PyCAMA report generated by tropl2-proc

tropl2-proc

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1 Short Introduction

1.1 The list of parameters

You may want to keep the list given in table 1 at hand when viewing the results.

2 Definitions

The averages shown here are *unweighed* averages:

$$\overline{x} = \frac{1}{N}\sum_{i=1}^{N} x_i \tag{1}$$

with N the number of observations in the dataset.

The spread of the measurements is indicated with the variance $V(x)$, or rather the standard deviation $\sigma(x) = \sqrt{V(x)}$.

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

We also report the more robust statistics median, minimum, maximum, various percentiles and inter quartile range.

The median m is the value of parameter x for which half of the observations of x is smaller than m:

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^{m} f(x)\,\mathrm{d}x = \frac{1}{2} \tag{3}$$

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

The median is a special case of a percentile. Instead of ½ in equation 3, other threshold values can be used. We report results for 1 %, 5 %, 10 %, 15.9 %, 25 %, 75 %, 84.1 %, 90 %, 95 % and 99 %. The inter quartile range is the difference between the 75 % and 25 % percentiles. Similarly the minimum and maximum values correspond to the 0 % and 100 % percentiles respectively.

For normally distributed parameters the mean and median are the same, while the $\mu \pm \sigma$ values and the 15.9 % and 84.1 % percentiles coincide.

To get a measure for the relation of one variable $x_{(k)}$ with another $x_{(l)}$, we calculate the covariance matrix C_{kl}.

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1}\sum_{i=1}^{N}(x_{(k),i} - \overline{x_{(k)}})(x_{(l),i} - \overline{x_{(l)}}) \tag{4}$$

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

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

The diagonal elements of the covariance matrix are the variances of the elements, $V(x_{(k)}) = C_{kk}$ and obviously $R_{kk} = 1$.

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm\sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.659 ± 0.405	17302714	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.709 \pm 153.328) \times 10^{-2}$	17302714	0.263	0.480	1.135×10^{-2}	-211	730
sulfurdioxide total vertical column precision [DU]	0.654 ± 1.112	17302714	0.197	0.427	0.341	4.086×10^{-2}	527
sulfurdioxide slant column density corrected [DU]	$(2.179 \pm 43.109) \times 10^{-2}$	17302714	0.242	0.363	9.486×10^{-3}	-44.4	497
sulfurdioxide slant column density cobra [DU]	$(2.147 \pm 38.204) \times 10^{-2}$	17302714	0.242	0.363	9.486×10^{-3}	-44.4	54.0
sulfurdioxide slant column density cobra precision [DU]	0.298 ± 0.150	17302714	0.188	0.152	0.250	8.087×10^{-2}	29.4
sulfurdioxide slant column density window1 [DU]	0.235 ± 0.717	17302714	0.275	0.742	0.255	-32.7	80.8
sulfurdioxide slant column density window1 precision [DU]	0.298 ± 0.150	17302714	0.188	0.152	0.250	8.087×10^{-2}	29.4
sulfurdioxide slant column density corrected win1 [DU]	$(8.229 \pm 70.595) \times 10^{-2}$	17302714	2.500×10^{-2}	0.722	5.987×10^{-2}	-32.7	80.7
background so2 slant column offset window1 [DU]	-0.153 ± 0.209	17302714	-0.300	0.212	-0.206	-1.41	4.04
sulfurdioxide slant column density window2 [DU]	3.86 ± 9.22	17302714	3.25	11.6	3.57	-1.913×10^{3}	1.611×10^{3}
sulfurdioxide slant column density window2 precision [DU]	8.14 ± 2.24	17302714	7.43	2.58	7.81	2.25	686
sulfurdioxide slant column density corrected win2 [DU]	1.42 ± 8.84	17302714	1.25	11.2	1.39	-1.921×10^{3}	1.611×10^{3}
background so2 slant column offset window2 [DU]	-2.44 ± 2.75	17302714	-0.250	3.75	-1.50	-27.4	4.69
sulfurdioxide slant column density window3 [DU]	-20.9 ± 24.4	17302714	-21.8	31.0	-21.1	-318	224
sulfurdioxide slant column density window3 precision [DU]	28.6 ± 13.3	17302714	22.5	9.49	25.0	10.0	250
sulfurdioxide slant column density corrected win3 [DU]	-8.01 ± 23.42	17302714	-8.40	29.6	-8.04	-317	228
background so2 slant column offset window3 [DU]	12.9 ± 7.5	17302714	7.28	12.4	12.2	-8.59	39.7
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	17302714	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.180 \pm 6.945) \times 10^{-2}$	17302714	1.125×10^{-2}	1.675×10^{-2}	1.488×10^{-2}	1.390×10^{-4}	2.34
fitted radiance shift [nm]	$(-5.422 \pm 26.303) \times 10^{-4}$	17302714	-5.000×10^{-4}	1.865×10^{-3}	-5.226×10^{-4}	-5.109×10^{-2}	0.100
fitted radiance squeeze [1]	$(-4.098 \pm 20.283) \times 10^{-5}$	17302714	-1.000×10^{-5}	2.083×10^{-4}	-2.389×10^{-5}	-2.064×10^{-2}	1.528×10^{-2}
fitted root mean square [1]	$(1.309 \pm 0.622) \times 10^{-3}$	17302714	9.250×10^{-4}	6.044×10^{-4}	1.112×10^{-3}	3.193×10^{-4}	6.797×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.806 ± 0.426	17302714	0.580	0.541	0.763	5.000×10^{-2}	2.80
sulfurdioxide total air mass factor polluted precision [1]	0.113 ± 0.131	17302714	3.500×10^{-2}	0.113	6.377×10^{-2}	2.500×10^{-3}	2.11
sulfurdioxide clear air mass factor polluted [1]	0.693 ± 0.309	17302714	0.540	0.410	0.657	3.181×10^{-2}	2.97
number of spectral points in retrieval [1]	73.5 ± 0.5	17302714	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	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.34	−1.08	−0.608	−0.391	−0.224	0.256	0.441	0.691	1.25	3.97
sulfurdioxide total vertical column precision [DU]	9.758×10^{-2}	0.135	0.162	0.186	0.218	0.645	0.922	1.30	2.10	5.43
sulfurdioxide slant column density corrected [DU]	−0.893	−0.500	−0.358	−0.265	−0.170	0.193	0.295	0.397	0.565	1.13
sulfurdioxide slant column density cobra [DU]	−0.893	−0.500	−0.358	−0.265	−0.170	0.193	0.295	0.397	0.565	1.13
sulfurdioxide slant column density cobra precision [DU]	0.138	0.164	0.177	0.187	0.201	0.353	0.408	0.469	0.577	0.850
sulfurdioxide slant column density window1 [DU]	−1.82	−0.874	−0.540	−0.332	−0.123	0.619	0.808	0.990	1.27	2.08
sulfurdioxide slant column density window1 precision [DU]	0.138	0.164	0.177	0.187	0.201	0.353	0.408	0.469	0.577	0.850
sulfurdioxide slant column density corrected win1 [DU]	−1.69	−0.930	−0.659	−0.482	−0.296	0.426	0.628	0.832	1.16	2.18
background so2 slant column offset window1 [DU]	−0.417	−0.353	−0.326	−0.309	−0.287	-7.496×10^{-2}	6.301×10^{-3}	9.127×10^{-2}	0.221	0.574
sulfurdioxide slant column density window2 [DU]	−17.1	−10.6	−7.31	−4.88	−2.11	9.52	12.6	15.4	19.3	27.5
sulfurdioxide slant column density window2 precision [DU]	4.35	5.25	5.78	6.19	6.68	9.26	10.1	10.9	12.1	14.7
sulfurdioxide slant column density corrected win2 [DU]	−19.7	−12.8	−9.43	−6.95	−4.18	6.98	9.78	12.3	15.7	22.9
background so2 slant column offset window2 [DU]	−10.1	−7.76	−6.47	−5.49	−4.17	−0.420	−0.124	0.121	0.571	1.94
sulfurdioxide slant column density window3 [DU]	−80.6	−60.7	−51.1	−44.1	−36.4	−5.41	2.63	9.87	19.6	38.6
sulfurdioxide slant column density window3 precision [DU]	14.2	16.7	18.4	19.8	21.4	30.9	35.7	41.8	54.0	85.7
sulfurdioxide slant column density corrected win3 [DU]	−66.1	−46.3	−37.0	−30.2	−22.8	6.86	14.4	21.2	30.3	48.7
background so2 slant column offset window3 [DU]	−1.10	2.35	3.79	4.99	6.61	19.0	21.4	23.2	25.3	28.8
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]	1.537×10^{-3}	2.925×10^{-3}	4.560×10^{-3}	6.601×10^{-3}	8.961×10^{-3}	2.571×10^{-2}	3.507×10^{-2}	5.769×10^{-2}	0.116	0.355
fitted radiance shift [nm]	-8.520×10^{-3}	-4.471×10^{-3}	-3.051×10^{-3}	-2.232×10^{-3}	-1.507×10^{-3}	3.577×10^{-4}	1.059×10^{-3}	1.940×10^{-3}	3.477×10^{-3}	7.698×10^{-3}
fitted radiance squeeze [1]	-7.172×10^{-4}	-3.745×10^{-4}	-2.609×10^{-4}	-1.950×10^{-4}	-1.323×10^{-4}	7.594×10^{-5}	1.259×10^{-4}	1.718×10^{-4}	2.370×10^{-4}	3.895×10^{-4}
fitted root mean square [1]	5.935×10^{-4}	7.277×10^{-4}	7.977×10^{-4}	8.518×10^{-4}	9.191×10^{-4}	1.524×10^{-3}	1.780×10^{-3}	2.043×10^{-3}	2.498×10^{-3}	3.606×10^{-3}
sulfurdioxide total air mass factor polluted [1]	5.575×10^{-2}	0.187	0.290	0.381	0.501	1.04	1.21	1.39	1.62	2.01
sulfurdioxide total air mass factor polluted precision [1]	8.678×10^{-3}	1.587×10^{-2}	2.191×10^{-2}	2.761×10^{-2}	3.524×10^{-2}	0.148	0.200	0.257	0.357	0.612
sulfurdioxide clear air mass factor polluted [1]	0.167	0.262	0.326	0.389	0.474	0.884	0.982	1.06	1.18	1.73
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]	0.652 ± 0.406	8794352	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(7.220 \pm 199.429) \times 10^{-2}$	8794352	0.571	1.376×10^{-2}	-211	730	-0.263	0.308
sulfurdioxide total vertical column precision [DU]	0.857 ± 1.424	8794352	0.638	0.420	4.086×10^{-2}	213	0.237	0.875
sulfurdioxide slant column density corrected [DU]	$(2.761 \pm 44.440) \times 10^{-2}$	8794352	0.385	1.062×10^{-2}	-14.0	58.0	-0.179	0.206
sulfurdioxide slant column density cobra [DU]	$(2.714 \pm 42.320) \times 10^{-2}$	8794352	0.385	1.062×10^{-2}	-14.0	36.5	-0.179	0.206
sulfurdioxide slant column density cobra precision [DU]	0.322 ± 0.172	8794352	0.176	0.272	8.800×10^{-2}	21.7	0.206	0.382
sulfurdioxide slant column density window1 [DU]	0.242 ± 0.792	8794352	0.785	0.267	-15.5	47.2	-0.133	0.652
sulfurdioxide slant column density window1 precision [DU]	0.322 ± 0.172	8794352	0.176	0.272	8.800×10^{-2}	21.7	0.206	0.382
sulfurdioxide slant column density corrected win1 [DU]	$(9.769 \pm 78.386) \times 10^{-2}$	8794352	0.768	6.472×10^{-2}	-15.7	47.3	-0.311	0.457
background so2 slant column offset window1 [DU]	-0.144 ± 0.247	8794352	0.231	-0.214	-0.690	2.99	-0.298	-6.755×10^{-2}
sulfurdioxide slant column density window2 [DU]	4.59 ± 9.36	8794352	12.0	4.24	-550	80.0	-1.59	10.4
sulfurdioxide slant column density window2 precision [DU]	8.18 ± 2.13	8794352	2.56	7.86	2.25	406	6.73	9.29
sulfurdioxide slant column density corrected win2 [DU]	1.44 ± 8.83	8794352	11.3	1.41	-550	74.3	-4.22	7.06
background so2 slant column offset window2 [DU]	-3.15 ± 3.18	8794352	5.16	-2.40	-27.4	4.69	-5.62	-0.457
sulfurdioxide slant column density window3 [DU]	-23.5 ± 23.9	8794352	30.4	-23.7	-229	145	-38.7	-8.30
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 12.5	8794352	8.59	24.4	10.0	250	21.1	29.7
sulfurdioxide slant column density corrected win3 [DU]	-7.93 ± 22.97	8794352	29.1	-7.80	-212	161	-22.4	6.72
background so2 slant column offset window3 [DU]	15.6 ± 7.4	8794352	13.1	15.9	-5.44	39.7	8.72	21.8
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	8794352	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.450 \pm 9.165) \times 10^{-2}$	8794352	2.776×10^{-2}	1.639×10^{-2}	1.390×10^{-4}	2.34	7.960×10^{-3}	3.572×10^{-2}
fitted radiance shift [nm]	$(-3.838 \pm 24.911) \times 10^{-4}$	8794352	1.679×10^{-3}	-3.868×10^{-4}	-4.126×10^{-2}	4.210×10^{-2}	-1.246×10^{-3}	4.324×10^{-4}
fitted radiance squeeze [1]	$(-5.250 \pm 23.224) \times 10^{-5}$	8794352	2.244×10^{-4}	-2.485×10^{-5}	-1.216×10^{-2}	1.096×10^{-2}	-1.441×10^{-4}	8.032×10^{-5}
fitted root mean square [1]	$(1.406 \pm 0.721) \times 10^{-3}$	8794352	6.998×10^{-4}	1.173×10^{-3}	3.193×10^{-4}	4.356×10^{-2}	9.416×10^{-4}	1.641×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.732 ± 0.427	8794352	0.573	0.676	5.000×10^{-2}	2.80	0.408	0.980
sulfurdioxide total air mass factor polluted precision [1]	0.109 ± 0.149	8794352	0.101	5.363×10^{-2}	2.500×10^{-3}	2.11	2.898×10^{-2}	0.130
sulfurdioxide clear air mass factor polluted [1]	0.623 ± 0.308	8794352	0.469	0.568	3.181×10^{-2}	2.70	0.375	0.844
number of spectral points in retrieval [1]	73.5 ± 0.5	8794352	1.000	73.0	71.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.666 ± 0.405	8508362	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.114 \pm 81.772) \times 10^{-2}$	8508362	0.411	9.437×10^{-3}	-80.1	467	-0.194	0.217
sulfurdioxide total vertical column precision [DU]	0.445 ± 0.575	8508362	0.290	0.291	4.491×10^{-2}	527	0.203	0.494
sulfurdioxide slant column density corrected [DU]	$(1.578 \pm 41.681) \times 10^{-2}$	8508362	0.343	8.424×10^{-3}	-44.4	497	-0.162	0.181
sulfurdioxide slant column density cobra [DU]	$(1.560 \pm 33.412) \times 10^{-2}$	8508362	0.343	8.423×10^{-3}	-44.4	54.0	-0.162	0.181
sulfurdioxide slant column density cobra precision [DU]	0.274 ± 0.118	8508362	0.126	0.236	8.087×10^{-2}	29.4	0.198	0.323
sulfurdioxide slant column density window1 [DU]	0.227 ± 0.630	8508362	0.701	0.244	-32.7	80.8	-0.114	0.587
sulfurdioxide slant column density window1 precision [DU]	0.274 ± 0.118	8508362	0.126	0.236	8.087×10^{-2}	29.4	0.198	0.323
sulfurdioxide slant column density corrected win1 [DU]	$(6.638 \pm 61.472) \times 10^{-2}$	8508362	0.678	5.534×10^{-2}	-32.7	80.7	-0.281	0.397
background so2 slant column offset window1 [DU]	-0.161 ± 0.159	8508362	0.195	-0.201	-1.41	4.04	-0.278	-8.248×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.11 ± 9.01	8508362	11.2	2.92	-1.913×10^{3}	1.611×10^{3}	-2.62	8.60
sulfurdioxide slant column density window2 precision [DU]	8.11 ± 2.35	8508362	2.59	7.75	2.25	686	6.63	9.22
sulfurdioxide slant column density corrected win2 [DU]	1.41 ± 8.84	8508362	11.0	1.38	-1.921×10^{3}	1.611×10^{3}	-4.13	6.90
background so2 slant column offset window2 [DU]	-1.70 ± 1.98	8508362	2.28	-1.16	-19.1	4.08	-2.68	-0.395
sulfurdioxide slant column density window3 [DU]	-18.2 ± 24.7	8508362	31.2	-18.5	-318	224	-33.8	-2.59
sulfurdioxide slant column density window3 precision [DU]	29.5 ± 14.0	8508362	10.3	25.7	10.3	232	21.7	32.0
sulfurdioxide slant column density corrected win3 [DU]	-8.10 ± 23.87	8508362	30.2	-8.30	-317	228	-23.2	7.02
background so2 slant column offset window3 [DU]	10.1 ± 6.6	8508362	11.2	8.63	-8.59	31.6	4.68	15.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	8508362	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.868 \pm 2.808) \times 10^{-2}$	8508362	1.145×10^{-2}	1.425×10^{-2}	8.250×10^{-4}	1.49	9.611×10^{-3}	2.106×10^{-2}
fitted radiance shift [nm]	$(-7.060 \pm 27.573) \times 10^{-4}$	8508362	2.031×10^{-3}	-6.878×10^{-4}	-5.109×10^{-2}	0.100	-1.772×10^{-3}	2.597×10^{-4}
fitted radiance squeeze [1]	$(-2.906 \pm 16.623) \times 10^{-5}$	8508362	1.942×10^{-4}	-2.300×10^{-5}	-2.064×10^{-2}	1.528×10^{-2}	-1.224×10^{-4}	7.173×10^{-5}
fitted root mean square [1]	$(1.209 \pm 0.478) \times 10^{-3}$	8508362	4.992×10^{-4}	1.066×10^{-3}	3.305×10^{-4}	6.797×10^{-2}	9.000×10^{-4}	1.399×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.883 ± 0.411	8508362	0.504	0.830	5.000×10^{-2}	2.65	0.600	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.118 ± 0.109	8508362	0.123	7.625×10^{-2}	4.572×10^{-3}	1.67	4.117×10^{-2}	0.164
sulfurdioxide clear air mass factor polluted [1]	0.765 ± 0.293	8508362	0.353	0.715	0.135	2.97	0.565	0.917
number of spectral points in retrieval [1]	73.4 ± 0.5	8508362	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]	0.701 ± 0.393	12144299	0.710	1.000	0.0	1.000	0.290	1.000
sulfurdioxide total vertical column [DU]	$(2.947 \pm 110.693) \times 10^{-2}$	12144299	0.439	9.313×10^{-3}	-150	467	-0.208	0.232
sulfurdioxide total vertical column precision [DU]	0.528 ± 0.779	12144299	0.348	0.306	5.024×10^{-2}	94.3	0.209	0.557
sulfurdioxide slant column density corrected [DU]	$(1.575 \pm 39.525) \times 10^{-2}$	12144299	0.349	7.939×10^{-3}	-9.99	497	-0.165	0.184
sulfurdioxide slant column density cobra [DU]	$(1.559 \pm 34.338) \times 10^{-2}$	12144299	0.349	7.939×10^{-3}	-9.99	54.0	-0.165	0.184
sulfurdioxide slant column density cobra precision [DU]	0.283 ± 0.133	12144299	0.138	0.238	8.087×10^{-2}	29.4	0.197	0.335
sulfurdioxide slant column density window1 [DU]	0.235 ± 0.658	12144299	0.714	0.252	-32.7	36.0	-0.111	0.603
sulfurdioxide slant column density window1 precision [DU]	0.283 ± 0.133	12144299	0.138	0.238	8.087×10^{-2}	29.4	0.197	0.335
sulfurdioxide slant column density corrected win1 [DU]	$(7.126 \pm 64.615) \times 10^{-2}$	12144299	0.695	5.481×10^{-2}	-32.7	35.9	-0.289	0.406
background so2 slant column offset window1 [DU]	-0.163 ± 0.183	12144299	0.201	-0.207	-1.41	2.90	-0.286	-8.534×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.44 ± 8.99	12144299	11.3	3.21	-1.913×10^{3}	1.611×10^{3}	-2.37	8.98
sulfurdioxide slant column density window2 precision [DU]	8.03 ± 2.16	12144299	2.49	7.68	2.25	686	6.61	9.10
sulfurdioxide slant column density corrected win2 [DU]	1.40 ± 8.71	12144299	11.0	1.38	-1.921×10^{3}	1.611×10^{3}	-4.12	6.89
background so2 slant column offset window2 [DU]	-2.04 ± 2.39	12144299	2.98	-1.31	-24.8	4.69	-3.35	-0.376
sulfurdioxide slant column density window3 [DU]	-17.9 ± 24.5	12144299	31.2	-18.2	-239	224	-33.6	-2.35
sulfurdioxide slant column density window3 precision [DU]	28.2 ± 12.5	12144299	9.27	24.9	10.1	218	21.4	30.6
sulfurdioxide slant column density corrected win3 [DU]	-6.03 ± 23.21	12144299	29.6	-6.28	-232	228	-20.9	8.72
background so2 slant column offset window3 [DU]	11.9 ± 7.0	12144299	11.3	11.0	-8.59	36.5	6.30	17.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	12144299	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.082 \pm 3.190) \times 10^{-2}$	12144299	1.270×10^{-2}	1.439×10^{-2}	3.704×10^{-4}	0.928	9.519×10^{-3}	2.222×10^{-2}
fitted radiance shift [nm]	$(-5.378 \pm 24.783) \times 10^{-4}$	12144299	1.843×10^{-3}	-5.033×10^{-4}	-5.109×10^{-2}	0.100	-1.491×10^{-3}	3.522×10^{-4}
fitted radiance squeeze [1]	$(-3.029 \pm 18.212) \times 10^{-5}$	12144299	1.990×10^{-4}	-1.947×10^{-5}	-1.332×10^{-2}	1.287×10^{-2}	-1.220×10^{-4}	7.699×10^{-5}
fitted root mean square [1]	$(1.246 \pm 0.543) \times 10^{-3}$	12144299	5.425×10^{-4}	1.072×10^{-3}	3.193×10^{-4}	6.797×10^{-2}	9.025×10^{-4}	1.445×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.831 ± 0.391	12144299	0.493	0.806	5.000×10^{-2}	2.71	0.558	1.05
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.104	12144299	0.103	6.645×10^{-2}	3.321×10^{-3}	1.65	3.928×10^{-2}	0.142
sulfurdioxide clear air mass factor polluted [1]	0.726 ± 0.286	12144299	0.380	0.697	4.700×10^{-2}	2.70	0.523	0.903
number of spectral points in retrieval [1]	73.5 ± 0.5	12144299	1.000	73.0	71.0	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]	0.606 ± 0.416	3814698	0.830	1.000	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(7.023 \pm 194.860) \times 10^{-2}$	3814698	0.564	1.404×10^{-2}	-179	178	-0.258	0.305
sulfurdioxide total vertical column precision [DU]	0.838 ± 1.418	3814698	0.580	0.415	4.086×10^{-2}	52.0	0.248	0.828
sulfurdioxide slant column density corrected [DU]	$(2.937 \pm 45.760) \times 10^{-2}$	3814698	0.383	1.143×10^{-2}	-44.4	100	-0.178	0.206
sulfurdioxide slant column density cobra [DU]	$(2.881 \pm 43.033) \times 10^{-2}$	3814698	0.383	1.143×10^{-2}	-44.4	47.4	-0.178	0.206
sulfurdioxide slant column density cobra precision [DU]	0.316 ± 0.165	3814698	0.160	0.268	8.545×10^{-2}	17.7	0.211	0.370
sulfurdioxide slant column density window1 [DU]	0.254 ± 0.784	3814698	0.777	0.276	-25.7	80.8	-0.120	0.657
sulfurdioxide slant column density window1 precision [DU]	0.316 ± 0.165	3814698	0.160	0.268	8.545×10^{-2}	17.7	0.211	0.370
sulfurdioxide slant column density corrected win1 [DU]	$(9.834 \pm 77.198) \times 10^{-2}$	3814698	0.754	7.017×10^{-2}	-25.7	80.7	-0.300	0.454
background so2 slant column offset window1 [DU]	-0.155 ± 0.231	3814698	0.211	-0.223	-0.871	4.04	-0.297	-8.550×10^{-2}
sulfurdioxide slant column density window2 [DU]	4.27 ± 9.53	3814698	12.0	3.97	-624	924	-1.89	10.1
sulfurdioxide slant column density window2 precision [DU]	8.38 ± 2.43	3814698	2.65	8.08	2.35	395	6.87	9.52
sulfurdioxide slant column density corrected win2 [DU]	1.44 ± 9.06	3814698	11.4	1.40	-624	924	-4.29	7.11
background so2 slant column offset window2 [DU]	-2.83 ± 3.07	3814698	4.74	-1.68	-27.4	4.69	-5.17	-0.427
sulfurdioxide slant column density window3 [DU]	-27.6 ± 23.3	3814698	29.3	-27.2	-318	161	-42.1	-12.8
sulfurdioxide slant column density window3 precision [DU]	30.1 ± 15.6	3814698	10.3	25.8	10.0	248	21.7	32.1
sulfurdioxide slant column density corrected win3 [DU]	-13.7 ± 23.6	3814698	29.8	-13.1	-317	167	-28.2	1.51
background so2 slant column offset window3 [DU]	13.9 ± 8.0	3814698	14.0	13.7	-8.59	39.7	6.89	20.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	3814698	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.774 \pm 11.344) \times 10^{-2}$	3814698	4.487×10^{-2}	1.903×10^{-2}	1.390×10^{-4}	2.34	7.412×10^{-3}	5.228×10^{-2}
fitted radiance shift [nm]	$(-5.399 \pm 30.875) \times 10^{-4}$	3814698	1.896×10^{-3}	-5.657×10^{-4}	-4.131×10^{-2}	6.159×10^{-2}	-1.524×10^{-3}	3.728×10^{-4}
fitted radiance squeeze [1]	$(-5.101 \pm 22.026) \times 10^{-5}$	3814698	2.192×10^{-4}	-2.916×10^{-5}	-1.454×10^{-2}	1.528×10^{-2}	-1.442×10^{-4}	7.505×10^{-5}
fitted root mean square [1]	$(1.378 \pm 0.688) \times 10^{-3}$	3814698	6.328×10^{-4}	1.170×10^{-3}	3.305×10^{-4}	5.532×10^{-2}	9.572×10^{-4}	1.590×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.766 ± 0.494	3814698	0.605	0.648	5.000×10^{-2}	2.80	0.406	1.01
sulfurdioxide total air mass factor polluted precision [1]	0.131 ± 0.181	3814698	0.143	5.376×10^{-2}	2.500×10^{-3}	2.11	2.734×10^{-2}	0.170
sulfurdioxide clear air mass factor polluted [1]	0.621 ± 0.335	3814698	0.439	0.563	3.181×10^{-2}	2.97	0.365	0.804
number of spectral points in retrieval [1]	73.4 ± 0.5	3814698	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

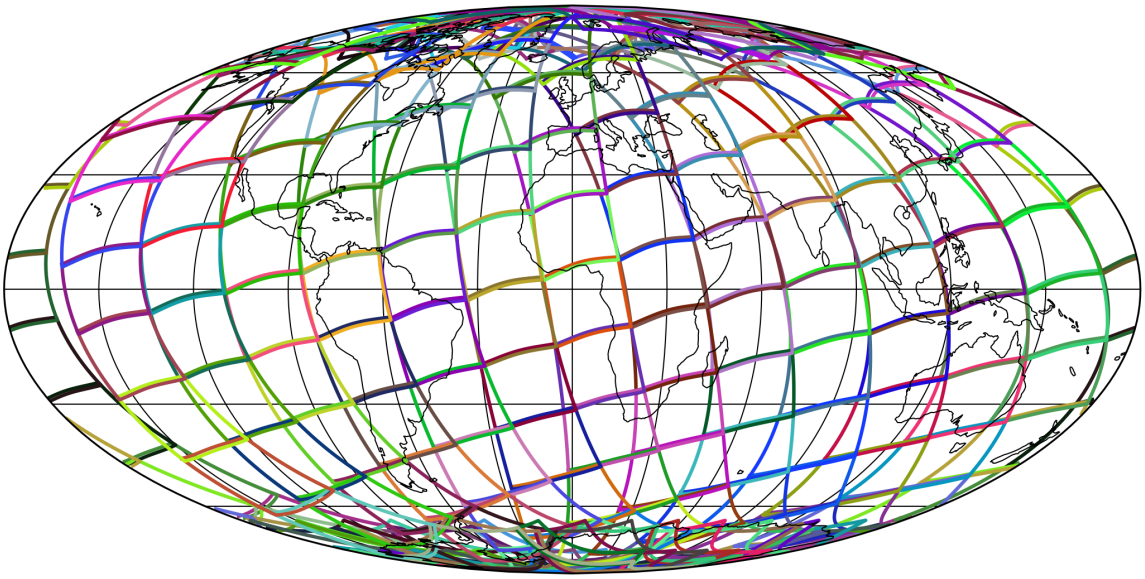

Figure 1: Outline of the granules.

4 Input data monitoring

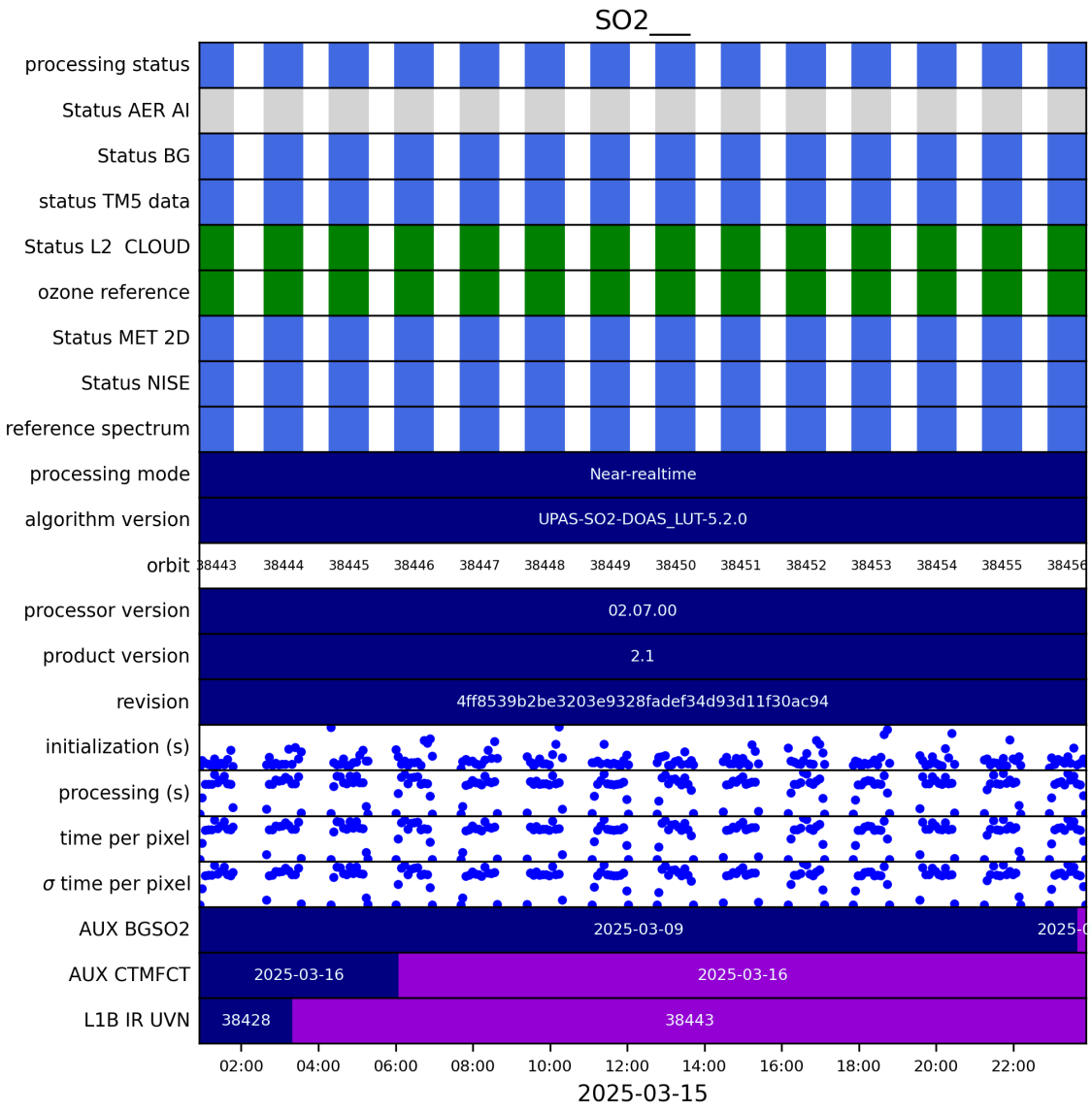

Figure 2: Input data per granule

5 Warnings and errors

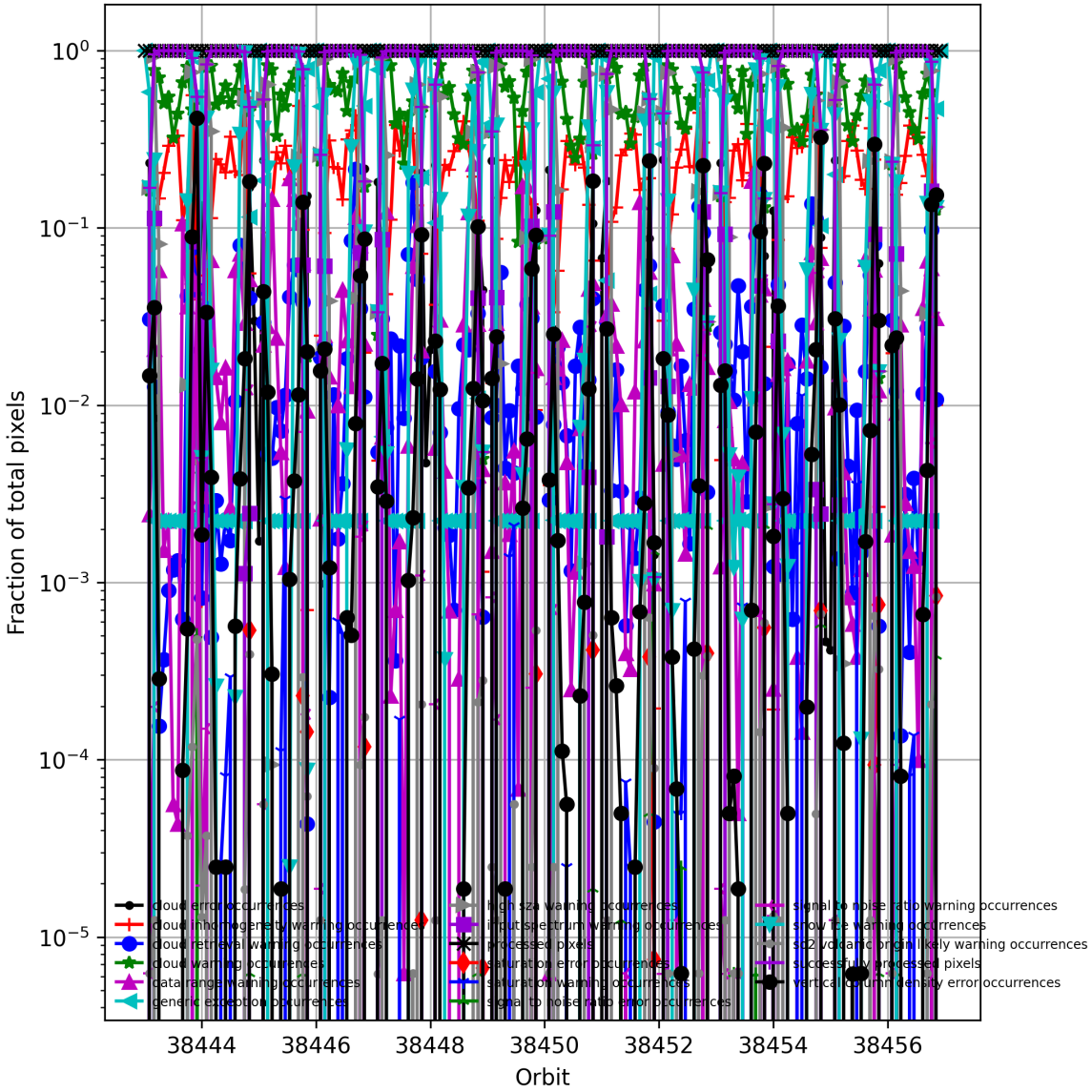

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

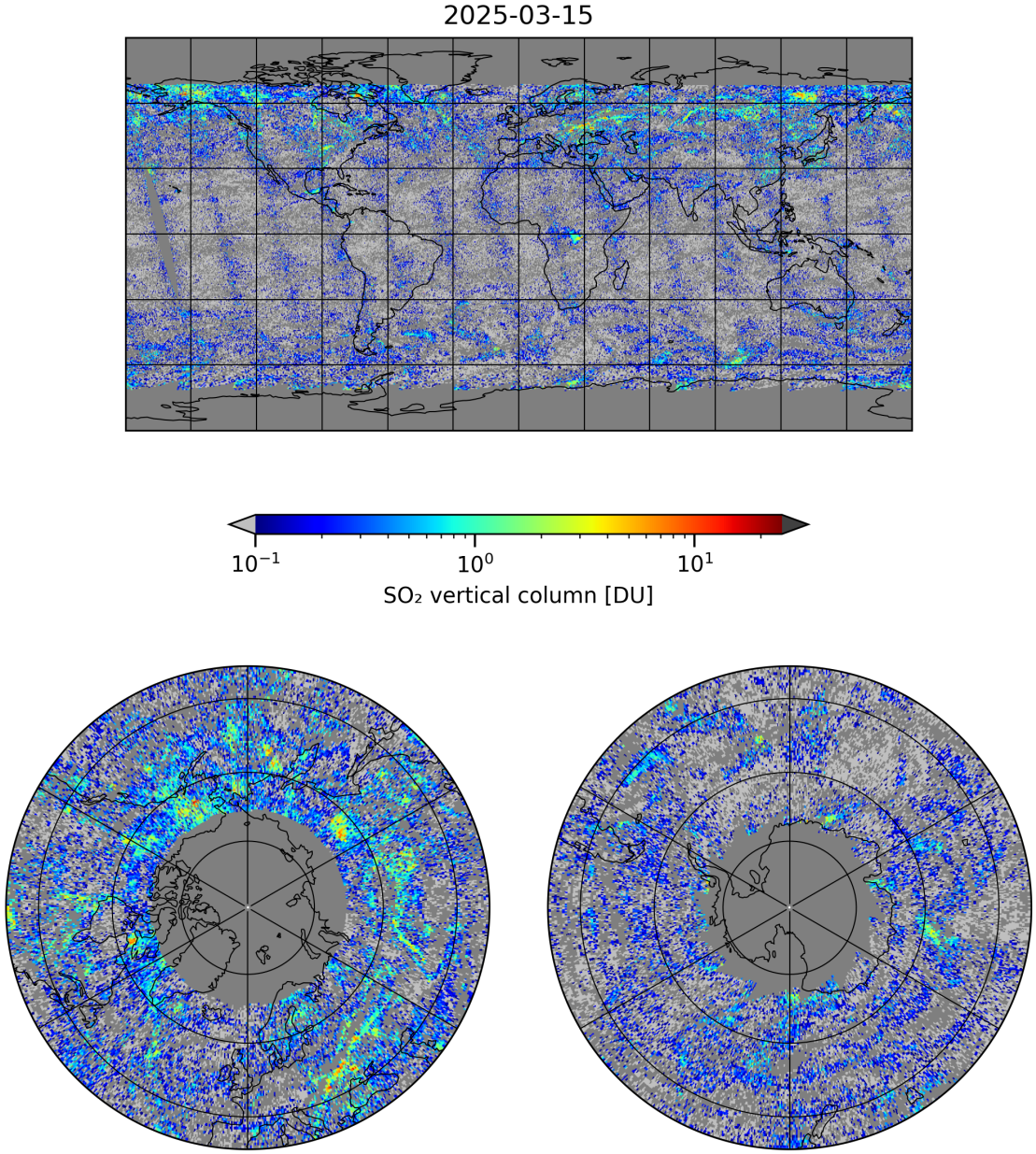

Figure 4: Map of "SO_2 vertical column" for 2025-03-15 to 2025-03-15

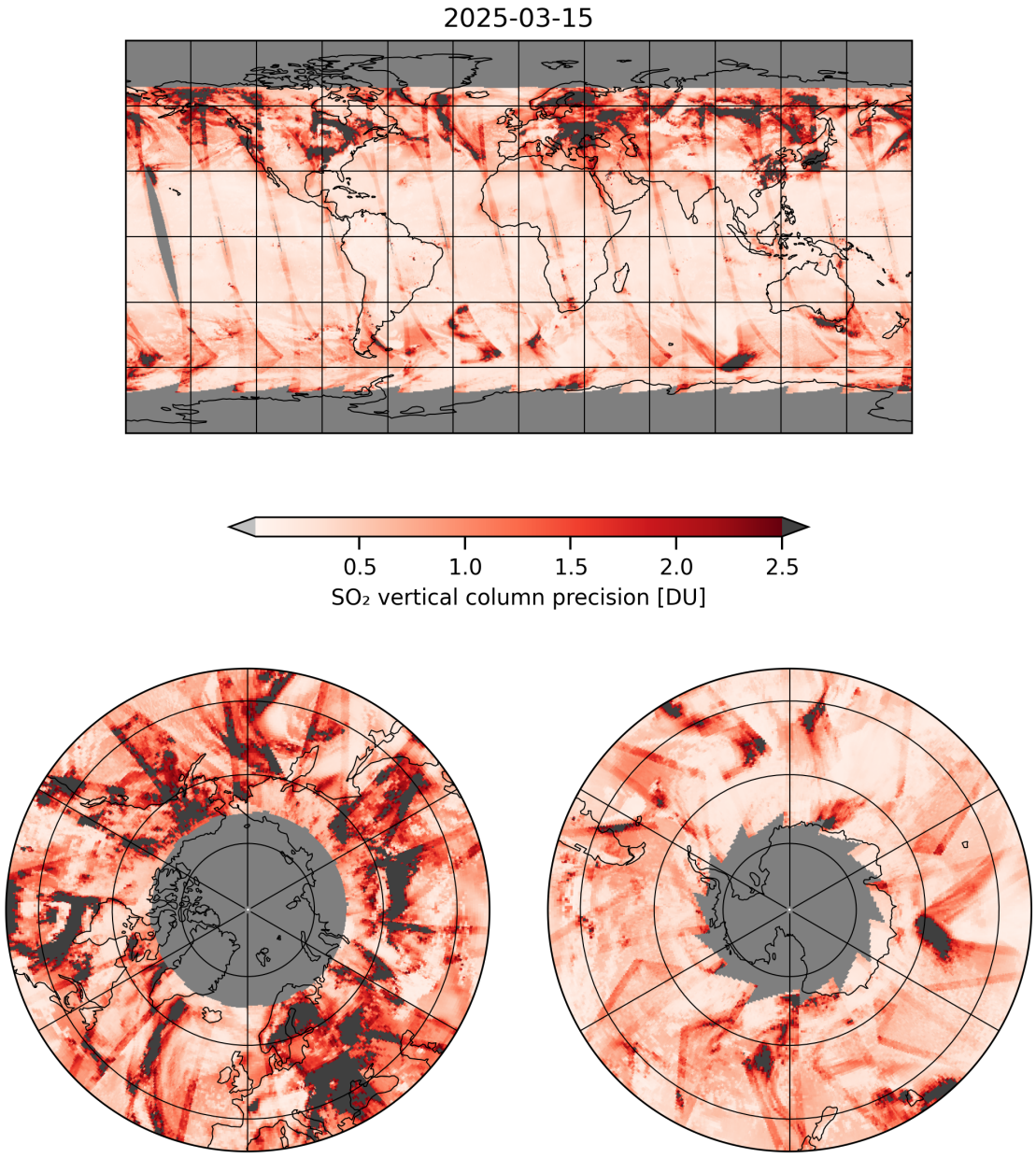

Figure 5: Map of "SO_2 vertical column precision" for 2025-03-15 to 2025-03-15

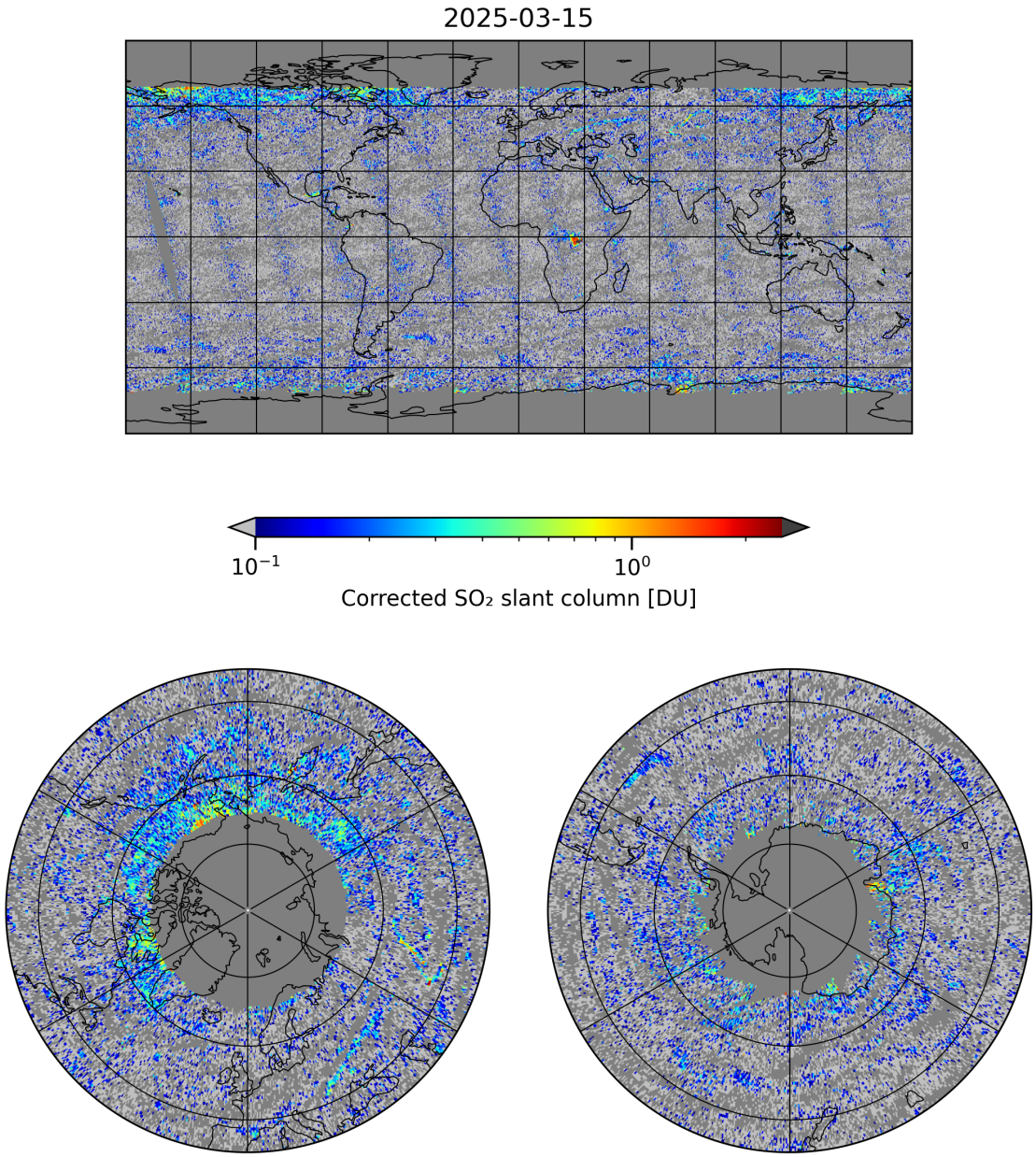

Figure 6: Map of “Corrected SO_2 slant column” for 2025-03-15 to 2025-03-15

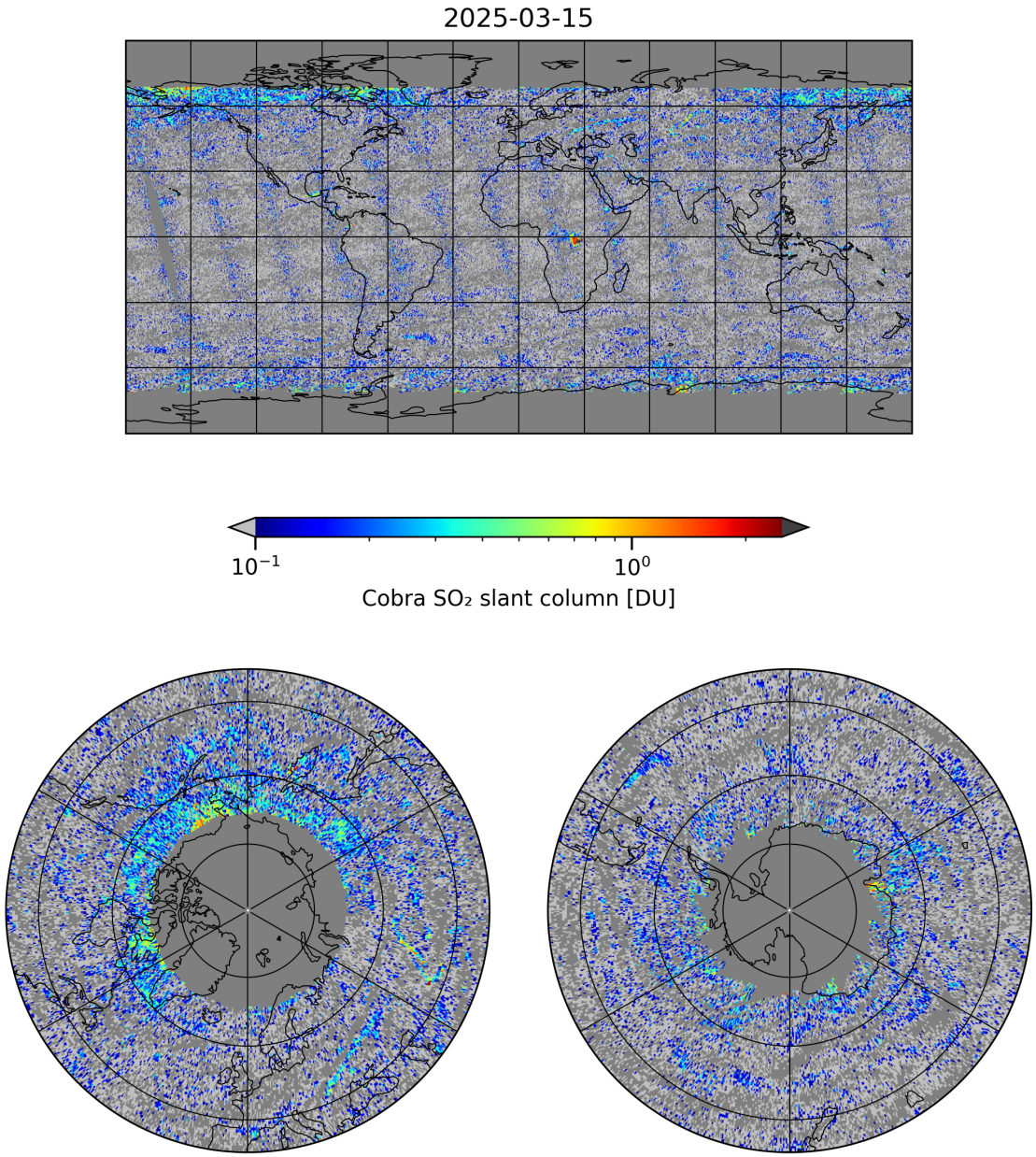

Figure 7: Map of “Cobra SO_2 slant column” for 2025-03-15 to 2025-03-15

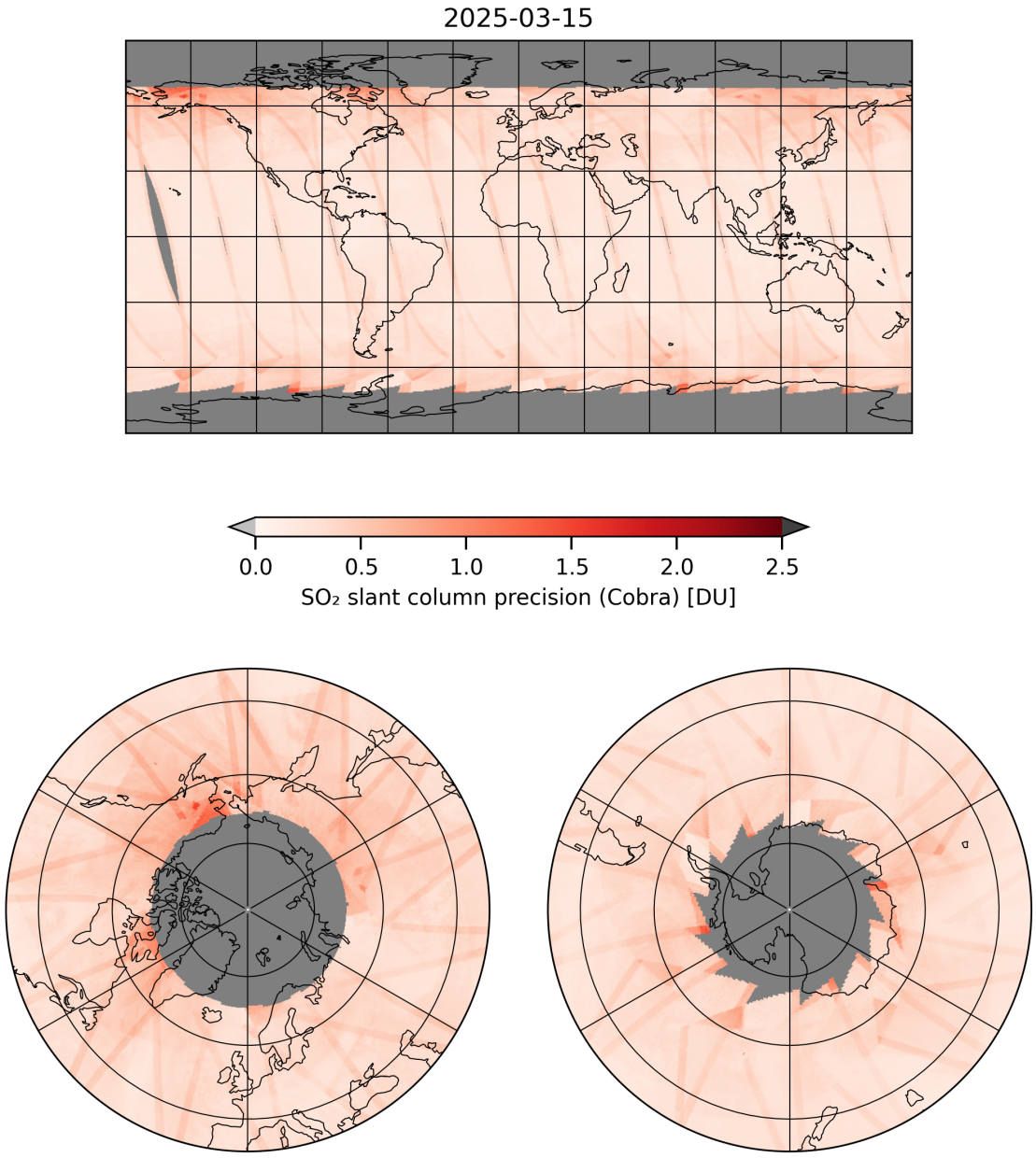

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-03-15 to 2025-03-15

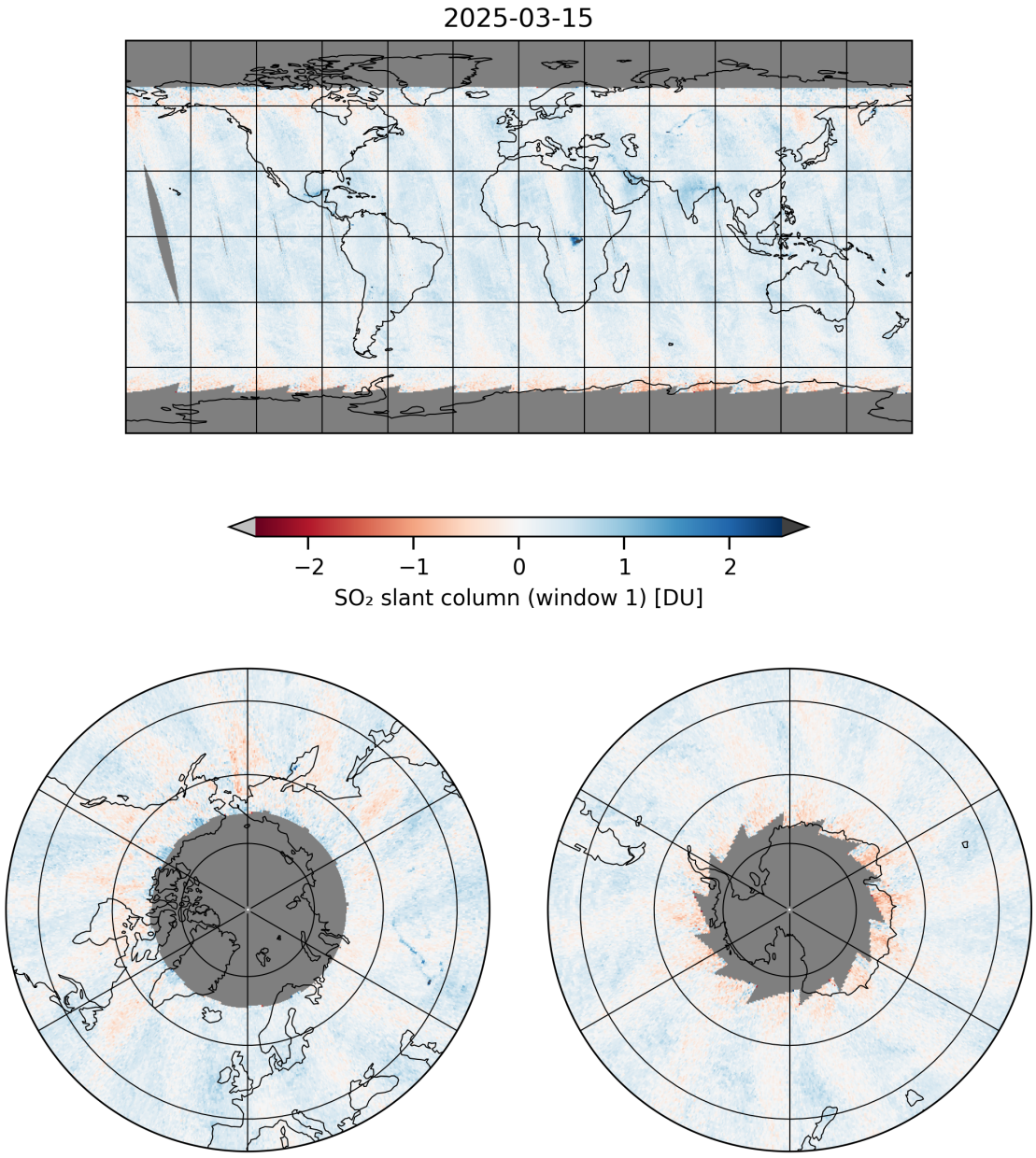

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-03-15 to 2025-03-15

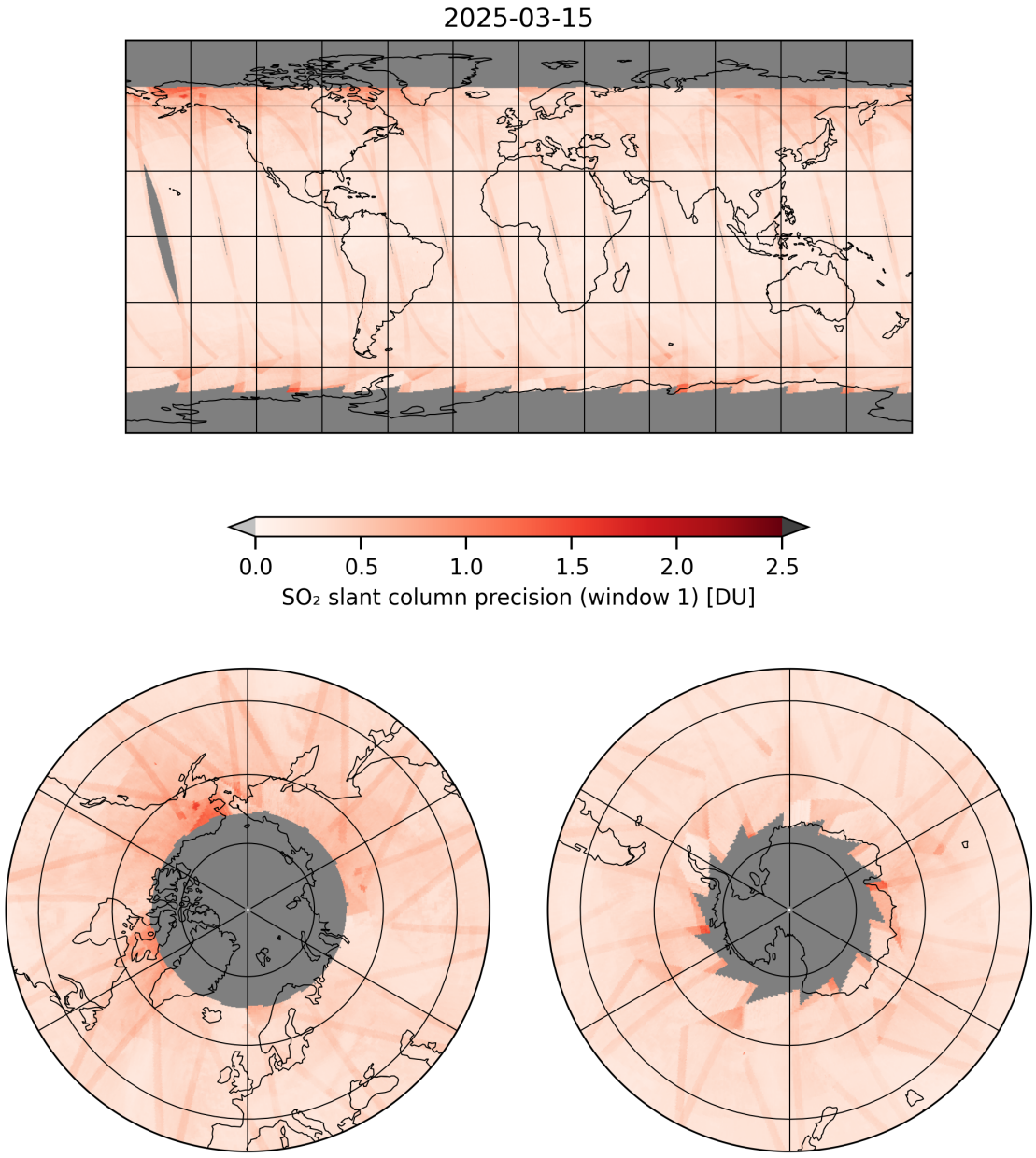

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-03-15 to 2025-03-15

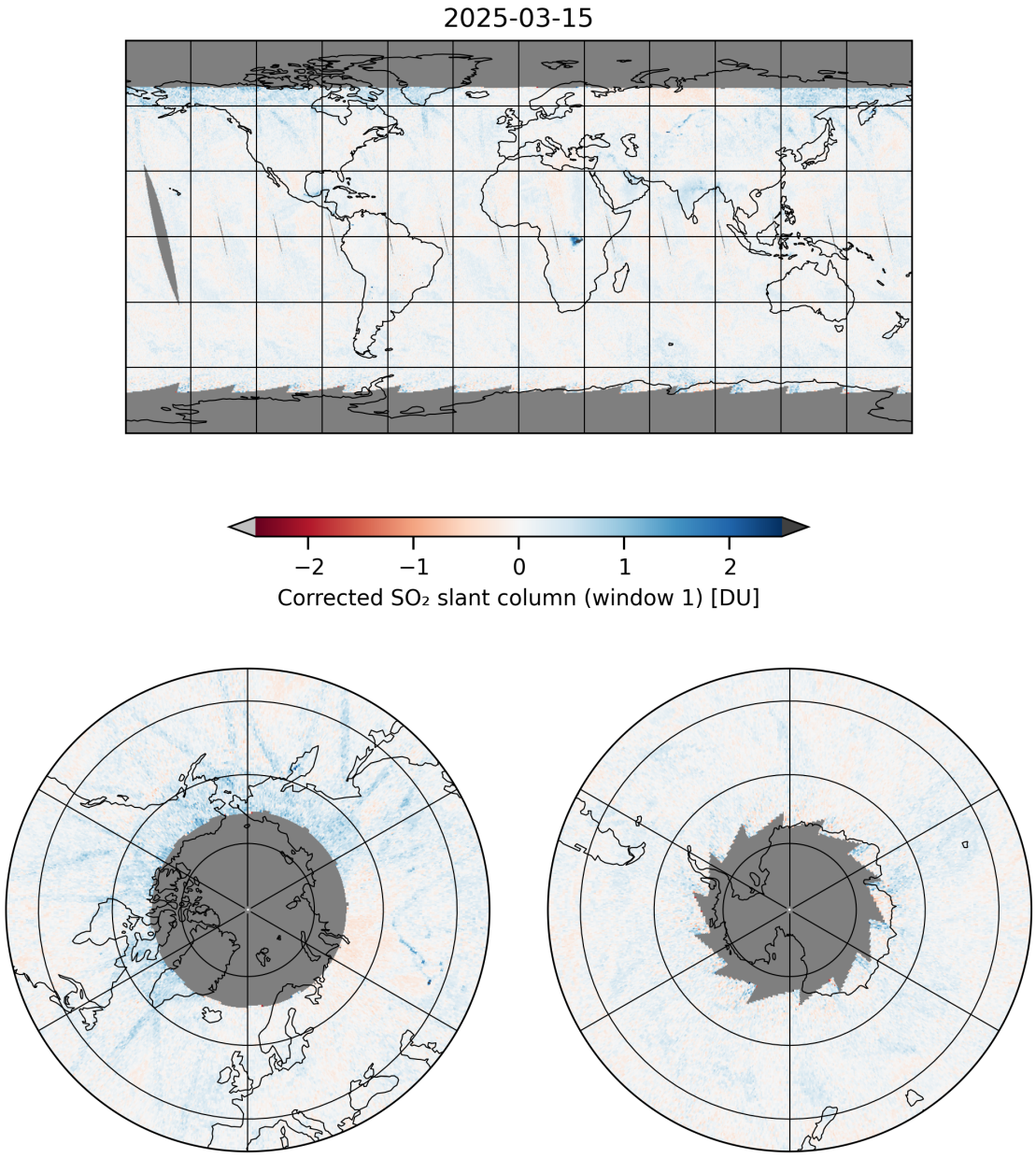

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-03-15 to 2025-03-15

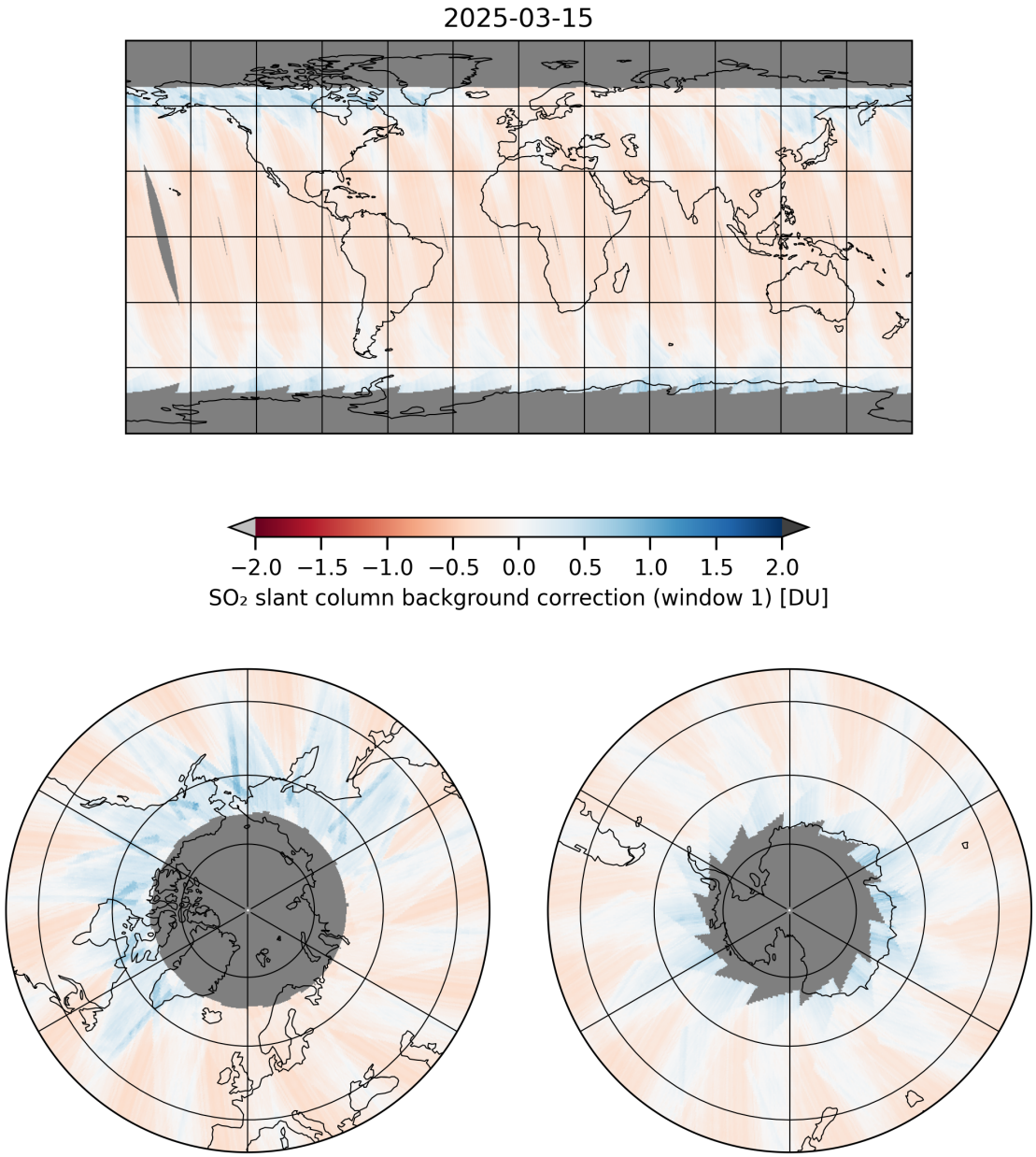

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-03-15 to 2025-03-15

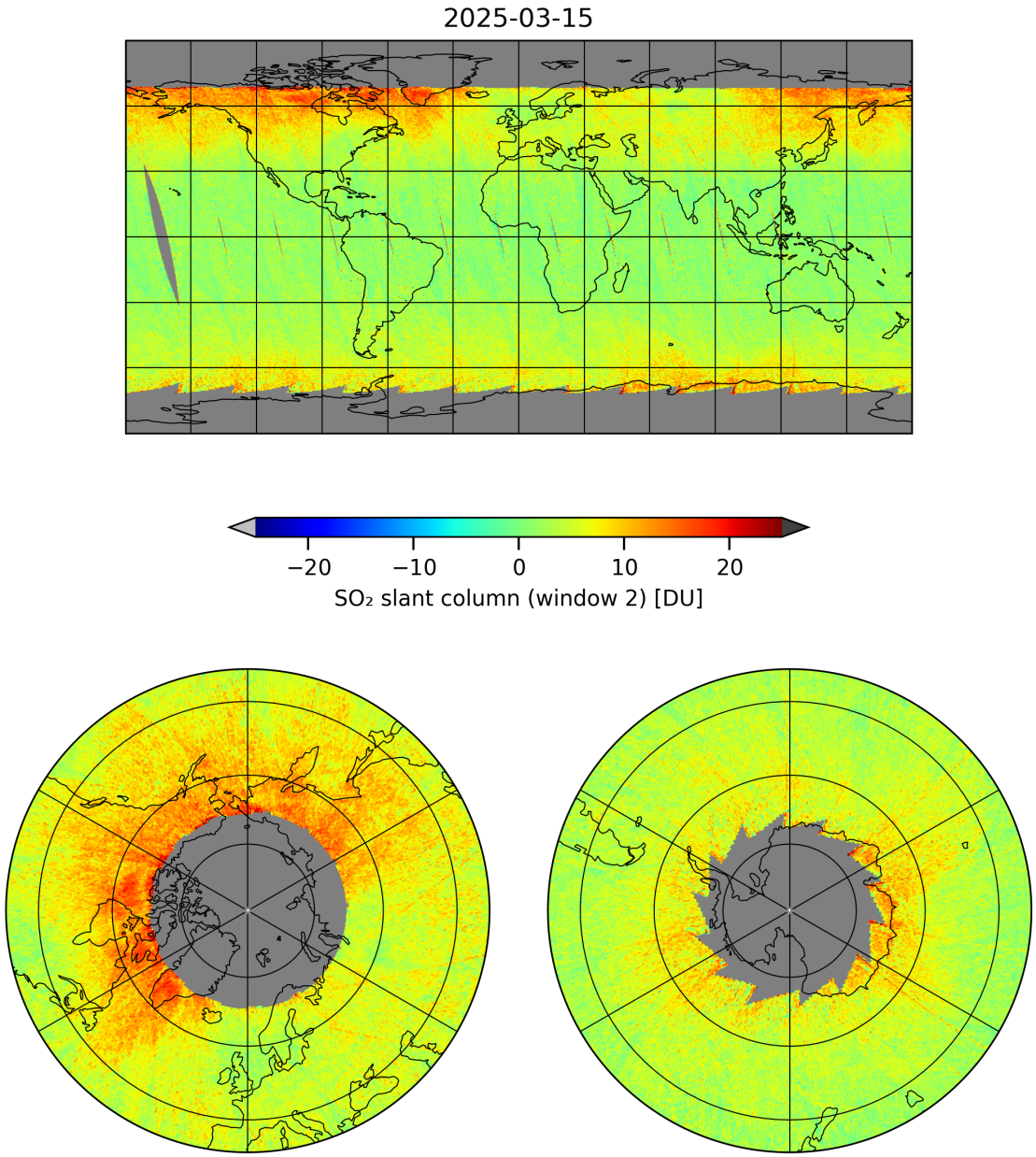

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-03-15 to 2025-03-15

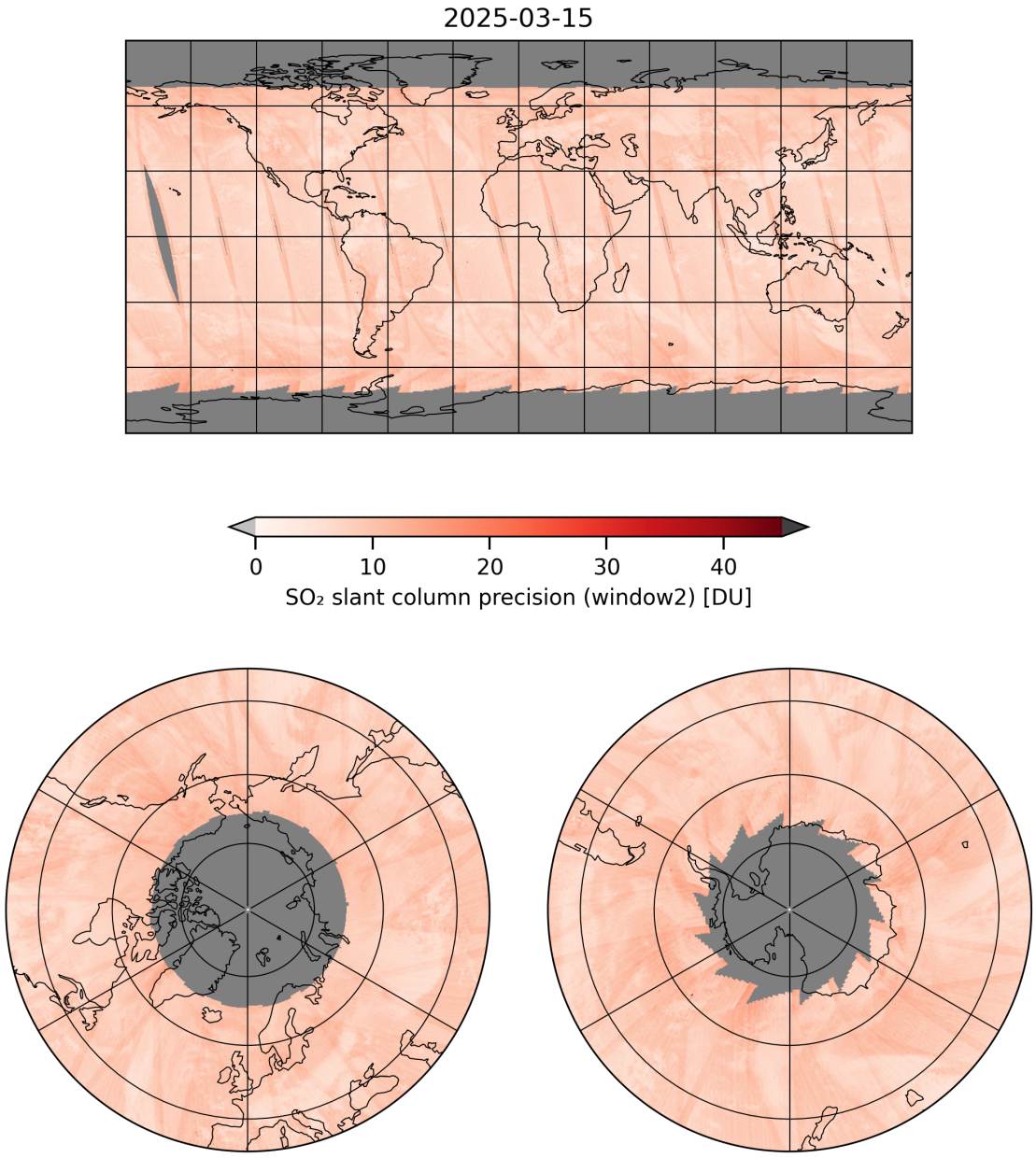

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-03-15 to 2025-03-15

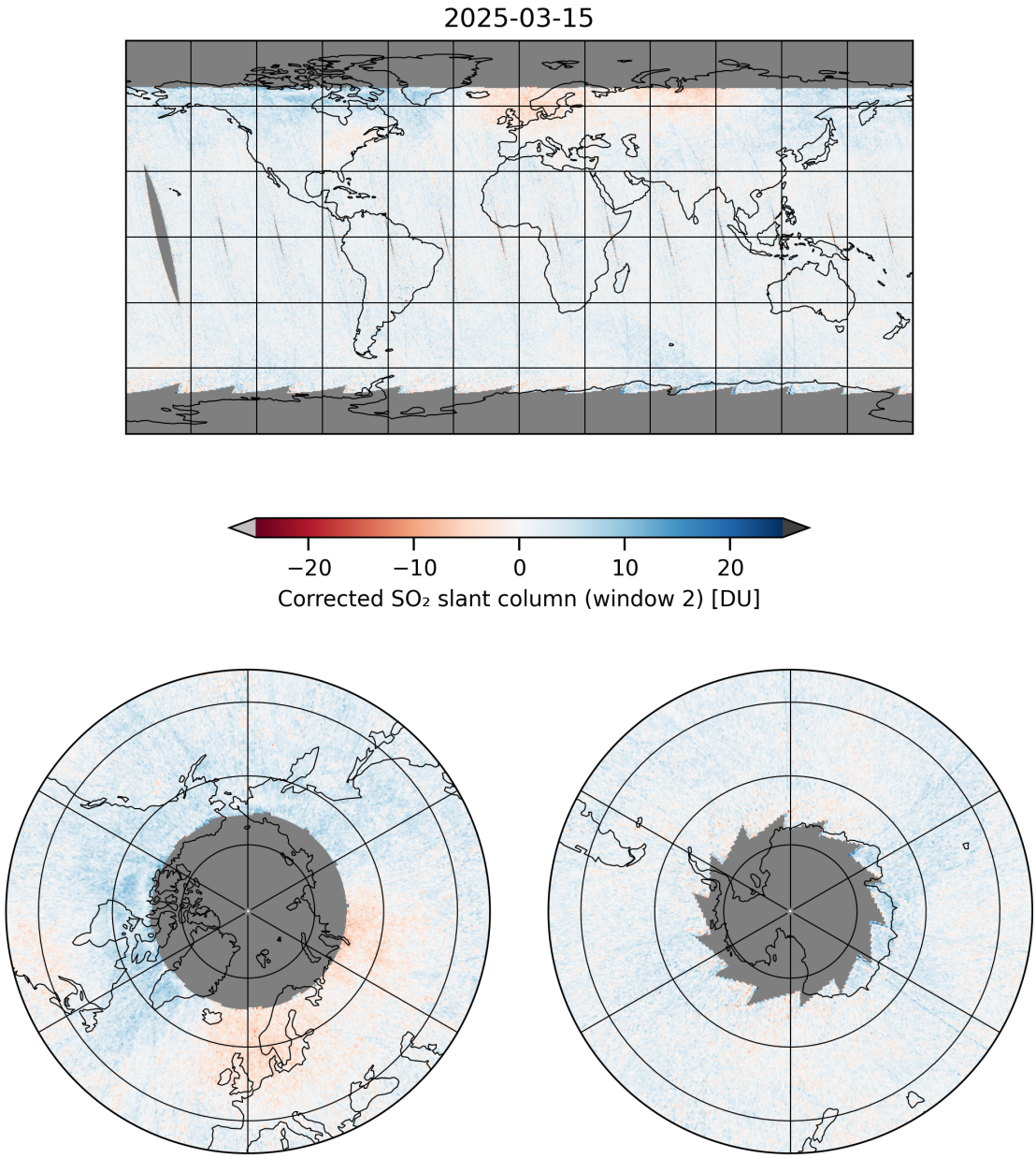

Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-03-15 to 2025-03-15

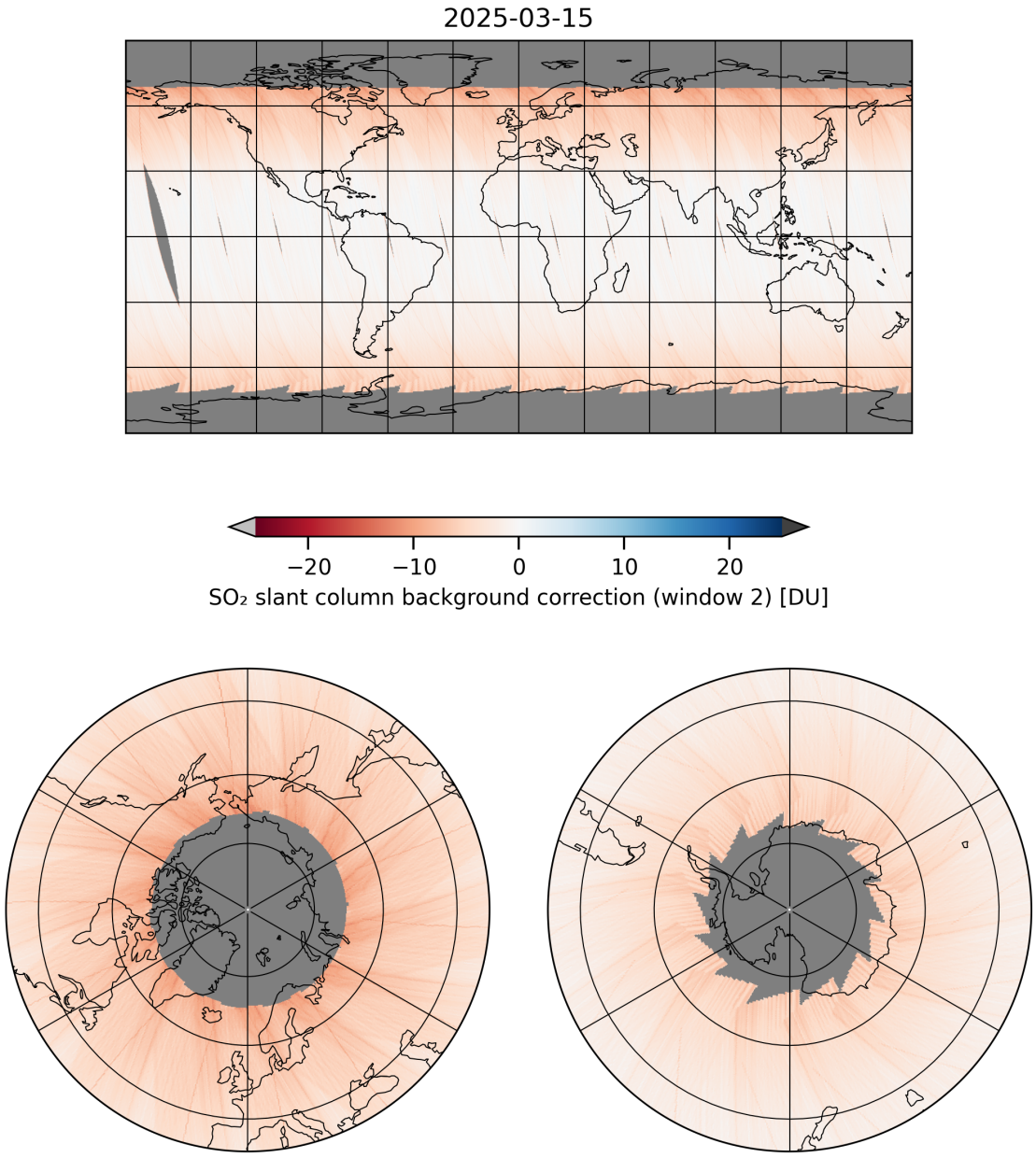

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-03-15 to 2025-03-15

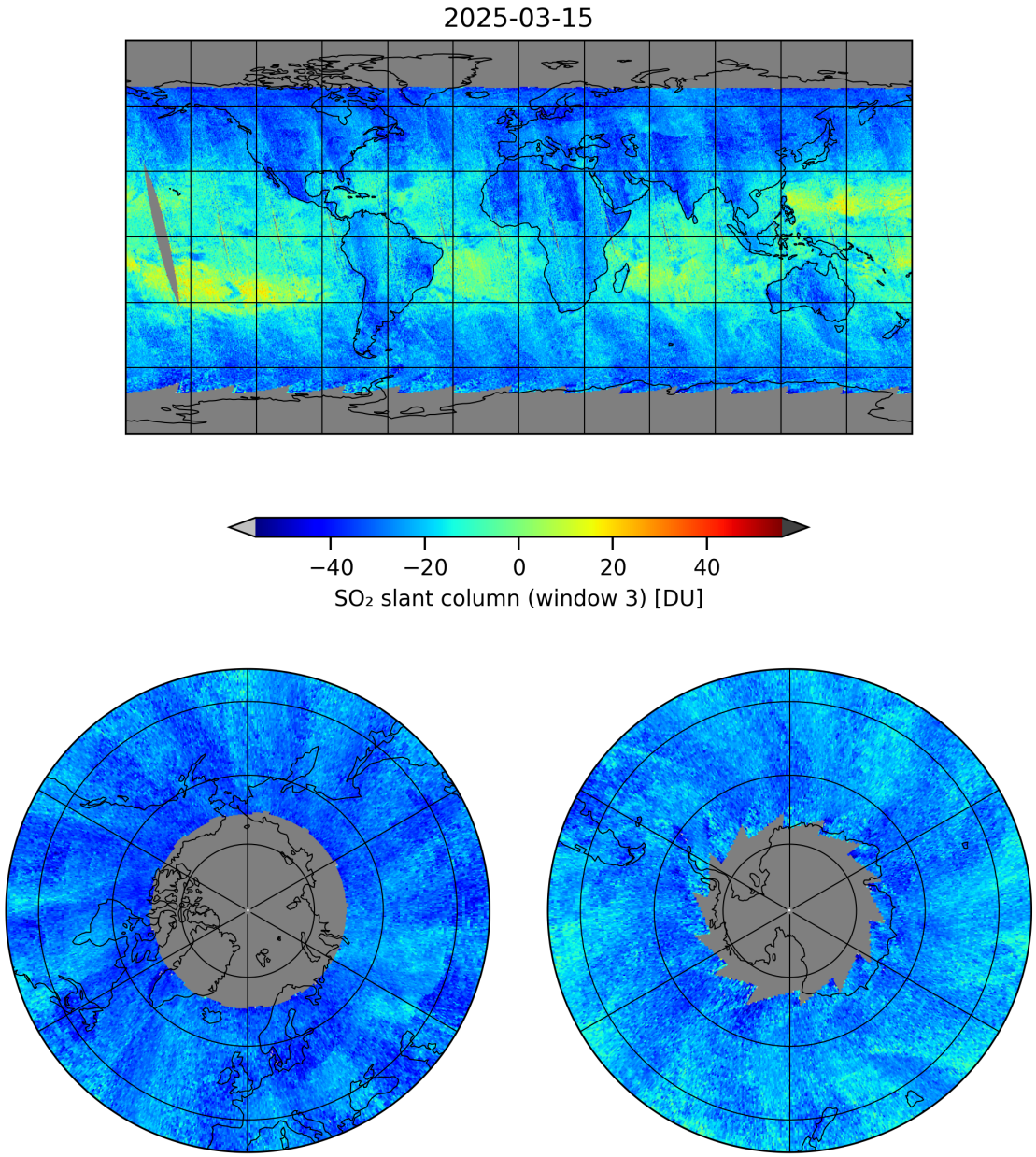

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-03-15 to 2025-03-15

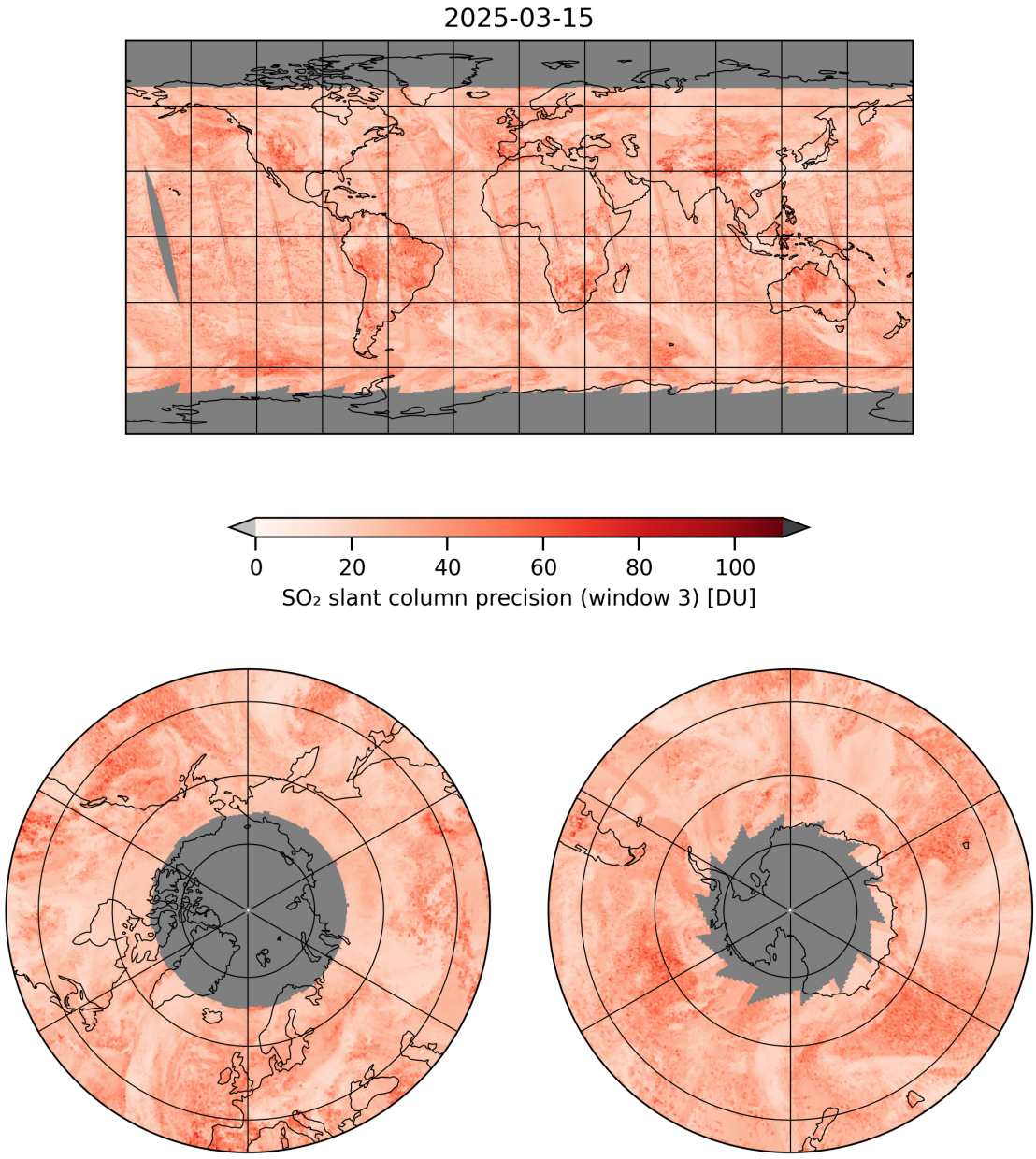

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-03-15 to 2025-03-15

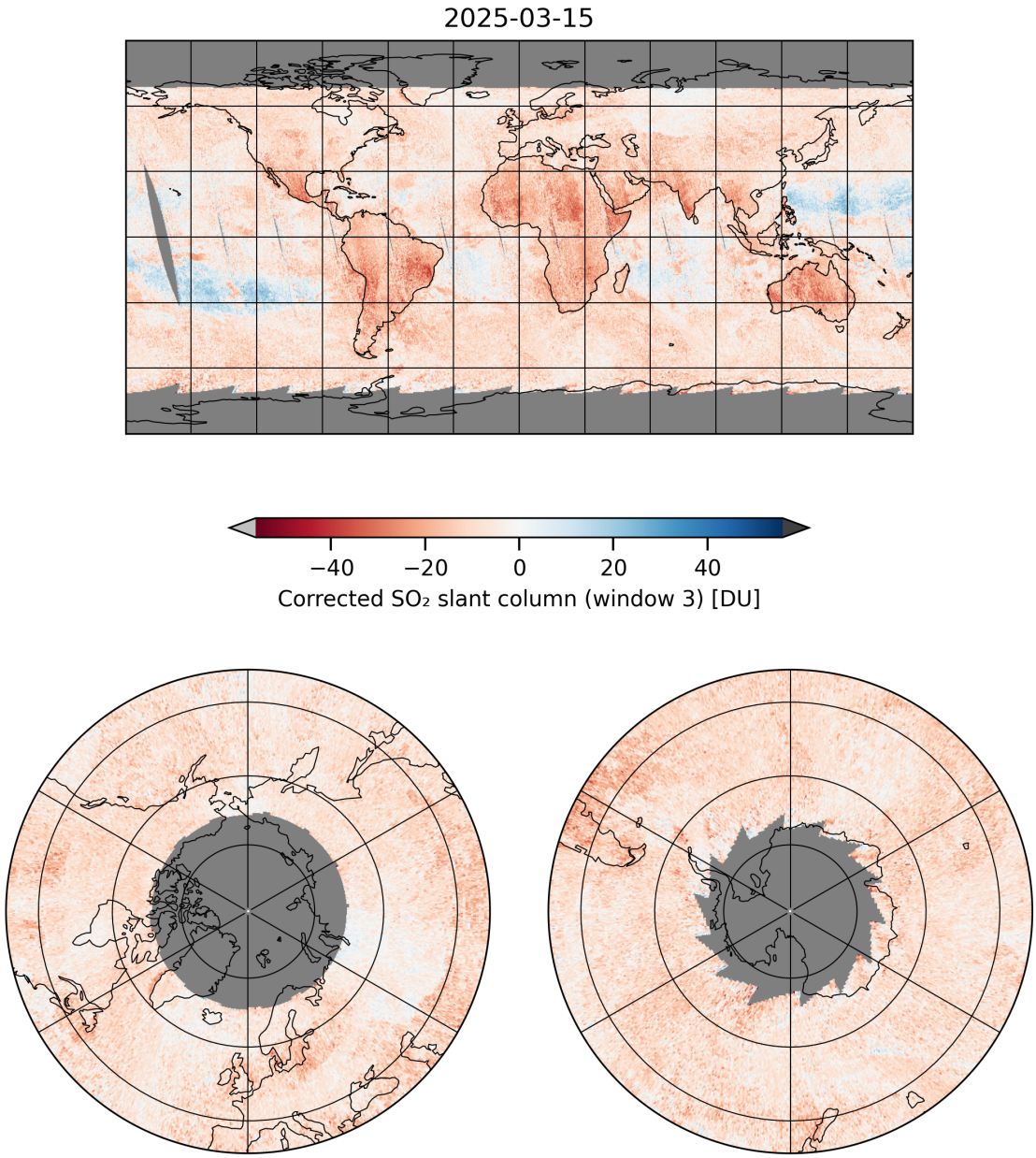

Figure 19: Map of “Corrected SO_2 slant column (window 3)” for 2025-03-15 to 2025-03-15

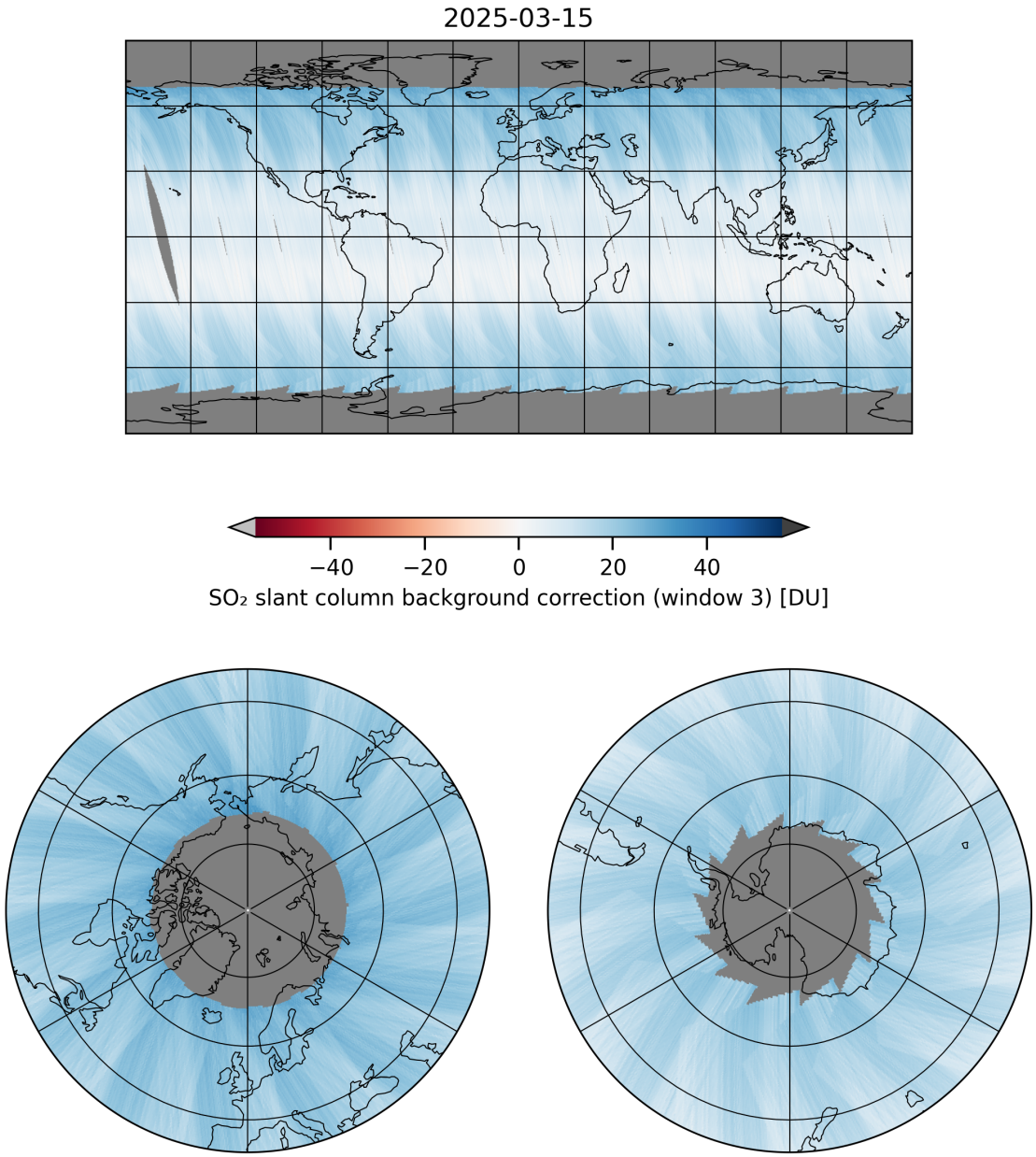

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-03-15 to 2025-03-15

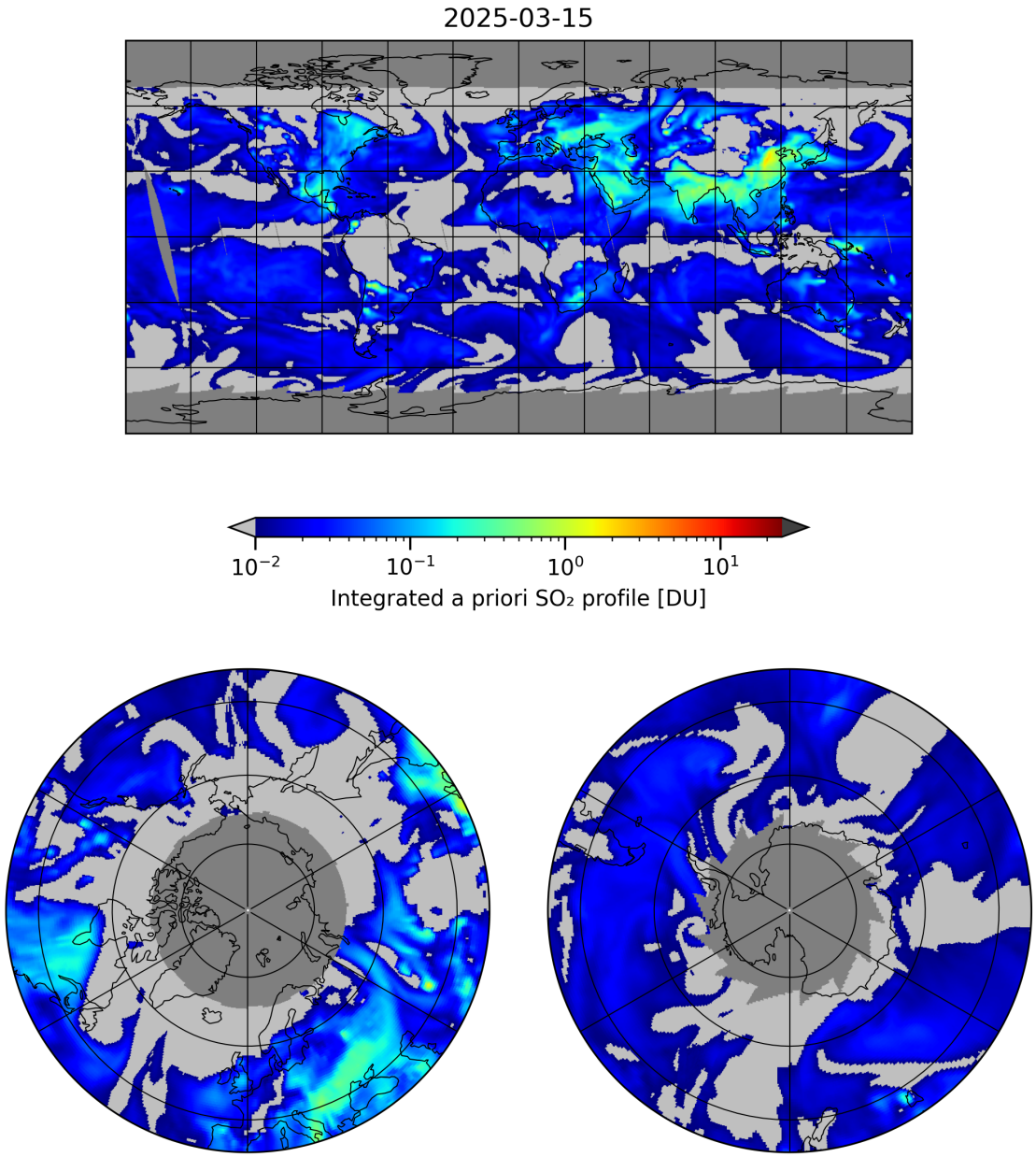

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-03-15 to 2025-03-15

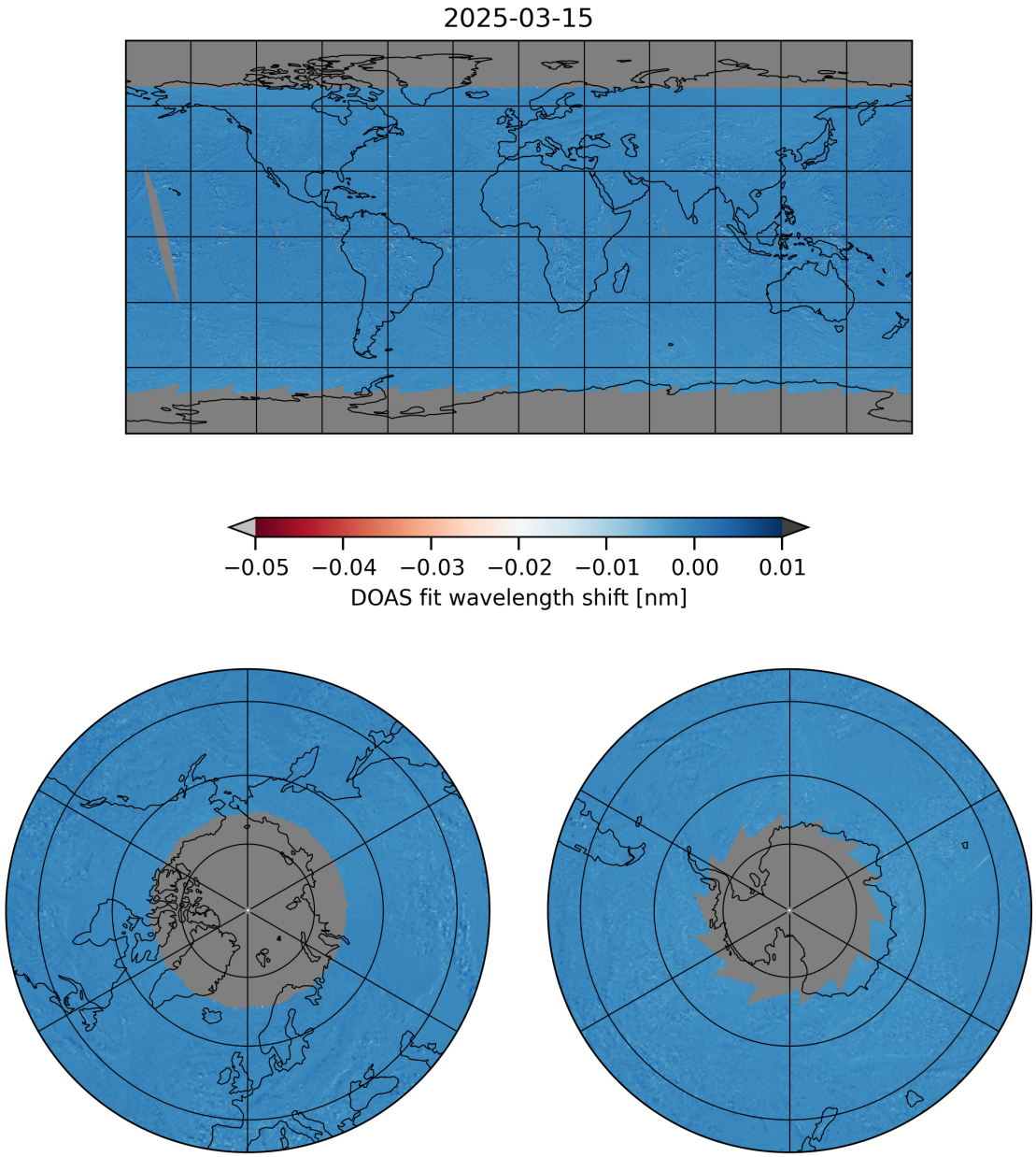

Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-15 to 2025-03-15

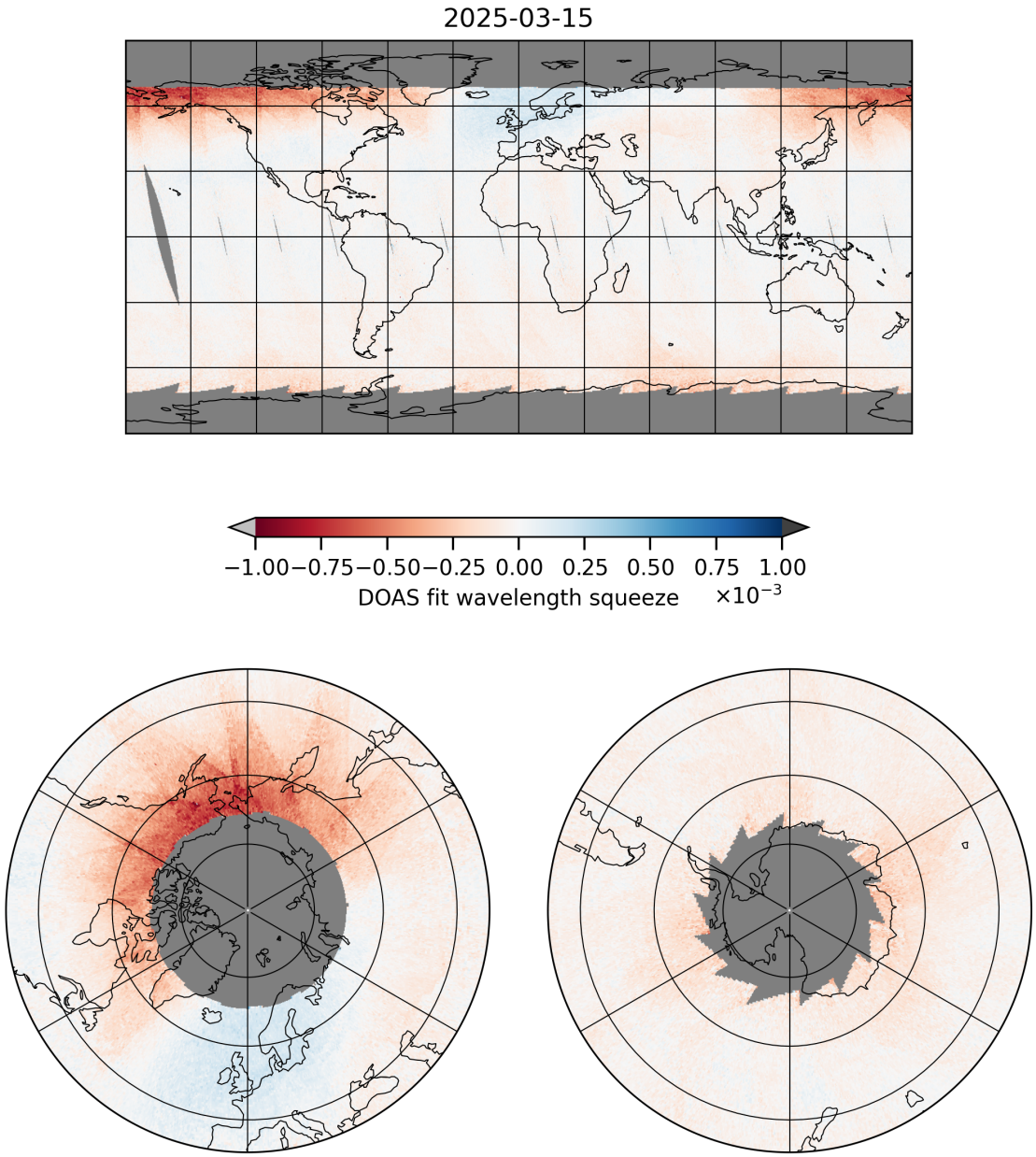

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-15 to 2025-03-15

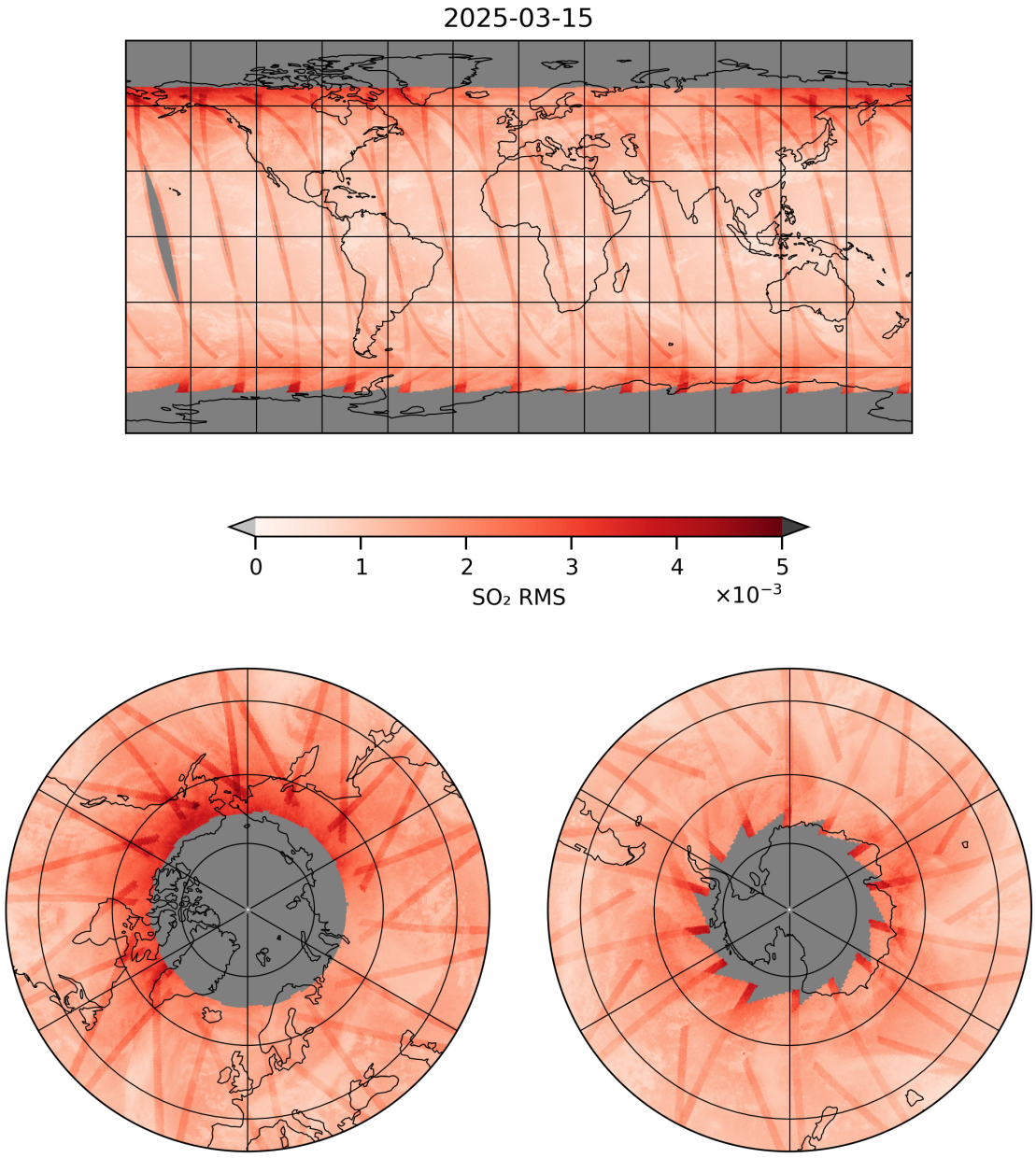

Figure 24: Map of "SO_2 RMS" for 2025-03-15 to 2025-03-15

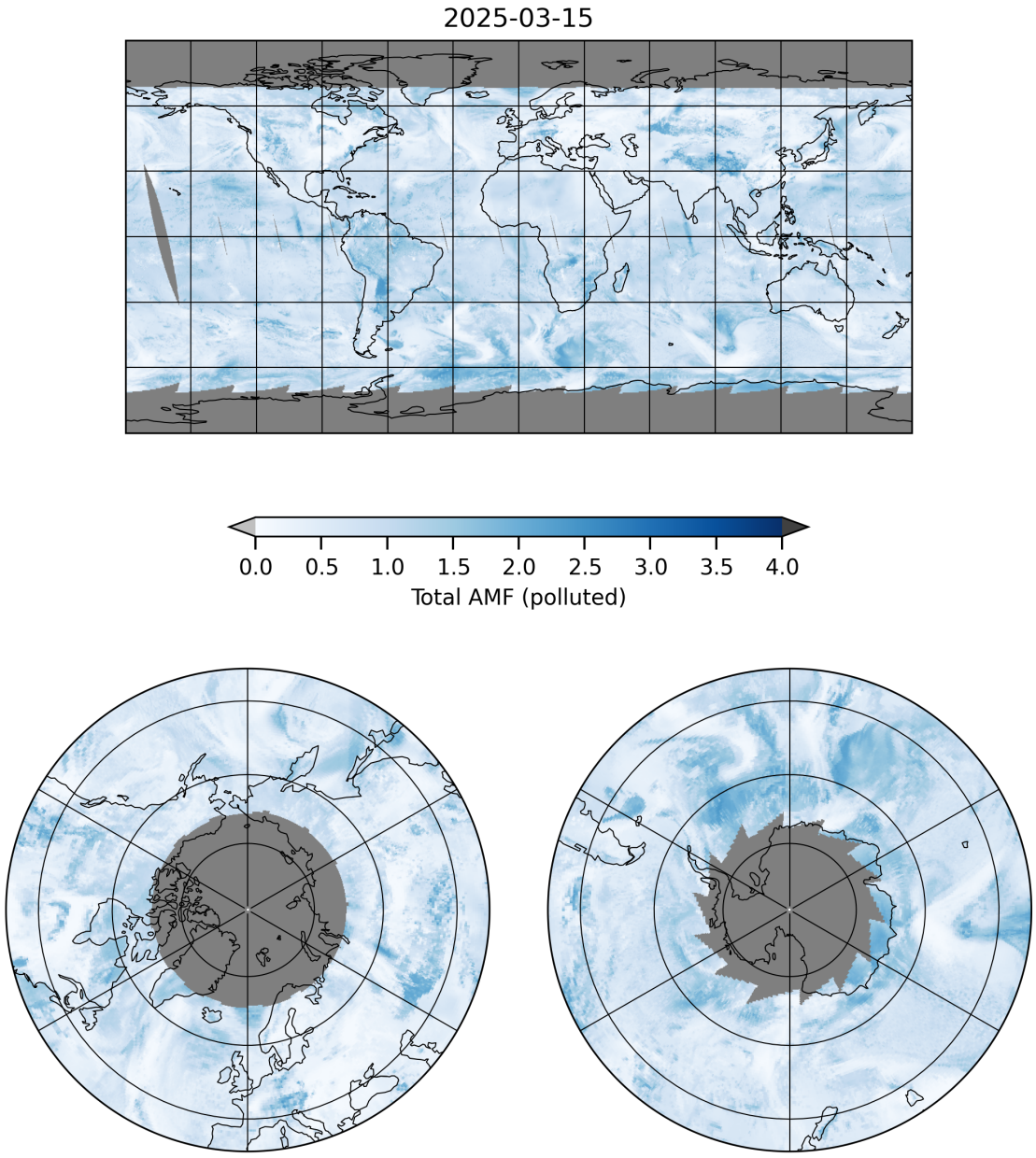

Figure 25: Map of “Total AMF (polluted)” for 2025-03-15 to 2025-03-15

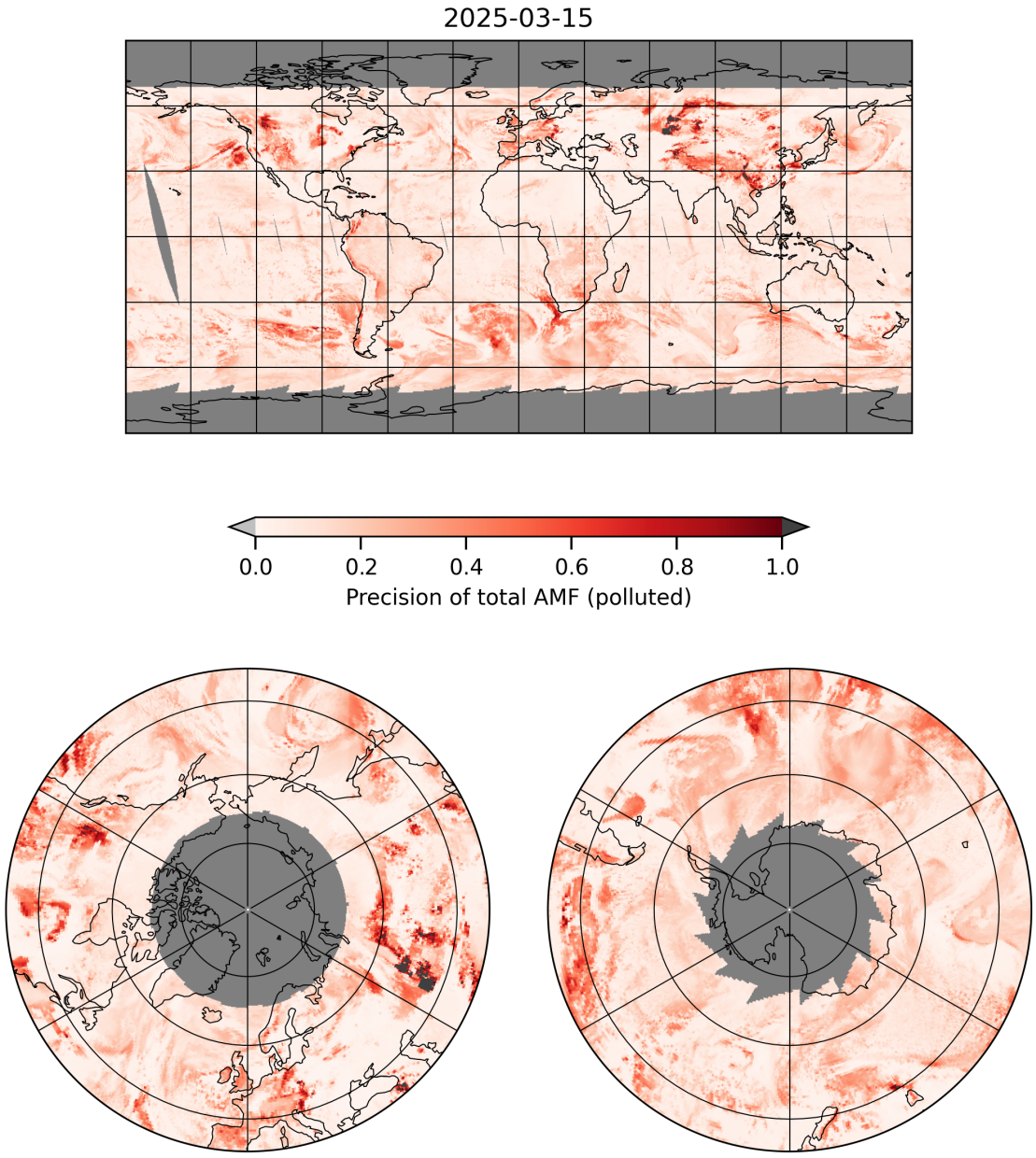

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-15 to 2025-03-15

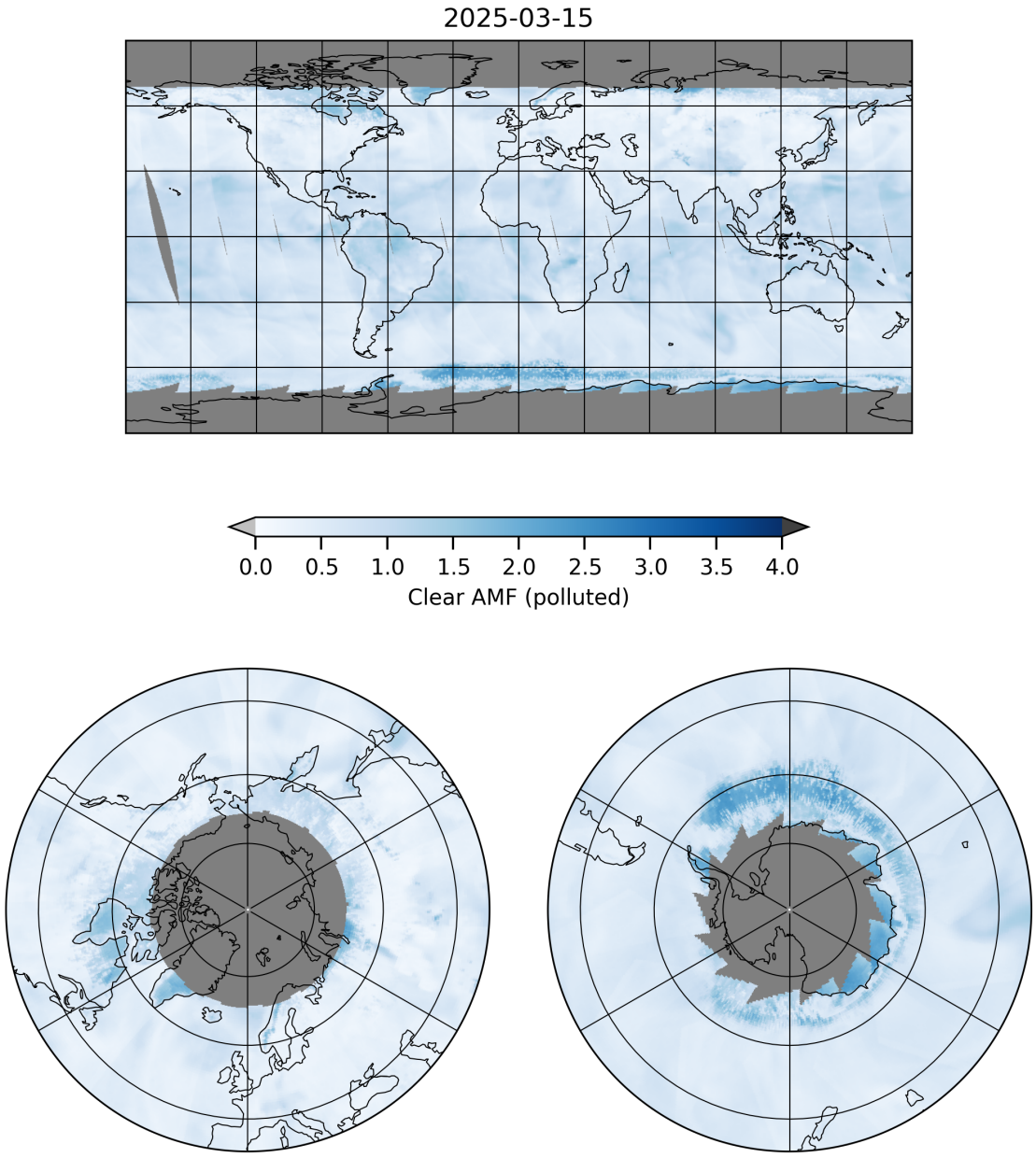

Figure 27: Map of “Clear AMF (polluted)” for 2025-03-15 to 2025-03-15

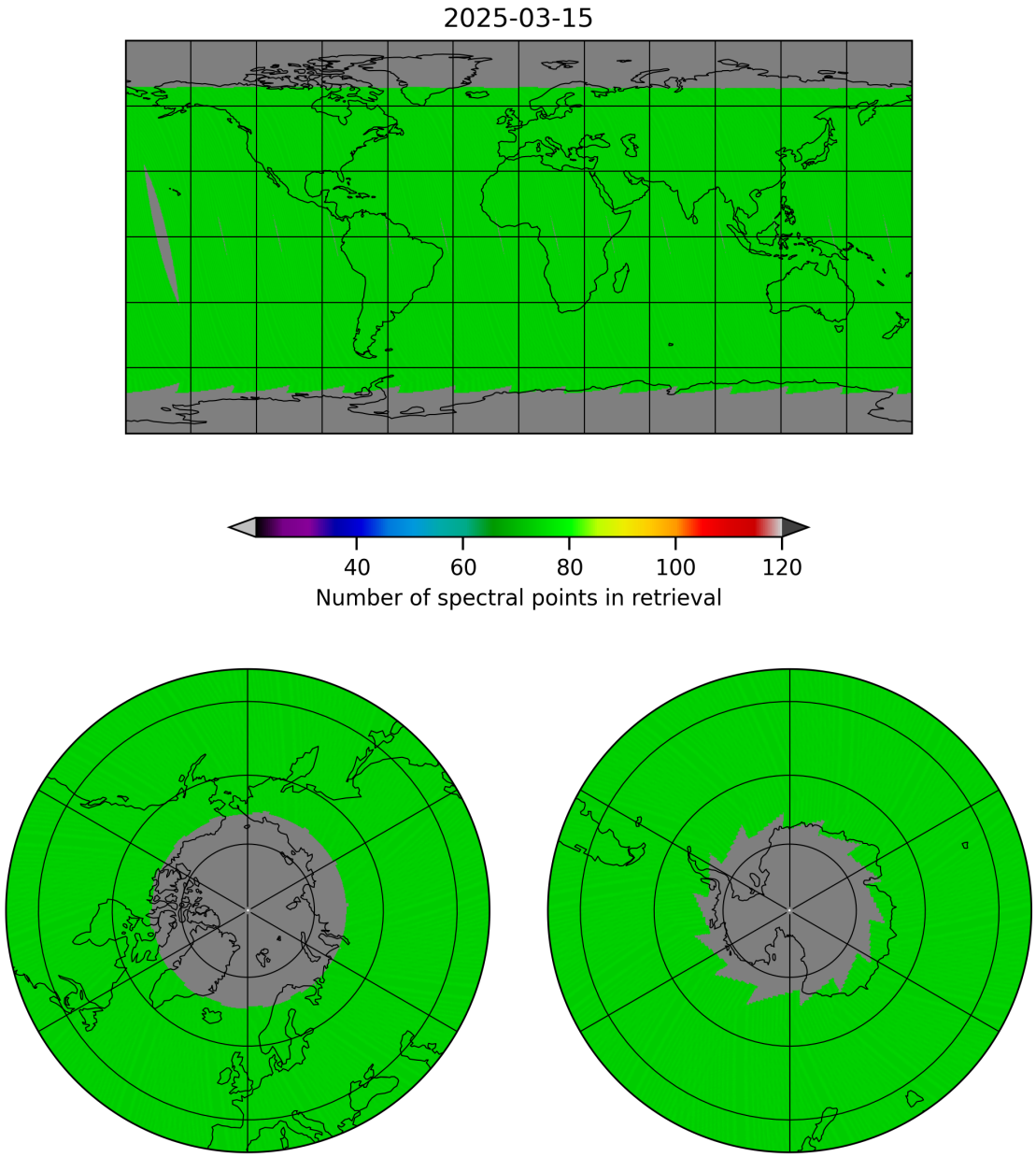

Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-15 to 2025-03-15

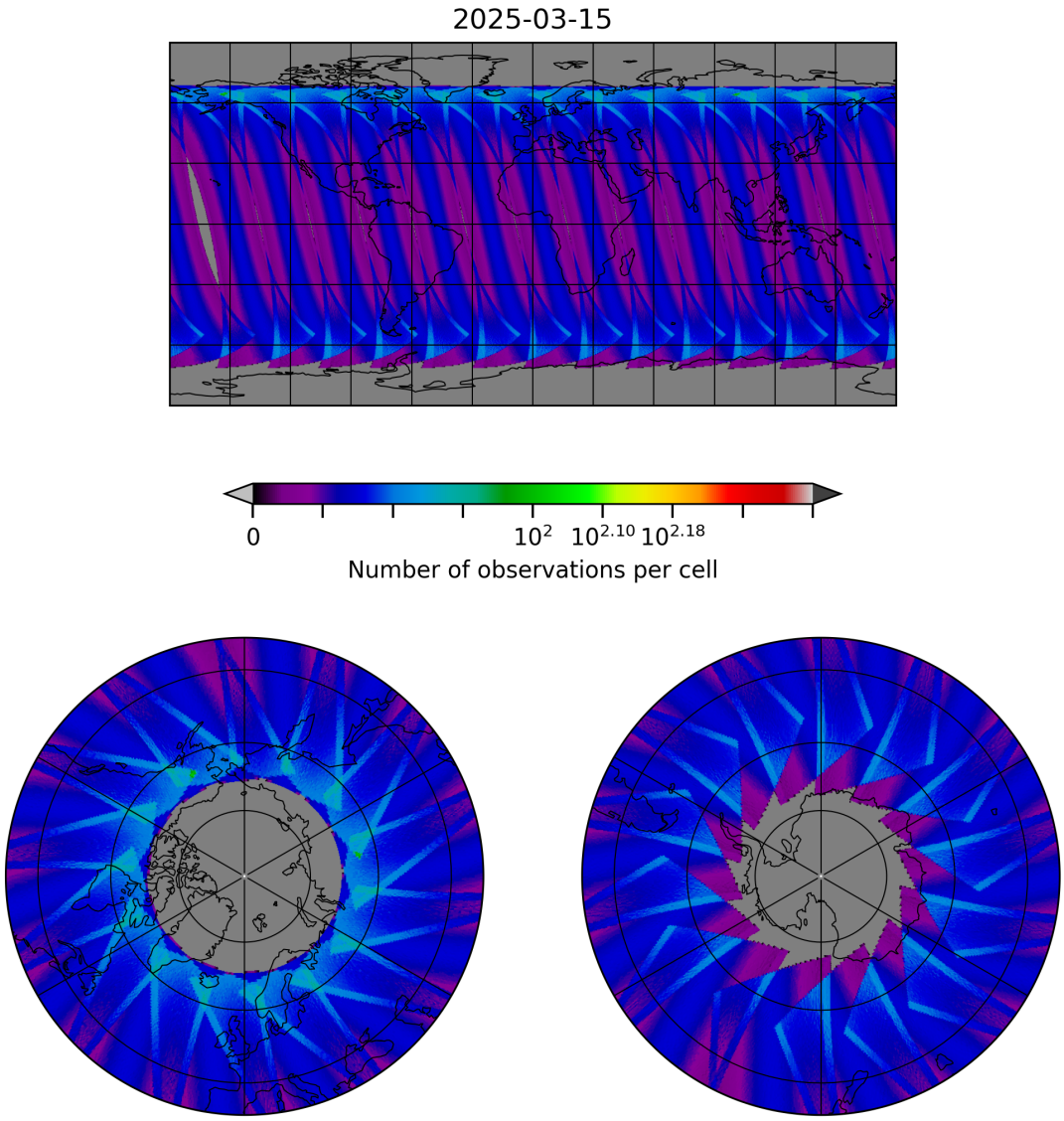

Figure 29: Map of the number of observations for 2025-03-15 to 2025-03-15

7 Zonal average

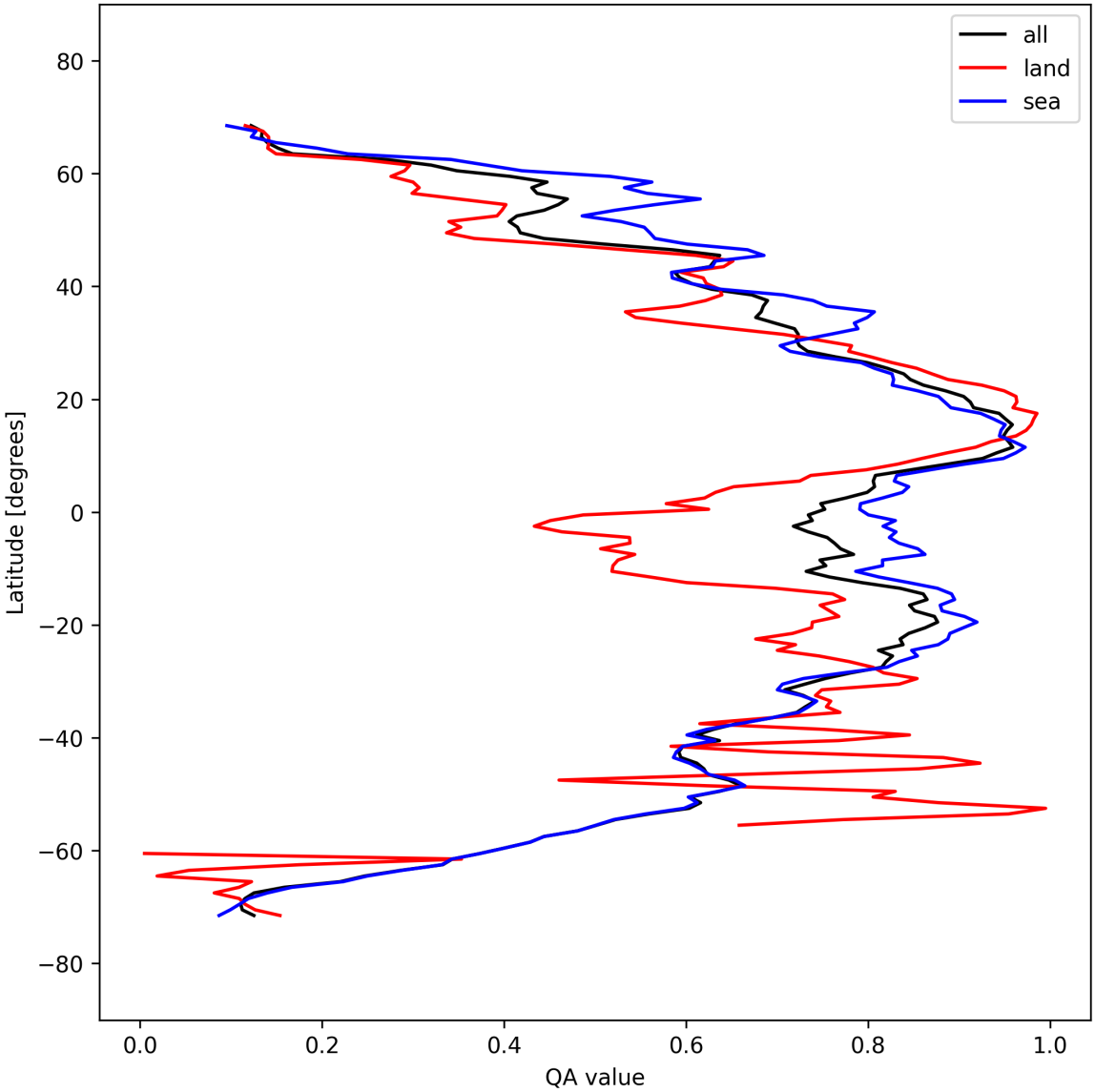

Figure 30: Zonal average of “QA value” for 2025-03-15 to 2025-03-15.

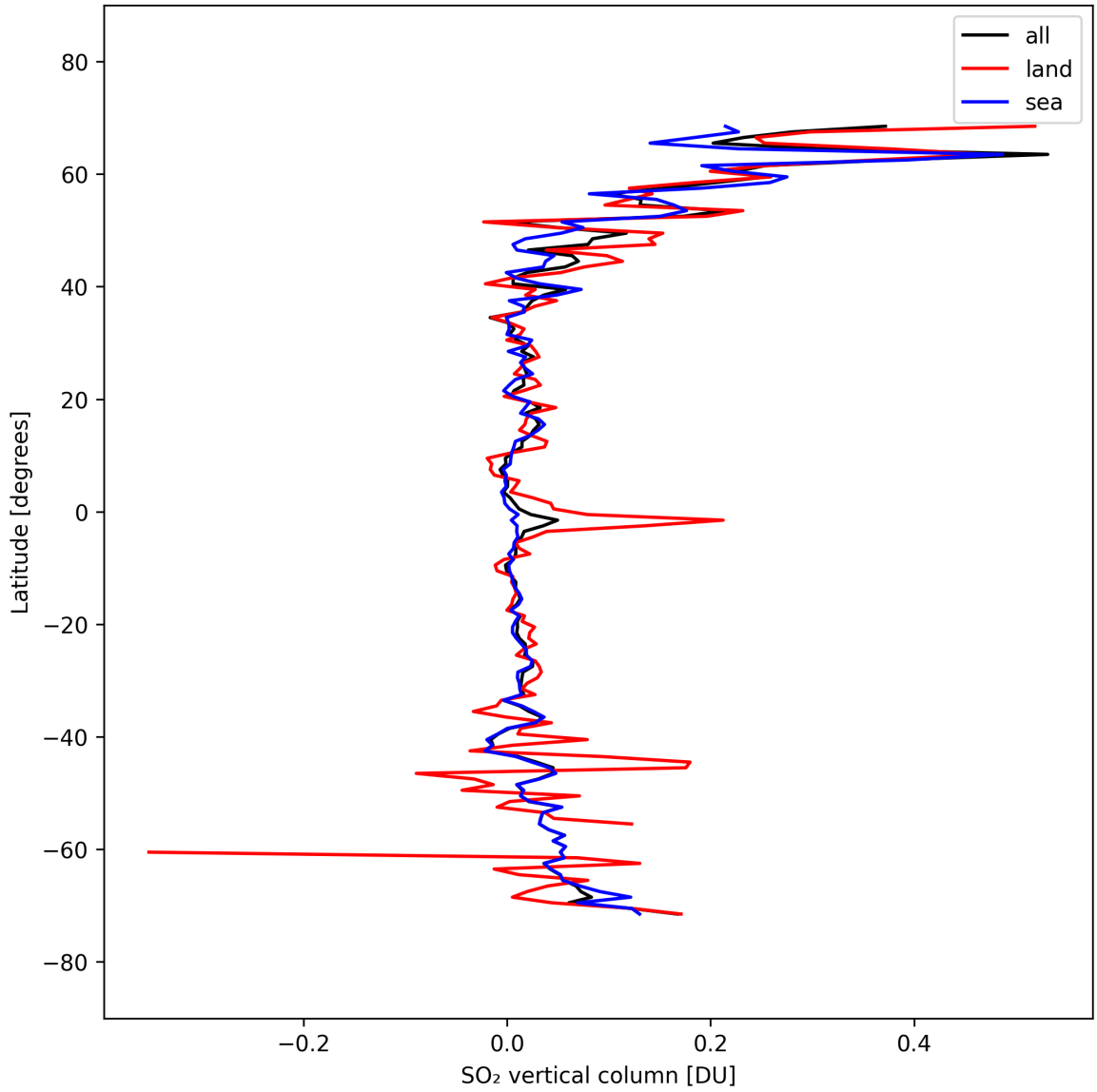

Figure 31: Zonal average of "SO_2 vertical column" for 2025-03-15 to 2025-03-15.

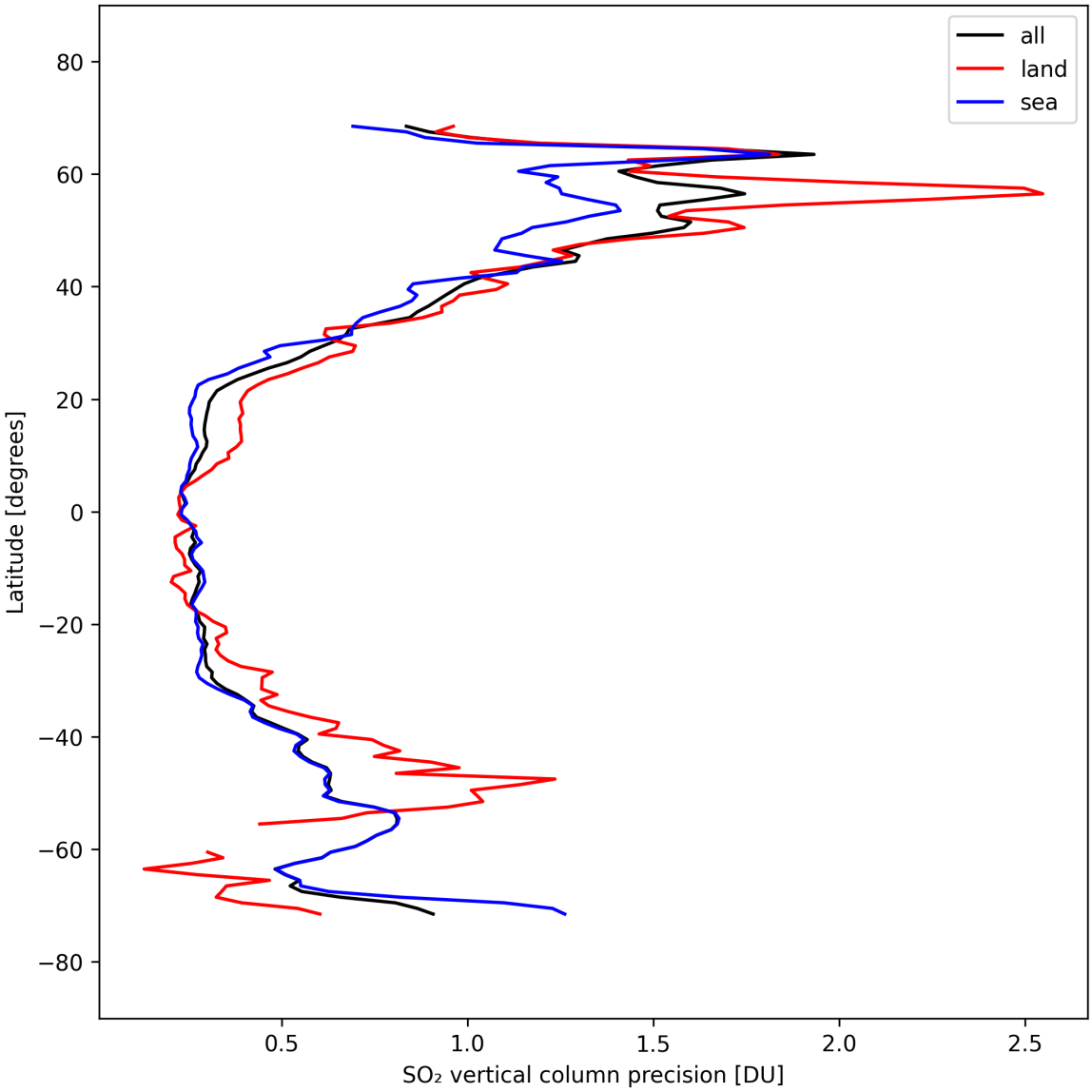

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-03-15 to 2025-03-15.

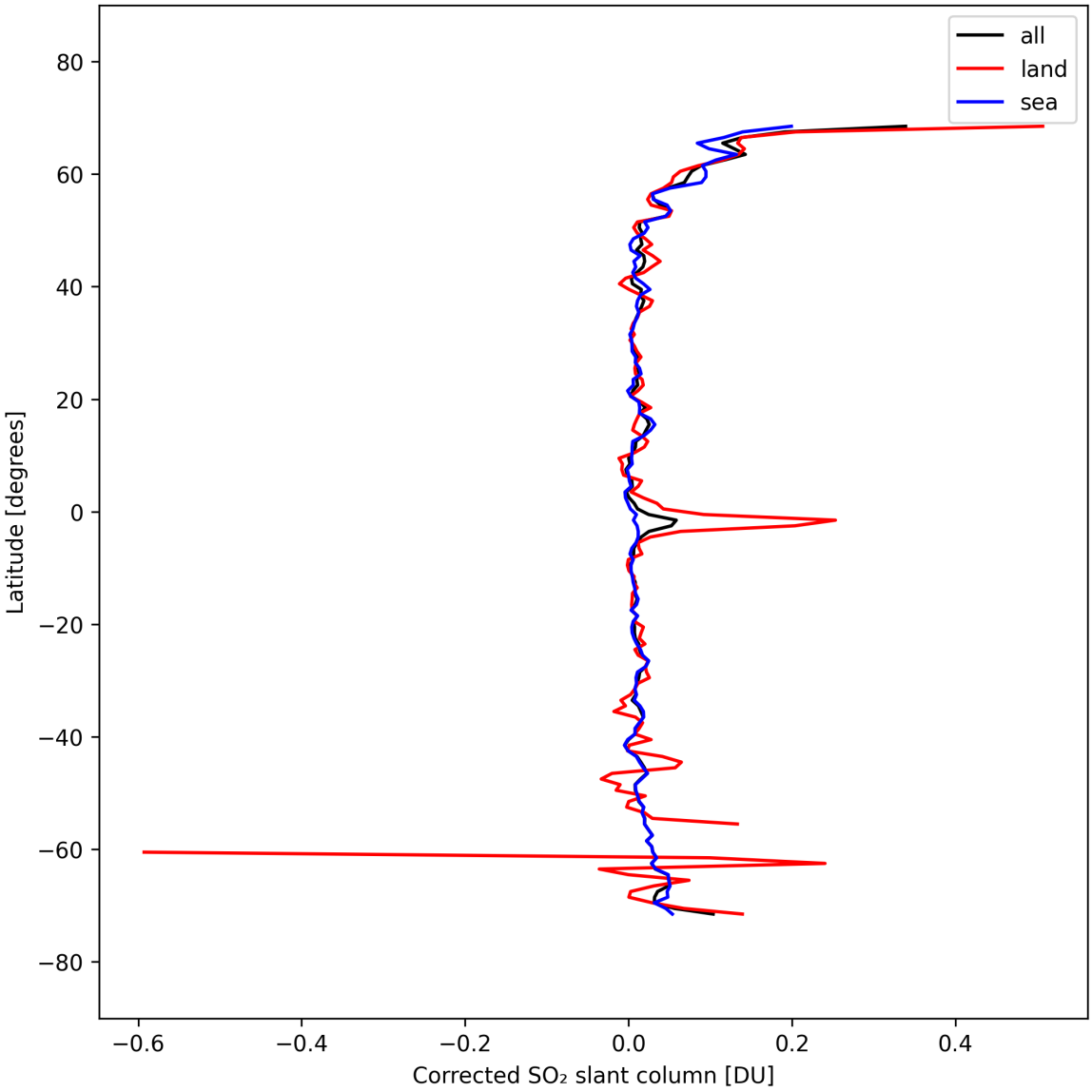

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-03-15 to 2025-03-15.

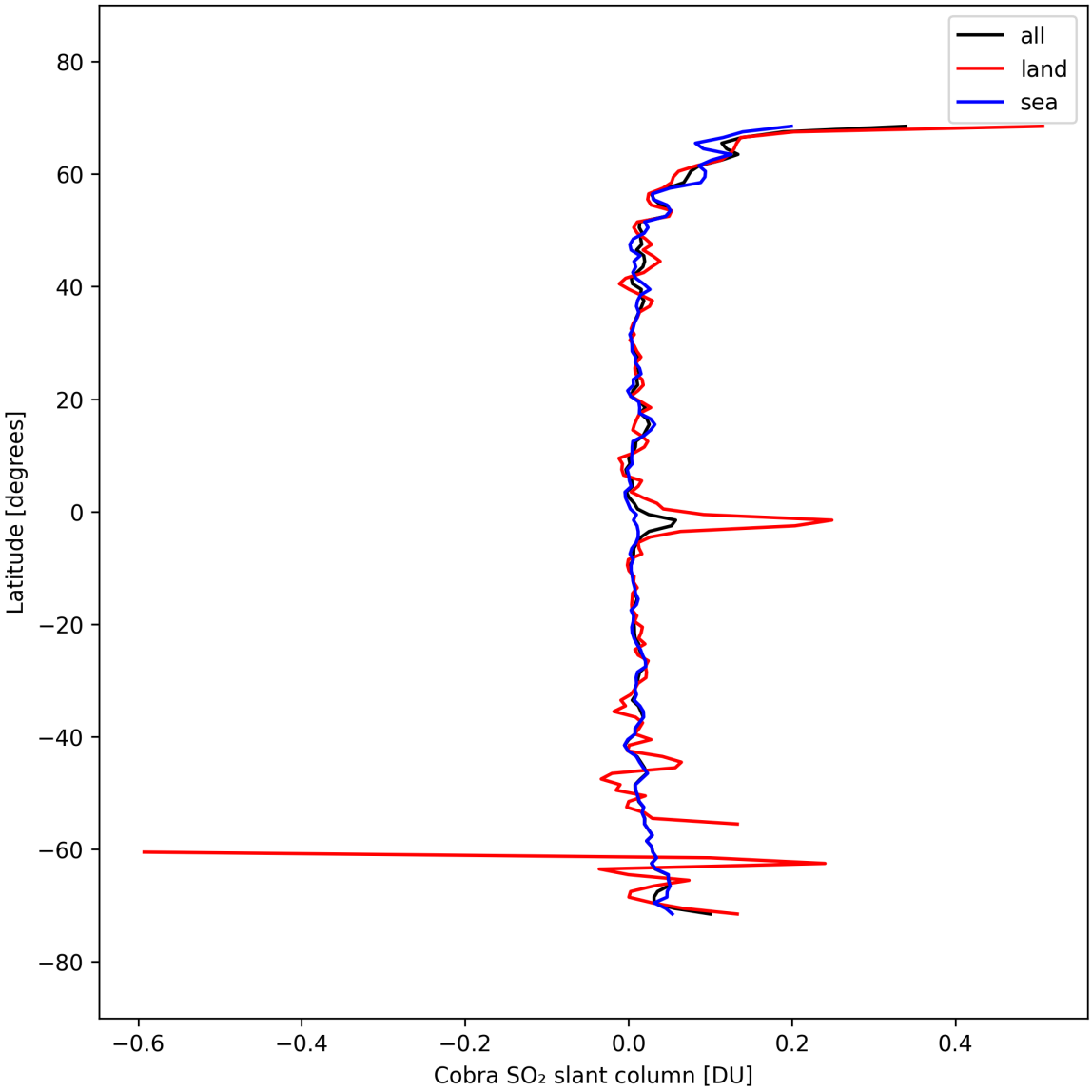

Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-03-15 to 2025-03-15.

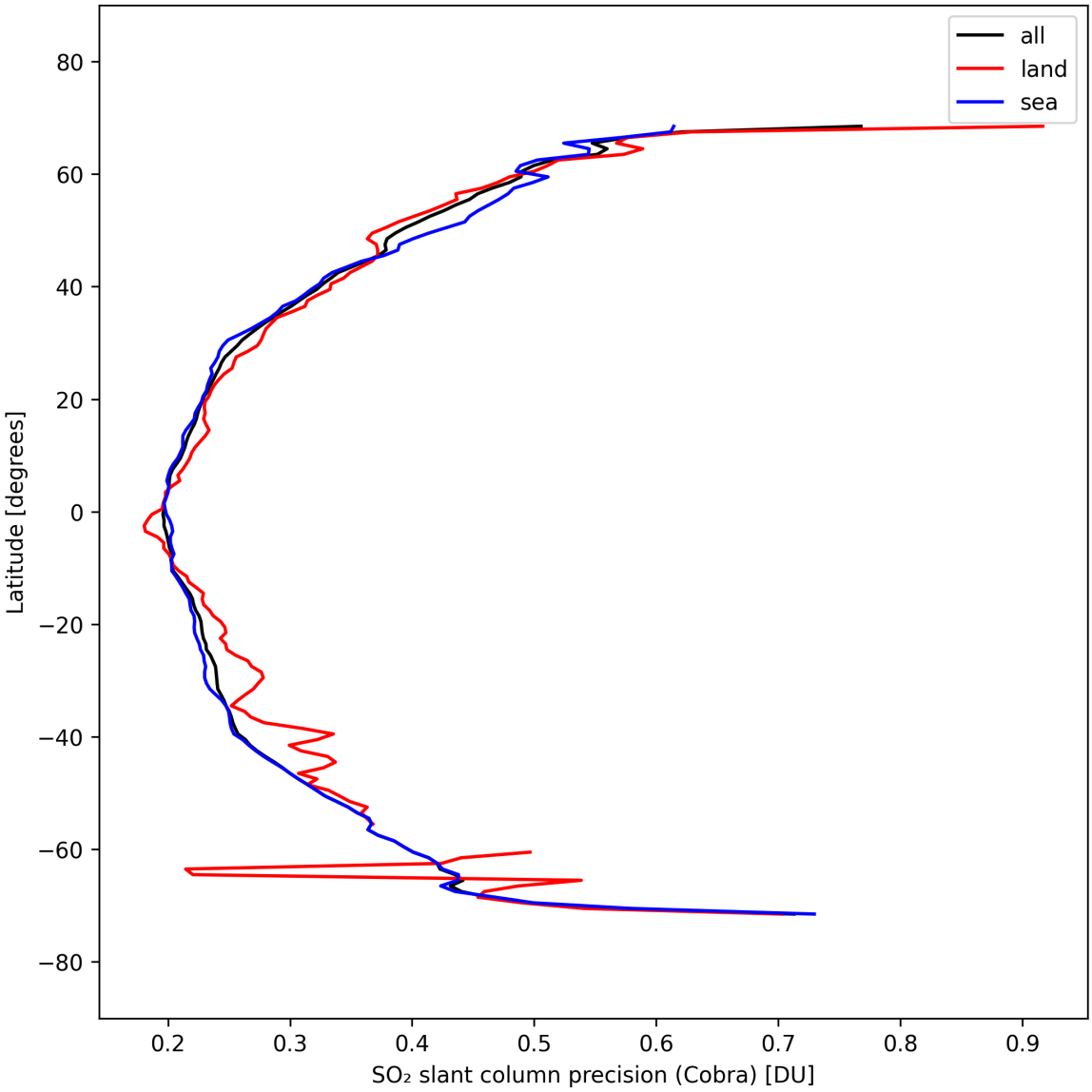

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-03-15 to 2025-03-15.

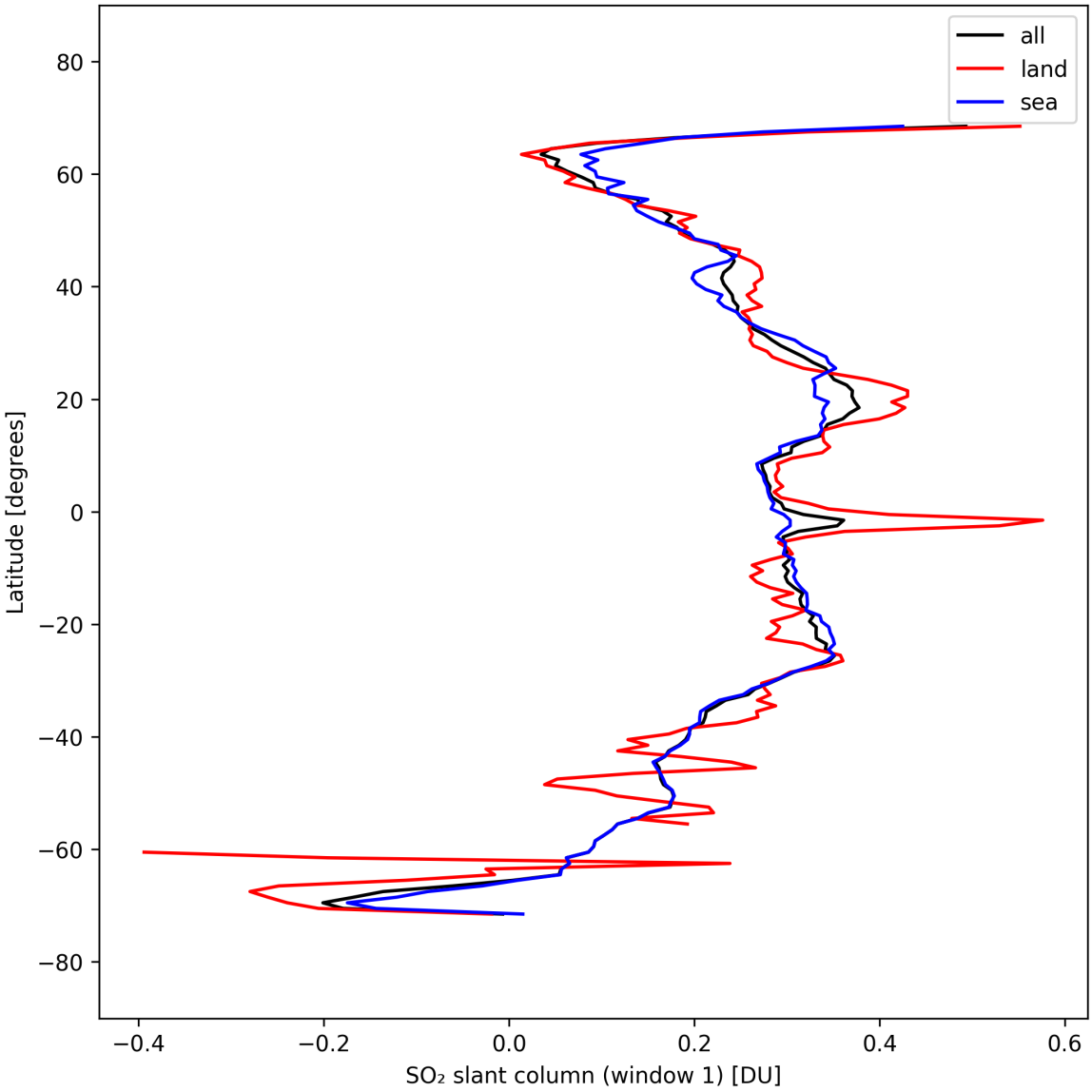

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-03-15 to 2025-03-15.

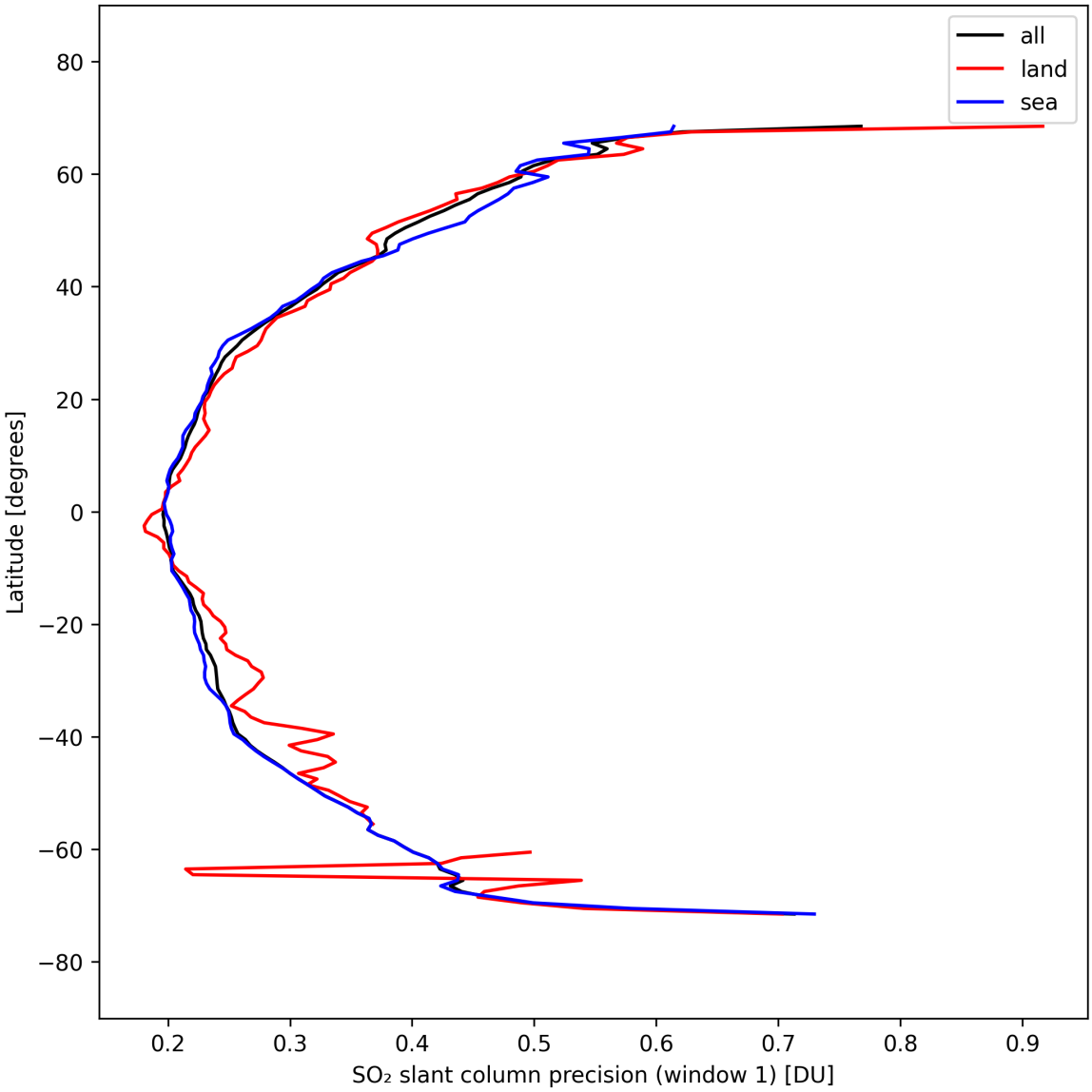

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-03-15 to 2025-03-15.

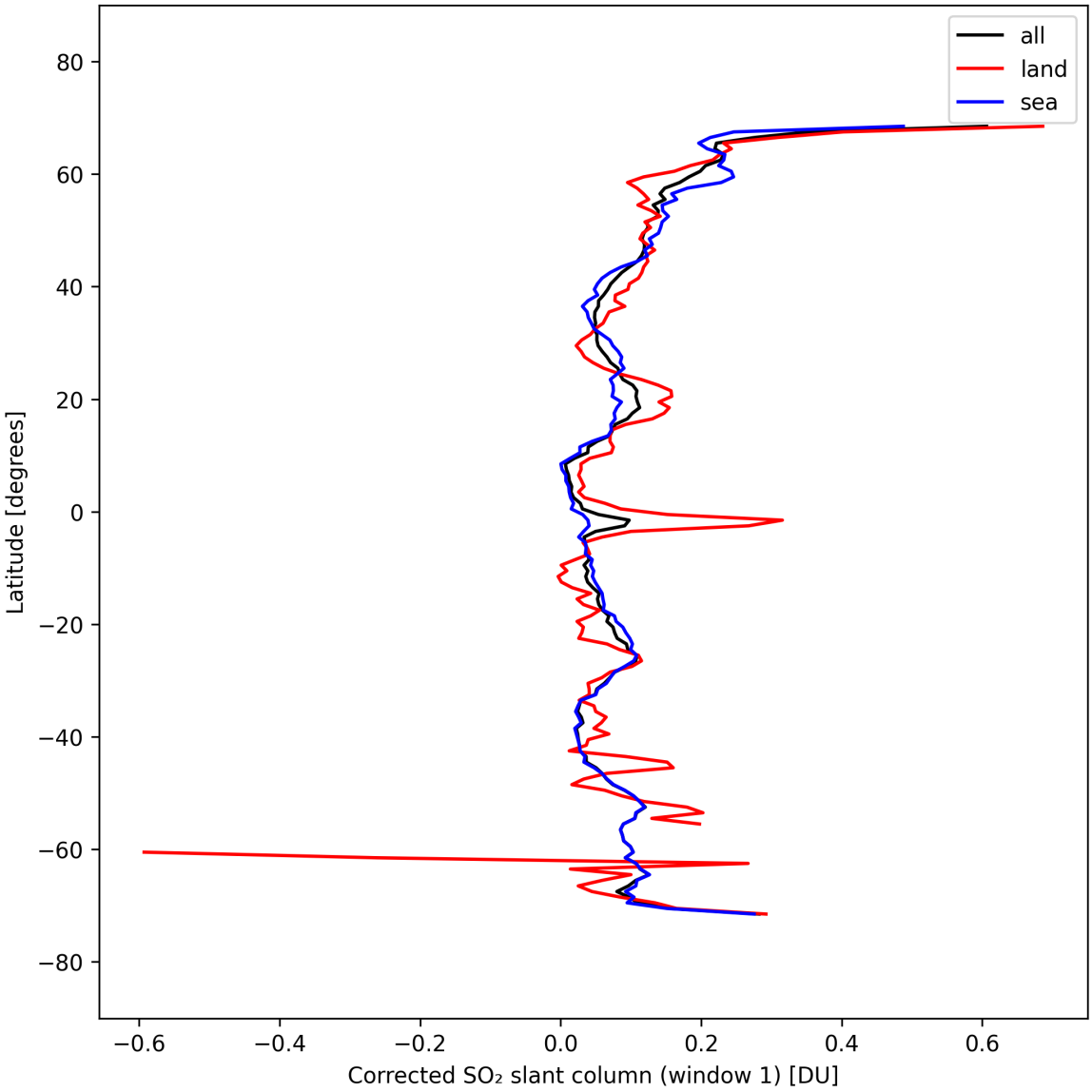

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-03-15 to 2025-03-15.

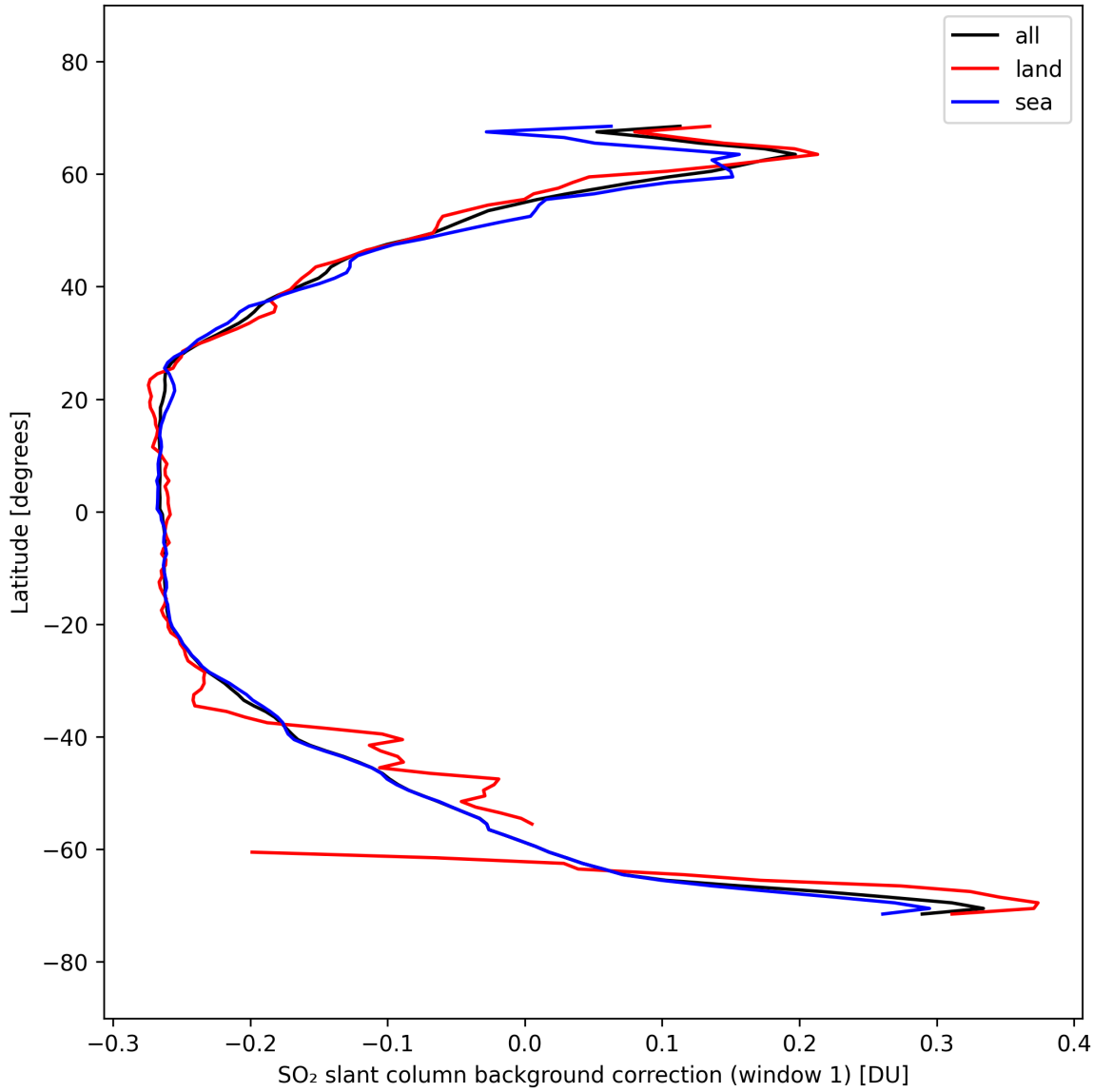

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-03-15 to 2025-03-15.

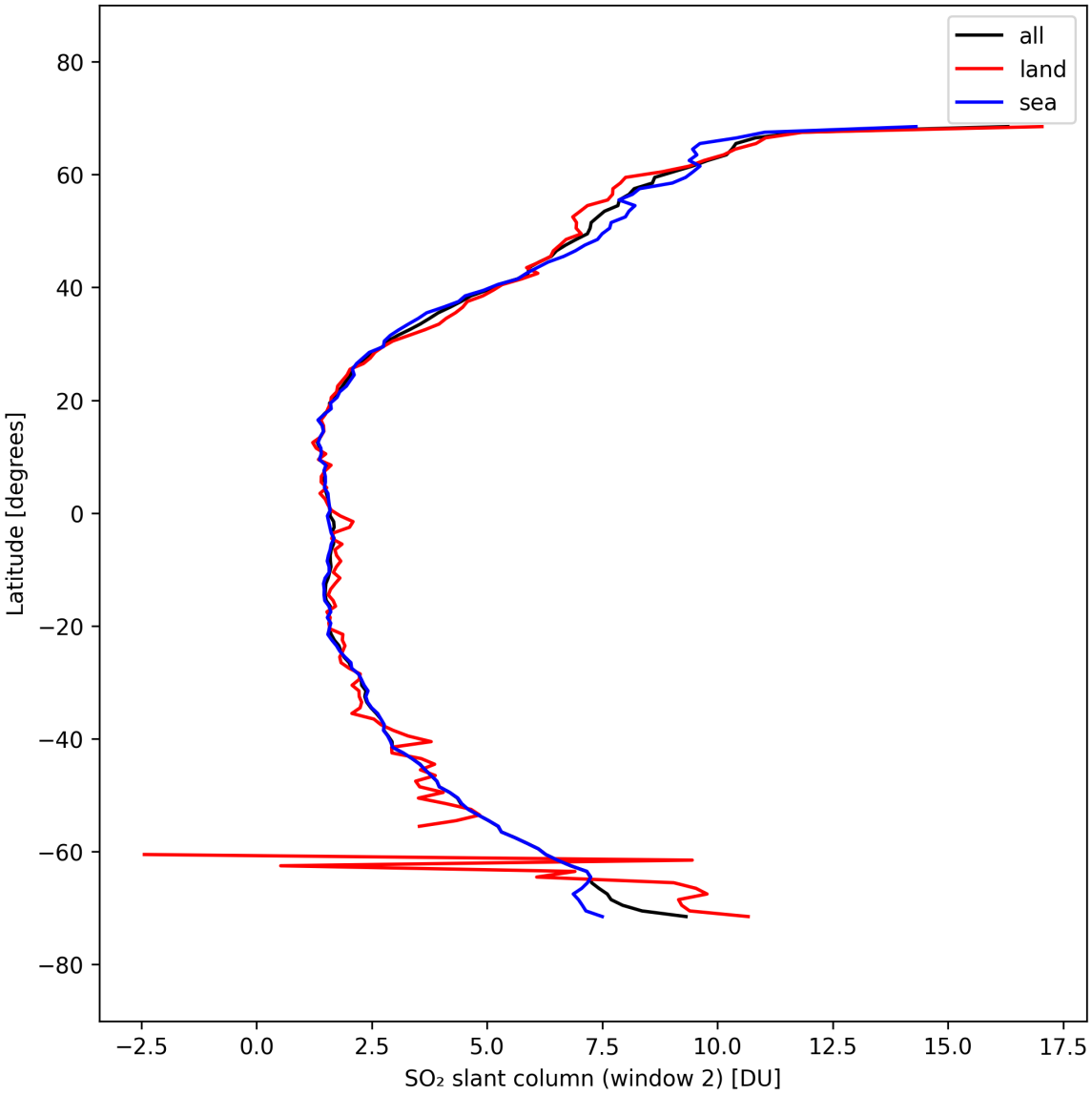

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-03-15 to 2025-03-15.

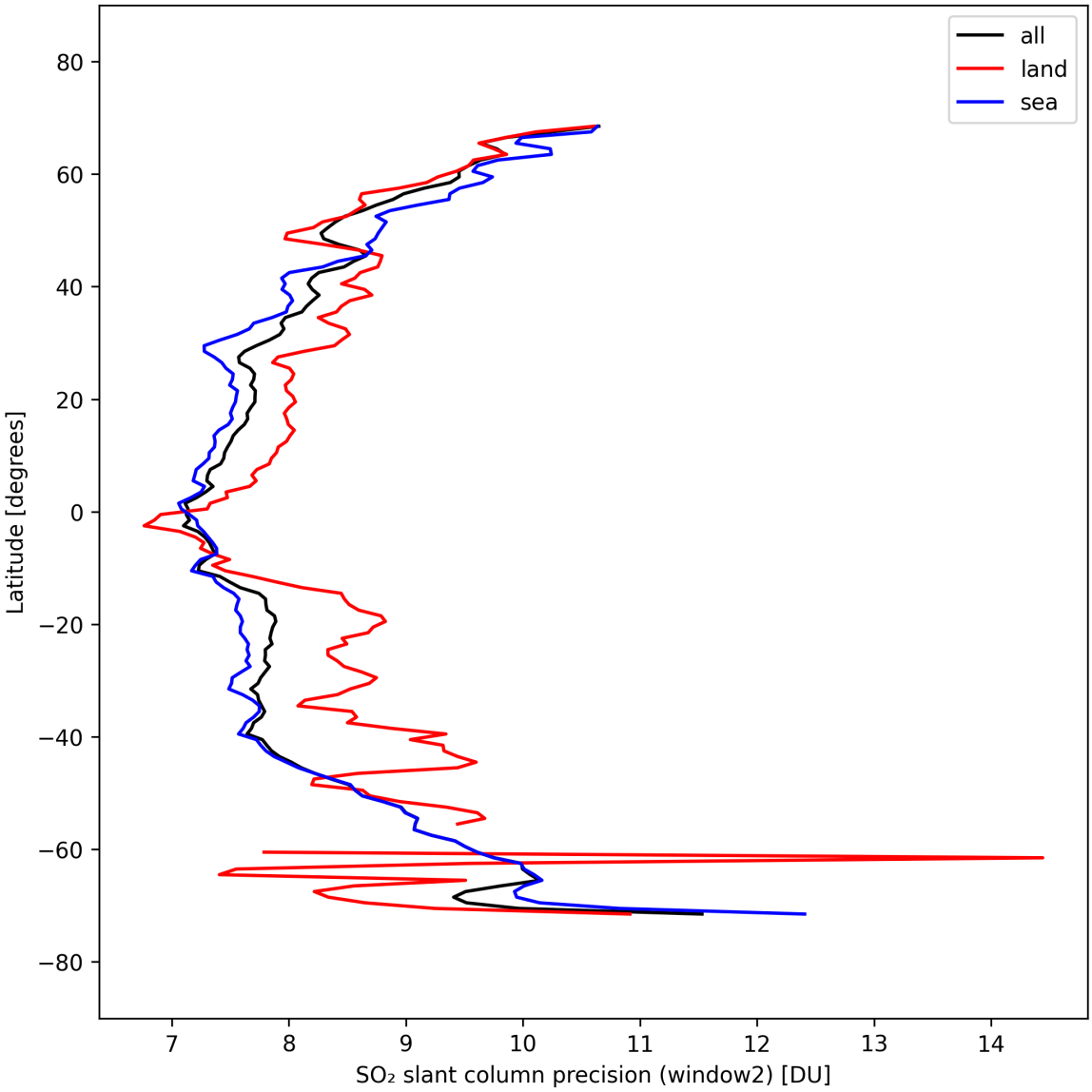

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-03-15 to 2025-03-15.

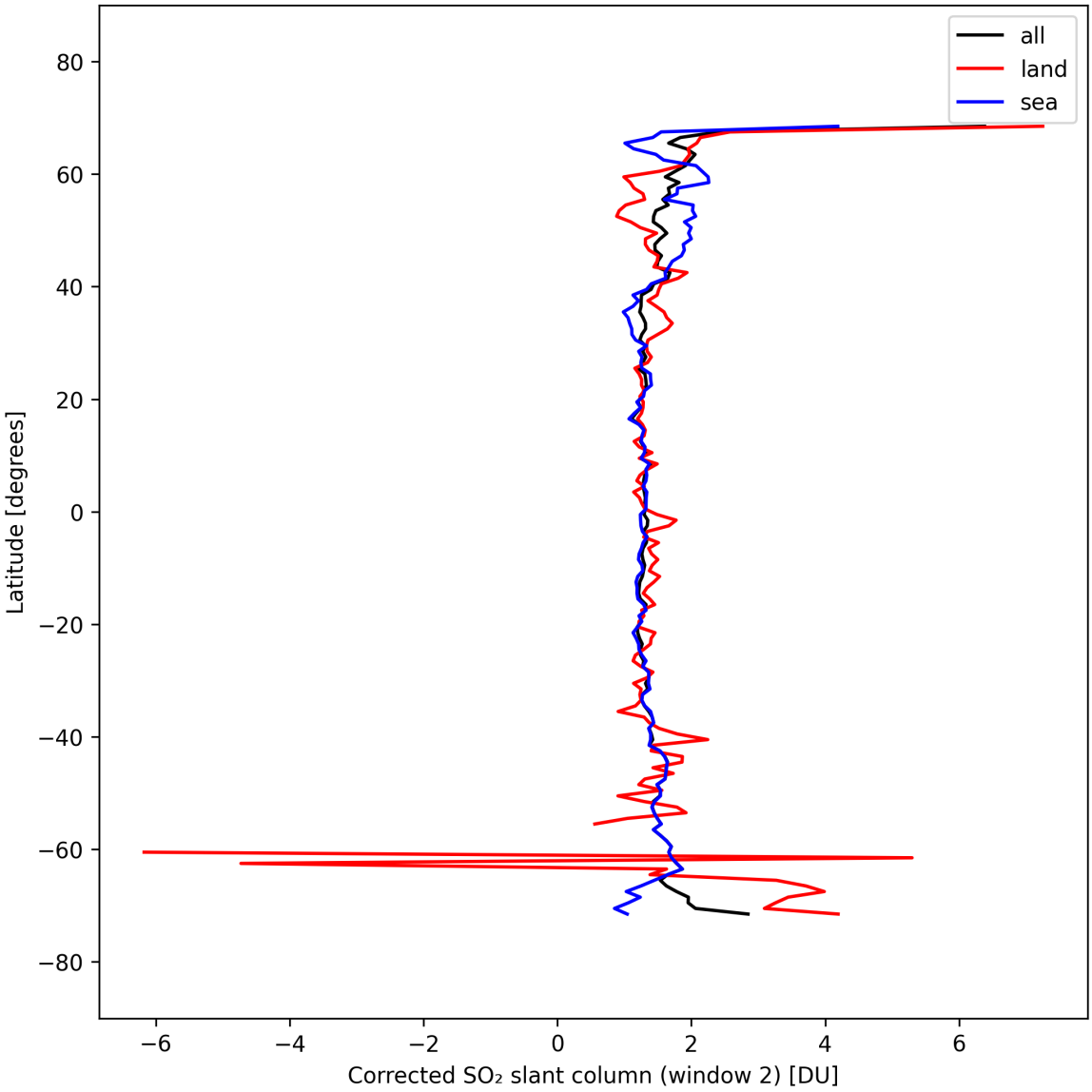

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-03-15 to 2025-03-15.

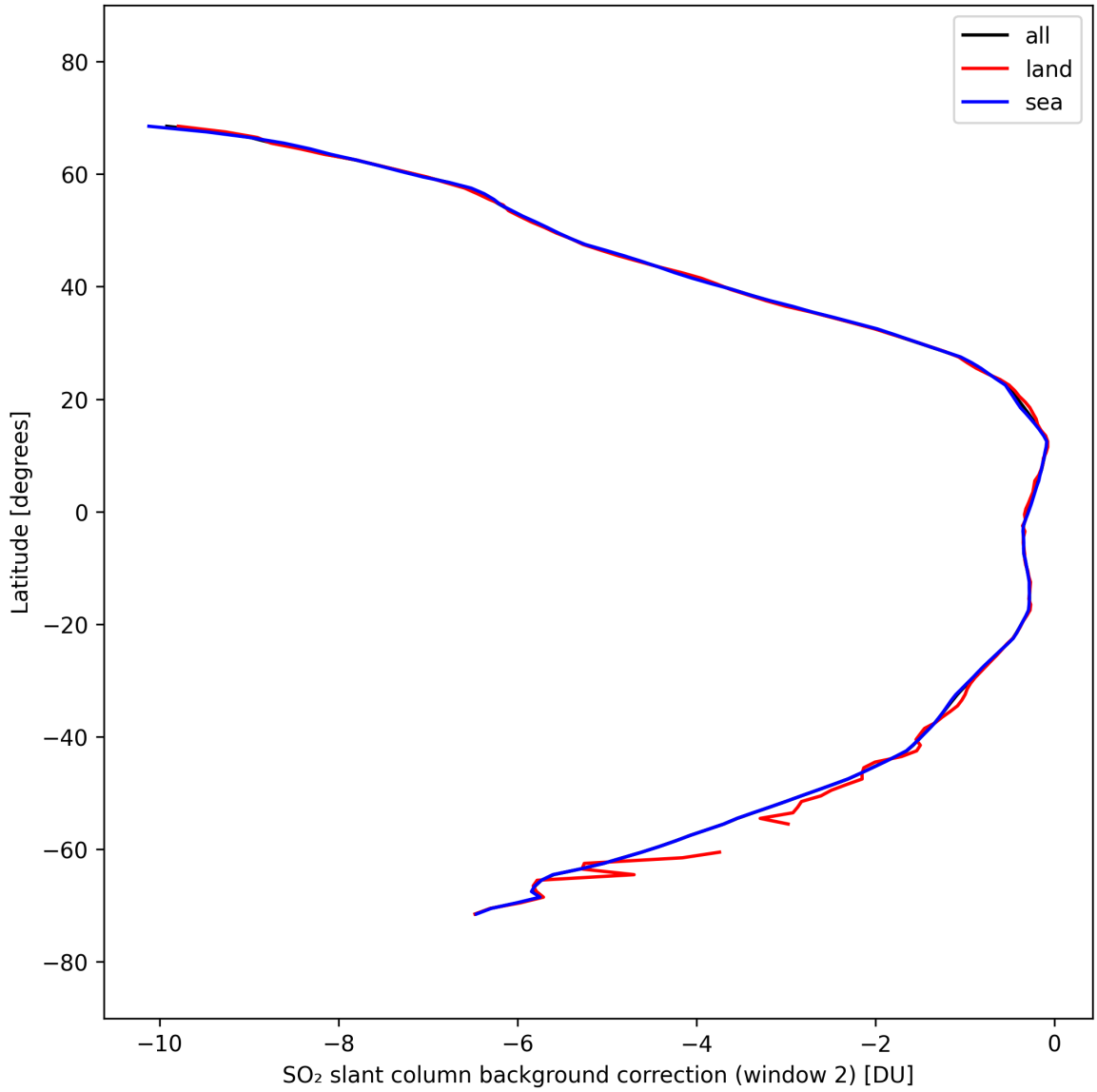

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-03-15 to 2025-03-15.

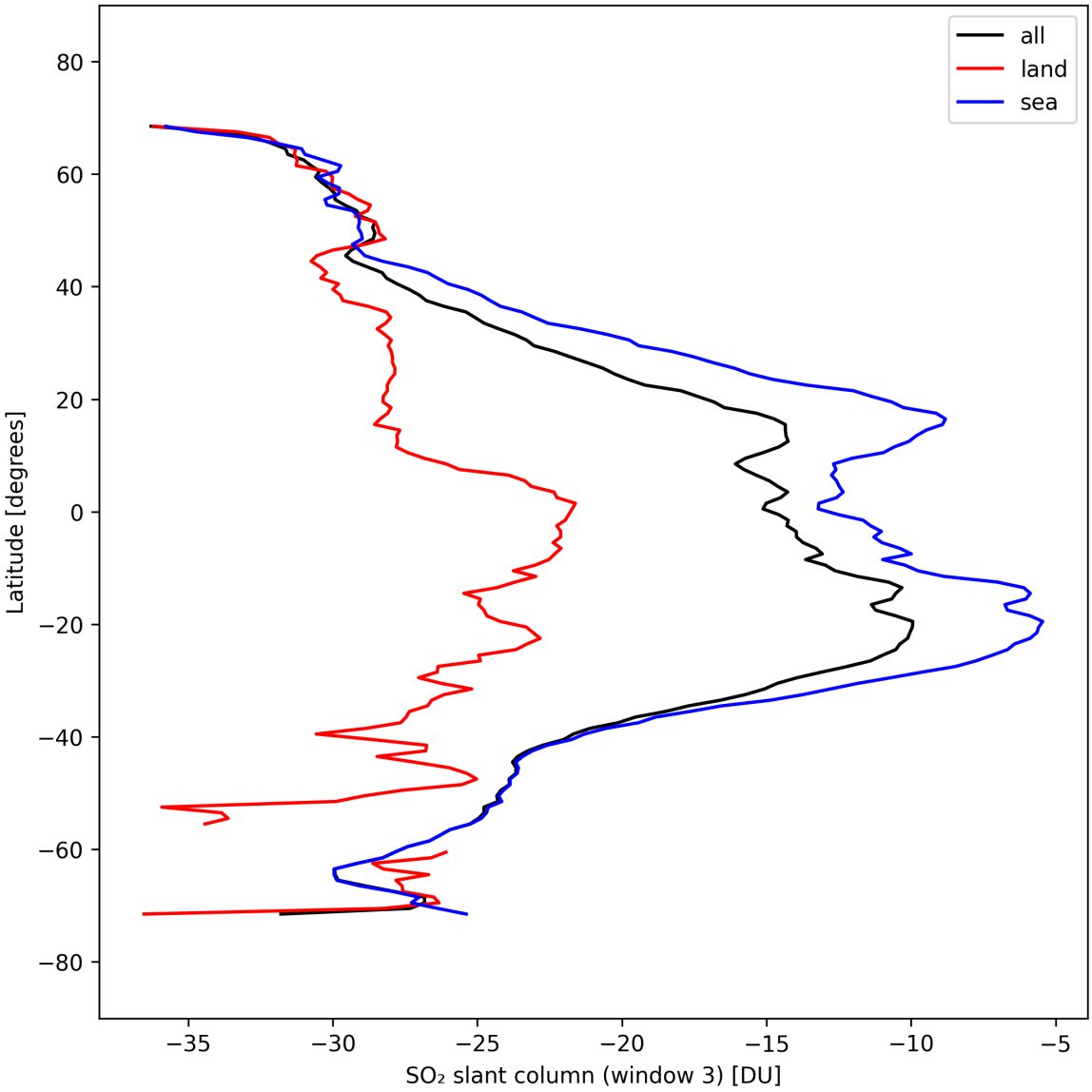

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-03-15 to 2025-03-15.

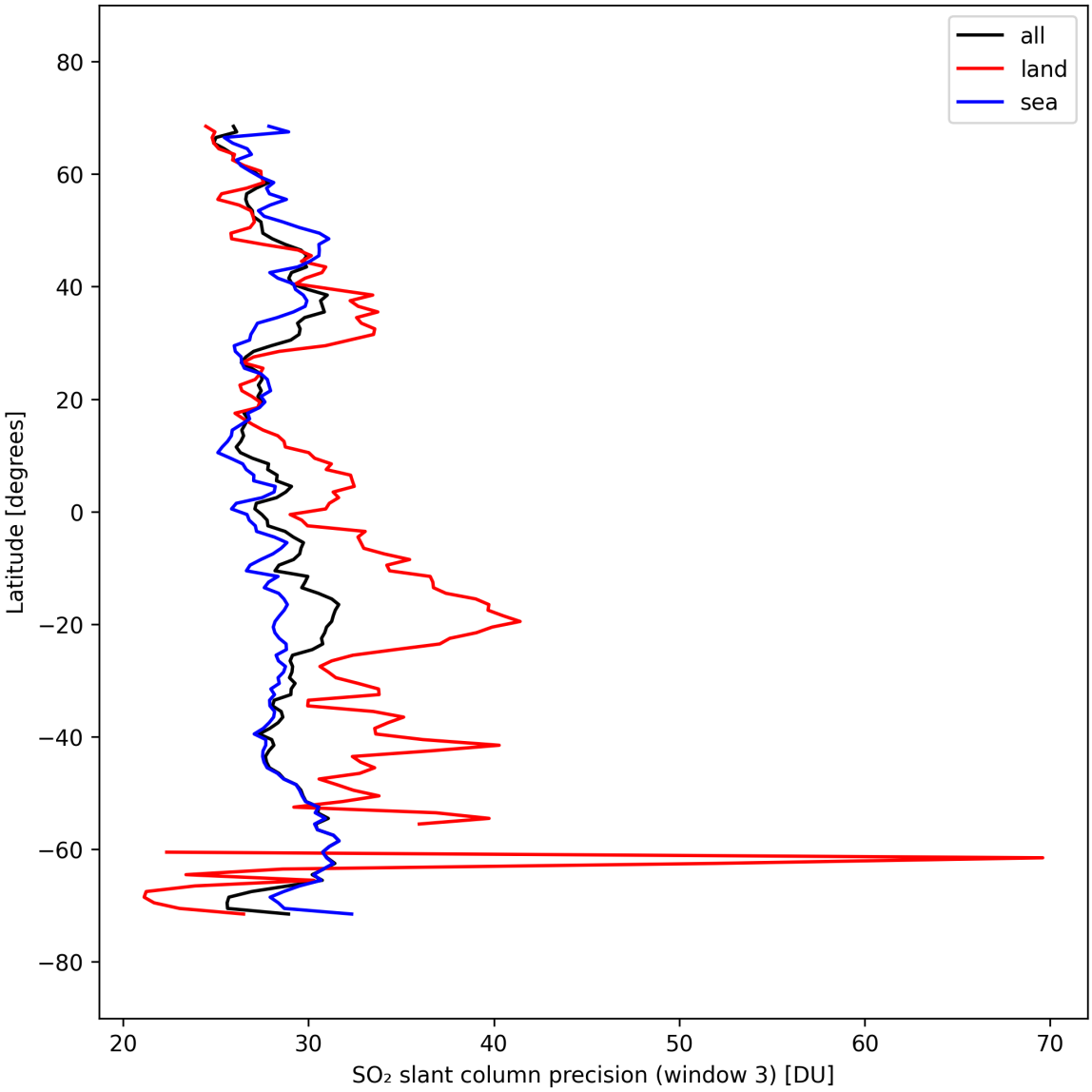

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-03-15 to 2025-03-15.

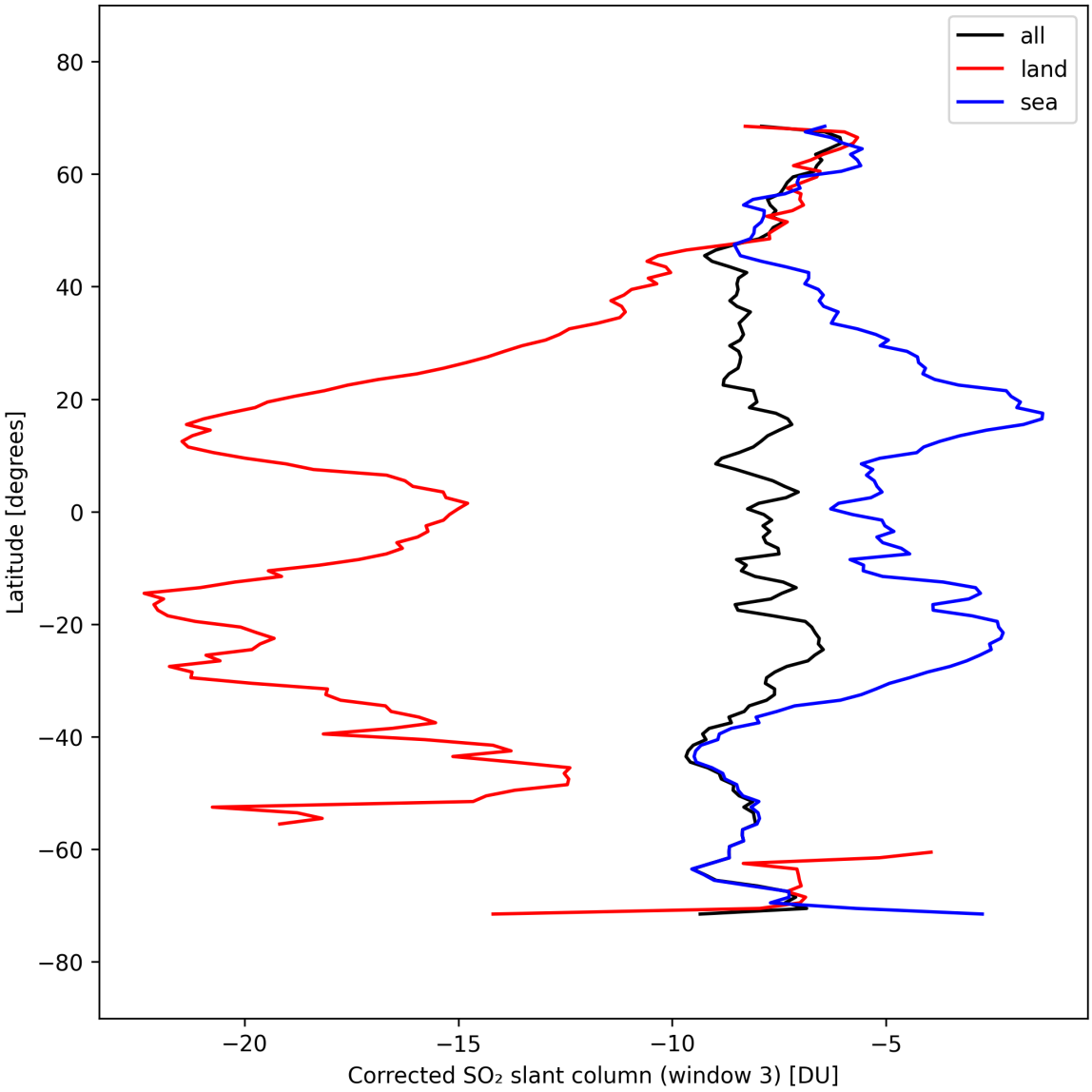

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-03-15 to 2025-03-15.

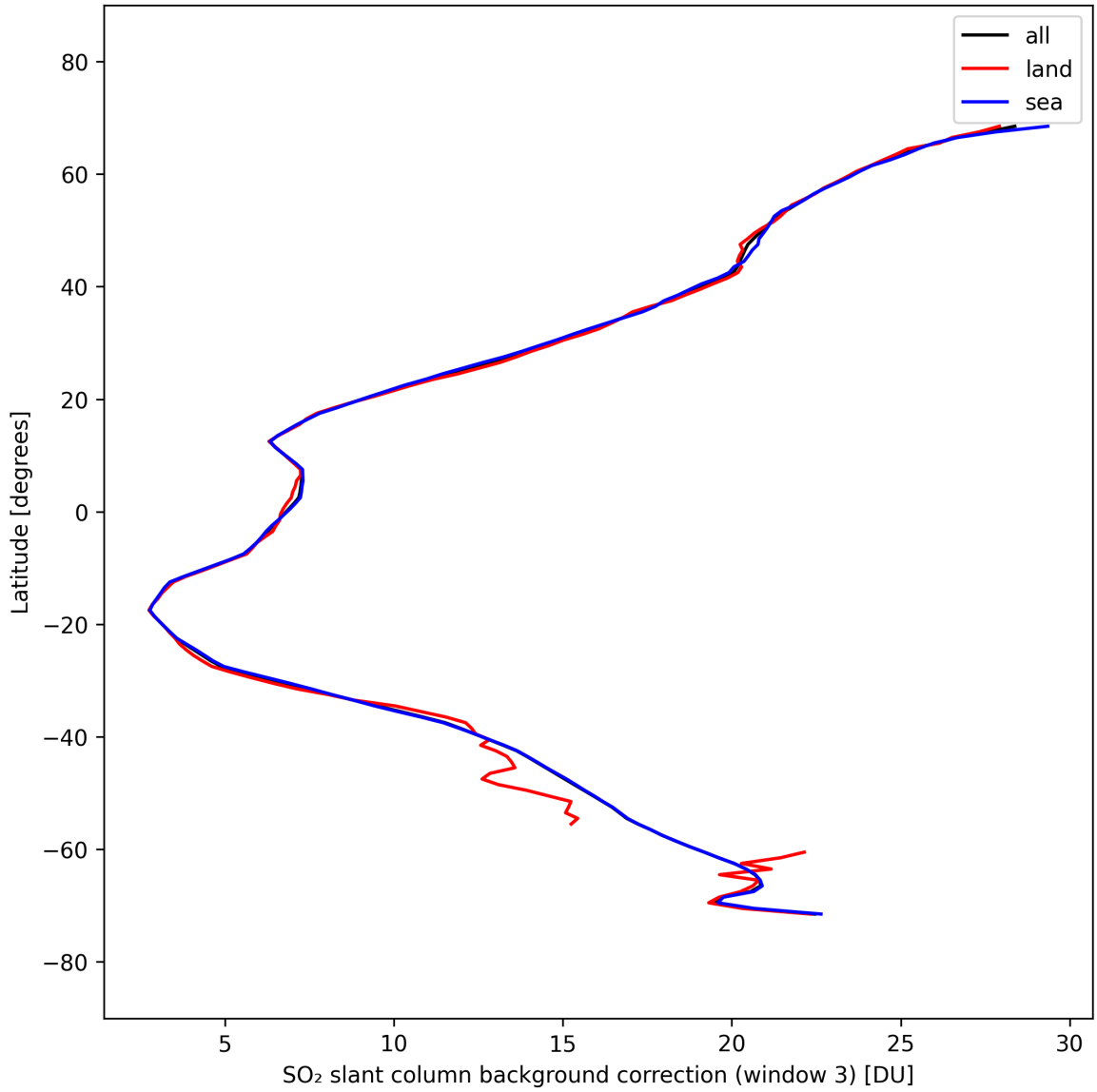

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-03-15 to 2025-03-15.

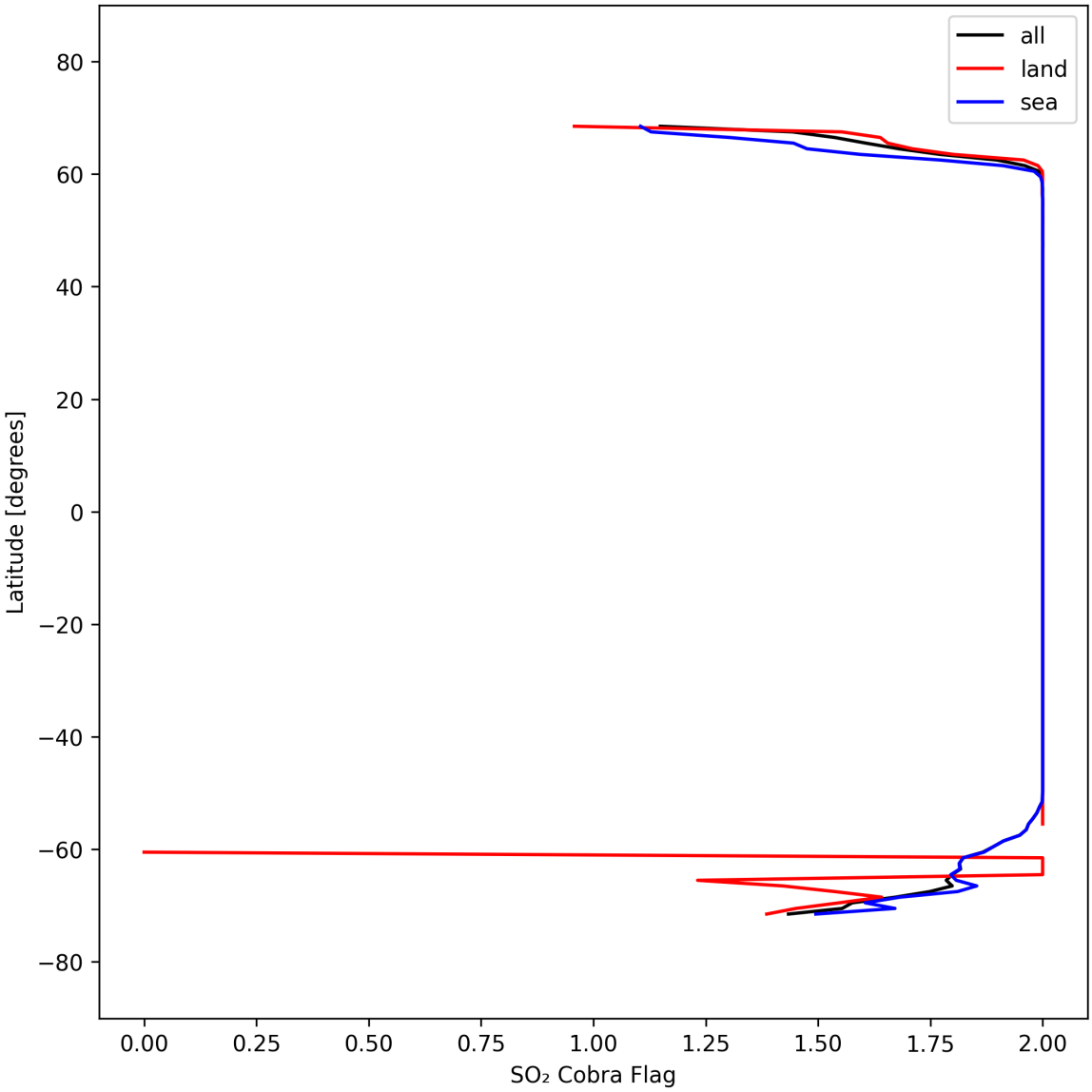

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-03-15 to 2025-03-15.

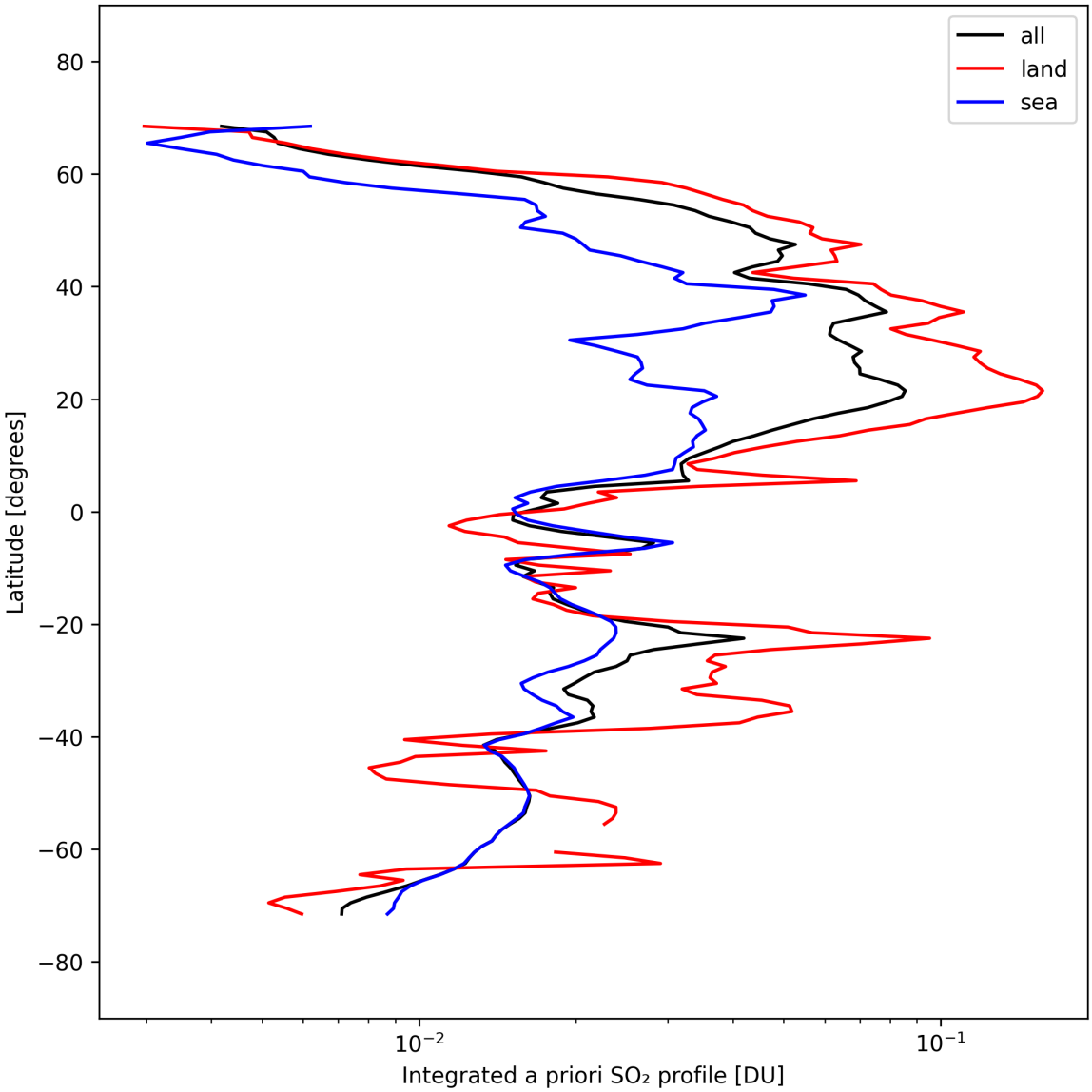

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-03-15 to 2025-03-15.

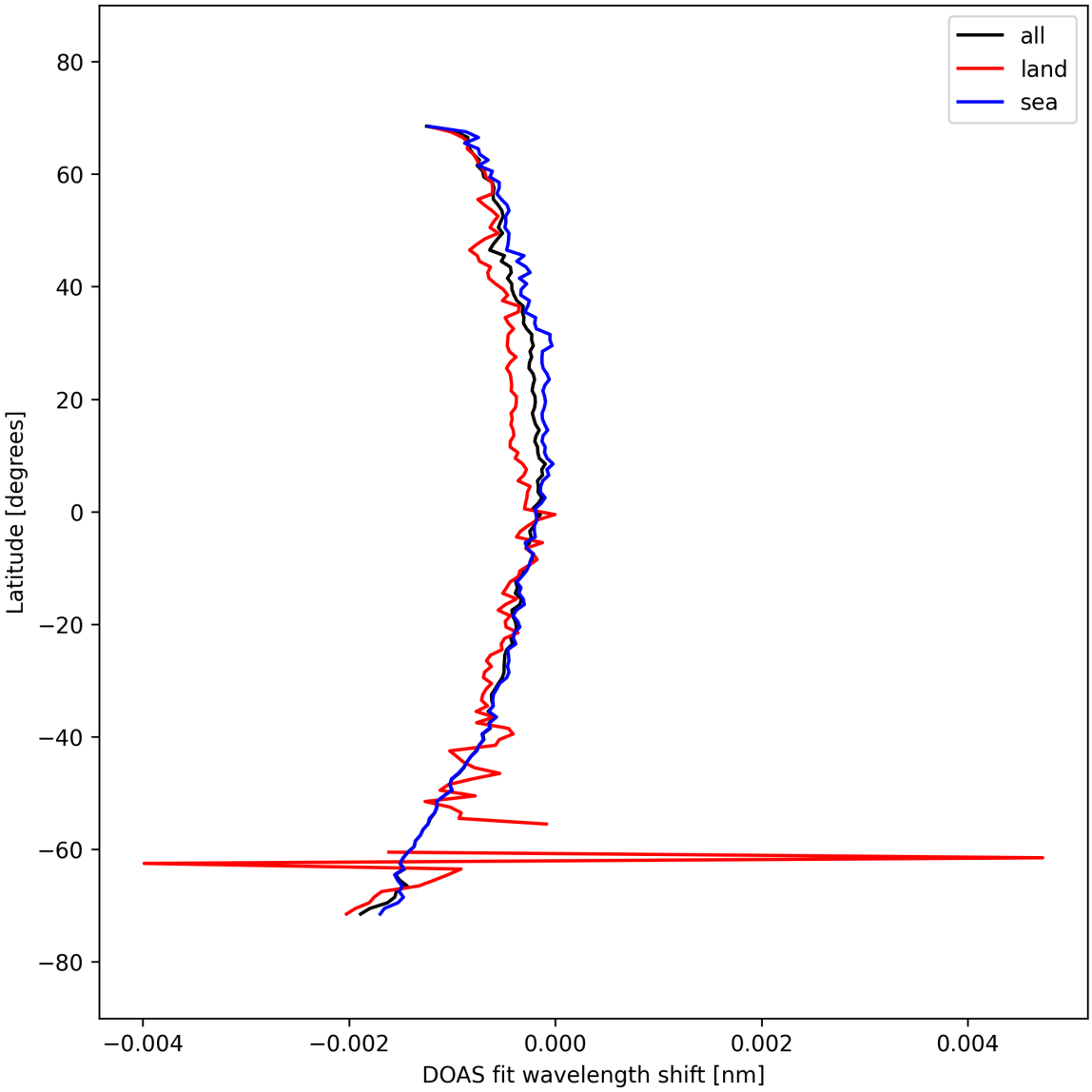

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-15 to 2025-03-15.

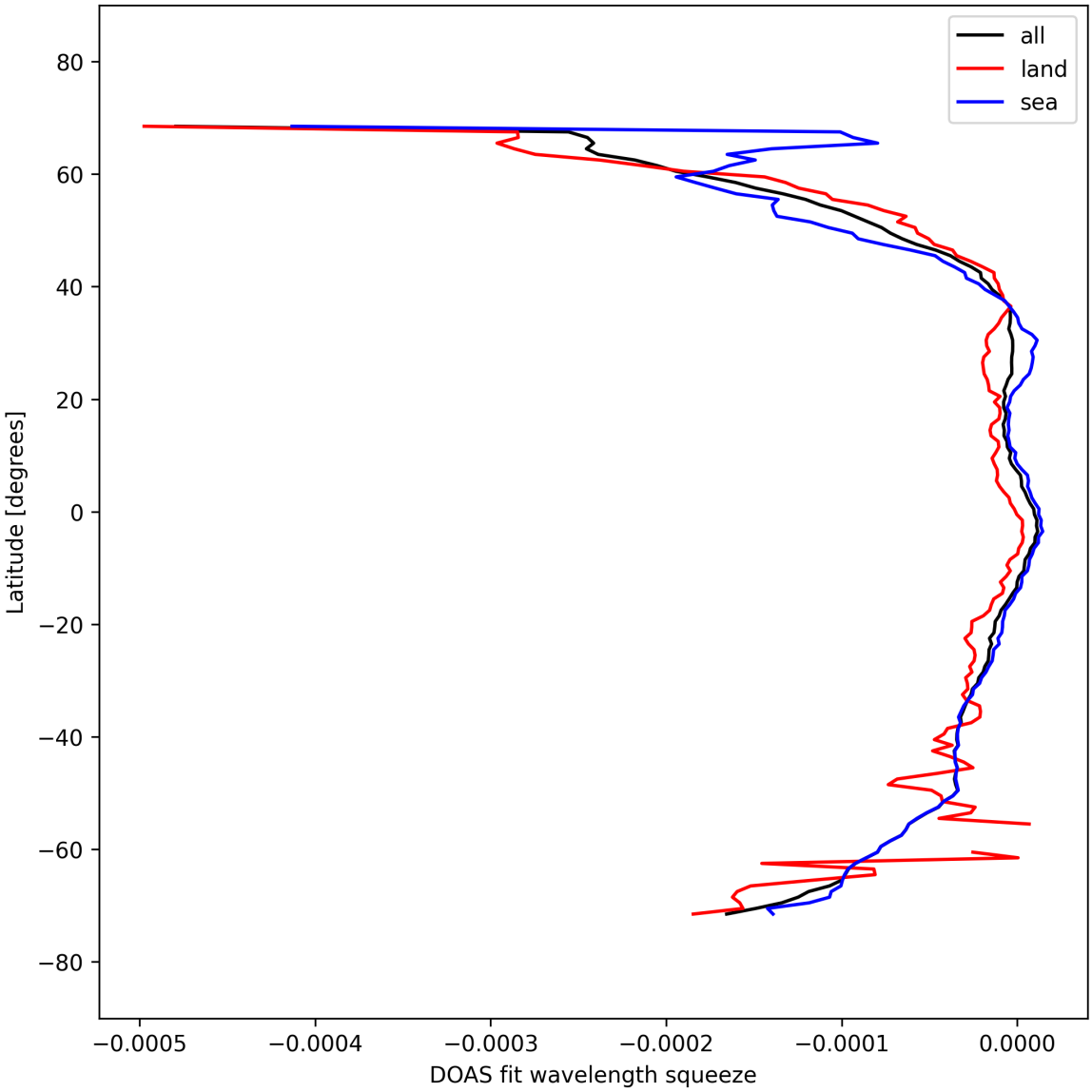

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-15 to 2025-03-15.

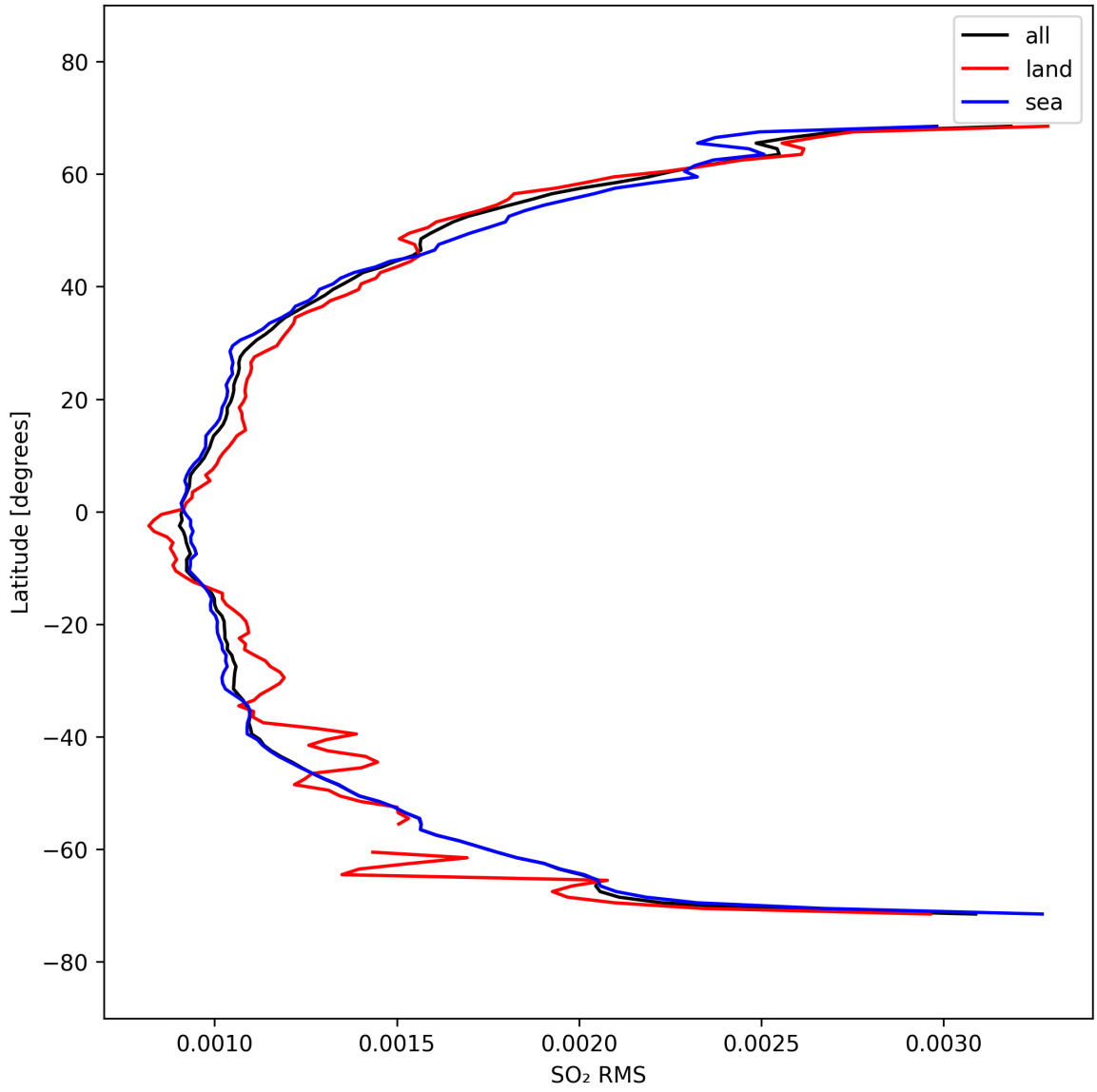

Figure 52: Zonal average of "SO_2 RMS" for 2025-03-15 to 2025-03-15.

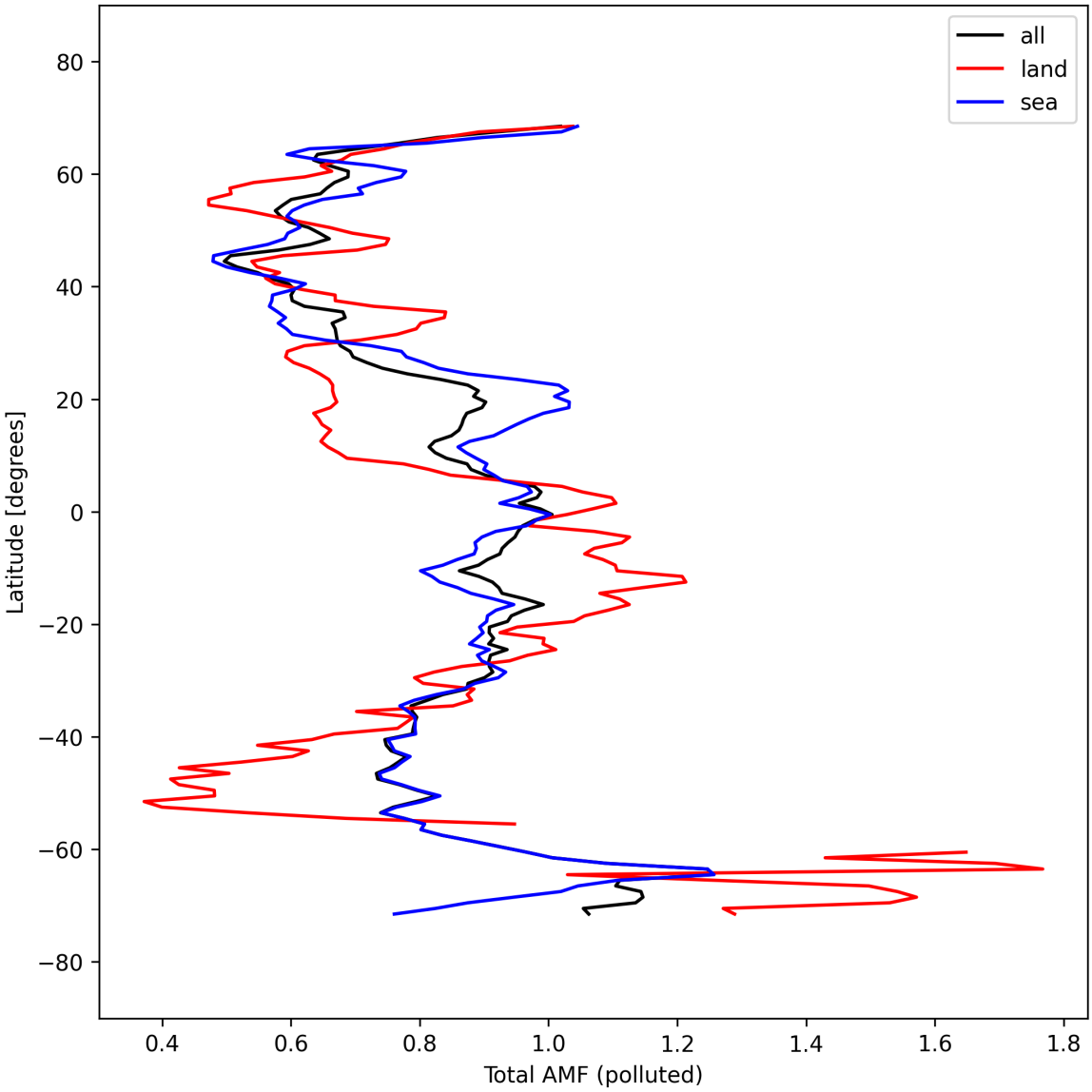

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-15 to 2025-03-15.

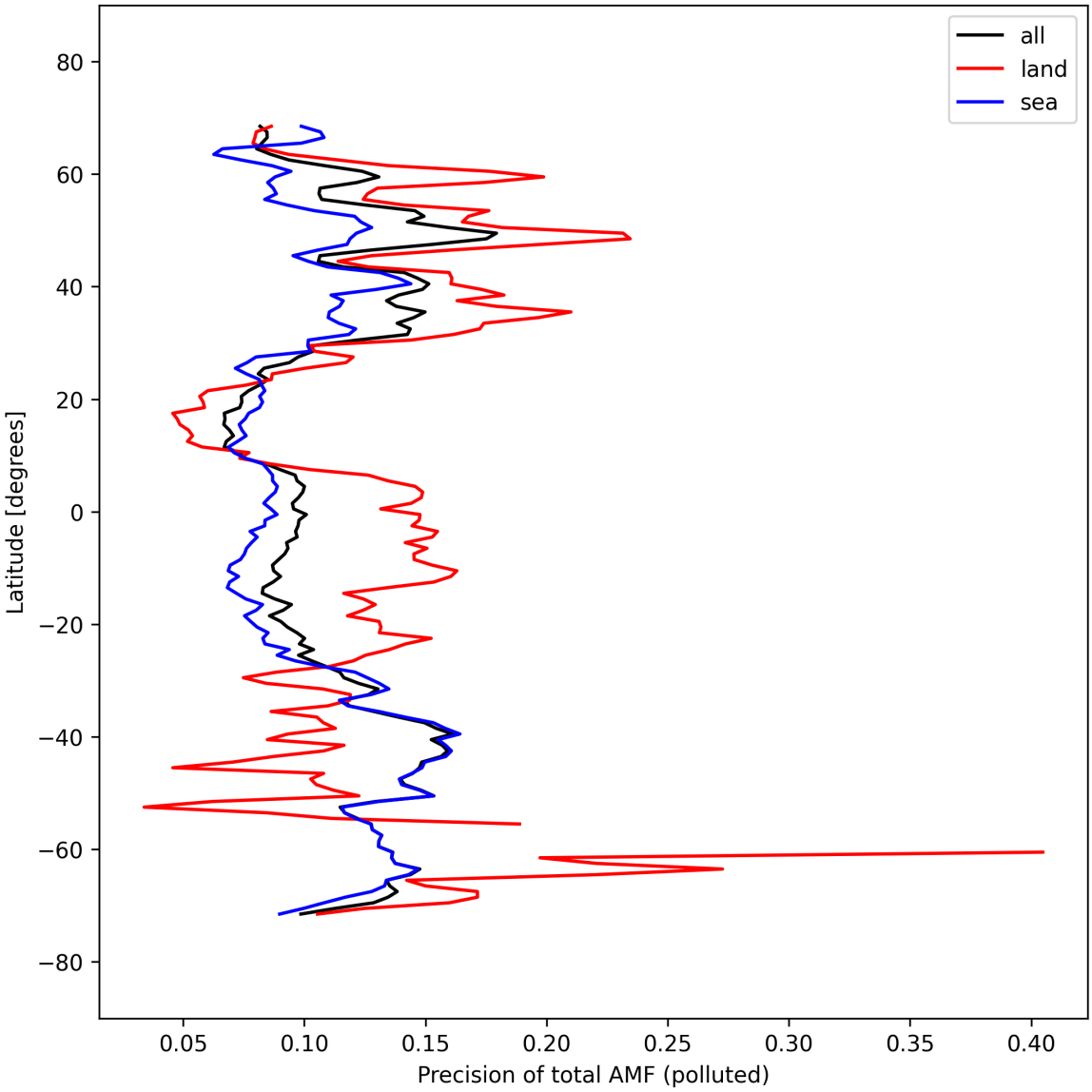

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-15 to 2025-03-15.

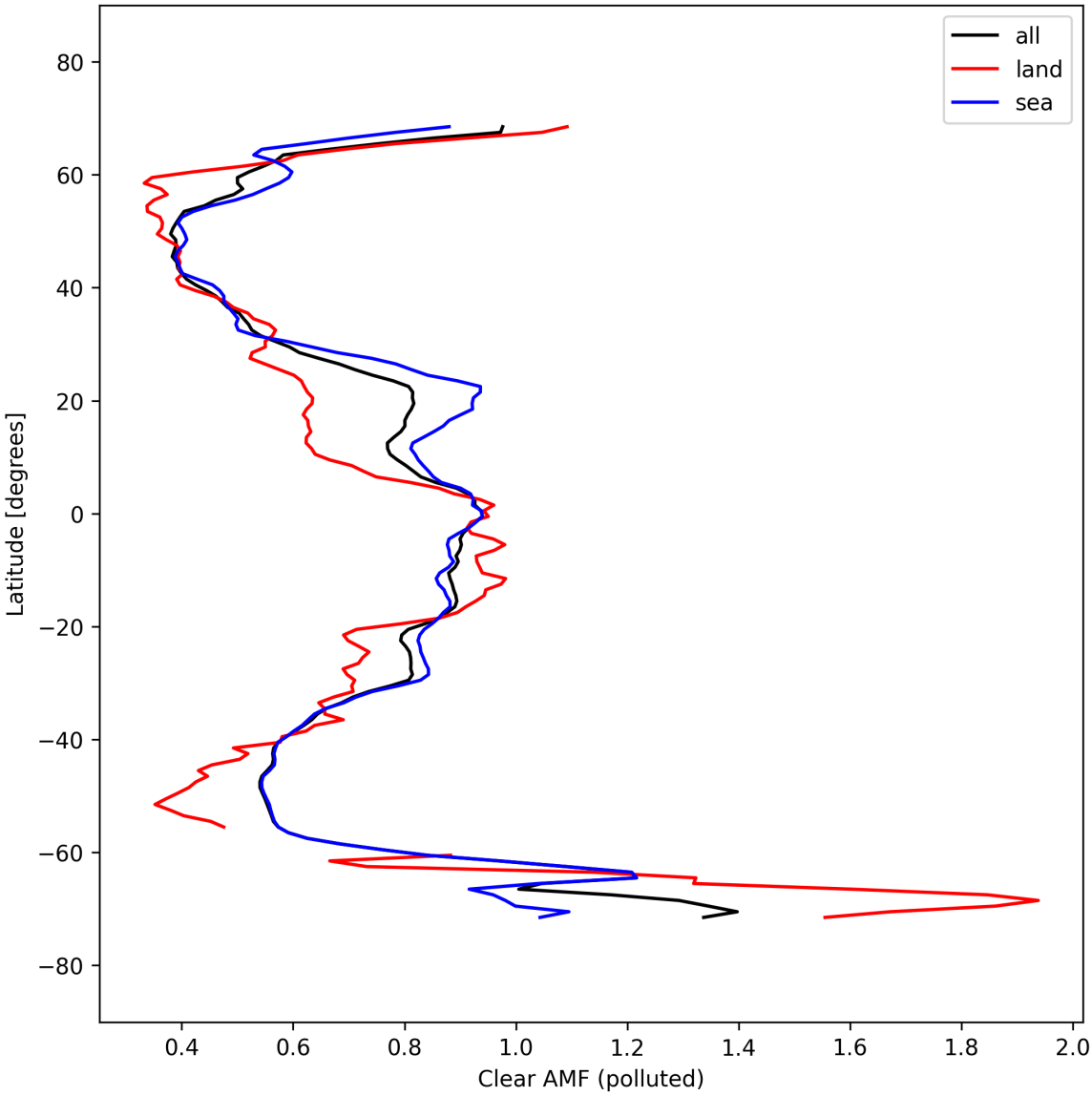

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-15 to 2025-03-15.

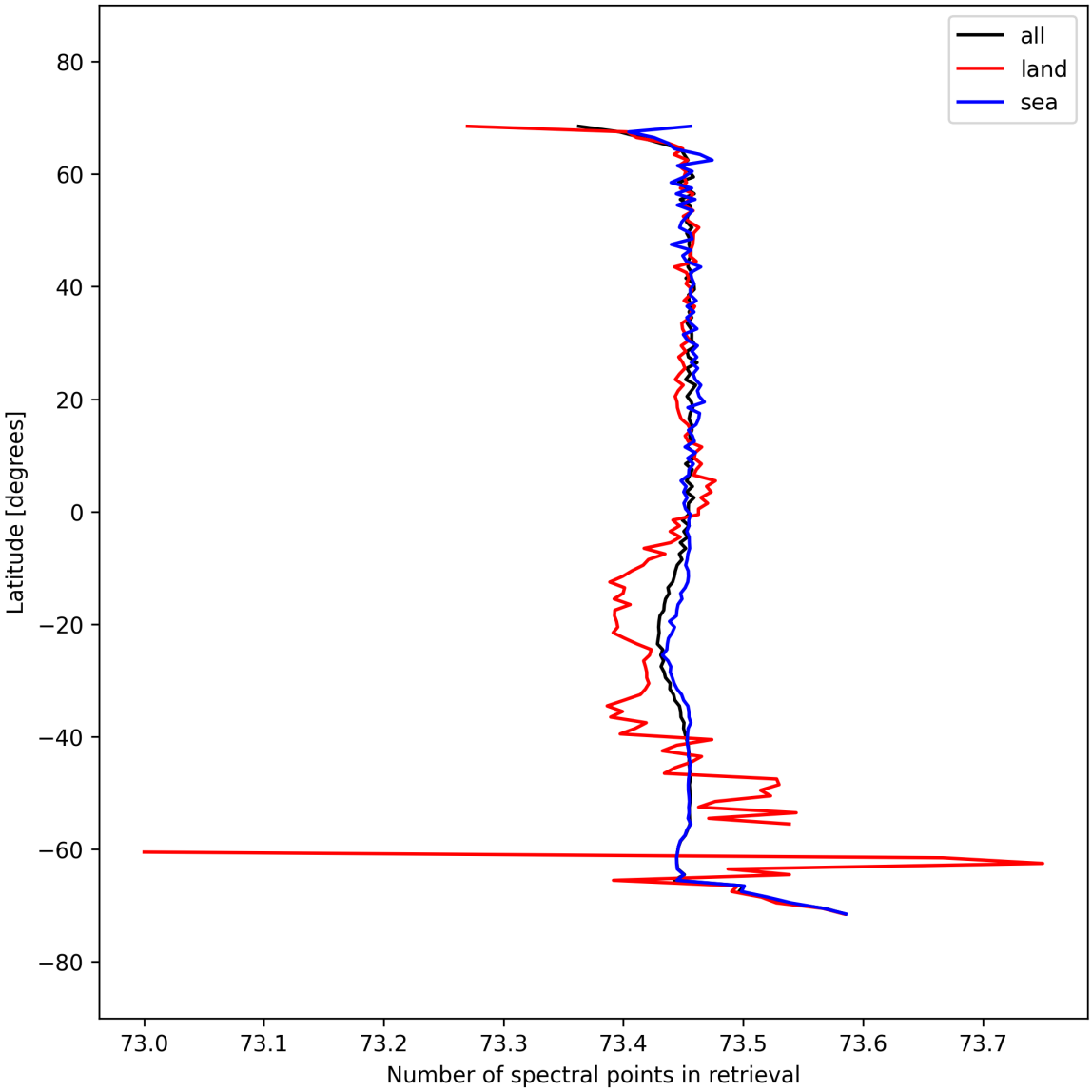

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-15 to 2025-03-15.

8 Histograms

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

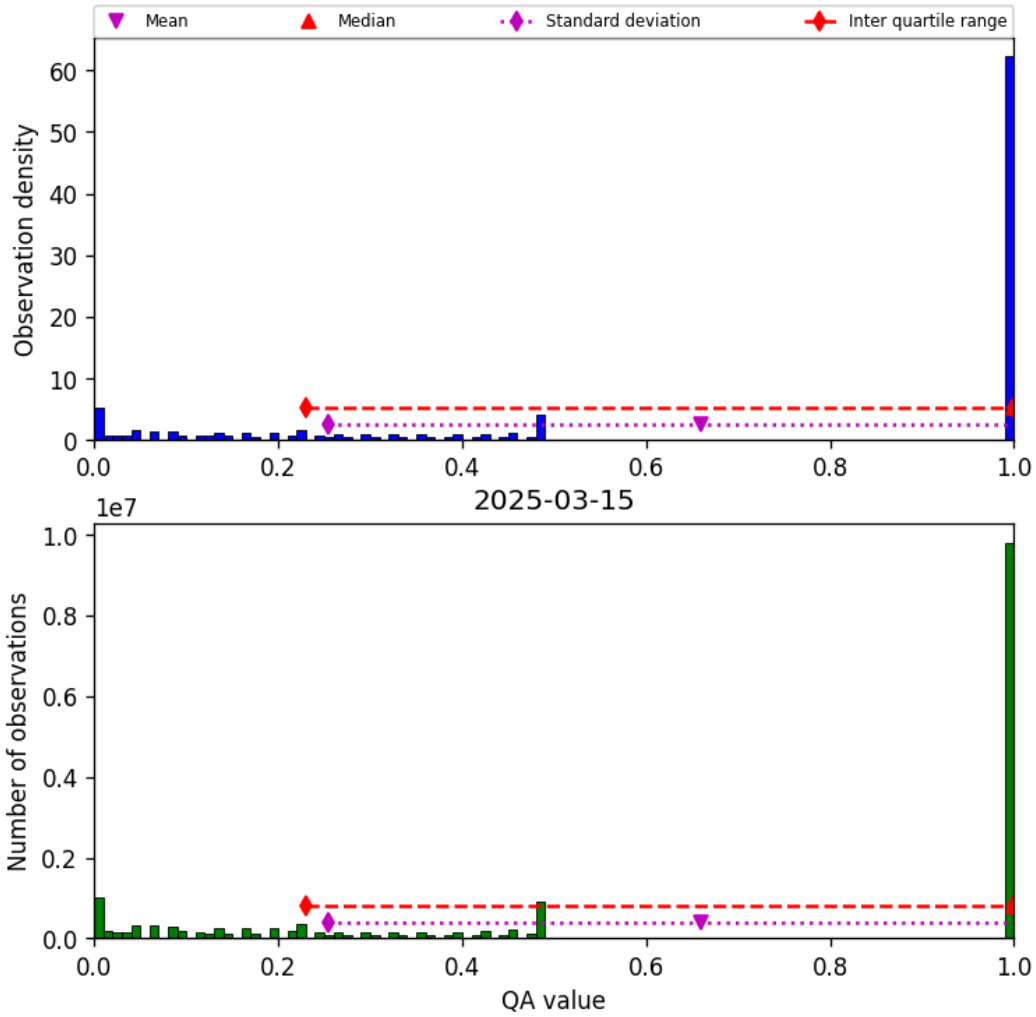

Figure 57: Histogram of “QA value” for 2025-03-15 to 2025-03-15

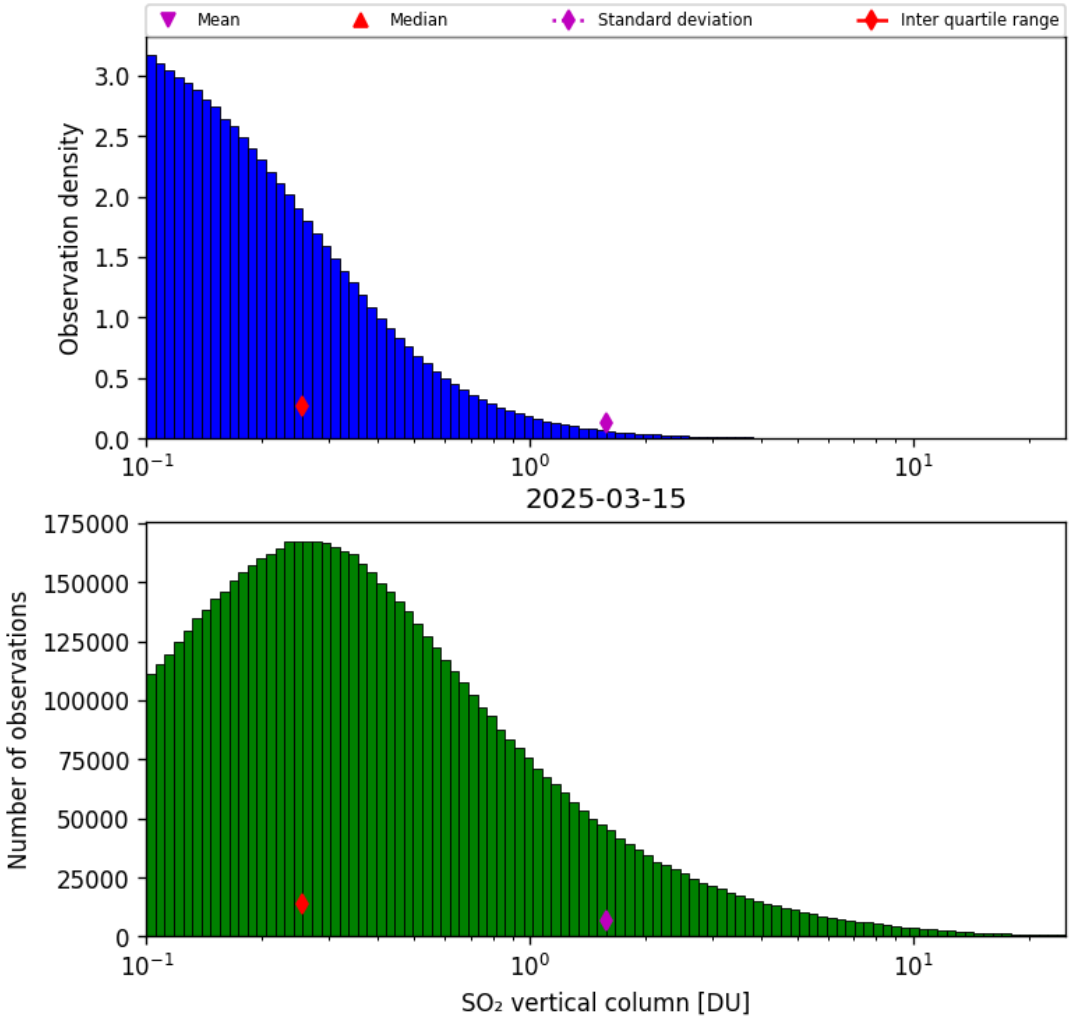

Figure 58: Histogram of "SO_2 vertical column" for 2025-03-15 to 2025-03-15

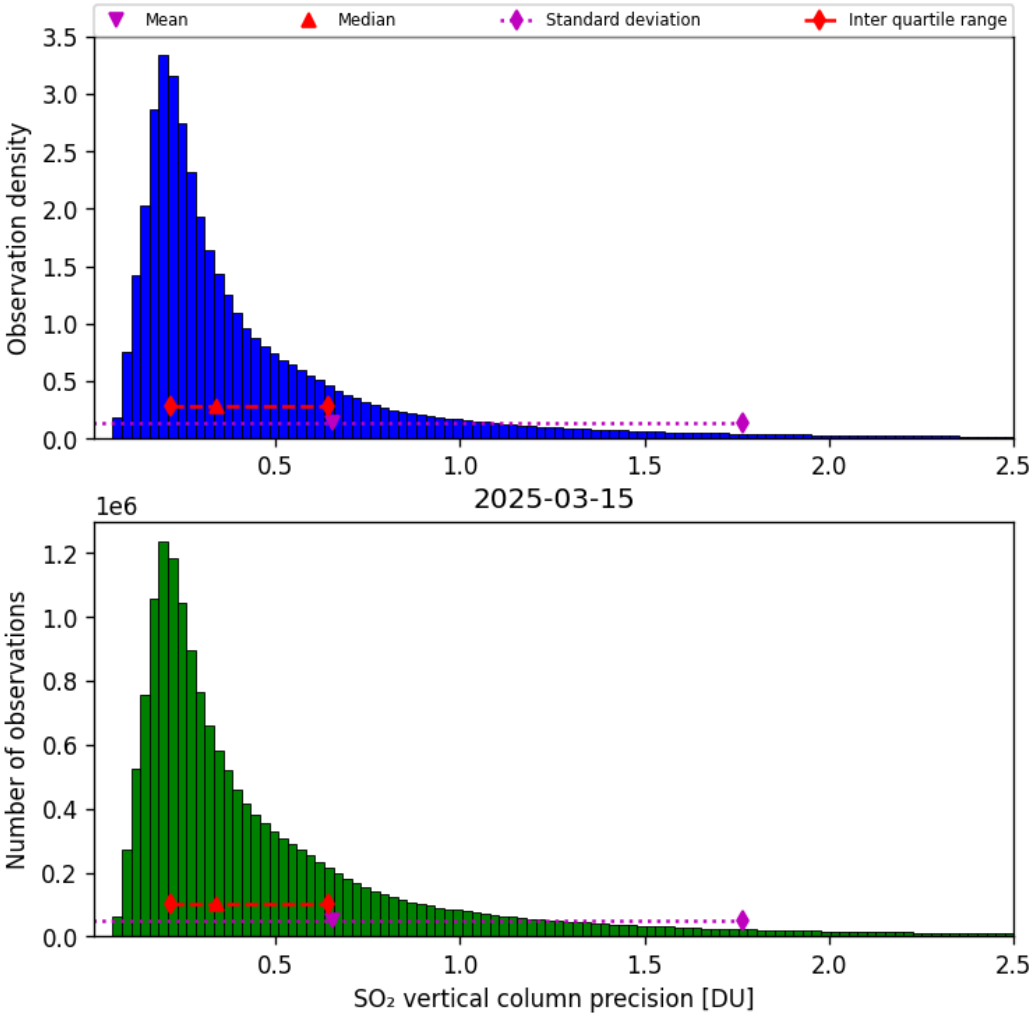

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-03-15 to 2025-03-15

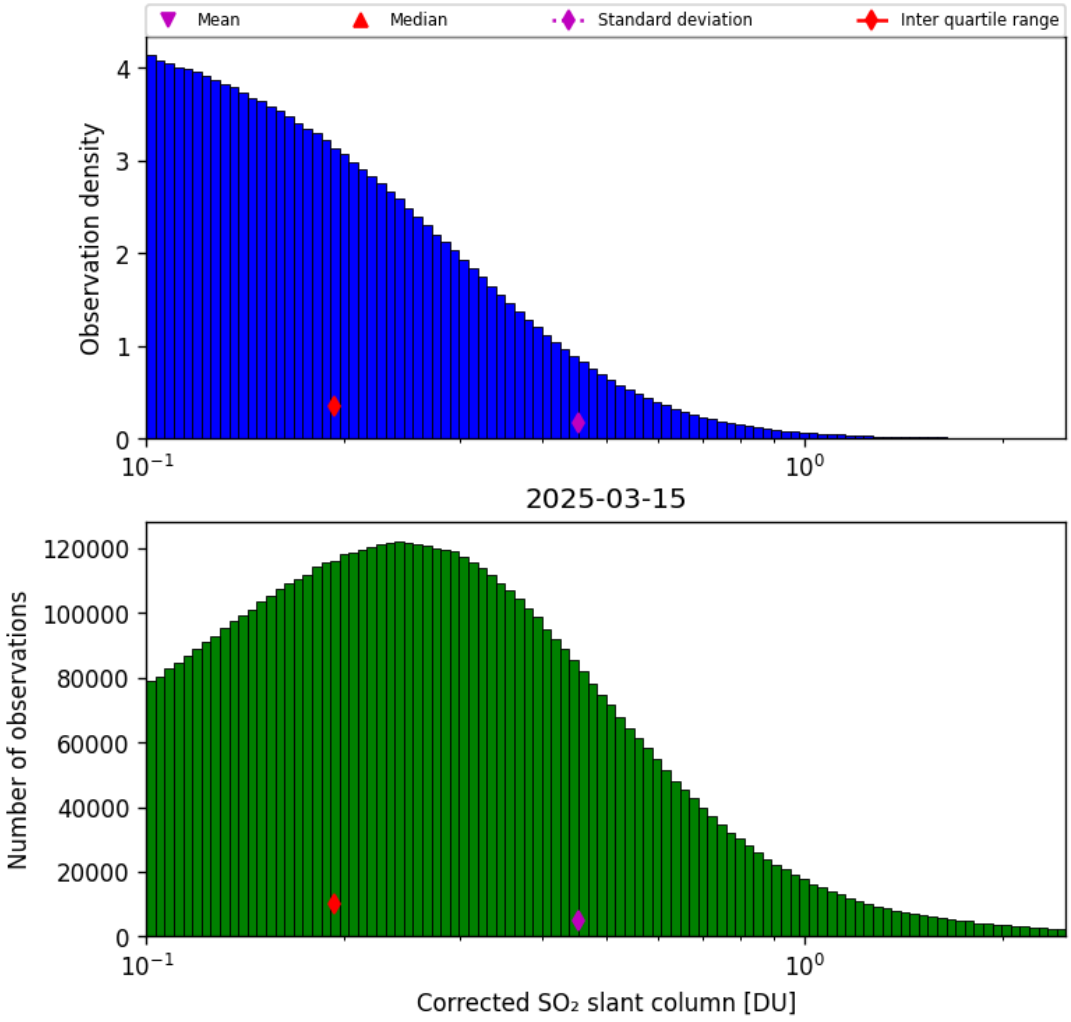

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-03-15 to 2025-03-15

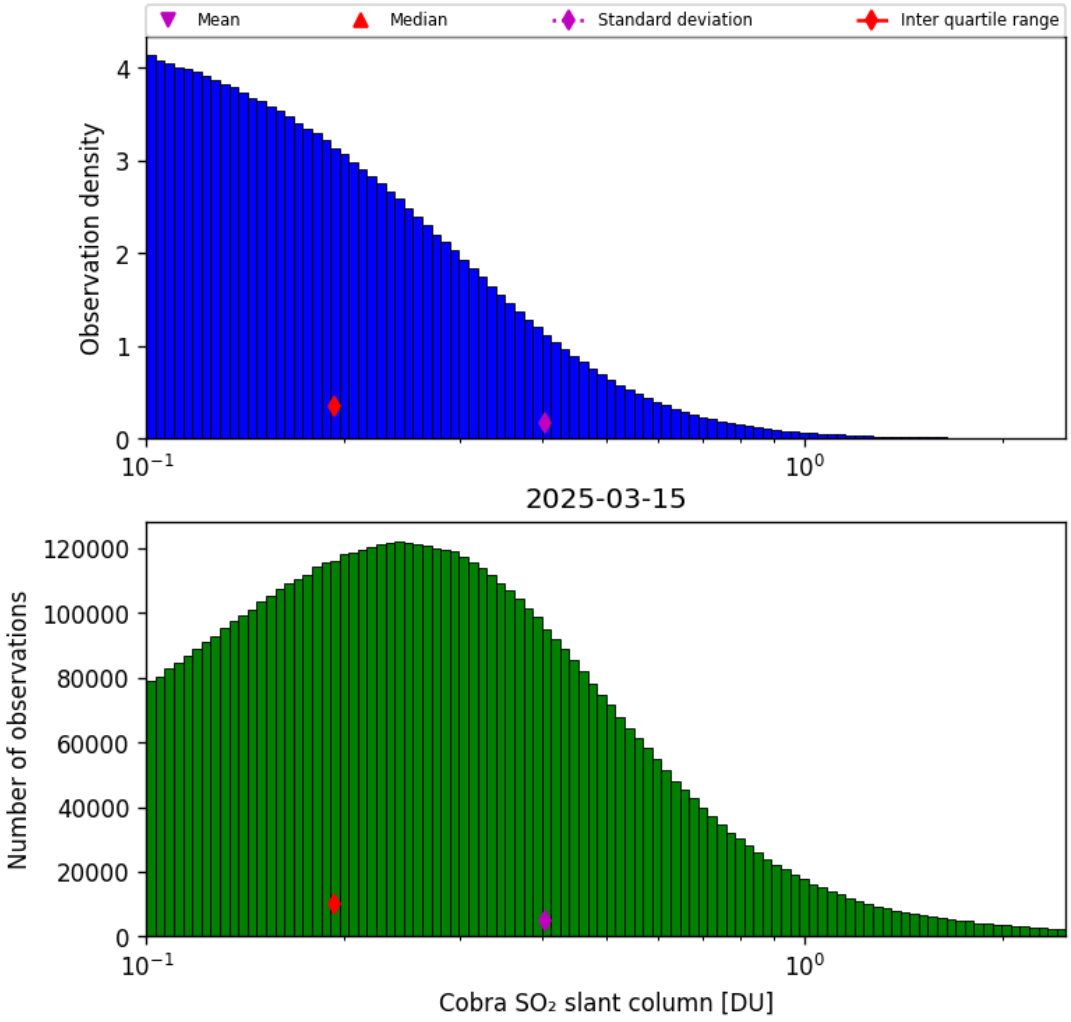

Figure 61: Histogram of “Cobra SO_2 slant column” for 2025-03-15 to 2025-03-15

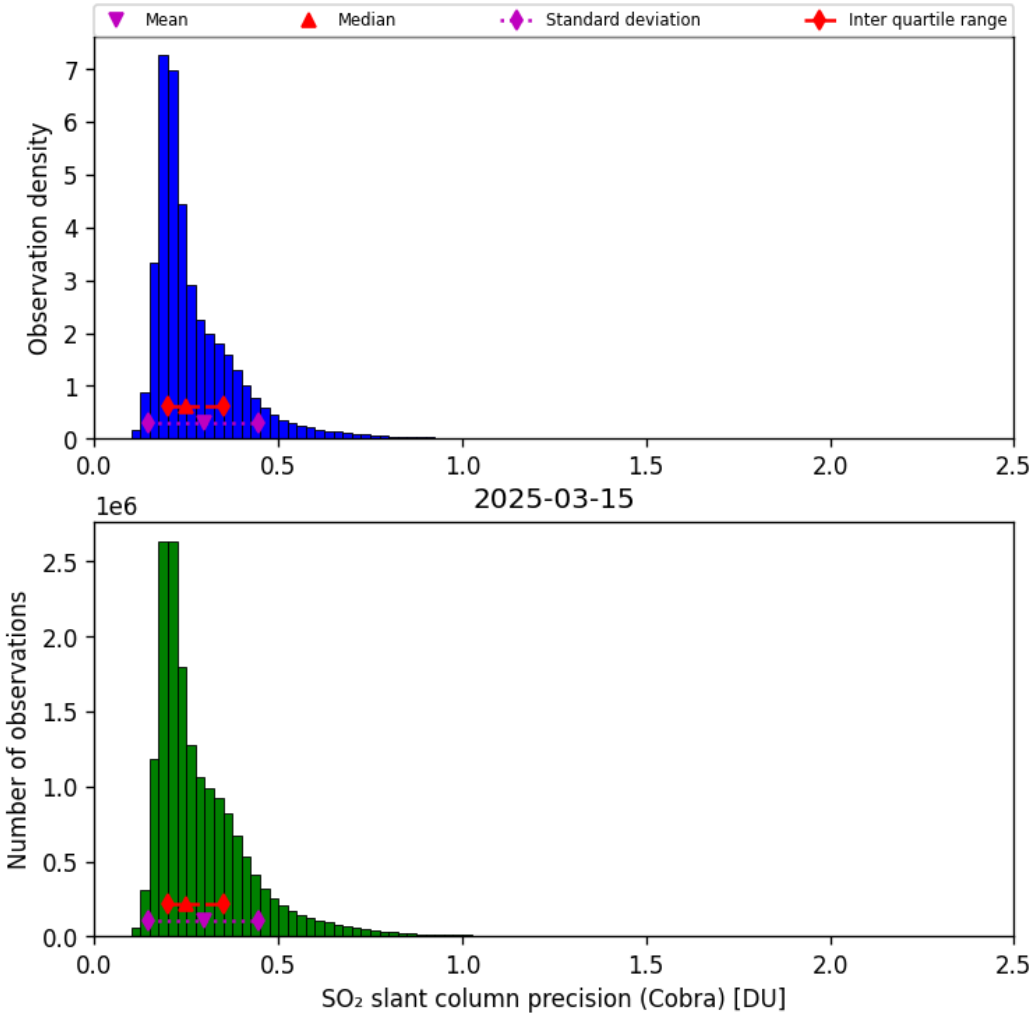

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-03-15 to 2025-03-15

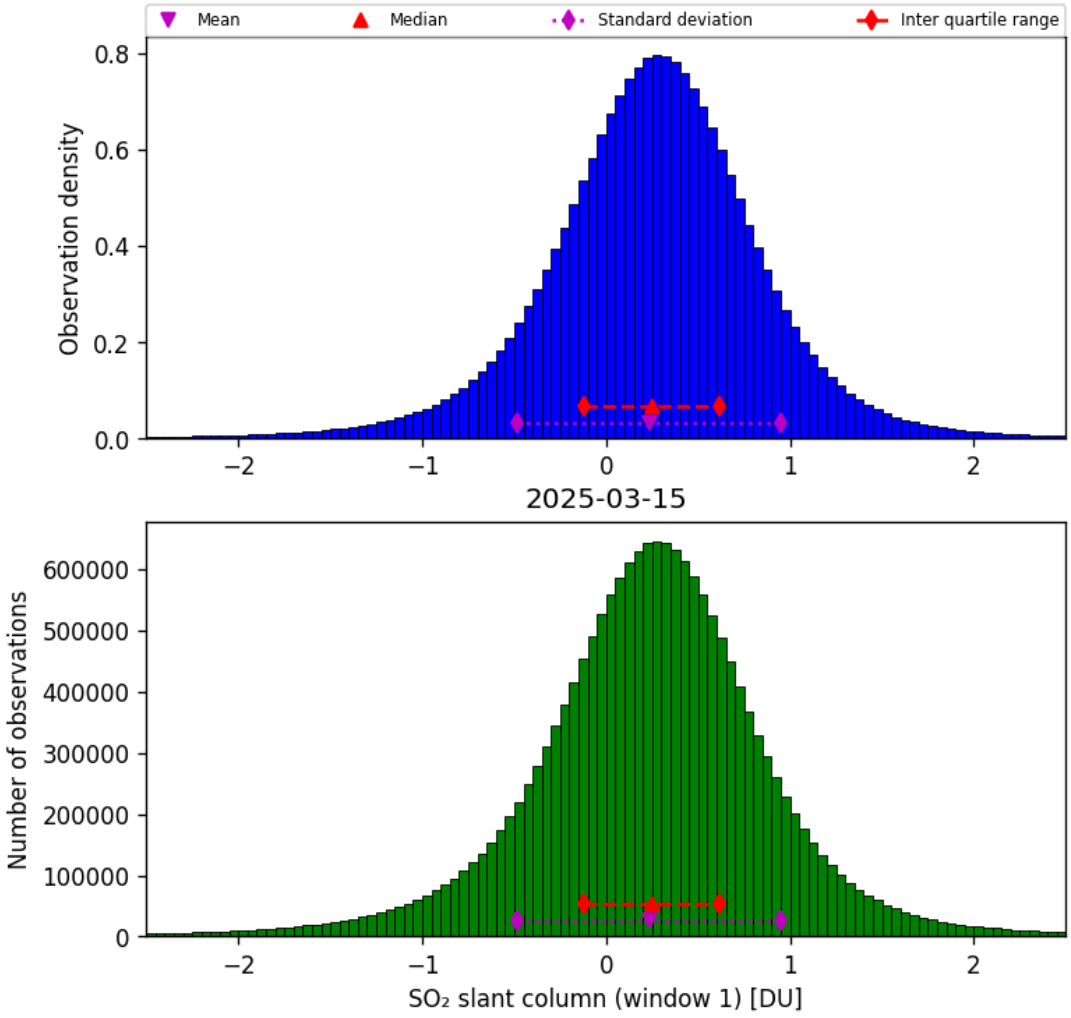

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-03-15 to 2025-03-15

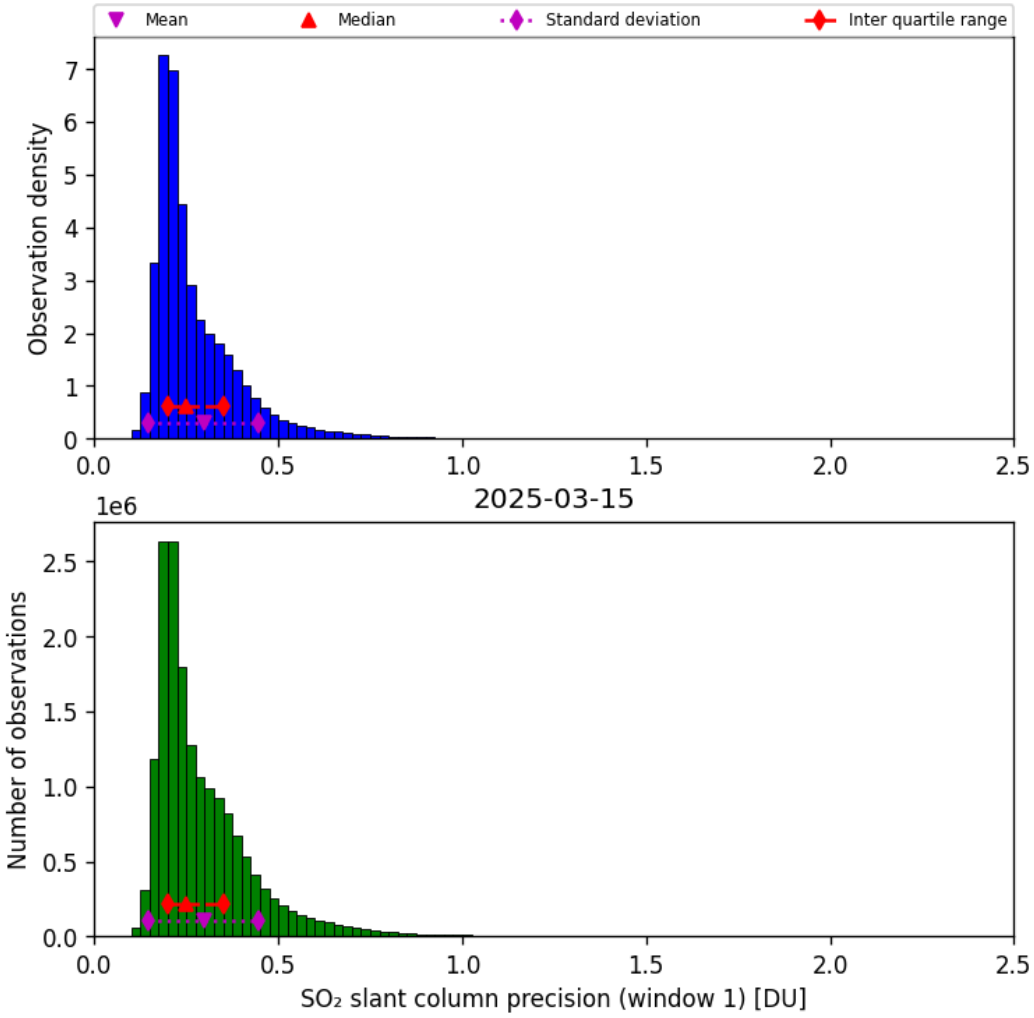

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-03-15 to 2025-03-15

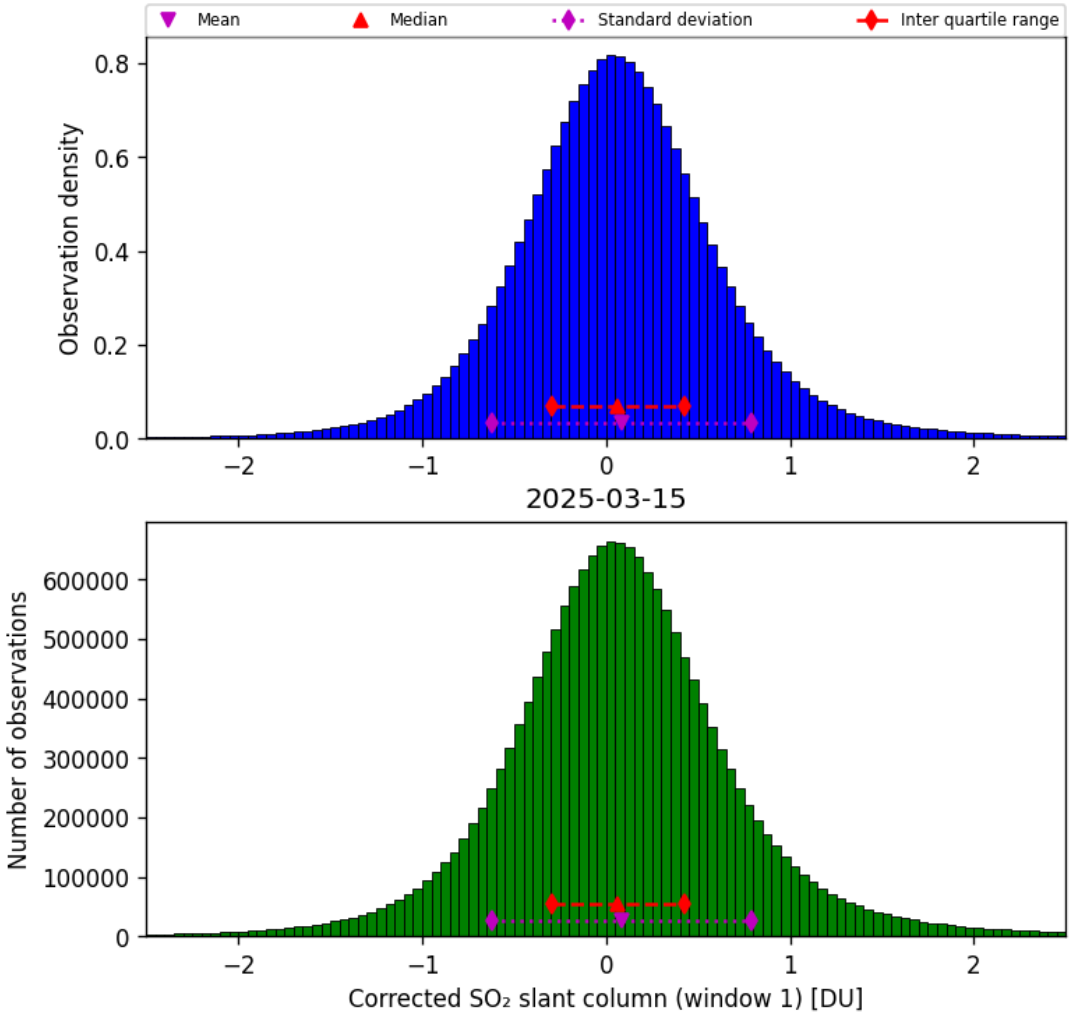

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-03-15 to 2025-03-15

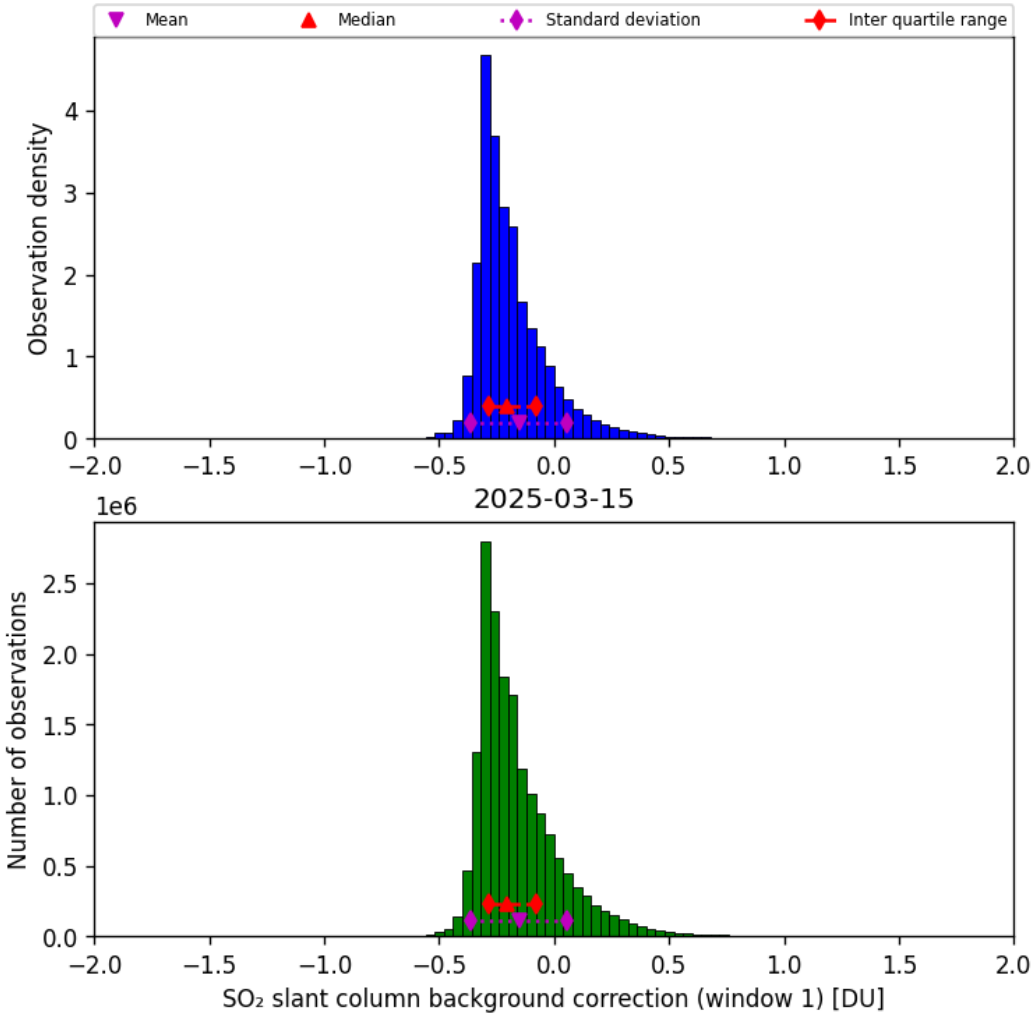

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-03-15 to 2025-03-15

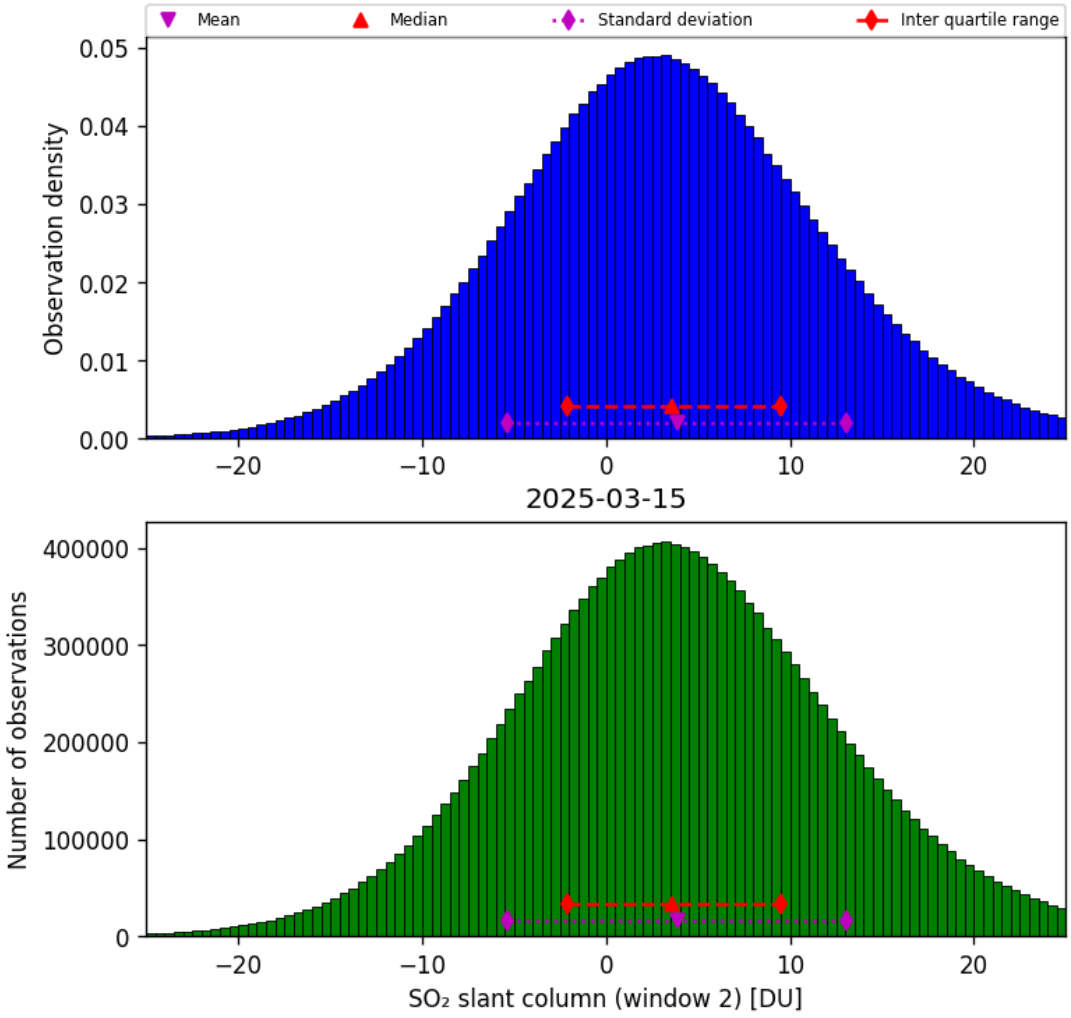

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-03-15 to 2025-03-15

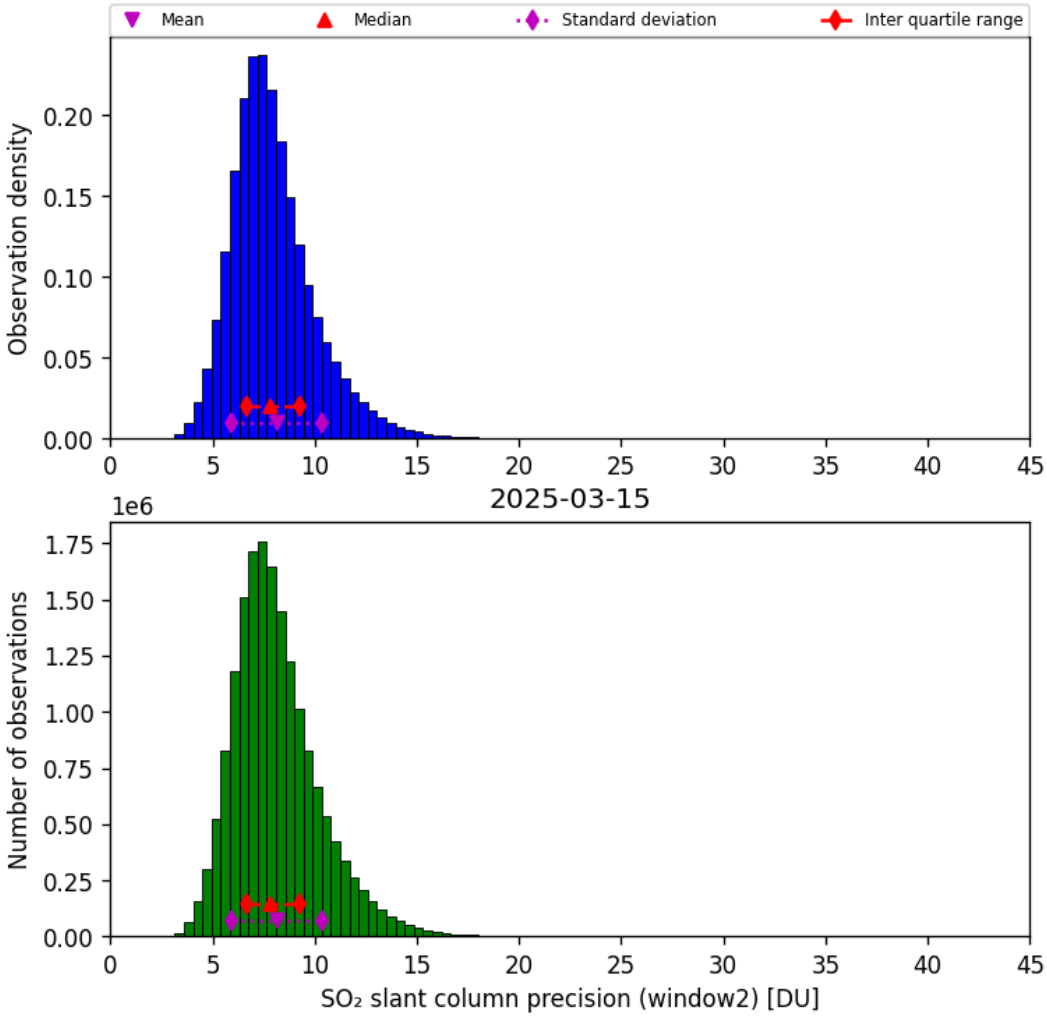

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-03-15 to 2025-03-15

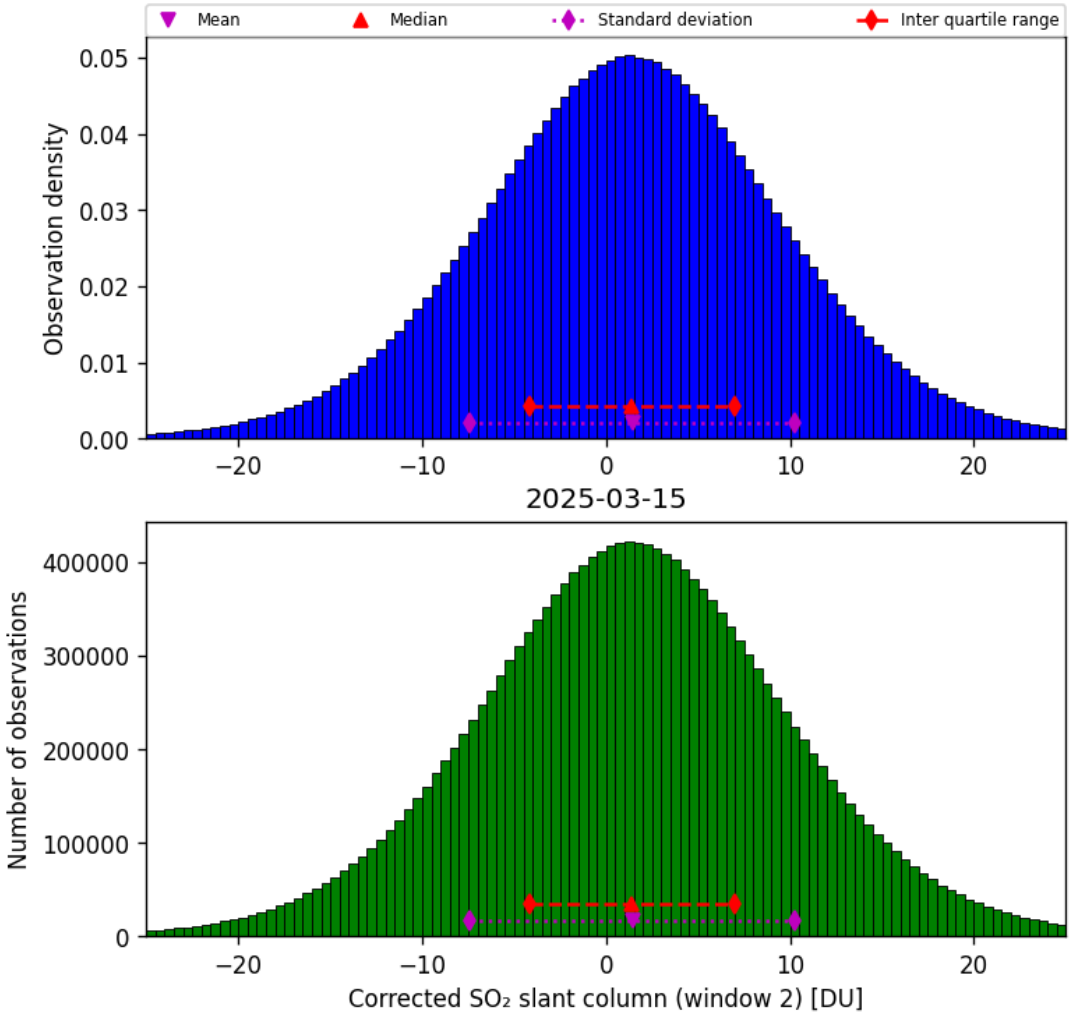

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-03-15 to 2025-03-15

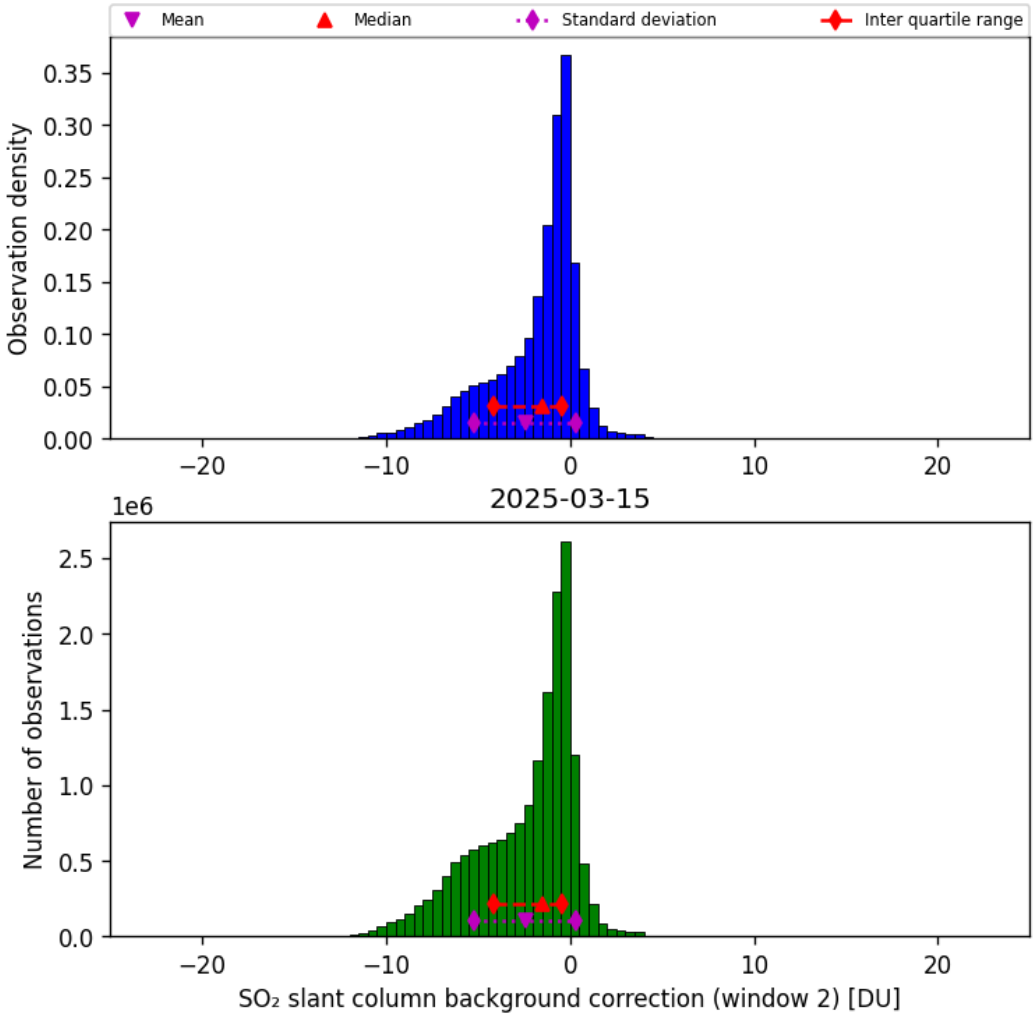

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-03-15 to 2025-03-15

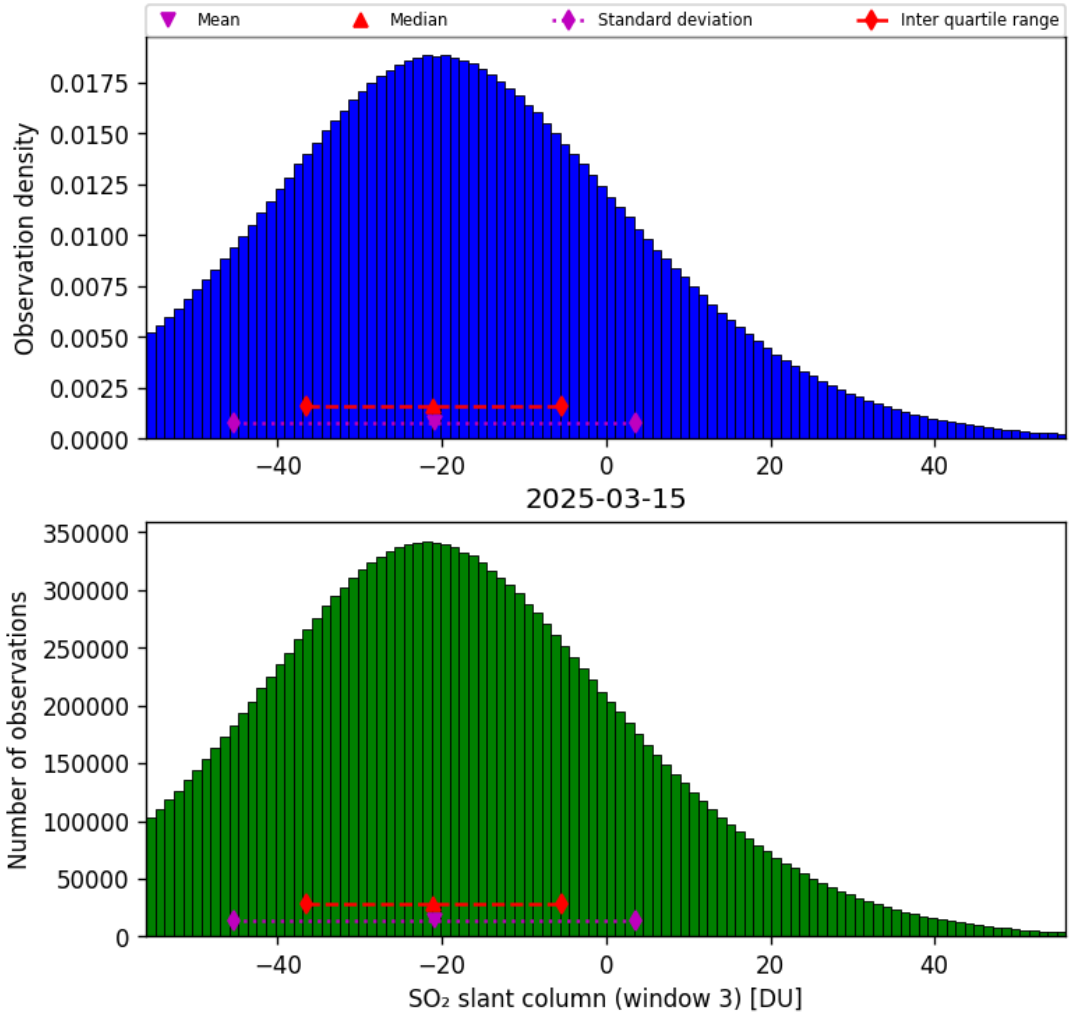

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-03-15 to 2025-03-15

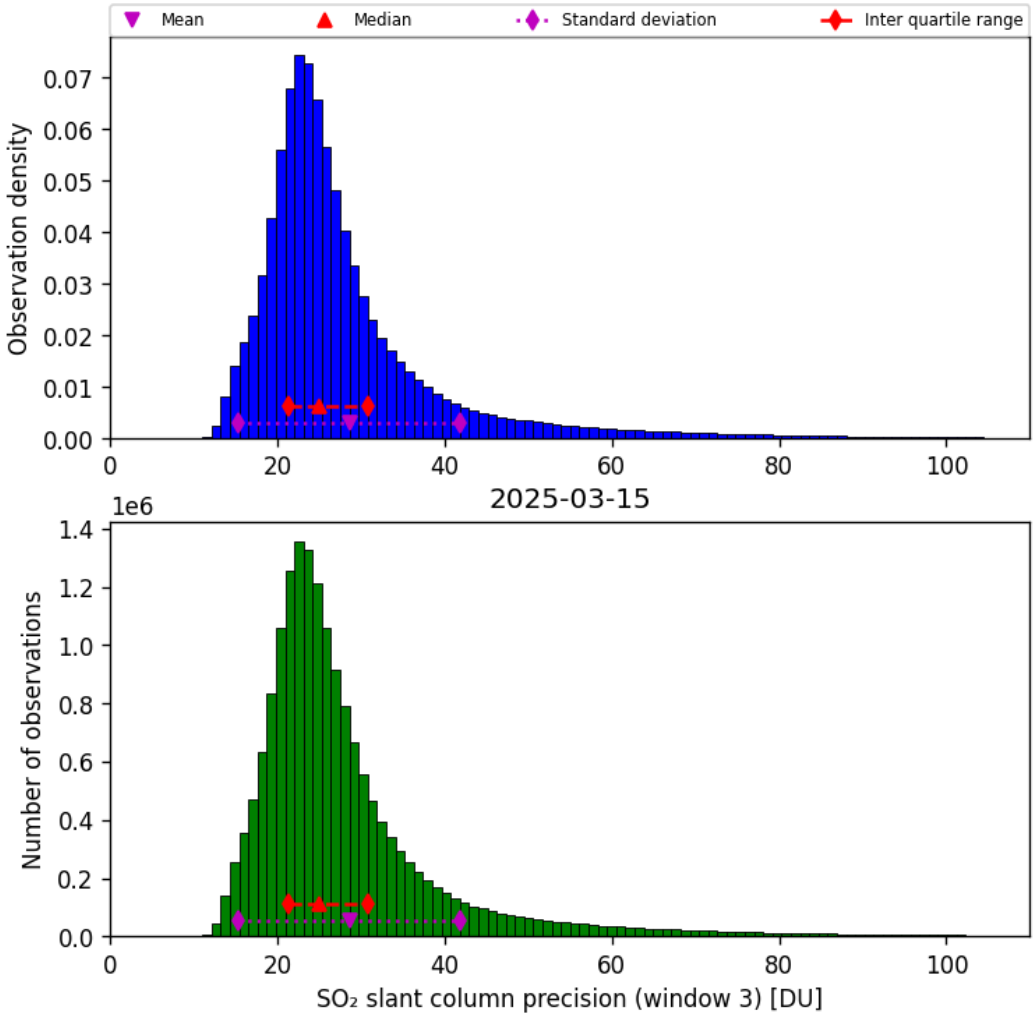

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-03-15 to 2025-03-15

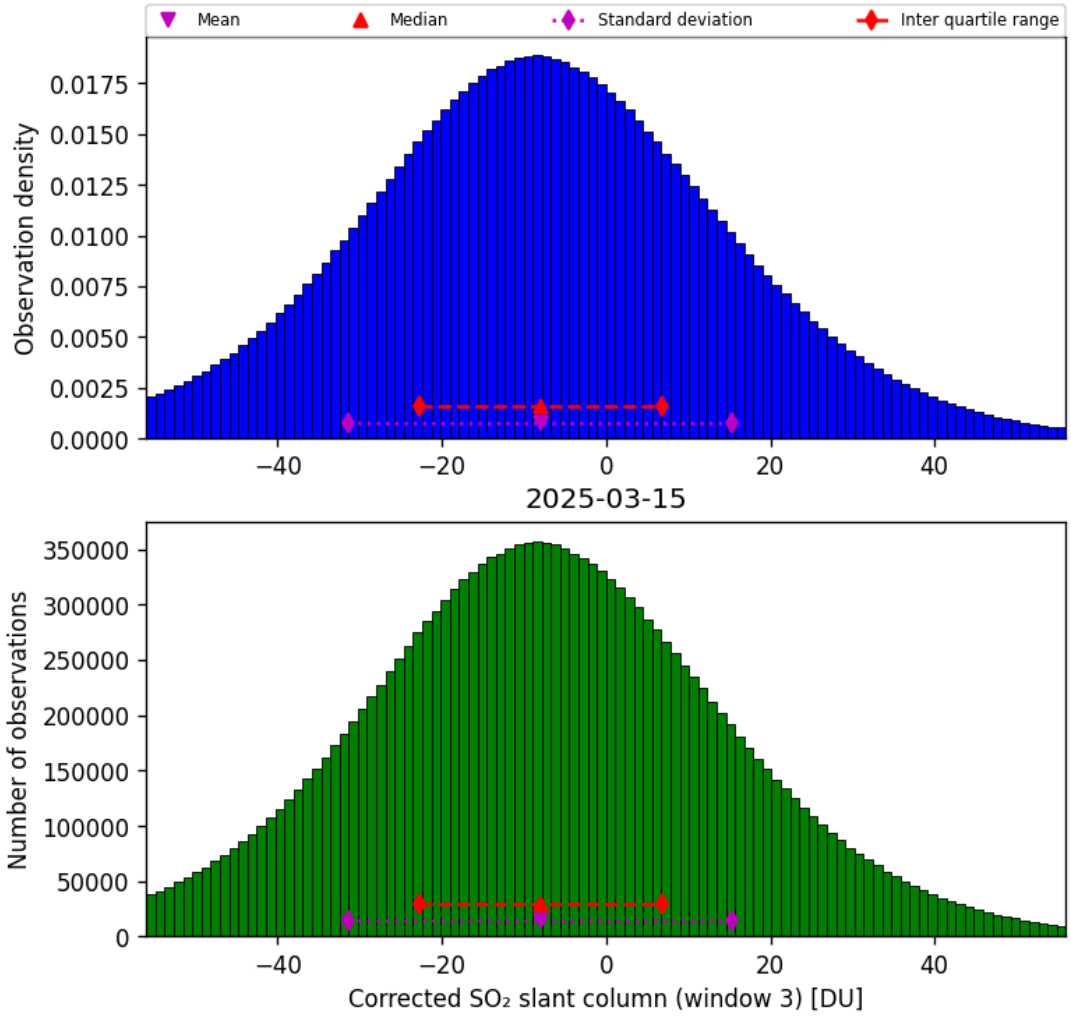

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-03-15 to 2025-03-15

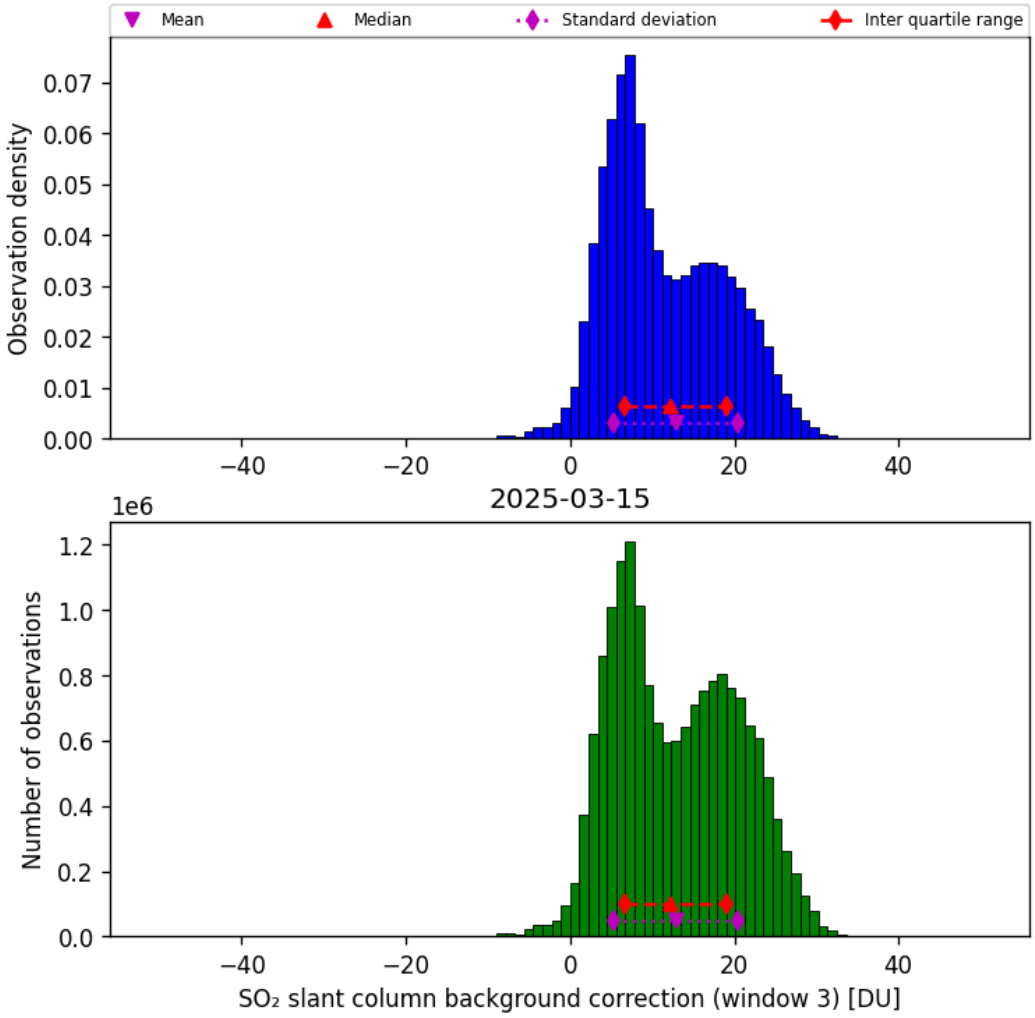

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-03-15 to 2025-03-15

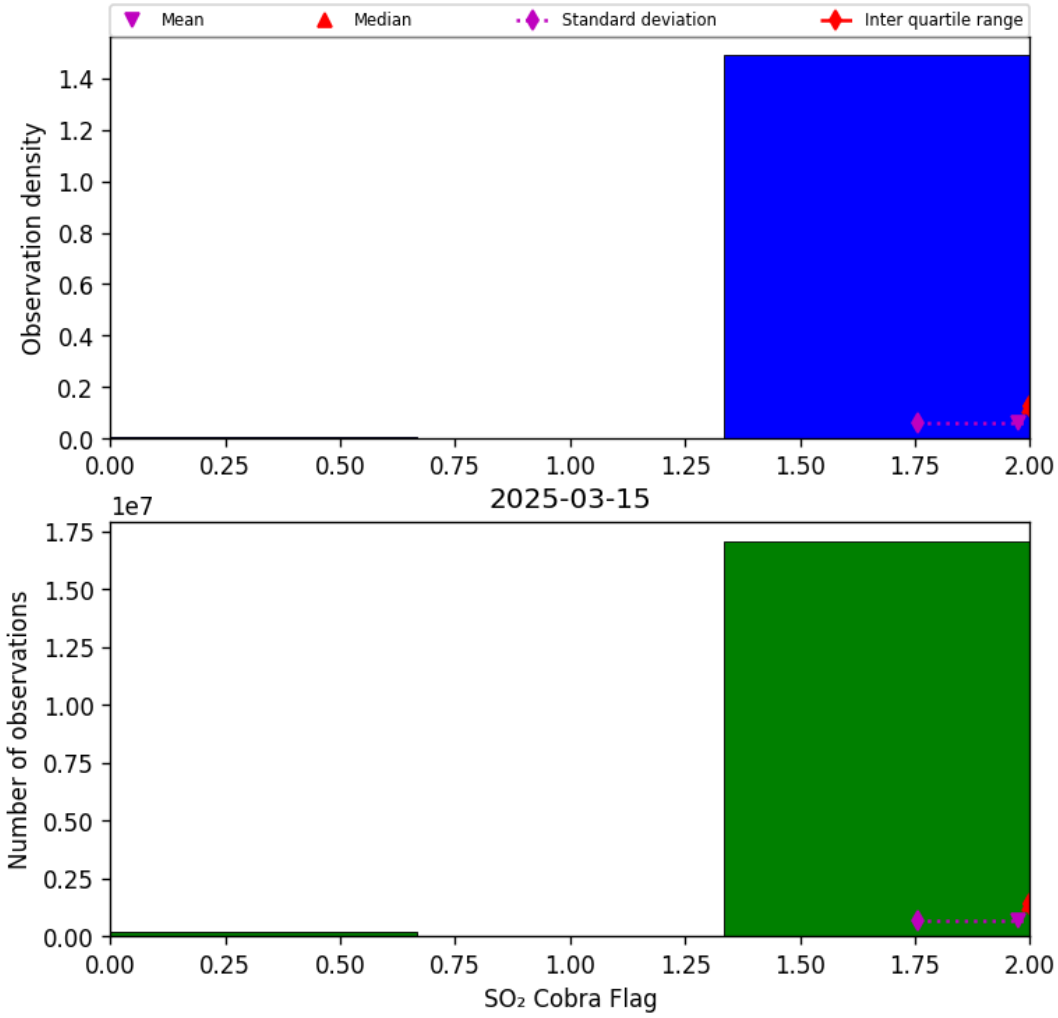

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-03-15 to 2025-03-15

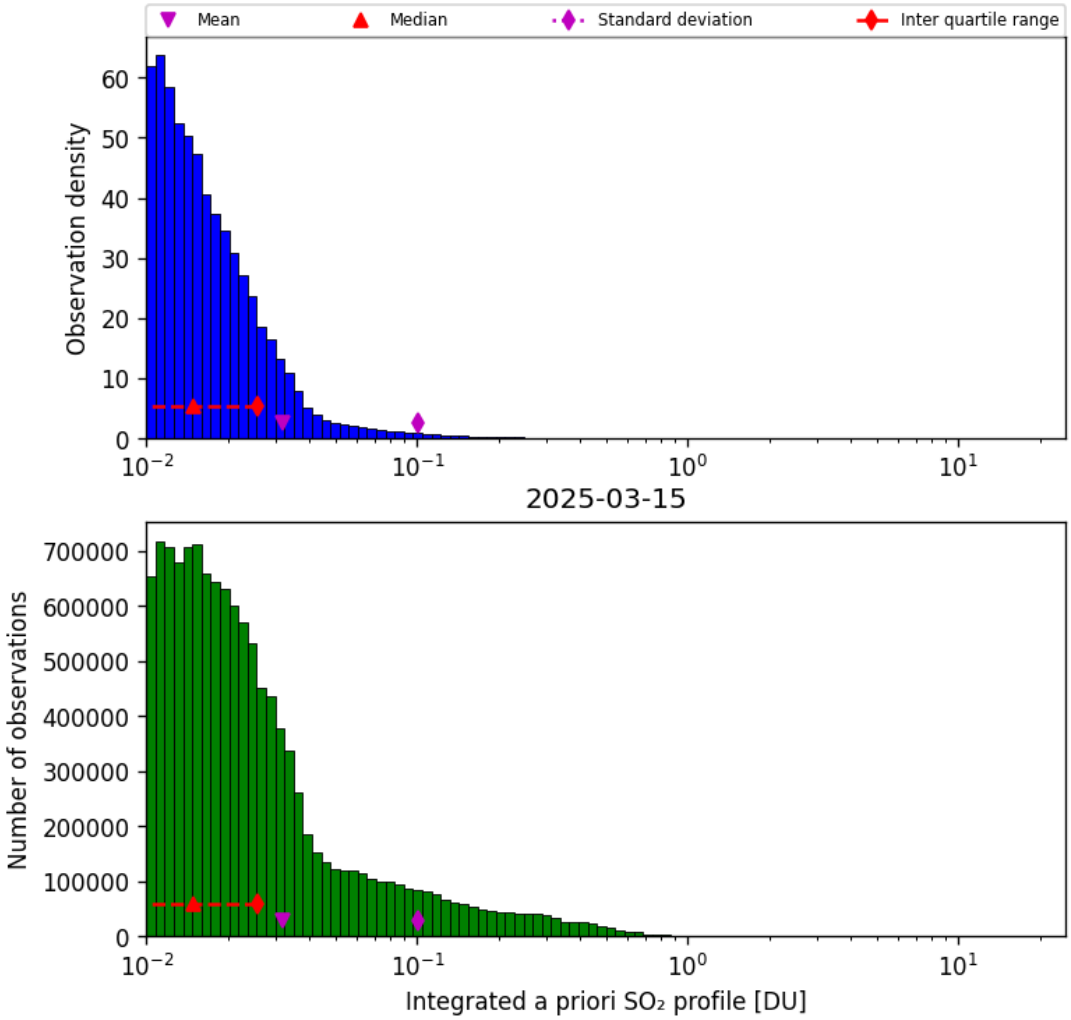

Figure 76: Histogram of “Integrated a priori SO_2 profile” for 2025-03-15 to 2025-03-15

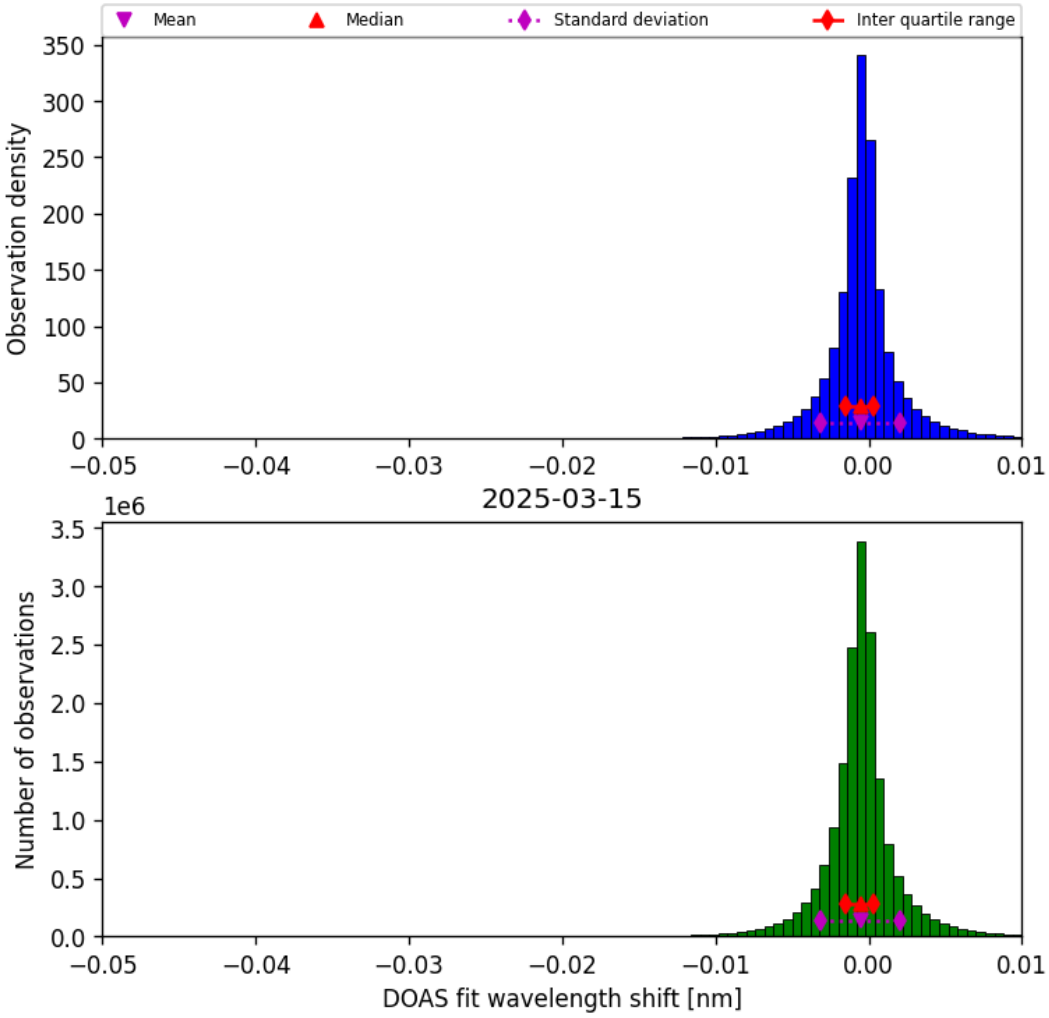

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-15 to 2025-03-15

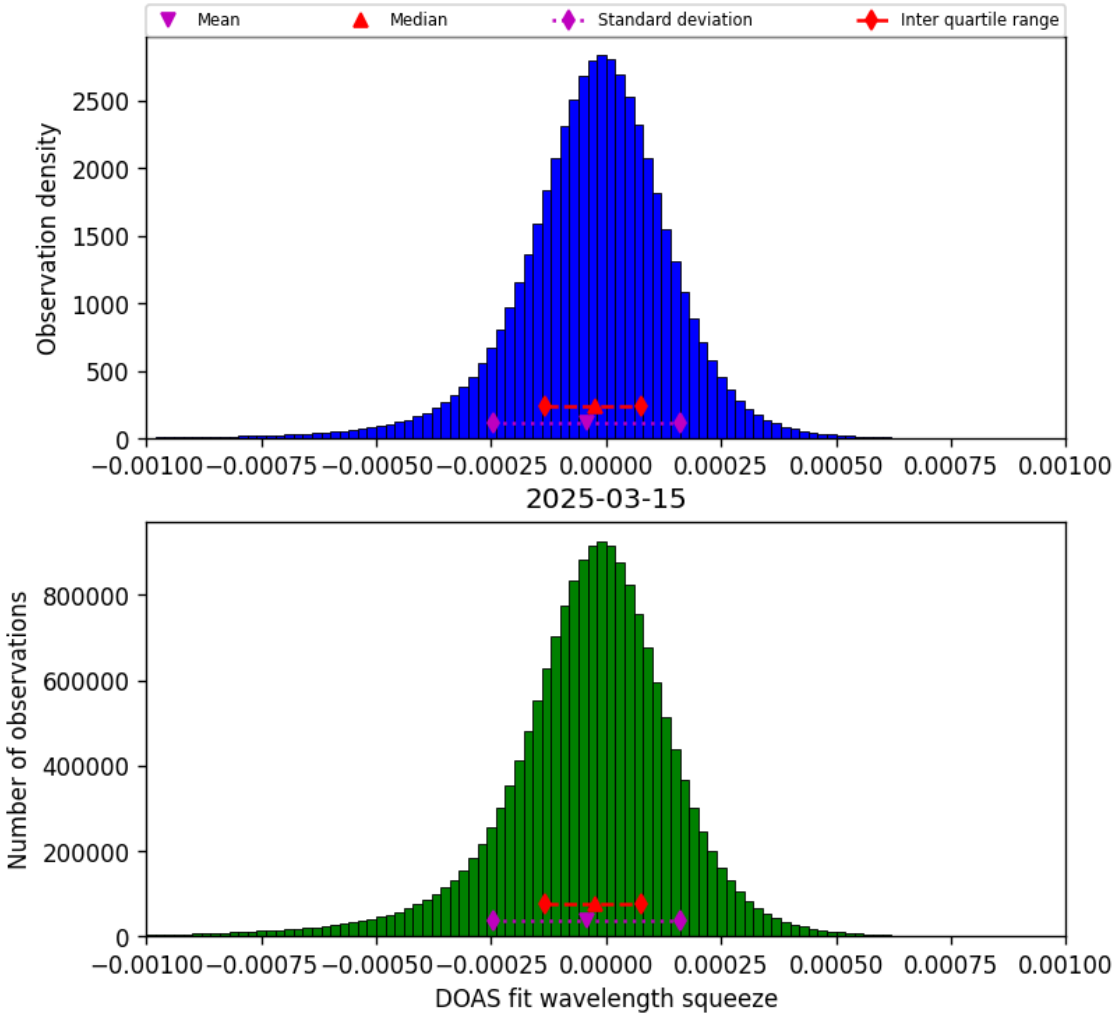

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-15 to 2025-03-15

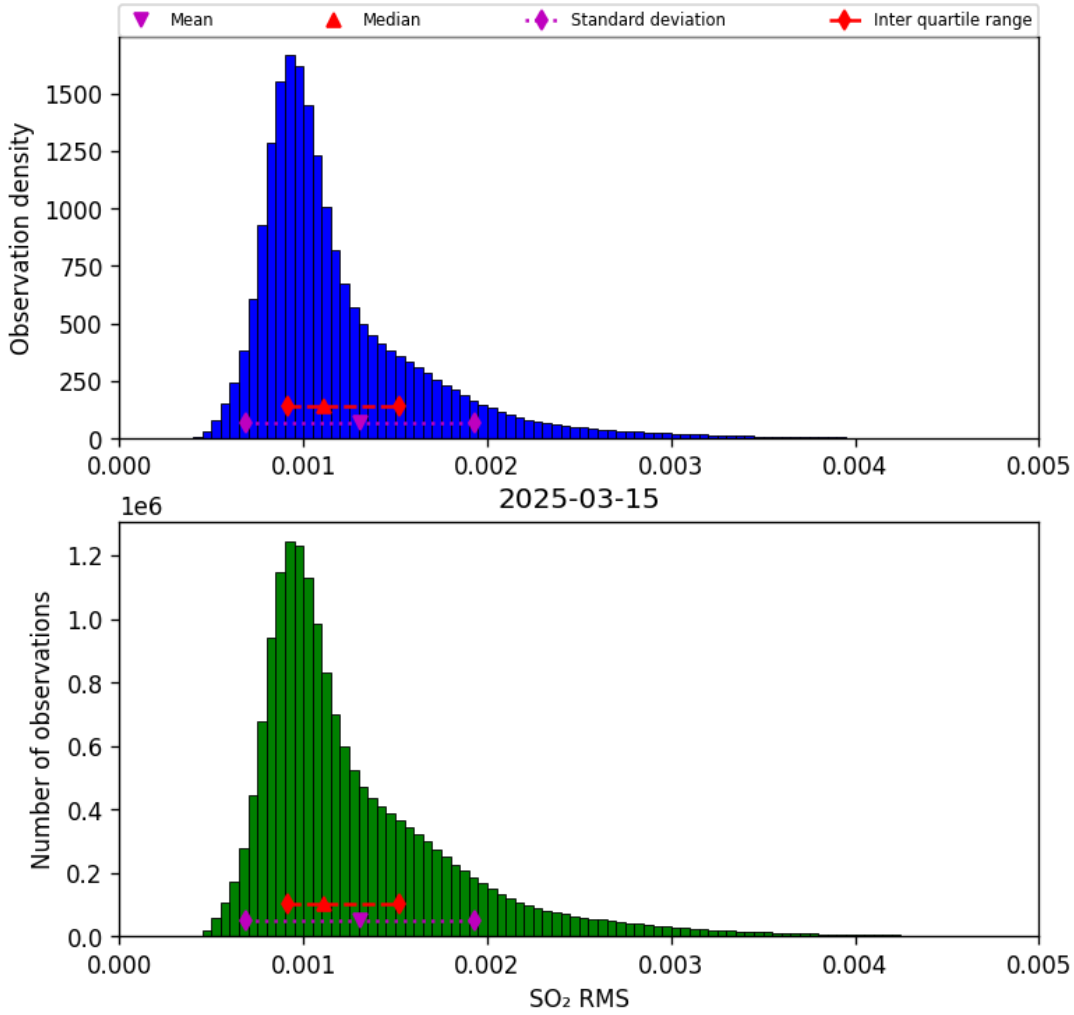

Figure 79: Histogram of "SO_2 RMS" for 2025-03-15 to 2025-03-15

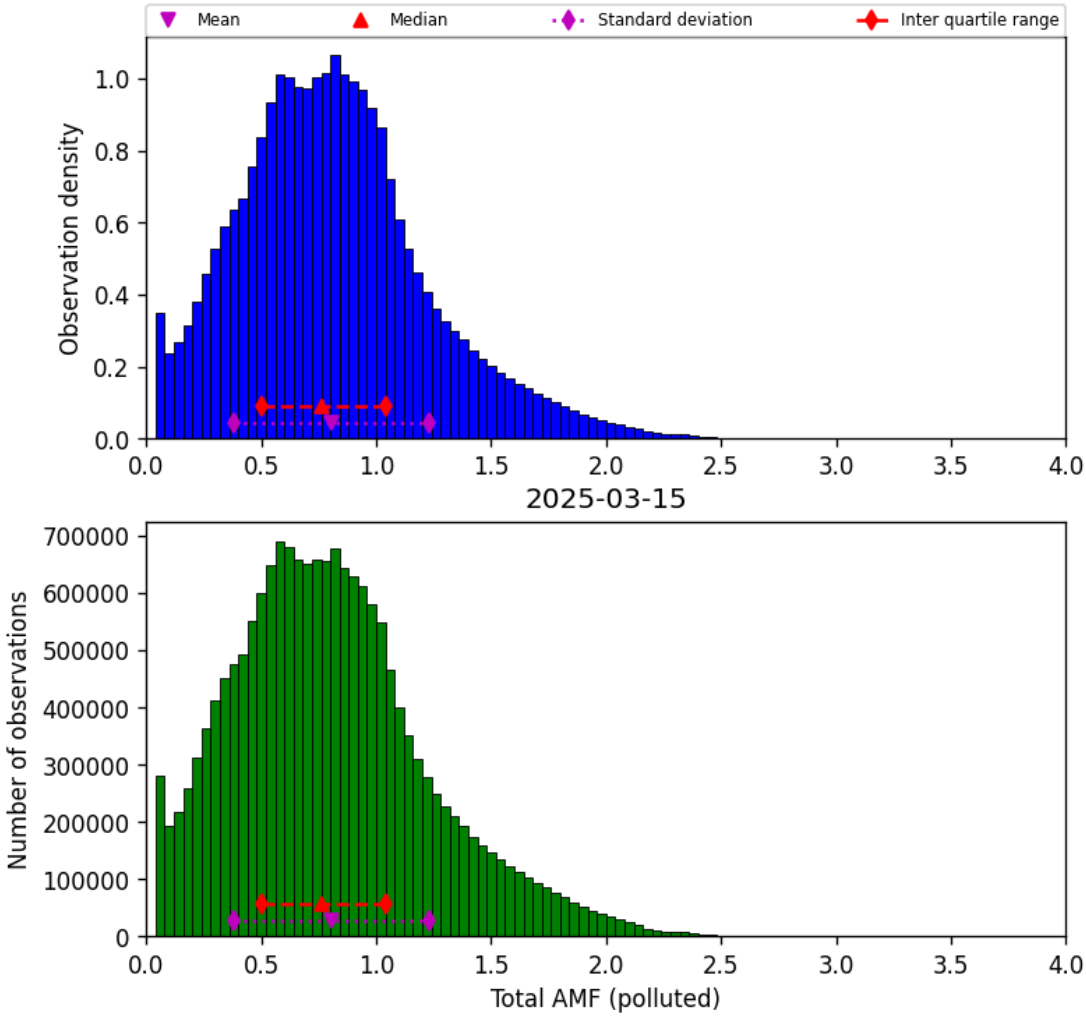

Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-15 to 2025-03-15

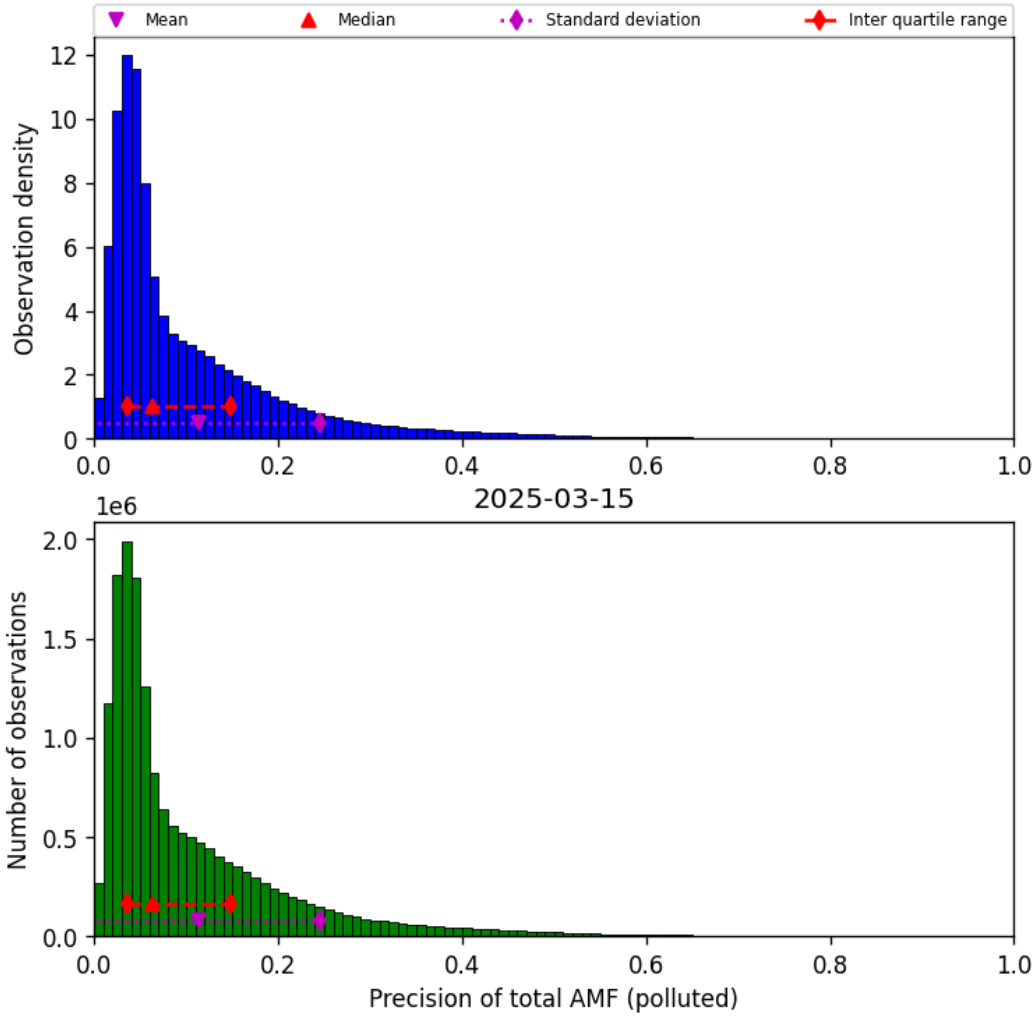

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-15 to 2025-03-15

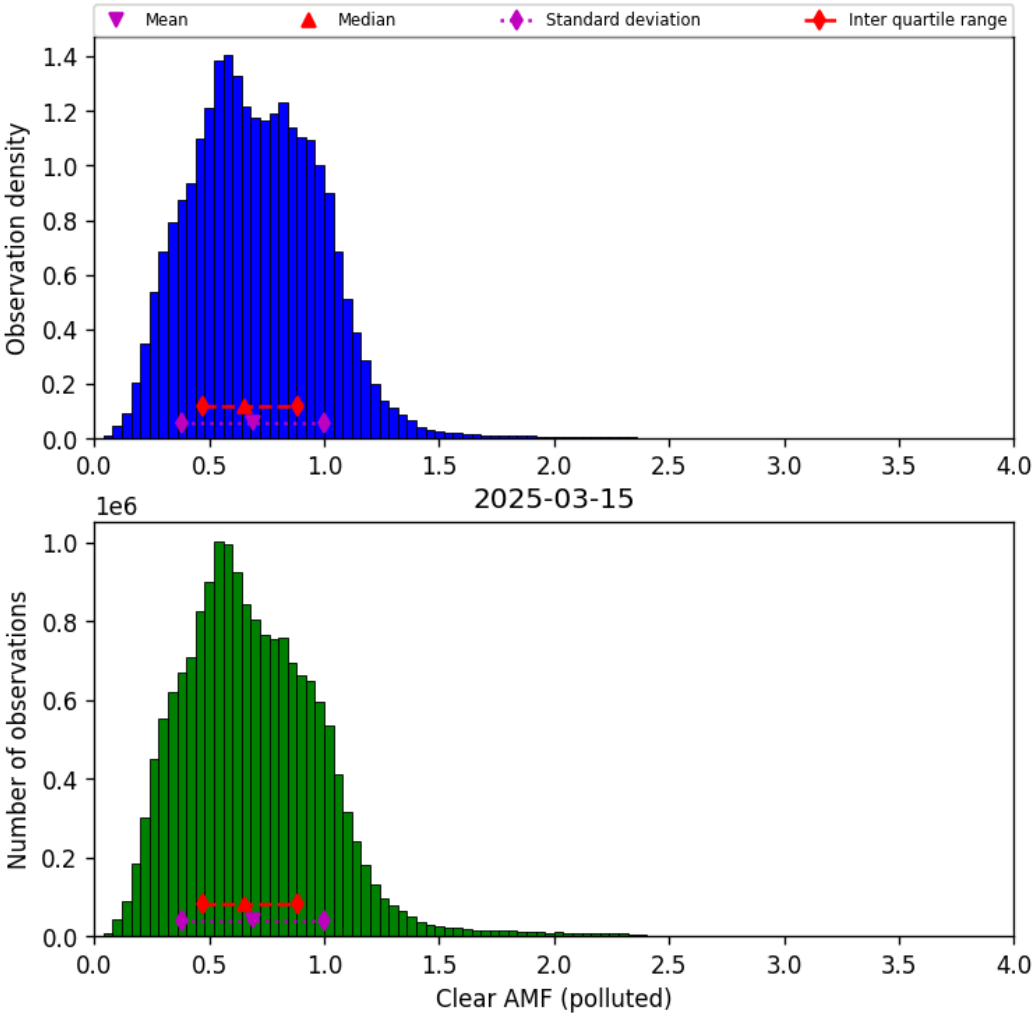

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-03-15 to 2025-03-15

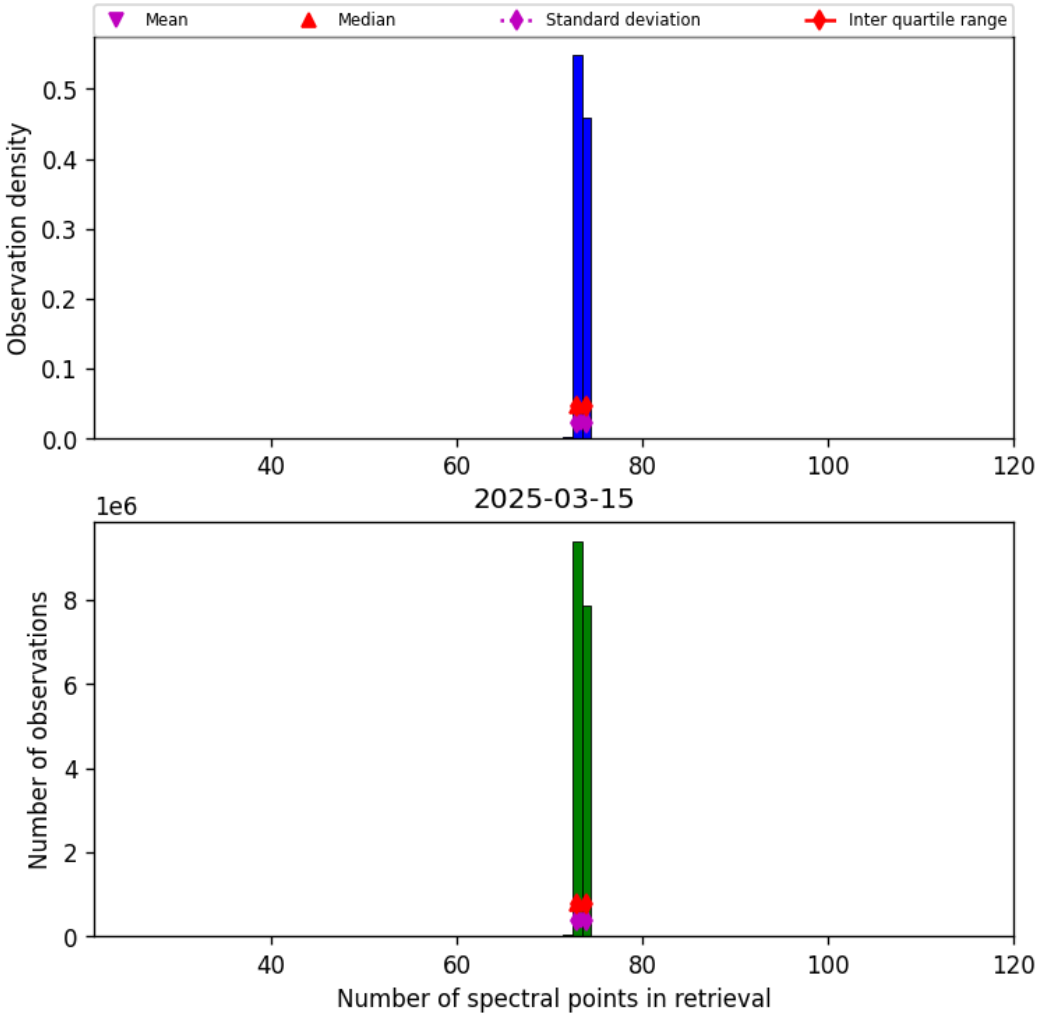

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-15 to 2025-03-15

9 Along track statistics

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

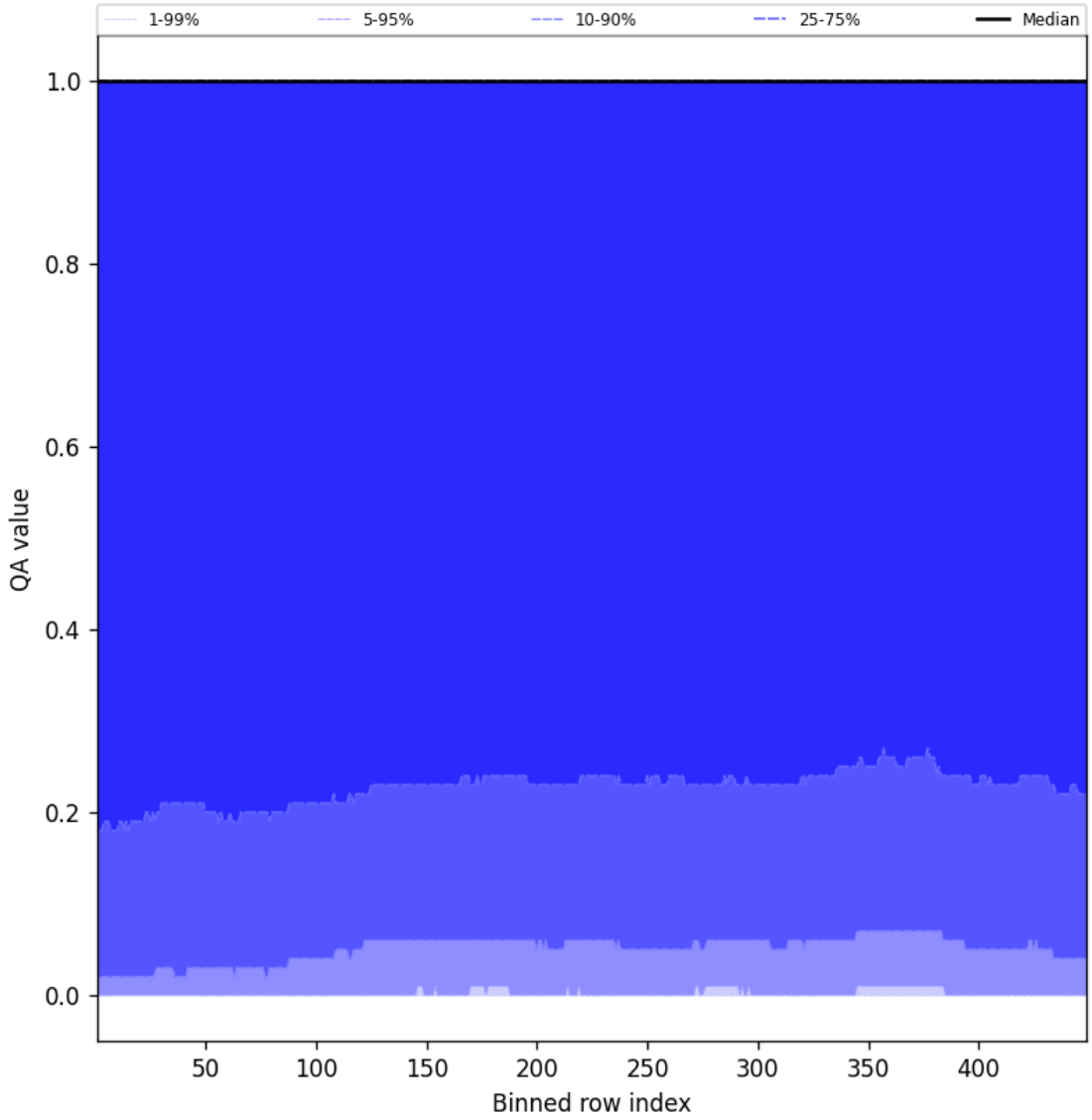

Figure 84: Along track statistics of “QA value” for 2025-03-15 to 2025-03-15

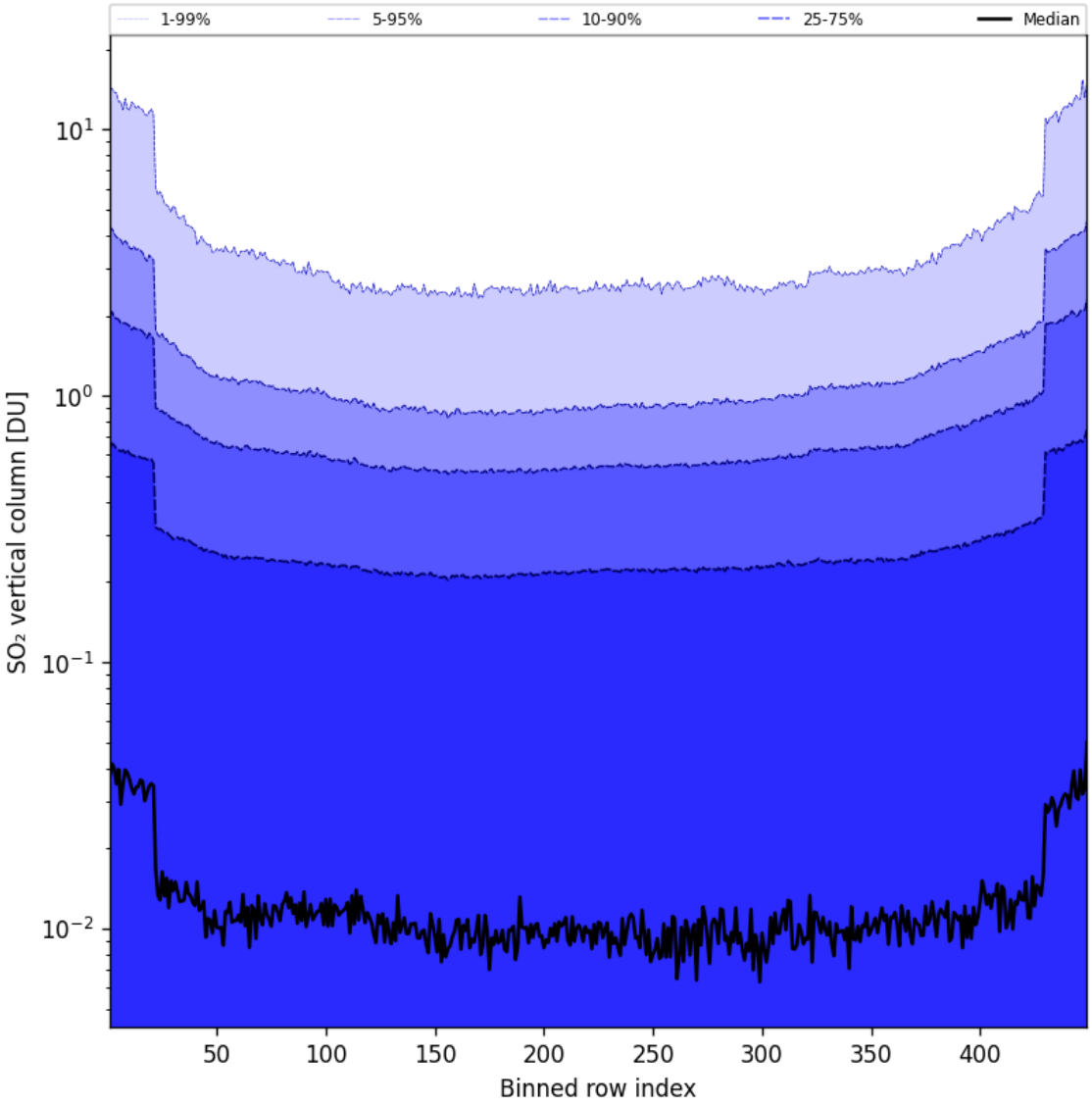

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-03-15 to 2025-03-15

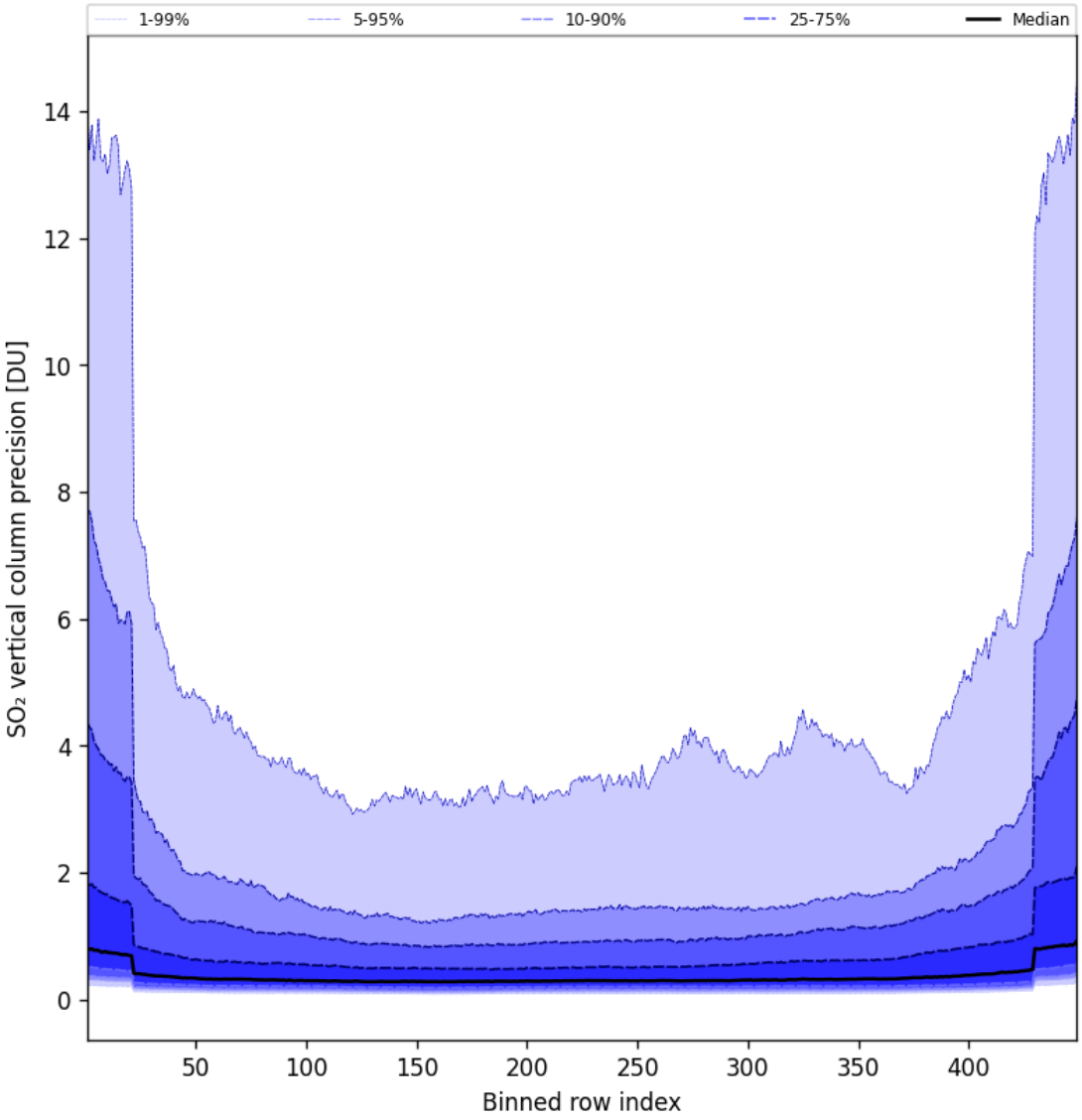

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-03-15 to 2025-03-15

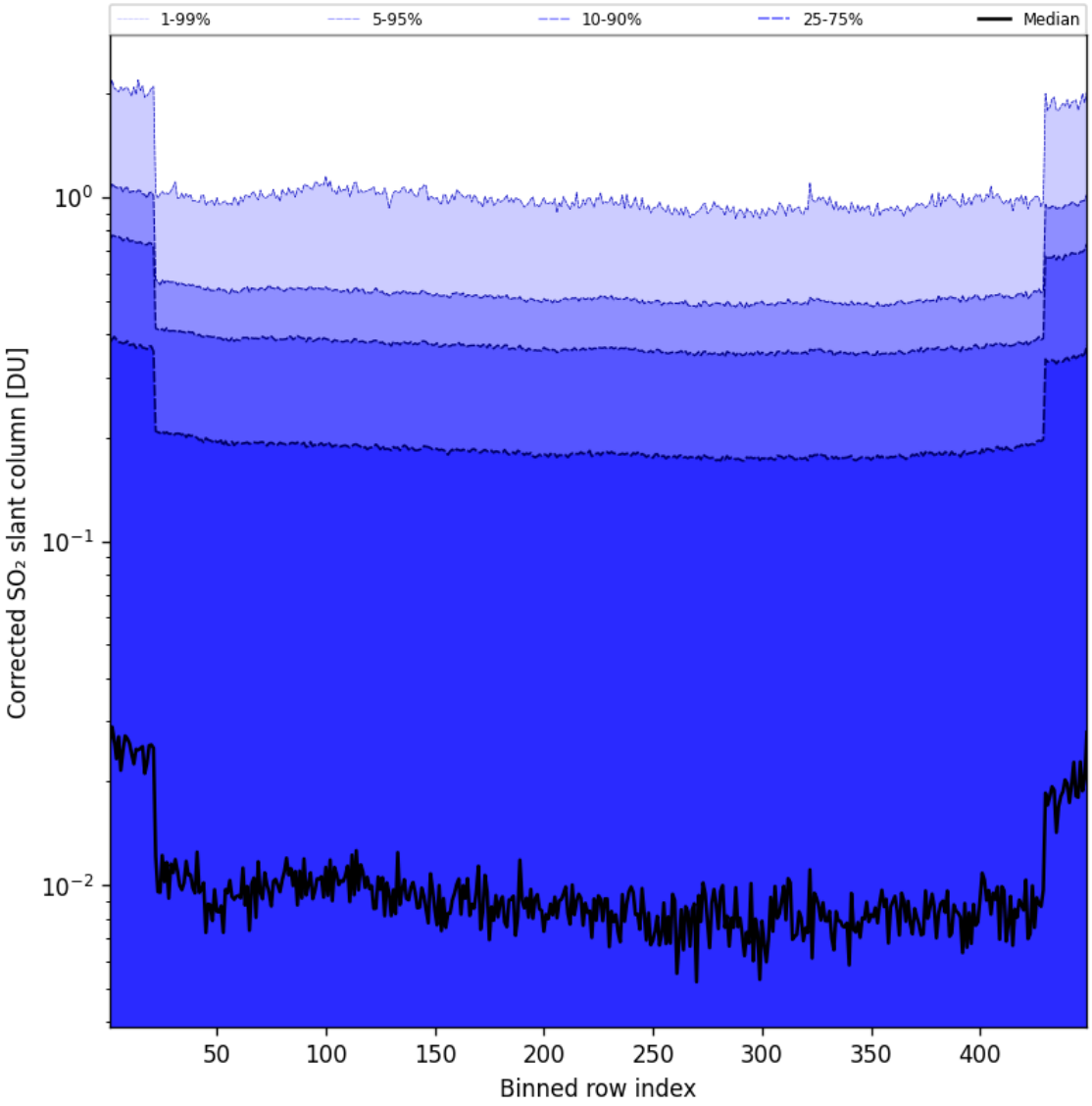

Figure 87: Along track statistics of “Corrected SO_2 slant column” for 2025-03-15 to 2025-03-15

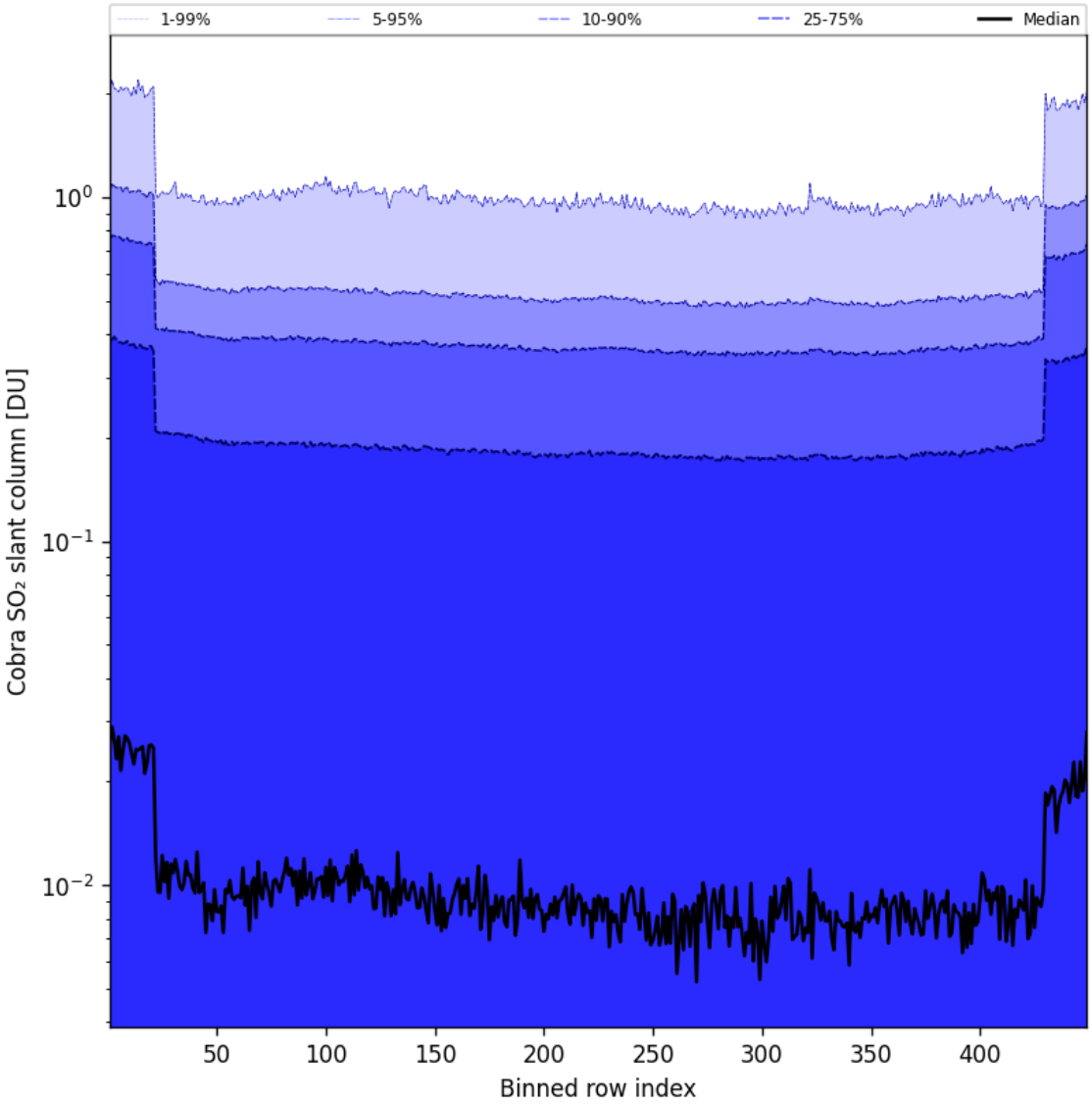

Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-03-15 to 2025-03-15

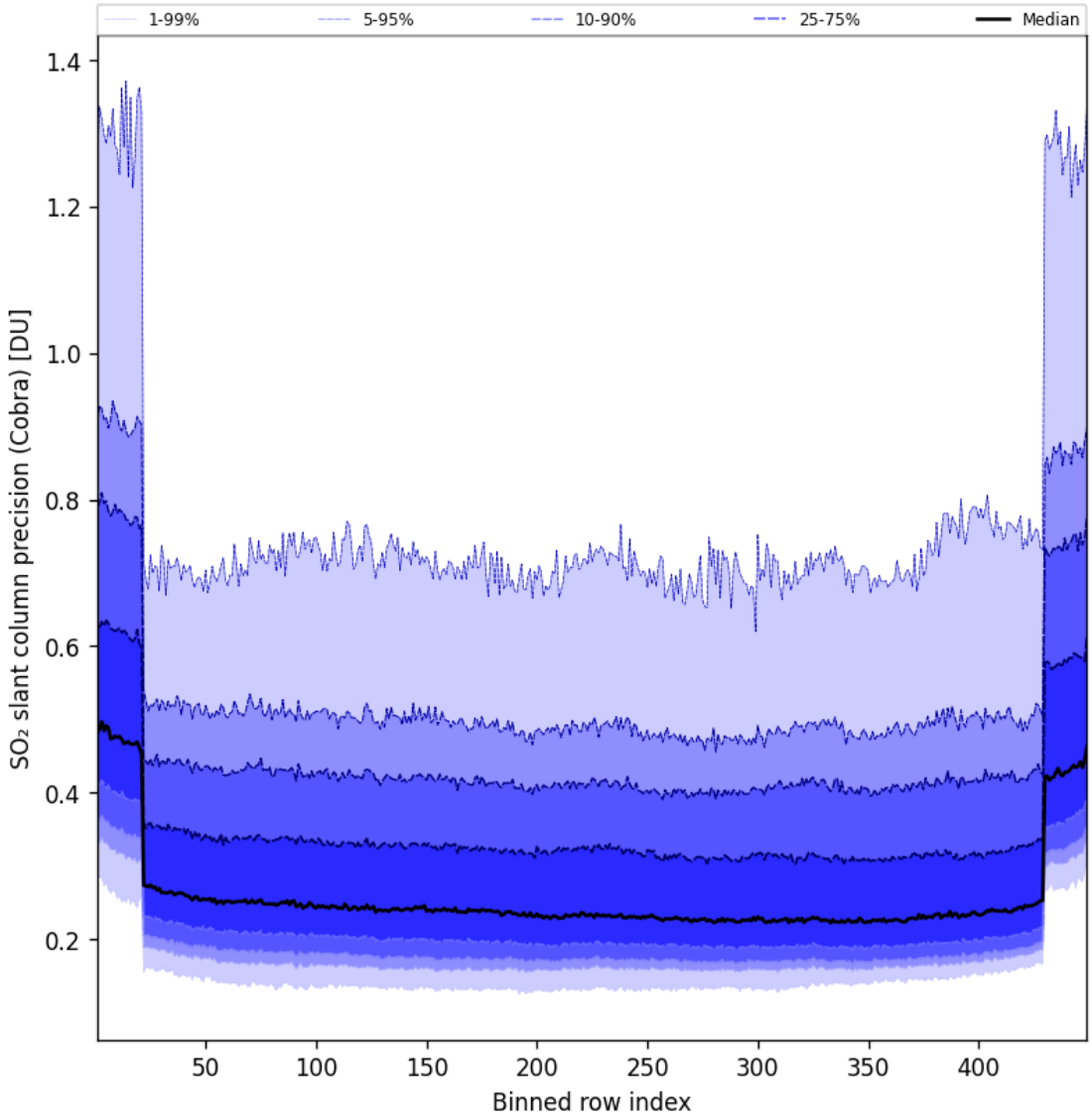

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-03-15 to 2025-03-15

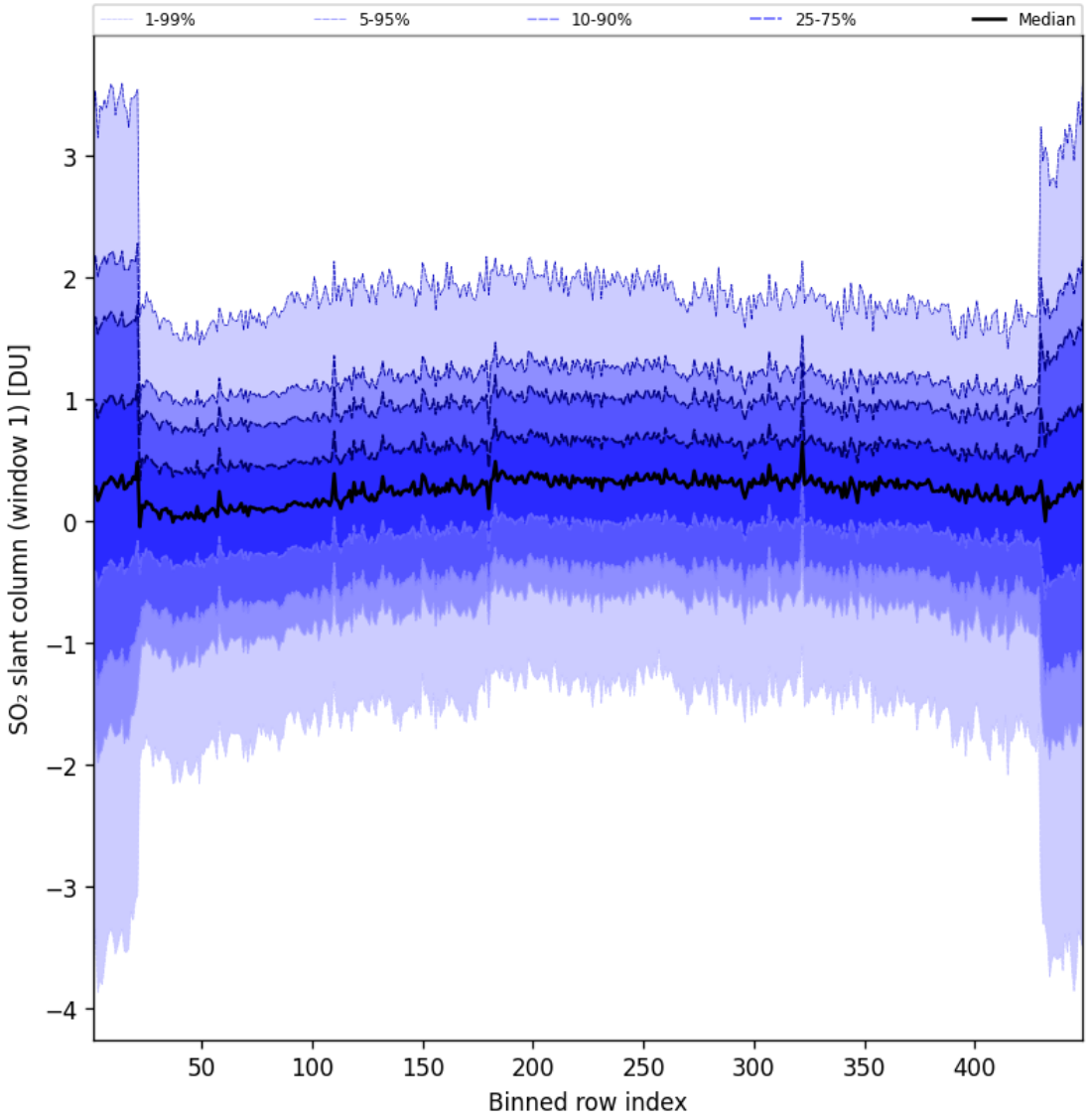

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-03-15 to 2025-03-15

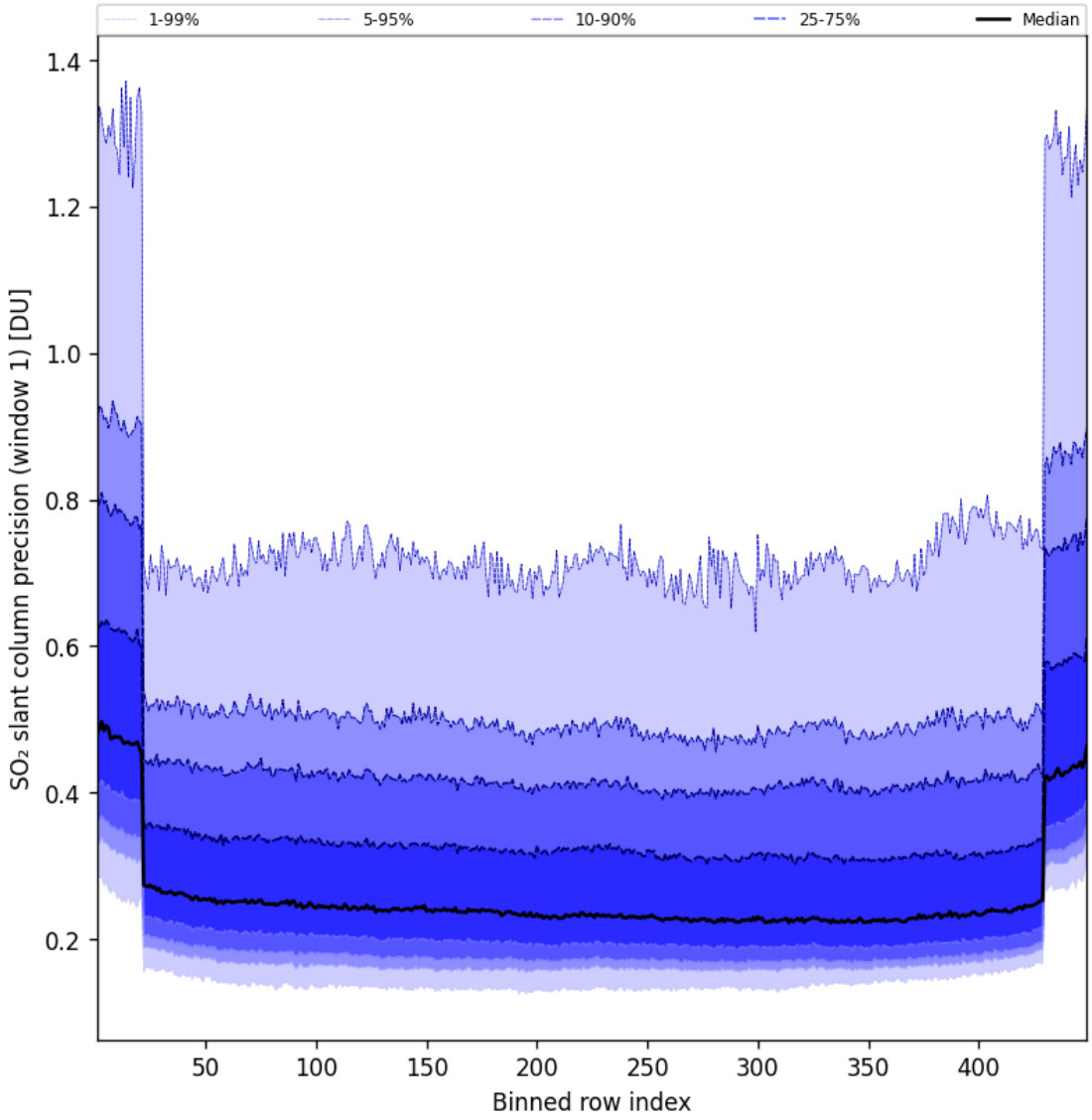

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-03-15 to 2025-03-15

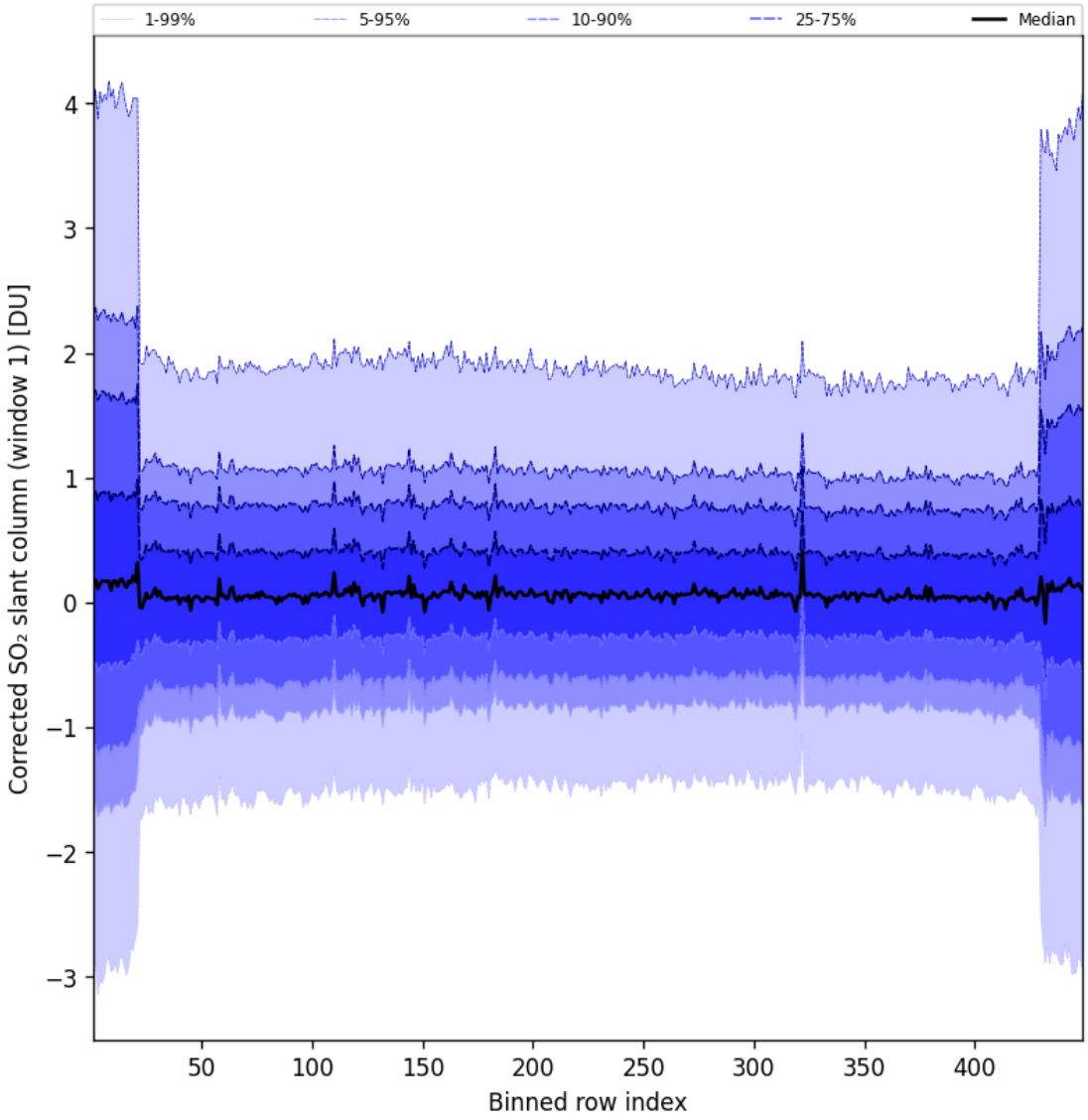

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-03-15 to 2025-03-15

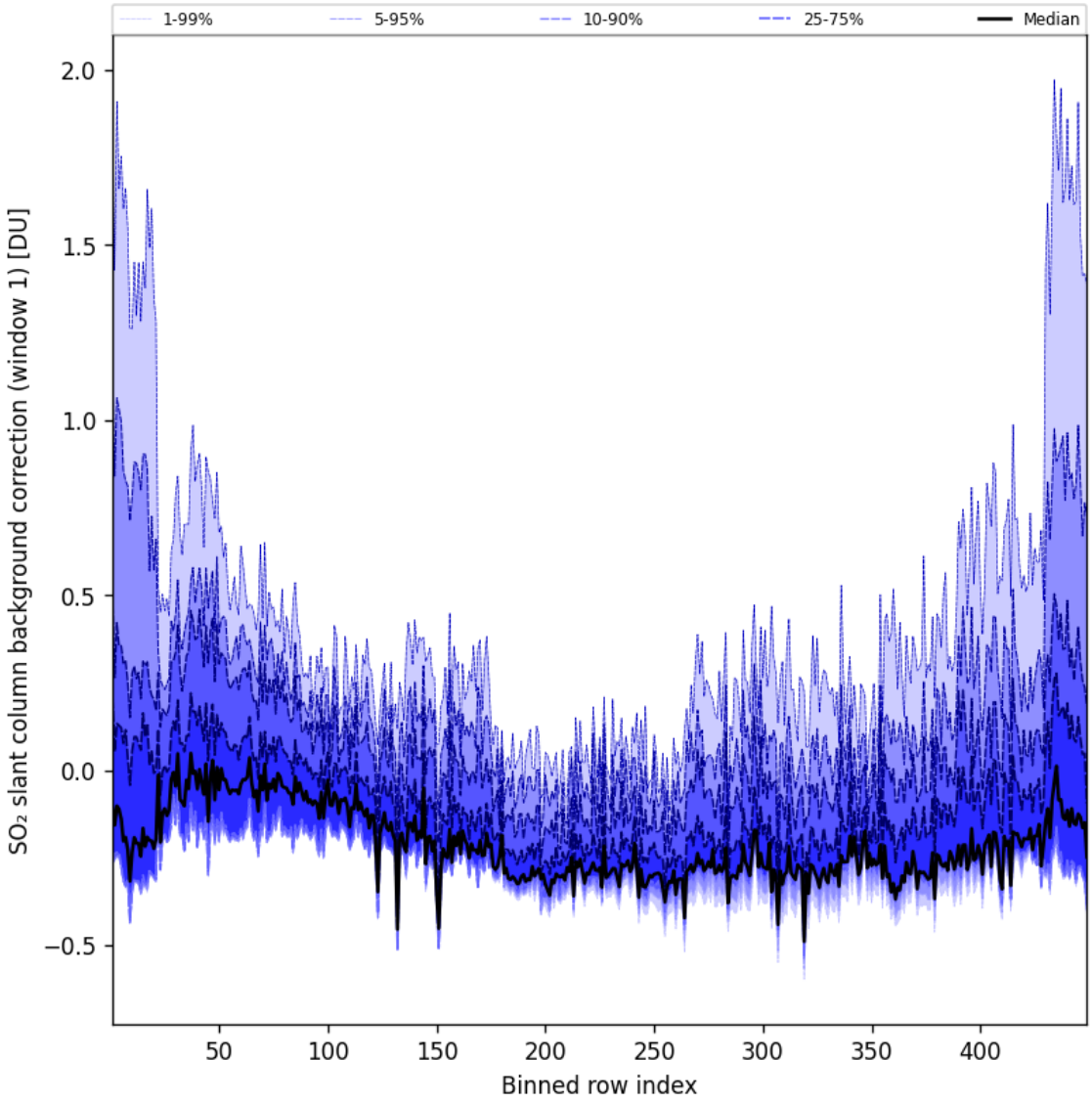

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-03-15 to 2025-03-15

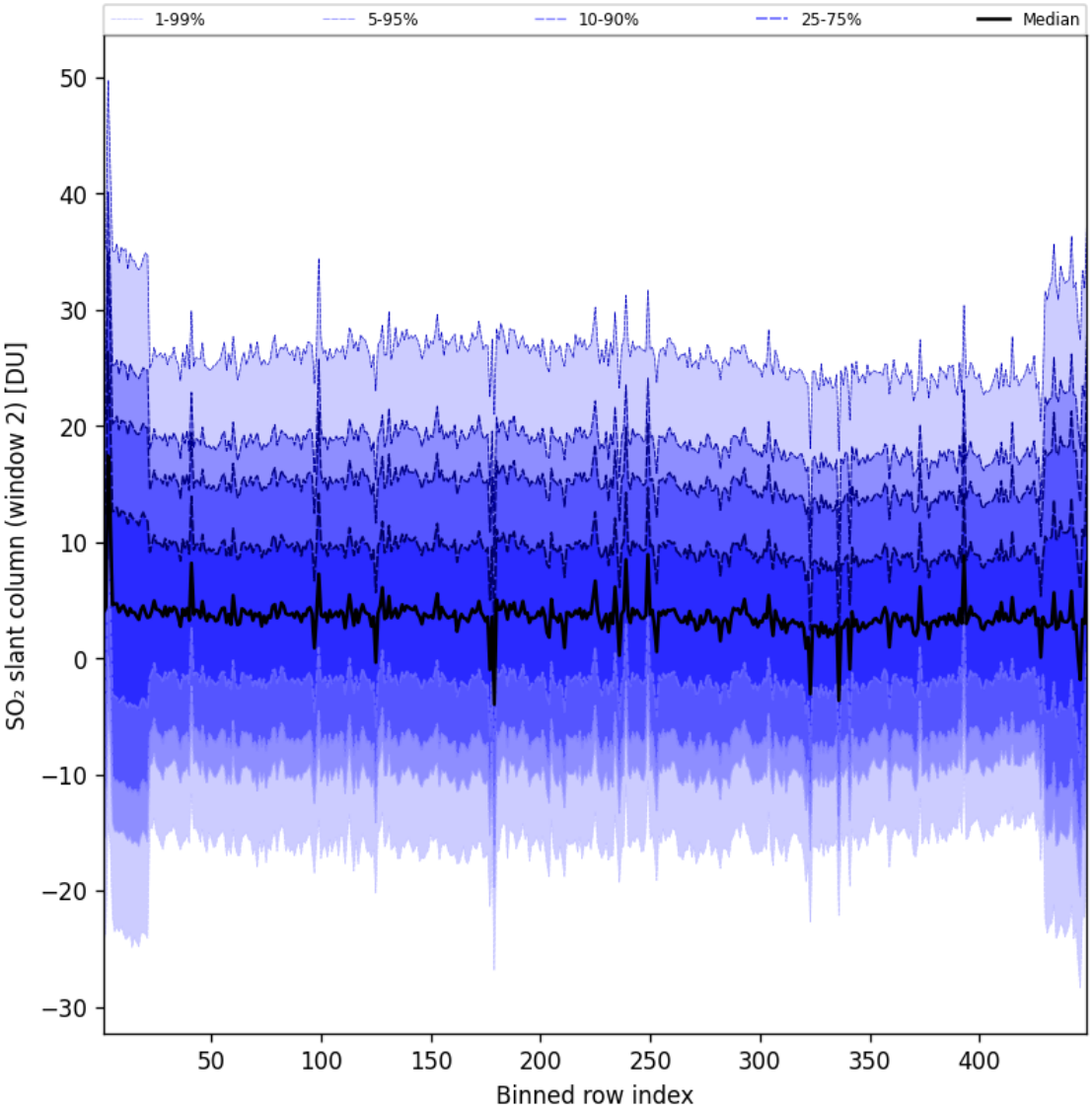

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-03-15 to 2025-03-15

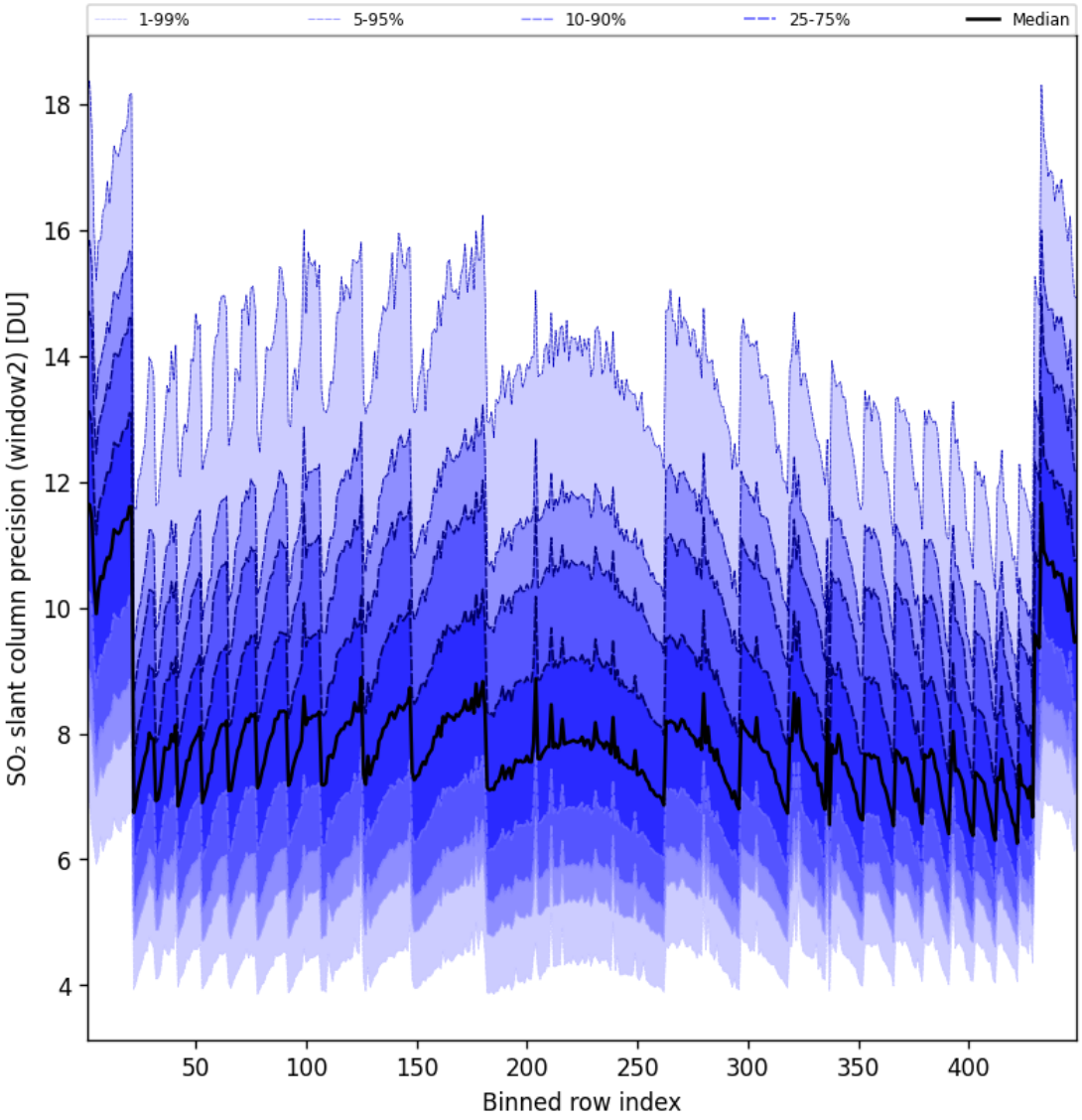

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-03-15 to 2025-03-15

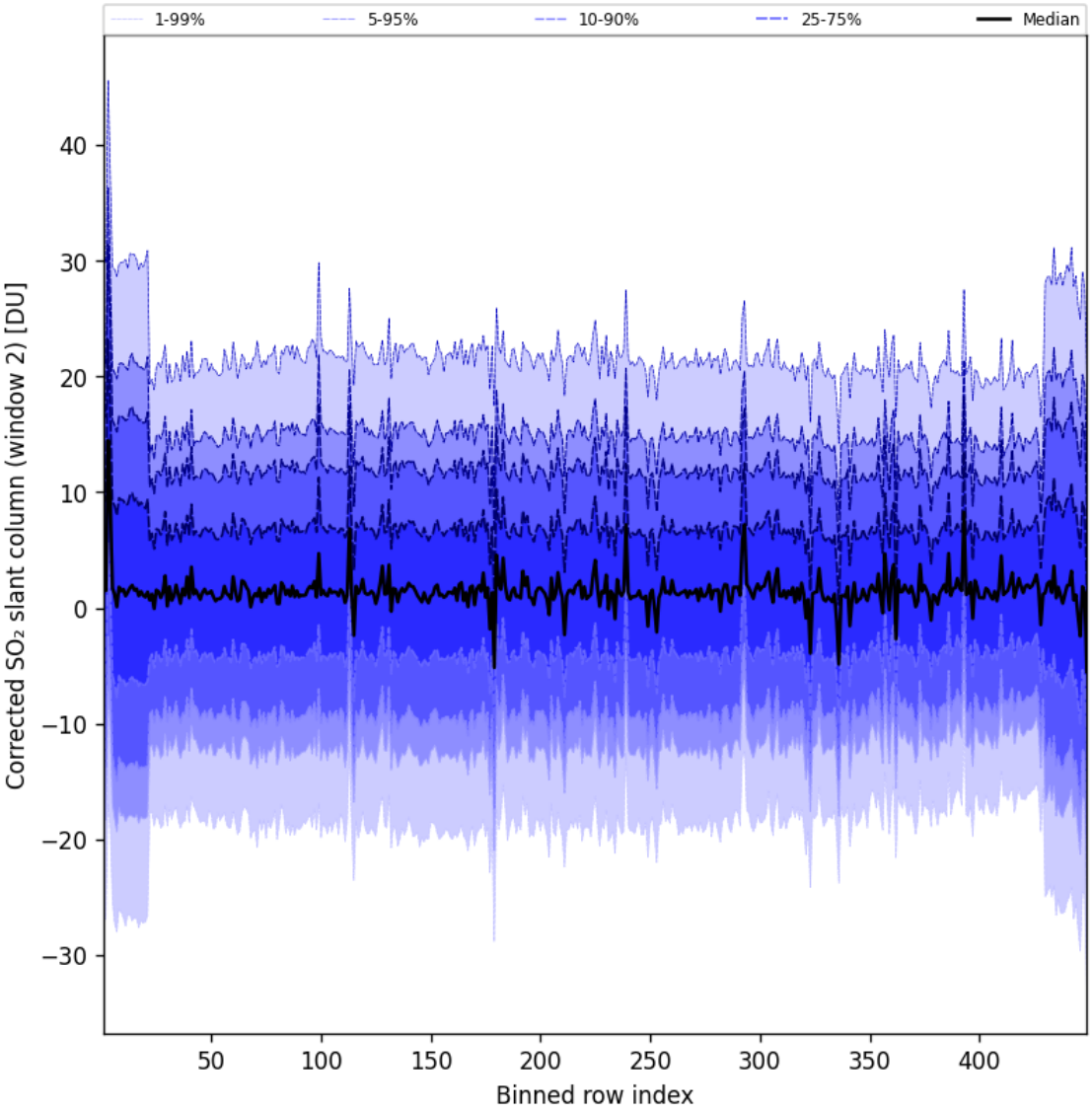

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-03-15 to 2025-03-15

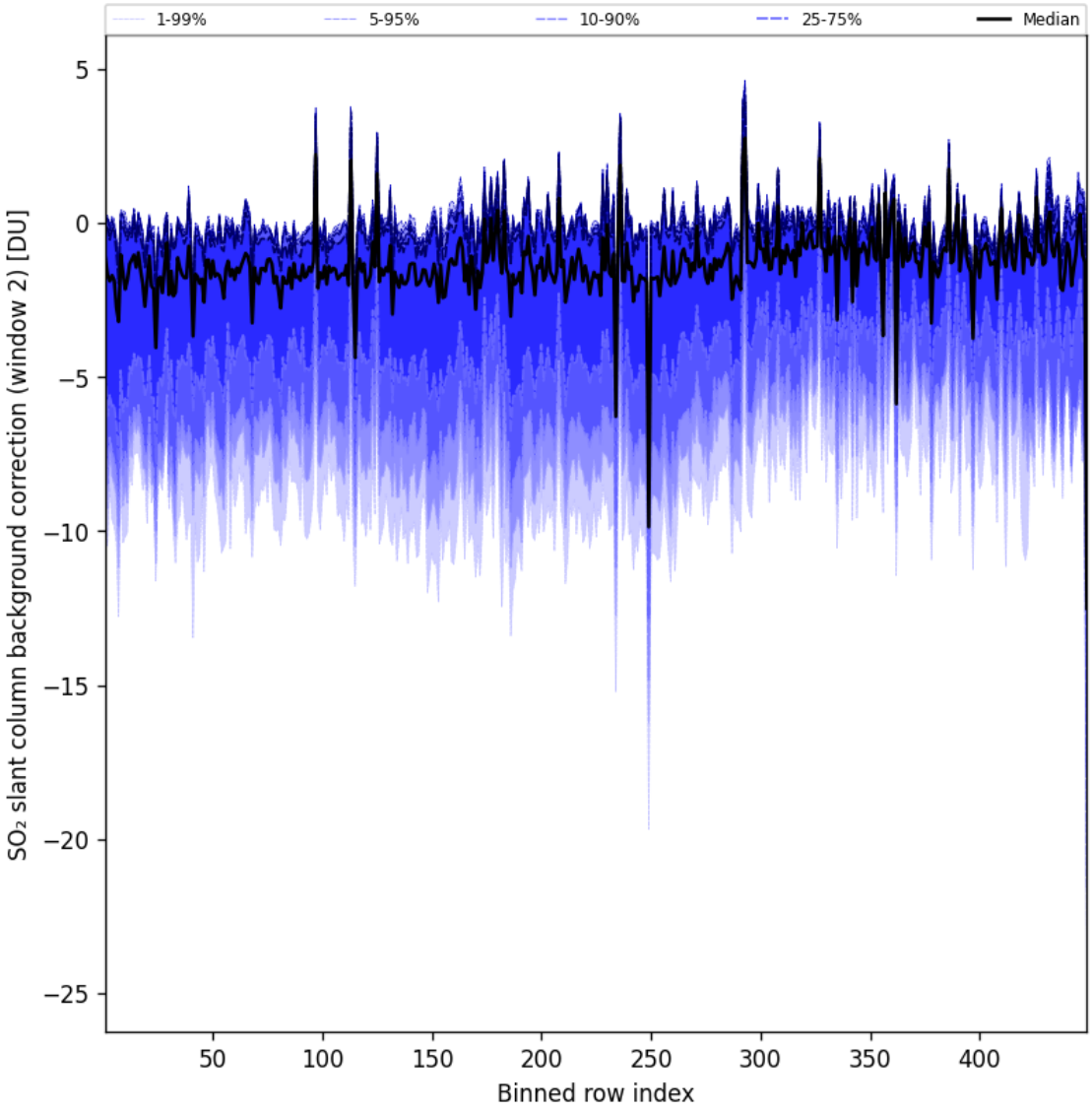

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-03-15 to 2025-03-15

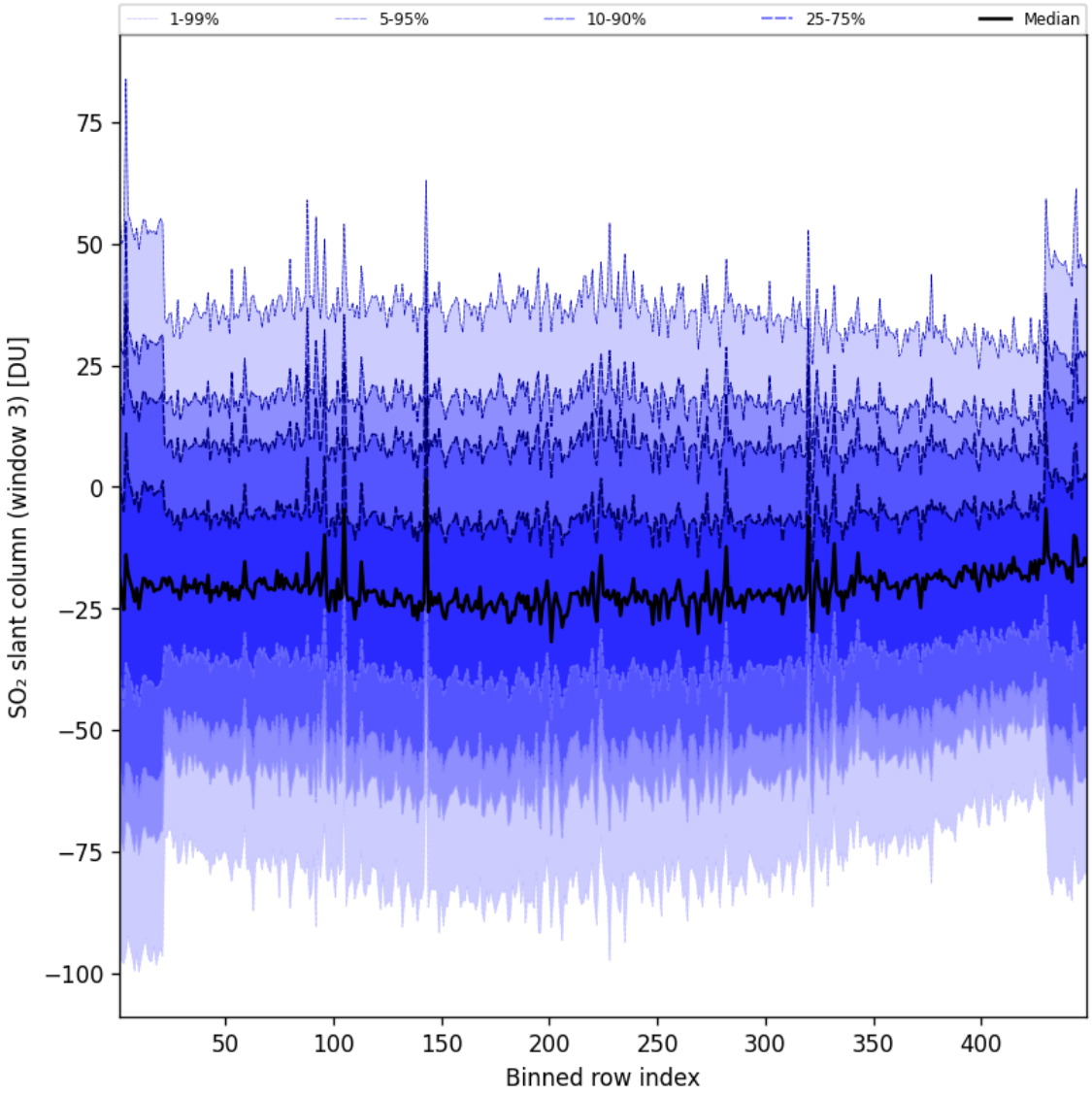

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-03-15 to 2025-03-15

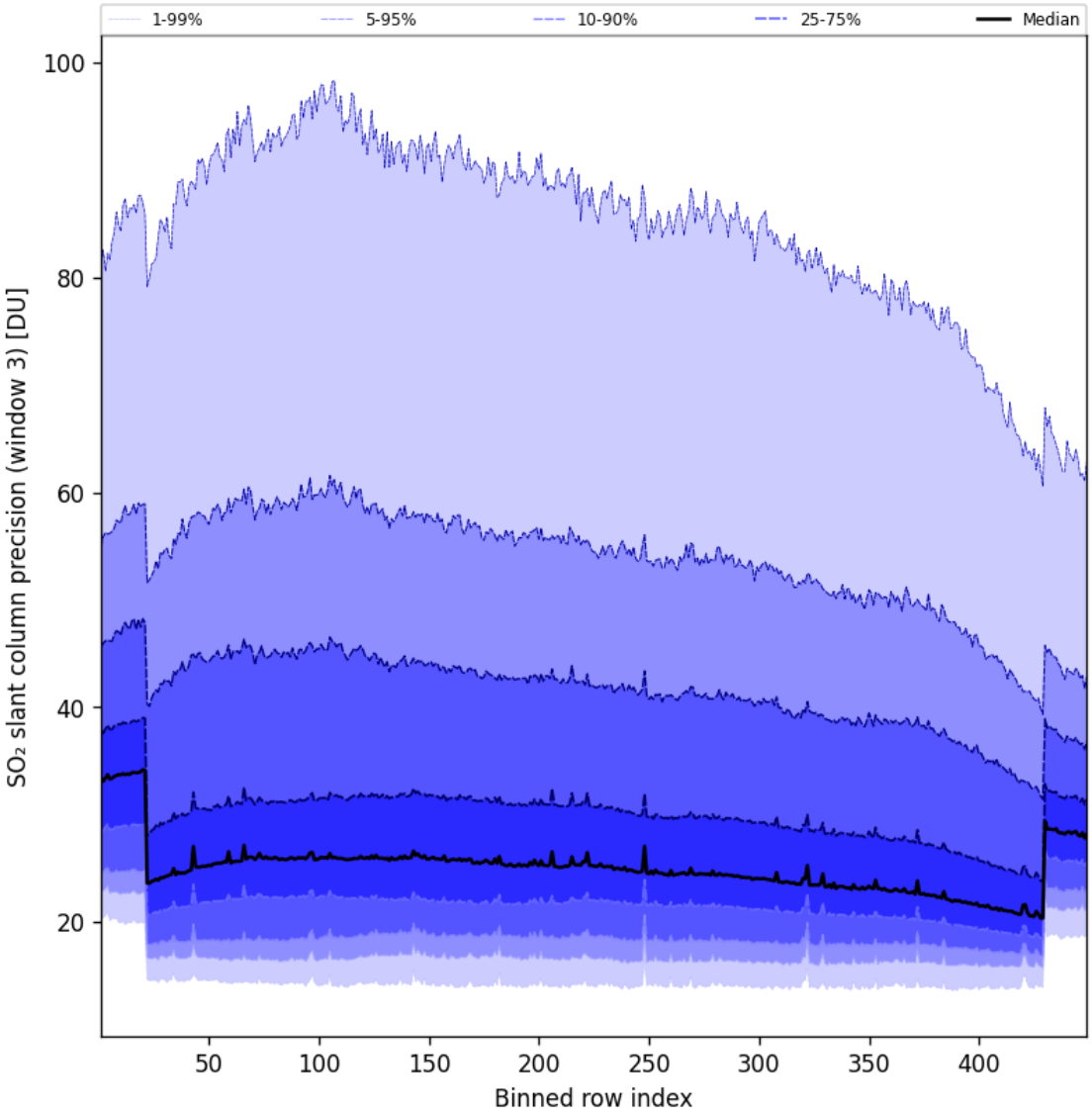

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-03-15 to 2025-03-15

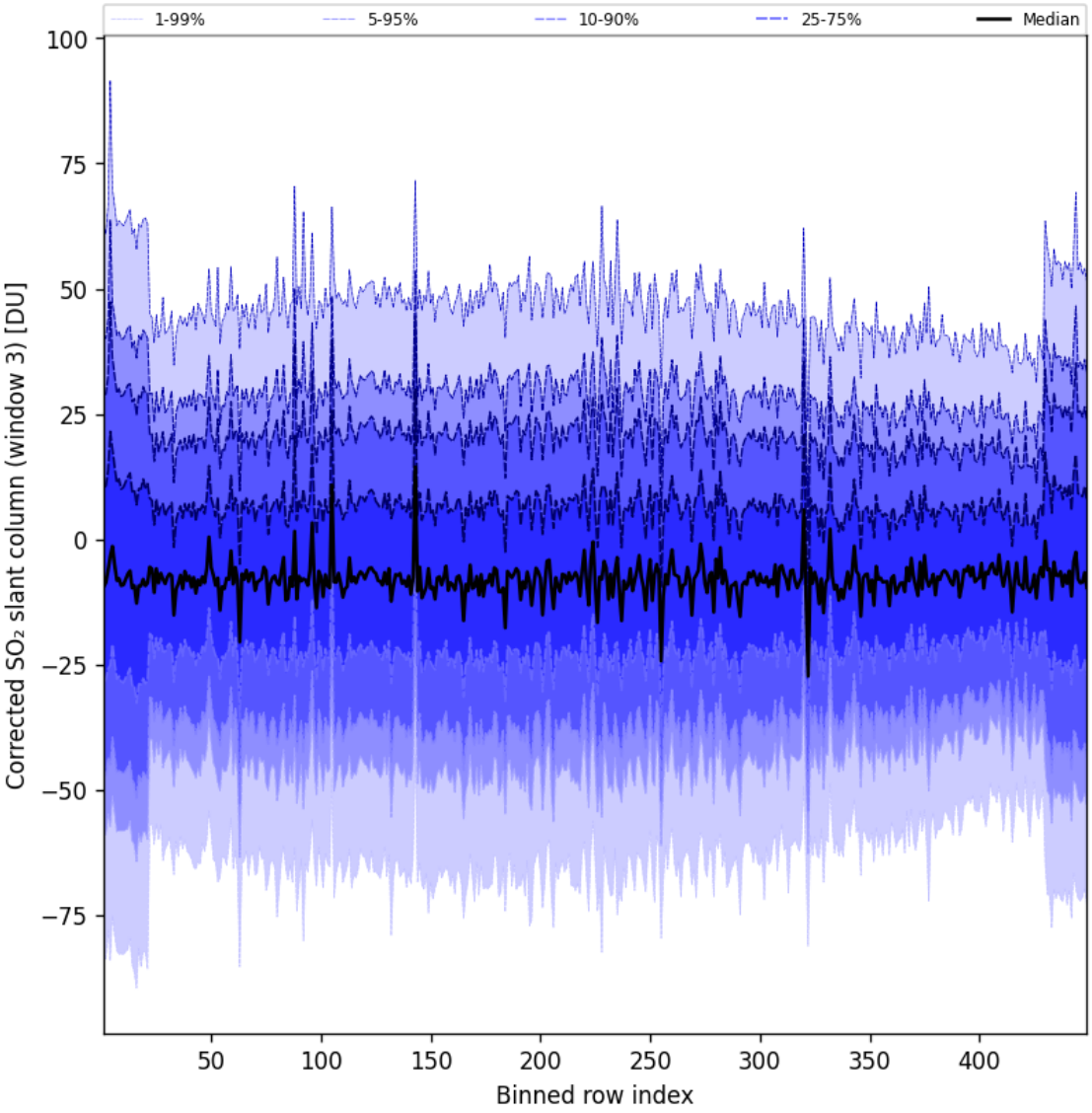

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-03-15 to 2025-03-15

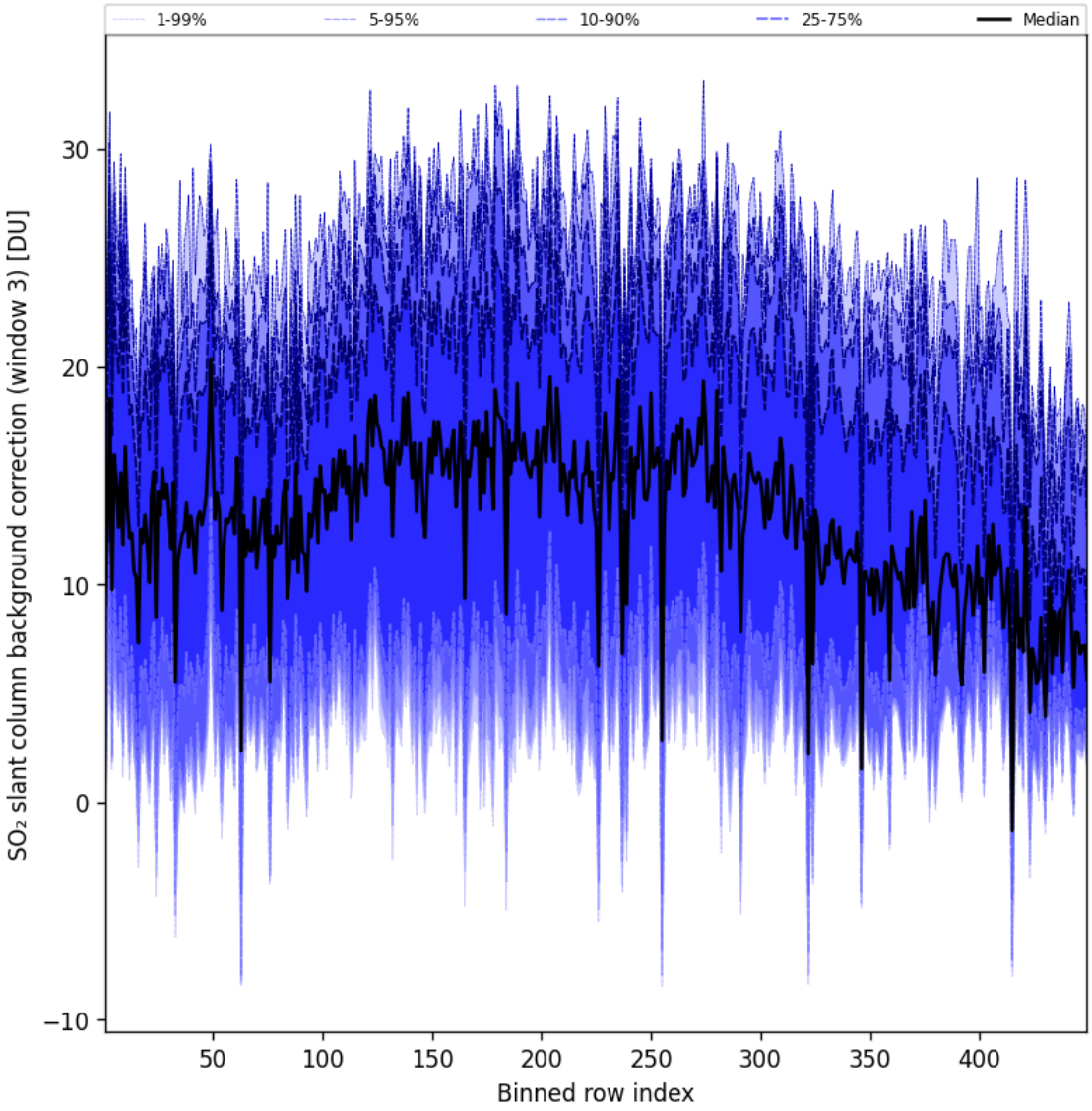

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-03-15 to 2025-03-15

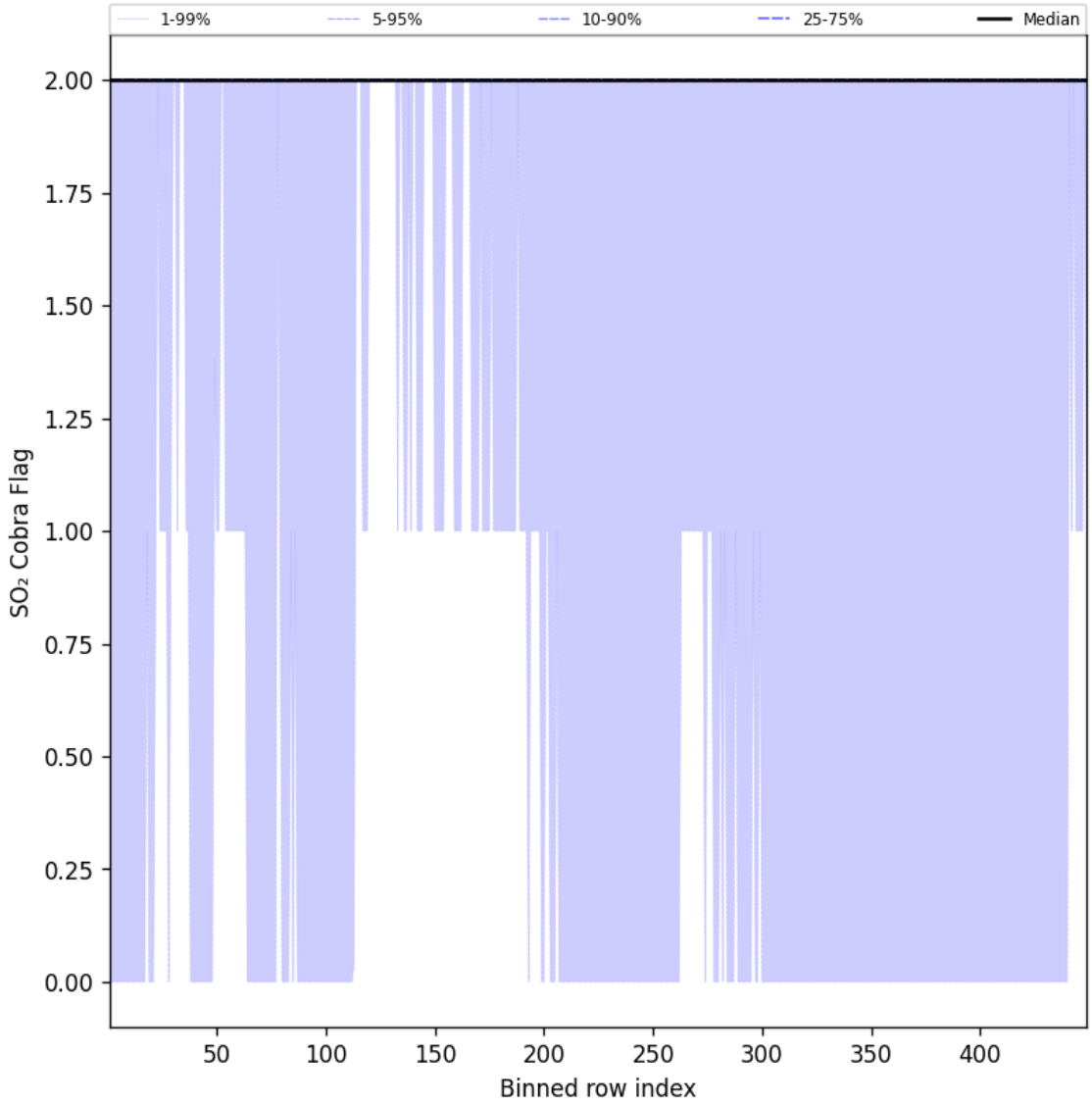

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-03-15 to 2025-03-15

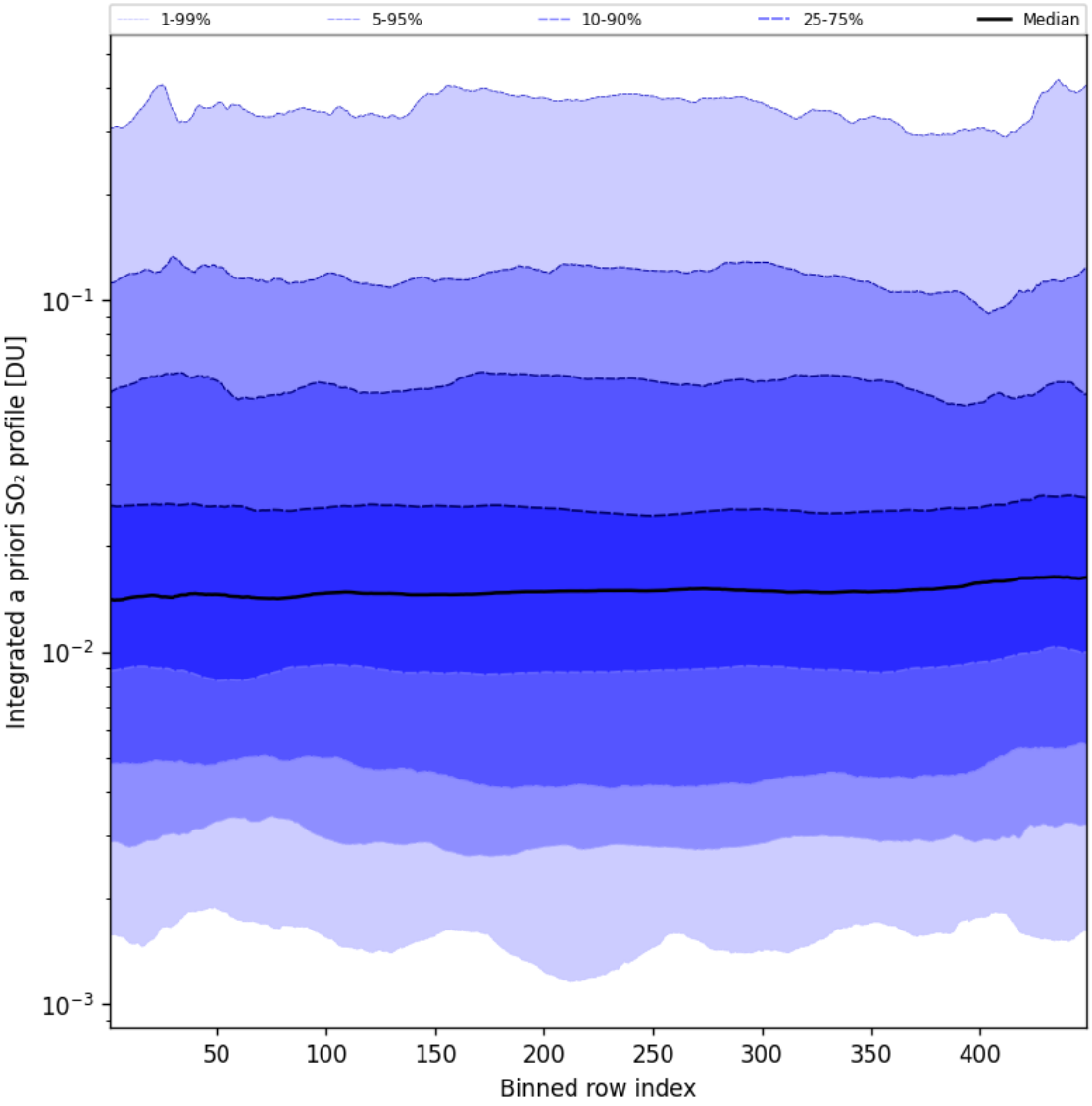

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-03-15 to 2025-03-15

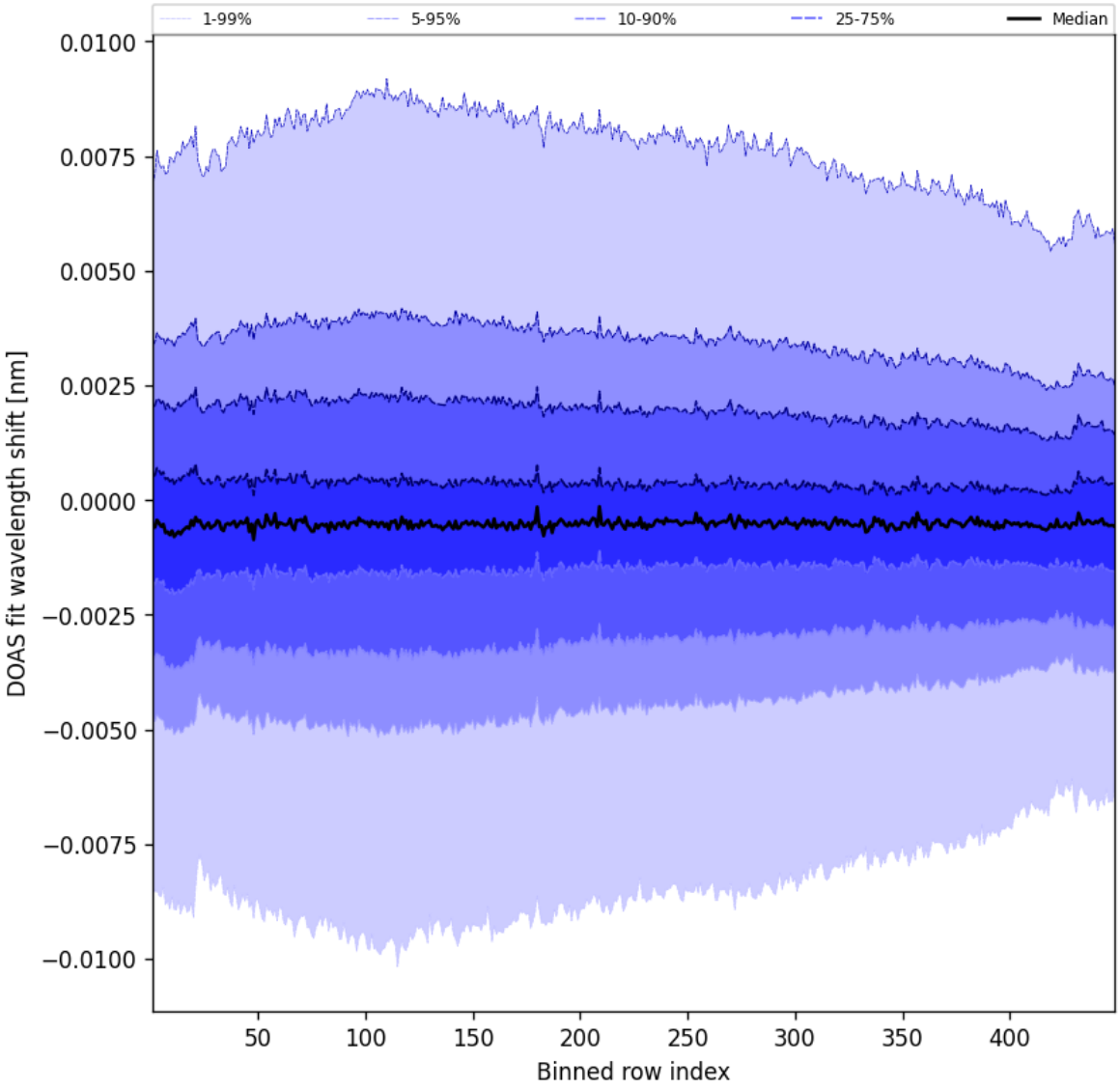

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-03-15 to 2025-03-15

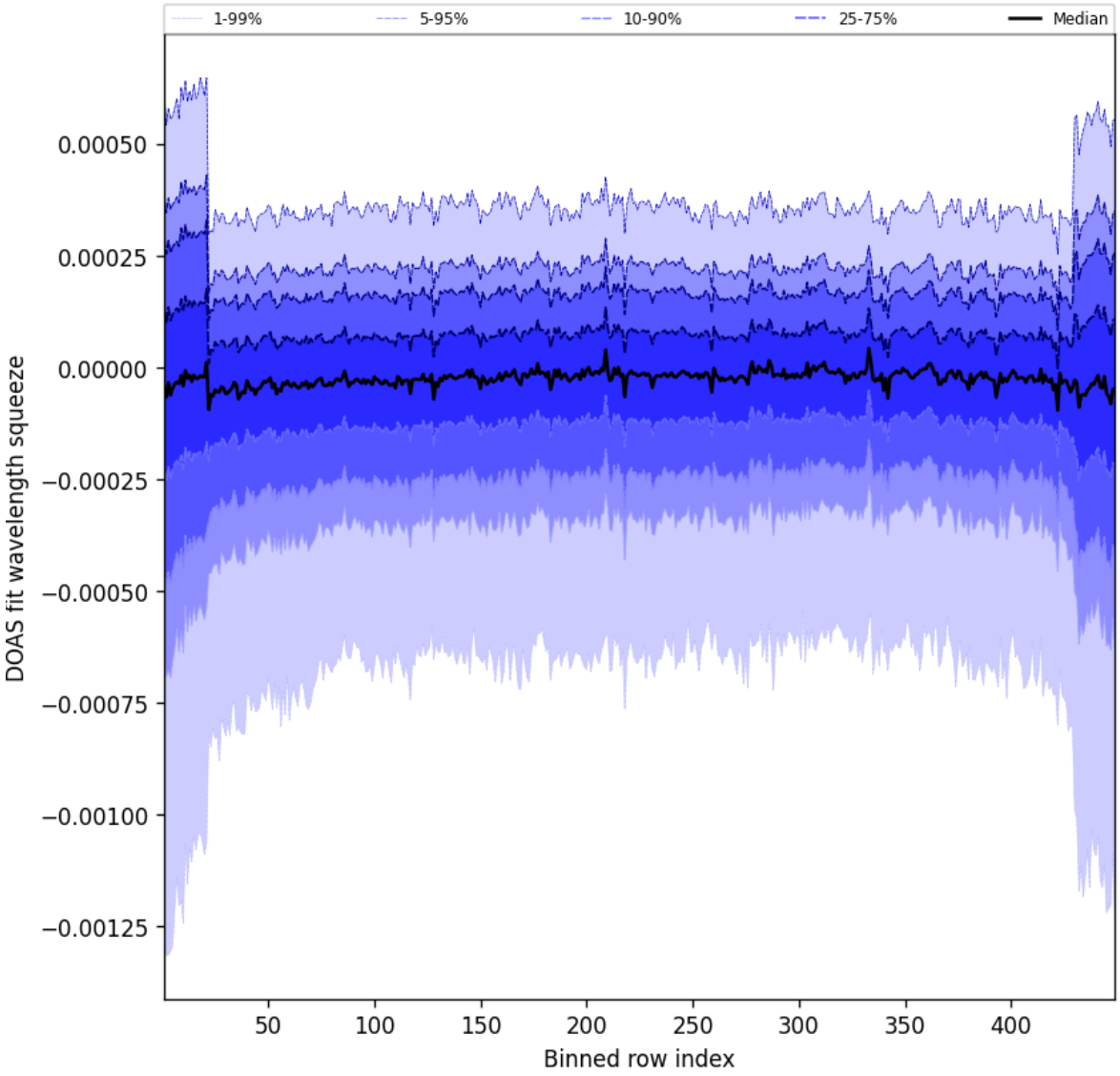

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-03-15 to 2025-03-15

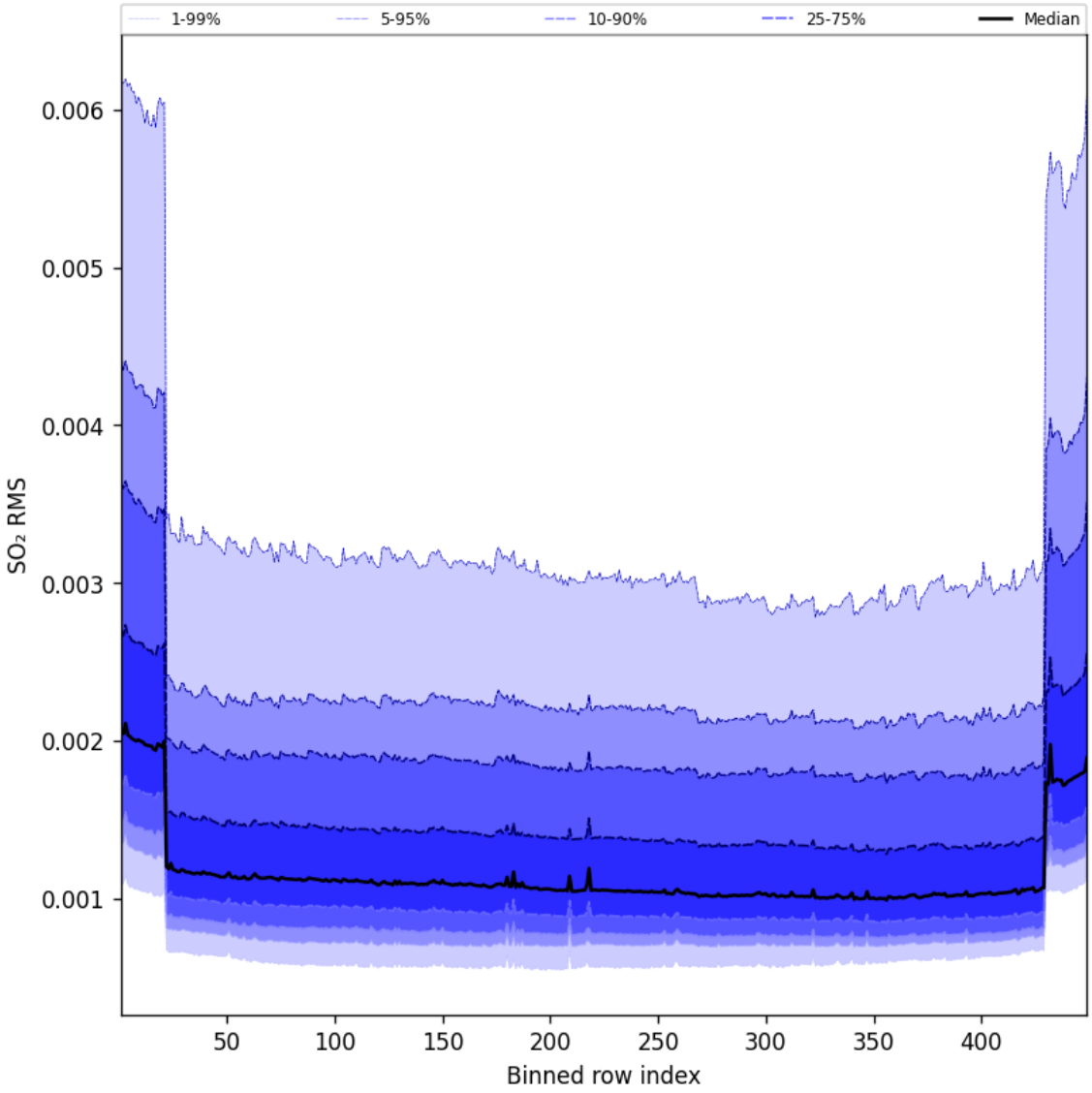

Figure 106: Along track statistics of "SO_2 RMS" for 2025-03-15 to 2025-03-15

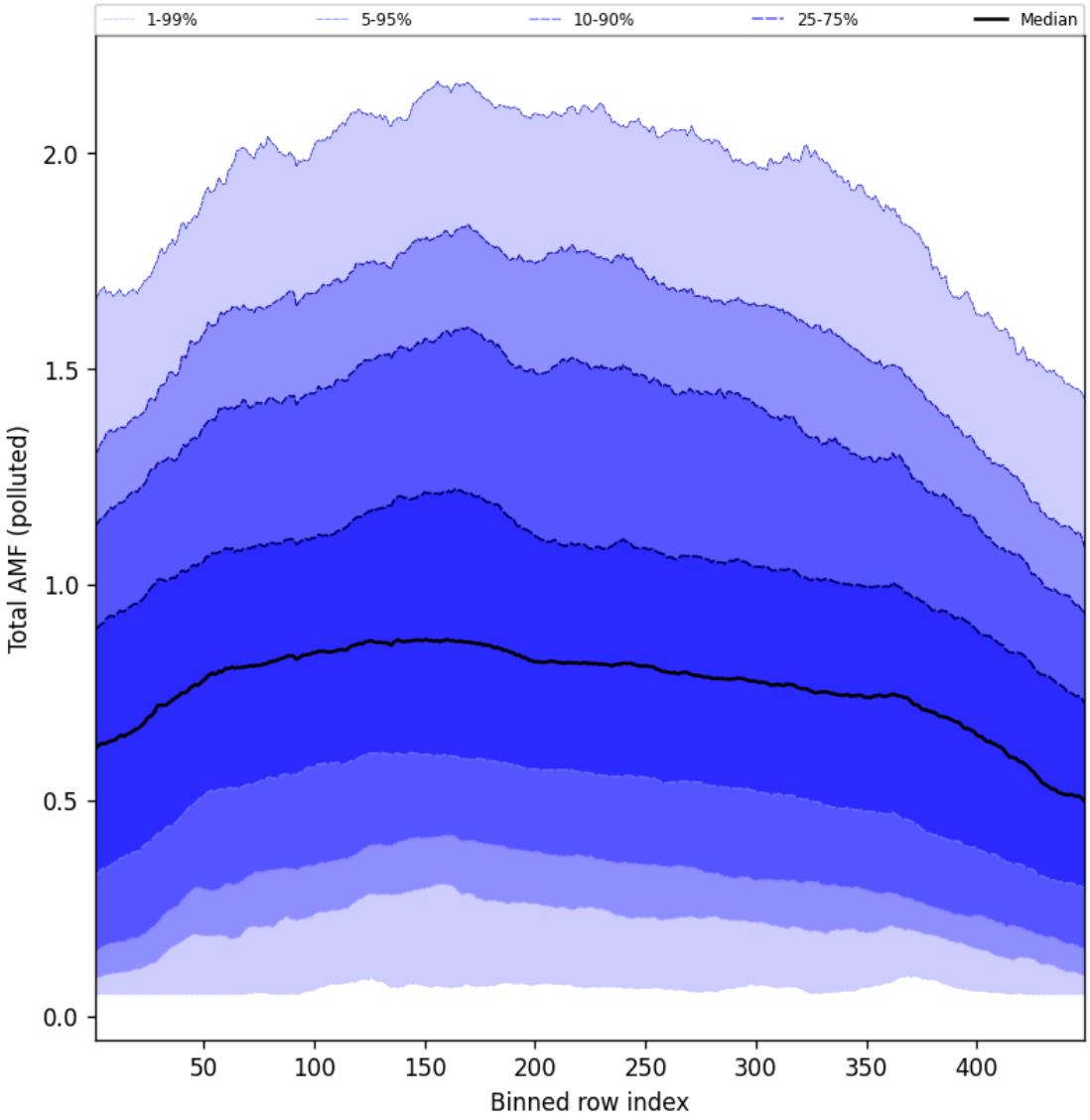

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-15 to 2025-03-15

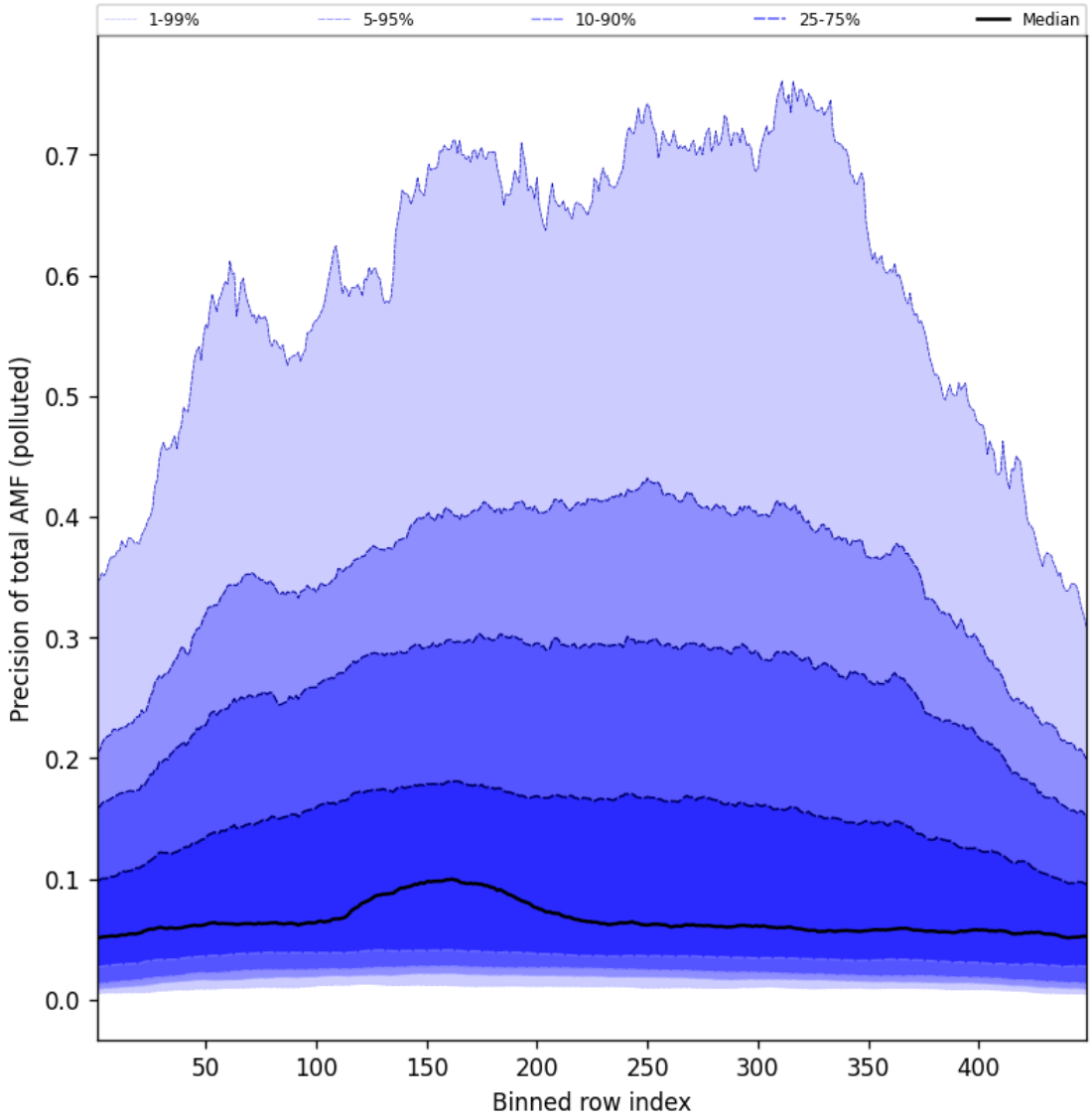

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-15 to 2025-03-15

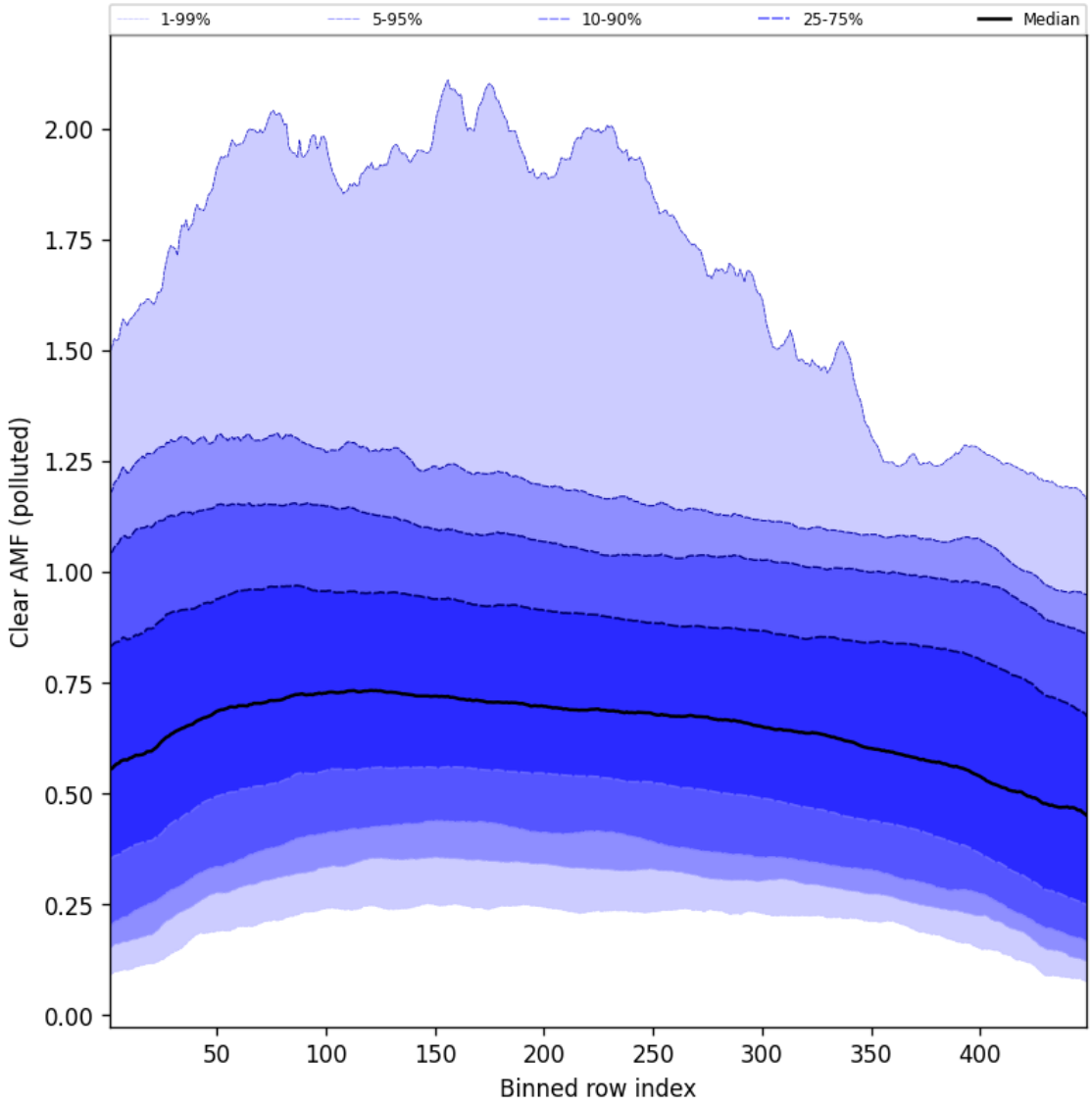

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-15 to 2025-03-15

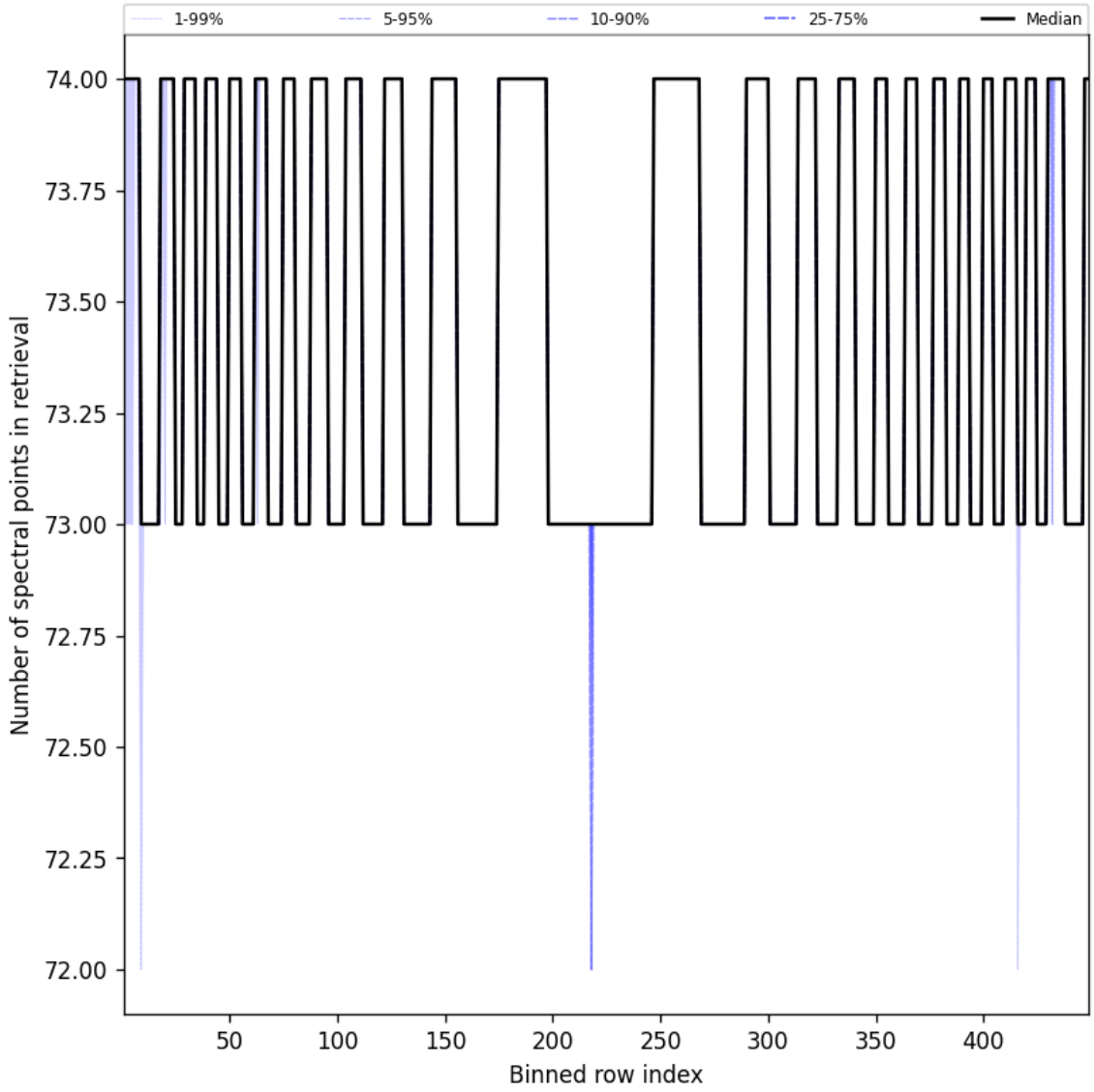

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-15 to 2025-03-15

10 Coincidence density

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

Contents

List of Figures

List of Tables

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