

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]	0.632 ± 0.405	17433706	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.825 \pm 93.441) \times 10^{-2}$	17433706	0.249	0.428	1.036×10^{-2}	-169	727
sulfurdioxide total vertical column precision [DU]	0.474 ± 0.623	17433706	0.222	0.296	0.309	4.574×10^{-2}	82.1
sulfurdioxide slant column density corrected [DU]	$(1.986 \pm 42.919) \times 10^{-2}$	17433706	0.242	0.368	9.605×10^{-3}	-71.5	425
sulfurdioxide slant column density cobra [DU]	$(1.953 \pm 37.943) \times 10^{-2}$	17433706	0.242	0.368	9.605×10^{-3}	-71.5	86.2
sulfurdioxide slant column density cobra precision [DU]	0.295 ± 0.138	17433706	0.213	0.132	0.254	8.074×10^{-2}	35.9
sulfurdioxide slant column density window1 [DU]	0.113 ± 0.697	17433706	0.125	0.741	0.113	-340	188
sulfurdioxide slant column density window1 precision [DU]	0.295 ± 0.138	17433706	0.213	0.132	0.254	8.074×10^{-2}	35.9
sulfurdioxide slant column density corrected win1 [DU]	$(1.852 \pm 68.634) \times 10^{-2}$	17433706	-2.500×10^{-2}	0.724	-1.346×10^{-3}	-340	188
background so2 slant column offset window1 [DU]	$(-9.408 \pm 13.995) \times 10^{-2}$	17433706	-0.180	0.183	-0.126	-1.09	2.70
sulfurdioxide slant column density window2 [DU]	0.646 ± 9.071	17433706	0.250	11.2	0.543	-2.270×10^3	1.181×10^3
sulfurdioxide slant column density window2 precision [DU]	8.18 ± 2.48	17433706	7.43	2.69	7.80	2.14	1.035×10^3
sulfurdioxide slant column density corrected win2 [DU]	-0.230 ± 8.990	17433706	-0.250	11.1	-0.225	-2.267×10^3	1.181×10^3
background so2 slant column offset window2 [DU]	-0.875 ± 1.818	17433706	0.250	2.28	-0.579	-12.1	9.25
sulfurdioxide slant column density window3 [DU]	-5.89 ± 23.85	17433706	-6.16	29.3	-5.75	-1.395×10^3	1.148×10^3
sulfurdioxide slant column density window3 precision [DU]	28.6 ± 13.9	17433706	22.5	10.9	24.9	9.59	1.746×10^3
sulfurdioxide slant column density corrected win3 [DU]	-1.99 ± 23.54	17433706	-1.68	29.1	-1.80	-1.402×10^3	1.150×10^3
background so2 slant column offset window3 [DU]	3.90 ± 4.45	17433706	6.16	6.44	4.33	-13.7	21.4
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	17433706	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.120 \pm 6.852) \times 10^{-2}$	17433706	1.800×10^{-2}	2.348×10^{-2}	1.514×10^{-2}	1.623×10^{-4}	2.19
fitted radiance shift [nm]	$(-1.178 \pm 26.609) \times 10^{-4}$	17433706	1.000×10^{-4}	1.786×10^{-3}	-1.264×10^{-4}	-6.110×10^{-2}	6.839×10^{-2}
fitted radiance squeeze [1]	$(-5.068 \pm 19.115) \times 10^{-5}$	17433706	-3.000×10^{-5}	2.207×10^{-4}	-4.519×10^{-5}	-2.643×10^{-2}	2.104×10^{-2}
fitted root mean square [1]	$(1.285 \pm 0.533) \times 10^{-3}$	17433706	9.750×10^{-4}	5.216×10^{-4}	1.135×10^{-3}	3.034×10^{-4}	0.106
sulfurdioxide total air mass factor polluted [1]	0.935 ± 0.498	17433706	0.660	0.603	0.829	5.000×10^{-2}	2.82
sulfurdioxide total air mass factor polluted precision [1]	0.127 ± 0.148	17433706	3.500×10^{-2}	0.117	8.110×10^{-2}	2.619×10^{-3}	1.93
sulfurdioxide clear air mass factor polluted [1]	0.788 ± 0.384	17433706	0.660	0.398	0.715	4.596×10^{-2}	2.85
number of spectral points in retrieval [1]	73.4 ± 0.5	17433706	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}	0.110	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.06	-0.795	-0.495	-0.338	-0.201	0.227	0.374	0.548	0.890	2.39
sulfurdioxide total vertical column precision [DU]	9.153×10^{-2}	0.126	0.153	0.178	0.213	0.508	0.667	0.861	1.30	3.09
sulfurdioxide slant column density corrected [DU]	-0.868	-0.495	-0.358	-0.268	-0.173	0.195	0.296	0.395	0.552	1.04
sulfurdioxide slant column density cobra [DU]	-0.868	-0.495	-0.358	-0.268	-0.173	0.195	0.296	0.395	0.552	1.04
sulfurdioxide slant column density cobra precision [DU]	0.143	0.169	0.184	0.196	0.210	0.342	0.400	0.453	0.546	0.803
sulfurdioxide slant column density window1 [DU]	-1.67	-0.931	-0.647	-0.458	-0.260	0.481	0.675	0.861	1.14	1.94
sulfurdioxide slant column density window1 precision [DU]	0.143	0.169	0.184	0.196	0.210	0.342	0.400	0.453	0.546	0.803
sulfurdioxide slant column density corrected win1 [DU]	-1.64	-0.969	-0.714	-0.541	-0.357	0.366	0.565	0.761	1.06	1.92
background so2 slant column offset window1 [DU]	-0.339	-0.269	-0.235	-0.215	-0.194	-1.157×10^{-2}	4.263×10^{-2}	9.166×10^{-2}	0.160	0.318
sulfurdioxide slant column density window2 [DU]	-20.6	-13.6	-10.3	-7.81	-5.04	6.18	9.04	11.7	15.3	23.2
sulfurdioxide slant column density window2 precision [DU]	4.30	5.12	5.66	6.10	6.62	9.31	10.2	11.2	12.5	15.3
sulfurdioxide slant column density corrected win2 [DU]	-21.9	-14.6	-11.1	-8.61	-5.80	5.33	8.12	10.6	14.1	21.5
background so2 slant column offset window2 [DU]	-5.92	-4.17	-3.28	-2.64	-1.91	0.363	0.647	0.876	1.29	3.25
sulfurdioxide slant column density window3 [DU]	-67.1	-45.1	-35.1	-28.0	-20.4	8.94	16.5	23.4	32.8	51.9
sulfurdioxide slant column density window3 precision [DU]	13.5	15.6	17.5	19.0	20.7	31.7	36.5	42.6	54.7	87.0
sulfurdioxide slant column density corrected win3 [DU]	-62.0	-40.8	-30.9	-23.9	-16.4	12.7	20.1	26.9	36.1	55.2
background so2 slant column offset window3 [DU]	-6.05	-3.67	-2.08	-0.840	0.643	7.08	8.21	9.22	10.7	13.8
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]	2.885×10^{-4}	3.984×10^{-4}	7.164×10^{-4}	1.865×10^{-3}	5.451×10^{-3}	2.893×10^{-2}	4.272×10^{-2}	6.472×10^{-2}	0.114	0.304
fitted radiance shift [nm]	-8.178×10^{-3}	-4.037×10^{-3}	-2.572×10^{-3}	-1.738×10^{-3}	-1.042×10^{-3}	7.438×10^{-4}	1.466×10^{-3}	2.364×10^{-3}	3.925×10^{-3}	8.245×10^{-3}
fitted radiance squeeze [1]	-5.539×10^{-4}	-3.598×10^{-4}	-2.768×10^{-4}	-2.193×10^{-4}	-1.585×10^{-4}	6.215×10^{-5}	1.163×10^{-4}	1.665×10^{-4}	2.387×10^{-4}	4.176×10^{-4}
fitted root mean square [1]	5.997×10^{-4}	7.331×10^{-4}	8.142×10^{-4}	8.762×10^{-4}	9.490×10^{-4}	1.471×10^{-3}	1.721×10^{-3}	1.965×10^{-3}	2.306×10^{-3}	3.186×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.103	0.277	0.389	0.482	0.594	1.20	1.45	1.67	1.95	2.37
sulfurdioxide total air mass factor polluted precision [1]	1.099×10^{-2}	2.012×10^{-2}	2.653×10^{-2}	3.222×10^{-2}	3.988×10^{-2}	0.157	0.204	0.263	0.384	0.776
sulfurdioxide clear air mass factor polluted [1]	0.234	0.323	0.383	0.445	0.528	0.926	1.08	1.32	1.62	2.05
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]	0.582 ± 0.411	12222485	0.830	0.490	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(1.847 \pm 82.865) \times 10^{-2}$	12222485	0.380	8.111×10^{-3}	-121	154	-0.180	0.200
sulfurdioxide total vertical column precision [DU]	0.423 ± 0.607	12222485	0.238	0.273	4.574×10^{-2}	37.1	0.193	0.432
sulfurdioxide slant column density corrected [DU]	$(1.421 \pm 32.952) \times 10^{-2}$	12222485	0.343	7.824×10^{-3}	-11.2	71.8	-0.162	0.181
sulfurdioxide slant column density cobra [DU]	$(1.416 \pm 32.439) \times 10^{-2}$	12222485	0.343	7.824×10^{-3}	-11.2	39.9	-0.162	0.181
sulfurdioxide slant column density cobra precision [DU]	0.271 ± 0.114	12222485	0.104	0.236	8.074×10^{-2}	15.6	0.202	0.305
sulfurdioxide slant column density window1 [DU]	$(9.587 \pm 62.011) \times 10^{-2}$	12222485	0.699	0.102	-16.0	43.9	-0.252	0.447
sulfurdioxide slant column density window1 precision [DU]	0.271 ± 0.114	12222485	0.104	0.236	8.074×10^{-2}	15.6	0.202	0.305
sulfurdioxide slant column density corrected win1 [DU]	$(6.182 \pm 604.365) \times 10^{-3}$	12222485	0.677	-7.431×10^{-3}	-16.0	43.8	-0.342	0.336
background so2 slant column offset window1 [DU]	$(-8.969 \pm 14.259) \times 10^{-2}$	12222485	0.201	-0.118	-0.738	2.44	-0.198	2.721×10^{-3}
sulfurdioxide slant column density window2 [DU]	0.395 ± 8.280	12222485	10.6	0.381	-730	969	-4.92	5.67
sulfurdioxide slant column density window2 precision [DU]	7.71 ± 2.08	12222485	2.33	7.41	2.19	339	6.34	8.68
sulfurdioxide slant column density corrected win2 [DU]	-0.280 ± 8.236	12222485	10.5	-0.253	-735	967	-5.54	4.99
background so2 slant column offset window2 [DU]	-0.676 ± 1.666	12222485	2.23	-0.484	-9.56	9.18	-1.73	0.494
sulfurdioxide slant column density window3 [DU]	-5.21 ± 22.13	12222485	27.5	-5.35	-1.395×10^3	238	-19.0	8.52
sulfurdioxide slant column density window3 precision [DU]	27.1 ± 13.9	12222485	9.28	23.3	9.59	1.746×10^3	19.8	29.0
sulfurdioxide slant column density corrected win3 [DU]	-1.83 ± 21.82	12222485	27.2	-1.71	-1.402×10^3	234	-15.3	11.9
background so2 slant column offset window3 [DU]	3.38 ± 4.43	12222485	7.07	4.32	-13.7	17.4	-0.196	6.87
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	12222485	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.225 \pm 7.610) \times 10^{-2}$	12222485	2.628×10^{-2}	1.151×10^{-2}	1.623×10^{-4}	2.19	2.435×10^{-3}	2.872×10^{-2}
fitted radiance shift [nm]	$(2.016 \pm 272.543) \times 10^{-5}$	12222485	1.725×10^{-3}	-9.029×10^{-6}	-4.362×10^{-2}	4.409×10^{-2}	-8.621×10^{-4}	8.631×10^{-4}
fitted radiance squeeze [1]	$(-7.780 \pm 17.736) \times 10^{-5}$	12222485	2.135×10^{-4}	-6.601×10^{-5}	-2.516×10^{-3}	6.632×10^{-3}	-1.780×10^{-4}	3.547×10^{-5}
fitted root mean square [1]	$(1.201 \pm 0.466) \times 10^{-3}$	12222485	4.323×10^{-4}	1.075×10^{-3}	3.034×10^{-4}	1.153×10^{-2}	9.141×10^{-4}	1.346×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.996 ± 0.542	12222485	0.725	0.882	5.000×10^{-2}	2.82	0.608	1.33
sulfurdioxide total air mass factor polluted precision [1]	0.144 ± 0.166	12222485	0.129	9.416×10^{-2}	2.619×10^{-3}	1.93	4.462×10^{-2}	0.173
sulfurdioxide clear air mass factor polluted [1]	0.829 ± 0.434	12222485	0.497	0.745	4.596×10^{-2}	2.85	0.509	1.01
number of spectral points in retrieval [1]	73.4 ± 0.5	12222485	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]	0.749 ± 0.363	5211221	0.570	1.000	0.0	1.000	0.430	1.000
sulfurdioxide total vertical column [DU]	$(5.121 \pm 114.444) \times 10^{-2}$	5211221	0.575	1.821×10^{-2}	-169	727	-0.264	0.312
sulfurdioxide total vertical column precision [DU]	0.592 ± 0.645	5211221	0.378	0.412	5.236×10^{-2}	82.1	0.285	0.664
sulfurdioxide slant column density corrected [DU]	$(3.311 \pm 60.110) \times 10^{-2}$	5211221	0.439	1.484×10^{-2}	-71.5	425	-0.202	0.237
sulfurdioxide slant column density cobra [DU]	$(3.213 \pm 48.435) \times 10^{-2}$	5211221	0.439	1.484×10^{-2}	-71.5	86.2	-0.202	0.237
sulfurdioxide slant column density cobra precision [DU]	0.352 ± 0.168	5211221	0.169	0.310	9.501×10^{-2}	35.9	0.244	0.412
sulfurdioxide slant column density window1 [DU]	0.152 ± 0.848	5211221	0.857	0.146	-340	188	-0.283	0.574
sulfurdioxide slant column density window1 precision [DU]	0.352 ± 0.168	5211221	0.169	0.310	9.501×10^{-2}	35.9	0.244	0.412
sulfurdioxide slant column density corrected win1 [DU]	$(4.747 \pm 84.737) \times 10^{-2}$	5211221	0.853	1.656×10^{-2}	-340	188	-0.401	0.452
background so2 slant column offset window1 [DU]	-0.104 ± 0.133	5211221	0.137	-0.136	-1.09	2.70	-0.185	-4.798×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.23 ± 10.68	5211221	12.9	1.01	-2.270×10^3	1.181×10^3	-5.36	7.56
sulfurdioxide slant column density window2 precision [DU]	9.30 ± 2.94	5211221	2.99	8.92	2.14	1.035×10^3	7.61	10.6
sulfurdioxide slant column density corrected win2 [DU]	-0.111 ± 10.549	5211221	12.8	-0.143	-2.267×10^3	1.181×10^3	-6.53	6.26
background so2 slant column offset window2 [DU]	-1.34 ± 2.06	5211221	2.55	-0.773	-12.1	9.25	-2.51	4.955×10^{-2}
sulfurdioxide slant column density window3 [DU]	-7.50 ± 27.39	5211221	34.4	-6.91	-824	1.148×10^3	-24.4	10.1
sulfurdioxide slant column density window3 precision [DU]	32.1 ± 13.2	5211221	10.8	29.0	10.4	967	24.6	35.4
sulfurdioxide slant column density corrected win3 [DU]	-2.37 ± 27.14	5211221	34.2	-2.06	-822	1.150×10^3	-19.2	15.0
background so2 slant column offset window3 [DU]	5.13 ± 4.25	5211221	6.07	4.33	-7.03	21.4	1.94	8.01
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.30	5211221	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.873 \pm 4.601) \times 10^{-2}$	5211221	1.545×10^{-2}	1.963×10^{-2}	1.568×10^{-3}	1.69	1.367×10^{-2}	2.912×10^{-2}
fitted radiance shift [nm]	$(-4.414 \pm 24.731) \times 10^{-4}$	5211221	1.806×10^{-3}	-4.332×10^{-4}	-6.110×10^{-2}	6.839×10^{-2}	-1.380×10^{-3}	4.265×10^{-4}
fitted radiance squeeze [1]	$(1.291 \pm 20.661) \times 10^{-5}$	5211221	2.309×10^{-4}	8.306×10^{-6}	-2.643×10^{-2}	2.104×10^{-2}	-1.053×10^{-4}	1.255×10^{-4}
fitted root mean square [1]	$(1.482 \pm 0.621) \times 10^{-3}$	5211221	6.727×10^{-4}	1.317×10^{-3}	3.884×10^{-4}	0.106	1.071×10^{-3}	1.744×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.793 ± 0.337	5211221	0.392	0.740	5.000×10^{-2}	2.61	0.576	0.968
sulfurdioxide total air mass factor polluted precision [1]	$(8.727 \pm 8.045) \times 10^{-2}$	5211221	8.382×10^{-2}	5.518×10^{-2}	3.712×10^{-3}	1.65	3.396×10^{-2}	0.118
sulfurdioxide clear air mass factor polluted [1]	0.690 ± 0.195	5211221	0.259	0.674	7.425×10^{-2}	1.54	0.556	0.815
number of spectral points in retrieval [1]	73.4 ± 0.5	5211221	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]	0.641 ± 0.393	11255387	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.669 \pm 83.531) \times 10^{-2}$	11255387	0.433	1.105×10^{-2}	-48.8	295	-0.203	0.230
sulfurdioxide total vertical column precision [DU]	0.465 ± 0.586	11255387	0.281	0.308	5.127×10^{-2}	43.7	0.218	0.499
sulfurdioxide slant column density corrected [DU]	$(1.865 \pm 38.509) \times 10^{-2}$	11255387	0.372	1.005×10^{-2}	-26.2	273	-0.174	0.198
sulfurdioxide slant column density cobra [DU]	$(1.853 \pm 36.550) \times 10^{-2}$	11255387	0.372	1.005×10^{-2}	-26.2	44.5	-0.174	0.198
sulfurdioxide slant column density cobra precision [DU]	0.299 ± 0.136	11255387	0.144	0.257	8.074×10^{-2}	23.1	0.209	0.354
sulfurdioxide slant column density window1 [DU]	0.106 ± 0.690	11255387	0.754	0.114	-122	101	-0.268	0.486
sulfurdioxide slant column density window1 precision [DU]	0.299 ± 0.136	11255387	0.144	0.257	8.074×10^{-2}	23.1	0.209	0.354
sulfurdioxide slant column density corrected win1 [DU]	$(1.752 \pm 67.833) \times 10^{-2}$	11255387	0.735	4.259×10^{-4}	-122	101	-0.362	0.373
background so2 slant column offset window1 [DU]	$(-8.857 \pm 14.811) \times 10^{-2}$	11255387	0.191	-0.127	-1.09	2.70	-0.194	-2.488×10^{-3}
sulfurdioxide slant column density window2 [DU]	0.745 ± 8.992	11255387	11.2	0.599	-2.270×10^3	1.072×10^3	-4.97	6.26
sulfurdioxide slant column density window2 precision [DU]	8.11 ± 2.28	11255387	2.59	7.75	2.41	1.035×10^3	6.62	9.22
sulfurdioxide slant column density corrected win2 [DU]	-0.205 ± 8.896	11255387	11.1	-0.210	-2.267×10^3	1.070×10^3	-5.78	5.35
background so2 slant column offset window2 [DU]	-0.950 ± 1.925	11255387	2.50	-0.547	-12.1	9.25	-2.12	0.376
sulfurdioxide slant column density window3 [DU]	-3.39 ± 23.52	11255387	29.3	-3.50	-1.395×10^3	284	-18.0	11.3
sulfurdioxide slant column density window3 precision [DU]	27.3 ± 11.8	11255387	9.77	24.2	9.74	838	20.5	30.3
sulfurdioxide slant column density corrected win3 [DU]	0.394 ± 23.000	11255387	28.8	0.277	-1.402×10^3	282	-14.0	14.8
background so2 slant column offset window3 [DU]	3.79 ± 4.49	11255387	6.37	3.98	-13.7	21.4	0.513	6.88
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	11255387	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.077 \pm 4.053) \times 10^{-2}$	11255387	1.695×10^{-2}	1.404×10^{-2}	1.863×10^{-4}	2.17	6.407×10^{-3}	2.335×10^{-2}
fitted radiance shift [nm]	$(-1.491 \pm 22.971) \times 10^{-4}$	11255387	1.719×10^{-3}	-1.394×10^{-4}	-6.110×10^{-2}	3.695×10^{-2}	-1.032×10^{-3}	6.870×10^{-4}
fitted radiance squeeze [1]	$(-4.350 \pm 19.241) \times 10^{-5}$	11255387	2.219×10^{-4}	-3.710×10^{-5}	-1.411×10^{-2}	1.405×10^{-2}	-1.516×10^{-4}	7.030×10^{-5}
fitted root mean square [1]	$(1.302 \pm 0.540) \times 10^{-3}$	11255387	5.700×10^{-4}	1.143×10^{-3}	3.368×10^{-4}	6.972×10^{-2}	9.477×10^{-4}	1.518×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.924 ± 0.453	11255387	0.545	0.842	5.000×10^{-2}	2.60	0.622	1.17
sulfurdioxide total air mass factor polluted precision [1]	0.122 ± 0.153	11255387	9.925×10^{-2}	7.580×10^{-2}	4.171×10^{-3}	1.90	4.168×10^{-2}	0.141
sulfurdioxide clear air mass factor polluted [1]	0.799 ± 0.371	11255387	0.363	0.739	9.417×10^{-2}	2.64	0.564	0.926
number of spectral points in retrieval [1]	73.4 ± 0.5	11255387	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]	0.652 ± 0.419	4281685	0.810	1.000	0.0	1.000	0.190	1.000
sulfurdioxide total vertical column [DU]	$(3.144 \pm 99.628) \times 10^{-2}$	4281685	0.411	9.094×10^{-3}	-130	727	-0.193	0.218
sulfurdioxide total vertical column precision [DU]	0.462 ± 0.578	4281685	0.312	0.310	4.574×10^{-2}	82.1	0.199	0.510
sulfurdioxide slant column density corrected [DU]	$(2.352 \pm 53.014) \times 10^{-2}$	4281685	0.353	8.719×10^{-3}	-68.3	425	-0.166	0.187
sulfurdioxide slant column density cobra [DU]	$(2.265 \pm 40.761) \times 10^{-2}$	4281685	0.353	8.719×10^{-3}	-68.3	39.9	-0.166	0.187
sulfurdioxide slant column density cobra precision [DU]	0.283 ± 0.139	4281685	0.101	0.243	8.475×10^{-2}	35.9	0.208	0.309
sulfurdioxide slant column density window1 [DU]	0.146 ± 0.713	4281685	0.707	0.131	-340	188	-0.220	0.487
sulfurdioxide slant column density window1 precision [DU]	0.283 ± 0.139	4281685	0.101	0.243	8.475×10^{-2}	35.9	0.208	0.309
sulfurdioxide slant column density corrected win1 [DU]	$(2.040 \pm 70.496) \times 10^{-2}$	4281685	0.692	-5.166×10^{-3}	-340	188	-0.344	0.348
background so2 slant column offset window1 [DU]	-0.125 ± 0.119	4281685	0.148	-0.152	-0.921	2.44	-0.205	-5.761×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.284 ± 9.328	4281685	11.3	0.257	-959	1.181×10^3	-5.39	5.88
sulfurdioxide slant column density window2 precision [DU]	8.36 ± 2.90	4281685	2.86	7.94	2.14	637	6.67	9.53
sulfurdioxide slant column density corrected win2 [DU]	-0.265 ± 9.273	4281685	11.2	-0.247	-959	1.181×10^3	-5.86	5.32
background so2 slant column offset window2 [DU]	-0.549 ± 1.592	4281685	1.88	-0.318	-12.1	9.24	-1.42	0.465
sulfurdioxide slant column density window3 [DU]	-10.8 ± 24.2	4281685	29.3	-10.1	-824	1.148×10^3	-25.0	4.26
sulfurdioxide slant column density window3 precision [DU]	31.2 ± 17.1	4281685	12.9	26.5	9.59	1.746×10^3	21.6	34.5
sulfurdioxide slant column density corrected win3 [DU]	-7.35 ± 24.28	4281685	29.7	-6.63	-822	1.150×10^3	-21.8	7.84
background so2 slant column offset window3 [DU]	3.43 ± 4.47	4281685	6.78	3.97	-13.7	21.4	9.858×10^{-2}	6.88
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.15	4281685	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.679 \pm 10.348) \times 10^{-2}$	4281685	5.393×10^{-2}	2.521×10^{-2}	1.623×10^{-4}	2.16	7.277×10^{-3}	6.121×10^{-2}
fitted radiance shift [nm]	$(-5.740 \pm 328.000) \times 10^{-5}$	4281685	1.767×10^{-3}	-1.058×10^{-4}	-4.528×10^{-2}	6.839×10^{-2}	-9.860×10^{-4}	7.809×10^{-4}
fitted radiance squeeze [1]	$(-4.856 \pm 18.445) \times 10^{-5}$	4281685	2.116×10^{-4}	-4.587×10^{-5}	-2.643×10^{-2}	1.832×10^{-2}	-1.533×10^{-4}	5.834×10^{-5}
fitted root mean square [1]	$(1.228 \pm 0.499) \times 10^{-3}$	4281685	4.174×10^{-4}	1.104×10^{-3}	3.034×10^{-4}	0.106	9.421×10^{-4}	1.360×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.952 ± 0.573	4281685	0.662	0.777	5.000×10^{-2}	2.82	0.551	1.21
sulfurdioxide total air mass factor polluted precision [1]	0.128 ± 0.131	4281685	0.150	8.798×10^{-2}	2.671×10^{-3}	1.93	3.382×10^{-2}	0.184
sulfurdioxide clear air mass factor polluted [1]	0.777 ± 0.404	4281685	0.406	0.673	4.876×10^{-2}	2.85	0.506	0.913
number of spectral points in retrieval [1]	73.4 ± 0.5	4281685	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

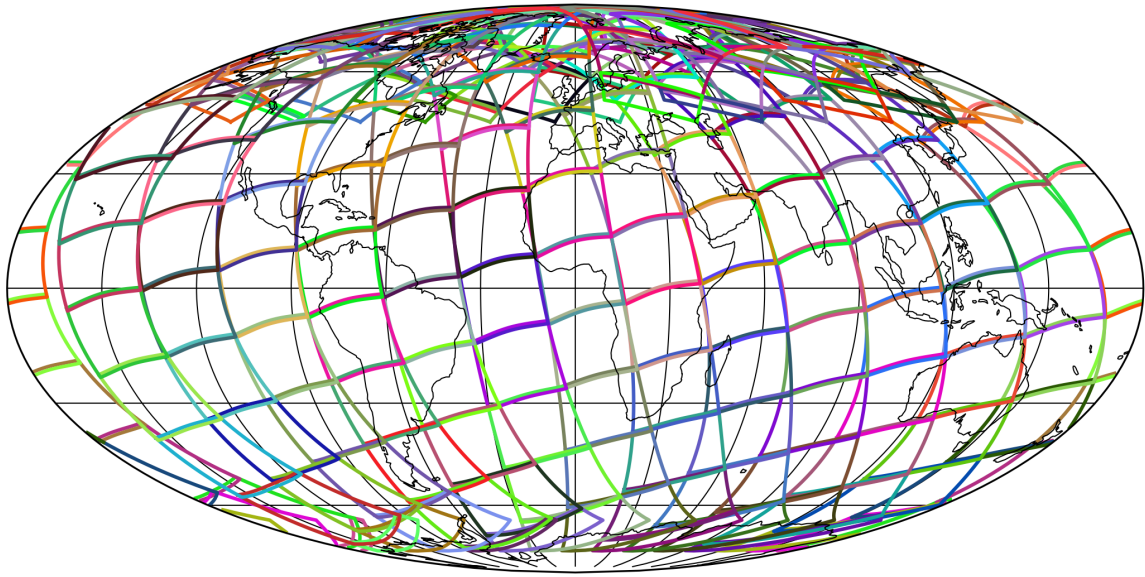


Figure 1: Outline of the granules.

4 Input data monitoring

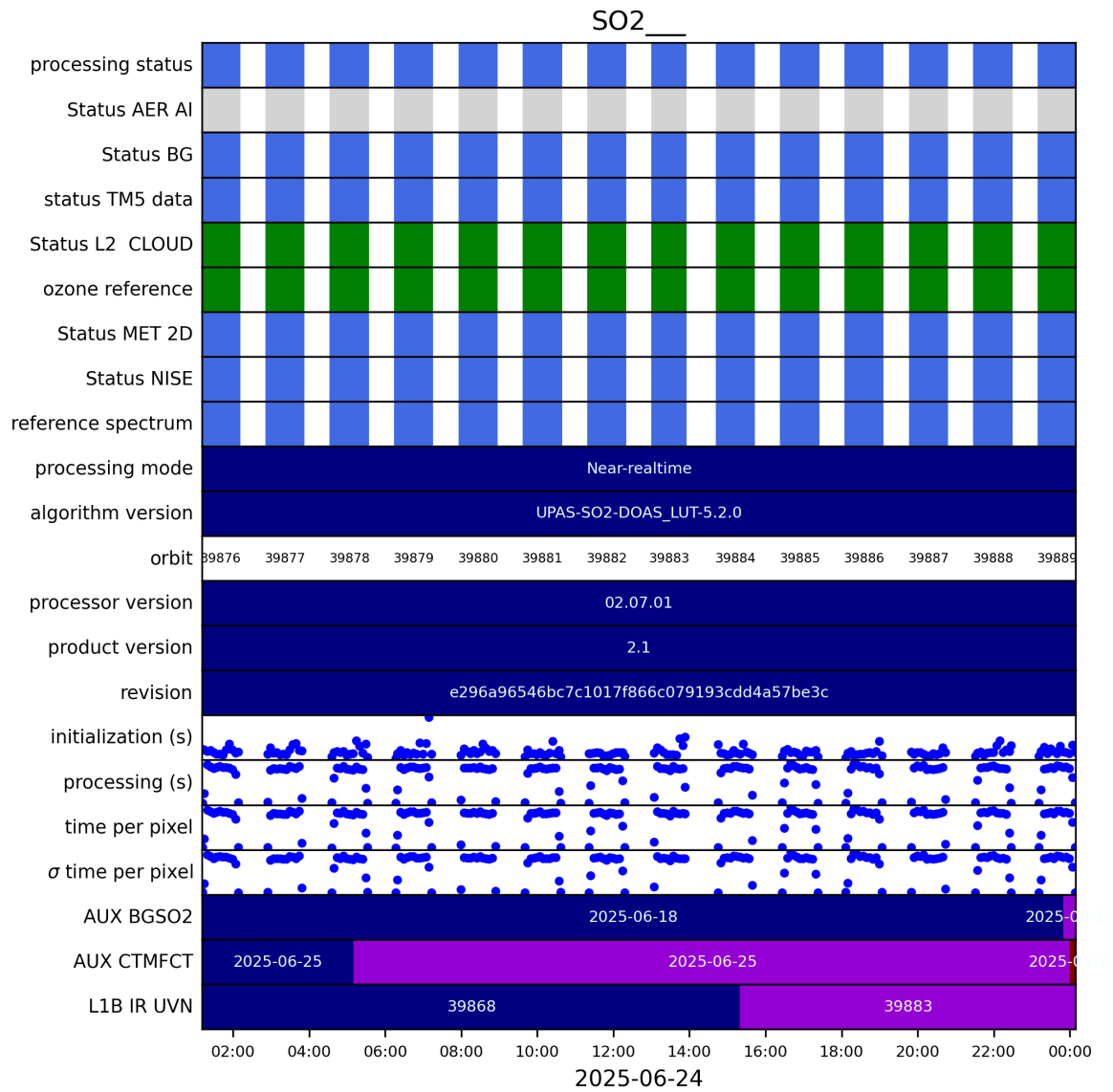


Figure 2: Input data per granule

5 Warnings and errors

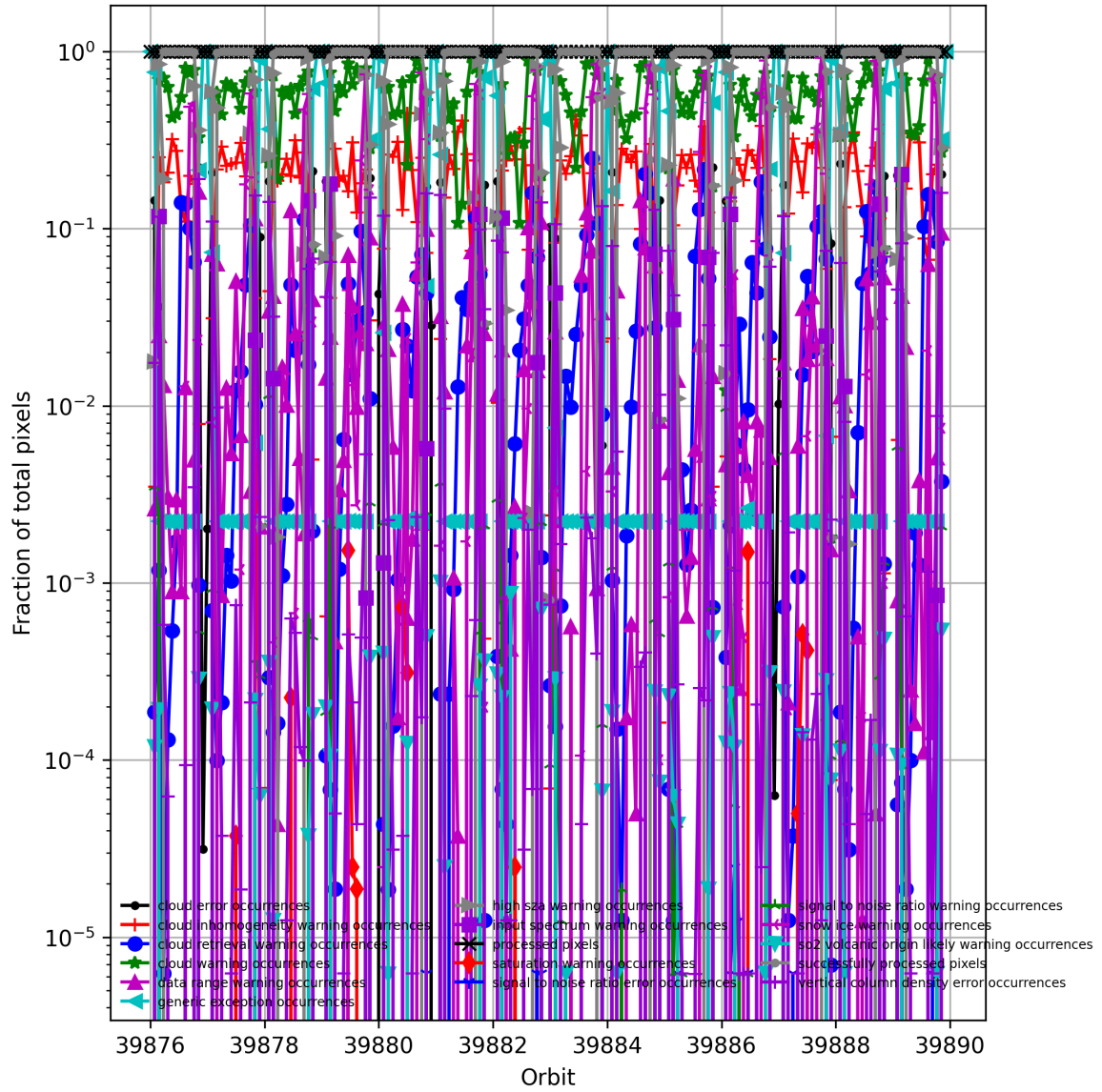


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

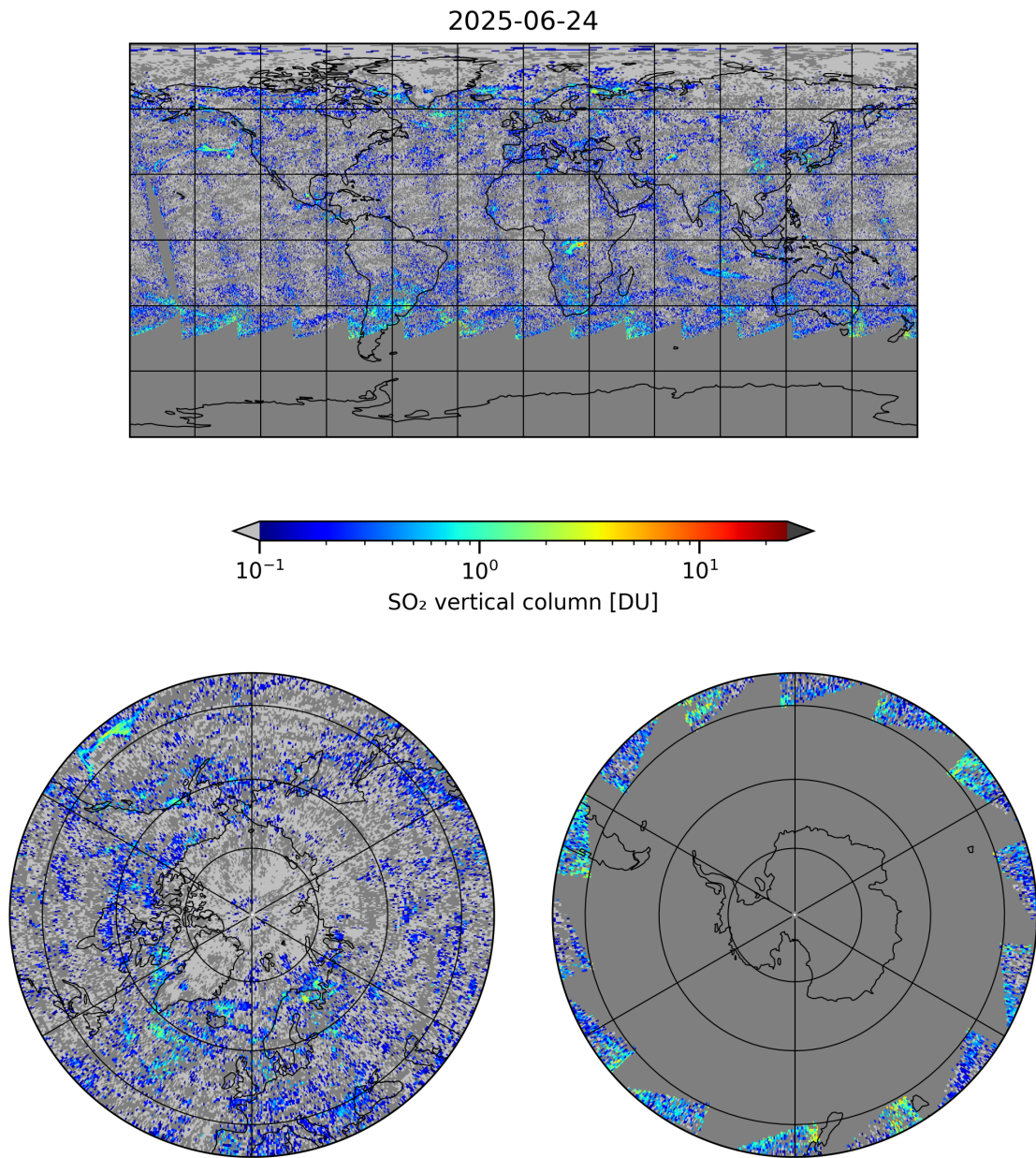


Figure 4: Map of “SO₂ vertical column” for 2025-06-24 to 2025-06-25

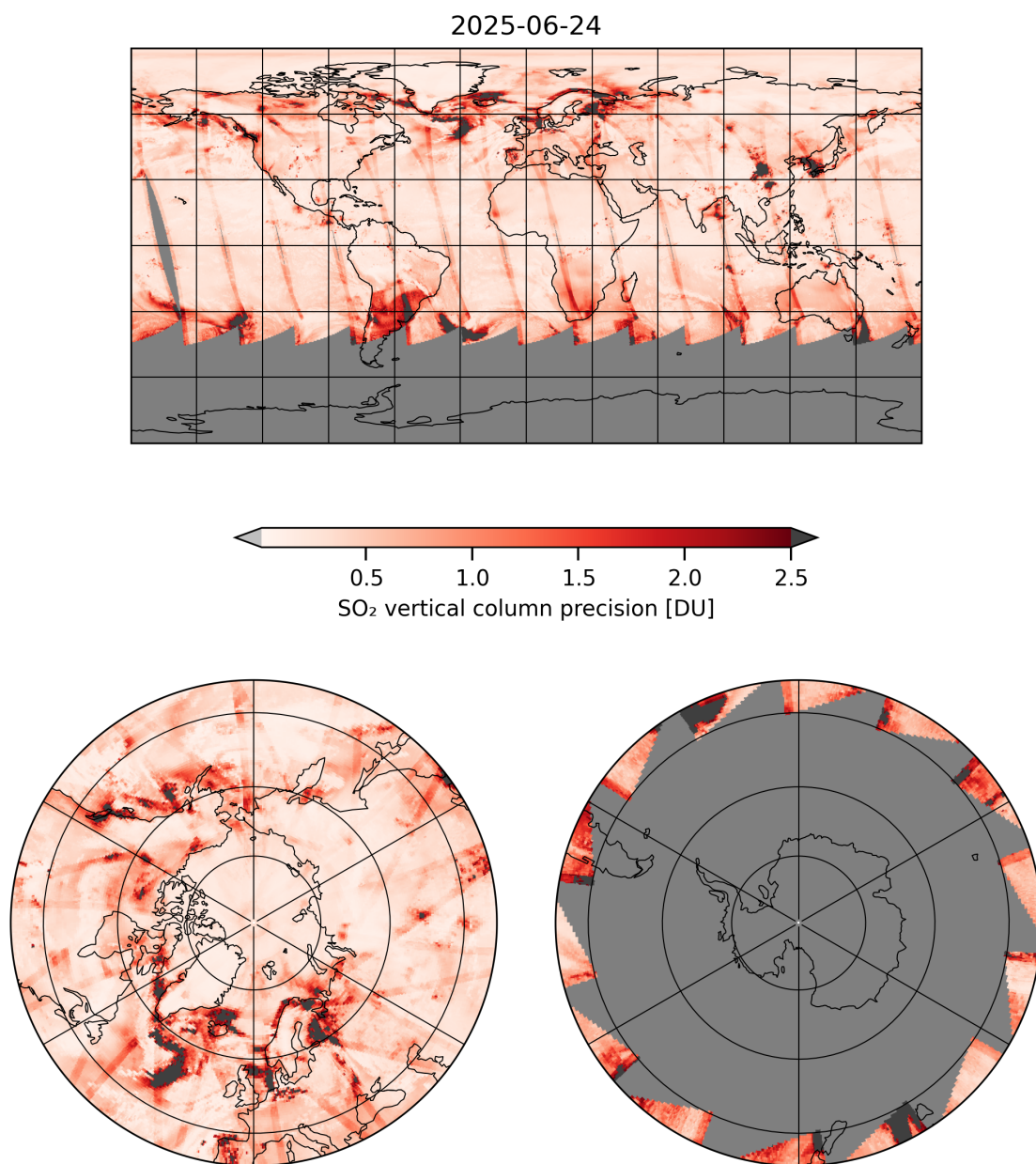


Figure 5: Map of “SO₂ vertical column precision” for 2025-06-24 to 2025-06-25

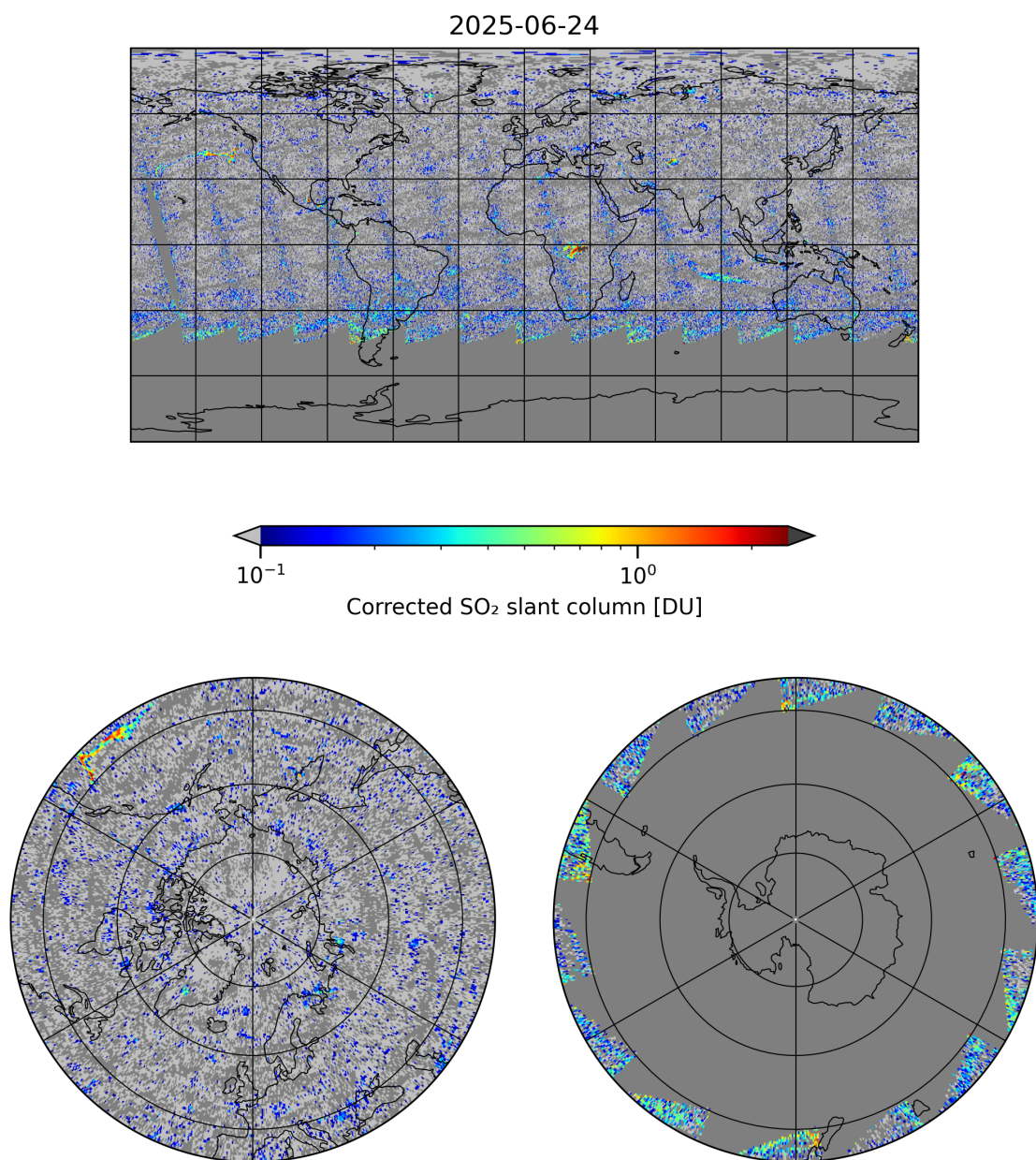


Figure 6: Map of “Corrected SO₂ slant column” for 2025-06-24 to 2025-06-25

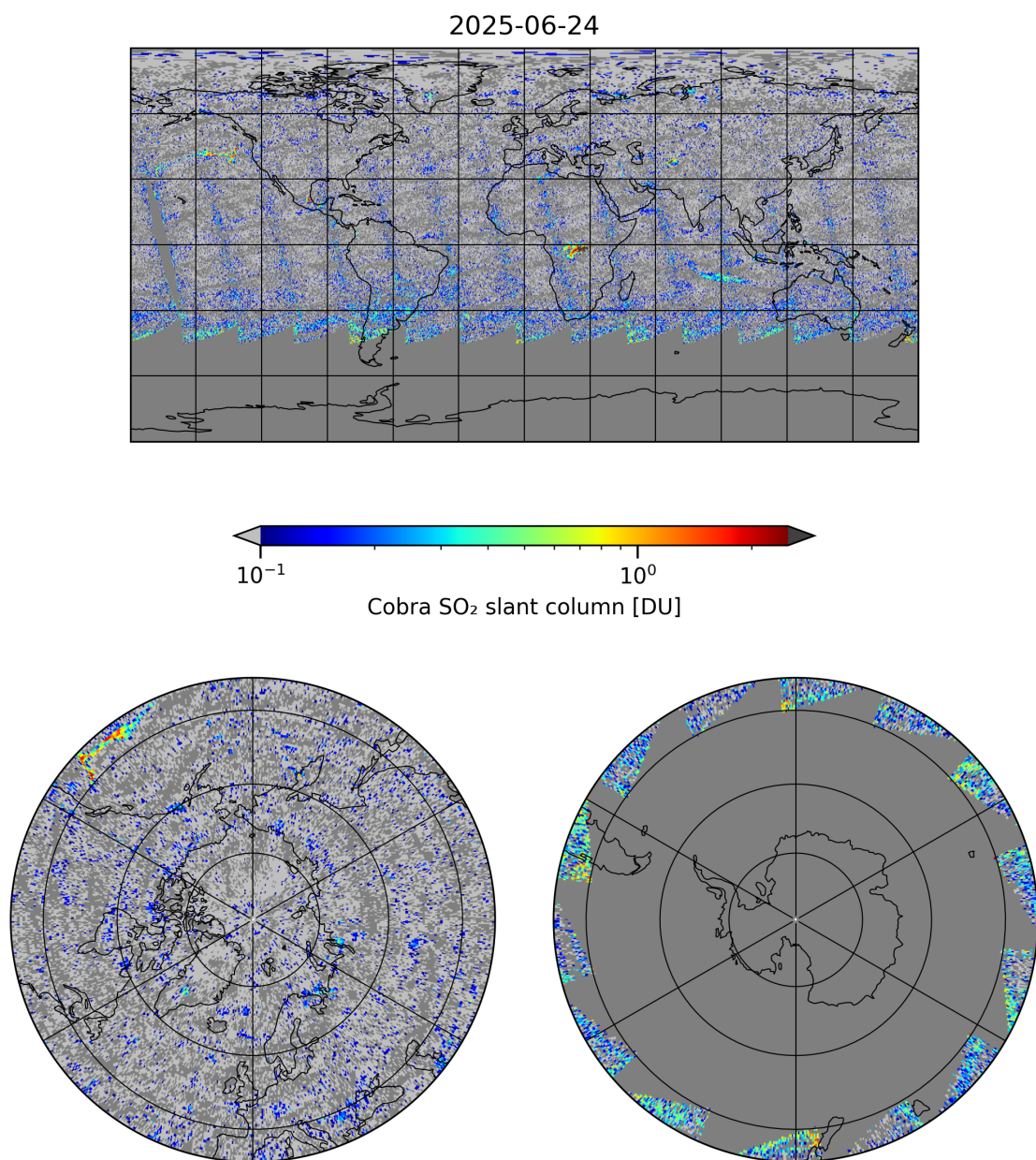


Figure 7: Map of “Cobra SO₂ slant column” for 2025-06-24 to 2025-06-25

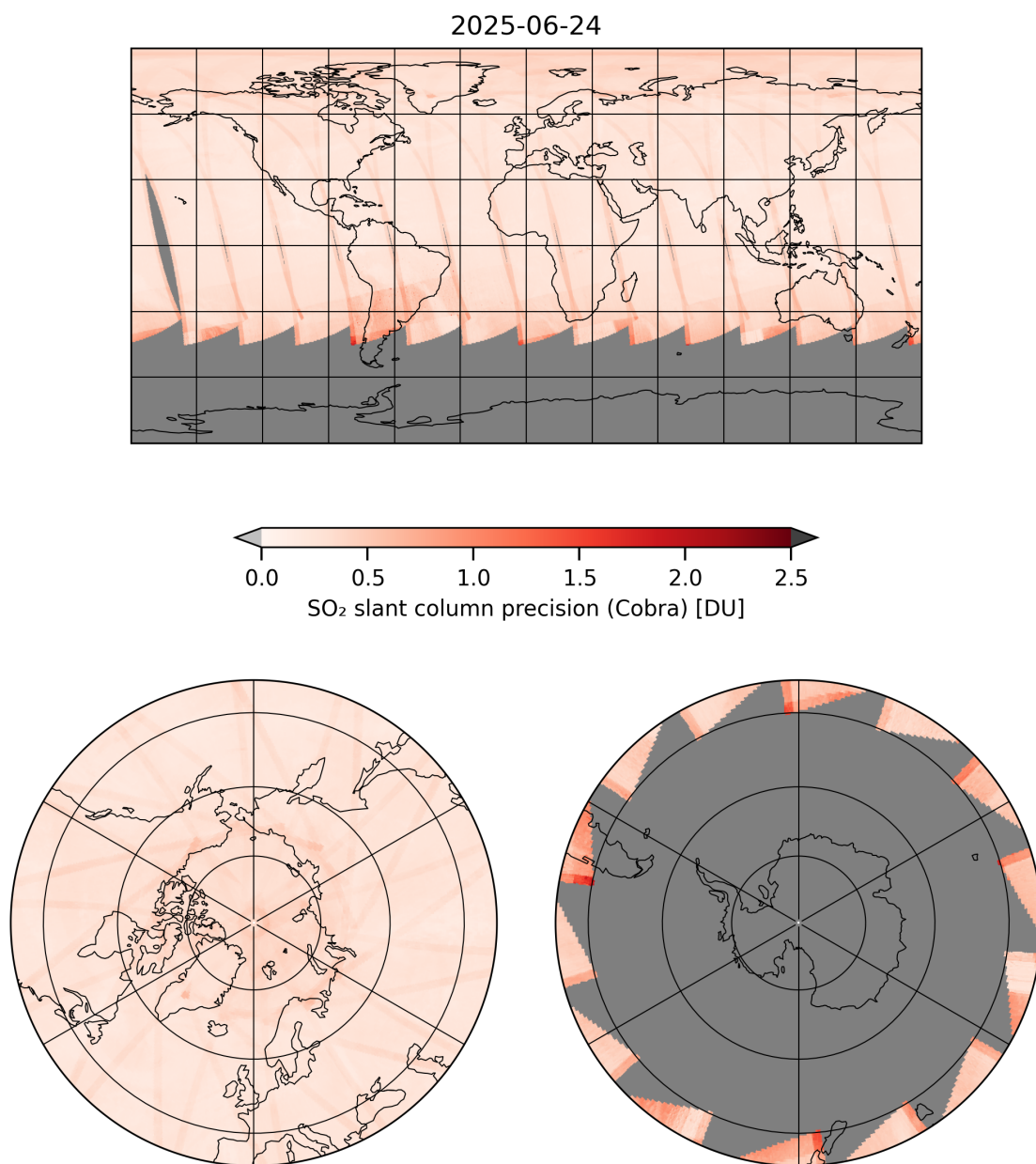


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-06-24 to 2025-06-25

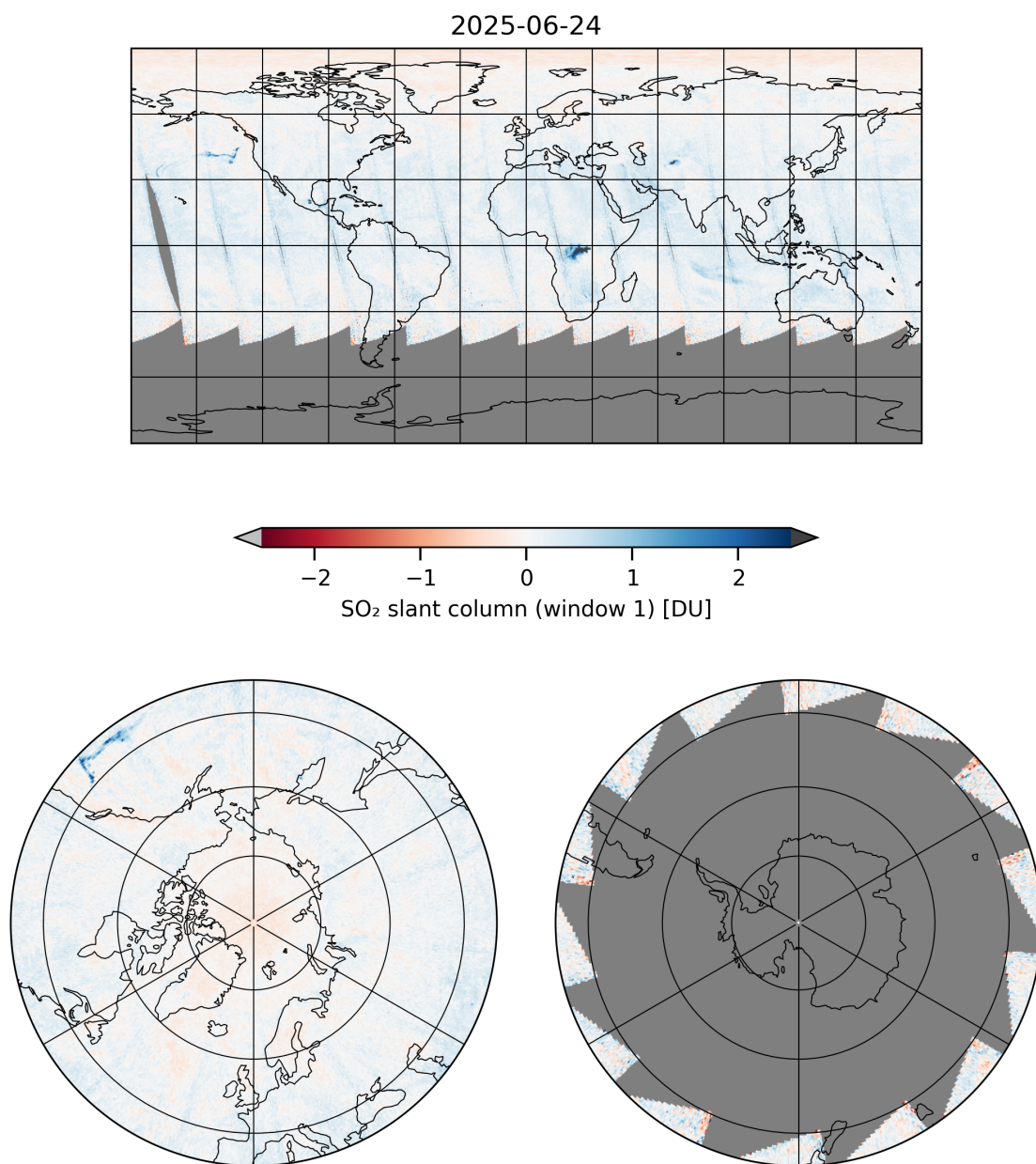


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-06-24 to 2025-06-25

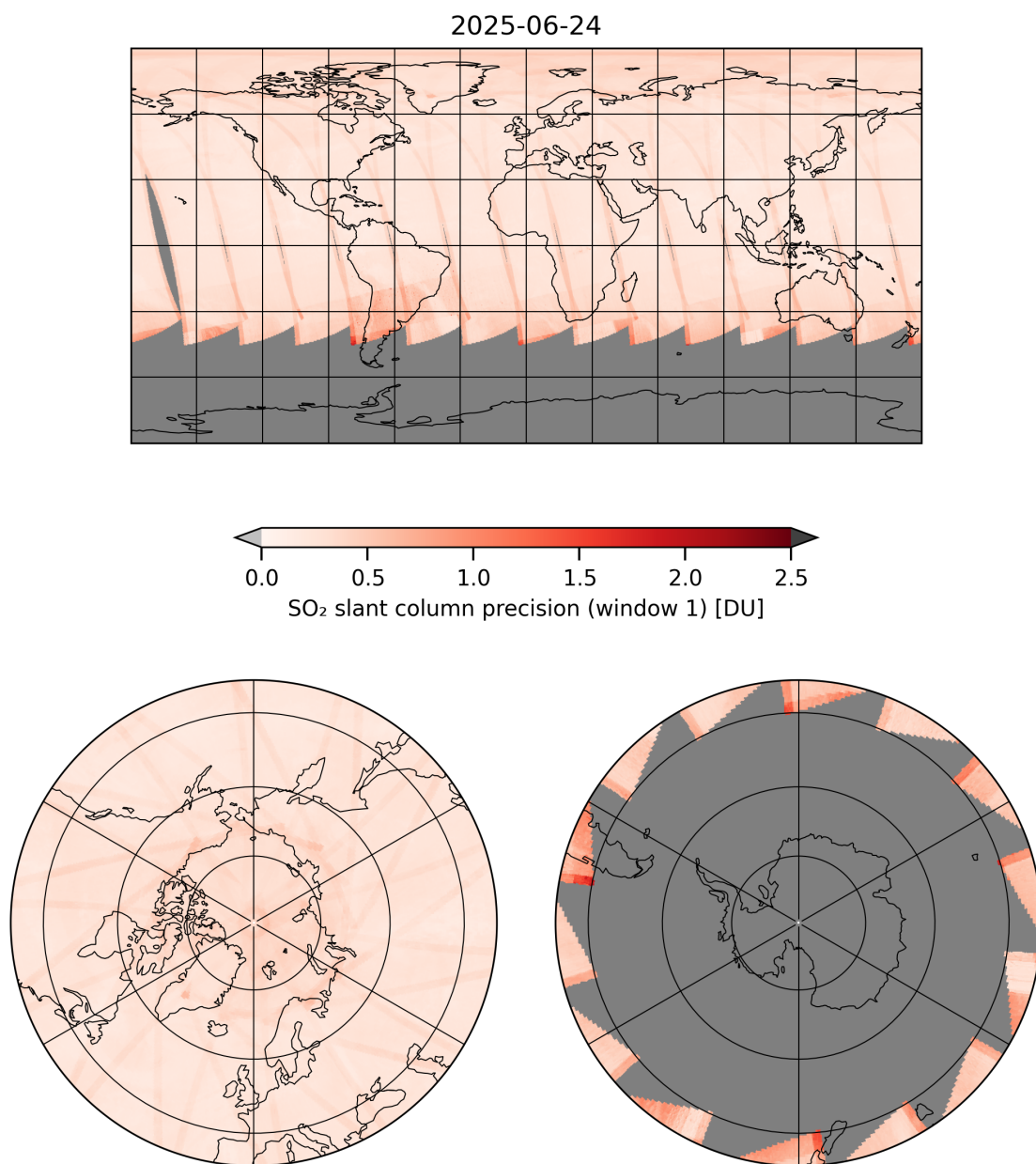


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-06-24 to 2025-06-25

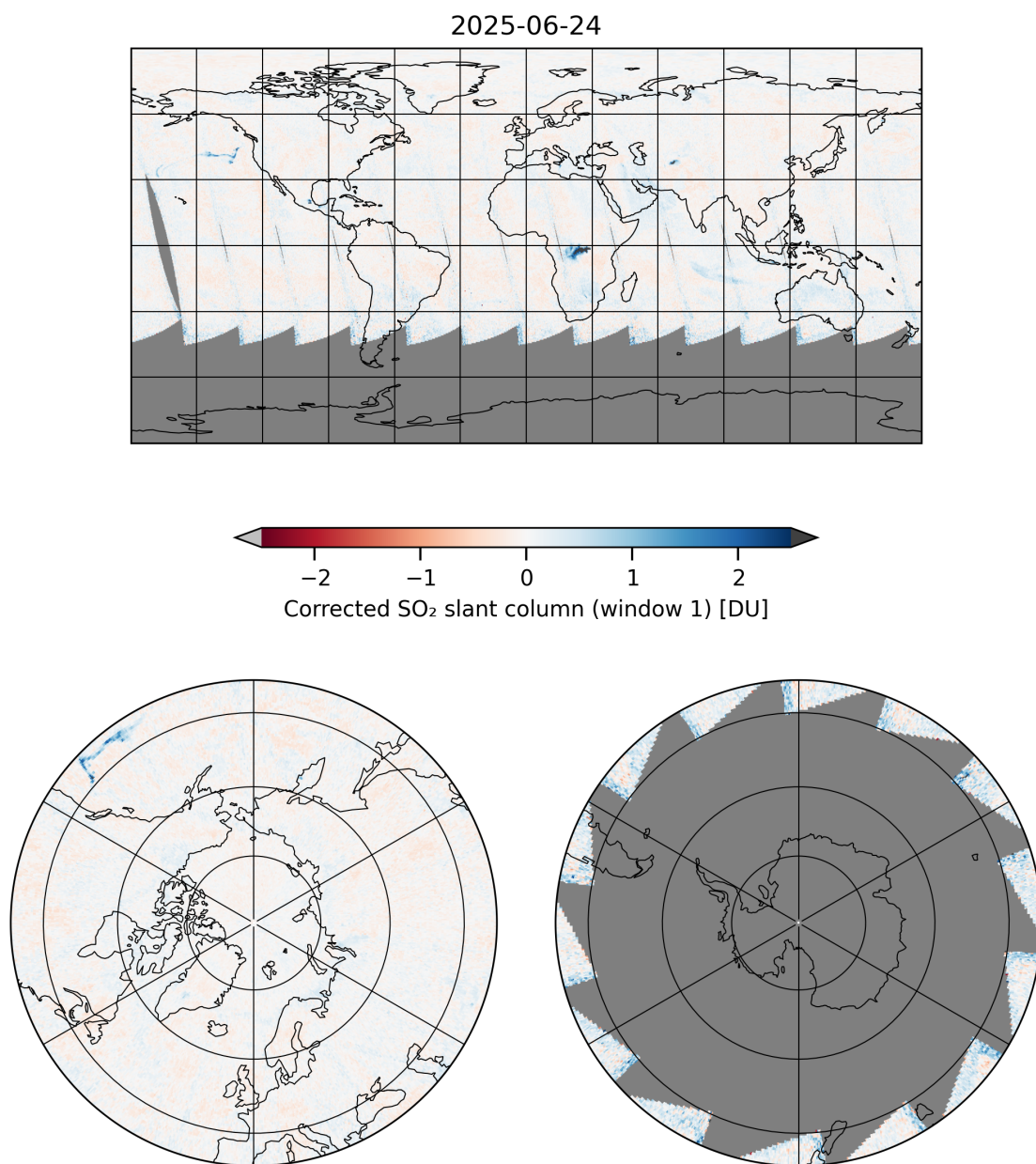


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-06-24 to 2025-06-25

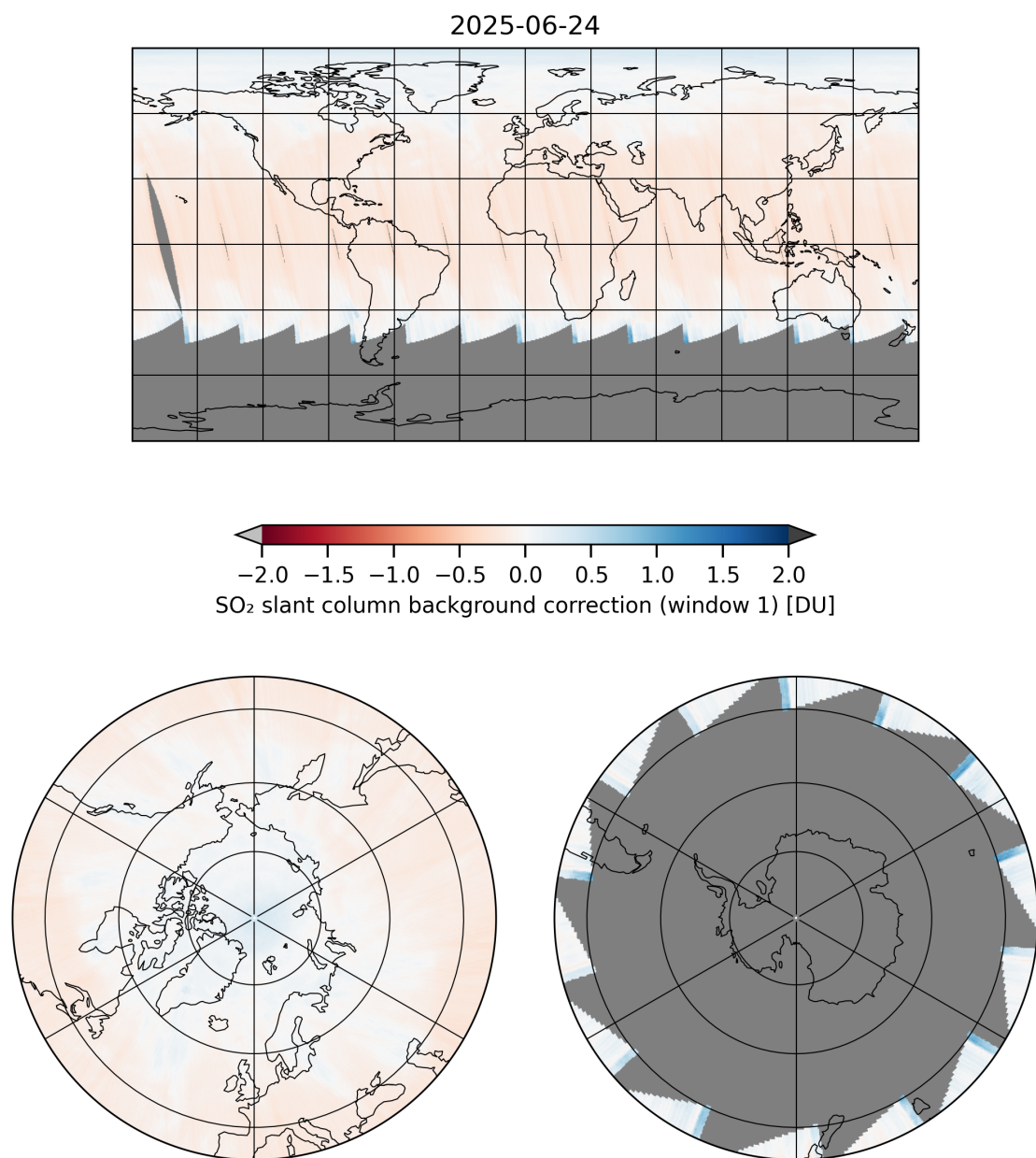


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-06-24 to 2025-06-25

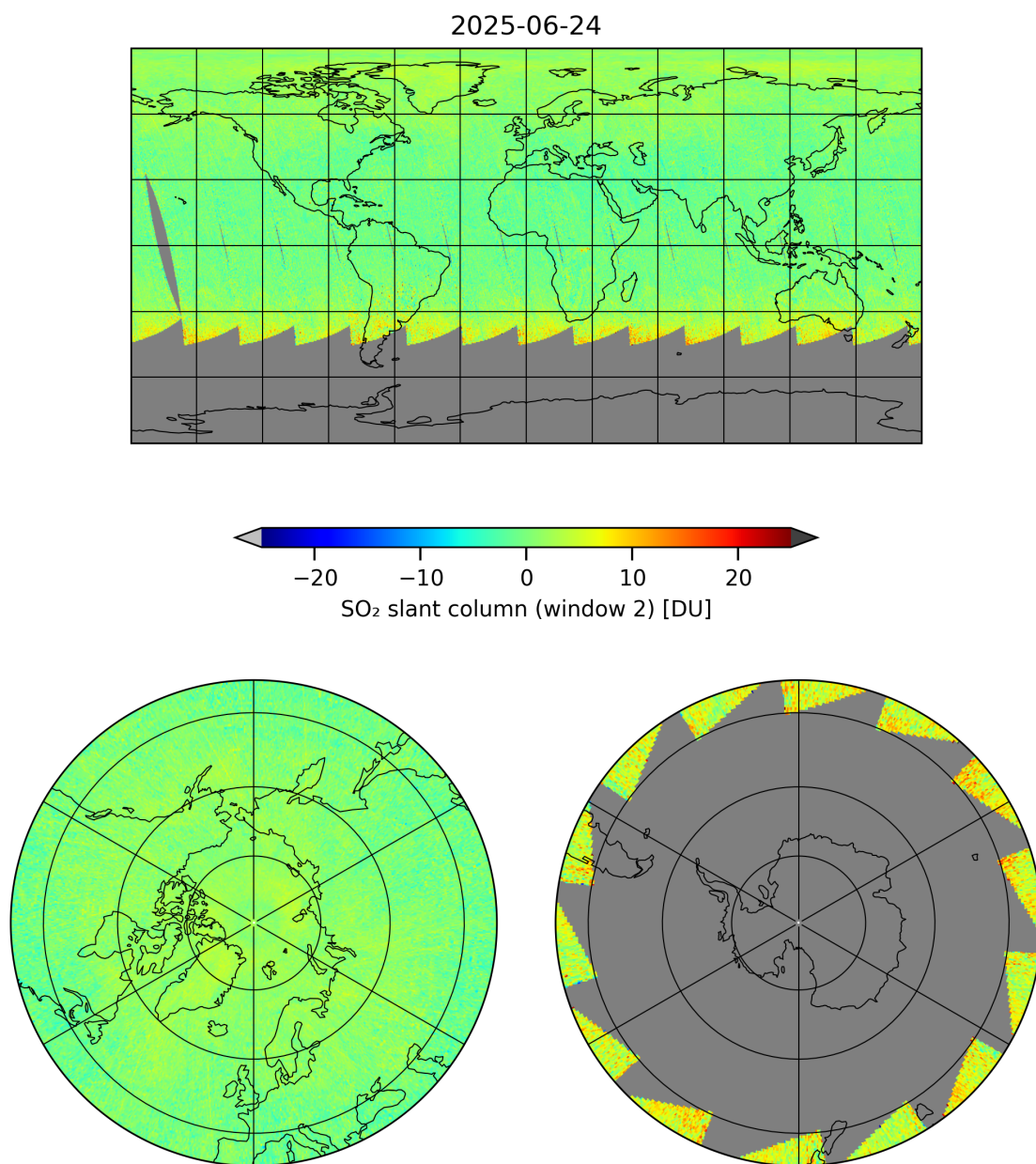


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-06-24 to 2025-06-25

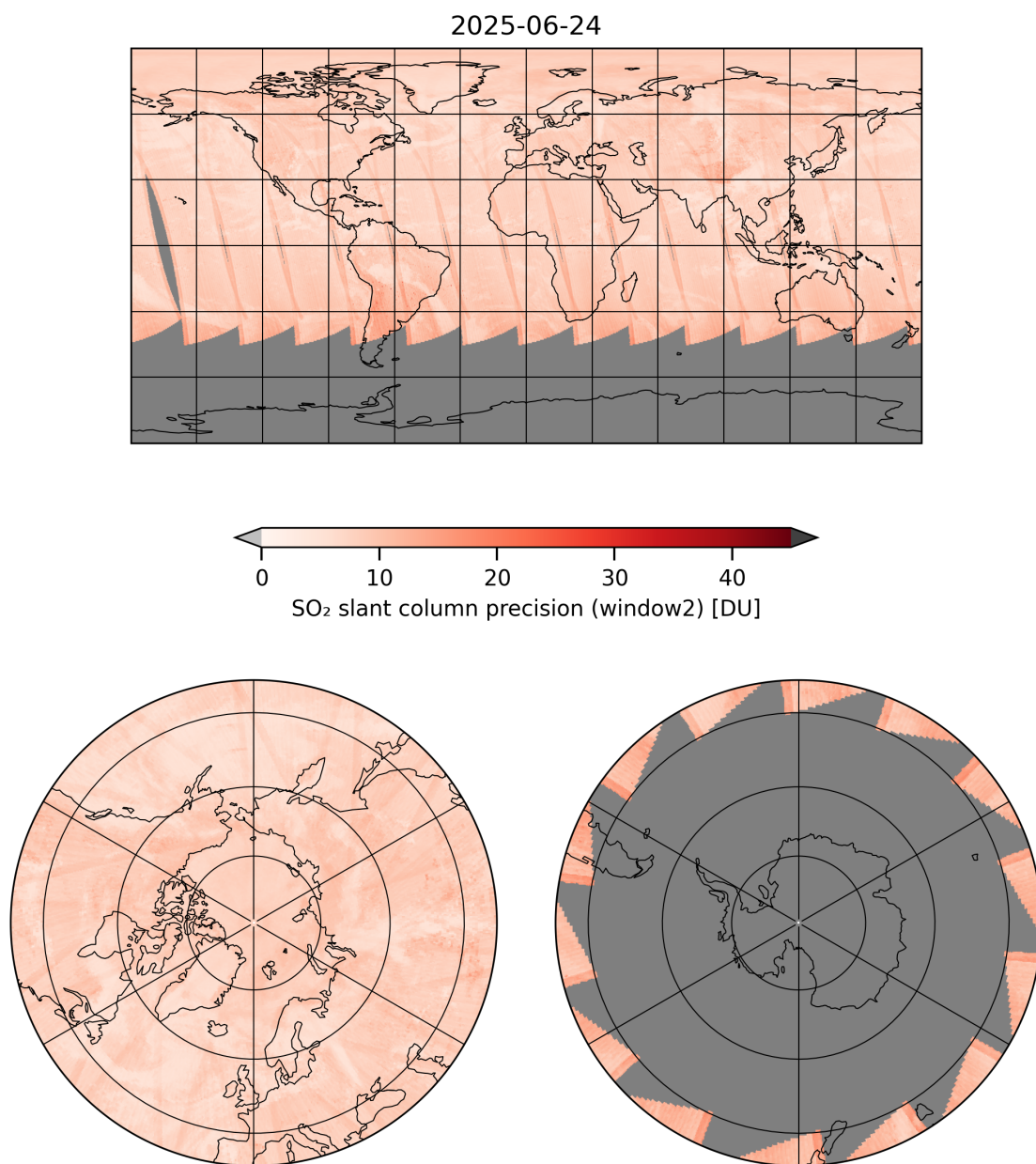


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-06-24 to 2025-06-25

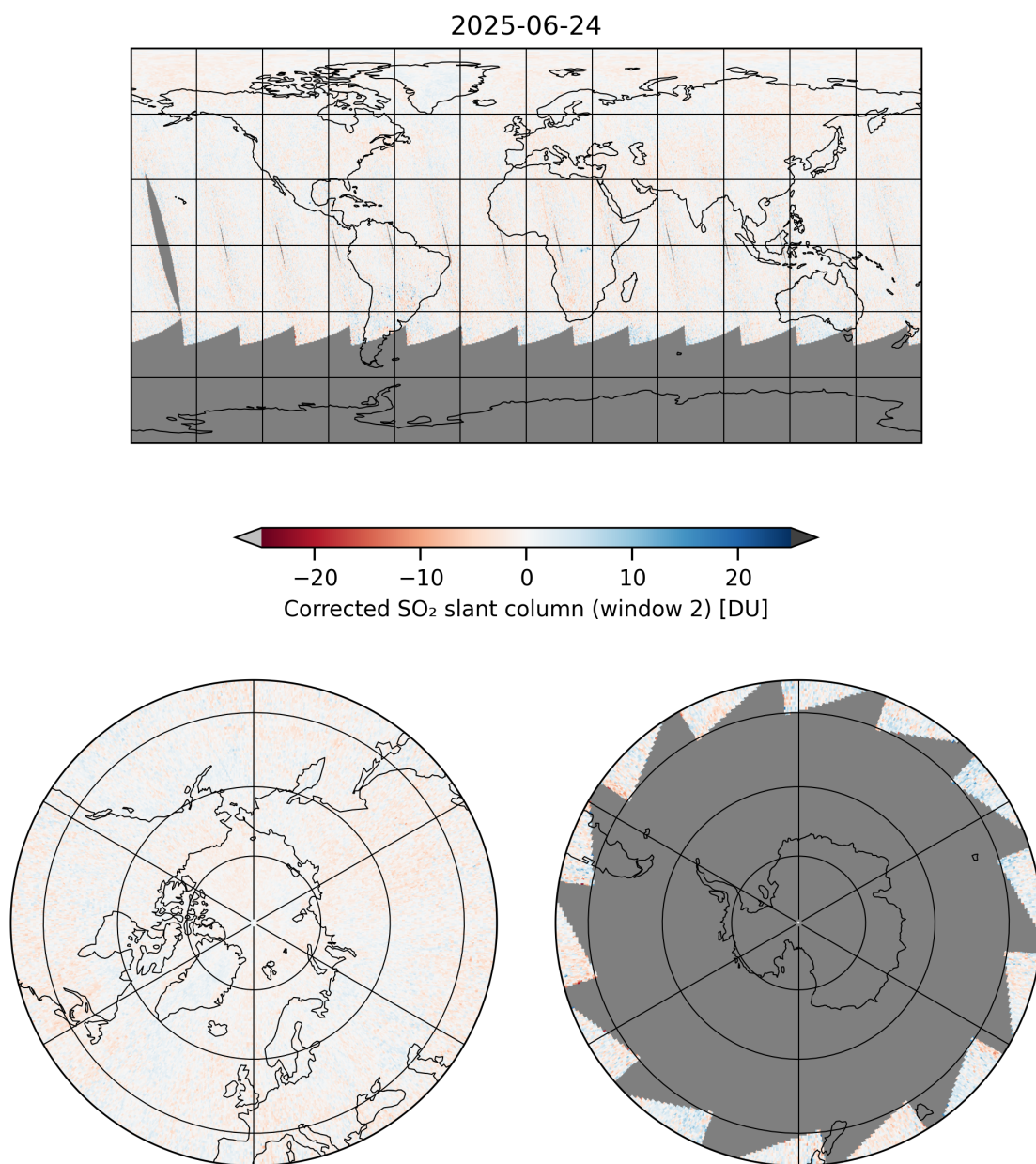


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-06-24 to 2025-06-25

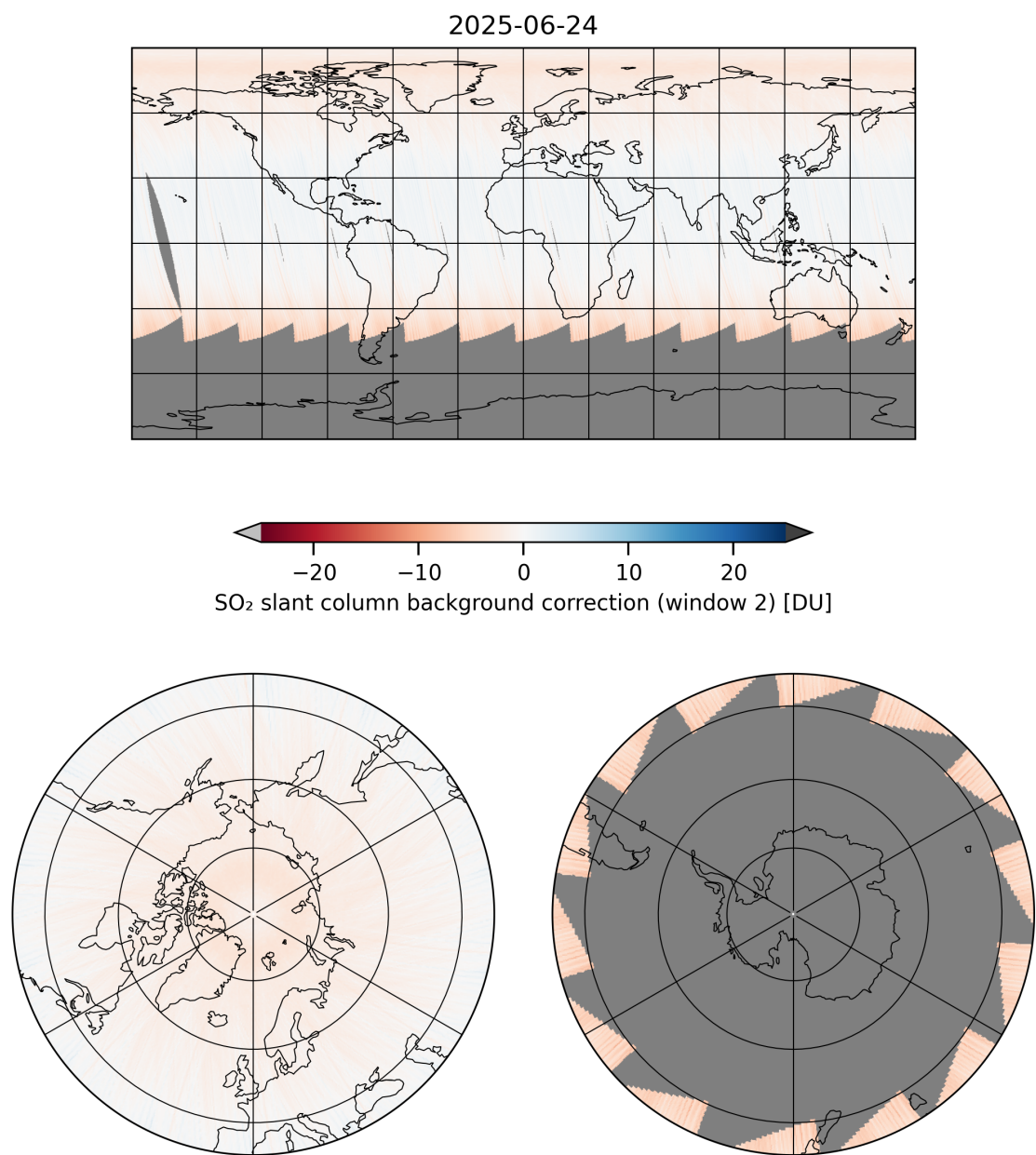


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-06-24 to 2025-06-25

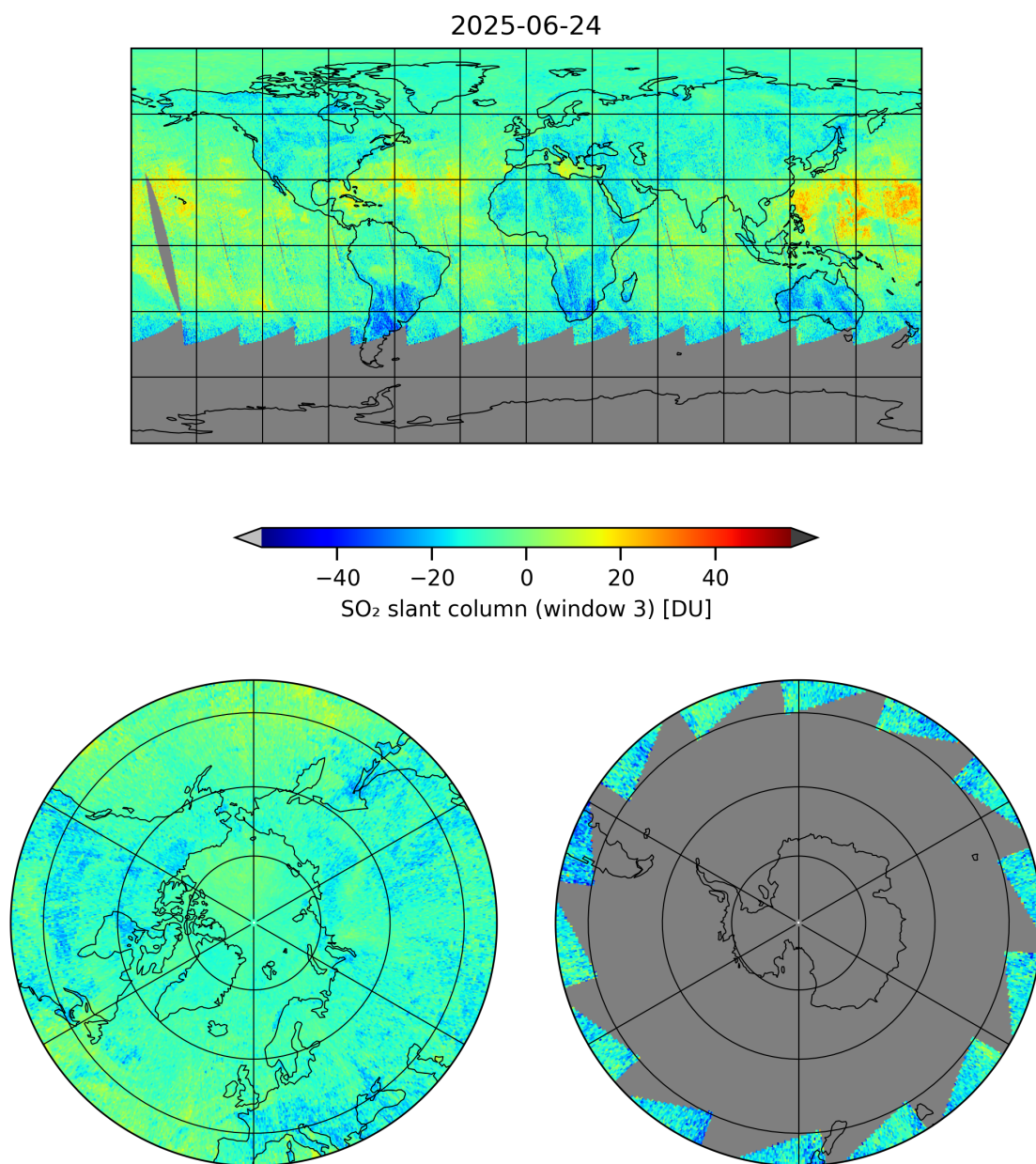


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-06-24 to 2025-06-25

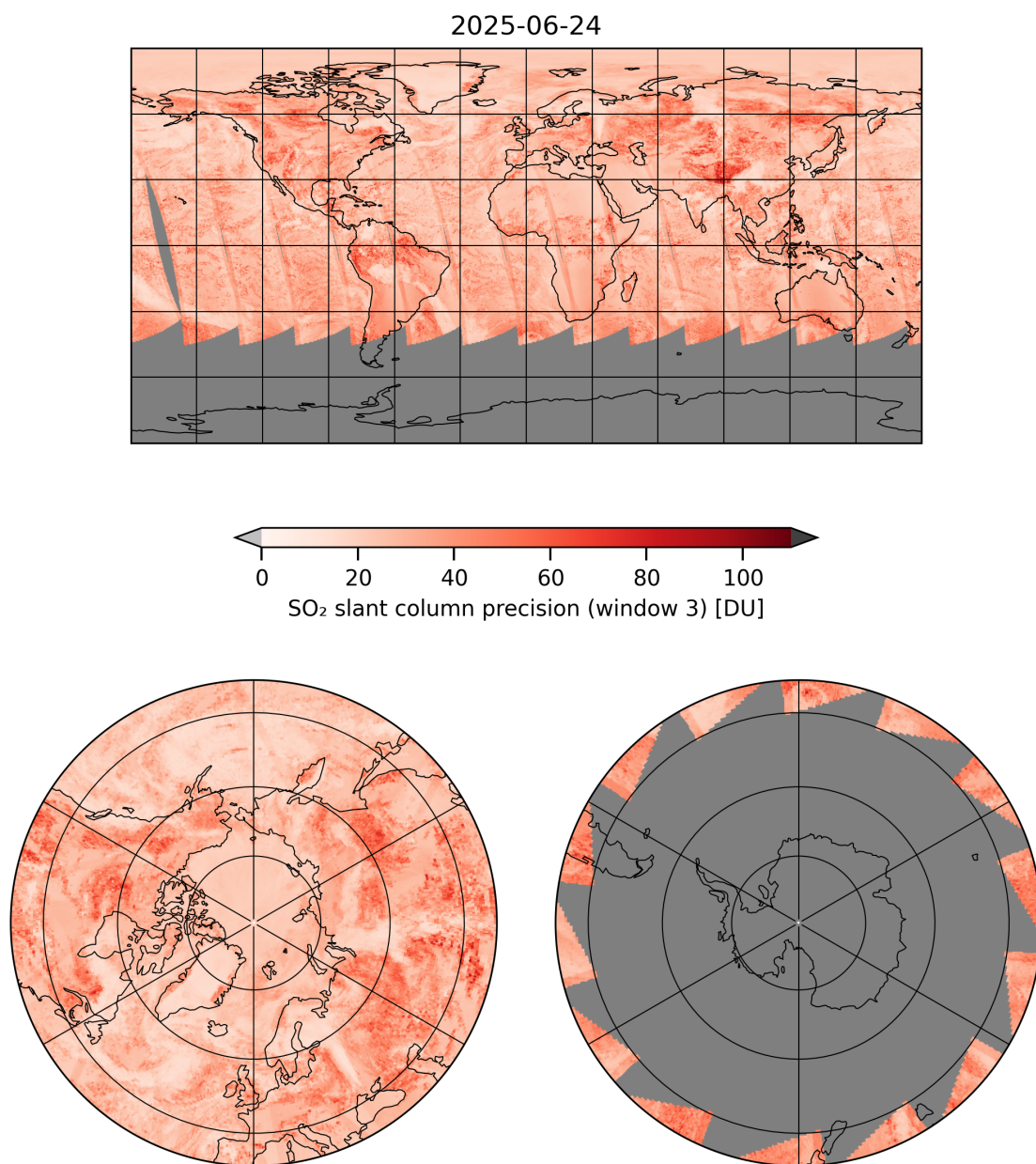


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-06-24 to 2025-06-25

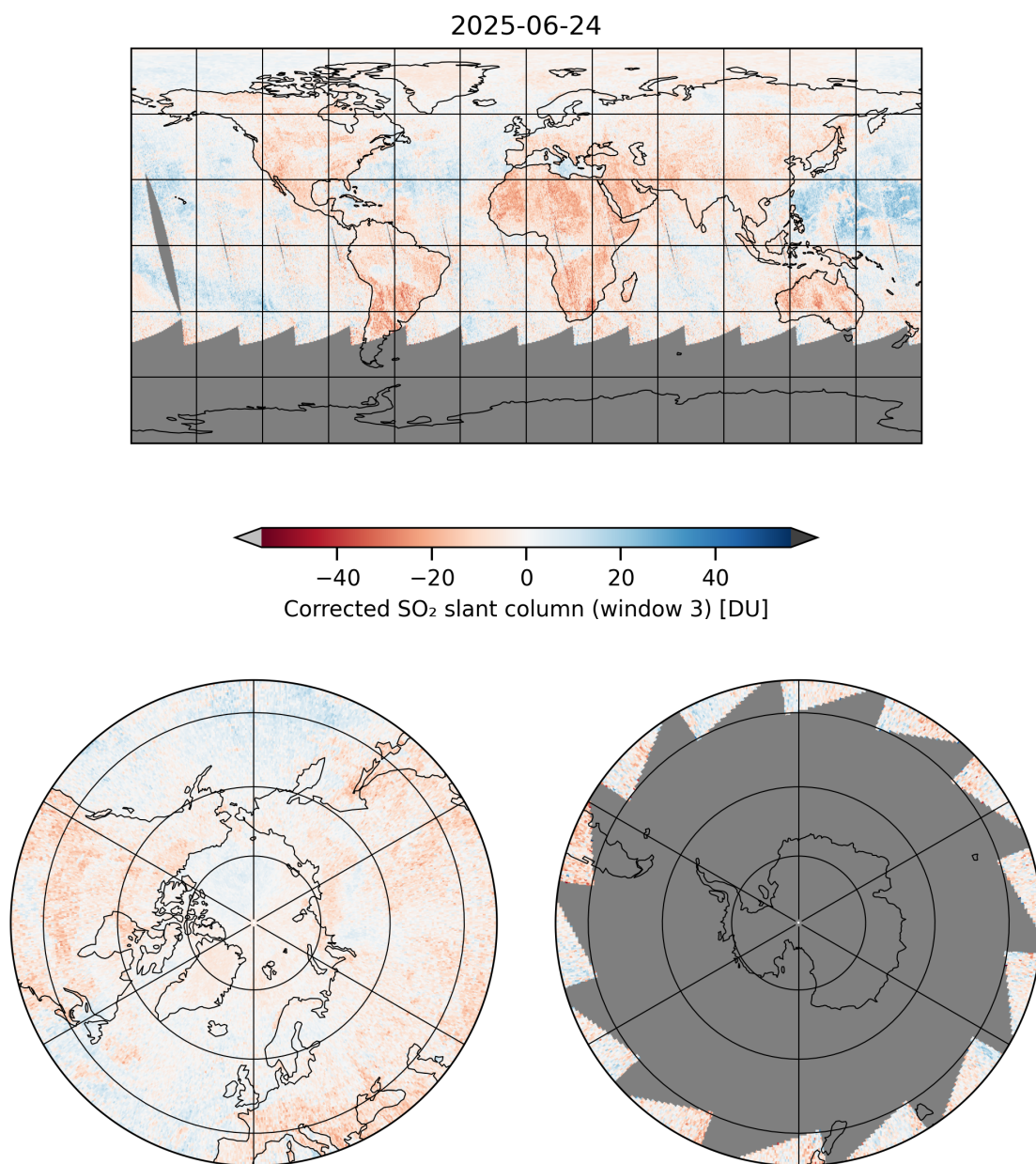


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-06-24 to 2025-06-25

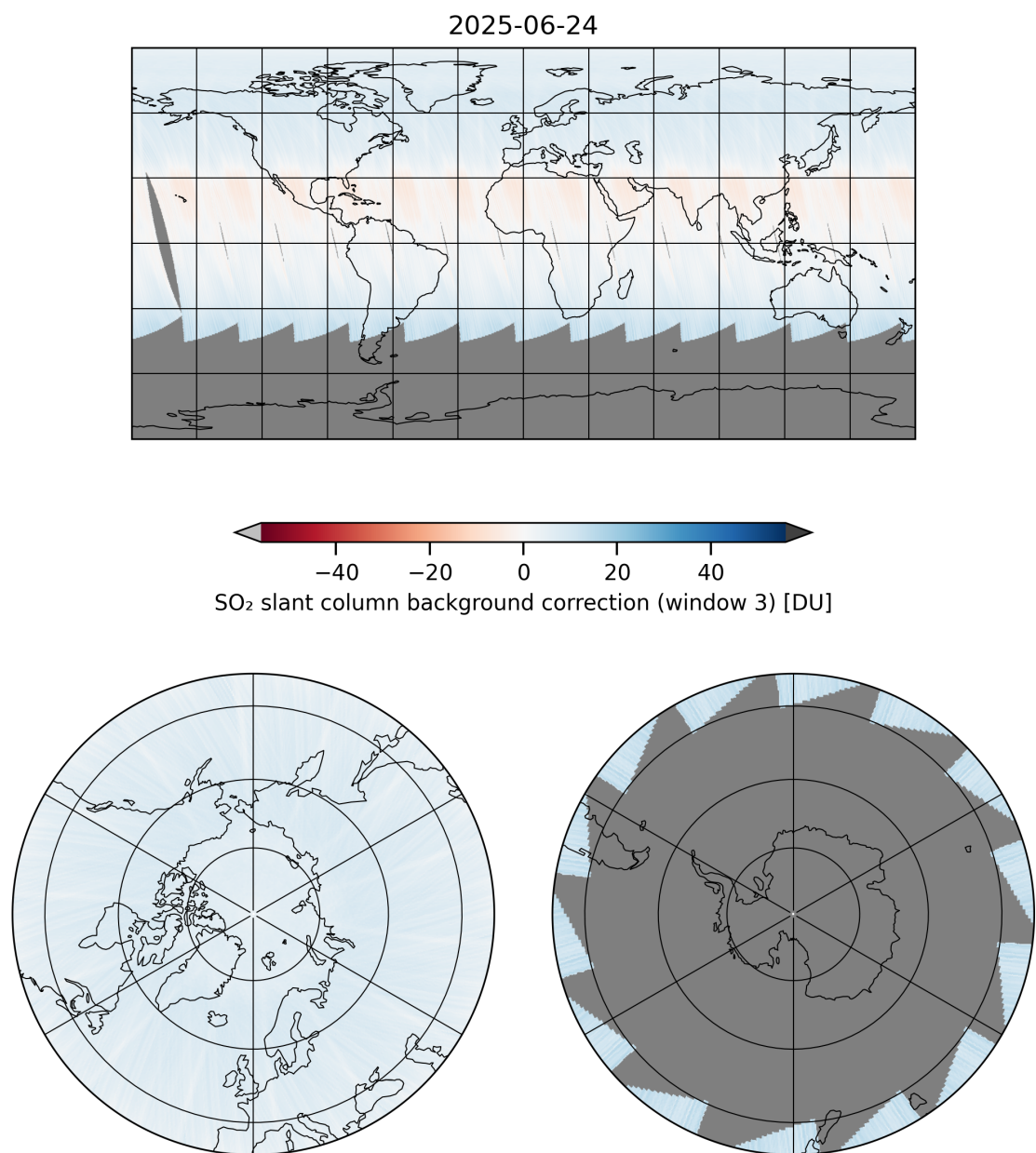


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-06-24 to 2025-06-25

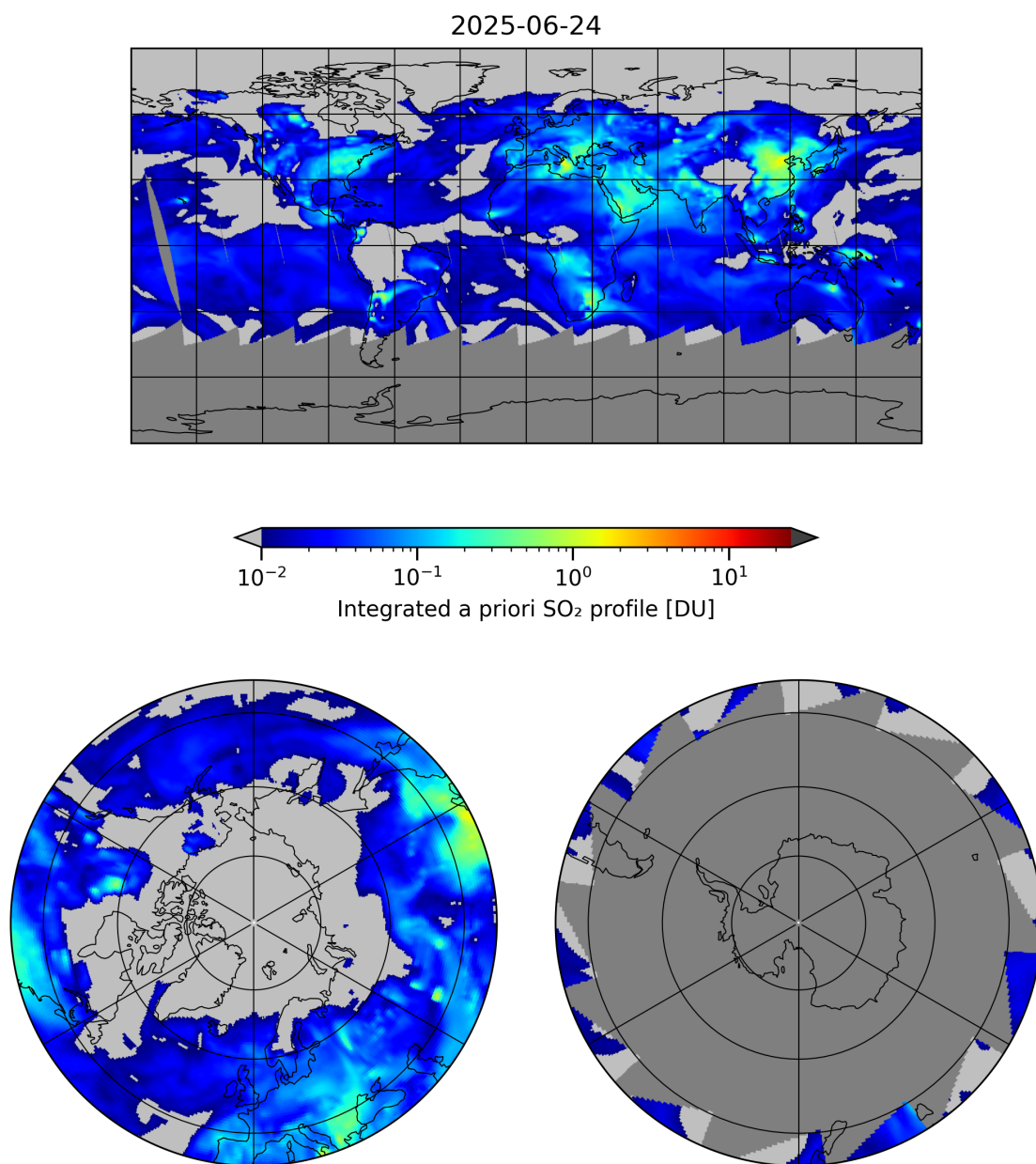


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-06-24 to 2025-06-25

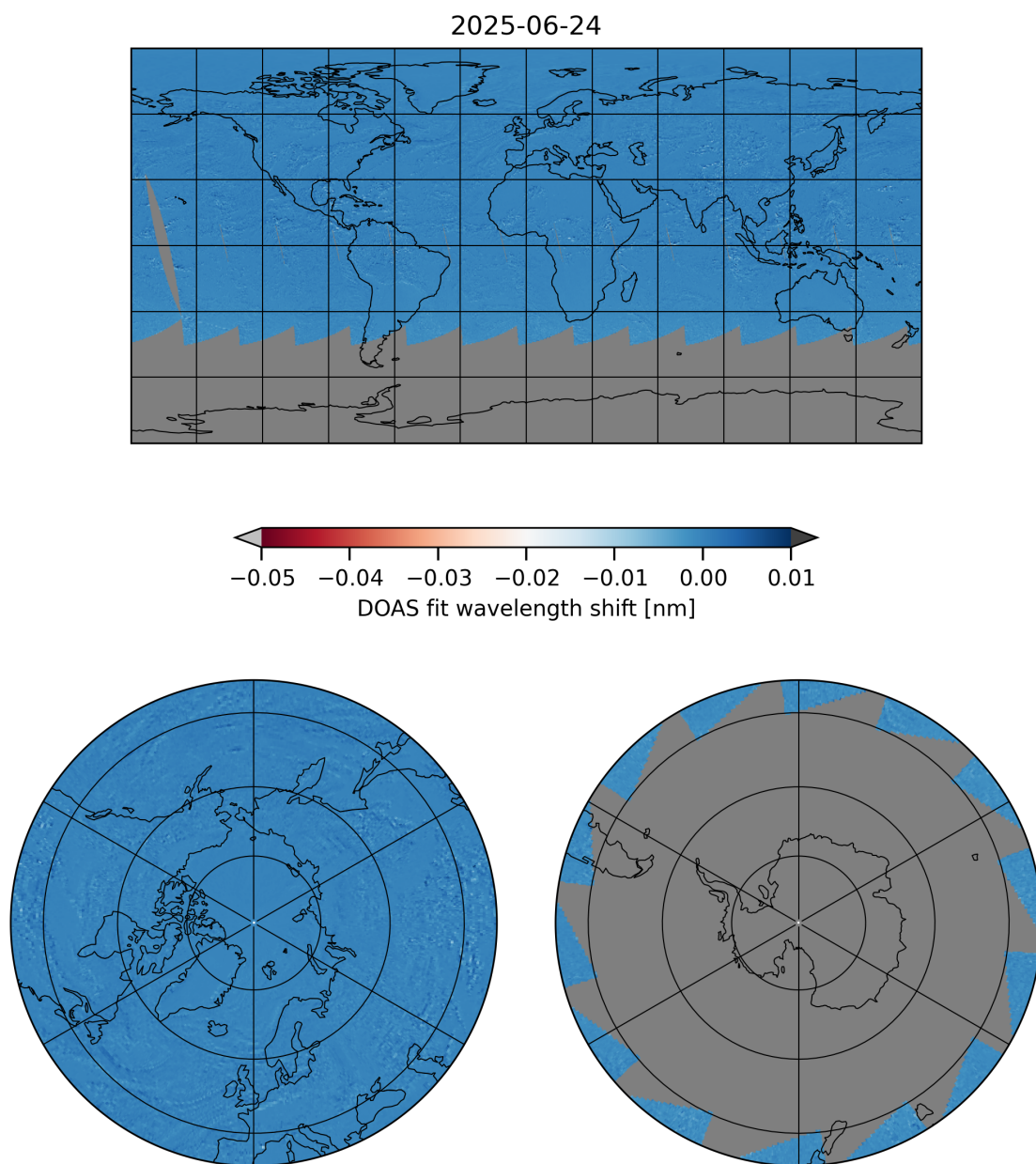


Figure 22: Map of “DOAS fit wavelength shift” for 2025-06-24 to 2025-06-25

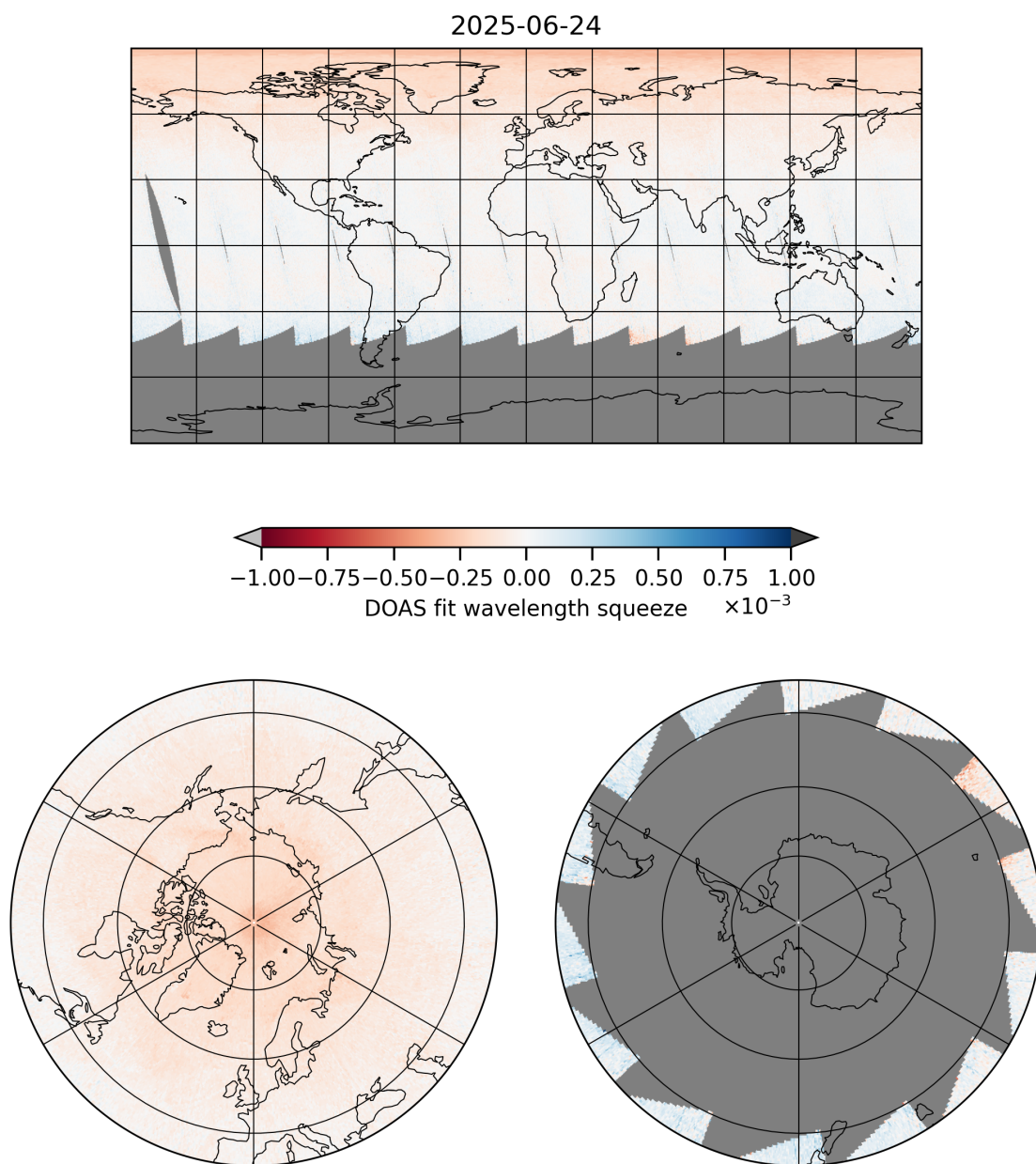


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-06-24 to 2025-06-25

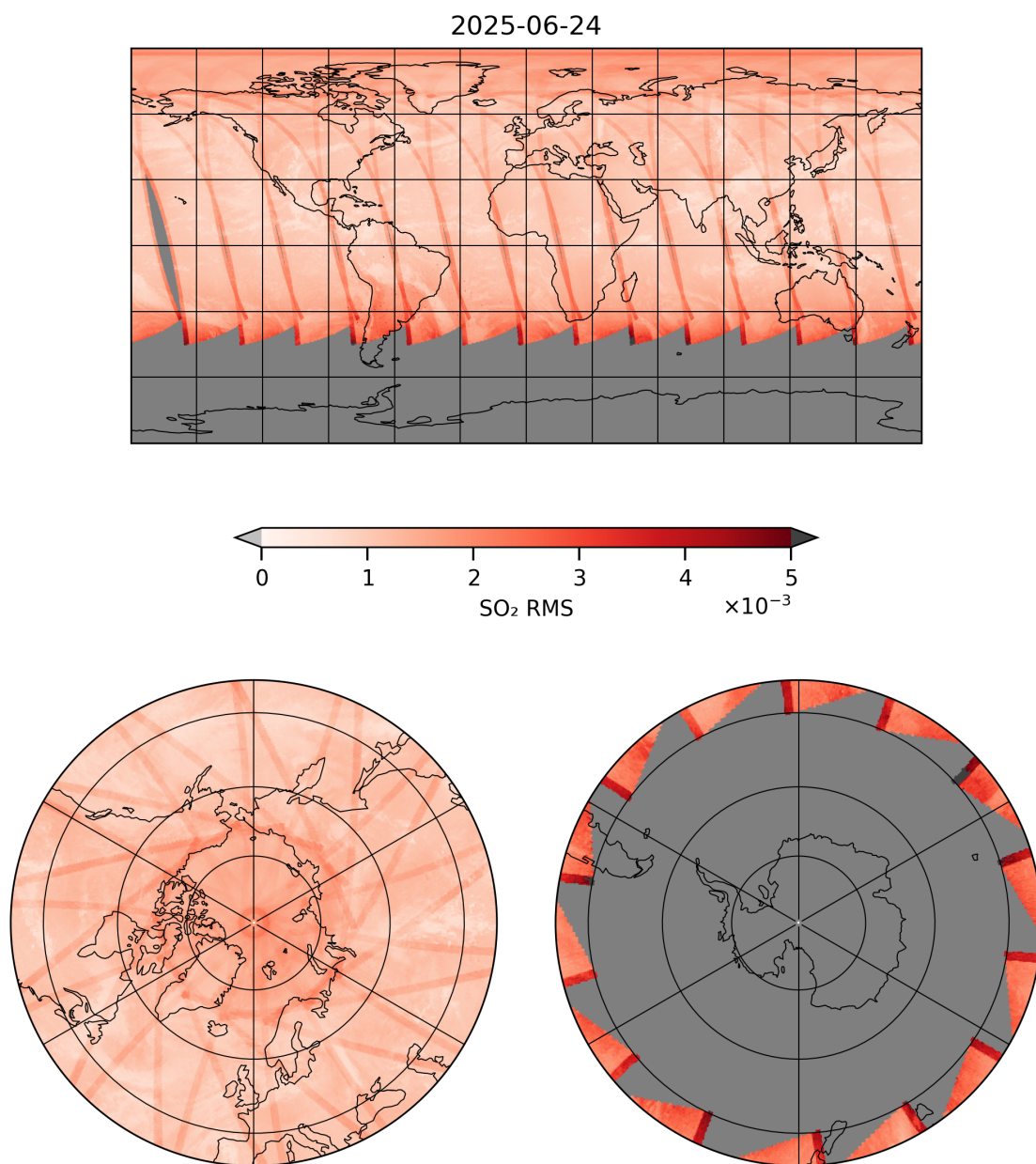


Figure 24: Map of “SO₂ RMS” for 2025-06-24 to 2025-06-25

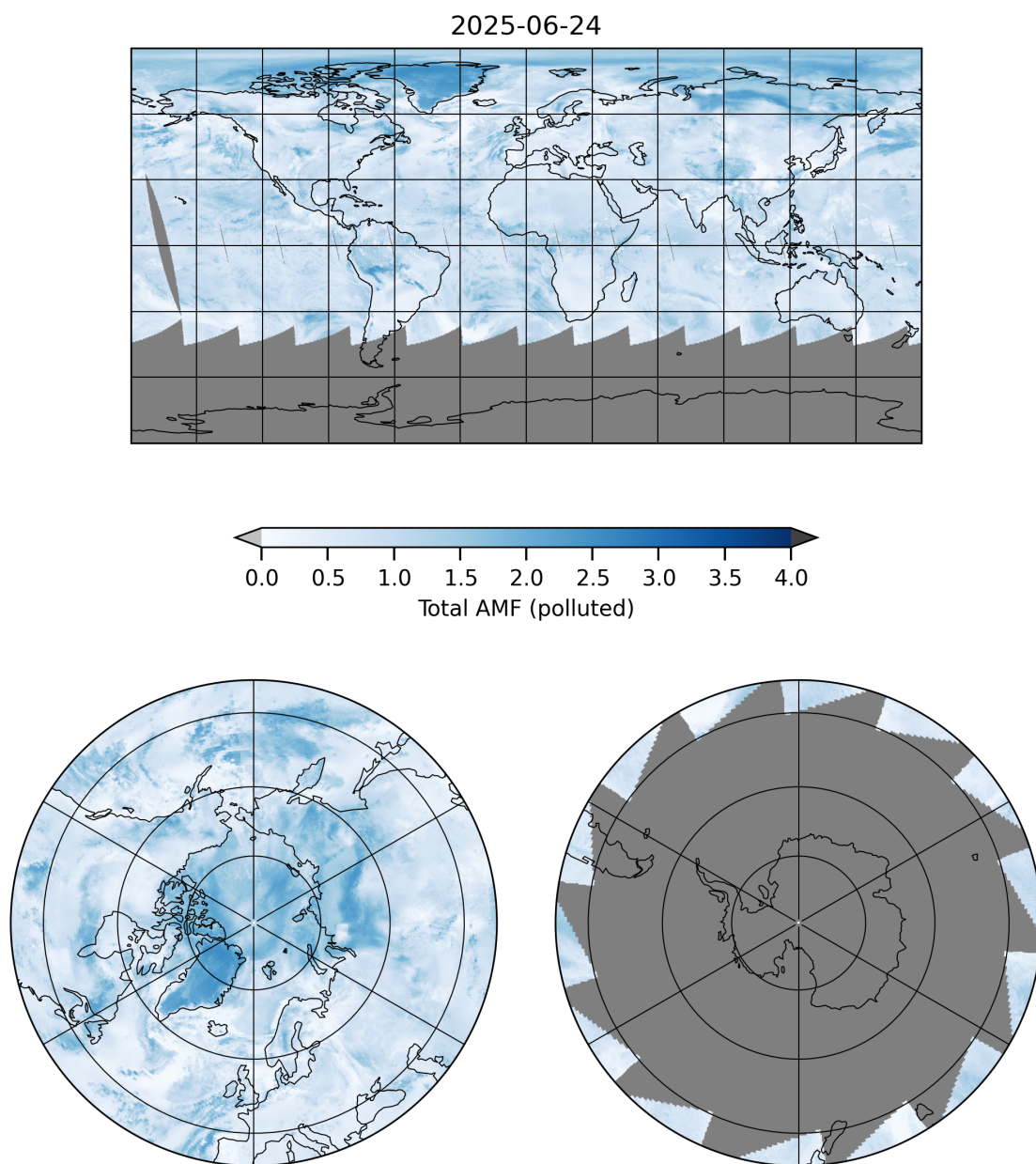


Figure 25: Map of “Total AMF (polluted)” for 2025-06-24 to 2025-06-25

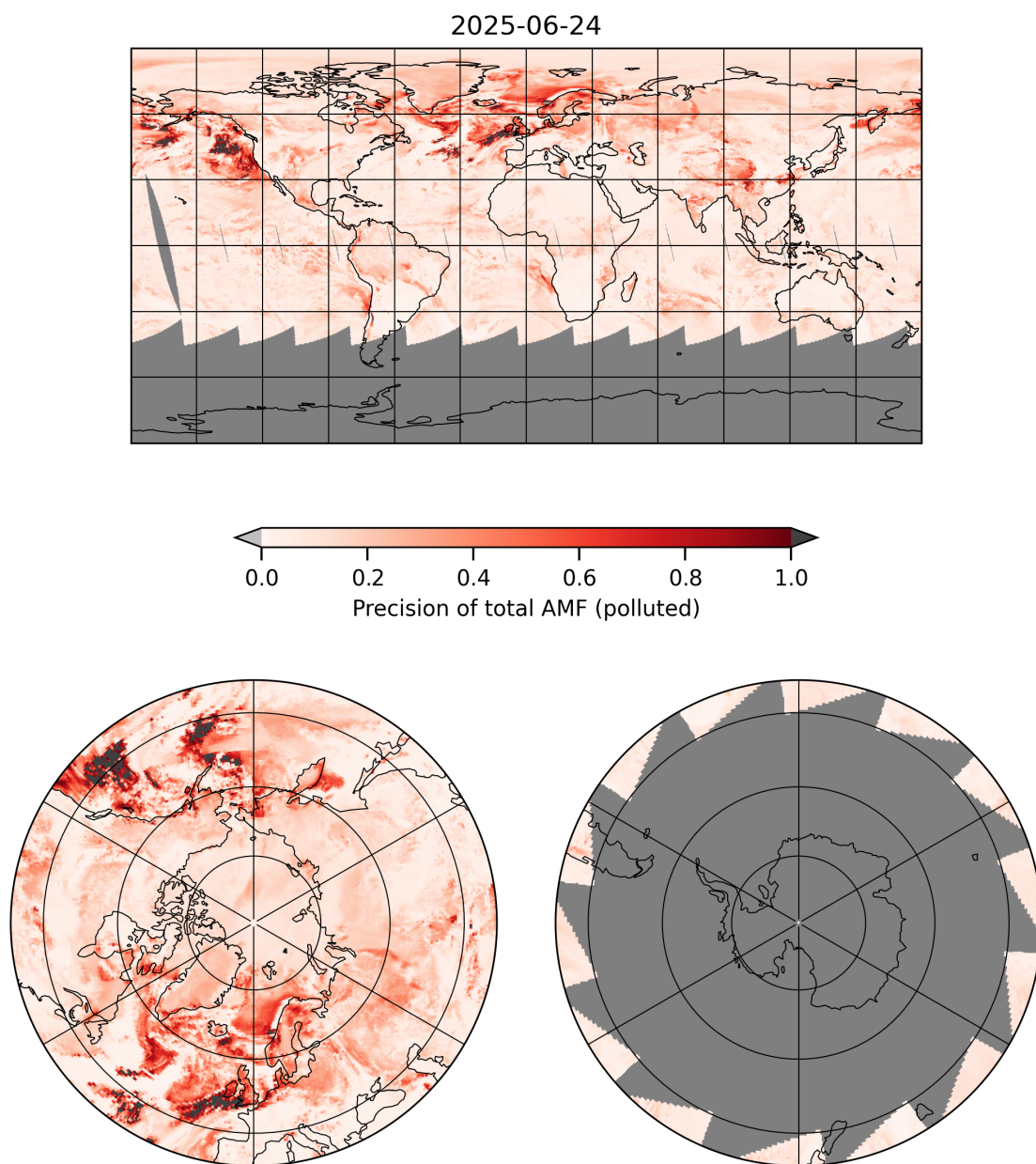


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-06-24 to 2025-06-25

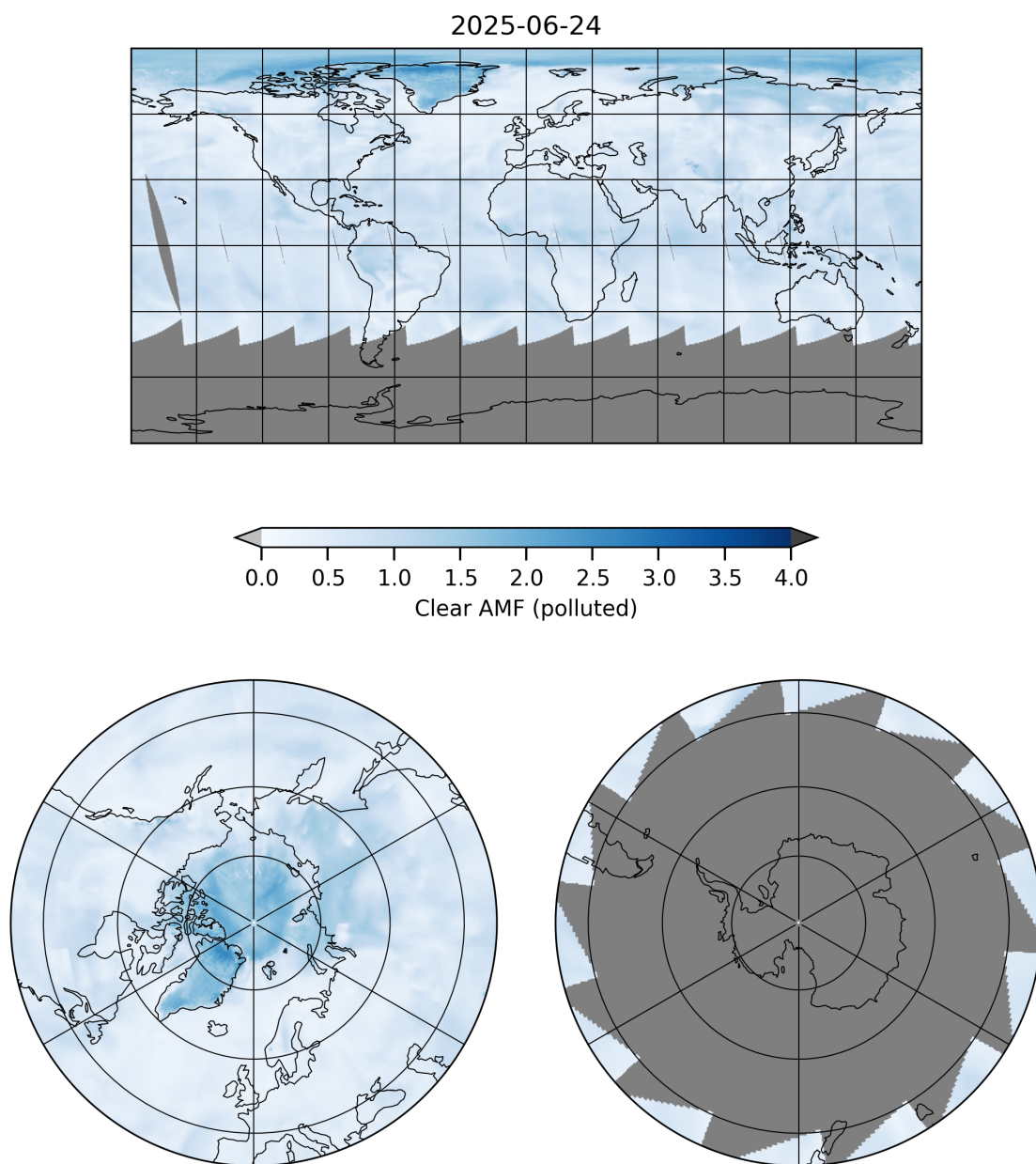


Figure 27: Map of “Clear AMF (polluted)” for 2025-06-24 to 2025-06-25

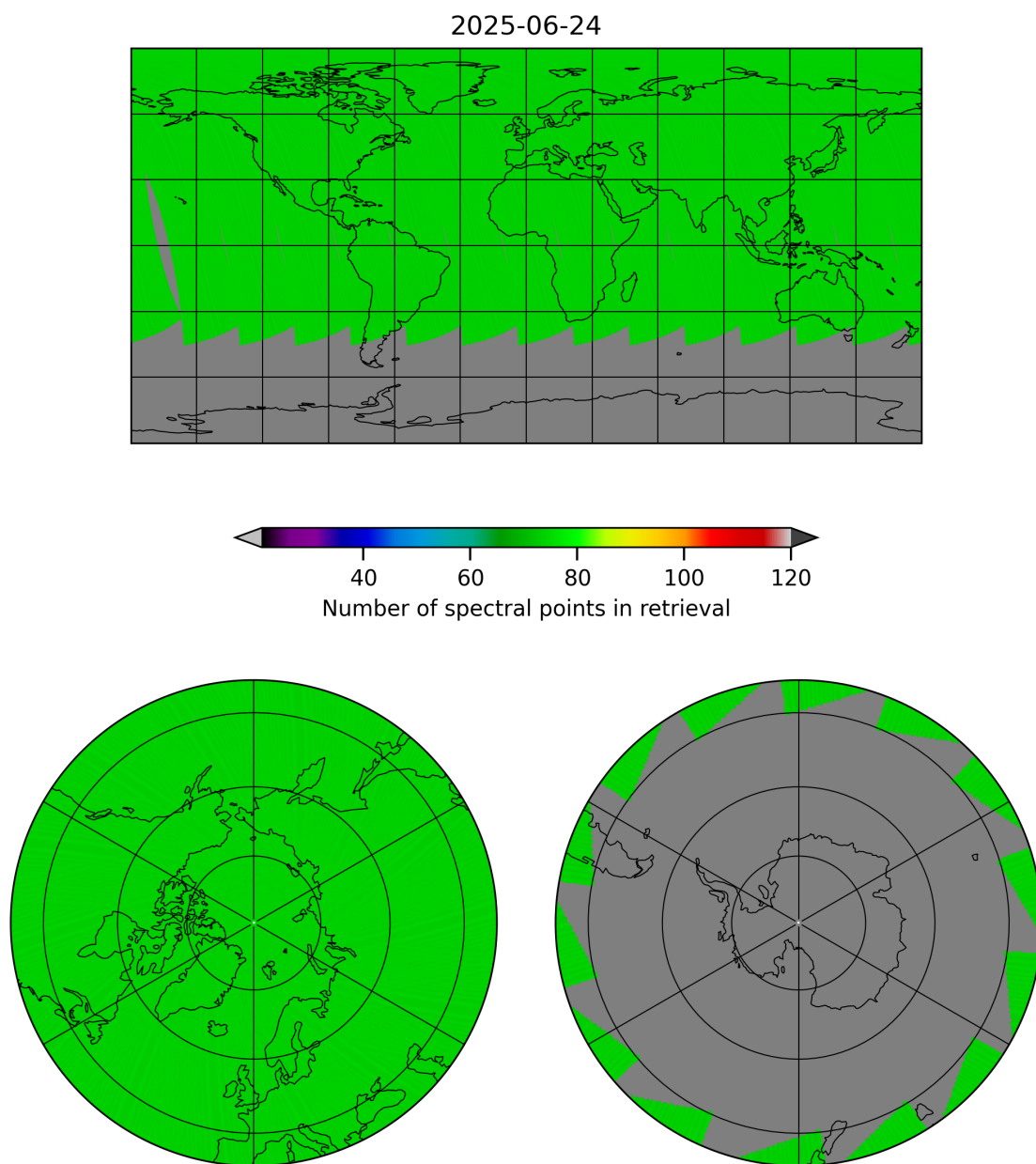


Figure 28: Map of “Number of spectral points in retrieval” for 2025-06-24 to 2025-06-25

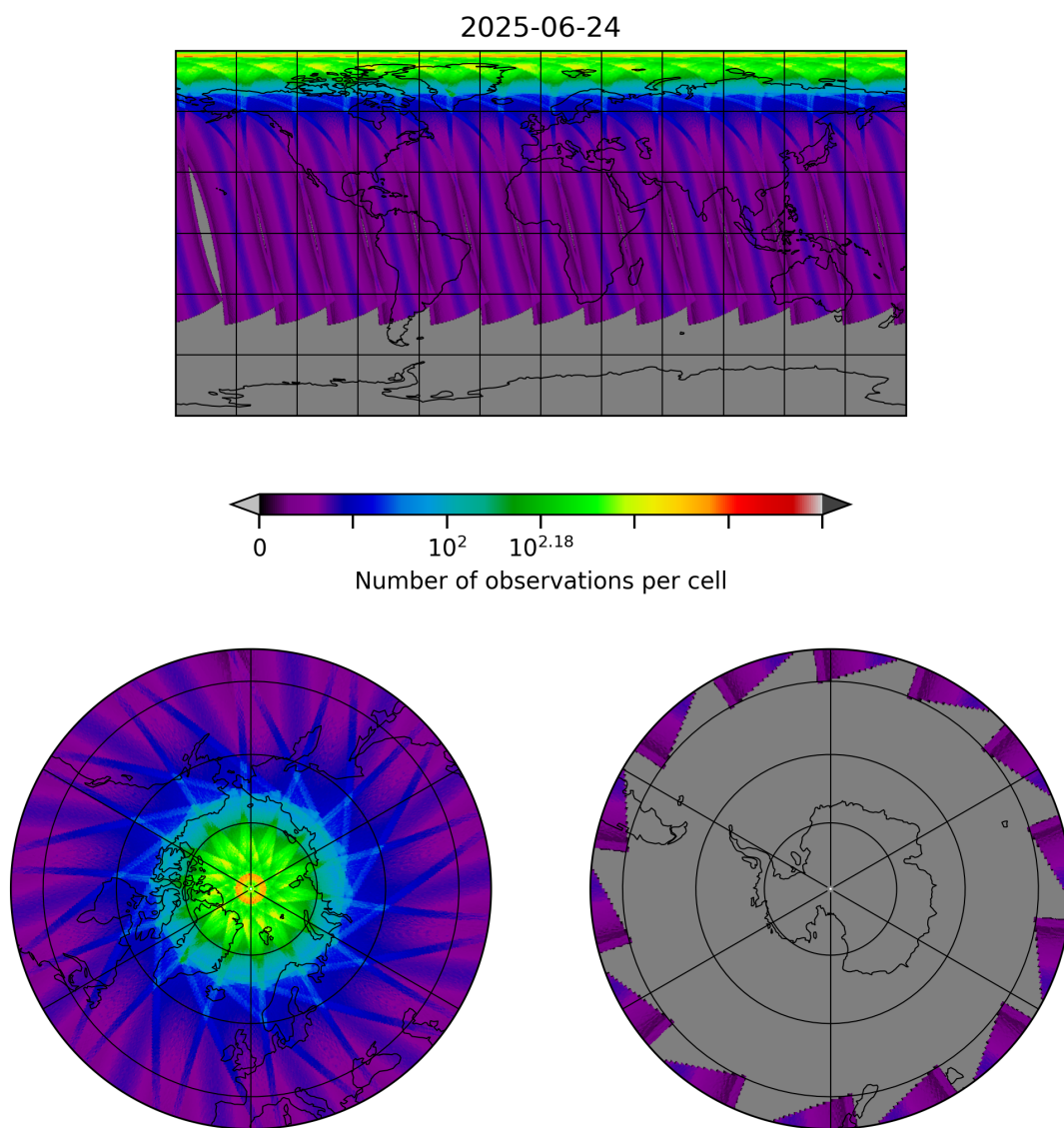


Figure 29: Map of the number of observations for 2025-06-24 to 2025-06-25

7 Zonal average

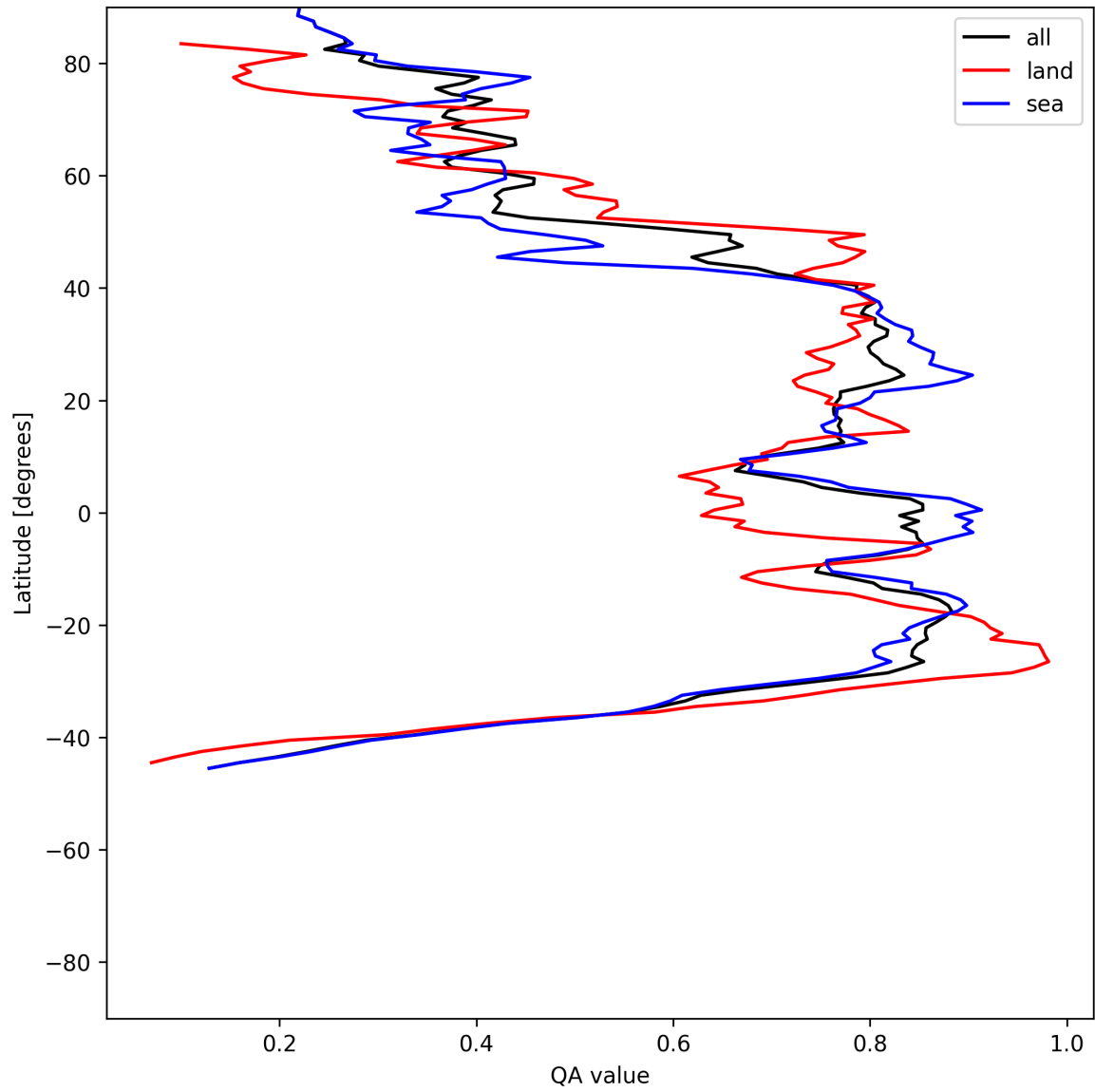


Figure 30: Zonal average of “QA value” for 2025-06-24 to 2025-06-25.

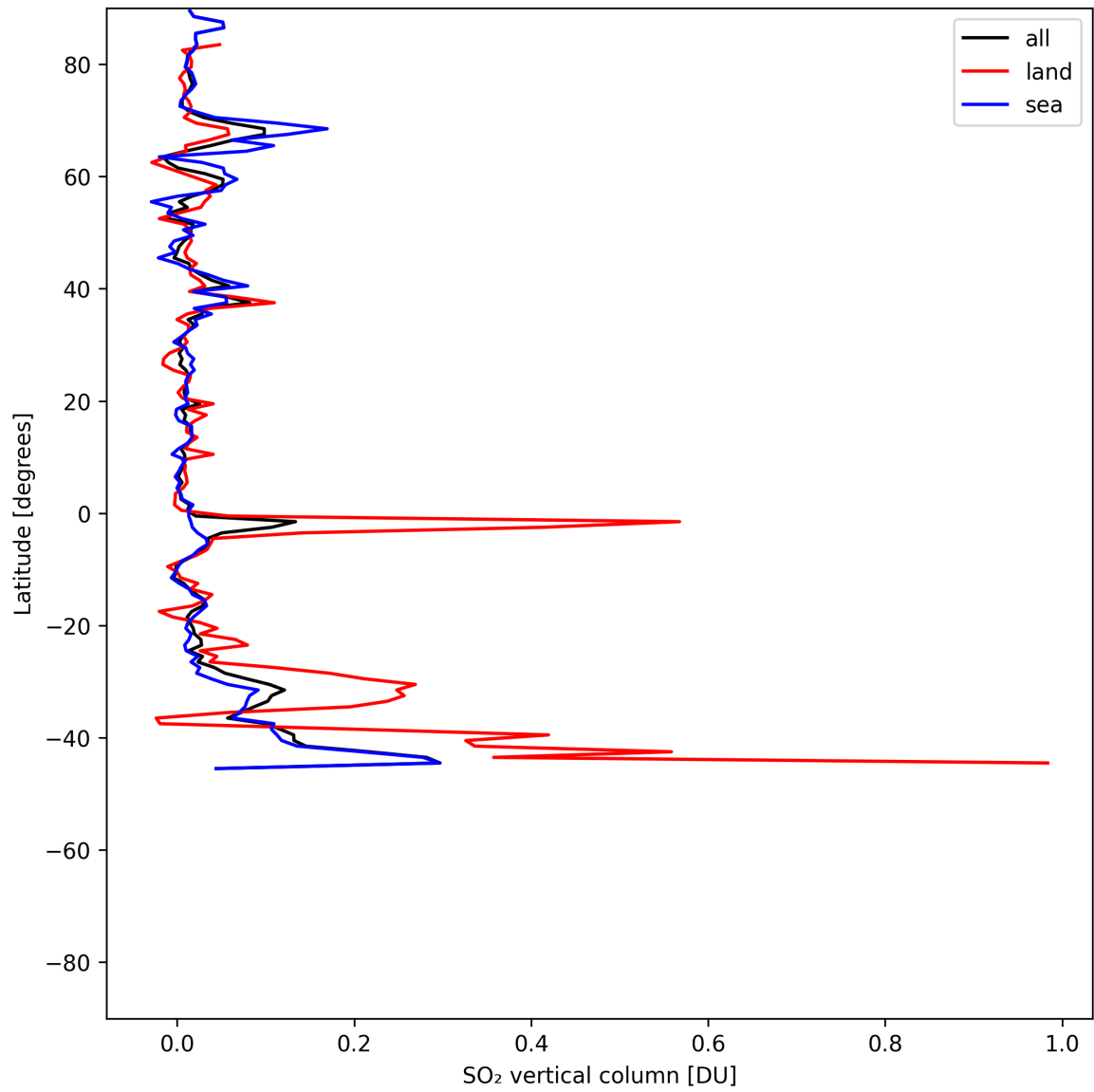


Figure 31: Zonal average of “SO₂ vertical column” for 2025-06-24 to 2025-06-25.

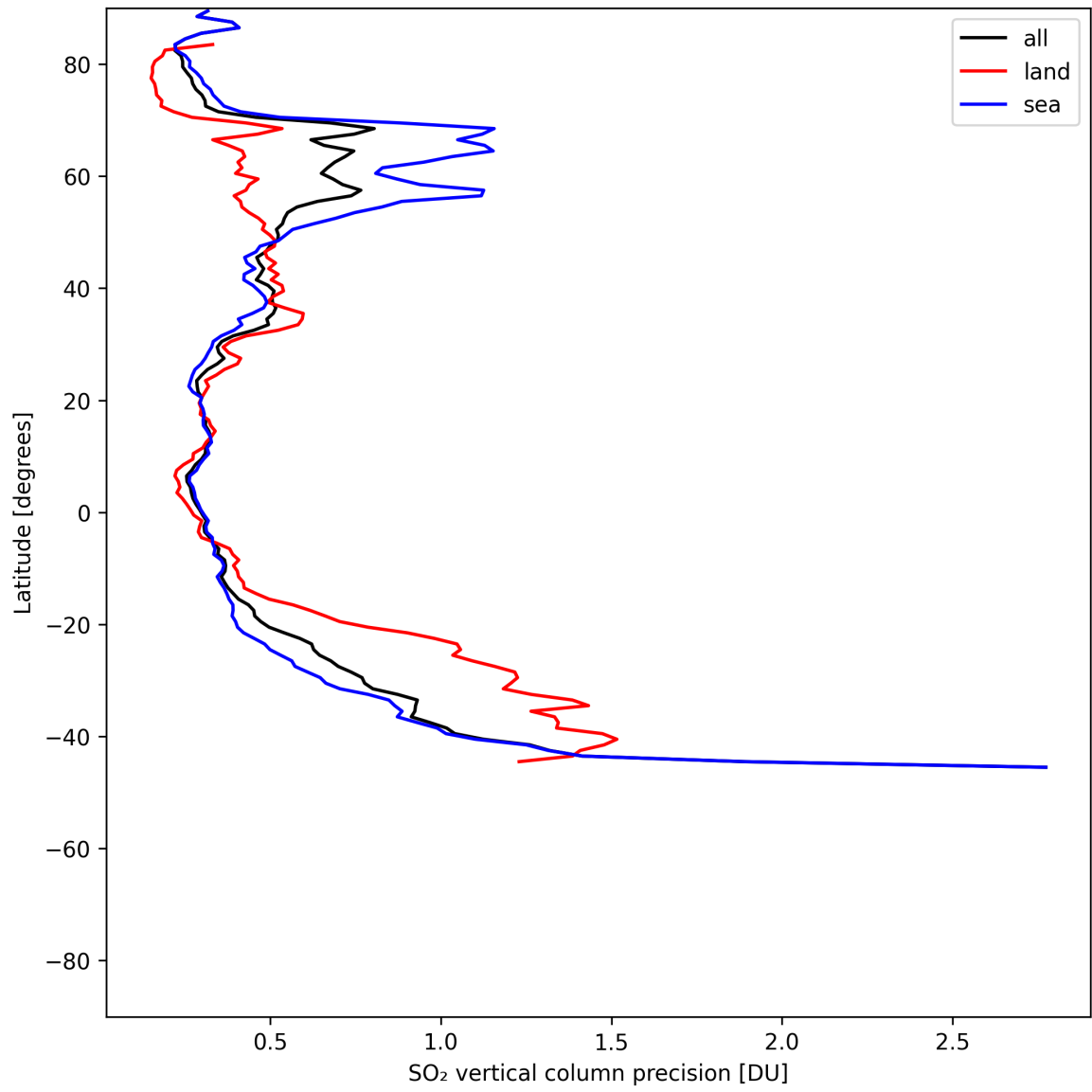


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-06-24 to 2025-06-25.

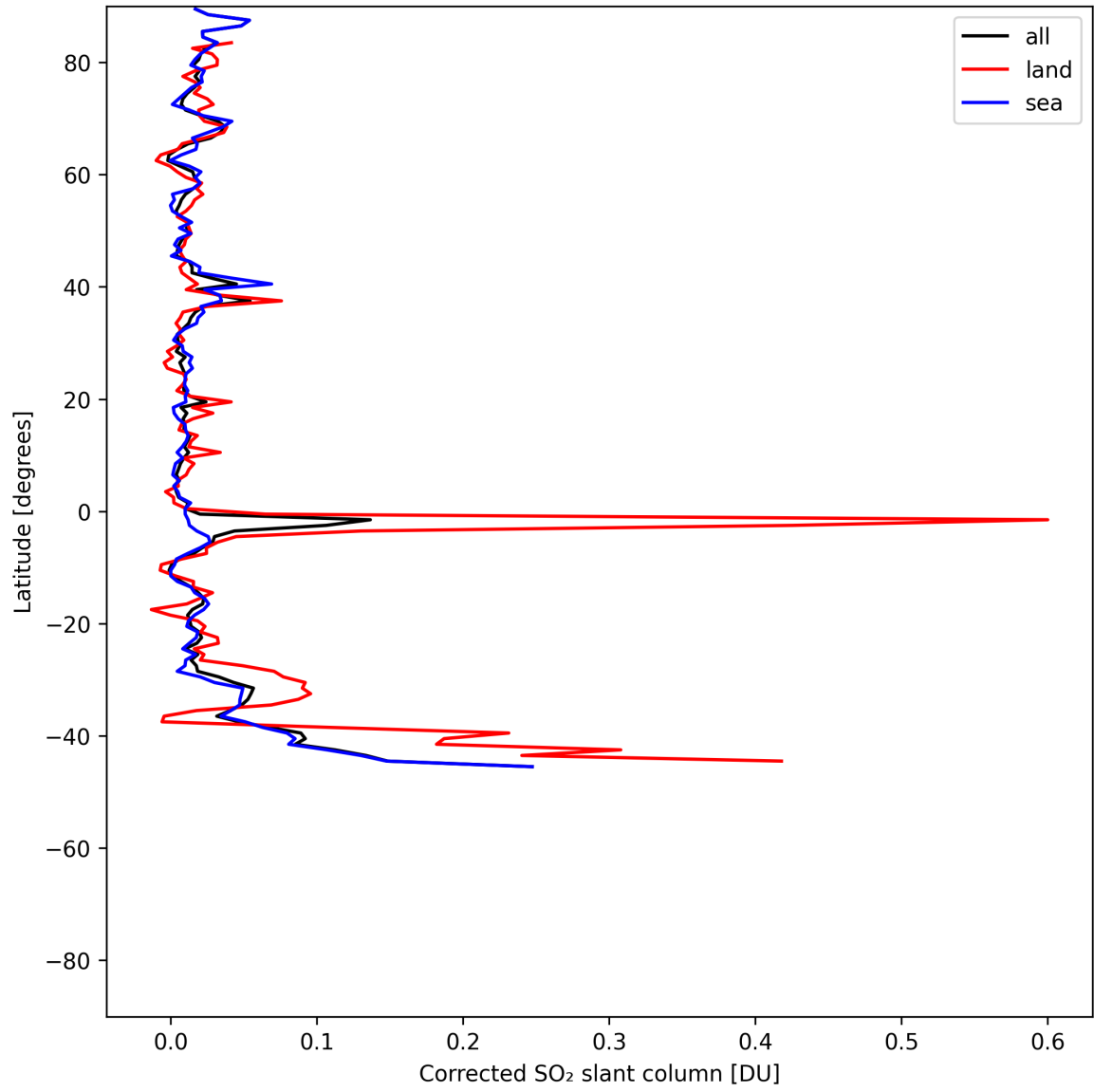


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-06-24 to 2025-06-25.

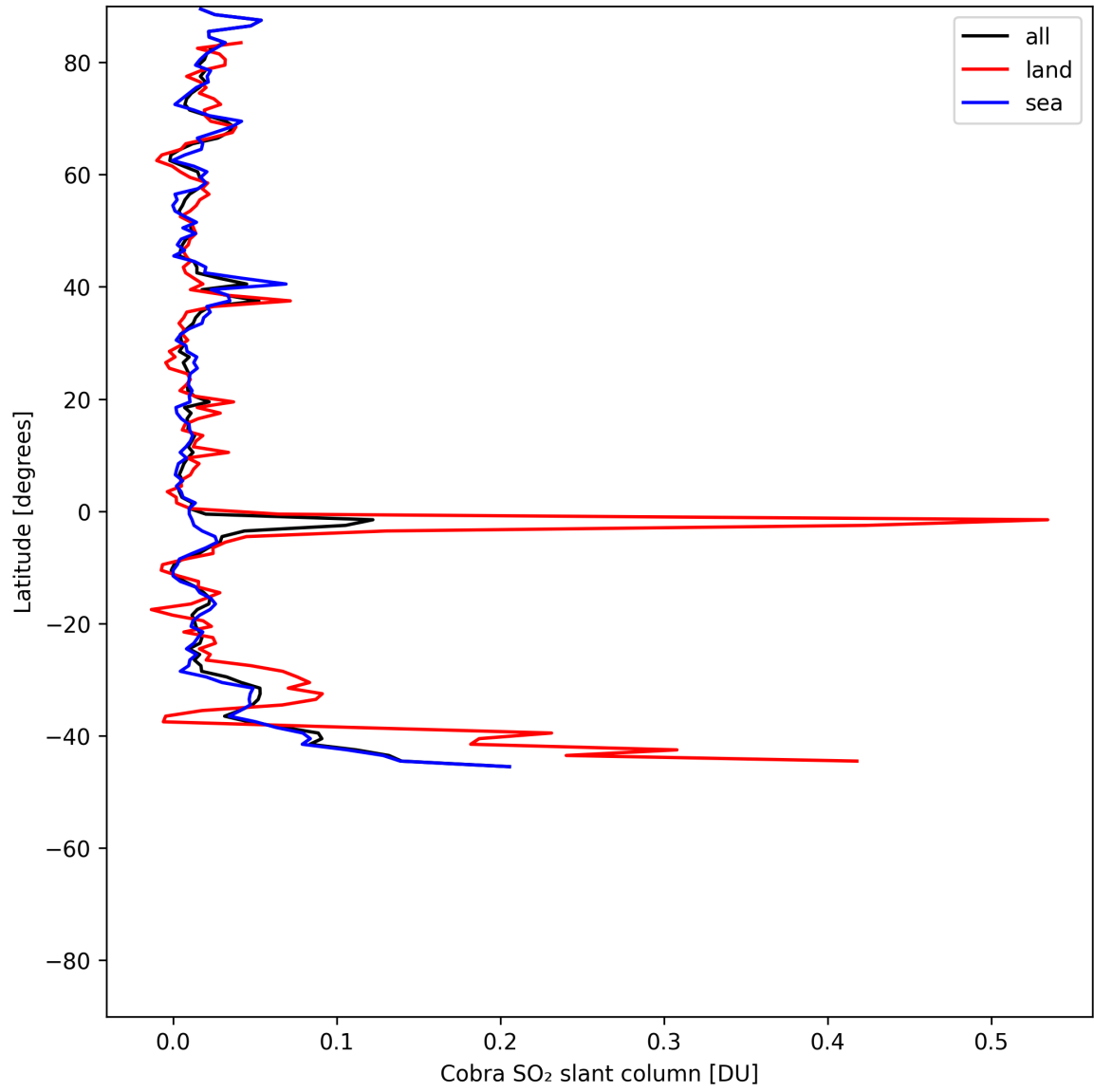


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-06-24 to 2025-06-25.

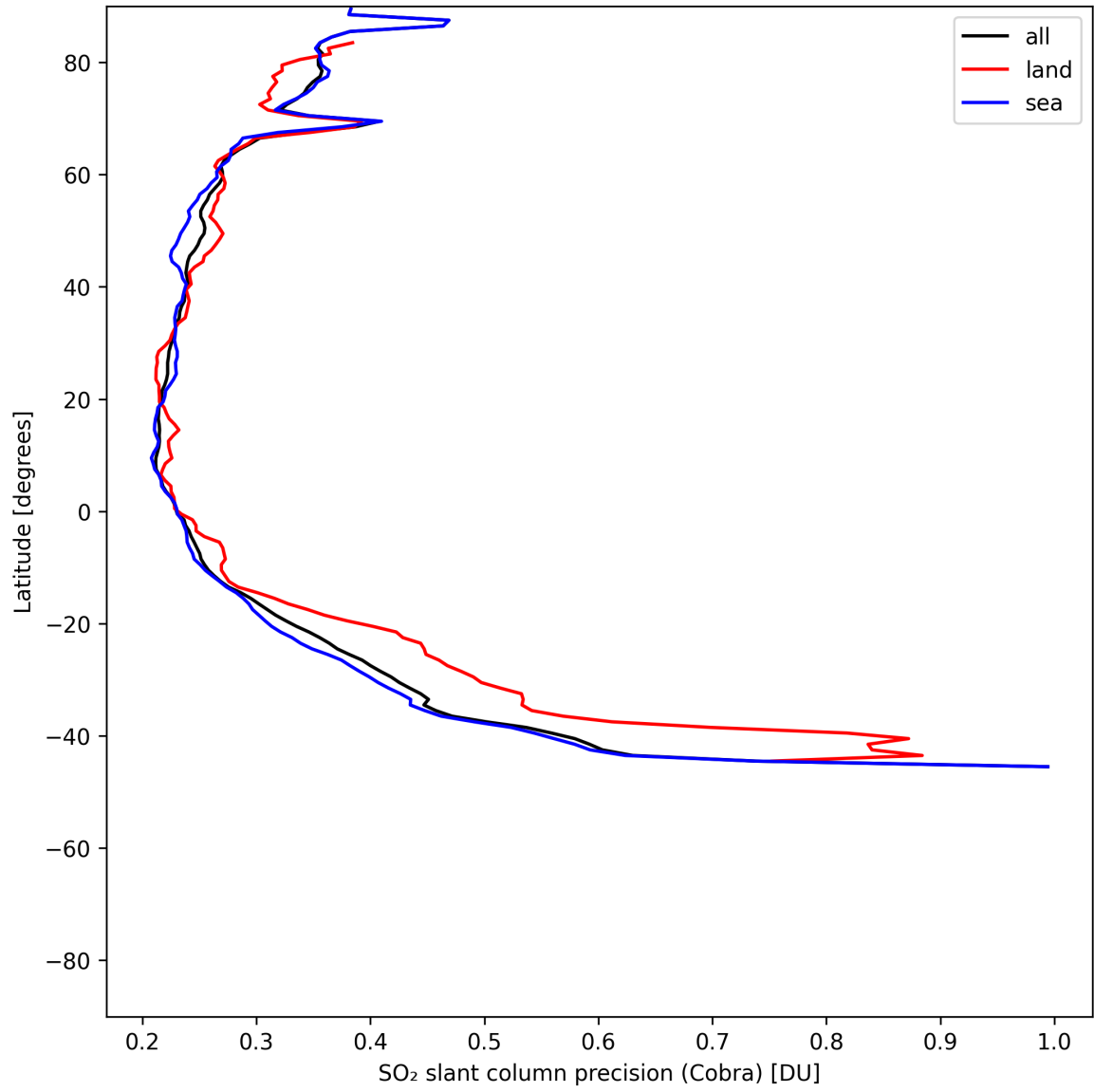


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-06-24 to 2025-06-25.

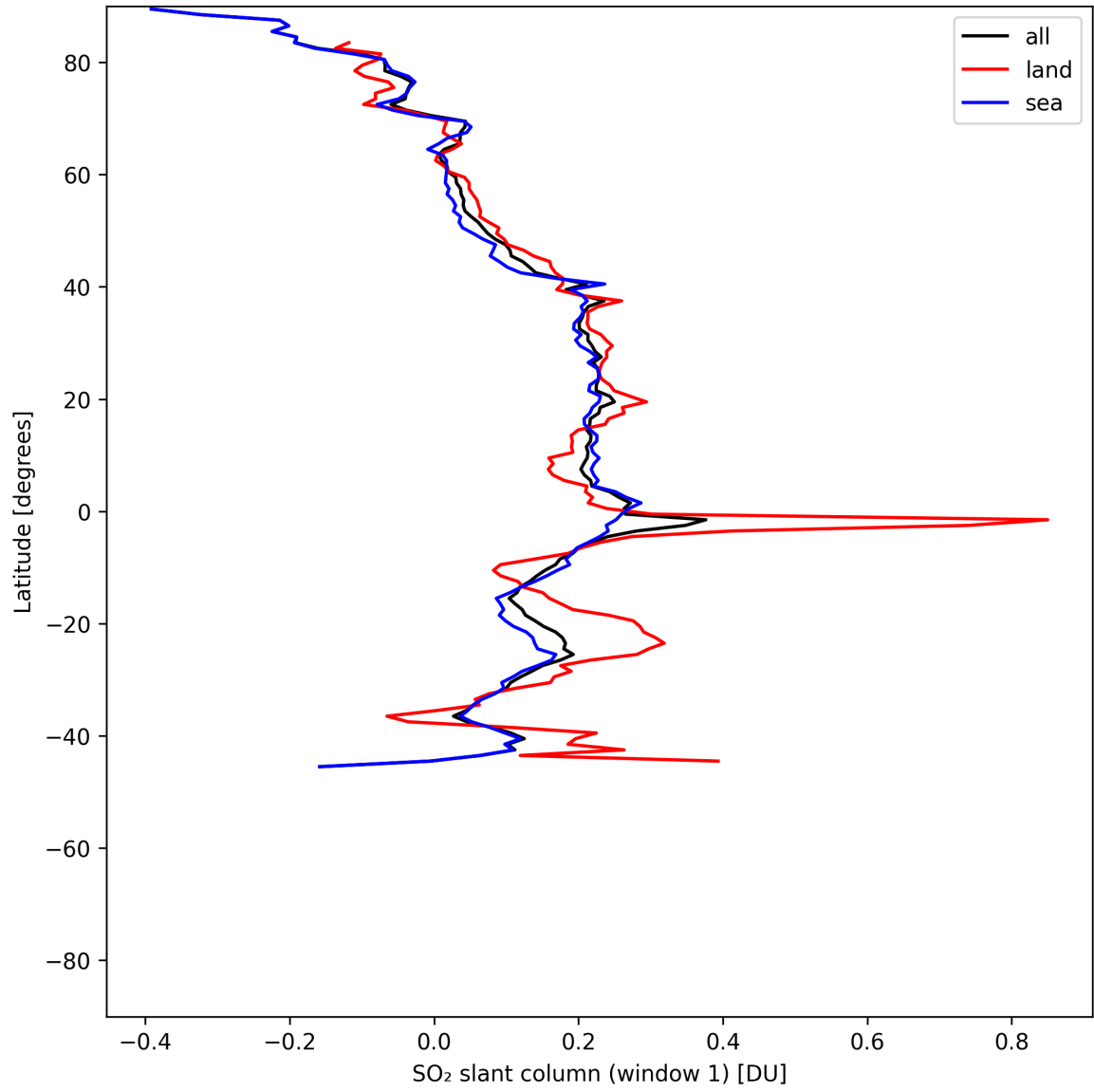


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-06-24 to 2025-06-25.

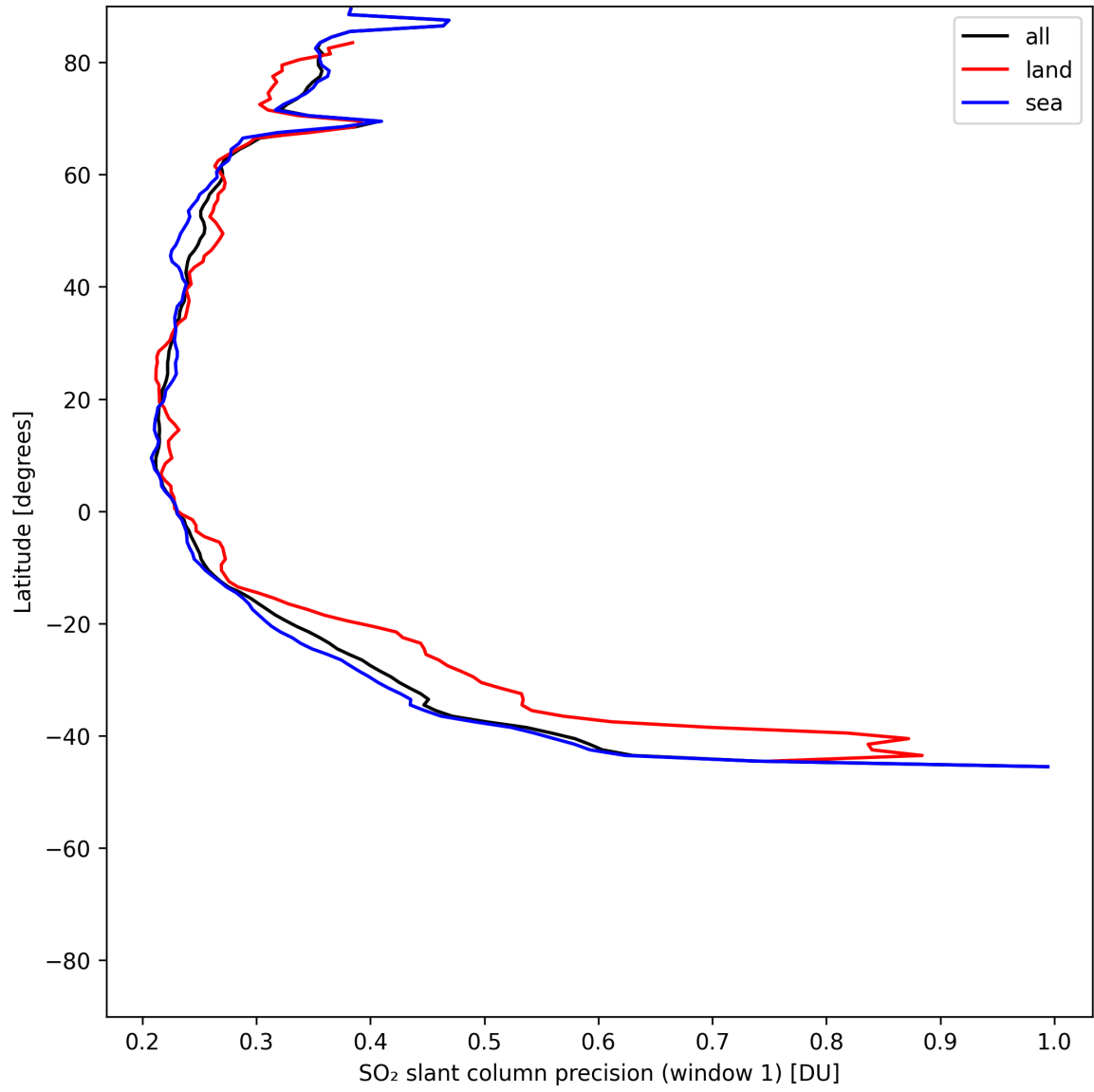


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-06-24 to 2025-06-25.

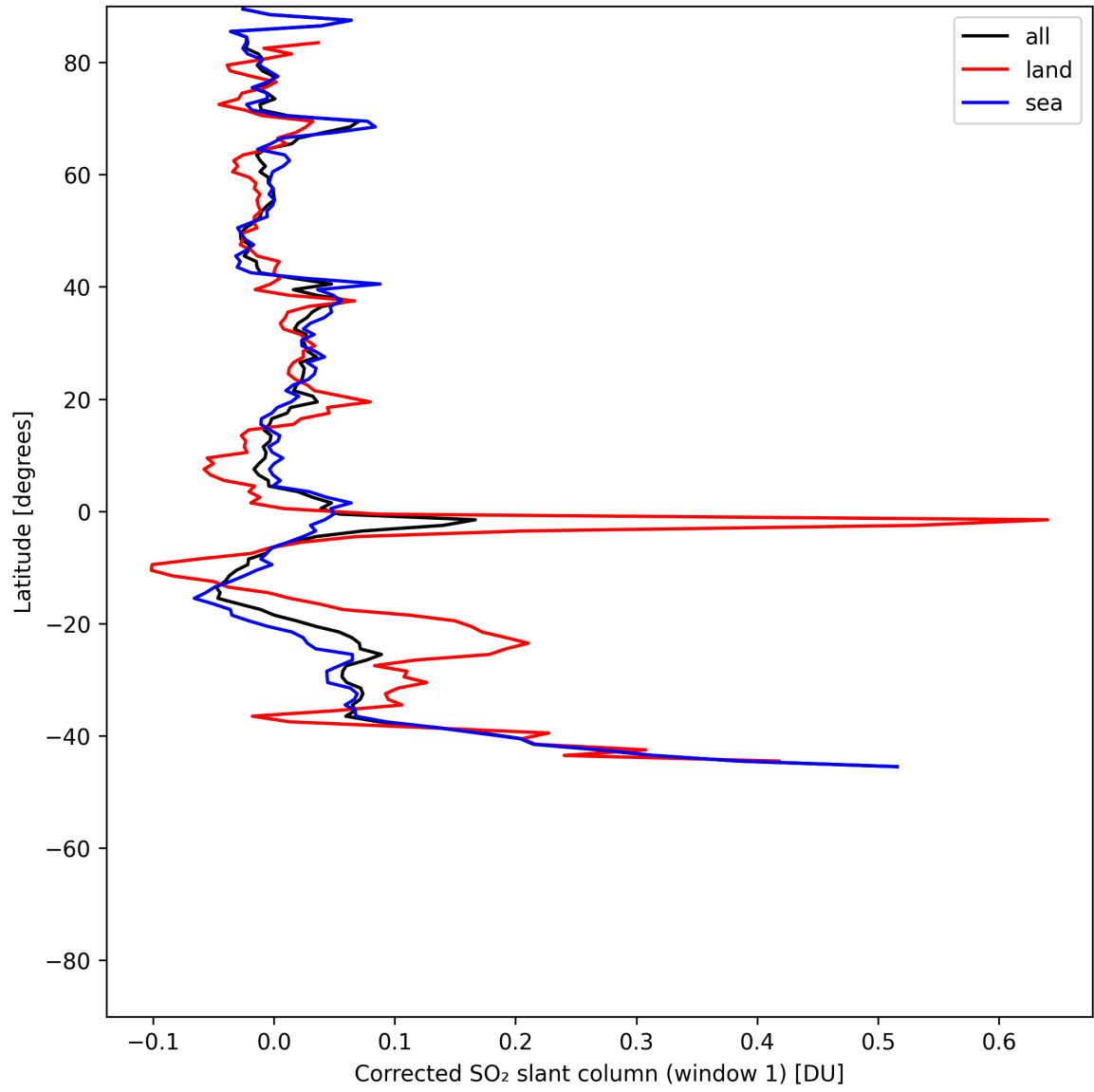


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-06-24 to 2025-06-25.

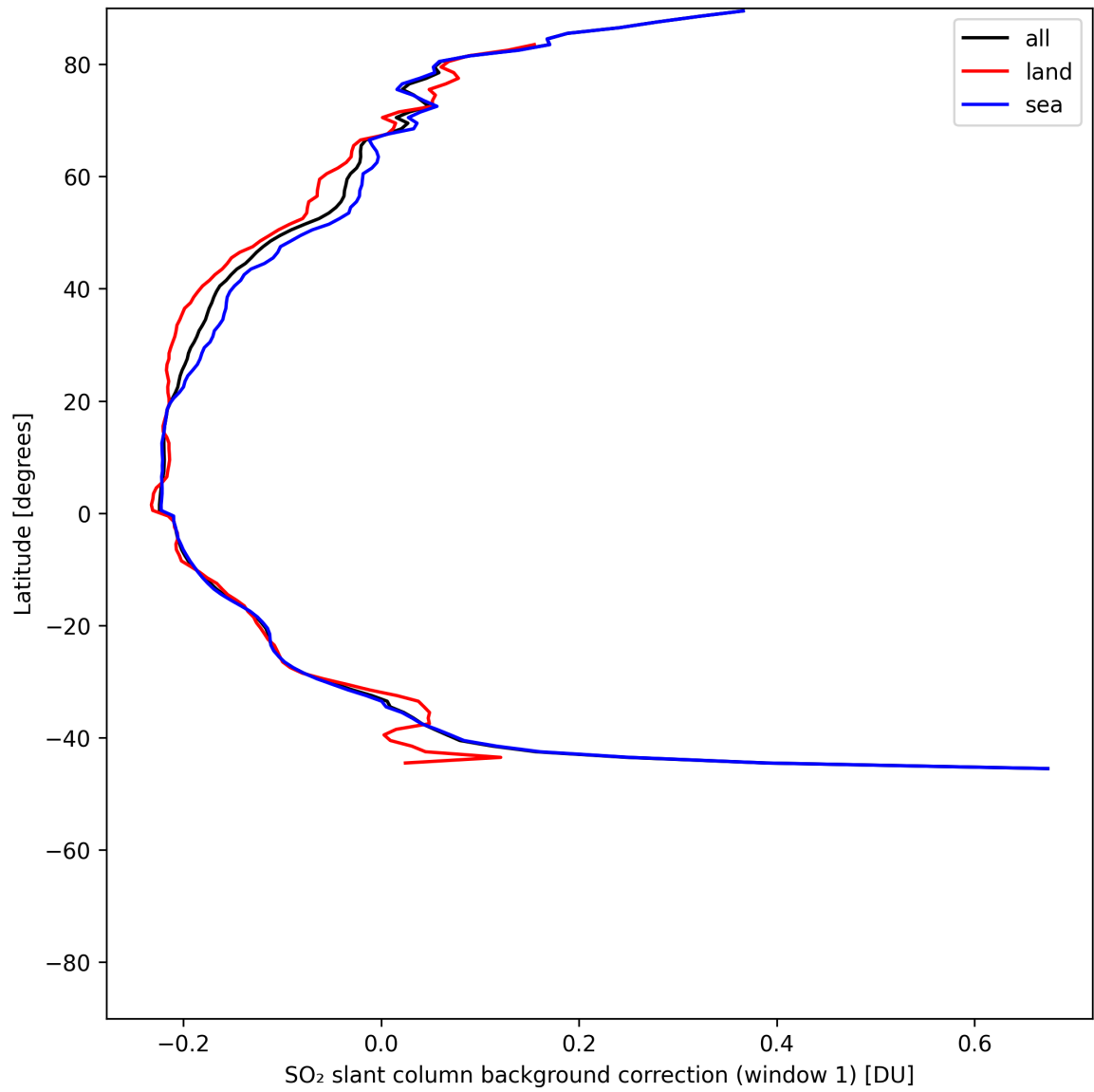


Figure 39: Zonal average of "SO₂ slant column background correction (window 1)" for 2025-06-24 to 2025-06-25.

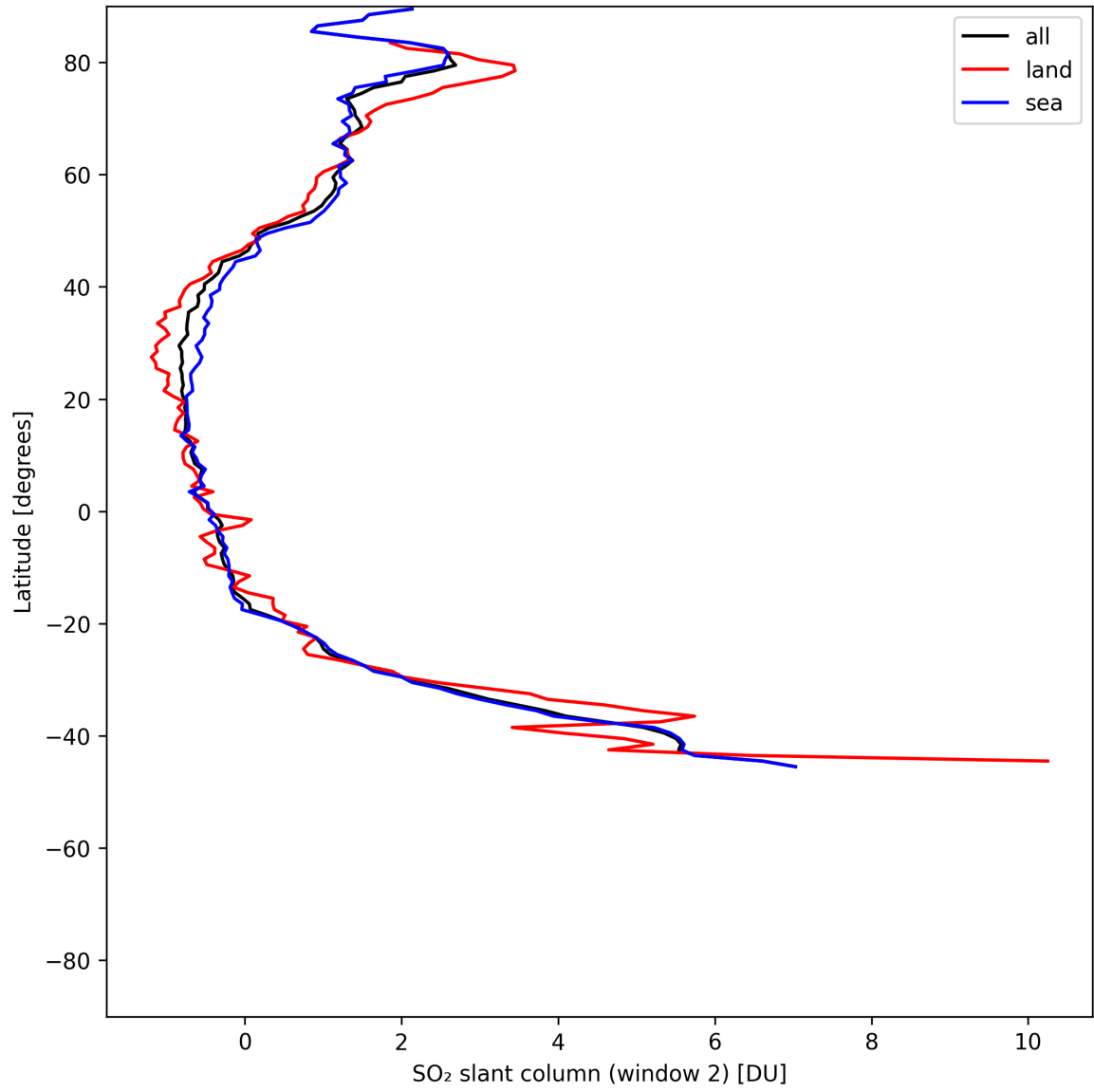


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-06-24 to 2025-06-25.

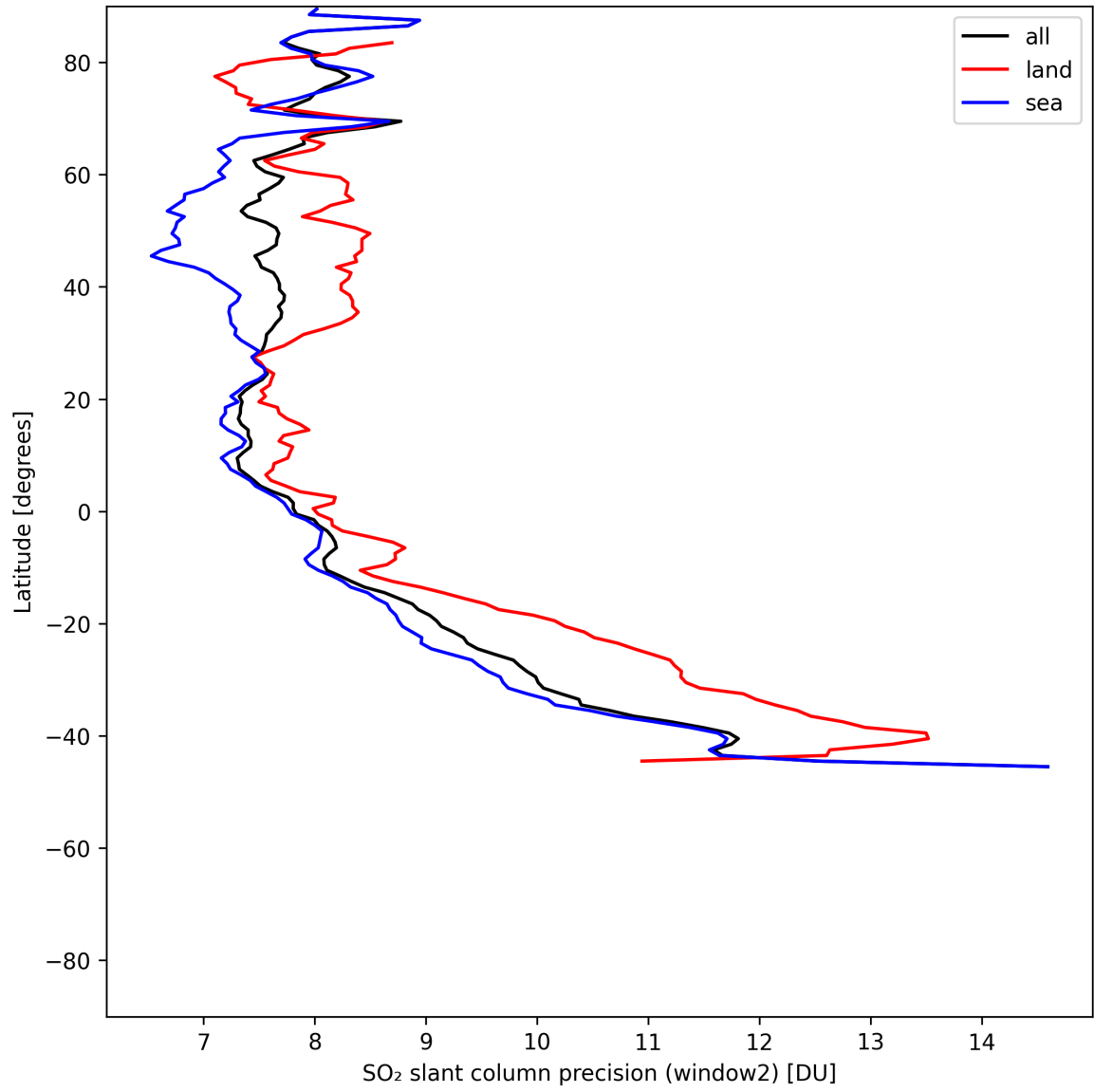


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-06-24 to 2025-06-25.

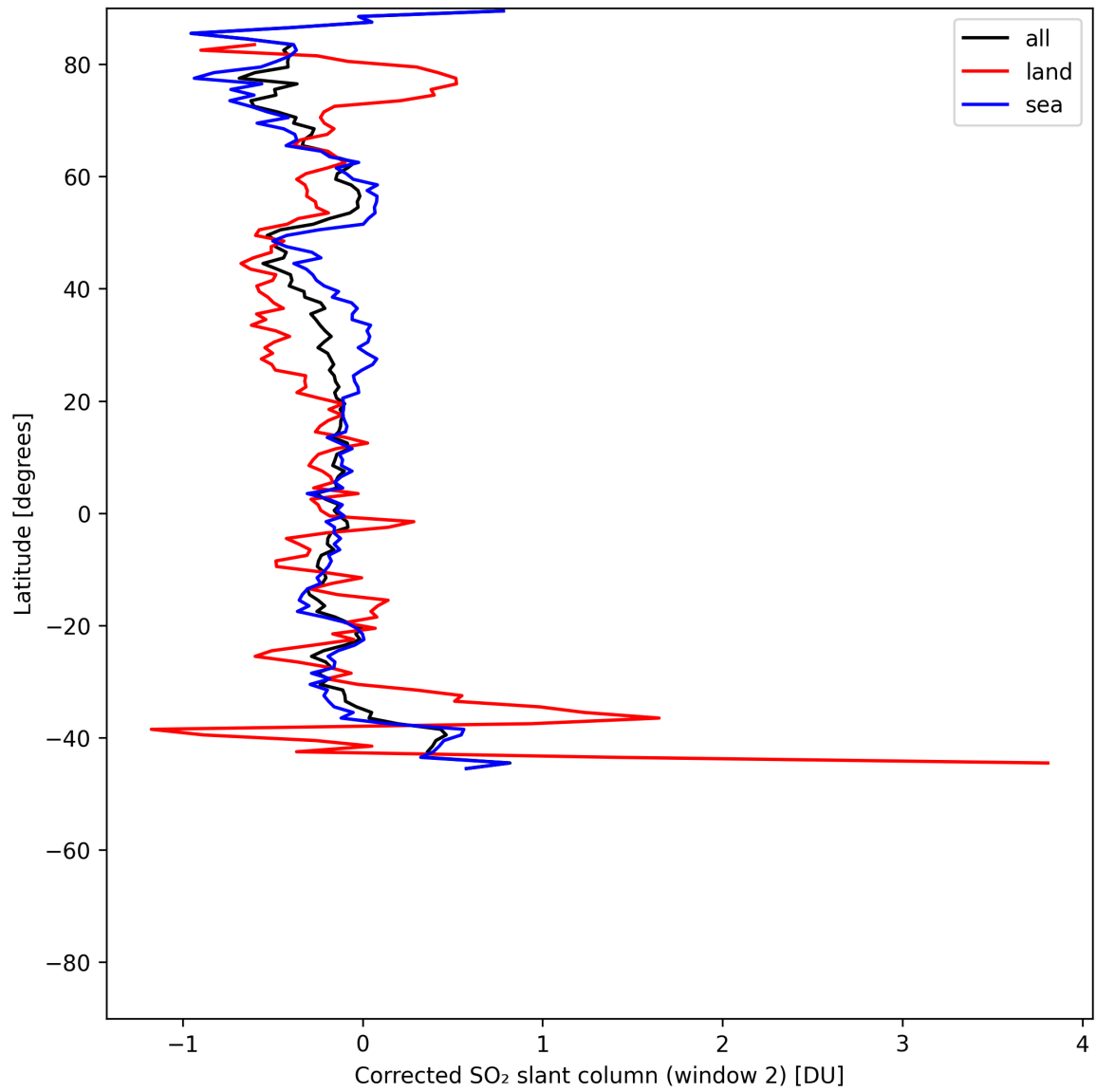


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-06-24 to 2025-06-25.

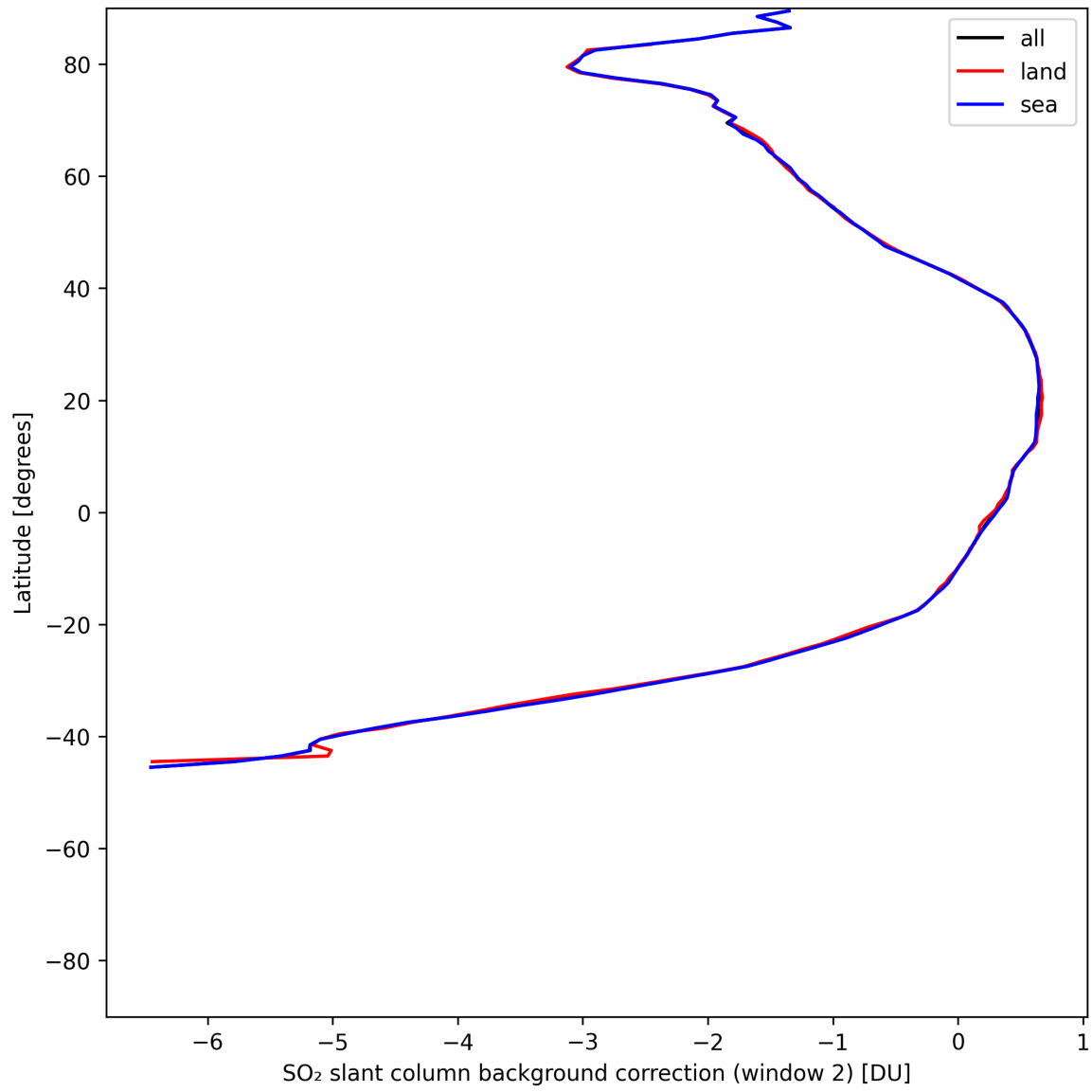


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-06-24 to 2025-06-25.

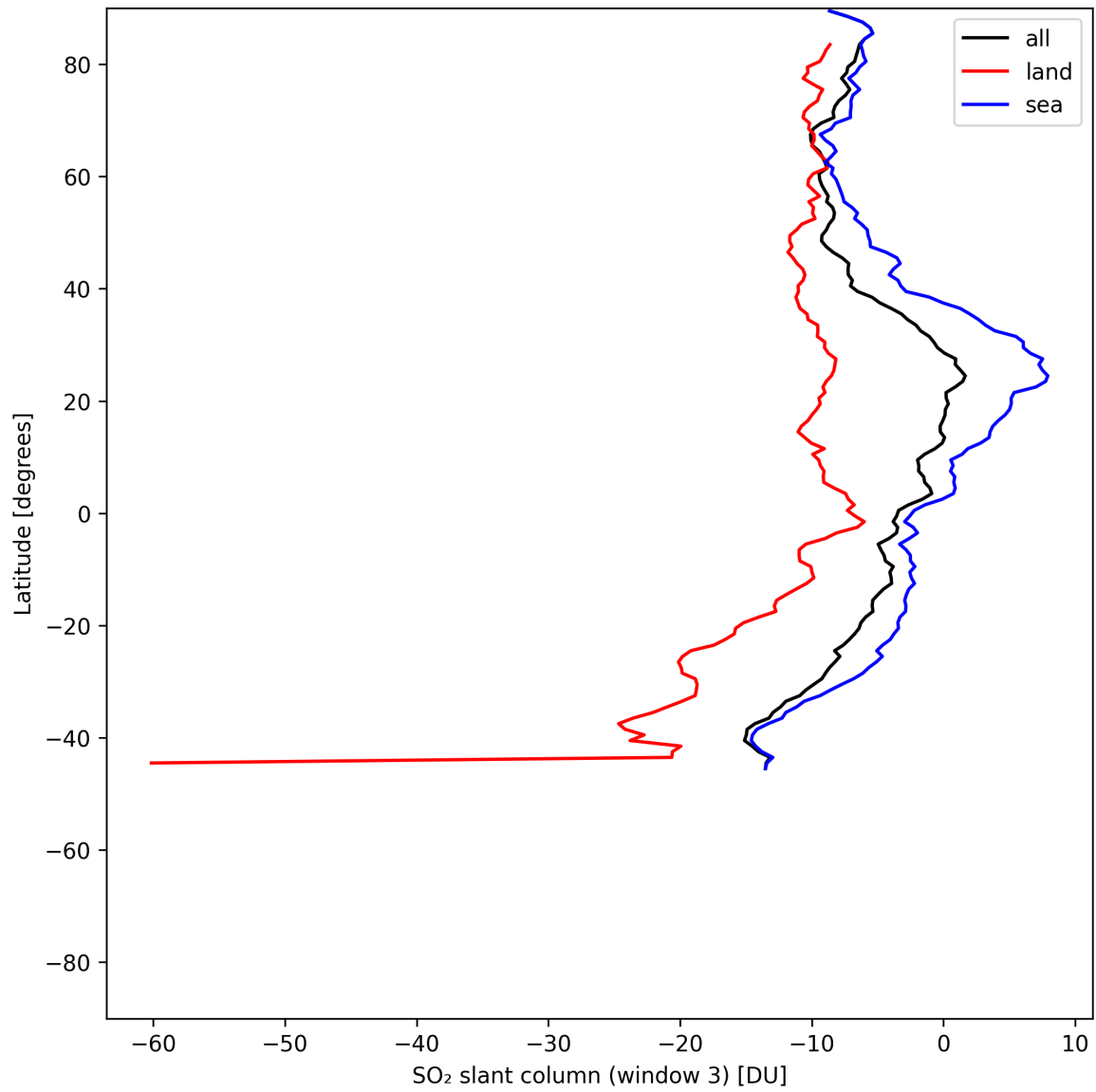


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-06-24 to 2025-06-25.

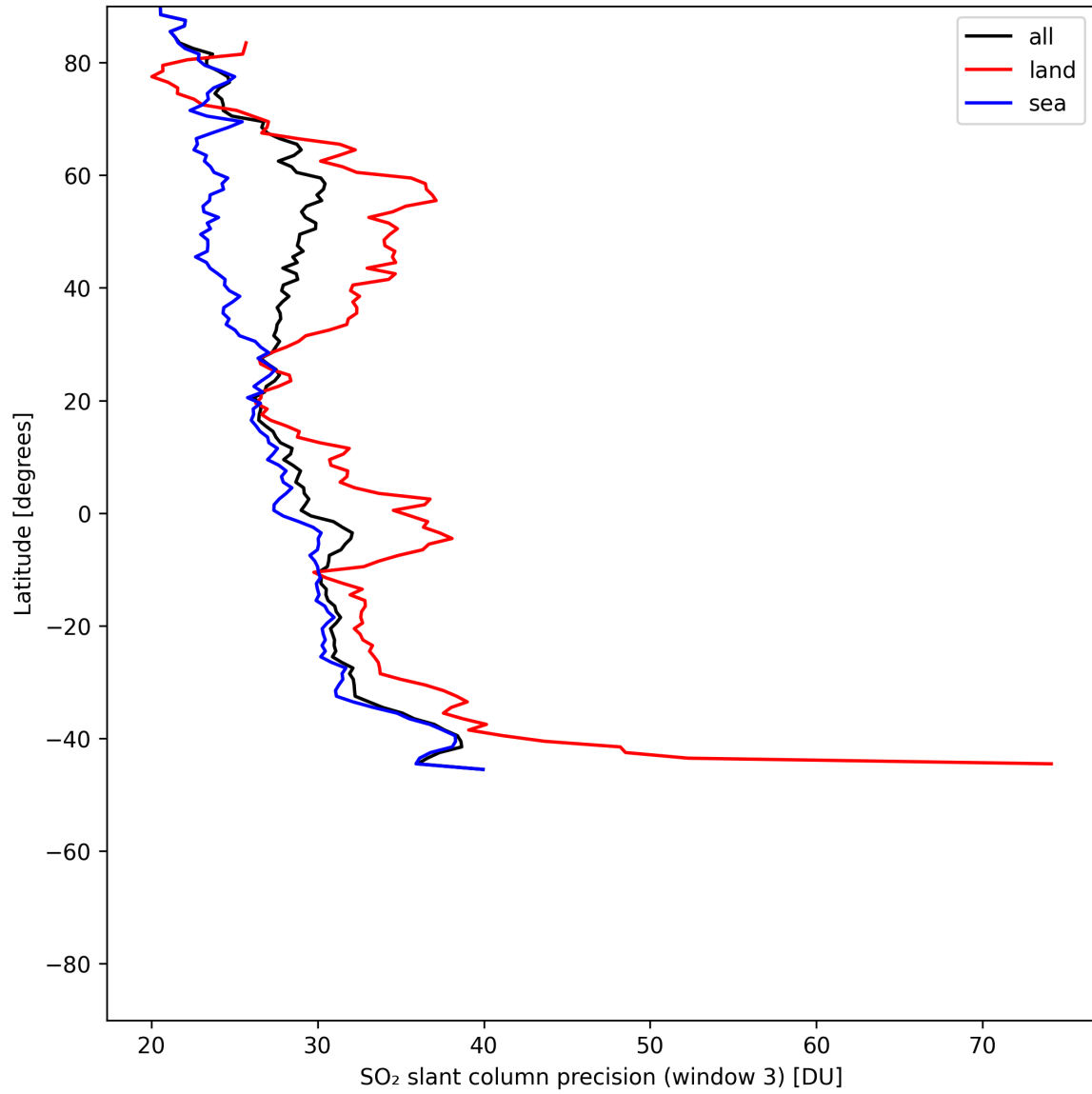


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-06-24 to 2025-06-25.

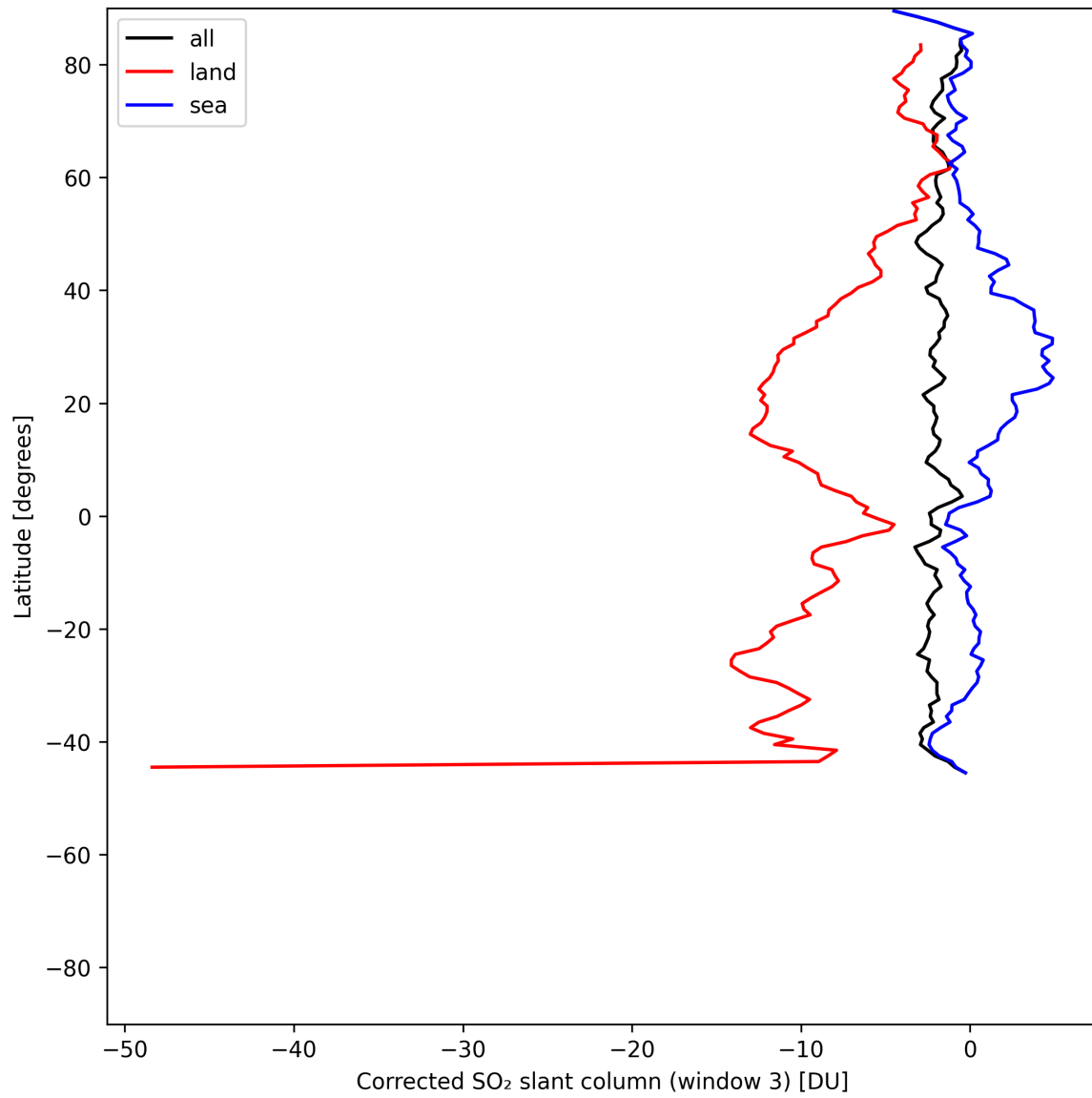


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-06-24 to 2025-06-25.

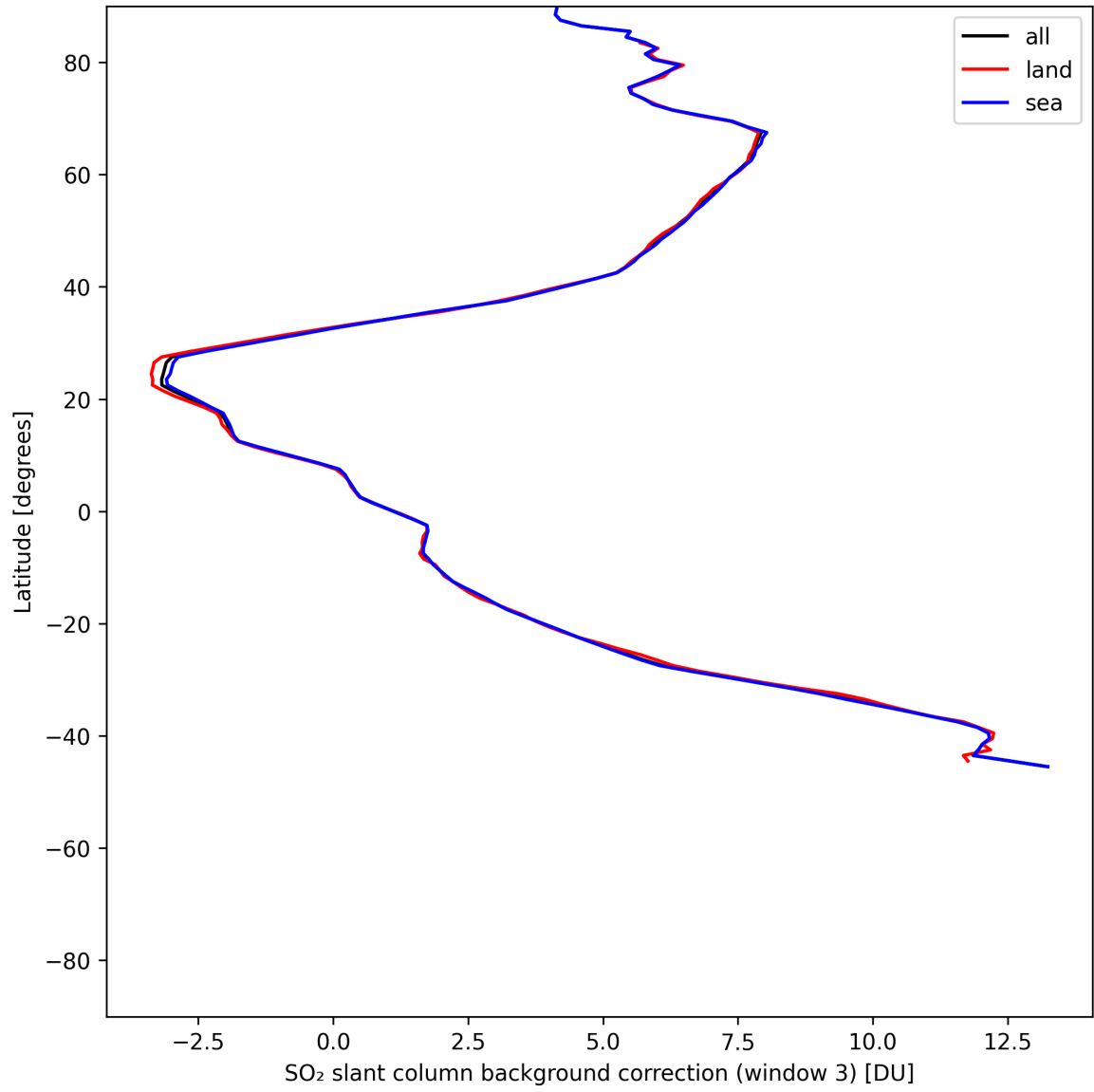


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-06-24 to 2025-06-25.

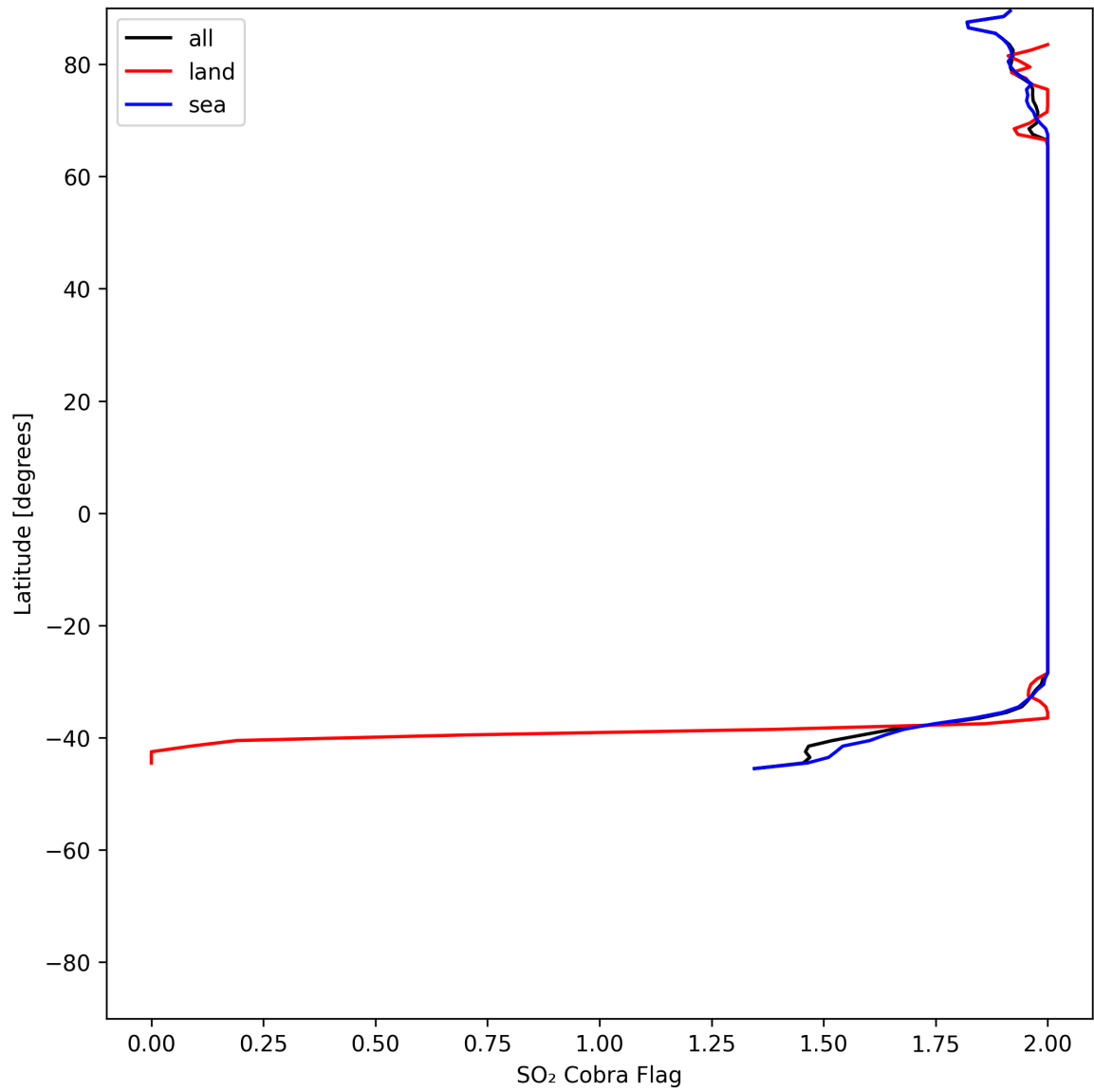


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-06-24 to 2025-06-25.

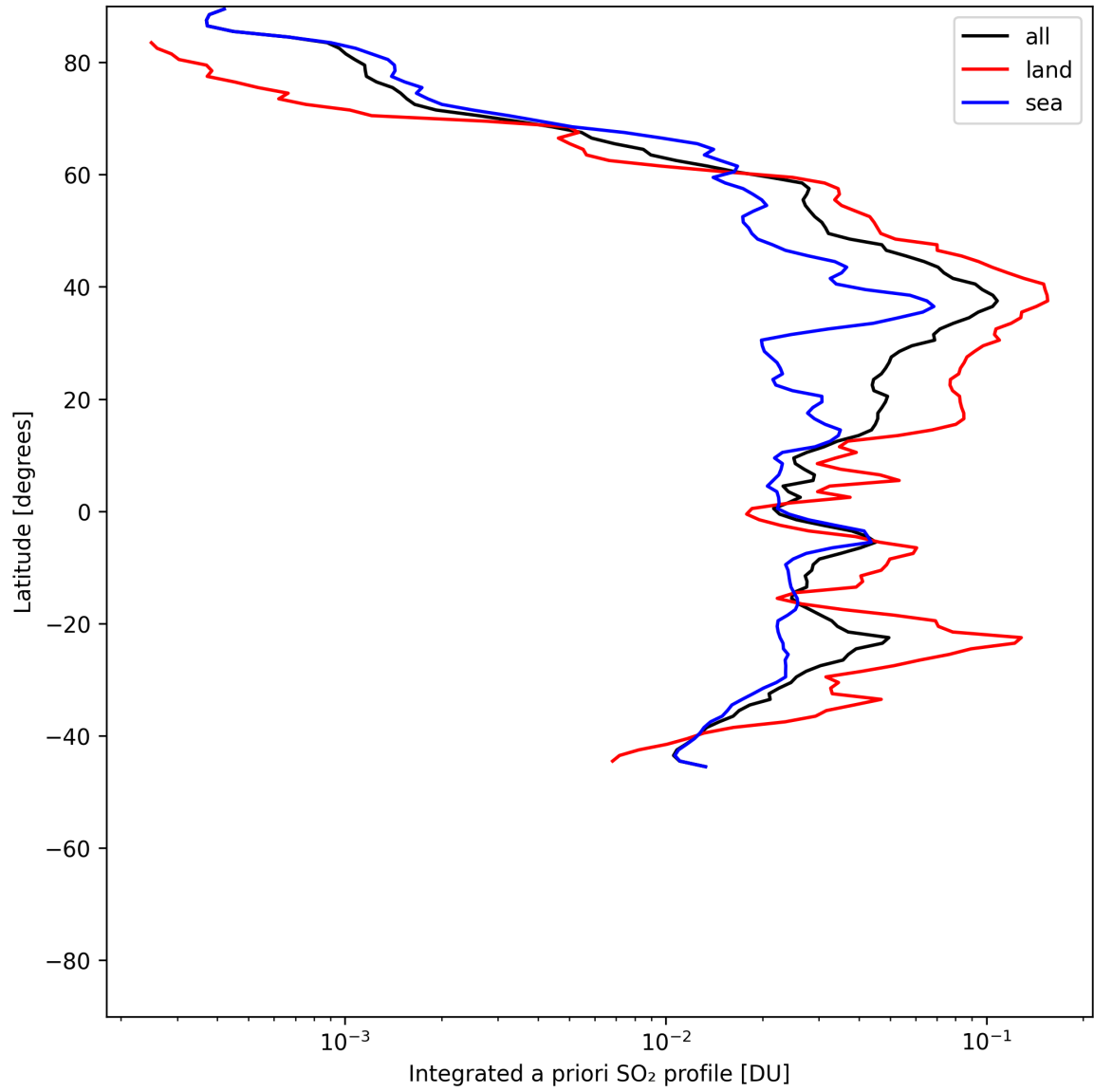


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-06-24 to 2025-06-25.

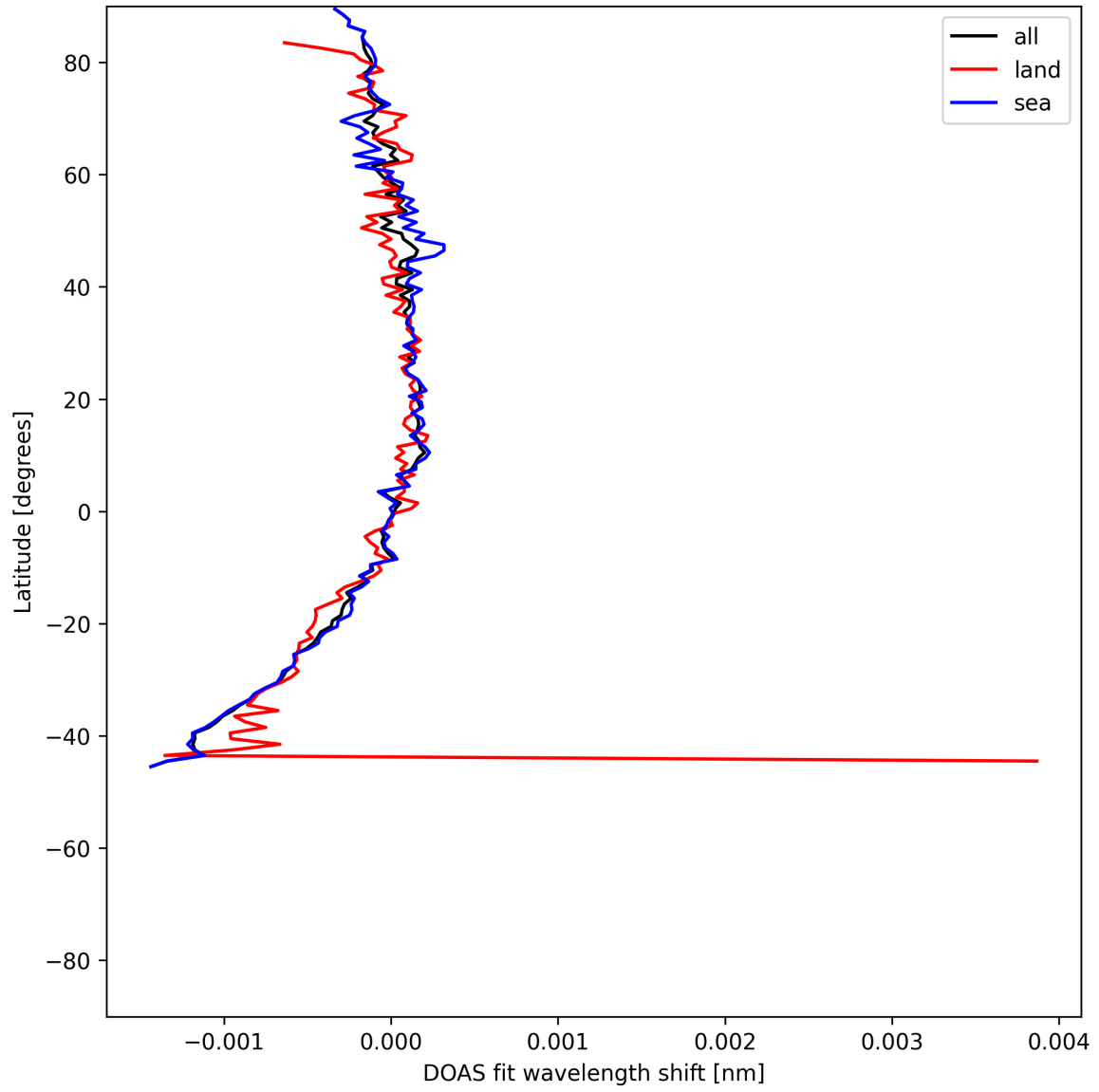


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-06-24 to 2025-06-25.

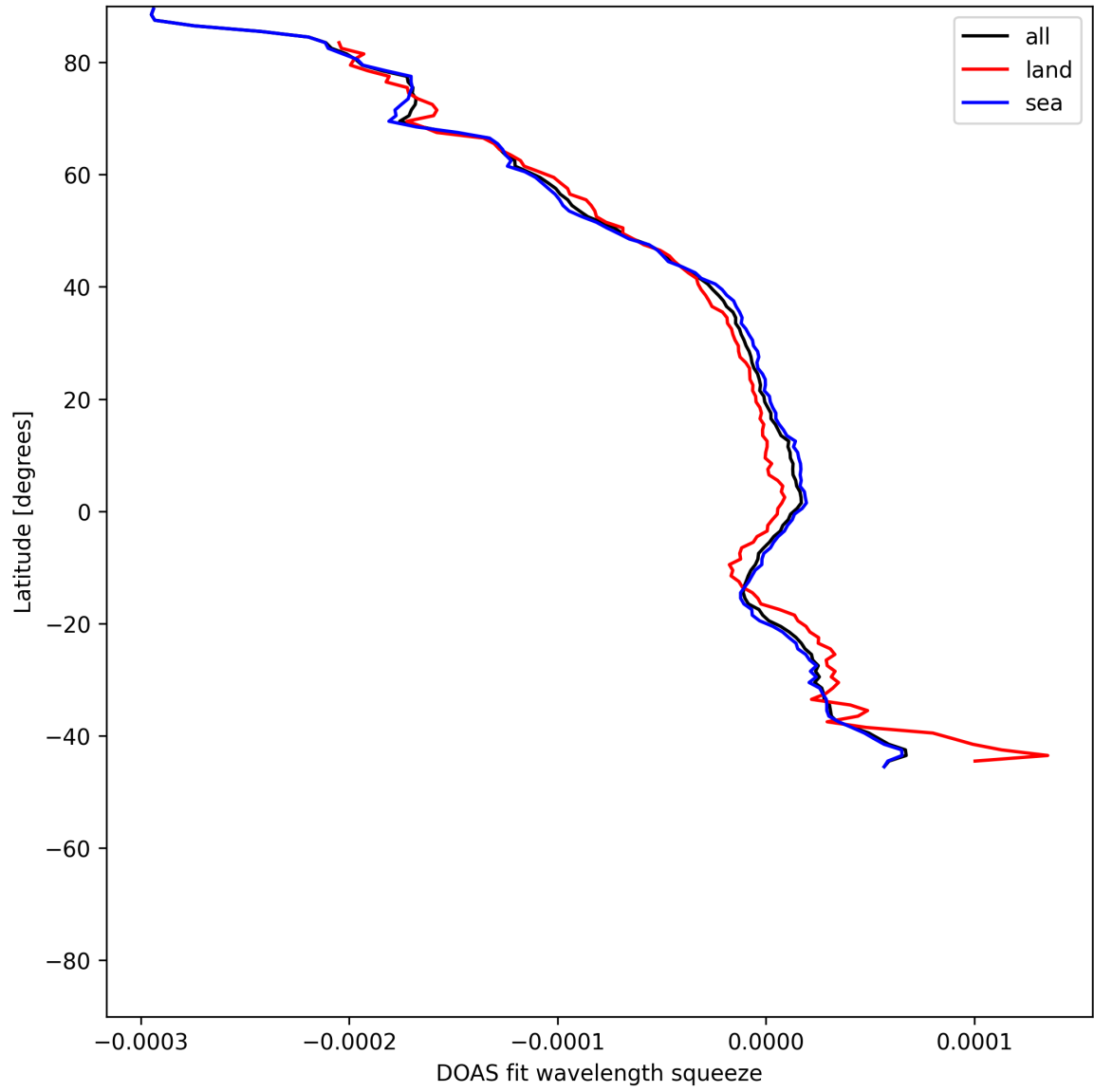


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-06-24 to 2025-06-25.

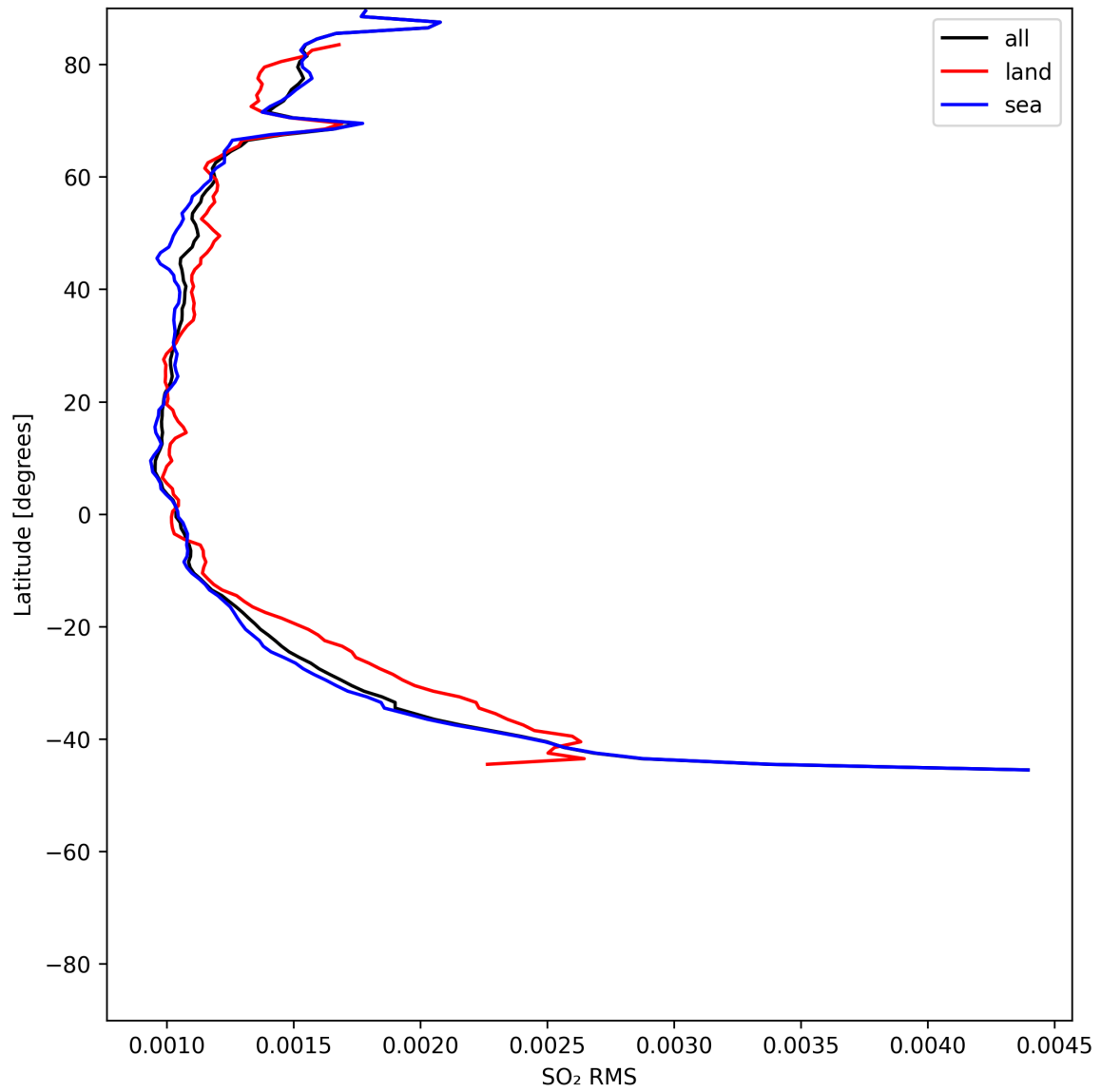


Figure 52: Zonal average of “SO₂ RMS” for 2025-06-24 to 2025-06-25.

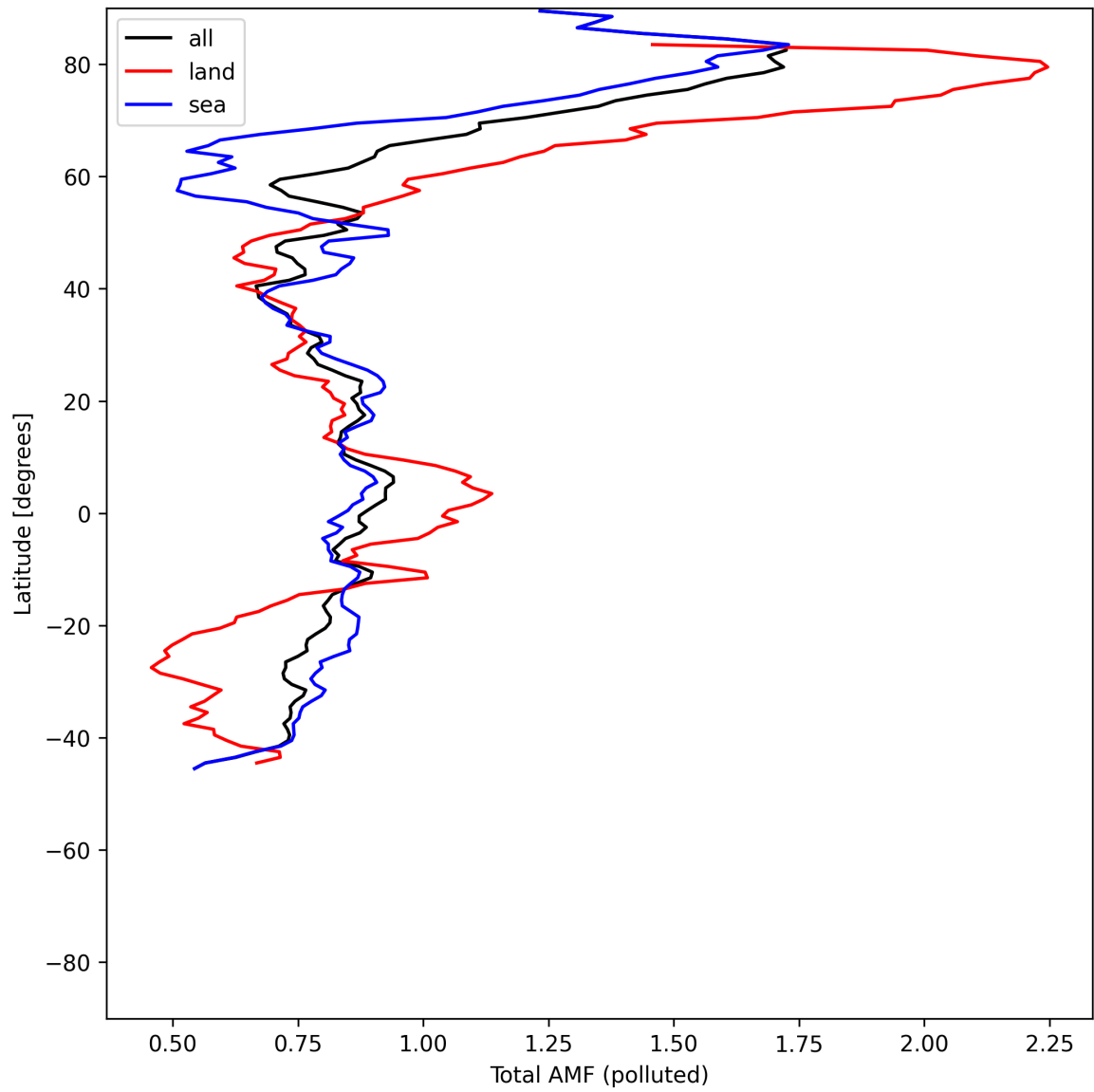


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-06-24 to 2025-06-25.

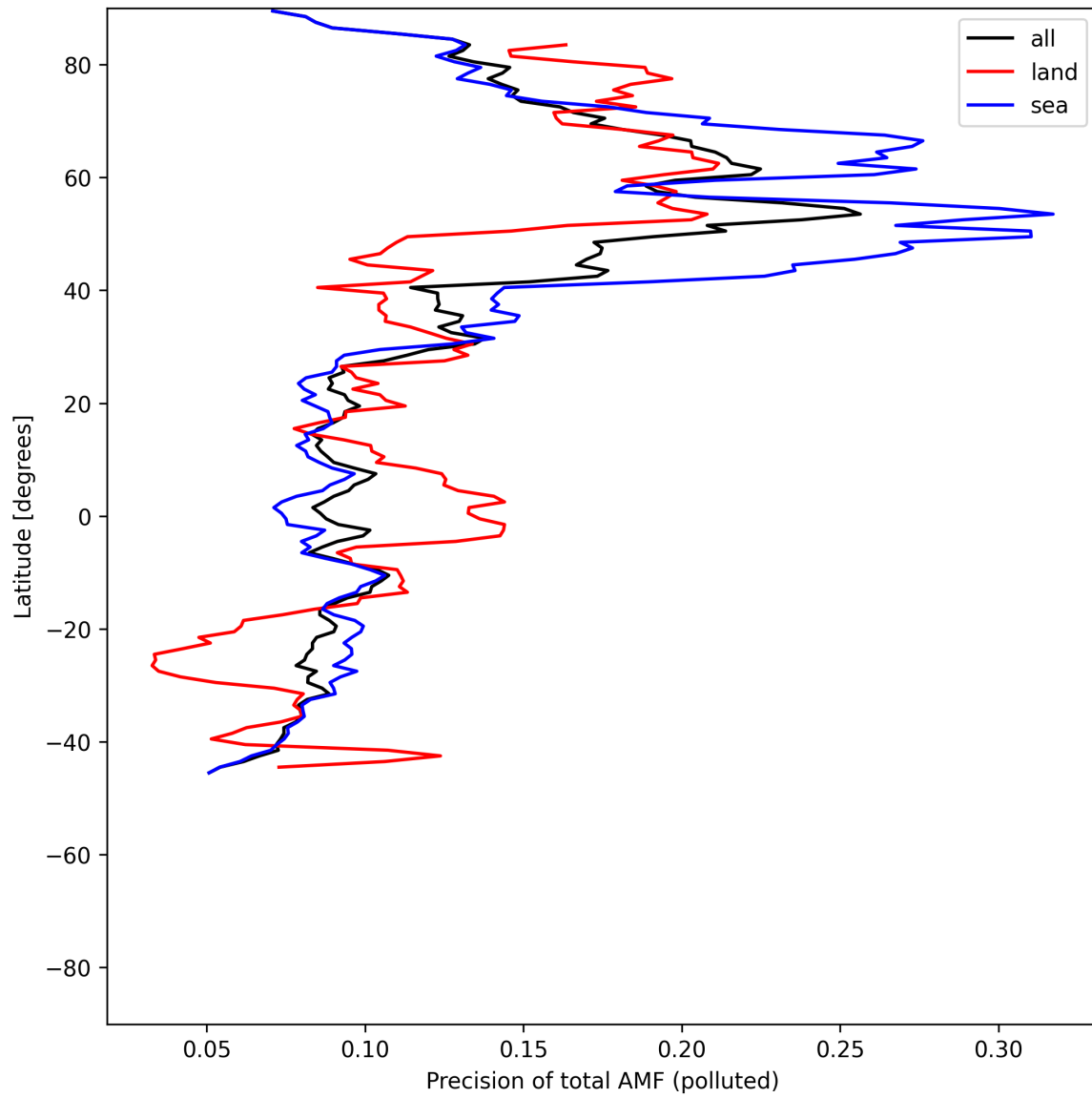


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-06-24 to 2025-06-25.

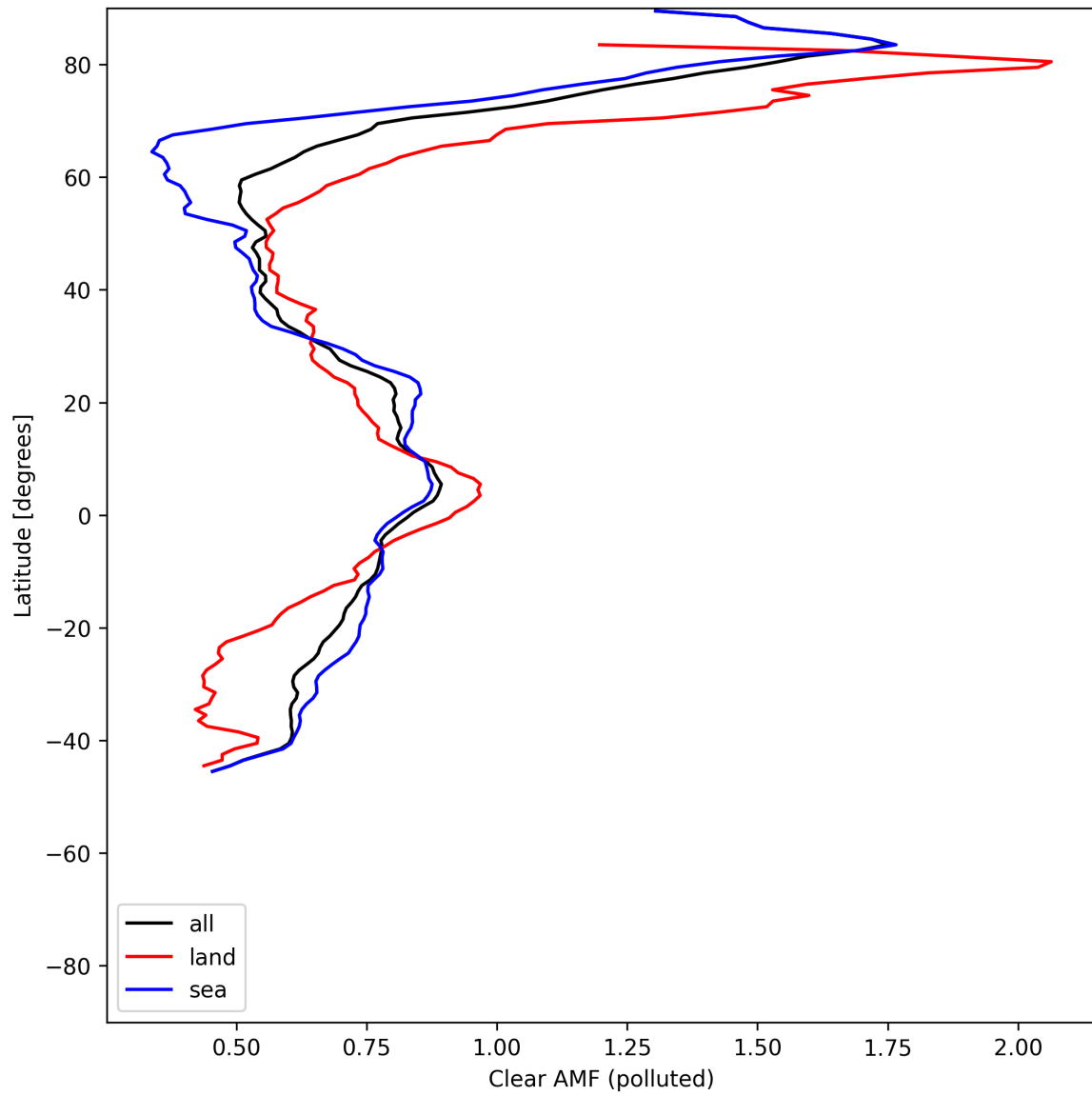


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-06-24 to 2025-06-25.

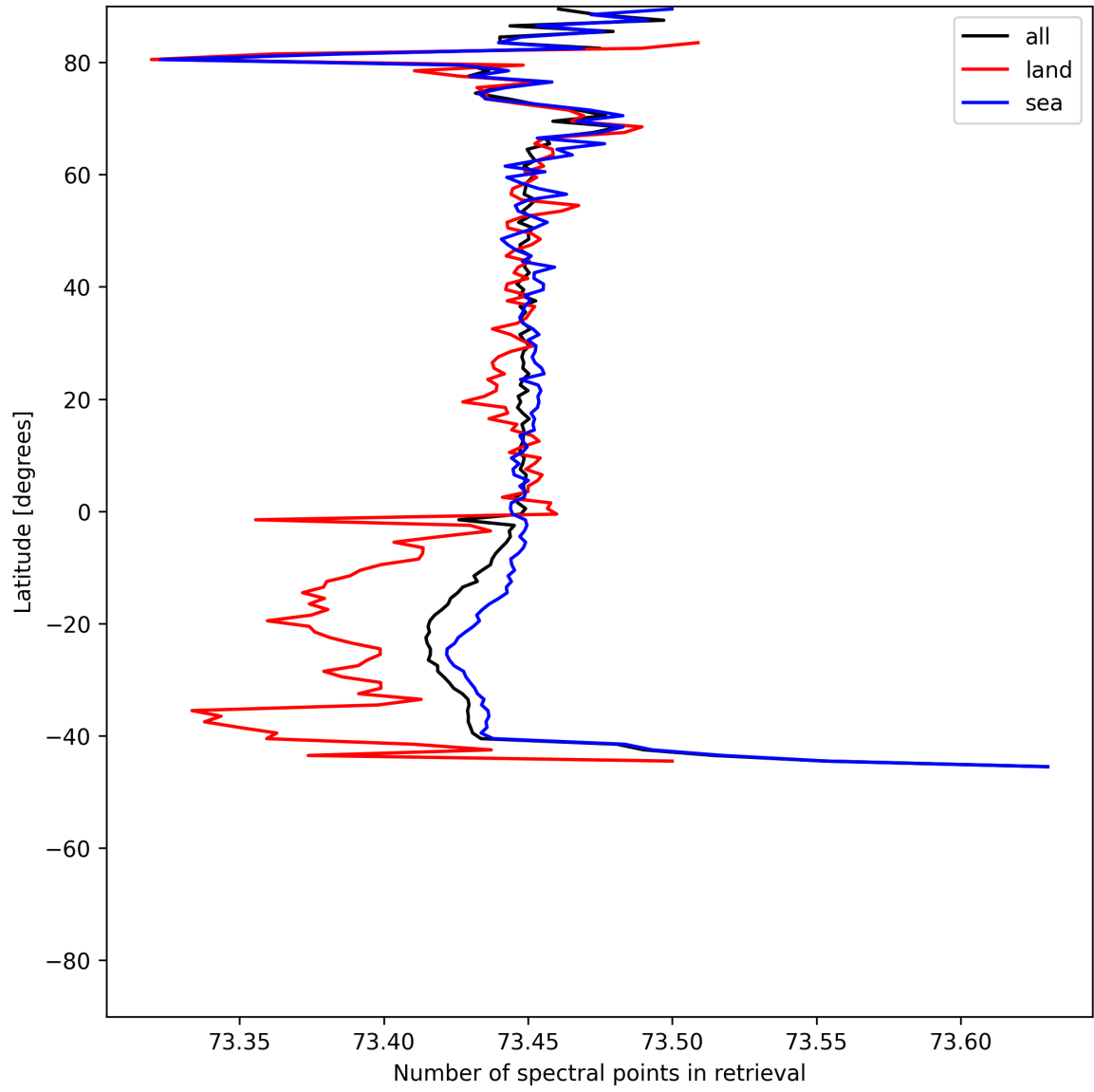


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-06-24 to 2025-06-25.

8 Histograms

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

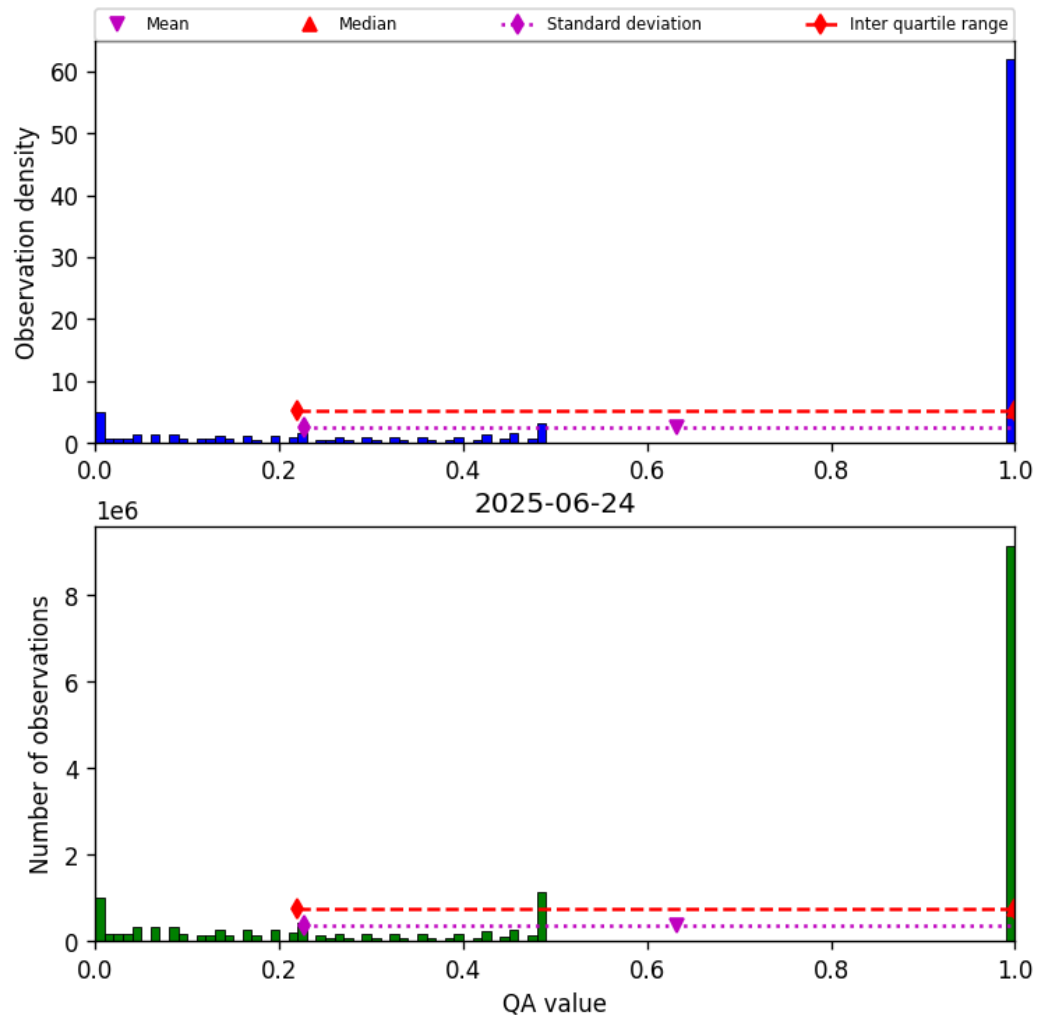


Figure 57: Histogram of “QA value” for 2025-06-24 to 2025-06-25

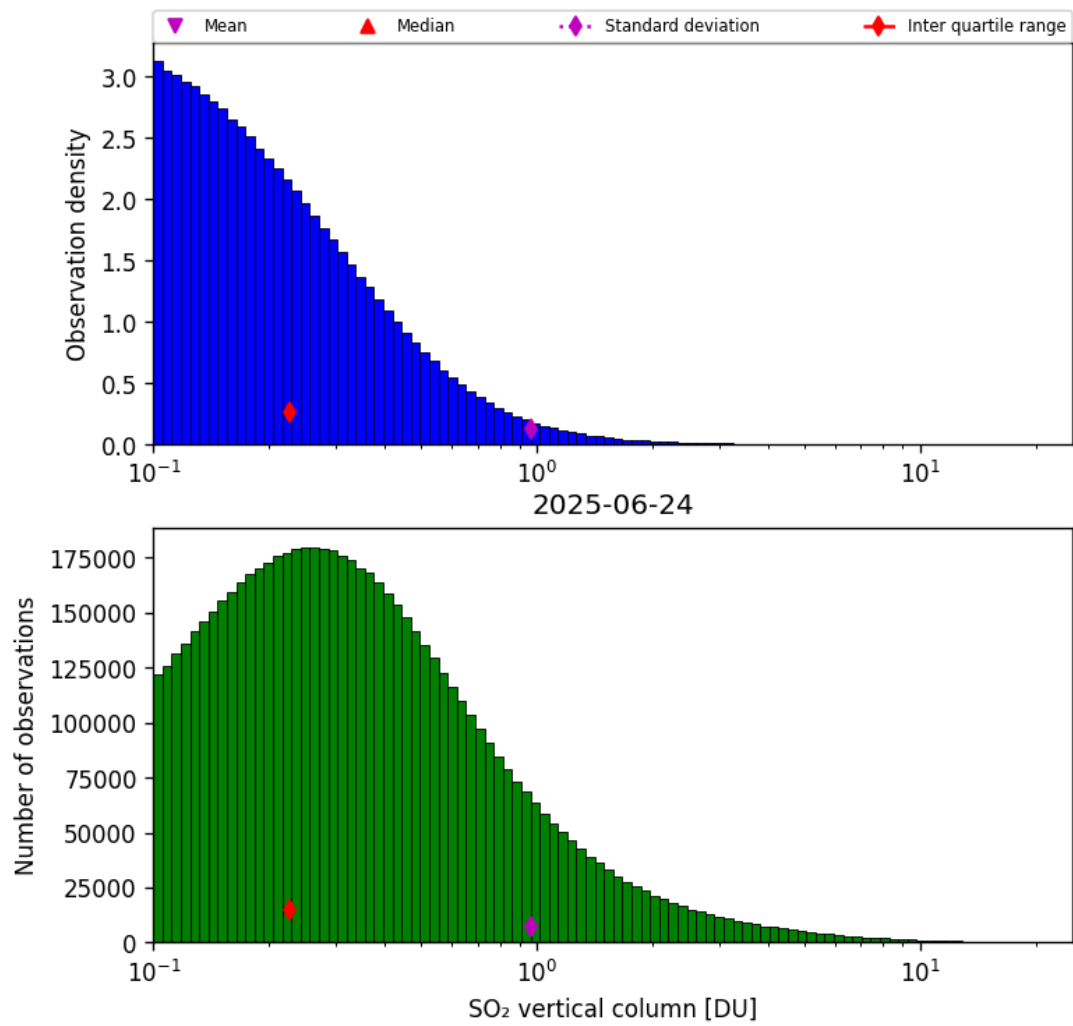


Figure 58: Histogram of “SO₂ vertical column” for 2025-06-24 to 2025-06-25

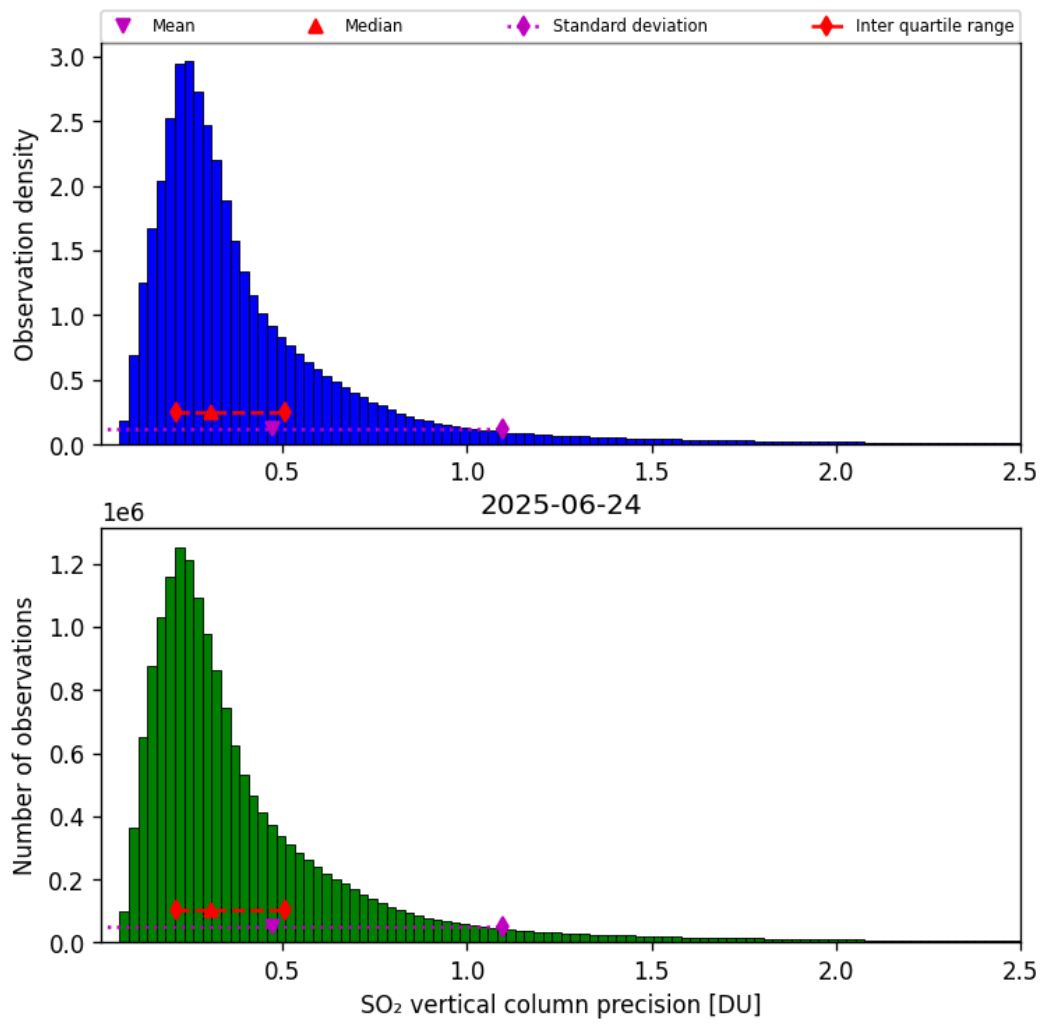


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-06-24 to 2025-06-25

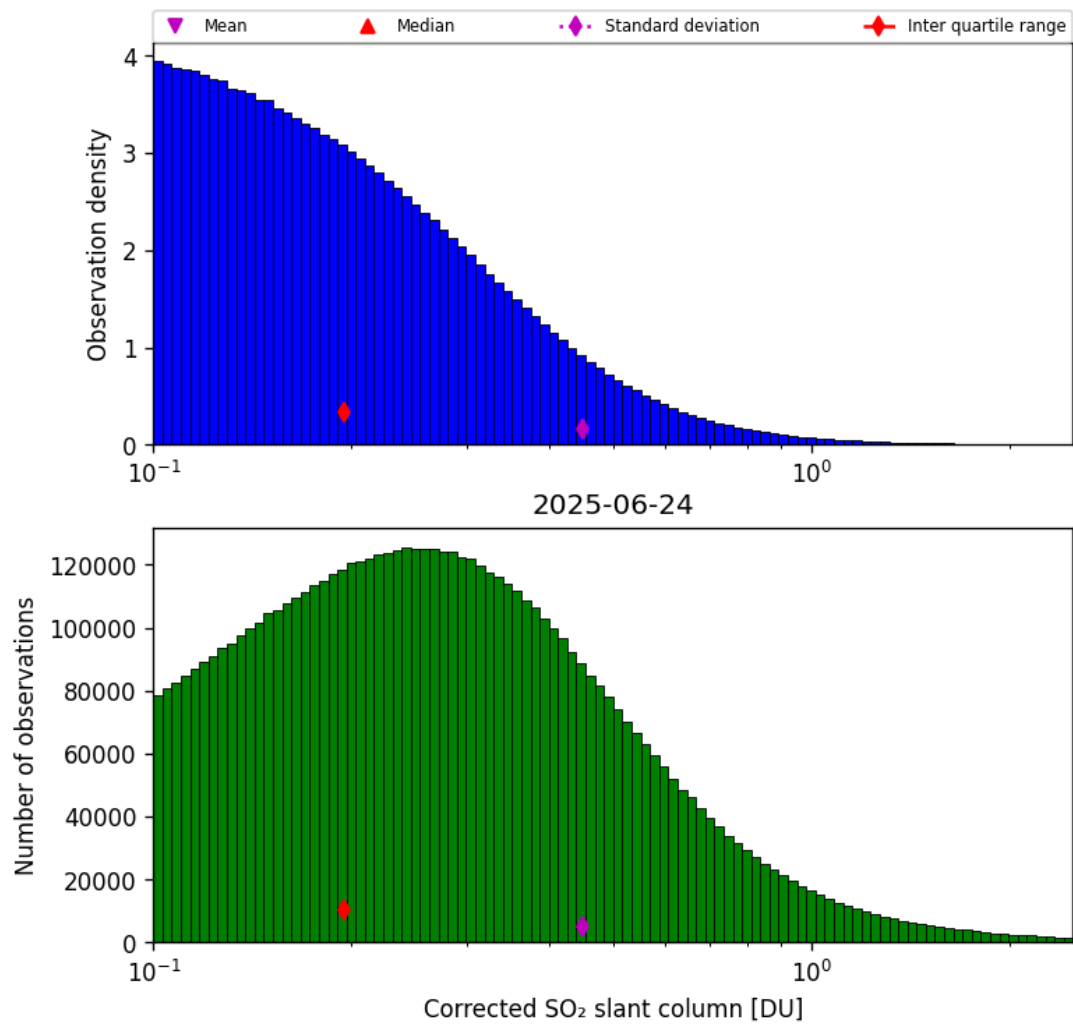


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-06-24 to 2025-06-25

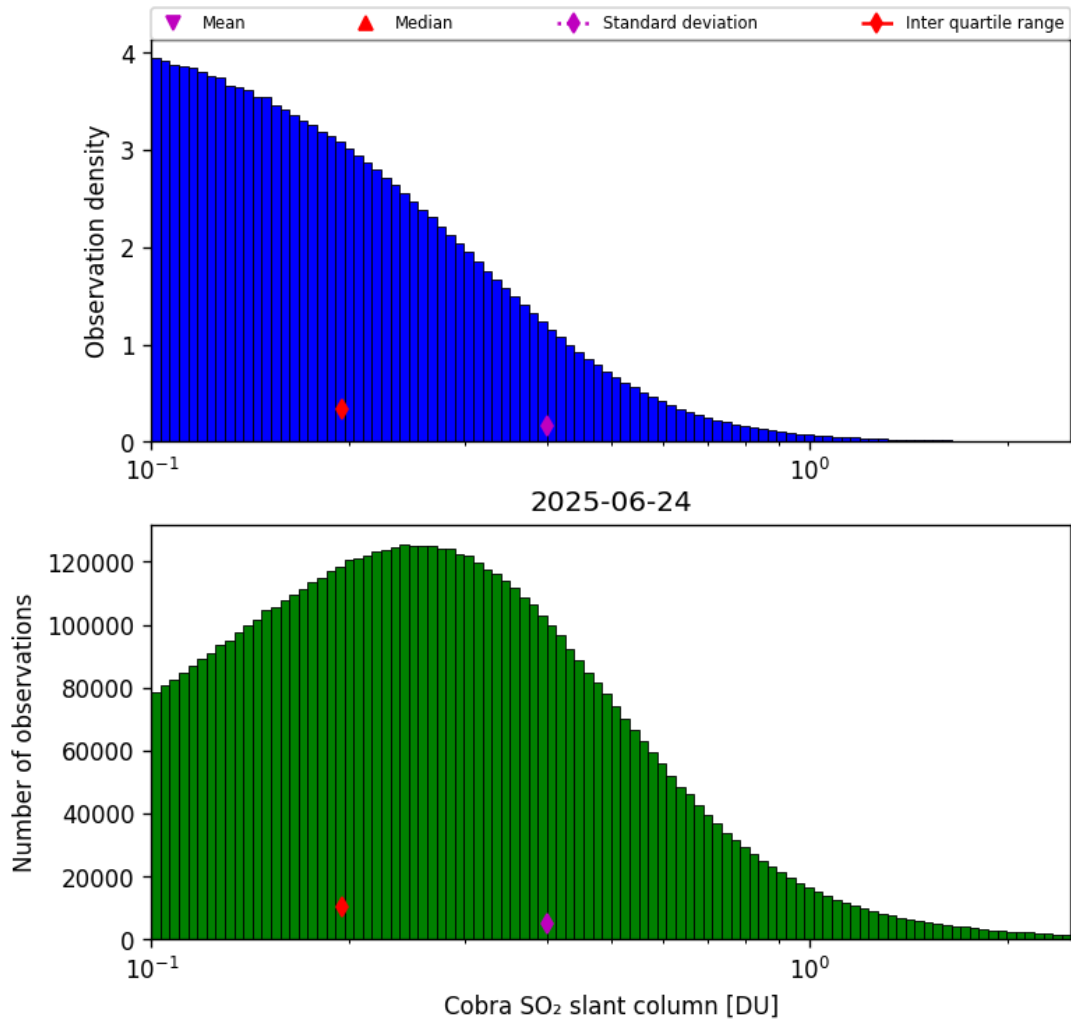


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-06-24 to 2025-06-25

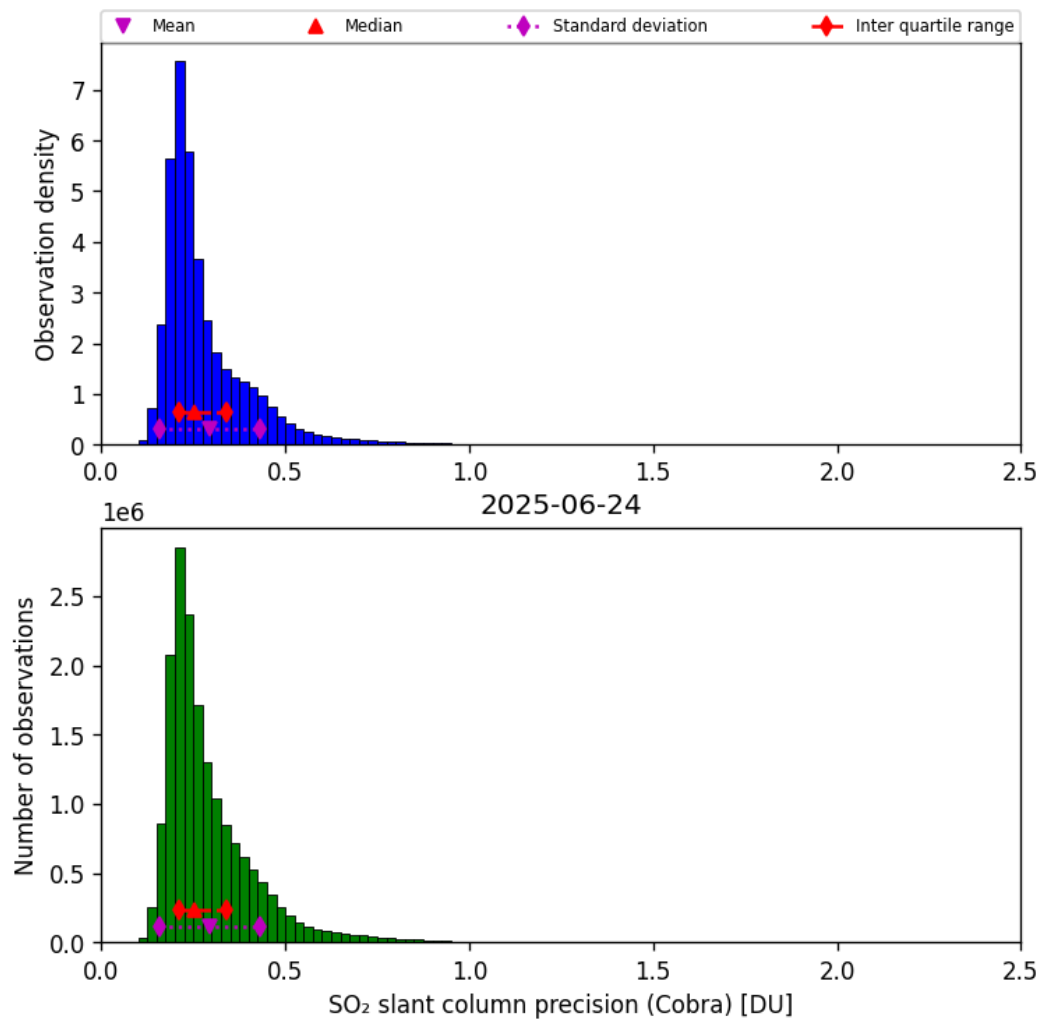


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-06-24 to 2025-06-25

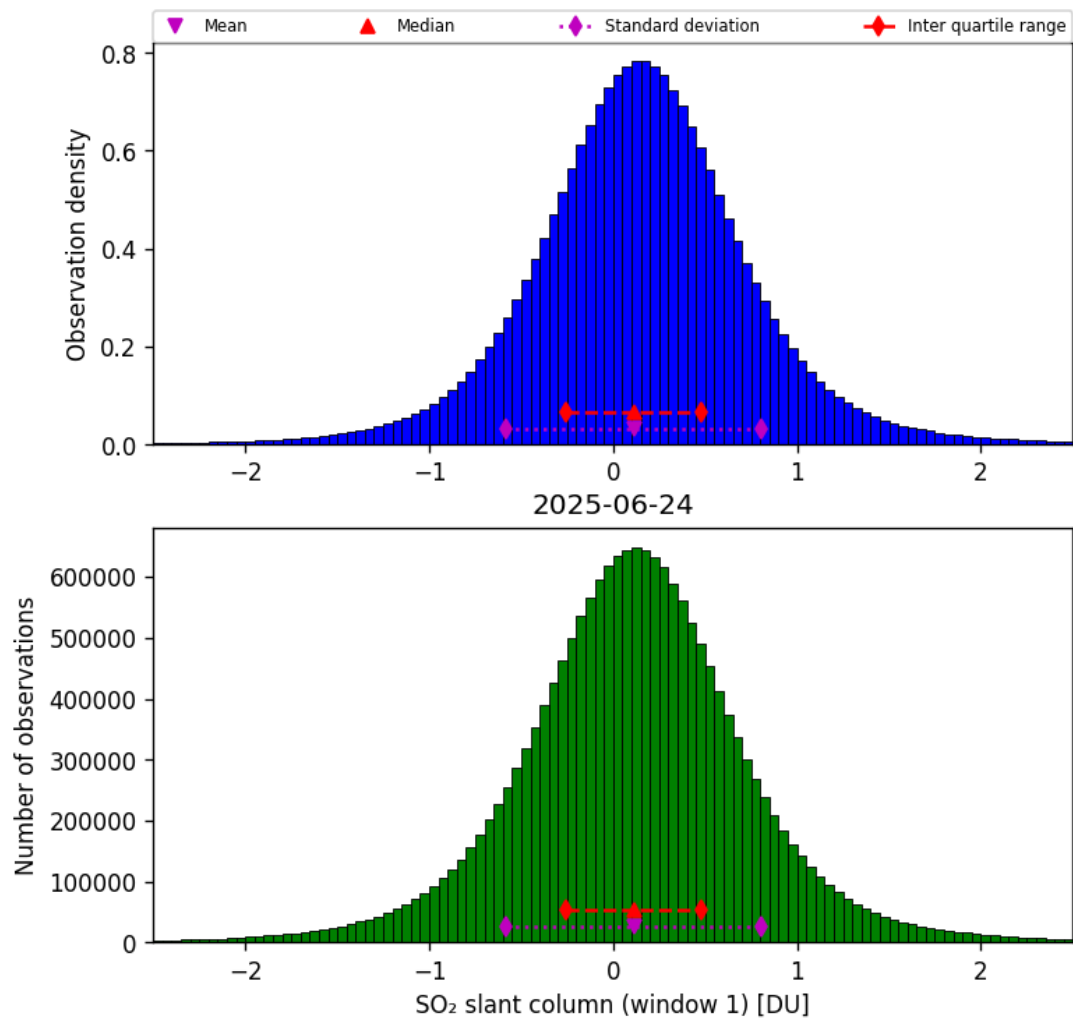


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-06-24 to 2025-06-25

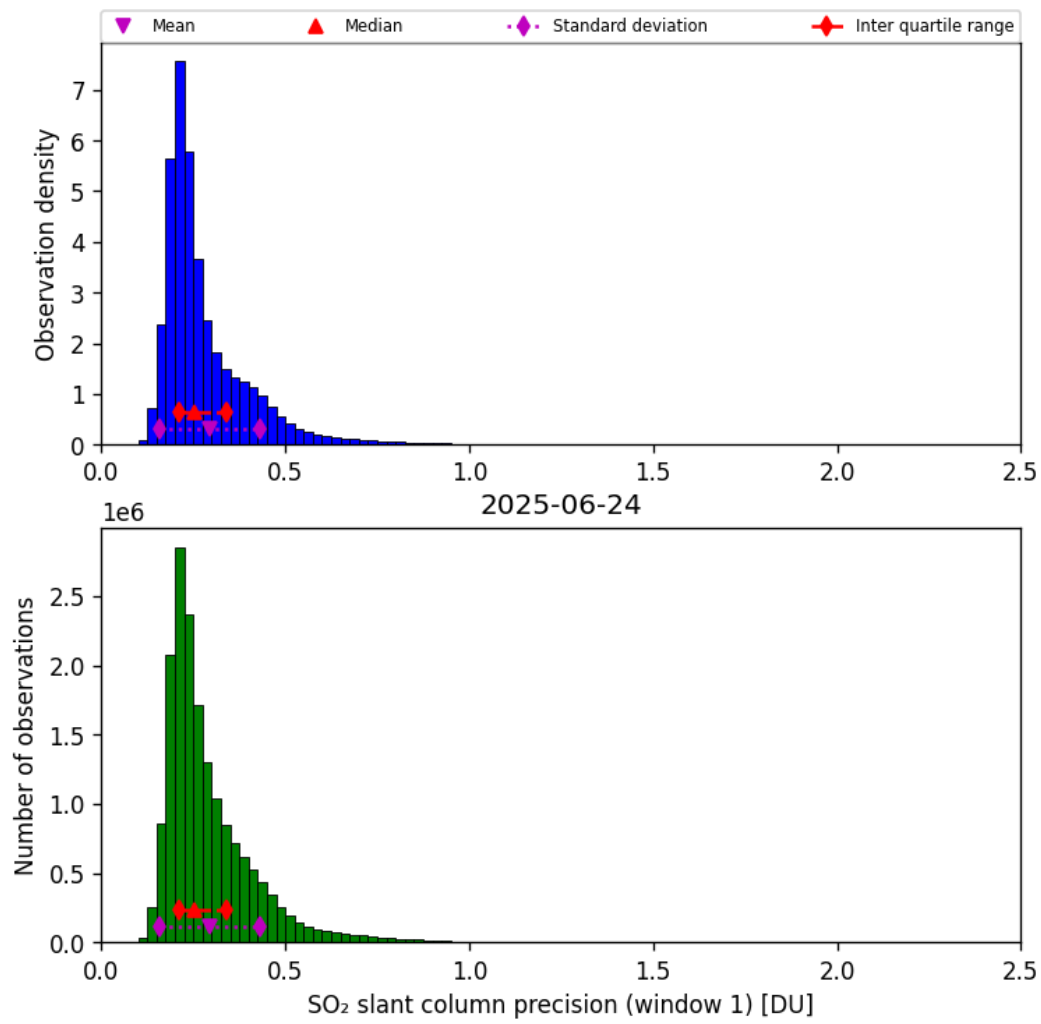


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-06-24 to 2025-06-25

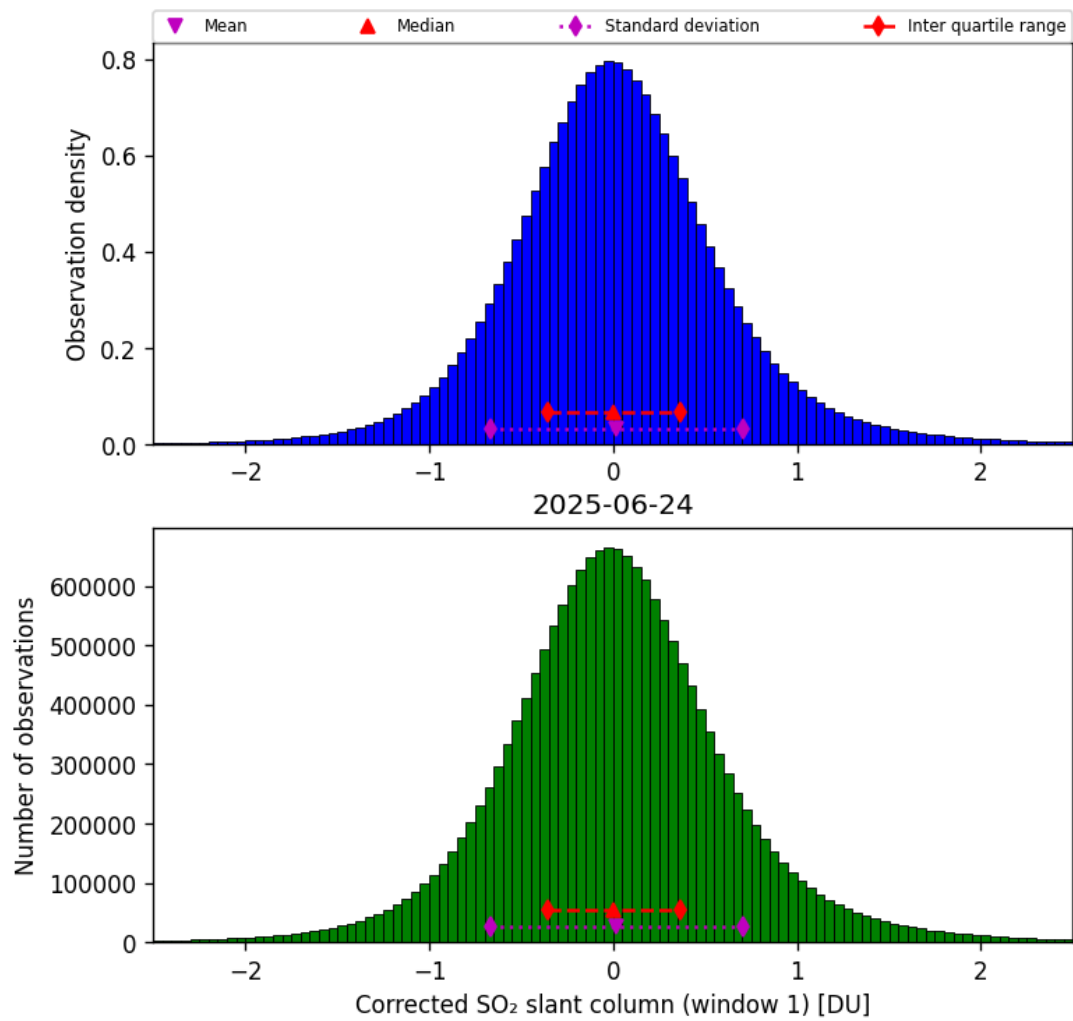


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-06-24 to 2025-06-25

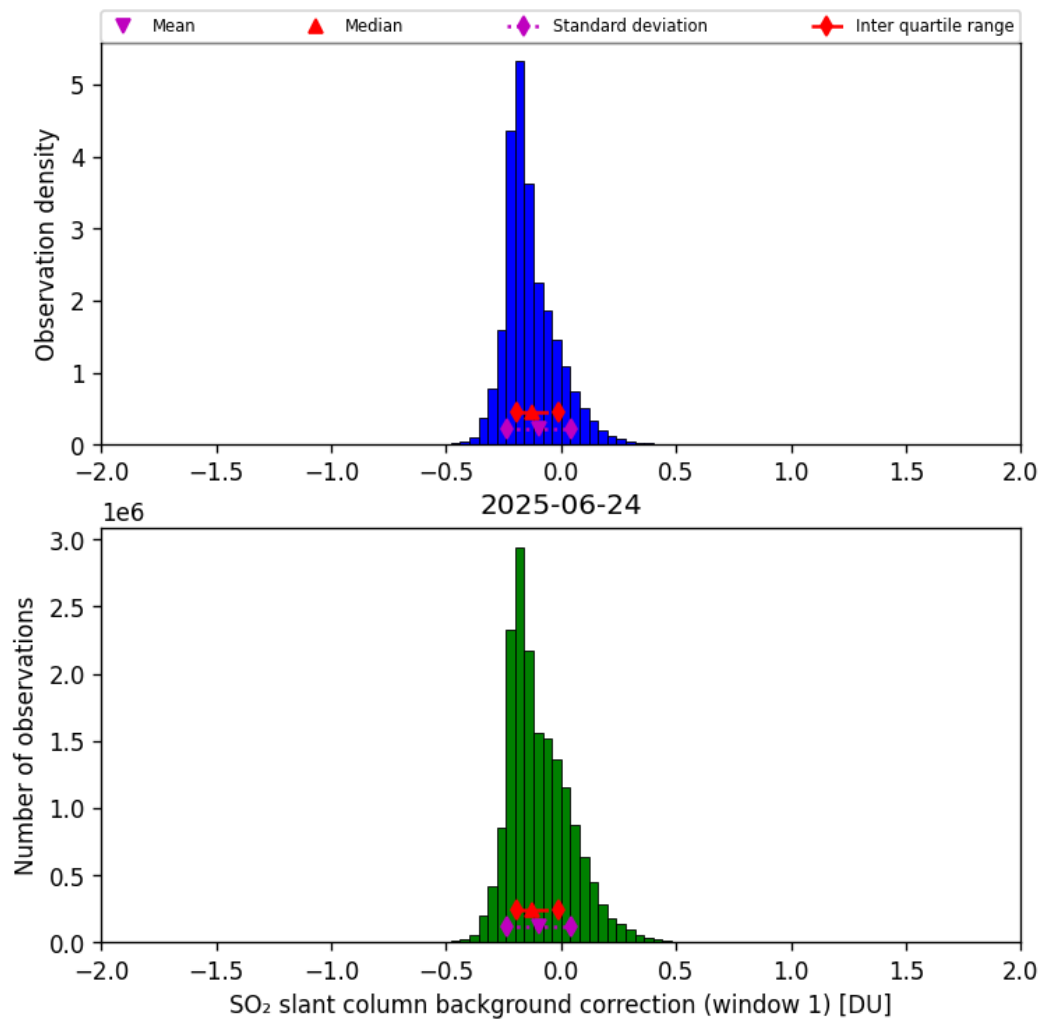


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-06-24 to 2025-06-25

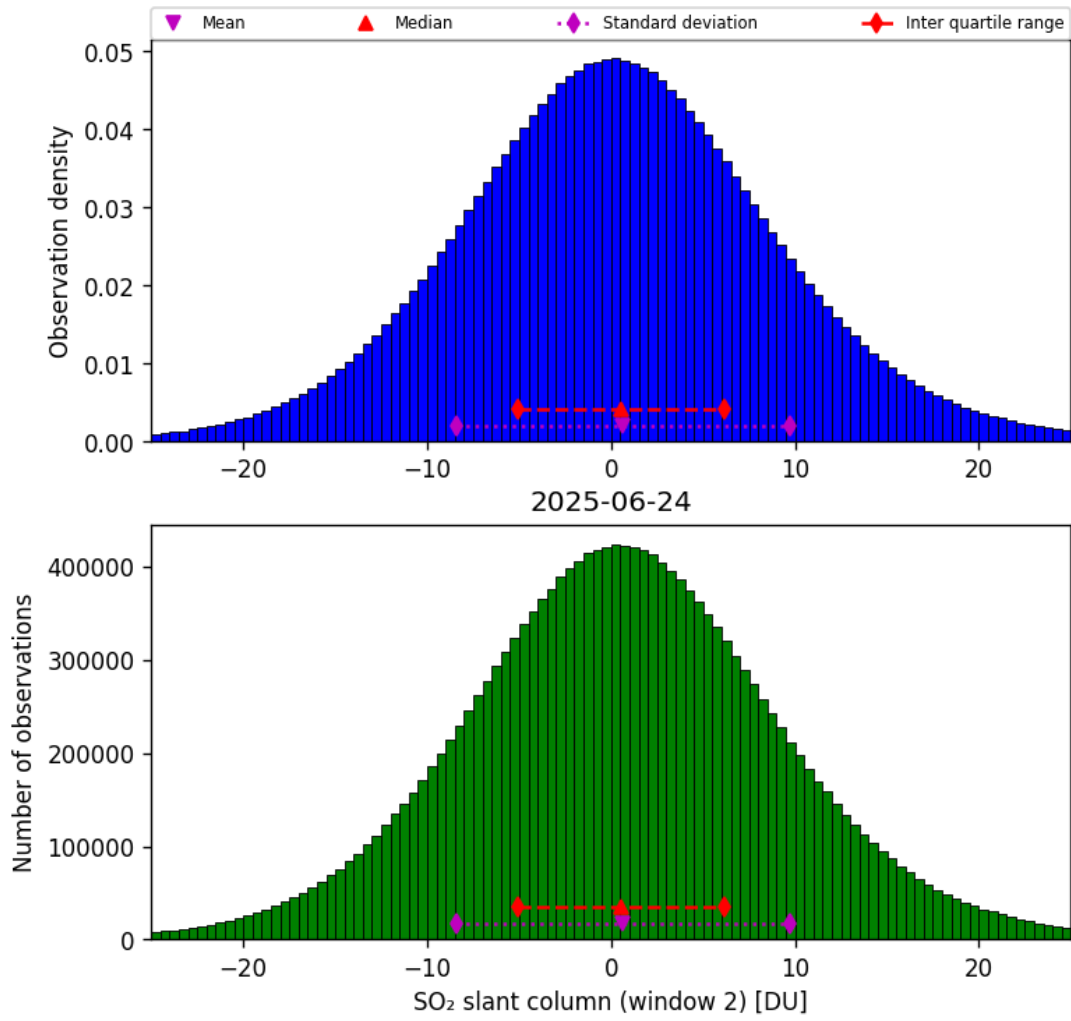


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-06-24 to 2025-06-25

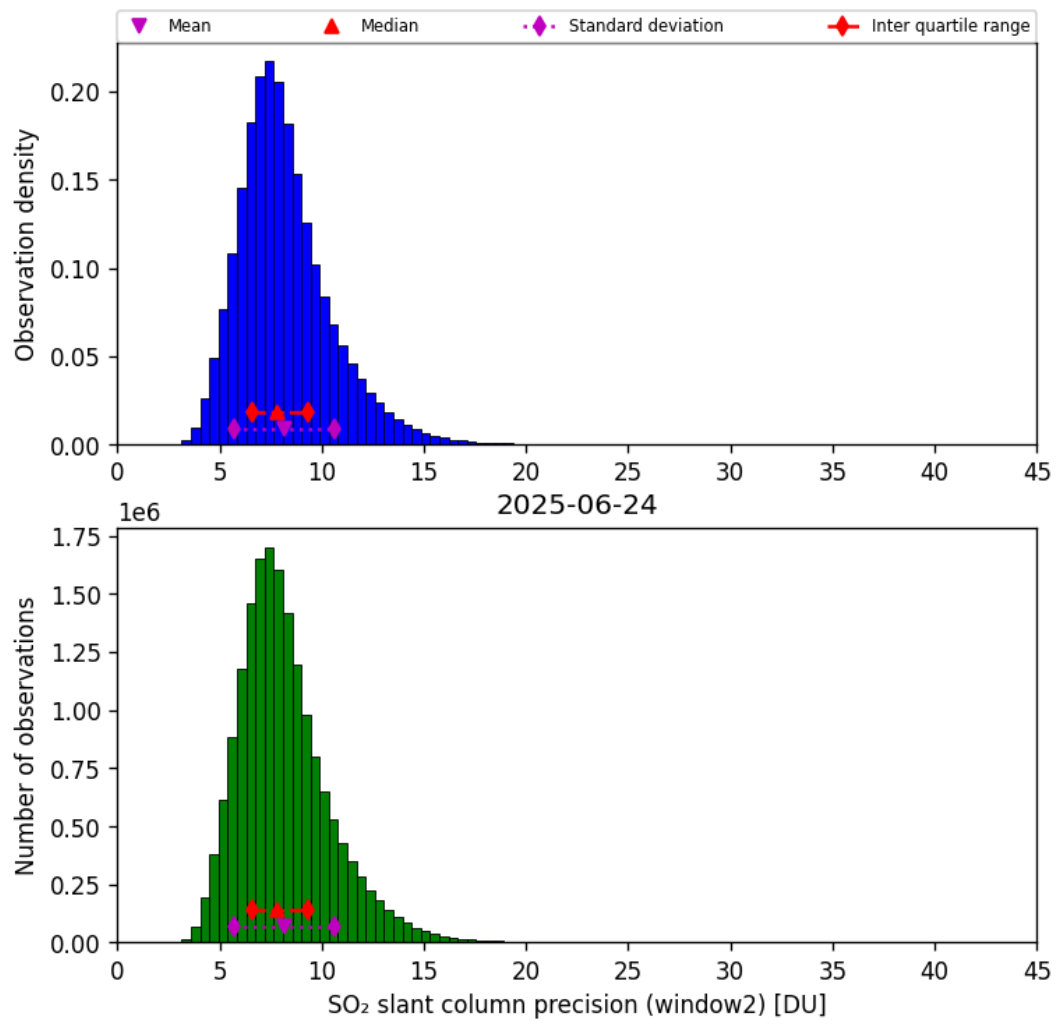


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-06-24 to 2025-06-25

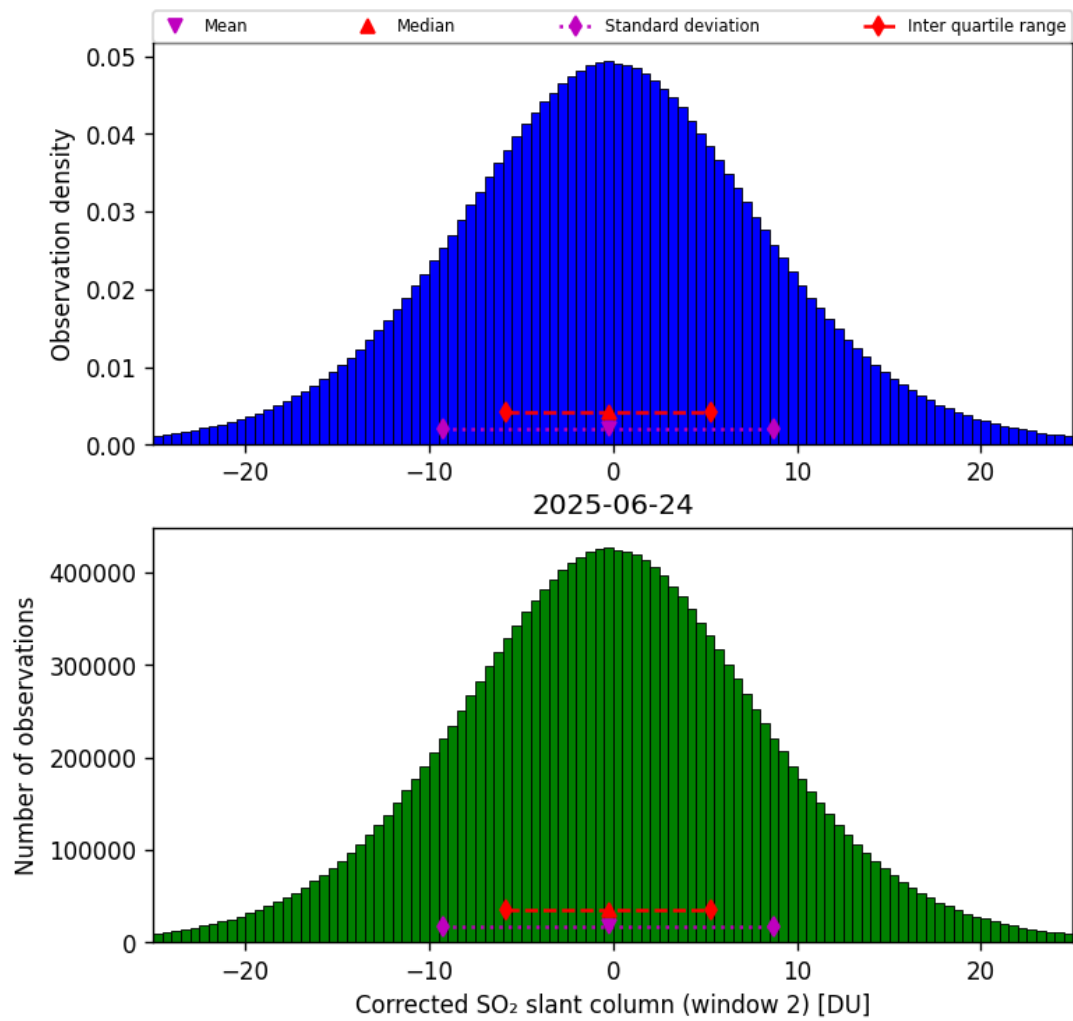


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-06-24 to 2025-06-25

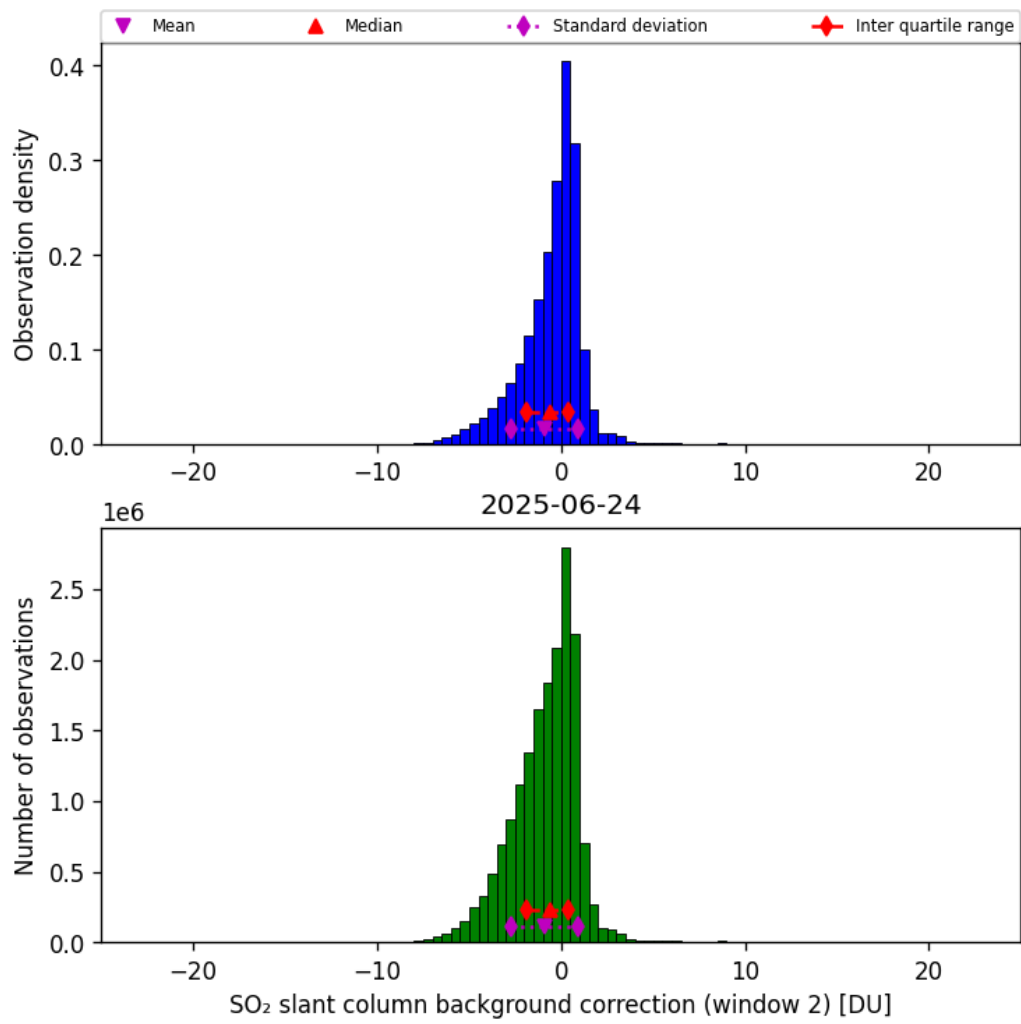


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-06-24 to 2025-06-25

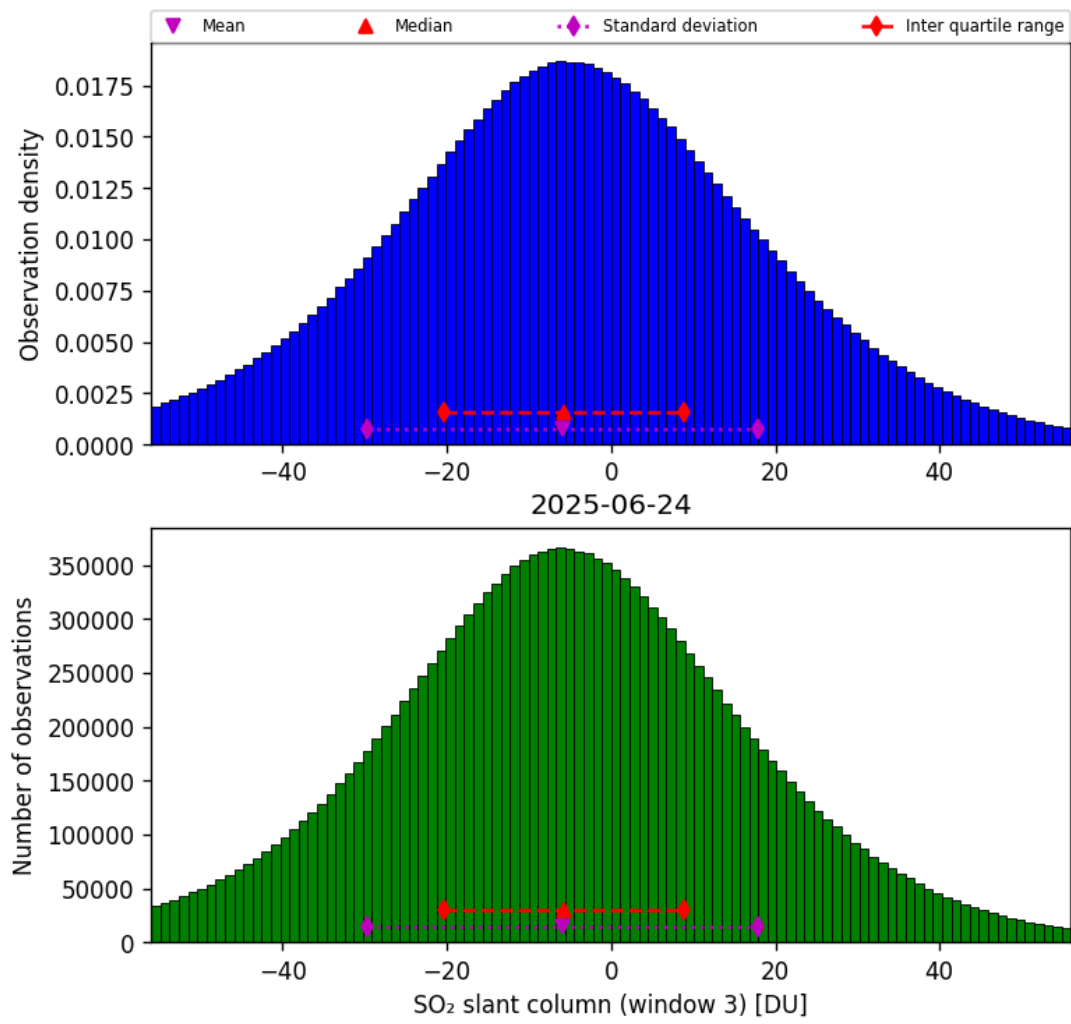


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-06-24 to 2025-06-25

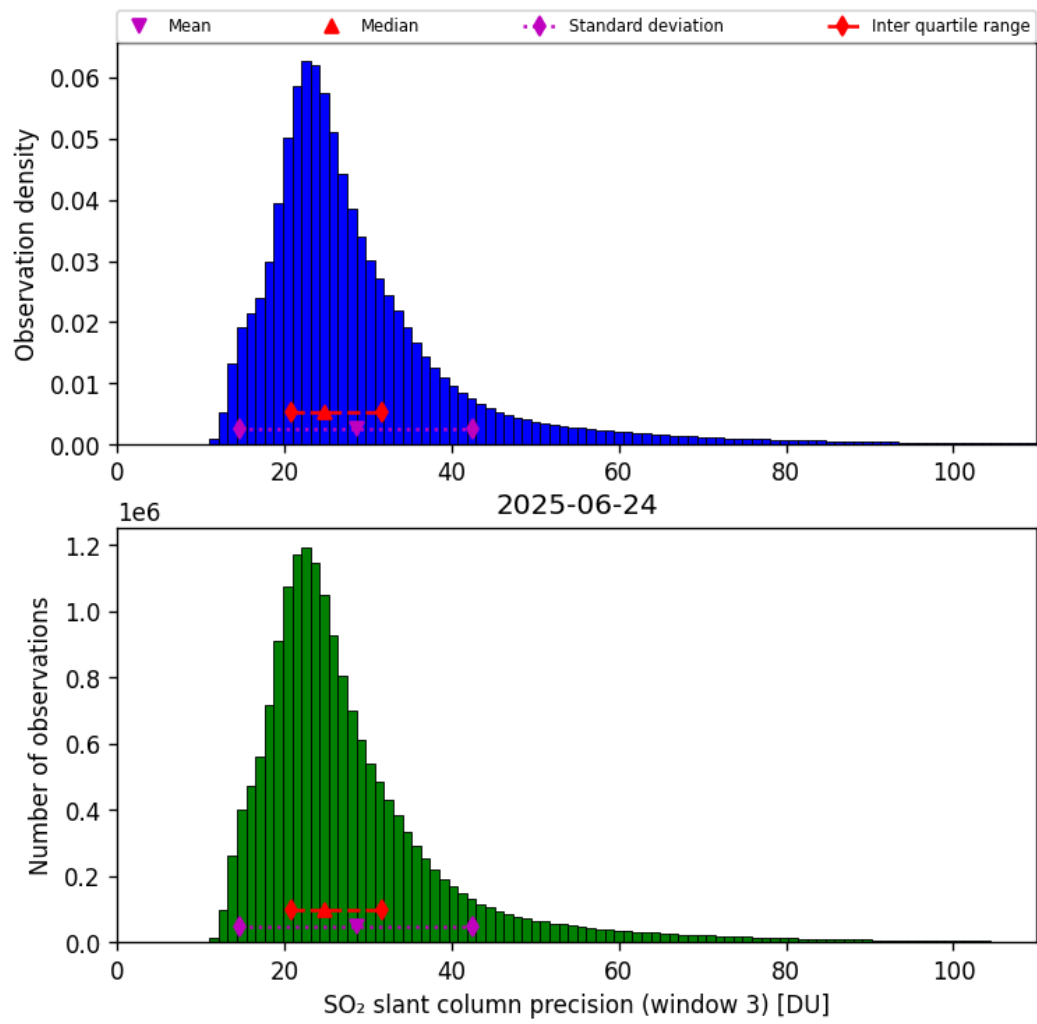


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-06-24 to 2025-06-25

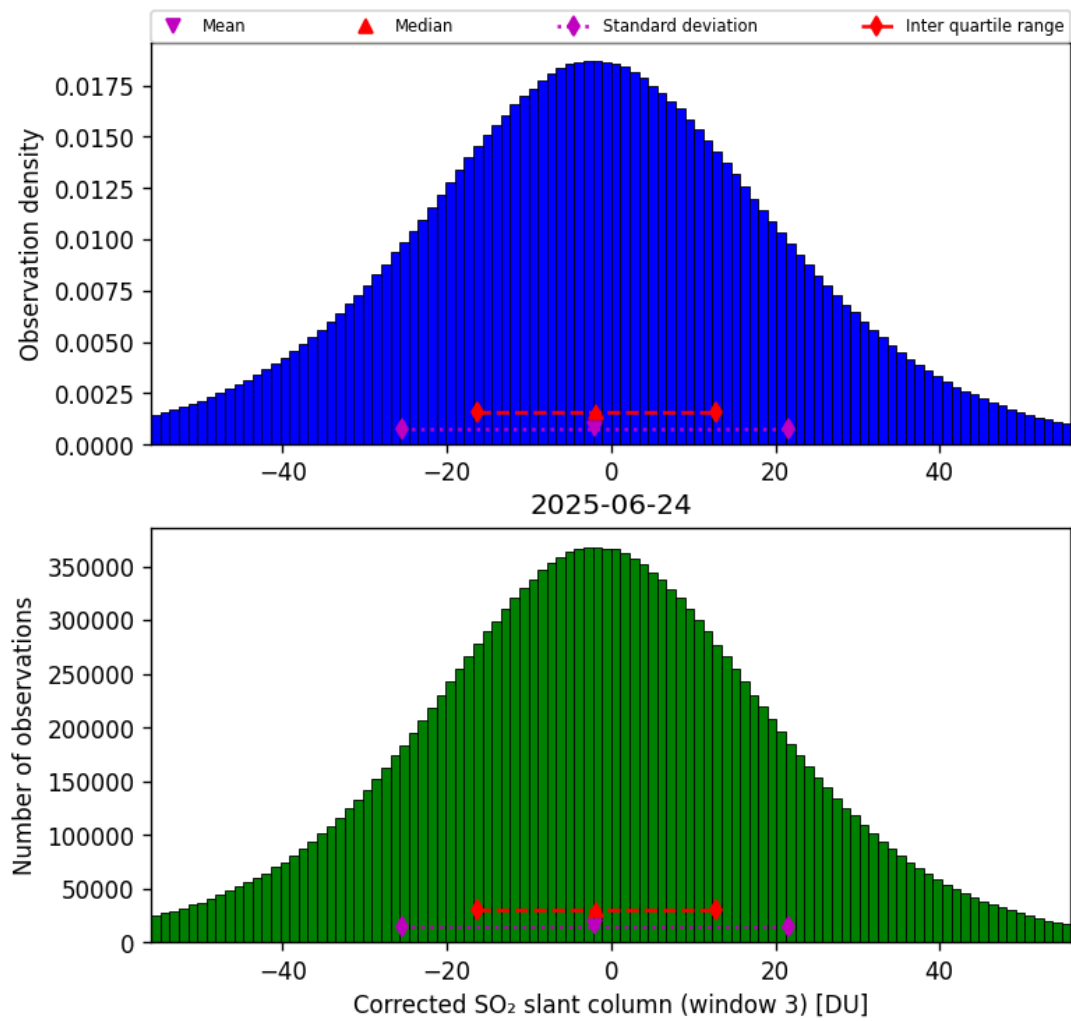


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-06-24 to 2025-06-25

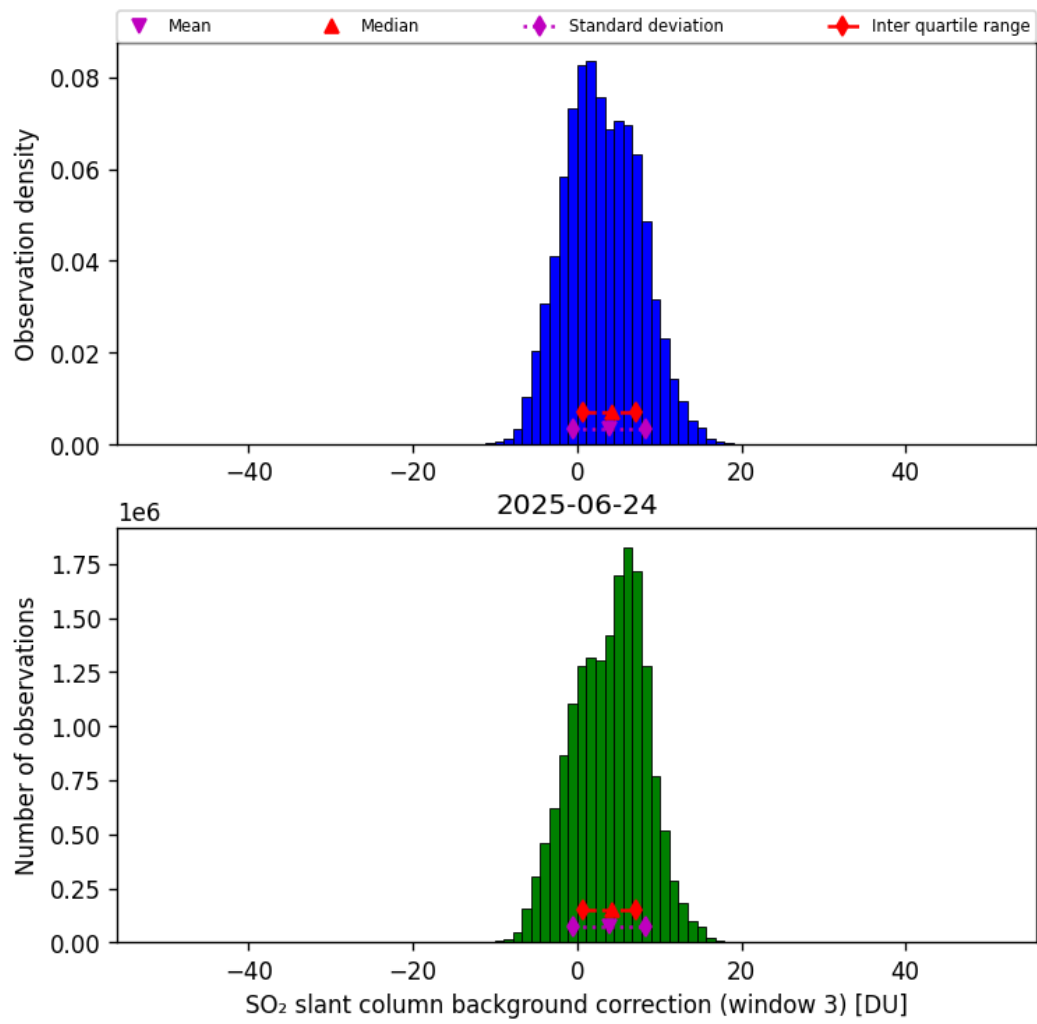


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-06-24 to 2025-06-25

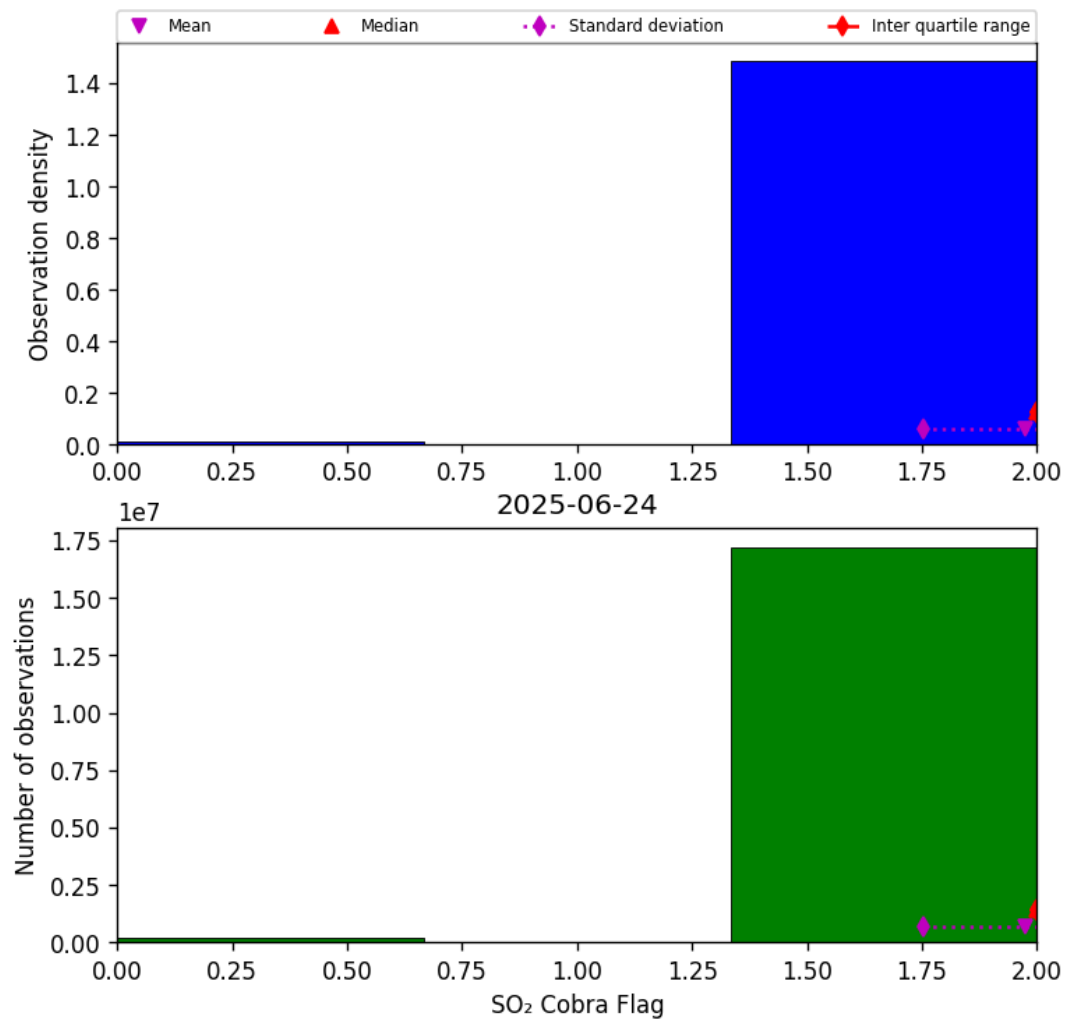


Figure 75: Histogram of "SO₂ Cobra Flag" for 2025-06-24 to 2025-06-25

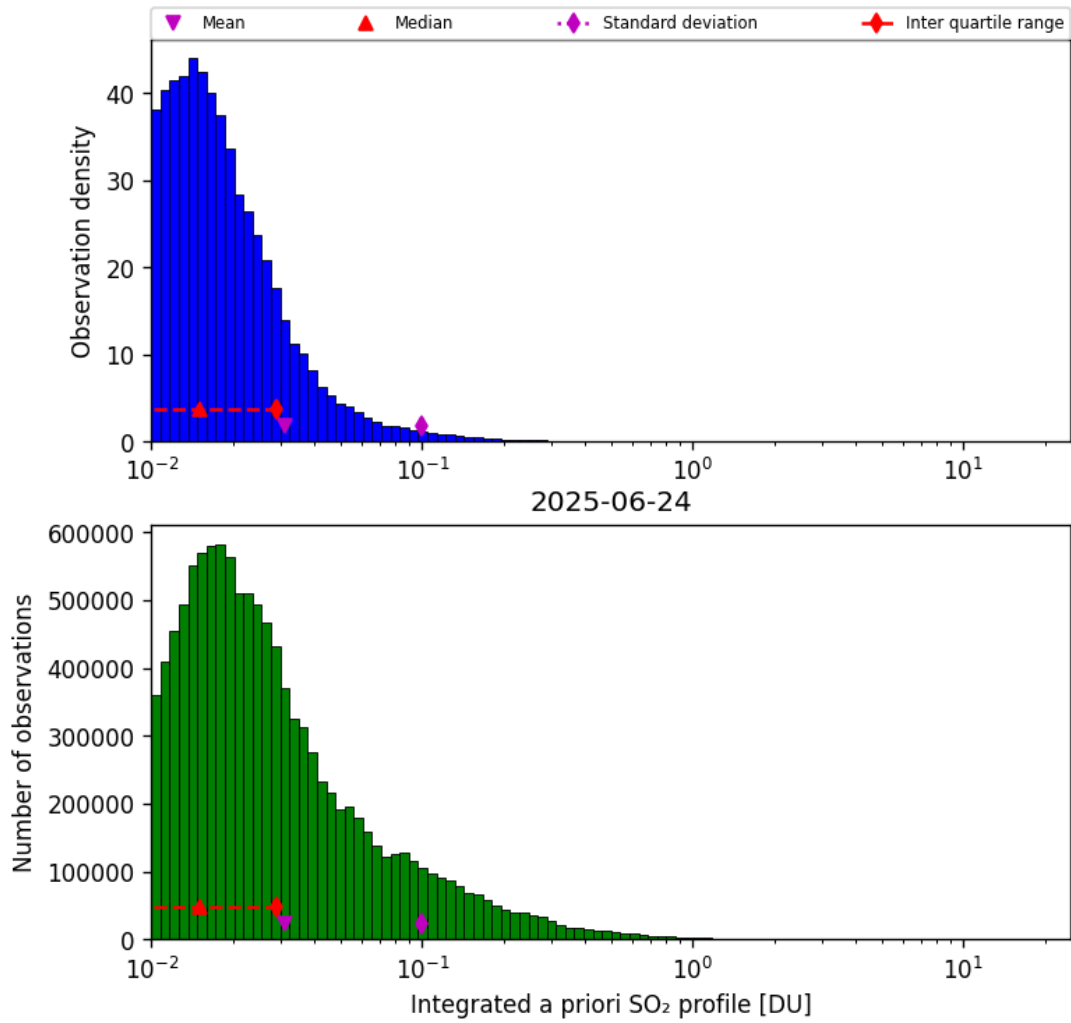


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-06-24 to 2025-06-25

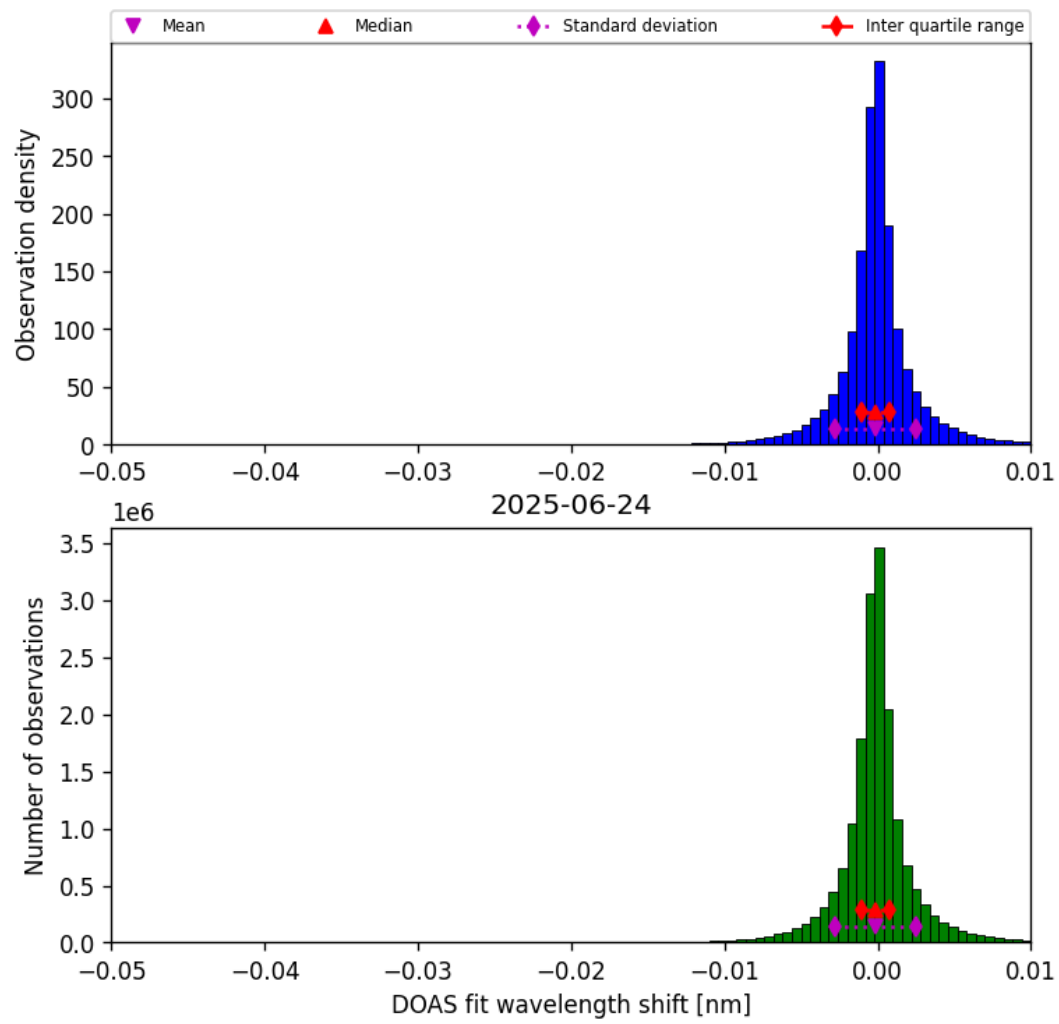


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-06-24 to 2025-06-25

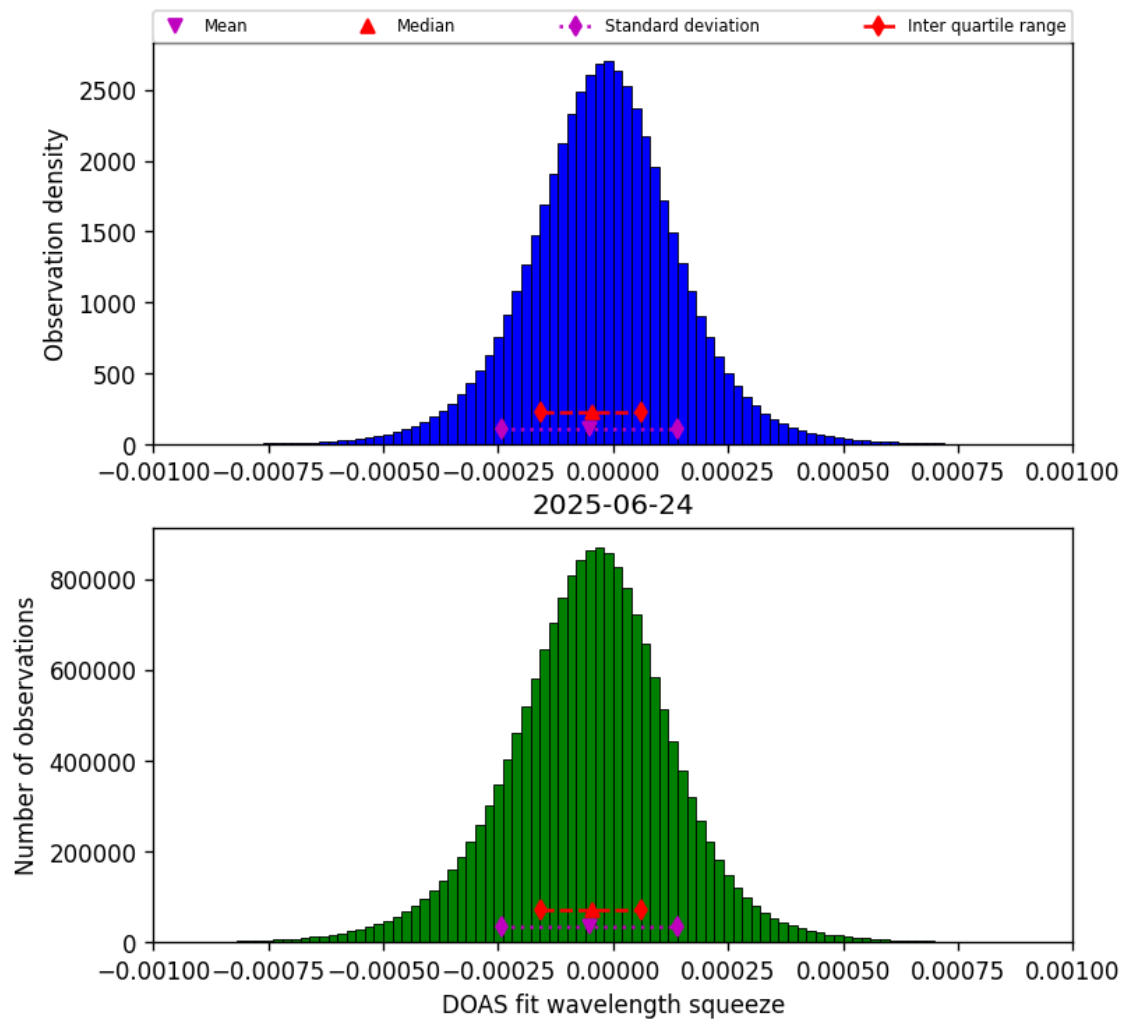


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-06-24 to 2025-06-25

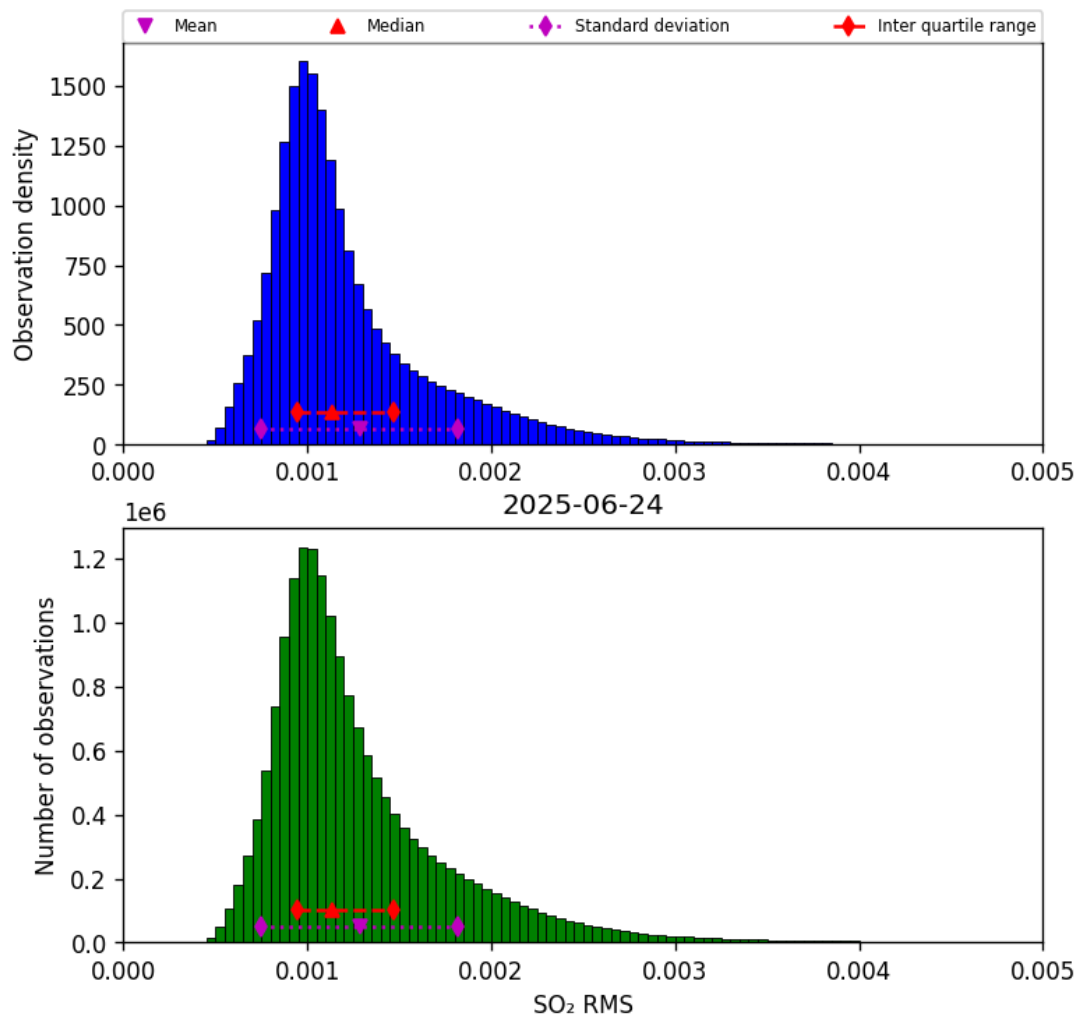


Figure 79: Histogram of “SO₂ RMS” for 2025-06-24 to 2025-06-25

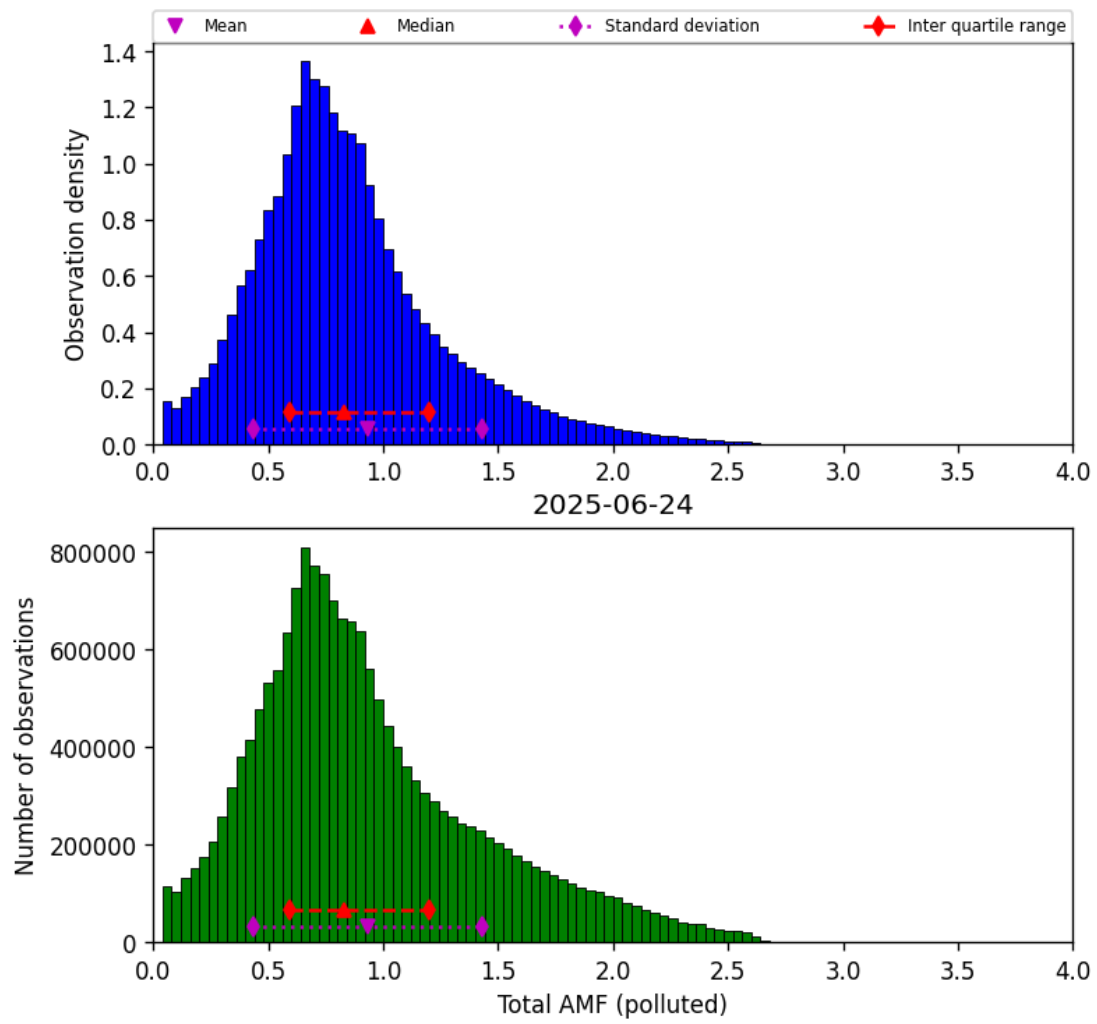


Figure 80: Histogram of “Total AMF (polluted)” for 2025-06-24 to 2025-06-25

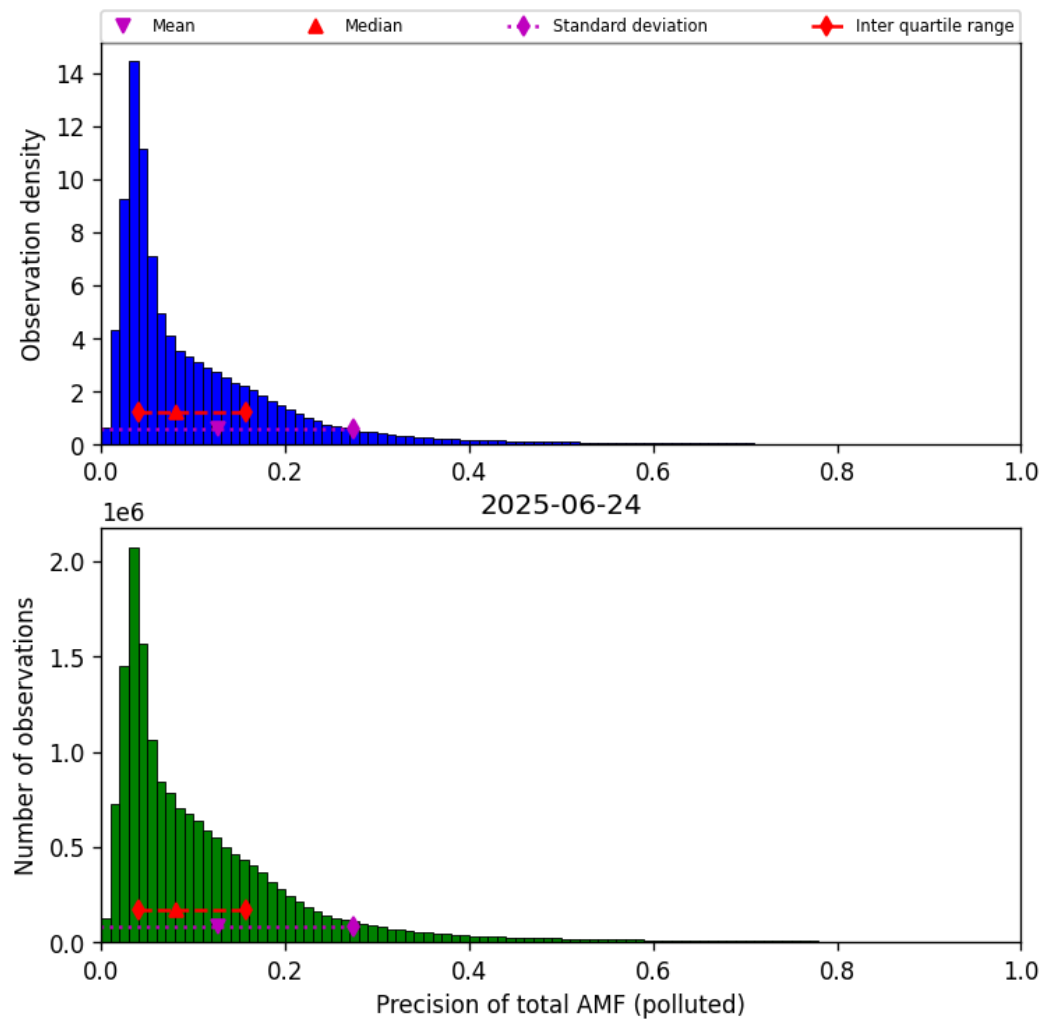


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-06-24 to 2025-06-25

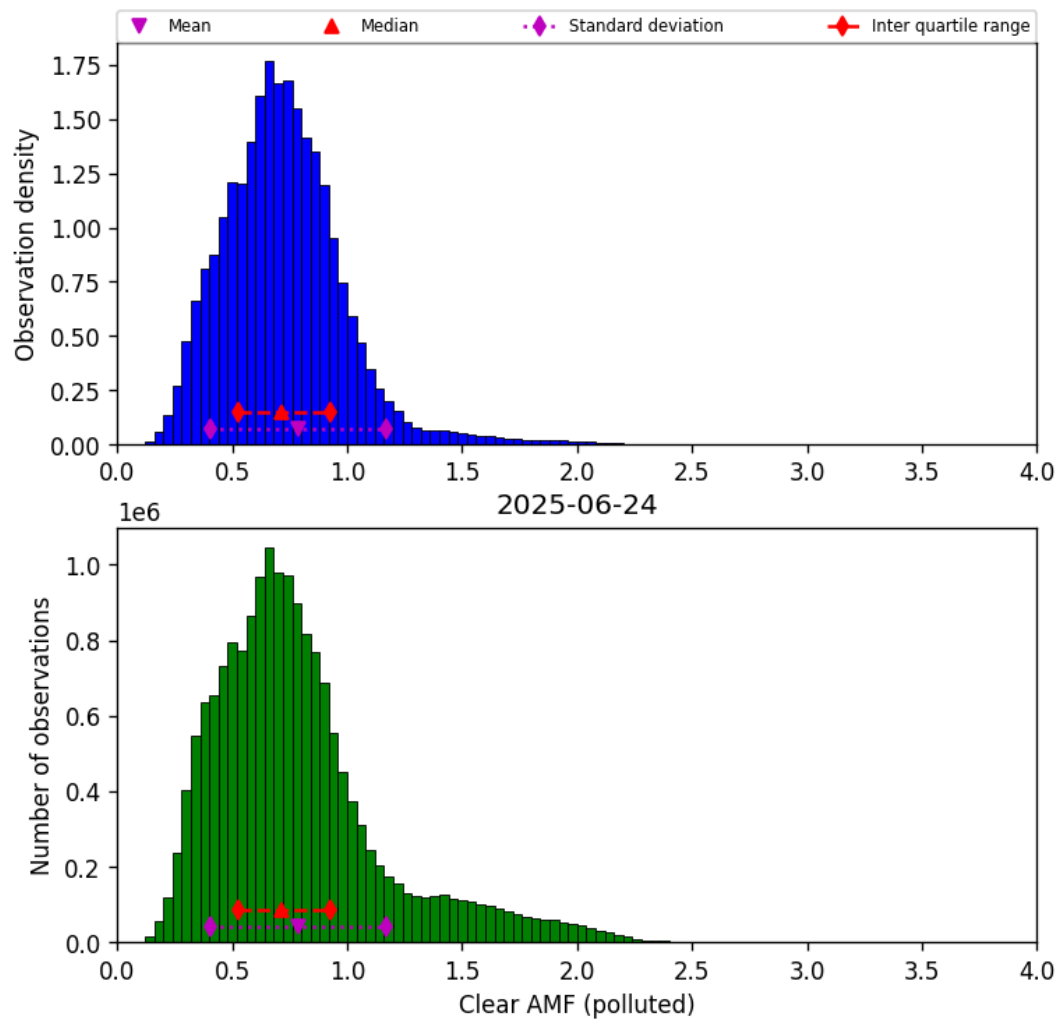


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-06-24 to 2025-06-25

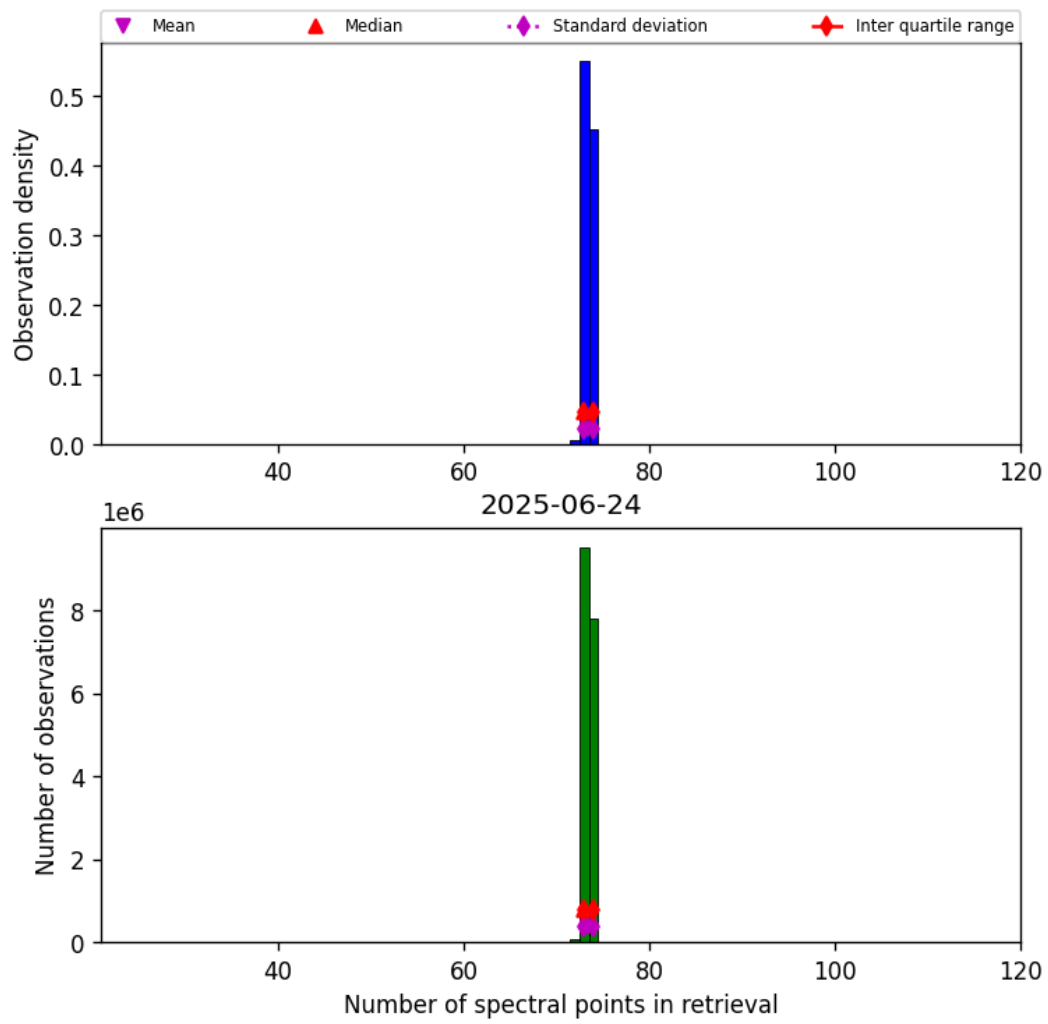


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-06-24 to 2025-06-25

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.

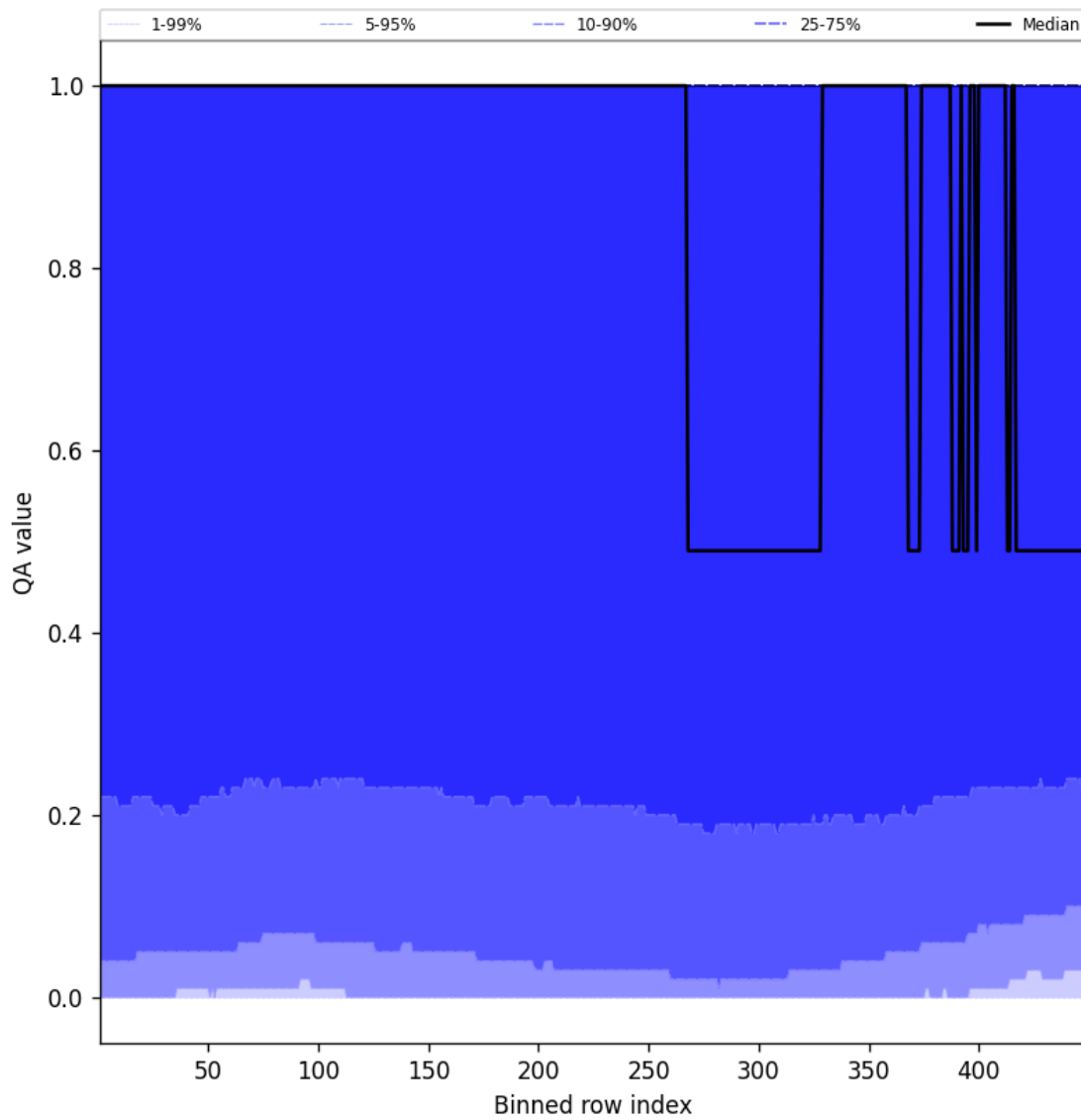


Figure 84: Along track statistics of “QA value” for 2025-06-24 to 2025-06-25

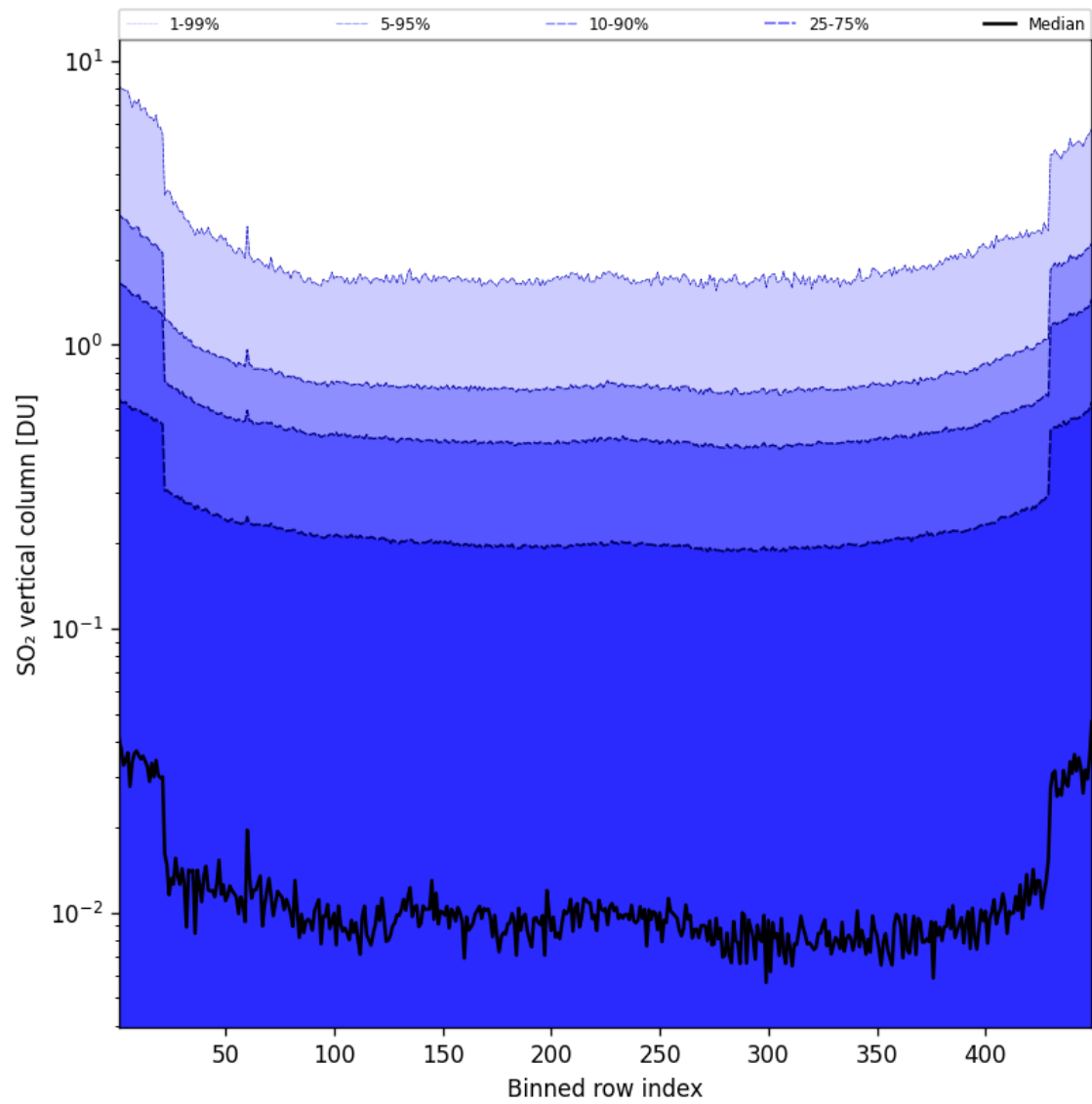


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-06-24 to 2025-06-25

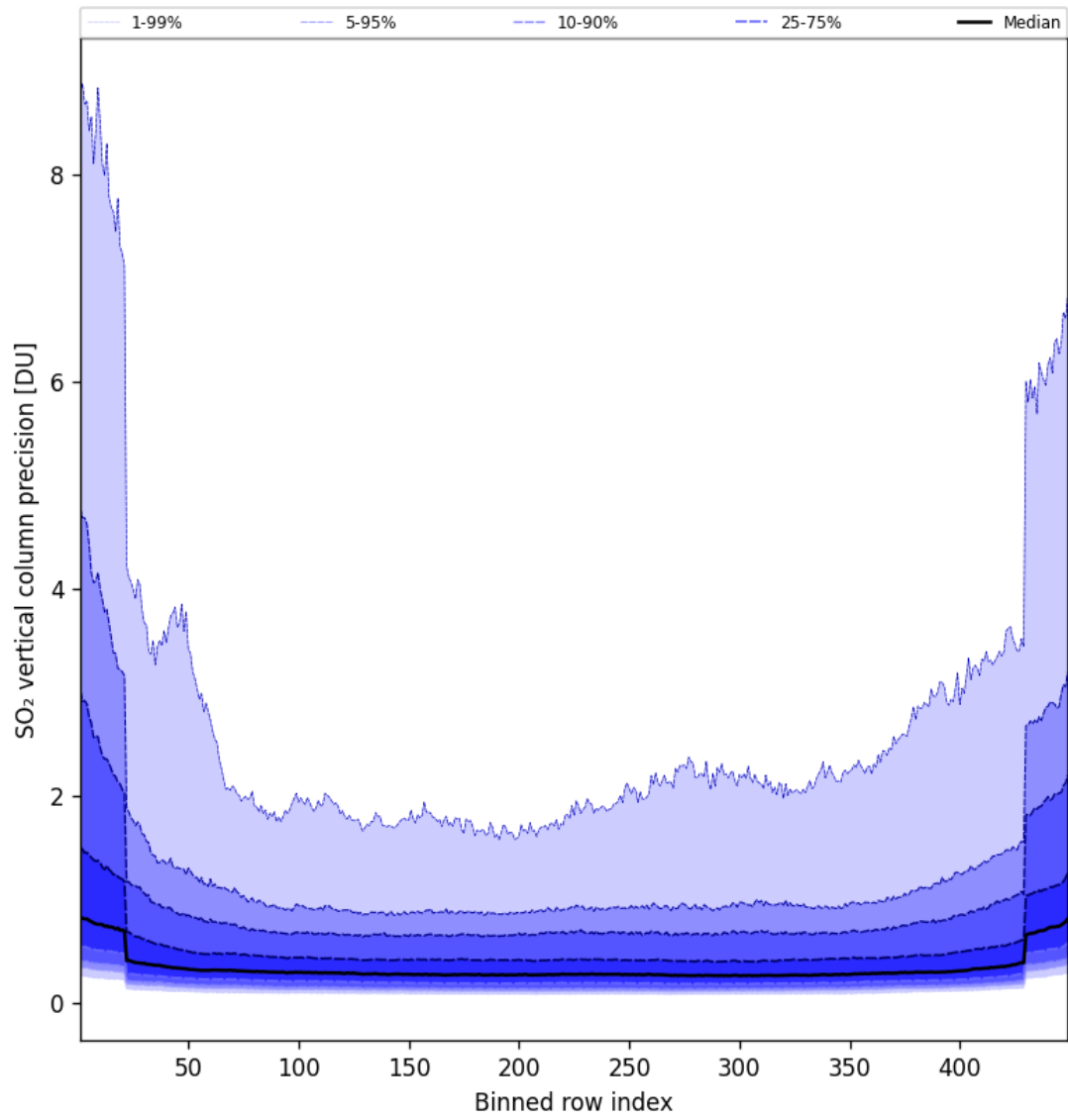


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-06-24 to 2025-06-25

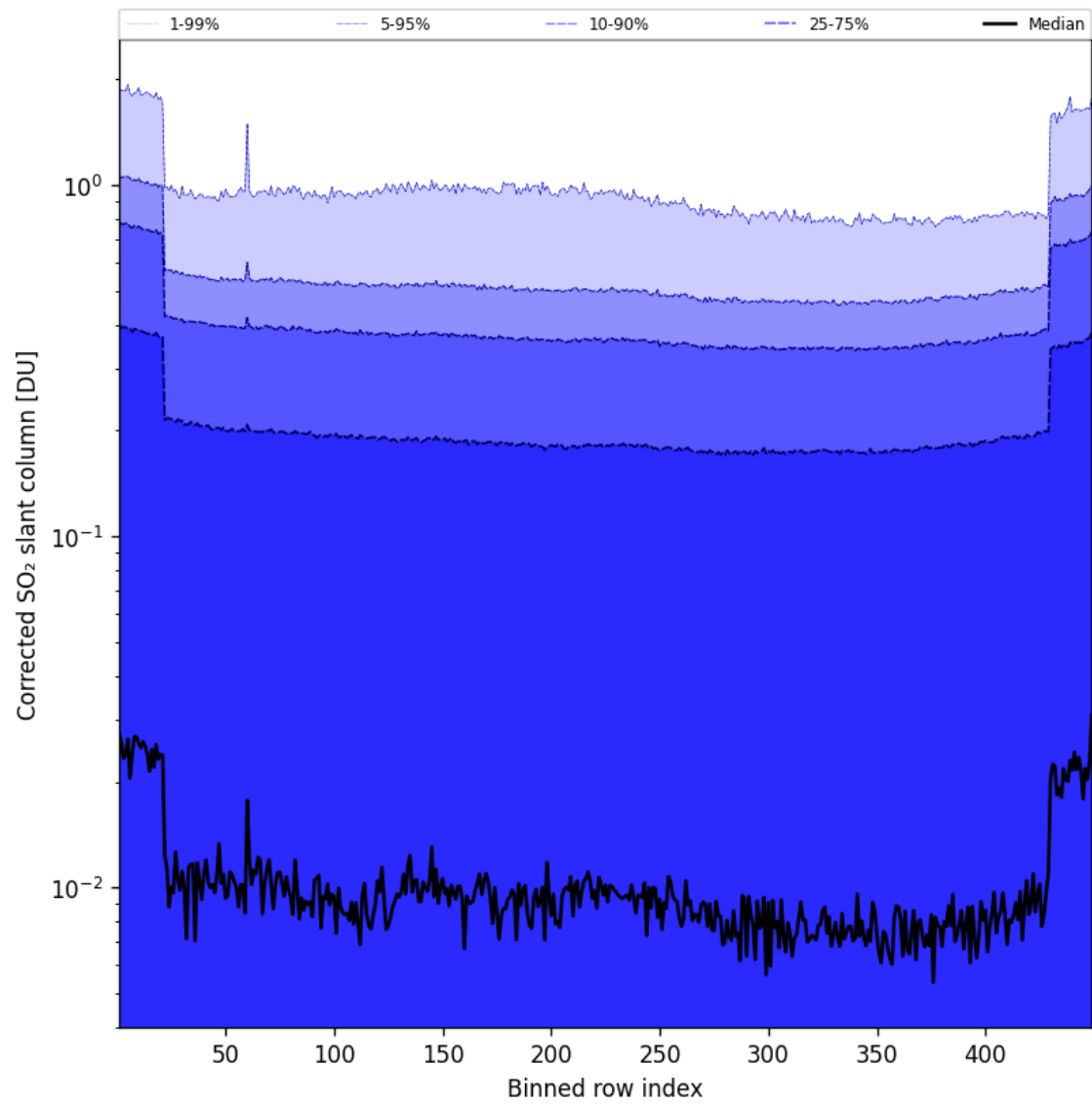


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-06-24 to 2025-06-25

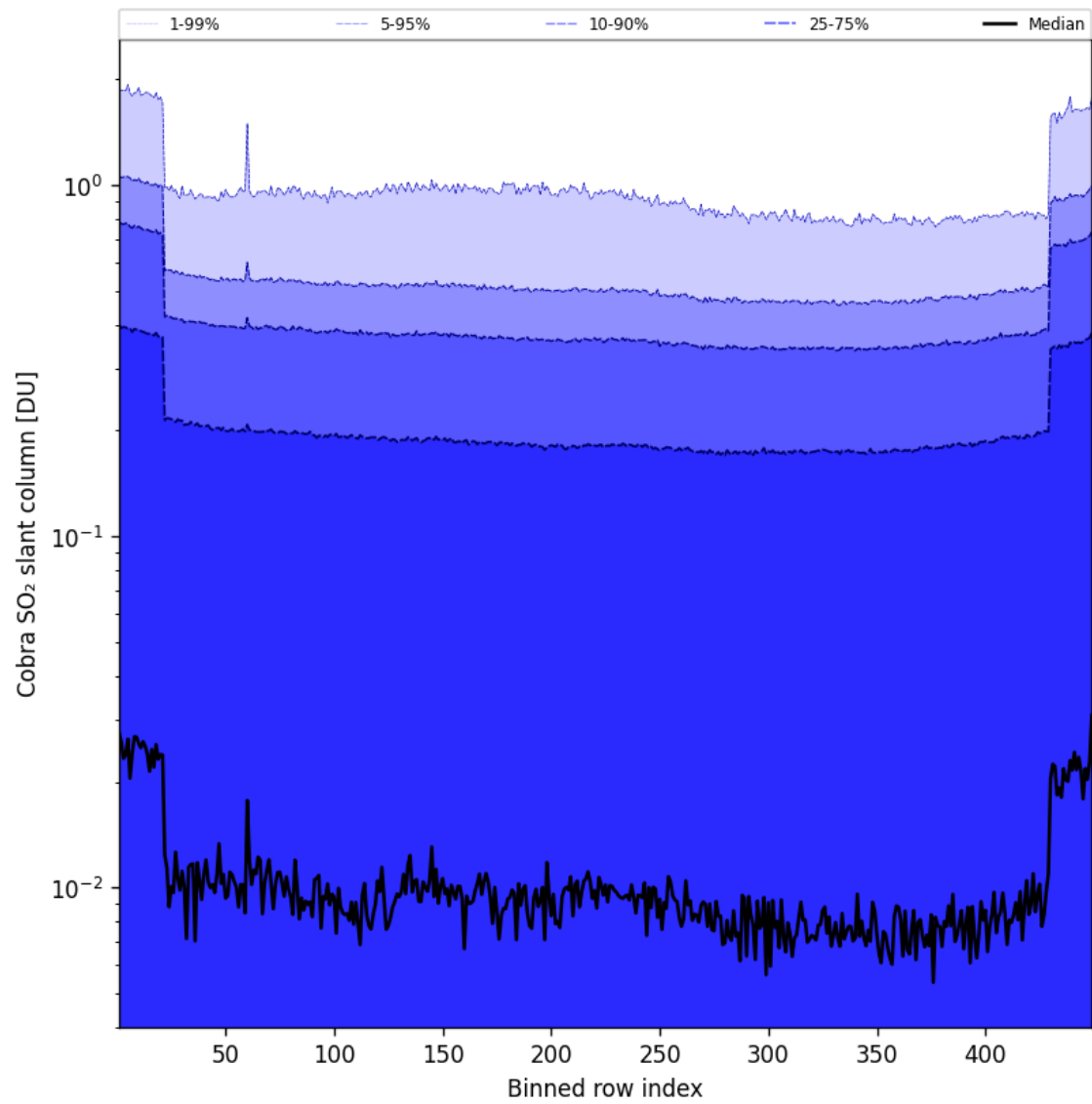


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-06-24 to 2025-06-25

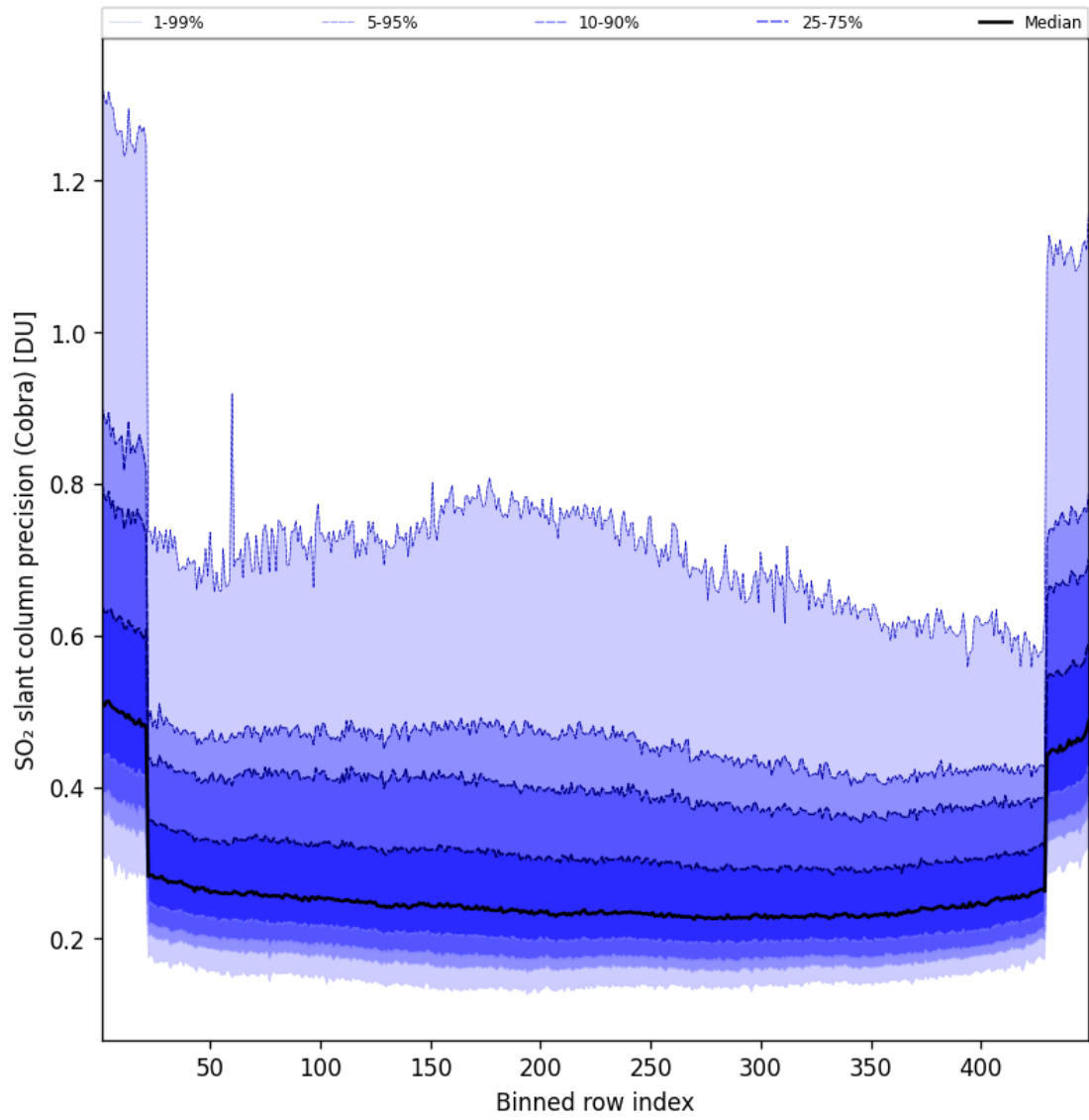


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-06-24 to 2025-06-25

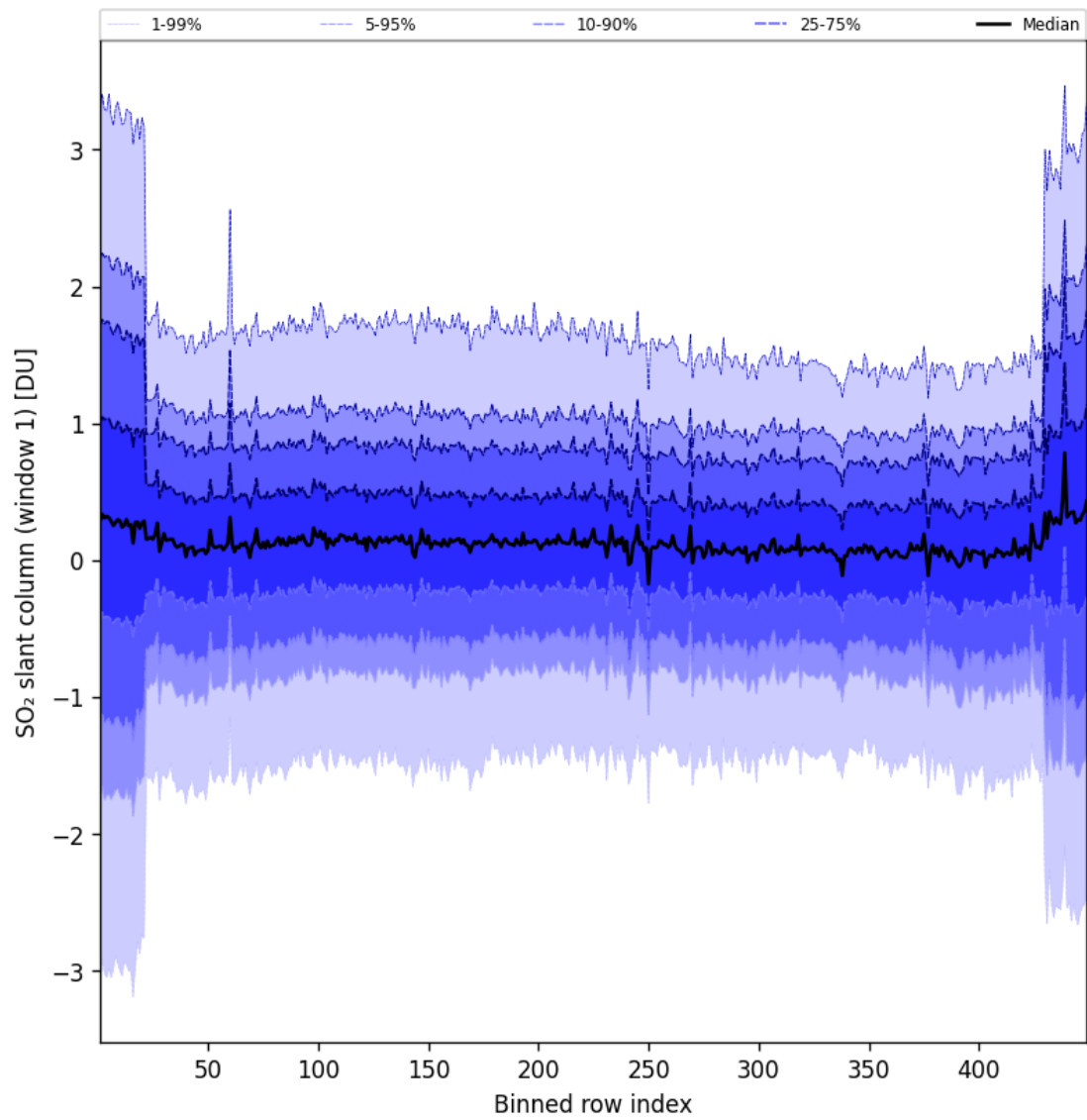


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-06-24 to 2025-06-25

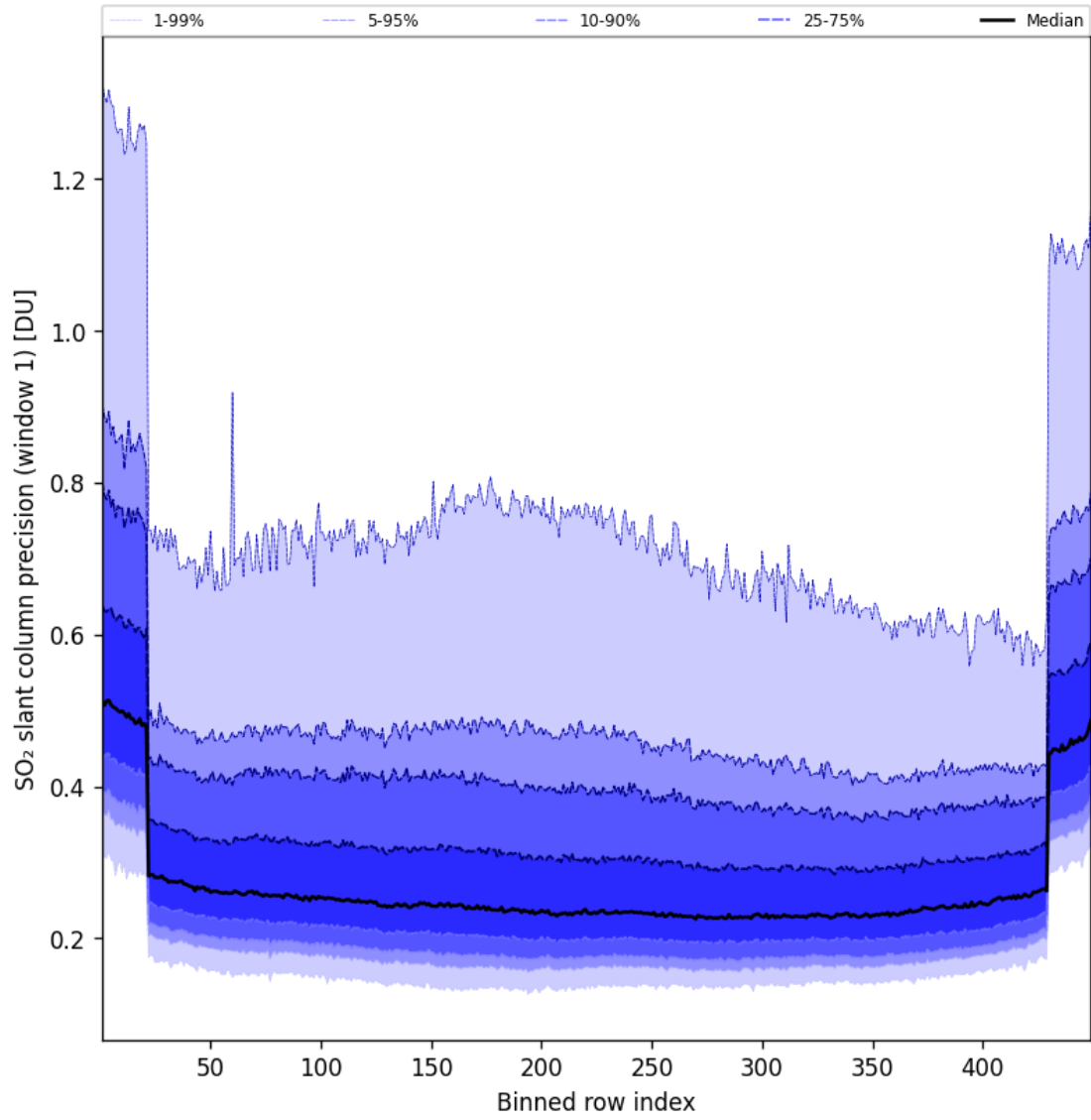


Figure 91: Along track statistics of "SO₂ slant column precision (window 1)" for 2025-06-24 to 2025-06-25

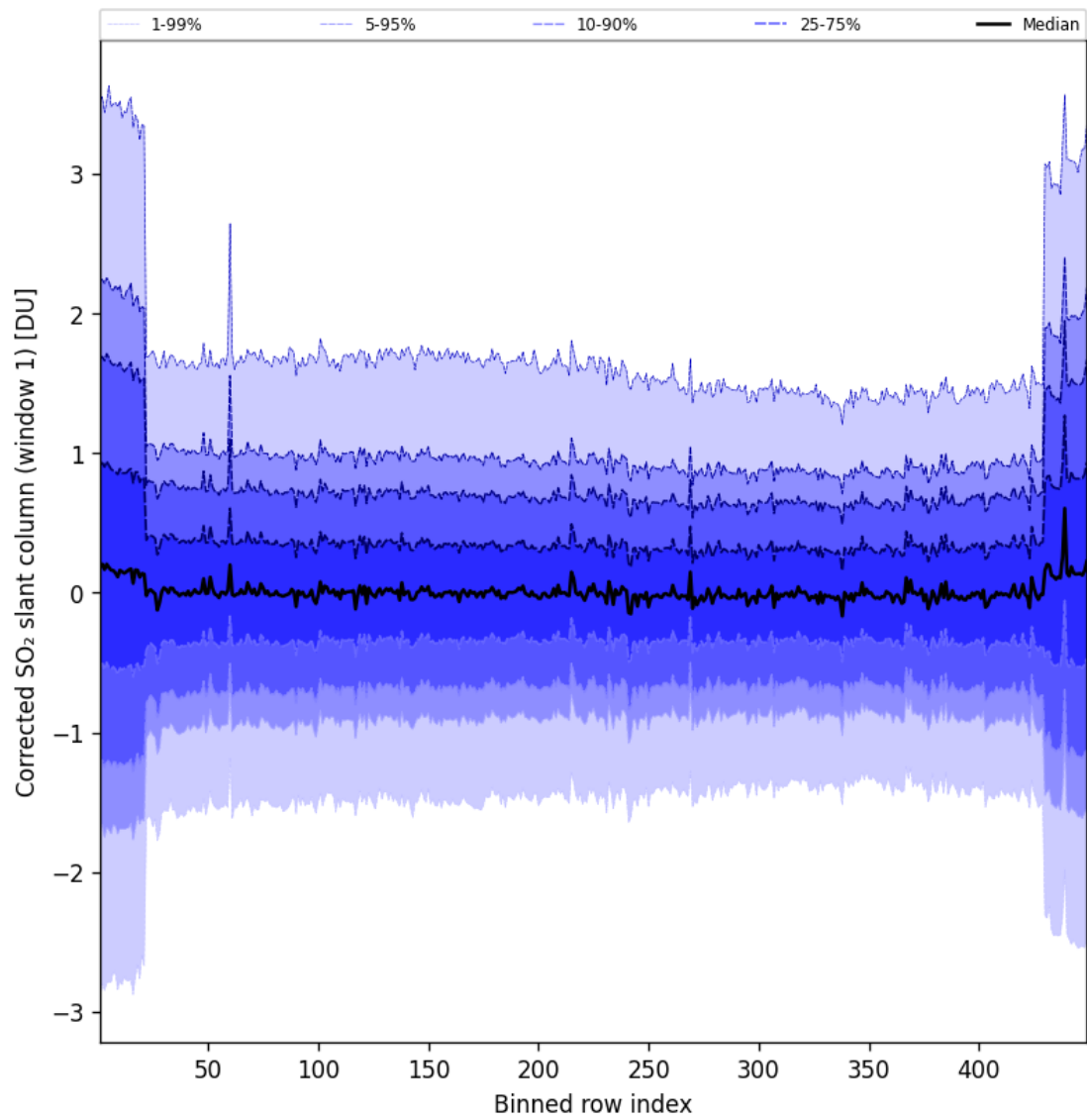


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-06-24 to 2025-06-25

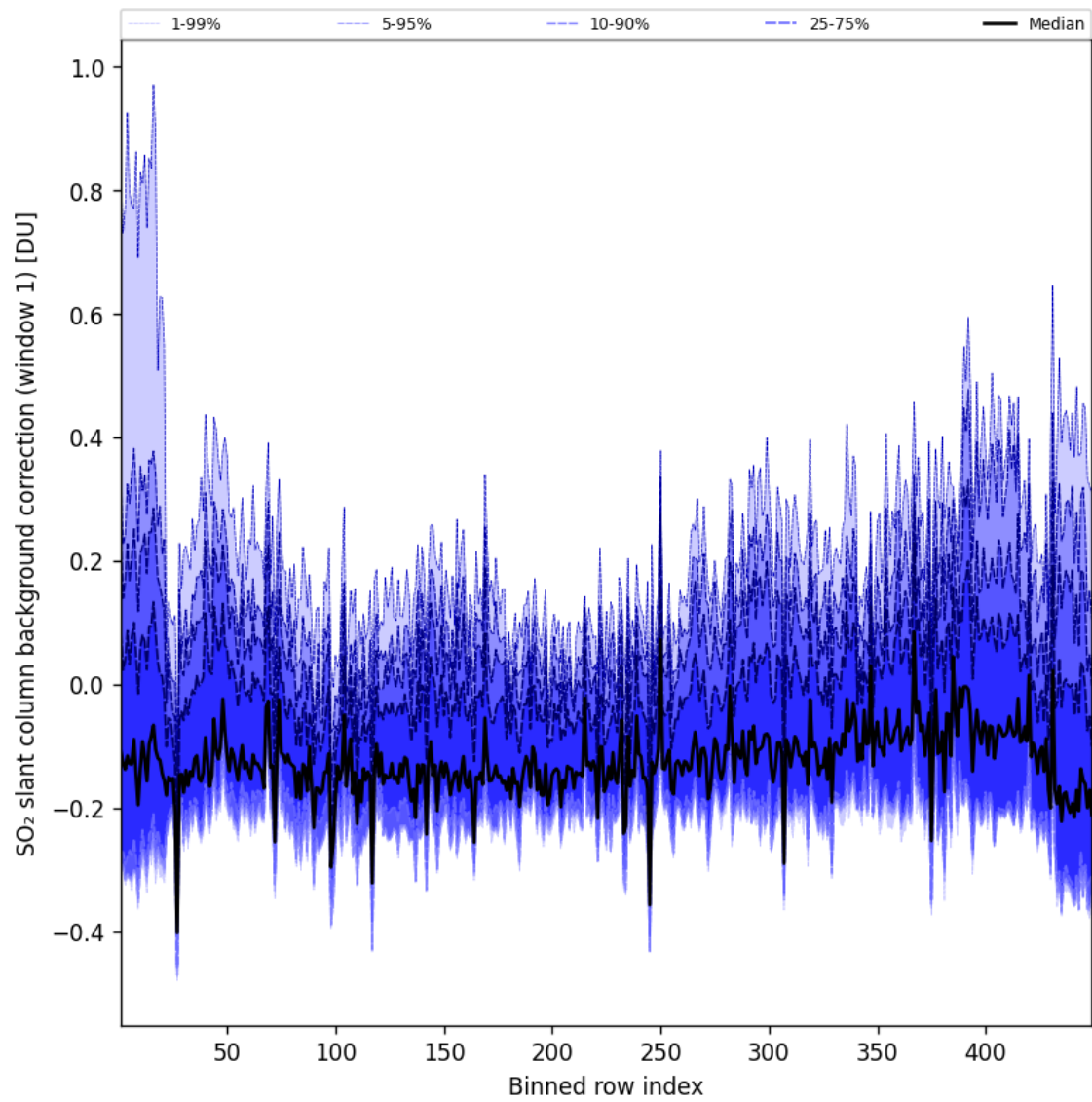


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-06-24 to 2025-06-25

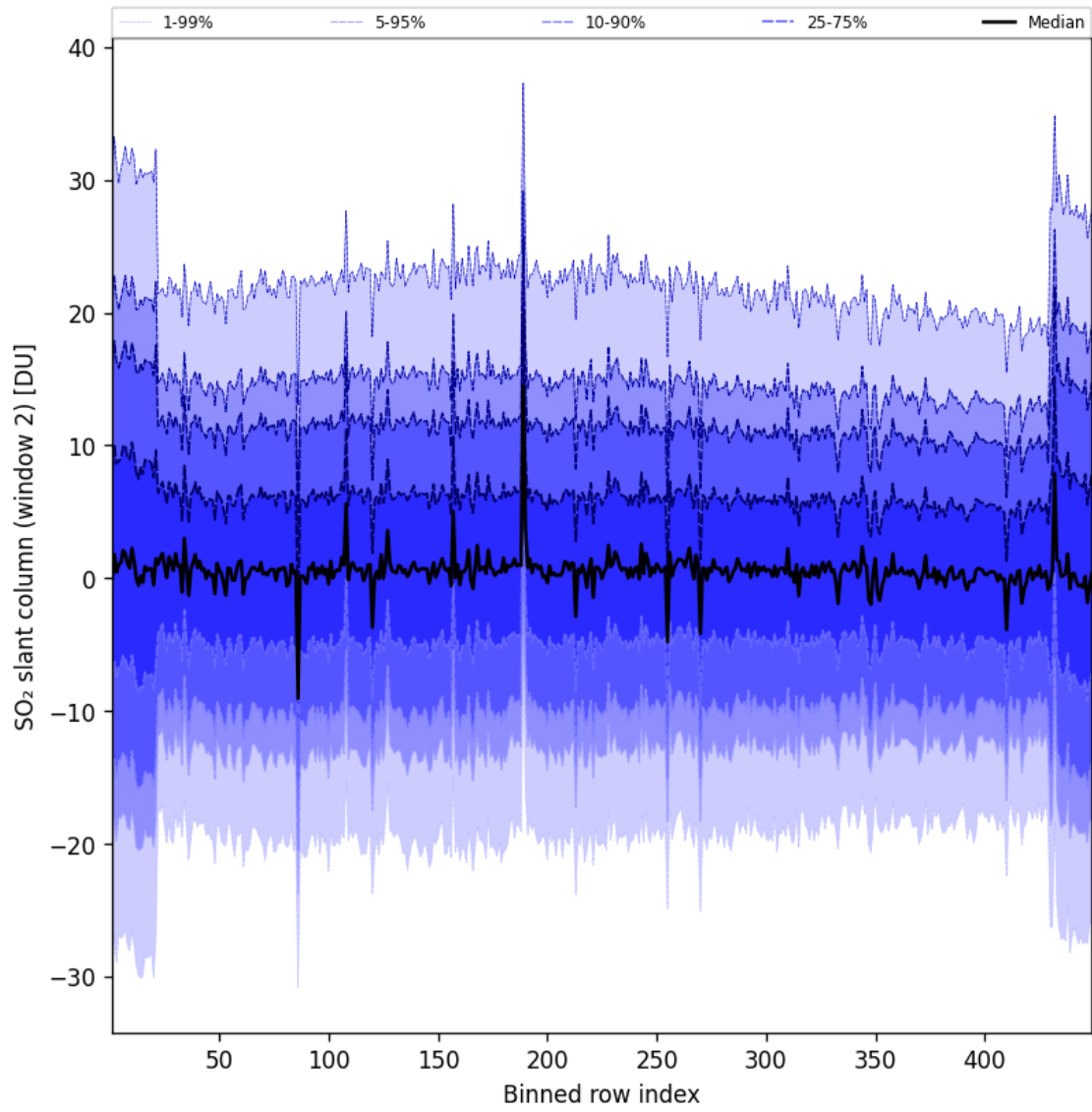


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-06-24 to 2025-06-25

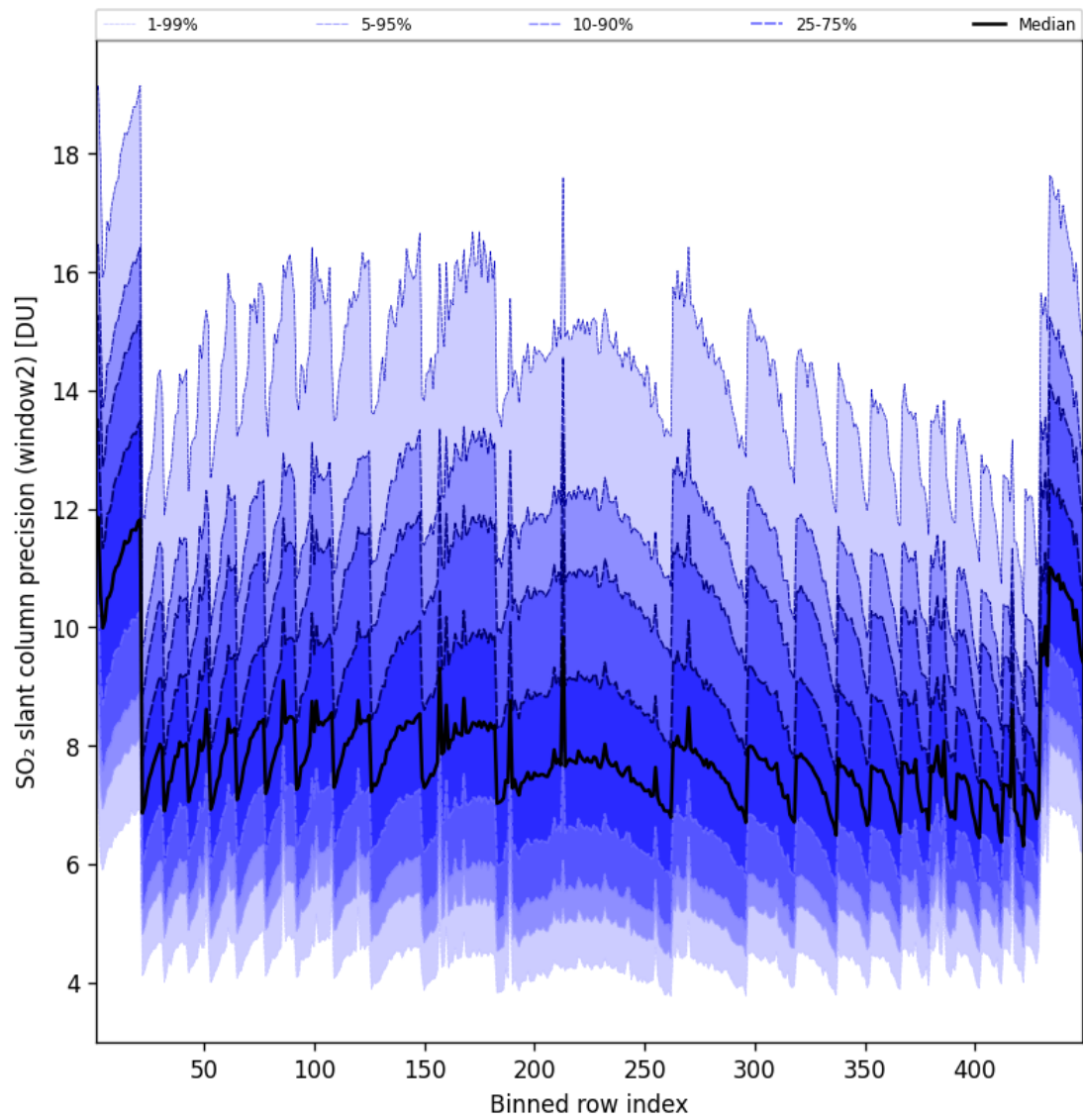


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-06-24 to 2025-06-25

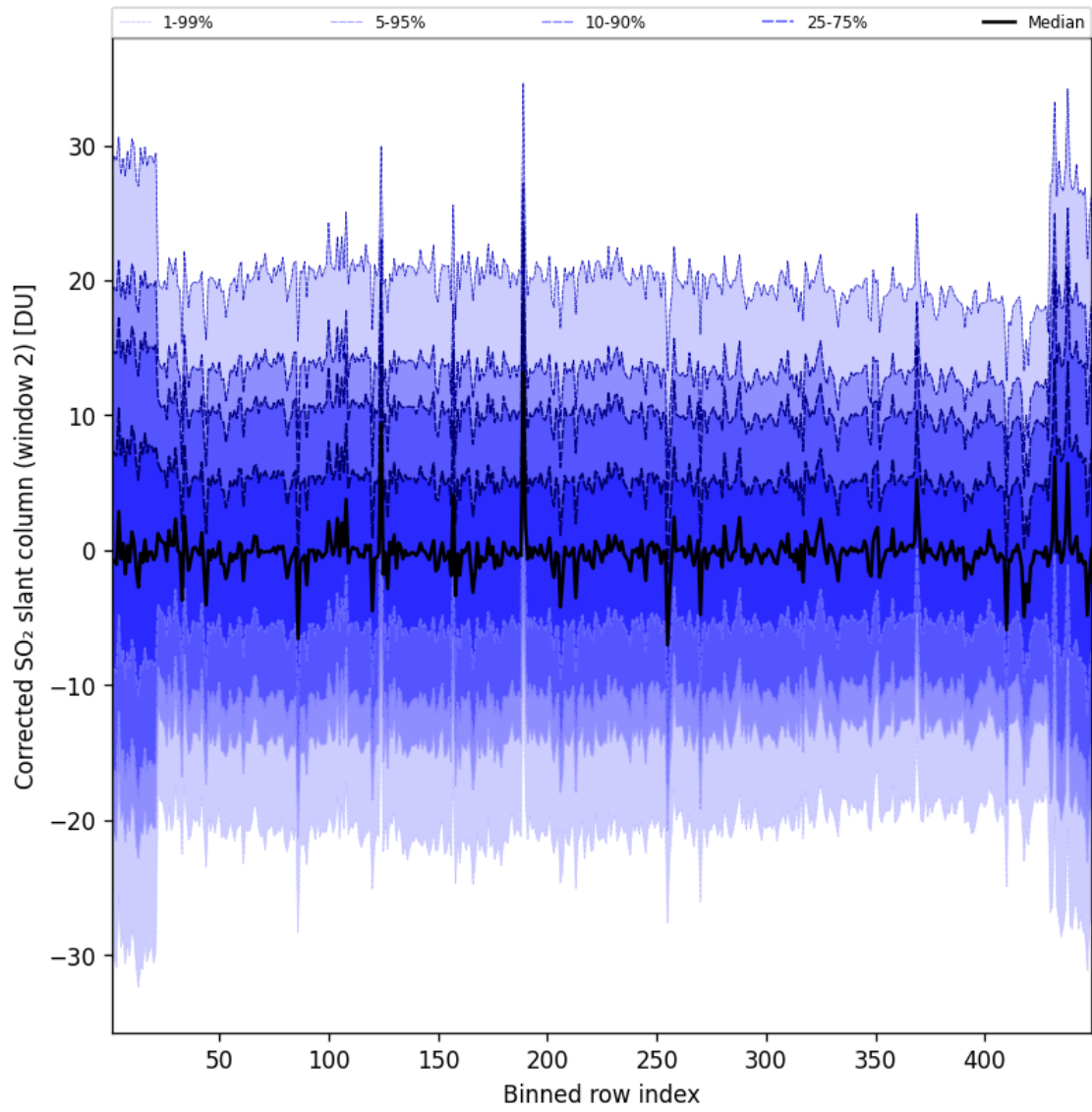


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-06-24 to 2025-06-25

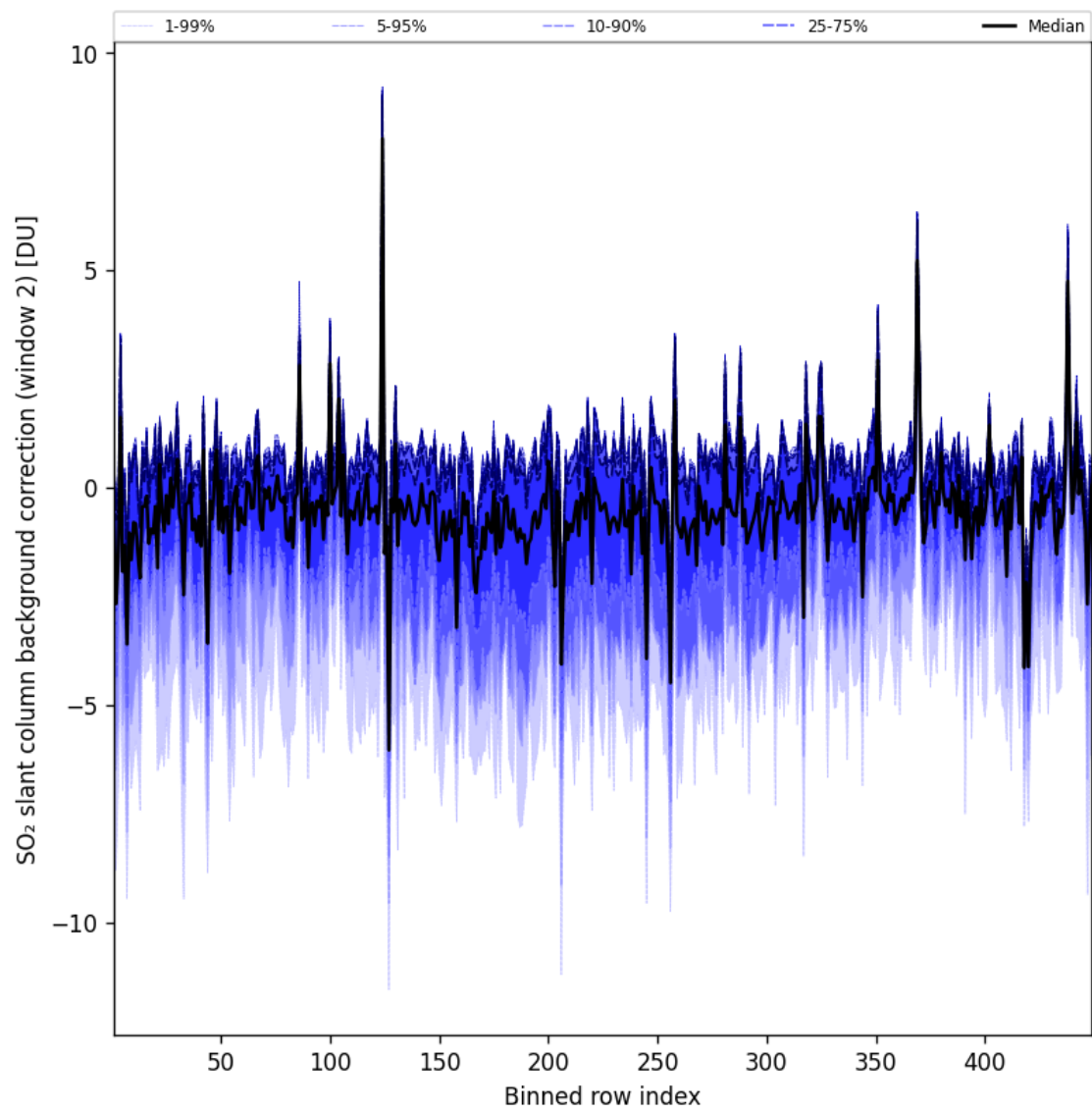


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-06-24 to 2025-06-25

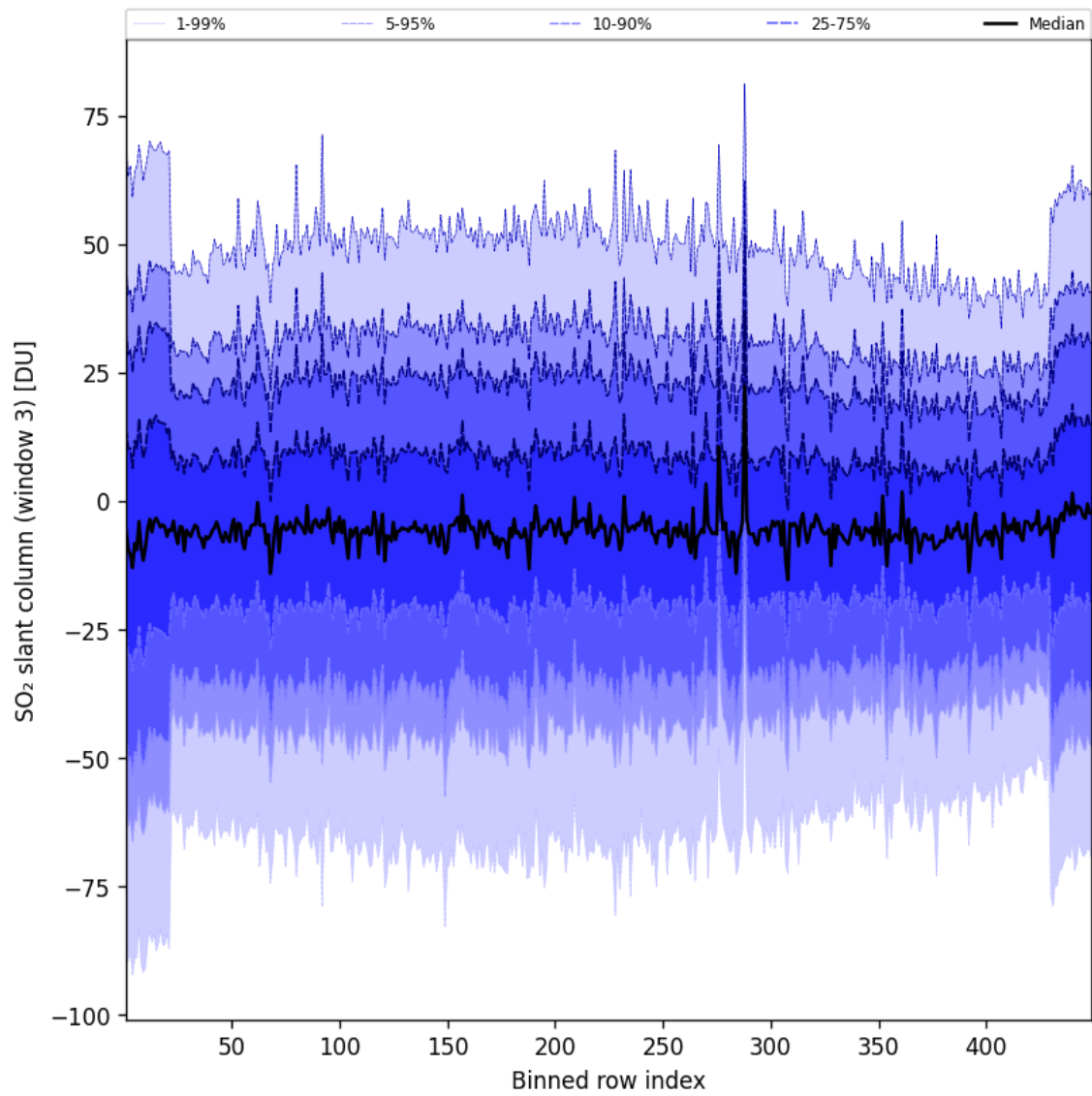


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-06-24 to 2025-06-25

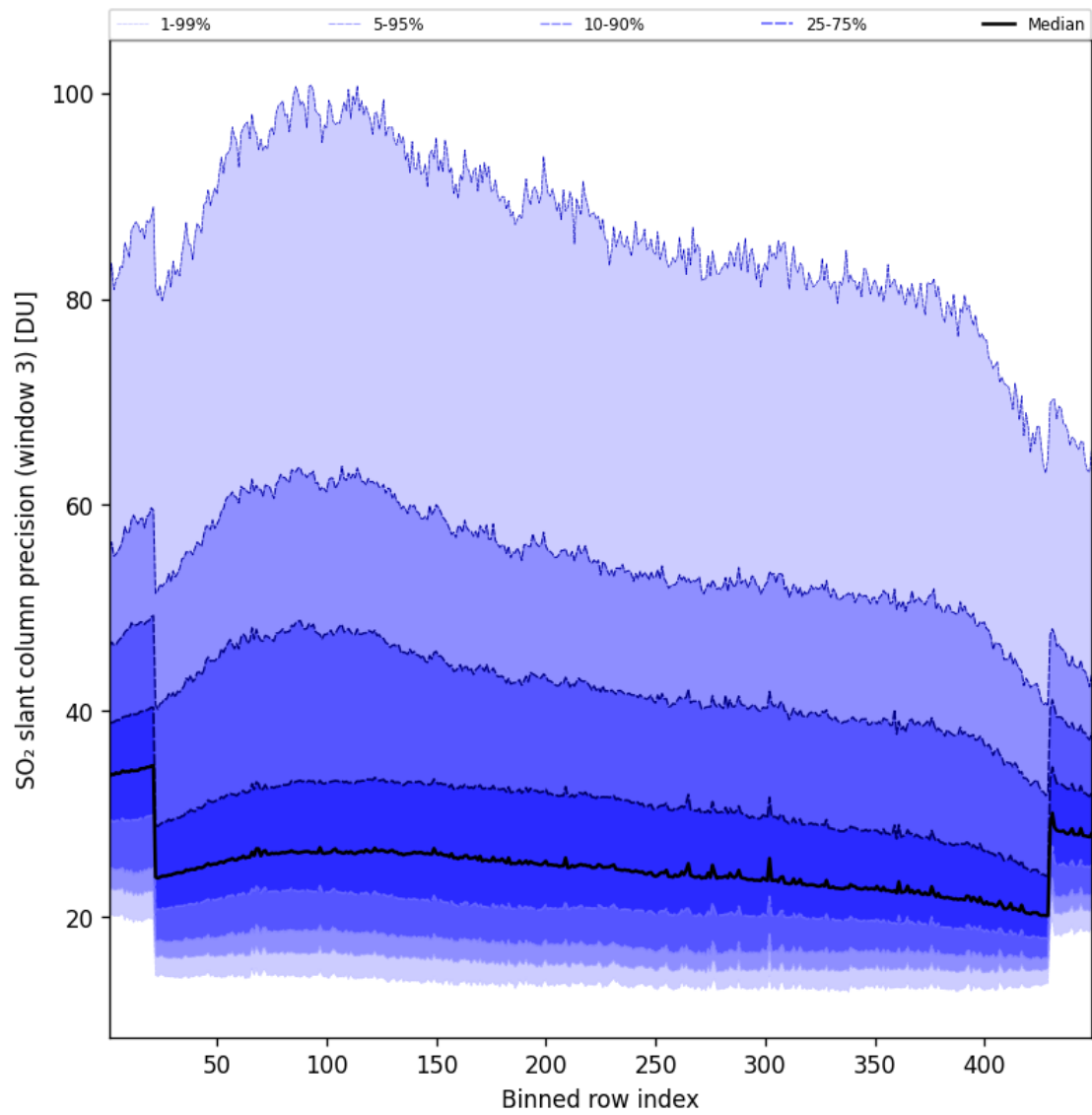


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-06-24 to 2025-06-25

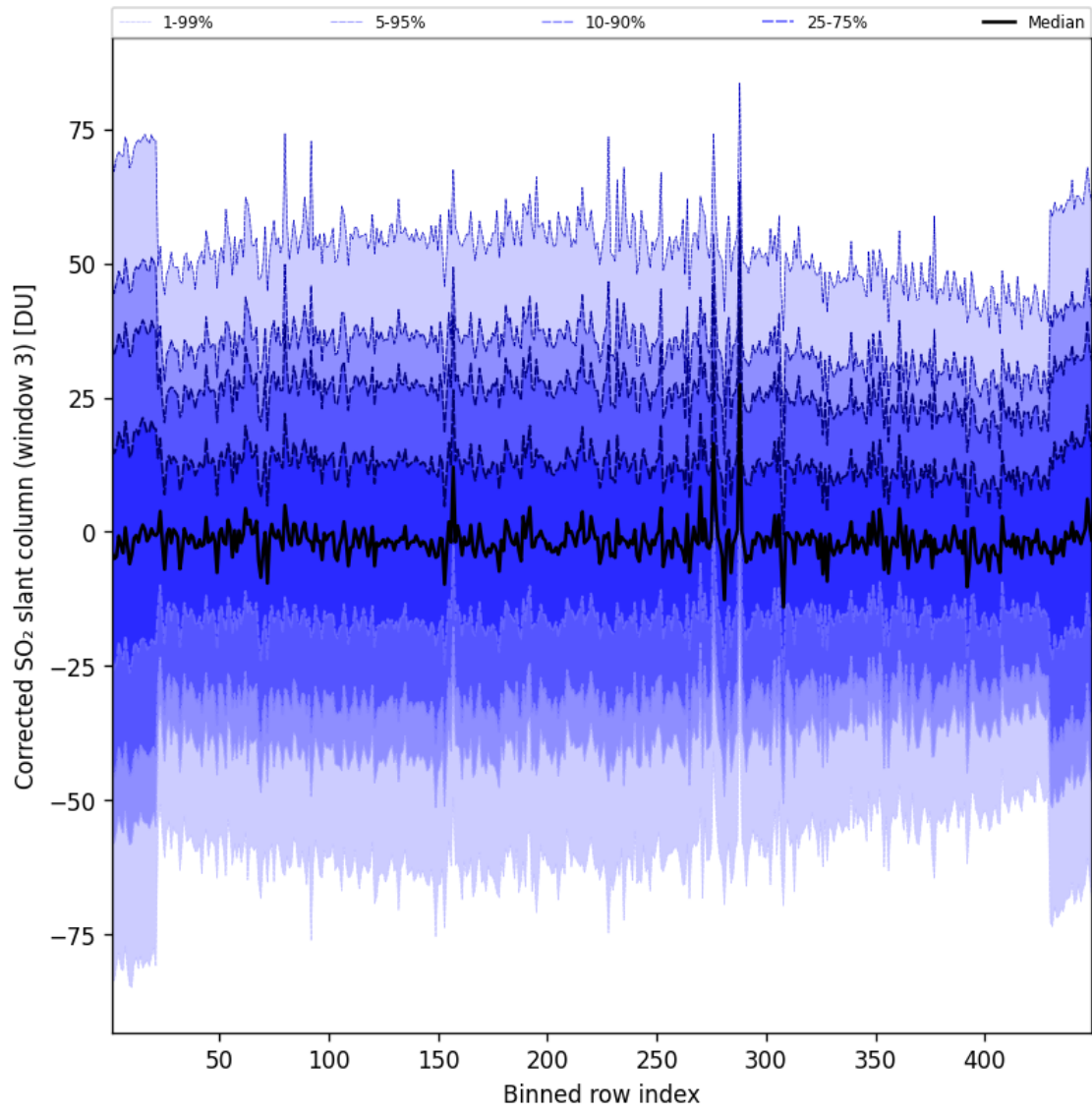


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-06-24 to 2025-06-25

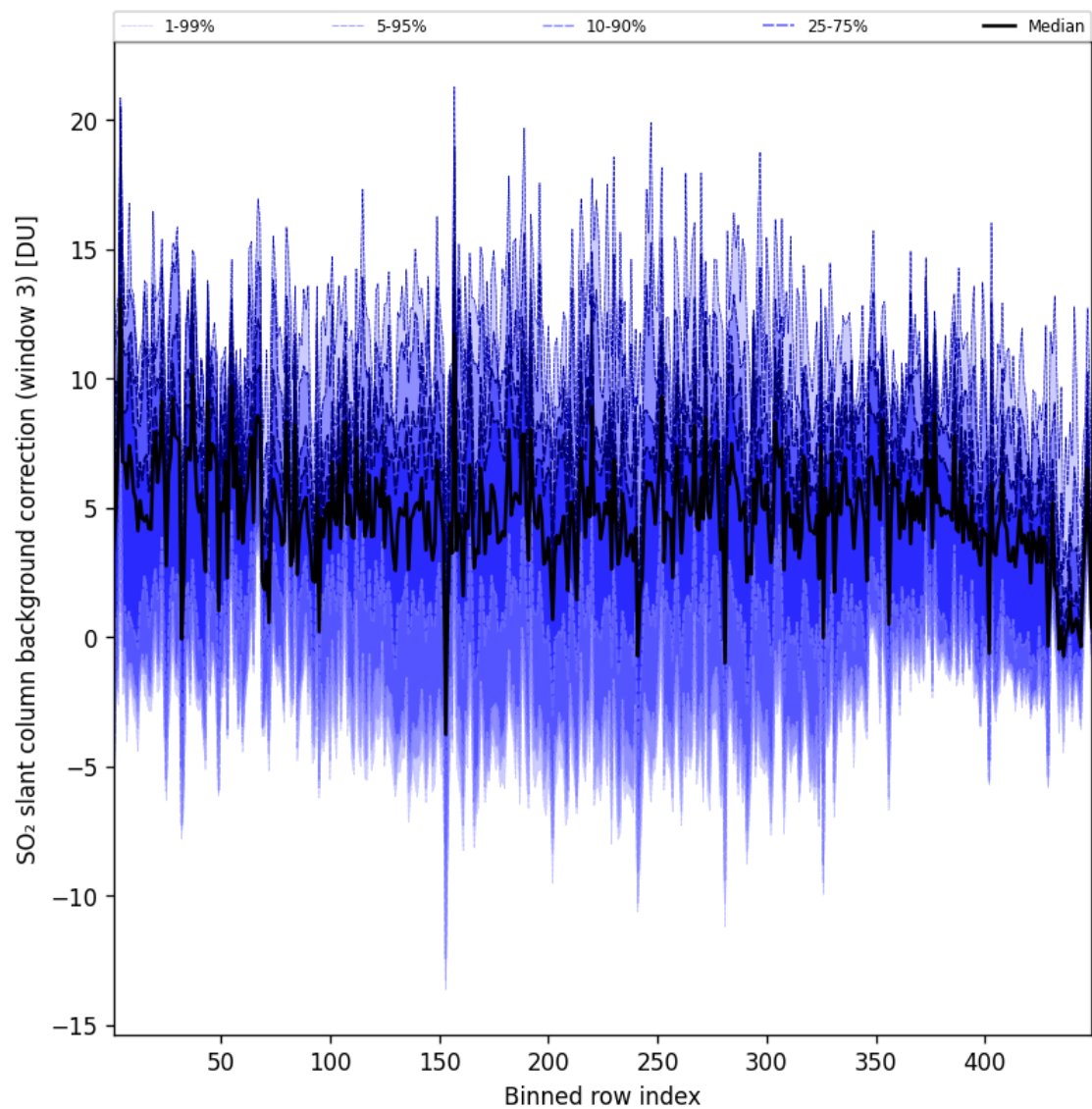


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-06-24 to 2025-06-25

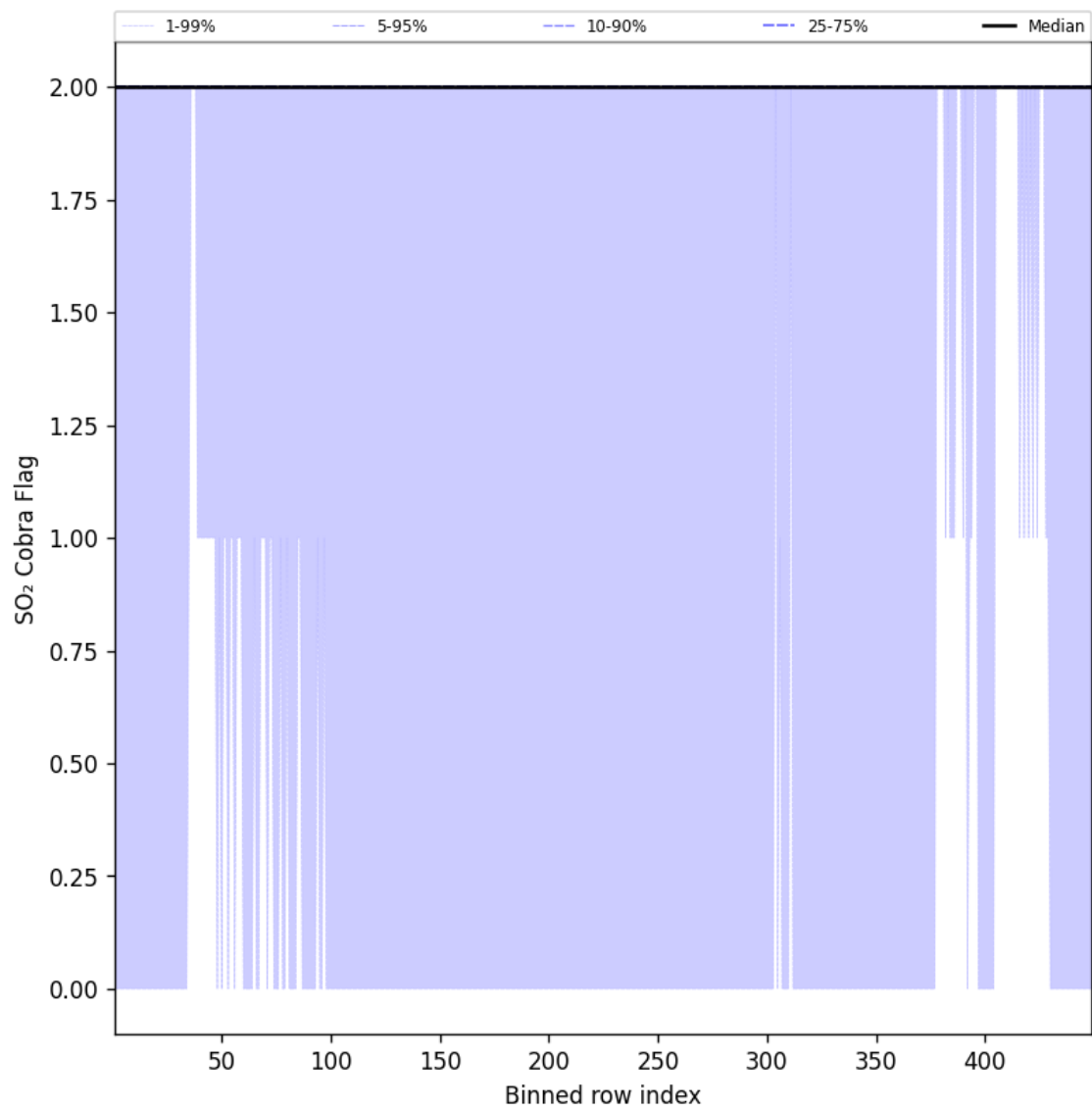


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-06-24 to 2025-06-25

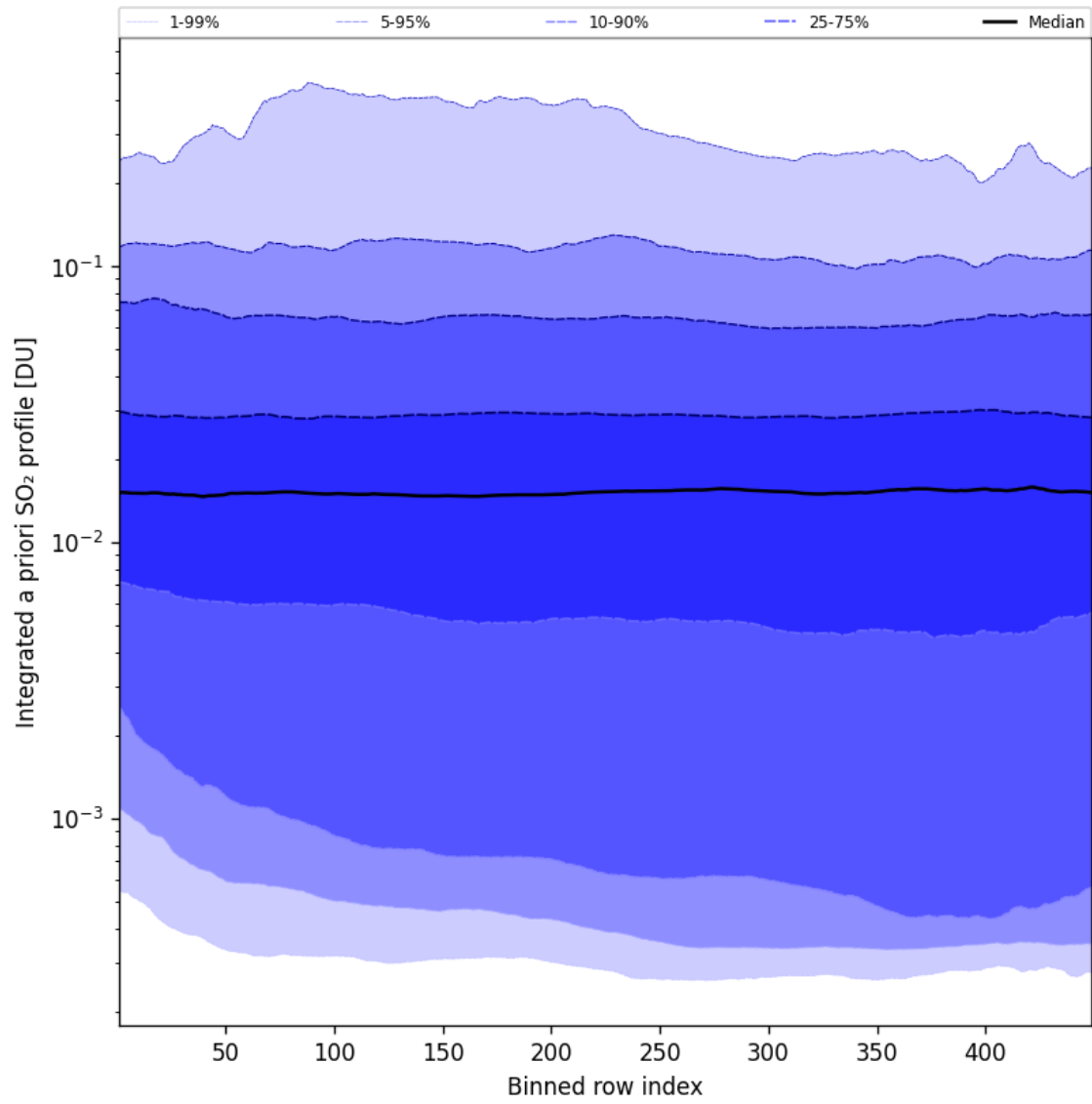


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-06-24 to 2025-06-25

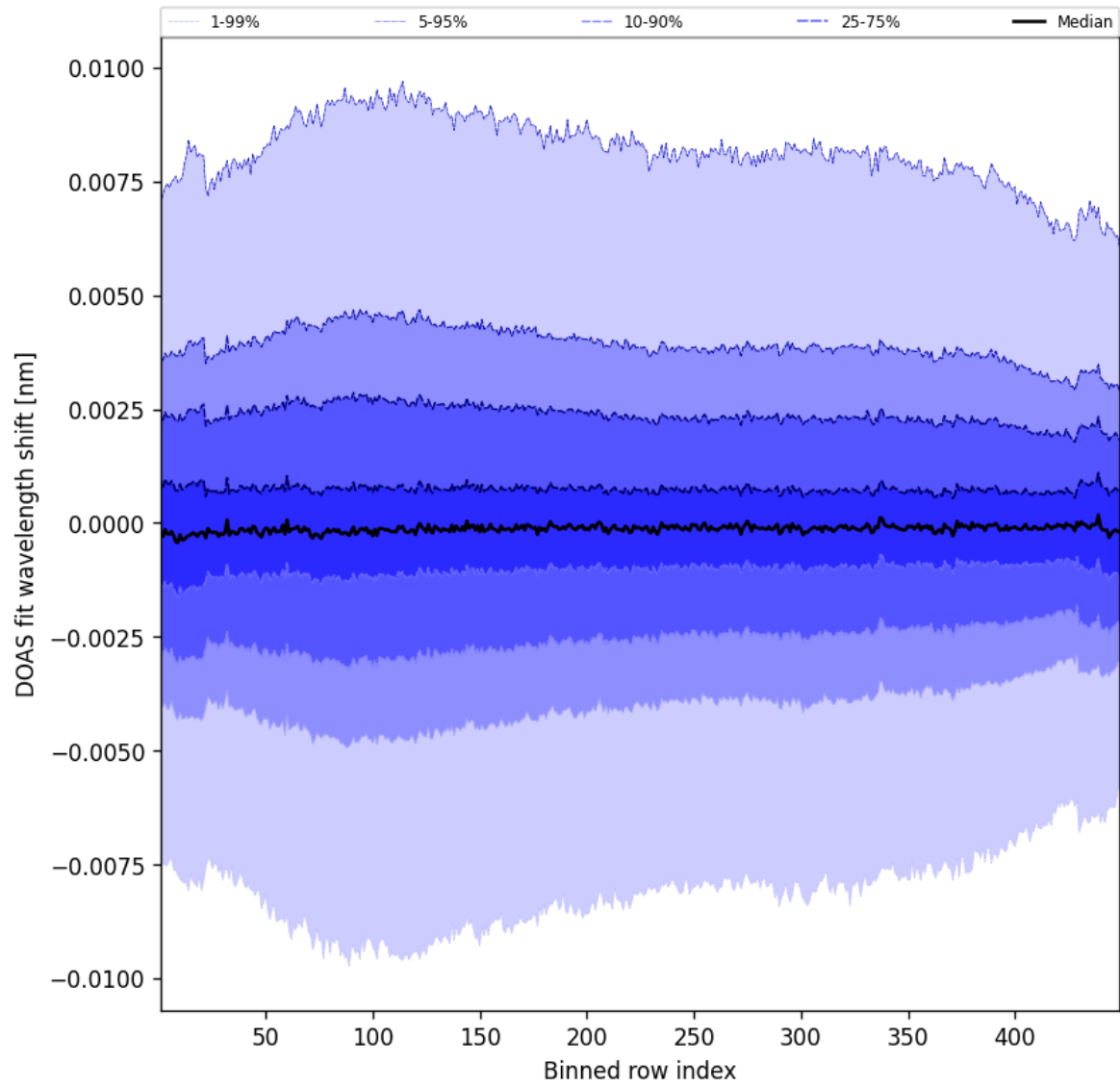


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-06-24 to 2025-06-25

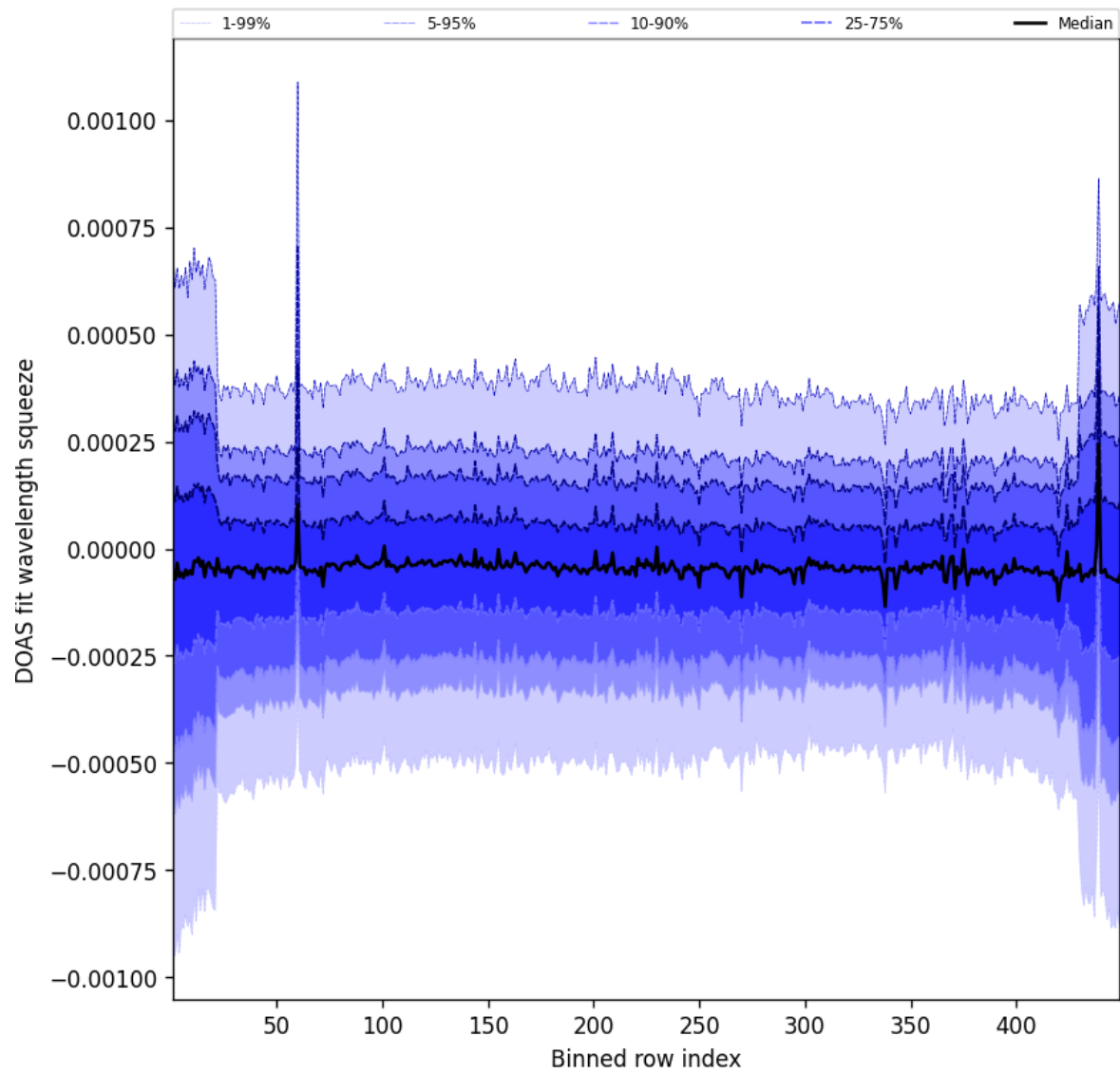


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-06-24 to 2025-06-25

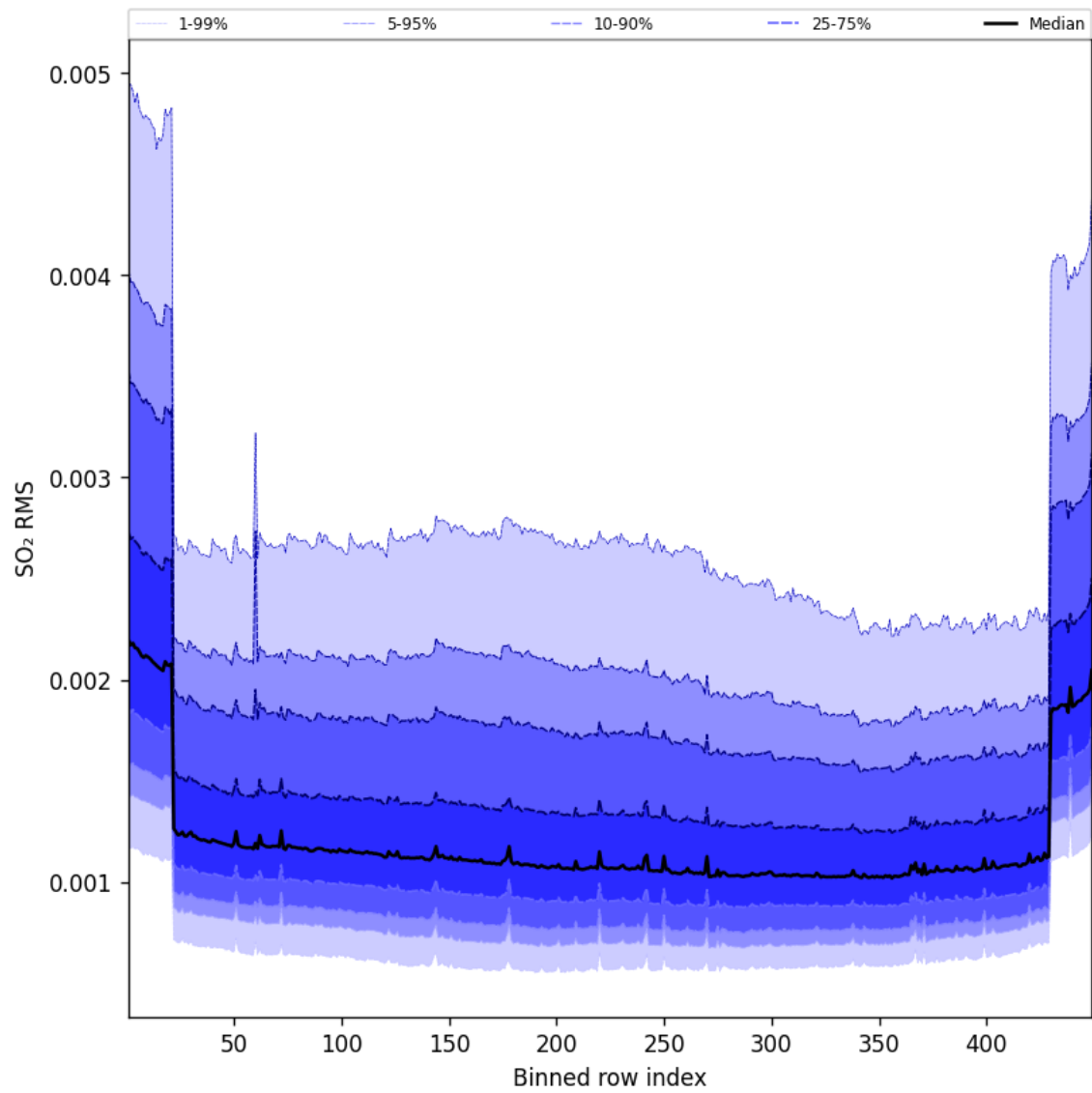


Figure 106: Along track statistics of “SO₂ RMS” for 2025-06-24 to 2025-06-25

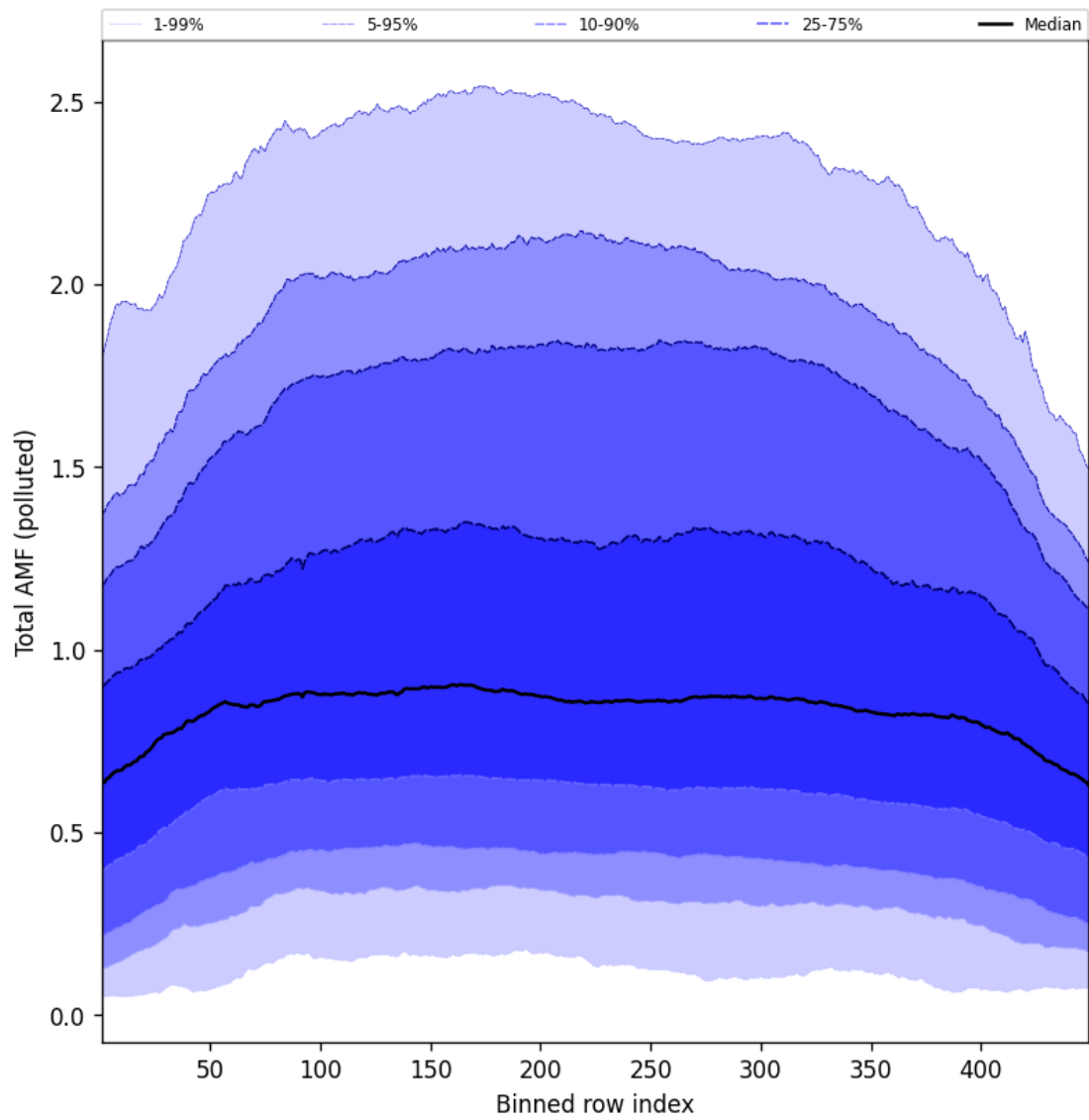


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-06-24 to 2025-06-25

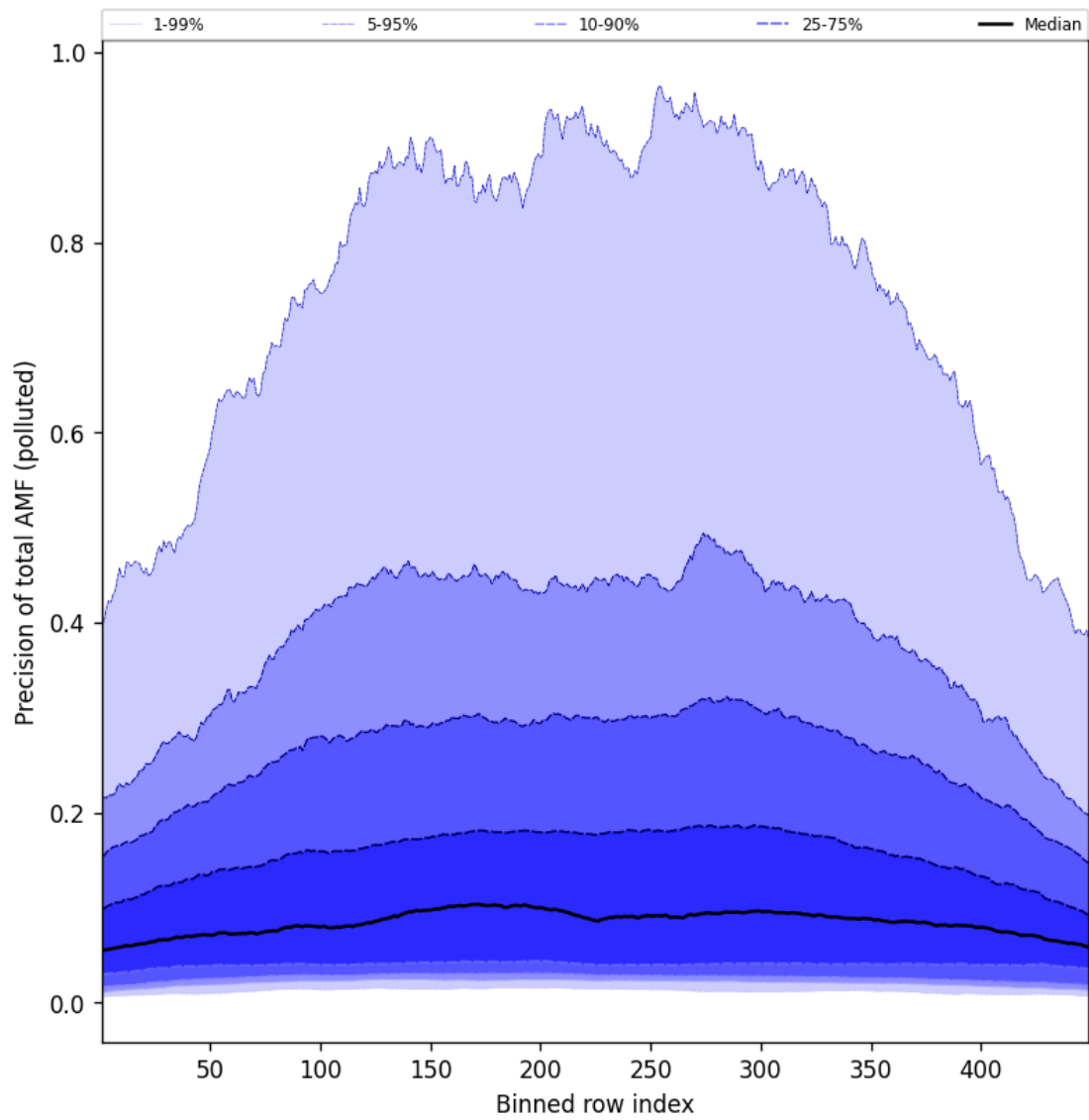


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-06-24 to 2025-06-25

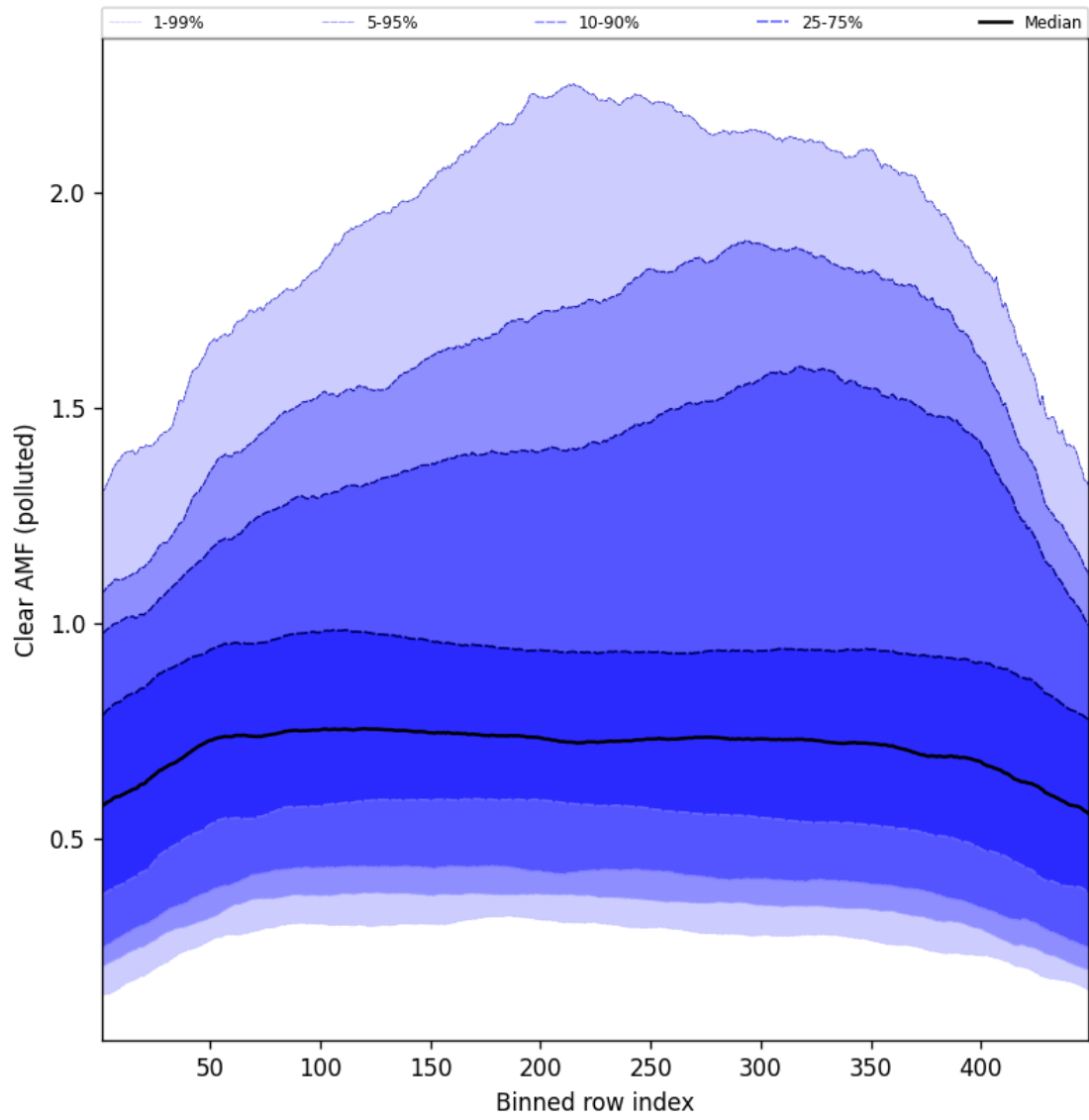


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-06-24 to 2025-06-25

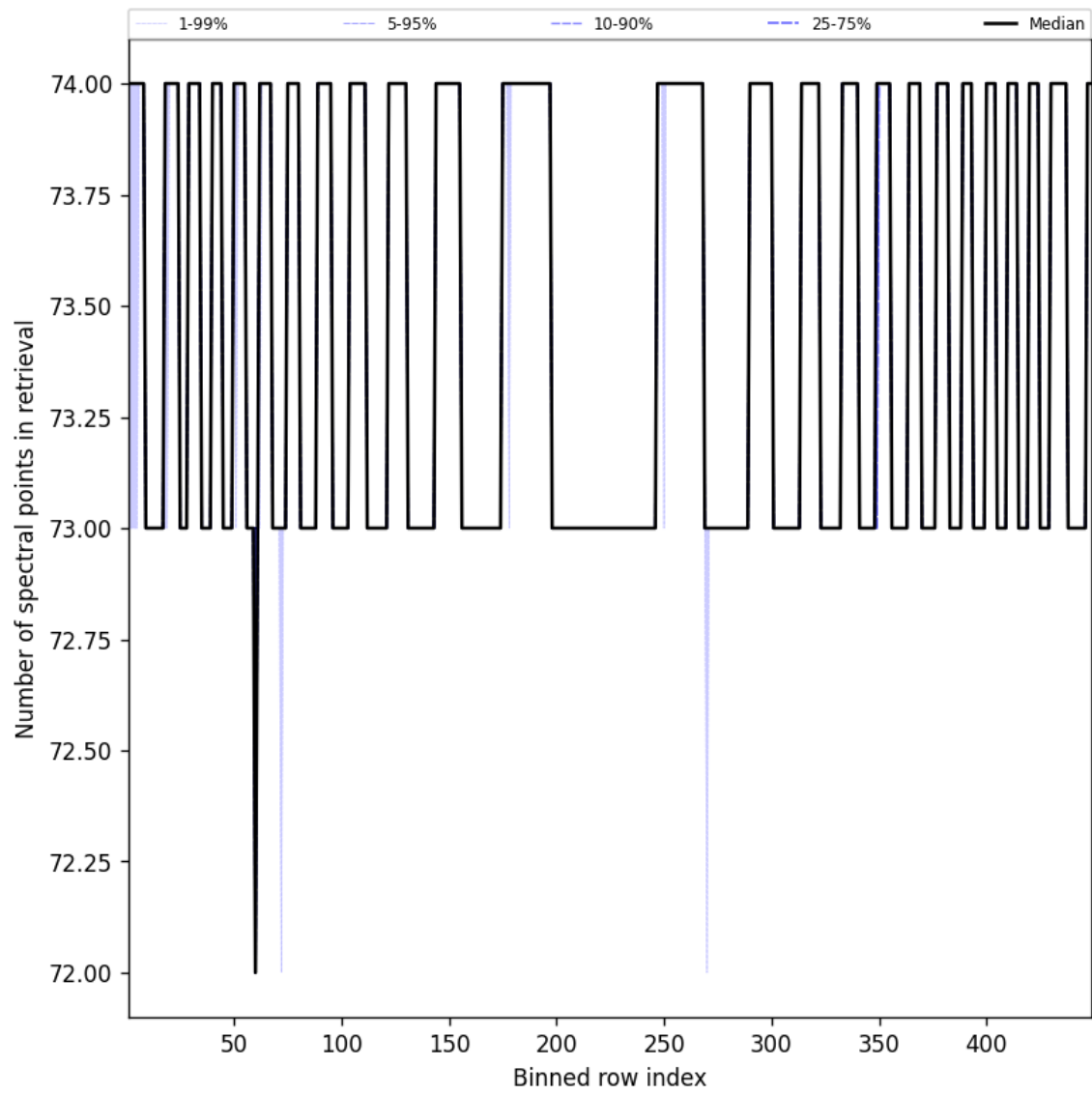


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-06-24 to 2025-06-25

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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