PyCAMA report generated by tropl2-proc

tropl2-proc

2024-08-02 (08:15)

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]	0.624 ± 0.235	6884496	0.705	0.300	0.700	0.0	1.000
carbonmonoxide total column [mol m^{-2}]	$(2.870 \pm 0.951) \times 10^{-2}$	6884496	2.590×10^{-2}	9.180×10^{-3}	2.711×10^{-2}	0.0	0.757
carbonmonoxide total column corrected [mol m^{-2}]	$(2.870 \pm 0.936) \times 10^{-2}$	6884496	2.650×10^{-2}	8.860×10^{-3}	2.707×10^{-2}	-2.969×10^{-3}	0.758
carbonmonoxide total column precision [mol m^{-2}]	$(1.178 \pm 0.610) \times 10^{-3}$	6884496	8.050×10^{-4}	6.814×10^{-4}	1.002×10^{-3}	0.0	0.115
number of spectral points in retrieval [1]	154 ± 1	6884496	155	2.00	154	30.0	156
chi square [1]	$(0.172 \pm 1.234) \times 10^{4}$	6884496	518	1.195×10^{3}	1.130×10^{3}	206	5.732×10^{6}
degrees of freedom [1]	7.52 ± 0.46	6884496	7.95	0.938	7.69	4.00	8.00
number of iterations [1]	8.53 ± 1.28	6884496	8.17	1.000	8.00	5.00	15.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	0.400	0.400	0.400	0.700	0.700	0.700	1.000	1.000
carbonmonoxide total column [mol m^{-2}]	1.544×10^{-2}	1.835×10^{-2}	1.988×10^{-2}	2.115×10^{-2}	2.282×10^{-2}	3.200×10^{-2}	3.525×10^{-2}	3.889×10^{-2}	4.428×10^{-2}	6.283×10^{-2}
carbonmonoxide total column corrected [mol m^{-2}]	1.621×10^{-2}	1.884×10^{-2}	2.018×10^{-2}	2.132×10^{-2}	2.292×10^{-2}	3.178×10^{-2}	3.507×10^{-2}	3.872×10^{-2}	4.401×10^{-2}	6.266×10^{-2}
carbonmonoxide total column precision [mol m^{-2}]	3.903×10^{-4}	5.155×10^{-4}	6.007×10^{-4}	6.670×10^{-4}	7.560×10^{-4}	1.437×10^{-3}	1.740×10^{-3}	2.047×10^{-3}	2.443×10^{-3}	3.103×10^{-3}
number of spectral points in retrieval [1]	151	152	153	153	153	155	155	156	156	156
chi square [1]	349	426	492	566	690	1.885×10^{3}	2.376×10^{3}	2.919×10^{3}	3.941×10^{3}	7.851×10^{3}
degrees of freedom [1]	6.00	7.00	7.00	7.00	7.01	7.95	7.98	7.99	8.00	8.00
number of iterations [1]	6.00	7.00	8.00	8.00	8.00	9.00	9.00	9.00	11.0	14.0

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]	0.643 ± 0.219	4407214	0.0	0.700	0.0	1.000	0.700	0.700
carbonmonoxide total column [mol m^{-2}]	$(3.140 \pm 0.960) \times 10^{-2}$	4407214	8.287×10^{-3}	2.960×10^{-2}	0.0	0.735	2.605×10^{-2}	3.434×10^{-2}
carbonmonoxide total column corrected [mol m^{-2}]	$(3.141 \pm 0.944) \times 10^{-2}$	4407214	7.952×10^{-3}	2.951×10^{-2}	-1.958×10^{-3}	0.738	2.619×10^{-2}	3.415×10^{-2}
carbonmonoxide total column precision [mol m^{-2}]	$(1.119 \pm 0.575) \times 10^{-3}$	4407214	6.447×10^{-4}	9.566×10^{-4}	0.0	3.214×10^{-2}	7.209×10^{-4}	1.366×10^{-3}
number of spectral points in retrieval [1]	154 ± 1	4407214	2.00	154	30.0	156	153	155
chi square [1]	$(0.202 \pm 1.435) \times 10^{4}$	4407214	1.389×10^{3}	1.335×10^{3}	207	5.667×10^{6}	796	2.184×10^{3}
degrees of freedom [1]	7.54 ± 0.48	4407214	0.957	7.77	4.00	8.00	7.00	7.96
number of iterations [1]	8.54 ± 1.36	4407214	1.000	8.00	5.00	15.0	8.00	9.00

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]	0.589 ± 0.258	2477282	0.300	0.700	0.0	1.000	0.400	0.700
carbonmonoxide total column [mol m^{-2}]	$(2.389 \pm 0.717) \times 10^{-2}$	2477282	5.501×10^{-3}	2.257×10^{-2}	0.0	0.757	2.015×10^{-2}	2.565×10^{-2}
carbonmonoxide total column corrected [mol m^{-2}]	$(2.390 \pm 0.699) \times 10^{-2}$	2477282	5.005×10^{-3}	2.249×10^{-2}	-2.969×10^{-3}	0.758	2.035×10^{-2}	2.536×10^{-2}
carbonmonoxide total column precision [mol m^{-2}]	$(1.284 \pm 0.655) \times 10^{-3}$	2477282	7.469×10^{-4}	1.084×10^{-3}	0.0	0.115	8.241×10^{-4}	1.571×10^{-3}
number of spectral points in retrieval [1]	154 ± 1	2477282	2.00	154	147	156	153	155
chi square [1]	$(0.119 \pm 0.753) \times 10^{4}$	2477282	792	872	206	5.732×10^{6}	577	1.369×10^{3}
degrees of freedom [1]	7.49 ± 0.43	2477282	0.866	7.57	4.00	8.00	7.04	7.91
number of iterations [1]	8.50 ± 1.12	2477282	1.000	8.00	5.00	15.0	8.00	9.00

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]	0.607 ± 0.230	4395374	0.300	0.700	0.0	1.000	0.400	0.700
carbonmonoxide total column [mol m^{-2}]	$(2.693 \pm 0.754) \times 10^{-2}$	4395374	8.265×10^{-3}	2.552×10^{-2}	0.0	0.757	2.187×10^{-2}	3.013×10^{-2}
carbonmonoxide total column corrected [mol m^{-2}]	$(2.693 \pm 0.736) \times 10^{-2}$	4395374	7.983×10^{-3}	2.546×10^{-2}	-2.953×10^{-3}	0.758	2.196×10^{-2}	2.995×10^{-2}
carbonmonoxide total column precision [mol m^{-2}]	$(1.258 \pm 0.643) \times 10^{-3}$	4395374	7.722×10^{-4}	1.056×10^{-3}	0.0	0.115	7.926×10^{-4}	1.565×10^{-3}
number of spectral points in retrieval [1]	154 ± 1	4395374	2.00	154	30.0	156	153	155
chi square [1]	$(0.147 \pm 1.175) \times 10^{4}$	4395374	983	986	206	5.732×10^{6}	632	1.615×10^{3}
degrees of freedom [1]	7.54 ± 0.43	4395374	0.913	7.70	4.00	8.00	7.02	7.94
number of iterations [1]	8.58 ± 1.29	4395374	1.000	8.00	5.00	15.0	8.00	9.00

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]	0.672 ± 0.234	1719152	0.0	0.700	0.0	1.000	0.700	0.700
carbonmonoxide total column [mol m^{-2}]	$(3.081 \pm 1.056) \times 10^{-2}$	1719152	9.323×10^{-3}	2.902×10^{-2}	0.0	0.632	2.477×10^{-2}	3.409×10^{-2}
carbonmonoxide total column corrected [mol m^{-2}]	$(3.082 \pm 1.043) \times 10^{-2}$	1719152	8.984×10^{-3}	2.899×10^{-2}	-2.707×10^{-3}	0.633	2.494×10^{-2}	3.392×10^{-2}
carbonmonoxide total column precision [mol m^{-2}]	$(9.689 \pm 4.833) \times 10^{-4}$	1719152	5.365×10^{-4}	8.647×10^{-4}	0.0	9.626×10^{-3}	6.341×10^{-4}	1.171×10^{-3}
number of spectral points in retrieval [1]	154 ± 1	1719152	2.00	154	93.0	156	153	155
chi square [1]	$(0.240 \pm 1.343) \times 10^{4}$	1719152	1.679×10^{3}	1.624×10^{3}	207	5.667×10^{6}	975	2.653×10^{3}
degrees of freedom [1]	7.47 ± 0.53	1719152	0.964	7.63	4.00	8.00	7.00	7.97
number of iterations [1]	8.40 ± 1.25	1719152	1.000	8.00	5.00	15.0	8.00	9.00

Table 7: Correlation matrix

	Viewing zenith angle	Solar zenith angle	Latitude	CO total vertical column	CO total vertical column (stripe-corrected)	CO total vertical column precision	Number of spectral points in retrieval	χ^2	Degrees of freedom for signal	Number of iterations
Viewing zenith angle	1.000	2.763×10^{-2}	-2.717×10^{-2}	1.744×10^{-2}	1.562×10^{-2}	-0.193	8.901×10^{-2}	8.179×10^{-3}	4.098×10^{-2}	4.194×10^{-2}
Solar zenith angle	2.763×10^{-2}	1.000	-0.144	-0.245	-0.249	-2.957×10^{-2}	4.947×10^{-3}	-4.354×10^{-2}	-7.959×10^{-2}	-9.095×10^{-2}
Latitude	-2.717×10^{-2}	-0.144	1.000	0.403	0.410	-0.159	-2.369×10^{-3}	2.432×10^{-2}	4.205×10^{-2}	3.347×10^{-2}
CO total vertical column	1.744×10^{-2}	-0.245	0.403	1.000	0.988	1.864×10^{-2}	7.868×10^{-3}	1.673×10^{-2}	4.151×10^{-2}	2.135×10^{-3}
CO total vertical column (stripe-corrected)	1.562×10^{-2}	-0.249	0.410	0.988	1.000	1.676×10^{-2}	7.046×10^{-3}	1.726×10^{-2}	4.240×10^{-2}	2.624×10^{-3}
CO total vertical column precision	-0.193	-2.957×10^{-2}	-0.159	1.864×10^{-2}	1.676×10^{-2}	1.000	-1.574×10^{-2}	-6.408×10^{-2}	6.529×10^{-2}	-5.763×10^{-2}
Number of spectral points in retrieval	8.901×10^{-2}	4.947×10^{-3}	-2.369×10^{-3}	7.868×10^{-3}	7.046×10^{-3}	-1.574×10^{-2}	1.000	-1.768×10^{-4}	-6.736×10^{-3}	1.583×10^{-2}
χ^2	8.179×10^{-3}	-4.354×10^{-2}	2.432×10^{-2}	1.673×10^{-2}	1.726×10^{-2}	-6.408×10^{-2}	-1.768×10^{-4}	1.000	-8.430×10^{-3}	-7.386×10^{-3}
Degrees of freedom for signal	4.098×10^{-2}	-7.959×10^{-2}	4.205×10^{-2}	4.151×10^{-2}	4.240×10^{-2}	6.529×10^{-2}	-6.736×10^{-3}	-8.430×10^{-3}	1.000	-7.382×10^{-2}
Number of iterations	4.194×10^{-2}	-9.095×10^{-2}	3.347×10^{-2}	2.135×10^{-3}	2.624×10^{-3}	-5.763×10^{-2}	1.583×10^{-2}	-7.386×10^{-3}	-7.382×10^{-2}	1.000

Table 8: Covariance matrix

Viewing zenith angle	Solar zenith angle	Latitude	CO total vertical column	CO total vertical column (stripe-corrected)	CO total vertical column precision	Number of spectral points in retrieval	χ^2	Degrees of freedom for signal	Number of iterations
351	11.1	-22.6	3.107×10^{-3}	2.738×10^{-3}	-2.205×10^{-3}	2.18	1.891×10^{3}	0.354	1.00
11.1	464	-138	-5.025×10^{-2}	-5.026×10^{-2}	-3.885×10^{-4}	0.139	-1.157×10^{4}	-0.791	-2.50
-22.6	-138	1.968×10^{3}	0.170	0.170	-4.307×10^{-3}	-0.138	1.332×10^{4}	0.860	1.90
3.107×10^{-3}	-5.025×10^{-2}	0.170	9.046×10^{-5}	8.796×10^{-5}	1.082×10^{-7}	9.789×10^{-5}	1.96	1.821×10^{-4}	2.596×10^{-5}
2.738×10^{-3}	-5.026×10^{-2}	0.170	8.796×10^{-5}	8.764×10^{-5}	9.572×10^{-8}	8.629×10^{-5}	1.99	1.831×10^{-4}	3.140×10^{-5}
-2.205×10^{-3}	-3.885×10^{-4}	-4.307×10^{-3}	1.082×10^{-7}	9.572×10^{-8}	3.721×10^{-7}	-1.256×10^{-5}	-0.482	1.837×10^{-5}	-4.494×10^{-5}
2.18	0.139	-0.138	9.789×10^{-5}	8.629×10^{-5}	-1.256×10^{-5}	1.71	-2.85	-4.064×10^{-3}	2.647×10^{-2}
1.891×10^{3}	-1.157×10^{4}	1.332×10^{4}	1.96	1.99	-0.482	-2.85	1.523×10^{8}	-48.0	-117
0.354	-0.791	0.860	1.821×10^{-4}	1.831×10^{-4}	1.837×10^{-5}	-4.064×10^{-3}	-48.0	0.213	-4.353×10^{-2}
1.00	-2.50	1.90	2.596×10^{-5}	3.140×10^{-5}	-4.494×10^{-5}	2.647×10^{-2}	-117	-4.353×10^{-2}	1.63

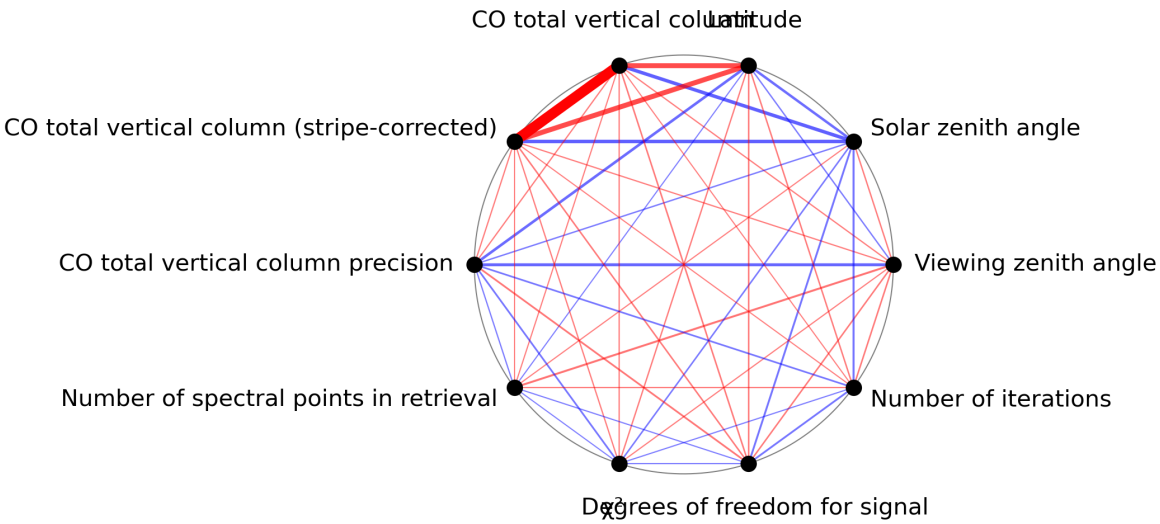

Figure 1: Map of correlation graph for 2024-07-17 to 2024-07-19.

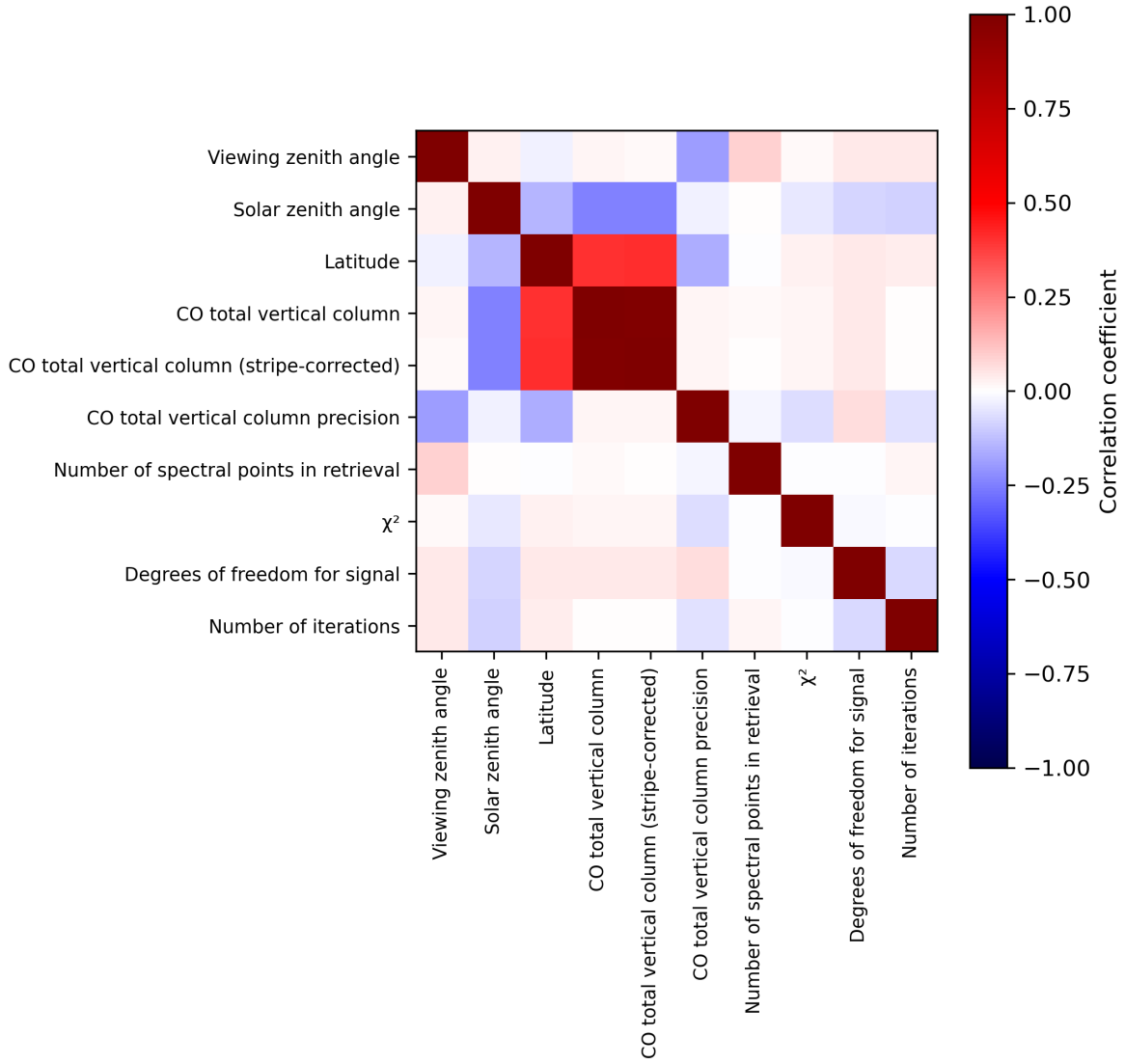

Figure 2: Map of correlation matrix for 2024-07-17 to 2024-07-19.

3 Granule outlines

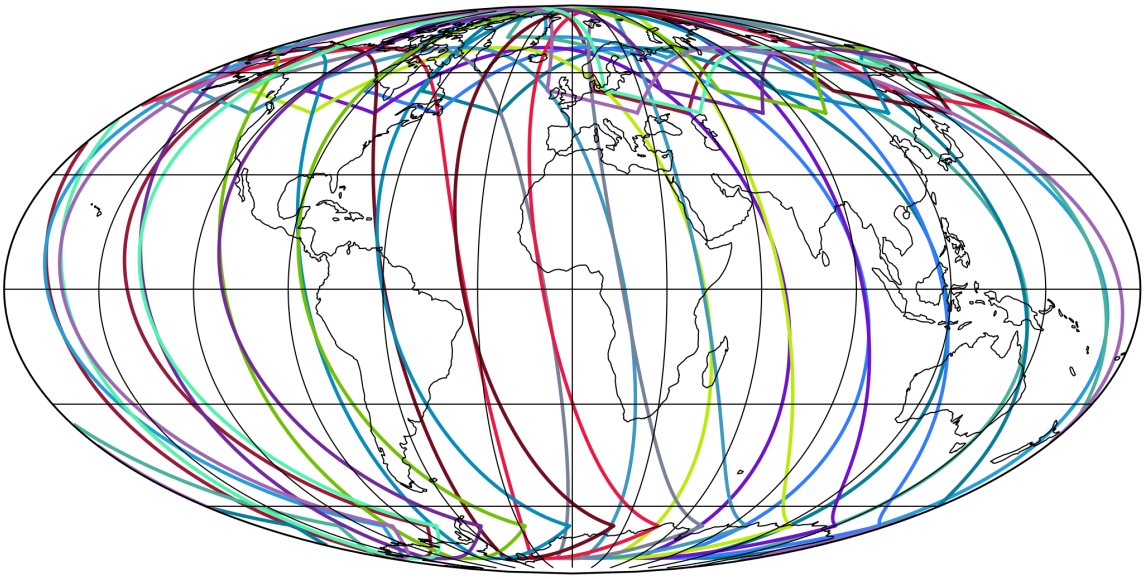

Figure 3: Outline of the granules.

4 Input data monitoring

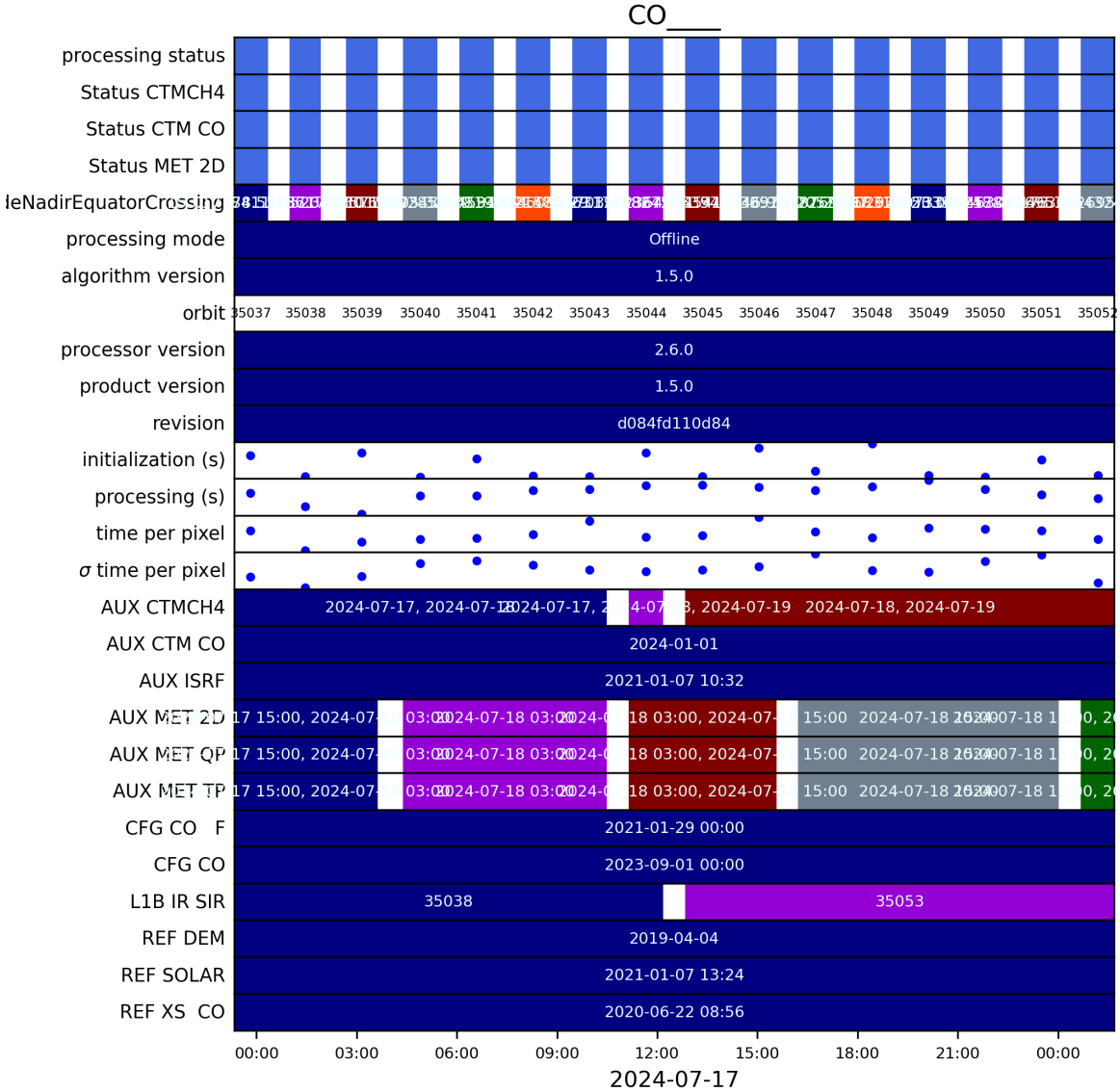

Figure 4: Input data per granule

5 Warnings and errors

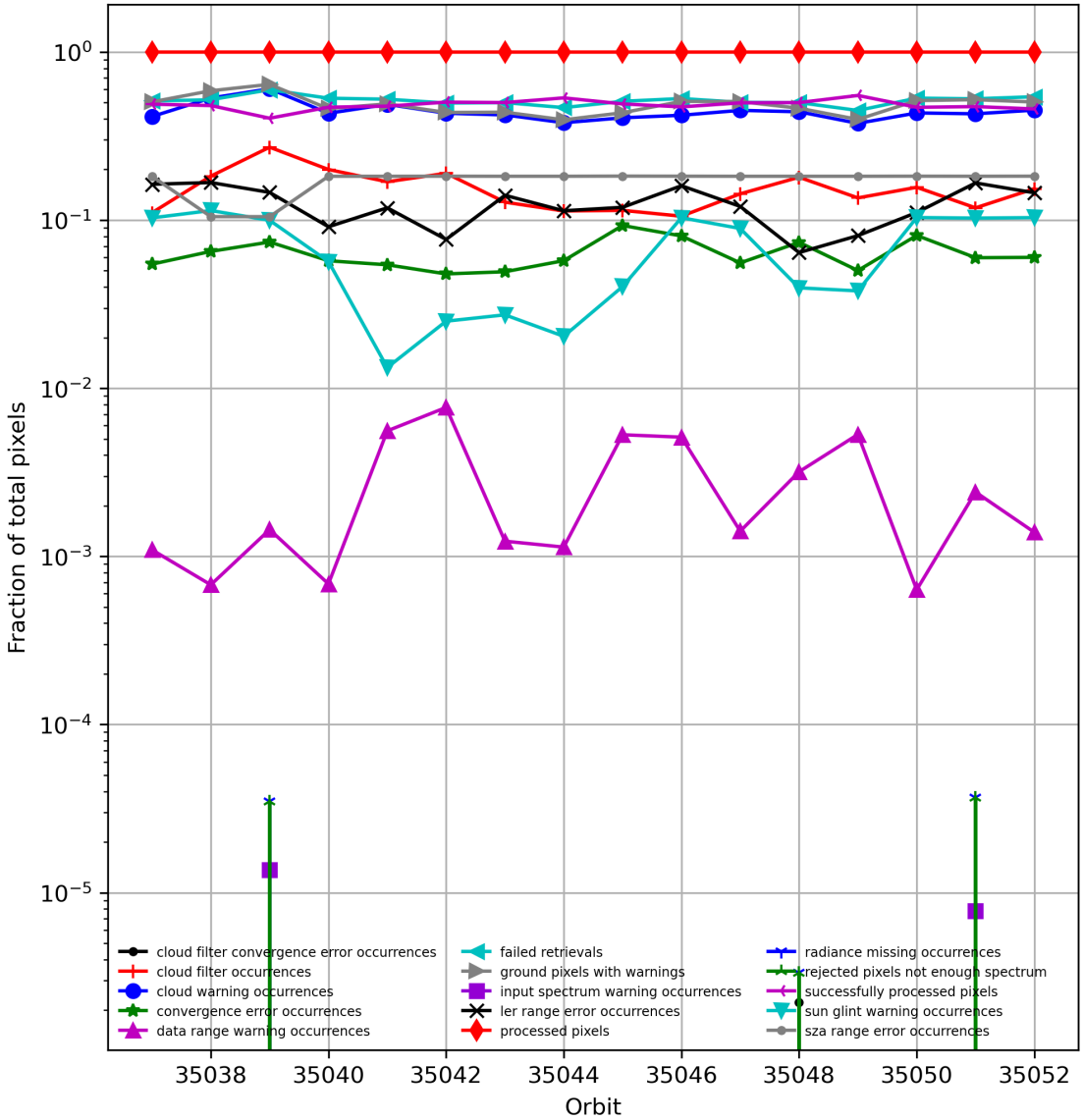

Figure 5: Fraction of pixels with specific warnings and errors during processing

6 World maps

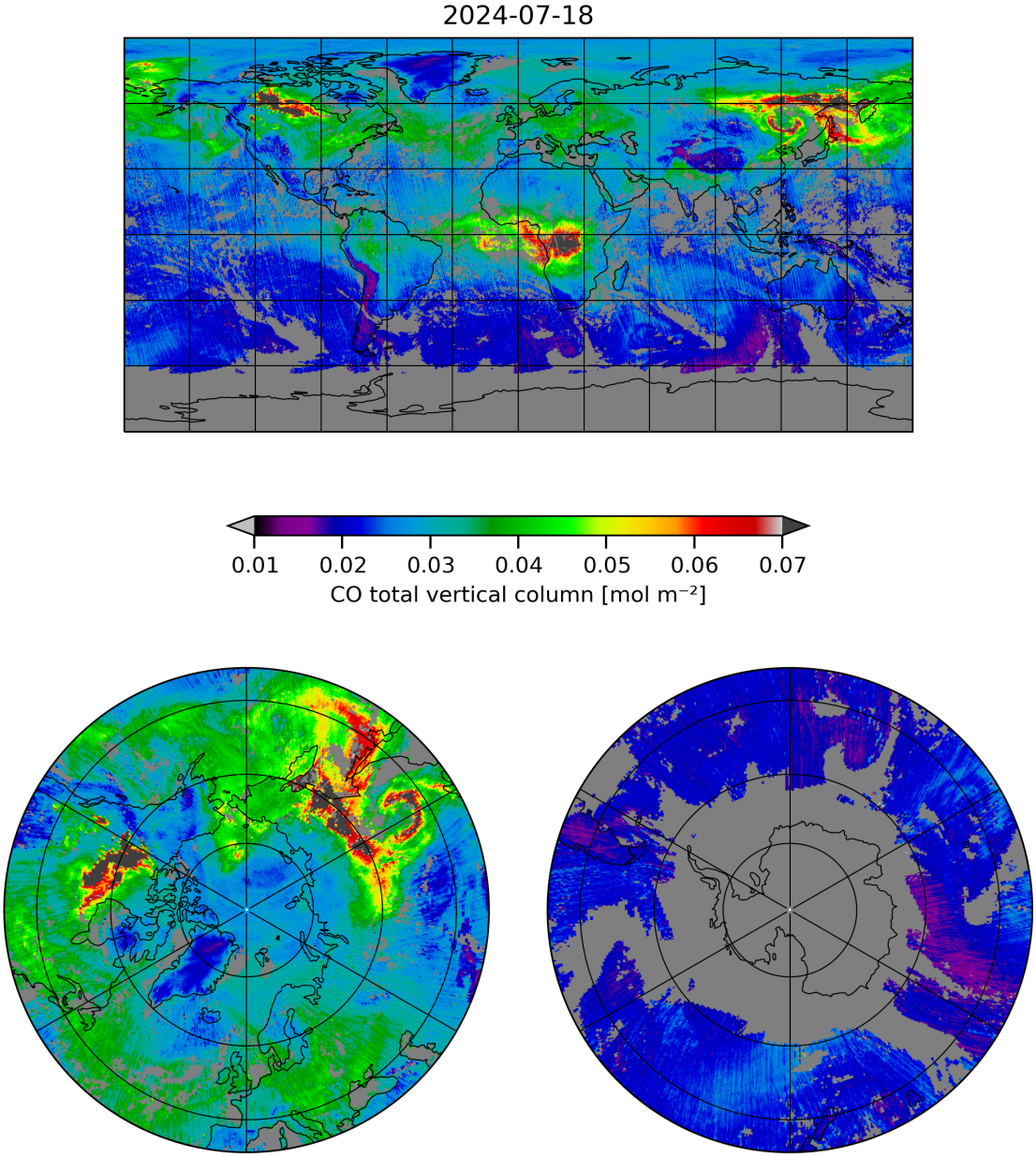

Figure 6: Map of “CO total vertical column” for 2024-07-17 to 2024-07-19

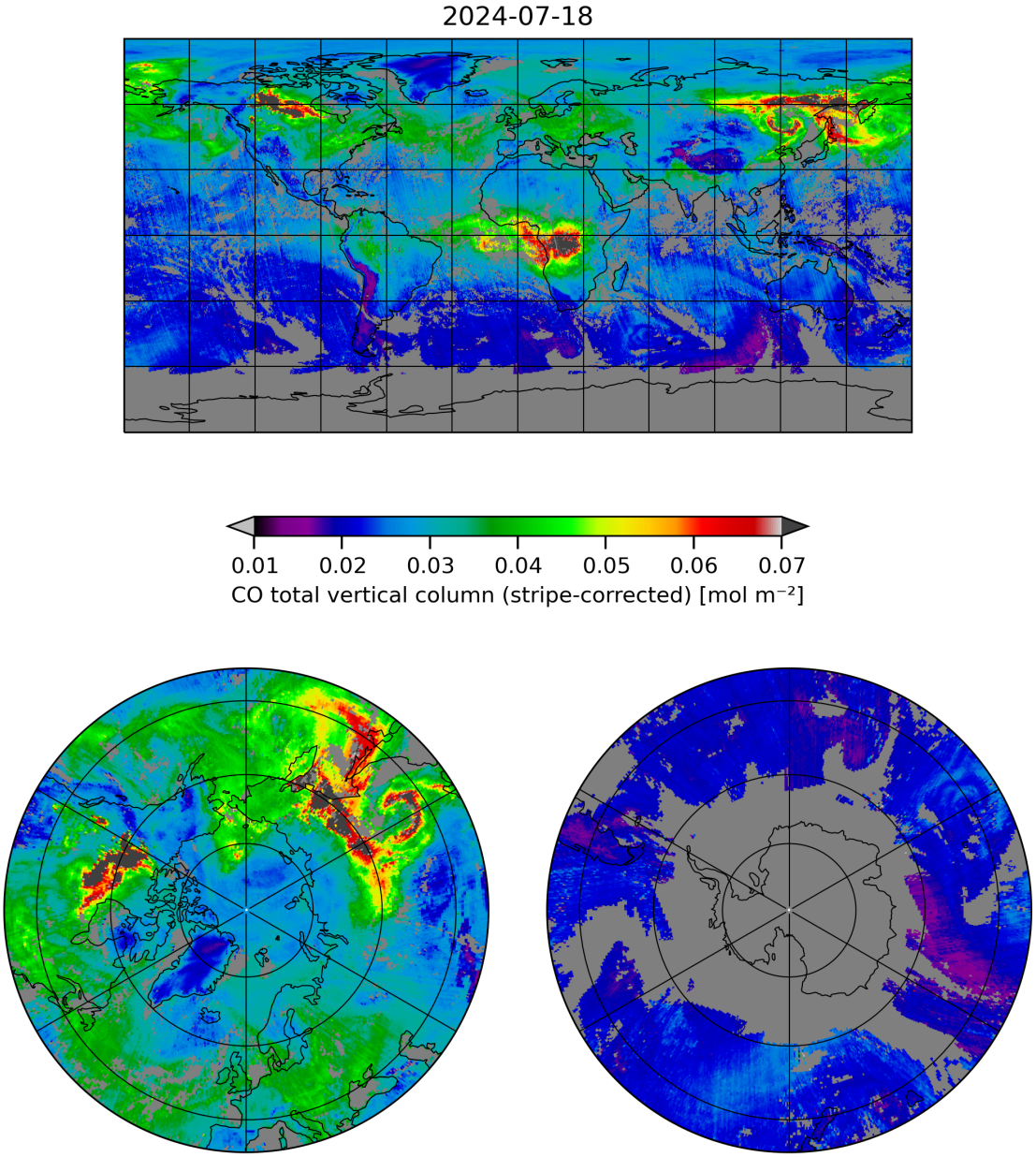

Figure 7: Map of “CO total vertical column (stripe-corrected)” for 2024-07-17 to 2024-07-19

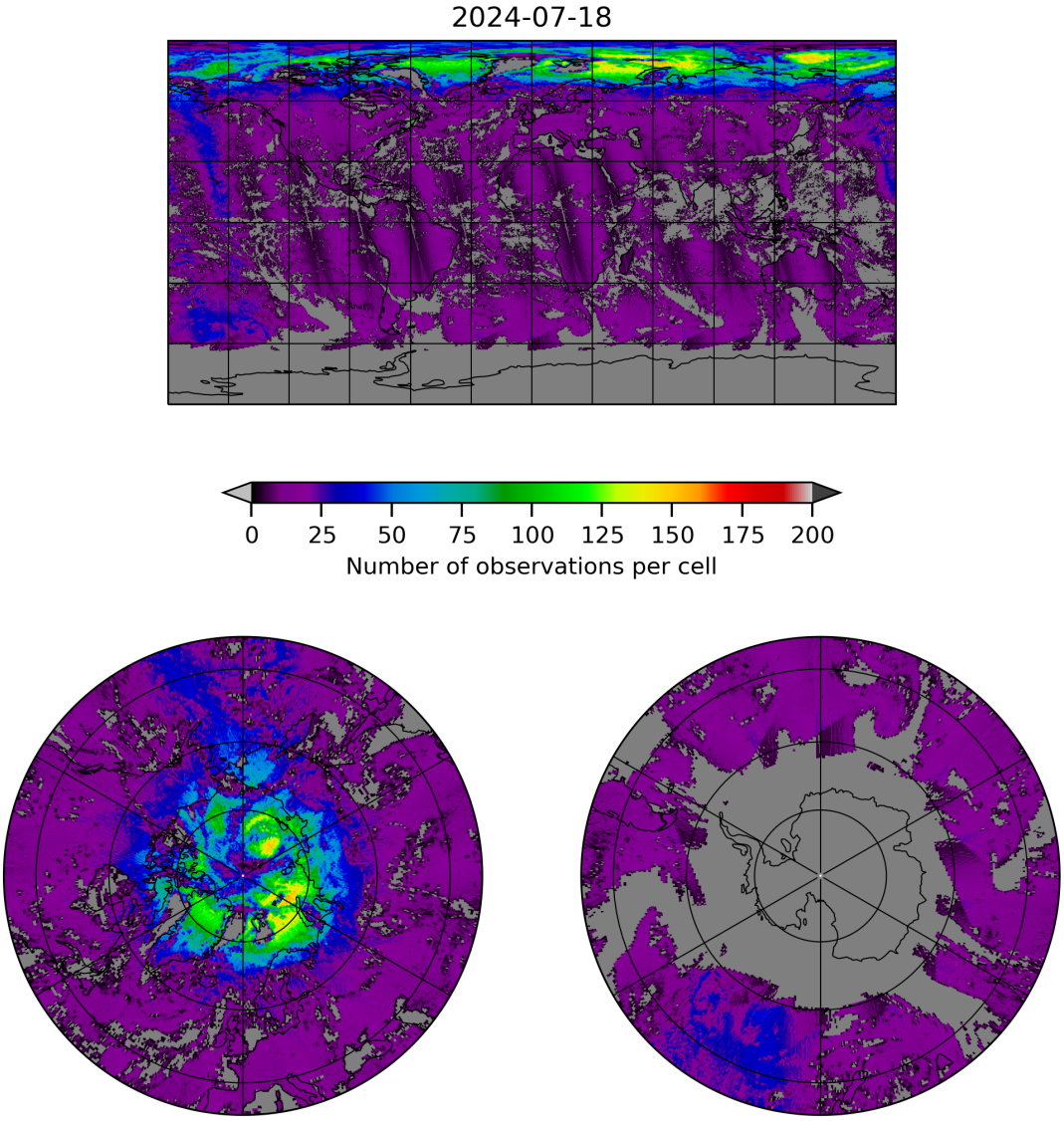

Figure 8: Map of the number of observations for 2024-07-17 to 2024-07-19

7 Zonal average

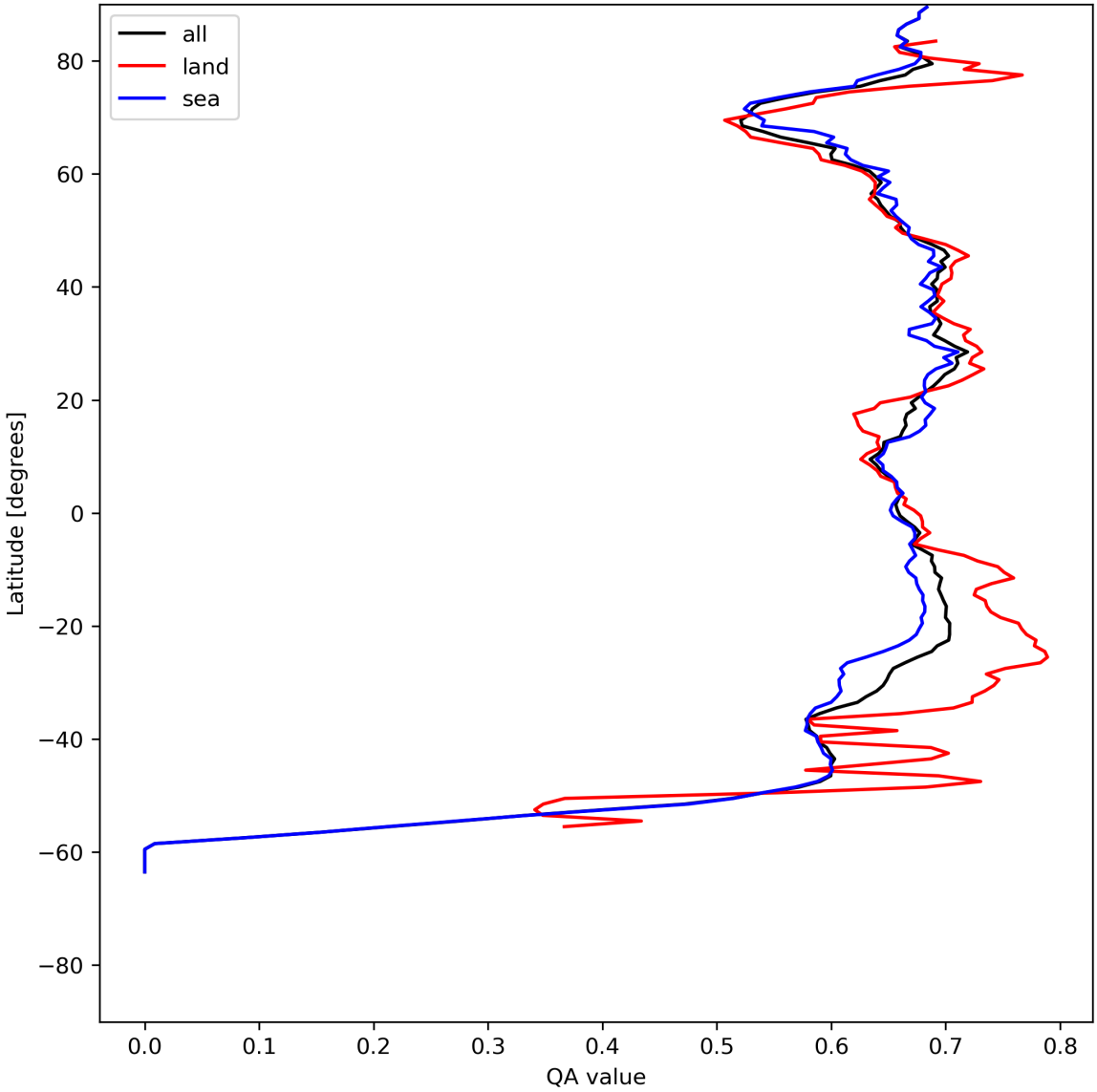

Figure 9: Zonal average of “QA value” for 2024-07-17 to 2024-07-19.

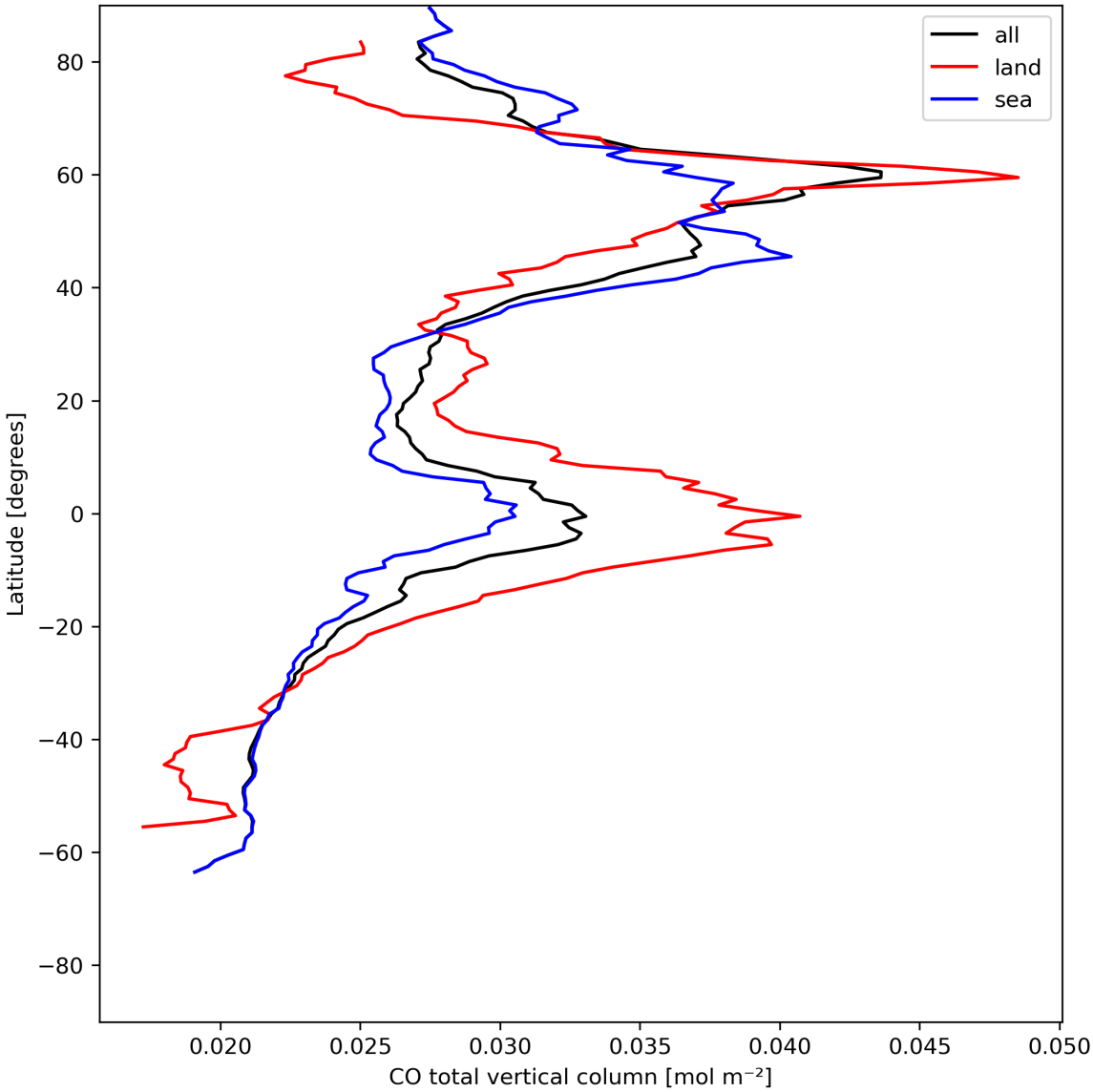

Figure 10: Zonal average of “CO total vertical column” for 2024-07-17 to 2024-07-19.

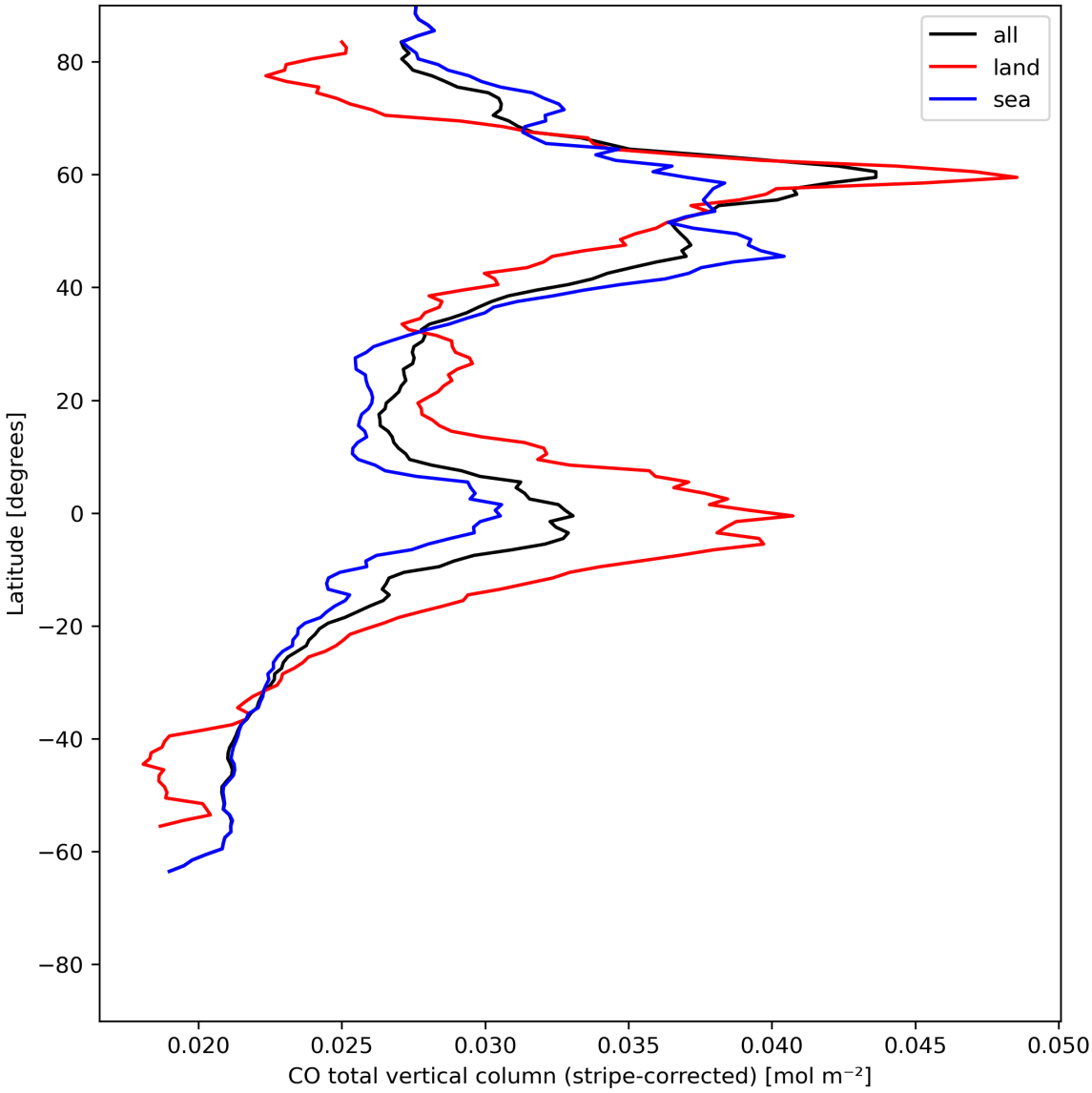

Figure 11: Zonal average of “CO total vertical column (stripe-corrected)” for 2024-07-17 to 2024-07-19.

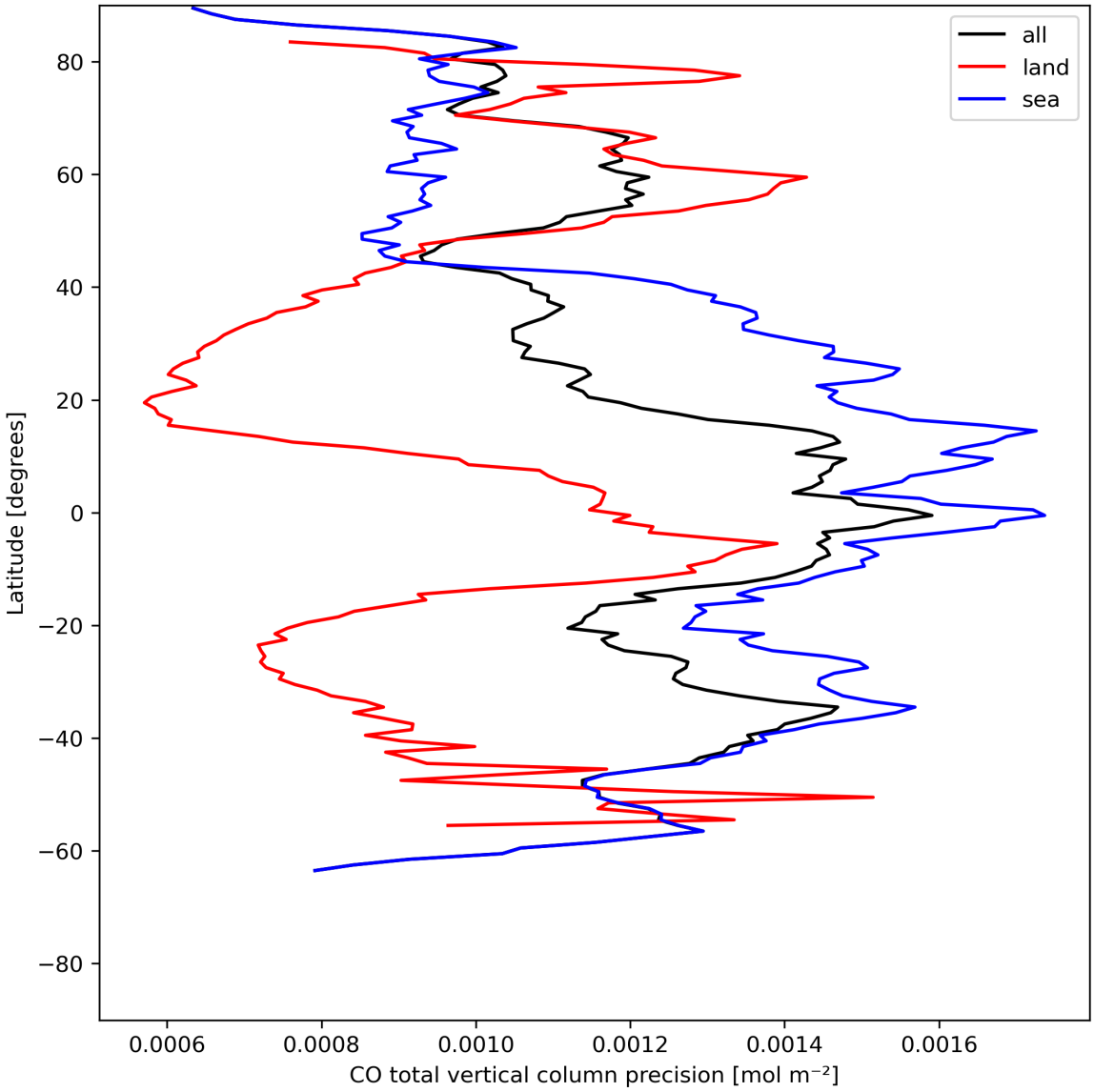

Figure 12: Zonal average of “CO total vertical column precision” for 2024-07-17 to 2024-07-19.

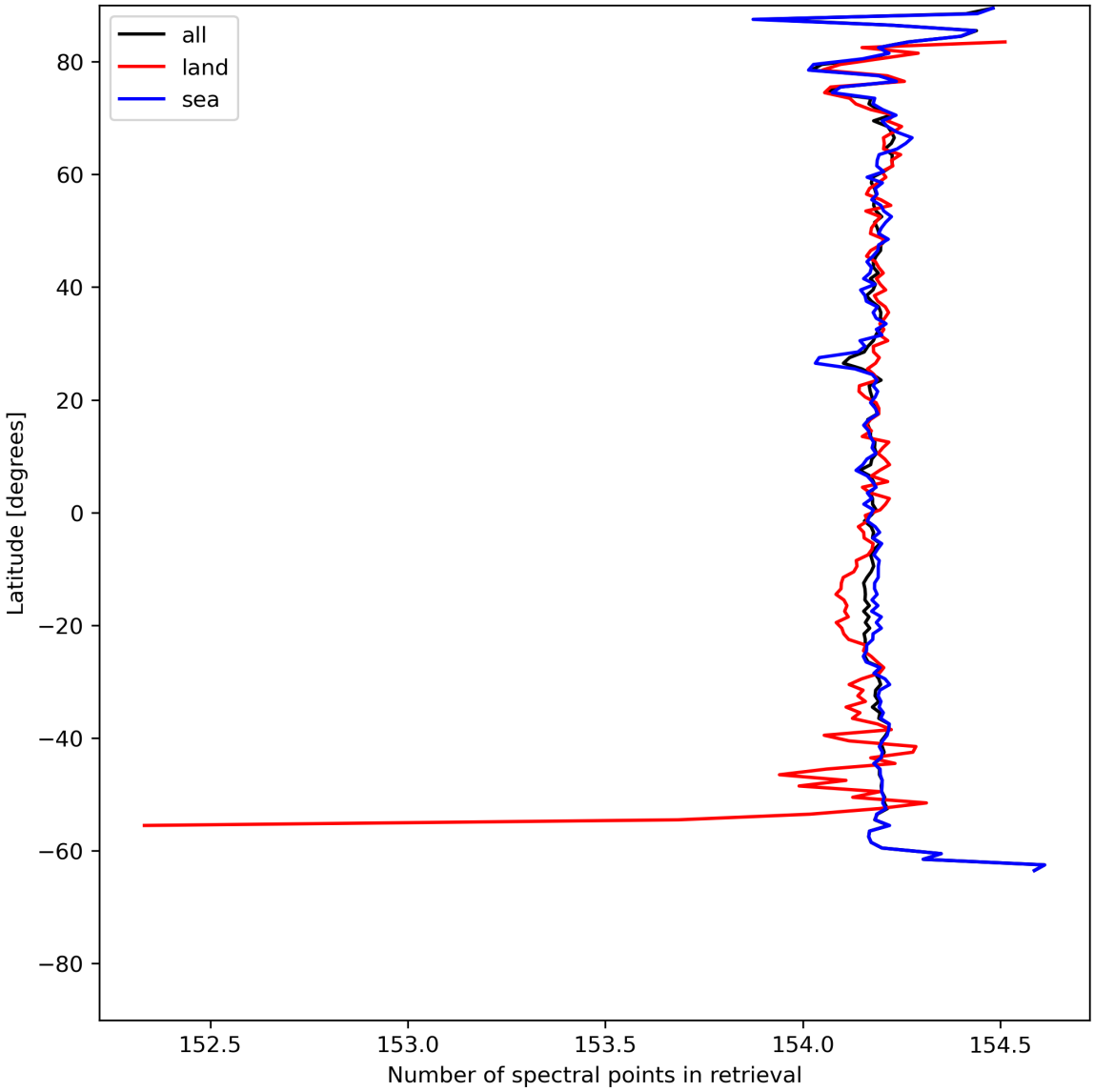

Figure 13: Zonal average of “Number of spectral points in retrieval” for 2024-07-17 to 2024-07-19.

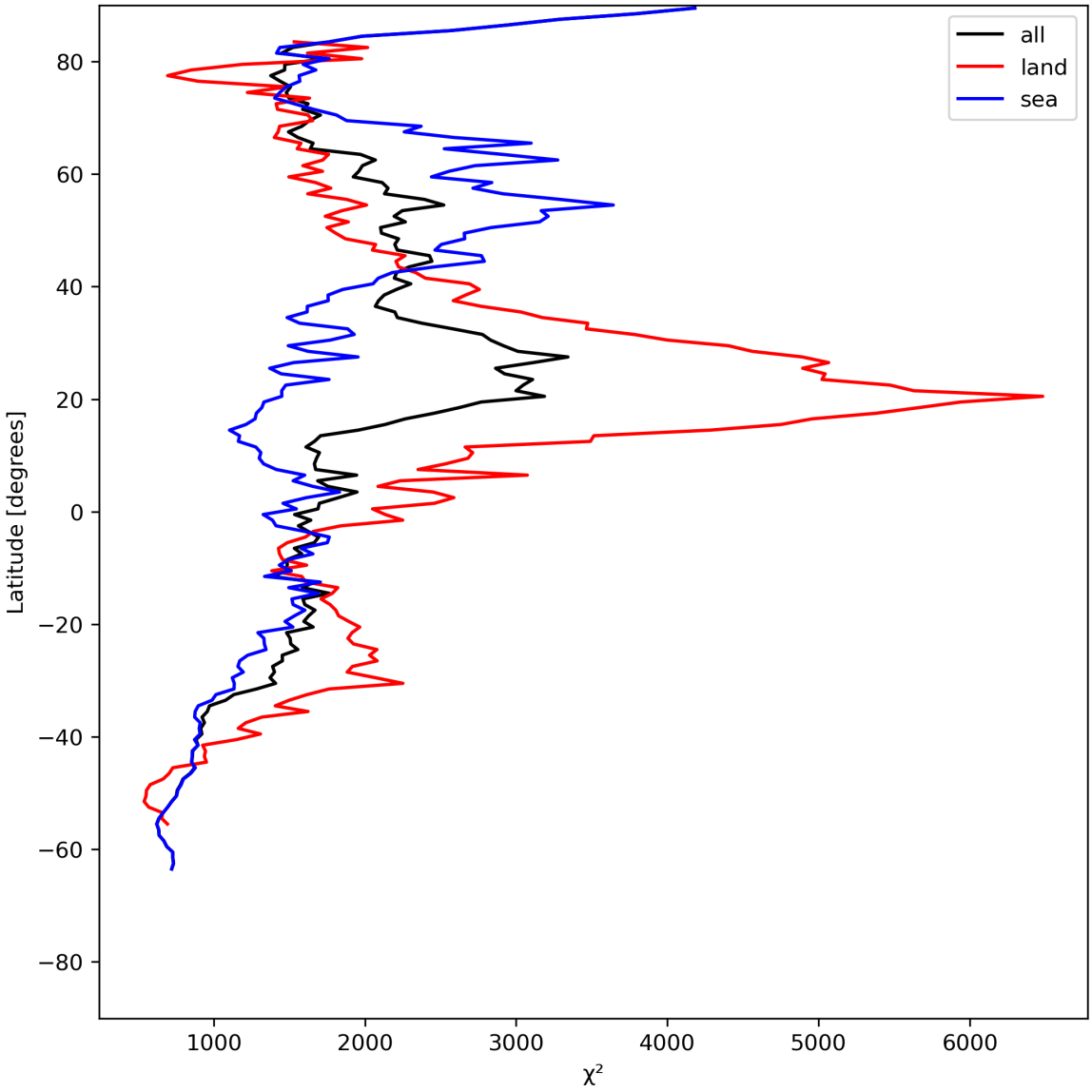

Figure 14: Zonal average of "χ^2" for 2024-07-17 to 2024-07-19.

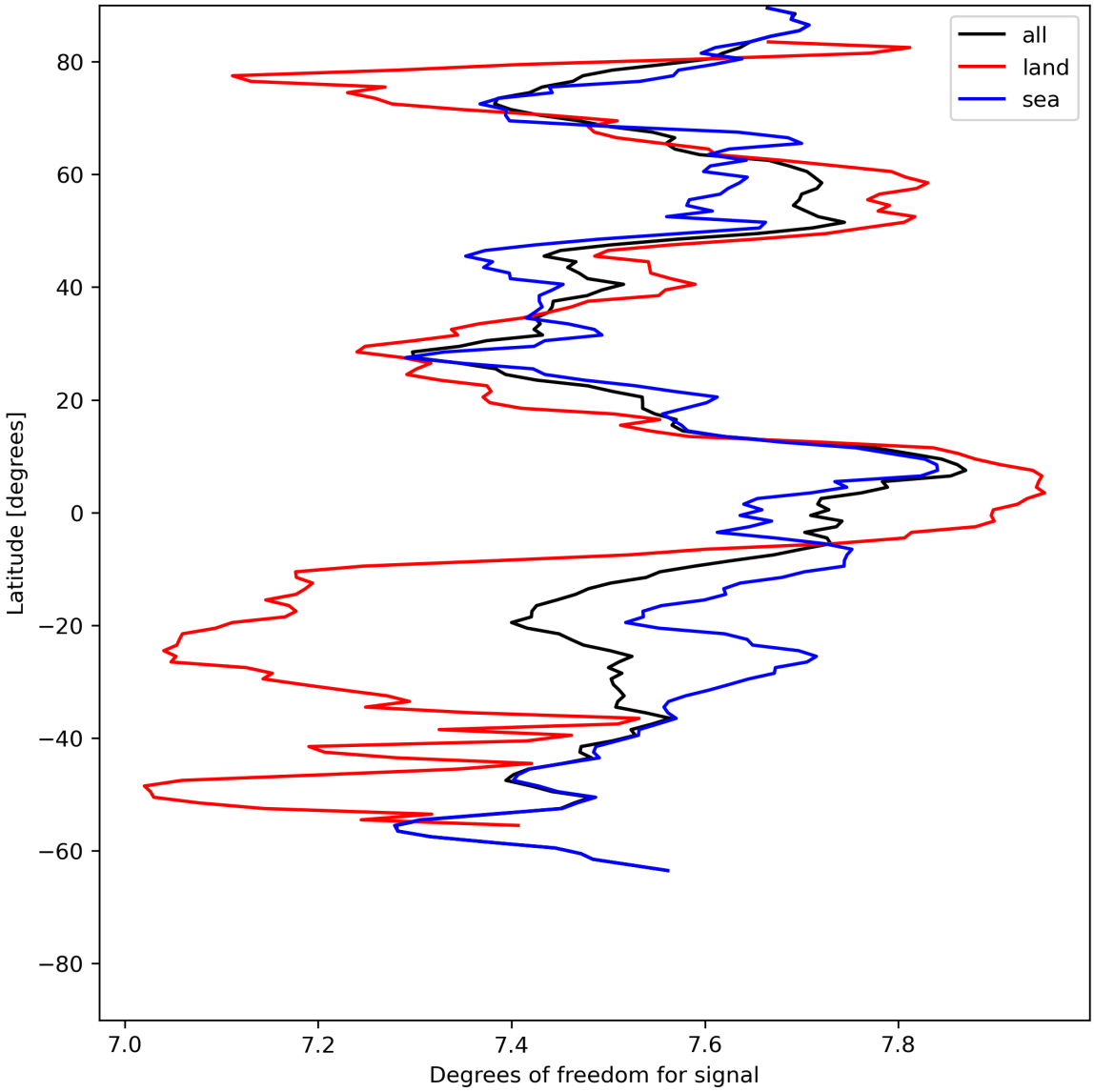

Figure 15: Zonal average of “Degrees of freedom for signal” for 2024-07-17 to 2024-07-19.

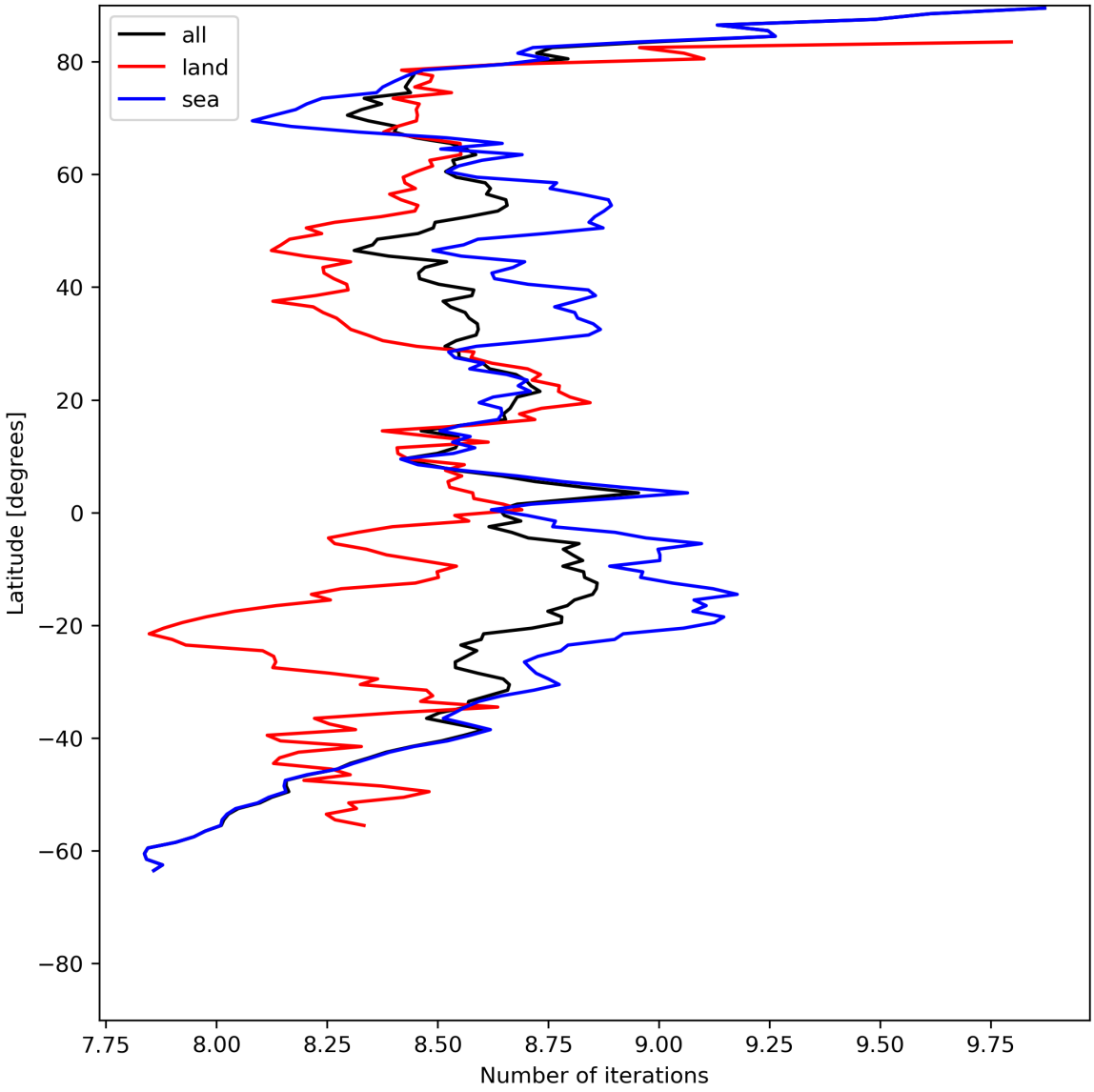

Figure 16: Zonal average of “Number of iterations” for 2024-07-17 to 2024-07-19.

8 Histograms

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

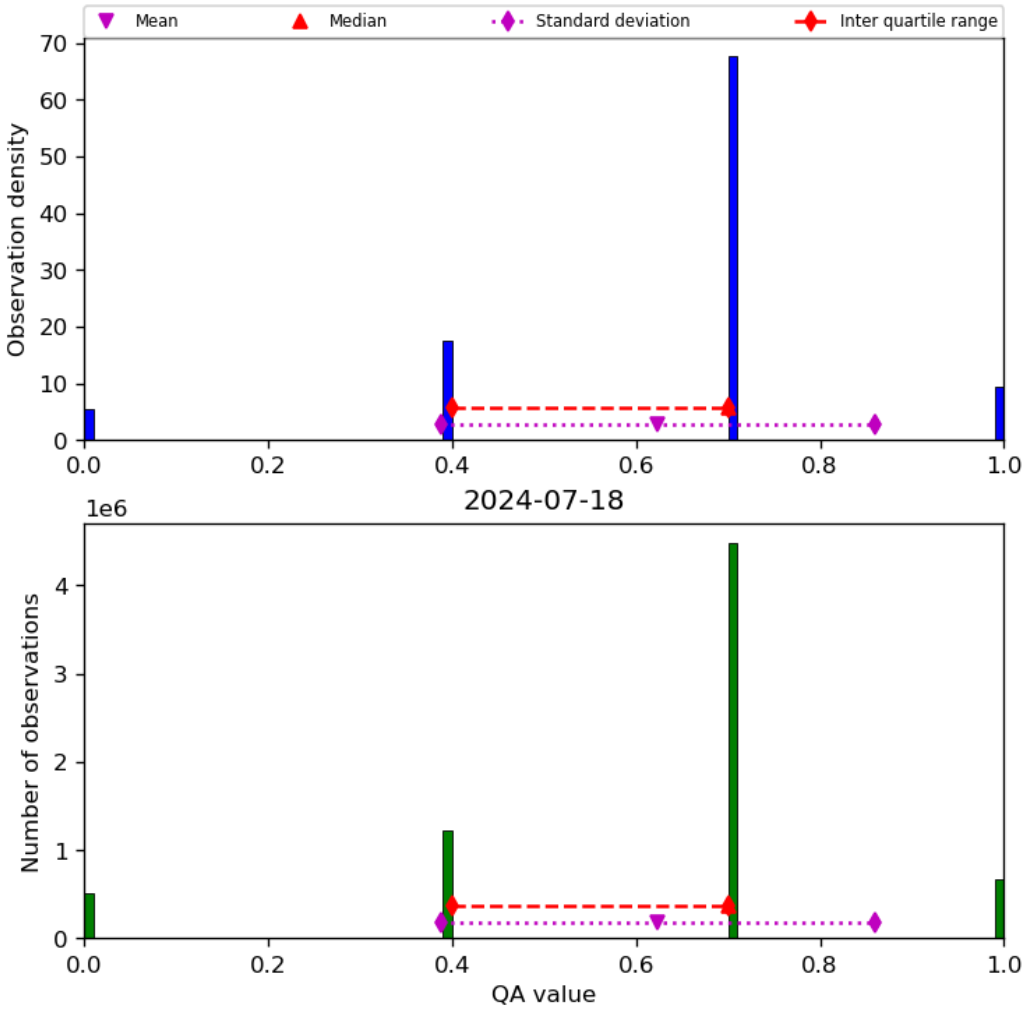

Figure 17: Histogram of “QA value” for 2024-07-17 to 2024-07-19

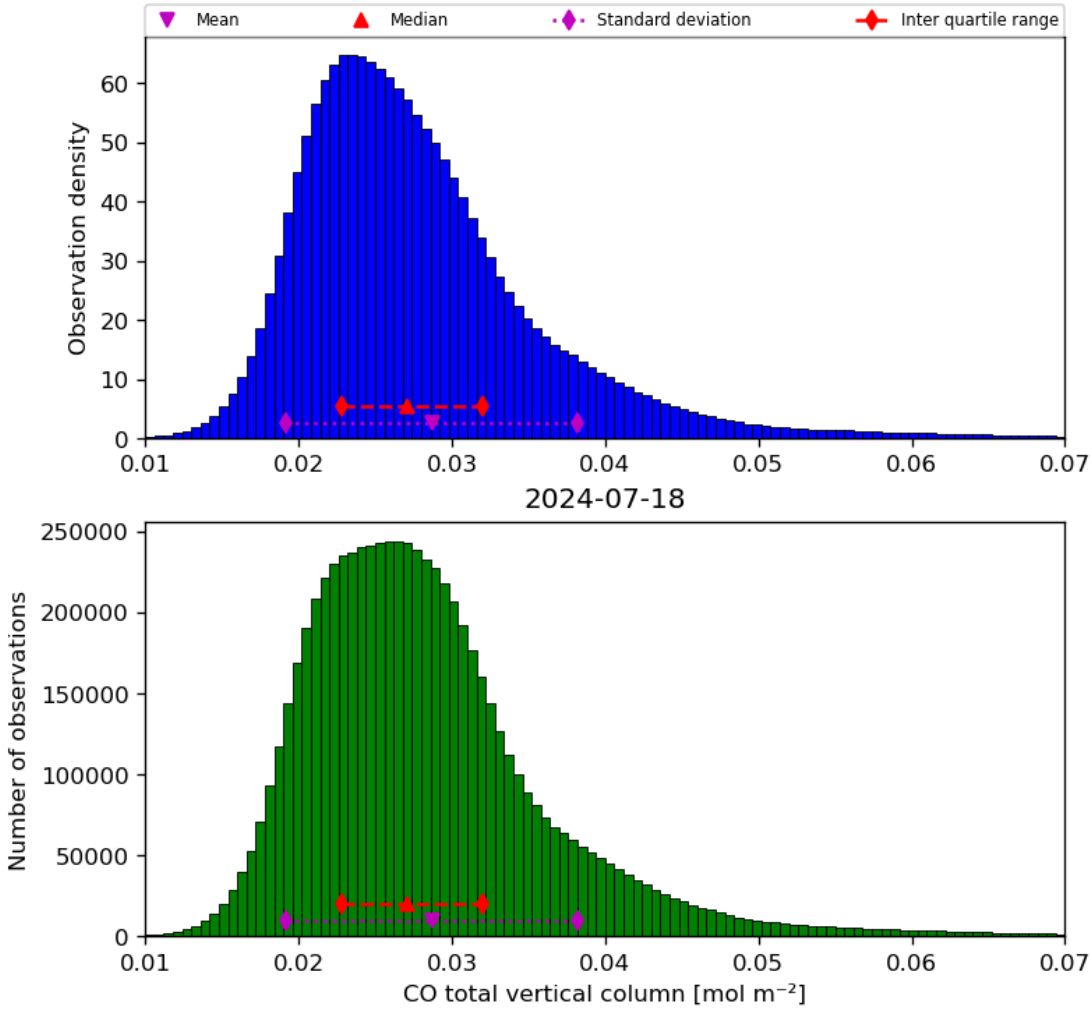

Figure 18: Histogram of “CO total vertical column” for 2024-07-17 to 2024-07-19

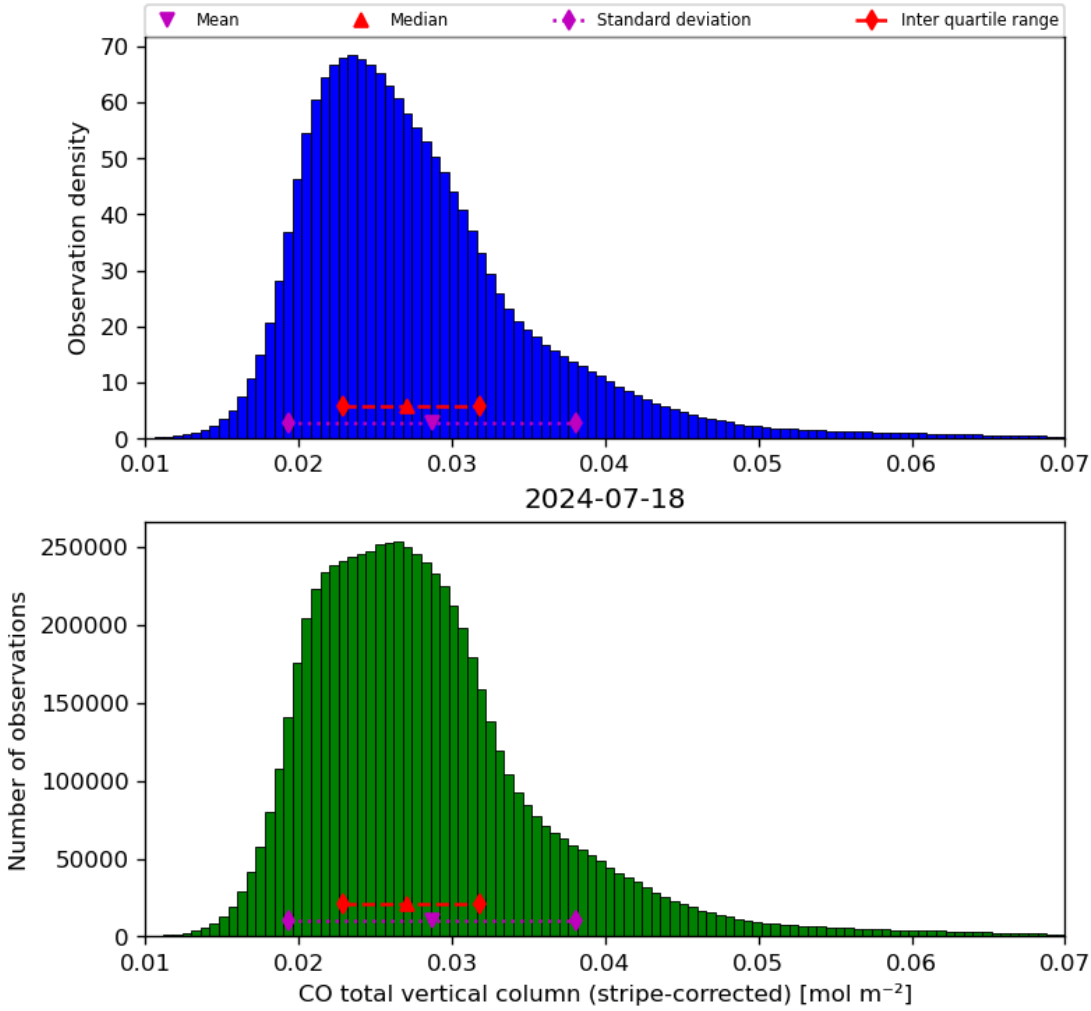

Figure 19: Histogram of “CO total vertical column (stripe-corrected)” for 2024-07-17 to 2024-07-19

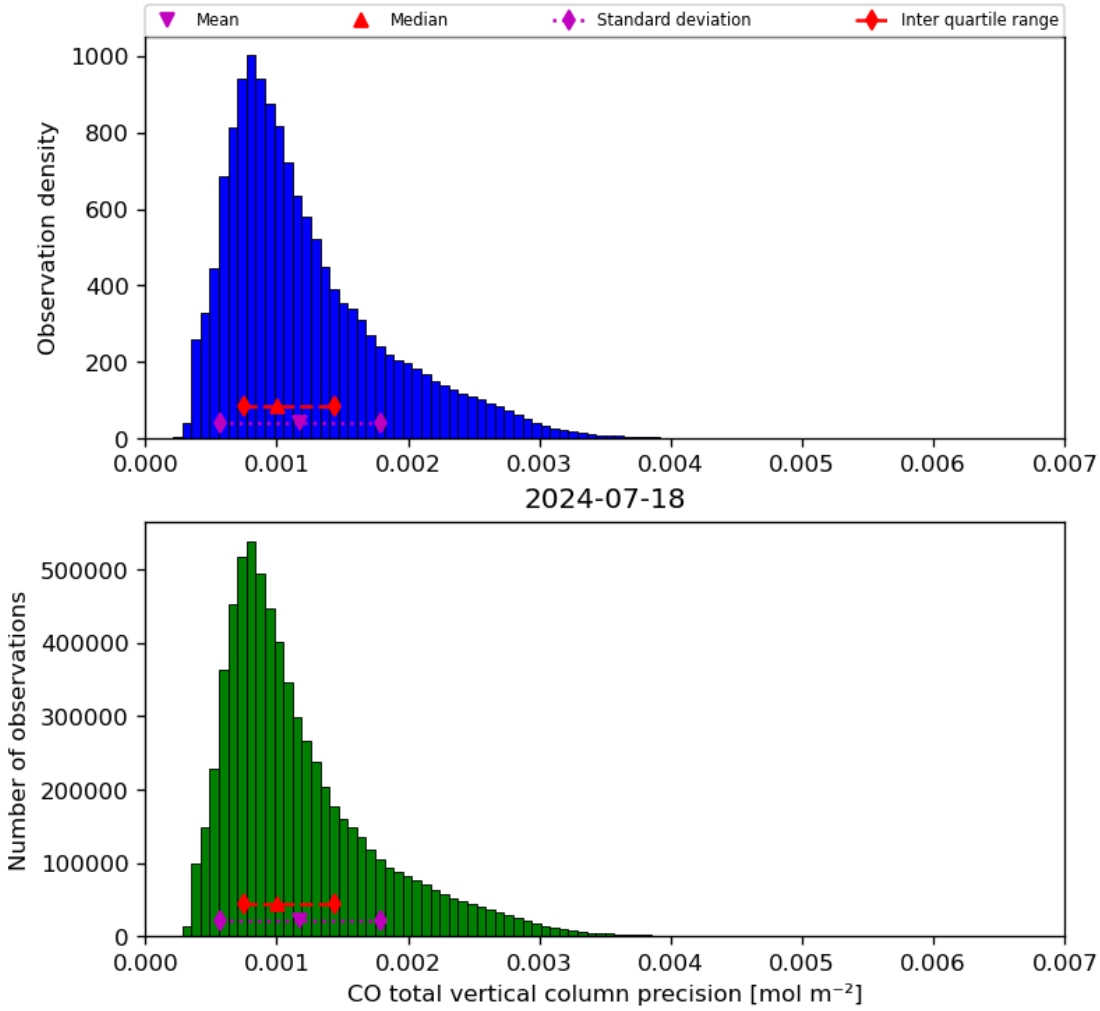

Figure 20: Histogram of “CO total vertical column precision” for 2024-07-17 to 2024-07-19

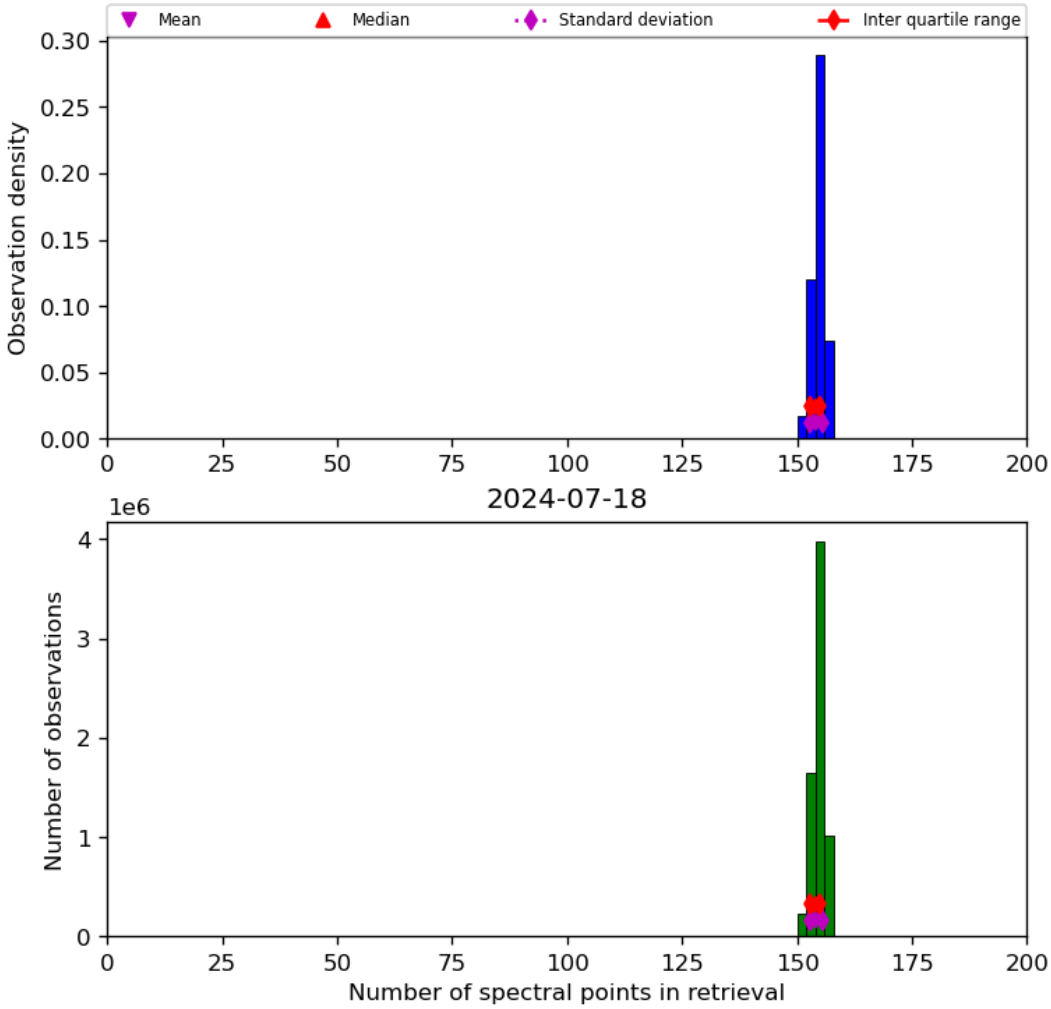

Figure 21: Histogram of “Number of spectral points in retrieval” for 2024-07-17 to 2024-07-19

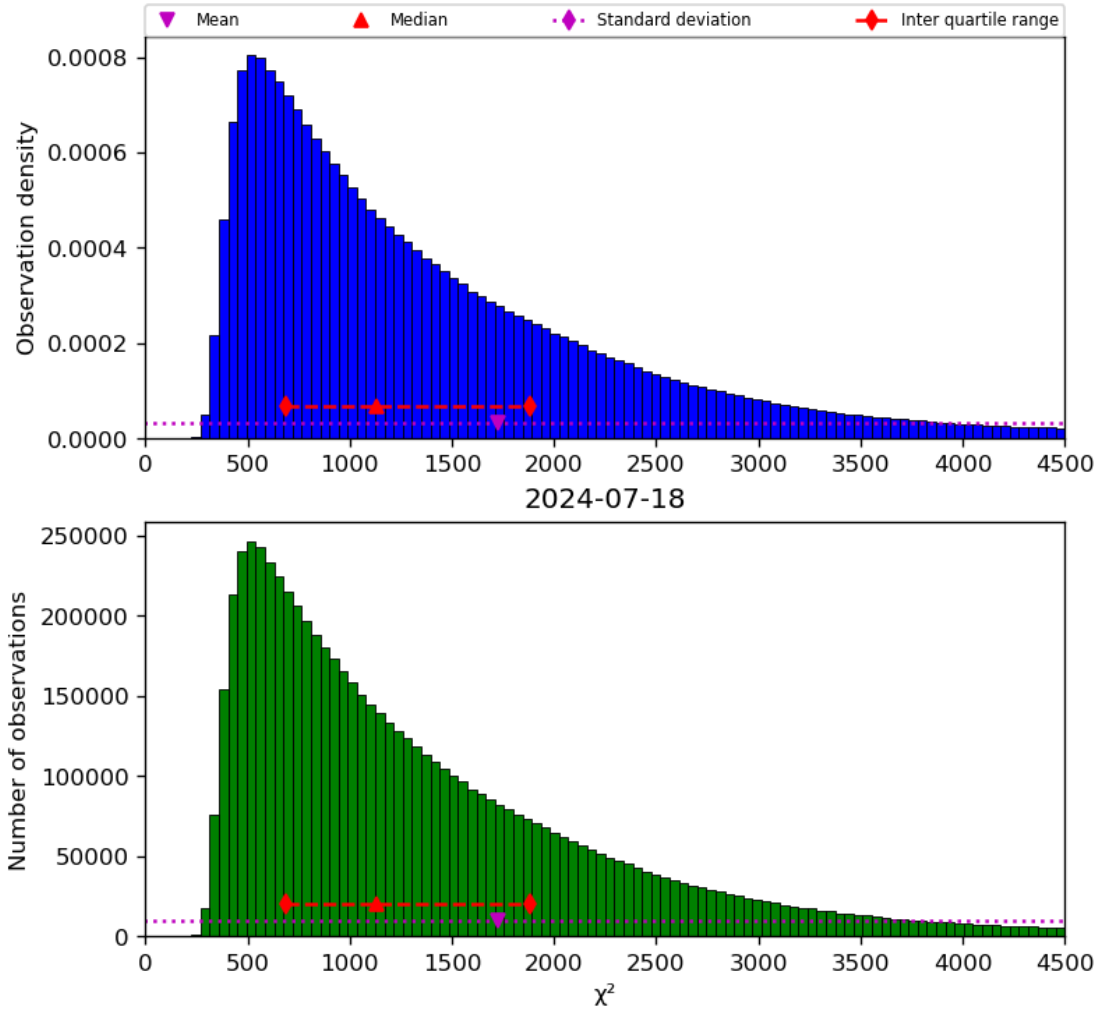

Figure 22: Histogram of "χ^2" for 2024-07-17 to 2024-07-19

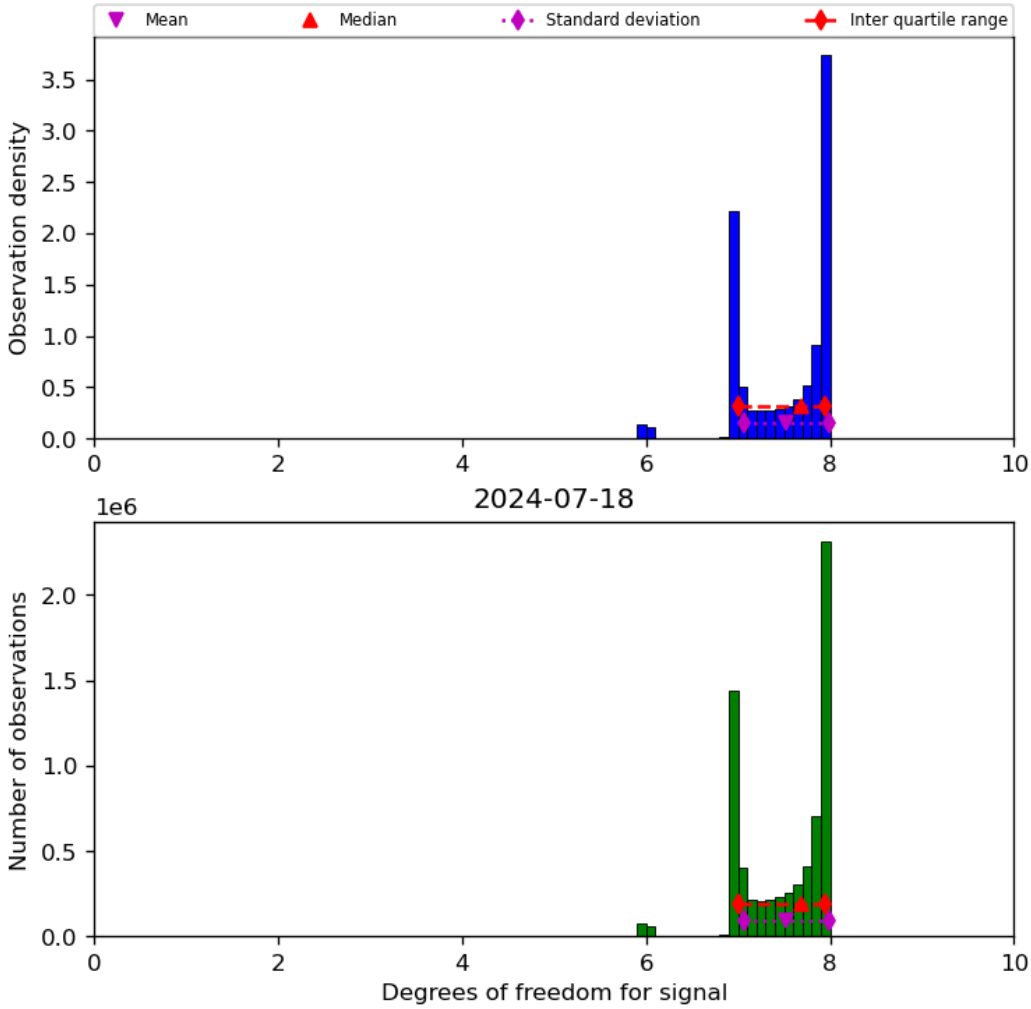

Figure 23: Histogram of “Degrees of freedom for signal” for 2024-07-17 to 2024-07-19

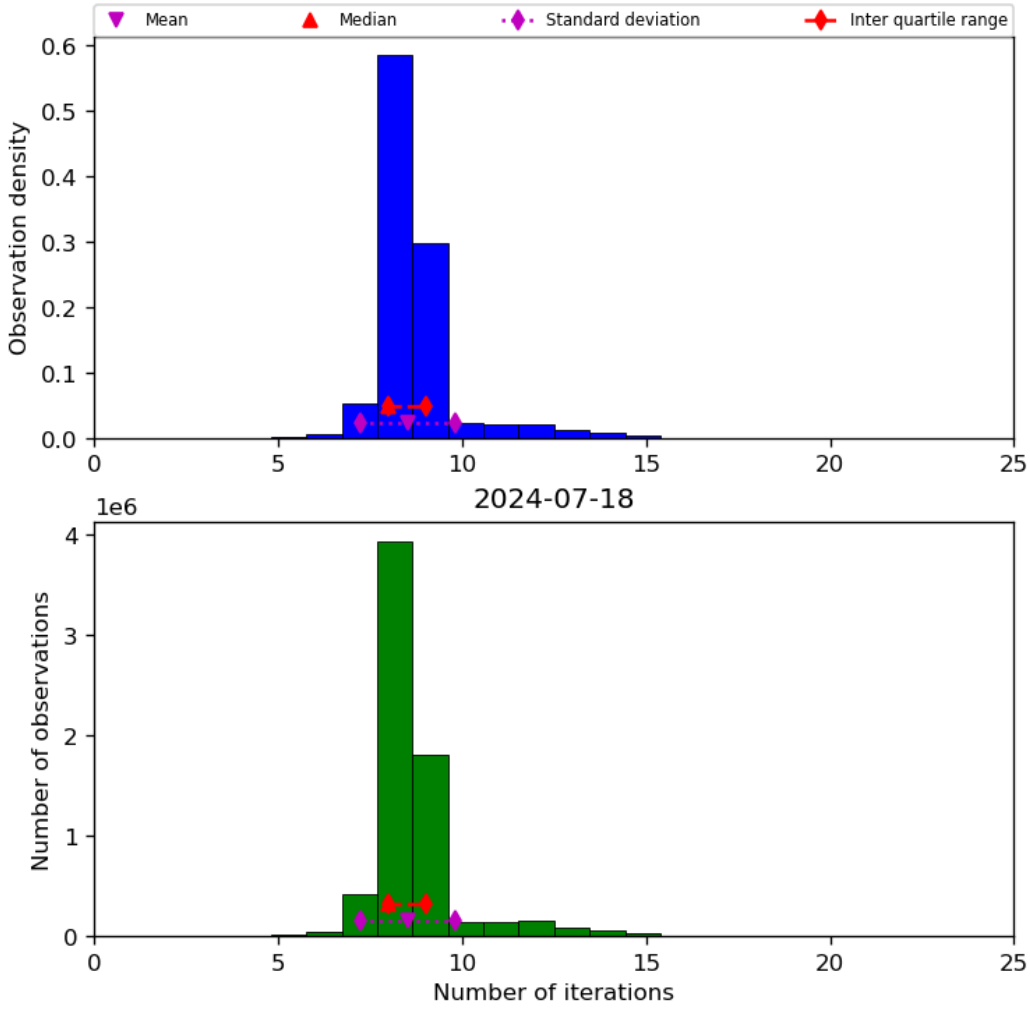

Figure 24: Histogram of “Number of iterations” for 2024-07-17 to 2024-07-19

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.

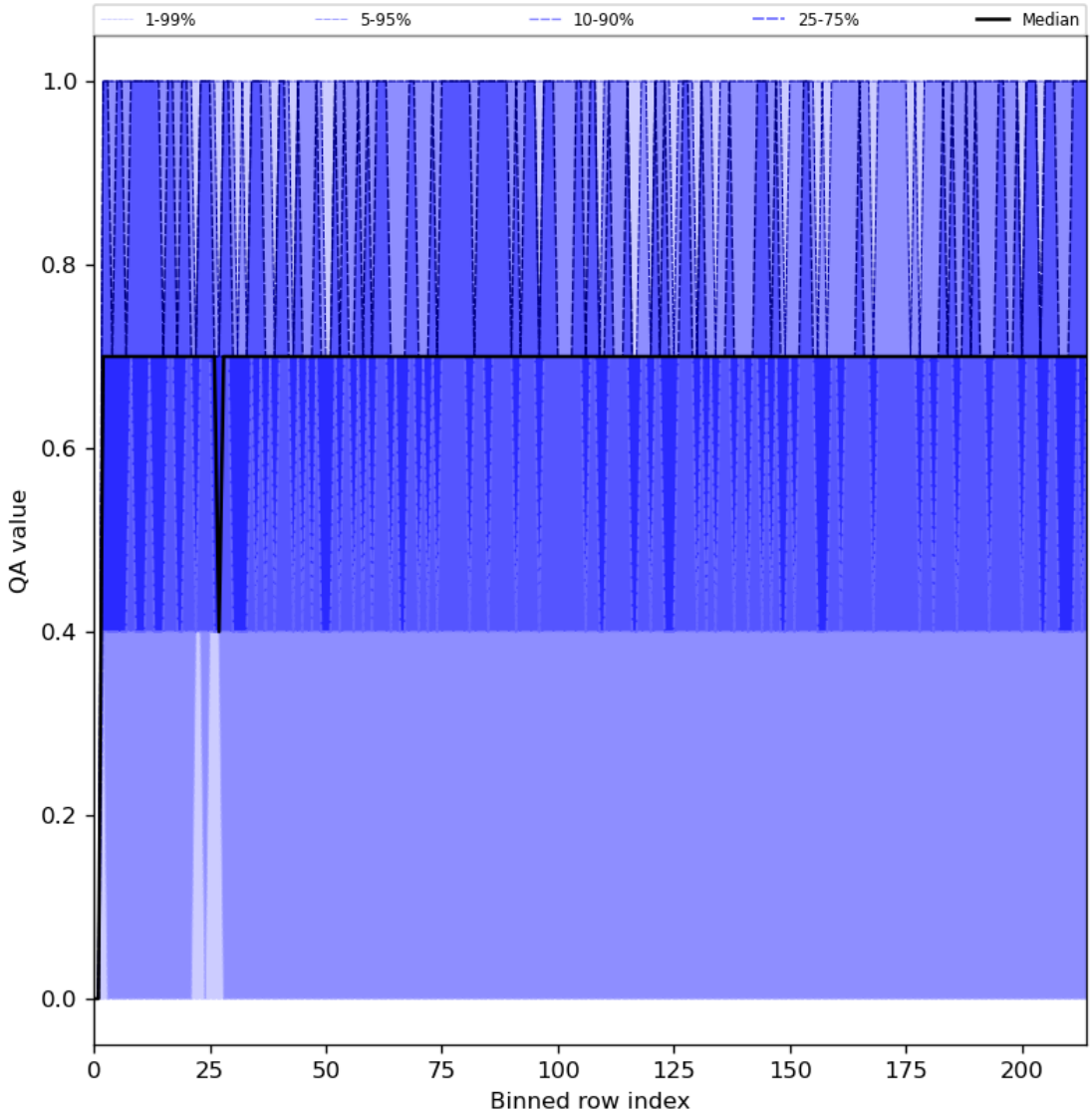

Figure 25: Along track statistics of “QA value” for 2024-07-17 to 2024-07-19

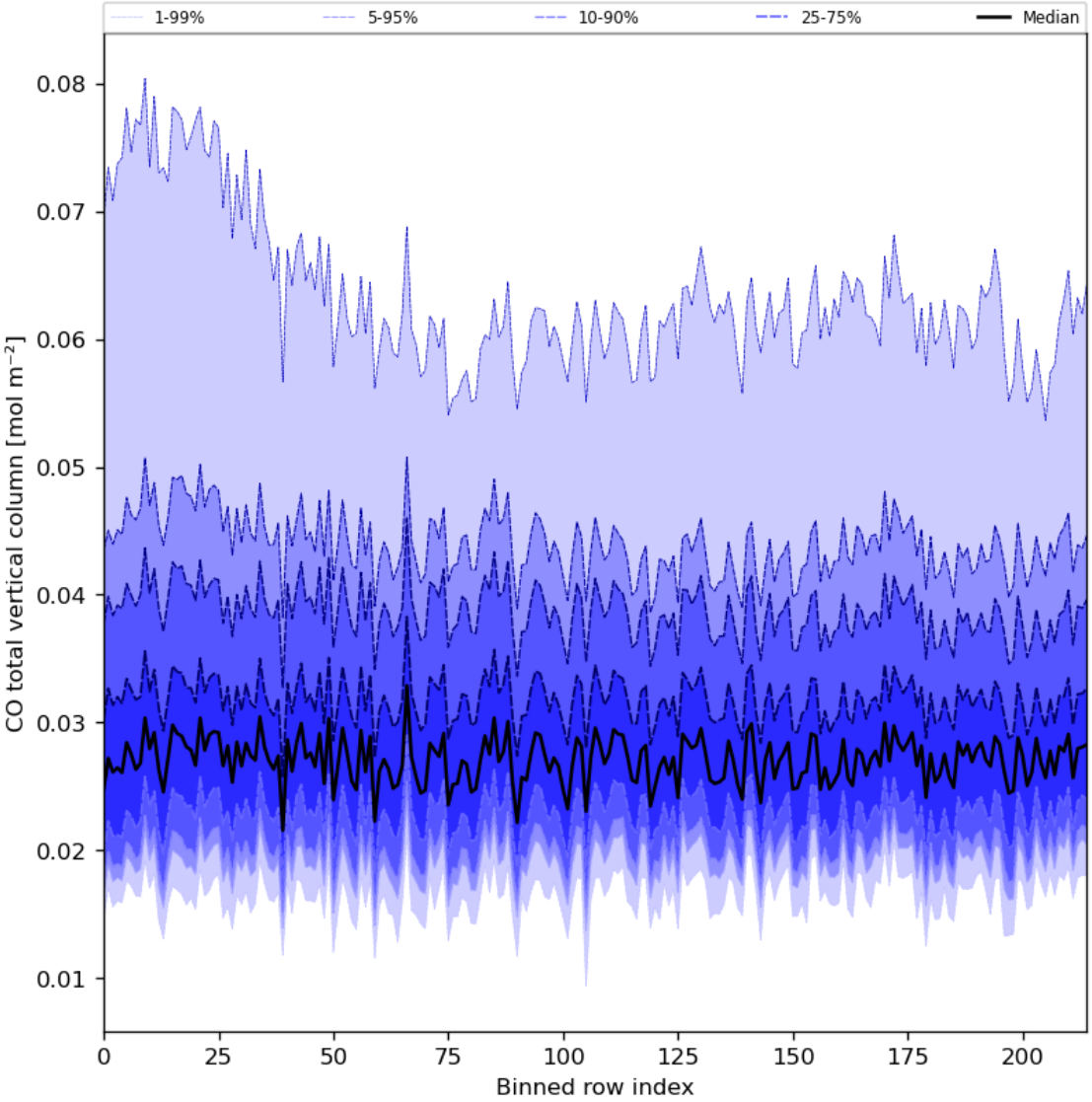

Figure 26: Along track statistics of “CO total vertical column” for 2024-07-17 to 2024-07-19

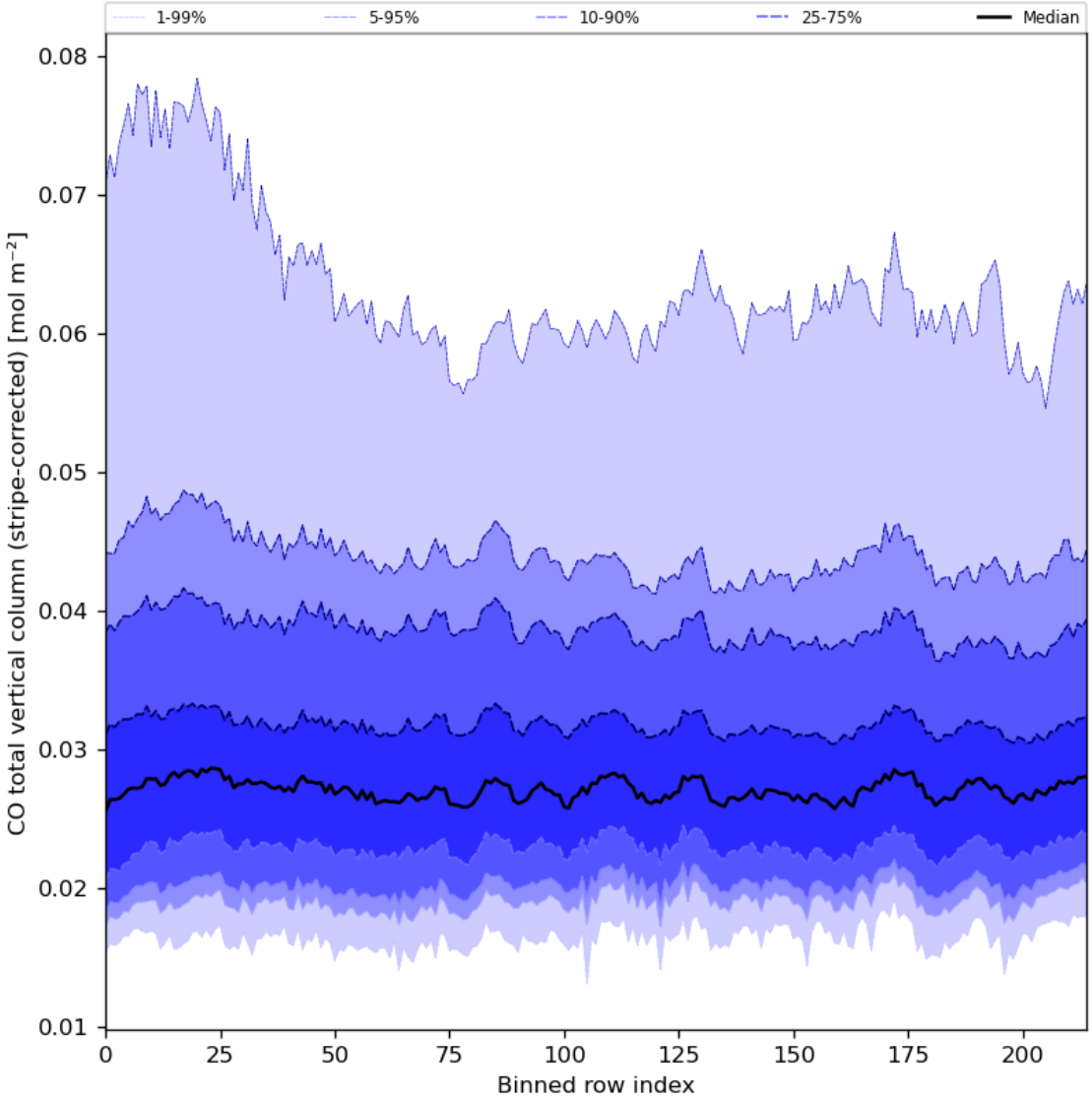

Figure 27: Along track statistics of “CO total vertical column (stripe-corrected)” for 2024-07-17 to 2024-07-19

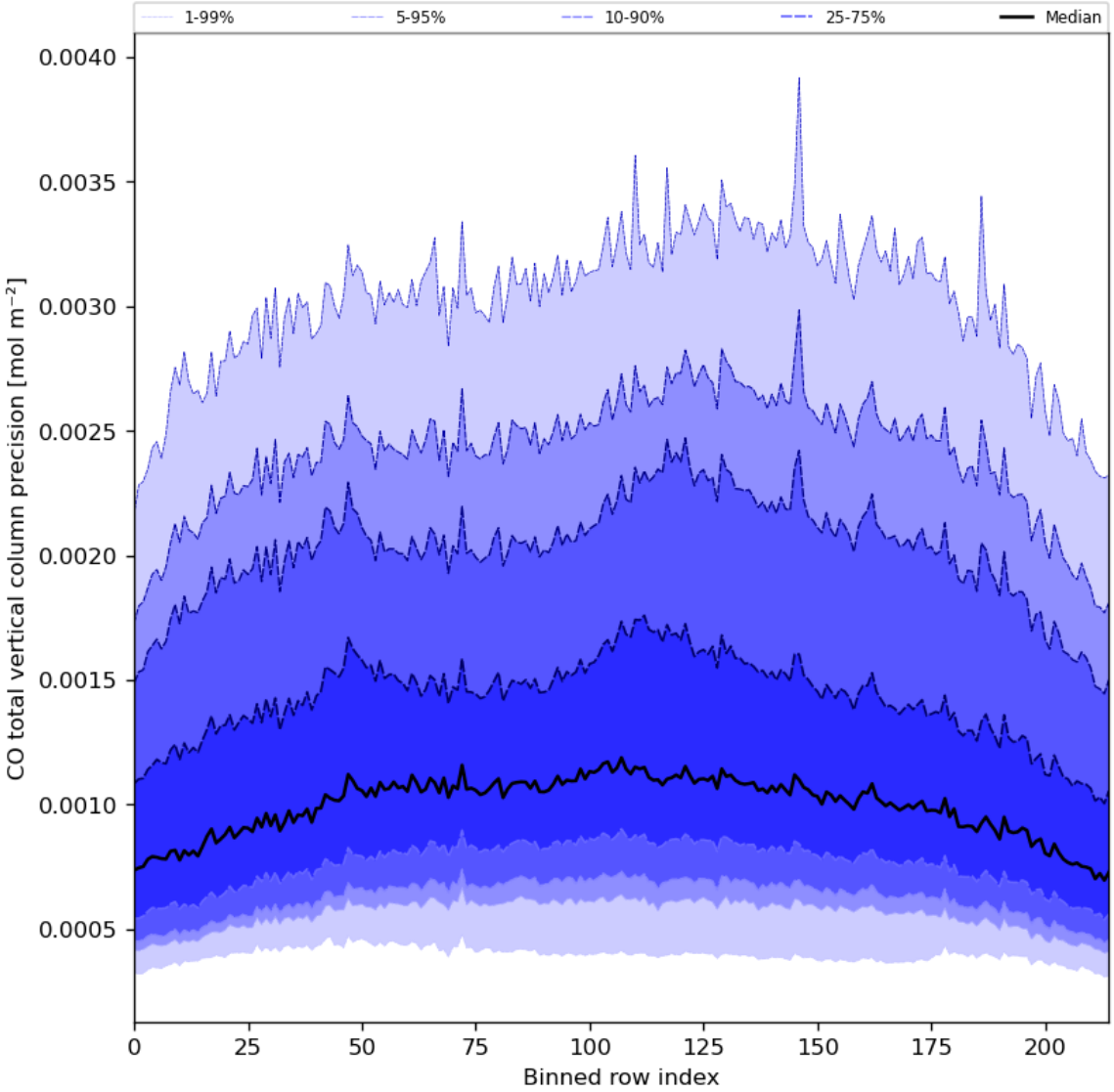

Figure 28: Along track statistics of “CO total vertical column precision” for 2024-07-17 to 2024-07-19

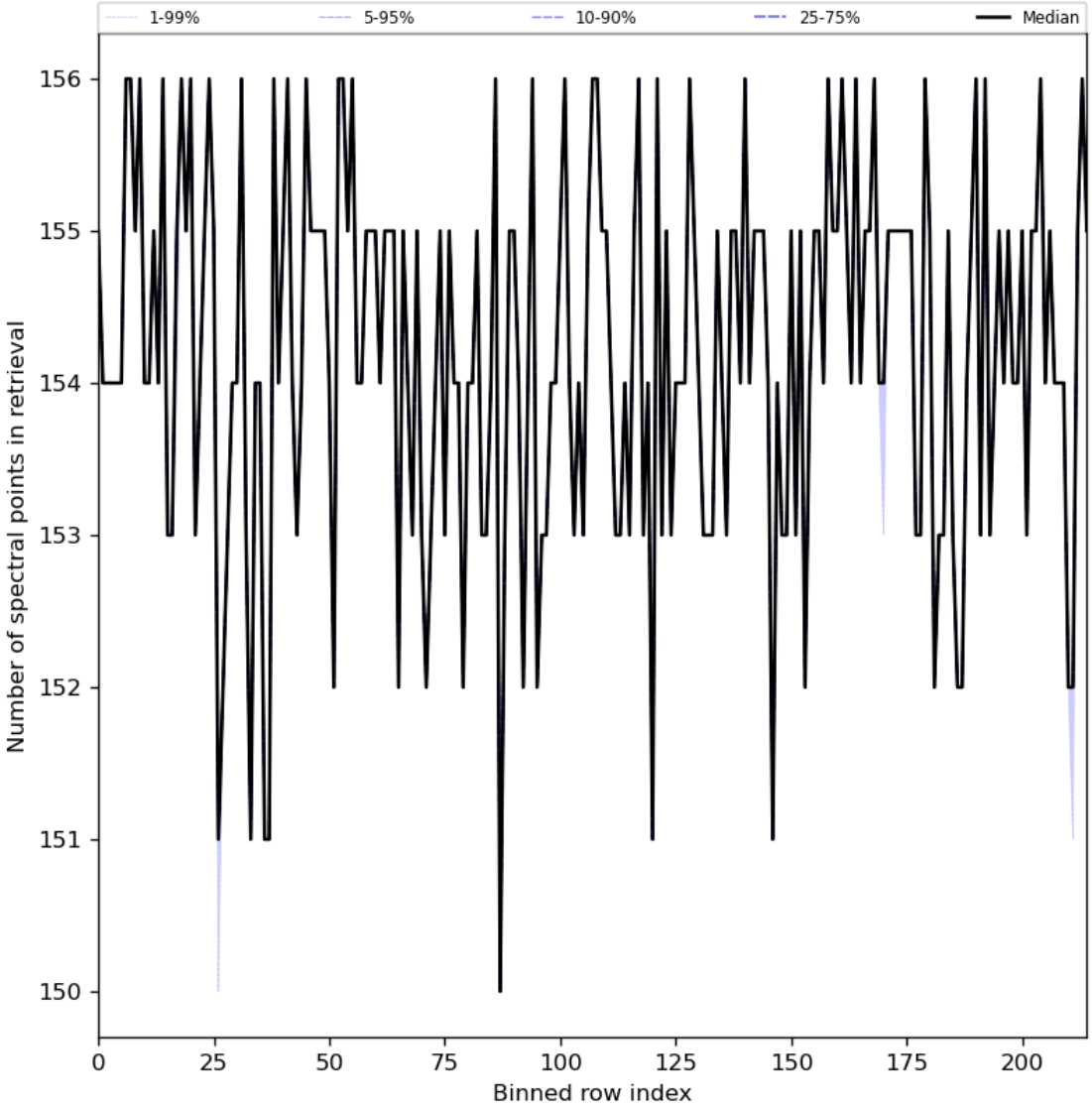

Figure 29: Along track statistics of “Number of spectral points in retrieval” for 2024-07-17 to 2024-07-19

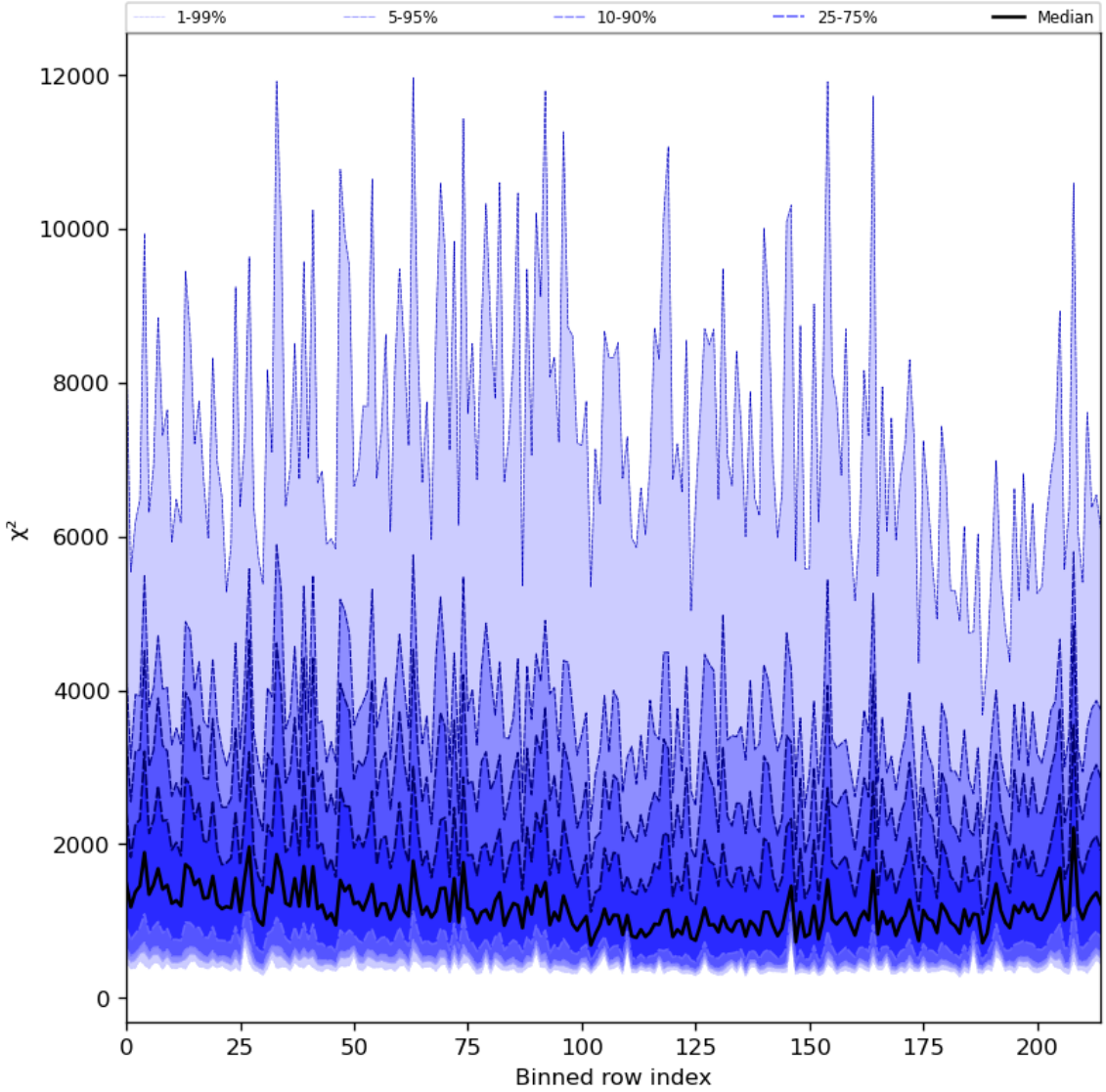

Figure 30: Along track statistics of "χ^2" for 2024-07-17 to 2024-07-19

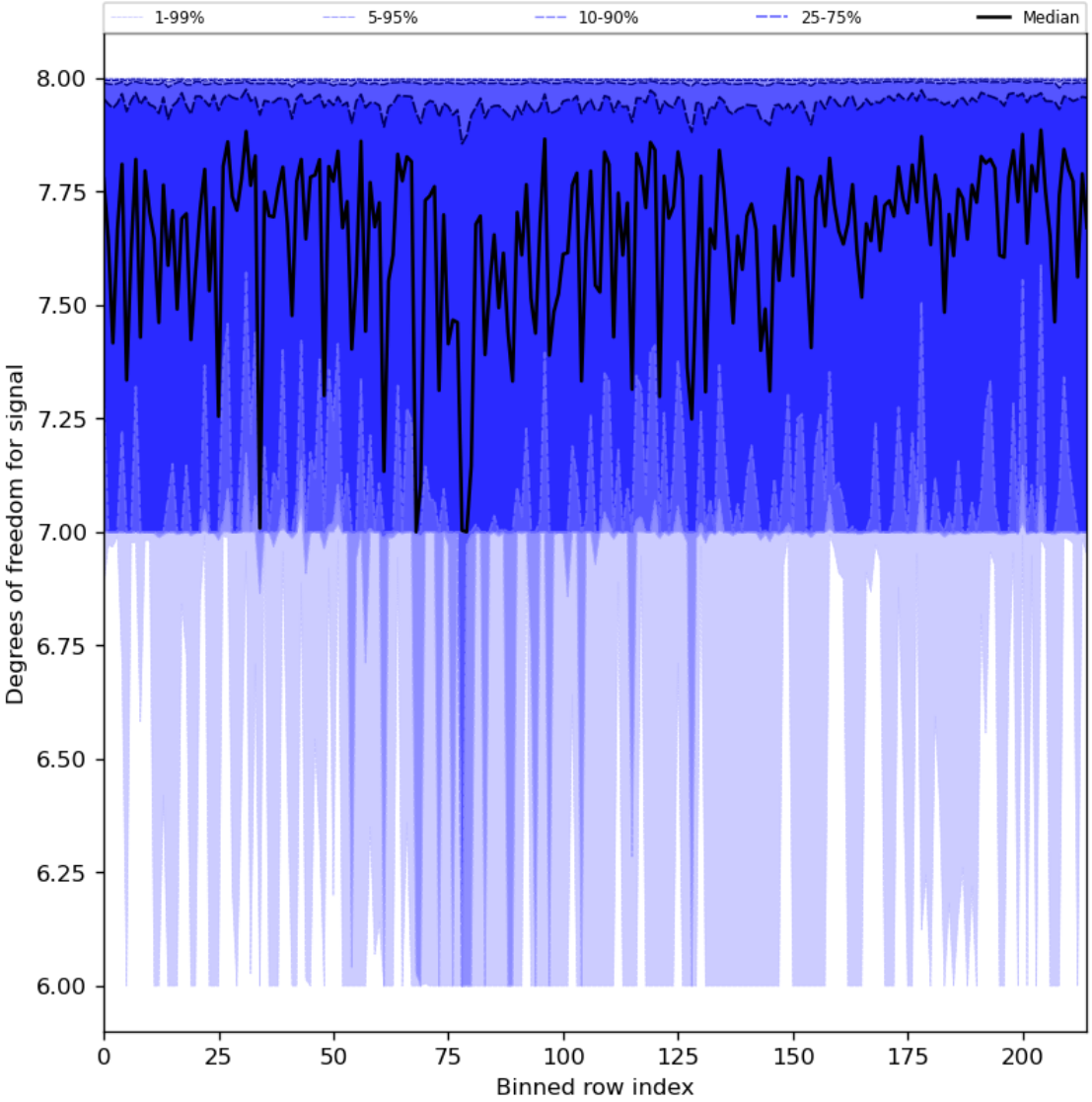

Figure 31: Along track statistics of “Degrees of freedom for signal” for 2024-07-17 to 2024-07-19

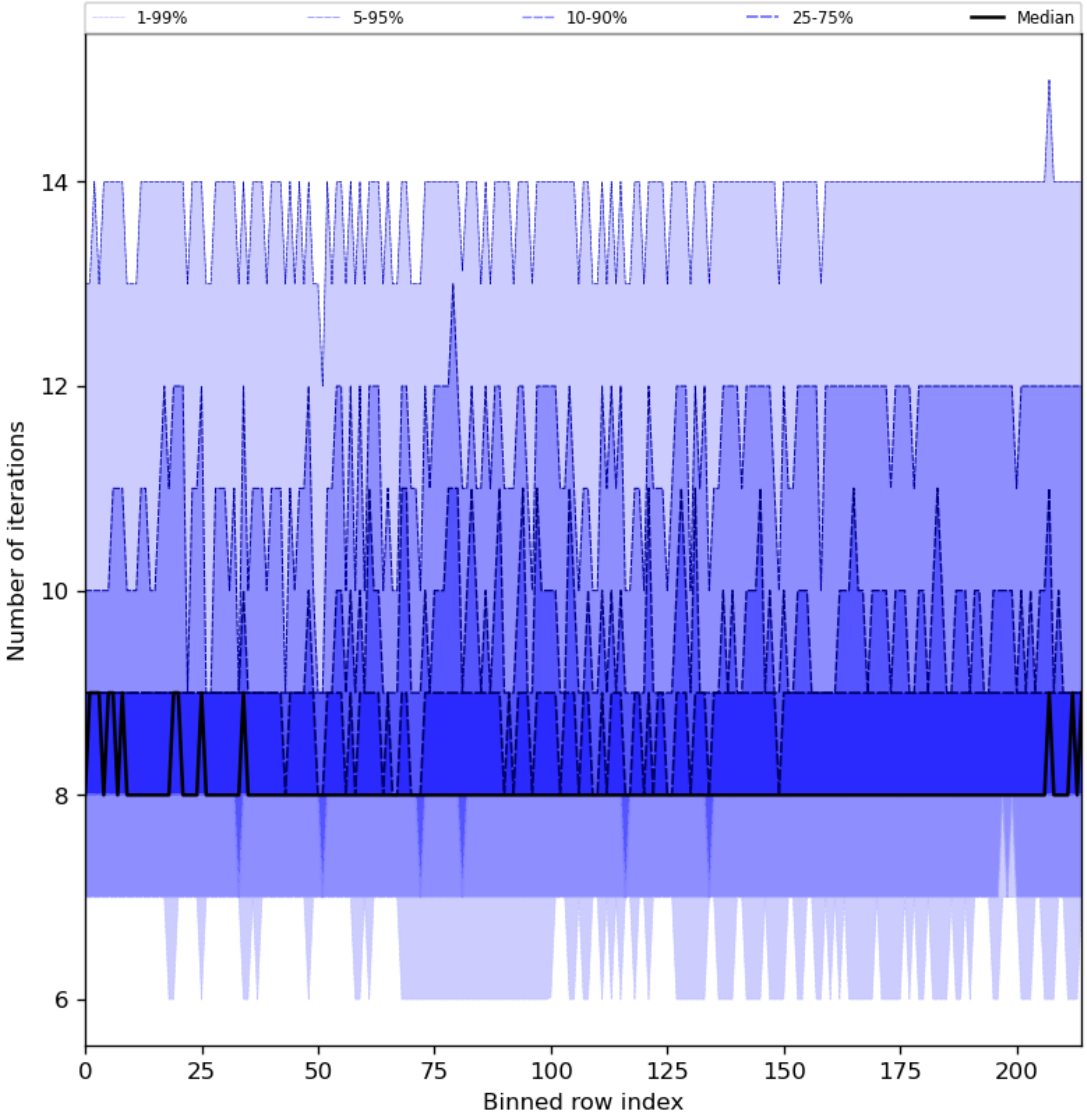

Figure 32: Along track statistics of “Number of iterations” for 2024-07-17 to 2024-07-19

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.

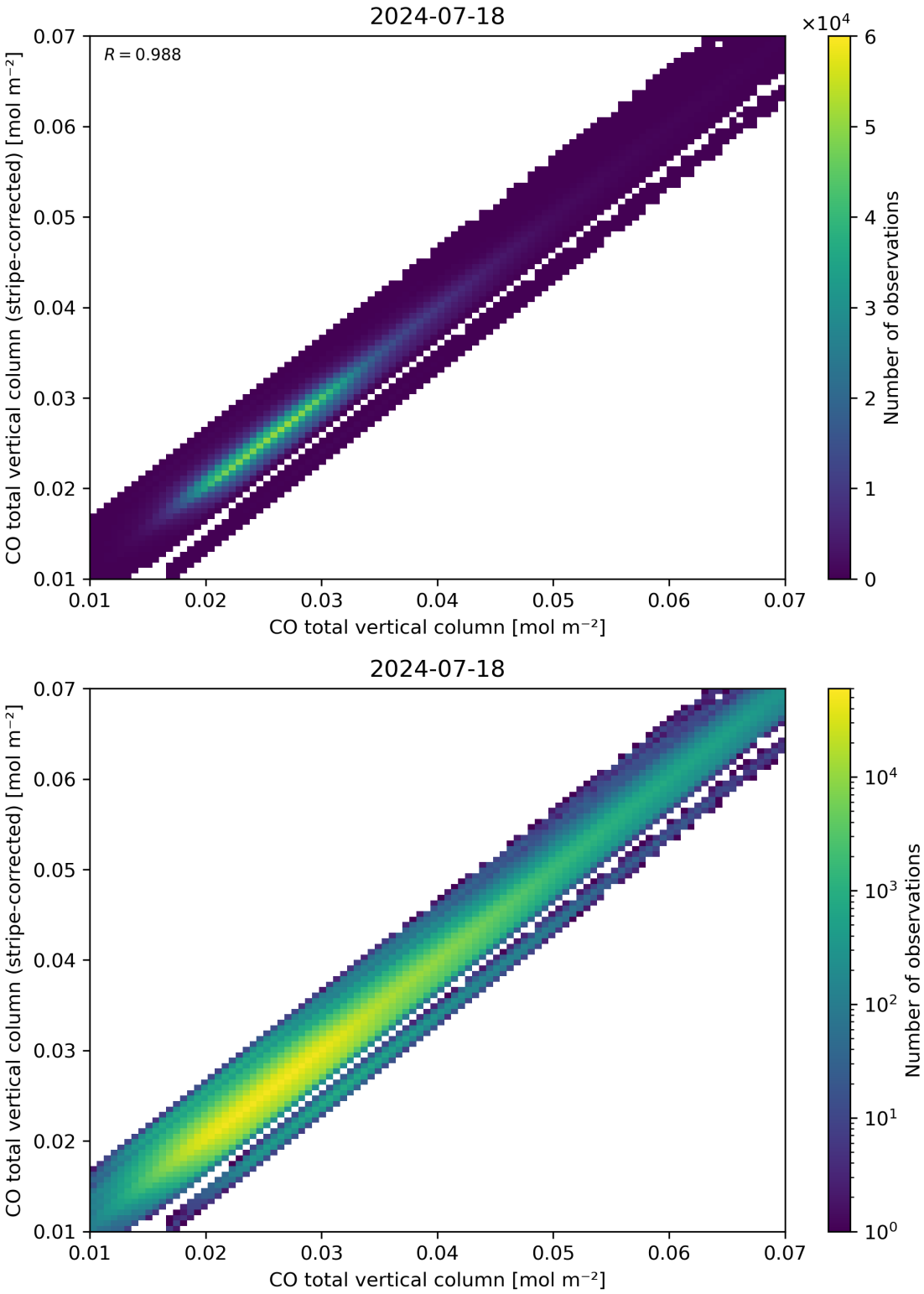

Figure 33: Scatter density plot of "CO total vertical column" against "CO total vertical column (stripe-corrected)" for 2024-07-17 to 2024-07-19.

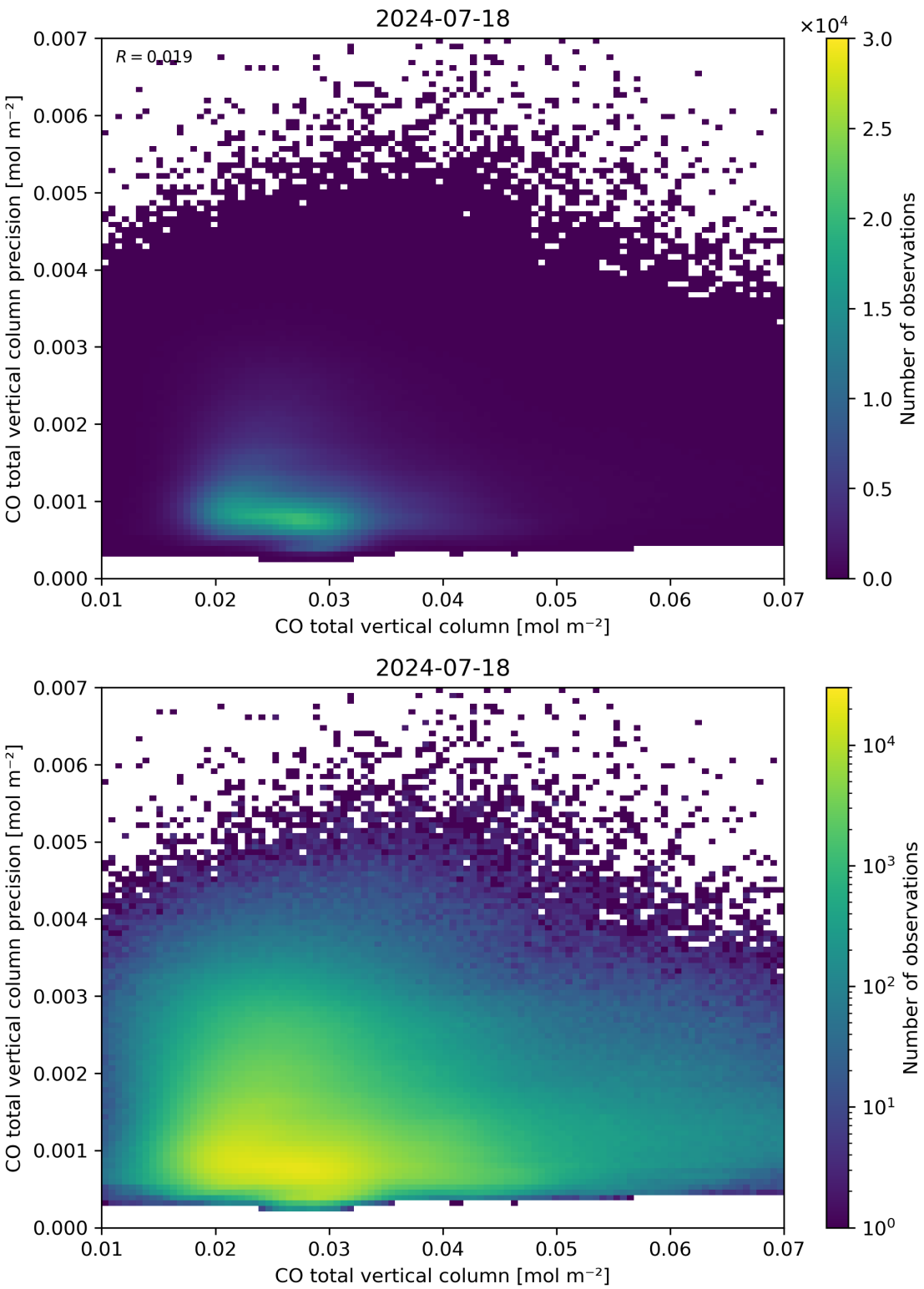

Figure 34: Scatter density plot of “CO total vertical column” against “CO total vertical column precision” for 2024-07-17 to 2024-07-19.

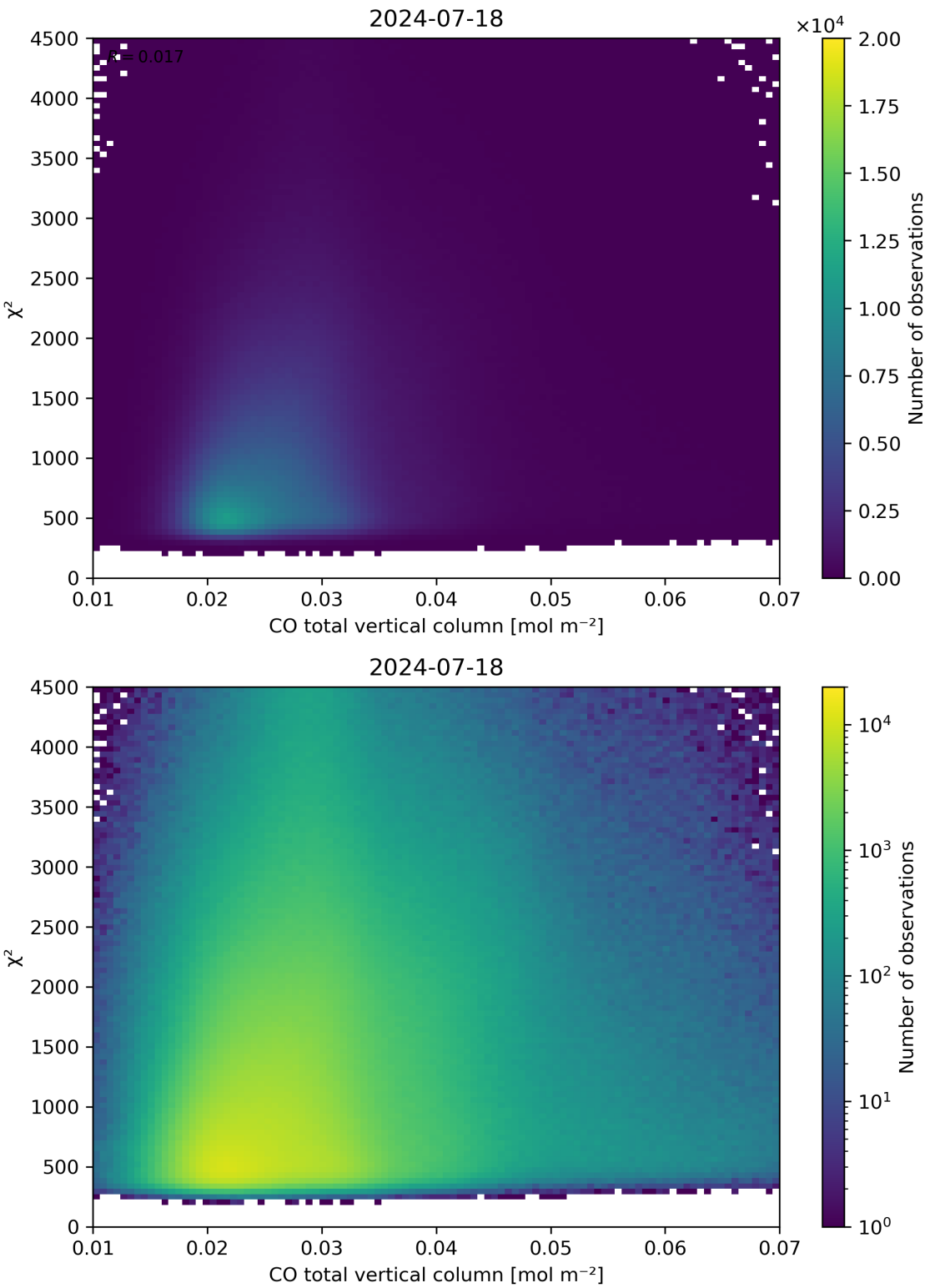

Figure 35: Scatter density plot of "CO total vertical column" against "χ^2" for 2024-07-17 to 2024-07-19.

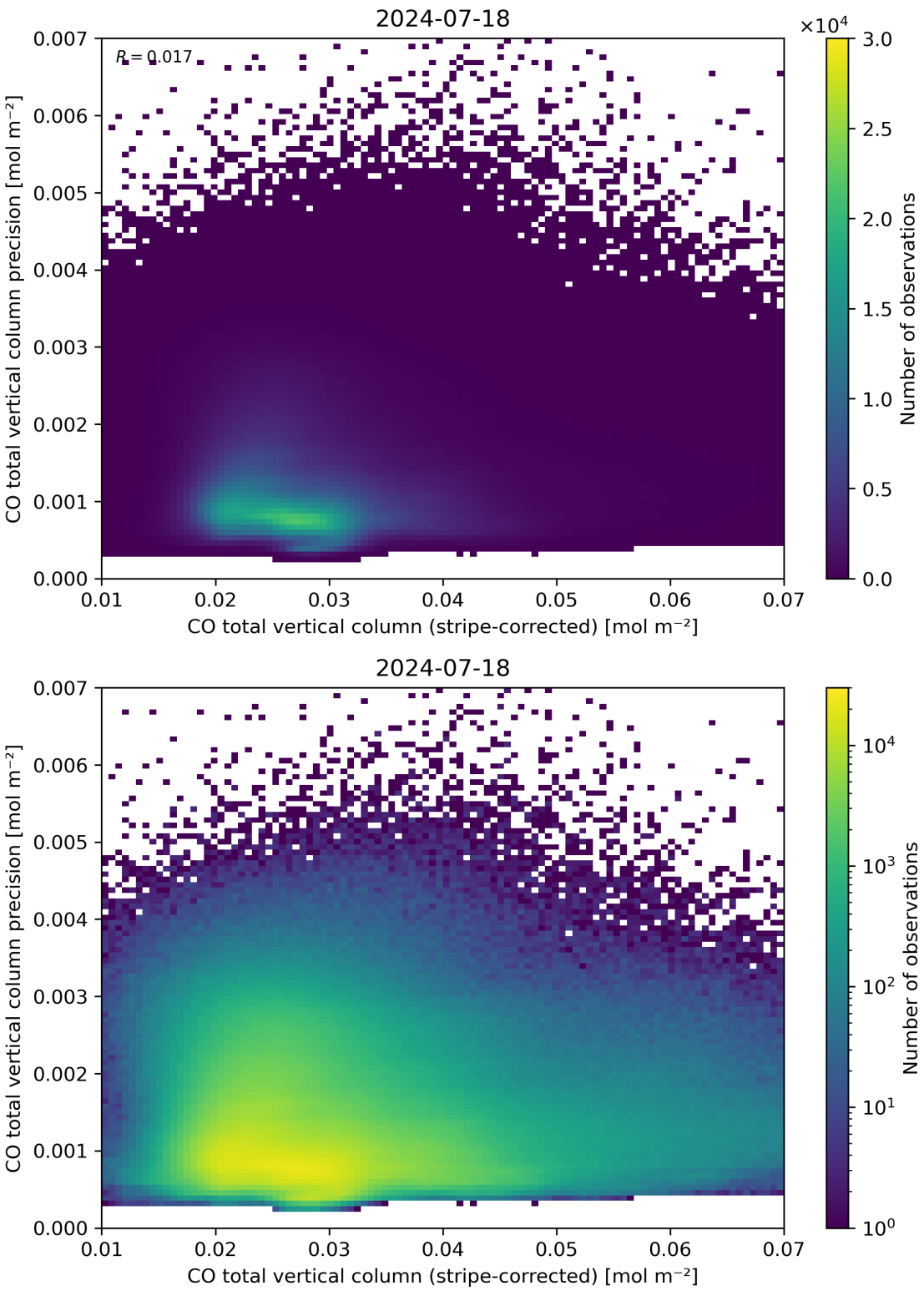

Figure 36: Scatter density plot of "CO total vertical column (stripe-corrected)" against "CO total vertical column precision" for 2024-07-17 to 2024-07-19.

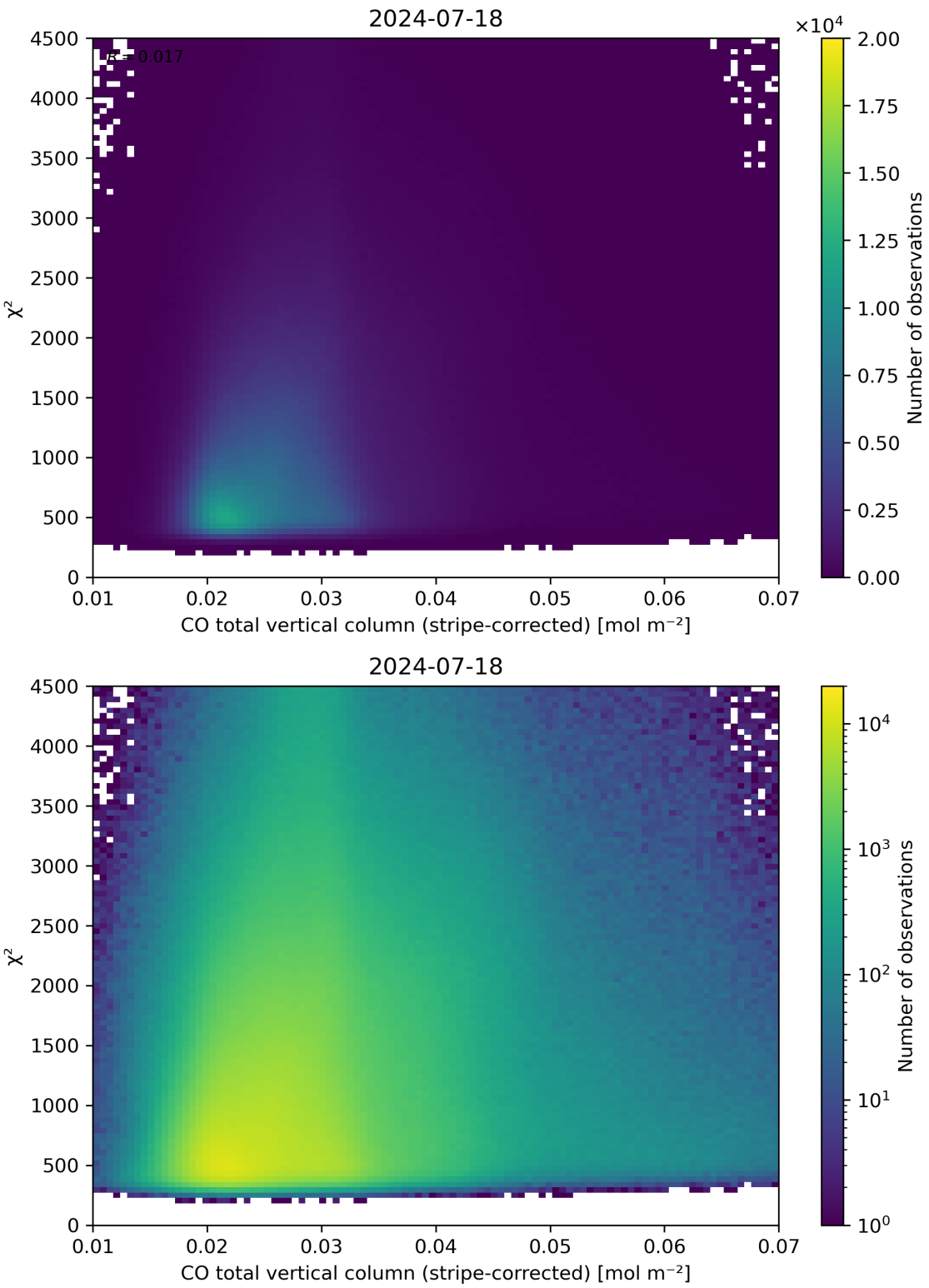

Figure 37: Scatter density plot of "CO total vertical column (stripe-corrected)" against "χ^2" for 2024-07-17 to 2024-07-19.

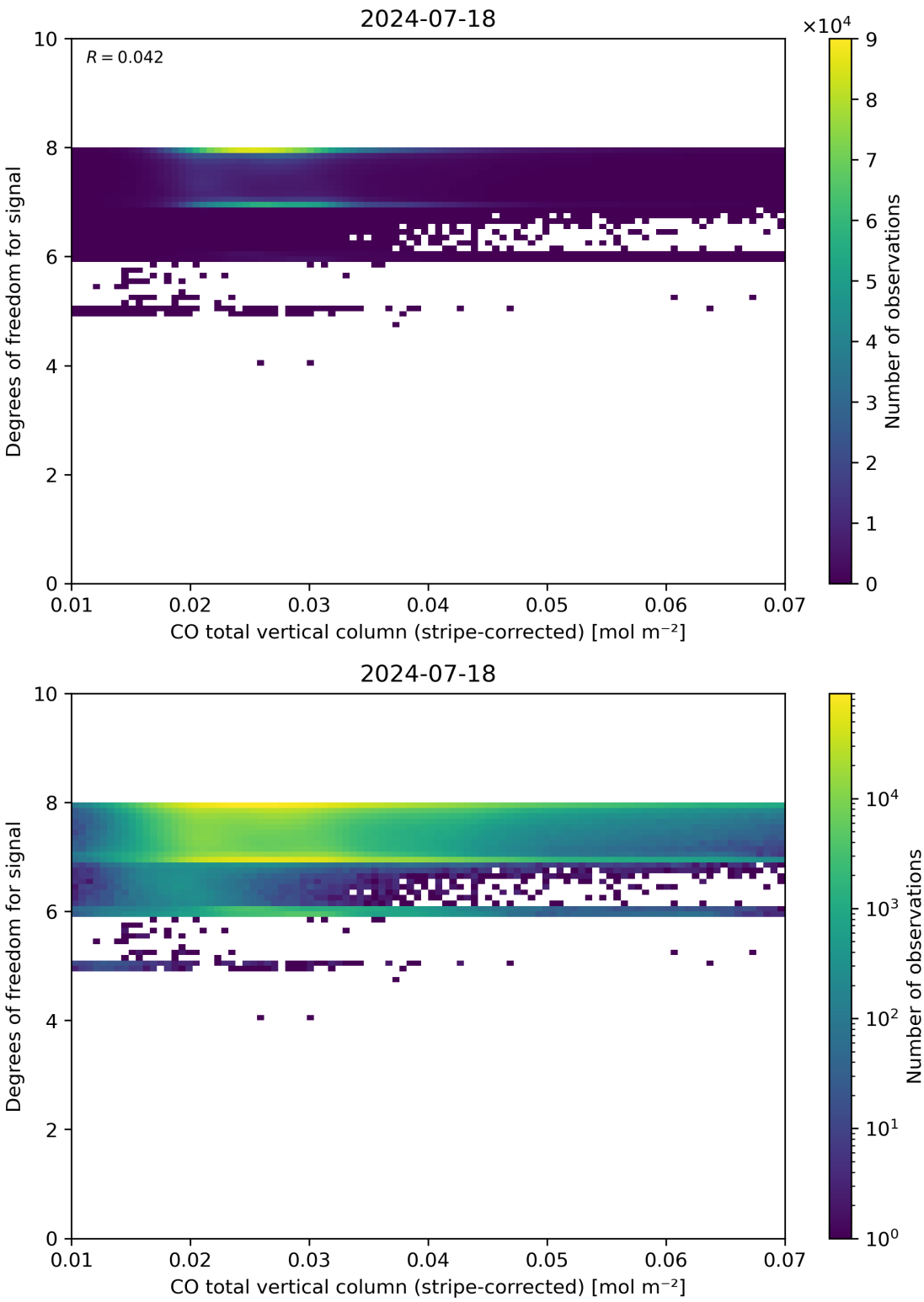

Figure 38: Scatter density plot of “CO total vertical column (stripe-corrected)” against “Degrees of freedom for signal” for 2024-07-17 to 2024-07-19.

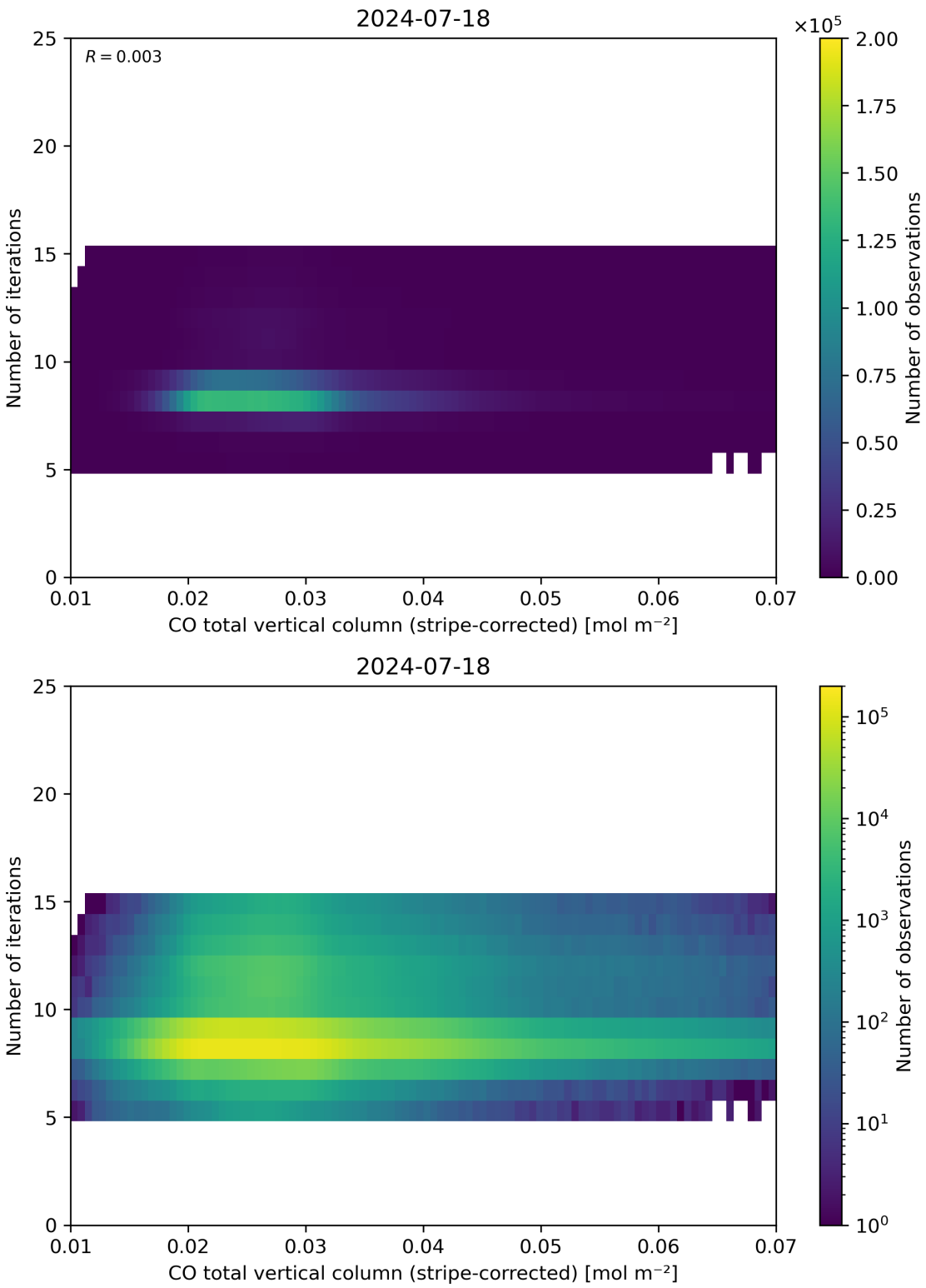

Figure 39: Scatter density plot of “CO total vertical column (stripe-corrected)” against “Number of iterations” for 2024-07-17 to 2024-07-19.

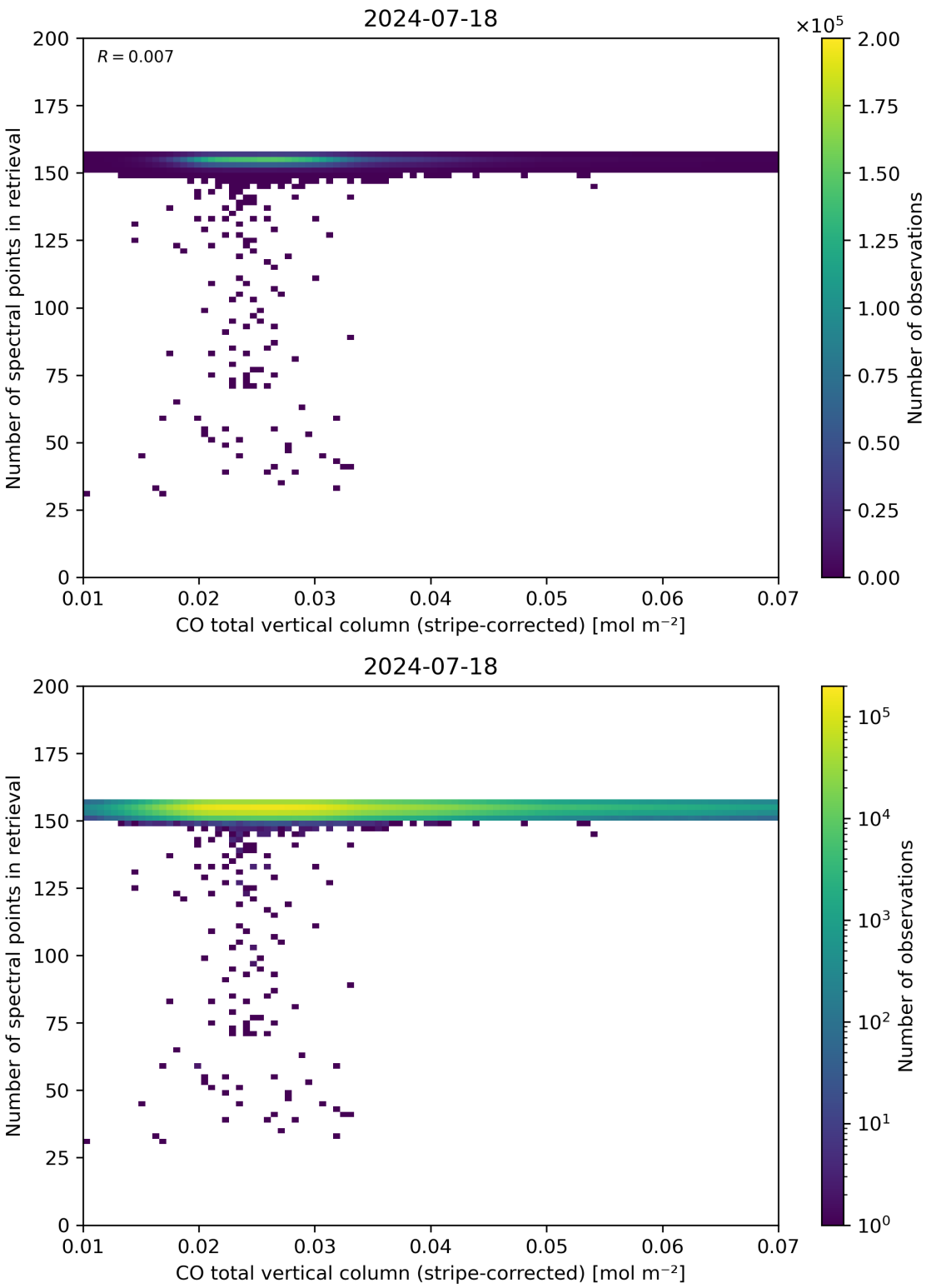

Figure 40: Scatter density plot of "CO total vertical column (stripe-corrected)" against "Number of spectral points in retrieval" for 2024-07-17 to 2024-07-19.

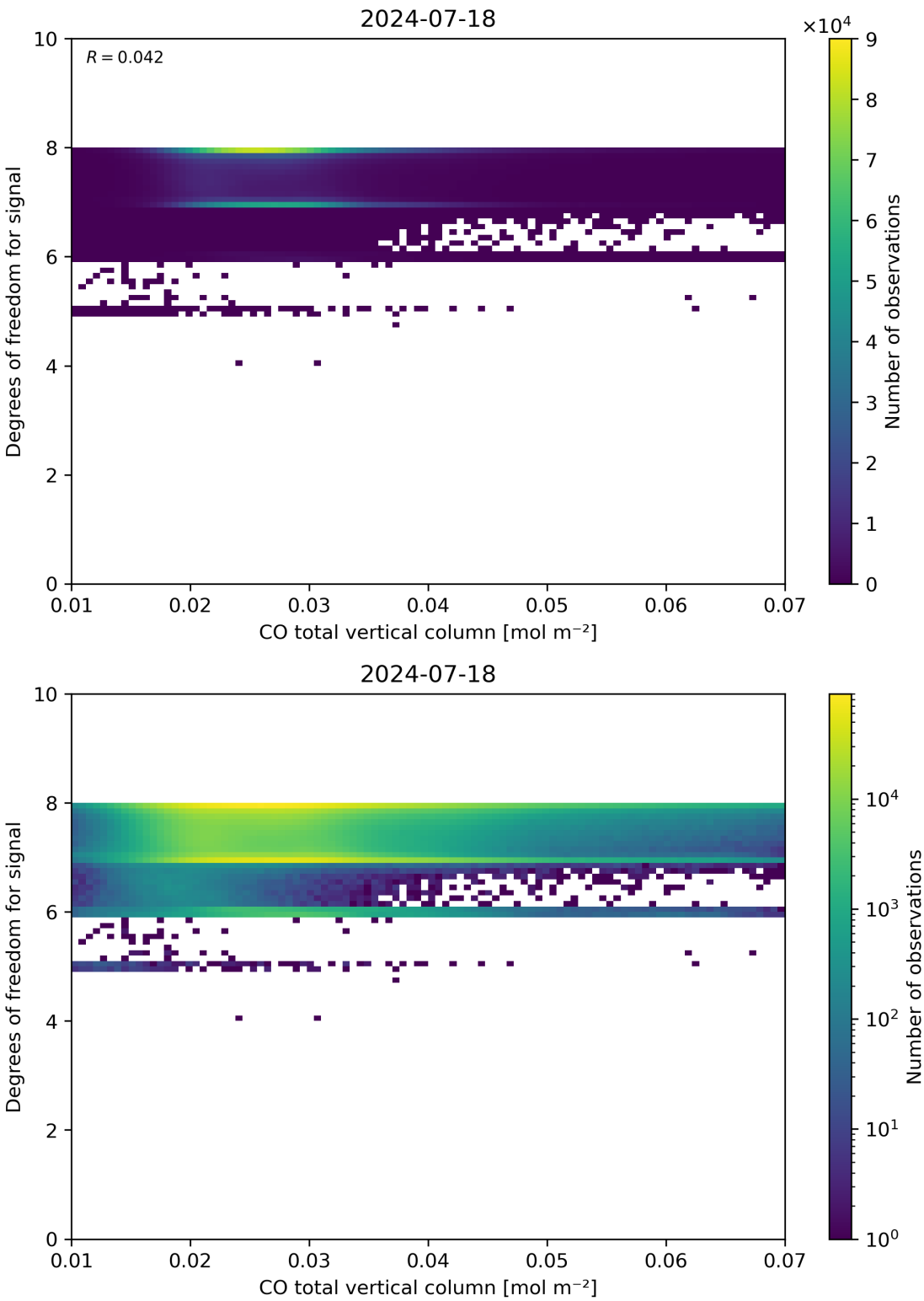

Figure 41: Scatter density plot of “CO total vertical column” against “Degrees of freedom for signal” for 2024-07-17 to 2024-07-19.

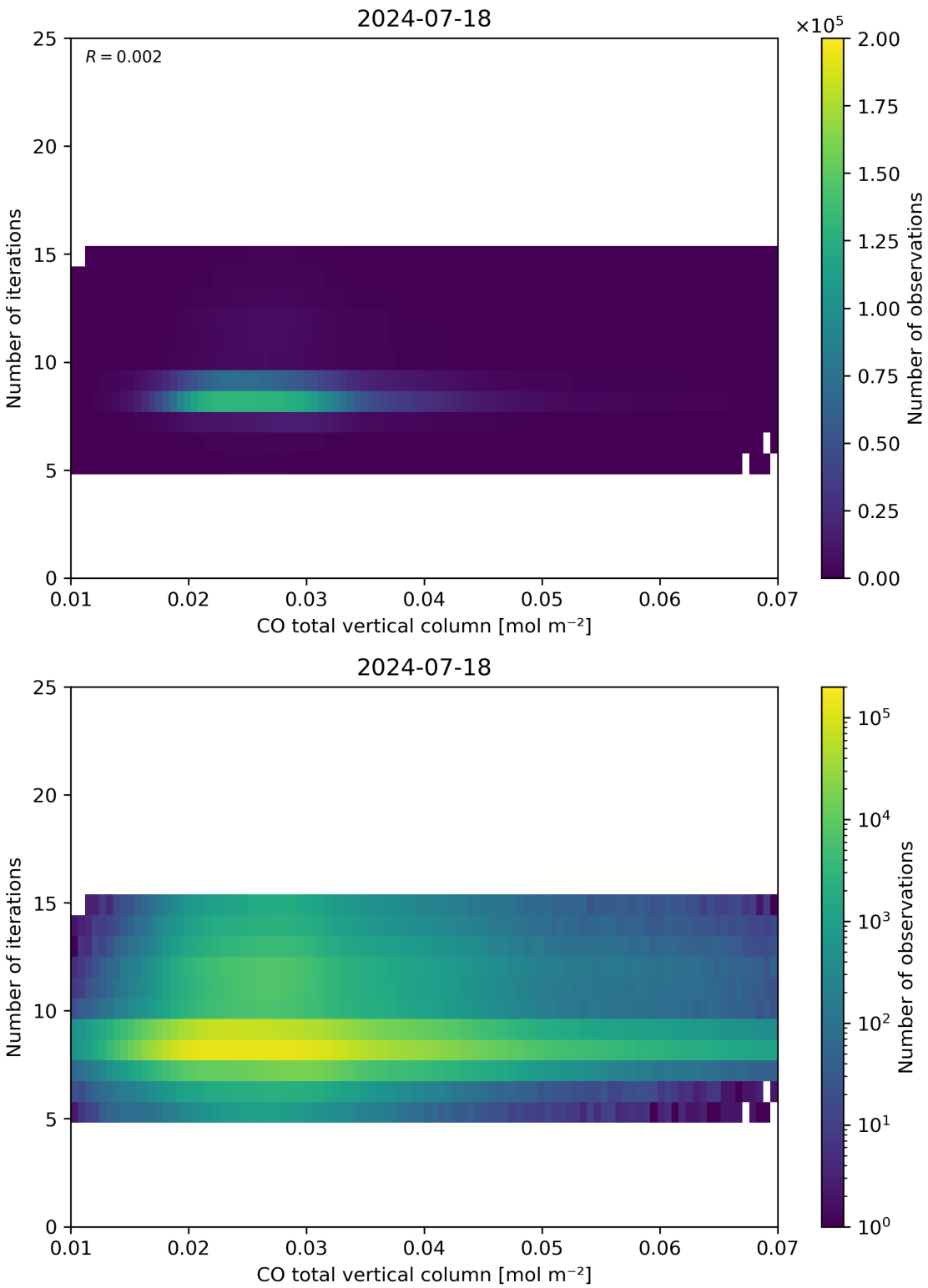

Figure 42: Scatter density plot of “CO total vertical column” against “Number of iterations” for 2024-07-17 to 2024-07-19.

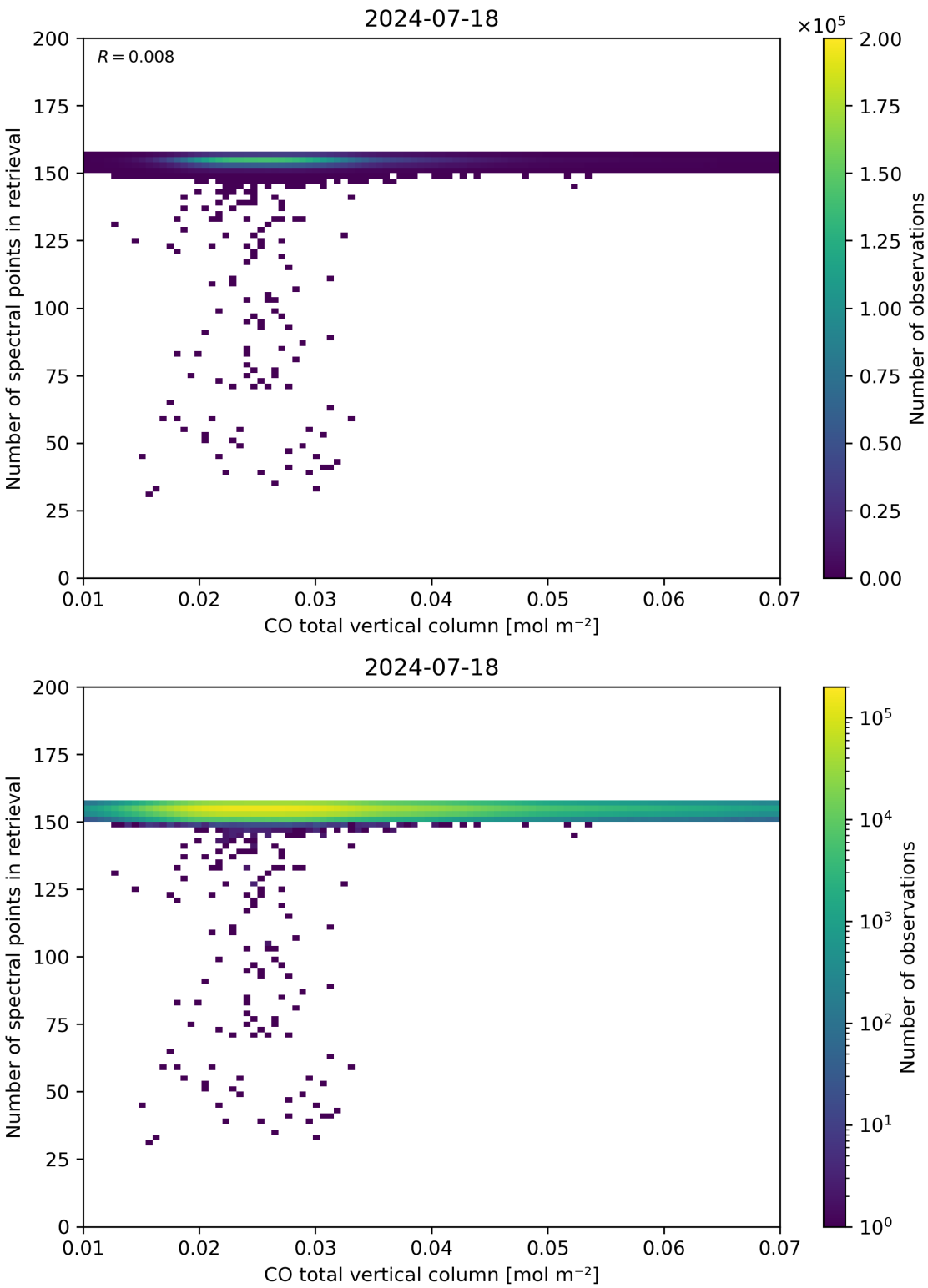

Figure 43: Scatter density plot of “CO total vertical column” against “Number of spectral points in retrieval” for 2024-07-17 to 2024-07-19.

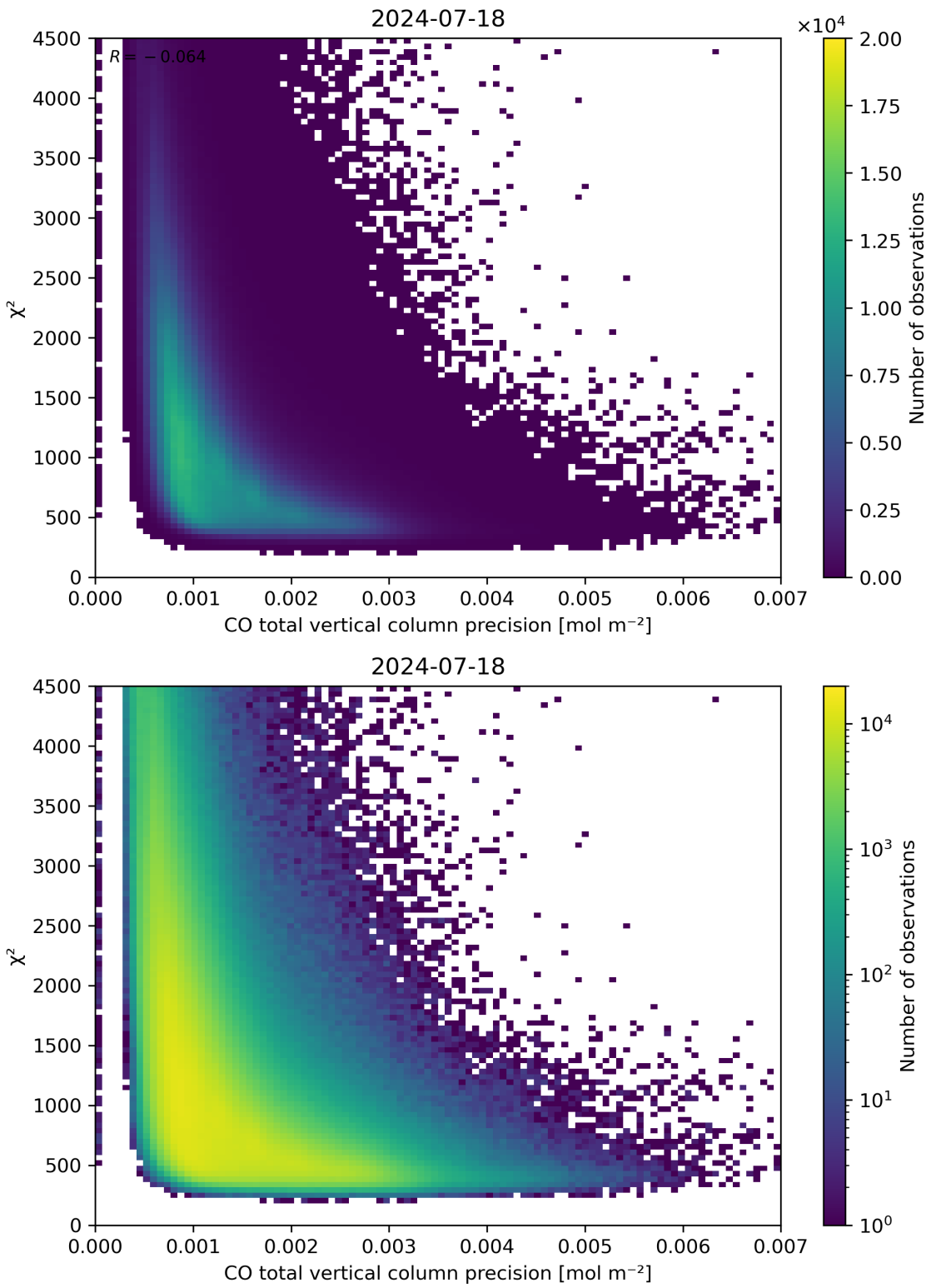

Figure 44: Scatter density plot of "CO total vertical column precision" against "χ^2" for 2024-07-17 to 2024-07-19.

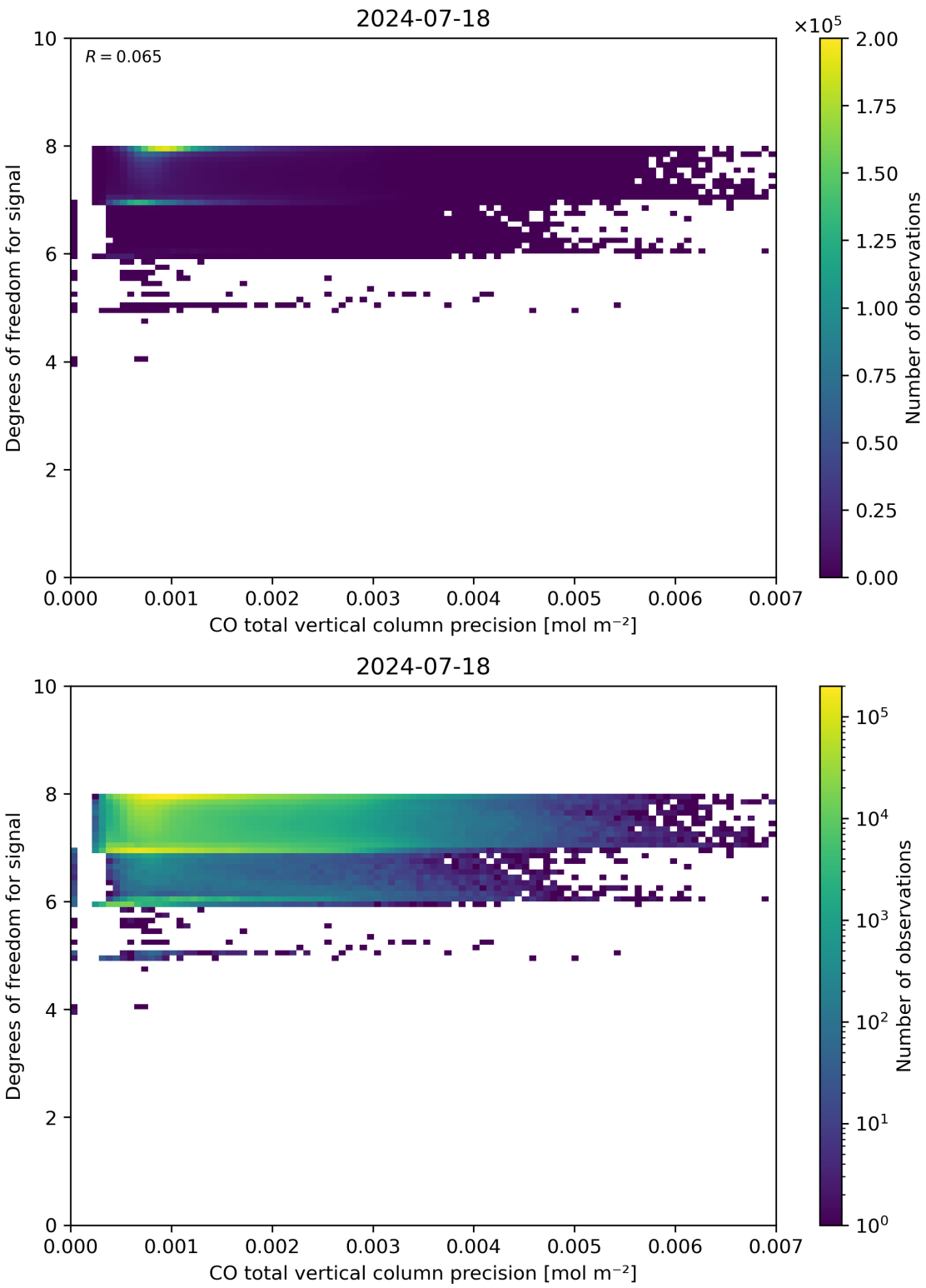

Figure 45: Scatter density plot of “CO total vertical column precision” against “Degrees of freedom for signal” for 2024-07-17 to 2024-07-19.

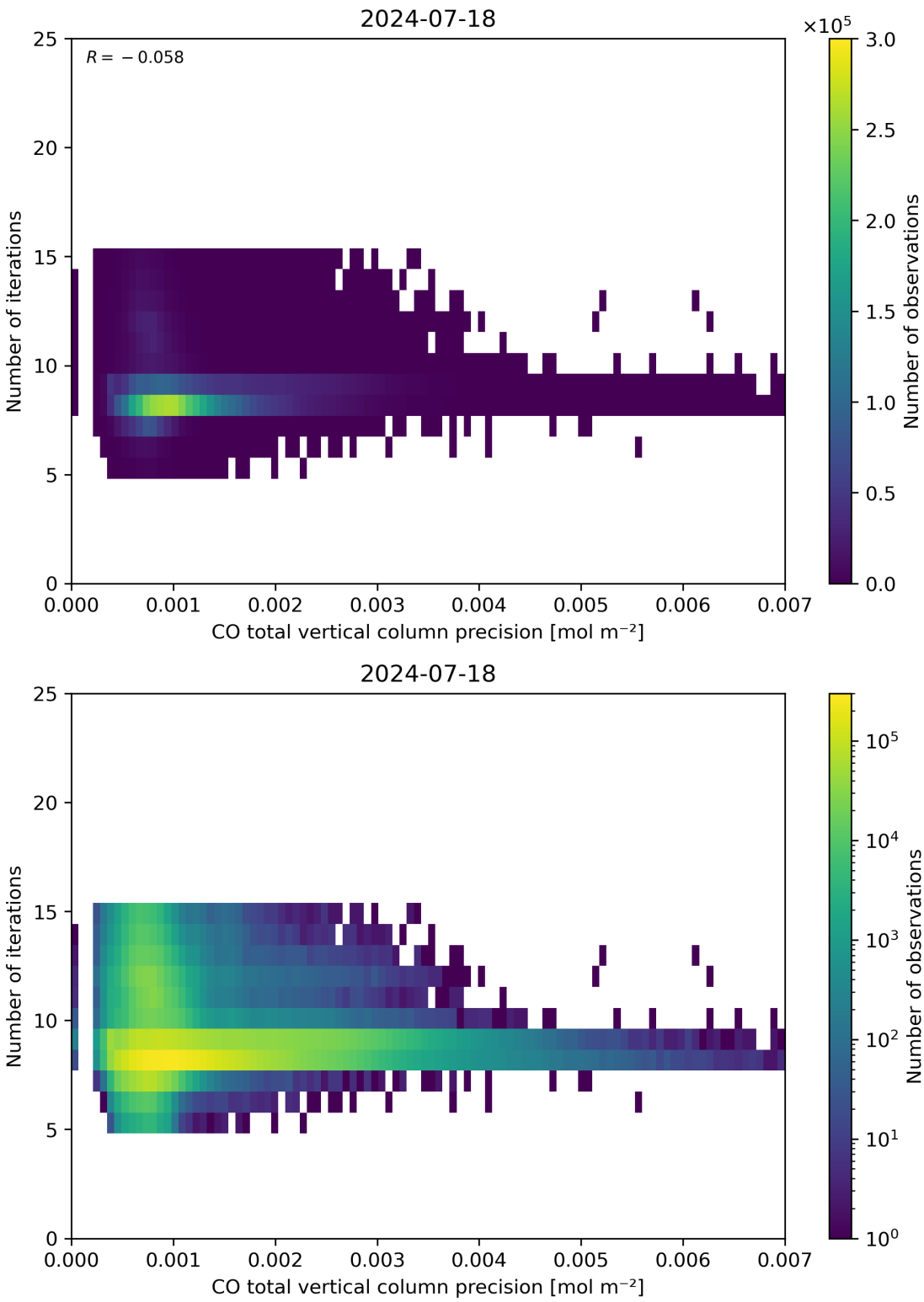

Figure 46: Scatter density plot of “CO total vertical column precision” against “Number of iterations” for 2024-07-17 to 2024-07-19.

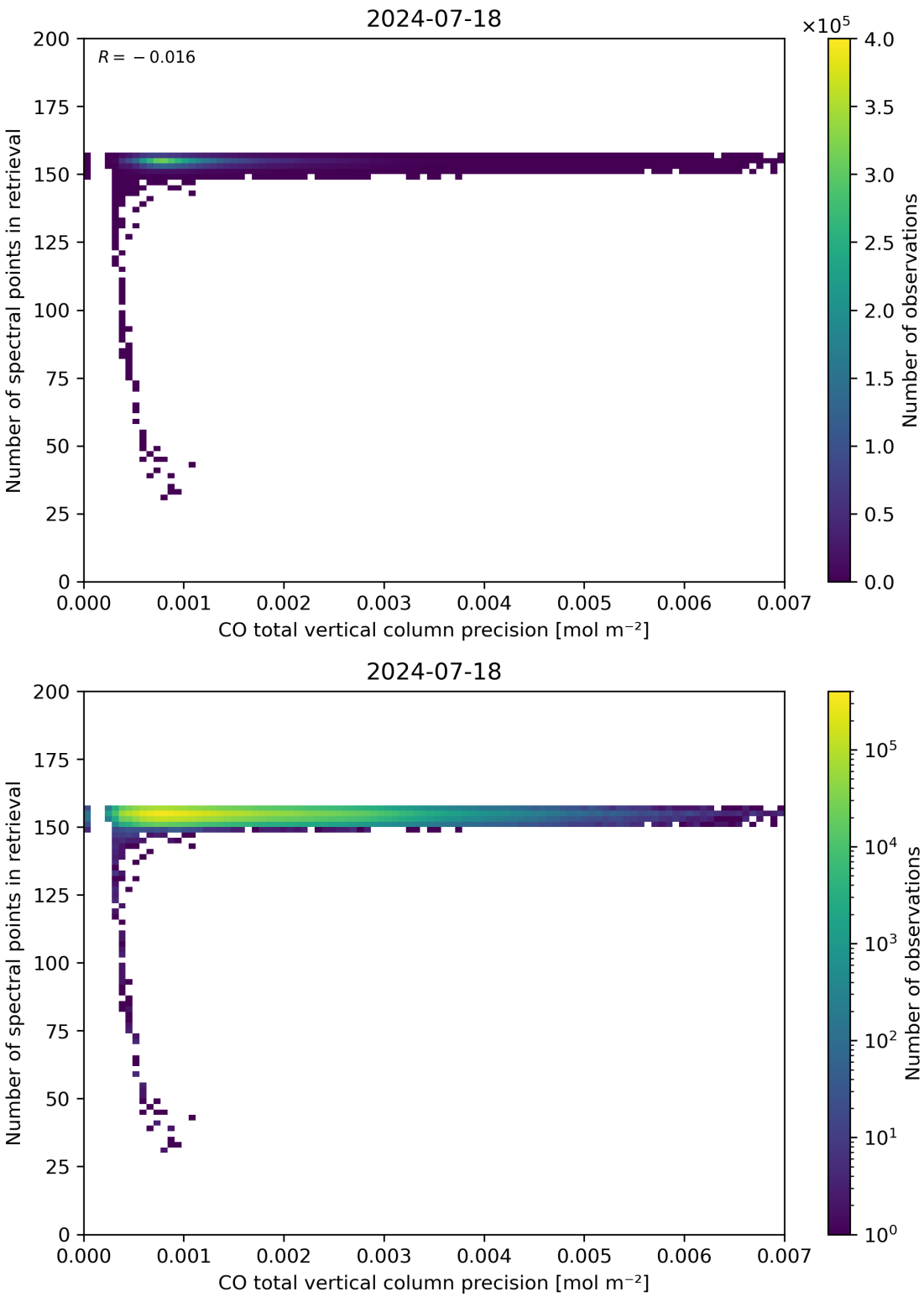

Figure 47: Scatter density plot of “CO total vertical column precision” against “Number of spectral points in retrieval” for 2024-07-17 to 2024-07-19.

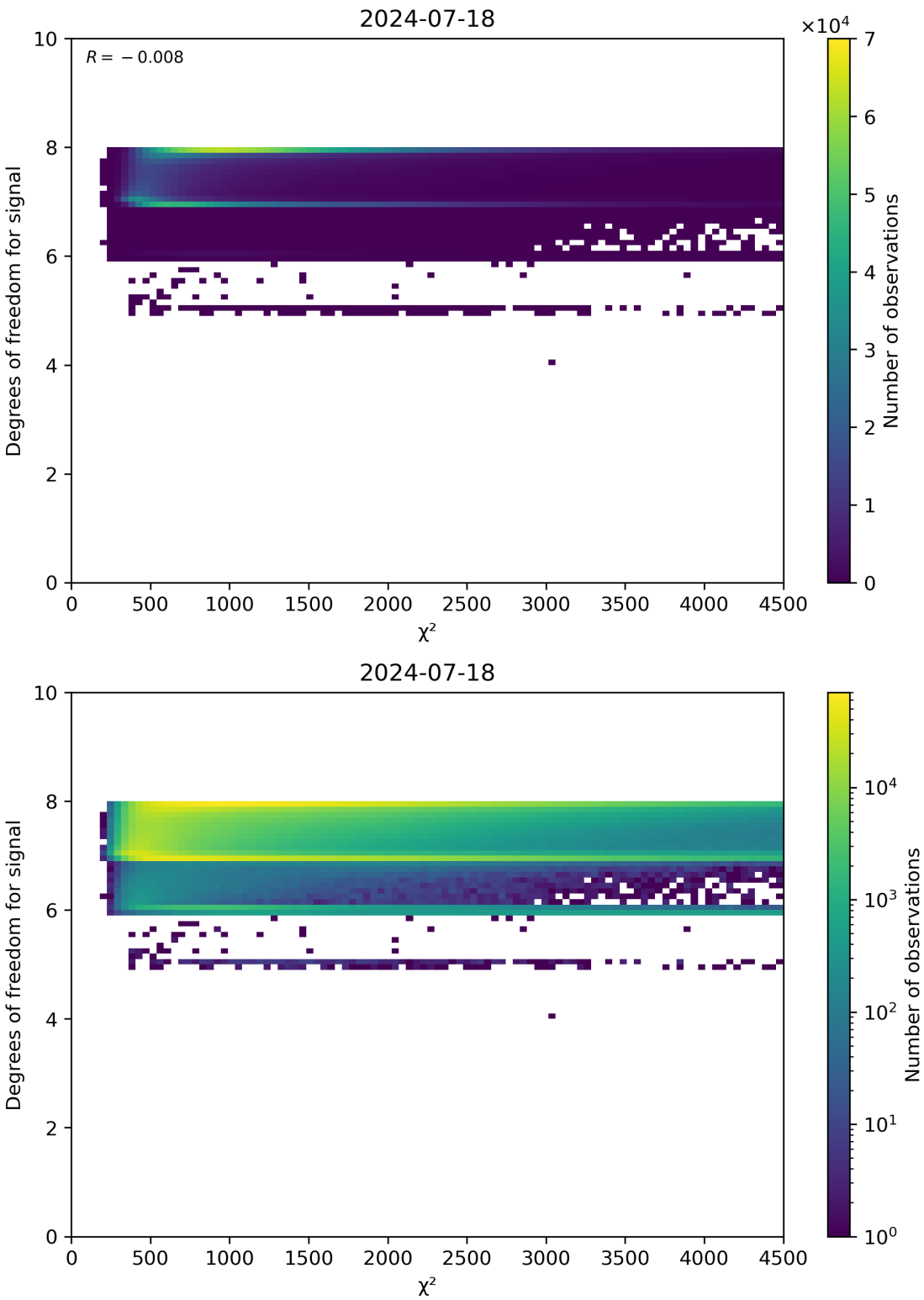

Figure 48: Scatter density plot of "χ^2" against "Degrees of freedom for signal" for 2024-07-17 to 2024-07-19.

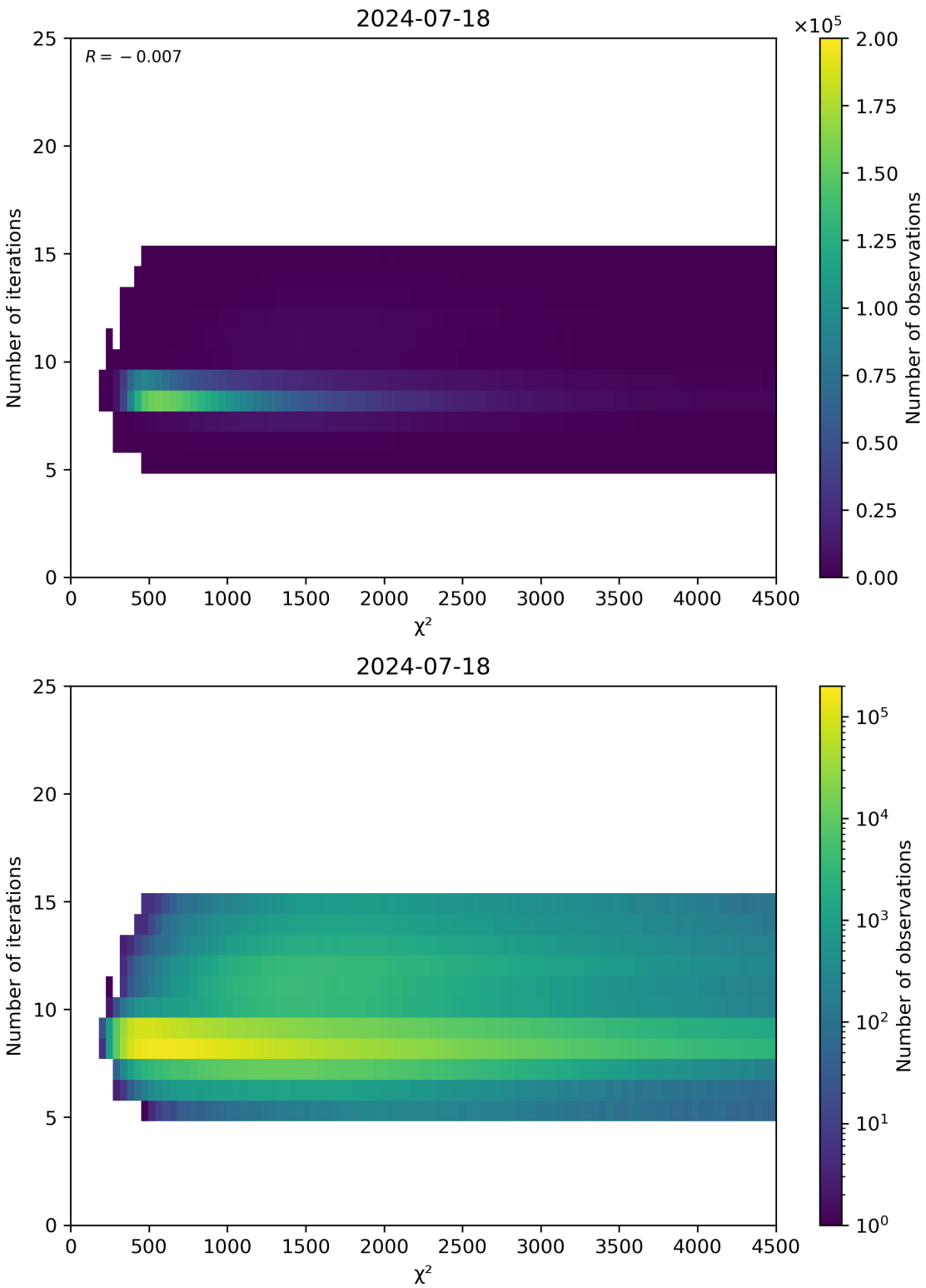

Figure 49: Scatter density plot of "χ^2" against "Number of iterations" for 2024-07-17 to 2024-07-19.

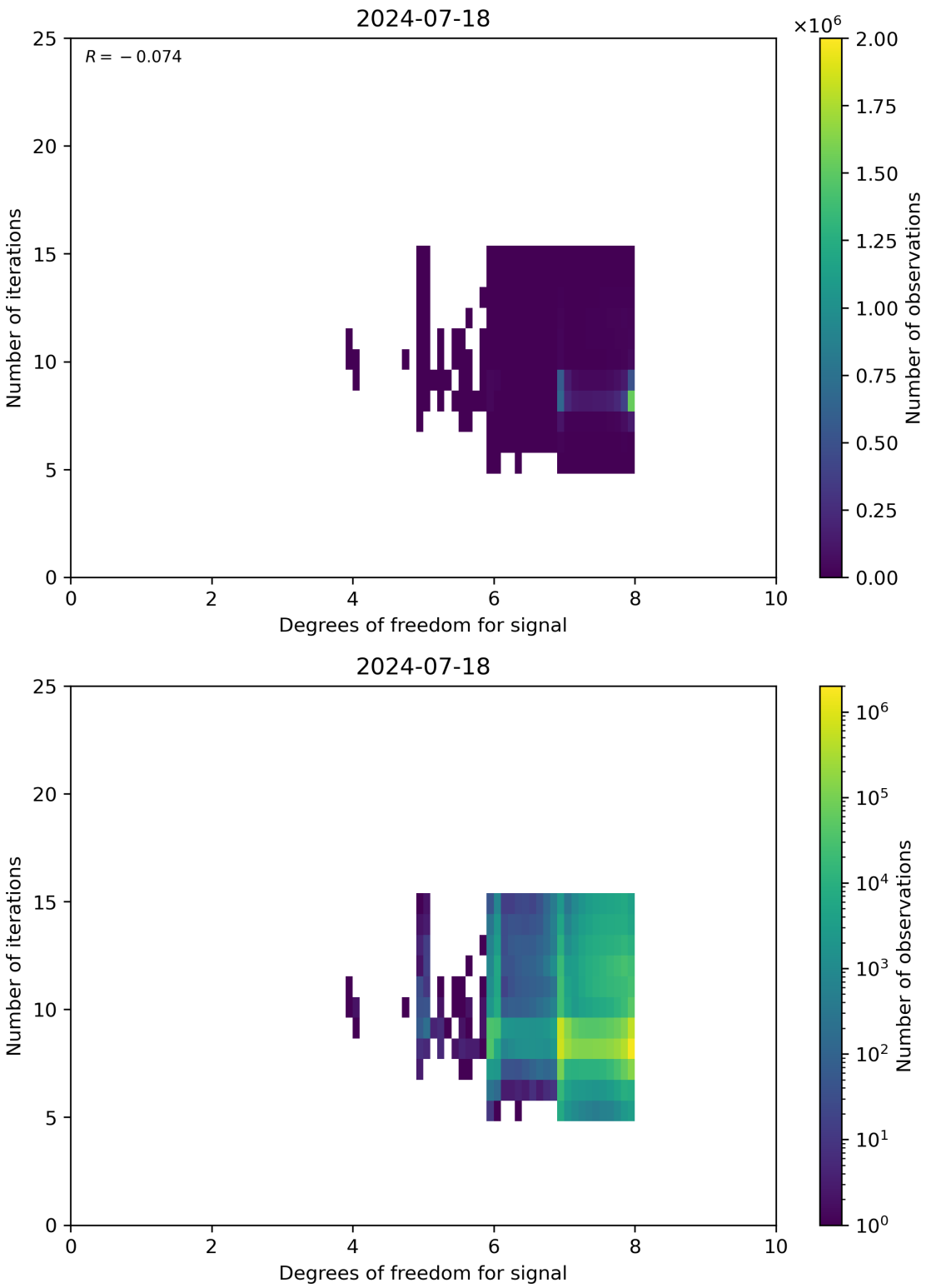

Figure 50: Scatter density plot of "Degrees of freedom for signal" against "Number of iterations" for 2024-07-17 to 2024-07-19.

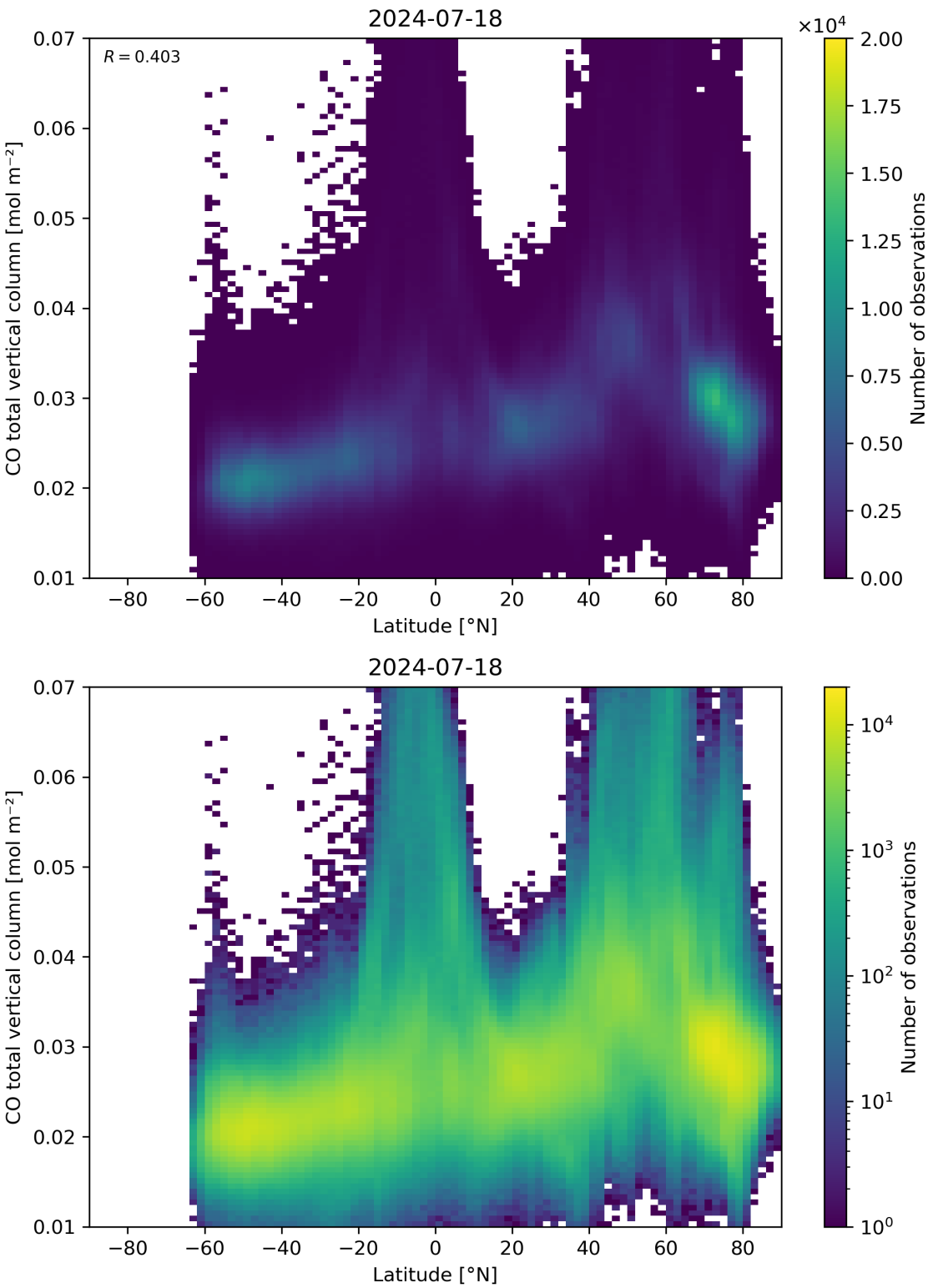

Figure 51: Scatter density plot of “Latitude” against “CO total vertical column” for 2024-07-17 to 2024-07-19.

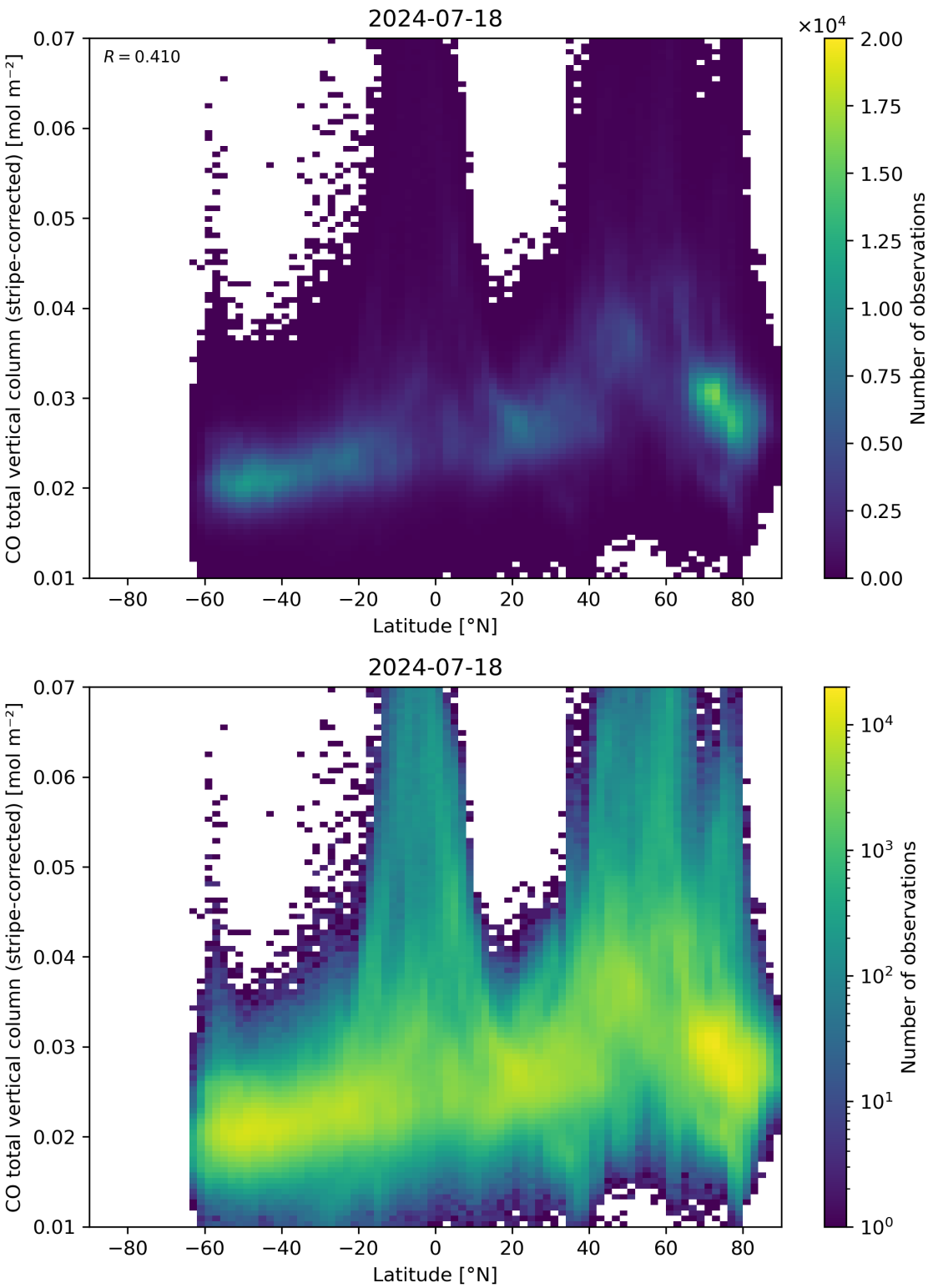

Figure 52: Scatter density plot of “Latitude” against “CO total vertical column (stripe-corrected)” for 2024-07-17 to 2024-07-19.

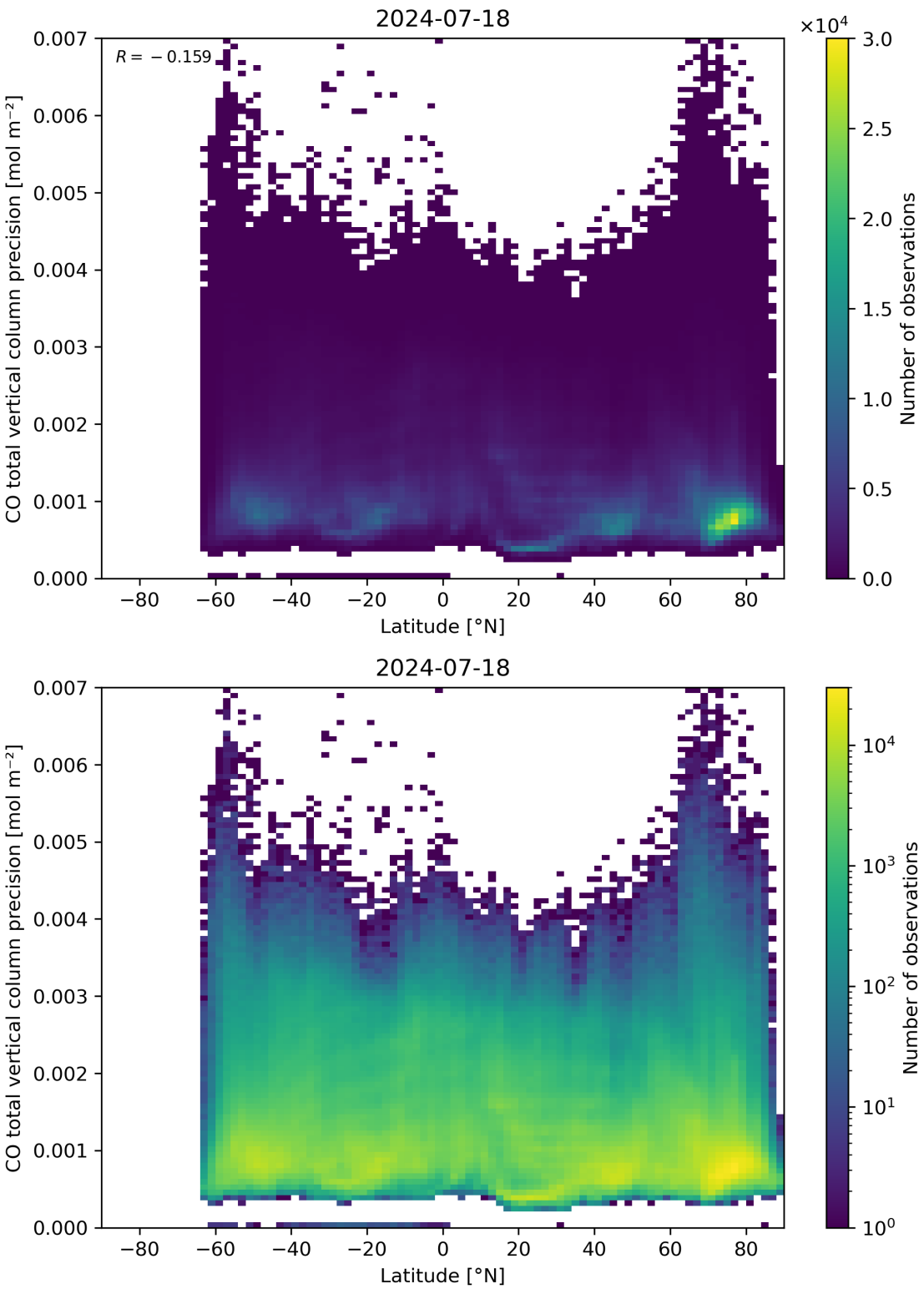

Figure 53: Scatter density plot of “Latitude” against “CO total vertical column precision” for 2024-07-17 to 2024-07-19.

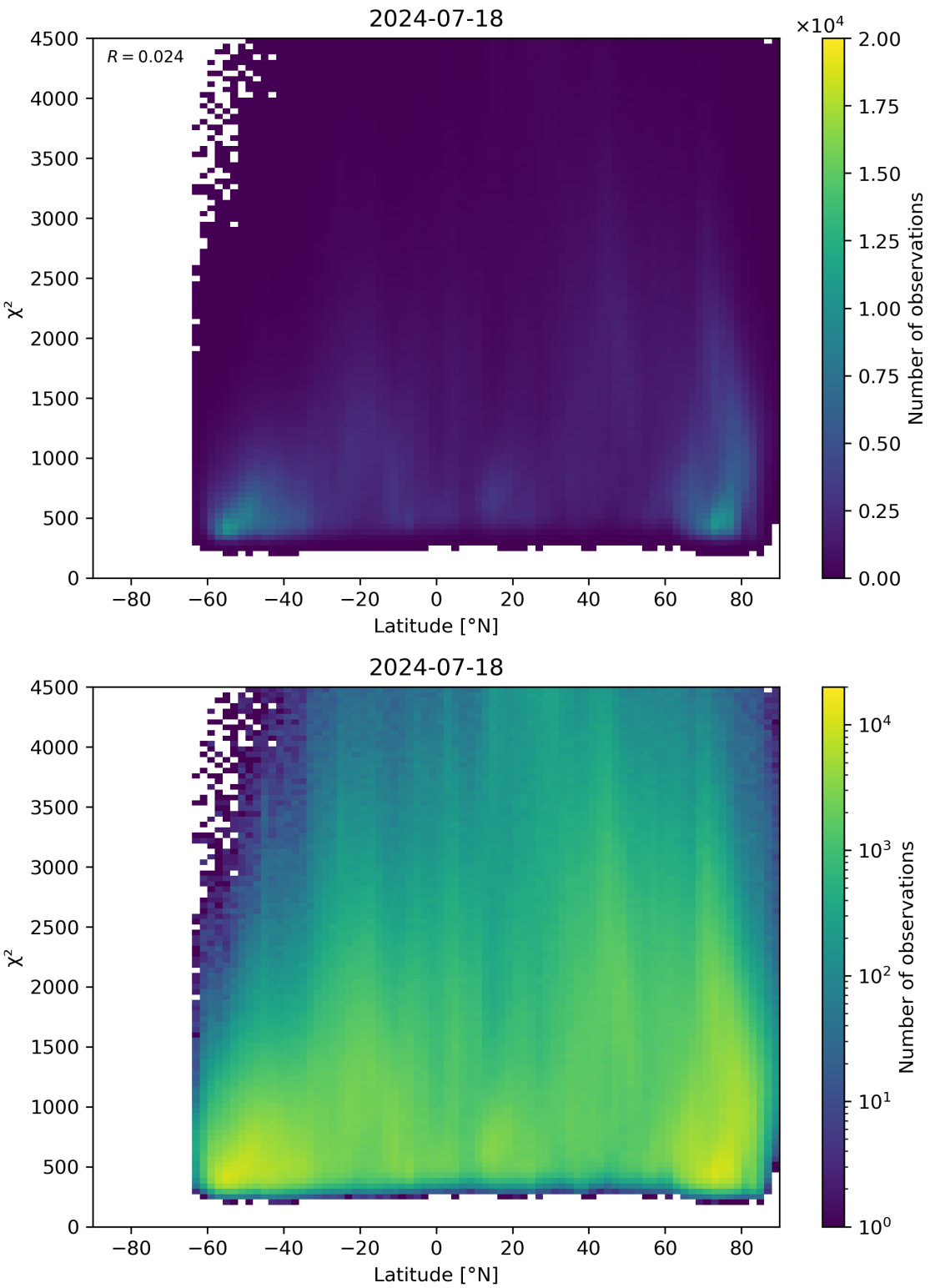

Figure 54: Scatter density plot of "Latitude" against "χ^2" for 2024-07-17 to 2024-07-19.

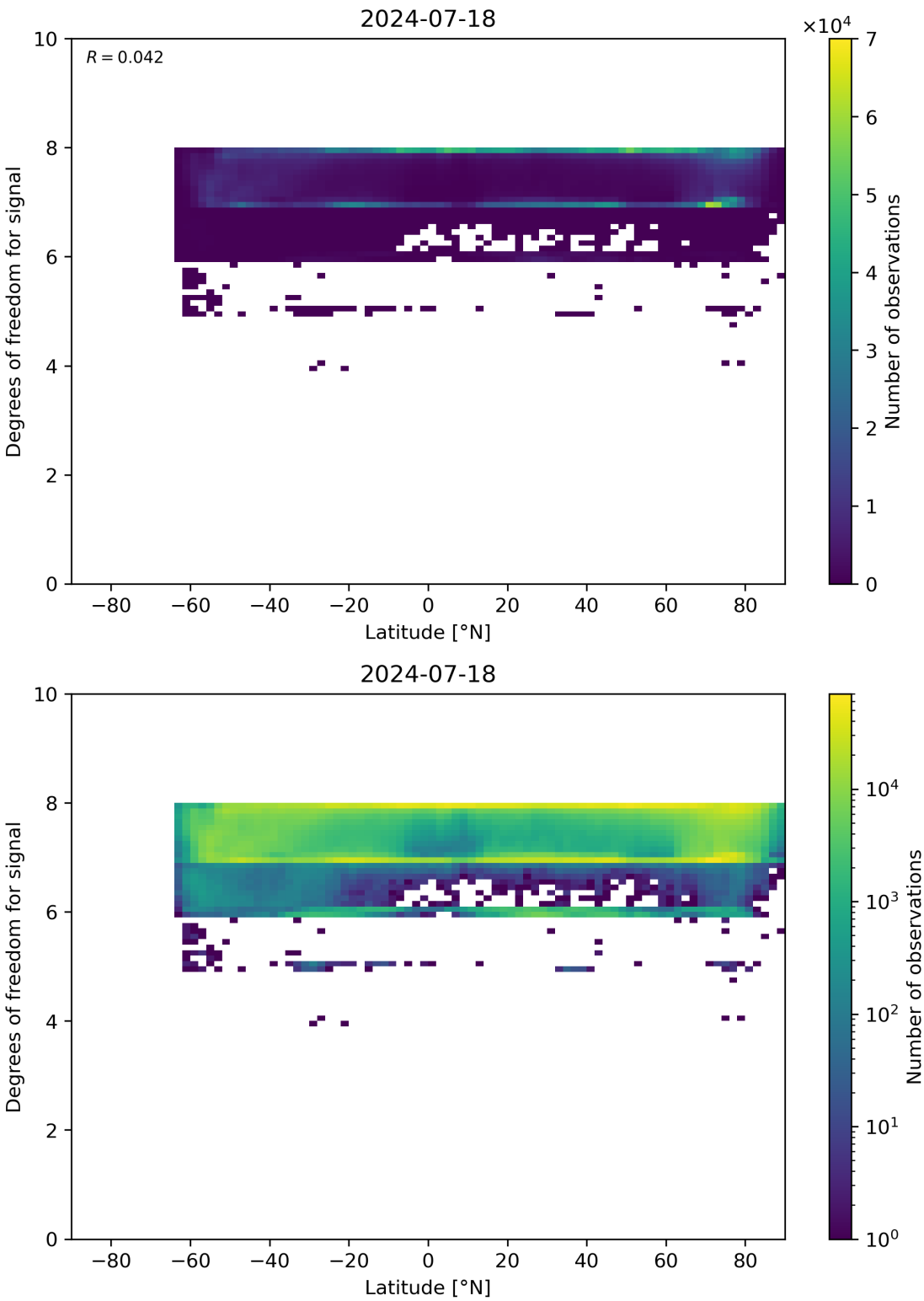

Figure 55: Scatter density plot of “Latitude” against “Degrees of freedom for signal” for 2024-07-17 to 2024-07-19.

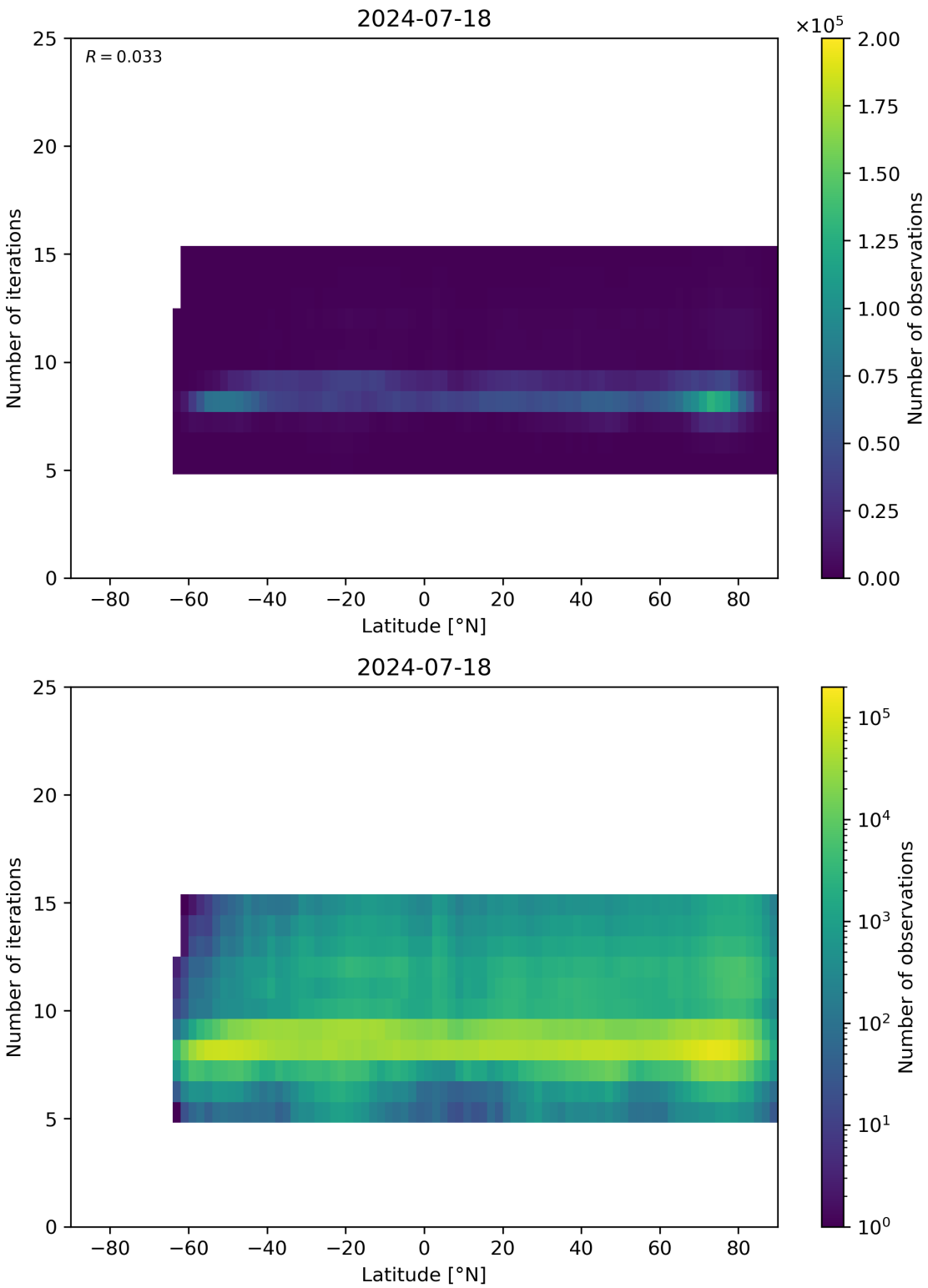

Figure 56: Scatter density plot of “Latitude” against “Number of iterations” for 2024-07-17 to 2024-07-19.

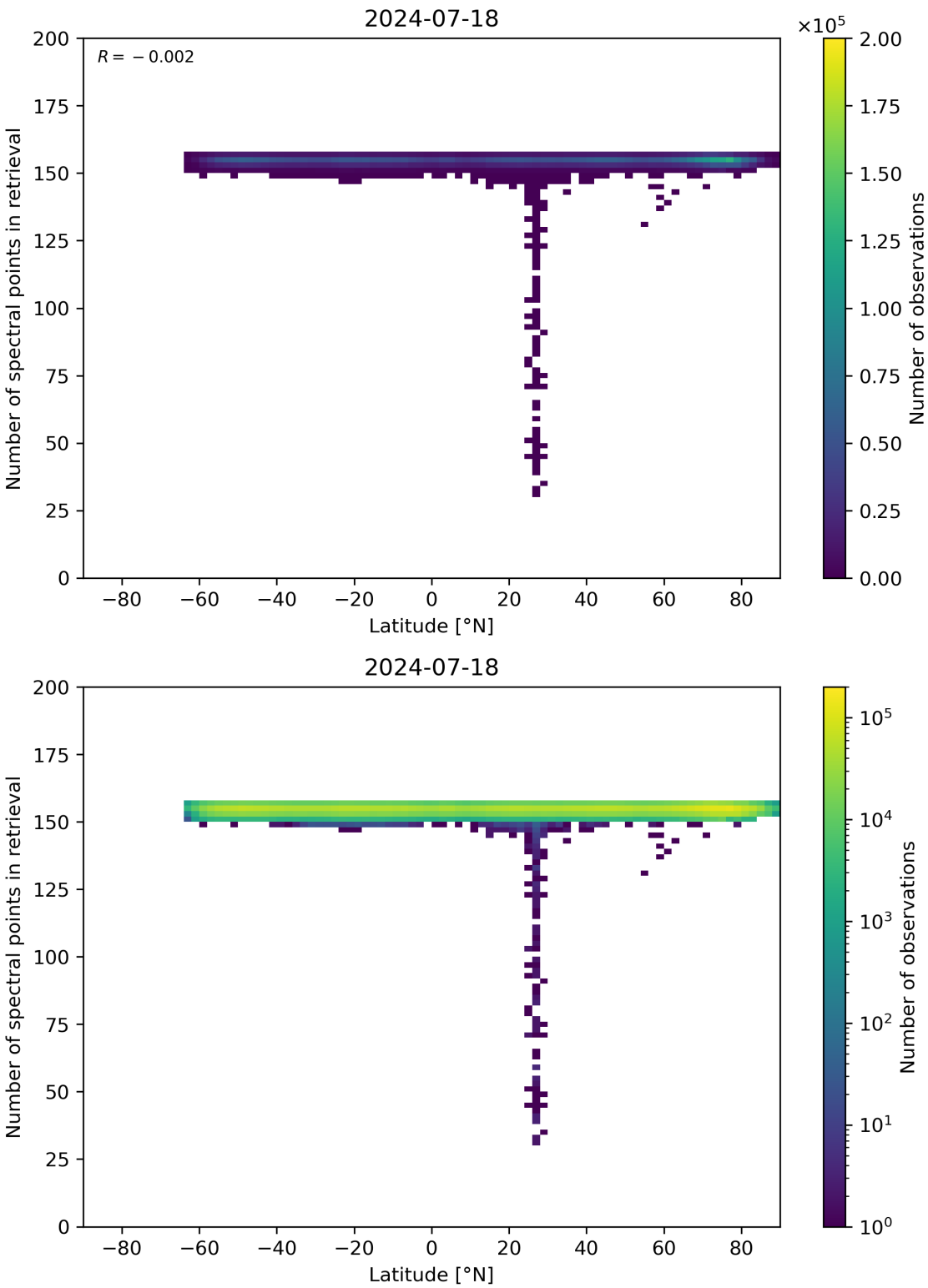

Figure 57: Scatter density plot of “Latitude” against “Number of spectral points in retrieval” for 2024-07-17 to 2024-07-19.

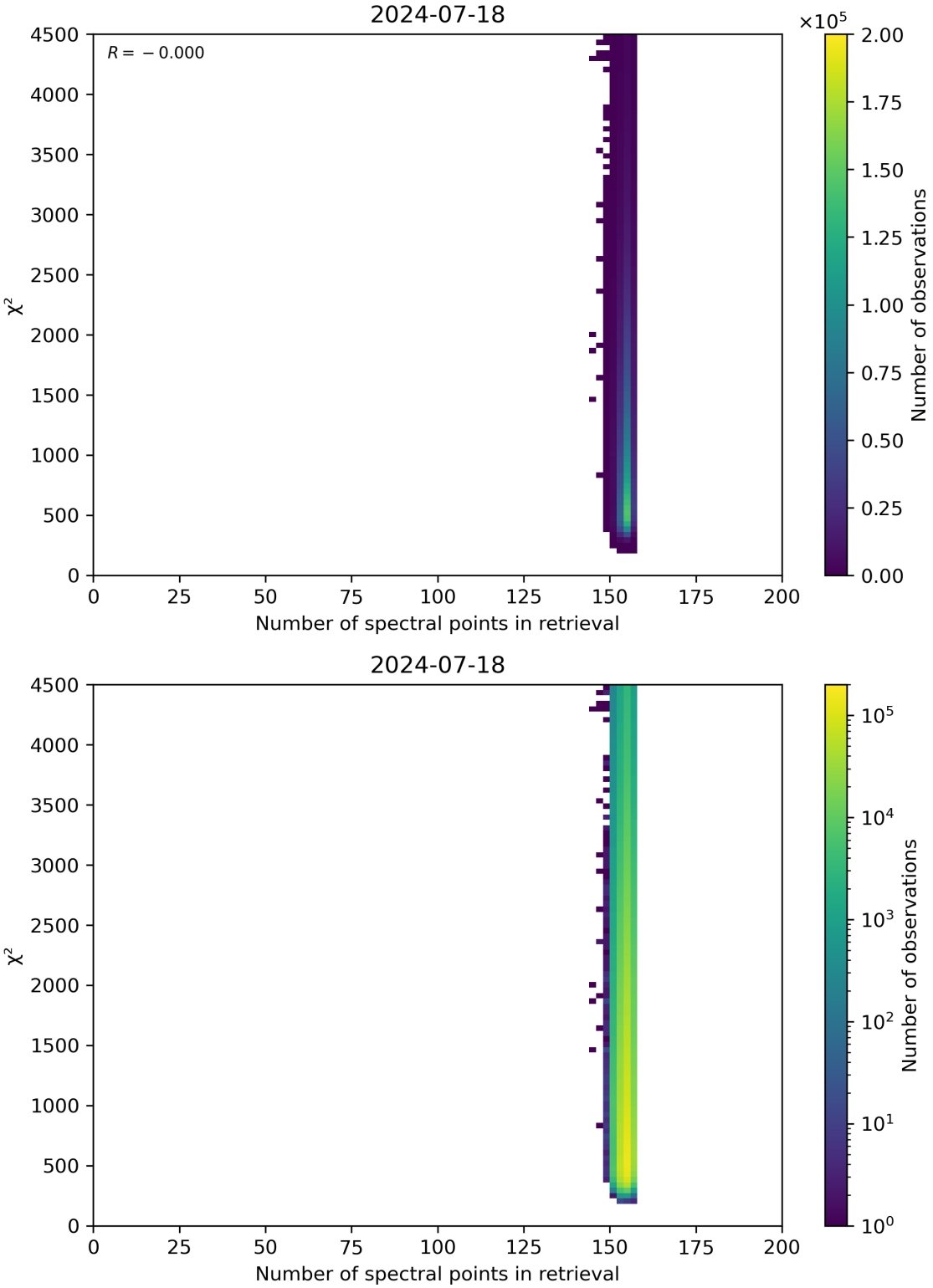

Figure 58: Scatter density plot of "Number of spectral points in retrieval" against "χ^2" for 2024-07-17 to 2024-07-19.

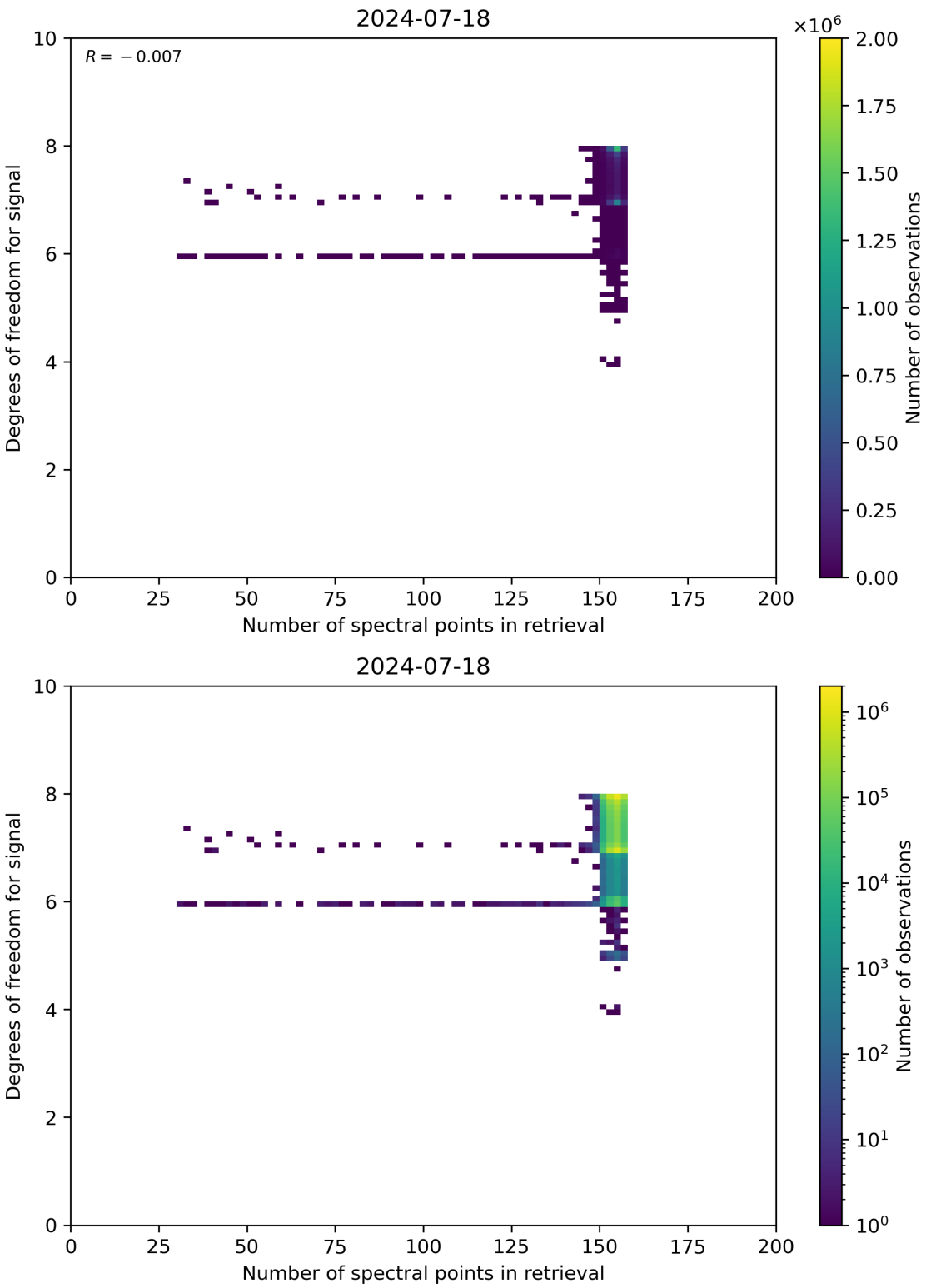

Figure 59: Scatter density plot of “Number of spectral points in retrieval” against “Degrees of freedom for signal” for 2024-07-17 to 2024-07-19.

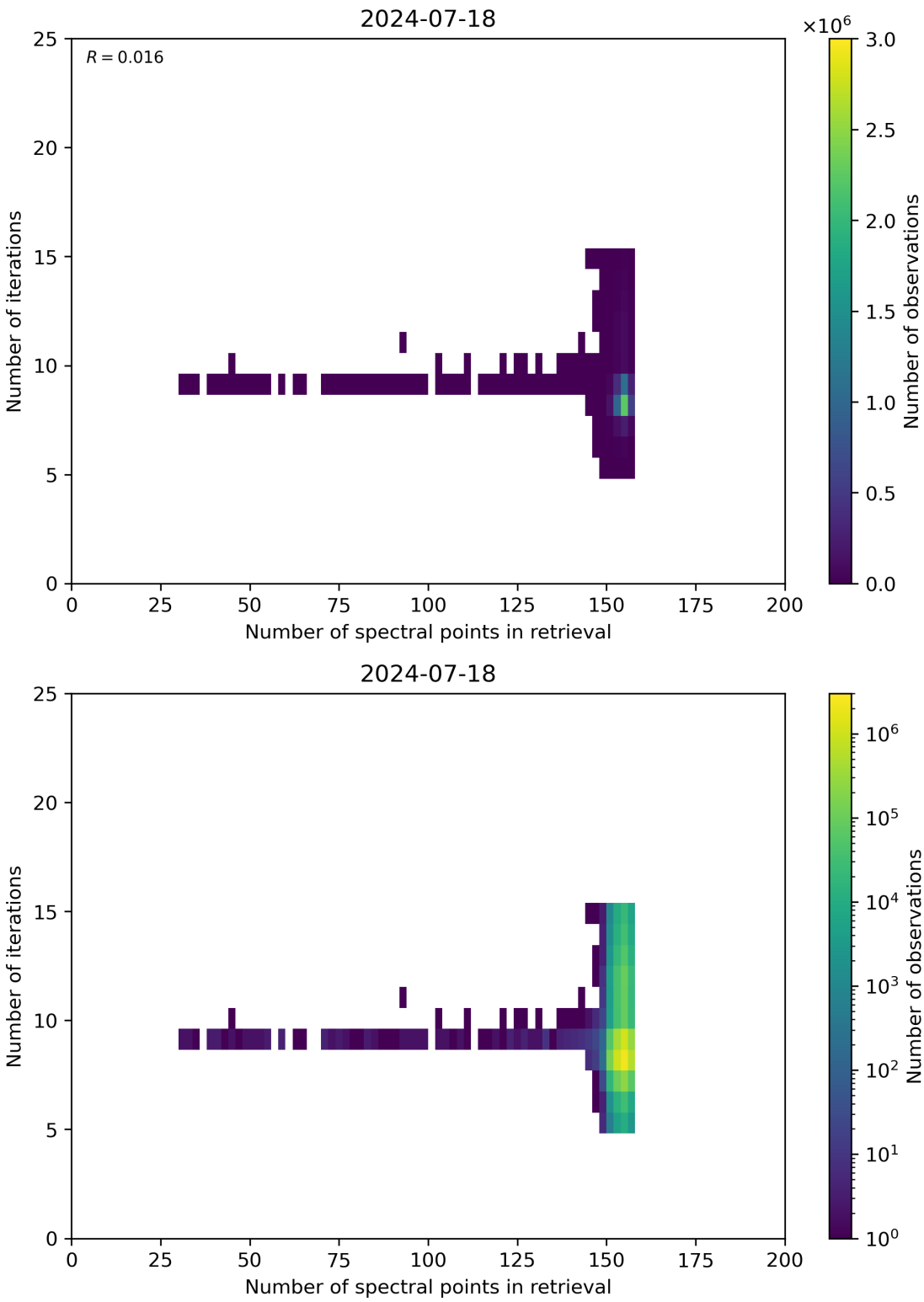

Figure 60: Scatter density plot of “Number of spectral points in retrieval” against “Number of iterations” for 2024-07-17 to 2024-07-19.

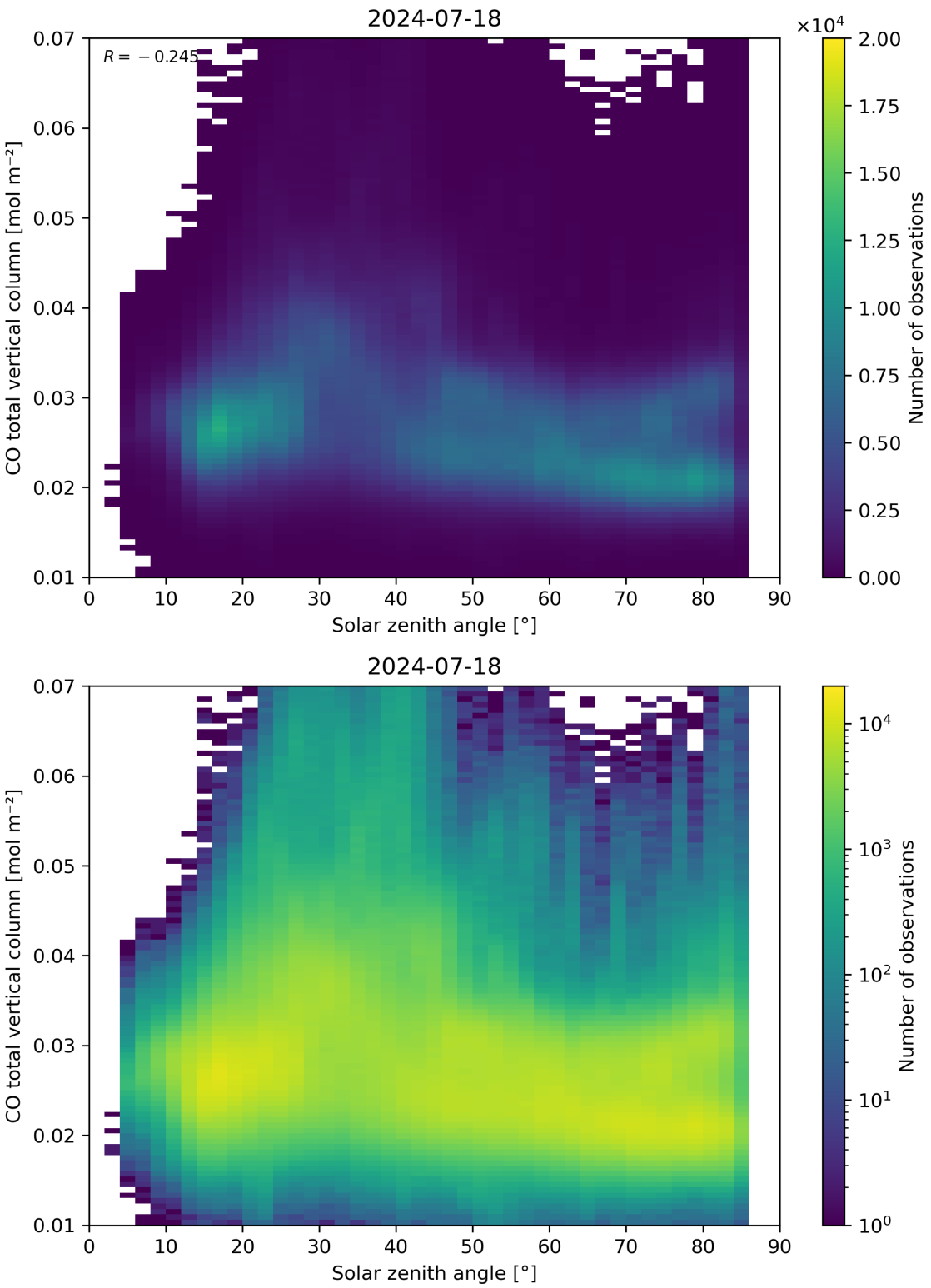

Figure 61: Scatter density plot of “Solar zenith angle” against “CO total vertical column” for 2024-07-17 to 2024-07-19.

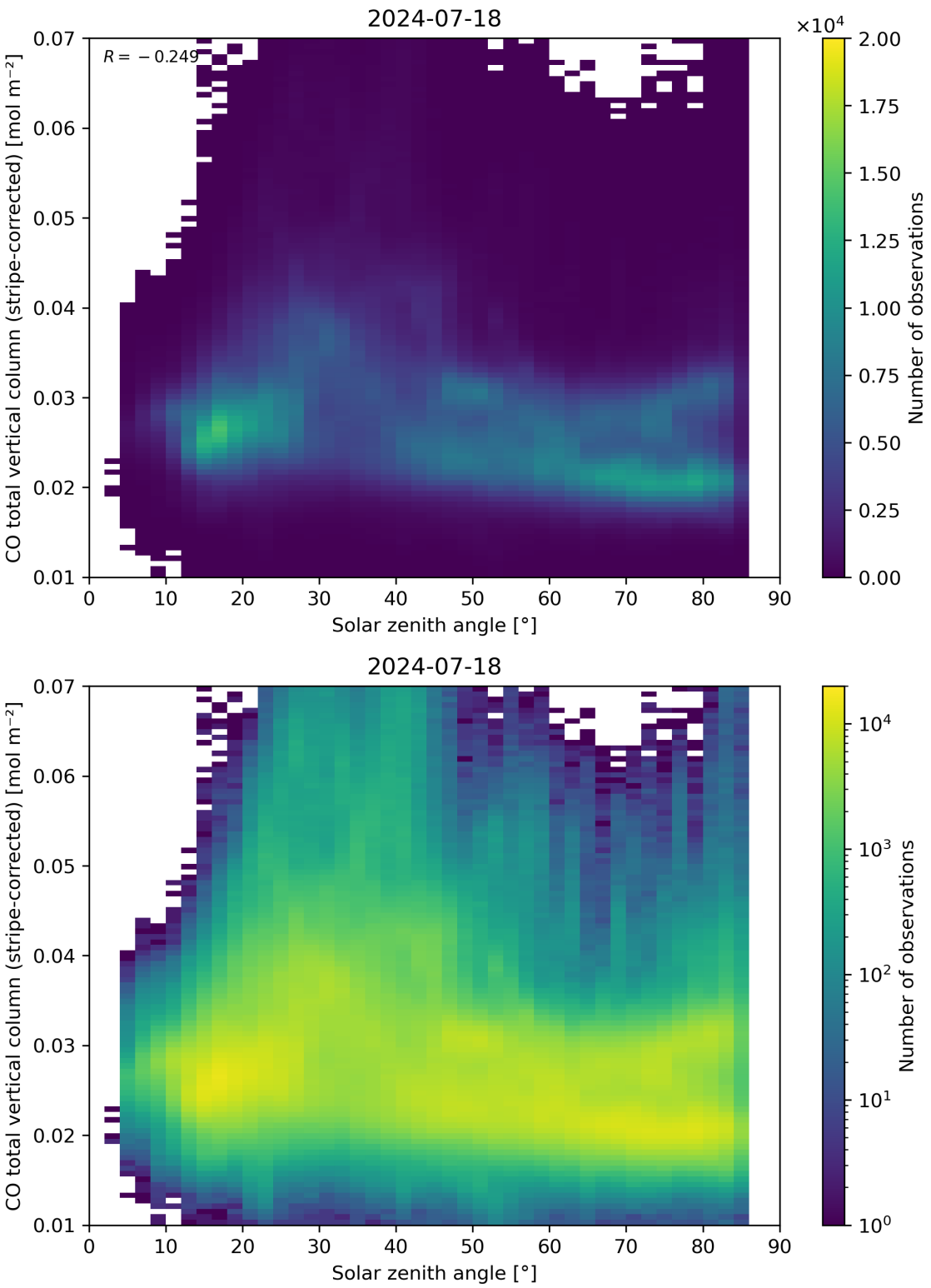

Figure 62: Scatter density plot of “Solar zenith angle” against “CO total vertical column (stripe-corrected)” for 2024-07-17 to 2024-07-19.

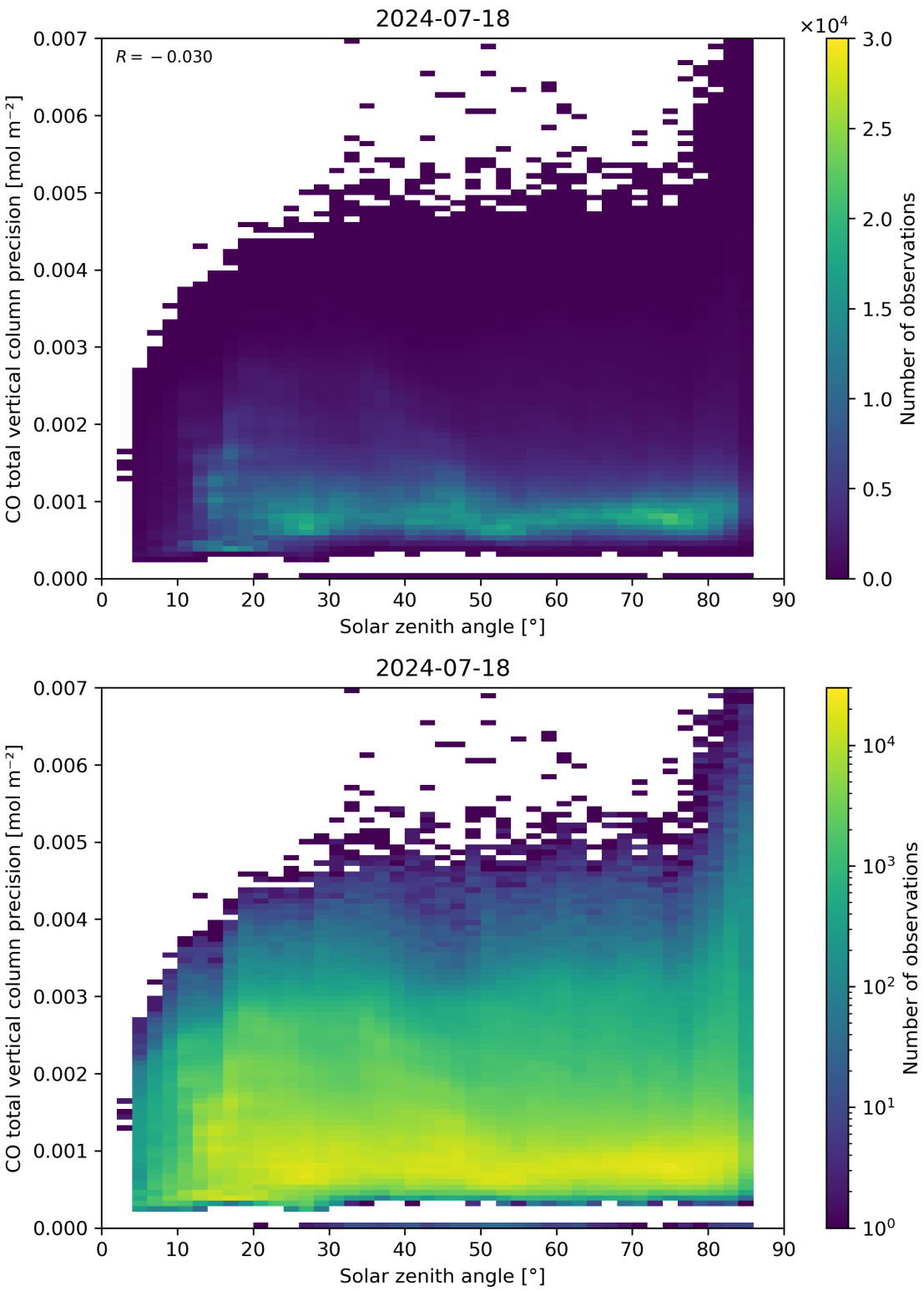

Figure 63: Scatter density plot of “Solar zenith angle” against “CO total vertical column precision” for 2024-07-17 to 2024-07-19.

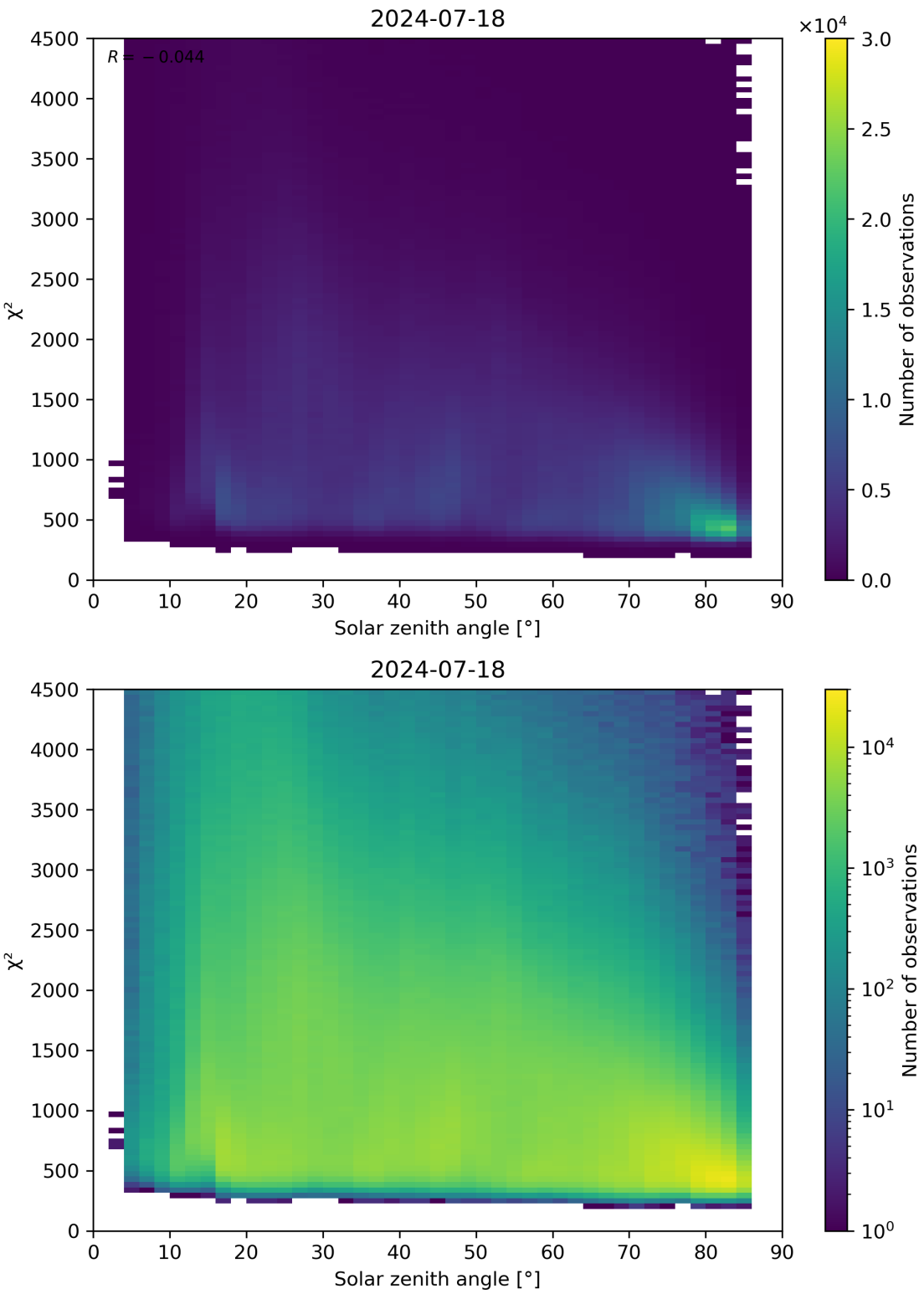

Figure 64: Scatter density plot of “Solar zenith angle” against “χ^2” for 2024-07-17 to 2024-07-19.

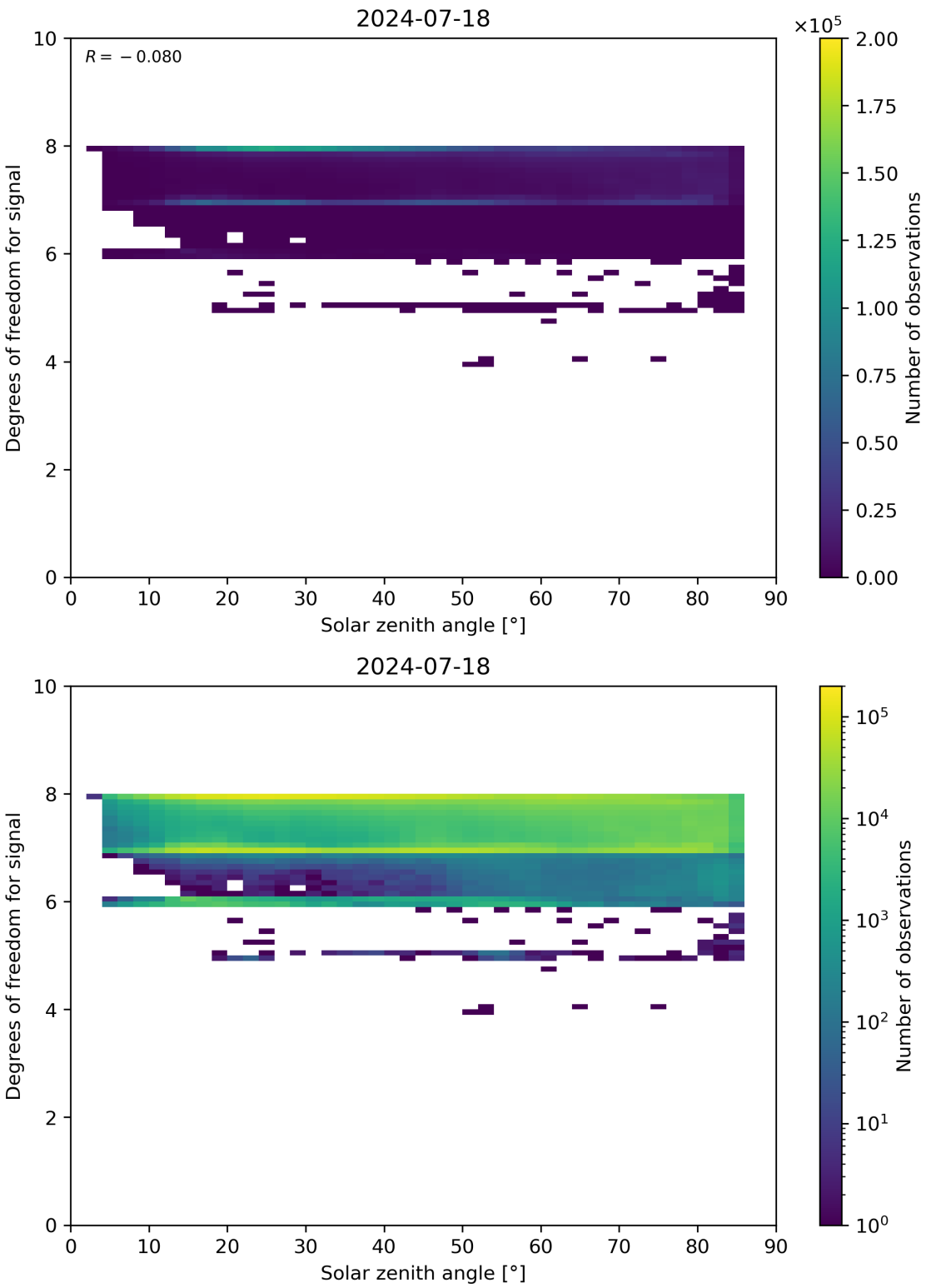

Figure 65: Scatter density plot of “Solar zenith angle” against “Degrees of freedom for signal” for 2024-07-17 to 2024-07-19.

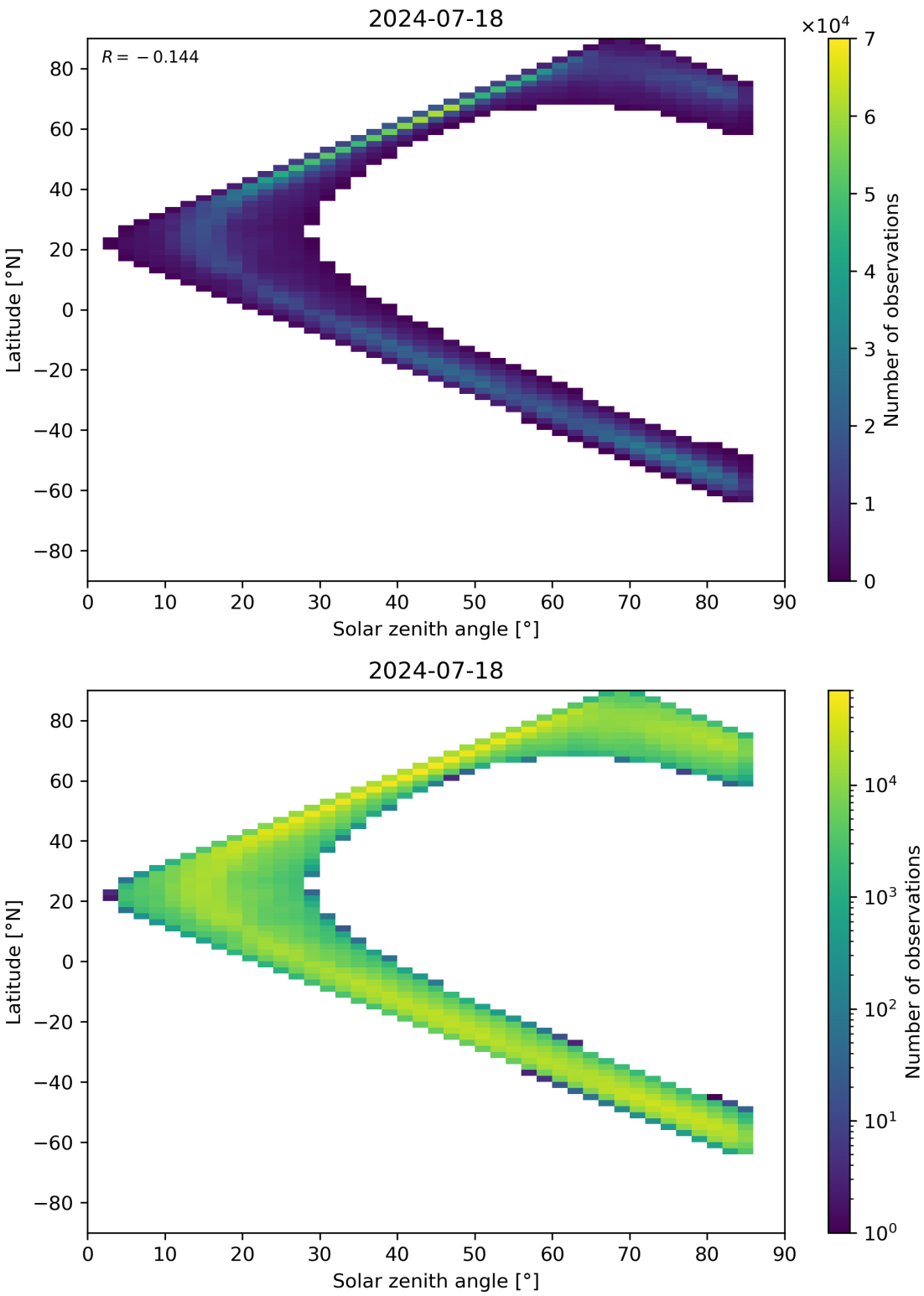

Figure 66: Scatter density plot of “Solar zenith angle” against “Latitude” for 2024-07-17 to 2024-07-19.

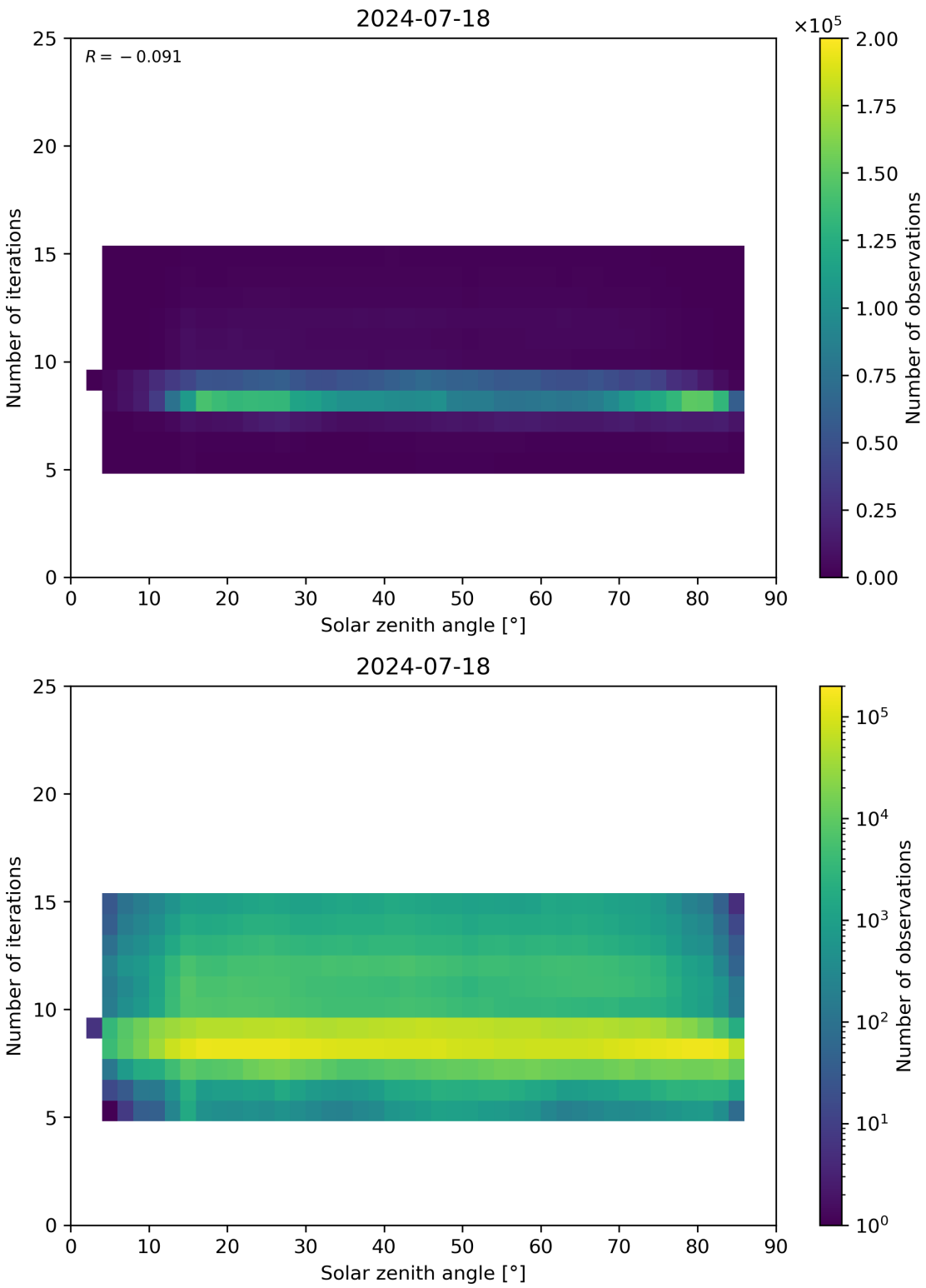

Figure 67: Scatter density plot of “Solar zenith angle” against “Number of iterations” for 2024-07-17 to 2024-07-19.

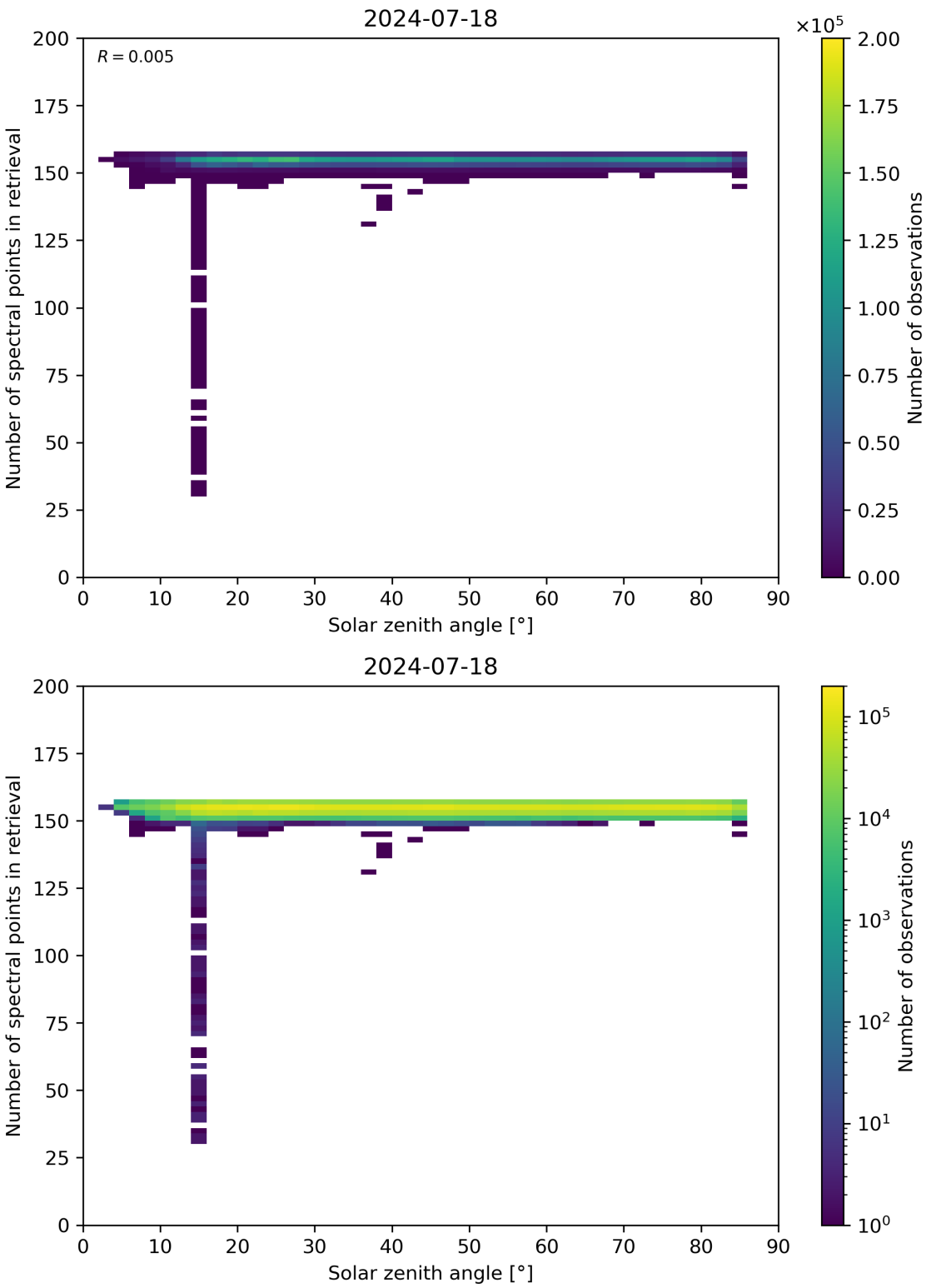

Figure 68: Scatter density plot of “Solar zenith angle” against “Number of spectral points in retrieval” for 2024-07-17 to 2024-07-19.

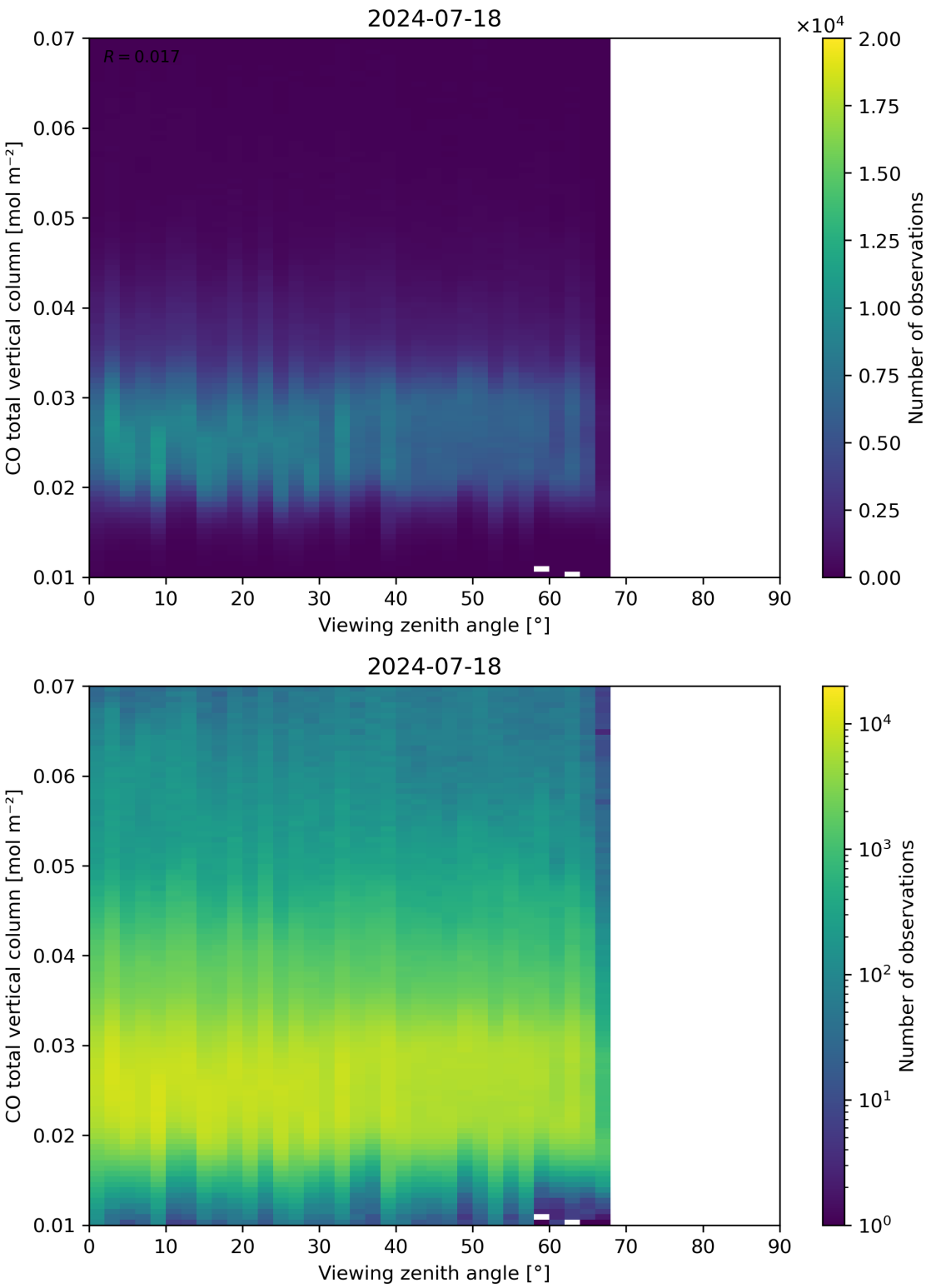

Figure 69: Scatter density plot of “Viewing zenith angle” against “CO total vertical column” for 2024-07-17 to 2024-07-19.

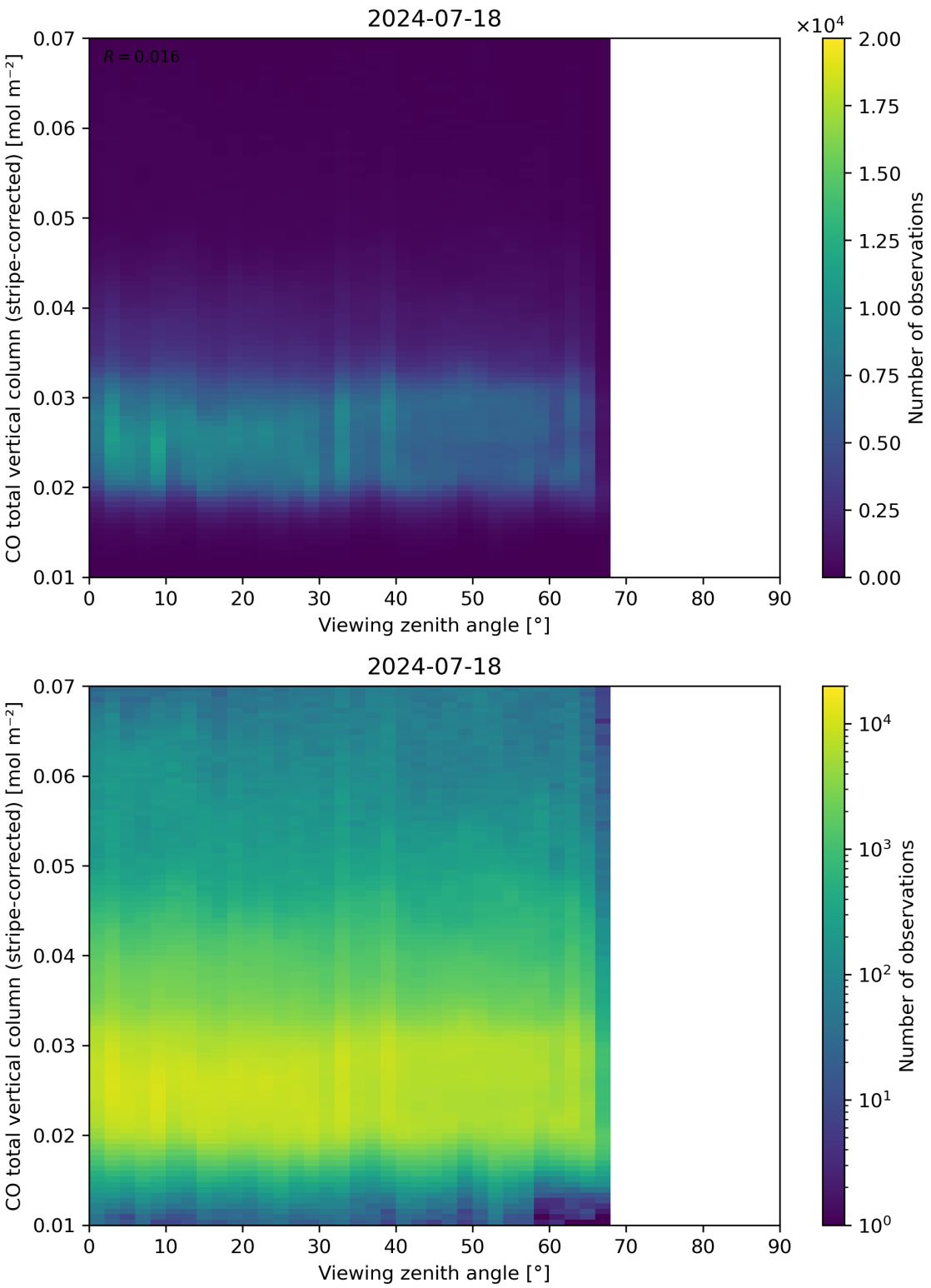

Figure 70: Scatter density plot of "Viewing zenith angle" against "CO total vertical column (stripe-corrected)" for 2024-07-17 to 2024-07-19.

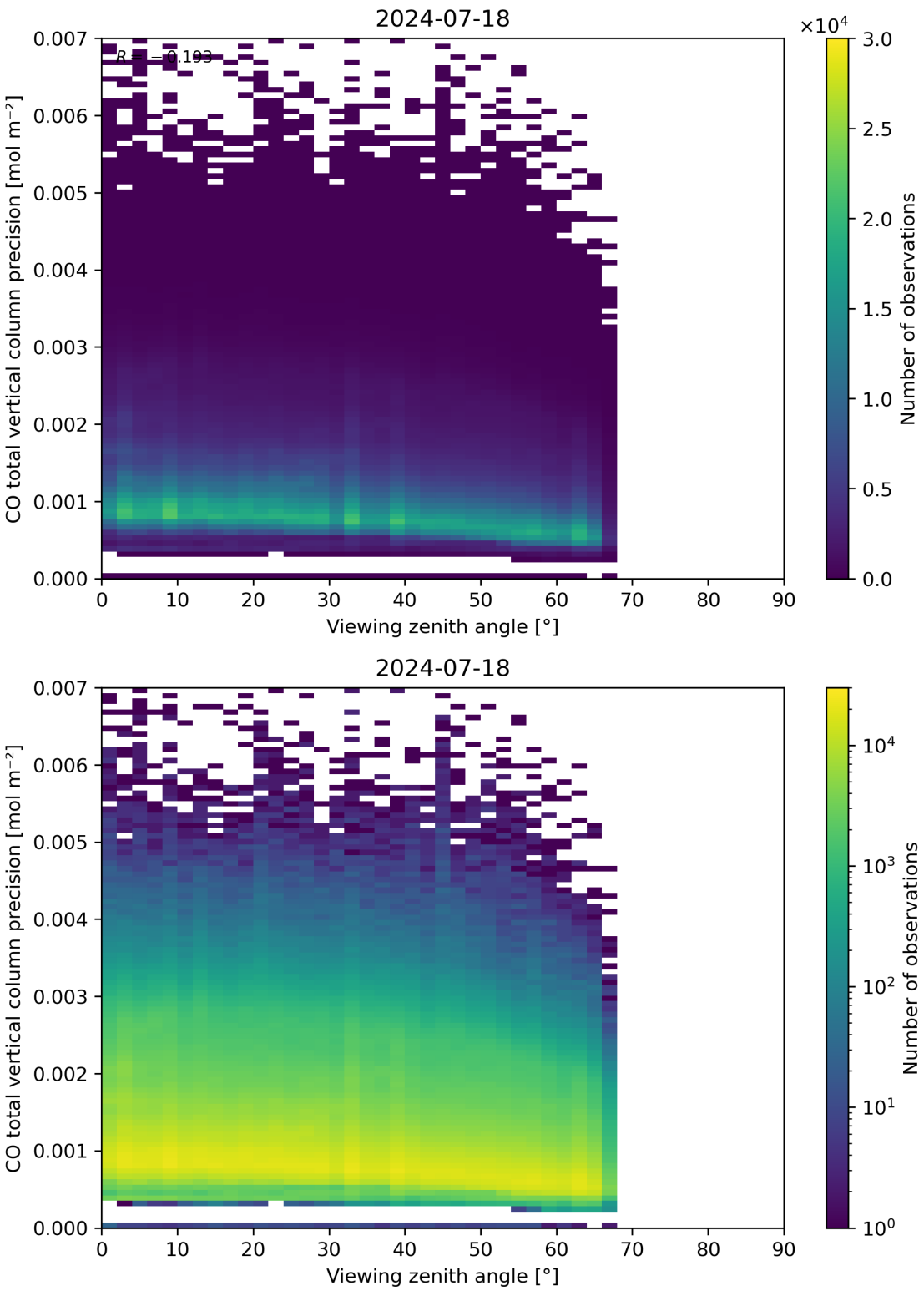

Figure 71: Scatter density plot of “Viewing zenith angle” against “CO total vertical column precision” for 2024-07-17 to 2024-07-19.

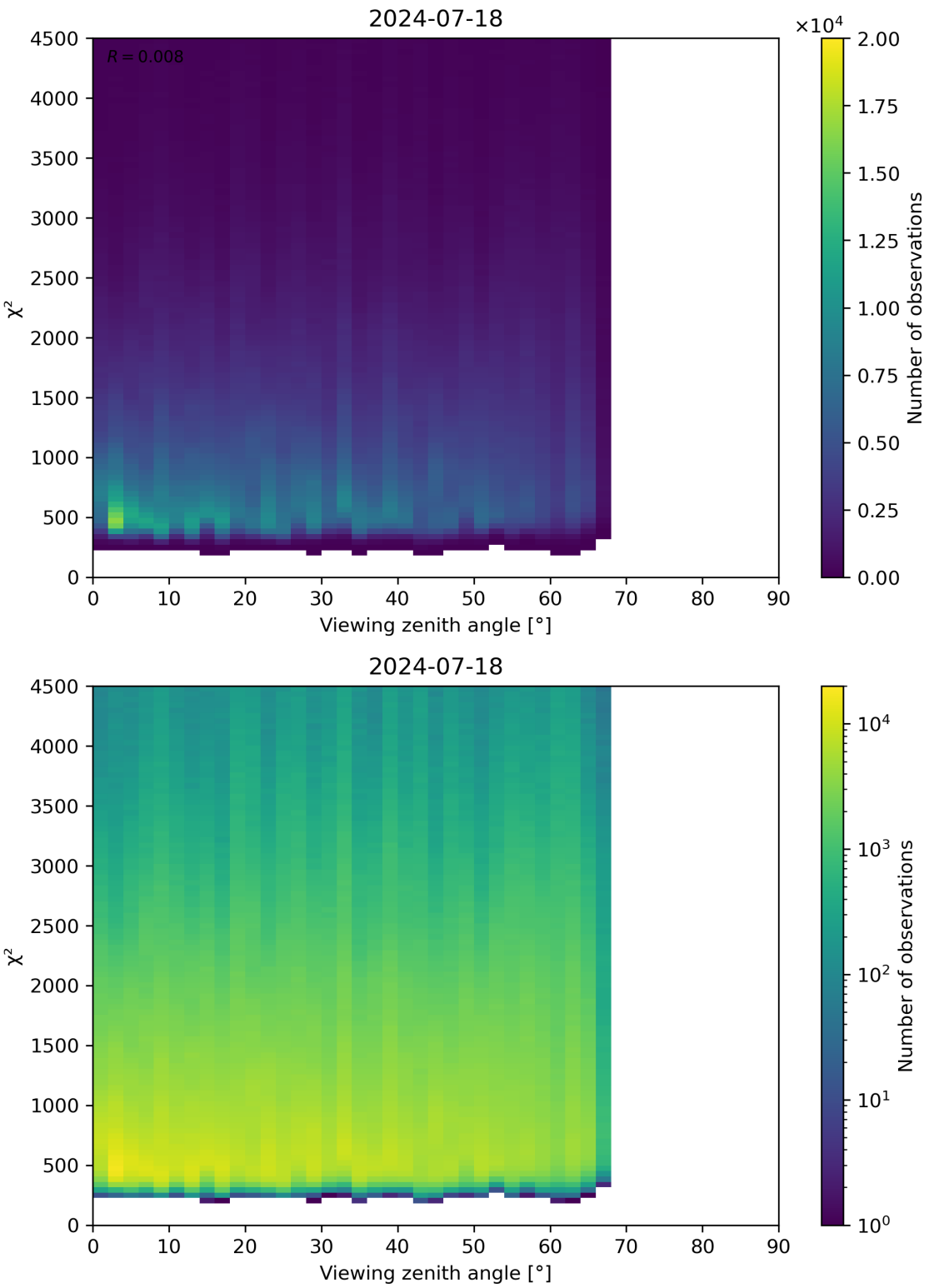

Figure 72: Scatter density plot of "Viewing zenith angle" against "χ^2" for 2024-07-17 to 2024-07-19.

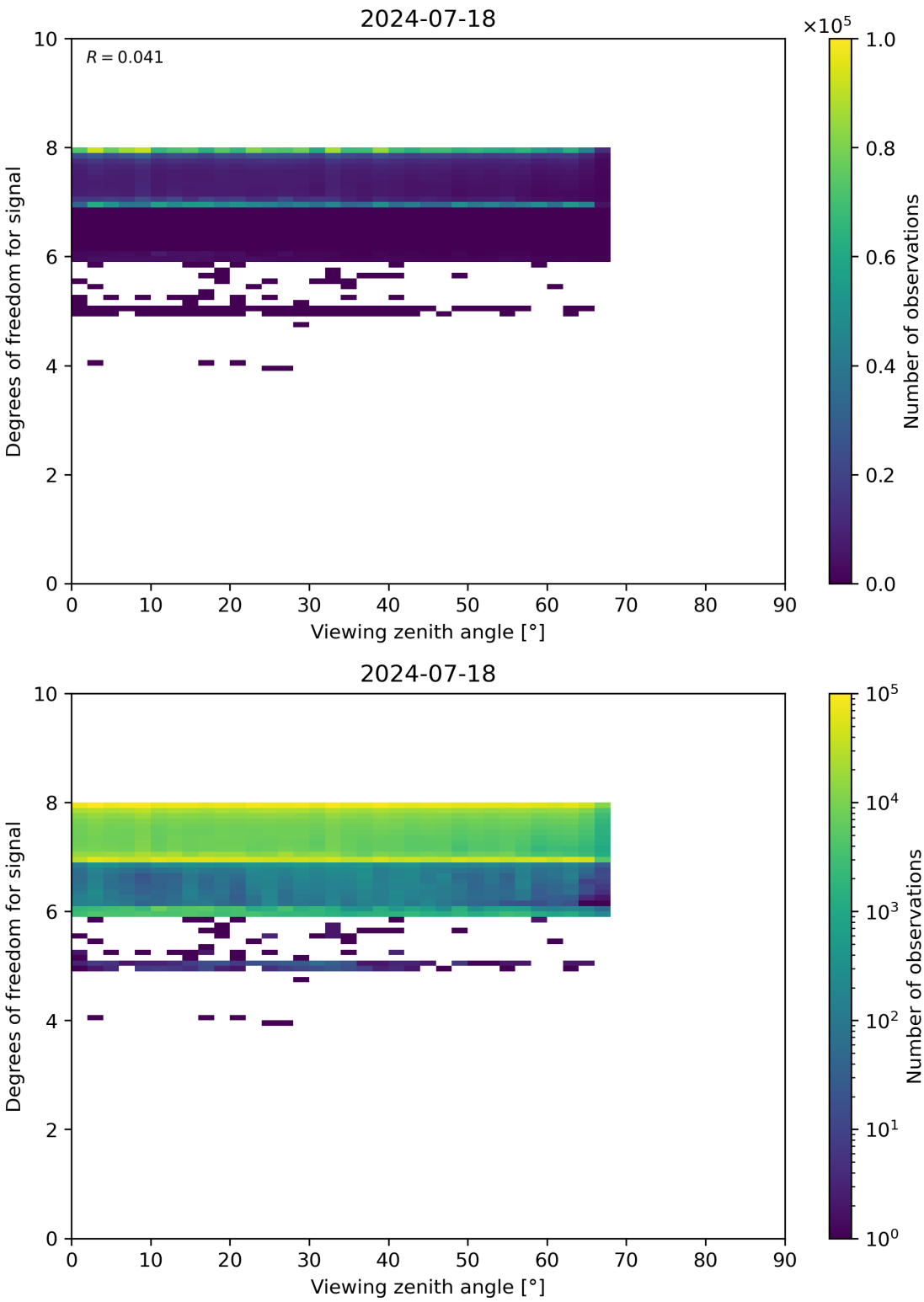

Figure 73: Scatter density plot of “Viewing zenith angle” against “Degrees of freedom for signal” for 2024-07-17 to 2024-07-19.

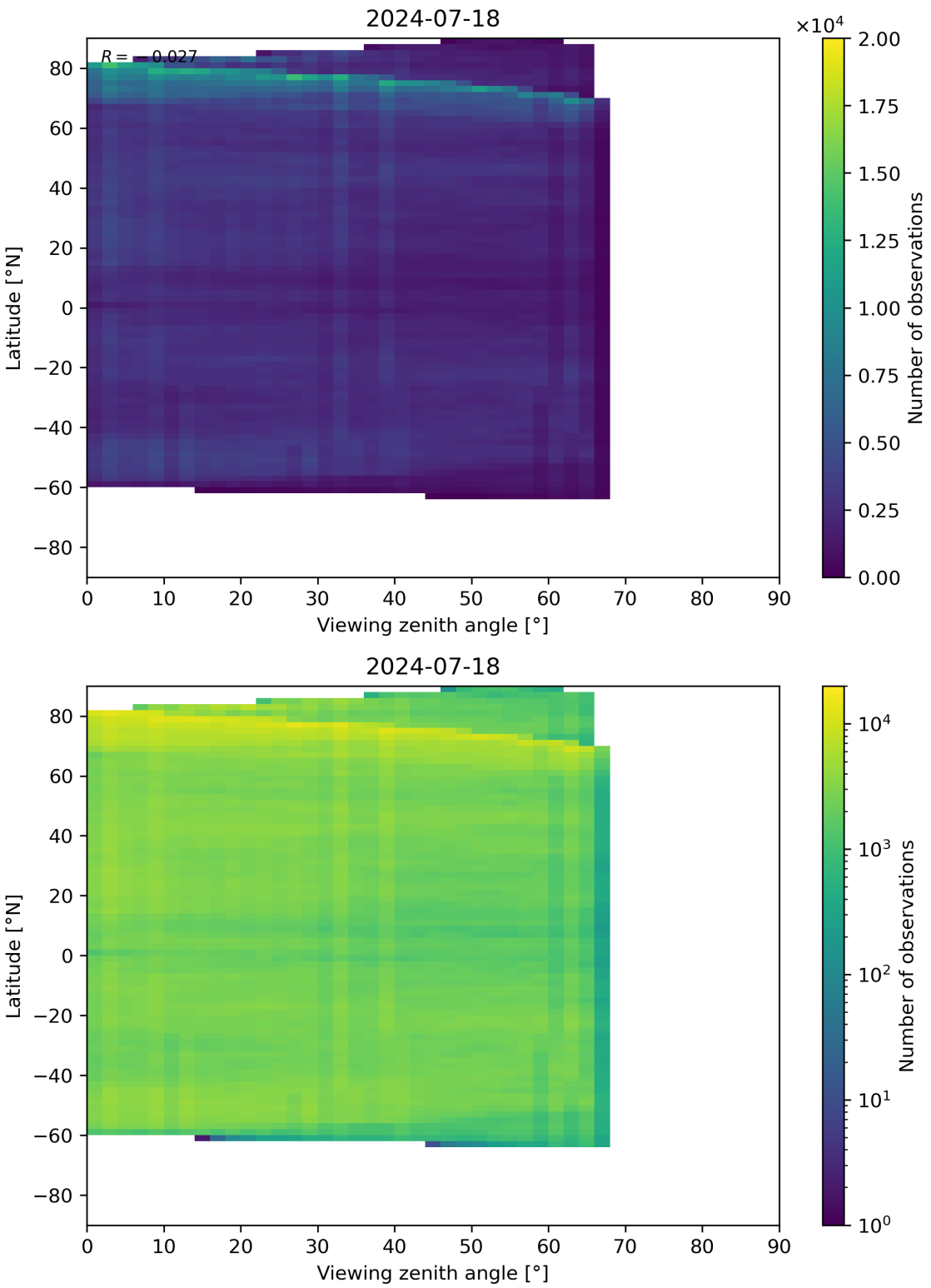

Figure 74: Scatter density plot of “Viewing zenith angle” against “Latitude” for 2024-07-17 to 2024-07-19.

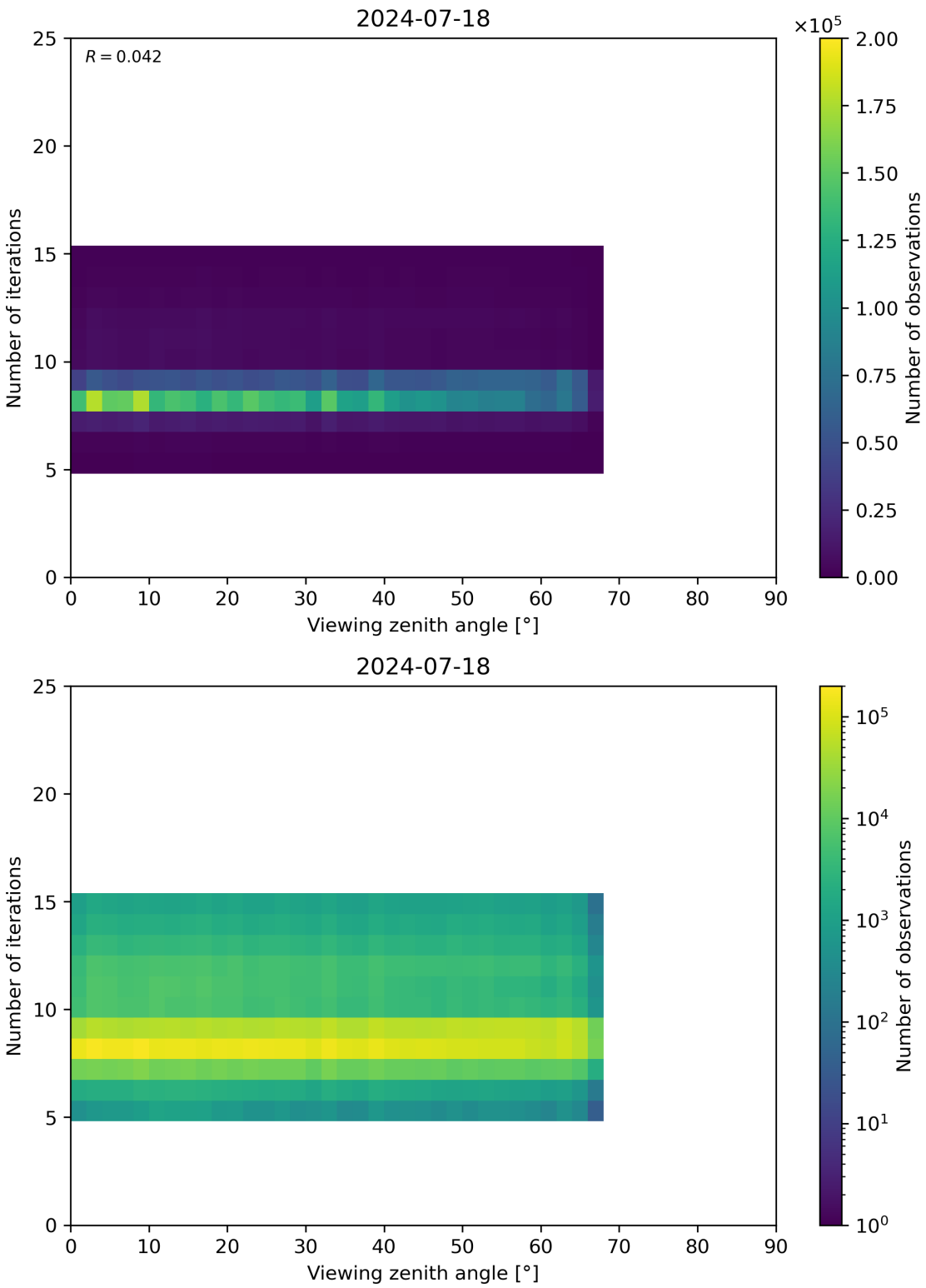

Figure 75: Scatter density plot of “Viewing zenith angle” against “Number of iterations” for 2024-07-17 to 2024-07-19.

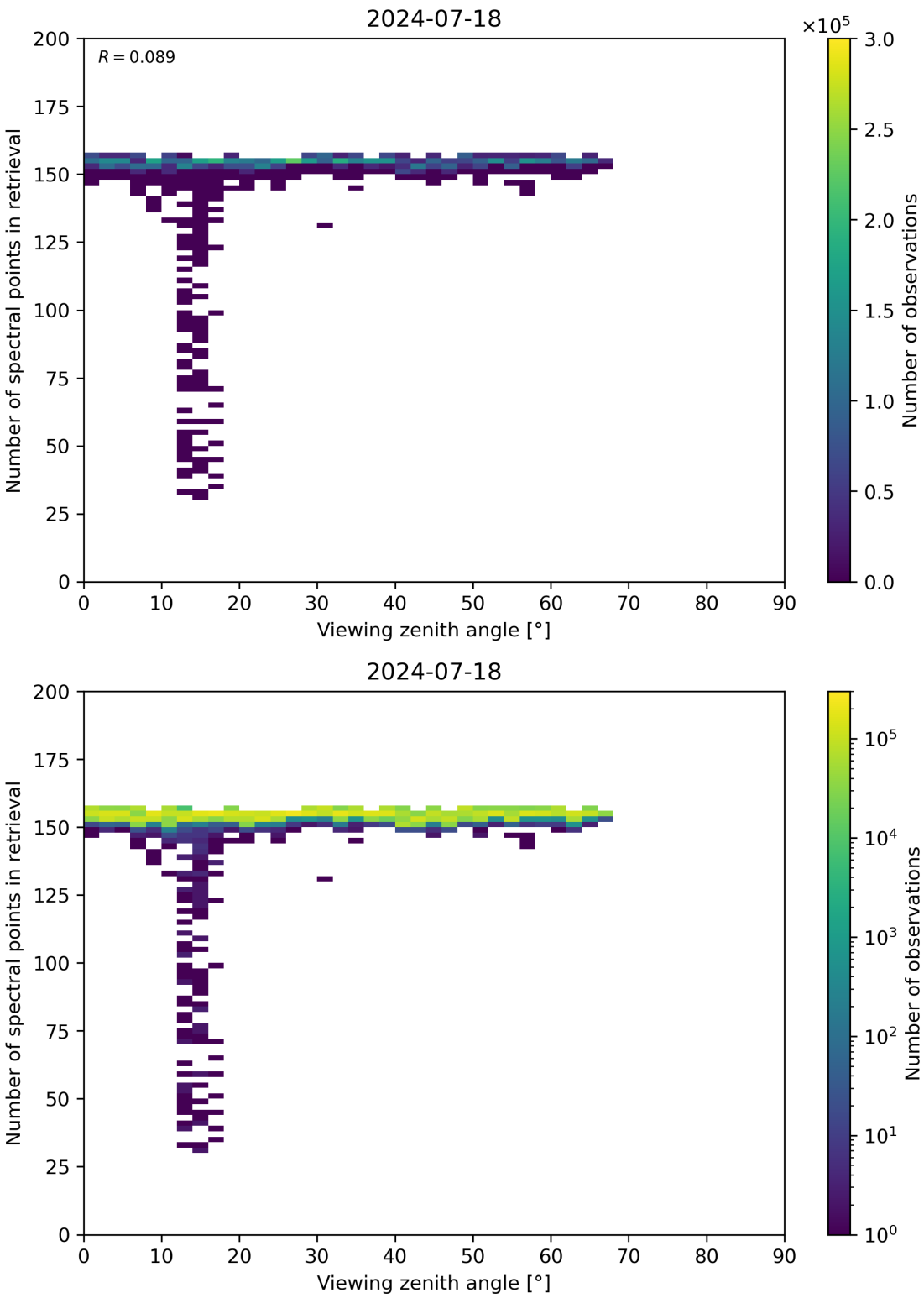

Figure 76: Scatter density plot of “Viewing zenith angle” against “Number of spectral points in retrieval” for 2024-07-17 to 2024-07-19.

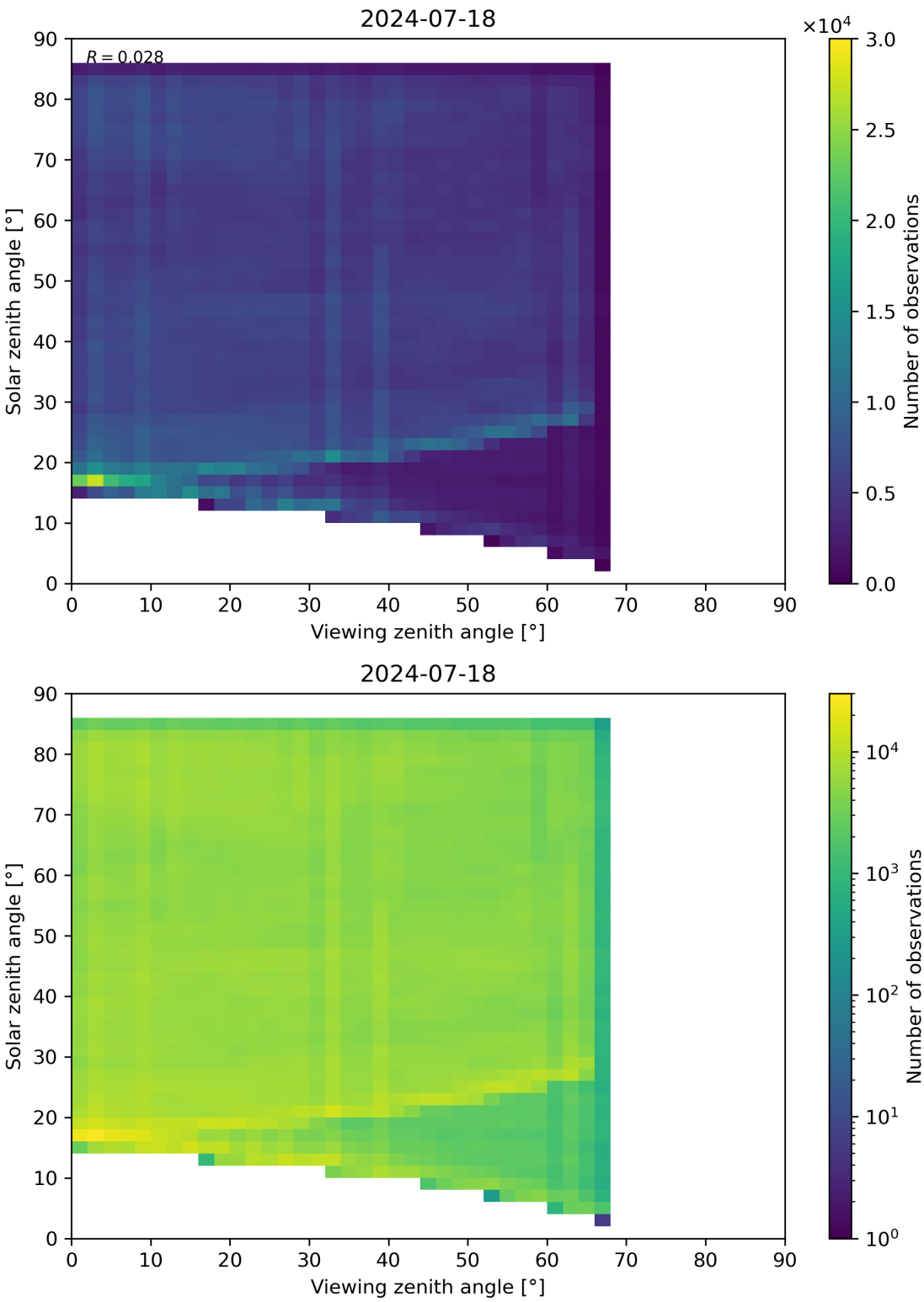

Figure 77: Scatter density plot of “Viewing zenith angle” against “Solar zenith angle” for 2024-07-17 to 2024-07-19.

Contents

List of Figures

List of Tables

11 Copyright information of ‘PyCAMA’

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