

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]	0.607 ± 0.417	17294896	0.995	0.820	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.986 \pm 145.870) \times 10^{-2}$	17294896	0.211	0.392	8.390×10^{-3}	-157	306
sulfurdioxide total vertical column precision [DU]	0.558 ± 1.019	17294896	0.122	0.340	0.294	3.349×10^{-2}	232
sulfurdioxide slant column density corrected [DU]	$(1.610 \pm 35.125) \times 10^{-2}$	17294896	0.220	0.336	8.173×10^{-3}	-9.51	417
sulfurdioxide slant column density cobra [DU]	$(1.601 \pm 33.204) \times 10^{-2}$	17294896	0.220	0.336	8.173×10^{-3}	-9.51	30.1
sulfurdioxide slant column density cobra precision [DU]	0.270 ± 0.125	17294896	0.188	0.112	0.230	7.713×10^{-2}	20.8
sulfurdioxide slant column density window1 [DU]	$(8.034 \pm 64.009) \times 10^{-2}$	17294896	7.500×10^{-2}	0.708	8.737×10^{-2}	-45.2	110
sulfurdioxide slant column density window1 precision [DU]	0.270 ± 0.125	17294896	0.188	0.112	0.230	7.713×10^{-2}	20.8
sulfurdioxide slant column density corrected win1 [DU]	$(2.458 \pm 61.889) \times 10^{-2}$	17294896	-2.500×10^{-2}	0.672	9.120×10^{-3}	-45.2	110
background so2 slant column offset window1 [DU]	$(-5.576 \pm 18.488) \times 10^{-2}$	17294896	-0.140	0.227	-0.115	-1.29	3.55
sulfurdioxide slant column density window2 [DU]	0.168 ± 8.596	17294896	0.250	10.7	8.304×10^{-3}	-973	811
sulfurdioxide slant column density window2 precision [DU]	7.77 ± 2.20	17294896	6.97	2.50	7.39	2.27	662
sulfurdioxide slant column density corrected win2 [DU]	-0.124 ± 8.394	17294896	0.250	10.5	-0.121	-973	814
background so2 slant column offset window2 [DU]	-0.291 ± 2.238	17294896	1.25	2.57	0.352	-12.1	10.6
sulfurdioxide slant column density window3 [DU]	-1.72 ± 23.22	17294896	-3.92	28.8	-1.93	-749	897
sulfurdioxide slant column density window3 precision [DU]	27.0 ± 12.4	17294896	21.5	9.65	23.7	10.3	663
sulfurdioxide slant column density corrected win3 [DU]	-0.685 ± 22.306	17294896	-0.560	27.6	-0.709	-754	889
background so2 slant column offset window3 [DU]	1.03 ± 6.39	17294896	1.68	9.74	1.16	-21.6	23.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	17294896	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.414 \pm 12.935) \times 10^{-2}$	17294896	1.946×10^{-2}	2.663×10^{-2}	2.231×10^{-2}	6.092×10^{-4}	4.34
fitted radiance shift [nm]	$(-3.216 \pm 24.117) \times 10^{-4}$	17294896	-5.000×10^{-4}	1.645×10^{-3}	-3.674×10^{-4}	-6.101×10^{-2}	7.966×10^{-2}
fitted radiance squeeze [1]	$(-5.786 \pm 18.338) \times 10^{-5}$	17294896	-3.000×10^{-5}	2.160×10^{-4}	-4.888×10^{-5}	-1.272×10^{-2}	1.414×10^{-2}
fitted root mean square [1]	$(1.204 \pm 0.506) \times 10^{-3}$	17294896	9.250×10^{-4}	4.721×10^{-4}	1.060×10^{-3}	3.191×10^{-4}	8.050×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.955 ± 0.634	17294896	0.660	0.706	0.779	5.000×10^{-2}	3.12
sulfurdioxide total air mass factor polluted precision [1]	0.147 ± 0.153	17294896	3.500×10^{-2}	0.174	8.976×10^{-2}	2.500×10^{-3}	1.77
sulfurdioxide clear air mass factor polluted [1]	0.827 ± 0.619	17294896	0.620	0.393	0.652	2.289×10^{-2}	3.18
number of spectral points in retrieval [1]	73.4 ± 0.5	17294896	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	3.000×10^{-2}	8.000×10^{-2}	0.180	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.92	-0.901	-0.510	-0.328	-0.184	0.208	0.363	0.564	1.01	3.47
sulfurdioxide total vertical column precision [DU]	7.726×10^{-2}	9.630×10^{-2}	0.115	0.138	0.179	0.518	0.754	1.11	1.87	4.75
sulfurdioxide slant column density corrected [DU]	-0.797	-0.452	-0.328	-0.245	-0.158	0.178	0.269	0.358	0.499	0.939
sulfurdioxide slant column density cobra [DU]	-0.797	-0.452	-0.328	-0.245	-0.158	0.178	0.269	0.358	0.499	0.939
sulfurdioxide slant column density cobra precision [DU]	0.133	0.157	0.170	0.181	0.194	0.305	0.371	0.428	0.503	0.741
sulfurdioxide slant column density window1 [DU]	-1.62	-0.915	-0.646	-0.463	-0.272	0.436	0.617	0.789	1.05	1.77
sulfurdioxide slant column density window1 precision [DU]	0.133	0.157	0.170	0.181	0.194	0.305	0.371	0.428	0.503	0.741
sulfurdioxide slant column density corrected win1 [DU]	-1.53	-0.889	-0.653	-0.493	-0.322	0.349	0.532	0.710	0.986	1.78
background so2 slant column offset window1 [DU]	-0.348	-0.278	-0.240	-0.207	-0.179	4.762×10^{-2}	0.155	0.232	0.308	0.438
sulfurdioxide slant column density window2 [DU]	-20.0	-13.4	-10.3	-7.93	-5.30	5.41	8.18	10.7	14.3	22.4
sulfurdioxide slant column density window2 precision [DU]	4.20	4.97	5.44	5.83	6.31	8.80	9.70	10.6	11.9	14.5
sulfurdioxide slant column density corrected win2 [DU]	-20.6	-13.7	-10.4	-8.02	-5.37	5.12	7.74	10.1	13.4	20.5
background so2 slant column offset window2 [DU]	-7.44	-4.98	-3.38	-2.34	-1.34	1.23	1.49	1.73	2.08	3.51
sulfurdioxide slant column density window3 [DU]	-60.3	-39.3	-29.9	-23.3	-16.1	12.7	20.3	27.3	36.7	55.1
sulfurdioxide slant column density window3 precision [DU]	14.3	16.2	17.5	18.6	20.0	29.6	34.1	39.2	49.8	79.9
sulfurdioxide slant column density corrected win3 [DU]	-57.3	-37.1	-27.9	-21.4	-14.4	13.2	20.3	26.9	35.8	54.0
background so2 slant column offset window3 [DU]	-12.8	-9.38	-7.42	-5.84	-3.81	5.94	7.97	9.50	11.1	14.0
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]	1.950×10^{-3}	4.286×10^{-3}	7.528×10^{-3}	9.895×10^{-3}	1.323×10^{-2}	3.986×10^{-2}	5.378×10^{-2}	7.238×10^{-2}	0.118	0.404
fitted radiance shift [nm]	-7.622×10^{-3}	-3.841×10^{-3}	-2.494×10^{-3}	-1.759×10^{-3}	-1.183×10^{-3}	4.621×10^{-4}	1.126×10^{-3}	1.961×10^{-3}	3.412×10^{-3}	7.354×10^{-3}
fitted radiance squeeze [1]	-5.548×10^{-4}	-3.635×10^{-4}	-2.812×10^{-4}	-2.232×10^{-4}	-1.616×10^{-4}	5.442×10^{-5}	1.054×10^{-4}	1.518×10^{-4}	2.179×10^{-4}	3.776×10^{-4}
fitted root mean square [1]	5.758×10^{-4}	6.957×10^{-4}	7.682×10^{-4}	8.236×10^{-4}	8.897×10^{-4}	1.362×10^{-3}	1.596×10^{-3}	1.834×10^{-3}	2.183×10^{-3}	3.080×10^{-3}
sulfurdioxide total air mass factor polluted [1]	8.421×10^{-2}	0.205	0.304	0.399	0.516	1.22	1.59	1.96	2.40	2.73
sulfurdioxide total air mass factor polluted precision [1]	8.592×10^{-3}	1.581×10^{-2}	2.257×10^{-2}	2.852×10^{-2}	3.618×10^{-2}	0.210	0.278	0.350	0.455	0.690
sulfurdioxide clear air mass factor polluted [1]	0.143	0.253	0.343	0.415	0.493	0.887	1.04	1.50	2.58	2.94
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]	0.722 ± 0.385	6182604	0.650	1.000	0.0	1.000	0.350	1.000
sulfurdioxide total vertical column [DU]	$(8.645 \pm 230.998) \times 10^{-2}$	6182604	0.646	1.574×10^{-2}	-157	194	-0.299	0.347
sulfurdioxide total vertical column precision [DU]	0.957 ± 1.525	6182604	0.715	0.462	4.957×10^{-2}	50.5	0.279	0.994
sulfurdioxide slant column density corrected [DU]	$(2.410 \pm 42.024) \times 10^{-2}$	6182604	0.400	1.127×10^{-2}	-8.85	55.5	-0.186	0.213
sulfurdioxide slant column density cobra [DU]	$(2.396 \pm 41.304) \times 10^{-2}$	6182604	0.400	1.127×10^{-2}	-8.85	10.1	-0.186	0.213
sulfurdioxide slant column density cobra precision [DU]	0.327 ± 0.155	6182604	0.179	0.280	9.111×10^{-2}	4.79	0.219	0.398
sulfurdioxide slant column density window1 [DU]	0.154 ± 0.754	6182604	0.803	0.163	-11.1	11.2	-0.242	0.561
sulfurdioxide slant column density window1 precision [DU]	0.327 ± 0.155	6182604	0.179	0.280	9.111×10^{-2}	4.79	0.219	0.398
sulfurdioxide slant column density corrected win1 [DU]	$(5.162 \pm 75.074) \times 10^{-2}$	6182604	0.792	2.812×10^{-2}	-9.96	12.2	-0.361	0.431
background so2 slant column offset window1 [DU]	-0.102 ± 0.159	6182604	0.139	-0.124	-0.957	3.55	-0.194	-5.501×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.860 ± 9.776	6182604	12.4	0.507	-180	104	-5.53	6.86
sulfurdioxide slant column density window2 precision [DU]	8.76 ± 2.26	6182604	2.82	8.42	2.29	222	7.18	10.0
sulfurdioxide slant column density corrected win2 [DU]	-0.152 ± 9.449	6182604	12.0	-0.156	-187	106	-6.16	5.84
background so2 slant column offset window2 [DU]	-1.01 ± 2.86	6182604	3.96	0.106	-12.1	10.6	-2.86	1.10
sulfurdioxide slant column density window3 [DU]	-4.82 ± 25.78	6182604	32.8	-4.19	-190	167	-20.9	11.9
sulfurdioxide slant column density window3 precision [DU]	30.2 ± 12.3	6182604	9.79	27.1	10.7	209	23.3	33.1
sulfurdioxide slant column density corrected win3 [DU]	-1.36 ± 25.26	6182604	32.1	-1.05	-184	176	-17.2	14.9
background so2 slant column offset window3 [DU]	3.46 ± 5.37	6182604	8.71	2.95	-15.1	23.5	-0.976	7.73
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.27	6182604	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.618 \pm 20.973) \times 10^{-2}$	6182604	5.602×10^{-2}	2.536×10^{-2}	6.092×10^{-4}	4.34	1.302×10^{-2}	6.903×10^{-2}
fitted radiance shift [nm]	$(-1.710 \pm 24.545) \times 10^{-4}$	6182604	1.656×10^{-3}	-1.940×10^{-4}	-3.439×10^{-2}	3.387×10^{-2}	-1.020×10^{-3}	6.366×10^{-4}
fitted radiance squeeze [1]	$(-6.858 \pm 194.961) \times 10^{-6}$	6182604	2.182×10^{-4}	-2.645×10^{-6}	-2.978×10^{-3}	5.704×10^{-3}	-1.126×10^{-4}	1.056×10^{-4}
fitted root mean square [1]	$(1.413 \pm 0.627) \times 10^{-3}$	6182604	6.980×10^{-4}	1.216×10^{-3}	3.519×10^{-4}	1.967×10^{-2}	9.898×10^{-4}	1.688×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.658 ± 0.385	6182604	0.506	0.605	5.000×10^{-2}	2.89	0.368	0.874
sulfurdioxide total air mass factor polluted precision [1]	$(9.359 \pm 12.595) \times 10^{-2}$	6182604	8.870×10^{-2}	4.541×10^{-2}	2.500×10^{-3}	1.77	2.541×10^{-2}	0.114
sulfurdioxide clear air mass factor polluted [1]	0.576 ± 0.273	6182604	0.414	0.557	2.289×10^{-2}	1.86	0.356	0.770
number of spectral points in retrieval [1]	73.5 ± 0.5	6182604	1.000	73.0	71.0	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]	0.543 ± 0.421	11112292	0.870	0.430	0.0	1.000	0.130	1.000
sulfurdioxide total vertical column [DU]	$(1.395 \pm 58.391) \times 10^{-2}$	11112292	0.309	6.277×10^{-3}	-45.0	306	-0.146	0.162
sulfurdioxide total vertical column precision [DU]	0.337 ± 0.428	11112292	0.233	0.236	3.349×10^{-2}	232	0.146	0.379
sulfurdioxide slant column density corrected [DU]	$(1.165 \pm 30.612) \times 10^{-2}$	11112292	0.307	6.820×10^{-3}	-9.51	417	-0.146	0.162
sulfurdioxide slant column density cobra [DU]	$(1.159 \pm 27.680) \times 10^{-2}$	11112292	0.307	6.820×10^{-3}	-9.51	30.1	-0.146	0.162
sulfurdioxide slant column density cobra precision [DU]	0.239 ± 0.089	11112292	7.703×10^{-2}	0.215	7.713×10^{-2}	20.8	0.185	0.262
sulfurdioxide slant column density window1 [DU]	$(3.932 \pm 56.291) \times 10^{-2}$	11112292	0.660	5.275×10^{-2}	-45.2	110	-0.285	0.374
sulfurdioxide slant column density window1 precision [DU]	0.239 ± 0.089	11112292	7.703×10^{-2}	0.215	7.713×10^{-2}	20.8	0.185	0.262
sulfurdioxide slant column density corrected win1 [DU]	$(9.530 \pm 530.950) \times 10^{-3}$	11112292	0.617	8.019×10^{-4}	-45.2	110	-0.305	0.312
background so2 slant column offset window1 [DU]	$(-2.979 \pm 19.278) \times 10^{-2}$	11112292	0.290	-0.105	-1.29	1.57	-0.175	0.115
sulfurdioxide slant column density window2 [DU]	-0.218 ± 7.836	11112292	9.94	-0.216	-973	811	-5.19	4.75
sulfurdioxide slant column density window2 precision [DU]	7.21 ± 1.96	11112292	2.05	6.94	2.27	662	6.00	8.05
sulfurdioxide slant column density corrected win2 [DU]	-0.108 ± 7.745	11112292	9.77	-0.105	-973	814	-5.00	4.77
background so2 slant column offset window2 [DU]	0.110 ± 1.673	11112292	2.23	0.466	-8.85	9.60	-0.937	1.30
sulfurdioxide slant column density window3 [DU]	$(6.181 \pm 21476.567) \times 10^{-3}$	11112292	27.0	-0.903	-749	897	-13.9	13.1
sulfurdioxide slant column density window3 precision [DU]	25.3 ± 12.0	11112292	7.68	21.9	10.3	663	19.0	26.6
sulfurdioxide slant column density corrected win3 [DU]	-0.309 ± 20.471	11112292	25.5	-0.557	-754	889	-13.1	12.4
background so2 slant column offset window3 [DU]	-0.315 ± 6.520	11112292	10.4	-0.144	-21.6	22.1	-5.65	4.73
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.17	11112292	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.631 \pm 2.605) \times 10^{-2}$	11112292	1.984×10^{-2}	2.145×10^{-2}	7.692×10^{-4}	1.17	1.335×10^{-2}	3.319×10^{-2}
fitted radiance shift [nm]	$(-4.054 \pm 23.834) \times 10^{-4}$	11112292	1.603×10^{-3}	-4.625×10^{-4}	-6.101×10^{-2}	7.966×10^{-2}	-1.254×10^{-3}	3.494×10^{-4}
fitted radiance squeeze [1]	$(-8.623 \pm 17.012) \times 10^{-5}$	11112292	2.101×10^{-4}	-7.306×10^{-5}	-1.272×10^{-2}	1.414×10^{-2}	-1.848×10^{-4}	2.527×10^{-5}
fitted root mean square [1]	$(1.088 \pm 0.376) \times 10^{-3}$	11112292	3.683×10^{-4}	9.973×10^{-4}	3.191×10^{-4}	8.050×10^{-2}	8.534×10^{-4}	1.222×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.12 ± 0.68	11112292	0.913	0.912	5.000×10^{-2}	3.12	0.612	1.53
sulfurdioxide total air mass factor polluted precision [1]	0.176 ± 0.159	11112292	0.204	0.134	4.819×10^{-3}	1.50	4.721×10^{-2}	0.251
sulfurdioxide clear air mass factor polluted [1]	0.967 ± 0.708	11112292	0.418	0.696	0.130	3.18	0.550	0.968
number of spectral points in retrieval [1]	73.4 ± 0.5	11112292	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]	0.651 ± 0.409	12212619	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(2.332 \pm 100.419) \times 10^{-2}$	12212619	0.398	7.820×10^{-3}	-116	142	-0.189	0.208
sulfurdioxide total vertical column precision [DU]	0.477 ± 0.725	12212619	0.282	0.293	4.881×10^{-2}	45.8	0.195	0.477
sulfurdioxide slant column density corrected [DU]	$(1.219 \pm 29.835) \times 10^{-2}$	12212619	0.318	6.841×10^{-3}	-8.16	46.3	-0.151	0.167
sulfurdioxide slant column density cobra [DU]	$(1.216 \pm 29.597) \times 10^{-2}$	12212619	0.318	6.841×10^{-3}	-8.16	30.1	-0.151	0.167
sulfurdioxide slant column density cobra precision [DU]	0.254 ± 0.110	12212619	9.016×10^{-2}	0.219	8.408×10^{-2}	12.9	0.189	0.279
sulfurdioxide slant column density window1 [DU]	0.105 ± 0.583	12212619	0.661	0.107	-36.7	52.7	-0.225	0.436
sulfurdioxide slant column density window1 precision [DU]	0.254 ± 0.110	12212619	9.016×10^{-2}	0.219	8.408×10^{-2}	12.9	0.189	0.279
sulfurdioxide slant column density corrected win1 [DU]	$(1.820 \pm 57.036) \times 10^{-2}$	12212619	0.639	6.094×10^{-3}	-36.7	52.4	-0.310	0.329
background so2 slant column offset window1 [DU]	$(-8.690 \pm 15.128) \times 10^{-2}$	12212619	0.173	-0.125	-1.29	2.84	-0.183	-9.962×10^{-3}
sulfurdioxide slant column density window2 [DU]	-0.199 ± 8.316	12212619	10.4	-0.325	-973	811	-5.51	4.92
sulfurdioxide slant column density window2 precision [DU]	7.57 ± 2.06	12212619	2.31	7.25	2.27	662	6.22	8.53
sulfurdioxide slant column density corrected win2 [DU]	-0.147 ± 8.189	12212619	10.3	-0.146	-973	814	-5.31	5.00
background so2 slant column offset window2 [DU]	$(5.201 \pm 198.090) \times 10^{-2}$	12212619	2.04	0.576	-12.1	10.6	-0.745	1.29
sulfurdioxide slant column density window3 [DU]	1.26 ± 22.72	12212619	28.6	0.809	-569	164	-13.2	15.5
sulfurdioxide slant column density window3 precision [DU]	26.7 ± 12.0	12212619	9.03	23.4	10.3	302	20.0	29.0
sulfurdioxide slant column density corrected win3 [DU]	1.21 ± 21.74	12212619	27.4	0.868	-576	160	-12.6	14.8
background so2 slant column offset window3 [DU]	$(-4.850 \pm 585.077) \times 10^{-2}$	12212619	8.39	0.145	-21.6	23.5	-4.31	4.08
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.13	12212619	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.354 \pm 5.173) \times 10^{-2}$	12212619	2.230×10^{-2}	2.308×10^{-2}	8.800×10^{-4}	2.80	1.519×10^{-2}	3.749×10^{-2}
fitted radiance shift [nm]	$(-2.623 \pm 23.760) \times 10^{-4}$	12212619	1.725×10^{-3}	-2.719×10^{-4}	-3.439×10^{-2}	3.994×10^{-2}	-1.147×10^{-3}	5.780×10^{-4}
fitted radiance squeeze [1]	$(-4.577 \pm 16.781) \times 10^{-5}$	12212619	1.970×10^{-4}	-3.932×10^{-5}	-1.272×10^{-2}	1.097×10^{-2}	-1.403×10^{-4}	5.667×10^{-5}
fitted root mean square [1]	$(1.130 \pm 0.452) \times 10^{-3}$	12212619	3.765×10^{-4}	1.006×10^{-3}	3.398×10^{-4}	4.098×10^{-2}	8.633×10^{-4}	1.240×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.854 ± 0.450	12212619	0.542	0.770	5.000×10^{-2}	2.59	0.543	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.133 ± 0.129	12212619	0.156	8.102×10^{-2}	2.869×10^{-3}	1.51	3.809×10^{-2}	0.194
sulfurdioxide clear air mass factor polluted [1]	0.673 ± 0.248	12212619	0.300	0.639	5.127×10^{-2}	2.59	0.510	0.810
number of spectral points in retrieval [1]	73.4 ± 0.5	12212619	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]	0.493 ± 0.417	4479127	0.900	0.380	0.0	1.000	0.1000	1.000
sulfurdioxide total vertical column [DU]	$(7.033 \pm 202.269) \times 10^{-2}$	4479127	0.346	8.676×10^{-3}	-152	306	-0.158	0.188
sulfurdioxide total vertical column precision [DU]	0.684 ± 1.375	4479127	0.528	0.271	3.349×10^{-2}	232	0.119	0.647
sulfurdioxide slant column density corrected [DU]	$(2.416 \pm 45.495) \times 10^{-2}$	4479127	0.384	1.153×10^{-2}	-9.51	417	-0.179	0.206
sulfurdioxide slant column density cobra [DU]	$(2.391 \pm 40.031) \times 10^{-2}$	4479127	0.384	1.153×10^{-2}	-9.51	28.6	-0.179	0.206
sulfurdioxide slant column density cobra precision [DU]	0.309 ± 0.143	4479127	0.144	0.266	7.713×10^{-2}	20.8	0.219	0.363
sulfurdioxide slant column density window1 [DU]	$(6.447 \pm 749.365) \times 10^{-3}$	4479127	0.844	1.130×10^{-2}	-45.2	110	-0.422	0.423
sulfurdioxide slant column density window1 precision [DU]	0.309 ± 0.143	4479127	0.144	0.266	7.713×10^{-2}	20.8	0.219	0.363
sulfurdioxide slant column density corrected win1 [DU]	$(3.629 \pm 71.291) \times 10^{-2}$	4479127	0.761	1.556×10^{-2}	-45.2	110	-0.358	0.402
background so2 slant column offset window1 [DU]	$(2.985 \pm 23.340) \times 10^{-2}$	4479127	0.409	-5.330×10^{-2}	-1.26	3.36	-0.163	0.246
sulfurdioxide slant column density window2 [DU]	1.04 ± 9.08	4479127	11.3	0.909	-493	434	-4.68	6.59
sulfurdioxide slant column density window2 precision [DU]	8.18 ± 2.41	4479127	2.88	7.76	2.38	514	6.52	9.40
sulfurdioxide slant column density corrected win2 [DU]	$(-6.265 \pm 879.873) \times 10^{-2}$	4479127	10.9	-4.775×10^{-2}	-493	435	-5.50	5.39
background so2 slant column offset window2 [DU]	-1.10 ± 2.50	4479127	3.69	-0.802	-11.8	8.68	-2.70	0.994
sulfurdioxide slant column density window3 [DU]	-9.03 ± 22.61	4479127	27.2	-8.56	-749	897	-22.4	4.88
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 12.9	4479127	10.6	24.2	10.5	663	19.7	30.3
sulfurdioxide slant column density corrected win3 [DU]	-5.24 ± 22.79	4479127	27.4	-4.47	-754	889	-18.5	8.91
background so2 slant column offset window3 [DU]	3.79 ± 6.85	4479127	10.8	5.74	-21.6	23.5	-1.67	9.14
sulfurdioxide slant column cobra flag [1]	1.94 ± 0.34	4479127	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.927 \pm 19.042) \times 10^{-2}$	4479127	4.126×10^{-2}	1.704×10^{-2}	6.092×10^{-4}	4.34	5.997×10^{-3}	4.726×10^{-2}
fitted radiance shift [nm]	$(-4.953 \pm 24.263) \times 10^{-4}$	4479127	1.332×10^{-3}	-6.051×10^{-4}	-6.101×10^{-2}	7.966×10^{-2}	-1.233×10^{-3}	9.889×10^{-5}
fitted radiance squeeze [1]	$(-9.522 \pm 21.320) \times 10^{-5}$	4479127	2.698×10^{-4}	-8.999×10^{-5}	-1.077×10^{-2}	1.414×10^{-2}	-2.294×10^{-4}	4.044×10^{-5}
fitted root mean square [1]	$(1.376 \pm 0.559) \times 10^{-3}$	4479127	5.745×10^{-4}	1.246×10^{-3}	3.191×10^{-4}	8.050×10^{-2}	1.017×10^{-3}	1.592×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.27 ± 0.91	4479127	1.80	0.928	5.000×10^{-2}	3.12	0.461	2.26
sulfurdioxide total air mass factor polluted precision [1]	0.187 ± 0.201	4479127	0.236	0.131	2.500×10^{-3}	1.77	3.091×10^{-2}	0.266
sulfurdioxide clear air mass factor polluted [1]	1.29 ± 1.01	4479127	1.99	0.800	2.289×10^{-2}	3.18	0.440	2.43
number of spectral points in retrieval [1]	73.4 ± 0.5	4479127	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

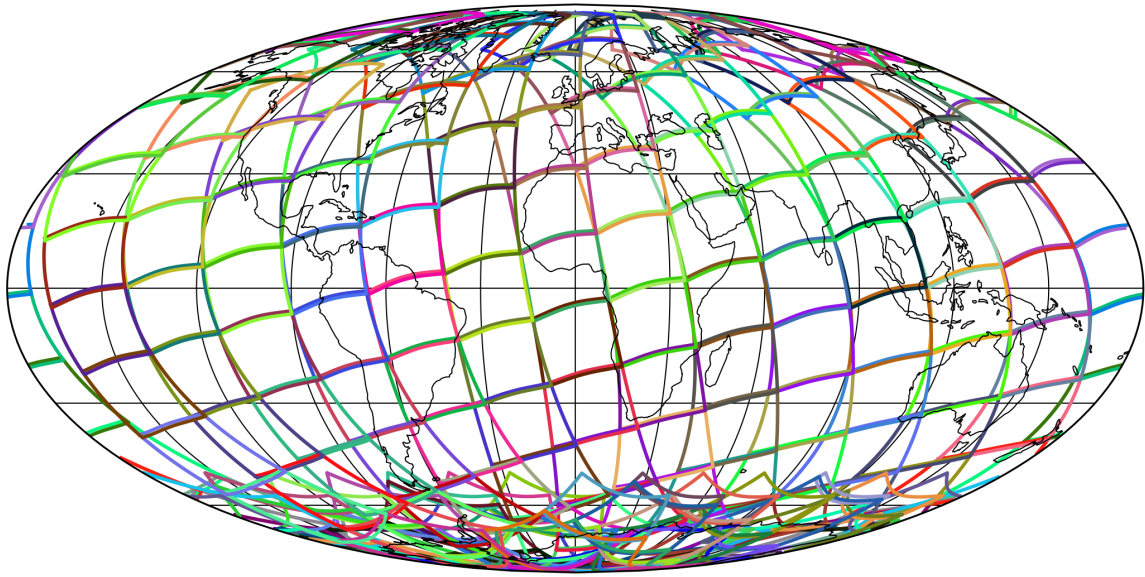


Figure 1: Outline of the granules.

4 Input data monitoring

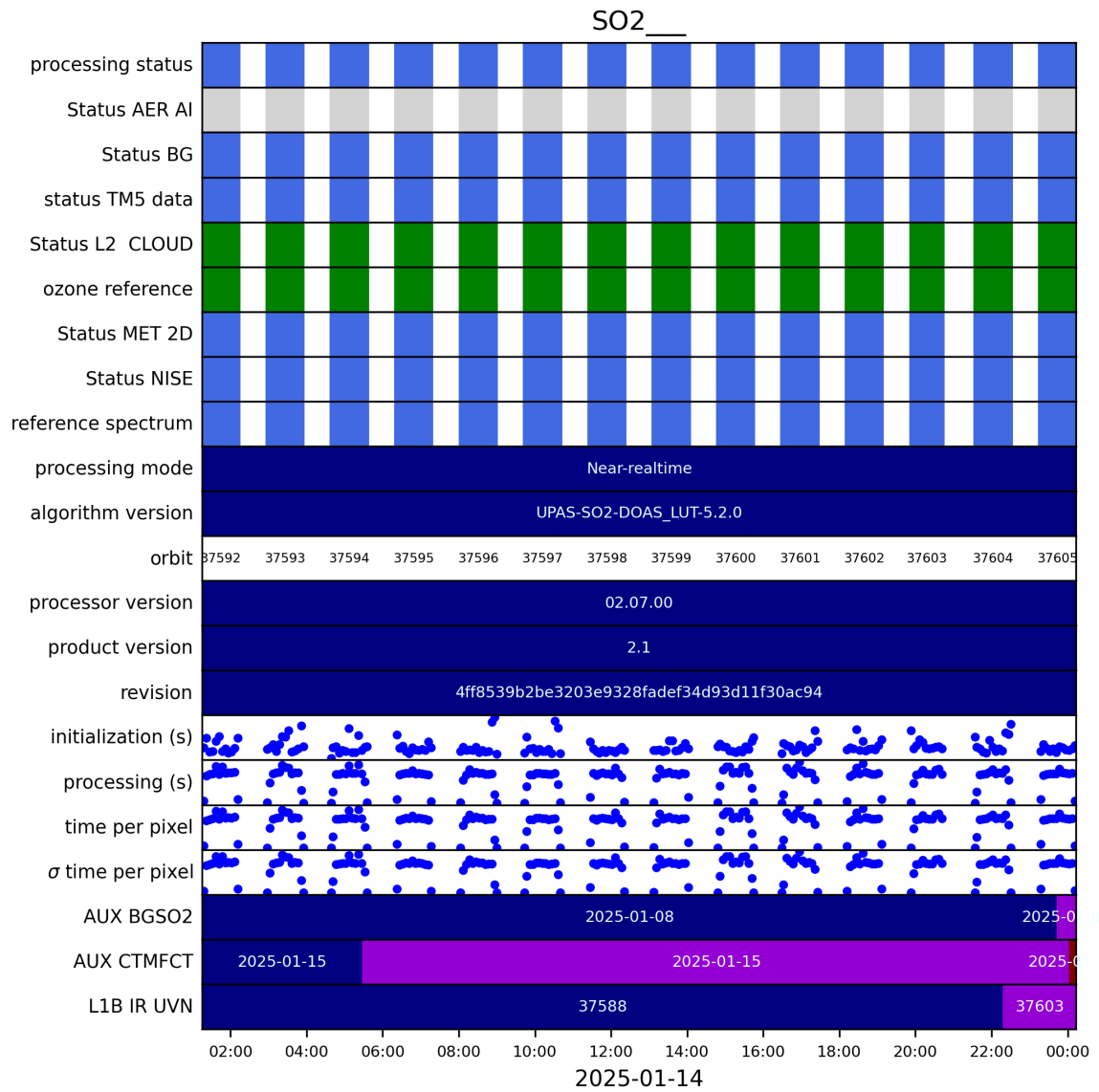


Figure 2: Input data per granule

5 Warnings and errors

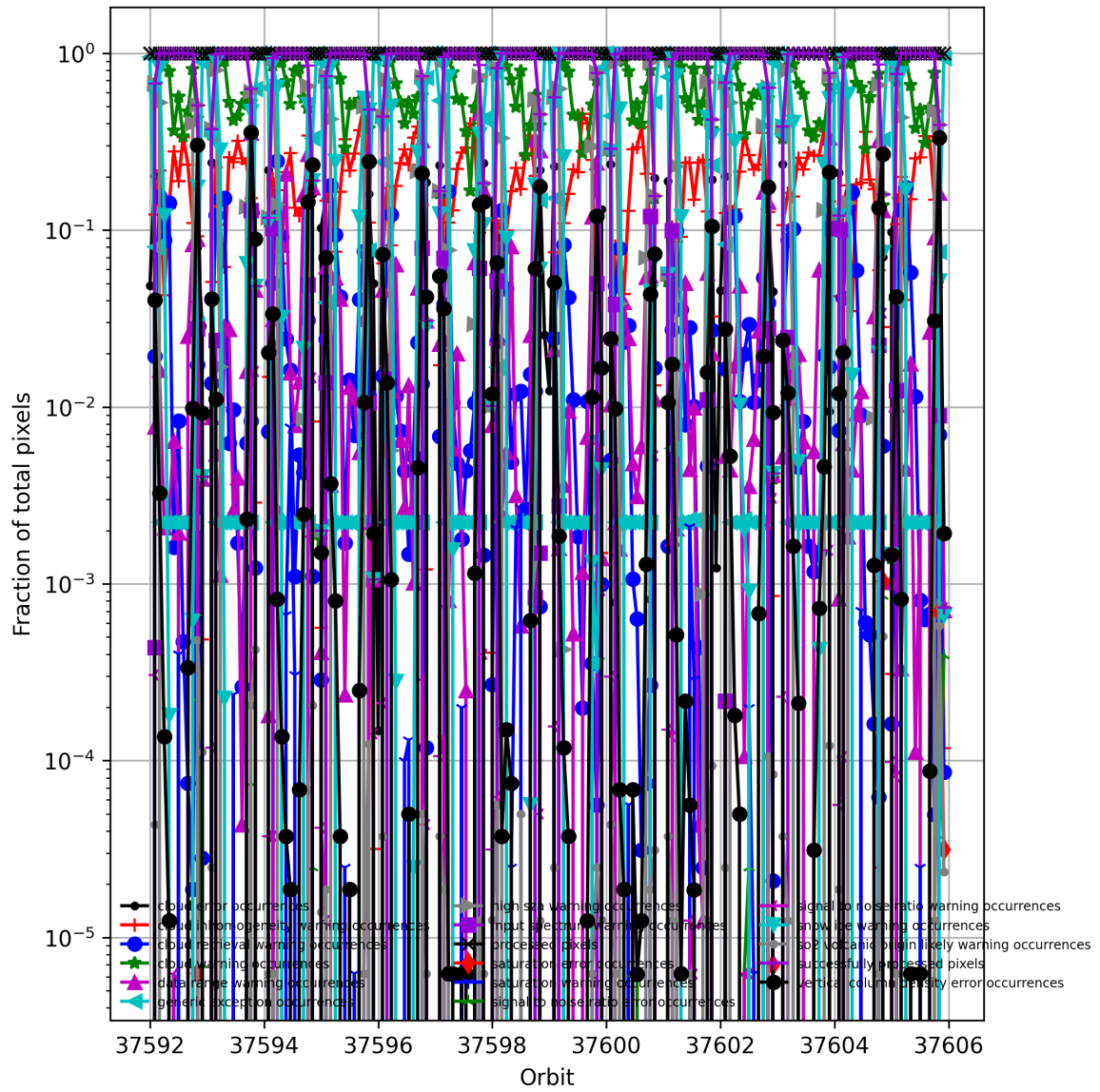


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

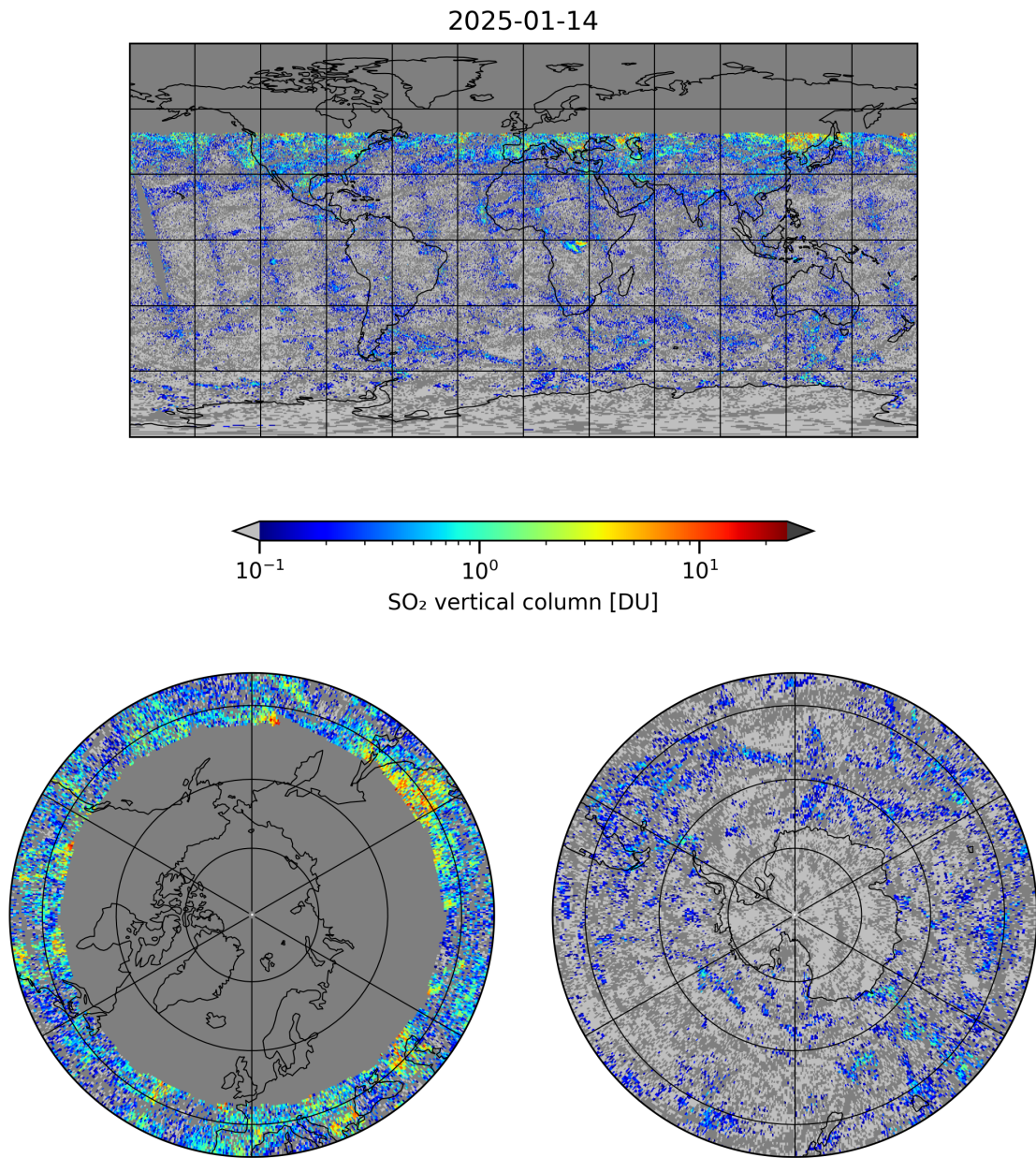


Figure 4: Map of “SO₂ vertical column” for 2025-01-14 to 2025-01-15

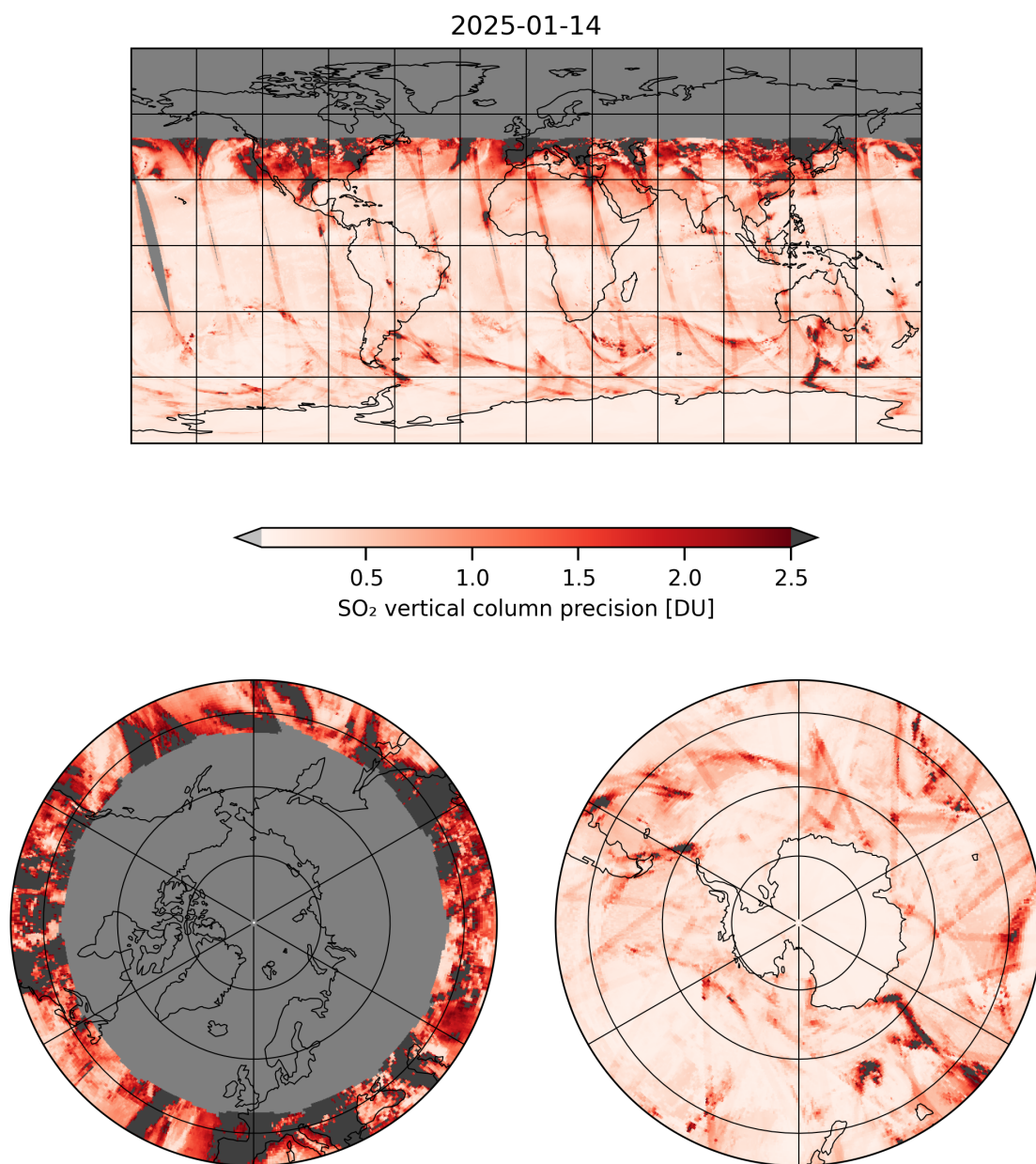


Figure 5: Map of “SO₂ vertical column precision” for 2025-01-14 to 2025-01-15

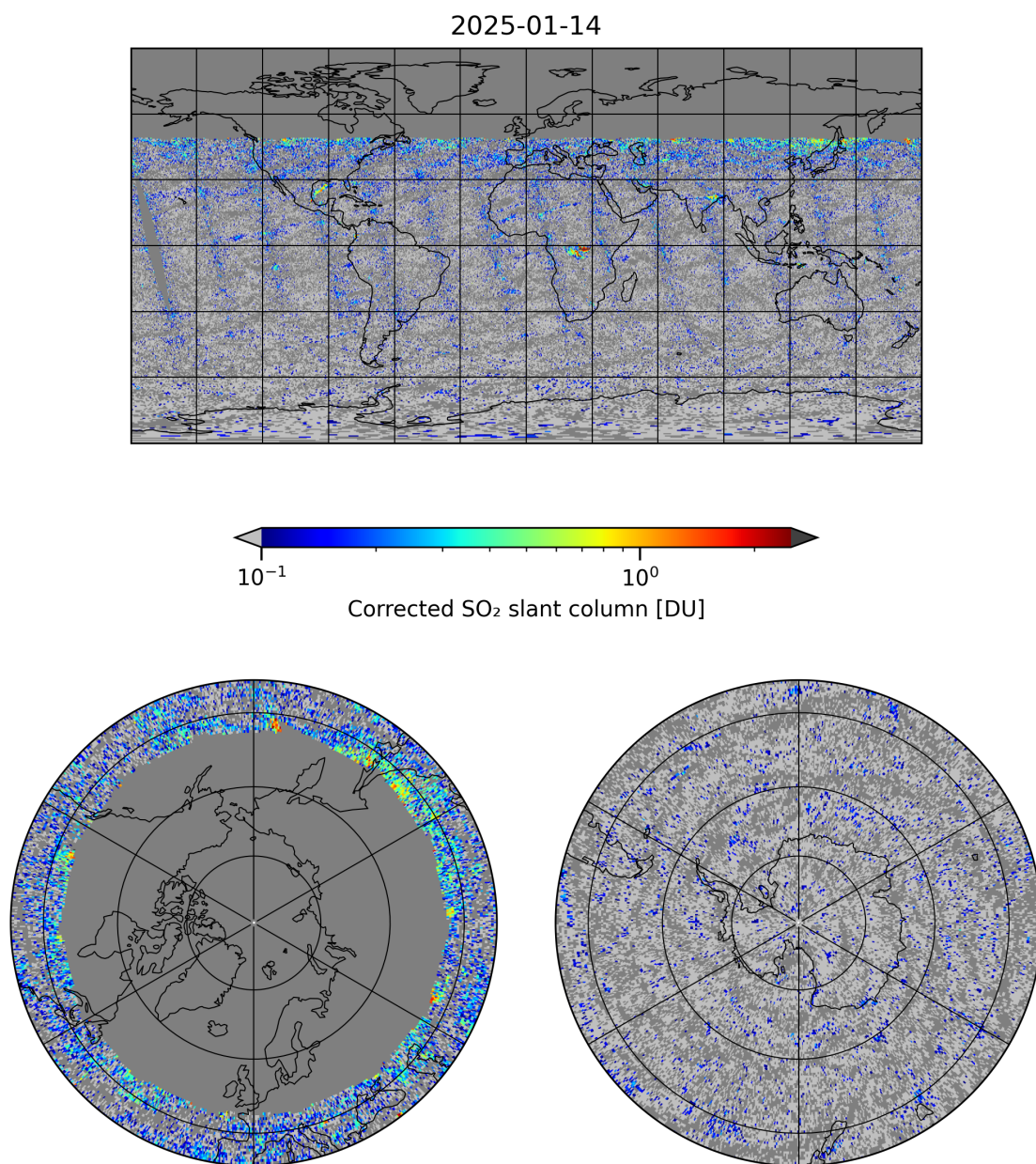


Figure 6: Map of “Corrected SO₂ slant column” for 2025-01-14 to 2025-01-15

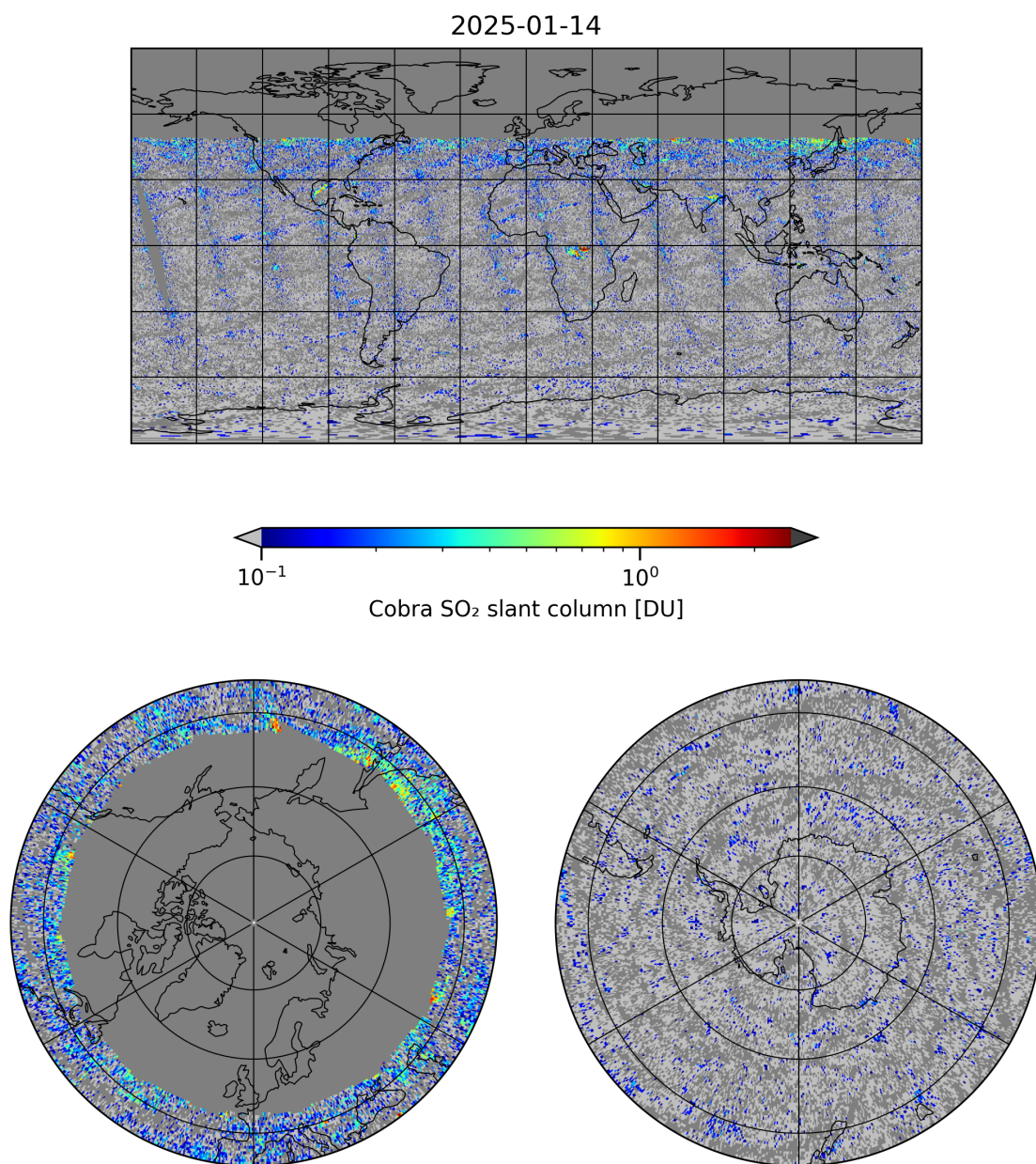


Figure 7: Map of “Cobra SO₂ slant column” for 2025-01-14 to 2025-01-15

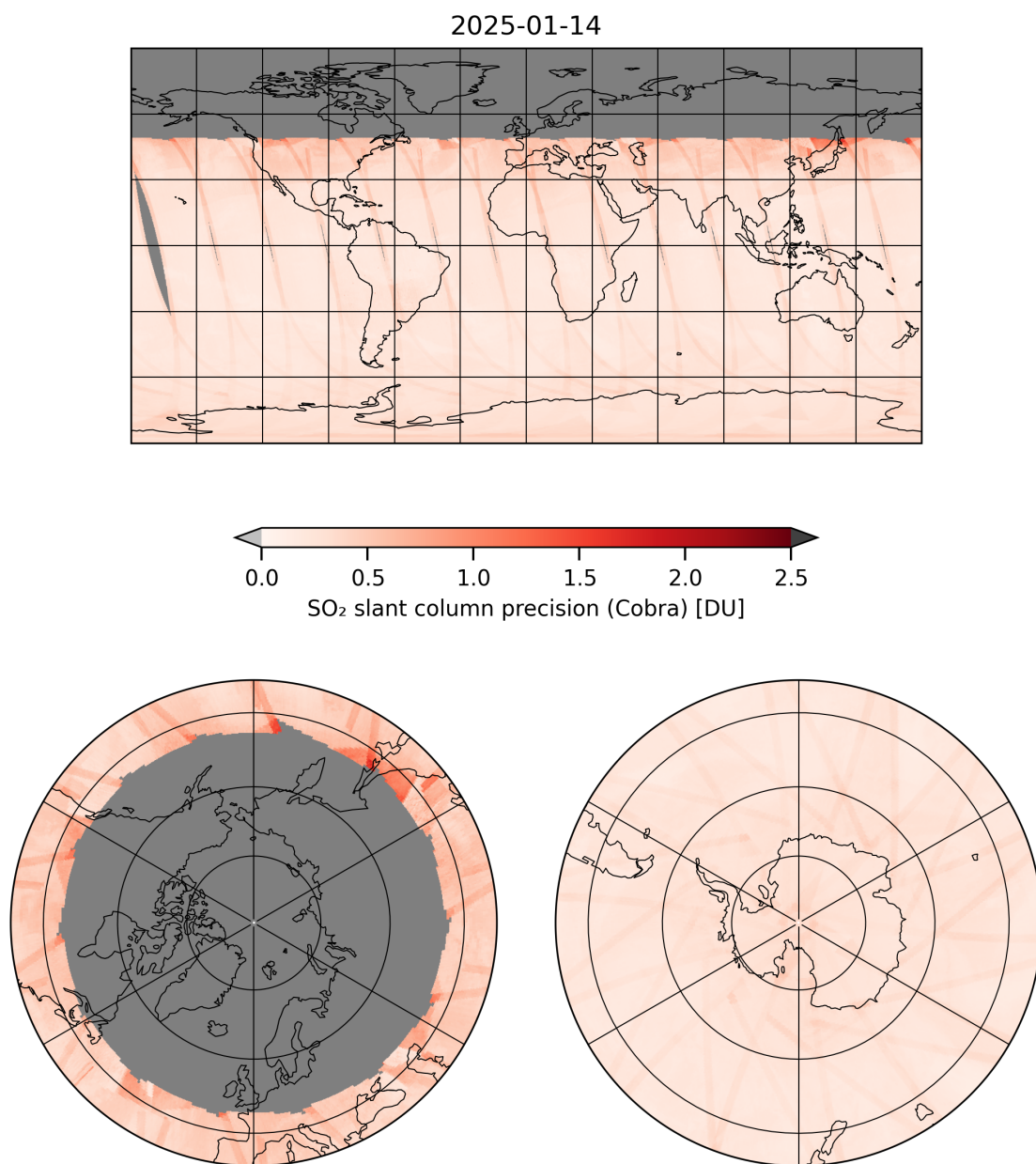


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-01-14 to 2025-01-15

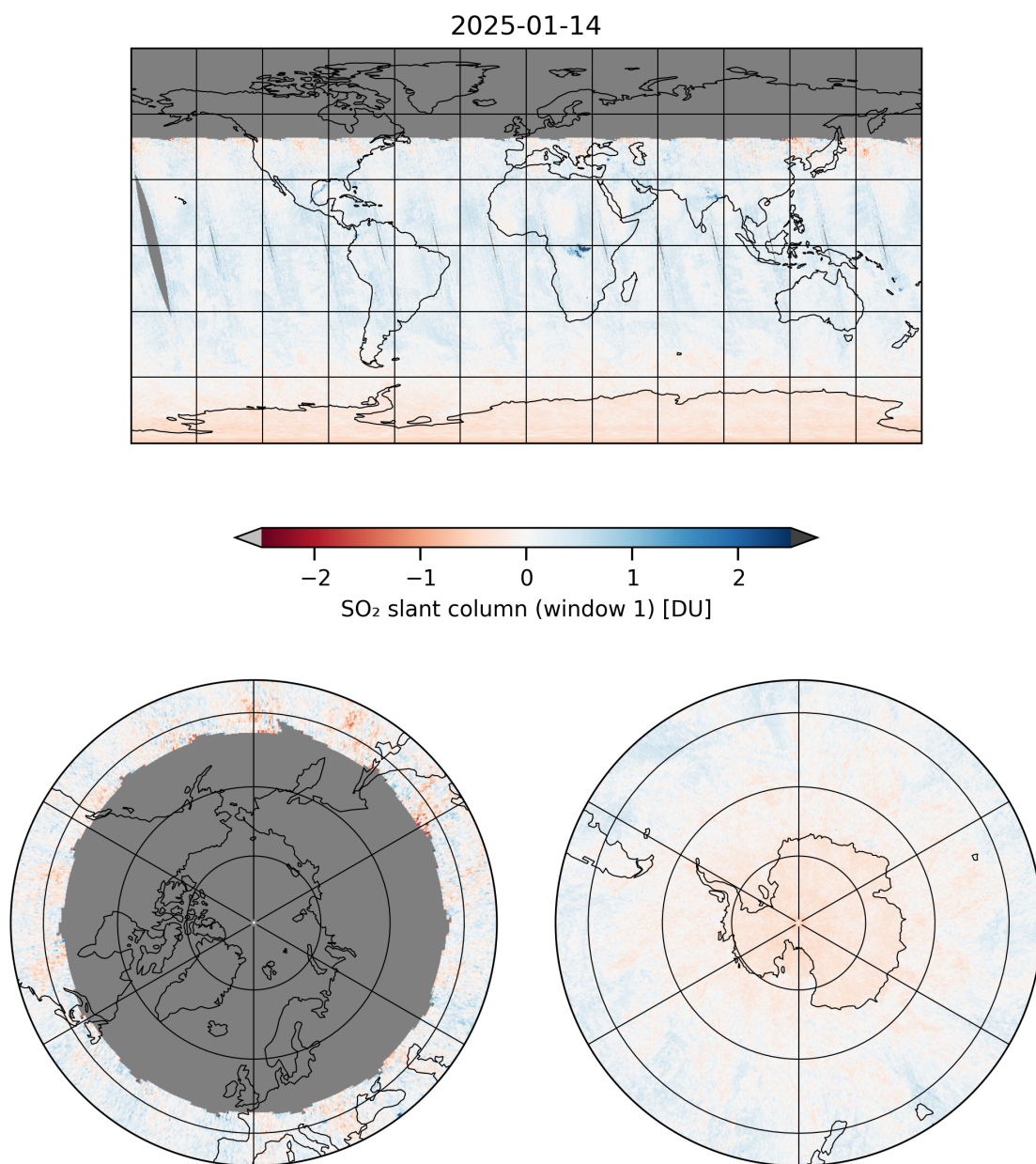


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-01-14 to 2025-01-15

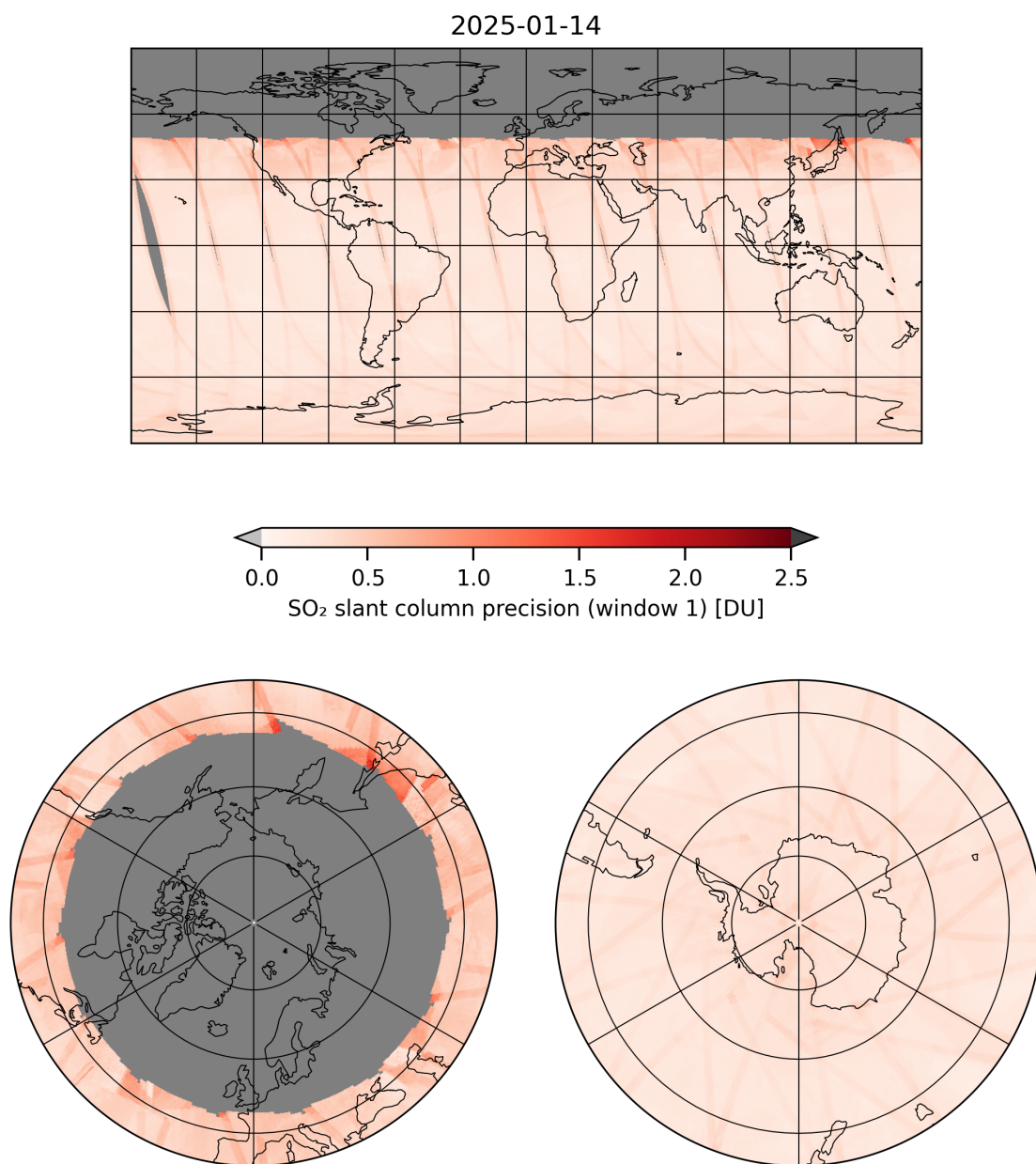


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-01-14 to 2025-01-15

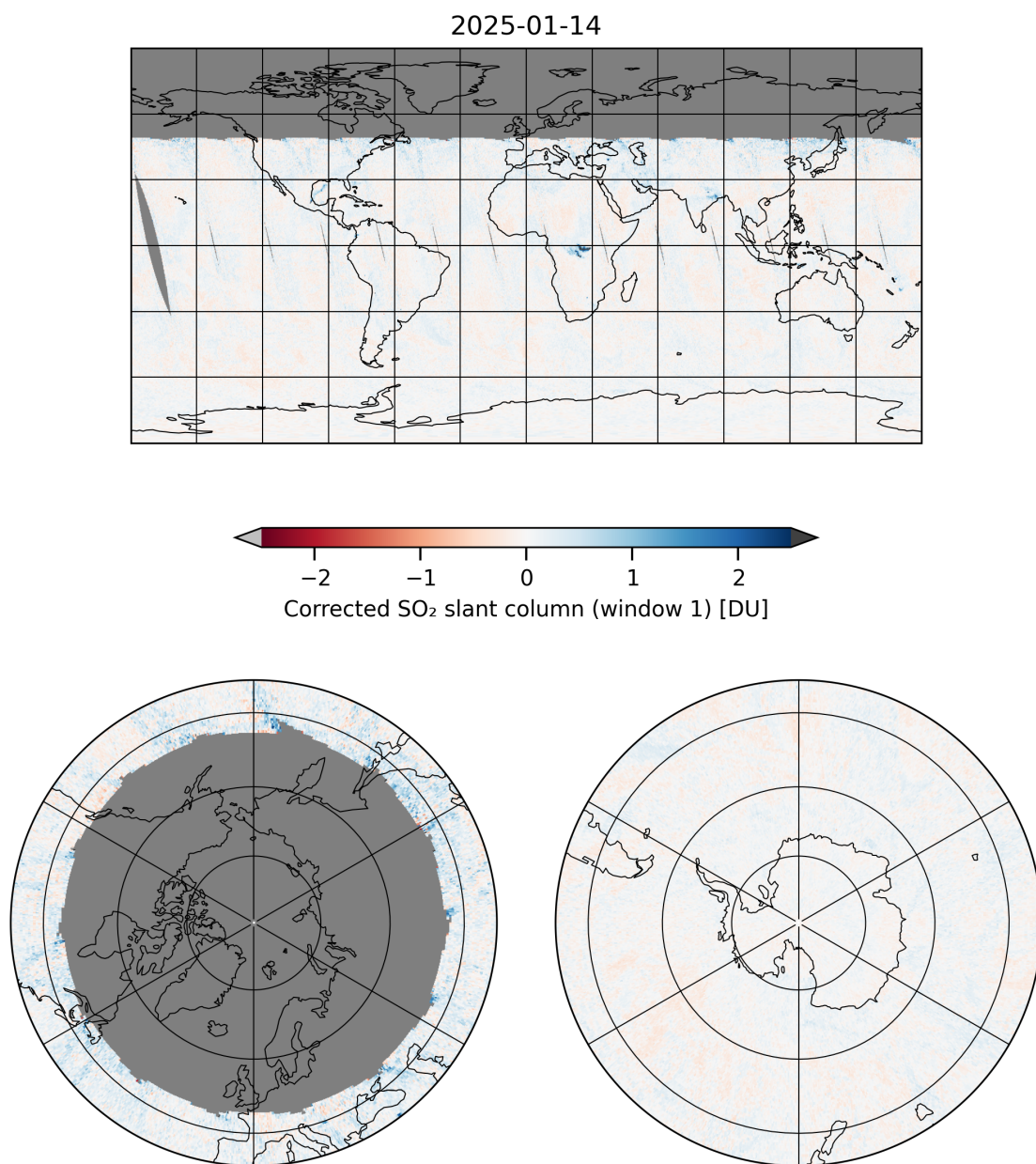


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-01-14 to 2025-01-15

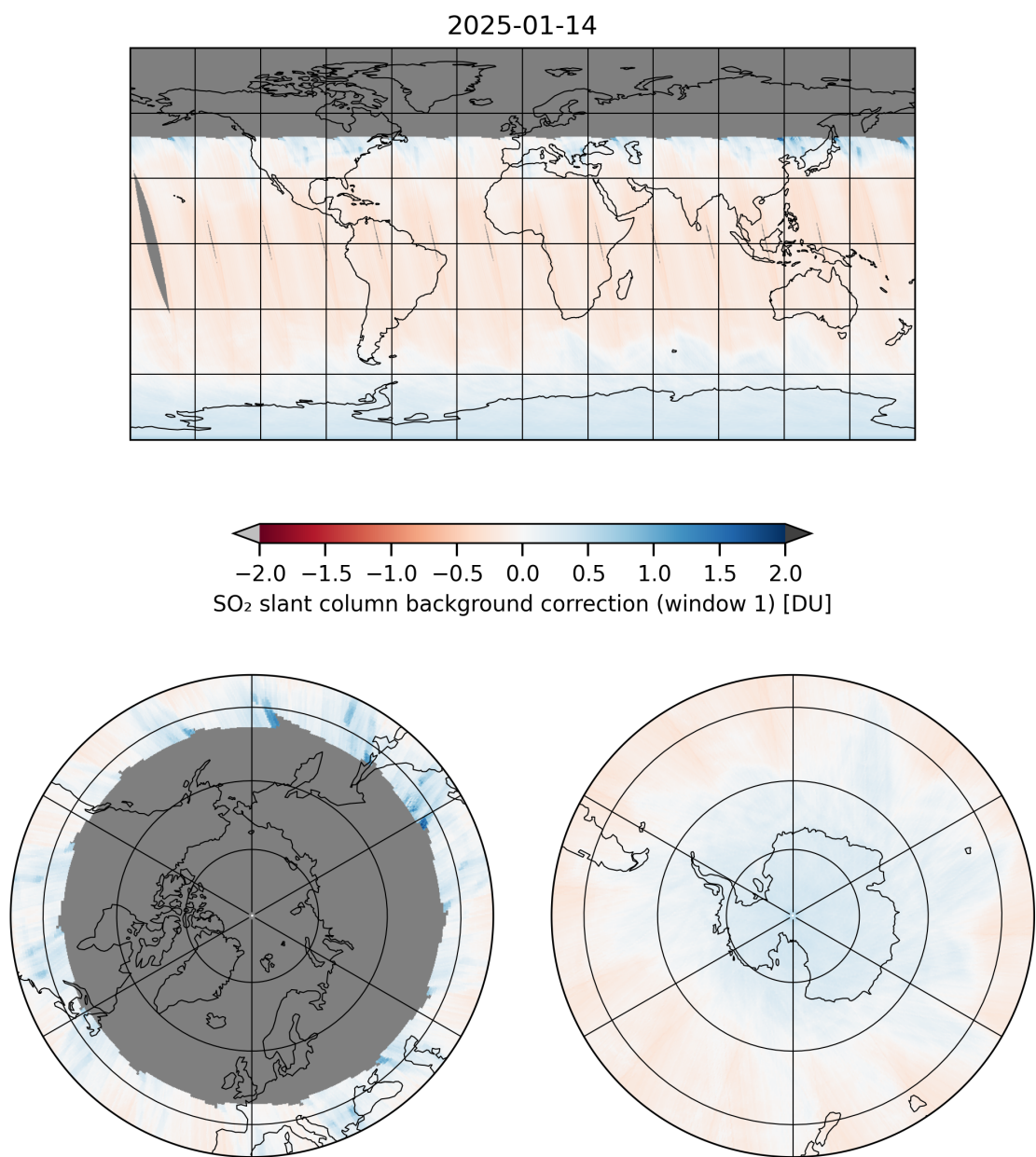


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-01-14 to 2025-01-15

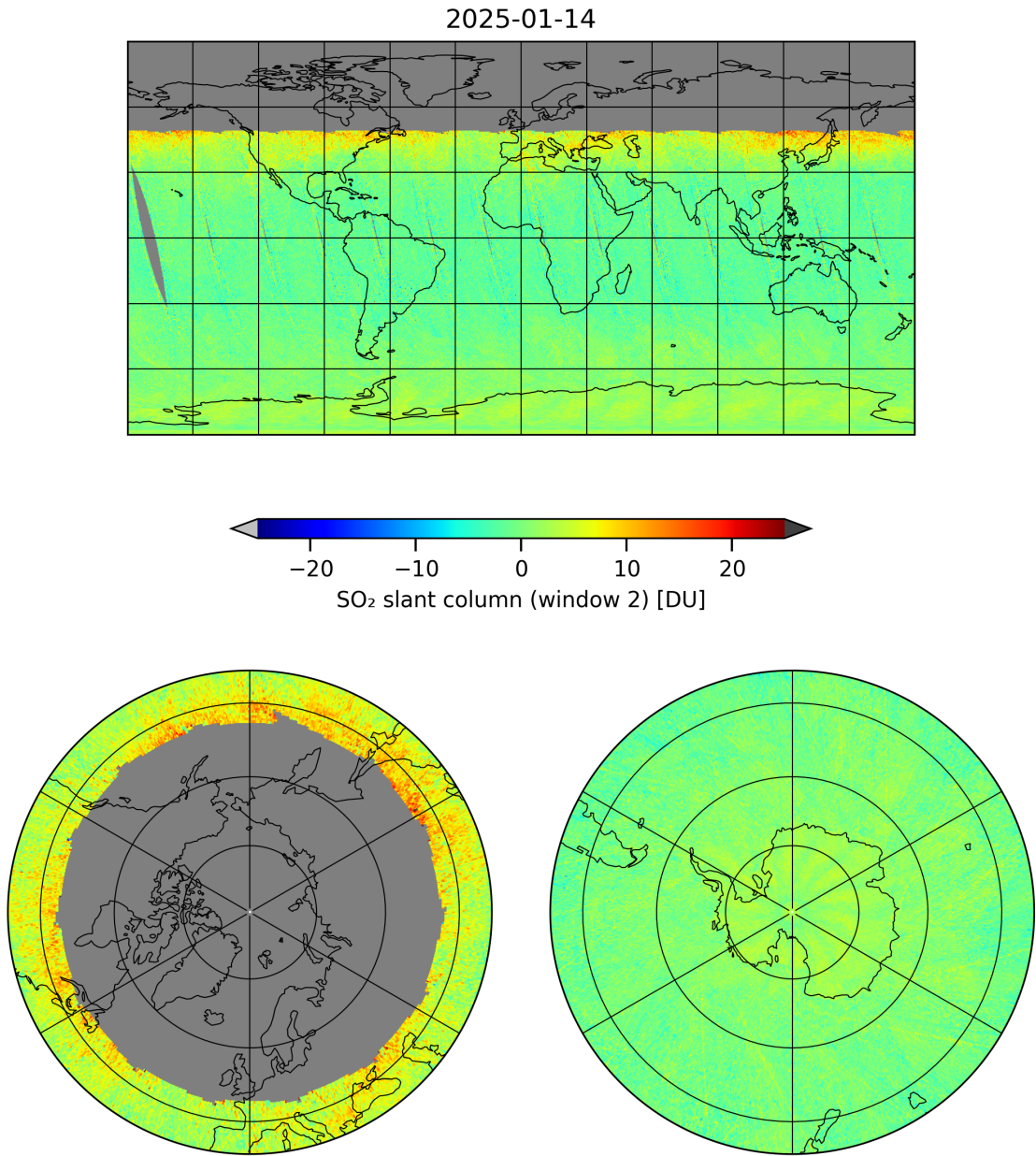


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-01-14 to 2025-01-15

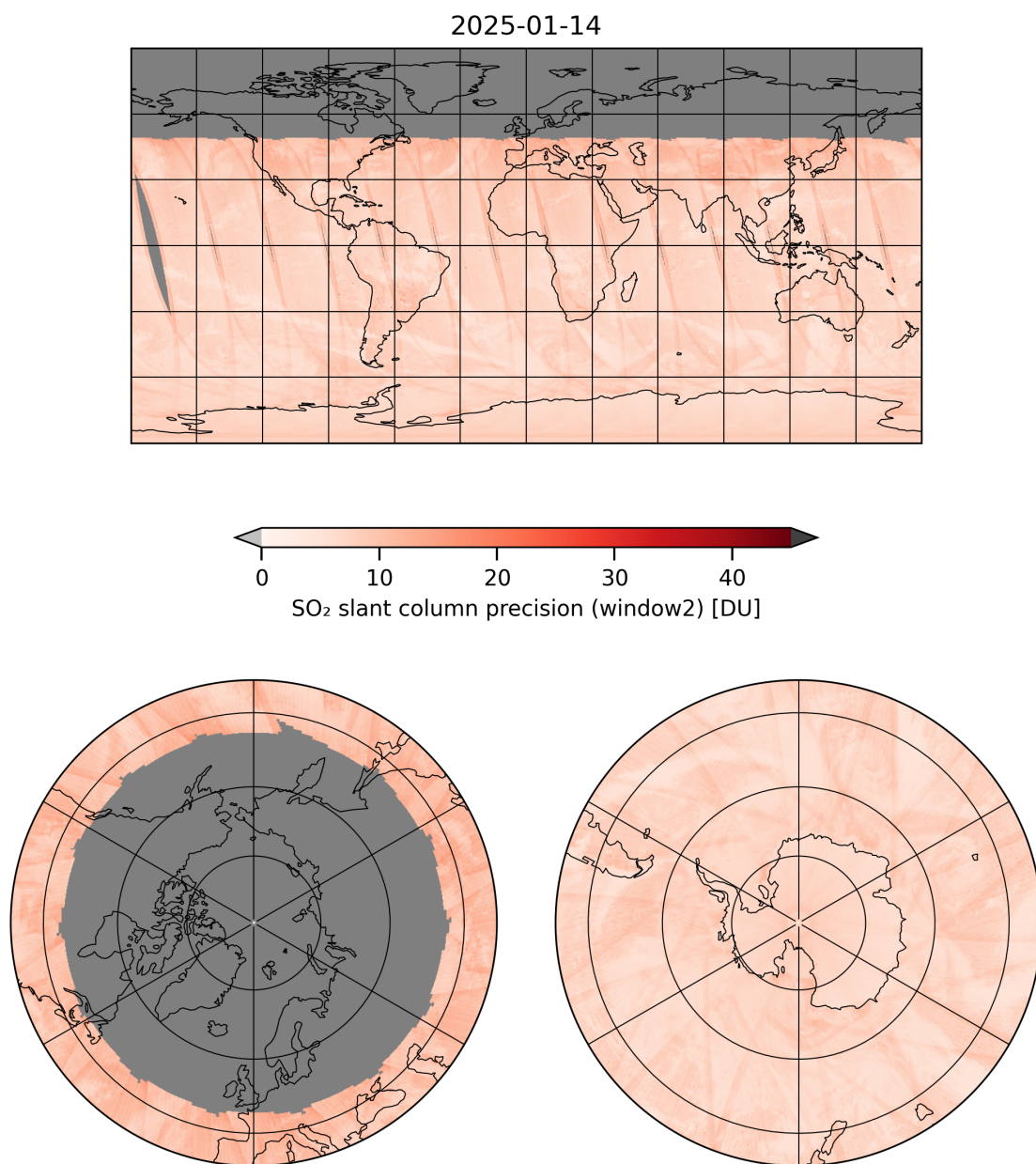


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-01-14 to 2025-01-15

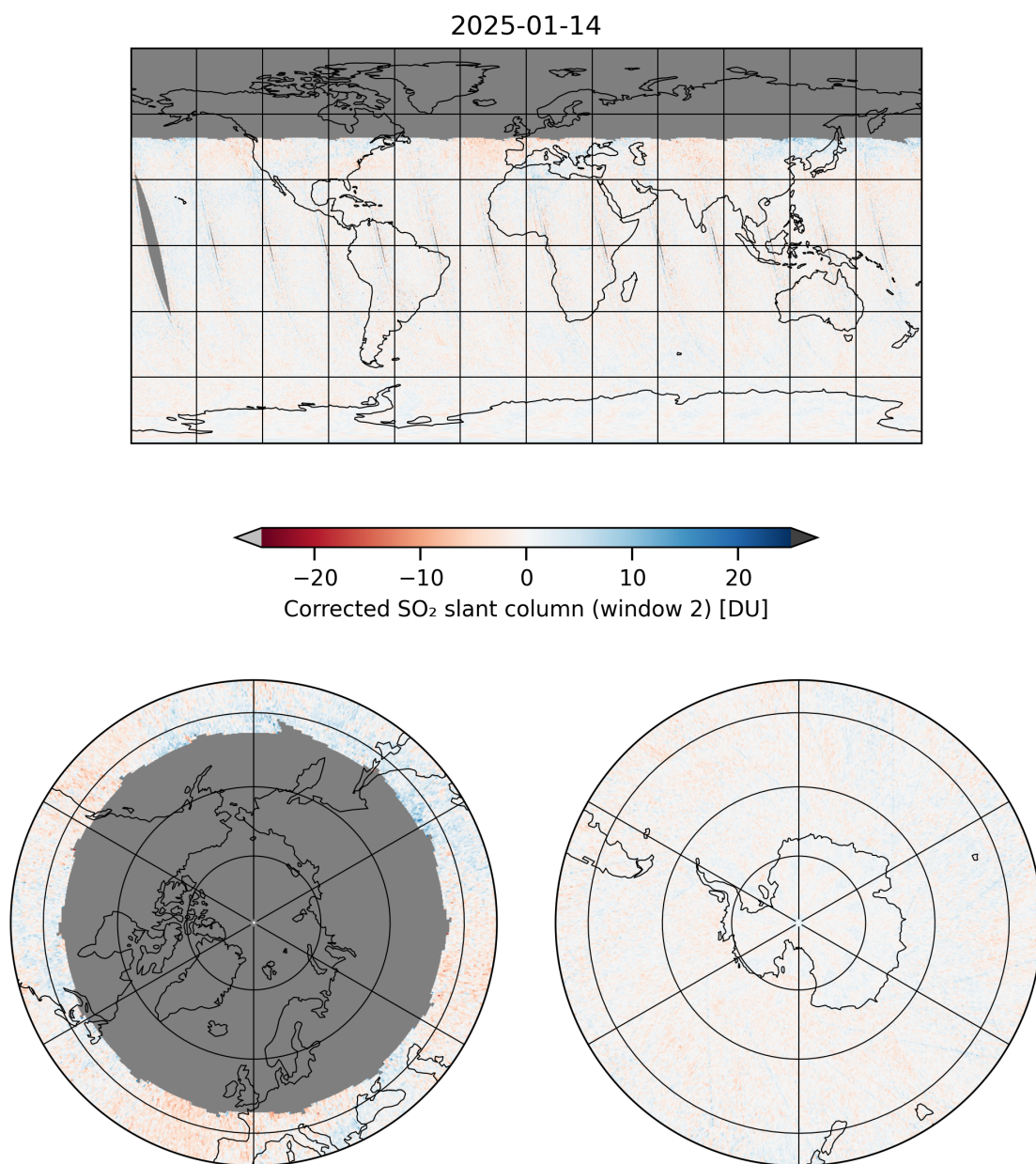


Figure 15: Map of "Corrected SO₂ slant column (window 2)" for 2025-01-14 to 2025-01-15

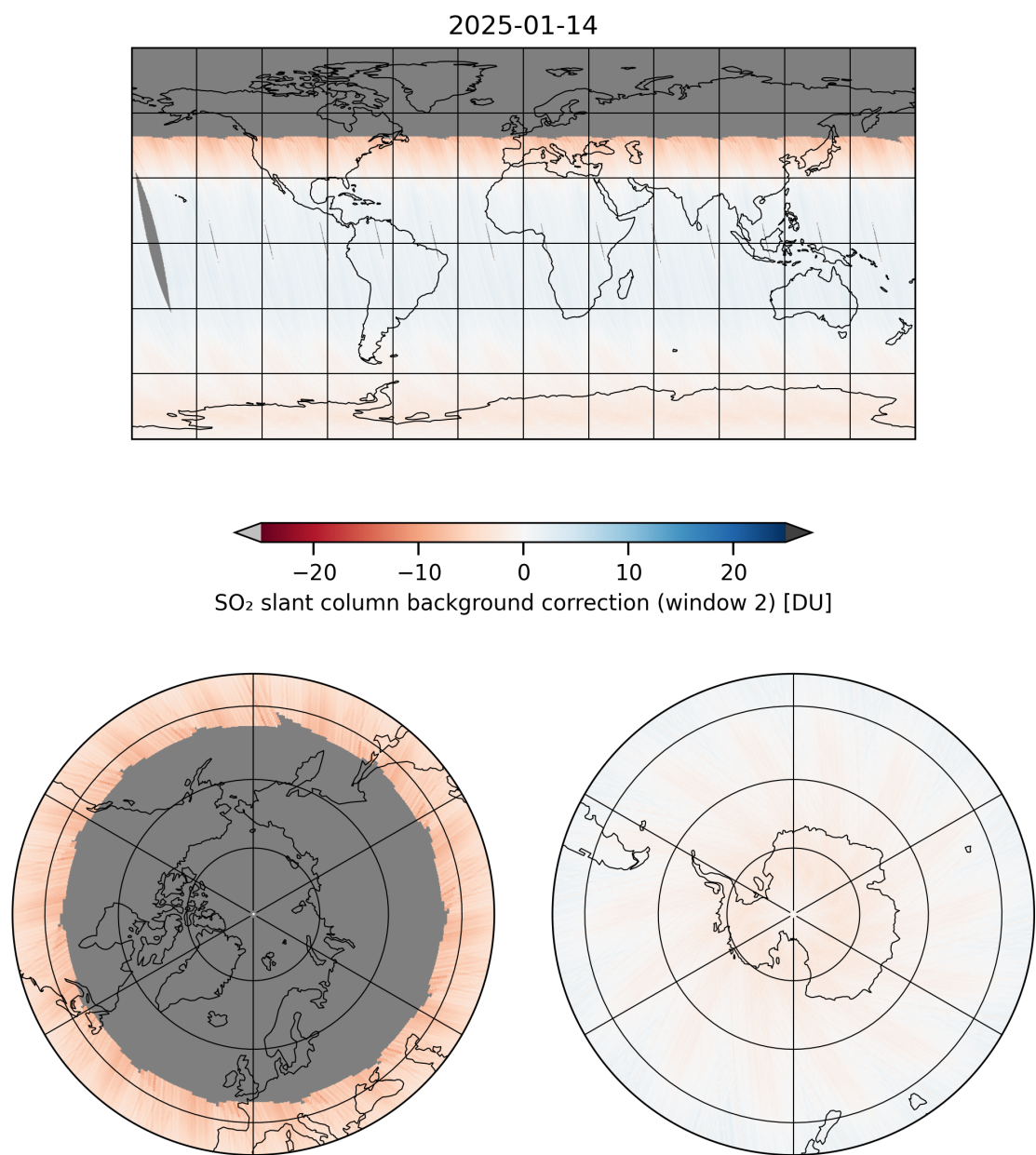


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-01-14 to 2025-01-15

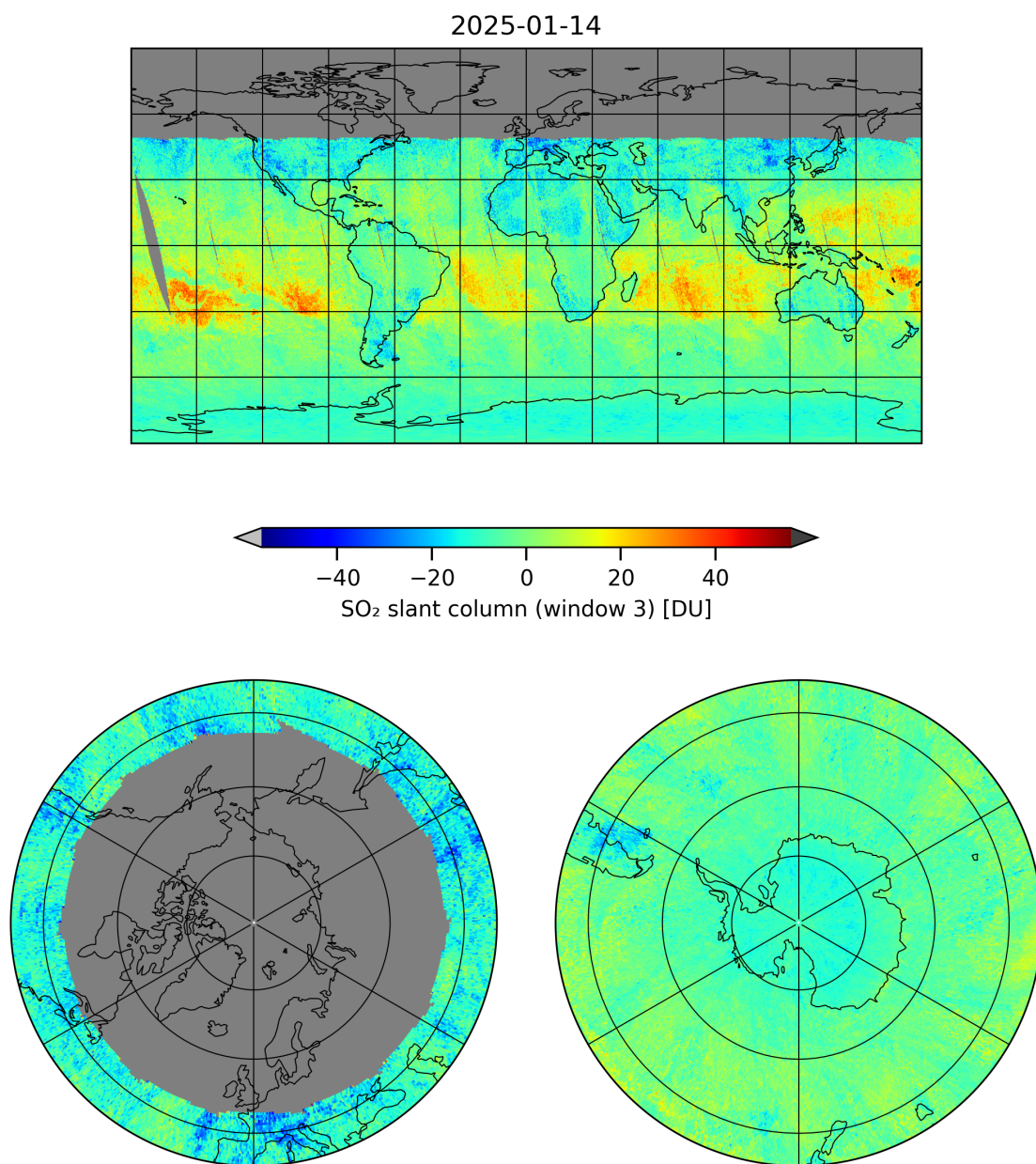


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-01-14 to 2025-01-15

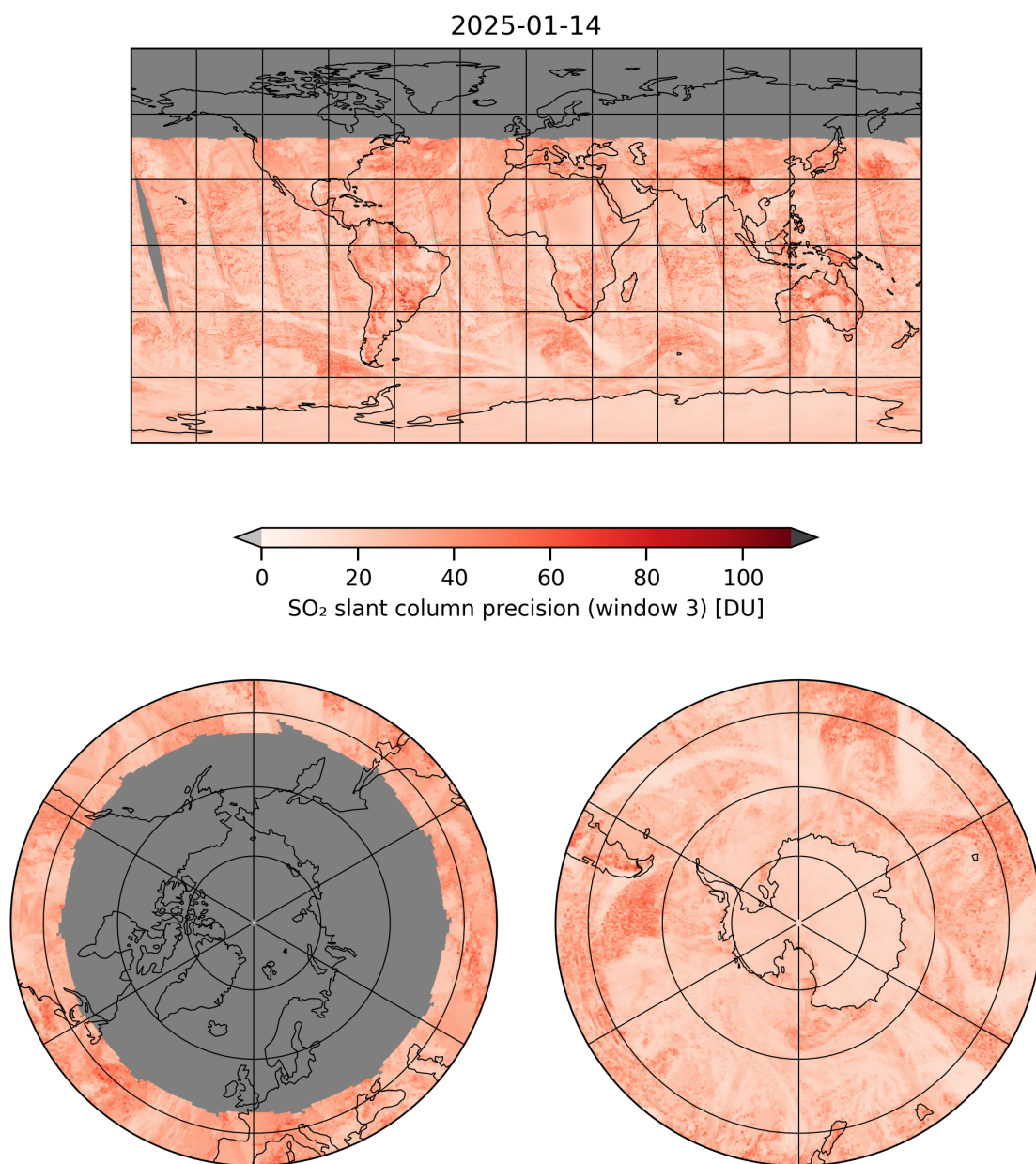


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-01-14 to 2025-01-15

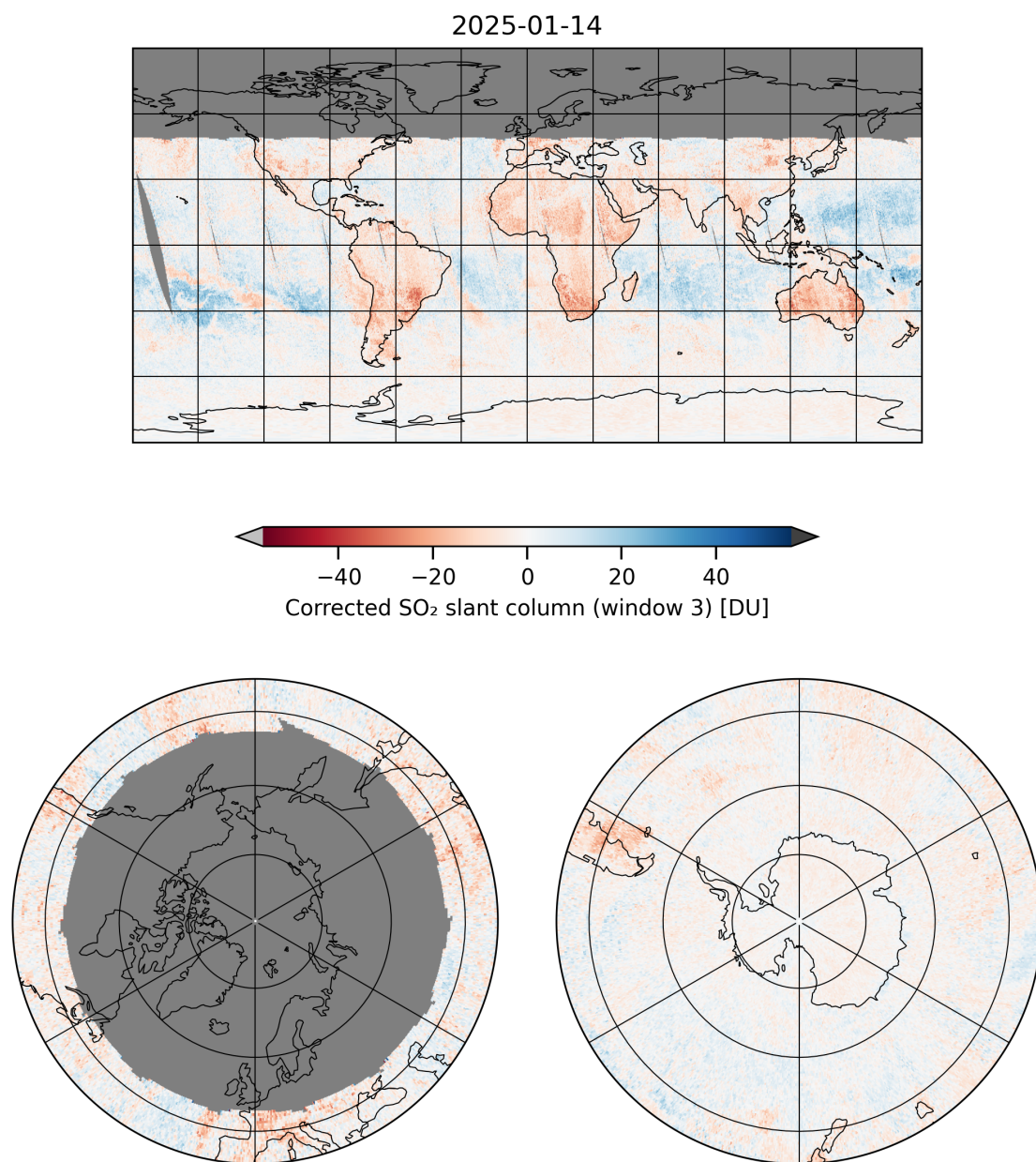


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-01-14 to 2025-01-15

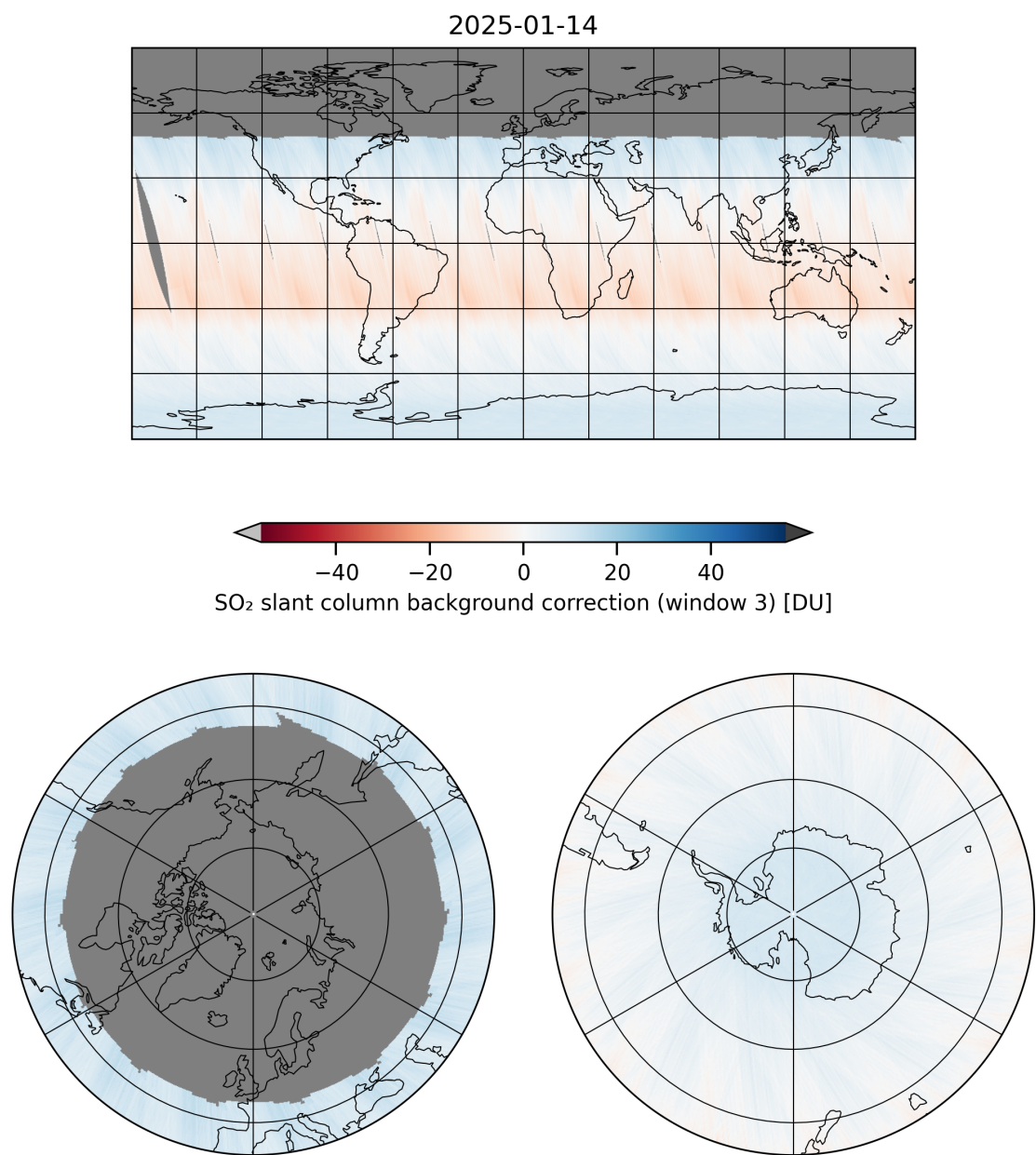


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-01-14 to 2025-01-15

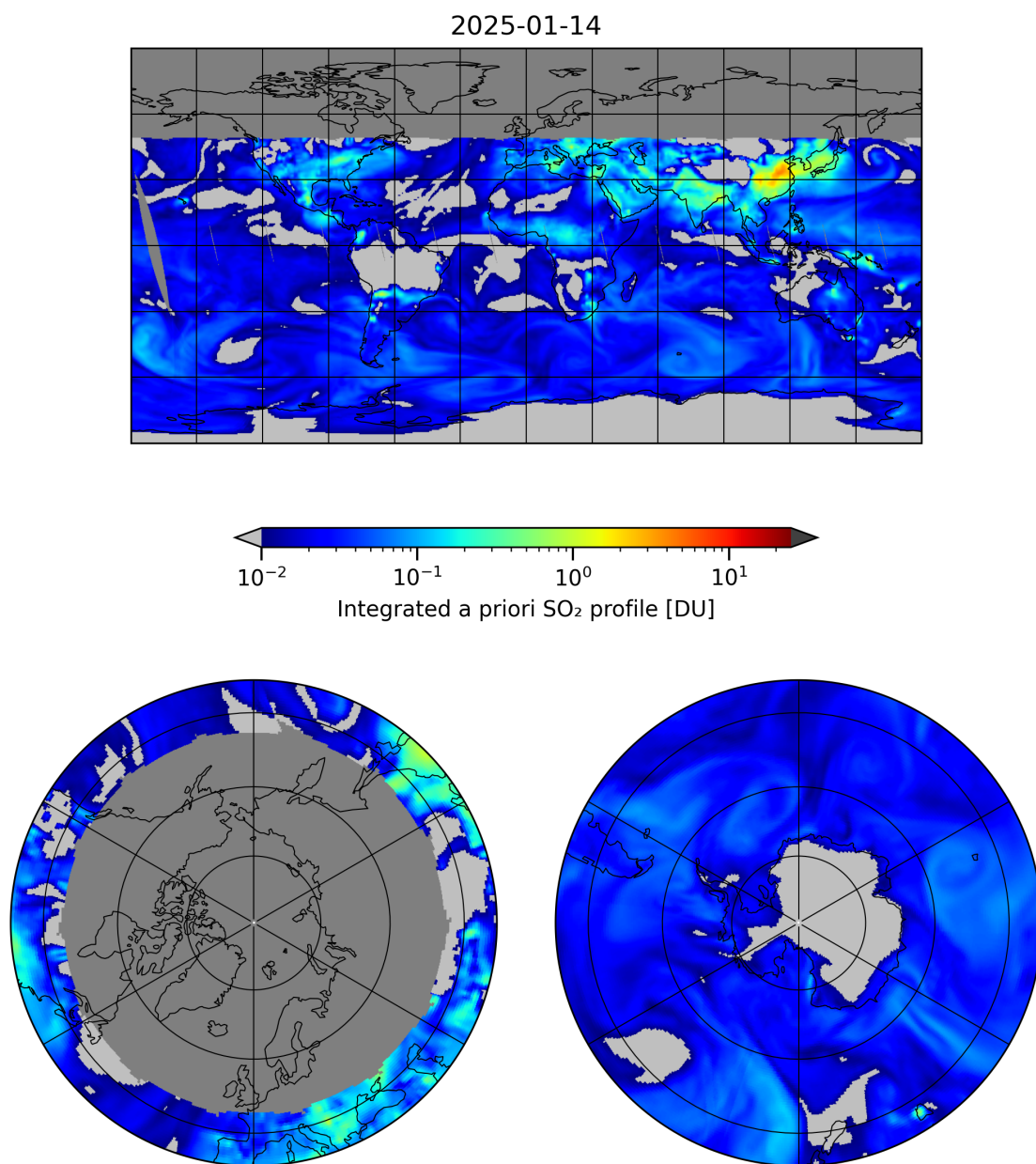


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-01-14 to 2025-01-15

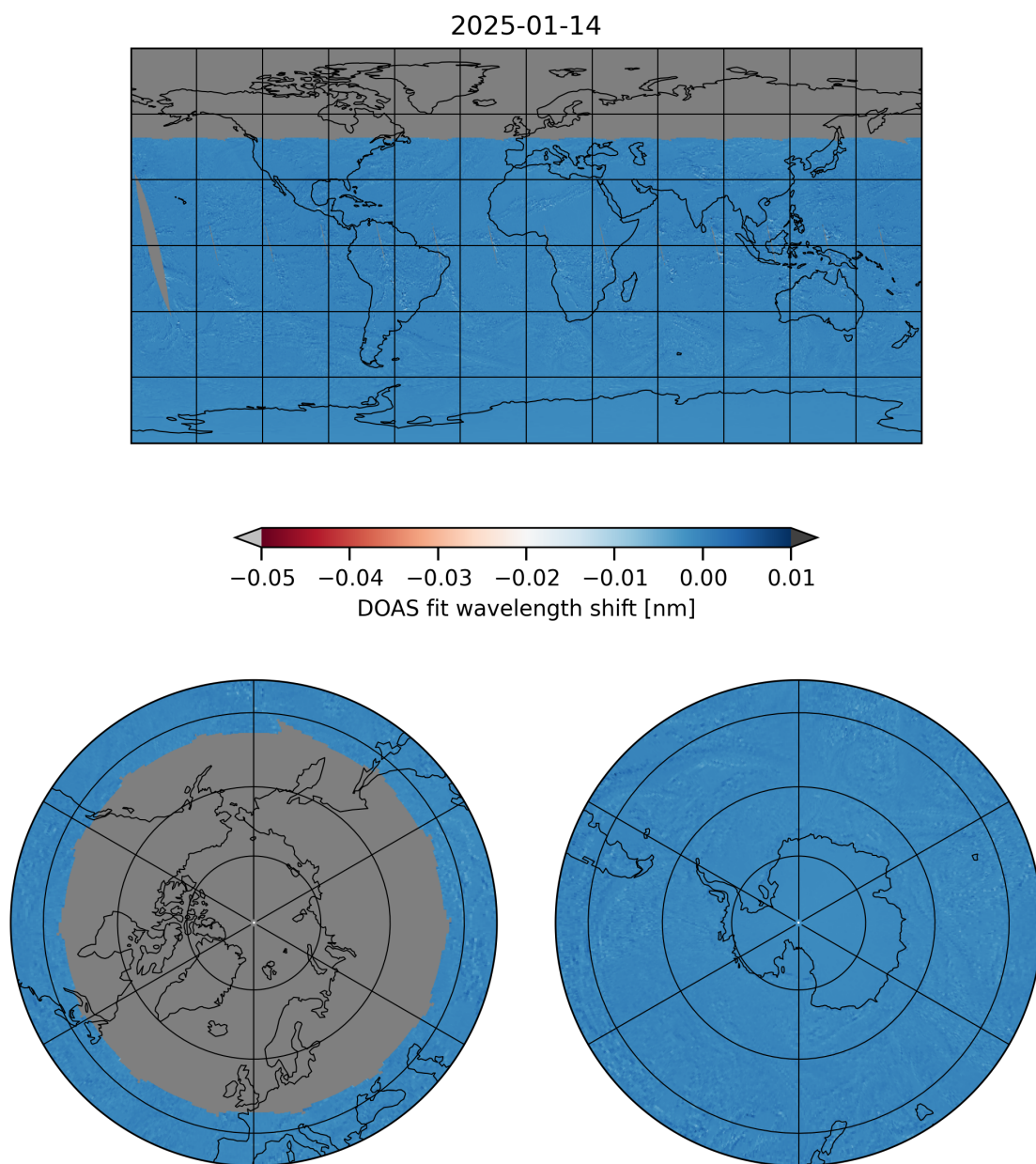


Figure 22: Map of “DOAS fit wavelength shift” for 2025-01-14 to 2025-01-15

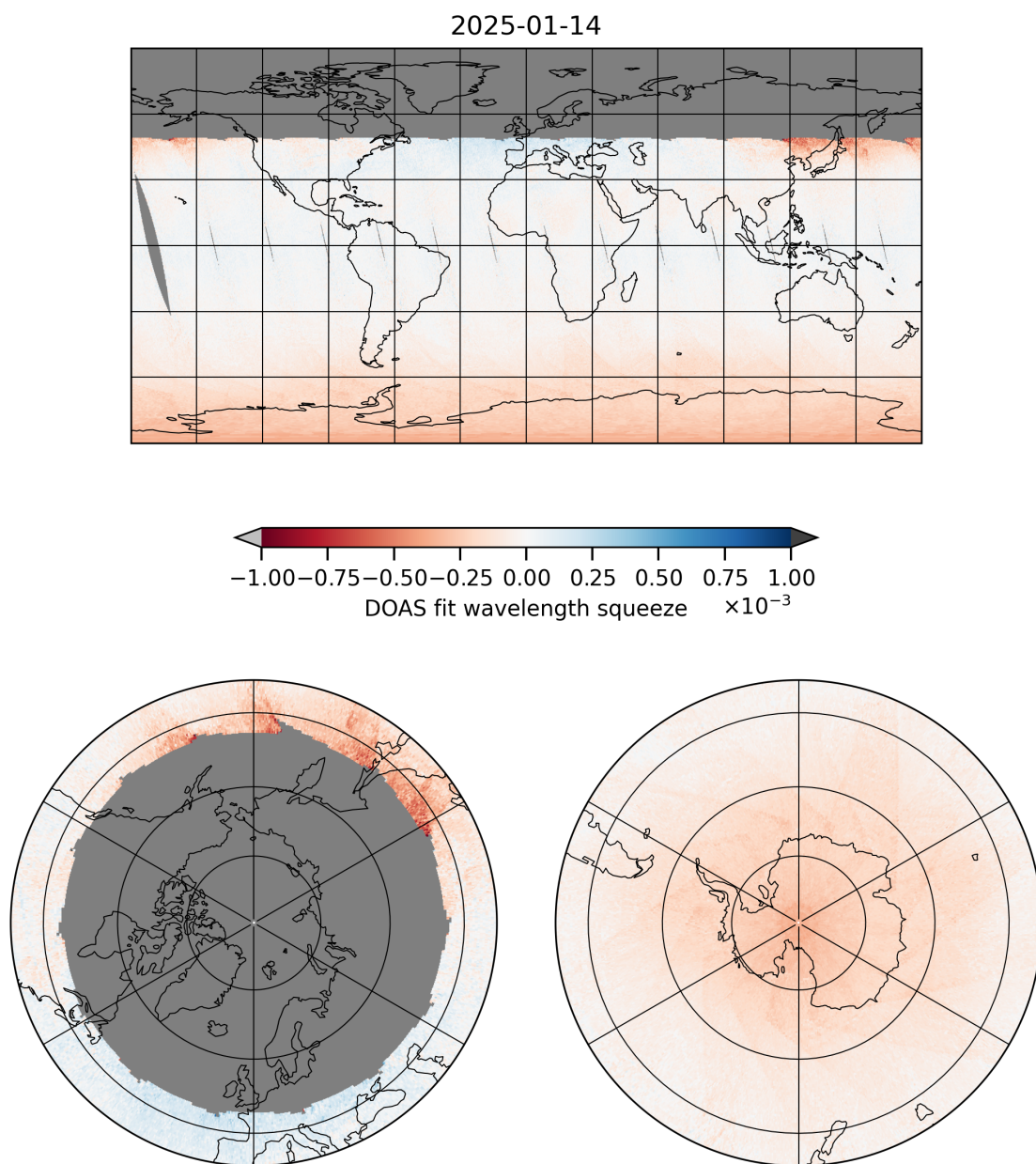


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-01-14 to 2025-01-15

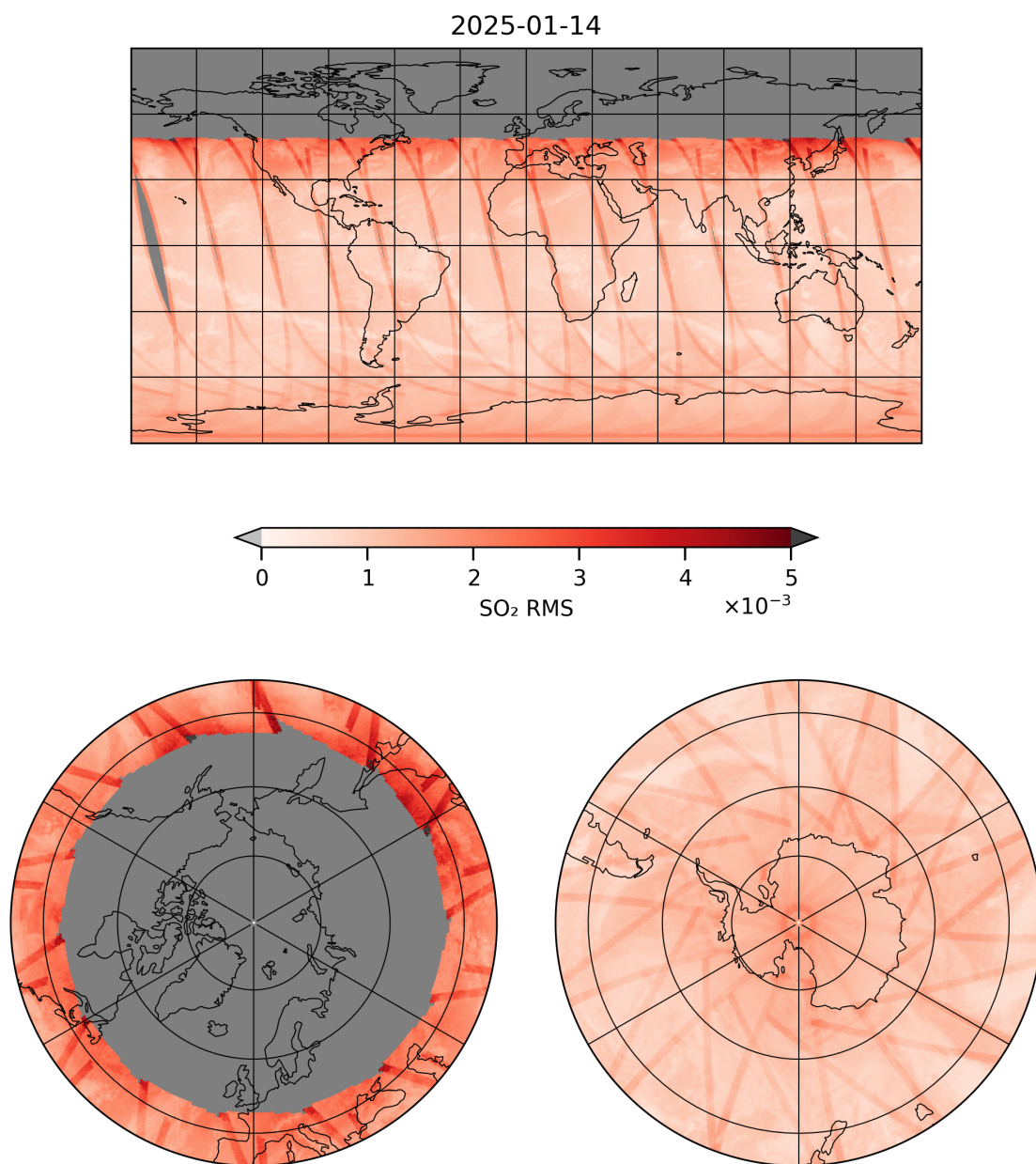


Figure 24: Map of “SO₂ RMS” for 2025-01-14 to 2025-01-15

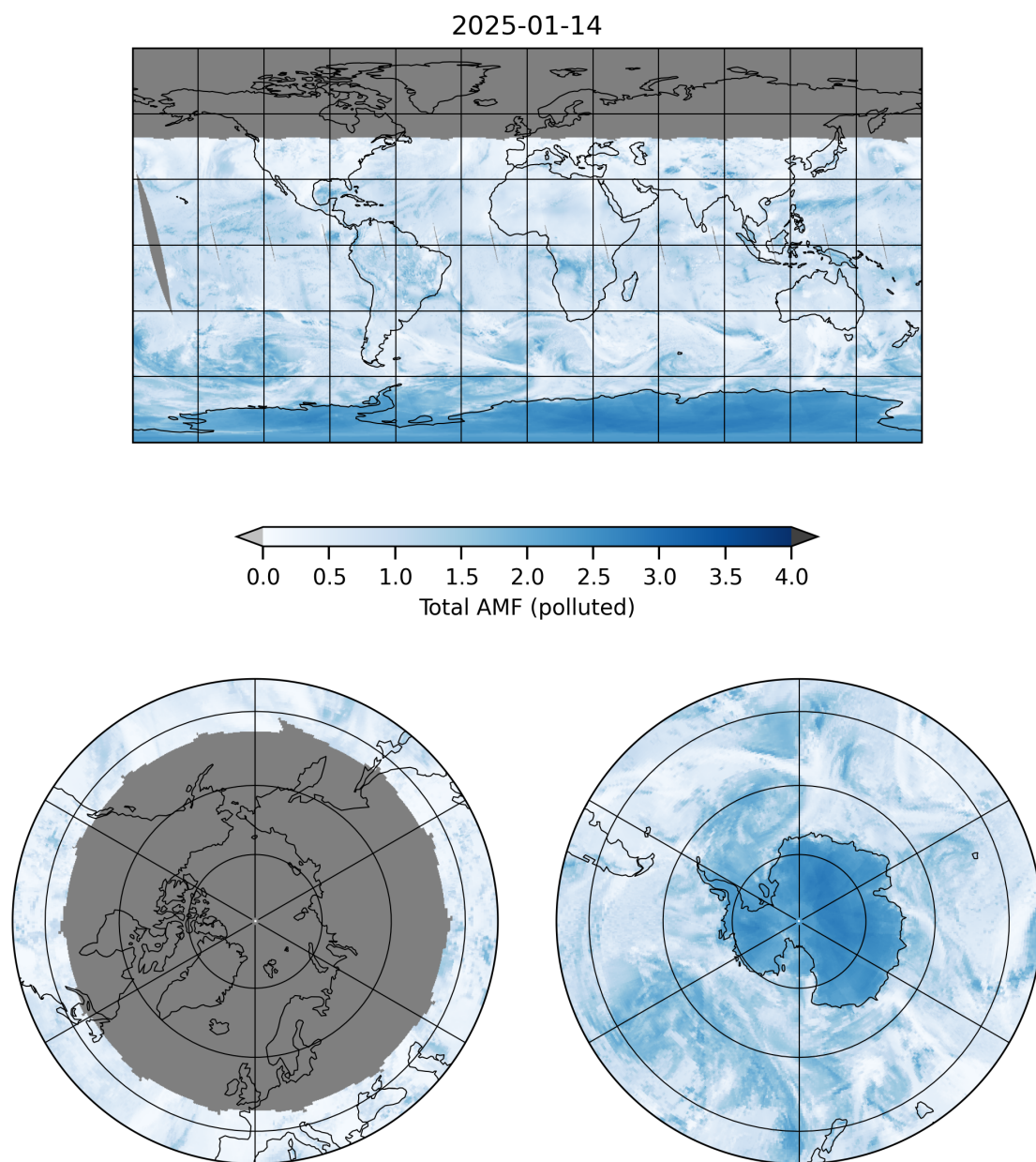


Figure 25: Map of "Total AMF (polluted)" for 2025-01-14 to 2025-01-15

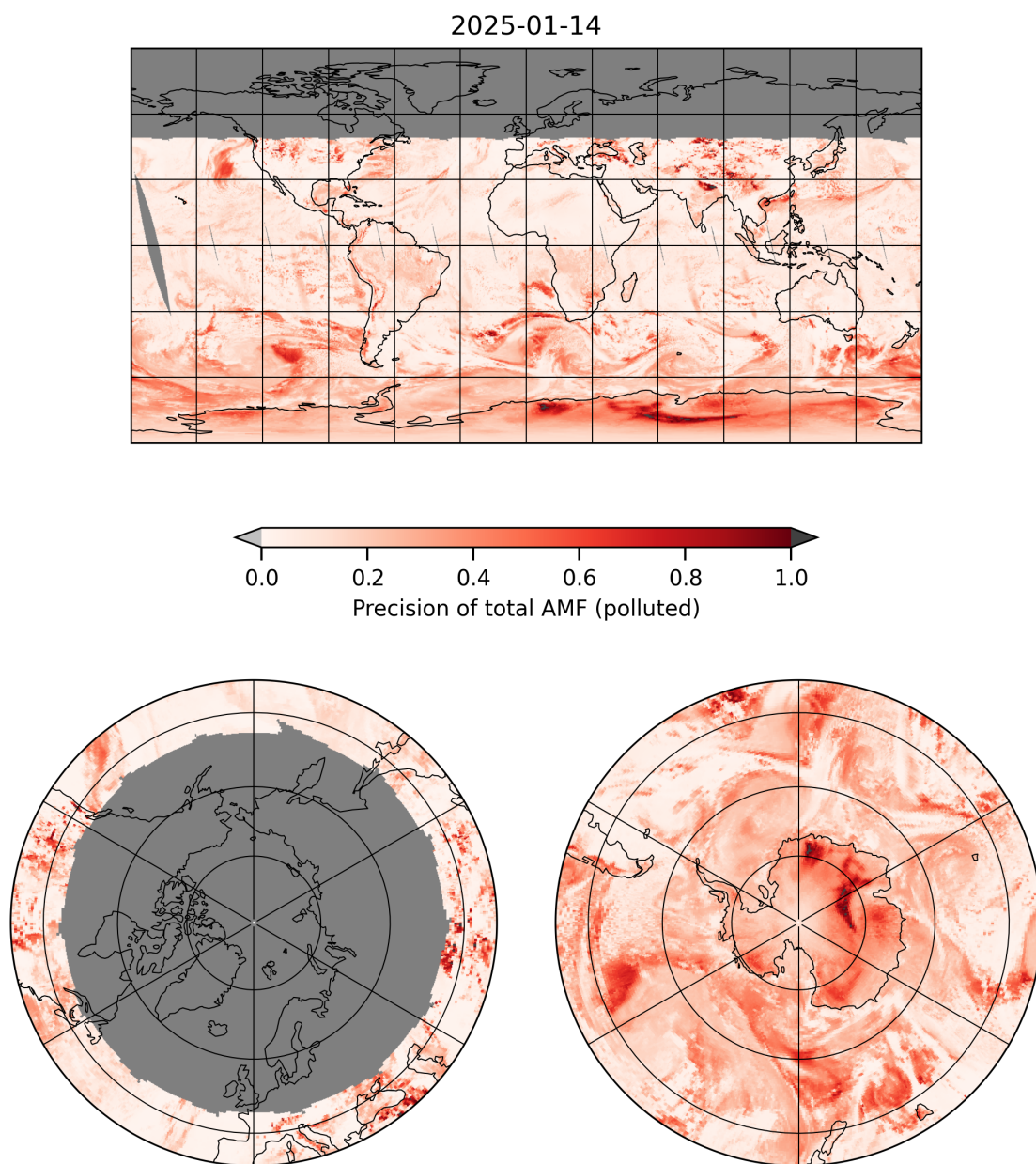


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-01-14 to 2025-01-15

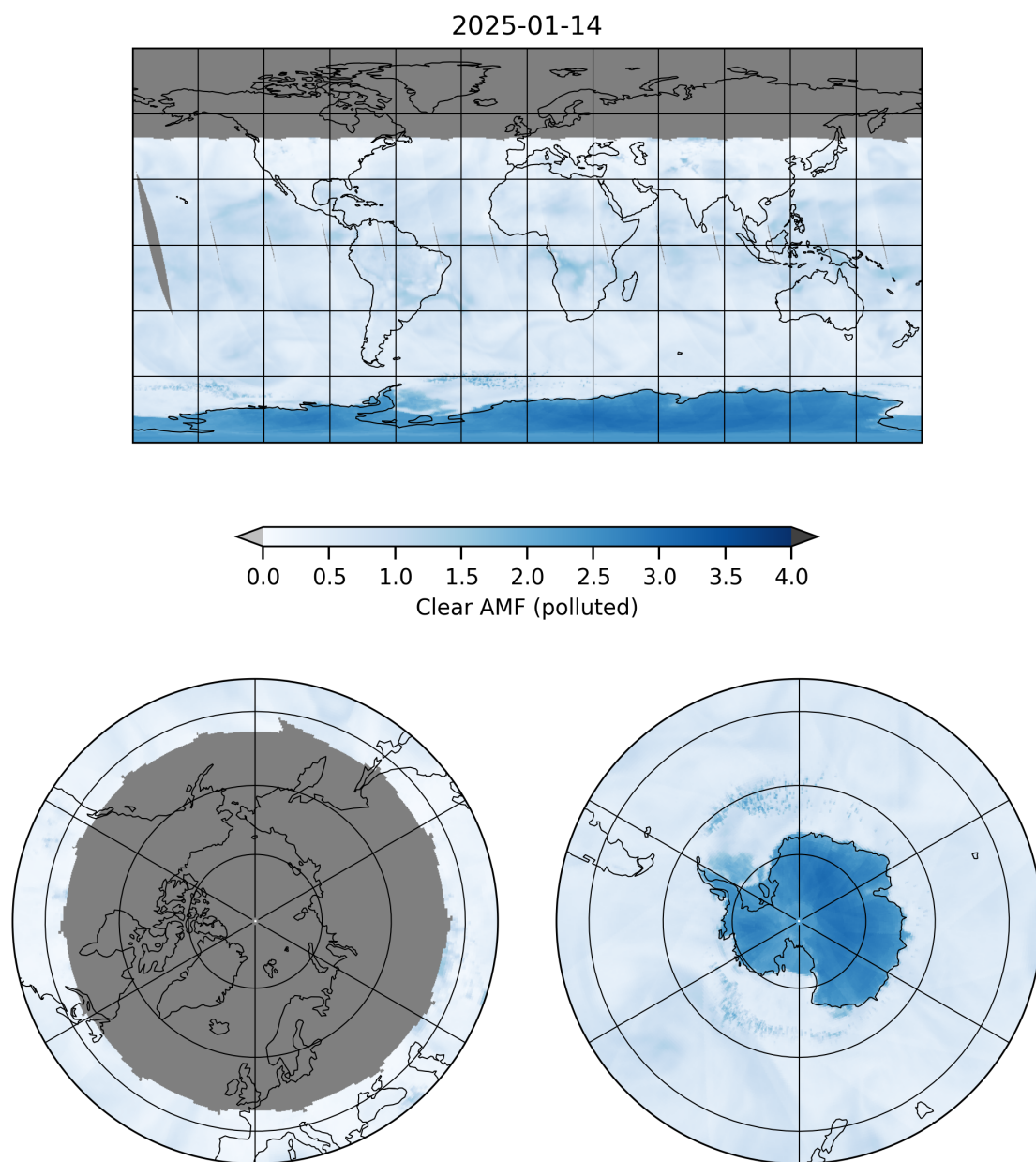


Figure 27: Map of “Clear AMF (polluted)” for 2025-01-14 to 2025-01-15

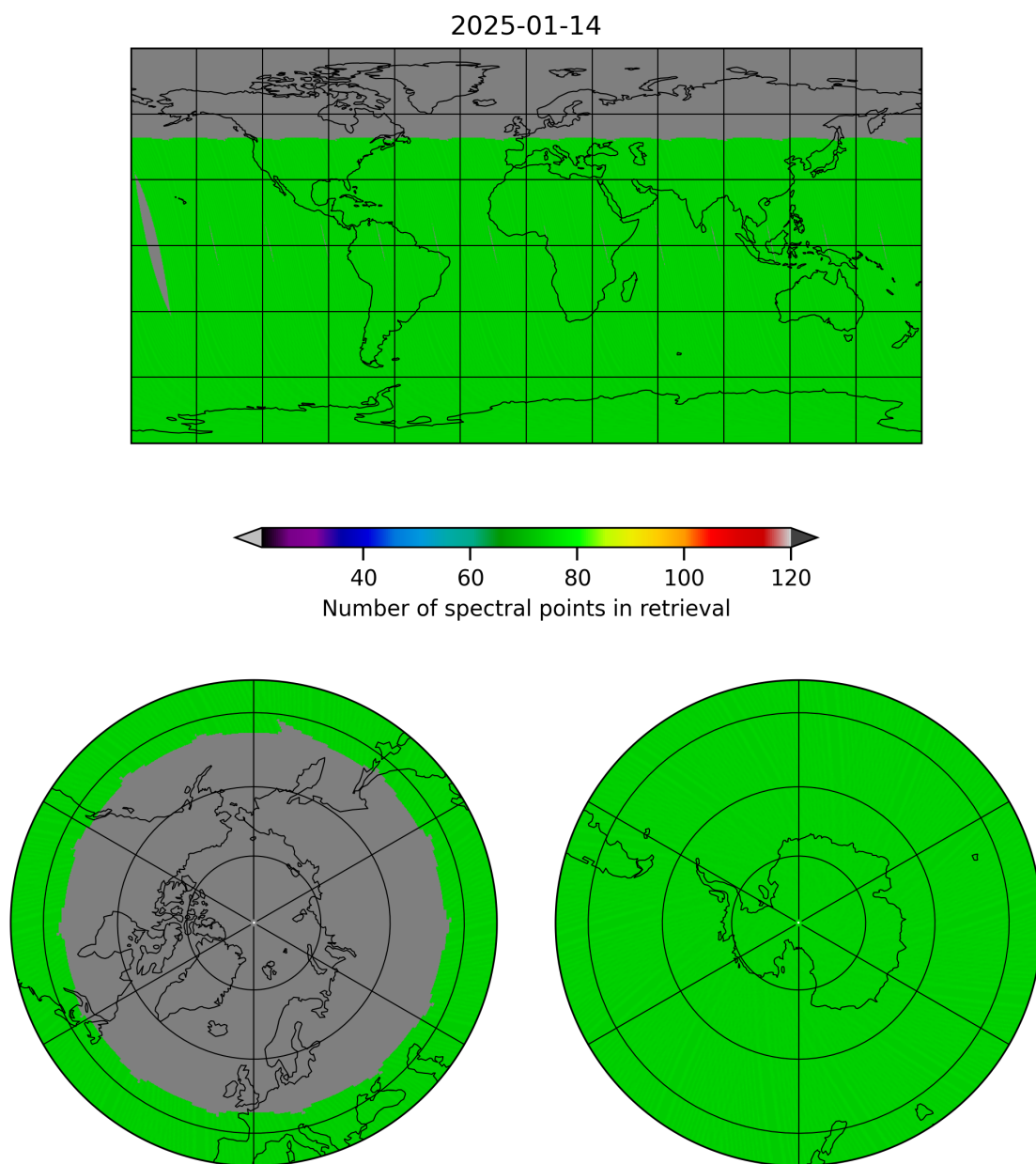


Figure 28: Map of “Number of spectral points in retrieval” for 2025-01-14 to 2025-01-15

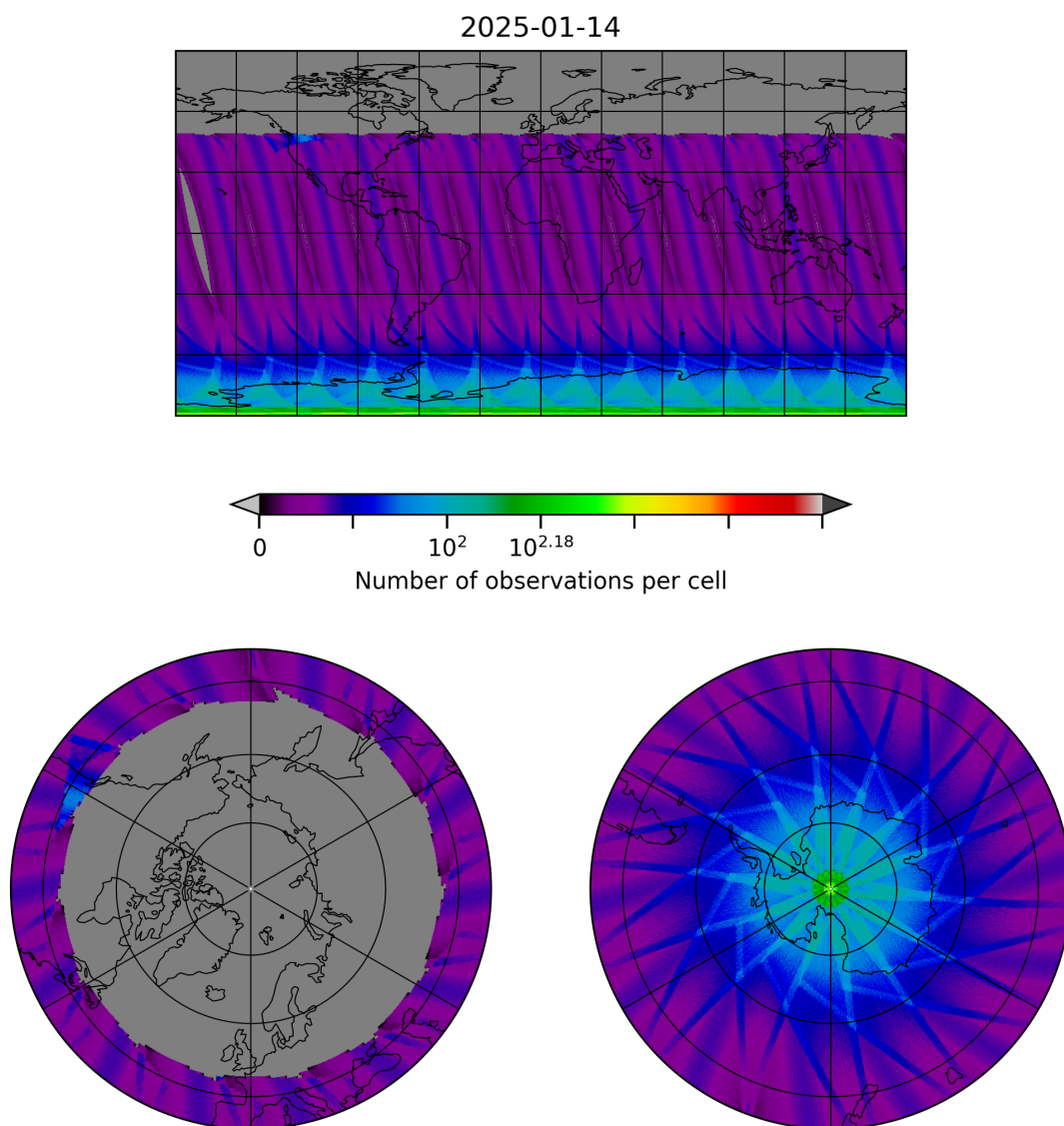


Figure 29: Map of the number of observations for 2025-01-14 to 2025-01-15

7 Zonal average

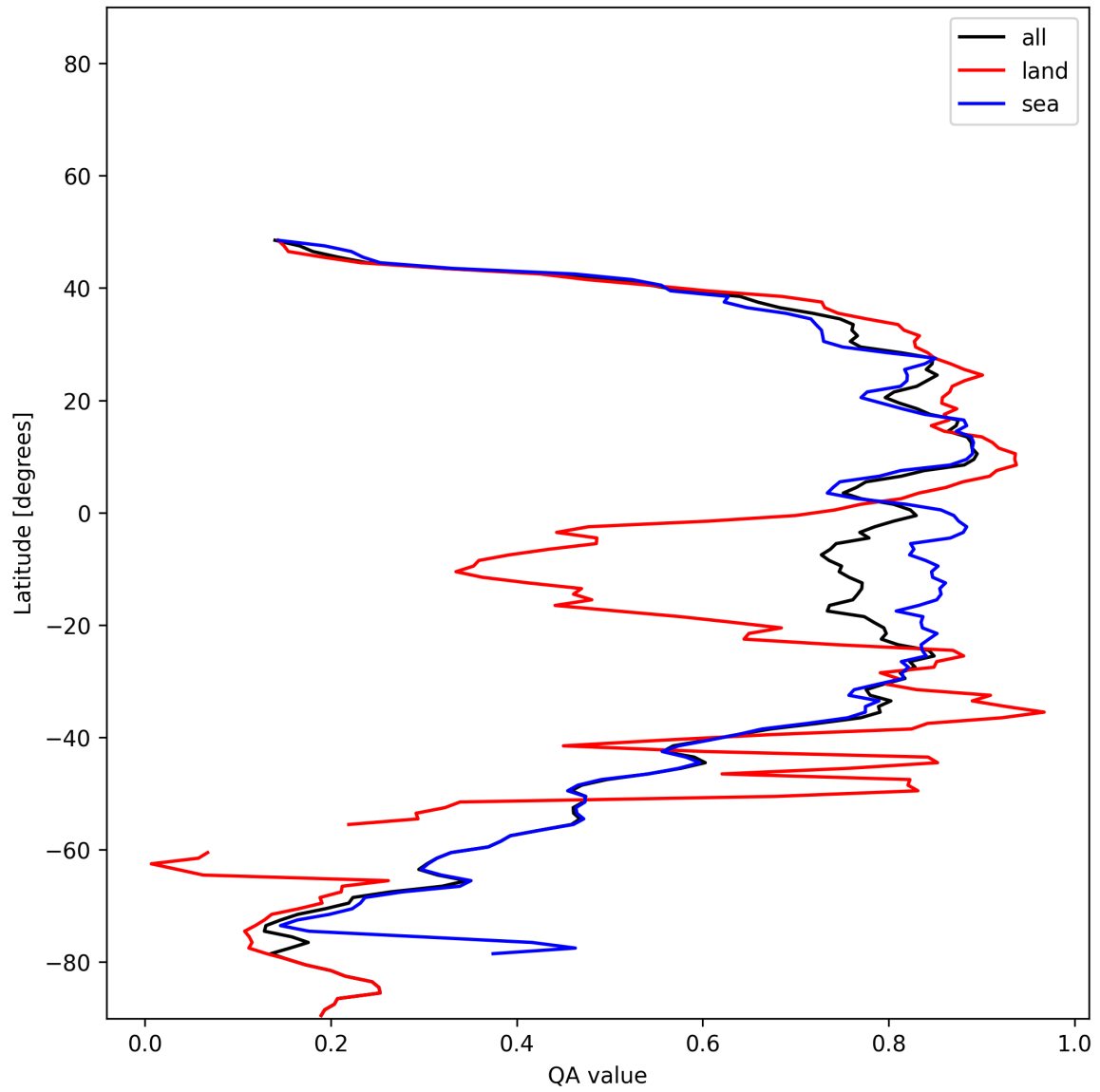


Figure 30: Zonal average of “QA value” for 2025-01-14 to 2025-01-15.

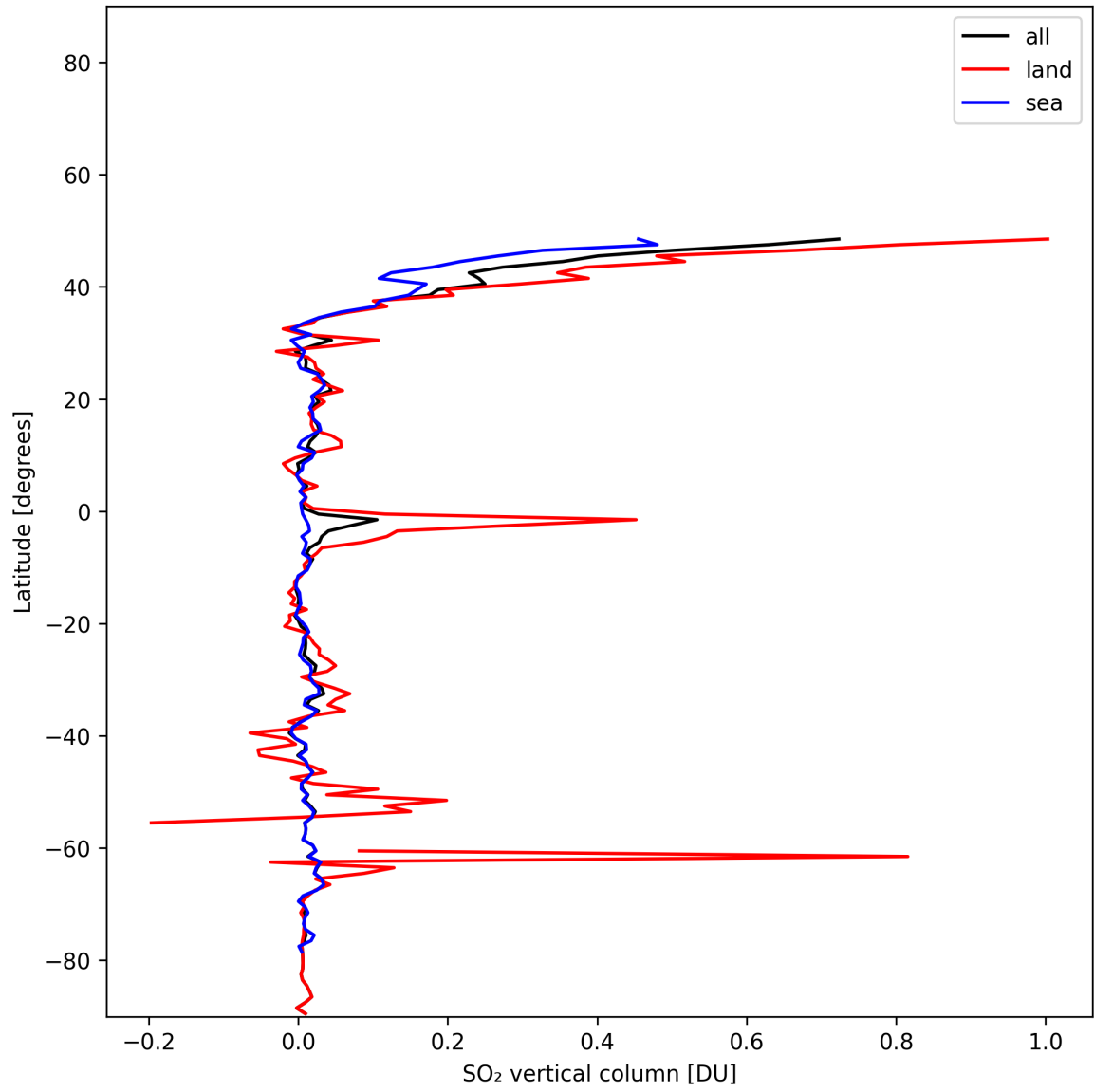


Figure 31: Zonal average of “SO₂ vertical column” for 2025-01-14 to 2025-01-15.

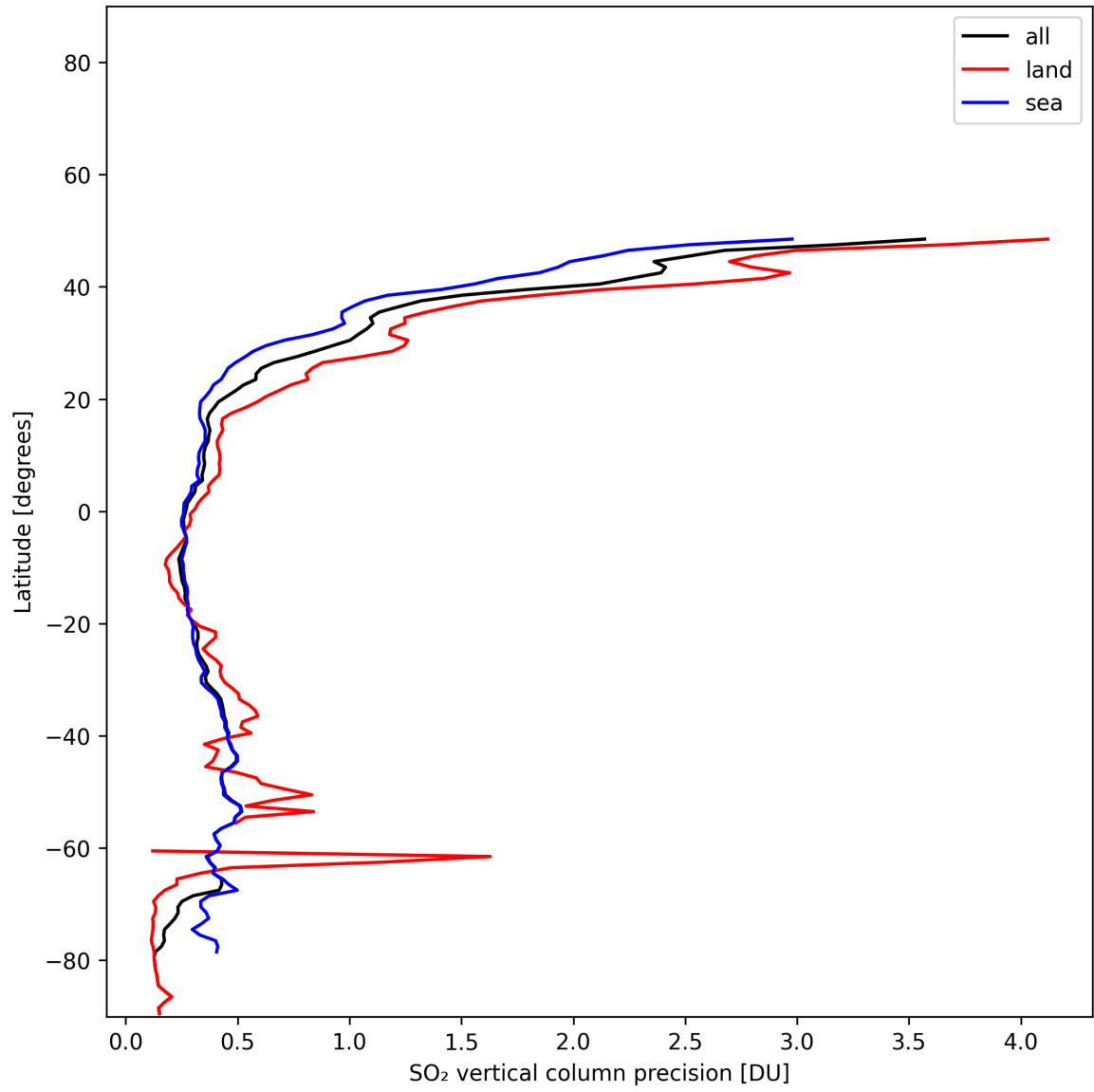


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-01-14 to 2025-01-15.

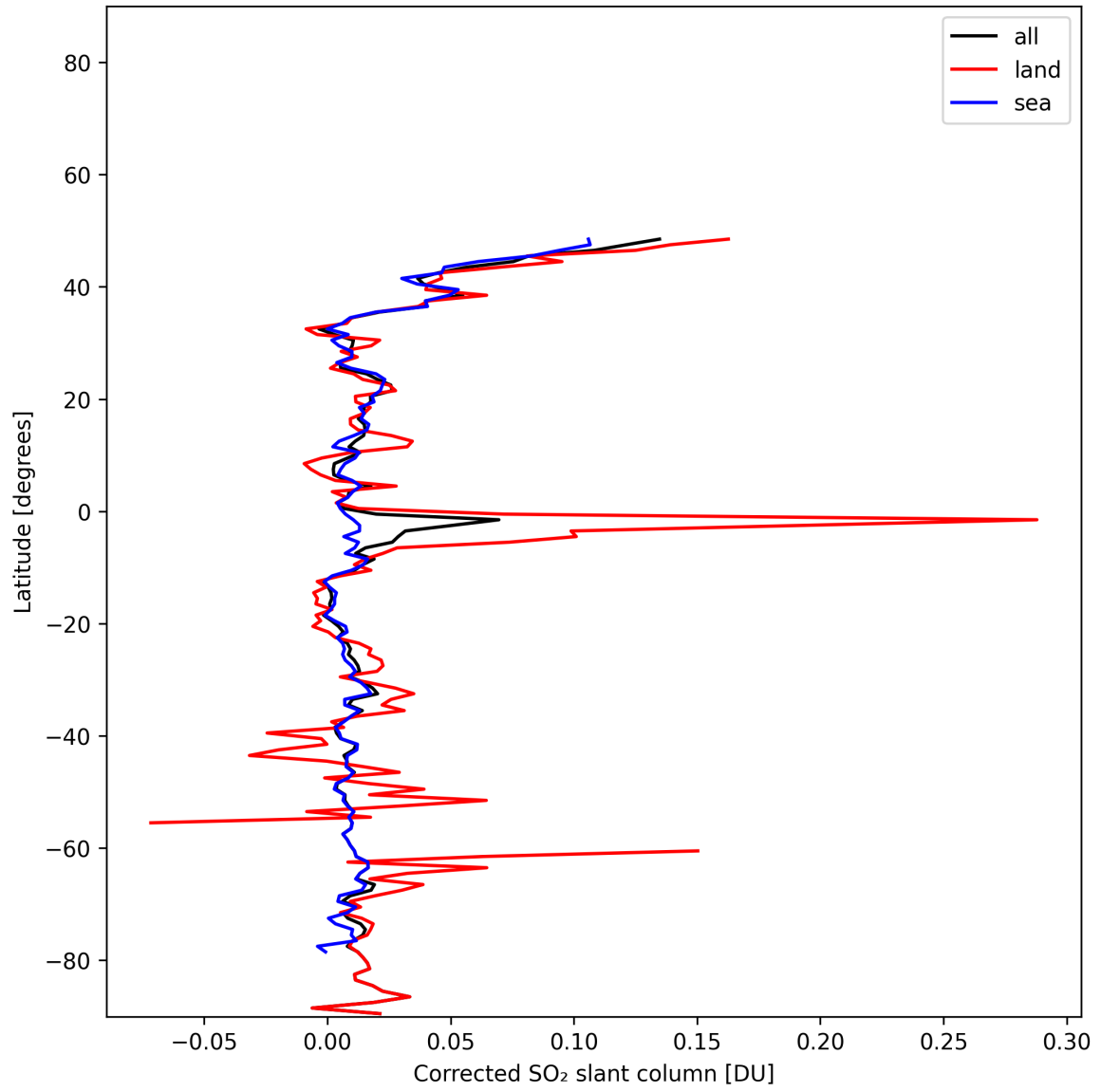


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-01-14 to 2025-01-15.

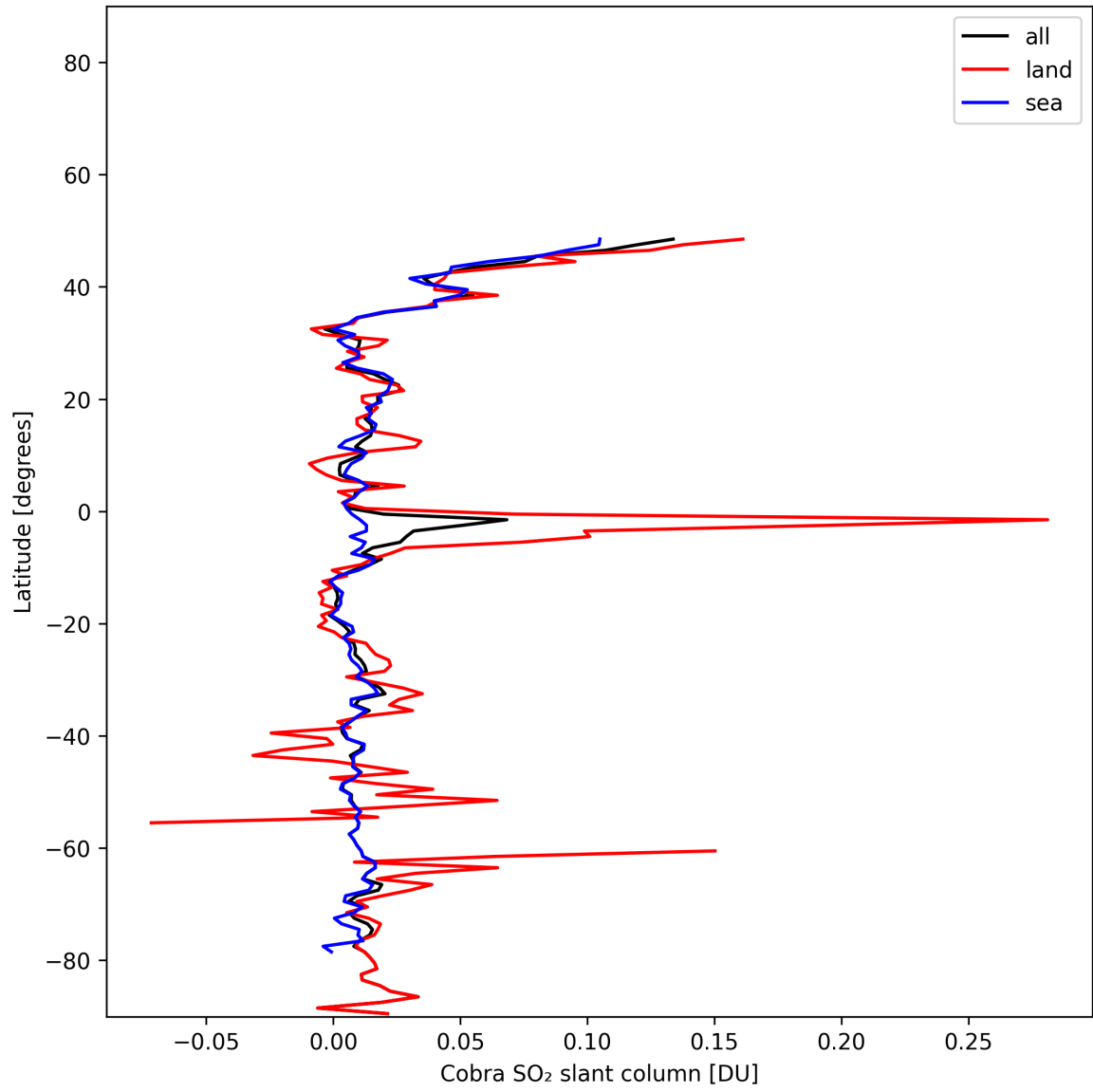


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-01-14 to 2025-01-15.

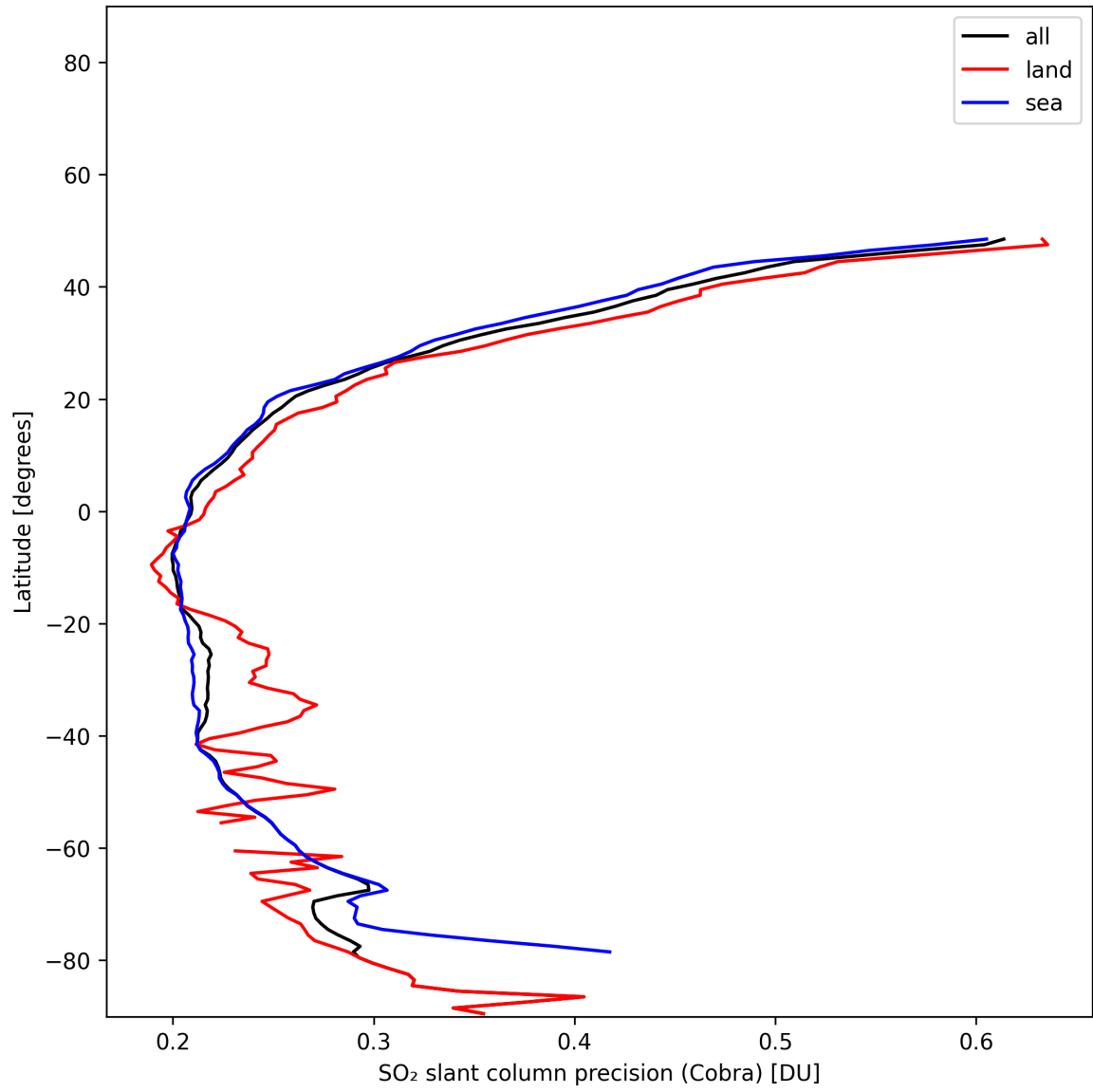


Figure 35: Zonal average of "SO₂ slant column precision (Cobra)" for 2025-01-14 to 2025-01-15.

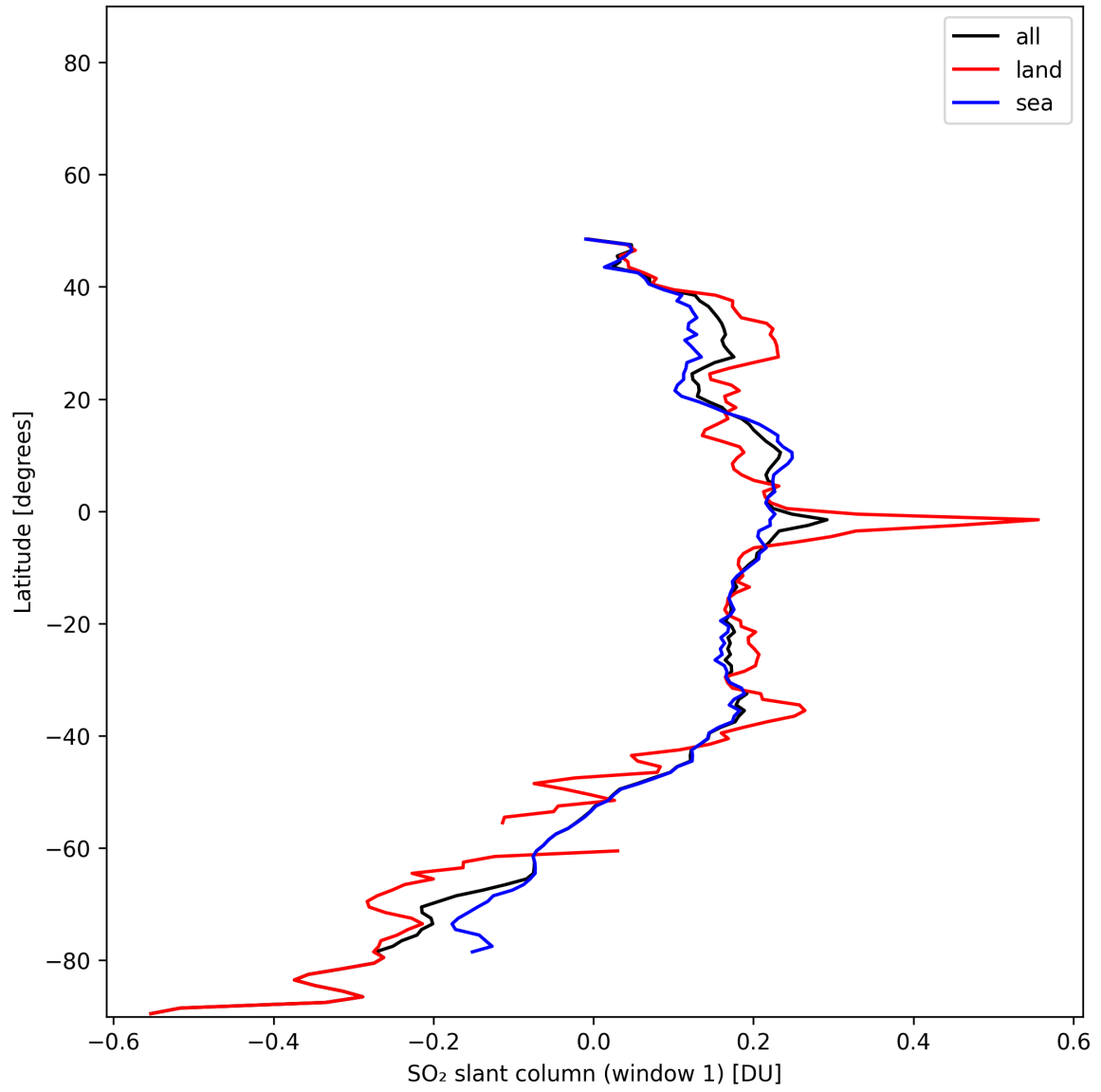


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-01-14 to 2025-01-15.

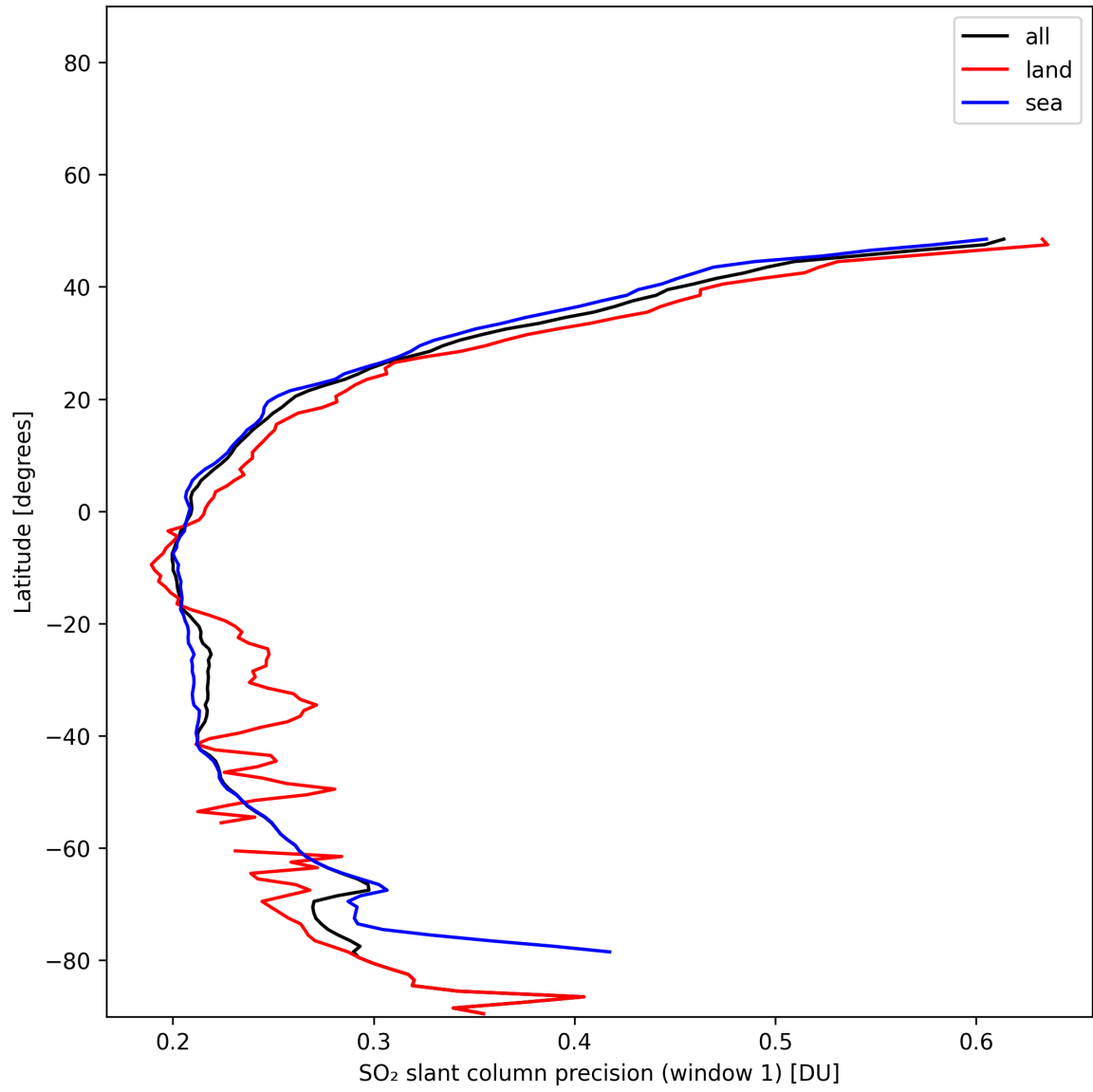


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-01-14 to 2025-01-15.

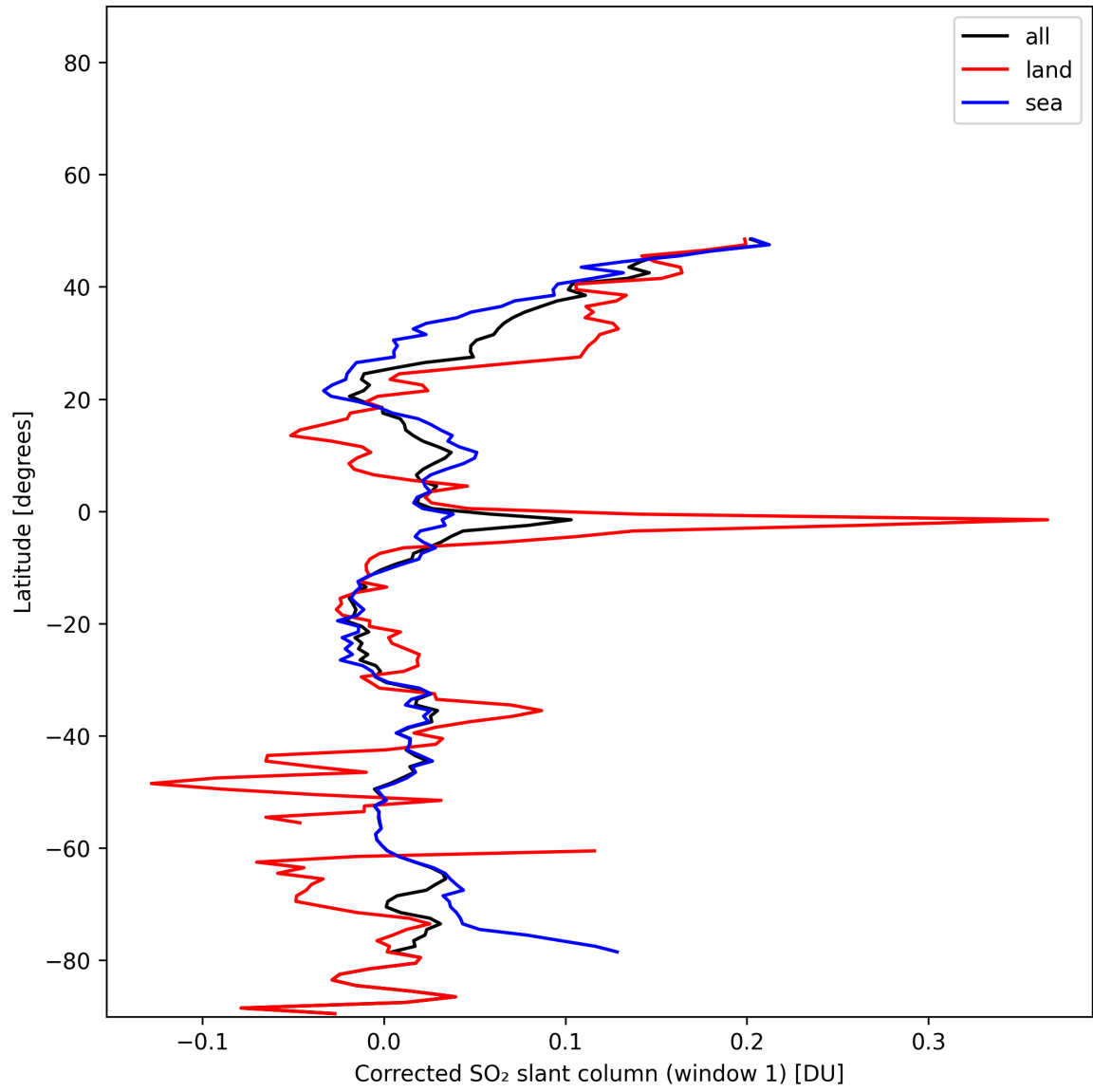


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-01-14 to 2025-01-15.

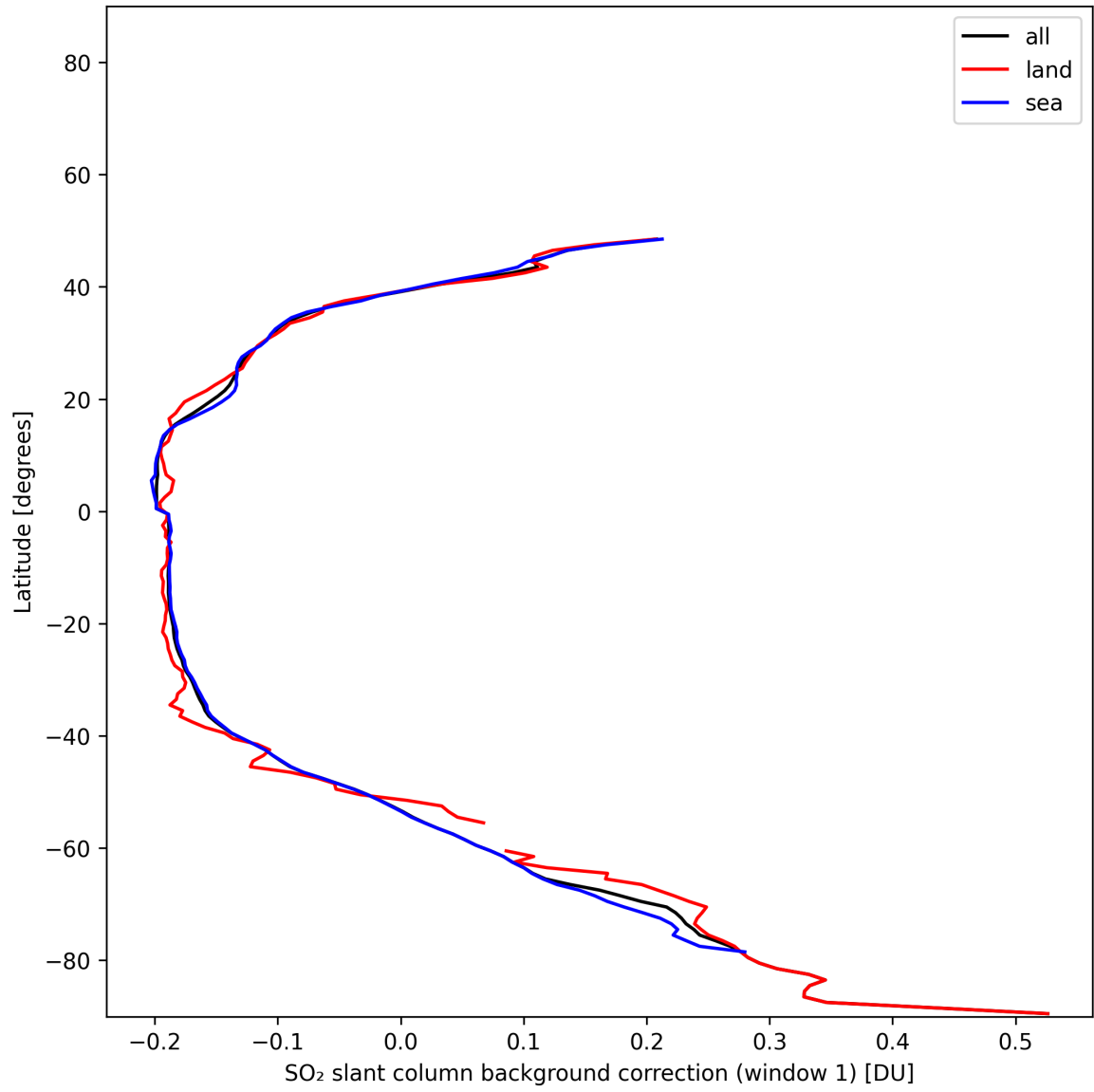


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-01-14 to 2025-01-15.

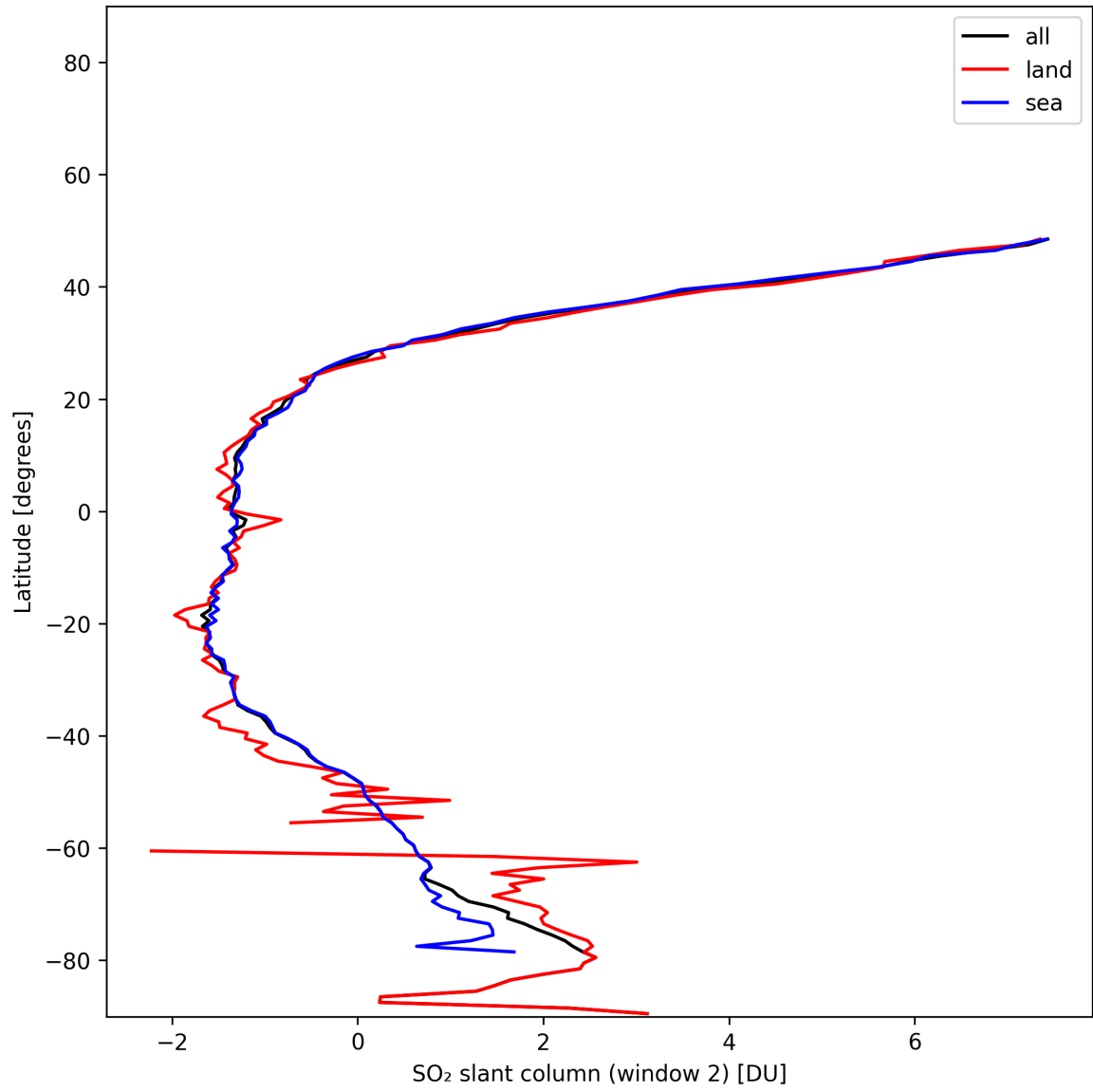


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-01-14 to 2025-01-15.

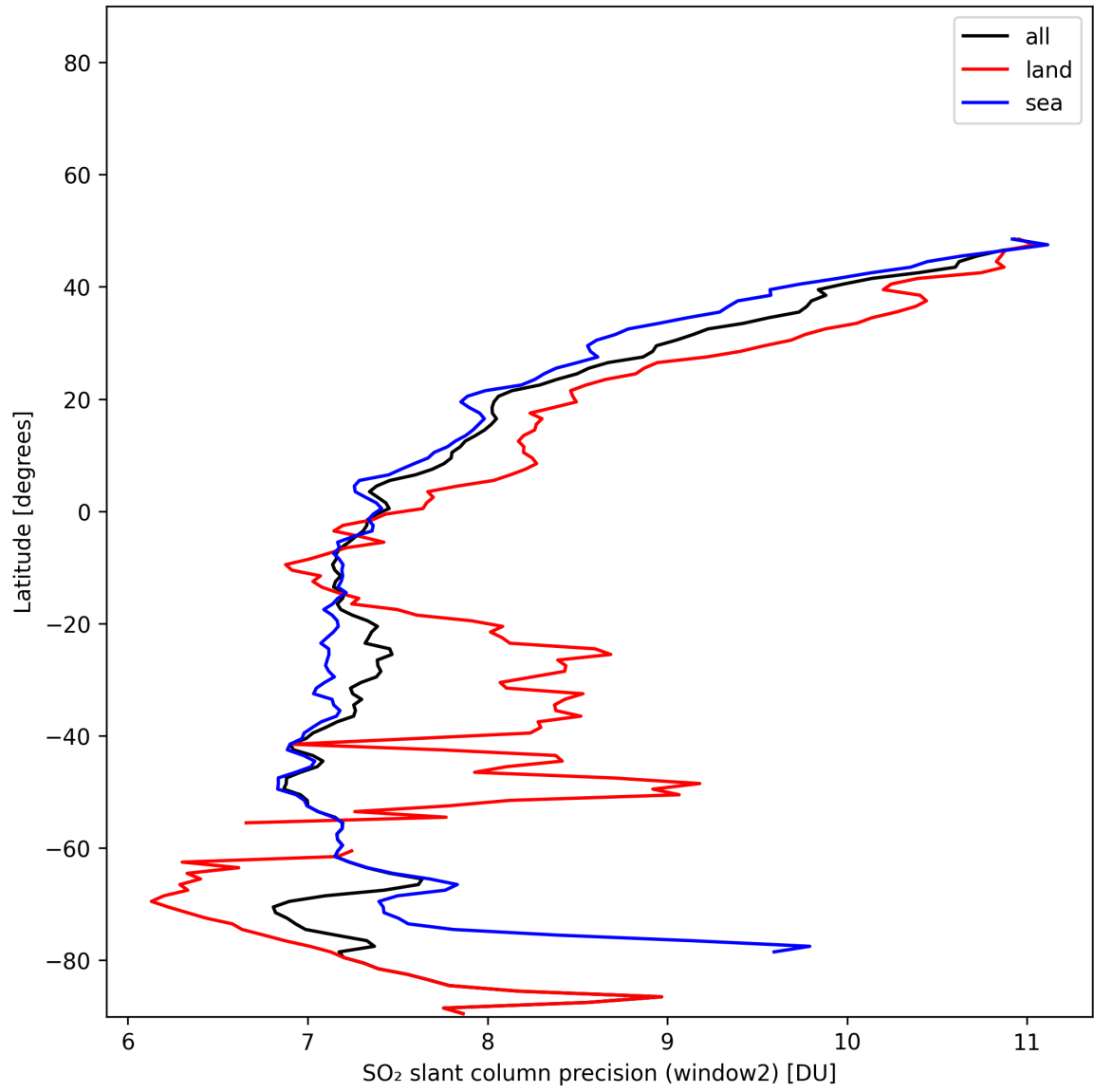


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-01-14 to 2025-01-15.

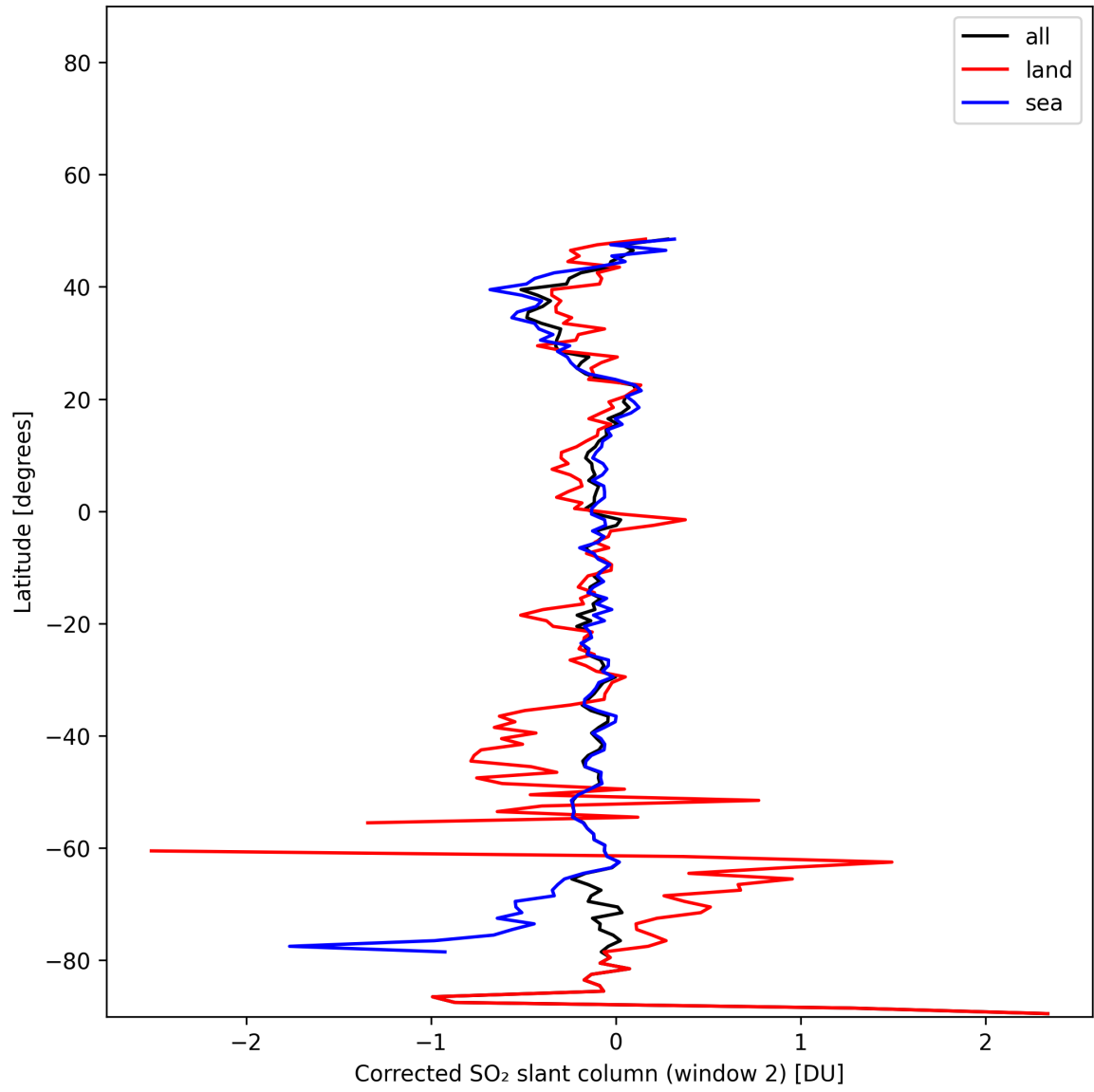


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-01-14 to 2025-01-15.

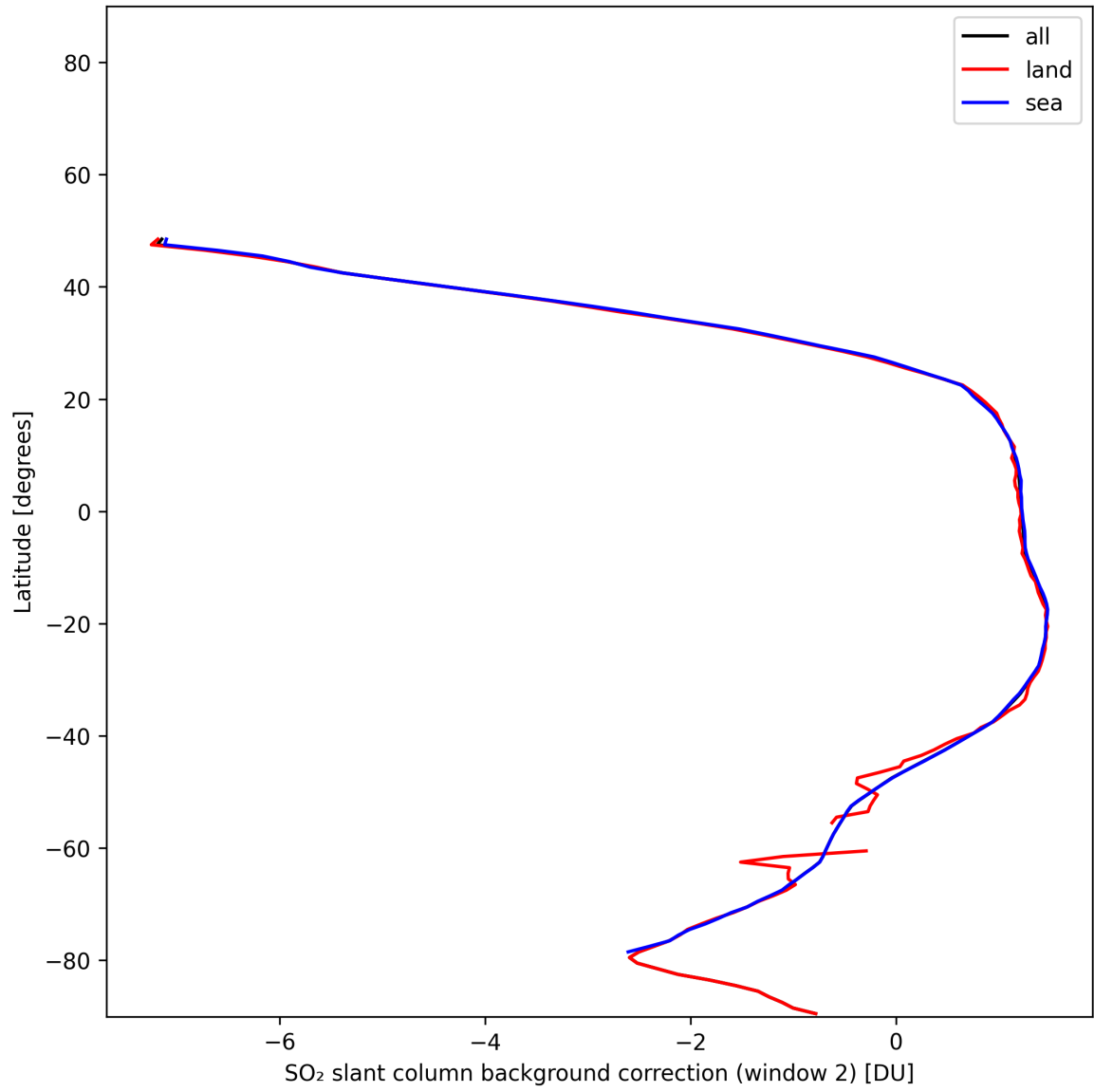


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-01-14 to 2025-01-15.

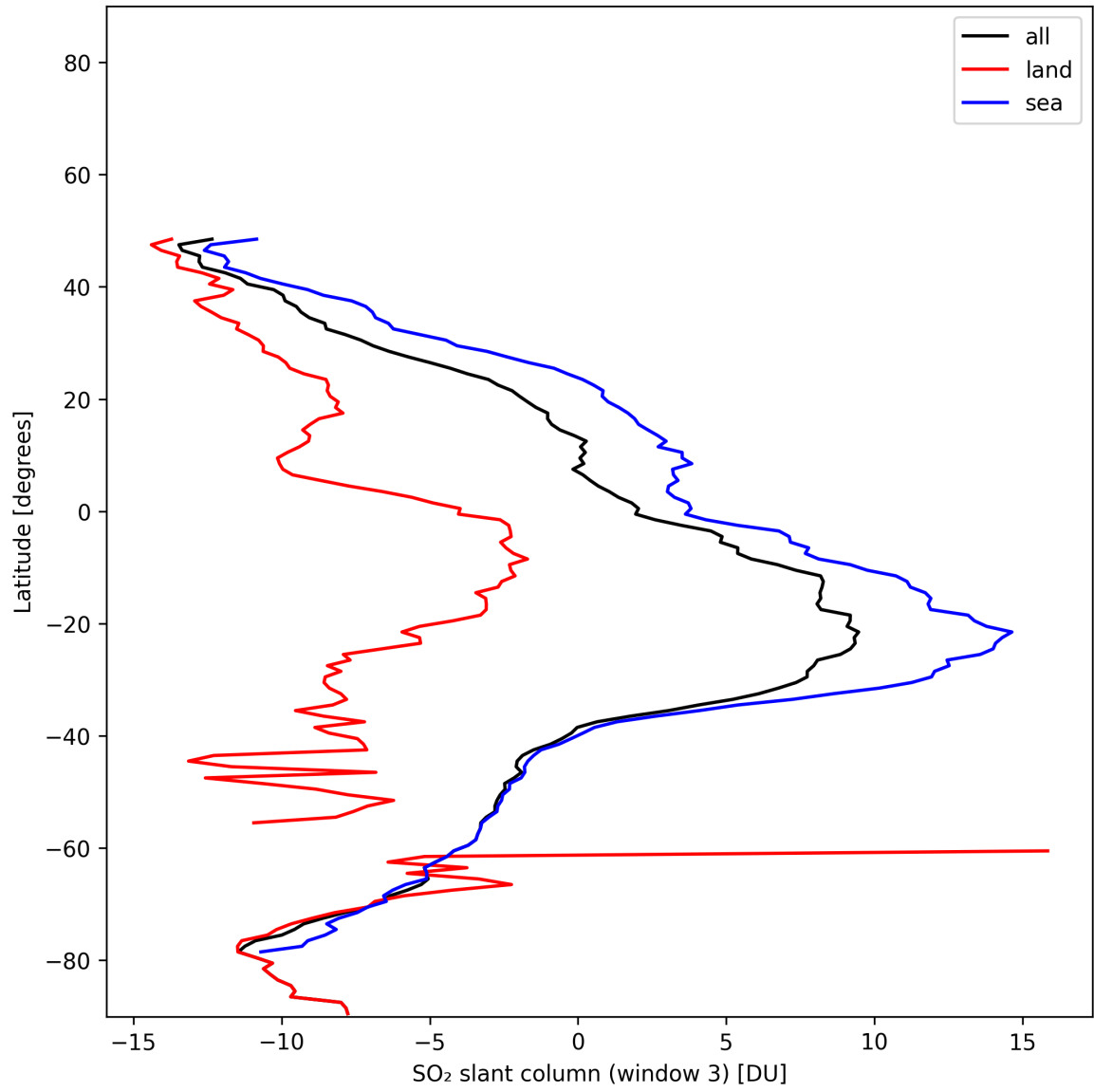


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-01-14 to 2025-01-15.

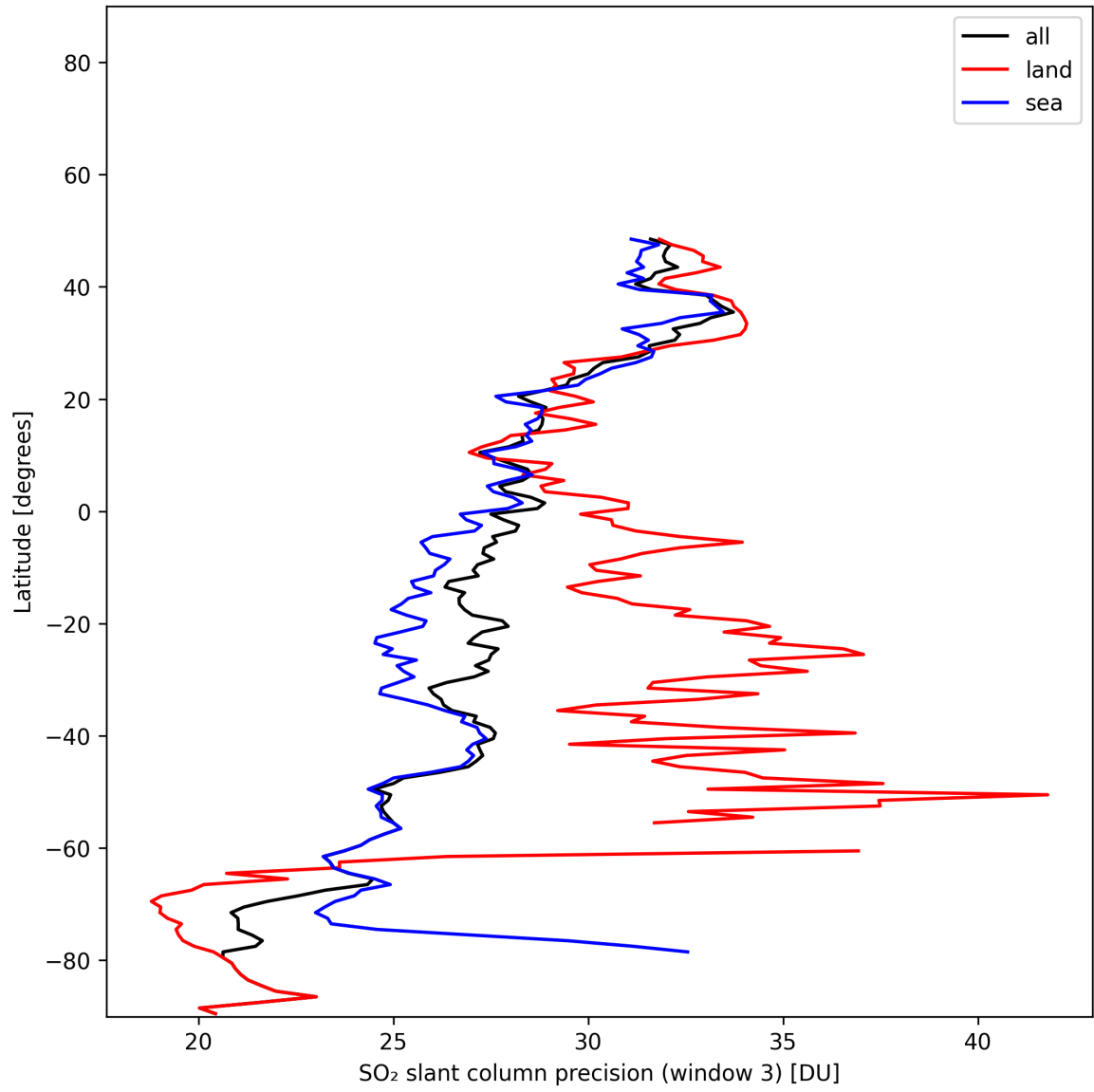


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-01-14 to 2025-01-15.

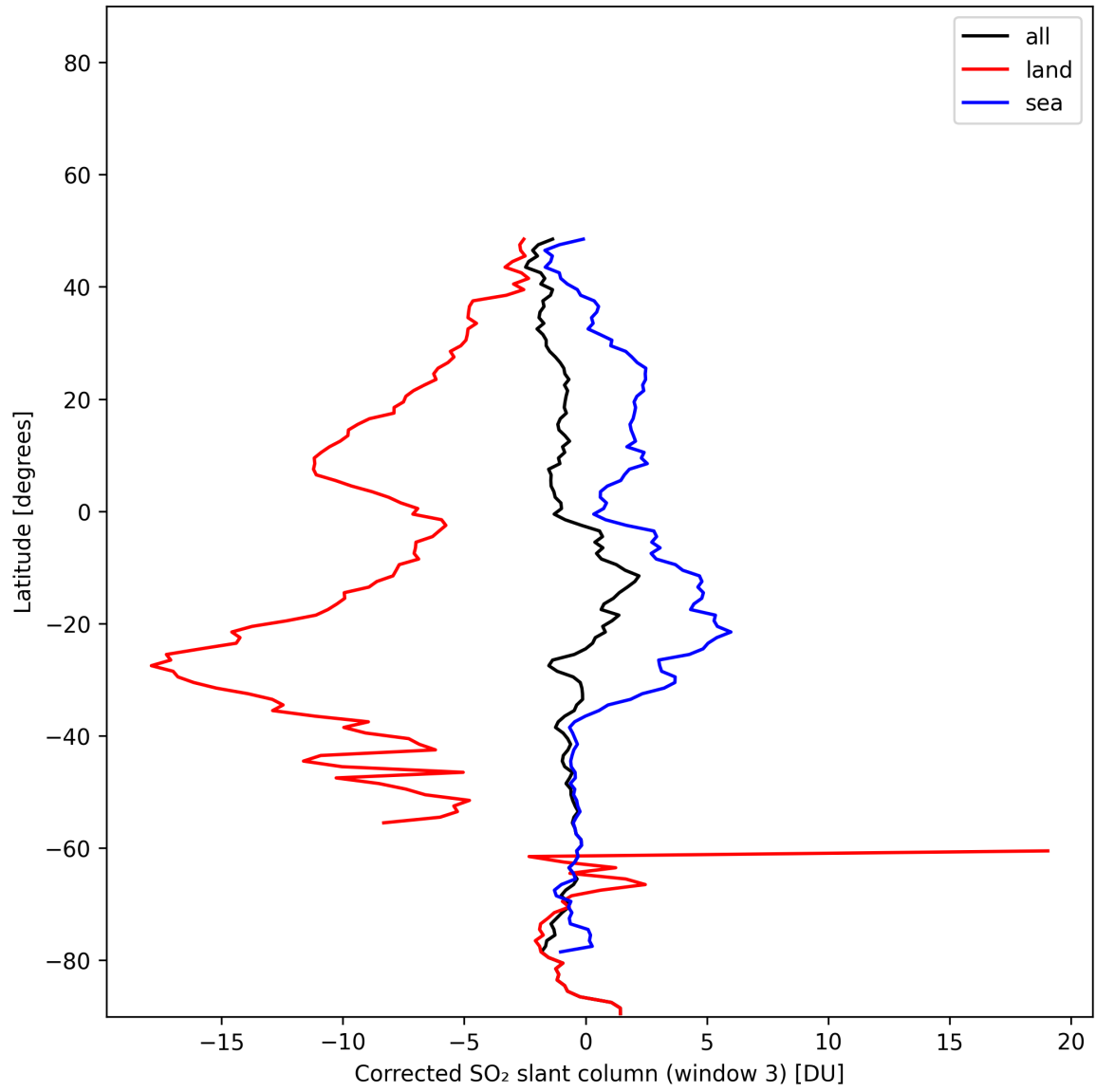


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-01-14 to 2025-01-15.

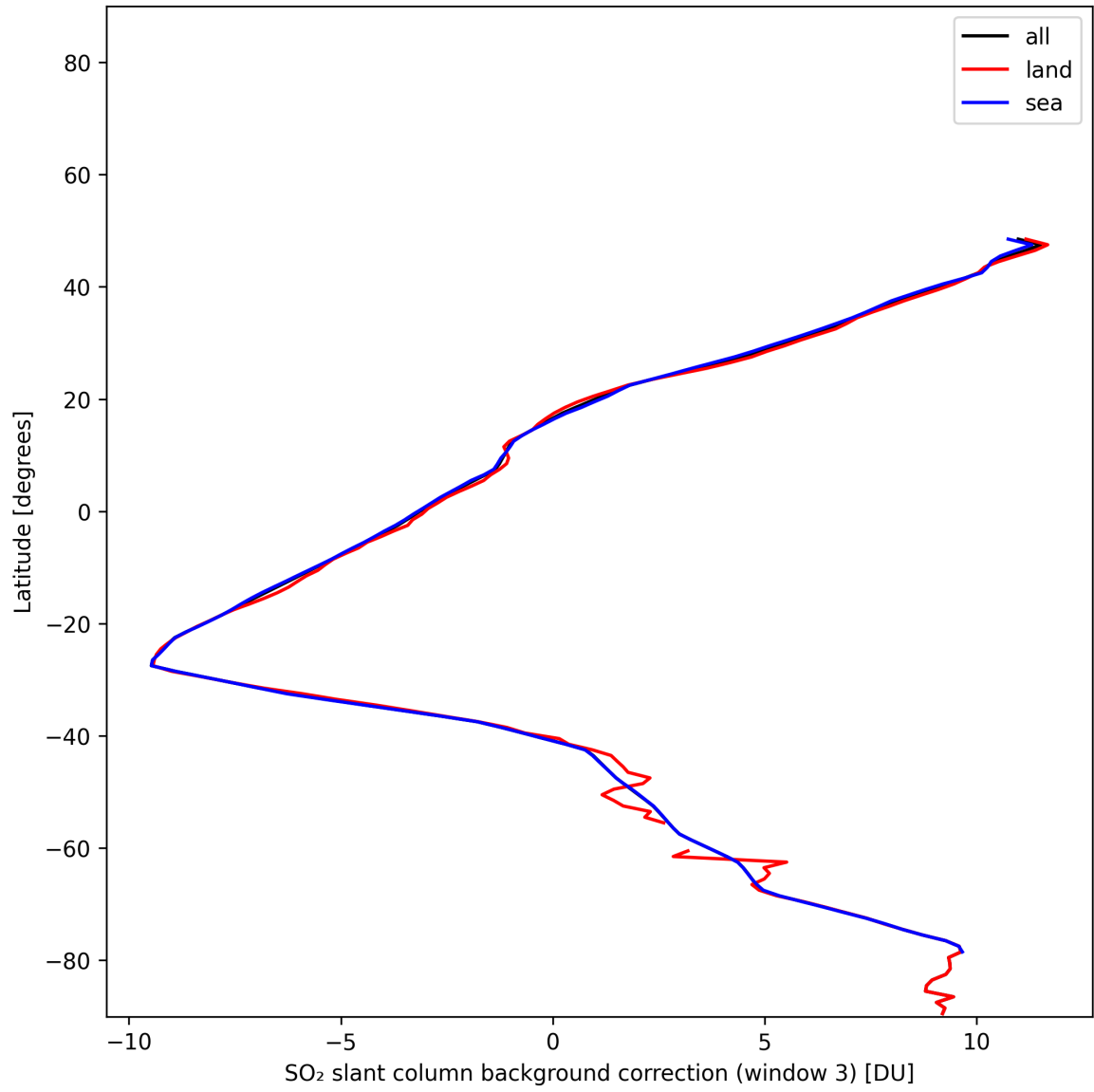


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-01-14 to 2025-01-15.

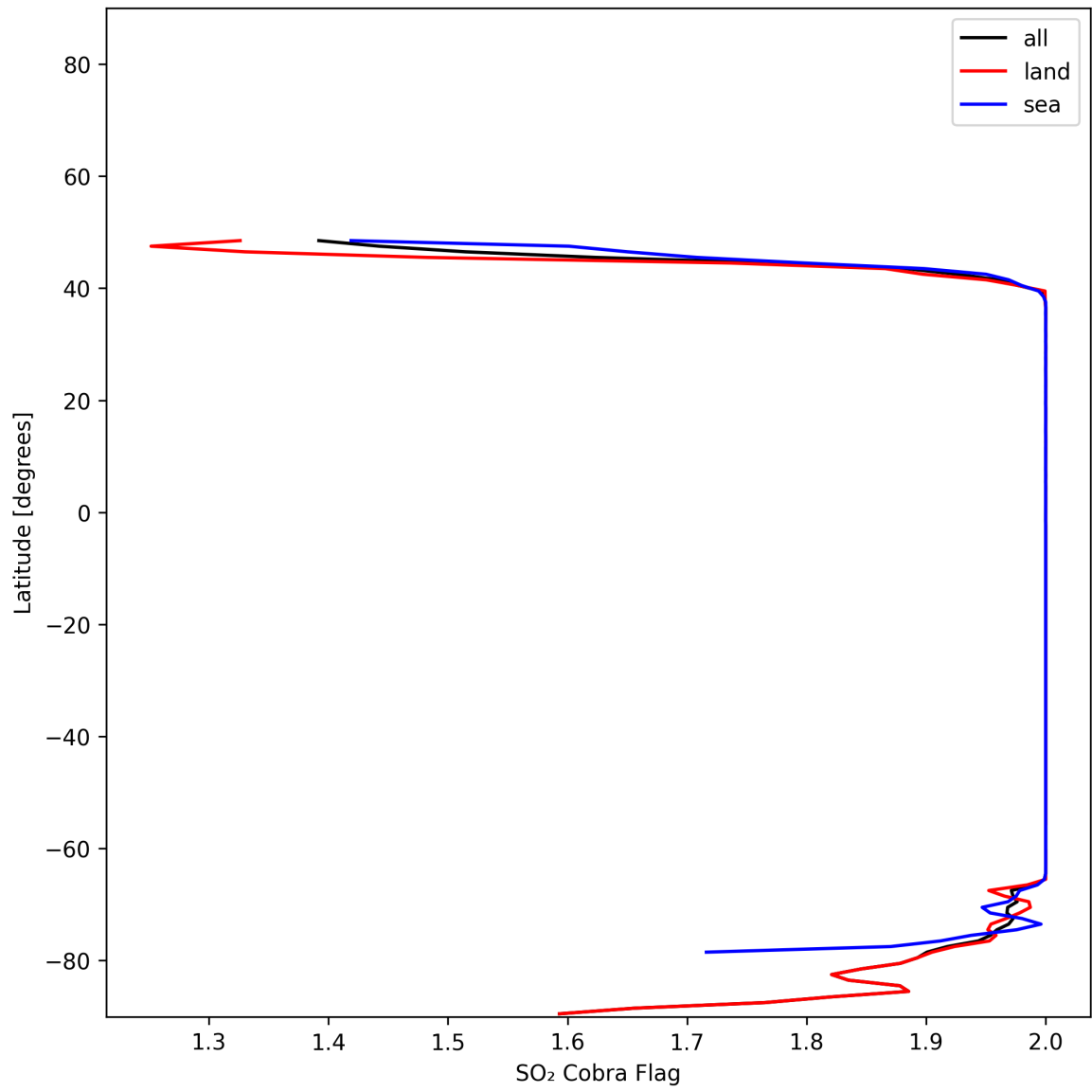


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-01-14 to 2025-01-15.

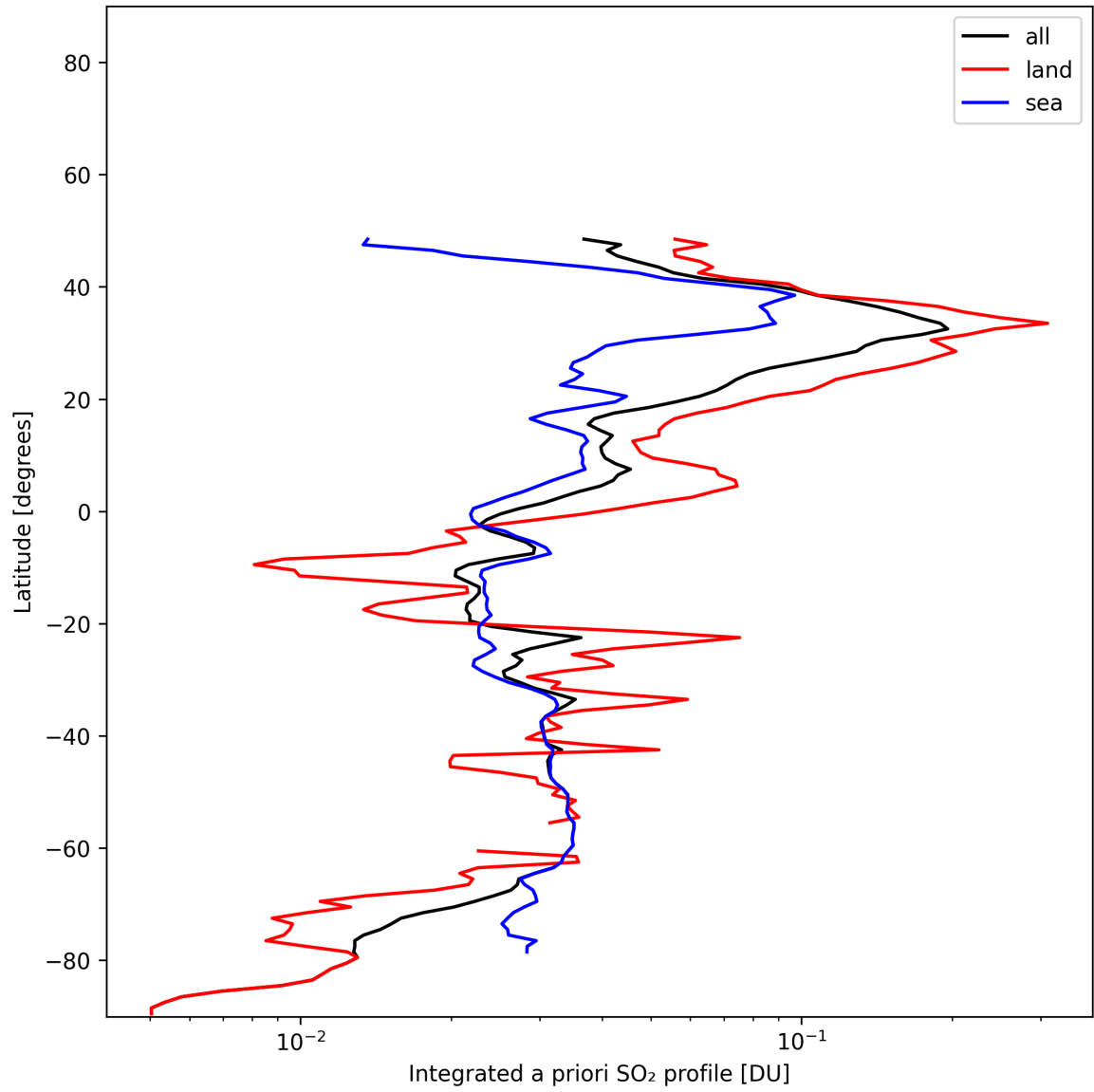


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-01-14 to 2025-01-15.

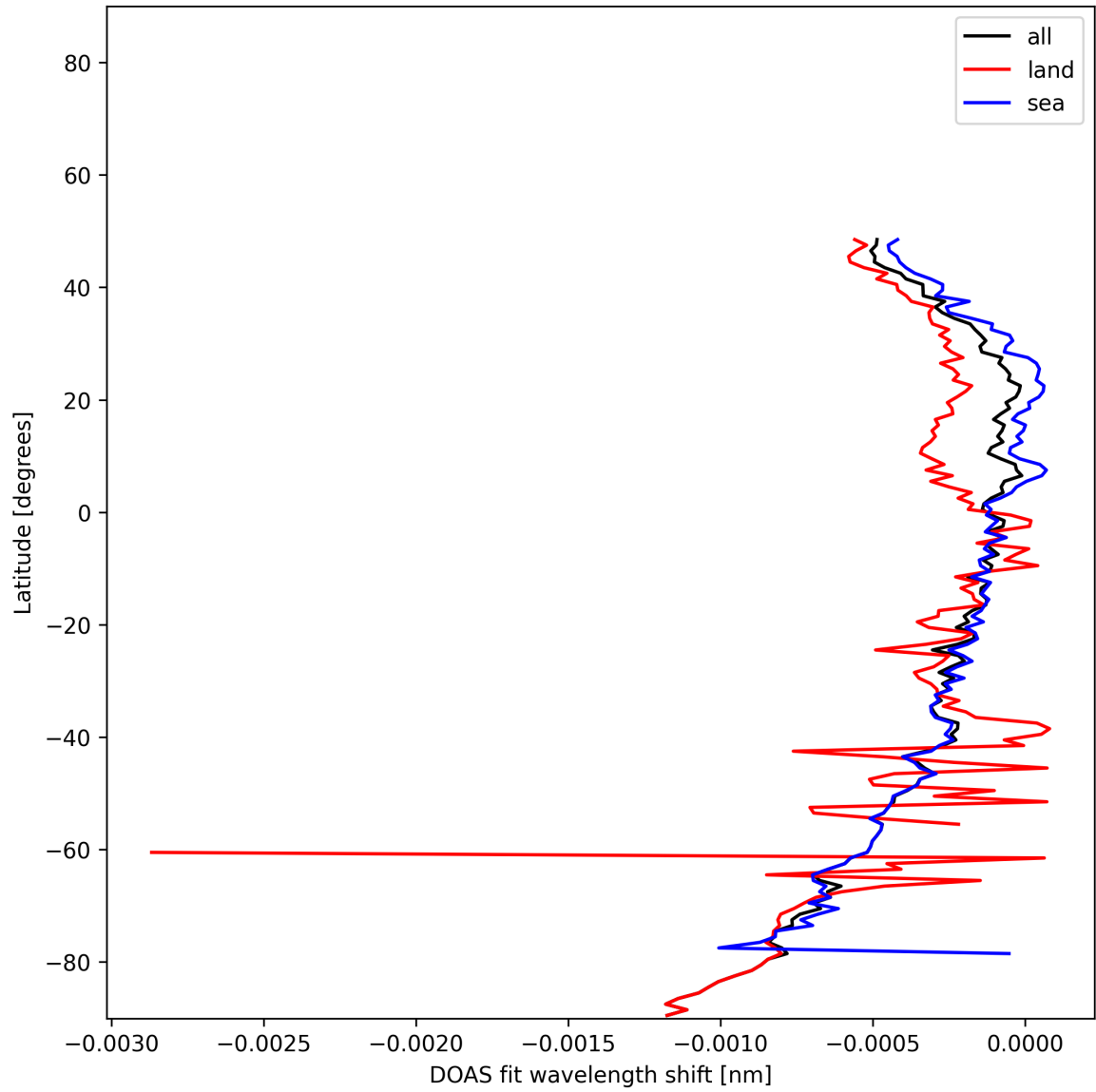


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-01-14 to 2025-01-15.

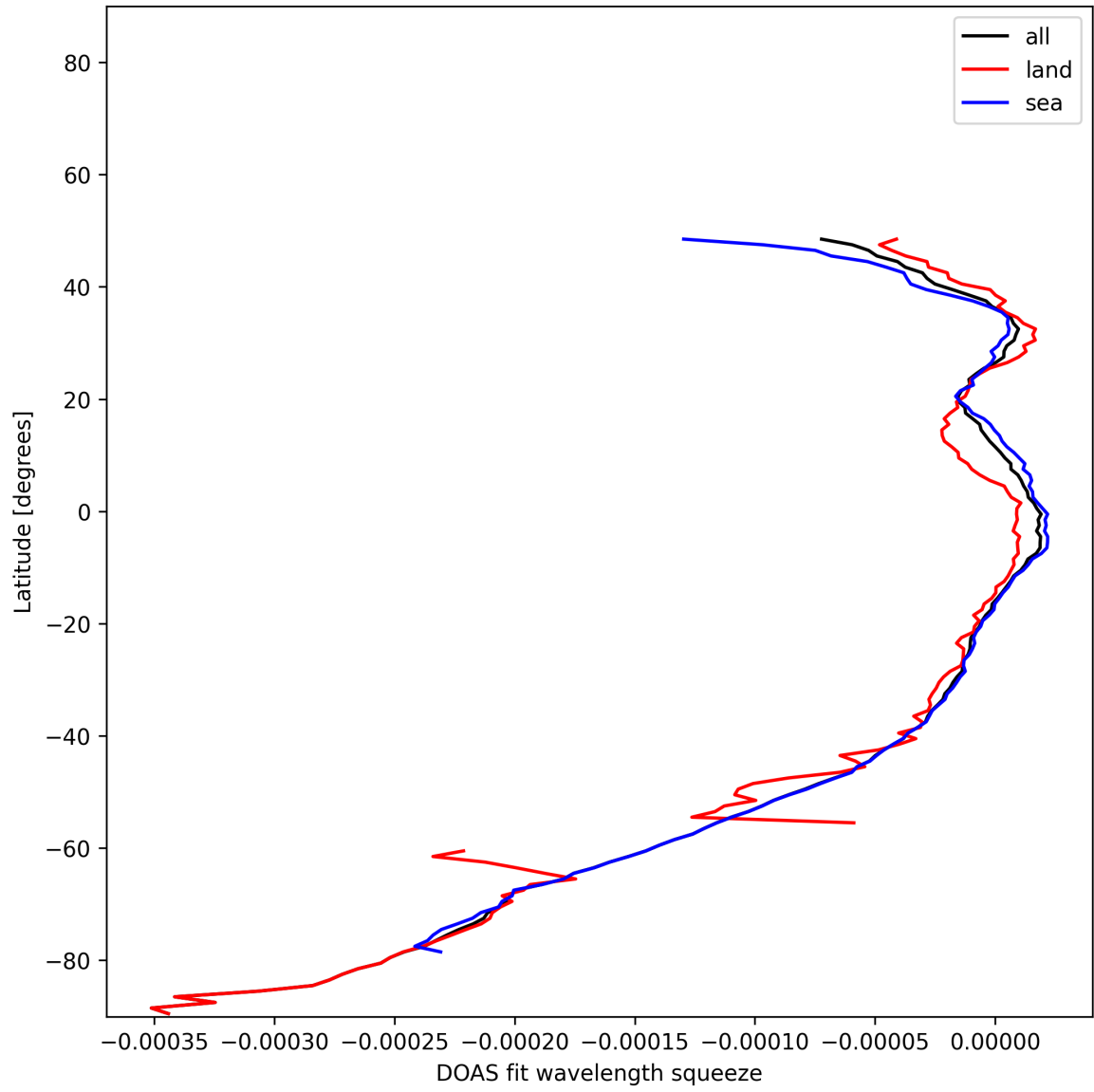


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-01-14 to 2025-01-15.

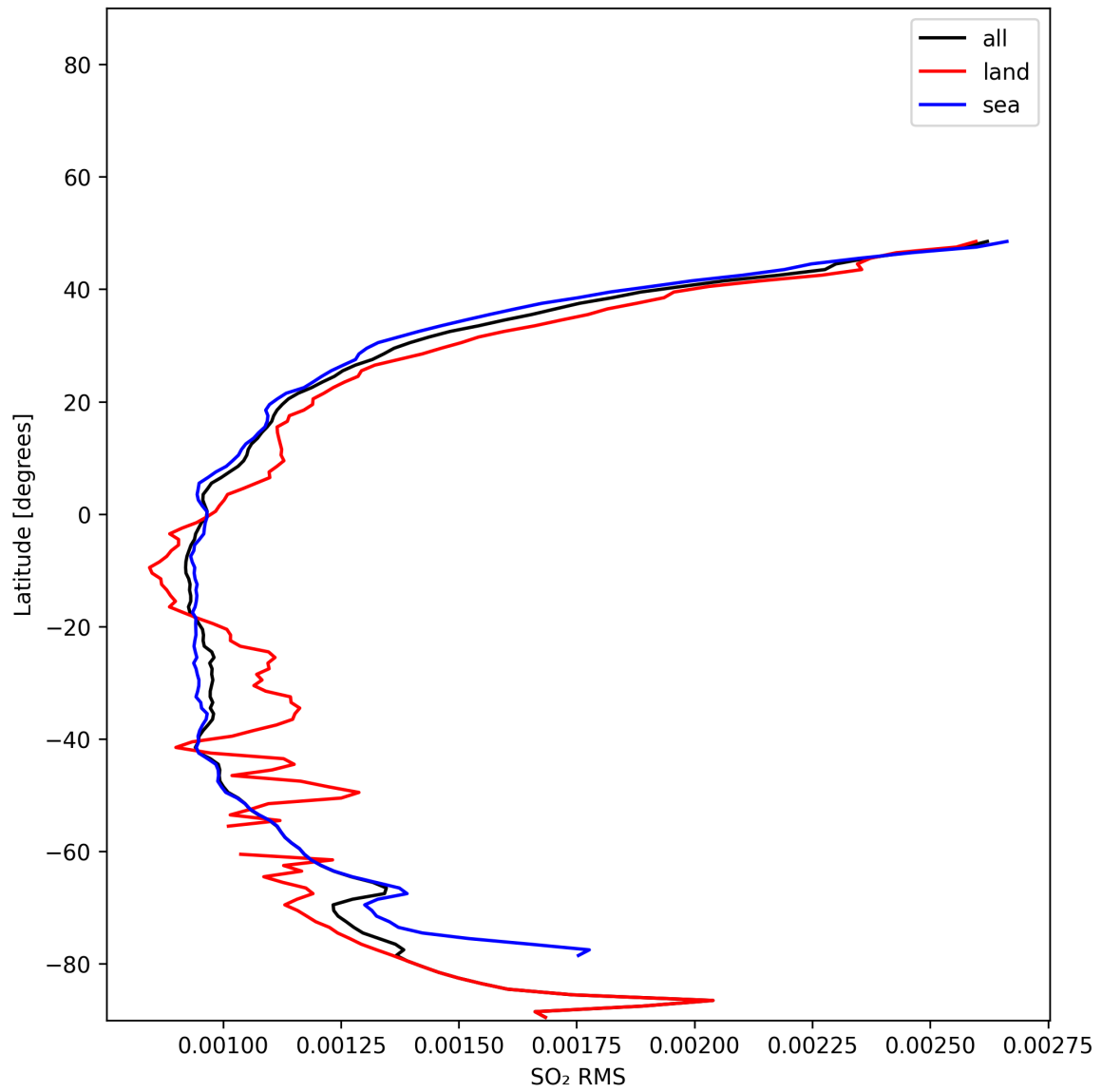


Figure 52: Zonal average of “SO₂ RMS” for 2025-01-14 to 2025-01-15.

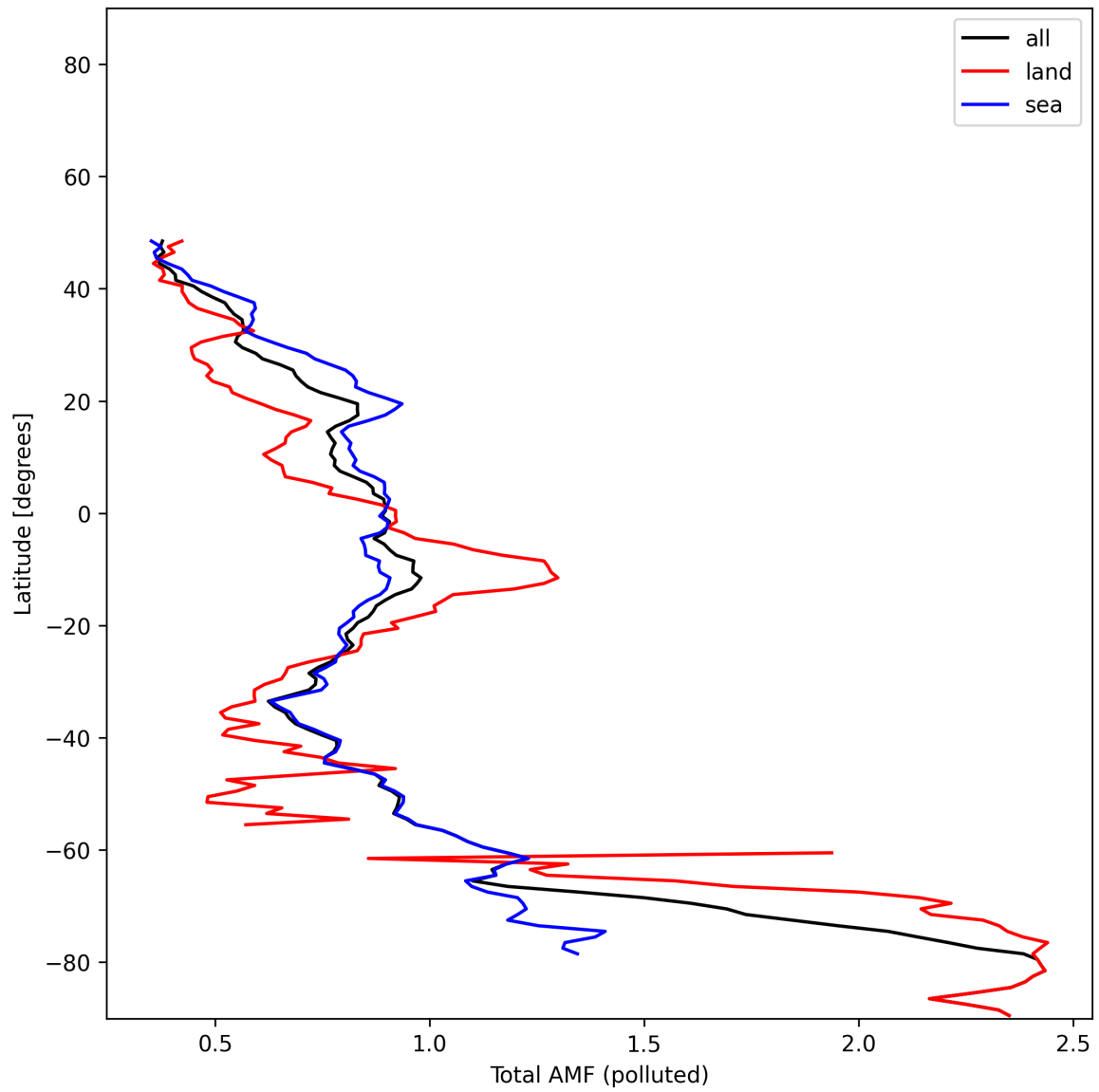


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-01-14 to 2025-01-15.

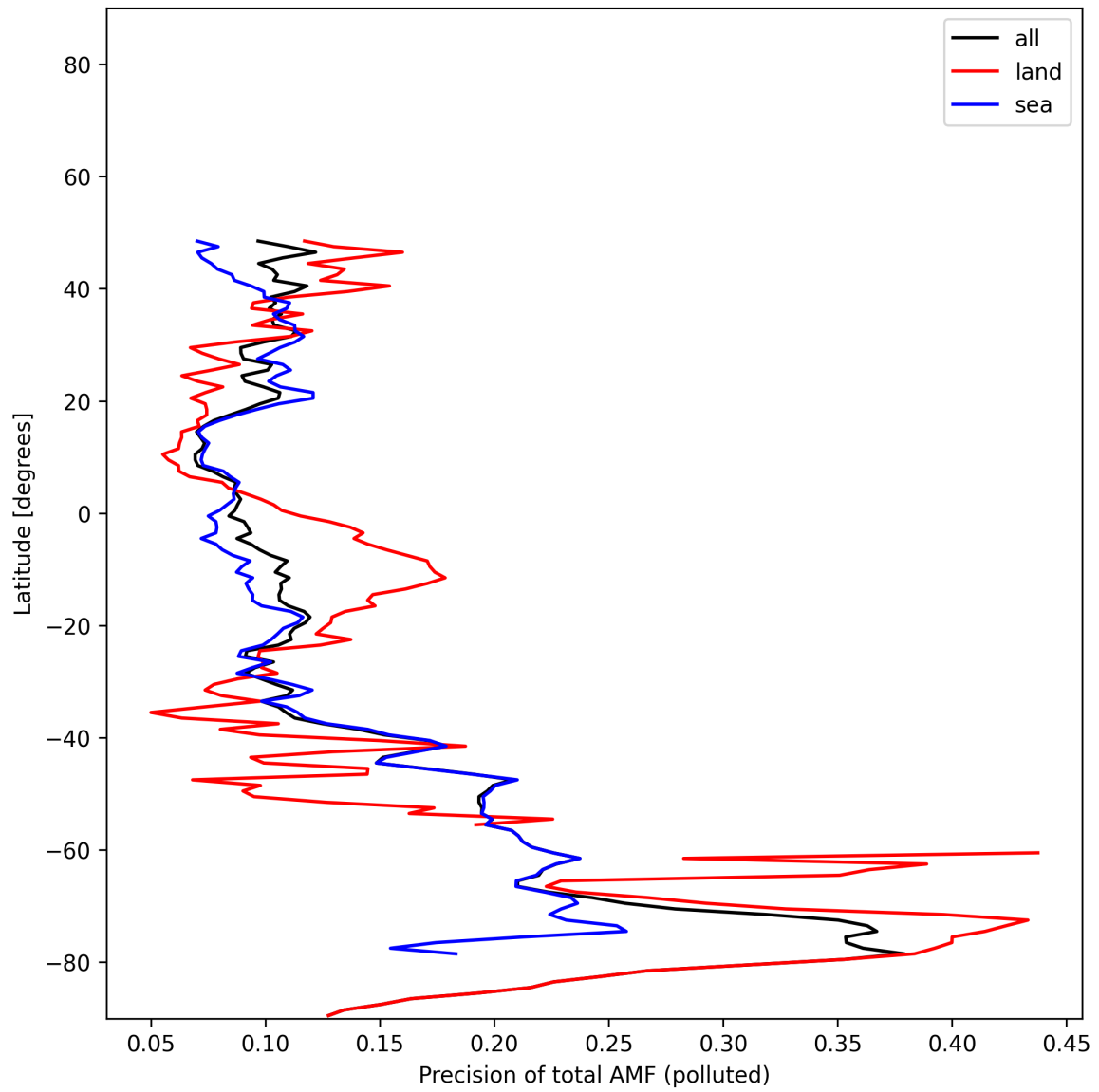


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-01-14 to 2025-01-15.

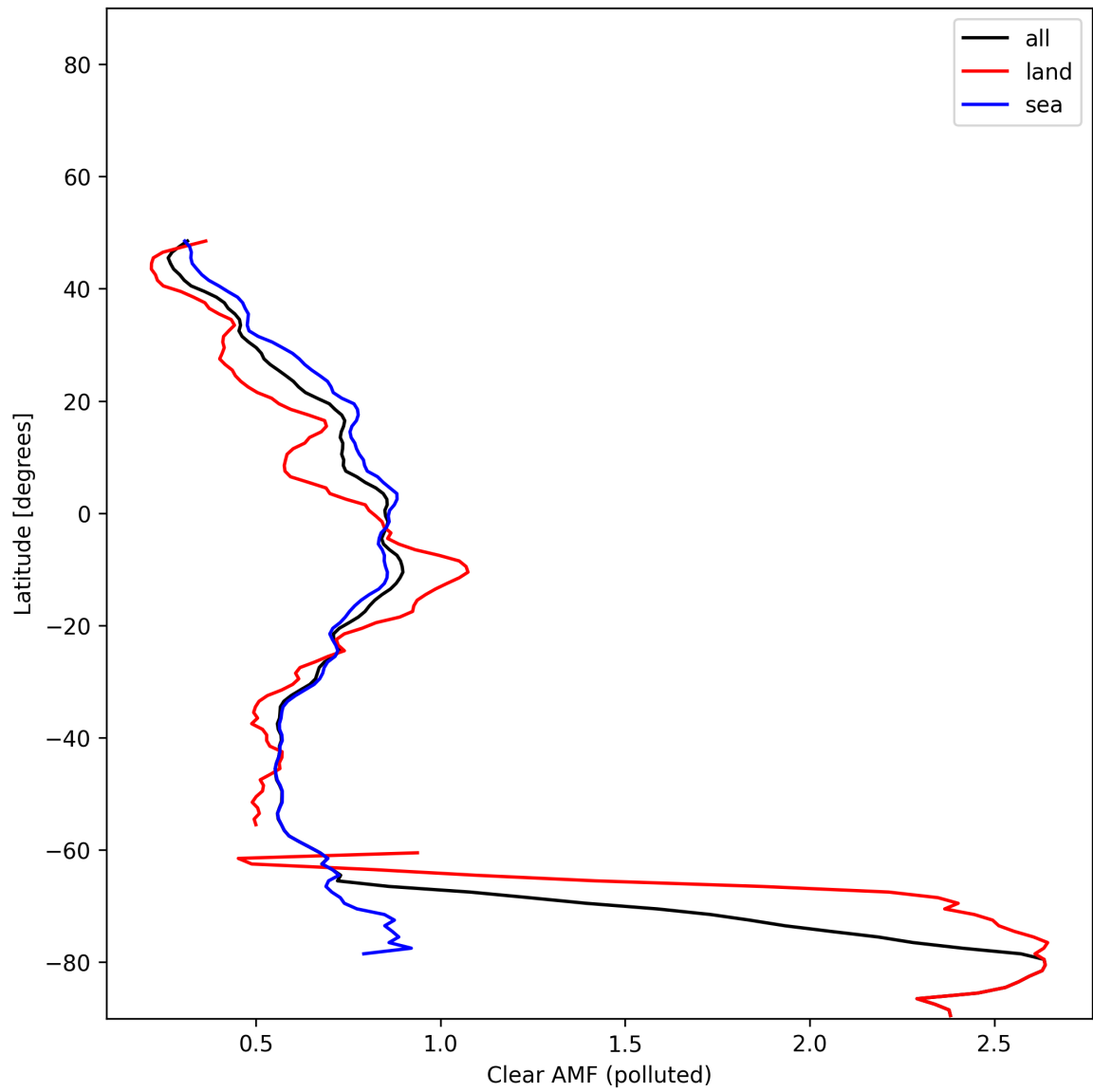


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-01-14 to 2025-01-15.

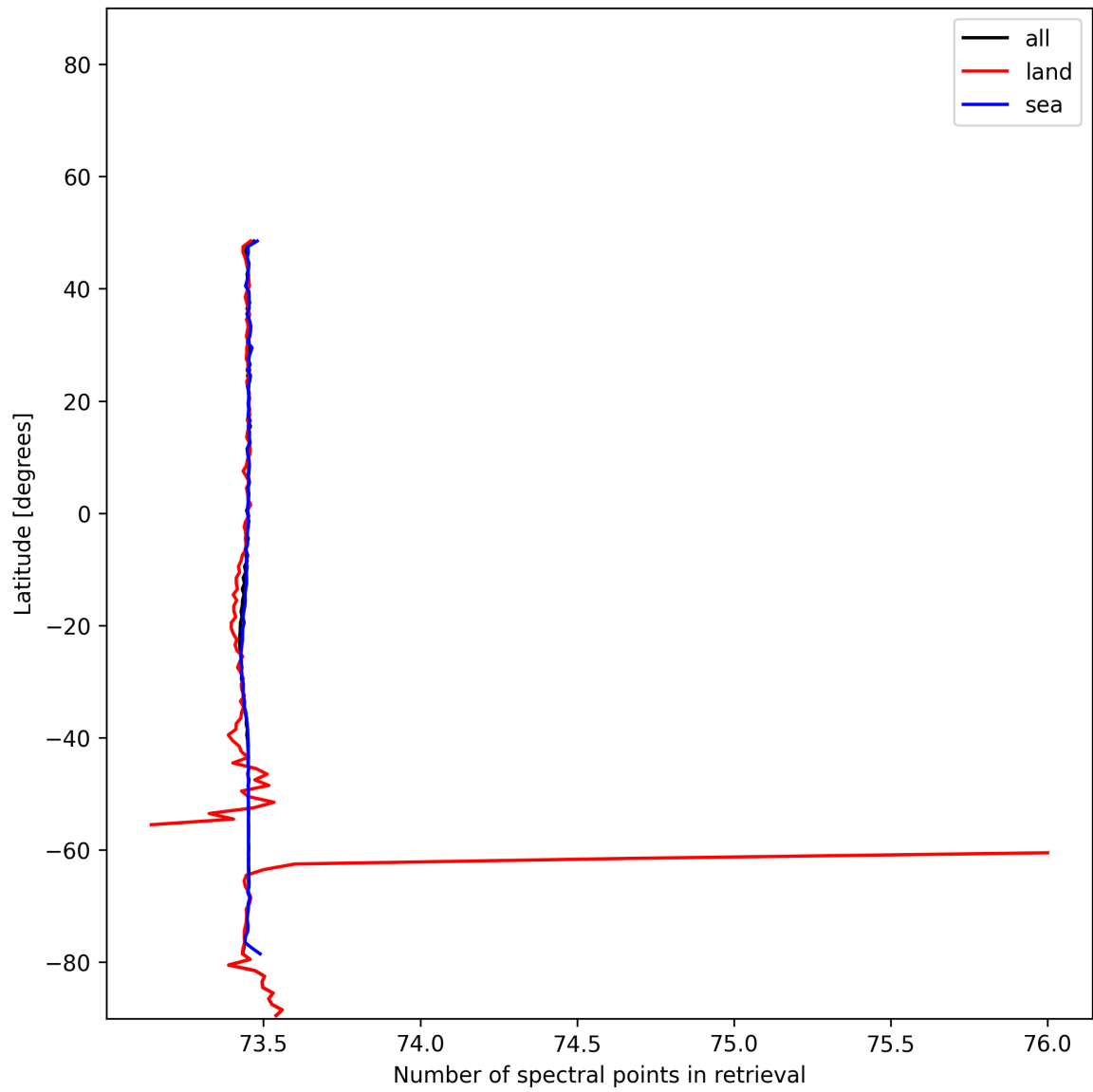


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-01-14 to 2025-01-15.

8 Histograms

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

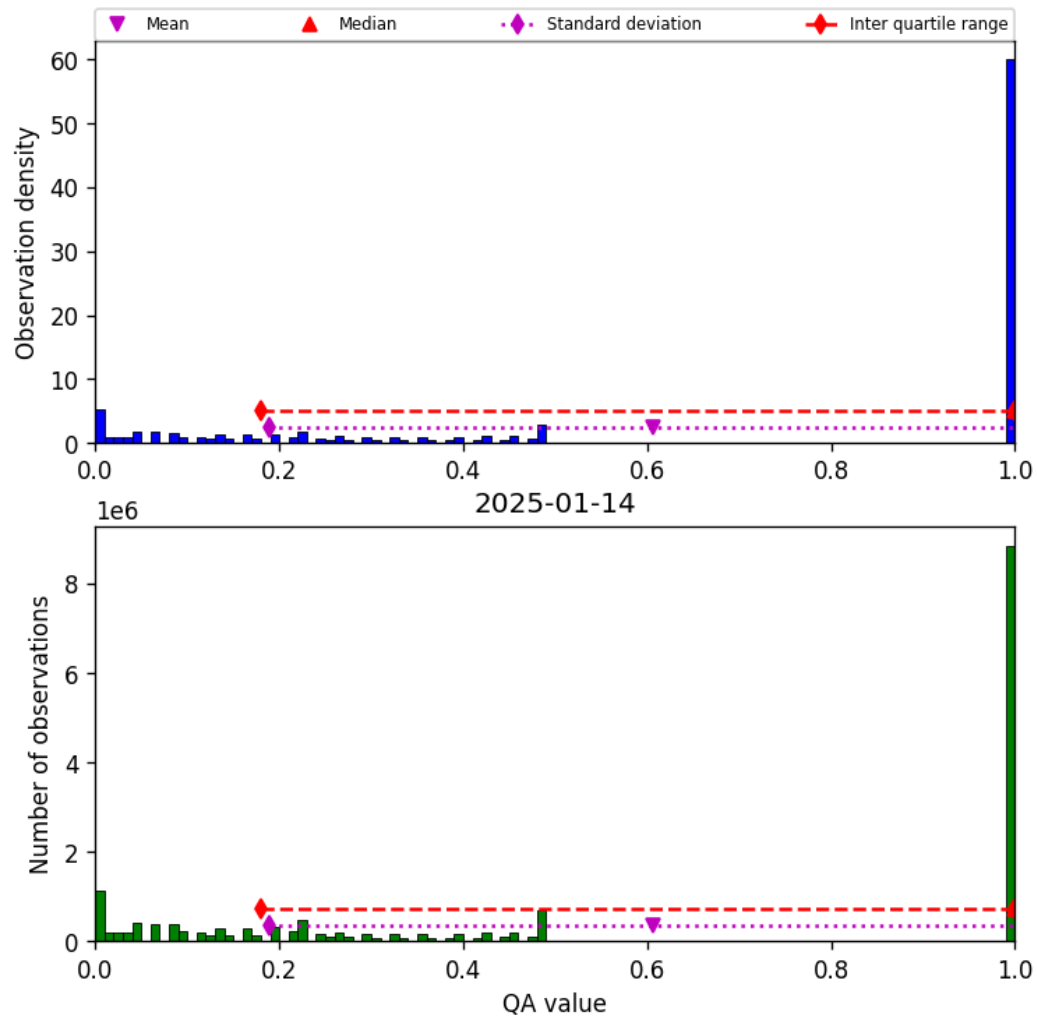


Figure 57: Histogram of “QA value” for 2025-01-14 to 2025-01-15

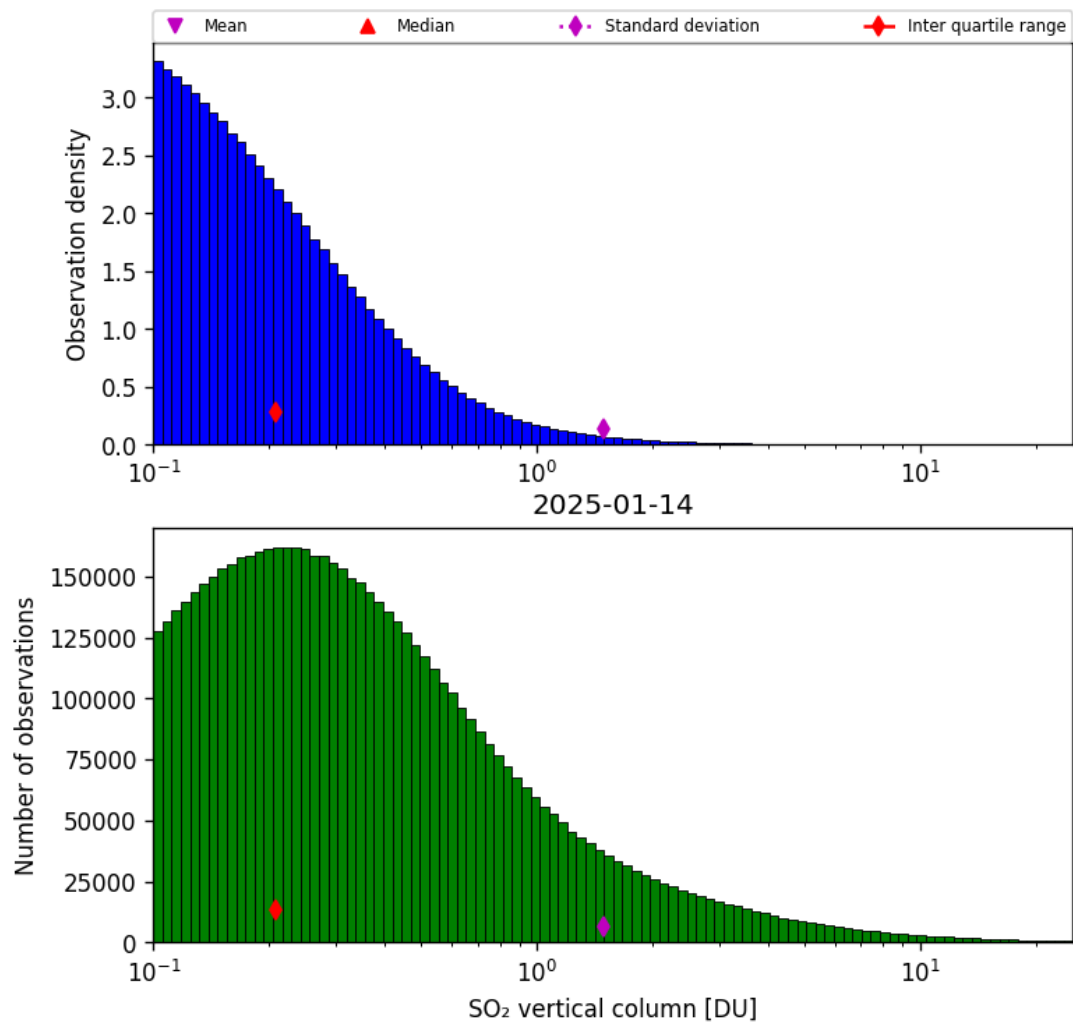


Figure 58: Histogram of “SO₂ vertical column” for 2025-01-14 to 2025-01-15

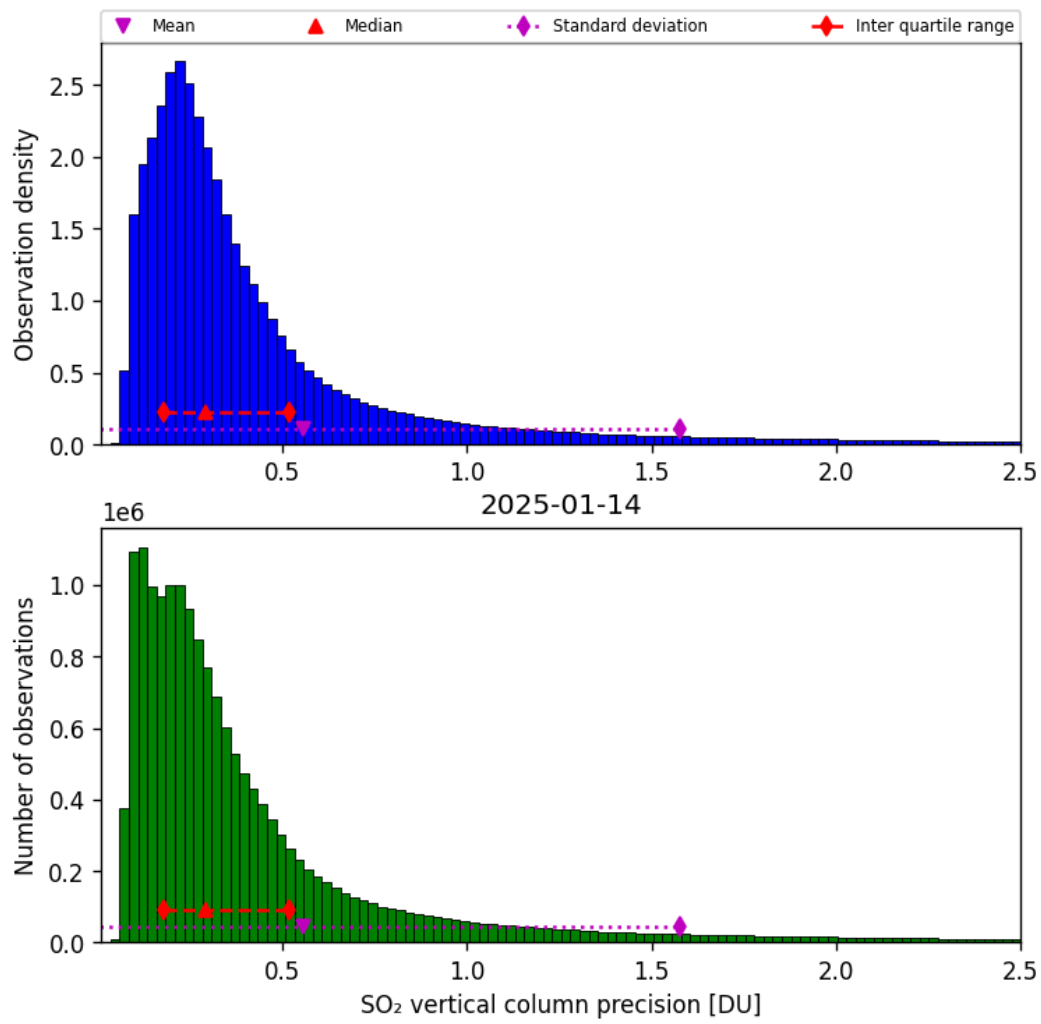


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-01-14 to 2025-01-15

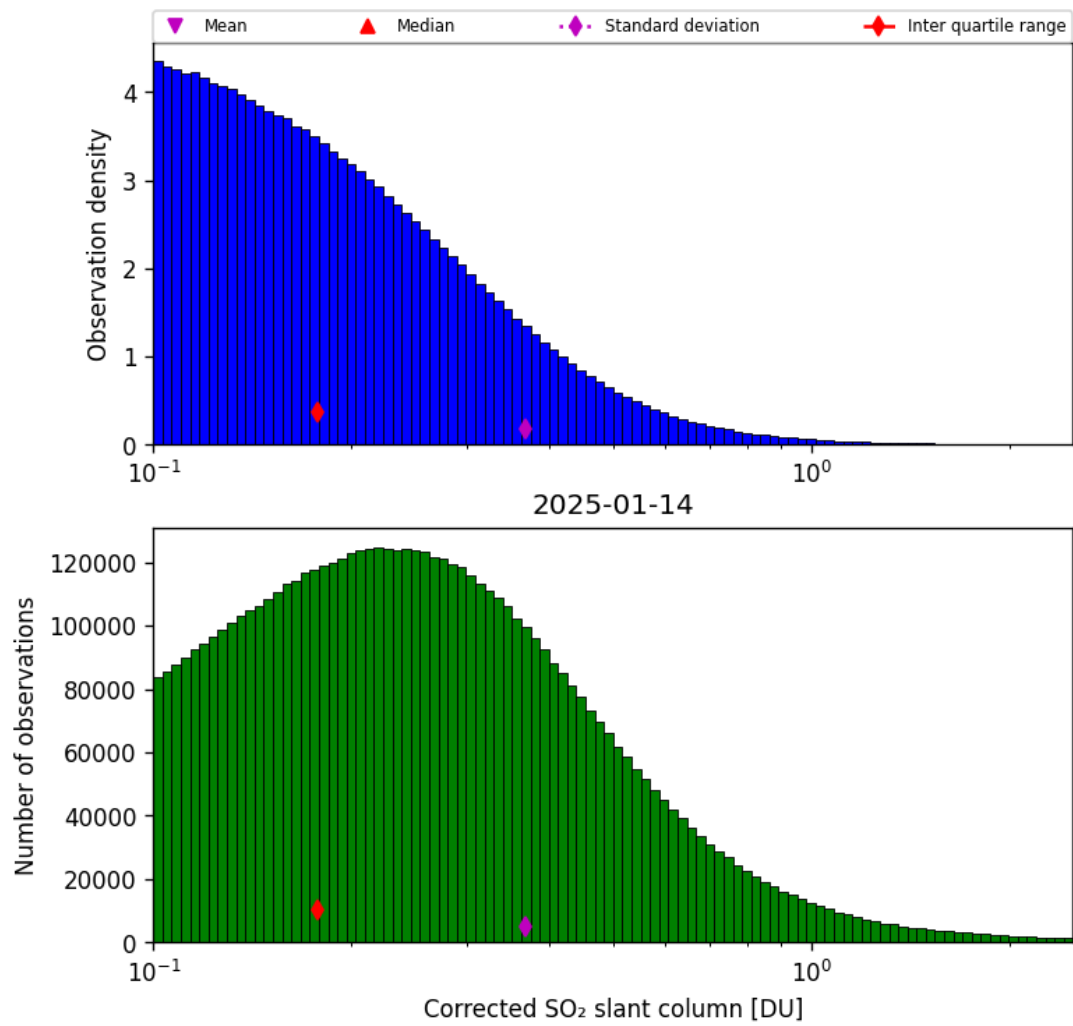


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-01-14 to 2025-01-15

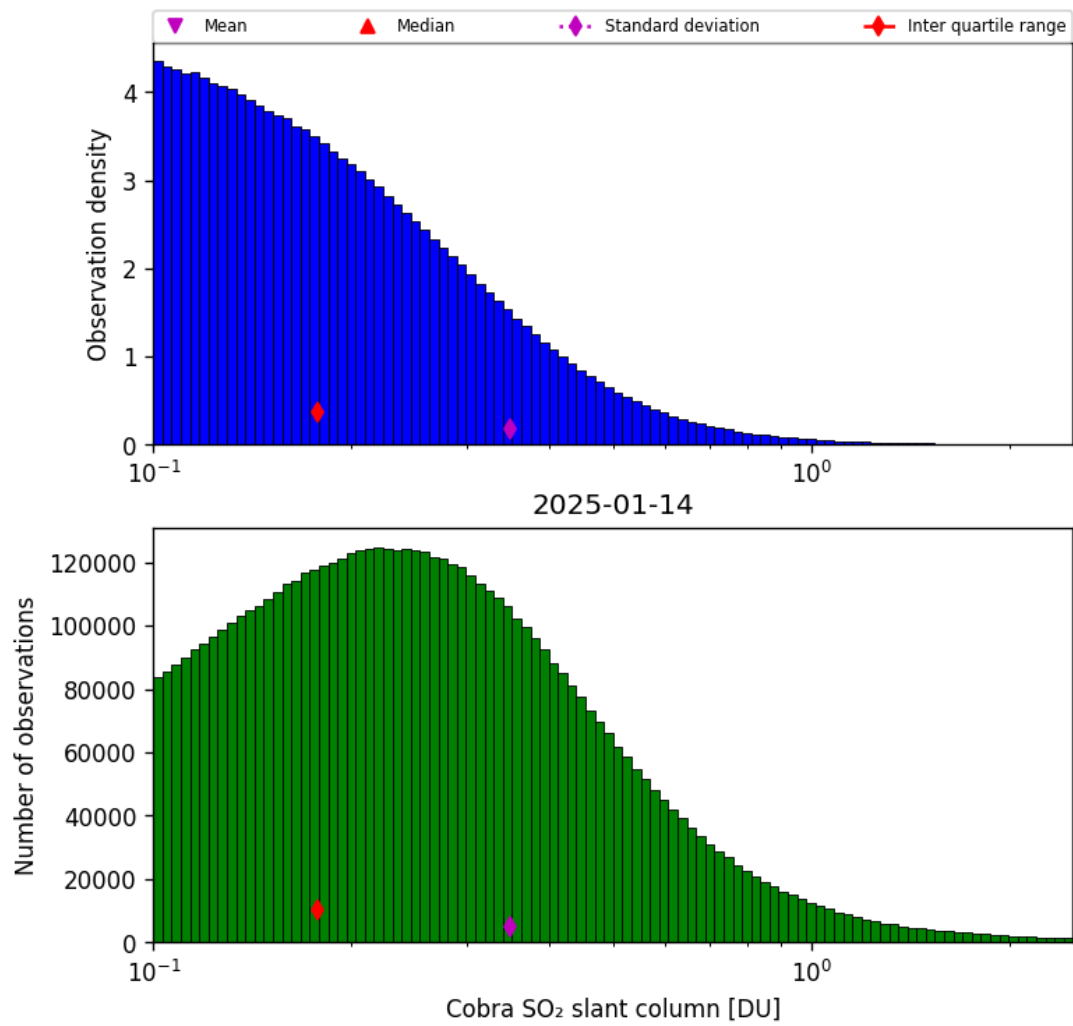


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-01-14 to 2025-01-15

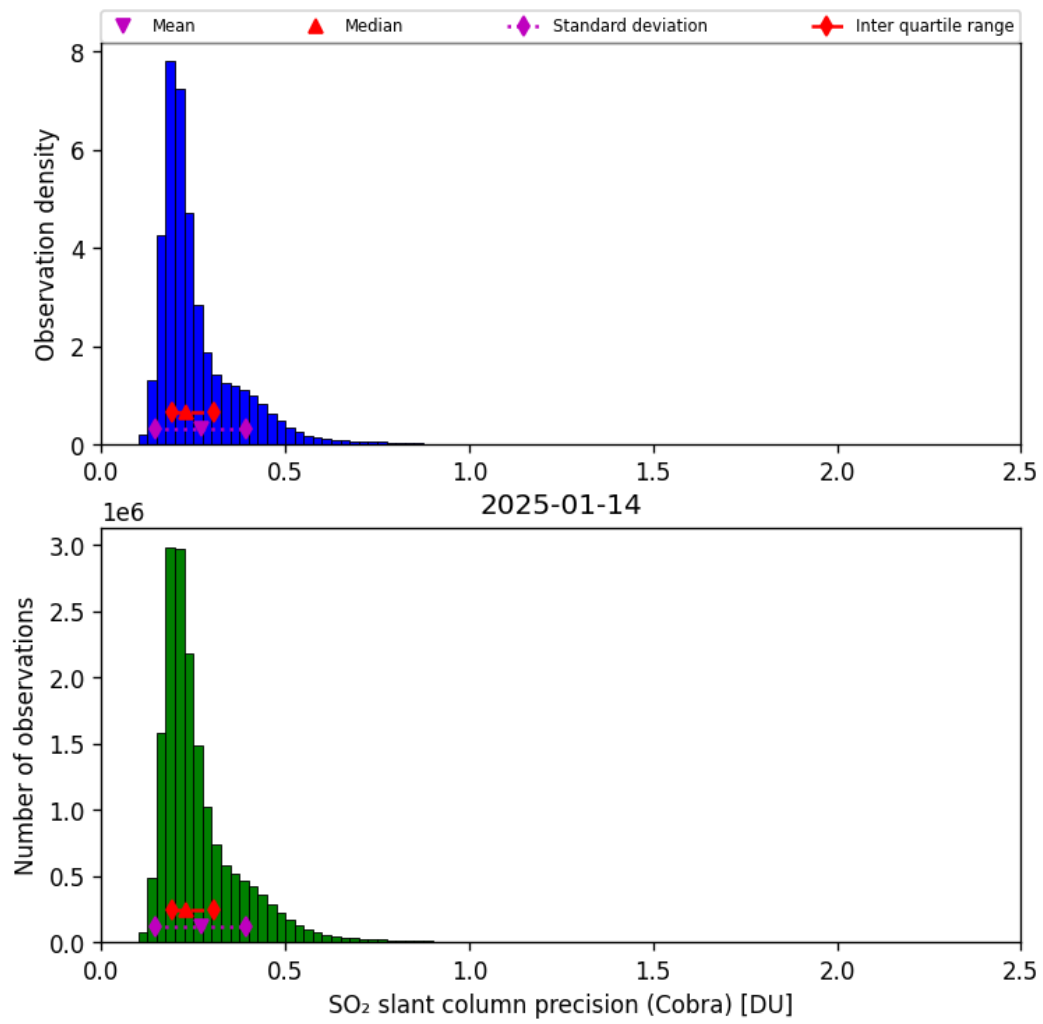


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-01-14 to 2025-01-15

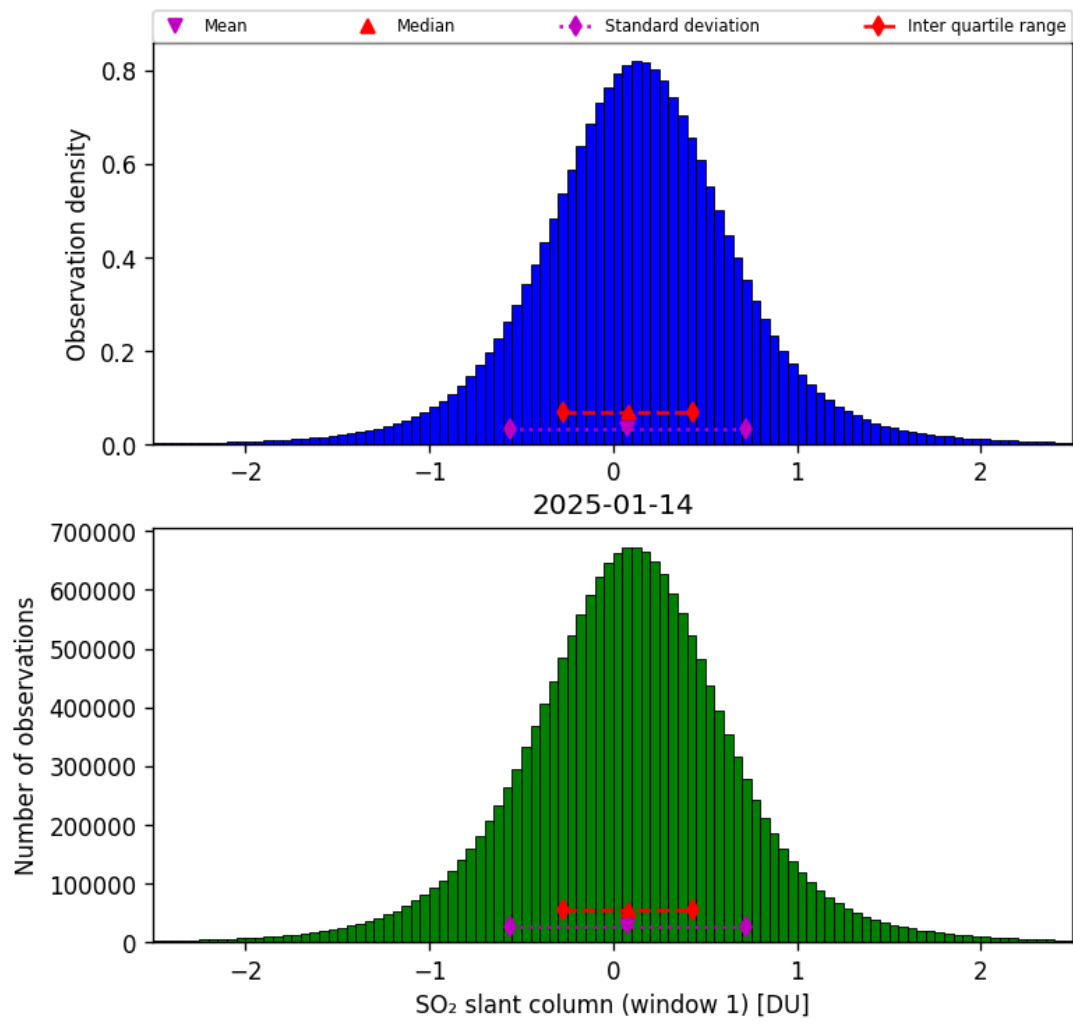


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-01-14 to 2025-01-15

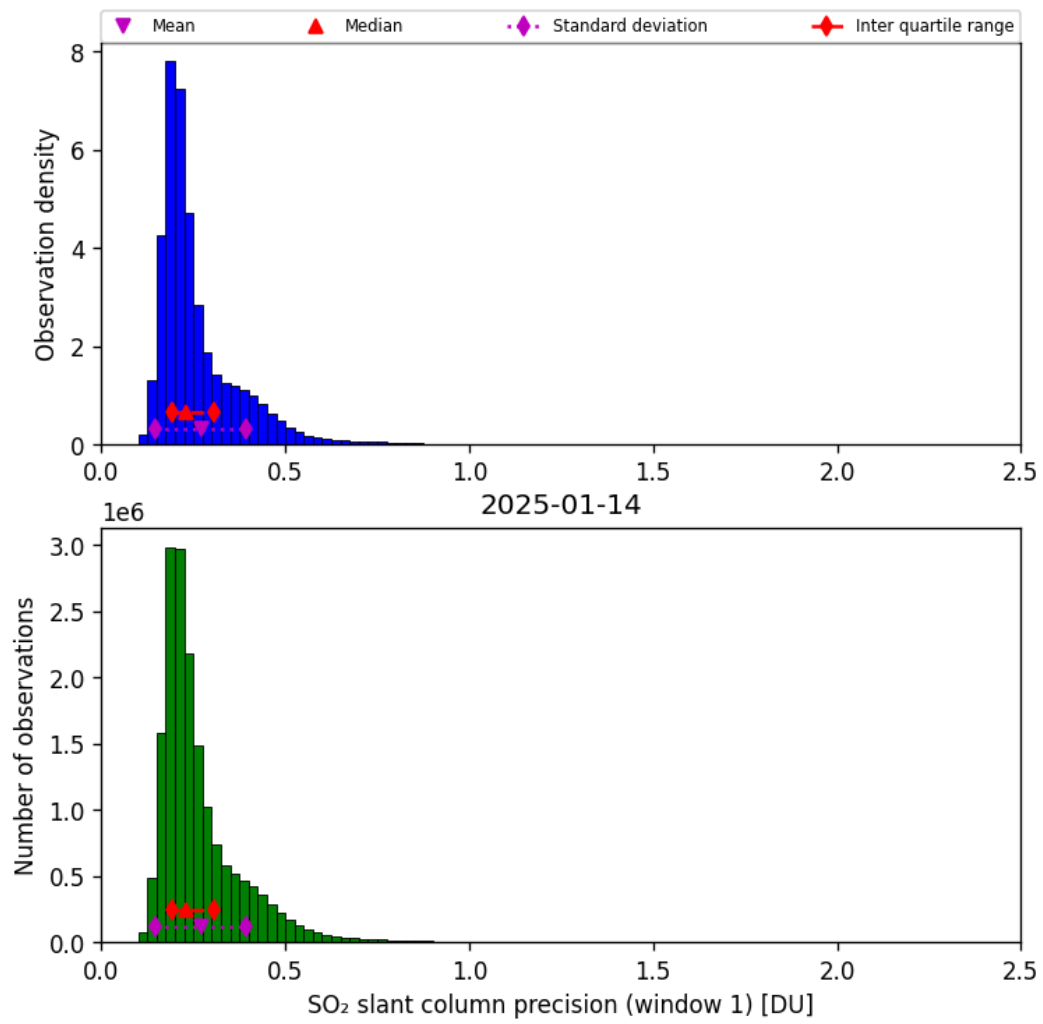


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-01-14 to 2025-01-15

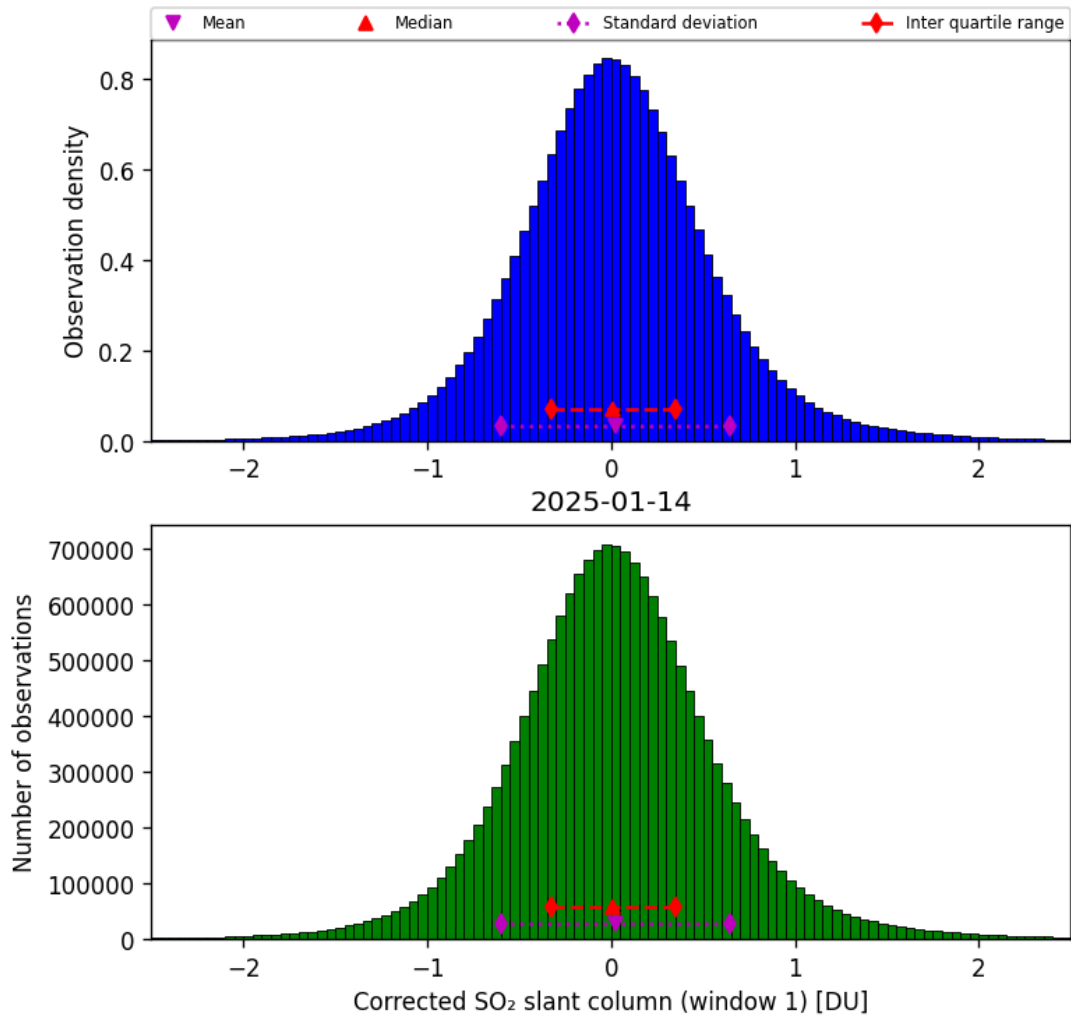


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-01-14 to 2025-01-15

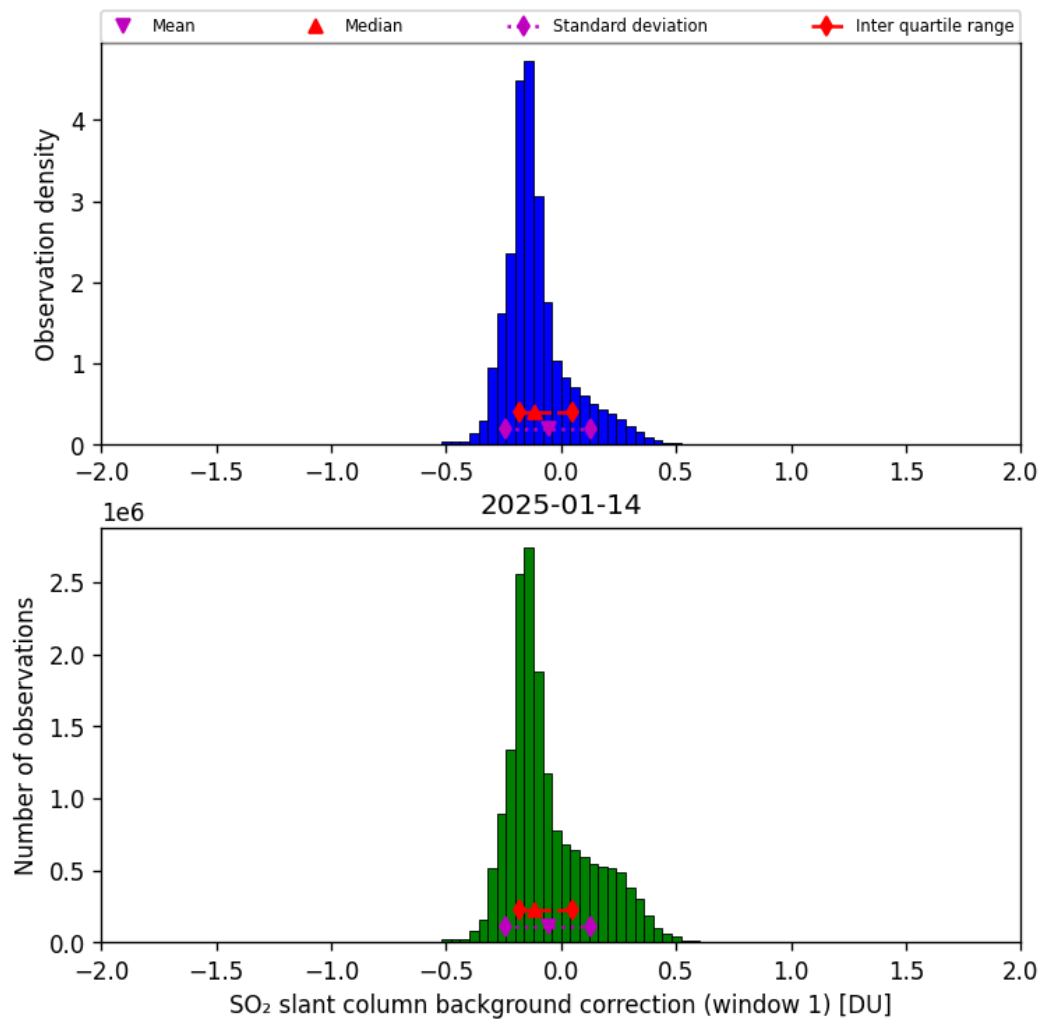


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-01-14 to 2025-01-15

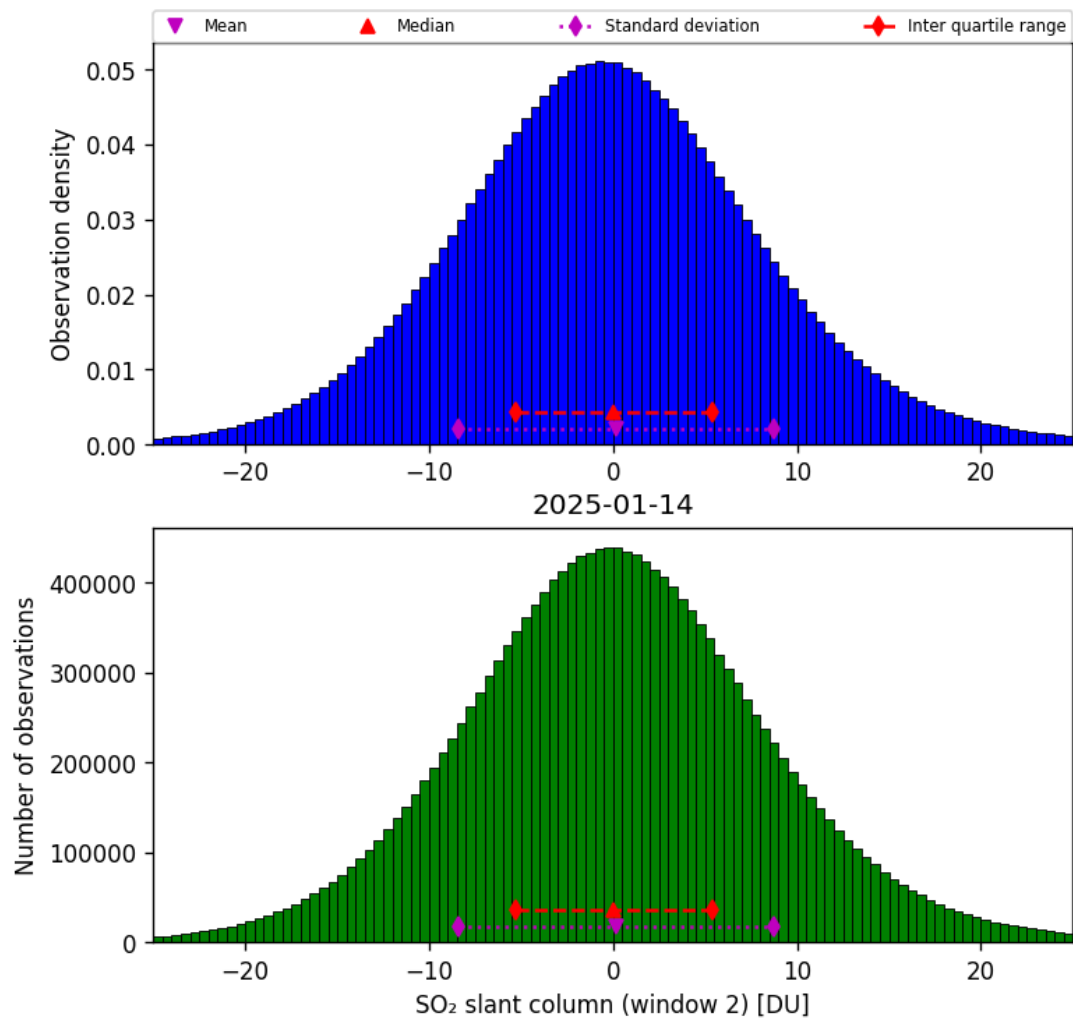


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-01-14 to 2025-01-15

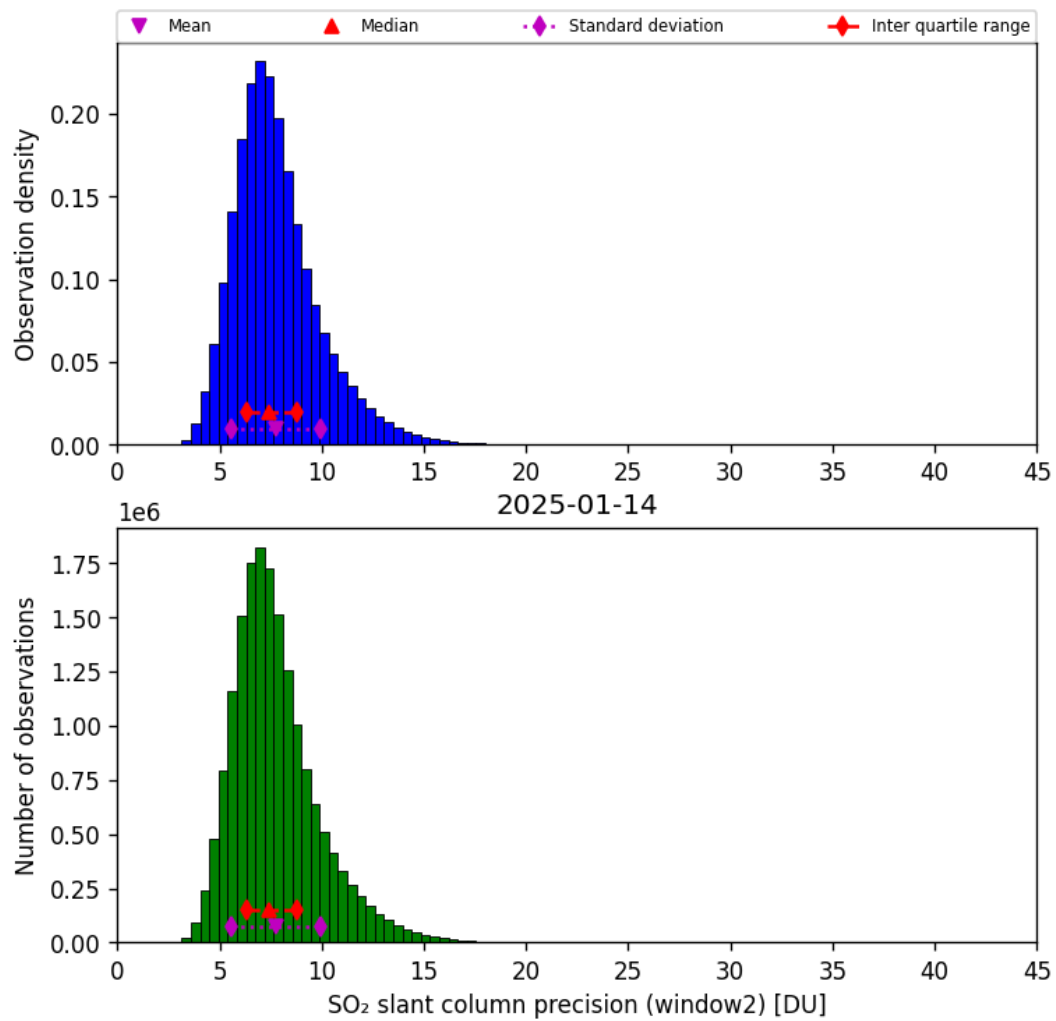


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-01-14 to 2025-01-15

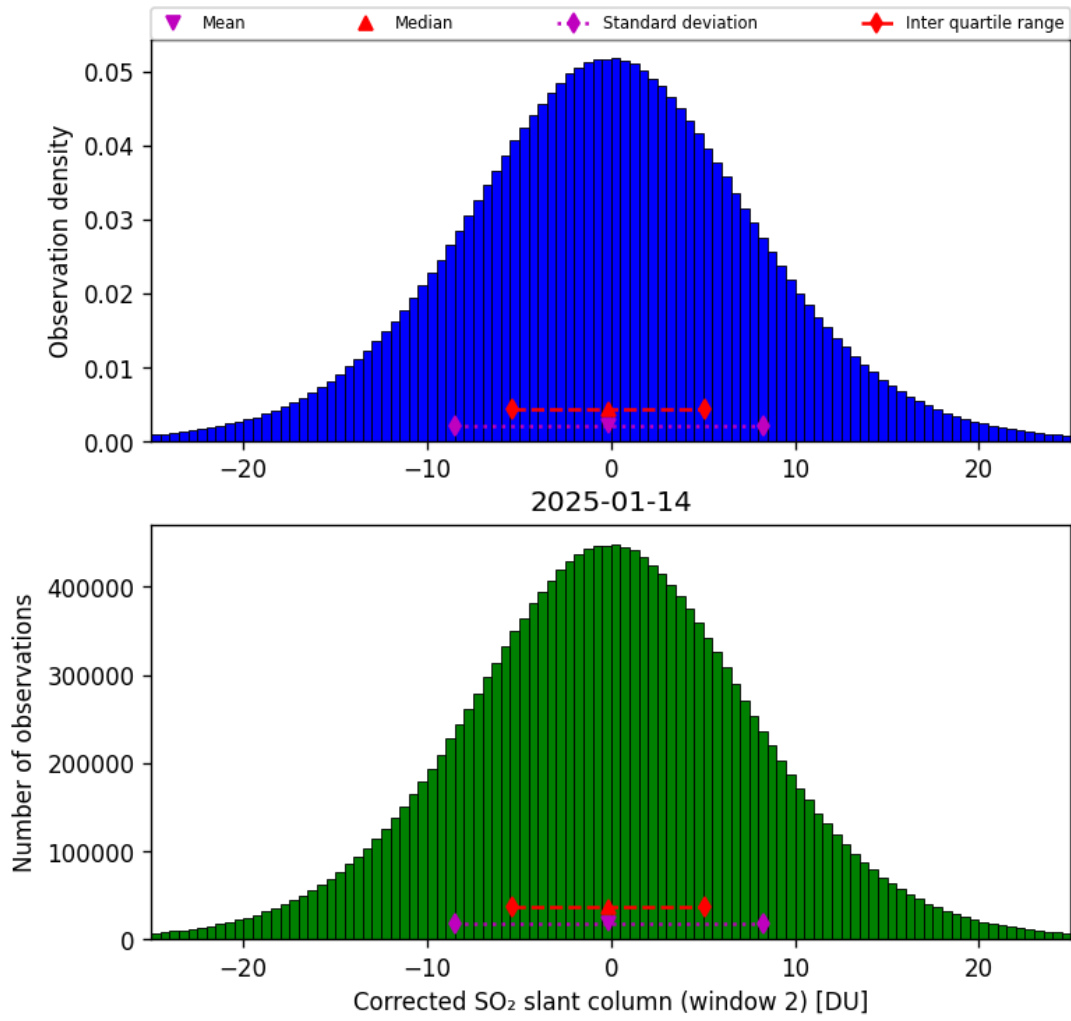


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-01-14 to 2025-01-15

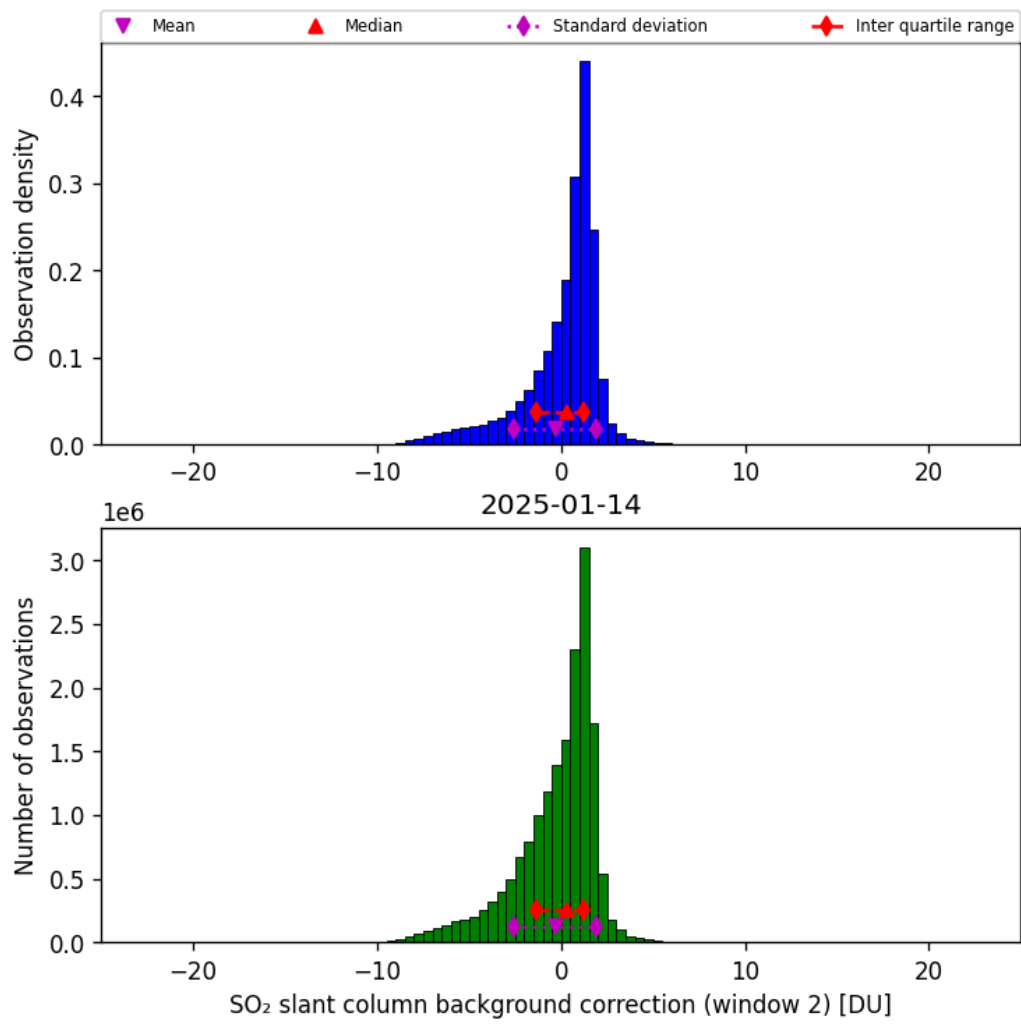


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-01-14 to 2025-01-15

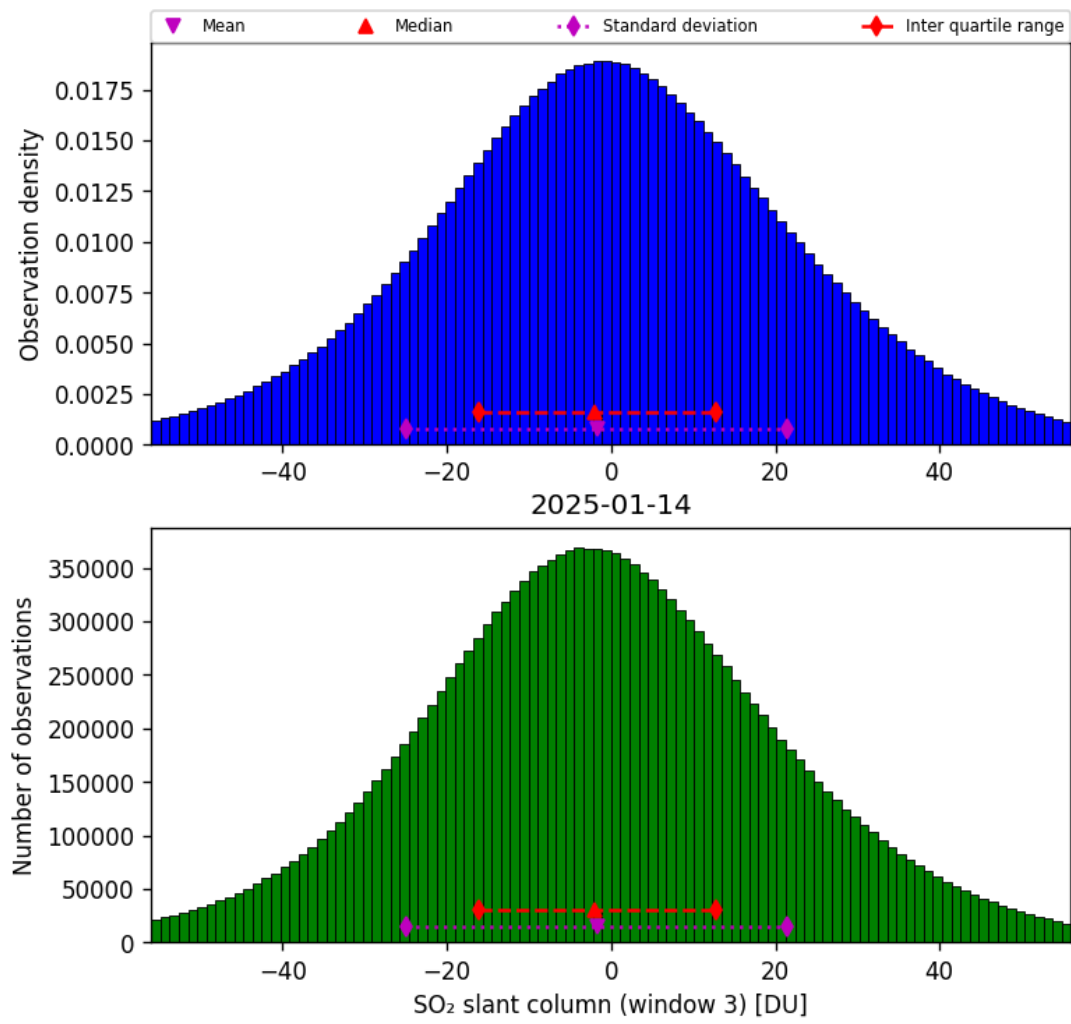


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-01-14 to 2025-01-15

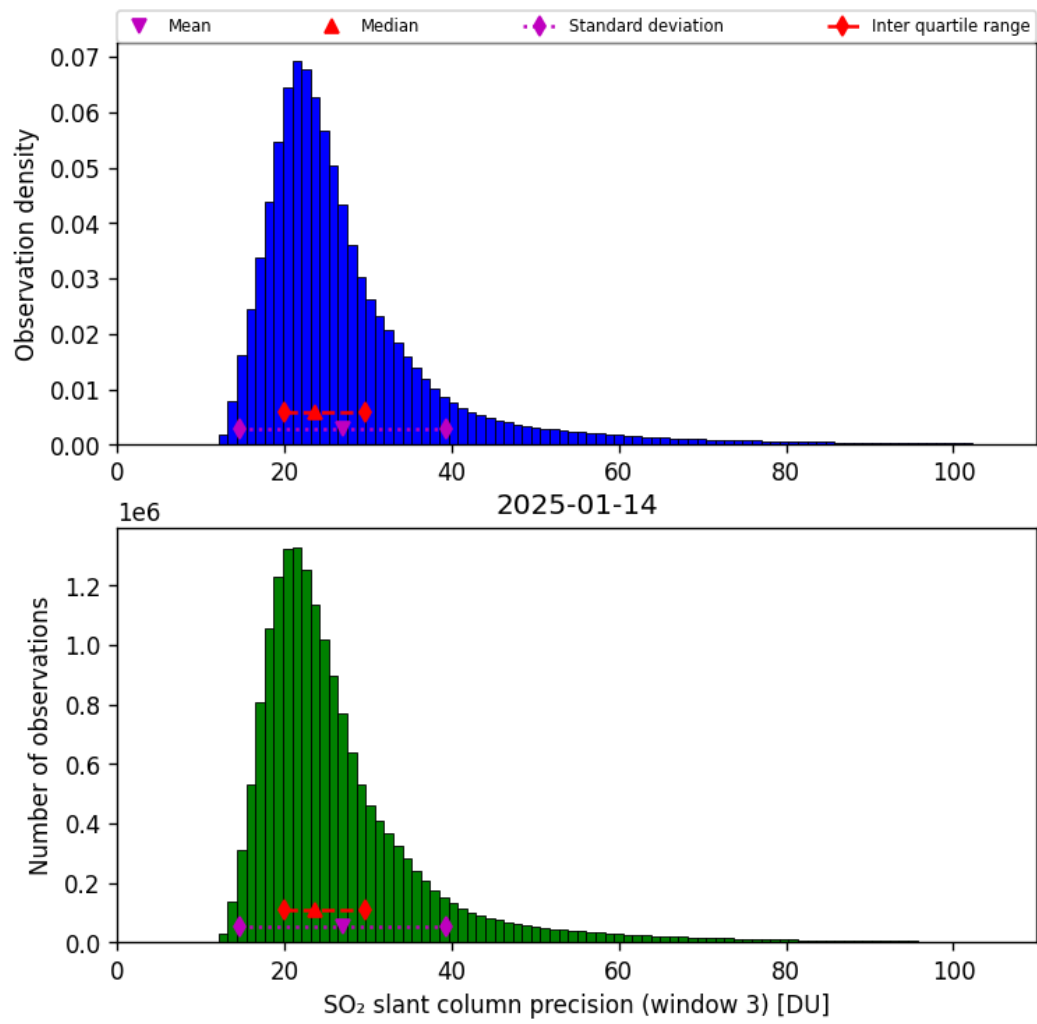


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-01-14 to 2025-01-15

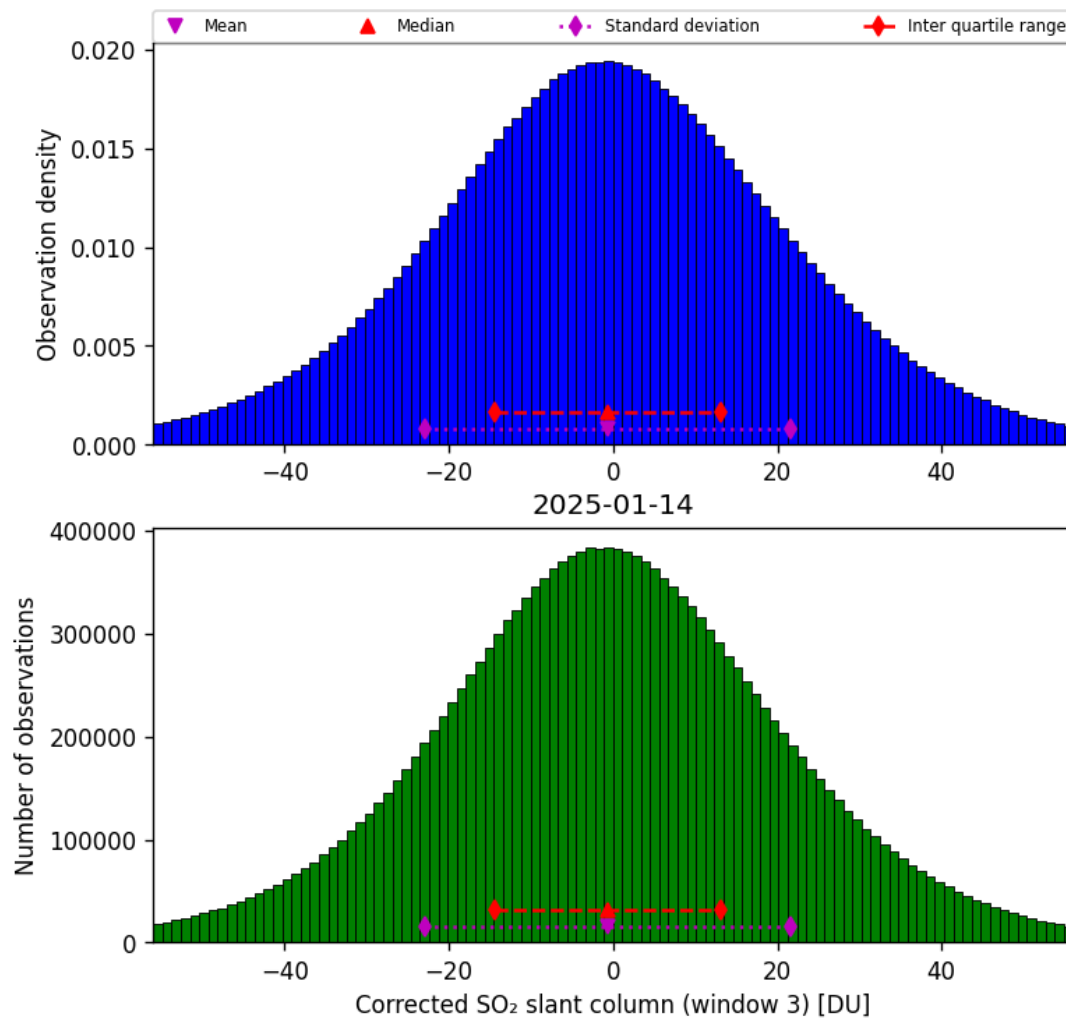


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-01-14 to 2025-01-15

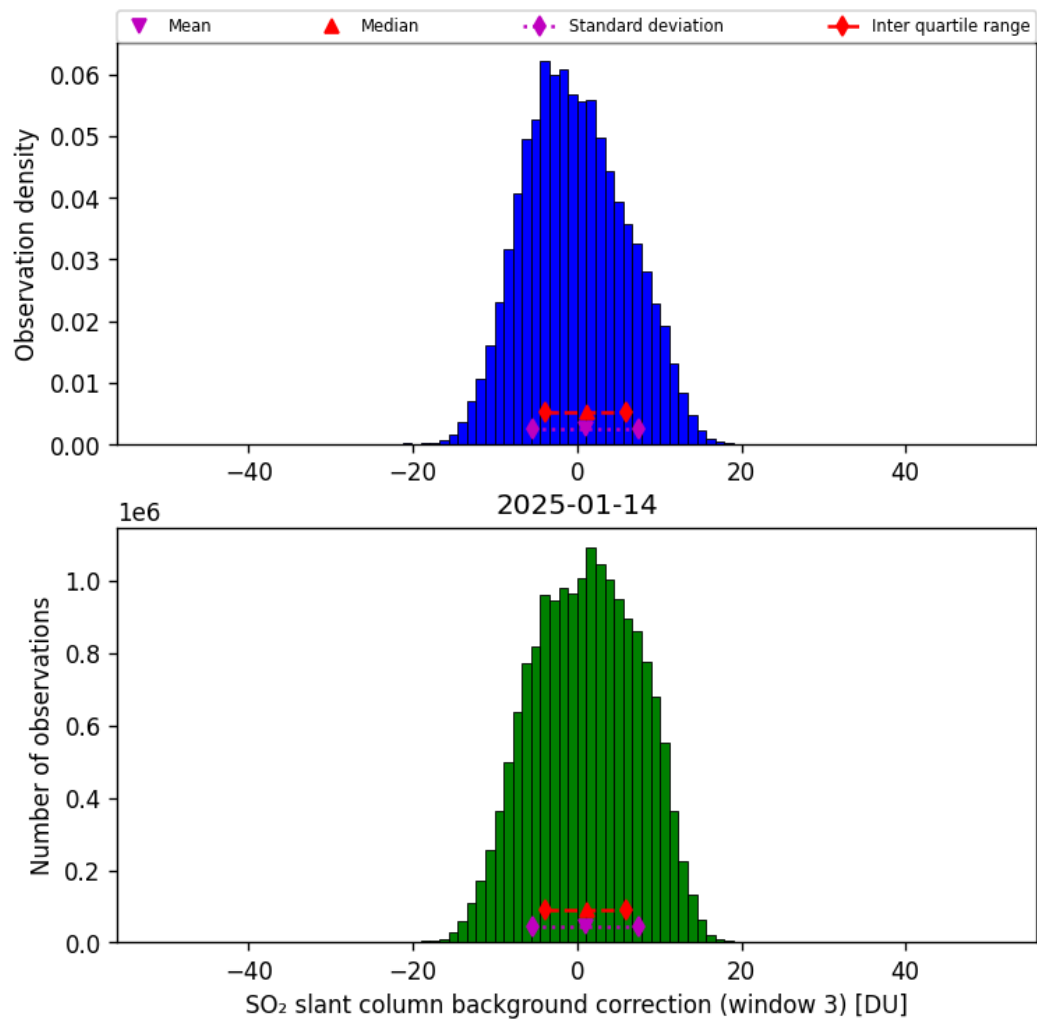


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-01-14 to 2025-01-15

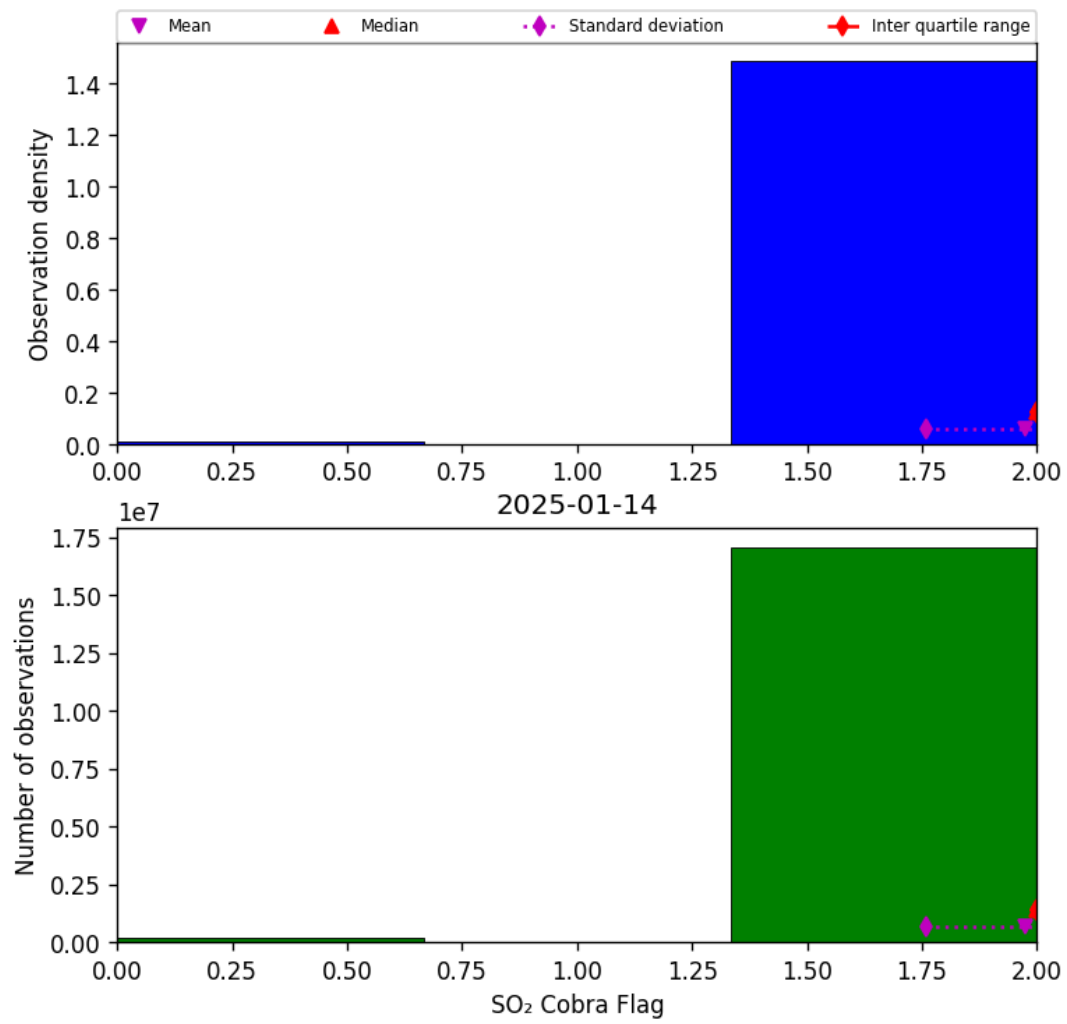


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-01-14 to 2025-01-15

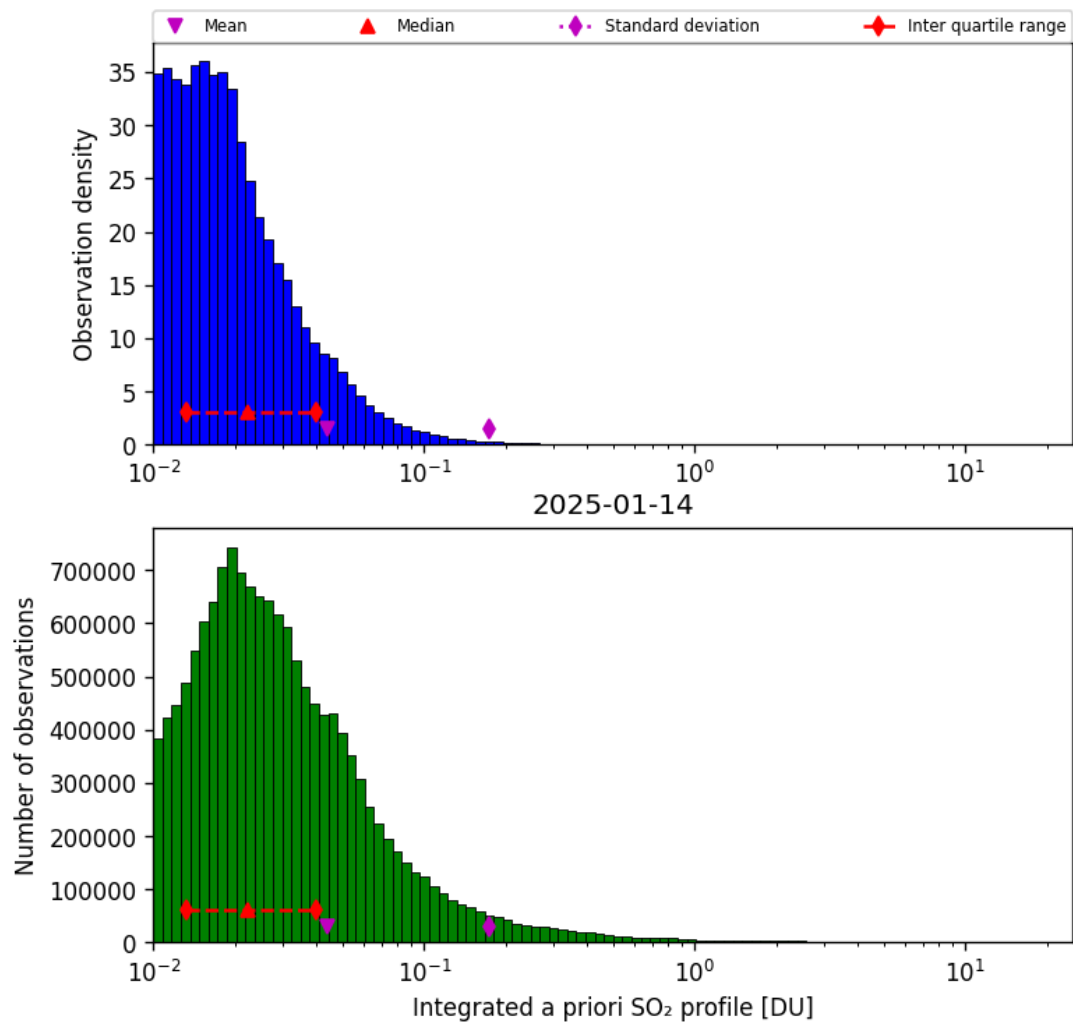


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-01-14 to 2025-01-15

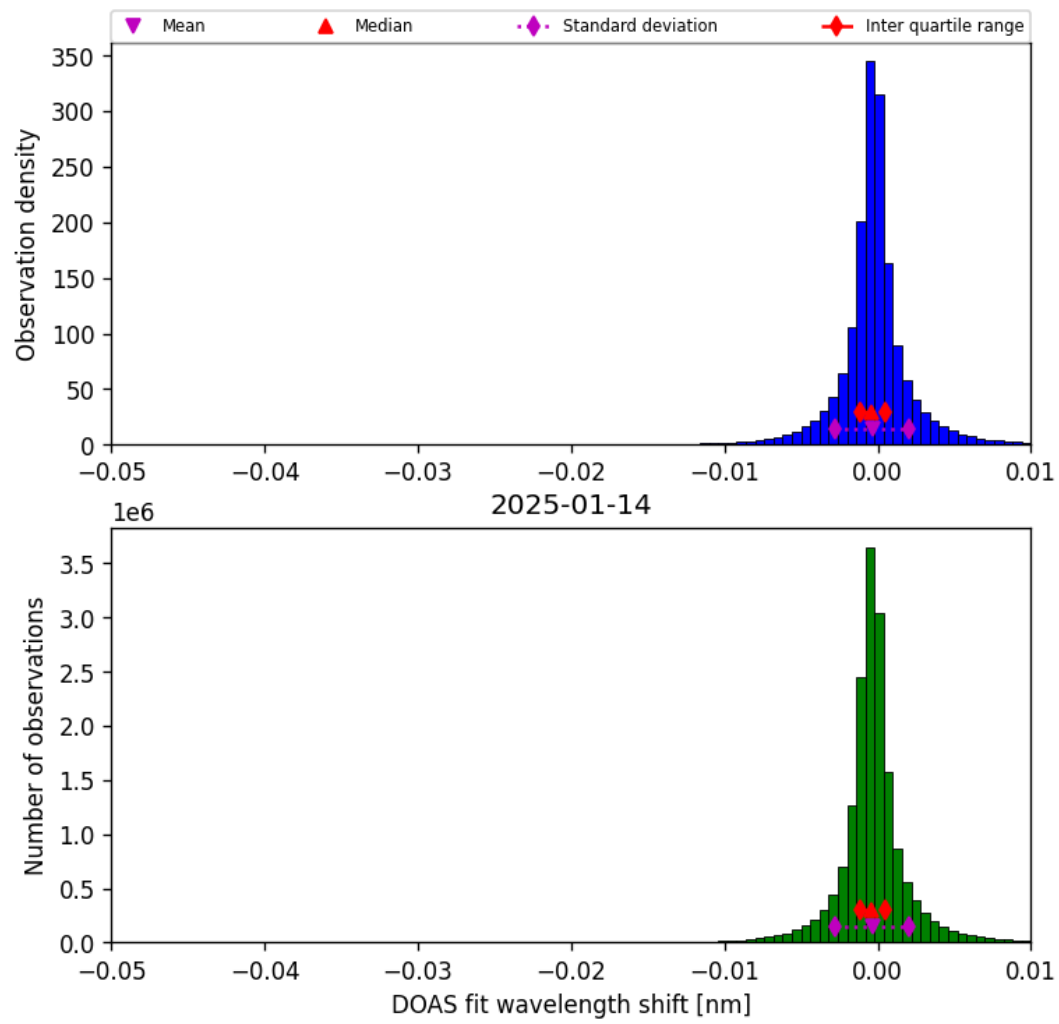


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-01-14 to 2025-01-15

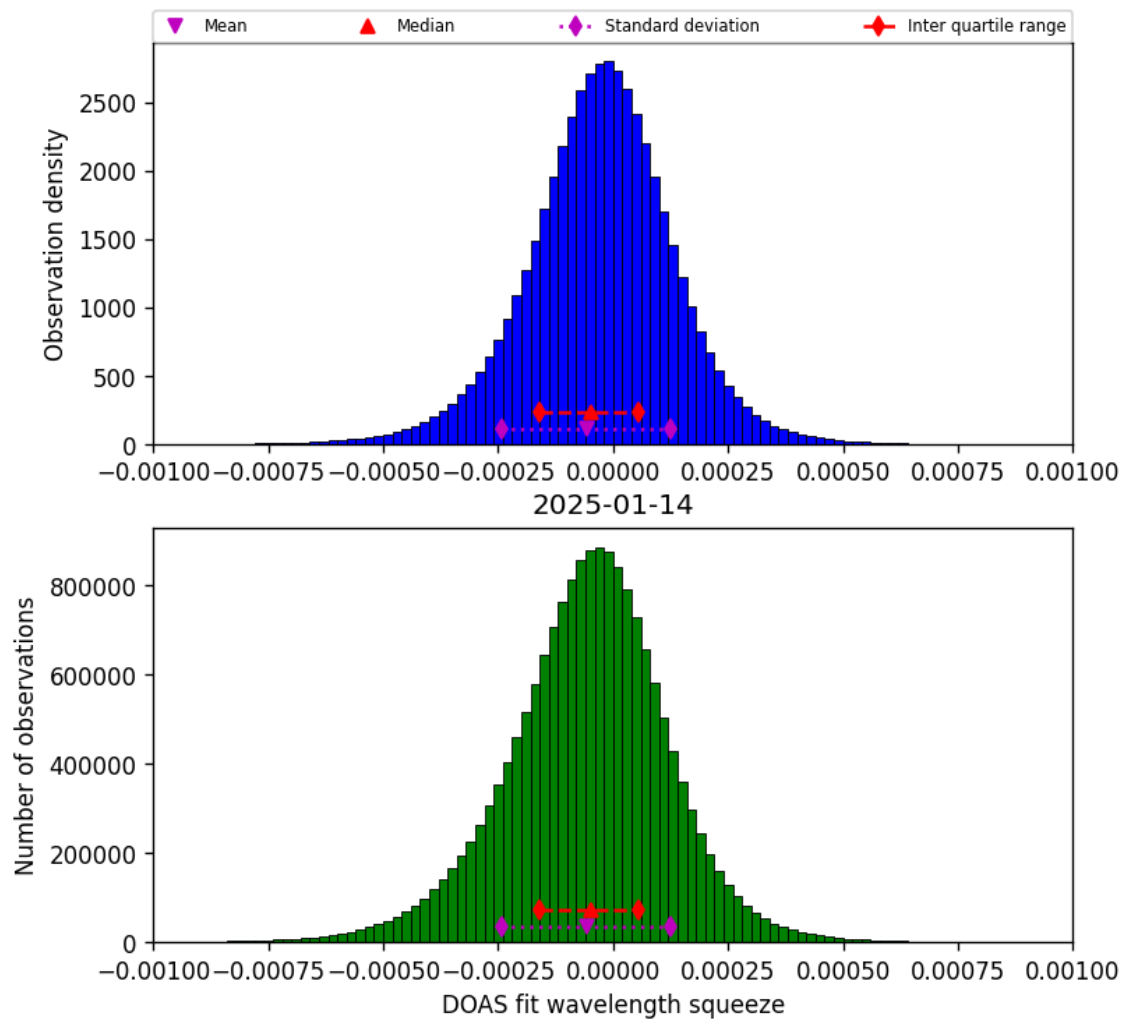


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-01-14 to 2025-01-15

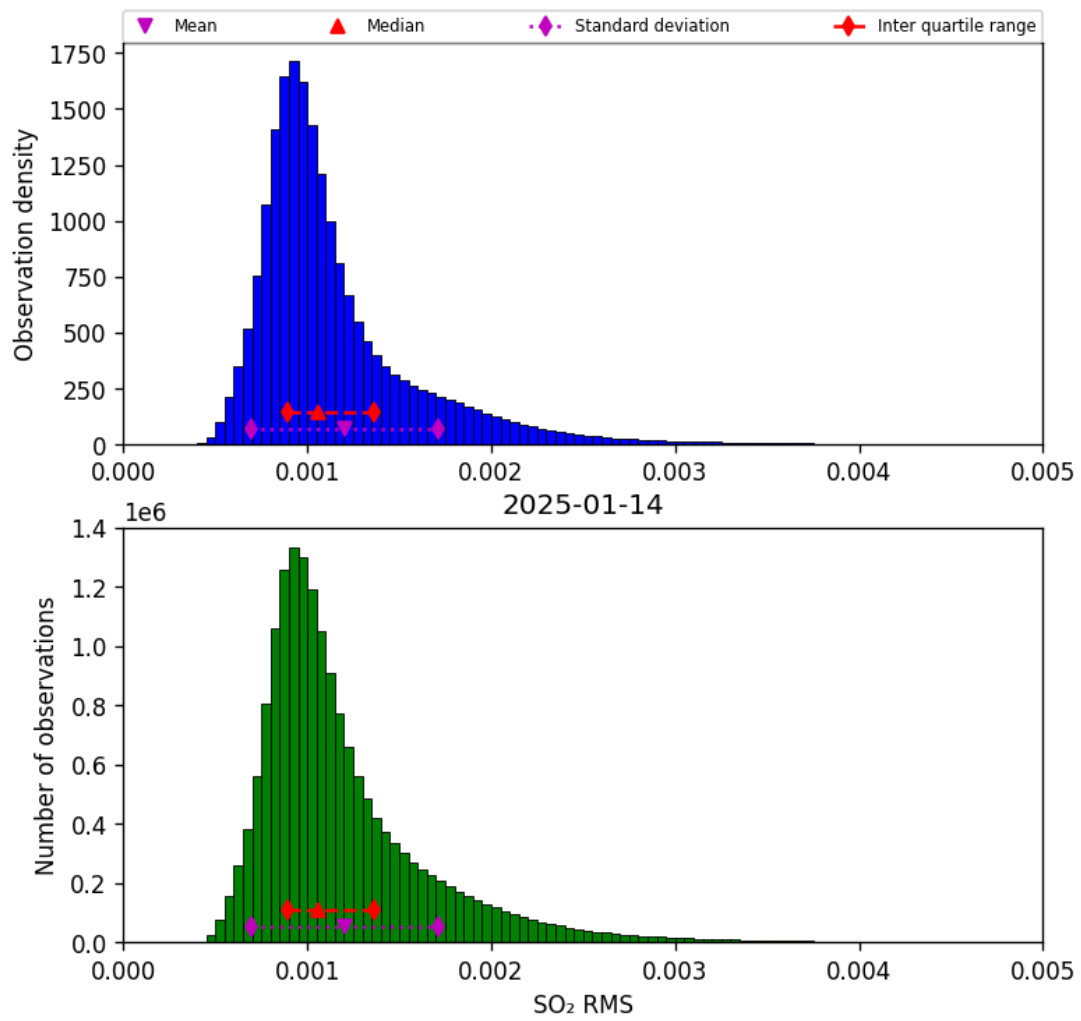


Figure 79: Histogram of “SO₂ RMS” for 2025-01-14 to 2025-01-15

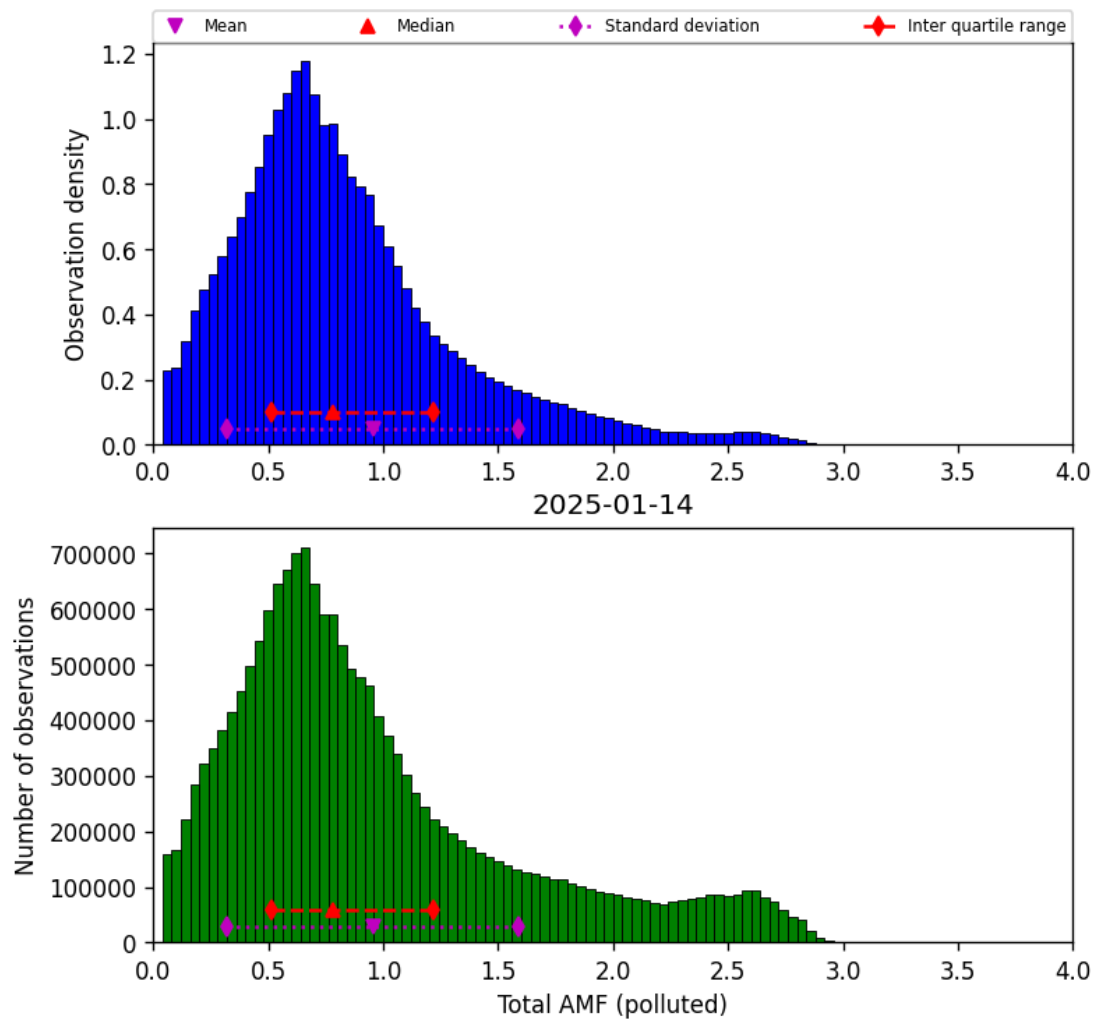


Figure 80: Histogram of “Total AMF (polluted)” for 2025-01-14 to 2025-01-15

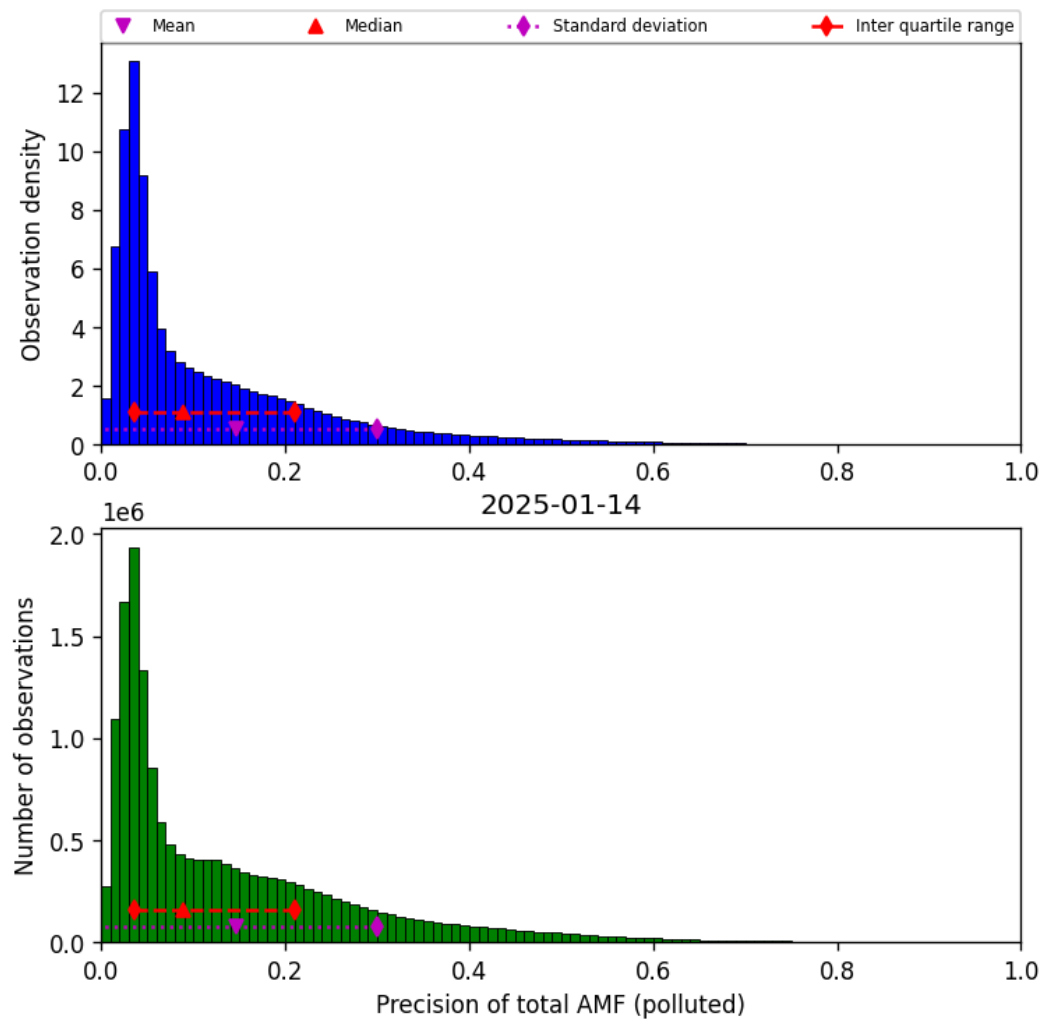


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-01-14 to 2025-01-15

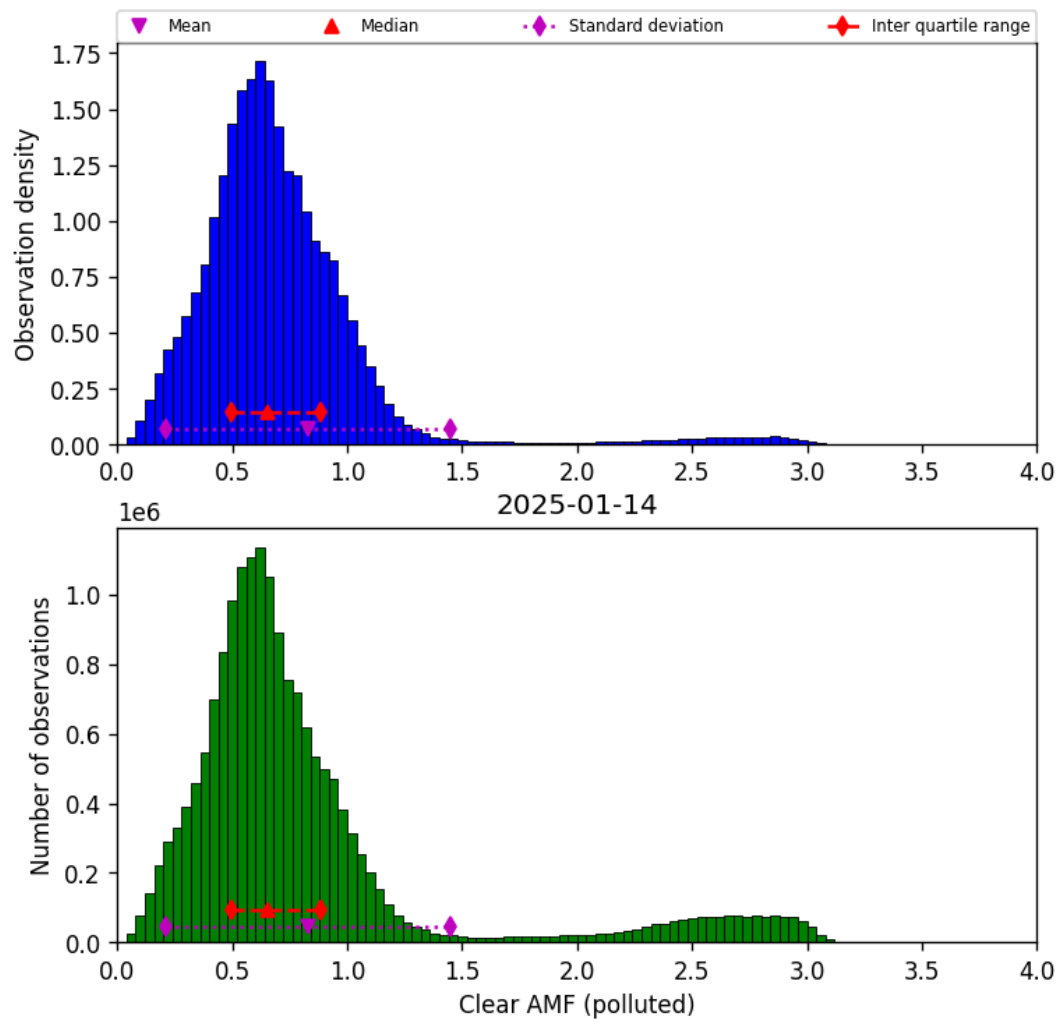


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-01-14 to 2025-01-15

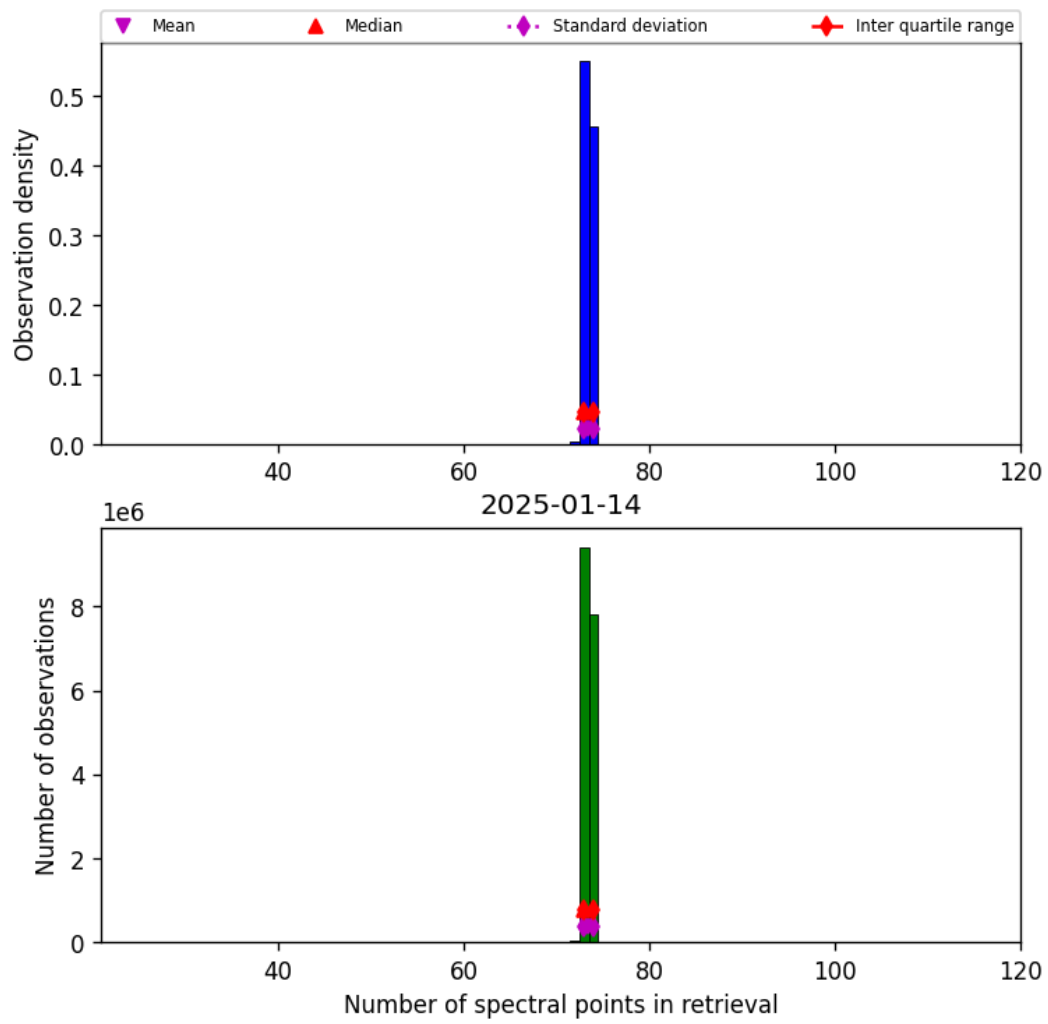


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-01-14 to 2025-01-15

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.

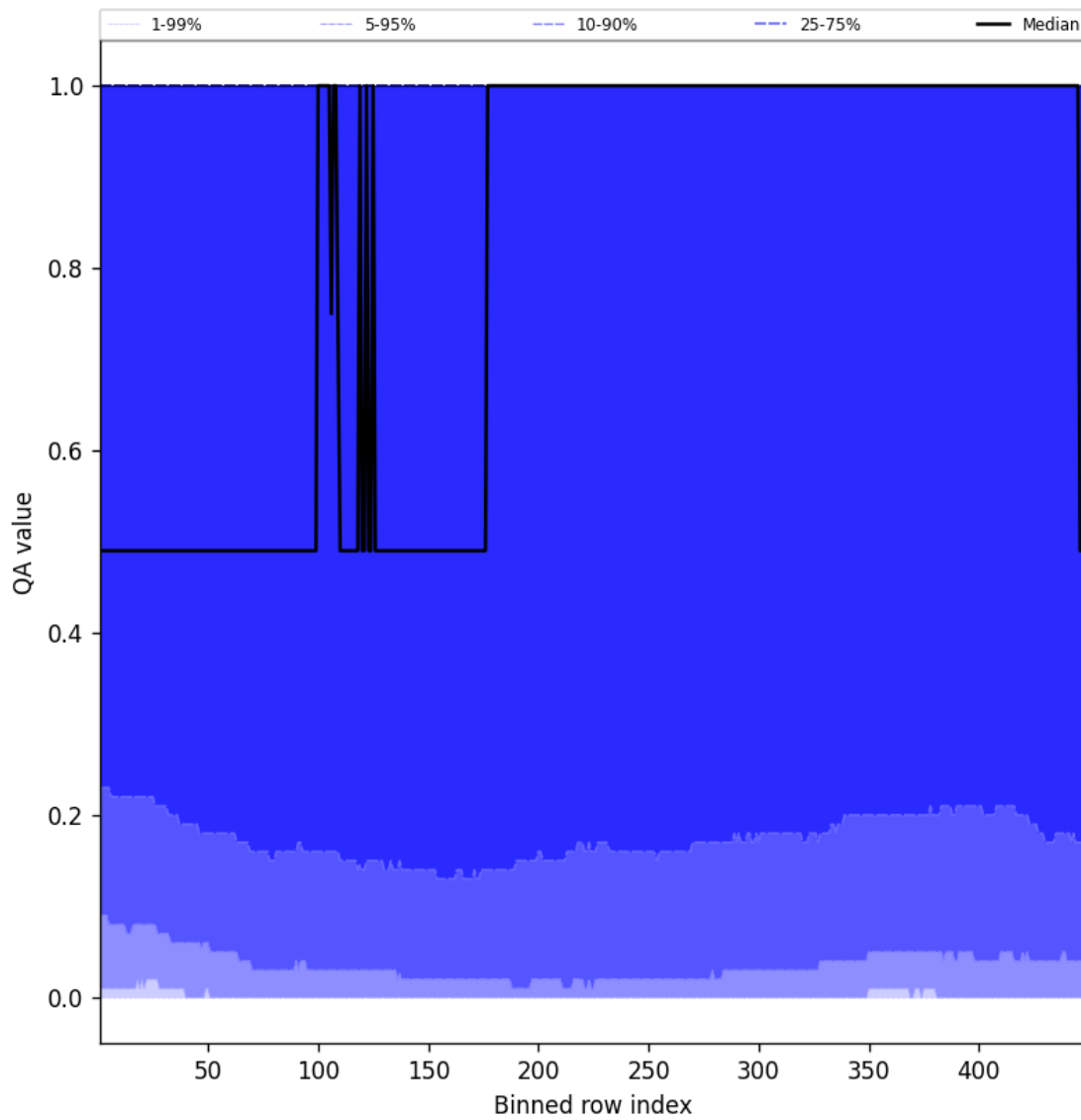


Figure 84: Along track statistics of “QA value” for 2025-01-14 to 2025-01-15

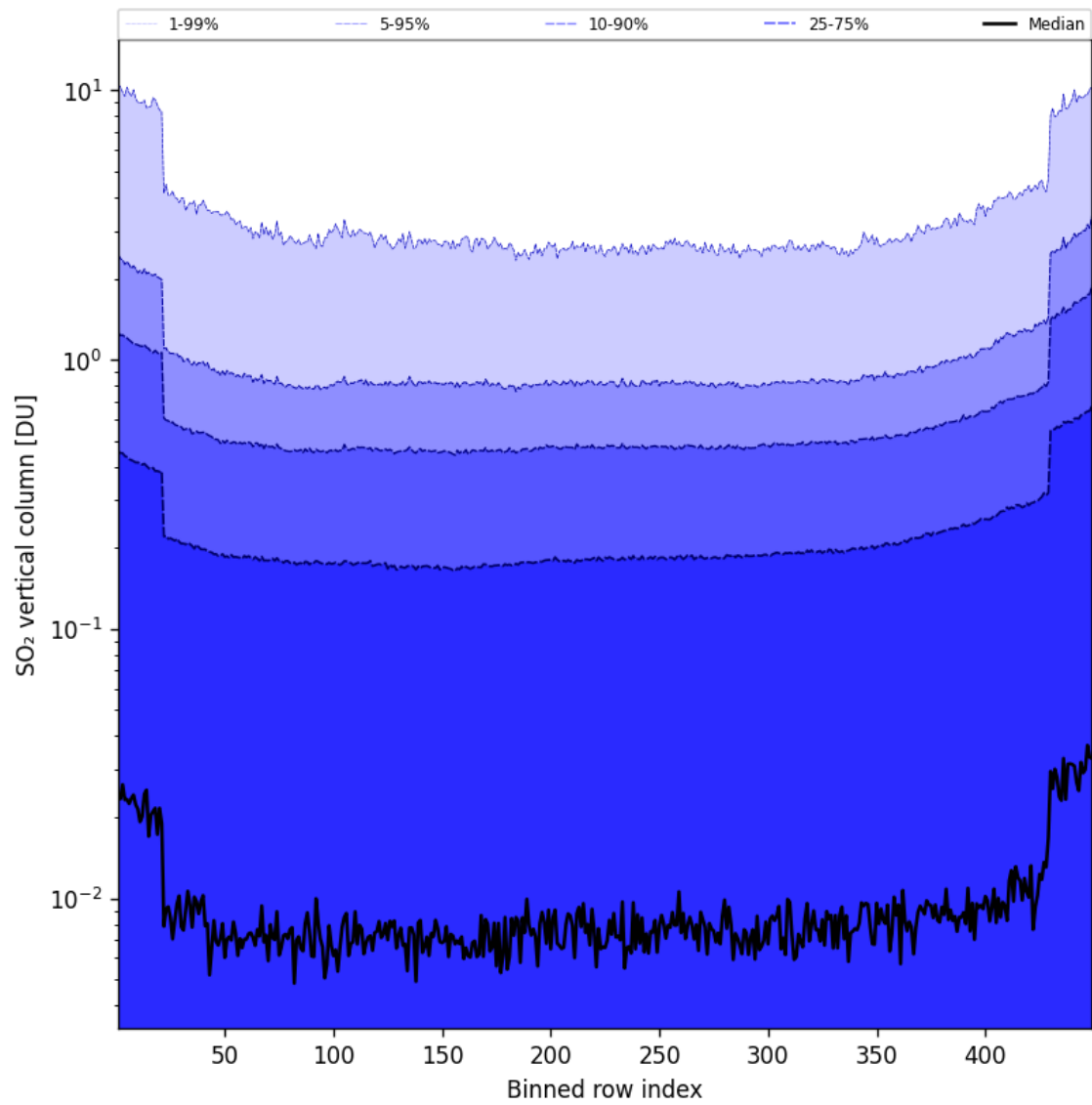


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-01-14 to 2025-01-15

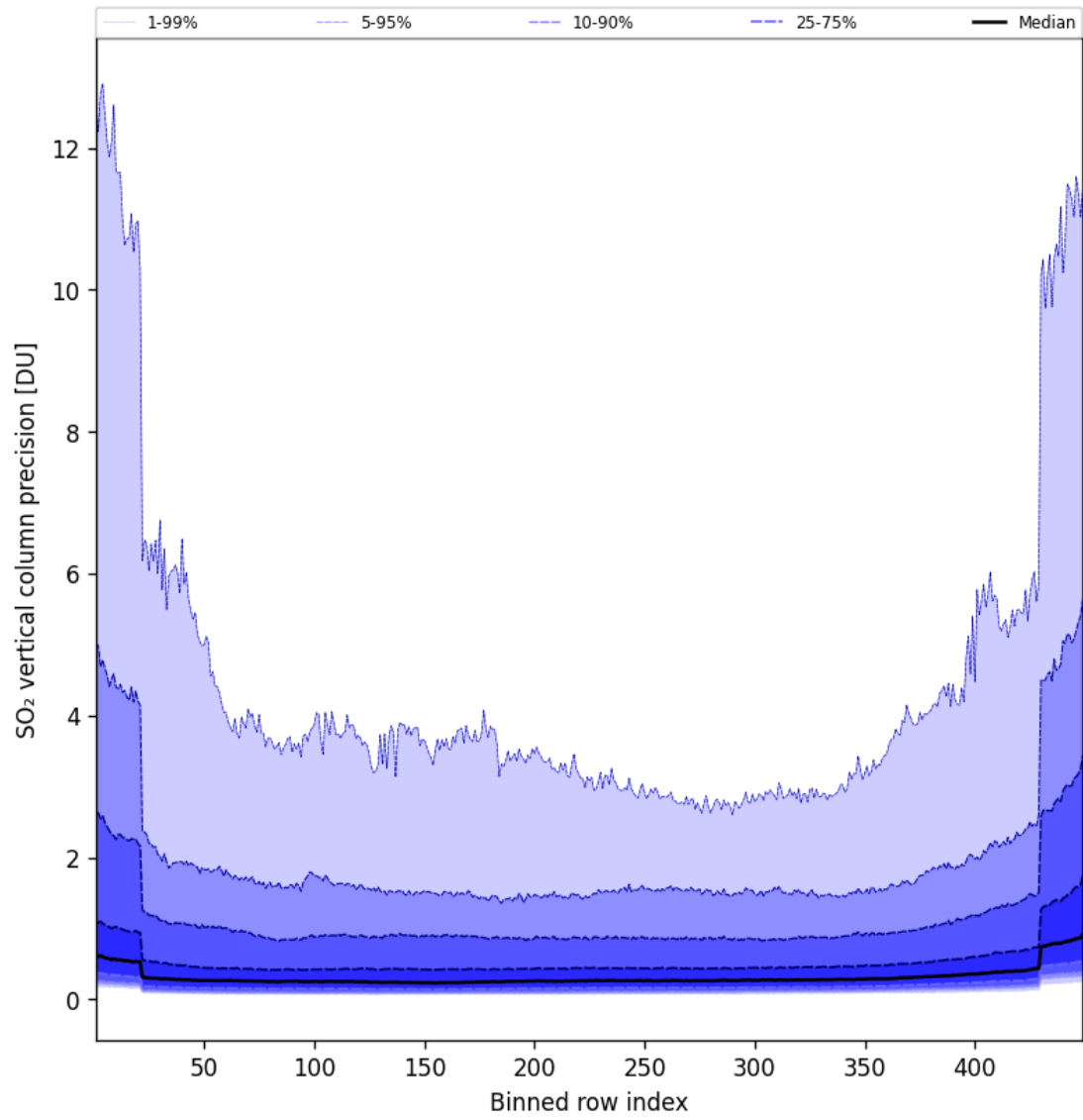


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-01-14 to 2025-01-15

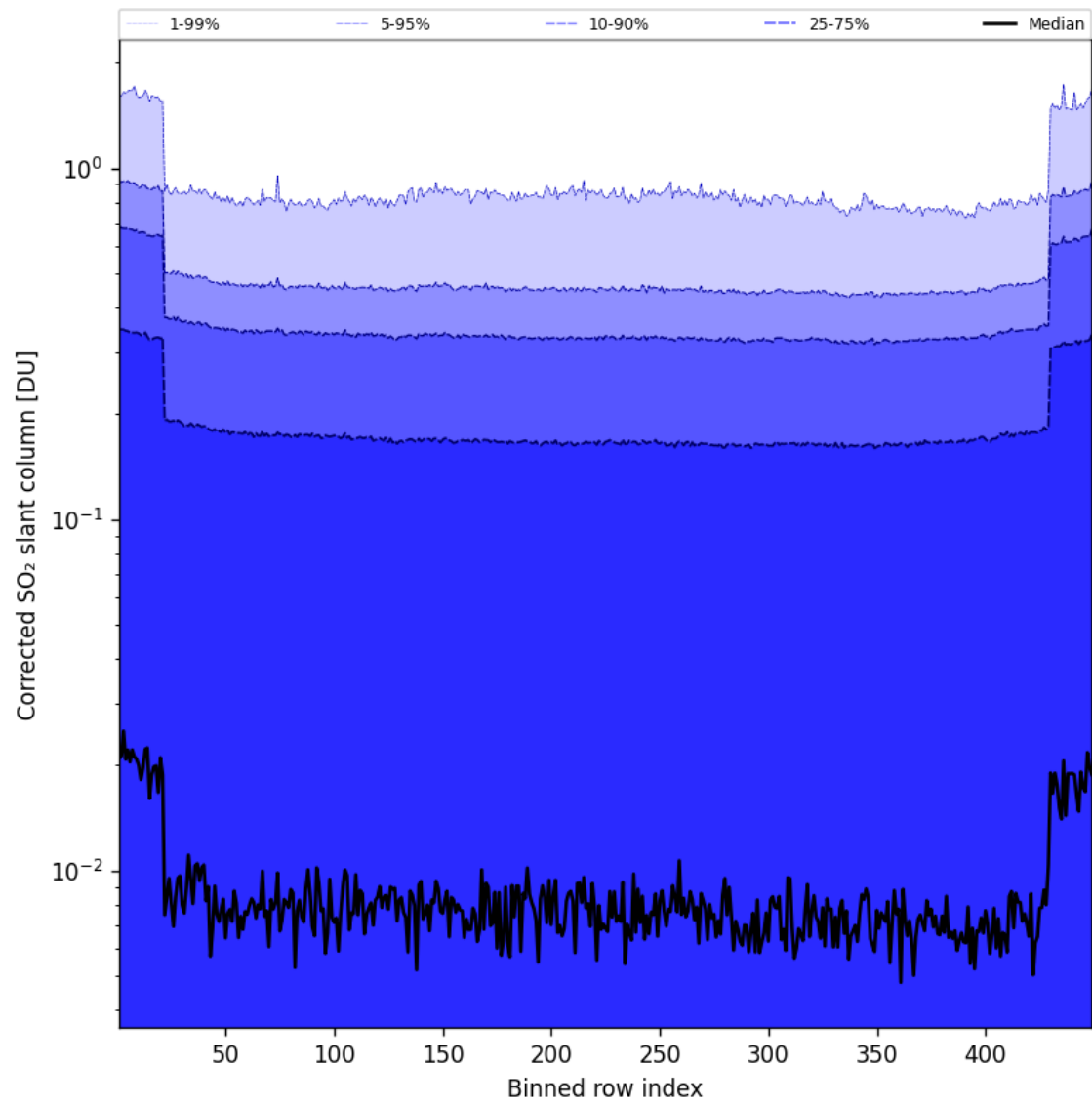


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-01-14 to 2025-01-15

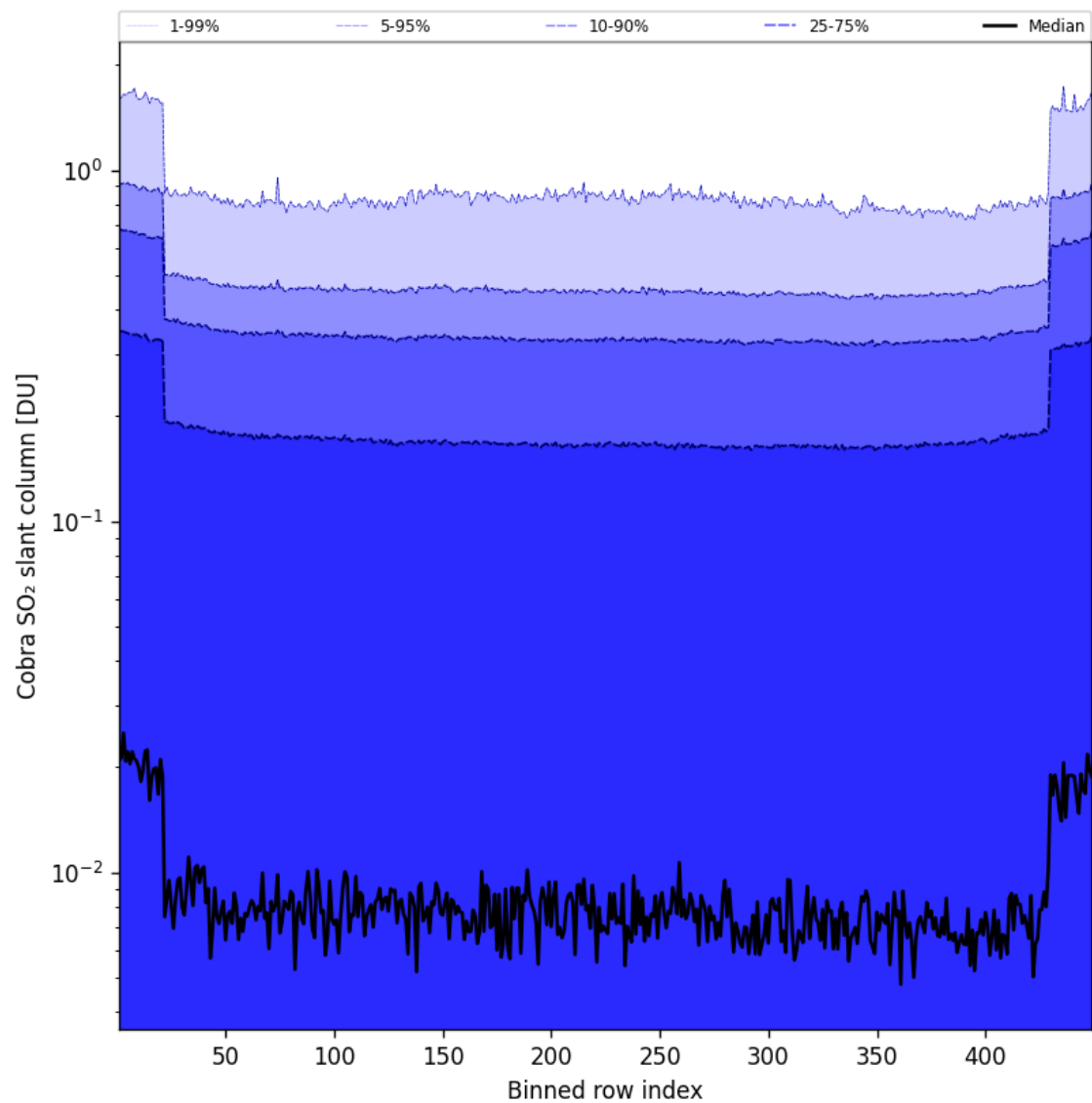


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-01-14 to 2025-01-15

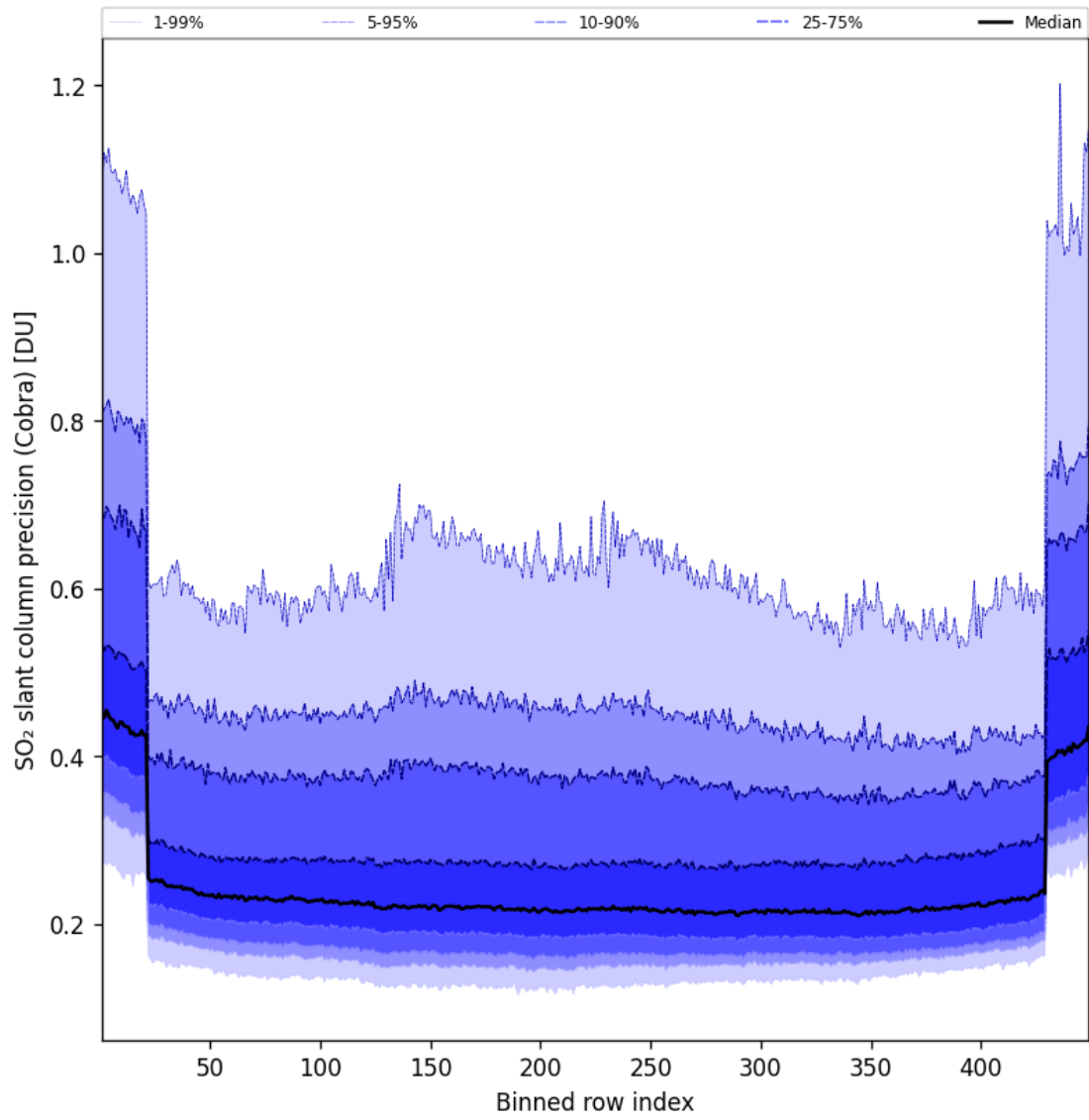


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-01-14 to 2025-01-15

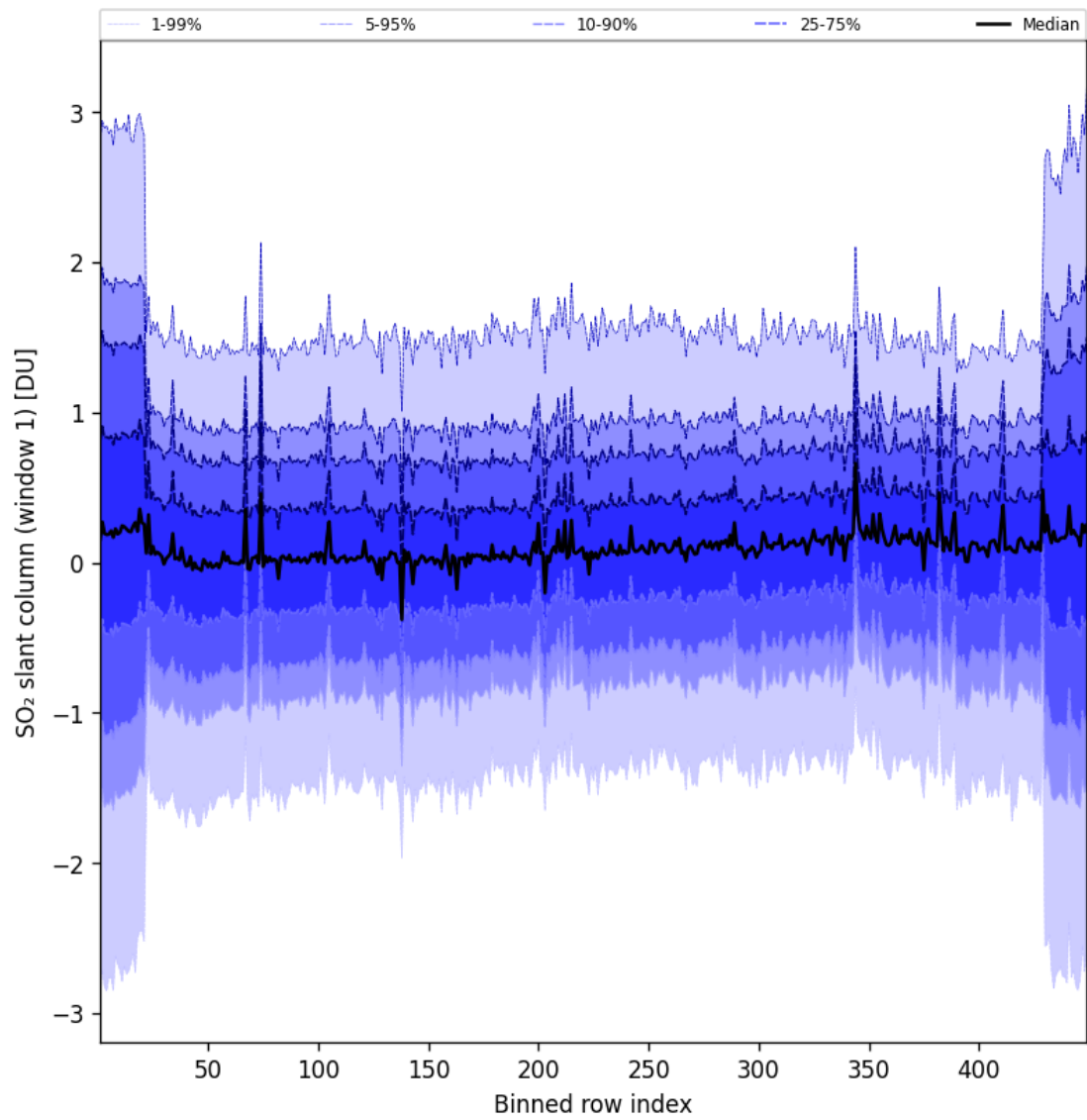


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-01-14 to 2025-01-15

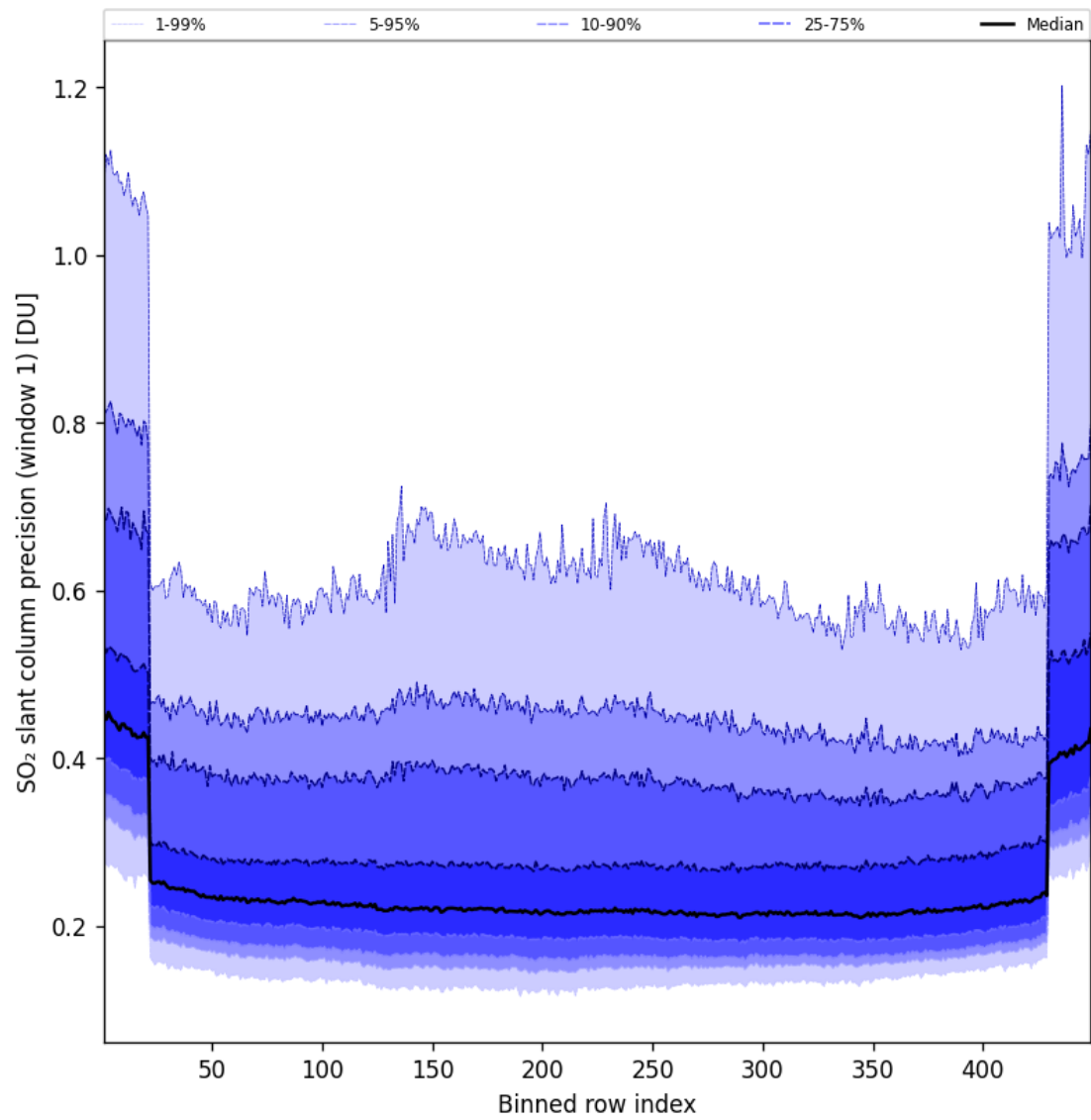


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-01-14 to 2025-01-15

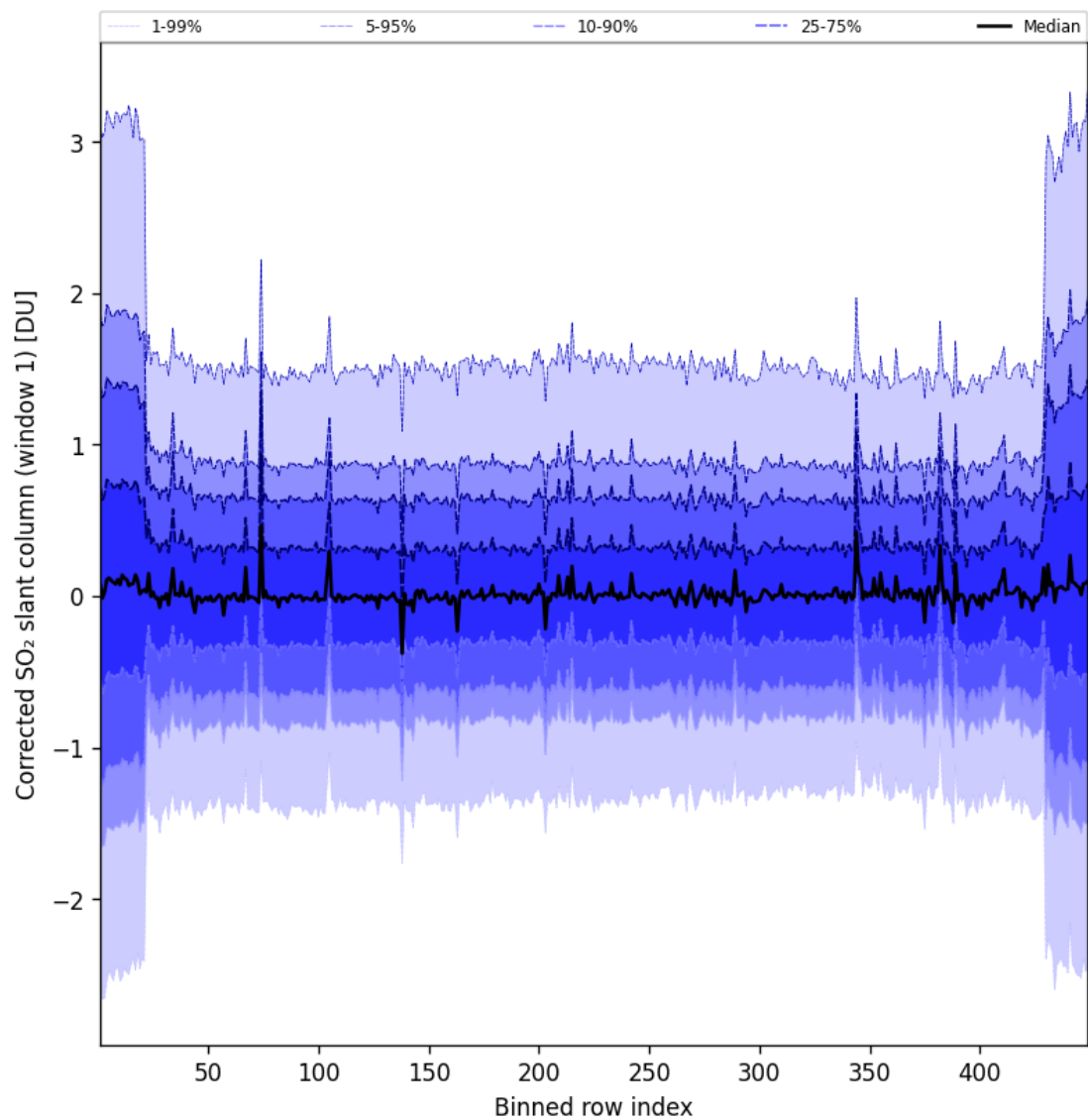


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-01-14 to 2025-01-15

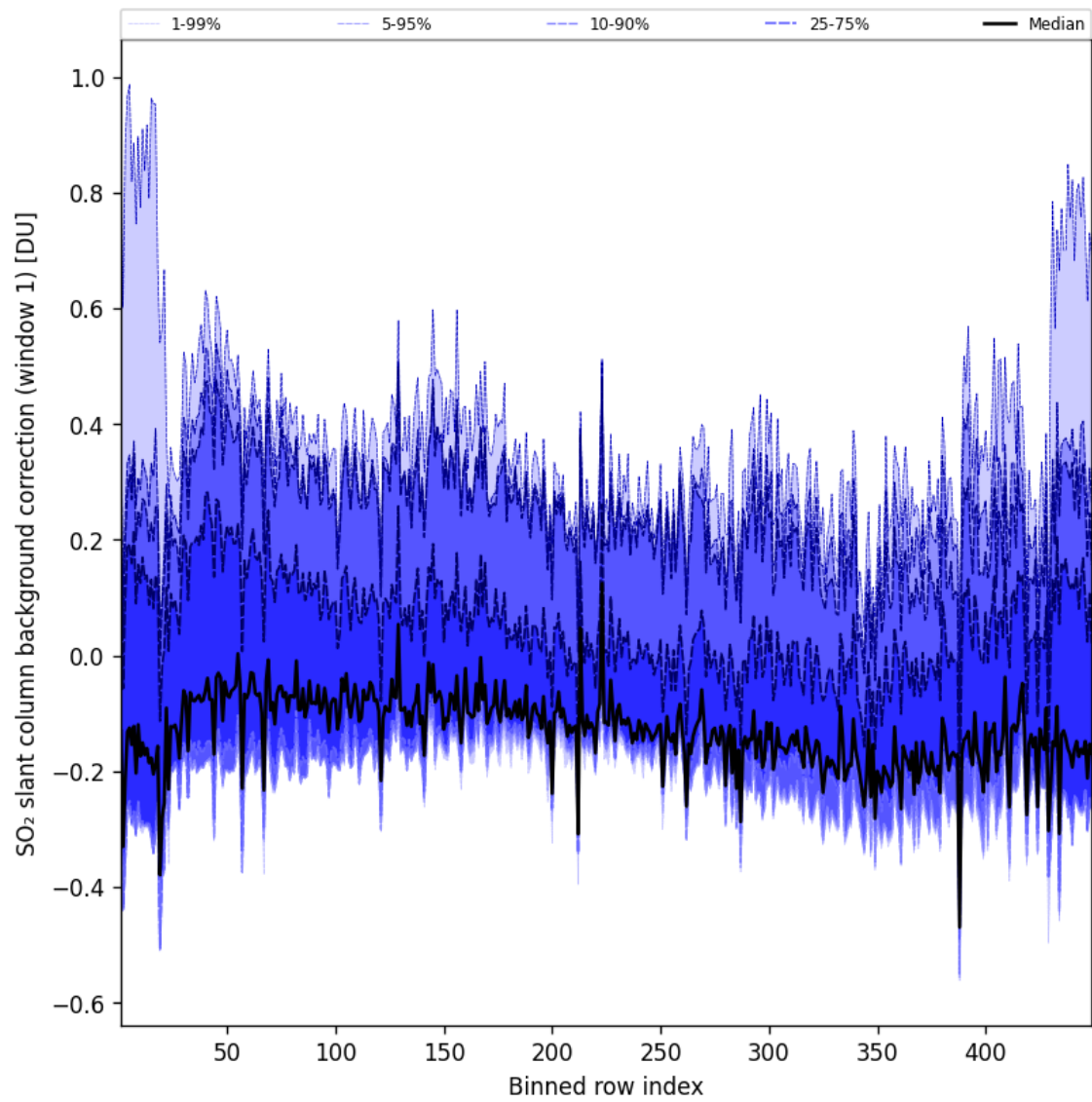


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-01-14 to 2025-01-15

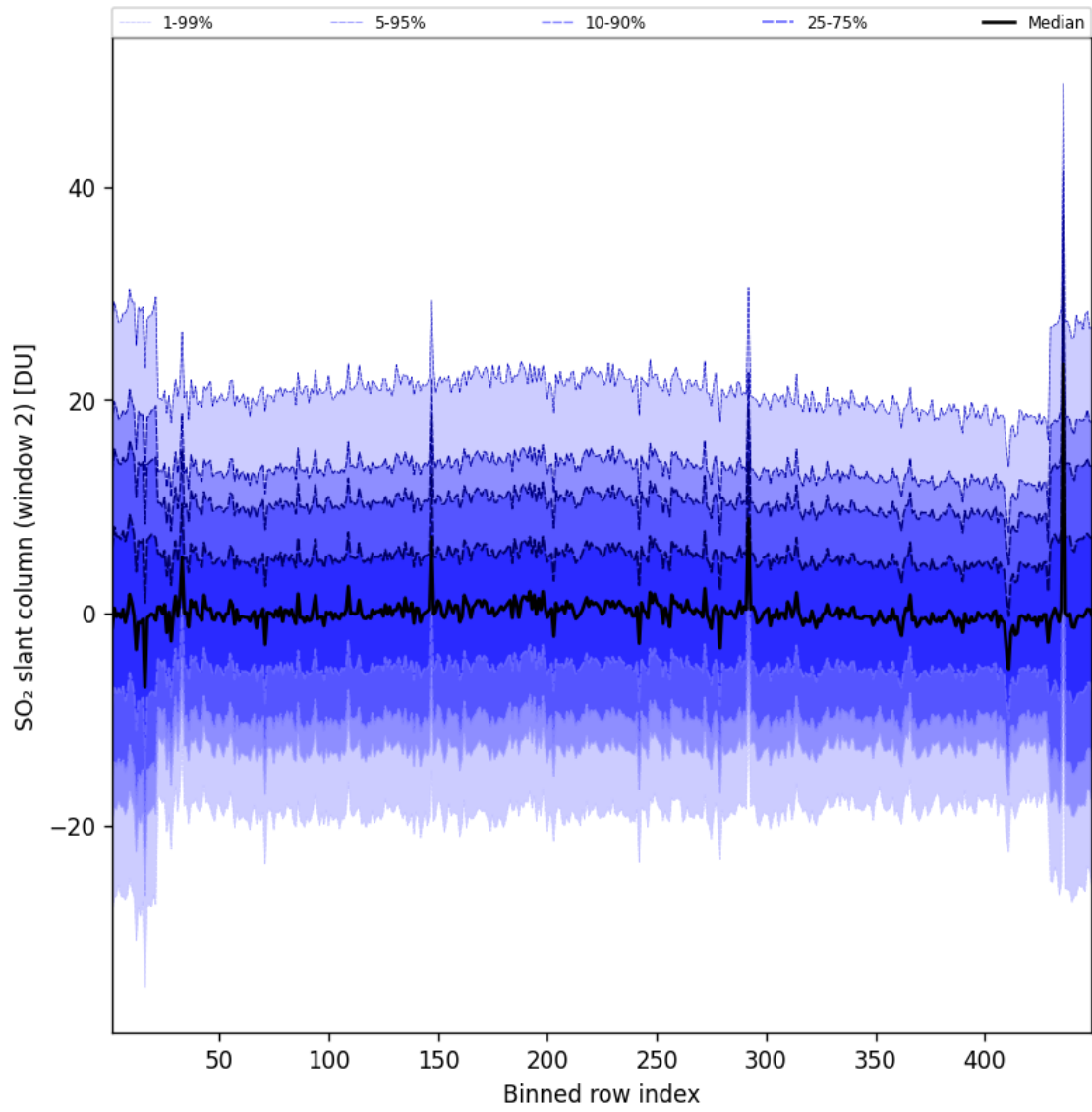


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-01-14 to 2025-01-15

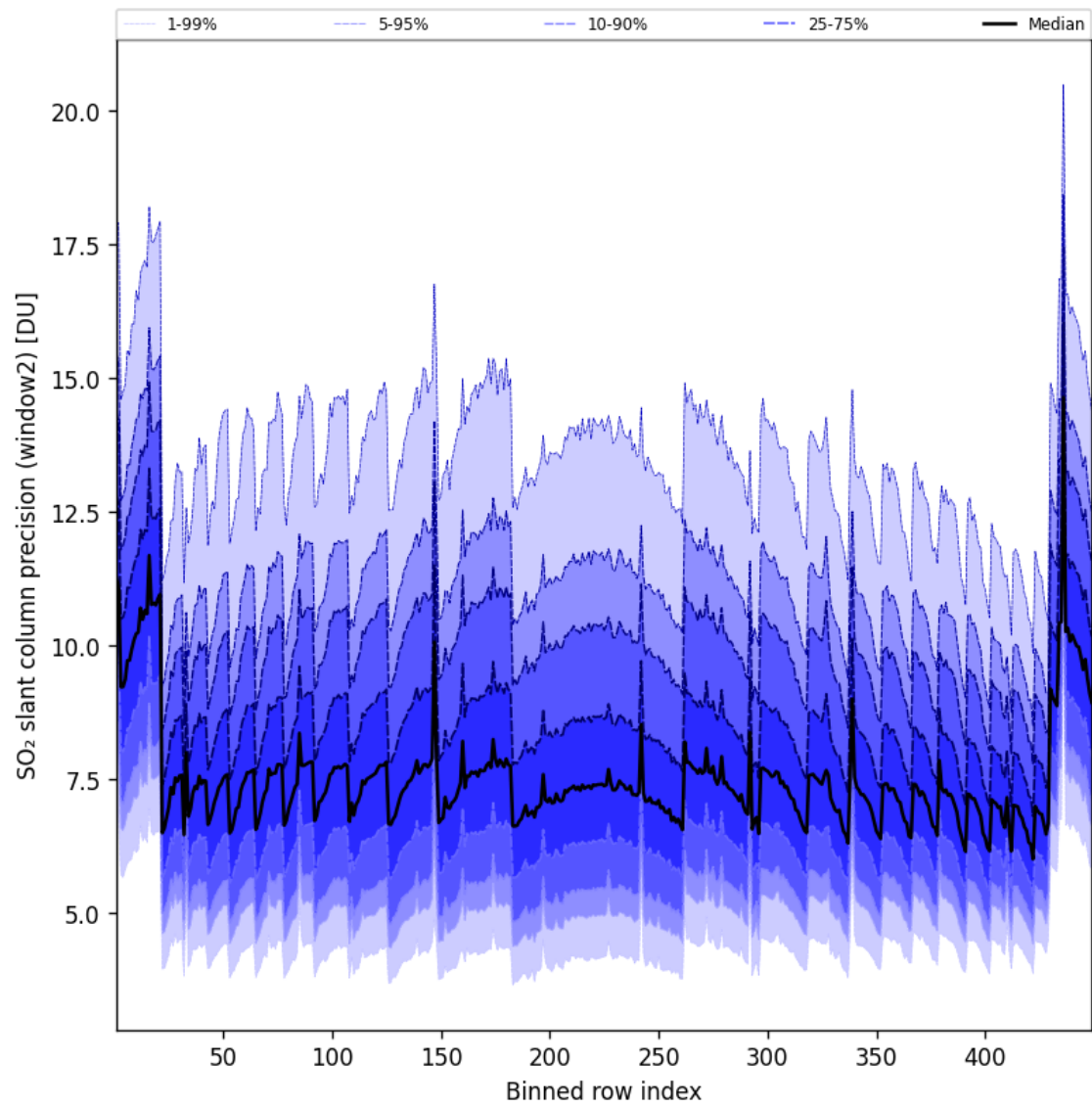


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-01-14 to 2025-01-15

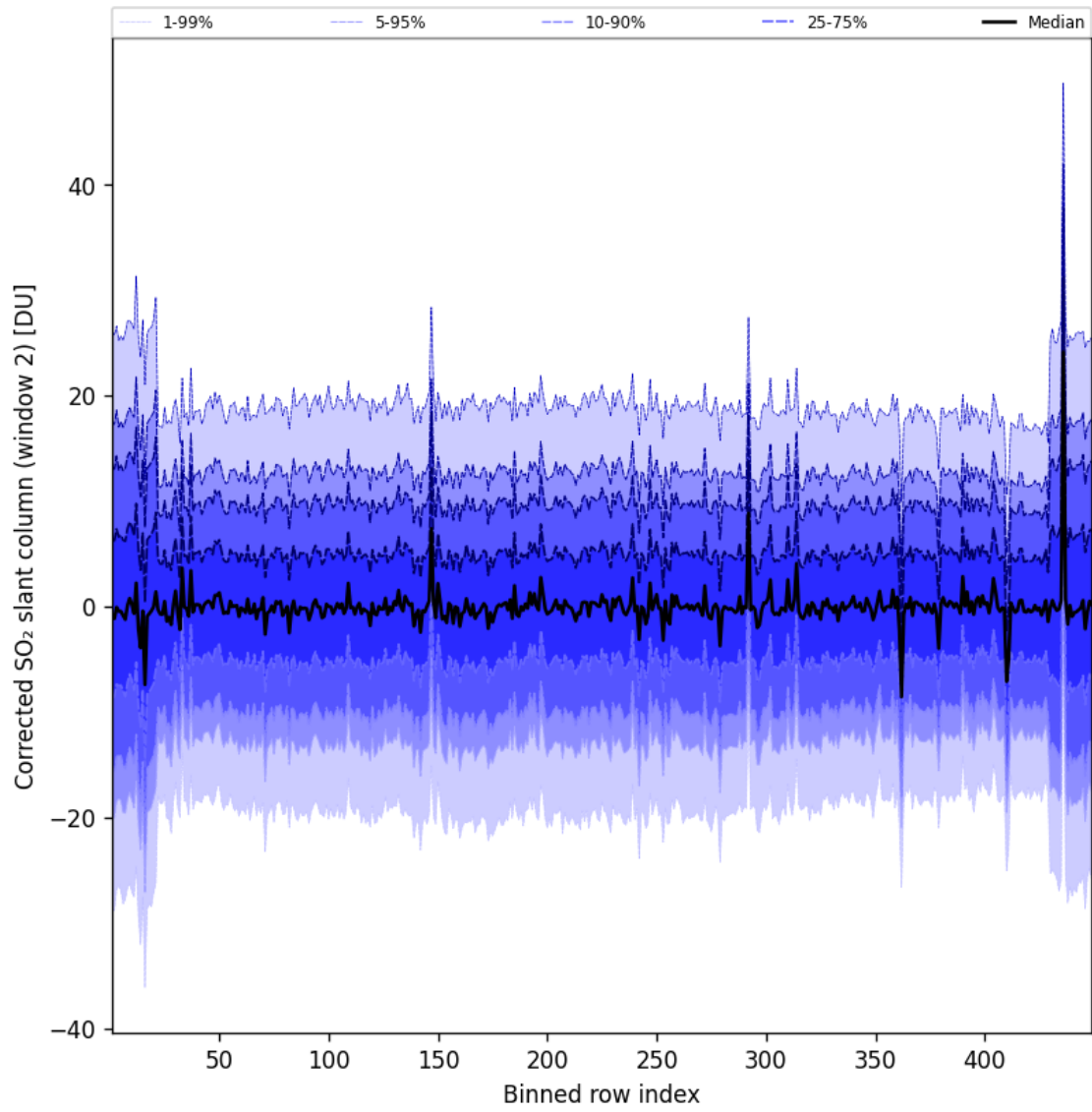


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-01-14 to 2025-01-15

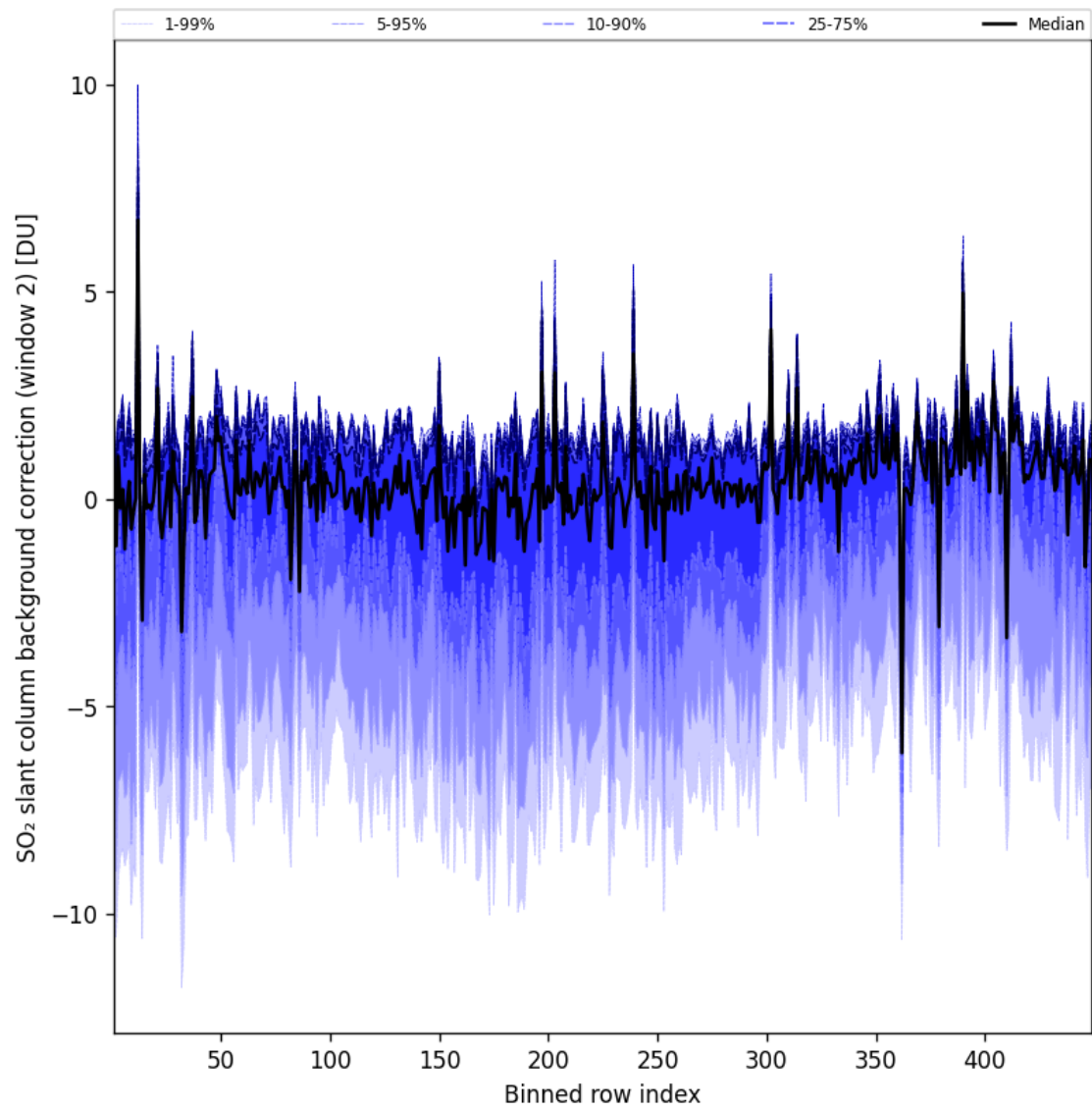


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-01-14 to 2025-01-15

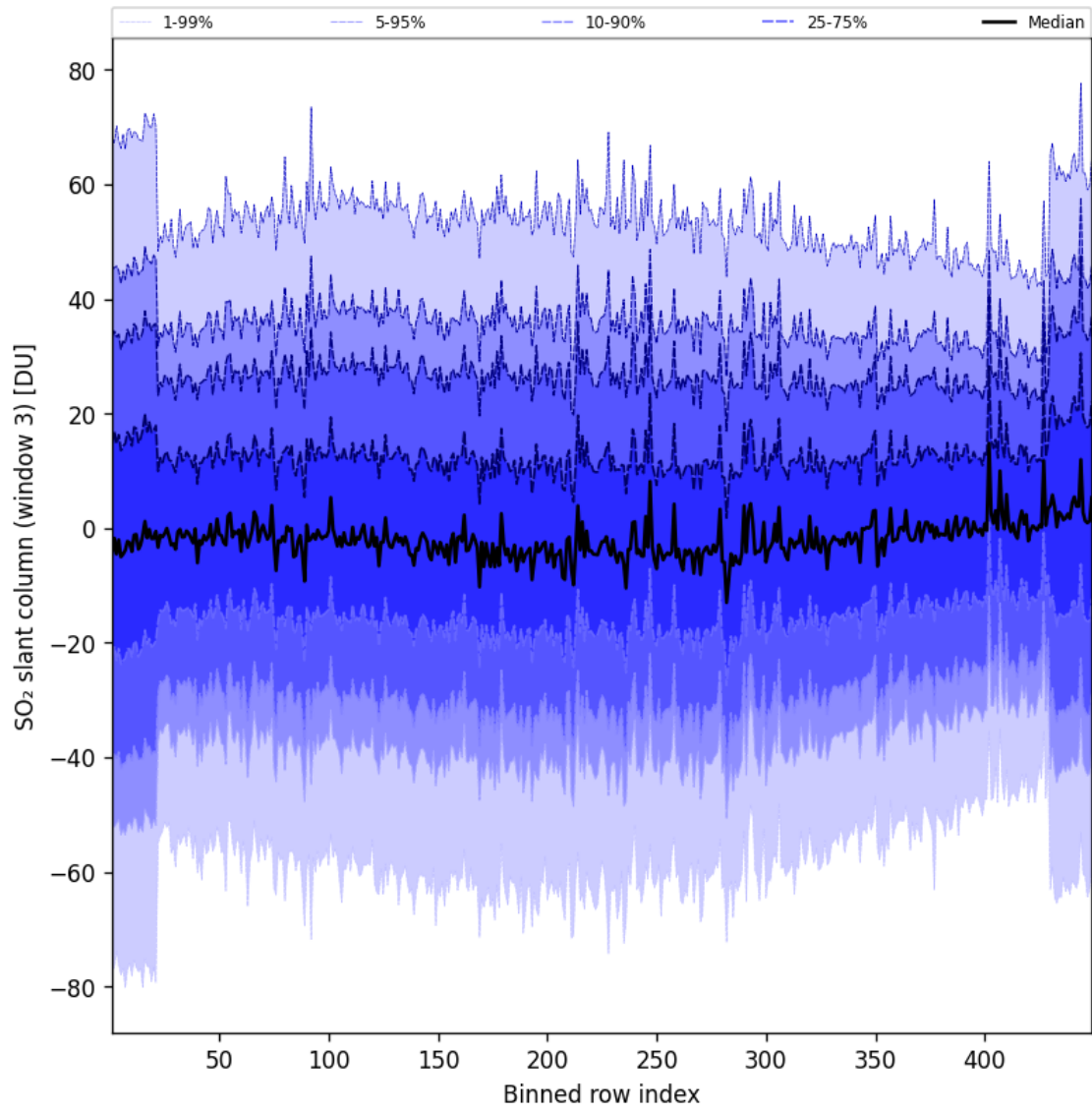


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-01-14 to 2025-01-15

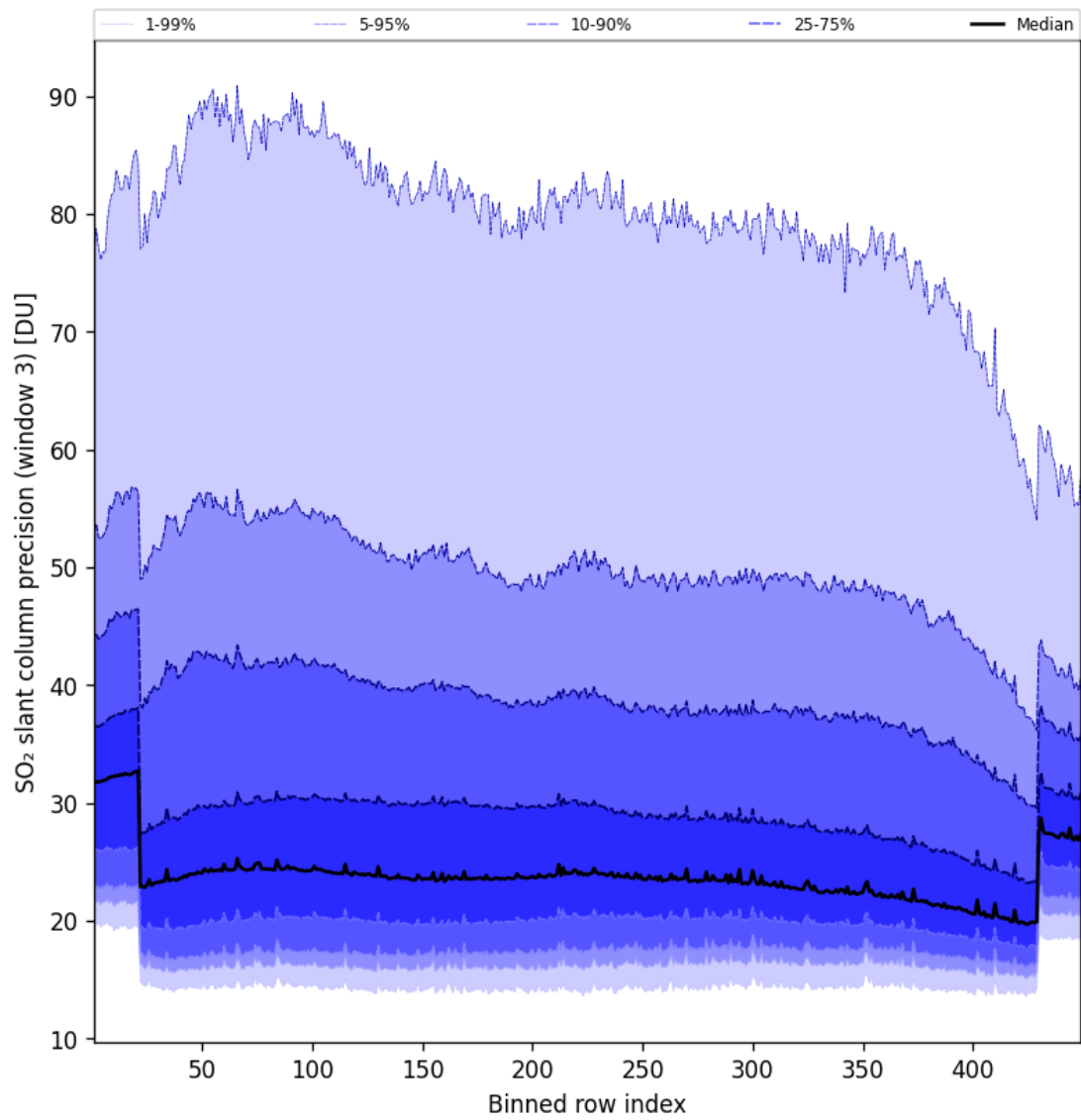


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-01-14 to 2025-01-15

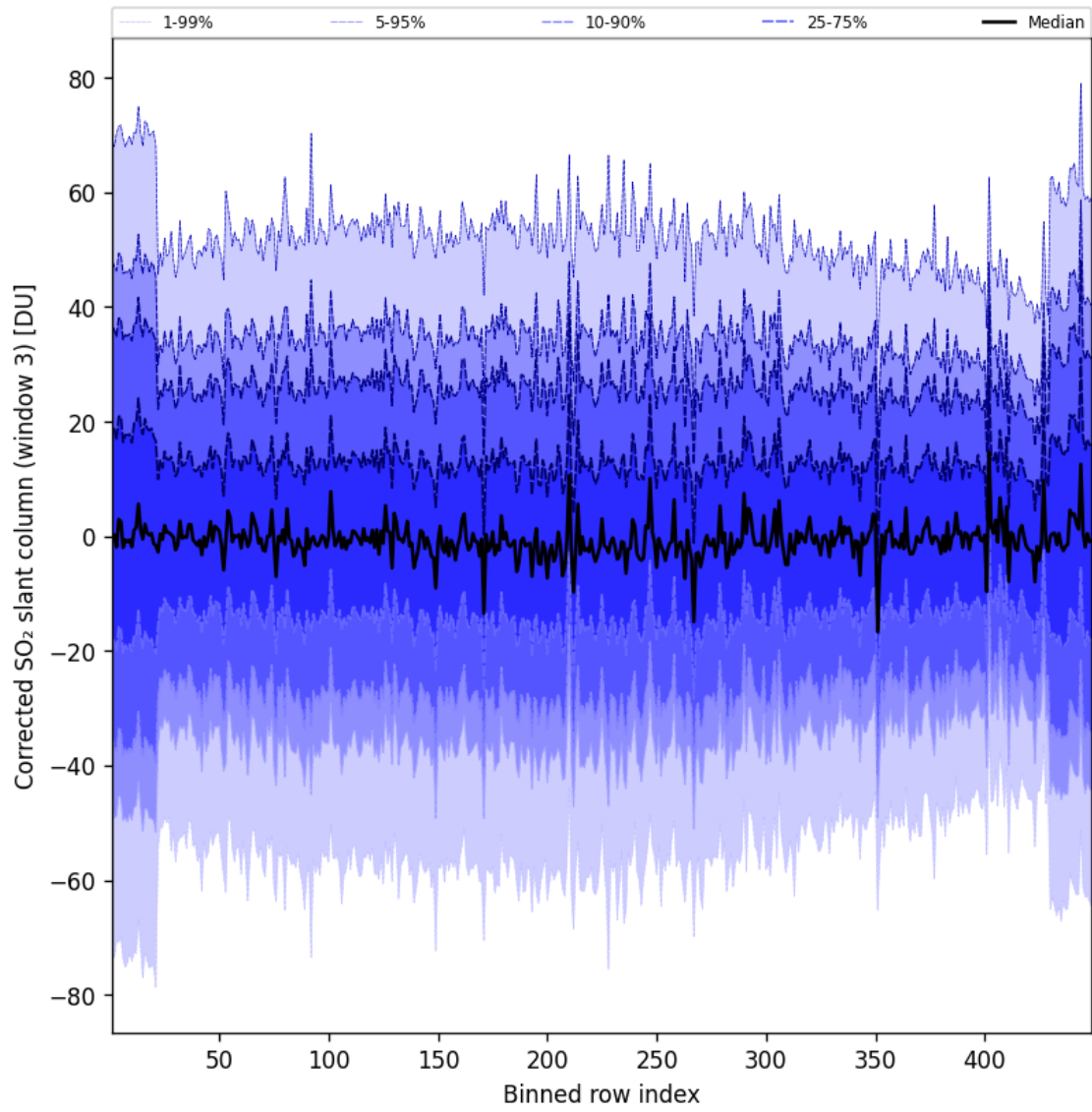


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-01-14 to 2025-01-15

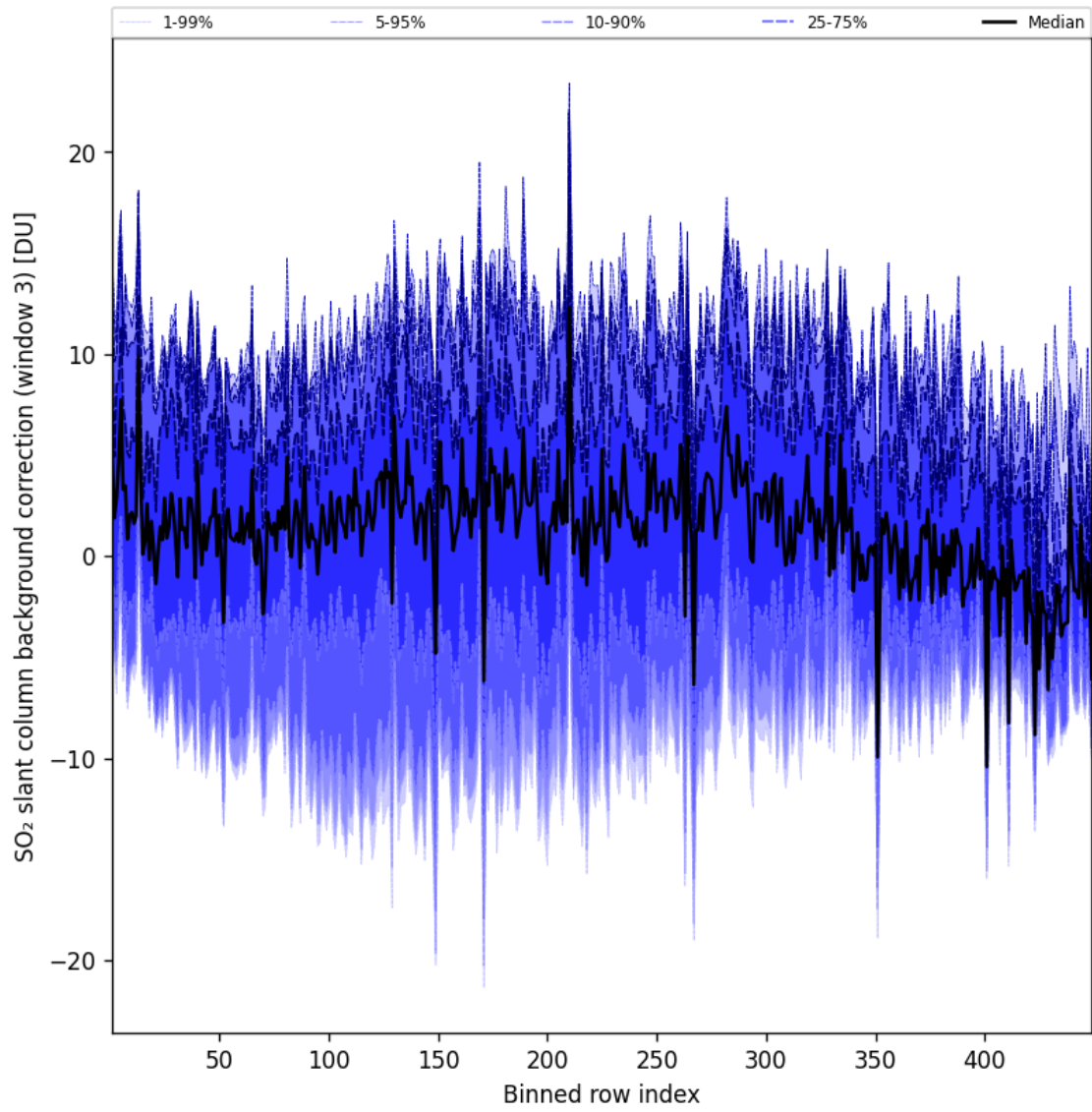


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-01-14 to 2025-01-15

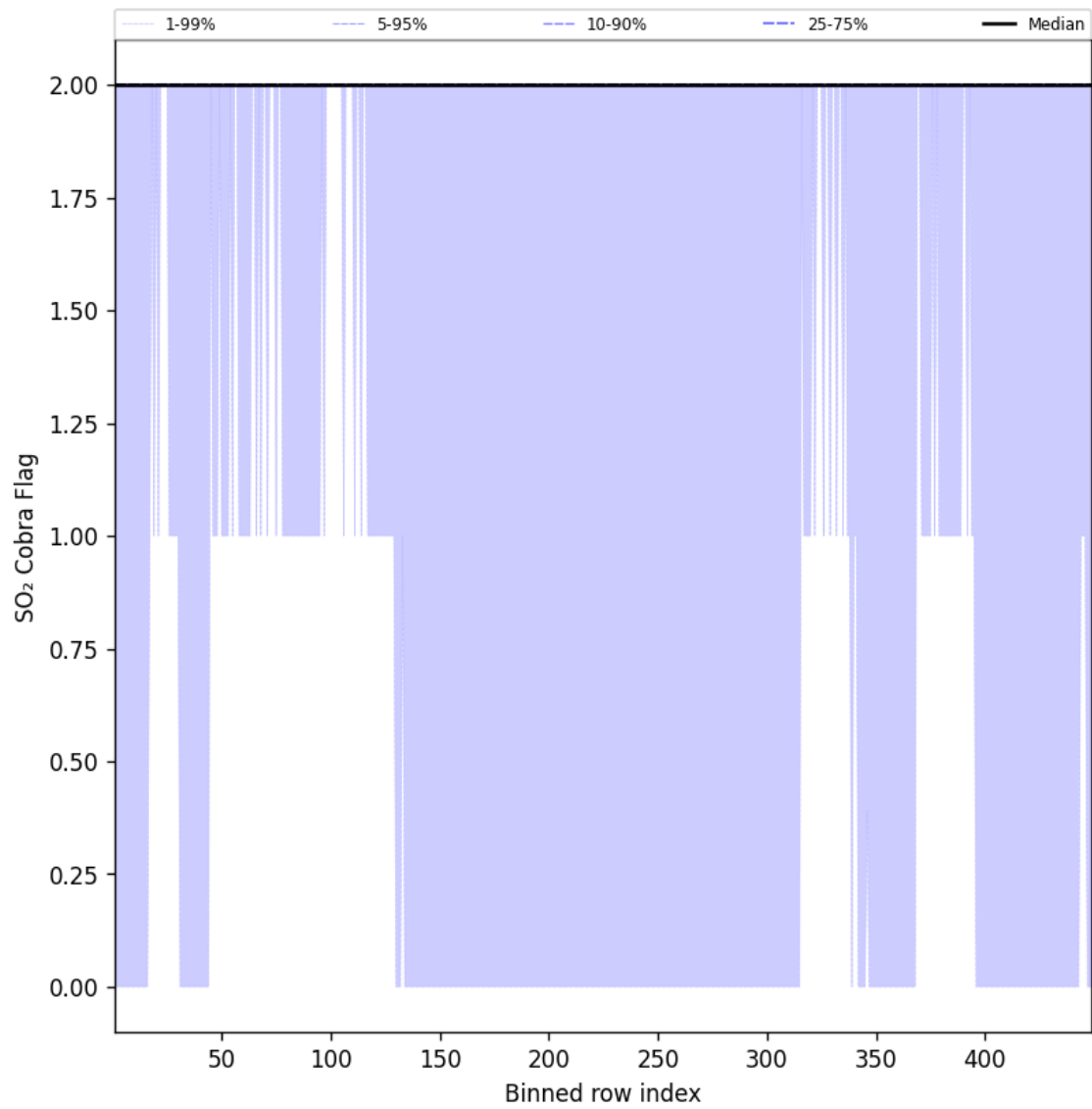


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-01-14 to 2025-01-15

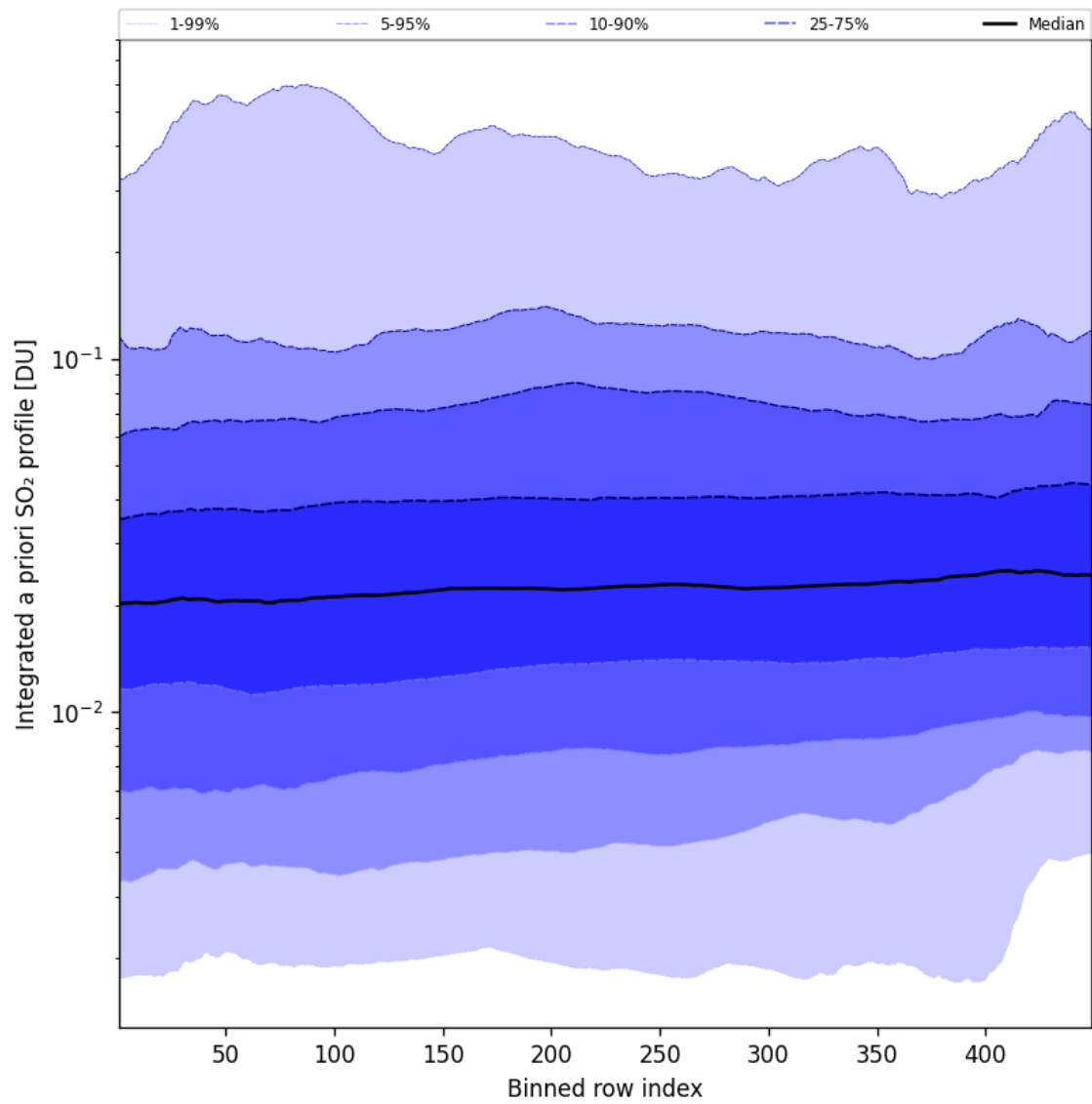


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-01-14 to 2025-01-15

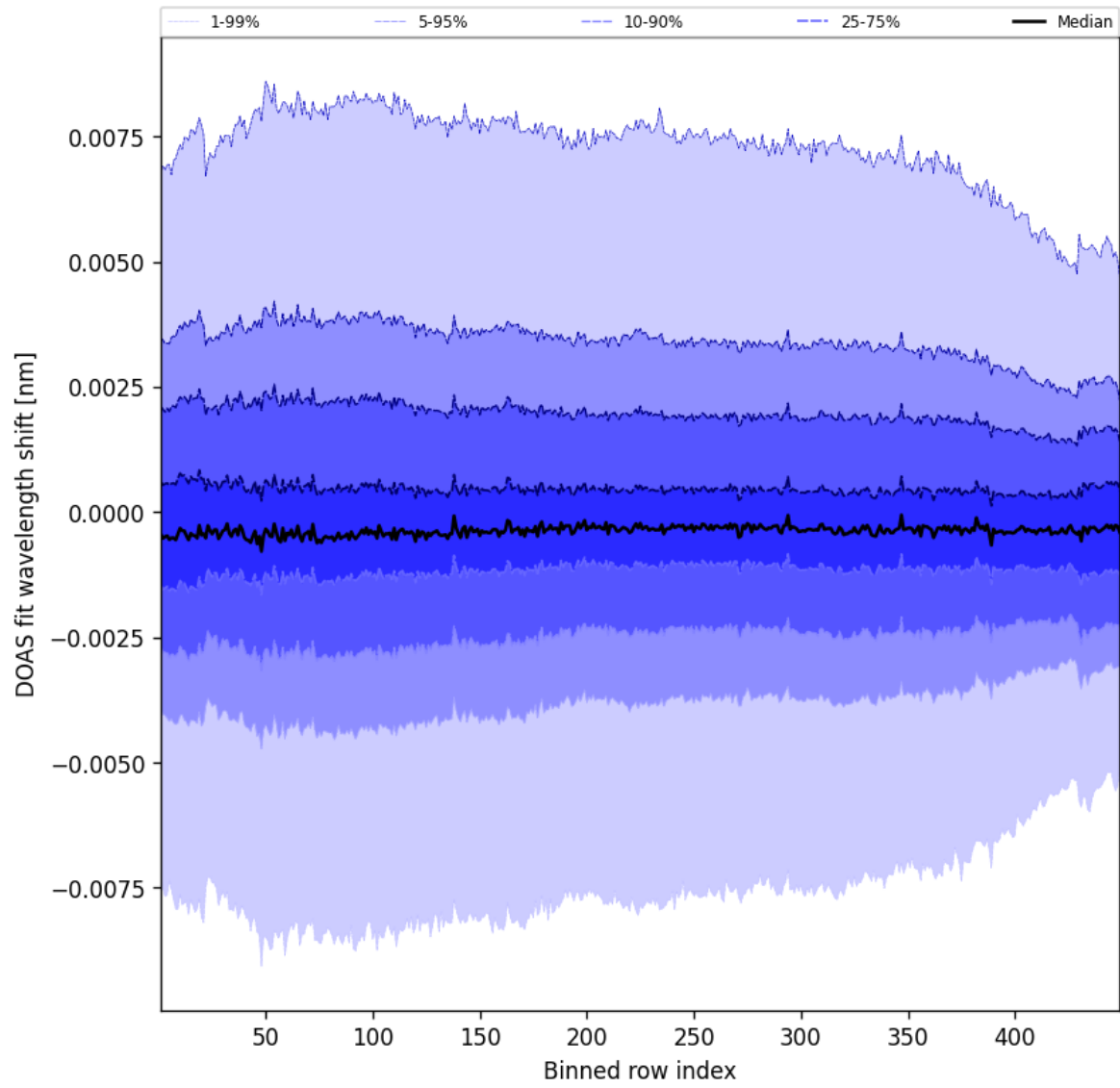


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-01-14 to 2025-01-15

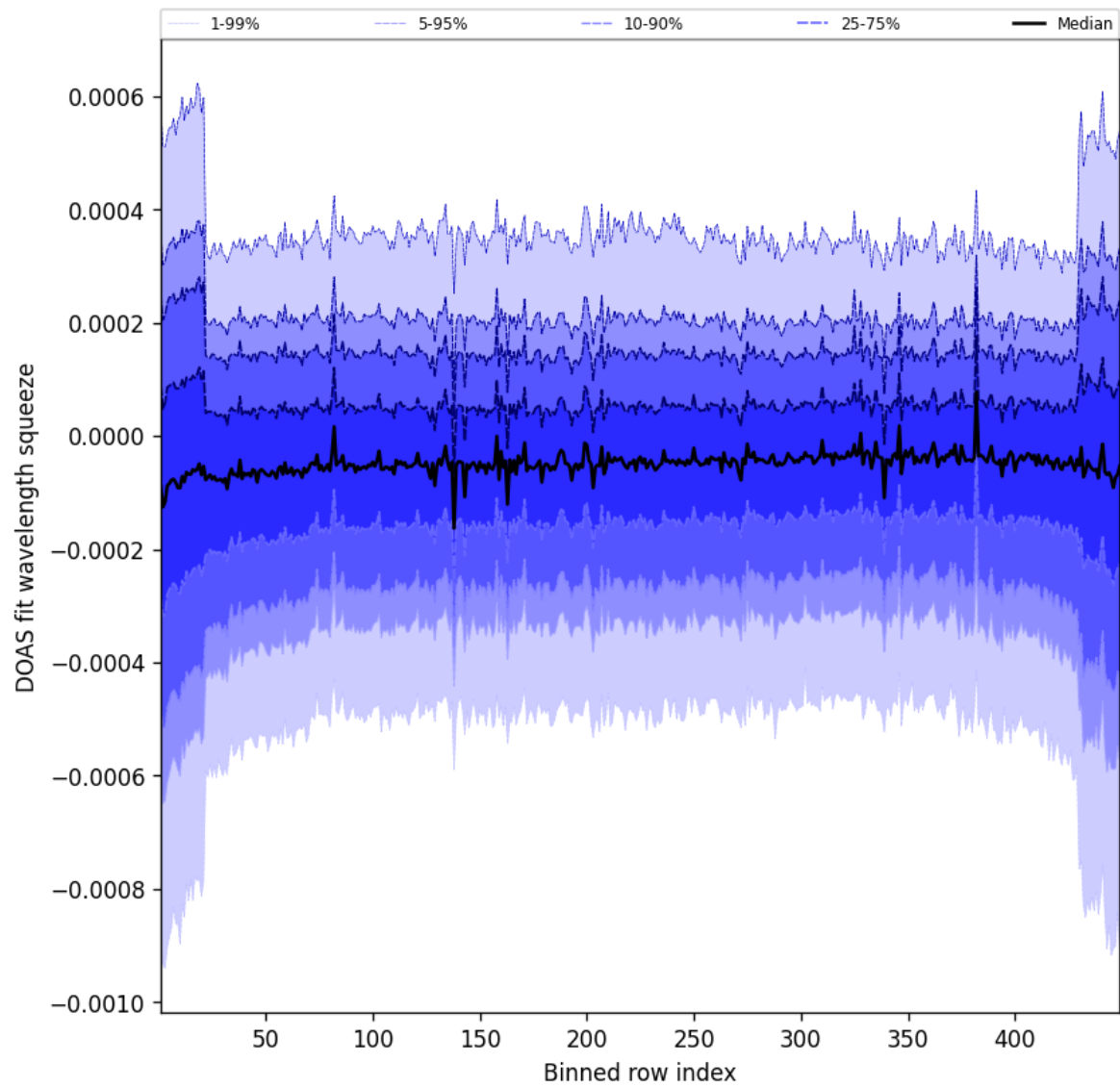


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-01-14 to 2025-01-15

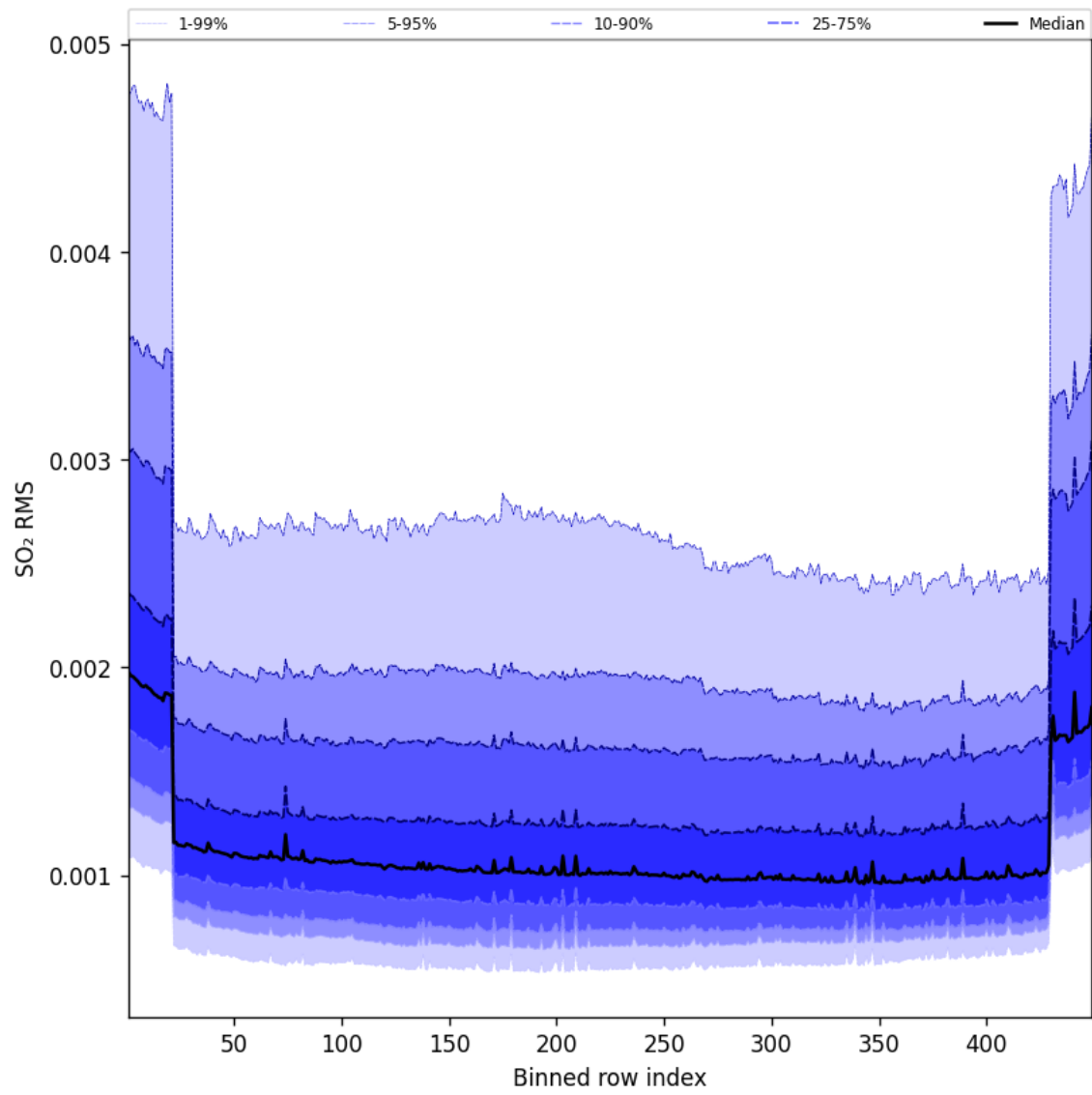


Figure 106: Along track statistics of “SO₂ RMS” for 2025-01-14 to 2025-01-15

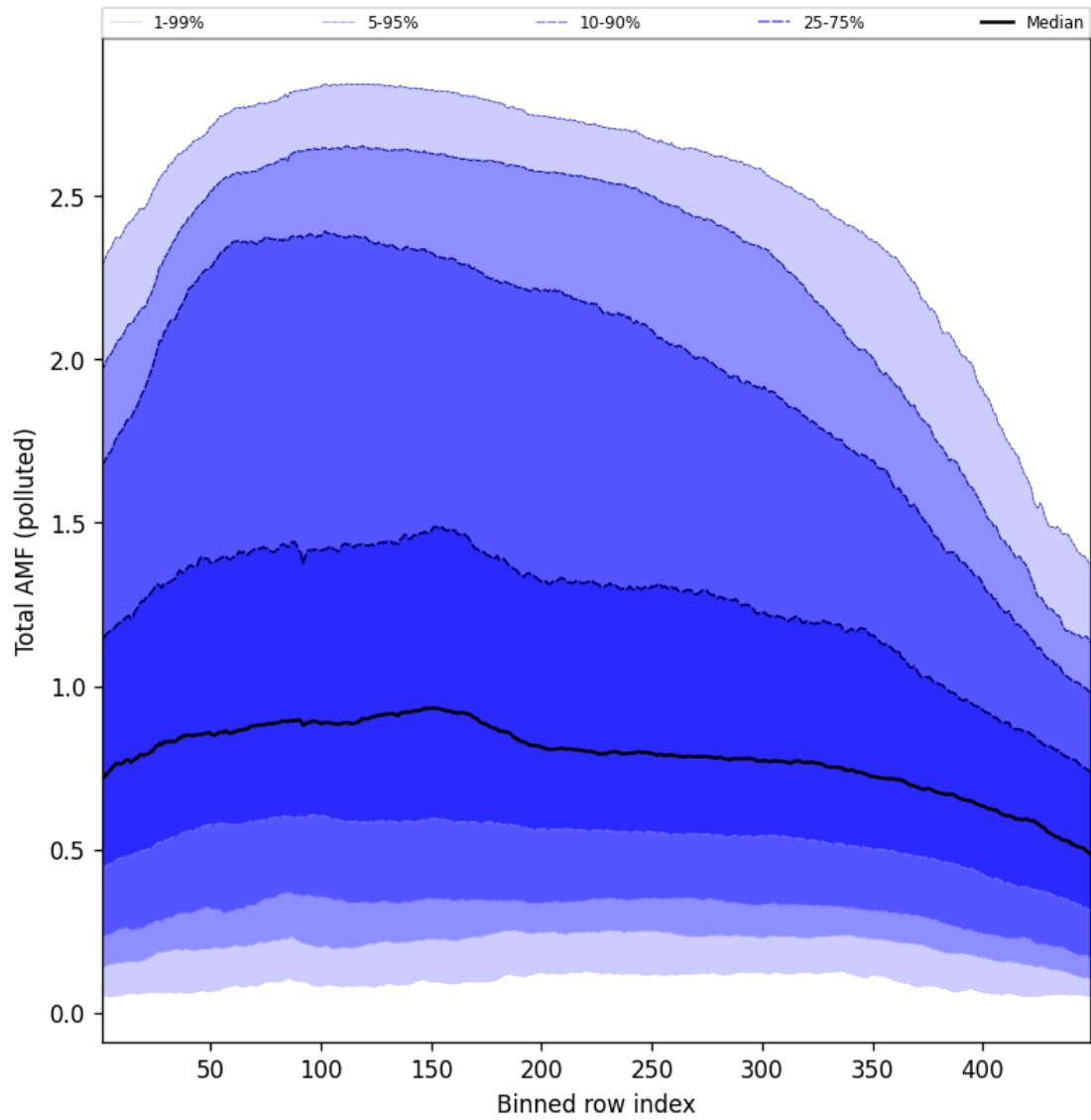


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-01-14 to 2025-01-15

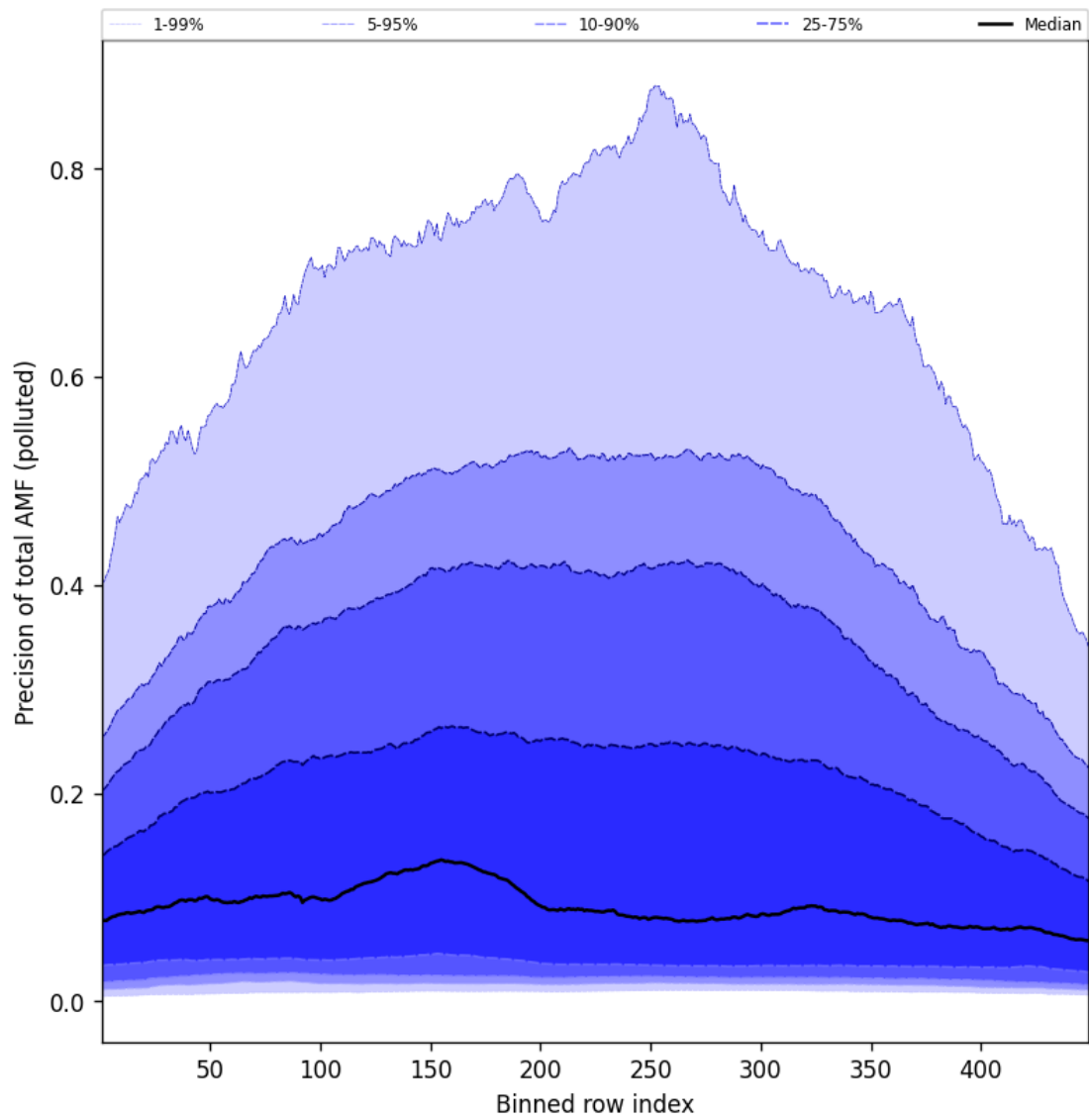


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-01-14 to 2025-01-15

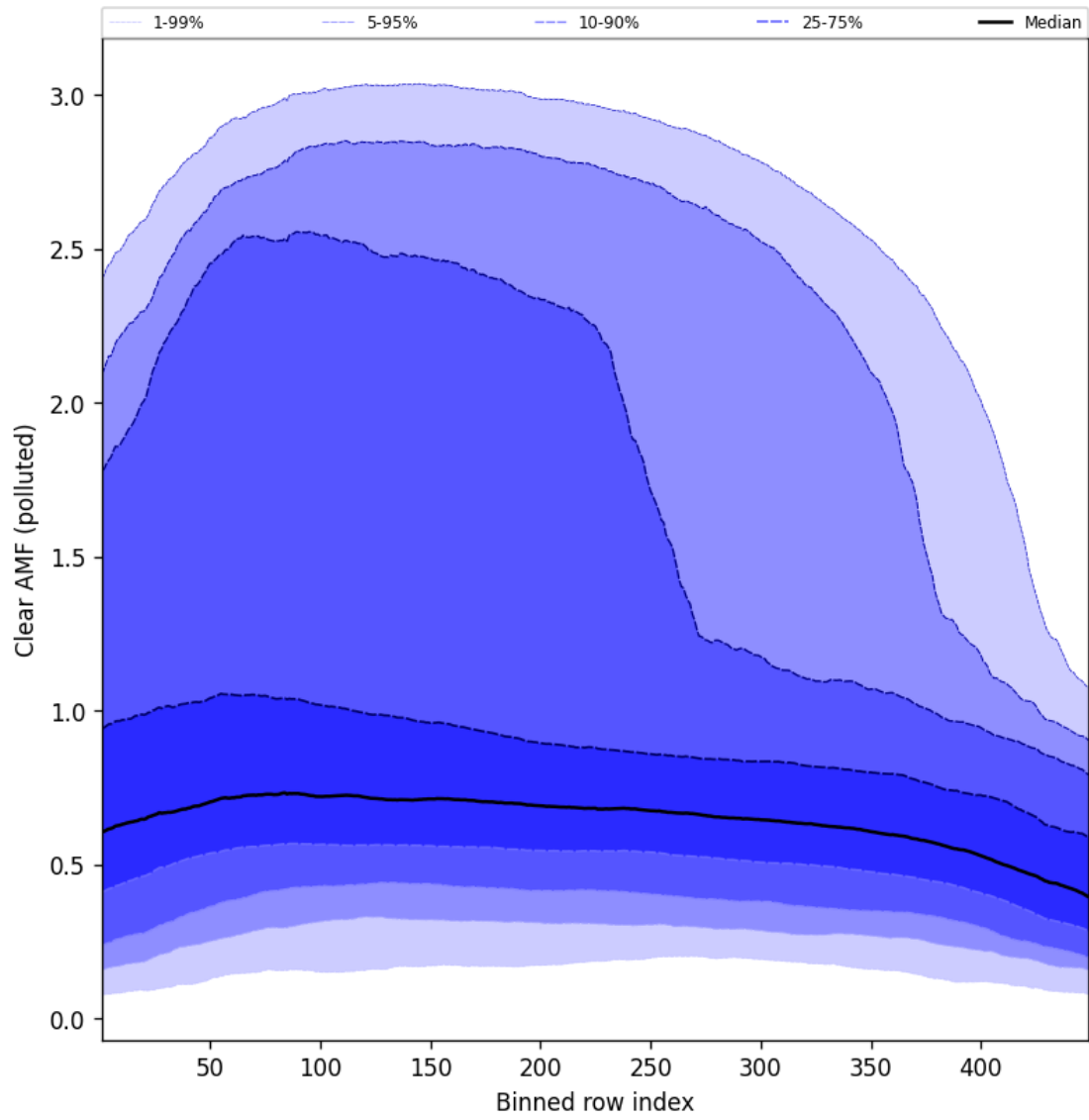


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-01-14 to 2025-01-15

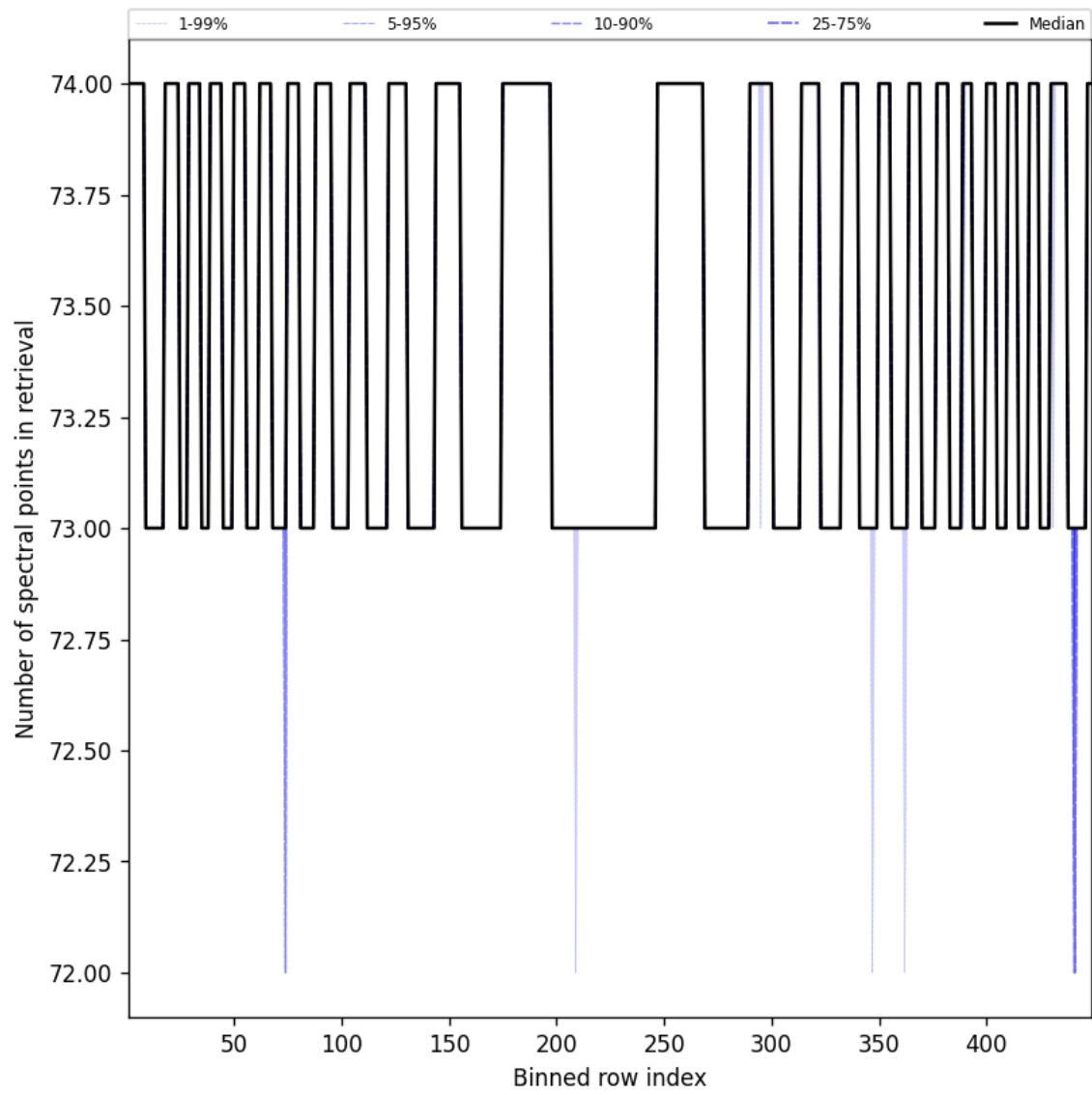


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-01-14 to 2025-01-15

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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