

PyCAMA report generated by tropl2-proc

tropl2-proc

2025-09-29 (03:31)

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]	0.669 $\pm$ 0.406	17073909	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.279 \pm 106.368) \times 10^{-2}$	17073909	0.263	0.474	1.075×10^{-2}	-90.1	479
sulfurdioxide total vertical column precision [DU]	0.565 $\pm$ 0.776	17073909	0.222	0.379	0.345	3.814×10^{-2}	175
sulfurdioxide slant column density corrected [DU]	$(1.913 \pm 39.086) \times 10^{-2}$	17073909	0.258	0.376	9.354×10^{-3}	-21.1	423
sulfurdioxide slant column density cobra [DU]	$(1.905 \pm 37.423) \times 10^{-2}$	17073909	0.258	0.376	9.354×10^{-3}	-21.1	41.4
sulfurdioxide slant column density cobra precision [DU]	0.305 $\pm$ 0.142	17073909	0.213	0.146	0.263	7.769×10^{-2}	44.2
sulfurdioxide slant column density window1 [DU]	0.177 $\pm$ 0.704	17073909	0.175	0.754	0.187	-98.1	65.7
sulfurdioxide slant column density window1 precision [DU]	0.305 $\pm$ 0.142	17073909	0.213	0.146	0.263	7.769×10^{-2}	44.2
sulfurdioxide slant column density corrected win1 [DU]	$(1.979 \pm 69.825) \times 10^{-2}$	17073909	-2.500×10^{-2}	0.743	-5.442×10^{-4}	-98.1	65.4
background so2 slant column offset window1 [DU]	-0.157 ± 0.162	17073909	-0.220	0.152	-0.183	-1.50	3.96
sulfurdioxide slant column density window2 [DU]	1.51 $\pm$ 9.35	17073909	1.25	11.8	1.27	-1.536×10^3	984
sulfurdioxide slant column density window2 precision [DU]	8.39 $\pm$ 2.33	17073909	7.43	2.70	8.04	2.17	616
sulfurdioxide slant column density corrected win2 [DU]	-1.34 ± 9.11	17073909	-1.75	11.5	-1.36	-1.537×10^3	983
background so2 slant column offset window2 [DU]	-2.85 ± 2.41	17073909	-0.750	3.61	-2.17	-14.6	5.29
sulfurdioxide slant column density window3 [DU]	-9.89 ± 24.88	17073909	-9.52	31.2	-9.62	-1.087×10^3	545
sulfurdioxide slant column density window3 precision [DU]	29.0 $\pm$ 13.4	17073909	23.7	10.3	25.6	9.71	363
sulfurdioxide slant column density corrected win3 [DU]	2.63 $\pm$ 24.24	17073909	2.80	30.4	2.83	-1.072×10^3	553
background so2 slant column offset window3 [DU]	12.5 $\pm$ 6.2	17073909	7.28	9.91	12.0	-14.2	42.8
sulfurdioxide slant column cobra flag [1]	1.98 $\pm$ 0.21	17073909	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.230 \pm 7.131) \times 10^{-2}$	17073909	1.217×10^{-2}	2.172×10^{-2}	1.304×10^{-2}	2.459×10^{-4}	2.48
fitted radiance shift [nm]	$(-4.477 \pm 26.494) \times 10^{-4}$	17073909	-5.000×10^{-4}	1.883×10^{-3}	-4.187×10^{-4}	-5.515×10^{-2}	6.048×10^{-2}
fitted radiance squeeze [1]	$(-1.322 \pm 19.879) \times 10^{-5}$	17073909	1.000×10^{-5}	2.136×10^{-4}	-9.410×10^{-7}	-1.583×10^{-2}	1.514×10^{-2}
fitted root mean square [1]	$(1.330 \pm 0.577) \times 10^{-3}$	17073909	9.750×10^{-4}	5.731×10^{-4}	1.166×10^{-3}	3.078×10^{-4}	7.322×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.856 $\pm$ 0.448	17073909	0.620	0.555	0.794	5.000×10^{-2}	2.88
sulfurdioxide total air mass factor polluted precision [1]	0.103 $\pm$ 0.102	17073909	3.500×10^{-2}	0.103	6.745×10^{-2}	2.671×10^{-3}	1.96
sulfurdioxide clear air mass factor polluted [1]	0.728 $\pm$ 0.302	17073909	0.620	0.377	0.697	4.911×10^{-2}	3.18
number of spectral points in retrieval [1]	73.4 $\pm$ 0.5	17073909	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	5.000×10^{-2}	0.120	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.62	-0.953	-0.574	-0.382	-0.222	0.252	0.425	0.639	1.08	3.03
sulfurdioxide total vertical column precision [DU]	9.672×10^{-2}	0.132	0.161	0.189	0.225	0.604	0.805	1.06	1.64	4.06
sulfurdioxide slant column density corrected [DU]	-0.894	-0.513	-0.369	-0.275	-0.177	0.199	0.303	0.406	0.570	1.07
sulfurdioxide slant column density cobra [DU]	-0.894	-0.513	-0.369	-0.275	-0.177	0.199	0.303	0.406	0.570	1.07
sulfurdioxide slant column density cobra precision [DU]	0.143	0.170	0.184	0.196	0.212	0.358	0.417	0.473	0.565	0.825
sulfurdioxide slant column density window1 [DU]	-1.78	-0.913	-0.601	-0.400	-0.194	0.561	0.757	0.945	1.23	2.02
sulfurdioxide slant column density window1 precision [DU]	0.143	0.170	0.184	0.196	0.212	0.358	0.417	0.473	0.565	0.825
sulfurdioxide slant column density corrected win1 [DU]	-1.73	-1.01	-0.737	-0.556	-0.366	0.377	0.584	0.789	1.11	2.03
background so2 slant column offset window1 [DU]	-0.445	-0.341	-0.310	-0.281	-0.253	-0.101	-4.377×10^{-2}	2.672×10^{-2}	0.136	0.371
sulfurdioxide slant column density window2 [DU]	-20.0	-13.2	-9.86	-7.36	-4.53	7.29	10.4	13.2	17.1	25.3
sulfurdioxide slant column density window2 precision [DU]	4.44	5.37	5.91	6.34	6.85	9.56	10.5	11.3	12.6	15.2
sulfurdioxide slant column density corrected win2 [DU]	-23.2	-16.0	-12.6	-9.99	-7.12	4.40	7.29	9.90	13.4	20.9
background so2 slant column offset window2 [DU]	-8.69	-7.35	-6.47	-5.66	-4.59	-0.974	-0.667	-0.430	-0.111	1.06
sulfurdioxide slant column density window3 [DU]	-73.3	-51.1	-40.7	-33.3	-25.3	5.95	13.8	20.9	30.4	49.3
sulfurdioxide slant column density window3 precision [DU]	14.2	16.8	18.5	19.9	21.6	31.9	36.3	41.9	53.7	86.0
sulfurdioxide slant column density corrected win3 [DU]	-58.8	-37.4	-27.4	-20.2	-12.4	18.0	25.7	32.6	41.9	60.7
background so2 slant column offset window3 [DU]	-0.408	4.20	5.38	6.30	7.45	17.4	19.2	20.8	22.8	25.8
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]	1.002×10^{-3}	2.398×10^{-3}	3.386×10^{-3}	4.510×10^{-3}	6.494×10^{-3}	2.821×10^{-2}	4.713×10^{-2}	7.066×10^{-2}	0.121	0.331
fitted radiance shift [nm]	-8.319×10^{-3}	-4.362×10^{-3}	-2.991×10^{-3}	-2.170×10^{-3}	-1.424×10^{-3}	4.588×10^{-4}	1.145×10^{-3}	2.017×10^{-3}	3.536×10^{-3}	7.831×10^{-3}
fitted radiance squeeze [1]	-6.420×10^{-4}	-3.375×10^{-4}	-2.343×10^{-4}	-1.718×10^{-4}	-1.104×10^{-4}	1.032×10^{-4}	1.561×10^{-4}	2.046×10^{-4}	2.726×10^{-4}	4.246×10^{-4}
fitted root mean square [1]	6.055×10^{-4}	7.456×10^{-4}	8.226×10^{-4}	8.831×10^{-4}	9.592×10^{-4}	1.532×10^{-3}	1.795×10^{-3}	2.054×10^{-3}	2.436×10^{-3}	3.419×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.731×10^{-2}	0.223	0.346	0.435	0.540	1.09	1.29	1.48	1.72	2.16
sulfurdioxide total air mass factor polluted precision [1]	9.148×10^{-3}	1.754×10^{-2}	2.350×10^{-2}	2.879×10^{-2}	3.649×10^{-2}	0.140	0.178	0.217	0.283	0.486
sulfurdioxide clear air mass factor polluted [1]	0.200	0.310	0.384	0.443	0.521	0.898	0.993	1.08	1.22	1.77
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]	0.678 ± 0.409	8794486	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.986 \pm 116.630) \times 10^{-2}$	8794486	0.499	1.099×10^{-2}	-90.1	110	-0.235	0.264
sulfurdioxide total vertical column precision [DU]	0.622 ± 0.879	8794486	0.413	0.354	4.711×10^{-2}	175	0.233	0.646
sulfurdioxide slant column density corrected [DU]	$(1.561 \pm 34.315) \times 10^{-2}$	8794486	0.363	8.733×10^{-3}	-8.15	57.2	-0.171	0.192
sulfurdioxide slant column density cobra [DU]	$(1.559 \pm 34.166) \times 10^{-2}$	8794486	0.363	8.733×10^{-3}	-8.15	13.9	-0.171	0.192
sulfurdioxide slant column density cobra precision [DU]	0.289 ± 0.121	8794486	0.131	0.255	8.748×10^{-2}	15.2	0.208	0.340
sulfurdioxide slant column density window1 [DU]	0.196 ± 0.650	8794486	0.731	0.201	-13.7	30.7	-0.168	0.564
sulfurdioxide slant column density window1 precision [DU]	0.289 ± 0.121	8794486	0.131	0.255	8.748×10^{-2}	15.2	0.208	0.340
sulfurdioxide slant column density corrected win1 [DU]	$(1.447 \pm 64.391) \times 10^{-2}$	8794486	0.720	-1.302×10^{-3}	-13.8	30.5	-0.356	0.364
background so2 slant column offset window1 [DU]	-0.181 ± 0.128	8794486	0.141	-0.197	-0.701	2.36	-0.260	-0.119
sulfurdioxide slant column density window2 [DU]	1.17 ± 9.24	8794486	11.7	0.957	-955	193	-4.81	6.90
sulfurdioxide slant column density window2 precision [DU]	8.41 ± 2.32	8794486	2.81	8.07	2.17	237	6.83	9.64
sulfurdioxide slant column density corrected win2 [DU]	-1.22 ± 9.03	8794486	11.5	-1.22	-955	190	-6.95	4.51
background so2 slant column offset window2 [DU]	-2.39 ± 2.08	8794486	2.57	-1.78	-14.6	5.29	-3.51	-0.936
sulfurdioxide slant column density window3 [DU]	-9.85 ± 25.71	8794486	32.0	-9.40	-208	545	-25.5	6.49
sulfurdioxide slant column density window3 precision [DU]	29.4 ± 13.7	8794486	11.0	26.0	9.71	363	21.7	32.7
sulfurdioxide slant column density corrected win3 [DU]	2.26 ± 24.97	8794486	31.3	2.53	-198	553	-13.1	18.1
background so2 slant column offset window3 [DU]	12.1 ± 6.4	8794486	10.5	11.1	-14.2	30.2	6.87	17.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	8794486	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.652 \pm 8.906) \times 10^{-2}$	8794486	3.707×10^{-2}	2.050×10^{-2}	2.459×10^{-4}	2.48	1.101×10^{-2}	4.808×10^{-2}
fitted radiance shift [nm]	$(-1.208 \pm 27.200) \times 10^{-4}$	8794486	1.709×10^{-3}	-1.578×10^{-4}	-4.281×10^{-2}	6.048×10^{-2}	-9.942×10^{-4}	7.144×10^{-4}
fitted radiance squeeze [1]	$(-4.960 \pm 168.145) \times 10^{-6}$	8794486	1.992×10^{-4}	-2.249×10^{-6}	-1.433×10^{-2}	1.217×10^{-2}	-1.029×10^{-4}	9.626×10^{-5}
fitted root mean square [1]	$(1.275 \pm 0.494) \times 10^{-3}$	8794486	5.451×10^{-4}	1.145×10^{-3}	3.078×10^{-4}	1.944×10^{-2}	9.415×10^{-4}	1.487×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.785 ± 0.423	8794486	0.531	0.745	5.000×10^{-2}	2.86	0.480	1.01
sulfurdioxide total air mass factor polluted precision [1]	0.100 ± 0.115	8794486	9.740×10^{-2}	5.623×10^{-2}	2.671×10^{-3}	1.96	3.317×10^{-2}	0.131
sulfurdioxide clear air mass factor polluted [1]	0.705 ± 0.293	8794486	0.430	0.695	4.911×10^{-2}	2.74	0.478	0.908
number of spectral points in retrieval [1]	73.5 ± 0.5	8794486	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.660 ± 0.402	8279423	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.591 \pm 94.252) \times 10^{-2}$	8279423	0.449	1.051×10^{-2}	-57.6	479	-0.209	0.240
sulfurdioxide total vertical column precision [DU]	0.505 ± 0.644	8279423	0.352	0.336	3.814×10^{-2}	116	0.214	0.566
sulfurdioxide slant column density corrected [DU]	$(2.288 \pm 43.584) \times 10^{-2}$	8279423	0.392	1.005×10^{-2}	-21.1	423	-0.184	0.208
sulfurdioxide slant column density cobra [DU]	$(2.273 \pm 40.594) \times 10^{-2}$	8279423	0.392	1.005×10^{-2}	-21.1	41.4	-0.184	0.208
sulfurdioxide slant column density cobra precision [DU]	0.321 ± 0.159	8279423	0.165	0.271	7.769×10^{-2}	44.2	0.217	0.382
sulfurdioxide slant column density window1 [DU]	0.157 ± 0.757	8279423	0.779	0.172	-98.1	65.7	-0.222	0.557
sulfurdioxide slant column density window1 precision [DU]	0.321 ± 0.159	8279423	0.165	0.271	7.769×10^{-2}	44.2	0.217	0.382
sulfurdioxide slant column density corrected win1 [DU]	$(2.544 \pm 75.164) \times 10^{-2}$	8279423	0.769	3.215×10^{-4}	-98.1	65.4	-0.377	0.392
background so2 slant column offset window1 [DU]	-0.132 ± 0.188	8279423	0.166	-0.167	-1.50	3.96	-0.243	-7.670×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.88 ± 9.46	8279423	11.9	1.62	-1.536×10^3	984	-4.23	7.69
sulfurdioxide slant column density window2 precision [DU]	8.36 ± 2.34	8279423	2.59	8.00	2.41	616	6.87	9.46
sulfurdioxide slant column density corrected win2 [DU]	-1.47 ± 9.19	8279423	11.6	-1.52	-1.537×10^3	983	-7.29	4.29
background so2 slant column offset window2 [DU]	-3.35 ± 2.62	8279423	4.44	-2.95	-14.5	5.27	-5.47	-1.03
sulfurdioxide slant column density window3 [DU]	-9.93 ± 23.97	8279423	30.5	-9.84	-1.087×10^3	437	-25.1	5.40
sulfurdioxide slant column density window3 precision [DU]	28.6 ± 13.0	8279423	9.52	25.2	9.86	303	21.5	31.0
sulfurdioxide slant column density corrected win3 [DU]	3.02 ± 23.43	8279423	29.6	3.12	-1.072×10^3	450	-11.7	17.9
background so2 slant column offset window3 [DU]	13.0 ± 5.9	8279423	9.30	12.7	-12.9	42.8	8.11	17.4
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	8279423	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.719 \pm 4.024) \times 10^{-2}$	8279423	1.010×10^{-2}	8.686×10^{-3}	4.161×10^{-4}	1.23	4.542×10^{-3}	1.464×10^{-2}
fitted radiance shift [nm]	$(-7.949 \pm 25.264) \times 10^{-4}$	8279423	1.945×10^{-3}	-7.304×10^{-4}	-5.515×10^{-2}	3.804×10^{-2}	-1.814×10^{-3}	1.310×10^{-4}
fitted radiance squeeze [1]	$(-2.200 \pm 22.652) \times 10^{-5}$	8279423	2.310×10^{-4}	6.598×10^{-7}	-1.583×10^{-2}	1.514×10^{-2}	-1.200×10^{-4}	1.110×10^{-4}
fitted root mean square [1]	$(1.389 \pm 0.648) \times 10^{-3}$	8279423	6.118×10^{-4}	1.189×10^{-3}	3.633×10^{-4}	7.322×10^{-2}	9.784×10^{-4}	1.590×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.932 ± 0.461	8279423	0.601	0.847	5.000×10^{-2}	2.88	0.598	1.20
sulfurdioxide total air mass factor polluted precision [1]	0.105 ± 0.085	8279423	0.107	8.237×10^{-2}	3.713×10^{-3}	1.72	4.013×10^{-2}	0.147
sulfurdioxide clear air mass factor polluted [1]	0.753 ± 0.309	8279423	0.329	0.698	8.161×10^{-2}	3.18	0.557	0.887
number of spectral points in retrieval [1]	73.4 ± 0.5	8279423	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]	0.670 ± 0.402	11962988	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.028 \pm 94.643) \times 10^{-2}$	11962988	0.441	1.024×10^{-2}	-58.0	479	-0.207	0.234
sulfurdioxide total vertical column precision [DU]	0.510 ± 0.673	11962988	0.335	0.316	4.189×10^{-2}	45.5	0.214	0.549
sulfurdioxide slant column density corrected [DU]	$(1.908 \pm 39.392) \times 10^{-2}$	11962988	0.368	9.243×10^{-3}	-17.4	423	-0.173	0.195
sulfurdioxide slant column density cobra [DU]	$(1.899 \pm 37.151) \times 10^{-2}$	11962988	0.368	9.243×10^{-3}	-17.4	36.2	-0.173	0.195
sulfurdioxide slant column density cobra precision [DU]	0.301 ± 0.147	11962988	0.146	0.253	7.769×10^{-2}	44.2	0.207	0.353
sulfurdioxide slant column density window1 [DU]	0.172 ± 0.701	11962988	0.738	0.185	-98.1	52.9	-0.189	0.549
sulfurdioxide slant column density window1 precision [DU]	0.301 ± 0.147	11962988	0.146	0.253	7.769×10^{-2}	44.2	0.207	0.353
sulfurdioxide slant column density corrected win1 [DU]	$(1.856 \pm 69.550) \times 10^{-2}$	11962988	0.727	-2.206×10^{-3}	-98.1	52.9	-0.360	0.367
background so2 slant column offset window1 [DU]	-0.153 ± 0.170	11962988	0.153	-0.183	-1.50	3.96	-0.252	-9.853×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.53 ± 9.12	11962988	11.6	1.28	-1.206×10^3	984	-4.39	7.16
sulfurdioxide slant column density window2 precision [DU]	8.15 ± 2.17	11962988	2.53	7.81	2.17	446	6.70	9.24
sulfurdioxide slant column density corrected win2 [DU]	-1.39 ± 8.87	11962988	11.3	-1.41	-1.208×10^3	983	-7.04	4.22
background so2 slant column offset window2 [DU]	-2.92 ± 2.48	11962988	3.86	-2.17	-14.5	5.29	-4.81	-0.953
sulfurdioxide slant column density window3 [DU]	-7.39 ± 23.98	11962988	30.4	-7.50	-669	437	-22.6	7.86
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 12.2	11962988	9.27	24.6	9.86	232	21.0	30.3
sulfurdioxide slant column density corrected win3 [DU]	4.92 ± 23.11	11962988	29.3	4.75	-654	450	-9.75	19.6
background so2 slant column offset window3 [DU]	12.3 ± 6.1	11962988	9.73	11.7	-14.2	42.8	7.37	17.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	11962988	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.830 \pm 3.565) \times 10^{-2}$	11962988	1.323×10^{-2}	1.112×10^{-2}	3.807×10^{-4}	2.37	5.659×10^{-3}	1.889×10^{-2}
fitted radiance shift [nm]	$(-5.345 \pm 24.735) \times 10^{-4}$	11962988	1.946×10^{-3}	-4.789×10^{-4}	-4.270×10^{-2}	3.854×10^{-2}	-1.546×10^{-3}	3.994×10^{-4}
fitted radiance squeeze [1]	$(-1.449 \pm 20.459) \times 10^{-5}$	11962988	2.118×10^{-4}	1.837×10^{-6}	-1.429×10^{-2}	1.514×10^{-2}	-1.073×10^{-4}	1.044×10^{-4}
fitted root mean square [1]	$(1.311 \pm 0.598) \times 10^{-3}$	11962988	5.561×10^{-4}	1.130×10^{-3}	3.078×10^{-4}	5.500×10^{-2}	9.382×10^{-4}	1.494×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.889 ± 0.437	11962988	0.532	0.835	5.000×10^{-2}	2.88	0.588	1.12
sulfurdioxide total air mass factor polluted precision [1]	$(9.978 \pm 8.418) \times 10^{-2}$	11962988	9.662×10^{-2}	7.167×10^{-2}	3.840×10^{-3}	1.57	4.034×10^{-2}	0.137
sulfurdioxide clear air mass factor polluted [1]	0.757 ± 0.287	11962988	0.352	0.727	8.204×10^{-2}	2.97	0.564	0.916
number of spectral points in retrieval [1]	73.4 ± 0.5	11962988	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.709 $\pm$ 0.405	3769503	0.740	1.000	0.0	1.000	0.260	1.000
sulfurdioxide total vertical column [DU]	$(3.192 \pm 116.905) \times 10^{-2}$	3769503	0.545	1.071×10^{-2}	-41.7	209	-0.257	0.288
sulfurdioxide total vertical column precision [DU]	0.637 $\pm$ 0.868	3769503	0.416	0.402	3.814×10^{-2}	116	0.265	0.681
sulfurdioxide slant column density corrected [DU]	$(1.792 \pm 36.866) \times 10^{-2}$	3769503	0.384	8.493×10^{-3}	-21.1	57.2	-0.182	0.202
sulfurdioxide slant column density cobra [DU]	$(1.786 \pm 36.500) \times 10^{-2}$	3769503	0.384	8.493×10^{-3}	-21.1	20.8	-0.182	0.202
sulfurdioxide slant column density cobra precision [DU]	0.302 $\pm$ 0.121	3769503	0.125	0.272	8.840×10^{-2}	27.3	0.223	0.348
sulfurdioxide slant column density window1 [DU]	0.201 $\pm$ 0.680	3769503	0.766	0.203	-47.7	51.3	-0.181	0.585
sulfurdioxide slant column density window1 precision [DU]	0.302 $\pm$ 0.121	3769503	0.125	0.272	8.840×10^{-2}	27.3	0.223	0.348
sulfurdioxide slant column density corrected win1 [DU]	$(1.851 \pm 67.395) \times 10^{-2}$	3769503	0.755	7.137×10^{-4}	-47.7	51.1	-0.371	0.385
background so2 slant column offset window1 [DU]	-0.182 $\pm$ 0.133	3769503	0.140	-0.197	-1.14	2.36	-0.263	-0.123
sulfurdioxide slant column density window2 [DU]	1.09 $\pm$ 9.74	3769503	12.3	0.917	-1.536×10^3	883	-5.14	7.11
sulfurdioxide slant column density window2 precision [DU]	8.84 $\pm$ 2.58	3769503	2.78	8.50	2.33	616	7.25	10.0
sulfurdioxide slant column density corrected win2 [DU]	-1.24 $\pm$ 9.54	3769503	12.0	-1.25	-1.537×10^3	881	-7.25	4.75
background so2 slant column offset window2 [DU]	-2.33 $\pm$ 2.03	3769503	2.47	-1.79	-14.6	5.29	-3.38	-0.912
sulfurdioxide slant column density window3 [DU]	-15.5 $\pm$ 25.7	3769503	32.4	-14.8	-1.087×10^3	278	-31.4	0.984
sulfurdioxide slant column density window3 precision [DU]	32.1 $\pm$ 16.0	3769503	11.0	27.9	10.4	326	23.6	34.6
sulfurdioxide slant column density corrected win3 [DU]	-3.51 $\pm$ 25.73	3769503	32.4	-2.96	-1.072×10^3	288	-19.5	12.9
background so2 slant column offset window3 [DU]	12.0 $\pm$ 6.1	3769503	9.62	11.0	-14.2	42.5	7.22	16.8
sulfurdioxide slant column cobra flag [1]	1.98 $\pm$ 0.19	3769503	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.702 \pm 11.439) \times 10^{-2}$	3769503	6.388×10^{-2}	2.929×10^{-2}	2.459×10^{-4}	2.42	1.147×10^{-2}	7.535×10^{-2}
fitted radiance shift [nm]	$(-2.477 \pm 31.294) \times 10^{-4}$	3769503	1.675×10^{-3}	-3.044×10^{-4}	-5.515×10^{-2}	4.593×10^{-2}	-1.114×10^{-3}	5.609×10^{-4}
fitted radiance squeeze [1]	$(-9.252 \pm 178.905) \times 10^{-6}$	3769503	2.111×10^{-4}	-6.757×10^{-6}	-1.583×10^{-2}	1.323×10^{-2}	-1.130×10^{-4}	9.812×10^{-5}
fitted root mean square [1]	$(1.320 \pm 0.490) \times 10^{-3}$	3769503	5.033×10^{-4}	1.208×10^{-3}	3.559×10^{-4}	7.322×10^{-2}	1.005×10^{-3}	1.508×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.777 $\pm$ 0.443	3769503	0.521	0.686	5.000×10^{-2}	2.87	0.469	0.989
sulfurdioxide total air mass factor polluted precision [1]	0.109 $\pm$ 0.135	3769503	0.115	5.008×10^{-2}	2.743×10^{-3}	1.94	2.918×10^{-2}	0.144
sulfurdioxide clear air mass factor polluted [1]	0.665 $\pm$ 0.312	3769503	0.389	0.617	4.977×10^{-2}	3.18	0.445	0.834
number of spectral points in retrieval [1]	73.4 $\pm$ 0.5	3769503	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

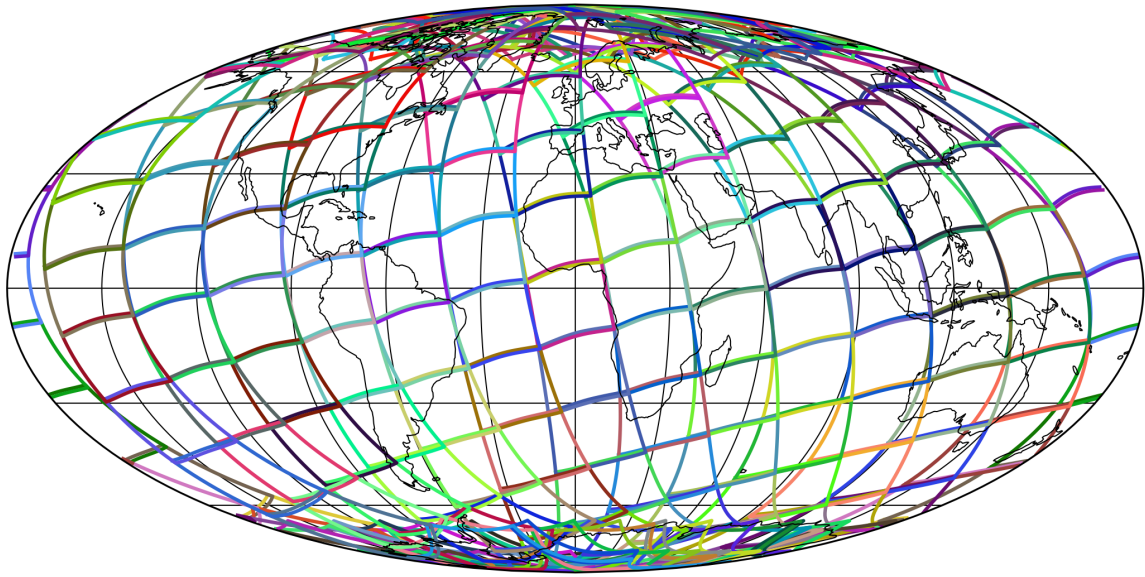


Figure 1: Outline of the granules.

4 Input data monitoring

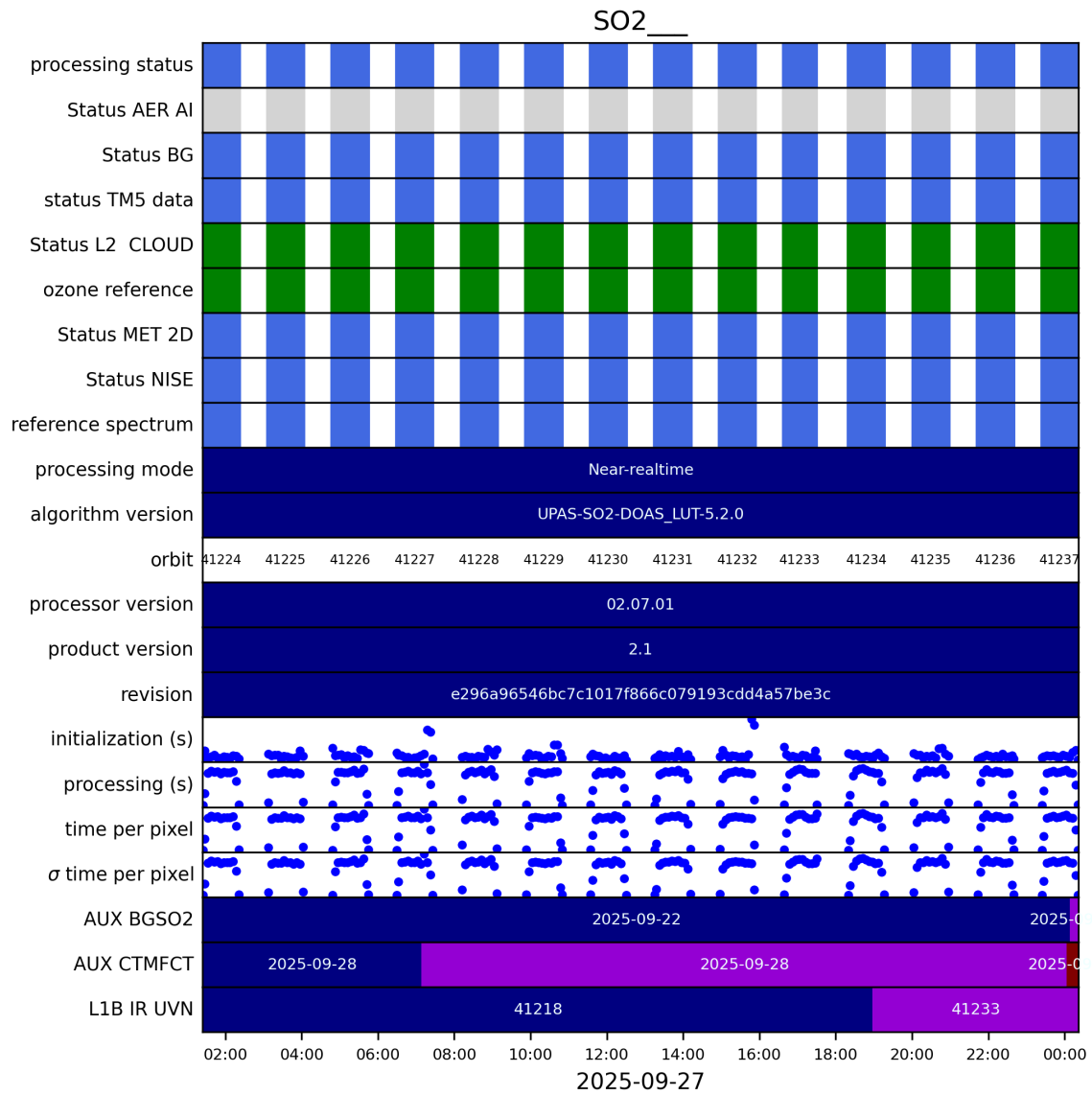


Figure 2: Input data per granule

5 Warnings and errors

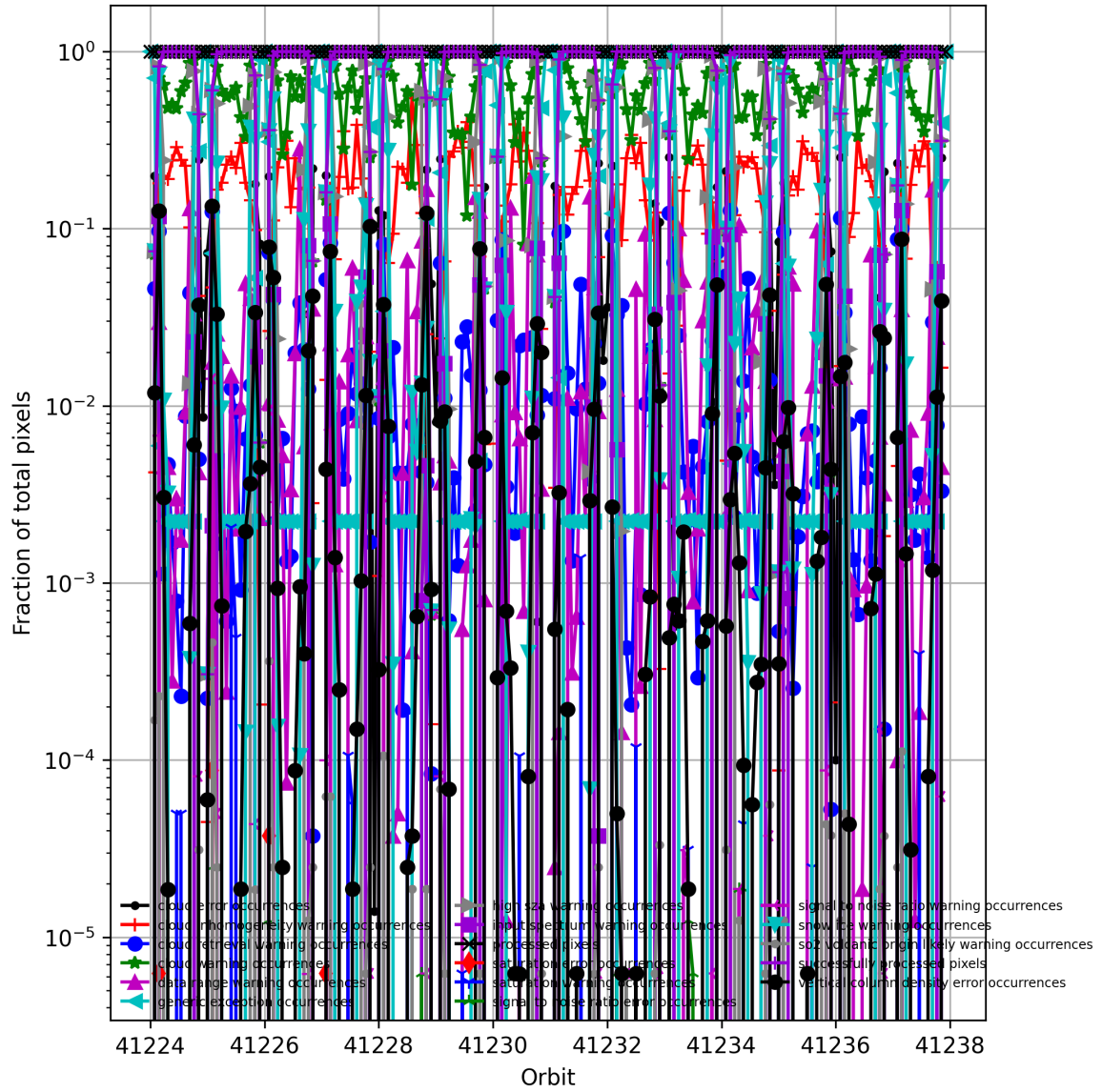


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

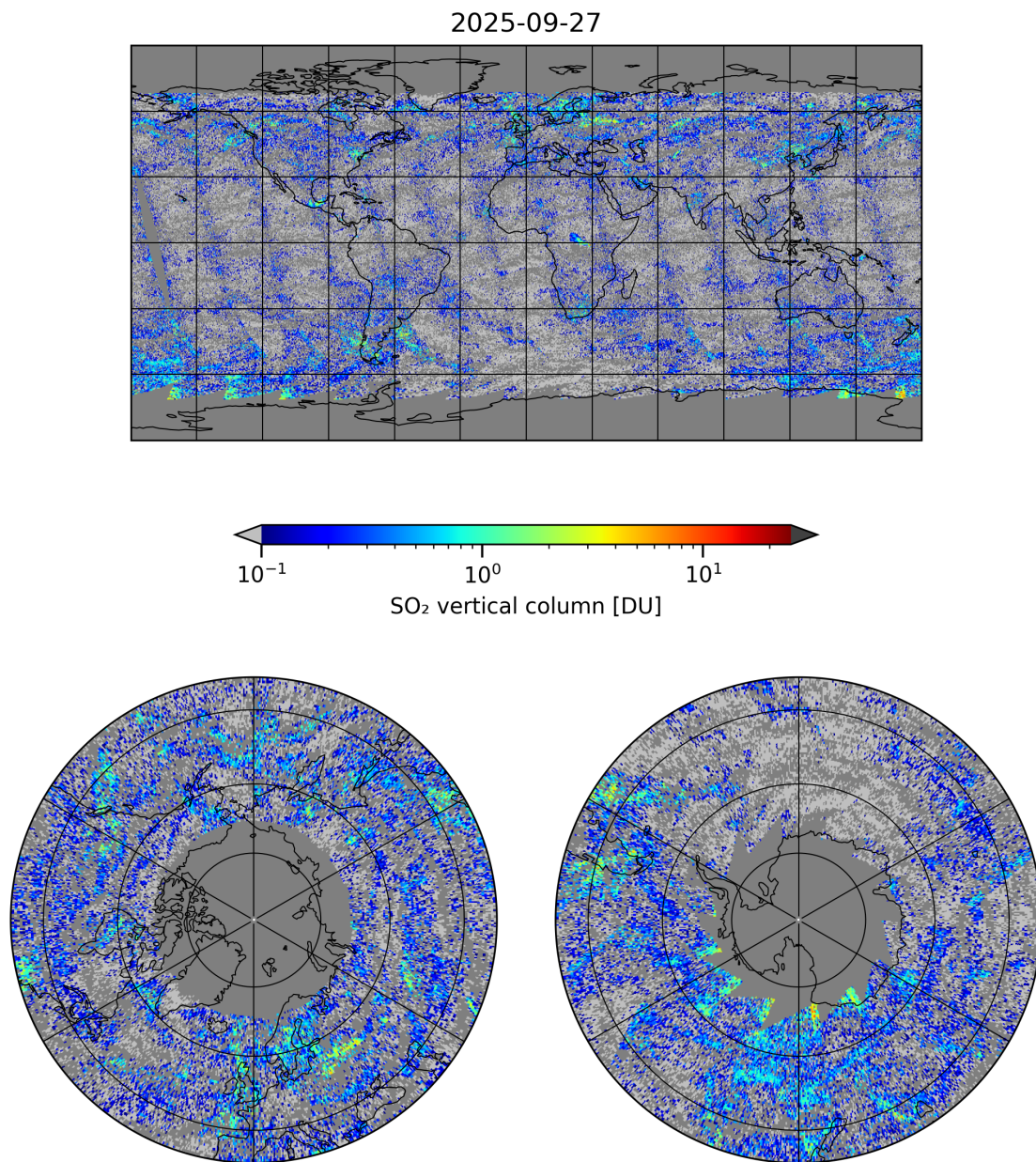


Figure 4: Map of “SO₂ vertical column” for 2025-09-27 to 2025-09-28

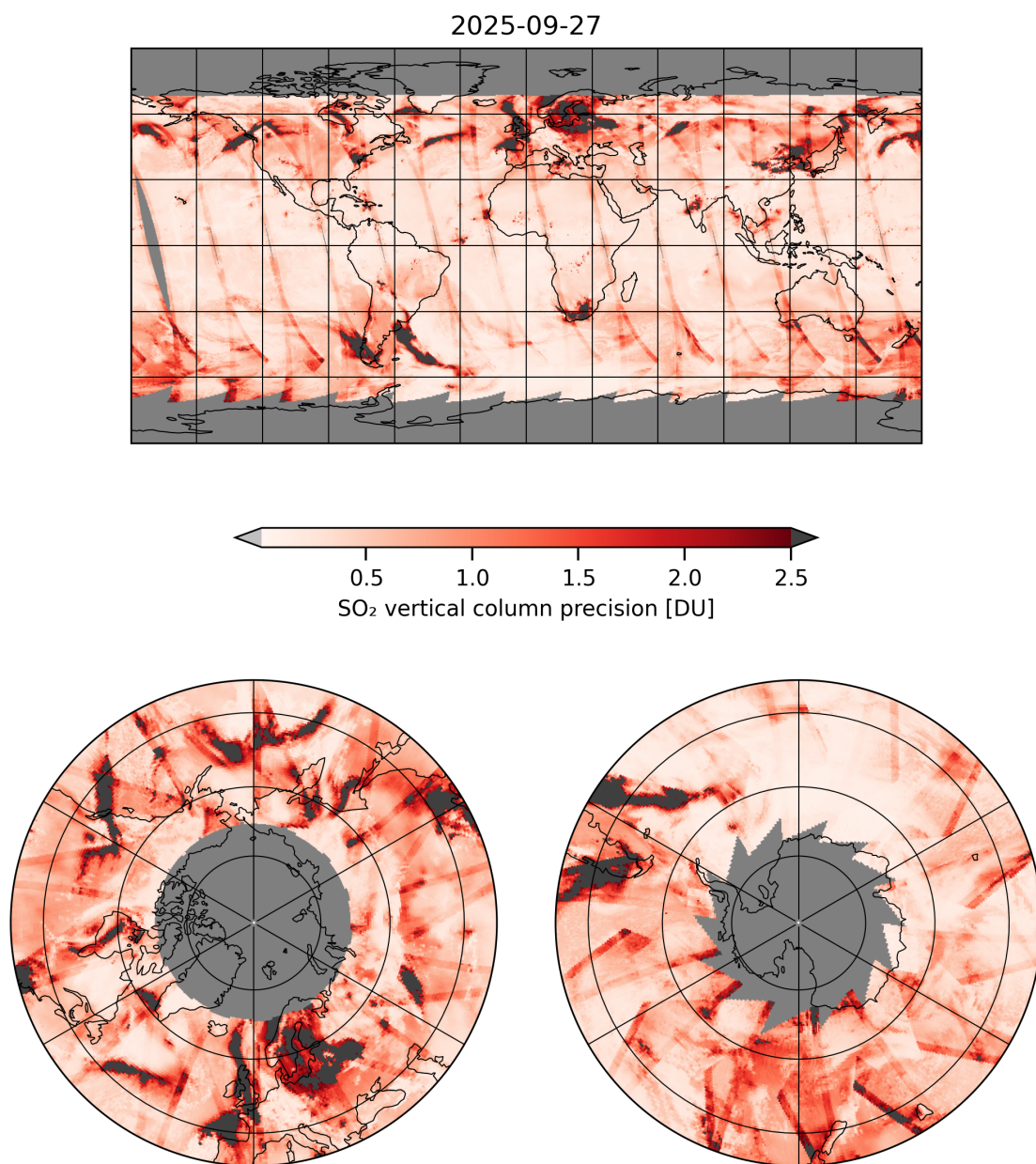


Figure 5: Map of “SO₂ vertical column precision” for 2025-09-27 to 2025-09-28

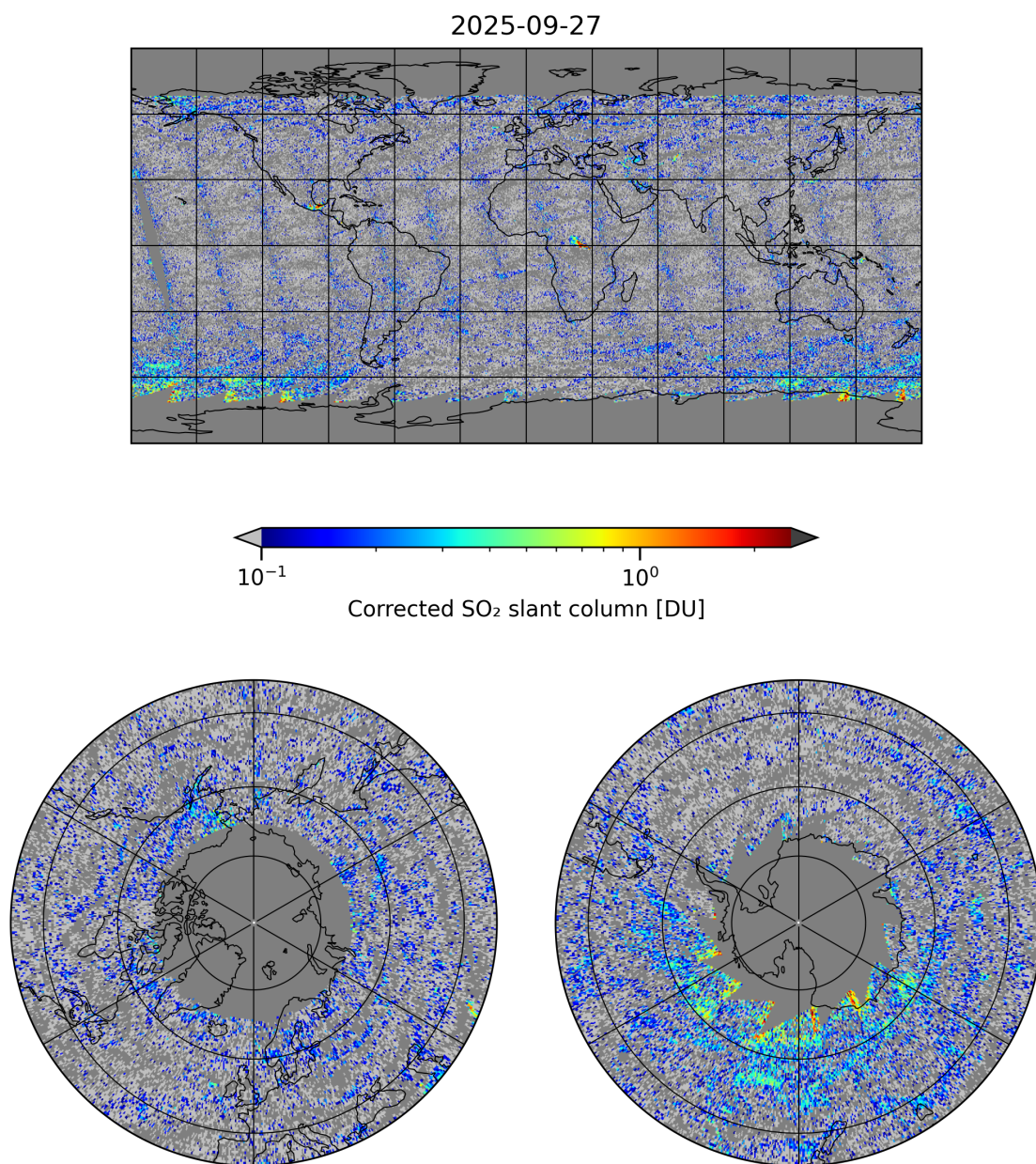


Figure 6: Map of “Corrected SO₂ slant column” for 2025-09-27 to 2025-09-28

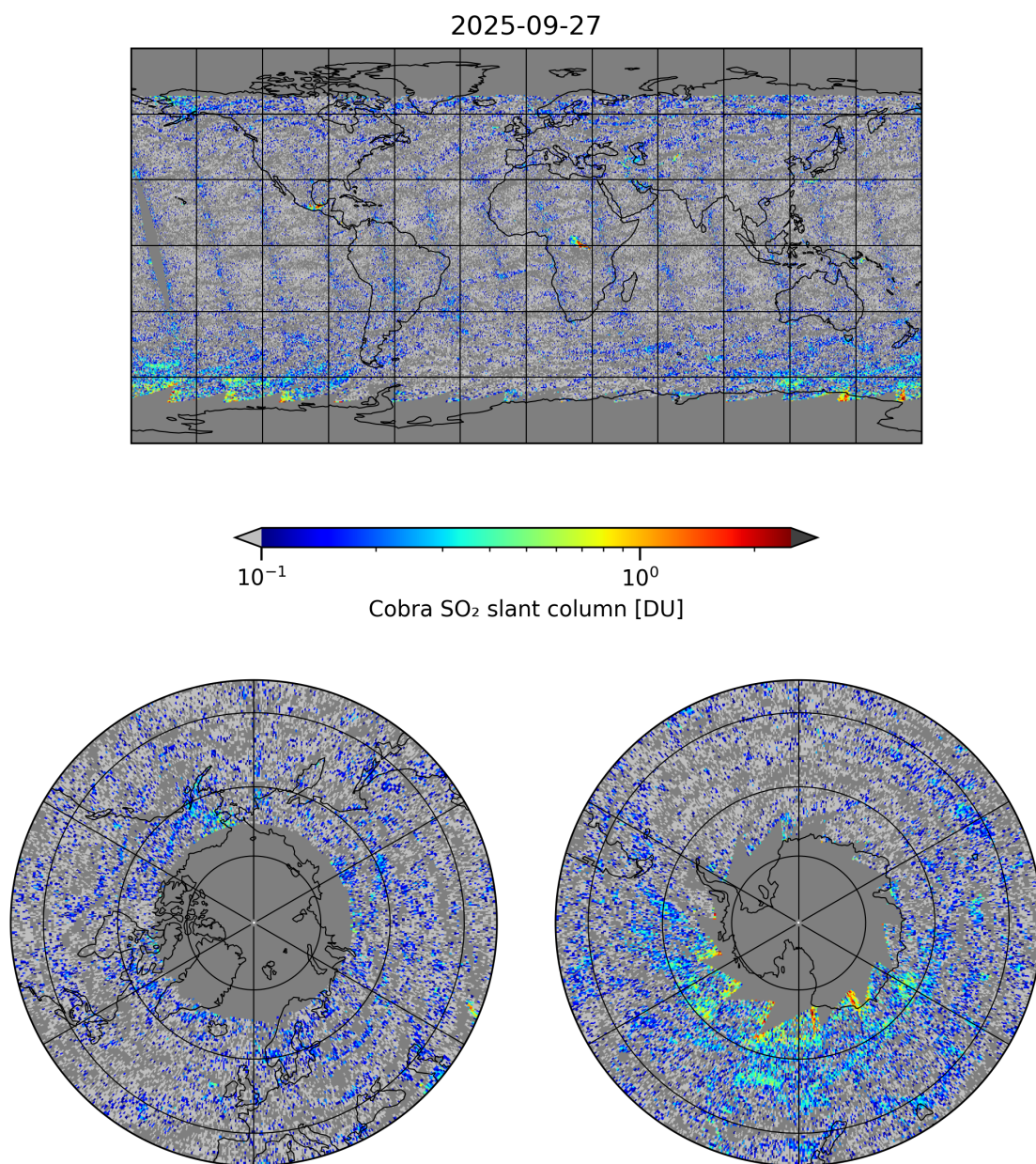


Figure 7: Map of “Cobra SO₂ slant column” for 2025-09-27 to 2025-09-28

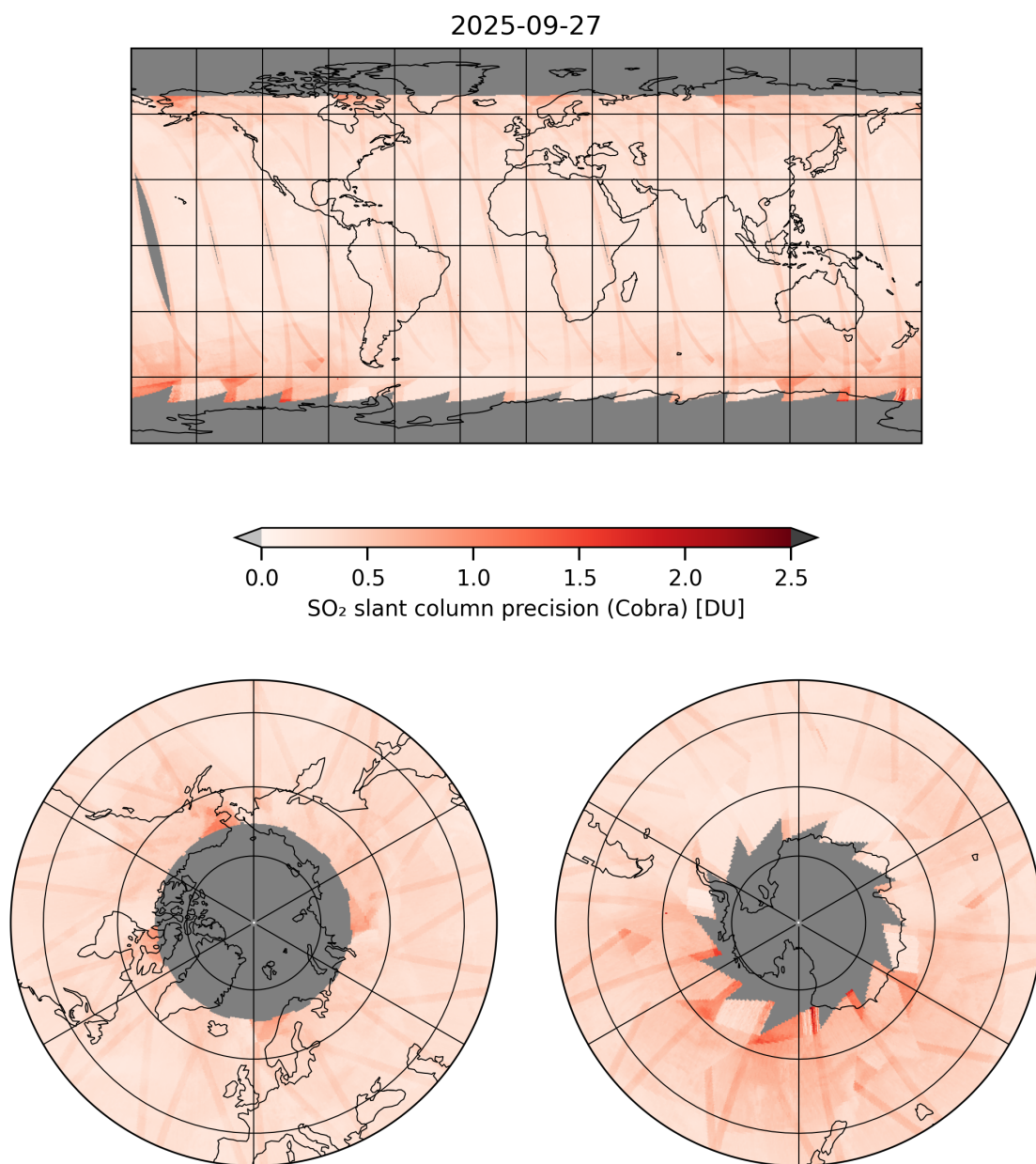


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-09-27 to 2025-09-28

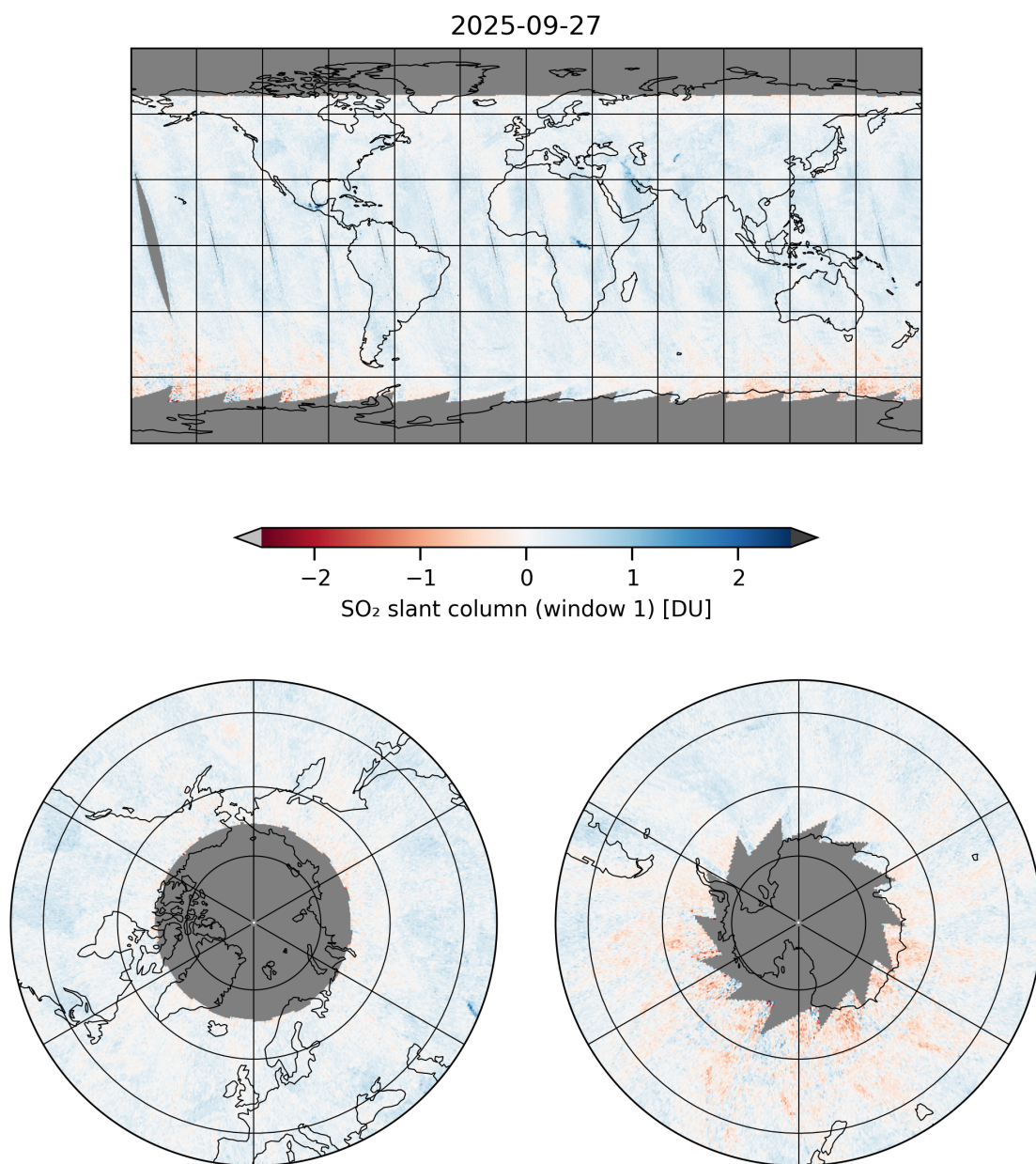


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-09-27 to 2025-09-28

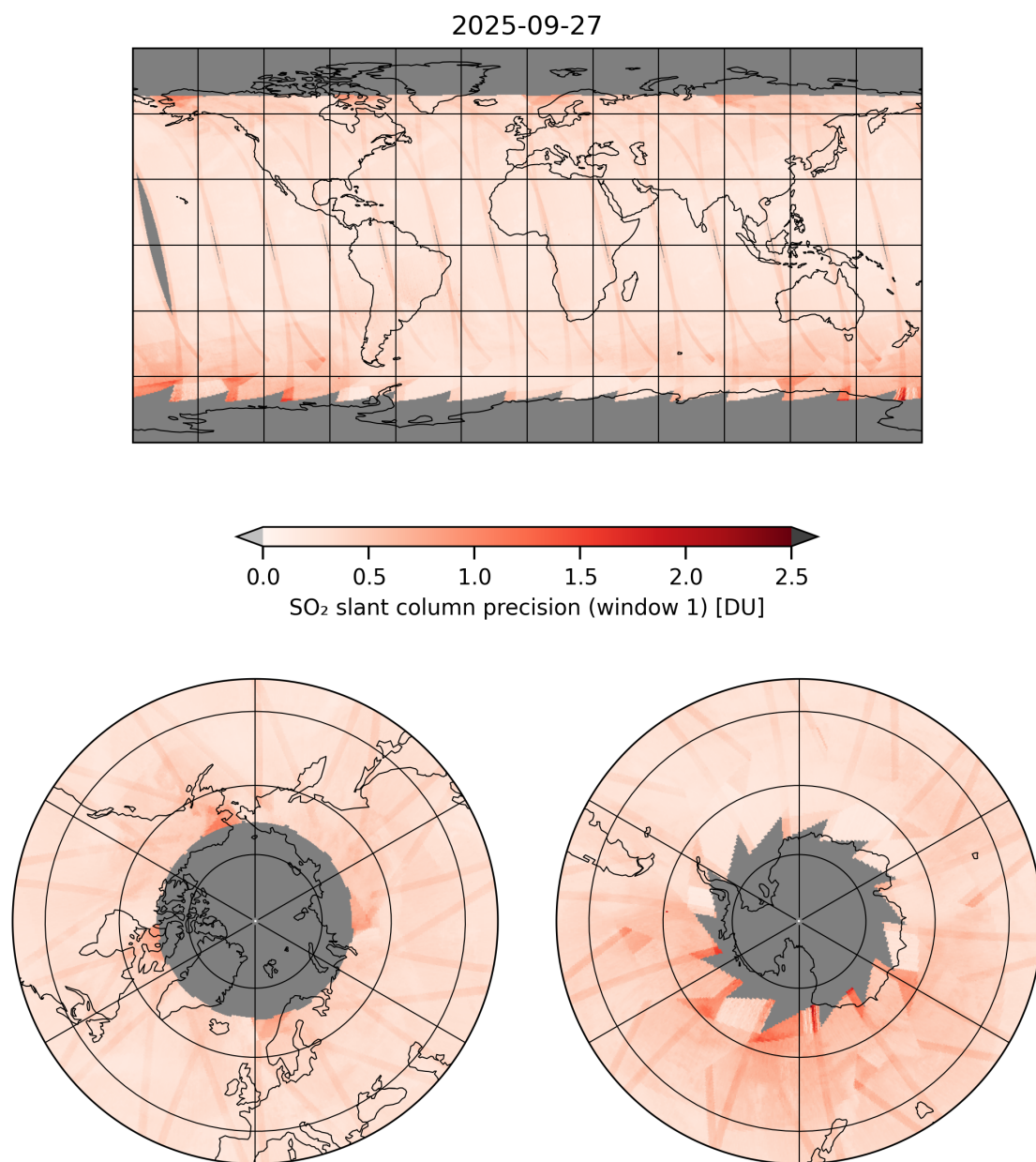


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-09-27 to 2025-09-28

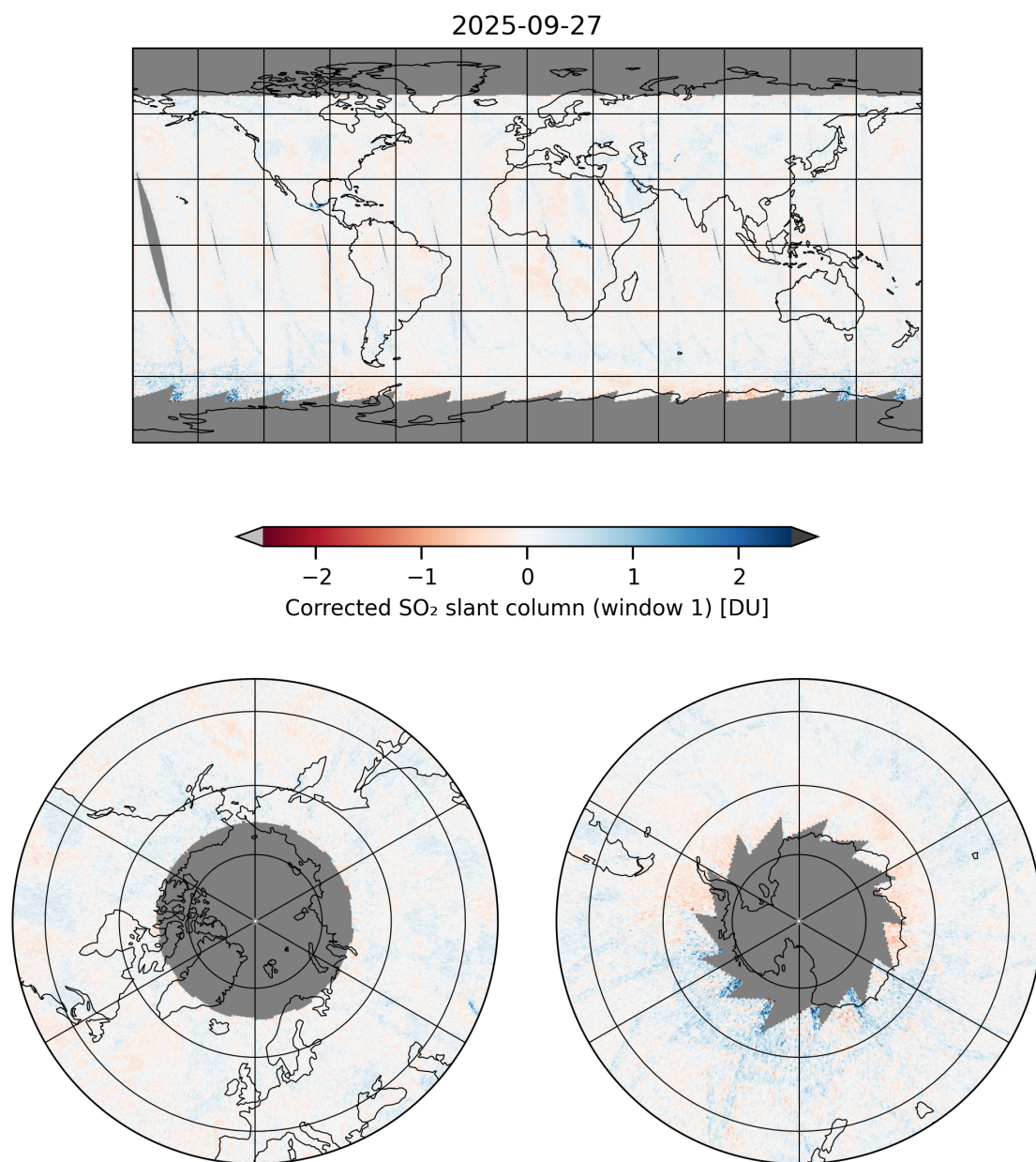


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-09-27 to 2025-09-28

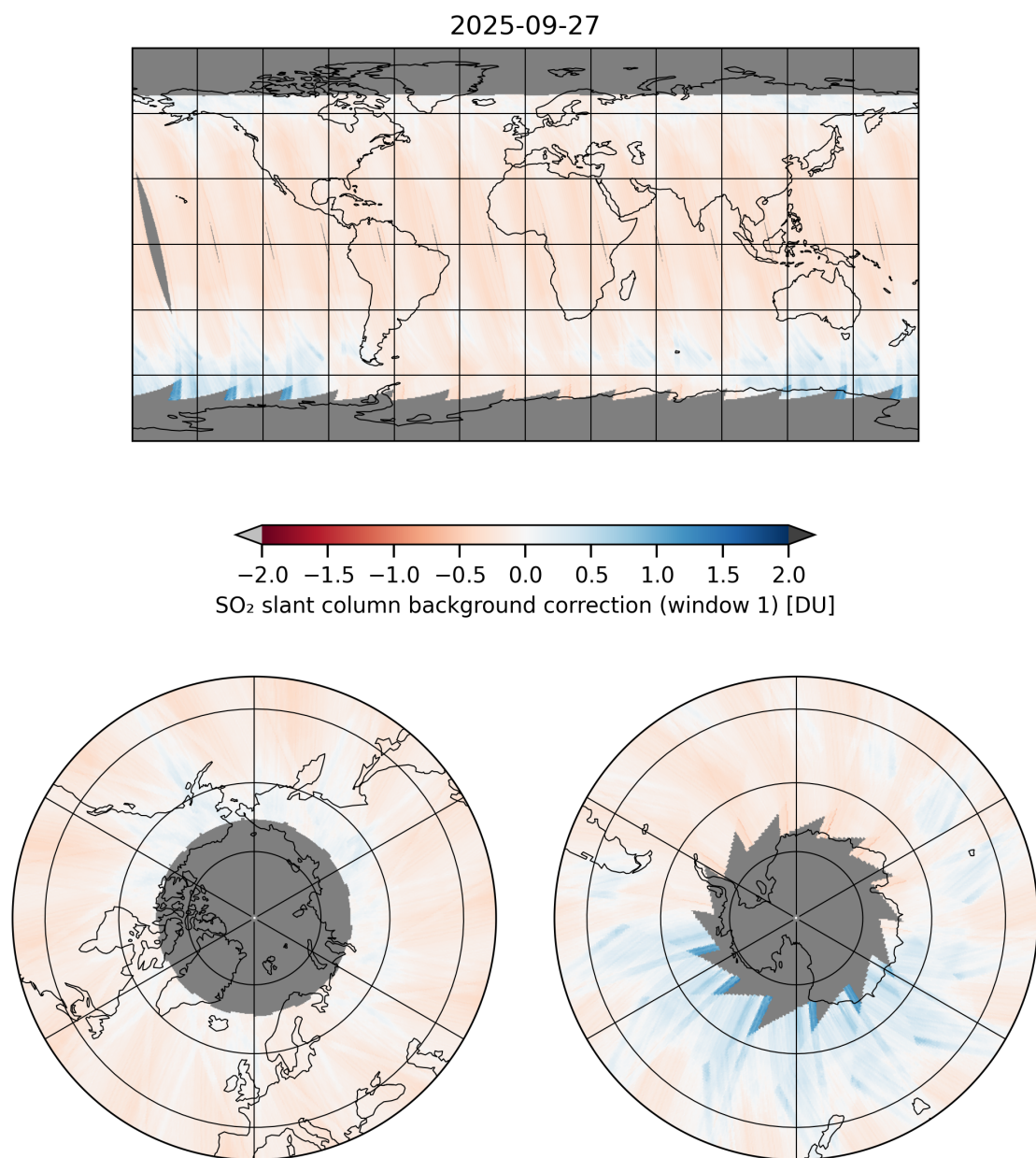


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-09-27 to 2025-09-28

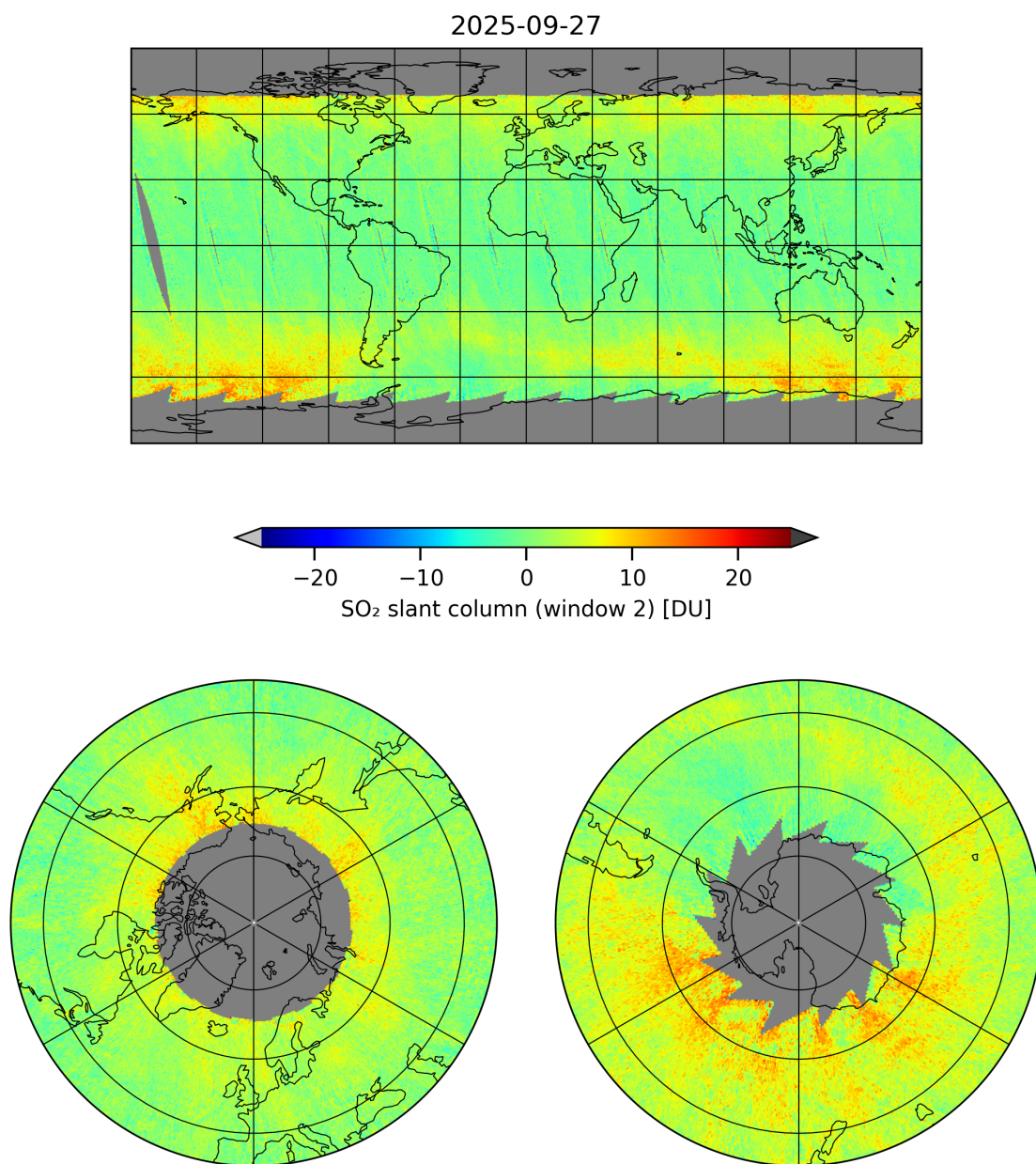


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-09-27 to 2025-09-28

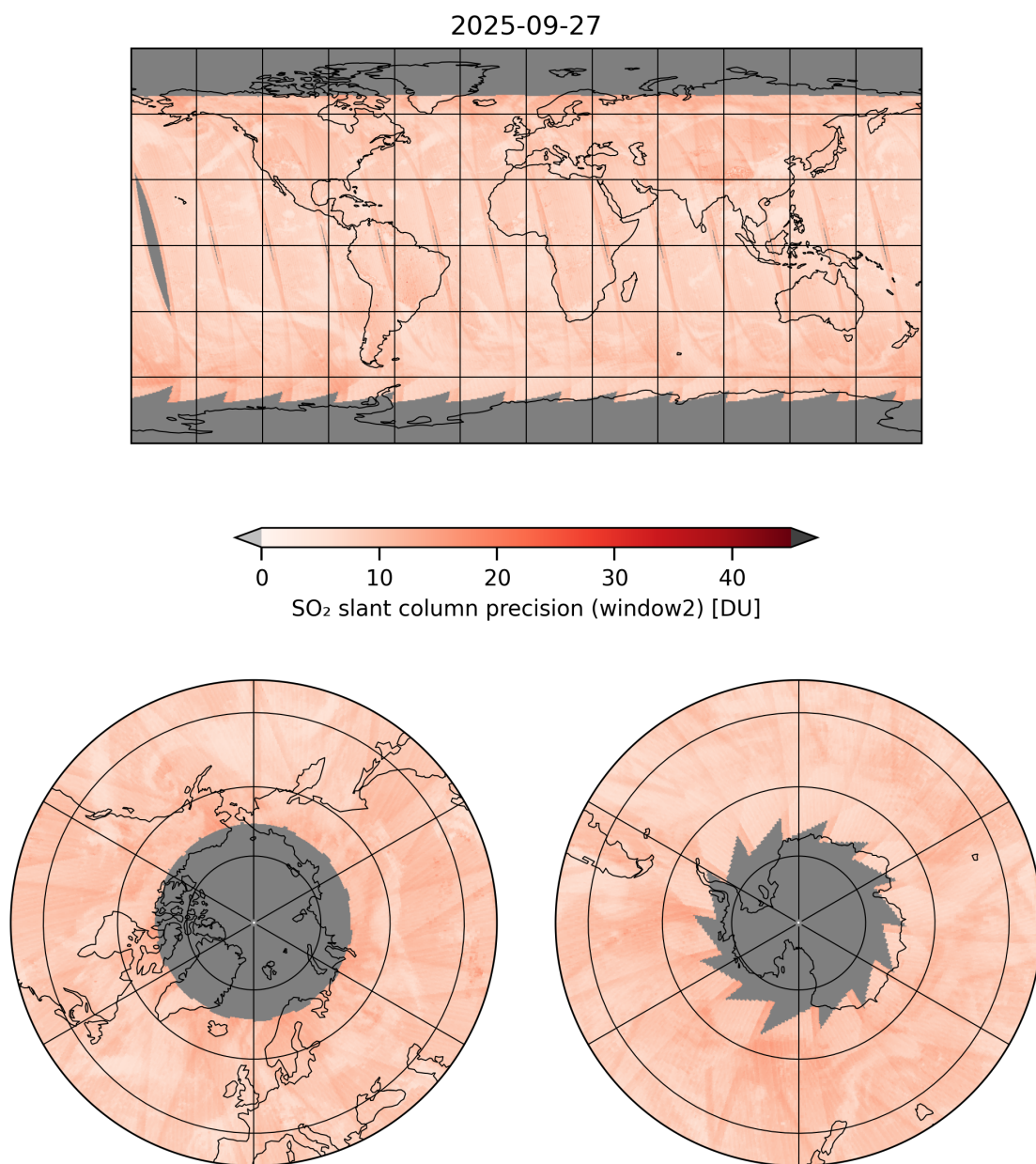


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-09-27 to 2025-09-28

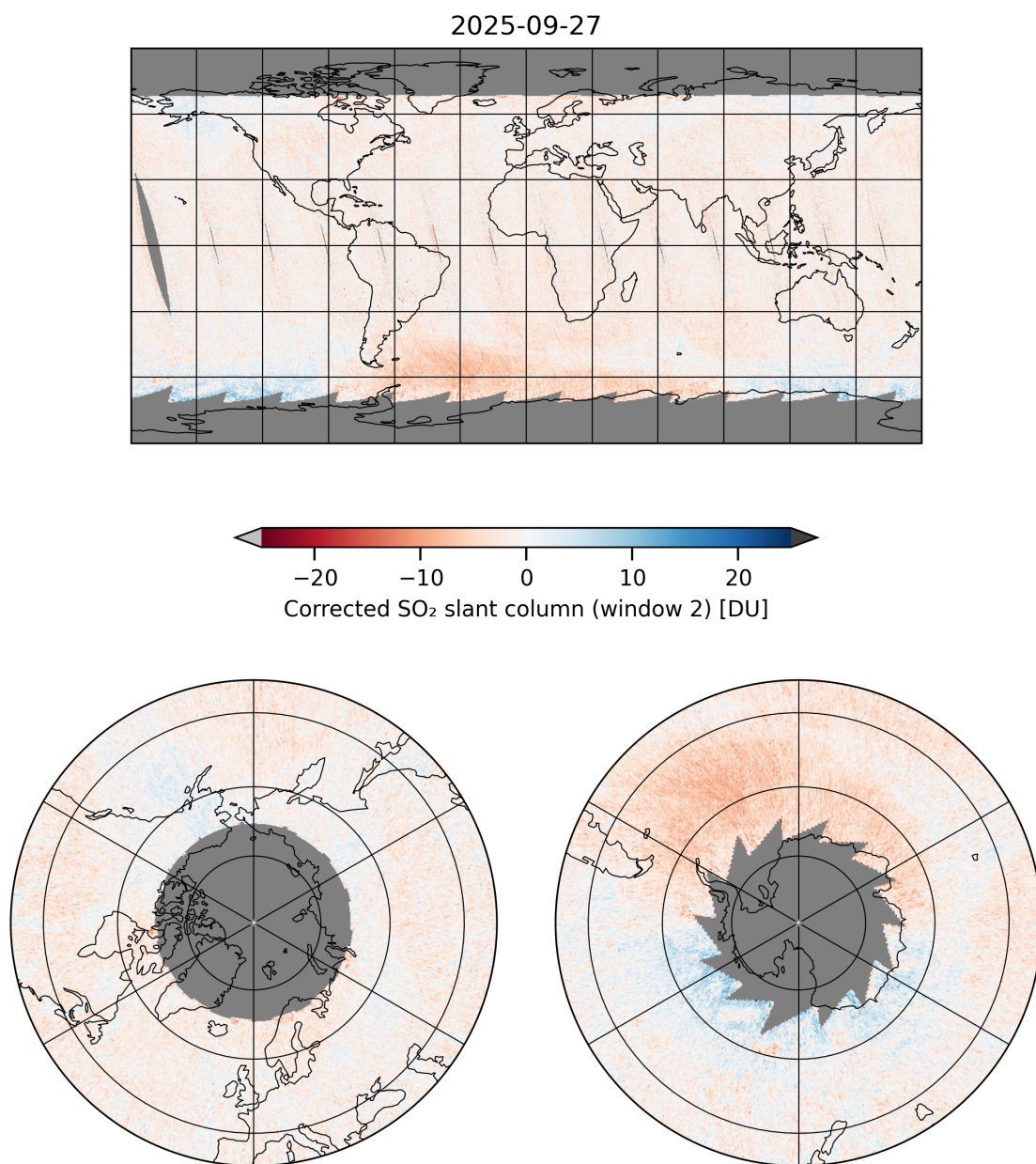


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-09-27 to 2025-09-28

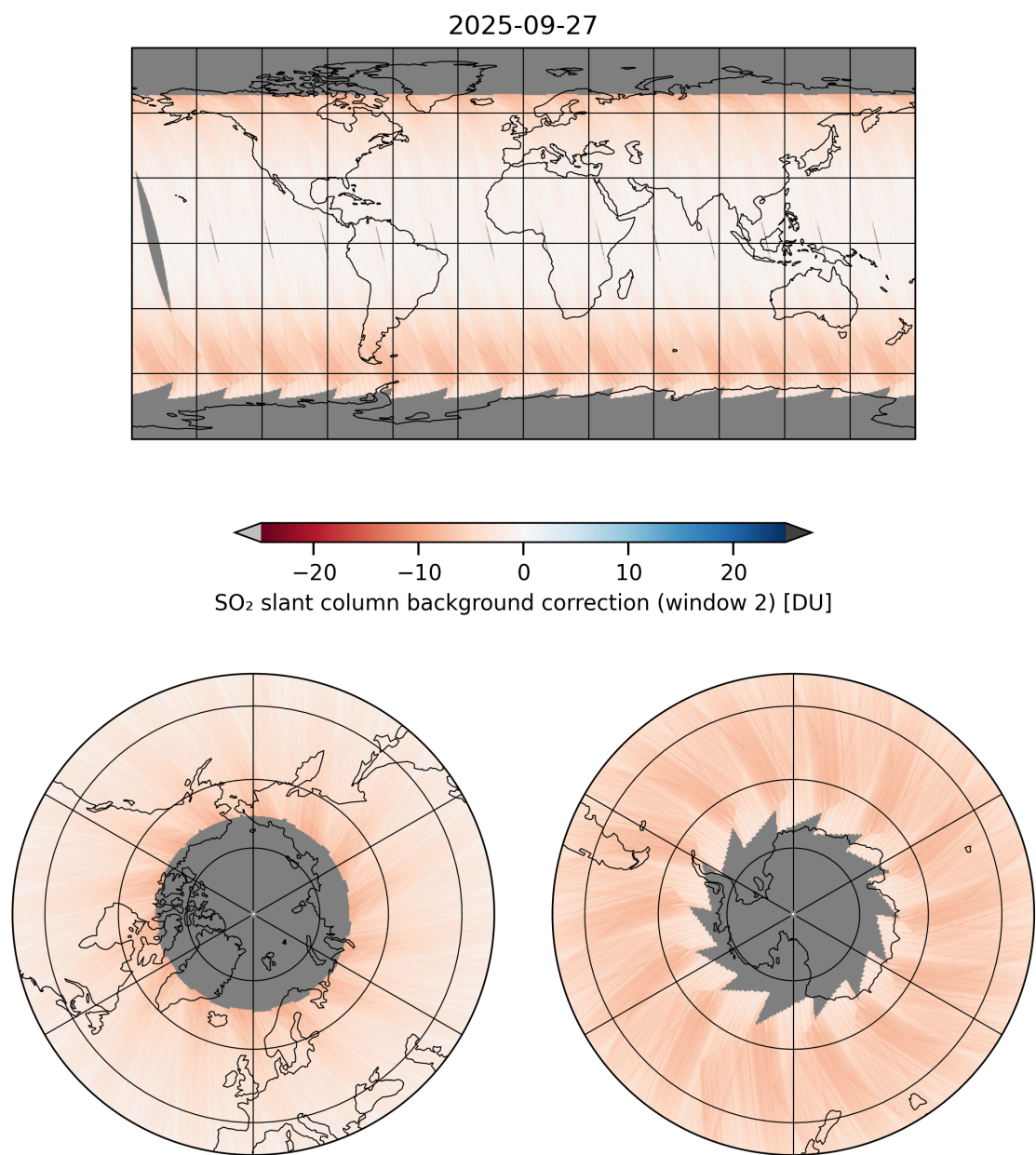


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-09-27 to 2025-09-28

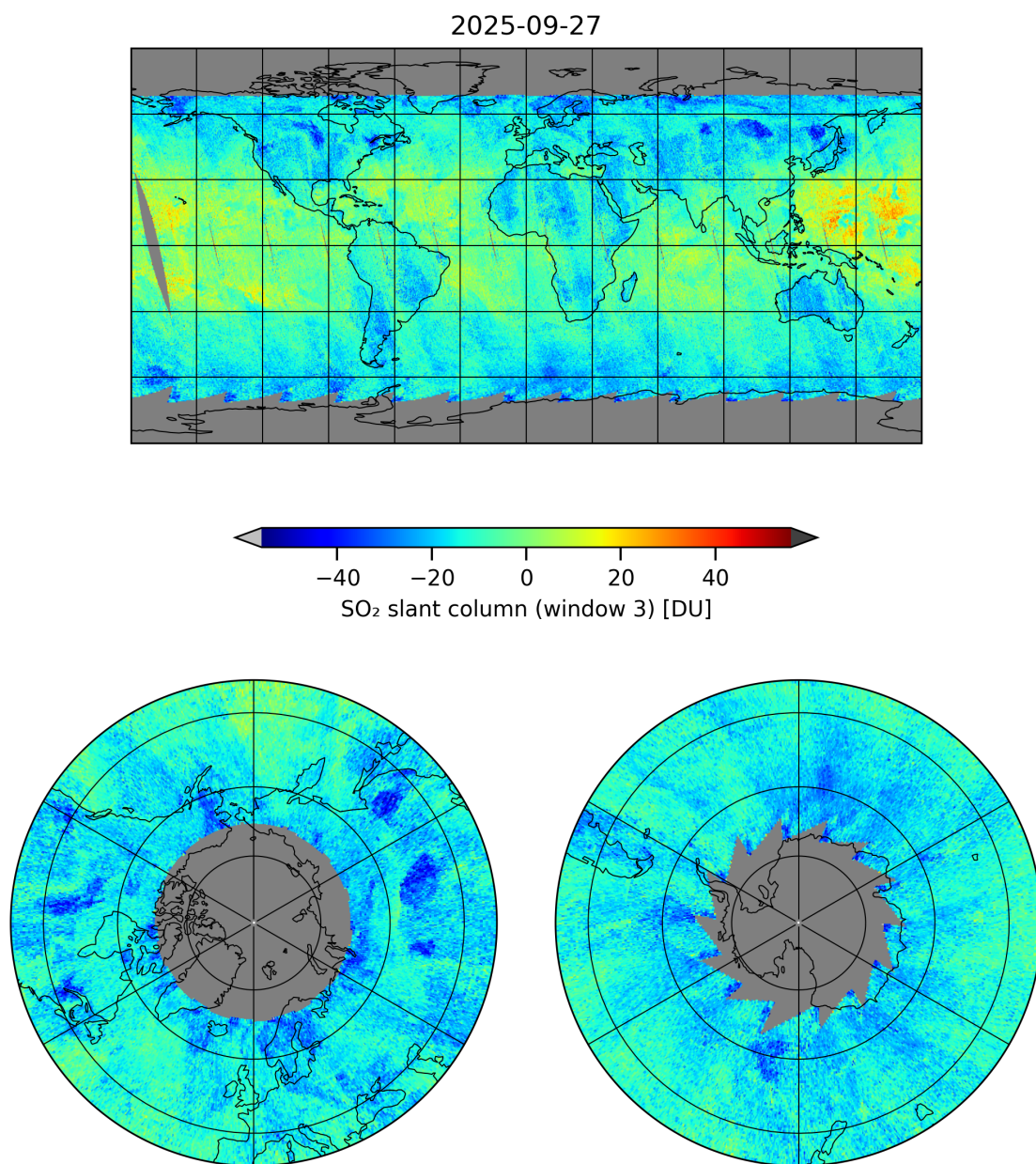


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-09-27 to 2025-09-28

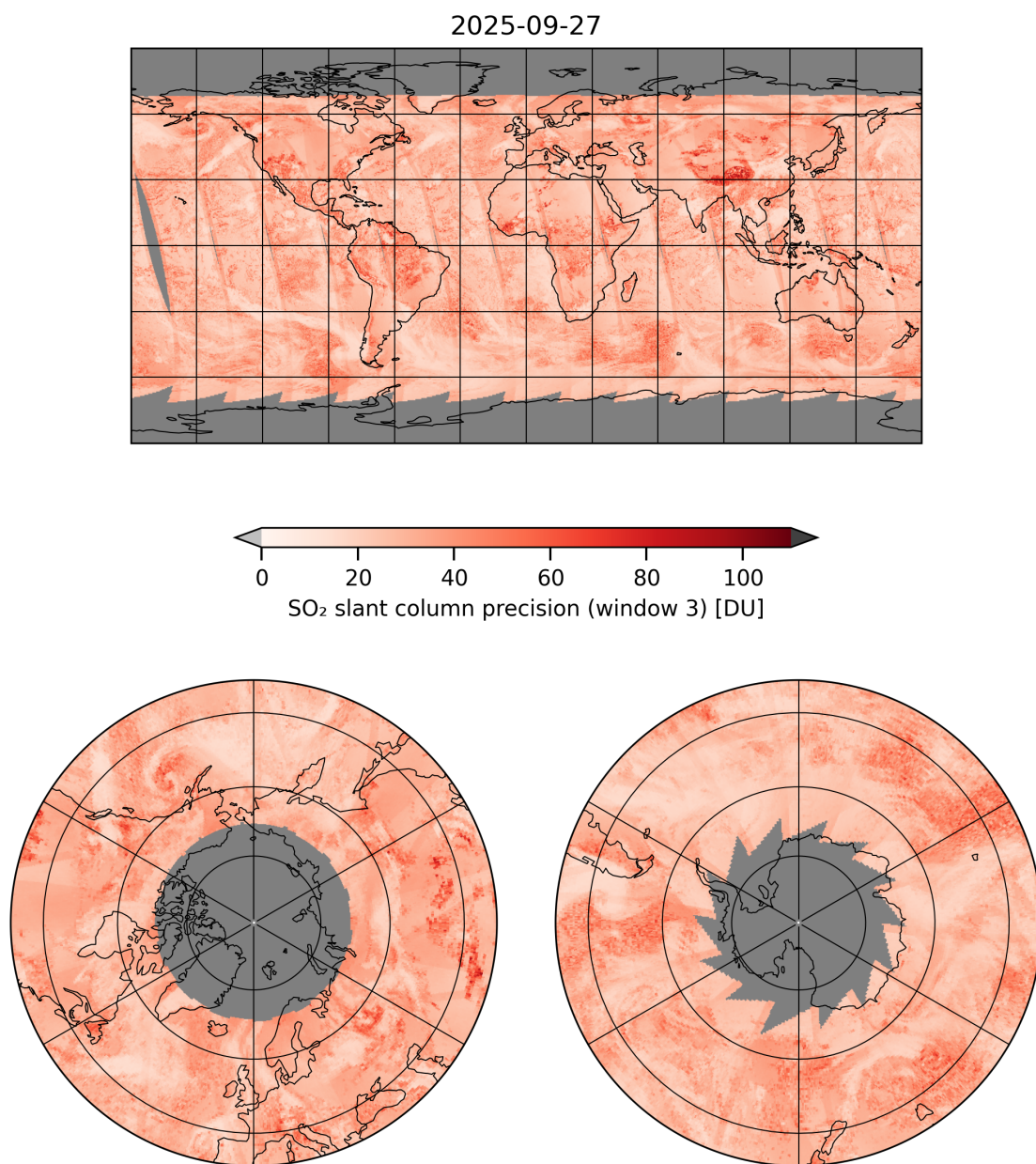


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-09-27 to 2025-09-28

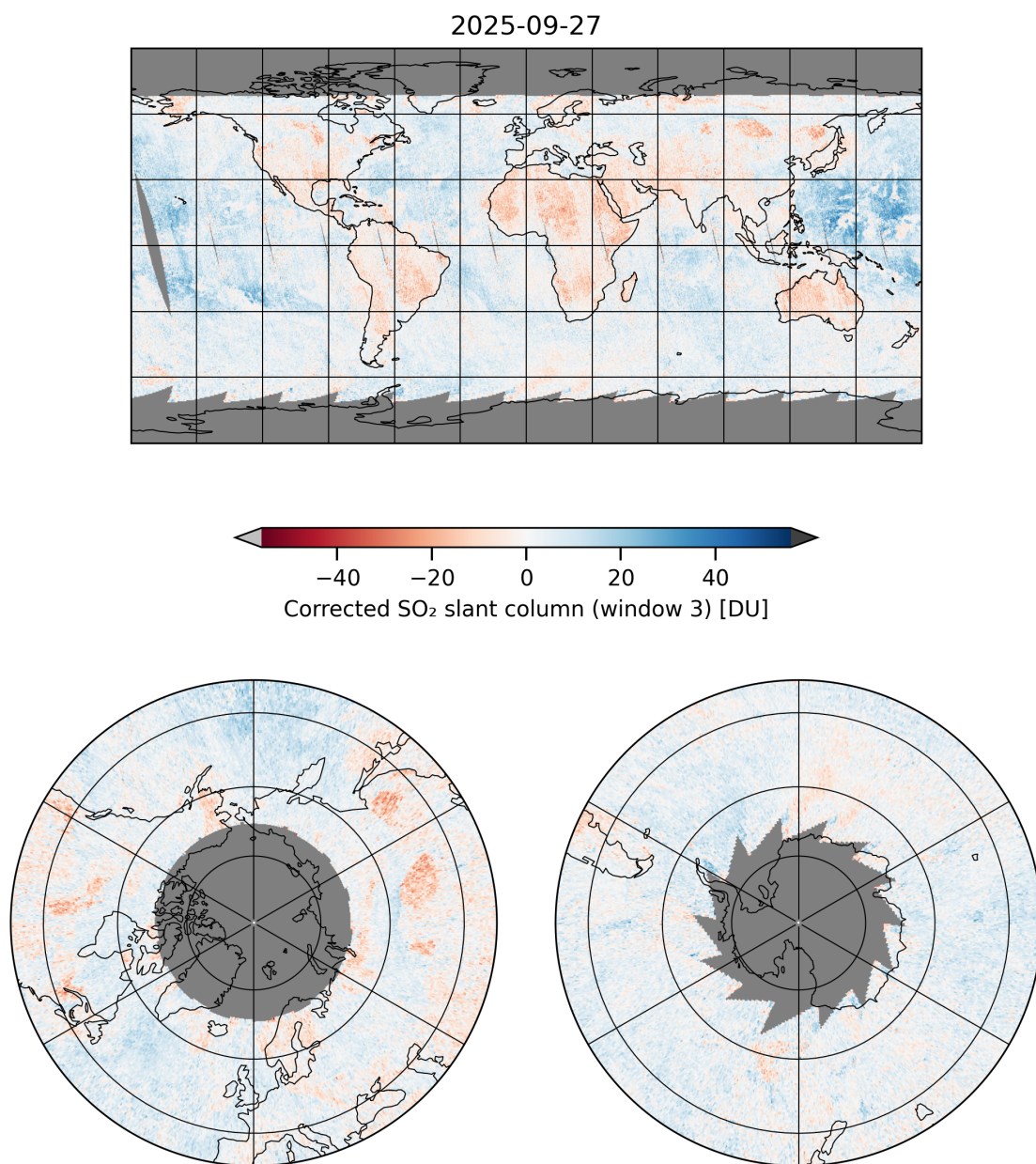


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-09-27 to 2025-09-28

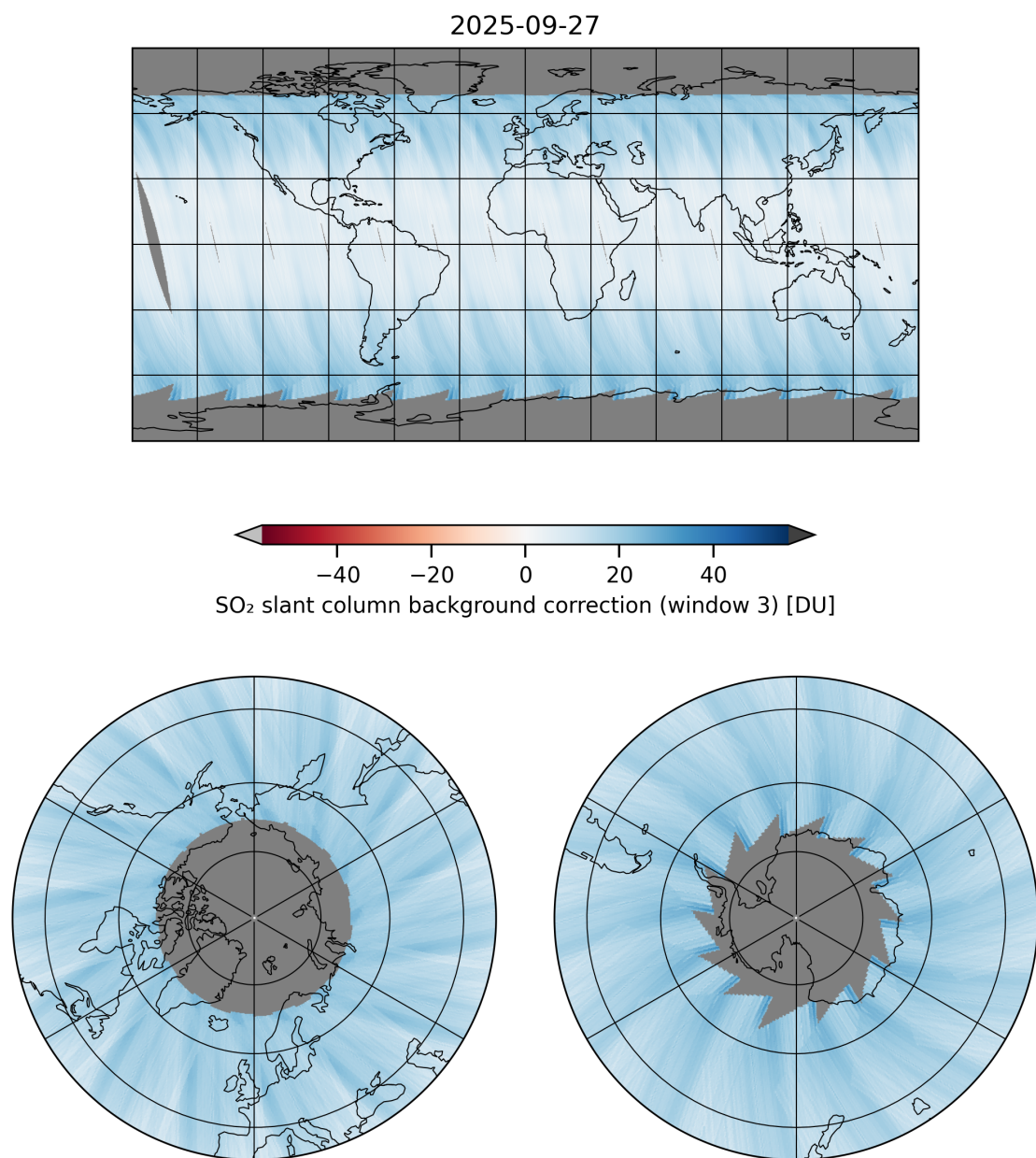


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-09-27 to 2025-09-28

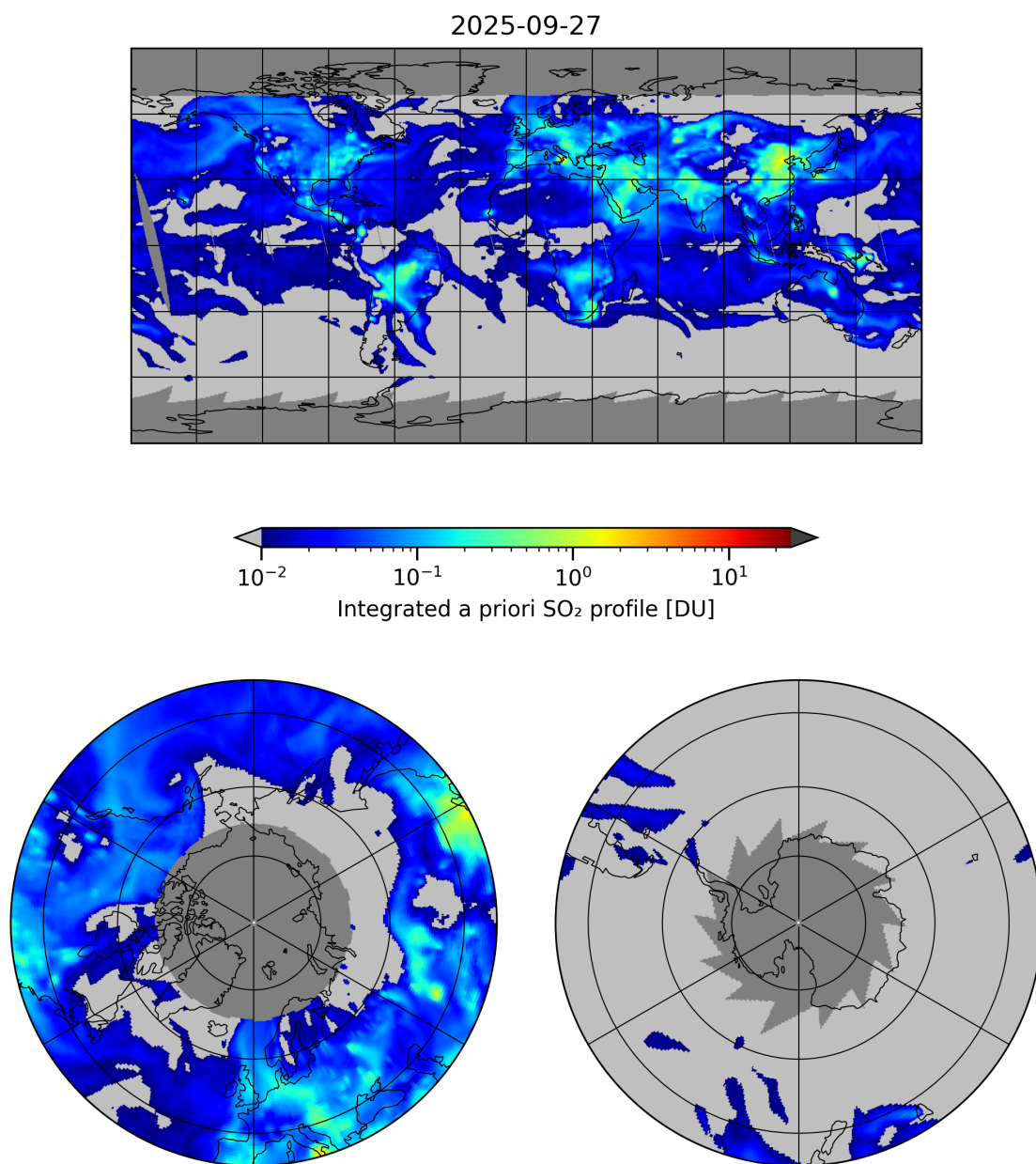


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-09-27 to 2025-09-28

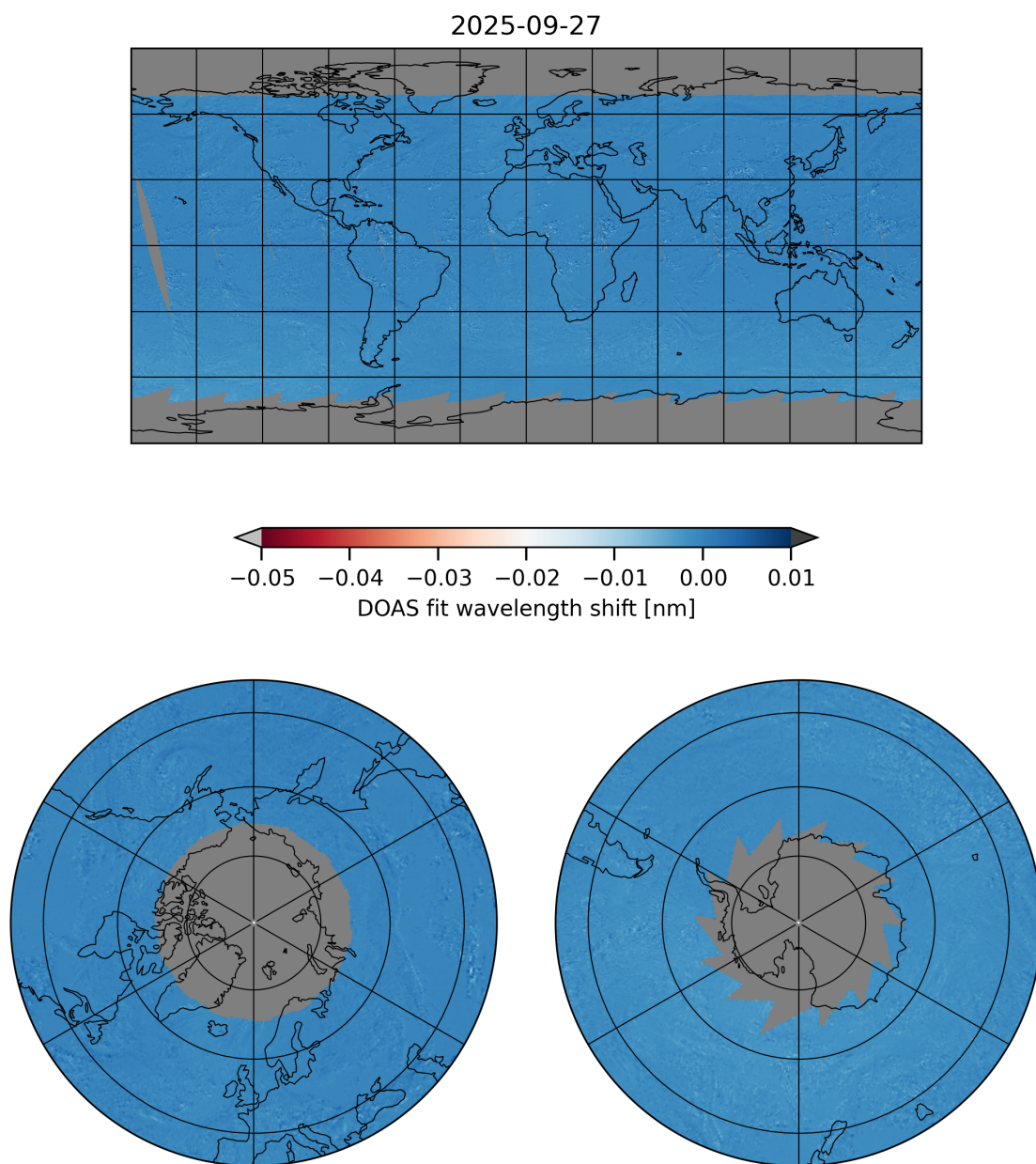


Figure 22: Map of “DOAS fit wavelength shift” for 2025-09-27 to 2025-09-28

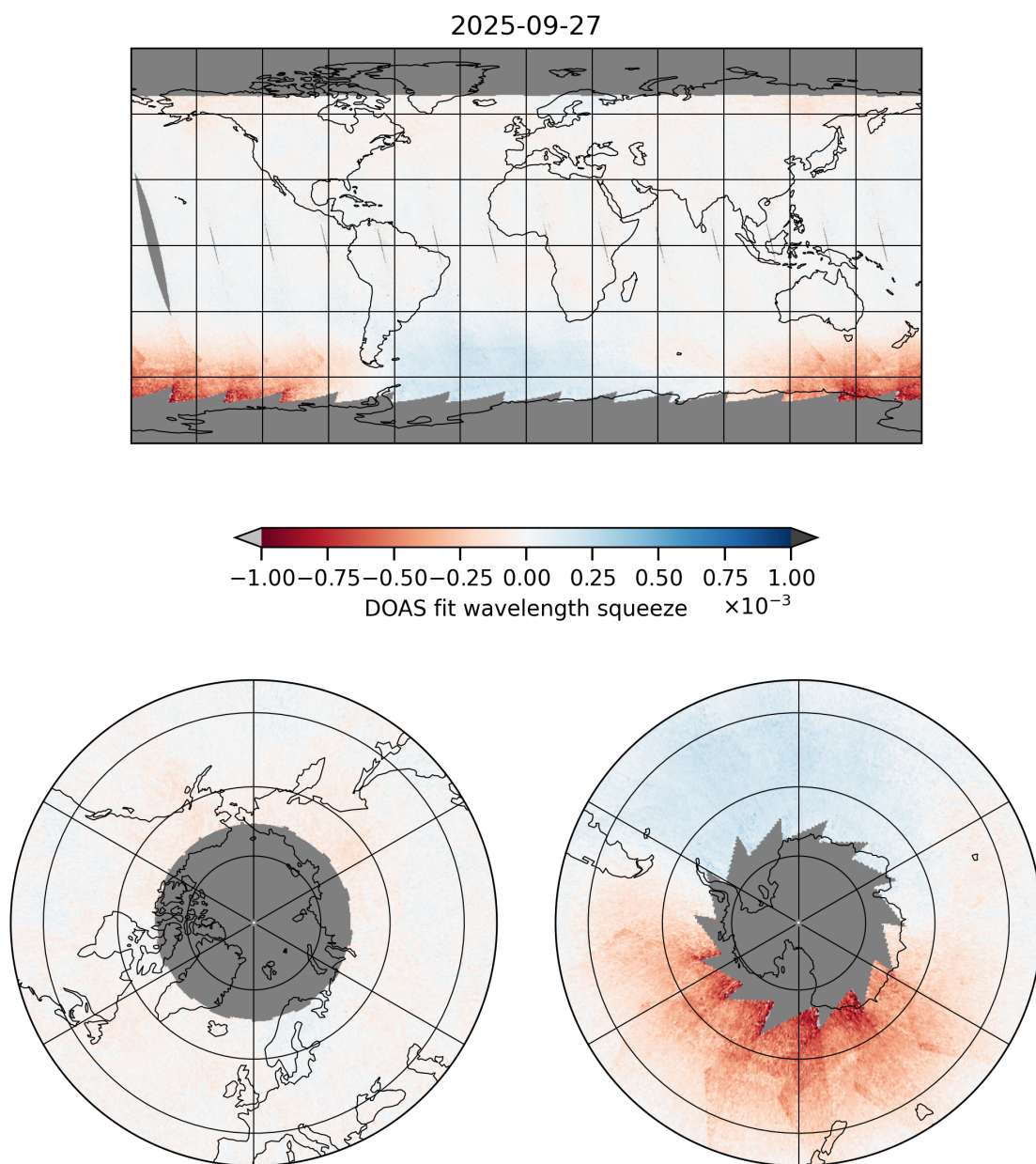


Figure 23: Map of "DOAS fit wavelength squeeze" for 2025-09-27 to 2025-09-28

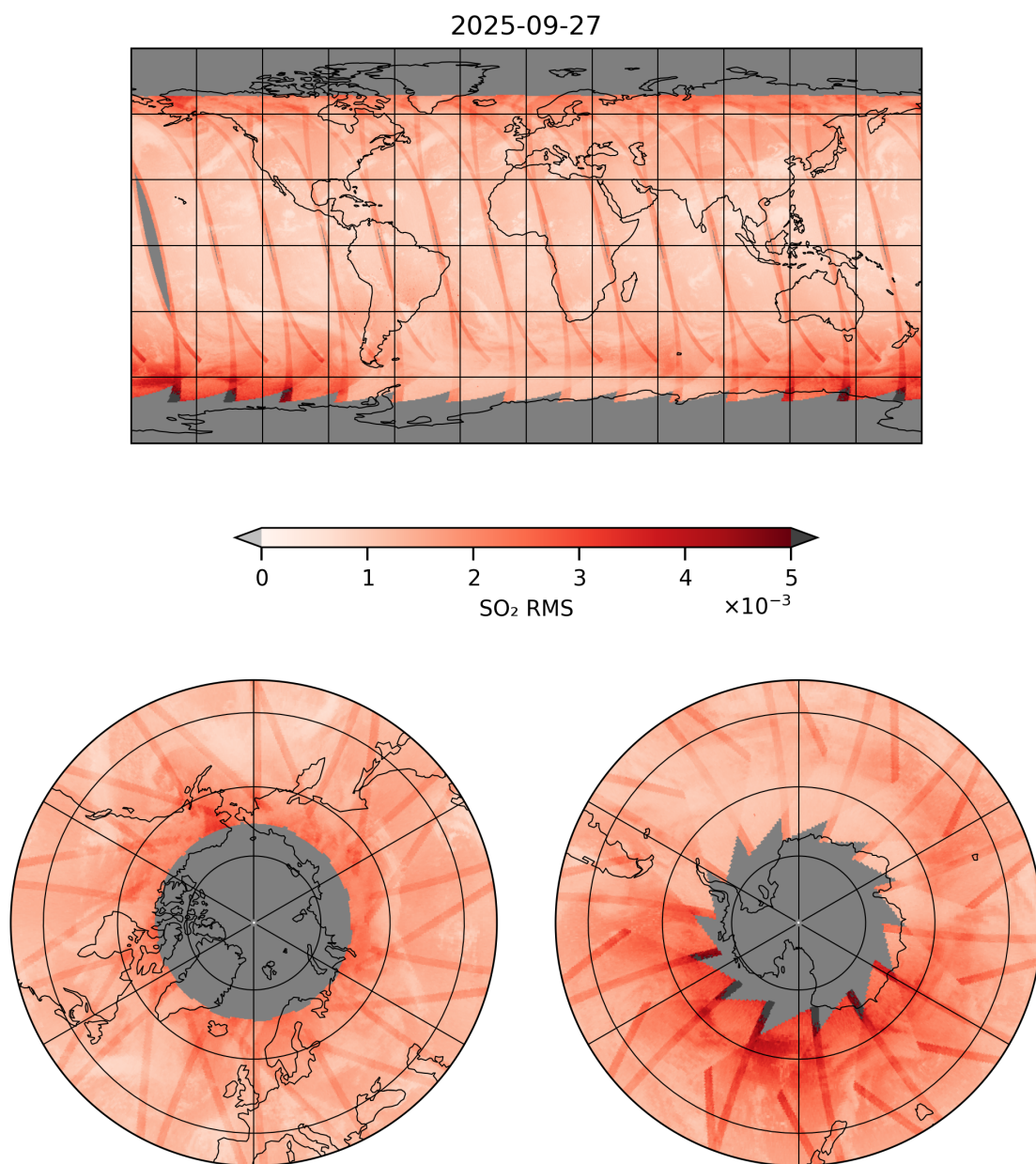


Figure 24: Map of “SO₂ RMS” for 2025-09-27 to 2025-09-28

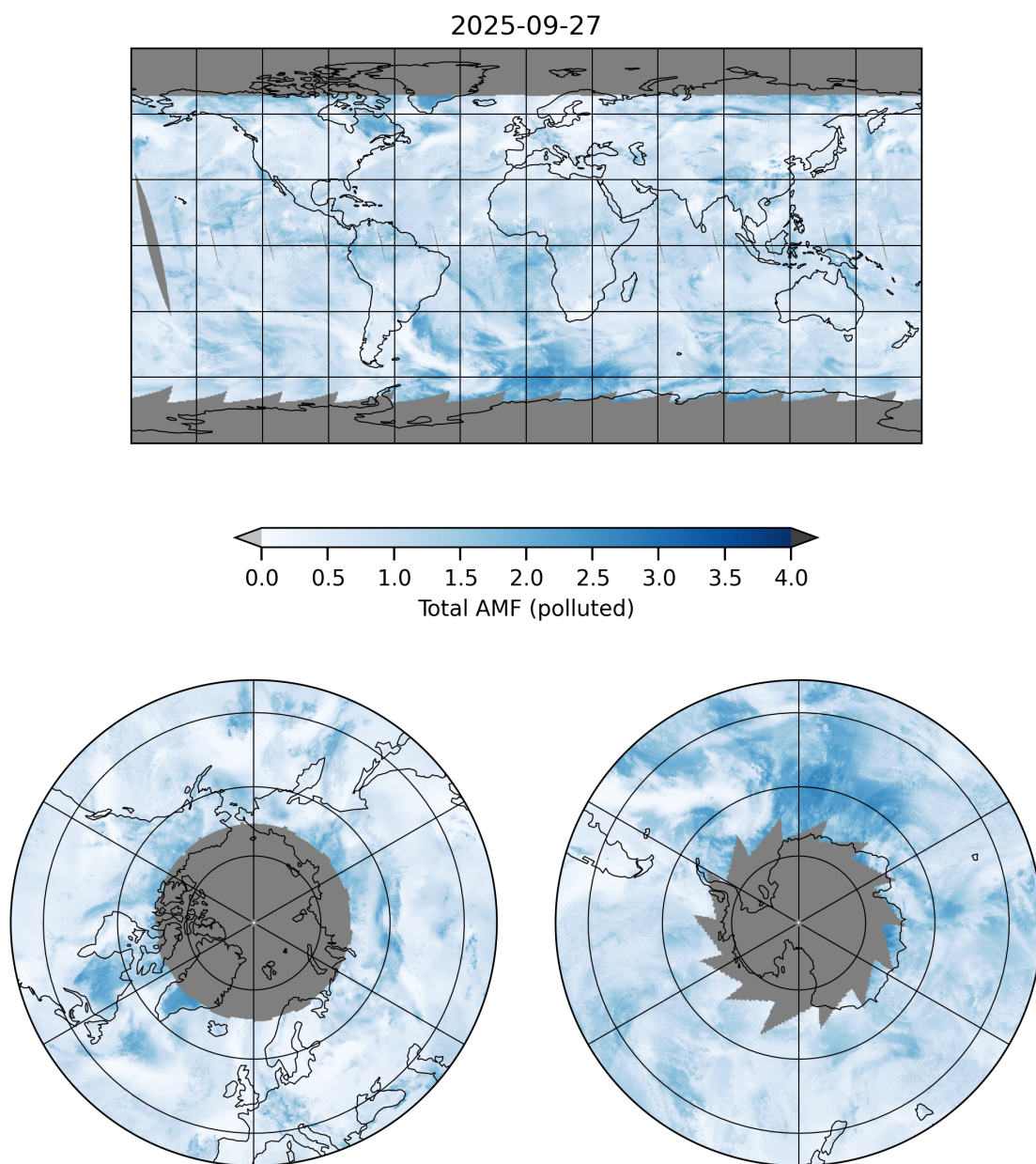


Figure 25: Map of “Total AMF (polluted)” for 2025-09-27 to 2025-09-28

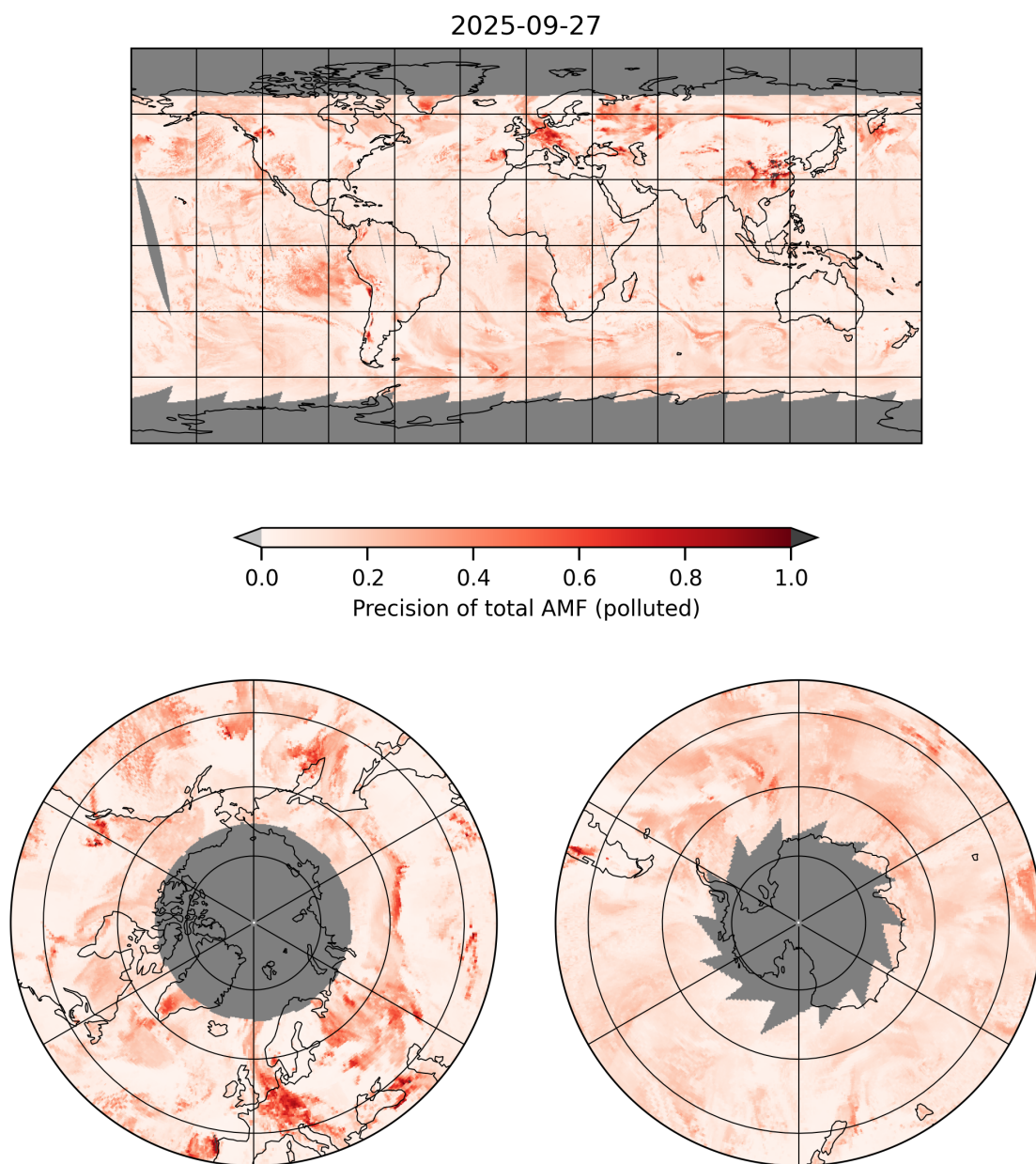


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-09-27 to 2025-09-28

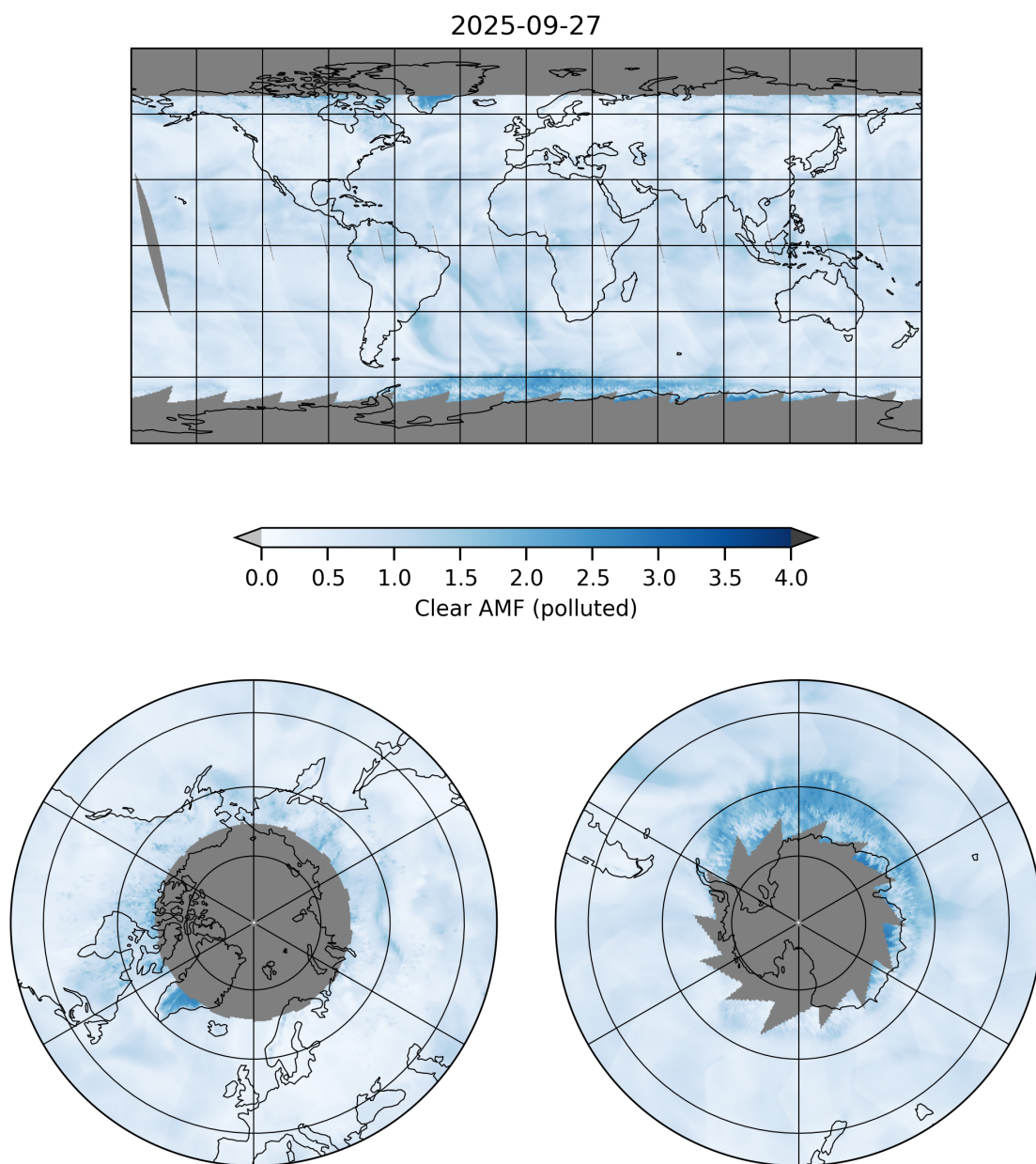


Figure 27: Map of “Clear AMF (polluted)” for 2025-09-27 to 2025-09-28

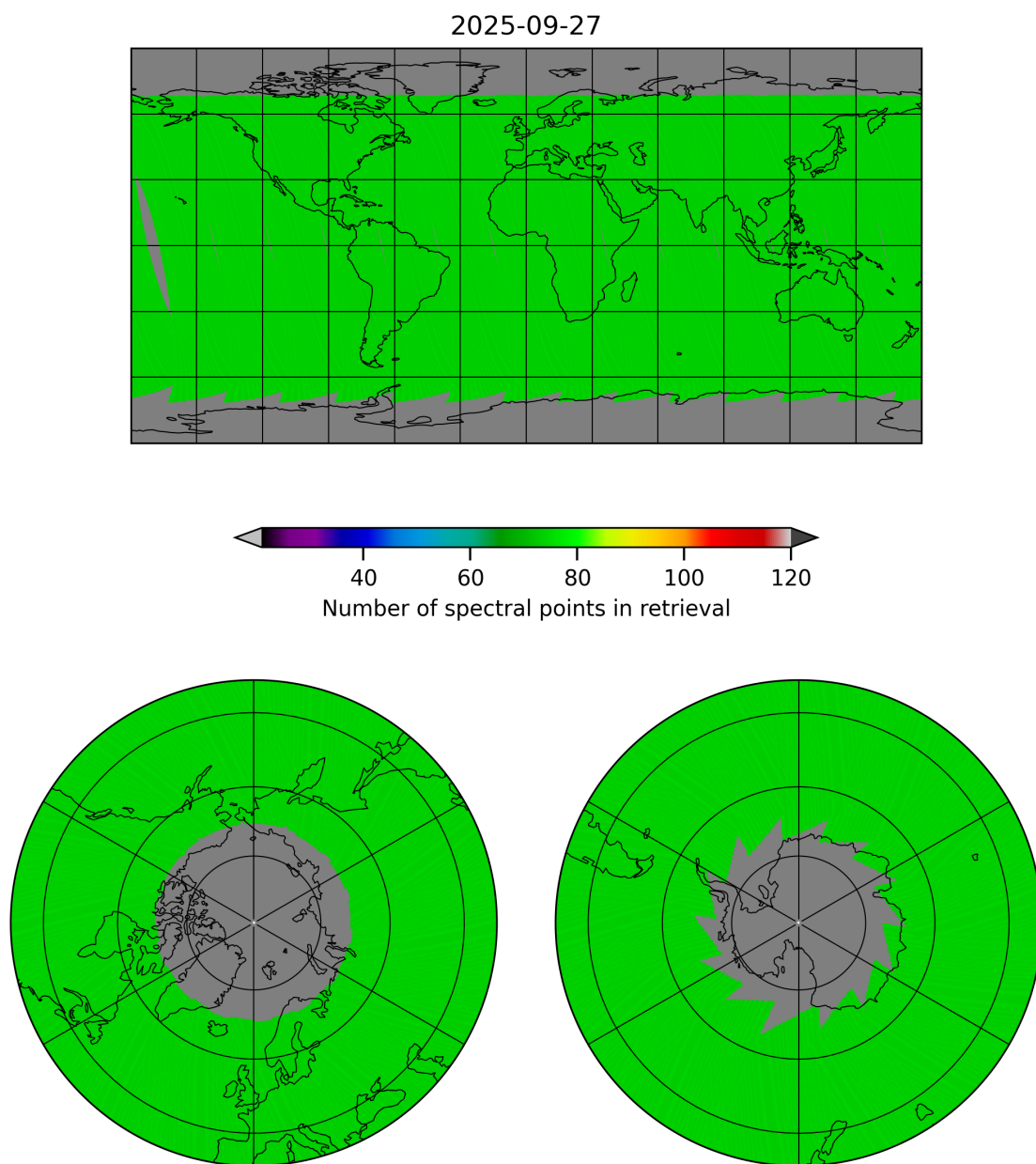


Figure 28: Map of “Number of spectral points in retrieval” for 2025-09-27 to 2025-09-28

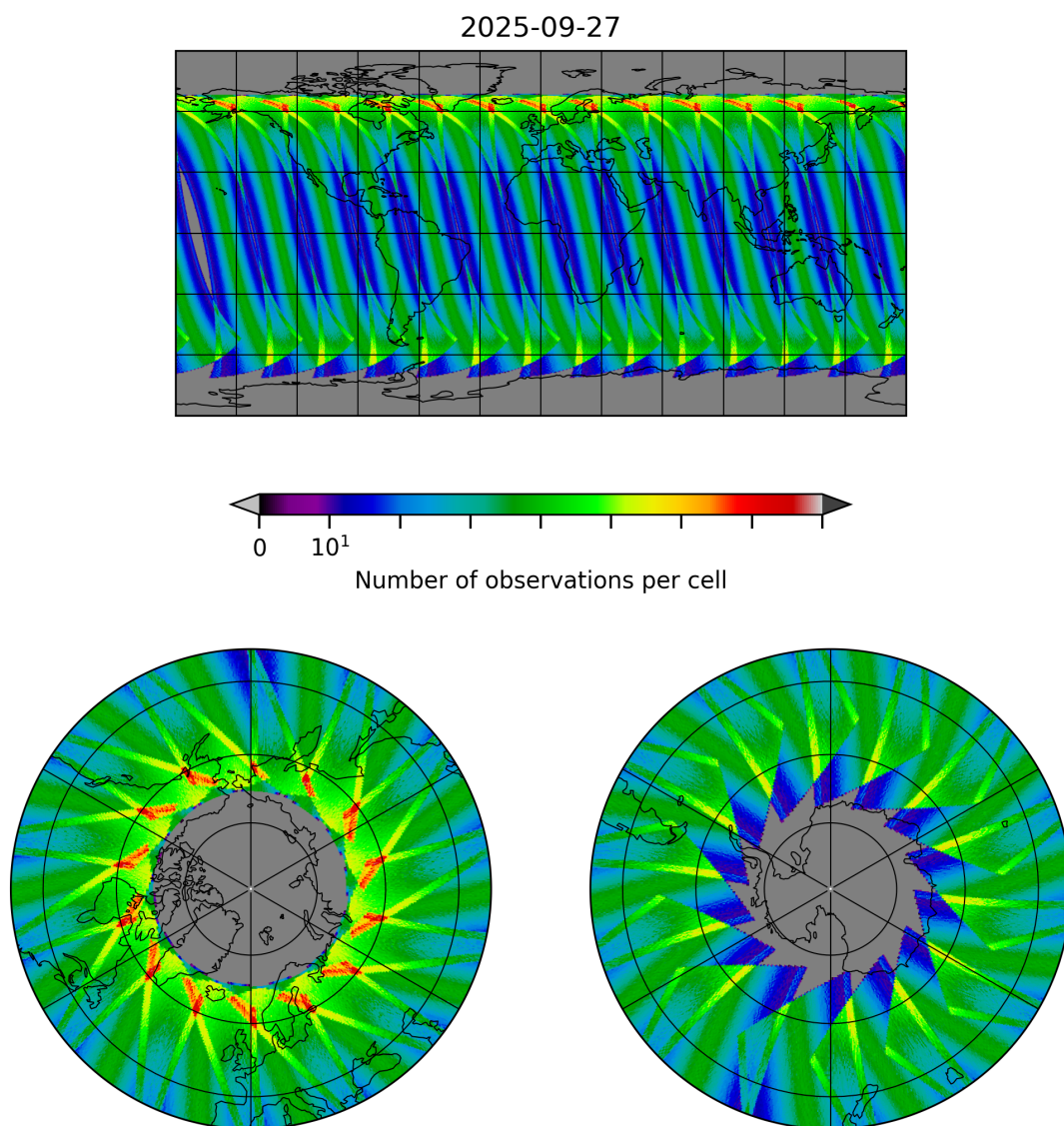


Figure 29: Map of the number of observations for 2025-09-27 to 2025-09-28

7 Zonal average

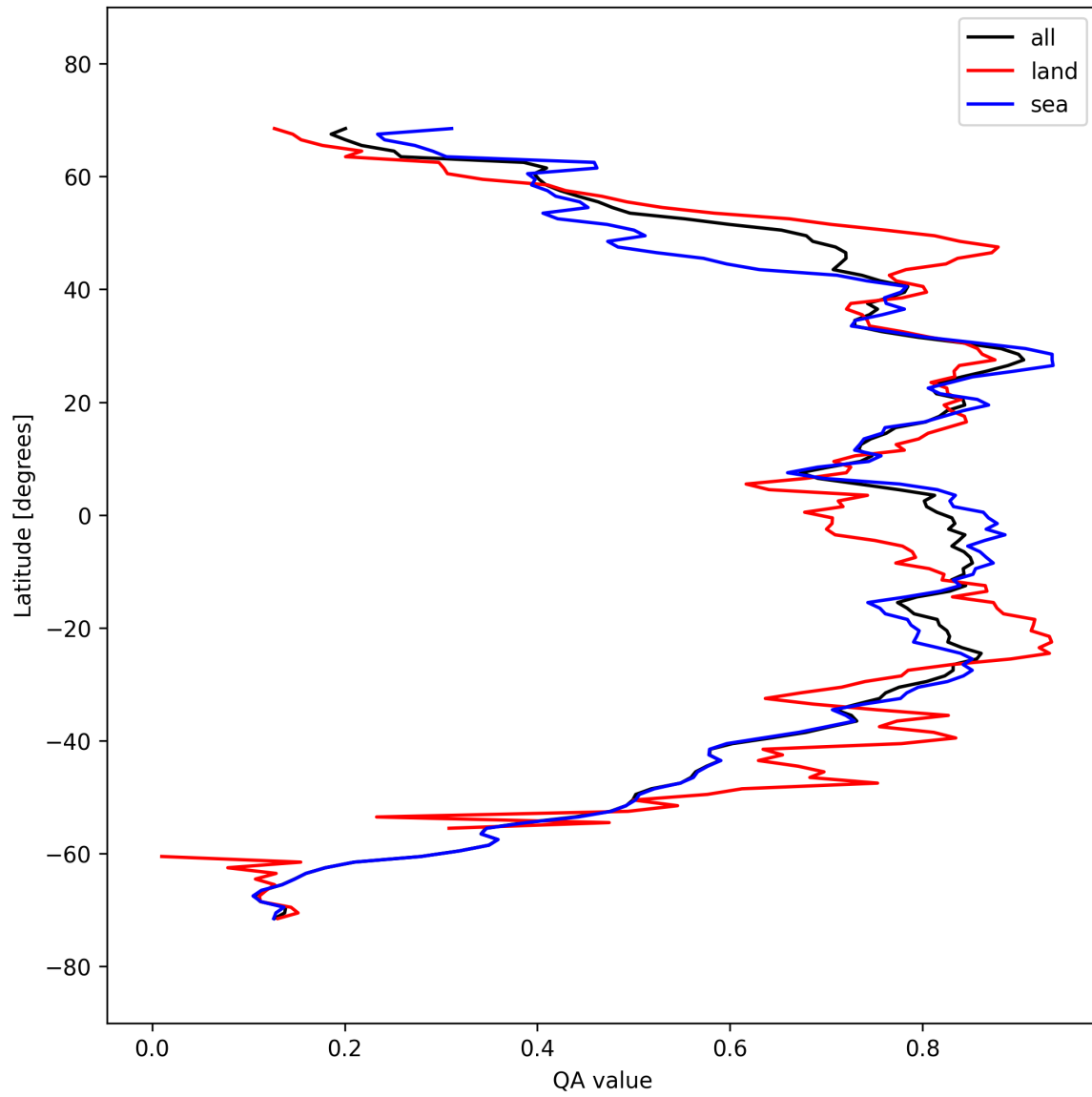


Figure 30: Zonal average of “QA value” for 2025-09-27 to 2025-09-28.

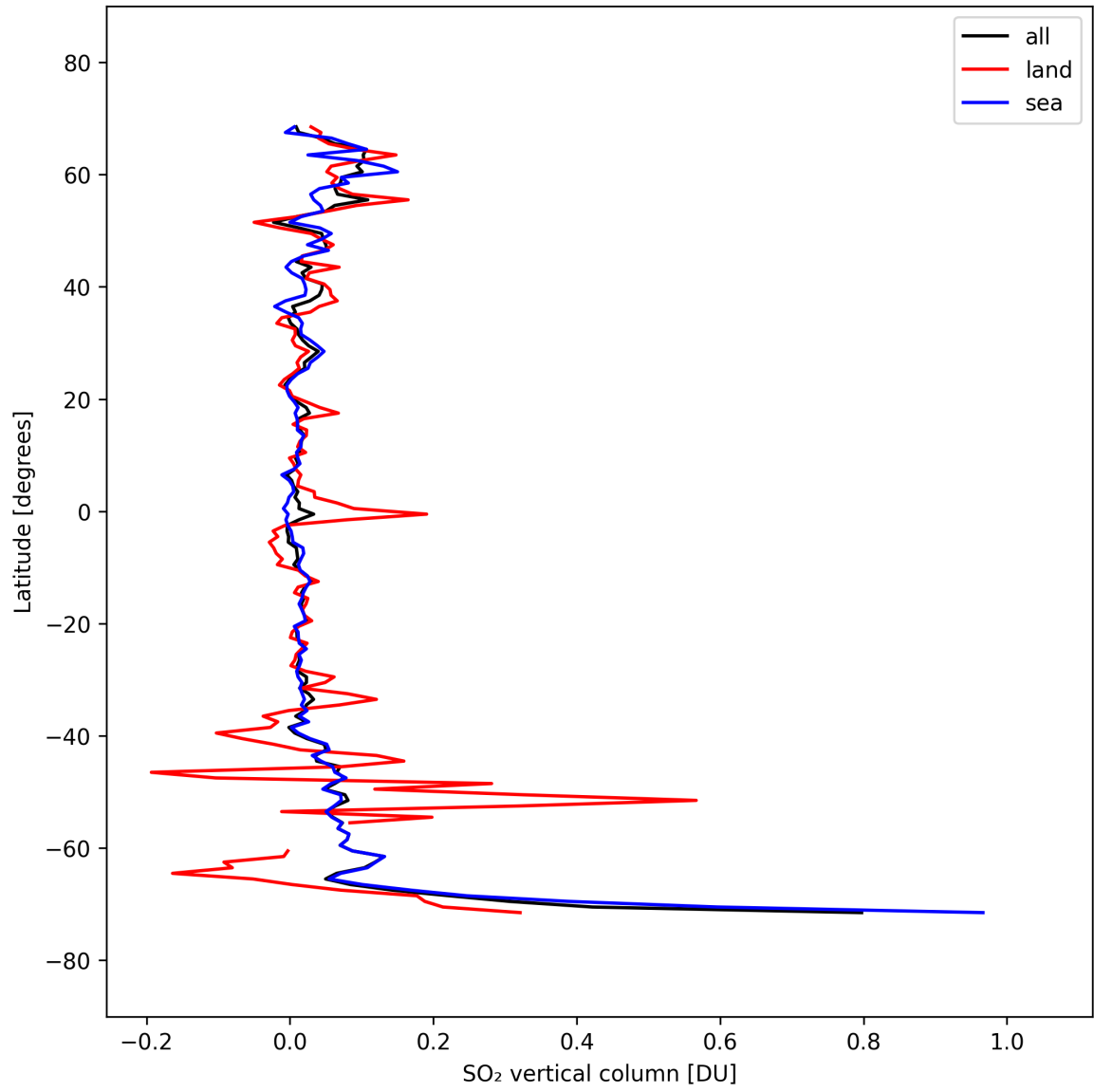


Figure 31: Zonal average of “SO₂ vertical column” for 2025-09-27 to 2025-09-28.

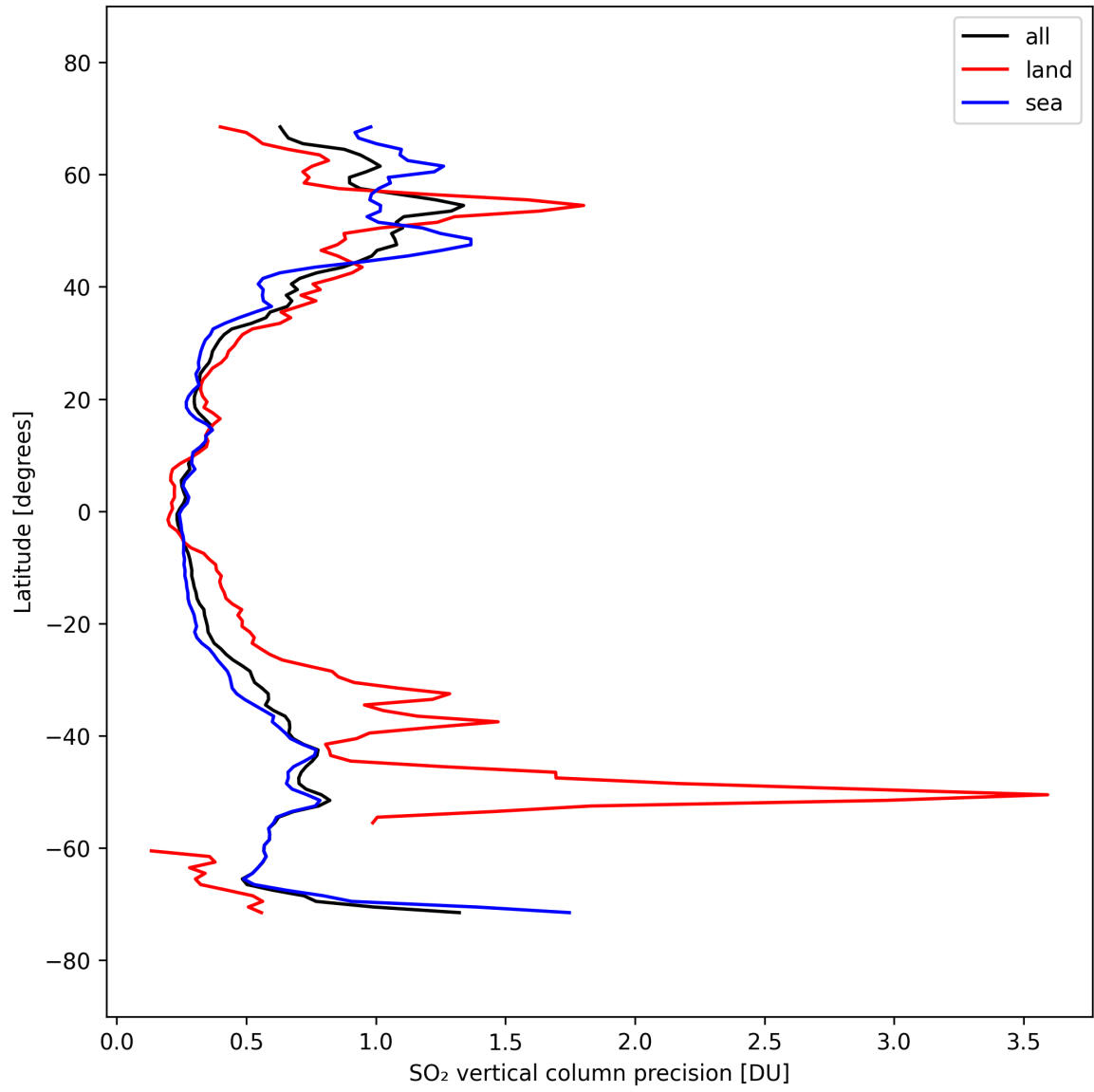


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-09-27 to 2025-09-28.

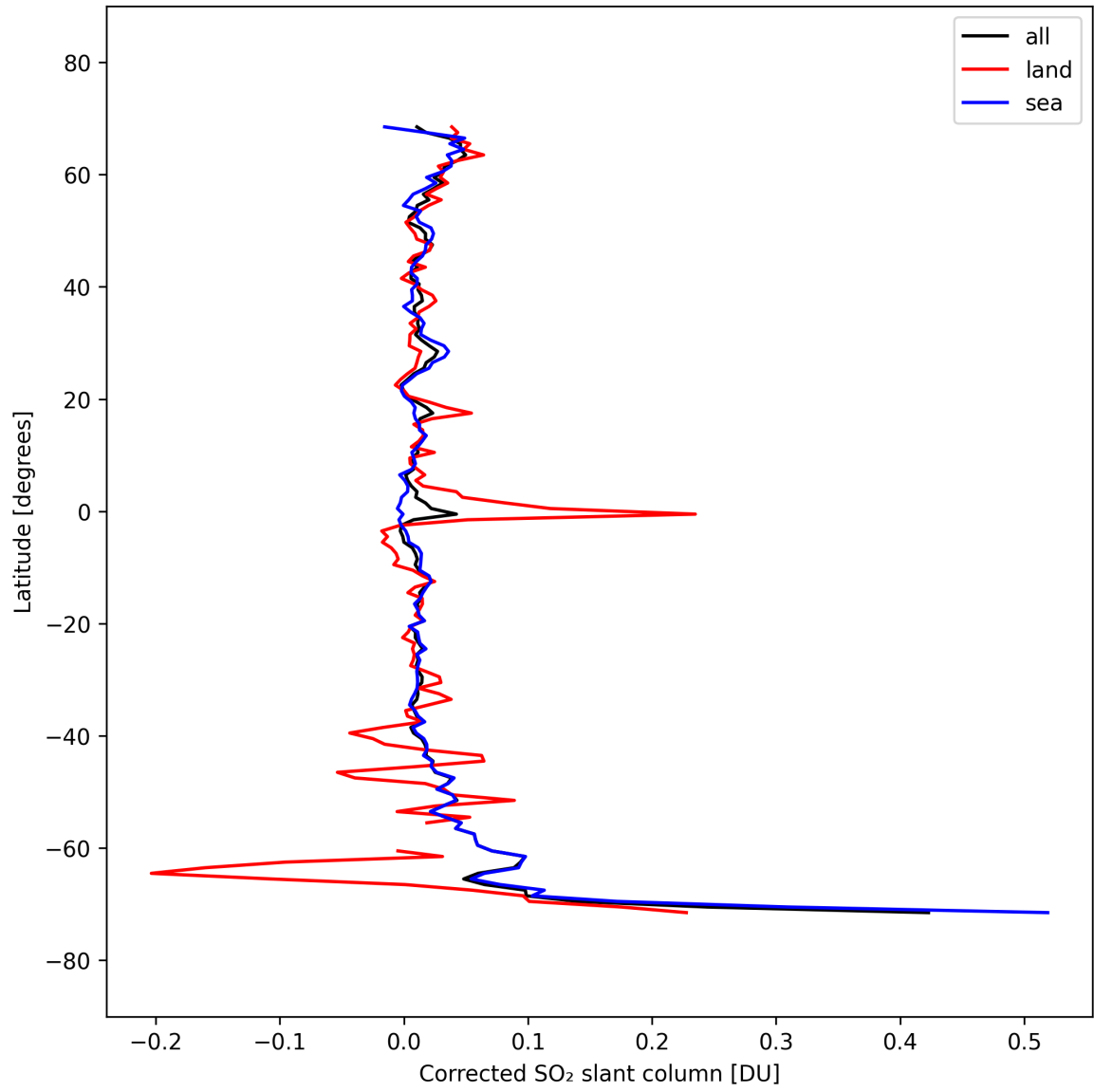


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-09-27 to 2025-09-28.

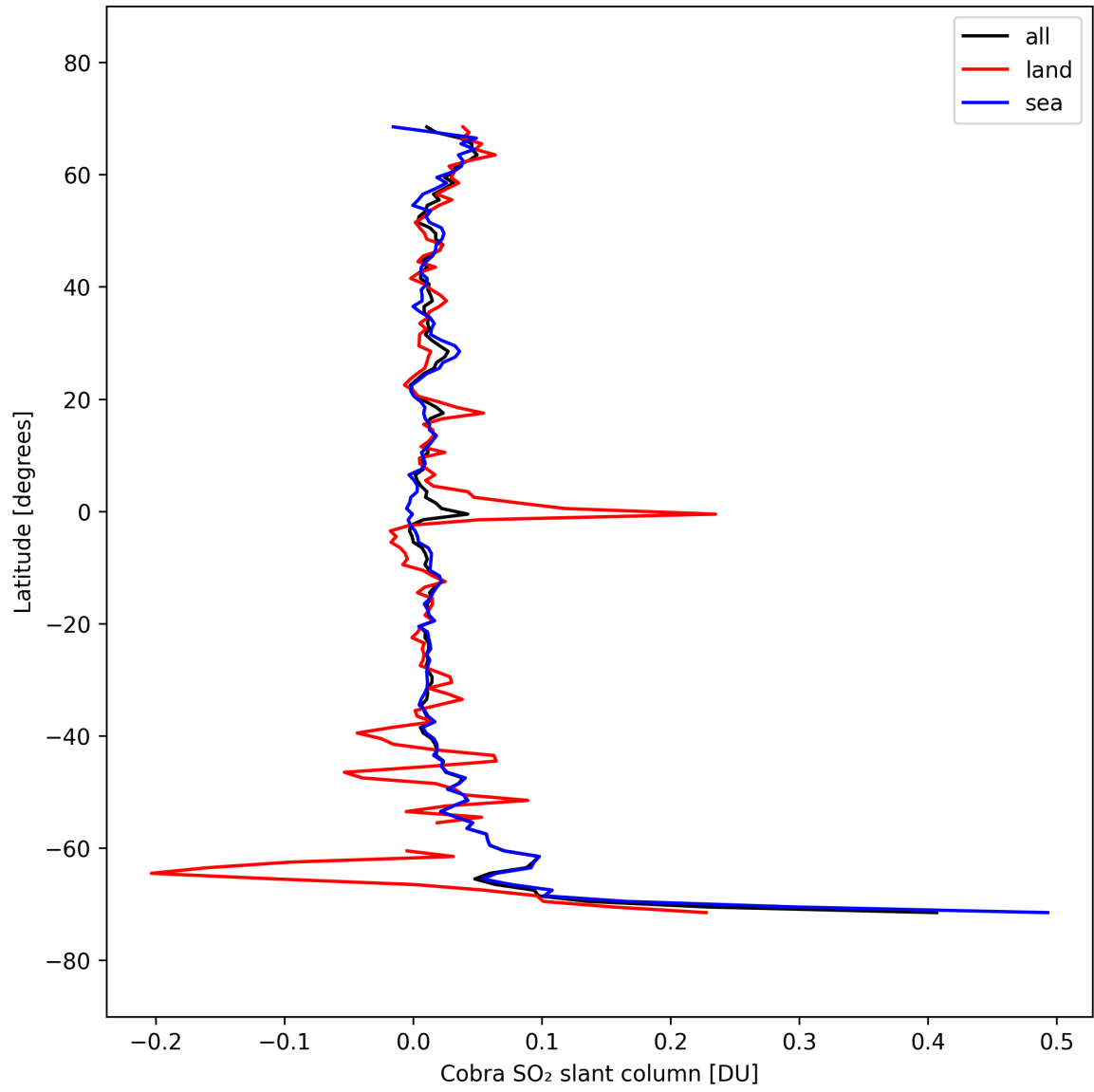


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-09-27 to 2025-09-28.

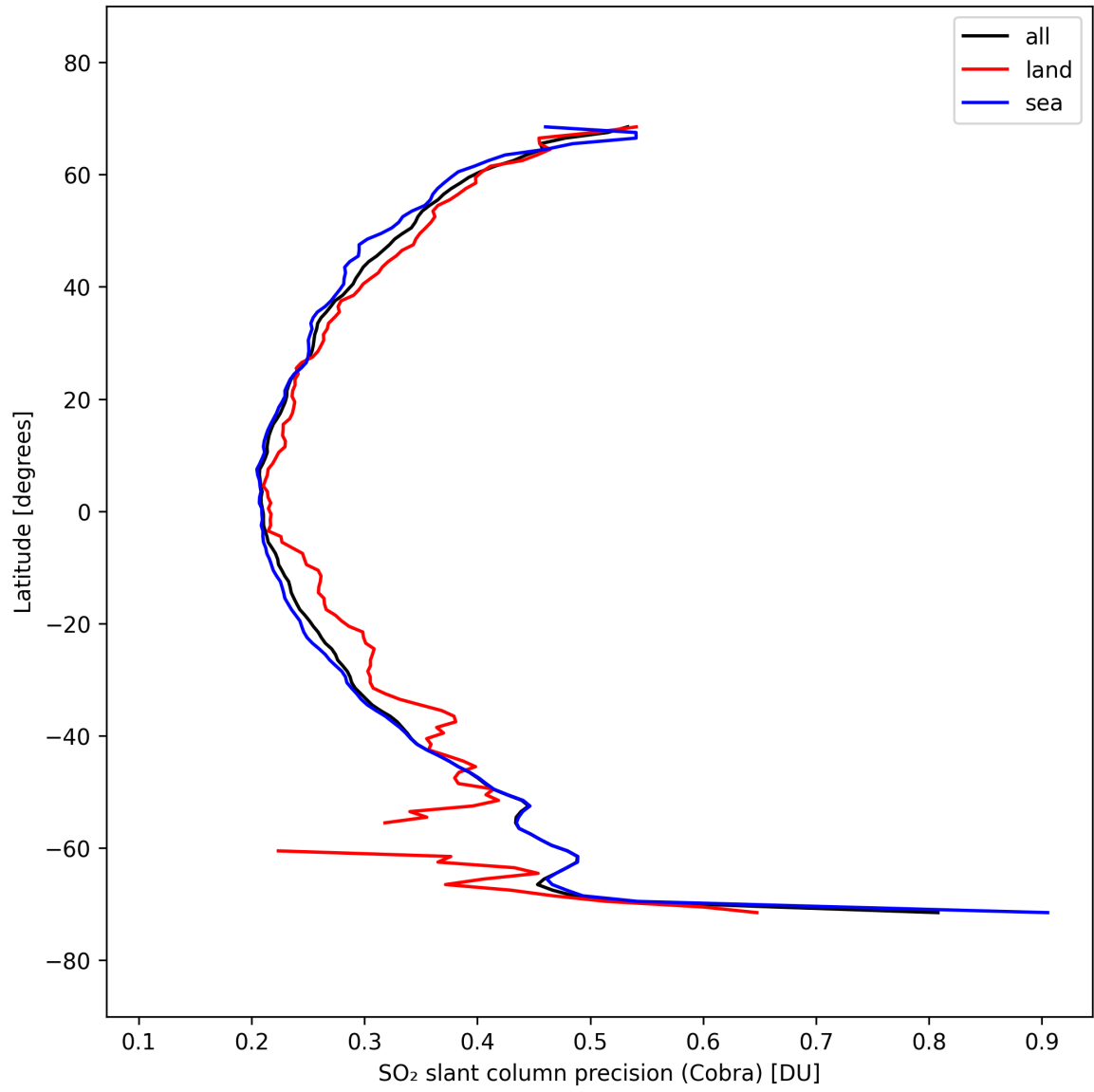


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-09-27 to 2025-09-28.

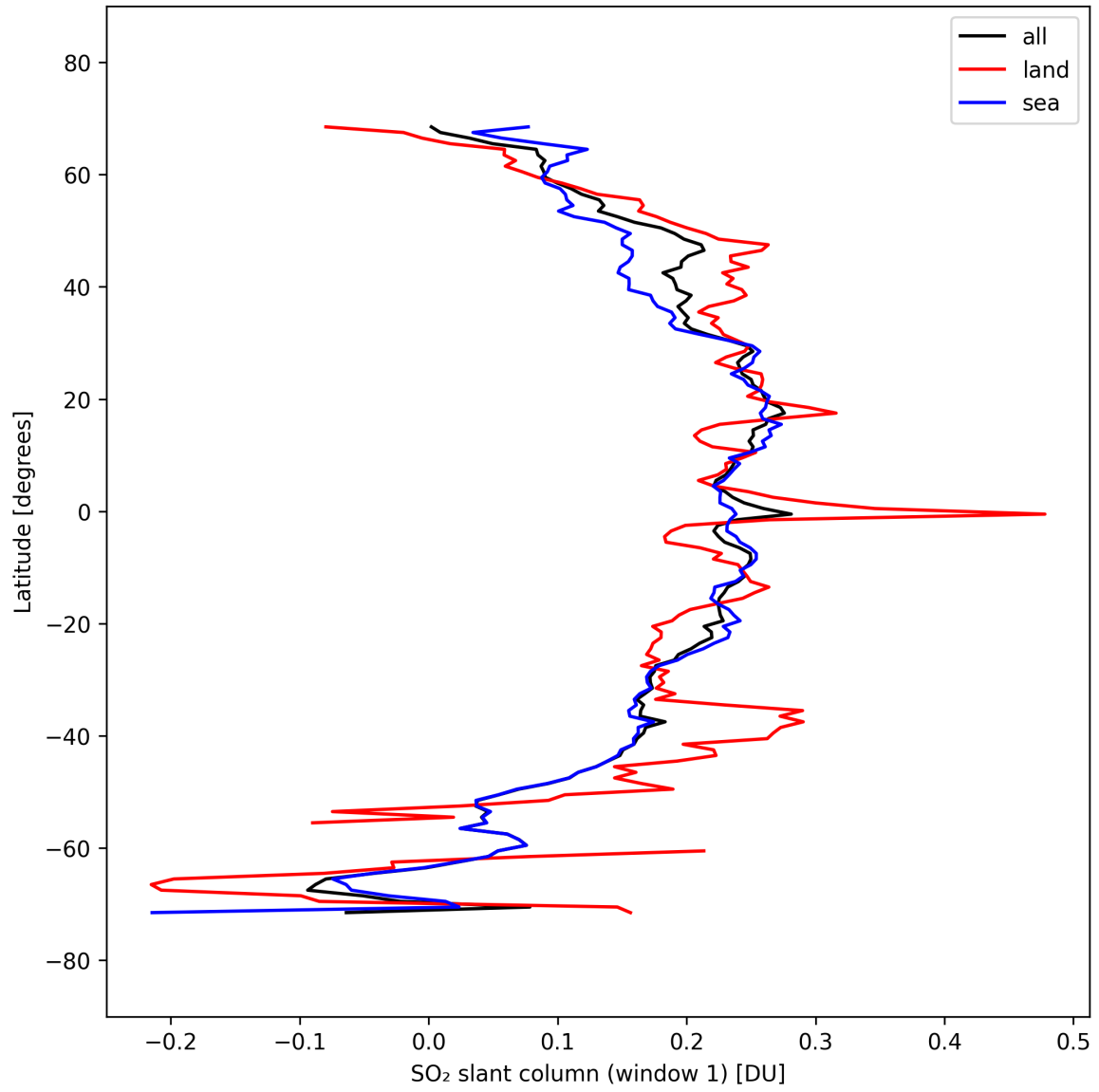


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-09-27 to 2025-09-28.

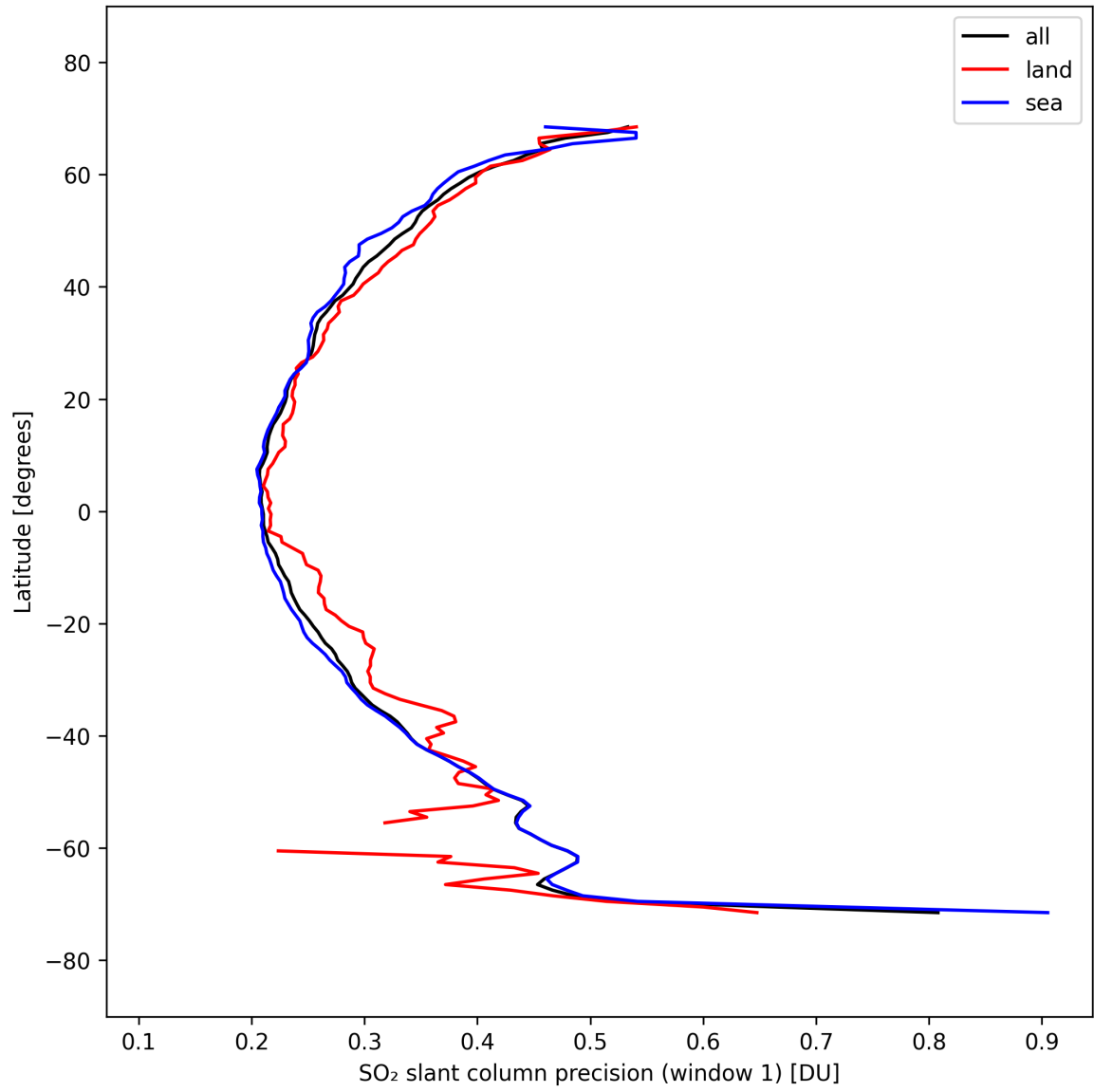


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-09-27 to 2025-09-28.

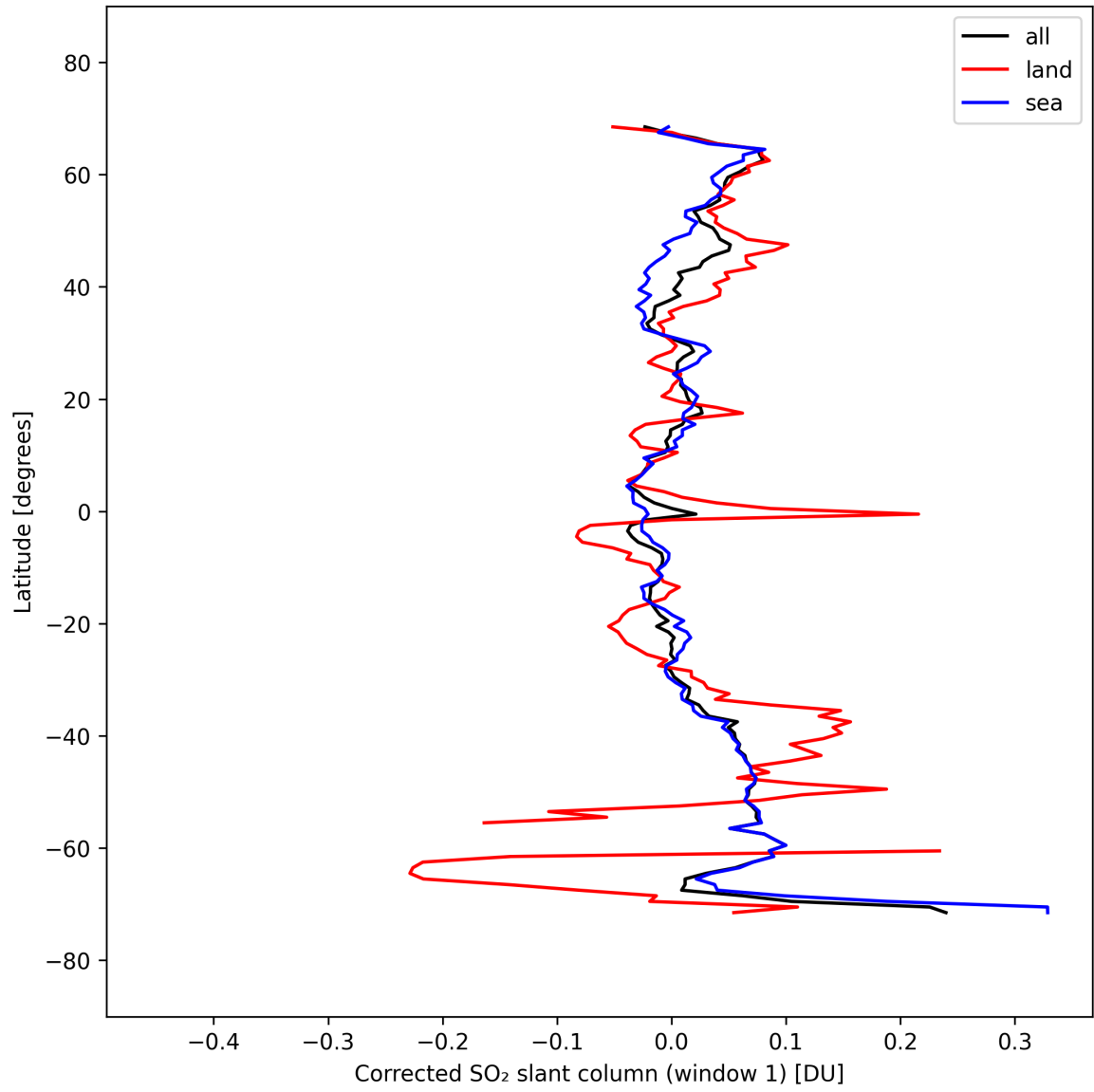


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-09-27 to 2025-09-28.

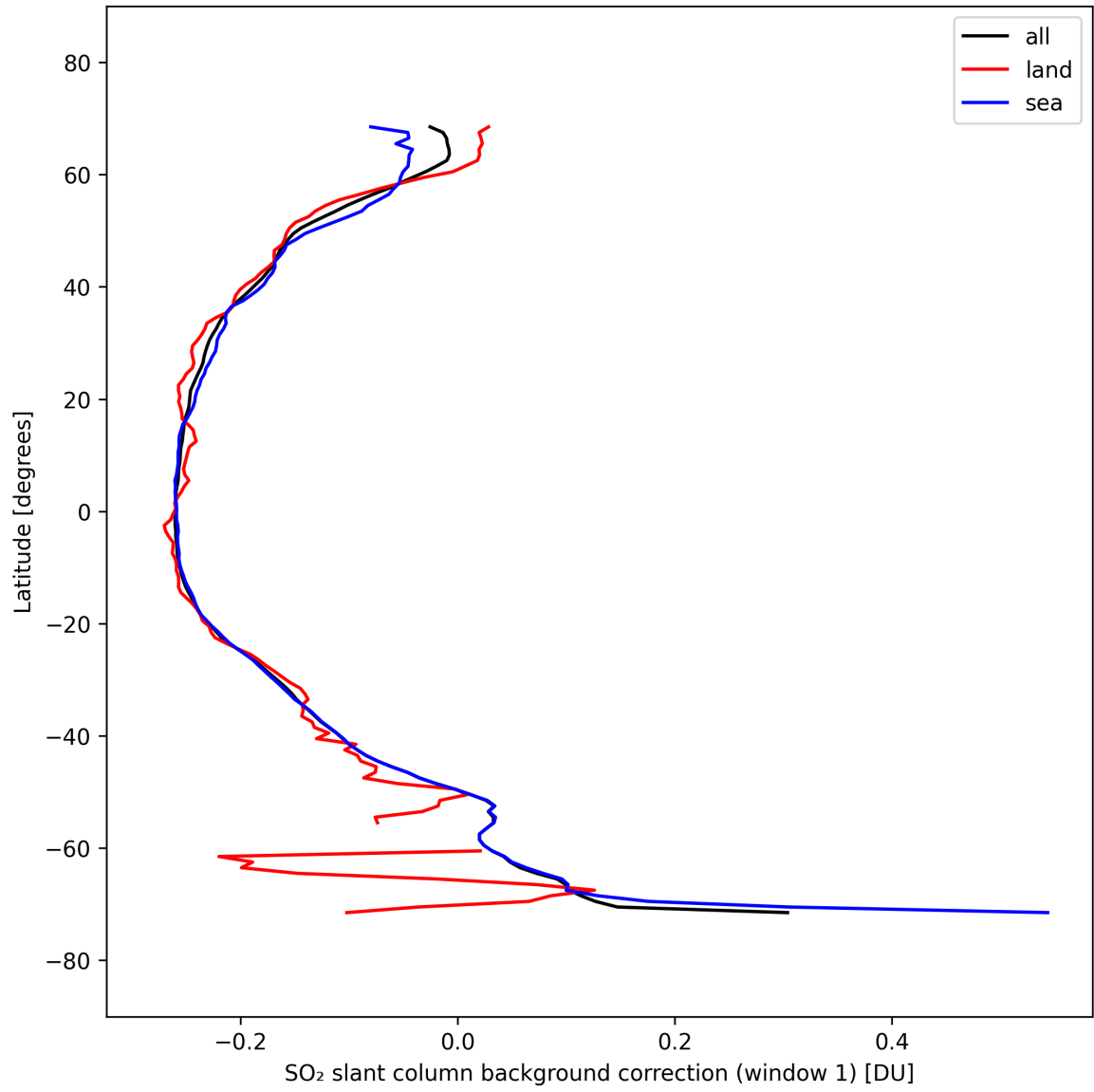


Figure 39: Zonal average of "SO₂ slant column background correction (window 1)" for 2025-09-27 to 2025-09-28.

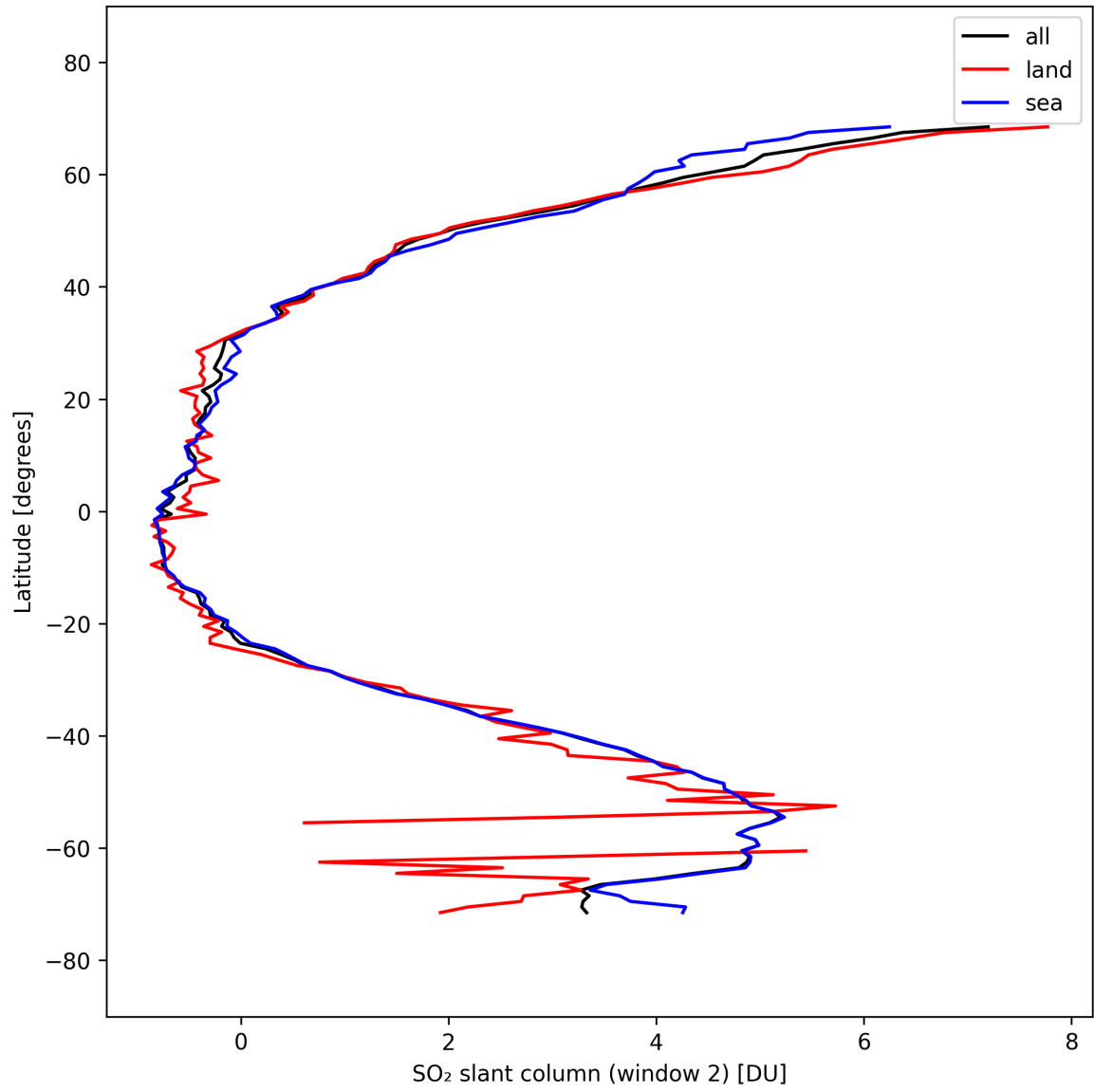


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-09-27 to 2025-09-28.

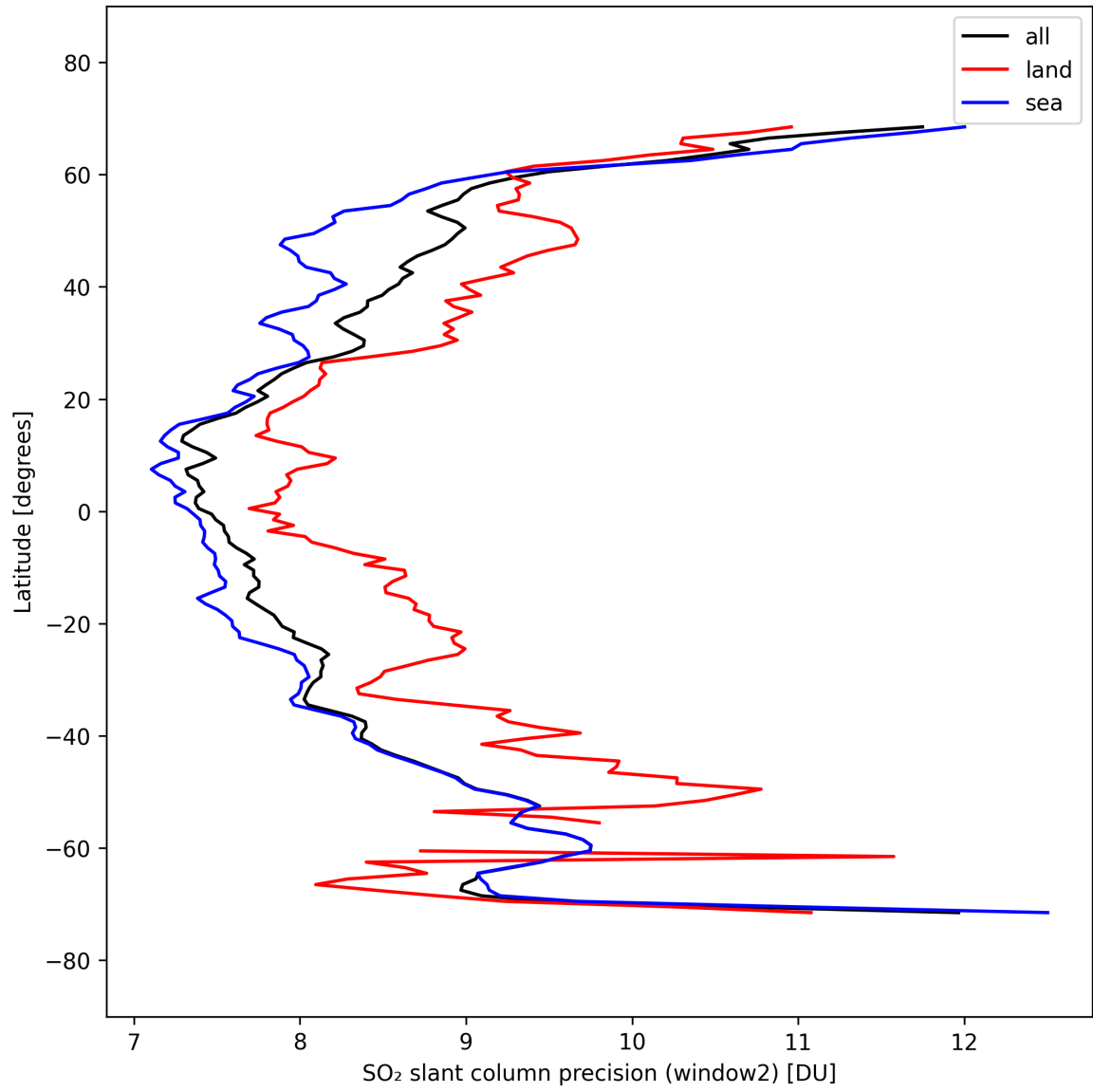


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-09-27 to 2025-09-28.

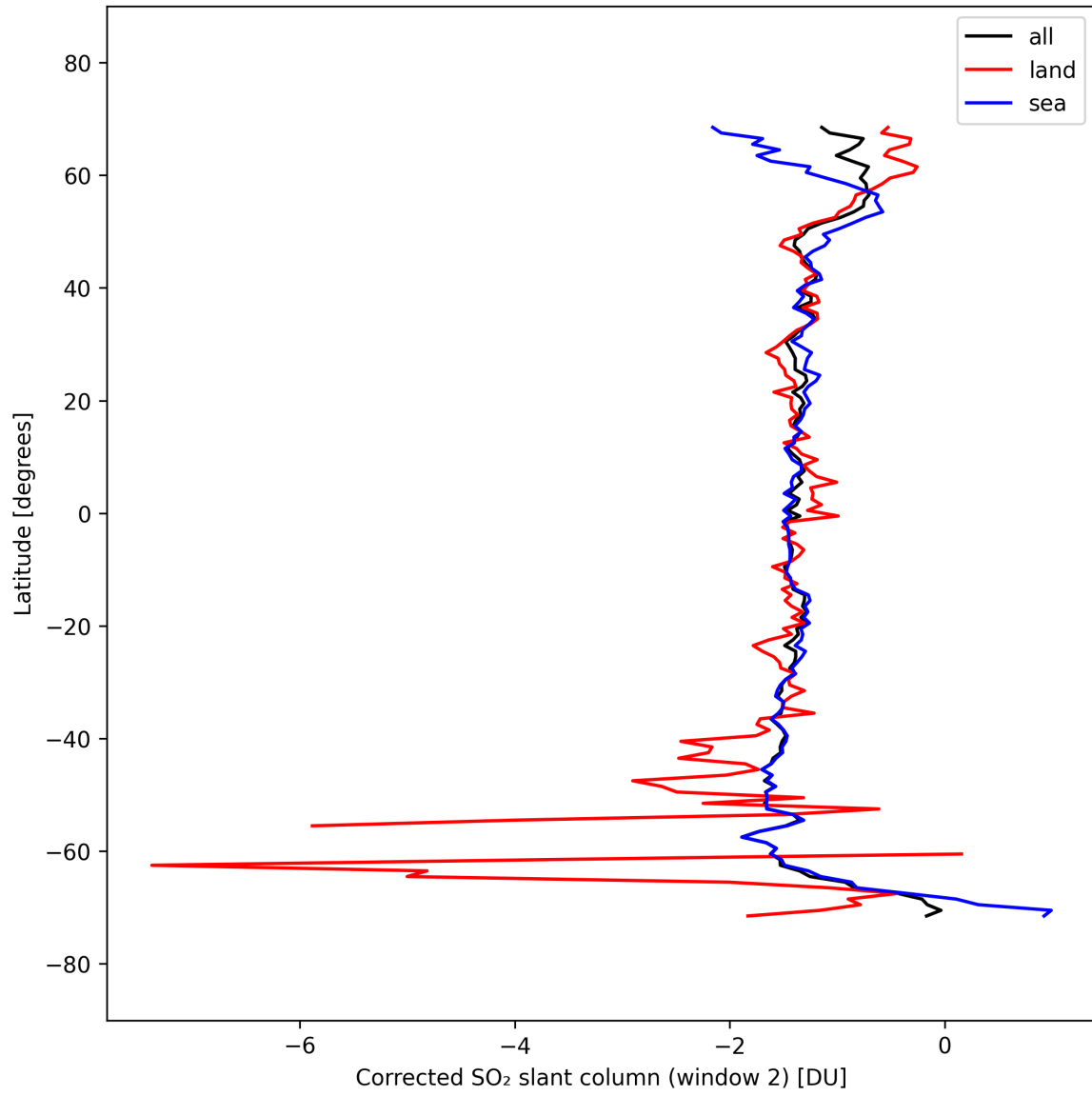


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-09-27 to 2025-09-28.

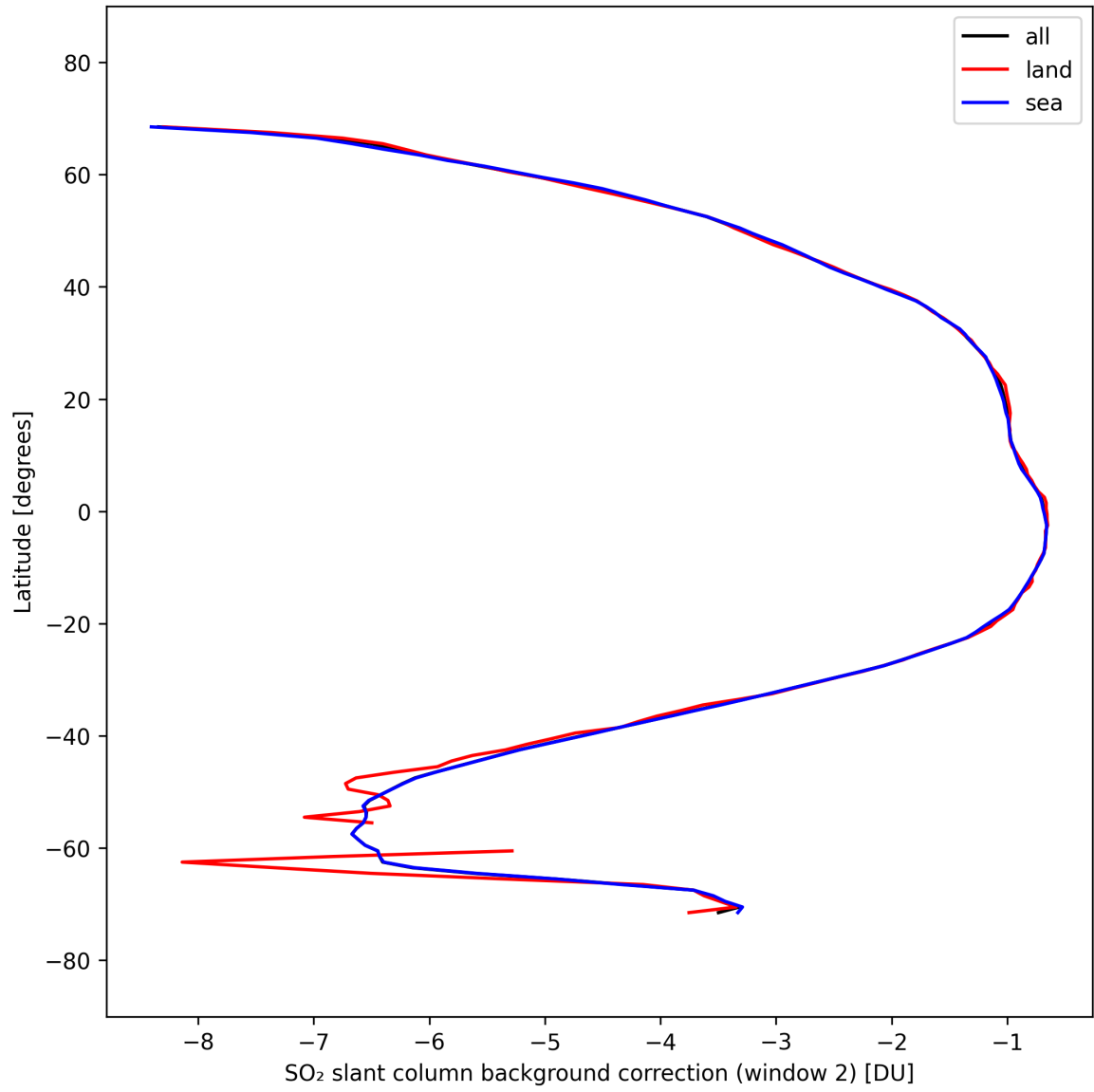


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-09-27 to 2025-09-28.

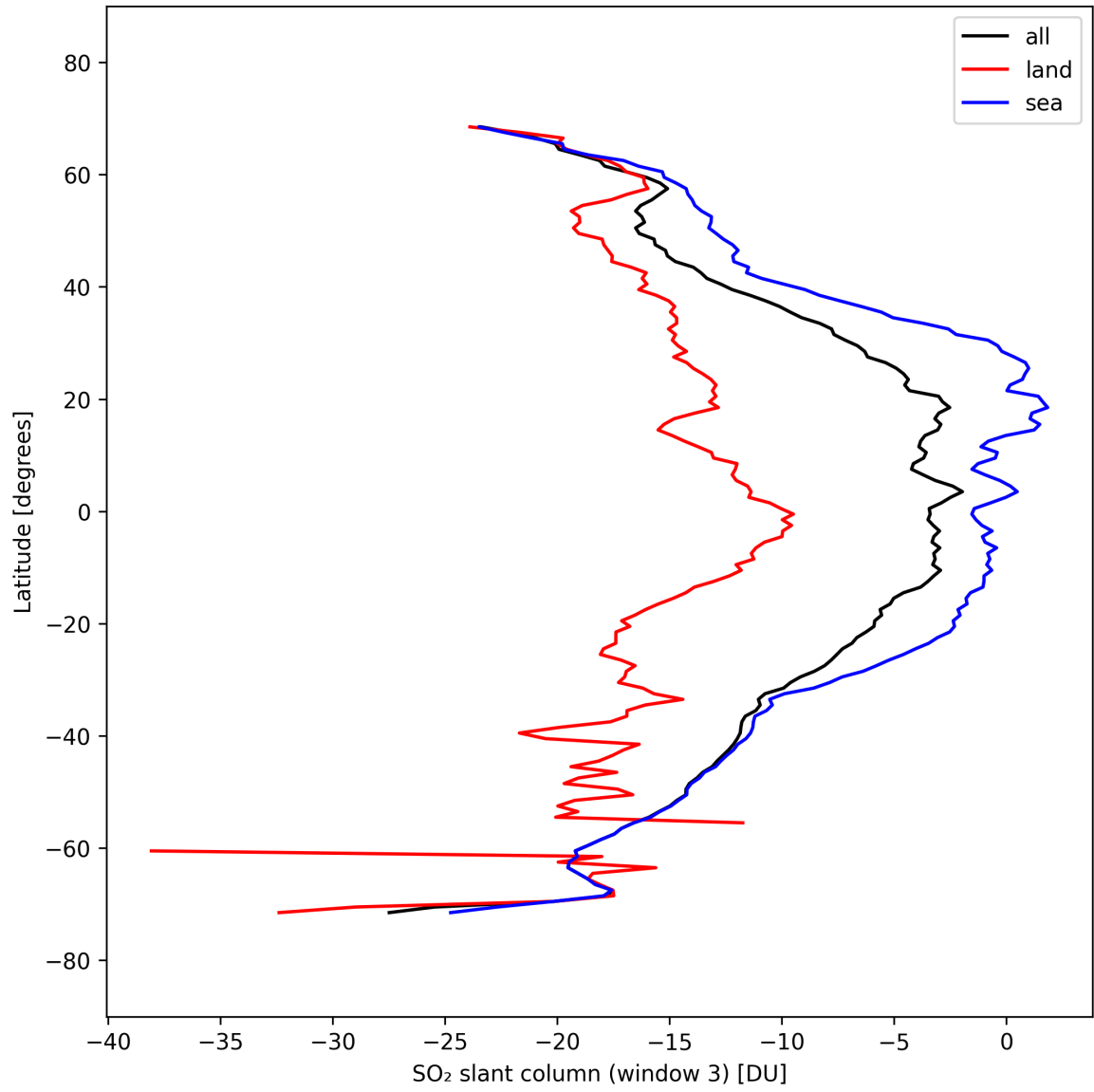


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-09-27 to 2025-09-28.

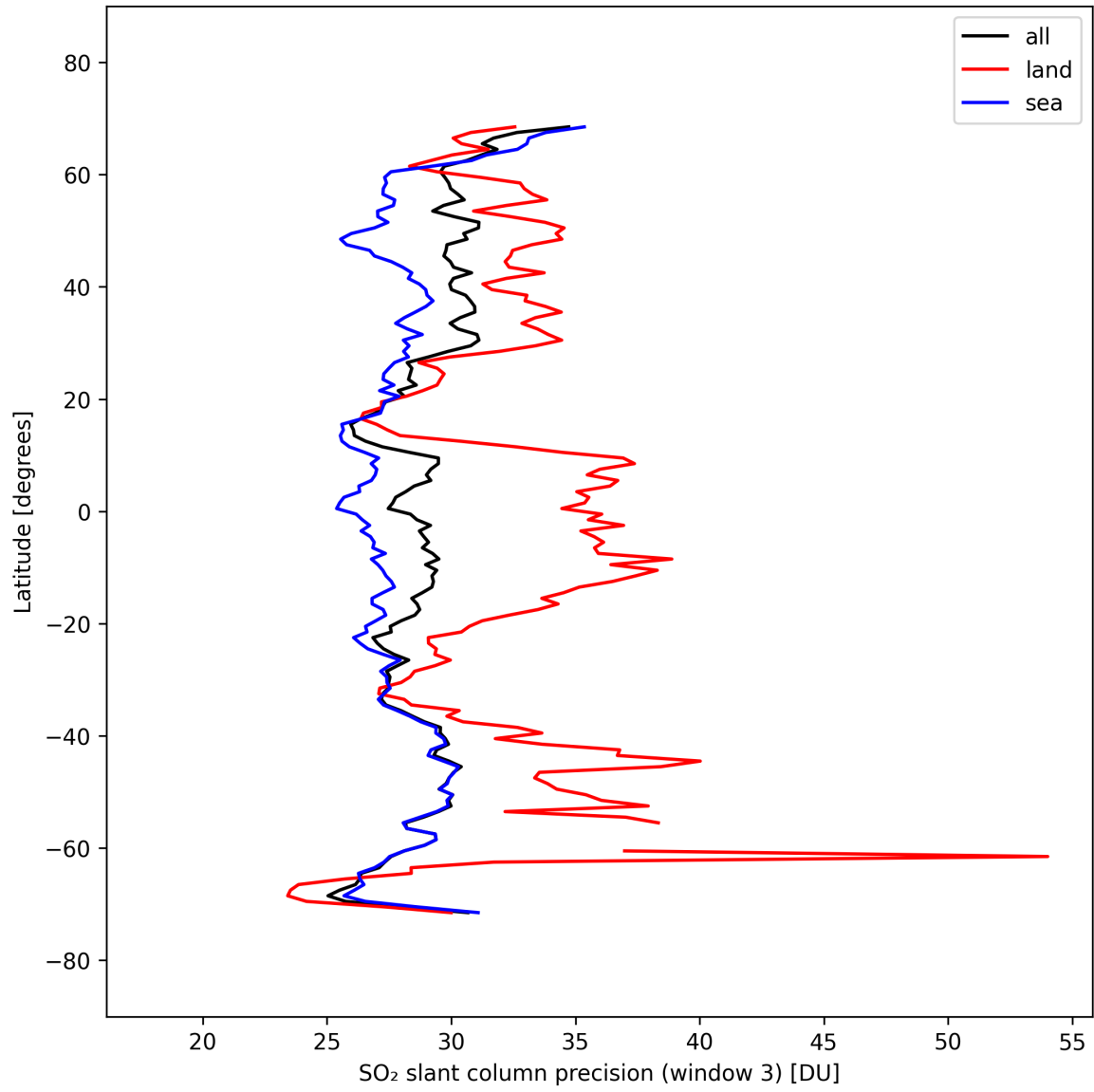


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-09-27 to 2025-09-28.

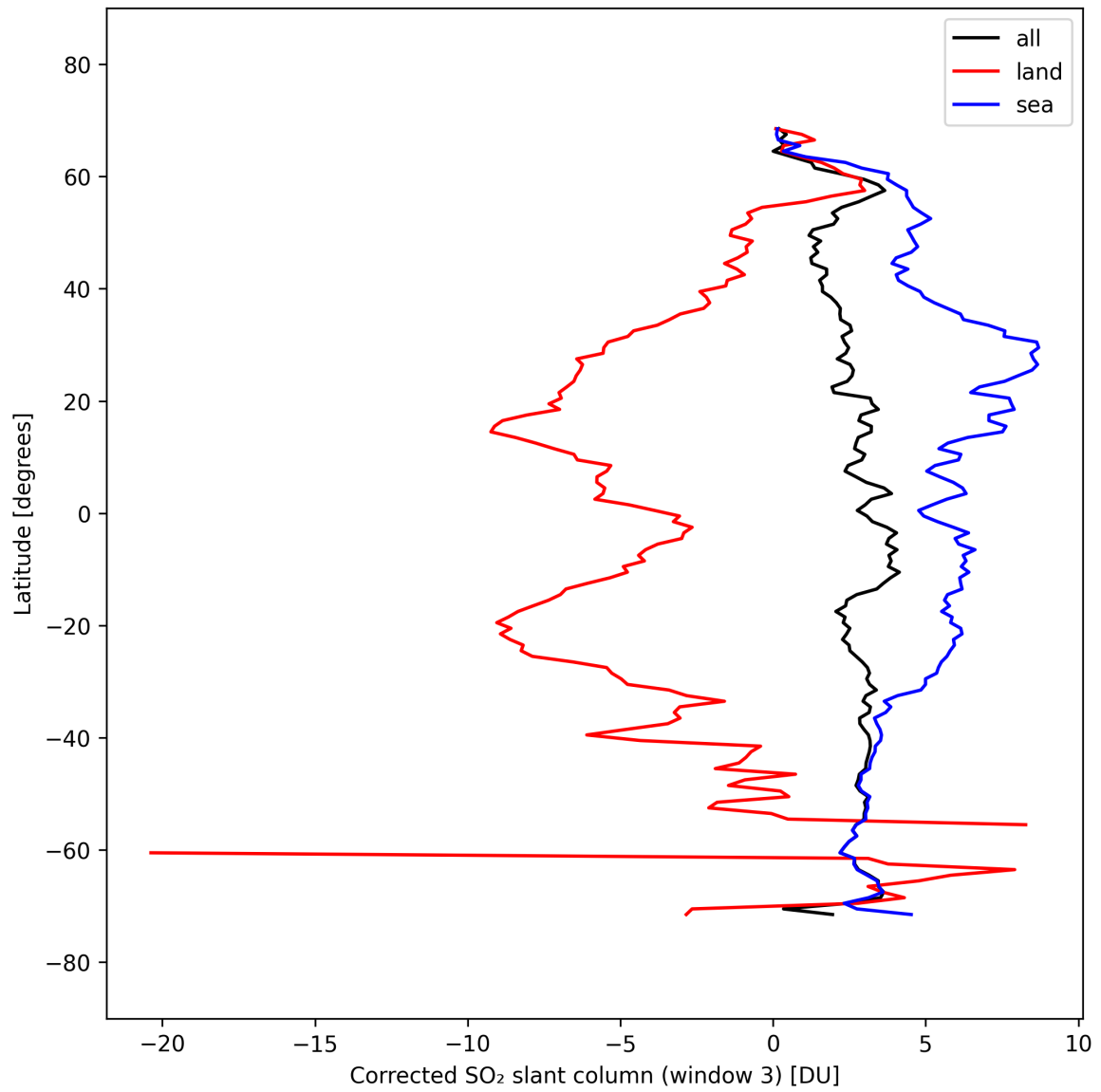


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-09-27 to 2025-09-28.

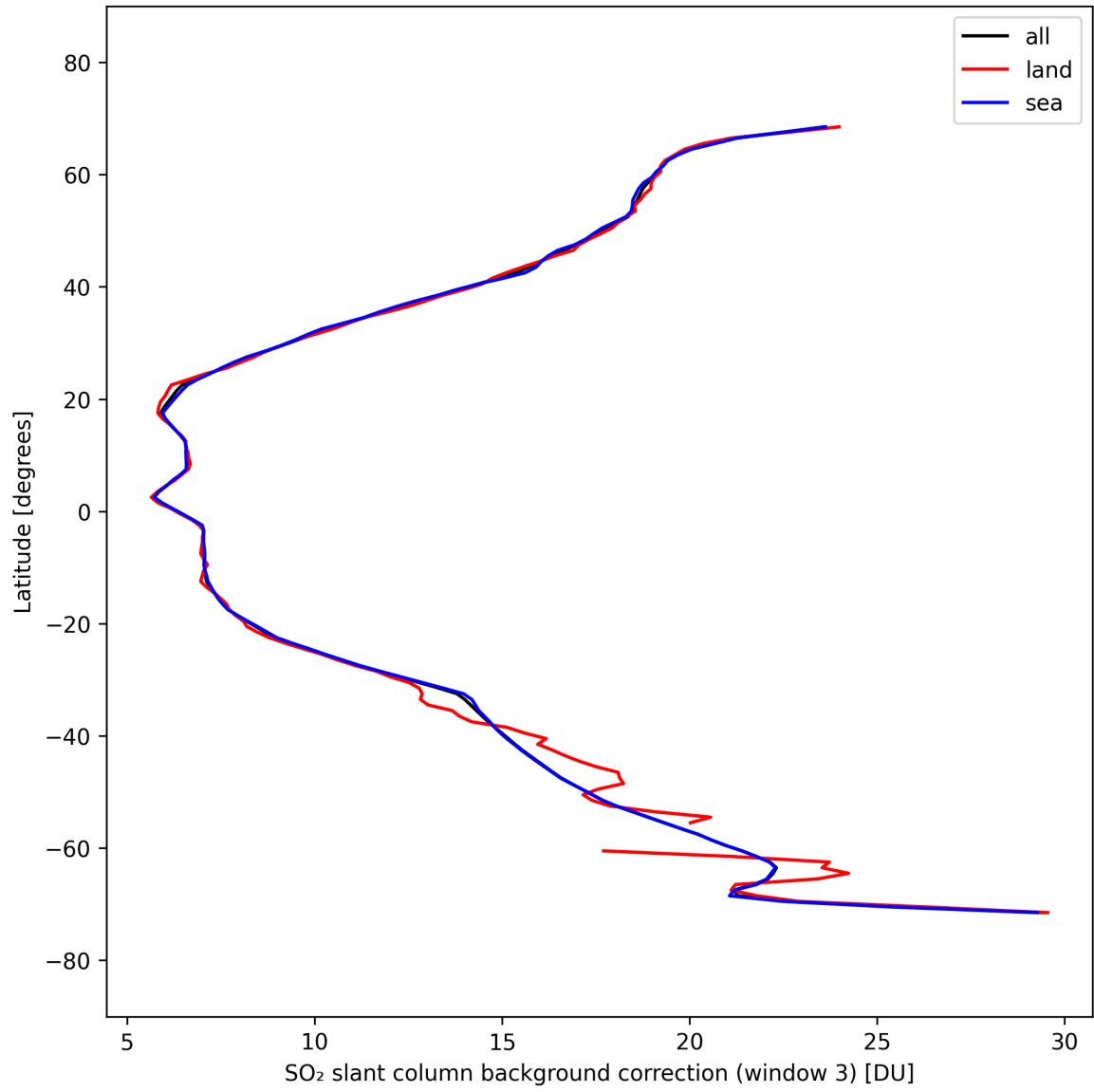


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-09-27 to 2025-09-28.

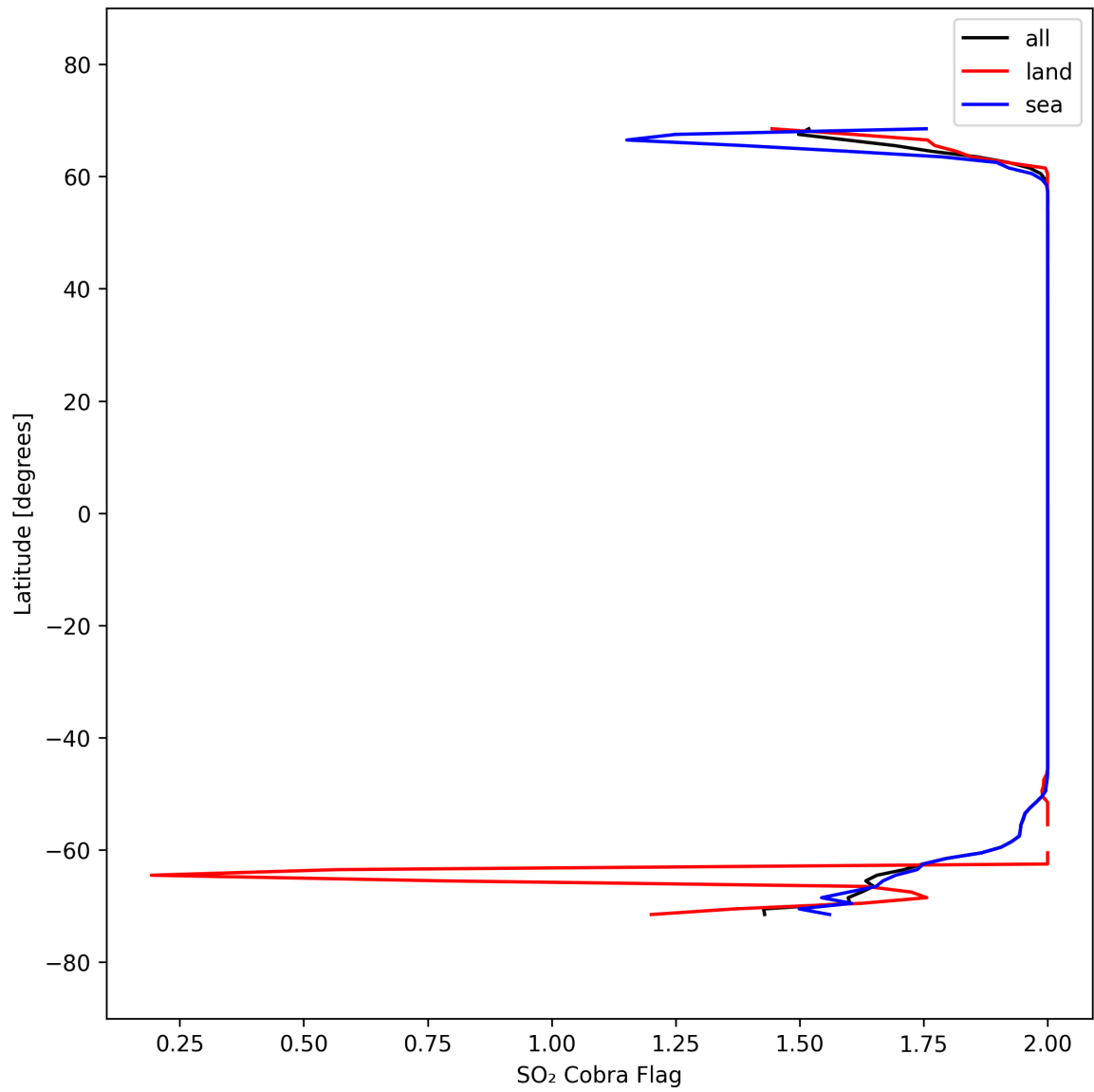


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-09-27 to 2025-09-28.

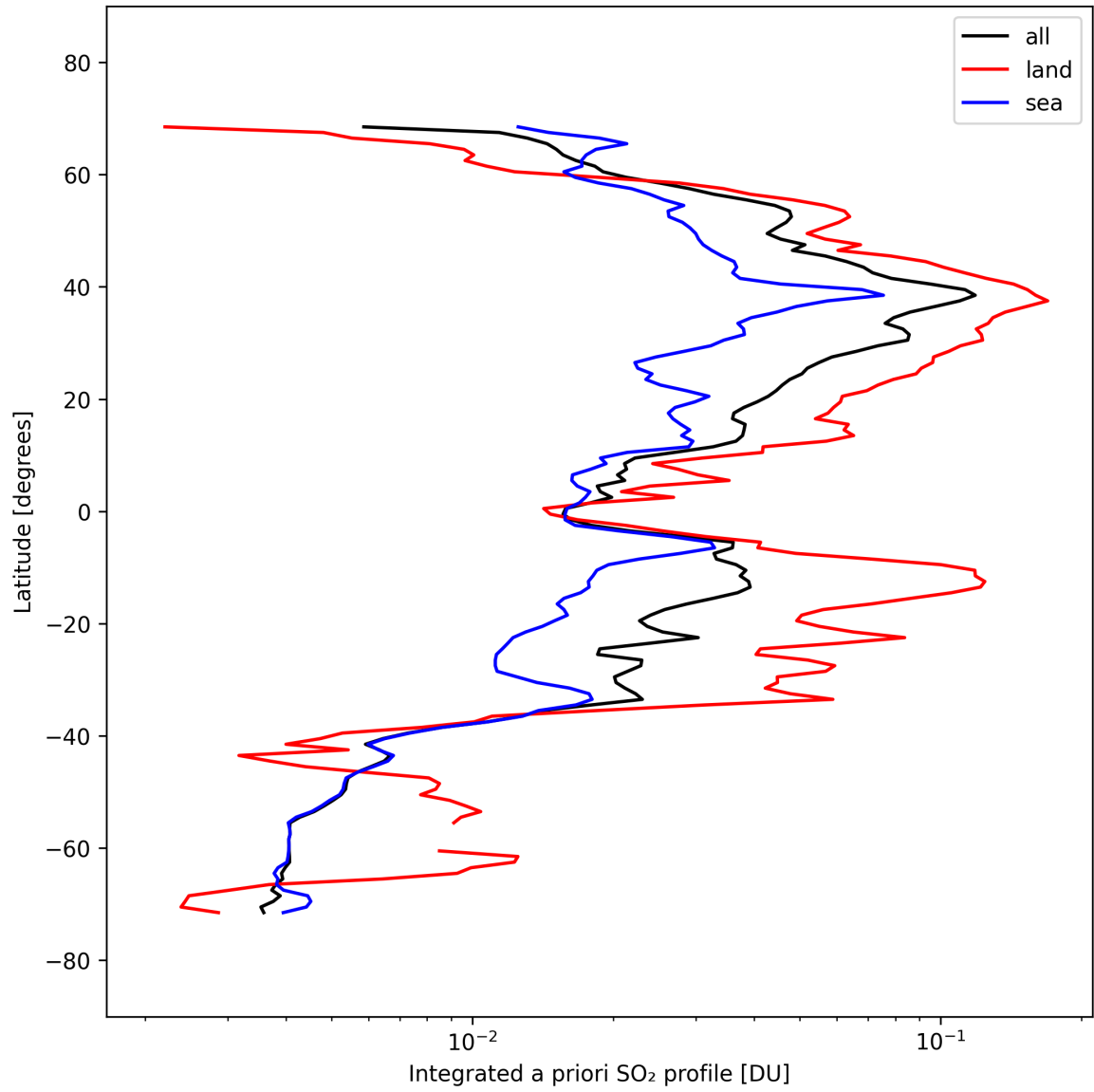


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-09-27 to 2025-09-28.

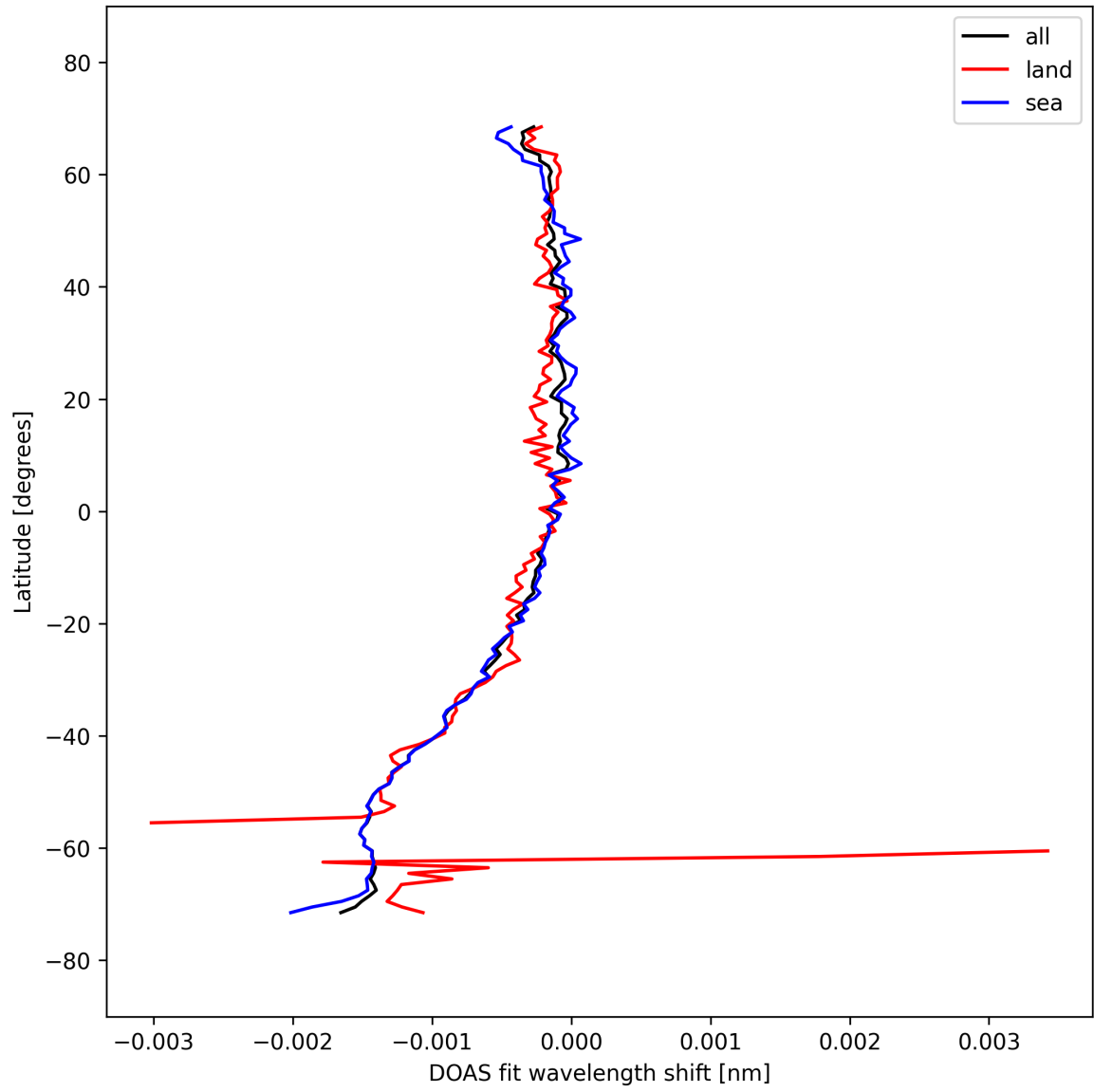


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-09-27 to 2025-09-28.

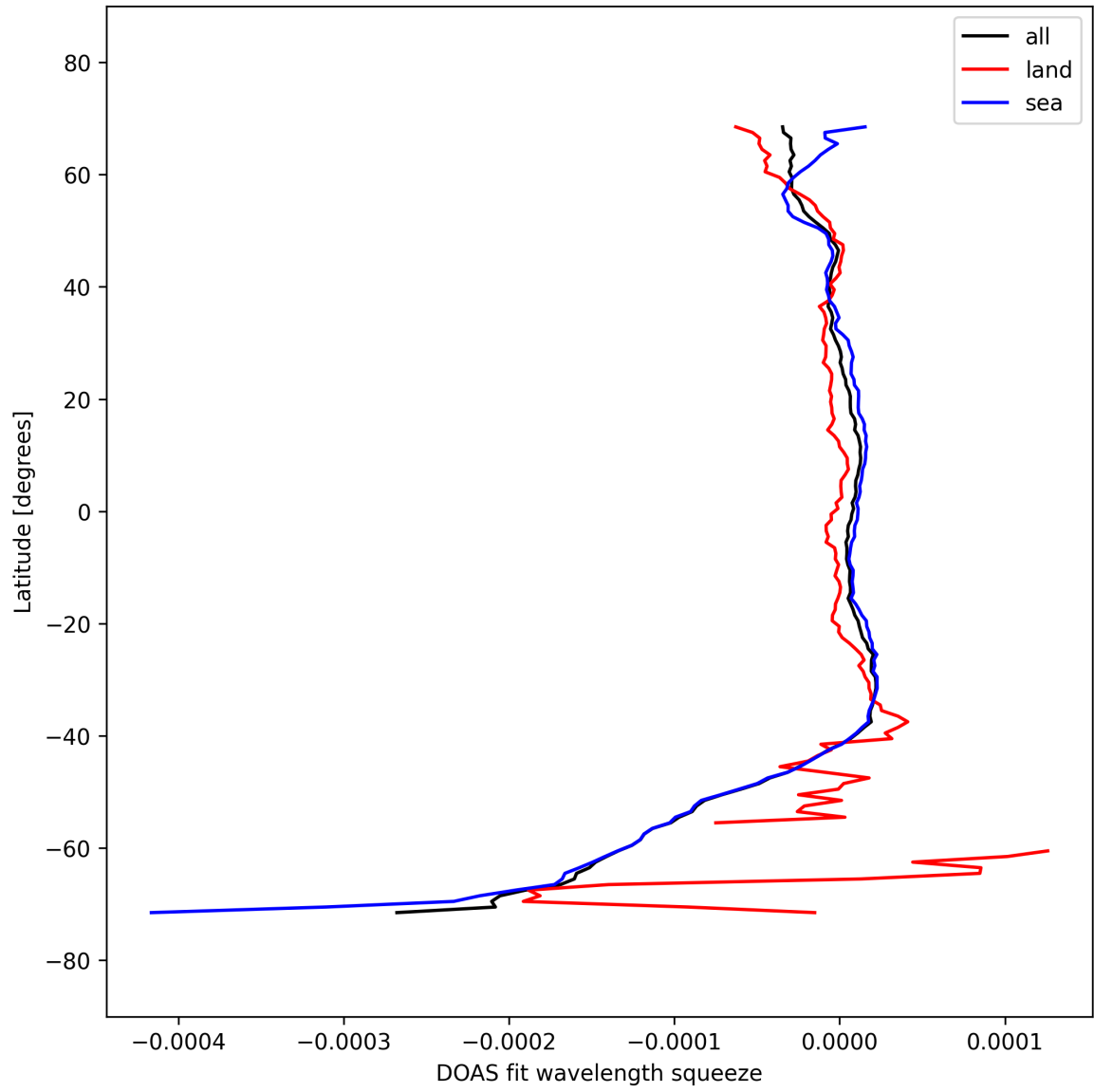


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-09-27 to 2025-09-28.

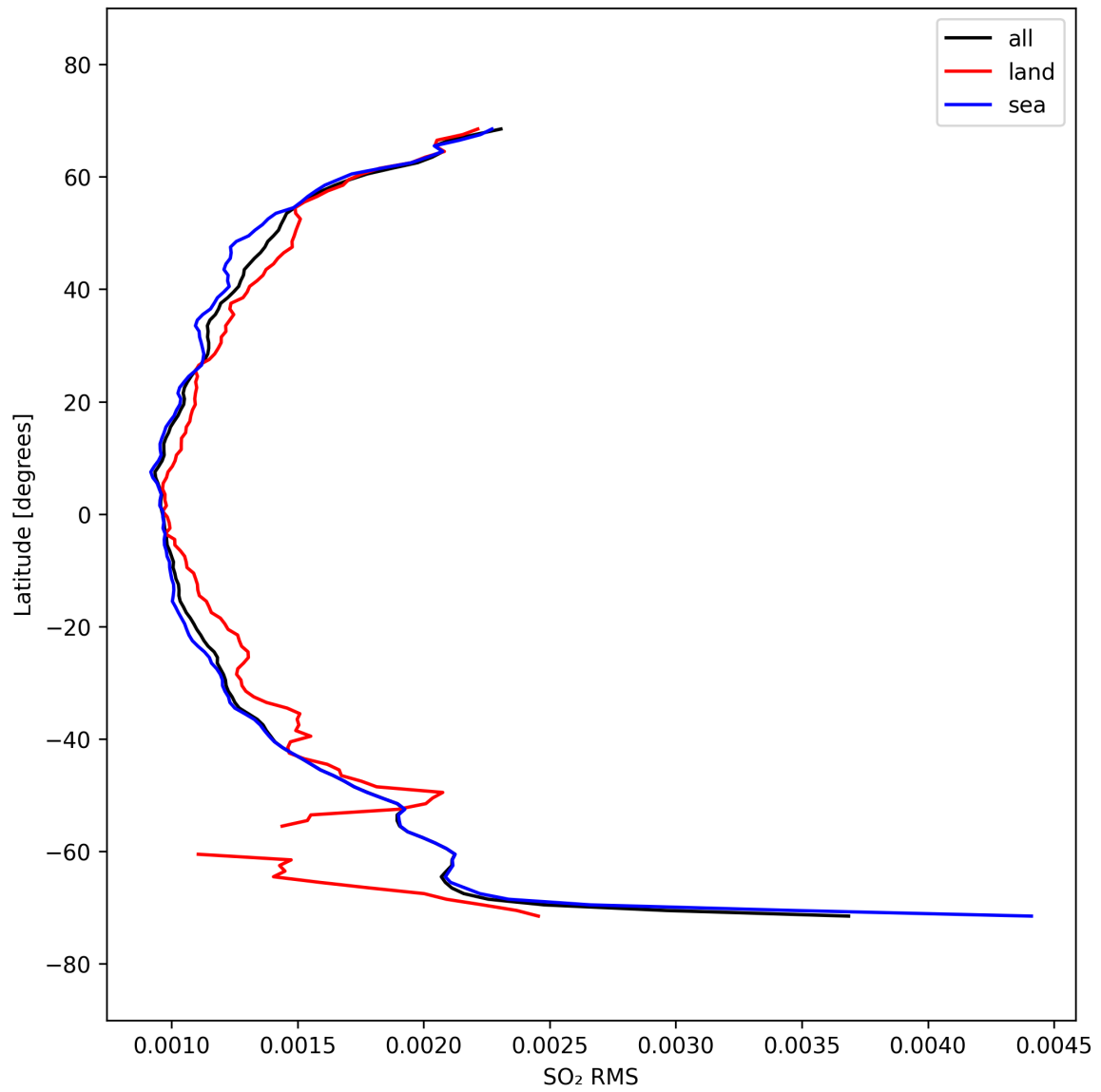


Figure 52: Zonal average of “SO₂ RMS” for 2025-09-27 to 2025-09-28.

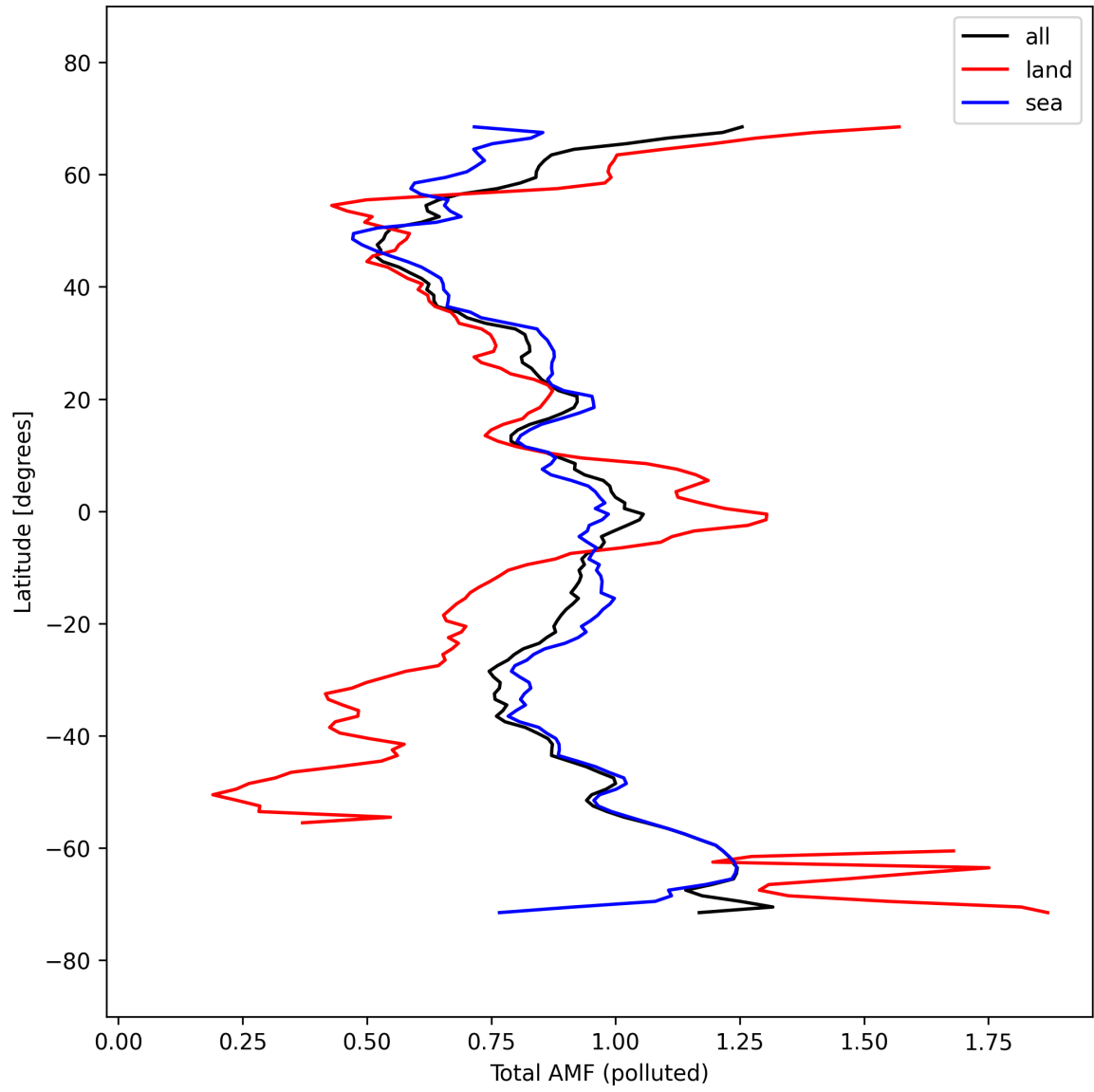


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-09-27 to 2025-09-28.

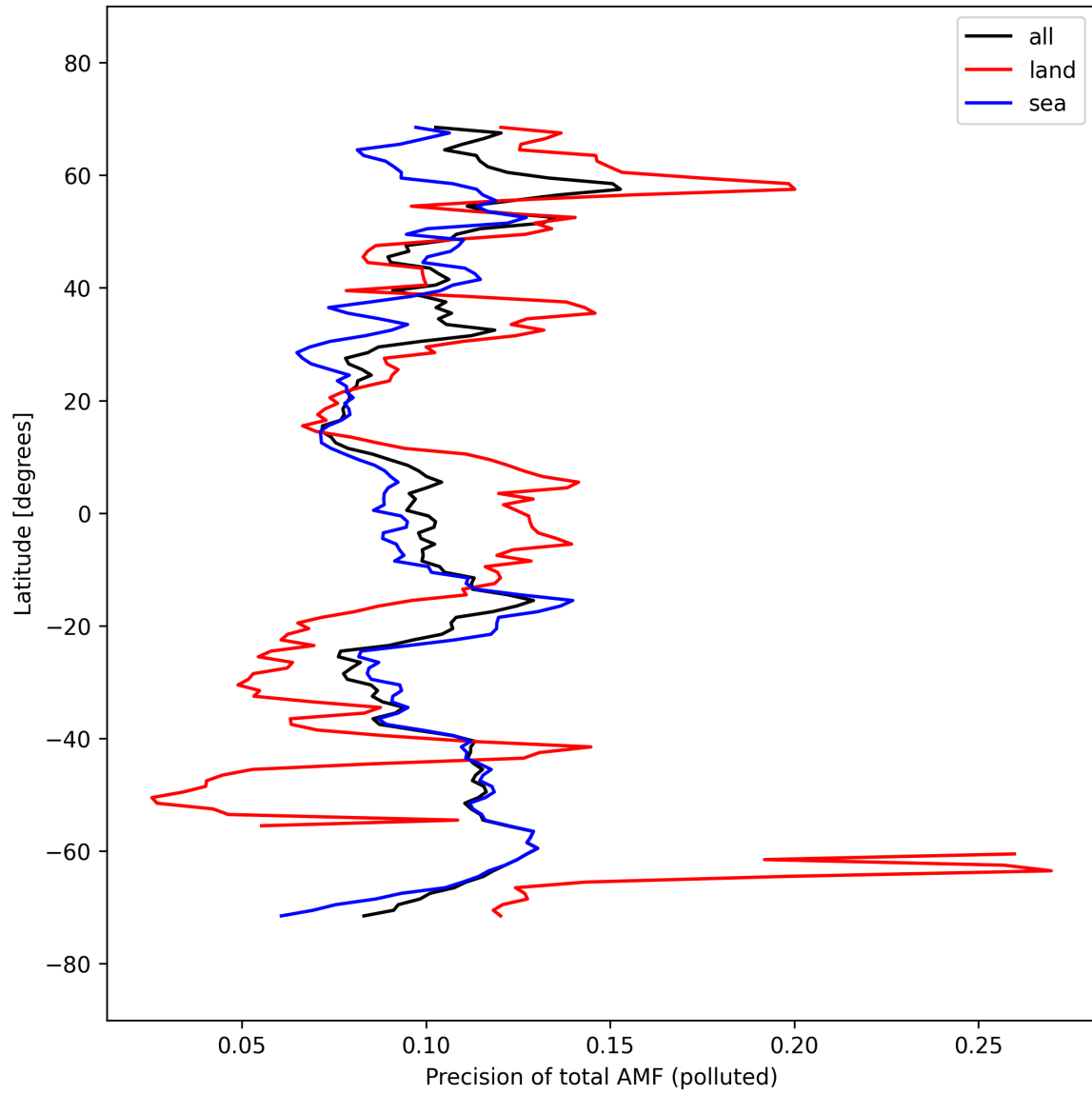


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-09-27 to 2025-09-28.

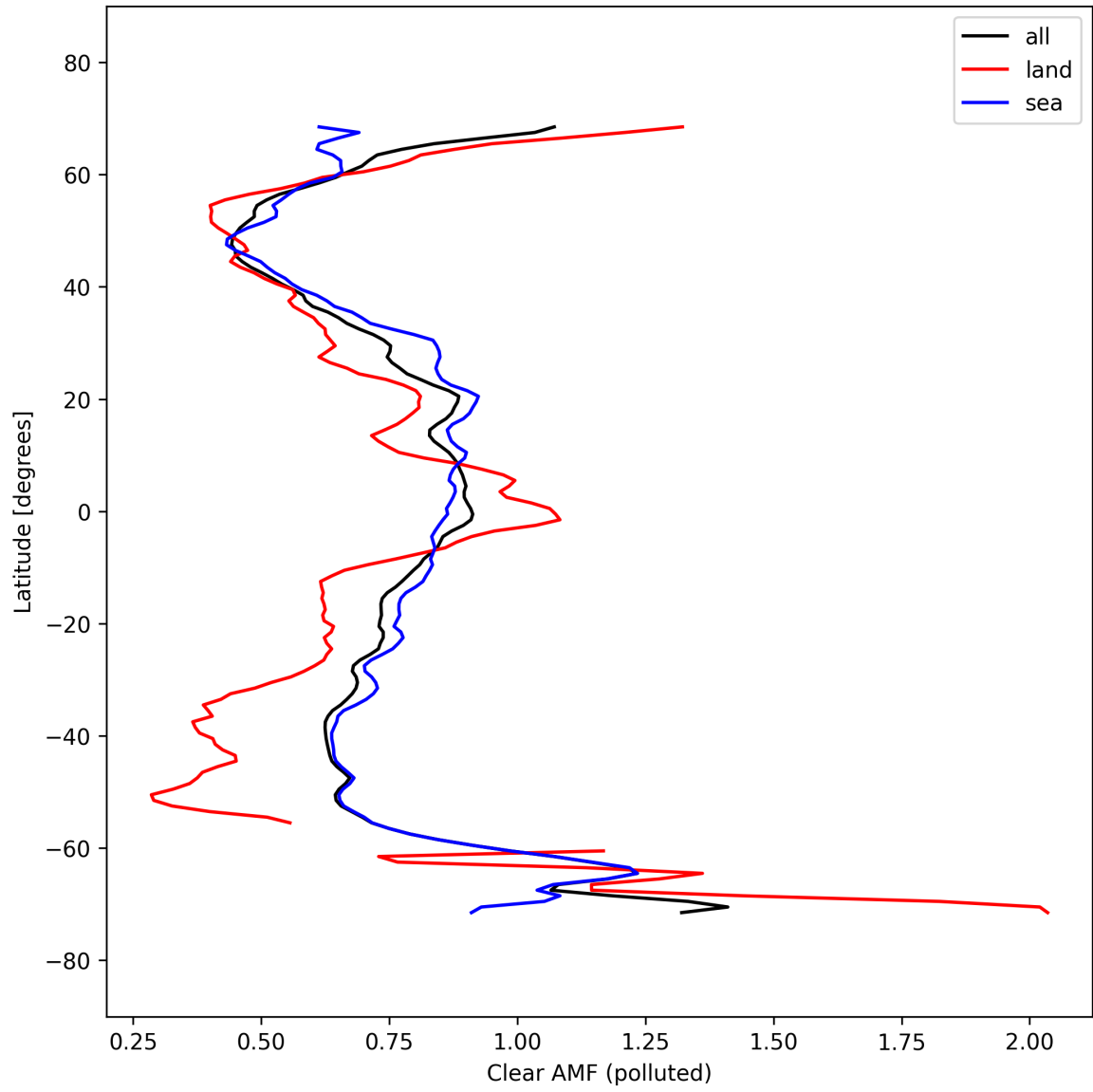


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-09-27 to 2025-09-28.

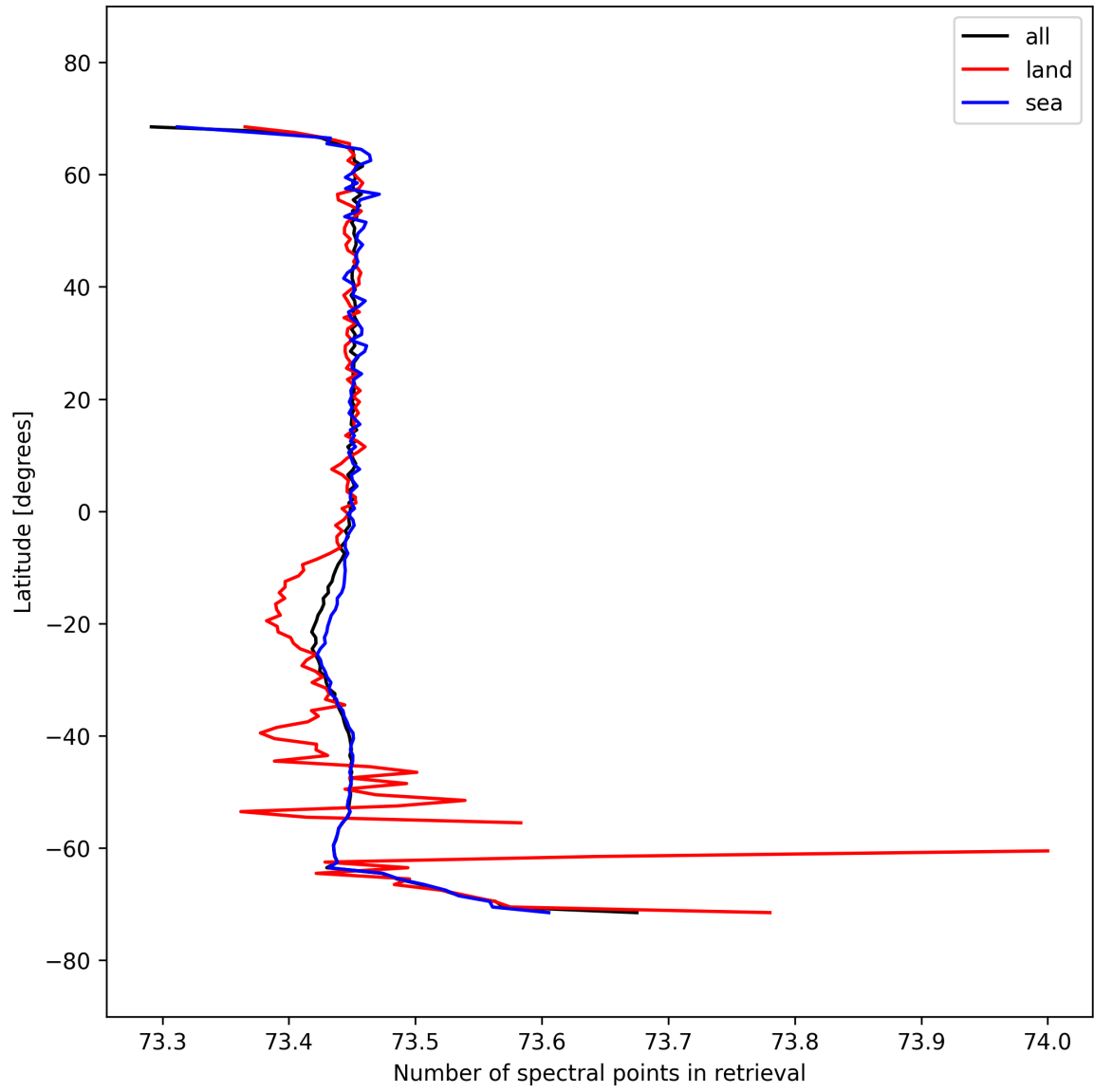


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-09-27 to 2025-09-28.

8 Histograms

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

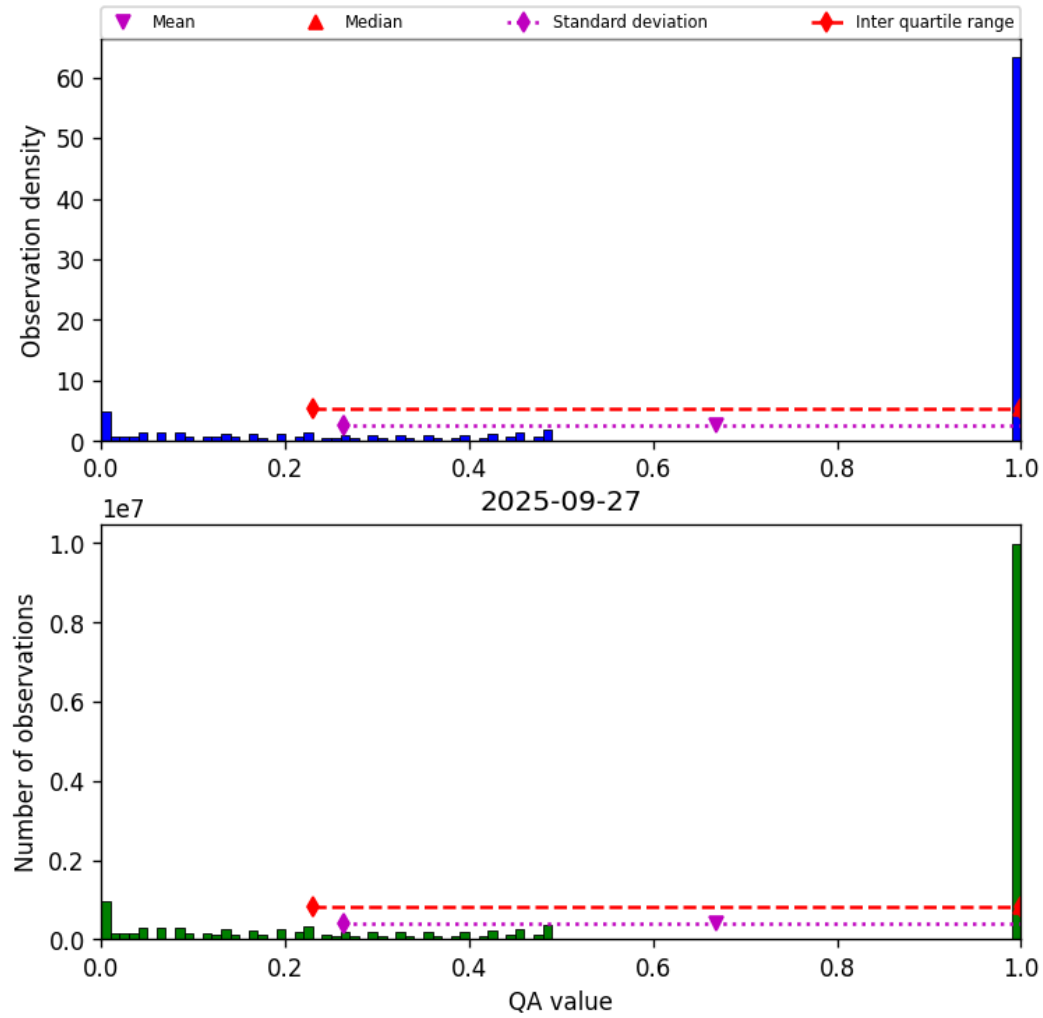


Figure 57: Histogram of “QA value” for 2025-09-27 to 2025-09-28

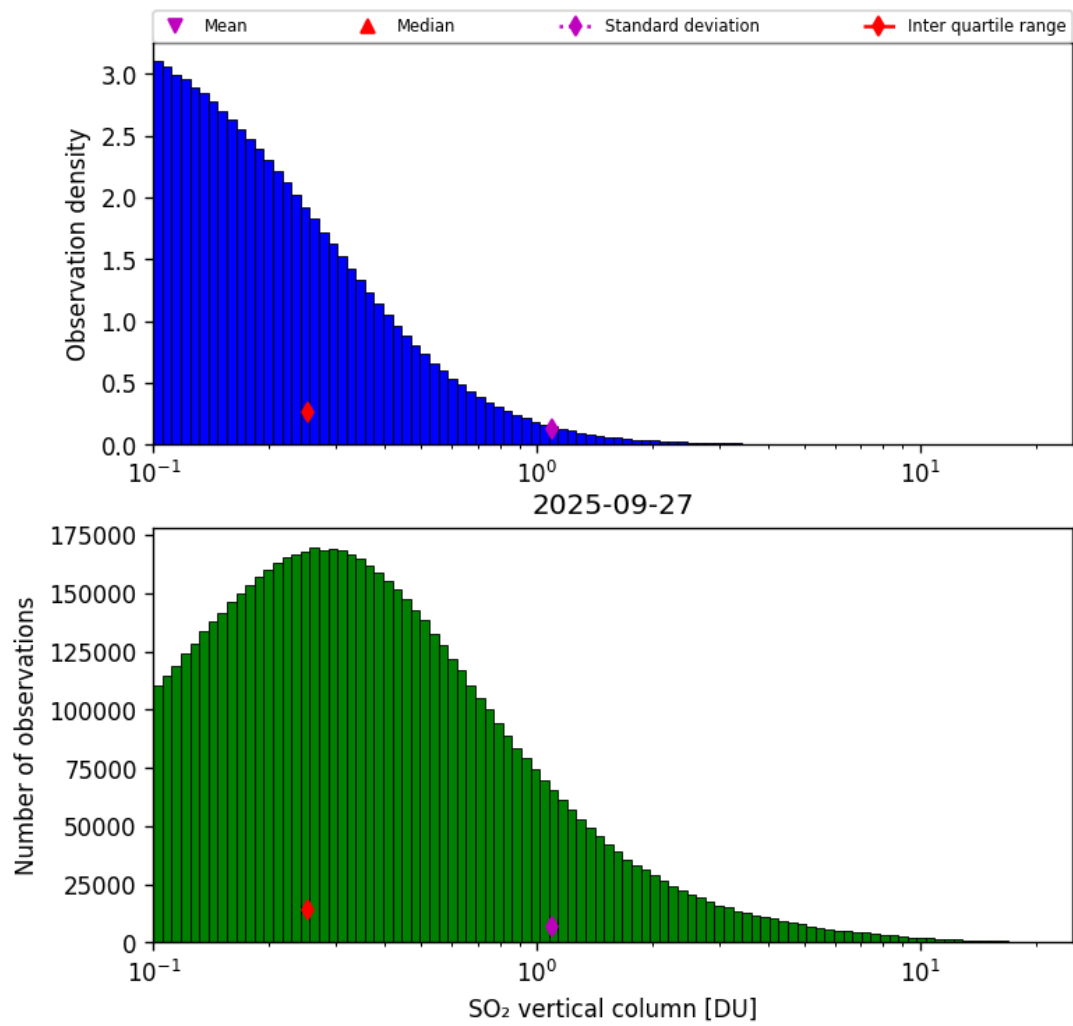


Figure 58: Histogram of “SO₂ vertical column” for 2025-09-27 to 2025-09-28

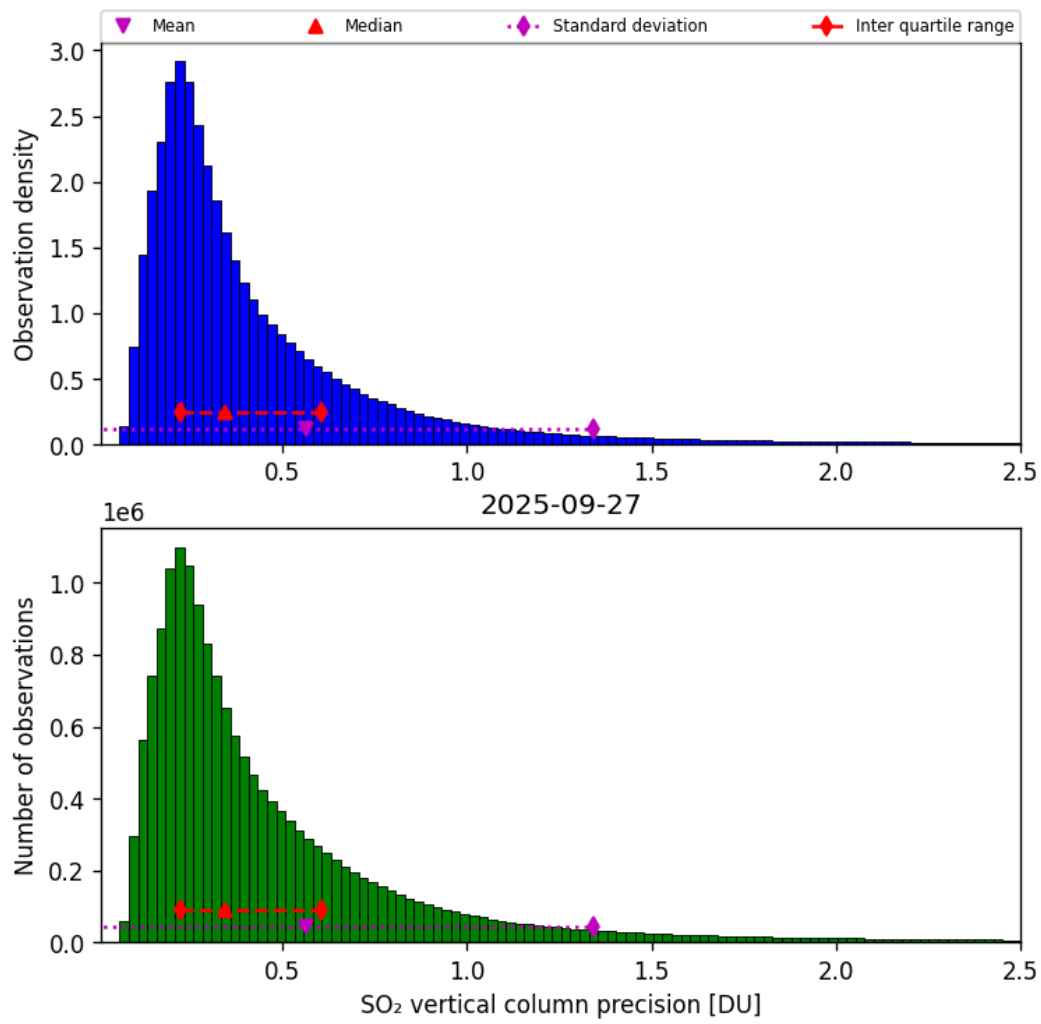


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-09-27 to 2025-09-28

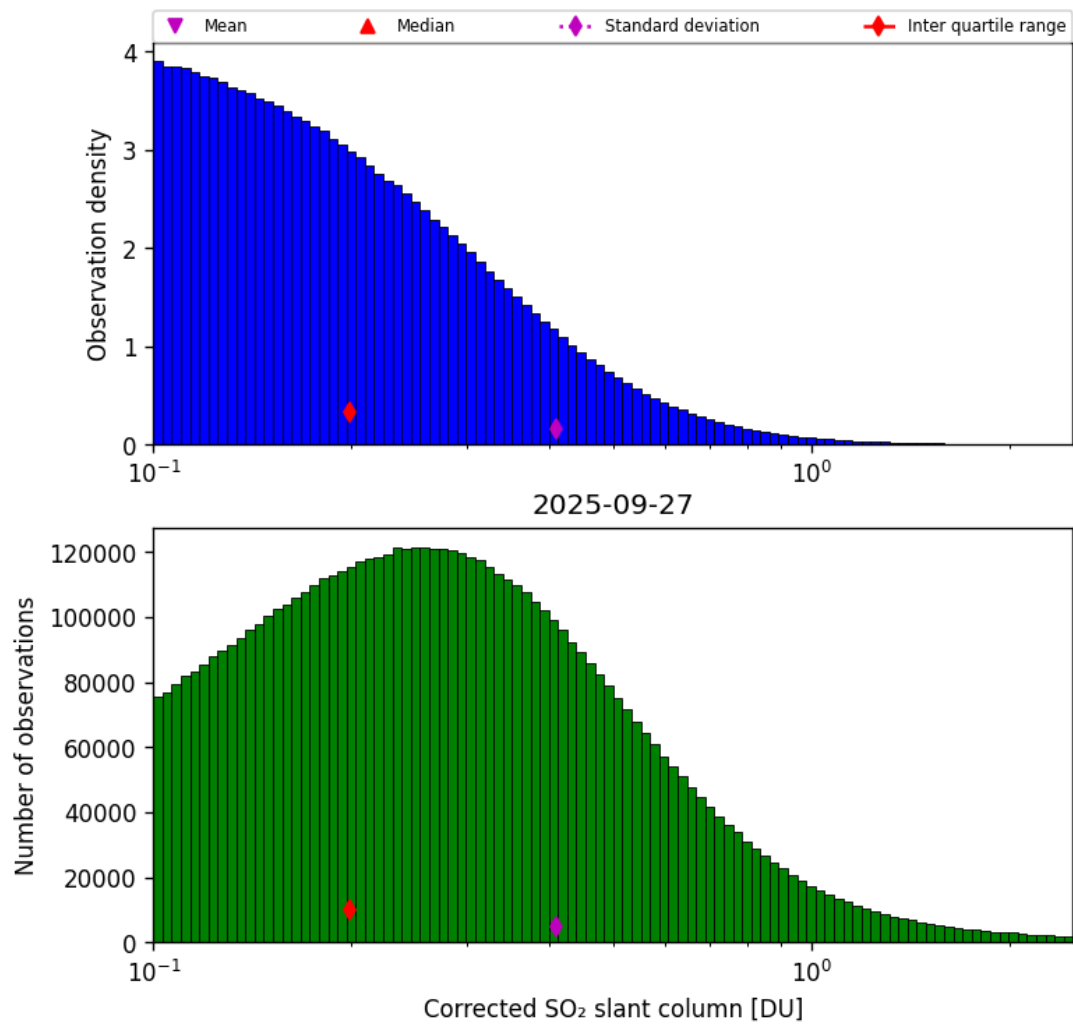


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-09-27 to 2025-09-28

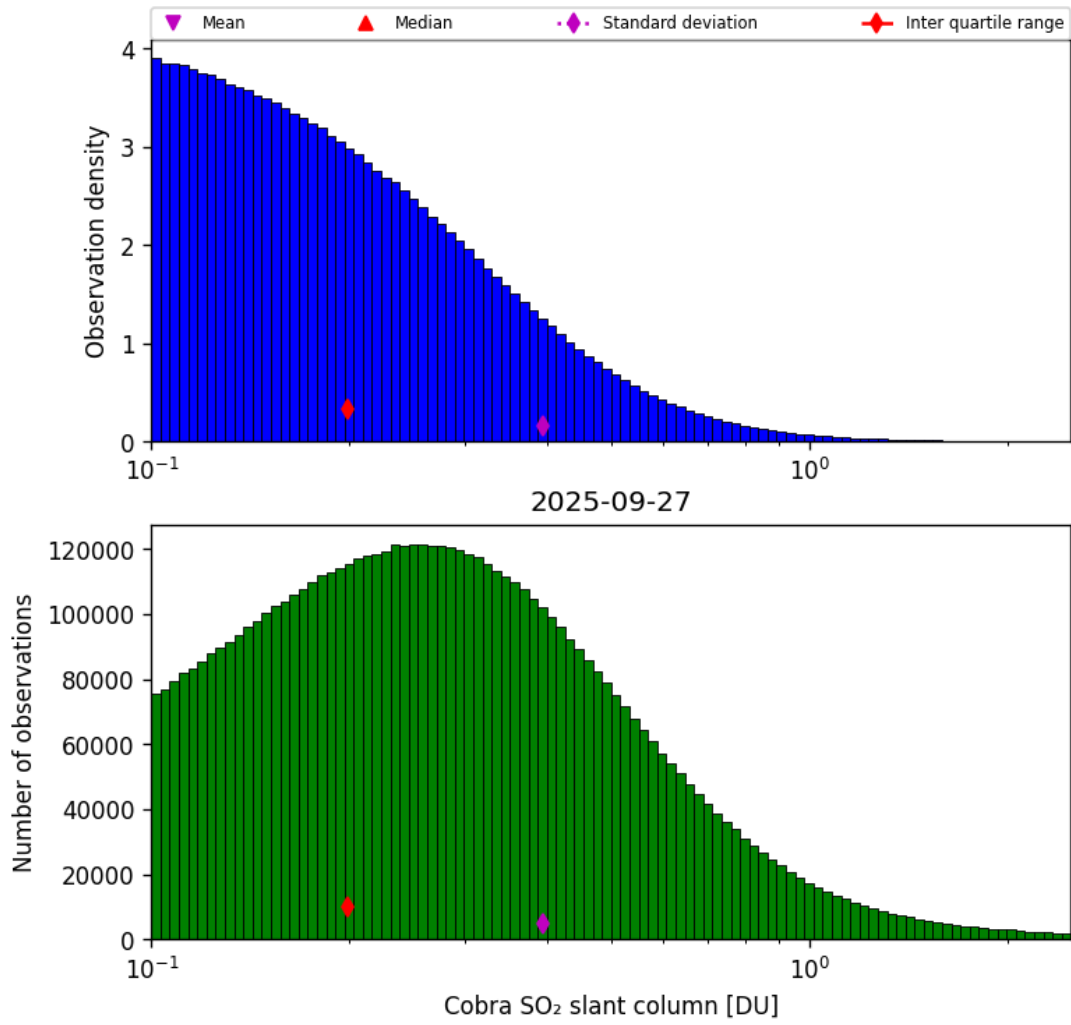


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-09-27 to 2025-09-28

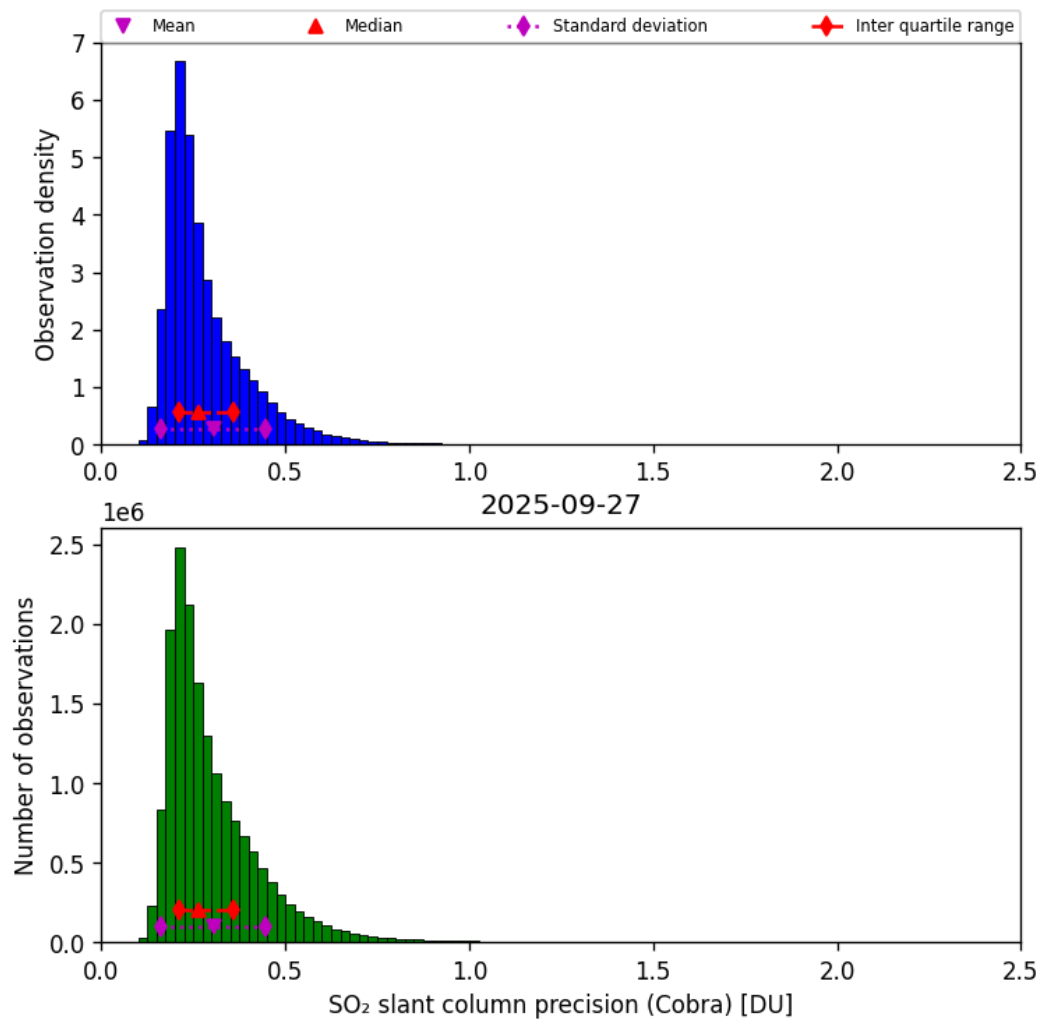


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-09-27 to 2025-09-28

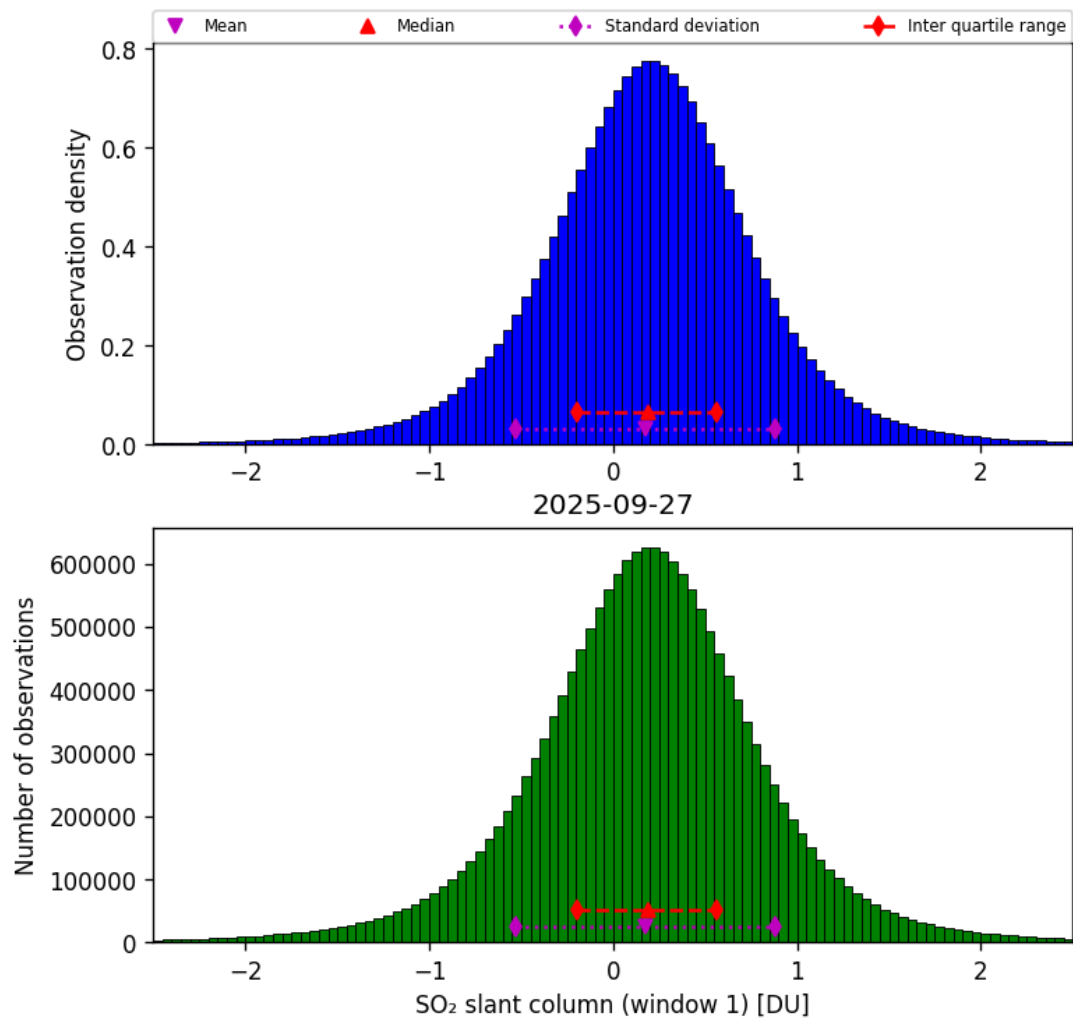


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-09-27 to 2025-09-28

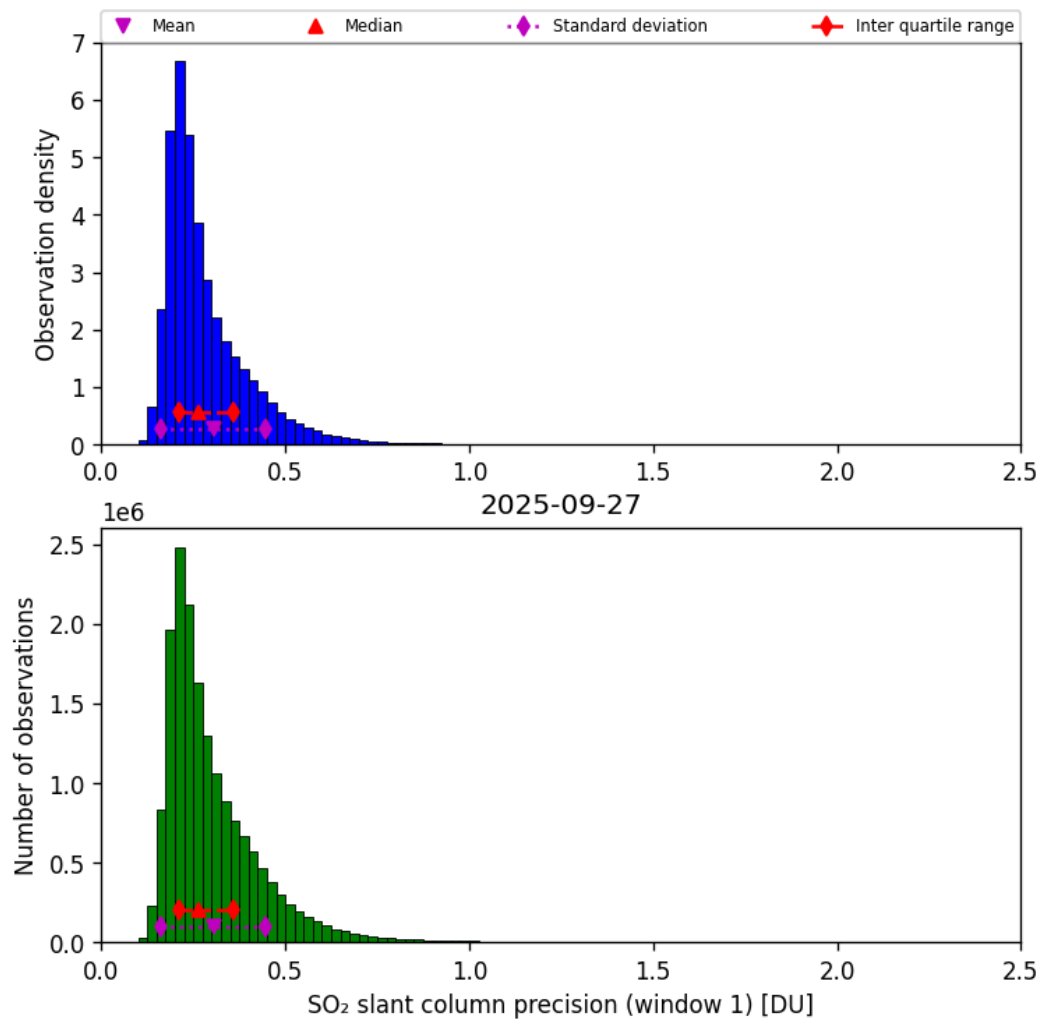


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-09-27 to 2025-09-28

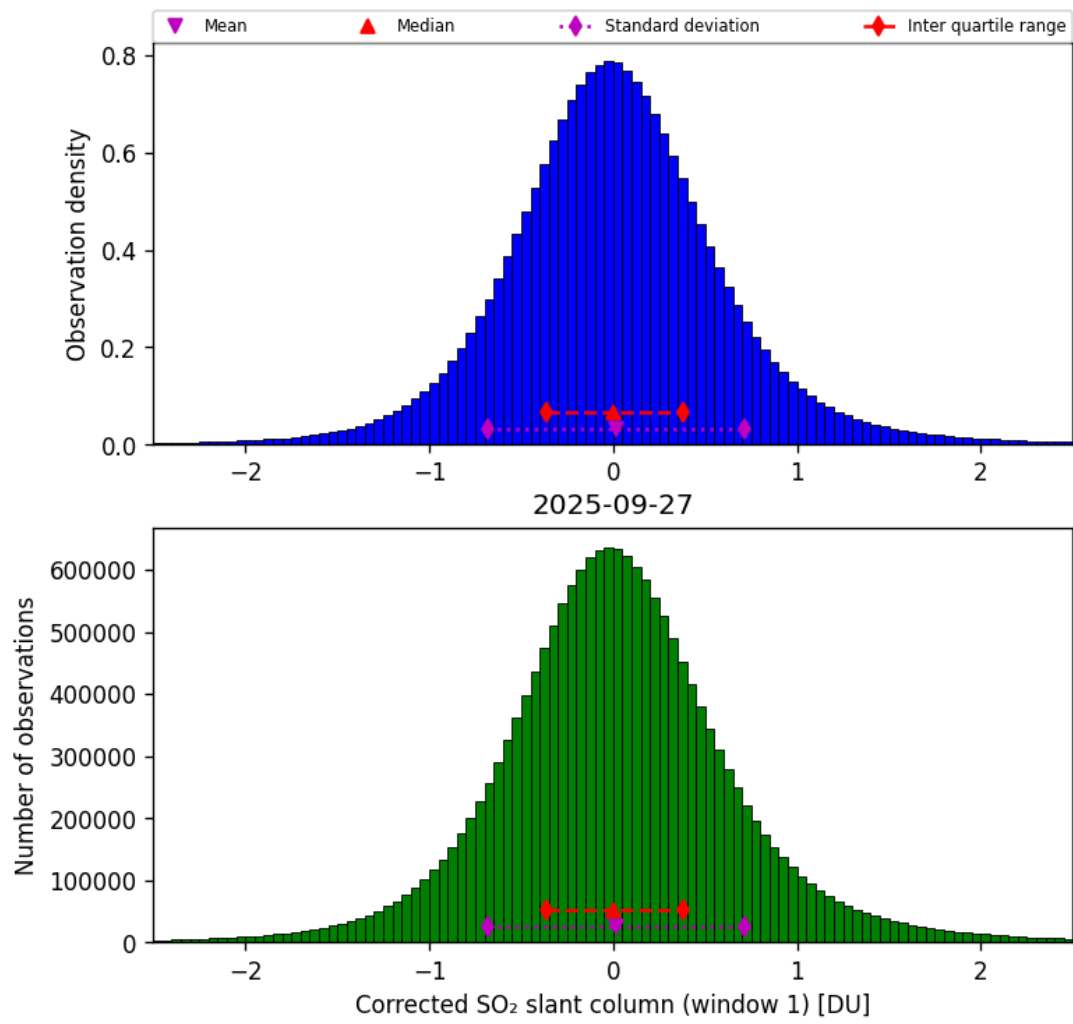


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-09-27 to 2025-09-28

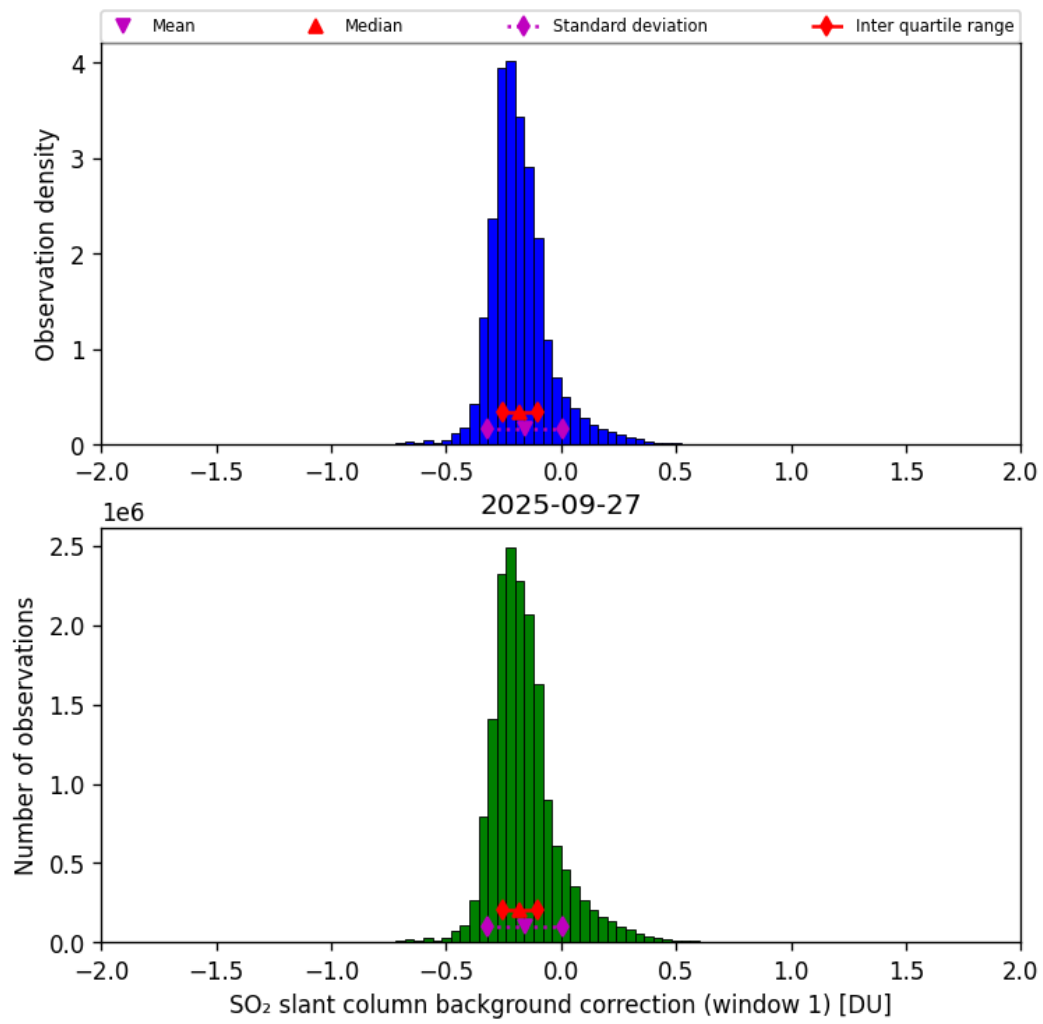


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-09-27 to 2025-09-28

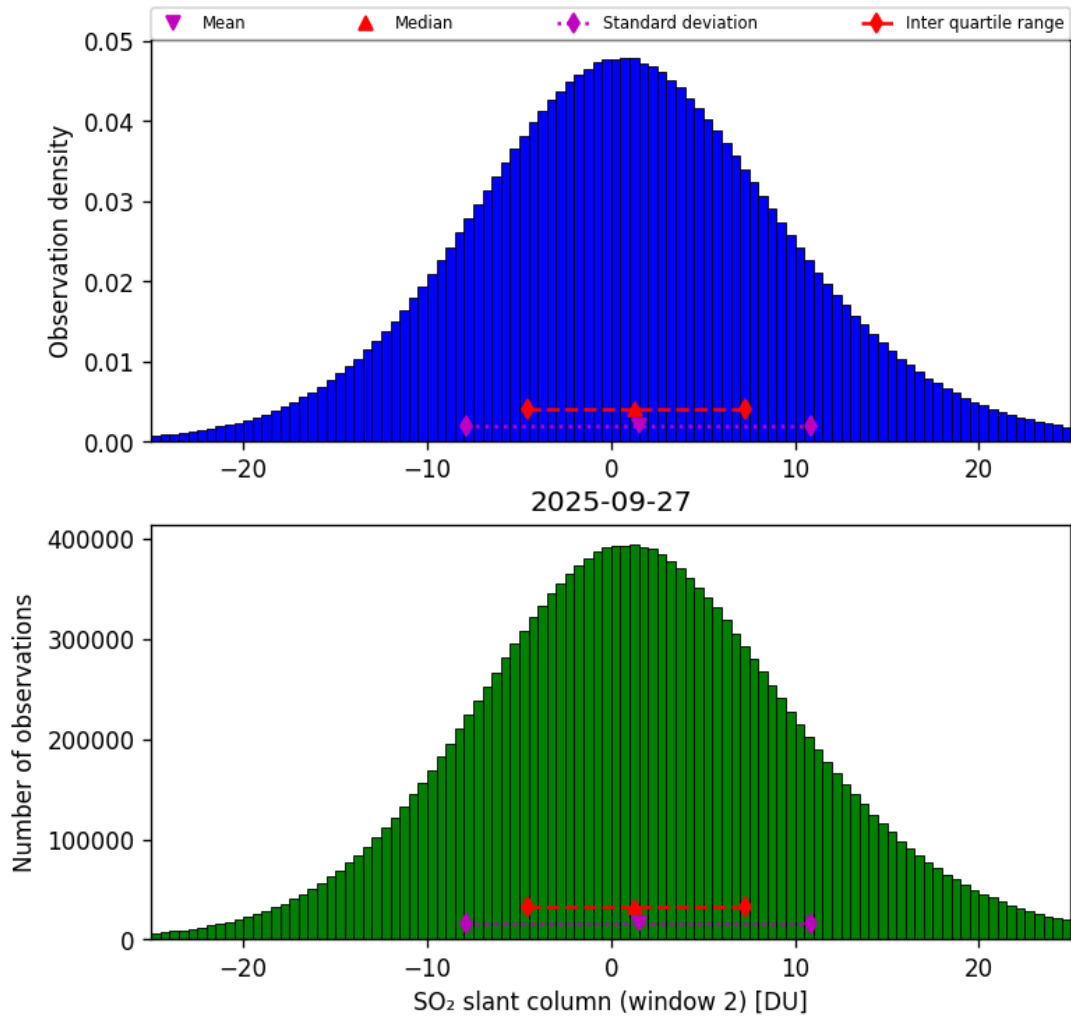


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-09-27 to 2025-09-28

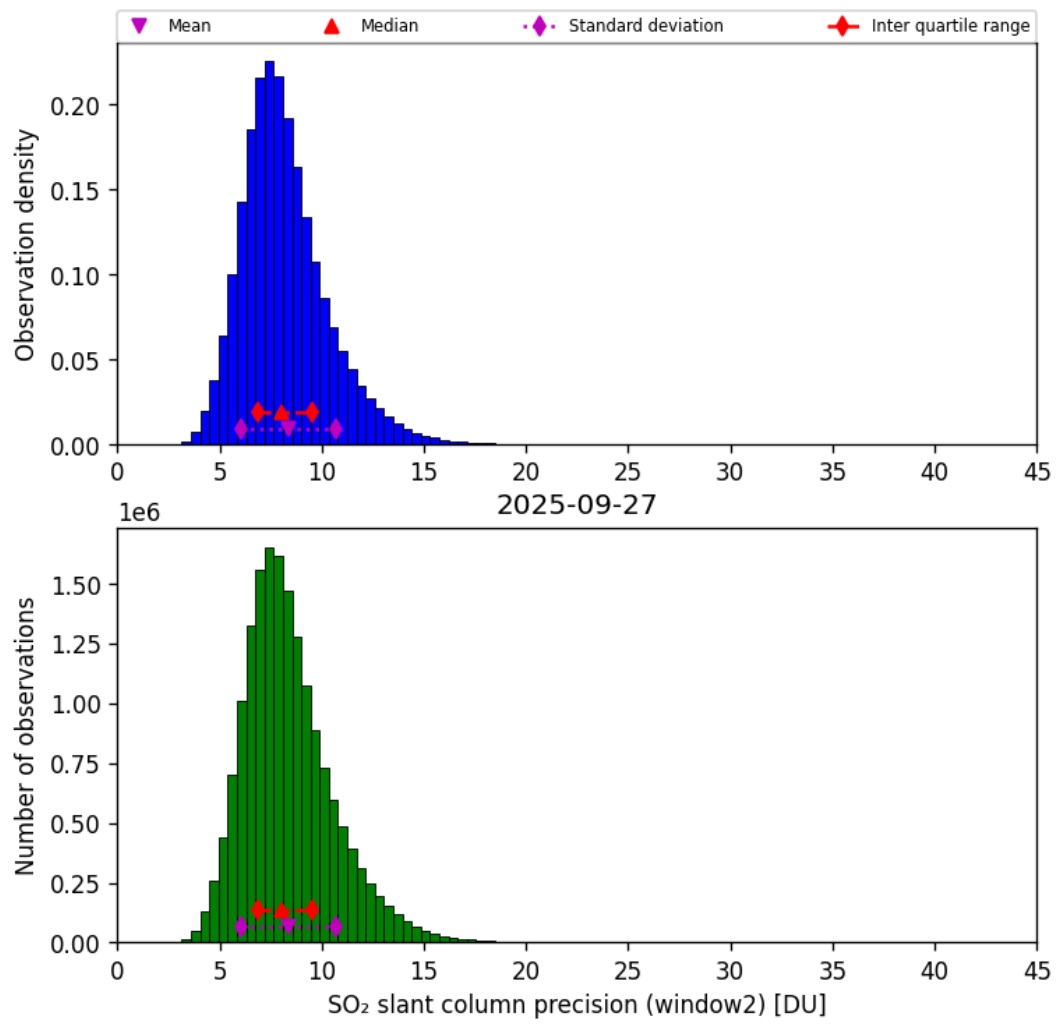


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-09-27 to 2025-09-28

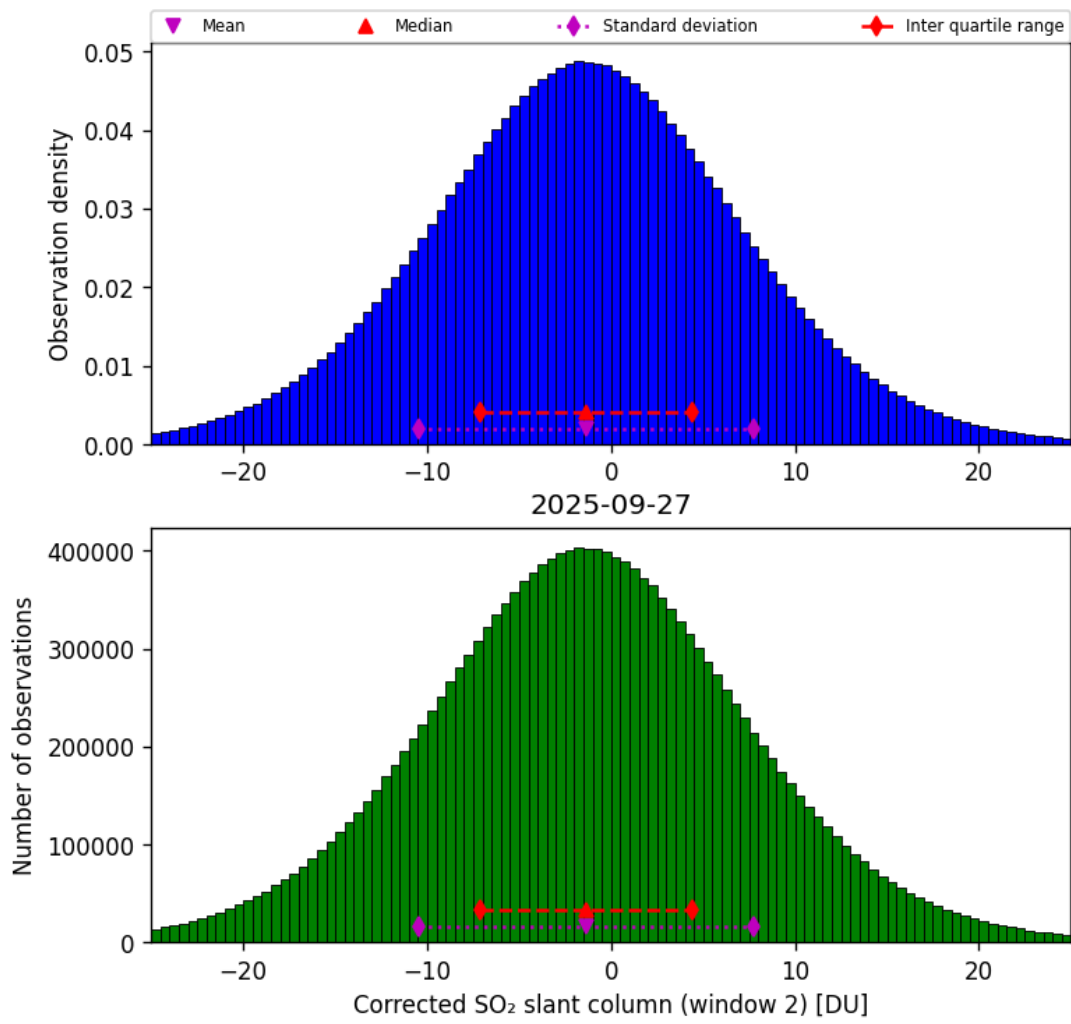


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-09-27 to 2025-09-28

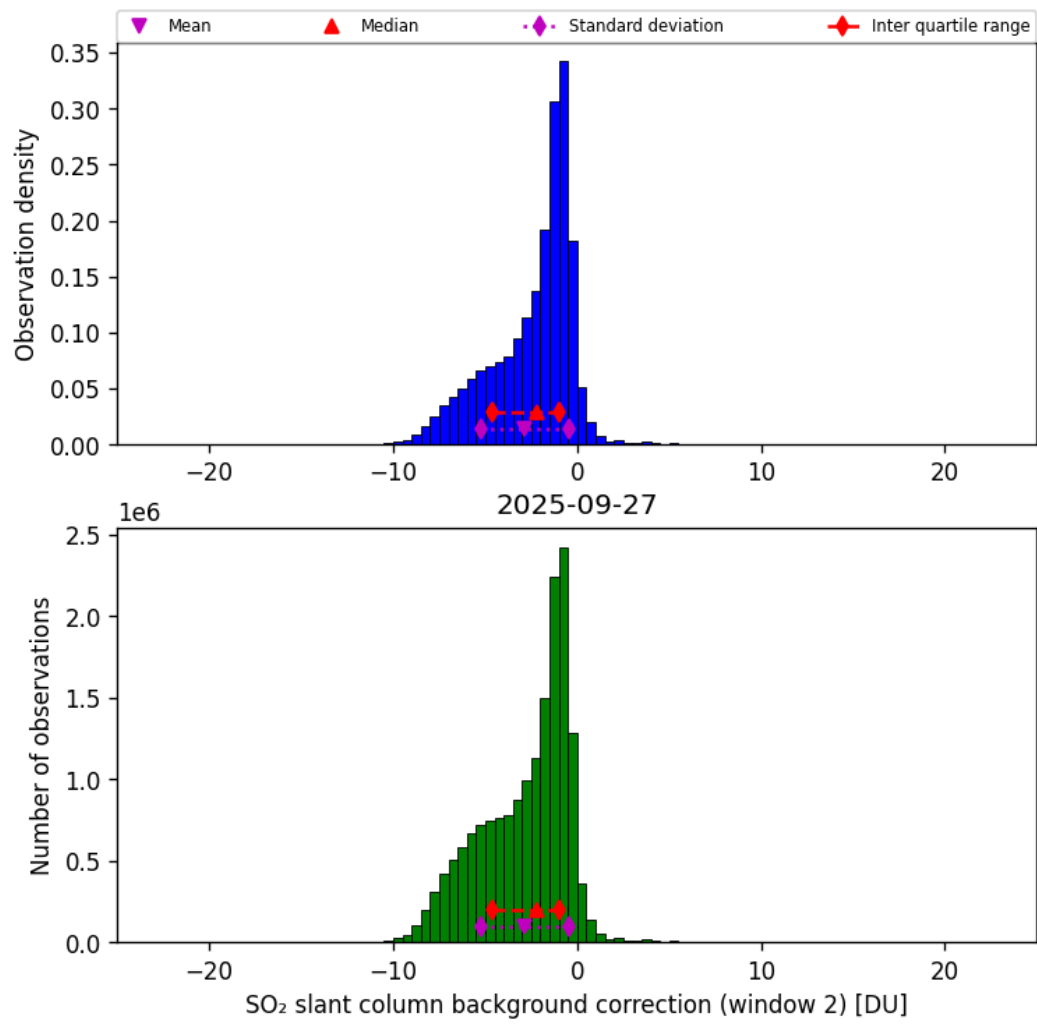


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-09-27 to 2025-09-28

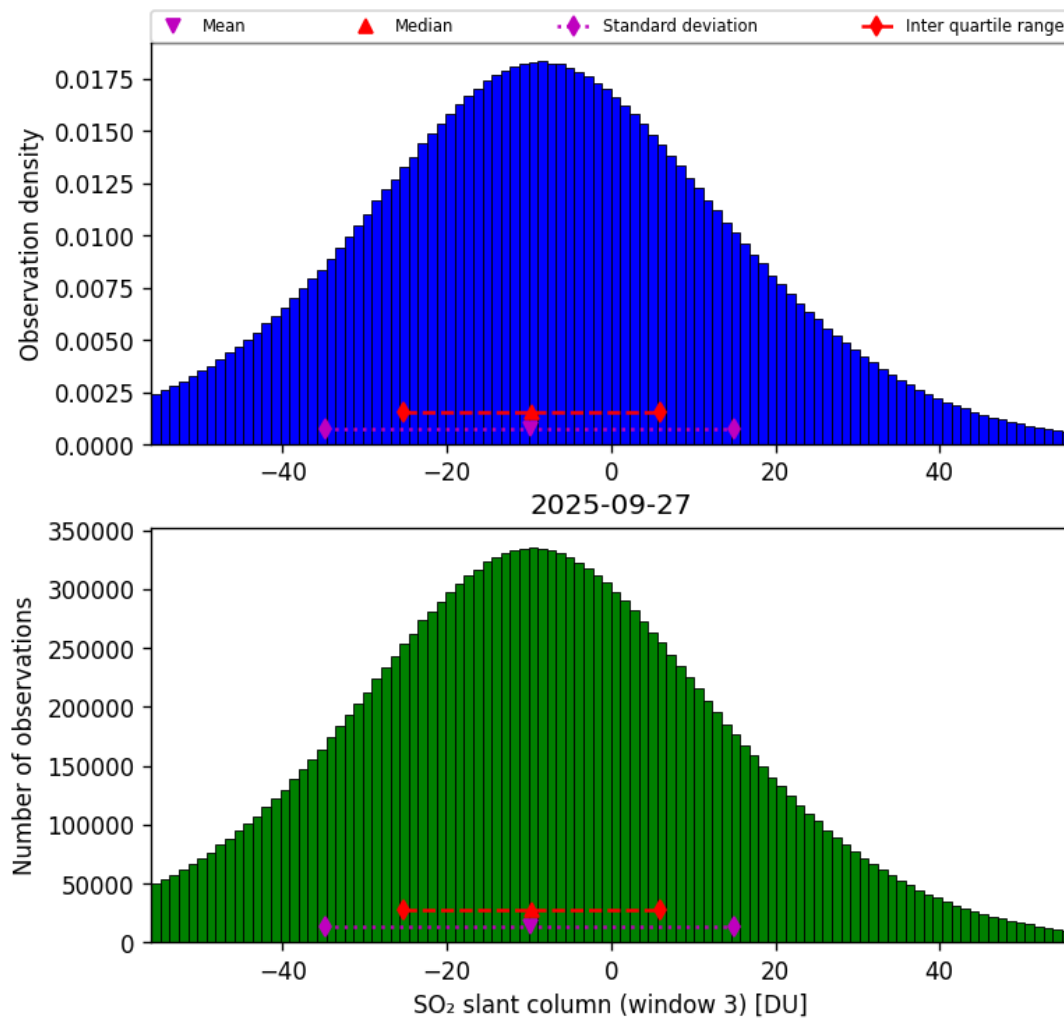


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-09-27 to 2025-09-28

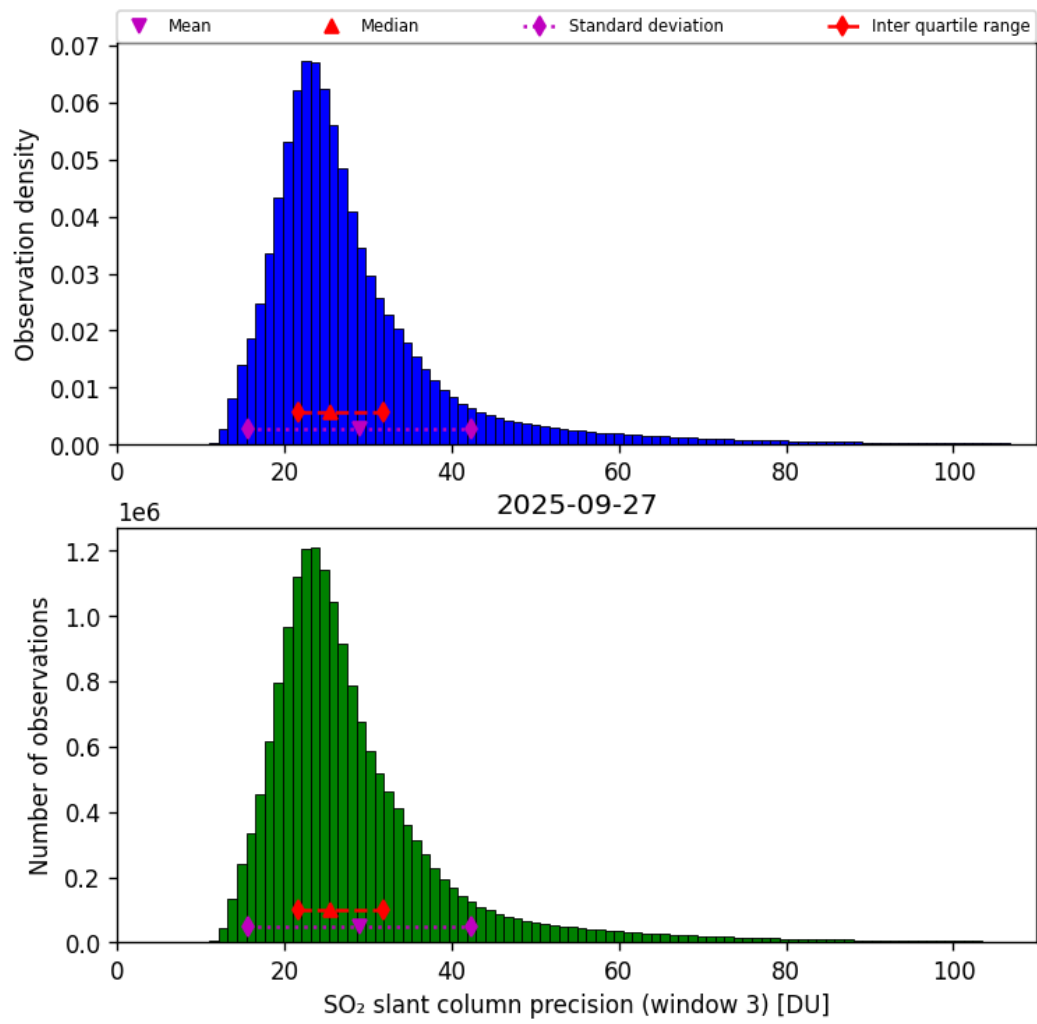


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-09-27 to 2025-09-28

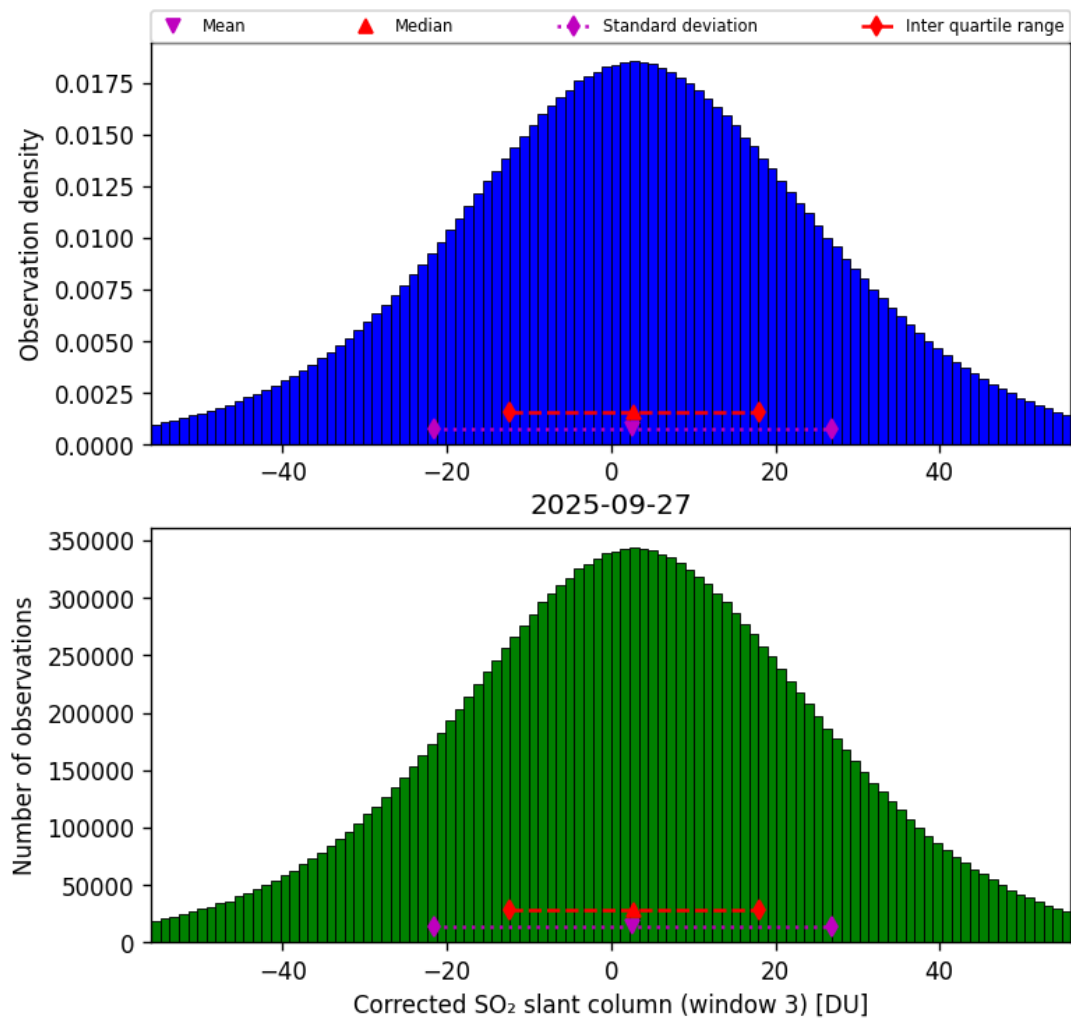


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-09-27 to 2025-09-28

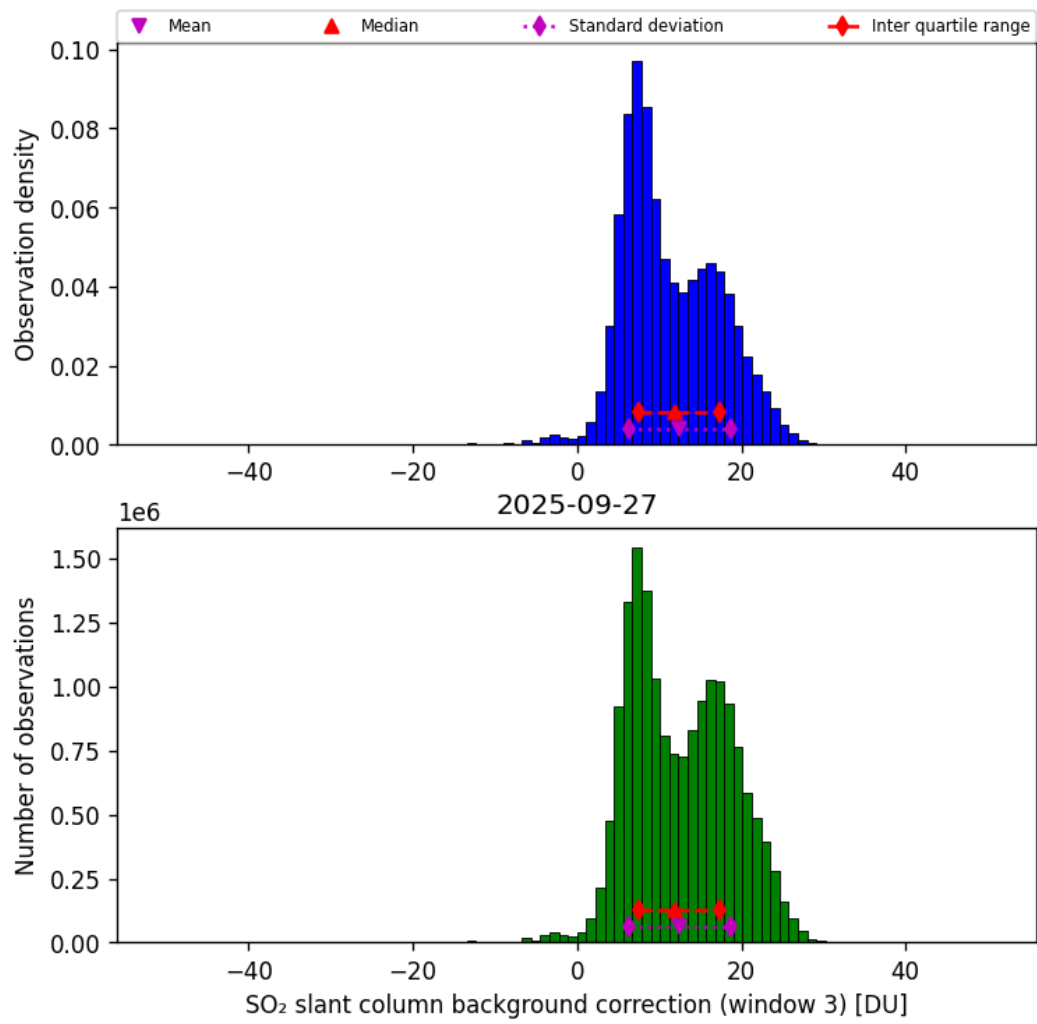


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-09-27 to 2025-09-28

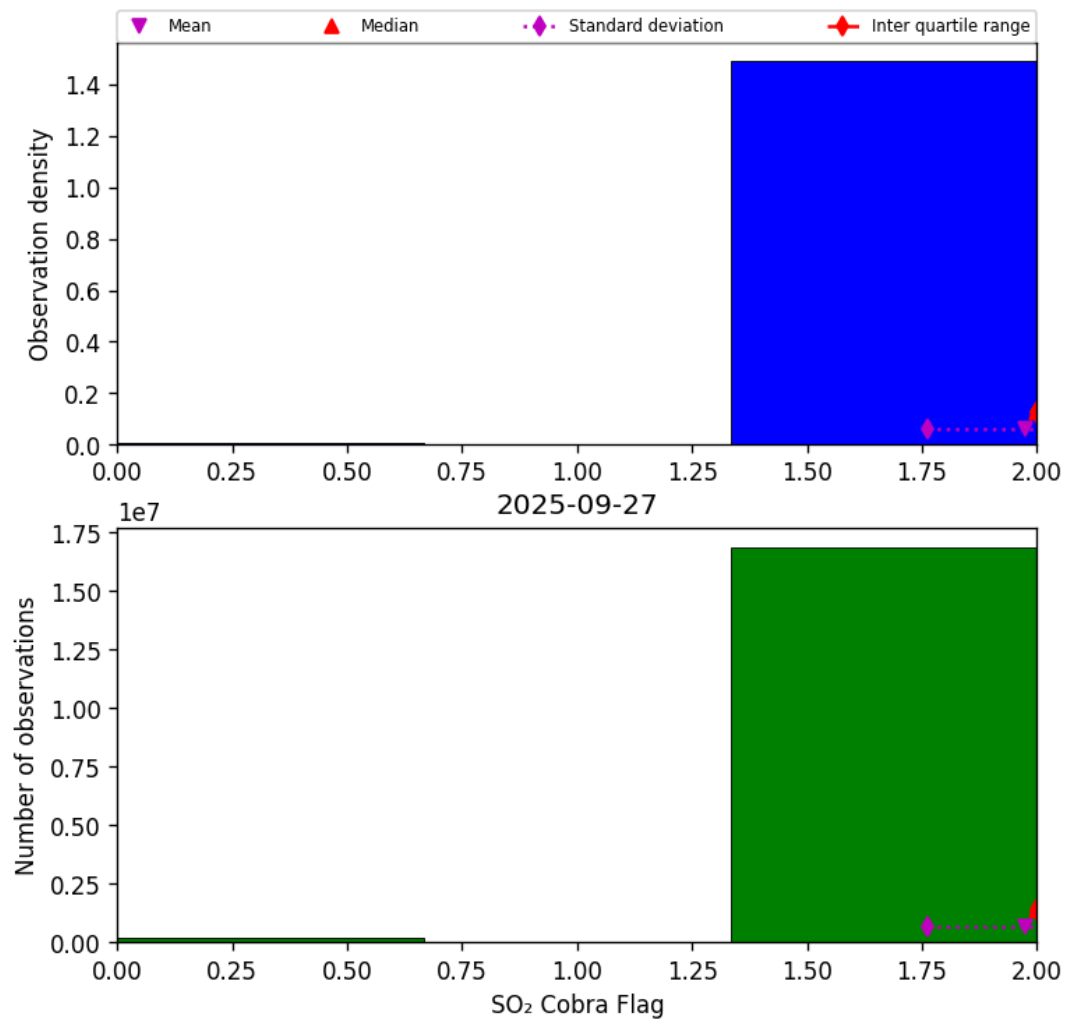


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-09-27 to 2025-09-28

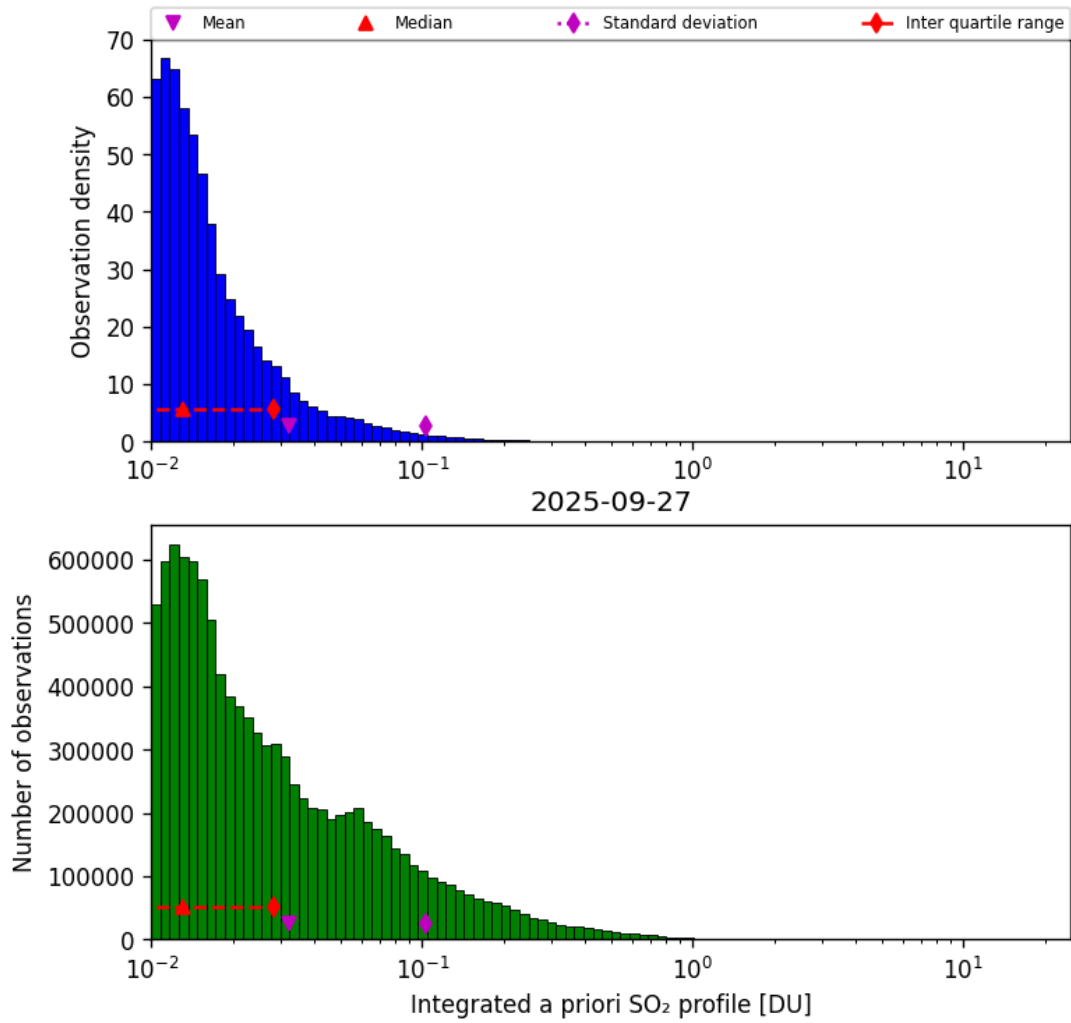


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-09-27 to 2025-09-28

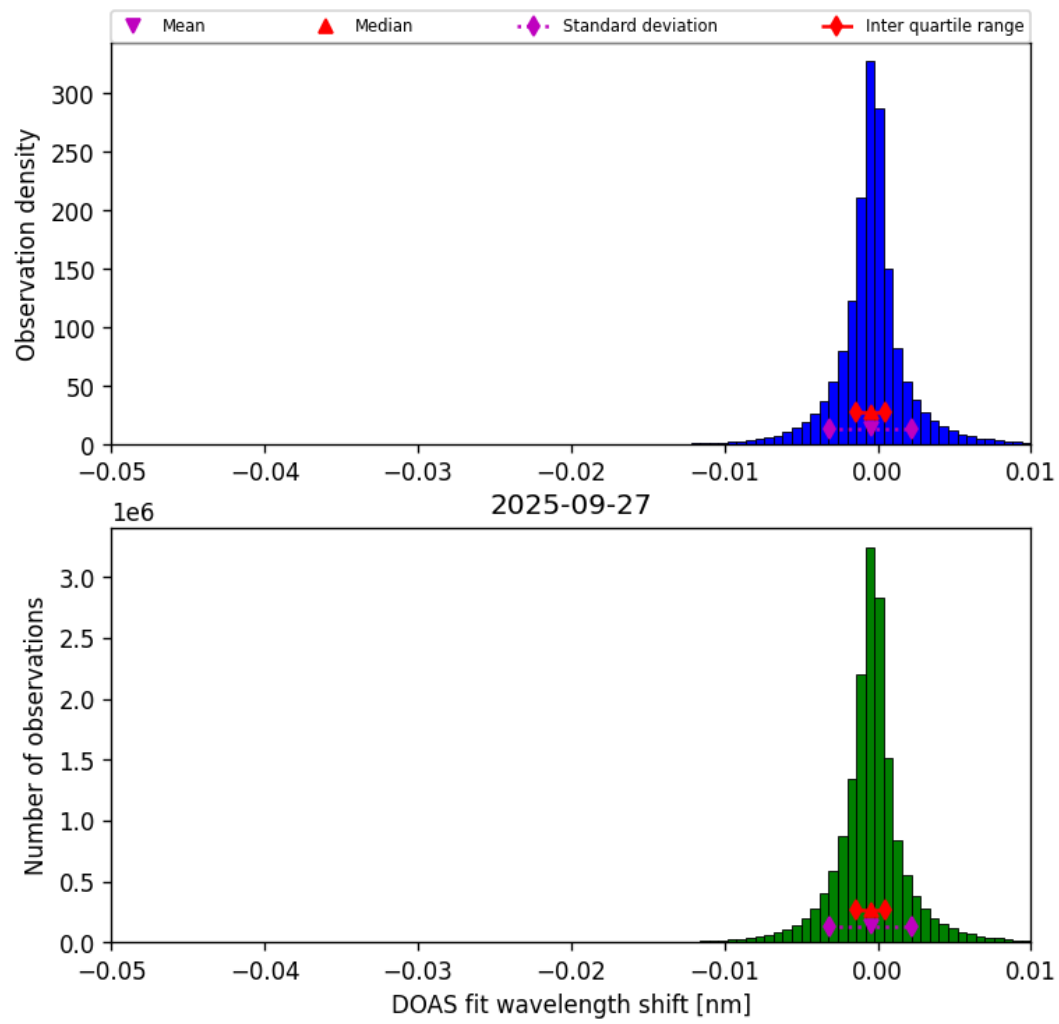


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-09-27 to 2025-09-28

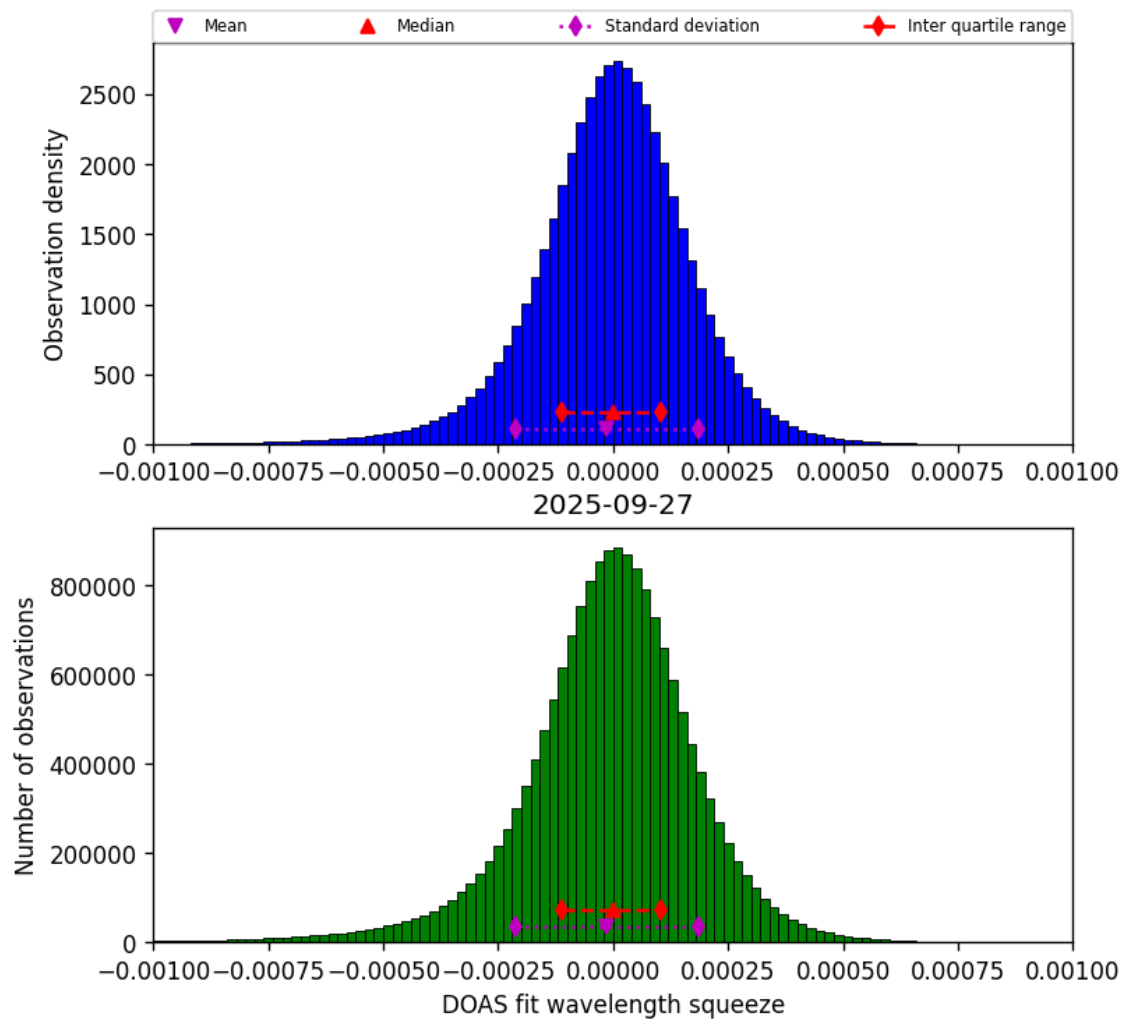


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-09-27 to 2025-09-28

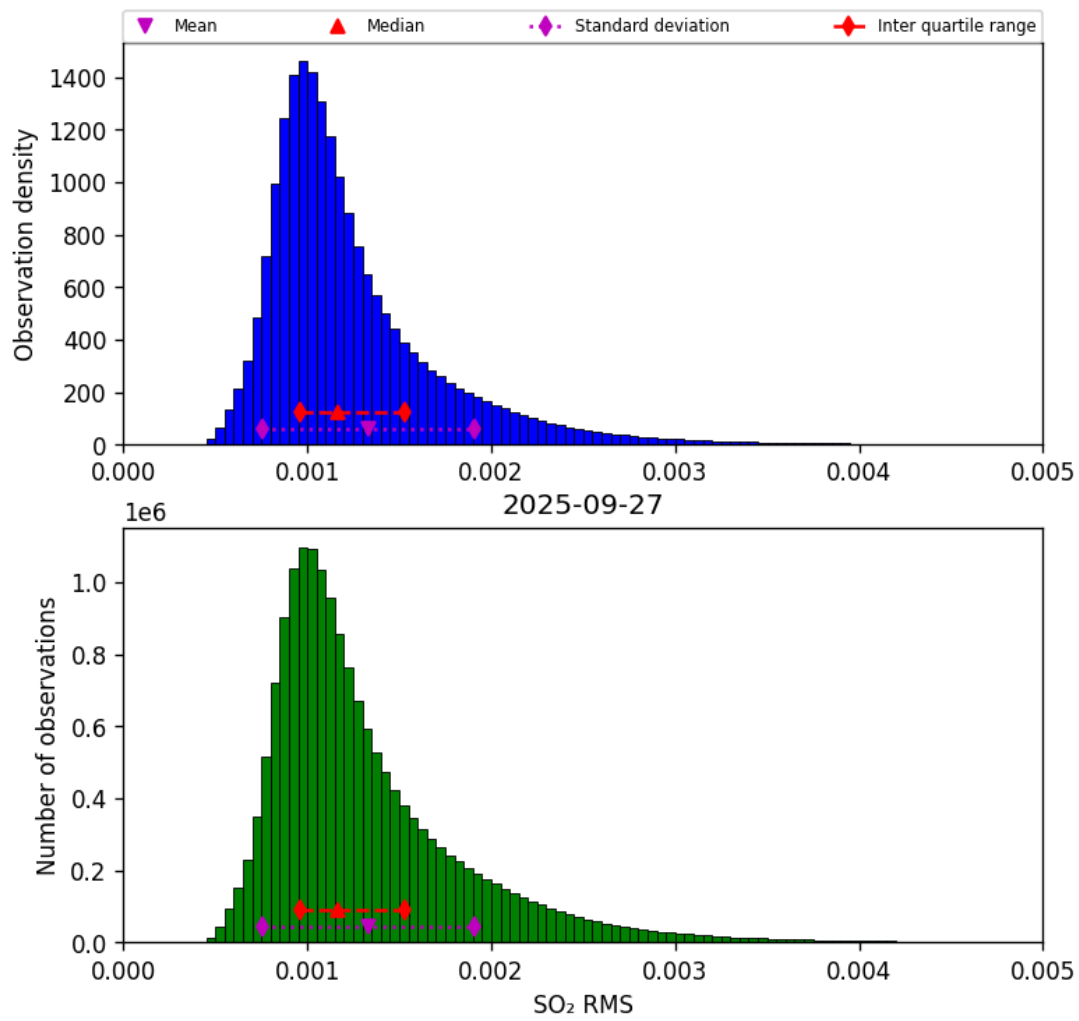


Figure 79: Histogram of “SO₂ RMS” for 2025-09-27 to 2025-09-28

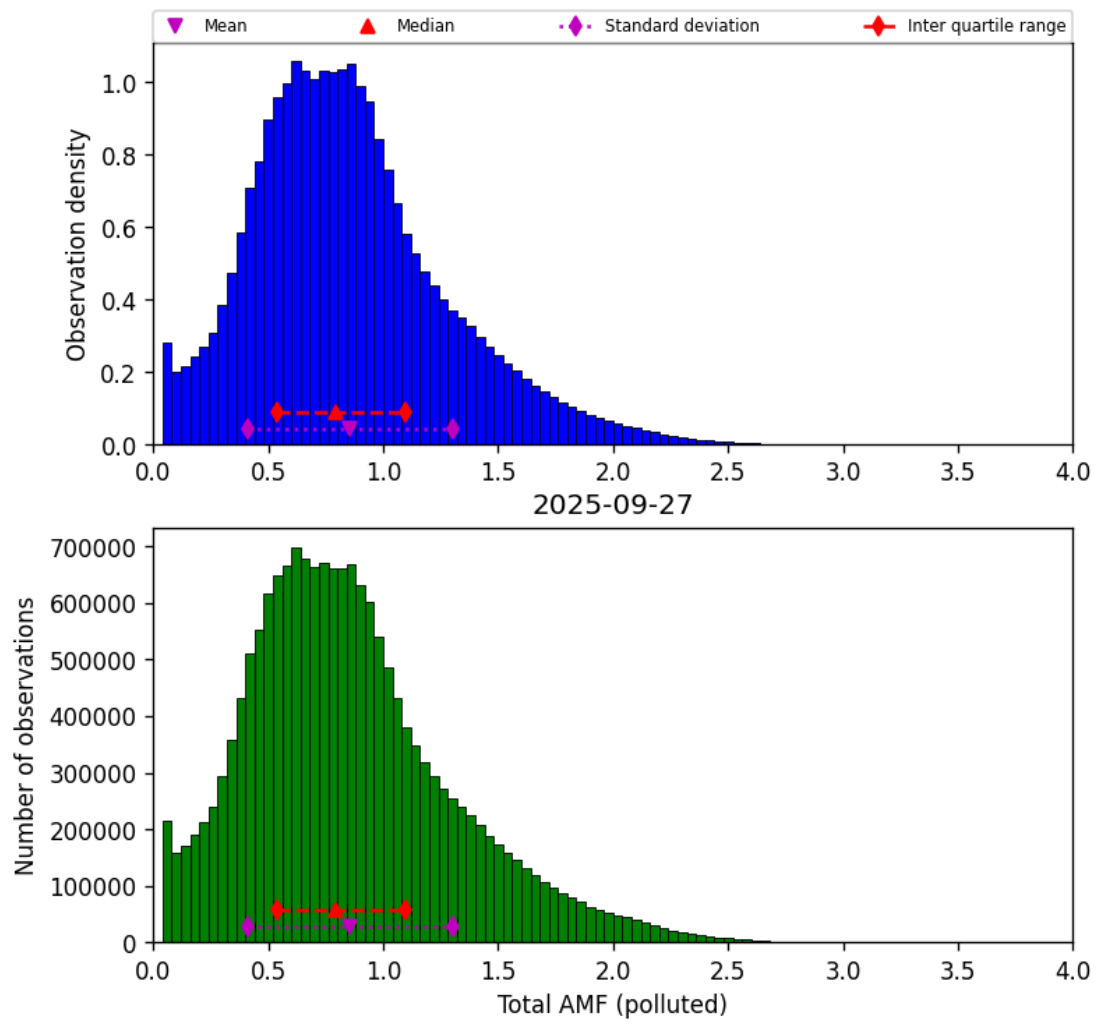


Figure 80: Histogram of “Total AMF (polluted)” for 2025-09-27 to 2025-09-28

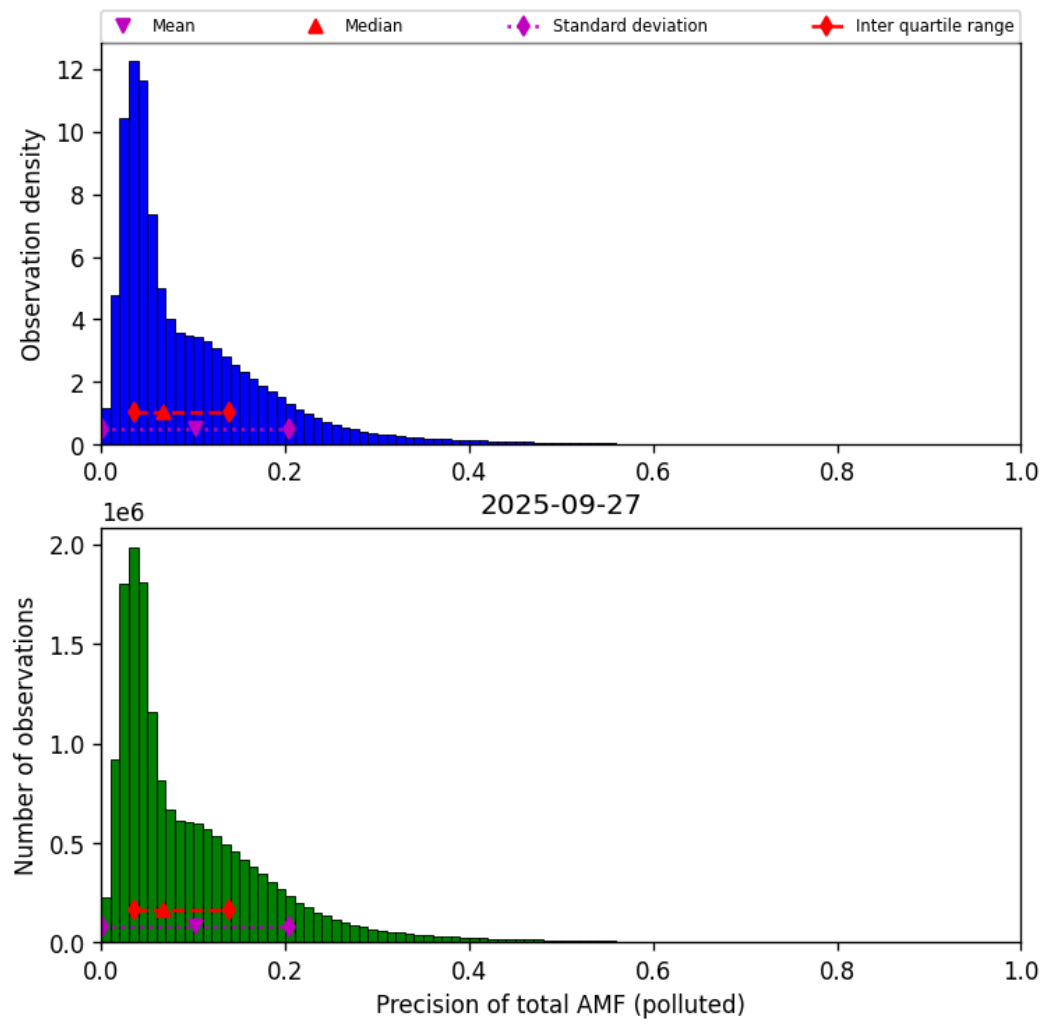


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-09-27 to 2025-09-28

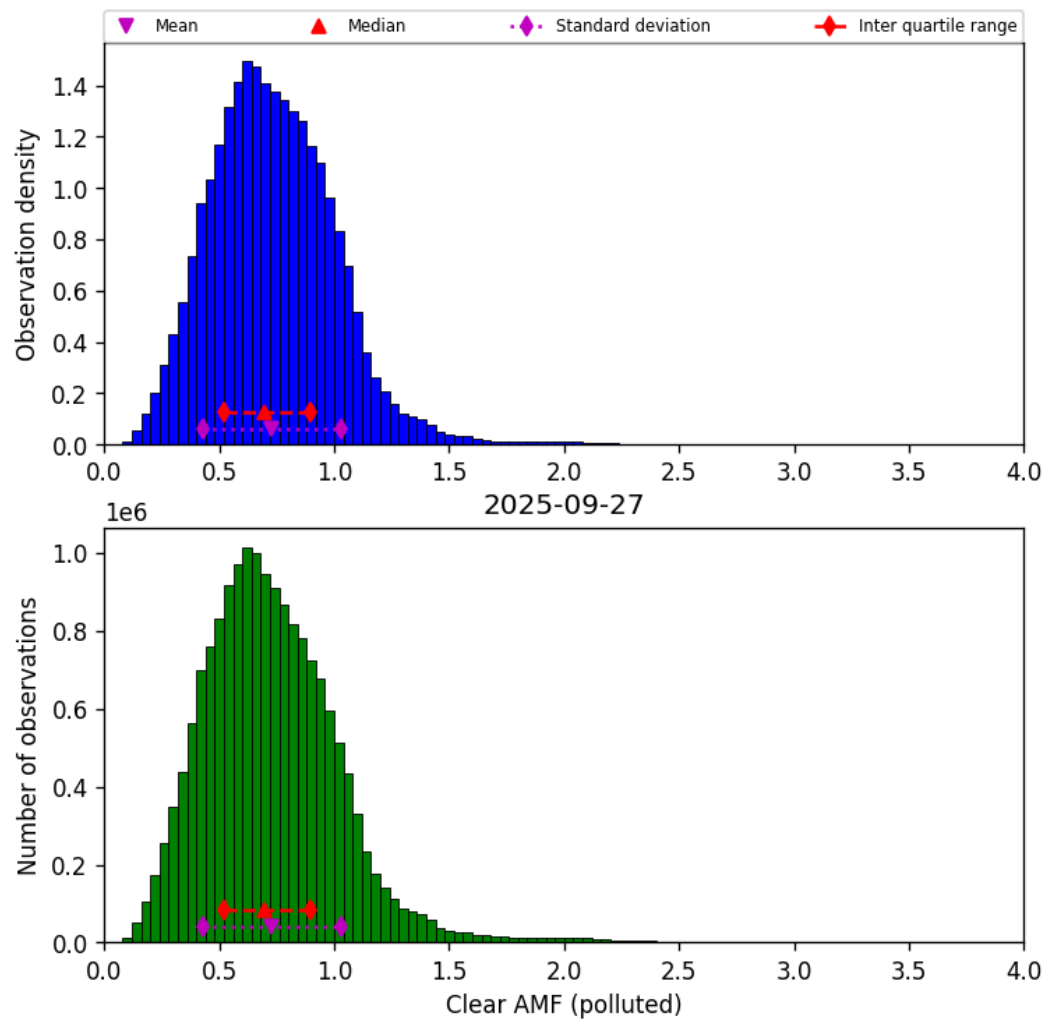


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-09-27 to 2025-09-28

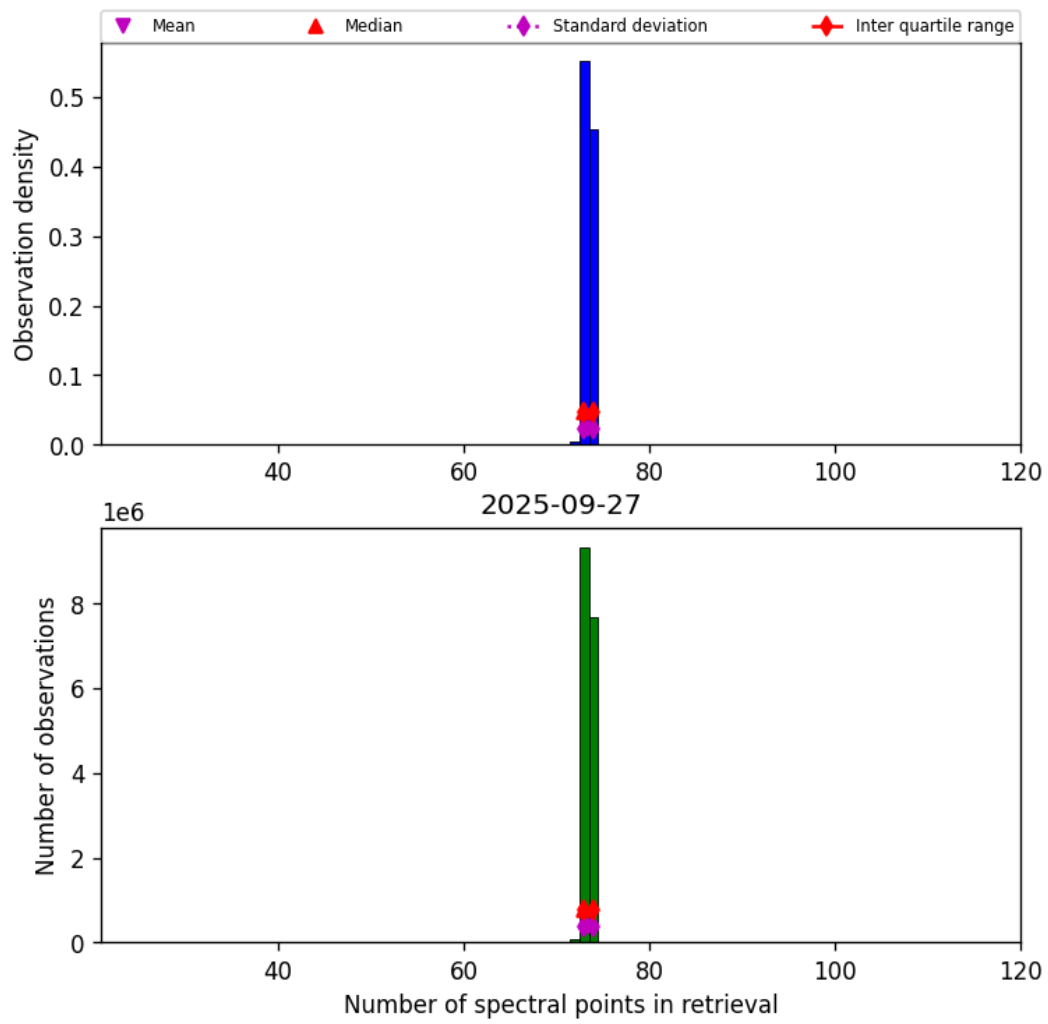


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-09-27 to 2025-09-28

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.

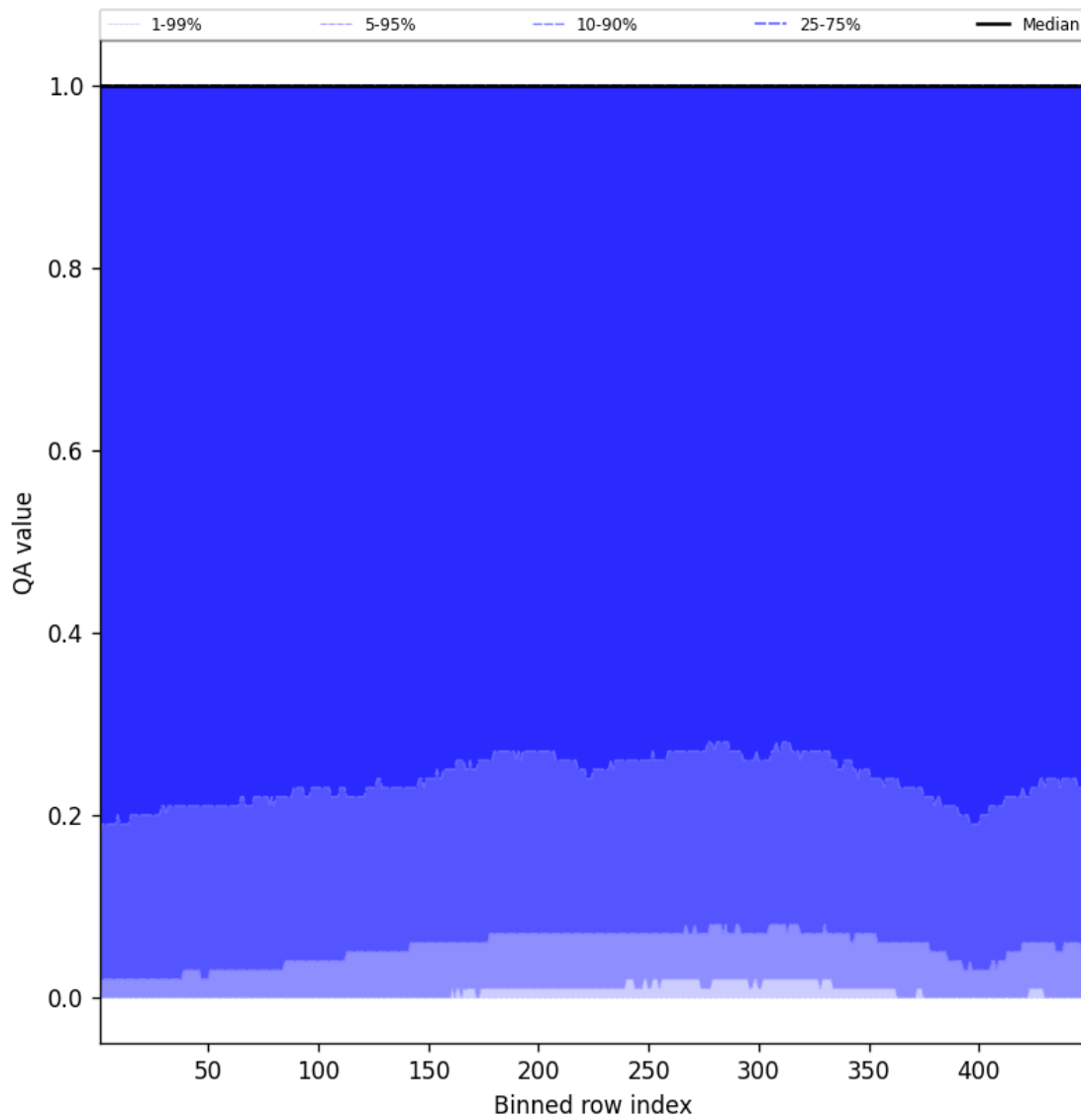


Figure 84: Along track statistics of “QA value” for 2025-09-27 to 2025-09-28

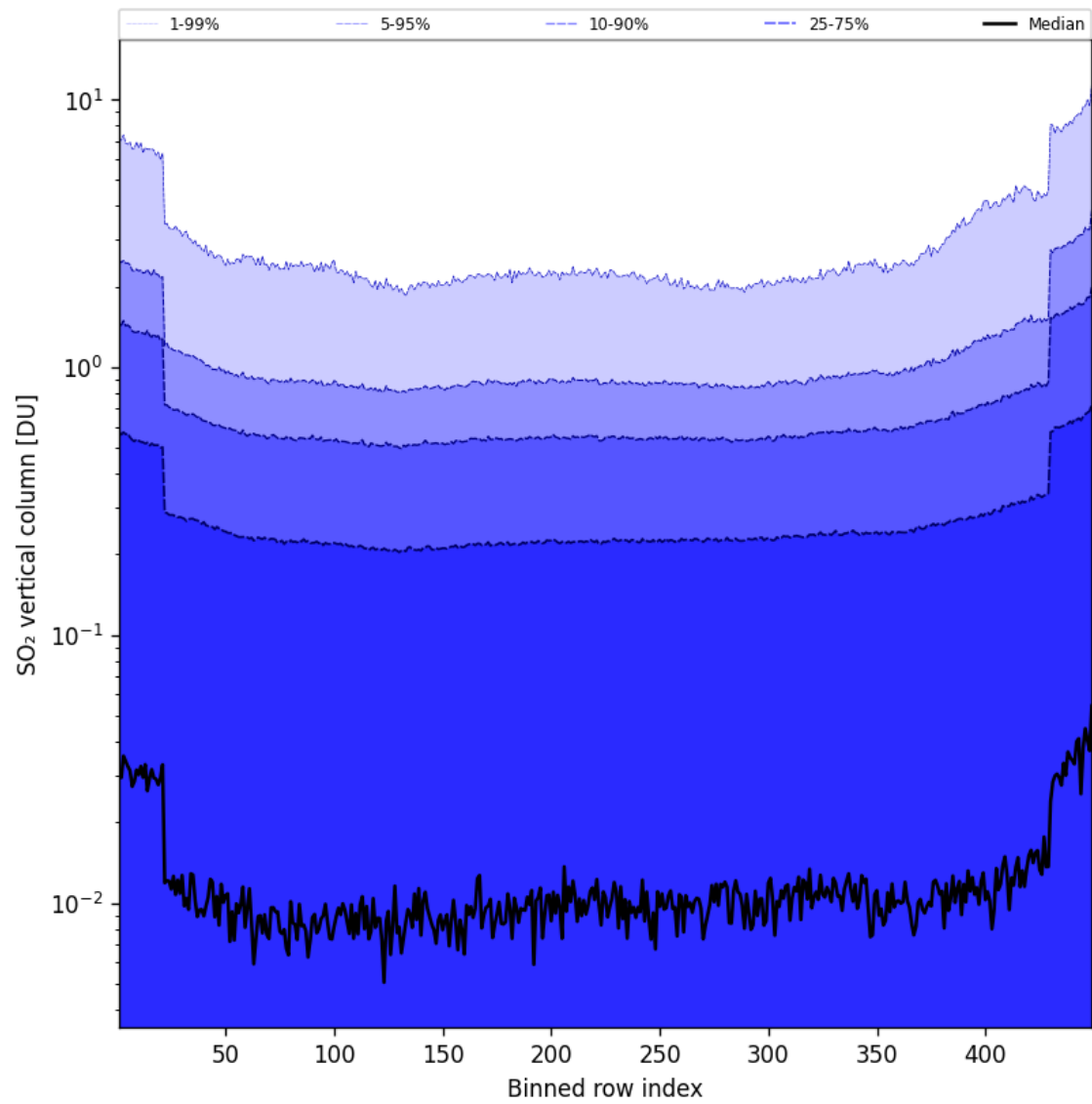


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-09-27 to 2025-09-28

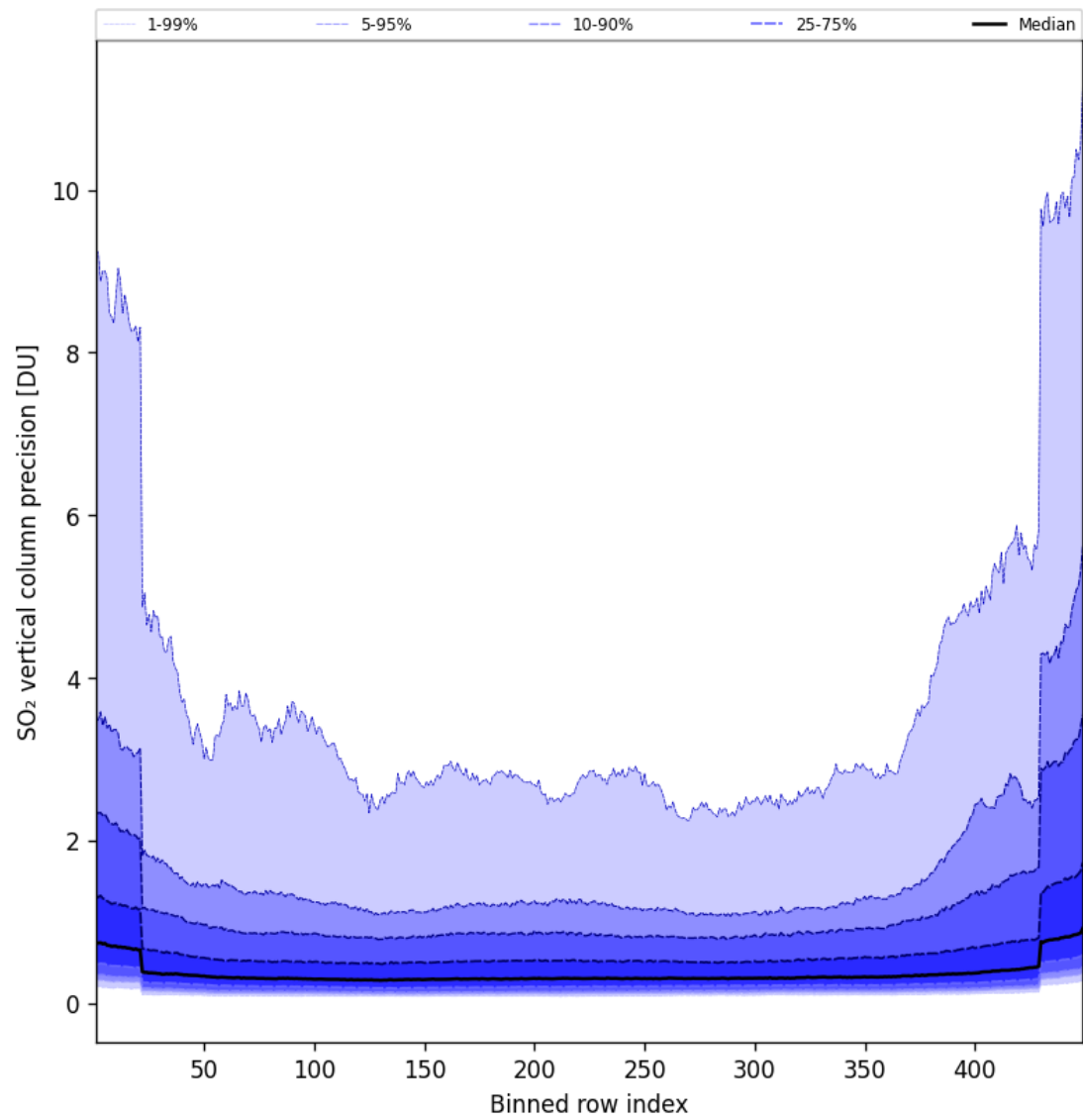


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-09-27 to 2025-09-28

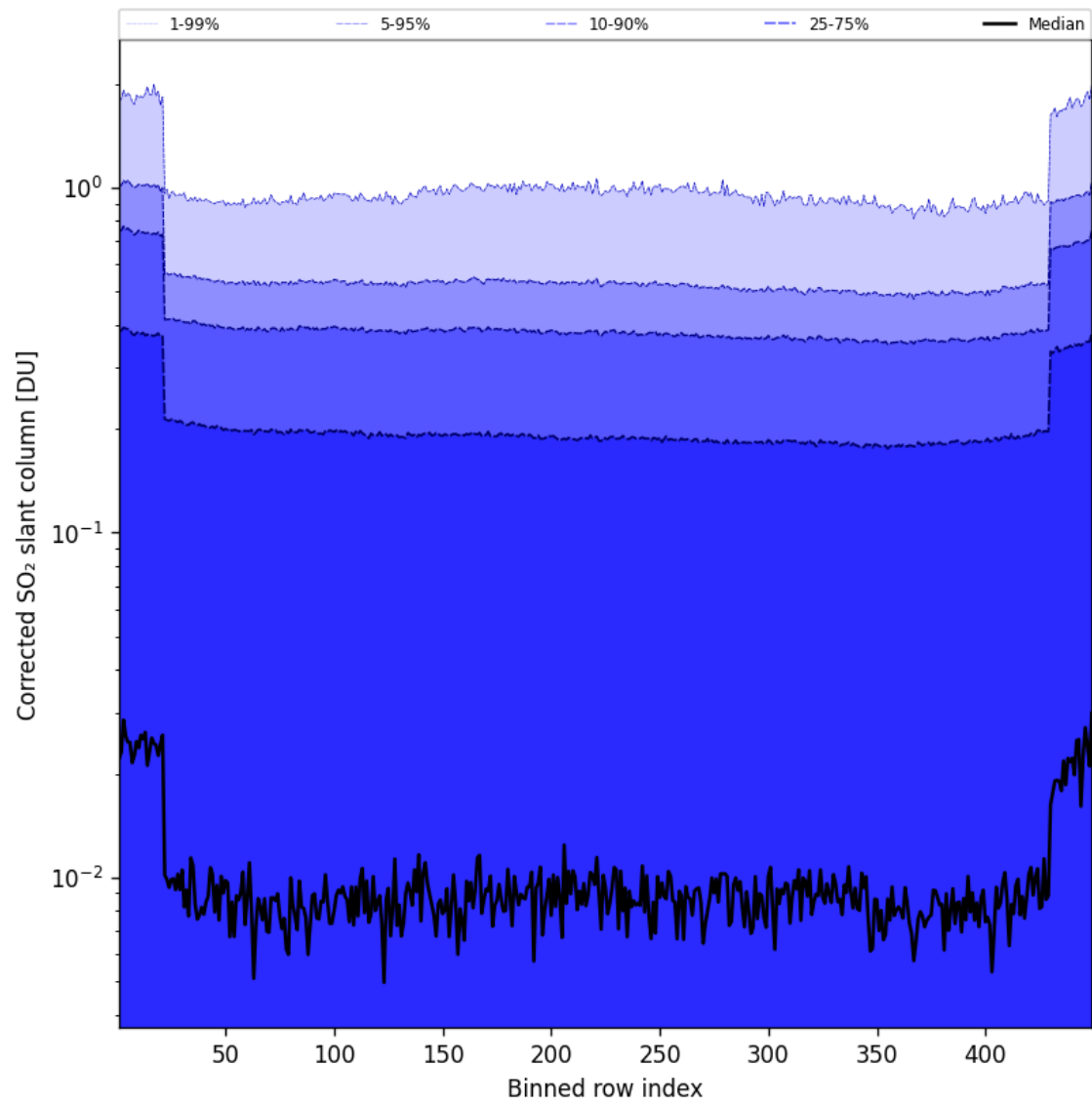


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-09-27 to 2025-09-28

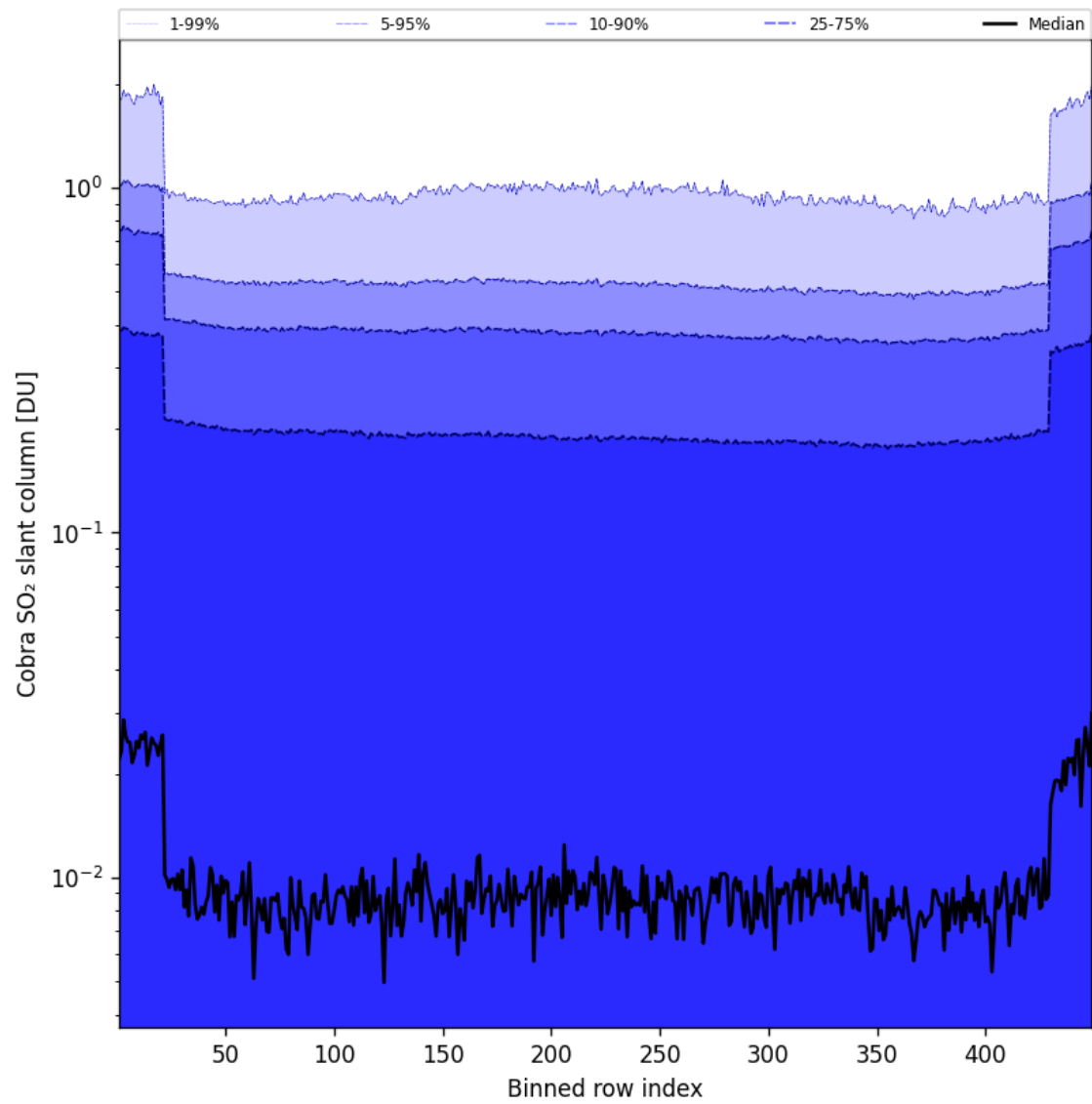


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-09-27 to 2025-09-28

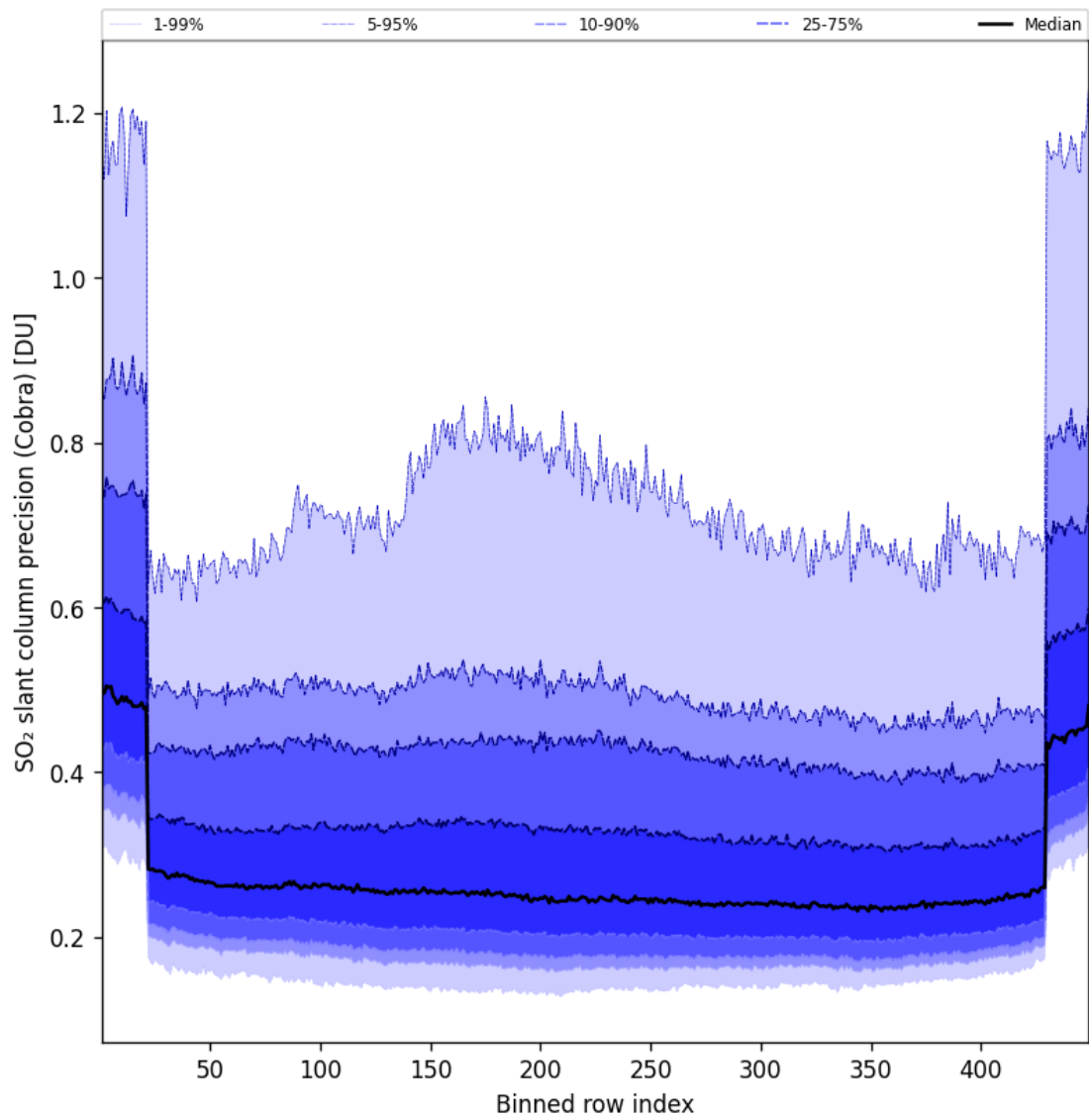


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-09-27 to 2025-09-28

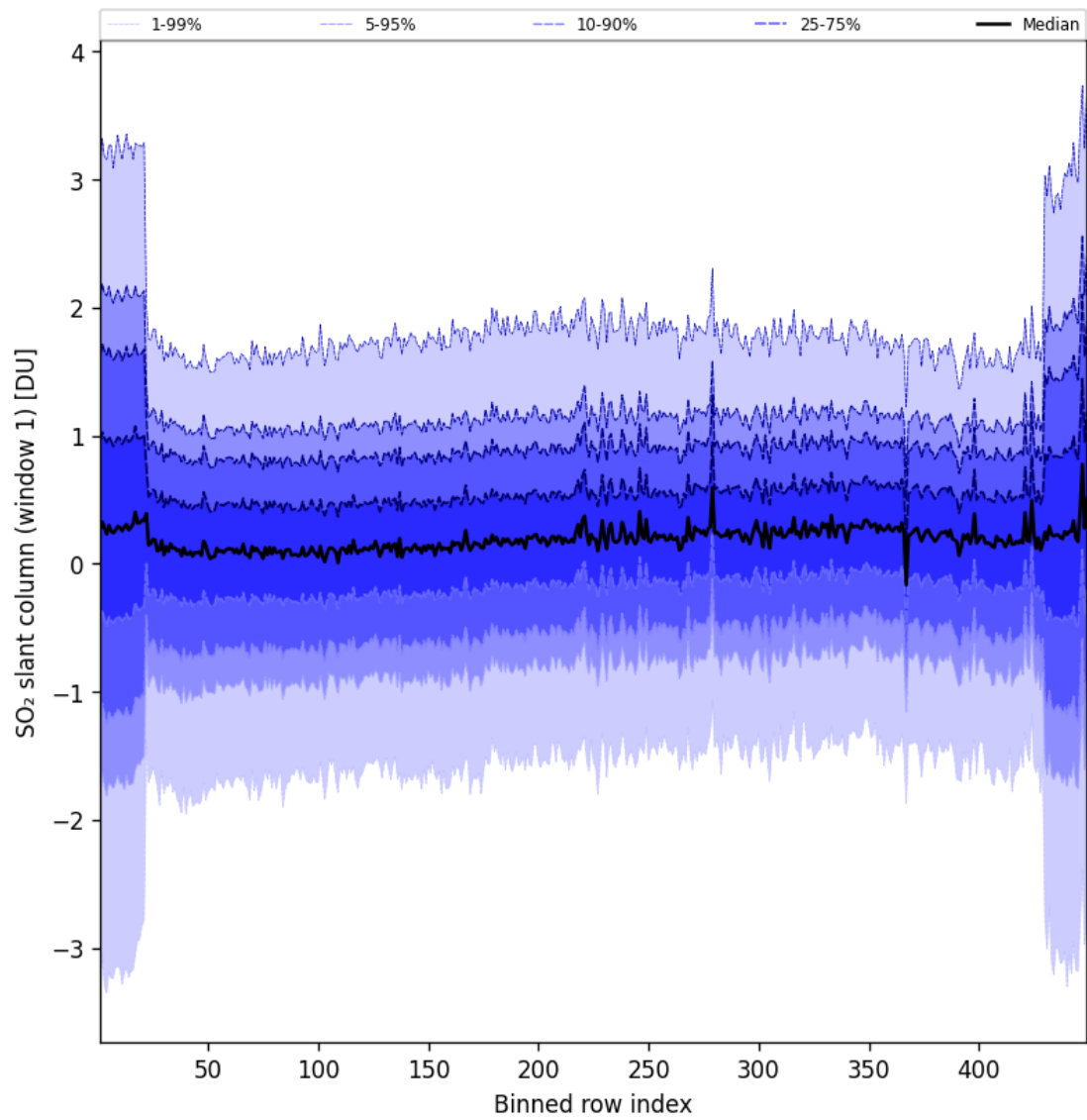


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-09-27 to 2025-09-28

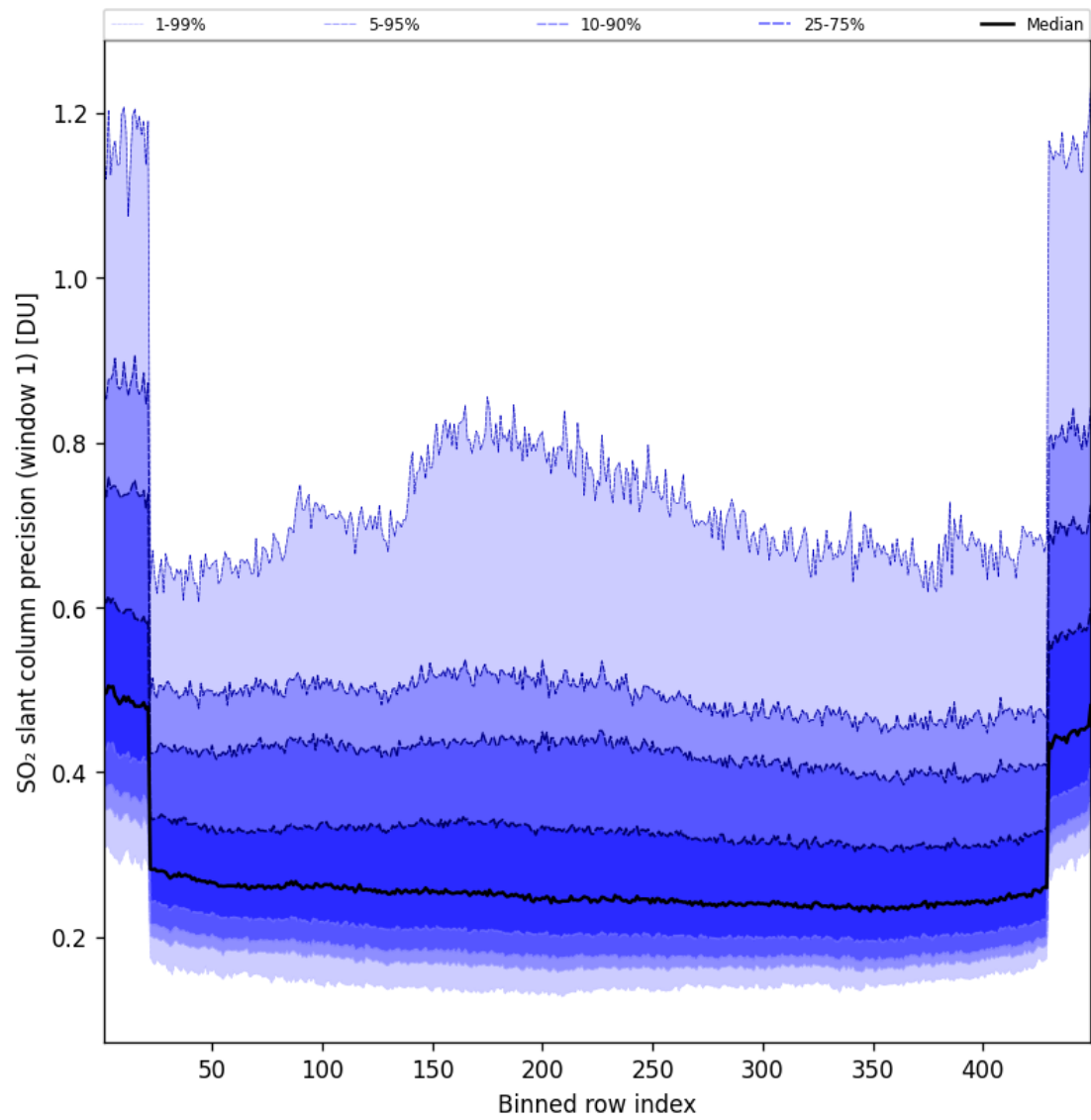


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-09-27 to 2025-09-28

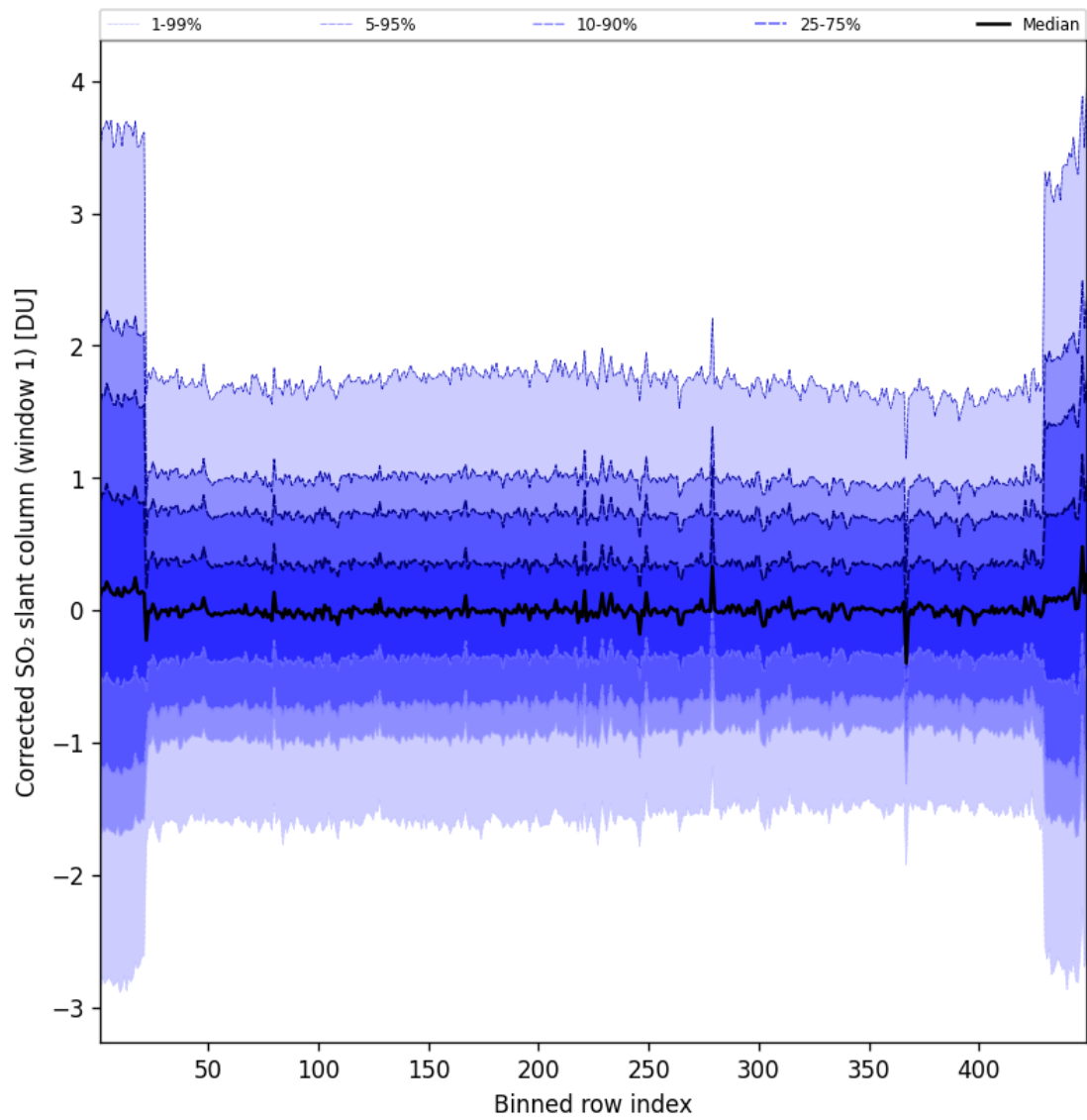


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-09-27 to 2025-09-28

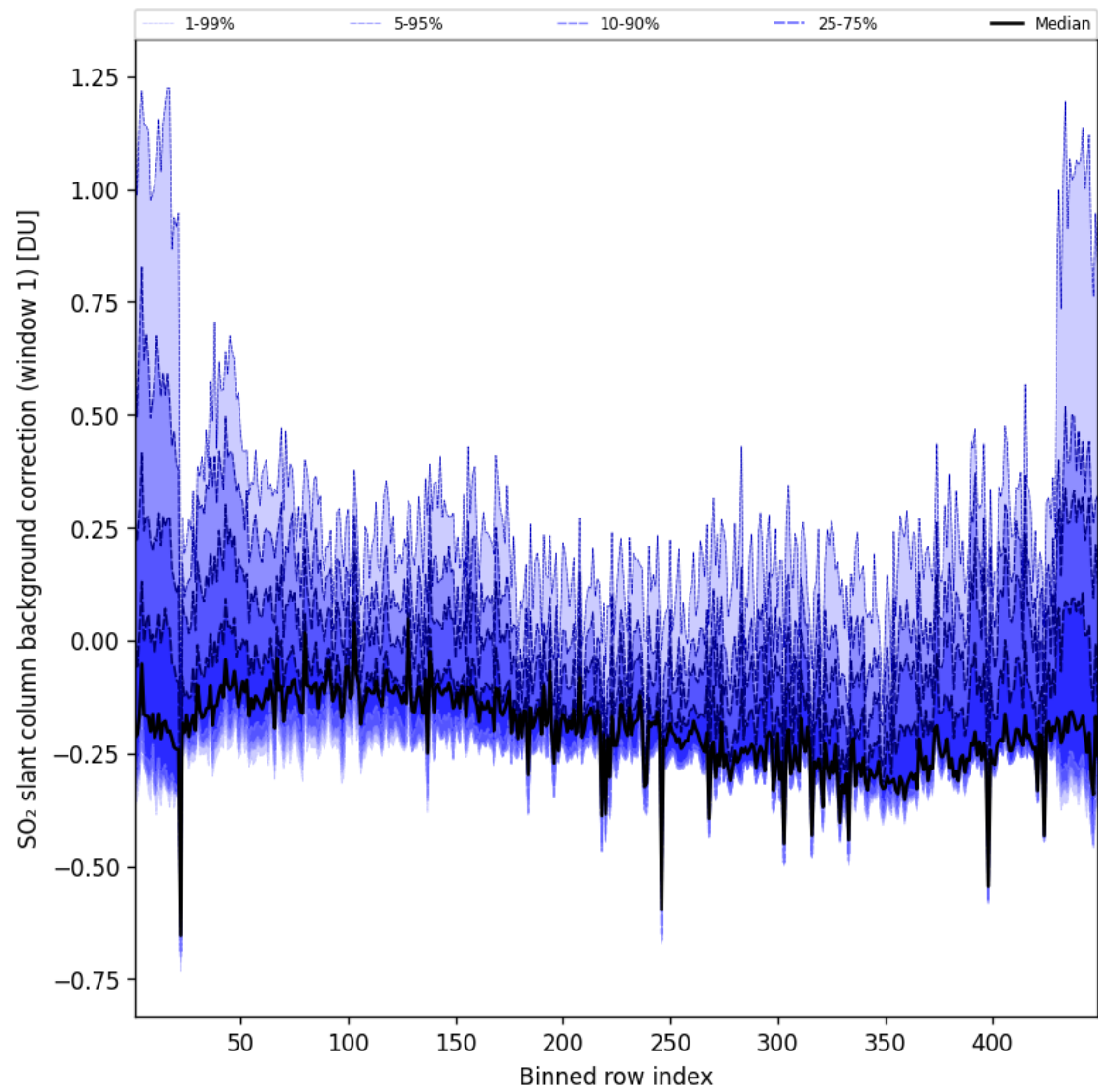


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-09-27 to 2025-09-28

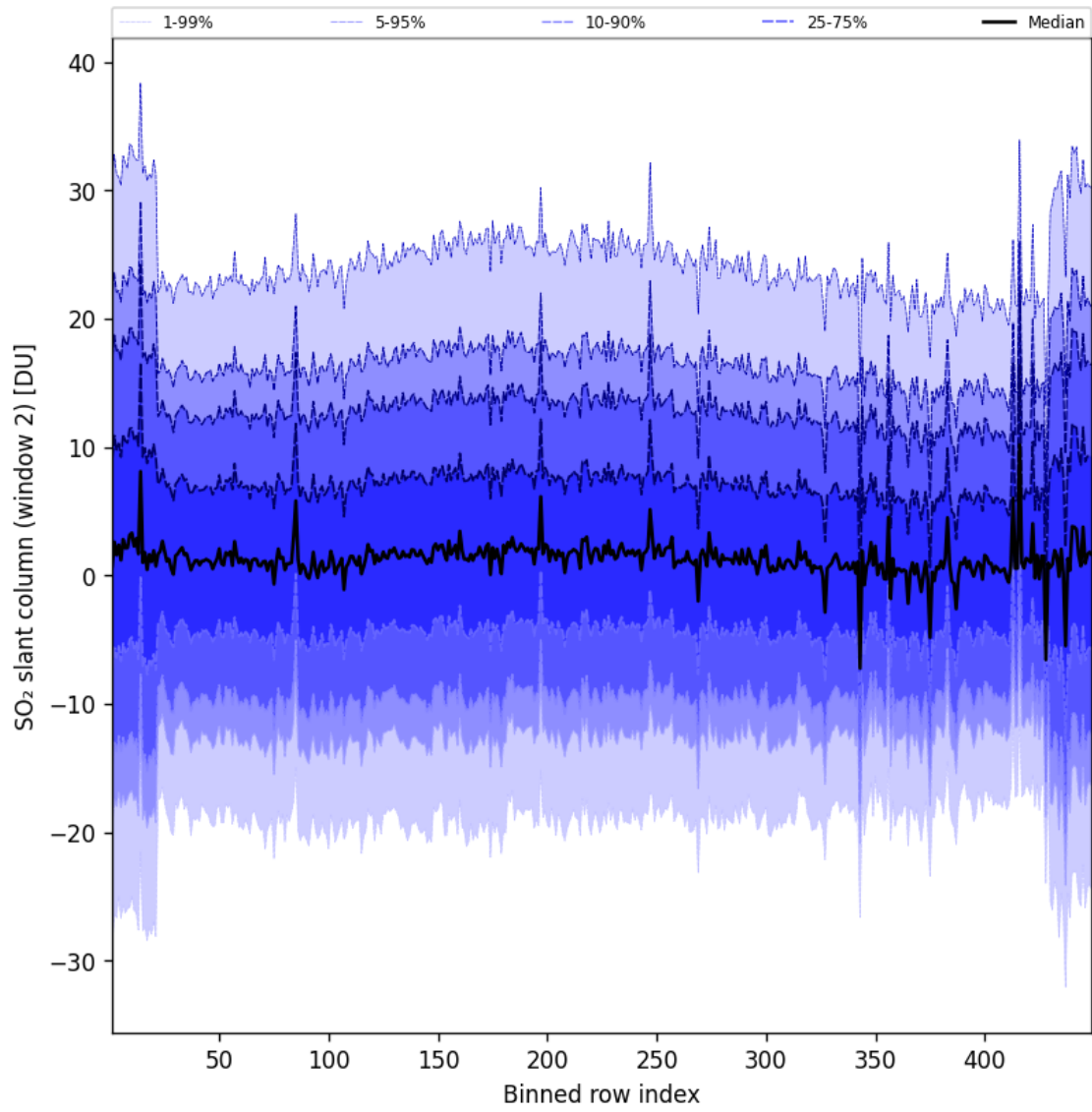


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-09-27 to 2025-09-28

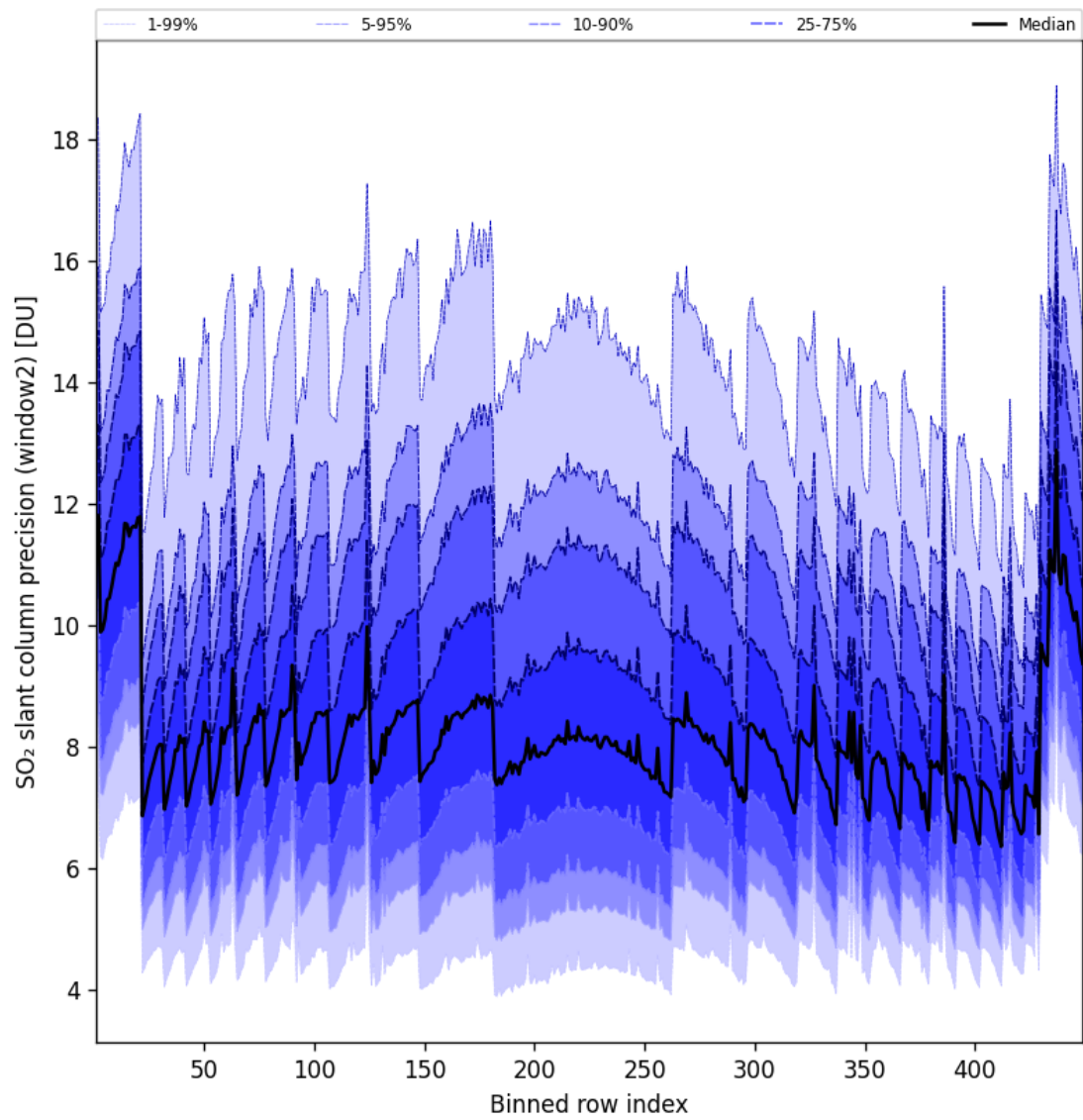


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-09-27 to 2025-09-28

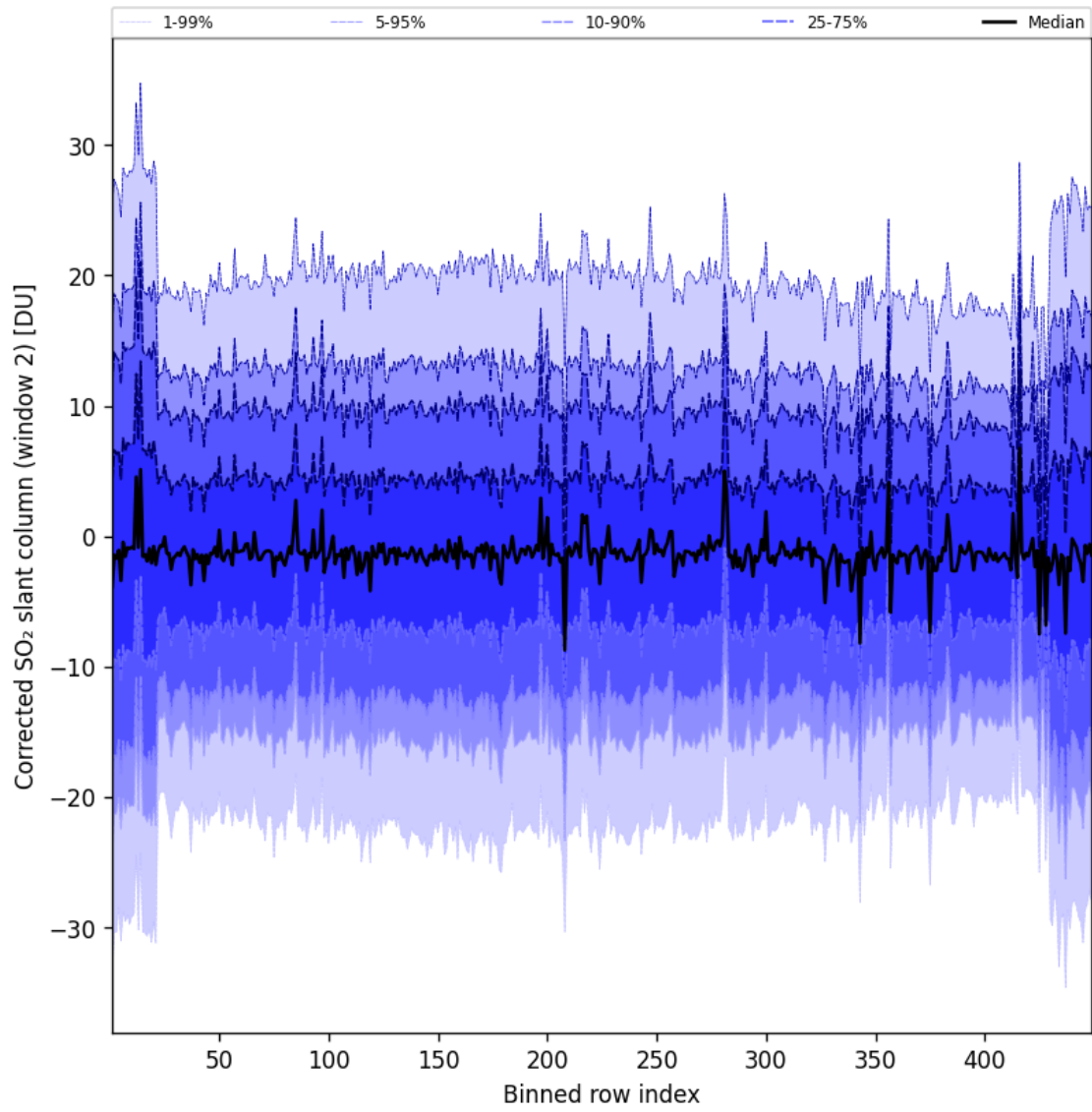


Figure 96: Along track statistics of "Corrected SO₂ slant column (window 2)" for 2025-09-27 to 2025-09-28

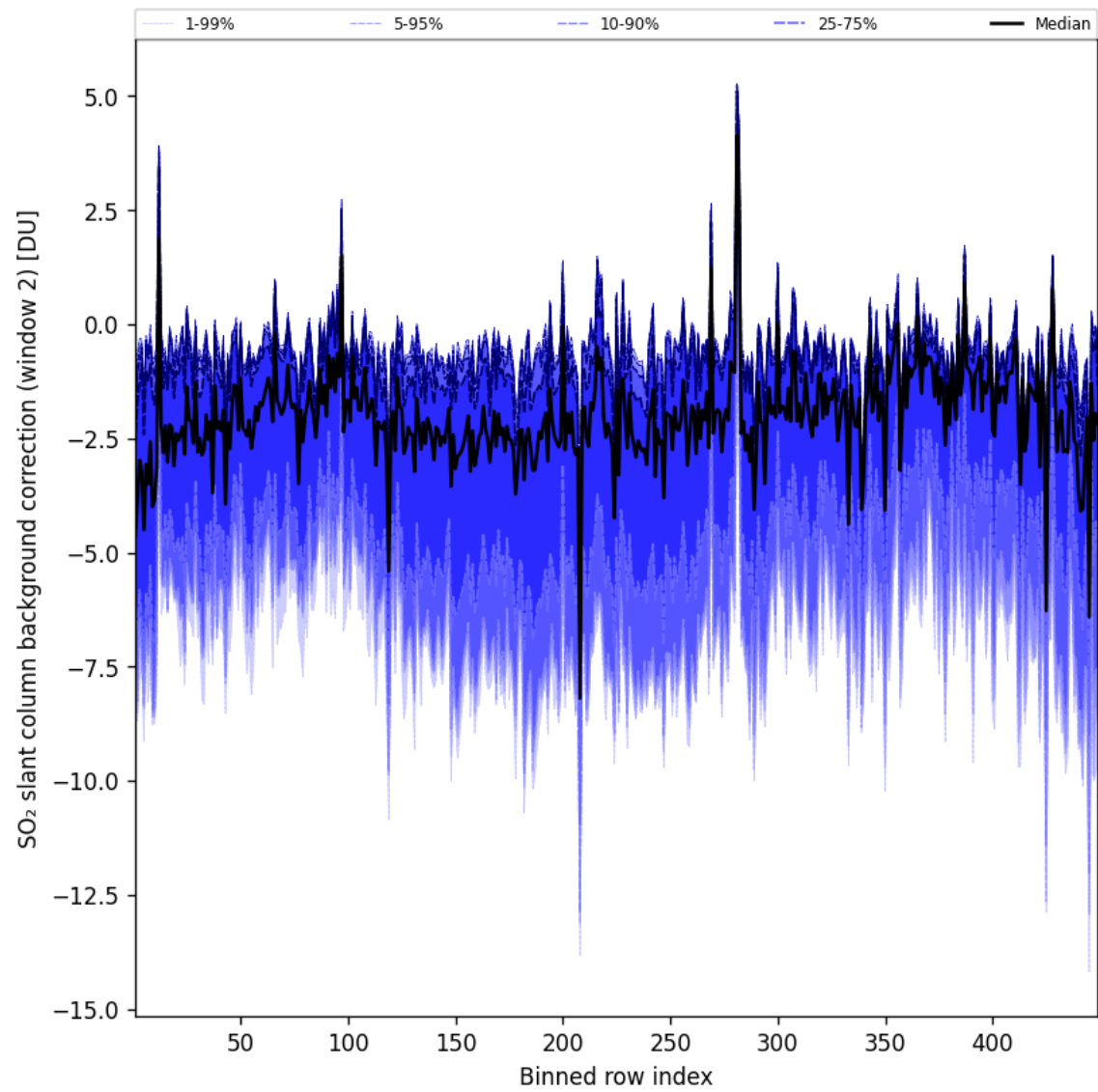


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-09-27 to 2025-09-28

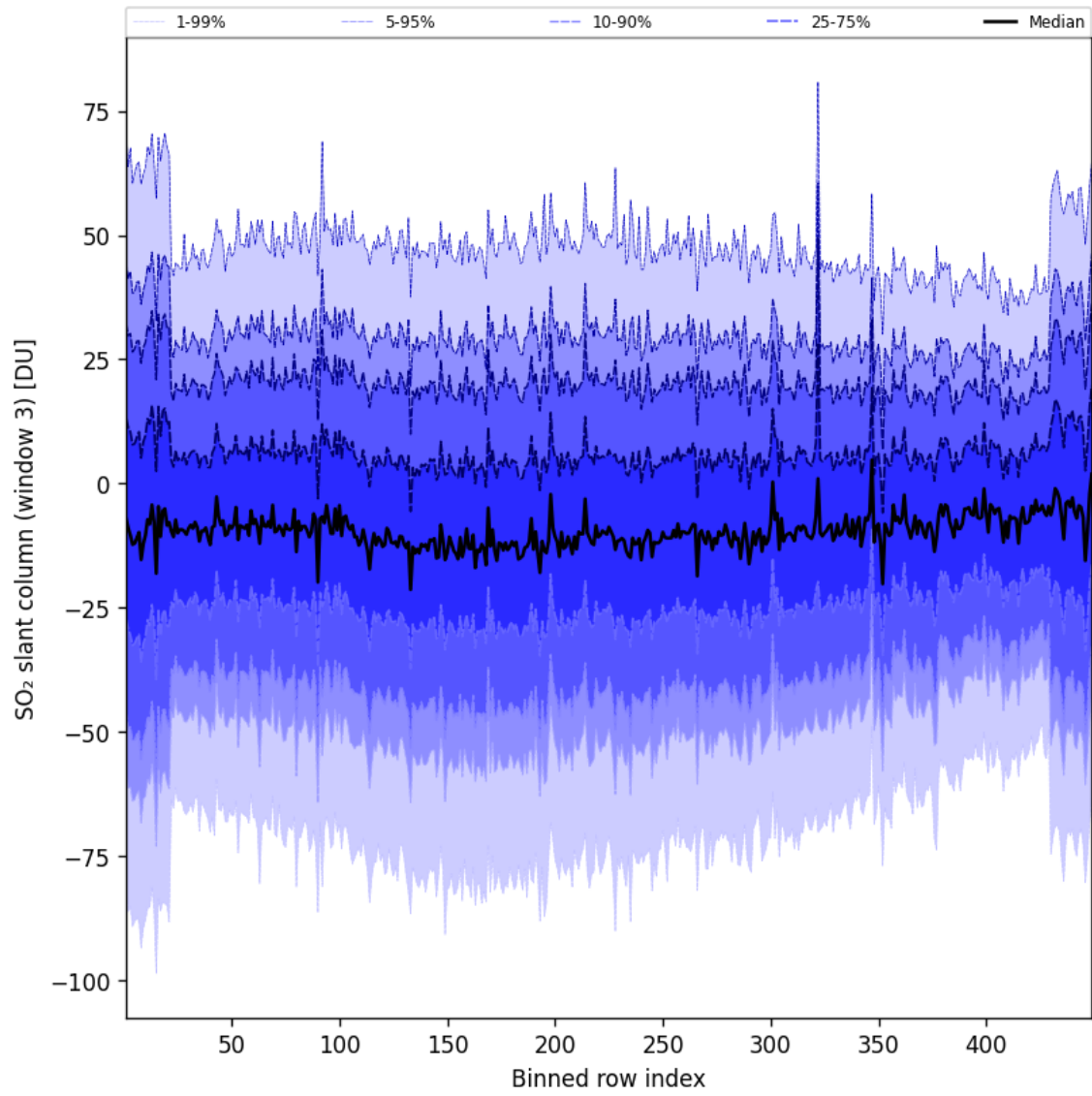


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-09-27 to 2025-09-28

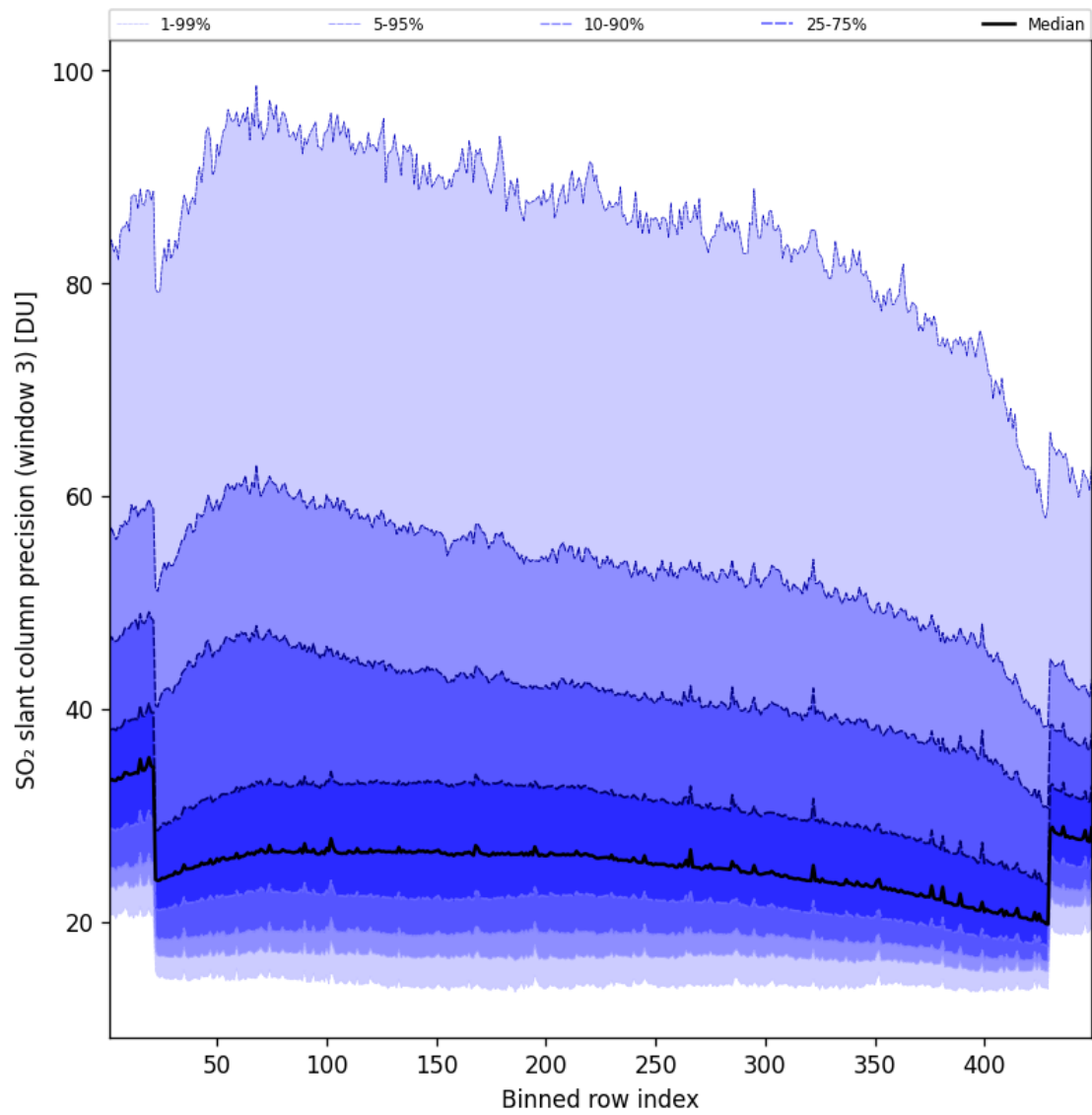


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-09-27 to 2025-09-28

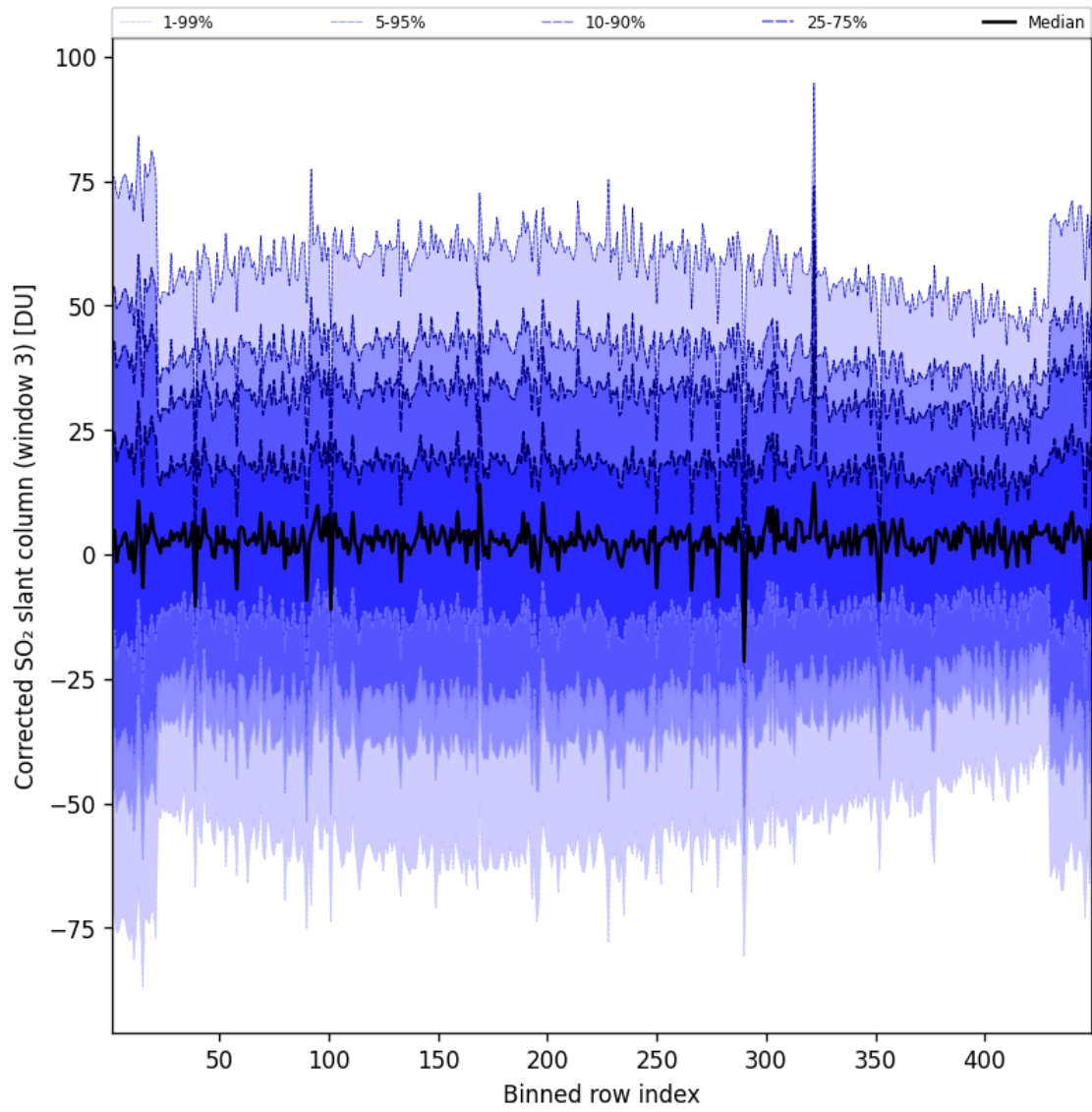


Figure 100: Along track statistics of "Corrected SO₂ slant column (window 3)" for 2025-09-27 to 2025-09-28

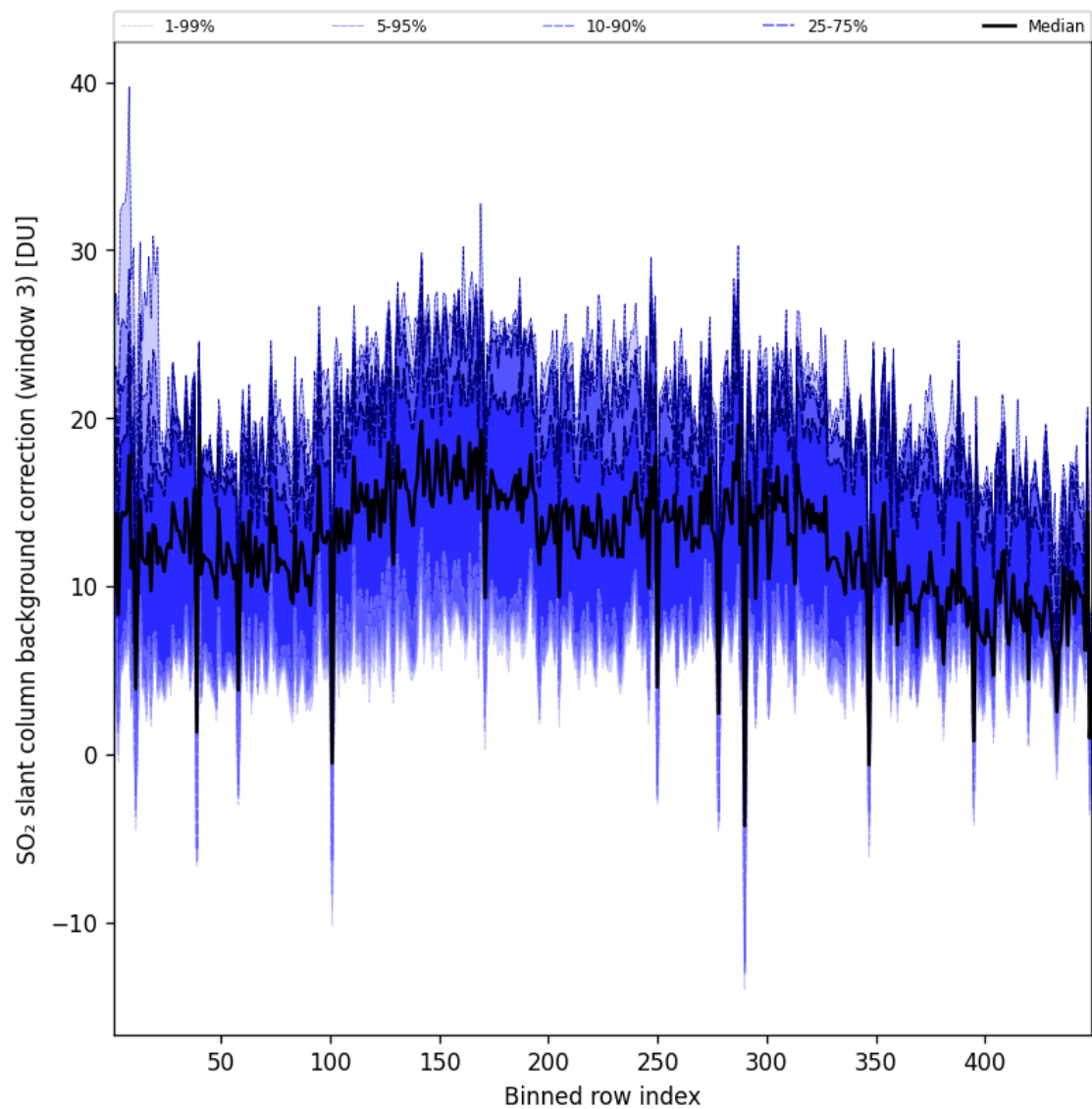


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-09-27 to 2025-09-28

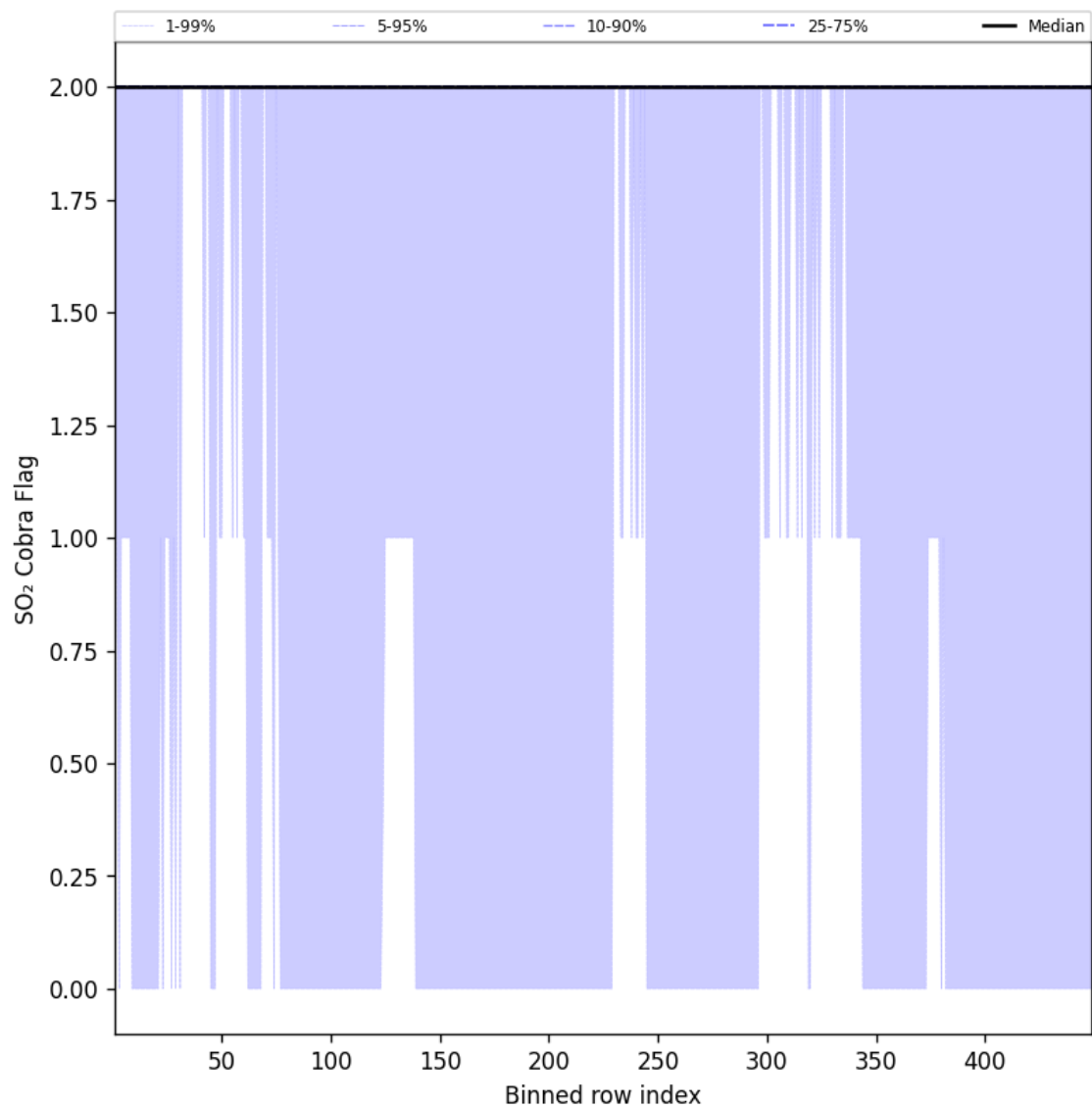


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-09-27 to 2025-09-28

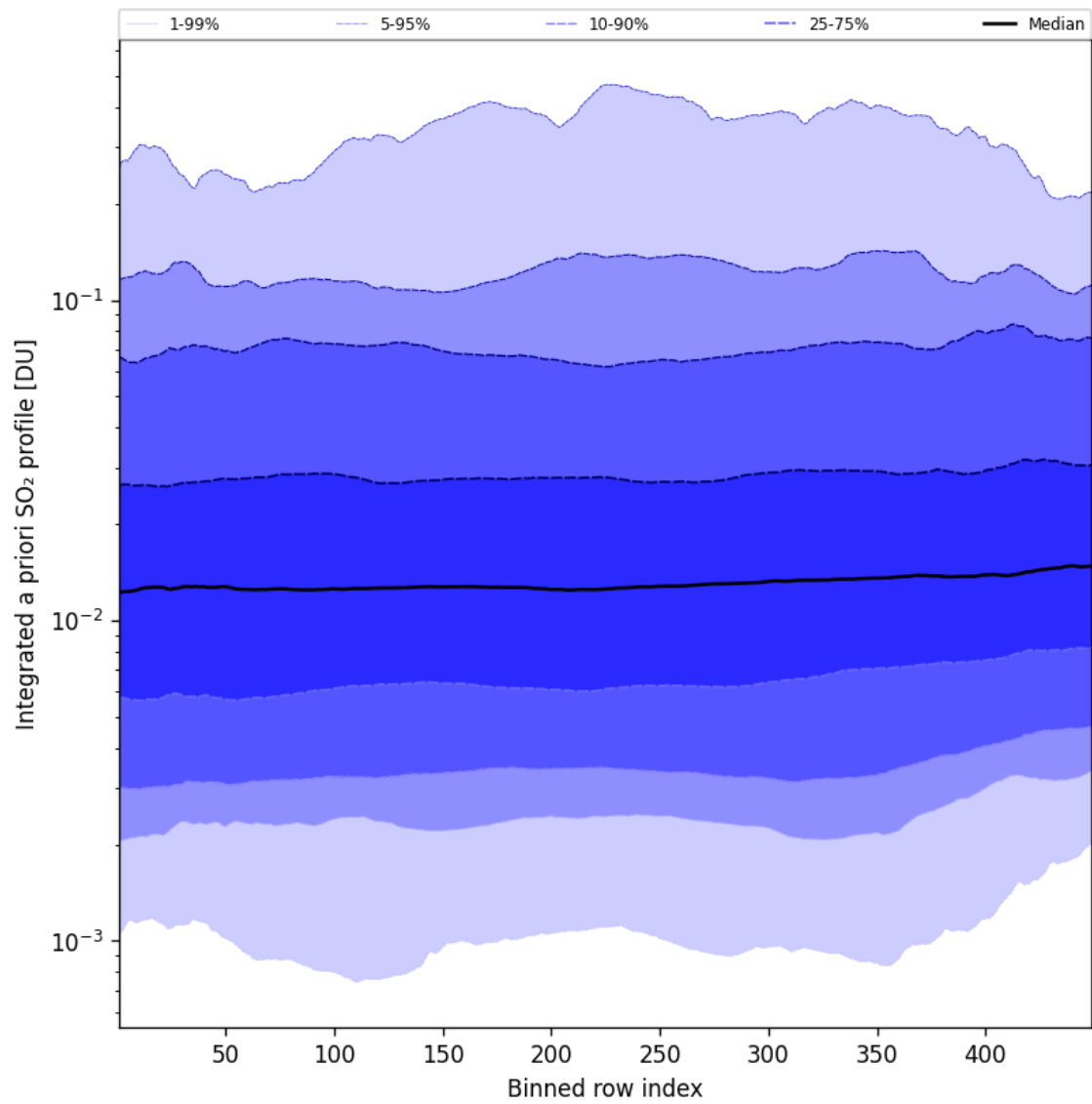


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-09-27 to 2025-09-28

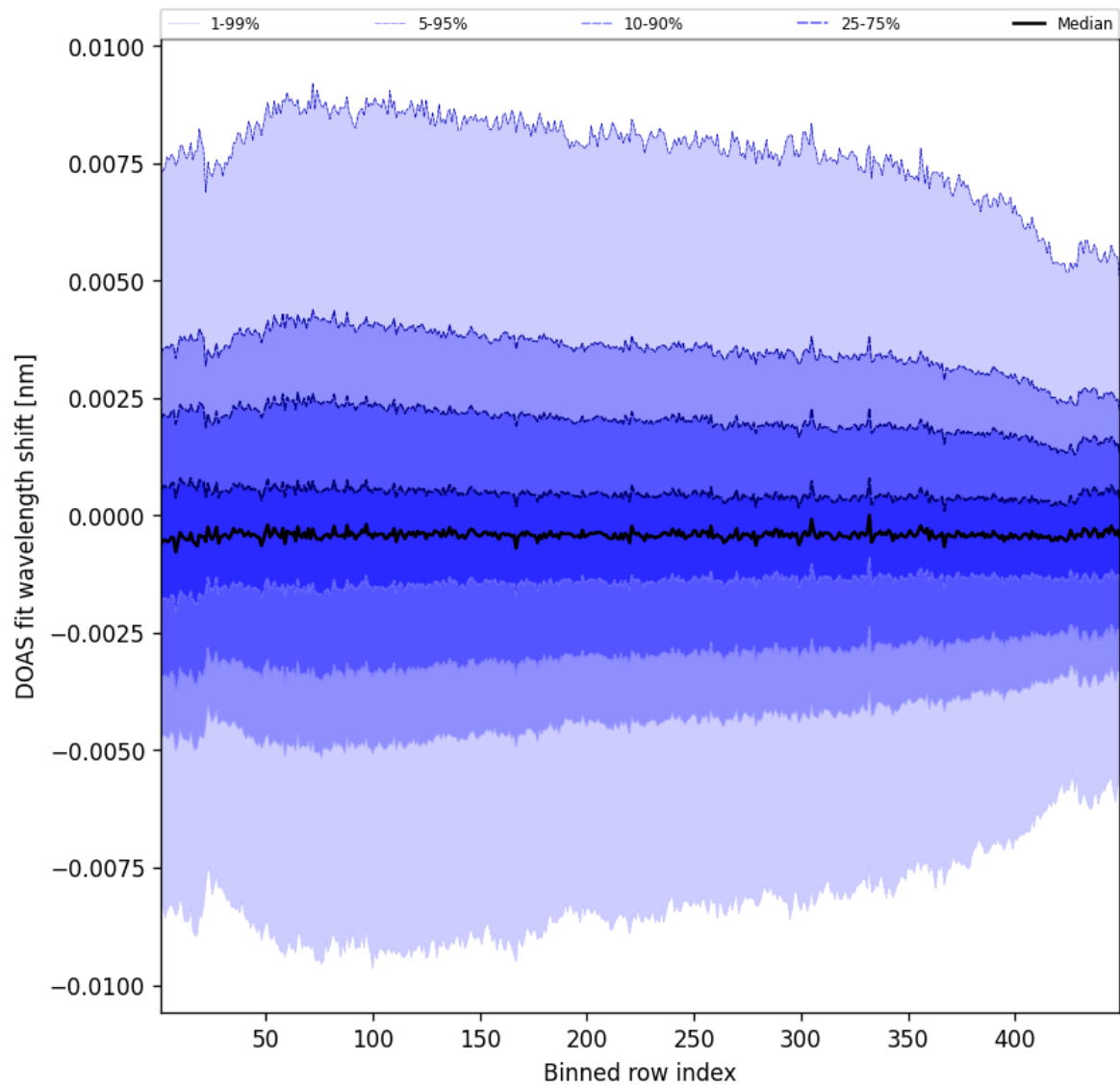


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-09-27 to 2025-09-28

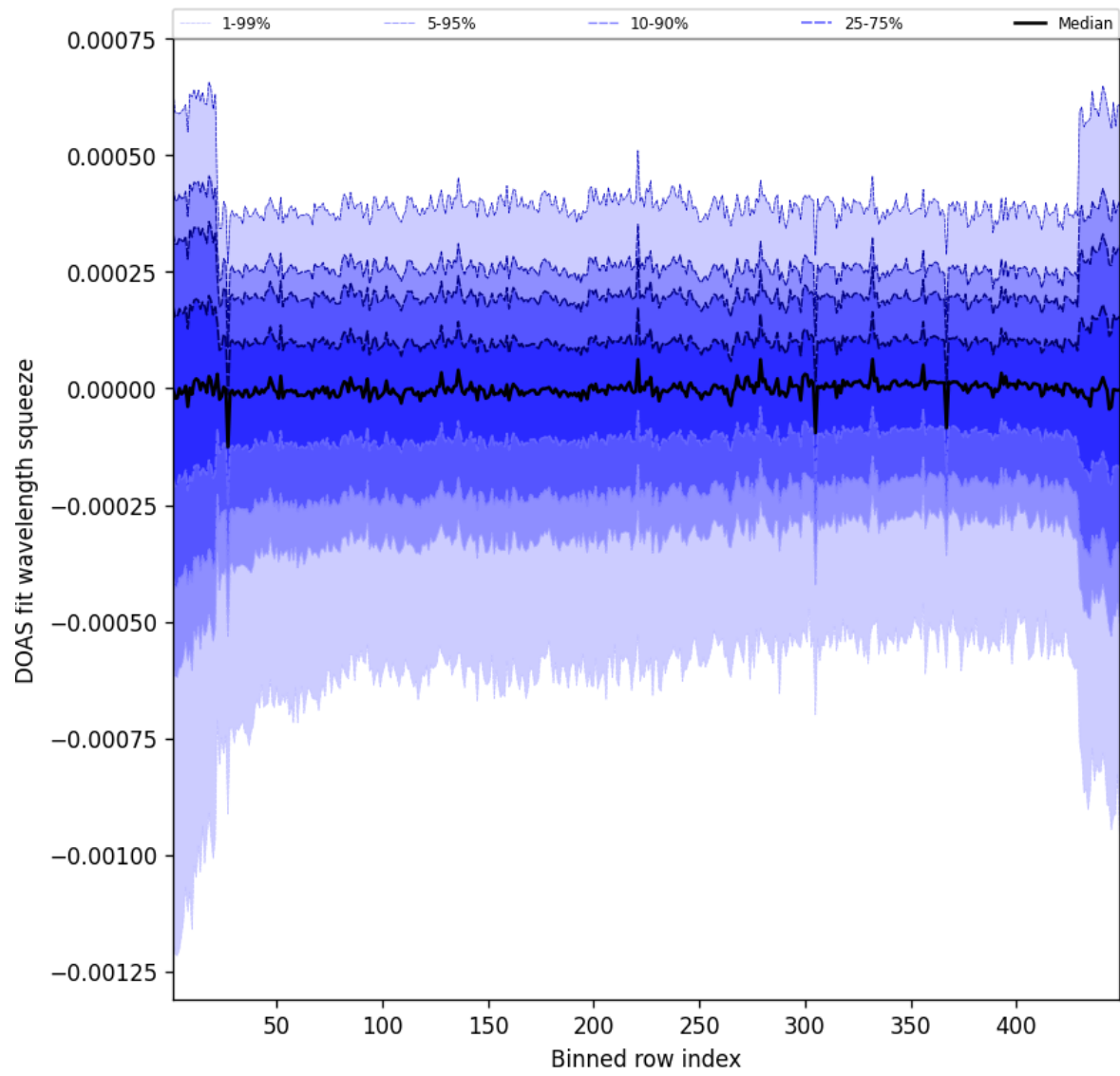


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-09-27 to 2025-09-28

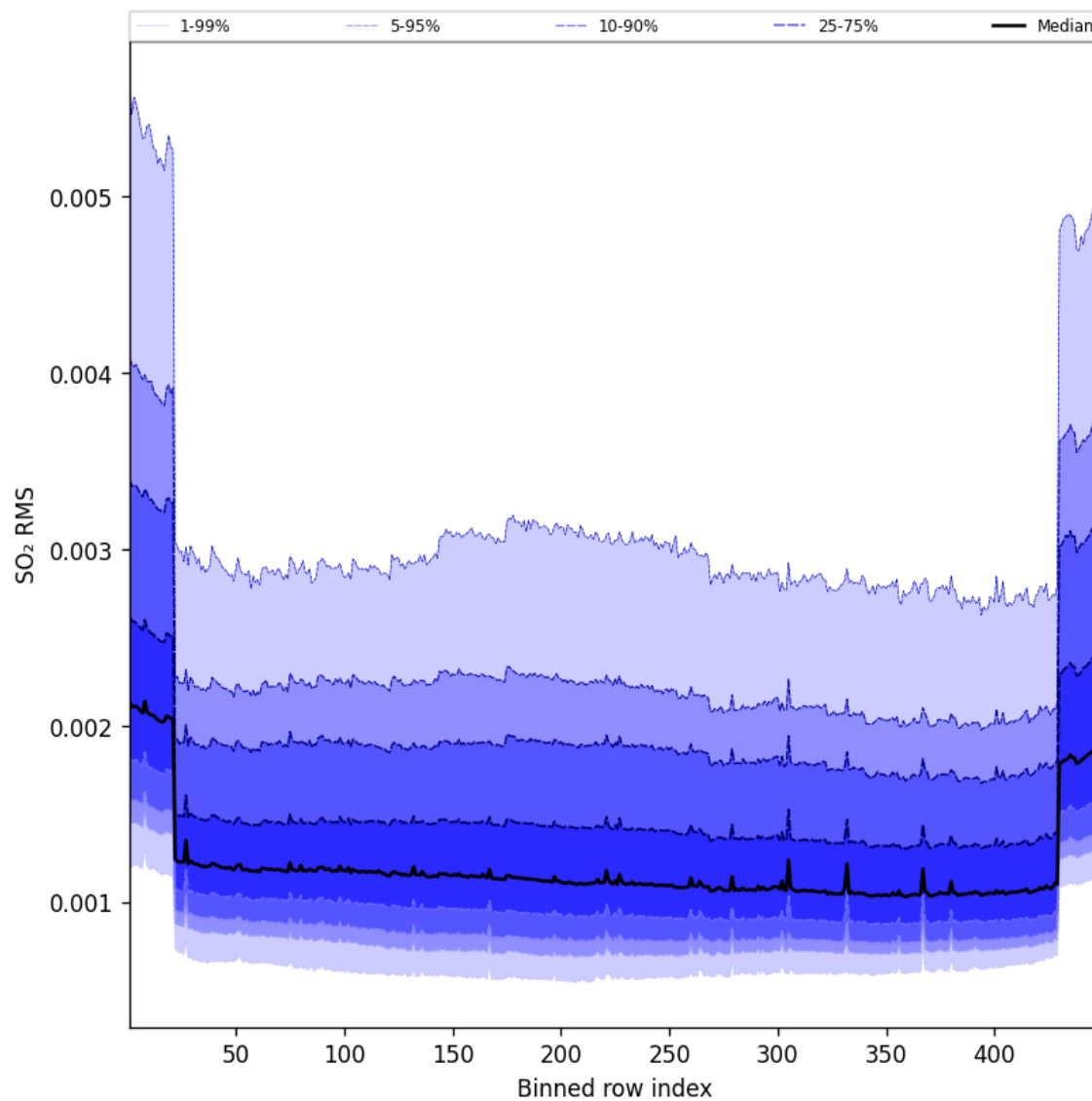


Figure 106: Along track statistics of “SO₂ RMS” for 2025-09-27 to 2025-09-28

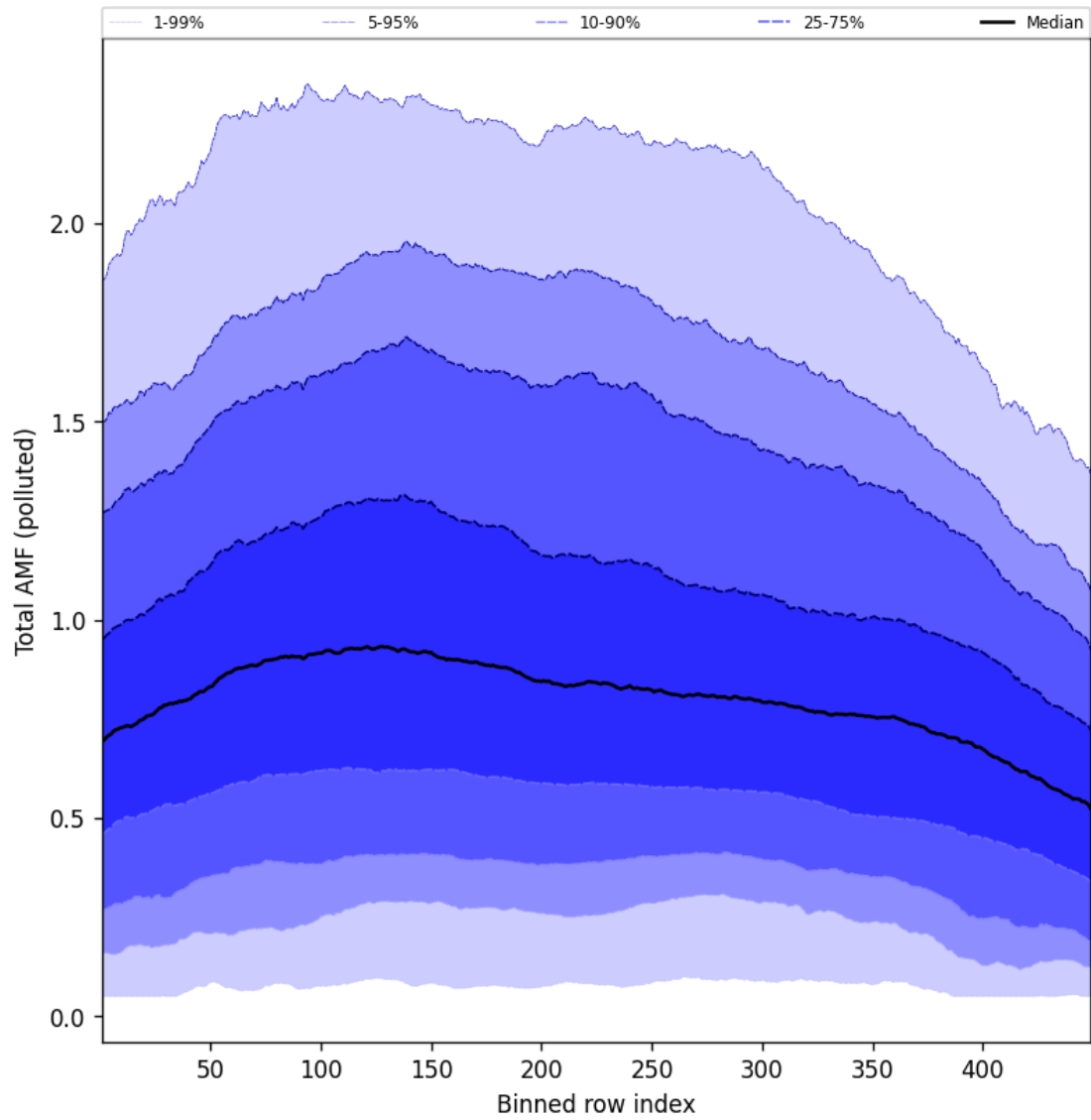


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-09-27 to 2025-09-28

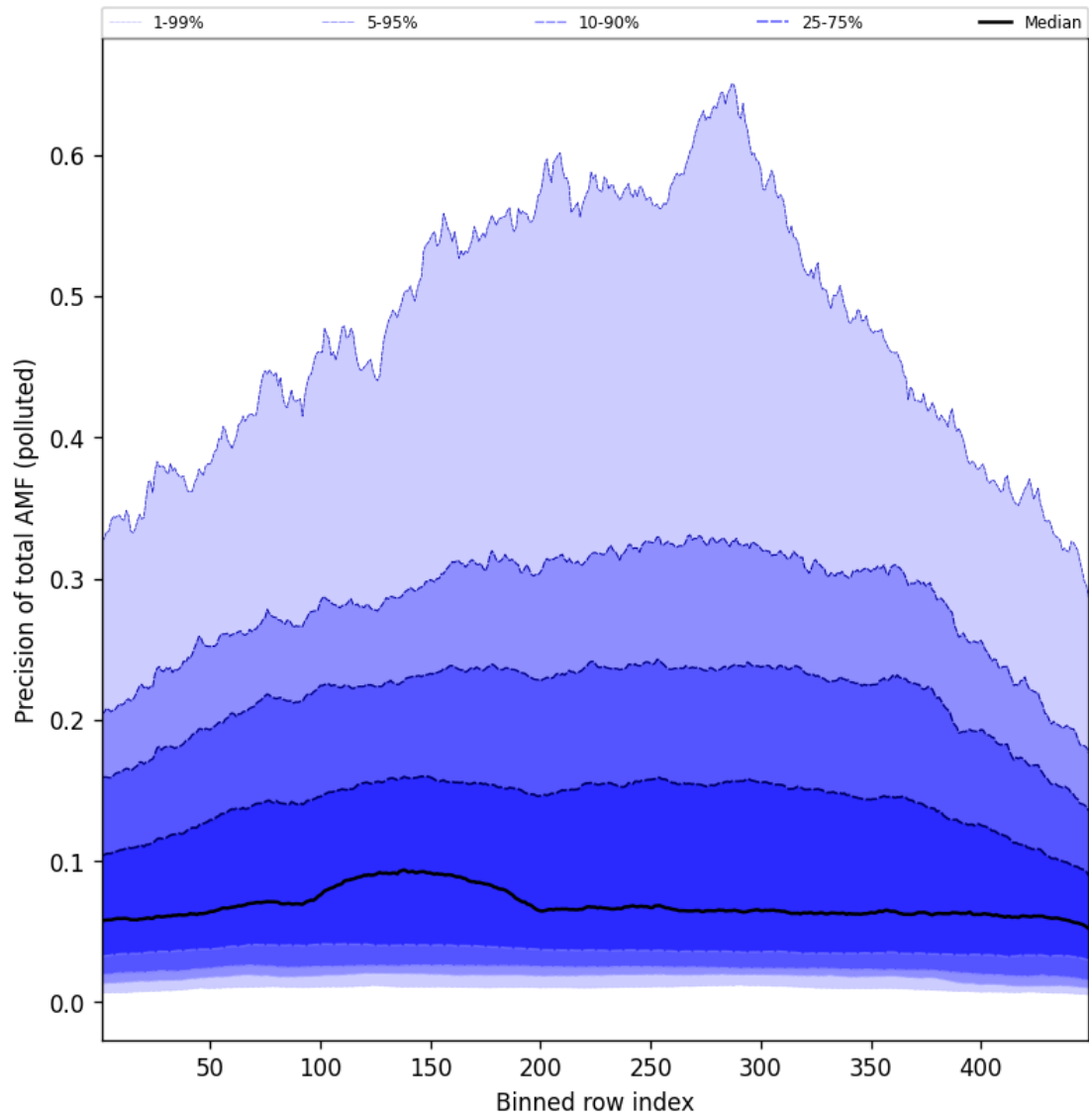


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-09-27 to 2025-09-28

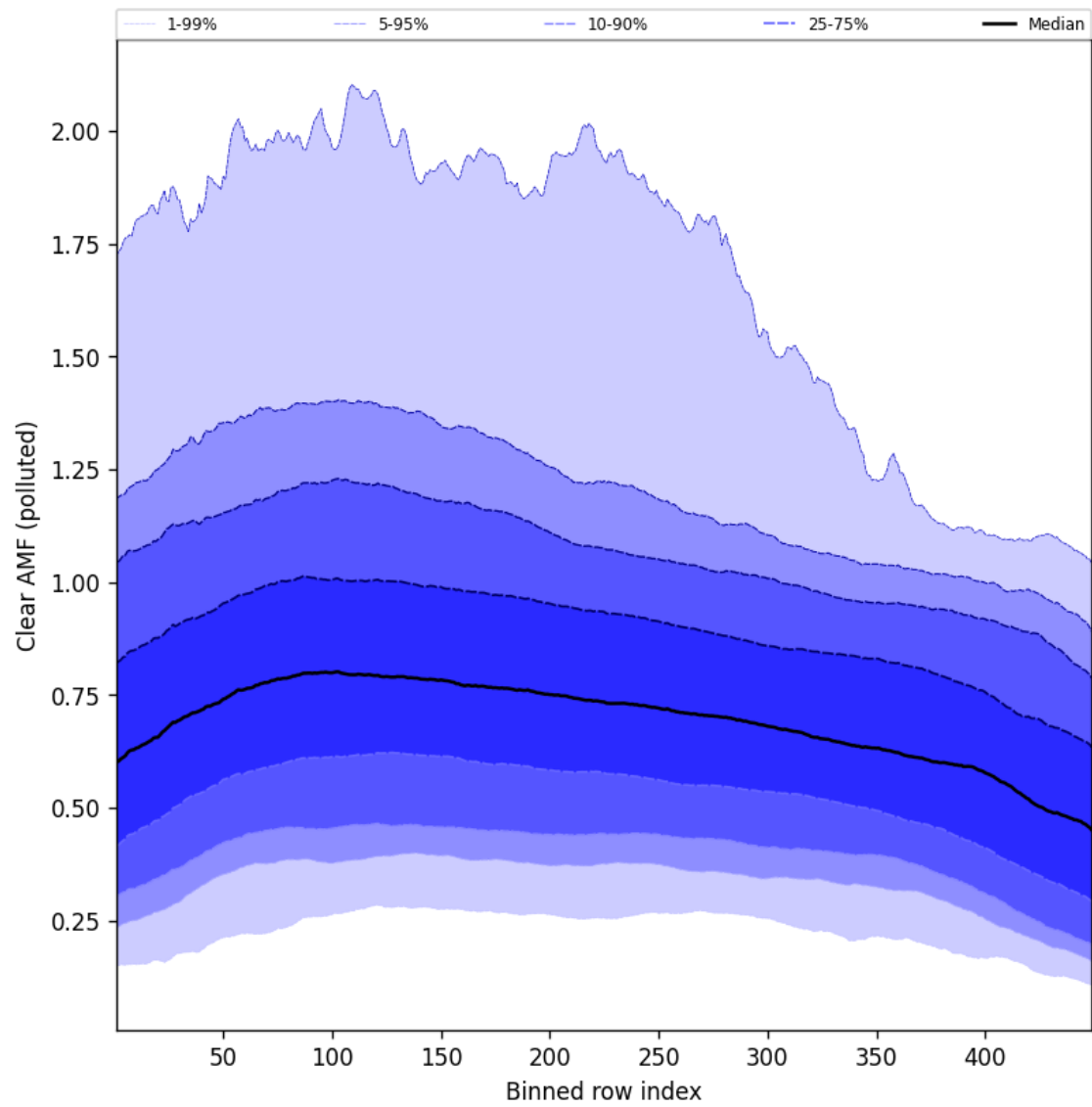


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-09-27 to 2025-09-28

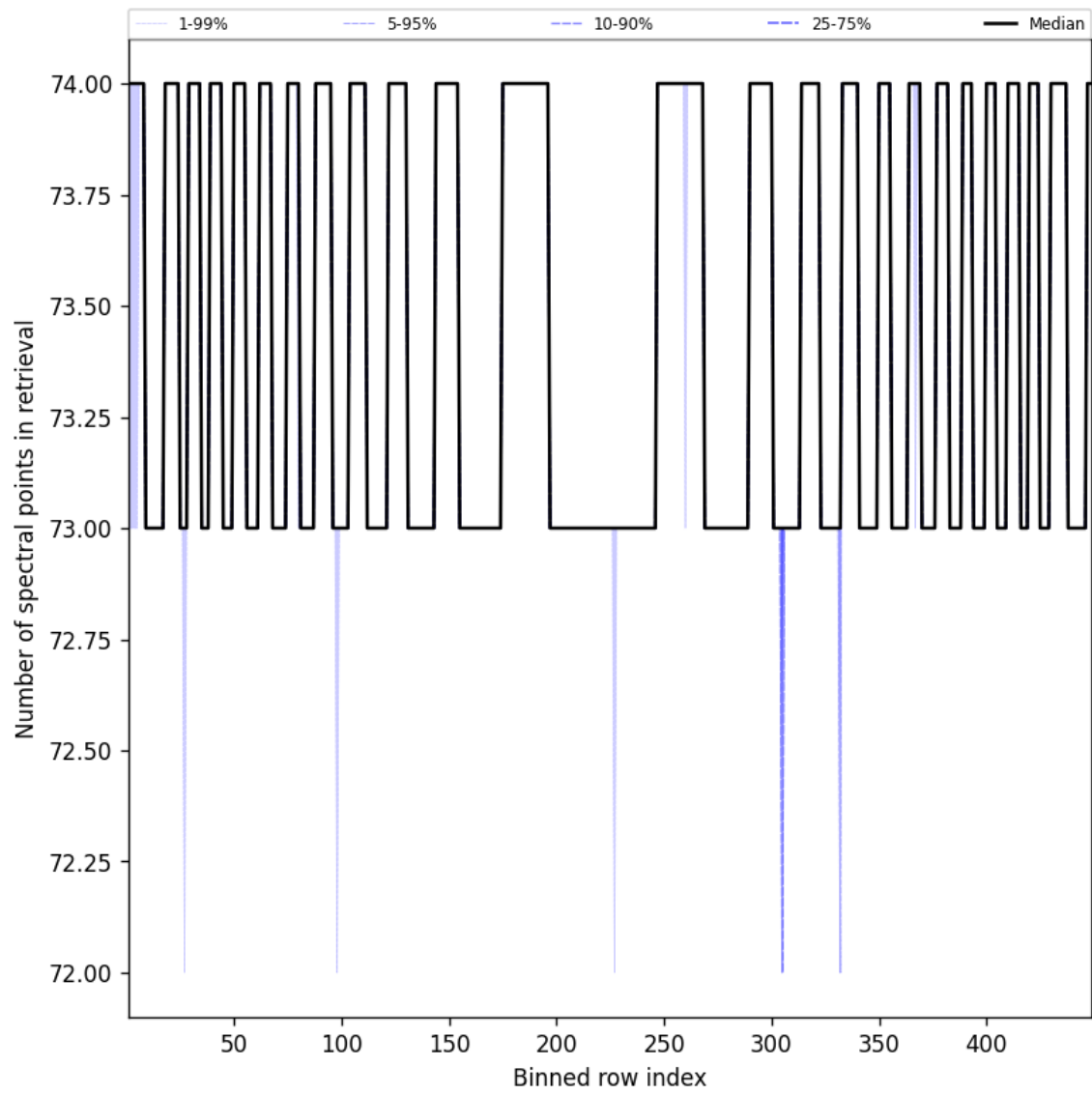


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-09-27 to 2025-09-28

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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