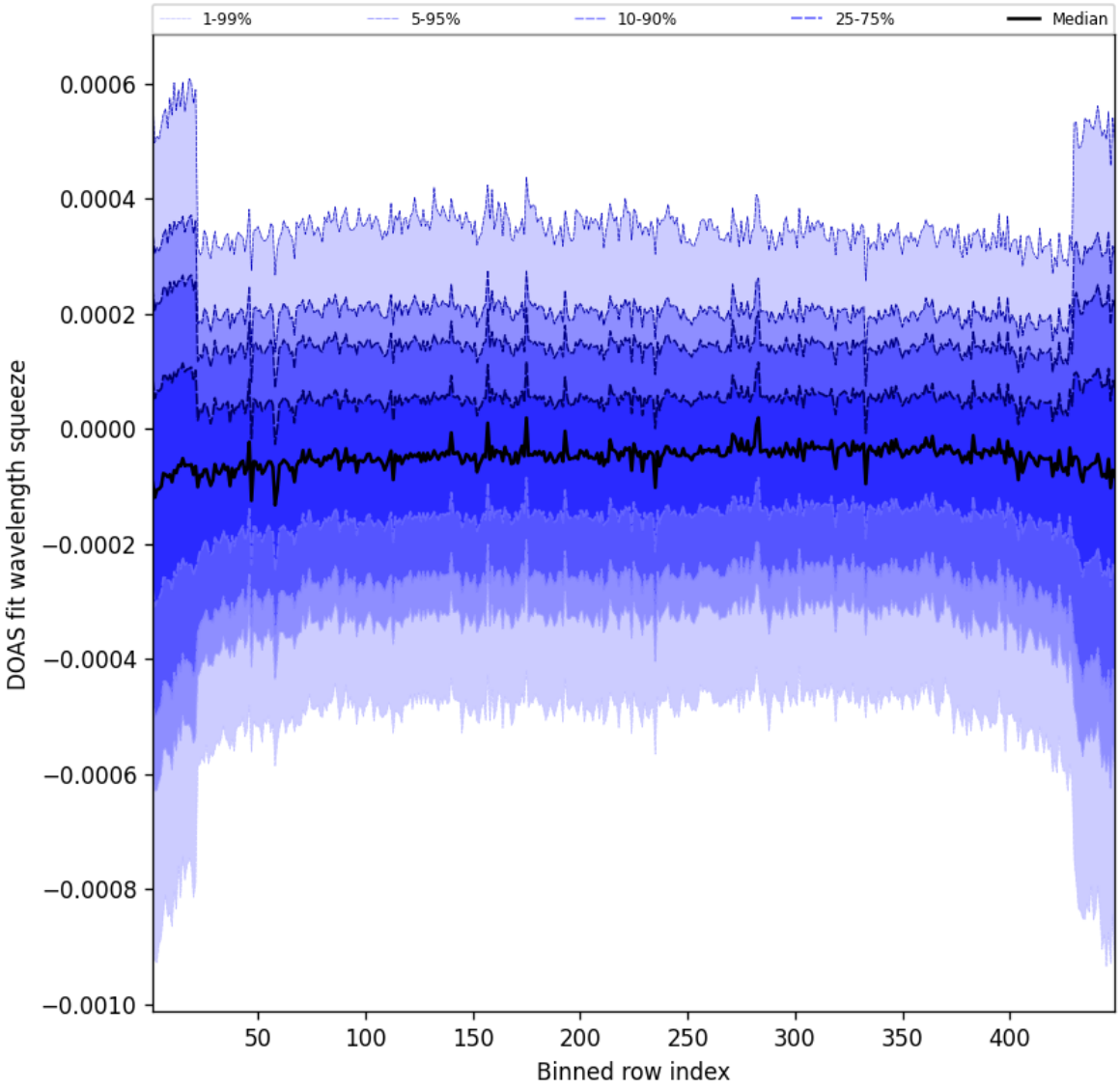

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-01-20 to 2025-01-21

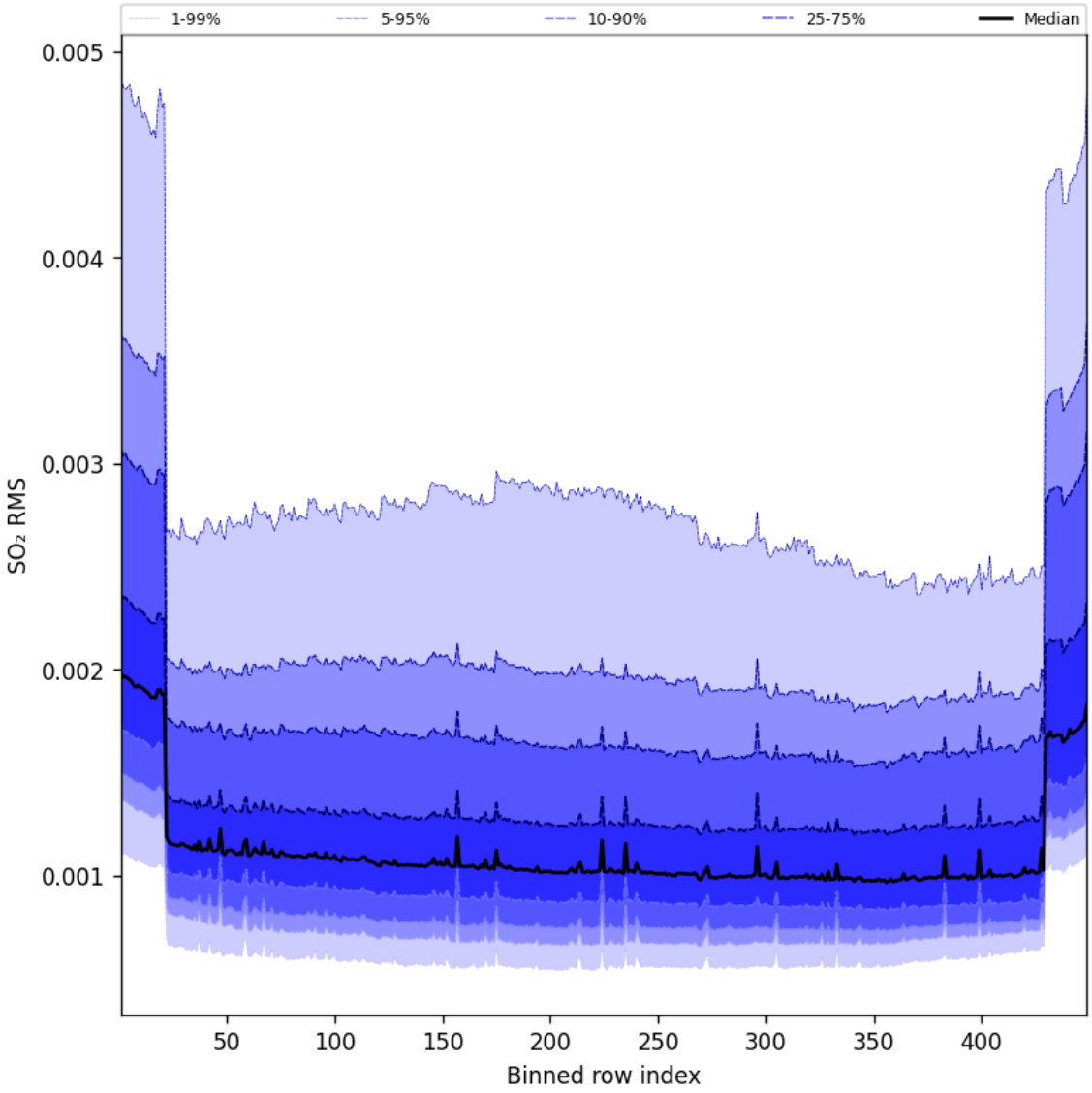

Figure 106: Along track statistics of "SO_2 RMS" for 2025-01-20 to 2025-01-21

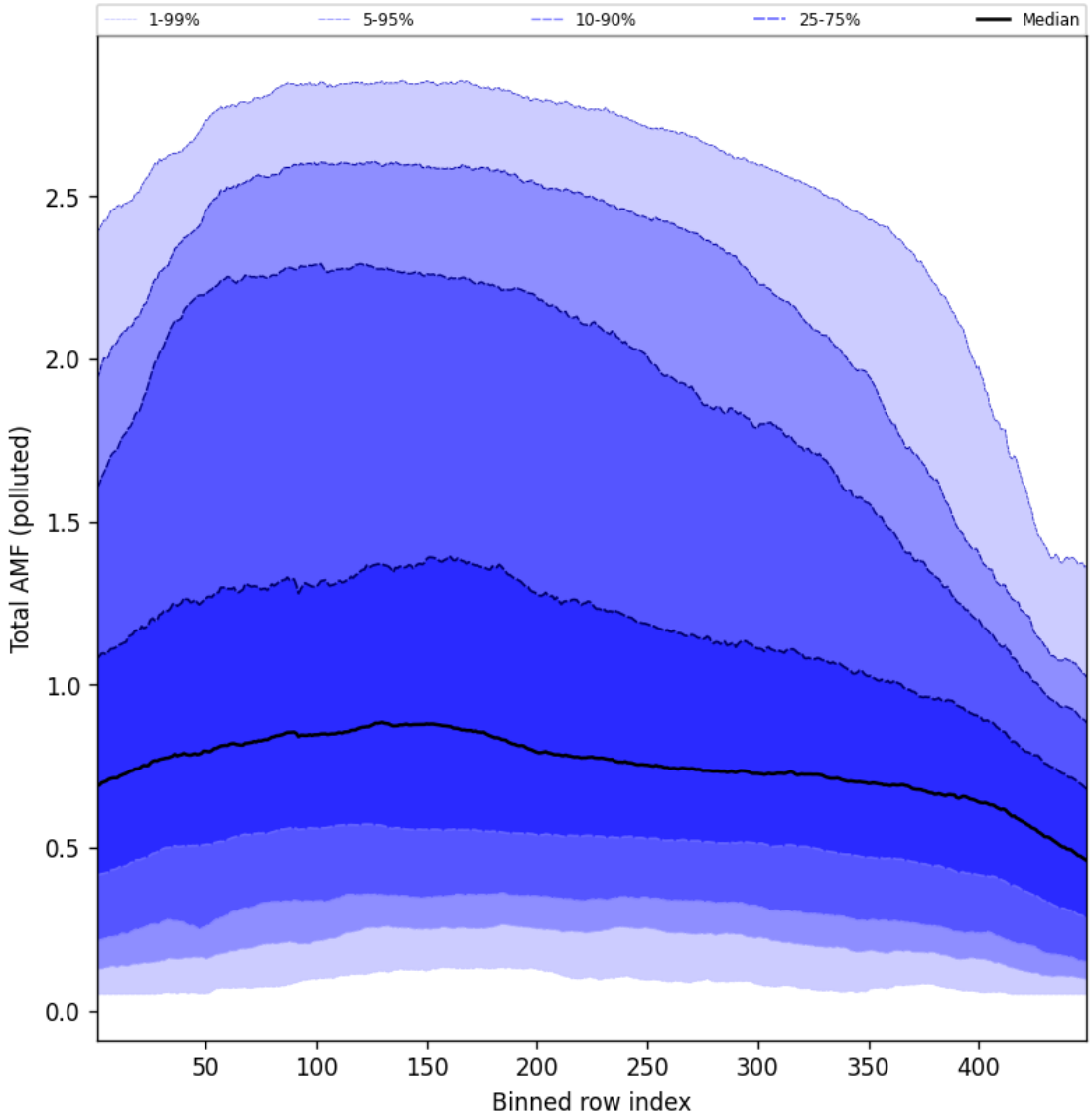

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-01-20 to 2025-01-21

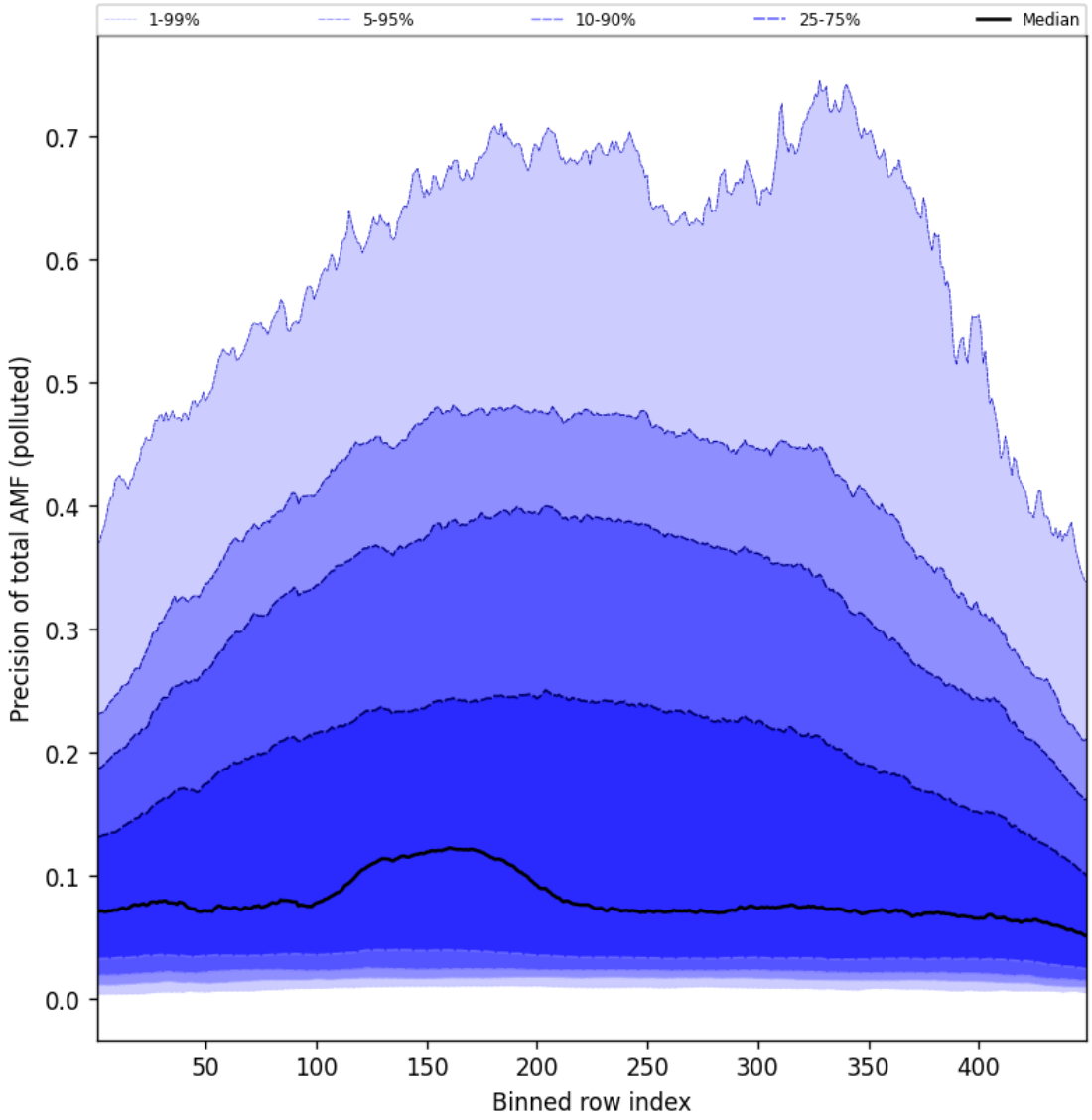

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-01-20 to 2025-01-21

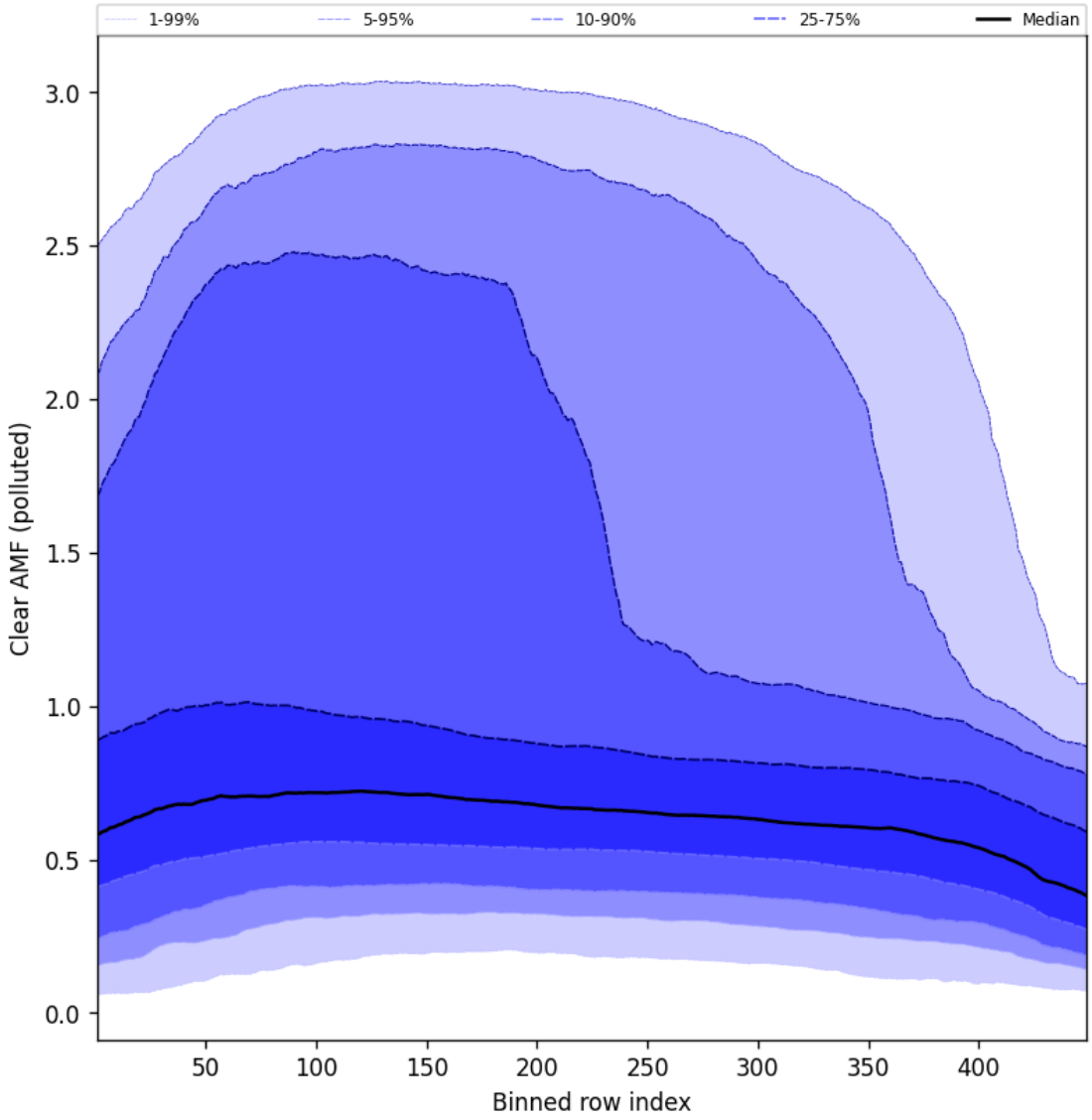

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-01-20 to 2025-01-21

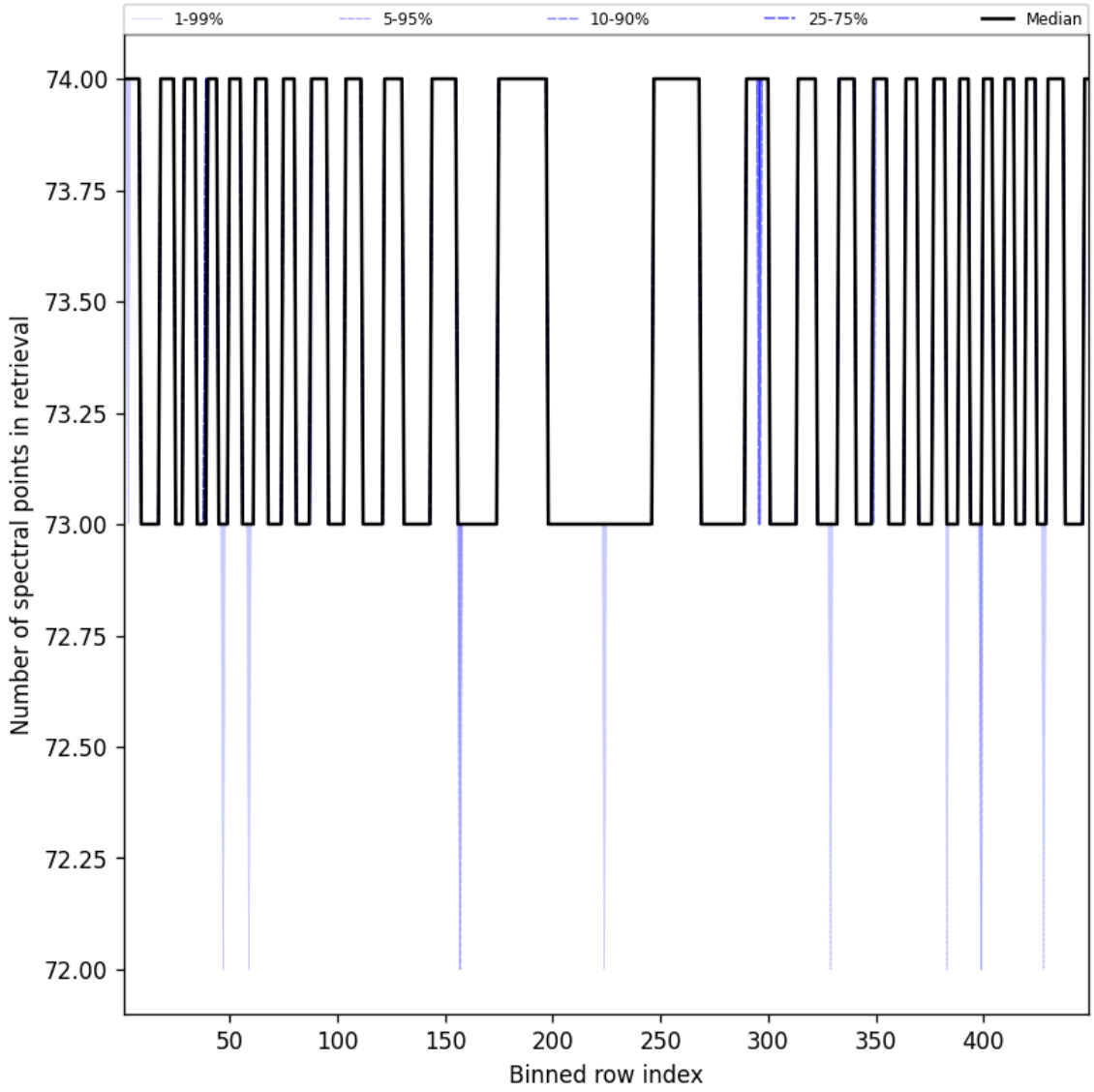

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-01-20 to 2025-01-21

10 Coincidence density

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

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11 Copyright information of 'PyCAMA'

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