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]	0.749 ± 0.296	1141512	0.995	0.600	1.000	0.400	1.000
methane mixing ratio [parts per 10^9]	$(0.182 \pm 0.009) \times 10^4$	1141512	1.732×10^3	178	1.777×10^3	1.264×10^3	2.424×10^3
methane mixing ratio precision [parts per 10^9]	3.04 ± 1.70	1141512	1.30	1.93	2.80	0.796	46.2
methane mixing ratio bias corrected [parts per 10^9]	$(0.183 \pm 0.008) \times 10^4$	1141512	1.752×10^3	154	1.801×10^3	1.299×10^3	2.434×10^3
number of spectral points in retrieval [1]	798 ± 3	1141512	798	4.00	798	754	805
wavelength calibration offset SWIR [nm]	$(-1.111 \pm 0.253) \times 10^{-2}$	1141512	-1.100×10^{-2}	1.979×10^{-3}	-1.094×10^{-2}	-7.217×10^{-2}	5.012×10^{-2}
chi square SWIR [1]	$(0.113 \pm 0.212) \times 10^5$	1141512	2.350×10^3	1.043×10^4	3.785×10^3	1.474×10^3	1.001×10^7
chi square NIR [1]	$(0.702 \pm 91.864) \times 10^5$	1141512	4.250×10^3	1.166×10^4	1.331×10^4	82.0	4.778×10^9
degrees of freedom [1]	17.8 ± 0.5	1141512	17.2	0.986	17.7	17.0	20.9
number of iterations [1]	10.1 ± 1.0	1141512	10.2	0.0	10.00	10.00	30.0
fluorescence [mol s^{-1} m^{-2} nm^{-1} sr^{-1}]	$(-2.143 \pm 2.652) \times 10^{-8}$	1141512	-6.500×10^{-9}	3.429×10^{-8}	-2.431×10^{-8}	-4.353×10^{-7}	7.679×10^{-7}
land fraction [1]	0.956 ± 0.193	1141512	0.995	0.0	1.000	0.0	1.000

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.400	0.400	0.400	0.400	0.400	1.000	1.000	1.000	1.000	1.000
methane mixing ratio [parts per 10^9]	1.683×10^3	1.703×10^3	1.715×10^3	1.724×10^3	1.735×10^3	1.913×10^3	1.934×10^3	1.946×10^3	1.958×10^3	1.977×10^3
methane mixing ratio precision [parts per 10^9]	1.09	1.22	1.33	1.48	1.81	3.75	4.34	4.98	5.97	8.46
methane mixing ratio bias corrected [parts per 10^9]	1.699×10^3	1.720×10^3	1.732×10^3	1.742×10^3	1.755×10^3	1.909×10^3	1.930×10^3	1.941×10^3	1.954×10^3	1.978×10^3
number of spectral points in retrieval [1]	792	793	794	795	796	800	801	802	803	804
wavelength calibration offset SWIR [nm]	-1.707×10^{-2}	-1.420×10^{-2}	-1.339×10^{-2}	-1.279×10^{-2}	-1.208×10^{-2}	-1.010×10^{-2}	-9.694×10^{-3}	-9.280×10^{-3}	-8.510×10^{-3}	-5.288×10^{-3}
chi square SWIR [1]	1.889×10^3	2.074×10^3	2.212×10^3	2.352×10^3	2.575×10^3	1.300×10^4	2.277×10^4	3.215×10^4	4.364×10^4	6.963×10^4
chi square NIR [1]	1.293×10^3	2.349×10^3	3.551×10^3	4.600×10^3	6.746×10^3	1.840×10^4	2.062×10^4	2.242×10^4	2.473×10^4	2.911×10^4
degrees of freedom [1]	17.1	17.2	17.2	17.2	17.3	18.3	18.5	18.6	18.7	18.9
number of iterations [1]	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	11.0
fluorescence [mol s^{-1} m^{-2} nm^{-1} sr^{-1}]	-7.275×10^{-8}	-5.798×10^{-8}	-5.074×10^{-8}	-4.556×10^{-8}	-3.983×10^{-8}	-5.545×10^{-9}	1.721×10^{-9}	9.777×10^{-9}	2.331×10^{-8}	5.601×10^{-8}
land fraction [1]	0.0	0.834	0.994	1.000	1.000	1.000	1.000	1.000	1.000	1.000

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]	0.783 ± 0.288	367717	0.600	1.000	0.400	1.000	0.400	1.000
methane mixing ratio [parts per 10^9]	$(0.193 \pm 0.003) \times 10^4$	367717	36.1	1.934×10^3	1.296×10^3	2.424×10^3	1.914×10^3	1.950×10^3
methane mixing ratio precision [parts per 10^9]	2.16 ± 1.49	367717	0.966	1.76	0.841	46.2	1.39	2.36
methane mixing ratio bias corrected [parts per 10^9]	$(0.193 \pm 0.003) \times 10^4$	367717	36.3	1.929×10^3	1.300×10^3	2.434×10^3	1.909×10^3	1.946×10^3
number of spectral points in retrieval [1]	798 ± 3	367717	4.00	798	754	805	796	800
wavelength calibration offset SWIR [nm]	$(-1.128 \pm 0.340) \times 10^{-2}$	367717	2.643×10^{-3}	-1.119×10^{-2}	-7.096×10^{-2}	5.012×10^{-2}	-1.269×10^{-2}	-1.004×10^{-2}
chi square SWIR [1]	$(0.227 \pm 0.246) \times 10^5$	367717	2.504×10^4	1.454×10^4	1.708×10^3	2.631×10^6	7.433×10^3	3.248×10^4
chi square NIR [1]	$(0.176 \pm 16.120) \times 10^6$	367717	6.060×10^3	5.642×10^3	82.0	4.778×10^9	3.642×10^3	9.702×10^3
degrees of freedom [1]	18.4 ± 0.4	367717	0.516	18.4	17.0	20.9	18.1	18.6
number of iterations [1]	10.2 ± 1.7	367717	0.0	10.00	10.00	30.0	10.00	10.00
fluorescence [mol s^{-1} m^{-2} nm^{-1} sr^{-1}]	$(-5.151 \pm 21.360) \times 10^{-9}$	367717	1.857×10^{-8}	-6.953×10^{-9}	-2.316×10^{-7}	7.679×10^{-7}	-1.603×10^{-8}	2.542×10^{-9}
land fraction [1]	0.968 ± 0.146	367717	9.041×10^{-4}	1.000	0.0	1.000	0.999	1.000

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]	0.733 ± 0.298	773795	0.600	1.000	0.400	1.000	0.400	1.000
methane mixing ratio [parts per 10^9]	$(0.176 \pm 0.005) \times 10^4$	773795	54.5	1.747×10^3	1.264×10^3	2.032×10^3	1.725×10^3	1.780×10^3
methane mixing ratio precision [parts per 10^9]	3.46 ± 1.63	773795	1.57	3.21	0.796	40.5	2.52	4.09
methane mixing ratio bias corrected [parts per 10^9]	$(0.178 \pm 0.005) \times 10^4$	773795	60.4	1.768×10^3	1.299×10^3	2.085×10^3	1.743×10^3	1.804×10^3
number of spectral points in retrieval [1]	798 ± 3	773795	4.00	798	782	805	796	800
wavelength calibration offset SWIR [nm]	$(-1.103 \pm 0.199) \times 10^{-2}$	773795	1.709×10^{-3}	-1.085×10^{-2}	-7.217×10^{-2}	4.426×10^{-2}	-1.182×10^{-2}	-1.011×10^{-2}
chi square SWIR [1]	$(0.589 \pm 1.676) \times 10^4$	773795	1.712×10^3	2.859×10^3	1.474×10^3	1.001×10^7	2.381×10^3	4.093×10^3
chi square NIR [1]	$(0.201 \pm 10.009) \times 10^5$	773795	7.734×10^3	1.617×10^4	137	3.255×10^8	1.253×10^4	2.027×10^4
degrees of freedom [1]	17.6 ± 0.4	773795	0.500	17.4	17.0	19.3	17.2	17.7
number of iterations [1]	10.0 ± 0.4	773795	0.0	10.00	10.00	30.0	10.00	10.00
fluorescence [mol s^{-1} m^{-2} nm^{-1} sr^{-1}]	$(-2.917 \pm 2.520) \times 10^{-8}$	773795	2.674×10^{-8}	-3.427×10^{-8}	-4.353×10^{-7}	3.736×10^{-7}	-4.439×10^{-8}	-1.764×10^{-8}
land fraction [1]	0.950 ± 0.212	773795	0.0	1.000	0.0	1.000	1.000	1.000

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]	0.649 ± 0.296	35020	0.600	0.400	0.400	1.000	0.400	1.000
methane mixing ratio [parts per 10^9]	$(0.186 \pm 0.003) \times 10^4$	35020	38.6	1.864×10^3	1.438×10^3	2.007×10^3	1.845×10^3	1.883×10^3
methane mixing ratio precision [parts per 10^9]	2.82 ± 1.28	35020	1.06	2.67	0.796	24.9	2.13	3.18
methane mixing ratio bias corrected [parts per 10^9]	$(0.187 \pm 0.003) \times 10^4$	35020	38.7	1.871×10^3	1.444×10^3	2.015×10^3	1.852×10^3	1.891×10^3
number of spectral points in retrieval [1]	798 ± 3	35020	4.00	798	789	803	796	800
wavelength calibration offset SWIR [nm]	$(-1.041 \pm 0.127) \times 10^{-2}$	35020	1.255×10^{-3}	-1.031×10^{-2}	-4.630×10^{-2}	3.474×10^{-3}	-1.101×10^{-2}	-9.756×10^{-3}
chi square SWIR [1]	$(0.776 \pm 5.393) \times 10^4$	35020	4.147×10^3	6.206×10^3	1.702×10^3	1.001×10^7	4.616×10^3	8.763×10^3
chi square NIR [1]	$(0.211 \pm 17.215) \times 10^5$	35020	1.766×10^3	2.272×10^3	137	1.836×10^8	1.721×10^3	3.487×10^3
degrees of freedom [1]	18.0 ± 0.2	35020	0.225	18.1	17.0	19.0	17.9	18.2
number of iterations [1]	10.0 ± 0.6	35020	0.0	10.00	10.00	30.0	10.00	10.00
fluorescence [mol s^{-1} m^{-2} nm^{-1} sr^{-1}]	$(-3.241 \pm 14.860) \times 10^{-9}$	35020	1.563×10^{-8}	-5.196×10^{-9}	-8.412×10^{-8}	1.573×10^{-7}	-1.232×10^{-8}	3.319×10^{-9}
land fraction [1]	0.0 ± 0.00	35020	0.0	0.0	0.0	0.0	0.0	0.0

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]	0.753 ± 0.295	962862	0.600	1.000	0.400	1.000	0.400	1.000
methane mixing ratio [parts per 10^9]	$(0.180 \pm 0.009) \times 10^4$	962862	162	1.761×10^3	1.332×10^3	2.239×10^3	1.731×10^3	1.893×10^3
methane mixing ratio precision [parts per 10^9]	3.08 ± 1.58	962862	2.02	2.91	0.841	32.4	1.82	3.84
methane mixing ratio bias corrected [parts per 10^9]	$(0.181 \pm 0.008) \times 10^4$	962862	140	1.783×10^3	1.340×10^3	2.424×10^3	1.749×10^3	1.889×10^3
number of spectral points in retrieval [1]	798 ± 3	962862	4.00	798	754	805	796	800
wavelength calibration offset SWIR [nm]	$(-1.113 \pm 0.168) \times 10^{-2}$	962862	1.855×10^{-3}	-1.094×10^{-2}	-5.558×10^{-2}	2.770×10^{-2}	-1.201×10^{-2}	-1.016×10^{-2}
chi square SWIR [1]	$(0.115 \pm 0.202) \times 10^5$	962862	1.120×10^4	3.257×10^3	1.474×10^3	5.151×10^6	2.484×10^3	1.369×10^4
chi square NIR [1]	$(0.778 \pm 99.545) \times 10^5$	962862	9.027×10^3	1.461×10^4	218	4.778×10^9	1.019×10^4	1.922×10^4
degrees of freedom [1]	17.8 ± 0.6	962862	0.996	17.6	17.0	20.9	17.3	18.3
number of iterations [1]	10.1 ± 1.0	962862	0.0	10.00	10.00	30.0	10.00	10.00
fluorescence [mol s^{-1} m^{-2} nm^{-1} sr^{-1}]	$(-2.450 \pm 2.616) \times 10^{-8}$	962862	3.292×10^{-8}	-2.960×10^{-8}	-1.991×10^{-7}	6.179×10^{-7}	-4.187×10^{-8}	-8.949×10^{-9}
land fraction [1]	1.000 ± 0.000	962862	0.0	1.000	1.000	1.000	1.000	1.000

Table 7: Correlation matrix

Viewing zenith angle	Solar zenith angle	Latitude	Mole fraction of CH_4	Precision of mole fraction of CH_4	Bias corrected mole fraction of CH_4	Number of points in the spectrum	Spectral offset SWIR ($\lambda_{true} - \lambda_{nominal}$)	χ^2 (SWIR)	χ^2 (NIR)	Degrees of freedom	Number of iterations	Fluorescence	Land fraction
1.000	-2.555×10^{-2}	9.826×10^{-2}	0.121	−0.145	0.105	4.131×10^{-2}	−0.402	9.587×10^{-2}	-2.495×10^{-3}	0.202	2.935×10^{-2}	0.318	9.226×10^{-4}
-2.555×10^{-2}	1.000	−0.439	−0.510	0.461	−0.490	5.731×10^{-3}	-4.884×10^{-2}	−0.340	-2.494×10^{-3}	−0.616	-3.231×10^{-2}	−0.509	0.400
9.826×10^{-2}	−0.439	1.000	0.928	−0.437	0.912	-5.098×10^{-3}	-2.009×10^{-2}	0.412	7.333×10^{-3}	0.792	0.101	0.526	−0.113
0.121	−0.510	0.928	1.000	−0.449	0.991	-9.708×10^{-3}	-2.566×10^{-2}	0.453	2.744×10^{-3}	0.860	7.649×10^{-2}	0.507	−0.107
−0.145	0.461	−0.437	−0.449	1.000	−0.363	-1.333×10^{-2}	6.664×10^{-2}	−0.370	-1.251×10^{-3}	−0.478	-4.651×10^{-2}	−0.358	-8.868×10^{-2}
0.105	−0.490	0.912	0.991	−0.363	1.000	-1.187×10^{-2}	-1.496×10^{-2}	0.395	1.408×10^{-3}	0.820	7.008×10^{-2}	0.483	−0.124
4.131×10^{-2}	5.731×10^{-3}	-5.098×10^{-3}	-9.708×10^{-3}	-1.333×10^{-2}	-1.187×10^{-2}	1.000	-2.086×10^{-2}	9.492×10^{-3}	-2.548×10^{-3}	-3.952×10^{-4}	6.958×10^{-3}	1.635×10^{-2}	7.931×10^{-3}
−0.402	-4.884×10^{-2}	-2.009×10^{-2}	-2.566×10^{-2}	6.664×10^{-2}	-1.496×10^{-2}	-2.086×10^{-2}	1.000	-3.040×10^{-2}	2.470×10^{-3}	-6.272×10^{-2}	-1.281×10^{-2}	−0.171	-6.057×10^{-2}
9.587×10^{-2}	−0.340	0.412	0.453	−0.370	0.395	9.492×10^{-3}	-3.040×10^{-2}	1.000	3.994×10^{-2}	0.546	0.102	0.314	3.991×10^{-2}
-2.495×10^{-3}	-2.494×10^{-3}	7.333×10^{-3}	2.744×10^{-3}	-1.251×10^{-3}	1.408×10^{-3}	-2.548×10^{-3}	2.470×10^{-3}	3.994×10^{-2}	1.000	1.675×10^{-2}	3.594×10^{-2}	1.226×10^{-2}	1.191×10^{-3}
0.202	−0.616	0.792	0.860	−0.478	0.820	-3.952×10^{-4}	-6.272×10^{-2}	0.546	1.675×10^{-2}	1.000	4.003×10^{-2}	0.579	-9.127×10^{-2}
2.935×10^{-2}	-3.231×10^{-2}	0.101	7.649×10^{-2}	-4.651×10^{-2}	7.008×10^{-2}	6.958×10^{-3}	-1.281×10^{-2}	0.102	3.594×10^{-2}	4.003×10^{-2}	1.000	8.641×10^{-2}	7.466×10^{-3}
0.318	−0.509	0.526	0.507	−0.358	0.483	1.635×10^{-2}	−0.171	0.314	1.226×10^{-2}	0.579	8.641×10^{-2}	1.000	−0.133
9.226×10^{-4}	0.400	−0.113	−0.107	-8.868×10^{-2}	−0.124	7.931×10^{-3}	-6.057×10^{-2}	3.991×10^{-2}	1.191×10^{-3}	-9.127×10^{-2}	7.466×10^{-3}	−0.133	1.000

Table 8: Covariance matrix

Viewing zenith angle	Solar zenith angle	Latitude	Mole fraction of CH_4	Precision of mole fraction of CH_4	Bias corrected mole fraction of CH_4	Number of points in the spectrum	Spectral offset SWIR ($\lambda_{true} - \lambda_{nominal}$)	χ^2 (SWIR)	χ^2 (NIR)	Degrees of freedom	Number of iterations	Fluorescence	Land fraction
258	-5.74	77.1	179	-3.95	140	1.86	-1.637×10^{-2}	3.259×10^{4}	-3.683×10^{5}	1.75	0.479	1.356×10^{-7}	2.868×10^{-3}
-5.74	195	-299	-659	10.9	-565	0.224	-1.730×10^{-3}	-1.006×10^{5}	-3.202×10^{5}	-4.63	-0.458	-1.885×10^{-7}	1.08
77.1	-299	2.387×10^{3}	4.198×10^{3}	-36.2	3.675×10^{3}	-0.696	-2.489×10^{-3}	4.257×10^{5}	3.291×10^{6}	20.8	4.99	6.819×10^{-7}	-1.07
179	-659	4.198×10^{3}	8.568×10^{3}	-70.6	7.564×10^{3}	-2.51	-6.020×10^{-3}	8.872×10^{5}	2.333×10^{6}	42.8	7.19	1.244×10^{-6}	-1.92
-3.95	10.9	-36.2	-70.6	2.88	-50.8	-6.329×10^{-2}	2.868×10^{-4}	-1.331×10^{4}	-1.951×10^{4}	-0.436	-8.019×10^{-2}	-1.610×10^{-8}	-2.913×10^{-2}
140	-565	3.675×10^{3}	7.564×10^{3}	-50.8	6.800×10^{3}	-2.74	-3.127×10^{-3}	6.898×10^{5}	1.067×10^{6}	36.4	5.87	1.056×10^{-6}	-1.98
1.86	0.224	-0.696	-2.51	-6.329×10^{-2}	-2.74	7.82	-1.478×10^{-4}	562	-6.544×10^{4}	-5.943×10^{-4}	1.976×10^{-2}	1.213×10^{-9}	4.290×10^{-3}
-1.637×10^{-2}	-1.730×10^{-3}	-2.489×10^{-3}	-6.020×10^{-3}	2.868×10^{-4}	-3.127×10^{-3}	-1.478×10^{-4}	6.426×10^{-6}	-1.63	57.5	-8.550×10^{-5}	-3.297×10^{-5}	-1.148×10^{-11}	-2.971×10^{-5}
3.259×10^{4}	-1.006×10^{5}	4.257×10^{5}	8.872×10^{5}	-1.331×10^{4}	6.898×10^{5}	562	-1.63	4.477×10^{8}	7.763×10^{9}	6.215×10^{3}	2.193×10^{3}	1.760×10^{-4}	163
-3.683×10^{5}	-3.202×10^{5}	3.291×10^{6}	2.333×10^{6}	-1.951×10^{4}	1.067×10^{6}	-6.544×10^{4}	57.5	7.763×10^{9}	8.439×10^{13}	8.277×10^{4}	3.352×10^{5}	2.986×10^{-3}	2.117×10^{3}
1.75	-4.63	20.8	42.8	-0.436	36.4	-5.943×10^{-4}	-8.550×10^{-5}	6.215×10^{3}	8.277×10^{4}	0.289	2.186×10^{-2}	8.261×10^{-9}	-9.497×10^{-3}
0.479	-0.458	4.99	7.19	-8.019×10^{-2}	5.87	1.976×10^{-2}	-3.297×10^{-5}	2.193×10^{3}	3.352×10^{5}	2.186×10^{-2}	1.03	2.327×10^{-9}	1.467×10^{-3}
1.356×10^{-7}	-1.885×10^{-7}	6.819×10^{-7}	1.244×10^{-6}	-1.610×10^{-8}	1.056×10^{-6}	1.213×10^{-9}	-1.148×10^{-11}	1.760×10^{-4}	2.986×10^{-3}	8.261×10^{-9}	2.327×10^{-9}	7.032×10^{-16}	-6.832×10^{-10}
2.868×10^{-3}	1.08	-1.07	-1.92	-2.913×10^{-2}	-1.98	4.290×10^{-3}	-2.971×10^{-5}	163	2.117×10^{3}	-9.497×10^{-3}	1.467×10^{-3}	-6.832×10^{-10}	3.743×10^{-2}

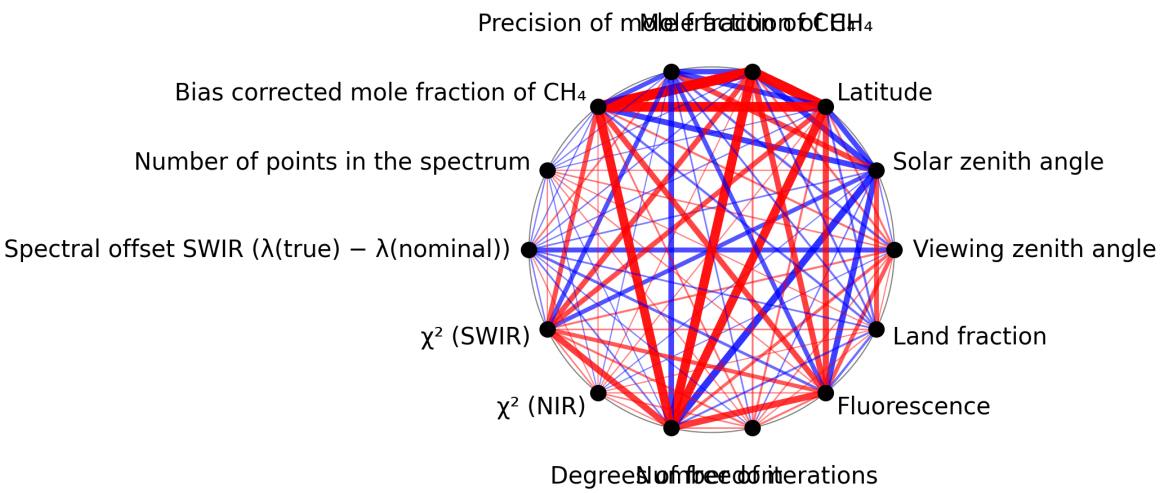


Figure 1: Map of correlation graph for 2025-11-28 to 2025-11-29.

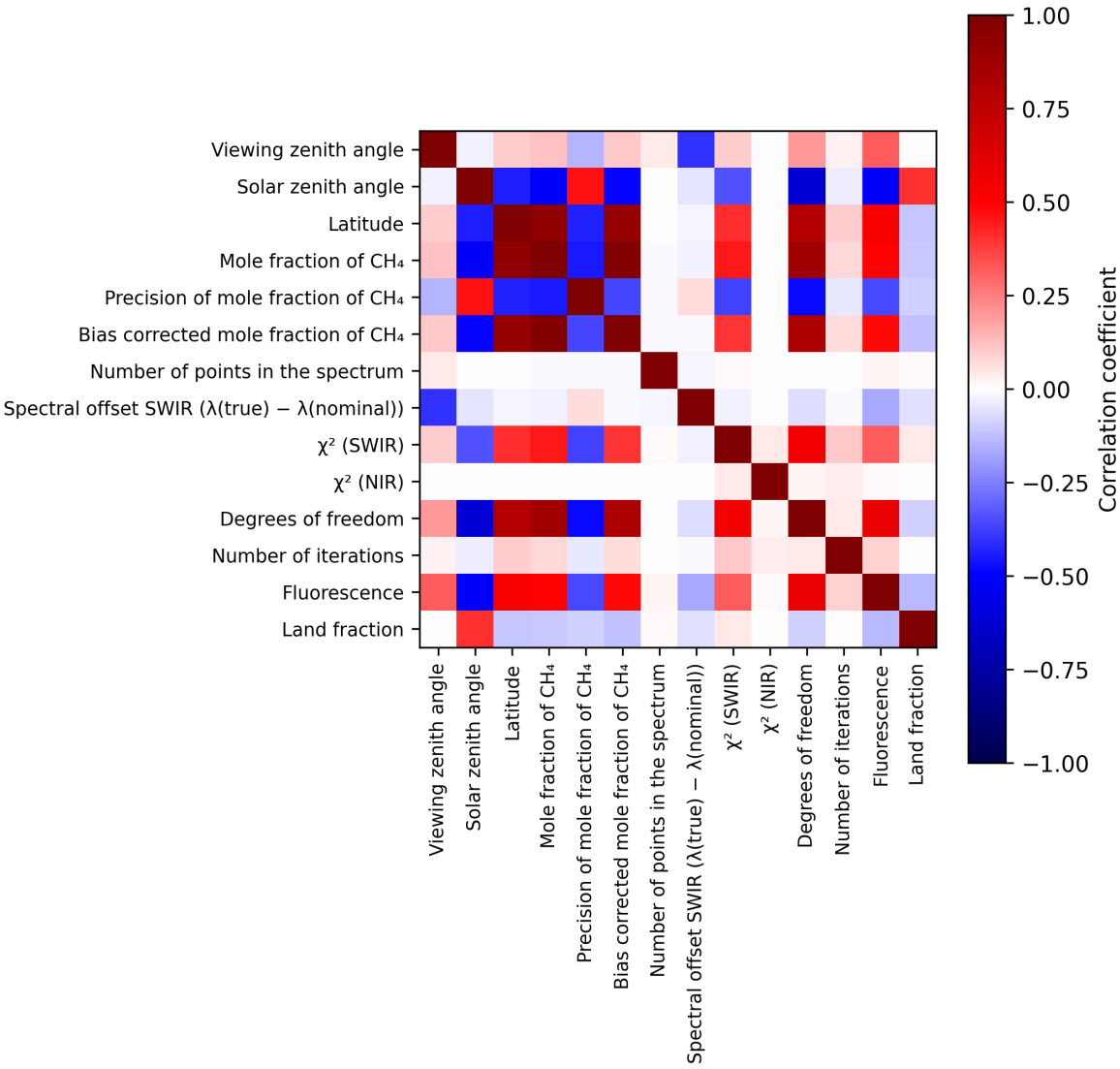


Figure 2: Map of correlation matrix for 2025-11-28 to 2025-11-29.

3 Granule outlines

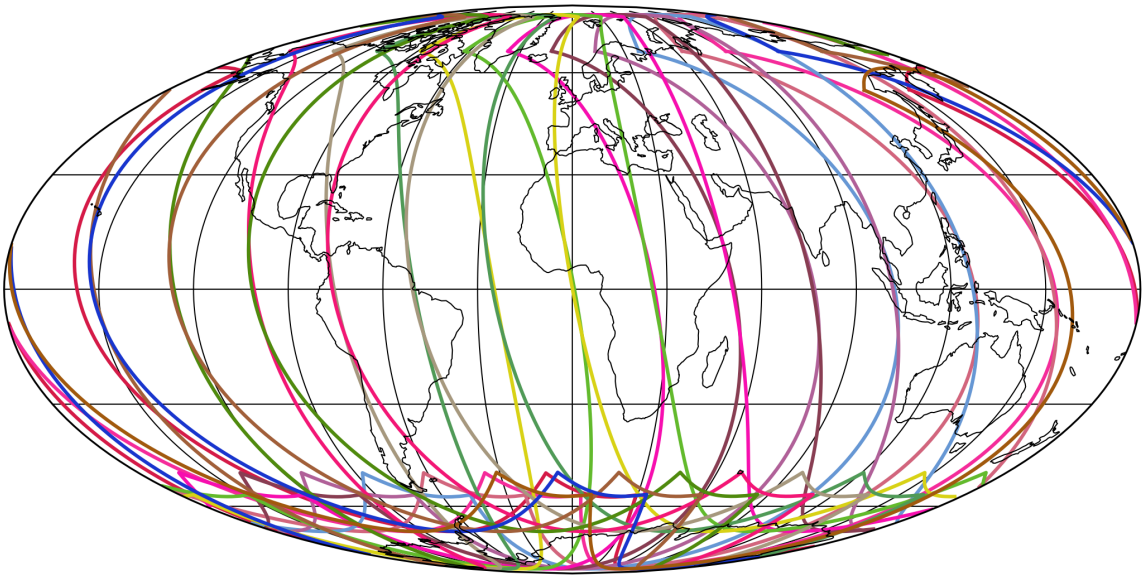


Figure 3: Outline of the granules.

4 Input data monitoring

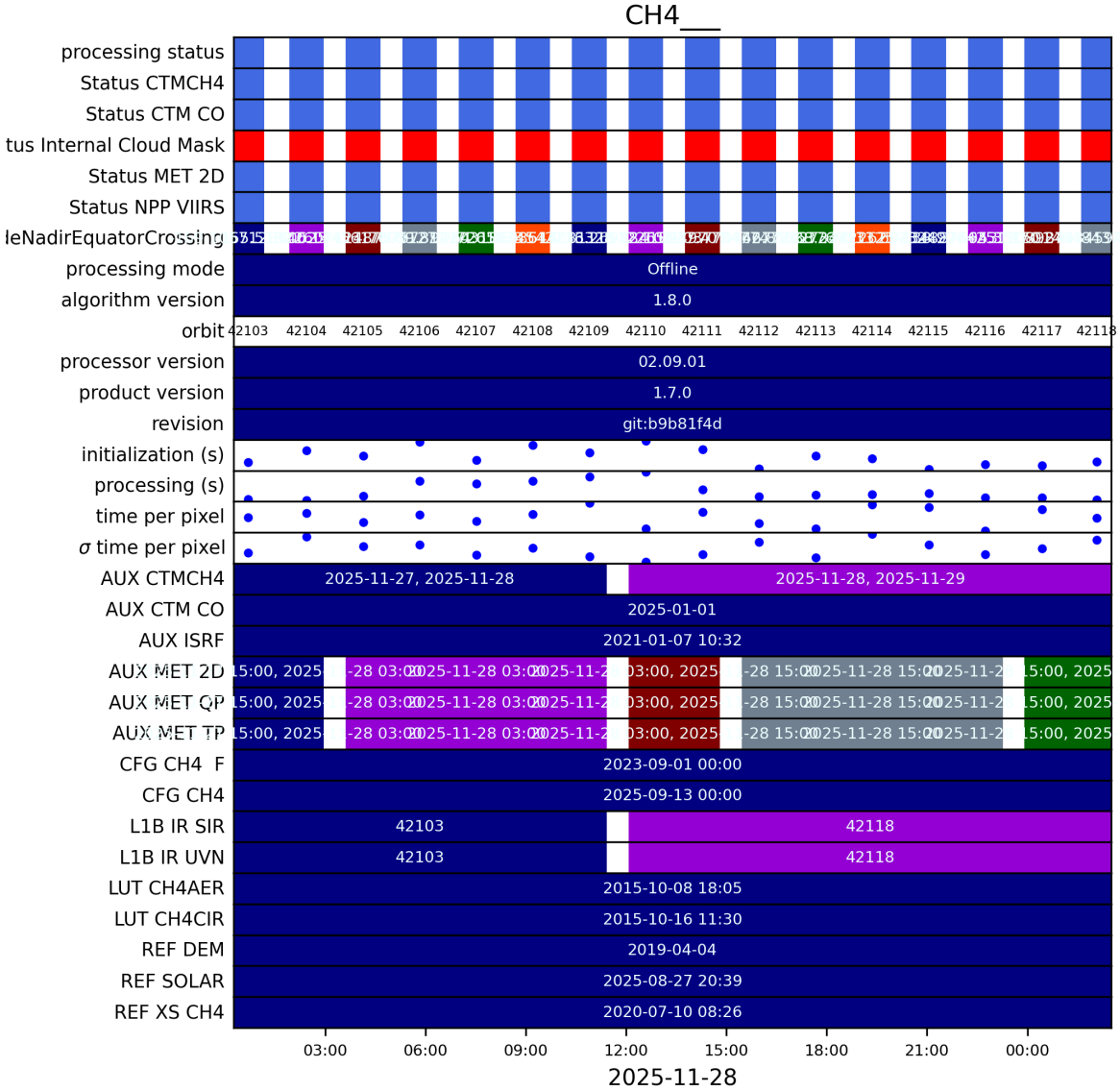


Figure 4: Input data per granule

5 Warnings and errors

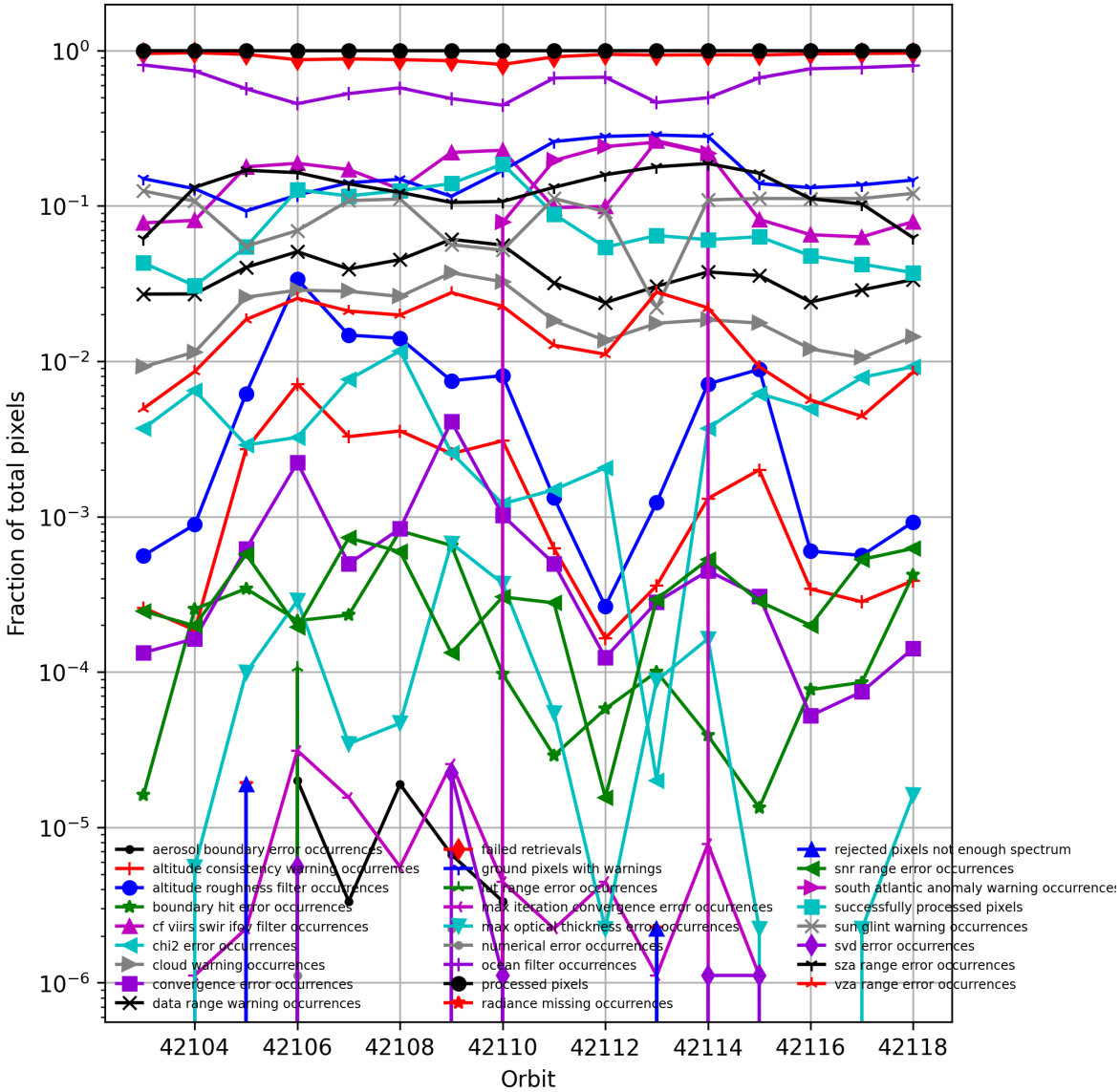


Figure 5: Fraction of pixels with specific warnings and errors during processing

6 World maps

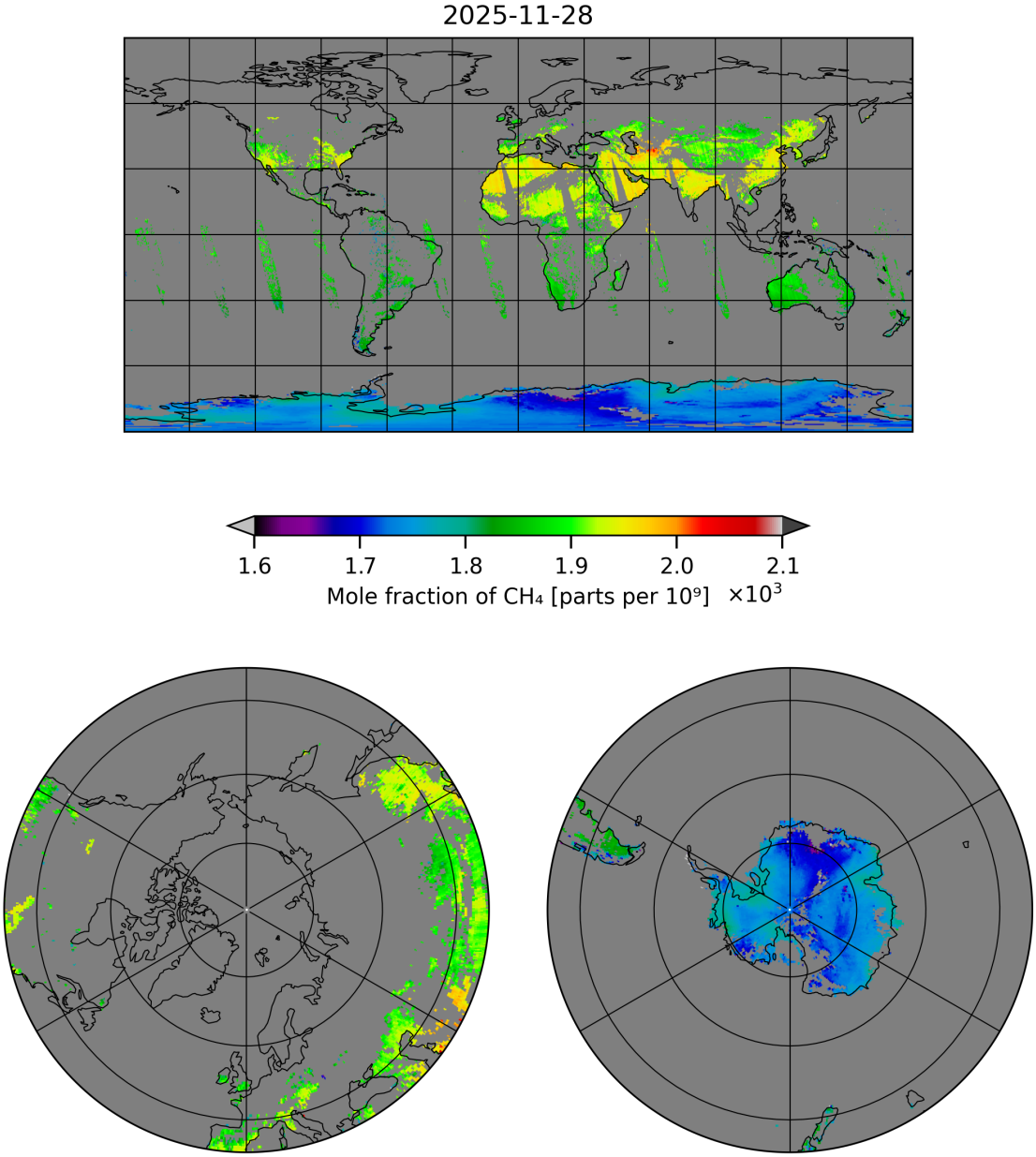


Figure 6: Map of "Mole fraction of CH_4" for 2025-11-28 to 2025-11-29

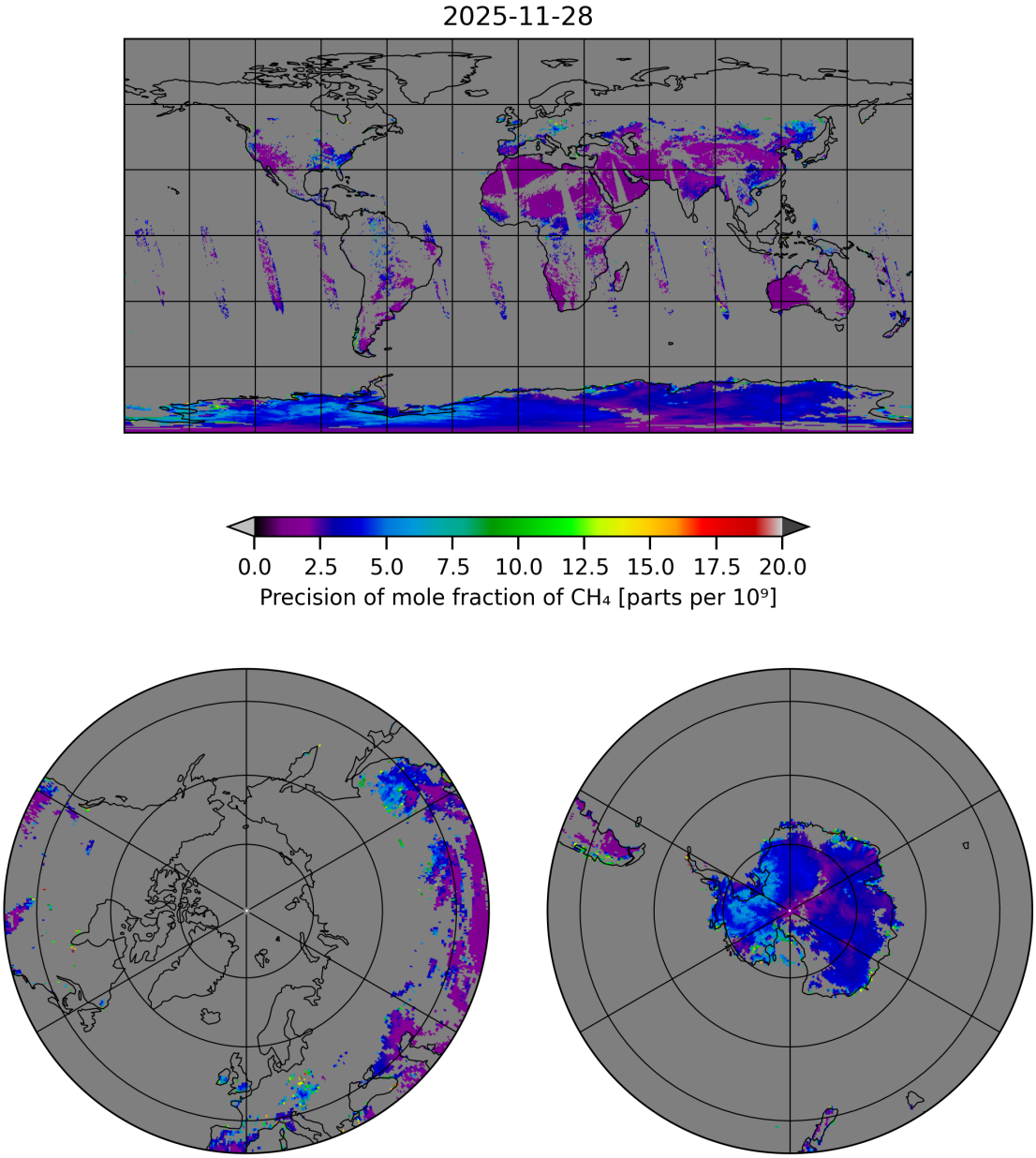


Figure 7: Map of "Precision of mole fraction of CH_4" for 2025-11-28 to 2025-11-29

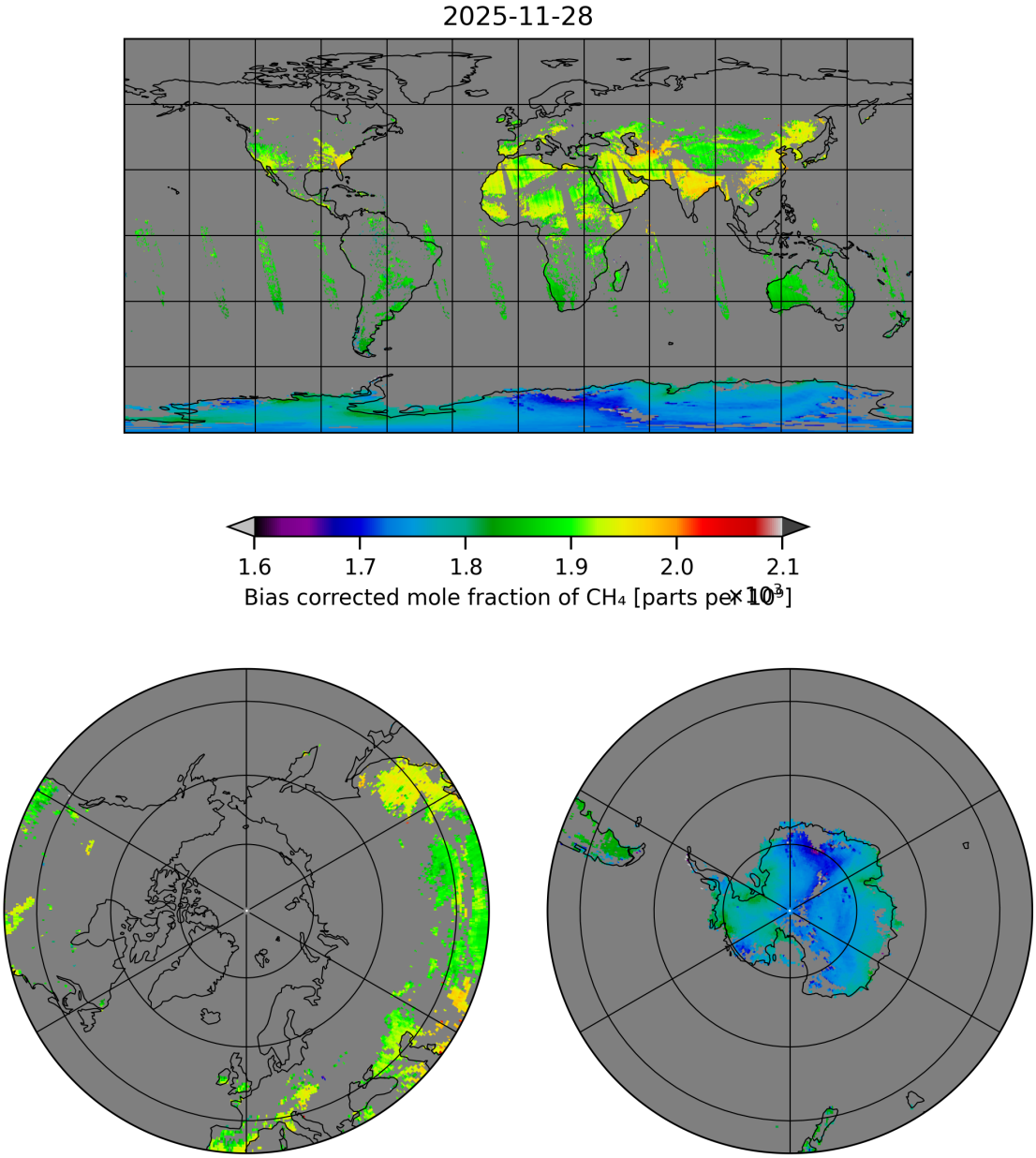


Figure 8: Map of "Bias corrected mole fraction of CH_4" for 2025-11-28 to 2025-11-29

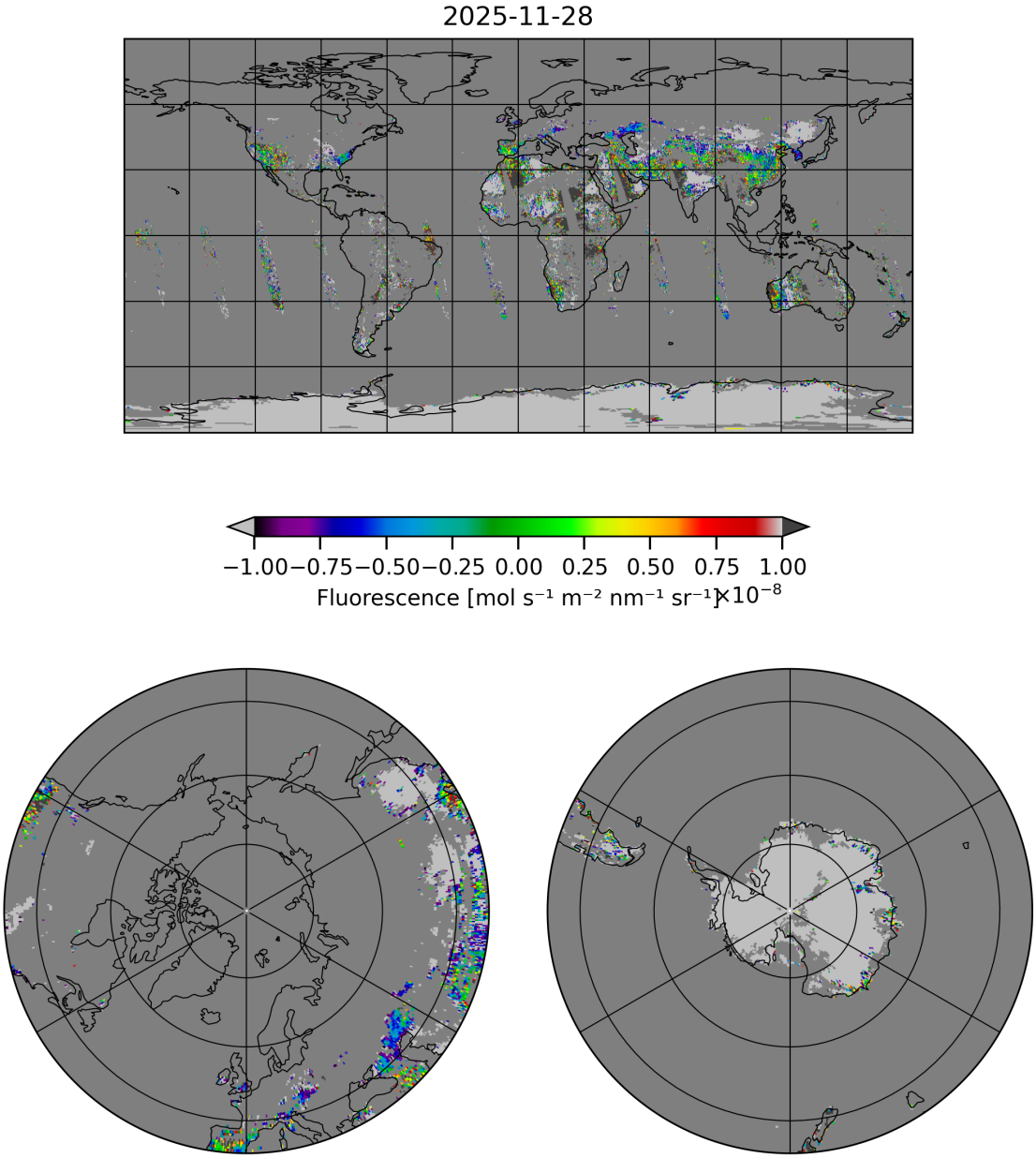


Figure 9: Map of “Fluorescence” for 2025-11-28 to 2025-11-29

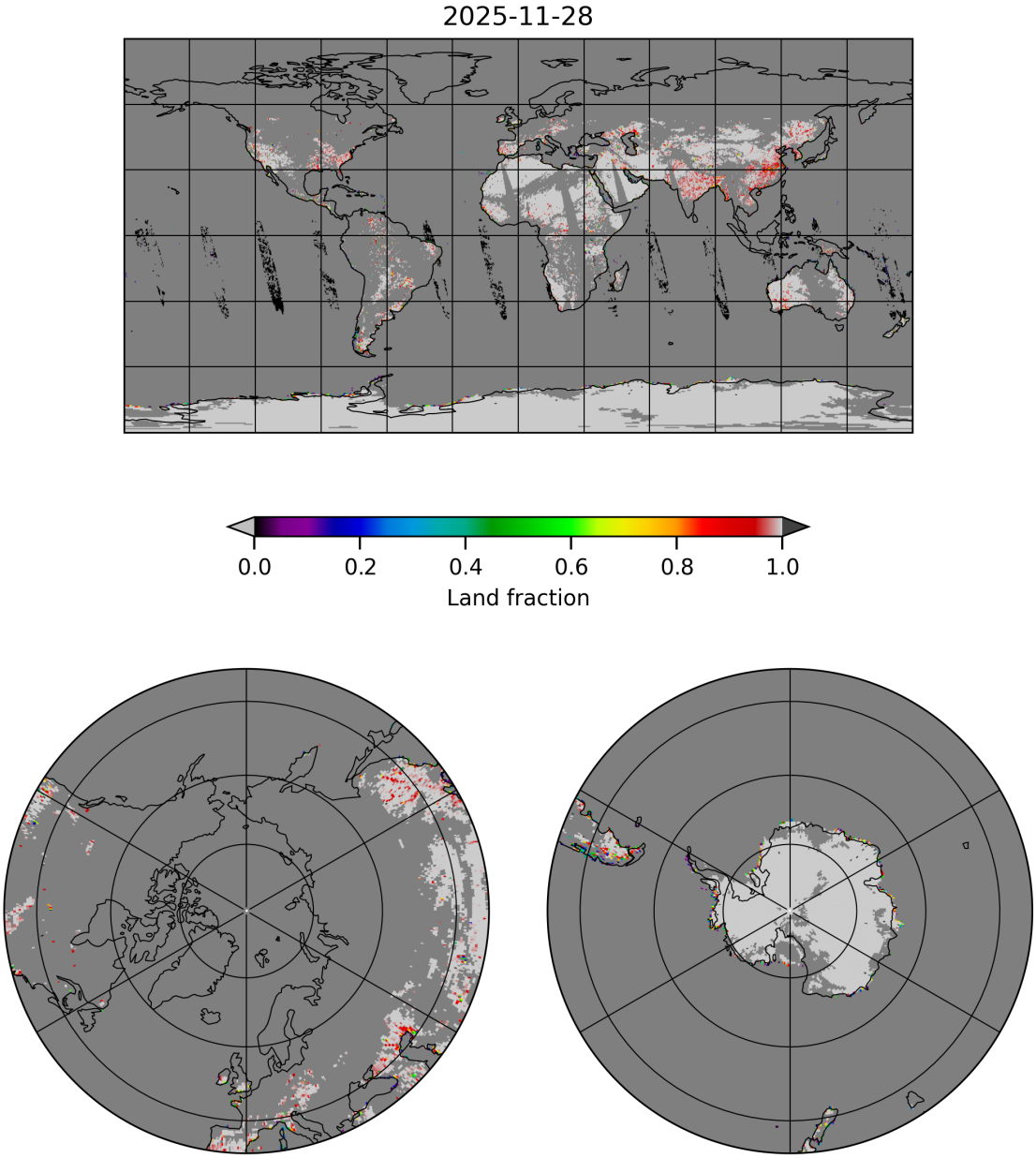


Figure 10: Map of “Land fraction” for 2025-11-28 to 2025-11-29

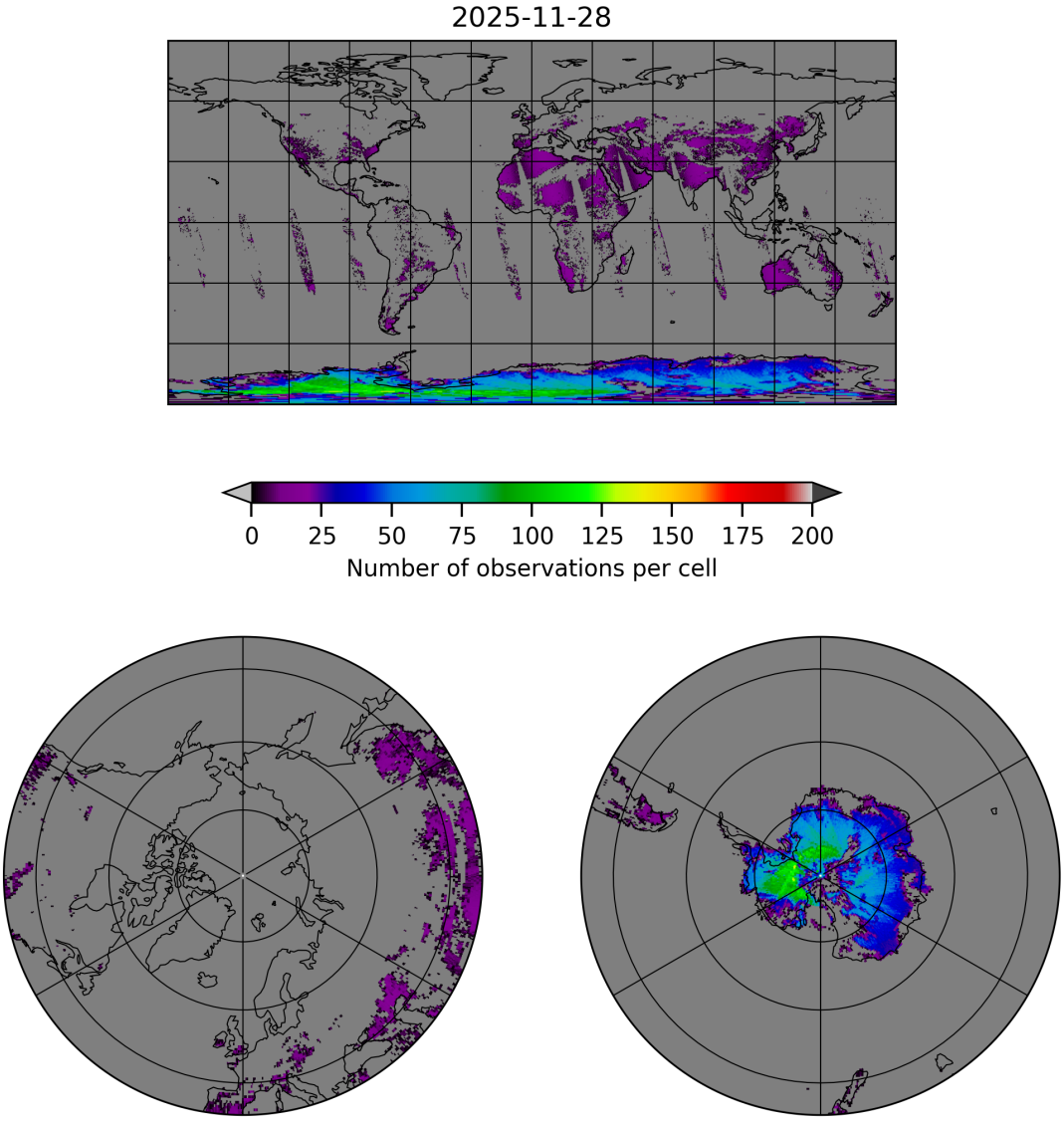


Figure 11: Map of the number of observations for 2025-11-28 to 2025-11-29

7 Zonal average

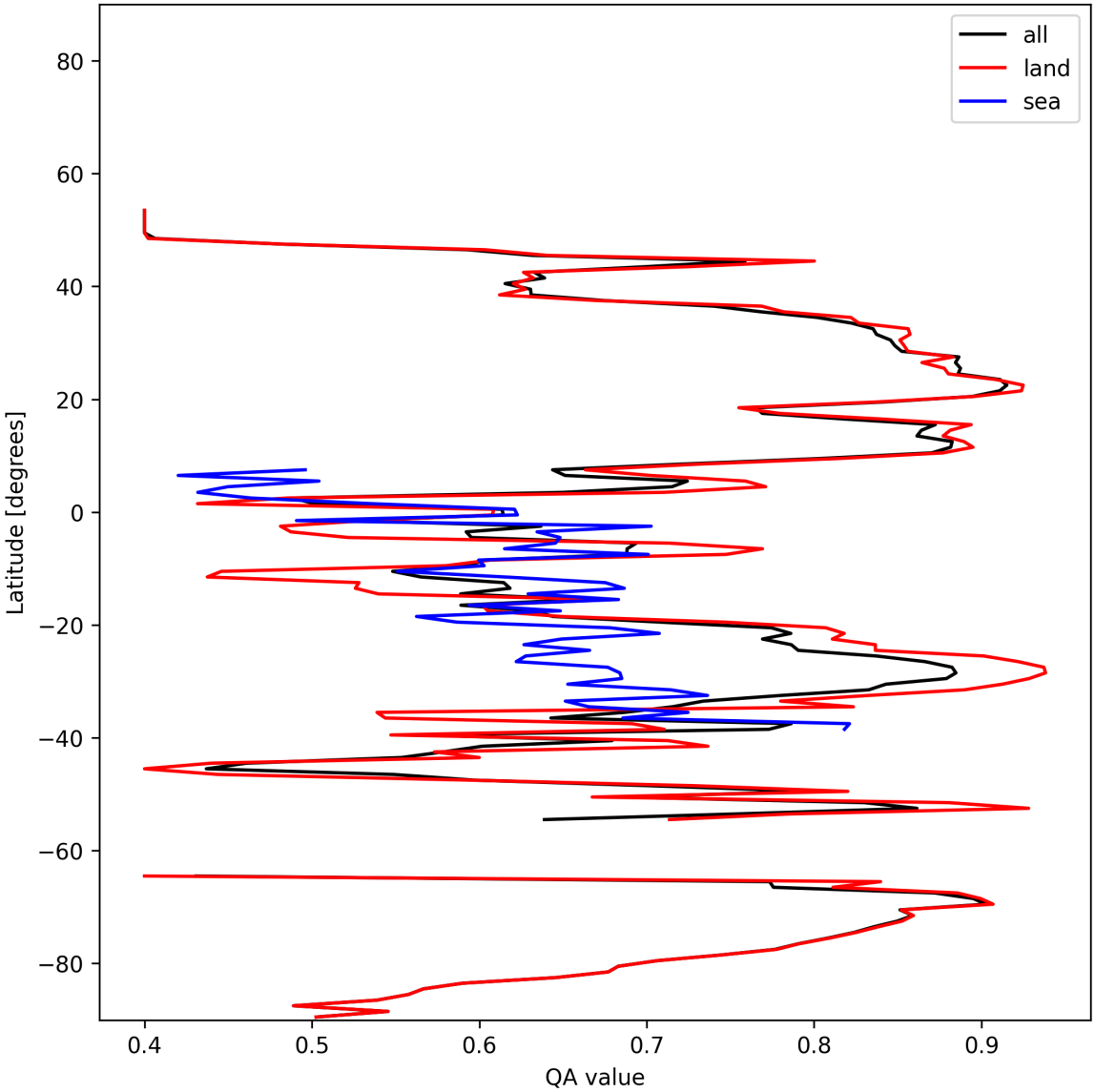


Figure 12: Zonal average of “QA value” for 2025-11-28 to 2025-11-29.

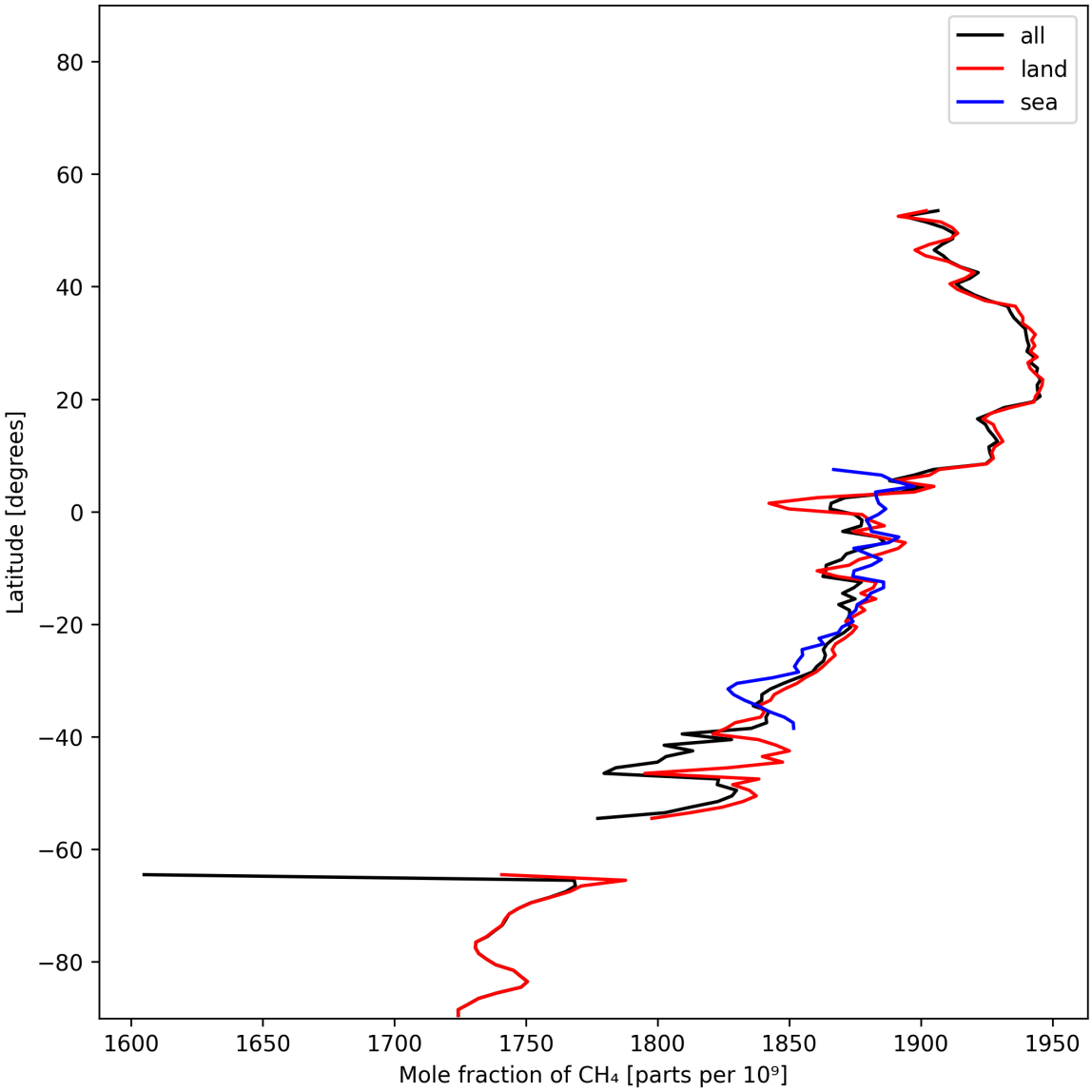


Figure 13: Zonal average of "Mole fraction of CH_4" for 2025-11-28 to 2025-11-29.

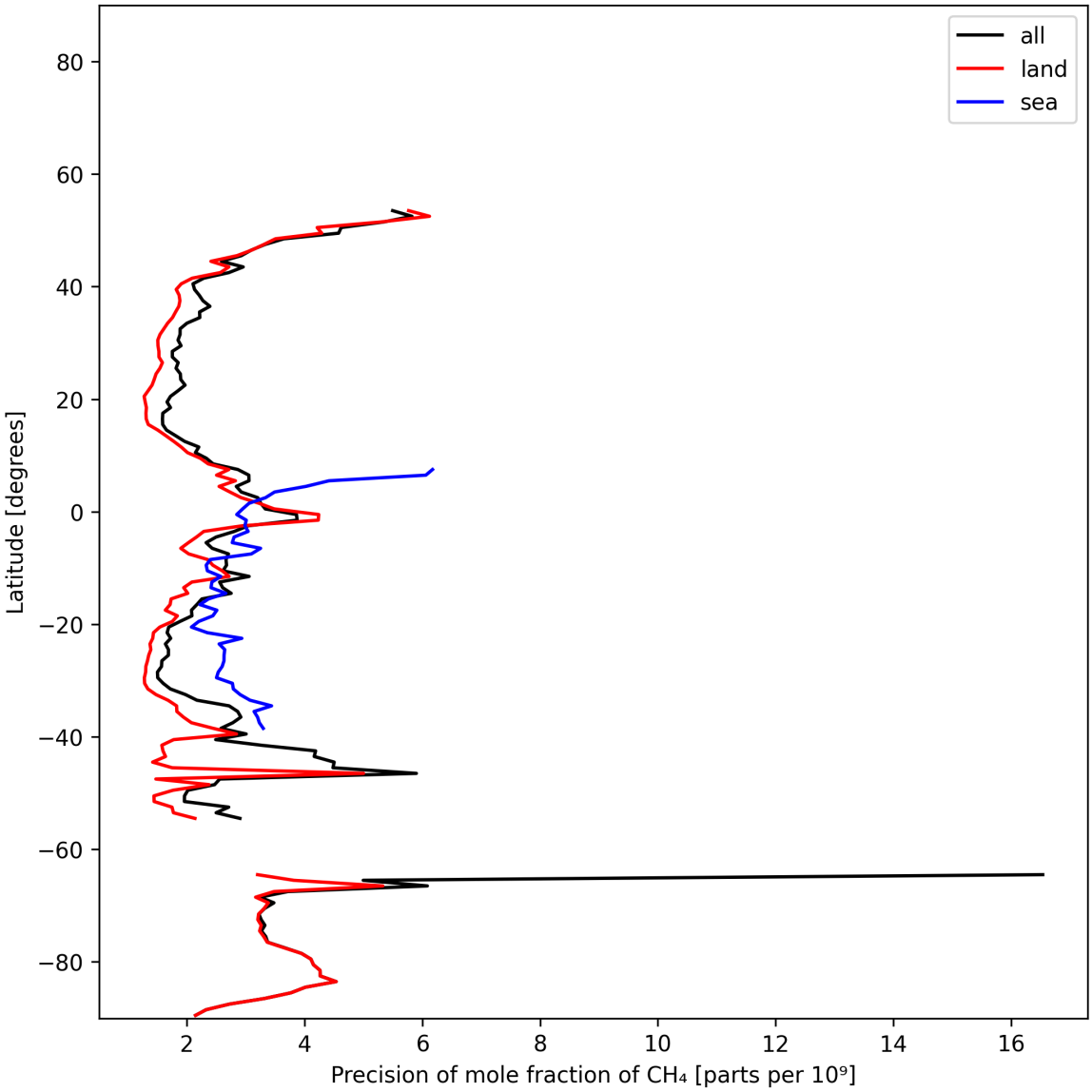


Figure 14: Zonal average of "Precision of mole fraction of CH_4" for 2025-11-28 to 2025-11-29.

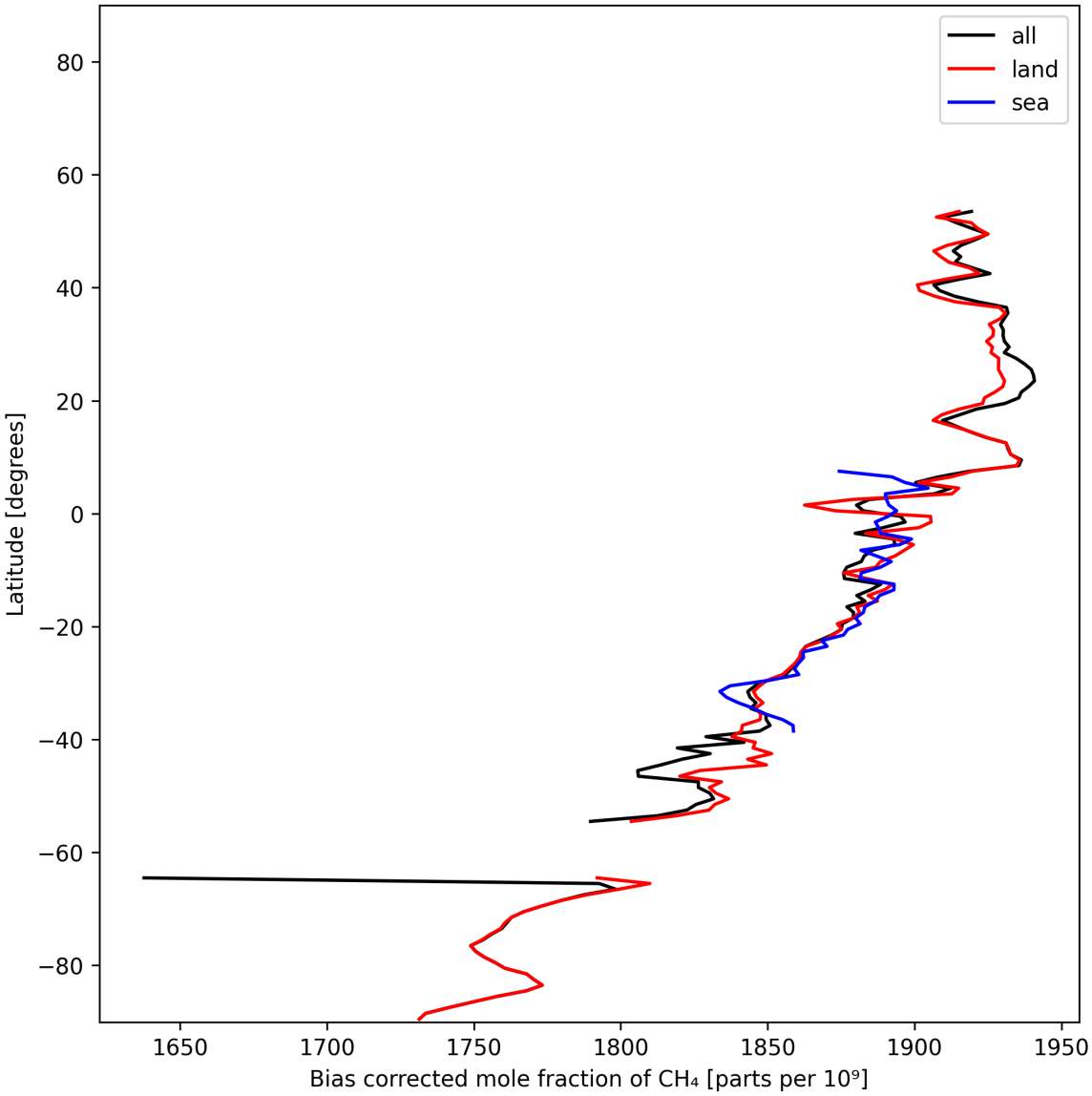


Figure 15: Zonal average of "Bias corrected mole fraction of CH_4" for 2025-11-28 to 2025-11-29.

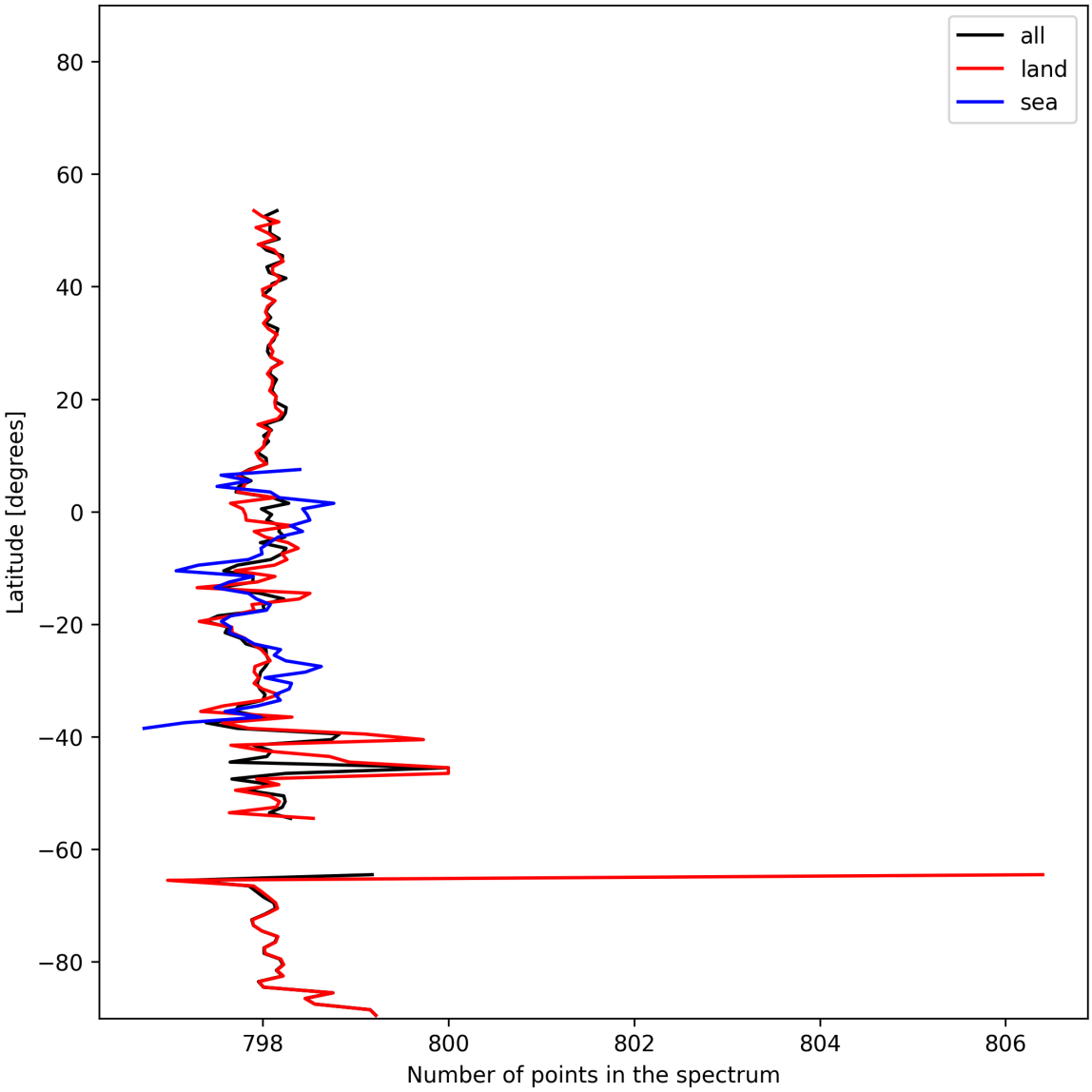


Figure 16: Zonal average of “Number of points in the spectrum” for 2025-11-28 to 2025-11-29.

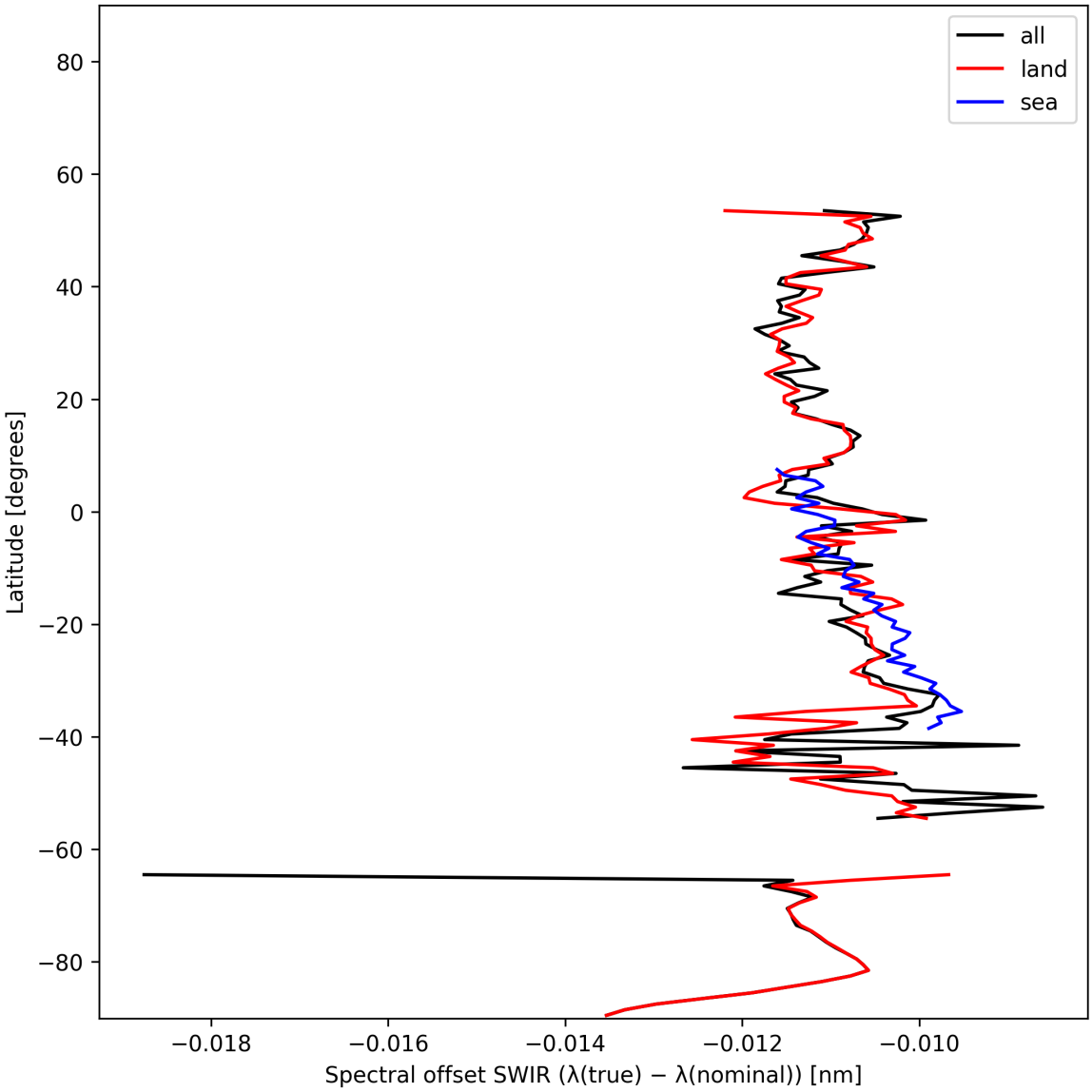


Figure 17: Zonal average of "Spectral offset SWIR ($\lambda_{\text{true}} - \lambda_{\text{nominal}}$)" for 2025-11-28 to 2025-11-29.

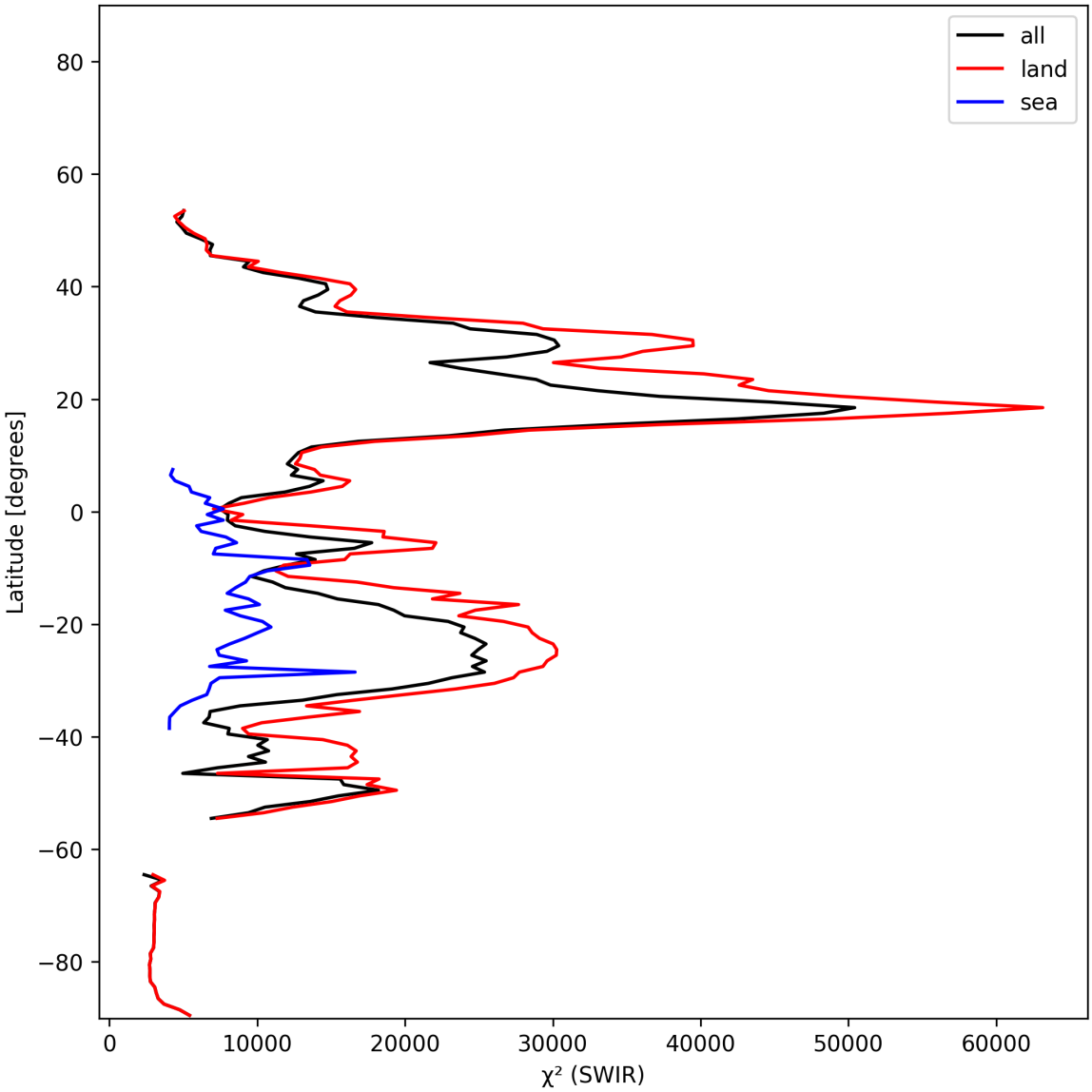


Figure 18: Zonal average of "χ^2 (SWIR)" for 2025-11-28 to 2025-11-29.

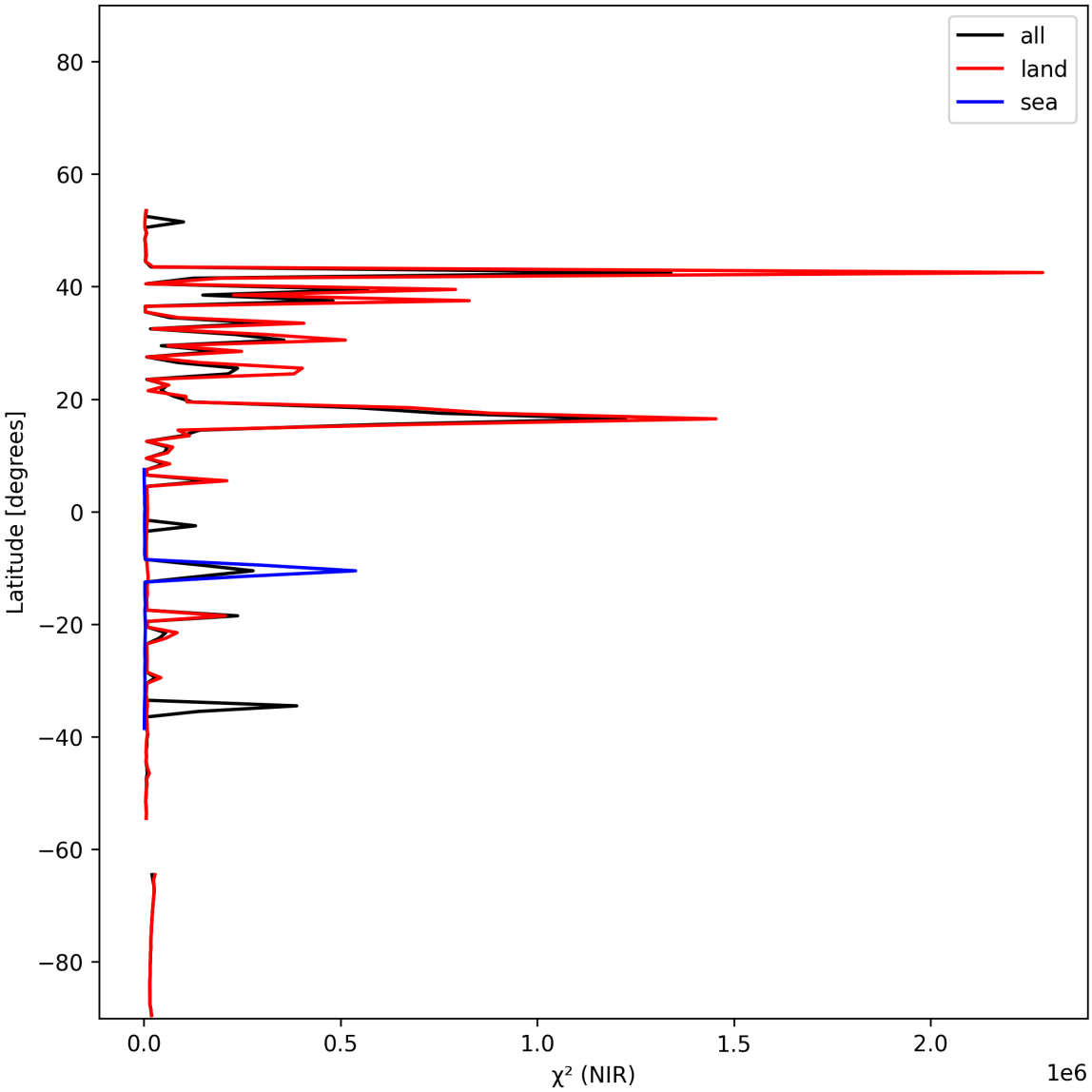


Figure 19: Zonal average of "χ^2 (NIR)" for 2025-11-28 to 2025-11-29.

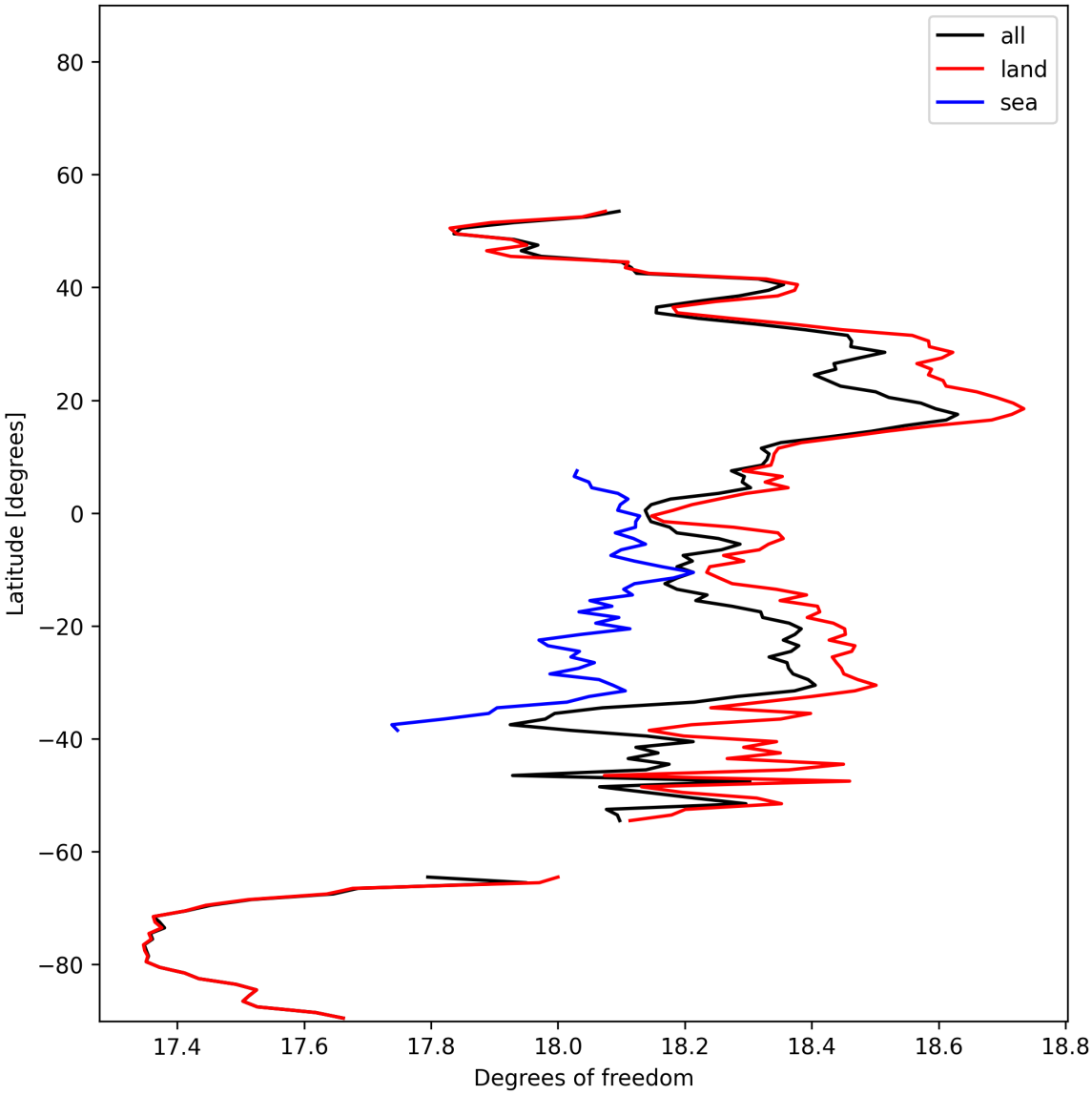


Figure 20: Zonal average of “Degrees of freedom” for 2025-11-28 to 2025-11-29.

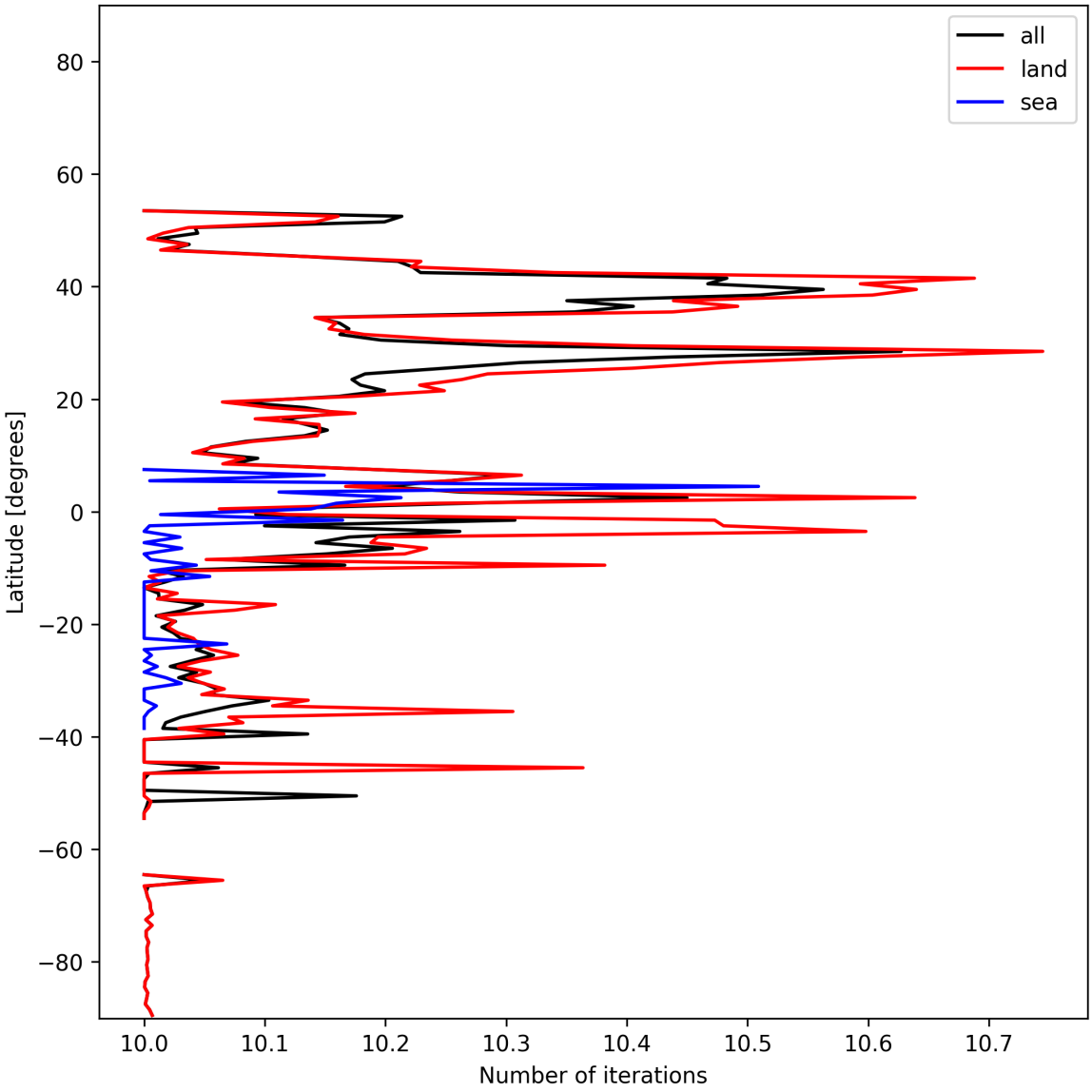


Figure 21: Zonal average of “Number of iterations” for 2025-11-28 to 2025-11-29.

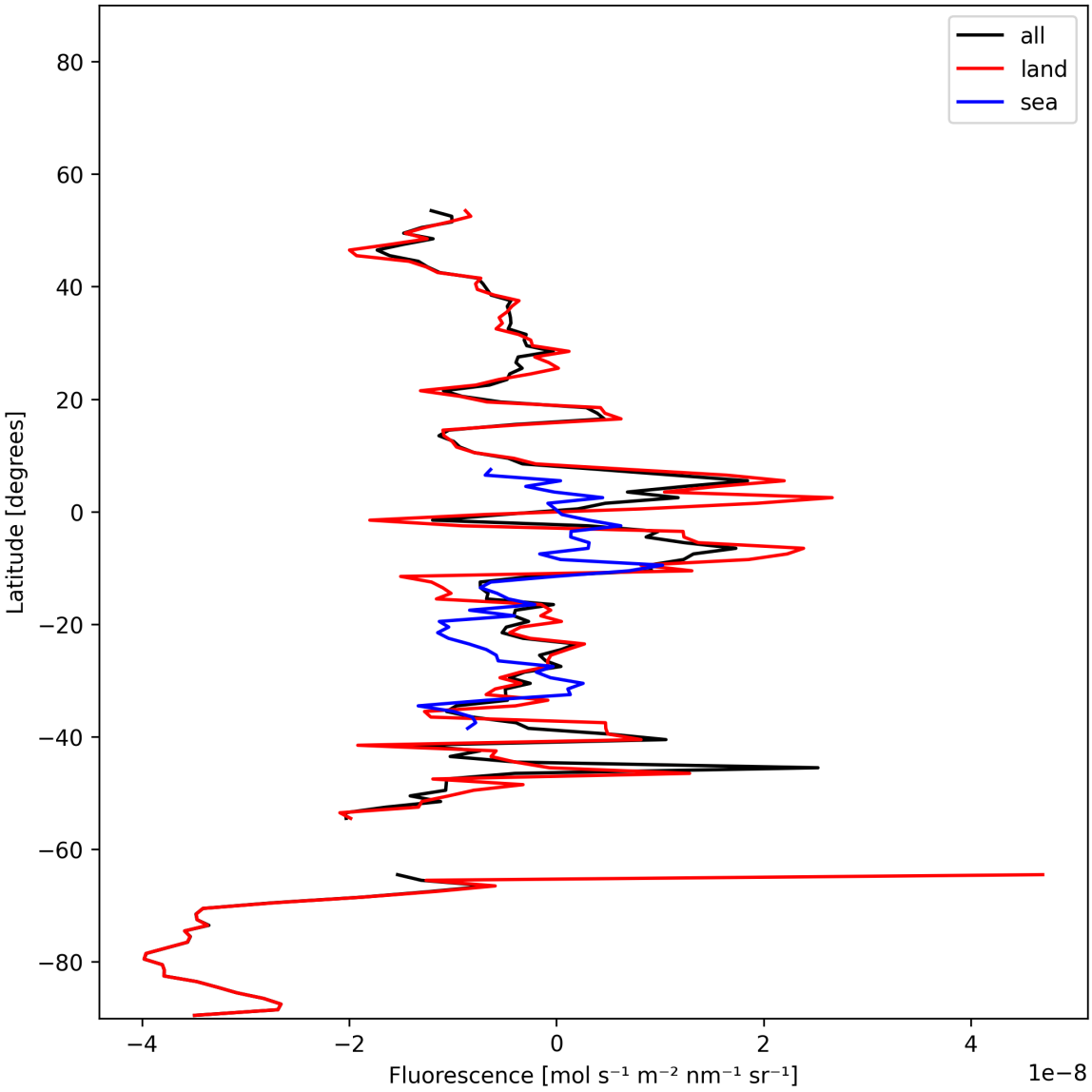


Figure 22: Zonal average of “Fluorescence” for 2025-11-28 to 2025-11-29.

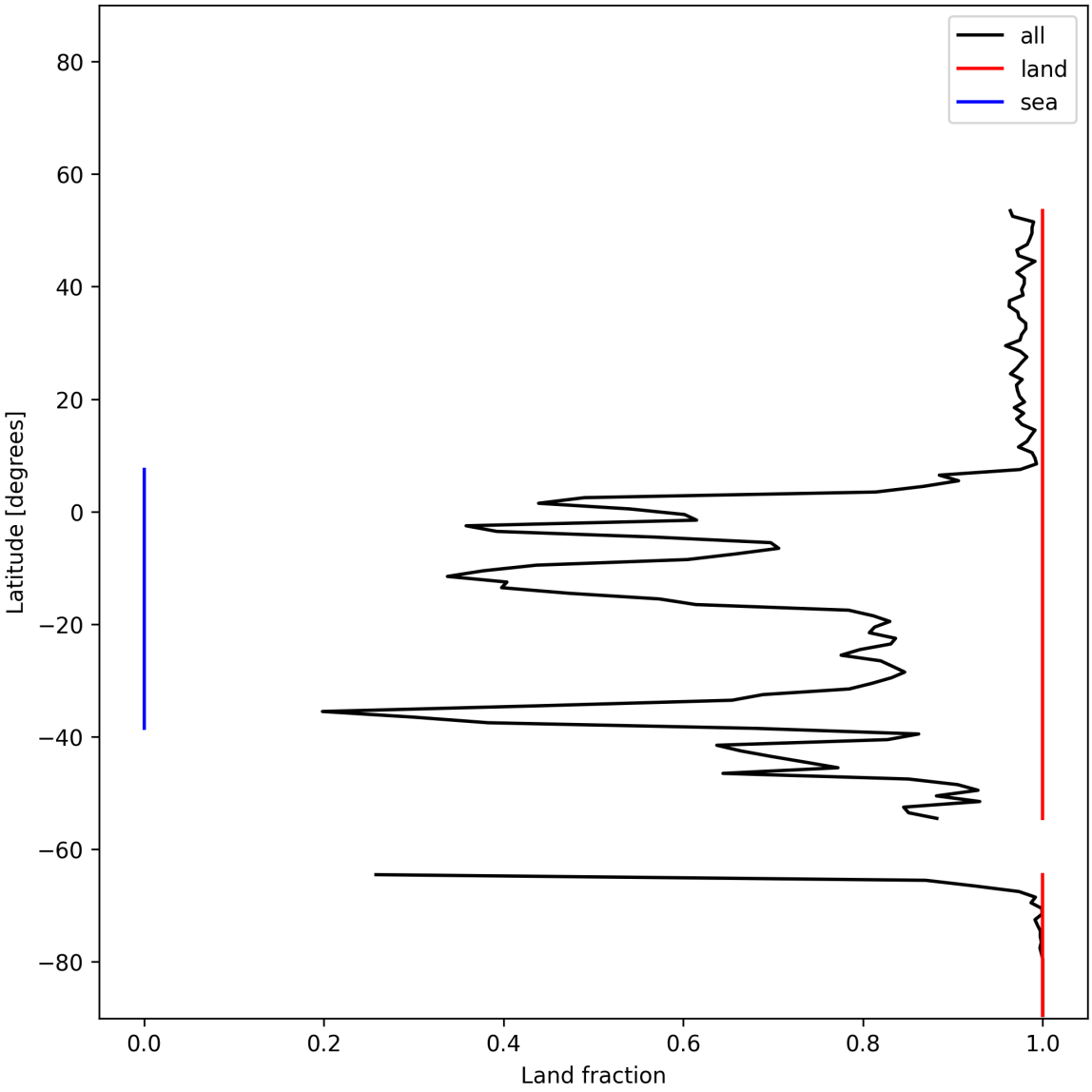


Figure 23: Zonal average of “Land fraction” for 2025-11-28 to 2025-11-29.

8 Histograms

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

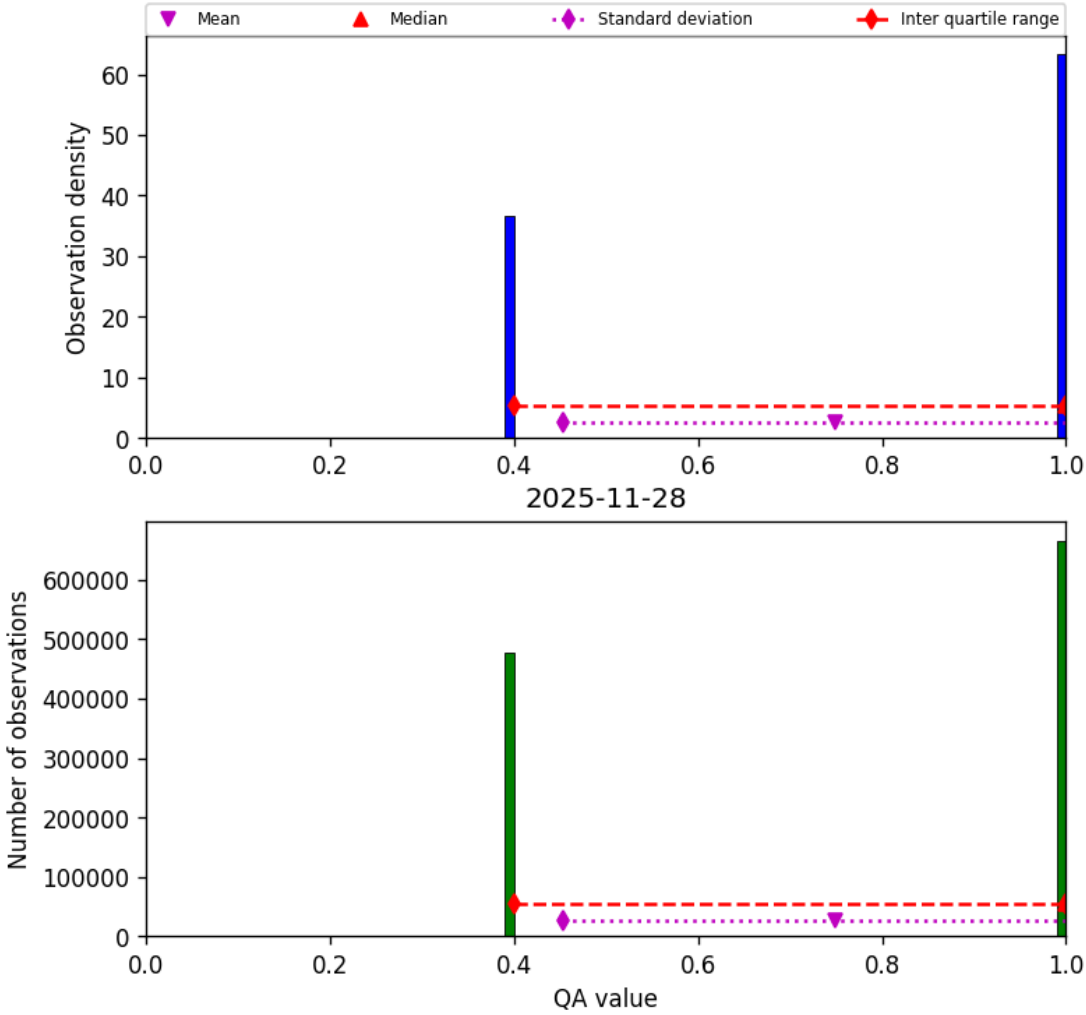


Figure 24: Histogram of “QA value” for 2025-11-28 to 2025-11-29

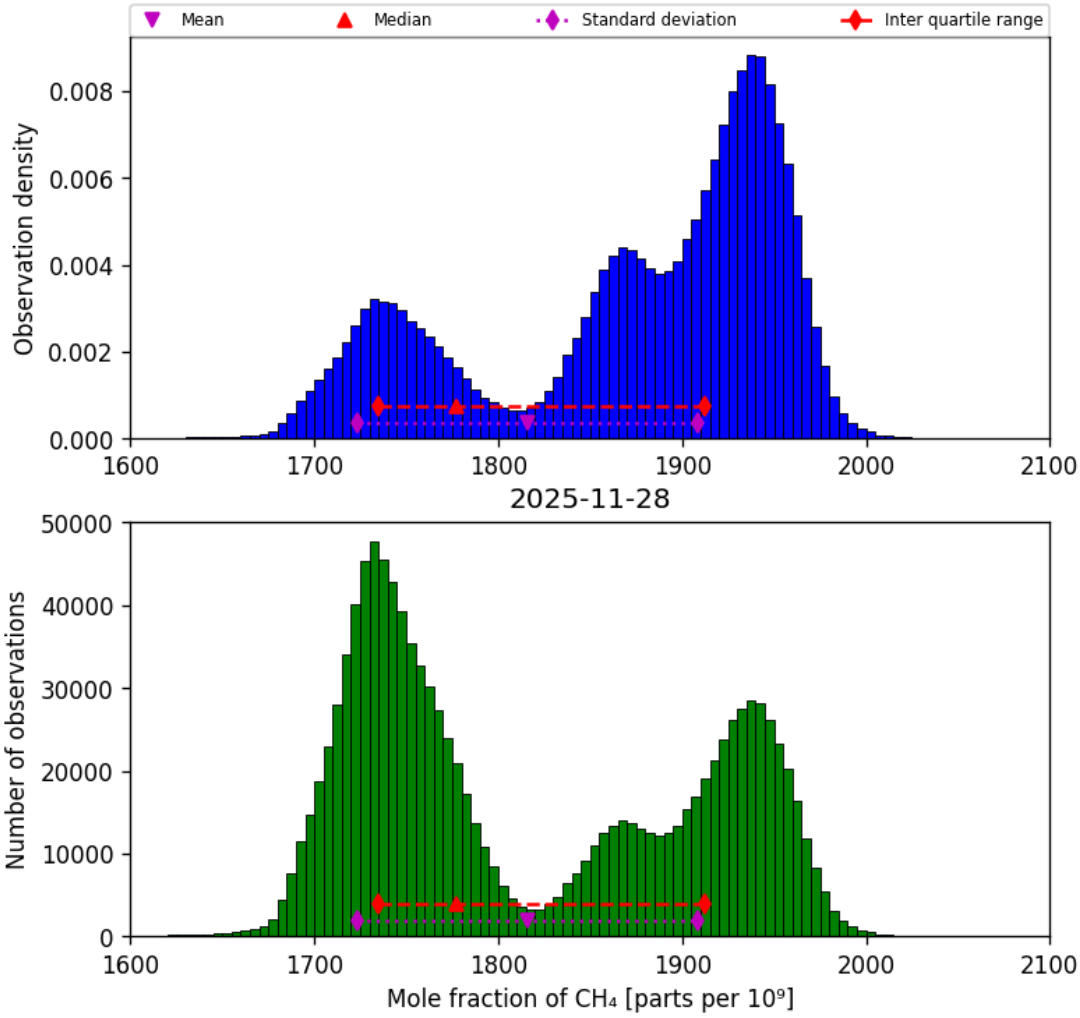


Figure 25: Histogram of "Mole fraction of CH_4" for 2025-11-28 to 2025-11-29

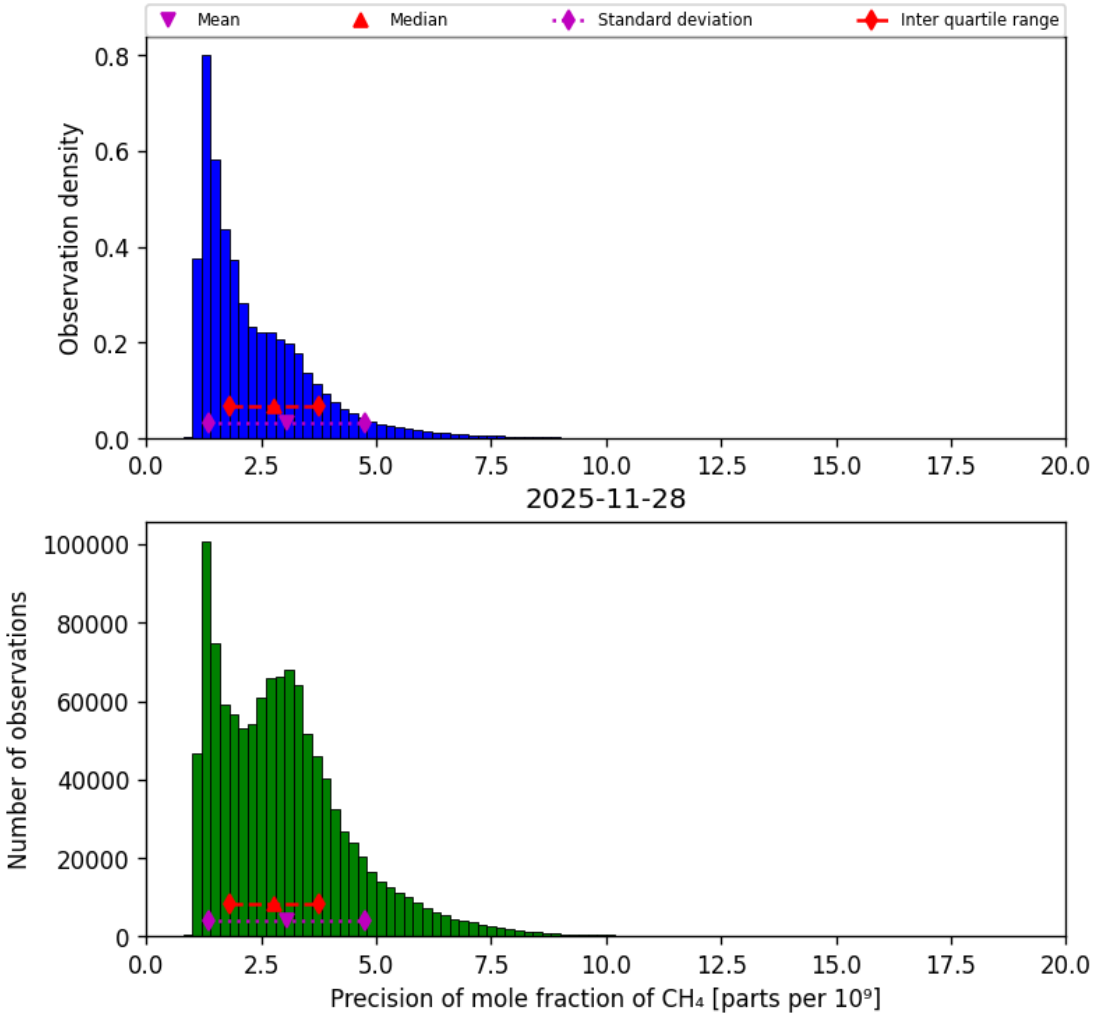


Figure 26: Histogram of "Precision of mole fraction of CH_4" for 2025-11-28 to 2025-11-29

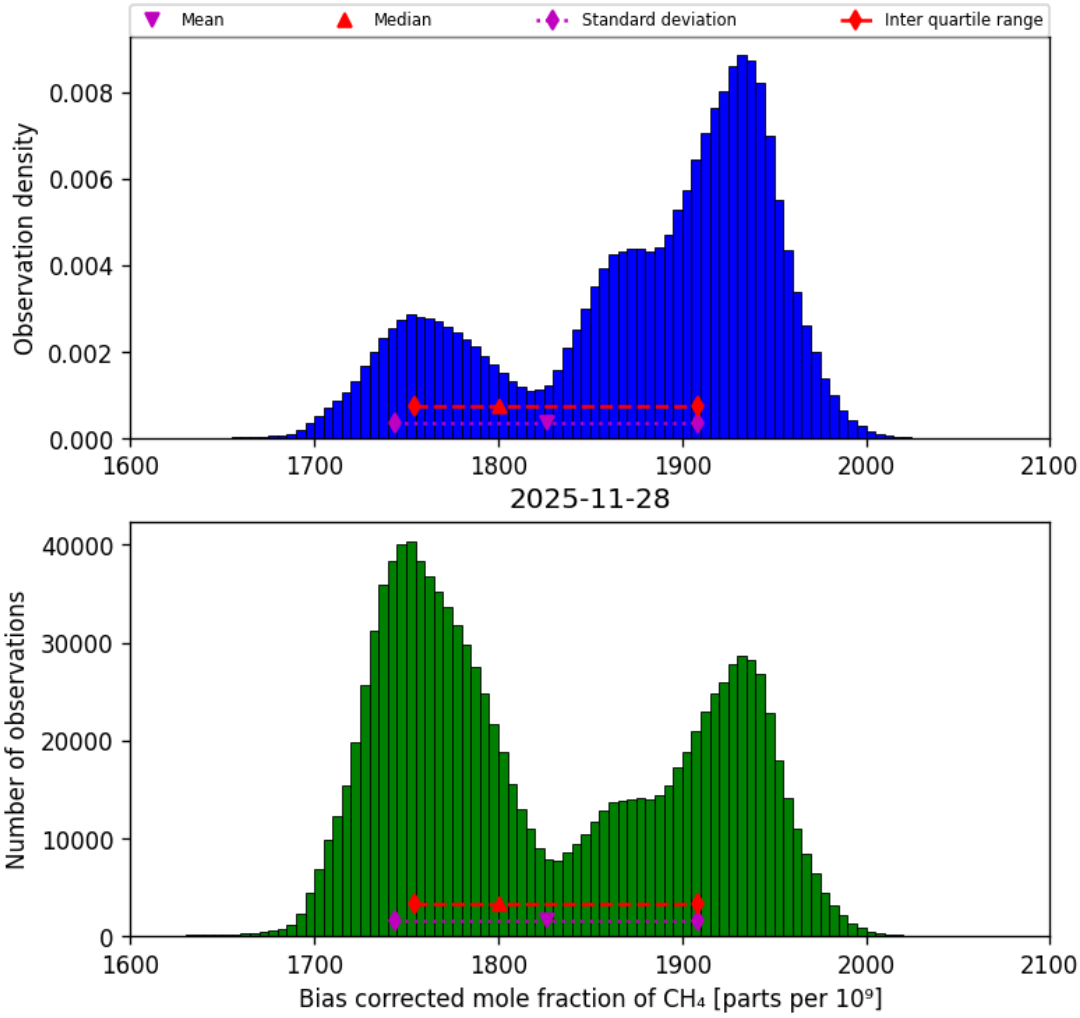


Figure 27: Histogram of "Bias corrected mole fraction of CH_4" for 2025-11-28 to 2025-11-29

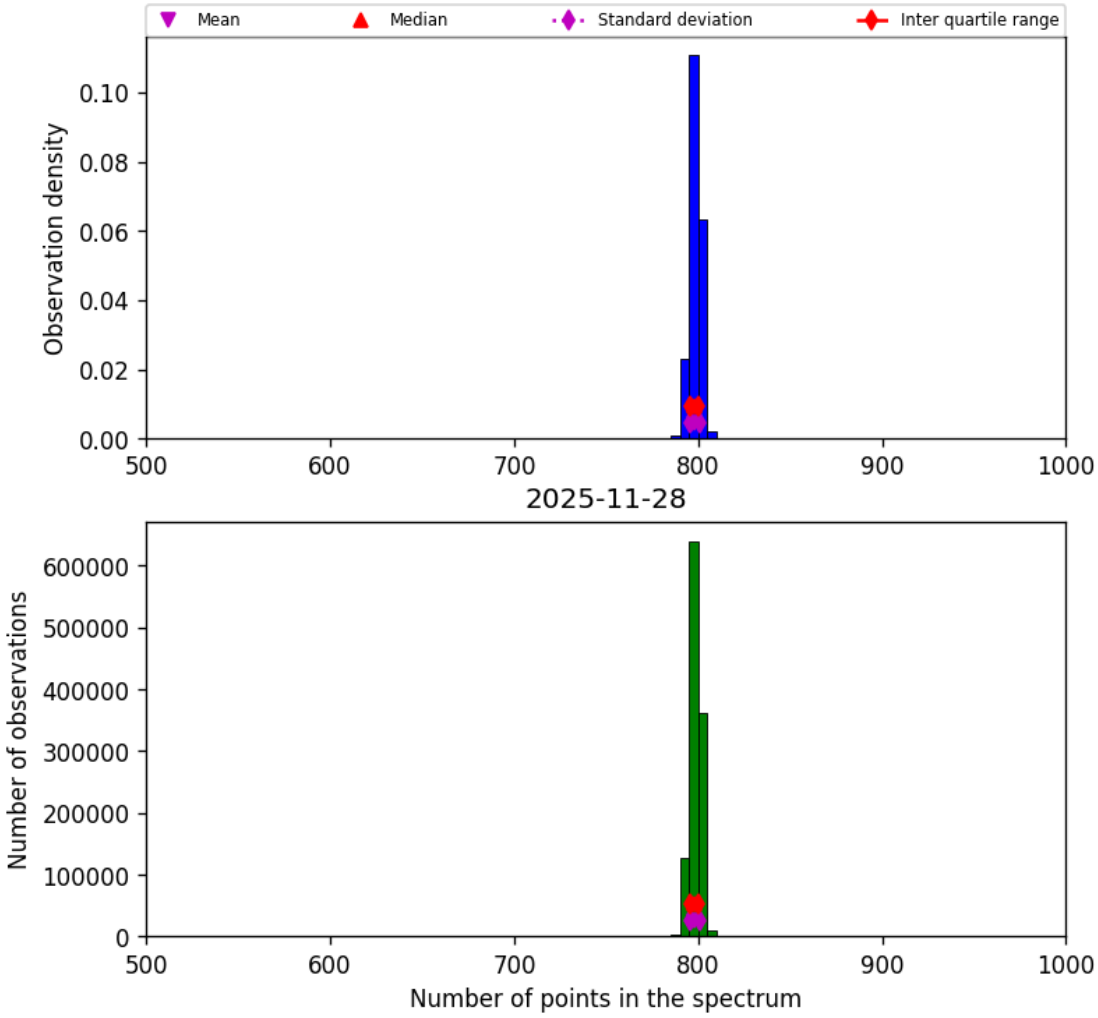


Figure 28: Histogram of “Number of points in the spectrum” for 2025-11-28 to 2025-11-29

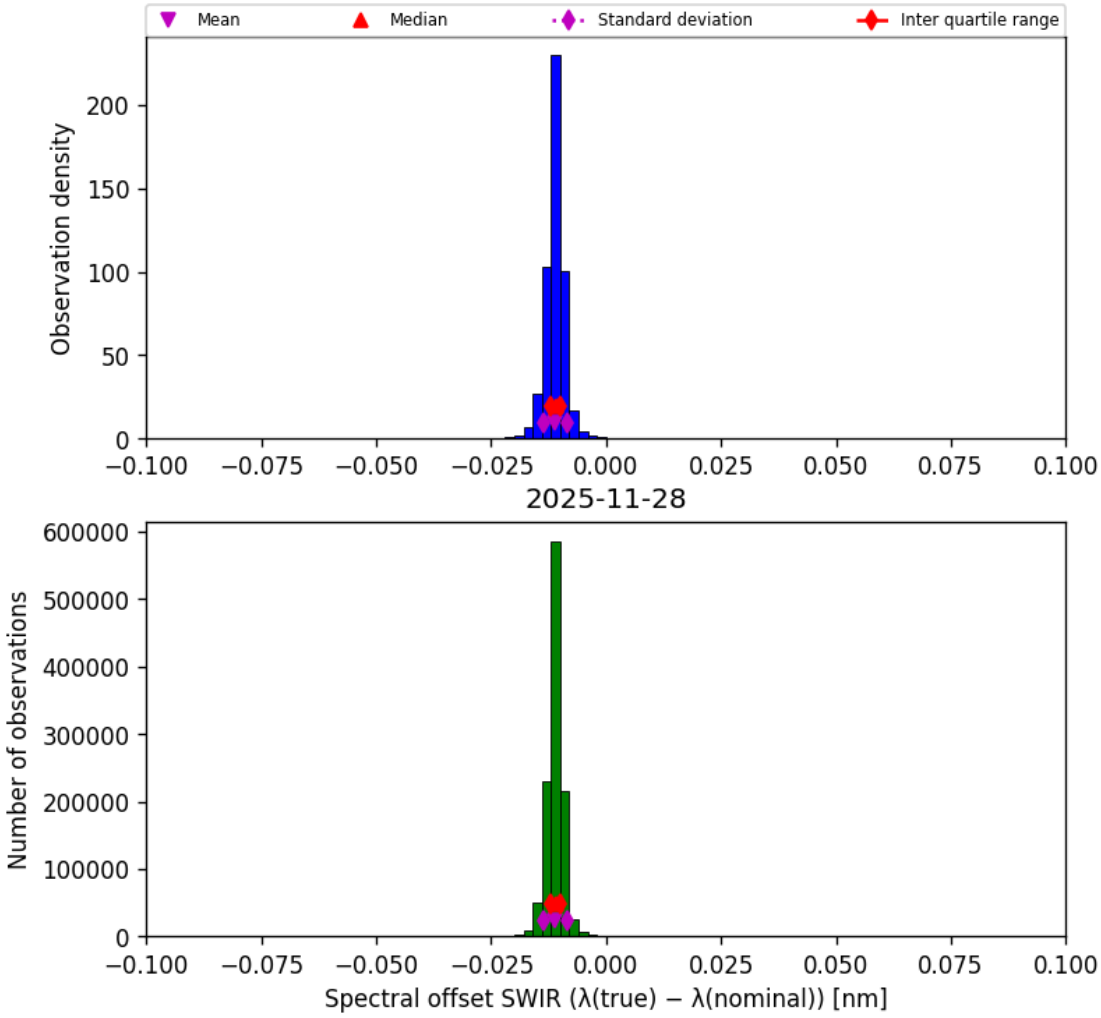


Figure 29: Histogram of "Spectral offset SWIR ($\lambda_{\text{true}} - \lambda_{\text{nominal}}$)" for 2025-11-28 to 2025-11-29

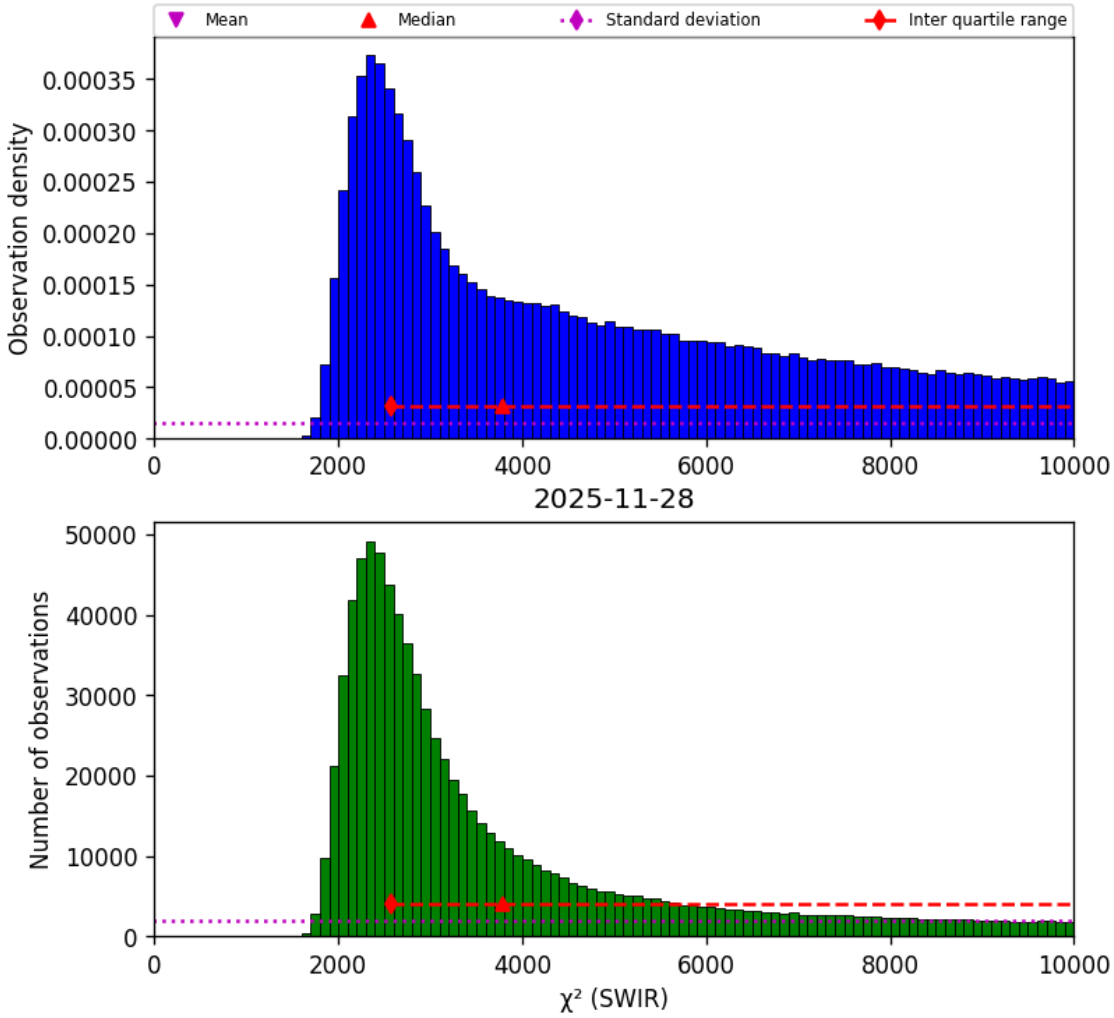


Figure 30: Histogram of "χ^2 (SWIR)" for 2025-11-28 to 2025-11-29

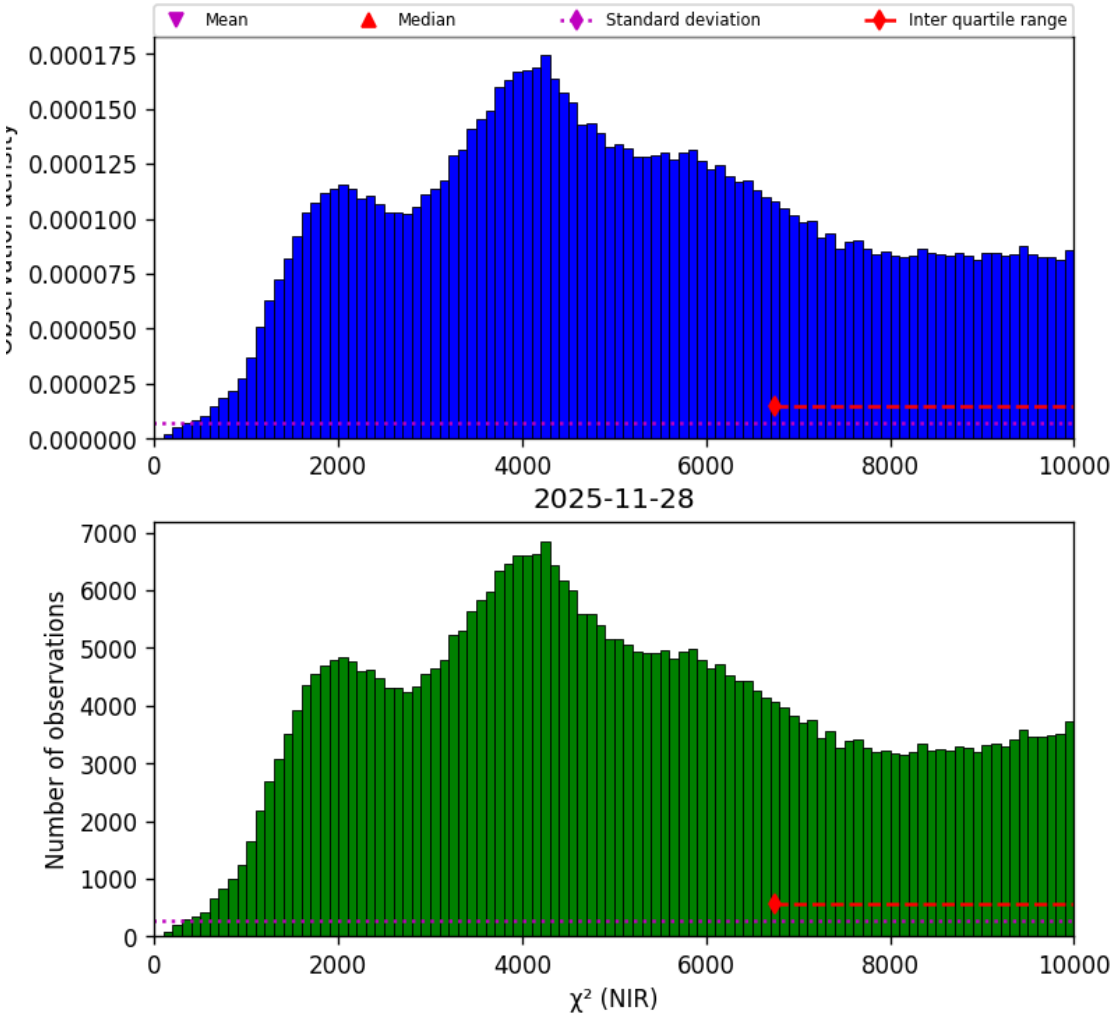


Figure 31: Histogram of "χ^2 (NIR)" for 2025-11-28 to 2025-11-29

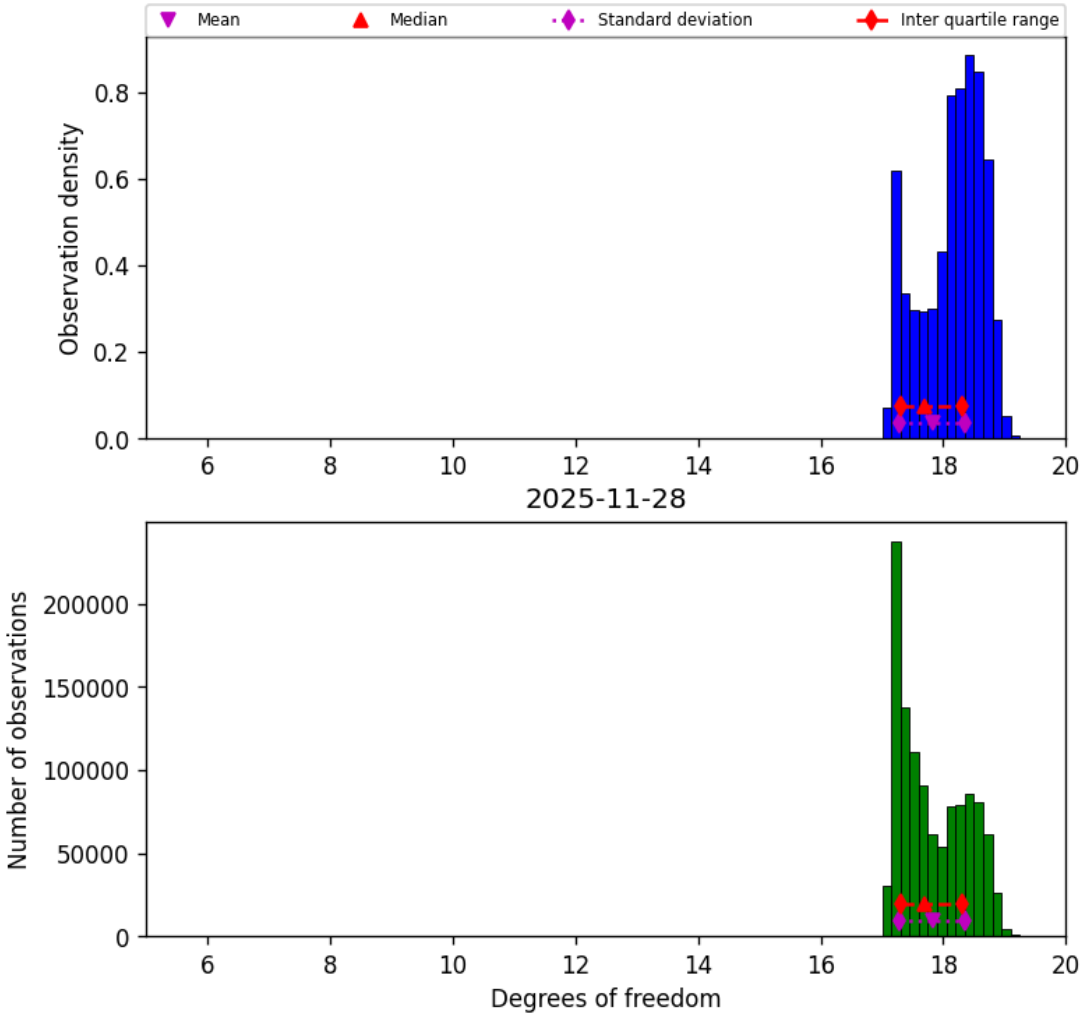


Figure 32: Histogram of “Degrees of freedom” for 2025-11-28 to 2025-11-29

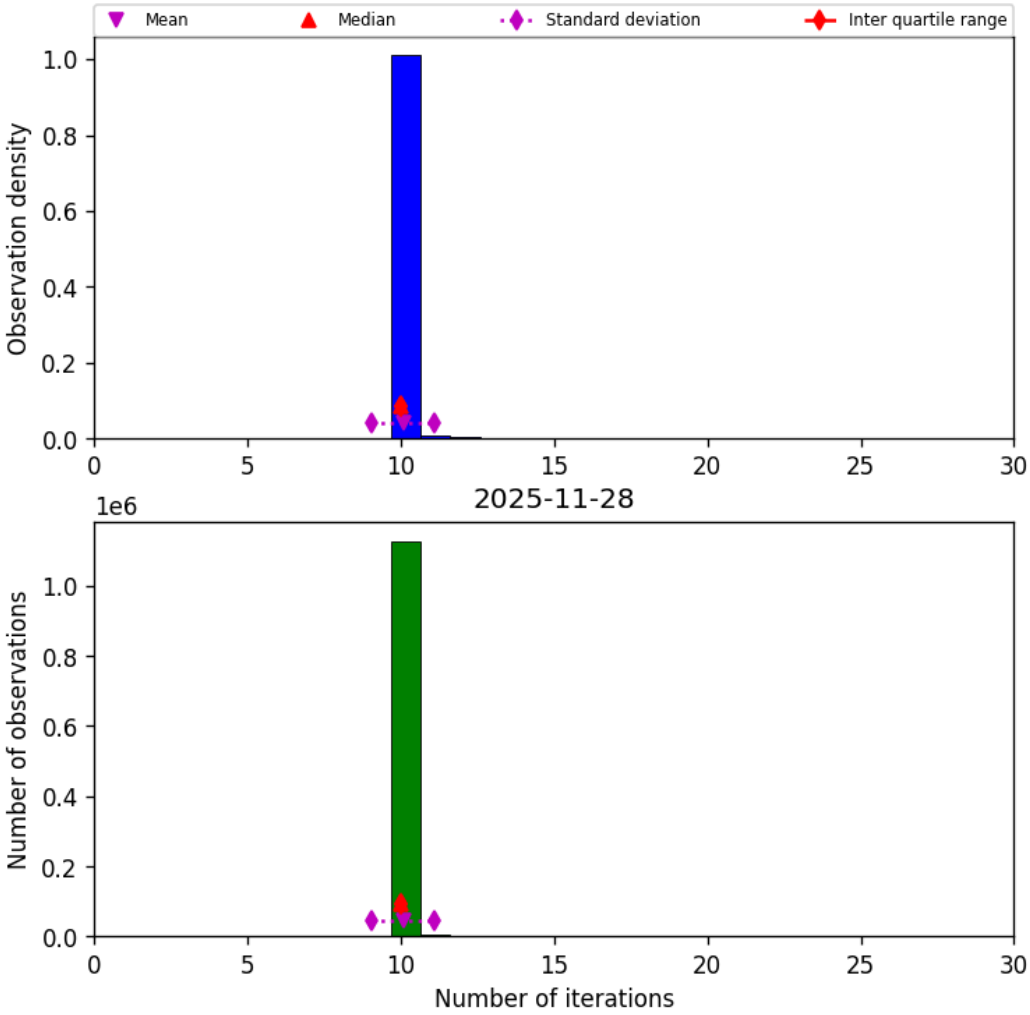


Figure 33: Histogram of “Number of iterations” for 2025-11-28 to 2025-11-29

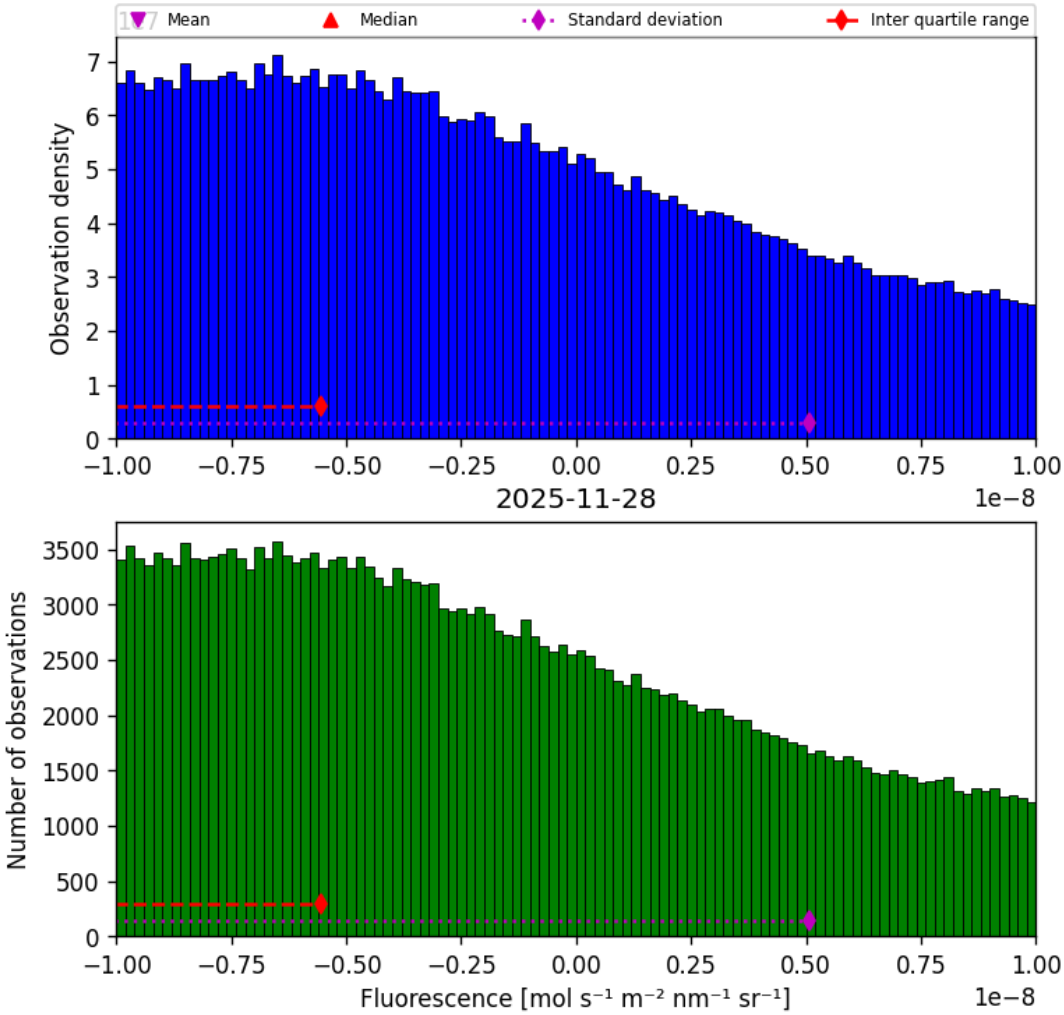


Figure 34: Histogram of “Fluorescence” for 2025-11-28 to 2025-11-29

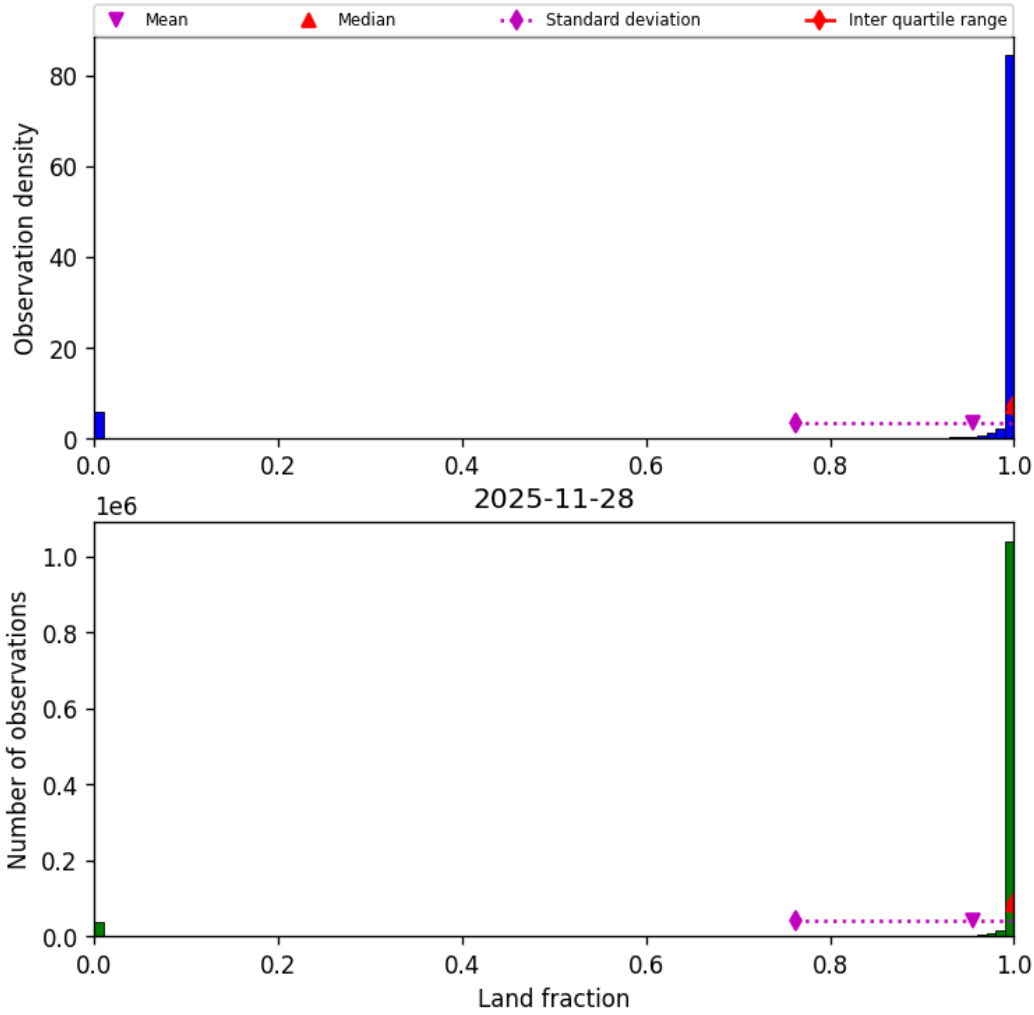


Figure 35: Histogram of “Land fraction” for 2025-11-28 to 2025-11-29

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.

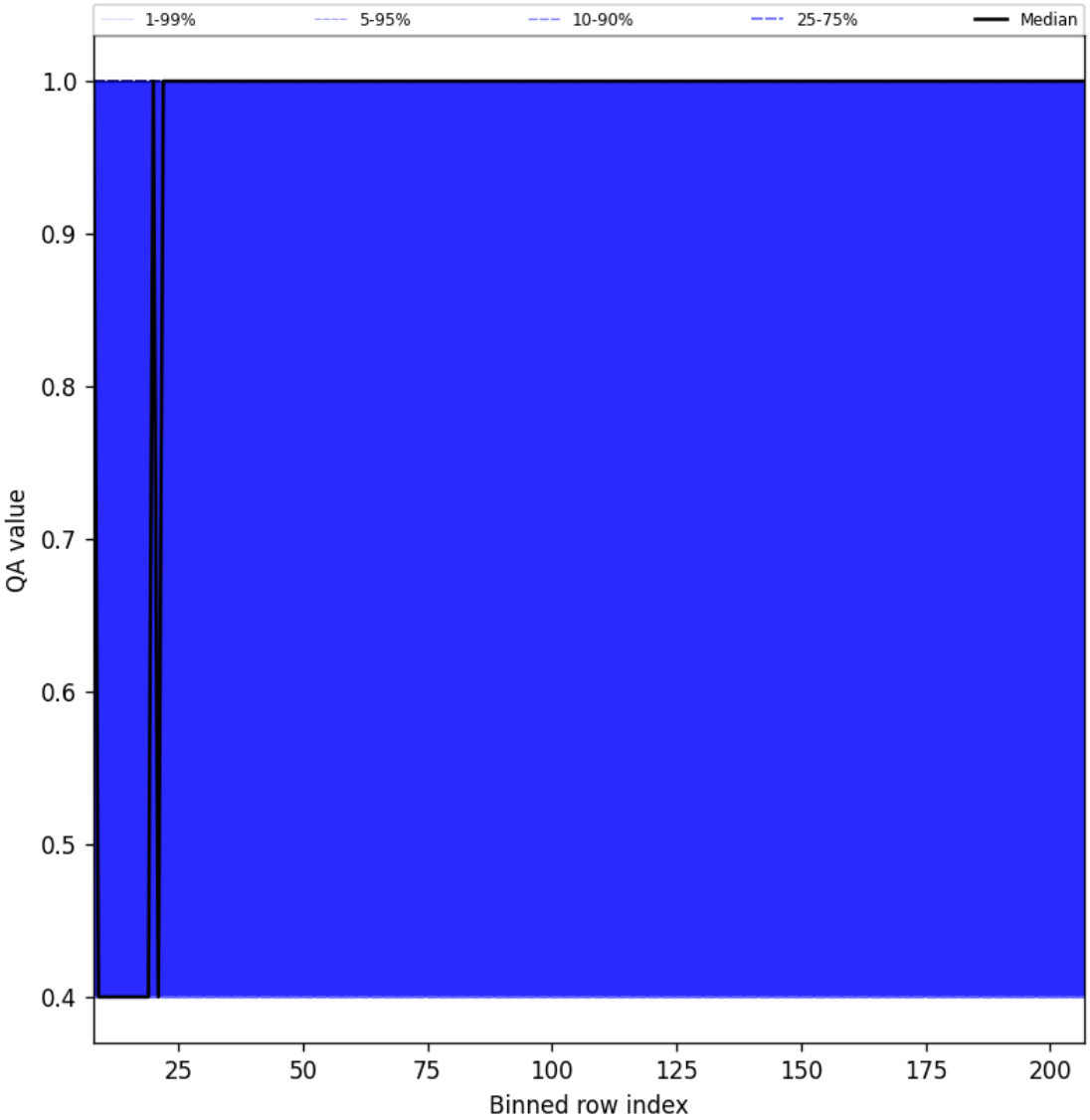


Figure 36: Along track statistics of “QA value” for 2025-11-28 to 2025-11-29

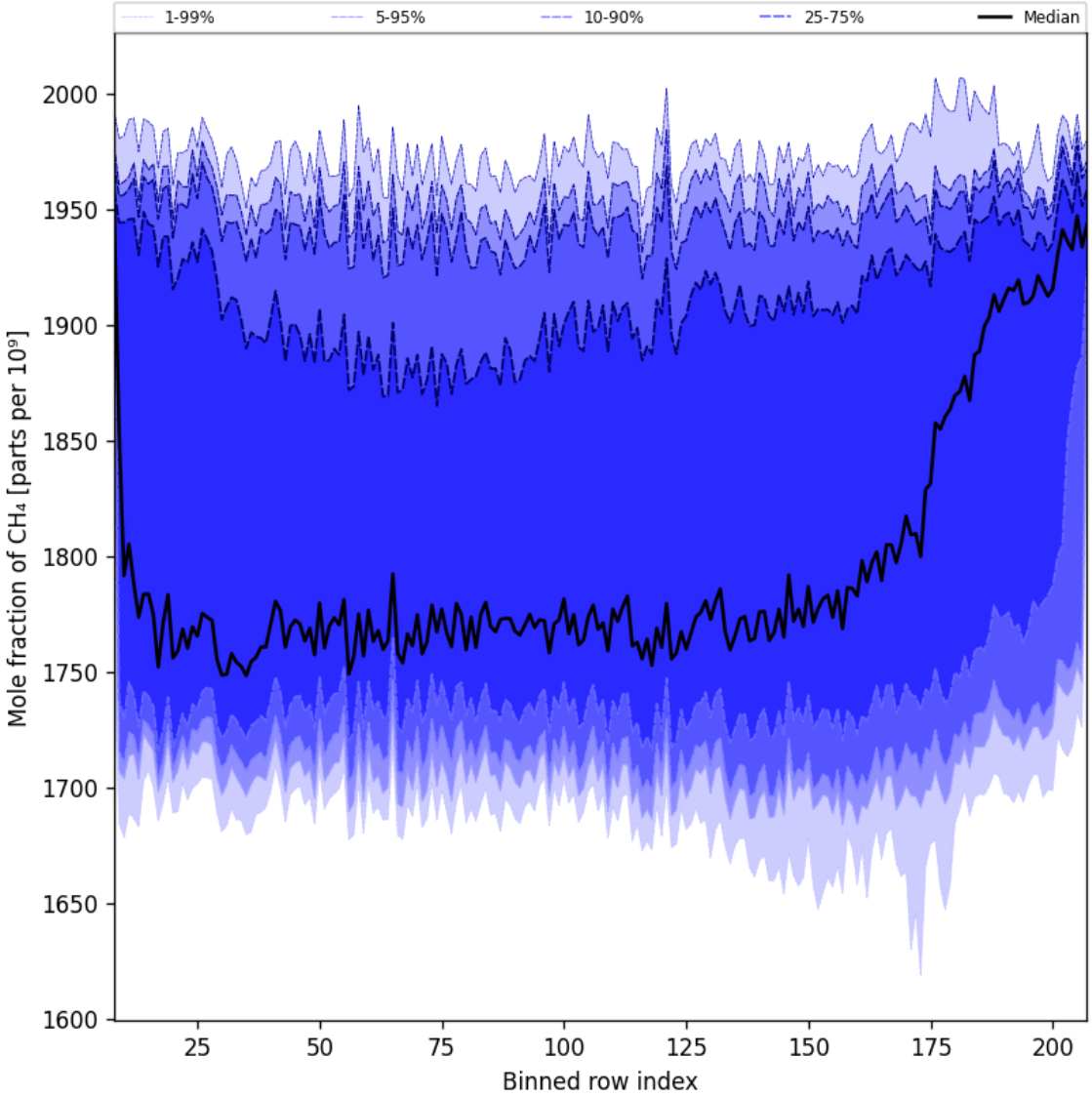


Figure 37: Along track statistics of “Mole fraction of CH_4” for 2025-11-28 to 2025-11-29

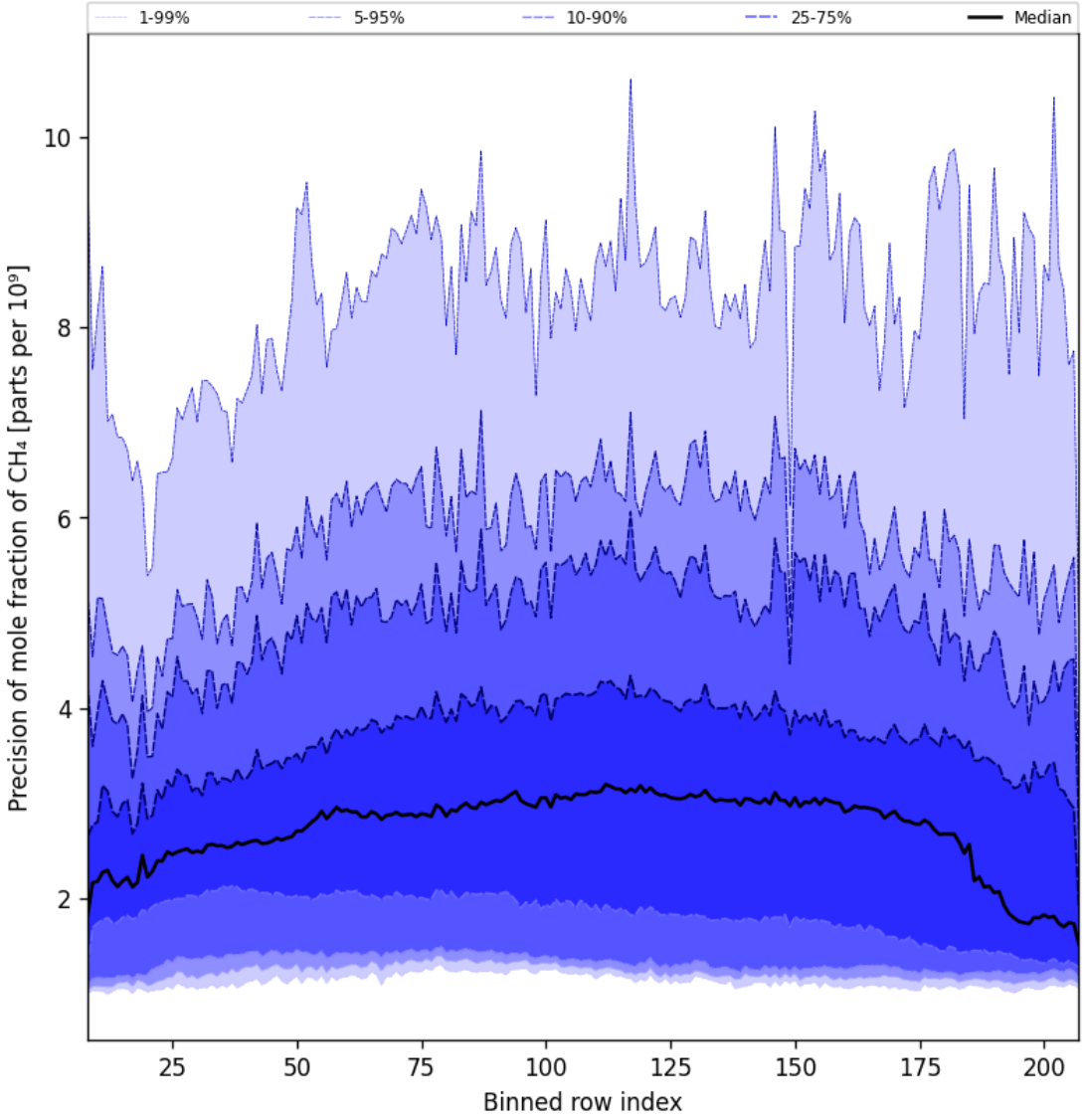


Figure 38: Along track statistics of “Precision of mole fraction of CH_4” for 2025-11-28 to 2025-11-29

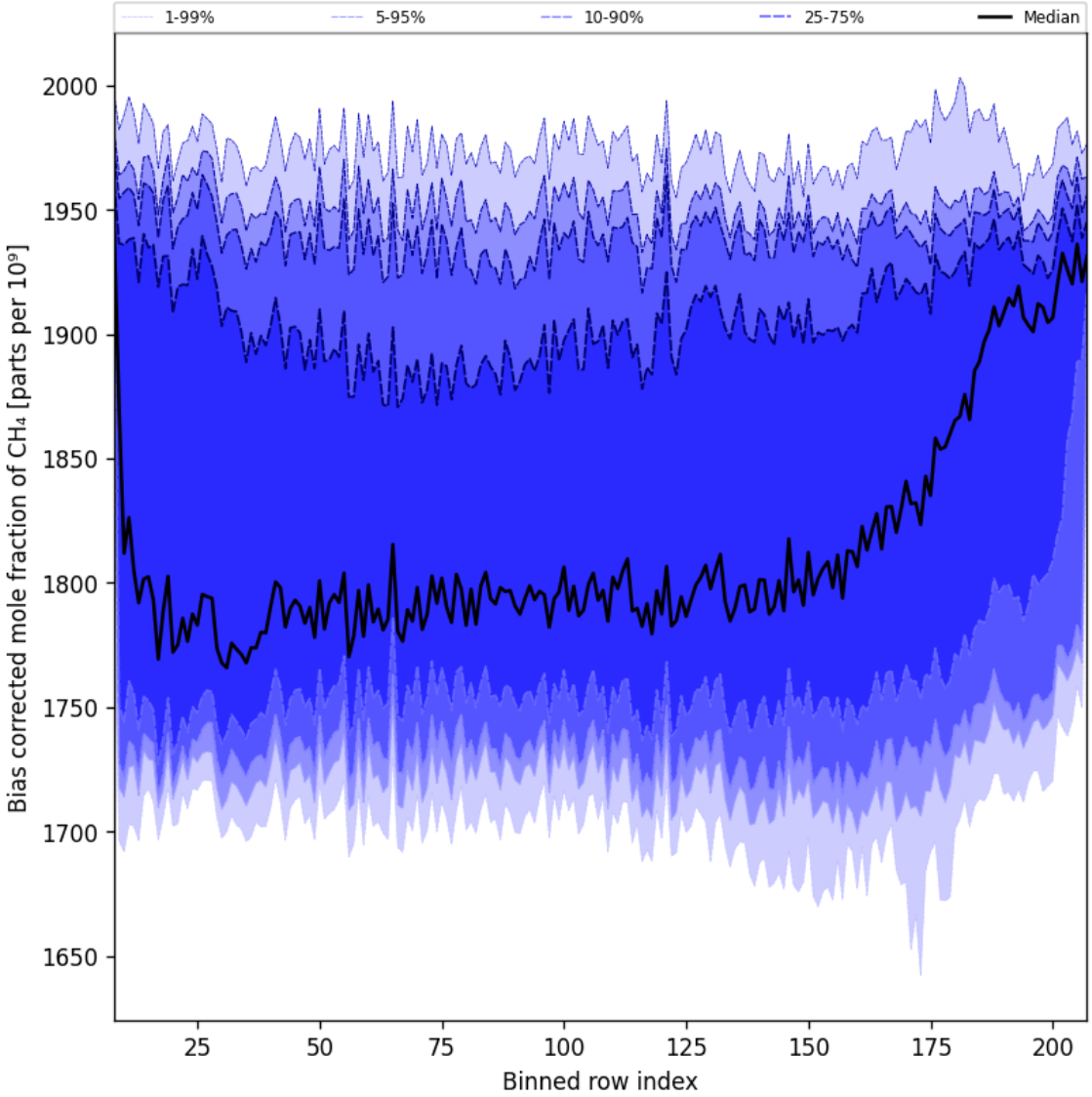


Figure 39: Along track statistics of "Bias corrected mole fraction of CH_4" for 2025-11-28 to 2025-11-29

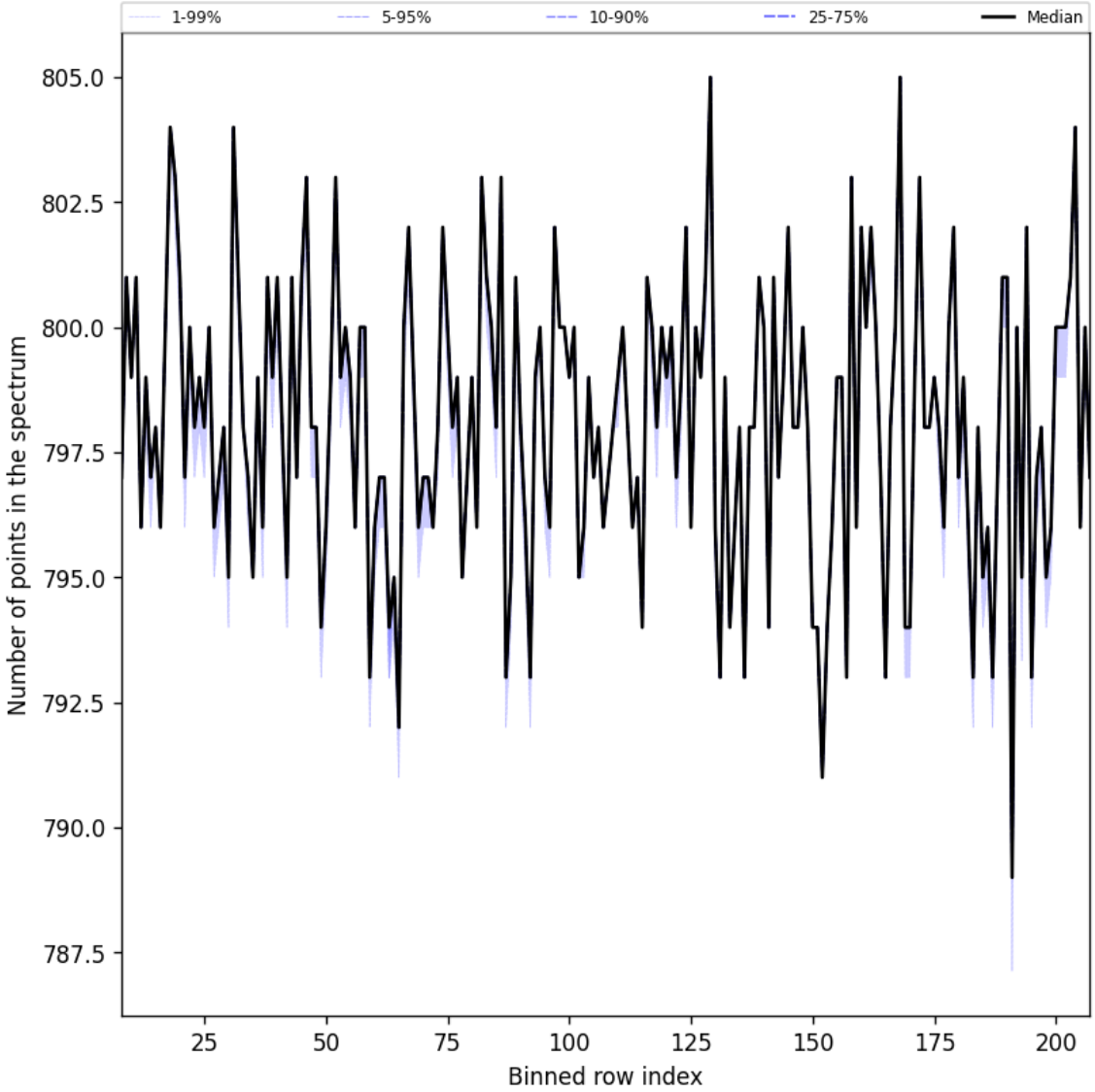


Figure 40: Along track statistics of “Number of points in the spectrum” for 2025-11-28 to 2025-11-29

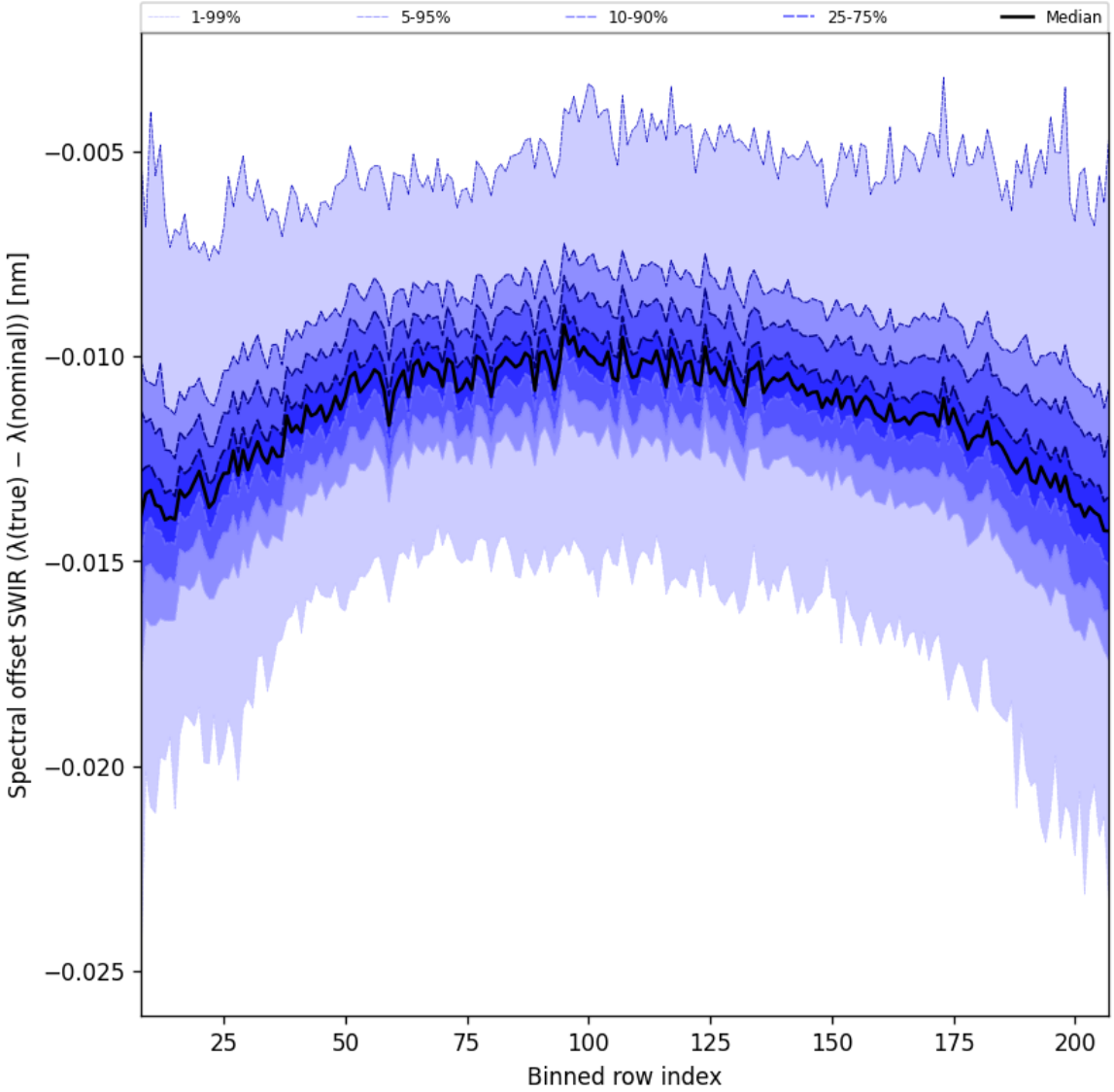


Figure 41: Along track statistics of "Spectral offset SWIR ($\lambda_{\text{true}} - \lambda_{\text{nominal}}$)" for 2025-11-28 to 2025-11-29

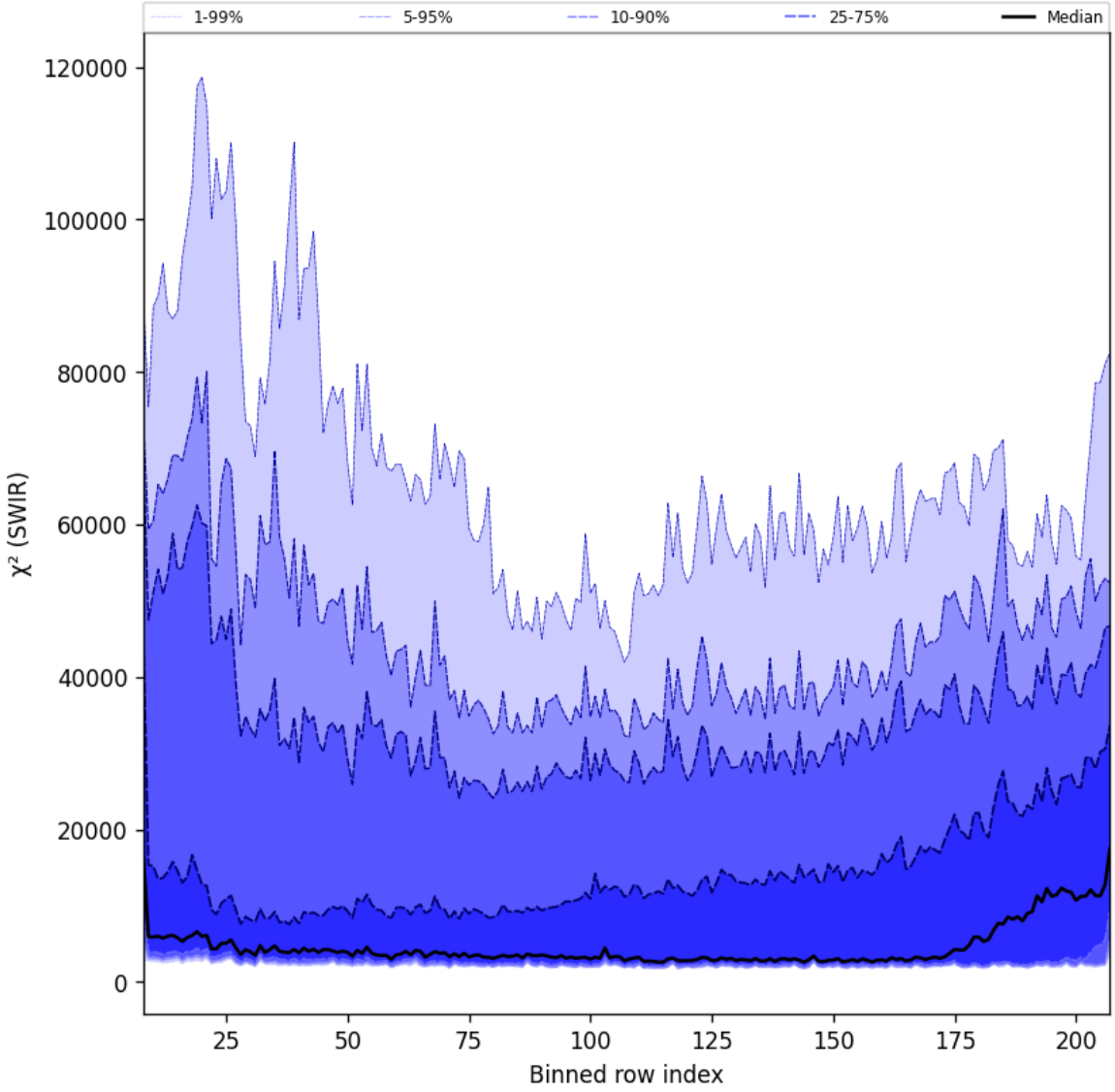


Figure 42: Along track statistics of "χ^2 (SWIR)" for 2025-11-28 to 2025-11-29

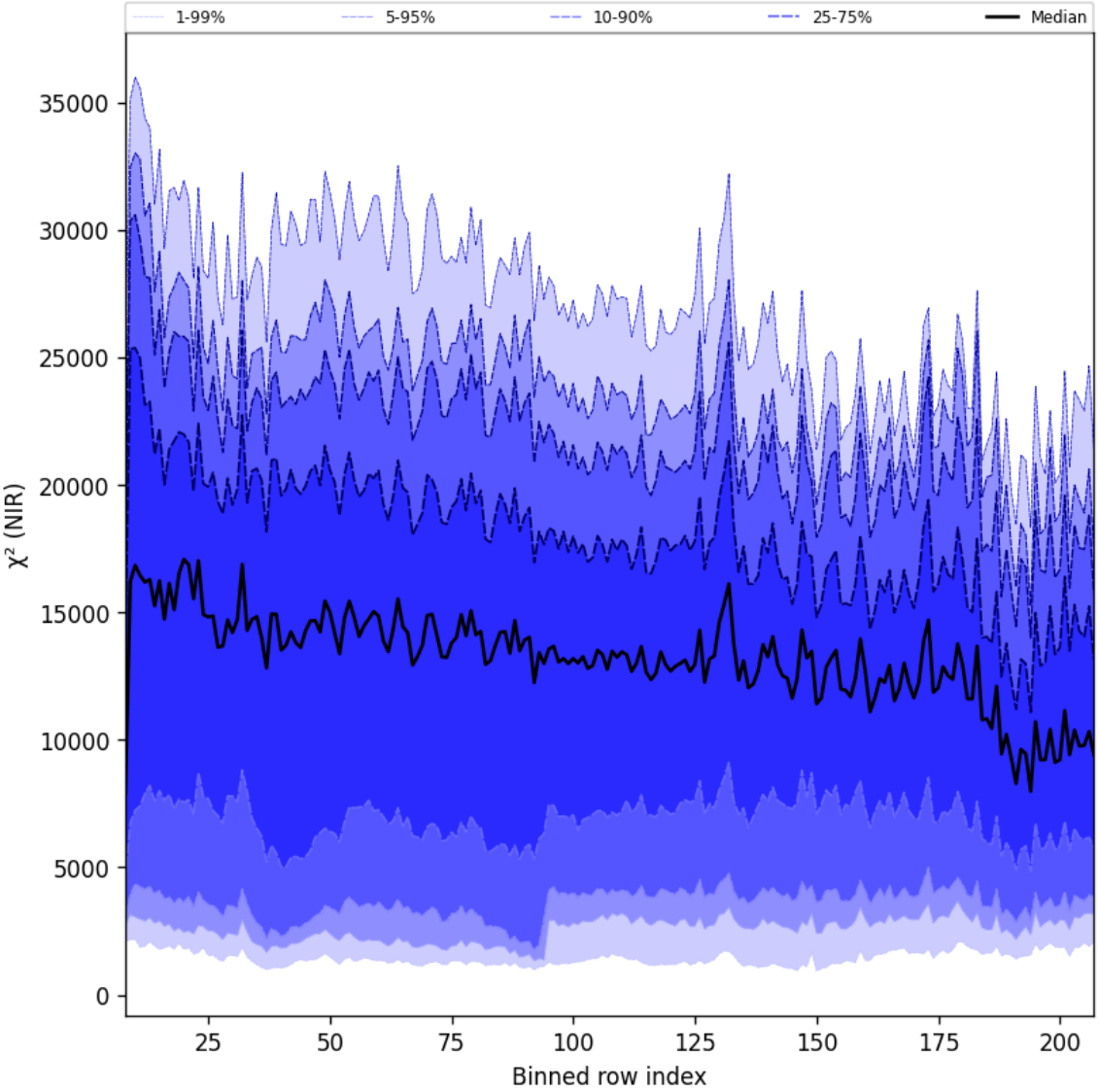


Figure 43: Along track statistics of "χ^2 (NIR)" for 2025-11-28 to 2025-11-29

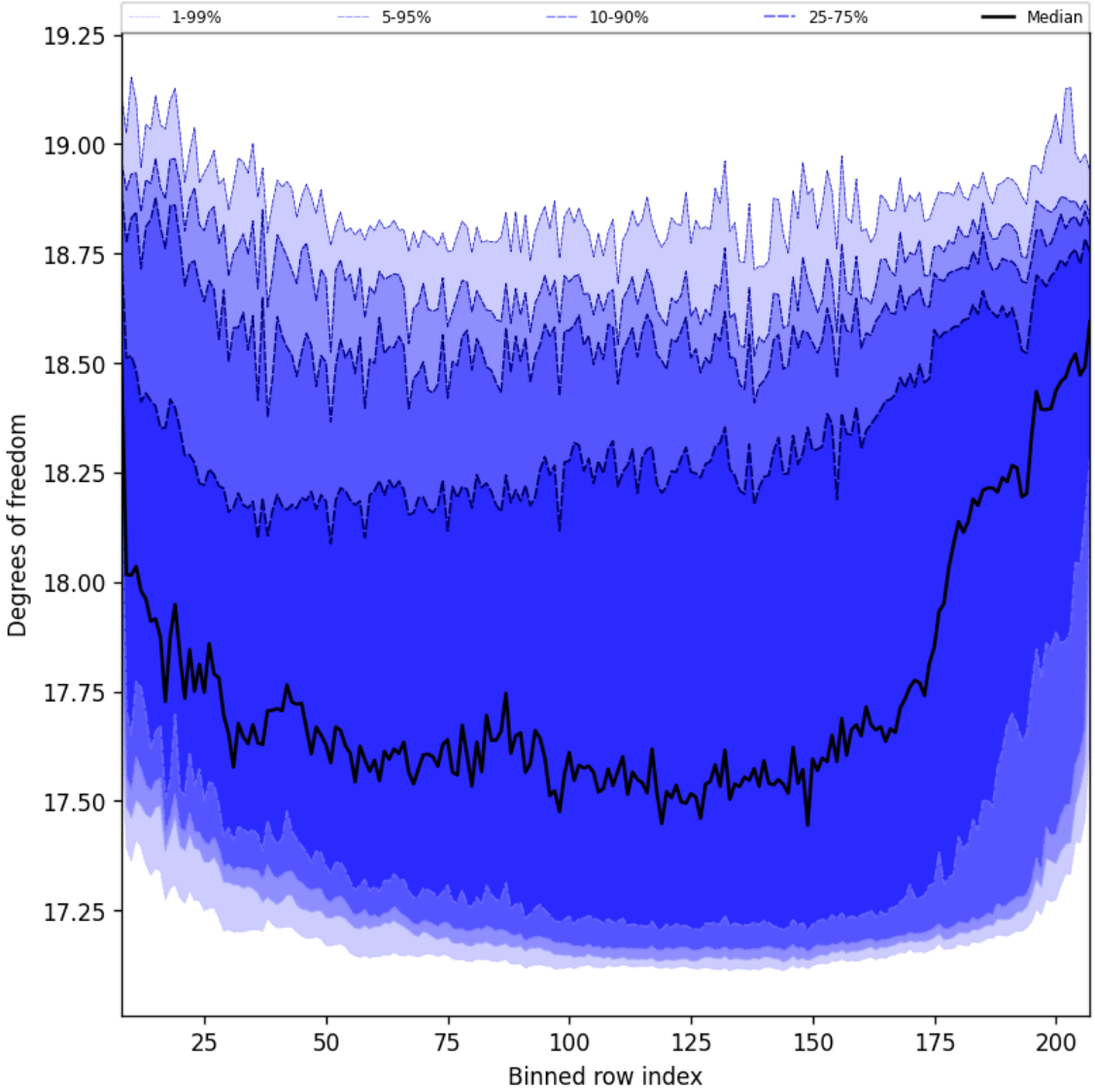


Figure 44: Along track statistics of “Degrees of freedom” for 2025-11-28 to 2025-11-29

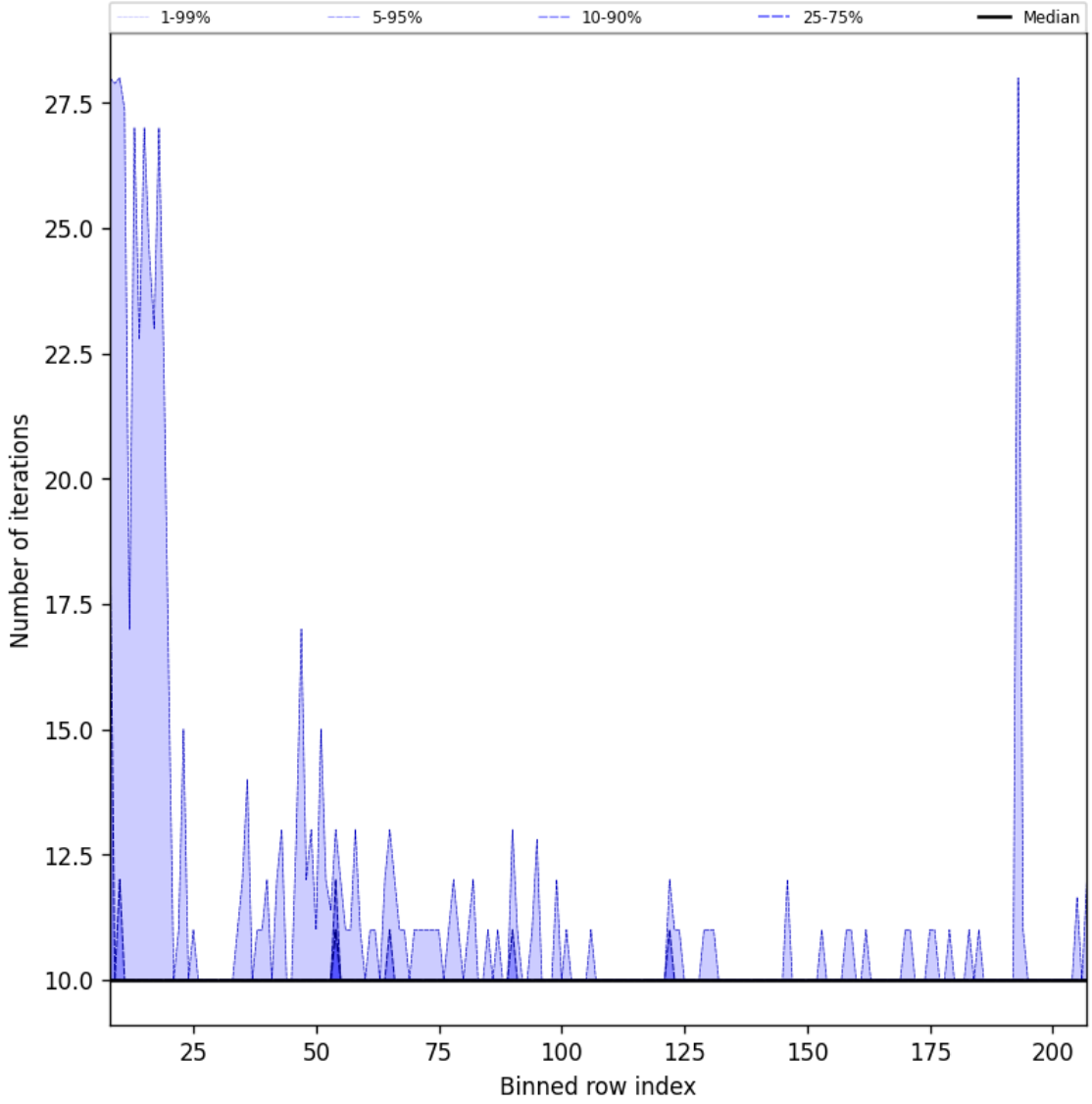


Figure 45: Along track statistics of “Number of iterations” for 2025-11-28 to 2025-11-29

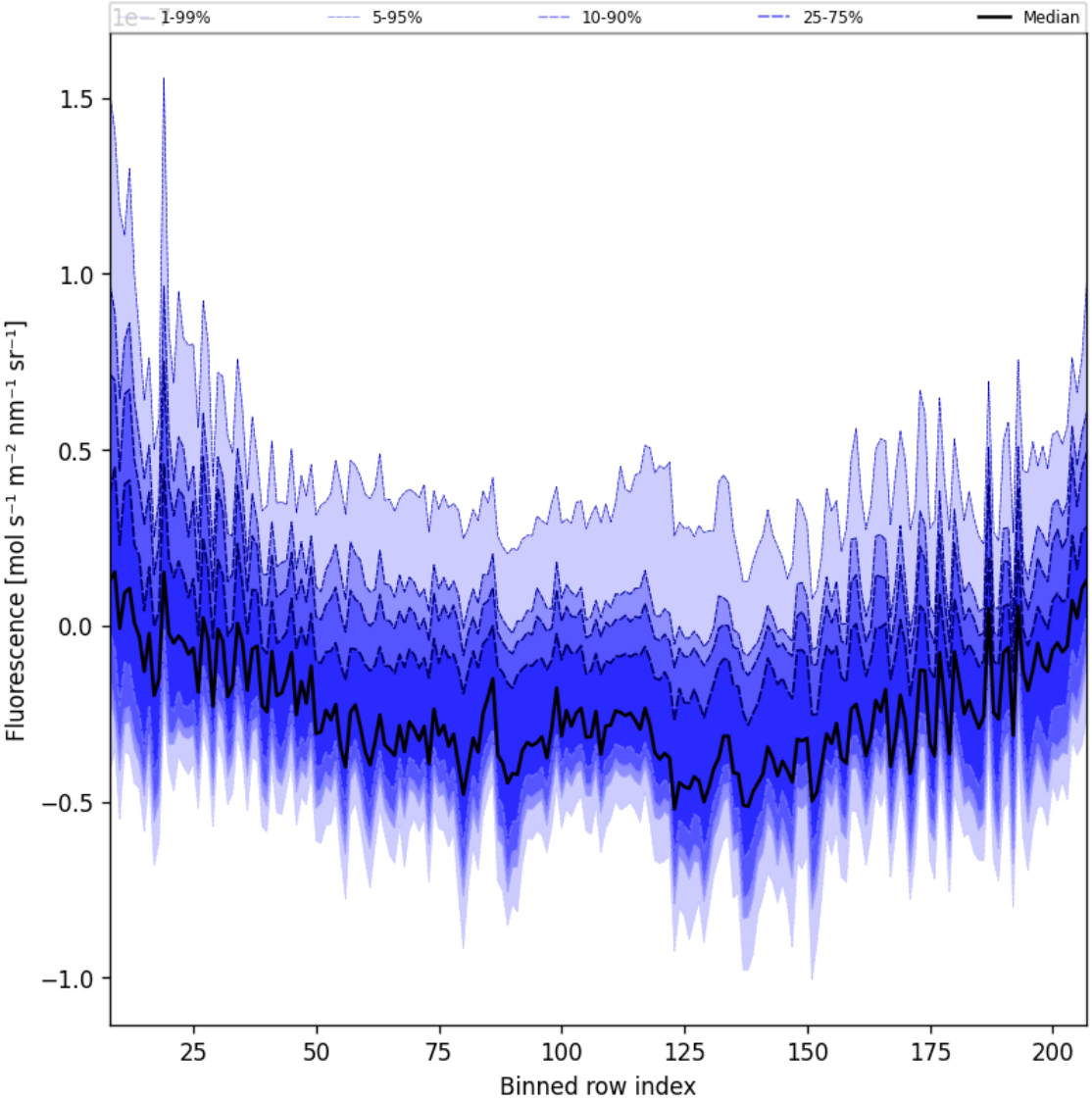


Figure 46: Along track statistics of “Fluorescence” for 2025-11-28 to 2025-11-29

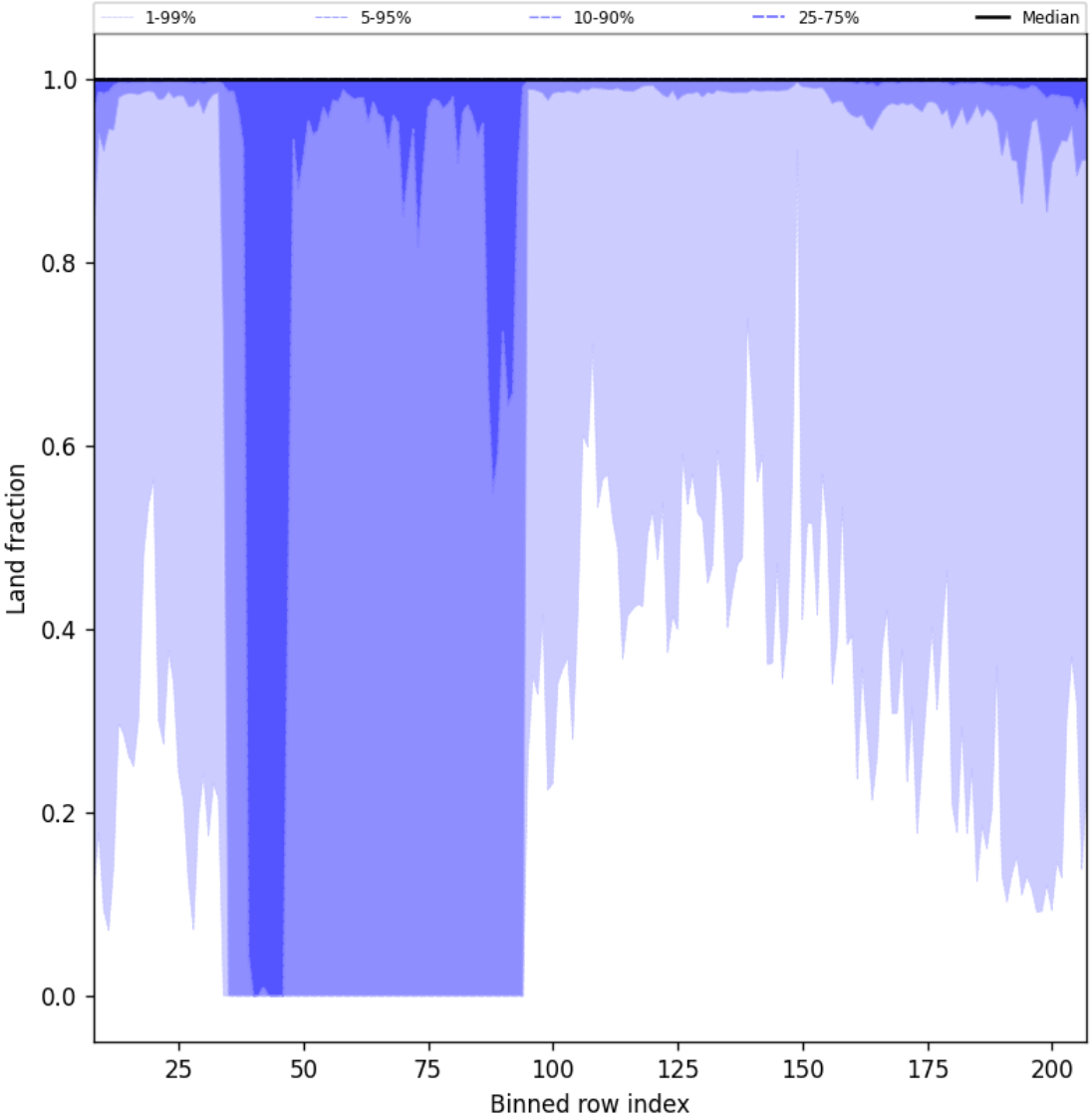


Figure 47: Along track statistics of “Land fraction” for 2025-11-28 to 2025-11-29

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.

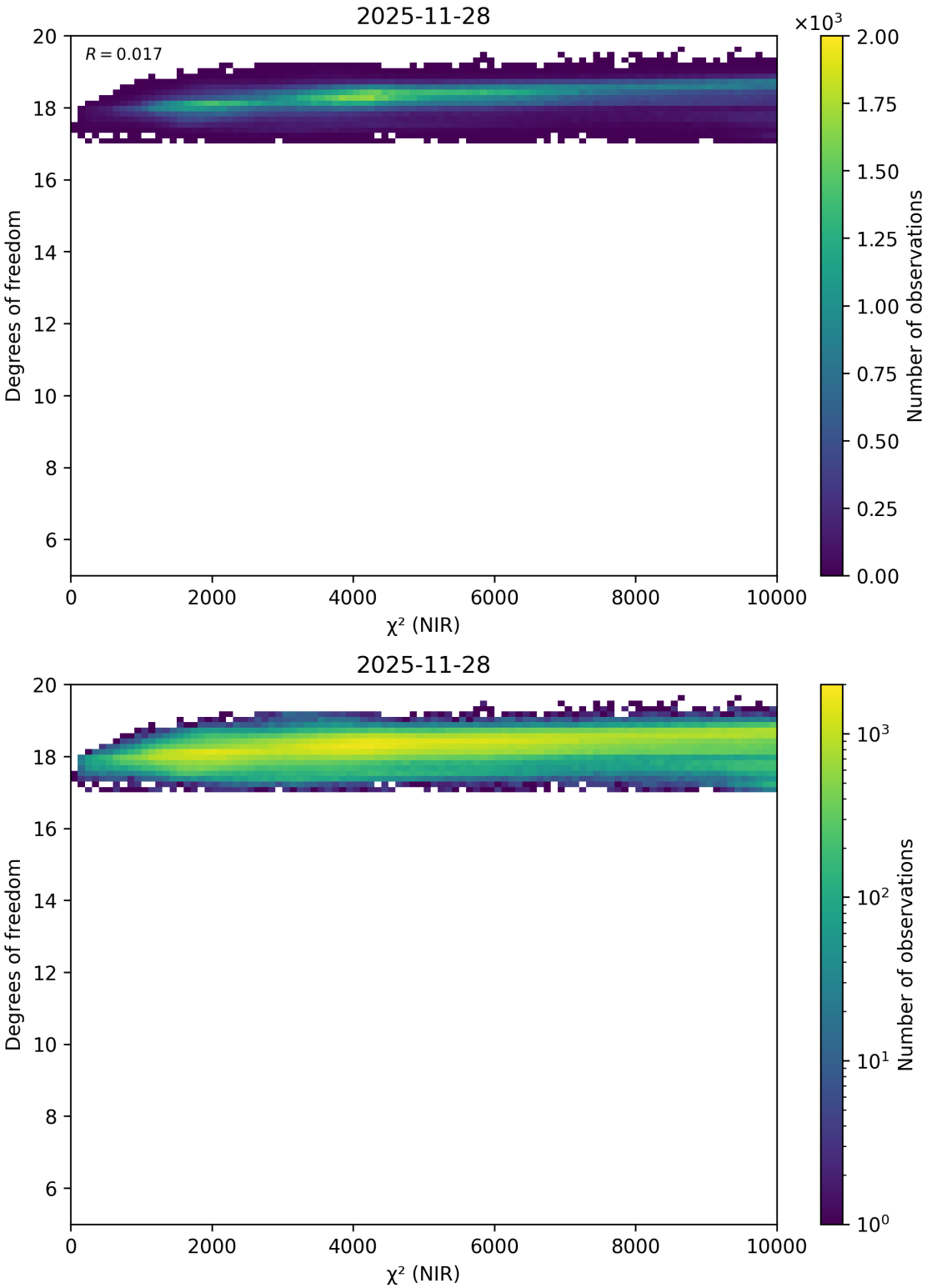


Figure 48: Scatter density plot of "χ^2 (NIR)" against "Degrees of freedom" for 2025-11-28 to 2025-11-29.

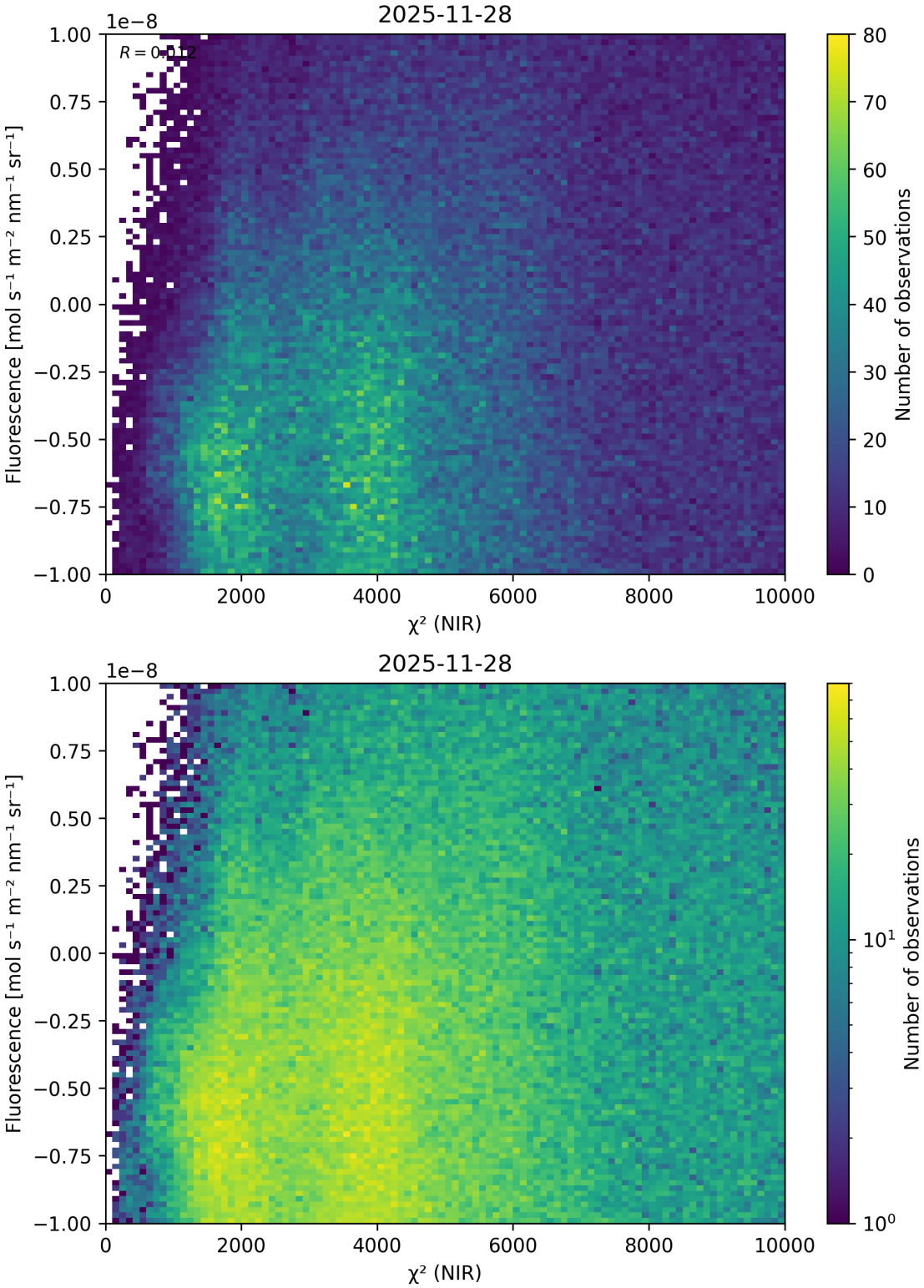


Figure 49: Scatter density plot of "χ^2 (NIR)" against "Fluorescence" for 2025-11-28 to 2025-11-29.

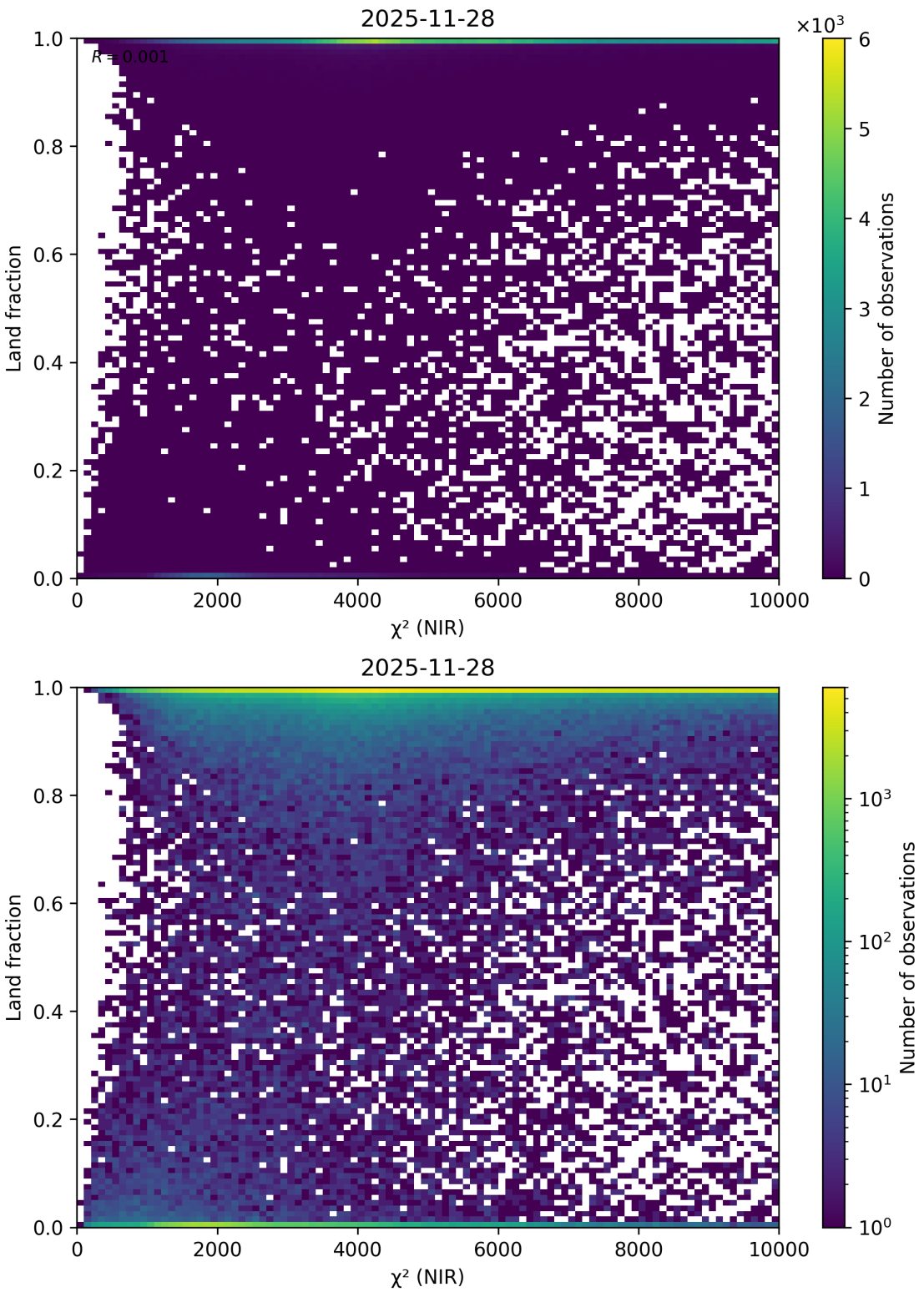


Figure 50: Scatter density plot of "χ^2 (NIR)" against "Land fraction" for 2025-11-28 to 2025-11-29.

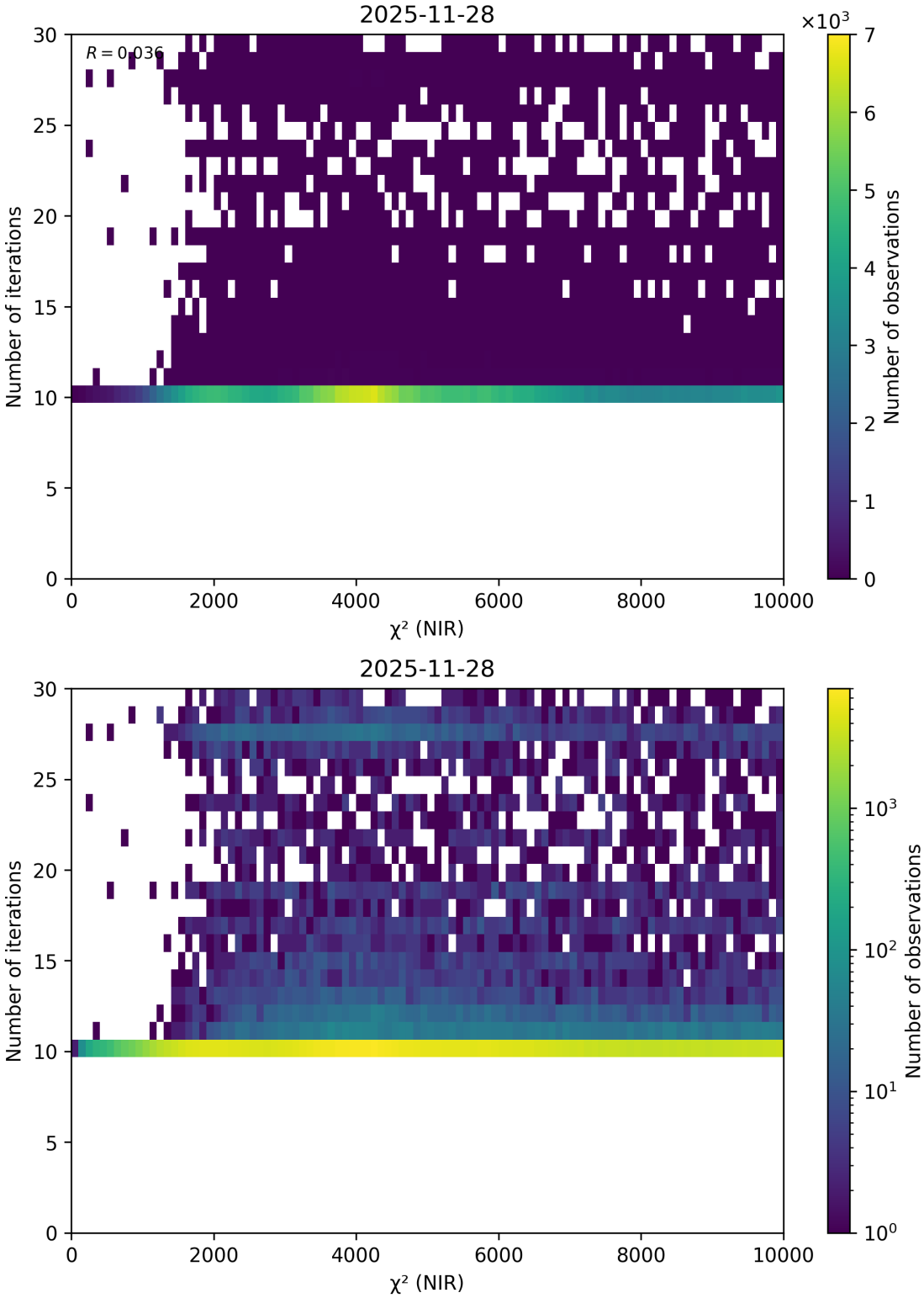


Figure 51: Scatter density plot of "χ^2 (NIR)" against "Number of iterations" for 2025-11-28 to 2025-11-29.

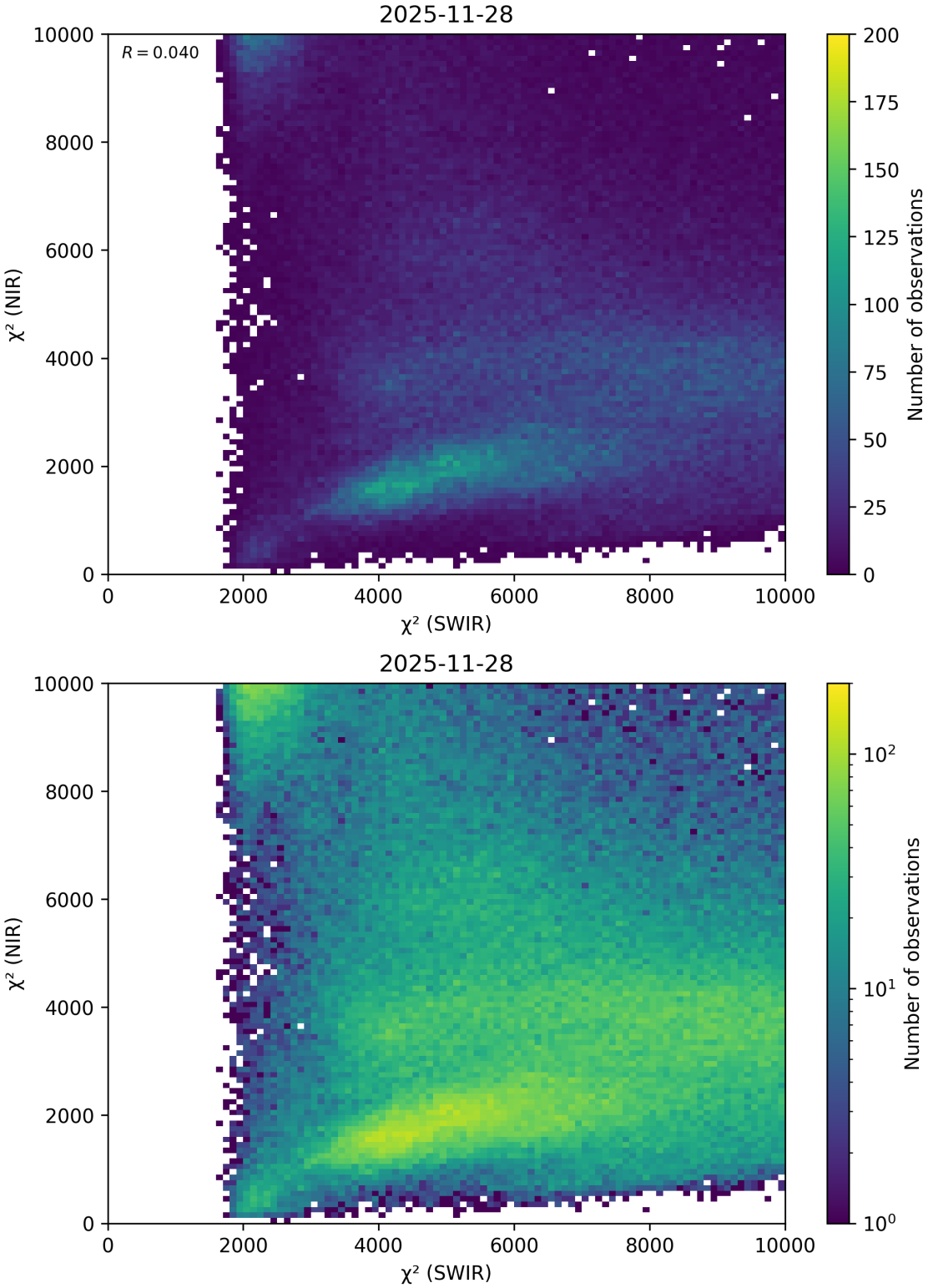


Figure 52: Scatter density plot of "χ^2 (SWIR)" against "χ^2 (NIR)" for 2025-11-28 to 2025-11-29.

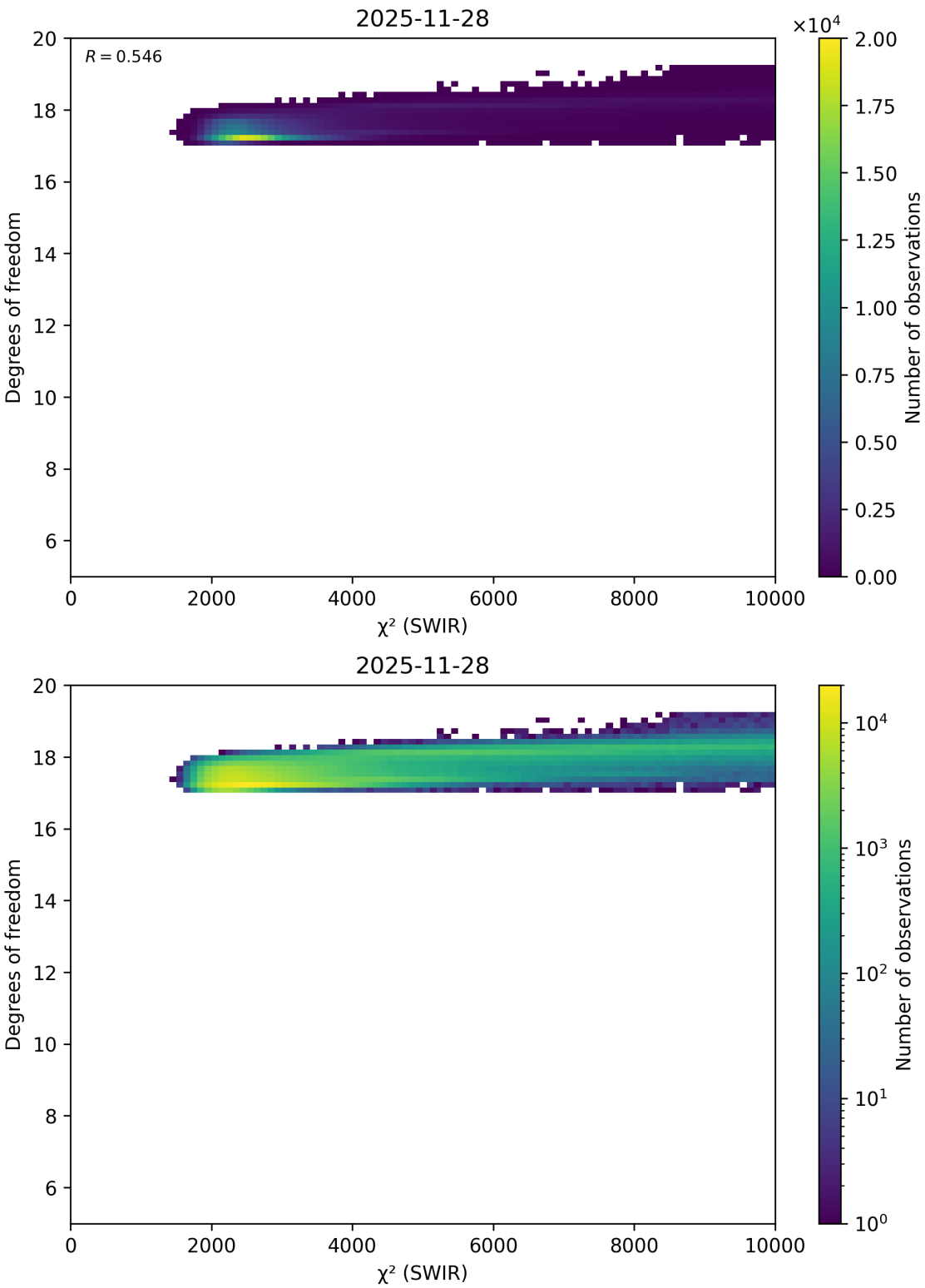


Figure 53: Scatter density plot of "χ^2 (SWIR)" against "Degrees of freedom" for 2025-11-28 to 2025-11-29.

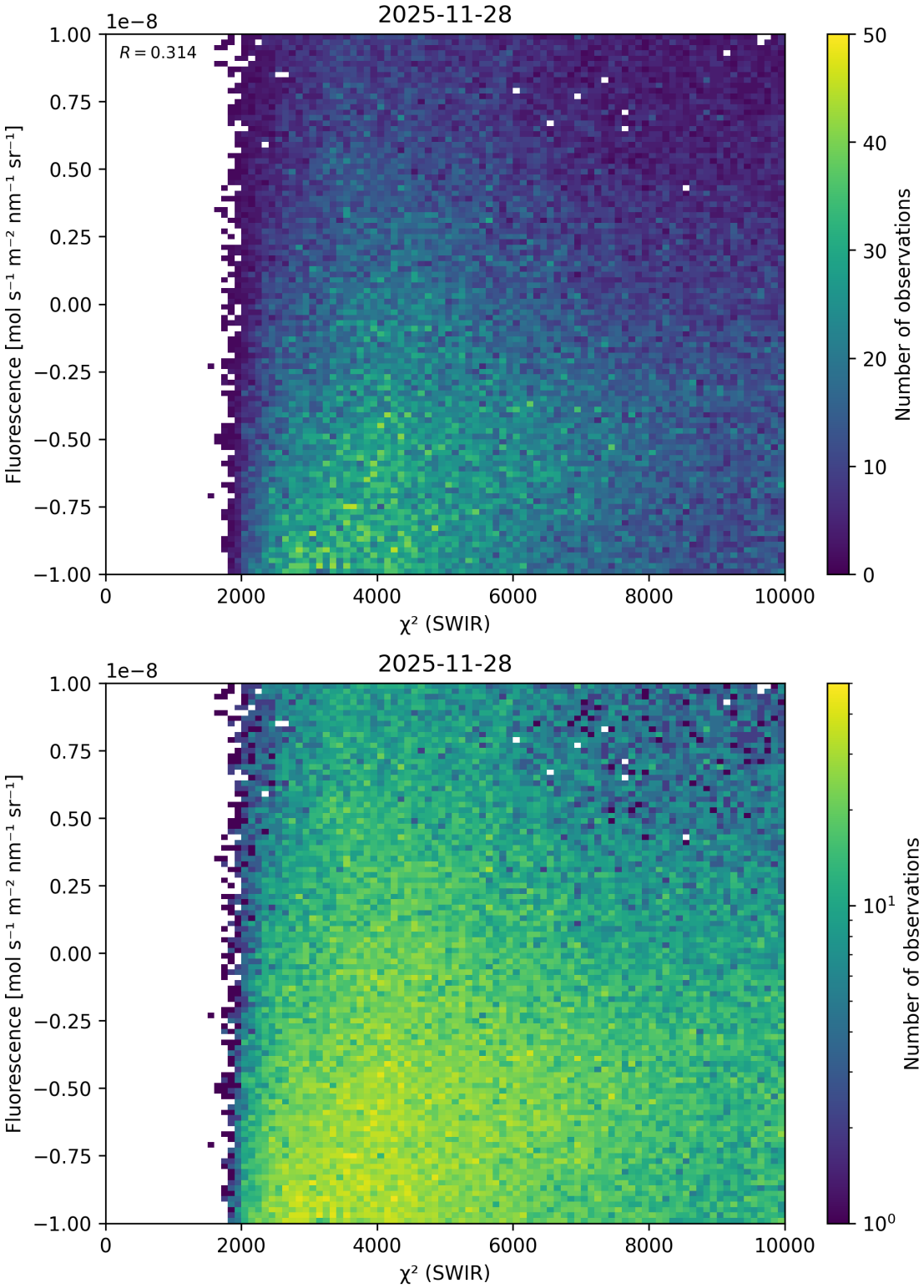


Figure 54: Scatter density plot of "χ^2 (SWIR)" against "Fluorescence" for 2025-11-28 to 2025-11-29.

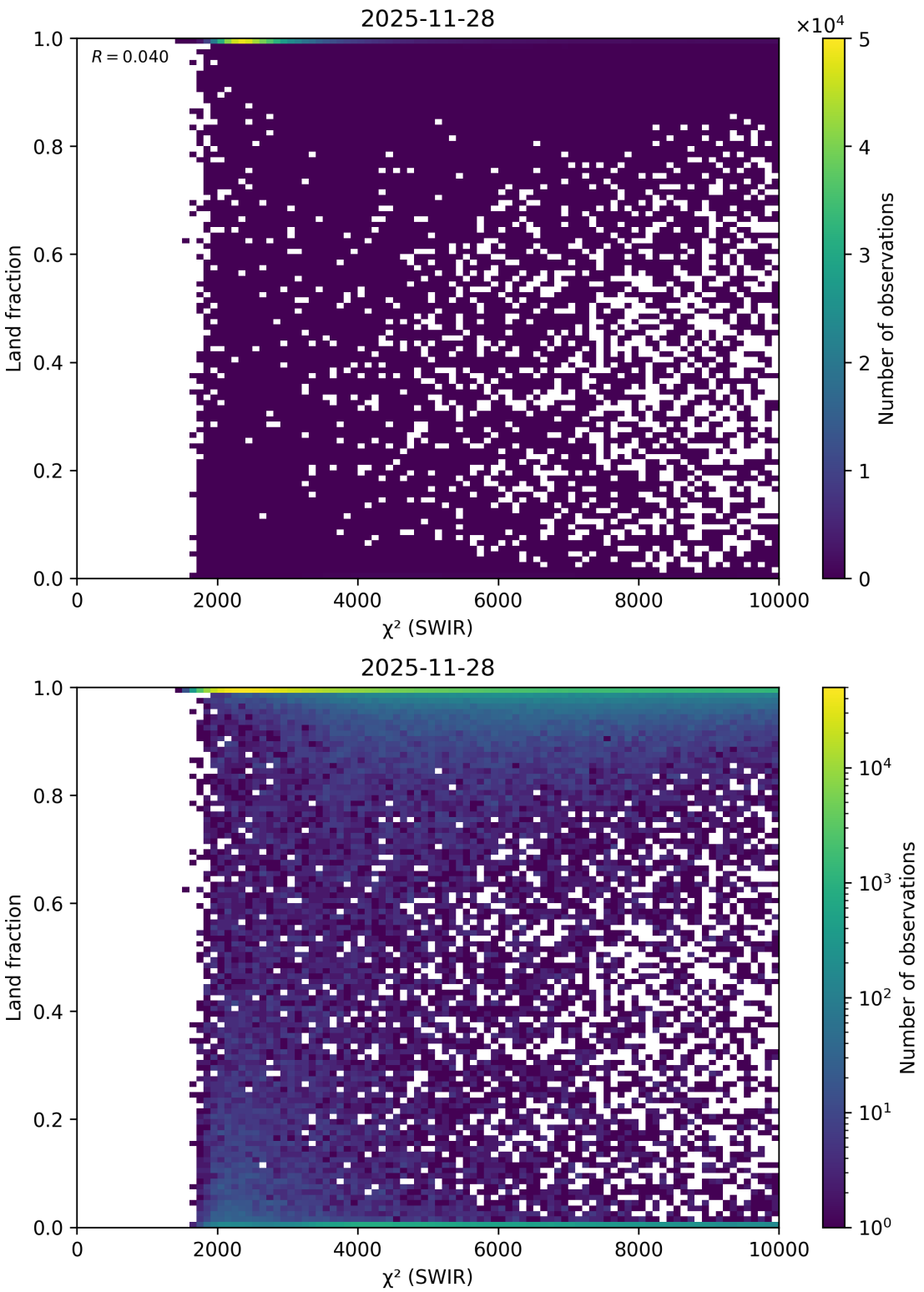


Figure 55: Scatter density plot of "χ^2 (SWIR)" against "Land fraction" for 2025-11-28 to 2025-11-29.

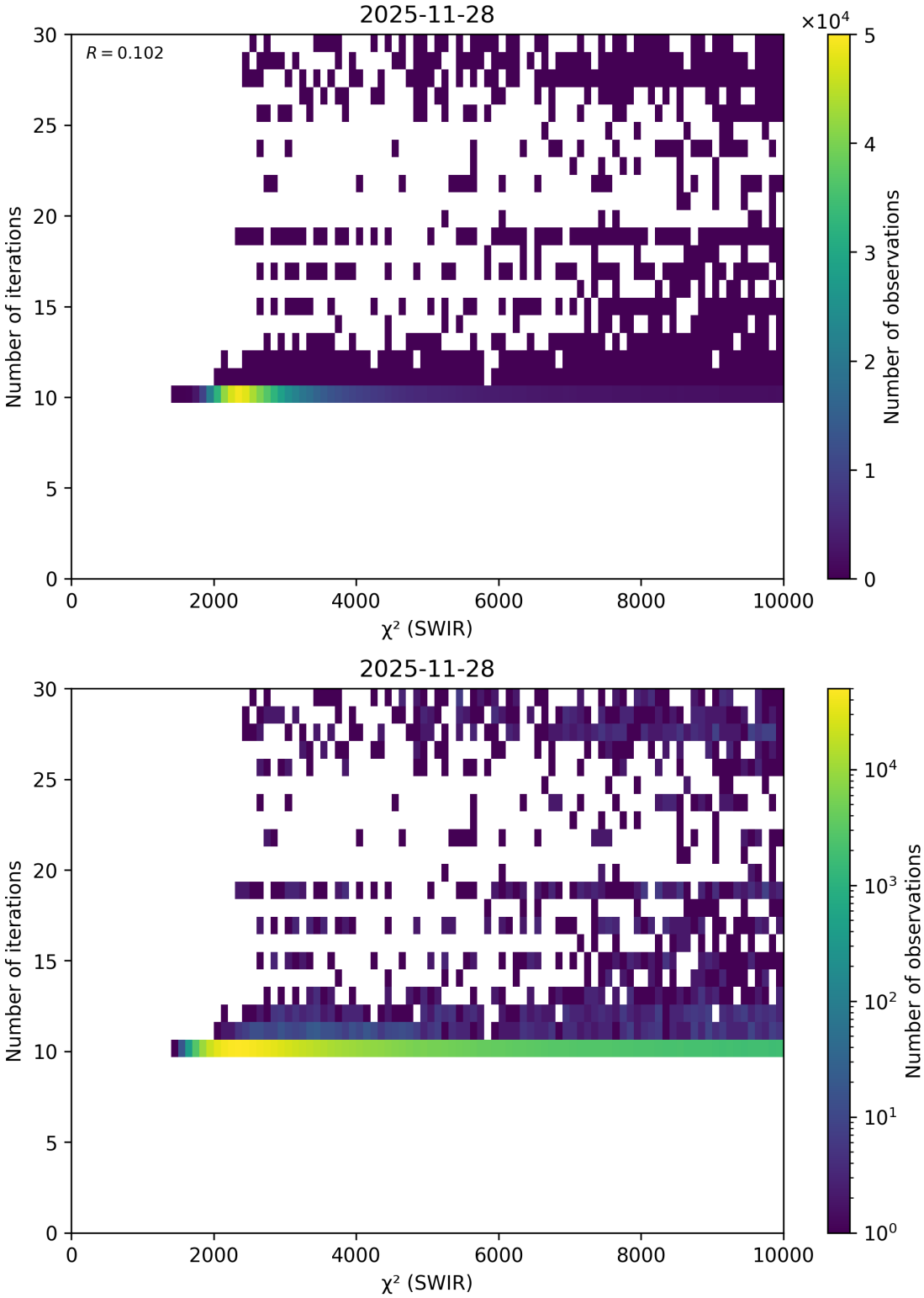


Figure 56: Scatter density plot of "χ^2 (SWIR)" against "Number of iterations" for 2025-11-28 to 2025-11-29.

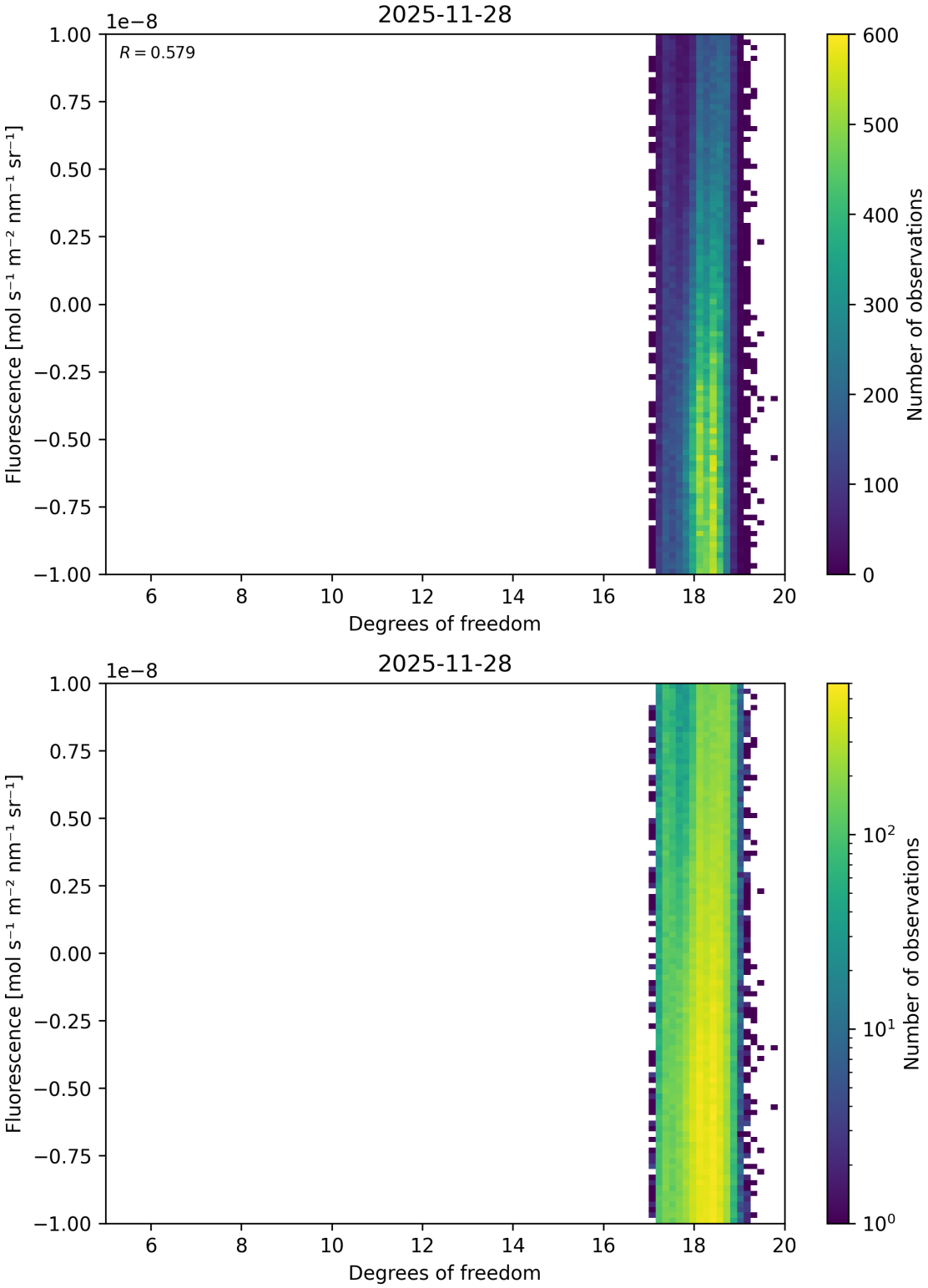


Figure 57: Scatter density plot of “Degrees of freedom” against “Fluorescence” for 2025-11-28 to 2025-11-29.

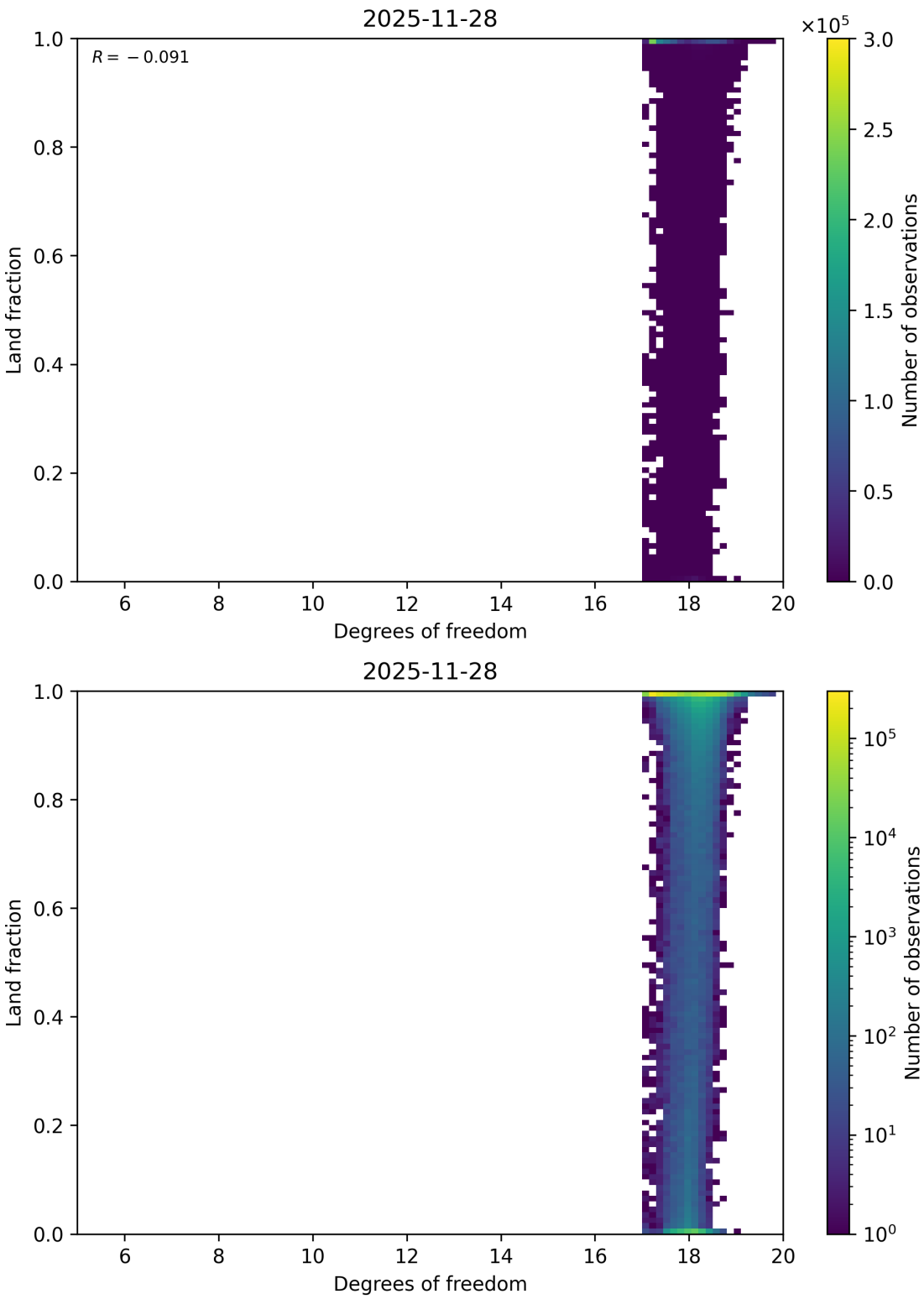


Figure 58: Scatter density plot of “Degrees of freedom” against “Land fraction” for 2025-11-28 to 2025-11-29.

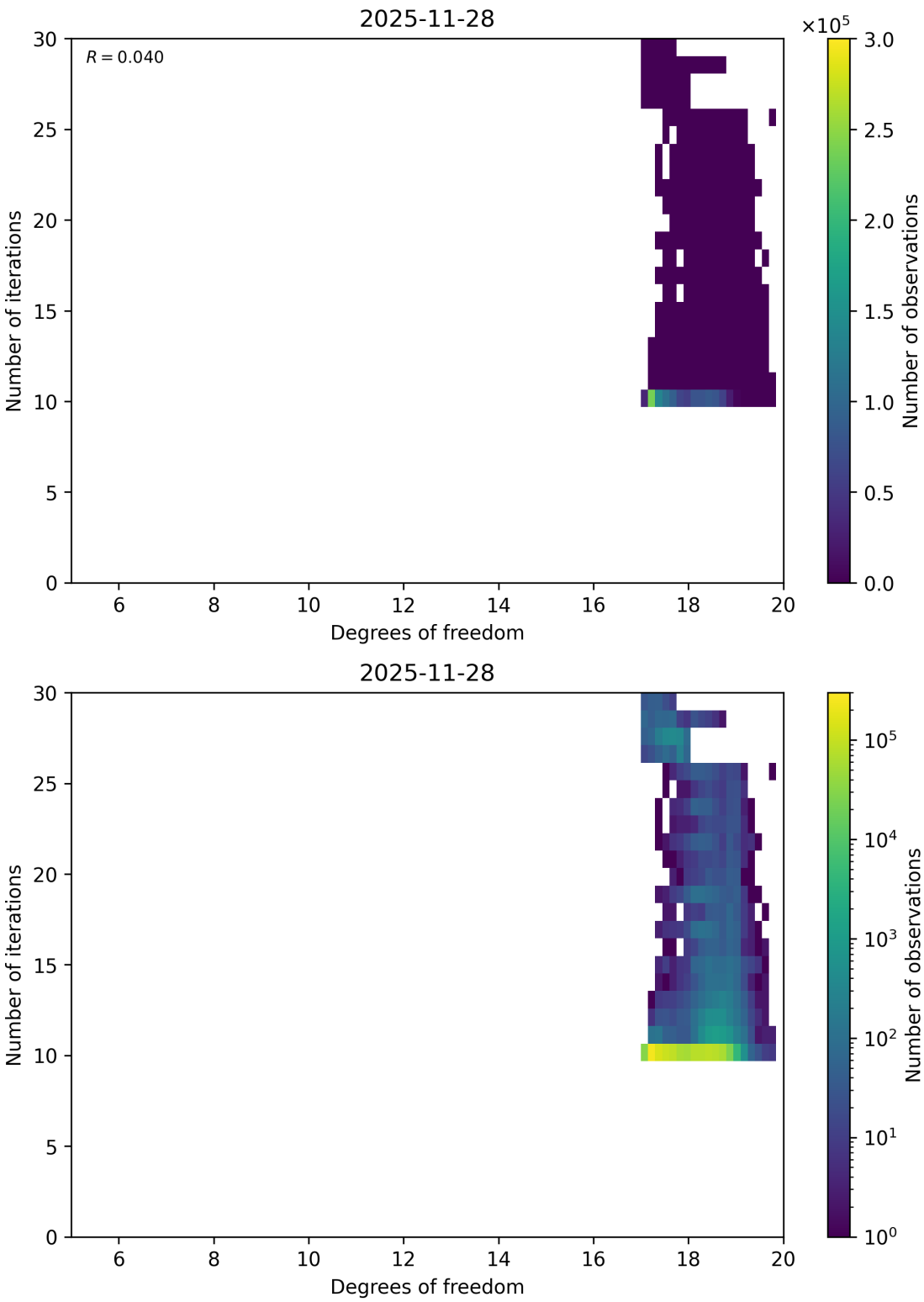


Figure 59: Scatter density plot of “Degrees of freedom” against “Number of iterations” for 2025-11-28 to 2025-11-29.

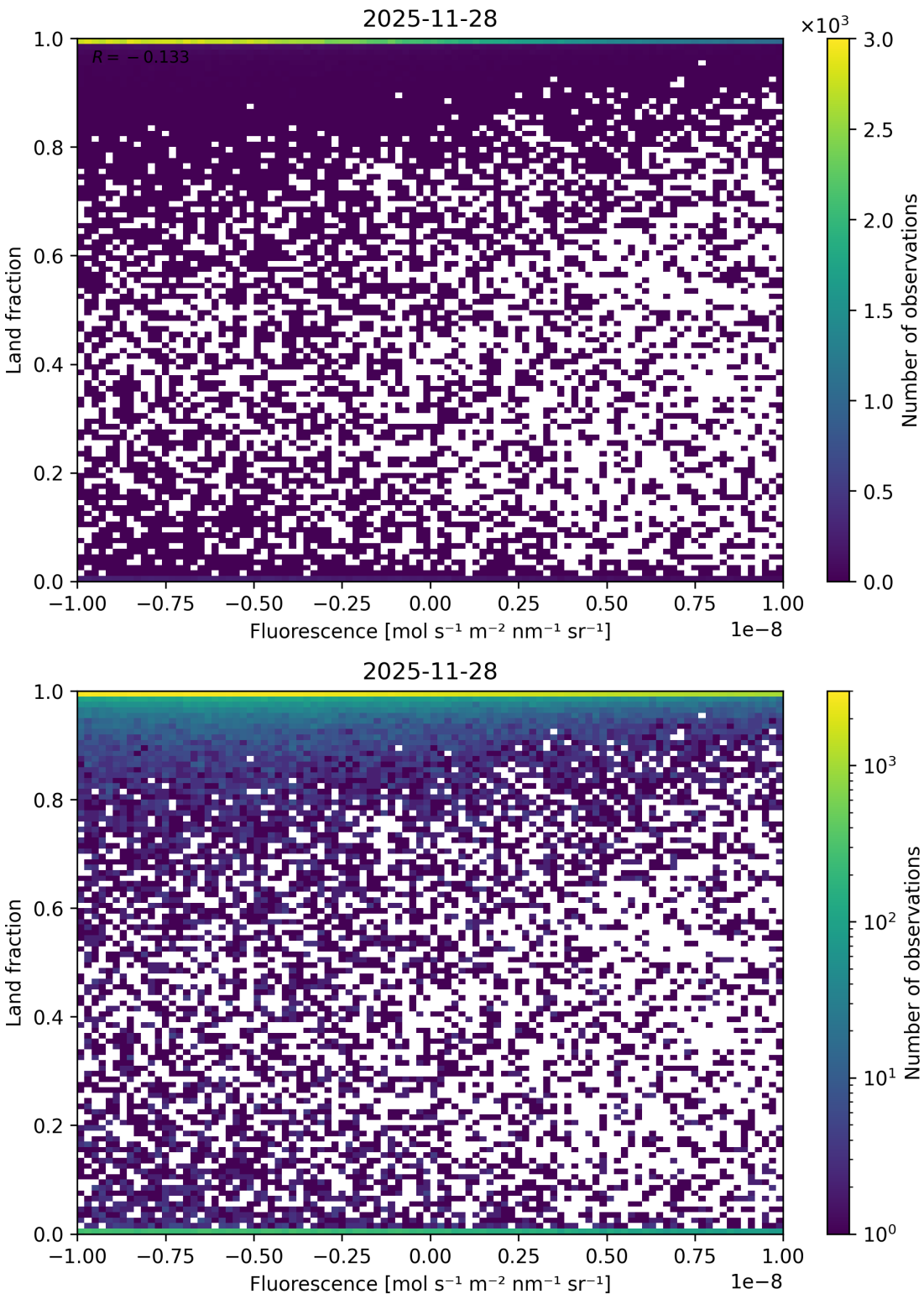


Figure 60: Scatter density plot of “Fluorescence” against “Land fraction” for 2025-11-28 to 2025-11-29.

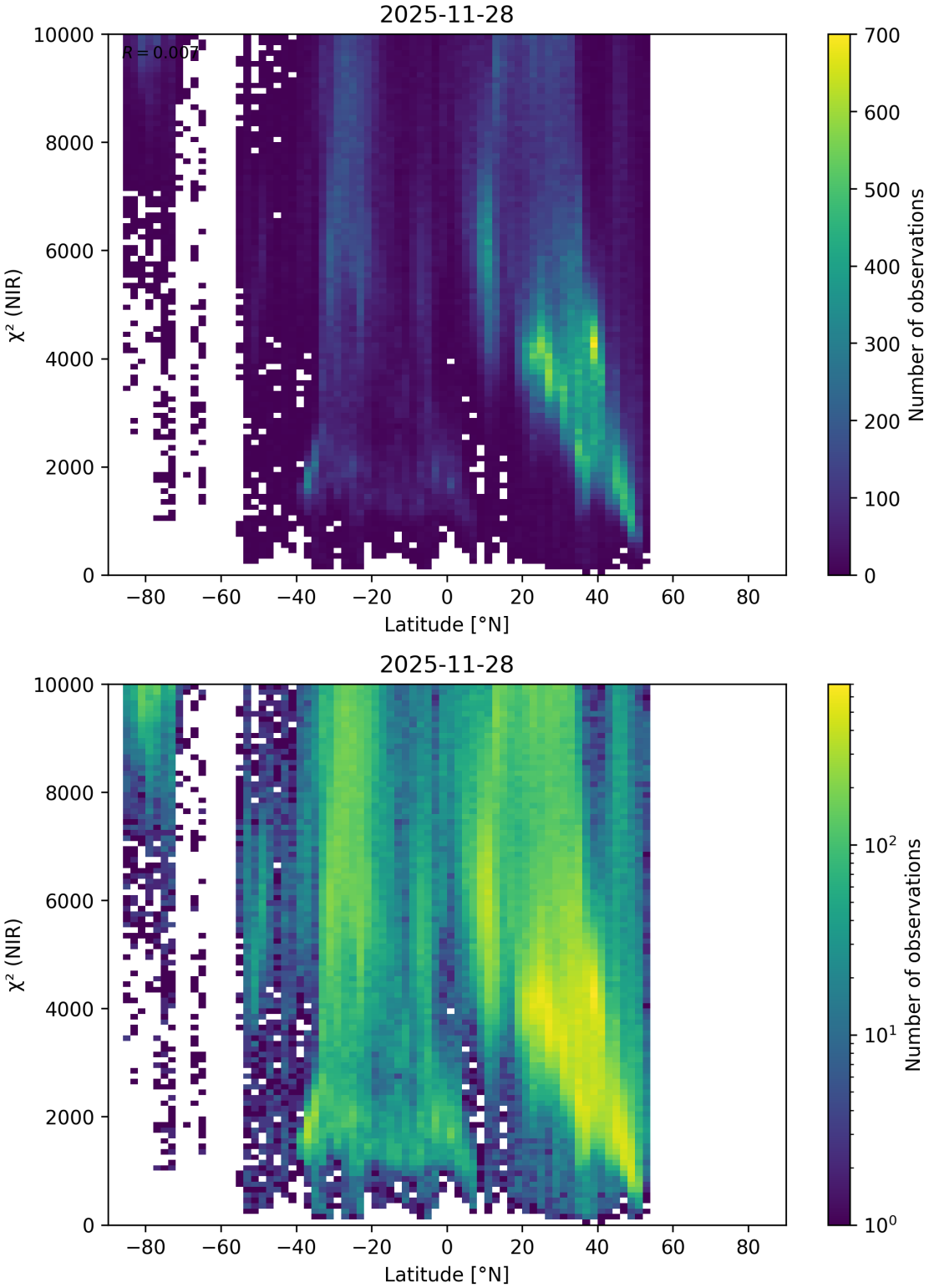


Figure 61: Scatter density plot of "Latitude" against "χ^2 (NIR)" for 2025-11-28 to 2025-11-29.

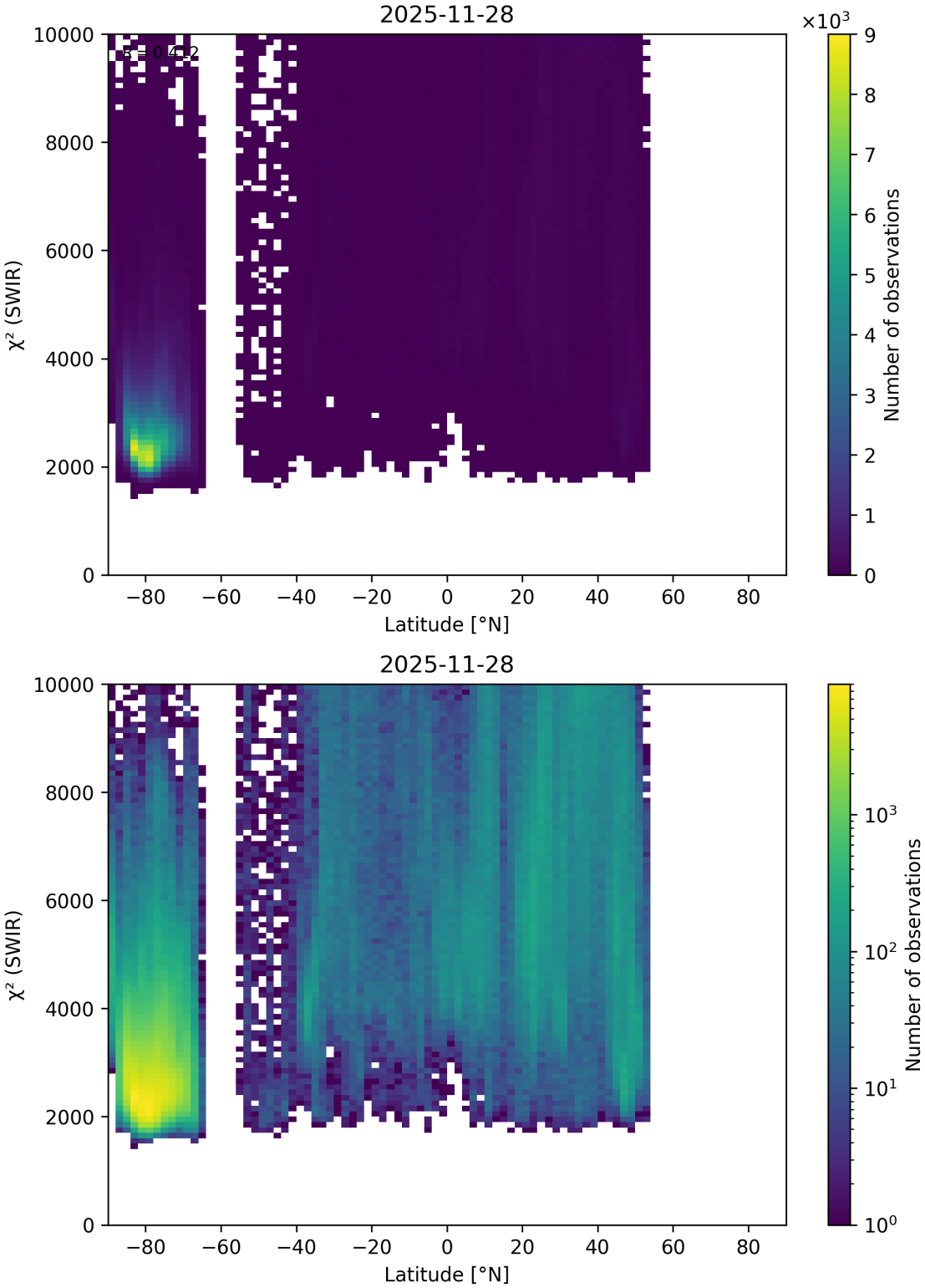


Figure 62: Scatter density plot of "Latitude" against "χ^2 (SWIR)" for 2025-11-28 to 2025-11-29.

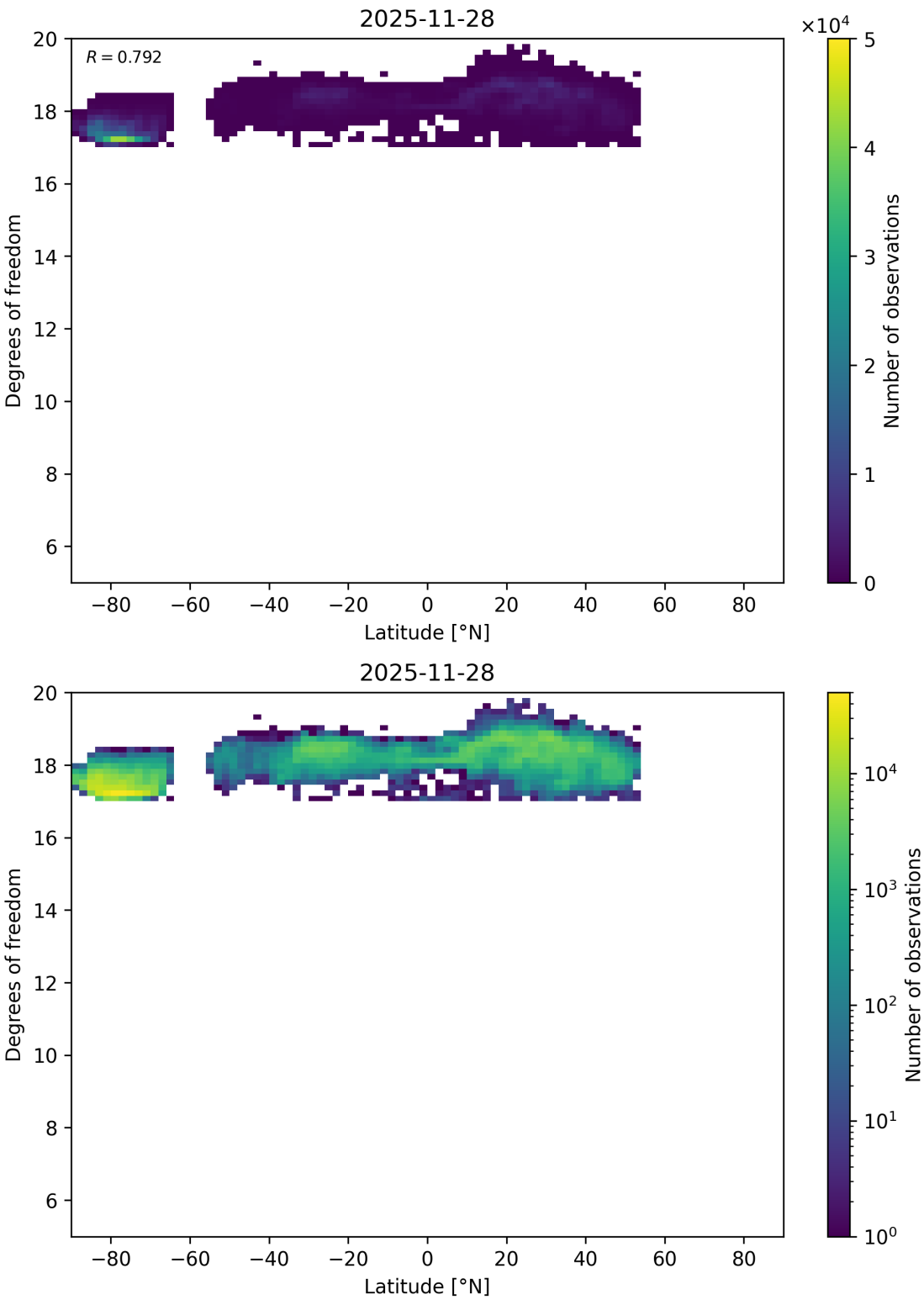


Figure 63: Scatter density plot of “Latitude” against “Degrees of freedom” for 2025-11-28 to 2025-11-29.

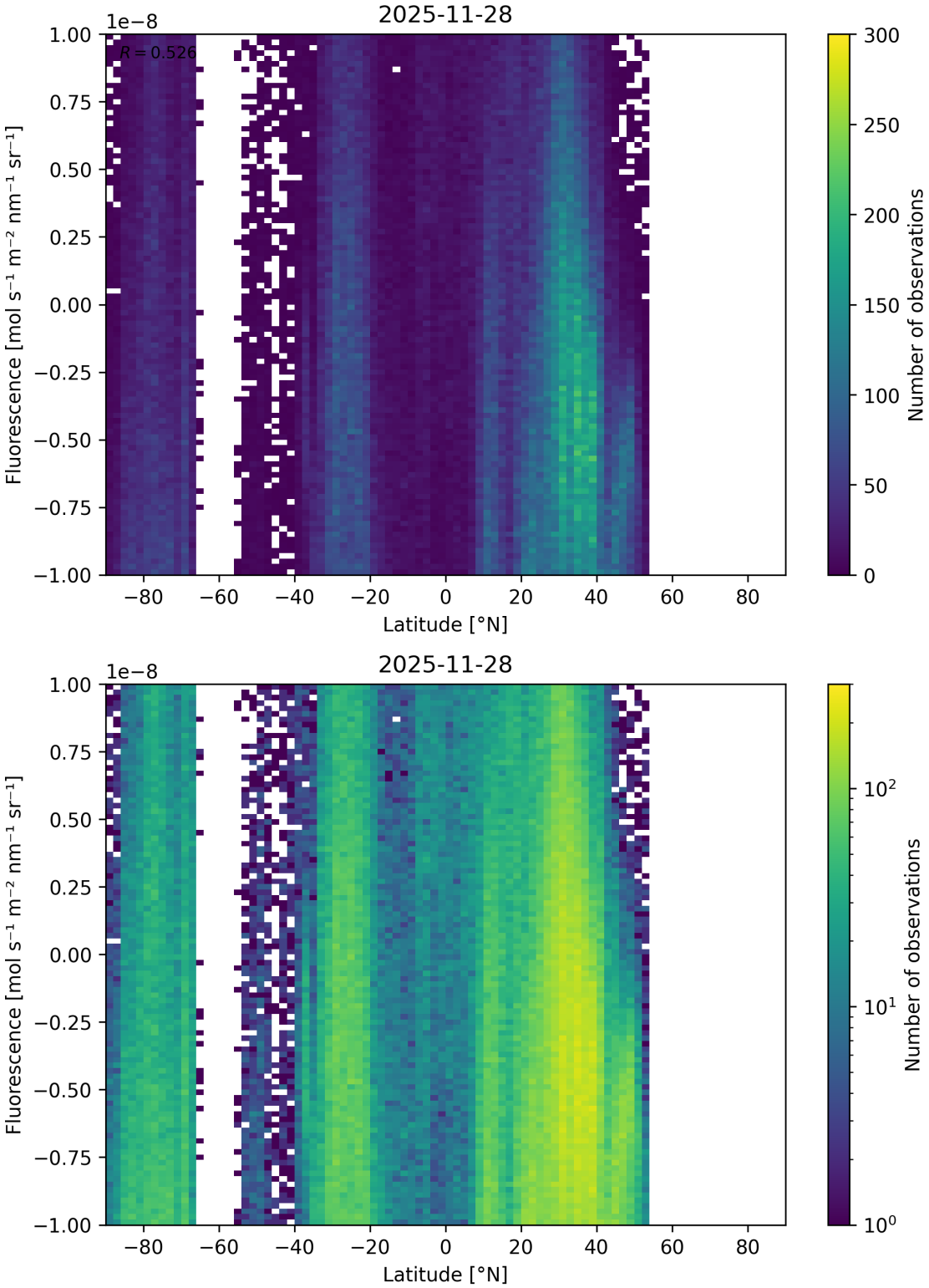


Figure 64: Scatter density plot of “Latitude” against “Fluorescence” for 2025-11-28 to 2025-11-29.

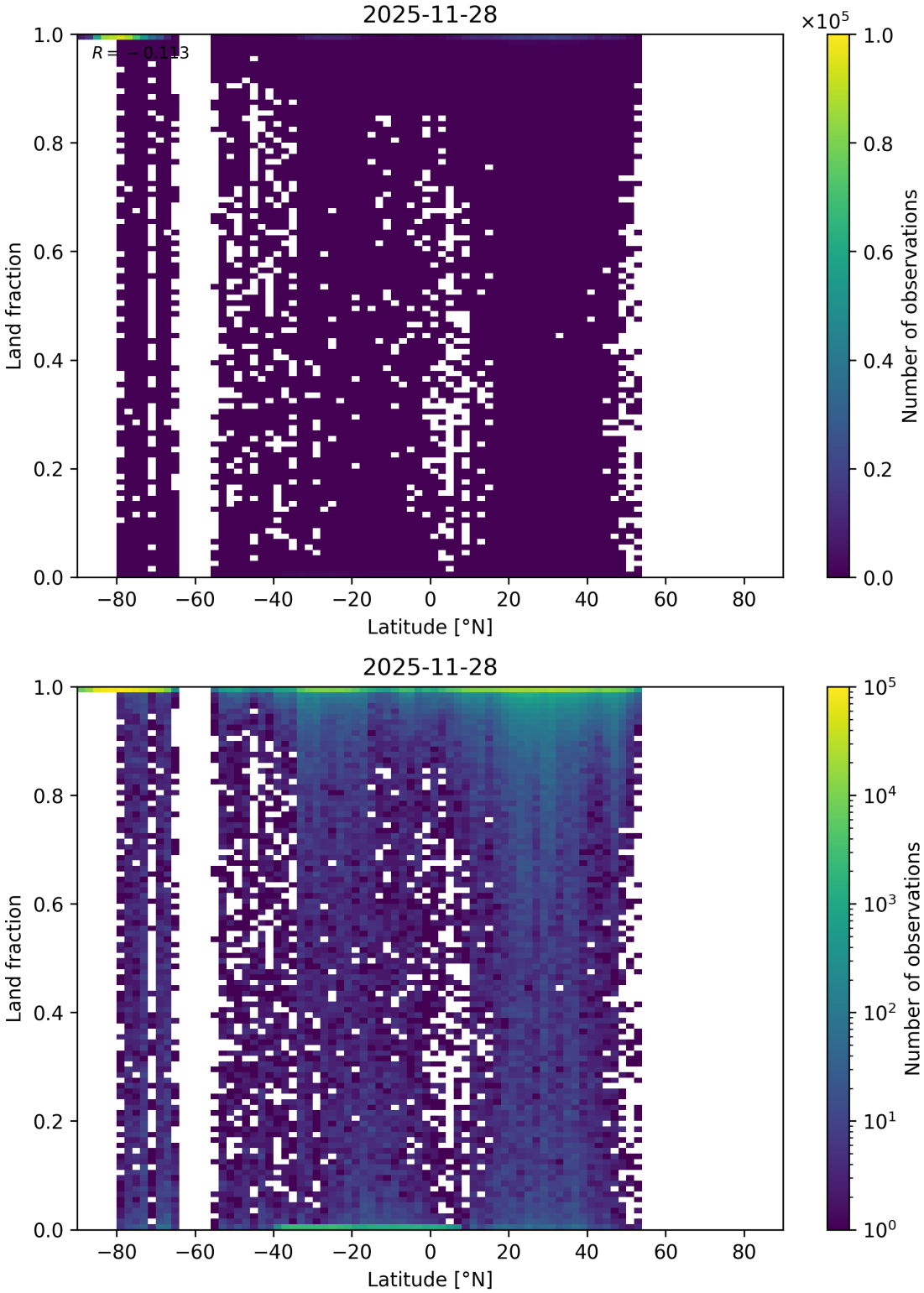


Figure 65: Scatter density plot of “Latitude” against “Land fraction” for 2025-11-28 to 2025-11-29.

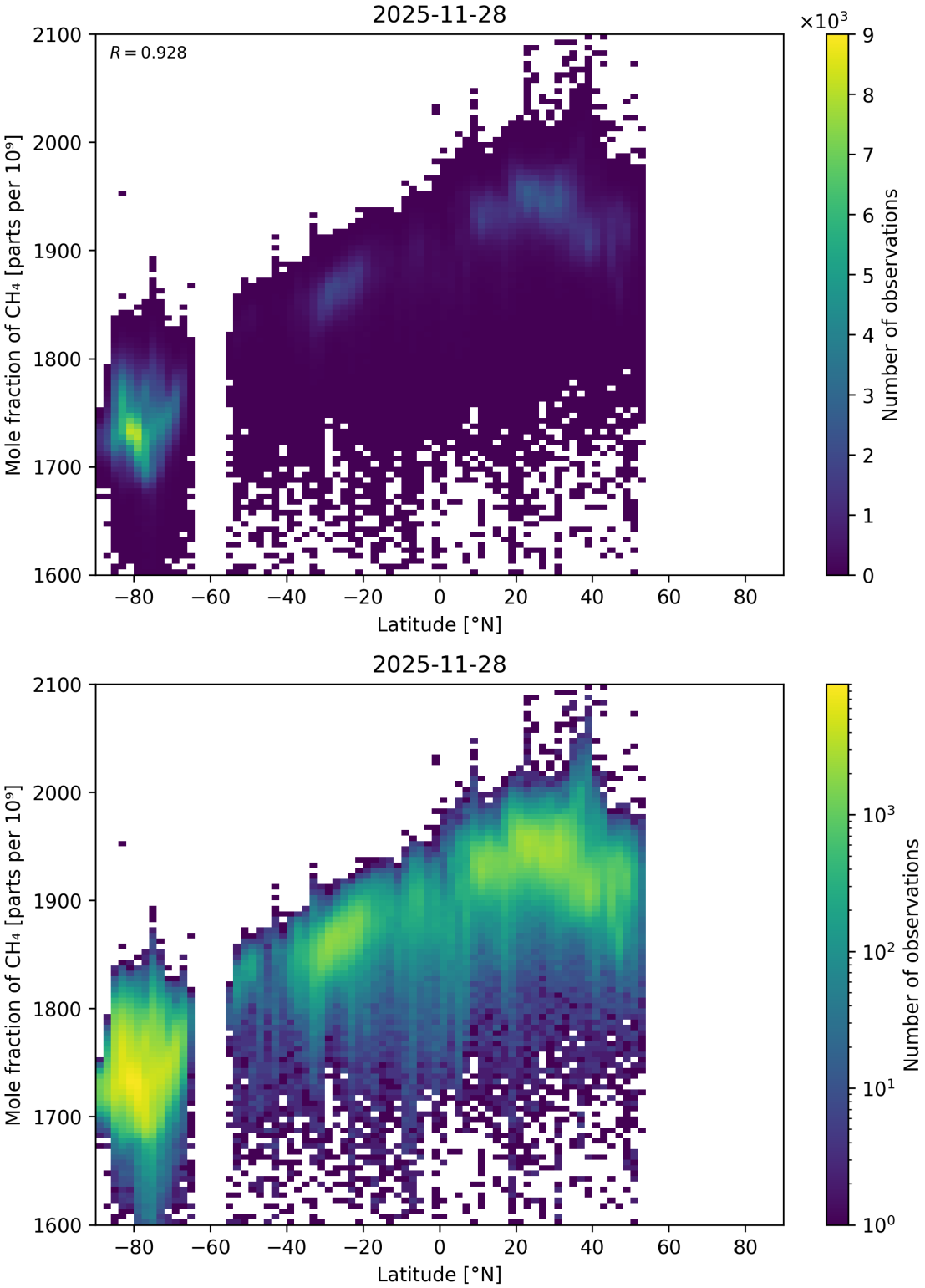


Figure 66: Scatter density plot of "Latitude" against "Mole fraction of CH_4" for 2025-11-28 to 2025-11-29.

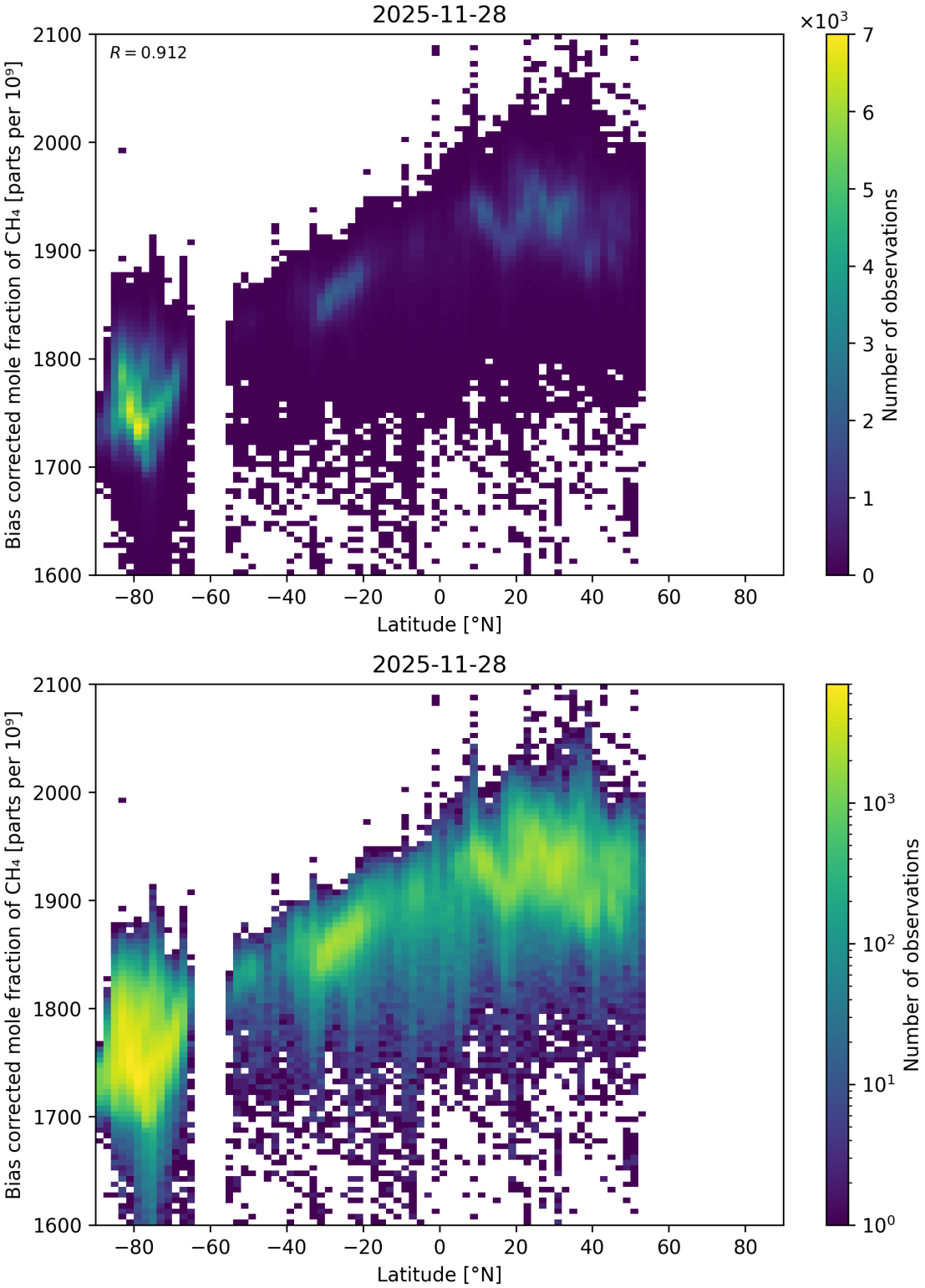


Figure 67: Scatter density plot of "Latitude" against "Bias corrected mole fraction of CH_4" for 2025-11-28 to 2025-11-29.

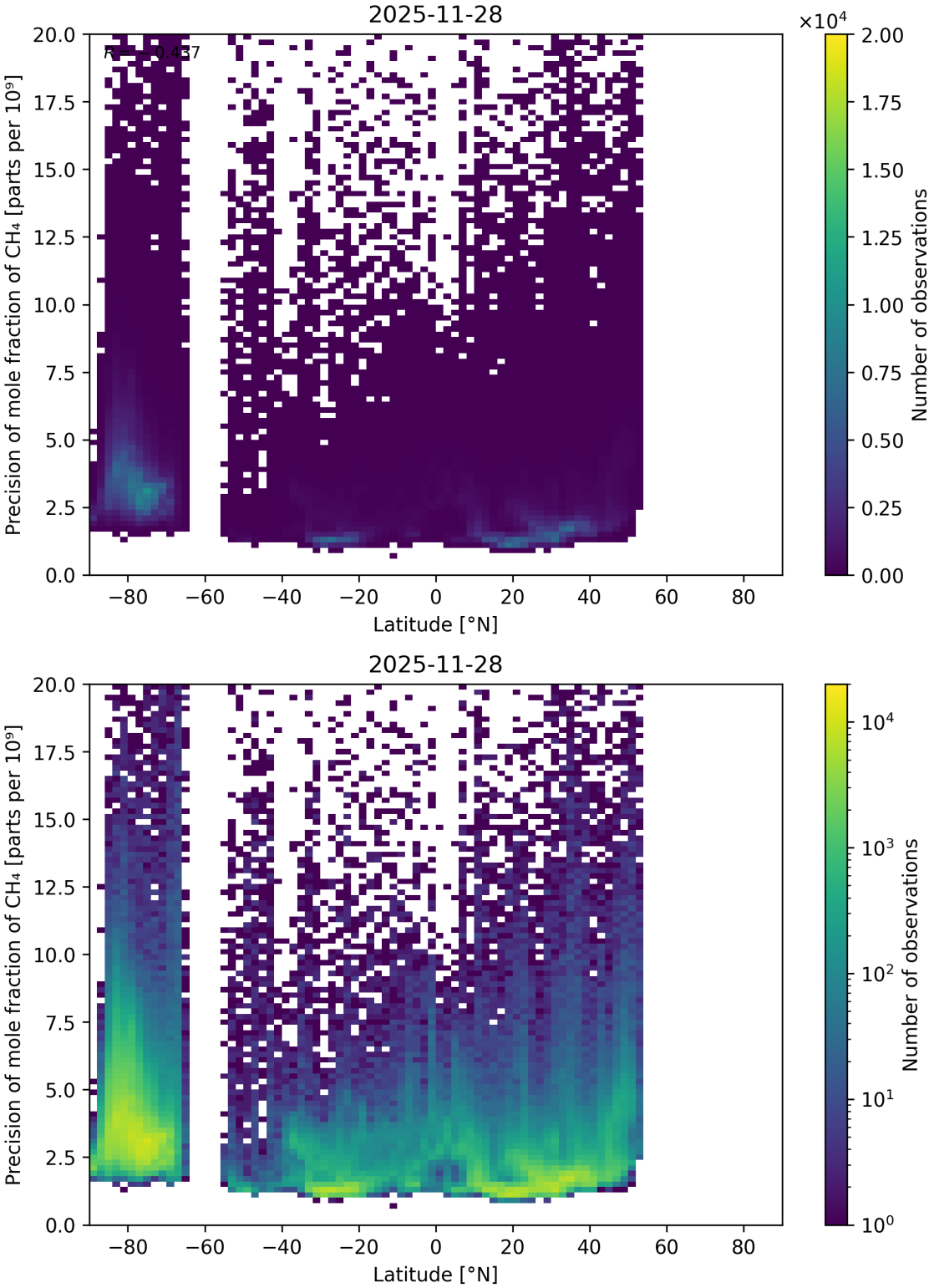


Figure 68: Scatter density plot of “Latitude” against “Precision of mole fraction of CH_4” for 2025-11-28 to 2025-11-29.

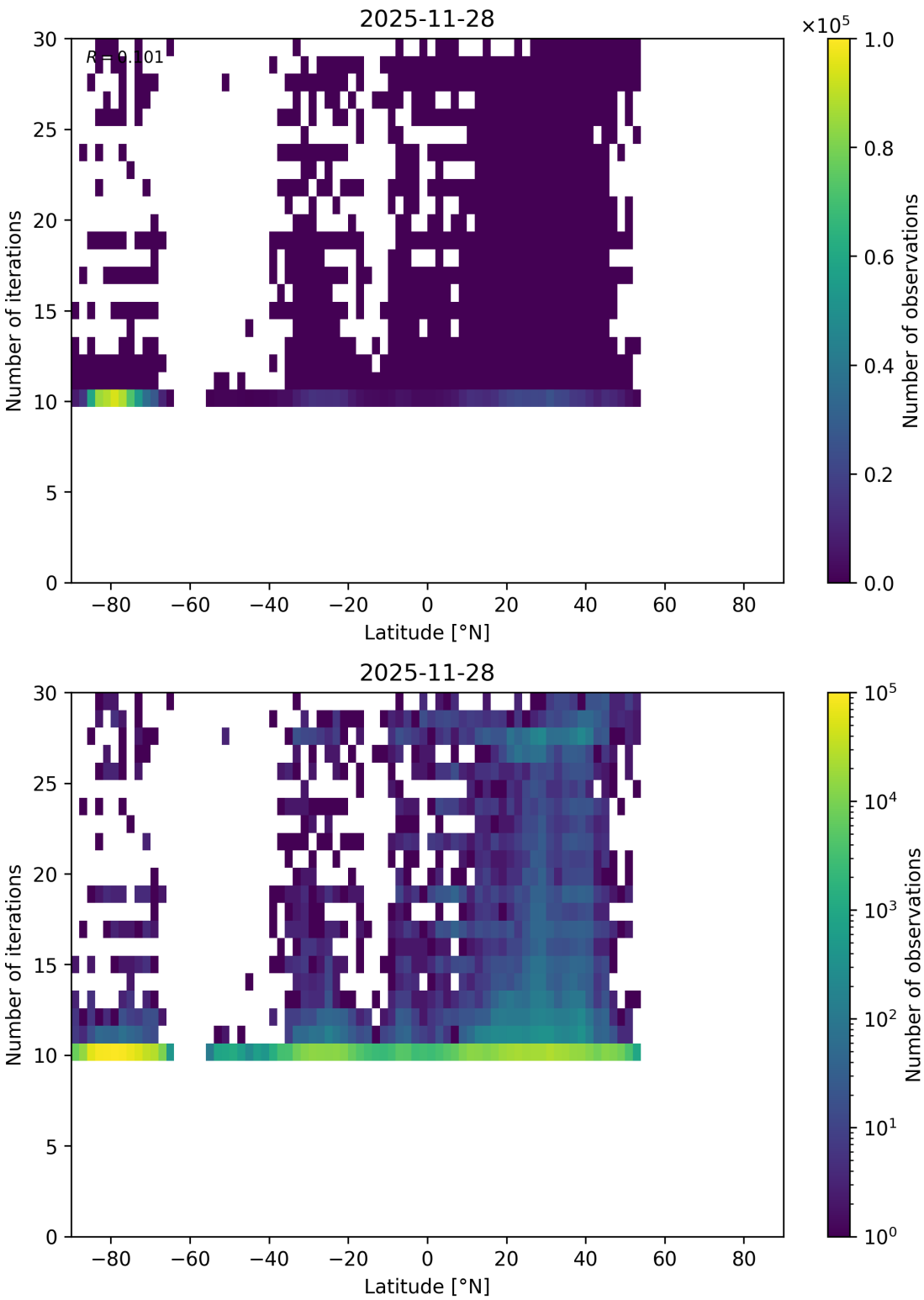


Figure 69: Scatter density plot of “Latitude” against “Number of iterations” for 2025-11-28 to 2025-11-29.

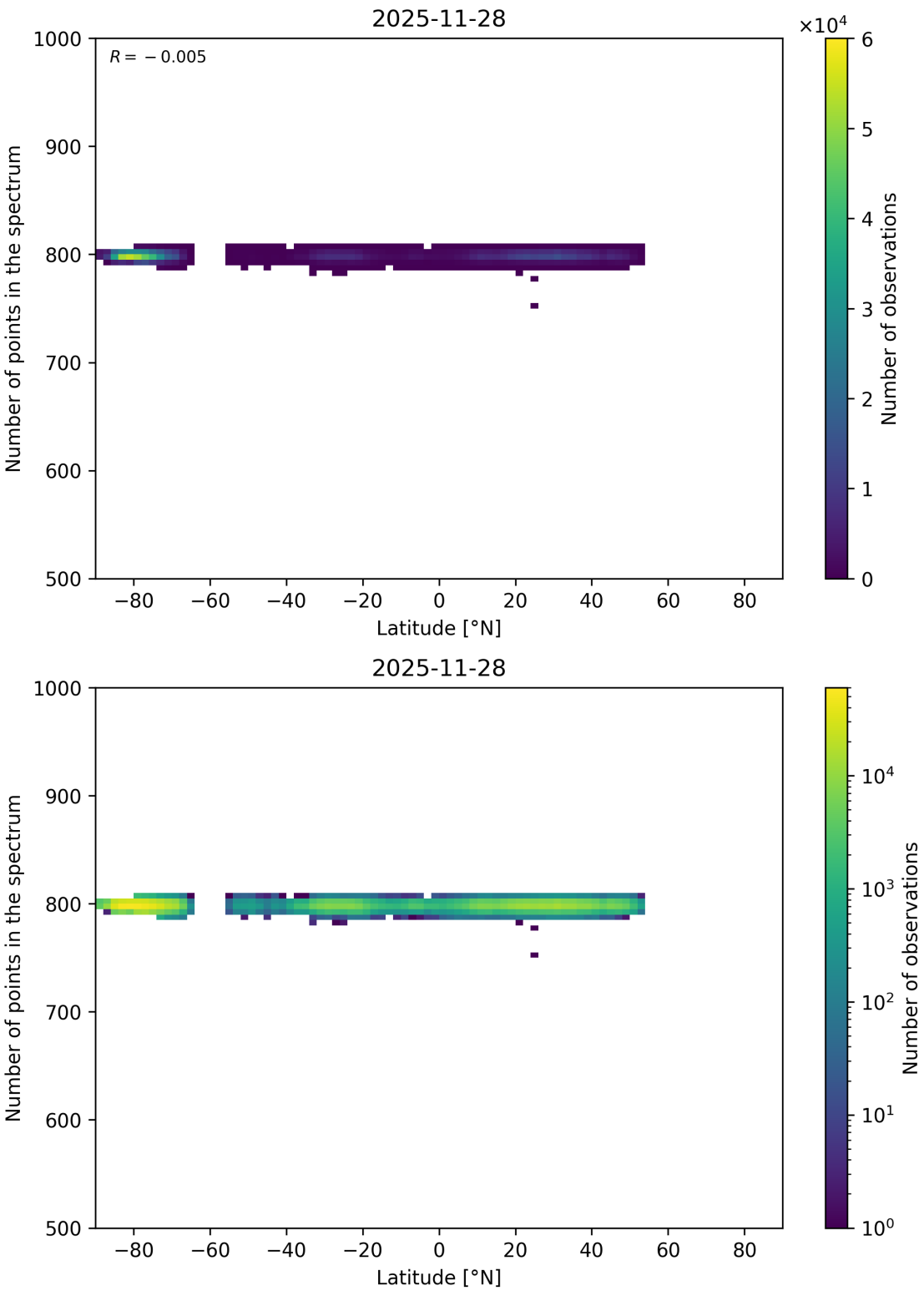


Figure 70: Scatter density plot of “Latitude” against “Number of points in the spectrum” for 2025-11-28 to 2025-11-29.

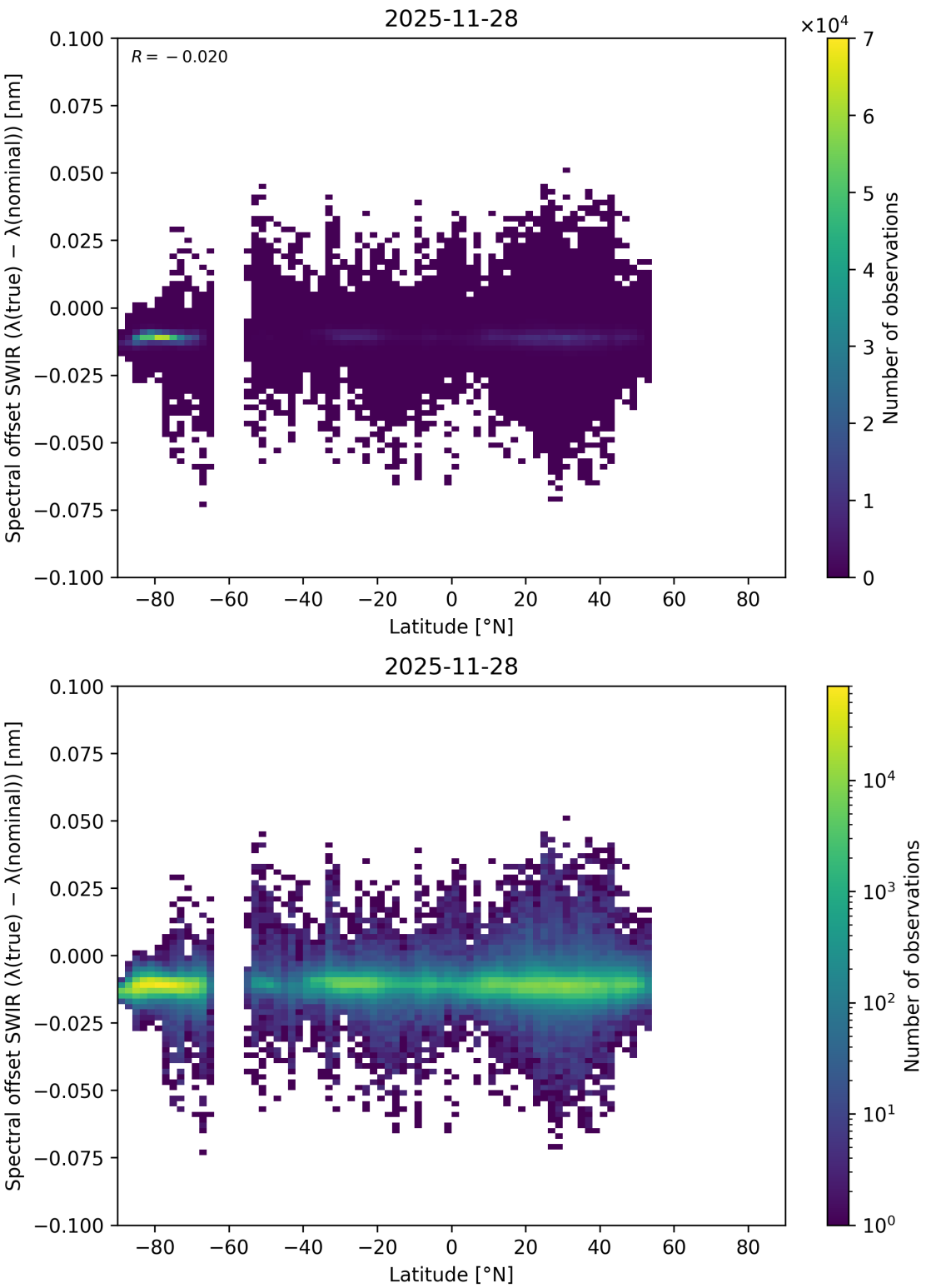


Figure 71: Scatter density plot of "Latitude" against "Spectral offset SWIR ($\lambda_{\text{true}} - \lambda_{\text{nominal}}$)" for 2025-11-28 to 2025-11-29.

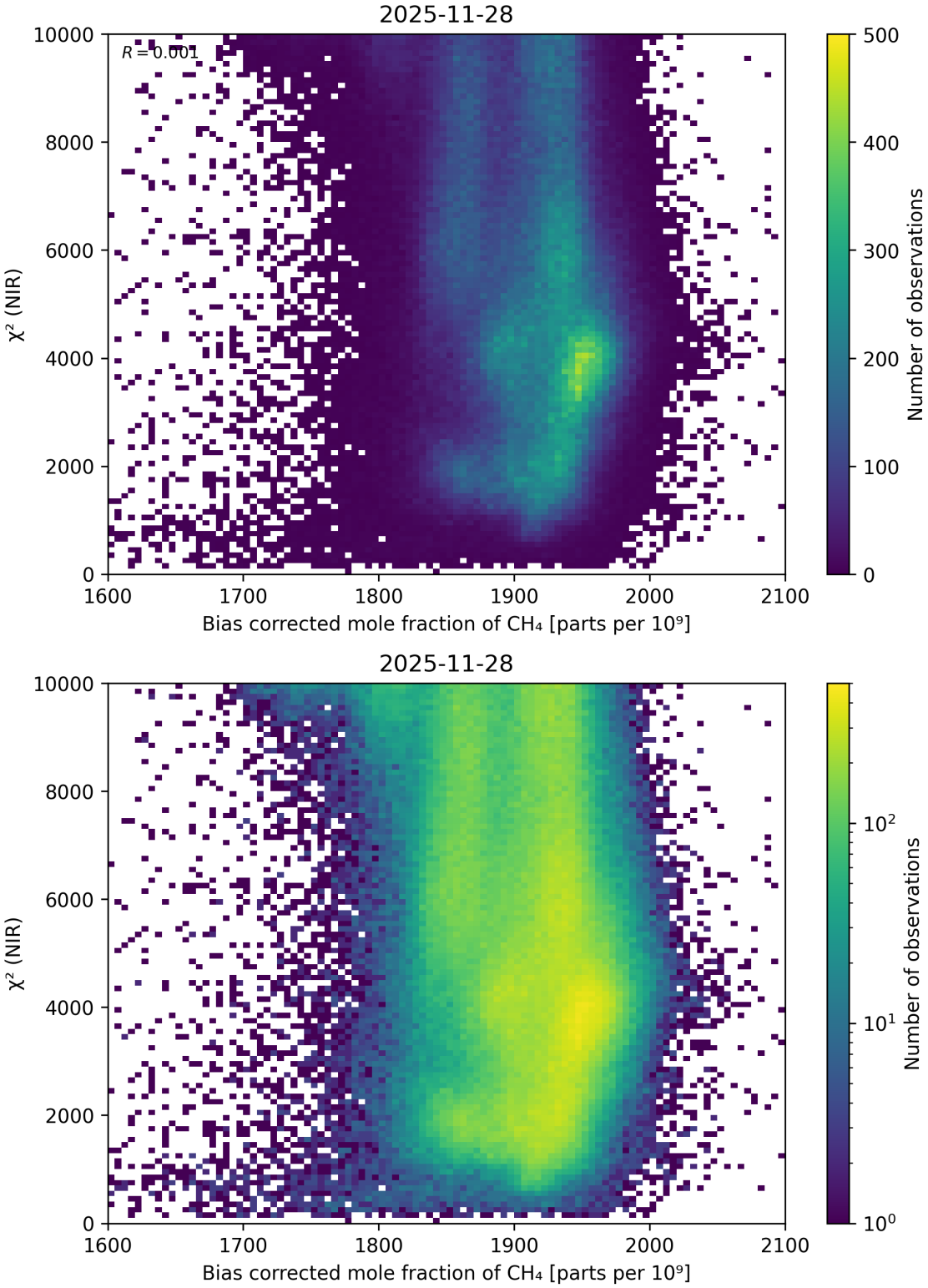


Figure 72: Scatter density plot of "Bias corrected mole fraction of CH_4" against "χ^2 (NIR)" for 2025-11-28 to 2025-11-29.

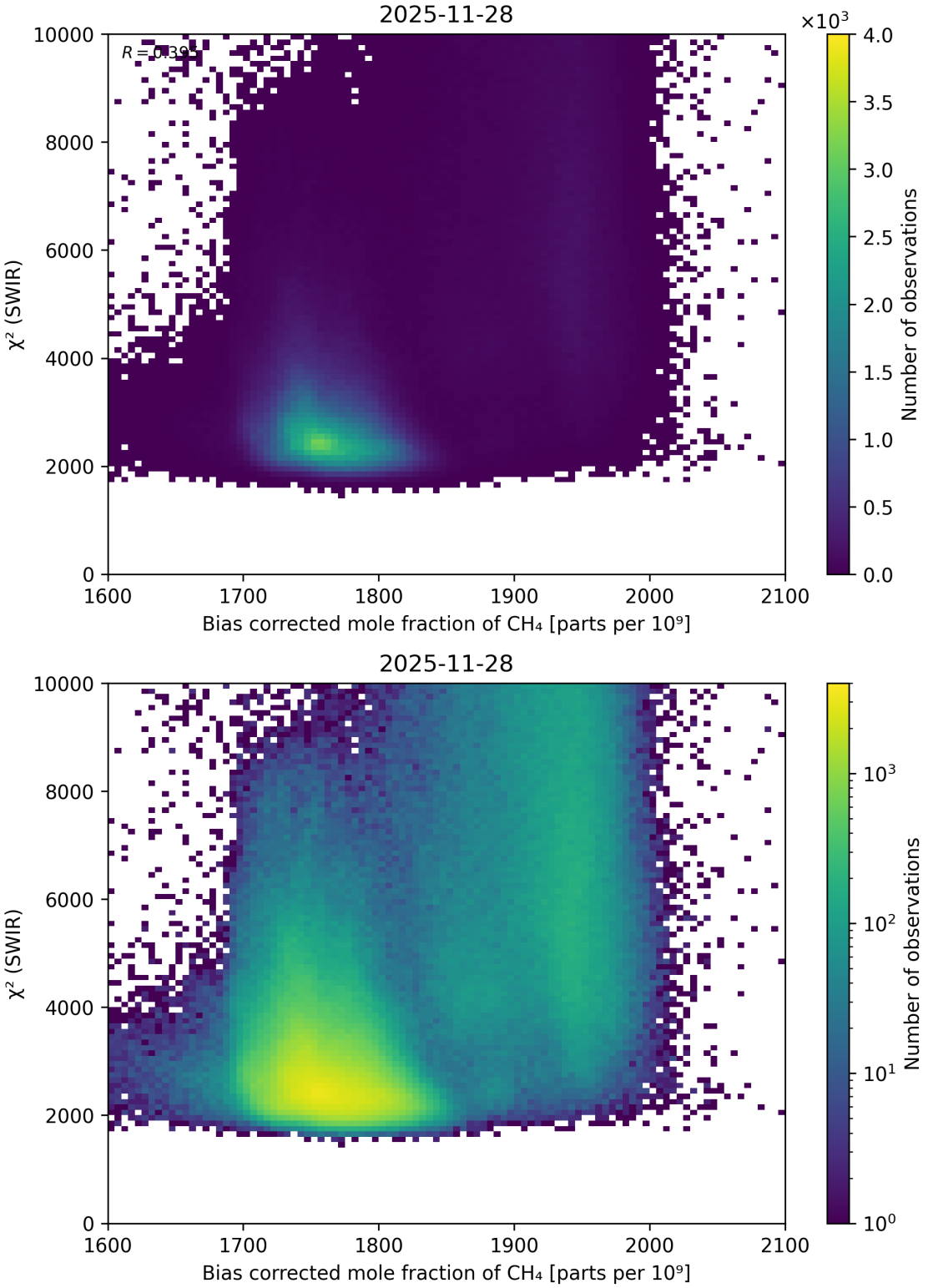


Figure 73: Scatter density plot of "Bias corrected mole fraction of CH_4" against "χ^2 (SWIR)" for 2025-11-28 to 2025-11-29.

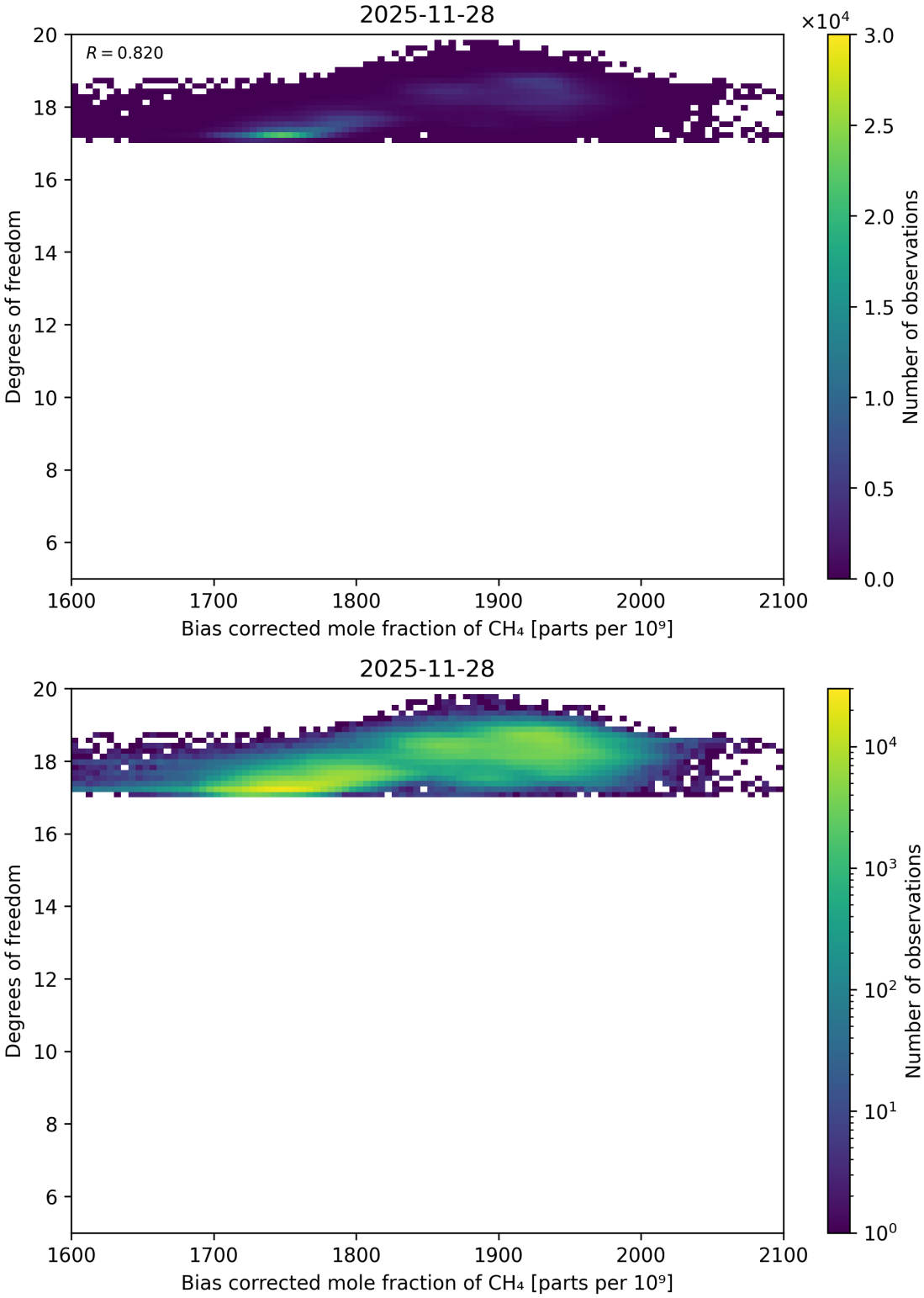


Figure 74: Scatter density plot of "Bias corrected mole fraction of CH_4" against "Degrees of freedom" for 2025-11-28 to 2025-11-29.

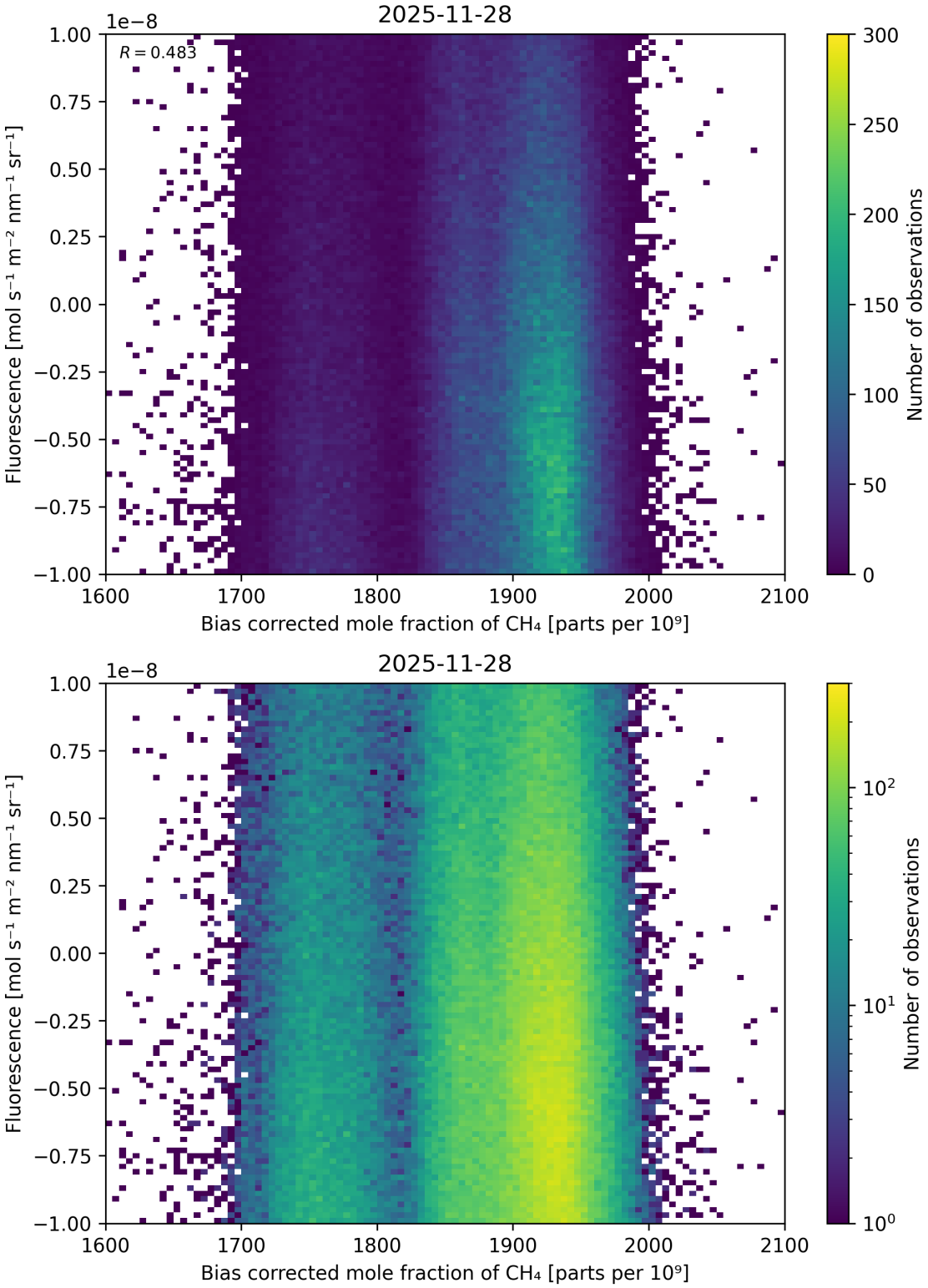


Figure 75: Scatter density plot of "Bias corrected mole fraction of CH_4" against "Fluorescence" for 2025-11-28 to 2025-11-29.

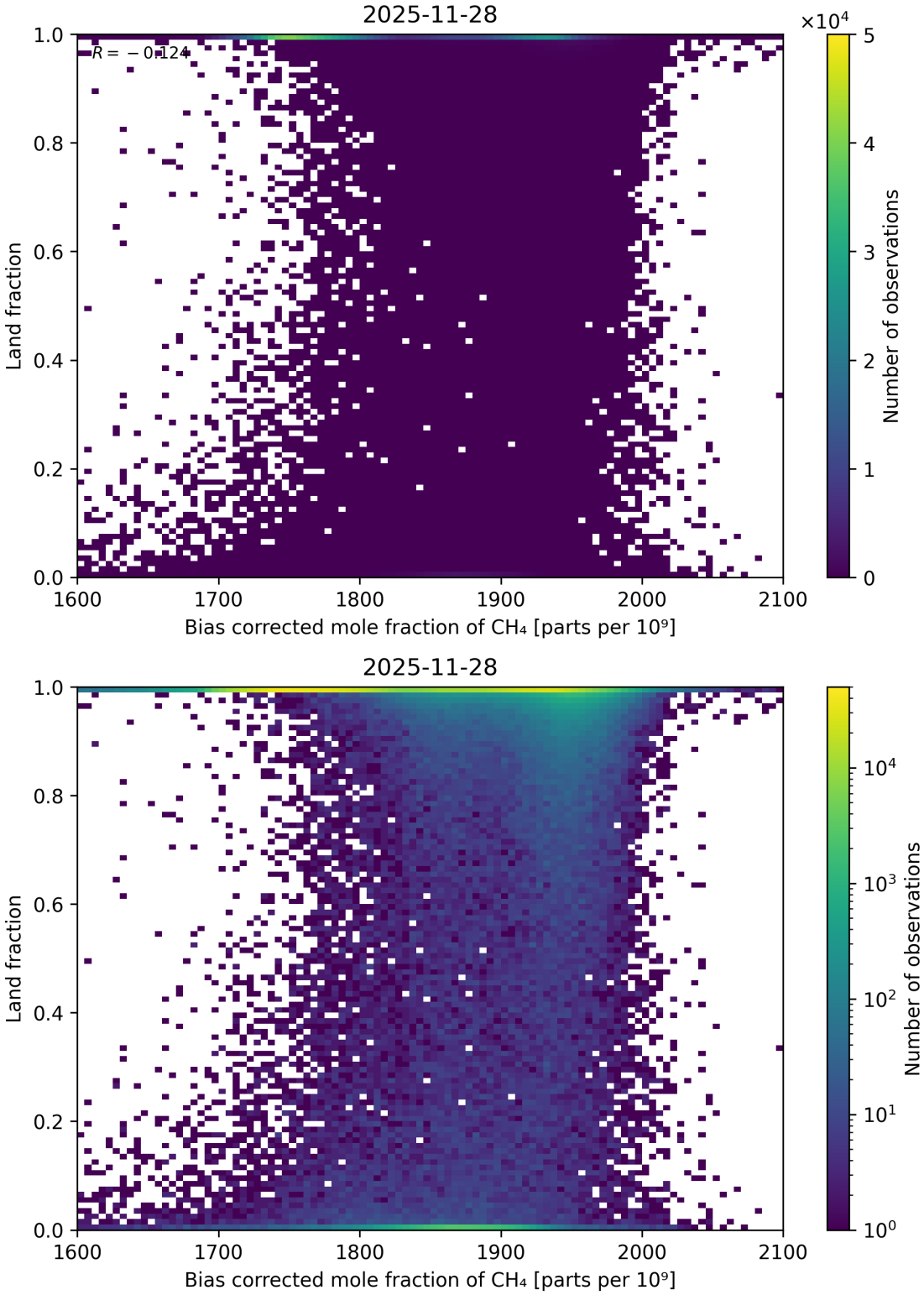


Figure 76: Scatter density plot of "Bias corrected mole fraction of CH_4" against "Land fraction" for 2025-11-28 to 2025-11-29.

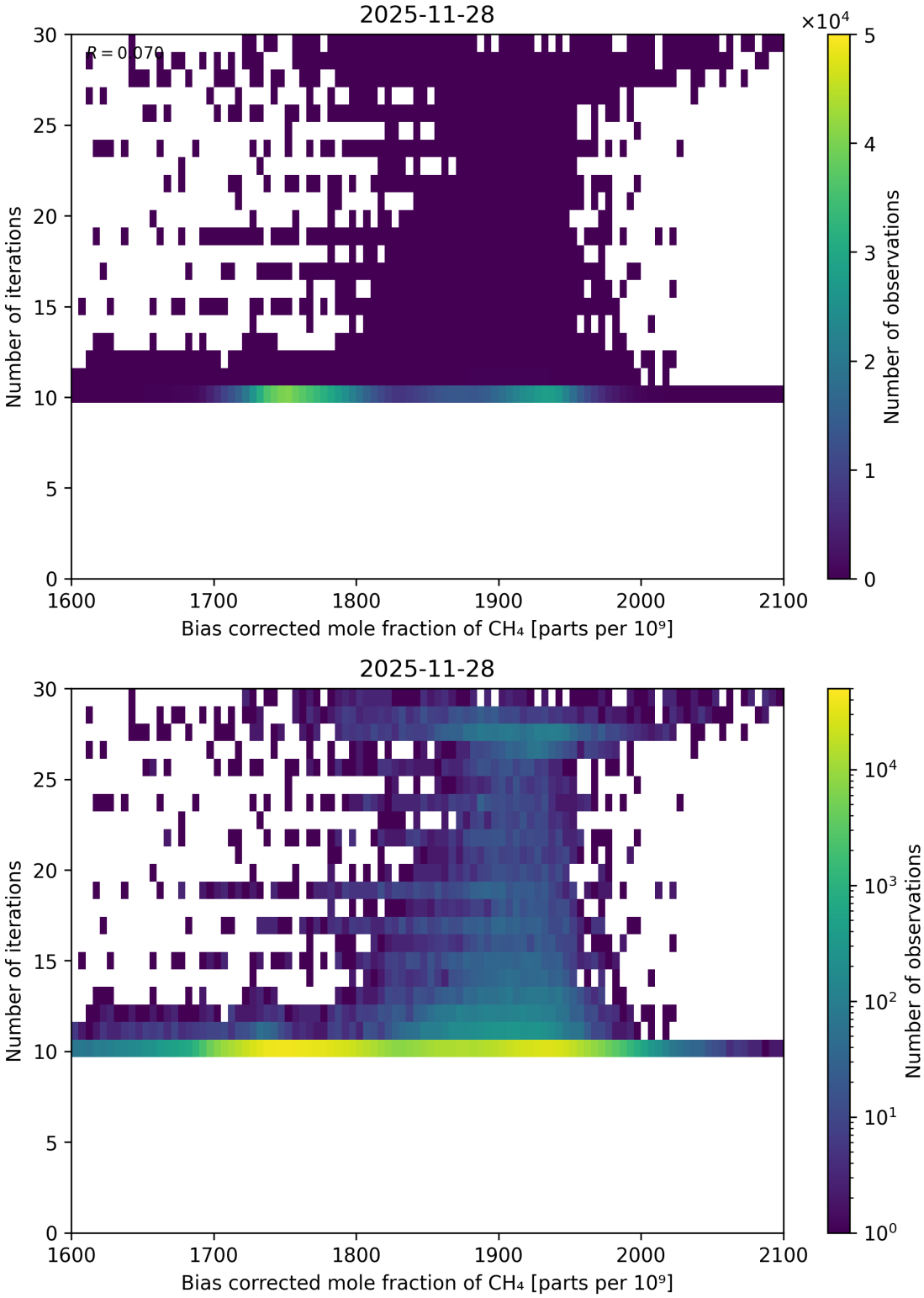


Figure 77: Scatter density plot of "Bias corrected mole fraction of CH_4" against "Number of iterations" for 2025-11-28 to 2025-11-29.

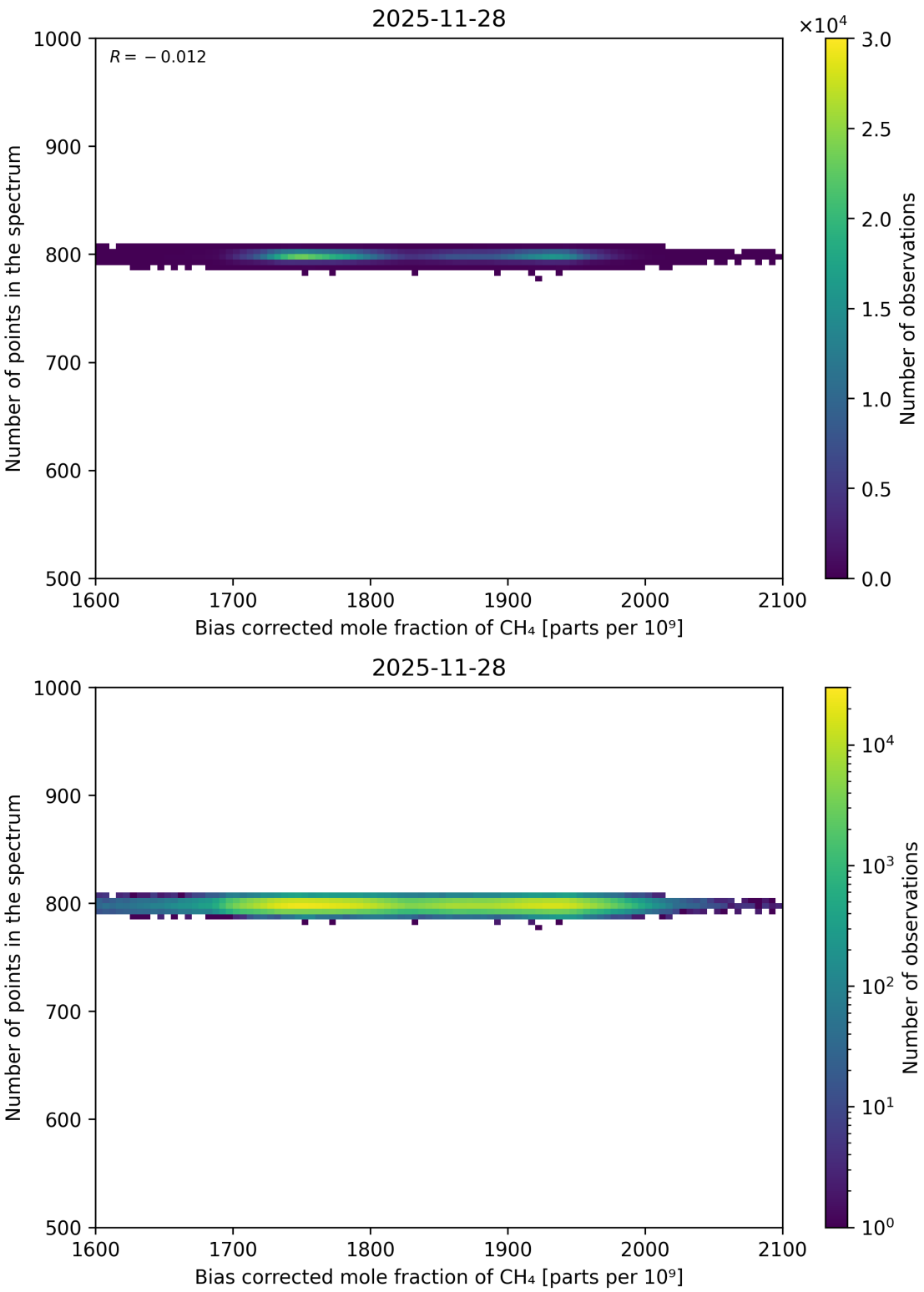


Figure 78: Scatter density plot of "Bias corrected mole fraction of CH_4" against "Number of points in the spectrum" for 2025-11-28 to 2025-11-29.

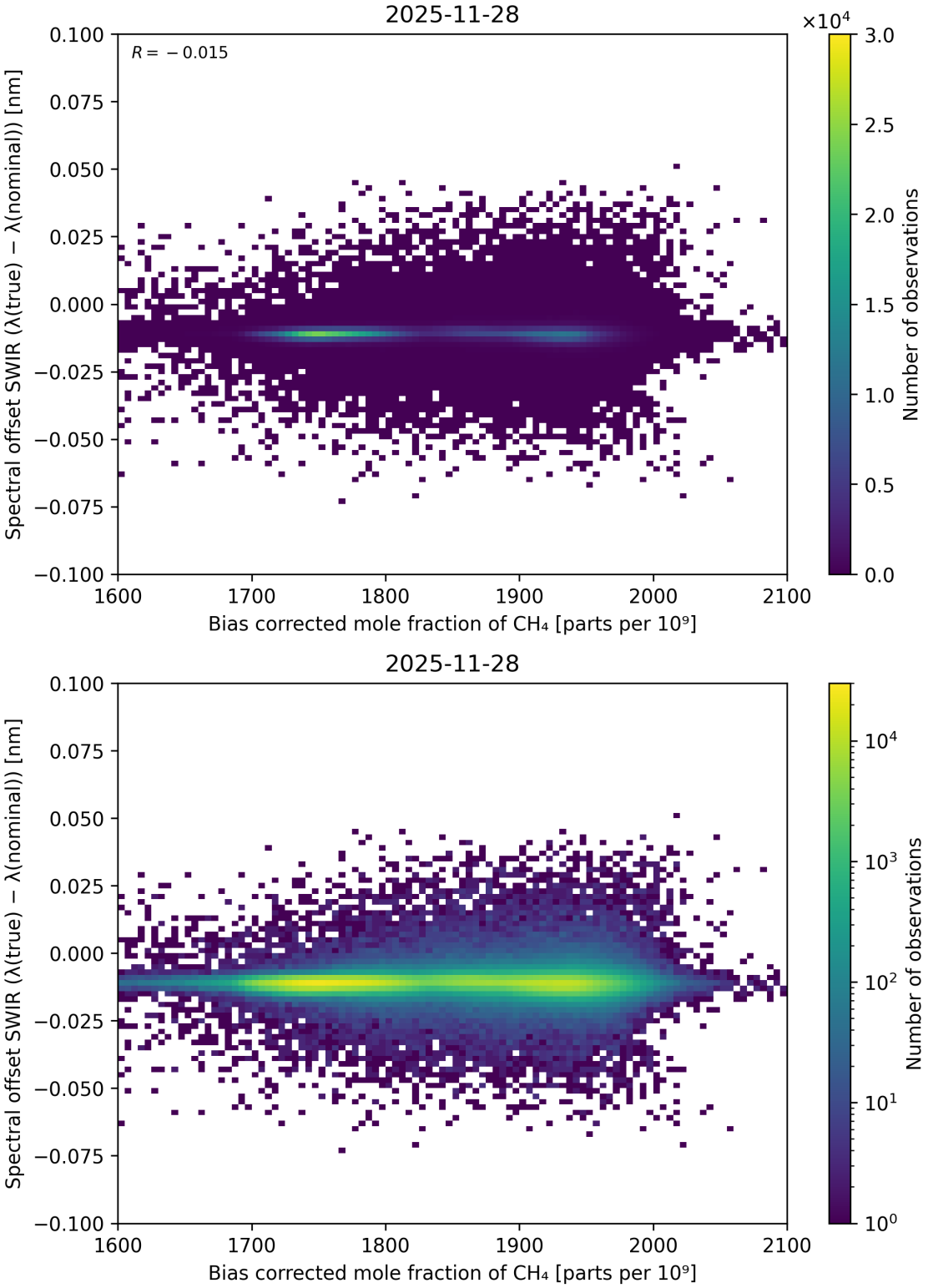


Figure 79: Scatter density plot of "Bias corrected mole fraction of CH_4" against "Spectral offset SWIR ($\lambda_{\text{true}} - \lambda_{\text{nominal}}$)" for 2025-11-28 to 2025-11-29.

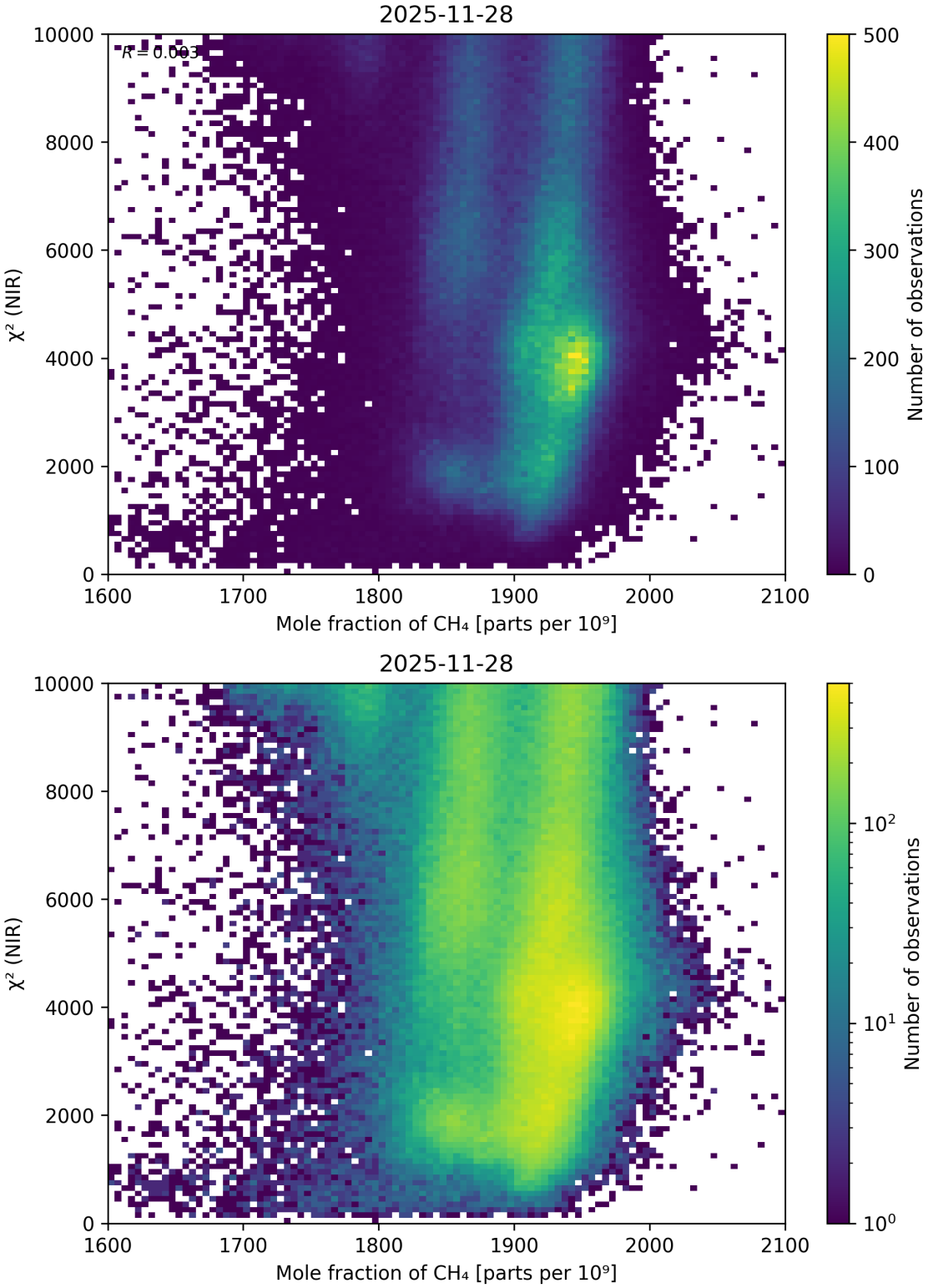


Figure 80: Scatter density plot of "Mole fraction of CH_4" against "χ^2 (NIR)" for 2025-11-28 to 2025-11-29.

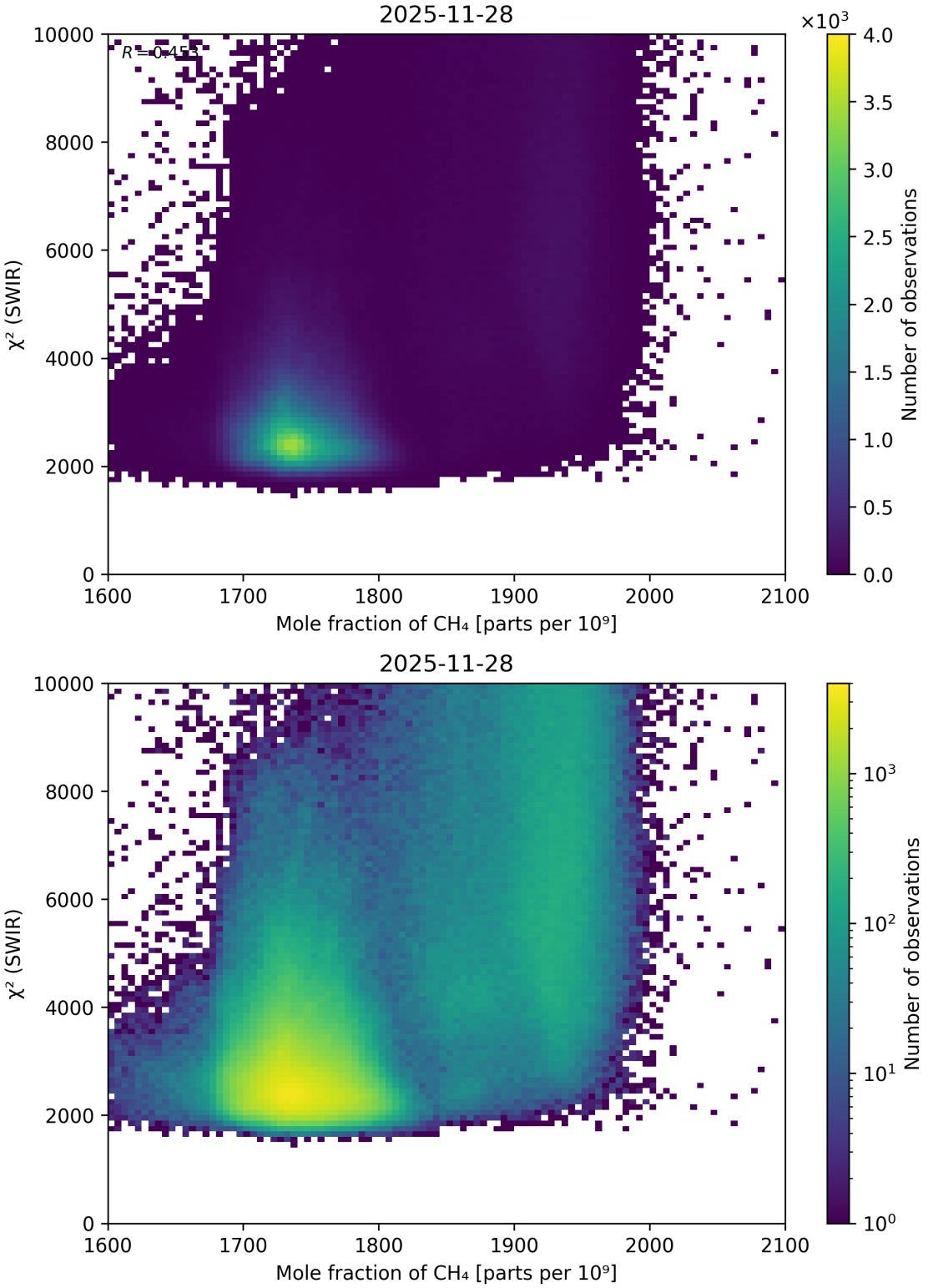


Figure 81: Scatter density plot of "Mole fraction of CH_4" against "χ^2 (SWIR)" for 2025-11-28 to 2025-11-29.

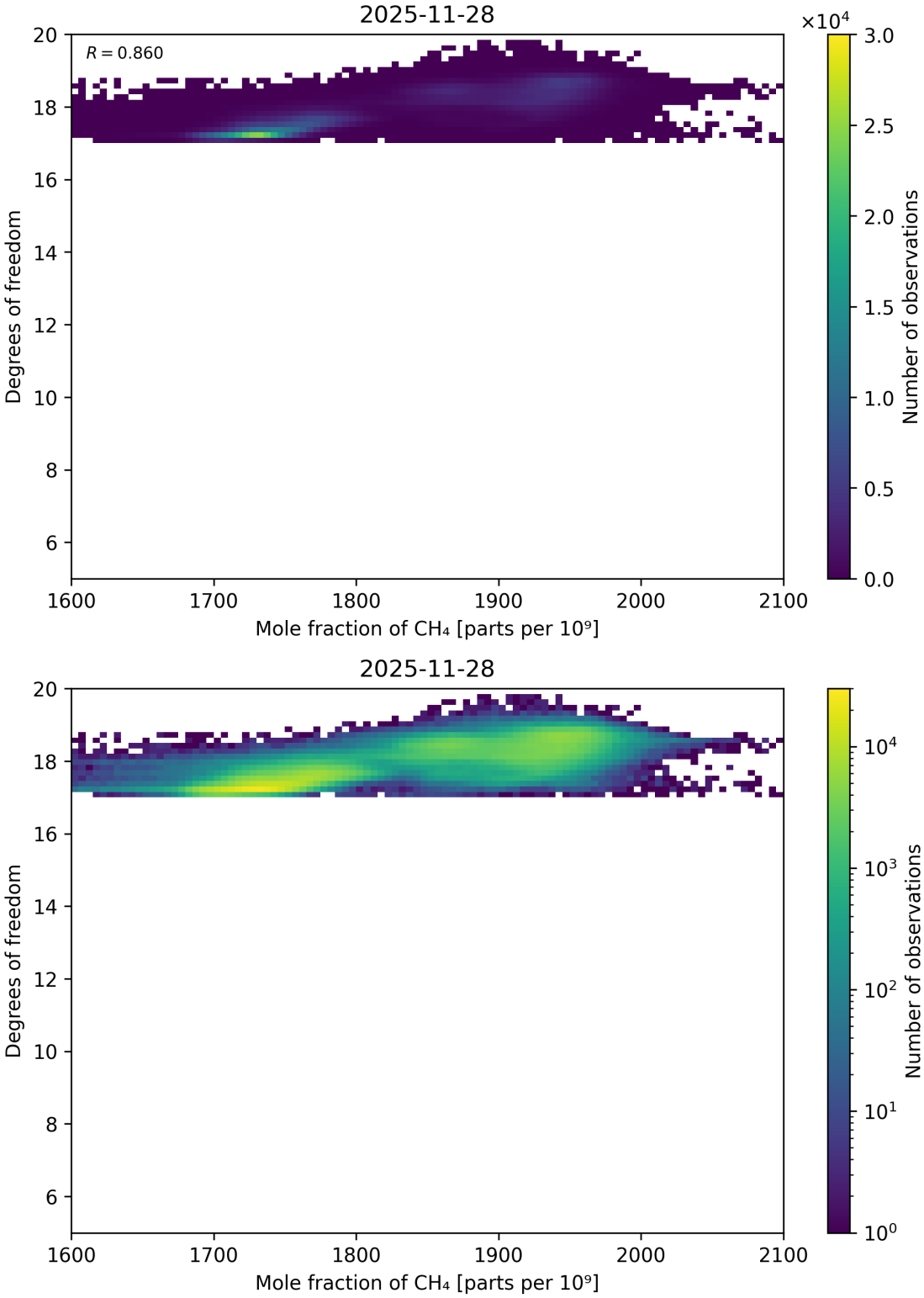


Figure 82: Scatter density plot of "Mole fraction of CH_4" against "Degrees of freedom" for 2025-11-28 to 2025-11-29.

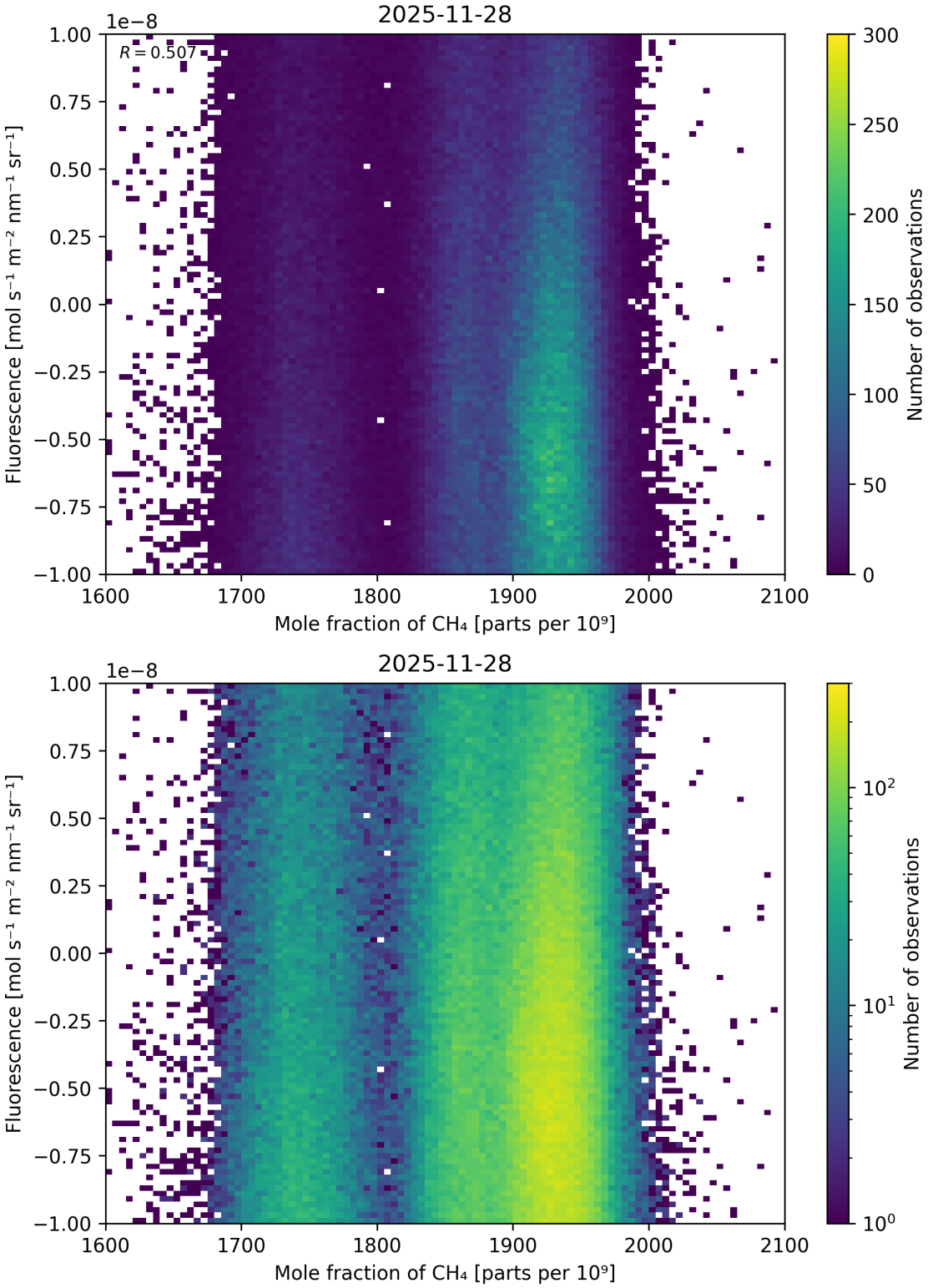


Figure 83: Scatter density plot of "Mole fraction of CH_4" against "Fluorescence" for 2025-11-28 to 2025-11-29.

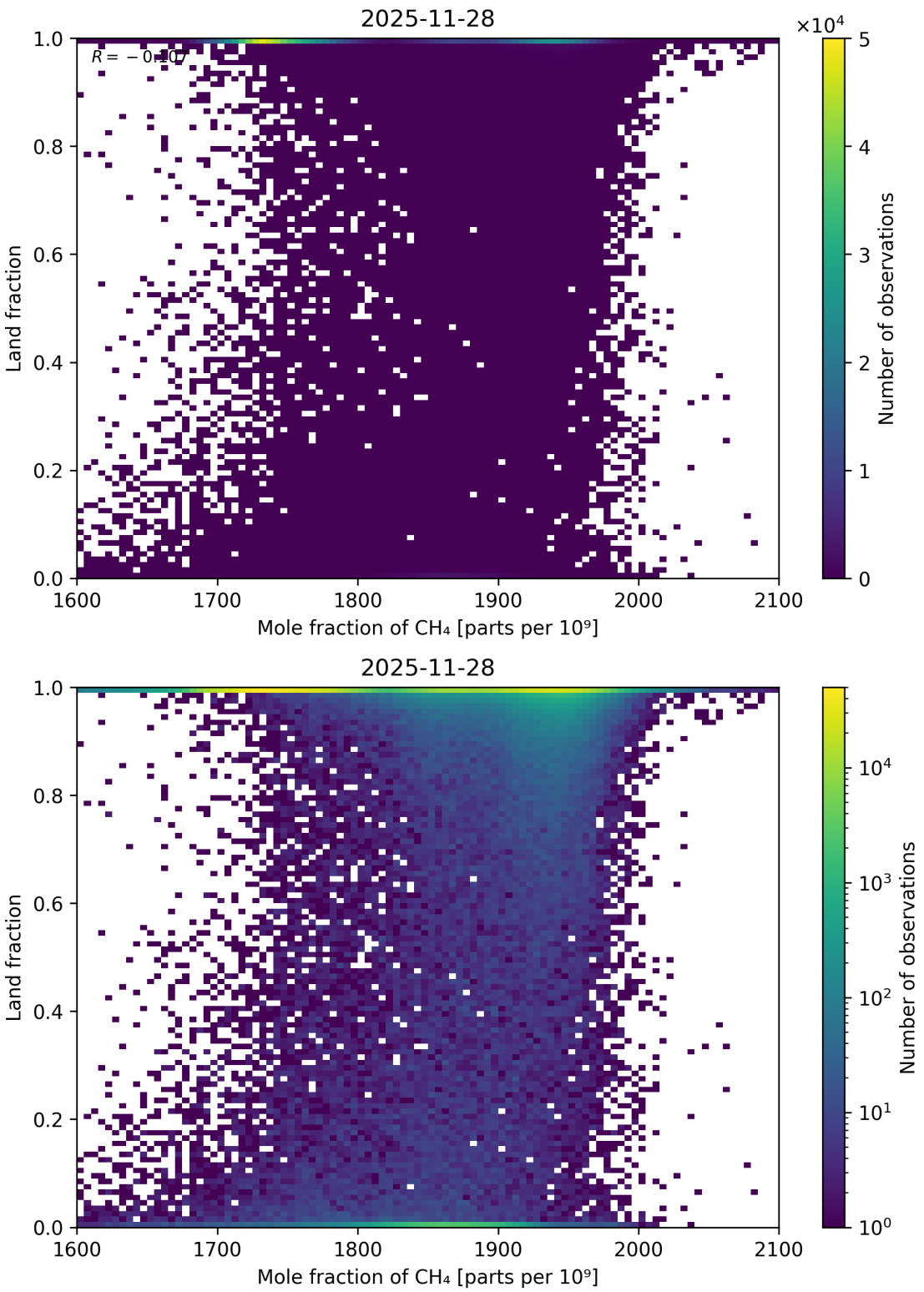


Figure 84: Scatter density plot of "Mole fraction of CH_4" against "Land fraction" for 2025-11-28 to 2025-11-29.

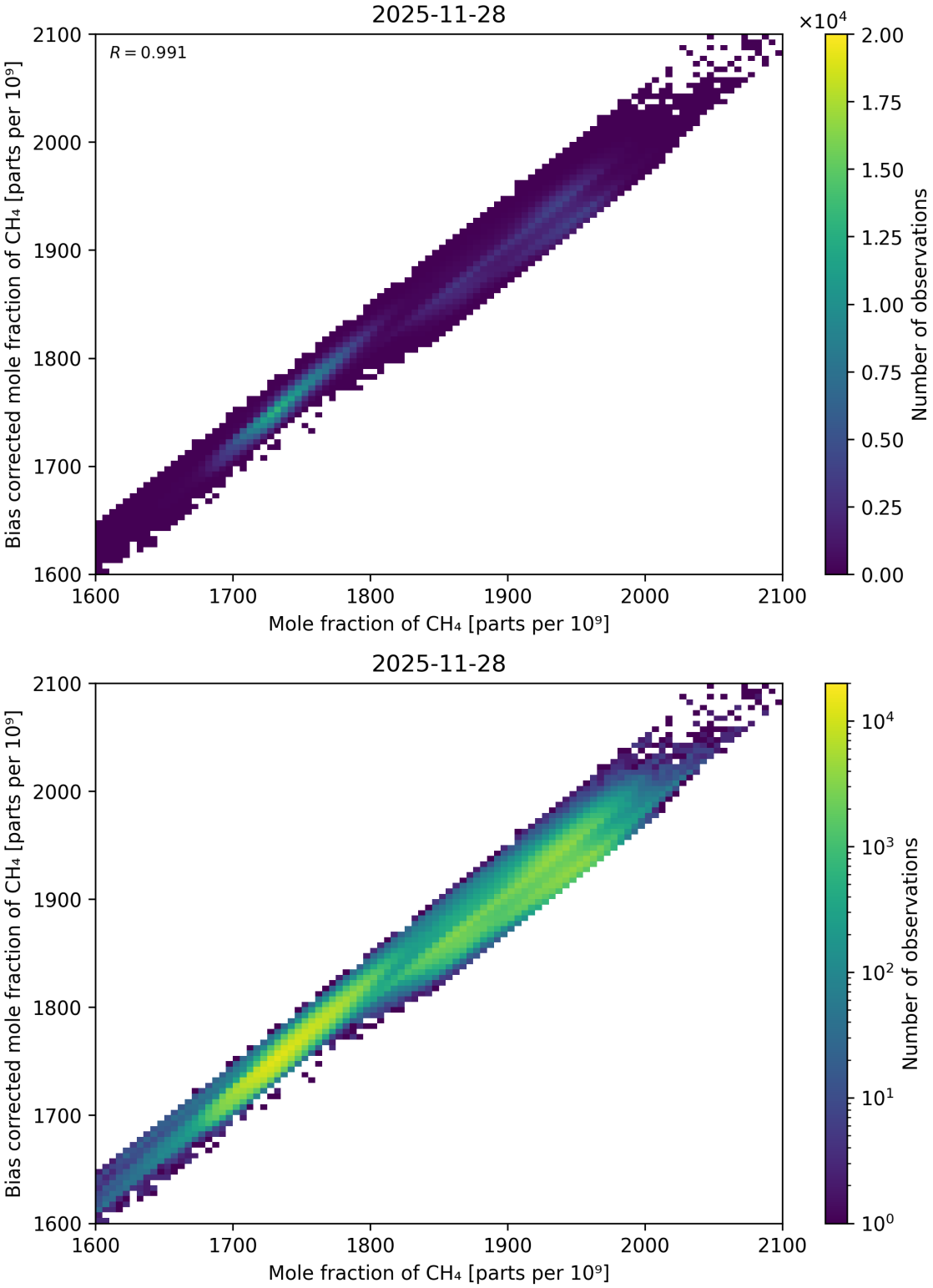


Figure 85: Scatter density plot of "Mole fraction of CH_4" against "Bias corrected mole fraction of CH_4" for 2025-11-28 to 2025-11-29.

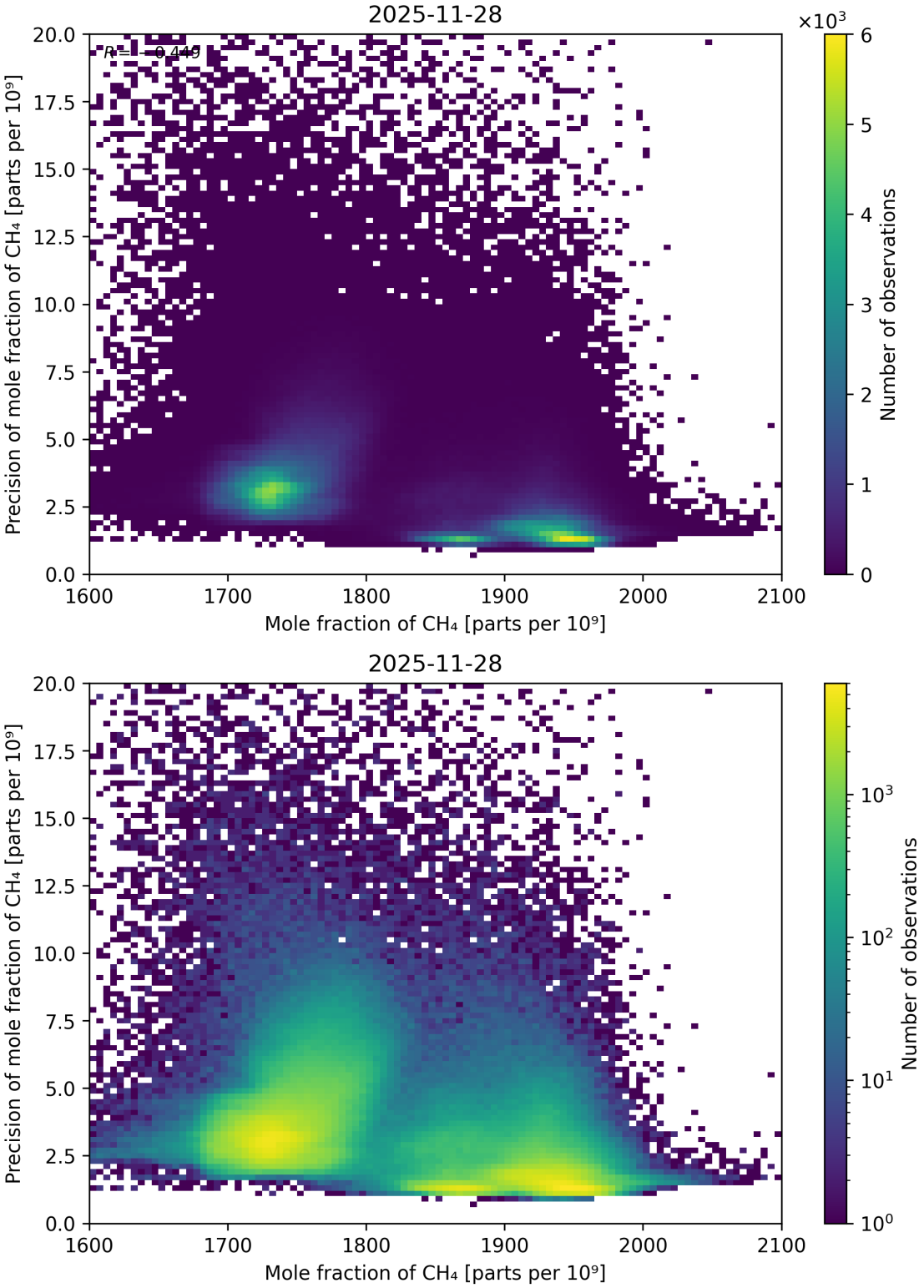


Figure 86: Scatter density plot of "Mole fraction of CH_4" against "Precision of mole fraction of CH_4" for 2025-11-28 to 2025-11-29.

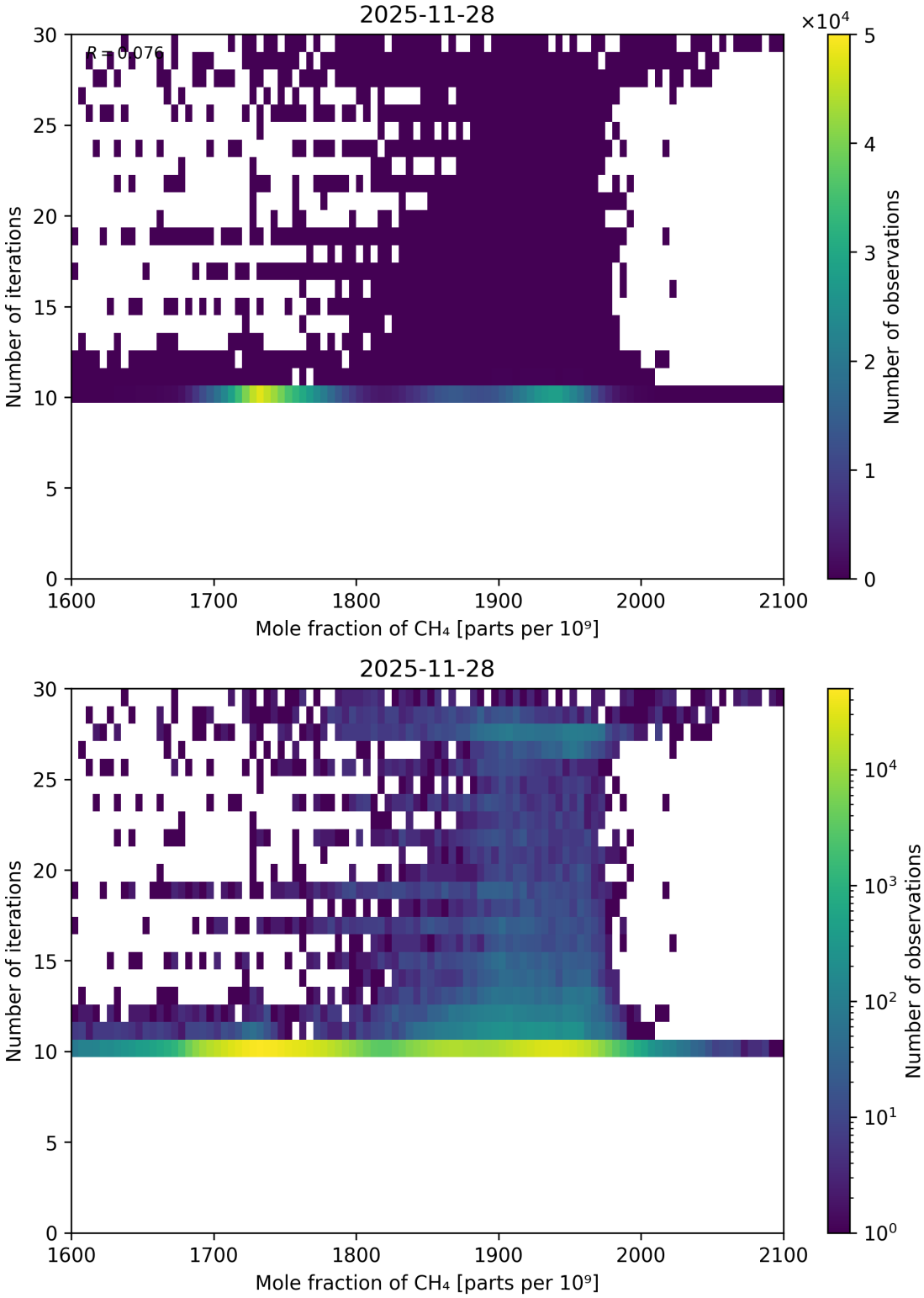


Figure 87: Scatter density plot of "Mole fraction of CH_4" against "Number of iterations" for 2025-11-28 to 2025-11-29.

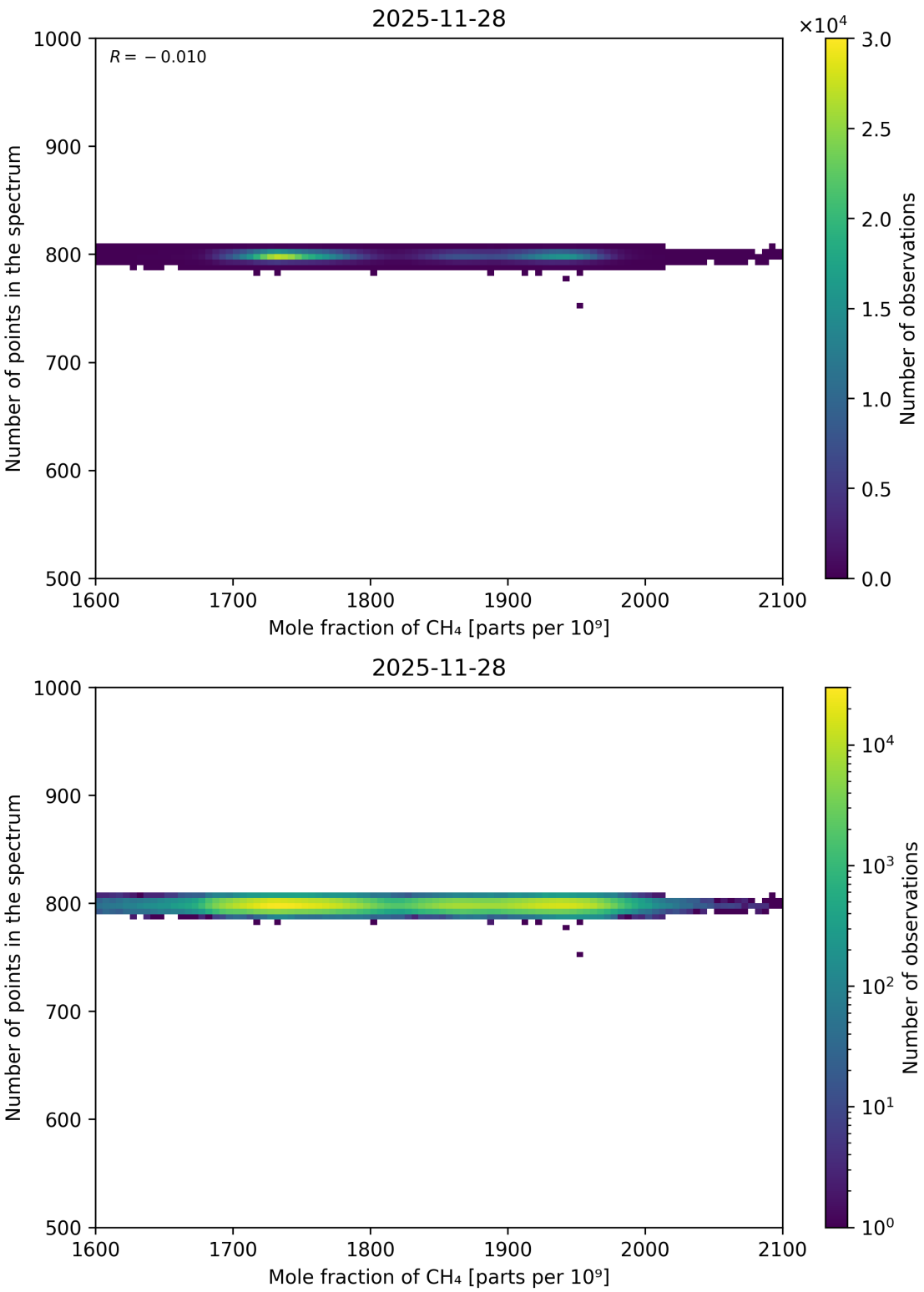


Figure 88: Scatter density plot of "Mole fraction of CH_4" against "Number of points in the spectrum" for 2025-11-28 to 2025-11-29.

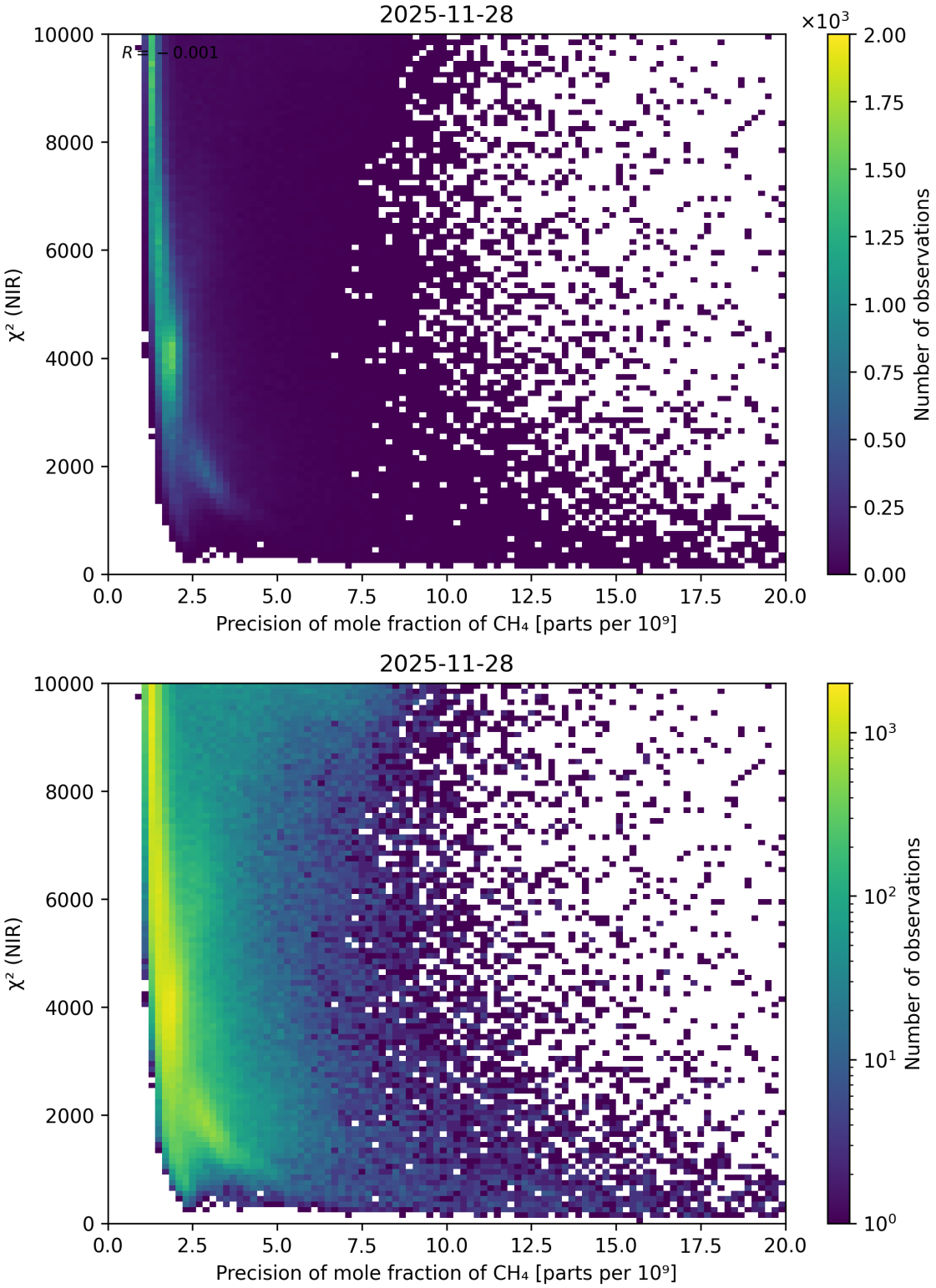


Figure 89: Scatter density plot of "Precision of mole fraction of CH_4" against "χ^2 (NIR)" for 2025-11-28 to 2025-11-29.

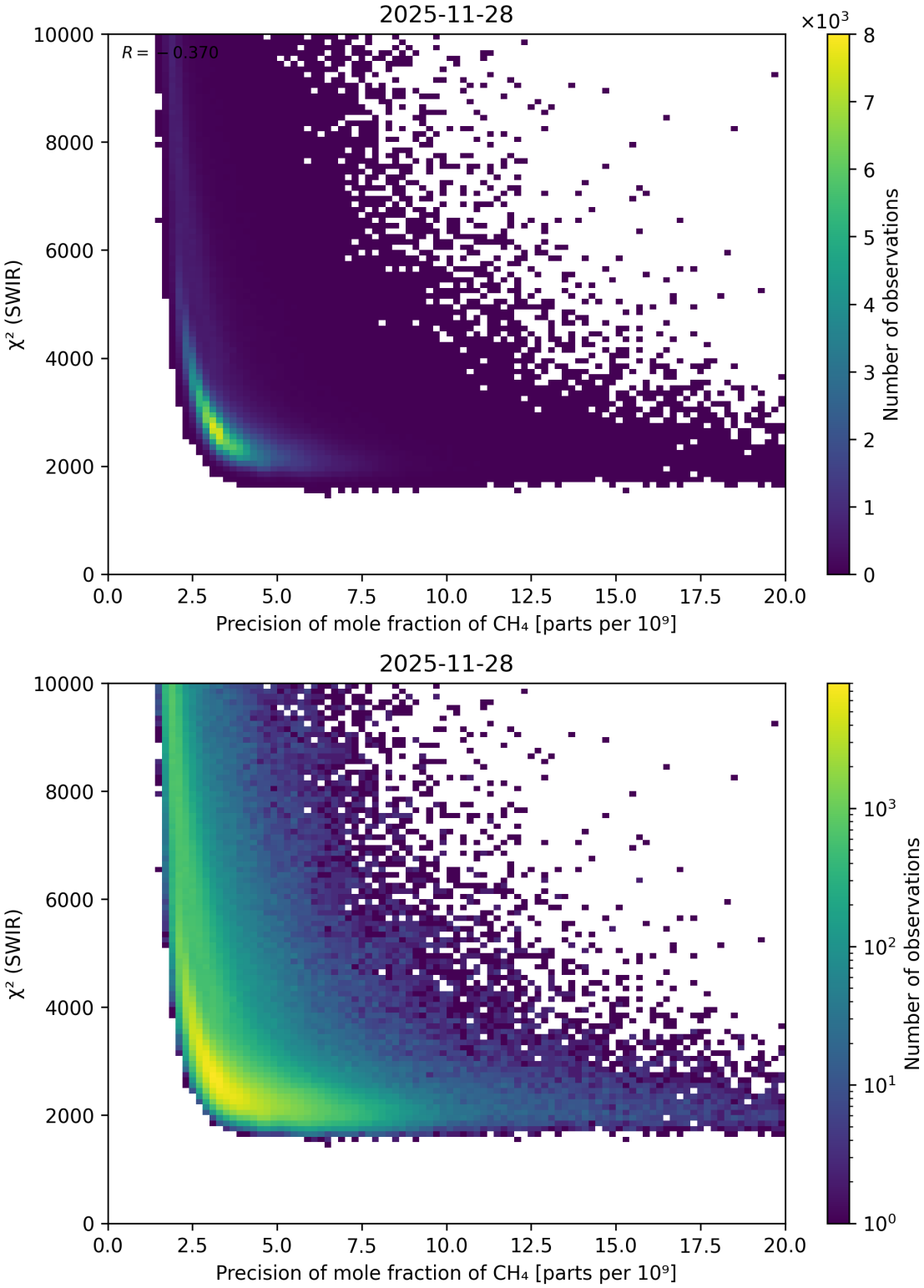


Figure 90: Scatter density plot of "Precision of mole fraction of CH_4" against "χ^2 (SWIR)" for 2025-11-28 to 2025-11-29.

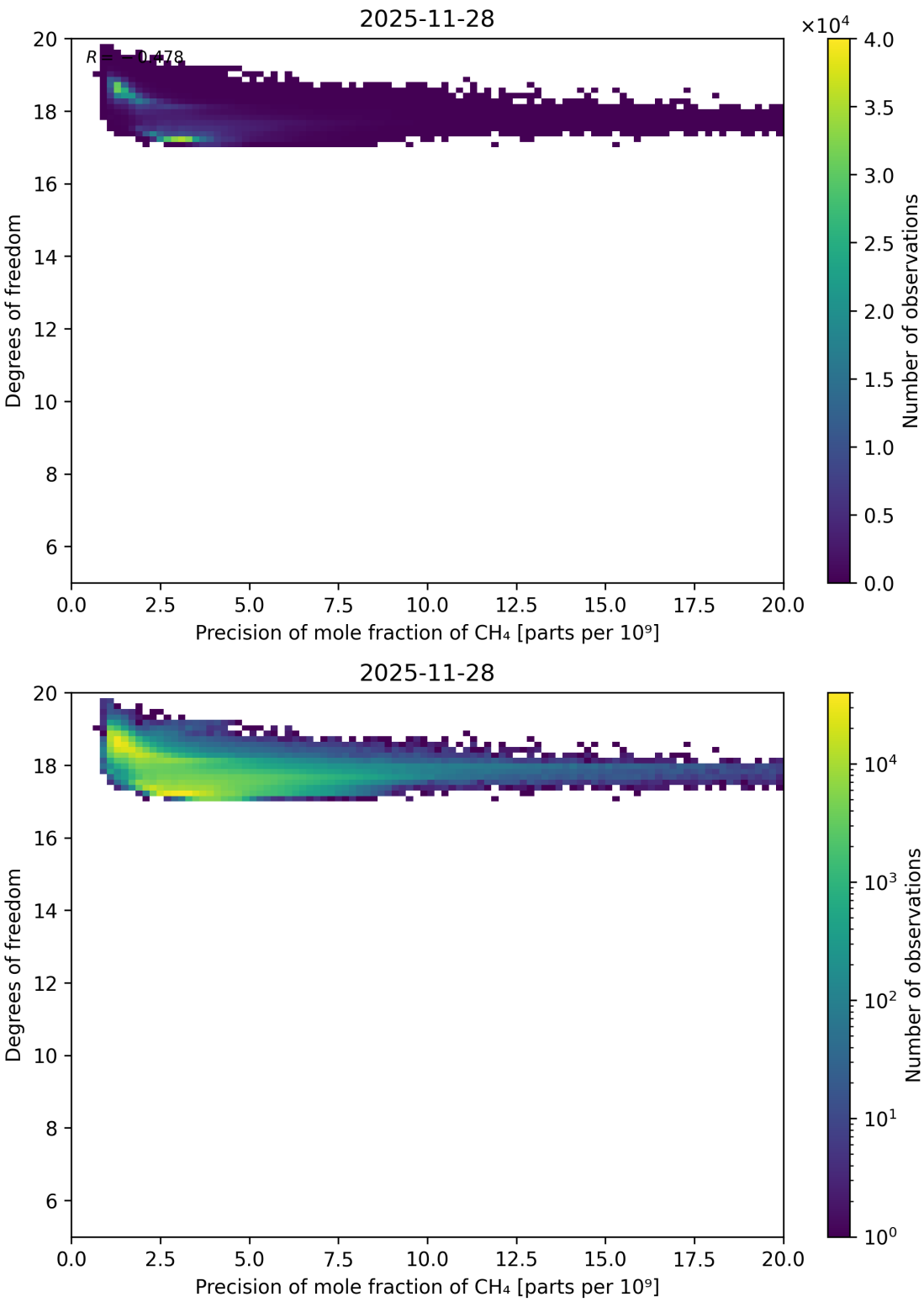


Figure 91: Scatter density plot of "Precision of mole fraction of CH_4" against "Degrees of freedom" for 2025-11-28 to 2025-11-29.

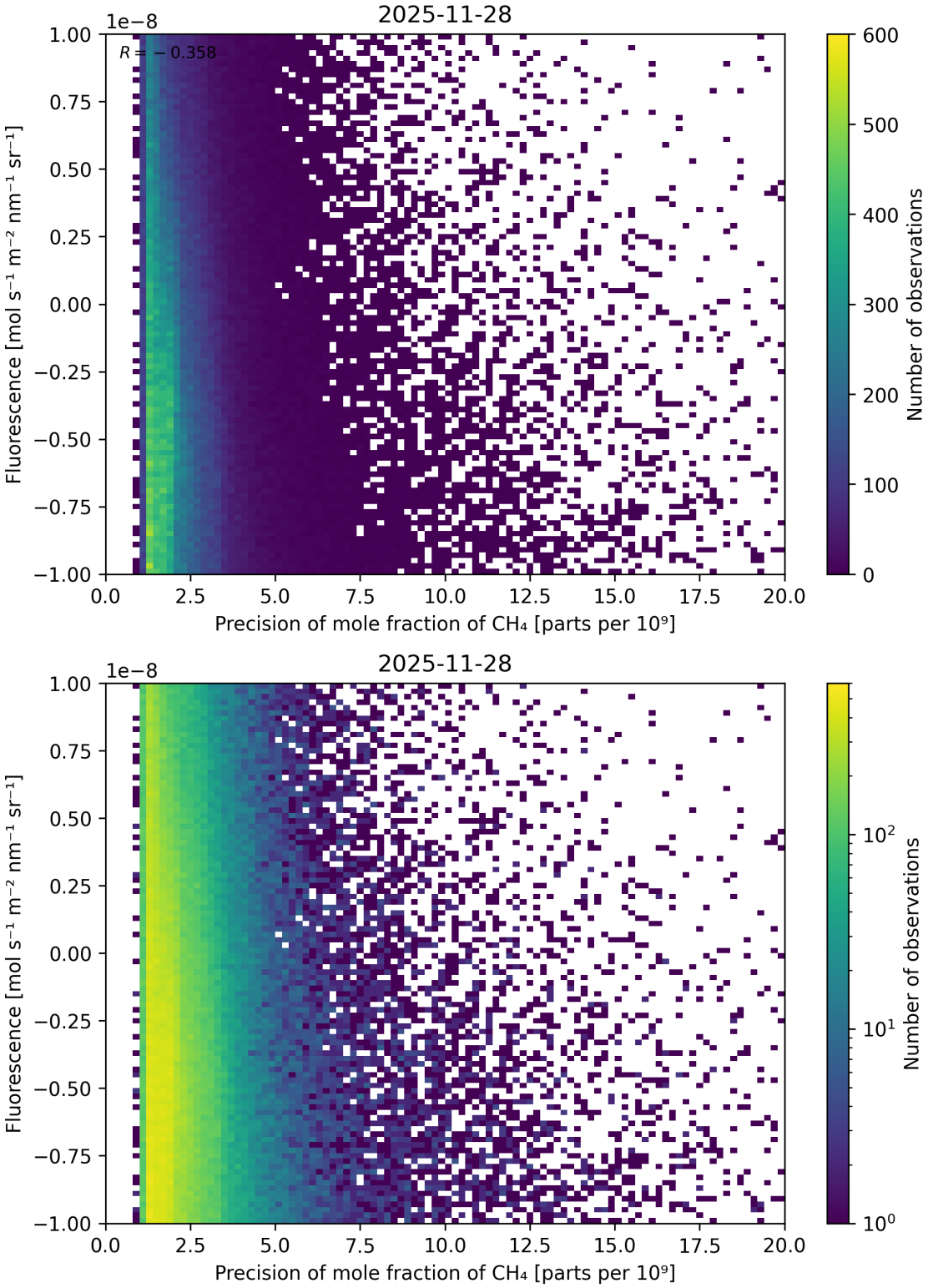


Figure 92: Scatter density plot of "Precision of mole fraction of CH_4" against "Fluorescence" for 2025-11-28 to 2025-11-29.

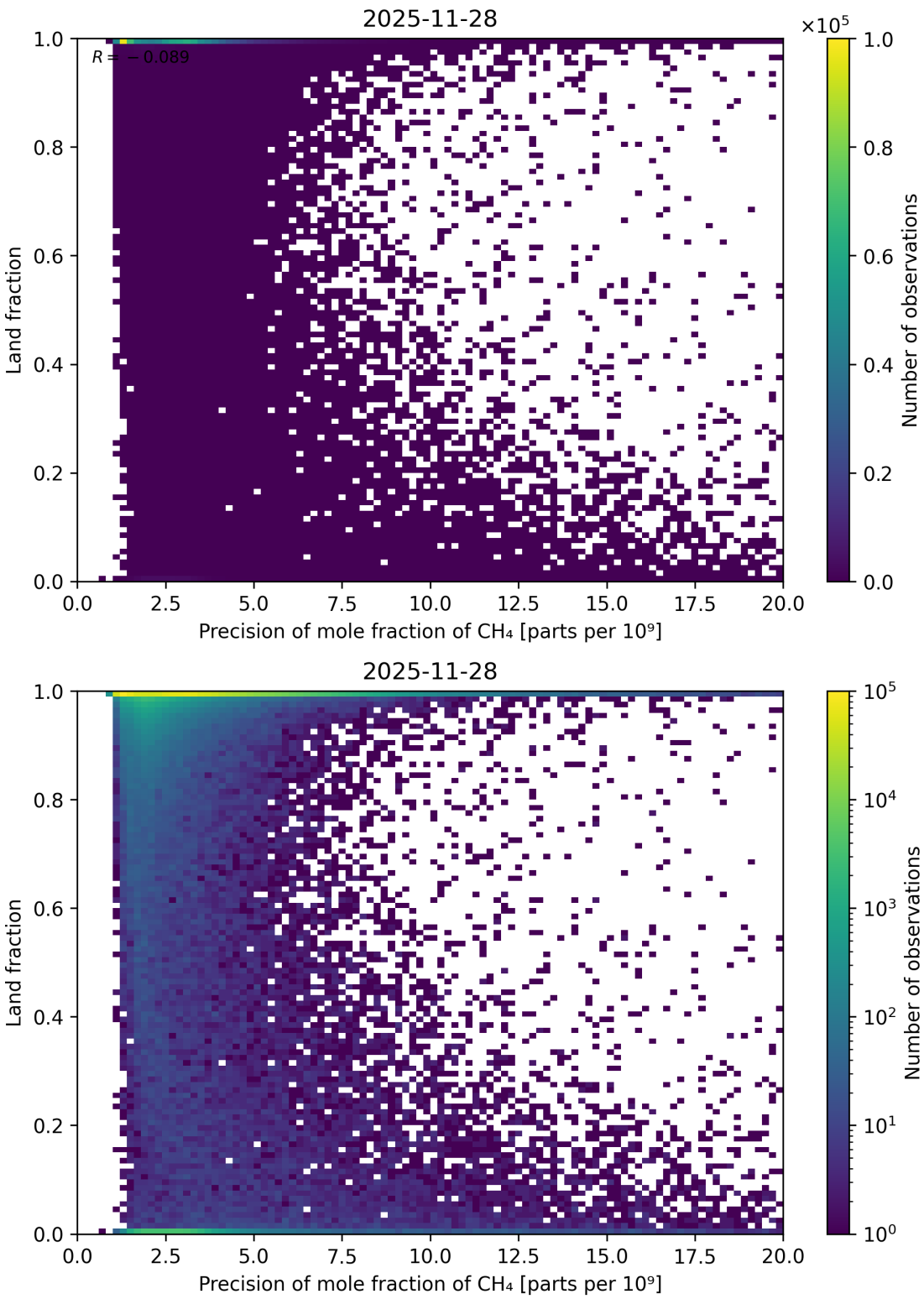


Figure 93: Scatter density plot of "Precision of mole fraction of CH_4" against "Land fraction" for 2025-11-28 to 2025-11-29.

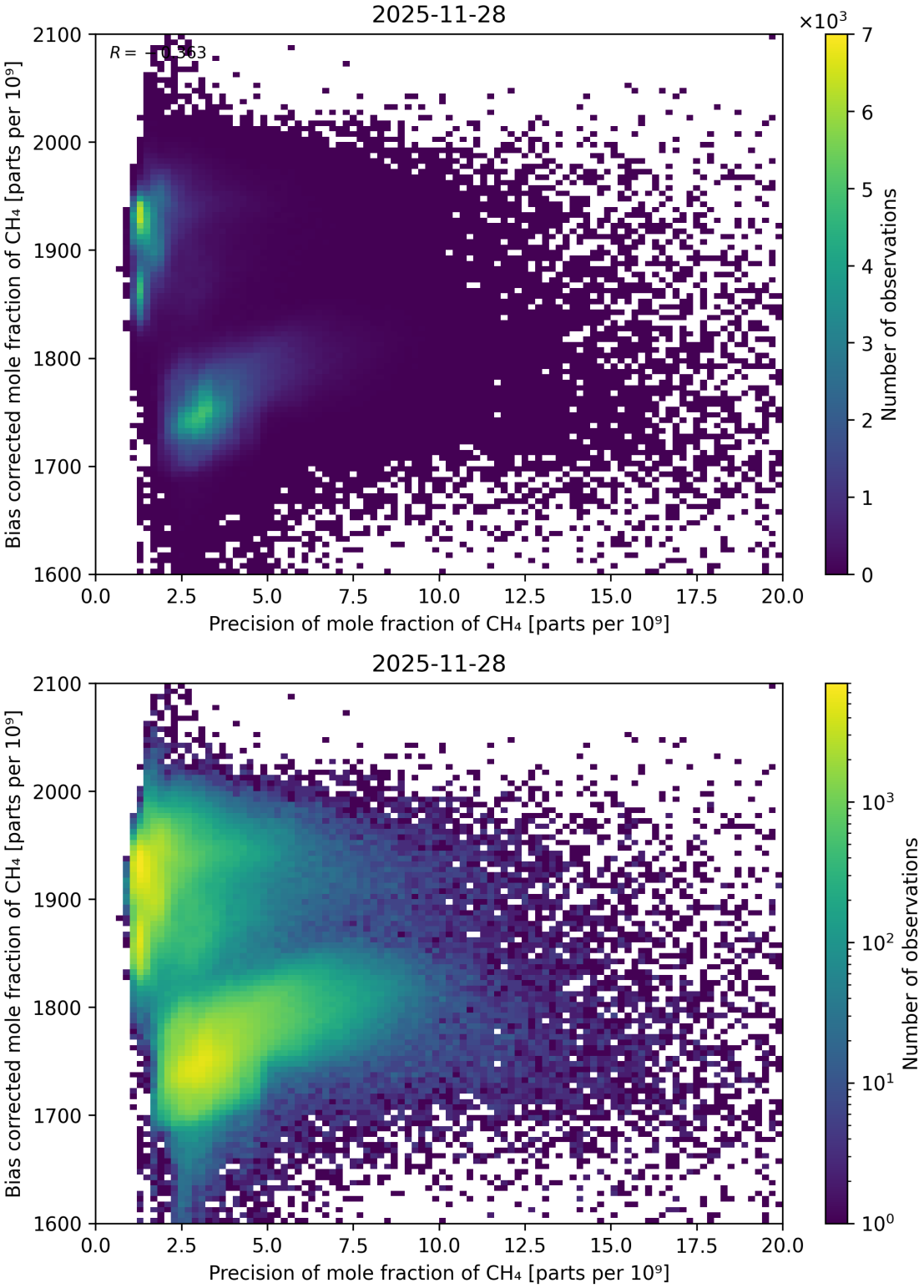


Figure 94: Scatter density plot of "Precision of mole fraction of CH_4" against "Bias corrected mole fraction of CH_4" for 2025-11-28 to 2025-11-29.

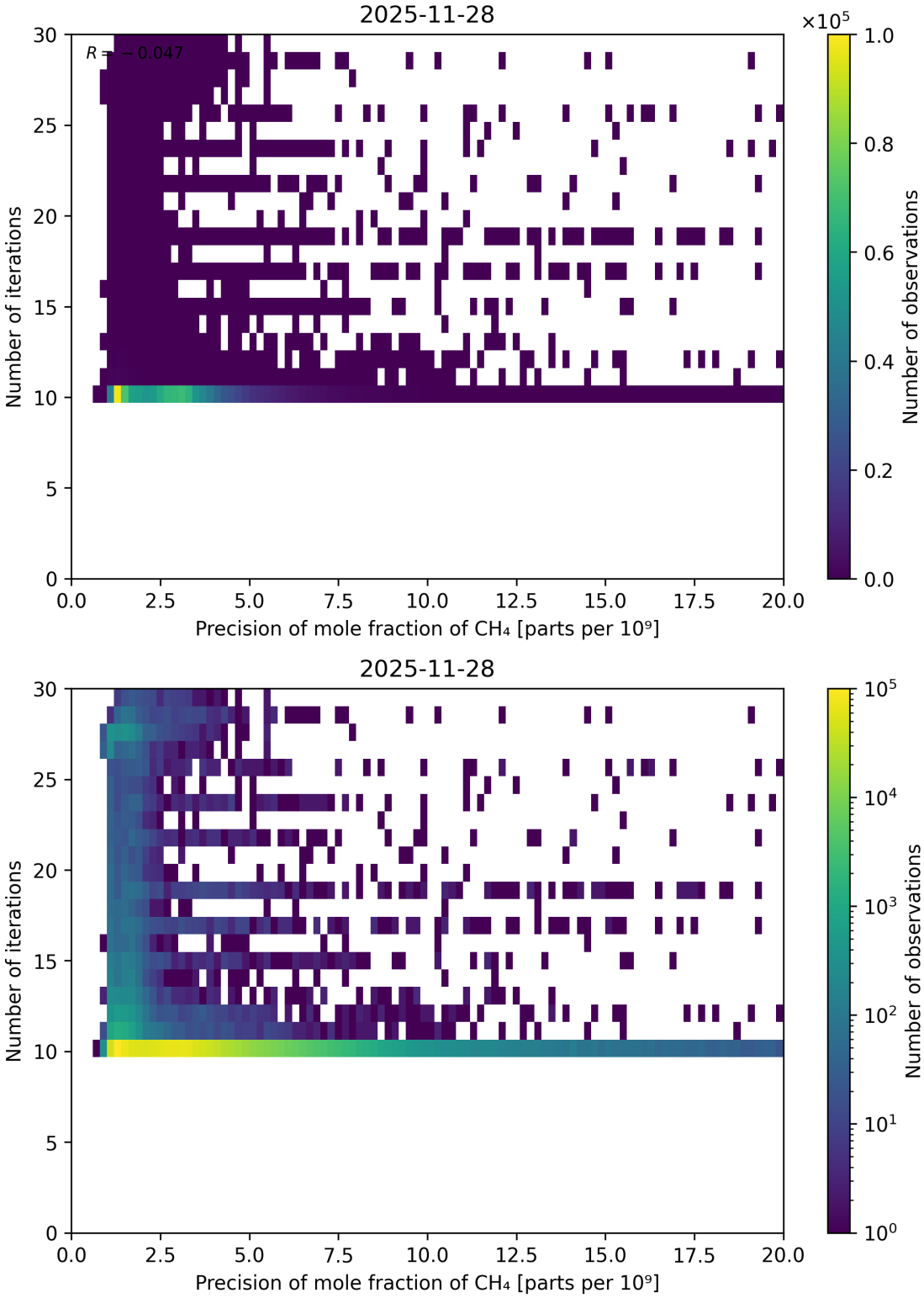
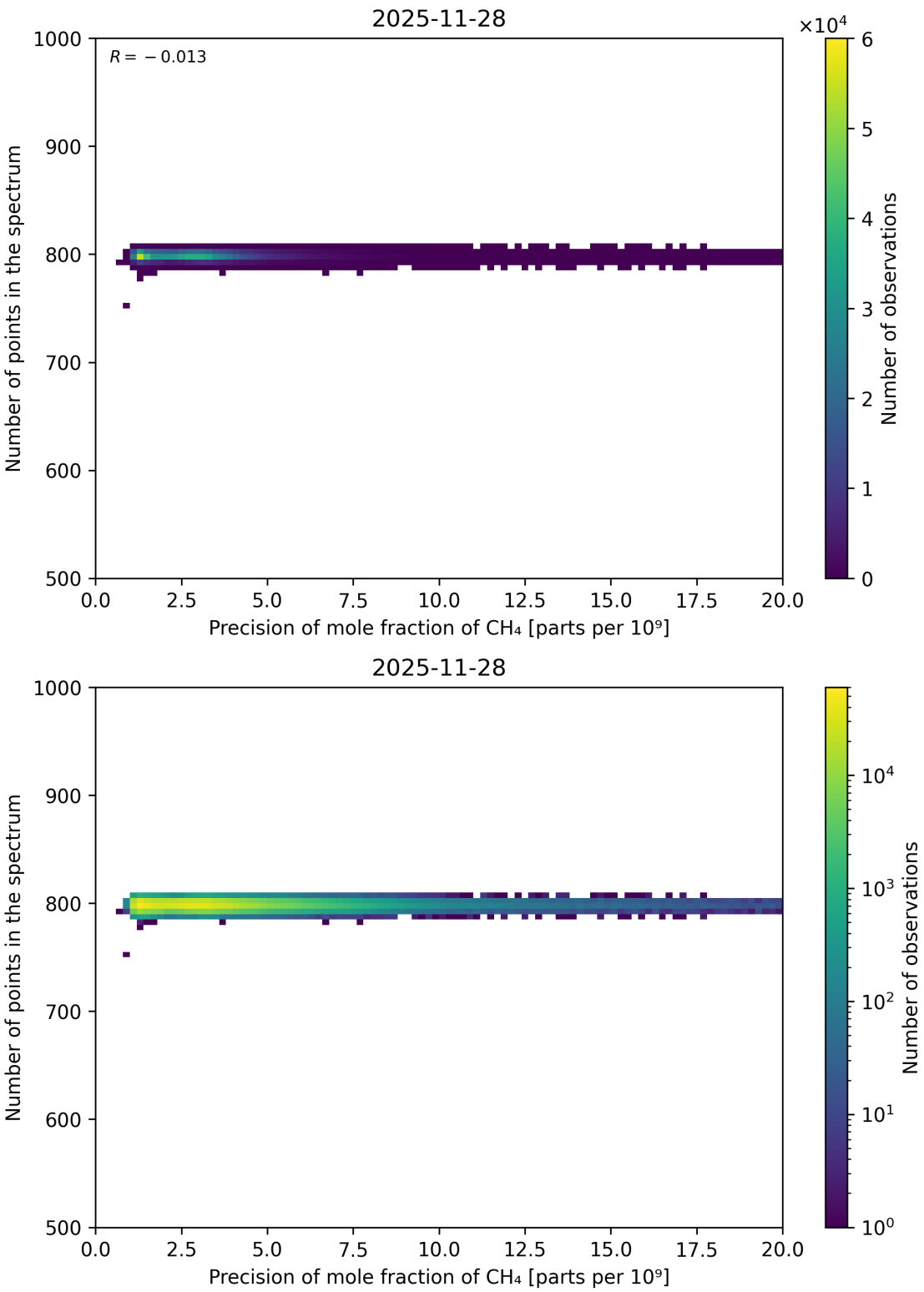


Figure 95: Scatter density plot of "Precision of mole fraction of CH_4" against "Number of iterations" for 2025-11-28 to 2025-11-29.



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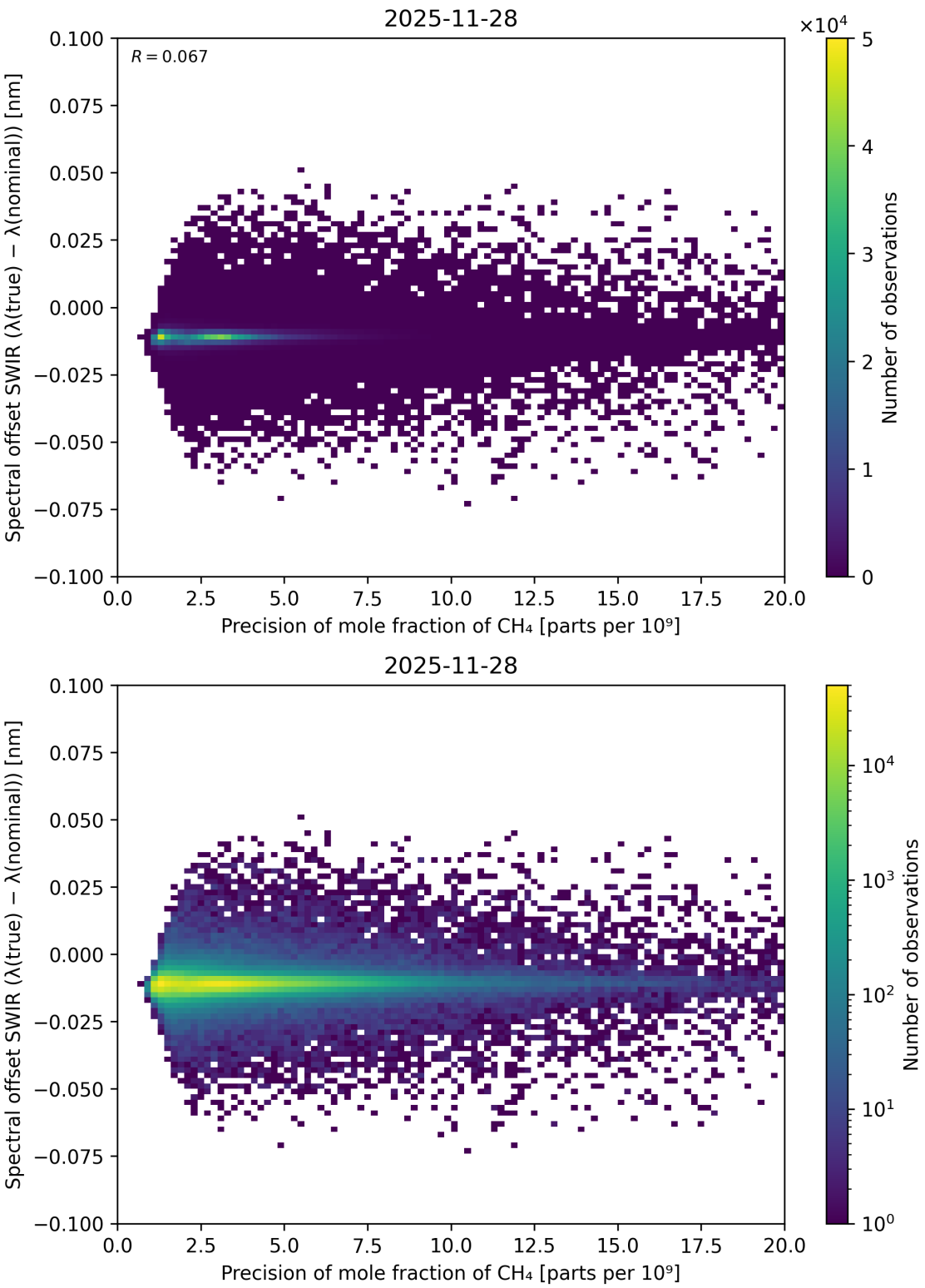

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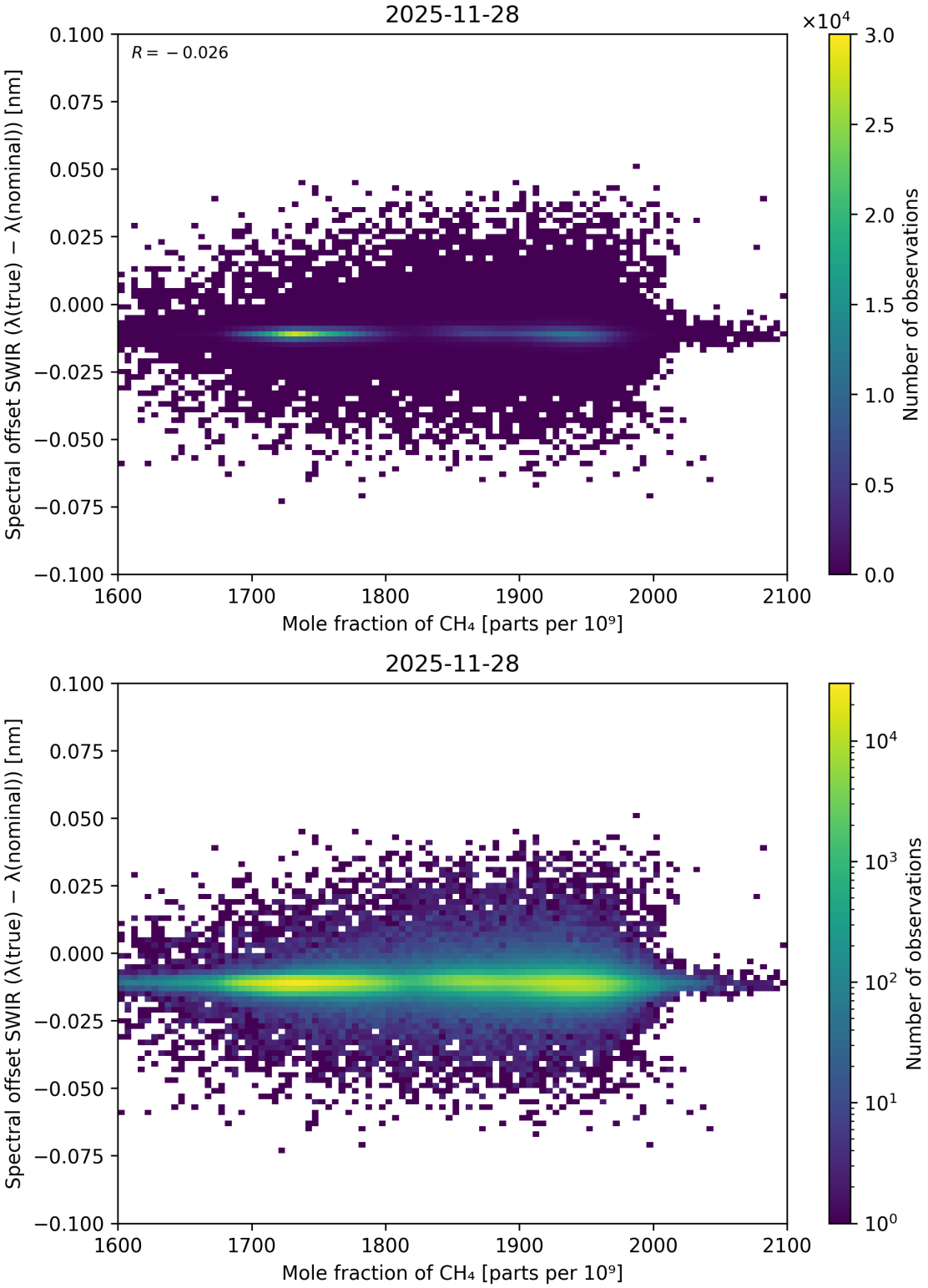

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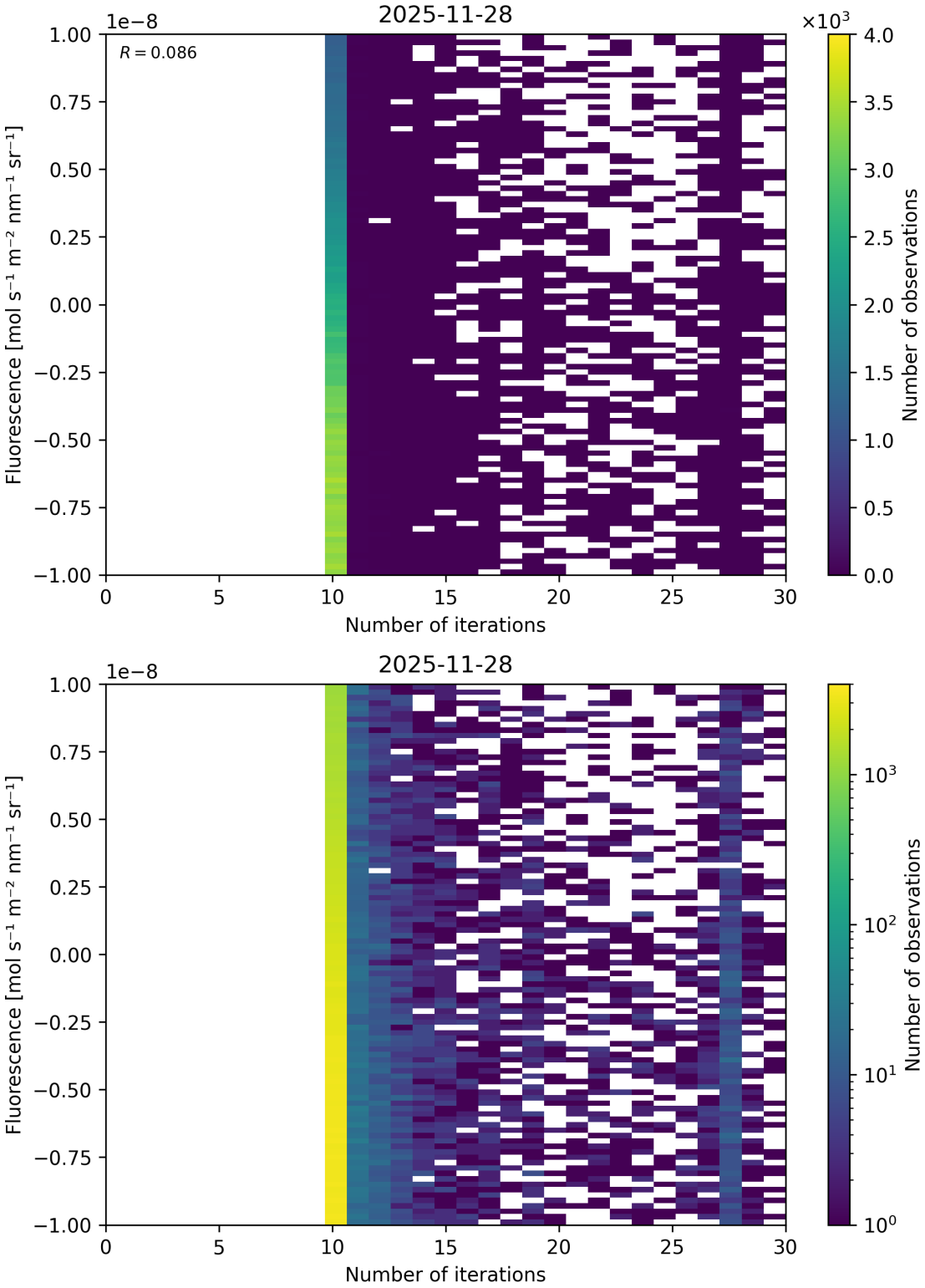

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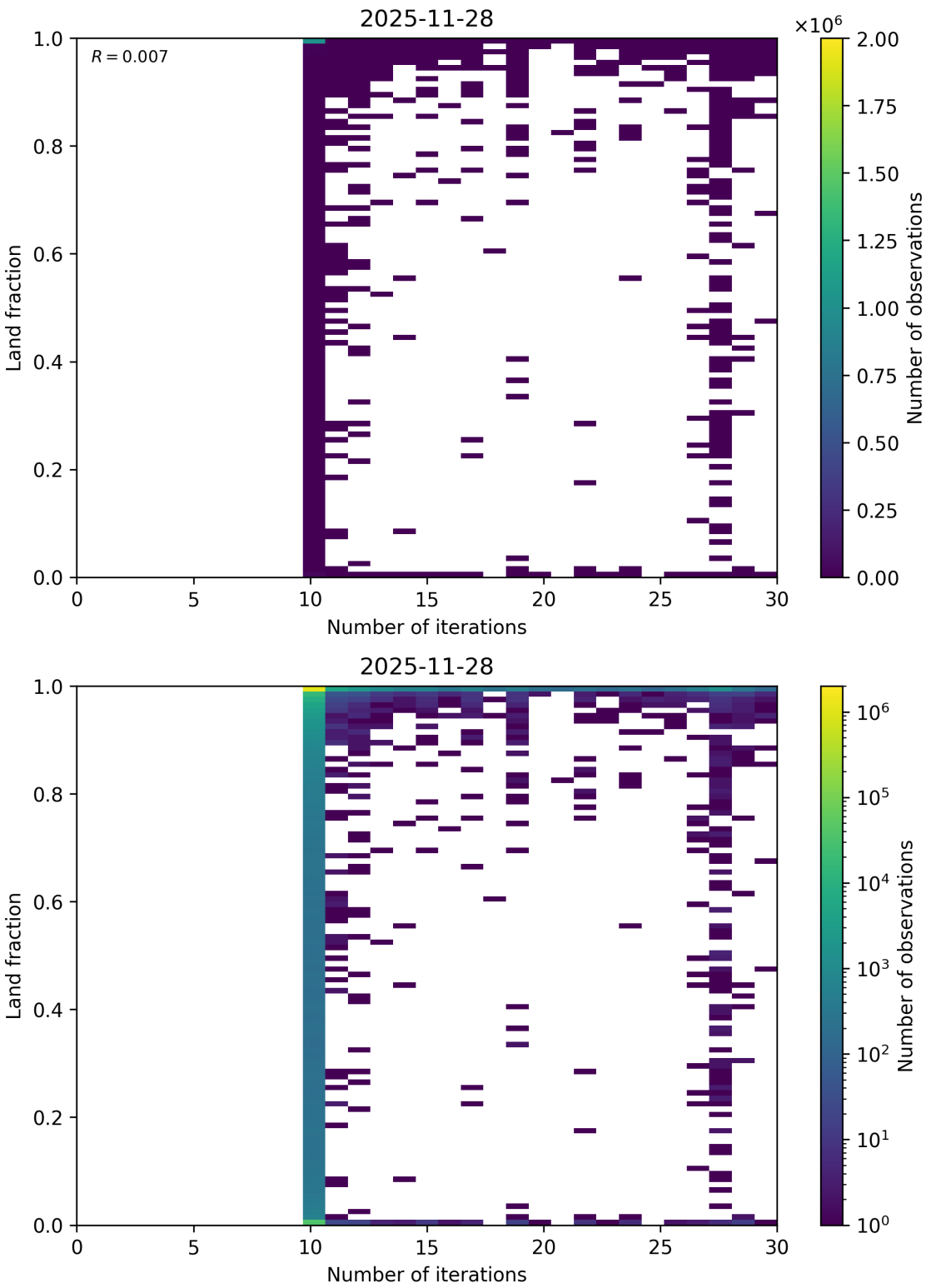

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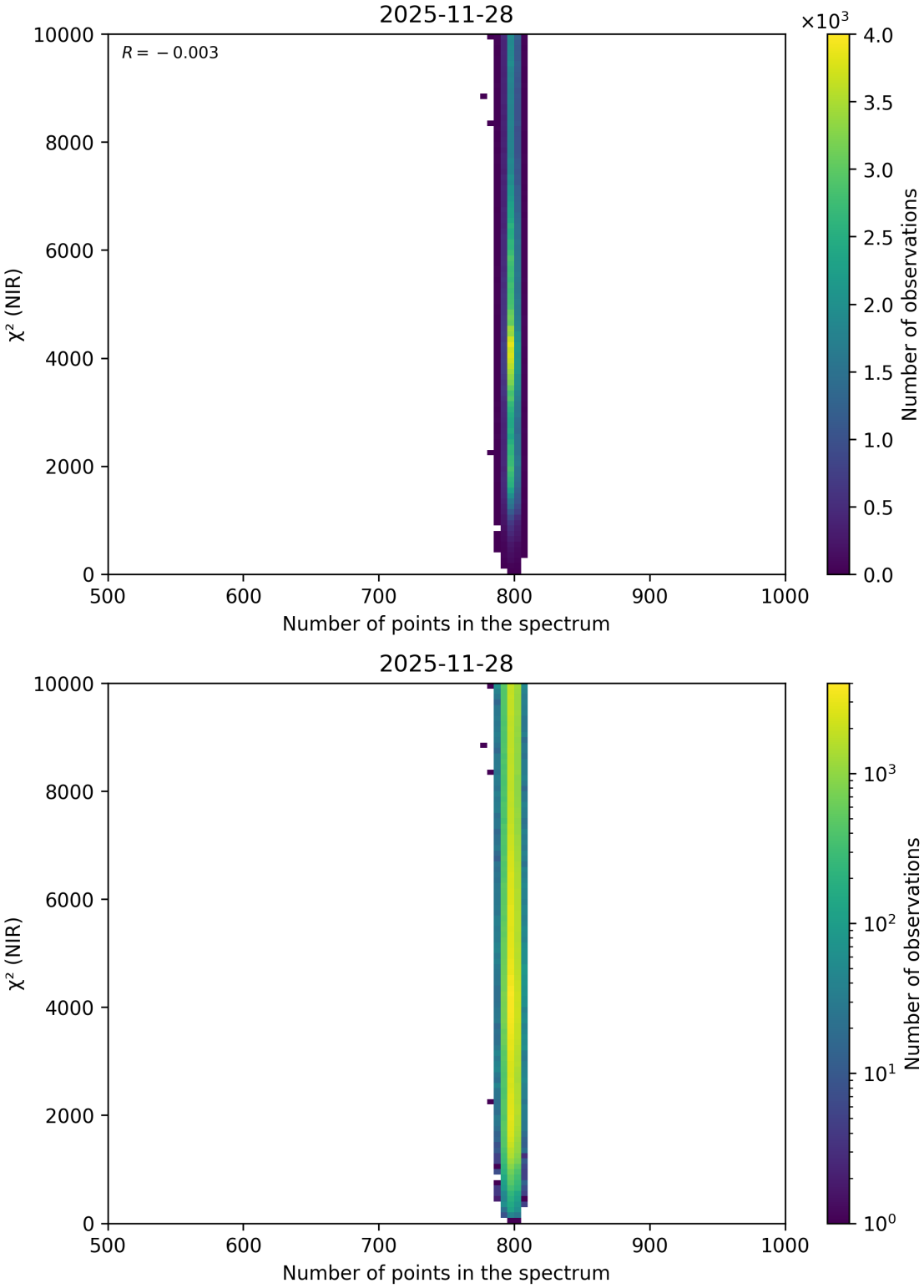

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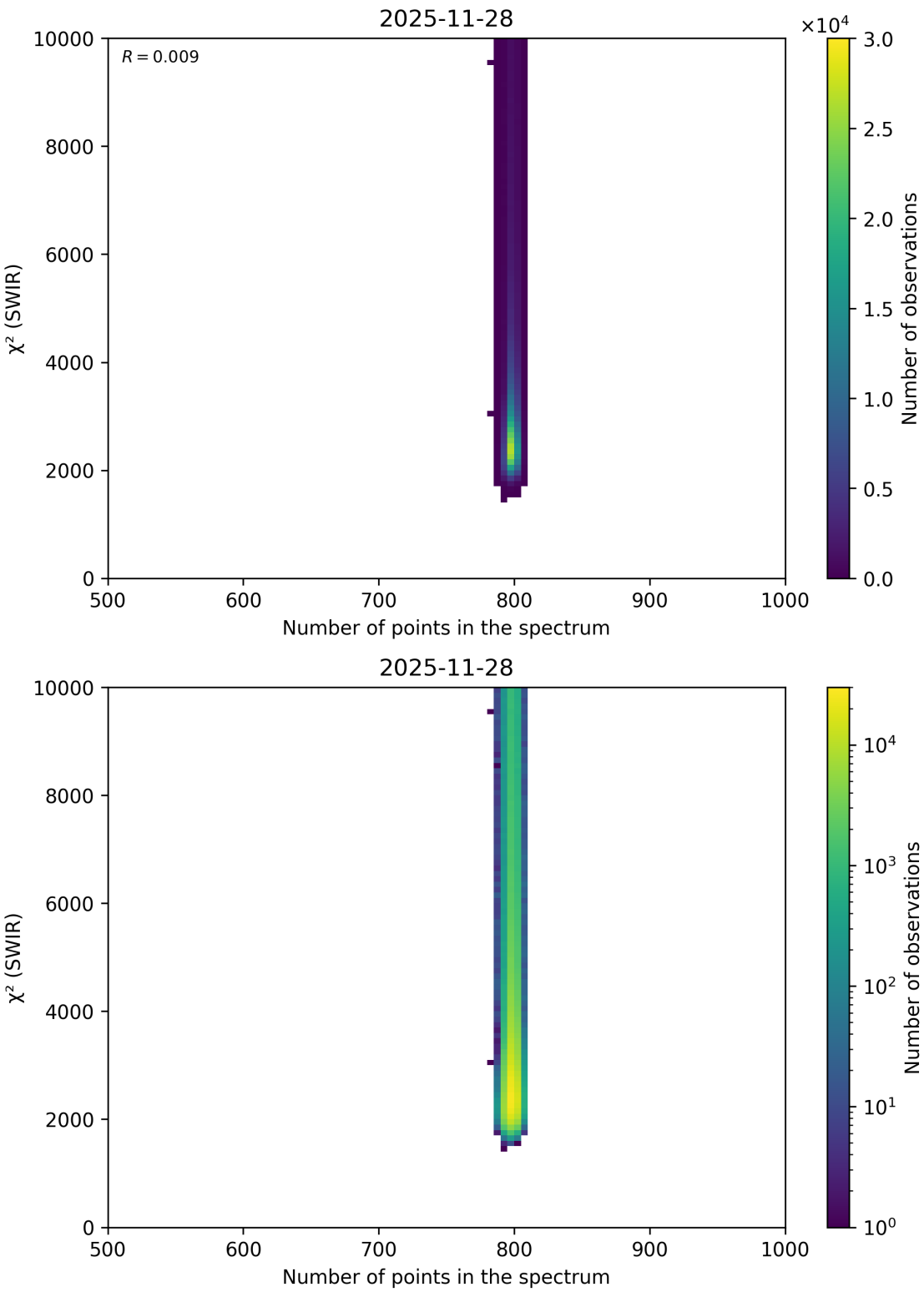

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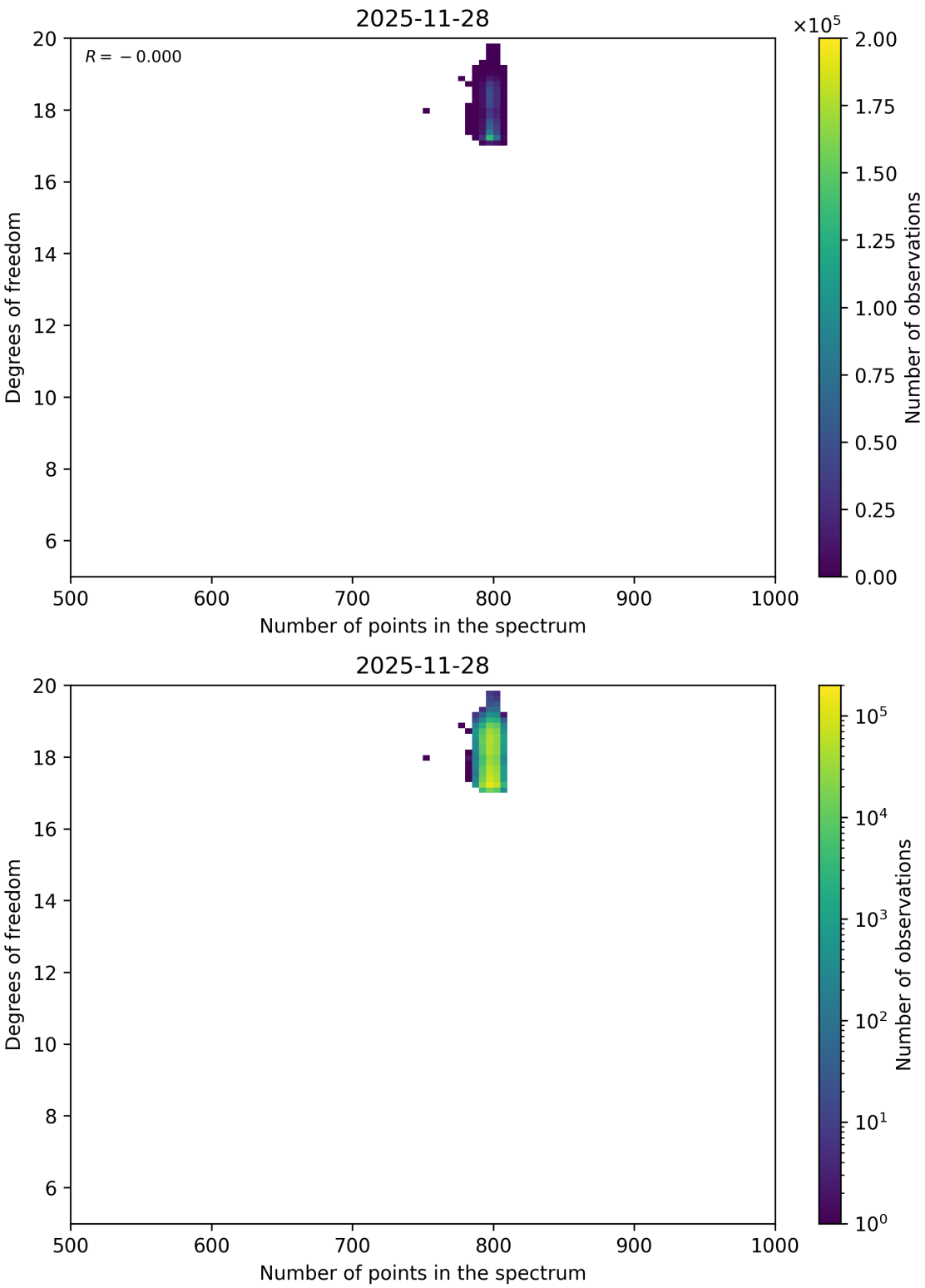

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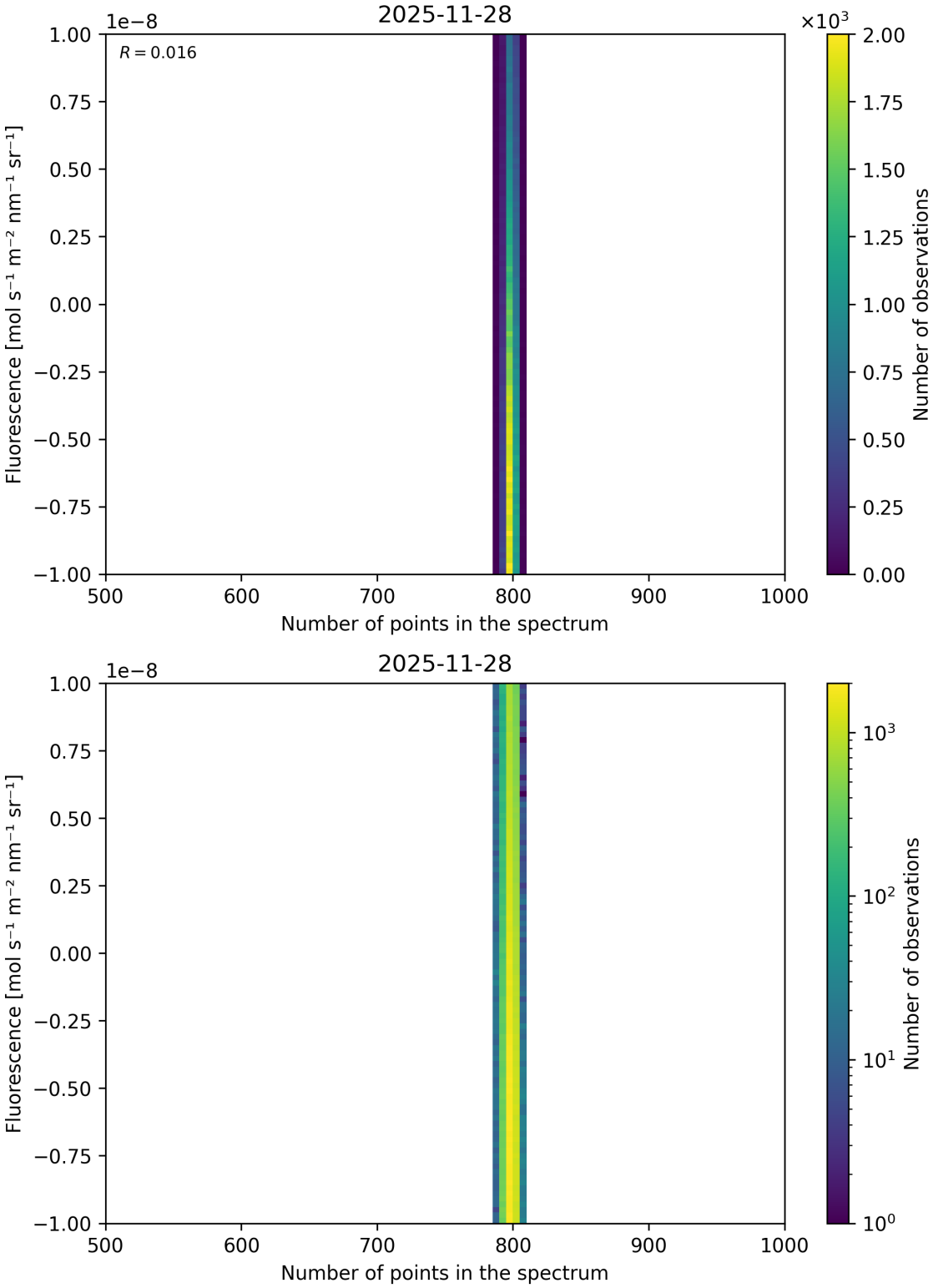

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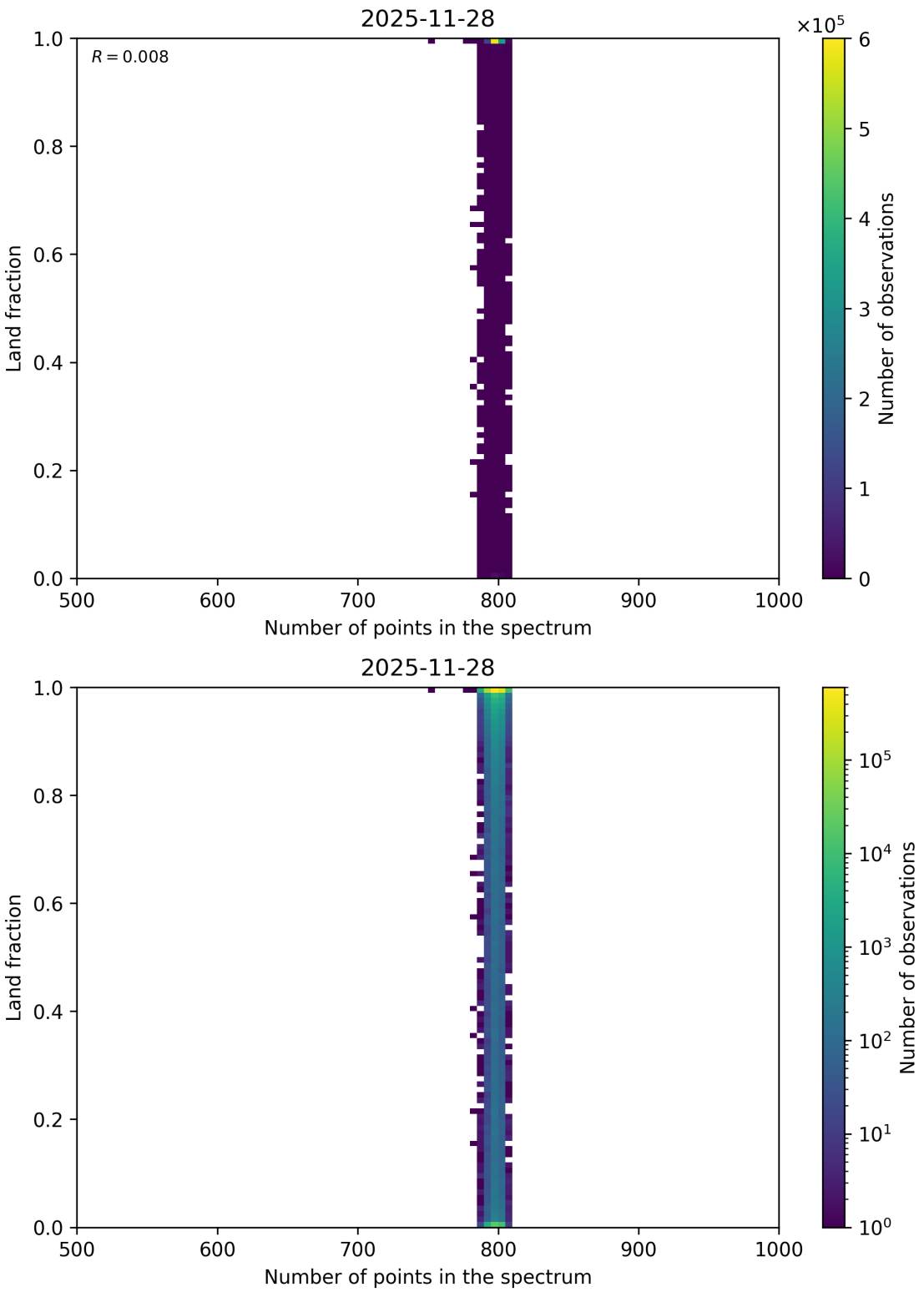

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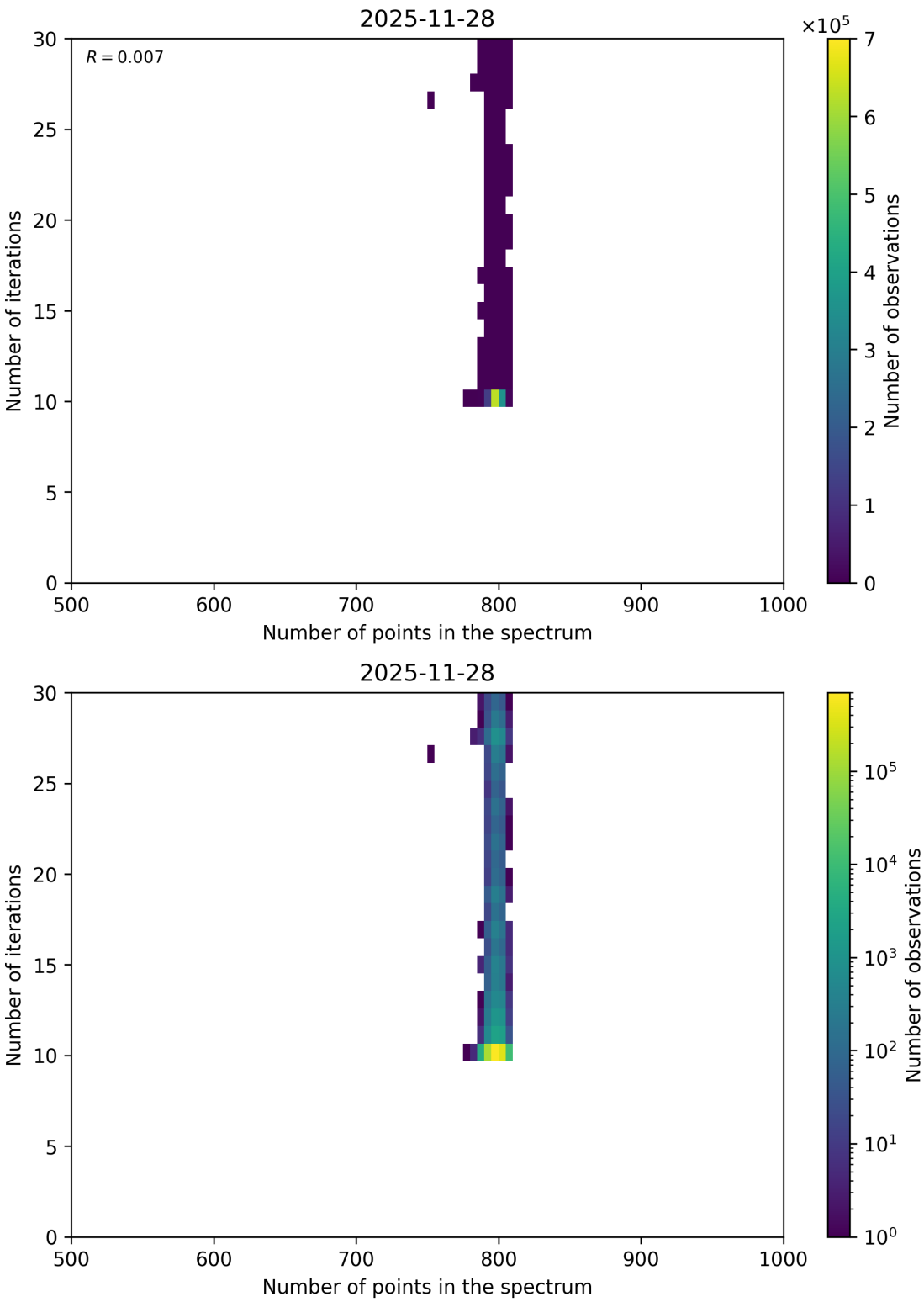

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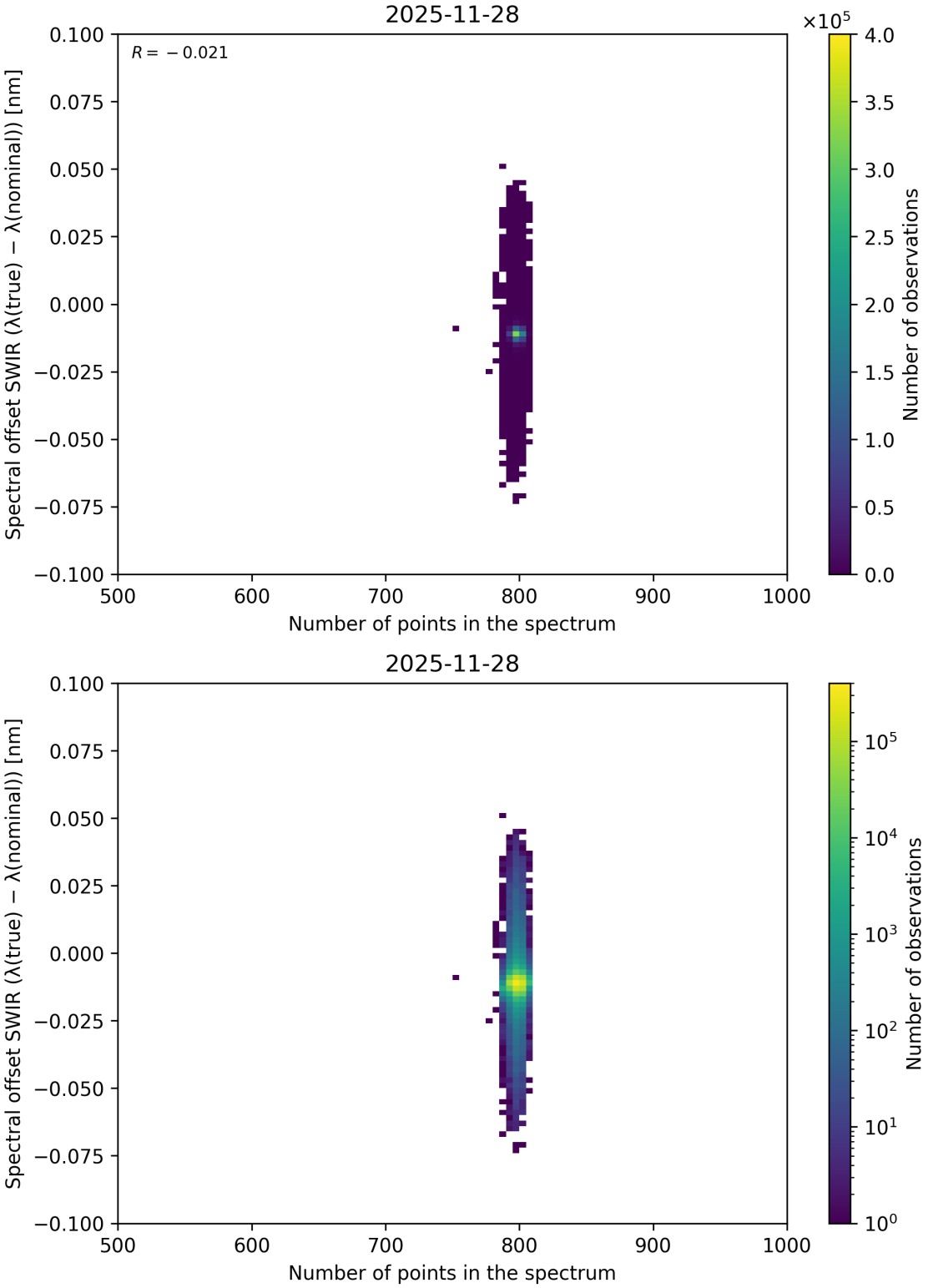

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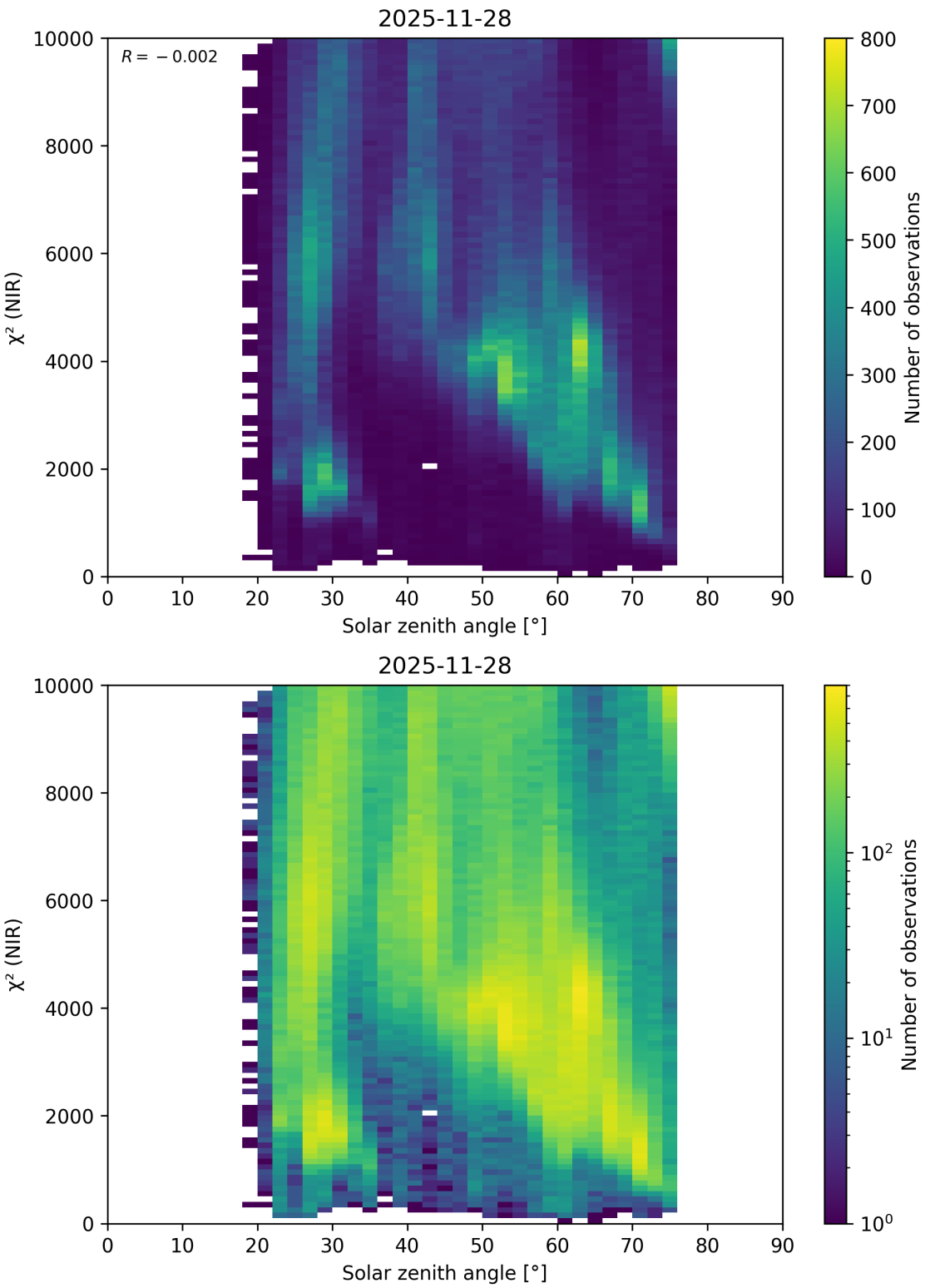

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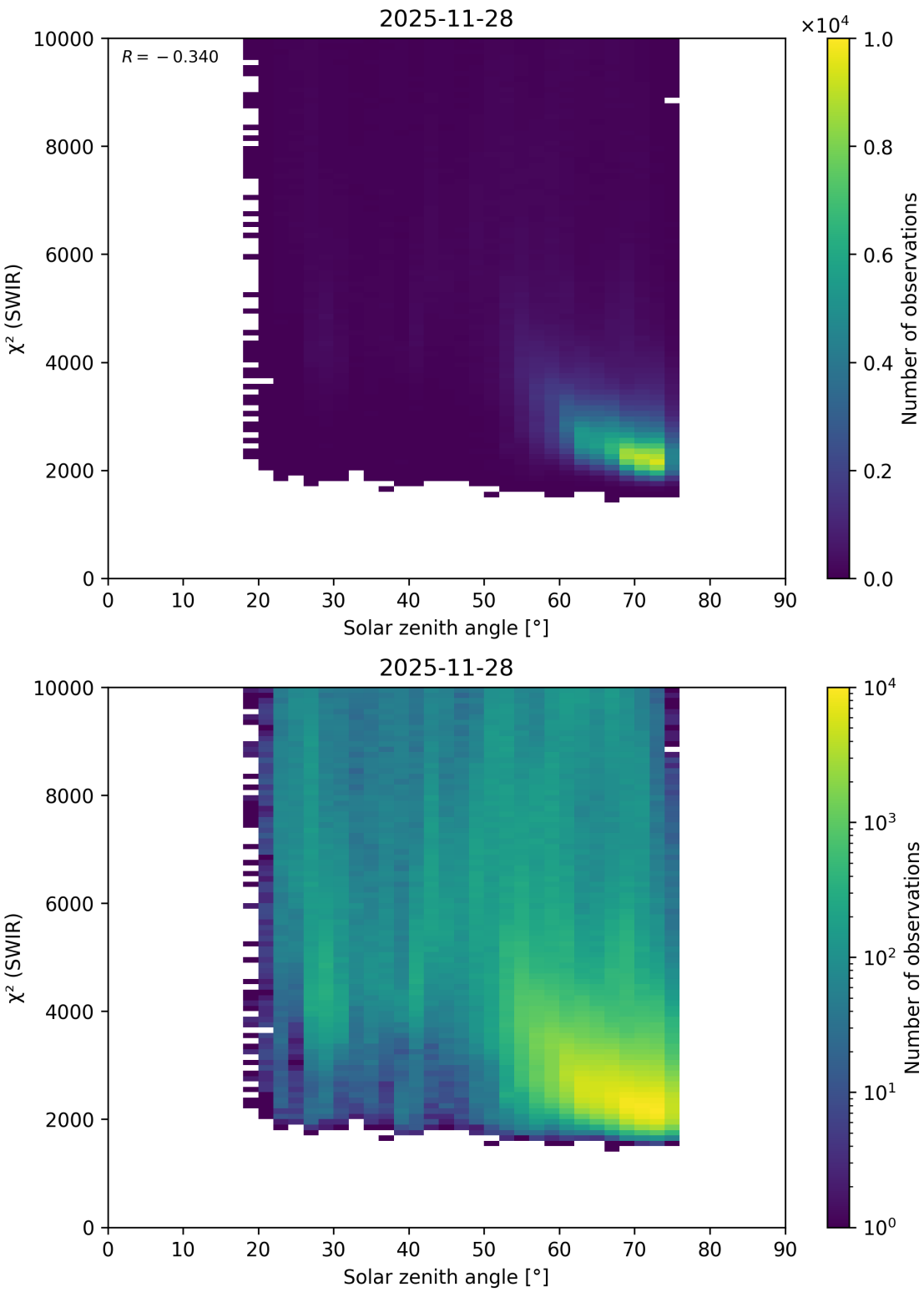

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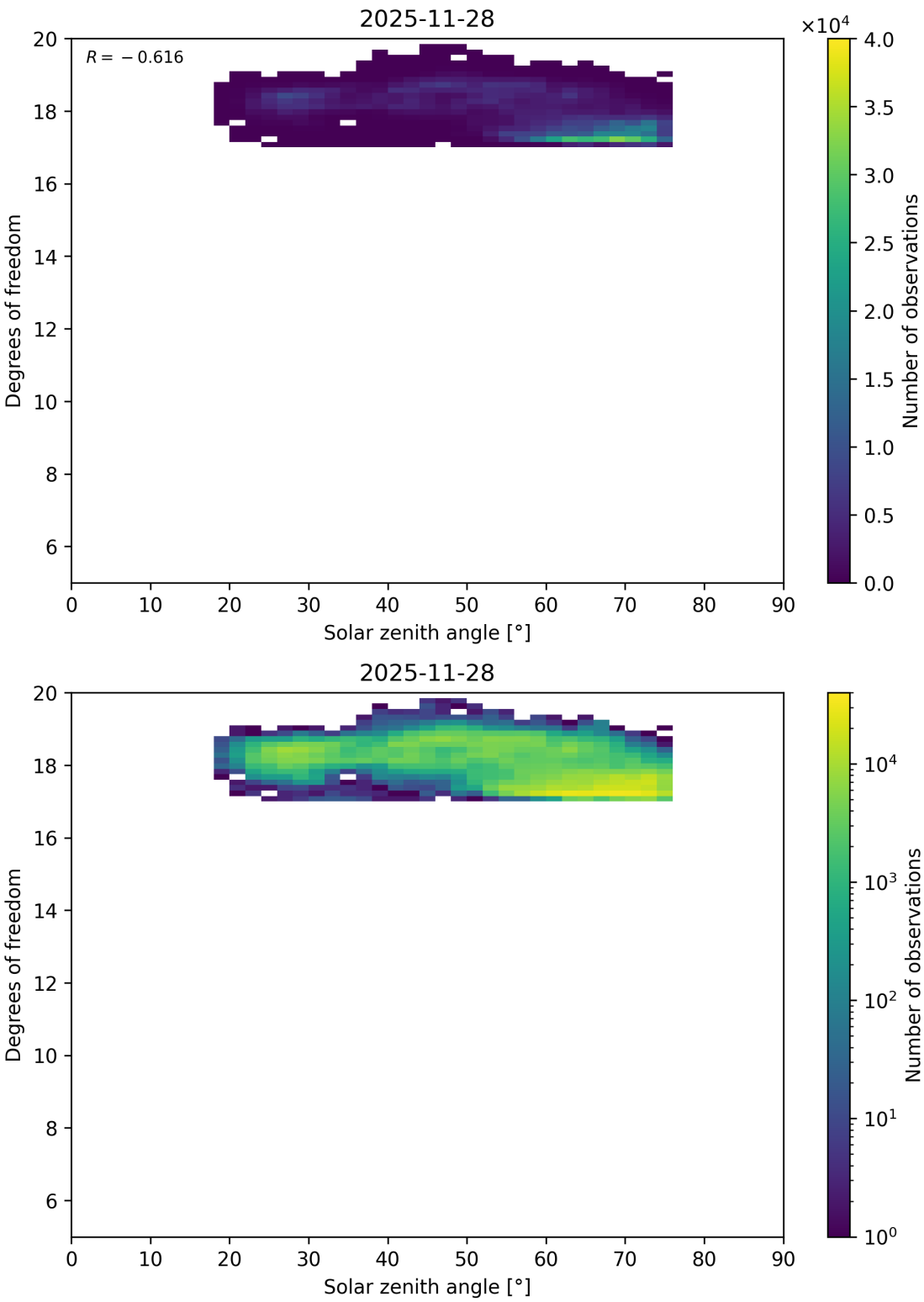

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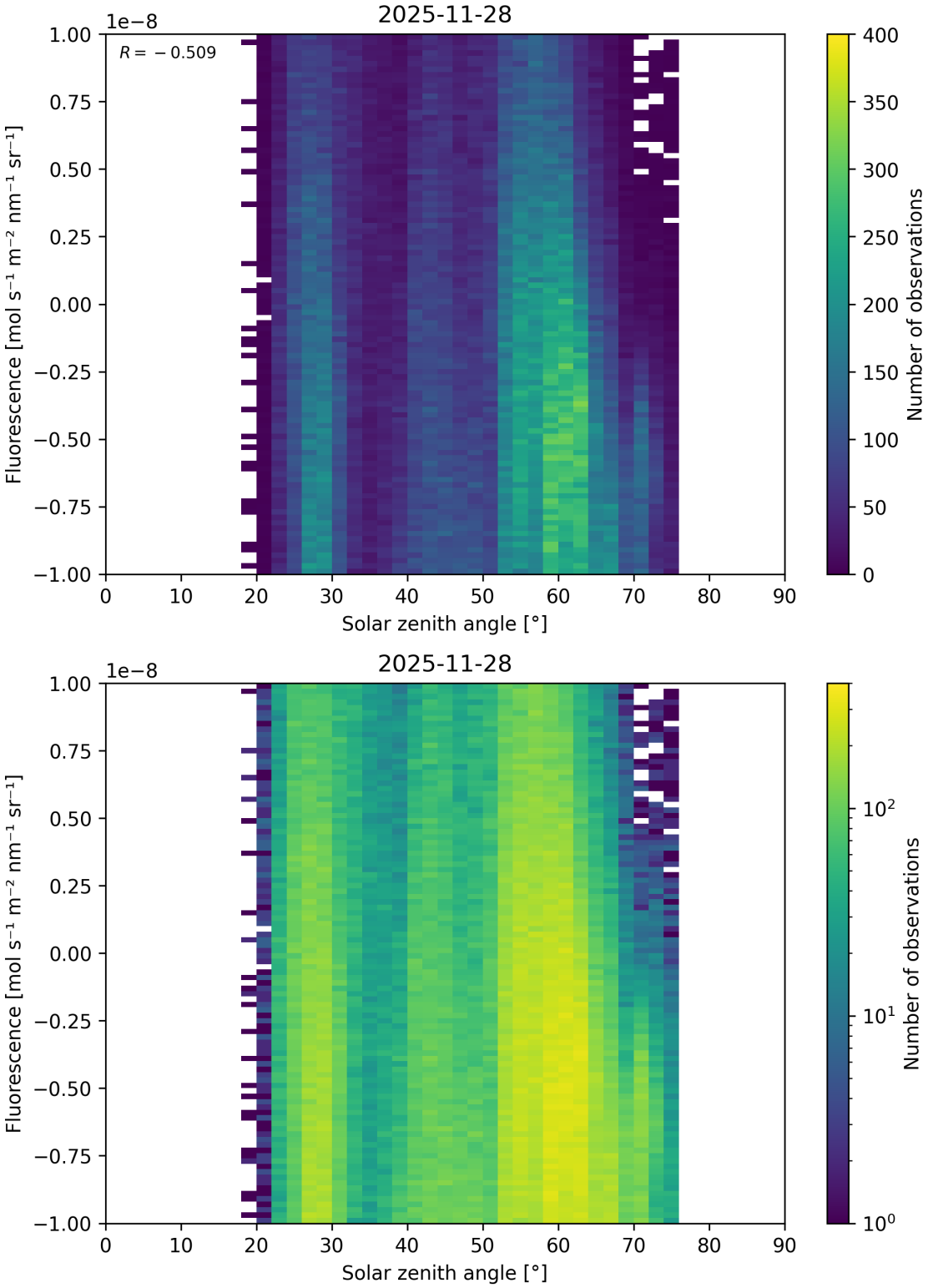

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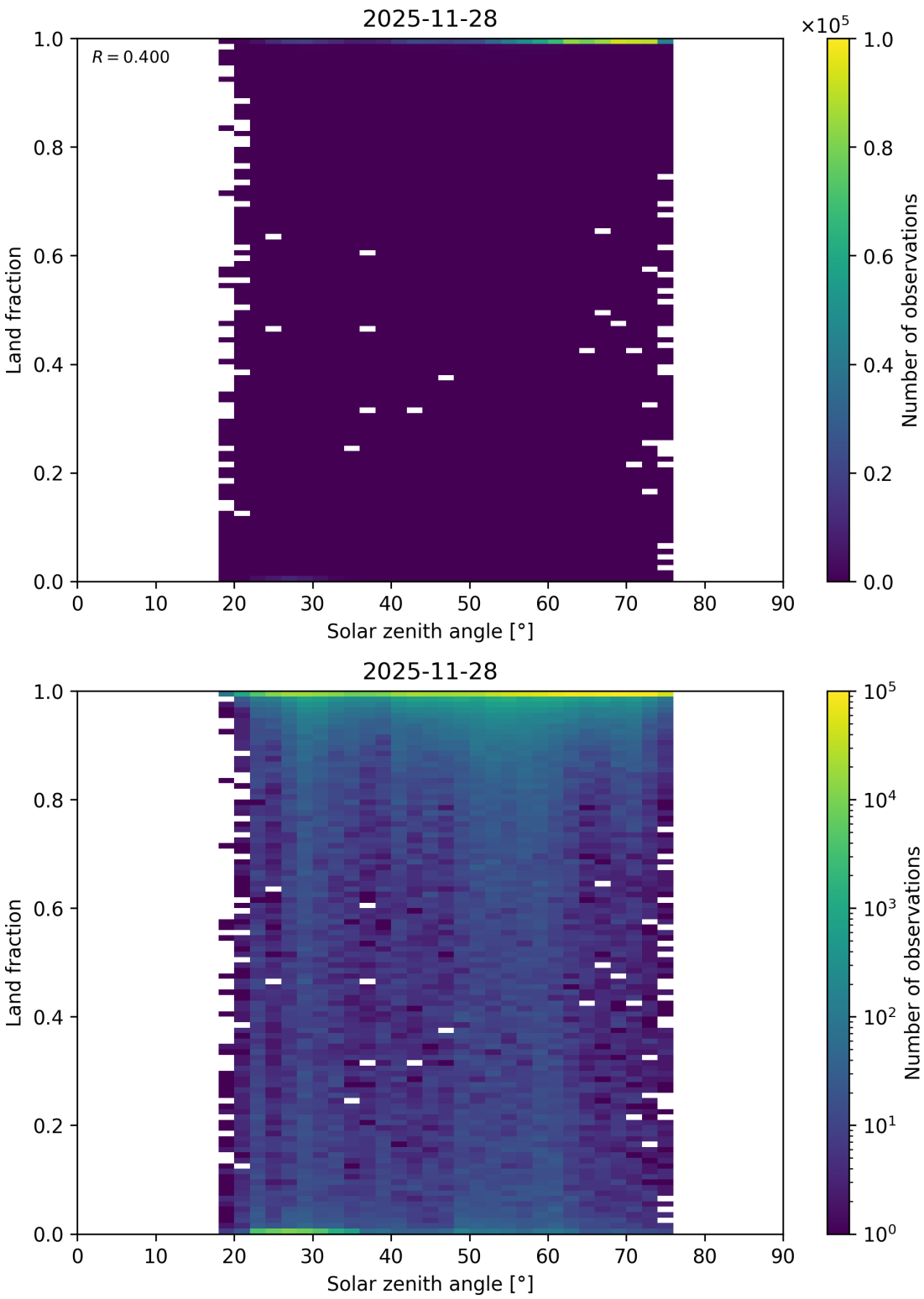

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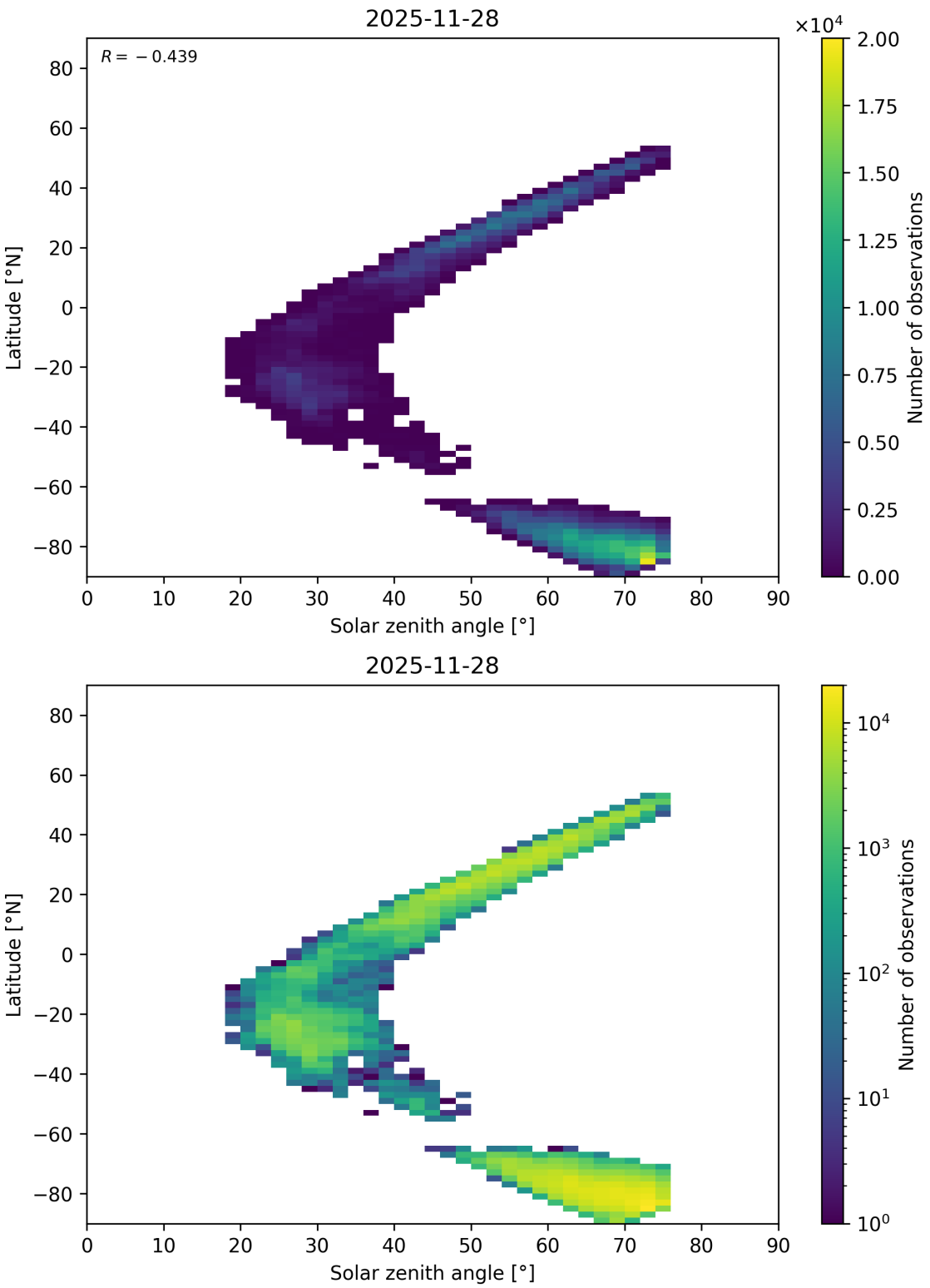

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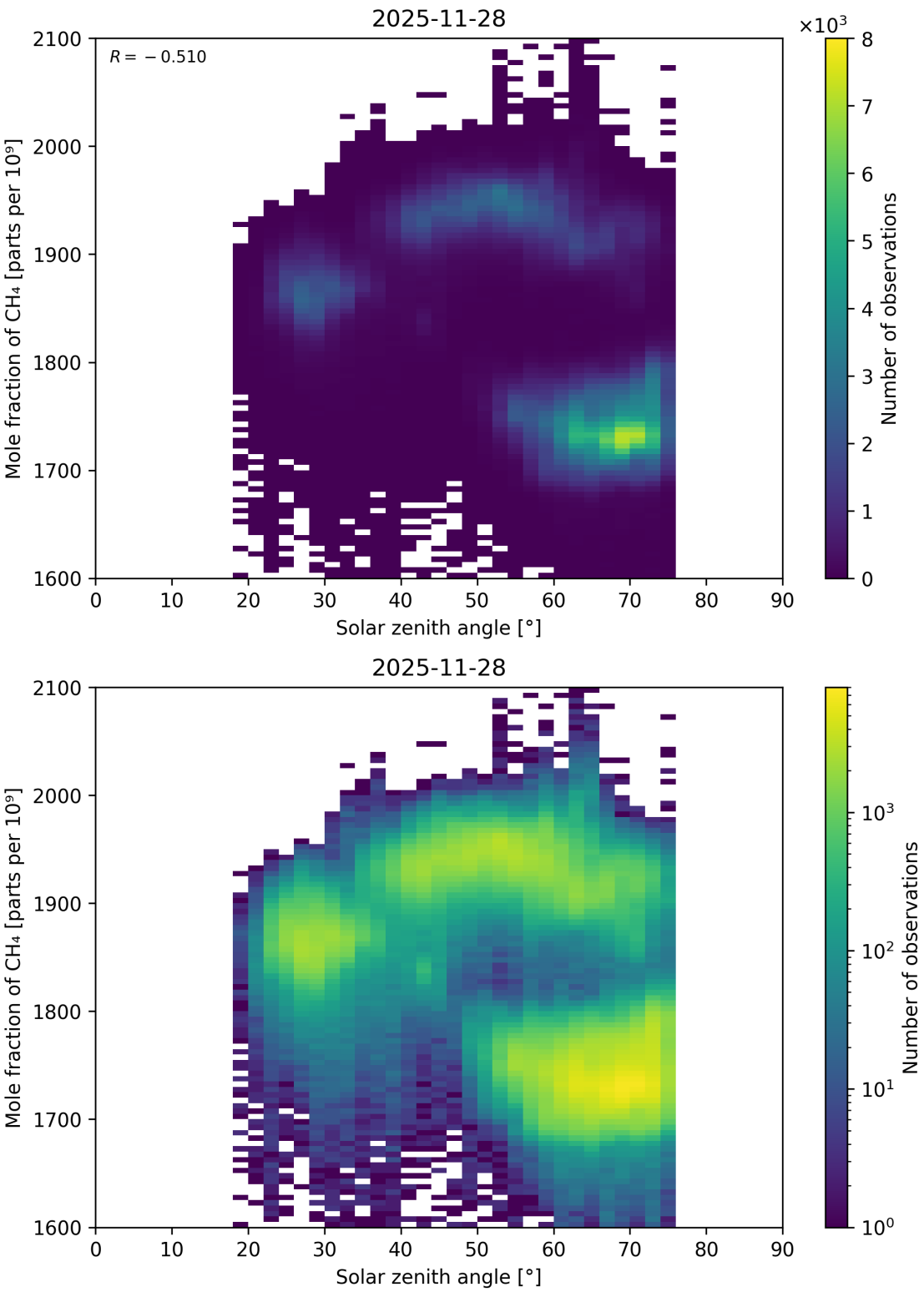

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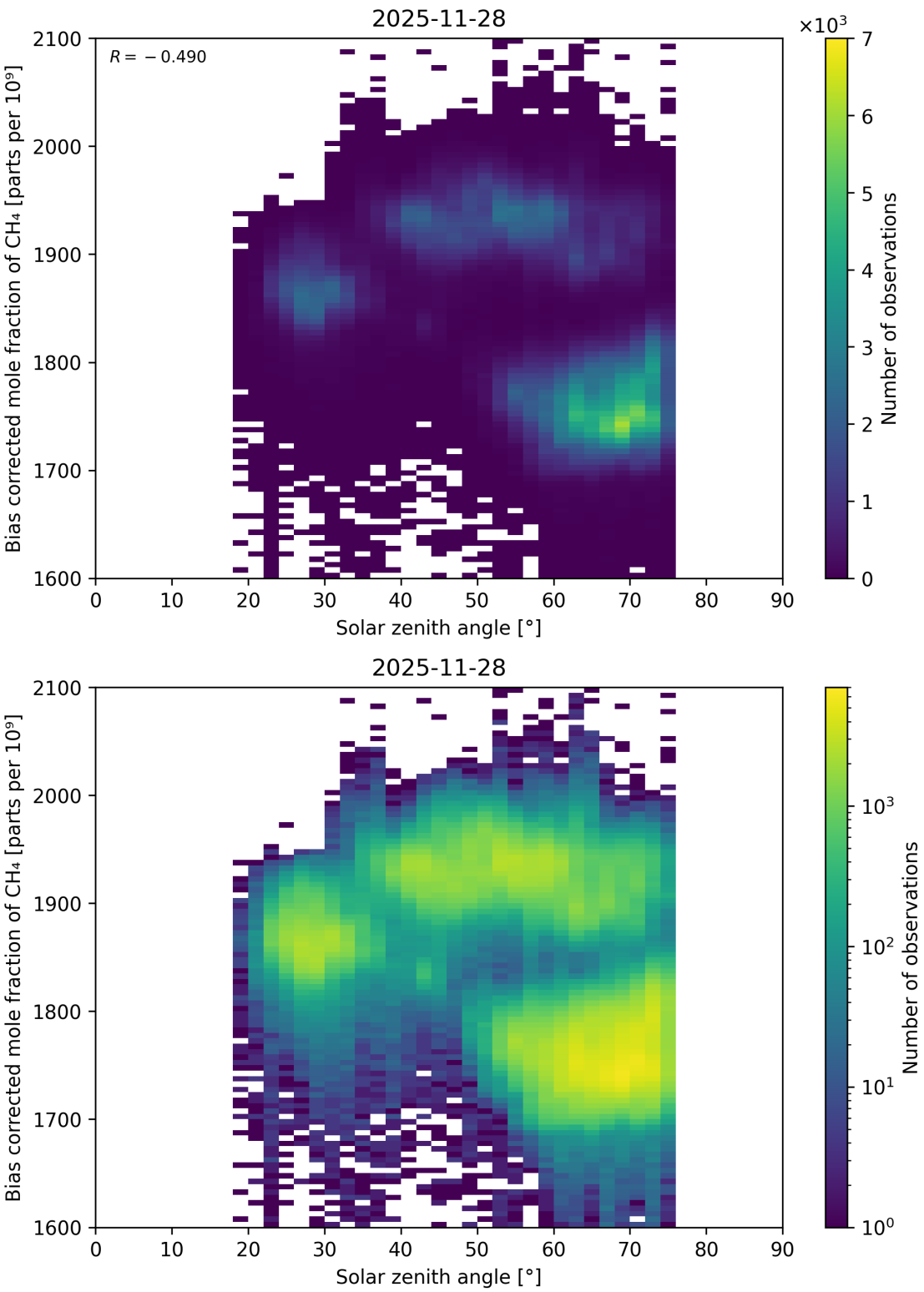

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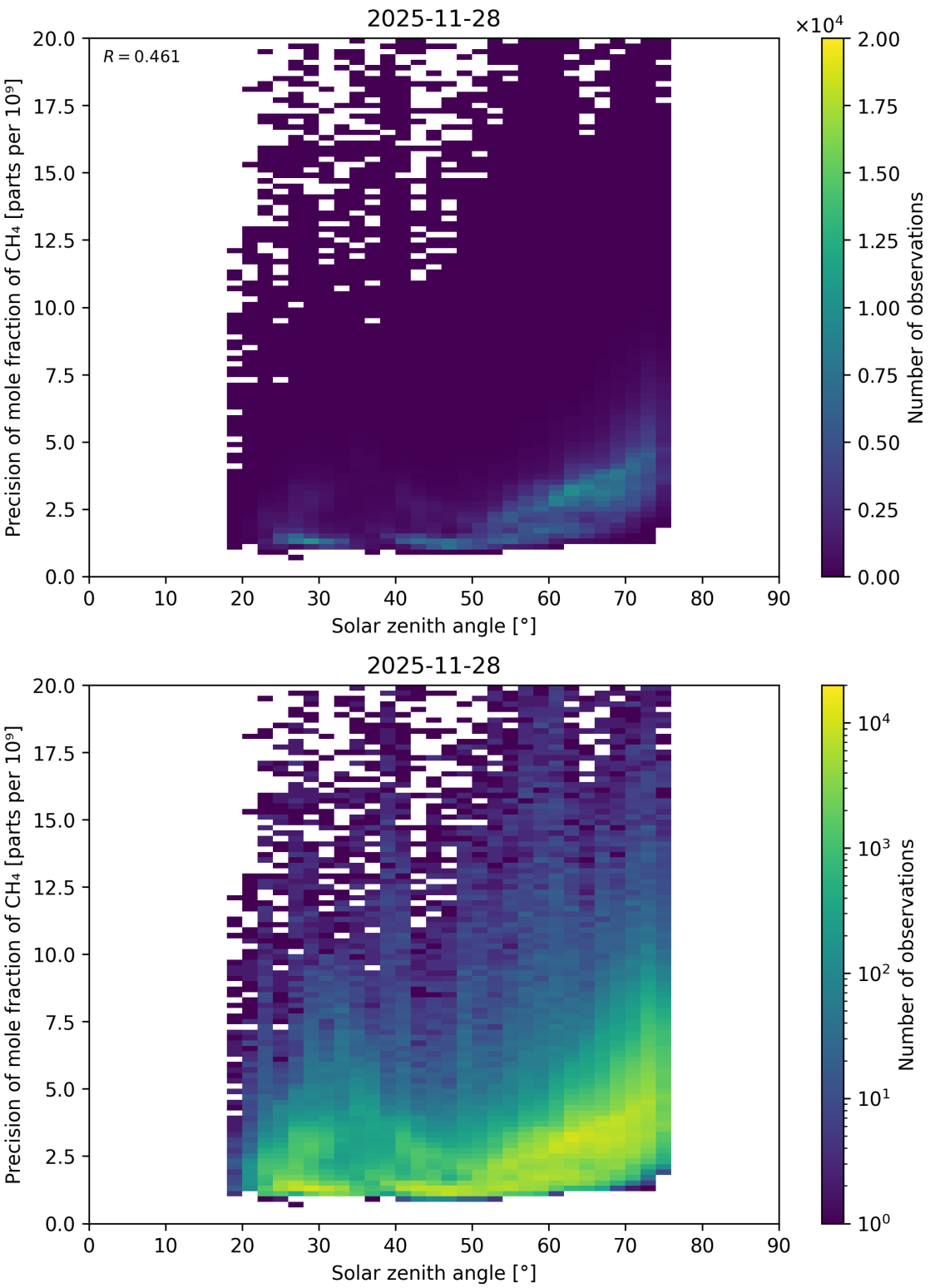

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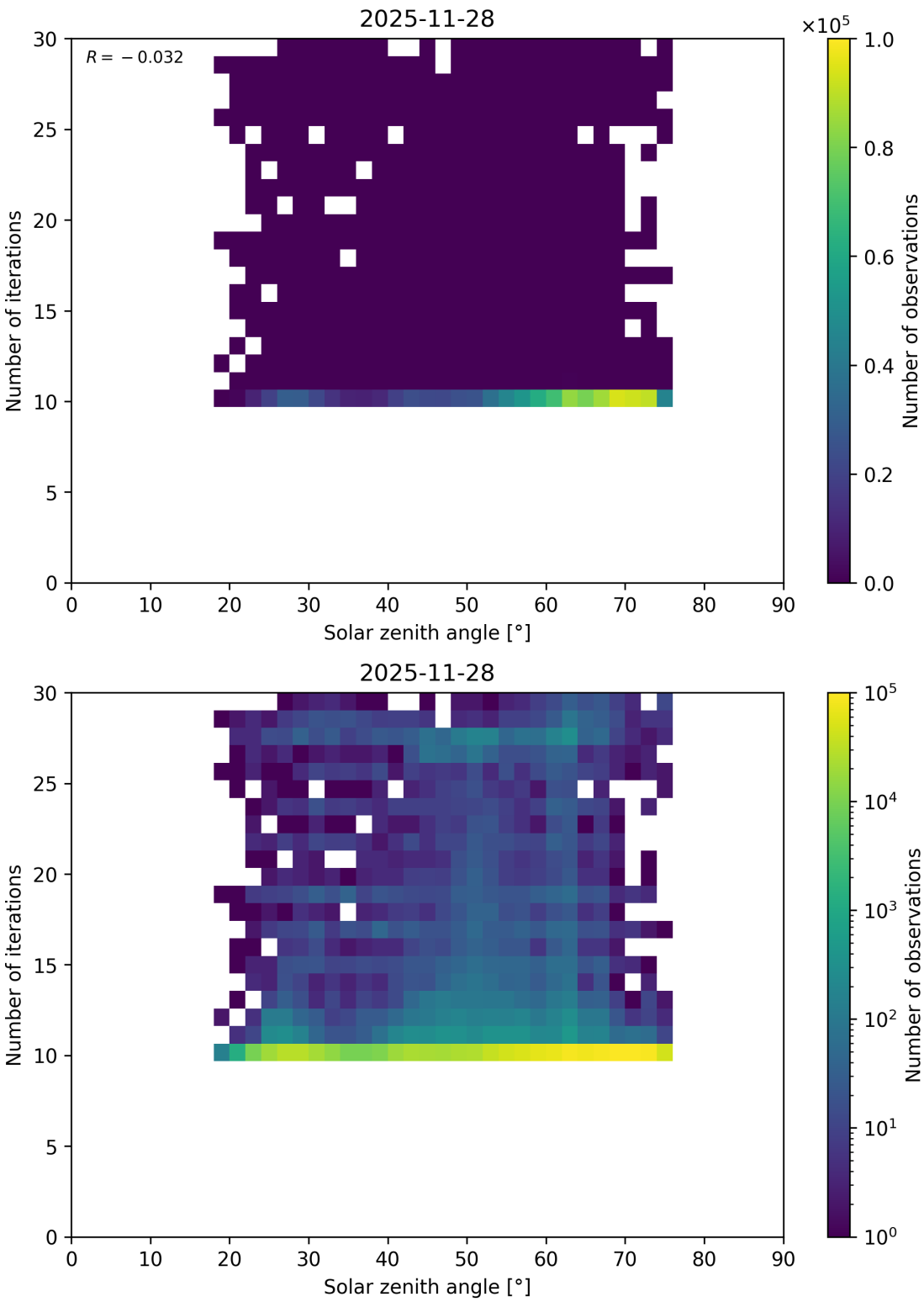

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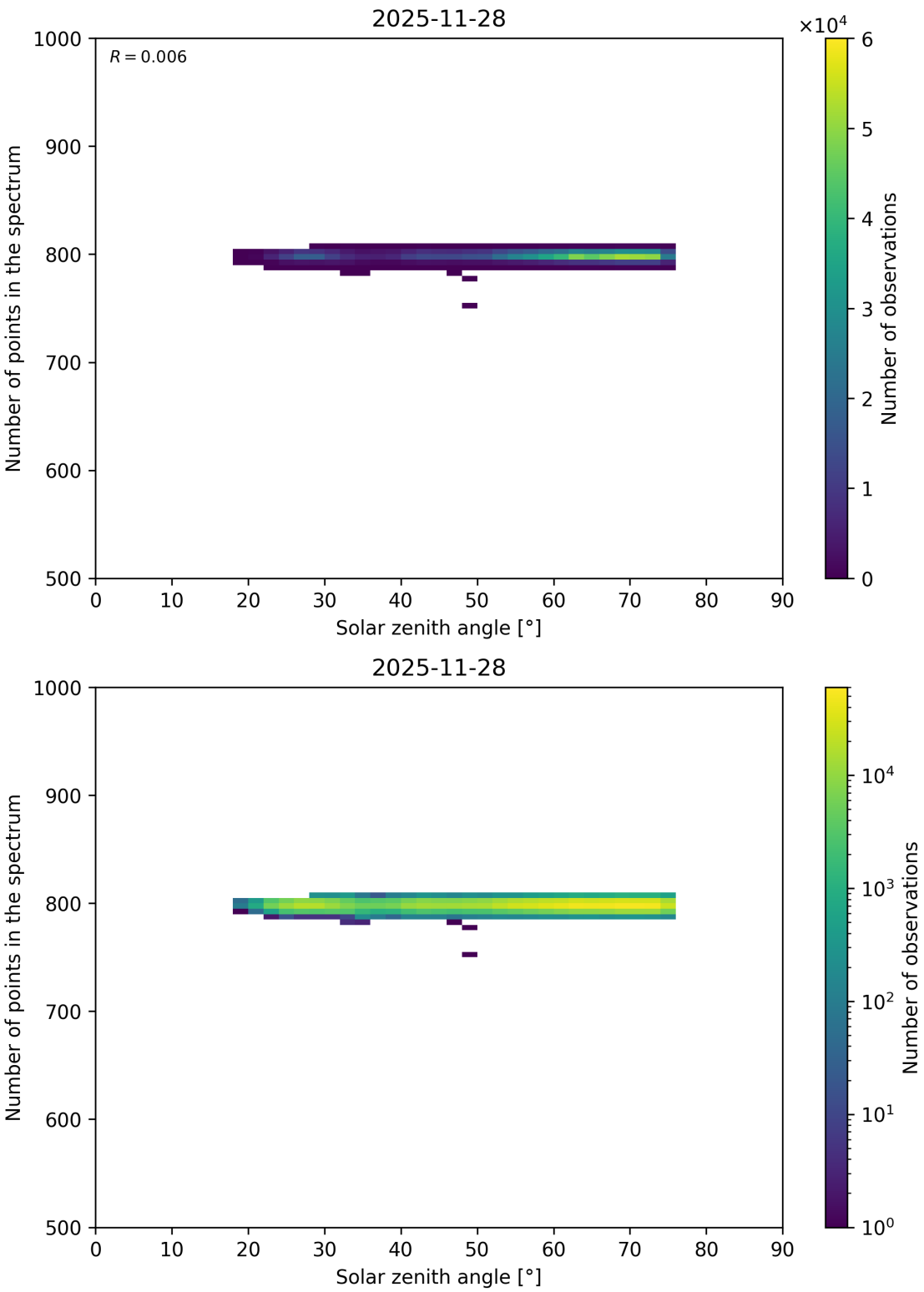

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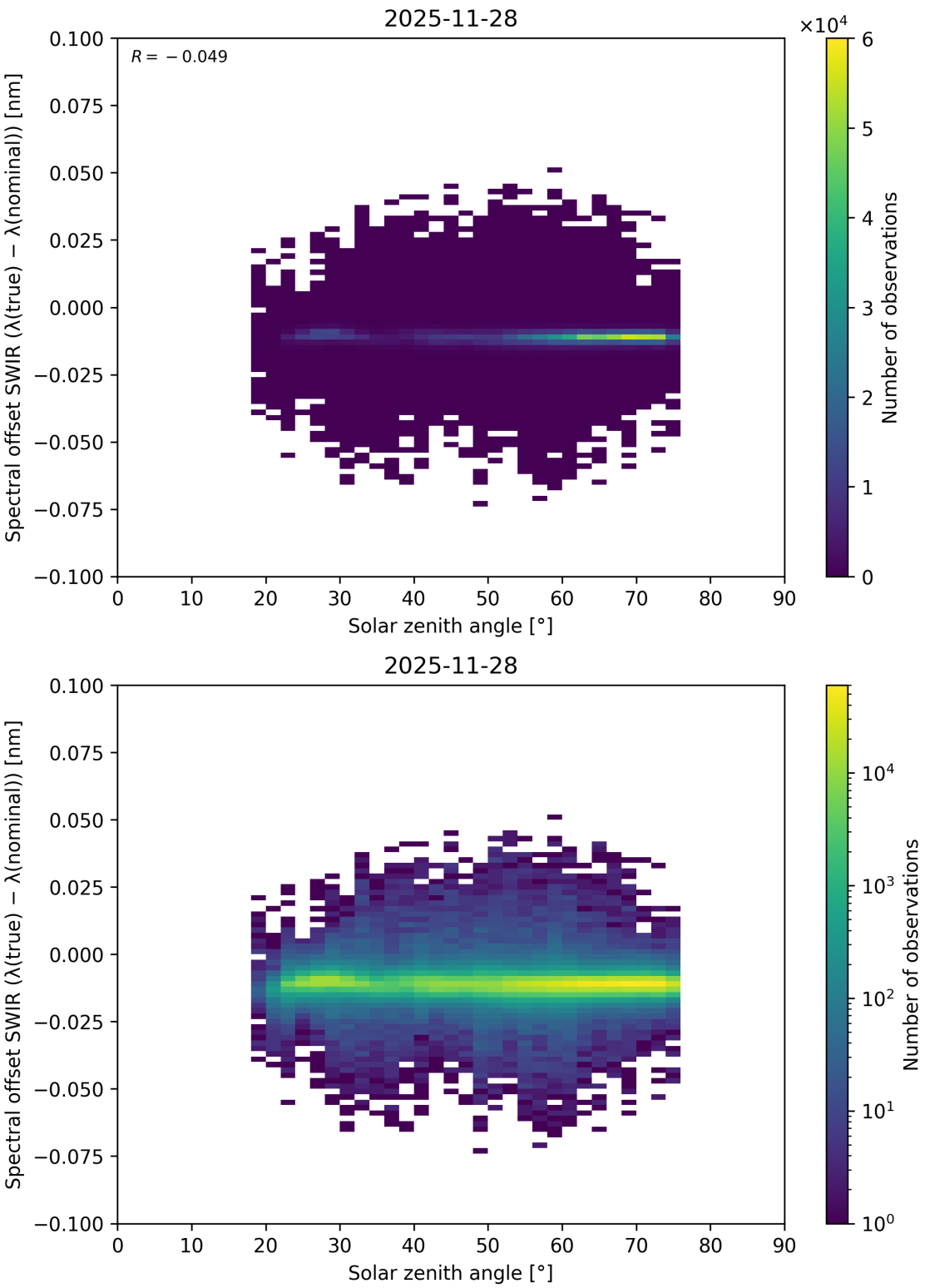

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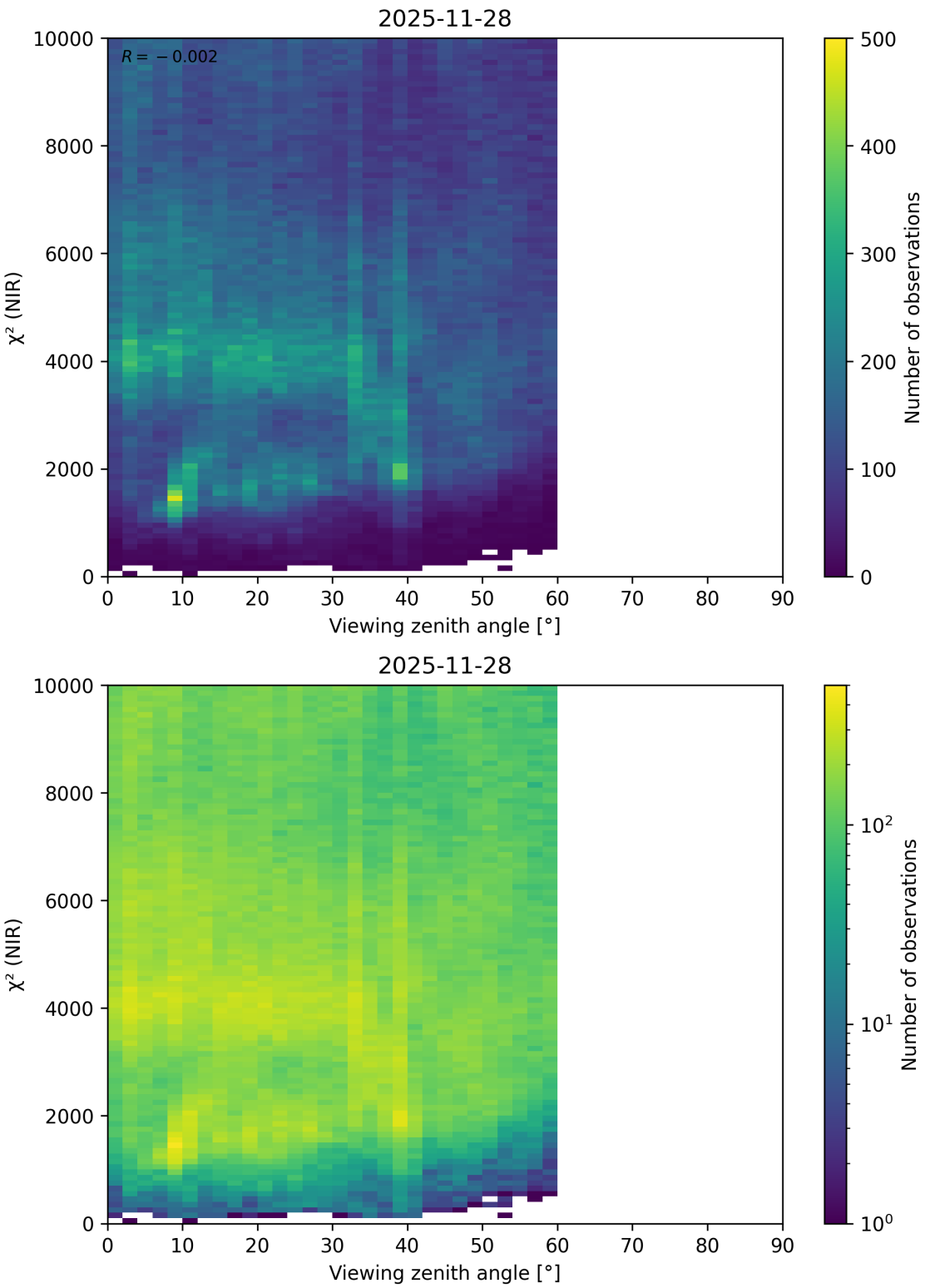

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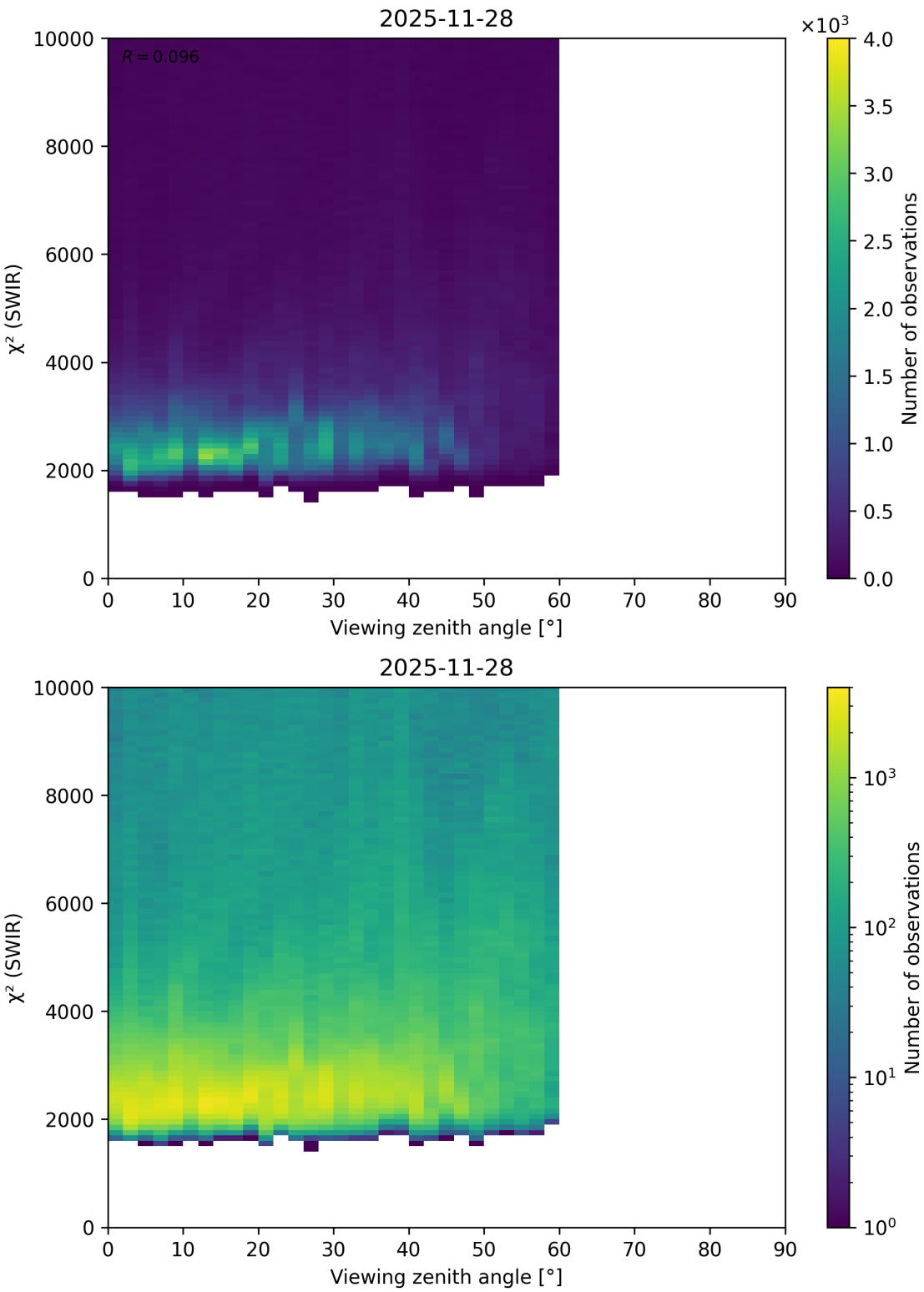

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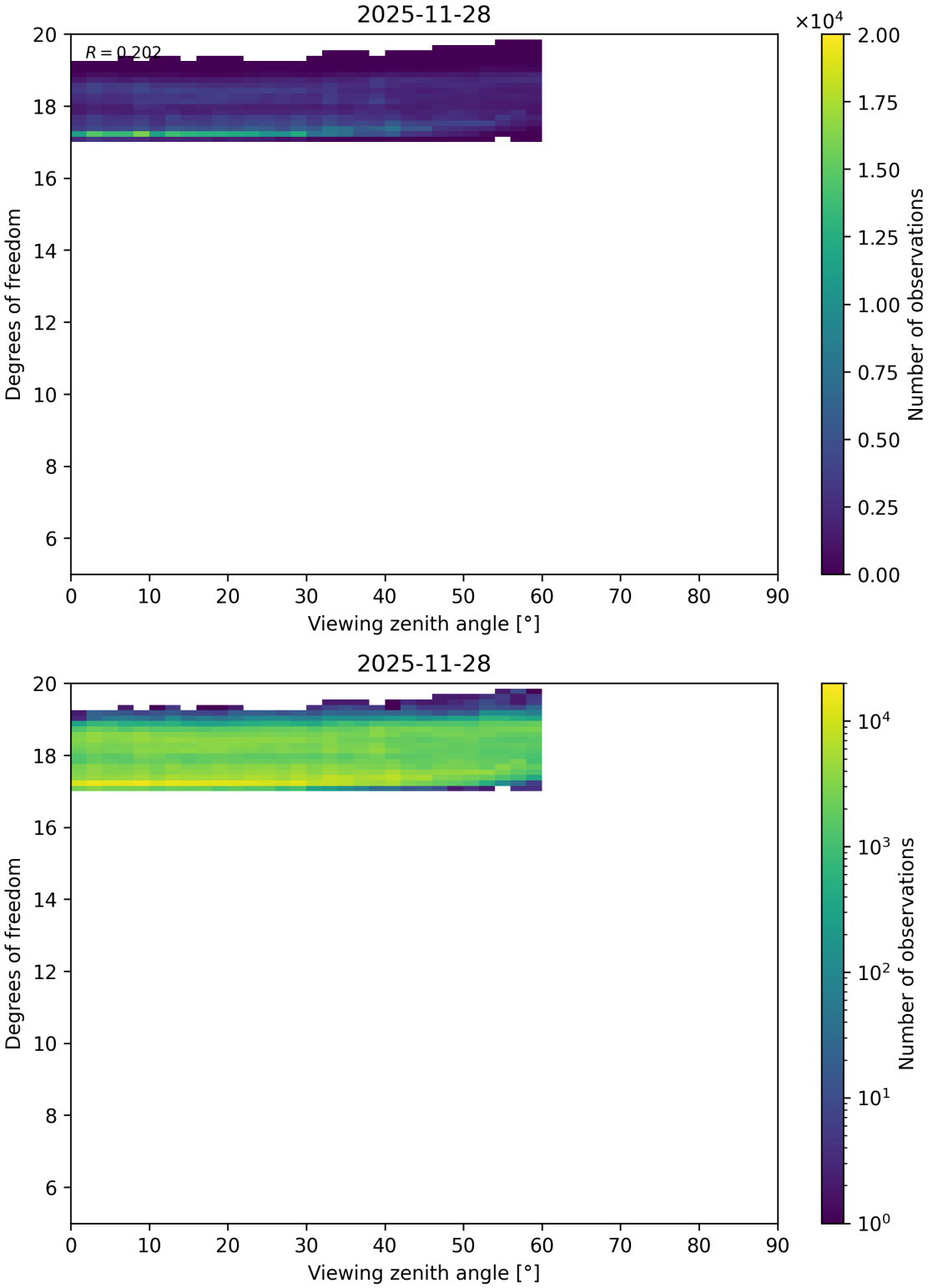

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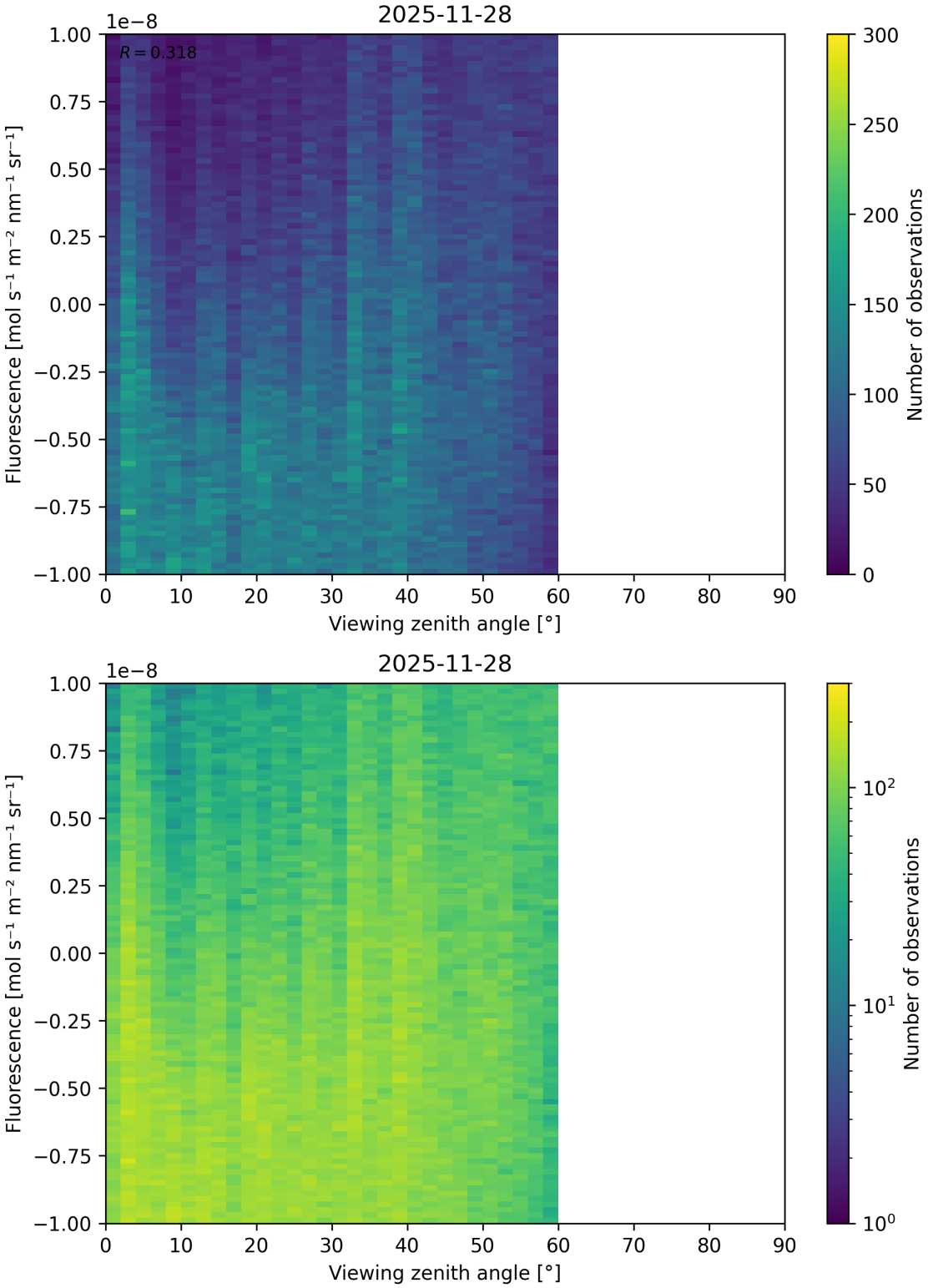

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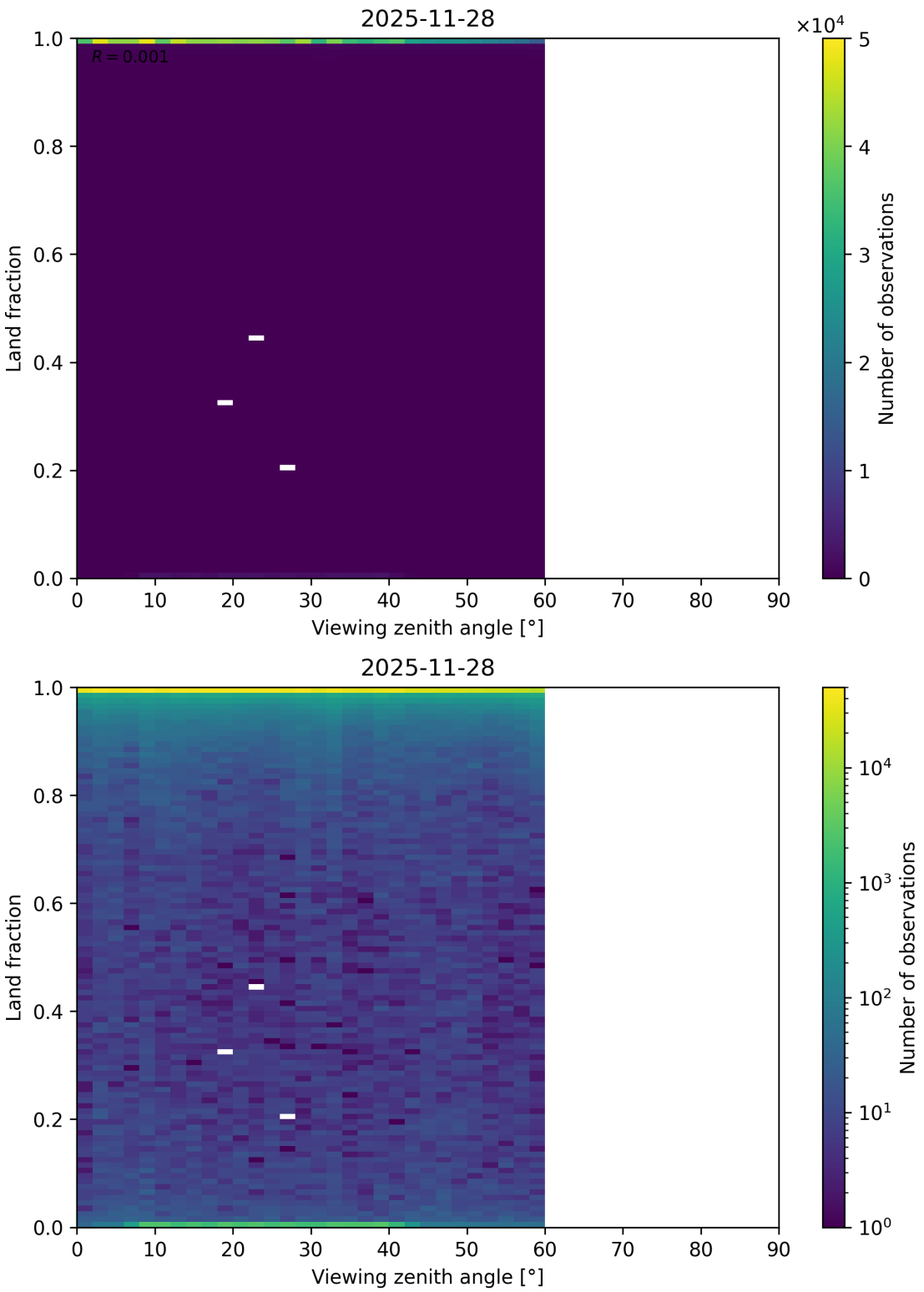

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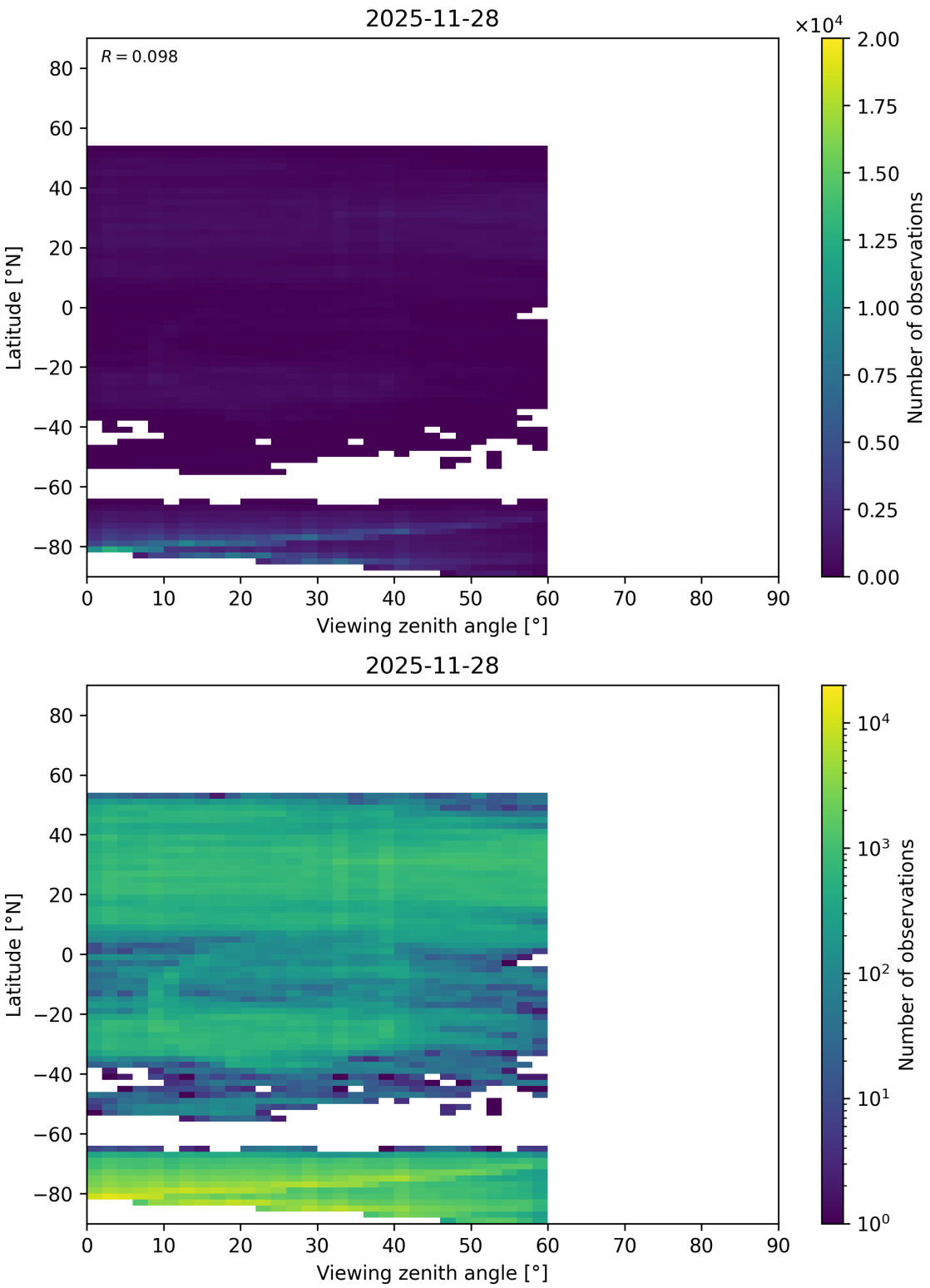

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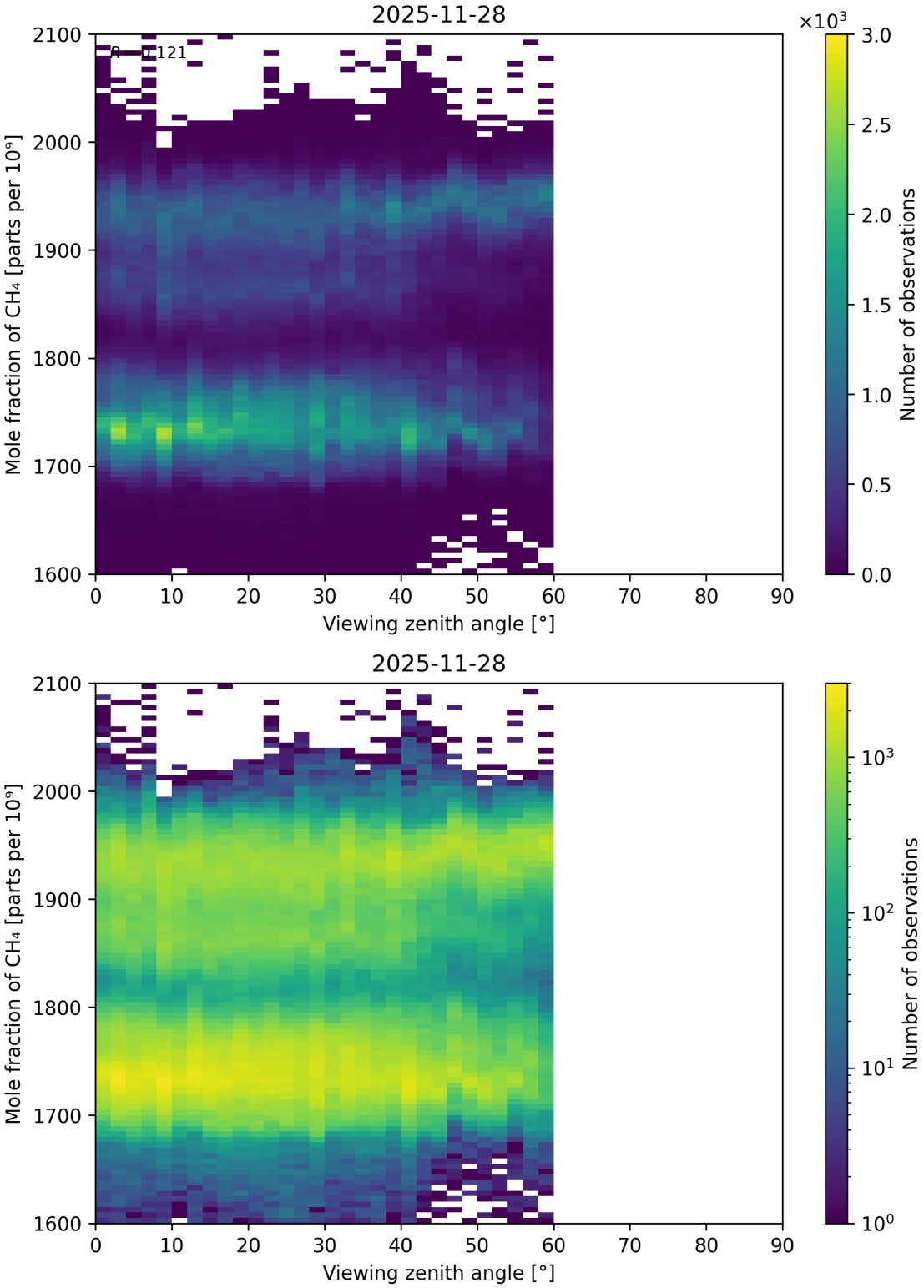

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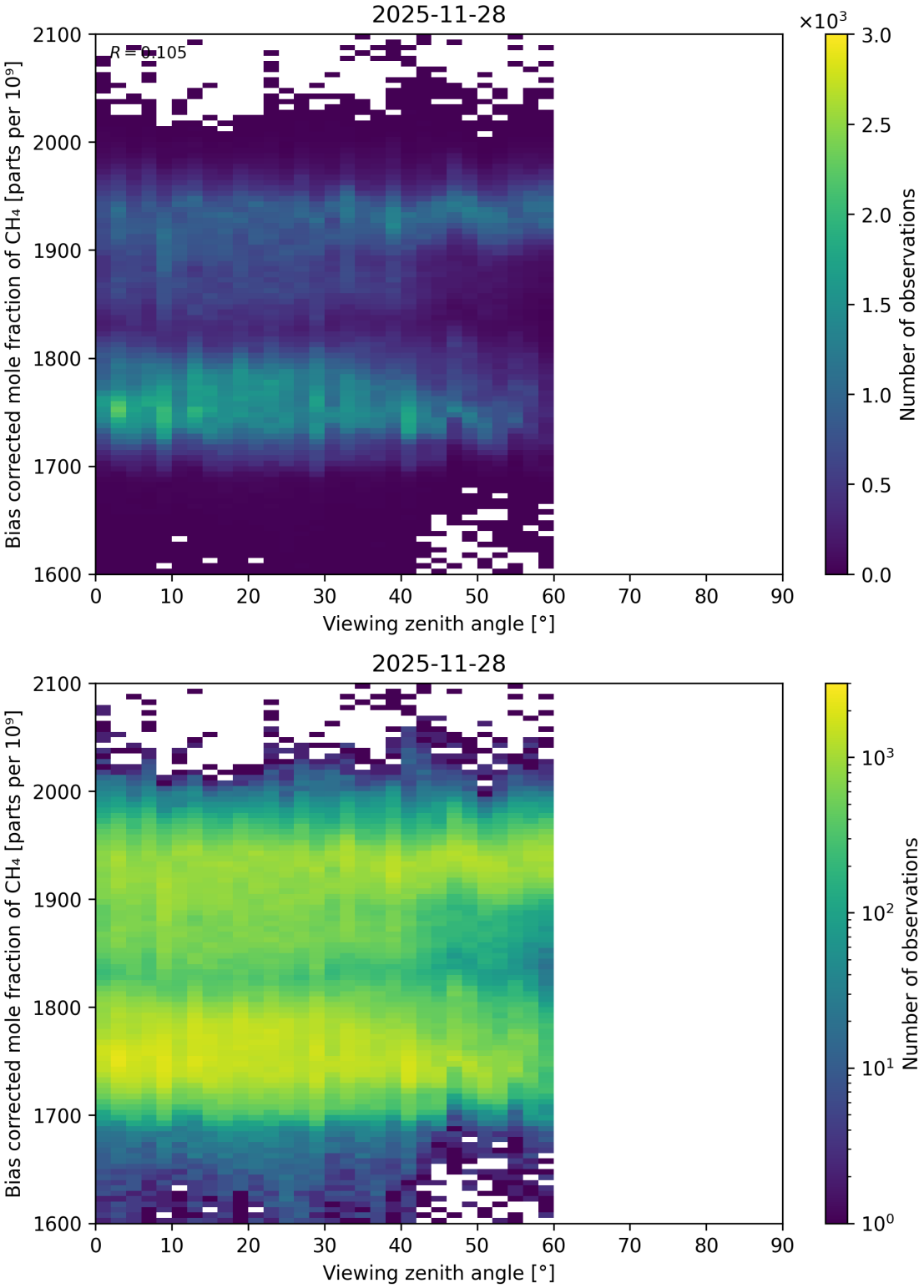

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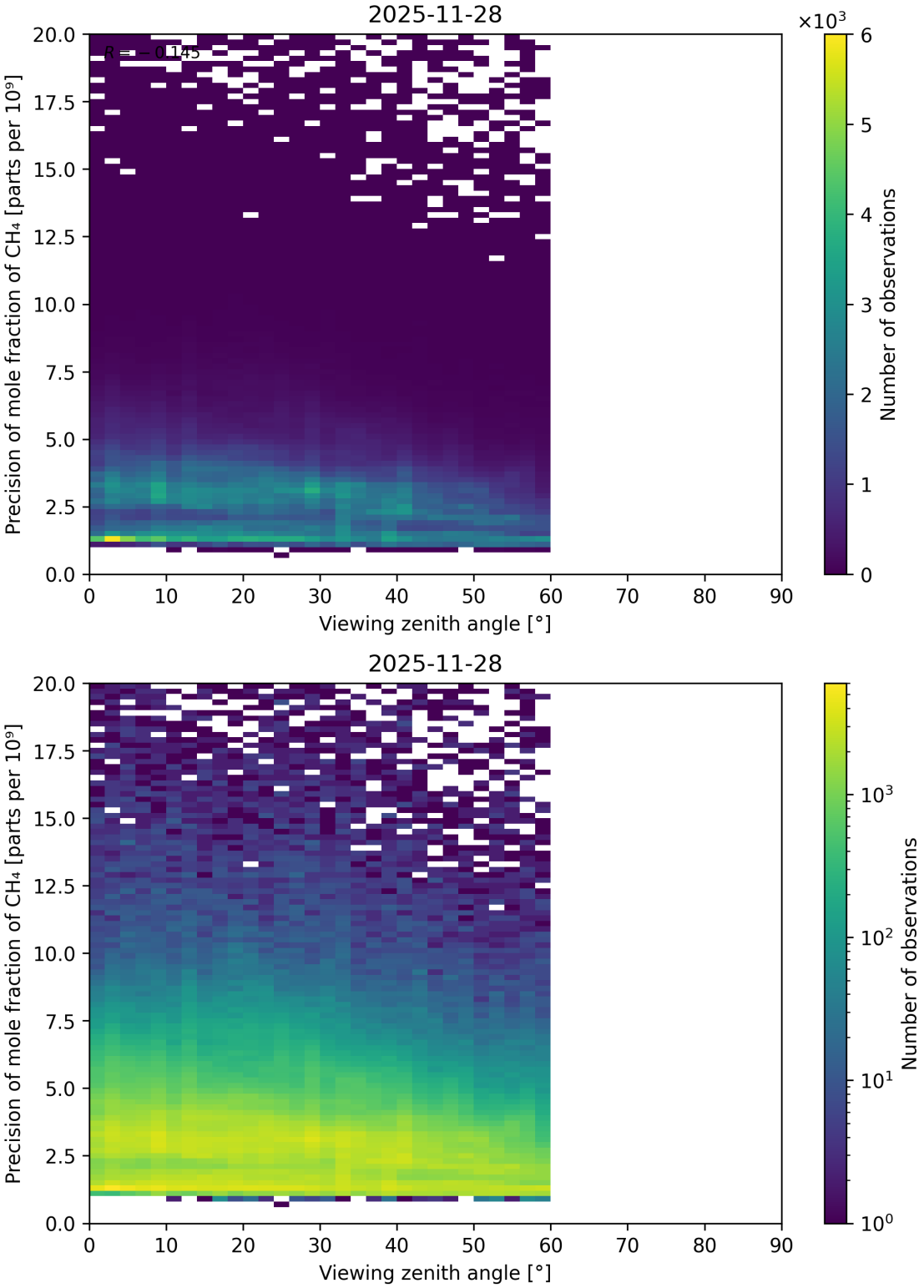

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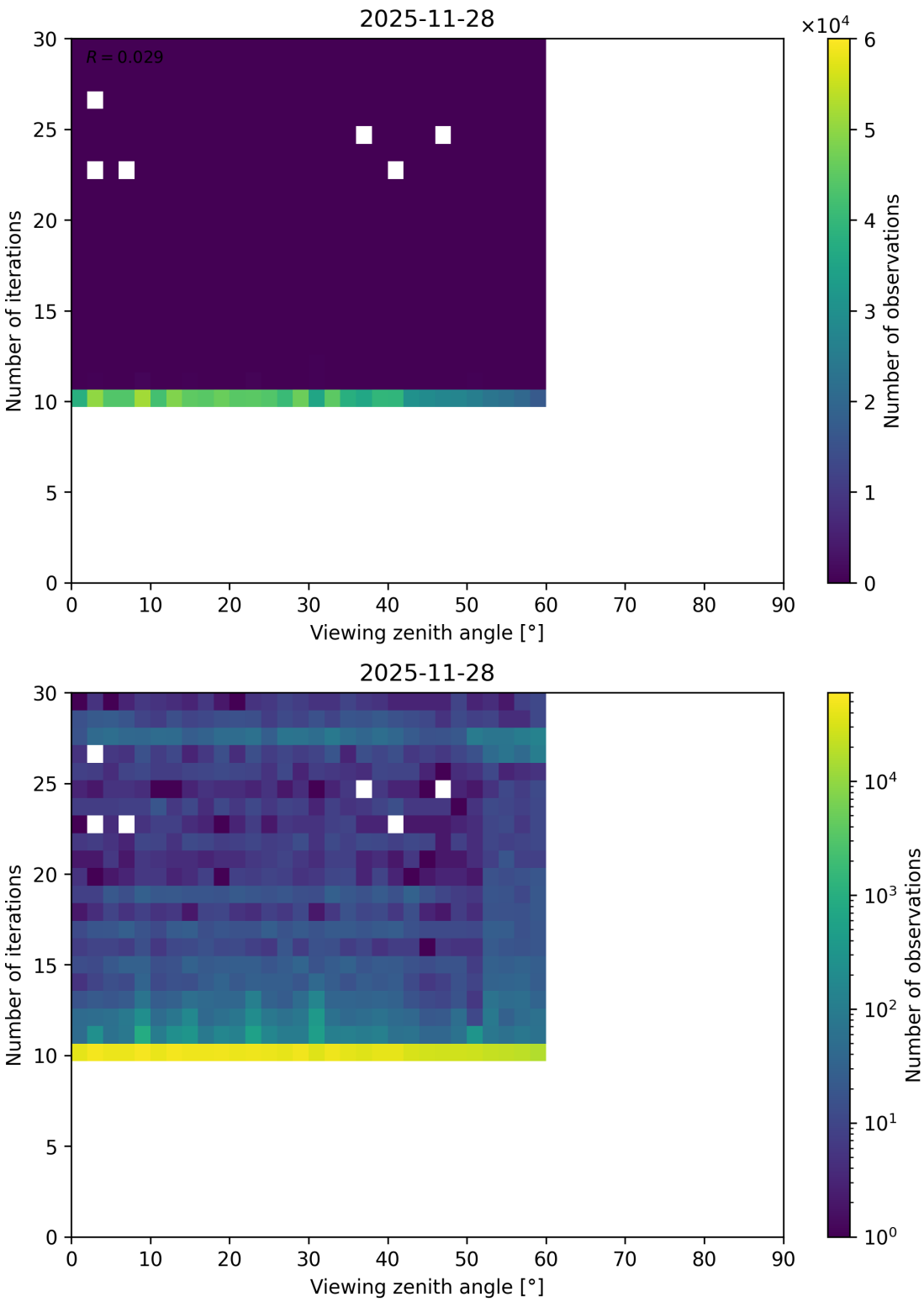

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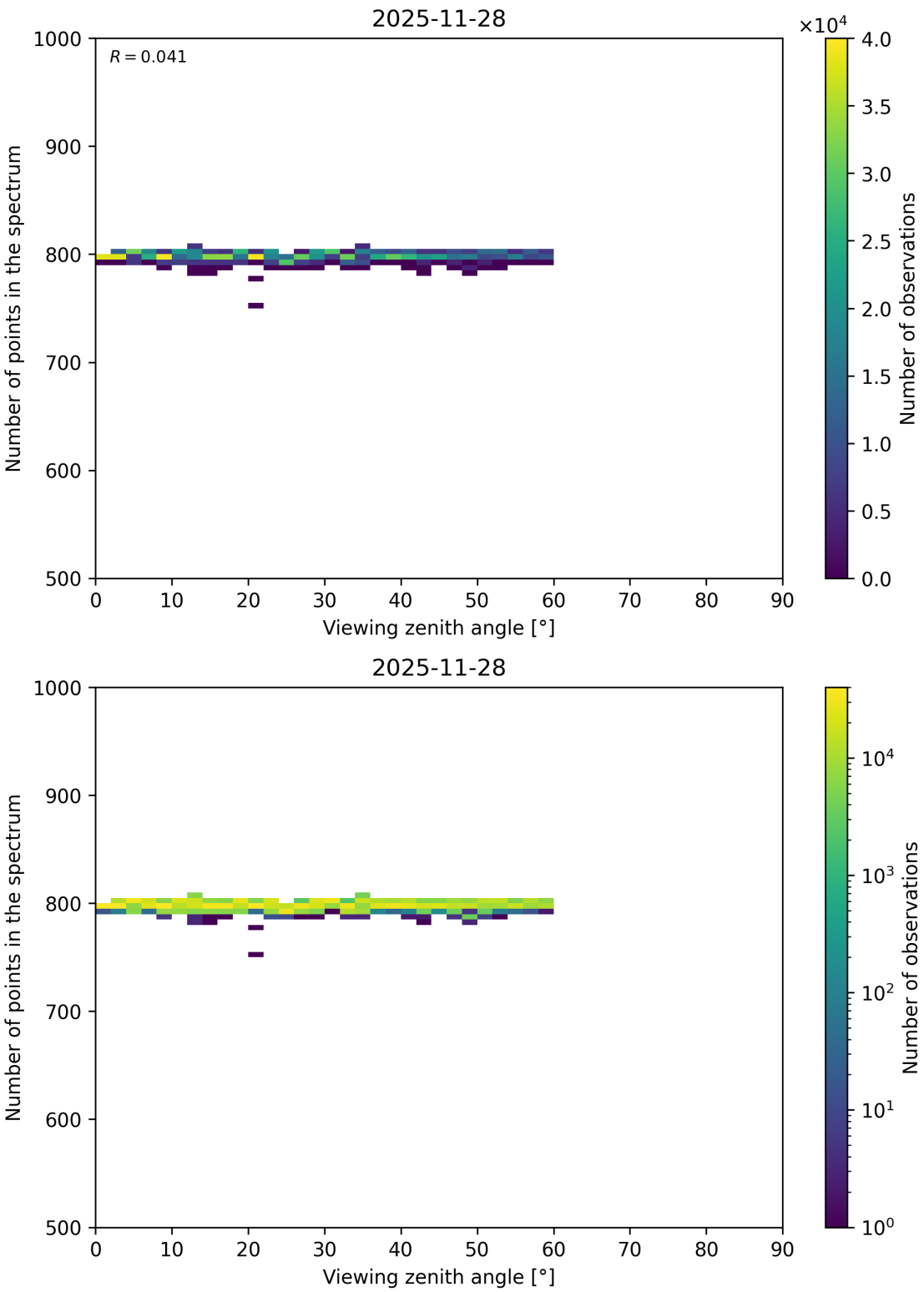

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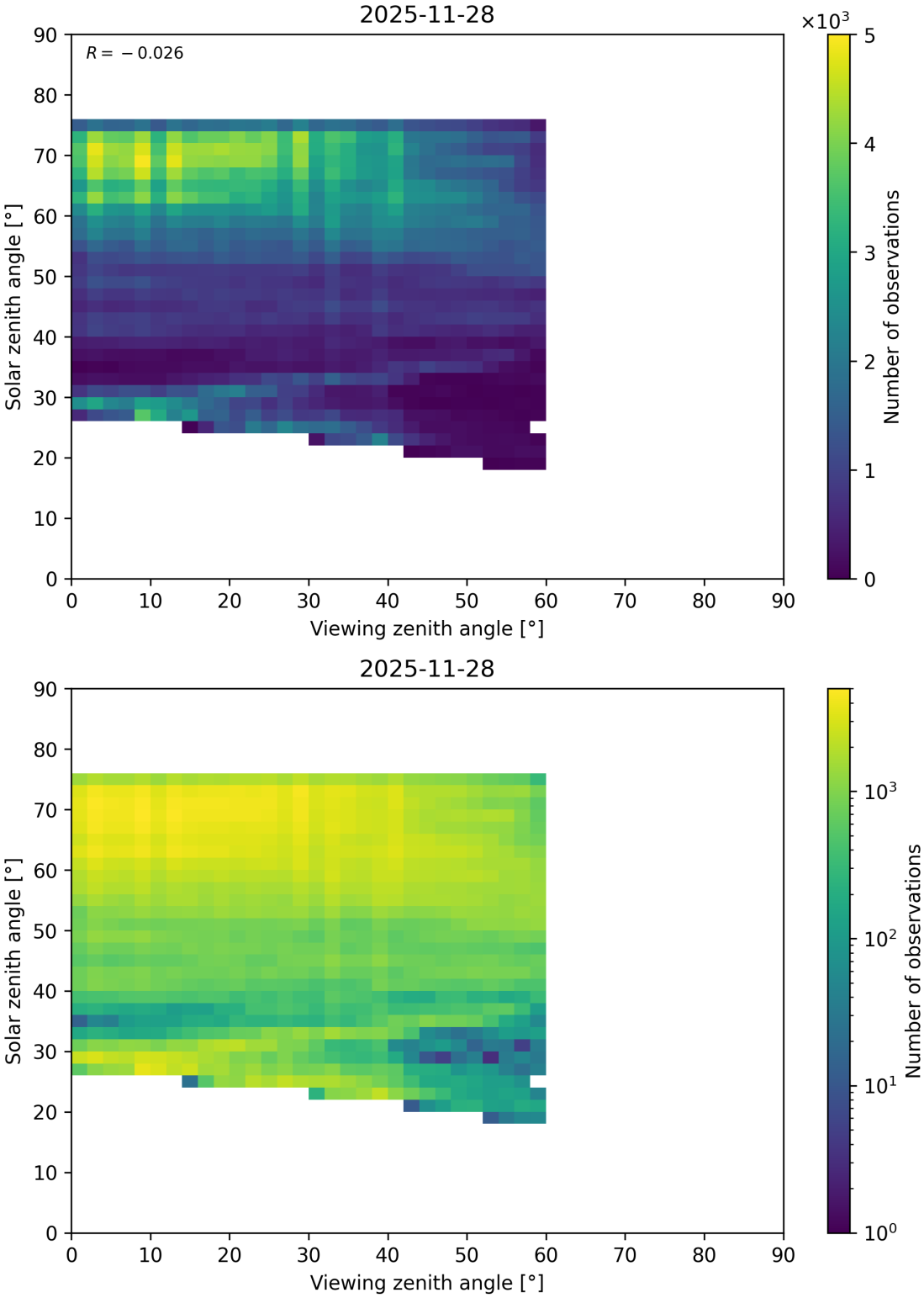

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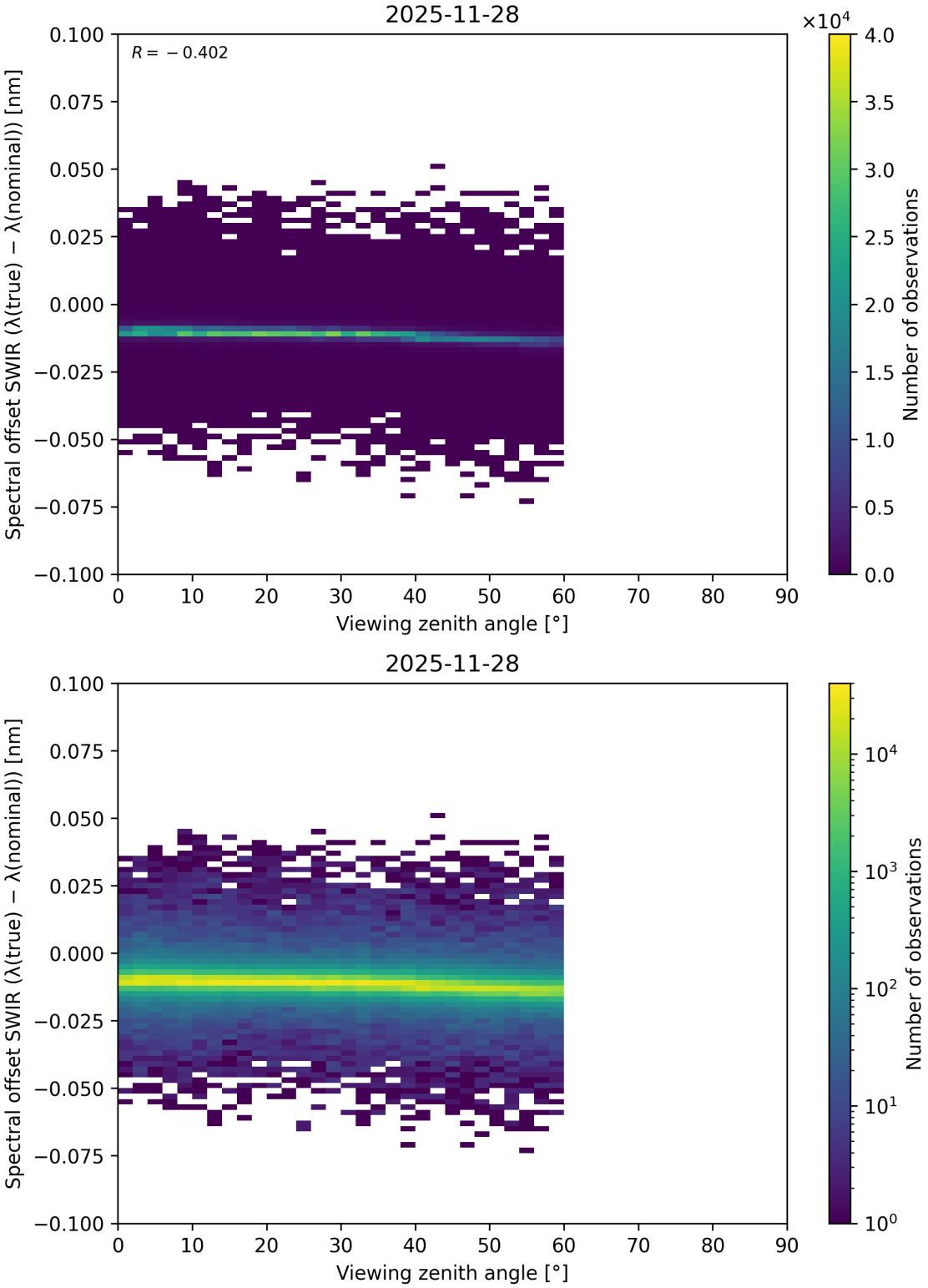

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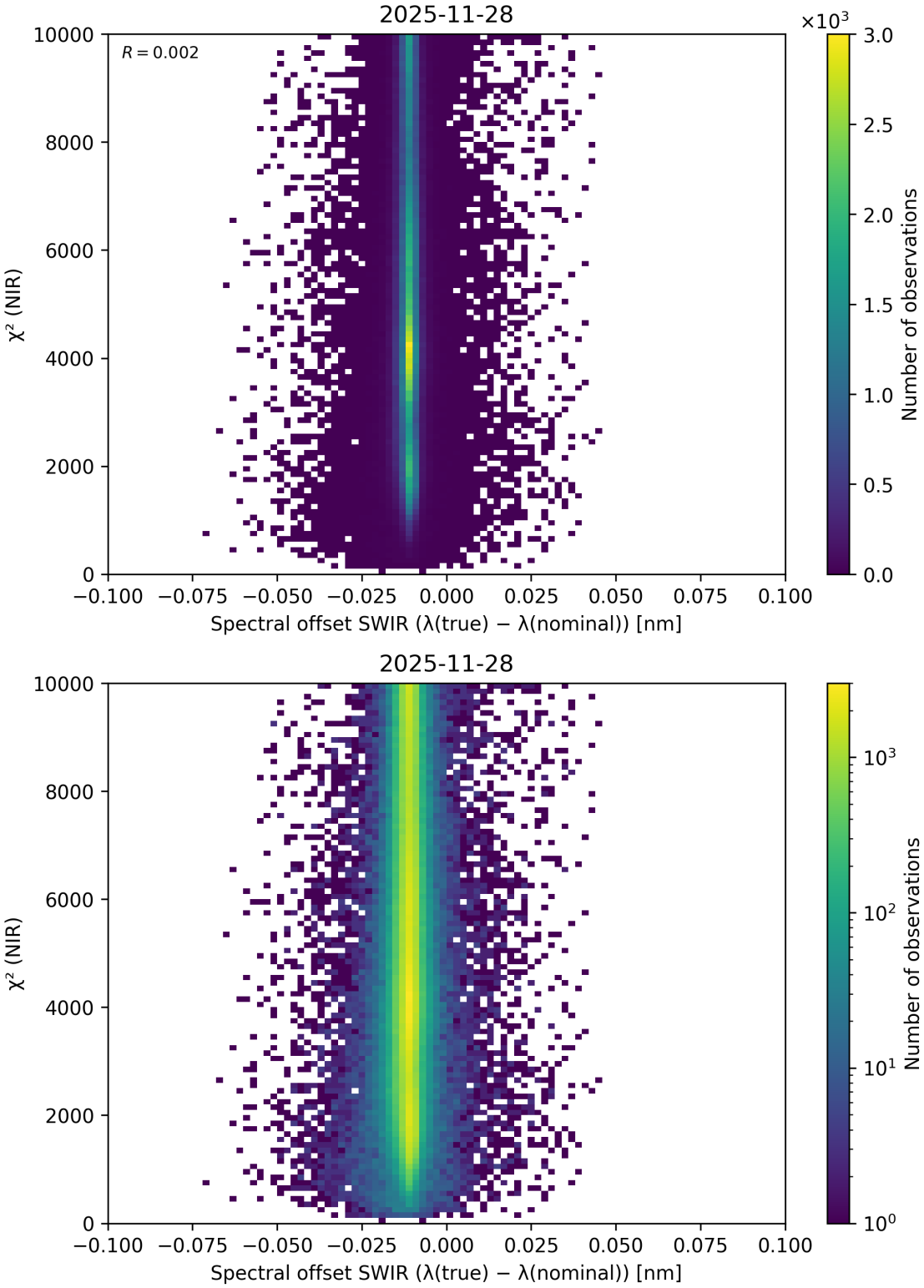

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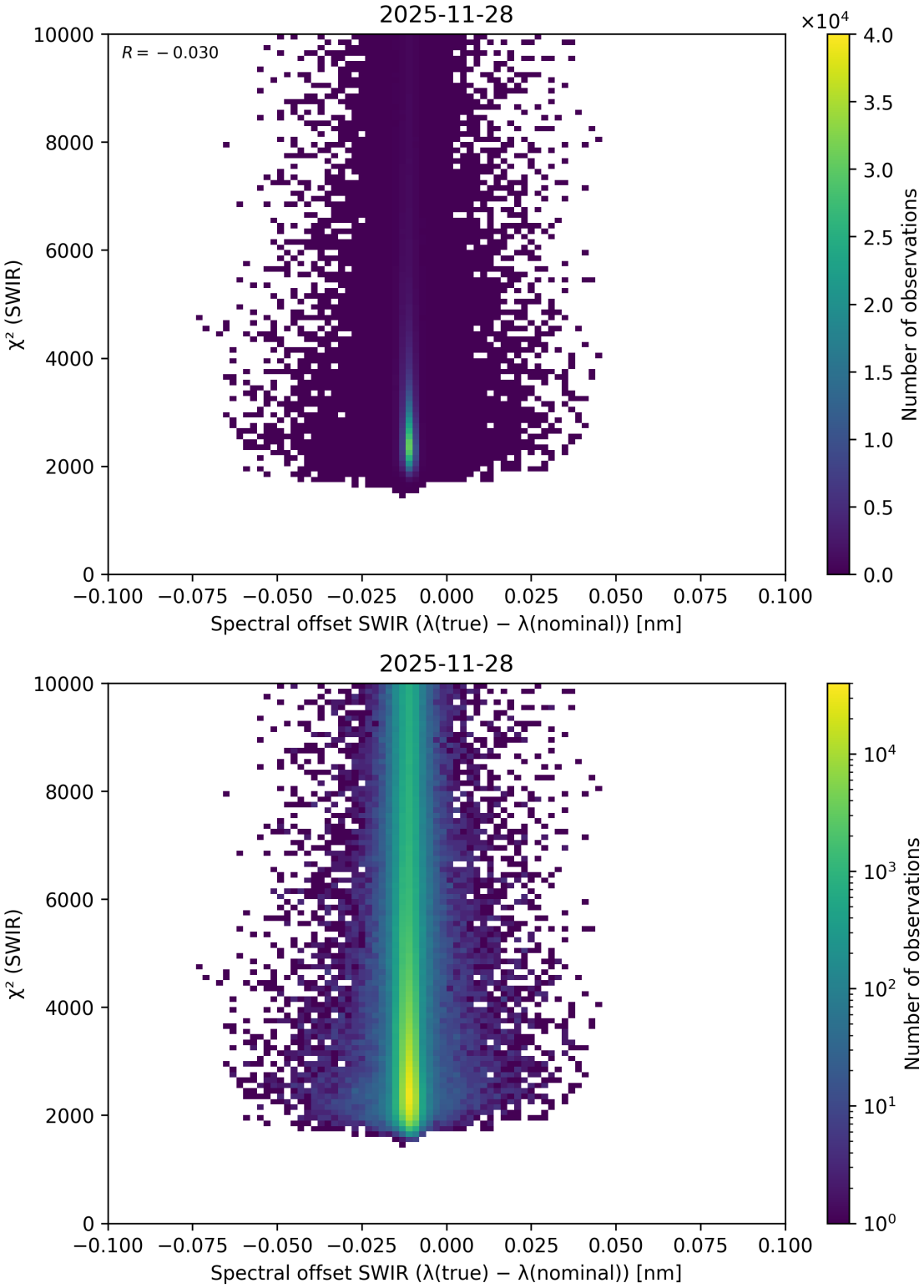

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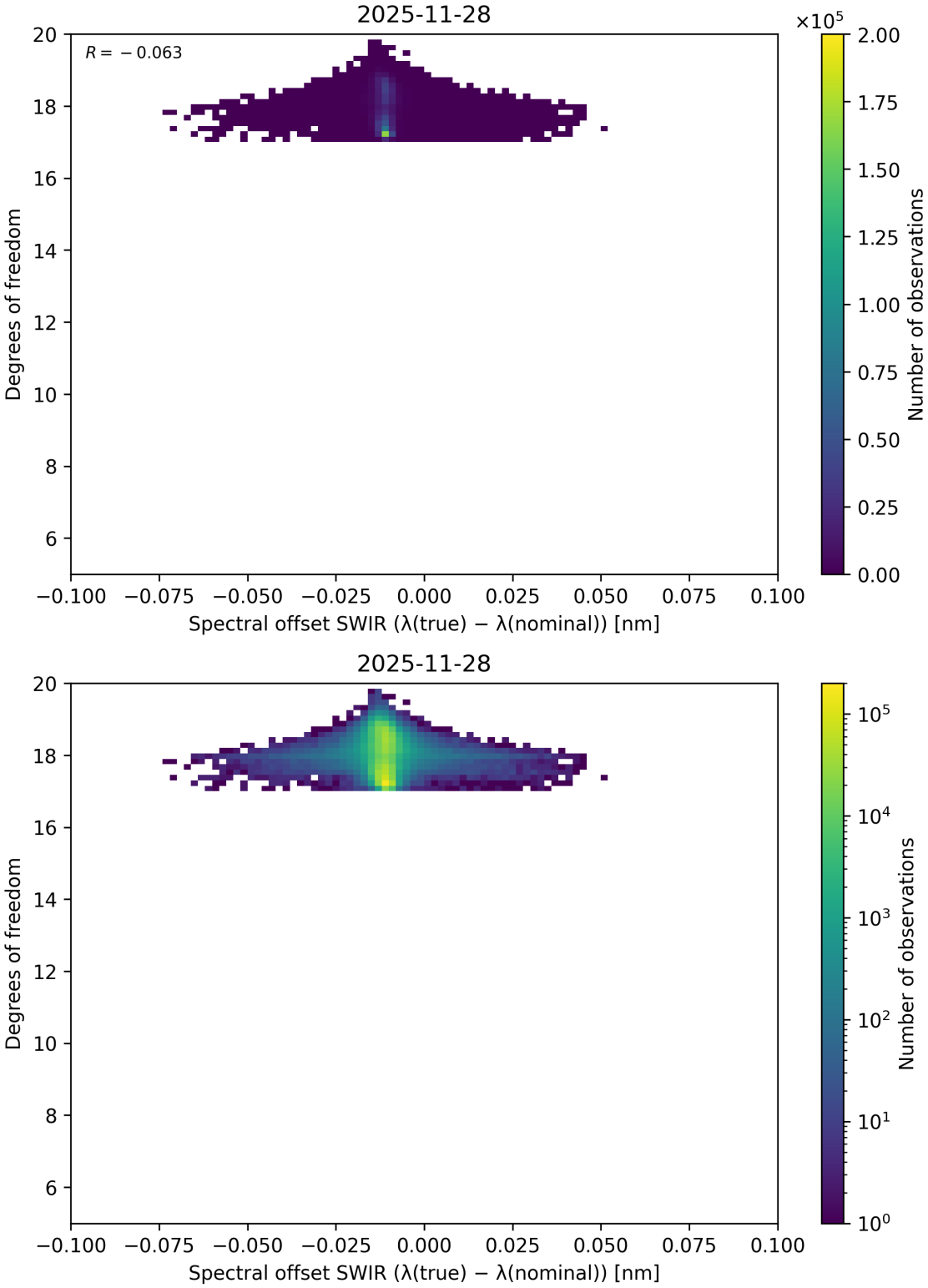

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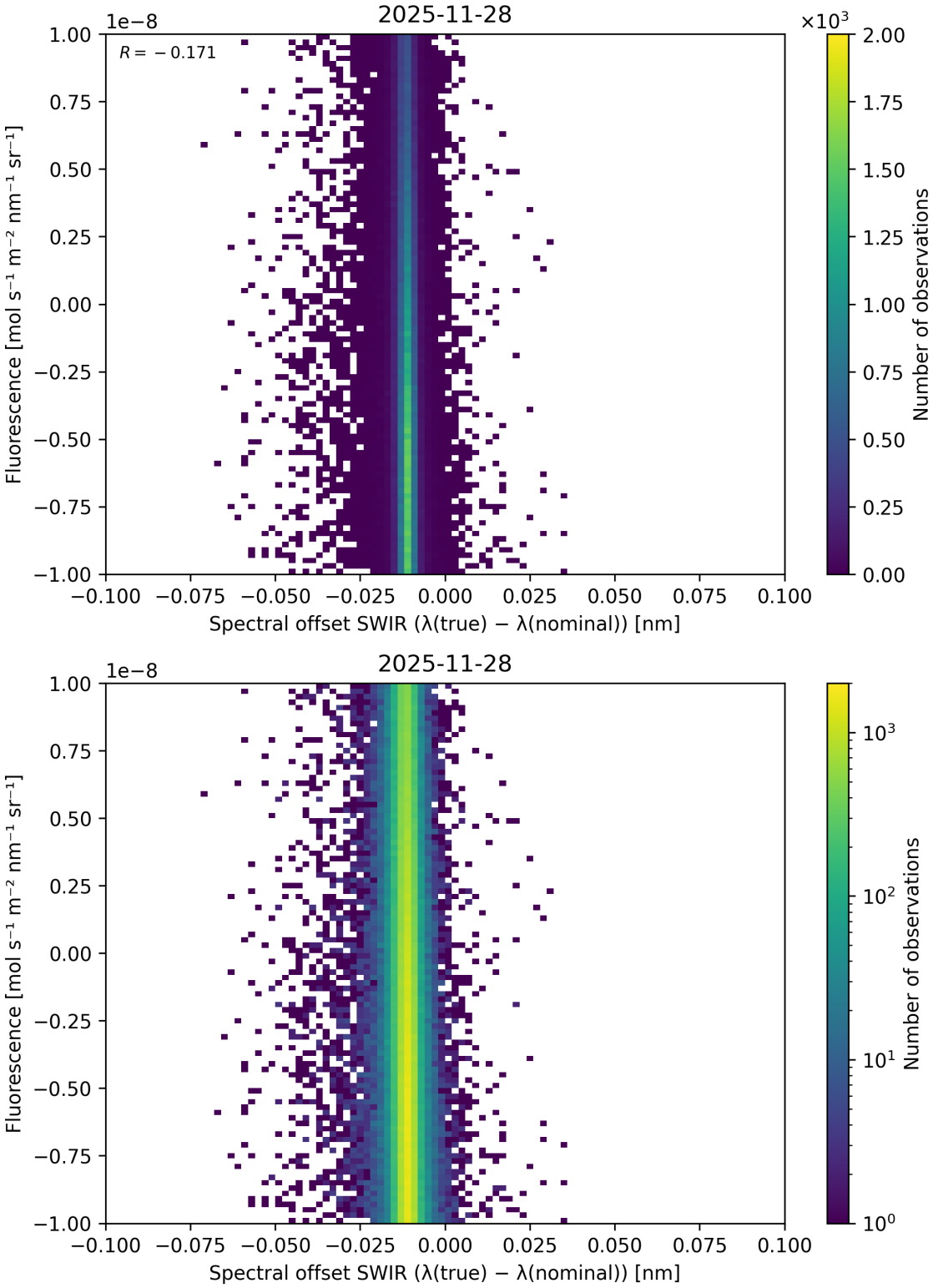

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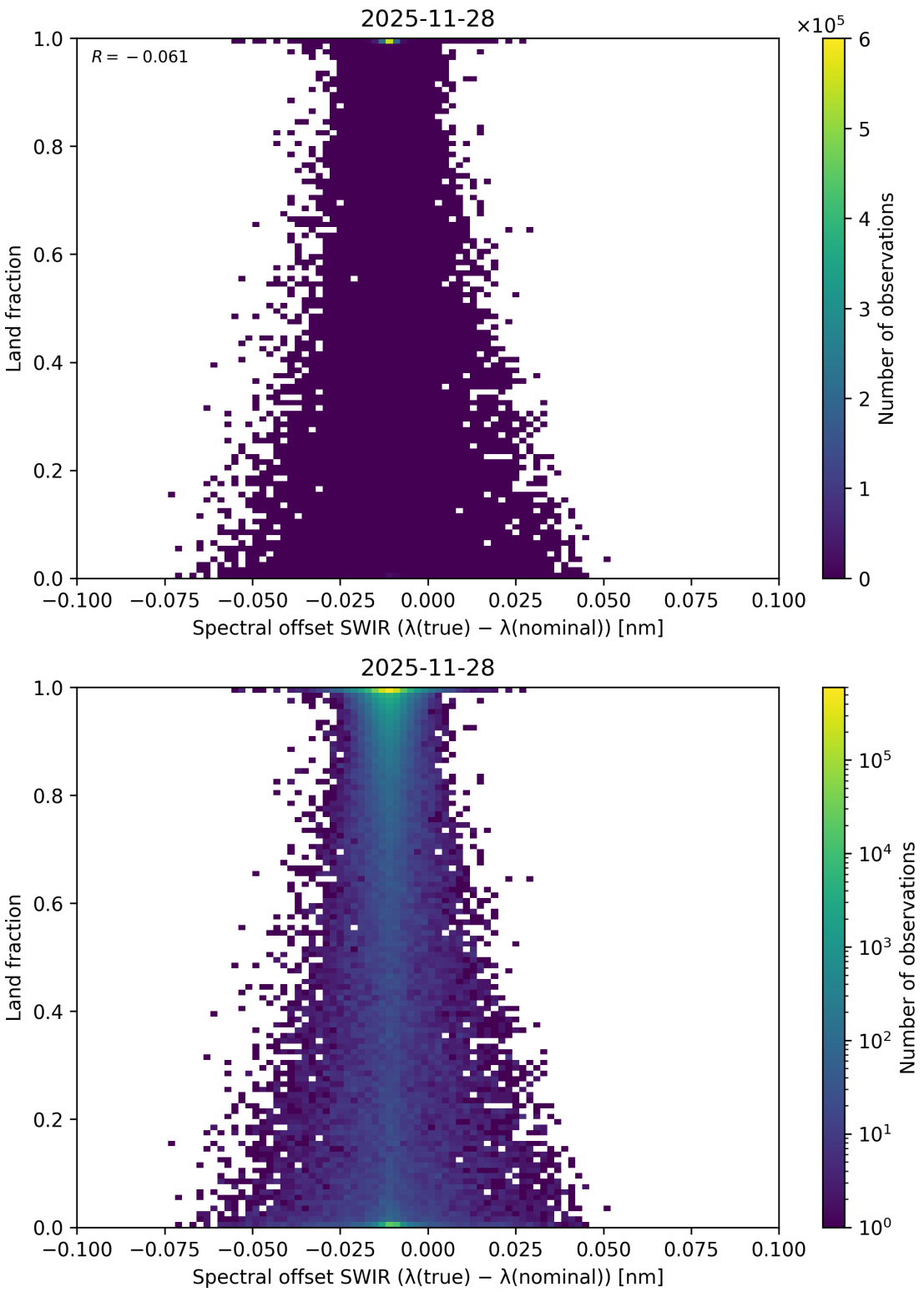

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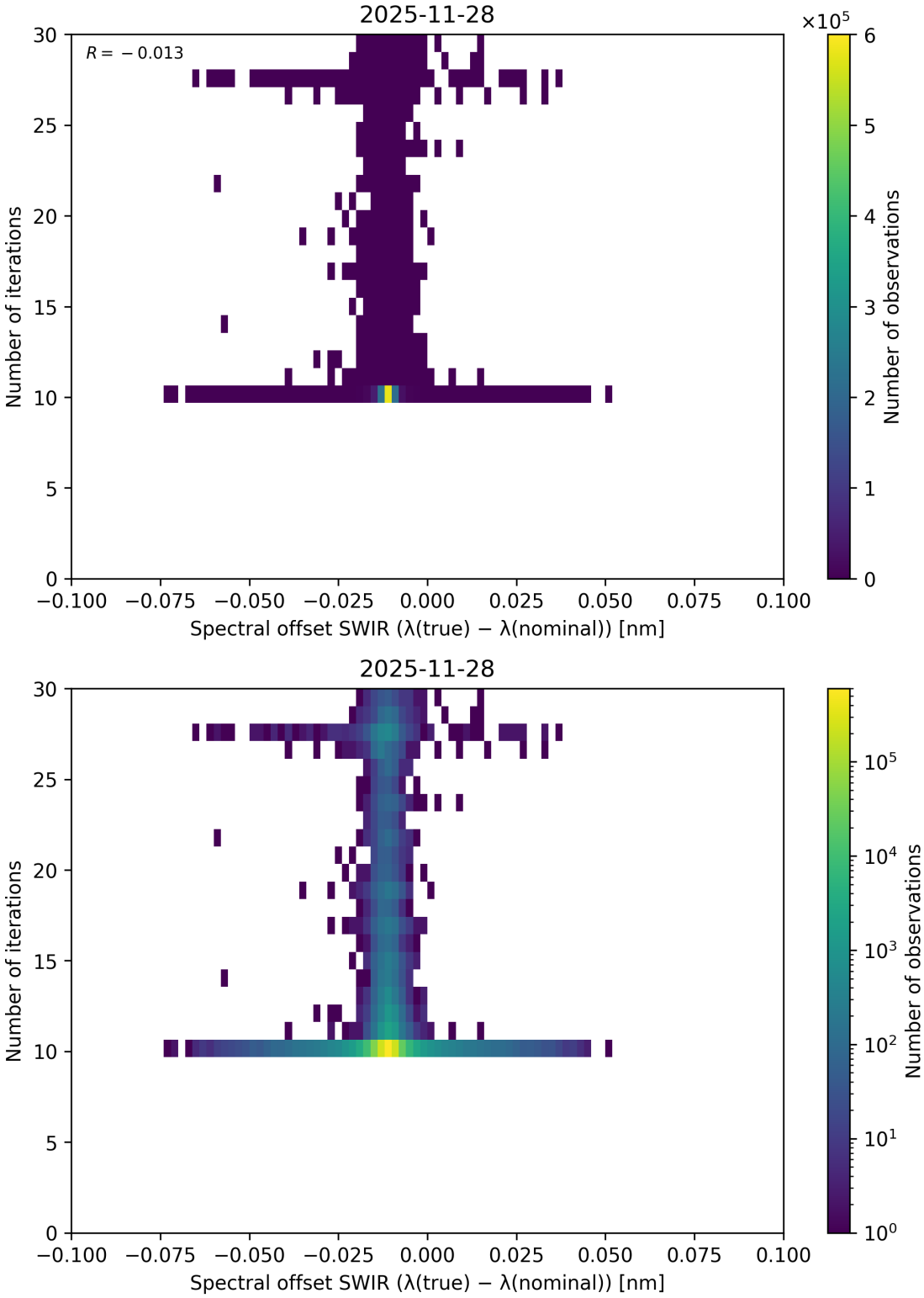

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