

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:

$$\bar{x} = \frac{1}{N} \sum_{i=1}^N x_i \quad (1)$$

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 $\sigma(x) = \sqrt{V(x)}$.

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

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 :

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^m f(x) dx = \frac{1}{2} \quad (3)$$

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

The median is a special case of a percentile. Instead of 1/2 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} .

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1} \sum_{i=1}^N (x_{(k),i} - \bar{x}_{(k)})(x_{(l),i} - \bar{x}_{(l)}) \quad (4)$$

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

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

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]	0.633 ± 0.414	17302116	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.244 \pm 149.269) \times 10^{-2}$	17302116	0.223	0.419	9.090×10^{-3}	-161	185
sulfurdioxide total vertical column precision [DU]	0.584 ± 1.083	17302116	0.197	0.348	0.308	3.385×10^{-2}	47.1
sulfurdioxide slant column density corrected [DU]	$(1.607 \pm 35.977) \times 10^{-2}$	17302116	0.242	0.340	8.282×10^{-3}	-8.58	515
sulfurdioxide slant column density cobra [DU]	$(1.597 \pm 33.378) \times 10^{-2}$	17302116	0.242	0.340	8.282×10^{-3}	-8.58	34.8
sulfurdioxide slant column density cobra precision [DU]	0.274 ± 0.125	17302116	0.188	0.117	0.236	7.802×10^{-2}	19.0
sulfurdioxide slant column density window1 [DU]	$(9.729 \pm 64.156) \times 10^{-2}$	17302116	0.125	0.706	0.106	-88.9	78.7
sulfurdioxide slant column density window1 precision [DU]	0.274 ± 0.125	17302116	0.188	0.117	0.236	7.802×10^{-2}	19.0
sulfurdioxide slant column density corrected win1 [DU]	$(1.501 \pm 62.512) \times 10^{-2}$	17302116	-2.500×10^{-2}	0.677	-4.117×10^{-4}	-88.9	79.2
background so2 slant column offset window1 [DU]	$(-8.229 \pm 17.534) \times 10^{-2}$	17302116	-0.180	0.202	-0.134	-1.12	3.18
sulfurdioxide slant column density window2 [DU]	0.262 ± 8.648	17302116	-0.250	10.9	9.917×10^{-2}	-647	1.020×10^3
sulfurdioxide slant column density window2 precision [DU]	7.84 ± 2.15	17302116	6.97	2.48	7.50	2.21	437
sulfurdioxide slant column density corrected win2 [DU]	0.906 ± 8.398	17302116	1.25	10.6	0.933	-646	1.022×10^3
background so2 slant column offset window2 [DU]	0.644 ± 2.383	17302116	2.25	2.50	1.34	-13.2	12.3
sulfurdioxide slant column density window3 [DU]	-0.743 ± 23.524	17302116	-1.68	29.4	-0.950	-347	304
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 12.5	17302116	21.5	9.38	24.1	9.78	235
sulfurdioxide slant column density corrected win3 [DU]	-5.36 ± 22.63	17302116	-6.16	28.3	-5.37	-362	284
background so2 slant column offset window3 [DU]	-4.62 ± 6.75	17302116	-8.40	9.97	-4.43	-27.6	23.0
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17302116	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.618 \pm 10.955) \times 10^{-2}$	17302116	3.112×10^{-2}	2.978×10^{-2}	2.562×10^{-2}	6.816×10^{-4}	3.12
fitted radiance shift [nm]	$(-3.584 \pm 24.683) \times 10^{-4}$	17302116	-5.000×10^{-4}	1.694×10^{-3}	-3.991×10^{-4}	-5.591×10^{-2}	4.249×10^{-2}
fitted radiance squeeze [1]	$(-4.238 \pm 17.688) \times 10^{-5}$	17302116	-3.000×10^{-5}	2.077×10^{-4}	-3.599×10^{-5}	-1.392×10^{-2}	1.405×10^{-2}
fitted root mean square [1]	$(1.212 \pm 0.506) \times 10^{-3}$	17302116	9.250×10^{-4}	4.922×10^{-4}	1.069×10^{-3}	3.123×10^{-4}	8.251×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.899 ± 0.587	17302116	0.580	0.629	0.754	5.000×10^{-2}	3.40
sulfurdioxide total air mass factor polluted precision [1]	0.137 ± 0.148	17302116	3.500×10^{-2}	0.159	7.726×10^{-2}	2.500×10^{-3}	2.00
sulfurdioxide clear air mass factor polluted [1]	0.790 ± 0.563	17302116	0.580	0.375	0.652	2.708×10^{-2}	3.64
number of spectral points in retrieval [1]	73.4 ± 0.5	17302116	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}	0.1000	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.97	-0.931	-0.532	-0.346	-0.197	0.222	0.384	0.591	1.05	3.57
sulfurdioxide total vertical column precision [DU]	8.265×10^{-2}	0.105	0.128	0.156	0.196	0.544	0.787	1.14	1.90	5.07
sulfurdioxide slant column density corrected [DU]	-0.802	-0.458	-0.332	-0.248	-0.160	0.180	0.272	0.363	0.506	0.941
sulfurdioxide slant column density cobra [DU]	-0.802	-0.458	-0.332	-0.248	-0.160	0.180	0.272	0.363	0.506	0.941
sulfurdioxide slant column density cobra precision [DU]	0.132	0.158	0.171	0.181	0.195	0.312	0.374	0.429	0.504	0.745
sulfurdioxide slant column density window1 [DU]	-1.61	-0.903	-0.629	-0.445	-0.253	0.453	0.633	0.805	1.07	1.79
sulfurdioxide slant column density window1 precision [DU]	0.132	0.158	0.171	0.181	0.195	0.312	0.374	0.429	0.504	0.745
sulfurdioxide slant column density corrected win1 [DU]	-1.54	-0.909	-0.670	-0.508	-0.335	0.342	0.527	0.707	0.989	1.79
background so2 slant column offset window1 [DU]	-0.384	-0.285	-0.253	-0.227	-0.195	6.067×10^{-3}	0.100	0.176	0.259	0.412
sulfurdioxide slant column density window2 [DU]	-20.0	-13.5	-10.3	-7.94	-5.29	5.61	8.43	11.0	14.5	22.3
sulfurdioxide slant column density window2 precision [DU]	4.21	5.03	5.53	5.93	6.41	8.89	9.74	10.6	11.8	14.3
sulfurdioxide slant column density corrected win2 [DU]	-19.6	-12.8	-9.48	-7.08	-4.40	6.24	8.89	11.3	14.5	21.2
background so2 slant column offset window2 [DU]	-7.09	-4.43	-2.56	-1.39	-0.339	2.16	2.40	2.62	2.98	5.30
sulfurdioxide slant column density window3 [DU]	-59.4	-38.9	-29.5	-22.8	-15.4	14.0	21.7	28.7	38.2	56.8
sulfurdioxide slant column density window3 precision [DU]	14.2	16.4	17.8	19.0	20.5	29.8	34.4	39.6	50.6	81.1
sulfurdioxide slant column density corrected win3 [DU]	-62.3	-42.4	-33.1	-26.6	-19.4	8.87	16.1	22.7	31.6	49.7
background so2 slant column offset window3 [DU]	-18.8	-16.0	-14.2	-12.2	-9.38	0.592	2.57	4.09	5.76	8.83
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]	3.786×10^{-3}	6.572×10^{-3}	9.033×10^{-3}	1.121×10^{-2}	1.437×10^{-2}	4.414×10^{-2}	5.718×10^{-2}	7.482×10^{-2}	0.124	0.442
fitted radiance shift [nm]	-7.773×10^{-3}	-3.934×10^{-3}	-2.590×10^{-3}	-1.844×10^{-3}	-1.247×10^{-3}	4.465×10^{-4}	1.124×10^{-3}	1.974×10^{-3}	3.433×10^{-3}	7.461×10^{-3}
fitted radiance squeeze [1]	-5.123×10^{-4}	-3.344×10^{-4}	-2.563×10^{-4}	-2.015×10^{-4}	-1.434×10^{-4}	6.427×10^{-5}	1.145×10^{-4}	1.608×10^{-4}	2.273×10^{-4}	3.909×10^{-4}
fitted root mean square [1]	5.688×10^{-4}	6.971×10^{-4}	7.696×10^{-4}	8.249×10^{-4}	8.918×10^{-4}	1.384×10^{-3}	1.622×10^{-3}	1.857×10^{-3}	2.188×10^{-3}	3.036×10^{-3}
sulfurdioxide total air mass factor polluted [1]	8.187×10^{-2}	0.201	0.296	0.389	0.500	1.13	1.43	1.77	2.25	2.67
sulfurdioxide total air mass factor polluted precision [1]	8.622×10^{-3}	1.598×10^{-2}	2.208×10^{-2}	2.745×10^{-2}	3.475×10^{-2}	0.194	0.262	0.331	0.442	0.675
sulfurdioxide clear air mass factor polluted [1]	0.155	0.259	0.342	0.411	0.488	0.862	0.988	1.21	2.43	2.92
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]	0.700 ± 0.398	6634933	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(8.721 \pm 227.542) \times 10^{-2}$	6634933	0.628	1.520×10^{-2}	-161	185	-0.290	0.338
sulfurdioxide total vertical column precision [DU]	0.936 ± 1.590	6634933	0.665	0.442	4.862×10^{-2}	47.1	0.273	0.938
sulfurdioxide slant column density corrected [DU]	$(2.415 \pm 41.226) \times 10^{-2}$	6634933	0.393	1.083×10^{-2}	-8.58	45.0	-0.183	0.210
sulfurdioxide slant column density cobra [DU]	$(2.402 \pm 40.642) \times 10^{-2}$	6634933	0.393	1.083×10^{-2}	-8.58	17.6	-0.183	0.210
sulfurdioxide slant column density cobra precision [DU]	0.322 ± 0.154	6634933	0.176	0.275	8.038×10^{-2}	7.84	0.217	0.393
sulfurdioxide slant column density window1 [DU]	0.168 ± 0.745	6634933	0.790	0.176	-60.1	16.2	-0.222	0.568
sulfurdioxide slant column density window1 precision [DU]	0.322 ± 0.154	6634933	0.176	0.275	8.038×10^{-2}	7.84	0.217	0.393
sulfurdioxide slant column density corrected win1 [DU]	$(4.664 \pm 74.163) \times 10^{-2}$	6634933	0.780	2.246×10^{-2}	-60.1	16.2	-0.360	0.419
background so2 slant column offset window1 [DU]	-0.122 ± 0.161	6634933	0.156	-0.143	-1.12	2.84	-0.220	-6.423×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.04 ± 9.60	6634933	12.2	0.703	-385	224	-5.26	6.98
sulfurdioxide slant column density window2 precision [DU]	8.57 ± 2.22	6634933	2.75	8.26	2.36	191	7.05	9.79
sulfurdioxide slant column density corrected win2 [DU]	0.869 ± 9.197	6634933	11.8	0.889	-386	226	-5.00	6.76
background so2 slant column offset window2 [DU]	-0.168 ± 3.052	6634933	4.08	0.978	-13.2	12.3	-2.05	2.03
sulfurdioxide slant column density window3 [DU]	-3.86 ± 25.13	6634933	31.9	-3.41	-208	186	-19.5	12.4
sulfurdioxide slant column density window3 precision [DU]	29.5 ± 12.3	6634933	9.63	26.5	10.1	219	22.8	32.4
sulfurdioxide slant column density corrected win3 [DU]	-5.76 ± 24.61	6634933	31.2	-5.49	-203	179	-21.1	10.0
background so2 slant column offset window3 [DU]	-1.90 ± 5.59	6634933	9.34	-2.28	-20.5	23.0	-6.69	2.65
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	6634933	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.981 \pm 16.985) \times 10^{-2}$	6634933	4.479×10^{-2}	2.557×10^{-2}	6.816×10^{-4}	3.12	1.344×10^{-2}	5.822×10^{-2}
fitted radiance shift [nm]	$(-1.987 \pm 24.678) \times 10^{-4}$	6634933	1.674×10^{-3}	-2.317×10^{-4}	-3.558×10^{-2}	3.410×10^{-2}	-1.057×10^{-3}	6.167×10^{-4}
fitted radiance squeeze [1]	$(4.951 \pm 185.433) \times 10^{-6}$	6634933	2.114×10^{-4}	5.684×10^{-6}	-2.674×10^{-3}	1.072×10^{-2}	-1.002×10^{-4}	1.113×10^{-4}
fitted root mean square [1]	$(1.392 \pm 0.616) \times 10^{-3}$	6634933	7.183×10^{-4}	1.194×10^{-3}	3.357×10^{-4}	3.961×10^{-2}	9.708×10^{-4}	1.689×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.660 ± 0.371	6634933	0.490	0.621	5.000×10^{-2}	2.82	0.379	0.869
sulfurdioxide total air mass factor polluted precision [1]	$(9.630 \pm 12.679) \times 10^{-2}$	6634933	9.204×10^{-2}	4.596×10^{-2}	2.500×10^{-3}	2.00	2.659×10^{-2}	0.119
sulfurdioxide clear air mass factor polluted [1]	0.583 ± 0.262	6634933	0.416	0.578	2.708×10^{-2}	2.00	0.370	0.786
number of spectral points in retrieval [1]	73.5 ± 0.5	6634933	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]	0.591 ± 0.418	10667183	0.830	0.490	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(1.460 \pm 62.576) \times 10^{-2}$	10667183	0.337	6.912×10^{-3}	-58.3	151	-0.160	0.177
sulfurdioxide total vertical column precision [DU]	0.366 ± 0.454	10667183	0.248	0.254	3.385×10^{-2}	33.5	0.163	0.412
sulfurdioxide slant column density corrected [DU]	$(1.104 \pm 32.273) \times 10^{-2}$	10667183	0.313	7.001×10^{-3}	-8.28	515	-0.148	0.165
sulfurdioxide slant column density cobra [DU]	$(1.096 \pm 27.910) \times 10^{-2}$	10667183	0.313	7.001×10^{-3}	-8.28	34.8	-0.148	0.165
sulfurdioxide slant column density cobra precision [DU]	0.244 ± 0.091	10667183	8.534×10^{-2}	0.219	7.802×10^{-2}	19.0	0.187	0.272
sulfurdioxide slant column density window1 [DU]	$(5.316 \pm 56.358) \times 10^{-2}$	10667183	0.658	6.952×10^{-2}	-88.9	78.7	-0.268	0.390
sulfurdioxide slant column density window1 precision [DU]	0.244 ± 0.091	10667183	8.534×10^{-2}	0.219	7.802×10^{-2}	19.0	0.187	0.272
sulfurdioxide slant column density corrected win1 [DU]	$(-4.667 \pm 539.189) \times 10^{-3}$	10667183	0.624	-1.199×10^{-2}	-88.9	79.2	-0.322	0.301
background so2 slant column offset window1 [DU]	$(-5.782 \pm 17.920) \times 10^{-2}$	10667183	0.253	-0.127	-0.976	3.18	-0.186	6.762×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.219 ± 7.959	10667183	10.2	-0.214	-647	1.020×10^3	-5.31	4.88
sulfurdioxide slant column density window2 precision [DU]	7.38 ± 1.96	10667183	2.13	7.10	2.21	437	6.13	8.26
sulfurdioxide slant column density corrected win2 [DU]	0.930 ± 7.860	10667183	10.0	0.957	-646	1.022×10^3	-4.07	5.96
background so2 slant column offset window2 [DU]	1.15 ± 1.66	10667183	2.09	1.51	-7.73	9.97	0.140	2.22
sulfurdioxide slant column density window3 [DU]	1.19 ± 22.25	10667183	28.0	0.387	-347	304	-13.2	14.9
sulfurdioxide slant column density window3 precision [DU]	26.1 ± 12.5	10667183	8.21	22.6	9.78	235	19.5	27.7
sulfurdioxide slant column density corrected win3 [DU]	-5.12 ± 21.30	10667183	26.7	-5.31	-362	284	-18.5	8.22
background so2 slant column offset window3 [DU]	-6.31 ± 6.86	10667183	11.4	-5.84	-27.6	14.9	-12.2	-0.807
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	10667183	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.149 \pm 3.092) \times 10^{-2}$	10667183	2.508×10^{-2}	2.564×10^{-2}	1.119×10^{-3}	1.73	1.510×10^{-2}	4.018×10^{-2}
fitted radiance shift [nm]	$(-4.578 \pm 24.634) \times 10^{-4}$	10667183	1.668×10^{-3}	-5.067×10^{-4}	-5.591×10^{-2}	4.249×10^{-2}	-1.341×10^{-3}	3.274×10^{-4}
fitted radiance squeeze [1]	$(-7.182 \pm 16.461) \times 10^{-5}$	10667183	2.011×10^{-4}	-6.030×10^{-5}	-1.392×10^{-2}	1.405×10^{-2}	-1.664×10^{-4}	3.468×10^{-5}
fitted root mean square [1]	$(1.101 \pm 0.384) \times 10^{-3}$	10667183	3.901×10^{-4}	1.009×10^{-3}	3.123×10^{-4}	8.251×10^{-2}	8.575×10^{-4}	1.248×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.05 ± 0.64	10667183	0.795	0.861	5.000×10^{-2}	3.40	0.580	1.37
sulfurdioxide total air mass factor polluted precision [1]	0.163 ± 0.155	10667183	0.193	0.114	6.142×10^{-3}	1.50	4.244×10^{-2}	0.235
sulfurdioxide clear air mass factor polluted [1]	0.918 ± 0.655	10667183	0.402	0.689	0.135	3.64	0.541	0.943
number of spectral points in retrieval [1]	73.4 ± 0.5	10667183	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]	0.675 ± 0.402	12366086	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(2.724 \pm 105.185) \times 10^{-2}$	12366086	0.423	9.110×10^{-3}	-105	154	-0.200	0.222
sulfurdioxide total vertical column precision [DU]	0.497 ± 0.768	12366086	0.294	0.307	4.611×10^{-2}	40.3	0.208	0.502
sulfurdioxide slant column density corrected [DU]	$(1.304 \pm 29.867) \times 10^{-2}$	12366086	0.323	7.540×10^{-3}	-8.00	34.2	-0.153	0.171
sulfurdioxide slant column density cobra [DU]	$(1.302 \pm 29.747) \times 10^{-2}$	12366086	0.323	7.540×10^{-3}	-8.00	24.2	-0.153	0.171
sulfurdioxide slant column density cobra precision [DU]	0.257 ± 0.108	12366086	9.979×10^{-2}	0.225	7.802×10^{-2}	19.0	0.190	0.289
sulfurdioxide slant column density window1 [DU]	0.110 ± 0.584	12366086	0.663	0.116	-60.1	78.7	-0.220	0.444
sulfurdioxide slant column density window1 precision [DU]	0.257 ± 0.108	12366086	9.979×10^{-2}	0.225	7.802×10^{-2}	19.0	0.190	0.289
sulfurdioxide slant column density corrected win1 [DU]	$(4.636 \pm 572.694) \times 10^{-3}$	12366086	0.644	-6.537×10^{-3}	-60.1	79.2	-0.326	0.318
background so2 slant column offset window1 [DU]	-0.105 ± 0.149	12366086	0.170	-0.142	-1.06	3.18	-0.199	-2.873×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.180 ± 8.303	12366086	10.5	-0.284	-647	819	-5.52	5.02
sulfurdioxide slant column density window2 precision [DU]	7.63 ± 2.00	12366086	2.33	7.34	2.21	334	6.29	8.63
sulfurdioxide slant column density corrected win2 [DU]	0.826 ± 8.170	12366086	10.4	0.863	-646	820	-4.37	6.05
background so2 slant column offset window2 [DU]	1.01 ± 2.06	12366086	2.01	1.53	-13.2	12.3	0.203	2.21
sulfurdioxide slant column density window3 [DU]	2.17 ± 23.10	12366086	29.2	1.74	-347	243	-12.5	16.7
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 11.8	12366086	8.96	23.8	9.78	208	20.3	29.3
sulfurdioxide slant column density corrected win3 [DU]	-3.39 ± 22.06	12366086	28.0	-3.71	-362	245	-17.5	10.5
background so2 slant column offset window3 [DU]	-5.55 ± 6.27	12366086	8.97	-5.30	-27.6	23.0	-9.93	-0.957
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.12	12366086	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.483 \pm 4.129) \times 10^{-2}$	12366086	2.605×10^{-2}	2.651×10^{-2}	1.010×10^{-3}	2.15	1.600×10^{-2}	4.205×10^{-2}
fitted radiance shift [nm]	$(-2.982 \pm 23.548) \times 10^{-4}$	12366086	1.746×10^{-3}	-3.054×10^{-4}	-5.591×10^{-2}	4.249×10^{-2}	-1.199×10^{-3}	5.463×10^{-4}
fitted radiance squeeze [1]	$(-3.738 \pm 16.397) \times 10^{-5}$	12366086	1.932×10^{-4}	-3.166×10^{-5}	-1.163×10^{-2}	1.385×10^{-2}	-1.308×10^{-4}	6.237×10^{-5}
fitted root mean square [1]	$(1.138 \pm 0.446) \times 10^{-3}$	12366086	4.053×10^{-4}	1.015×10^{-3}	3.123×10^{-4}	8.251×10^{-2}	8.643×10^{-4}	1.270×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.816 ± 0.426	12366086	0.503	0.746	5.000×10^{-2}	2.63	0.522	1.02
sulfurdioxide total air mass factor polluted precision [1]	0.125 ± 0.127	12366086	0.141	7.113×10^{-2}	2.500×10^{-3}	1.18	3.628×10^{-2}	0.178
sulfurdioxide clear air mass factor polluted [1]	0.673 ± 0.245	12366086	0.304	0.644	4.027×10^{-2}	2.69	0.508	0.813
number of spectral points in retrieval [1]	73.4 ± 0.5	12366086	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]	0.526 ± 0.423	4243431	0.900	0.490	0.0	1.000	0.1000	1.000
sulfurdioxide total vertical column [DU]	$(6.476 \pm 194.939) \times 10^{-2}$	4243431	0.372	7.618×10^{-3}	-123	151	-0.172	0.200
sulfurdioxide total vertical column precision [DU]	0.715 ± 1.437	4243431	0.525	0.287	3.385×10^{-2}	46.8	0.132	0.657
sulfurdioxide slant column density corrected [DU]	$(2.077 \pm 46.994) \times 10^{-2}$	4243431	0.384	9.355×10^{-3}	-8.58	515	-0.181	0.204
sulfurdioxide slant column density cobra [DU]	$(2.052 \pm 39.090) \times 10^{-2}$	4243431	0.384	9.355×10^{-3}	-8.58	34.8	-0.181	0.204
sulfurdioxide slant column density cobra precision [DU]	0.309 ± 0.142	4243431	0.149	0.265	8.084×10^{-2}	17.0	0.217	0.367
sulfurdioxide slant column density window1 [DU]	$(5.489 \pm 74.950) \times 10^{-2}$	4243431	0.832	6.520×10^{-2}	-88.9	72.1	-0.363	0.469
sulfurdioxide slant column density window1 precision [DU]	0.309 ± 0.142	4243431	0.149	0.265	8.084×10^{-2}	17.0	0.217	0.367
sulfurdioxide slant column density corrected win1 [DU]	$(3.707 \pm 72.043) \times 10^{-2}$	4243431	0.766	1.605×10^{-2}	-88.9	72.0	-0.361	0.404
background so2 slant column offset window1 [DU]	$(-1.782 \pm 21.987) \times 10^{-2}$	4243431	0.351	-9.608×10^{-2}	-0.976	2.51	-0.184	0.167
sulfurdioxide slant column density window2 [DU]	1.27 ± 9.23	4243431	11.6	1.13	-385	1.020×10^3	-4.65	7.00
sulfurdioxide slant column density window2 precision [DU]	8.27 ± 2.35	4243431	2.69	7.88	2.31	437	6.71	9.40
sulfurdioxide slant column density corrected win2 [DU]	1.11 ± 8.85	4243431	11.1	1.13	-386	1.022×10^3	-4.45	6.70
background so2 slant column offset window2 [DU]	-0.157 ± 2.704	4243431	3.75	0.331	-12.8	10.7	-1.78	1.98
sulfurdioxide slant column density window3 [DU]	-8.11 ± 22.73	4243431	28.0	-7.72	-264	304	-21.9	6.10
sulfurdioxide slant column density window3 precision [DU]	28.5 ± 14.0	4243431	10.0	24.9	9.99	235	20.5	30.6
sulfurdioxide slant column density corrected win3 [DU]	-10.4 ± 23.0	4243431	28.4	-9.67	-277	284	-24.2	4.19
background so2 slant column offset window3 [DU]	-2.30 ± 7.31	4243431	11.3	-0.325	-27.6	23.0	-7.85	3.49
sulfurdioxide slant column cobra flag [1]	1.94 ± 0.33	4243431	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.716 \pm 17.535) \times 10^{-2}$	4243431	4.325×10^{-2}	2.015×10^{-2}	6.921×10^{-4}	3.12	9.699×10^{-3}	5.295×10^{-2}
fitted radiance shift [nm]	$(-5.379 \pm 26.846) \times 10^{-4}$	4243431	1.414×10^{-3}	-6.471×10^{-4}	-4.385×10^{-2}	3.828×10^{-2}	-1.321×10^{-3}	9.334×10^{-5}
fitted radiance squeeze [1]	$(-6.129 \pm 20.378) \times 10^{-5}$	4243431	2.519×10^{-4}	-5.661×10^{-5}	-1.392×10^{-2}	1.405×10^{-2}	-1.871×10^{-4}	6.475×10^{-5}
fitted root mean square [1]	$(1.380 \pm 0.561) \times 10^{-3}$	4243431	5.937×10^{-4}	1.238×10^{-3}	3.547×10^{-4}	5.534×10^{-2}	1.014×10^{-3}	1.607×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.18 ± 0.85	4243431	1.54	0.858	5.000×10^{-2}	3.40	0.465	2.00
sulfurdioxide total air mass factor polluted precision [1]	0.178 ± 0.194	4243431	0.223	0.119	2.500×10^{-3}	2.00	3.118×10^{-2}	0.254
sulfurdioxide clear air mass factor polluted [1]	1.17 ± 0.95	4243431	1.73	0.753	2.708×10^{-2}	3.64	0.420	2.15
number of spectral points in retrieval [1]	73.4 ± 0.5	4243431	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

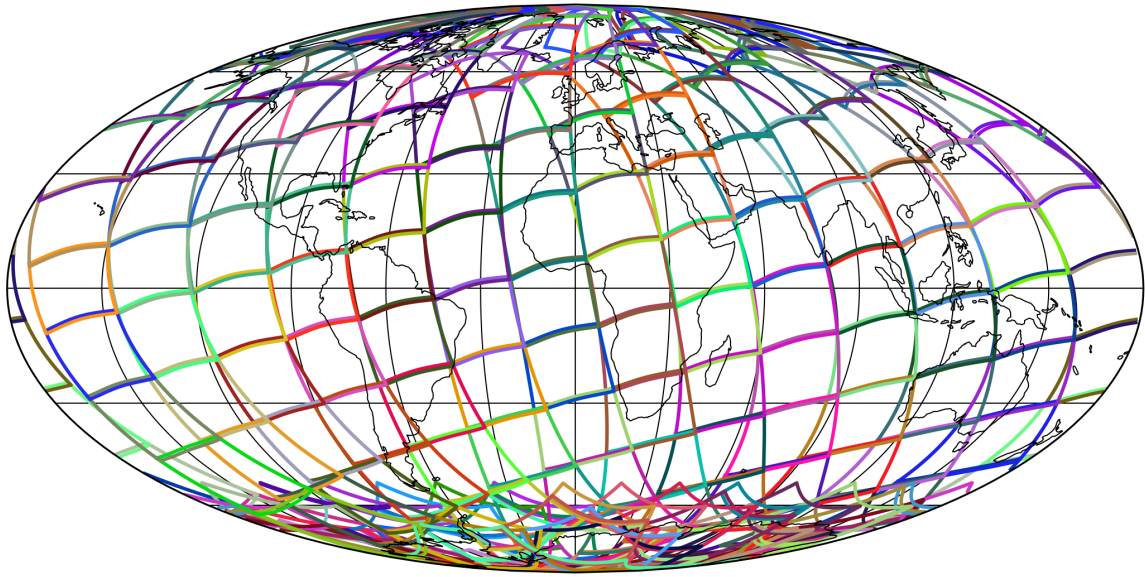


Figure 1: Outline of the granules.

4 Input data monitoring

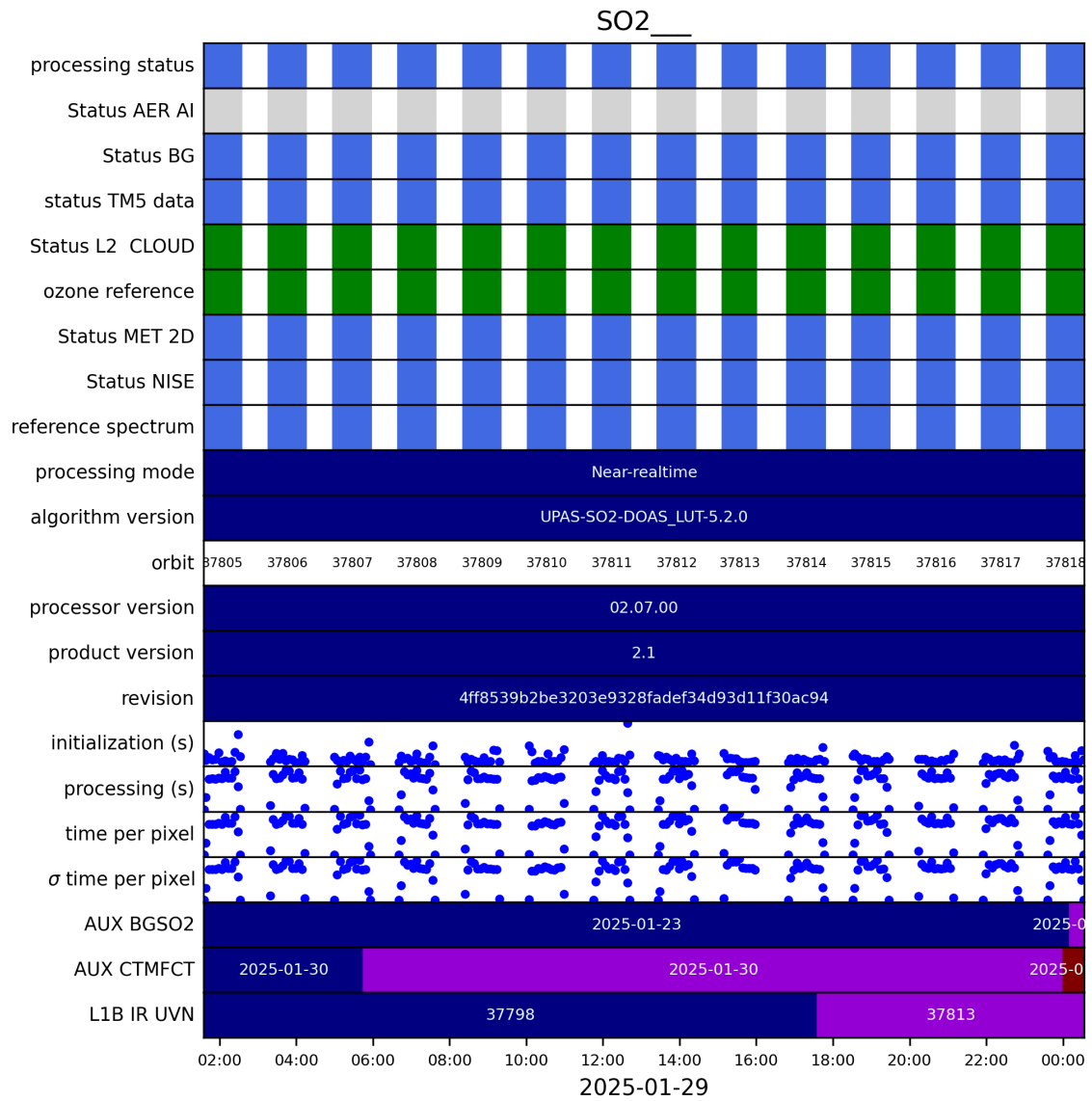


Figure 2: Input data per granule

5 Warnings and errors

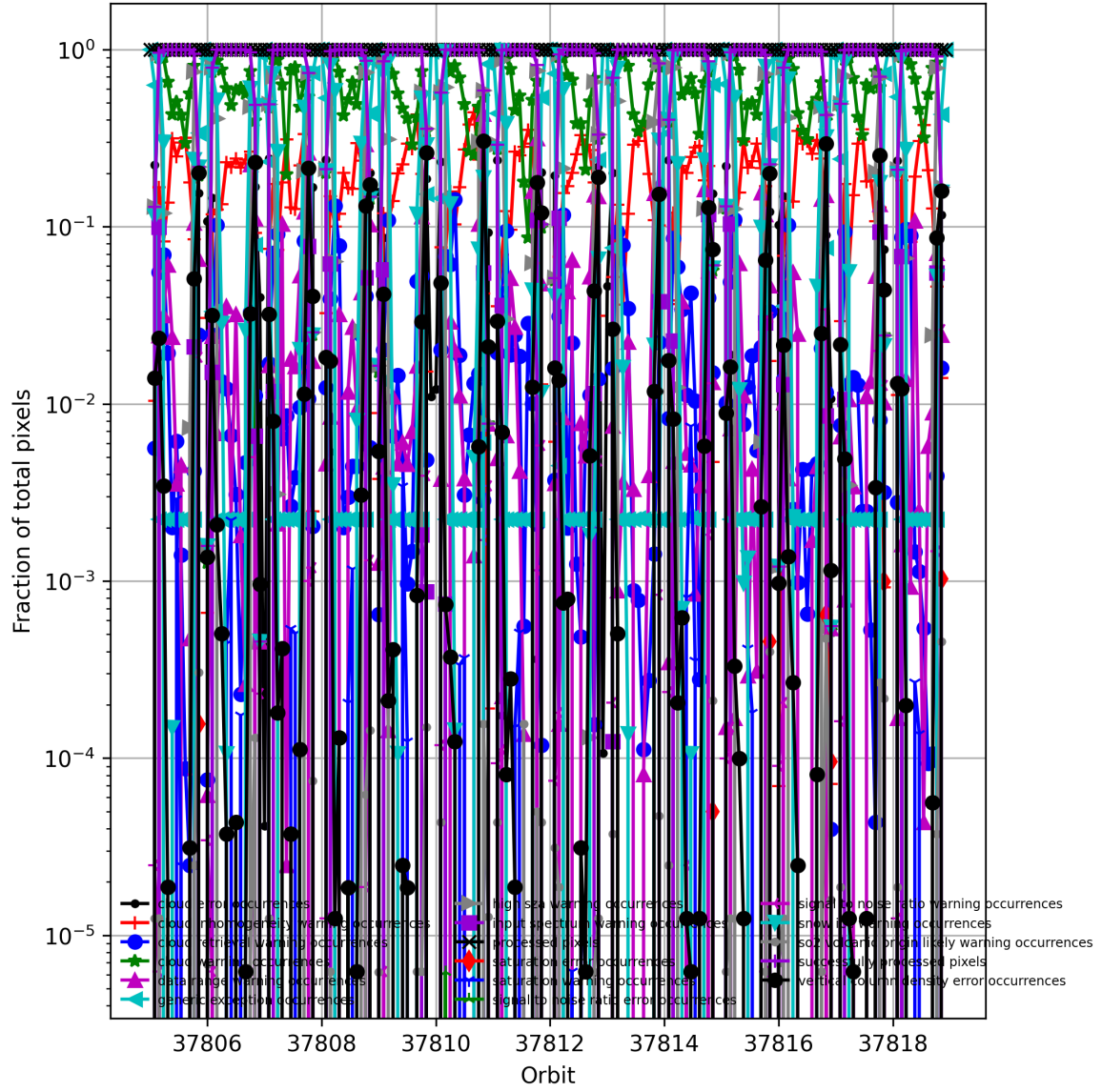


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

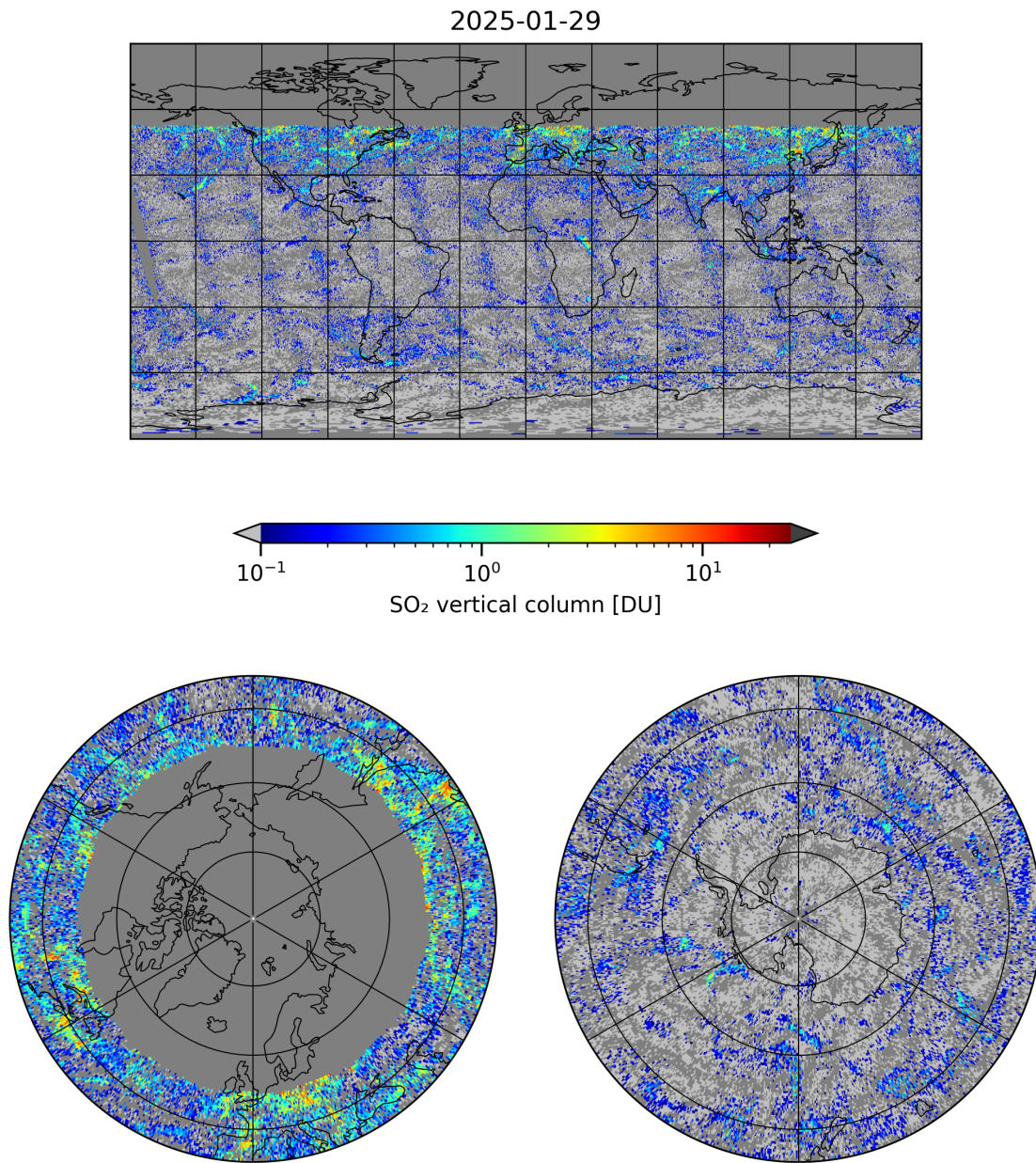


Figure 4: Map of “SO₂ vertical column” for 2025-01-29 to 2025-01-30

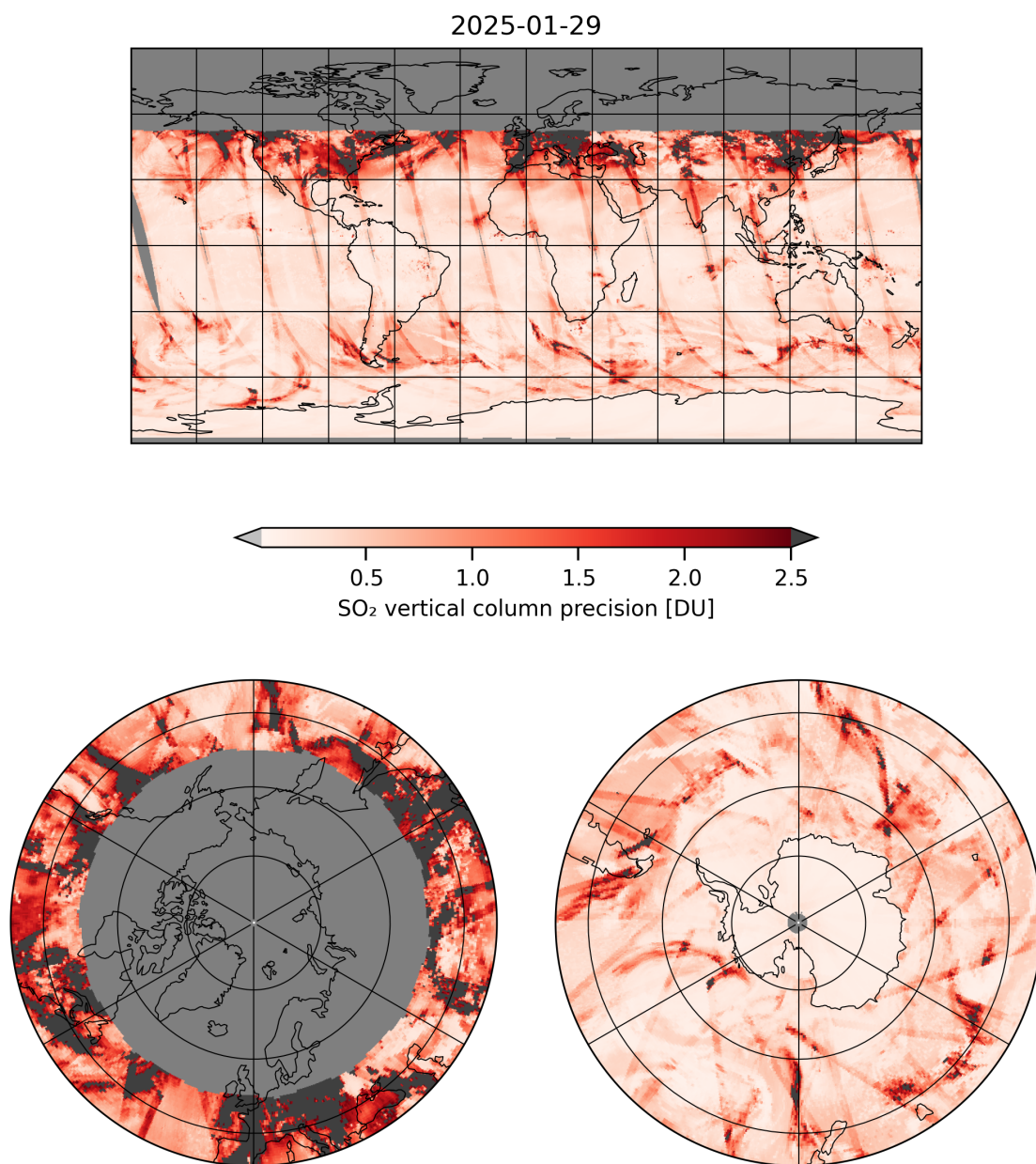


Figure 5: Map of “SO₂ vertical column precision” for 2025-01-29 to 2025-01-30

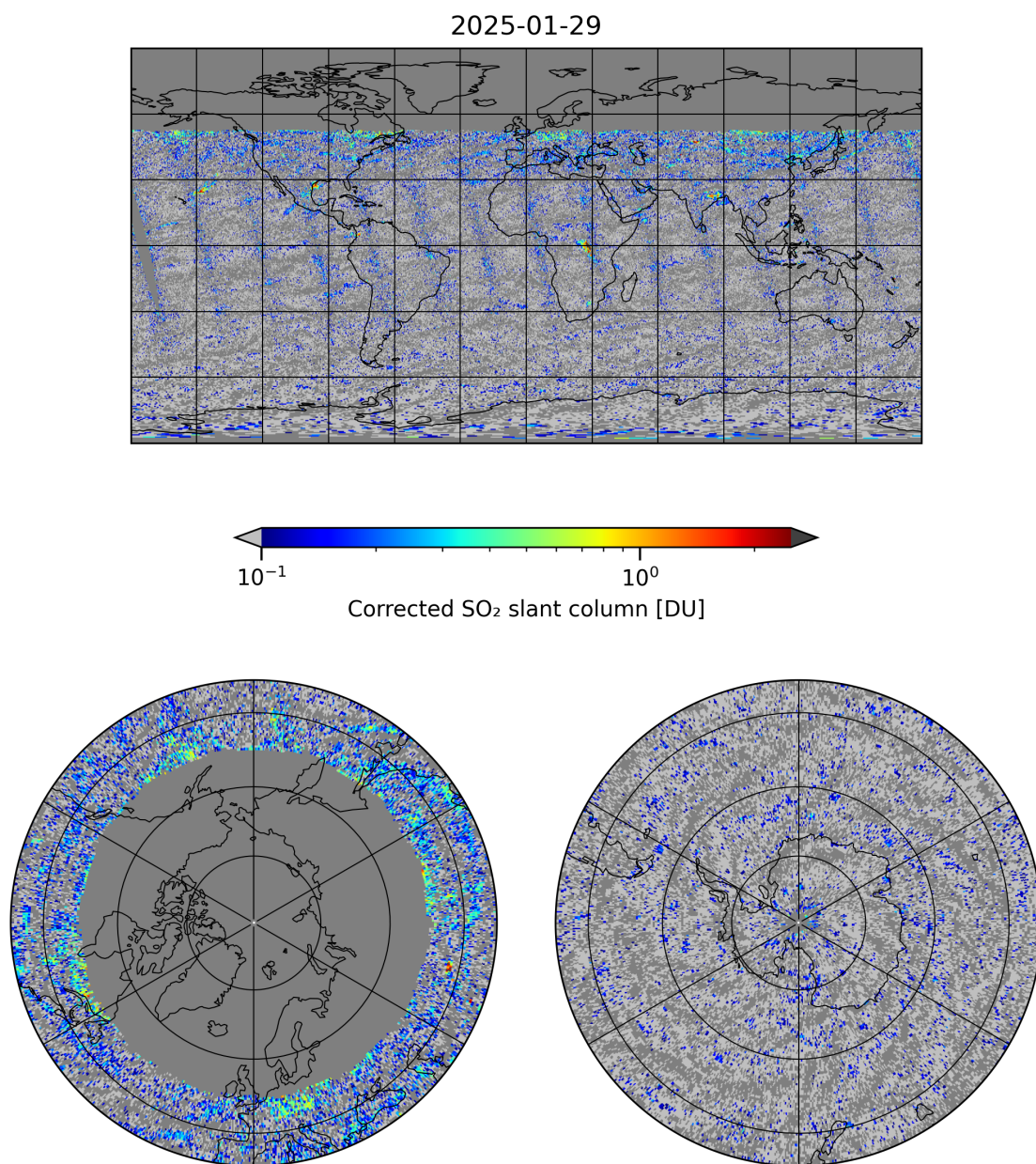


Figure 6: Map of “Corrected SO₂ slant column” for 2025-01-29 to 2025-01-30

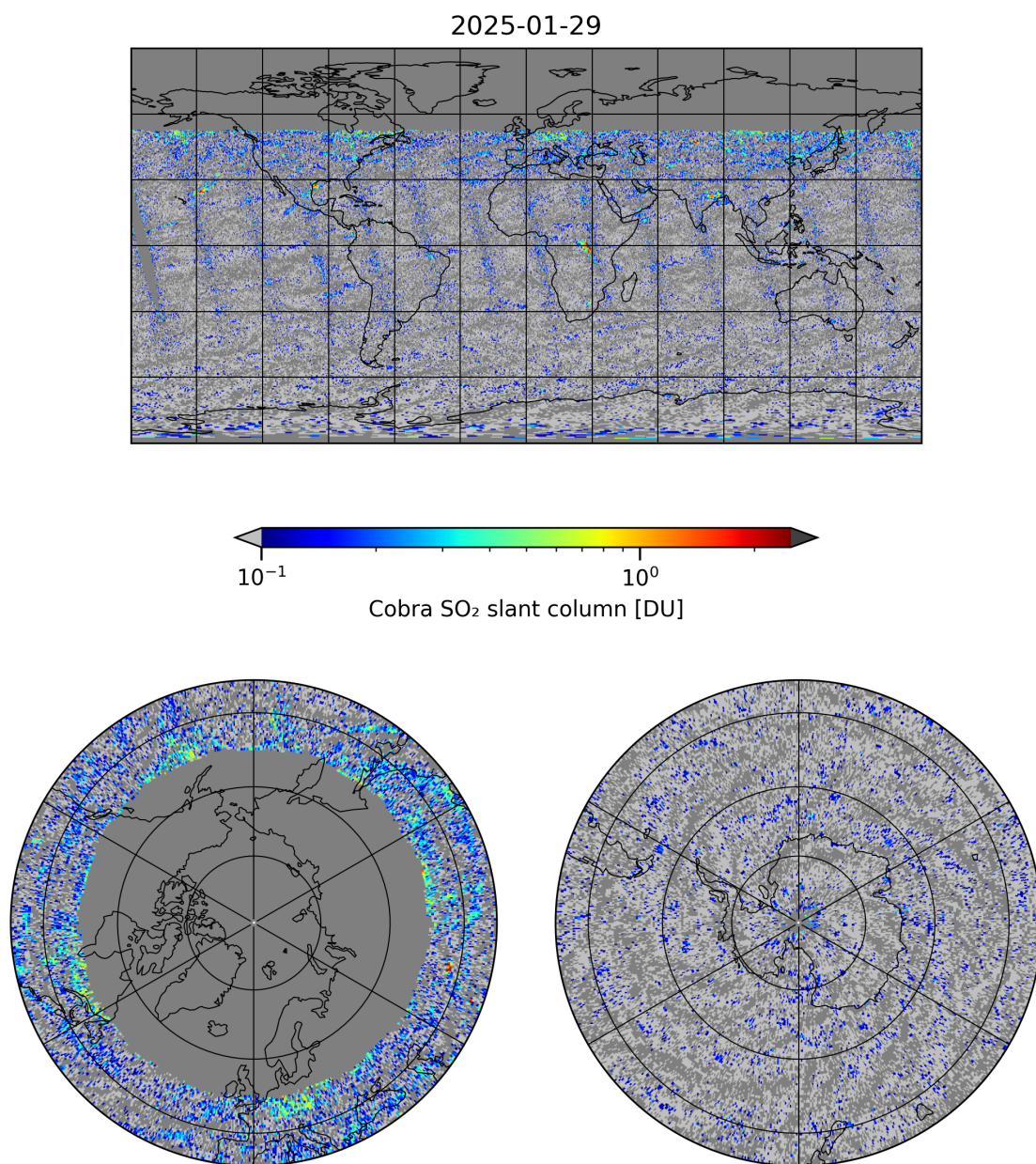


Figure 7: Map of “Cobra SO₂ slant column” for 2025-01-29 to 2025-01-30

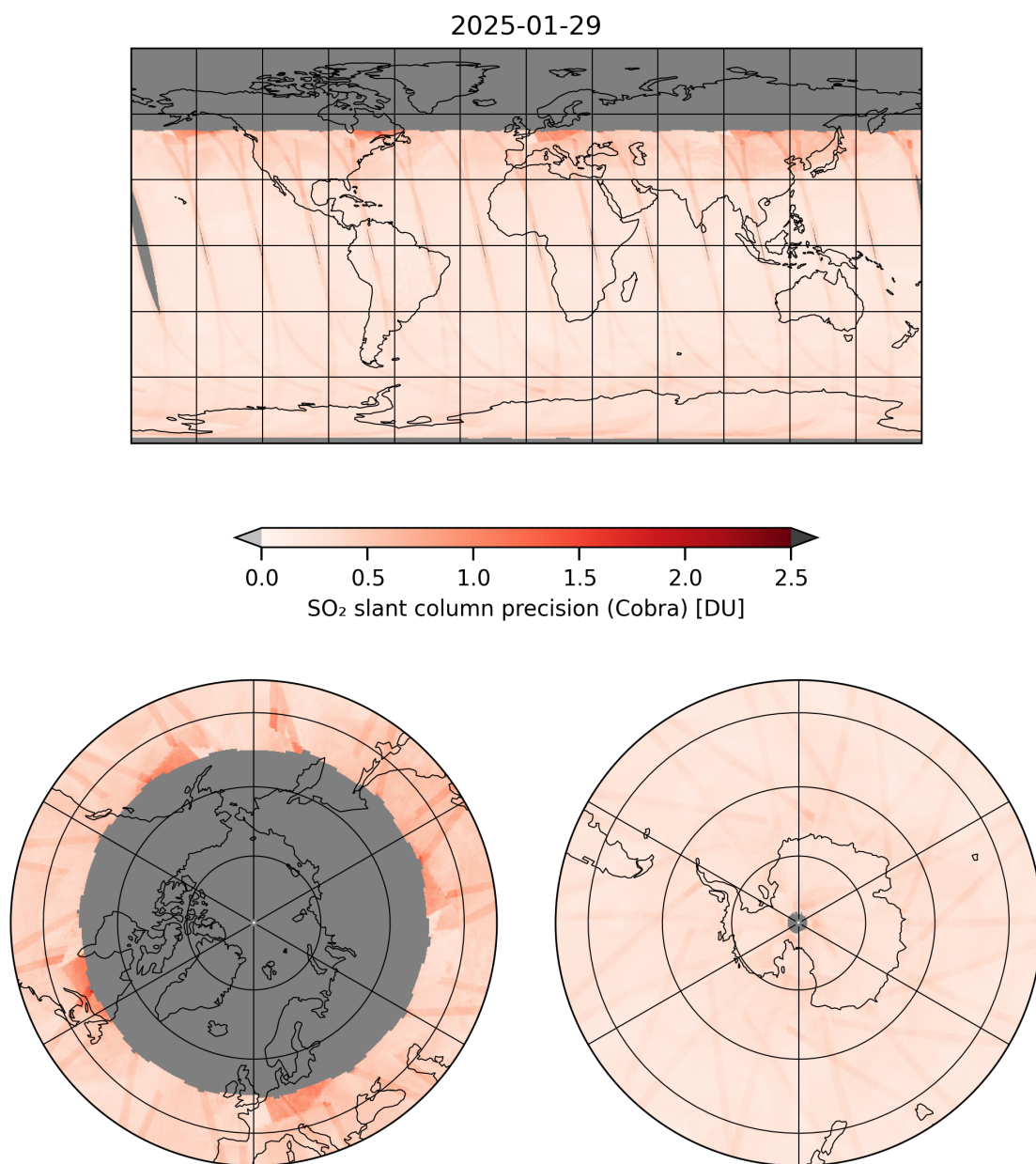


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-01-29 to 2025-01-30

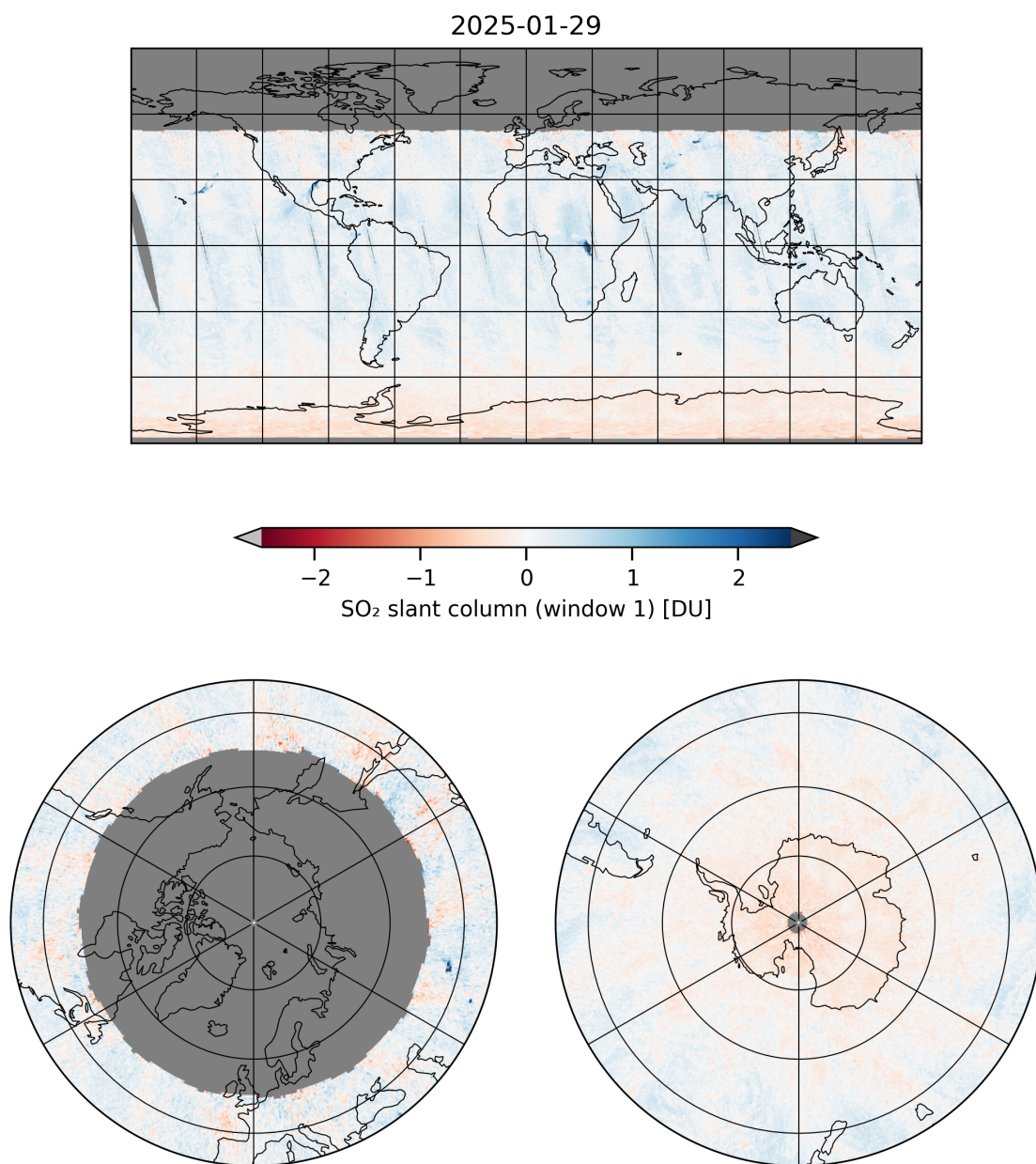


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-01-29 to 2025-01-30

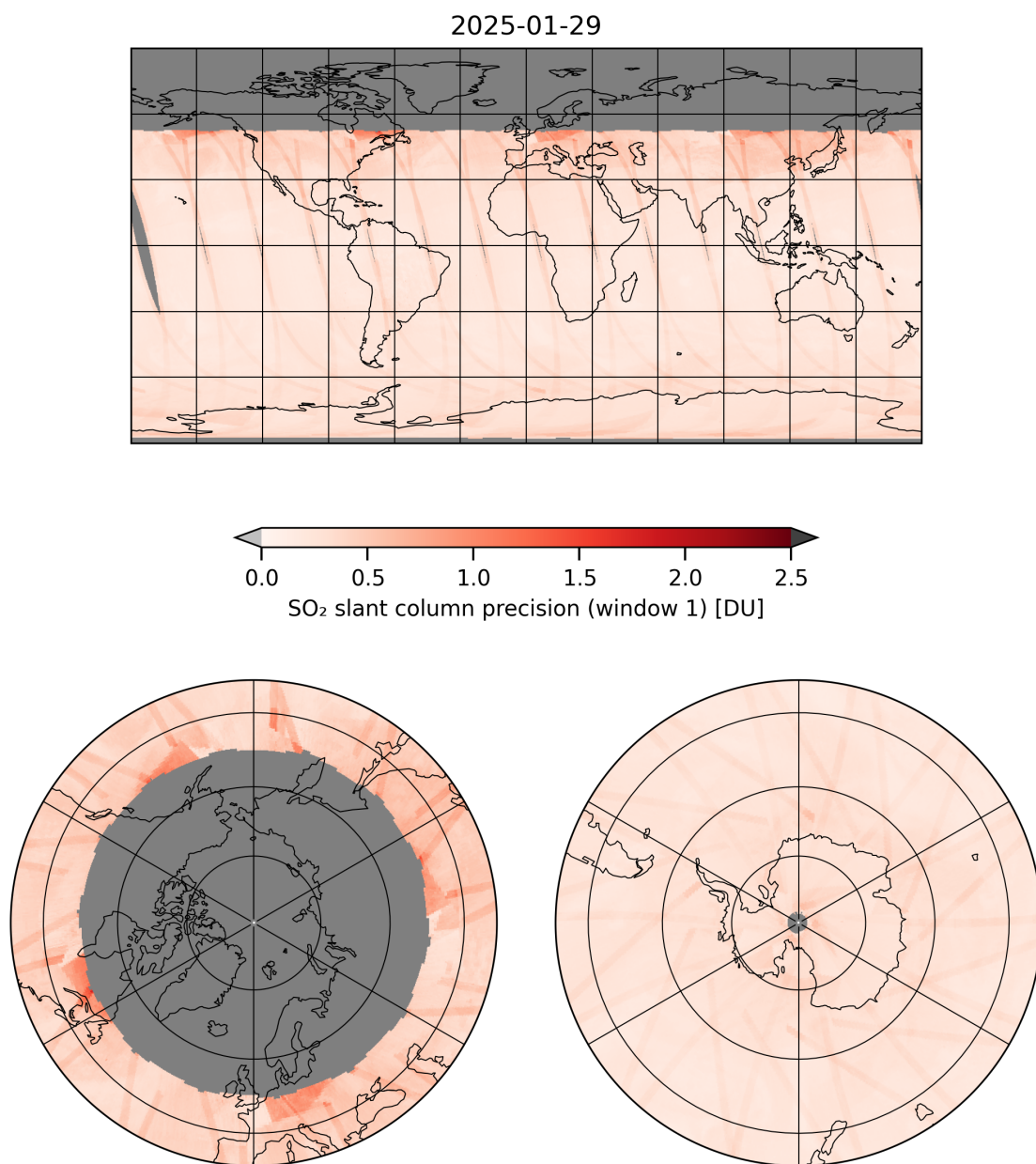


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-01-29 to 2025-01-30

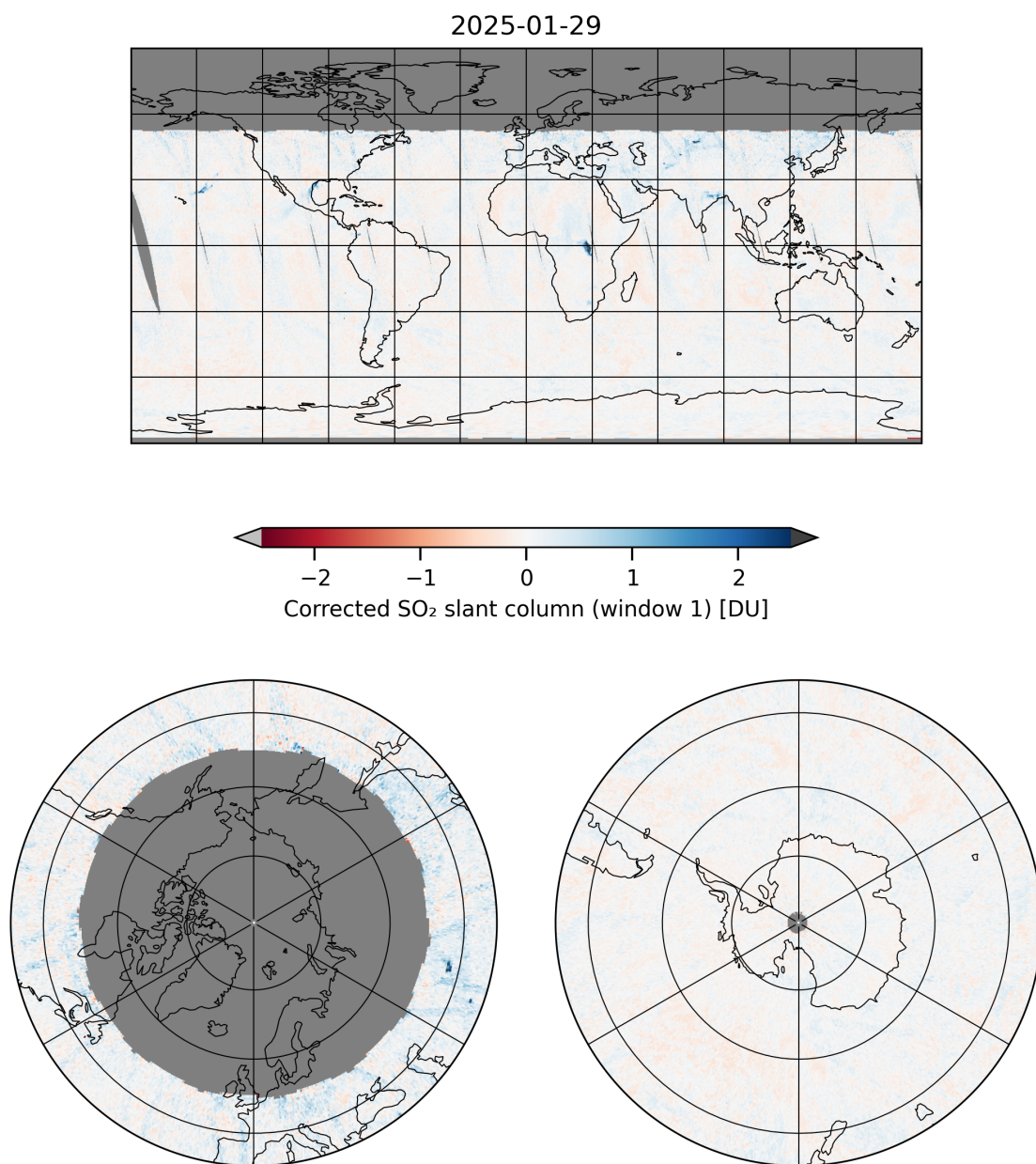


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-01-29 to 2025-01-30

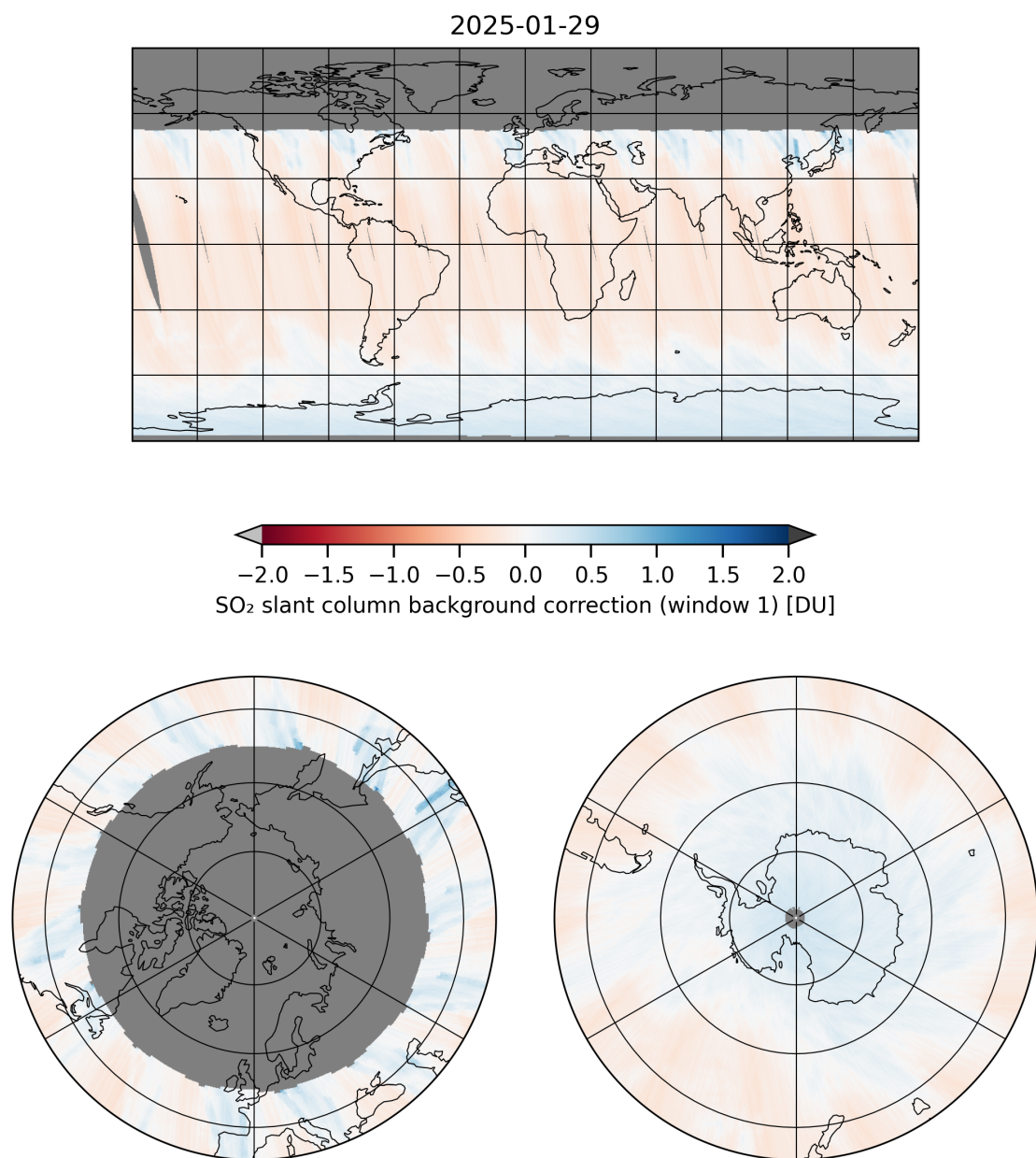


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-01-29 to 2025-01-30

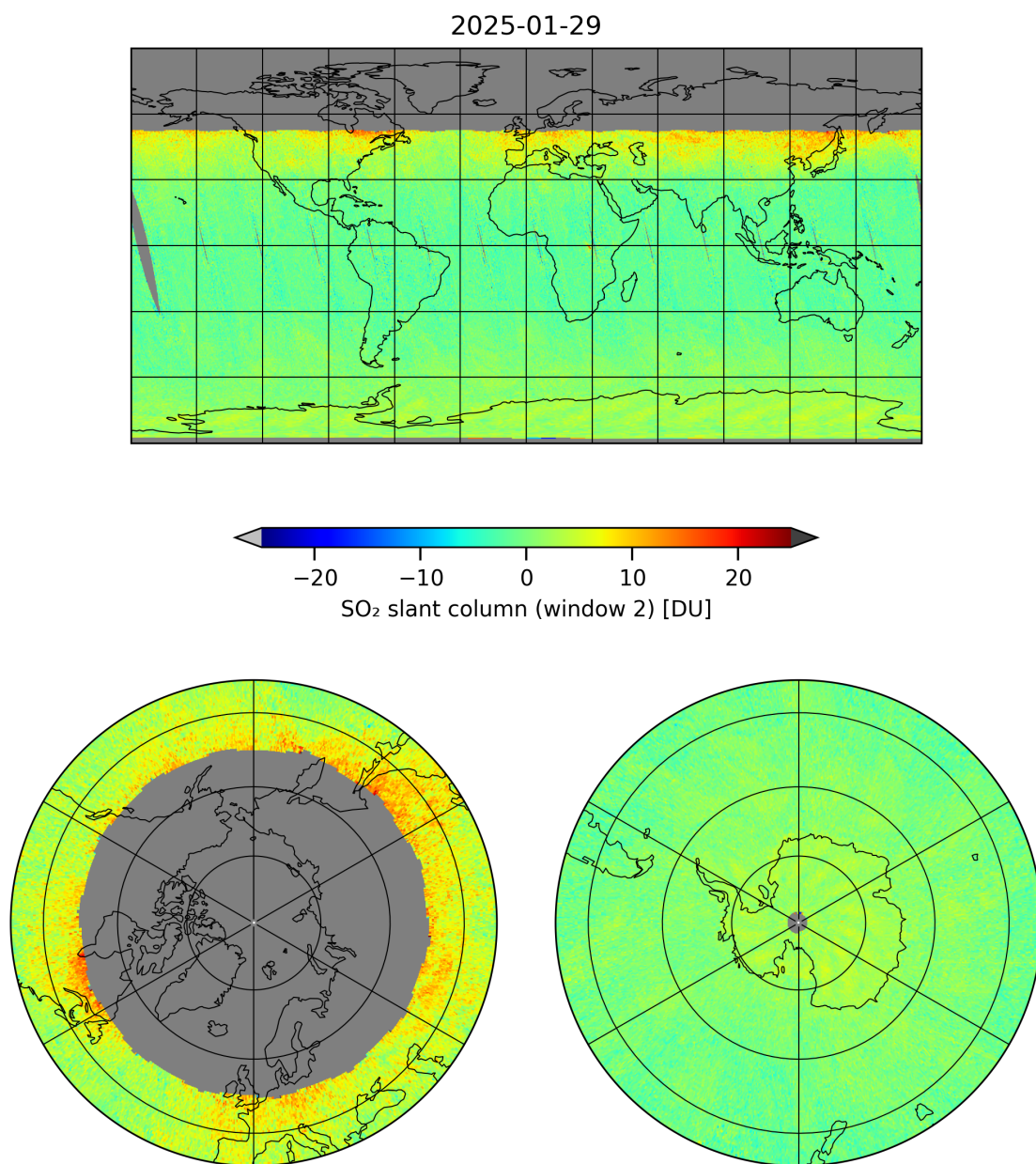


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-01-29 to 2025-01-30

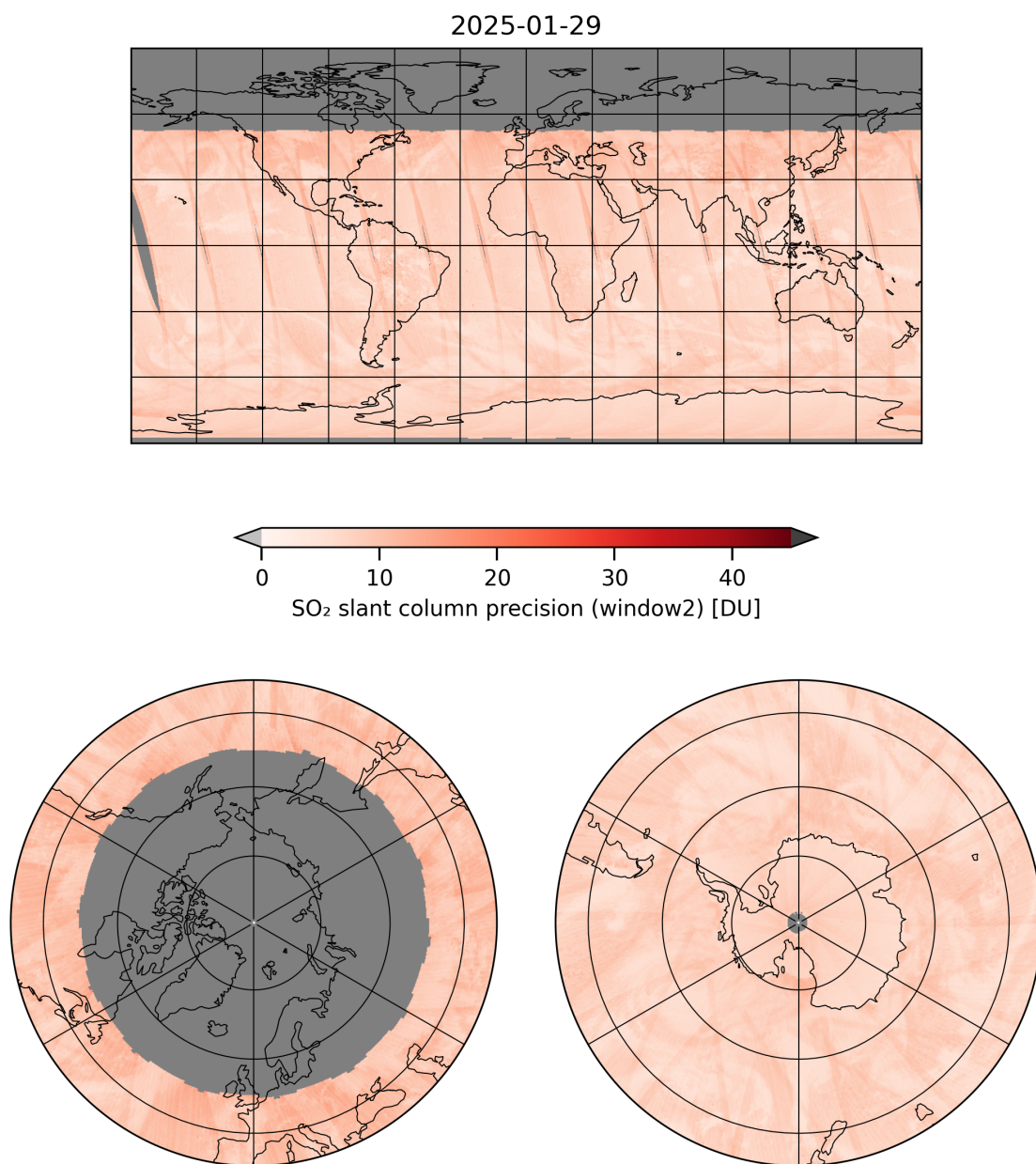


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-01-29 to 2025-01-30

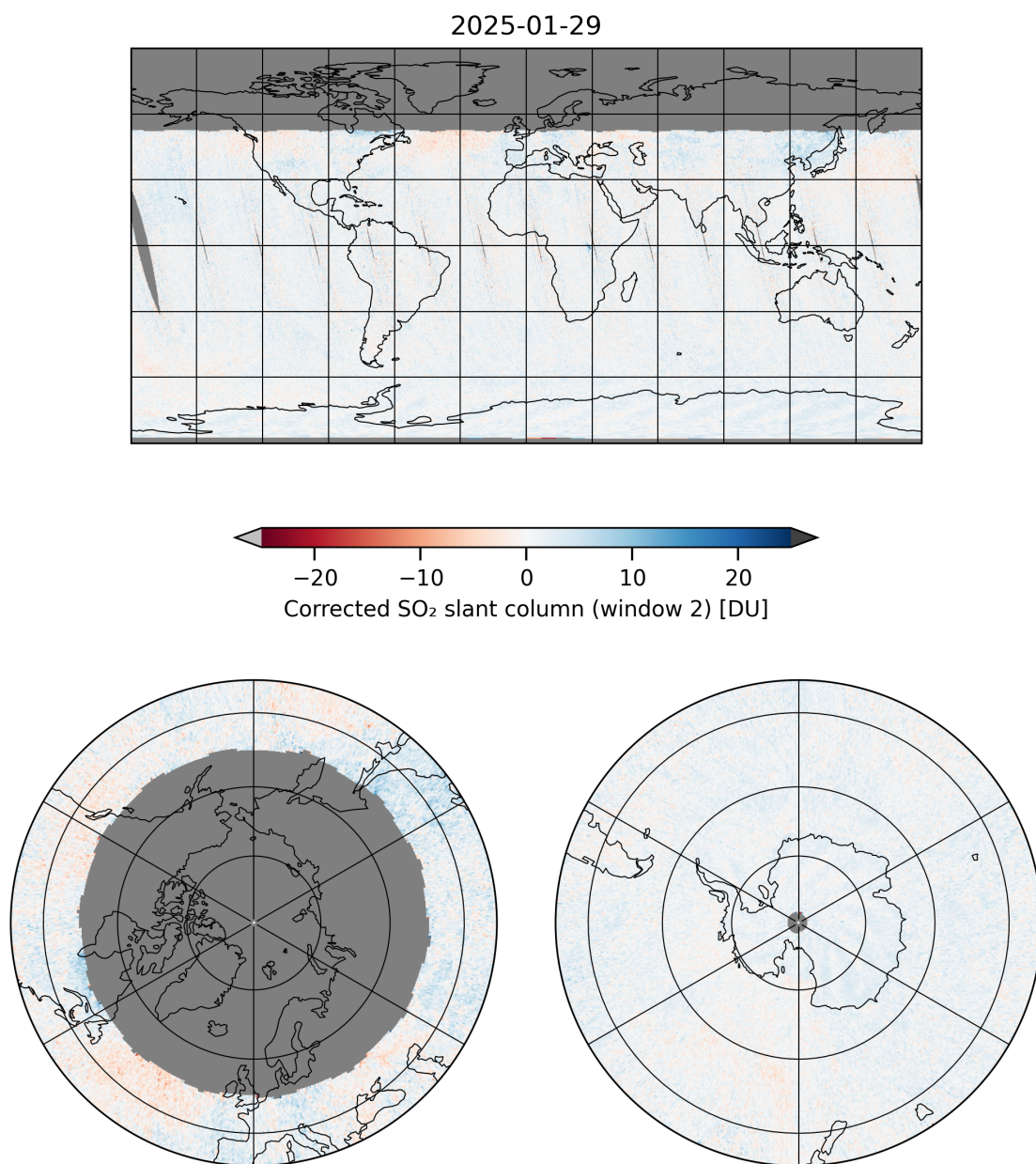


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-01-29 to 2025-01-30

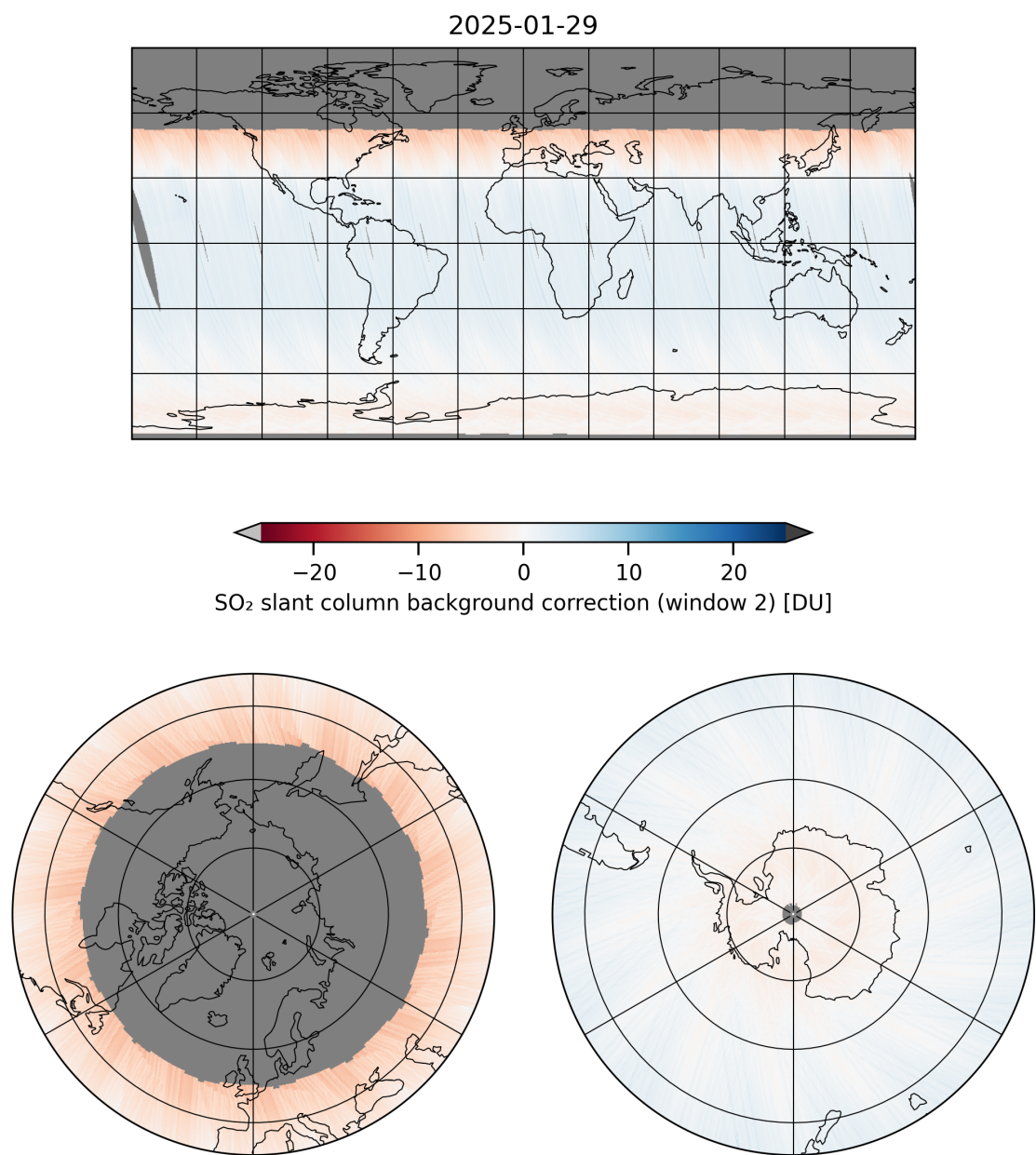


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-01-29 to 2025-01-30

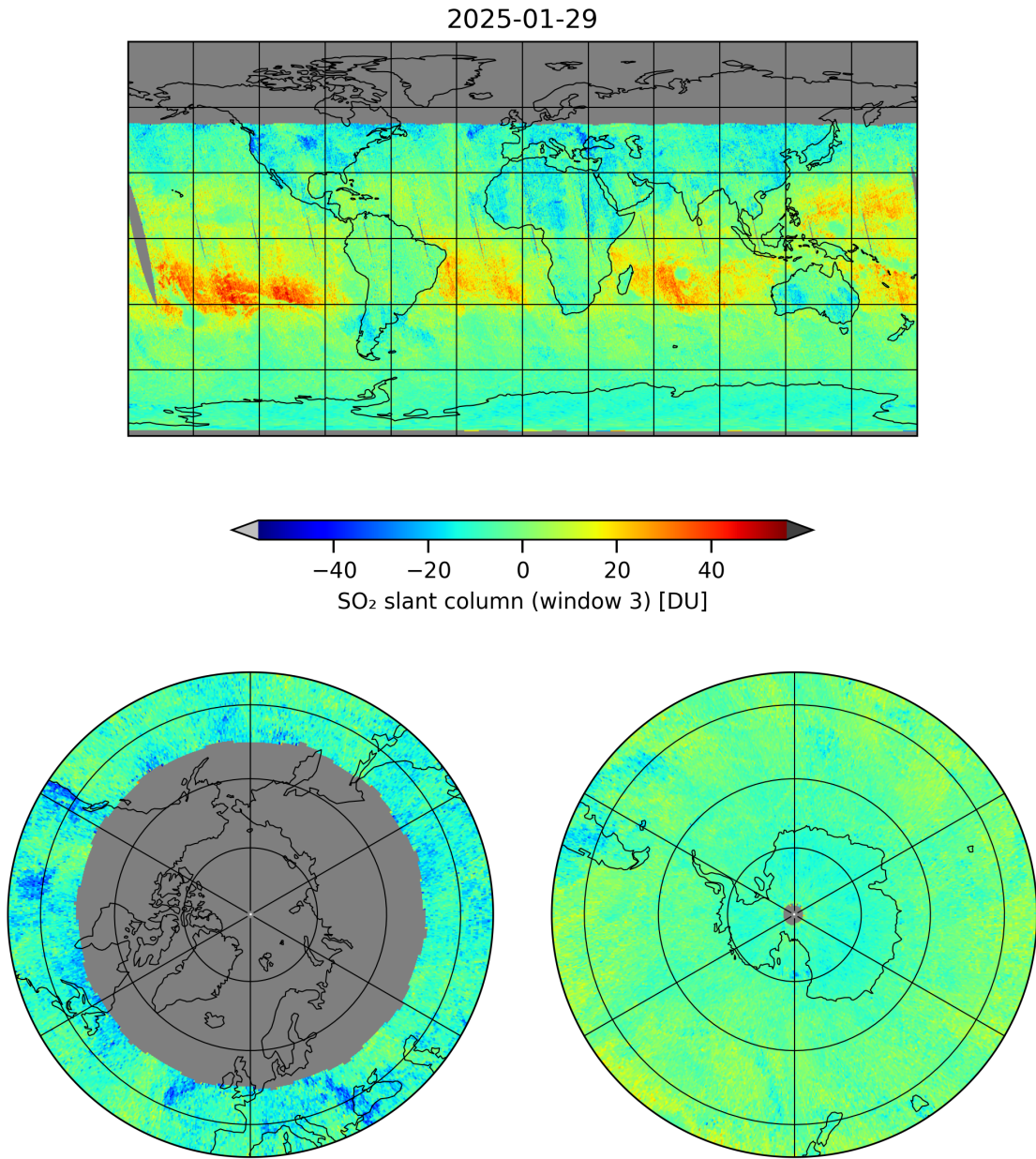


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-01-29 to 2025-01-30

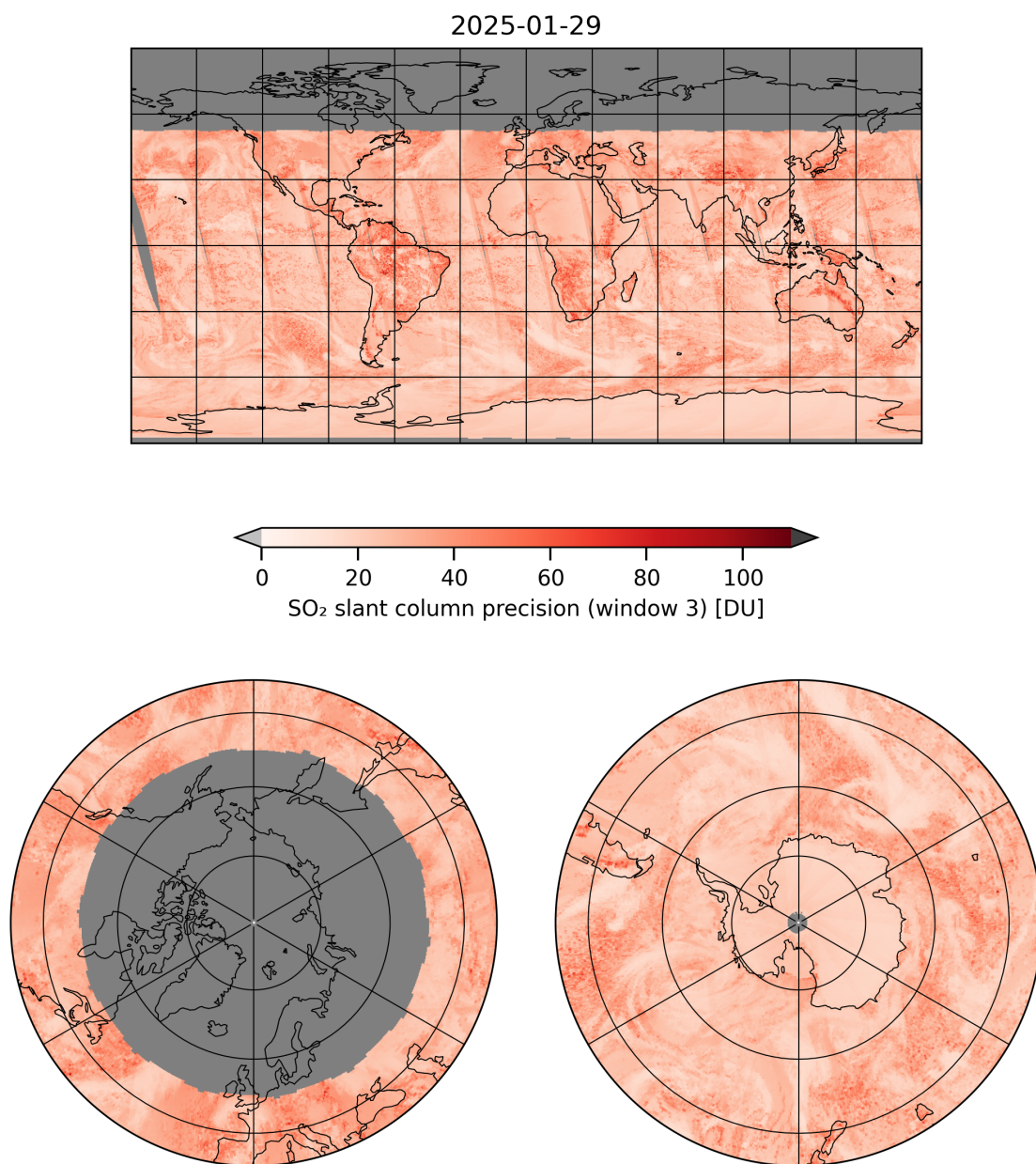


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-01-29 to 2025-01-30

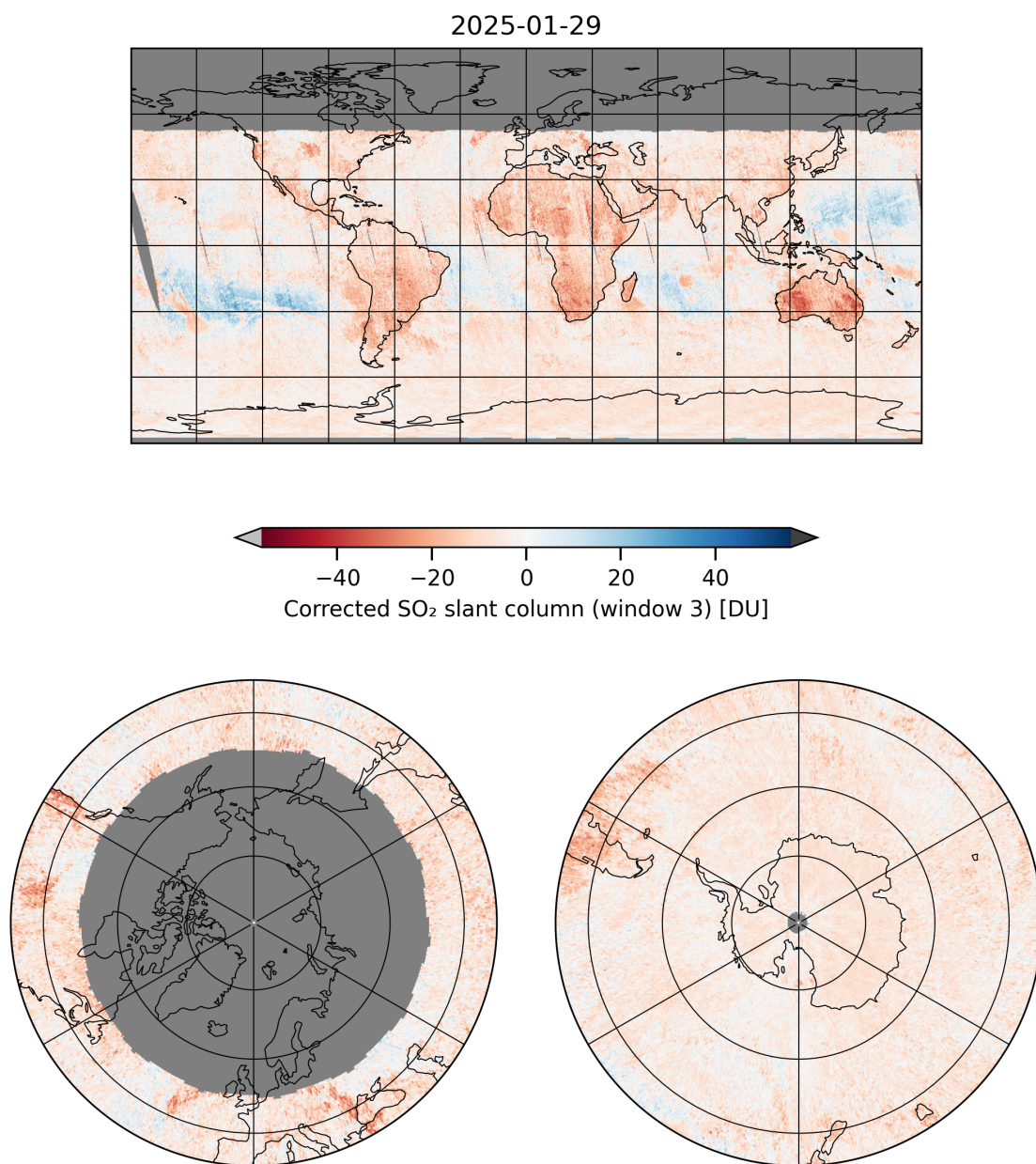


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-01-29 to 2025-01-30

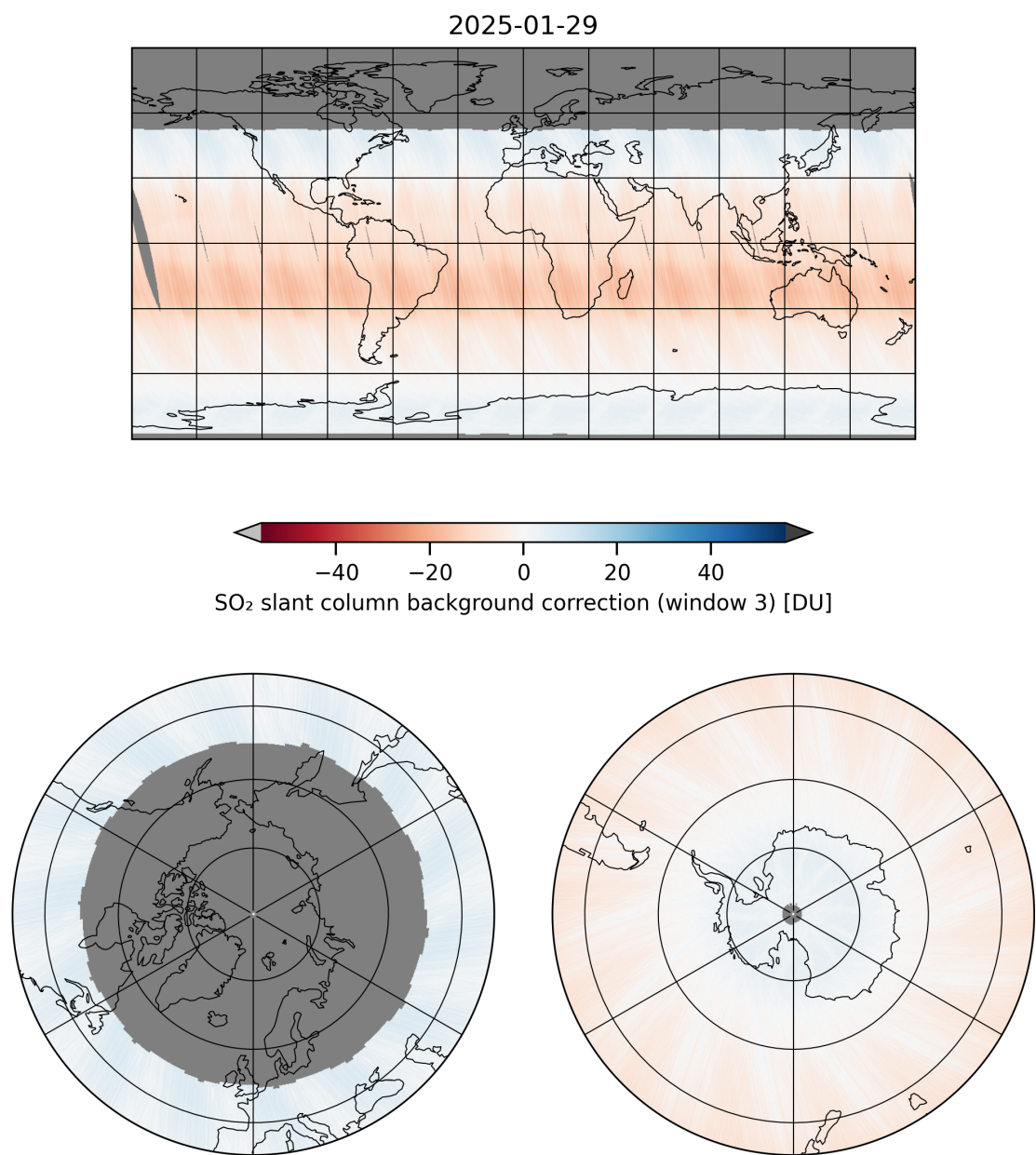


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-01-29 to 2025-01-30

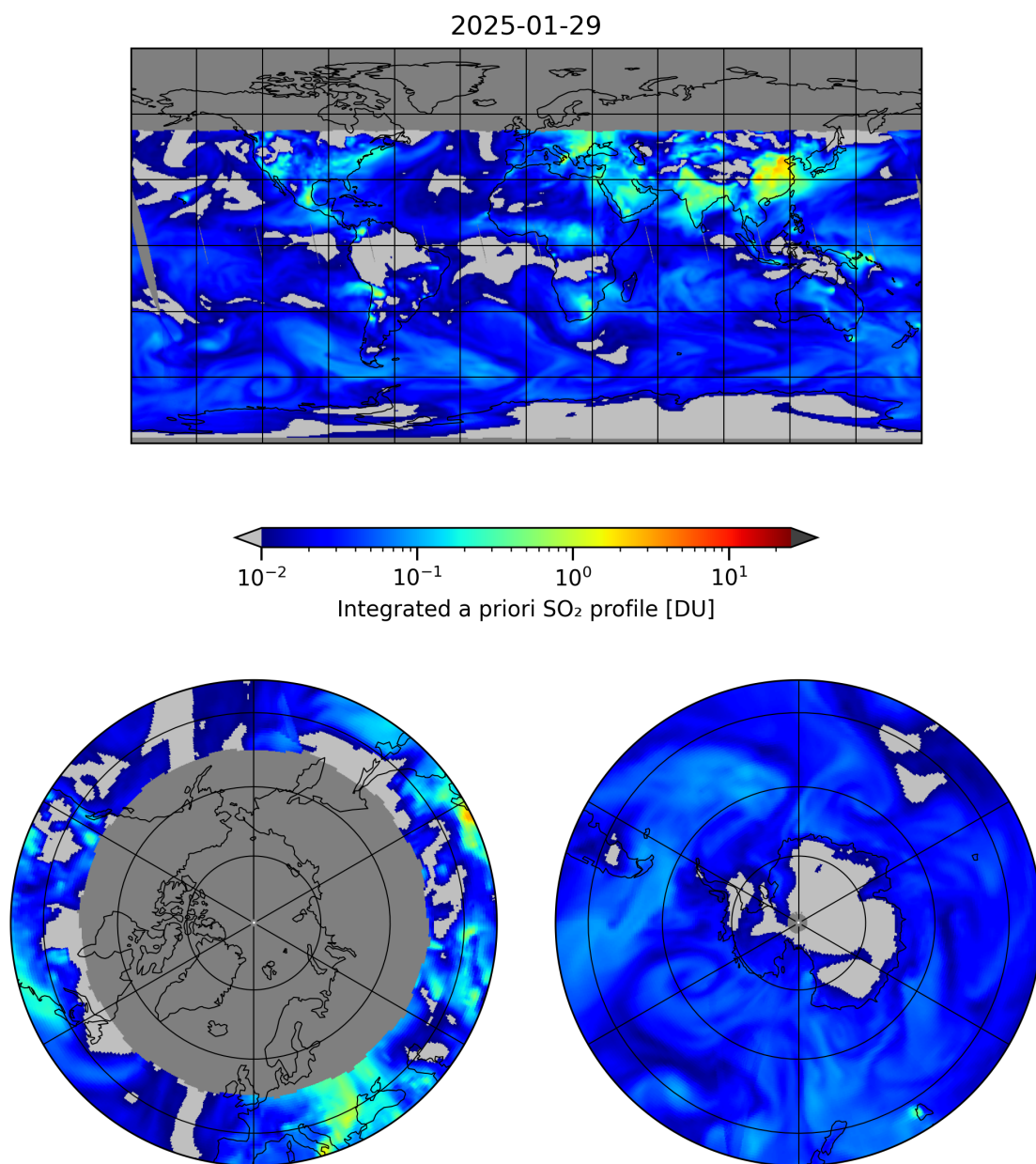


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-01-29 to 2025-01-30

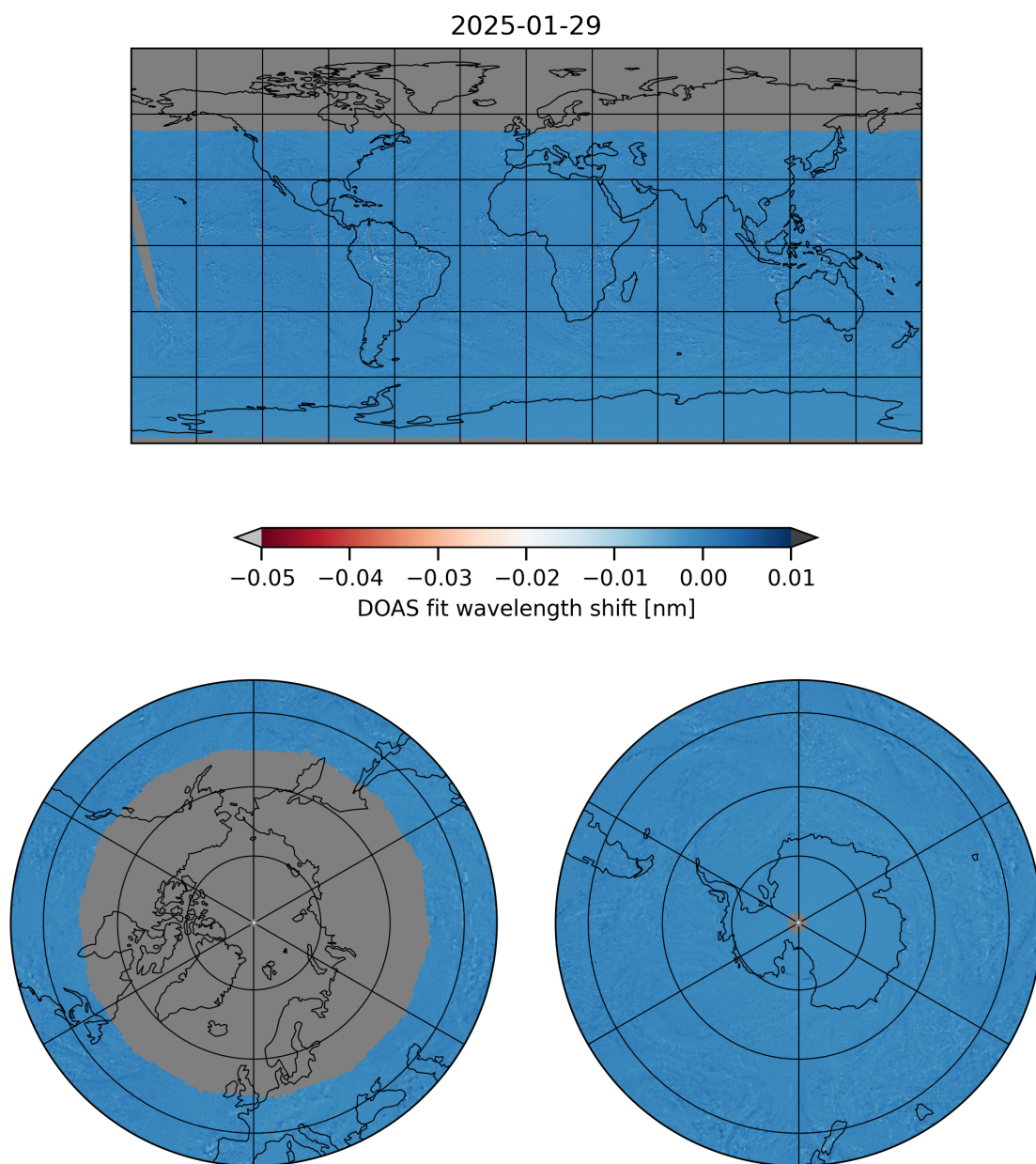


Figure 22: Map of “DOAS fit wavelength shift” for 2025-01-29 to 2025-01-30

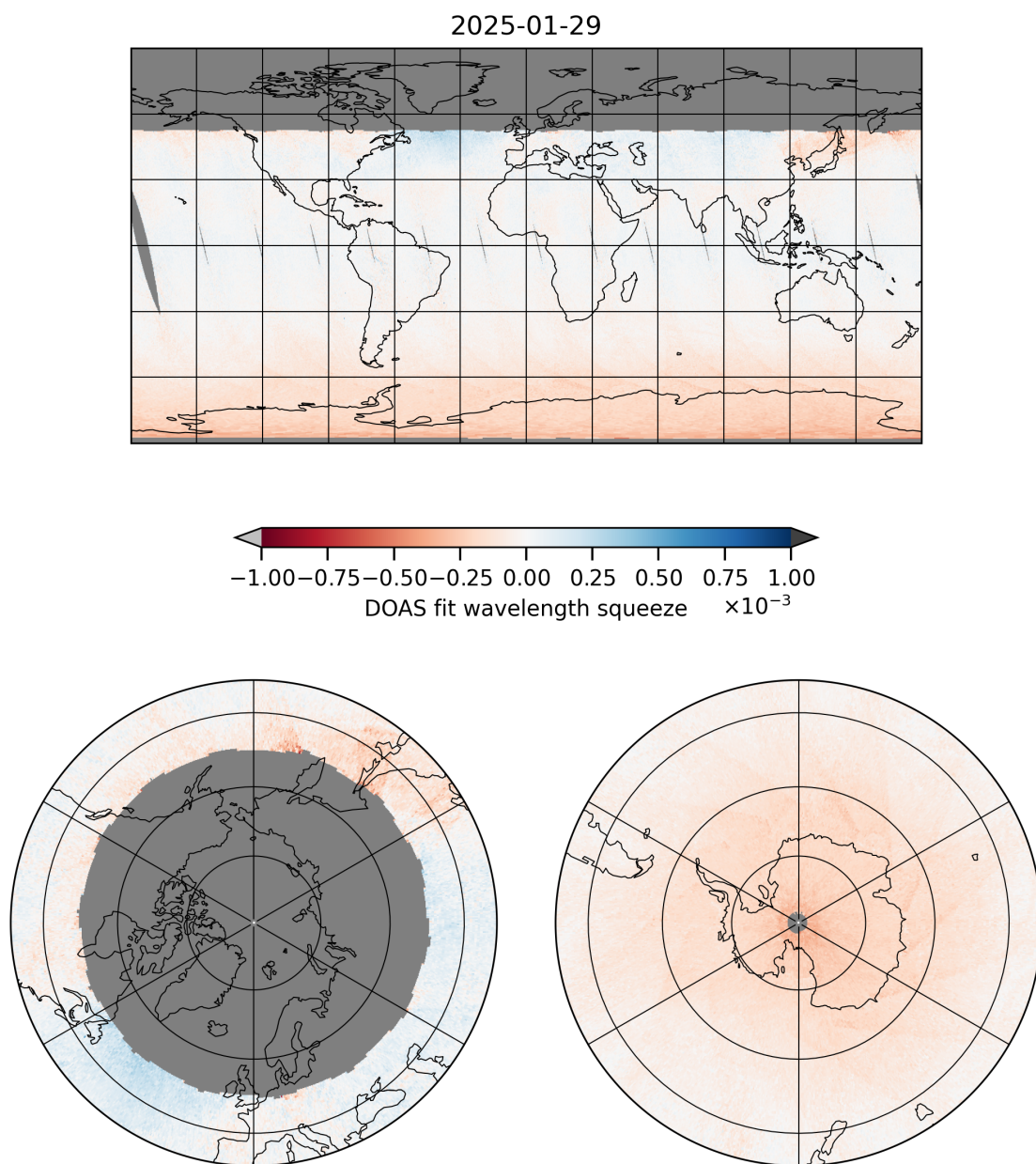


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-01-29 to 2025-01-30

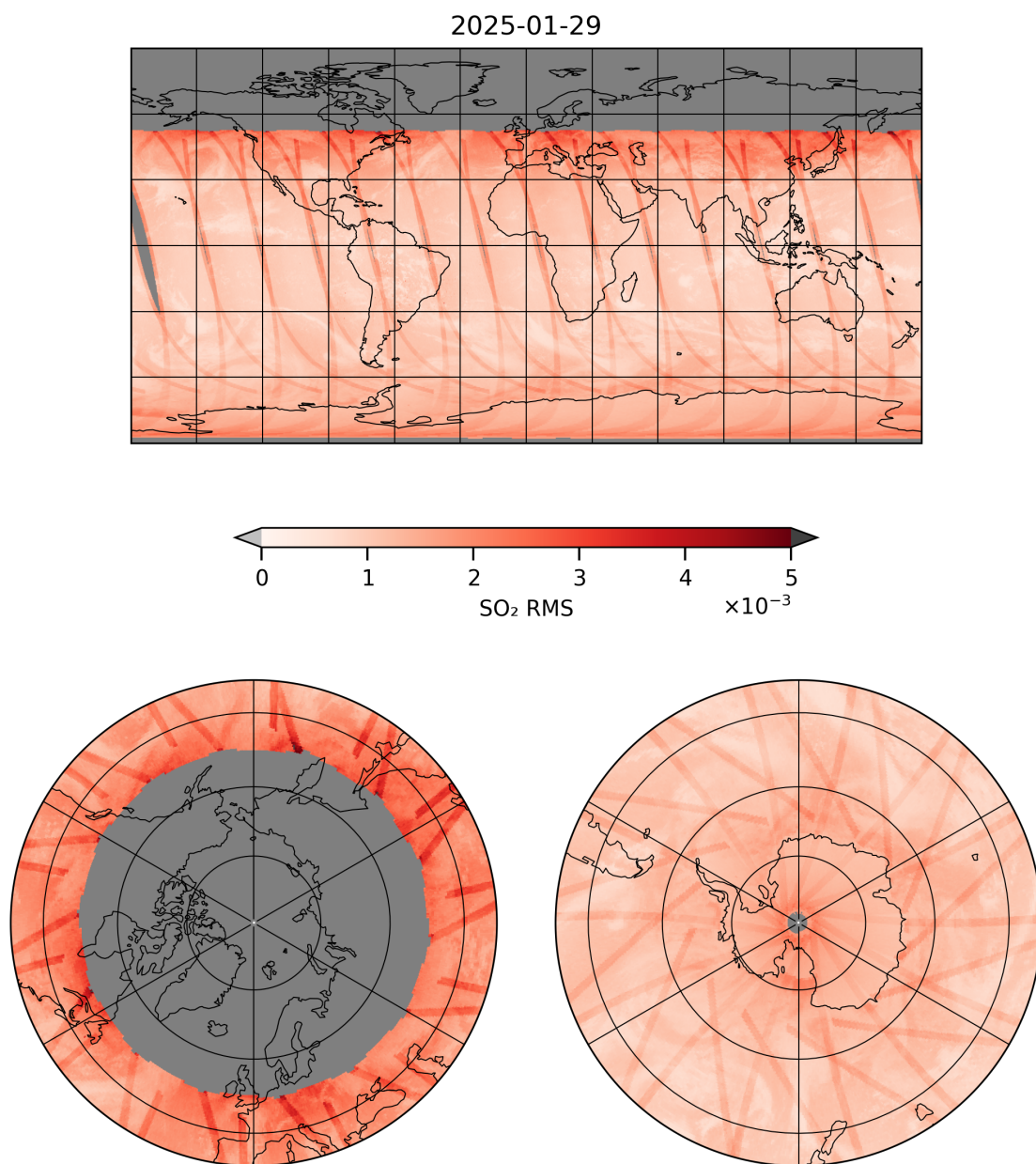


Figure 24: Map of “SO₂ RMS” for 2025-01-29 to 2025-01-30

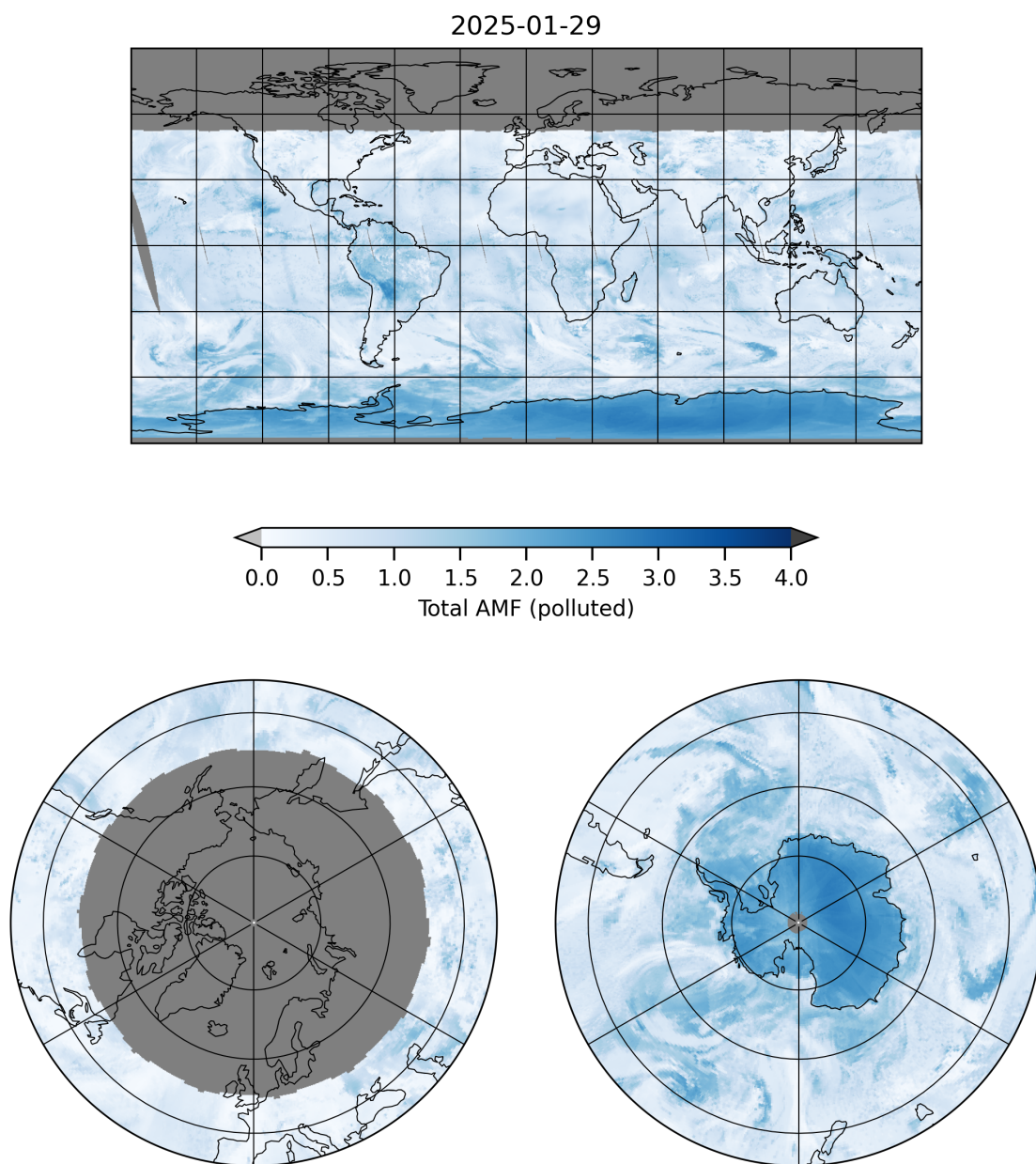


Figure 25: Map of “Total AMF (polluted)” for 2025-01-29 to 2025-01-30

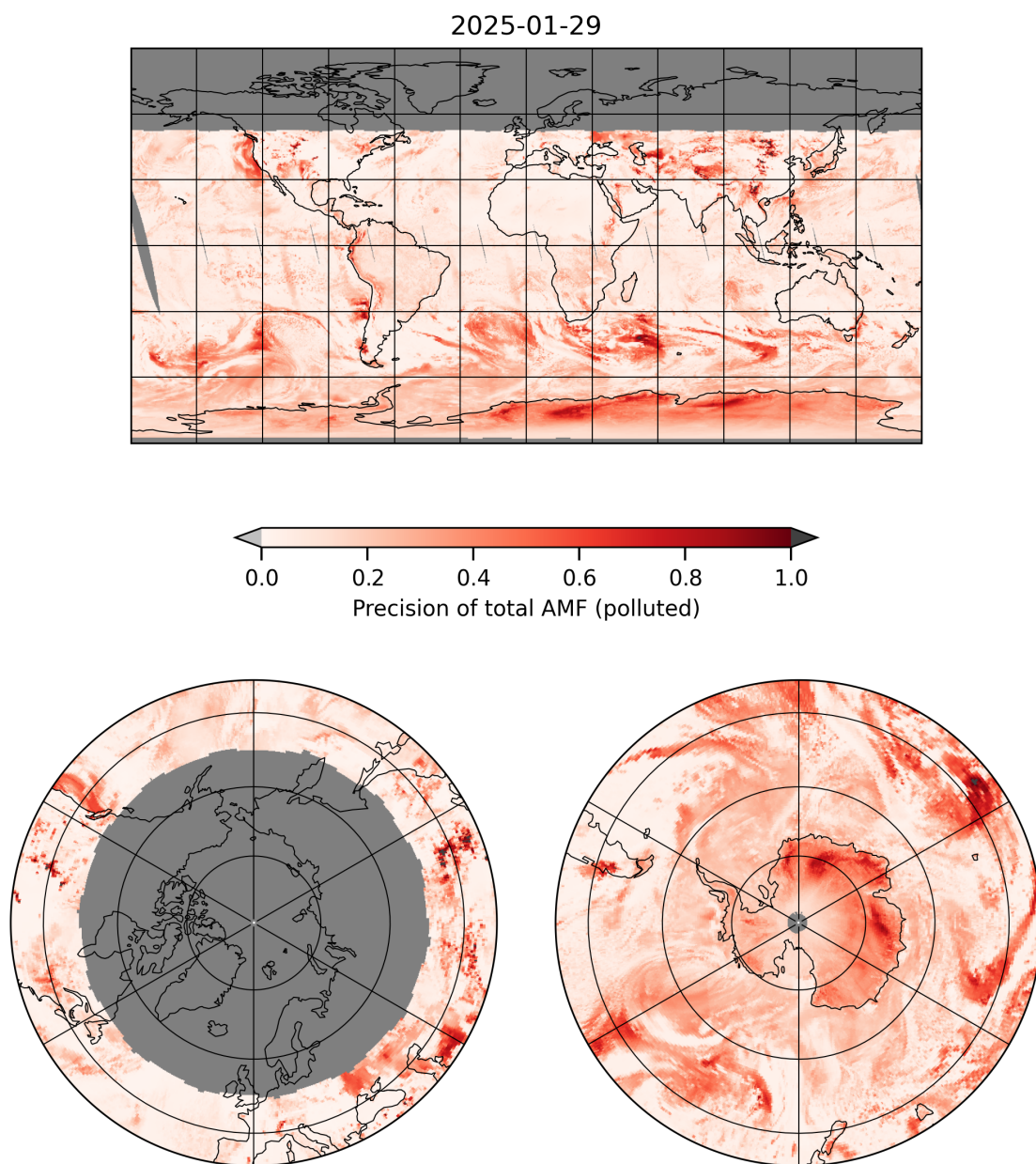


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-01-29 to 2025-01-30

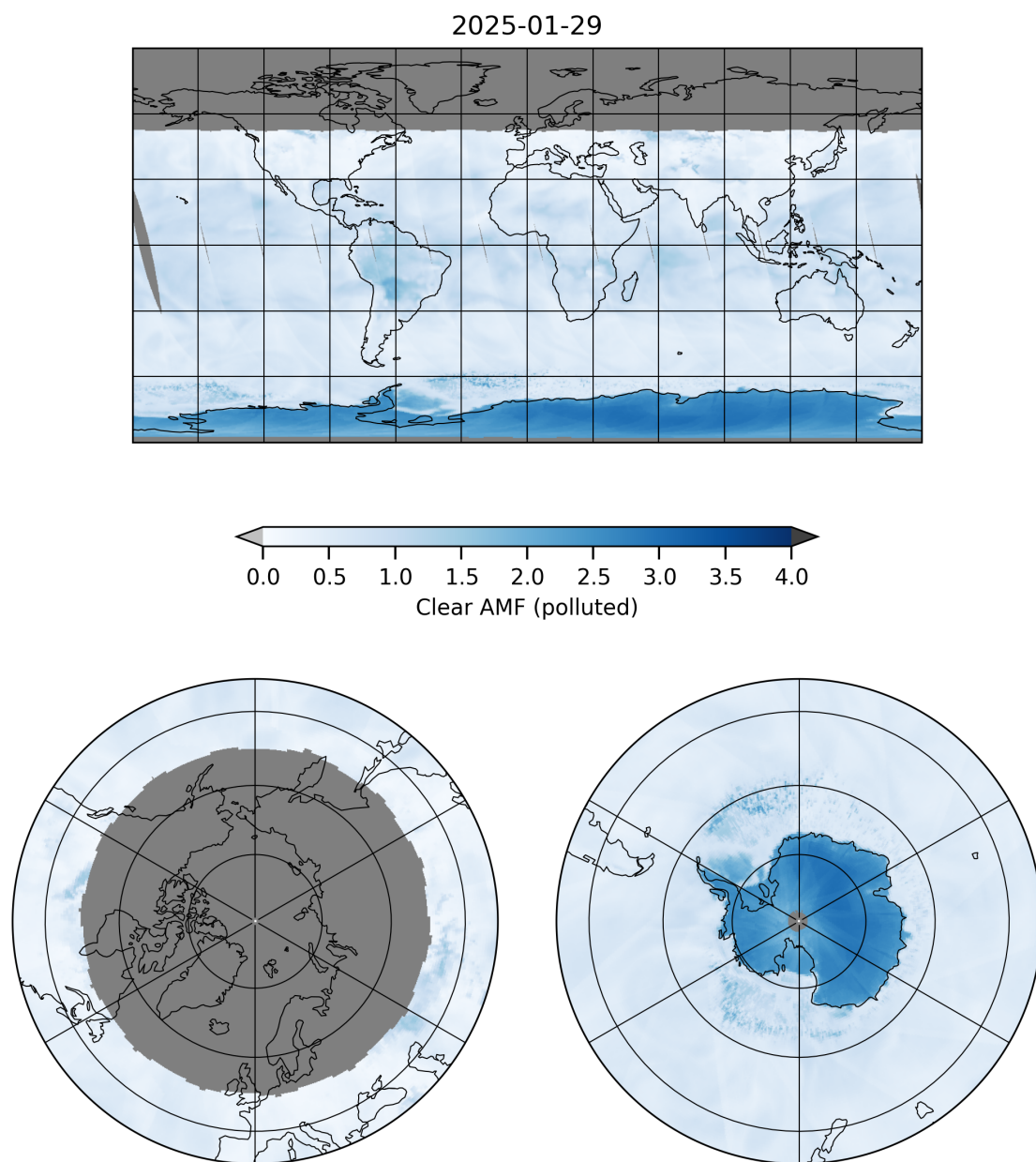


Figure 27: Map of “Clear AMF (polluted)” for 2025-01-29 to 2025-01-30

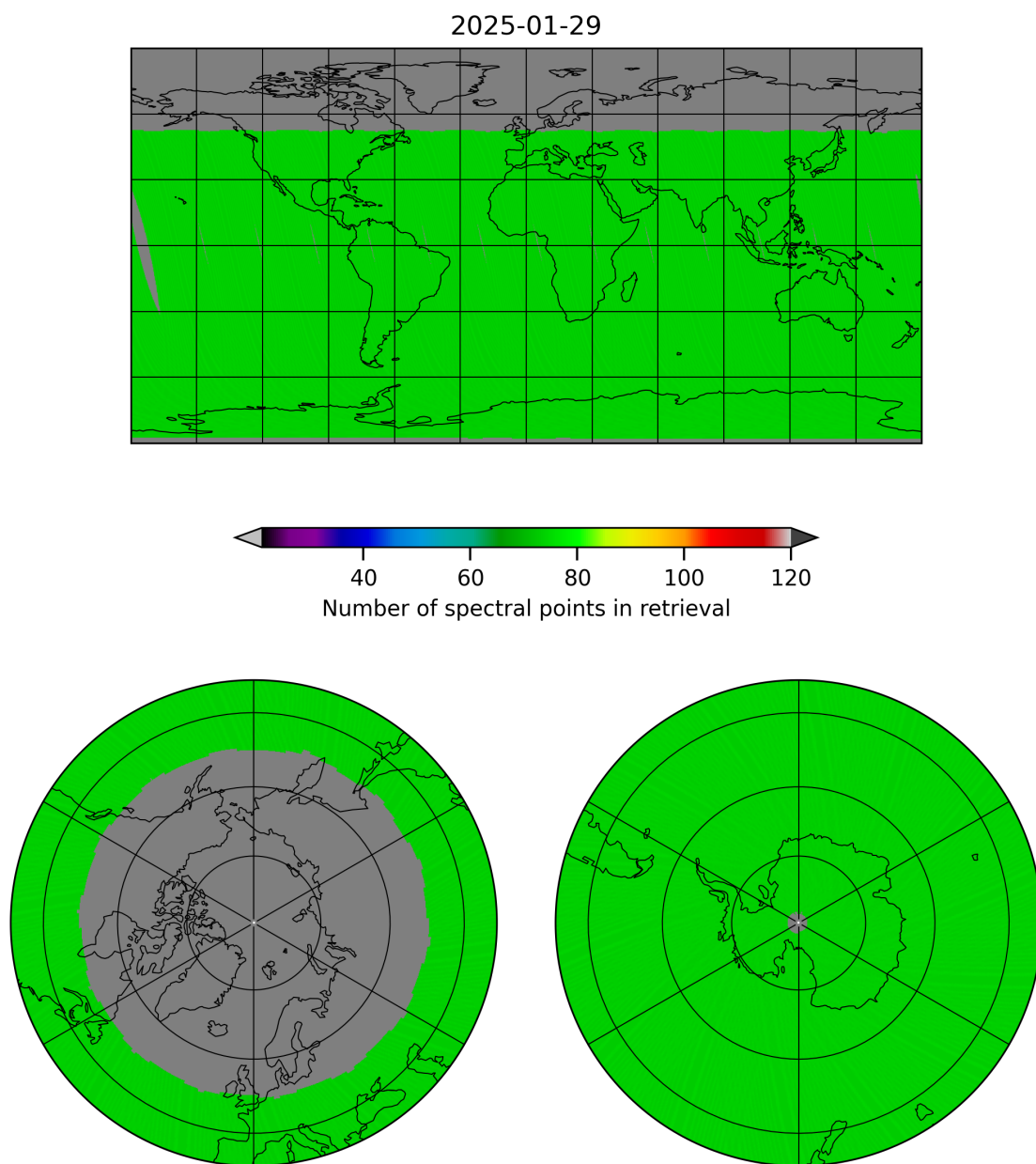


Figure 28: Map of “Number of spectral points in retrieval” for 2025-01-29 to 2025-01-30

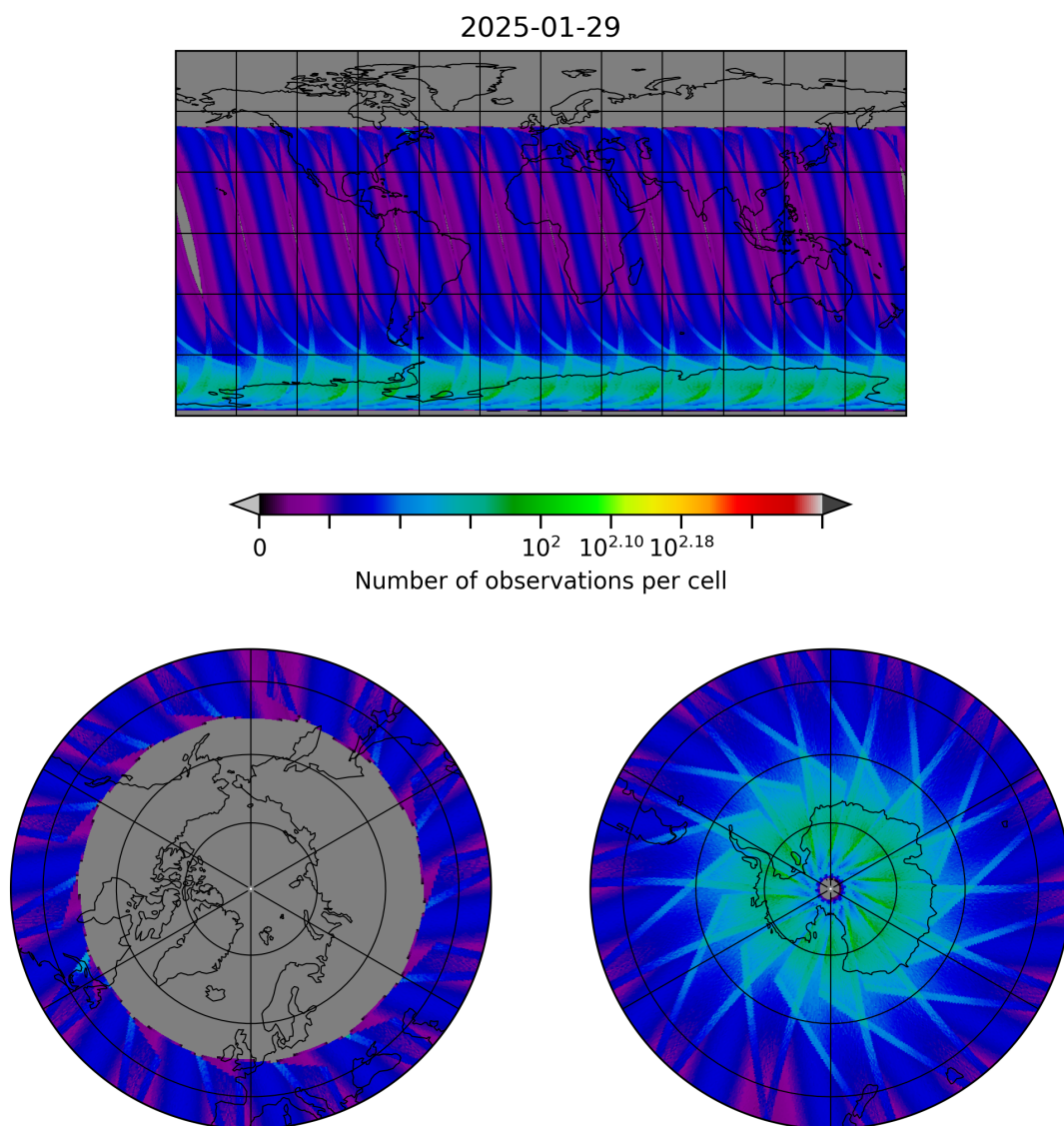


Figure 29: Map of the number of observations for 2025-01-29 to 2025-01-30

7 Zonal average

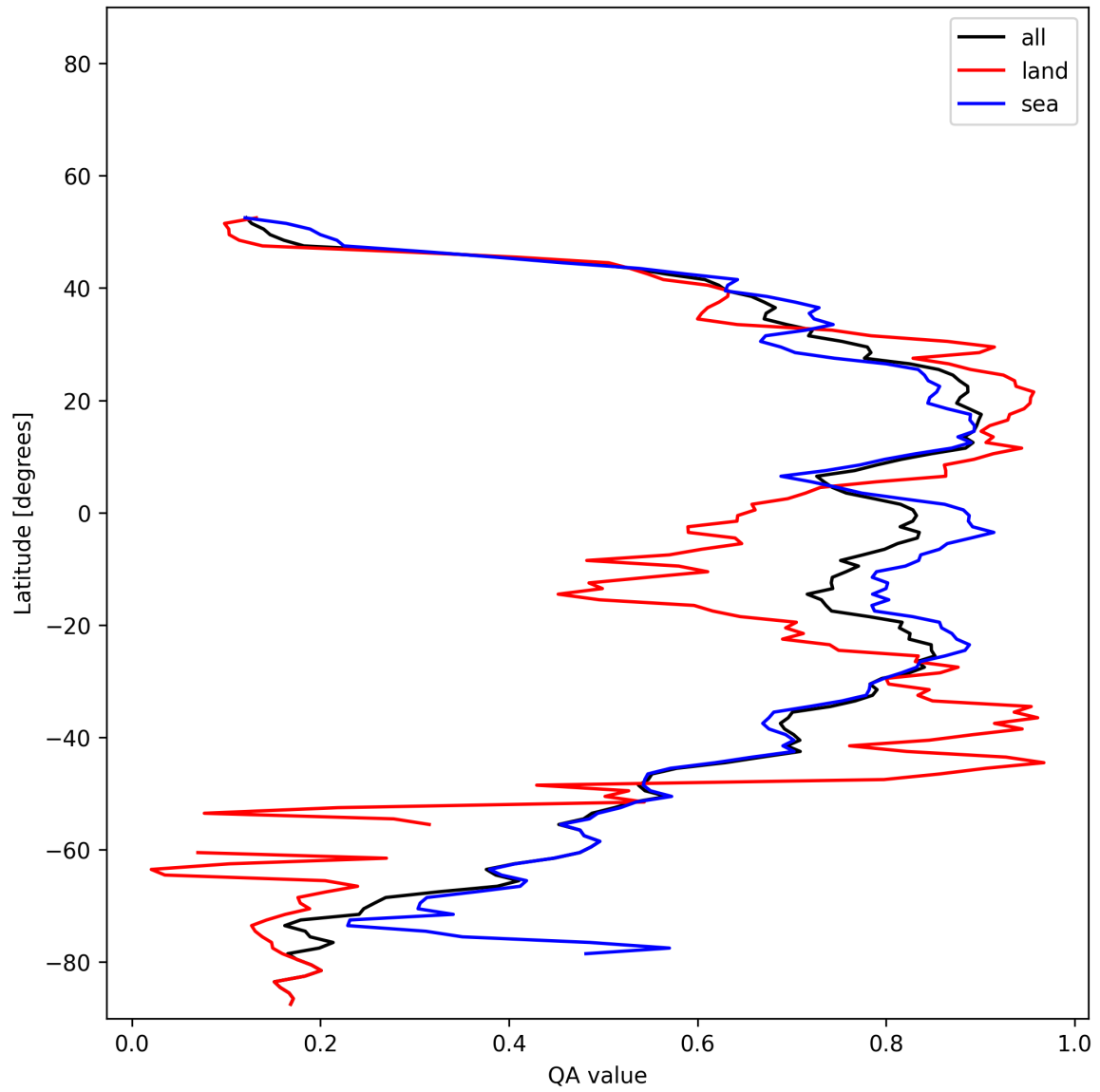


Figure 30: Zonal average of “QA value” for 2025-01-29 to 2025-01-30.

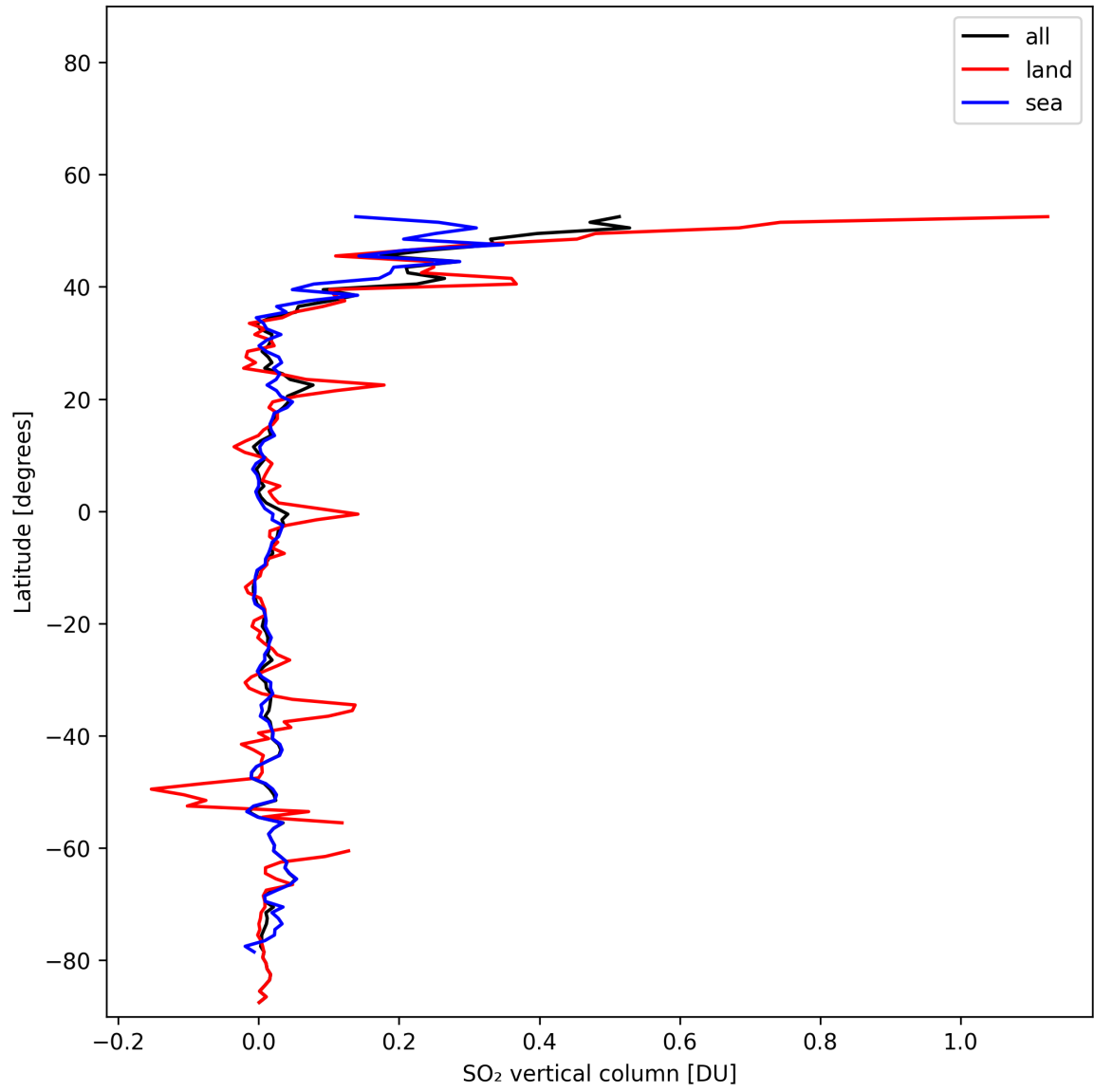


Figure 31: Zonal average of “SO₂ vertical column” for 2025-01-29 to 2025-01-30.

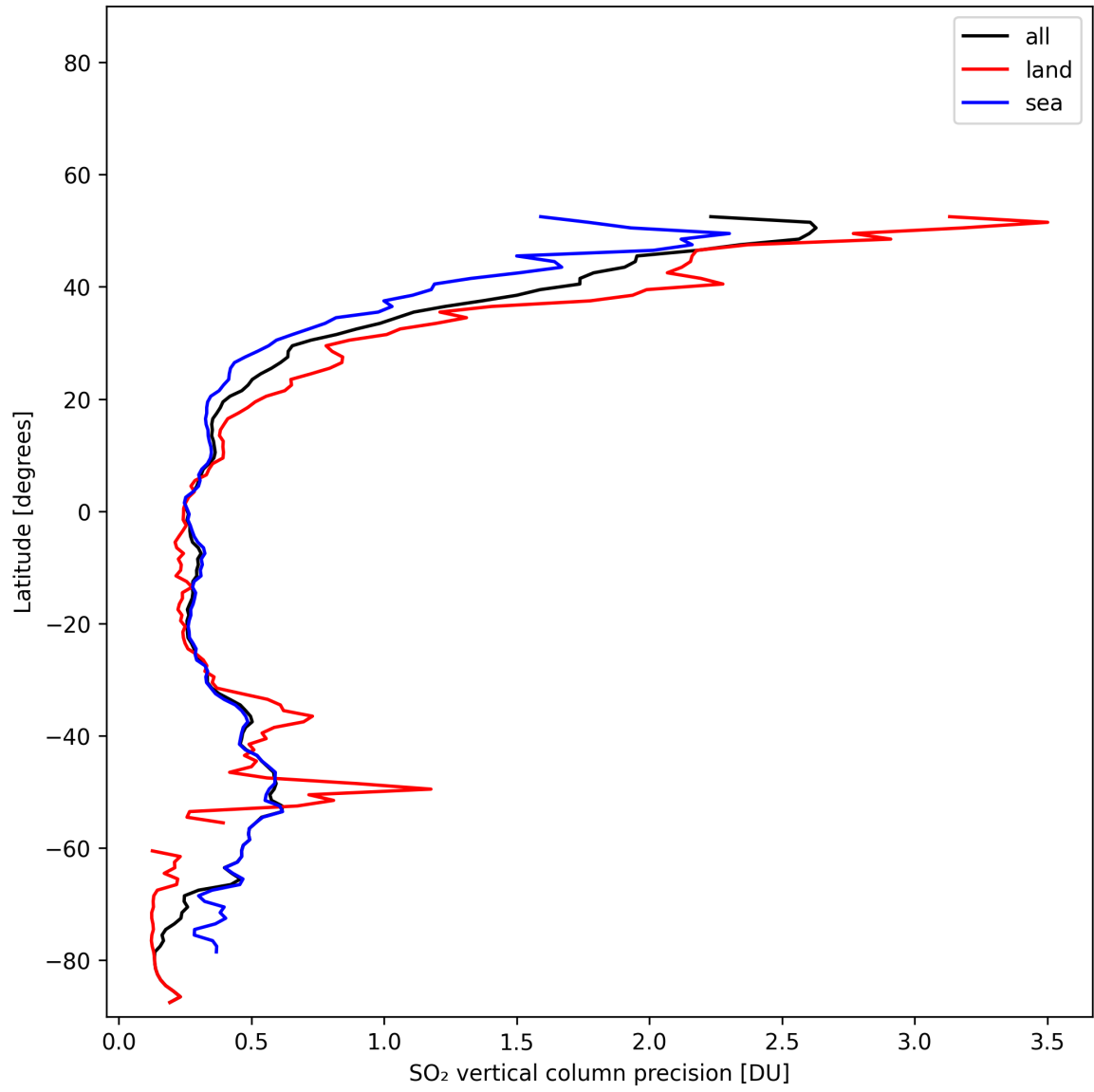


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-01-29 to 2025-01-30.

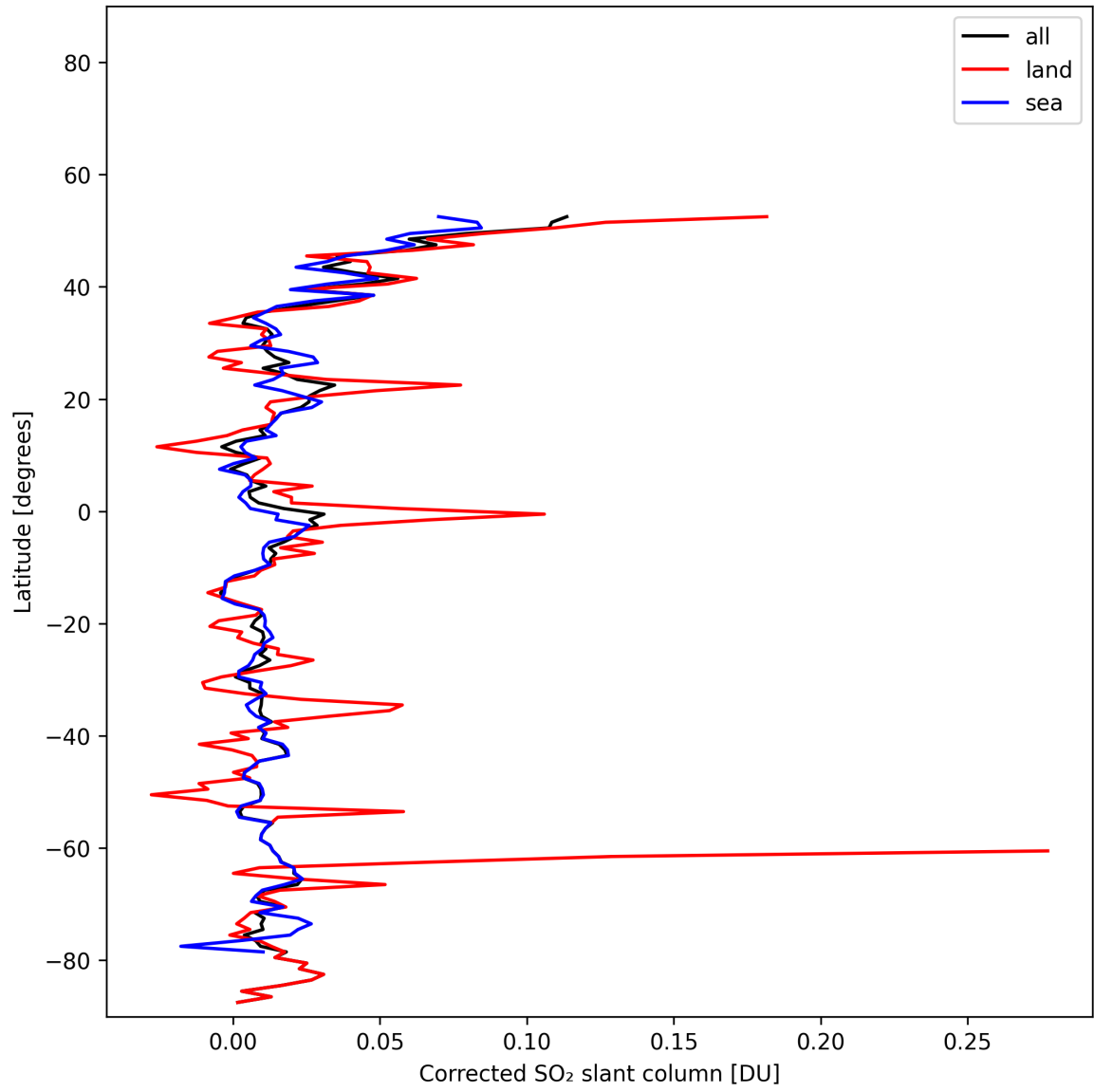


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-01-29 to 2025-01-30.

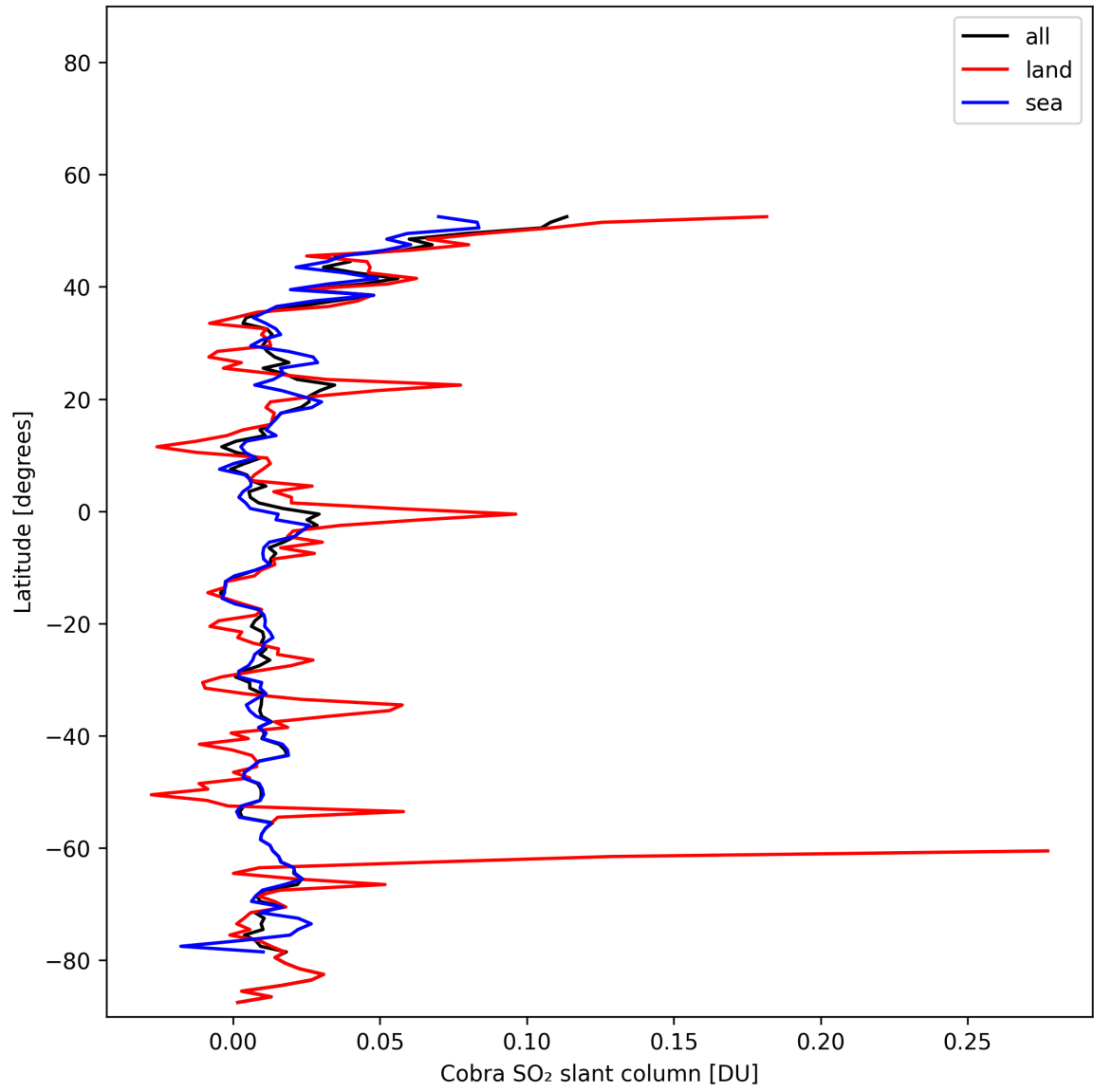


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-01-29 to 2025-01-30.

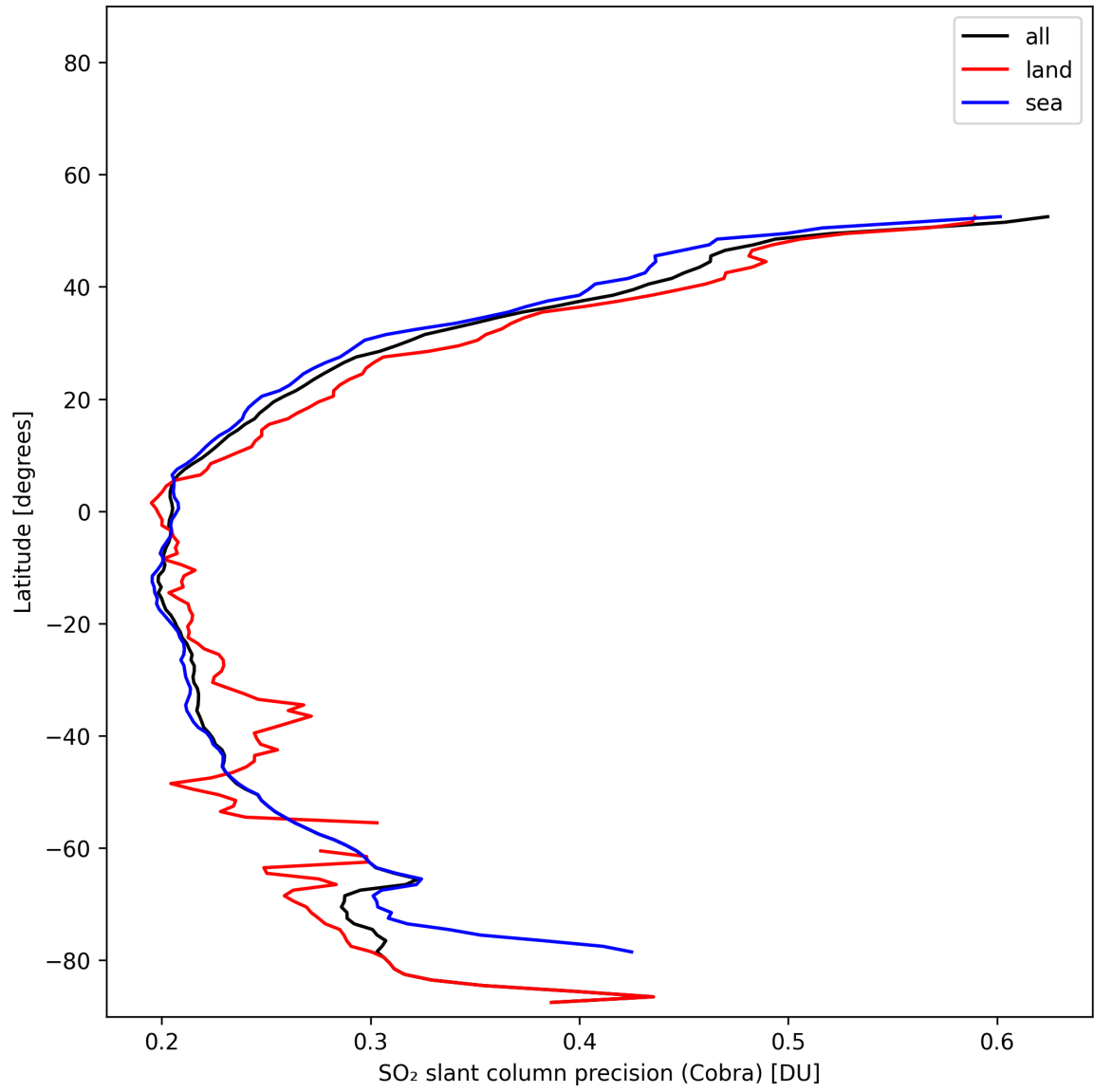


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-01-29 to 2025-01-30.

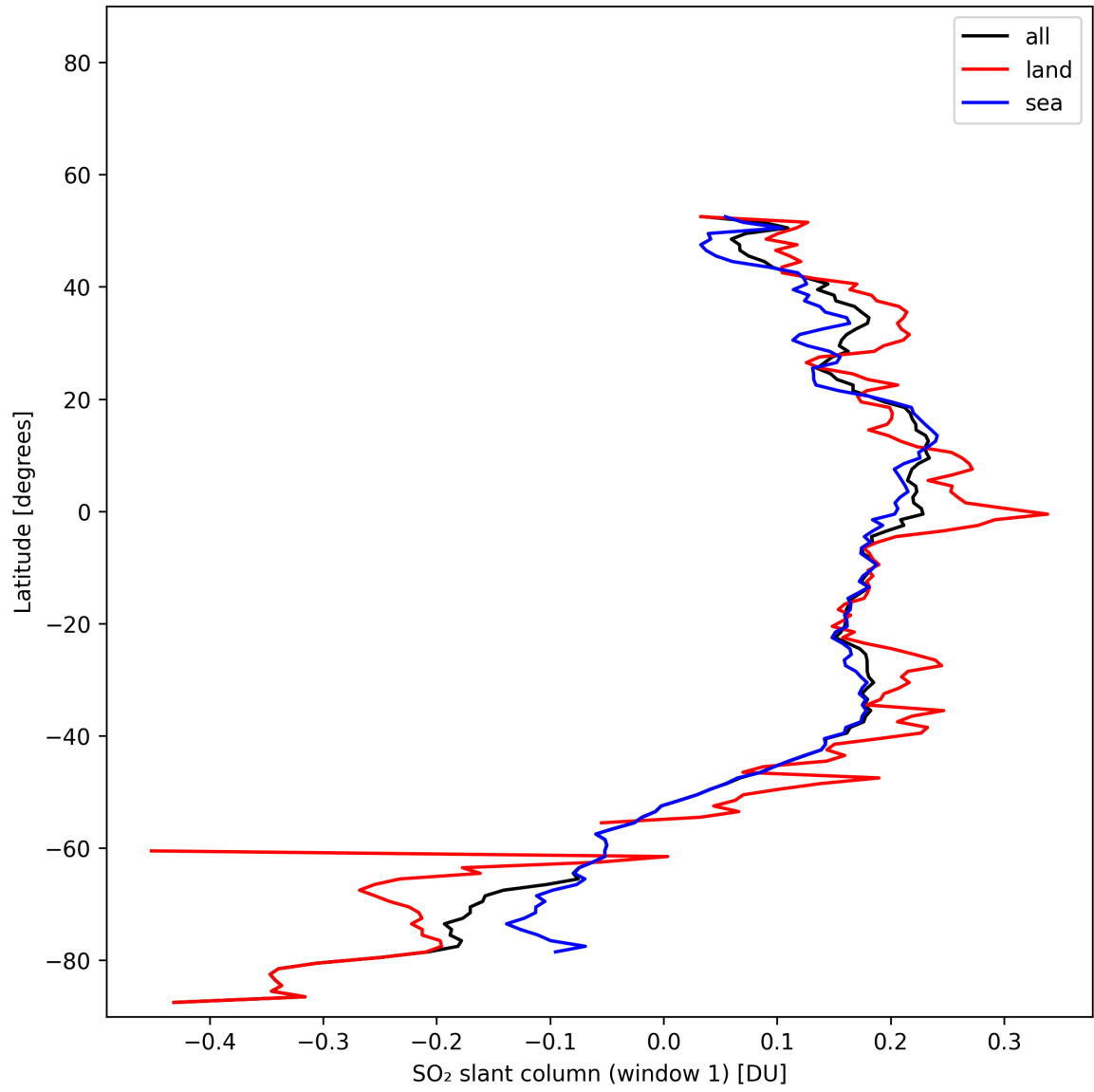


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-01-29 to 2025-01-30.

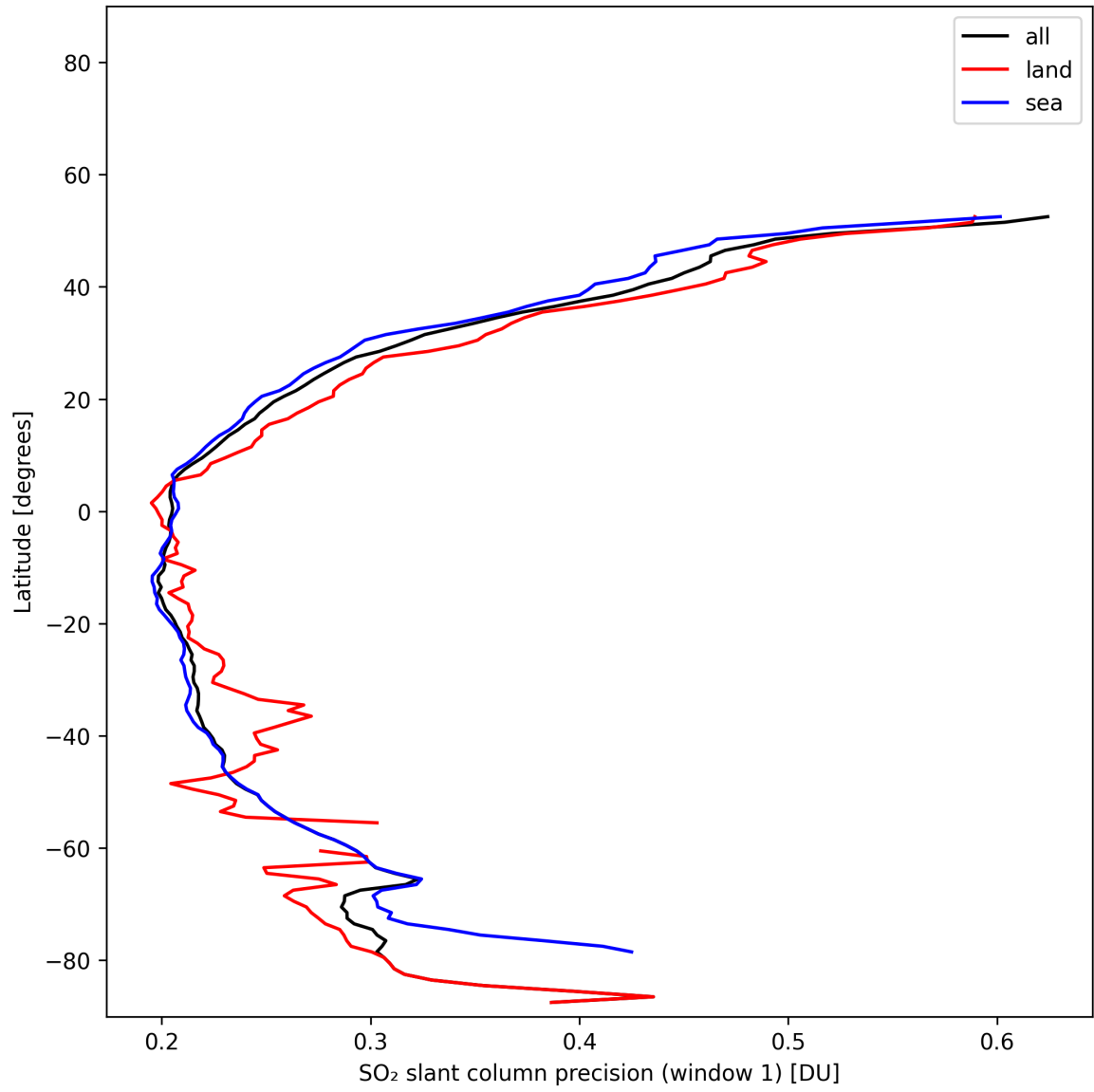


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-01-29 to 2025-01-30.

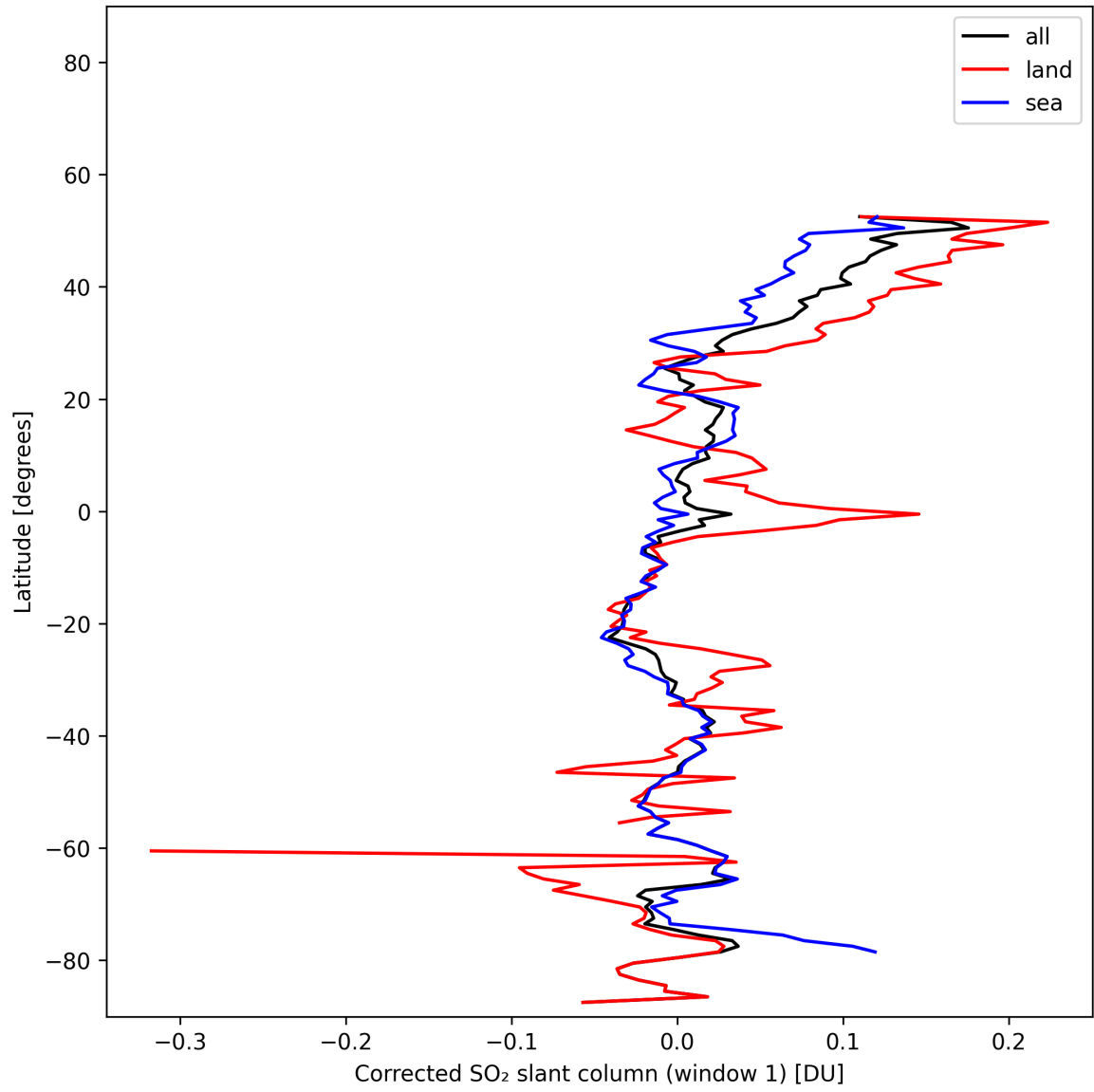


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-01-29 to 2025-01-30.

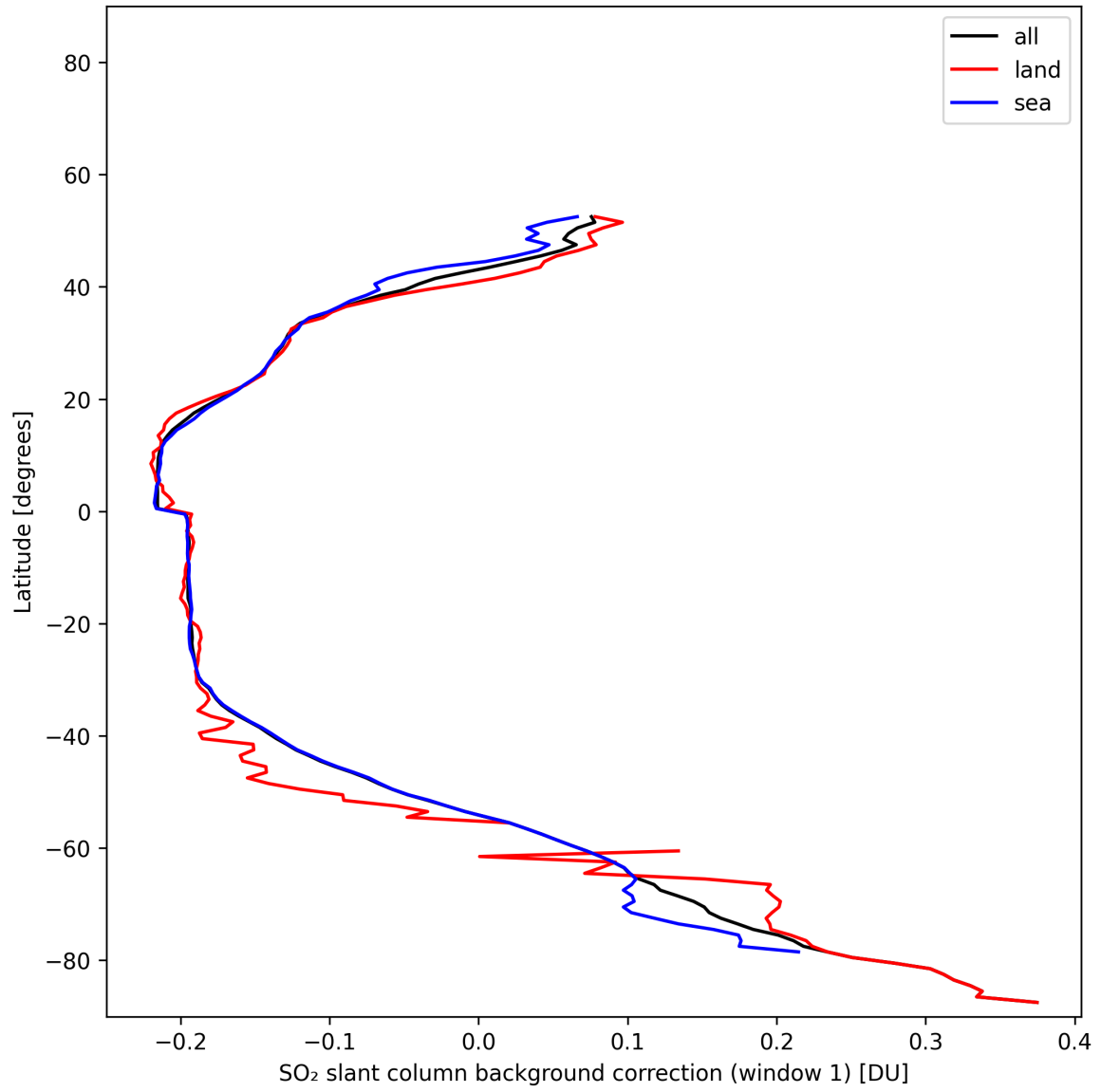


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-01-29 to 2025-01-30.

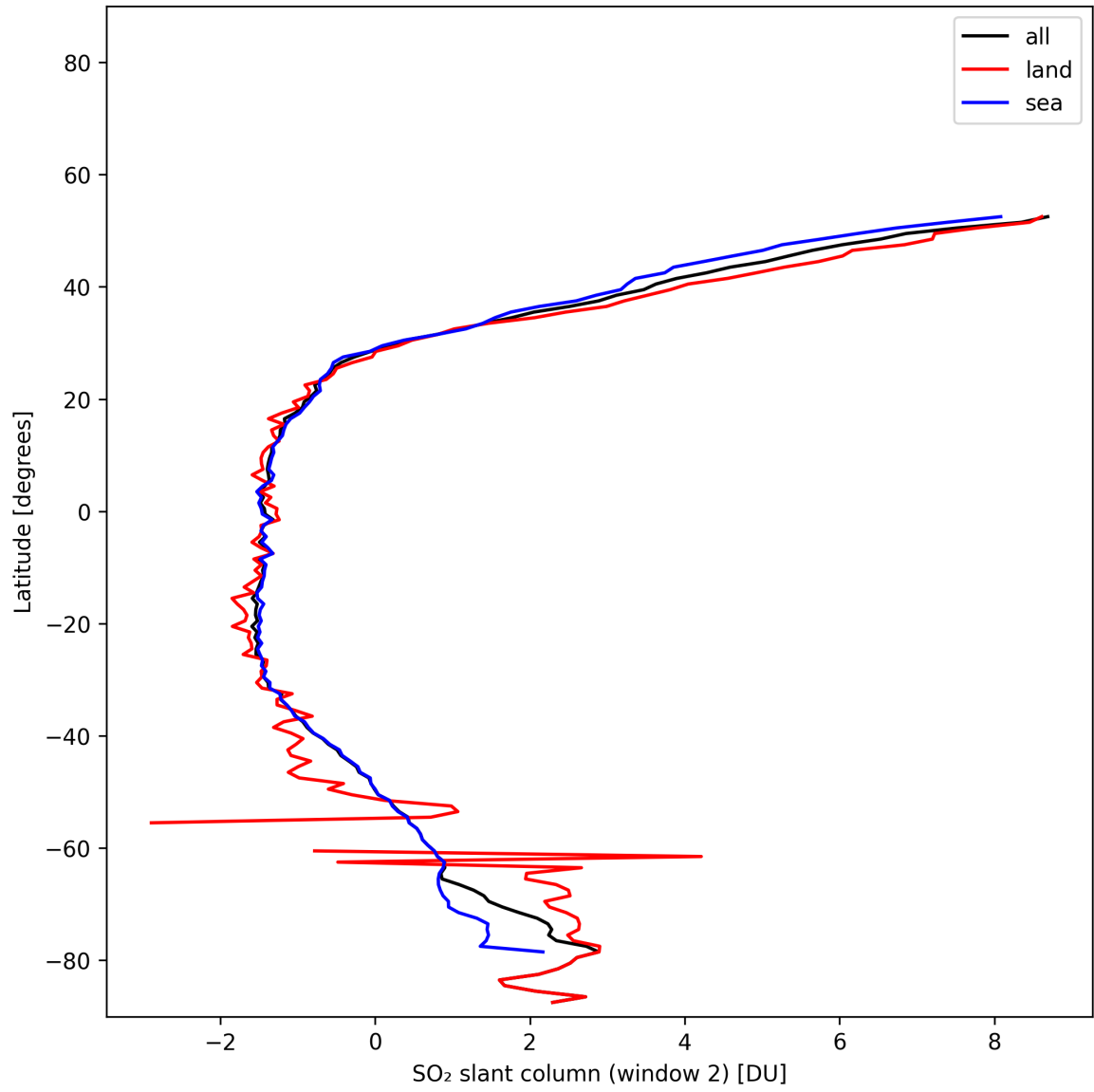


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-01-29 to 2025-01-30.

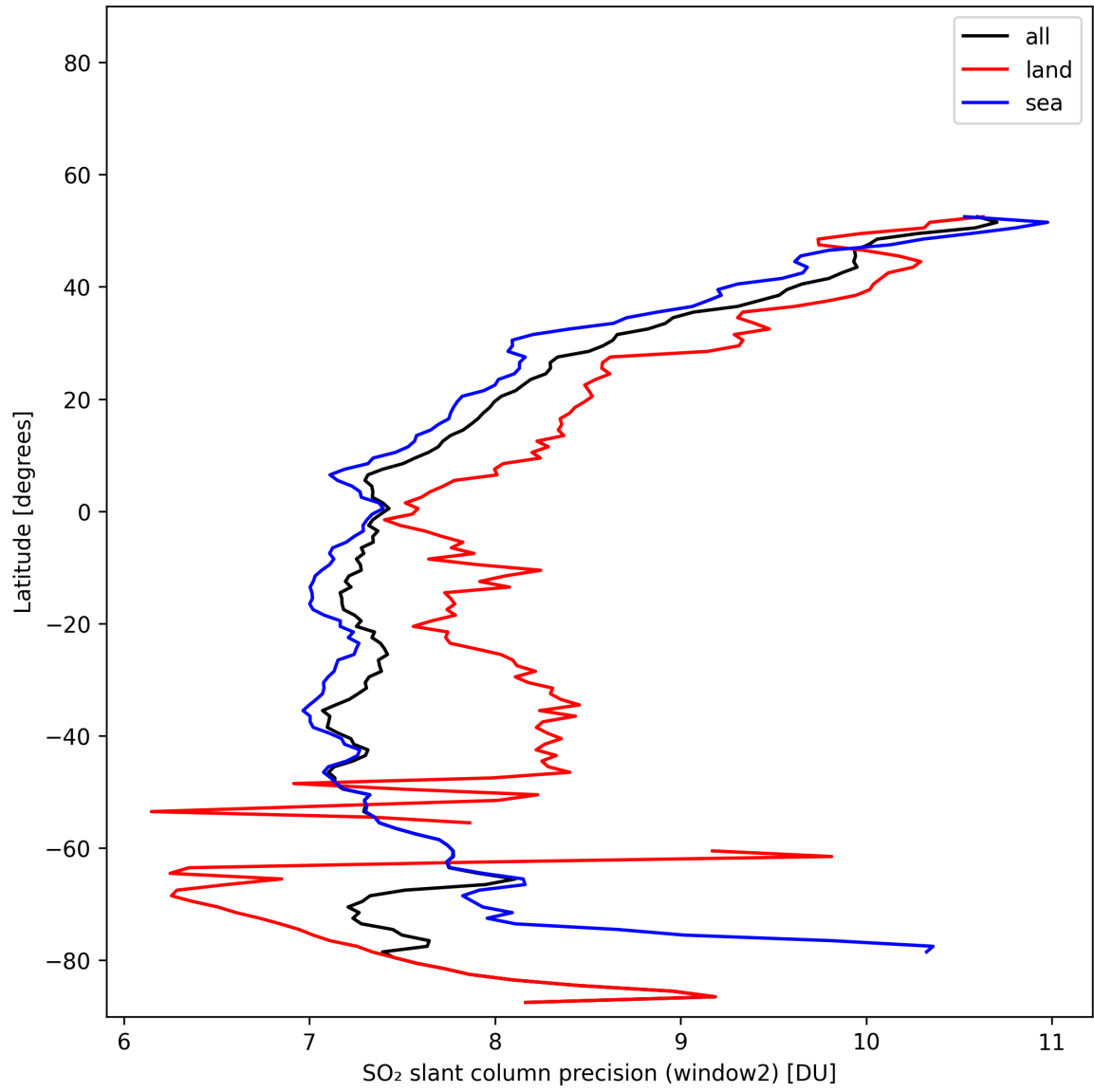


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-01-29 to 2025-01-30.

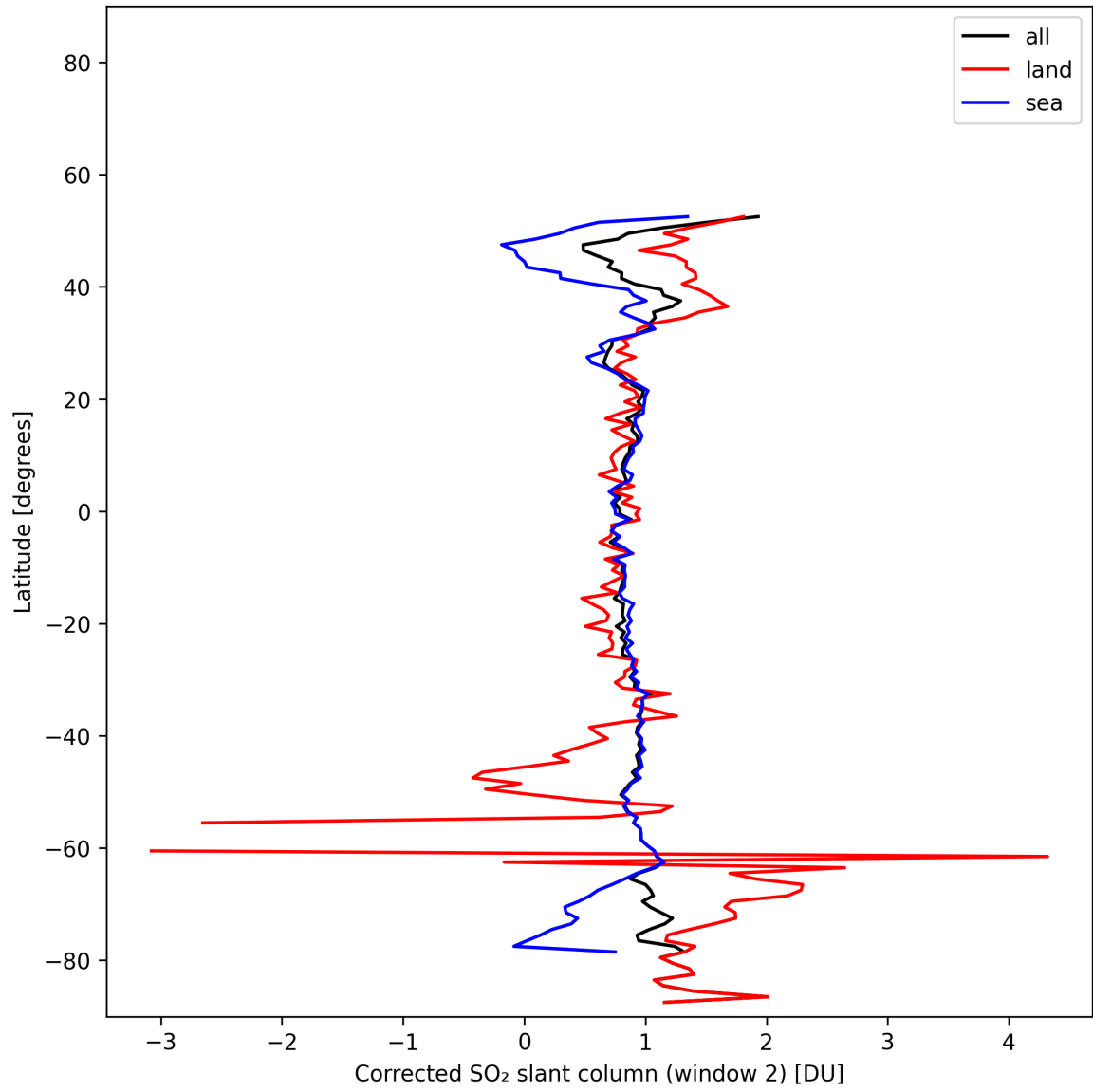


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-01-29 to 2025-01-30.

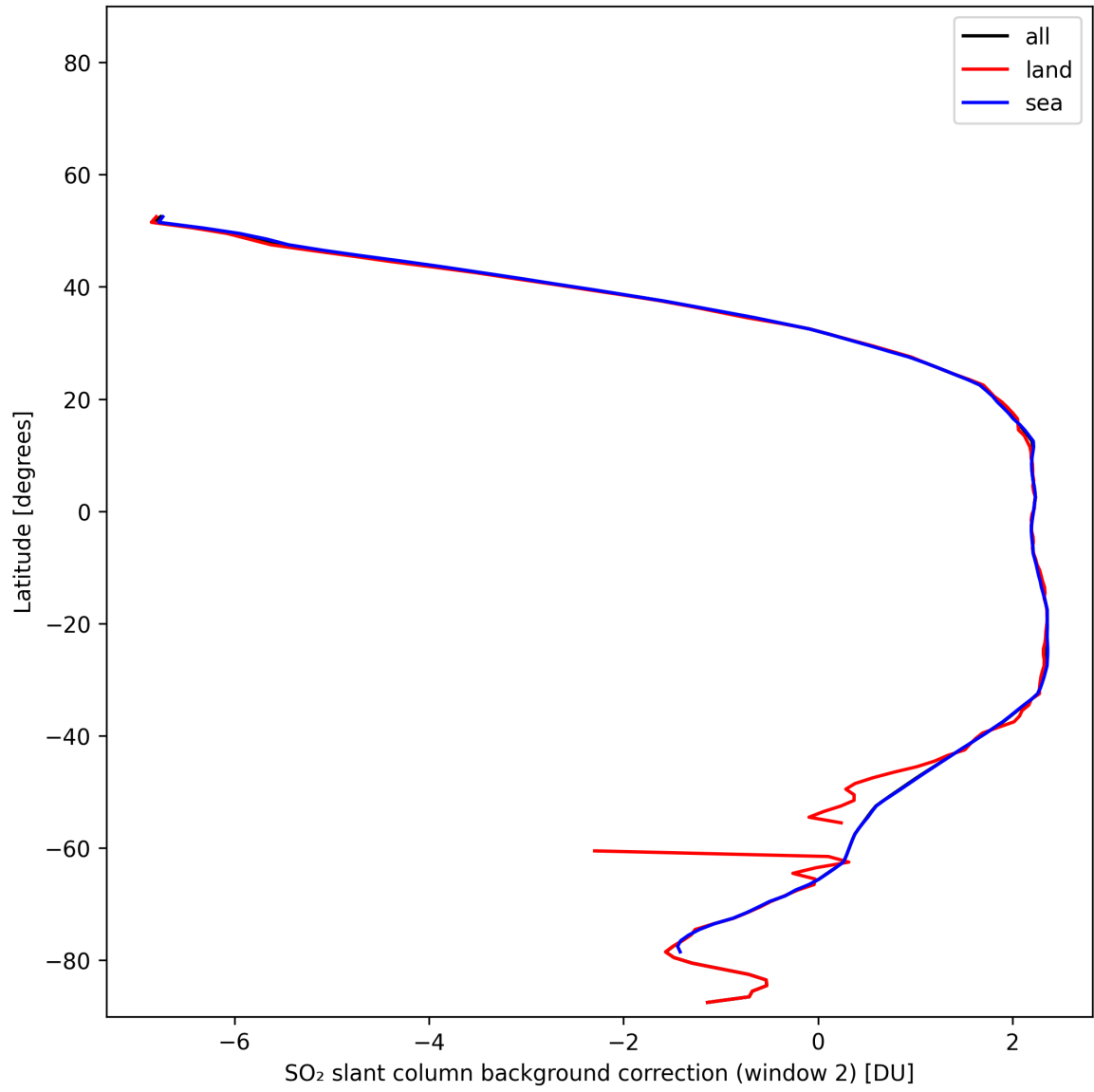


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-01-29 to 2025-01-30.

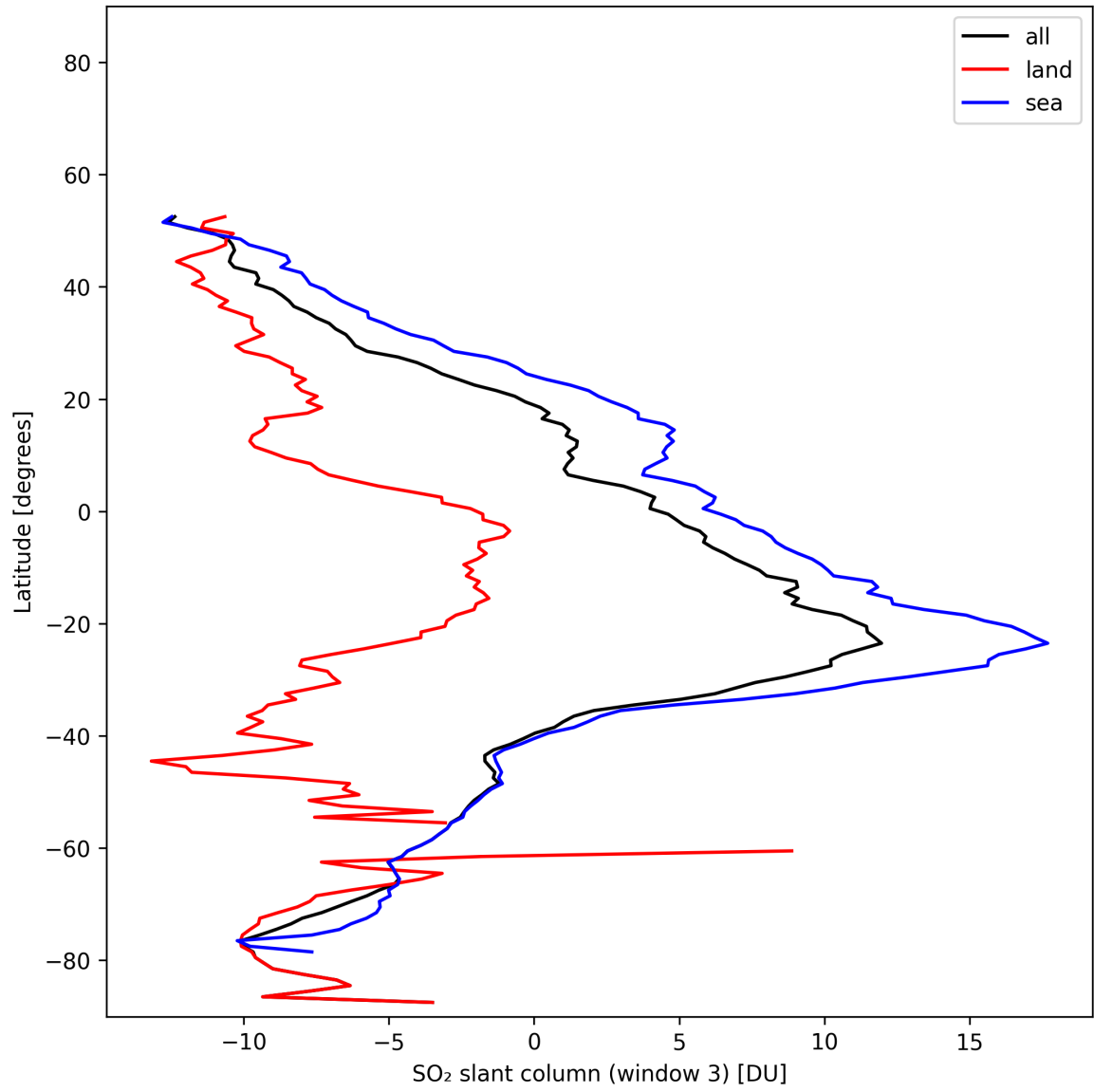


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-01-29 to 2025-01-30.

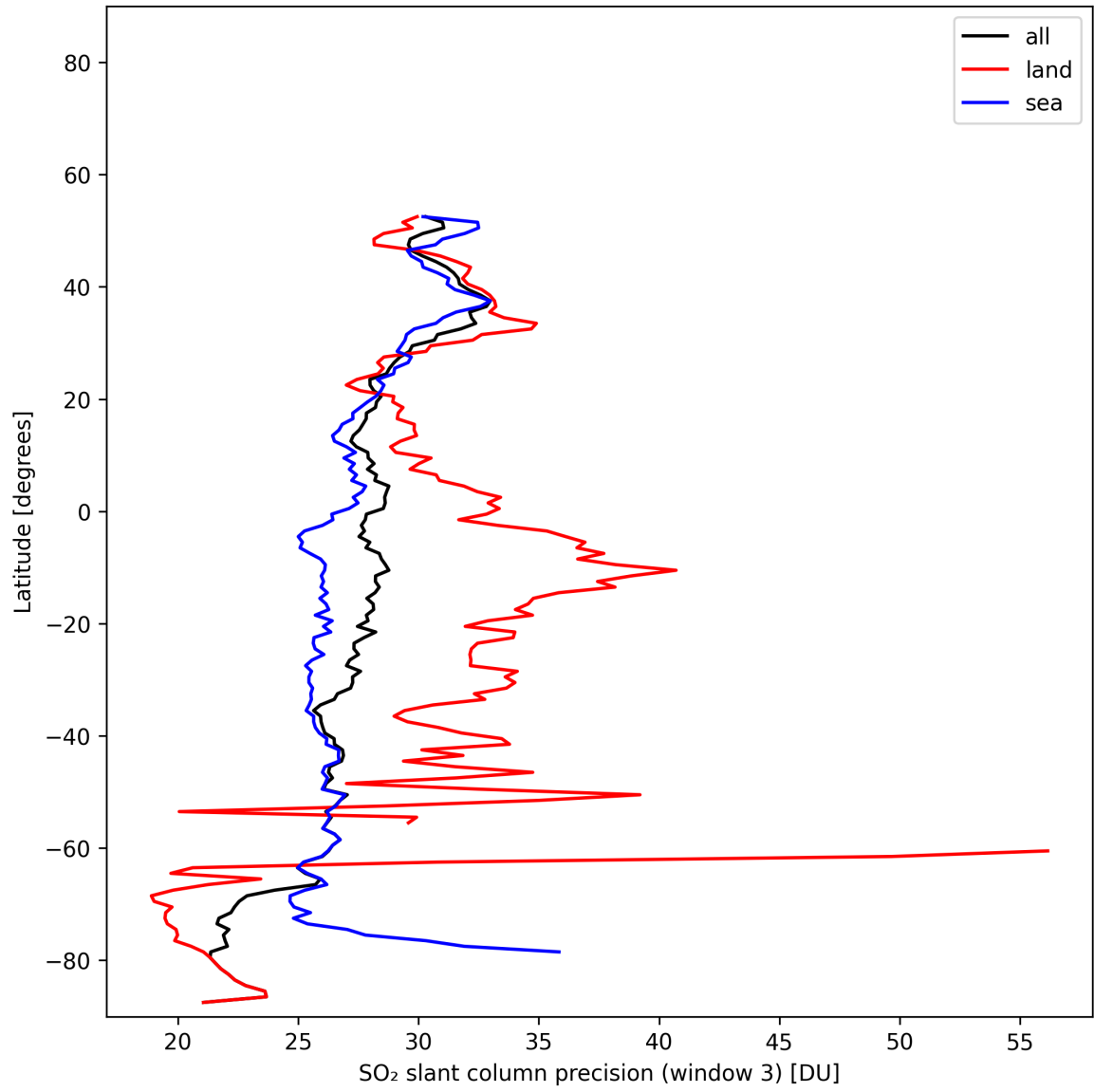


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-01-29 to 2025-01-30.

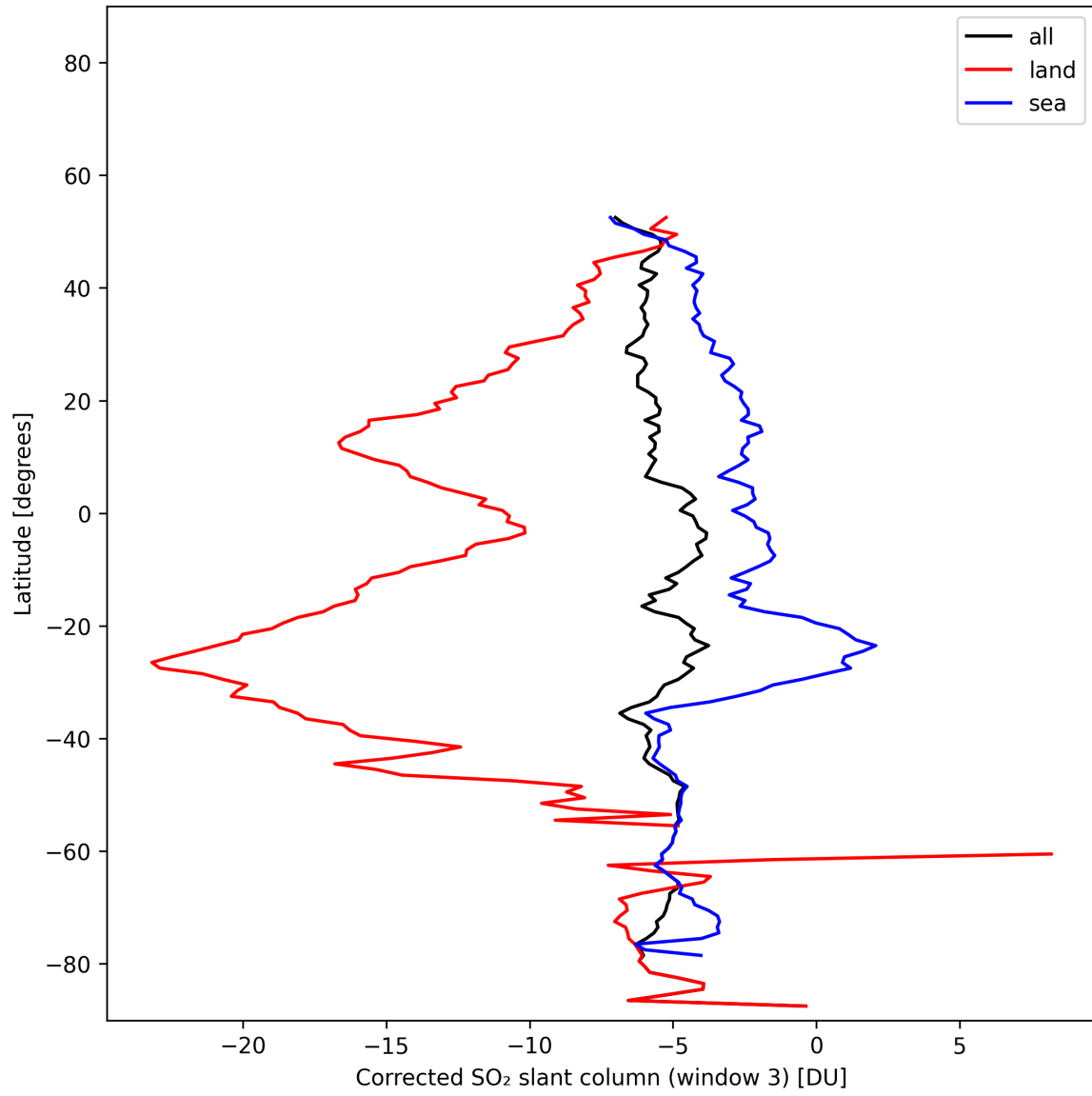


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-01-29 to 2025-01-30.

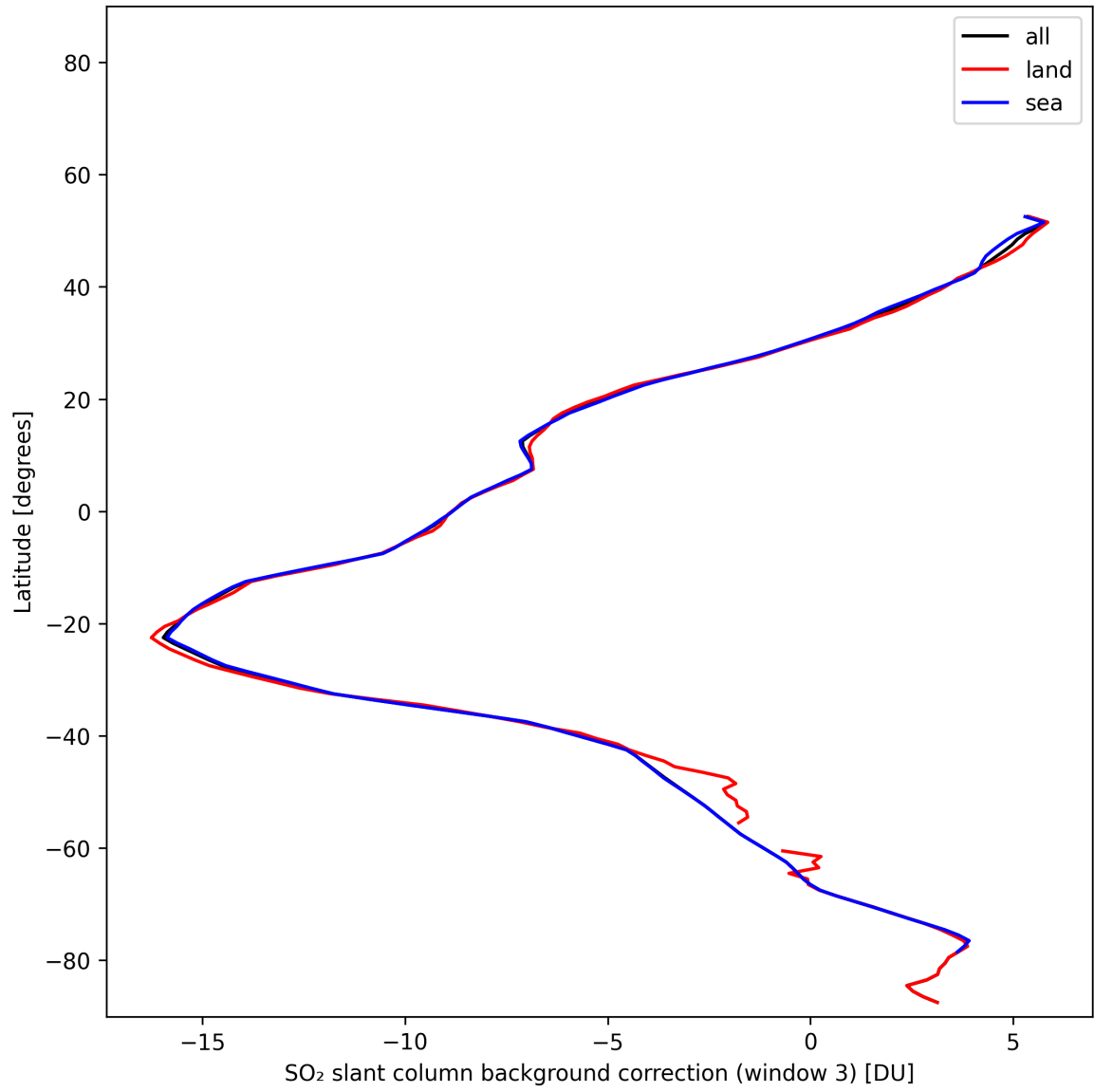


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-01-29 to 2025-01-30.

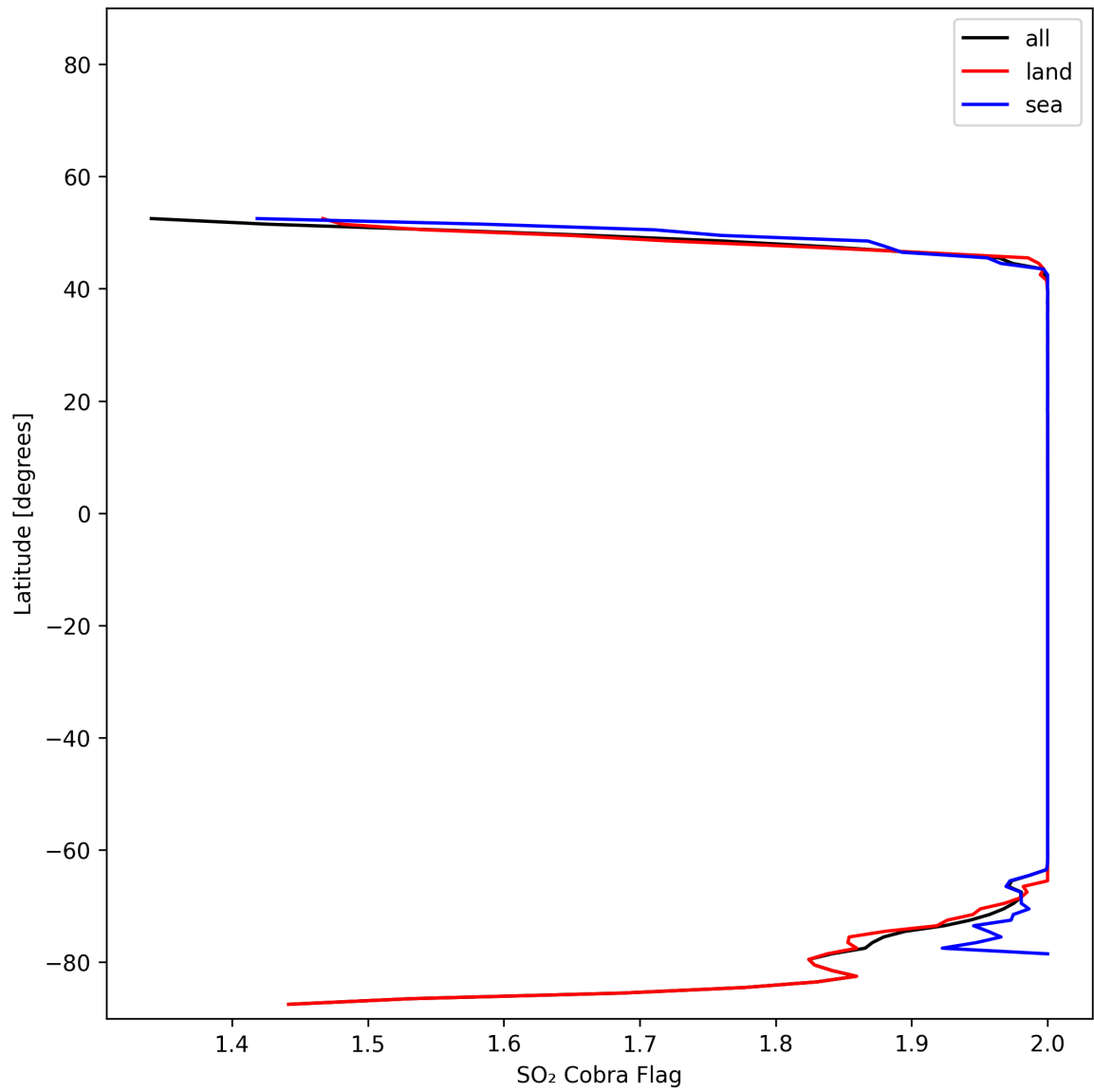


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-01-29 to 2025-01-30.

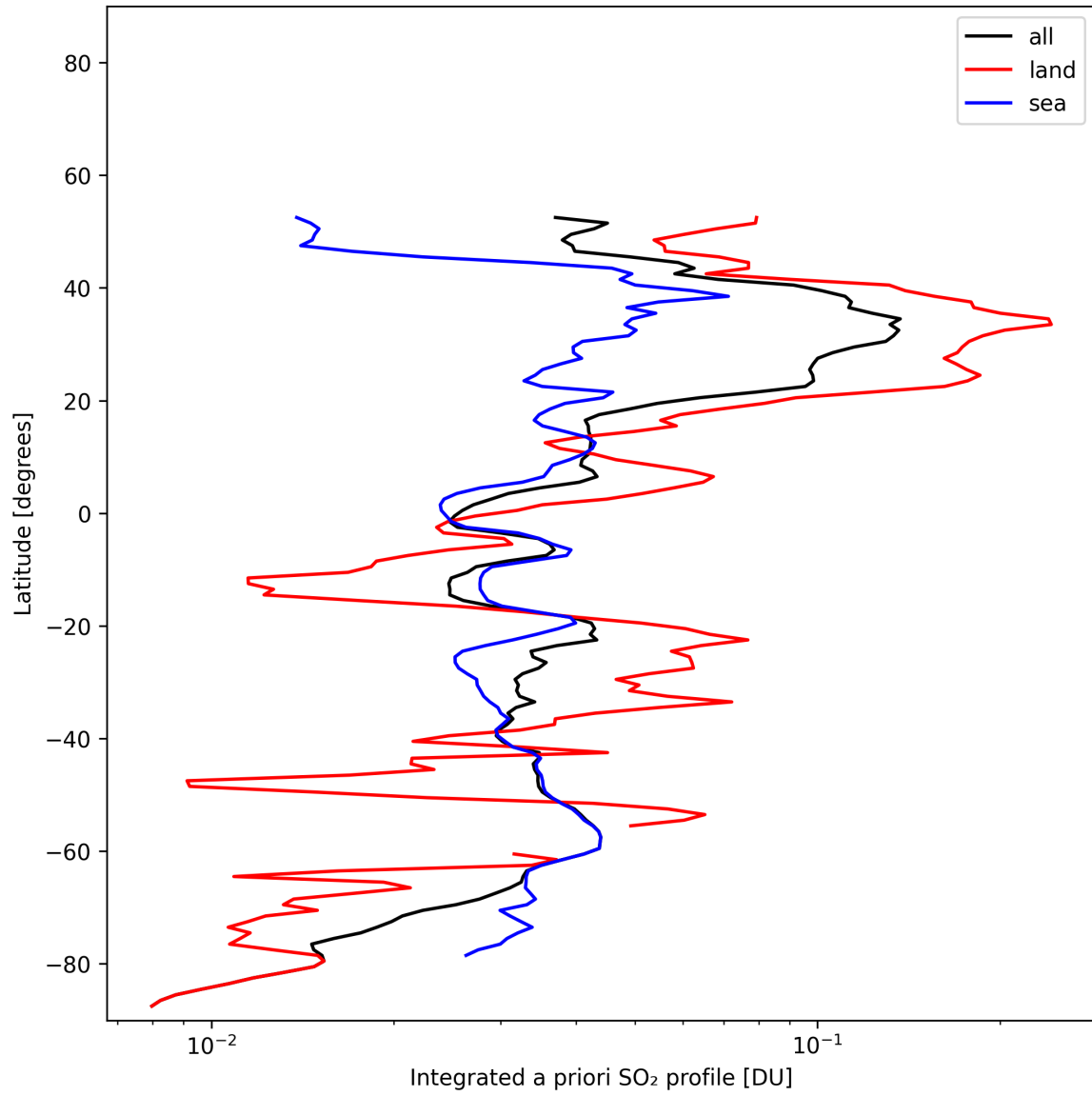


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-01-29 to 2025-01-30.

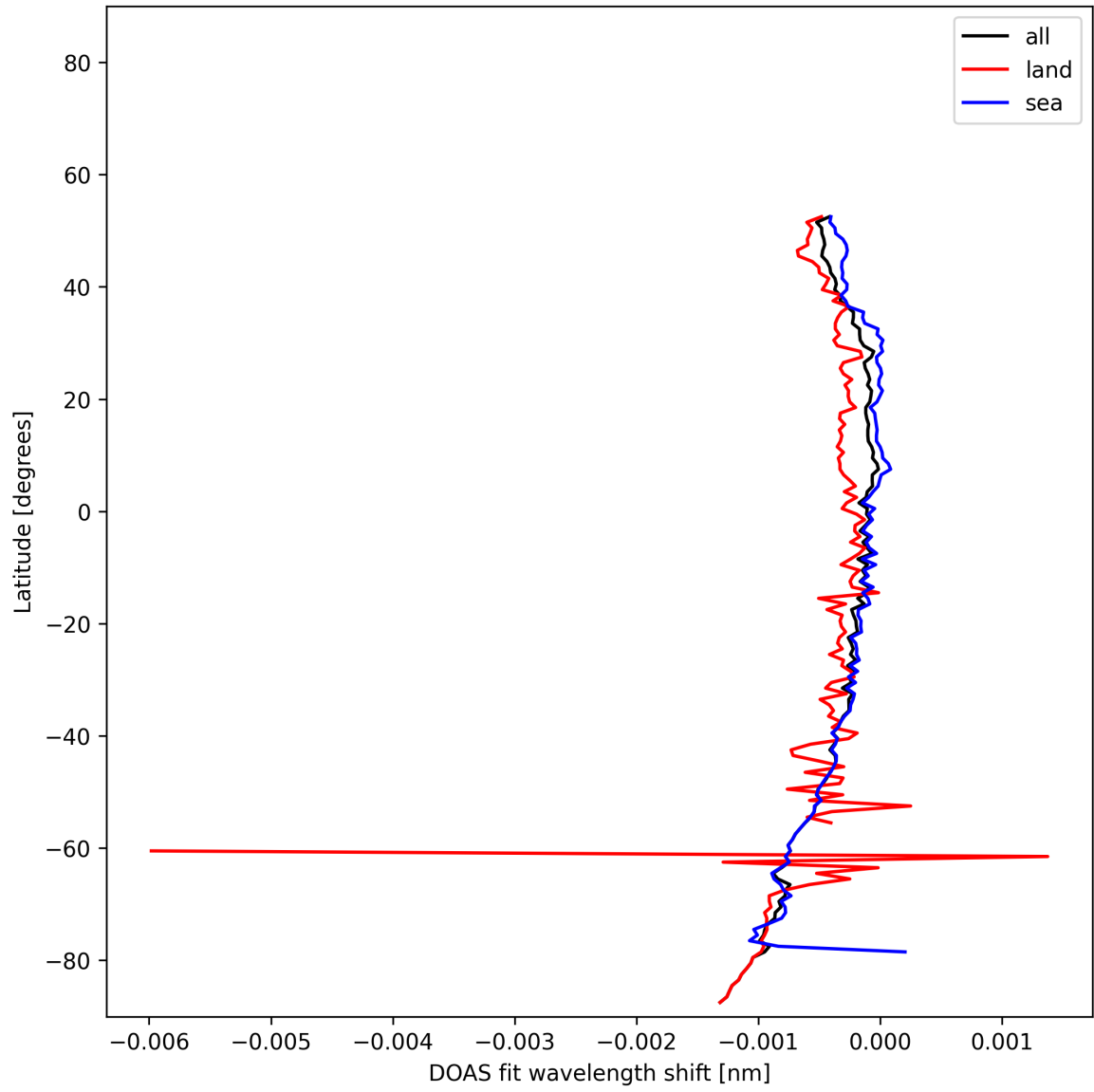


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-01-29 to 2025-01-30.

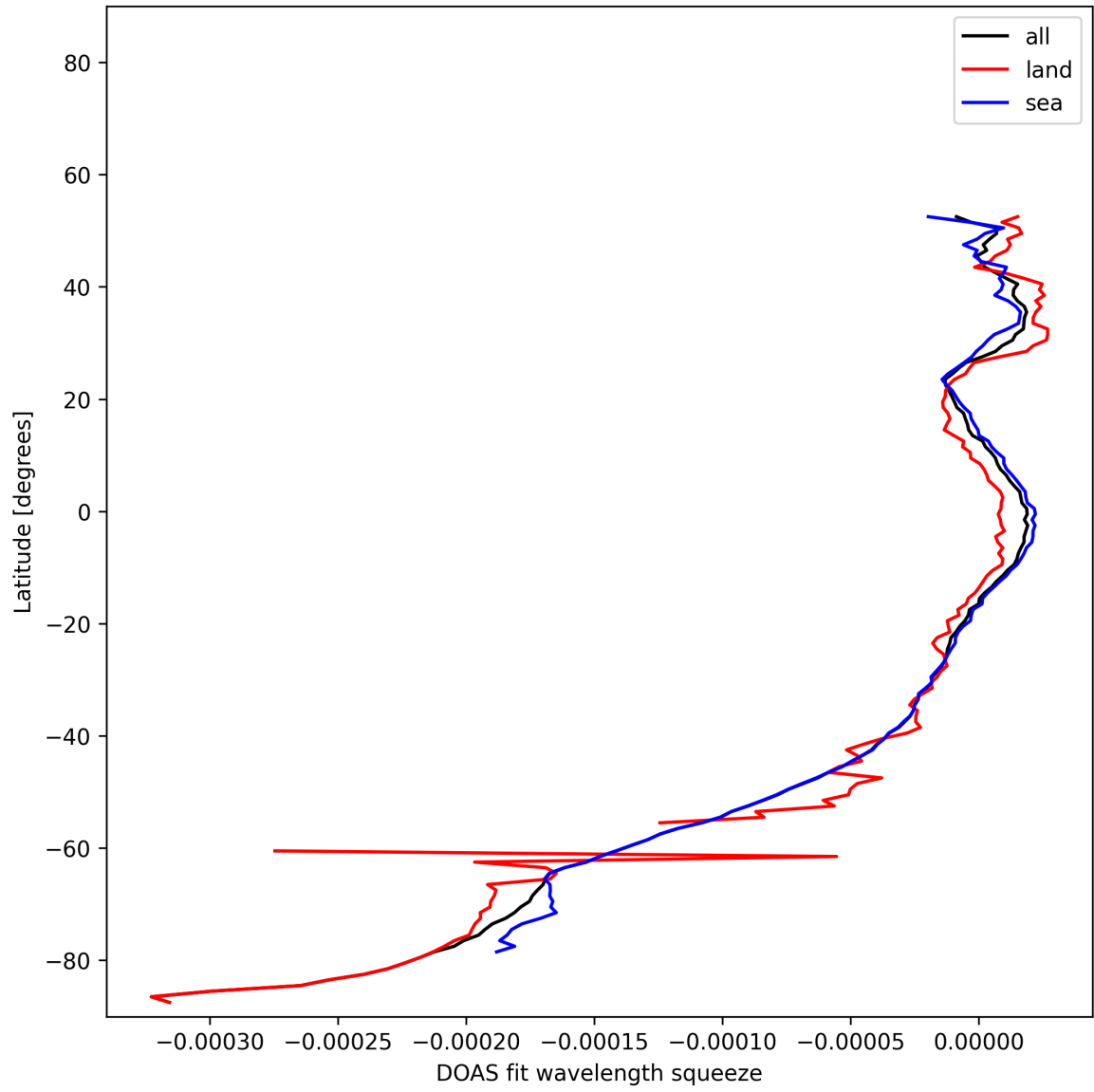


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-01-29 to 2025-01-30.

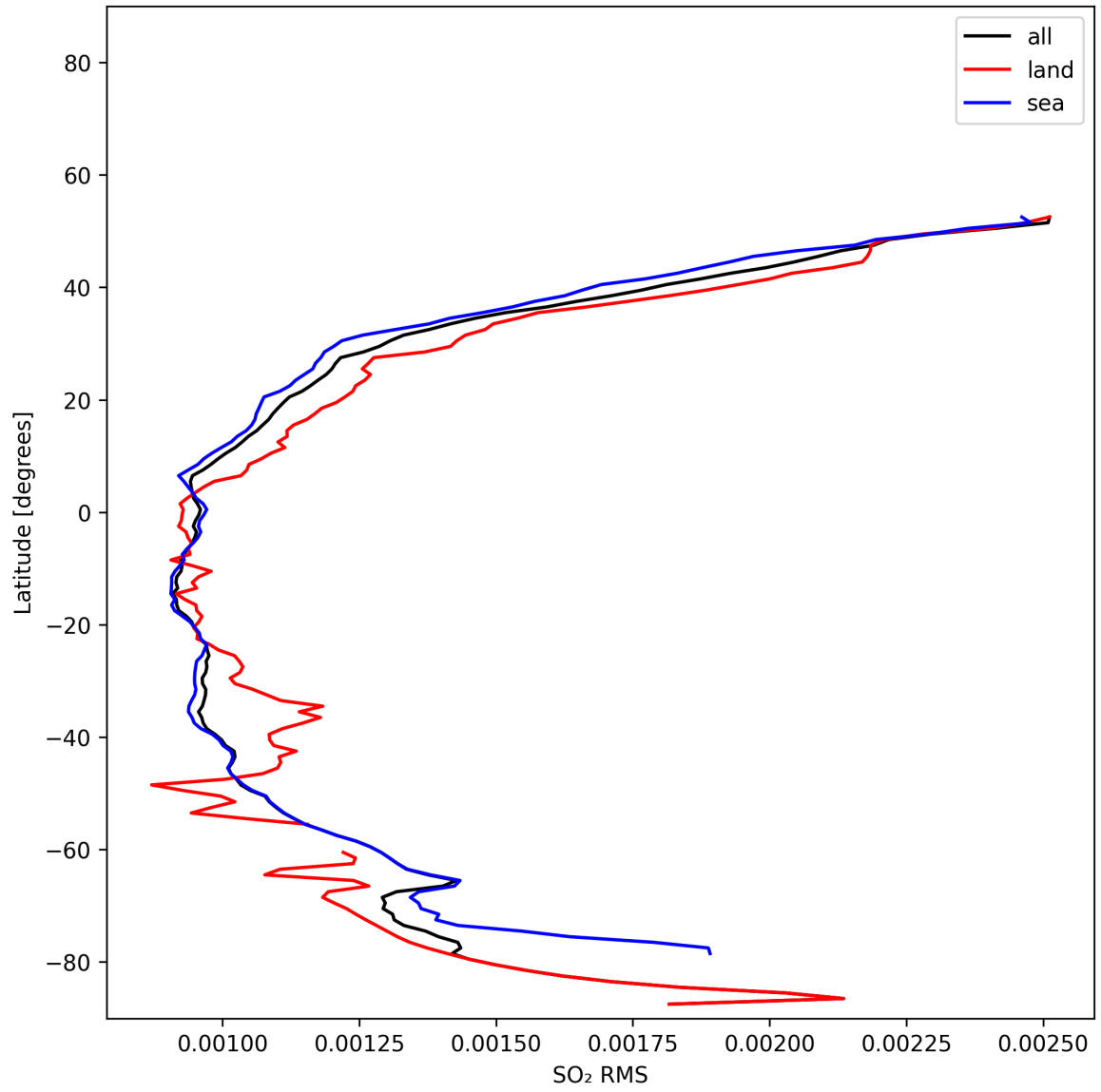


Figure 52: Zonal average of “SO₂ RMS” for 2025-01-29 to 2025-01-30.

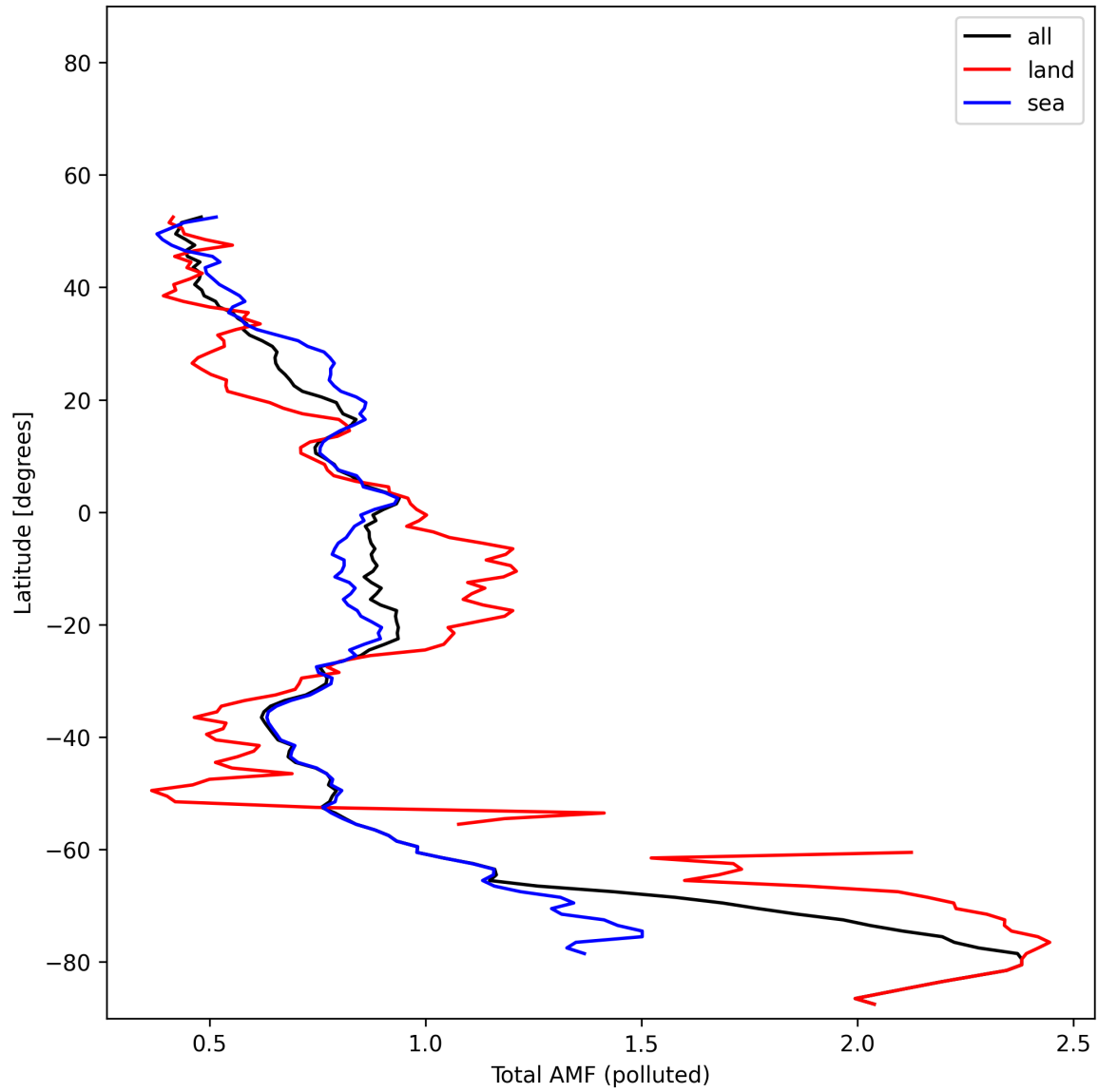


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-01-29 to 2025-01-30.

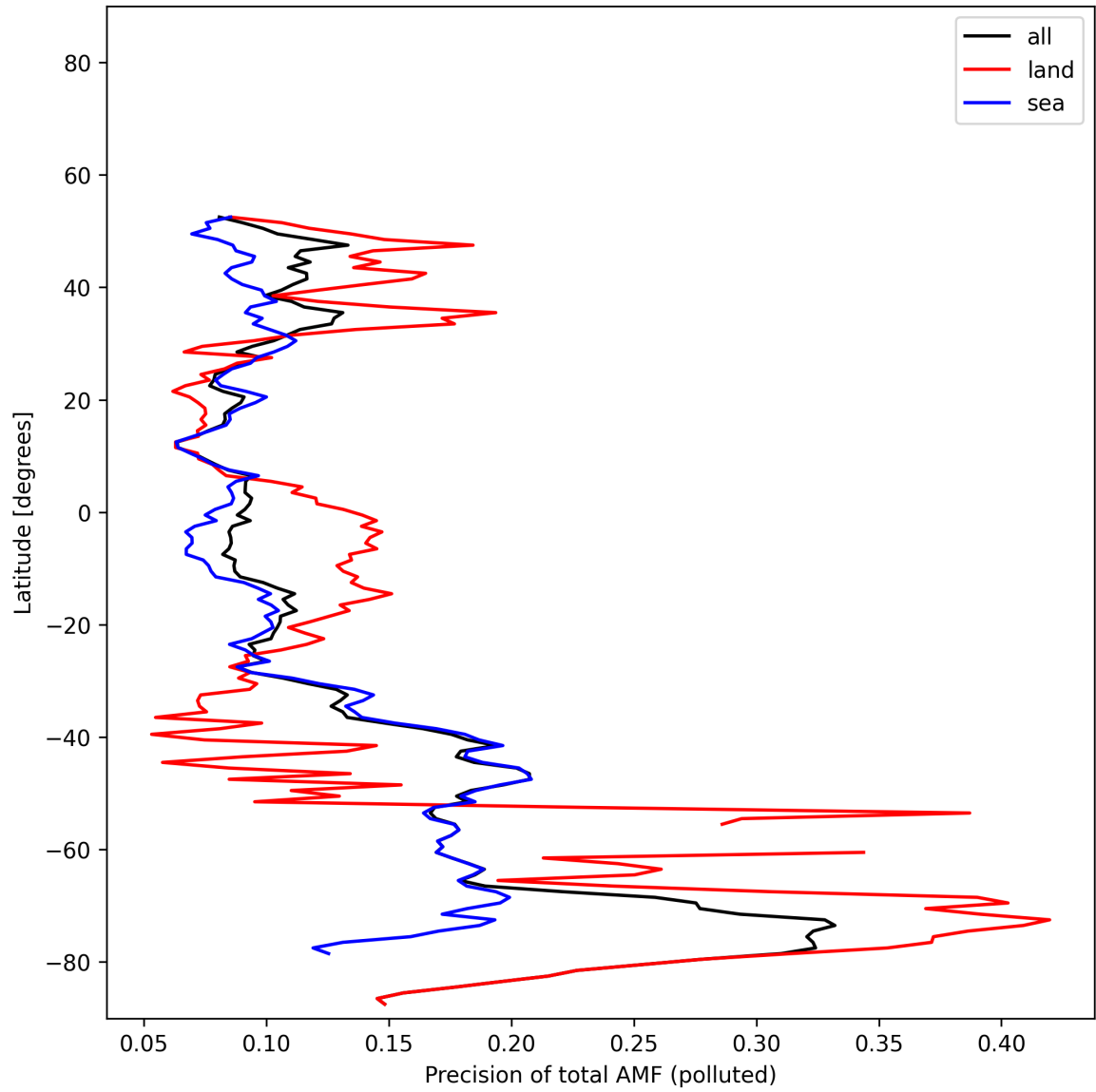


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-01-29 to 2025-01-30.

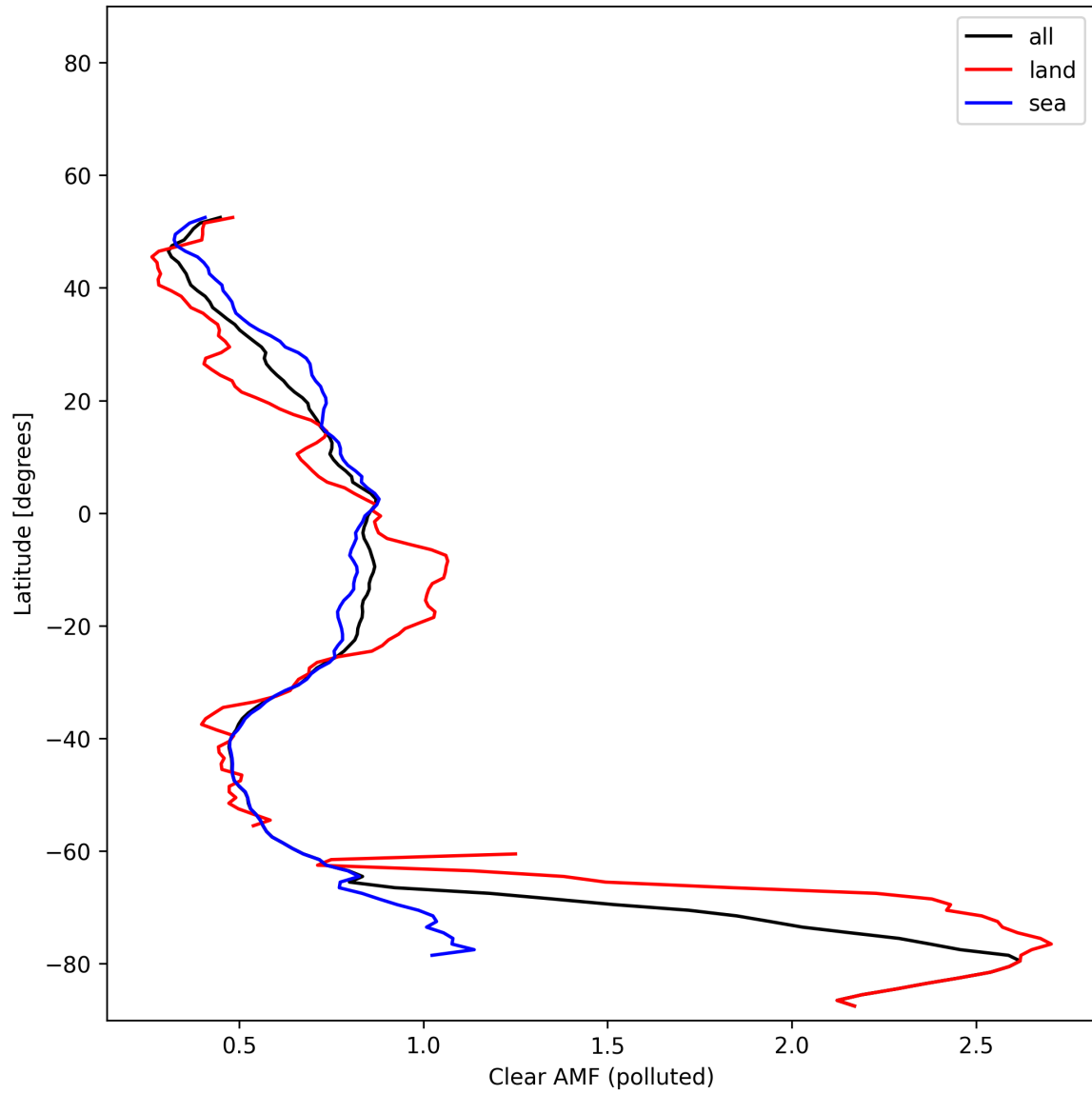


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-01-29 to 2025-01-30.

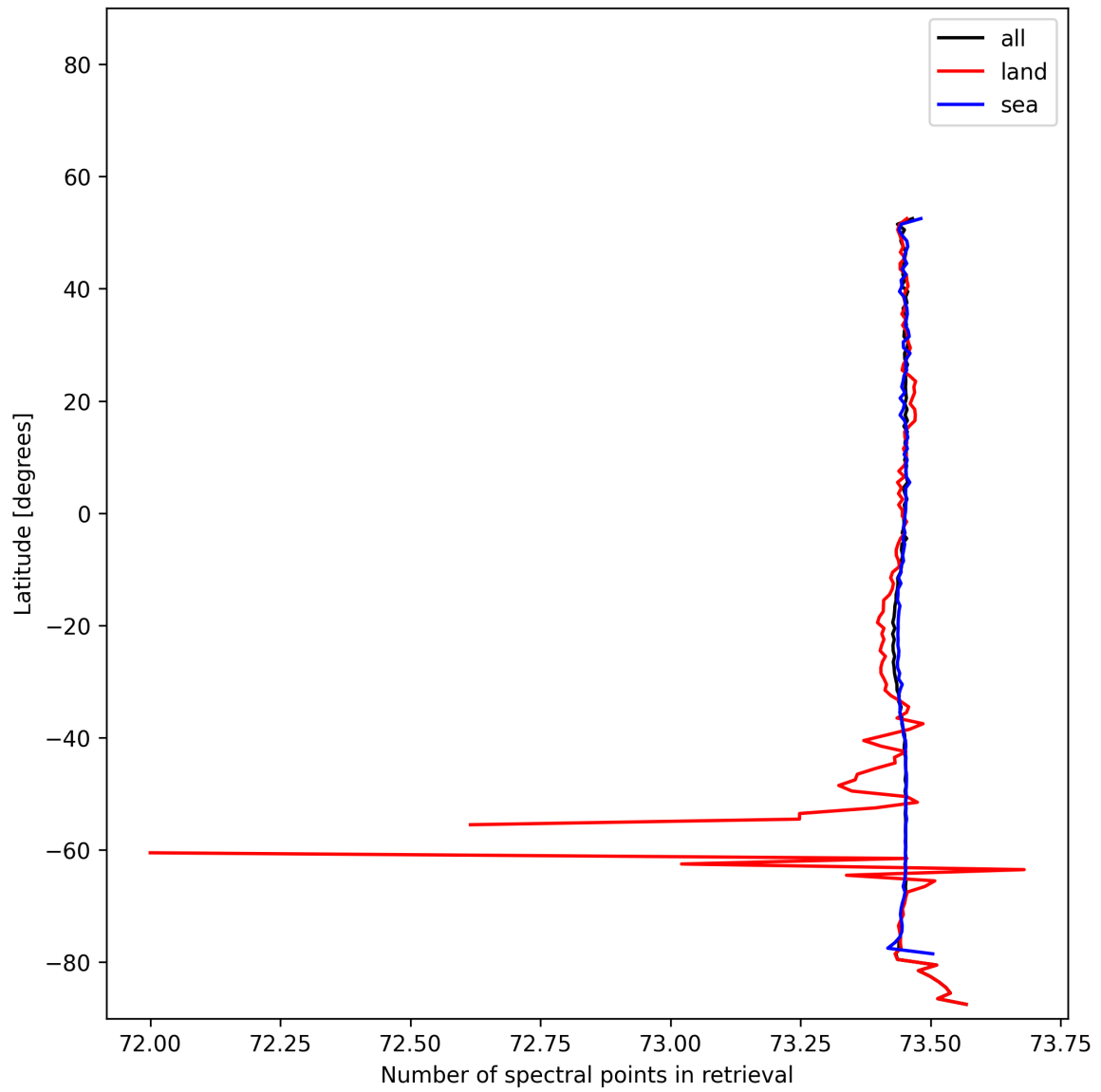


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-01-29 to 2025-01-30.

8 Histograms

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

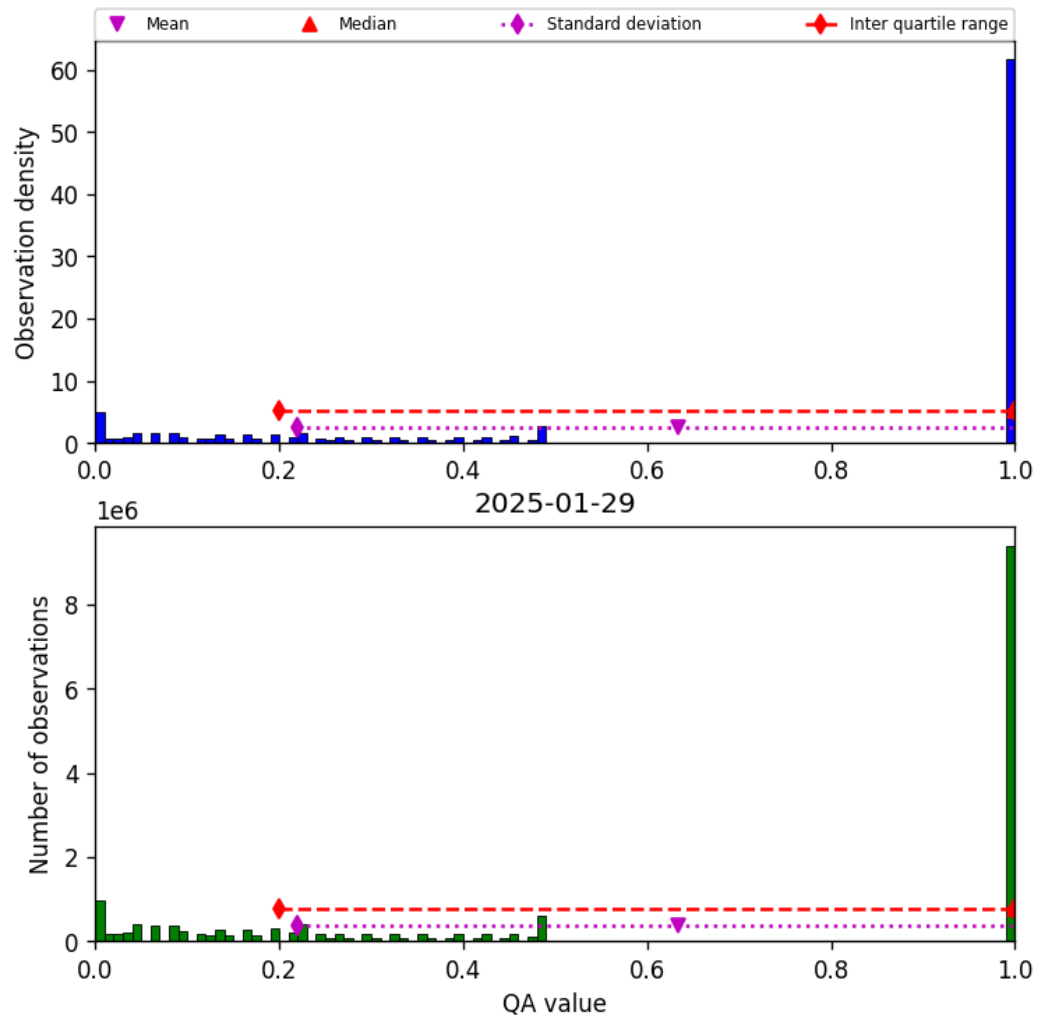


Figure 57: Histogram of “QA value” for 2025-01-29 to 2025-01-30

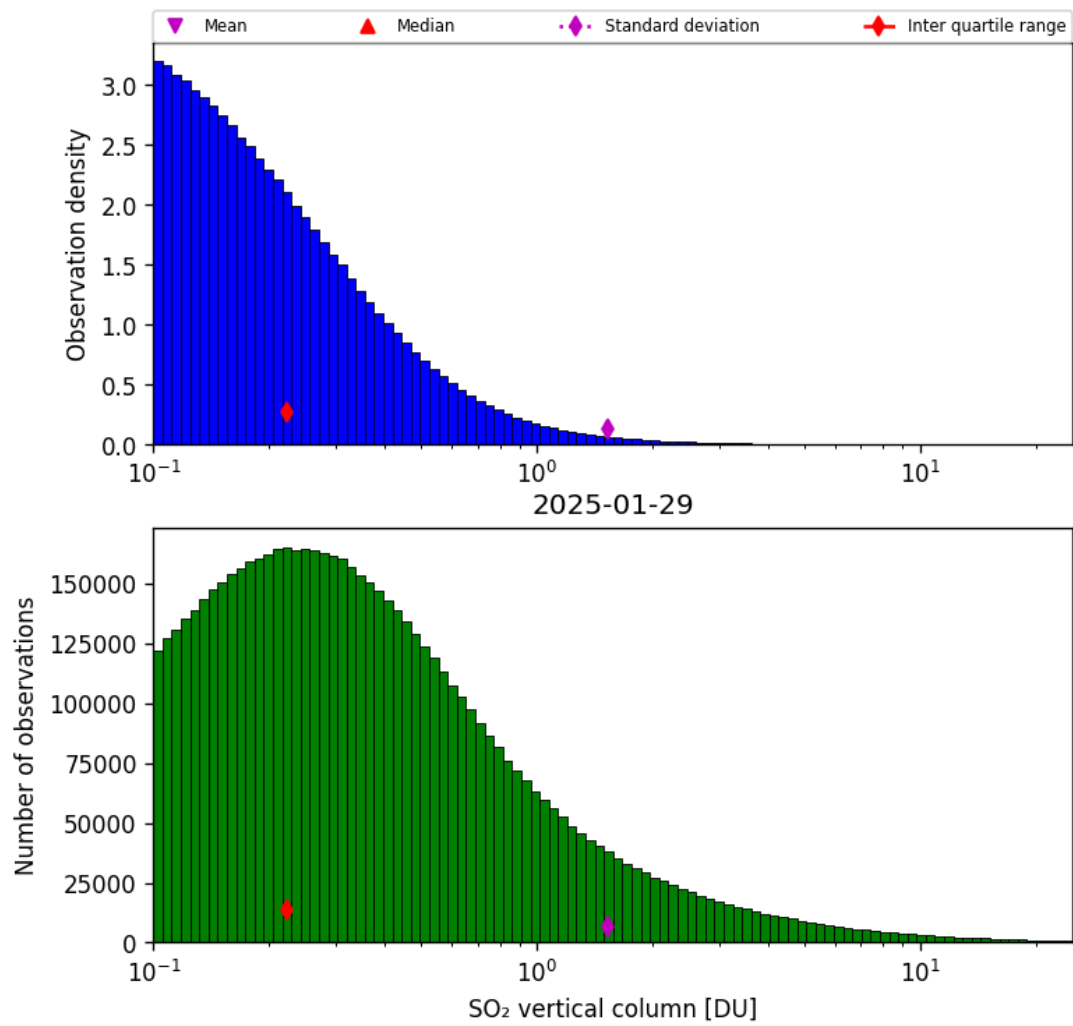


Figure 58: Histogram of “SO₂ vertical column” for 2025-01-29 to 2025-01-30

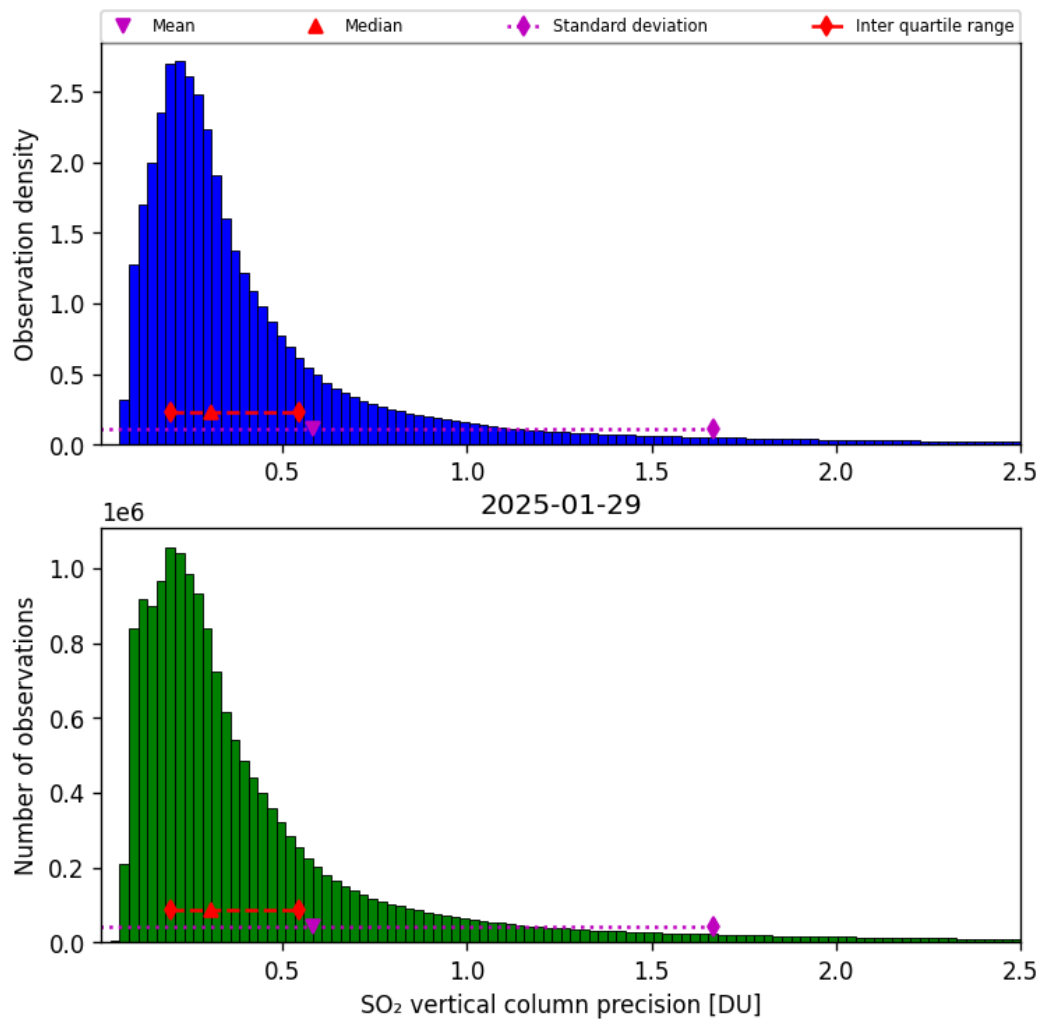


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-01-29 to 2025-01-30

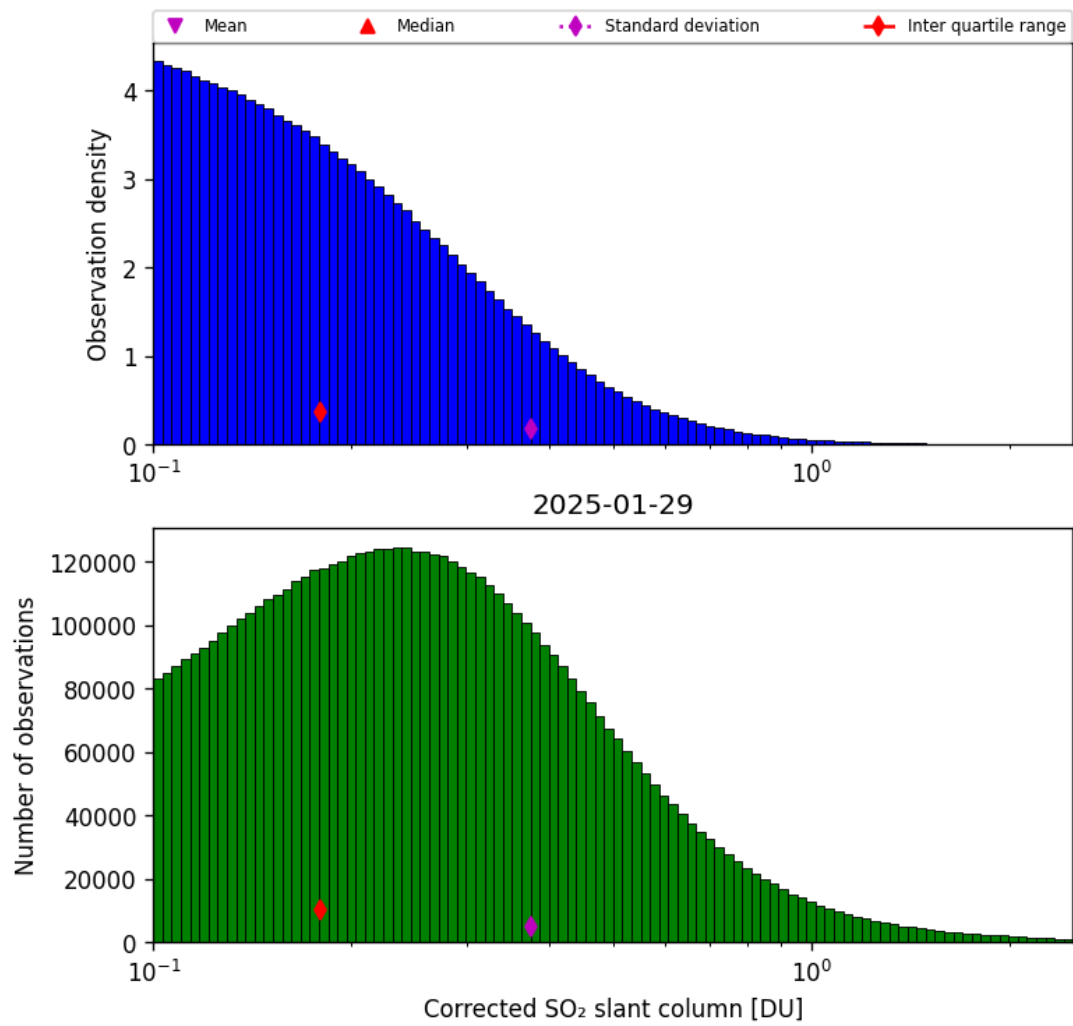


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-01-29 to 2025-01-30

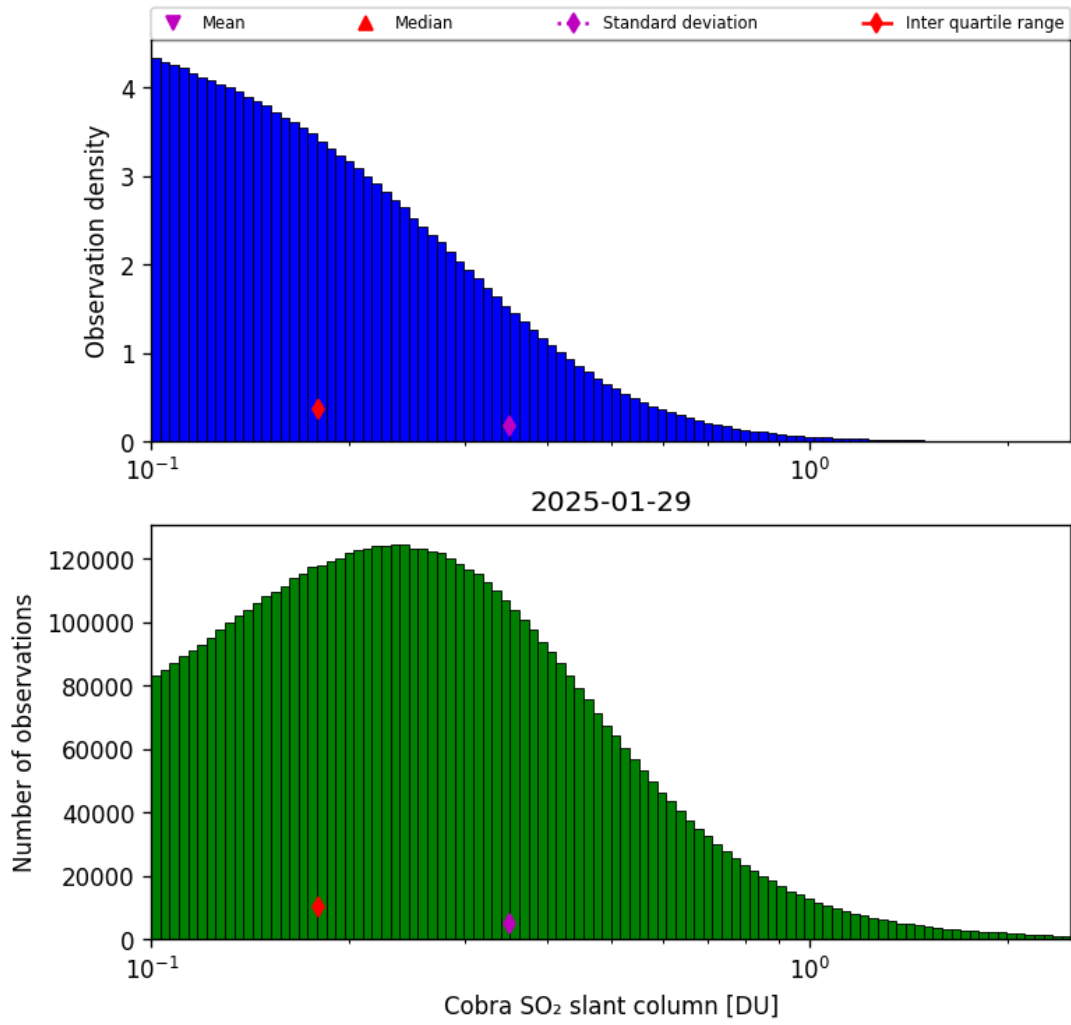


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-01-29 to 2025-01-30

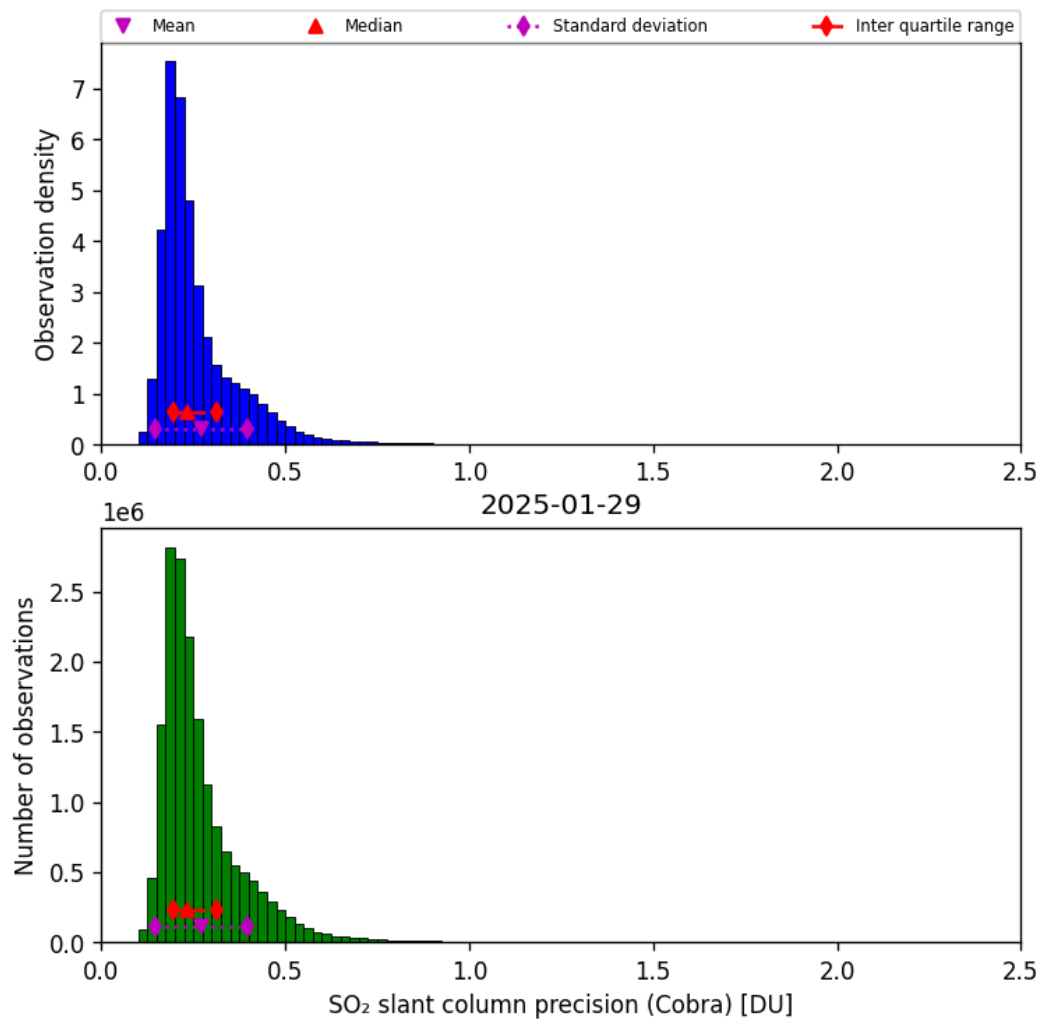


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-01-29 to 2025-01-30

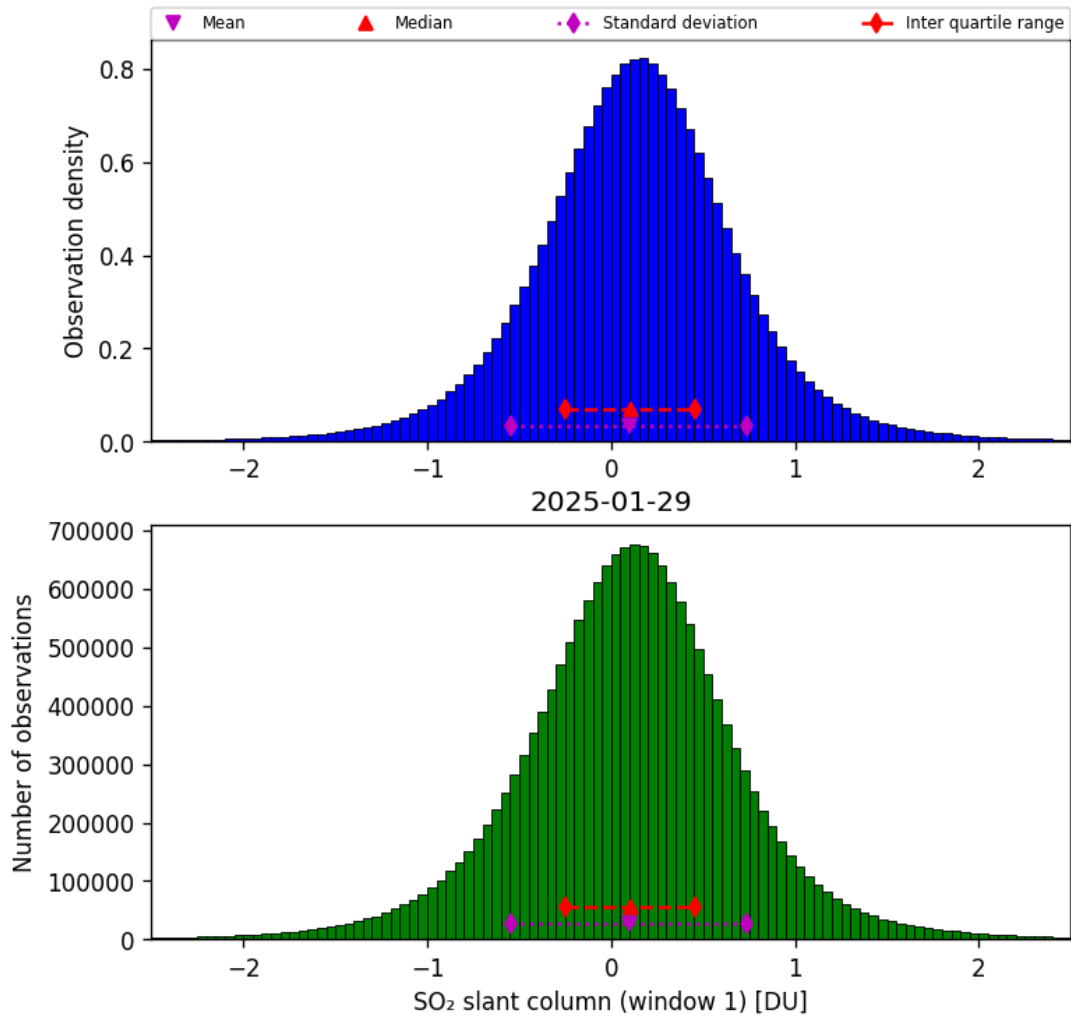


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-01-29 to 2025-01-30

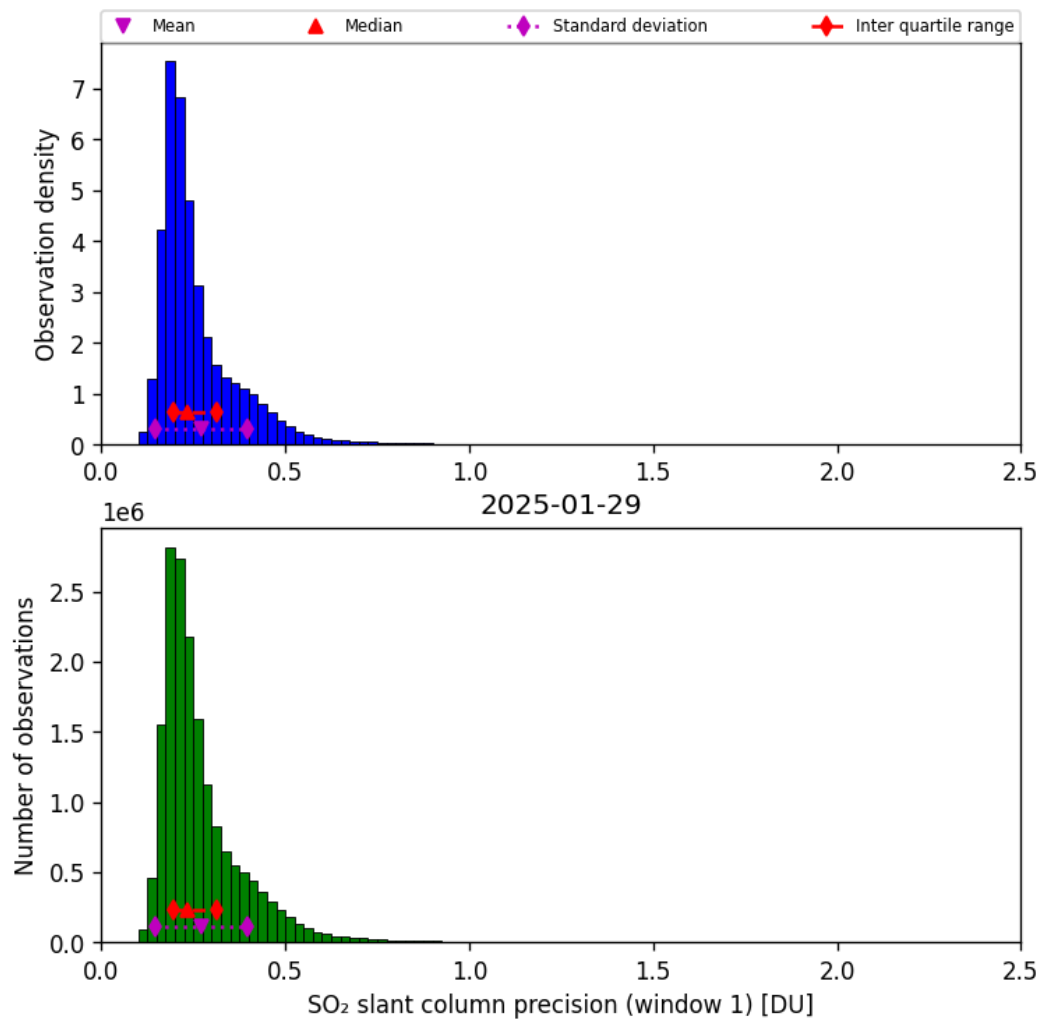


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-01-29 to 2025-01-30

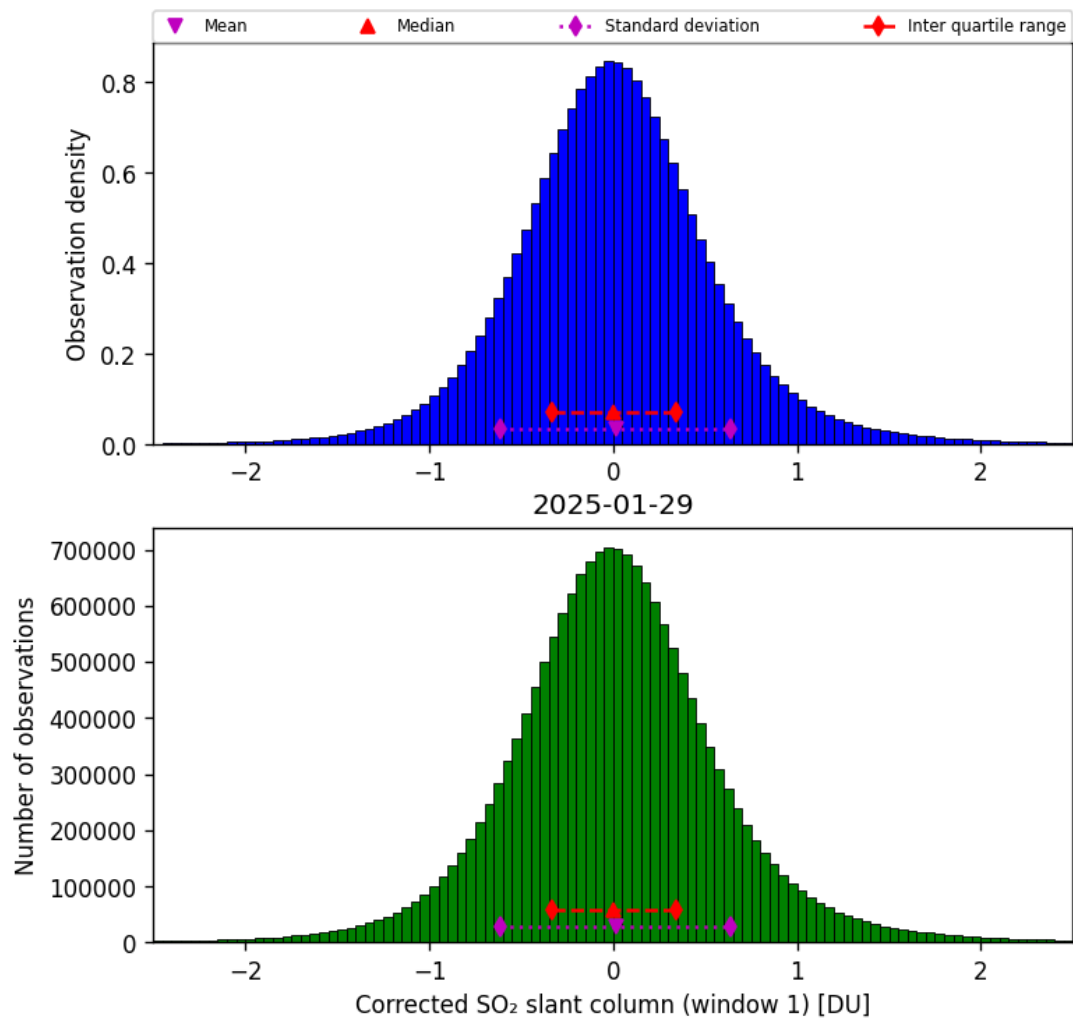


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-01-29 to 2025-01-30

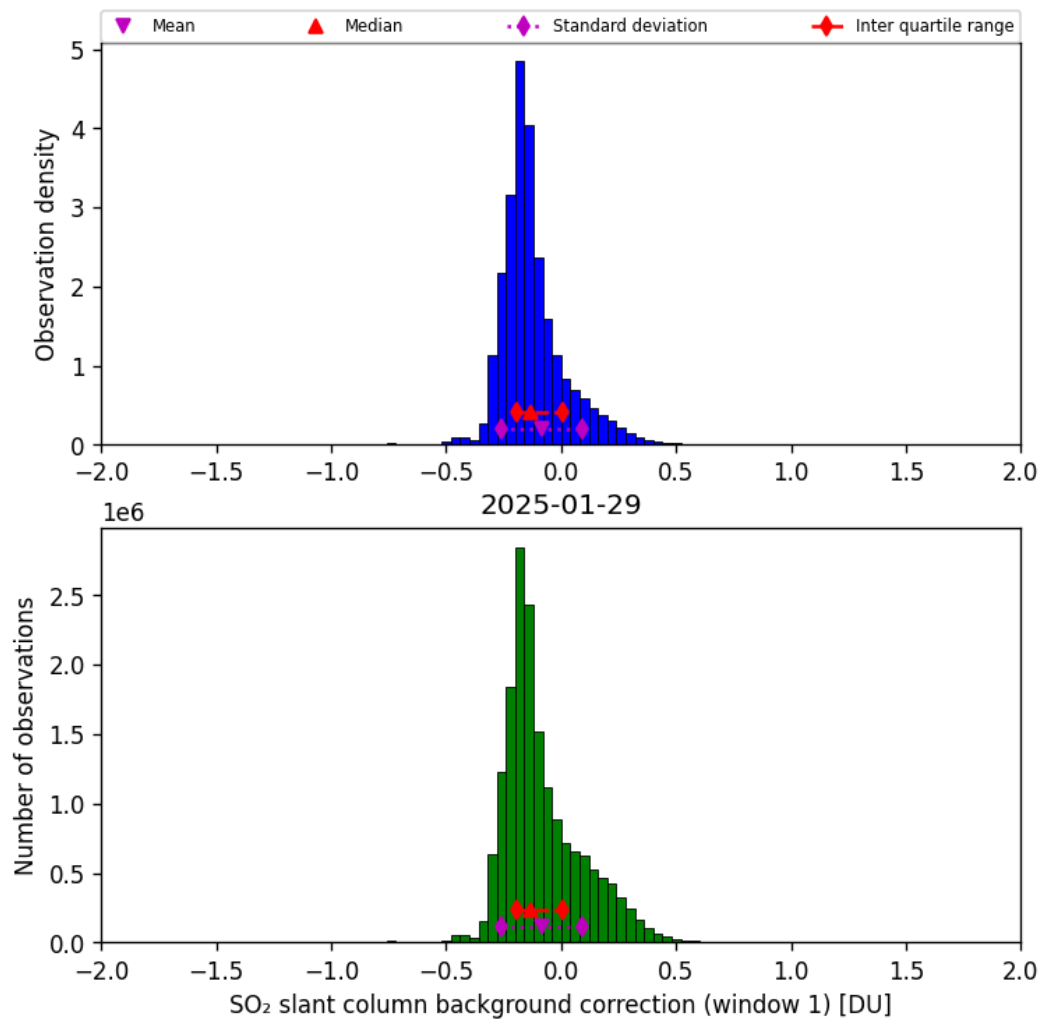


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-01-29 to 2025-01-30

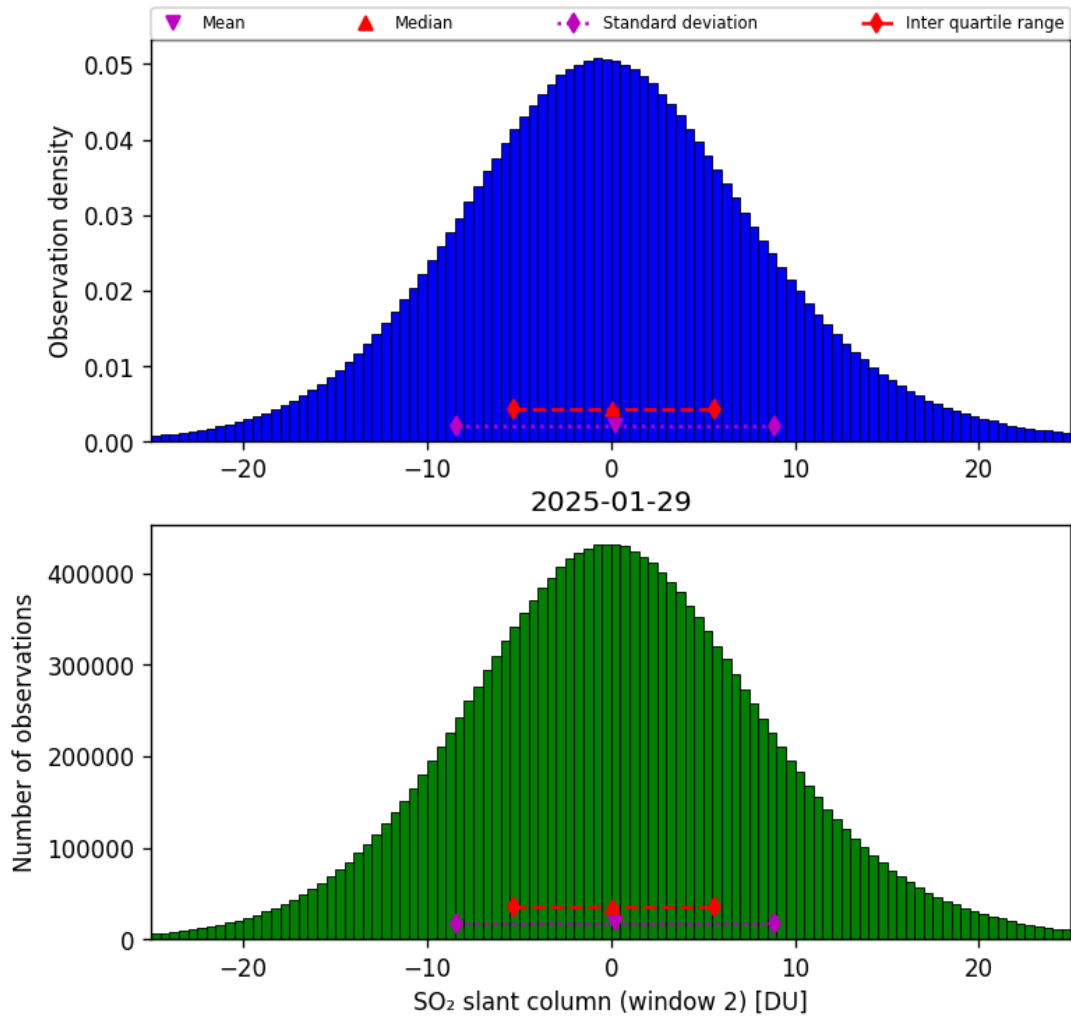


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-01-29 to 2025-01-30

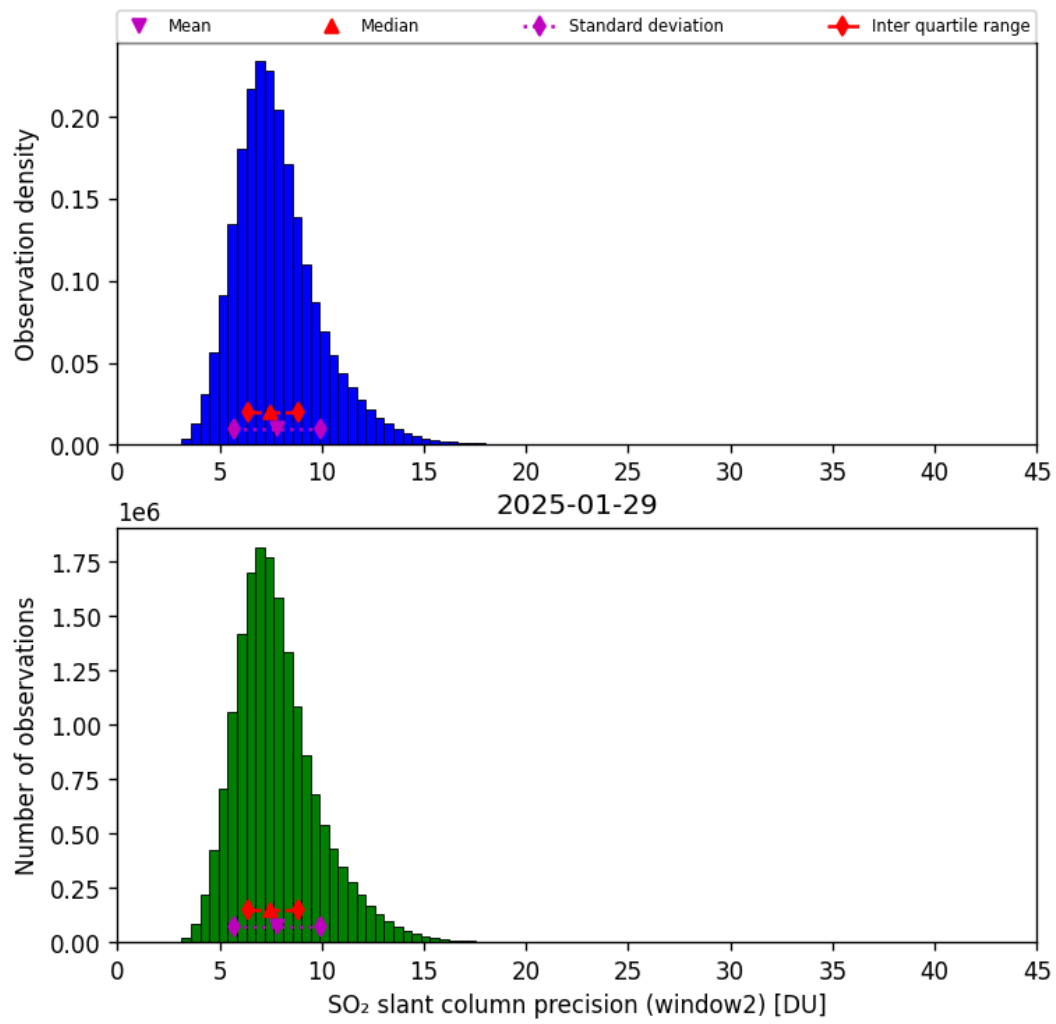


Figure 68: Histogram of "SO₂ slant column precision (window2)" for 2025-01-29 to 2025-01-30

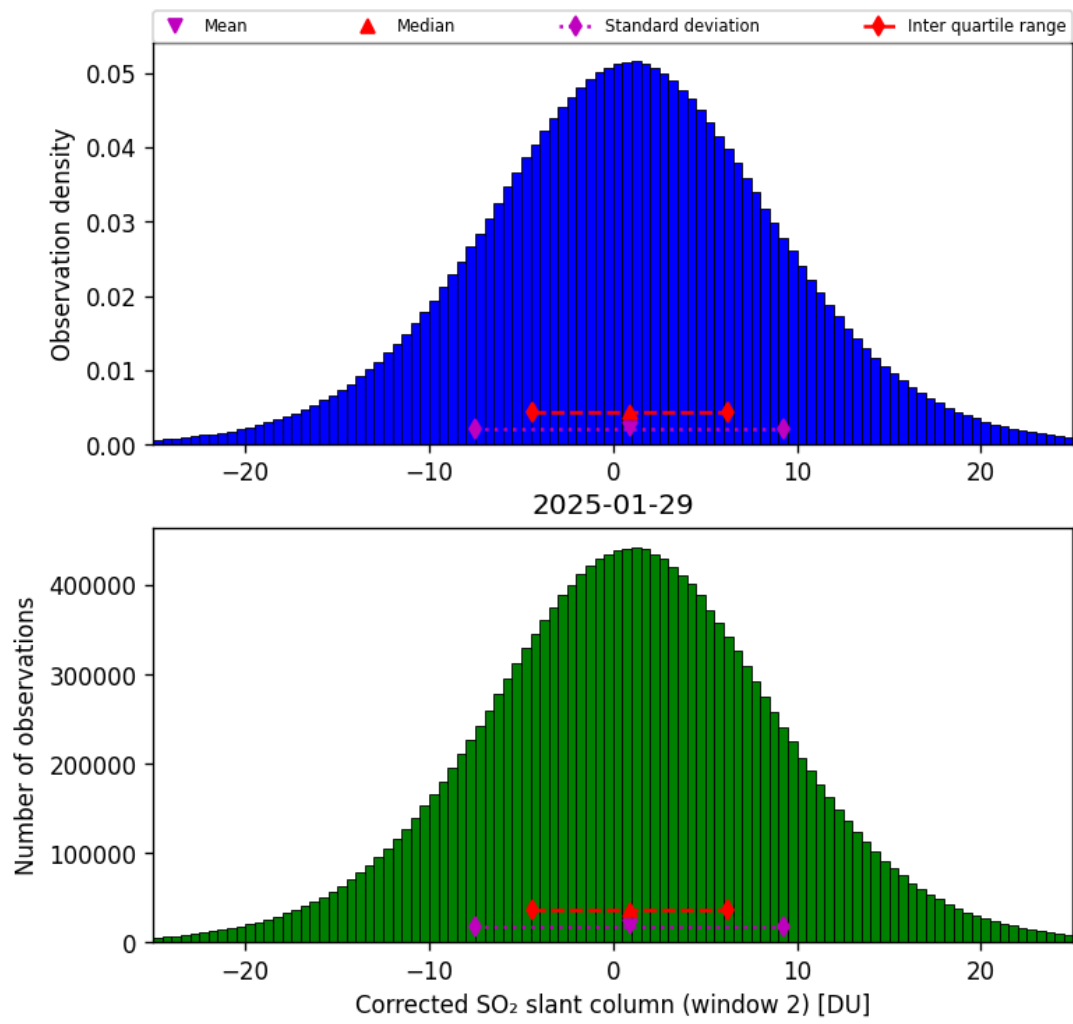


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-01-29 to 2025-01-30

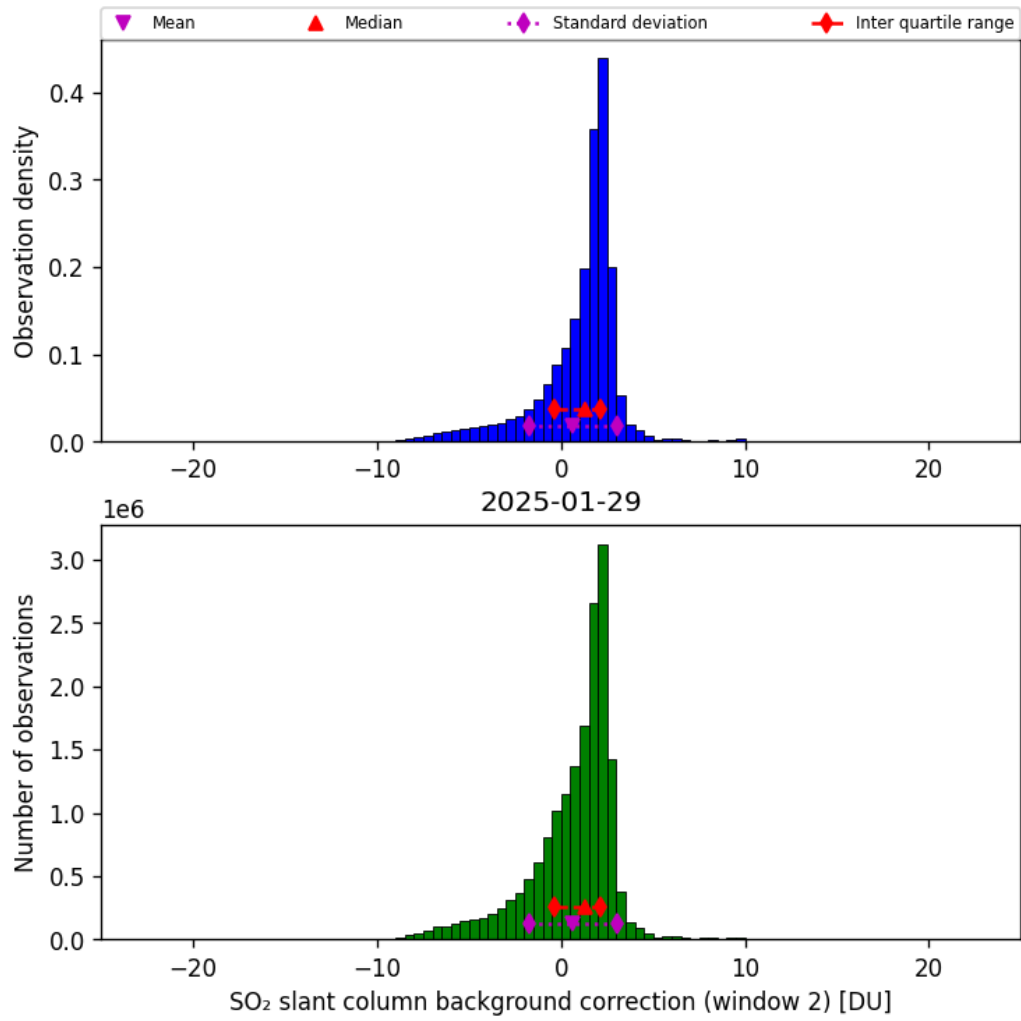


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-01-29 to 2025-01-30

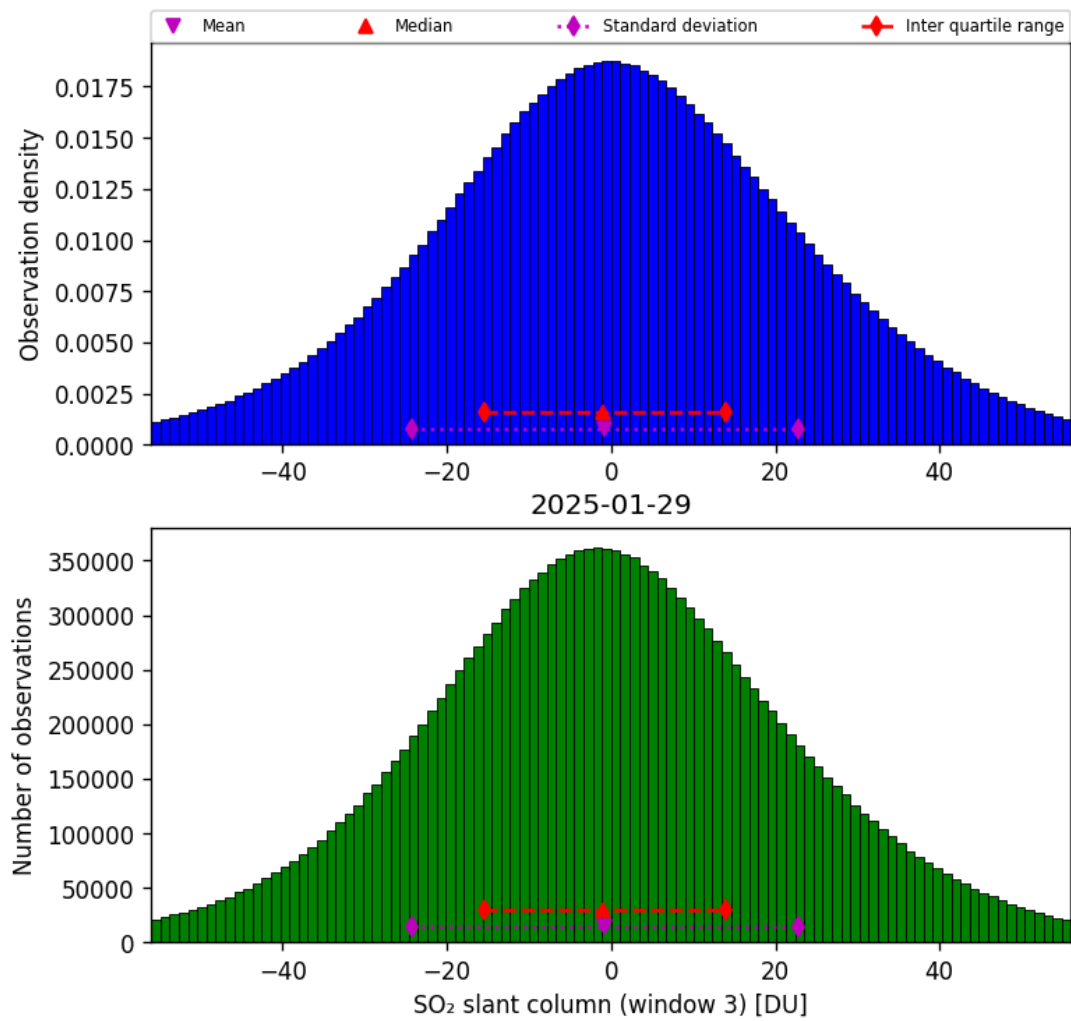


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-01-29 to 2025-01-30

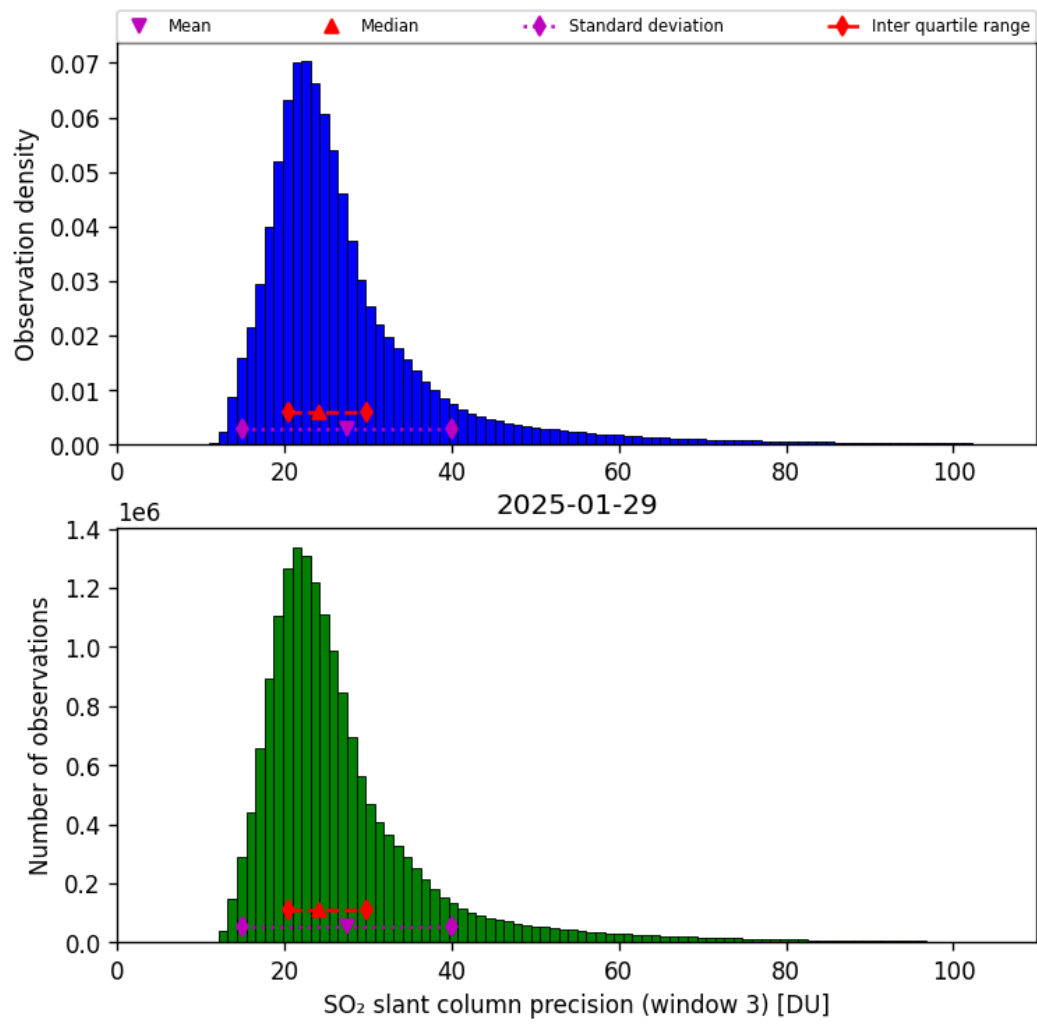


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-01-29 to 2025-01-30

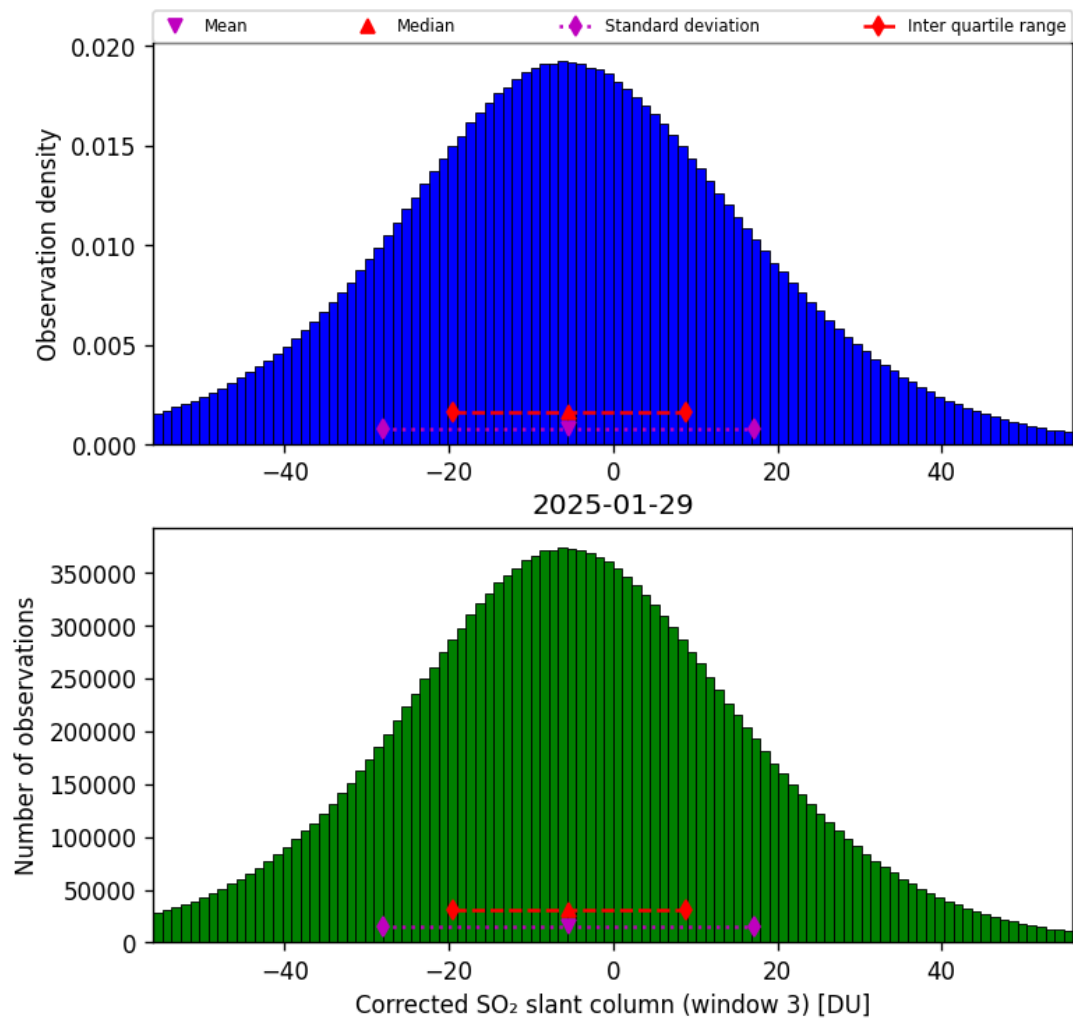


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-01-29 to 2025-01-30

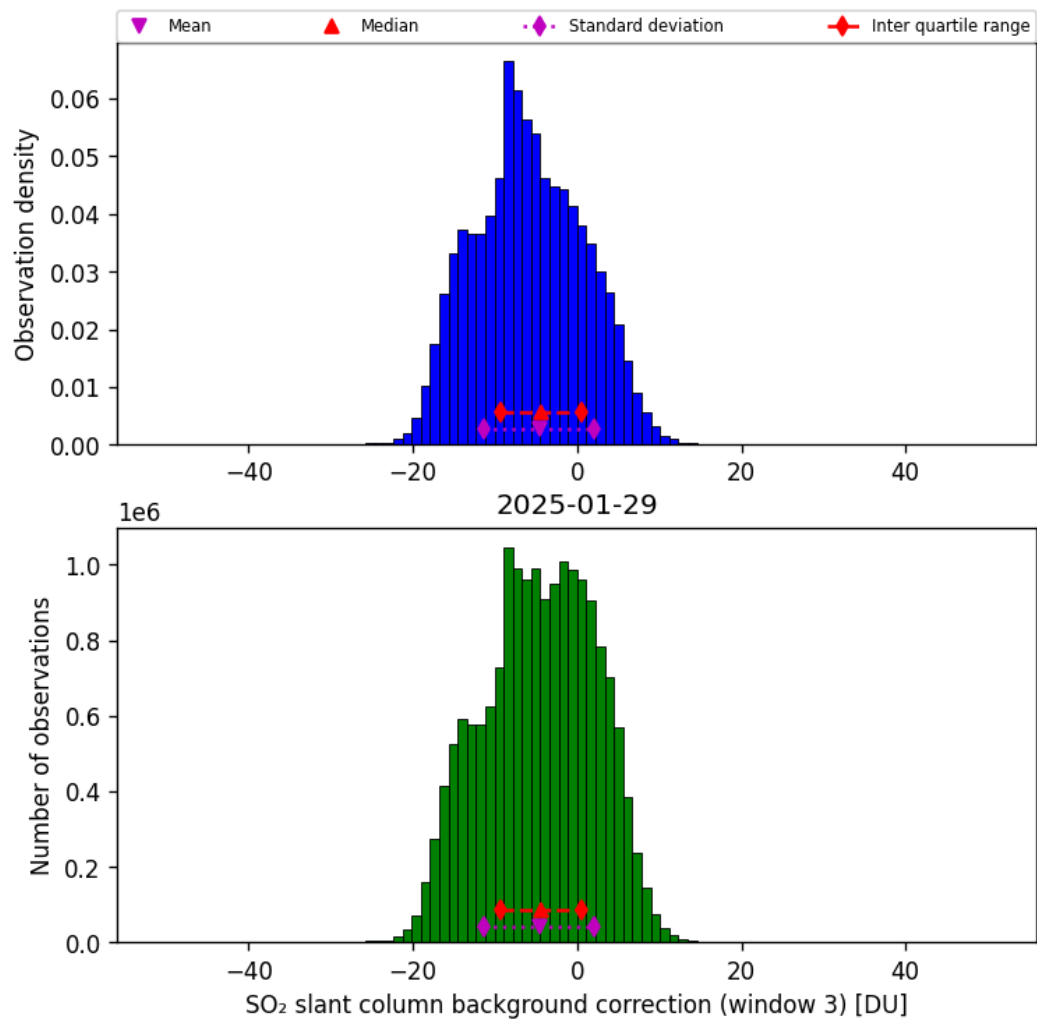


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-01-29 to 2025-01-30

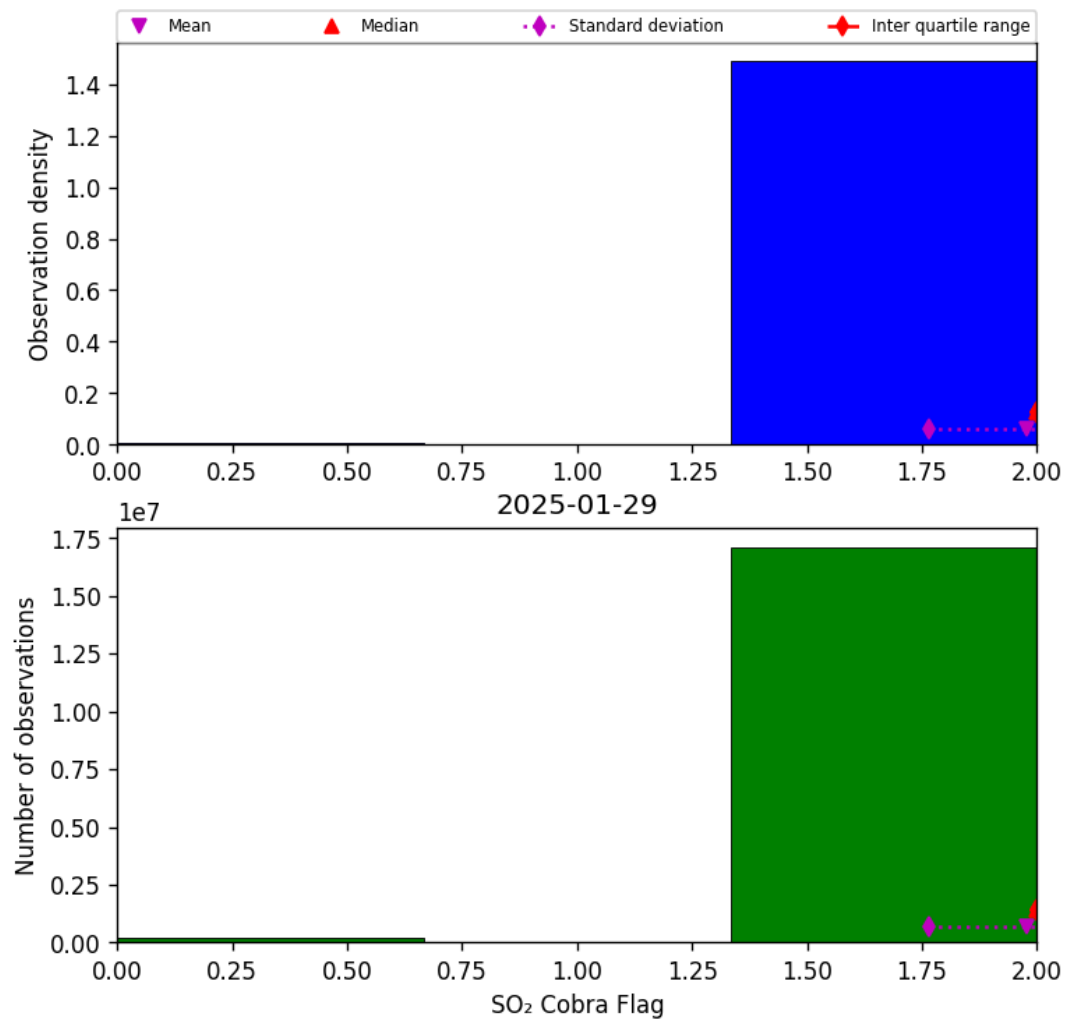


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-01-29 to 2025-01-30

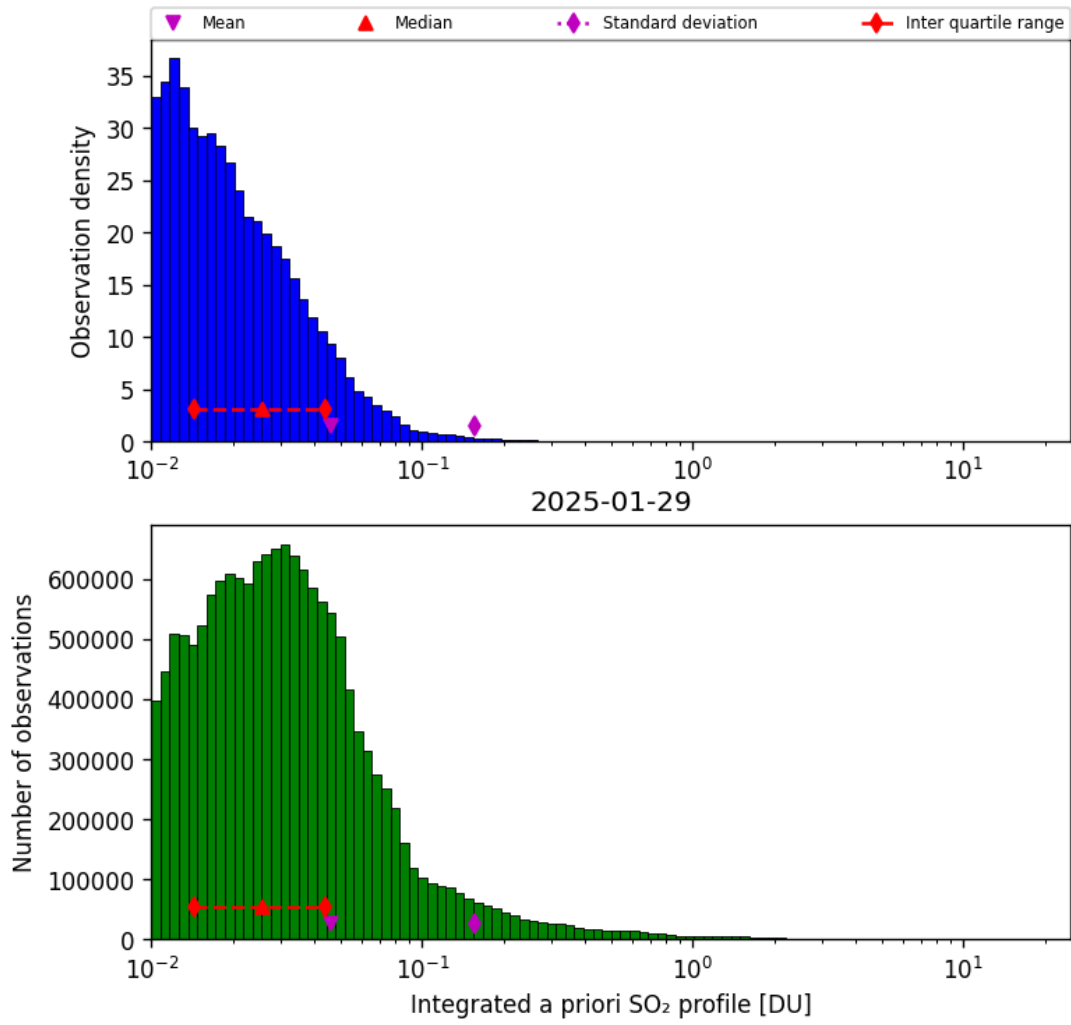


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-01-29 to 2025-01-30

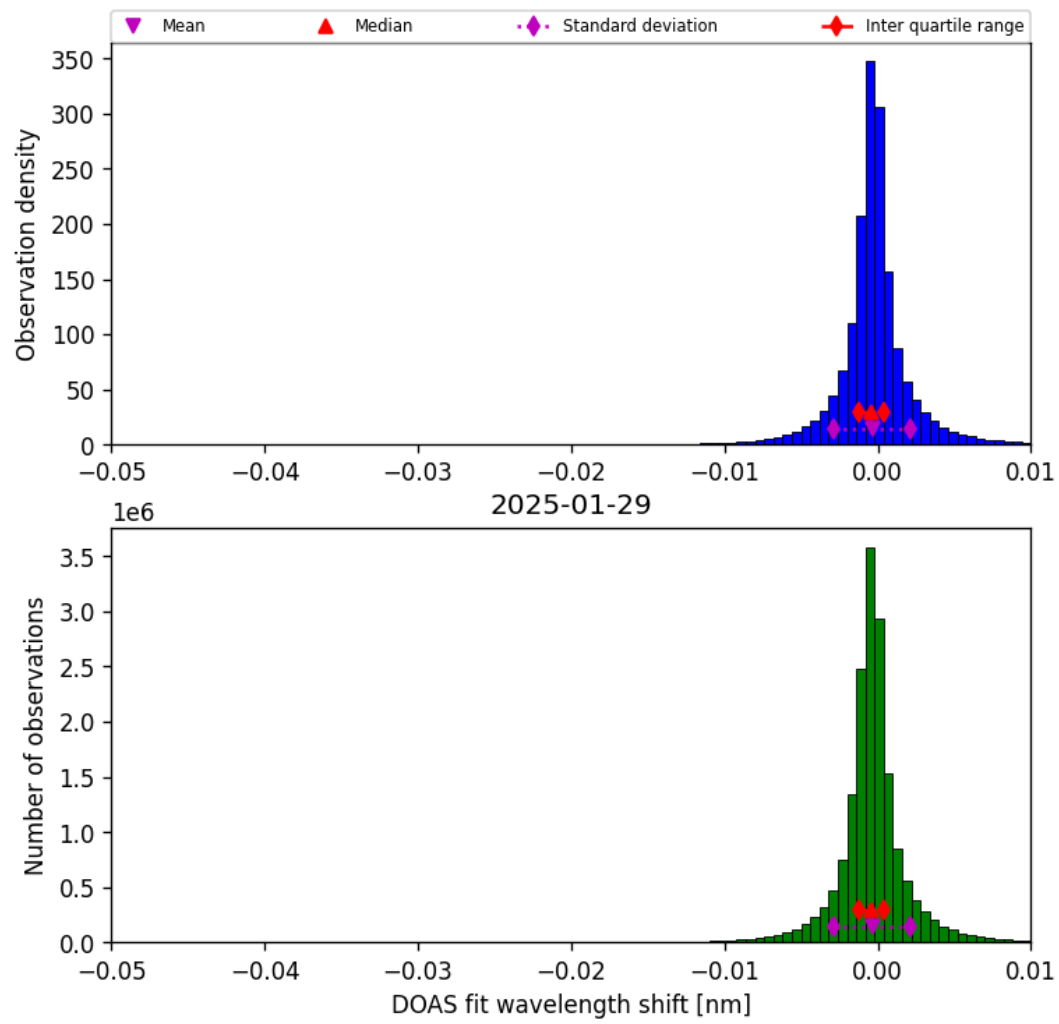


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-01-29 to 2025-01-30

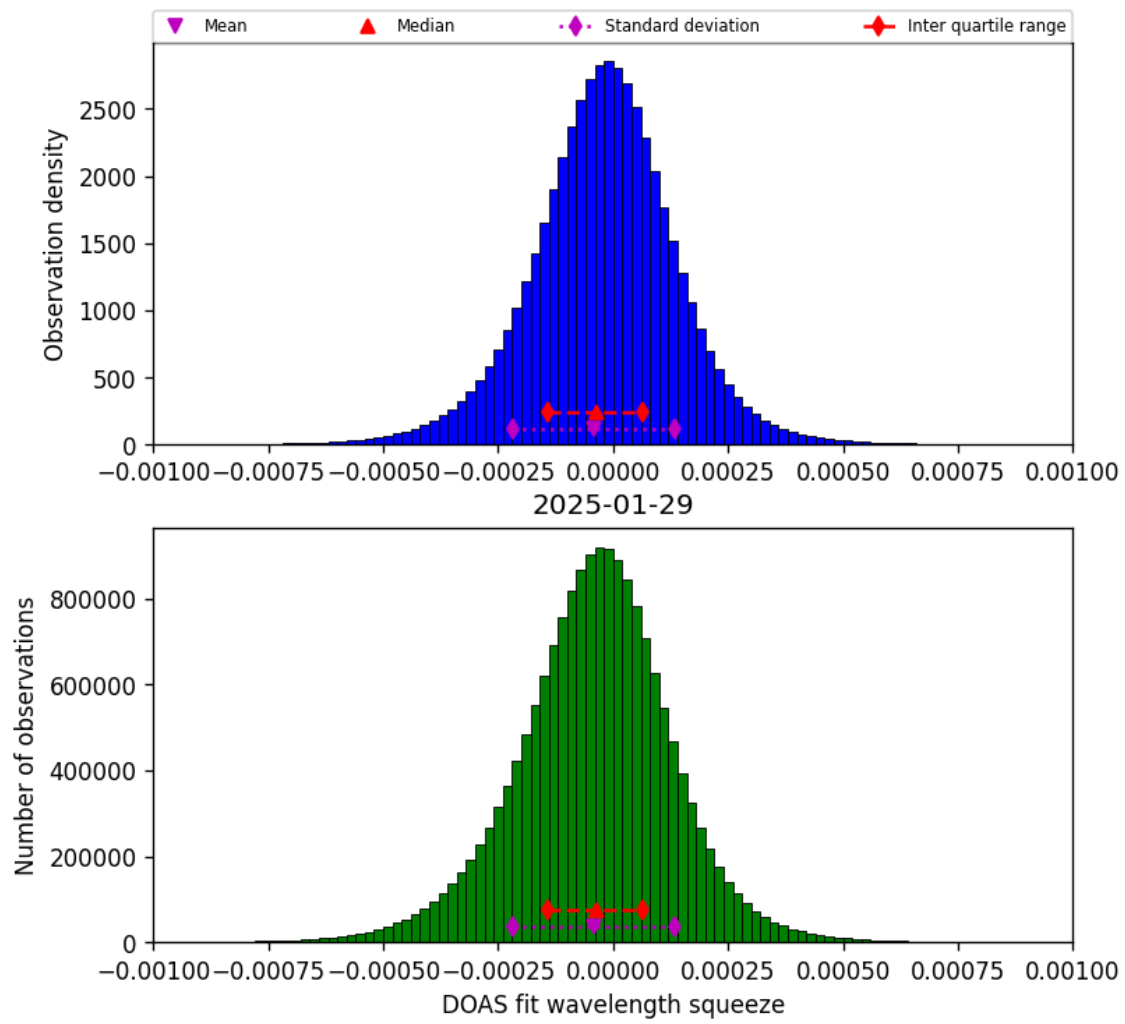


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-01-29 to 2025-01-30

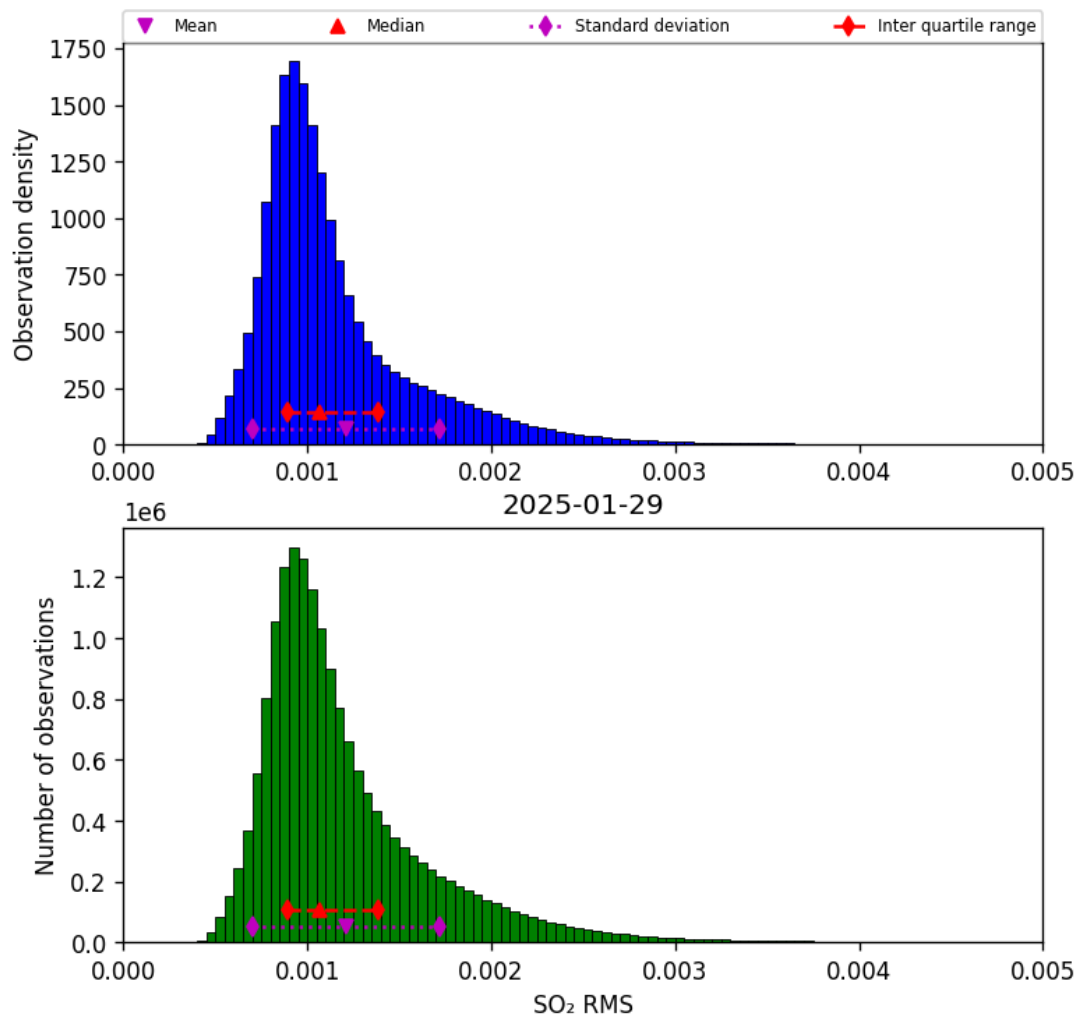


Figure 79: Histogram of “SO₂ RMS” for 2025-01-29 to 2025-01-30

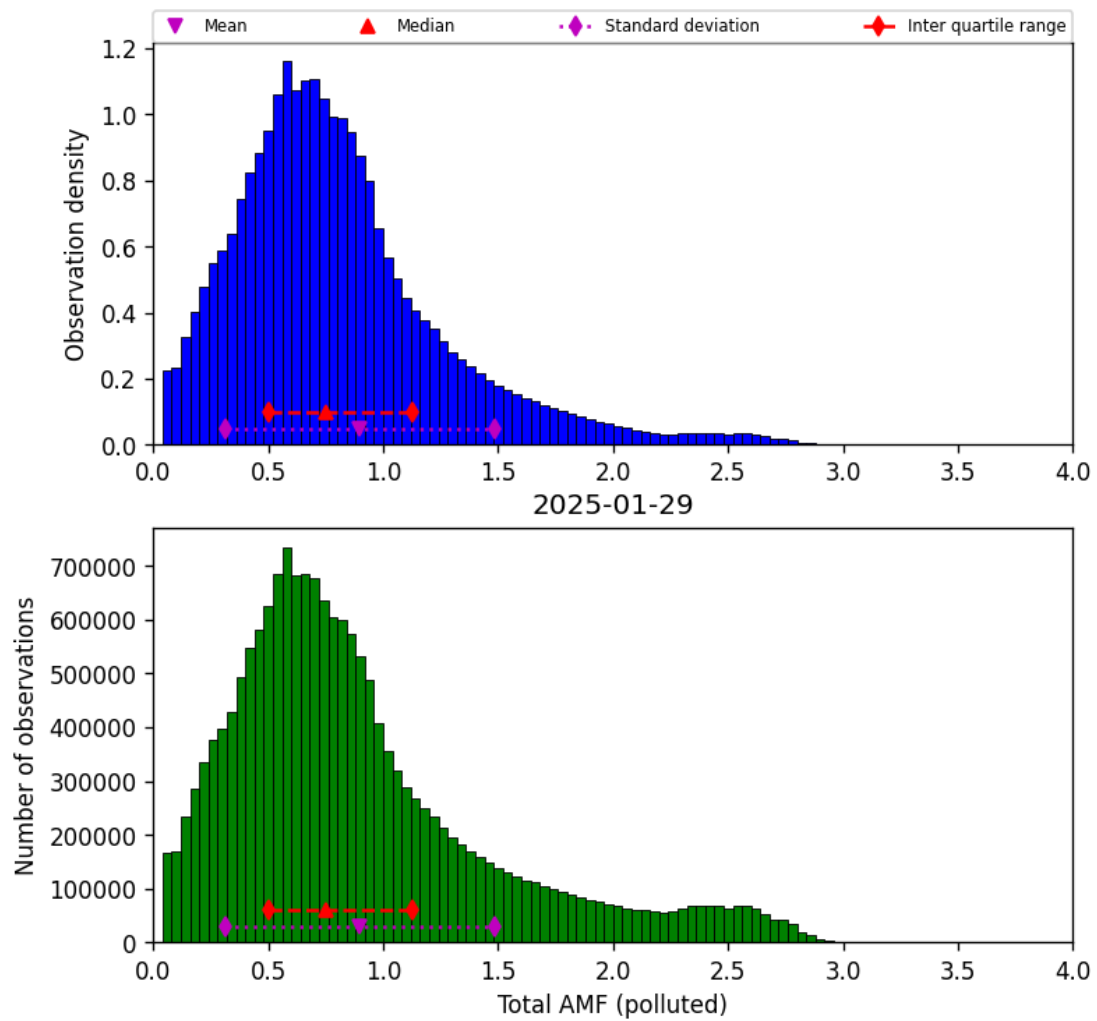


Figure 80: Histogram of “Total AMF (polluted)” for 2025-01-29 to 2025-01-30

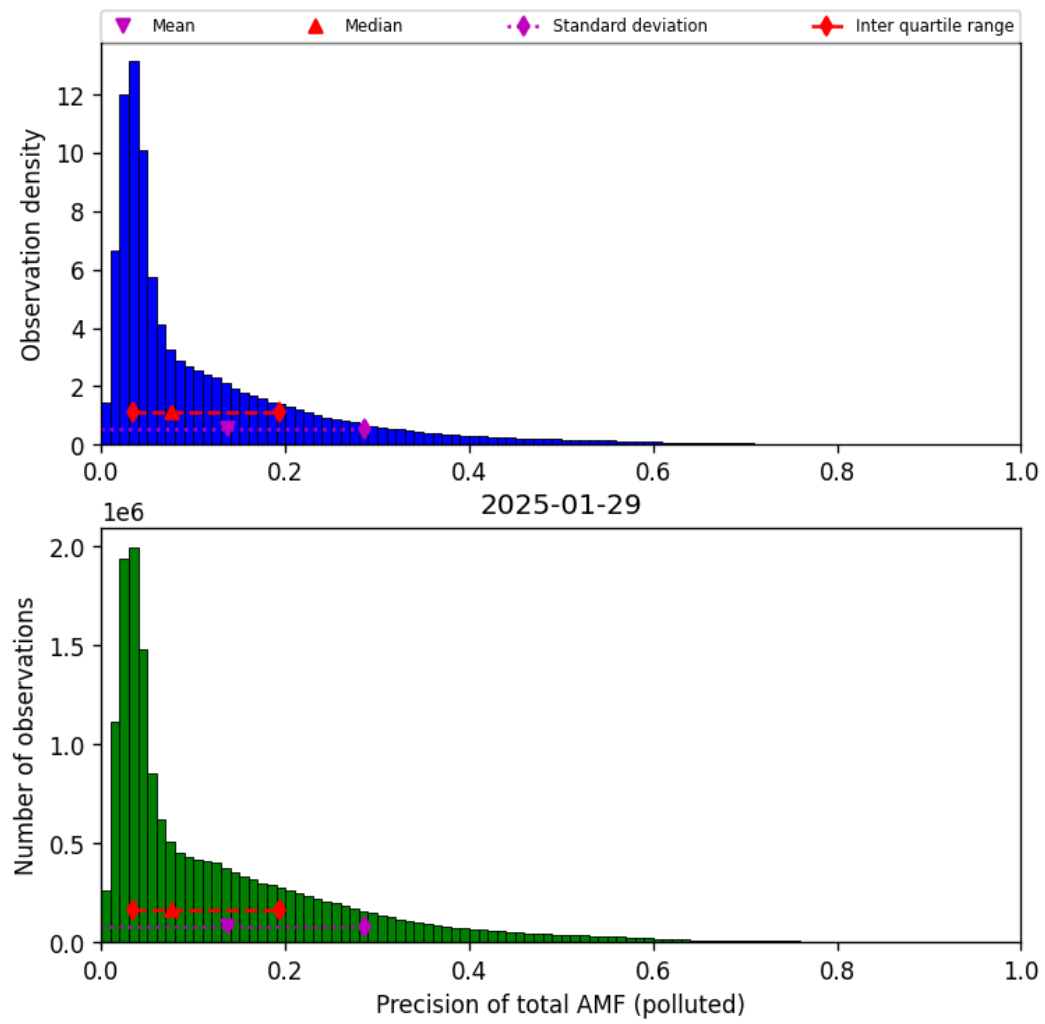


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-01-29 to 2025-01-30

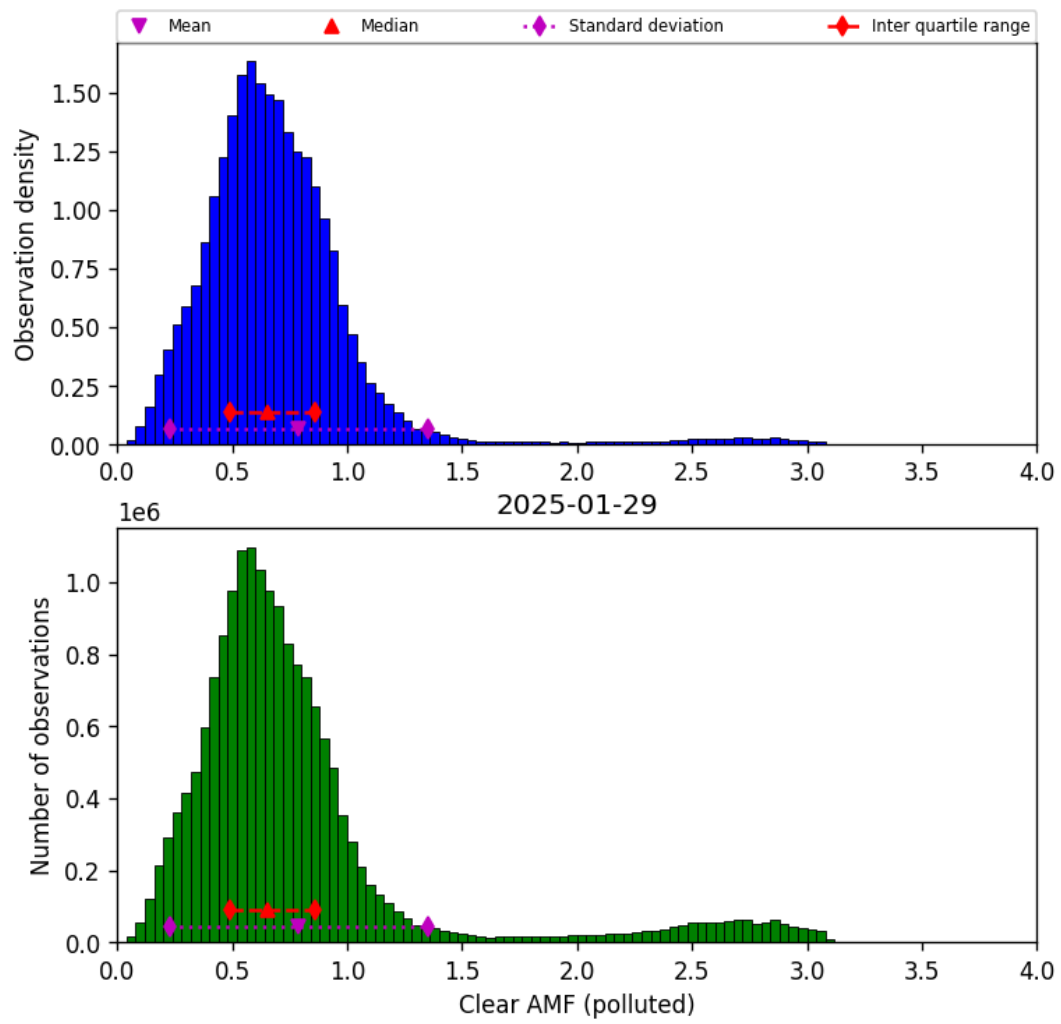


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-01-29 to 2025-01-30

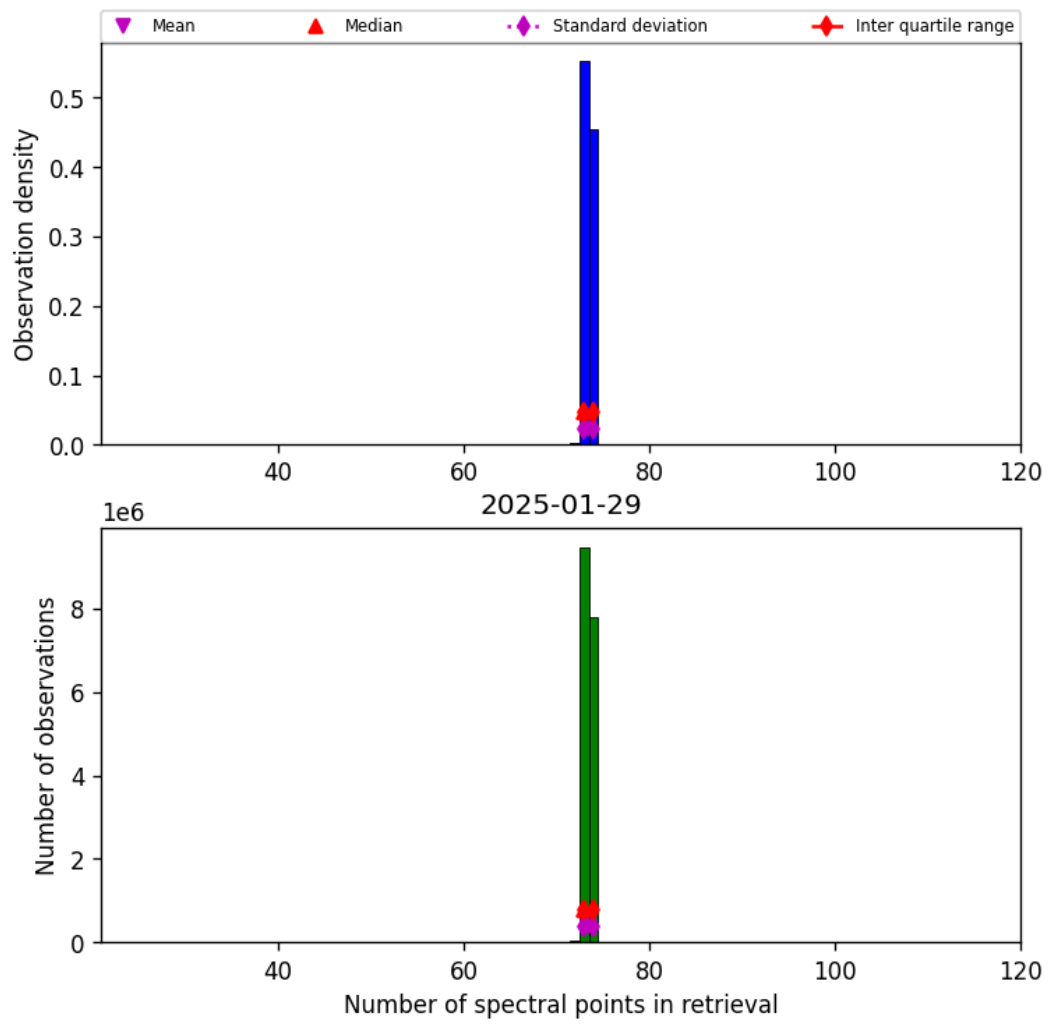


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-01-29 to 2025-01-30

9 Along track statistics

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

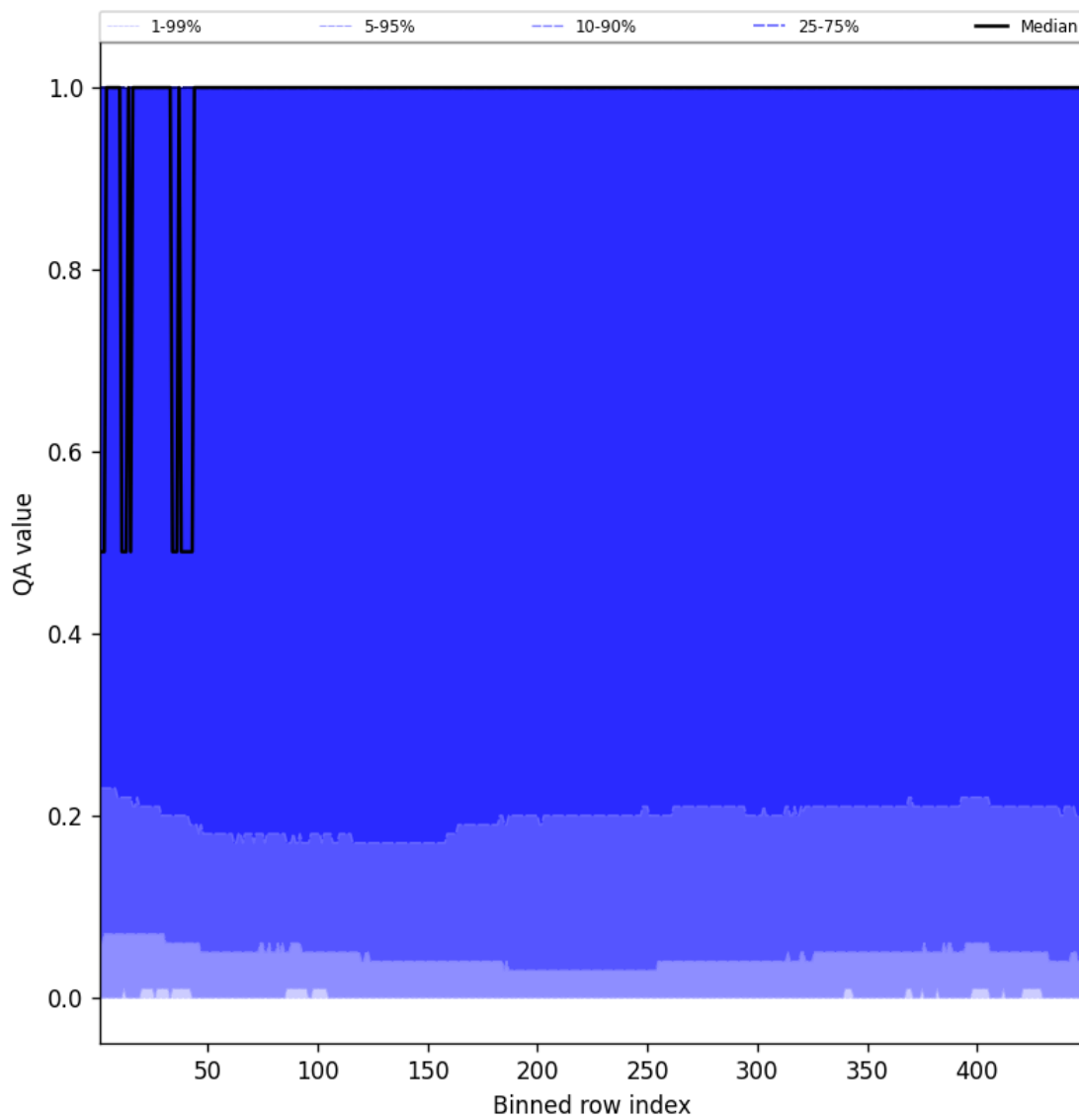


Figure 84: Along track statistics of “QA value” for 2025-01-29 to 2025-01-30

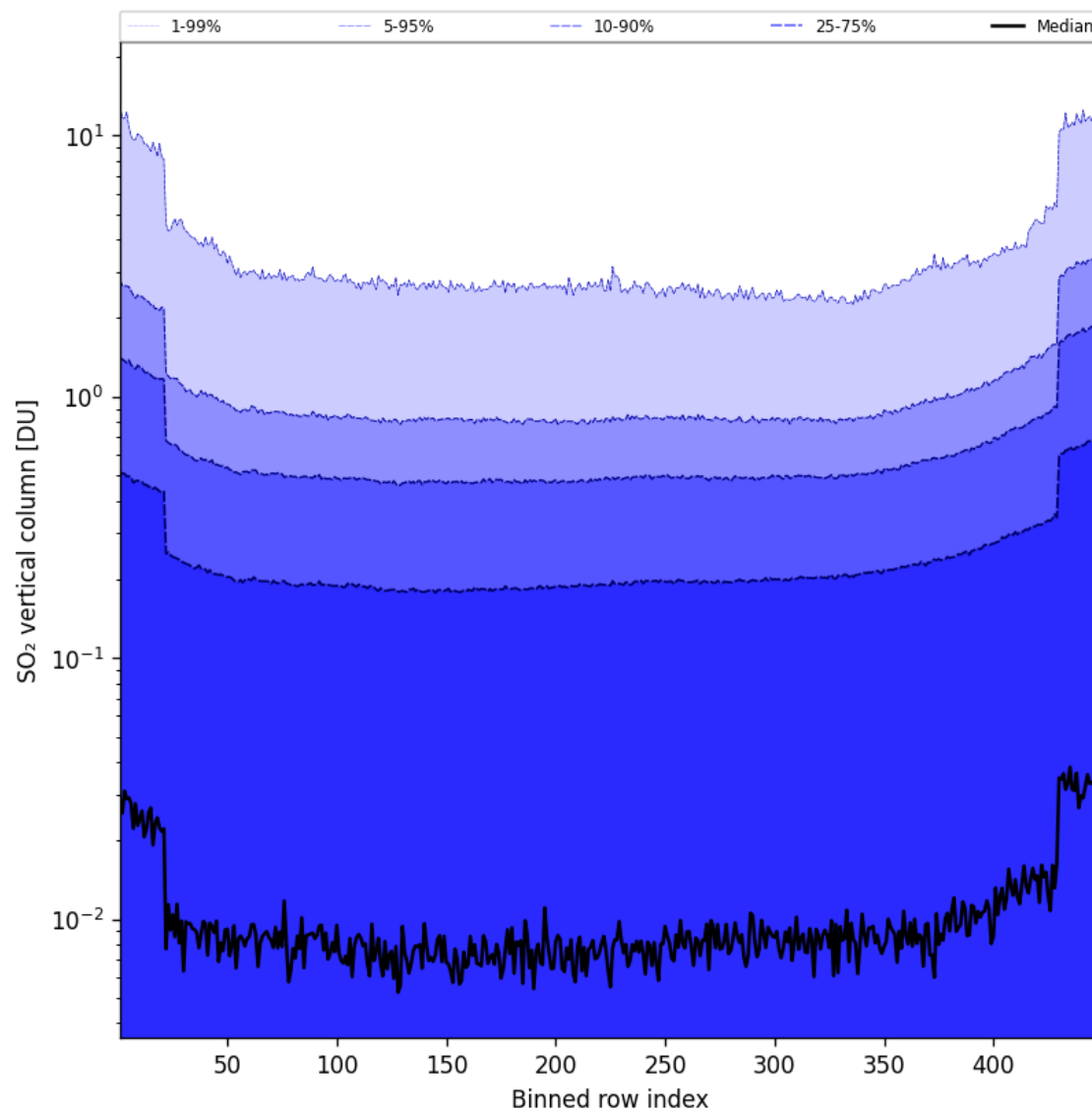


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-01-29 to 2025-01-30

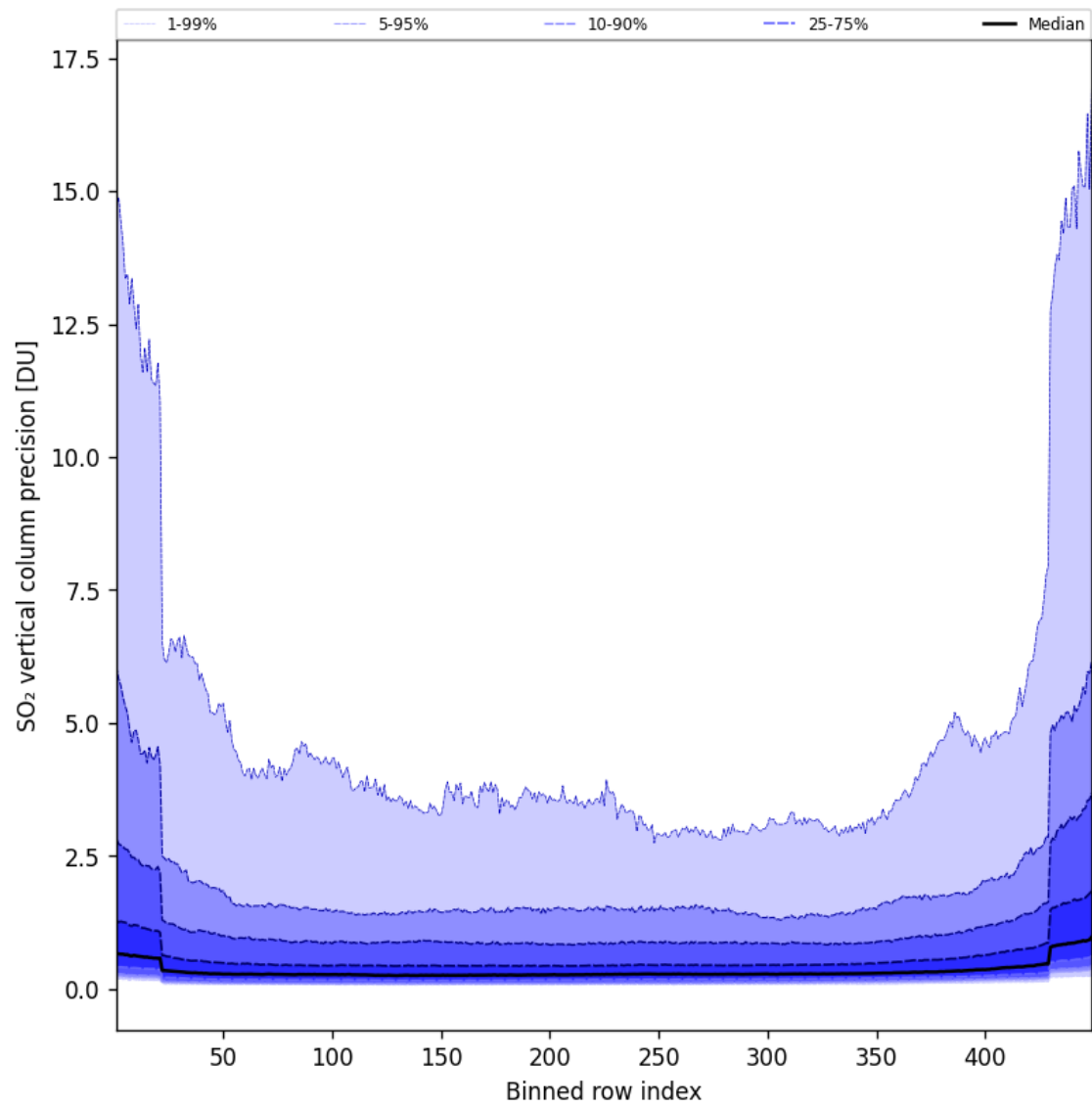


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-01-29 to 2025-01-30

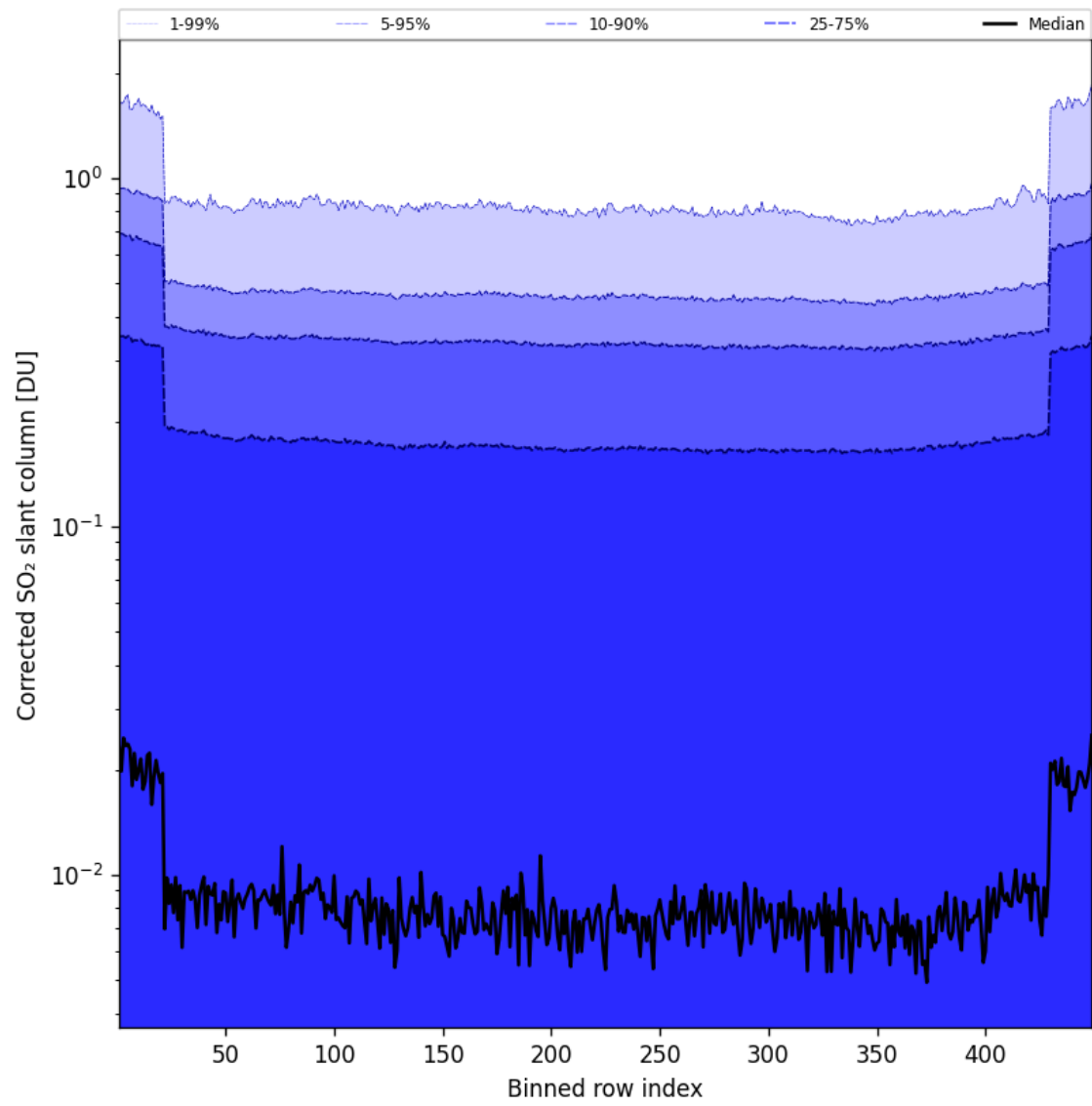


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-01-29 to 2025-01-30

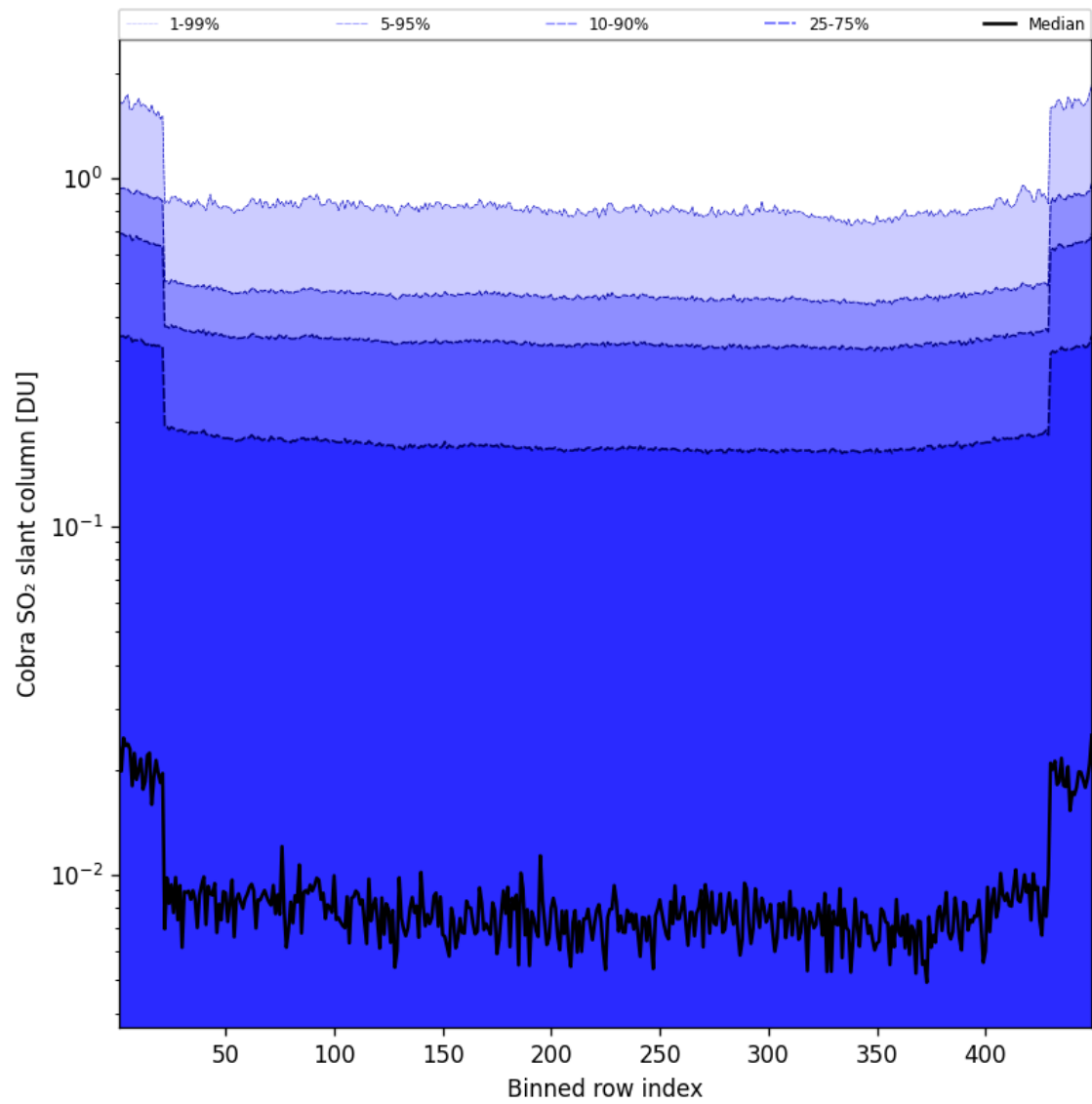


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-01-29 to 2025-01-30

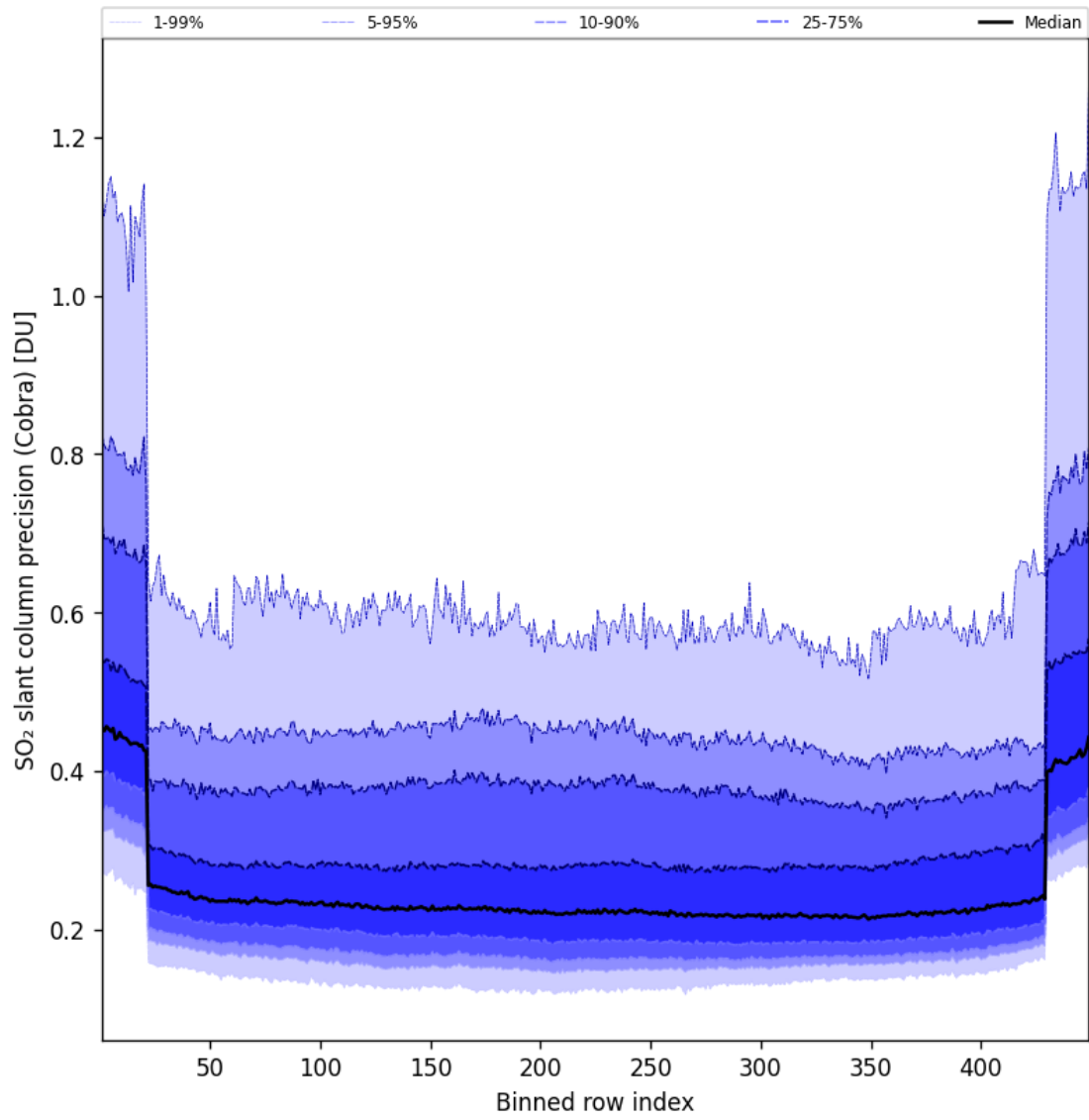


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-01-29 to 2025-01-30

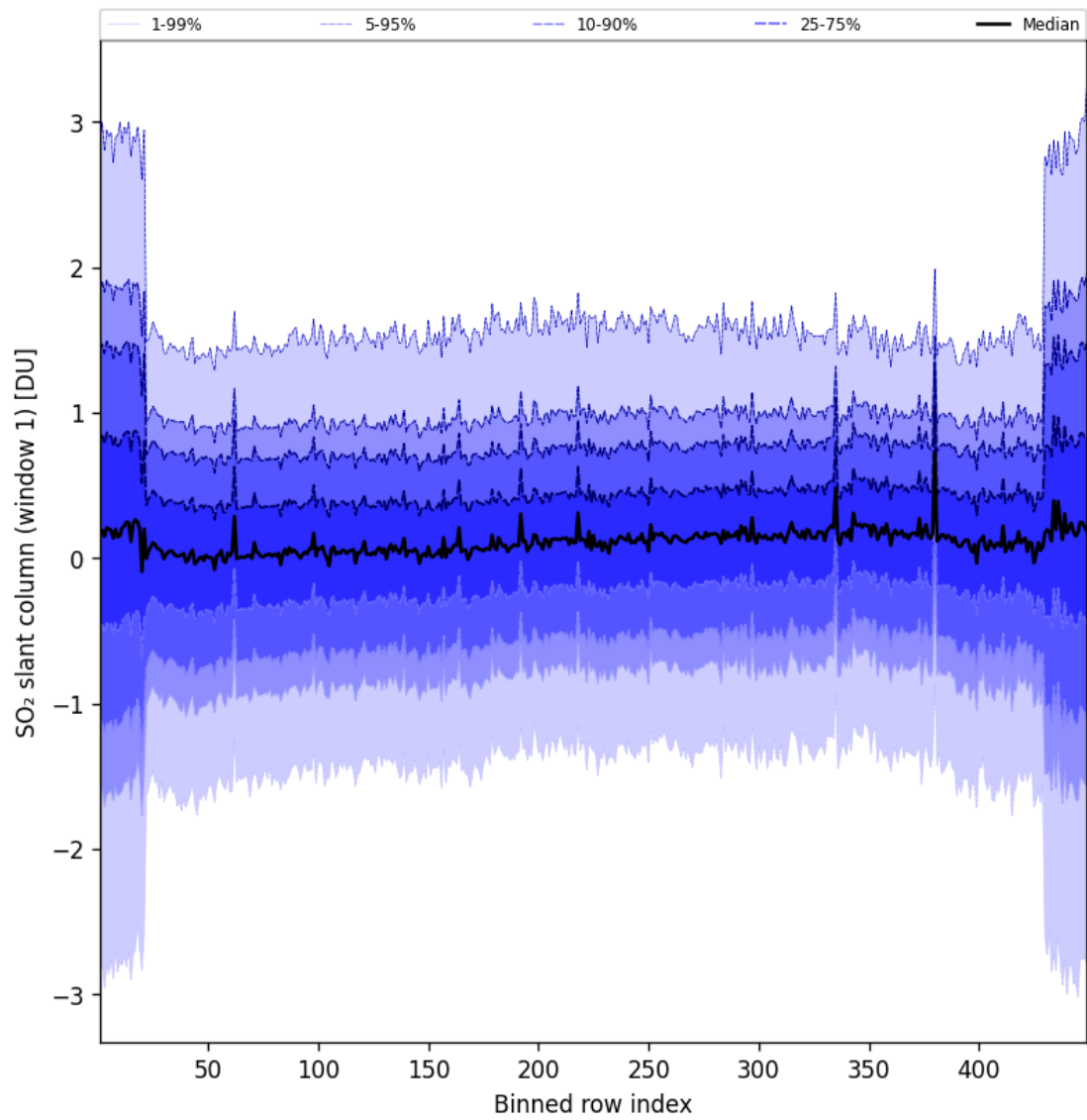


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-01-29 to 2025-01-30

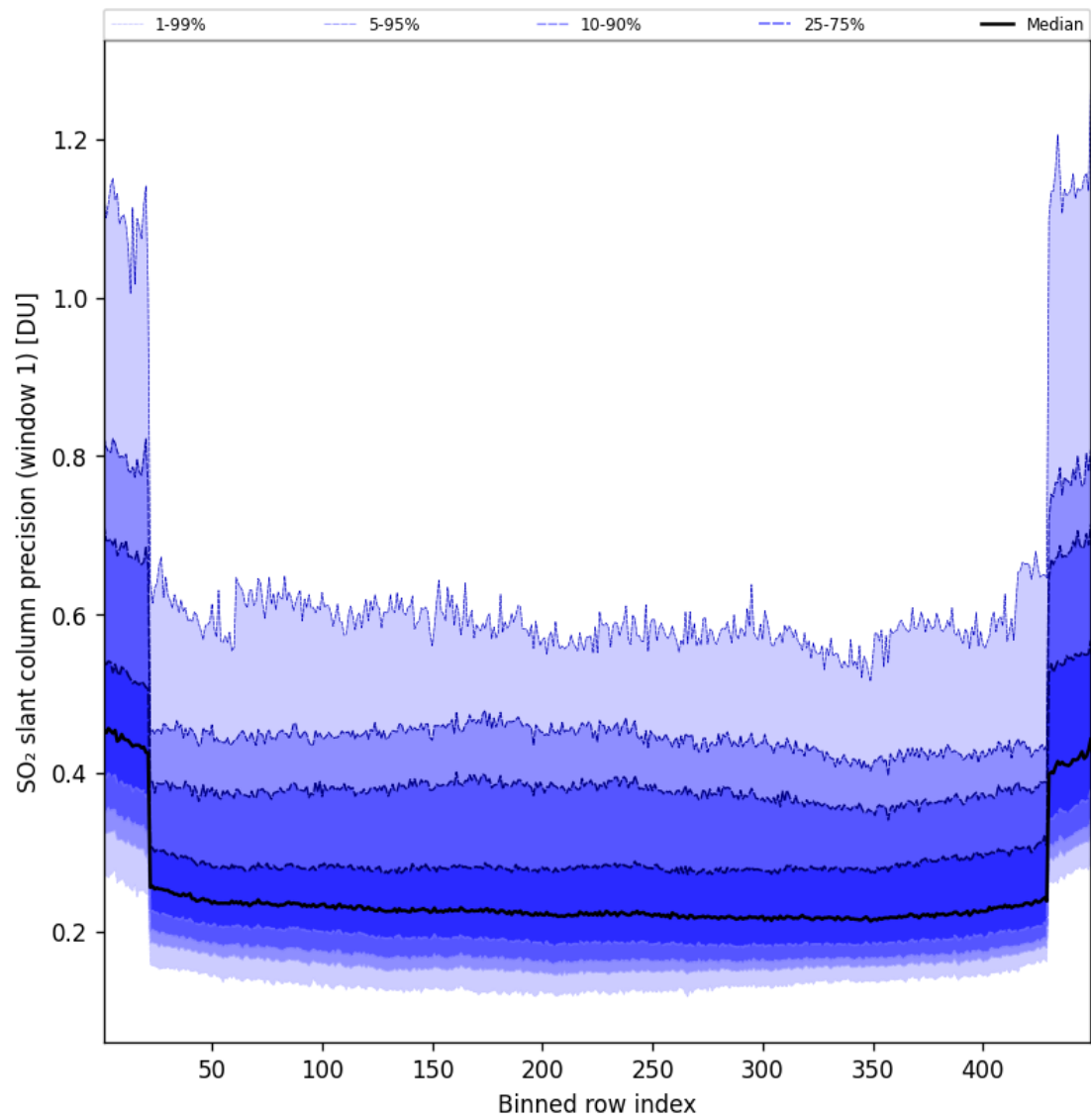


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-01-29 to 2025-01-30

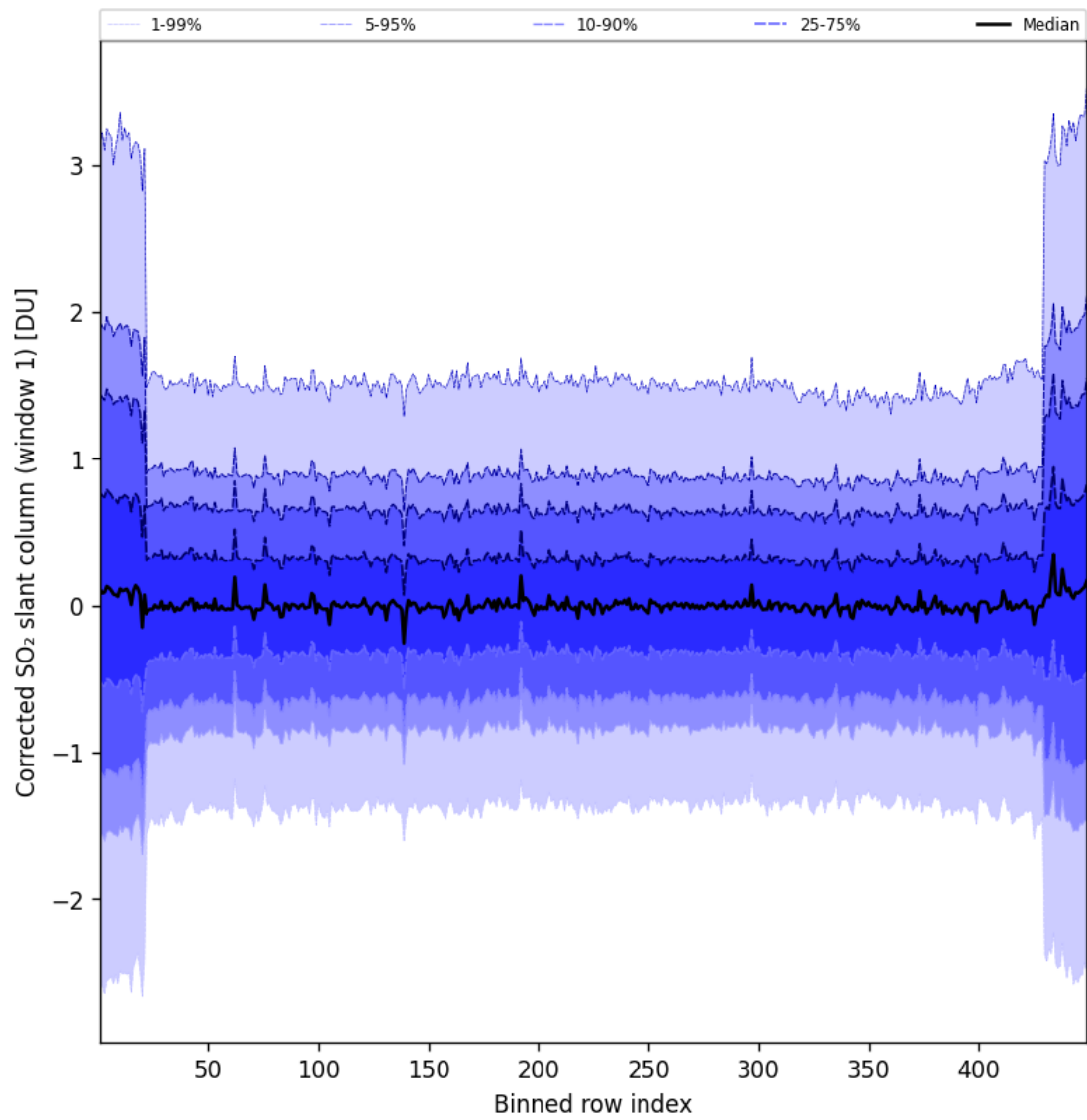


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-01-29 to 2025-01-30

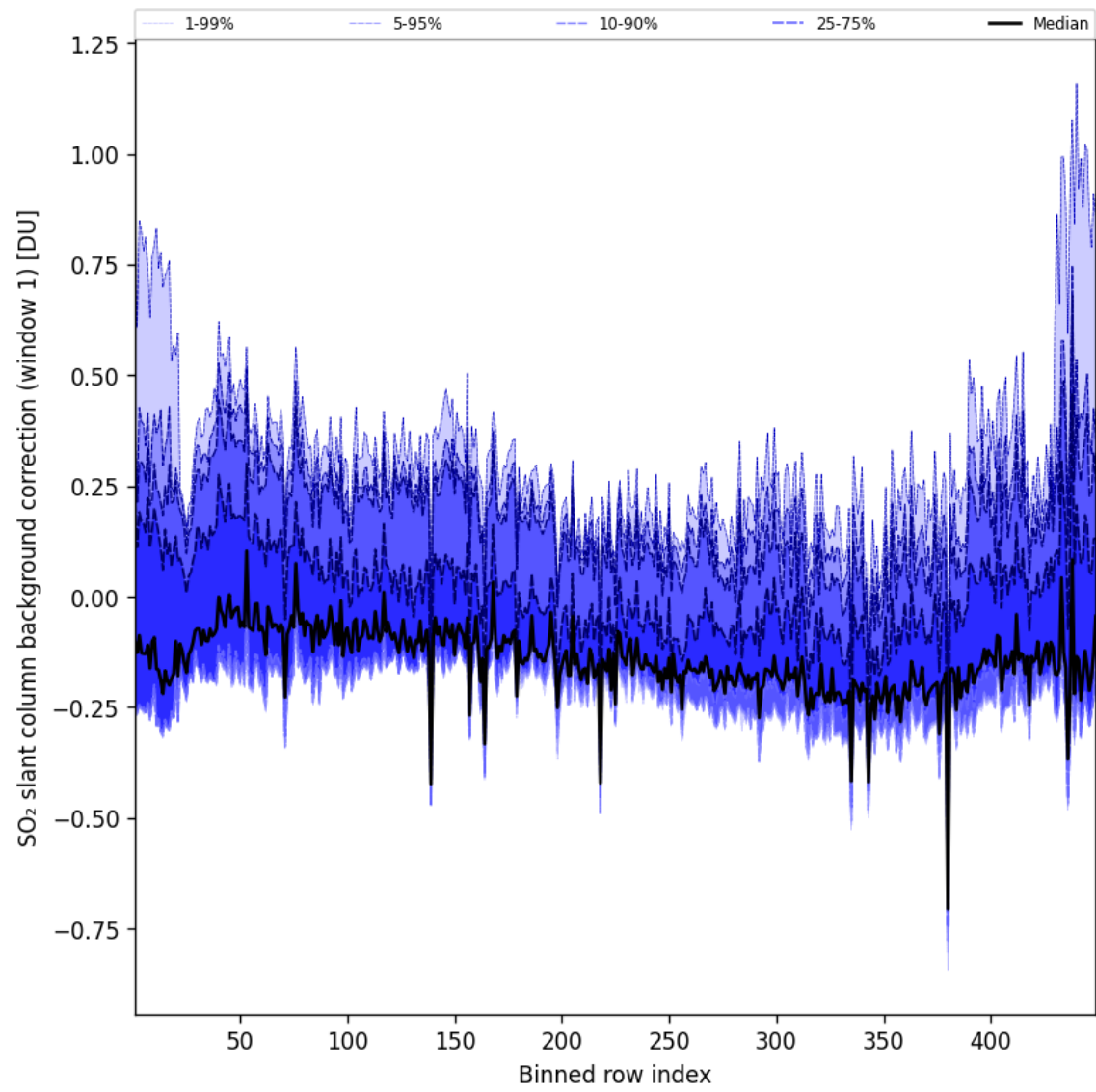


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-01-29 to 2025-01-30

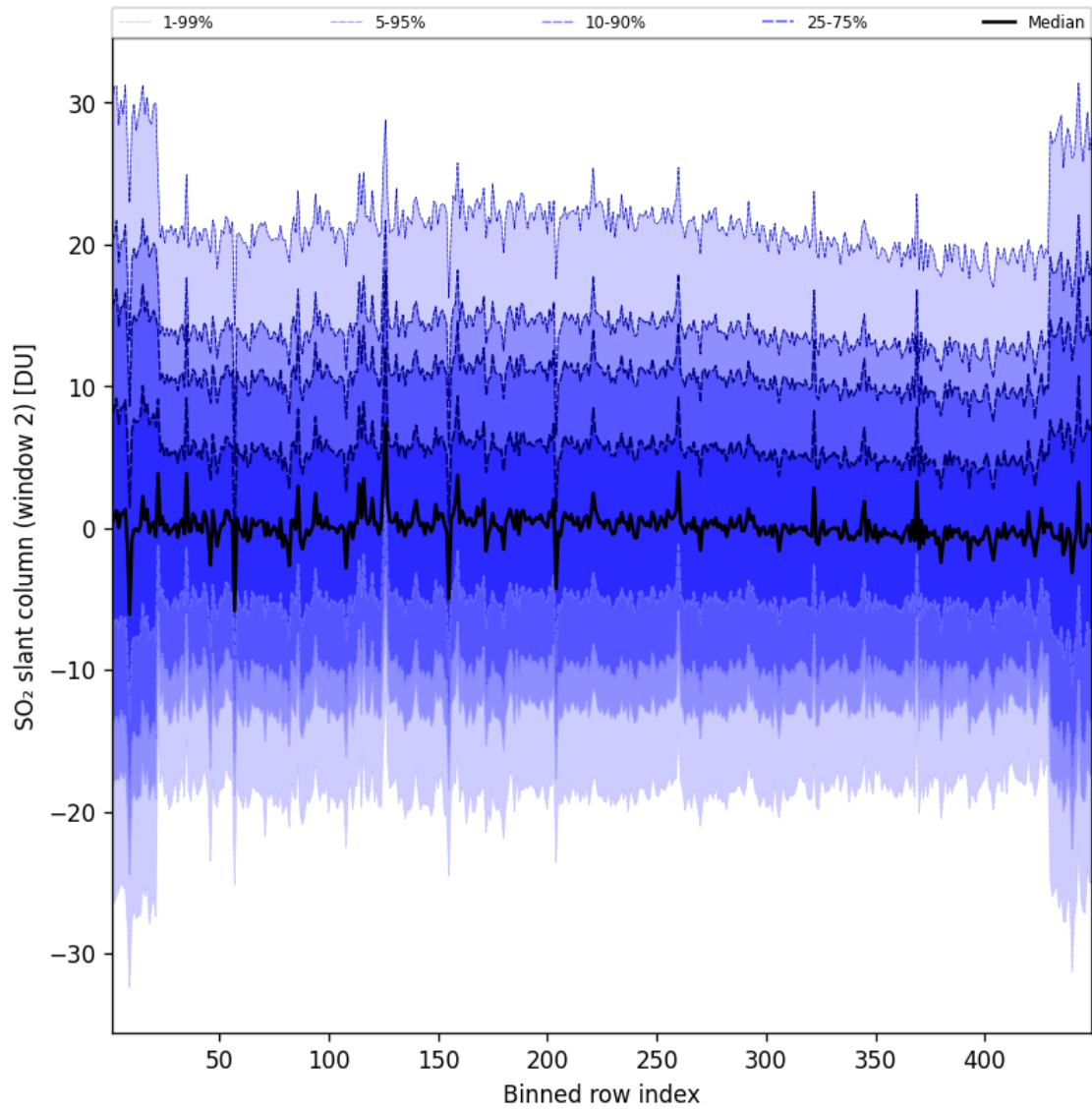


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-01-29 to 2025-01-30

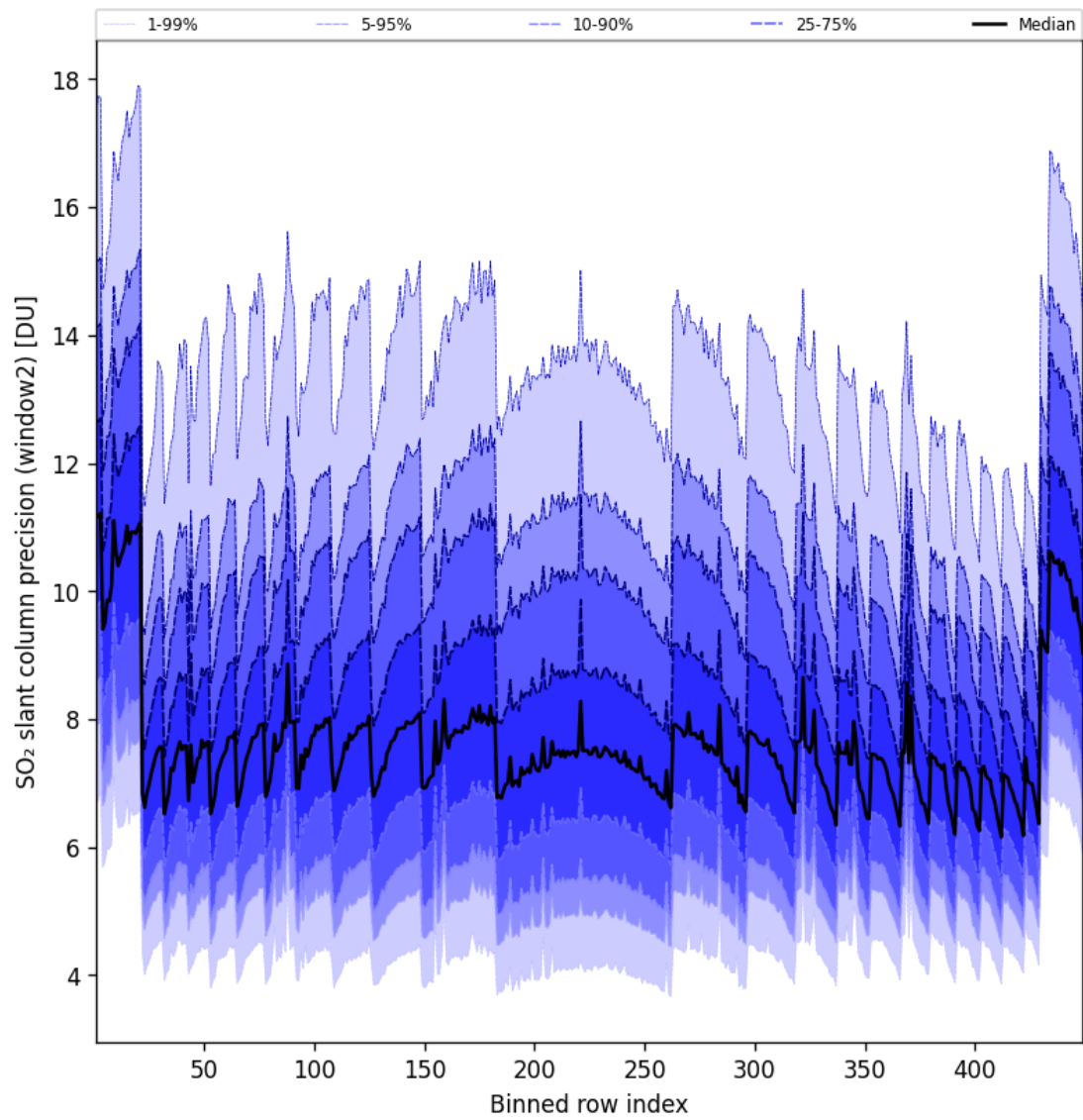


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-01-29 to 2025-01-30

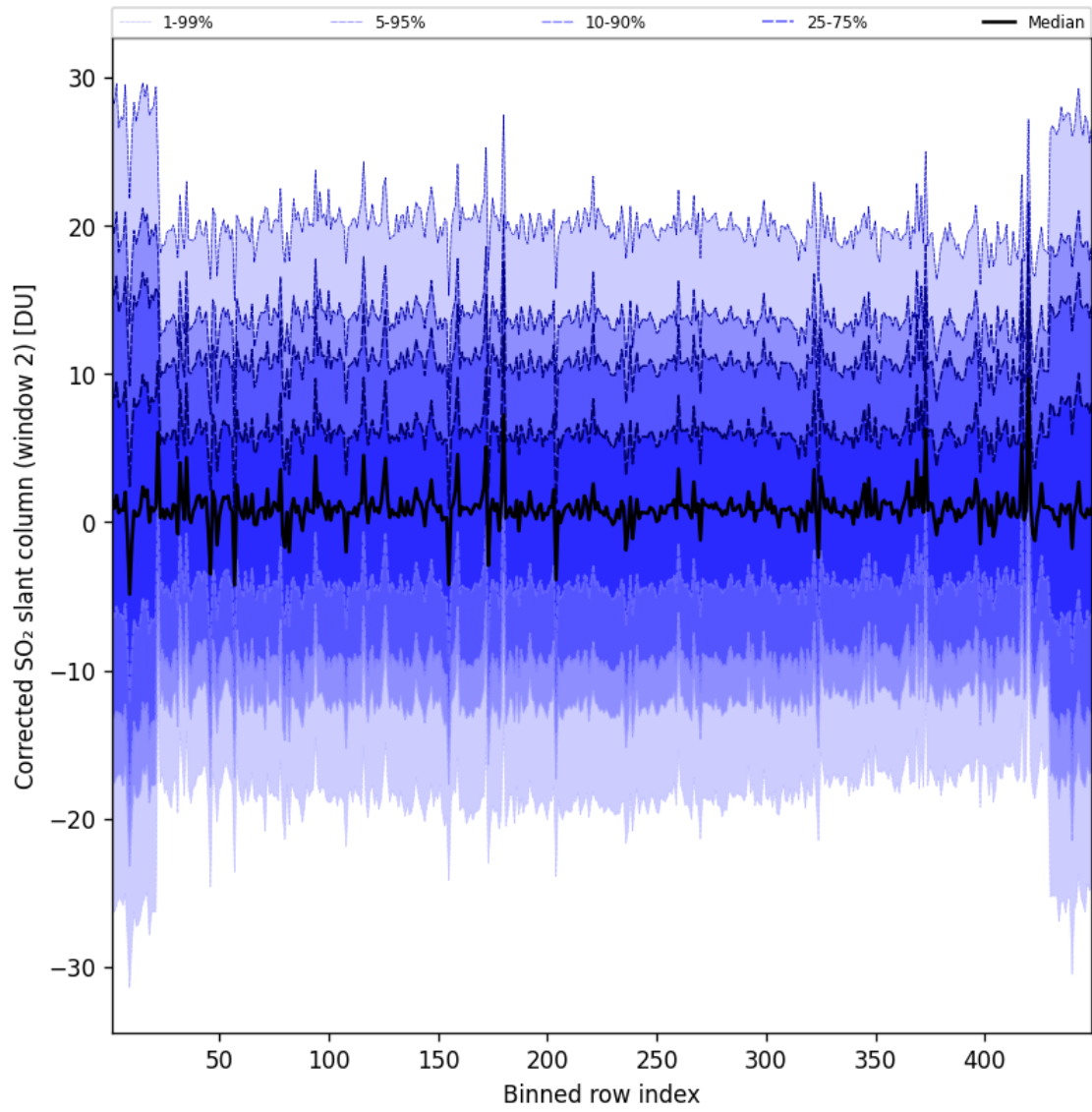


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-01-29 to 2025-01-30

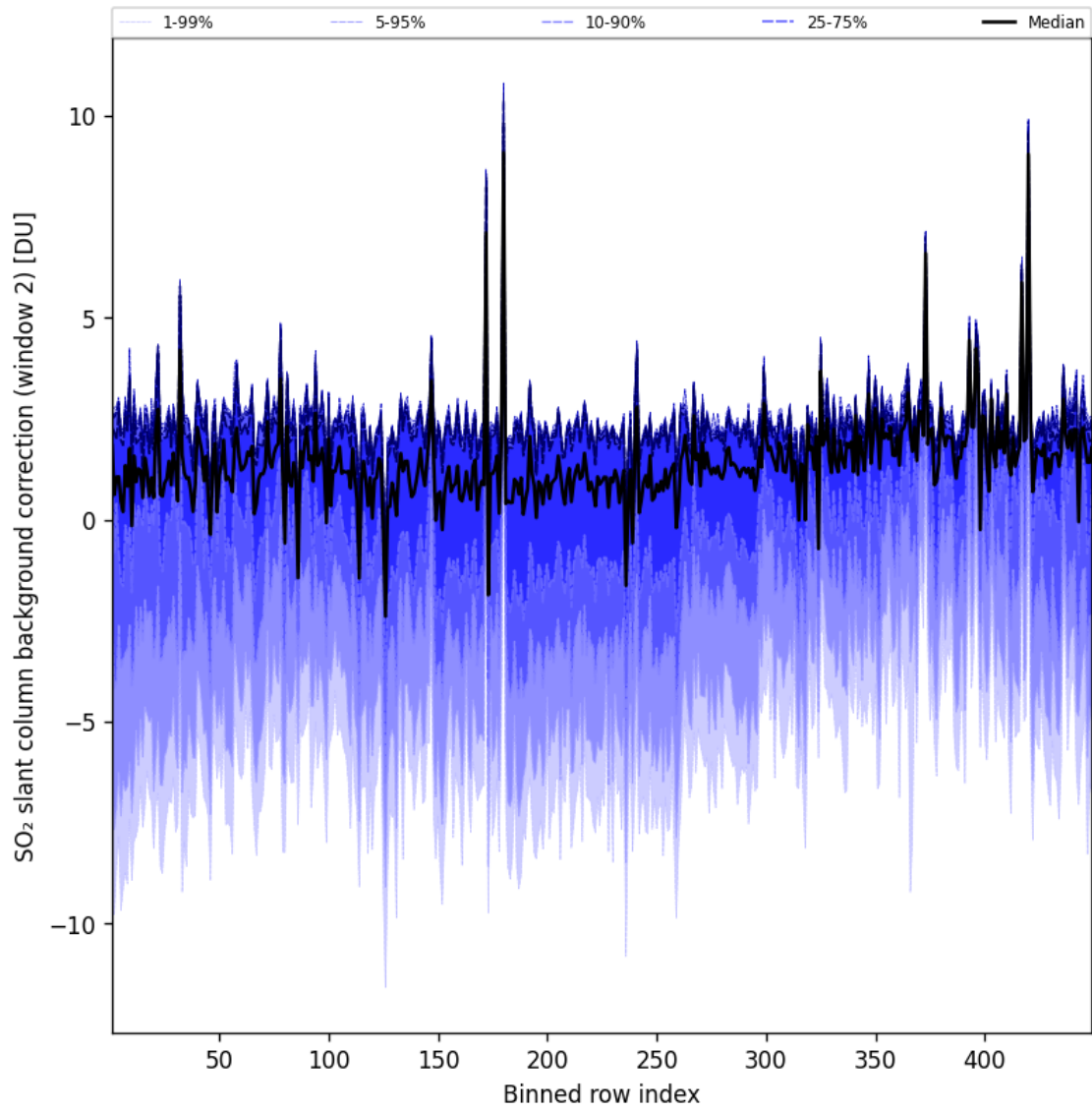


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-01-29 to 2025-01-30

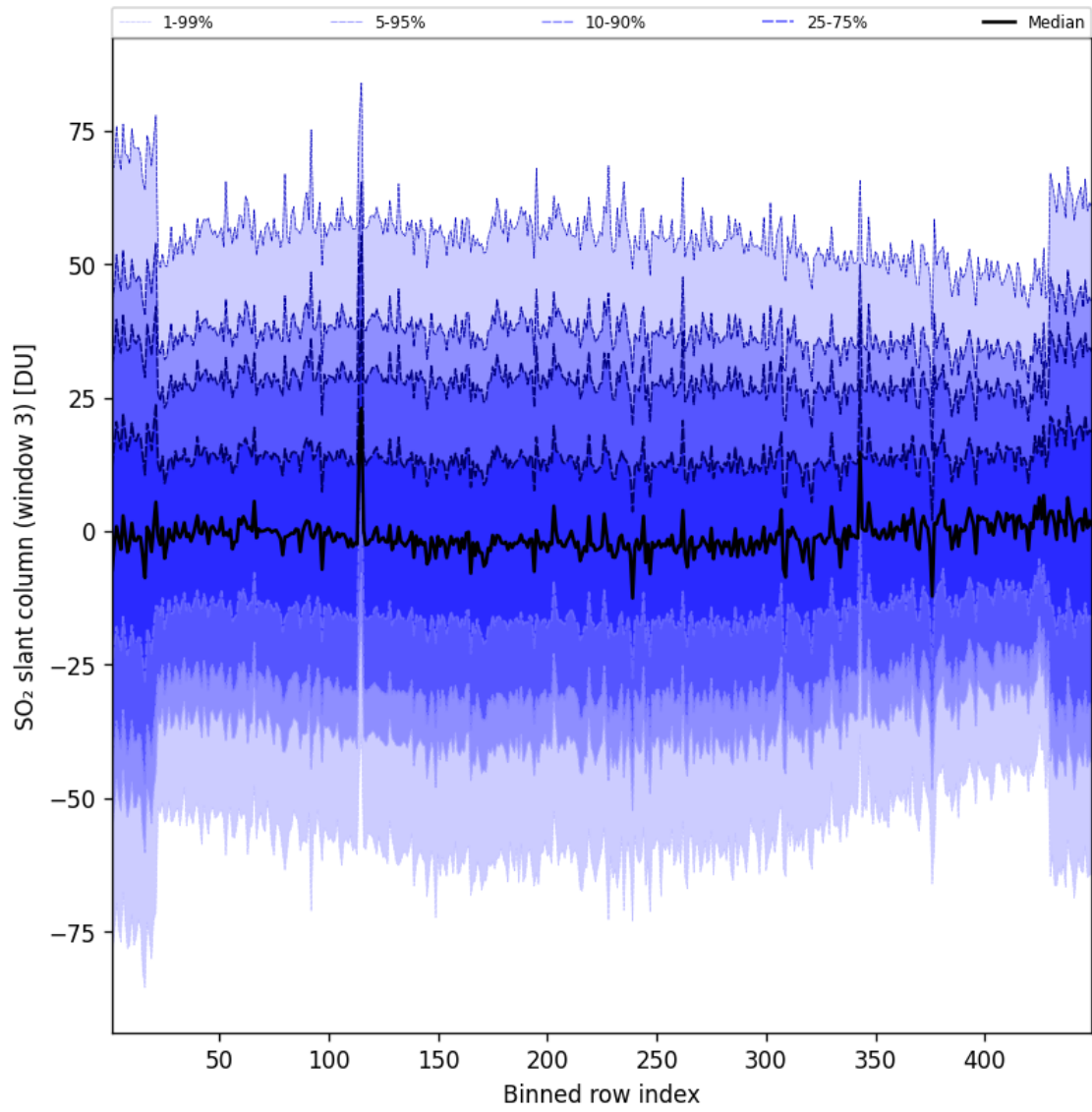


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-01-29 to 2025-01-30

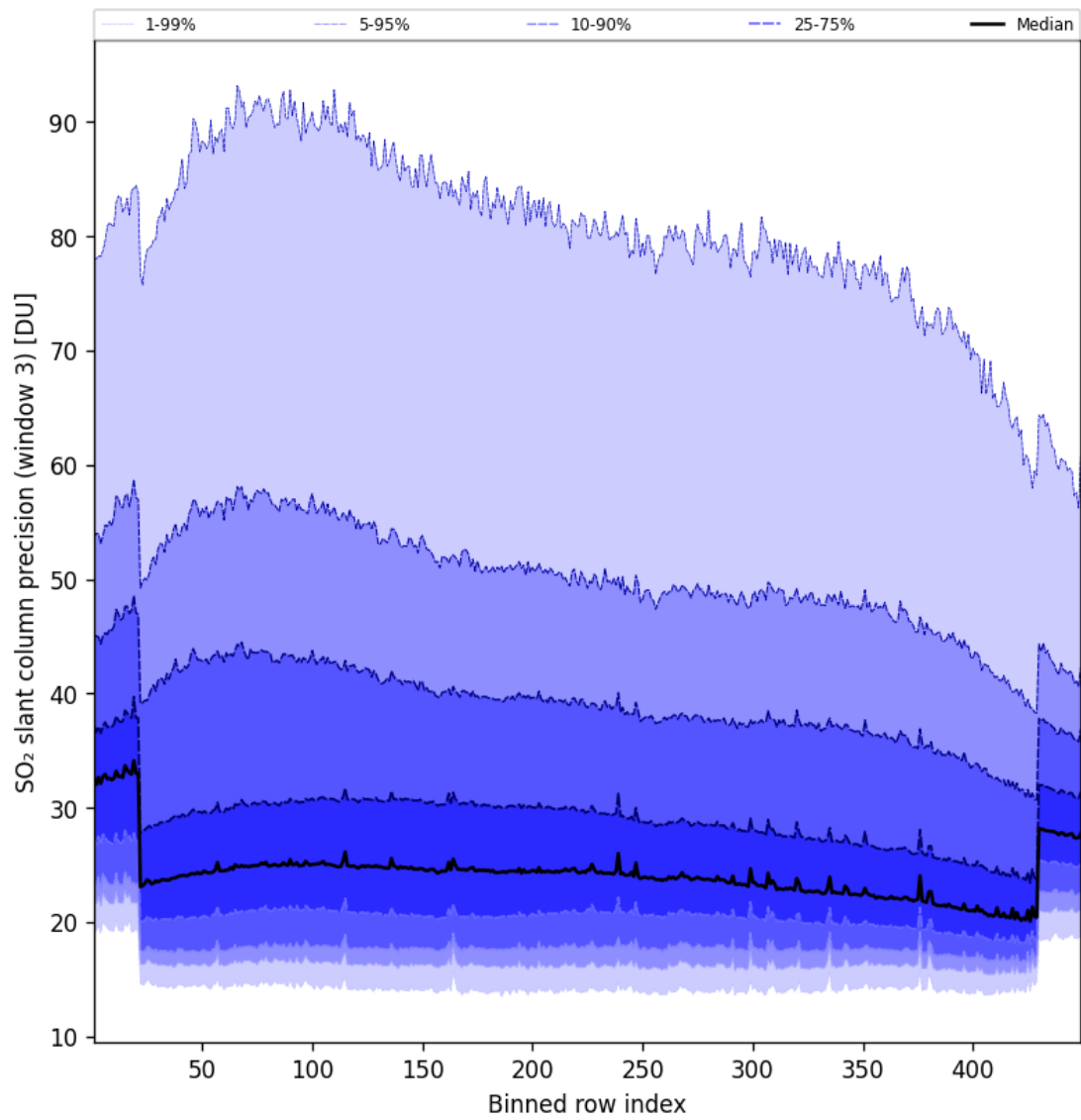


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-01-29 to 2025-01-30

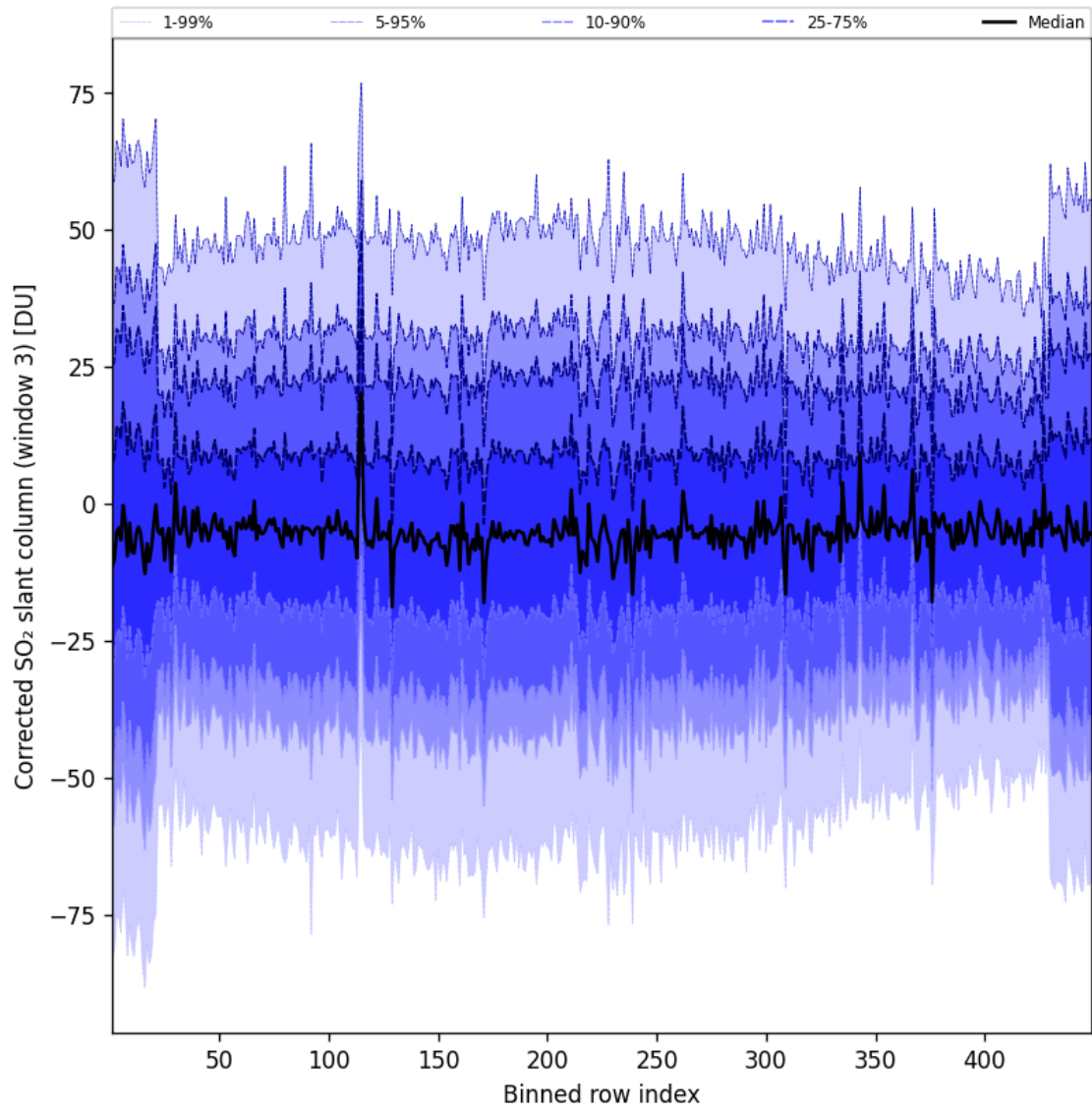


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-01-29 to 2025-01-30

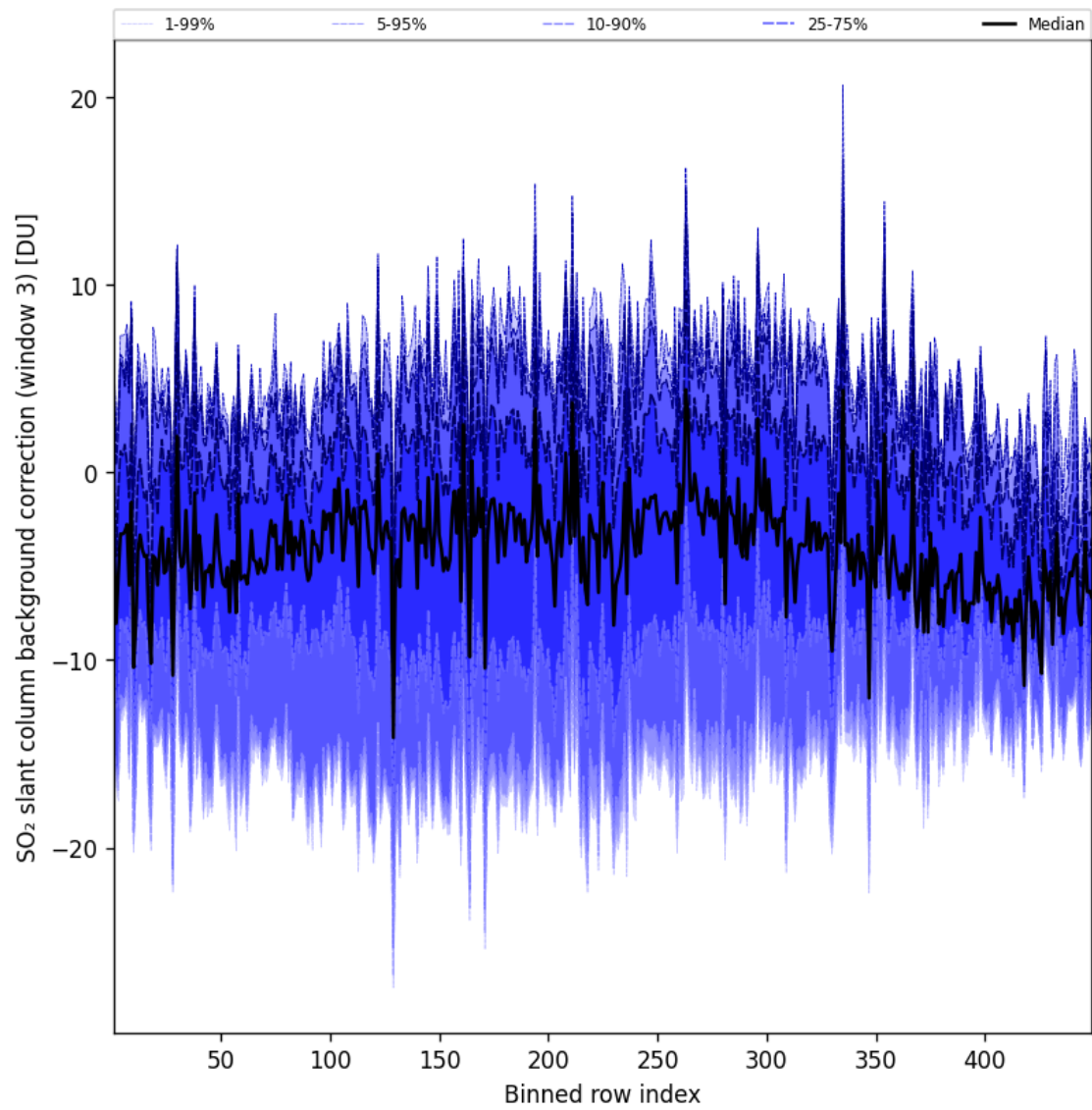


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-01-29 to 2025-01-30

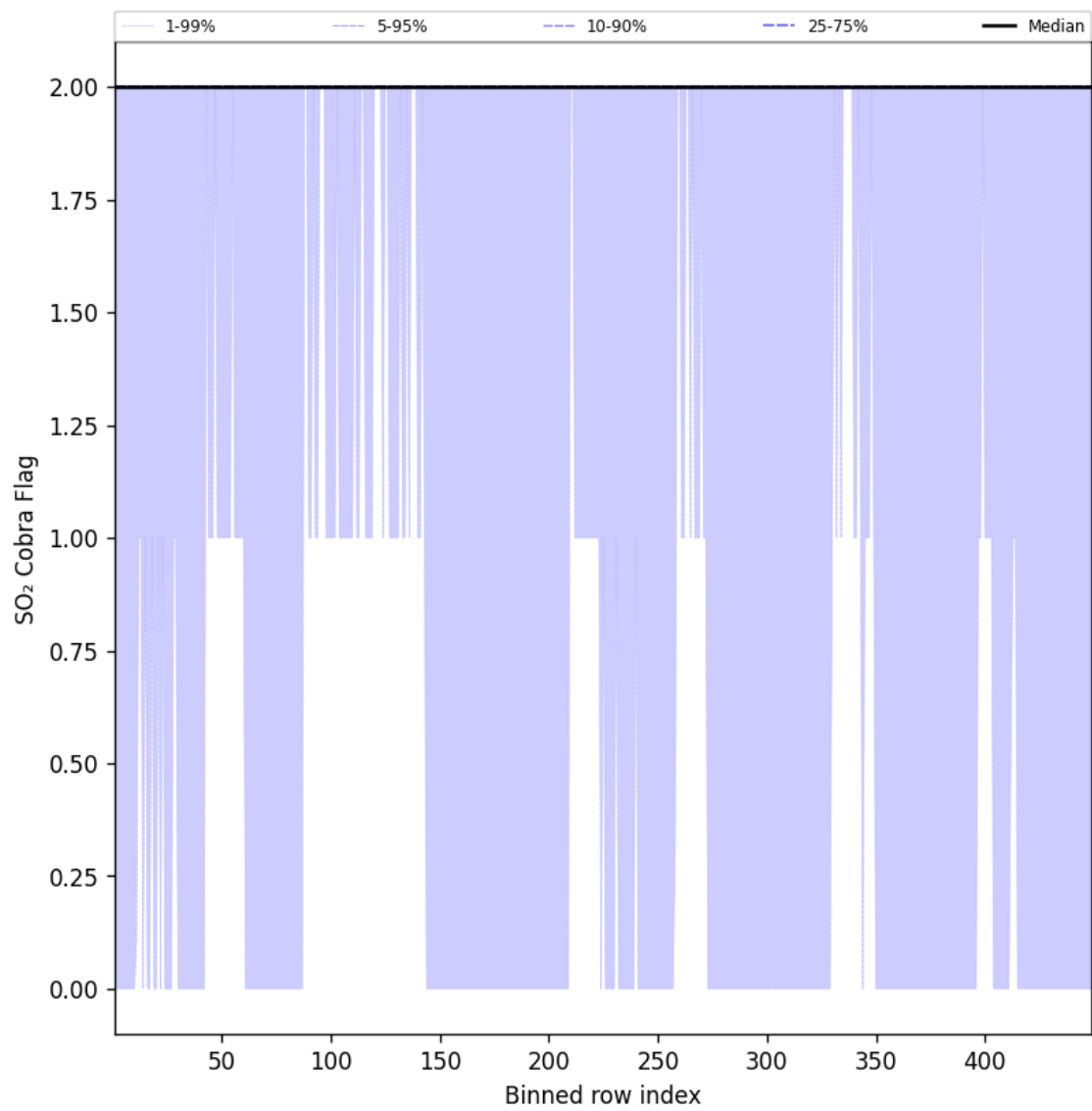


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-01-29 to 2025-01-30

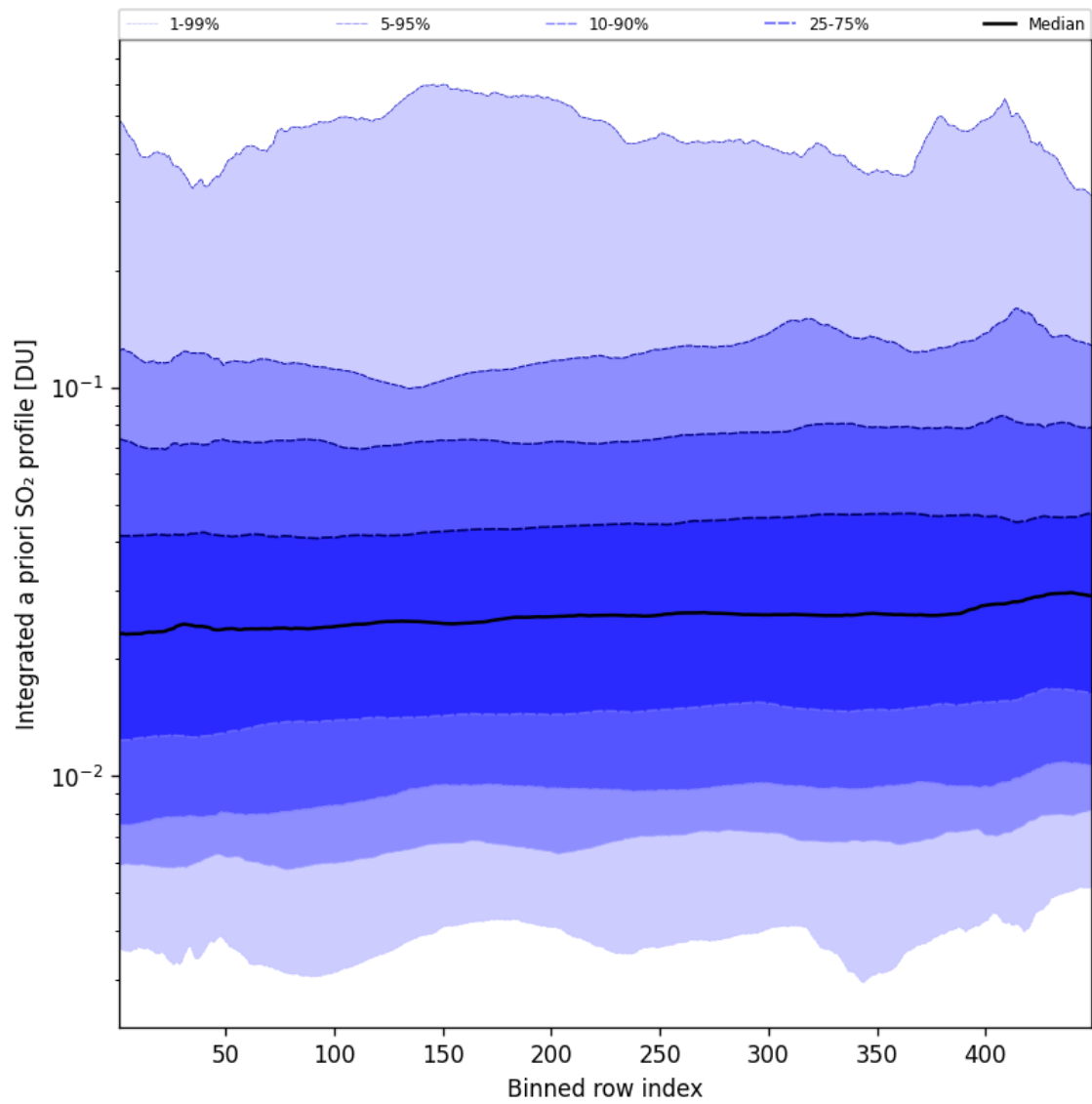


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-01-29 to 2025-01-30

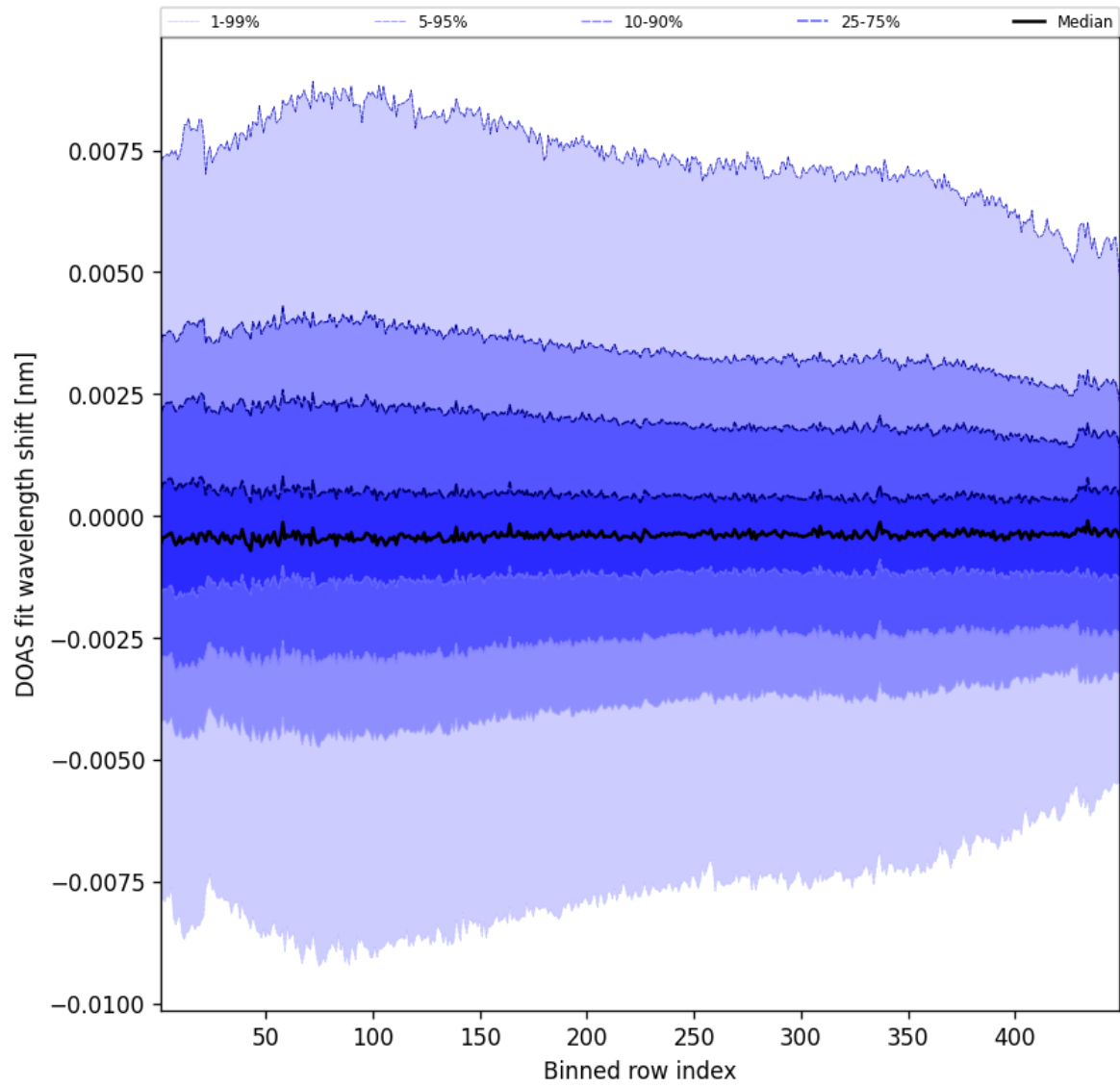


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-01-29 to 2025-01-30

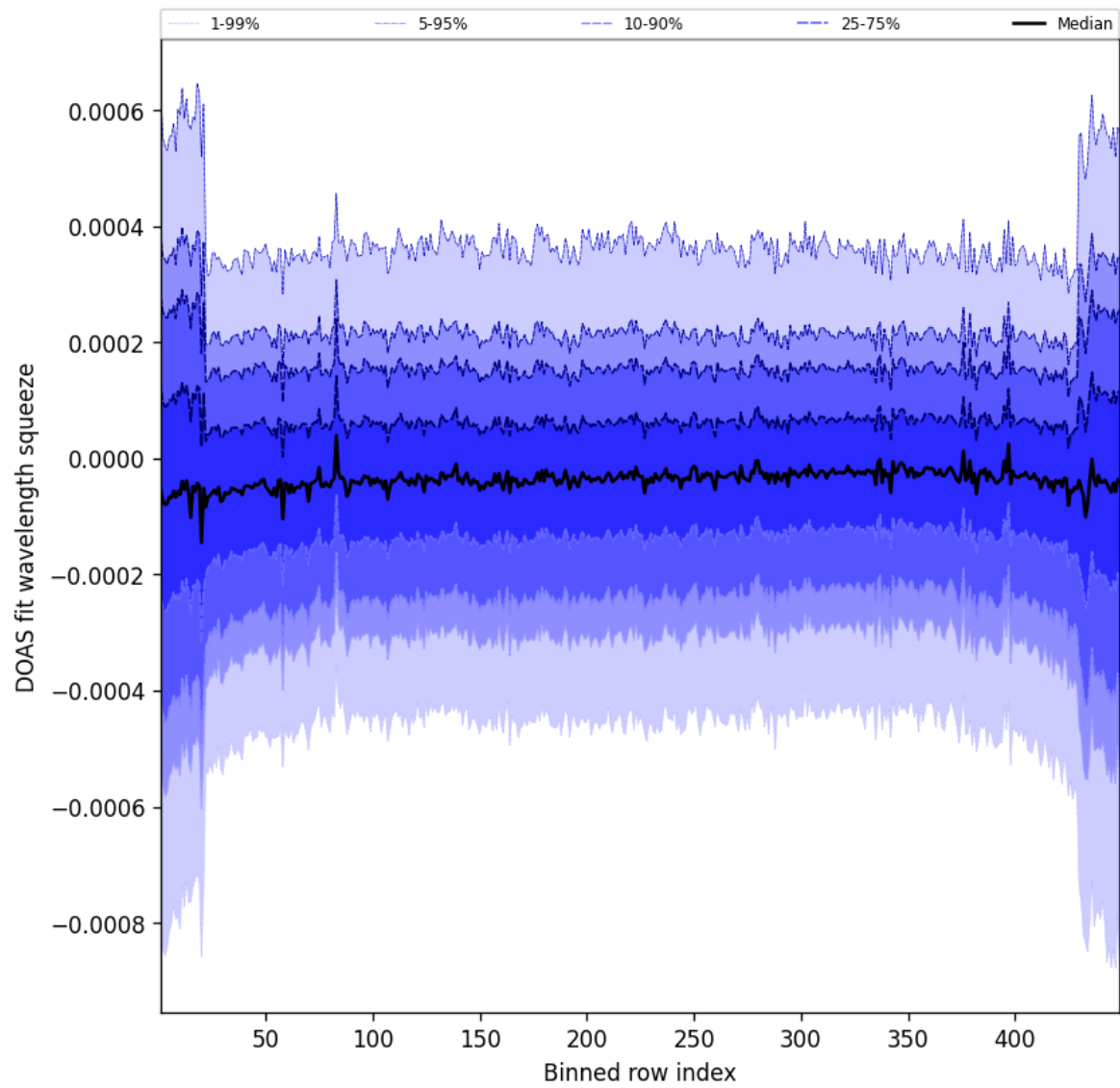


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-01-29 to 2025-01-30

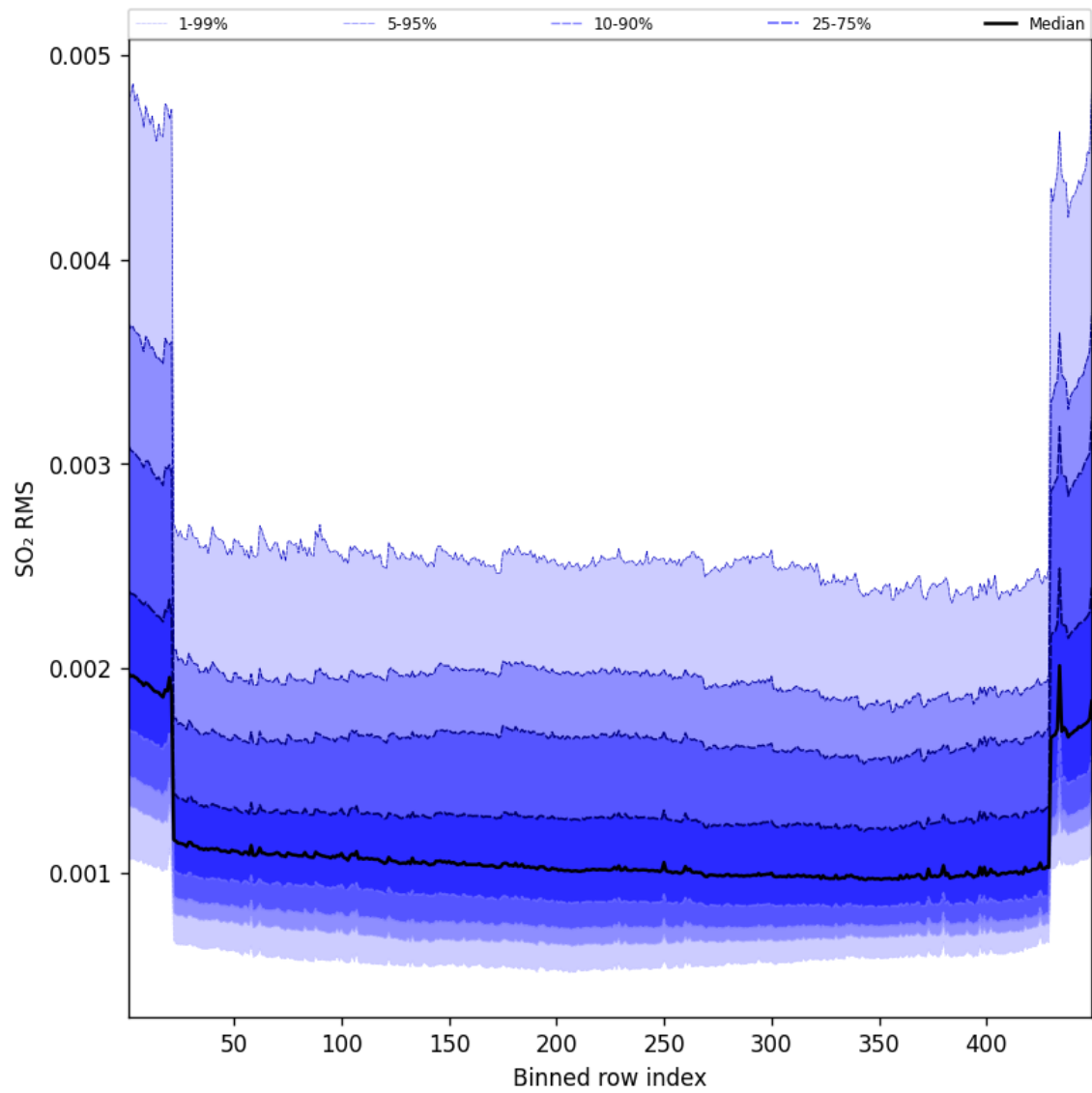


Figure 106: Along track statistics of “SO₂ RMS” for 2025-01-29 to 2025-01-30

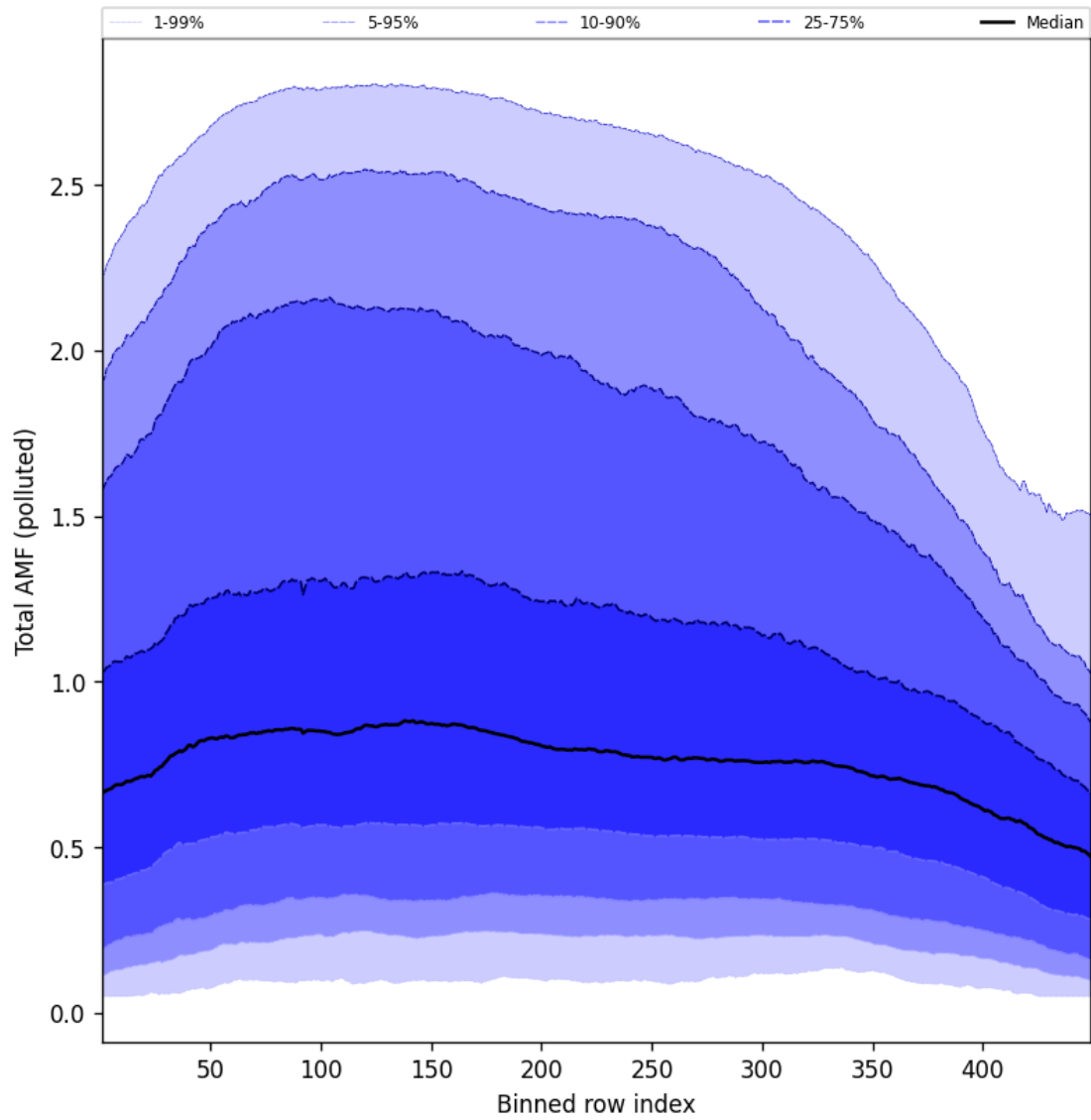


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-01-29 to 2025-01-30

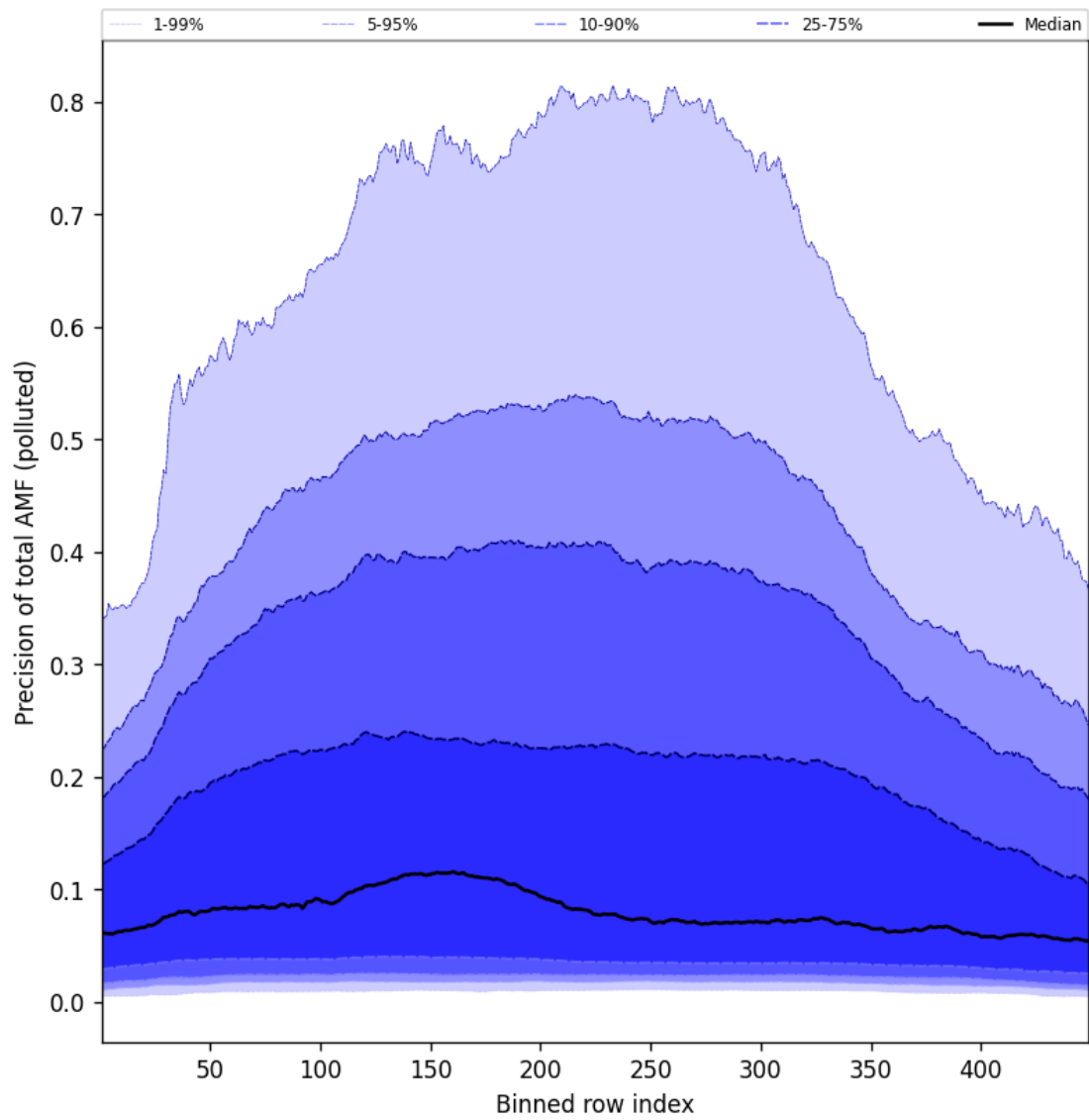


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-01-29 to 2025-01-30

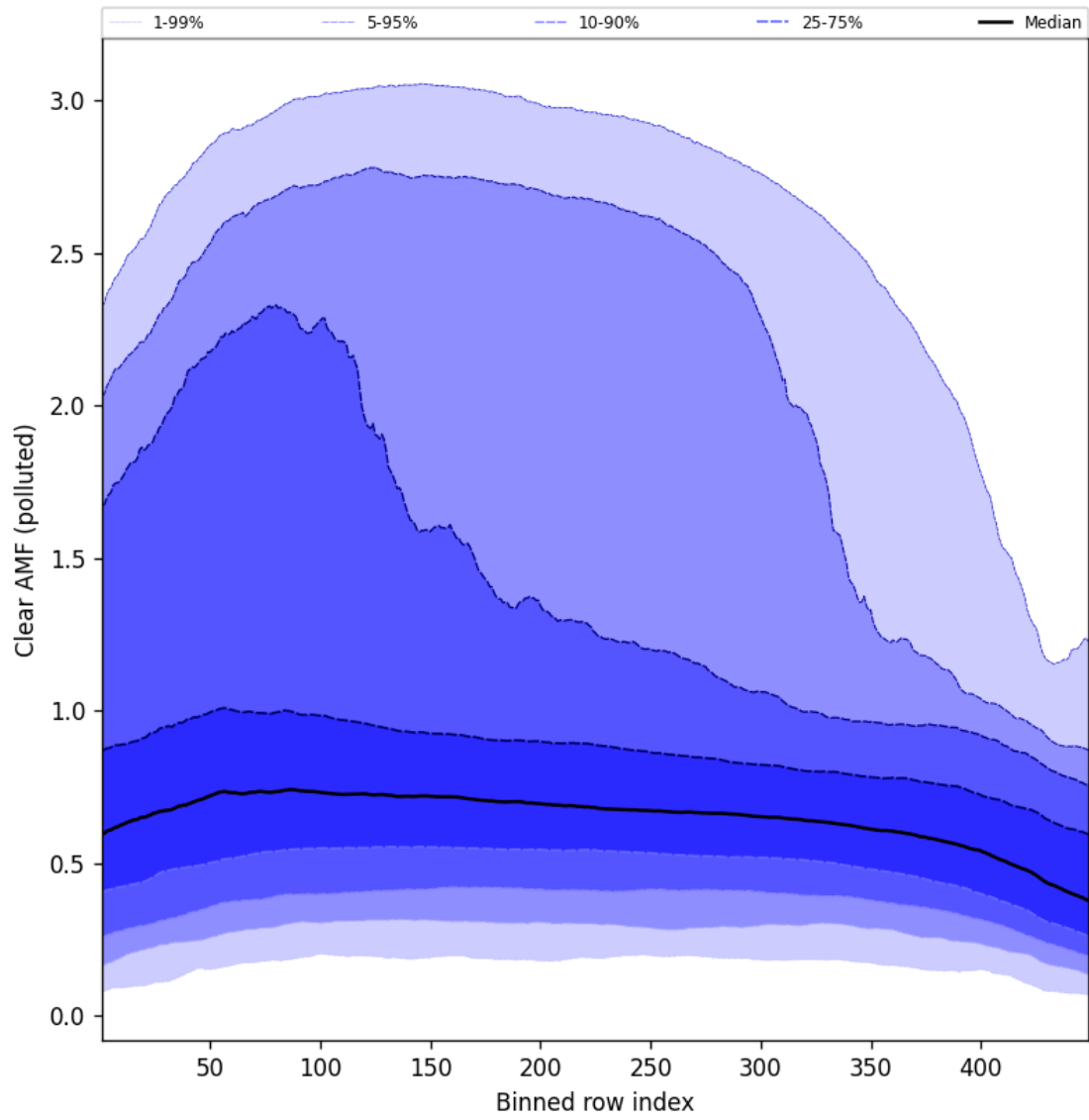


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-01-29 to 2025-01-30

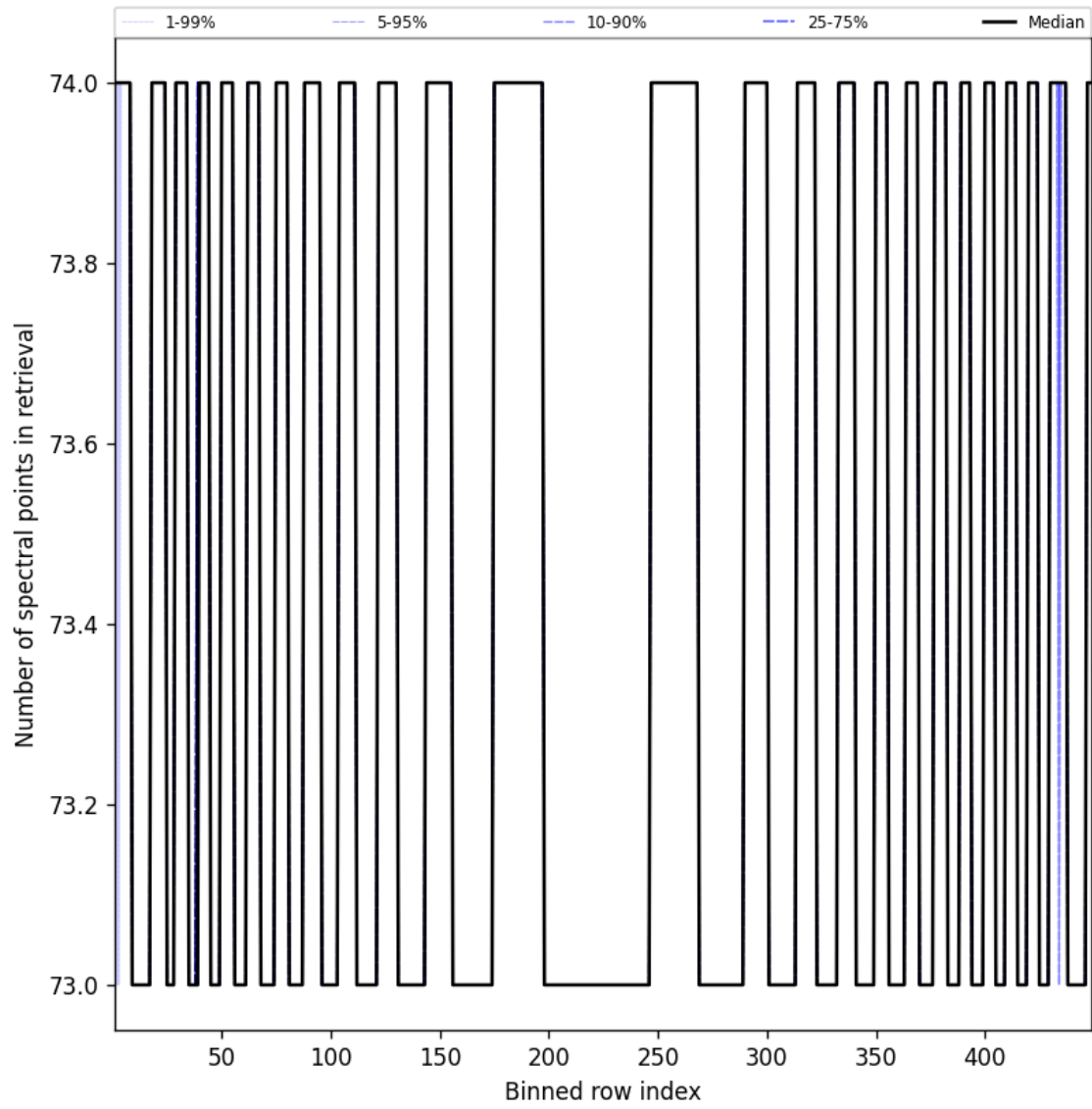


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-01-29 to 2025-01-30

10 Coincidence density

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

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