

PyCAMA report generated by tropl2-proc

tropl2-proc

2023-12-14 (01:30)

1 Short Introduction

1.1 The list of parameters

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

2 Definitions

The averages shown here are *unweighed* averages:

$$\bar{x} = \frac{1}{N} \sum_{i=1}^N x_i \quad (1)$$

with N the number of observations in the dataset.

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

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

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

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

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^m f(x) dx = \frac{1}{2} \quad (3)$$

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

The median is a special case of a percentile. Instead of 1/2 in equation 3, other threshold values can be used. We report results for 1 %, 5 %, 10 %, 15.9 %, 25 %, 75 %, 84.1 %, 90 %, 95 % and 99 %. The inter quartile range is the difference between the 75 % and 25 % percentiles. Similarly the minimum and maximum values correspond to the 0 % and 100 % percentiles respectively.

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

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

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1} \sum_{i=1}^N (x_{(k),i} - \bar{x}_{(k)})(x_{(l),i} - \bar{x}_{(l)}) \quad (4)$$

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

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

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

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm \sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.937 ± 0.152	23275962	0.995	0.0	1.000	0.350	1.000
cloud pressure crb [hPa]	760 ± 207	23275962	1.015×10^3	313	809	130	1.067×10^3
cloud pressure crb precision [hPa]	1.65 ± 7.66	23275962	0.750	0.772	0.334	7.935×10^{-4}	1.582×10^3
cloud fraction crb [1]	0.491 ± 0.385	23275962	0.996	0.856	0.430	0.0	1.000
cloud fraction crb precision [1]	$(1.201 \pm 5.018) \times 10^{-4}$	23275962	2.500×10^{-4}	6.486×10^{-5}	6.653×10^{-5}	7.107×10^{-10}	0.386
scene albedo [1]	0.472 ± 0.342	23275962	1.500×10^{-2}	0.631	0.438	-9.162×10^{-3}	5.30
scene albedo precision [1]	$(7.219 \pm 8.402) \times 10^{-5}$	23275962	2.500×10^{-4}	5.498×10^{-5}	4.560×10^{-5}	9.069×10^{-6}	9.374×10^{-3}
apparent scene pressure [hPa]	788 ± 188	23275962	1.008×10^3	287	840	130	1.068×10^3
apparent scene pressure precision [hPa]	0.695 ± 1.278	23275962	0.500	0.429	0.281	3.917×10^{-2}	32.6
chi square [1]	$(0.846 \pm 47.854) \times 10^5$	23275962	0.150	5.802×10^4	2.858×10^4	82.5	1.593×10^9
number of iterations [1]	3.91 ± 1.60	23275962	3.23	2.00	4.00	1.000	14.0
fluorescence [$\text{mol s}^{-1} \text{m}^{-2} \text{nm}^{-1} \text{sr}^{-1}$]	$(1.583 \pm 6.340) \times 10^{-9}$	23275962	7.500×10^{-10}	5.274×10^{-9}	1.312×10^{-9}	-2.101×10^{-6}	1.444×10^{-6}
fluorescence precision [$\text{mol s}^{-1} \text{m}^{-2} \text{nm}^{-1} \text{sr}^{-1}$]	$(1.749 \pm 0.708) \times 10^{-9}$	23275962	8.500×10^{-10}	1.062×10^{-9}	1.684×10^{-9}	4.326×10^{-10}	5.582×10^{-9}
chi square fluorescence [1]	$(0.486 \pm 0.918) \times 10^5$	23275962	750	4.362×10^4	1.383×10^4	100	1.911×10^6
degrees of freedom fluorescence [1]	6.00 ± 0.00	23275962	5.95	0.0	6.00	6.00	6.00
number of spectral points in retrieval [1]	59.0 ± 0.1	23275962	58.5	0.0	59.0	57.0	59.0
wavelength calibration offset [nm]	$(-3.379 \pm 11.003) \times 10^{-3}$	23275962	2.000×10^{-3}	1.148×10^{-2}	-1.482×10^{-3}	-0.153	0.296

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.500	0.500	0.700	0.900	1.000	1.000	1.000	1.000	1.000	1.000
cloud pressure crb [hPa]	241	360	444	525	623	935	970	991	1.009×10^3	1.019×10^3
cloud pressure crb precision [hPa]	6.863×10^{-2}	9.711×10^{-2}	0.119	0.141	0.176	0.948	1.72	3.05	6.44	20.9
cloud fraction crb [1]	0.0	1.365×10^{-2}	3.012×10^{-2}	5.289×10^{-2}	0.104	0.961	1.000	1.000	1.000	1.000
cloud fraction crb precision [1]	1.711×10^{-5}	2.118×10^{-5}	2.411×10^{-5}	2.732×10^{-5}	3.514×10^{-5}	1.000×10^{-4}	1.140×10^{-4}	1.801×10^{-4}	3.377×10^{-4}	9.980×10^{-4}
scene albedo [1]	8.509×10^{-3}	2.198×10^{-2}	4.046×10^{-2}	7.066×10^{-2}	0.147	0.778	0.889	0.948	1.00	1.13
scene albedo precision [1]	1.289×10^{-5}	1.521×10^{-5}	1.795×10^{-5}	2.155×10^{-5}	2.783×10^{-5}	8.281×10^{-5}	1.085×10^{-4}	1.438×10^{-4}	2.200×10^{-4}	4.547×10^{-4}
apparent scene pressure [hPa]	306	418	504	580	660	947	976	994	1.010×10^3	1.019×10^3
apparent scene pressure precision [hPa]	6.851×10^{-2}	9.582×10^{-2}	0.117	0.138	0.170	0.599	0.956	1.57	2.88	6.63
chi square [1]	429	1.292×10^3	2.926×10^3	5.543×10^3	1.035×10^4	6.837×10^4	9.519×10^4	1.221×10^5	1.589×10^5	2.312×10^5
number of iterations [1]	2.00	2.00	2.00	3.00	3.00	5.00	5.00	6.00	7.00	11.0
fluorescence [$\text{mol s}^{-1} \text{m}^{-2} \text{nm}^{-1} \text{sr}^{-1}$]	-1.338×10^{-8}	-6.244×10^{-9}	-3.777×10^{-9}	-2.342×10^{-9}	-1.038×10^{-9}	4.236×10^{-9}	6.038×10^{-9}	7.764×10^{-9}	1.020×10^{-8}	1.563×10^{-8}
fluorescence precision [$\text{mol s}^{-1} \text{m}^{-2} \text{nm}^{-1} \text{sr}^{-1}$]	7.129×10^{-10}	8.083×10^{-10}	8.830×10^{-10}	9.730×10^{-10}	1.150×10^{-9}	2.212×10^{-9}	2.495×10^{-9}	2.669×10^{-9}	2.984×10^{-9}	3.676×10^{-9}
chi square fluorescence [1]	453	873	1.309×10^3	2.097×10^3	3.842×10^3	4.746×10^4	8.494×10^4	1.361×10^5	2.285×10^5	4.588×10^5
degrees of freedom fluorescence [1]	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
number of spectral points in retrieval [1]	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0
wavelength calibration offset [nm]	-3.823×10^{-2}	-2.299×10^{-2}	-1.688×10^{-2}	-1.268×10^{-2}	-8.380×10^{-3}	3.098×10^{-3}	4.752×10^{-3}	6.085×10^{-3}	9.941×10^{-3}	2.338×10^{-2}

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]	0.990 ± 0.043	8871942	0.0	1.000	0.350	1.000	1.000	1.000
cloud pressure crb [hPa]	723 ± 226	8871942	387	779	130	1.067×10^3	534	922
cloud pressure crb precision [hPa]	2.39 ± 9.85	8871942	1.37	0.587	1.404×10^{-3}	1.582×10^3	0.238	1.61
cloud fraction crb [1]	0.369 ± 0.340	8871942	0.571	0.241	0.0	1.000	6.853×10^{-2}	0.640
cloud fraction crb precision [1]	$(1.132 \pm 1.731) \times 10^{-4}$	8871942	7.684×10^{-5}	7.206×10^{-5}	1.674×10^{-9}	0.133	3.846×10^{-5}	1.153×10^{-4}
scene albedo [1]	0.378 ± 0.293	8871942	0.464	0.332	-5.801×10^{-3}	4.84	0.116	0.580
scene albedo precision [1]	$(7.456 \pm 8.780) \times 10^{-5}$	8871942	5.347×10^{-5}	4.663×10^{-5}	9.069×10^{-6}	9.374×10^{-3}	2.987×10^{-5}	8.335×10^{-5}
apparent scene pressure [hPa]	763 ± 205	8871942	338	824	130	1.068×10^3	600	938
apparent scene pressure precision [hPa]	0.905 ± 1.574	8871942	0.617	0.395	3.917×10^{-2}	32.6	0.212	0.829
chi square [1]	$(0.534 \pm 32.616) \times 10^5$	8871942	2.830×10^4	1.680×10^4	82.5	1.144×10^9	6.703×10^3	3.500×10^4
number of iterations [1]	3.93 ± 1.81	8871942	1.000	3.00	1.000	14.0	3.00	4.00
fluorescence [$\text{mol s}^{-1} \text{m}^{-2} \text{nm}^{-1} \text{sr}^{-1}$]	$(6.774 \pm 47.636) \times 10^{-10}$	8871942	3.794×10^{-9}	7.566×10^{-10}	-1.435×10^{-6}	1.444×10^{-6}	-1.102×10^{-9}	2.691×10^{-9}
fluorescence precision [$\text{mol s}^{-1} \text{m}^{-2} \text{nm}^{-1} \text{sr}^{-1}$]	$(1.509 \pm 0.637) \times 10^{-9}$	8871942	8.758×10^{-10}	1.383×10^{-9}	4.388×10^{-10}	5.527×10^{-9}	9.912×10^{-10}	1.867×10^{-9}
chi square fluorescence [1]	$(0.473 \pm 0.953) \times 10^5$	8871942	3.853×10^4	1.168×10^4	100	1.742×10^6	3.814×10^3	4.234×10^4
degrees of freedom fluorescence [1]	6.00 ± 0.00	8871942	0.0	6.00	6.00	6.00	6.00	6.00
number of spectral points in retrieval [1]	59.0 ± 0.1	8871942	0.0	59.0	57.0	59.0	59.0	59.0
wavelength calibration offset [nm]	$(-4.550 \pm 11.960) \times 10^{-3}$	8871942	1.244×10^{-2}	-3.004×10^{-3}	-0.126	9.272×10^{-2}	-1.028×10^{-2}	2.159×10^{-3}

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]	0.905 ± 0.183	14404020	0.1000	1.000	0.350	1.000	0.900	1.000
cloud pressure crb [hPa]	782 ± 191	14404020	284	827	130	1.032×10^3	658	942
cloud pressure crb precision [hPa]	1.19 ± 5.87	14404020	0.443	0.258	7.935×10^{-4}	1.562×10^3	0.162	0.605
cloud fraction crb [1]	0.566 ± 0.391	14404020	0.851	0.602	0.0	1.000	0.149	1.000
cloud fraction crb precision [1]	$(1.244 \pm 6.232) \times 10^{-4}$	14404020	6.669×10^{-5}	6.180×10^{-5}	7.107×10^{-10}	0.386	3.331×10^{-5}	1.000×10^{-4}
scene albedo [1]	0.530 ± 0.357	14404020	0.696	0.555	-9.162×10^{-3}	5.30	0.169	0.865
scene albedo precision [1]	$(7.072 \pm 8.158) \times 10^{-5}$	14404020	5.576×10^{-5}	4.482×10^{-5}	9.859×10^{-6}	2.721×10^{-3}	2.670×10^{-5}	8.247×10^{-5}
apparent scene pressure [hPa]	804 ± 175	14404020	272	850	130	1.032×10^3	680	951
apparent scene pressure precision [hPa]	0.566 ± 1.034	14404020	0.302	0.238	4.005×10^{-2}	24.9	0.159	0.461
chi square [1]	$(0.104 \pm 5.518) \times 10^6$	14404020	7.355×10^4	4.277×10^4	113	1.593×10^9	1.547×10^4	8.902×10^4
number of iterations [1]	3.89 ± 1.45	14404020	2.00	4.00	1.000	14.0	3.00	5.00
fluorescence [$\text{mol s}^{-1} \text{m}^{-2} \text{nm}^{-1} \text{sr}^{-1}$]	$(2.141 \pm 7.082) \times 10^{-9}$	14404020	6.318×10^{-9}	1.910×10^{-9}	-2.101×10^{-6}	1.433×10^{-6}	-9.894×10^{-10}	5.329×10^{-9}
fluorescence precision [$\text{mol s}^{-1} \text{m}^{-2} \text{nm}^{-1} \text{sr}^{-1}$]	$(1.897 \pm 0.709) \times 10^{-9}$	14404020	1.085×10^{-9}	1.896×10^{-9}	4.326×10^{-10}	5.582×10^{-9}	1.315×10^{-9}	2.401×10^{-9}
chi square fluorescence [1]	$(0.494 \pm 0.896) \times 10^5$	14404020	4.674×10^4	1.535×10^4	122	1.911×10^6	3.868×10^3	5.061×10^4
degrees of freedom fluorescence [1]	6.00 ± 0.00	14404020	0.0	6.00	6.00	6.00	6.00	6.00
number of spectral points in retrieval [1]	59.0 ± 0.1	14404020	0.0	59.0	57.0	59.0	59.0	59.0
wavelength calibration offset [nm]	$(-2.657 \pm 10.304) \times 10^{-3}$	14404020	1.056×10^{-2}	-6.400×10^{-4}	-0.153	0.296	-7.070×10^{-3}	3.494×10^{-3}

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]	0.982 ± 0.043	14861132	0.0	1.000	0.350	1.000	1.000	1.000
cloud pressure crb [hPa]	786 ± 212	14861132	318	867	130	1.036×10^3	637	956
cloud pressure crb precision [hPa]	1.83 ± 8.26	14861132	0.876	0.360	4.028×10^{-3}	1.582×10^3	0.178	1.05
cloud fraction crb [1]	0.408 ± 0.352	14861132	0.648	0.309	0.0	1.000	7.714×10^{-2}	0.726
cloud fraction crb precision [1]	$(7.456 \pm 13.164) \times 10^{-5}$	14861132	5.131×10^{-5}	4.420×10^{-5}	1.364×10^{-9}	9.562×10^{-2}	2.744×10^{-5}	7.876×10^{-5}
scene albedo [1]	0.353 ± 0.303	14861132	0.540	0.267	-6.936×10^{-3}	5.30	7.211×10^{-2}	0.612
scene albedo precision [1]	$(5.370 \pm 6.926) \times 10^{-5}$	14861132	3.425×10^{-5}	3.641×10^{-5}	9.591×10^{-6}	9.374×10^{-3}	2.172×10^{-5}	5.597×10^{-5}
apparent scene pressure [hPa]	806 ± 200	14861132	289	883	130	1.068×10^3	676	965
apparent scene pressure precision [hPa]	0.912 ± 1.543	14861132	0.719	0.339	3.917×10^{-2}	32.6	0.175	0.894
chi square [1]	$(0.965 \pm 59.780) \times 10^5$	14861132	4.965×10^4	2.121×10^4	82.5	1.593×10^9	6.452×10^3	5.611×10^4
number of iterations [1]	3.34 ± 1.11	14861132	1.000	3.00	1.000	14.0	3.00	4.00
fluorescence [$\text{mol s}^{-1} \text{m}^{-2} \text{nm}^{-1} \text{sr}^{-1}$]	$(7.541 \pm 55.240) \times 10^{-10}$	14861132	4.645×10^{-9}	3.959×10^{-10}	-1.491×10^{-6}	1.215×10^{-6}	-1.608×10^{-9}	3.037×10^{-9}
fluorescence precision [$\text{mol s}^{-1} \text{m}^{-2} \text{nm}^{-1} \text{sr}^{-1}$]	$(1.689 \pm 0.734) \times 10^{-9}$	14861132	1.167×10^{-9}	1.556×10^{-9}	4.326×10^{-10}	5.496×10^{-9}	1.042×10^{-9}	2.208×10^{-9}
chi square fluorescence [1]	$(0.472 \pm 0.836) \times 10^5$	14861132	4.562×10^4	1.696×10^4	100	1.911×10^6	5.459×10^3	5.108×10^4
degrees of freedom fluorescence [1]	6.00 ± 0.00	14861132	0.0	6.00	6.00	6.00	6.00	6.00
number of spectral points in retrieval [1]	59.0 ± 0.1	14861132	0.0	59.0	57.0	59.0	59.0	59.0
wavelength calibration offset [nm]	$(-4.579 \pm 12.038) \times 10^{-3}$	14861132	1.194×10^{-2}	-3.069×10^{-3}	-0.153	0.296	-1.010×10^{-2}	1.836×10^{-3}

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]	0.836 ± 0.236	7174737	0.500	1.000	0.350	1.000	0.500	1.000
cloud pressure crb [hPa]	715 ± 186	7174737	240	719	130	1.057×10^3	619	859
cloud pressure crb precision [hPa]	1.28 ± 6.13	7174737	0.546	0.276	1.404×10^{-3}	1.541×10^3	0.167	0.713
cloud fraction crb [1]	0.661 ± 0.399	7174737	0.793	1.000	0.0	1.000	0.207	1.000
cloud fraction crb precision [1]	$(2.009 \pm 8.685) \times 10^{-4}$	7174737	1.080×10^{-5}	1.000×10^{-4}	7.107×10^{-10}	0.386	1.000×10^{-4}	1.108×10^{-4}
scene albedo [1]	0.708 ± 0.297	7174737	0.527	0.811	-5.784×10^{-3}	4.84	0.426	0.954
scene albedo precision [1]	$(1.009 \pm 0.894) \times 10^{-4}$	7174737	6.907×10^{-5}	7.912×10^{-5}	9.069×10^{-6}	1.588×10^{-3}	4.664×10^{-5}	1.157×10^{-4}
apparent scene pressure [hPa]	756 ± 156	7174737	239	755	130	1.057×10^3	650	889
apparent scene pressure precision [hPa]	0.281 ± 0.196	7174737	0.176	0.230	4.005×10^{-2}	13.0	0.159	0.335
chi square [1]	$(0.674 \pm 0.820) \times 10^5$	7174737	7.210×10^4	4.783×10^4	211	1.061×10^8	2.314×10^4	9.523×10^4
number of iterations [1]	5.00 ± 1.78	7174737	1.000	5.00	1.000	14.0	4.00	5.00
fluorescence [$\text{mol s}^{-1} \text{m}^{-2} \text{nm}^{-1} \text{sr}^{-1}$]	$(3.246 \pm 7.555) \times 10^{-9}$	7174737	5.018×10^{-9}	3.144×10^{-9}	-2.101×10^{-6}	1.444×10^{-6}	8.892×10^{-10}	5.907×10^{-9}
fluorescence precision [$\text{mol s}^{-1} \text{m}^{-2} \text{nm}^{-1} \text{sr}^{-1}$]	$(1.910 \pm 0.629) \times 10^{-9}$	7174737	7.944×10^{-10}	1.867×10^{-9}	4.703×10^{-10}	5.559×10^{-9}	1.452×10^{-9}	2.247×10^{-9}
chi square fluorescence [1]	$(0.502 \pm 1.024) \times 10^5$	7174737	3.645×10^4	8.118×10^3	129	1.847×10^6	1.905×10^3	3.835×10^4
degrees of freedom fluorescence [1]	6.00 ± 0.00	7174737	0.0	6.00	6.00	6.00	6.00	6.00
number of spectral points in retrieval [1]	59.0 ± 0.1	7174737	0.0	59.0	57.0	59.0	59.0	59.0
wavelength calibration offset [nm]	$(-9.213 \pm 80.131) \times 10^{-4}$	7174737	8.338×10^{-3}	1.448×10^{-3}	-0.119	8.297×10^{-2}	-4.033×10^{-3}	4.304×10^{-3}

Table 7: Correlation matrix												
Viewing zenith angle	Solar zenith angle	Latitude	Cloud pressure	Cloud fraction	Scene albedo	Apparent scene pressure	χ^2	Number of iterations	Fluorescence	χ^2 of fluorescence retrieval	Number of points in the spectrum	Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)
1.000	1.189×10^{-2}	3.861×10^{-3}	-0.108	8.497×10^{-2}	9.304×10^{-2}	-0.123	1.312×10^{-3}	-3.520×10^{-2}	6.177×10^{-2}	1.772×10^{-2}	1.736×10^{-2}	-9.496×10^{-2}
1.189×10^{-2}	1.000	5.996×10^{-2}	-0.176	0.459	0.533	-0.192	-6.093×10^{-3}	0.252	0.209	-0.352	3.959×10^{-3}	0.300
3.861×10^{-3}	5.996×10^{-2}	1.000	-0.129	-0.413	-0.397	-7.650×10^{-2}	-3.446×10^{-3}	-9.301×10^{-2}	-0.199	6.012×10^{-2}	1.053×10^{-3}	-0.162
-0.108	-0.176	-0.129	1.000	-0.202	-0.230	0.921	9.901×10^{-3}	-6.302×10^{-2}	-0.140	0.167	-8.289×10^{-3}	-0.185
8.497×10^{-2}	0.459	-0.413	-0.202	1.000	0.948	-0.360	1.512×10^{-2}	4.380×10^{-2}	0.390	-4.450×10^{-2}	5.799×10^{-4}	0.310
9.304×10^{-2}	0.533	-0.397	-0.230	0.948	1.000	-0.343	-3.069×10^{-3}	0.213	0.403	-2.195×10^{-2}	1.224×10^{-3}	0.307
-0.123	-0.192	-7.650×10^{-2}	0.921	-0.360	-0.343	1.000	-2.935×10^{-4}	2.341×10^{-2}	-0.178	0.199	-7.209×10^{-3}	-0.234
1.312×10^{-3}	-6.093×10^{-3}	-3.446×10^{-3}	9.901×10^{-3}	1.512×10^{-2}	-3.069×10^{-3}	-2.935×10^{-4}	1.000	1.837×10^{-2}	-4.178×10^{-4}	2.133×10^{-3}	-1.501×10^{-4}	-2.475×10^{-3}
-3.520×10^{-2}	0.252	-9.301×10^{-2}	-6.302×10^{-2}	4.380×10^{-2}	0.213	2.341×10^{-2}	1.837×10^{-2}	1.000	0.137	-7.295×10^{-2}	3.528×10^{-4}	8.456×10^{-2}
6.177×10^{-2}	0.209	-0.199	-0.140	0.390	0.403	-0.178	-4.178×10^{-4}	0.137	1.000	-0.204	-8.046×10^{-4}	0.277
1.772×10^{-2}	-0.352	6.012×10^{-2}	0.167	-4.450×10^{-2}	-2.195×10^{-2}	0.199	2.133×10^{-3}	-7.295×10^{-2}	-0.204	1.000	-4.886×10^{-3}	-0.379
1.736×10^{-2}	3.959×10^{-3}	1.053×10^{-3}	-8.289×10^{-3}	5.799×10^{-4}	1.224×10^{-3}	-7.209×10^{-3}	-1.501×10^{-4}	3.528×10^{-4}	-8.046×10^{-4}	-4.886×10^{-3}	1.000	-7.035×10^{-3}
-9.496×10^{-2}	0.300	-0.162	-0.185	0.310	0.307	-0.234	-2.475×10^{-3}	8.456×10^{-2}	0.277	-0.379	-7.035×10^{-3}	1.000

Table 8: Covariance matrix

Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)	Number of points in the spectrum	χ^2 of fluorescence retrieval	Fluorescence	Number of iterations	χ^2	Apparent scene pressure	Scene albedo	Cloud fraction	Cloud pressure	Latitude	Solar zenith angle	Viewing zenith angle
-2.045×10^{-2}	3.230×10^{-2}	3.186×10^4	7.665×10^{-9}	-1.10	1.229×10^5	-452	0.623	0.640	-439	3.48	4.47	383
6.345×10^{-2}	7.224×10^{-3}	-6.205×10^5	2.546×10^{-8}	7.72	-5.596×10^5	-694	3.50	3.39	-697	53.0	368	4.47
-8.184×10^{-2}	4.610×10^{-3}	2.543×10^5	-5.798×10^{-8}	-6.83	-7.593×10^5	-662	-6.26	-7.31	-1.232×10^3	2.121×10^3	53.0	3.48
-0.421	-0.163	3.182×10^6	-1.839×10^{-7}	-20.8	9.808×10^6	3.586×10^4	-16.3	-16.1	4.286×10^4	-1.232×10^3	-697	-439
1.313×10^{-3}	2.122×10^{-5}	-1.573×10^3	9.526×10^{-10}	2.689×10^{-2}	2.786×10^4	-26.0	0.125	0.148	-16.1	-7.31	3.39	0.640
1.153×10^{-3}	3.977×10^{-5}	-689	8.729×10^{-10}	0.116	-5.021×10^3	-22.1	0.117	0.125	-16.3	-6.26	3.50	0.623
-0.484	-0.129	3.436×10^6	-2.126×10^{-7}	7.02	-2.641×10^5	-22.1	-22.1	-26.0	3.586×10^4	-662	-694	-452
-130	-68.3	9.373×10^8	-1.268×10^{-5}	1.402×10^5	2.290×10^{13}	-2.641×10^5	-5.021×10^3	2.786×10^4	9.808×10^6	-7.593×10^5	-5.596×10^5	1.229×10^5
1.484×10^{-3}	5.351×10^{-5}	-1.069×10^4	1.384×10^{-9}	2.54	1.402×10^5	7.02	0.116	2.689×10^{-2}	-20.8	-6.83	7.72	-1.10
1.932×10^{-11}	-4.849×10^{-13}	-1.185×10^{-4}	4.019×10^{-17}	1.384×10^{-9}	-1.268×10^{-5}	-2.126×10^{-7}	8.729×10^{-10}	9.526×10^{-10}	-1.839×10^{-7}	-5.798×10^{-8}	2.546×10^{-8}	7.665×10^{-9}
-383	-42.7	8.435×10^9	-1.185×10^{-4}	-1.069×10^4	9.373×10^8	3.436×10^6	-689	-1.573×10^3	3.182×10^6	2.543×10^5	-6.205×10^5	3.186×10^4
-7.360×10^{-6}	9.039×10^{-3}	-42.7	-4.849×10^{-13}	5.351×10^{-5}	-68.3	-0.129	3.977×10^{-5}	2.122×10^{-5}	-0.163	4.610×10^{-3}	7.224×10^{-3}	3.230×10^{-2}
1.211×10^{-4}	-7.360×10^{-6}	-383	1.932×10^{-11}	1.484×10^{-3}	-130	-0.484	1.153×10^{-3}	1.313×10^{-3}	-0.421	-8.184×10^{-2}	6.345×10^{-2}	-2.045×10^{-2}

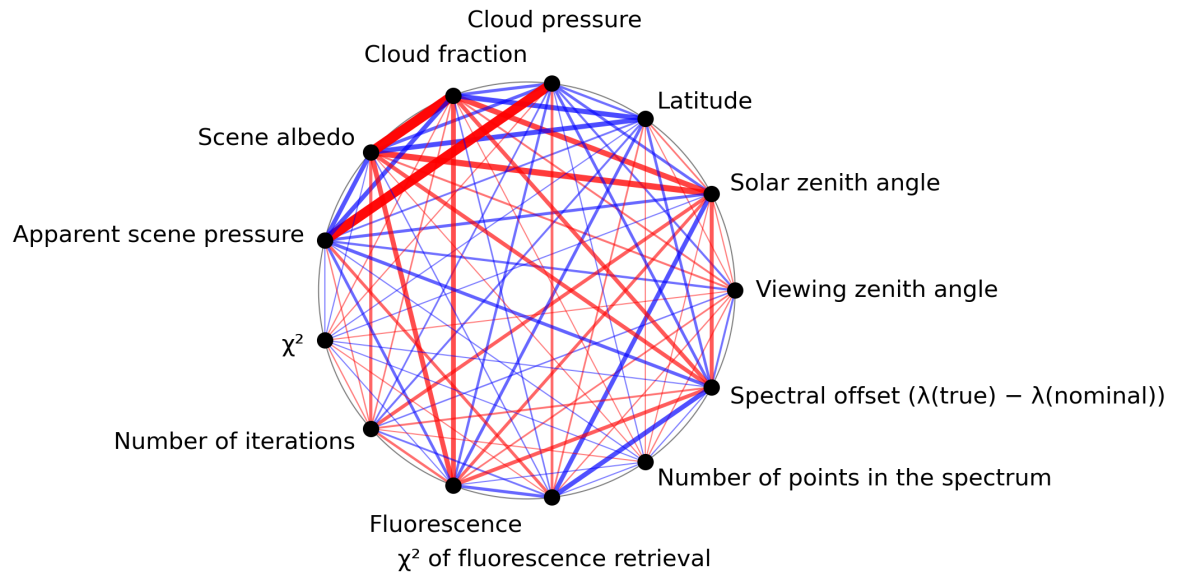


Figure 1: Map of correlation graph for 2023-11-28 to 2023-11-30.

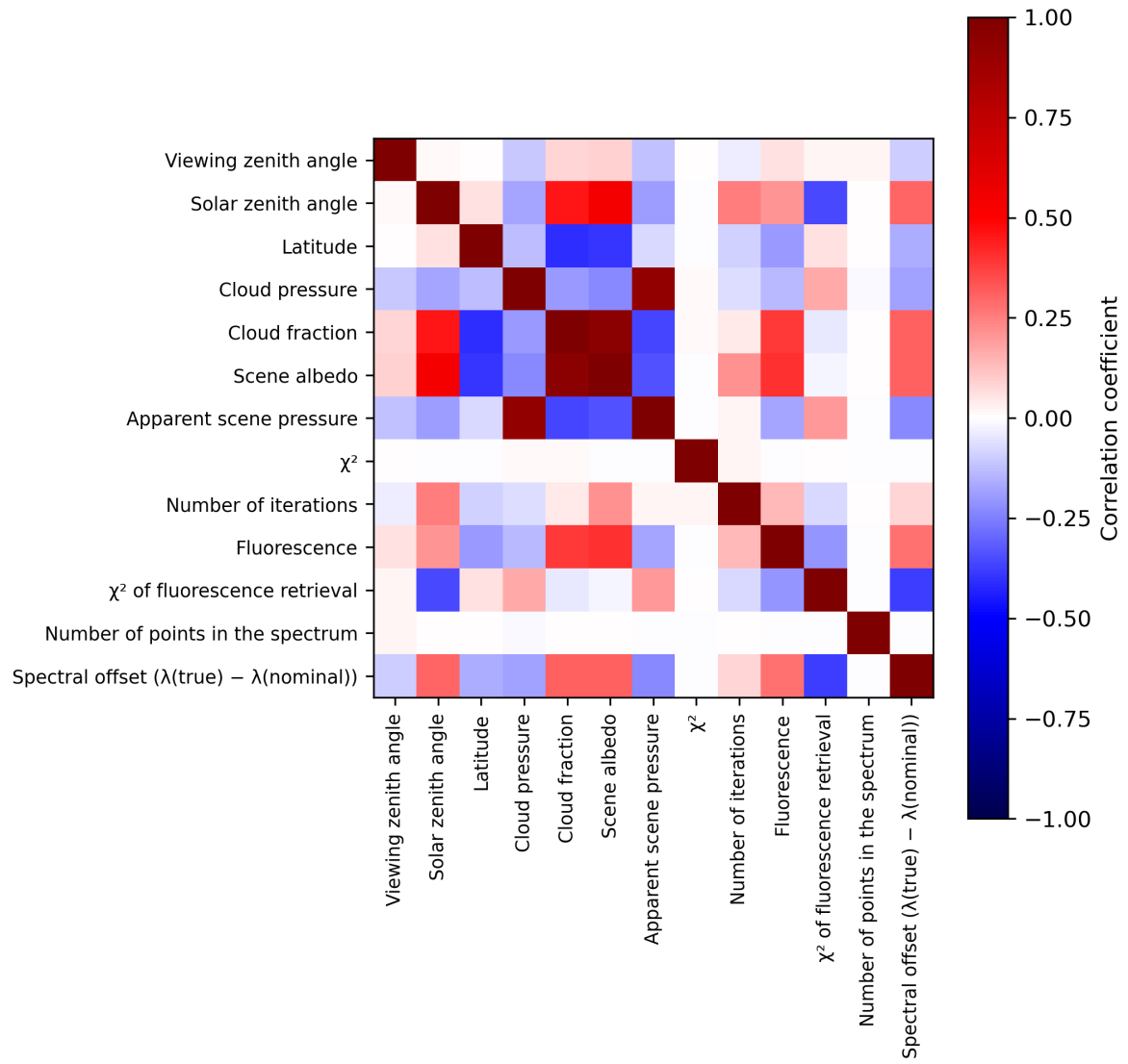


Figure 2: Map of correlation matrix for 2023-11-28 to 2023-11-30.

3 Granule outlines

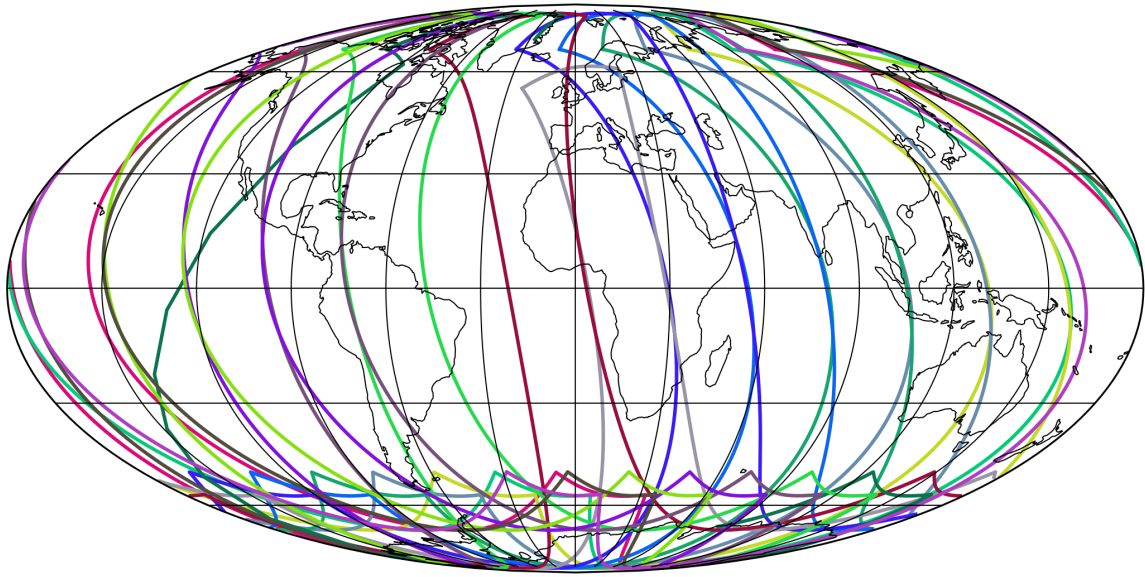


Figure 3: Outline of the granules.

4 Input data monitoring

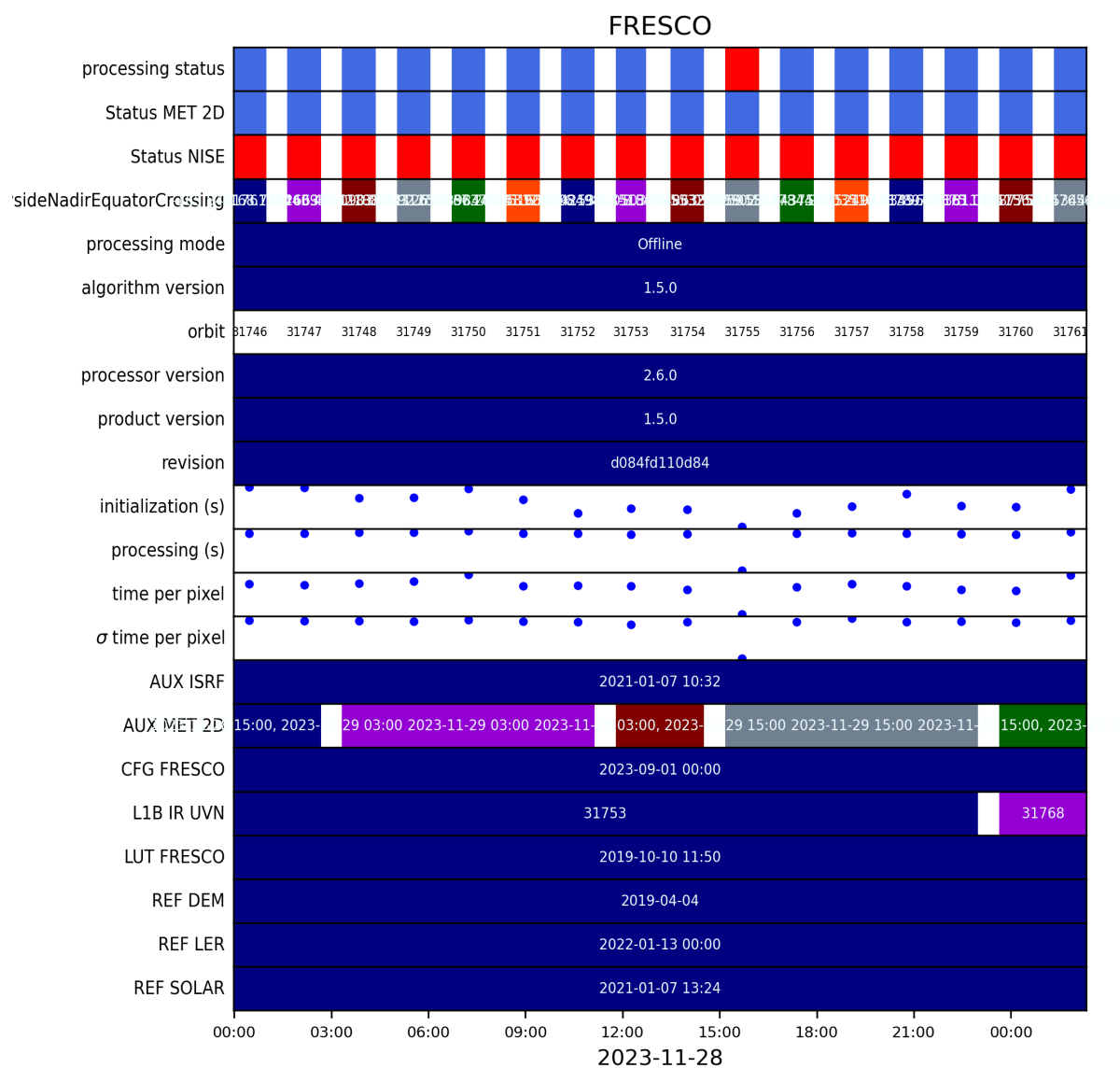


Figure 4: Input data per granule

5 Warnings and errors

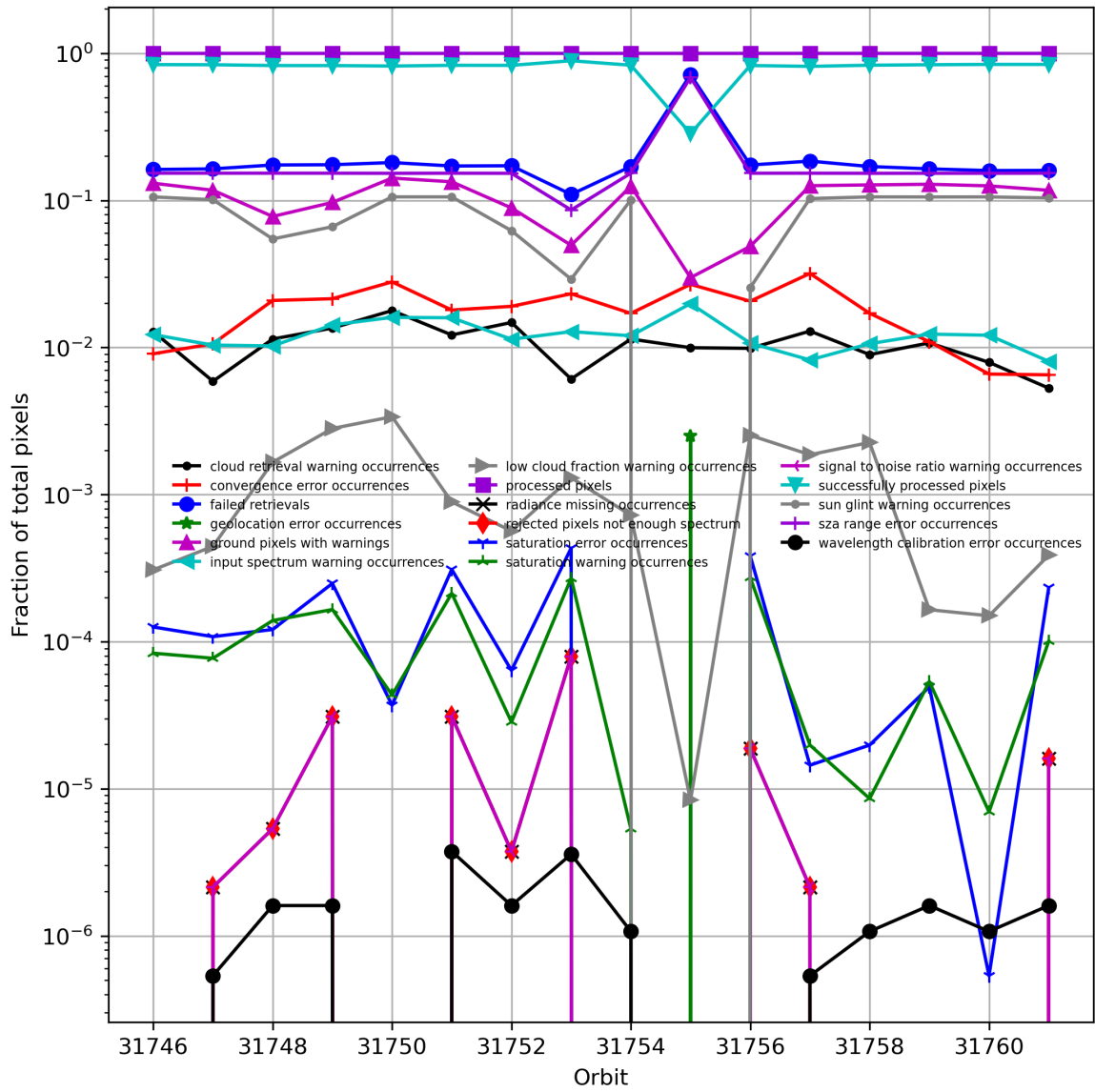


Figure 5: Fraction of pixels with specific warnings and errors during processing

6 World maps

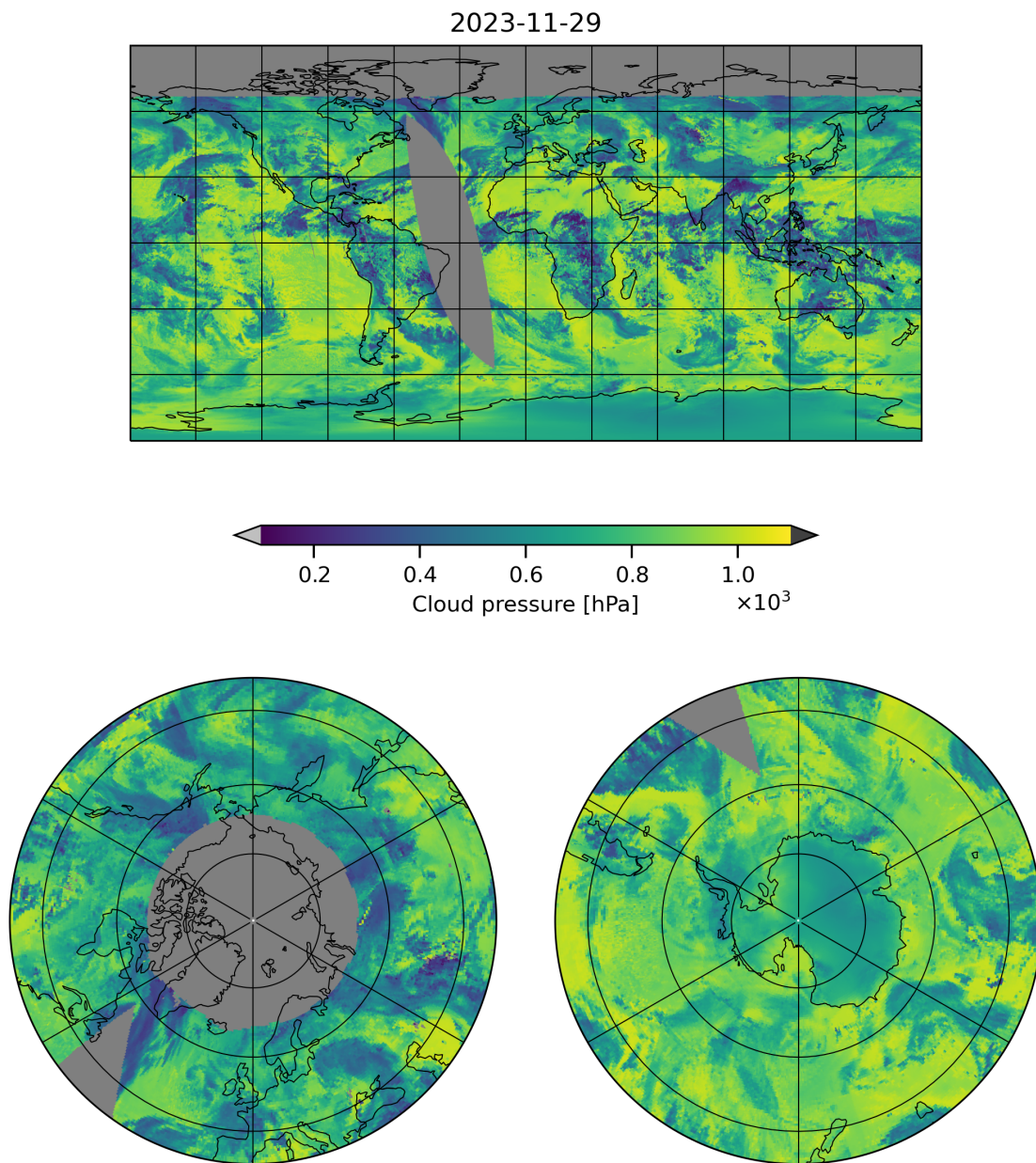


Figure 6: Map of “Cloud pressure” for 2023-11-28 to 2023-11-30

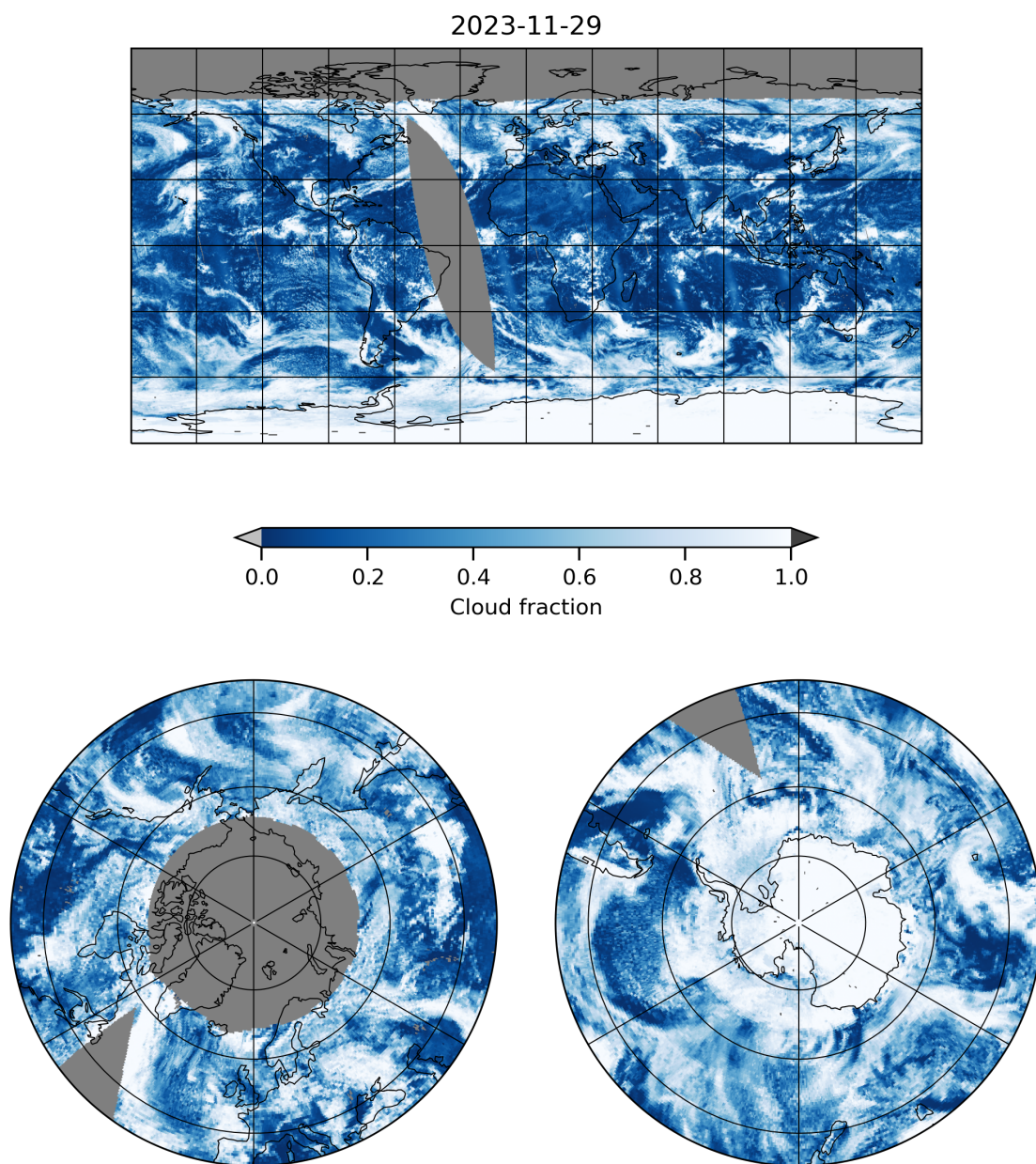


Figure 7: Map of “Cloud fraction” for 2023-11-28 to 2023-11-30

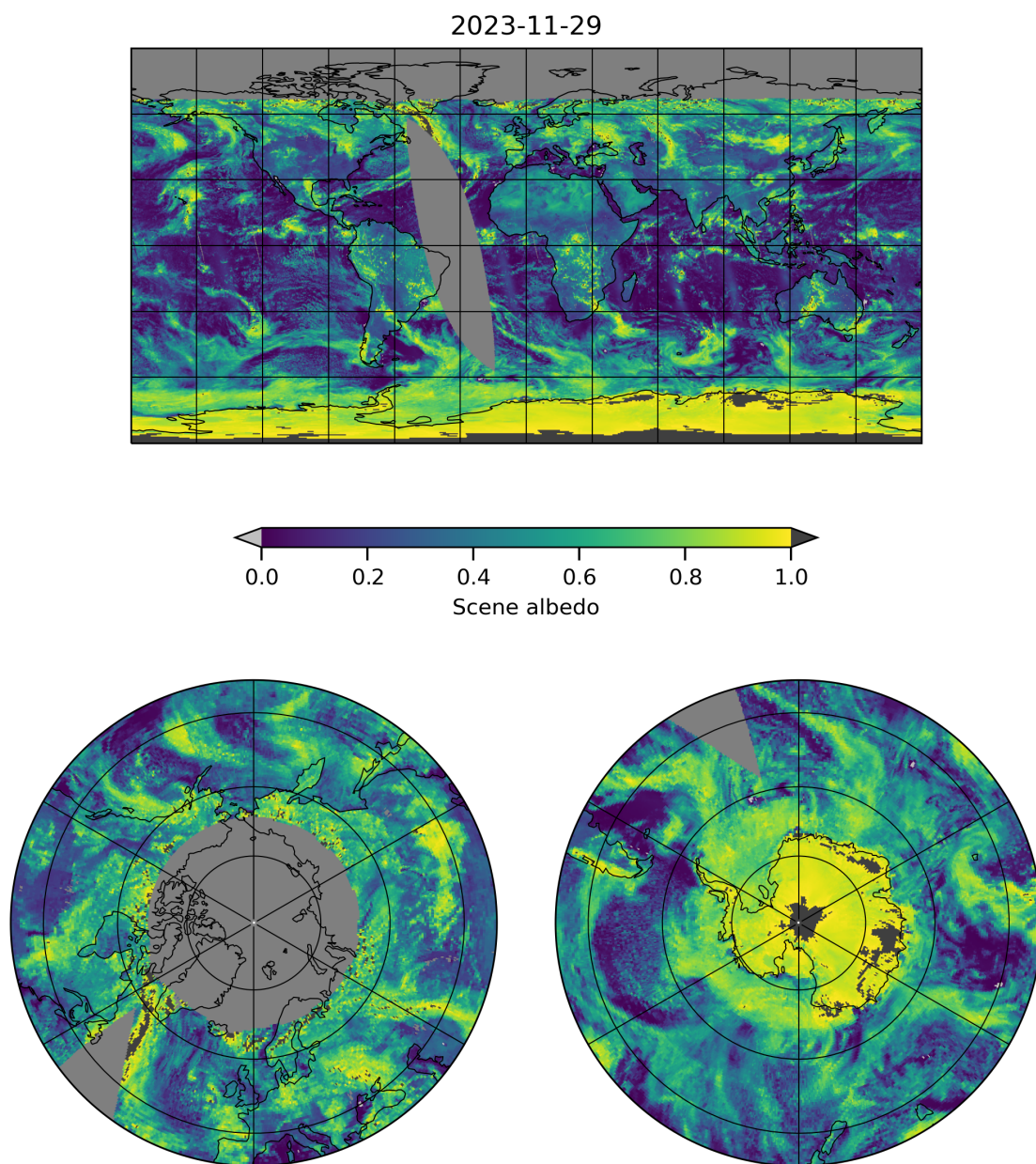


Figure 8: Map of “Scene albedo” for 2023-11-28 to 2023-11-30

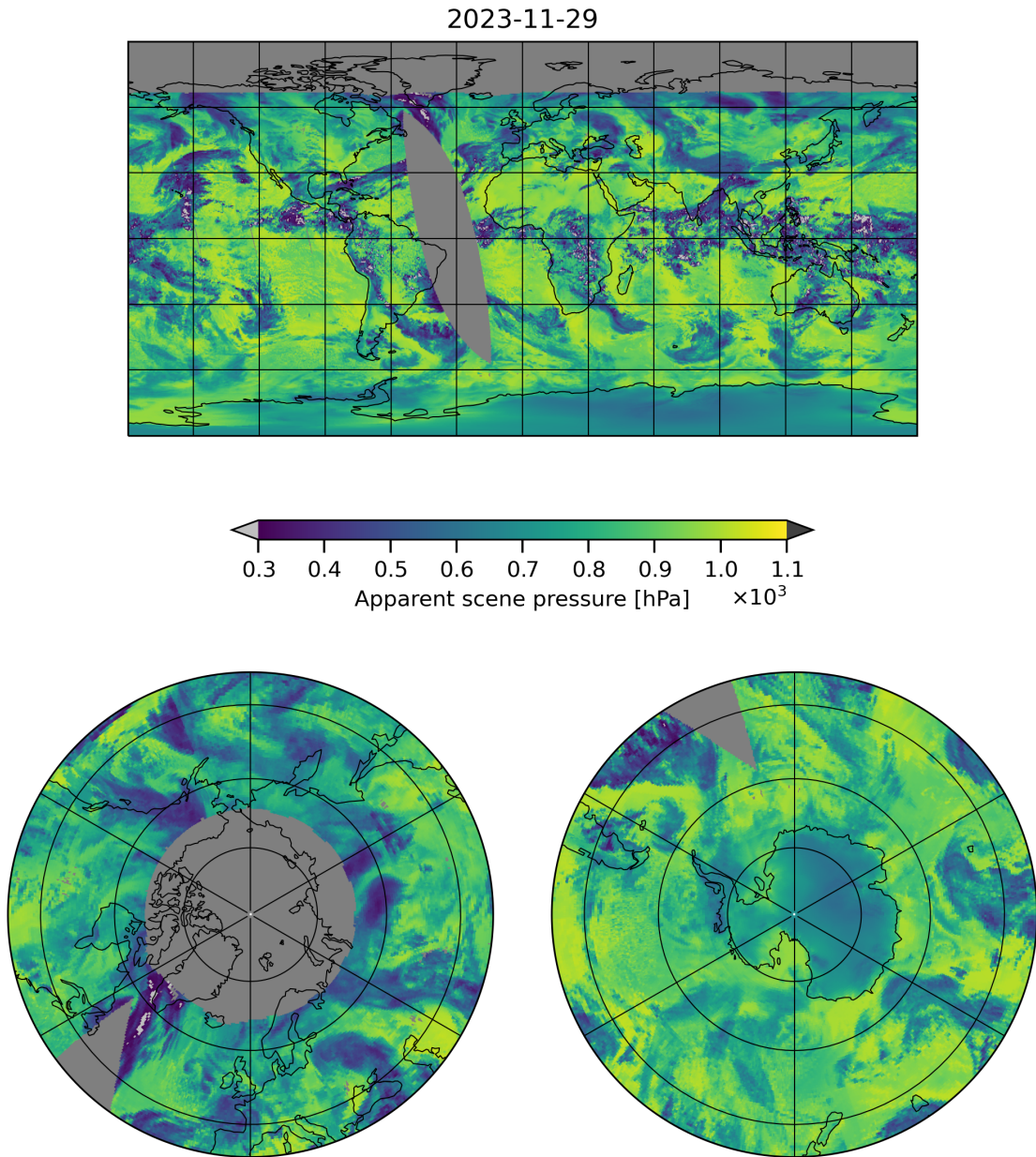


Figure 9: Map of “Apparent scene pressure” for 2023-11-28 to 2023-11-30

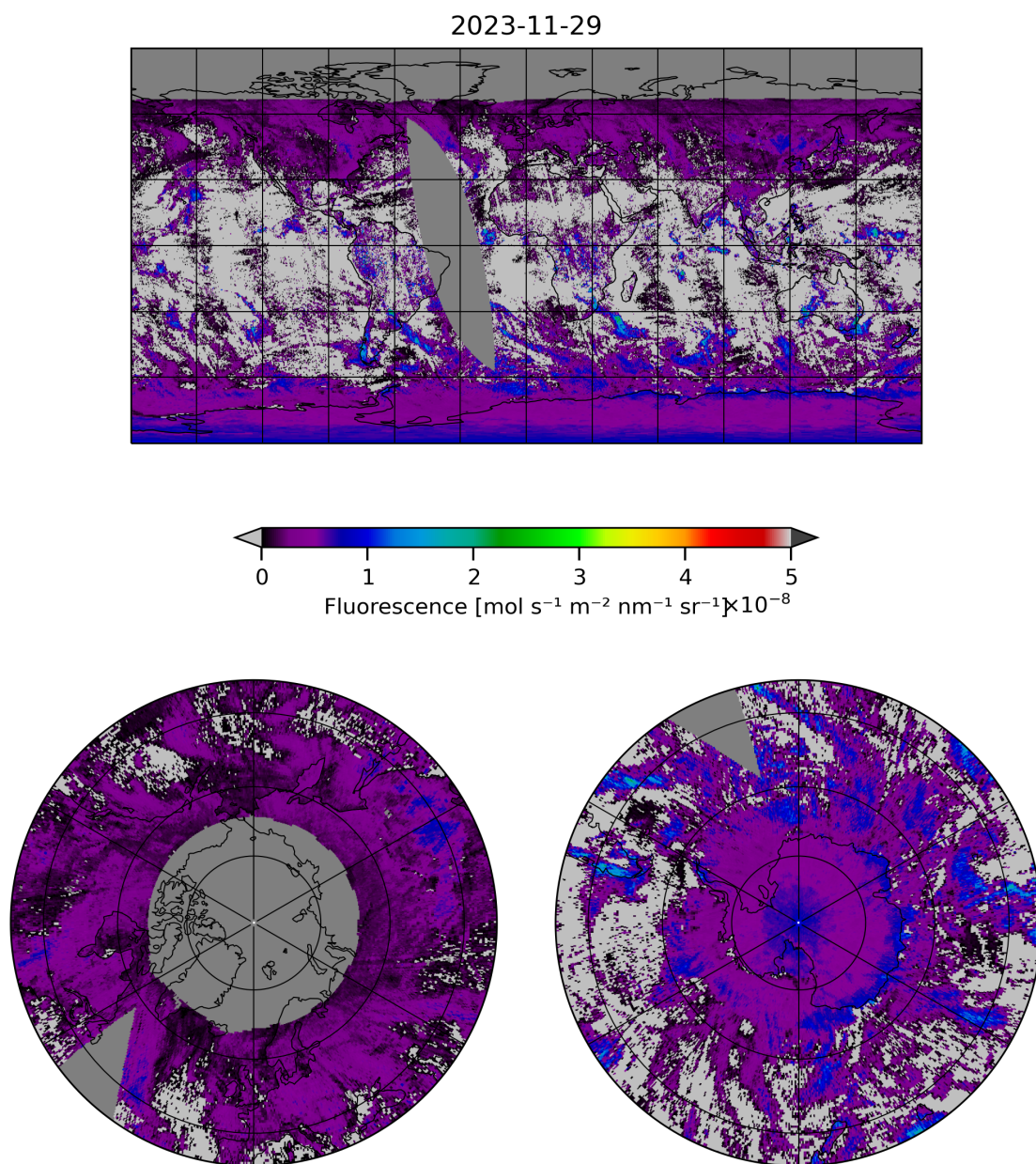


Figure 10: Map of “Fluorescence” for 2023-11-28 to 2023-11-30

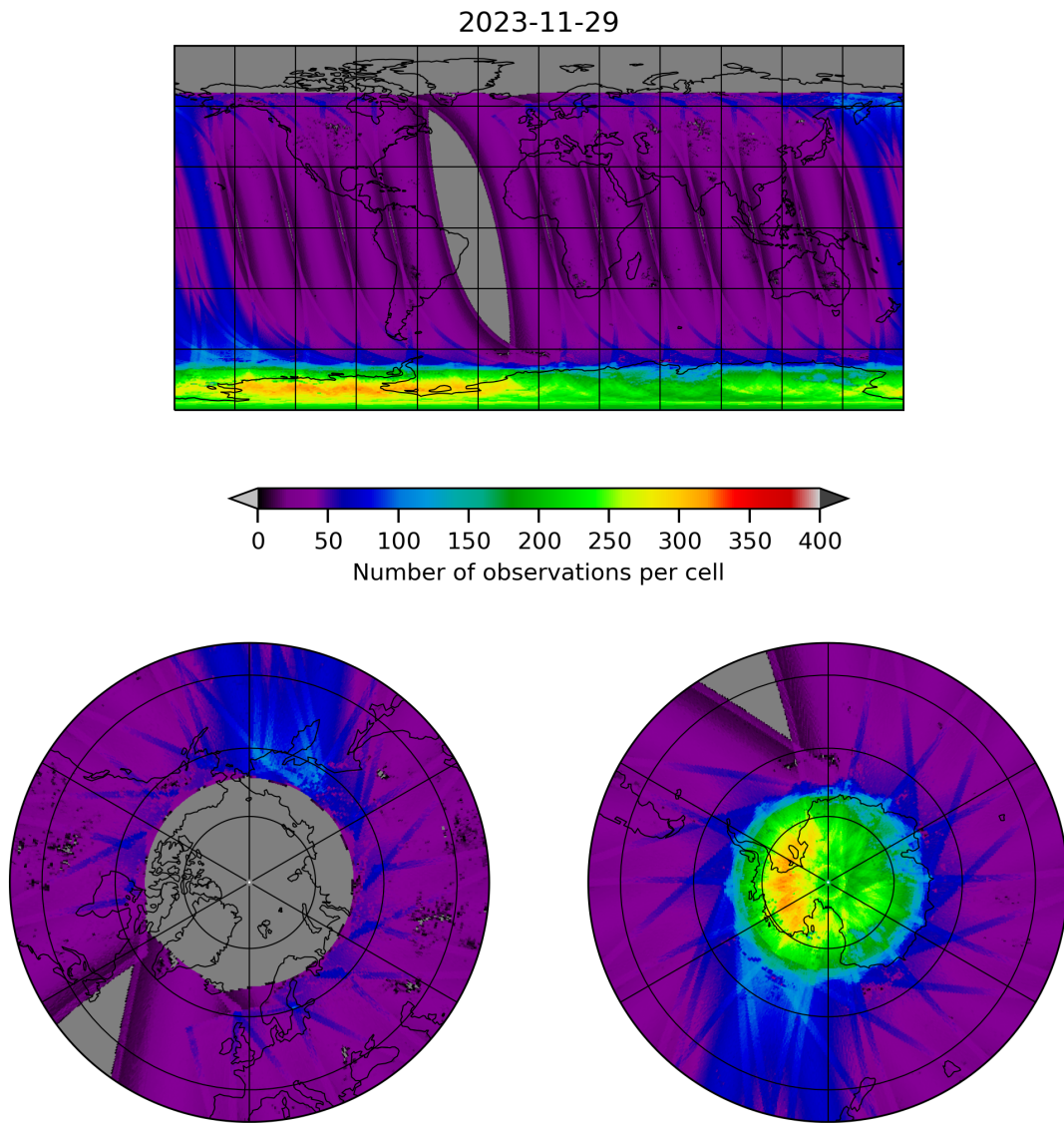


Figure 11: Map of the number of observations for 2023-11-28 to 2023-11-30

7 Zonal average

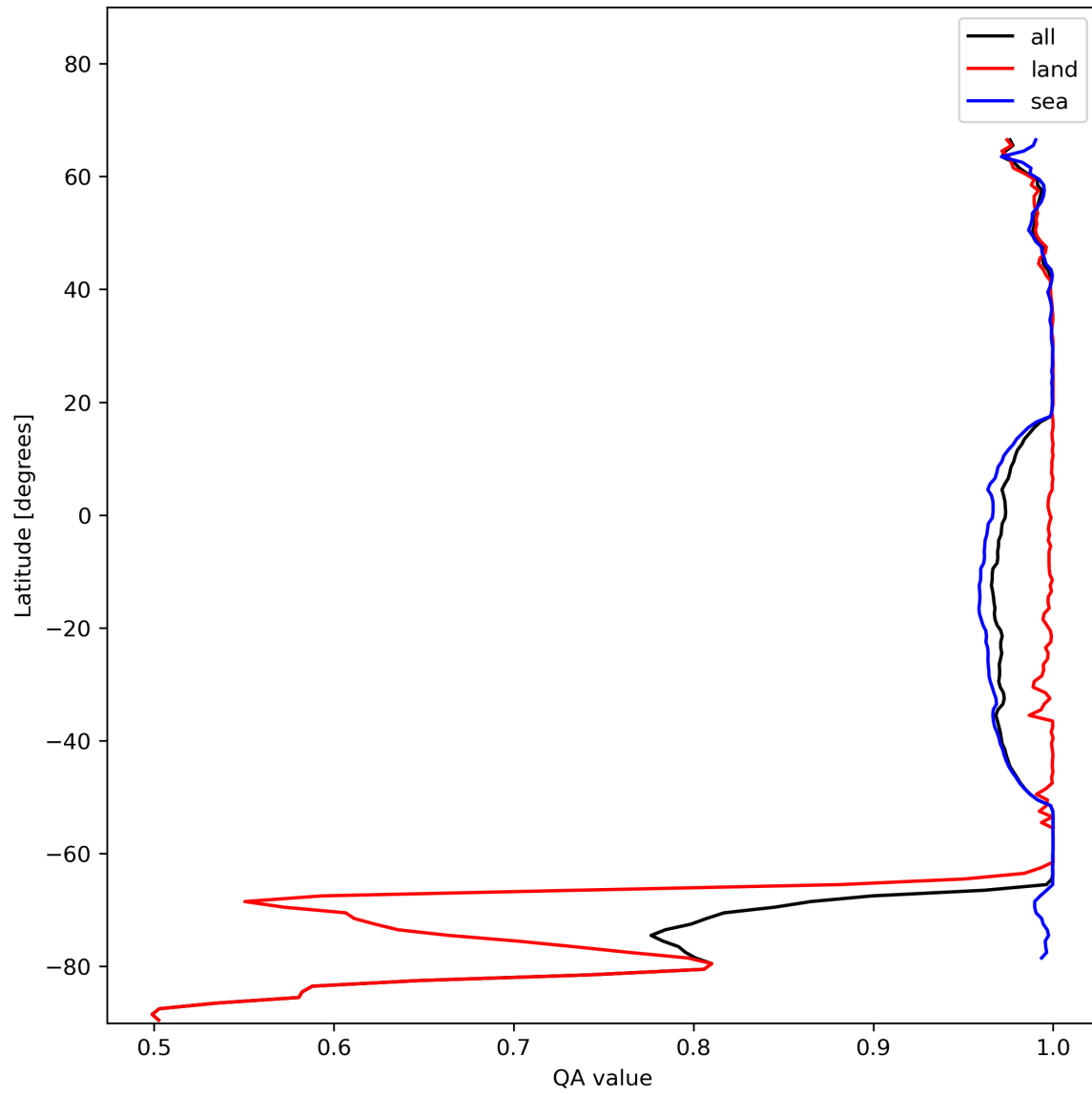


Figure 12: Zonal average of “QA value” for 2023-11-28 to 2023-11-30.

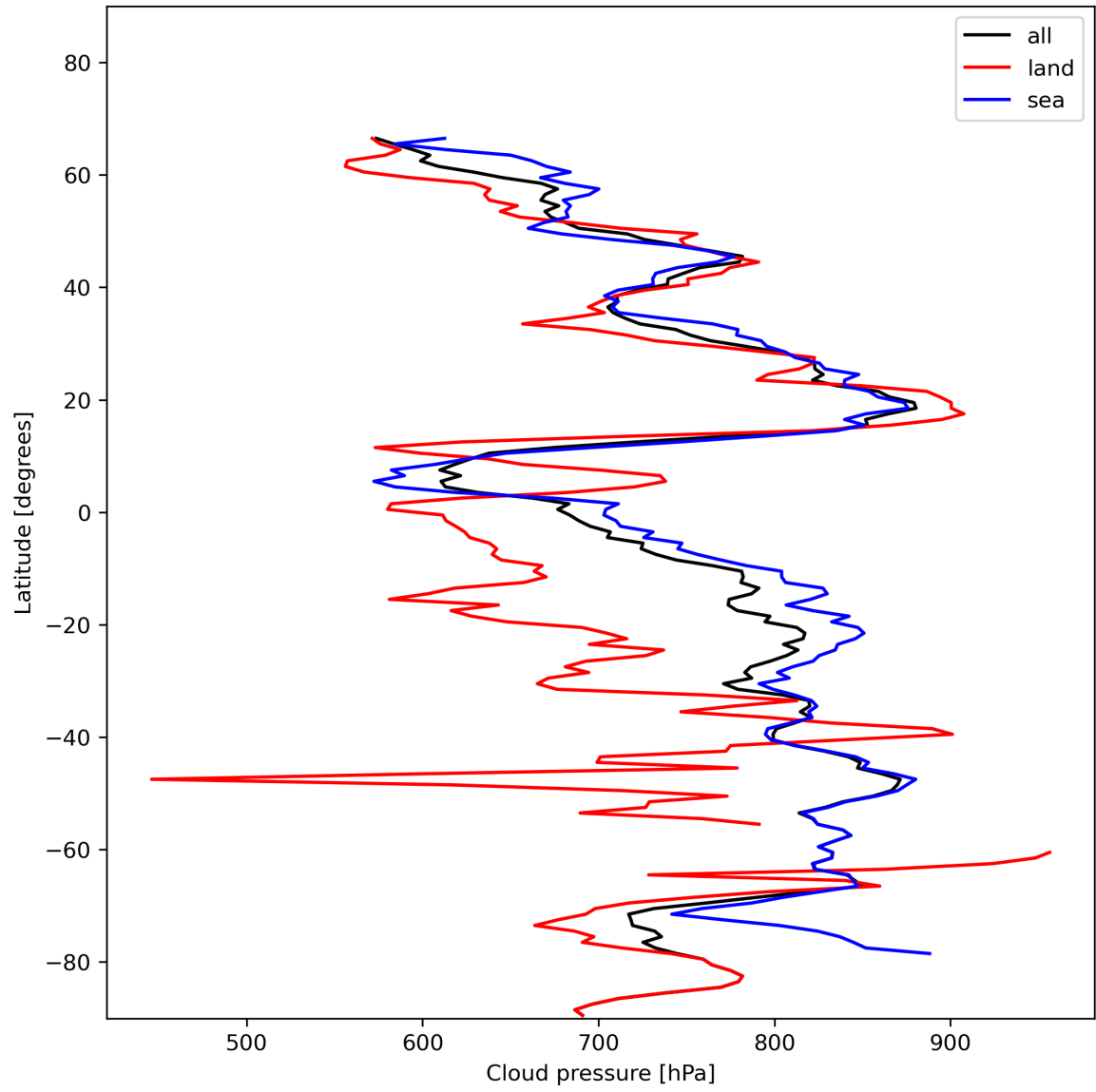


Figure 13: Zonal average of “Cloud pressure” for 2023-11-28 to 2023-11-30.

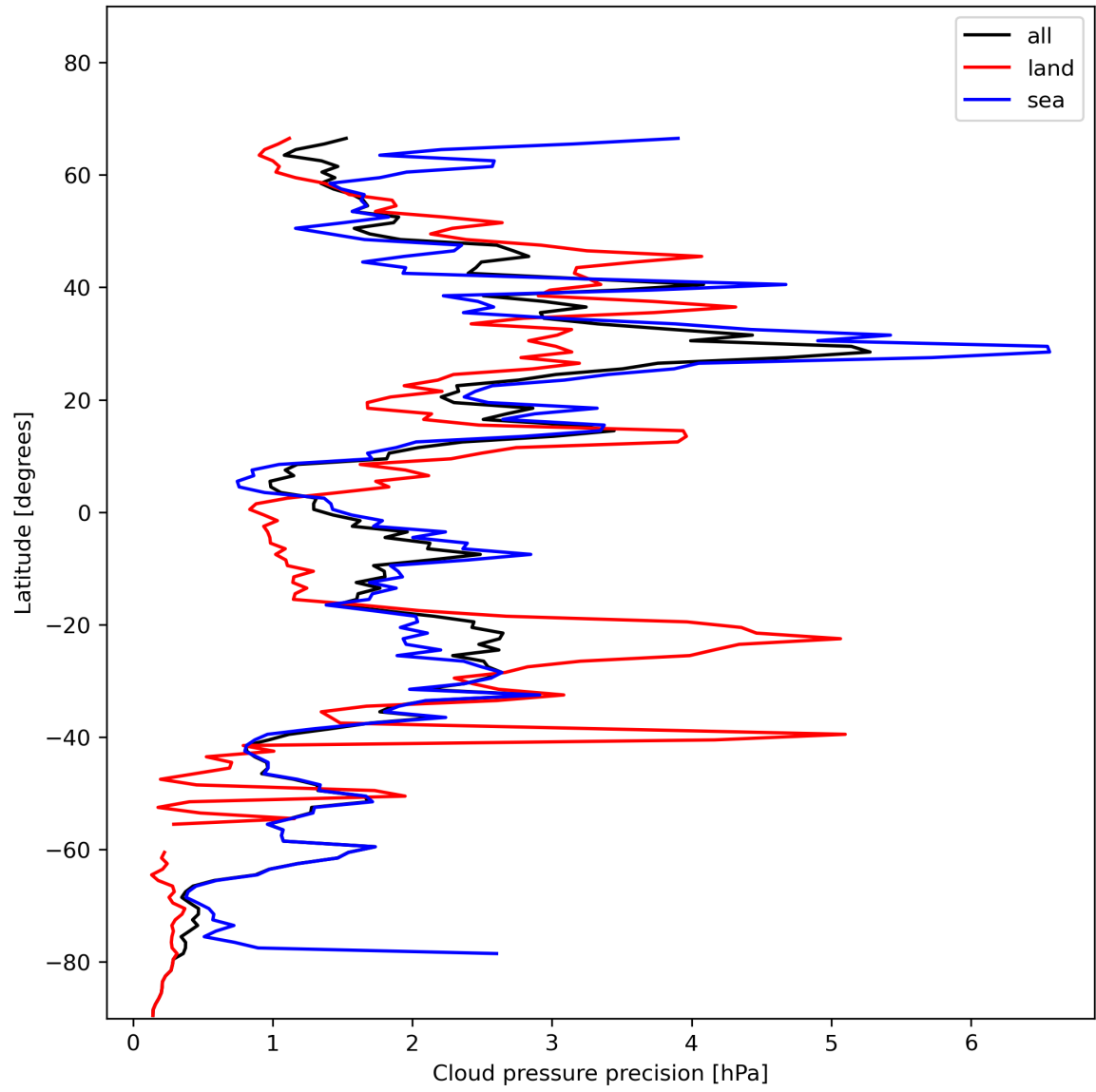


Figure 14: Zonal average of “Cloud pressure precision” for 2023-11-28 to 2023-11-30.

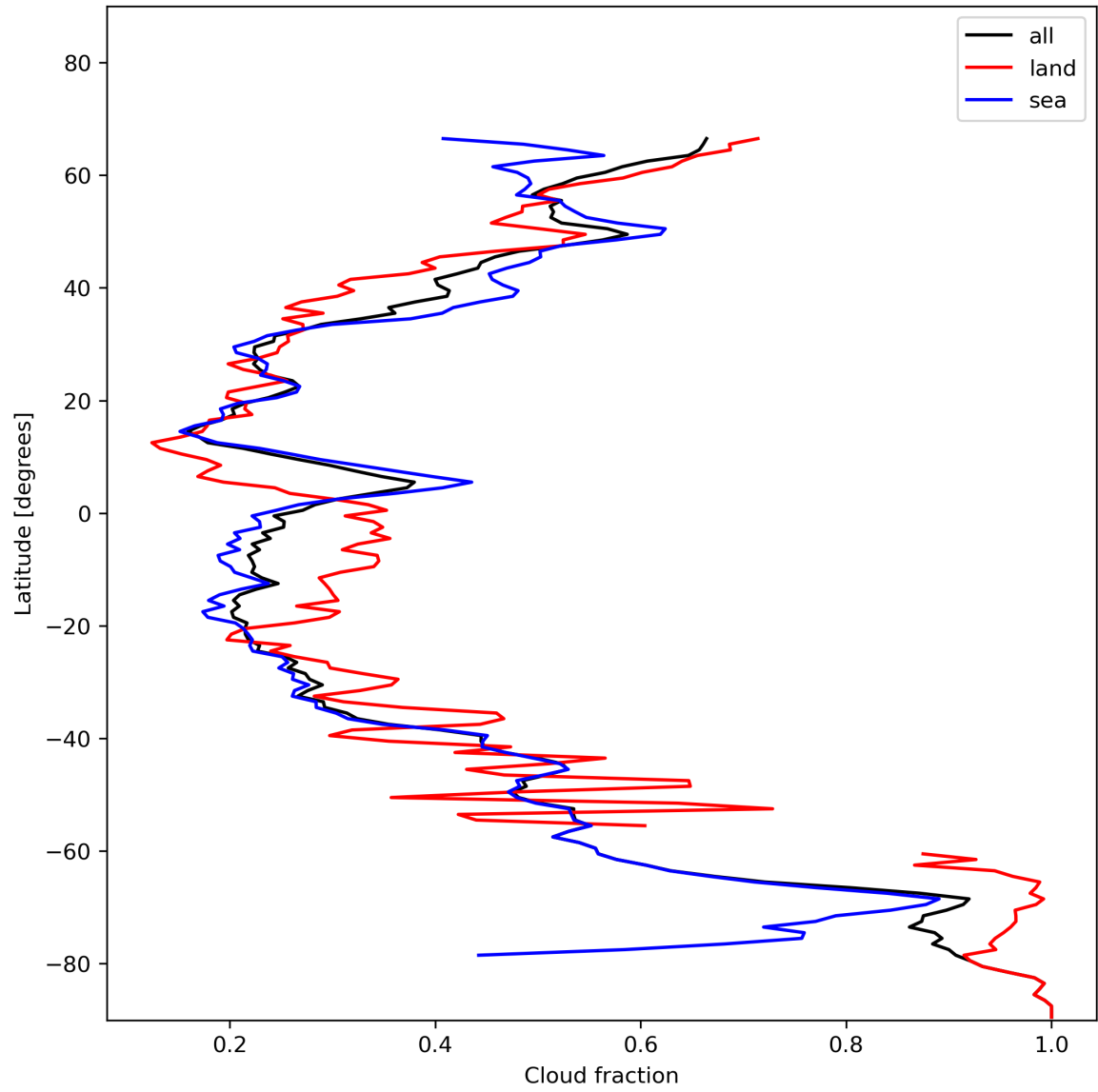


Figure 15: Zonal average of “Cloud fraction” for 2023-11-28 to 2023-11-30.

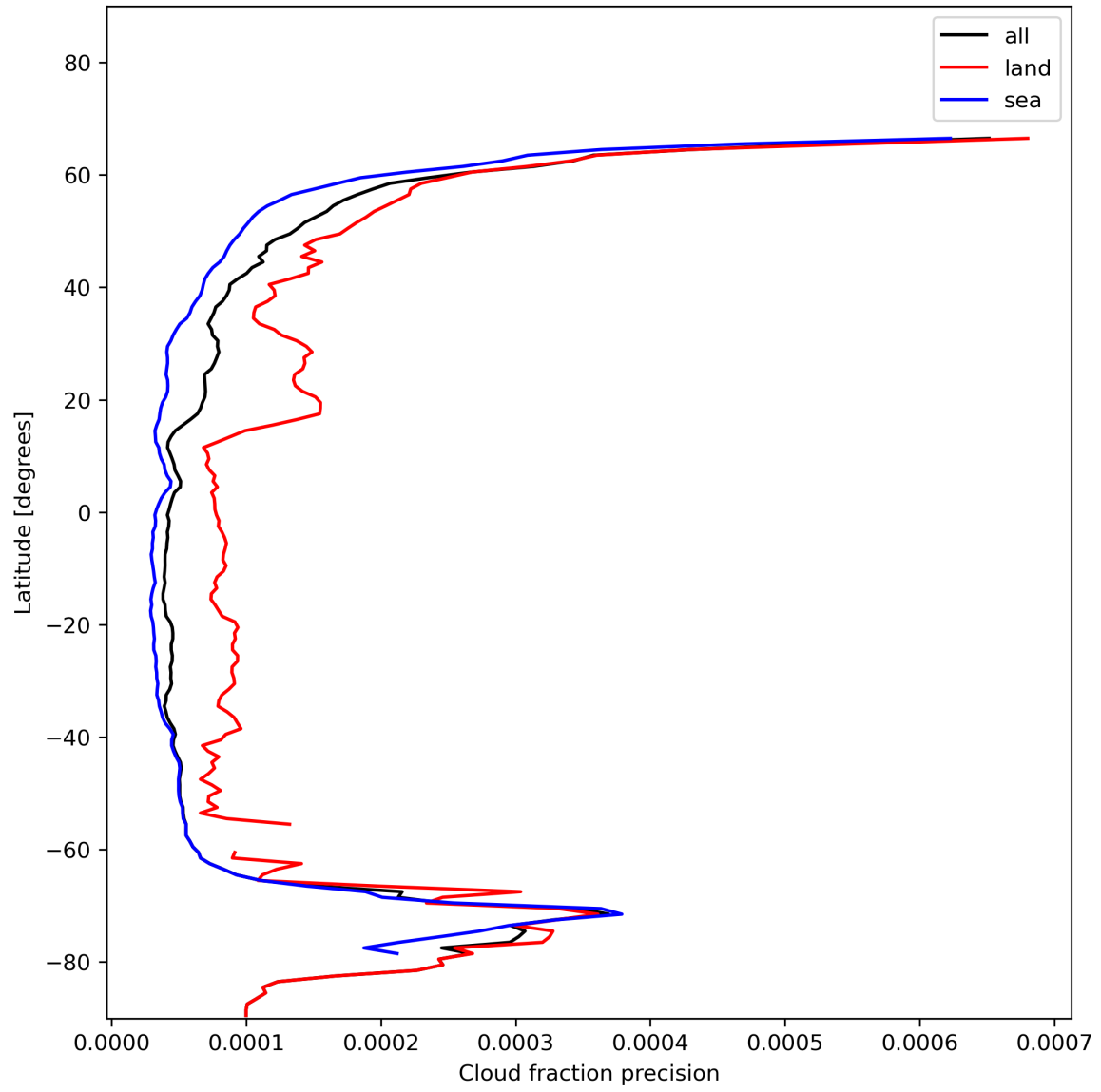


Figure 16: Zonal average of “Cloud fraction precision” for 2023-11-28 to 2023-11-30.

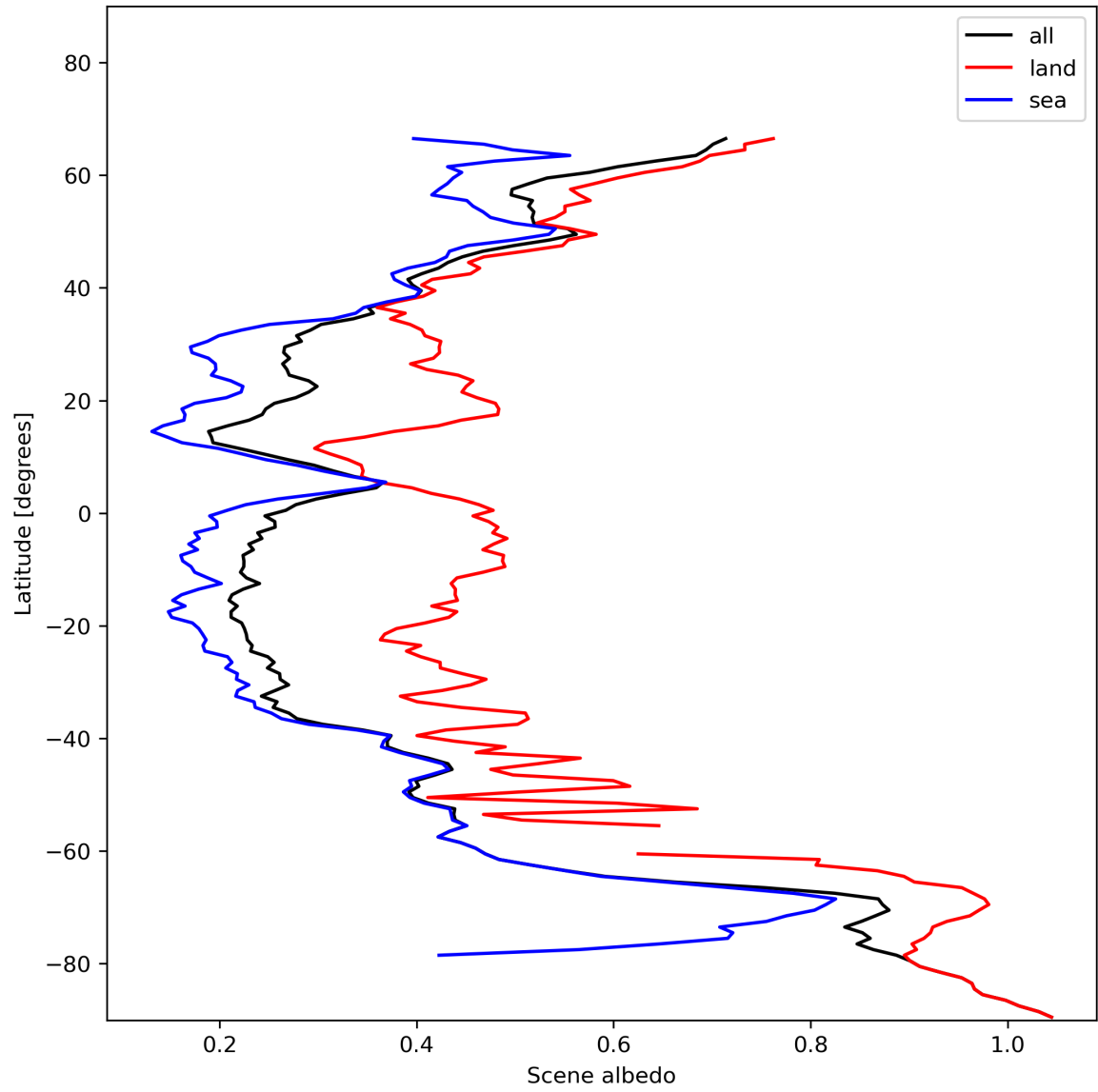


Figure 17: Zonal average of “Scene albedo” for 2023-11-28 to 2023-11-30.

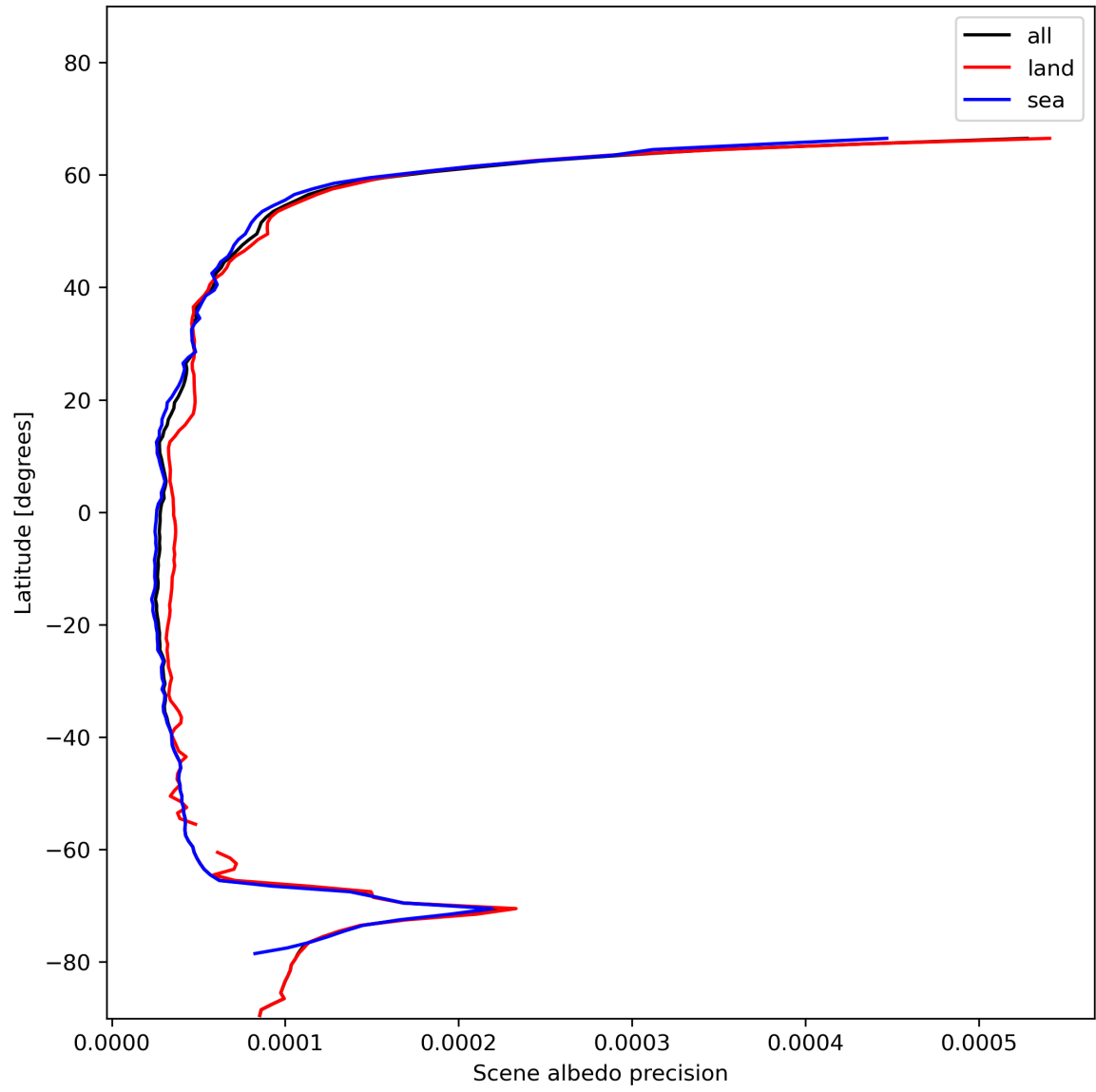


Figure 18: Zonal average of “Scene albedo precision” for 2023-11-28 to 2023-11-30.

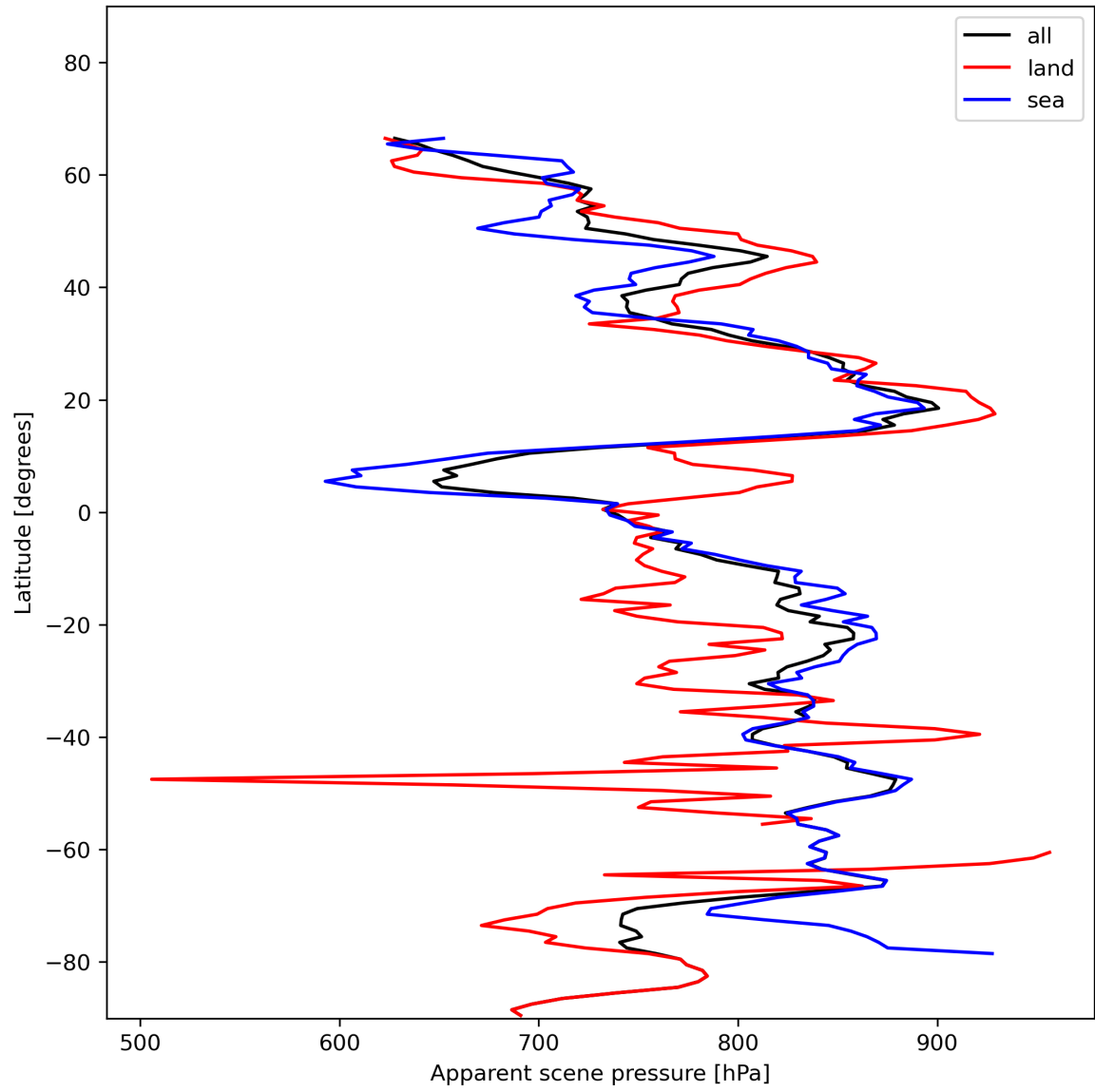


Figure 19: Zonal average of “Apparent scene pressure” for 2023-11-28 to 2023-11-30.

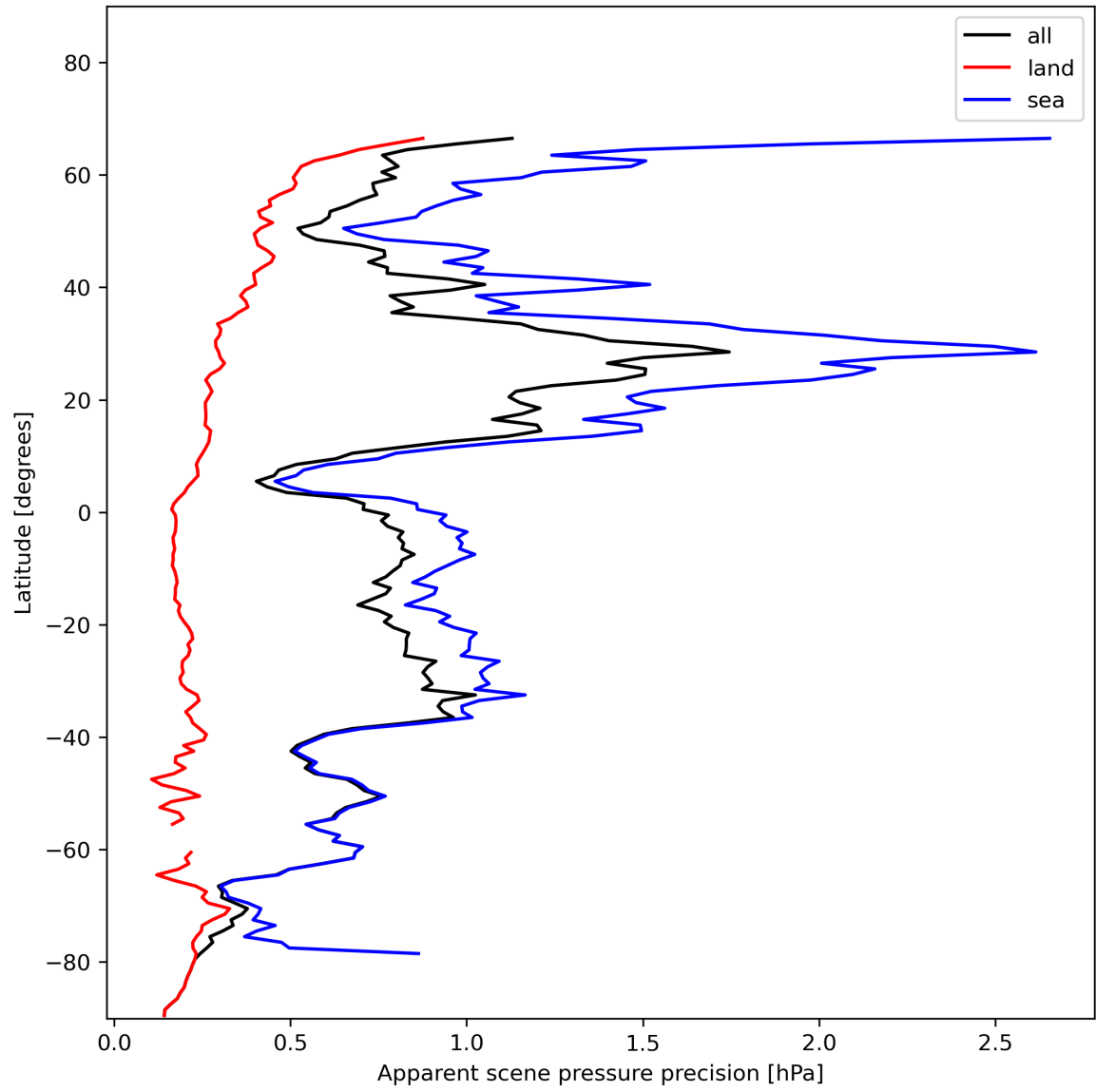


Figure 20: Zonal average of “Apparent scene pressure precision” for 2023-11-28 to 2023-11-30.

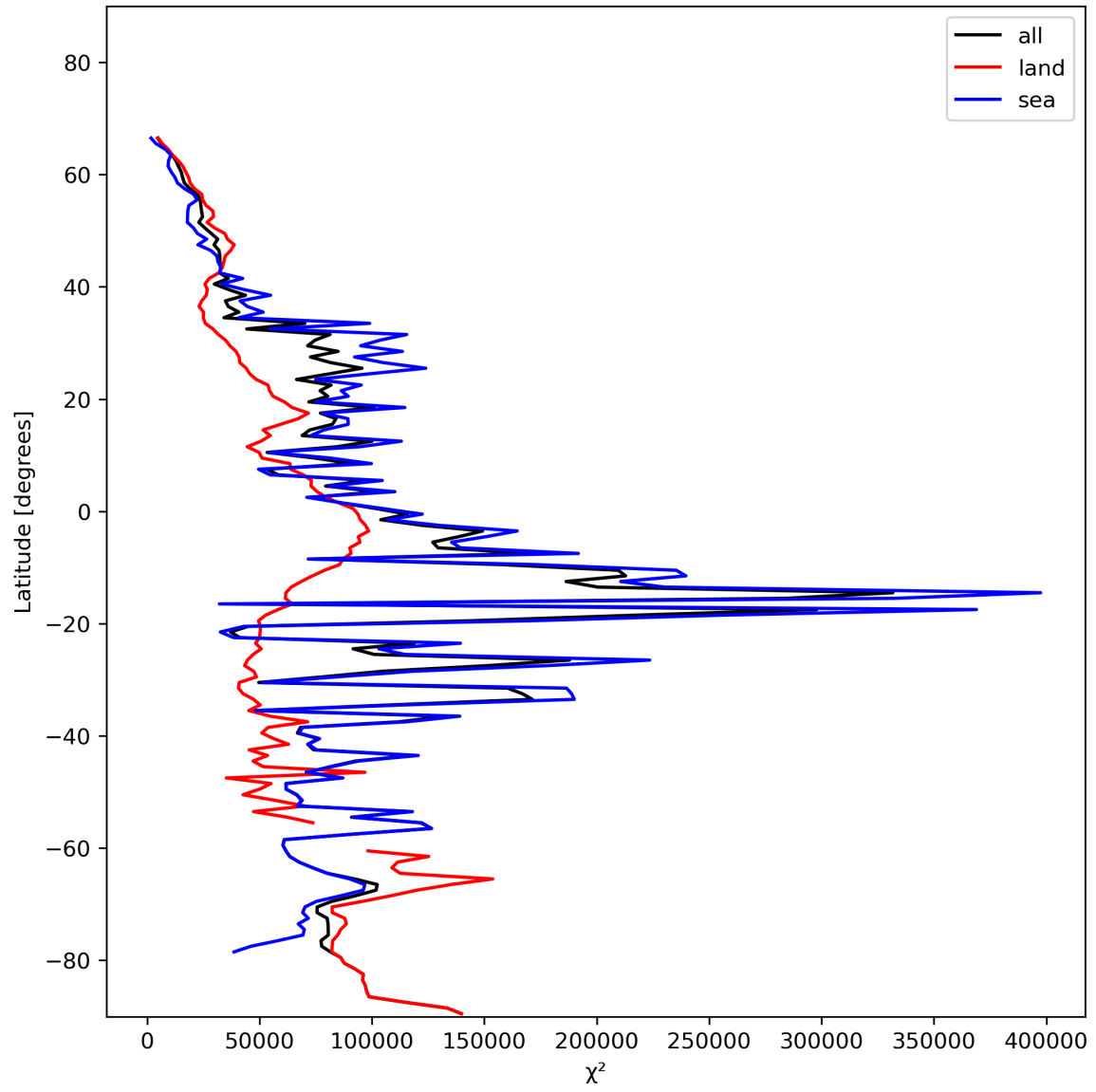


Figure 21: Zonal average of “ χ^2 ” for 2023-11-28 to 2023-11-30.

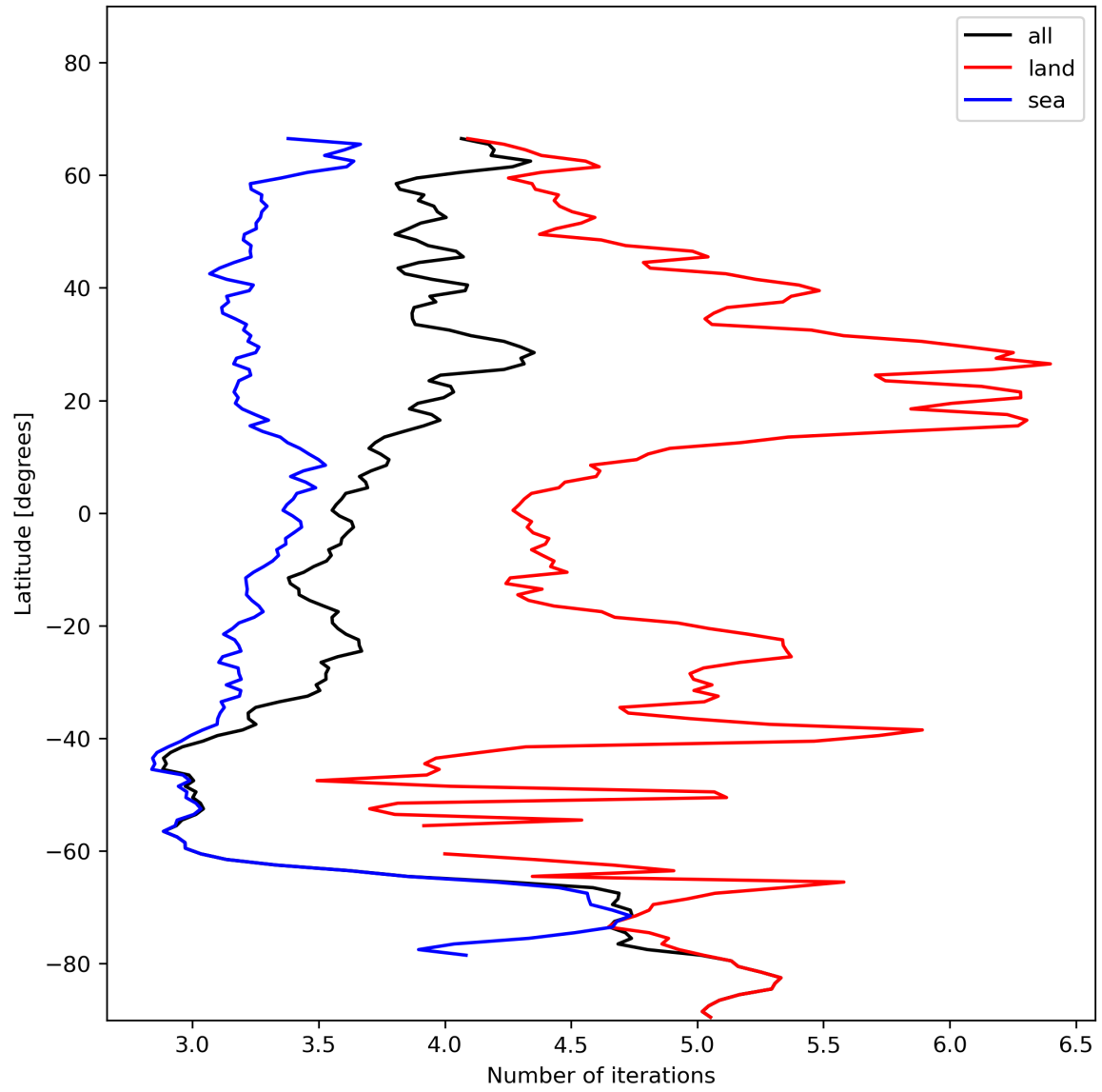


Figure 22: Zonal average of “Number of iterations” for 2023-11-28 to 2023-11-30.

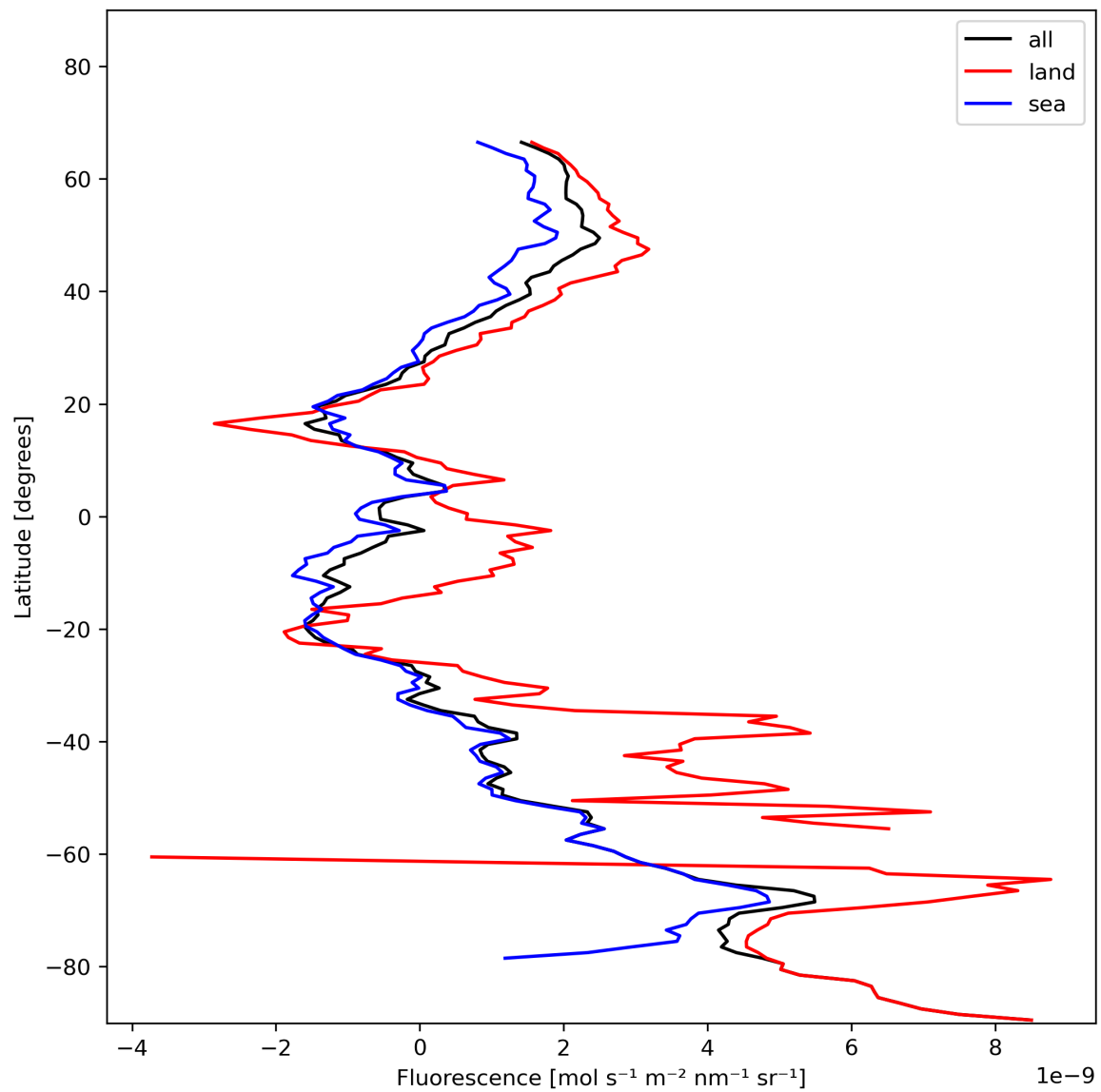


Figure 23: Zonal average of “Fluorescence” for 2023-11-28 to 2023-11-30.

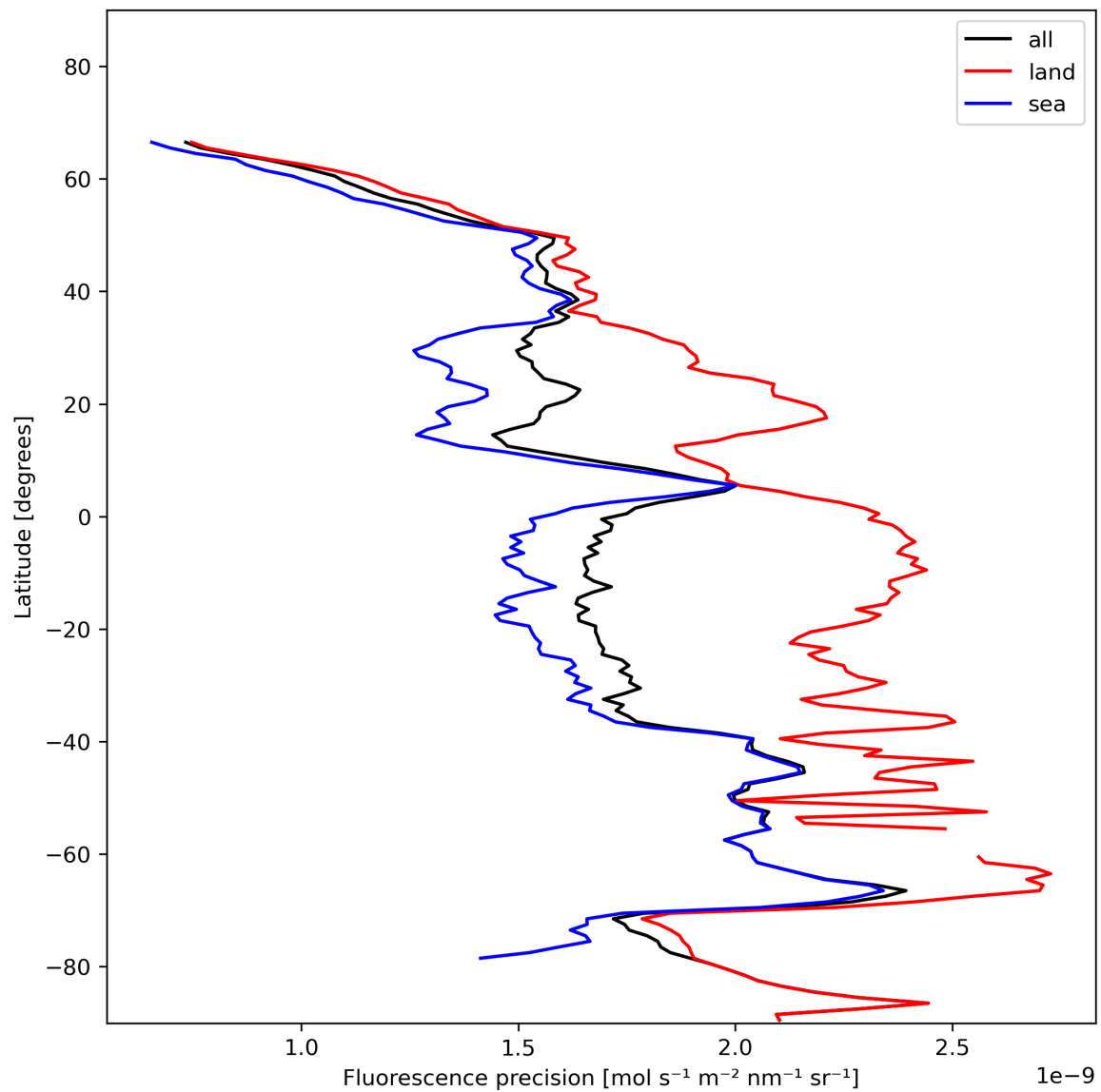


Figure 24: Zonal average of “Fluorescence precision” for 2023-11-28 to 2023-11-30.

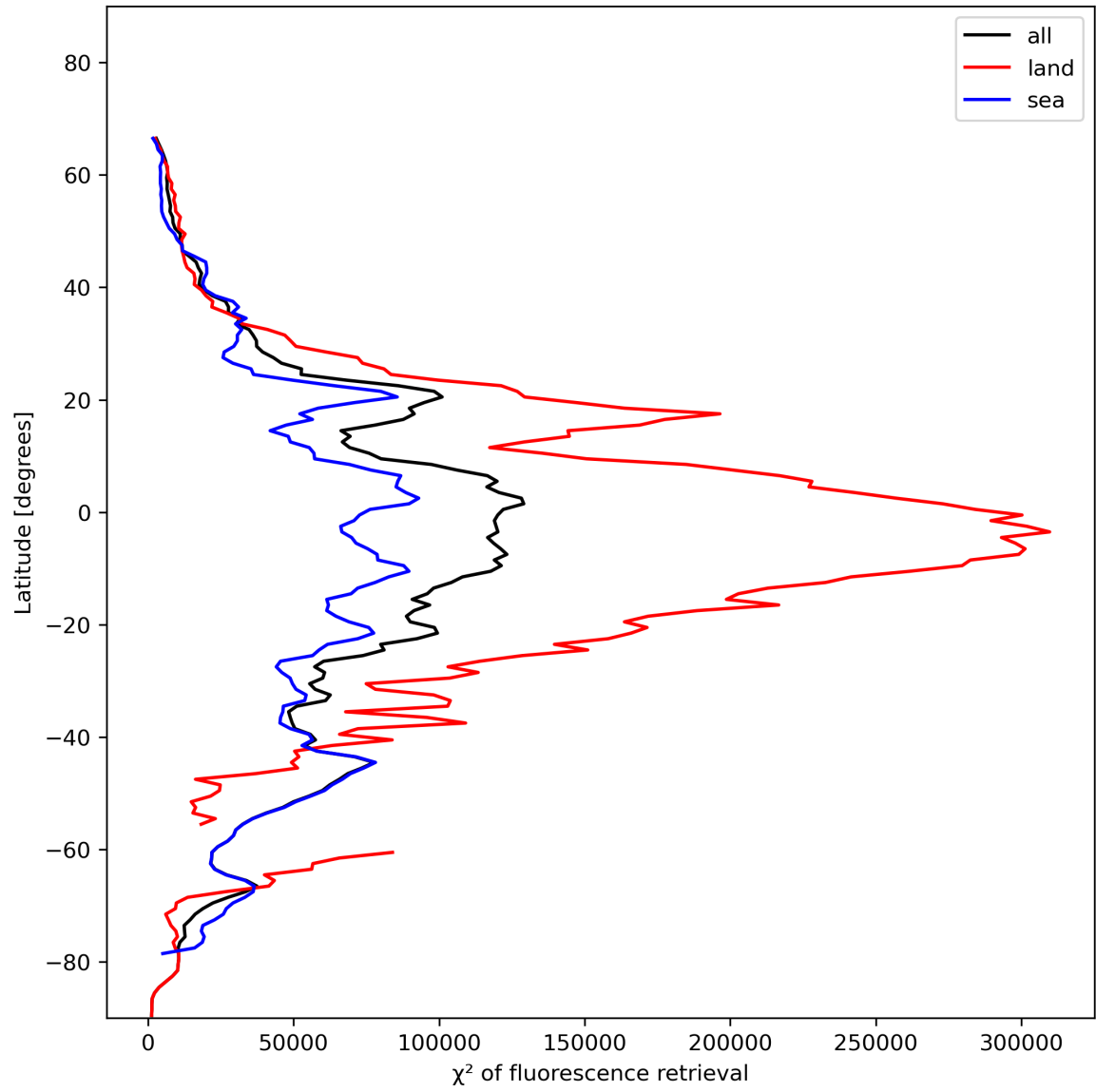


Figure 25: Zonal average of “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.

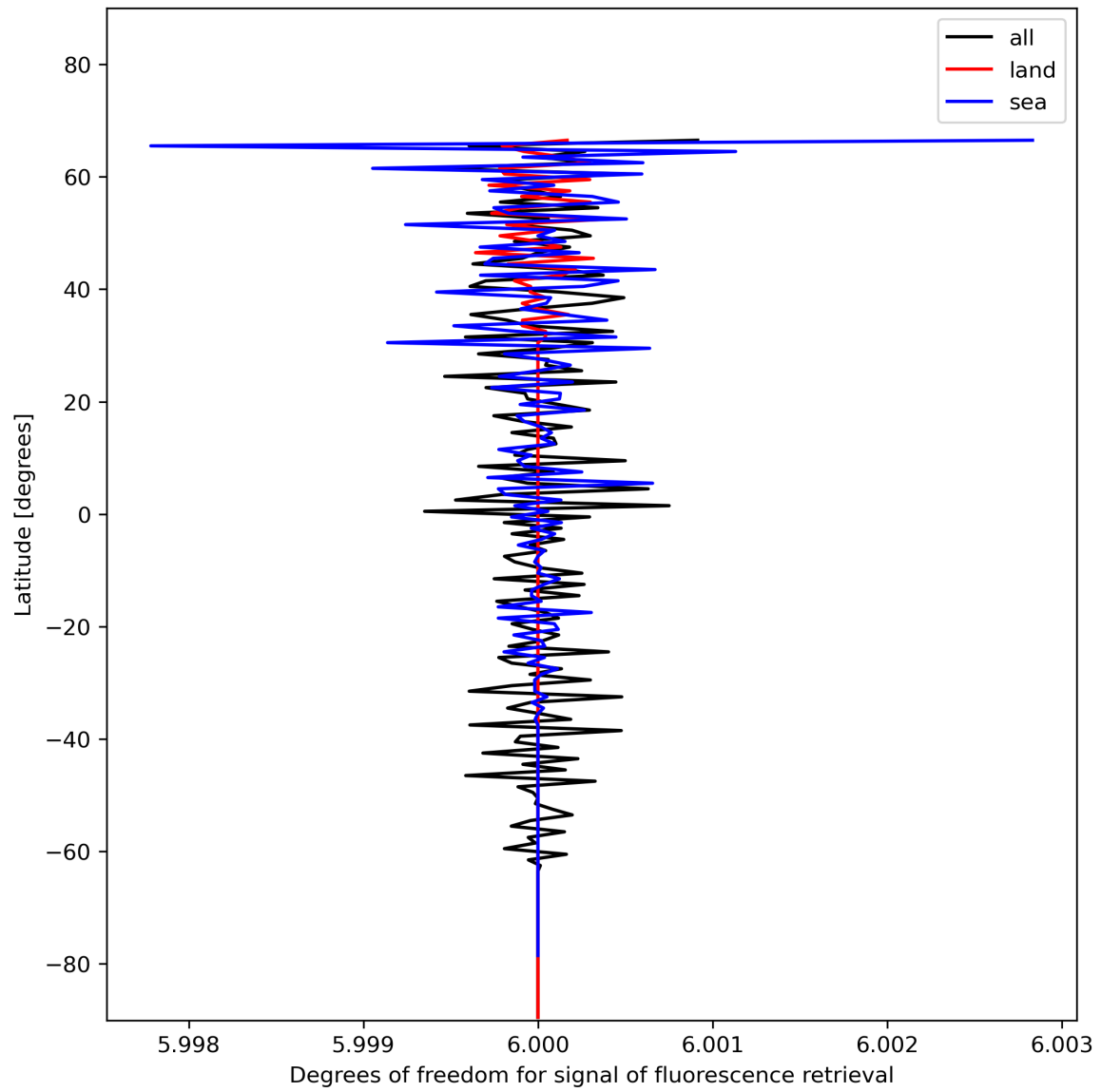


Figure 26: Zonal average of “Degrees of freedom for signal of fluorescence retrieval” for 2023-11-28 to 2023-11-30.

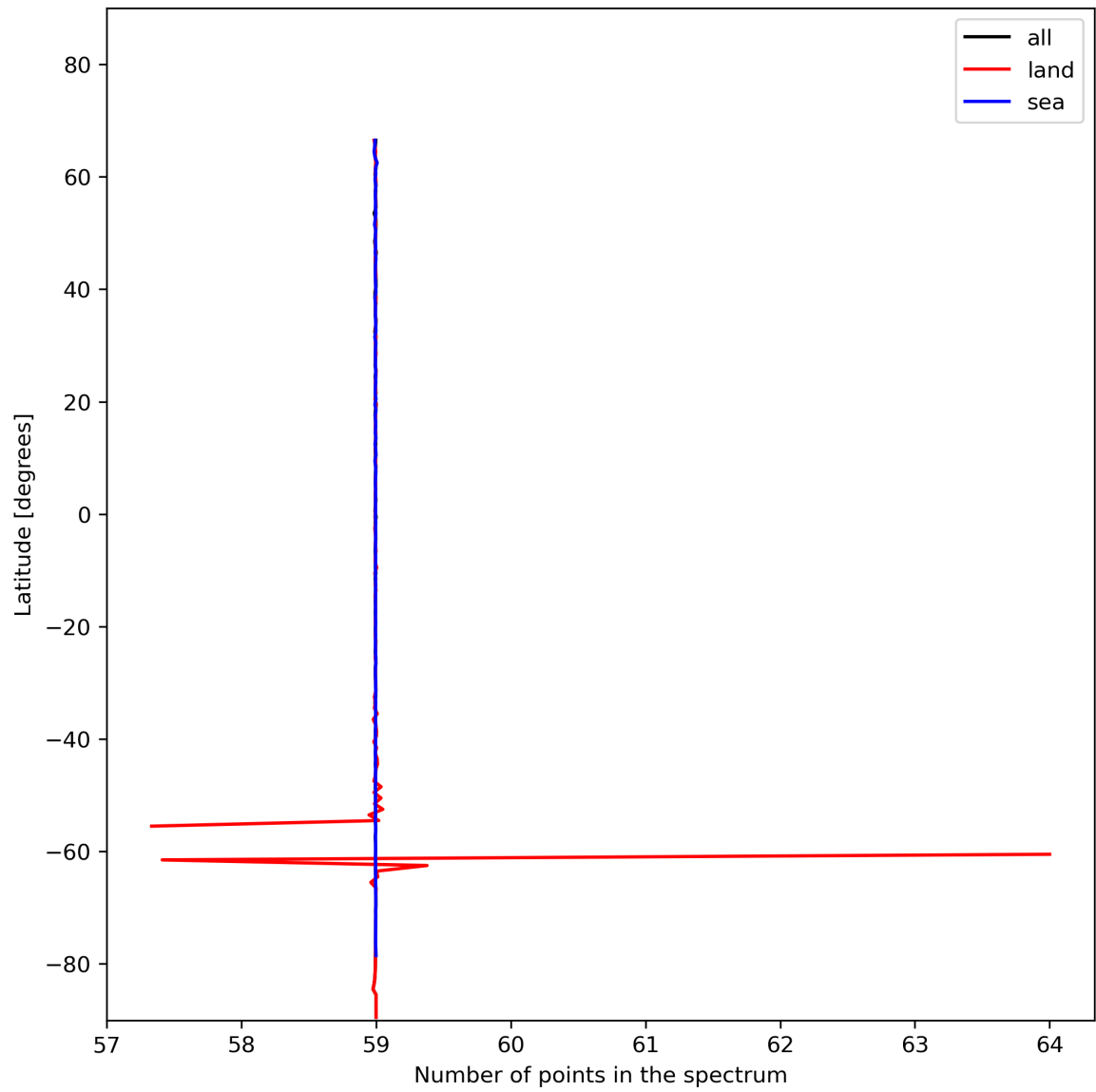


Figure 27: Zonal average of “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.

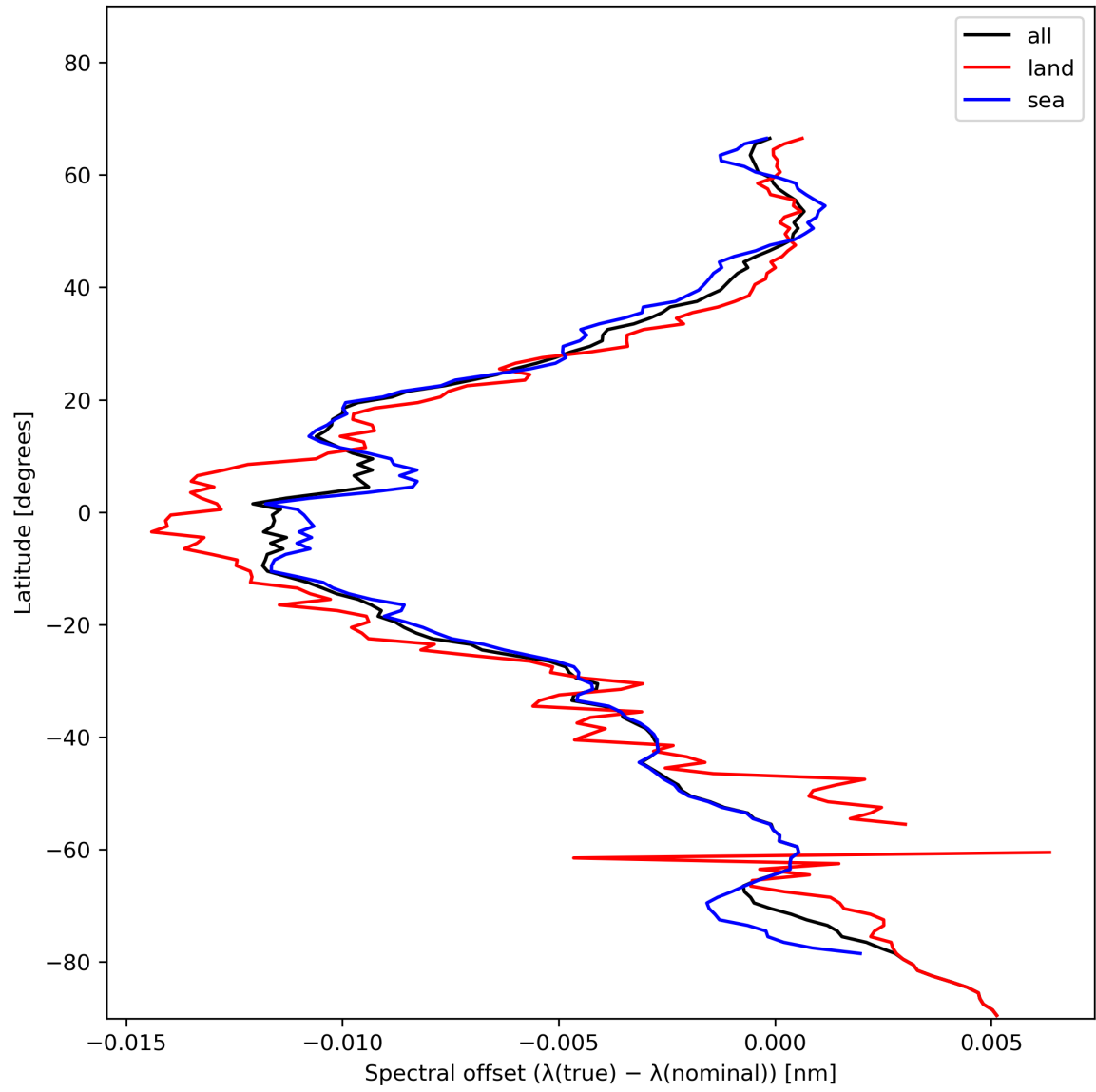


Figure 28: Zonal average of “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.

8 Histograms

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

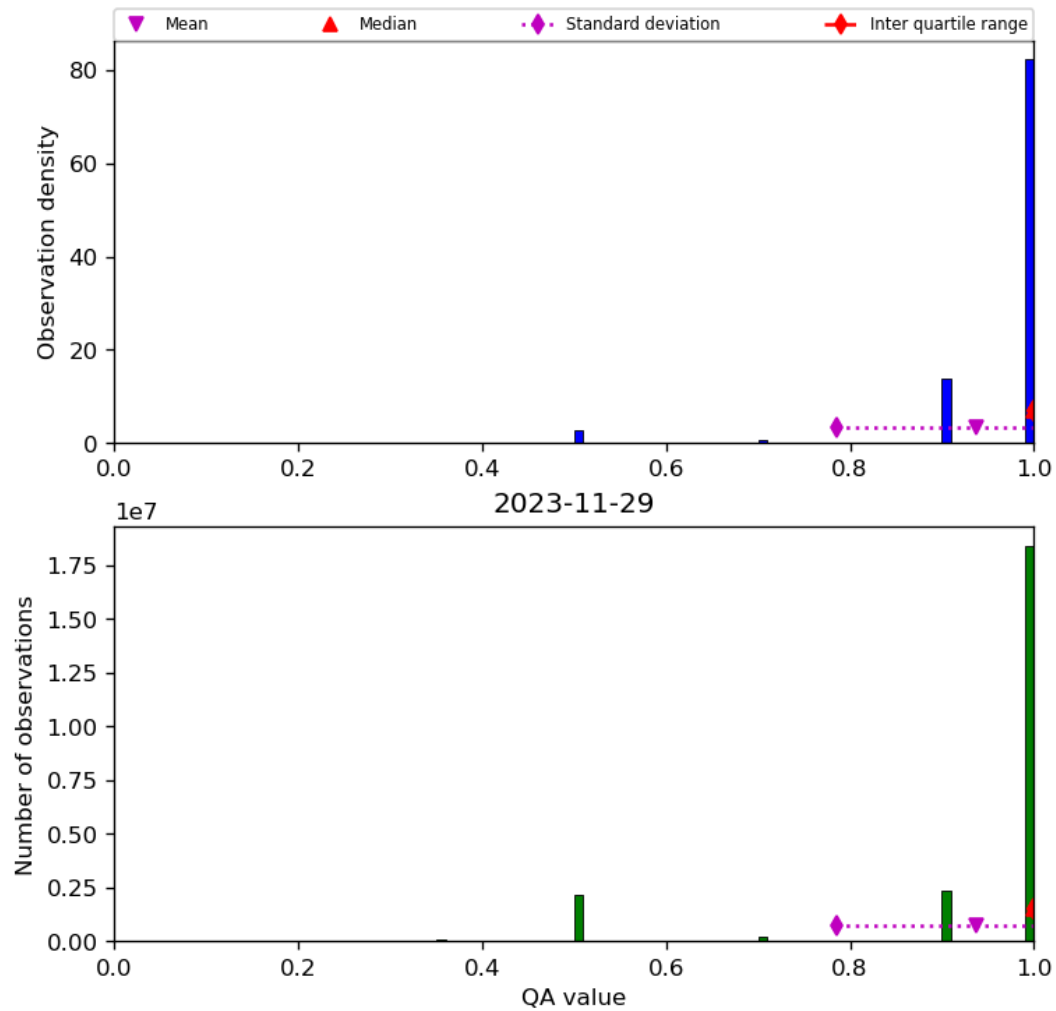


Figure 29: Histogram of “QA value” for 2023-11-28 to 2023-11-30

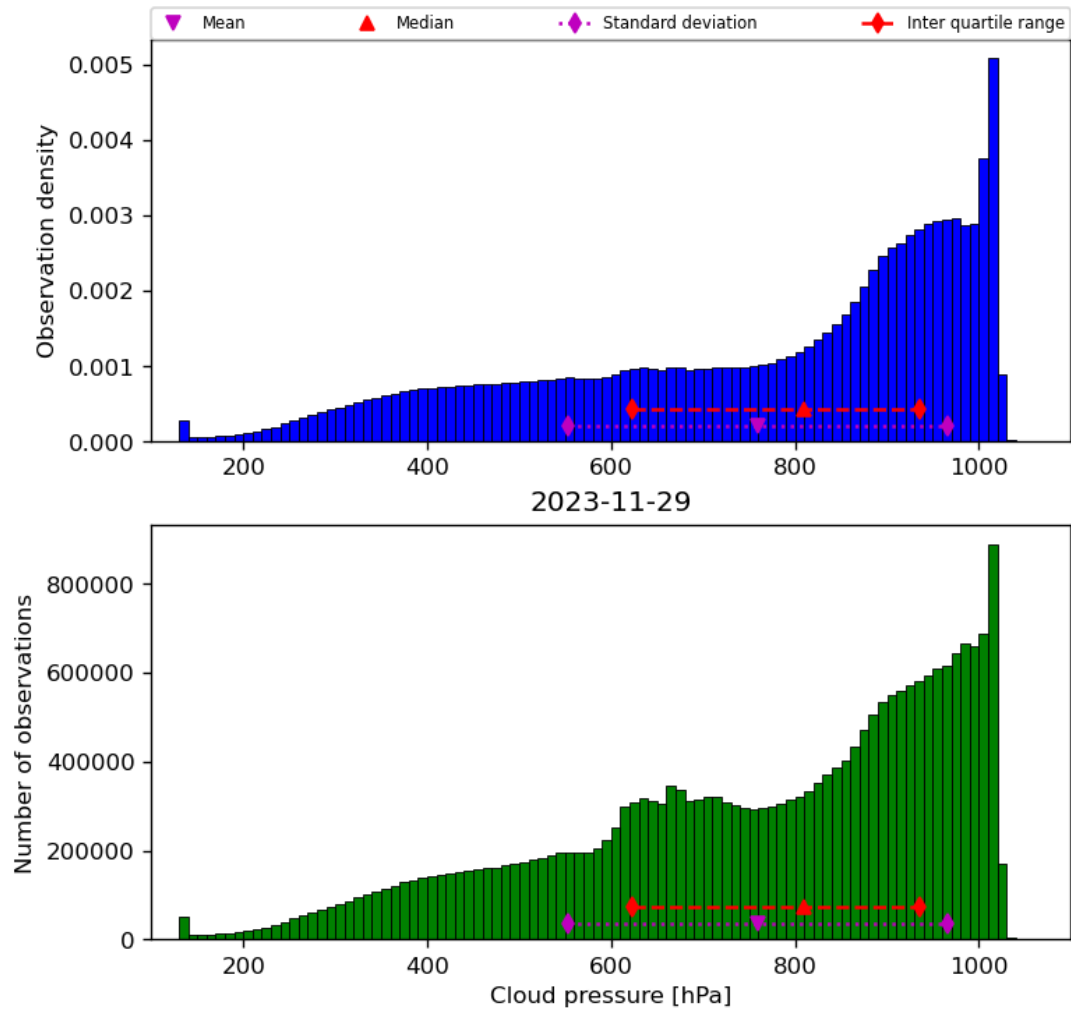


Figure 30: Histogram of “Cloud pressure” for 2023-11-28 to 2023-11-30

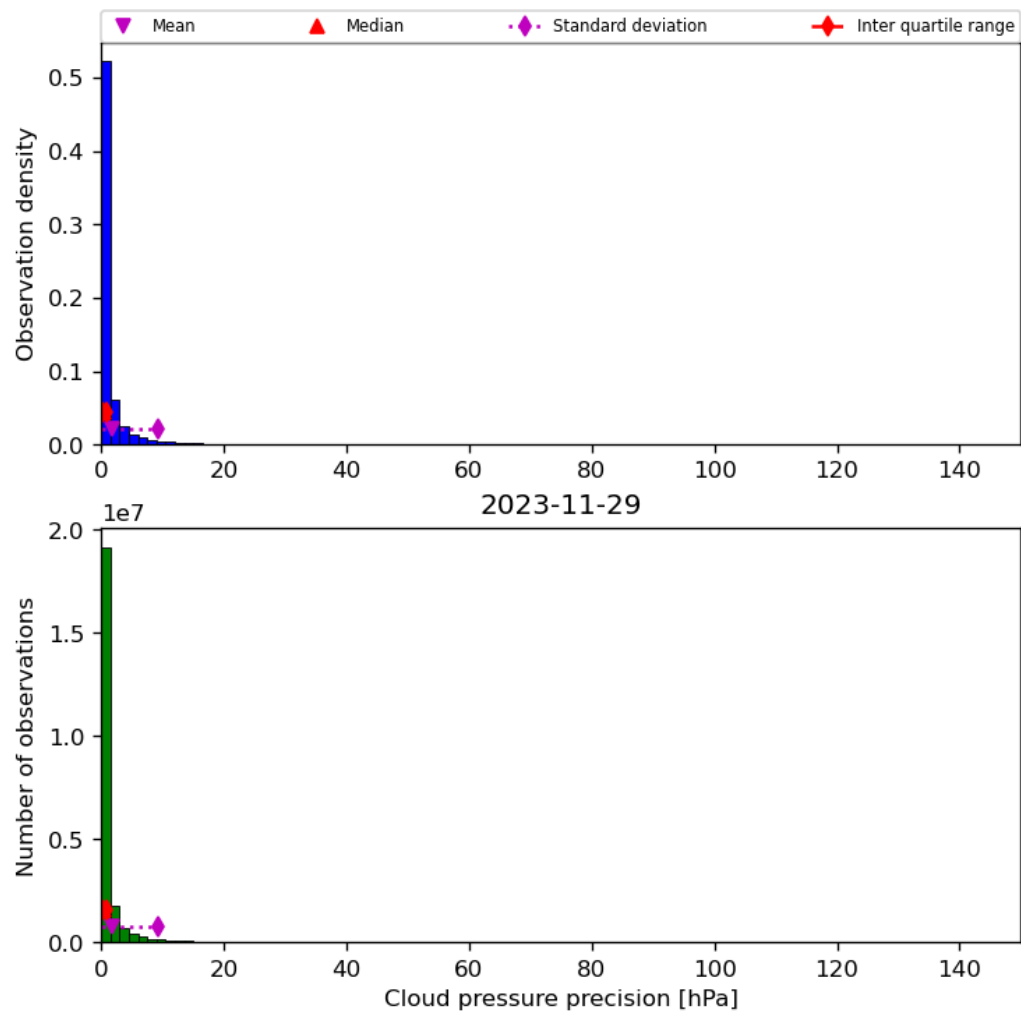


Figure 31: Histogram of “Cloud pressure precision” for 2023-11-28 to 2023-11-30

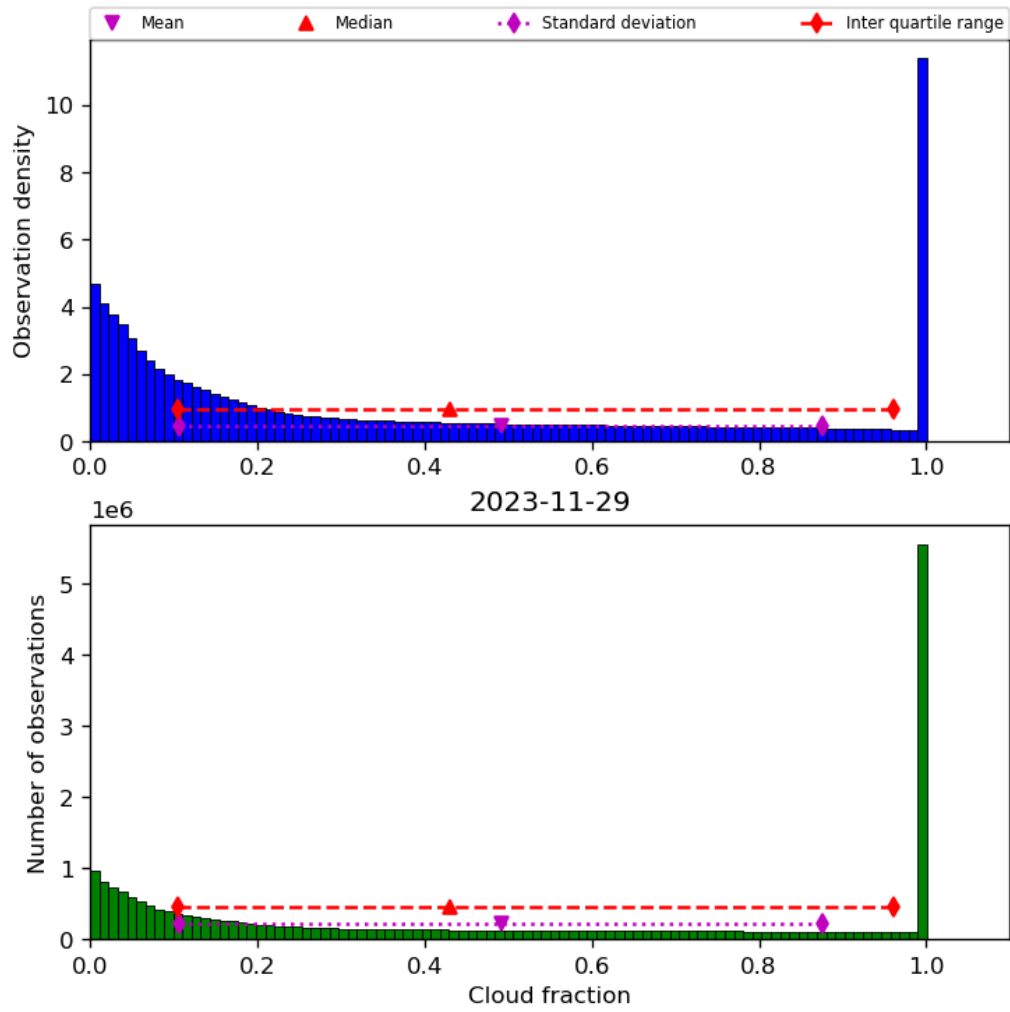


Figure 32: Histogram of “Cloud fraction” for 2023-11-28 to 2023-11-30

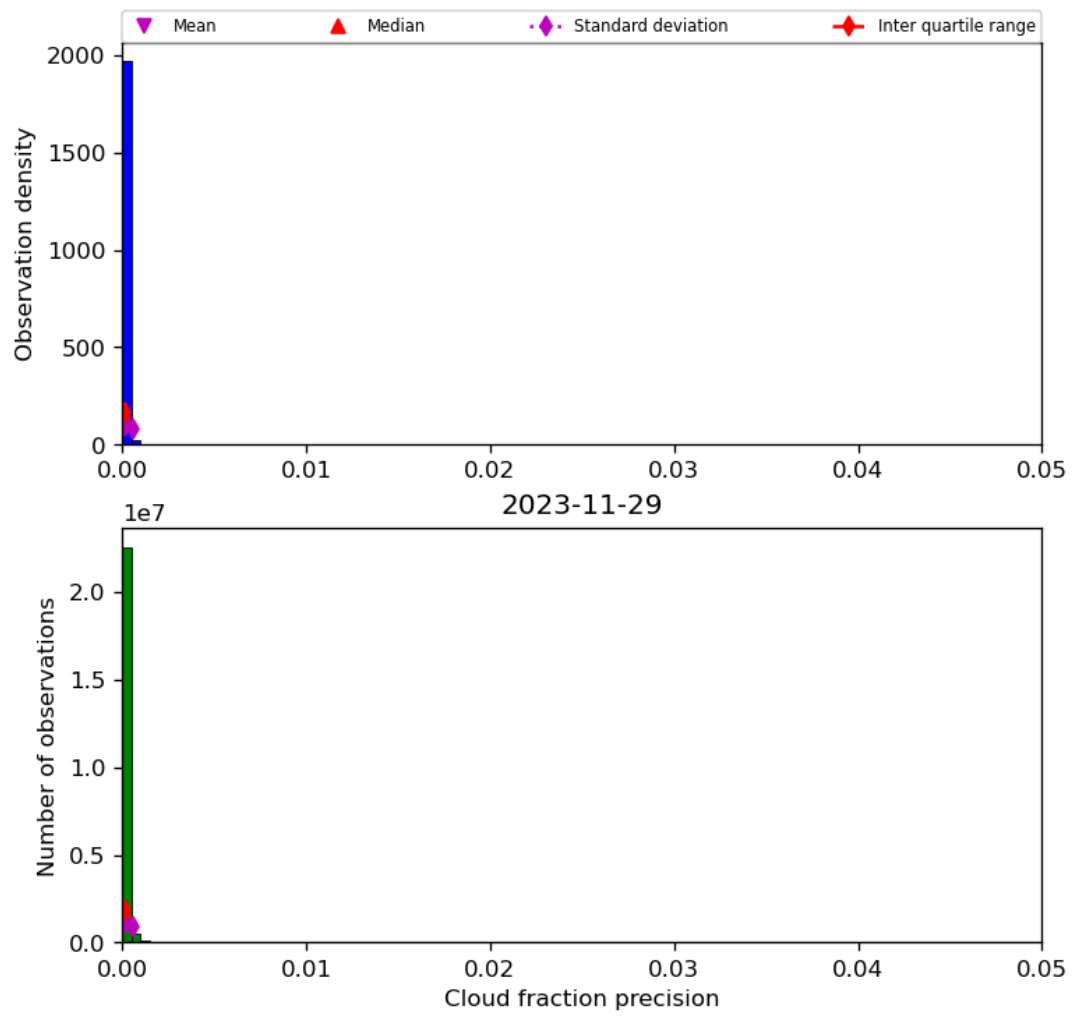


Figure 33: Histogram of “Cloud fraction precision” for 2023-11-28 to 2023-11-30

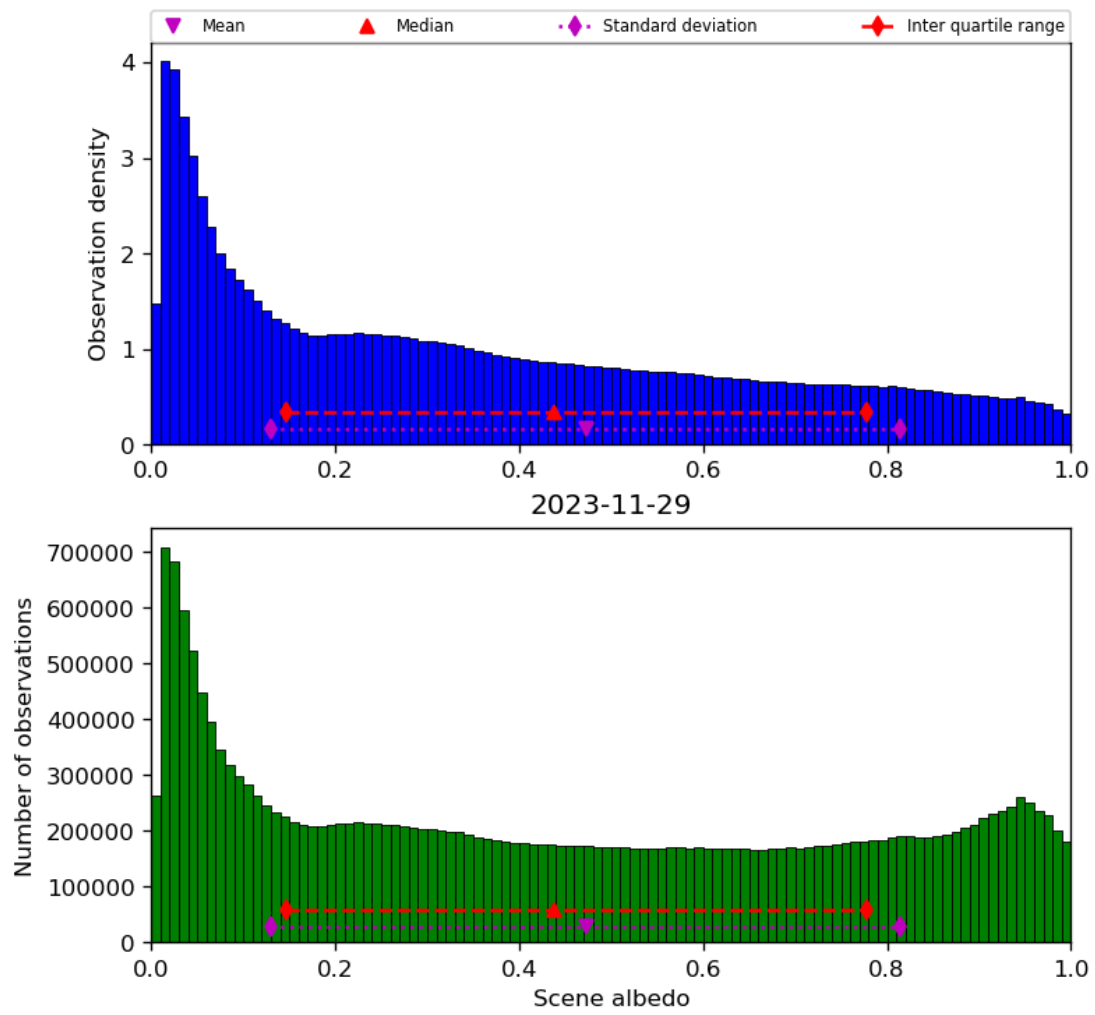


Figure 34: Histogram of “Scene albedo” for 2023-11-28 to 2023-11-30

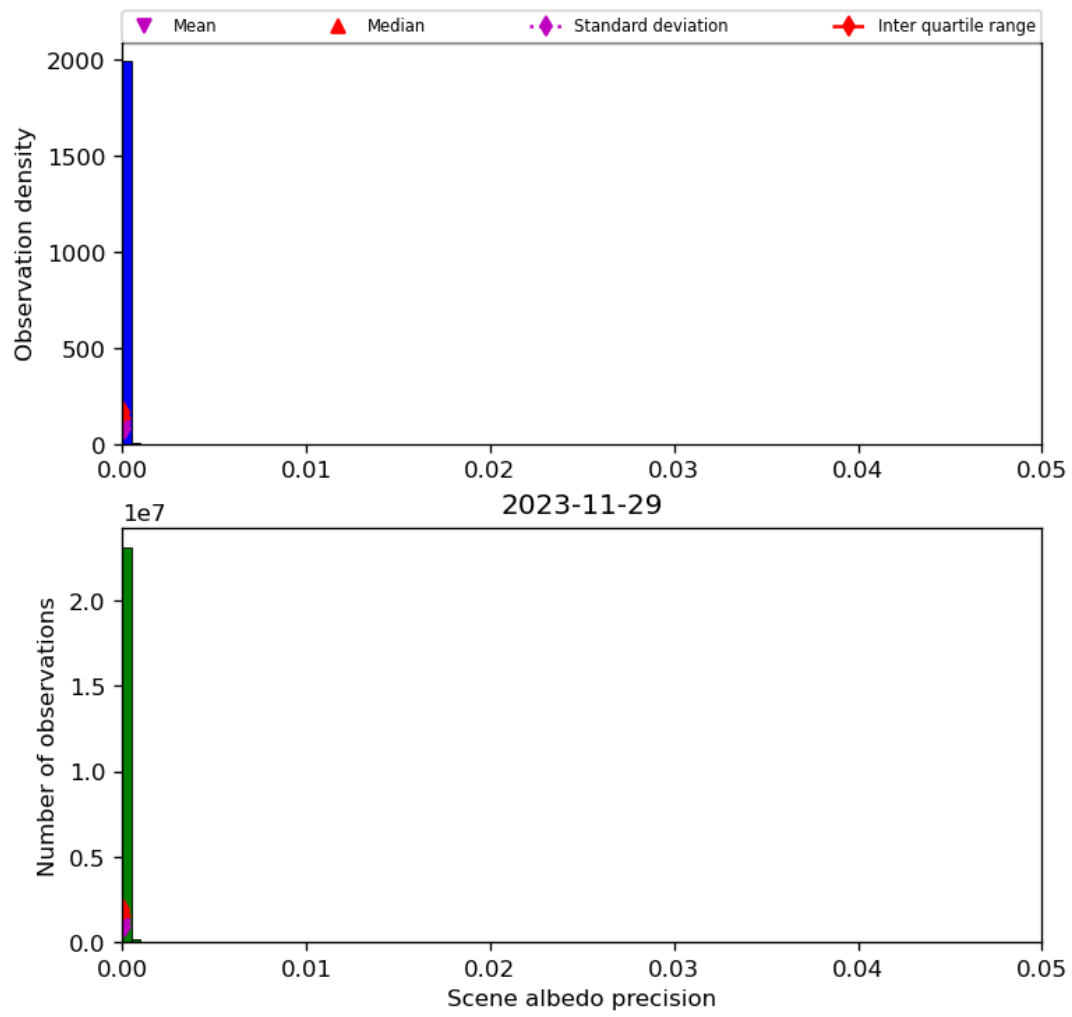


Figure 35: Histogram of “Scene albedo precision” for 2023-11-28 to 2023-11-30

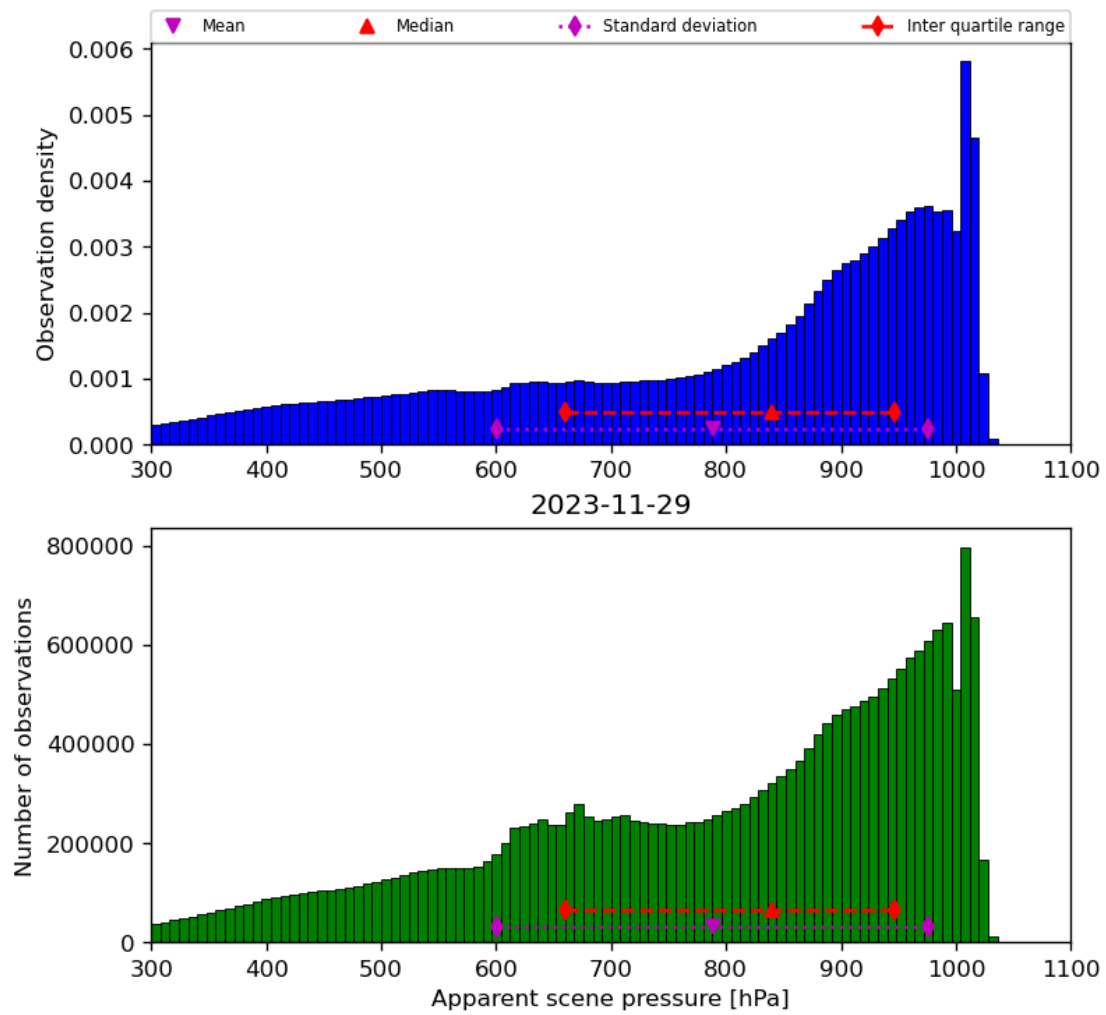


Figure 36: Histogram of “Apparent scene pressure” for 2023-11-28 to 2023-11-30

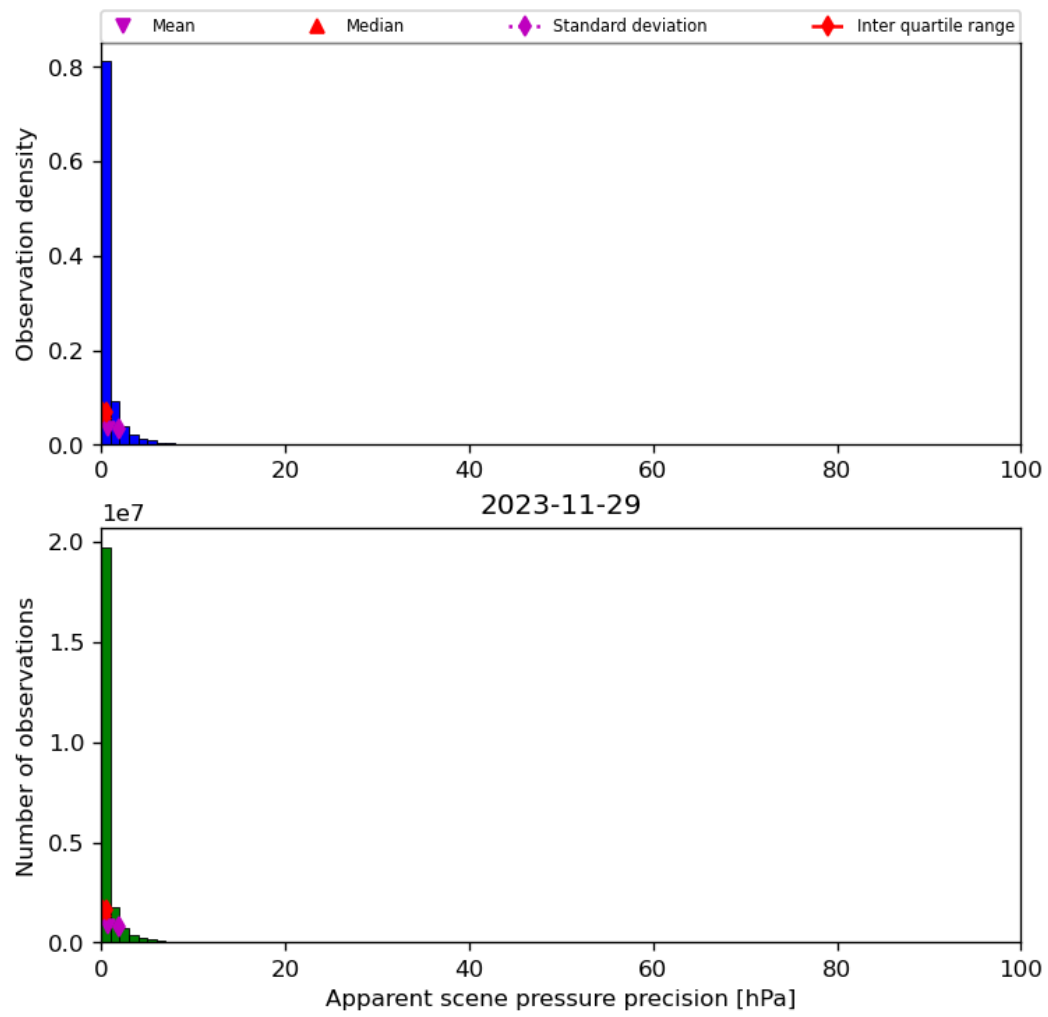


Figure 37: Histogram of “Apparent scene pressure precision” for 2023-11-28 to 2023-11-30

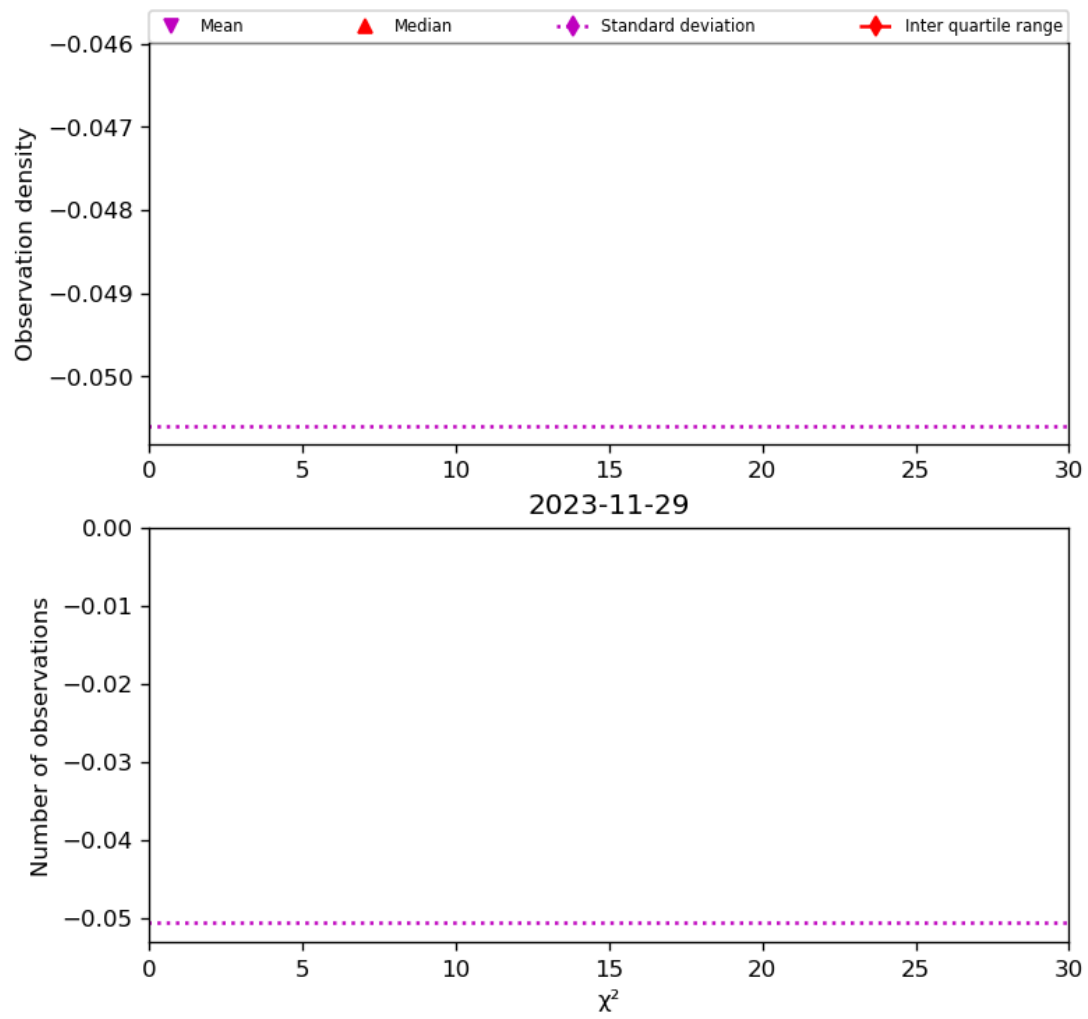


Figure 38: Histogram of “ χ^2 ” for 2023-11-28 to 2023-11-30

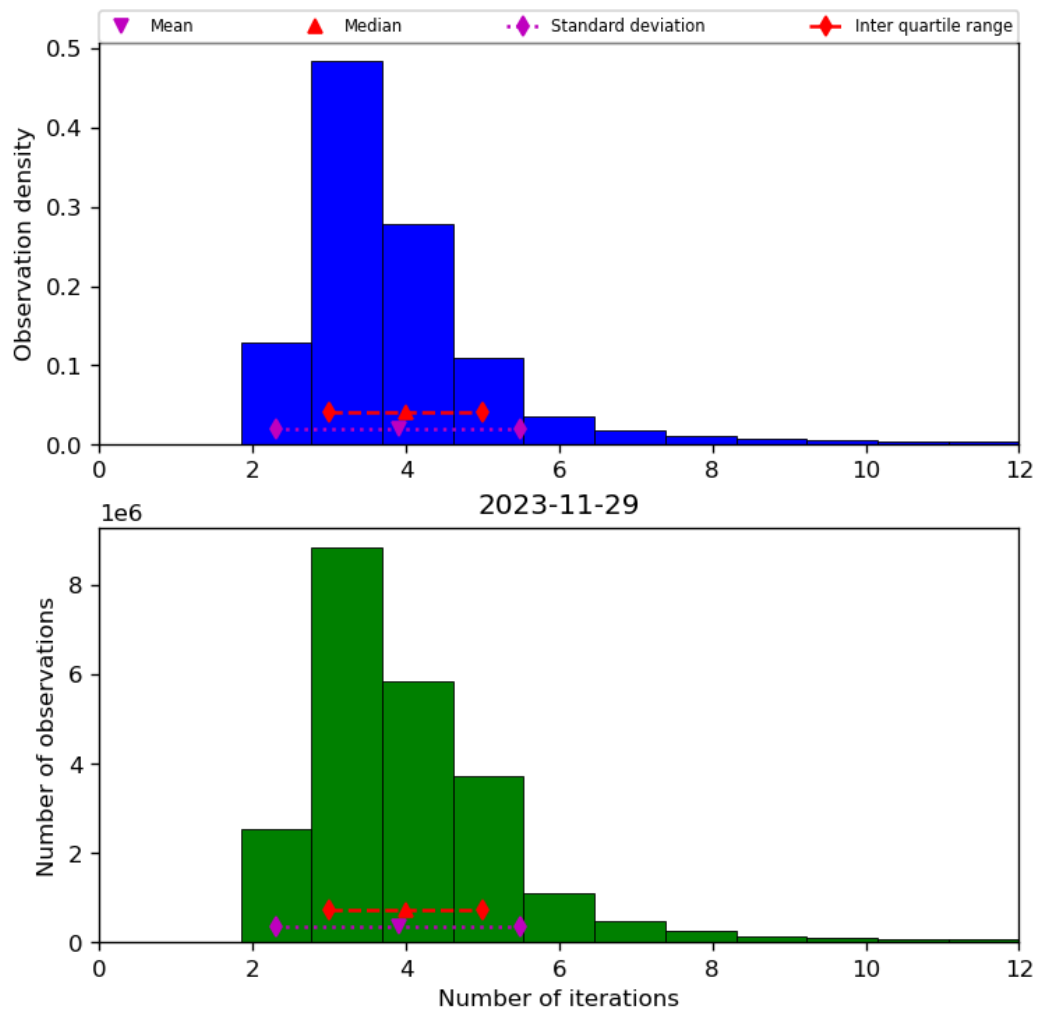


Figure 39: Histogram of “Number of iterations” for 2023-11-28 to 2023-11-30

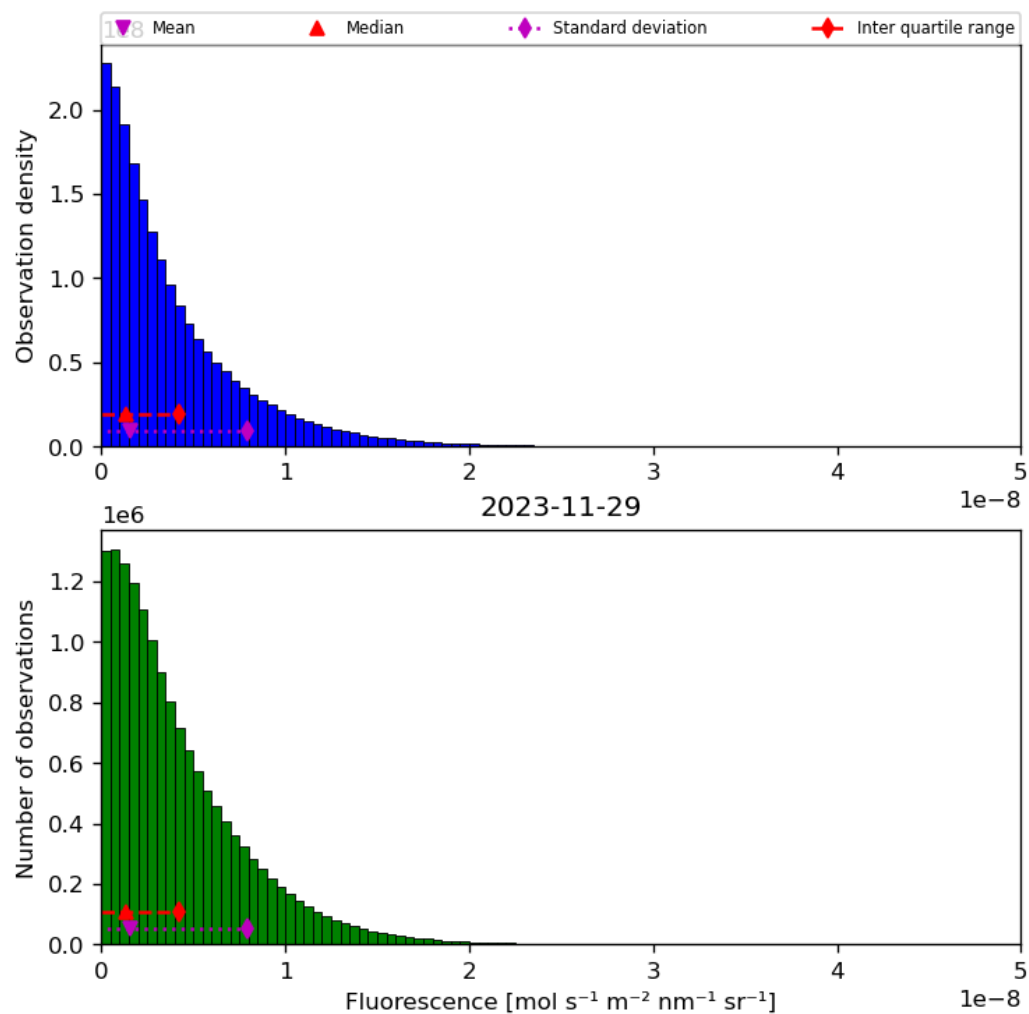


Figure 40: Histogram of “Fluorescence” for 2023-11-28 to 2023-11-30

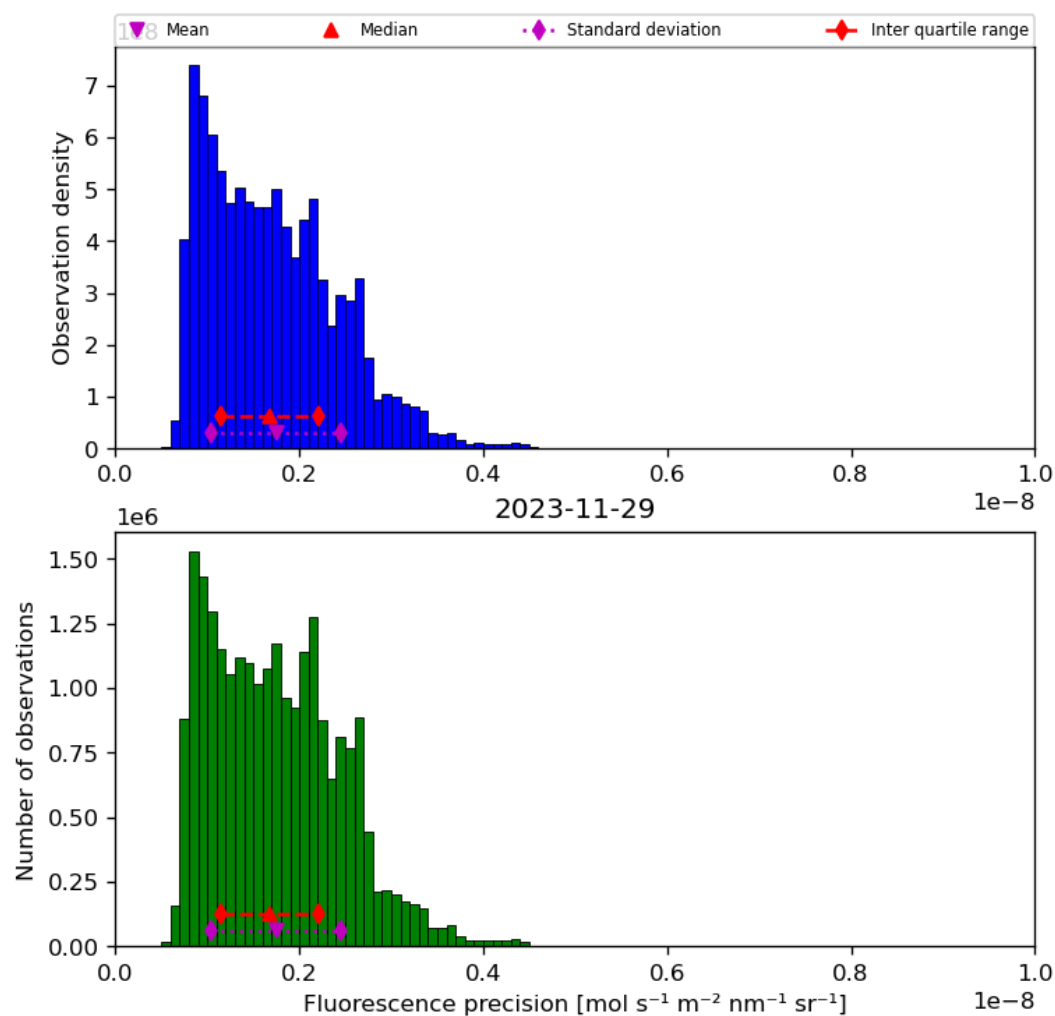


Figure 41: Histogram of “Fluorescence precision” for 2023-11-28 to 2023-11-30

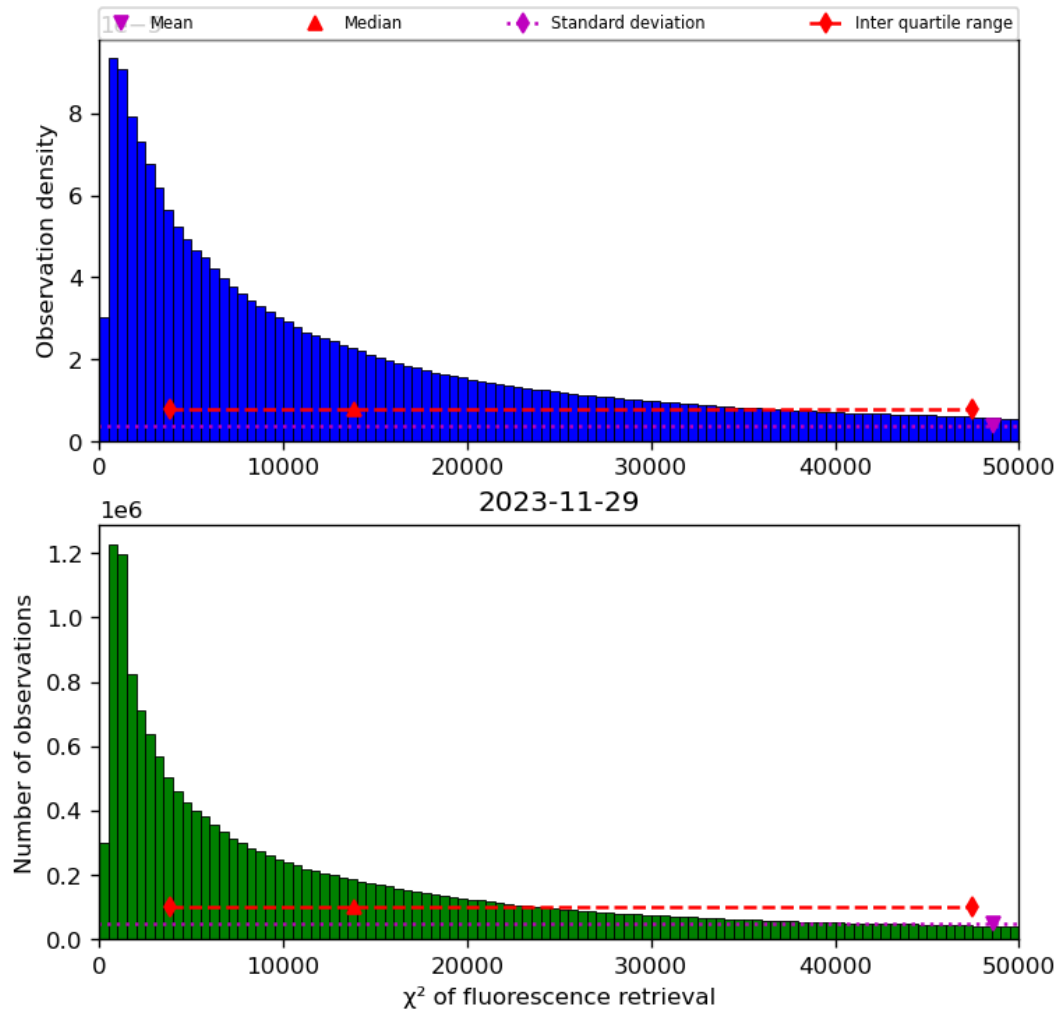


Figure 42: Histogram of “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30

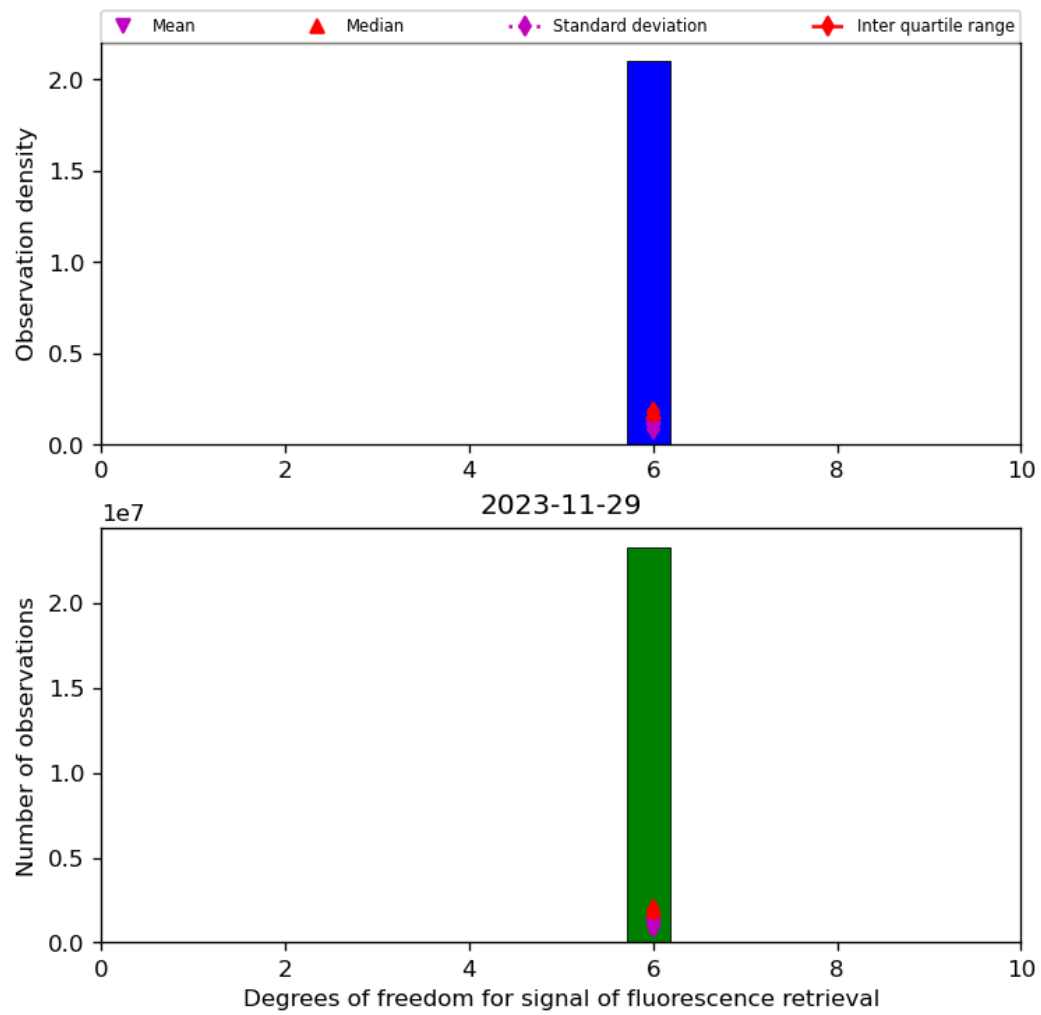


Figure 43: Histogram of “Degrees of freedom for signal of fluorescence retrieval” for 2023-11-28 to 2023-11-30

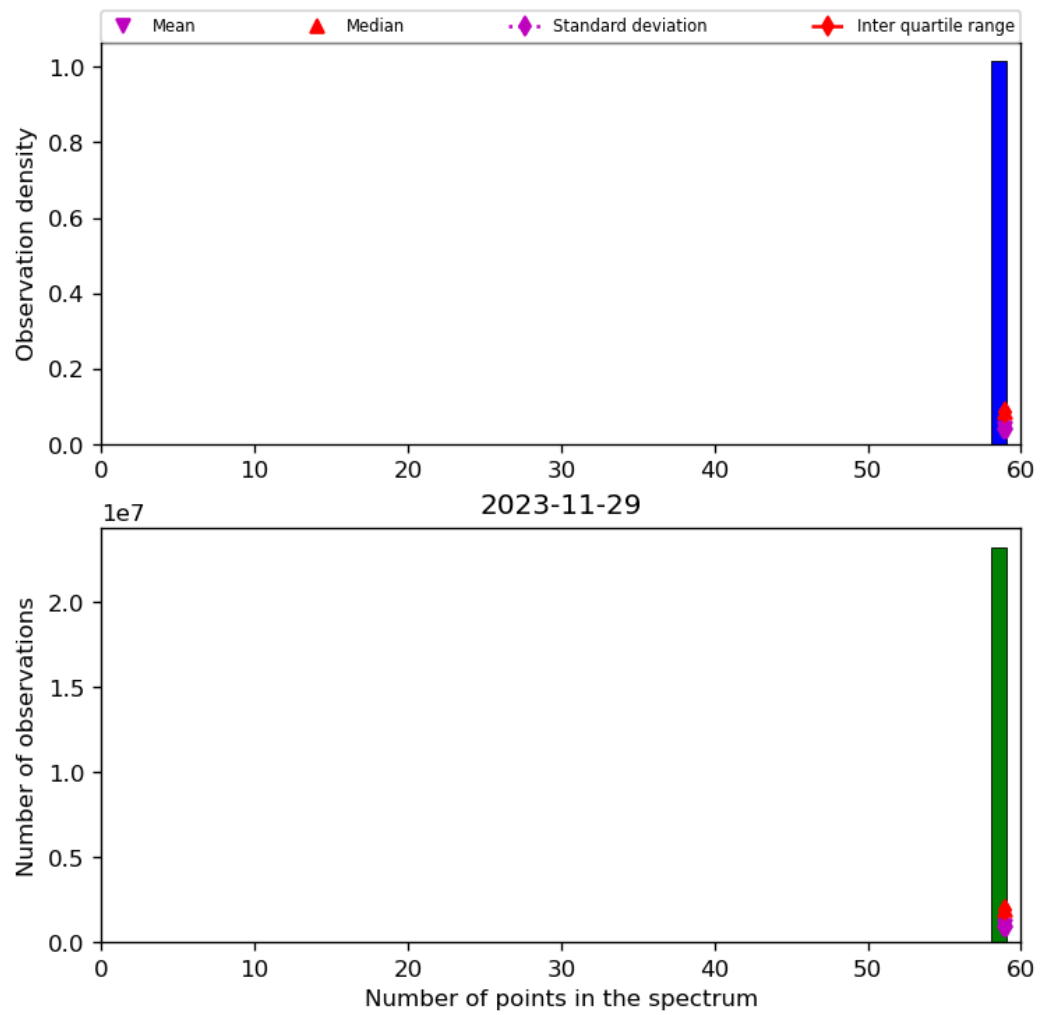


Figure 44: Histogram of “Number of points in the spectrum” for 2023-11-28 to 2023-11-30

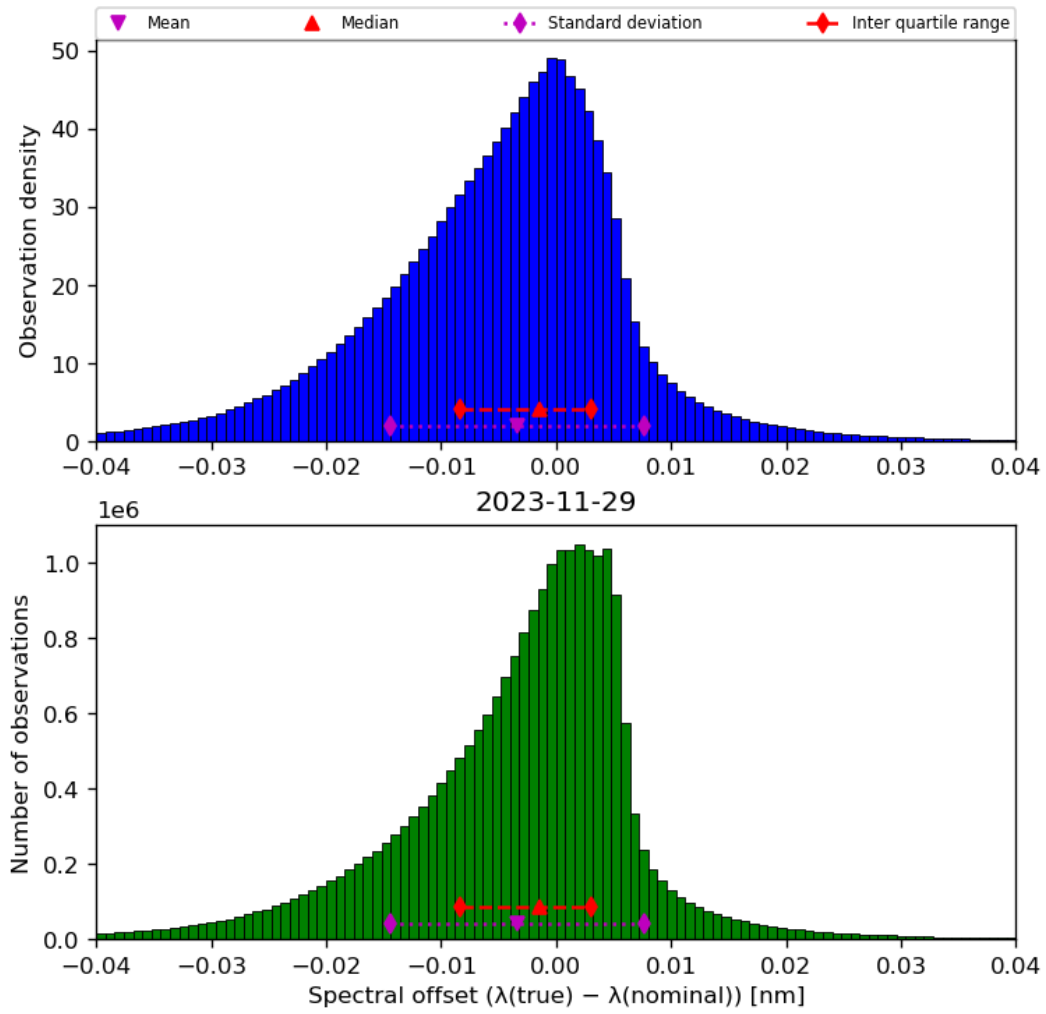


Figure 45: Histogram of “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30

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.

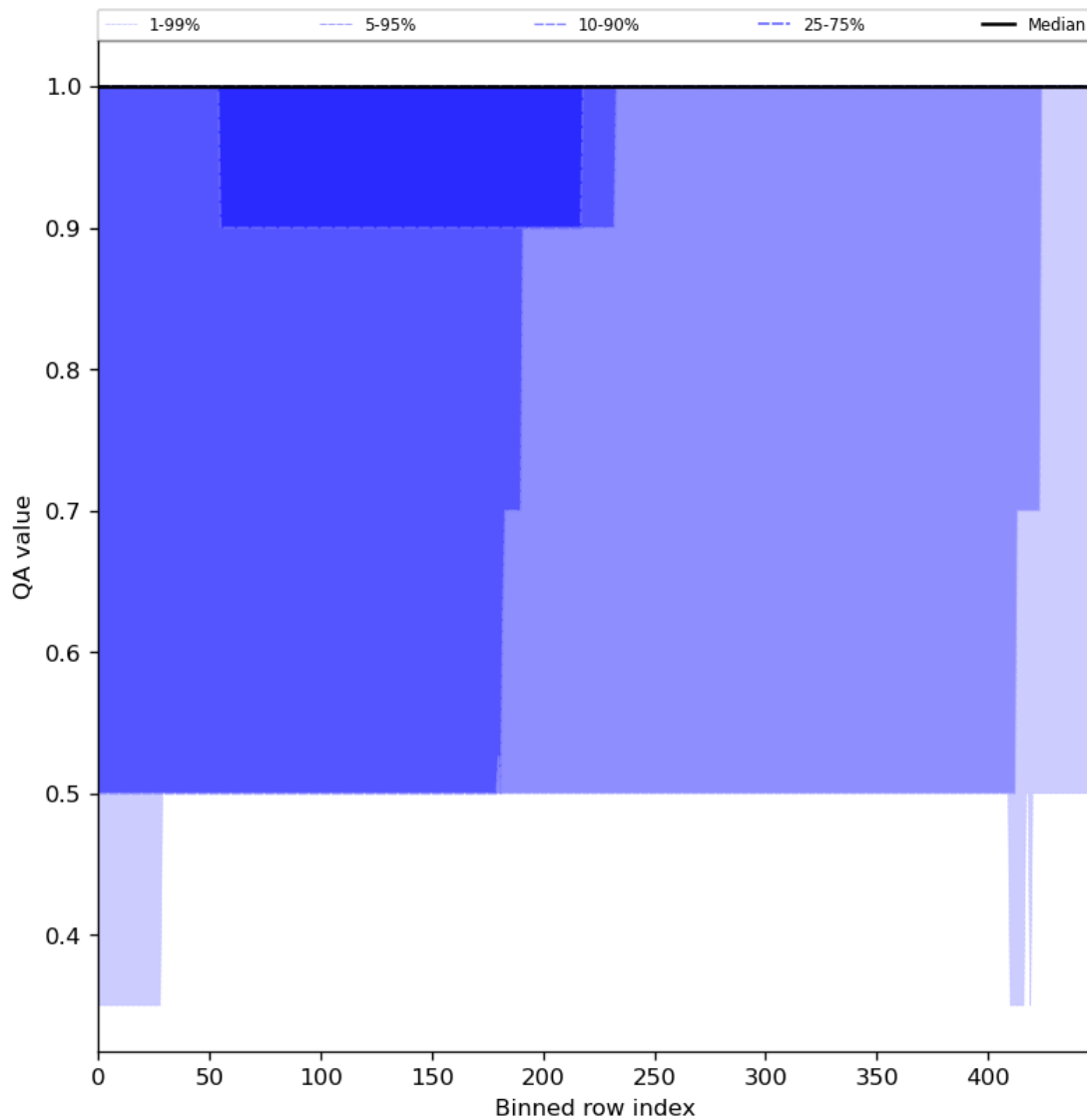


Figure 46: Along track statistics of “QA value” for 2023-11-28 to 2023-11-30

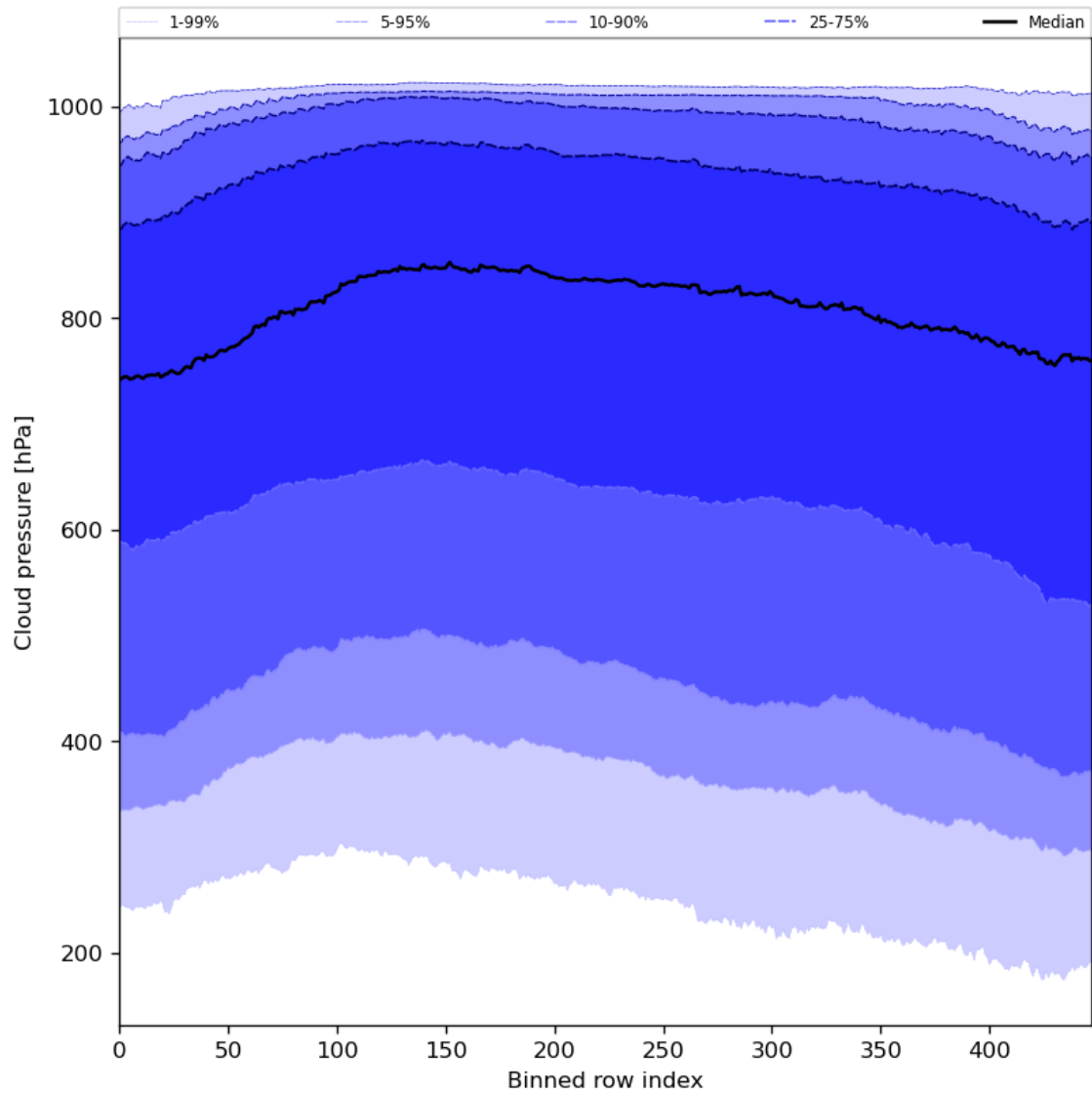


Figure 47: Along track statistics of “Cloud pressure” for 2023-11-28 to 2023-11-30

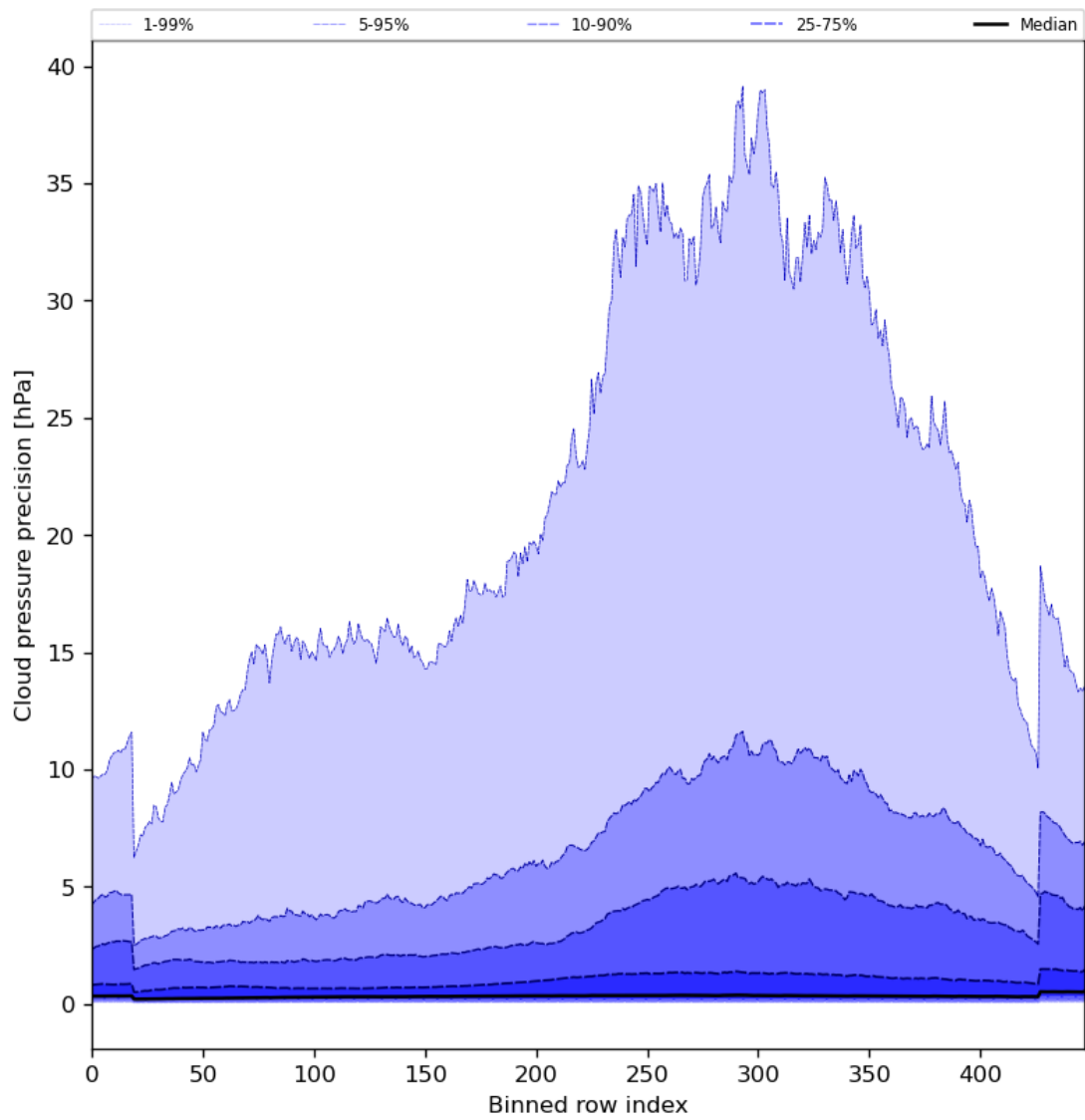


Figure 48: Along track statistics of “Cloud pressure precision” for 2023-11-28 to 2023-11-30

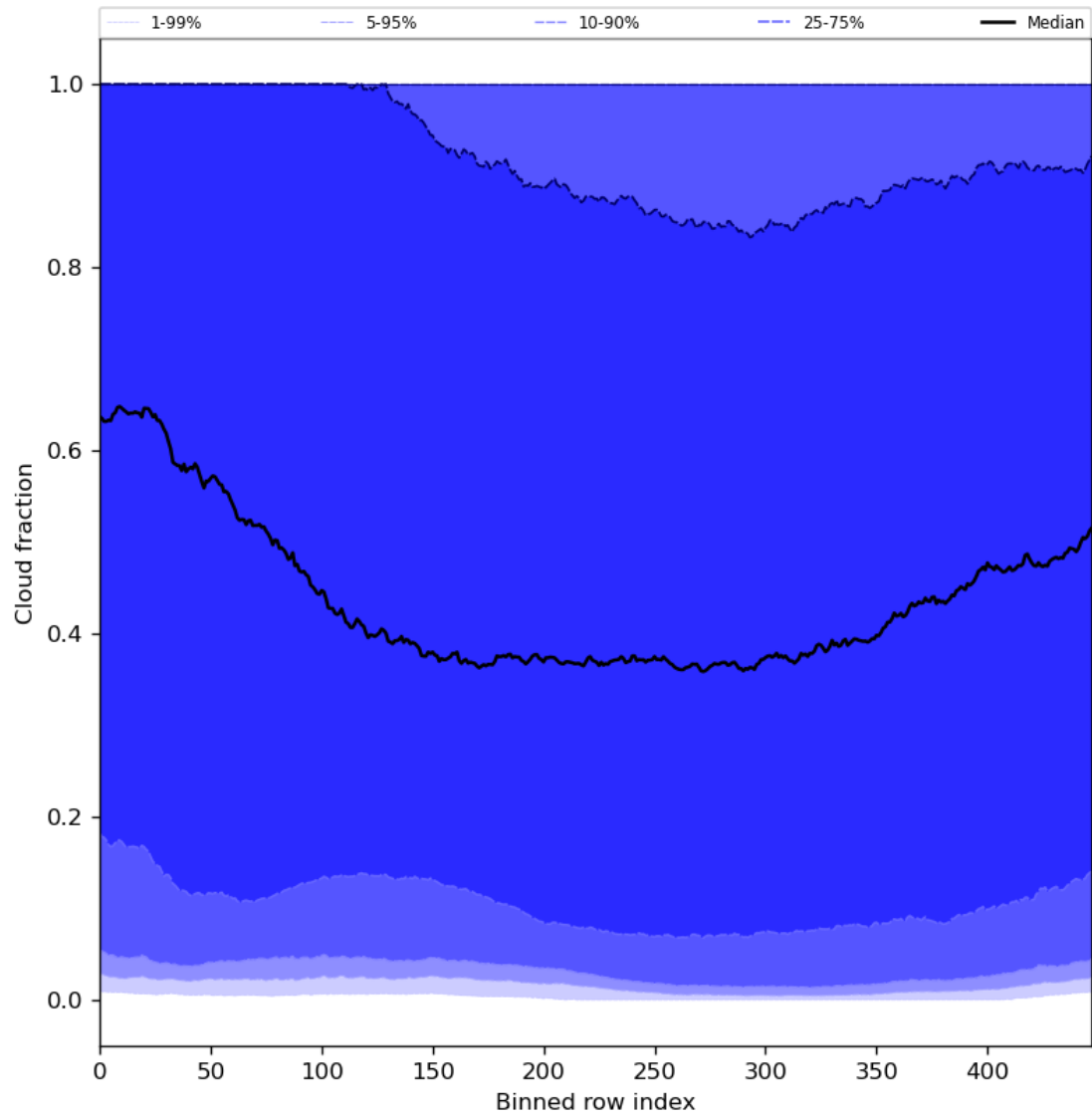


Figure 49: Along track statistics of “Cloud fraction” for 2023-11-28 to 2023-11-30

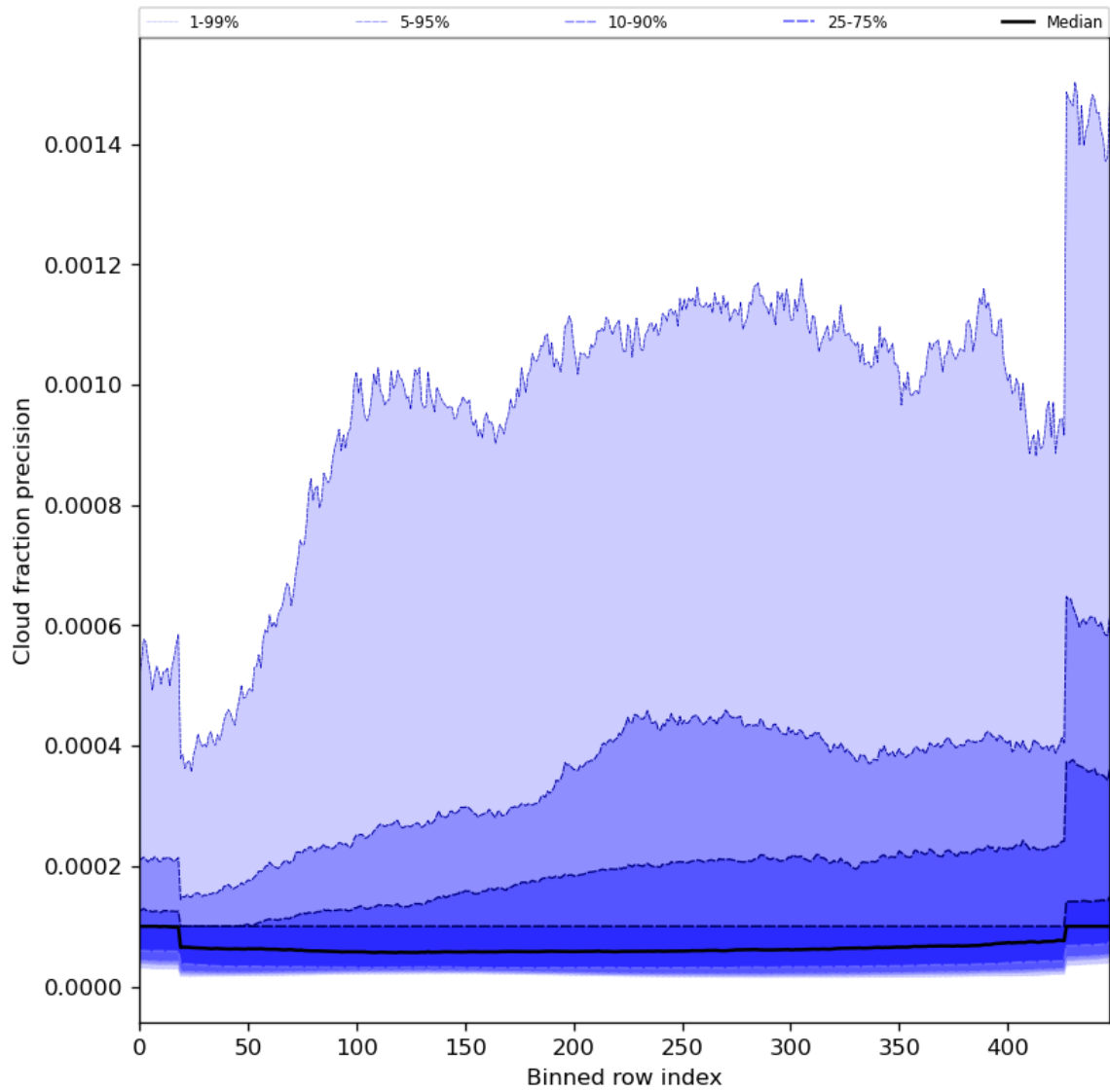


Figure 50: Along track statistics of “Cloud fraction precision” for 2023-11-28 to 2023-11-30

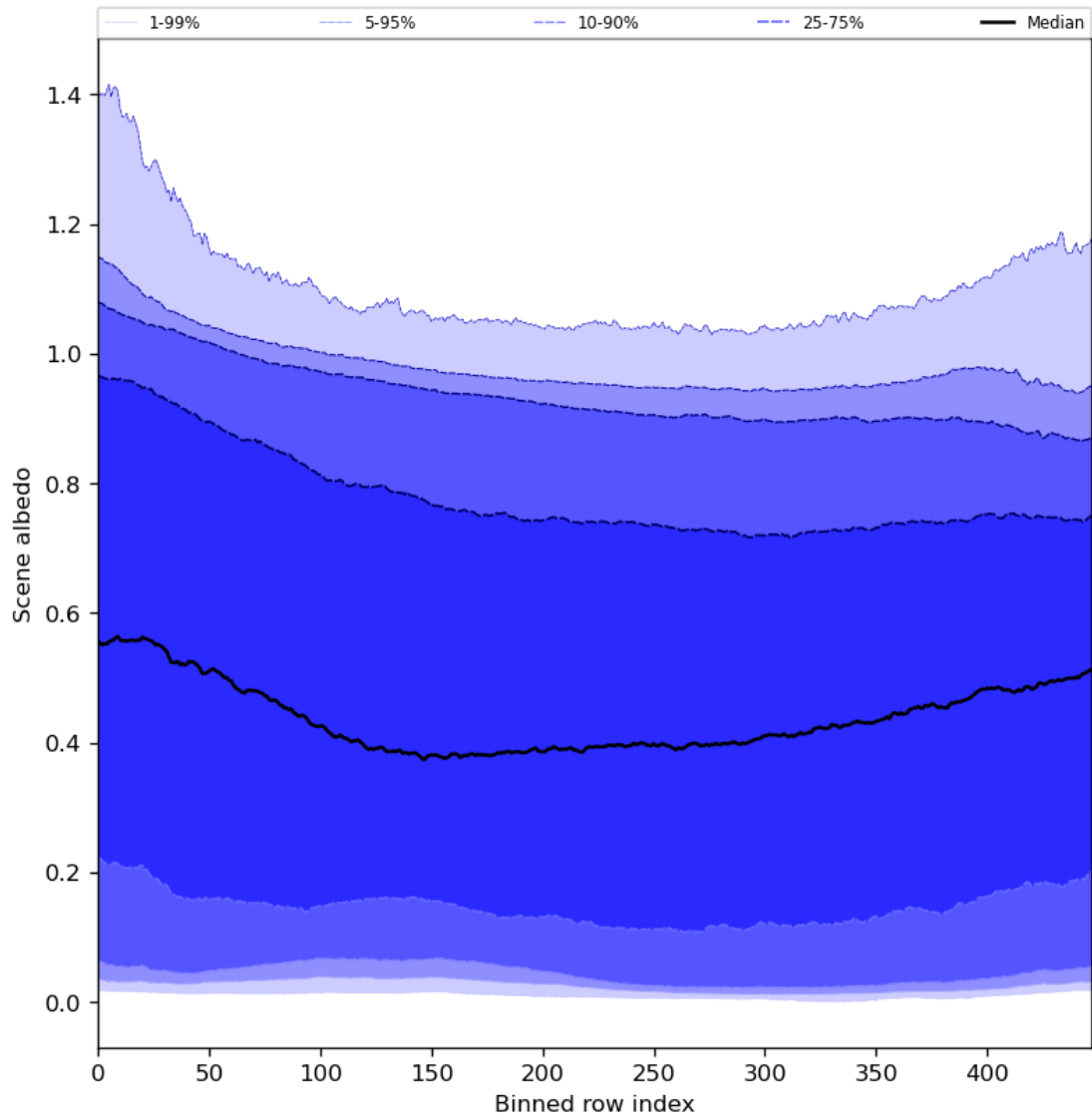


Figure 51: Along track statistics of “Scene albedo” for 2023-11-28 to 2023-11-30

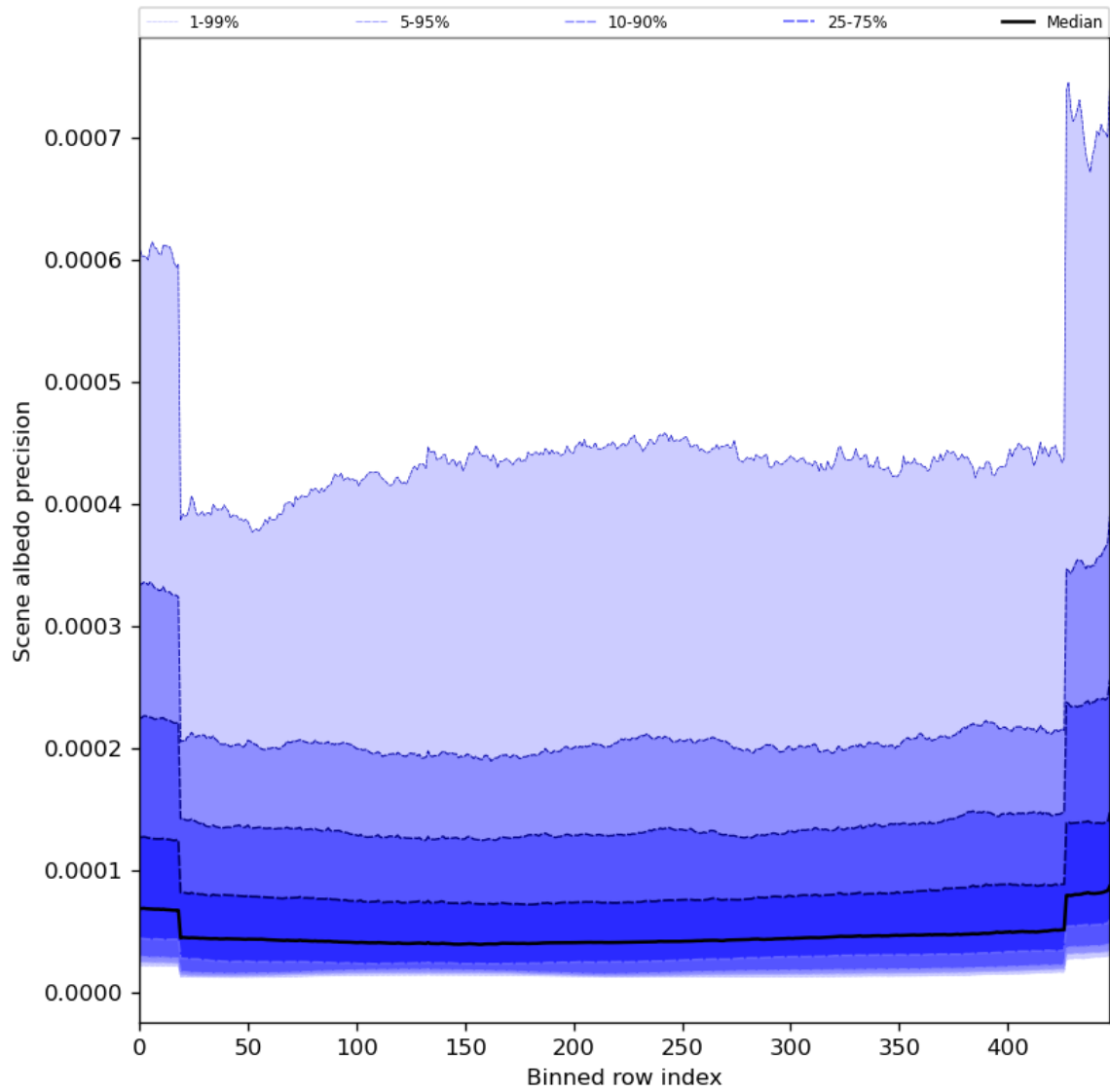


Figure 52: Along track statistics of “Scene albedo precision” for 2023-11-28 to 2023-11-30

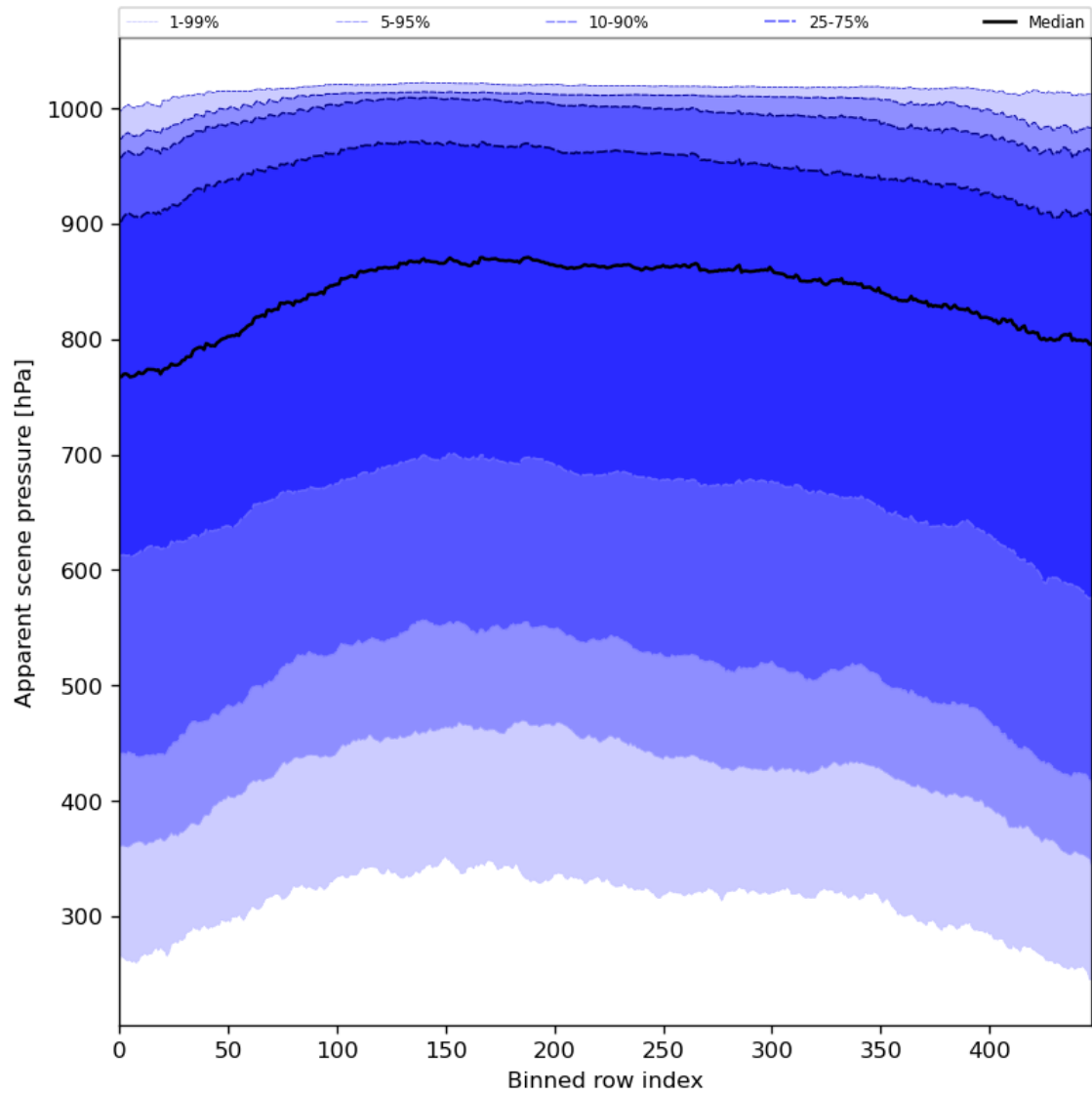


Figure 53: Along track statistics of “Apparent scene pressure” for 2023-11-28 to 2023-11-30

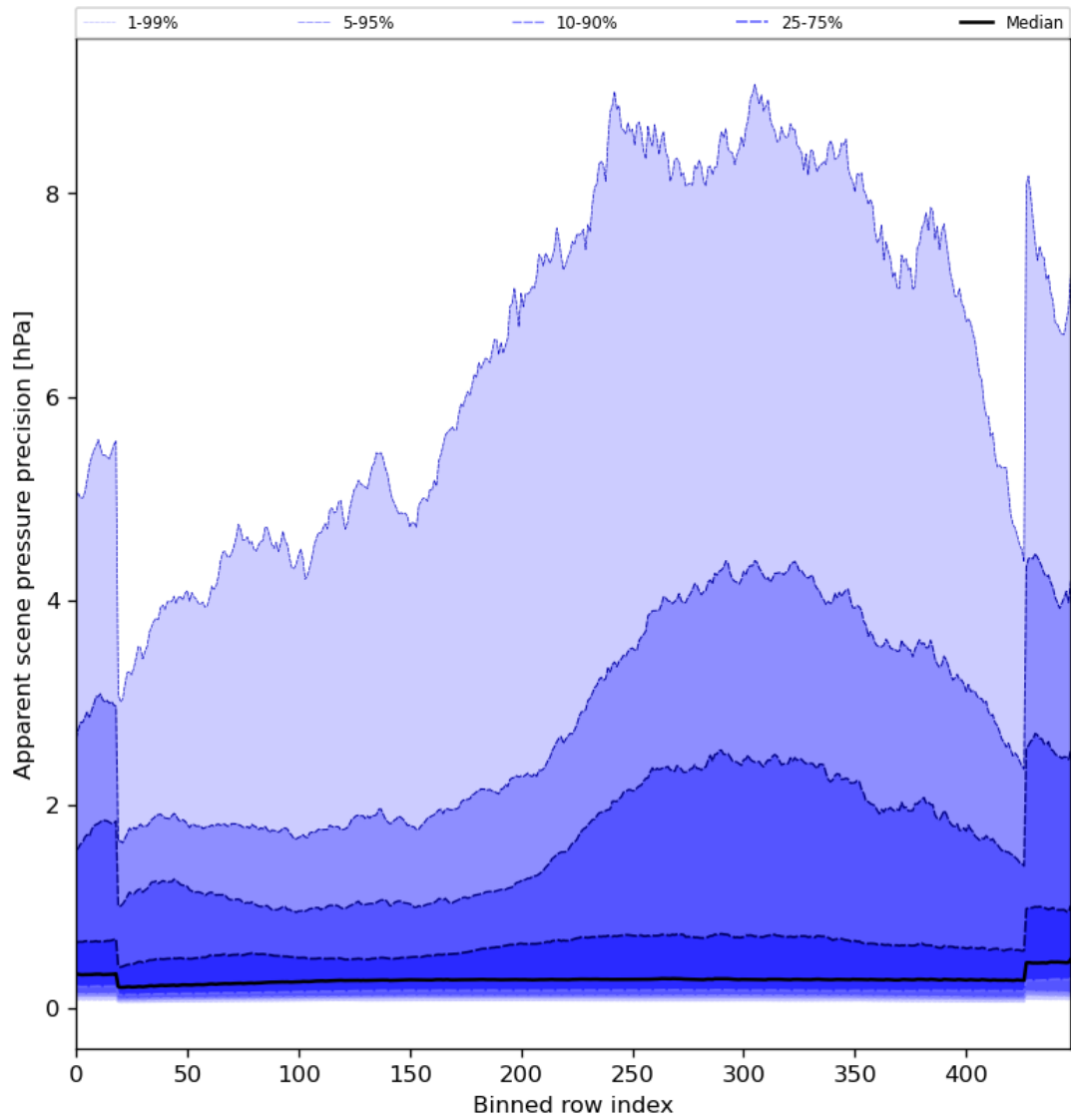


Figure 54: Along track statistics of “Apparent scene pressure precision” for 2023-11-28 to 2023-11-30

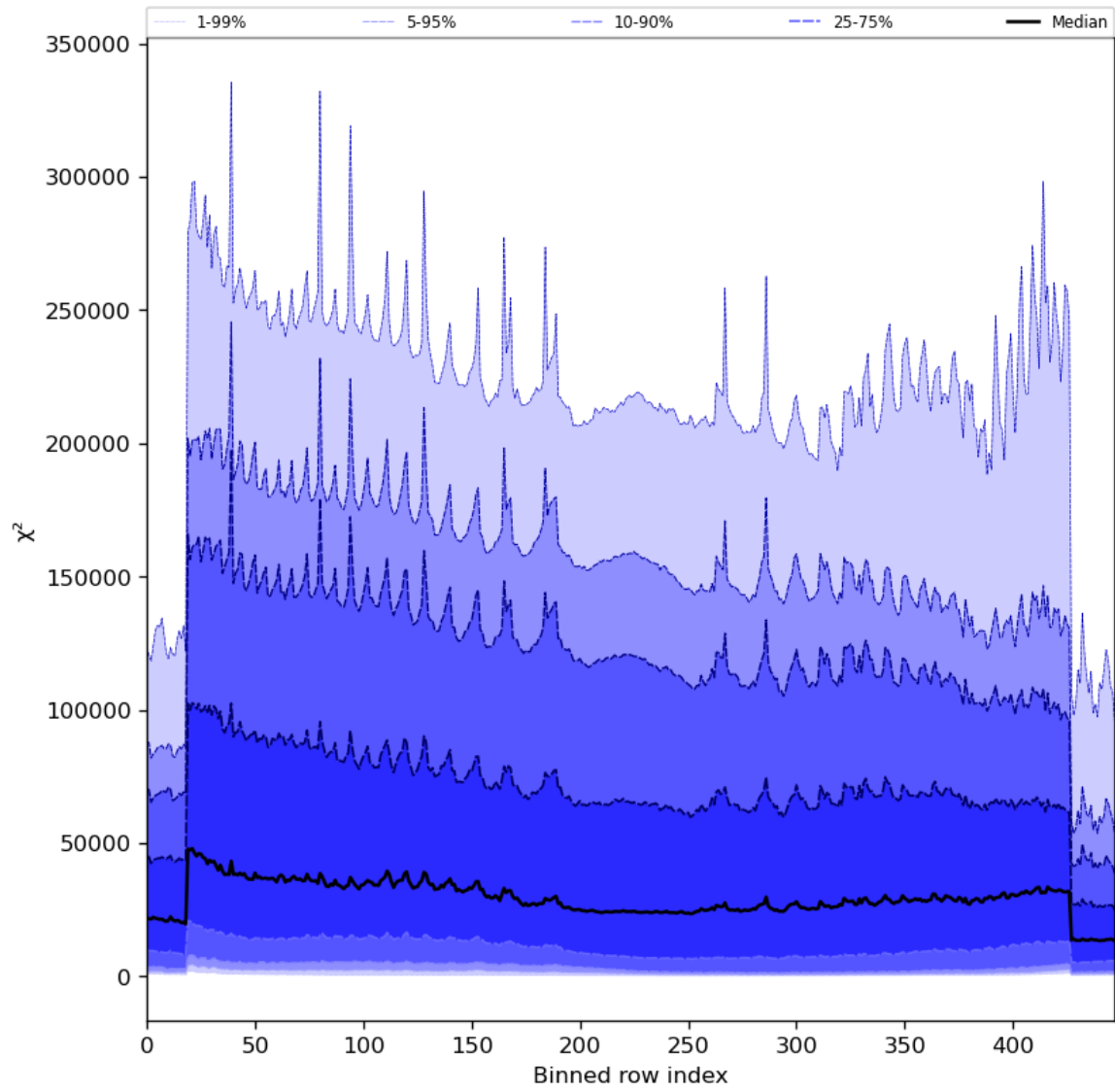


Figure 55: Along track statistics of “ χ^2 ” for 2023-11-28 to 2023-11-30

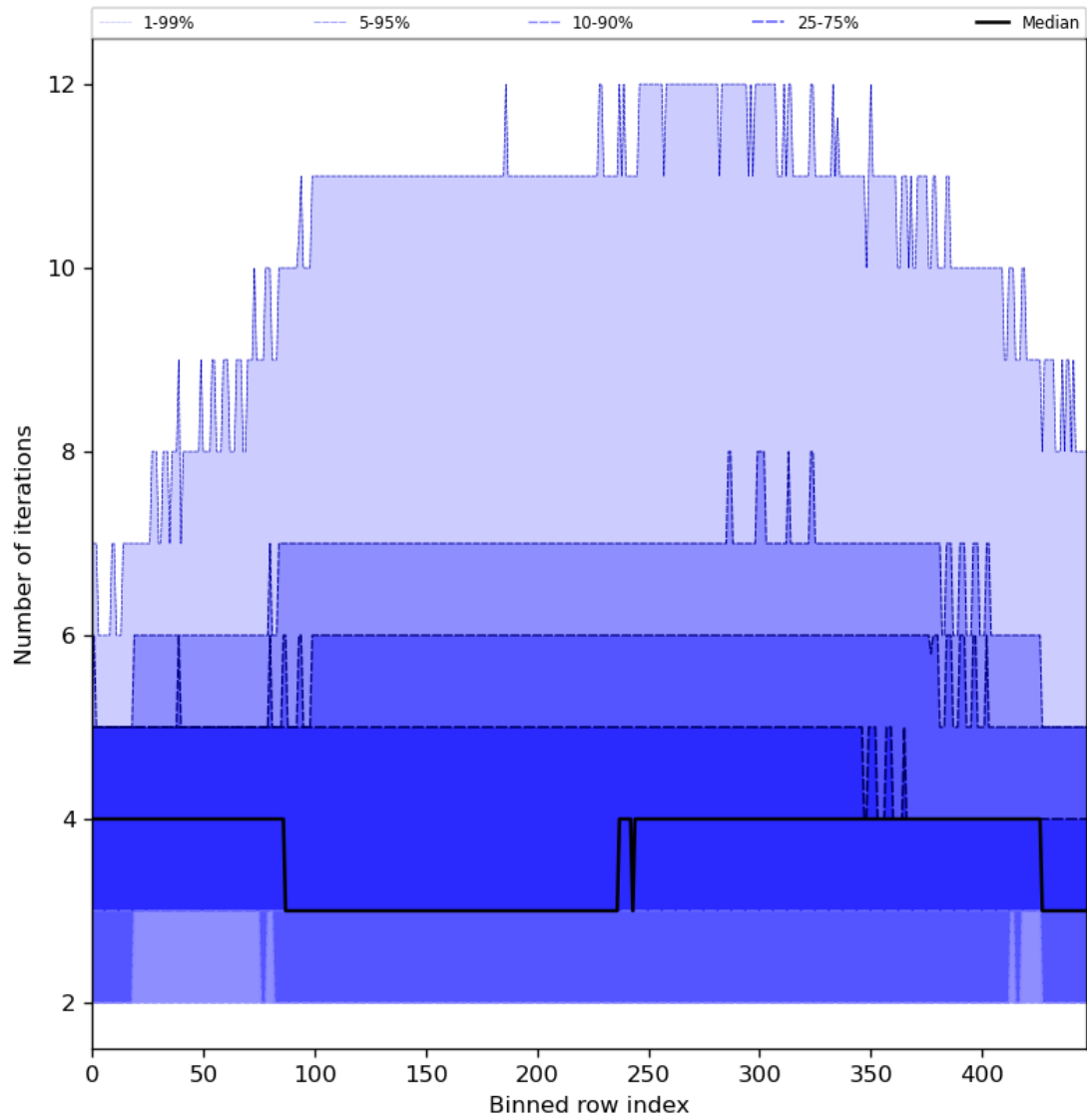


Figure 56: Along track statistics of “Number of iterations” for 2023-11-28 to 2023-11-30

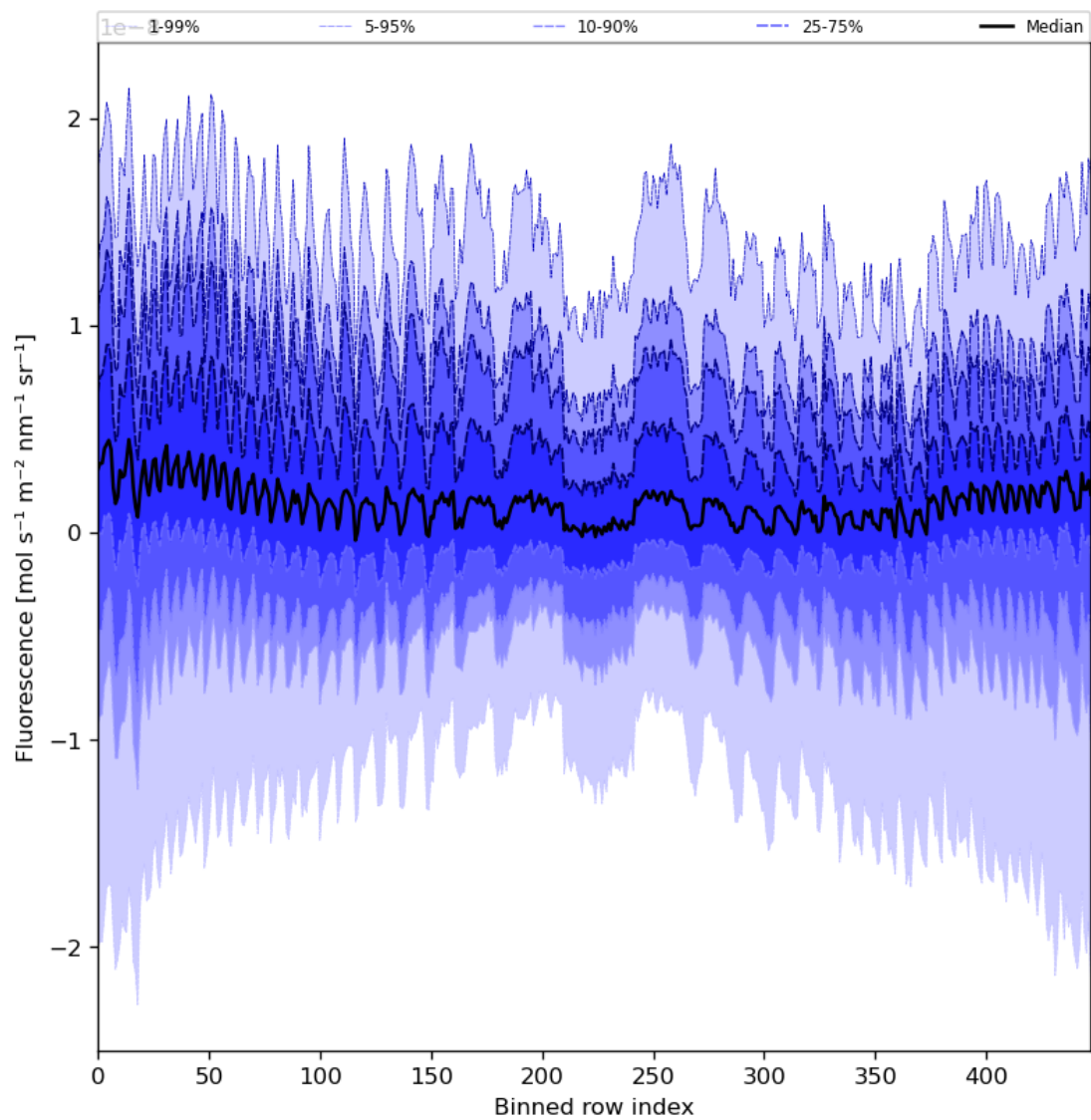


Figure 57: Along track statistics of “Fluorescence” for 2023-11-28 to 2023-11-30

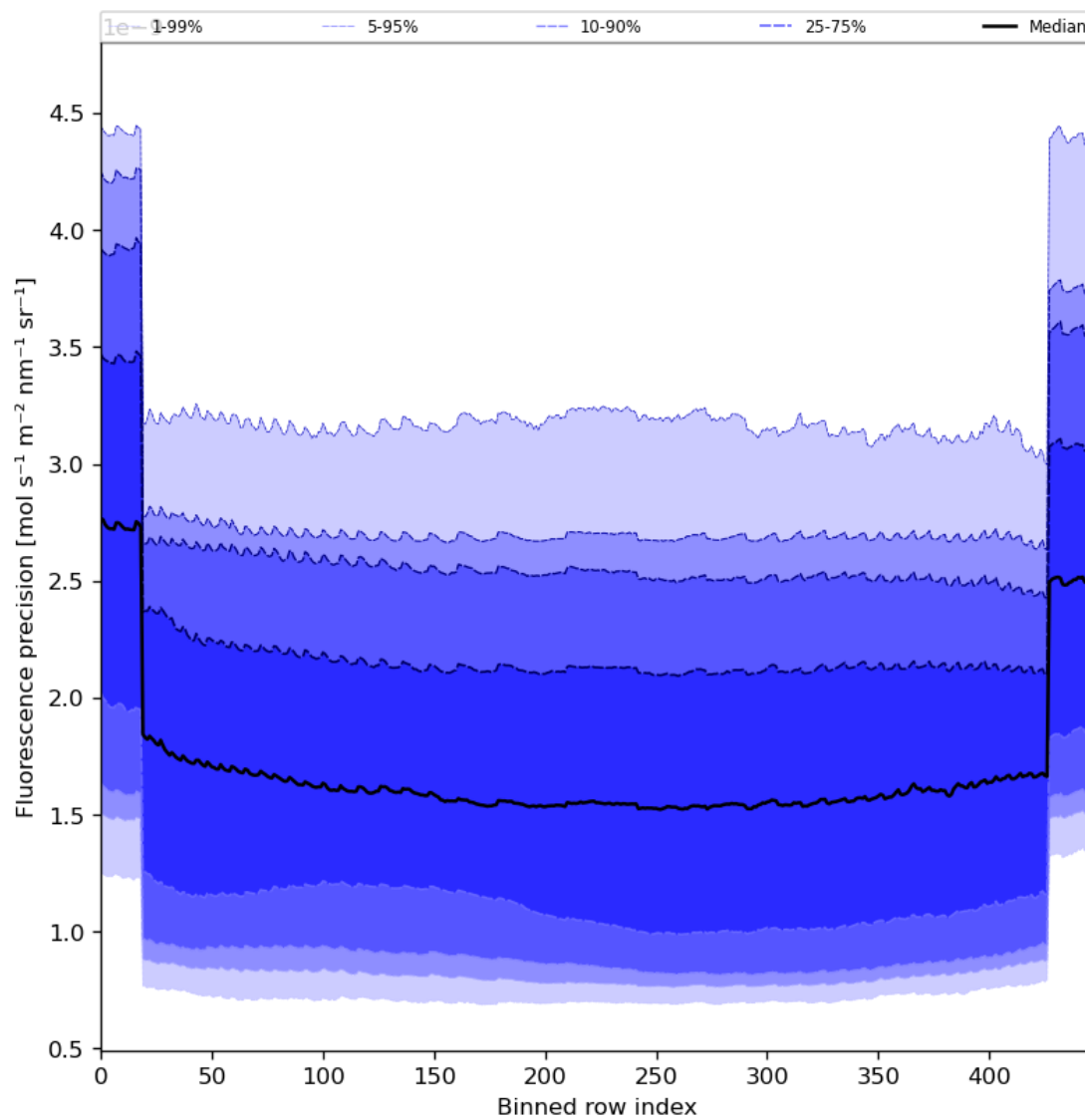


Figure 58: Along track statistics of “Fluorescence precision” for 2023-11-28 to 2023-11-30

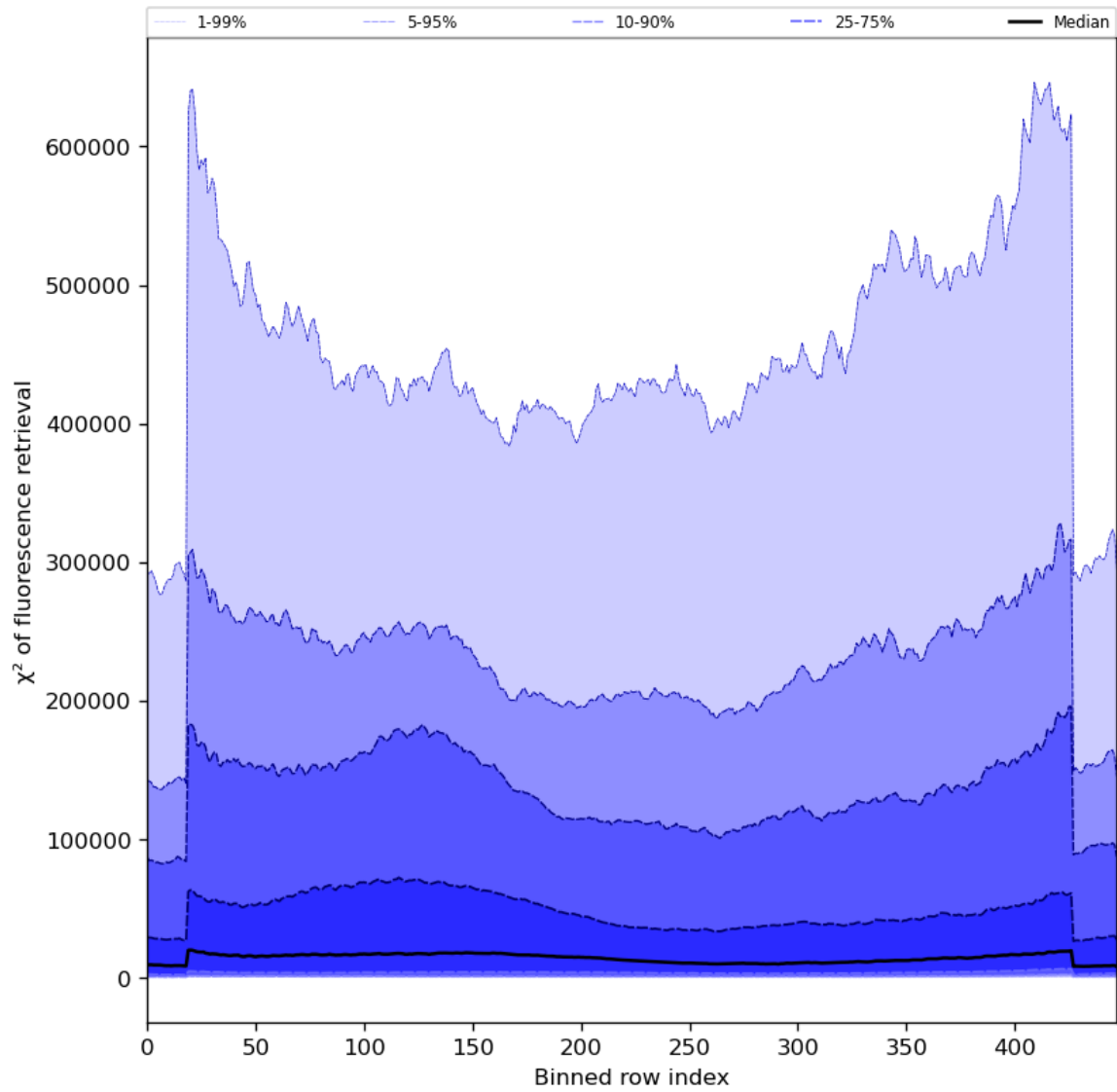


Figure 59: Along track statistics of " χ^2 of fluorescence retrieval" for 2023-11-28 to 2023-11-30

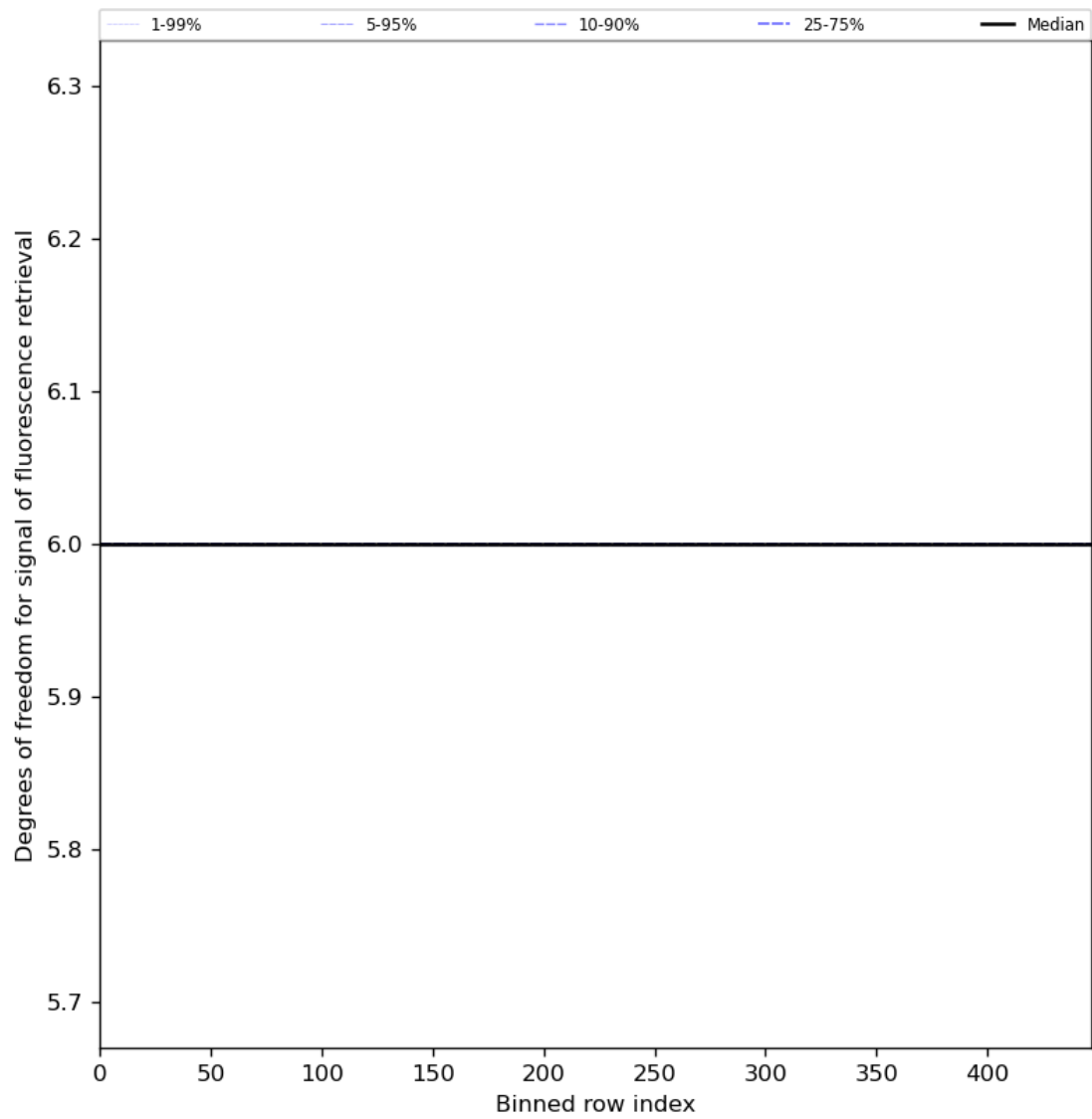


Figure 60: Along track statistics of “Degrees of freedom for signal of fluorescence retrieval” for 2023-11-28 to 2023-11-30

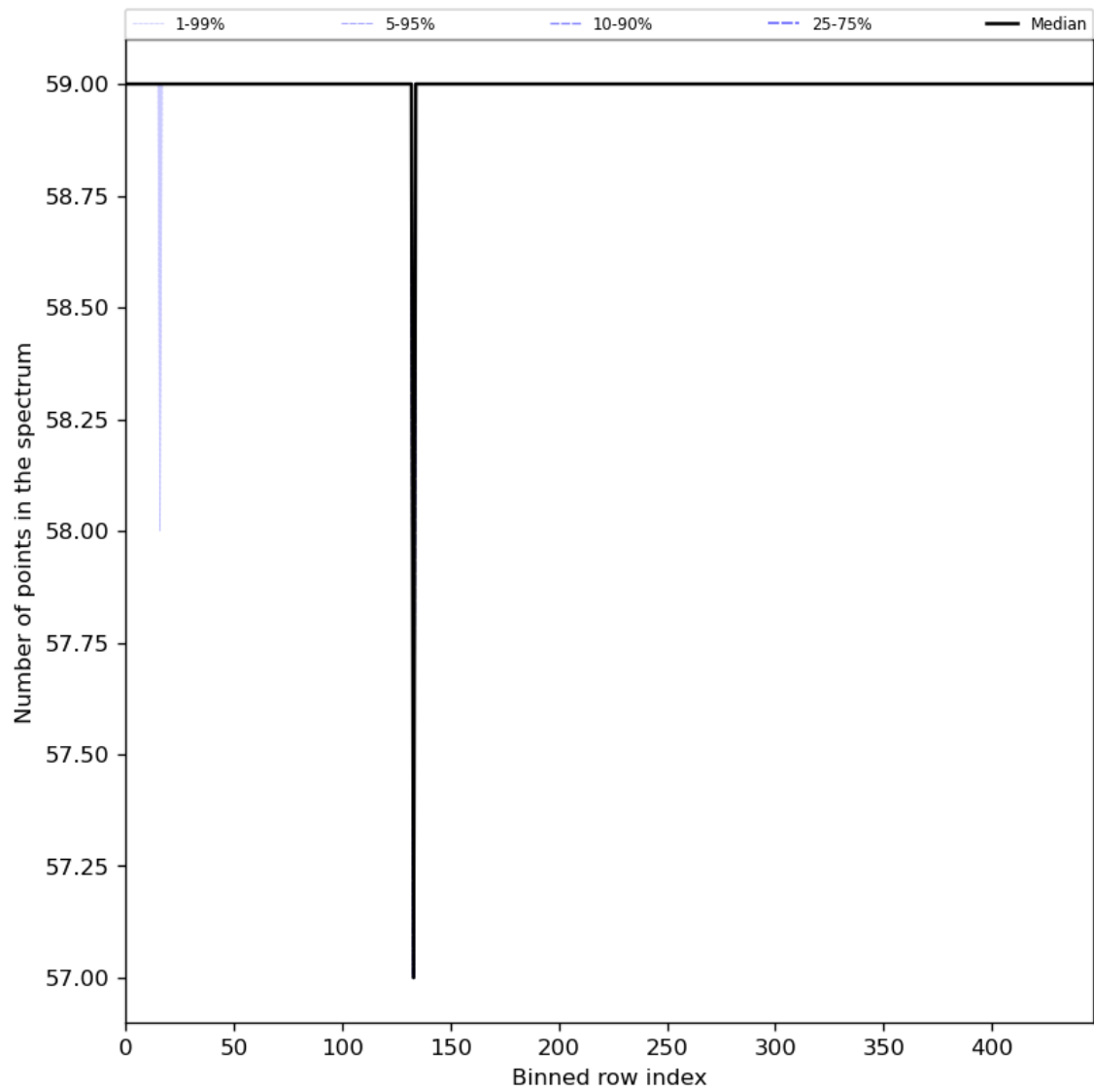


Figure 61: Along track statistics of “Number of points in the spectrum” for 2023-11-28 to 2023-11-30

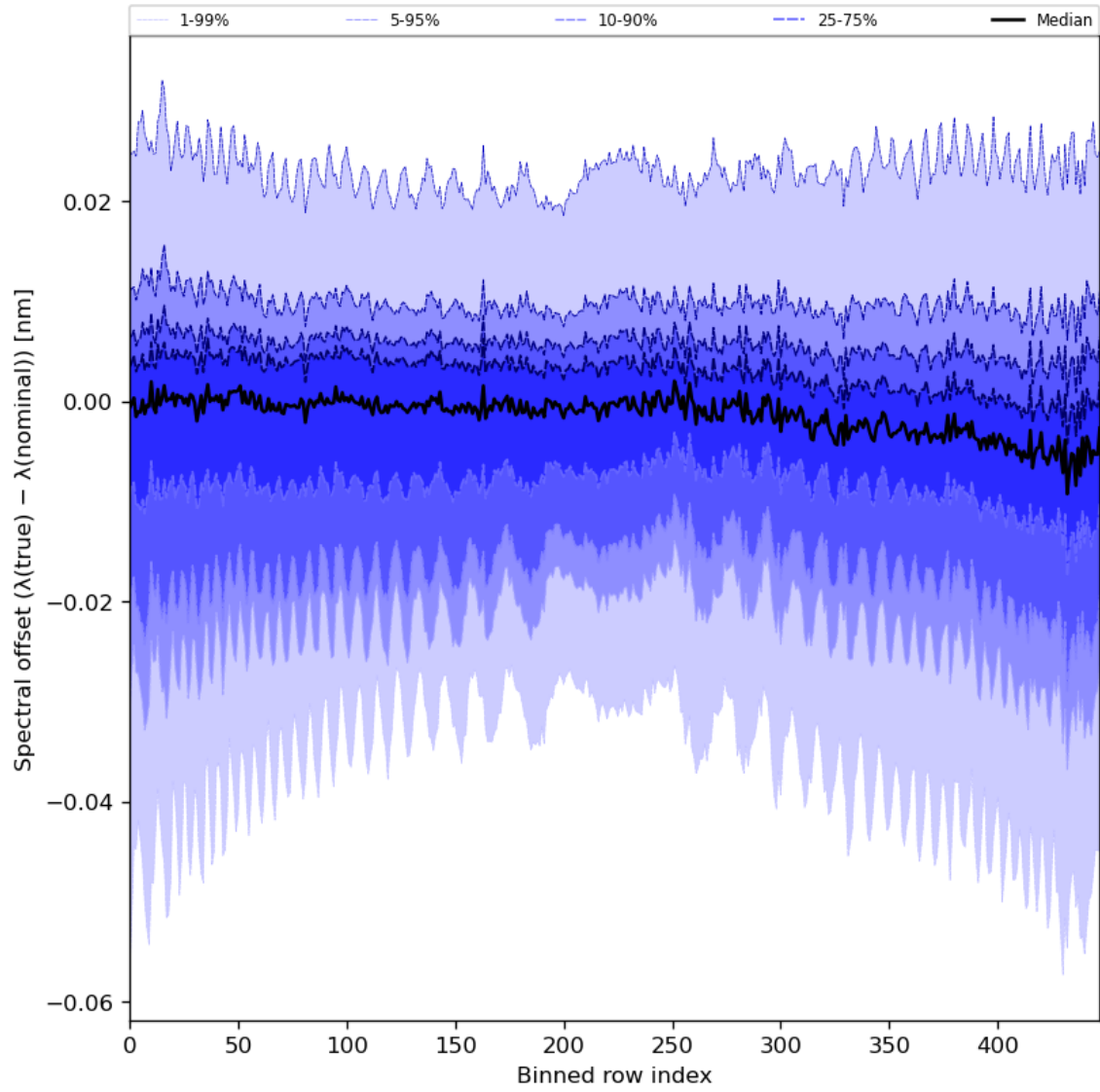


Figure 62: Along track statistics of “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30

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.

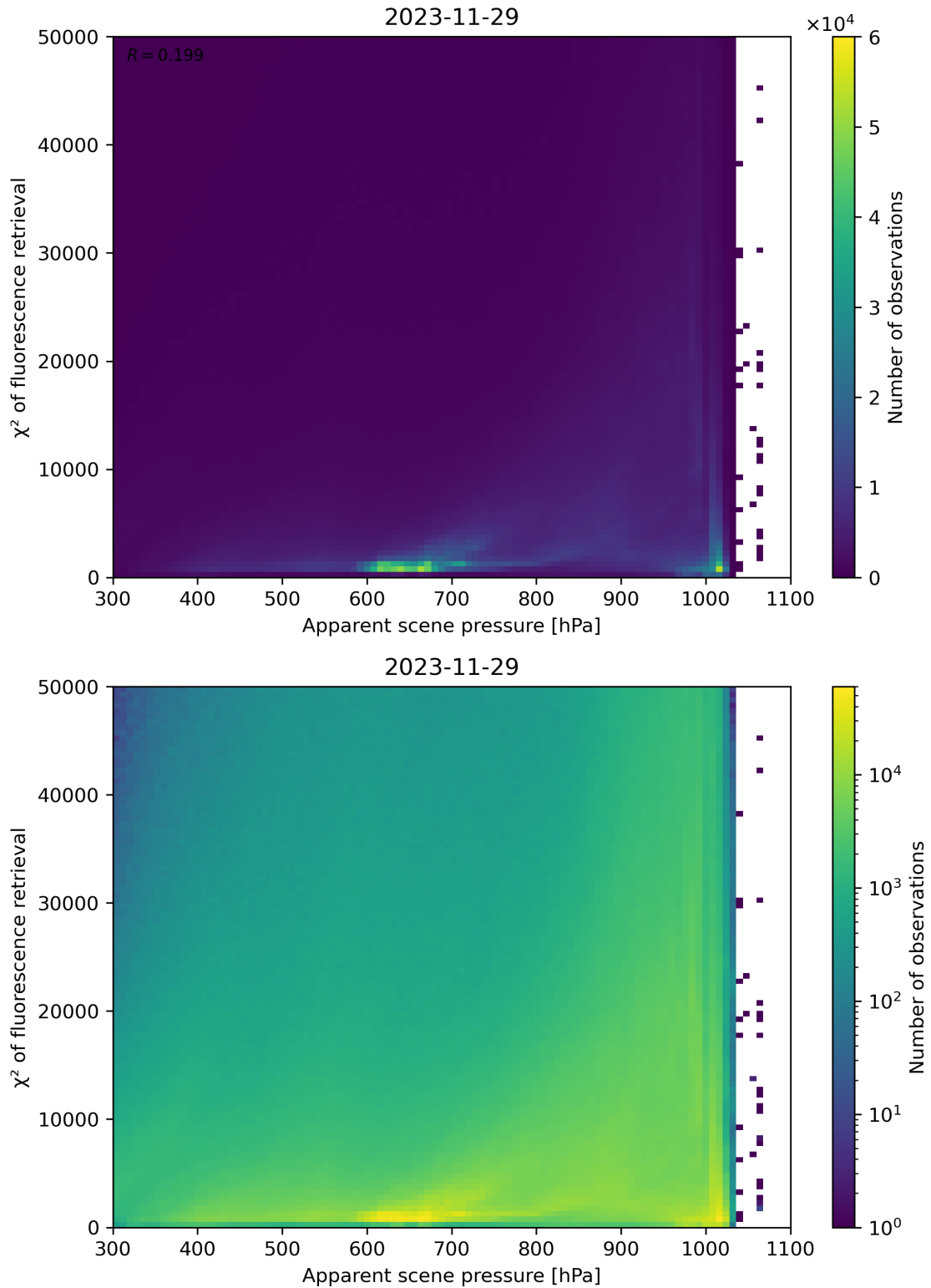


Figure 63: Scatter density plot of “Apparent scene pressure” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.

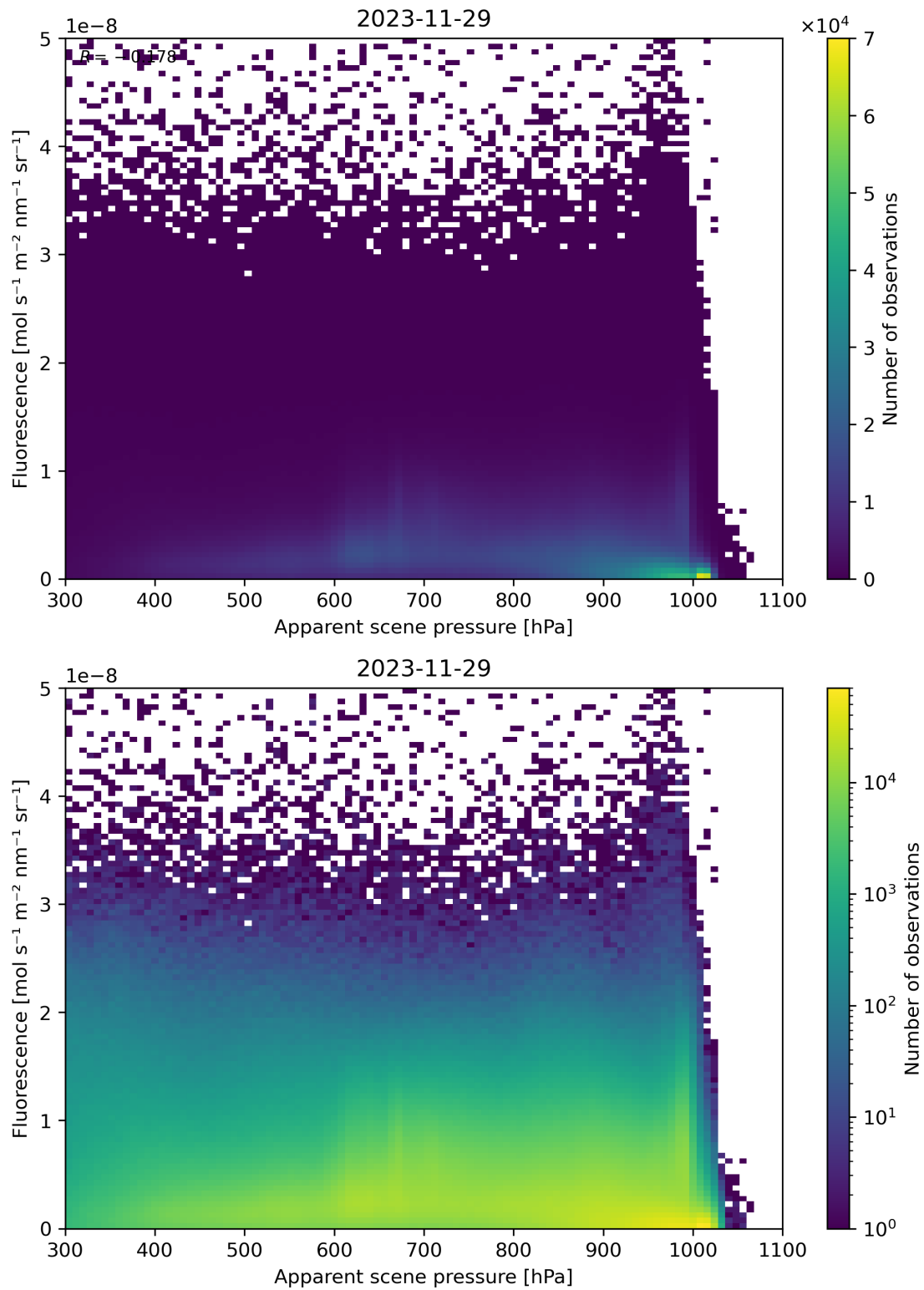


Figure 64: Scatter density plot of “Apparent scene pressure” against “Fluorescence” for 2023-11-28 to 2023-11-30.

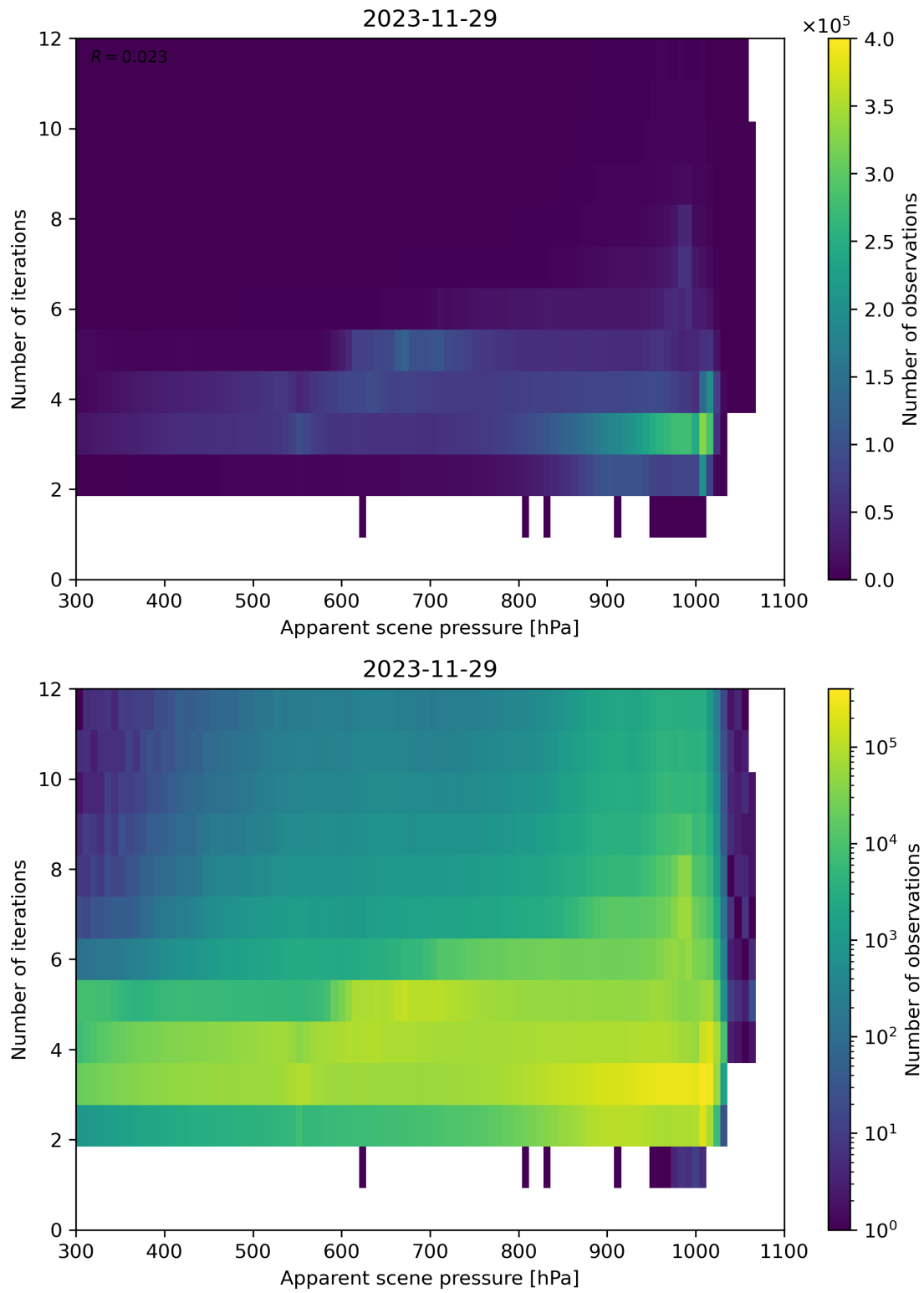


Figure 65: Scatter density plot of “Apparent scene pressure” against “Number of iterations” for 2023-11-28 to 2023-11-30.

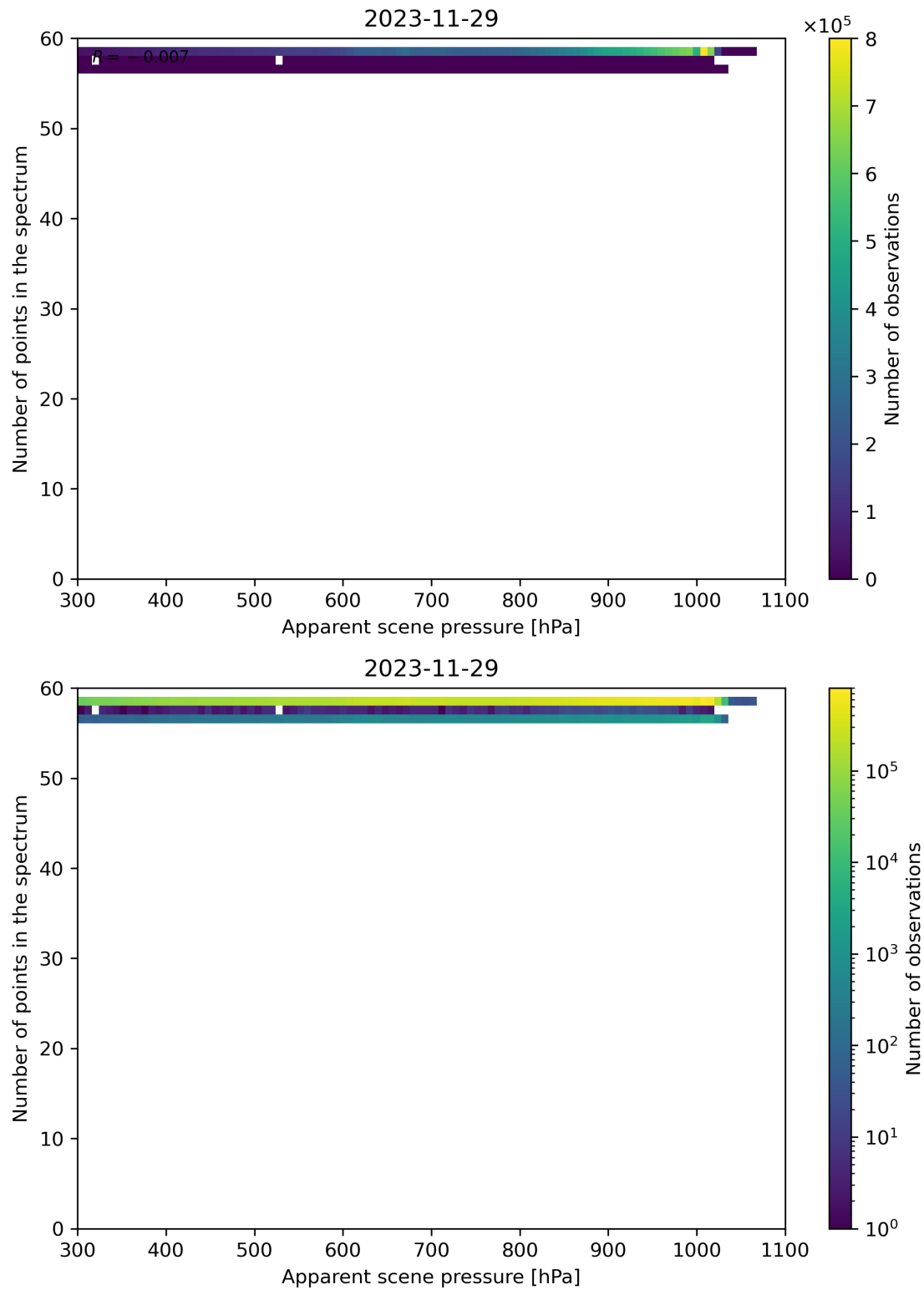


Figure 66: Scatter density plot of “Apparent scene pressure” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.

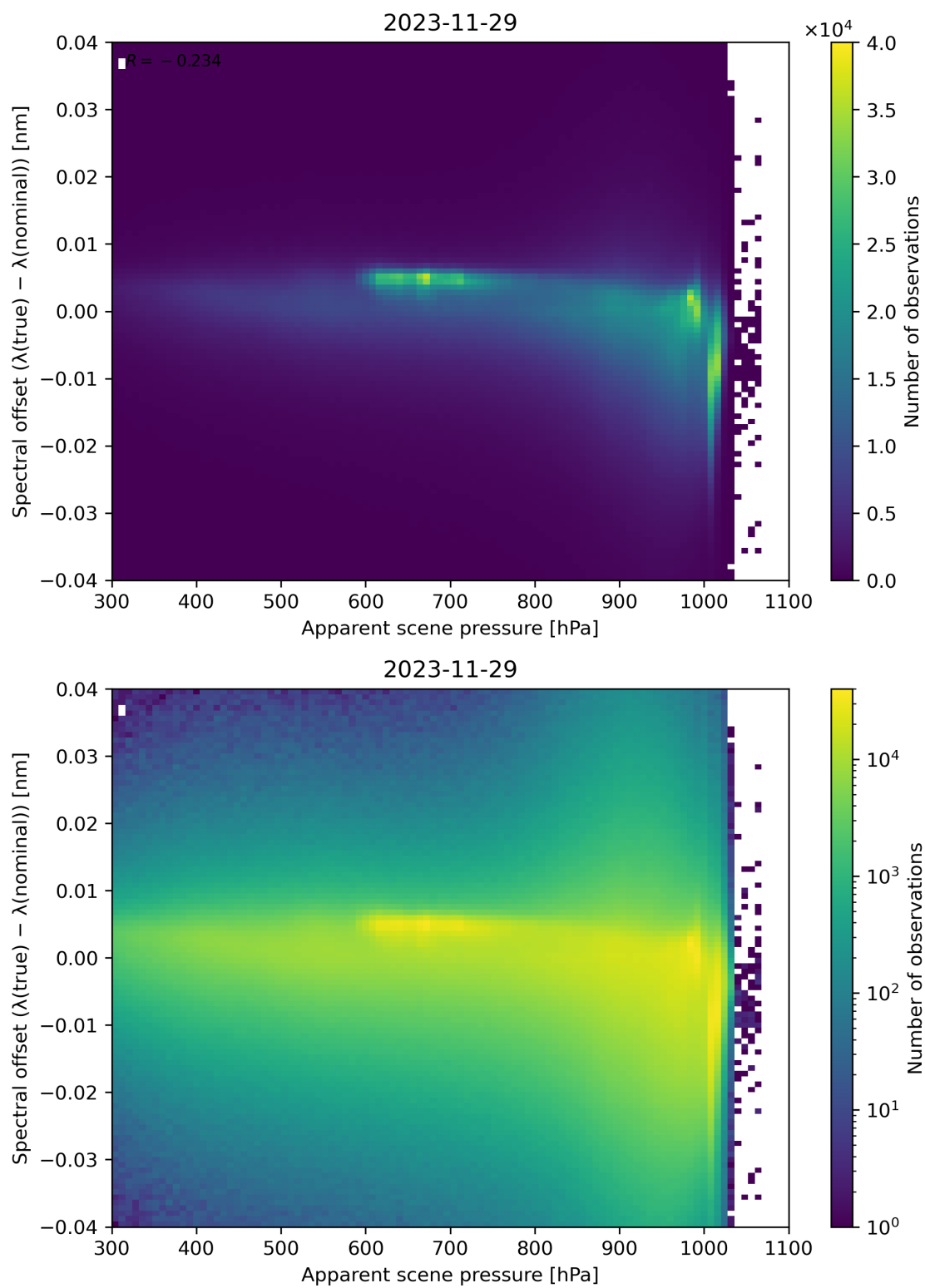


Figure 67: Scatter density plot of “Apparent scene pressure” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.

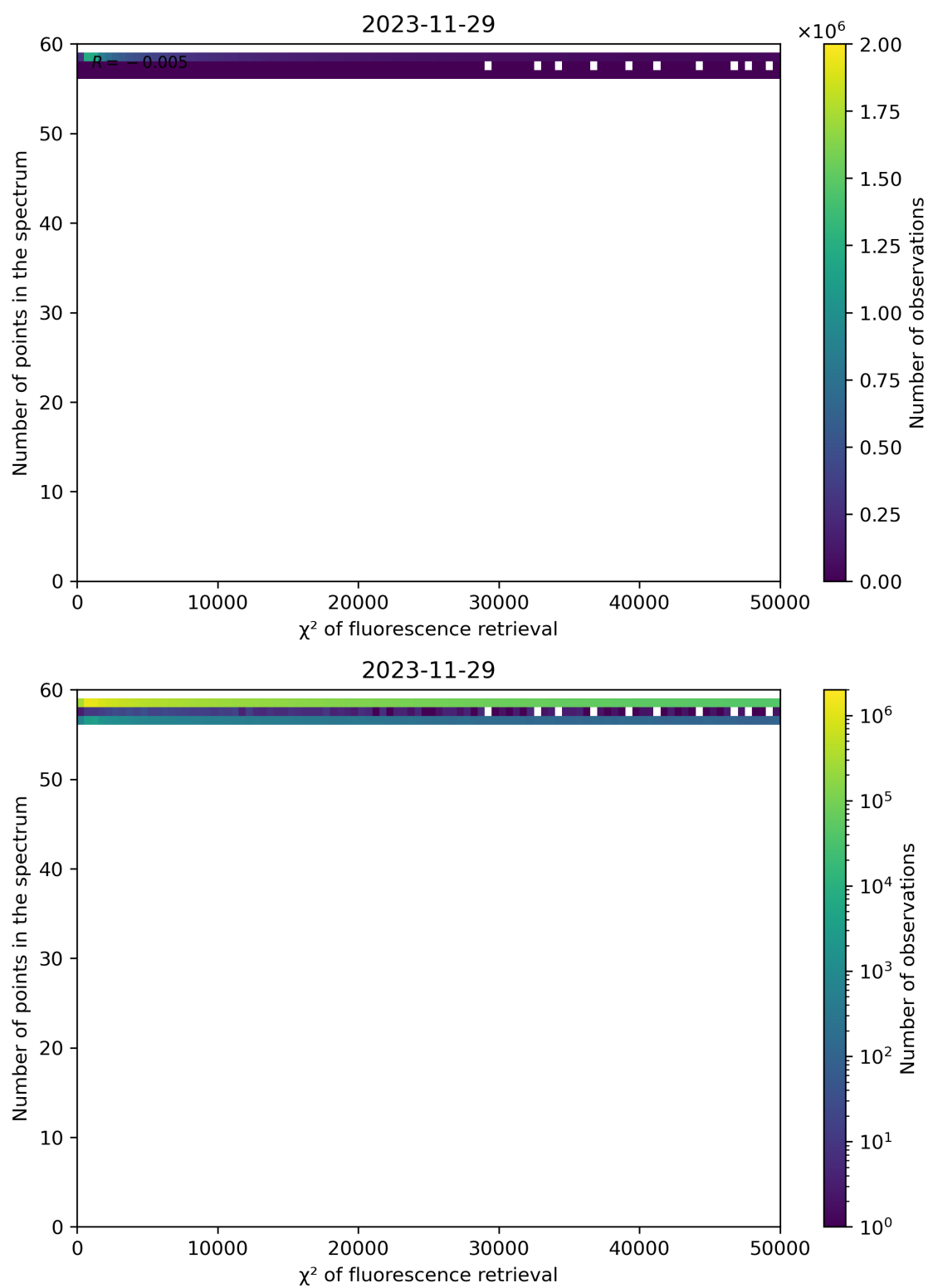


Figure 68: Scatter density plot of " χ^2 of fluorescence retrieval" against "Number of points in the spectrum" for 2023-11-28 to 2023-11-30.

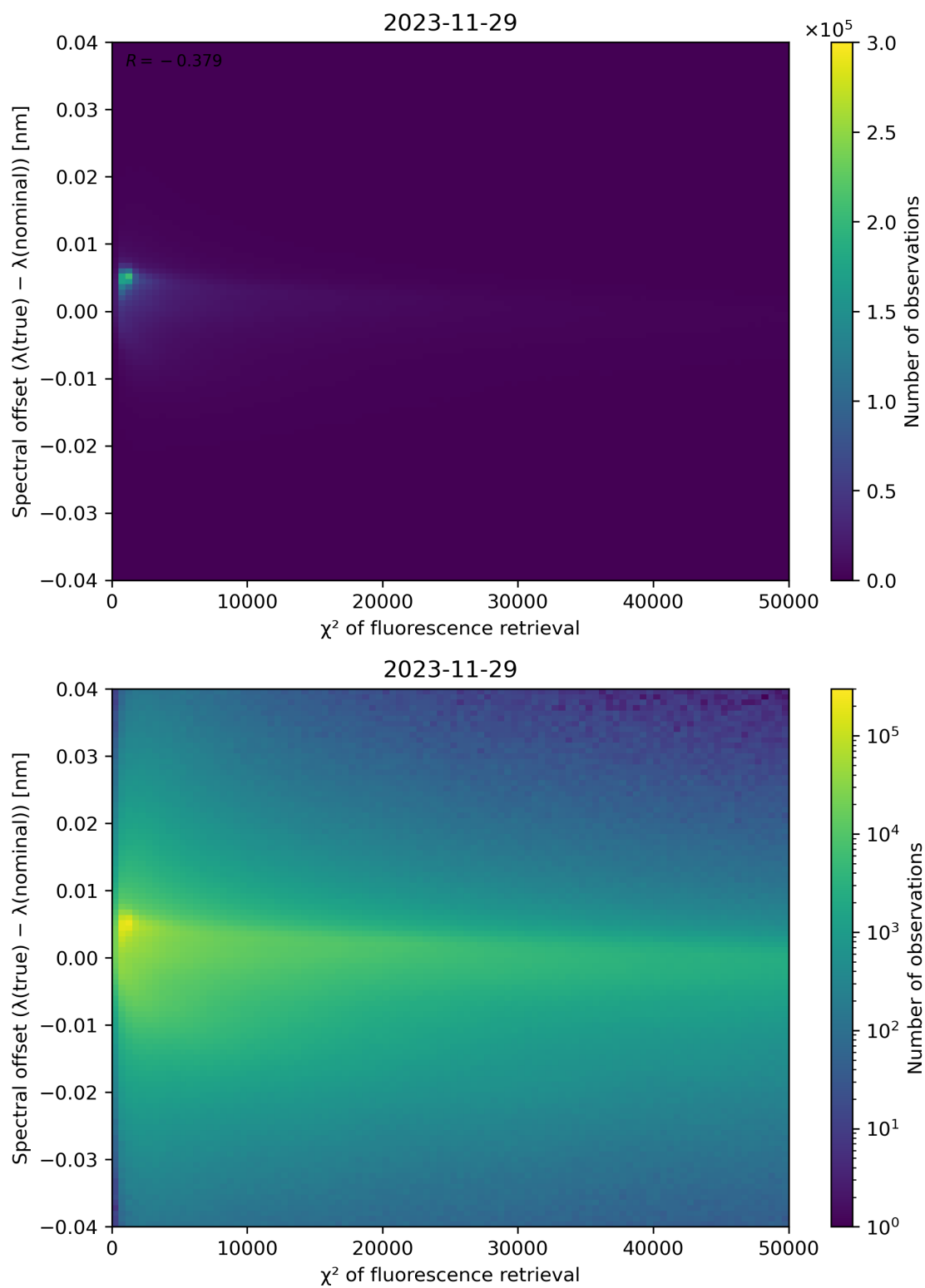


Figure 69: Scatter density plot of " χ^2 of fluorescence retrieval" against "Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)" for 2023-11-28 to 2023-11-30.

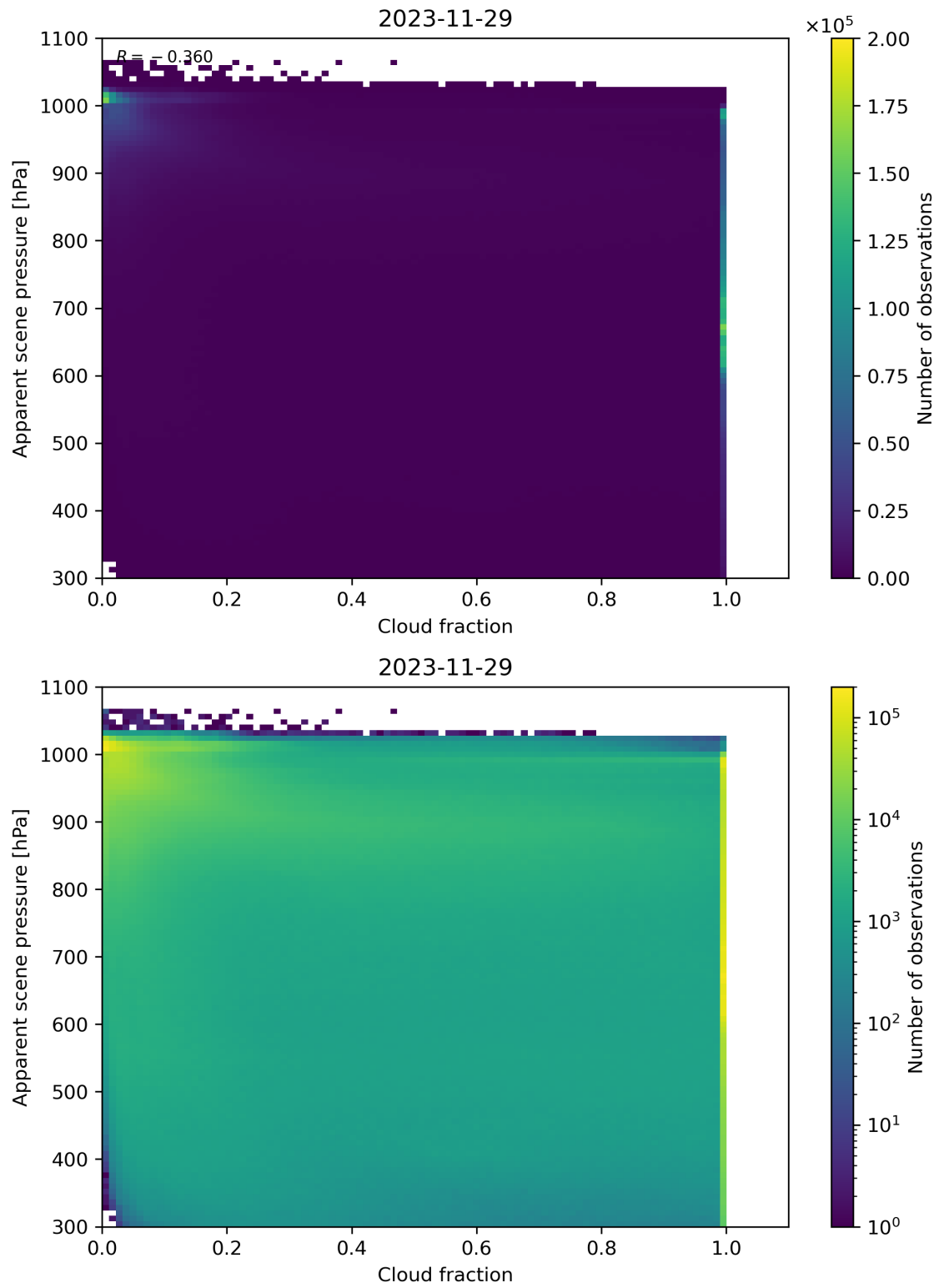


Figure 70: Scatter density plot of “Cloud fraction” against “Apparent scene pressure” for 2023-11-28 to 2023-11-30.

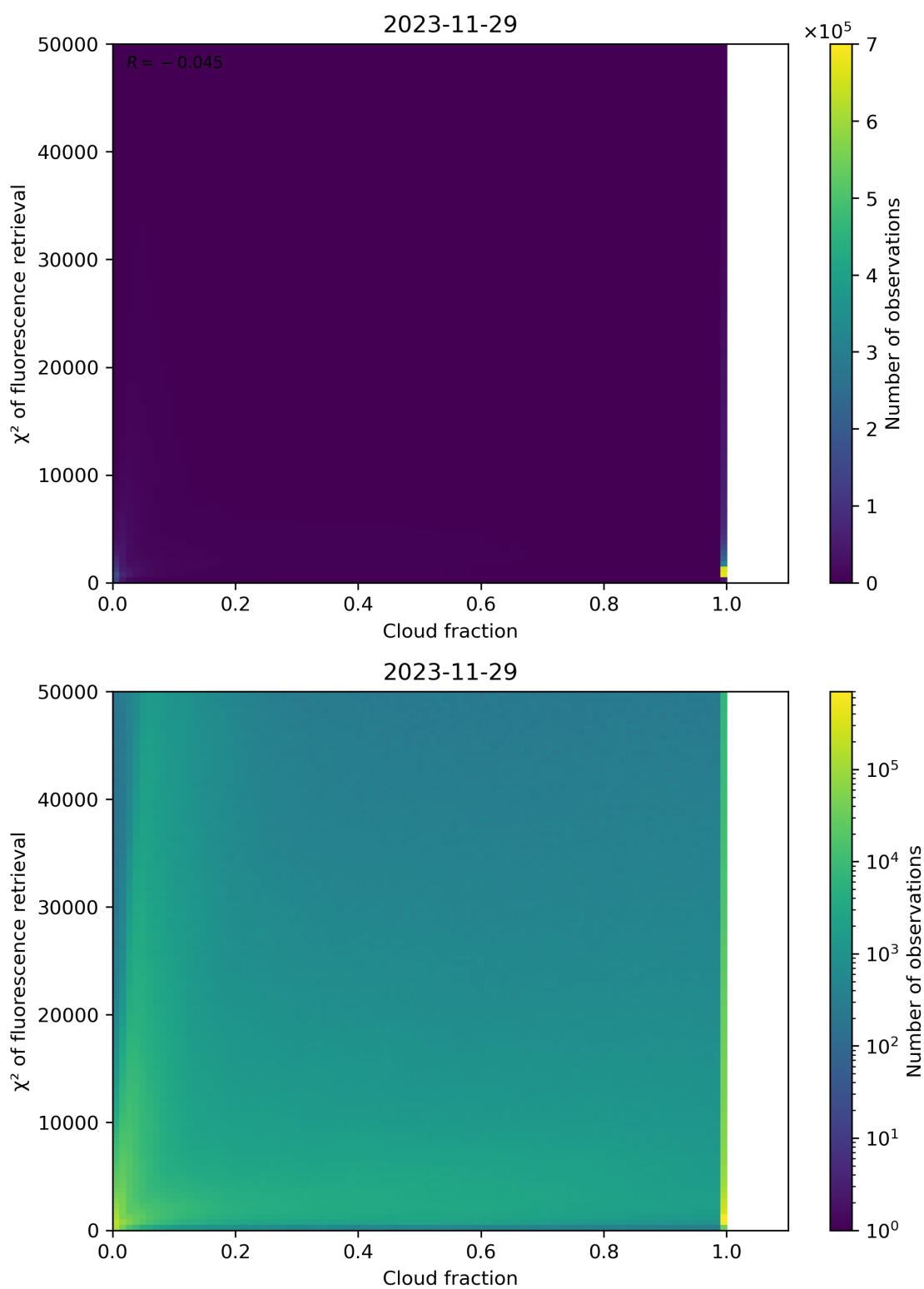


Figure 71: Scatter density plot of “Cloud fraction” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.

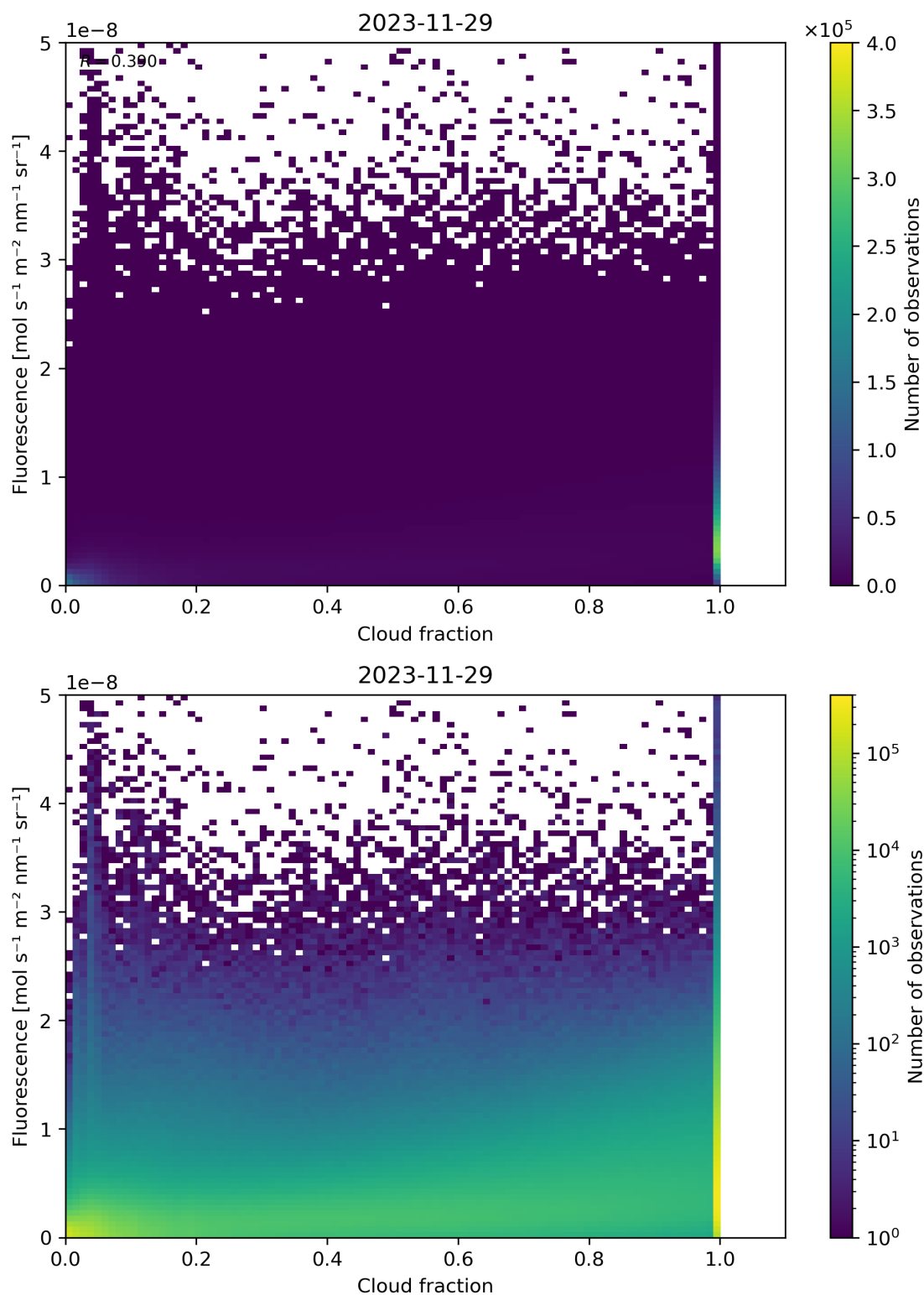


Figure 72: Scatter density plot of “Cloud fraction” against “Fluorescence” for 2023-11-28 to 2023-11-30.

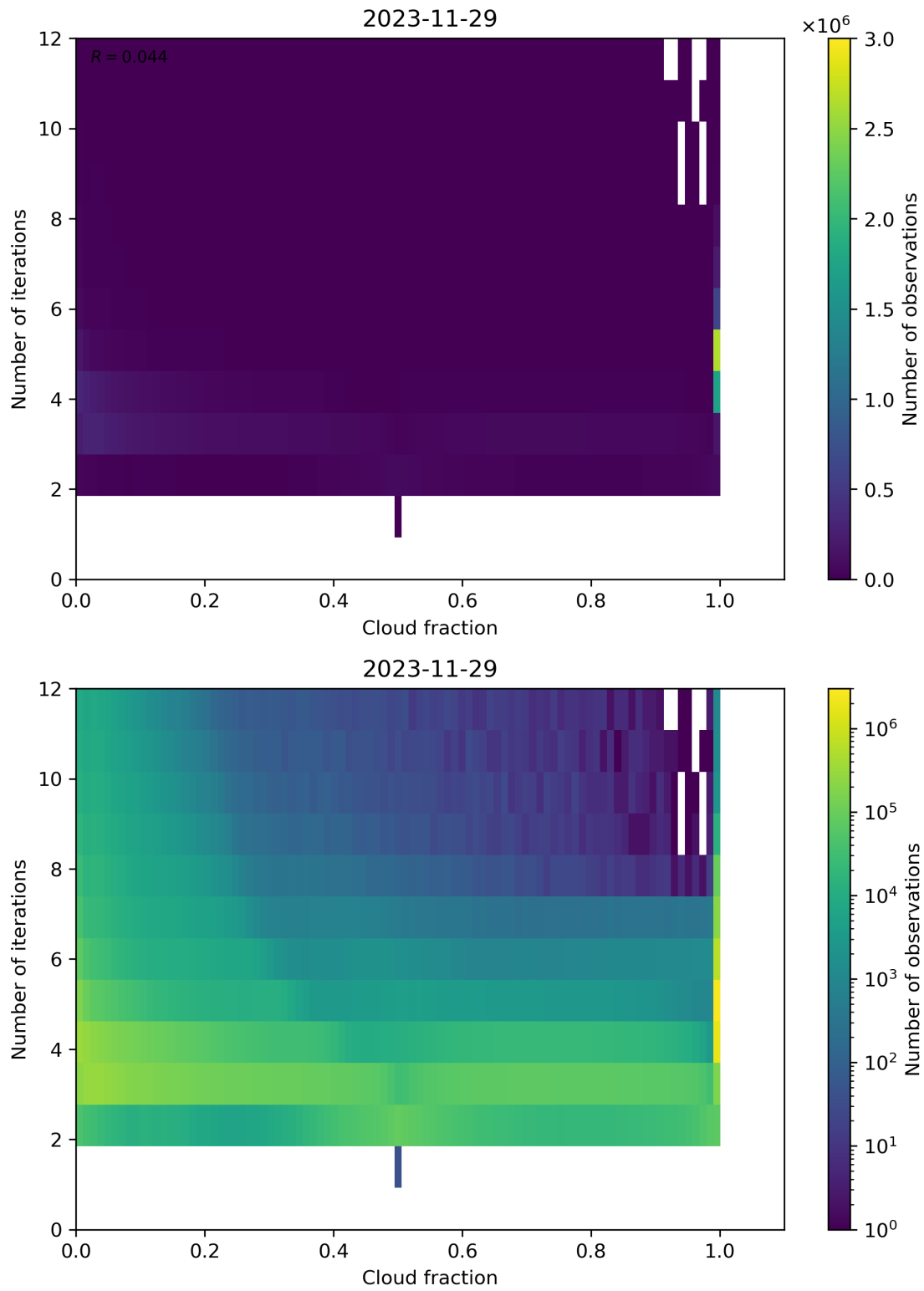


Figure 73: Scatter density plot of “Cloud fraction” against “Number of iterations” for 2023-11-28 to 2023-11-30.

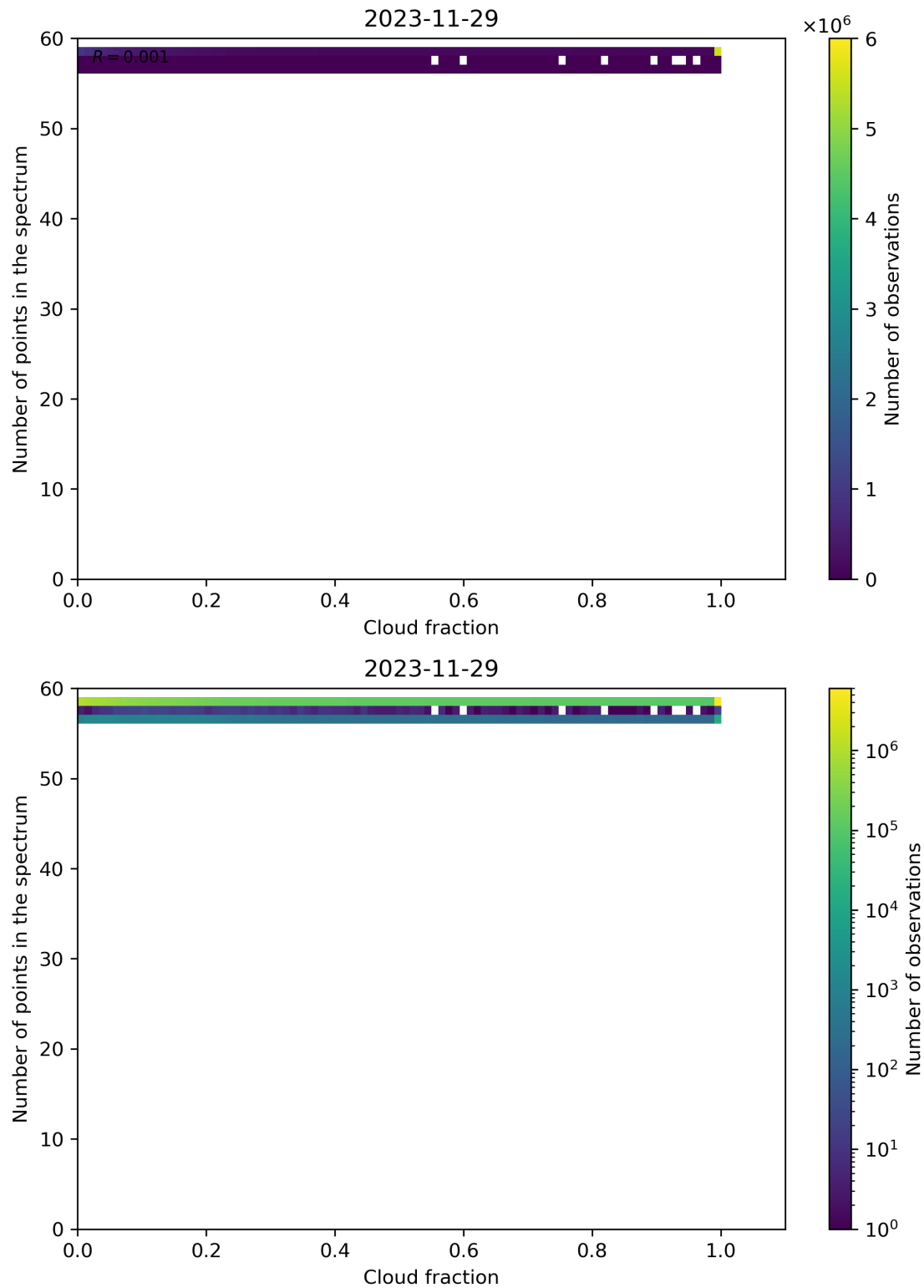


Figure 74: Scatter density plot of “Cloud fraction” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.

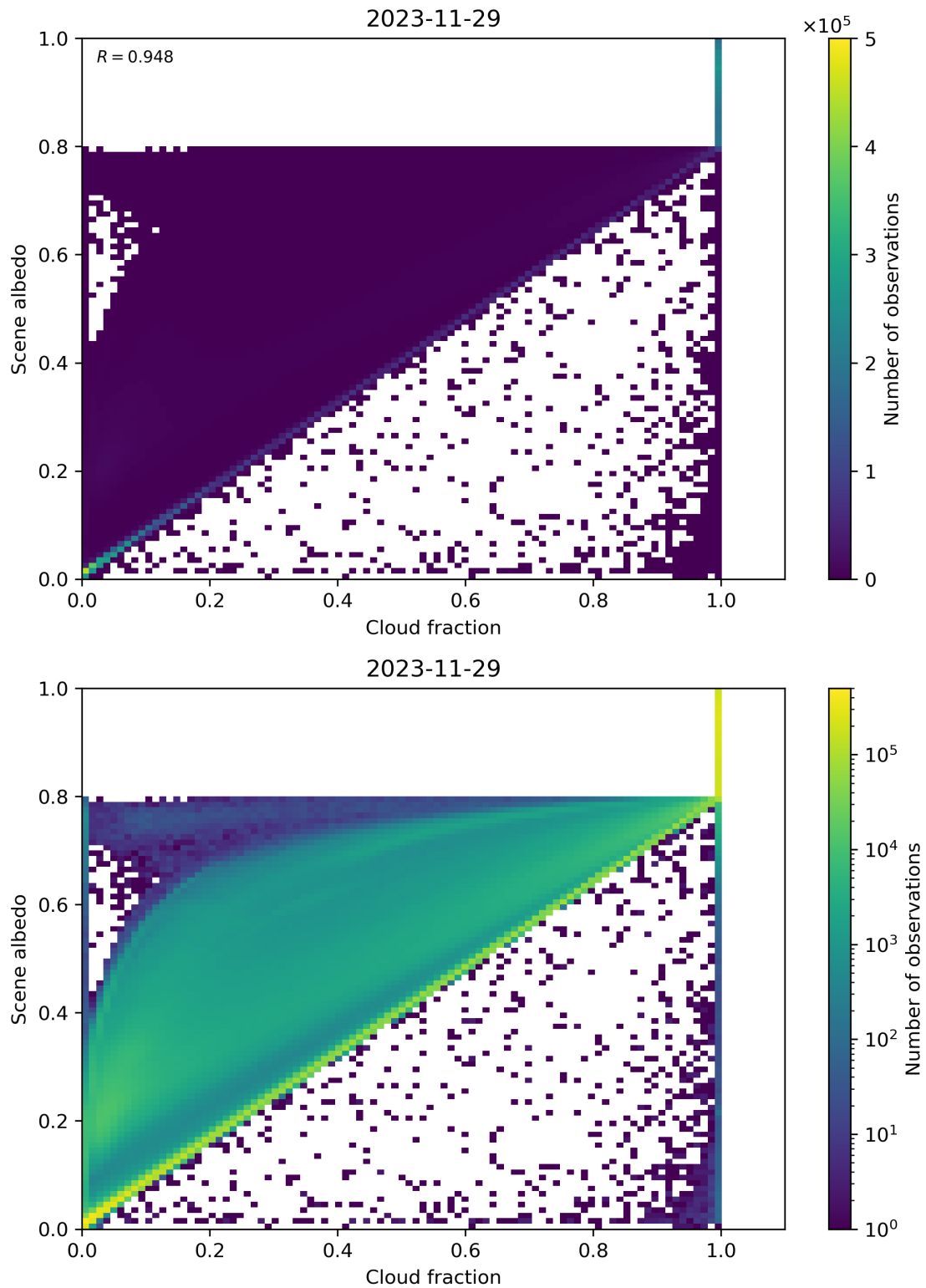


Figure 75: Scatter density plot of “Cloud fraction” against “Scene albedo” for 2023-11-28 to 2023-11-30.

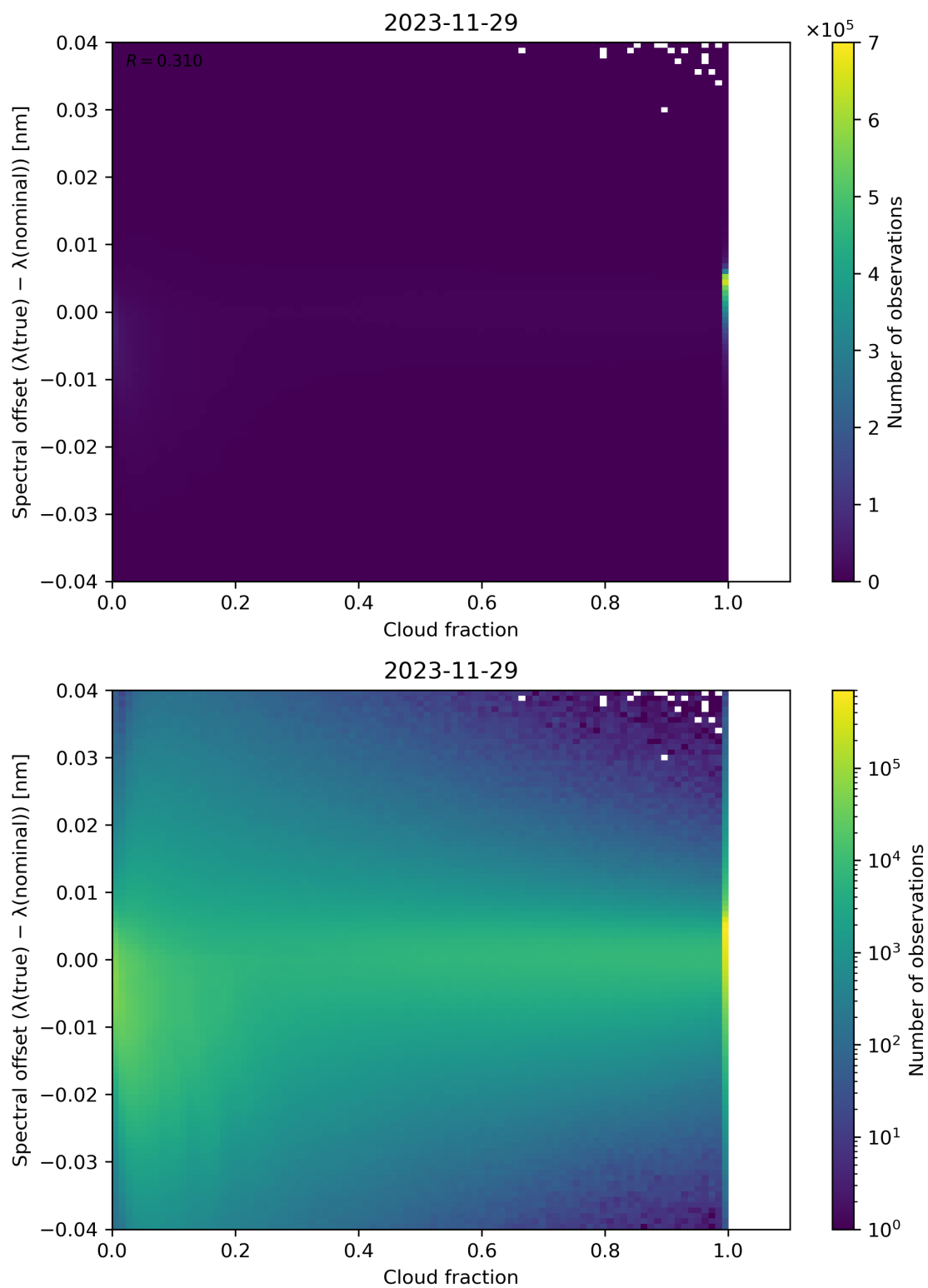


Figure 76: Scatter density plot of “Cloud fraction” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.

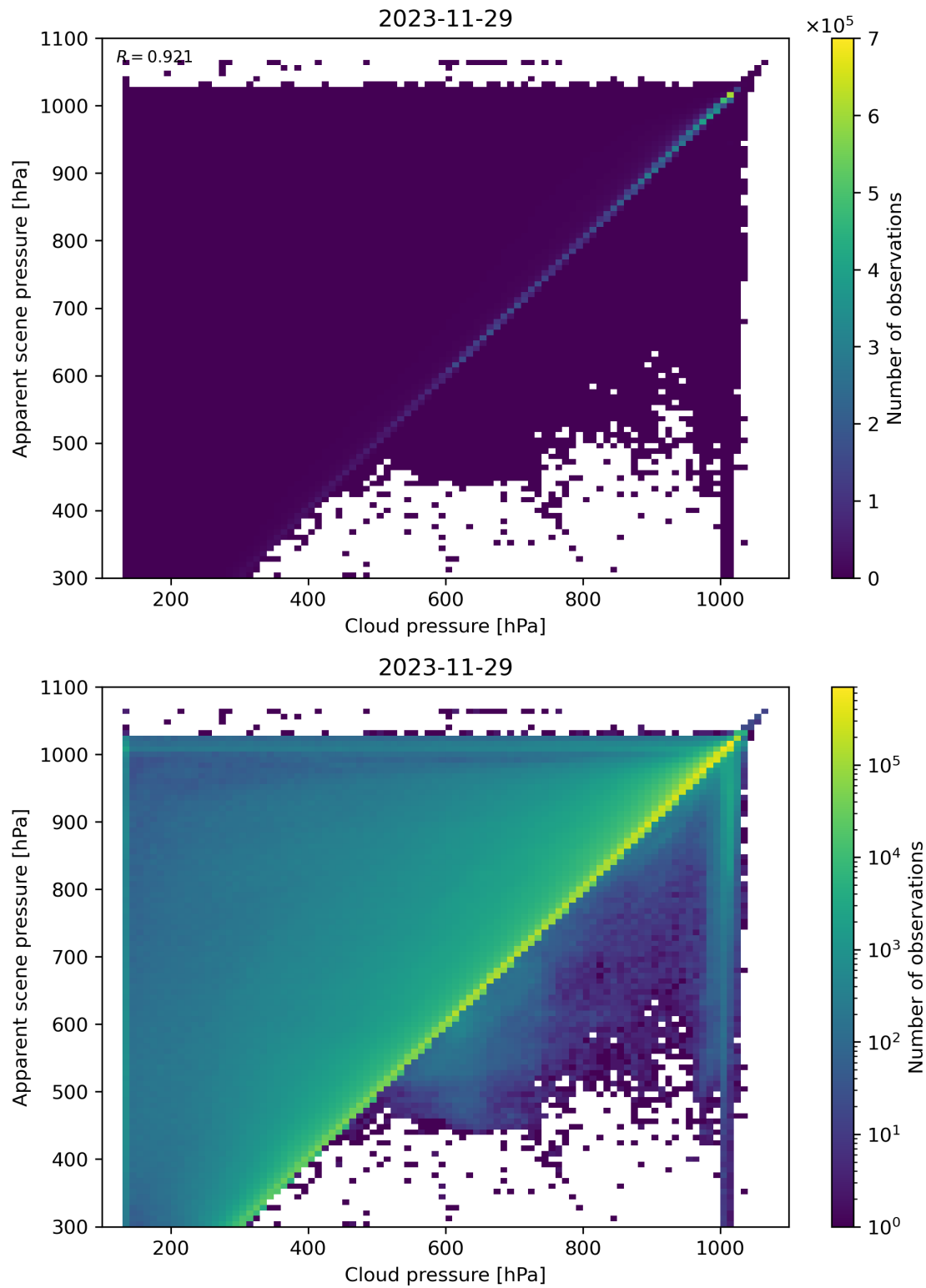


Figure 77: Scatter density plot of “Cloud pressure” against “Apparent scene pressure” for 2023-11-28 to 2023-11-30.

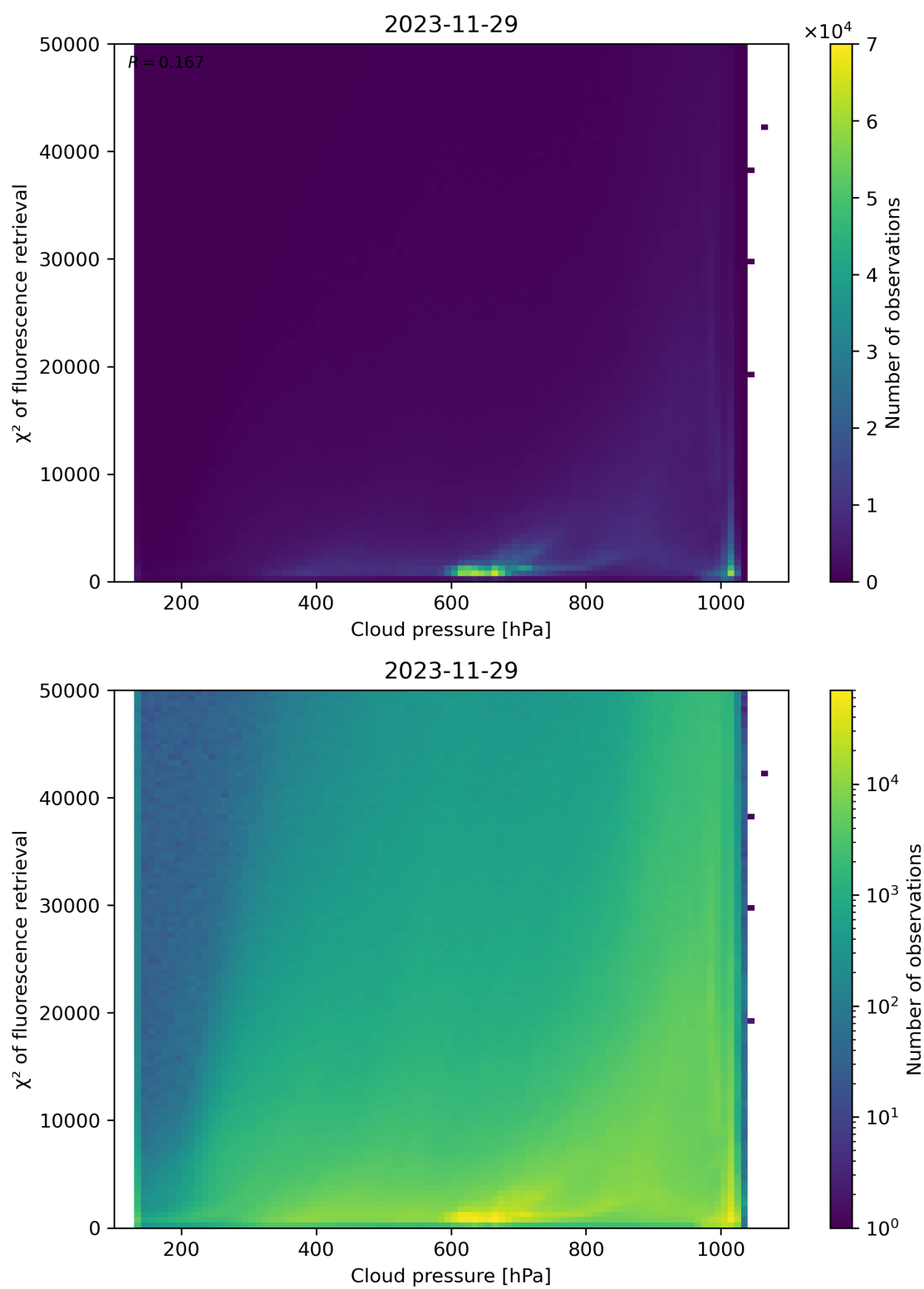


Figure 78: Scatter density plot of “Cloud pressure” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.

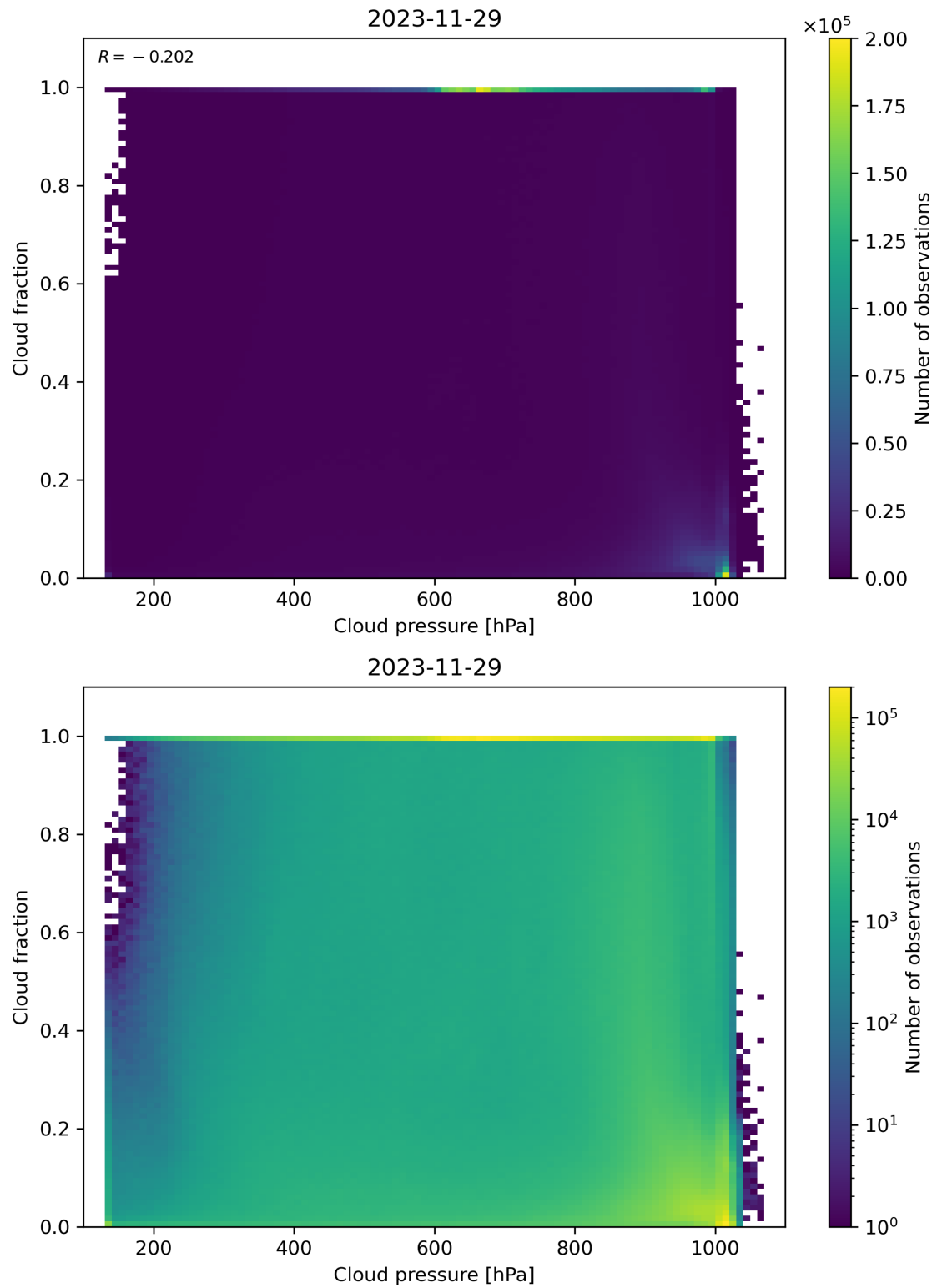


Figure 79: Scatter density plot of “Cloud pressure” against “Cloud fraction” for 2023-11-28 to 2023-11-30.

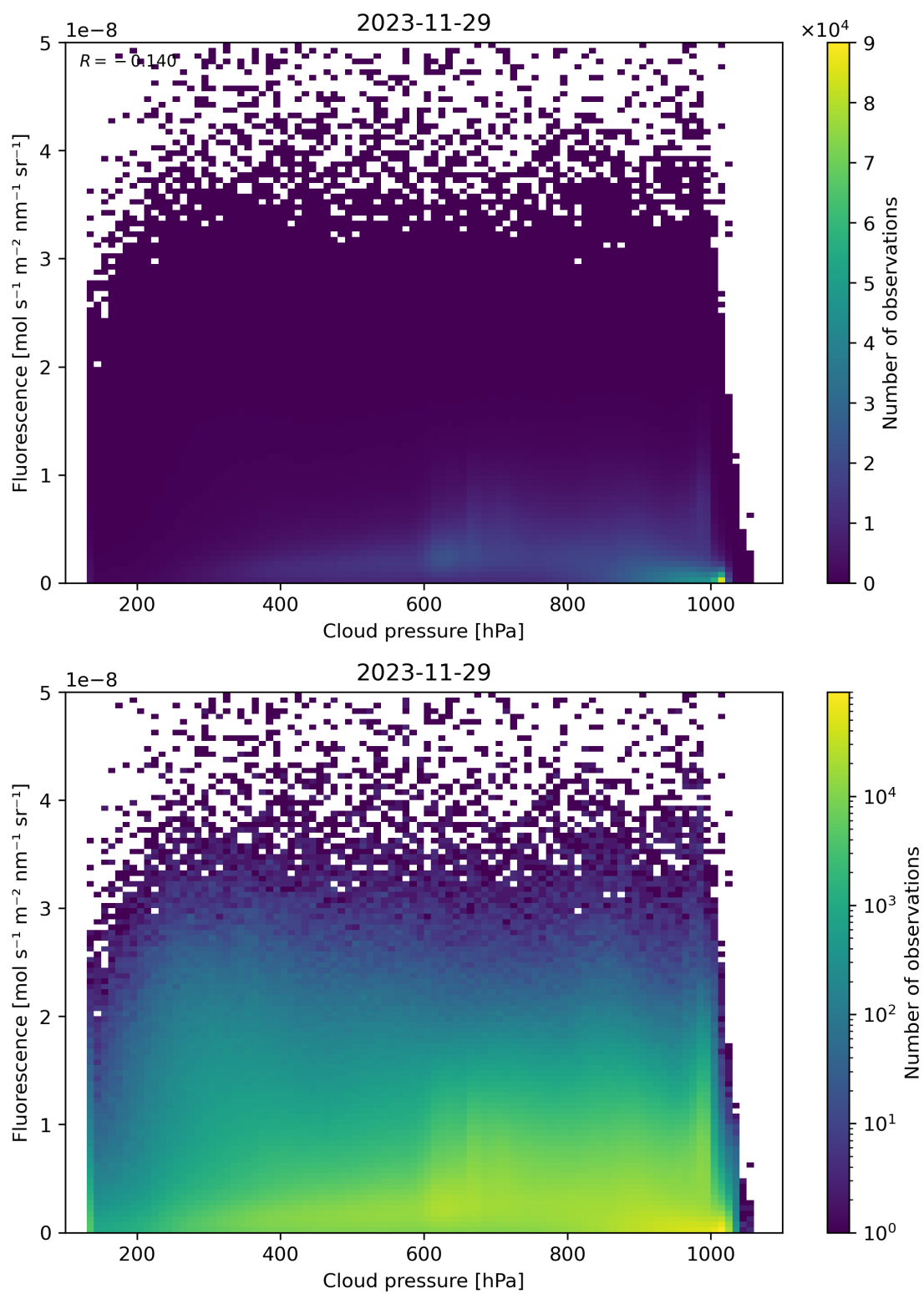


Figure 80: Scatter density plot of “Cloud pressure” against “Fluorescence” for 2023-11-28 to 2023-11-30.

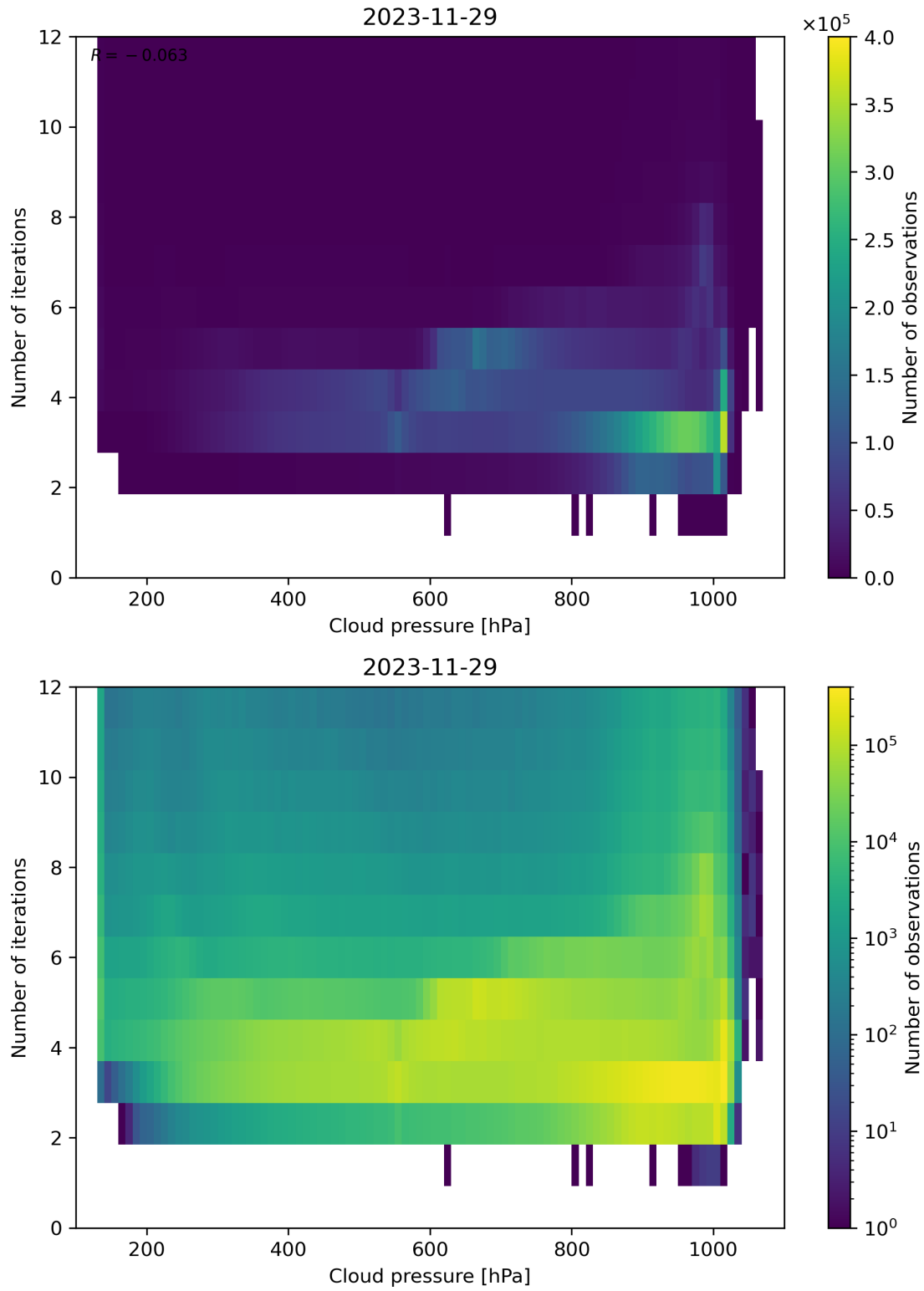


Figure 81: Scatter density plot of “Cloud pressure” against “Number of iterations” for 2023-11-28 to 2023-11-30.

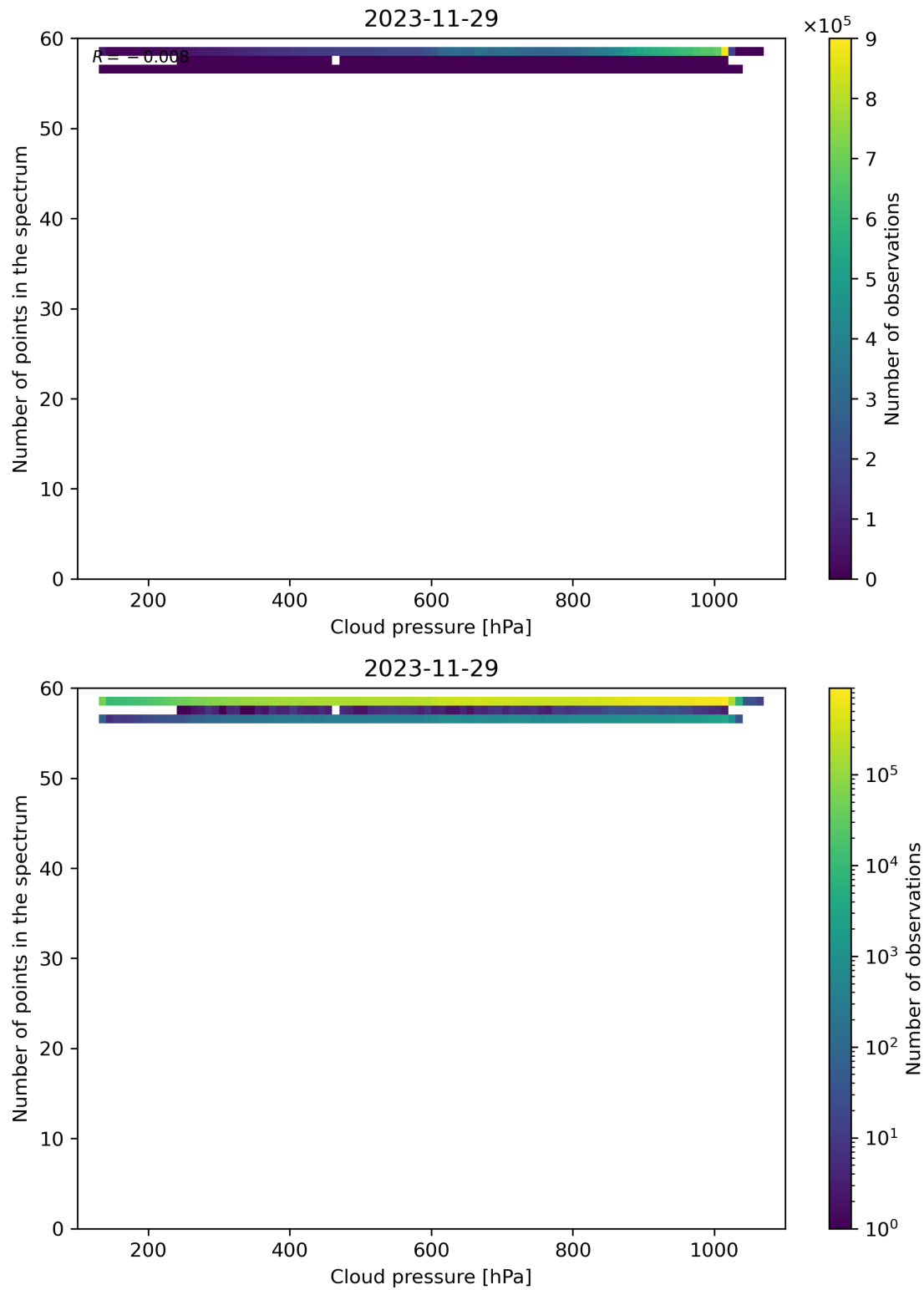


Figure 82: Scatter density plot of “Cloud pressure” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.

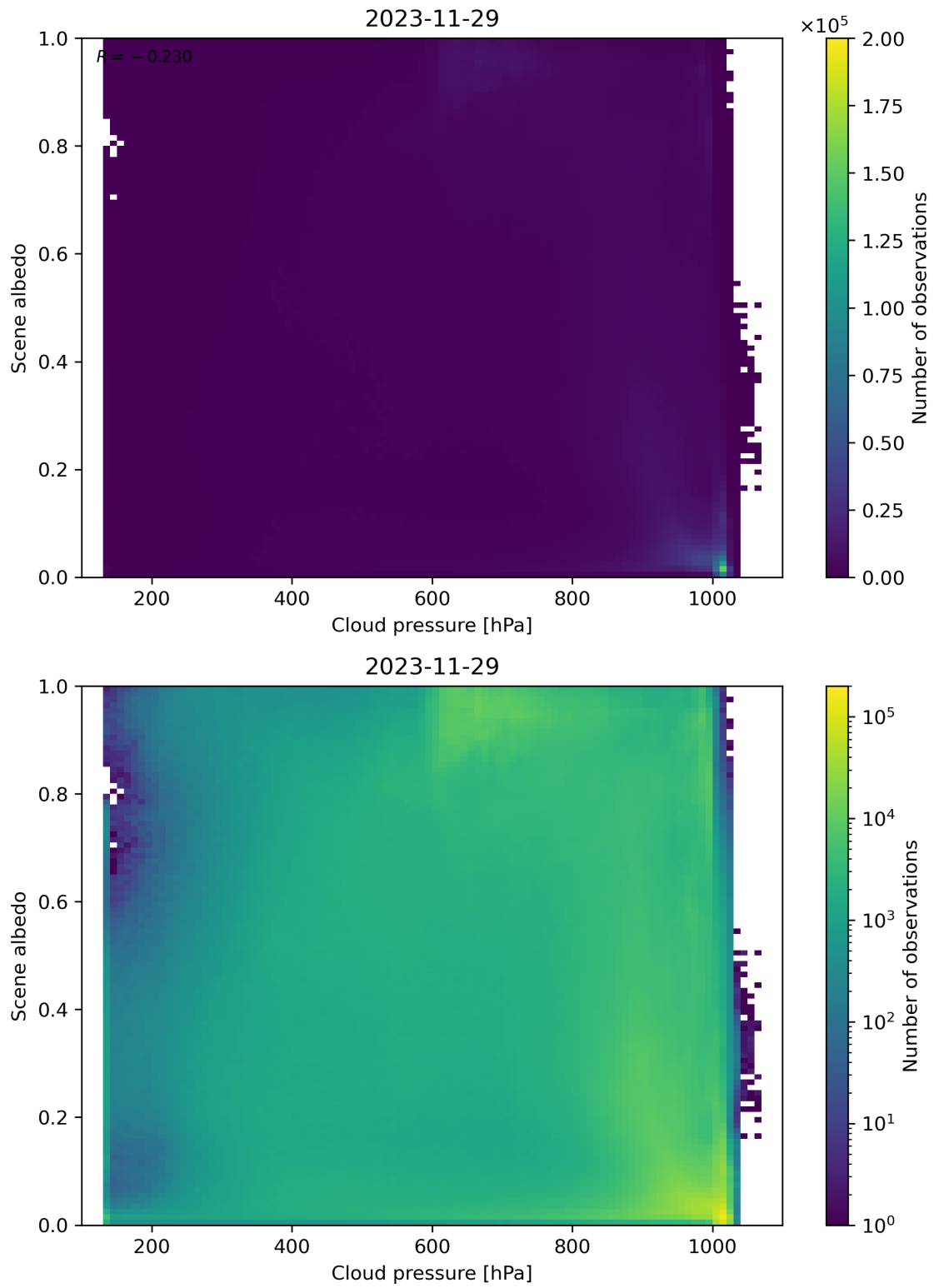


Figure 83: Scatter density plot of “Cloud pressure” against “Scene albedo” for 2023-11-28 to 2023-11-30.

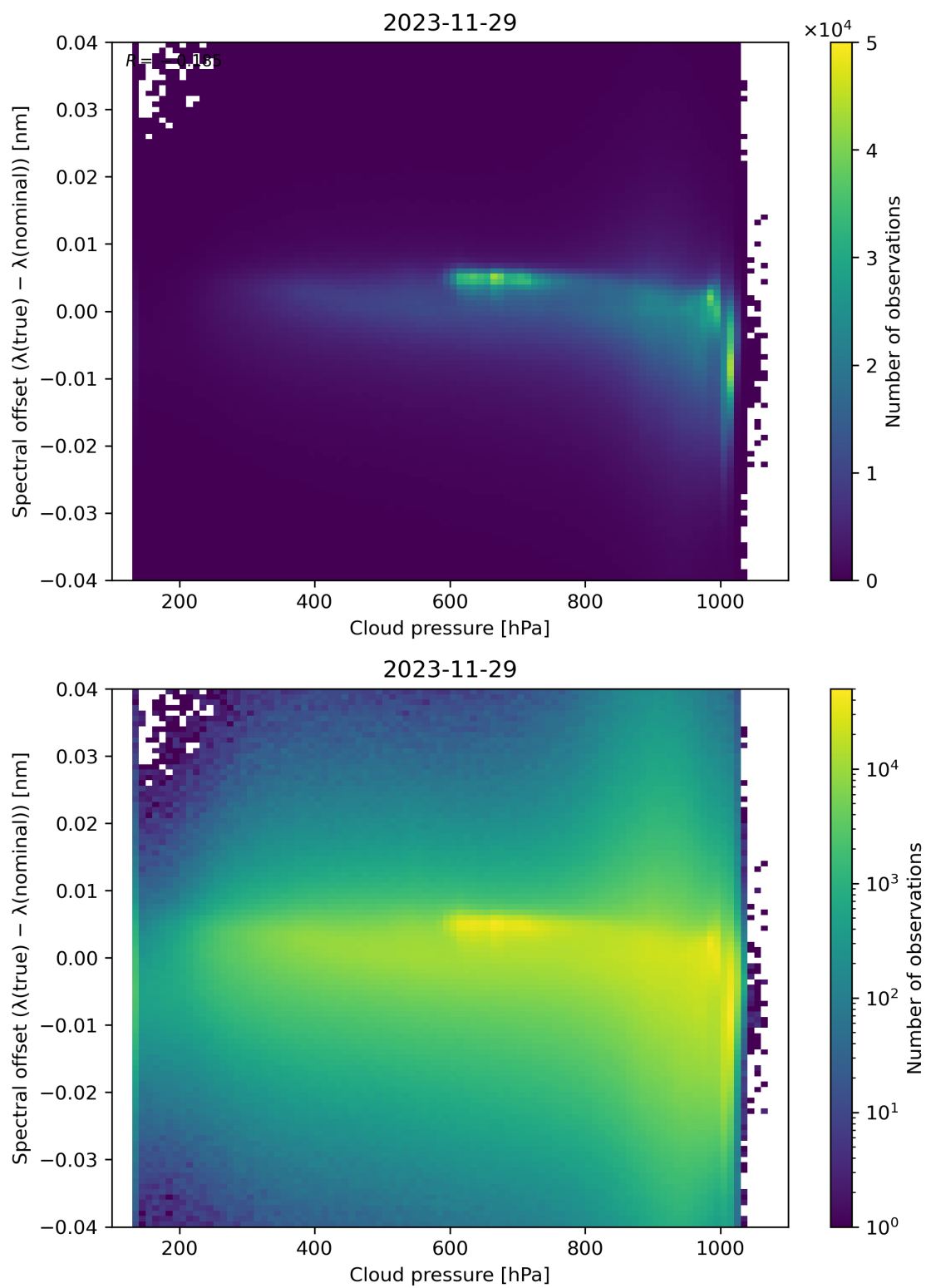


Figure 84: Scatter density plot of “Cloud pressure” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.

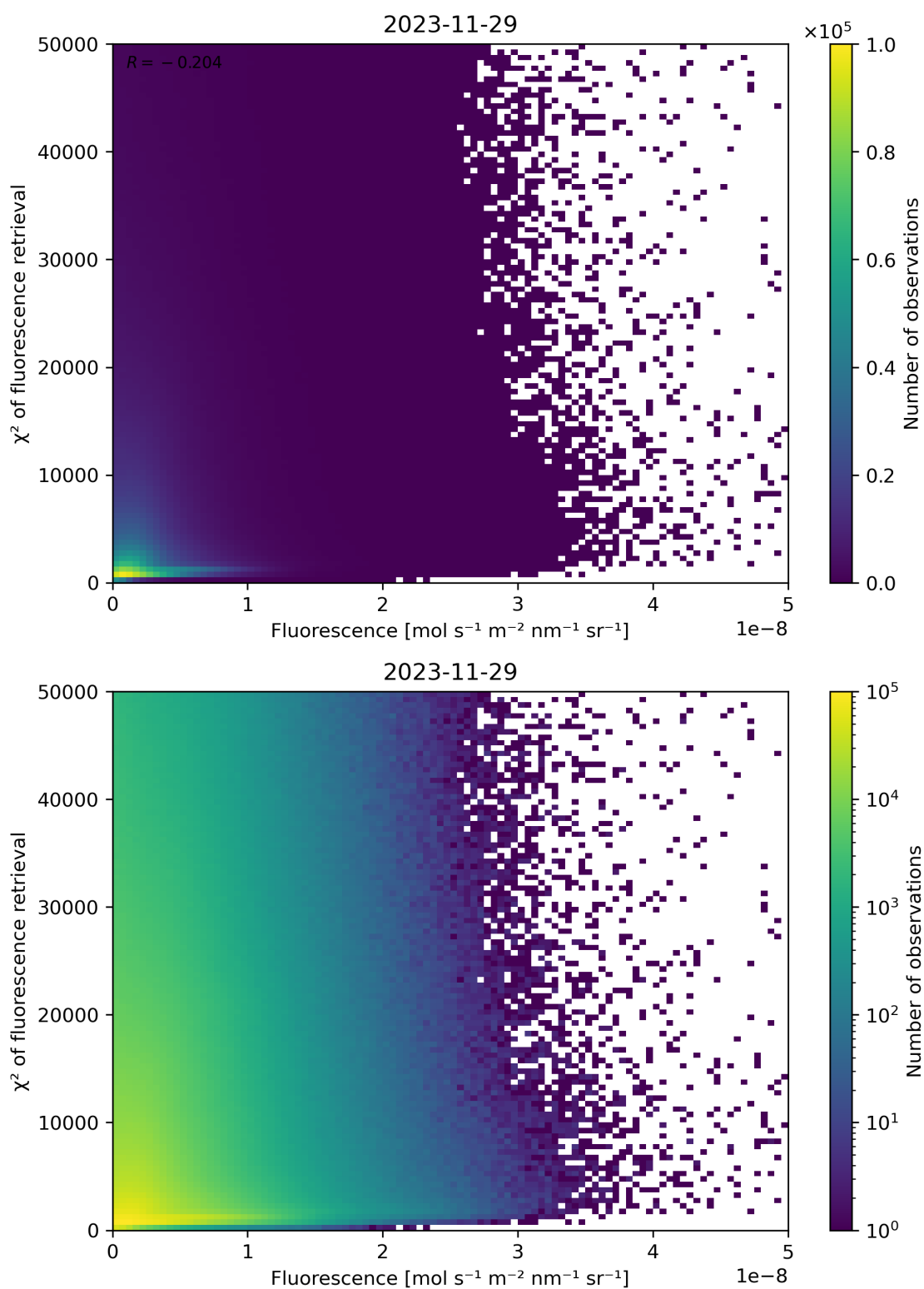


Figure 85: Scatter density plot of “Fluorescence” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.

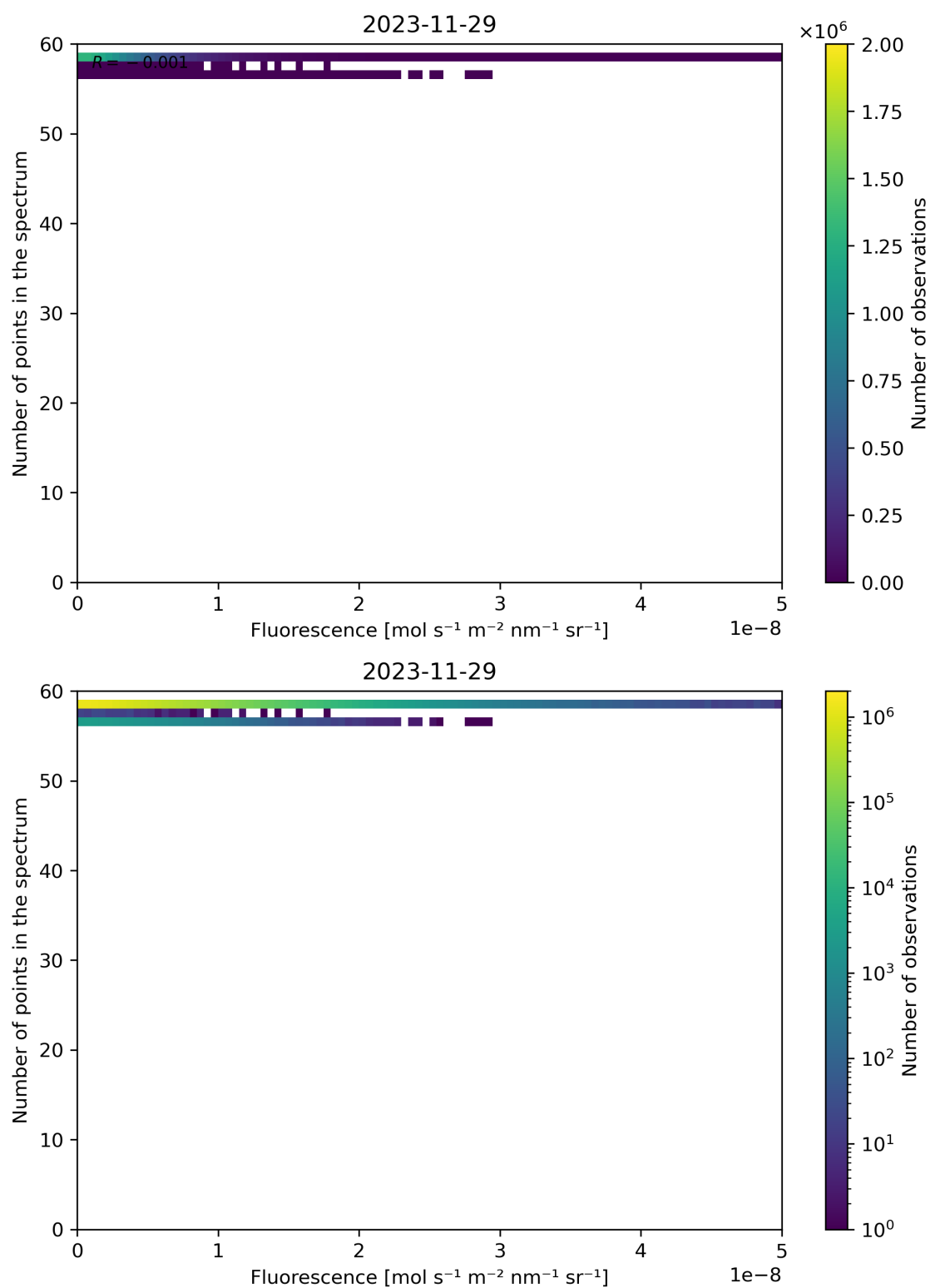


Figure 86: Scatter density plot of “Fluorescence” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.

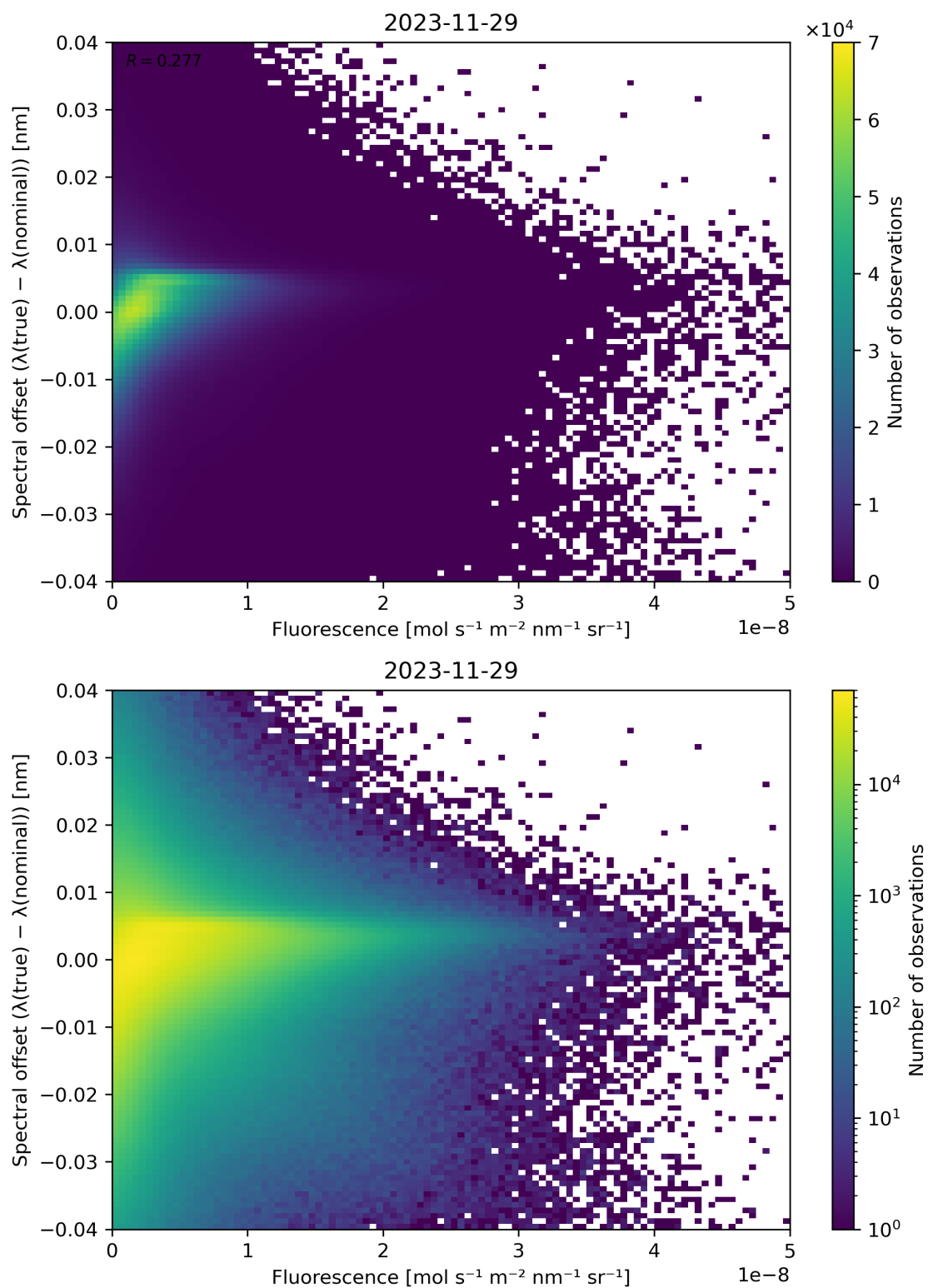


Figure 87: Scatter density plot of “Fluorescence” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.

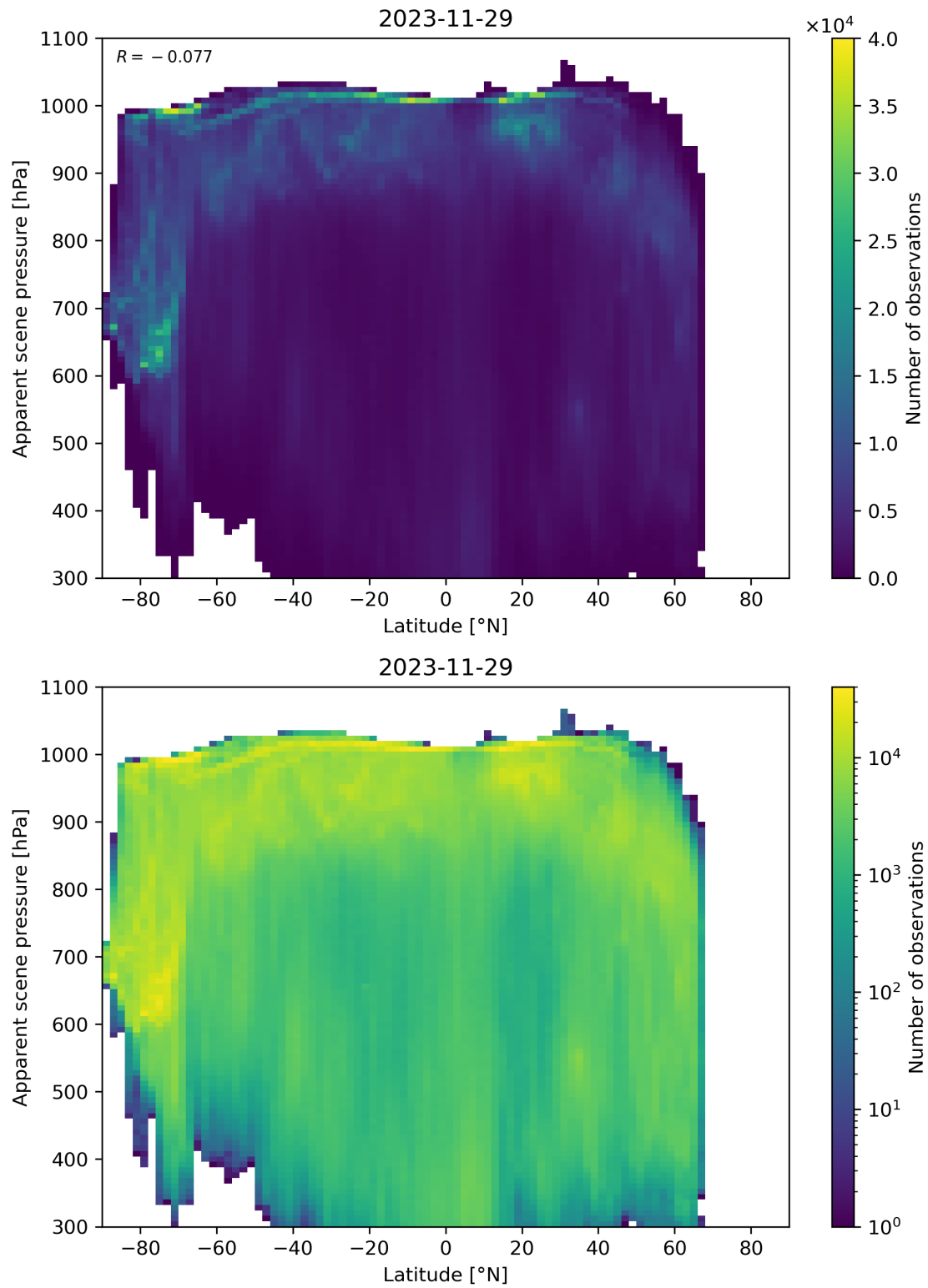


Figure 88: Scatter density plot of “Latitude” against “Apparent scene pressure” for 2023-11-28 to 2023-11-30.

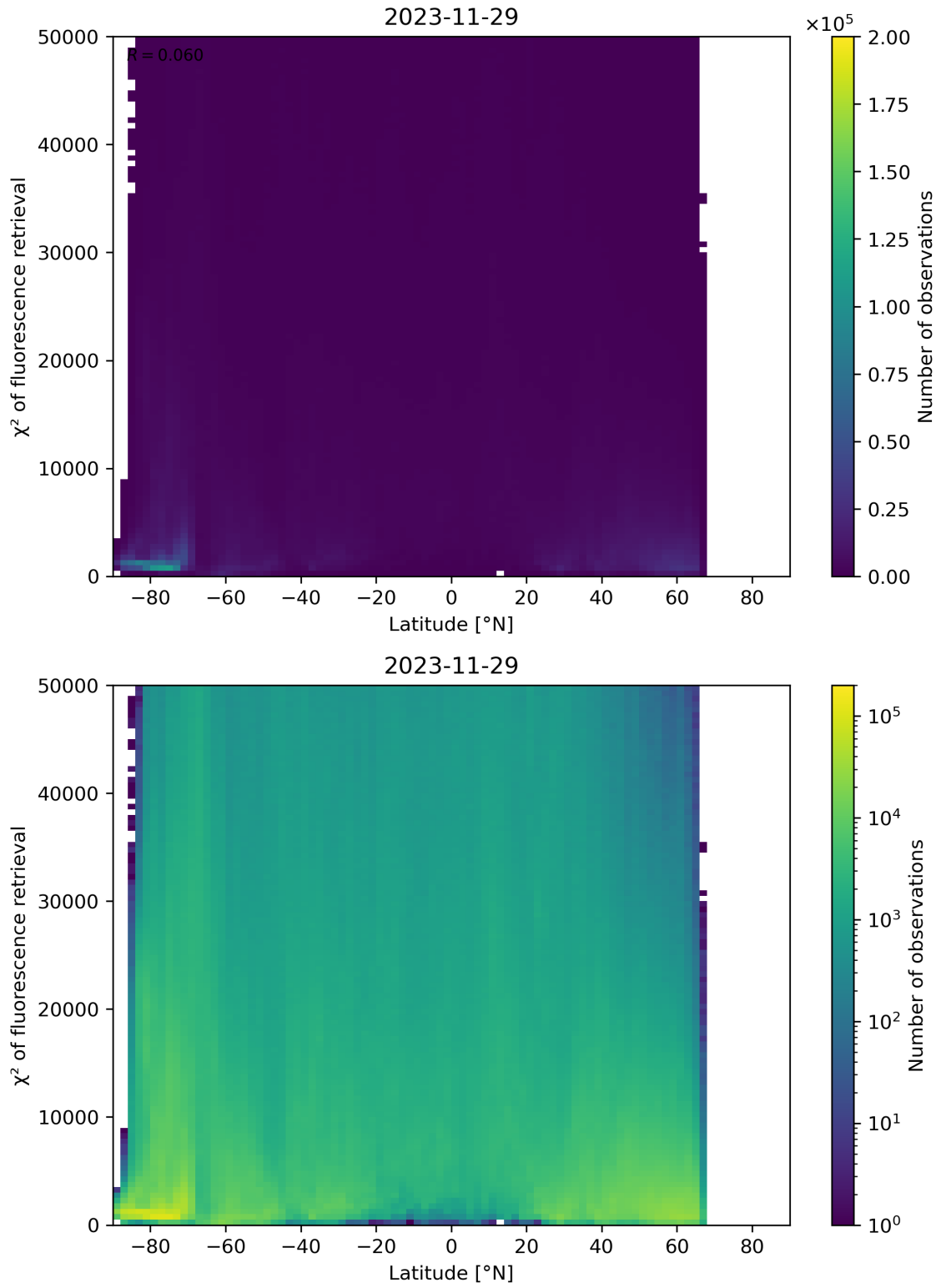


Figure 89: Scatter density plot of “Latitude” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.

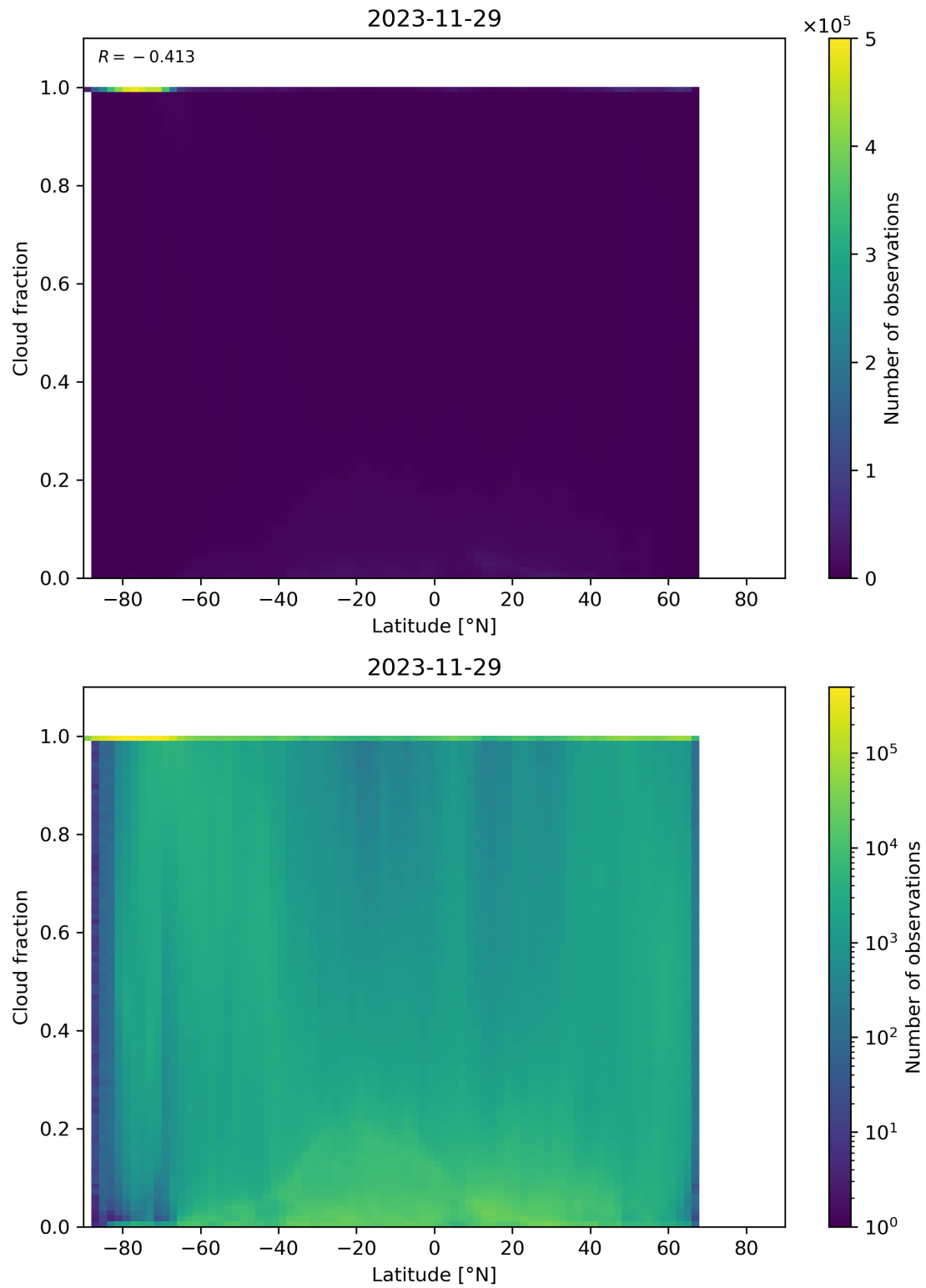


Figure 90: Scatter density plot of “Latitude” against “Cloud fraction” for 2023-11-28 to 2023-11-30.

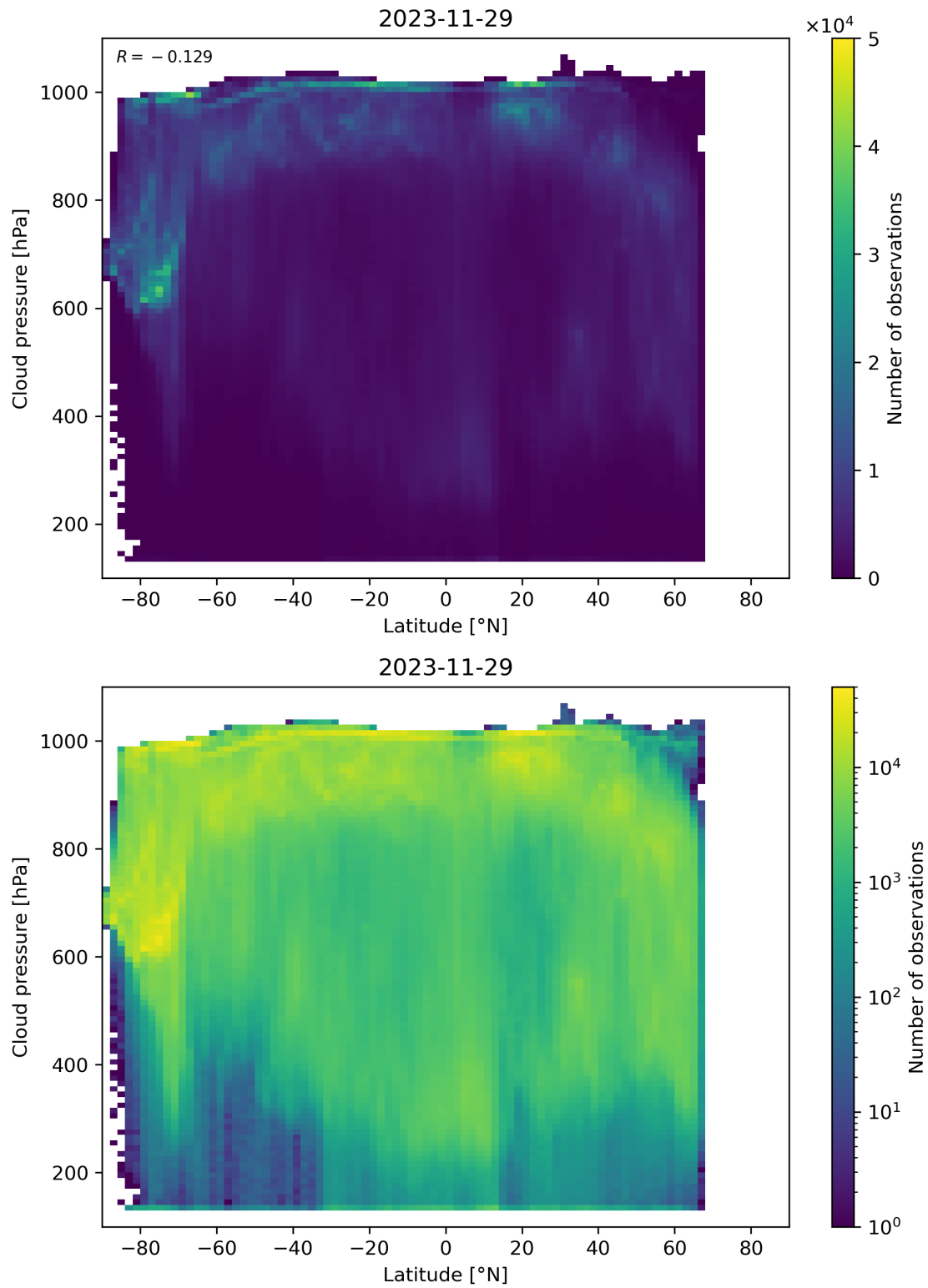


Figure 91: Scatter density plot of “Latitude” against “Cloud pressure” for 2023-11-28 to 2023-11-30.

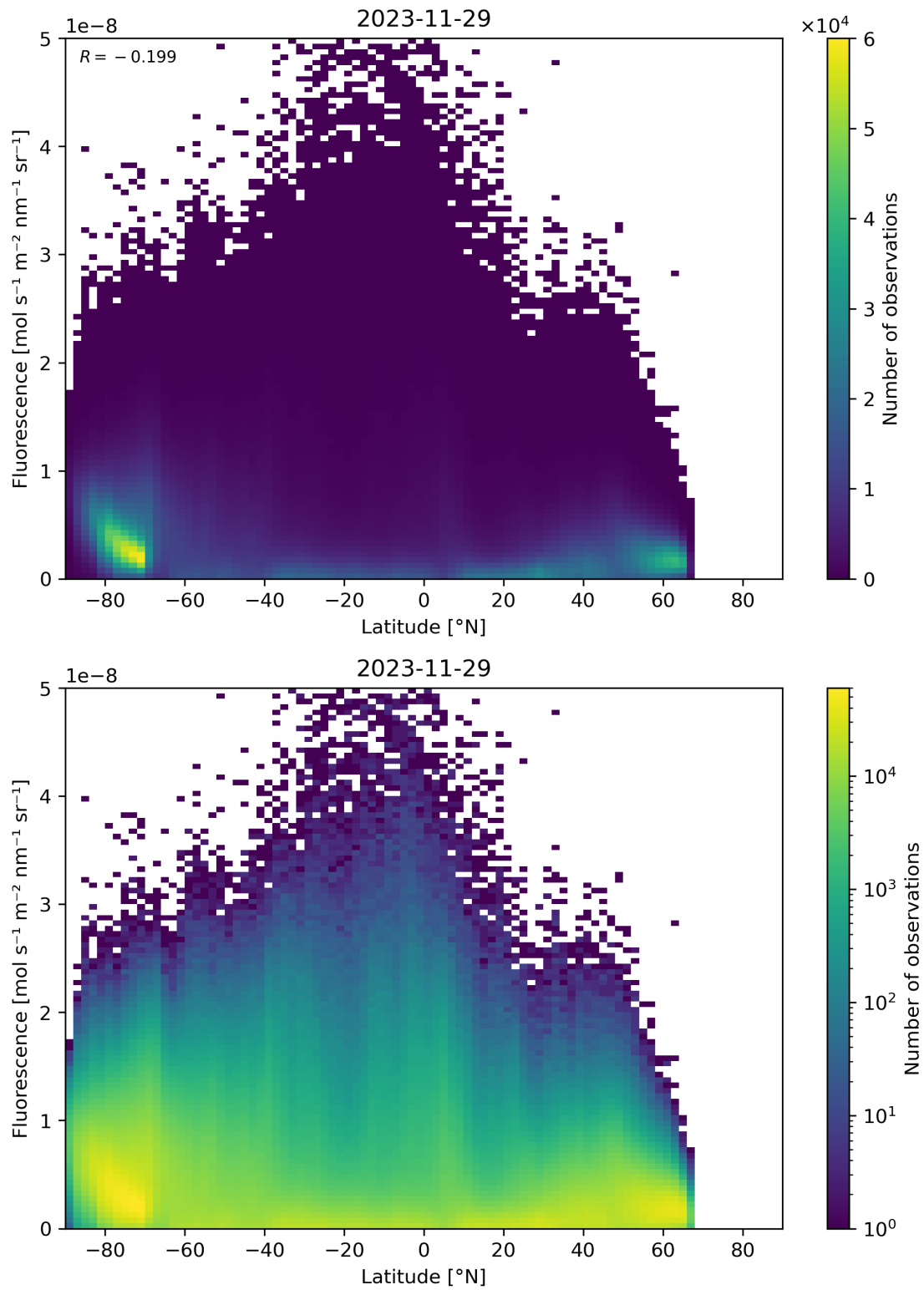


Figure 92: Scatter density plot of “Latitude” against “Fluorescence” for 2023-11-28 to 2023-11-30.

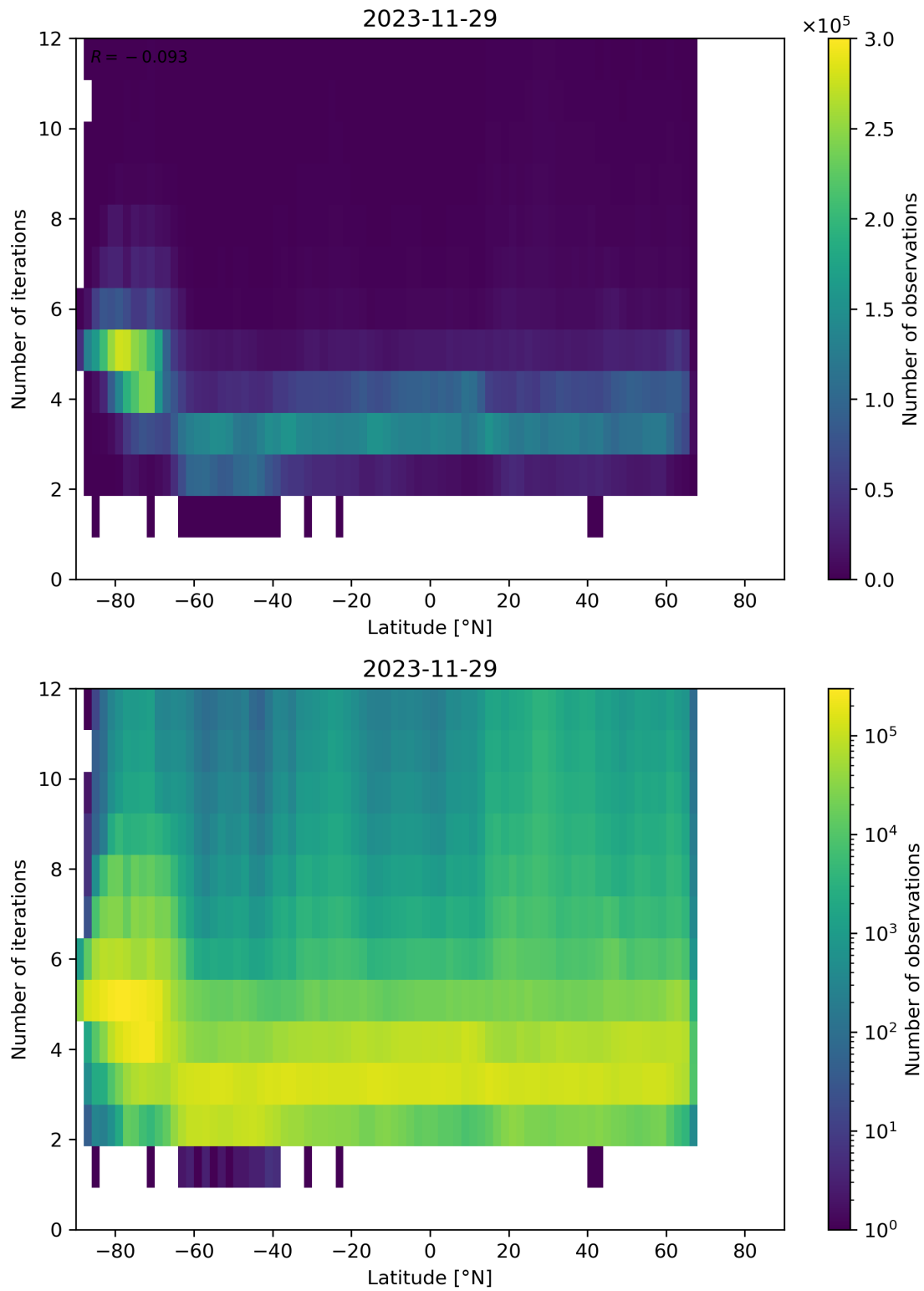


Figure 93: Scatter density plot of “Latitude” against “Number of iterations” for 2023-11-28 to 2023-11-30.

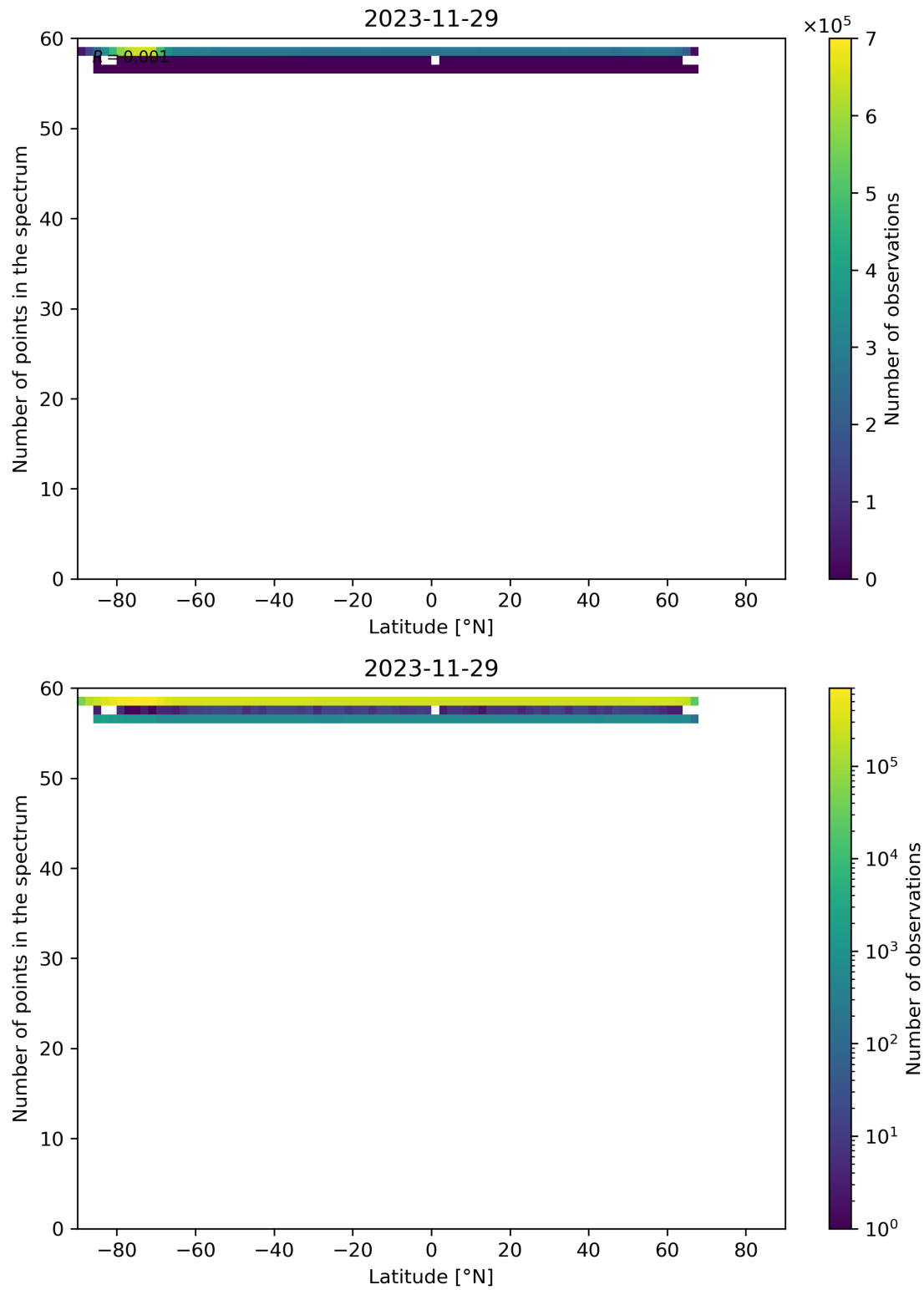


Figure 94: Scatter density plot of “Latitude” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.

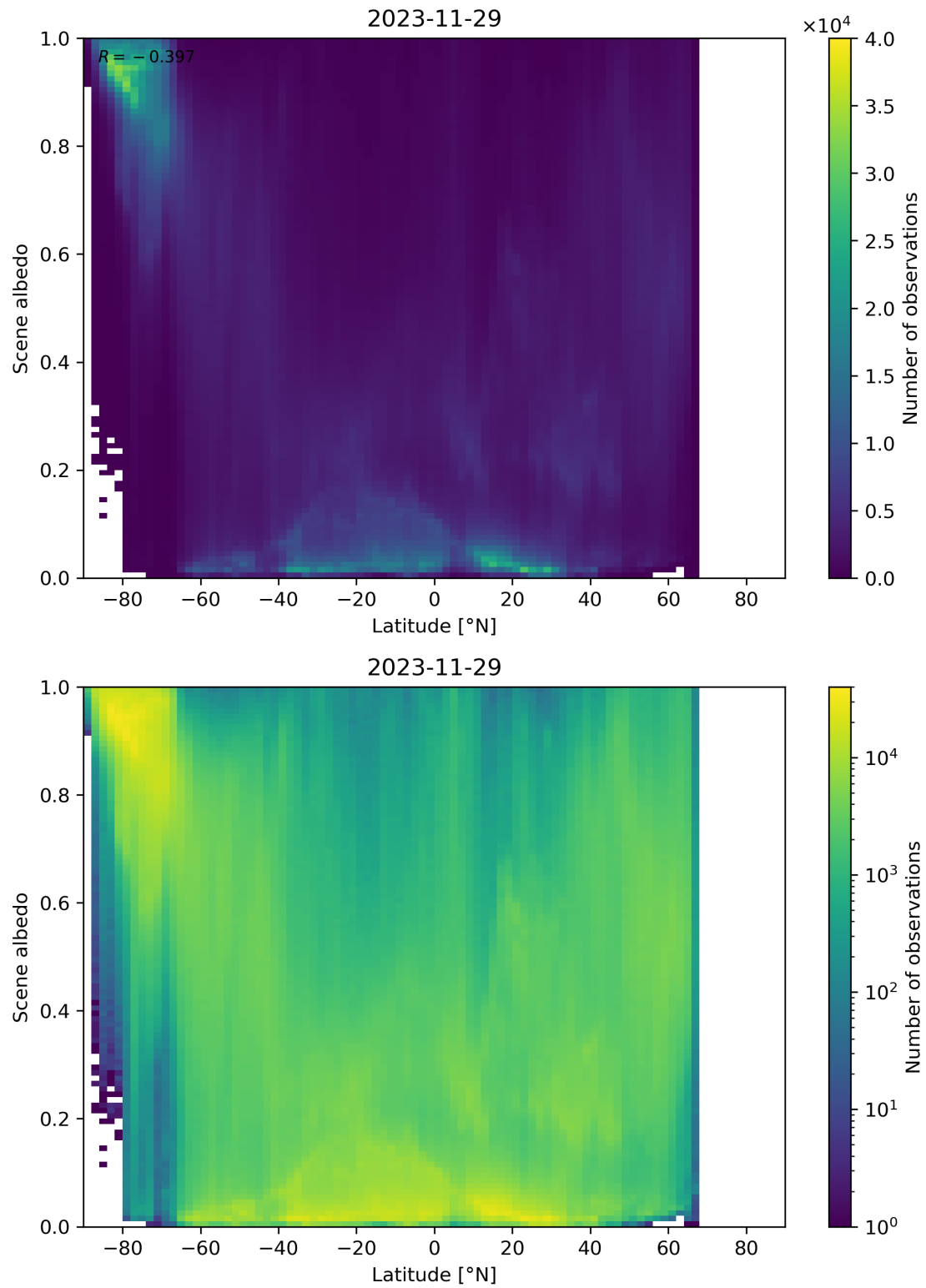


Figure 95: Scatter density plot of “Latitude” against “Scene albedo” for 2023-11-28 to 2023-11-30.

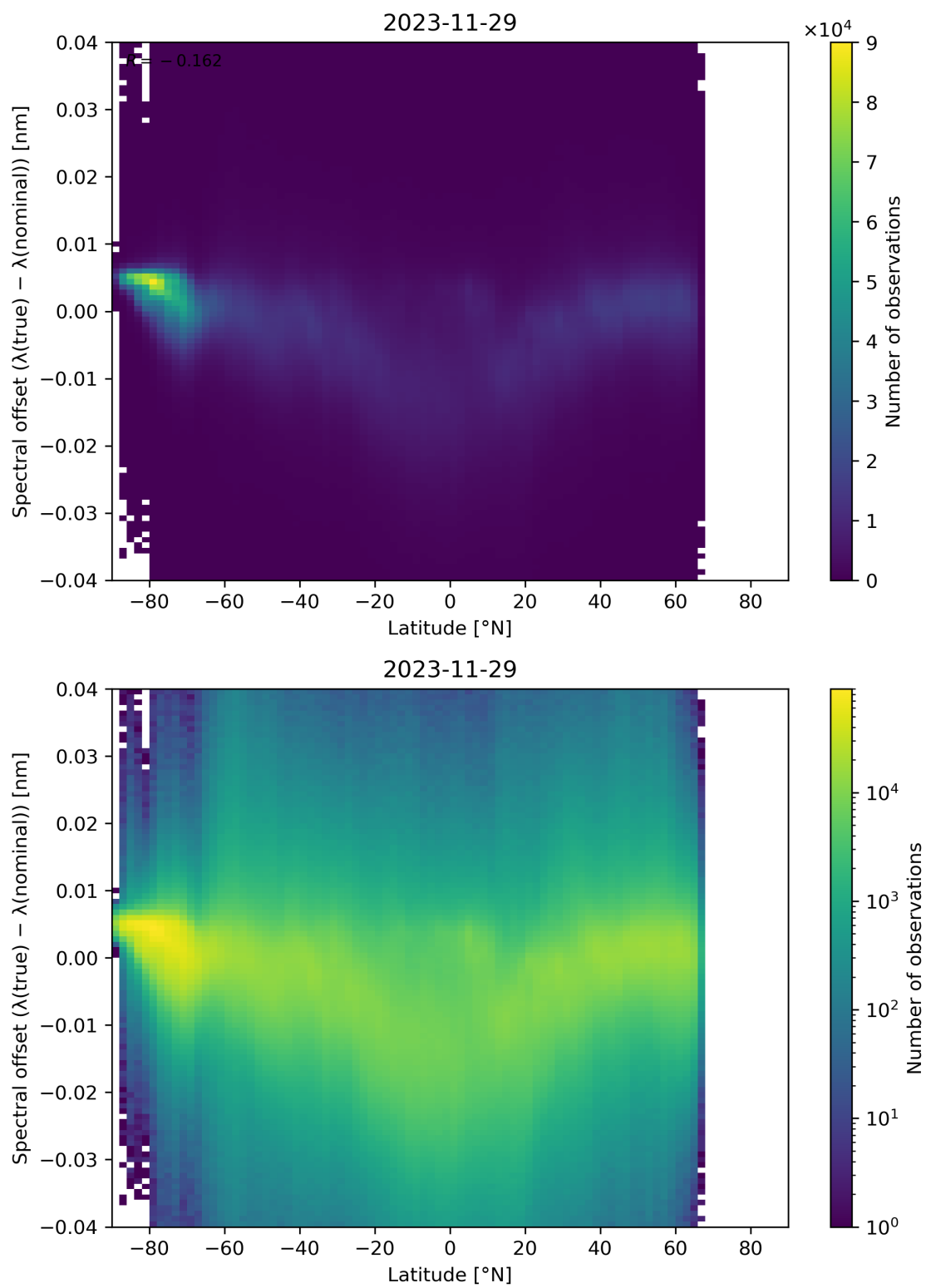


Figure 96: Scatter density plot of “Latitude” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.

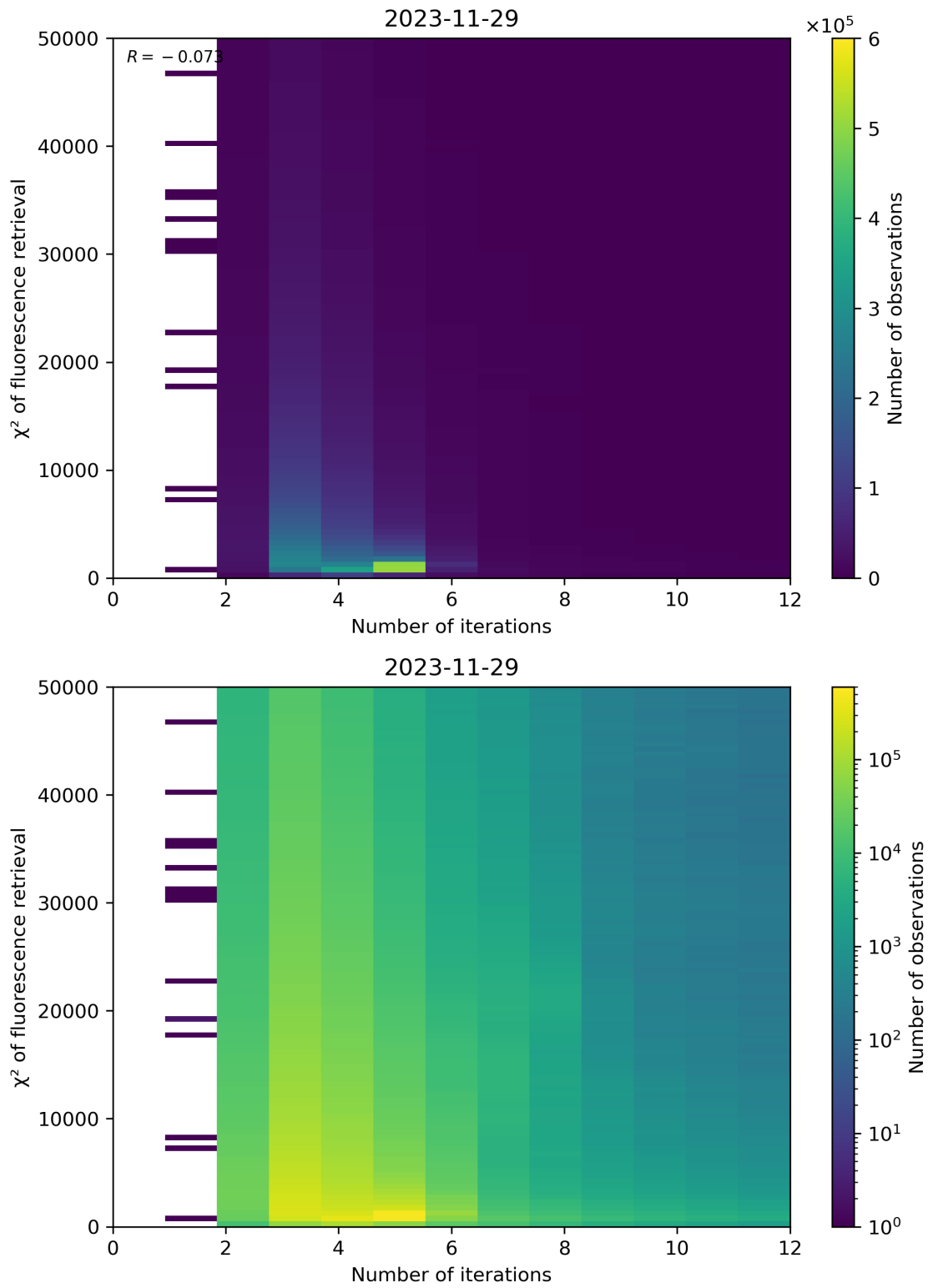


Figure 97: Scatter density plot of “Number of iterations” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.

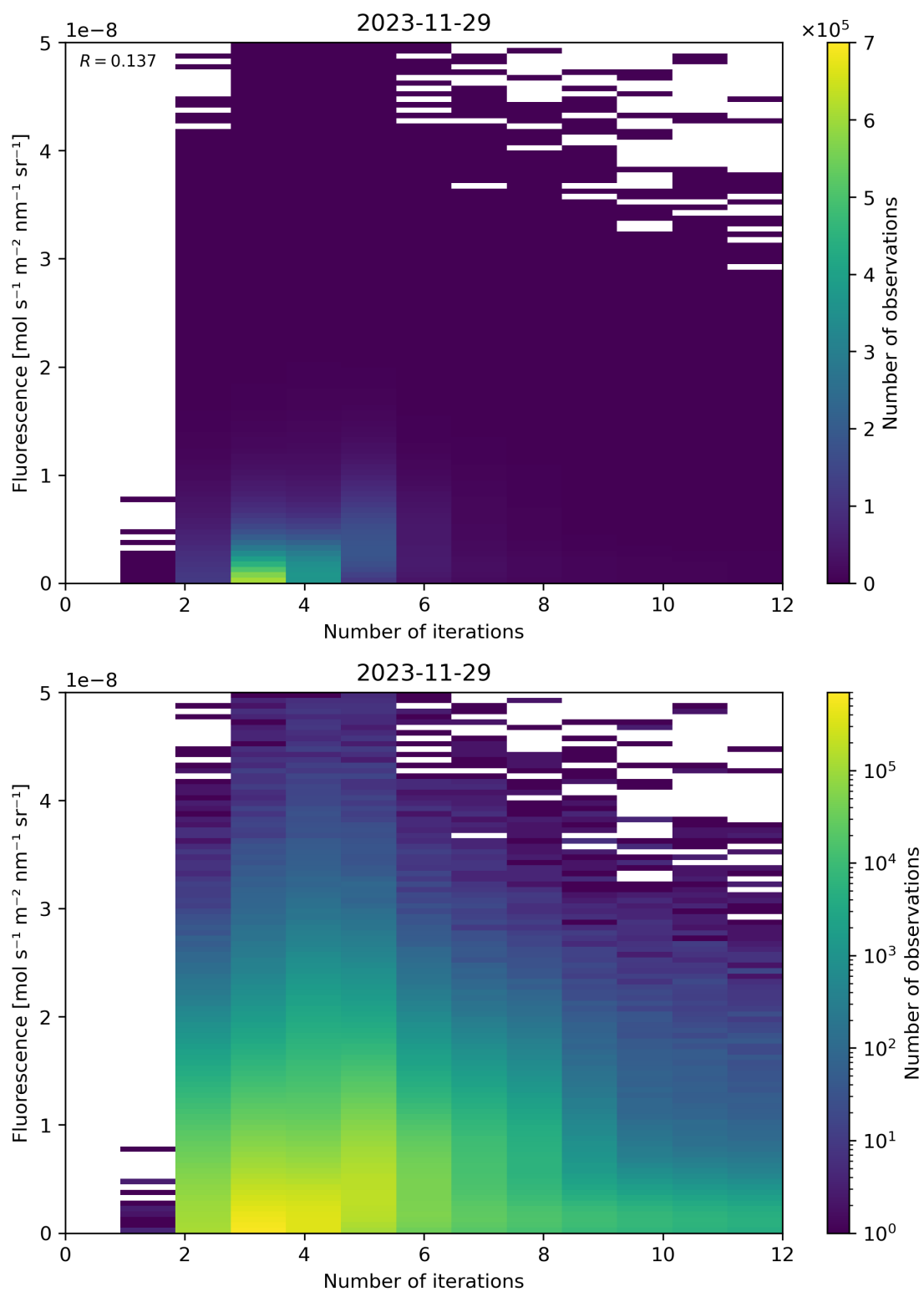


Figure 98: Scatter density plot of “Number of iterations” against “Fluorescence” for 2023-11-28 to 2023-11-30.

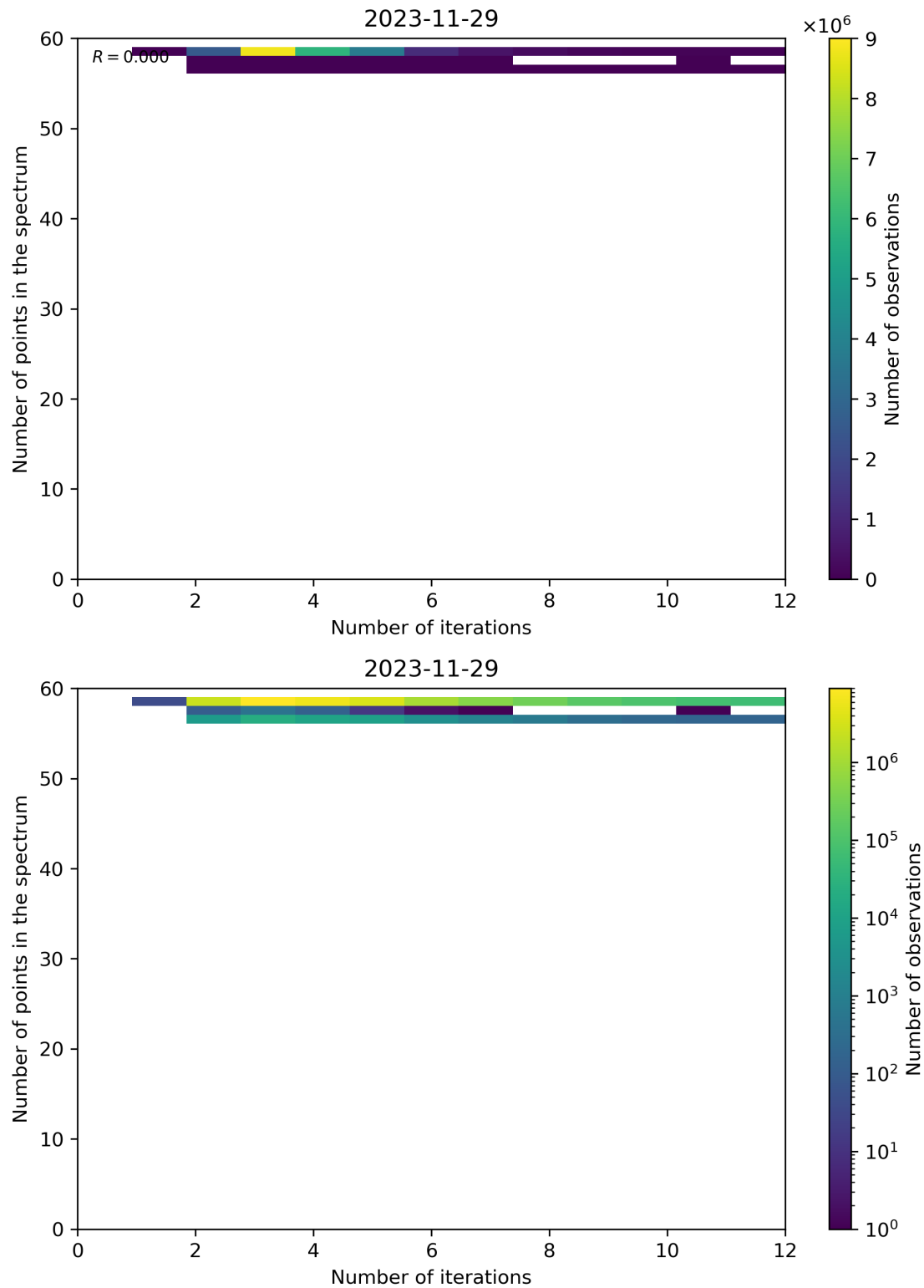


Figure 99: Scatter density plot of “Number of iterations” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.

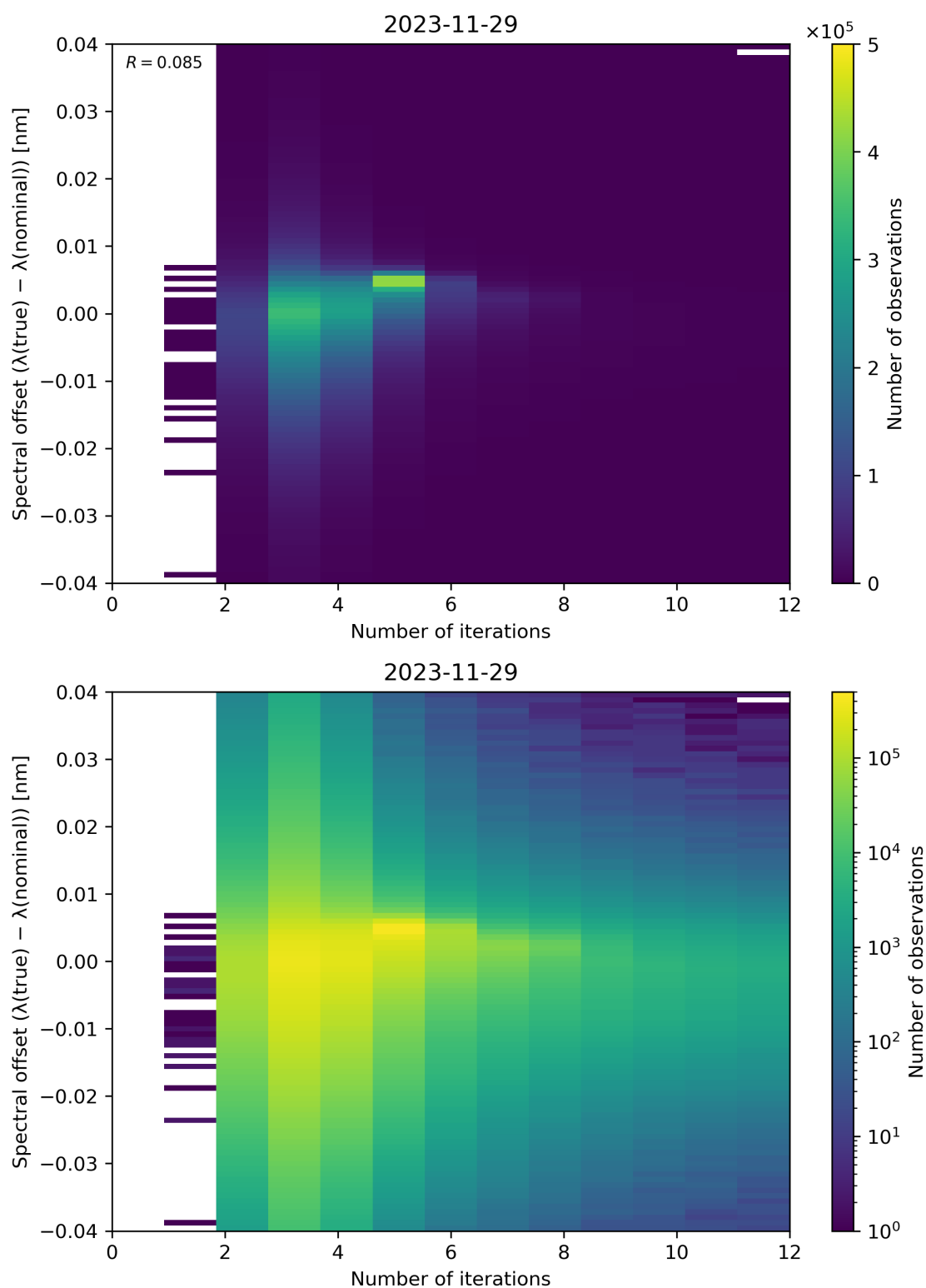


Figure 100: Scatter density plot of “Number of iterations” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.

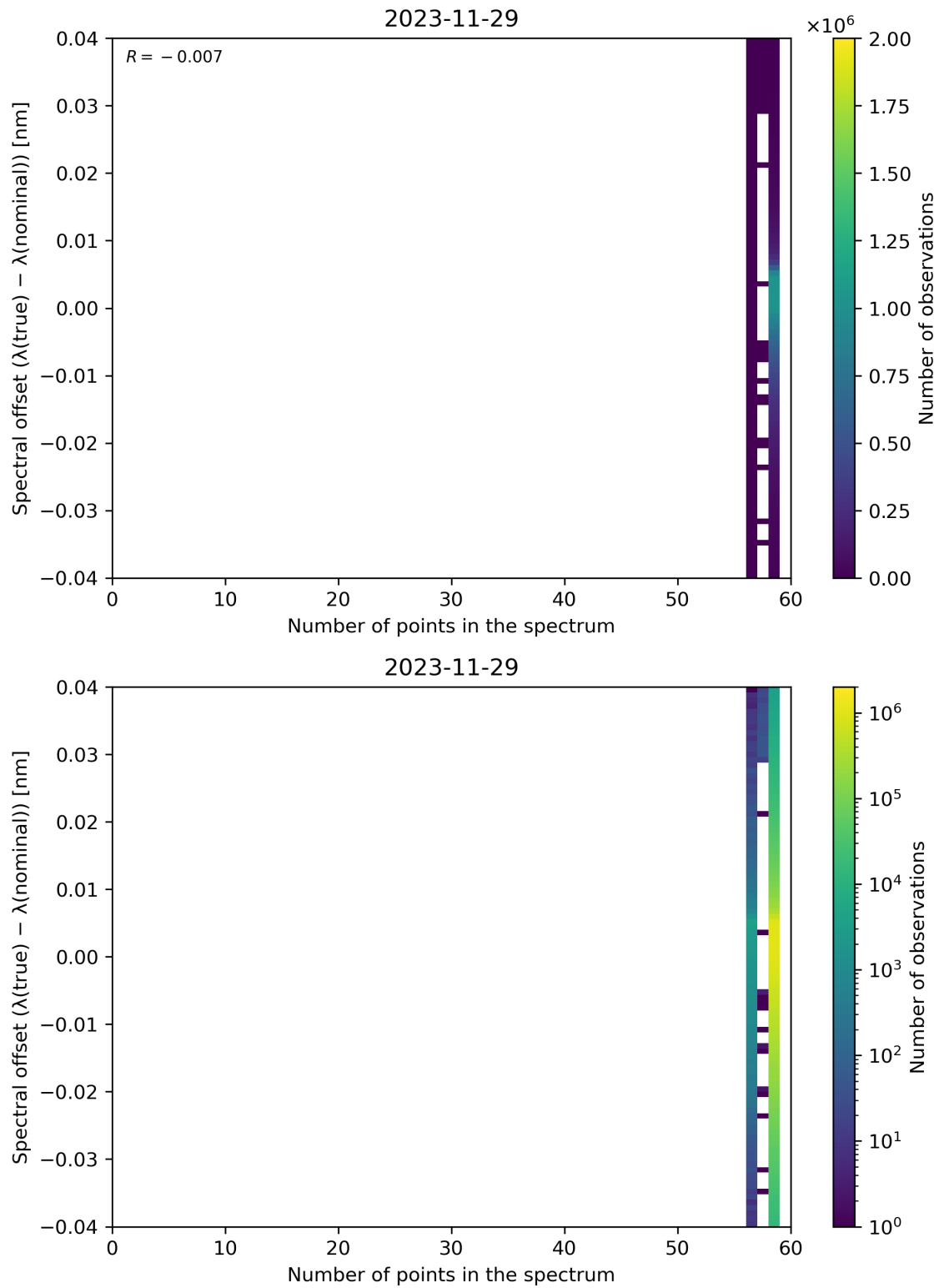


Figure 101: Scatter density plot of “Number of points in the spectrum” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.

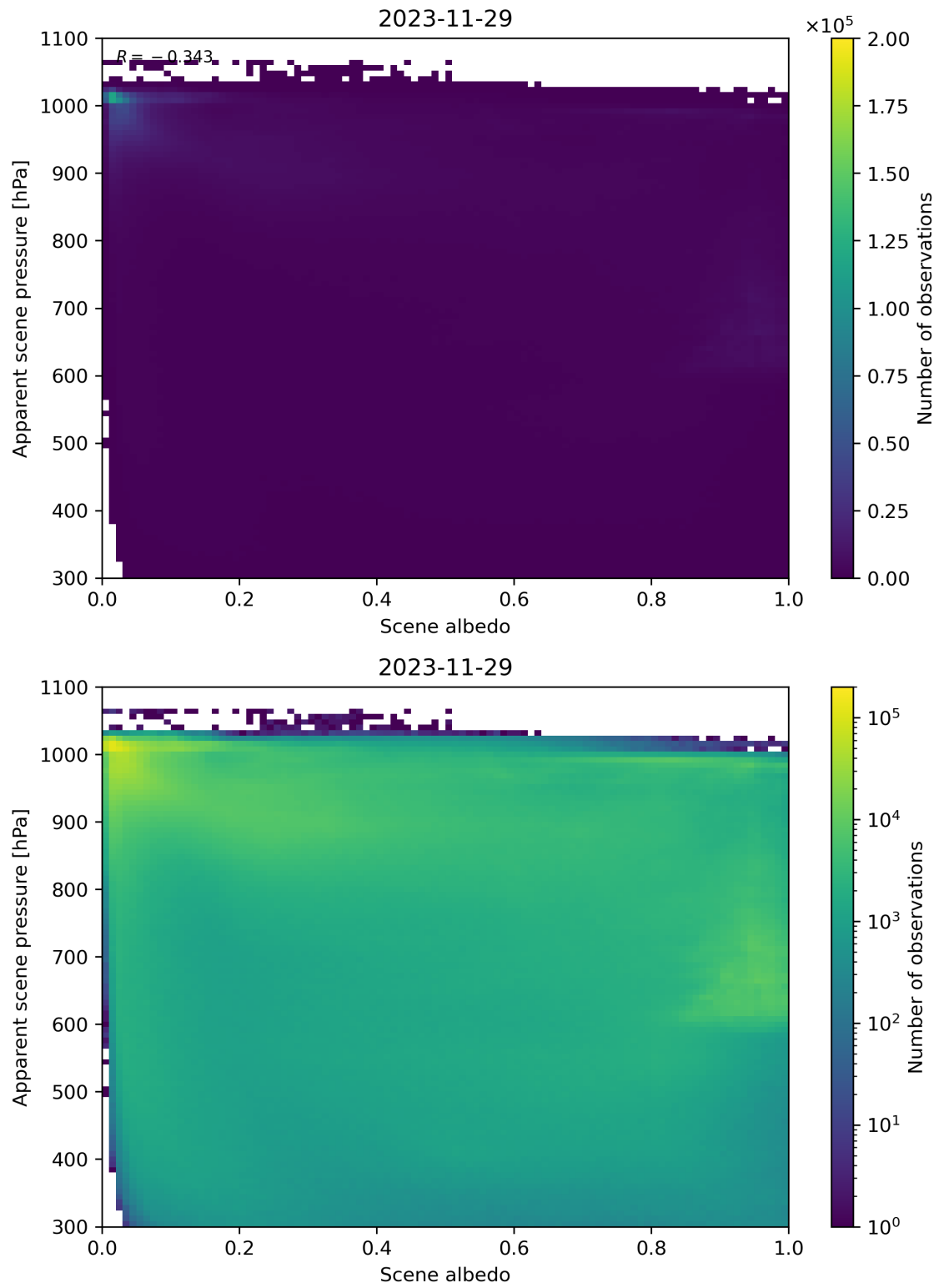


Figure 102: Scatter density plot of “Scene albedo” against “Apparent scene pressure” for 2023-11-28 to 2023-11-30.

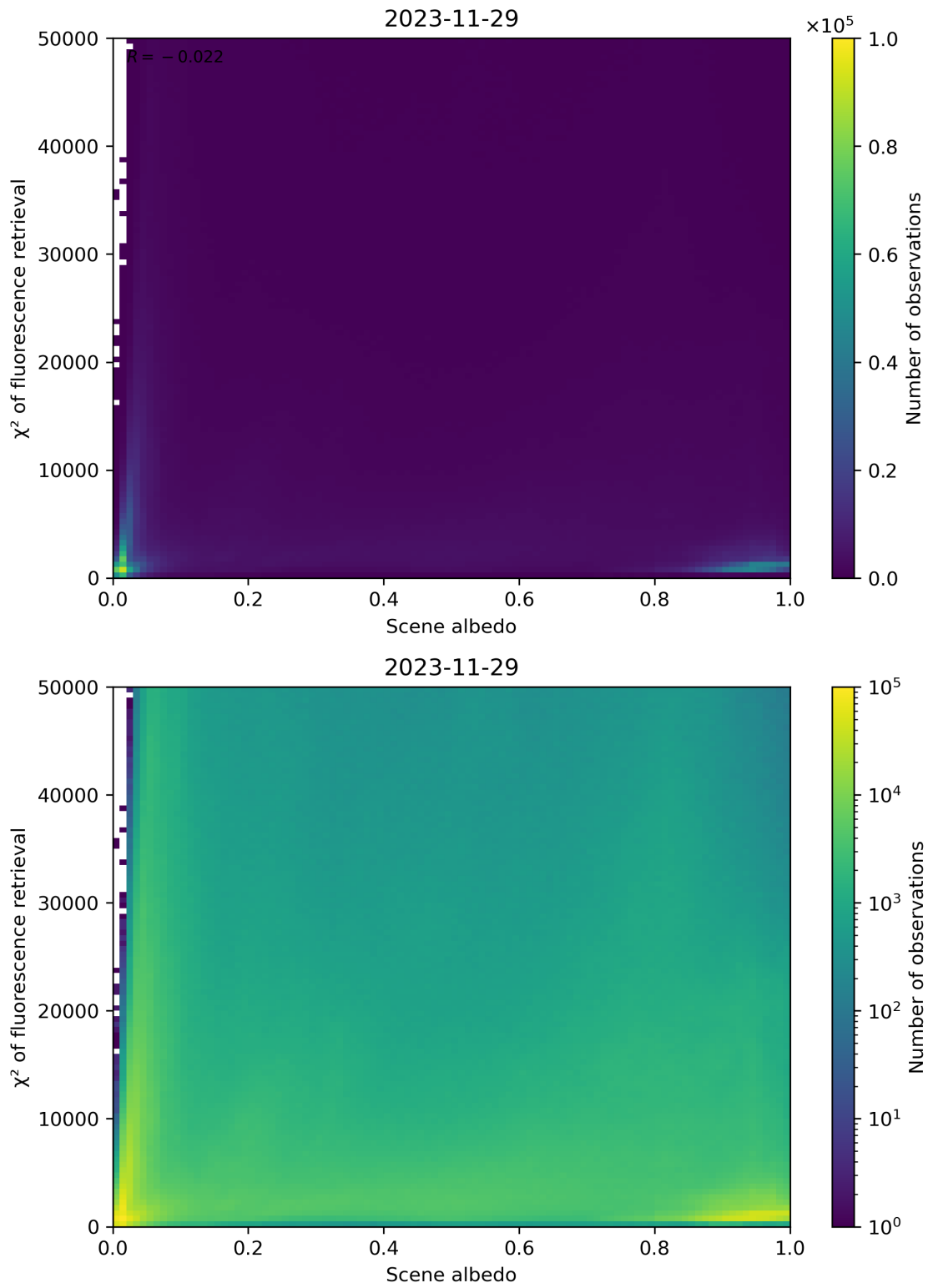


Figure 103: Scatter density plot of “Scene albedo” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.

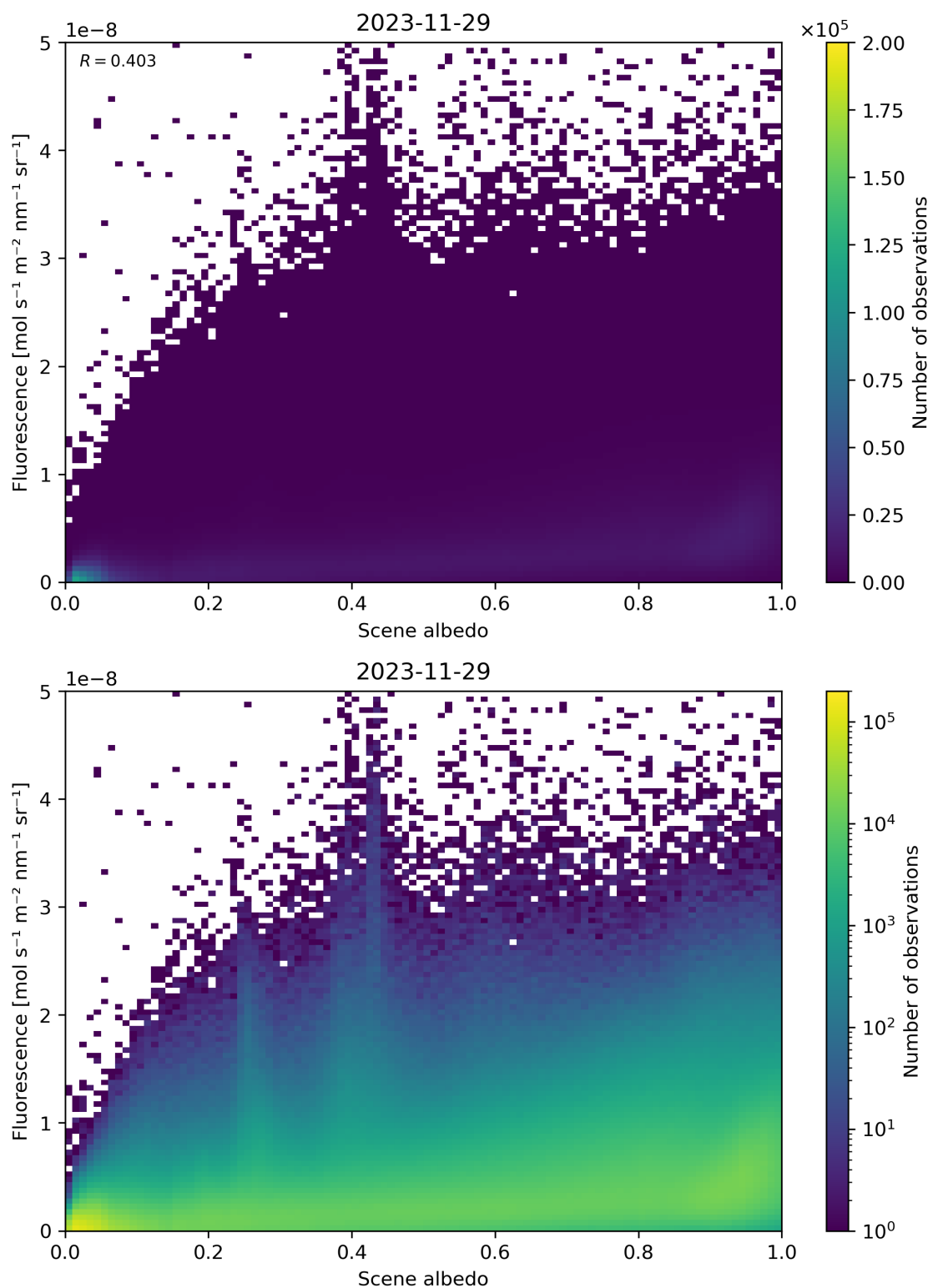


Figure 104: Scatter density plot of “Scene albedo” against “Fluorescence” for 2023-11-28 to 2023-11-30.

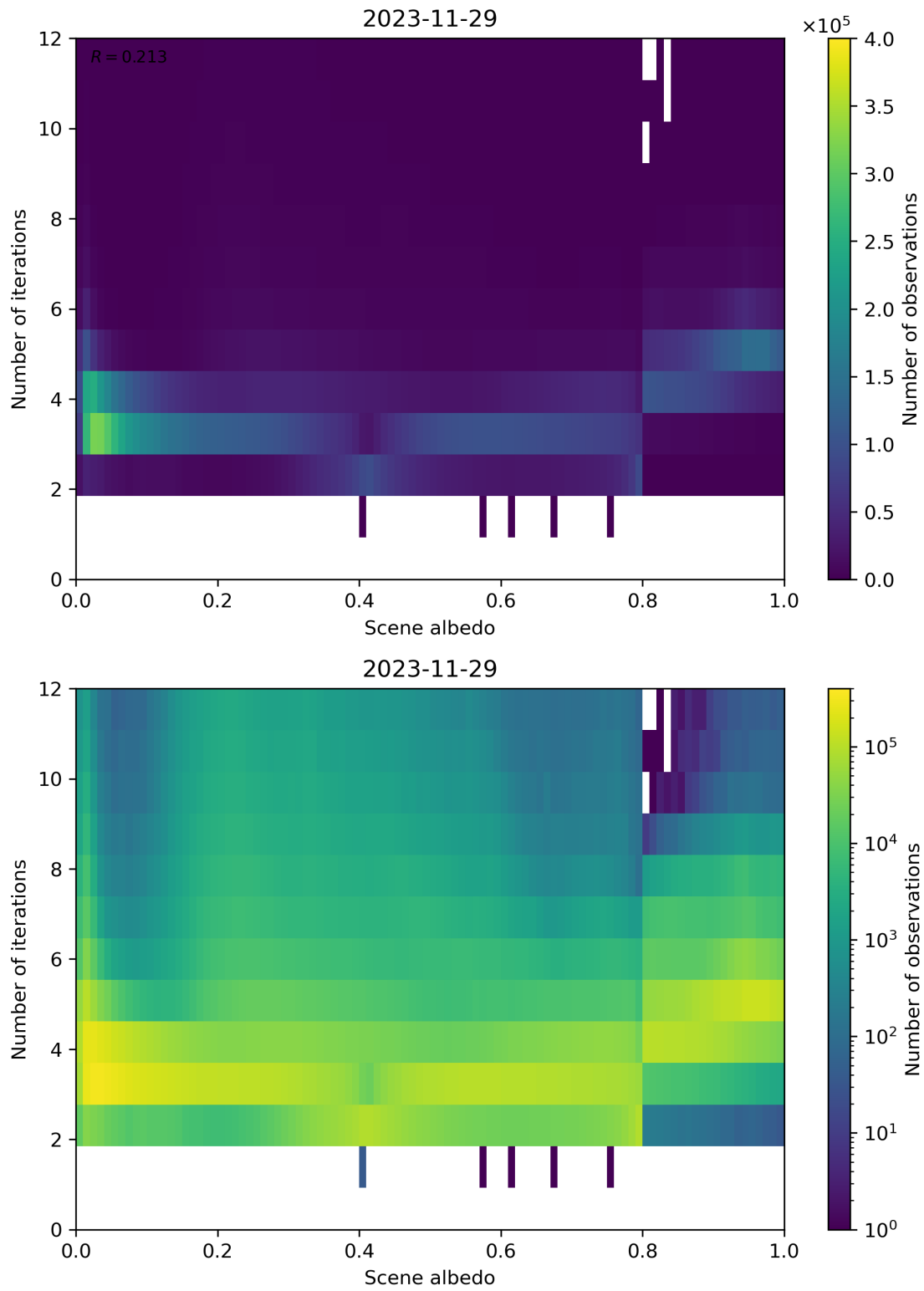


Figure 105: Scatter density plot of “Scene albedo” against “Number of iterations” for 2023-11-28 to 2023-11-30.

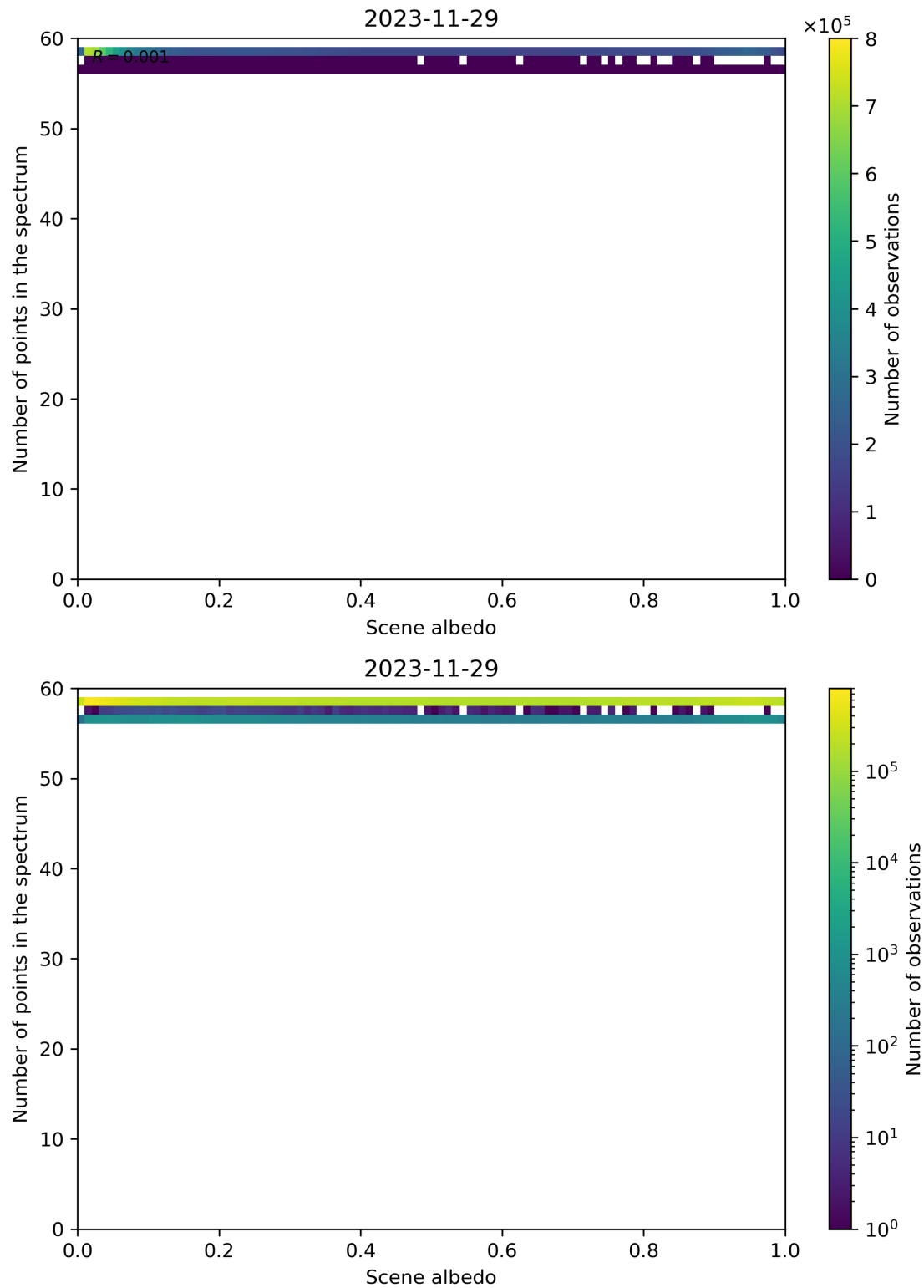


Figure 106: Scatter density plot of “Scene albedo” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.

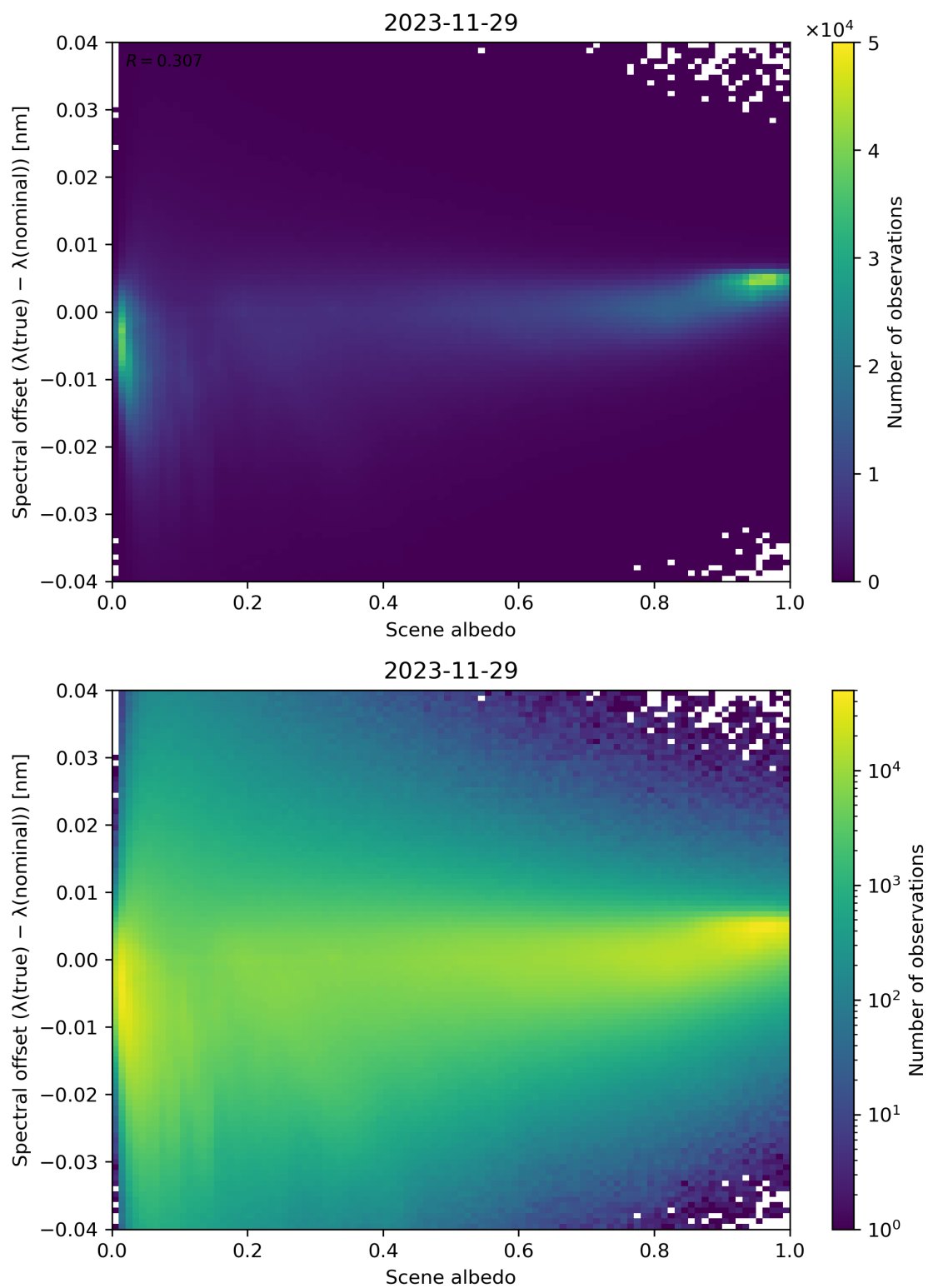


Figure 107: Scatter density plot of “Scene albedo” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.

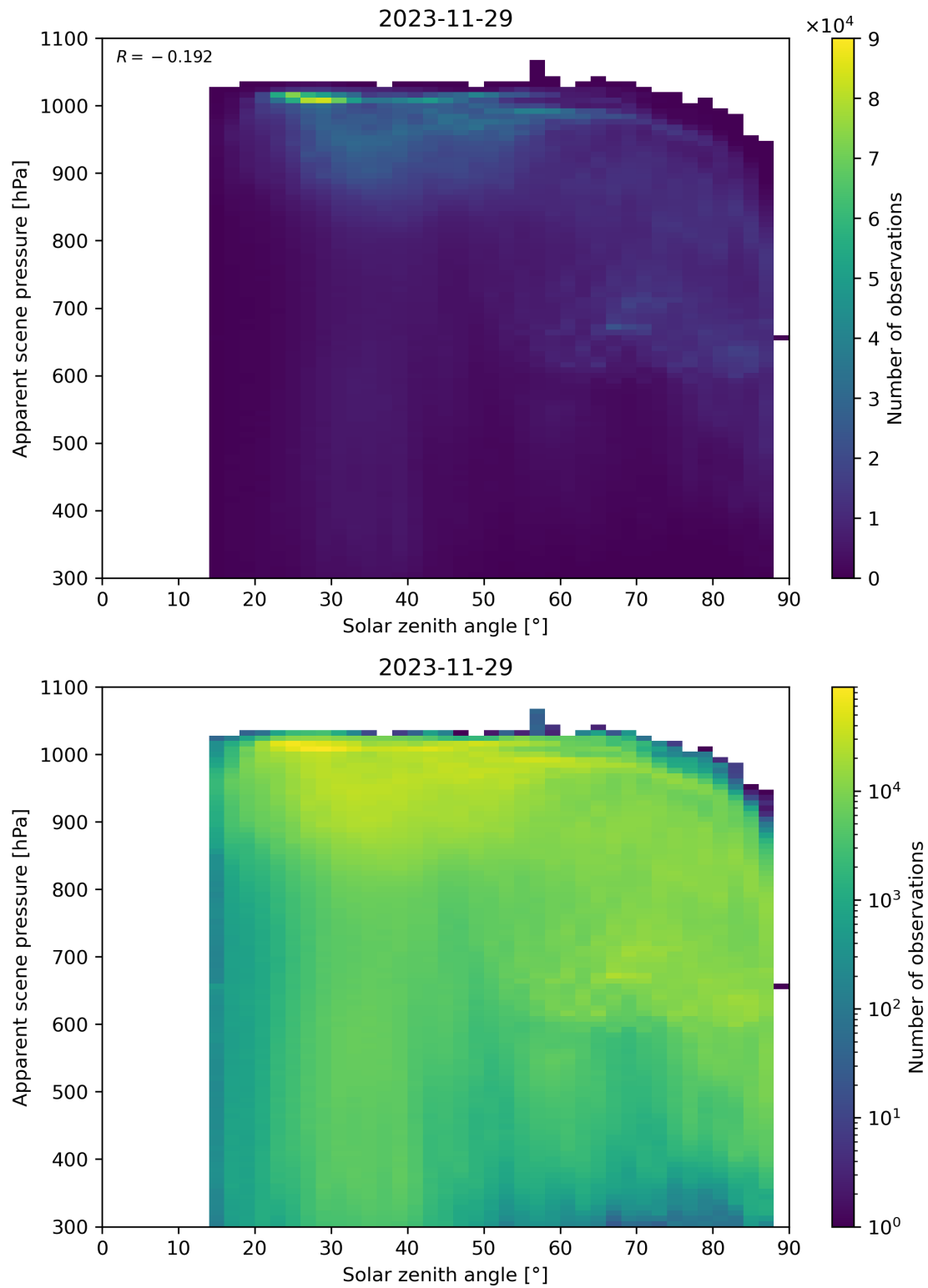


Figure 108: Scatter density plot of “Solar zenith angle” against “Apparent scene pressure” for 2023-11-28 to 2023-11-30.

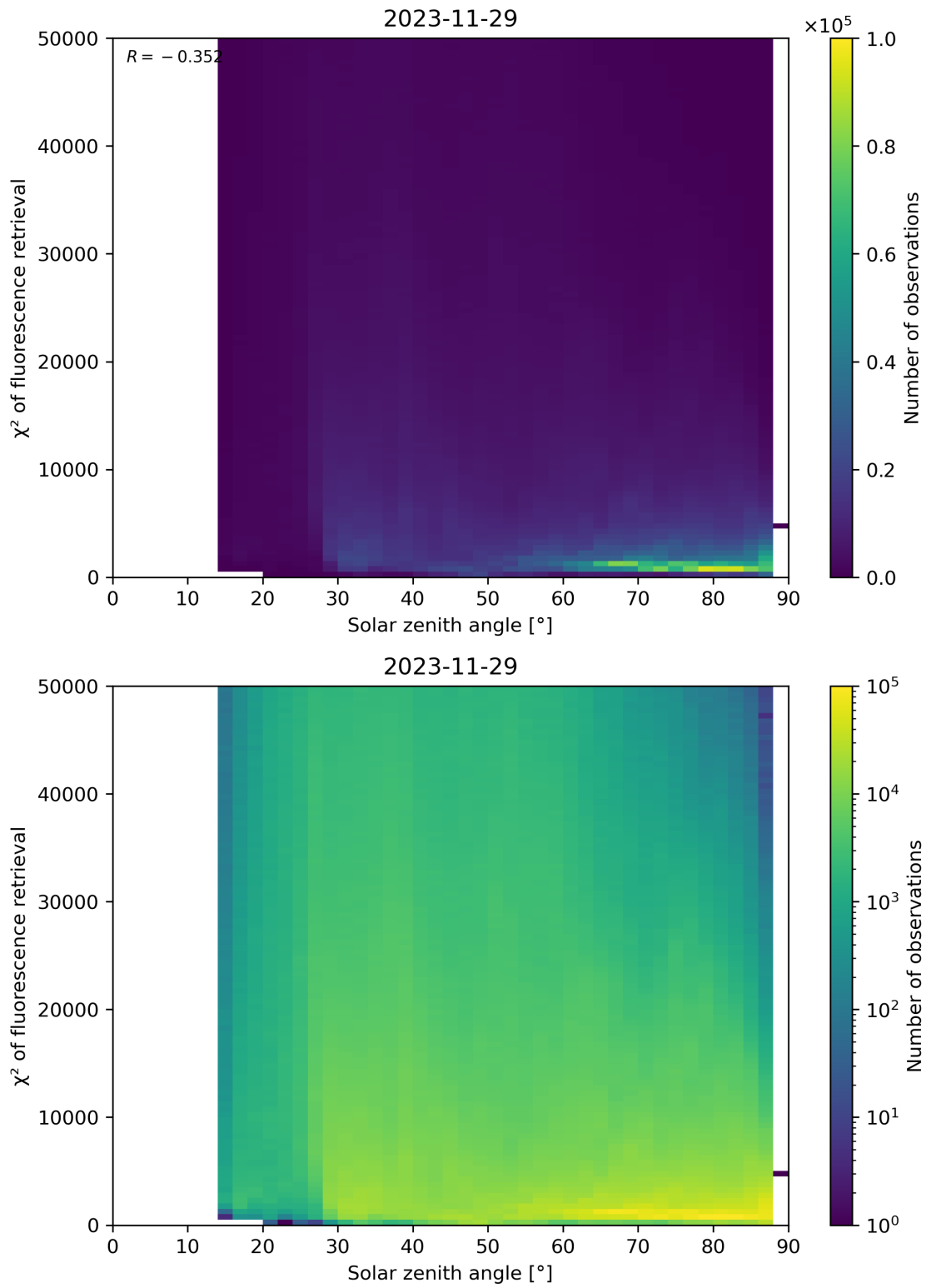


Figure 109: Scatter density plot of “Solar zenith angle” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.

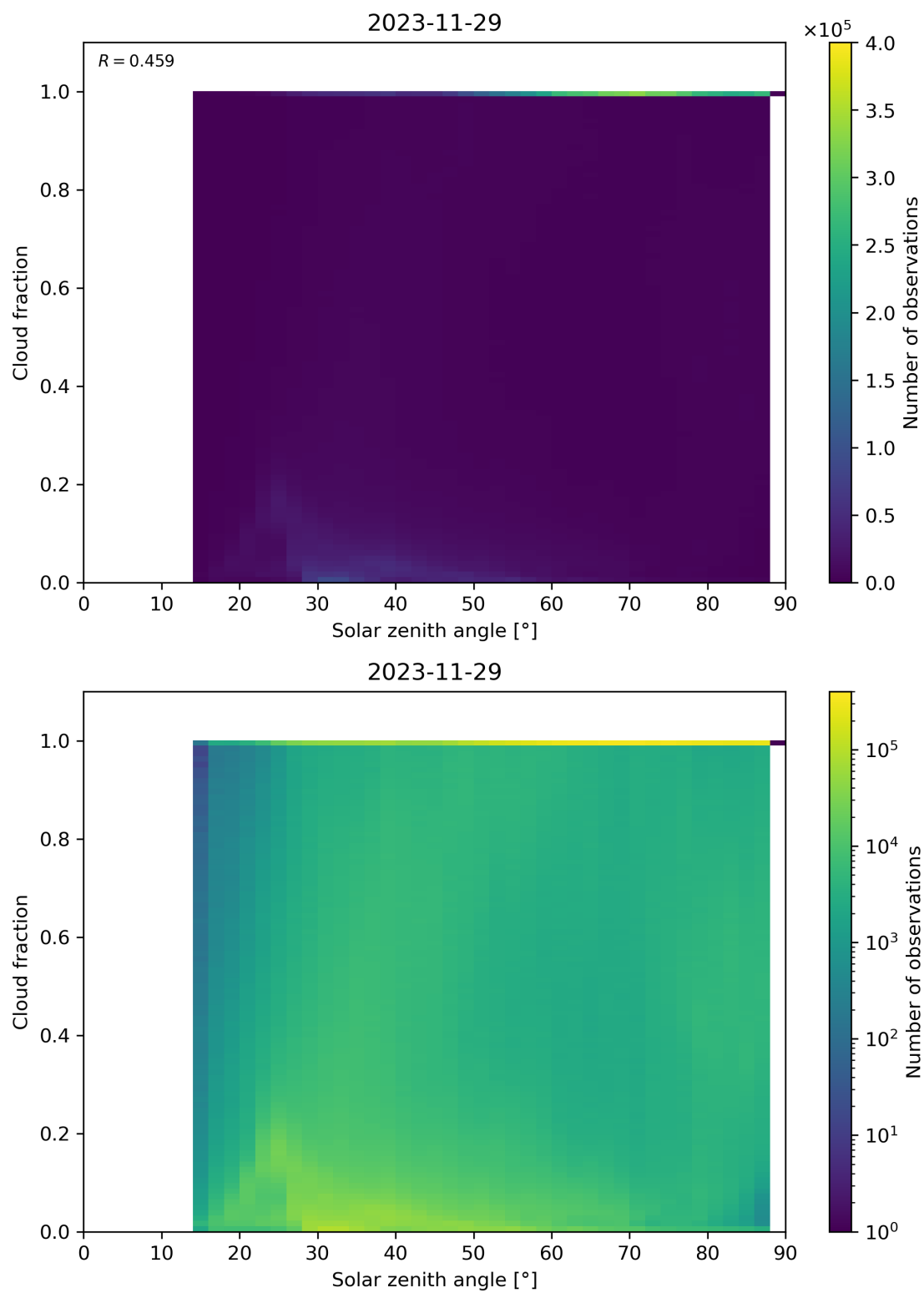


Figure 110: Scatter density plot of “Solar zenith angle” against “Cloud fraction” for 2023-11-28 to 2023-11-30.

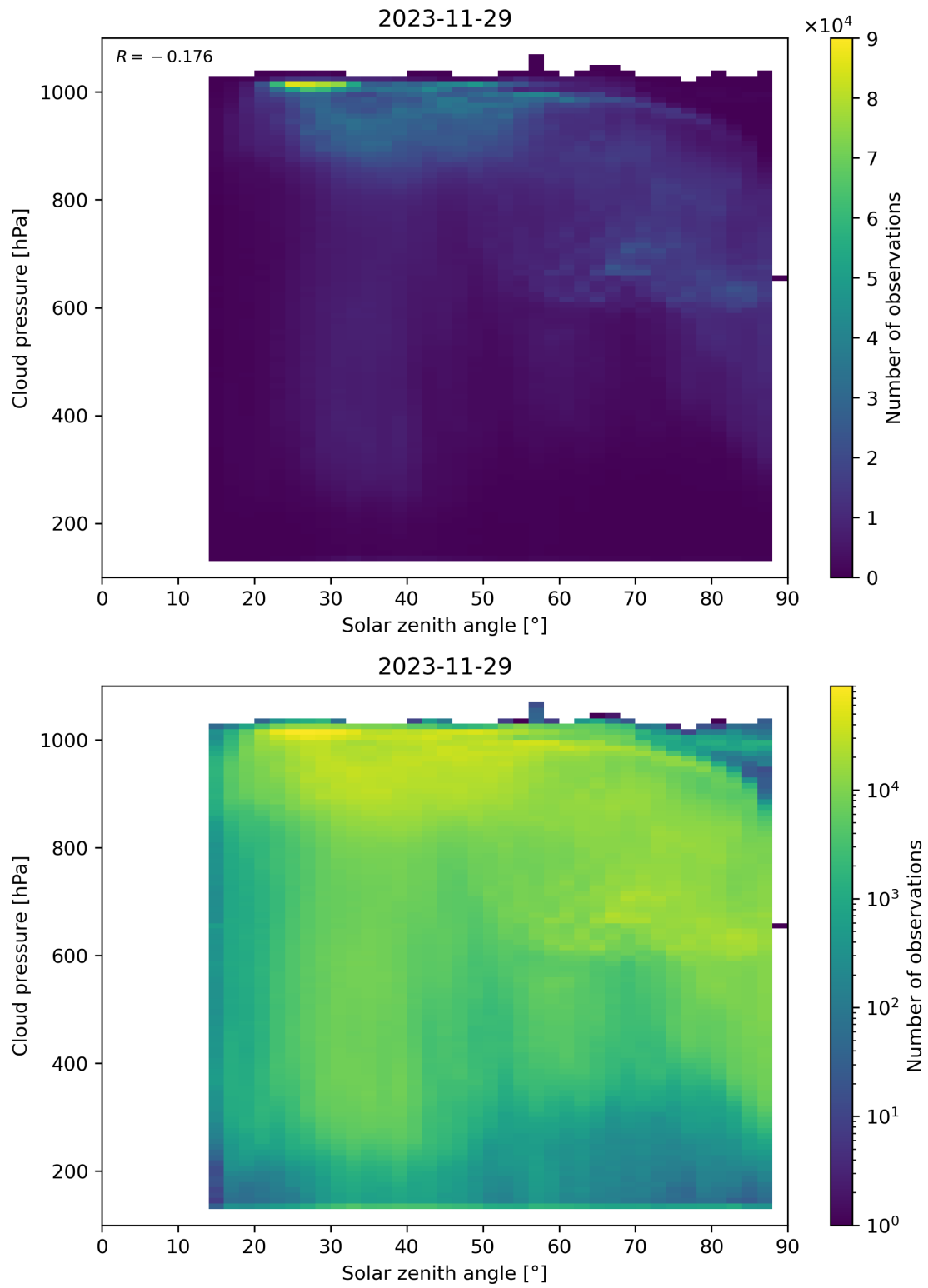


Figure 111: Scatter density plot of “Solar zenith angle” against “Cloud pressure” for 2023-11-28 to 2023-11-30.

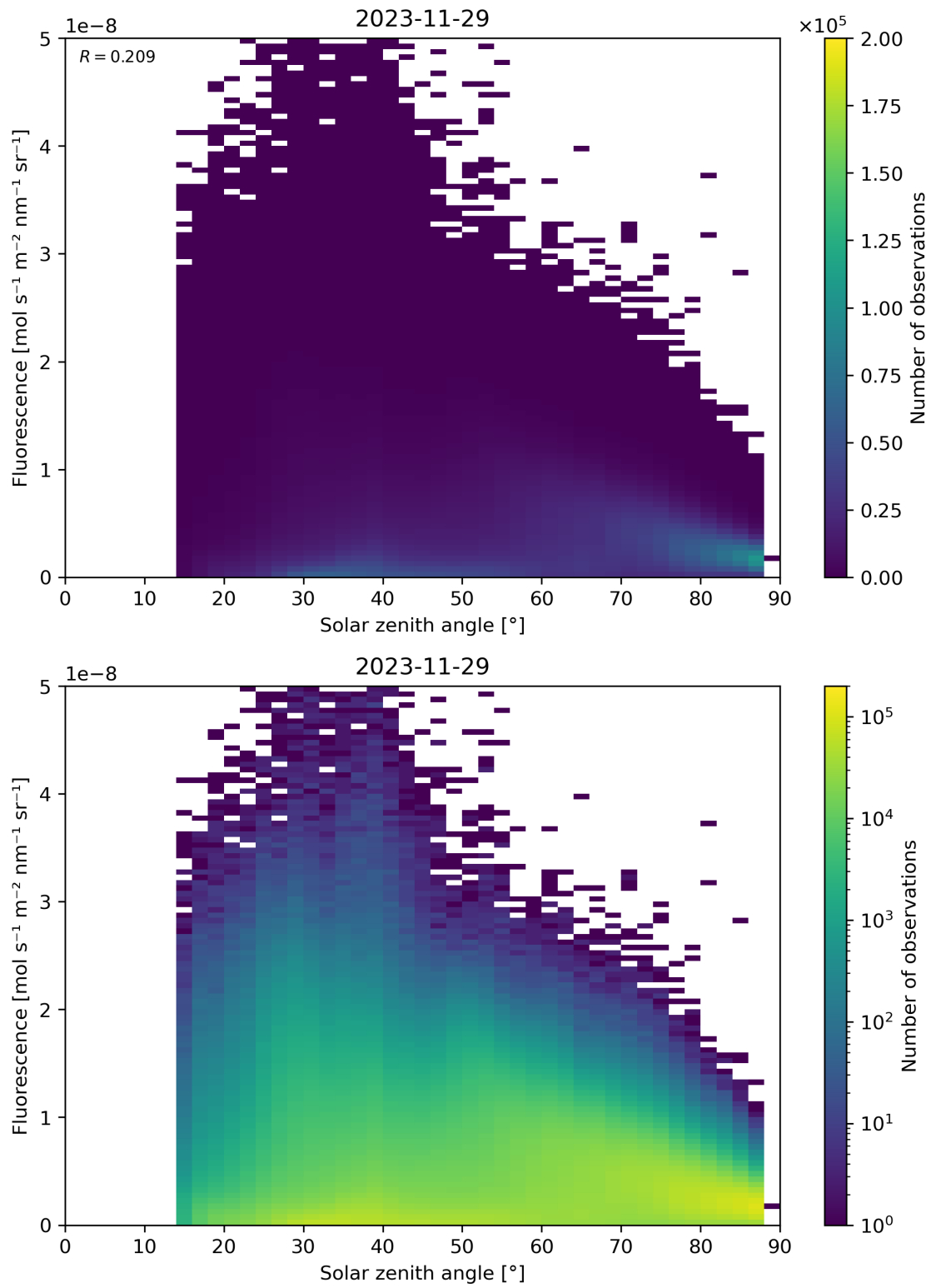


Figure 112: Scatter density plot of “Solar zenith angle” against “Fluorescence” for 2023-11-28 to 2023-11-30.

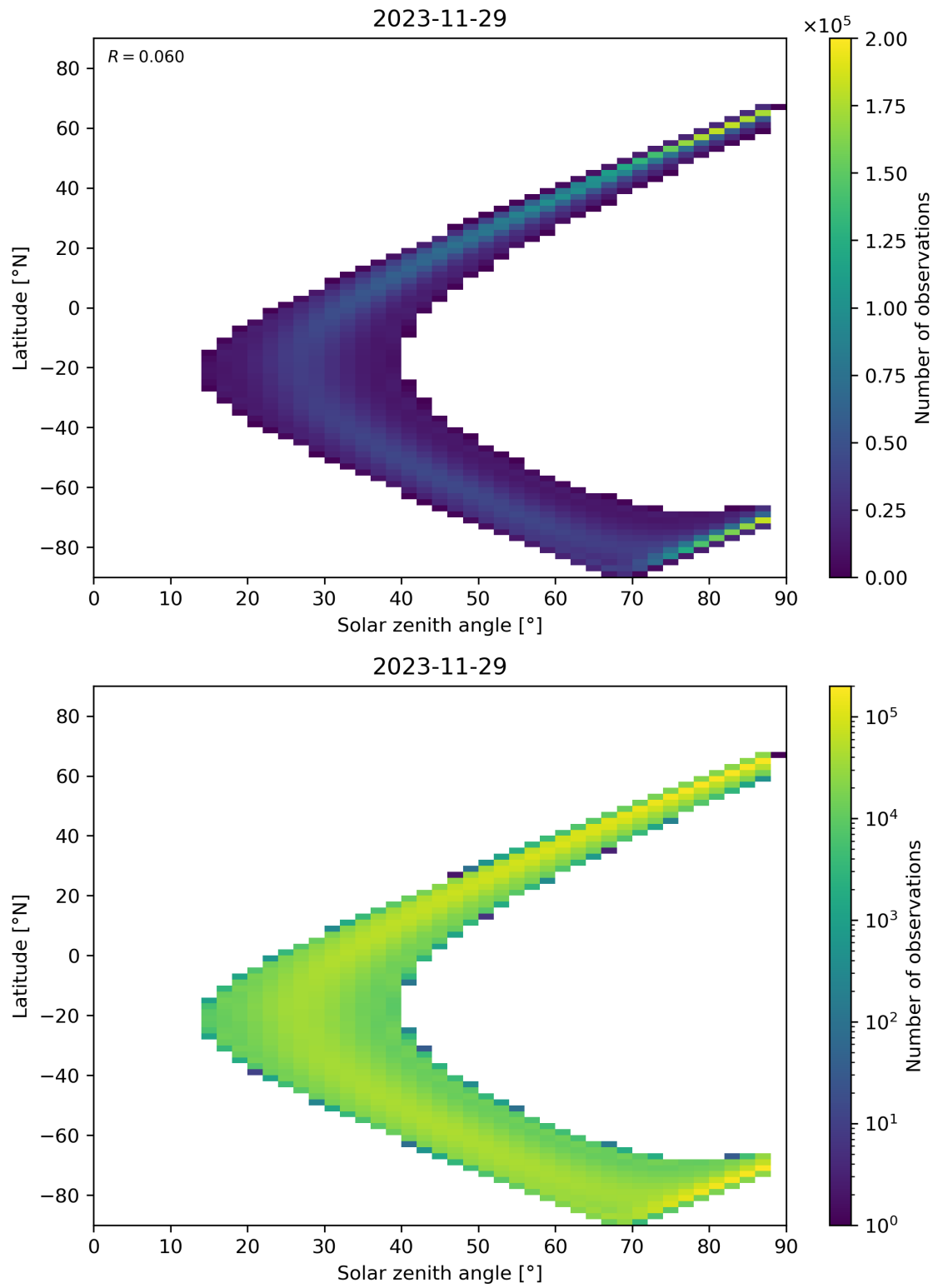


Figure 113: Scatter density plot of “Solar zenith angle” against “Latitude” for 2023-11-28 to 2023-11-30.

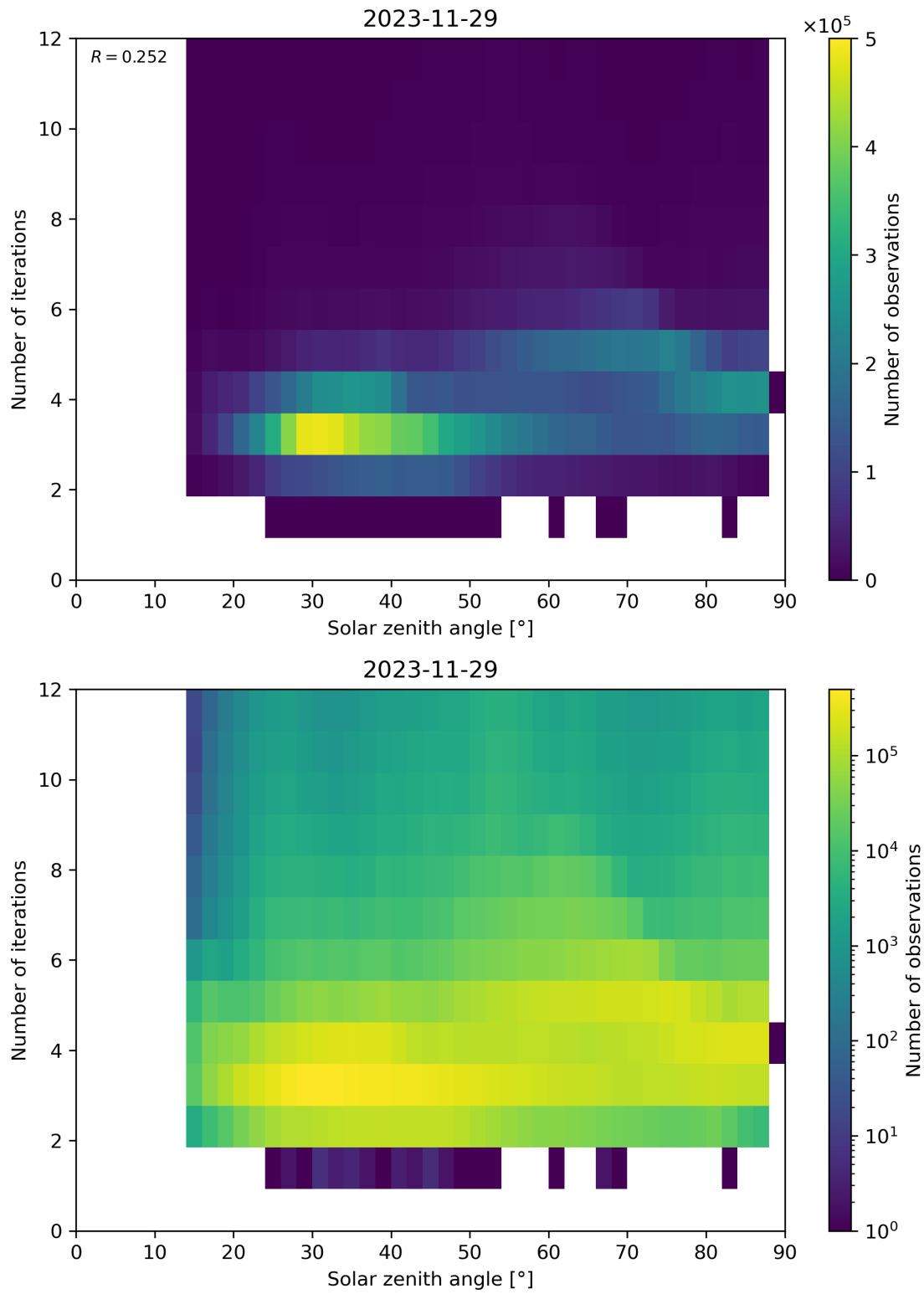


Figure 114: Scatter density plot of “Solar zenith angle” against “Number of iterations” for 2023-11-28 to 2023-11-30.

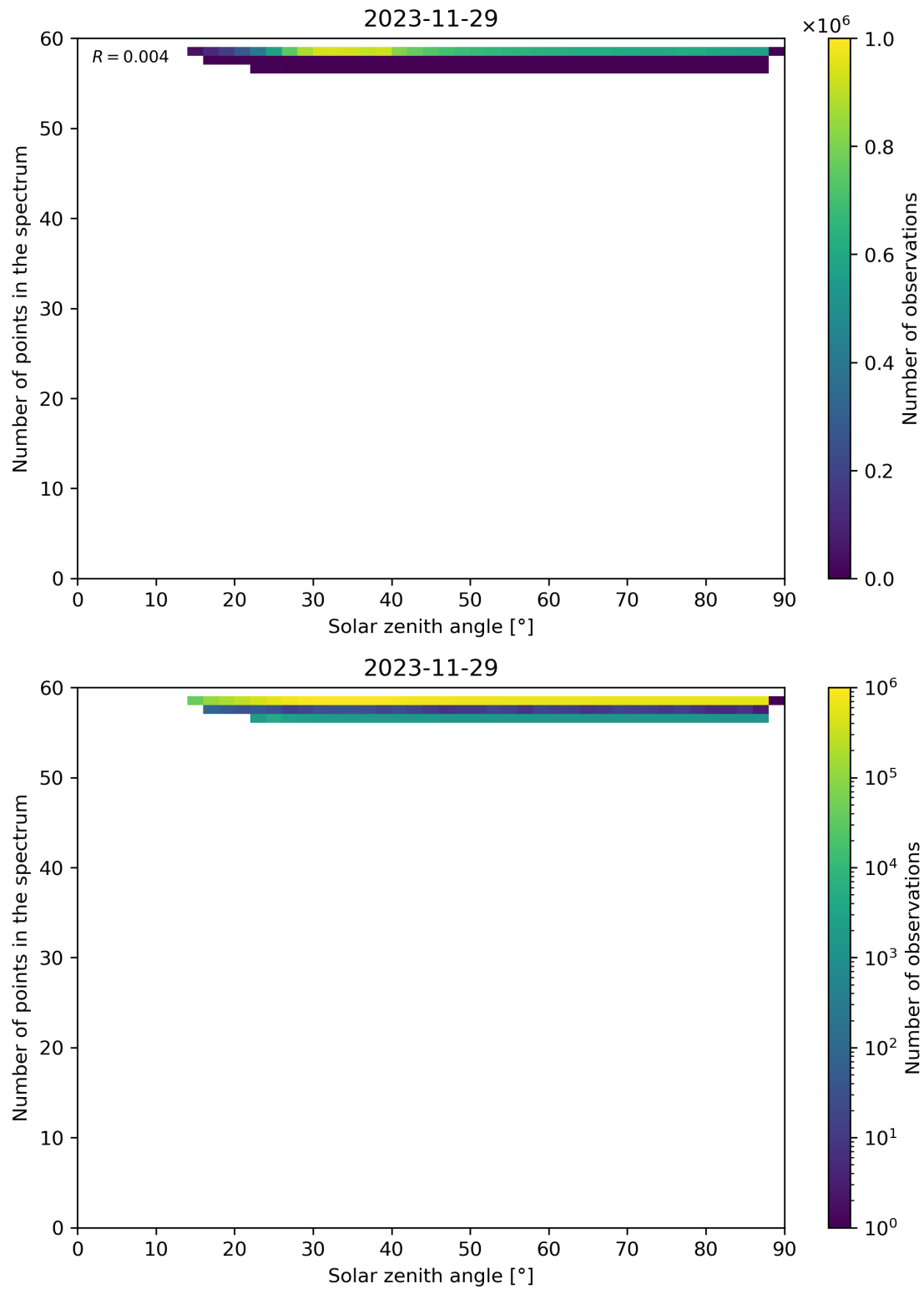


Figure 115: Scatter density plot of “Solar zenith angle” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.

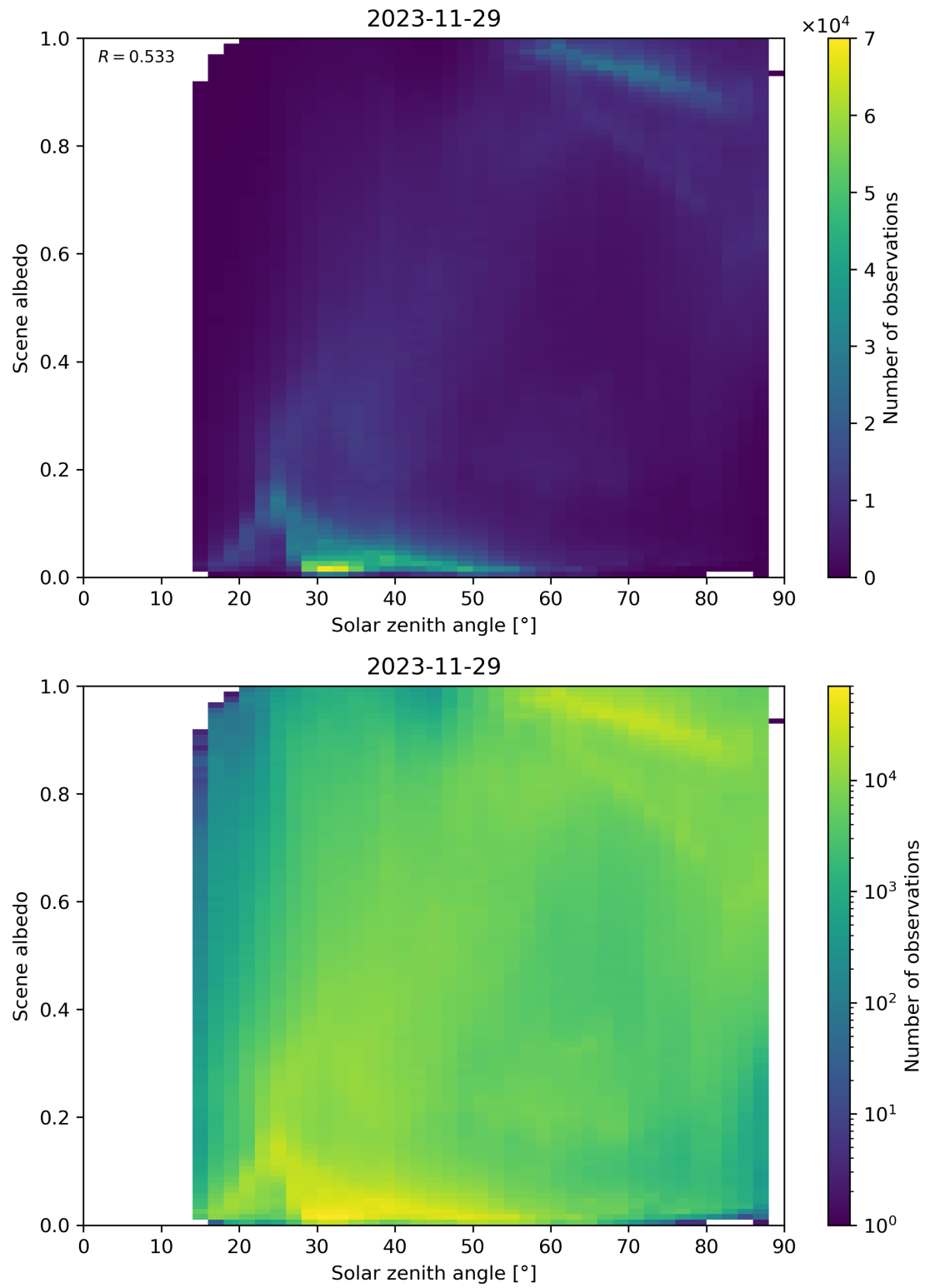


Figure 116: Scatter density plot of “Solar zenith angle” against “Scene albedo” for 2023-11-28 to 2023-11-30.

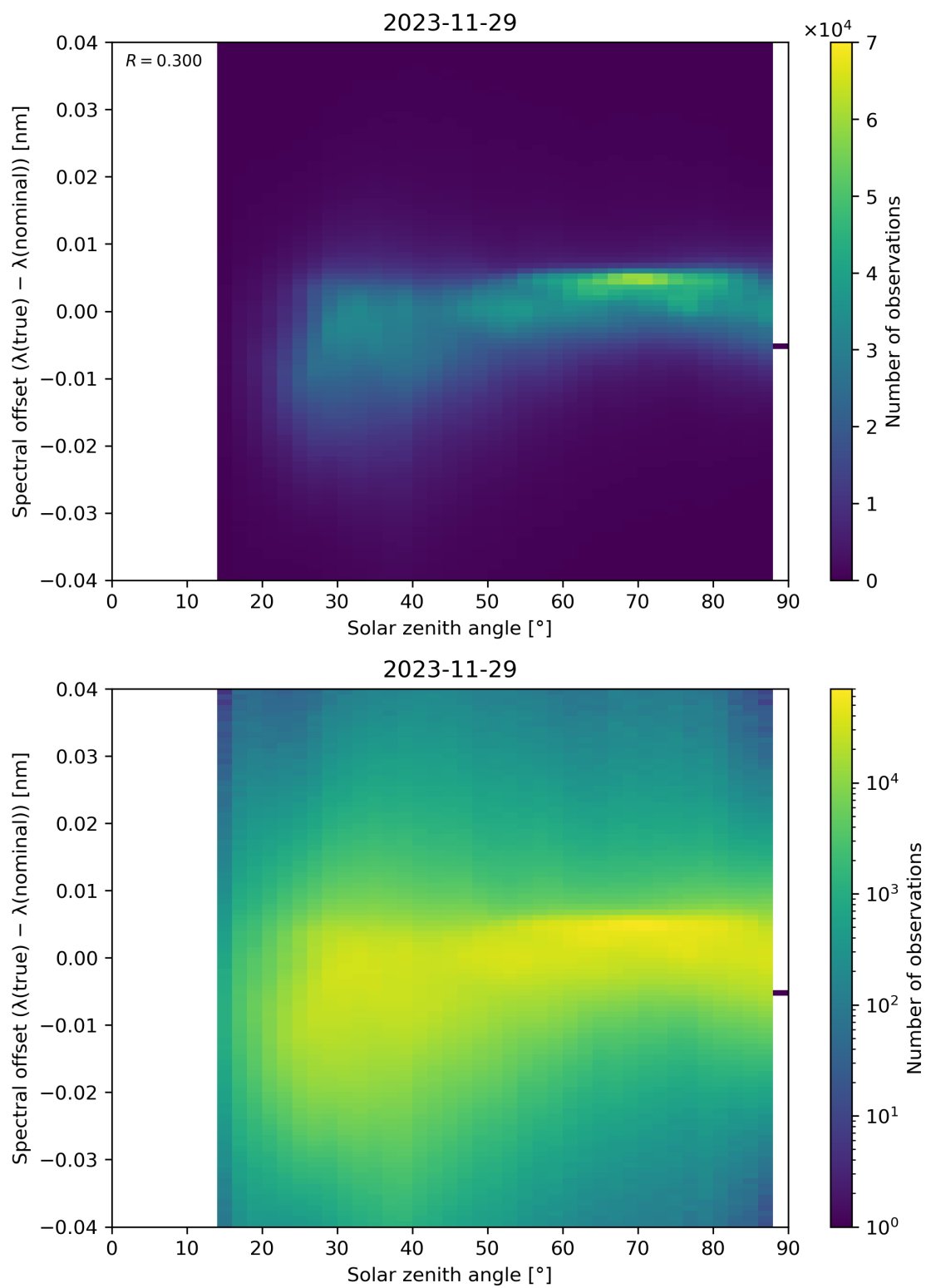


Figure 117: Scatter density plot of “Solar zenith angle” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.

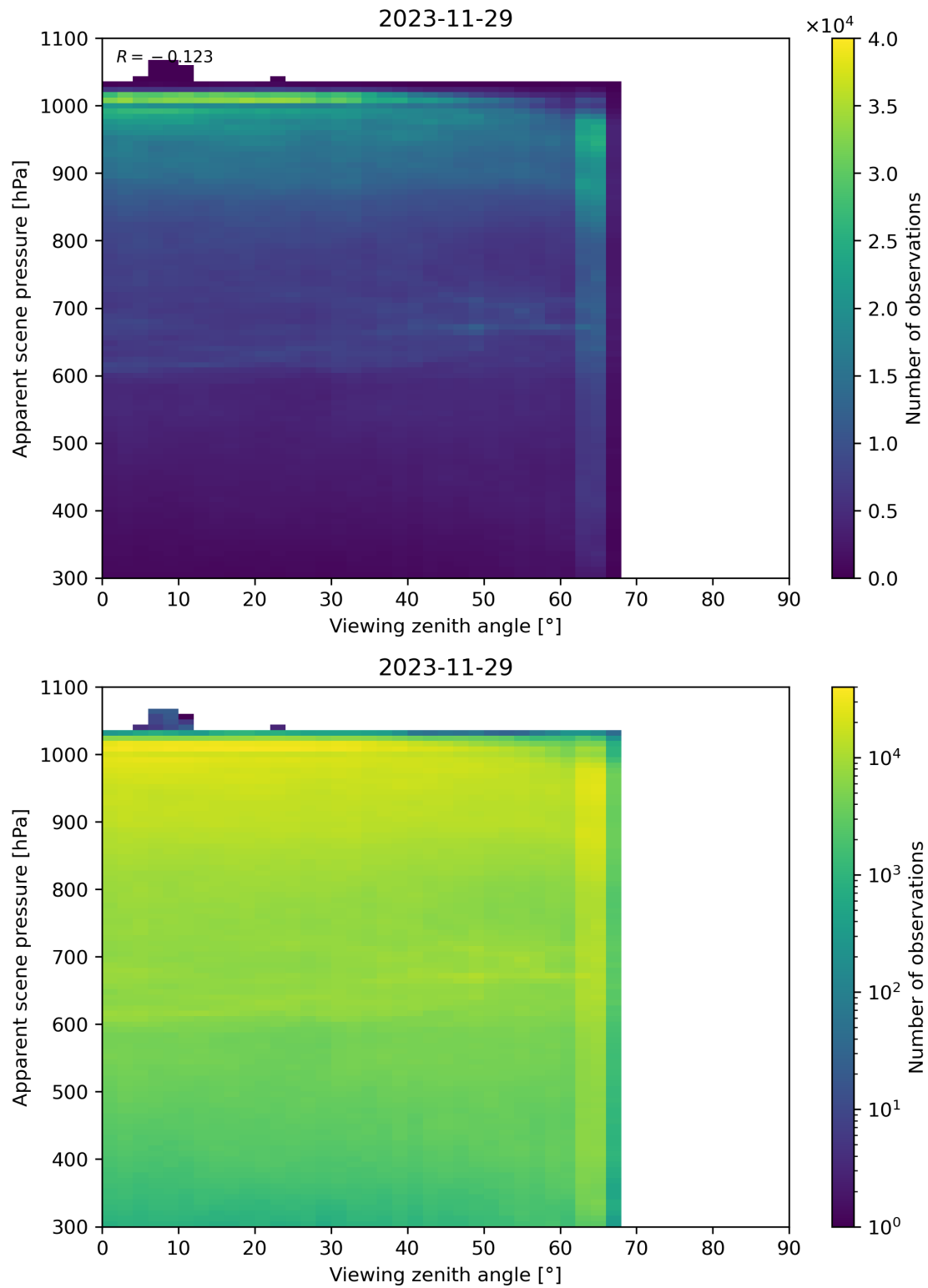


Figure 118: Scatter density plot of “Viewing zenith angle” against “Apparent scene pressure” for 2023-11-28 to 2023-11-30.

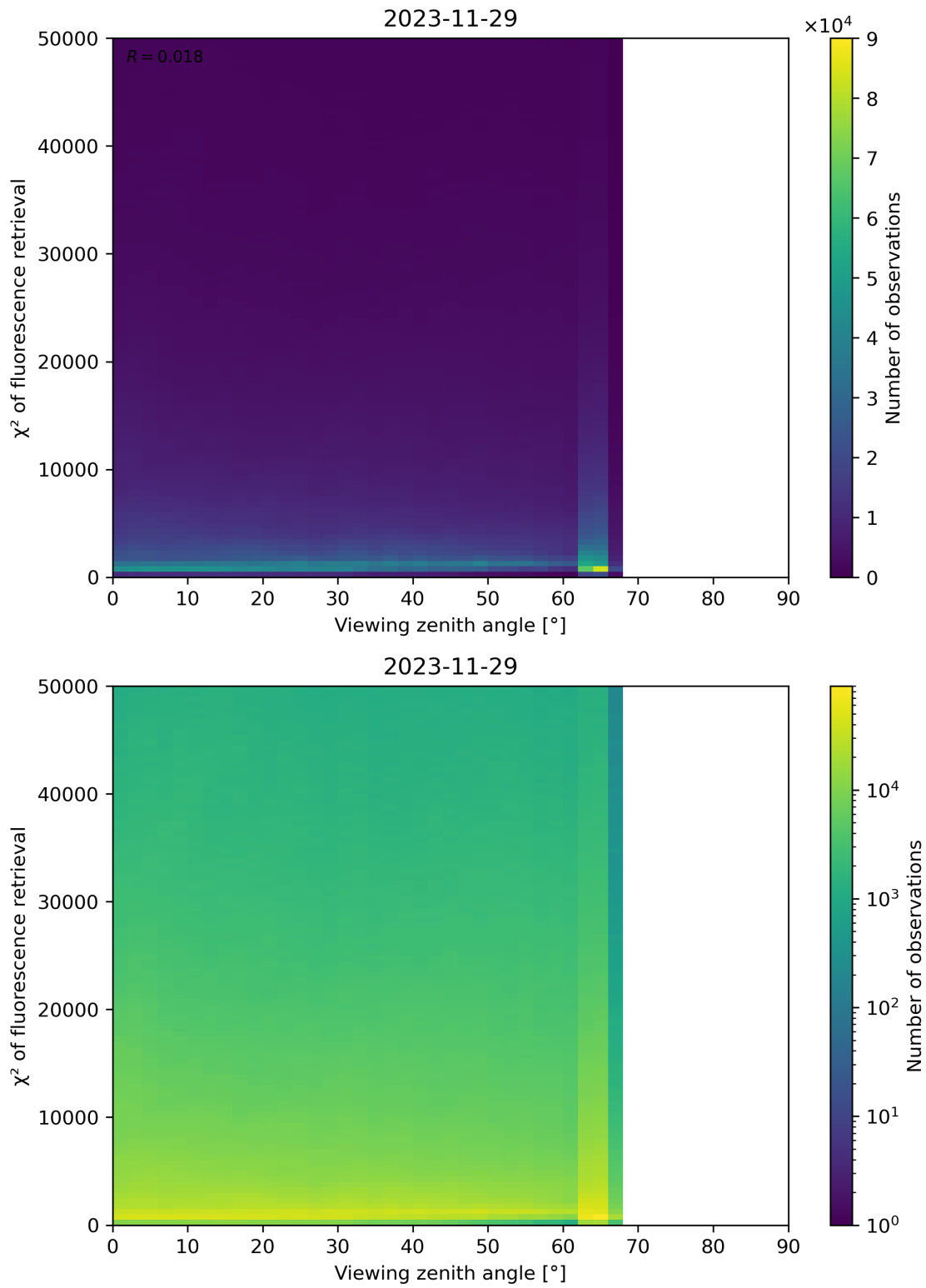


Figure 119: Scatter density plot of “Viewing zenith angle” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.

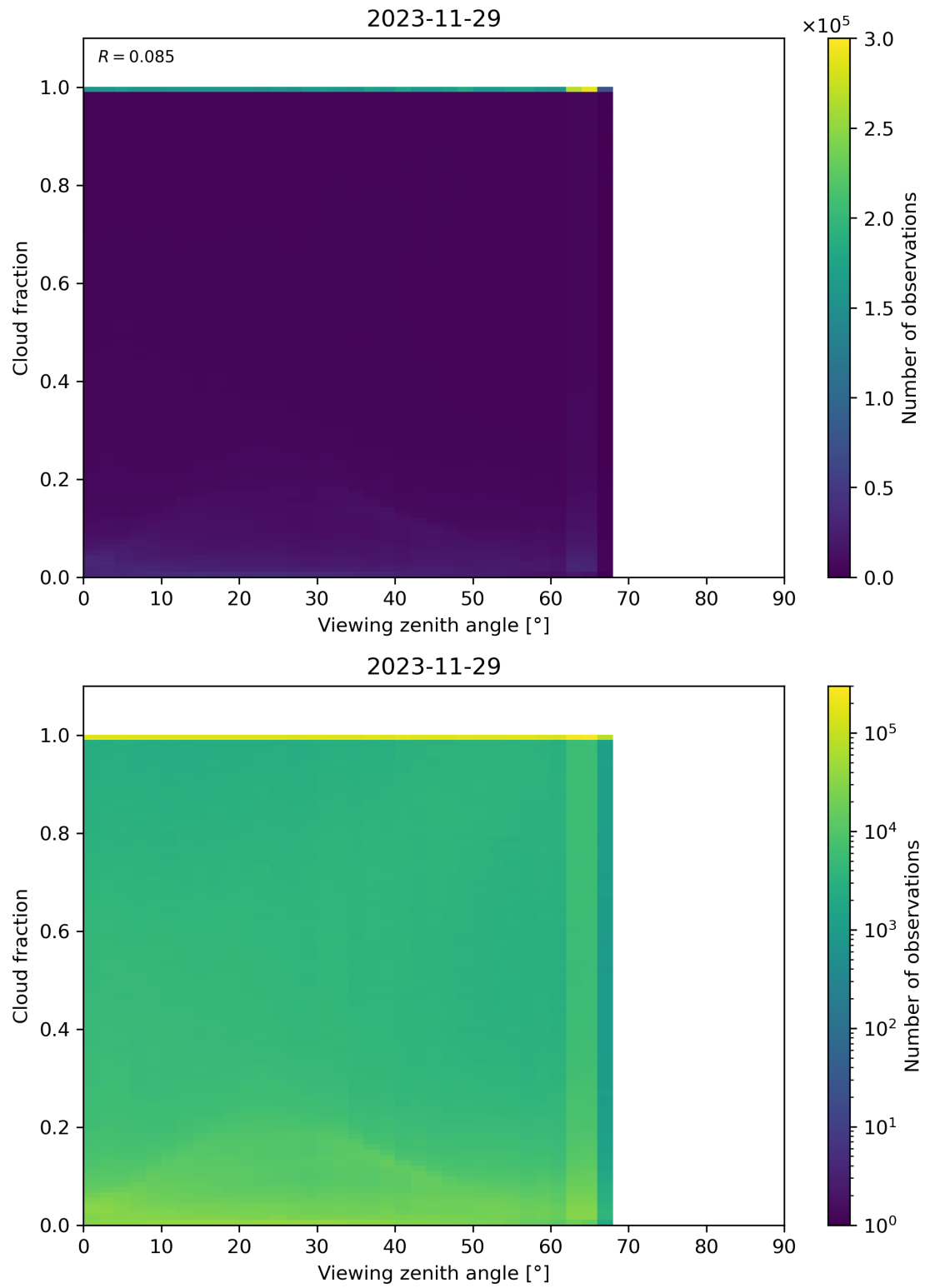


Figure 120: Scatter density plot of “Viewing zenith angle” against “Cloud fraction” for 2023-11-28 to 2023-11-30.

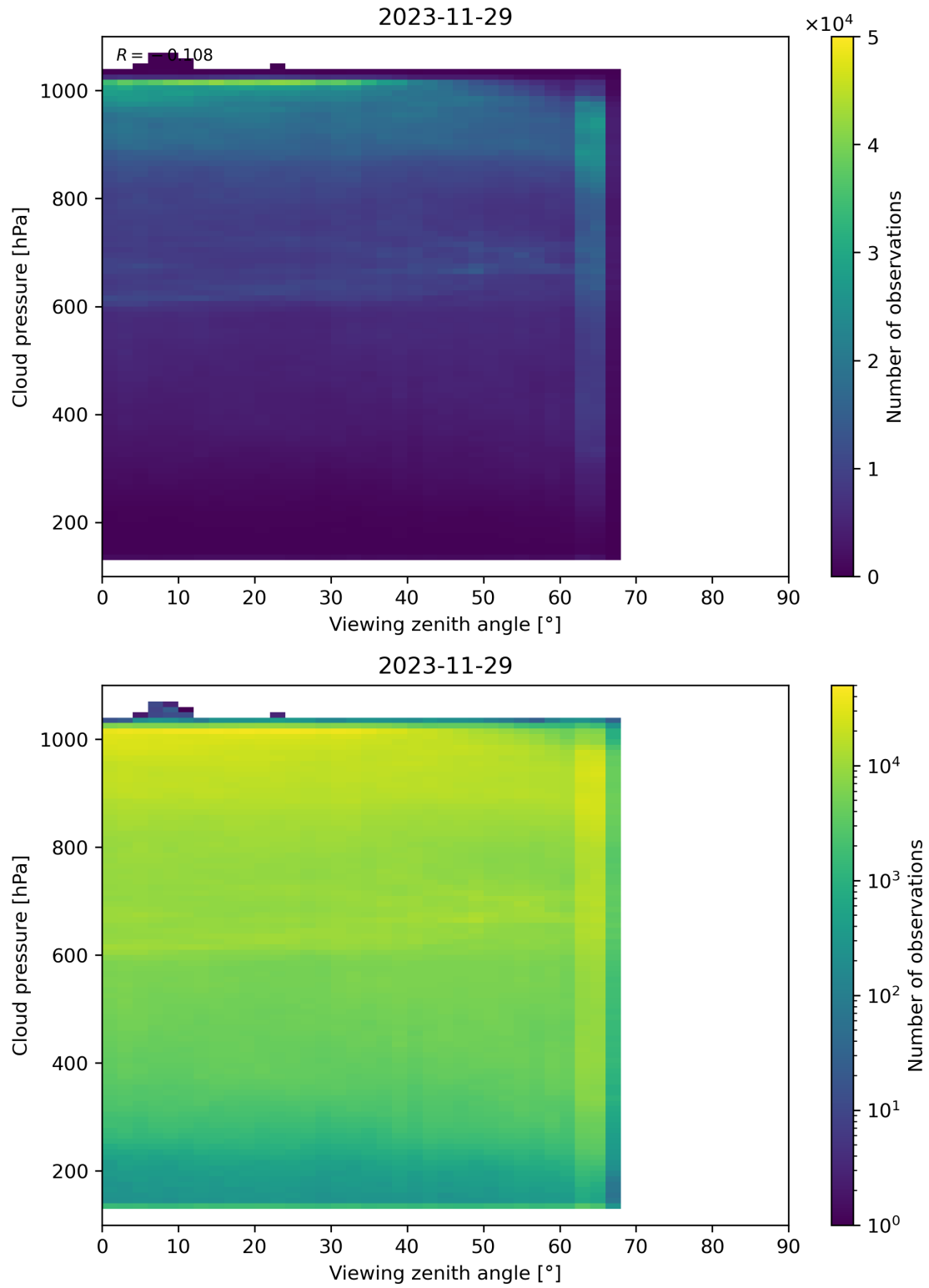


Figure 121: Scatter density plot of “Viewing zenith angle” against “Cloud pressure” for 2023-11-28 to 2023-11-30.

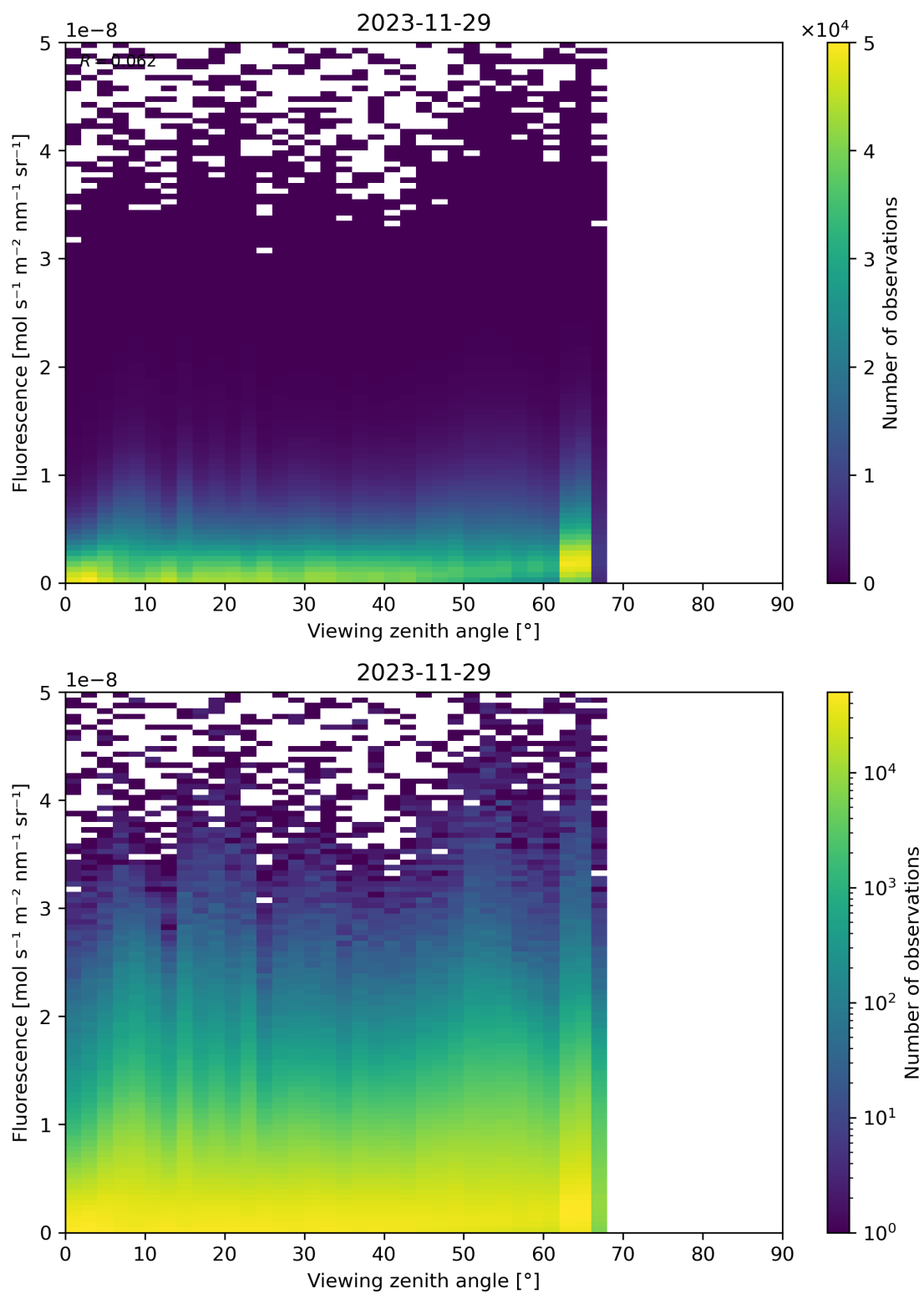


Figure 122: Scatter density plot of “Viewing zenith angle” against “Fluorescence” for 2023-11-28 to 2023-11-30.

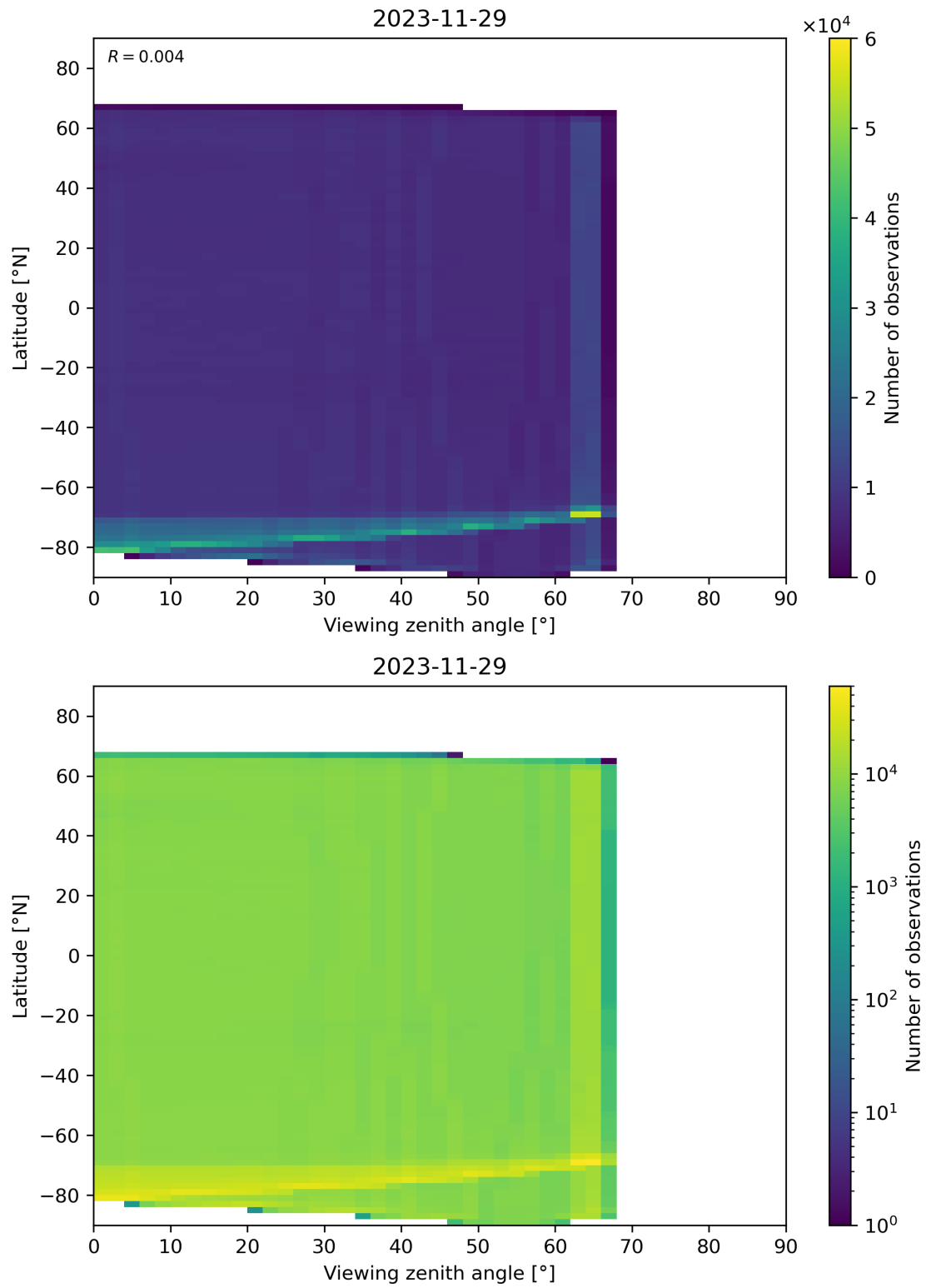


Figure 123: Scatter density plot of “Viewing zenith angle” against “Latitude” for 2023-11-28 to 2023-11-30.

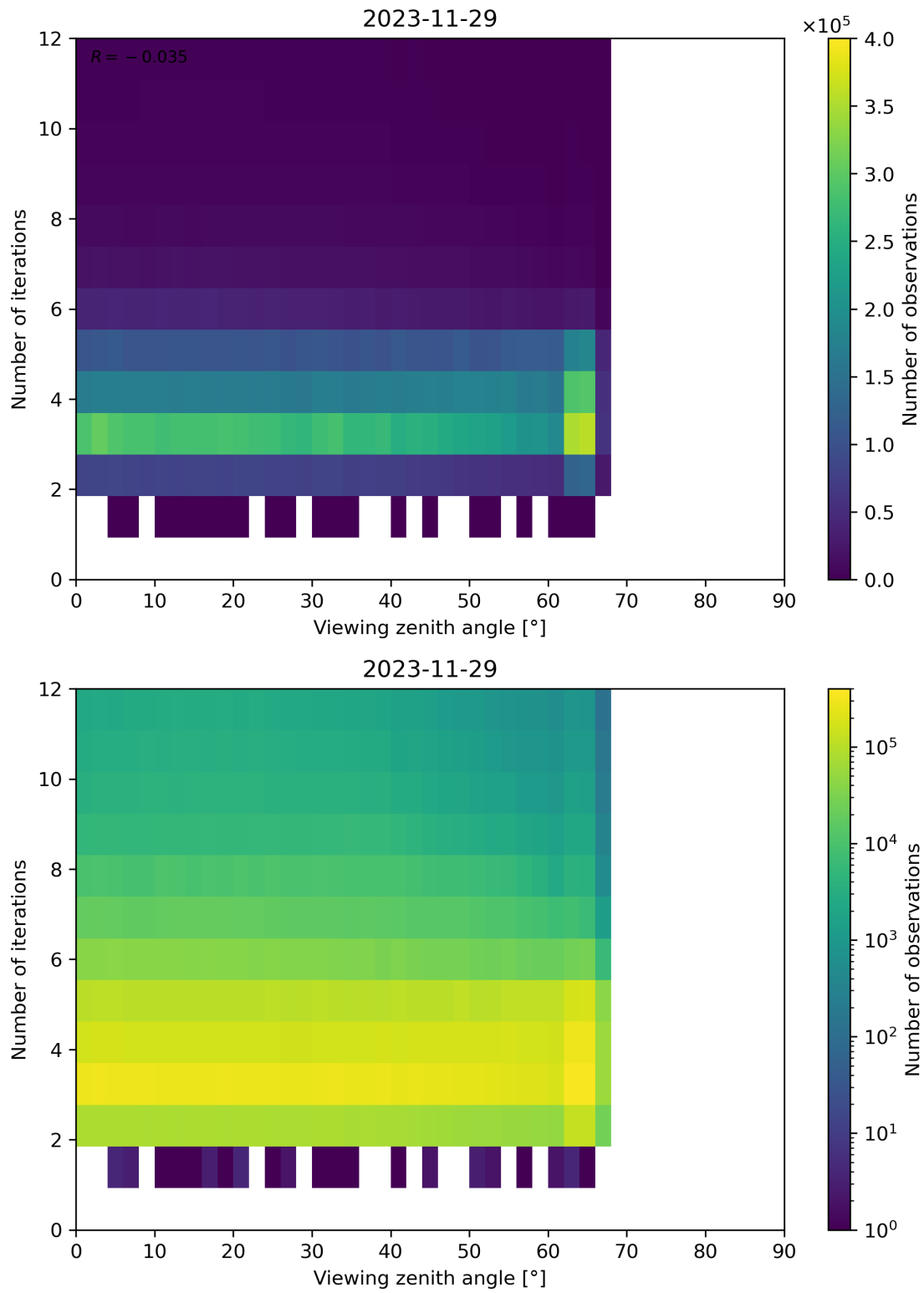


Figure 124: Scatter density plot of “Viewing zenith angle” against “Number of iterations” for 2023-11-28 to 2023-11-30.

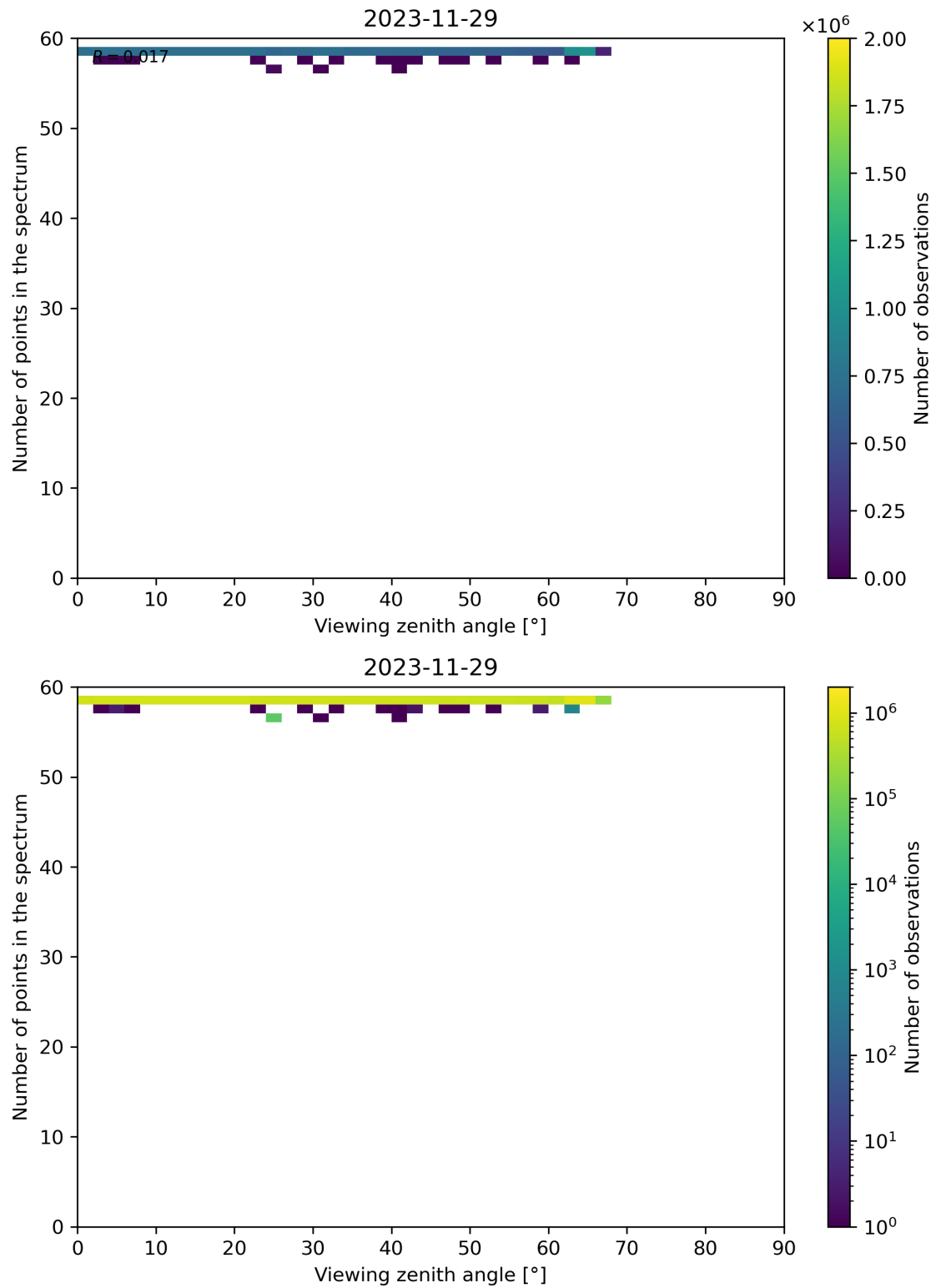


Figure 125: Scatter density plot of “Viewing zenith angle” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.

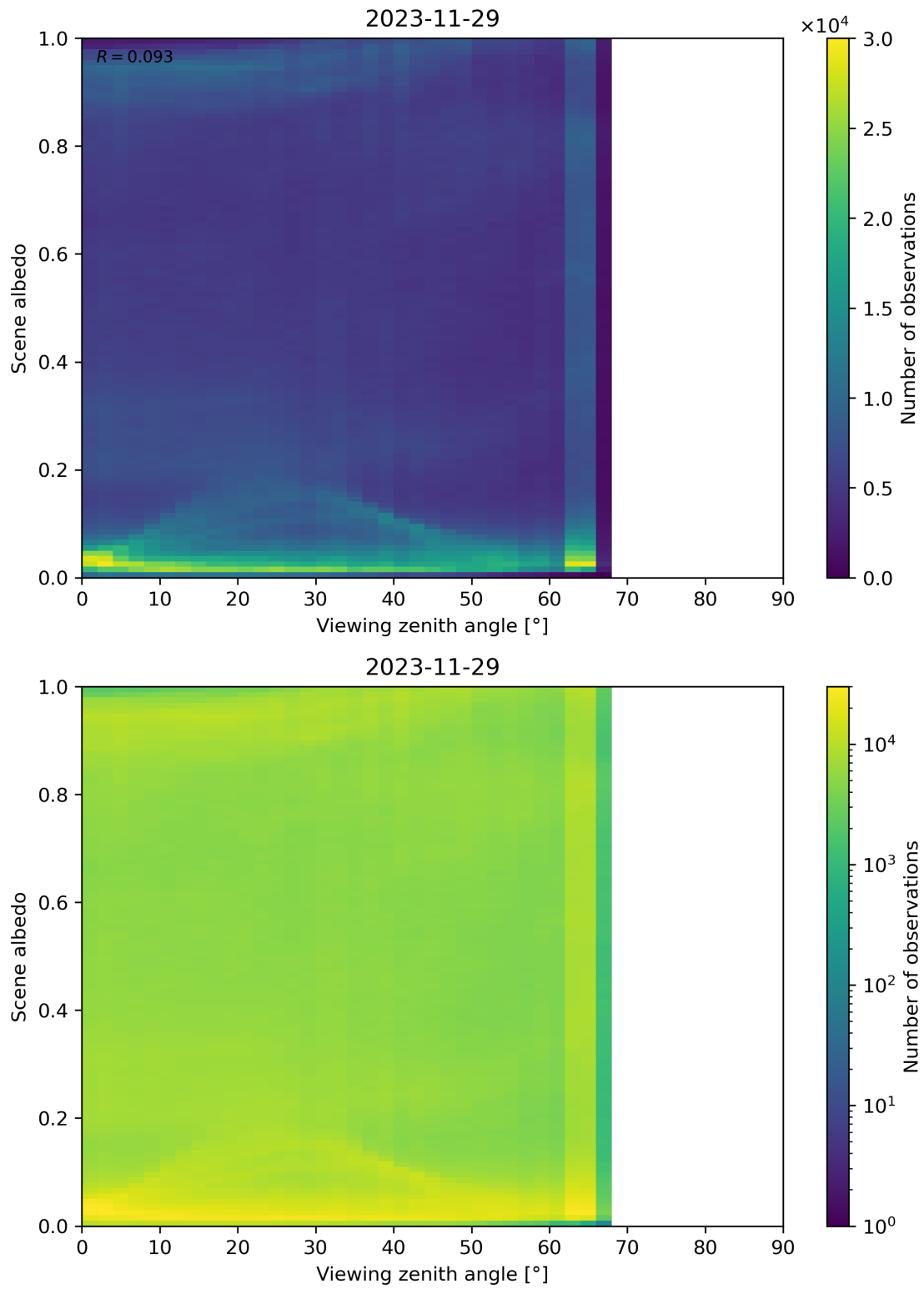


Figure 126: Scatter density plot of “Viewing zenith angle” against “Scene albedo” for 2023-11-28 to 2023-11-30.

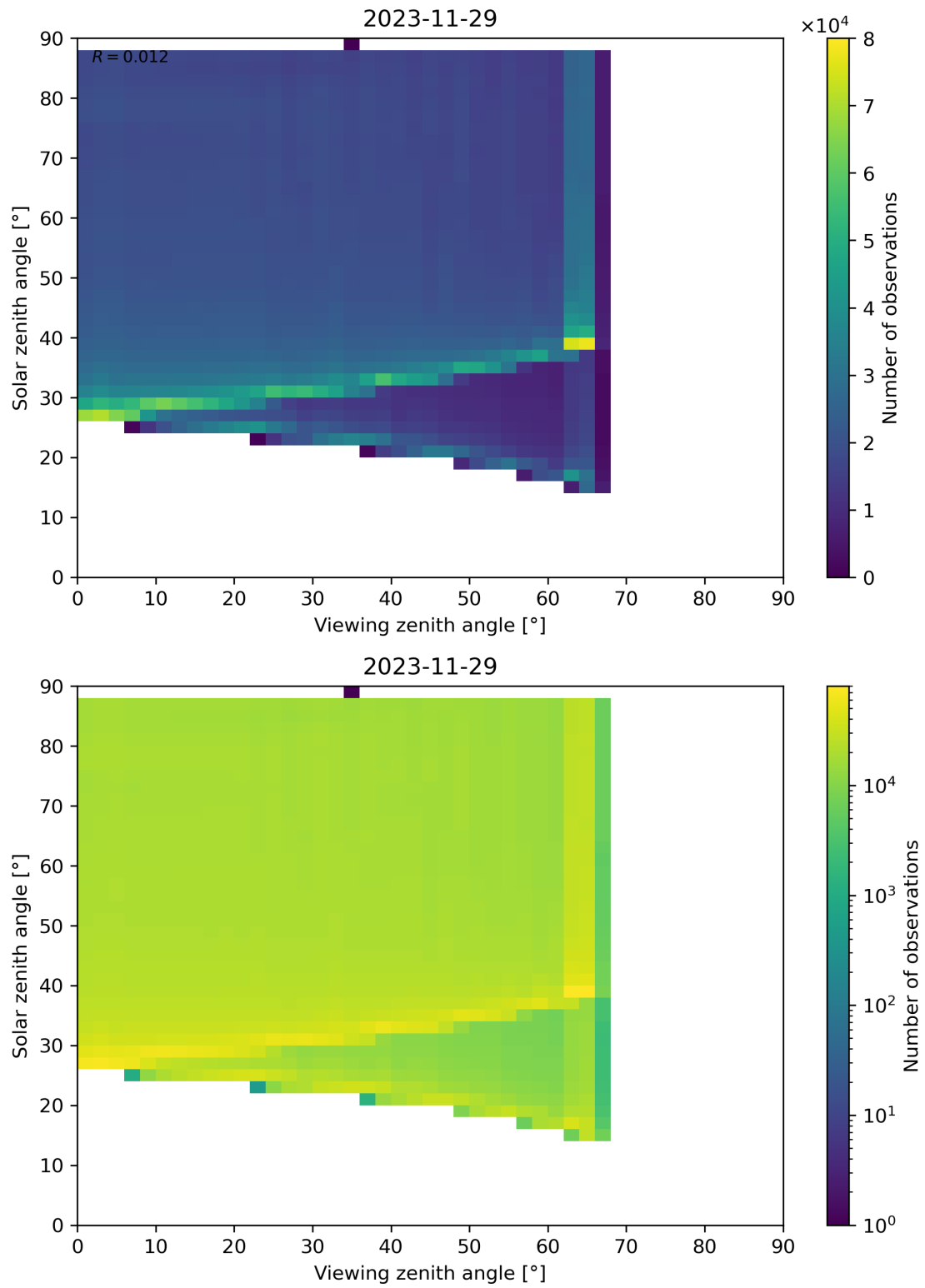


Figure 127: Scatter density plot of “Viewing zenith angle” against “Solar zenith angle” for 2023-11-28 to 2023-11-30.

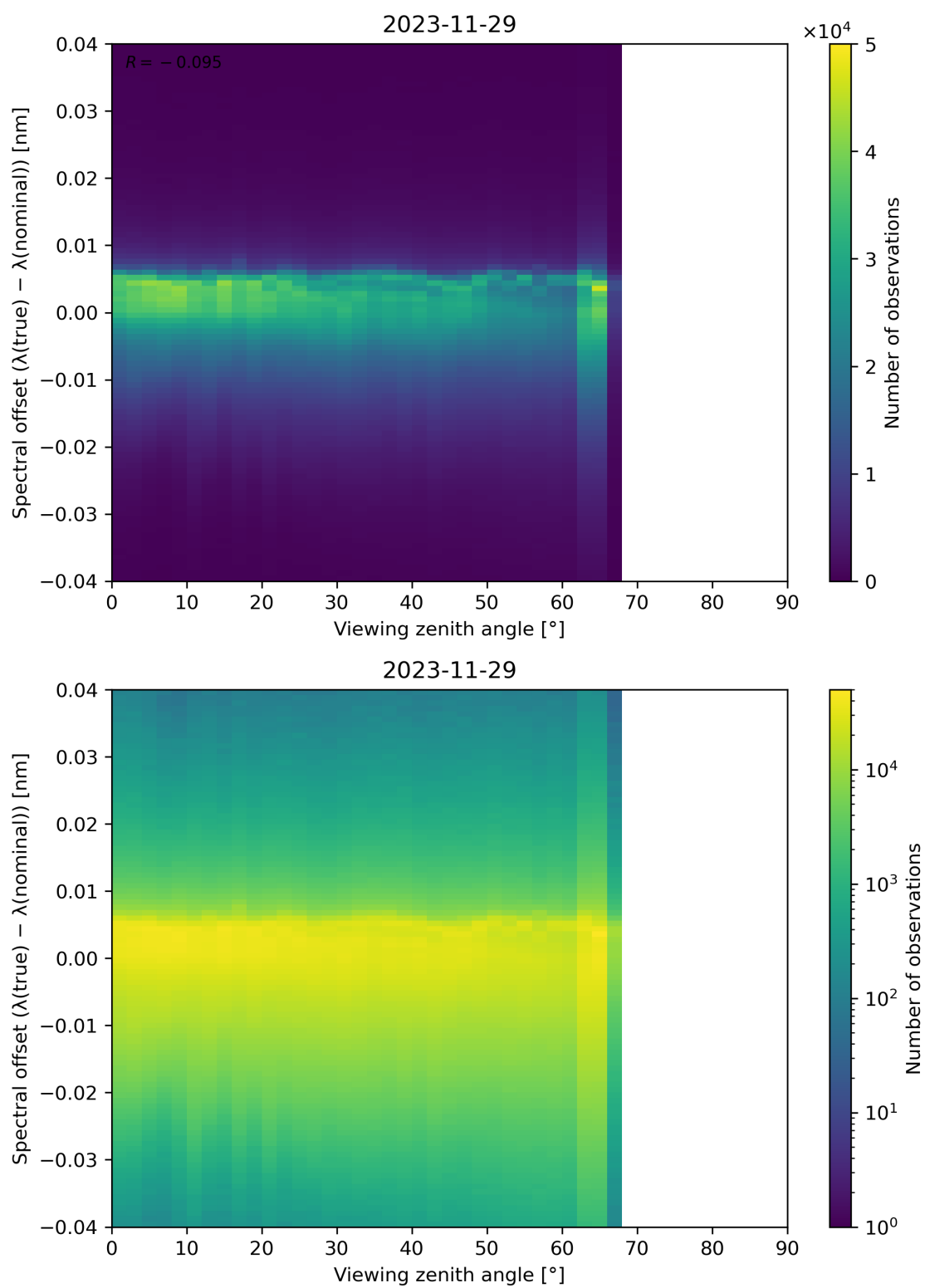


Figure 128: Scatter density plot of “Viewing zenith angle” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.

Contents

1	Short Introduction	1
1.1	The list of parameters	1
2	Definitions	1
3	Granule outlines	12
4	Input data monitoring	13
5	Warnings and errors	14
6	World maps	15
7	Zonal average	21
8	Histograms	38
9	Along track statistics	55
10	Coincidence density	72
11	Copyright information of ‘PyCAMA’	138

List of Figures

1	Map of correlation graph for 2023-11-28 to 2023-11-30.	10
2	Map of correlation matrix for 2023-11-28 to 2023-11-30.	11
3	Outline of the granules.	12
4	Input data per granule	13
5	Fraction of pixels with specific warnings and errors during processing	14
6	Map of “Cloud pressure” for 2023-11-28 to 2023-11-30	15
7	Map of “Cloud fraction” for 2023-11-28 to 2023-11-30	16
8	Map of “Scene albedo” for 2023-11-28 to 2023-11-30	17
9	Map of “Apparent scene pressure” for 2023-11-28 to 2023-11-30	18
10	Map of “Fluorescence” for 2023-11-28 to 2023-11-30	19
11	Map of the number of observations for 2023-11-28 to 2023-11-30	20
12	Zonal average of “QA value” for 2023-11-28 to 2023-11-30.	21
13	Zonal average of “Cloud pressure” for 2023-11-28 to 2023-11-30.	22
14	Zonal average of “Cloud pressure precision” for 2023-11-28 to 2023-11-30.	23
15	Zonal average of “Cloud fraction” for 2023-11-28 to 2023-11-30.	24
16	Zonal average of “Cloud fraction precision” for 2023-11-28 to 2023-11-30.	25
17	Zonal average of “Scene albedo” for 2023-11-28 to 2023-11-30.	26
18	Zonal average of “Scene albedo precision” for 2023-11-28 to 2023-11-30.	27
19	Zonal average of “Apparent scene pressure” for 2023-11-28 to 2023-11-30.	28
20	Zonal average of “Apparent scene pressure precision” for 2023-11-28 to 2023-11-30.	29
21	Zonal average of “ χ^2 ” for 2023-11-28 to 2023-11-30.	30
22	Zonal average of “Number of iterations” for 2023-11-28 to 2023-11-30.	31
23	Zonal average of “Fluorescence” for 2023-11-28 to 2023-11-30.	32
24	Zonal average of “Fluorescence precision” for 2023-11-28 to 2023-11-30.	33
25	Zonal average of “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.	34
26	Zonal average of “Degrees of freedom for signal of fluorescence retrieval” for 2023-11-28 to 2023-11-30.	35
27	Zonal average of “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.	36
28	Zonal average of “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.	37
29	Histogram of “QA value” for 2023-11-28 to 2023-11-30	38
30	Histogram of “Cloud pressure” for 2023-11-28 to 2023-11-30	39
31	Histogram of “Cloud pressure precision” for 2023-11-28 to 2023-11-30	40
32	Histogram of “Cloud fraction” for 2023-11-28 to 2023-11-30	41
33	Histogram of “Cloud fraction precision” for 2023-11-28 to 2023-11-30	42
34	Histogram of “Scene albedo” for 2023-11-28 to 2023-11-30	43
35	Histogram of “Scene albedo precision” for 2023-11-28 to 2023-11-30	44
36	Histogram of “Apparent scene pressure” for 2023-11-28 to 2023-11-30	45

37	Histogram of “Apparent scene pressure precision” for 2023-11-28 to 2023-11-30	46
38	Histogram of “ χ^2 ” for 2023-11-28 to 2023-11-30	47
39	Histogram of “Number of iterations” for 2023-11-28 to 2023-11-30	48
40	Histogram of “Fluorescence” for 2023-11-28 to 2023-11-30	49
41	Histogram of “Fluorescence precision” for 2023-11-28 to 2023-11-30	50
42	Histogram of “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30	51
43	Histogram of “Degrees of freedom for signal of fluorescence retrieval” for 2023-11-28 to 2023-11-30	52
44	Histogram of “Number of points in the spectrum” for 2023-11-28 to 2023-11-30	53
45	Histogram of “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30	54
46	Along track statistics of “QA value” for 2023-11-28 to 2023-11-30	55
47	Along track statistics of “Cloud pressure” for 2023-11-28 to 2023-11-30	56
48	Along track statistics of “Cloud pressure precision” for 2023-11-28 to 2023-11-30	57
49	Along track statistics of “Cloud fraction” for 2023-11-28 to 2023-11-30	58
50	Along track statistics of “Cloud fraction precision” for 2023-11-28 to 2023-11-30	59
51	Along track statistics of “Scene albedo” for 2023-11-28 to 2023-11-30	60
52	Along track statistics of “Scene albedo precision” for 2023-11-28 to 2023-11-30	61
53	Along track statistics of “Apparent scene pressure” for 2023-11-28 to 2023-11-30	62
54	Along track statistics of “Apparent scene pressure precision” for 2023-11-28 to 2023-11-30	63
55	Along track statistics of “ χ^2 ” for 2023-11-28 to 2023-11-30	64
56	Along track statistics of “Number of iterations” for 2023-11-28 to 2023-11-30	65
57	Along track statistics of “Fluorescence” for 2023-11-28 to 2023-11-30	66
58	Along track statistics of “Fluorescence precision” for 2023-11-28 to 2023-11-30	67
59	Along track statistics of “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30	68
60	Along track statistics of “Degrees of freedom for signal of fluorescence retrieval” for 2023-11-28 to 2023-11-30	69
61	Along track statistics of “Number of points in the spectrum” for 2023-11-28 to 2023-11-30	70
62	Along track statistics of “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30	71
63	Scatter density plot of “Apparent scene pressure” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.	72
64	Scatter density plot of “Apparent scene pressure” against “Fluorescence” for 2023-11-28 to 2023-11-30.	73
65	Scatter density plot of “Apparent scene pressure” against “Number of iterations” for 2023-11-28 to 2023-11-30.	74
66	Scatter density plot of “Apparent scene pressure” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.	75
67	Scatter density plot of “Apparent scene pressure” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.	76
68	Scatter density plot of “ χ^2 of fluorescence retrieval” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.	77
69	Scatter density plot of “ χ^2 of fluorescence retrieval” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.	78
70	Scatter density plot of “Cloud fraction” against “Apparent scene pressure” for 2023-11-28 to 2023-11-30.	79
71	Scatter density plot of “Cloud fraction” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.	80
72	Scatter density plot of “Cloud fraction” against “Fluorescence” for 2023-11-28 to 2023-11-30.	81
73	Scatter density plot of “Cloud fraction” against “Number of iterations” for 2023-11-28 to 2023-11-30.	82
74	Scatter density plot of “Cloud fraction” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.	83
75	Scatter density plot of “Cloud fraction” against “Scene albedo” for 2023-11-28 to 2023-11-30.	84
76	Scatter density plot of “Cloud fraction” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.	85
77	Scatter density plot of “Cloud pressure” against “Apparent scene pressure” for 2023-11-28 to 2023-11-30.	86
78	Scatter density plot of “Cloud pressure” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.	87
79	Scatter density plot of “Cloud pressure” against “Cloud fraction” for 2023-11-28 to 2023-11-30.	88
80	Scatter density plot of “Cloud pressure” against “Fluorescence” for 2023-11-28 to 2023-11-30.	89
81	Scatter density plot of “Cloud pressure” against “Number of iterations” for 2023-11-28 to 2023-11-30.	90
82	Scatter density plot of “Cloud pressure” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.	91
83	Scatter density plot of “Cloud pressure” against “Scene albedo” for 2023-11-28 to 2023-11-30.	92
84	Scatter density plot of “Cloud pressure” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.	93
85	Scatter density plot of “Fluorescence” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.	94
86	Scatter density plot of “Fluorescence” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.	95
87	Scatter density plot of “Fluorescence” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.	96

88	Scatter density plot of “Latitude” against “Apparent scene pressure” for 2023-11-28 to 2023-11-30.	97
89	Scatter density plot of “Latitude” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.	98
90	Scatter density plot of “Latitude” against “Cloud fraction” for 2023-11-28 to 2023-11-30.	99
91	Scatter density plot of “Latitude” against “Cloud pressure” for 2023-11-28 to 2023-11-30.	100
92	Scatter density plot of “Latitude” against “Fluorescence” for 2023-11-28 to 2023-11-30.	101
93	Scatter density plot of “Latitude” against “Number of iterations” for 2023-11-28 to 2023-11-30.	102
94	Scatter density plot of “Latitude” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.	103
95	Scatter density plot of “Latitude” against “Scene albedo” for 2023-11-28 to 2023-11-30.	104
96	Scatter density plot of “Latitude” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.	105
97	Scatter density plot of “Number of iterations” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.	106
98	Scatter density plot of “Number of iterations” against “Fluorescence” for 2023-11-28 to 2023-11-30.	107
99	Scatter density plot of “Number of iterations” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.	108
100	Scatter density plot of “Number of iterations” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.	109
101	Scatter density plot of “Number of points in the spectrum” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.	110
102	Scatter density plot of “Scene albedo” against “Apparent scene pressure” for 2023-11-28 to 2023-11-30.	111
103	Scatter density plot of “Scene albedo” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.	112
104	Scatter density plot of “Scene albedo” against “Fluorescence” for 2023-11-28 to 2023-11-30.	113
105	Scatter density plot of “Scene albedo” against “Number of iterations” for 2023-11-28 to 2023-11-30.	114
106	Scatter density plot of “Scene albedo” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.	115
107	Scatter density plot of “Scene albedo” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.	116
108	Scatter density plot of “Solar zenith angle” against “Apparent scene pressure” for 2023-11-28 to 2023-11-30.	117
109	Scatter density plot of “Solar zenith angle” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.	118
110	Scatter density plot of “Solar zenith angle” against “Cloud fraction” for 2023-11-28 to 2023-11-30.	119
111	Scatter density plot of “Solar zenith angle” against “Cloud pressure” for 2023-11-28 to 2023-11-30.	120
112	Scatter density plot of “Solar zenith angle” against “Fluorescence” for 2023-11-28 to 2023-11-30.	121
113	Scatter density plot of “Solar zenith angle” against “Latitude” for 2023-11-28 to 2023-11-30.	122
114	Scatter density plot of “Solar zenith angle” against “Number of iterations” for 2023-11-28 to 2023-11-30.	123
115	Scatter density plot of “Solar zenith angle” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.	124
116	Scatter density plot of “Solar zenith angle” against “Scene albedo” for 2023-11-28 to 2023-11-30.	125
117	Scatter density plot of “Solar zenith angle” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.	126
118	Scatter density plot of “Viewing zenith angle” against “Apparent scene pressure” for 2023-11-28 to 2023-11-30.	127
119	Scatter density plot of “Viewing zenith angle” against “ χ^2 of fluorescence retrieval” for 2023-11-28 to 2023-11-30.	128
120	Scatter density plot of “Viewing zenith angle” against “Cloud fraction” for 2023-11-28 to 2023-11-30.	129
121	Scatter density plot of “Viewing zenith angle” against “Cloud pressure” for 2023-11-28 to 2023-11-30.	130
122	Scatter density plot of “Viewing zenith angle” against “Fluorescence” for 2023-11-28 to 2023-11-30.	131
123	Scatter density plot of “Viewing zenith angle” against “Latitude” for 2023-11-28 to 2023-11-30.	132
124	Scatter density plot of “Viewing zenith angle” against “Number of iterations” for 2023-11-28 to 2023-11-30.	133
125	Scatter density plot of “Viewing zenith angle” against “Number of points in the spectrum” for 2023-11-28 to 2023-11-30.	134
126	Scatter density plot of “Viewing zenith angle” against “Scene albedo” for 2023-11-28 to 2023-11-30.	135
127	Scatter density plot of “Viewing zenith angle” against “Solar zenith angle” for 2023-11-28 to 2023-11-30.	136
128	Scatter density plot of “Viewing zenith angle” against “Spectral offset ($\lambda(\text{true}) - \lambda(\text{nominal})$)” for 2023-11-28 to 2023-11-30.	137

List of Tables

1	Parameterlist and basic statistics for the analysis	2
2	Percentile ranges	3
3	Parameterlist and basic statistics for the analysis for observations in the northern hemisphere	4
4	Parameterlist and basic statistics for the analysis for observations in the southern hemisphere	5
5	Parameterlist and basic statistics for the analysis for observations over water	6

6	Parameterlist and basic statistics for the analysis for observations over land	7
7	Correlation matrix	8
8	Covariance matrix	9

11 Copyright information of ‘PyCAMA’

Copyright © 2005 – 2023, Maarten Sneeep (KNMI).

All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. Neither the name of the copyright holder nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

This software is provided by the copyright holders and contributors “as is” and any express or implied warranties, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose are disclaimed. In no event shall the copyright holder or contributors be liable for any direct, indirect, incidental, special, exemplary, or consequential damages (including, but not limited to, procurement of substitute goods or services; loss of use, data, or profits; or business interruption) however caused and on any theory of liability, whether in contract, strict liability, or tort (including negligence or otherwise) arising in any way out of the use of this software, even if advised of the possibility of such damage.

Maarten Sneeep (maarten.sneeep@knmi.nl).