PyCAMA report generated by tropl2-proc

tropl2-proc

2023-11-16 (01:45)

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]	0.538 ± 0.413	21423942	5.000×10^{-3}	0.830	0.720	0.0	1.000
cloud fraction [1]	0.556 ± 0.343	21423942	0.995	0.723	0.517	3.667×10^{-3}	1.000
cloud top height [m]	$(0.397 \pm 0.285) \times 10^4$	21423942	1.425×10^3	3.991×10^3	3.291×10^3	0.0	2.000×10^4
cloud optical thickness [1]	21.1 ± 38.1	21423942	10.7	12.0	10.4	1.000	250
cloud fraction crb [1]	0.556 ± 0.343	21423942	0.995	0.723	0.516	8.306×10^{-3}	1.000
cloud height crb [m]	$(0.301 \pm 0.232) \times 10^4$	21423942	75.0	3.174×10^3	2.506×10^3	0.0	2.000×10^4
cloud albedo crb [1]	0.653 ± 0.209	21423942	0.995	0.282	0.636	0.0	1.000
surface albedo fitted [1]	0.278 ± 0.348	21423942	1.500×10^{-2}	0.498	6.899×10^{-2}	0.0	1.000
surface albedo fitted crb [1]	0.259 ± 0.330	21423942	1.500×10^{-2}	0.502	4.714×10^{-2}	0.0	1.000
fitted root mean square [1]	$(7.172 \pm 8.110) \times 10^{-4}$	21423942	5.000×10^{-5}	8.777×10^{-4}	4.730×10^{-4}	9.600×10^{-7}	0.141
fitted root mean square crb [1]	$(6.426 \pm 7.361) \times 10^{-4}$	21423942	5.000×10^{-5}	8.175×10^{-4}	3.764×10^{-4}	8.846×10^{-7}	0.145
wavelength shift [nm]	$(9.889 \pm 7.554) \times 10^{-3}$	21423942	6.300×10^{-3}	1.105×10^{-2}	9.628×10^{-3}	-5.185×10^{-2}	7.160×10^{-2}
cloud fraction apriori [1]	0.562 ± 0.349	21423942	0.995	0.763	0.529	0.0	1.000
reflectance blue ocra [1]	0.594 ± 0.232	21423942	0.315	0.405	0.577	0.125	2.09
reflectance green ocra [1]	0.548 ± 0.263	21423942	0.185	0.484	0.536	6.870×10^{-2}	2.38
reflectance continuum aband [1]	0.503 ± 0.289	21423942	4.500×10^{-2}	0.500	0.506	1.119×10^{-2}	5.05

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	0.0	0.0	8.000×10^{-2}	0.910	1.000	1.000	1.000	1.000
cloud fraction [1]	2.567×10^{-2}	6.664×10^{-2}	0.106	0.154	0.240	0.963	1.000	1.000	1.000	1.000
cloud top height [m]	136	592	963	1.278×10^{3}	1.712×10^{3}	5.703×10^{3}	6.898×10^{3}	7.974×10^{3}	9.448×10^{3}	1.220×10^{4}
cloud optical thickness [1]	1.000	2.53	3.86	4.82	5.96	18.0	26.6	39.5	72.9	250
cloud fraction crb [1]	2.537×10^{-2}	6.611×10^{-2}	0.105	0.153	0.239	0.962	1.000	1.000	1.000	1.000
cloud height crb [m]	0.0	181	506	789	1.159×10^{3}	4.332×10^{3}	5.398×10^{3}	6.369×10^{3}	7.608×10^{3}	9.703×10^{3}
cloud albedo crb [1]	6.320×10^{-2}	0.313	0.425	0.473	0.519	0.801	0.892	0.971	1.000	1.000
surface albedo fitted [1]	0.0	8.997×10^{-3}	1.343×10^{-2}	1.745×10^{-2}	2.388×10^{-2}	0.521	0.826	0.902	0.960	1.000
surface albedo fitted crb [1]	1.604×10^{-3}	7.303×10^{-3}	1.028×10^{-2}	1.325×10^{-2}	1.796×10^{-2}	0.520	0.771	0.833	0.894	0.949
fitted root mean square [1]	1.840×10^{-5}	3.801×10^{-5}	6.359×10^{-5}	9.915×10^{-5}	1.653×10^{-4}	1.043×10^{-3}	1.370×10^{-3}	1.680×10^{-3}	2.136×10^{-3}	3.252×10^{-3}
fitted root mean square crb [1]	1.062×10^{-5}	2.672×10^{-5}	4.636×10^{-5}	7.178×10^{-5}	1.215×10^{-4}	9.389×10^{-4}	1.286×10^{-3}	1.614×10^{-3}	2.075×10^{-3}	3.143×10^{-3}
wavelength shift [nm]	-7.130×10^{-3}	-3.744×10^{-4}	7.191×10^{-4}	2.039×10^{-3}	4.165×10^{-3}	1.522×10^{-2}	1.765×10^{-2}	1.967×10^{-2}	2.226×10^{-2}	2.767×10^{-2}
cloud fraction apriori [1]	1.647×10^{-2}	6.152×10^{-2}	9.732×10^{-2}	0.147	0.237	1.000	1.000	1.000	1.000	1.000
reflectance blue ocra [1]	0.235	0.265	0.296	0.331	0.389	0.795	0.853	0.894	0.939	1.11
reflectance green ocra [1]	0.157	0.184	0.208	0.240	0.298	0.783	0.850	0.895	0.942	1.07
reflectance continuum aband [1]	3.303×10^{-2}	6.323×10^{-2}	0.105	0.157	0.251	0.750	0.823	0.875	0.934	1.07

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]	0.605 ± 0.402	8744635	0.800	0.850	0.0	1.000	0.150	0.950
cloud fraction [1]	0.576 ± 0.354	8744635	0.762	0.578	5.312×10^{-3}	1.000	0.229	0.990
cloud top height [m]	$(0.408 \pm 0.273) \times 10^4$	8744635	3.737×10^3	3.435×10^3	0.0	2.000×10^4	1.922×10^3	5.659×10^3
cloud optical thickness [1]	26.3 ± 43.8	8744635	16.3	11.7	1.000	250	6.90	23.2
cloud fraction crb [1]	0.575 ± 0.354	8744635	0.763	0.575	8.468×10^{-3}	1.000	0.227	0.990
cloud height crb [m]	$(0.340 \pm 0.236) \times 10^4$	8744635	3.314×10^3	2.858×10^3	0.0	2.000×10^4	1.485×10^3	4.799×10^3
cloud albedo crb [1]	0.613 ± 0.188	8744635	0.225	0.601	0.0	1.000	0.504	0.729
surface albedo fitted [1]	0.137 ± 0.171	8744635	0.169	5.750×10^{-2}	0.0	1.000	2.362×10^{-2}	0.193
surface albedo fitted crb [1]	0.128 ± 0.172	8744635	0.162	3.932×10^{-2}	0.0	1.000	1.758×10^{-2}	0.180
fitted root mean square [1]	$(4.582 \pm 5.965) \times 10^{-4}$	8744635	4.794×10^{-4}	2.657×10^{-4}	9.600×10^{-7}	0.108	1.109×10^{-4}	5.902×10^{-4}
fitted root mean square crb [1]	$(4.064 \pm 5.266) \times 10^{-4}$	8744635	4.620×10^{-4}	2.025×10^{-4}	8.846×10^{-7}	4.045×10^{-2}	7.359×10^{-5}	5.356×10^{-4}
wavelength shift [nm]	$(7.763 \pm 7.036) \times 10^{-3}$	8744635	9.678×10^{-3}	7.002×10^{-3}	-4.979×10^{-2}	6.630×10^{-2}	2.523×10^{-3}	1.220×10^{-2}
cloud fraction apriori [1]	0.580 ± 0.361	8744635	0.780	0.585	0.0	1.000	0.220	1.000
reflectance blue ocra [1]	0.533 ± 0.200	8744635	0.305	0.507	0.125	2.03	0.368	0.673
reflectance green ocra [1]	0.475 ± 0.226	8744635	0.368	0.448	6.870×10^{-2}	2.06	0.275	0.644
reflectance continuum aband [1]	0.430 ± 0.258	8744635	0.394	0.409	1.119×10^{-2}	3.83	0.221	0.615

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]	0.493 ± 0.414	12679307	0.840	0.430	0.0	1.000	6.000×10^{-2}	0.900
cloud fraction [1]	0.542 ± 0.335	12679307	0.683	0.487	3.667×10^{-3}	1.000	0.246	0.929
cloud top height [m]	$(0.390 \pm 0.293) \times 10^4$	12679307	4.174×10^3	3.168×10^3	0.0	2.000×10^4	1.557×10^3	5.731×10^3
cloud optical thickness [1]	17.5 ± 33.0	12679307	9.97	9.75	1.000	250	5.55	15.5
cloud fraction crb [1]	0.543 ± 0.335	12679307	0.682	0.487	8.306×10^{-3}	1.000	0.247	0.928
cloud height crb [m]	$(0.274 \pm 0.226) \times 10^4$	12679307	3.084×10^3	2.223×10^3	0.0	2.000×10^4	930	4.014×10^3
cloud albedo crb [1]	0.681 ± 0.217	12679307	0.321	0.670	0.0	1.000	0.532	0.853
surface albedo fitted [1]	0.375 ± 0.402	12679307	0.814	8.554×10^{-2}	0.0	1.000	2.406×10^{-2}	0.838
surface albedo fitted crb [1]	0.349 ± 0.379	12679307	0.760	5.846×10^{-2}	0.0	1.000	1.825×10^{-2}	0.778
fitted root mean square [1]	$(8.958 \pm 8.875) \times 10^{-4}$	12679307	1.030×10^{-3}	7.150×10^{-4}	3.697×10^{-6}	0.141	2.635×10^{-4}	1.293×10^{-3}
fitted root mean square crb [1]	$(8.055 \pm 8.119) \times 10^{-4}$	12679307	9.973×10^{-4}	5.715×10^{-4}	1.637×10^{-6}	0.145	1.933×10^{-4}	1.191×10^{-3}
wavelength shift [nm]	$(1.136 \pm 0.755) \times 10^{-2}$	12679307	1.085×10^{-2}	1.165×10^{-2}	-5.185×10^{-2}	7.160×10^{-2}	5.861×10^{-3}	1.671×10^{-2}
cloud fraction apriori [1]	0.551 ± 0.340	12679307	0.724	0.502	0.0	1.000	0.248	0.972
reflectance blue ocra [1]	0.636 ± 0.243	12679307	0.431	0.664	0.135	2.09	0.412	0.842
reflectance green ocra [1]	0.598 ± 0.275	12679307	0.513	0.640	8.678×10^{-2}	2.38	0.326	0.839
reflectance continuum aband [1]	0.554 ± 0.299	12679307	0.521	0.608	1.363×10^{-2}	5.05	0.283	0.804

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]	0.685 ± 0.352	13257146	0.560	0.890	0.0	1.000	0.400	0.960
cloud fraction [1]	0.582 ± 0.357	13257146	0.770	0.593	3.667×10^{-3}	1.000	0.226	0.996
cloud top height [m]	$(0.345 \pm 0.265) \times 10^4$	13257146	3.325×10^3	2.651×10^3	0.0	2.000×10^4	1.468×10^3	4.792×10^3
cloud optical thickness [1]	19.5 ± 29.9	13257146	10.5	11.6	1.000	250	8.06	18.5
cloud fraction crb [1]	0.581 ± 0.358	13257146	0.774	0.591	8.592×10^{-3}	1.000	0.224	0.998
cloud height crb [m]	$(0.274 \pm 0.235) \times 10^4$	13257146	3.037×10^3	2.011×10^3	0.0	2.000×10^4	951	3.987×10^3
cloud albedo crb [1]	0.613 ± 0.175	13257146	0.222	0.601	0.0	1.000	0.506	0.728
surface albedo fitted [1]	0.121 ± 0.243	13257146	3.868×10^{-2}	2.908×10^{-2}	0.0	1.000	1.723×10^{-2}	5.590×10^{-2}
surface albedo fitted crb [1]	0.110 ± 0.235	13257146	2.535×10^{-2}	2.160×10^{-2}	0.0	1.000	1.308×10^{-2}	3.842×10^{-2}
fitted root mean square [1]	$(6.889 \pm 8.283) \times 10^{-4}$	13257146	9.157×10^{-4}	4.068×10^{-4}	9.600×10^{-7}	0.108	1.239×10^{-4}	1.040×10^{-3}
fitted root mean square crb [1]	$(6.680 \pm 7.599) \times 10^{-4}$	13257146	9.046×10^{-4}	3.832×10^{-4}	8.846×10^{-7}	7.494×10^{-2}	1.131×10^{-4}	1.018×10^{-3}
wavelength shift [nm]	$(9.629 \pm 7.895) \times 10^{-3}$	13257146	1.143×10^{-2}	9.480×10^{-3}	-5.185×10^{-2}	6.260×10^{-2}	3.707×10^{-3}	1.514×10^{-2}
cloud fraction apriori [1]	0.585 ± 0.365	13257146	0.783	0.604	0.0	1.000	0.217	1.000
reflectance blue ocra [1]	0.534 ± 0.205	13257146	0.328	0.497	0.145	2.07	0.362	0.689
reflectance green ocra [1]	0.476 ± 0.233	13257146	0.401	0.438	8.754×10^{-2}	1.94	0.265	0.666
reflectance continuum aband [1]	0.412 ± 0.272	13257146	0.489	0.387	1.119×10^{-2}	3.56	0.157	0.646

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]	0.282 ± 0.385	6589156	0.670	9.000×10^{-2}	0.0	1.000	0.0	0.670
cloud fraction [1]	0.482 ± 0.302	6589156	0.457	0.412	6.335×10^{-3}	1.000	0.241	0.699
cloud top height [m]	$(0.507 \pm 0.300) \times 10^4$	6589156	4.017×10^3	4.831×10^3	0.0	2.000×10^4	2.787×10^3	6.804×10^3
cloud optical thickness [1]	18.7 ± 41.3	6589156	7.89	6.30	1.000	250	4.58	12.5
cloud fraction crb [1]	0.484 ± 0.301	6589156	0.455	0.415	8.306×10^{-3}	1.000	0.244	0.699
cloud height crb [m]	$(0.355 \pm 0.223) \times 10^4$	6589156	2.924×10^3	3.306×10^3	0.0	2.000×10^4	1.872×10^3	4.796×10^3
cloud albedo crb [1]	0.729 ± 0.245	6589156	0.404	0.759	0.0	1.000	0.565	0.969
surface albedo fitted [1]	0.599 ± 0.335	6589156	0.682	0.753	0.0	1.000	0.235	0.917
surface albedo fitted crb [1]	0.563 ± 0.308	6589156	0.614	0.718	1.901×10^{-3}	1.000	0.228	0.842
fitted root mean square [1]	$(8.174 \pm 7.817) \times 10^{-4}$	6589156	8.276×10^{-4}	6.238×10^{-4}	4.017×10^{-6}	0.108	2.971×10^{-4}	1.125×10^{-3}
fitted root mean square crb [1]	$(6.507 \pm 6.998) \times 10^{-4}$	6589156	7.334×10^{-4}	4.285×10^{-4}	2.979×10^{-6}	6.758×10^{-2}	1.676×10^{-4}	9.011×10^{-4}
wavelength shift [nm]	$(1.088 \pm 0.695) \times 10^{-2}$	6589156	1.060×10^{-2}	1.057×10^{-2}	-4.462×10^{-2}	7.160×10^{-2}	5.408×10^{-3}	1.601×10^{-2}
cloud fraction apriori [1]	0.495 ± 0.307	6589156	0.478	0.429	0.0	1.000	0.247	0.725
reflectance blue ocra [1]	0.711 ± 0.243	6589156	0.370	0.793	0.125	2.09	0.515	0.885
reflectance green ocra [1]	0.686 ± 0.270	6589156	0.427	0.786	6.870×10^{-2}	2.38	0.463	0.891
reflectance continuum aband [1]	0.676 ± 0.251	6589156	0.404	0.741	1.877×10^{-2}	5.05	0.465	0.869

Table 7: Correlation matrix

Viewing zenith angle	Solar zenith angle	Latitude	Radiometric cloud fraction	Cloud top height	Cloud optical thickness	Cloud fraction (CRB)	Cloud height (CRB)	Cloud albedo (CRB)	OCRA cloud fraction
1.000	-6.688×10^{-3}	2.330×10^{-2}	4.400×10^{-2}	2.571×10^{-2}	-4.183×10^{-2}	4.378×10^{-2}	8.208×10^{-2}	2.568×10^{-2}	4.302×10^{-2}
-6.688×10^{-3}	1.000	2.571×10^{-2}	0.104	9.102×10^{-2}	0.142	0.107	1.879×10^{-2}	0.232	0.118
2.330×10^{-2}	2.571×10^{-2}	1.000	7.392×10^{-2}	-5.570×10^{-2}	0.142	7.009×10^{-2}	8.139×10^{-2}	-0.224	6.101×10^{-2}
4.400×10^{-2}	0.104	7.392×10^{-2}	1.000	-9.494×10^{-2}	0.237	1.000	-3.739×10^{-2}	0.130	0.984
2.571×10^{-2}	9.102×10^{-2}	-5.570×10^{-2}	-9.494×10^{-2}	1.000	4.910×10^{-3}	-9.290×10^{-2}	0.924	0.180	-0.103
-4.183×10^{-2}	0.142	0.142	0.237	4.910×10^{-3}	1.000	0.232	6.903×10^{-2}	0.338	0.236
4.378×10^{-2}	0.107	7.009×10^{-2}	1.000	-9.290×10^{-2}	0.232	1.000	-3.680×10^{-2}	0.131	0.984
8.208×10^{-2}	1.879×10^{-2}	8.139×10^{-2}	-3.739×10^{-2}	0.924	6.903×10^{-2}	-3.680×10^{-2}	1.000	2.417×10^{-2}	-5.066×10^{-2}
2.568×10^{-2}	0.232	-0.224	0.130	0.180	0.338	0.131	2.417×10^{-2}	1.000	0.146
4.302×10^{-2}	0.118	6.101×10^{-2}	0.984	-0.103	0.236	0.984	-5.066×10^{-2}	0.146	1.000

Table 8: Covariance matrix

Viewing zenith angle	Solar zenith angle	Latitude	Radiometric cloud fraction	Cloud top height	Cloud optical thickness	Cloud fraction (CRB)	Cloud height (CRB)	Cloud albedo (CRB)	OCRA cloud fraction
380	-2.49	23.0	0.294	1.430×10^3	-31.1	0.293	3.720×10^3	0.104	0.293
-2.49	365	24.9	0.684	4.961×10^3	104	0.700	835	0.925	0.785
23.0	24.9	2.564×10^3	1.28	-8.045×10^3	274	1.22	9.580×10^3	-2.37	1.08
0.294	0.684	1.28	0.118	-92.9	3.09	0.118	-29.8	9.280×10^{-3}	0.118
1.430×10^3	4.961×10^3	-8.045×10^3	-92.9	8.136×10^6	533	-90.9	6.126×10^6	107	-103
-31.1	104	274	3.09	533	1.450×10^3	3.03	6.110×10^3	2.69	3.14
0.293	0.700	1.22	0.118	-90.9	3.03	0.118	-29.4	9.341×10^{-3}	0.118
3.720×10^3	835	9.580×10^3	-29.8	6.126×10^6	6.110×10^3	-29.4	5.404×10^6	11.7	-41.1
0.104	0.925	-2.37	9.280×10^{-3}	107	2.69	9.341×10^{-3}	11.7	4.350×10^{-2}	1.066×10^{-2}
0.293	0.785	1.08	0.118	-103	3.14	0.118	-41.1	1.066×10^{-2}	0.122

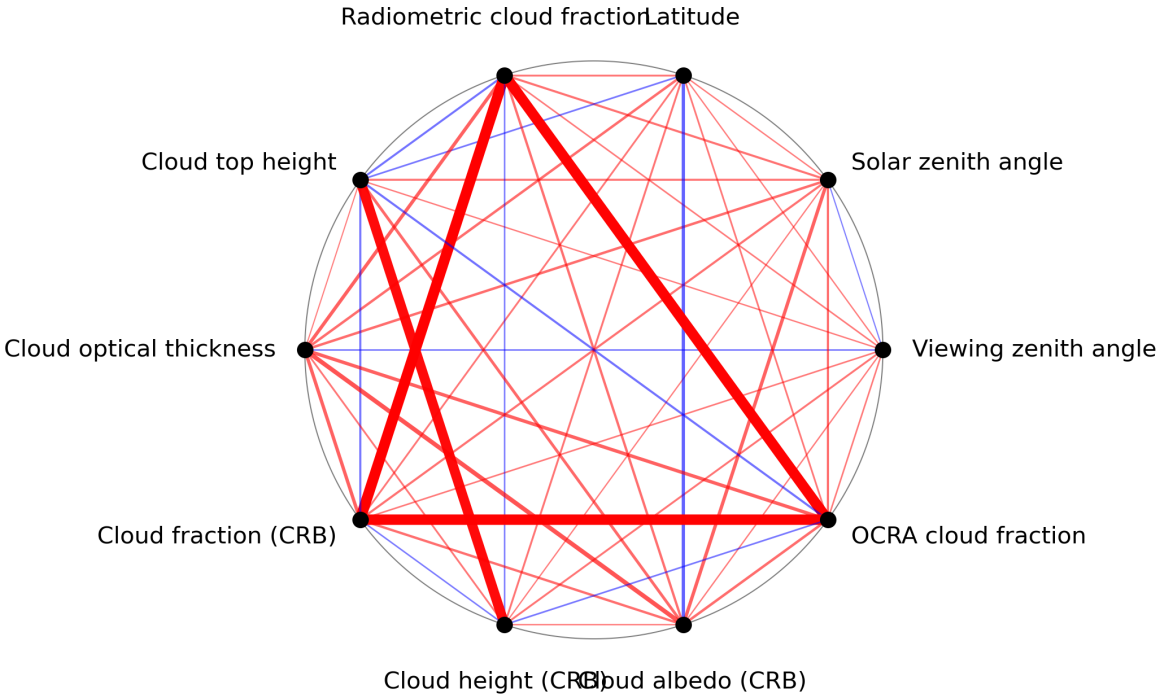


Figure 1: Map of correlation graph for 2023-10-31 to 2023-11-02.

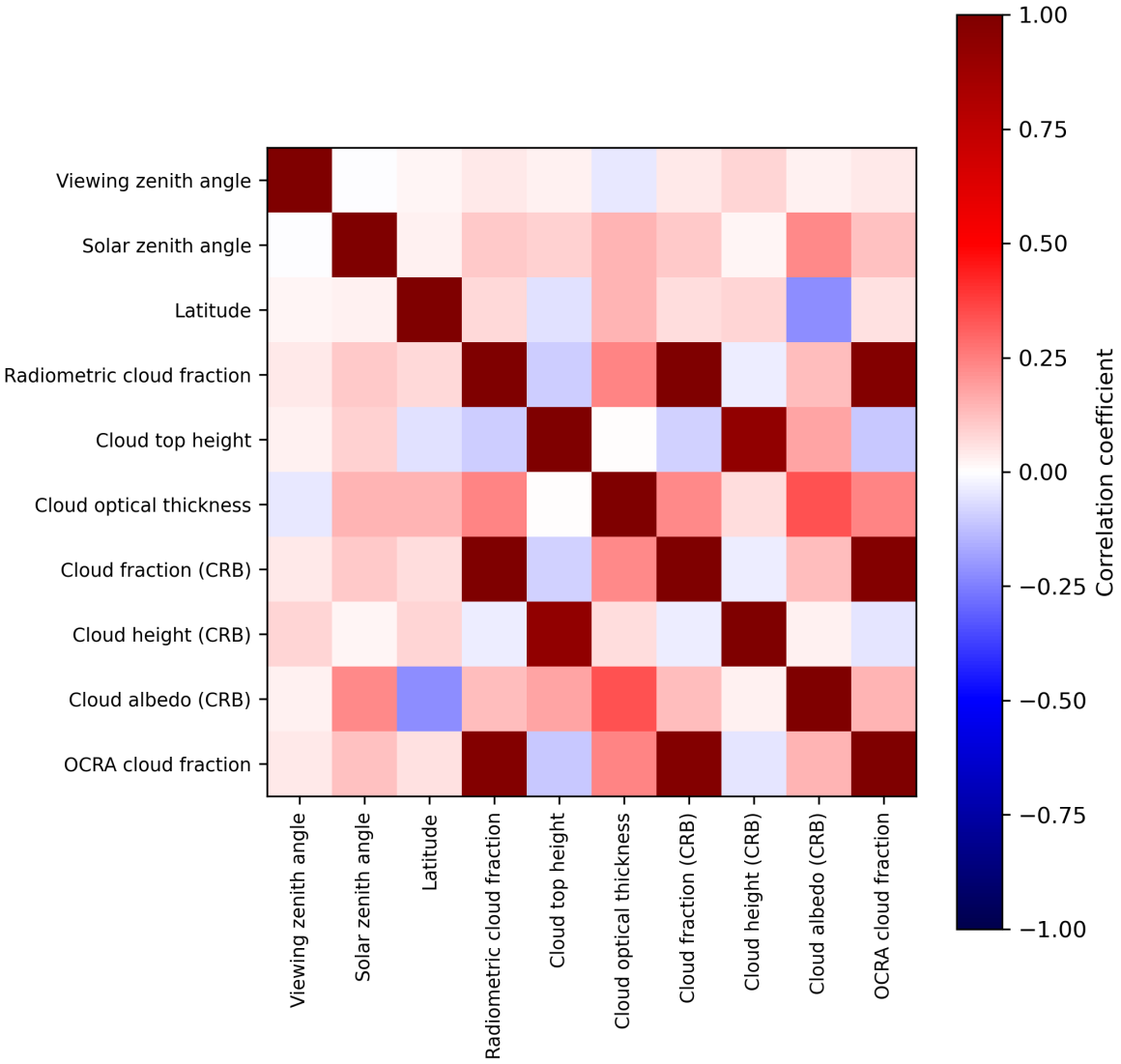


Figure 2: Map of correlation matrix for 2023-10-31 to 2023-11-02.

3 Granule outlines

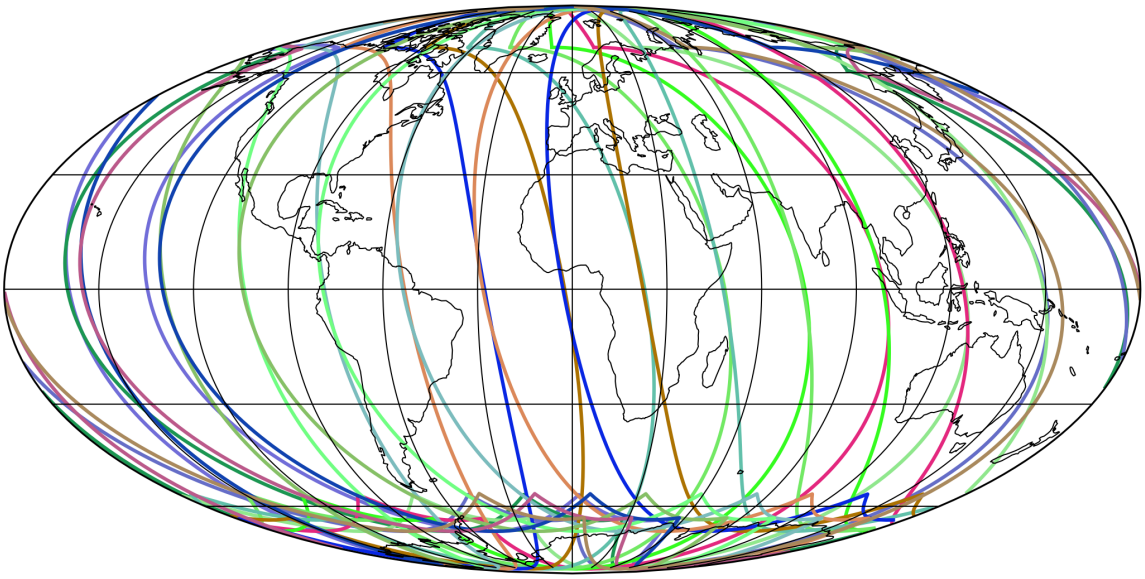


Figure 3: Outline of the granules.

4 Input data monitoring

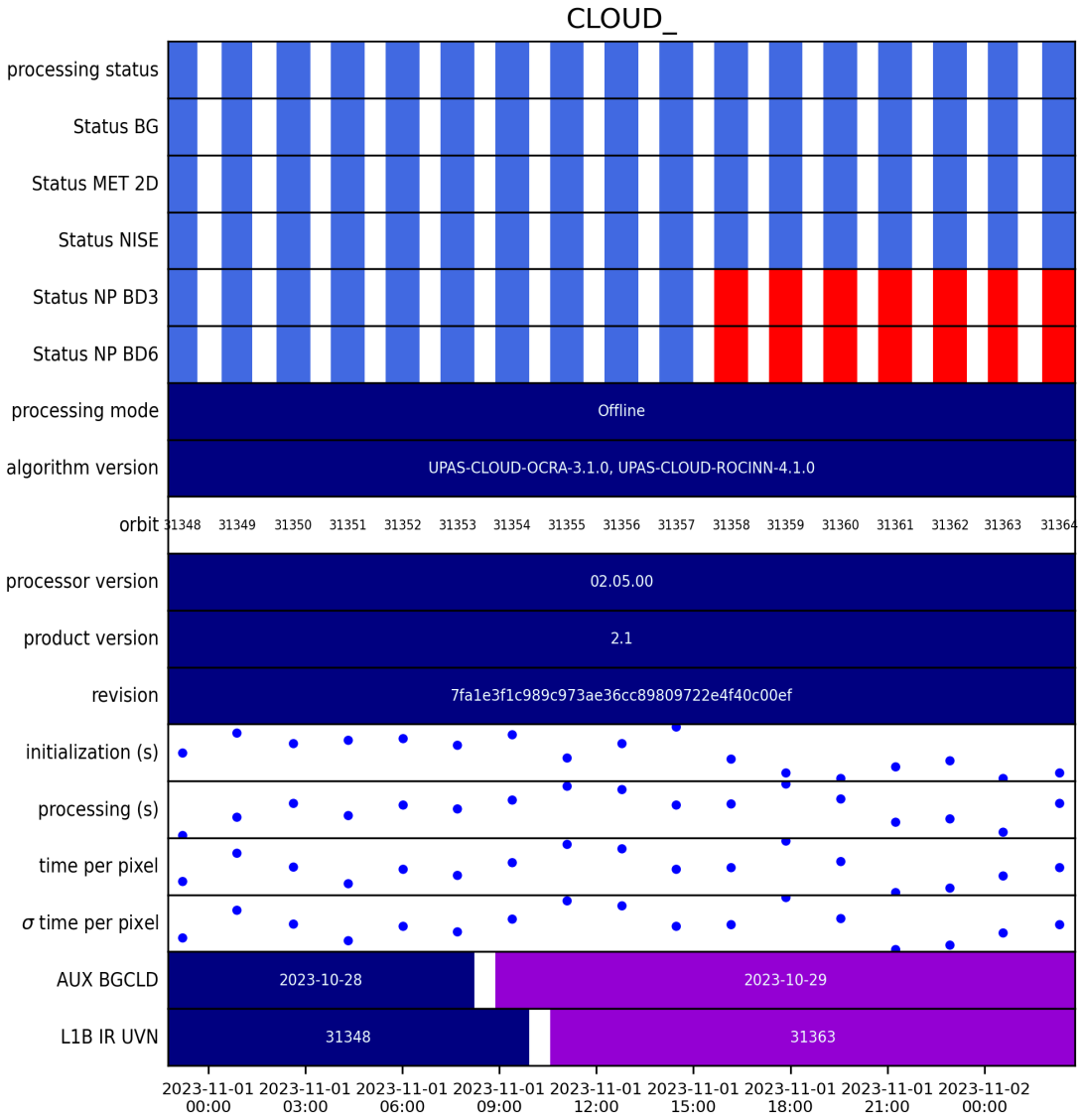


Figure 4: Input data per granule

5 Warnings and errors

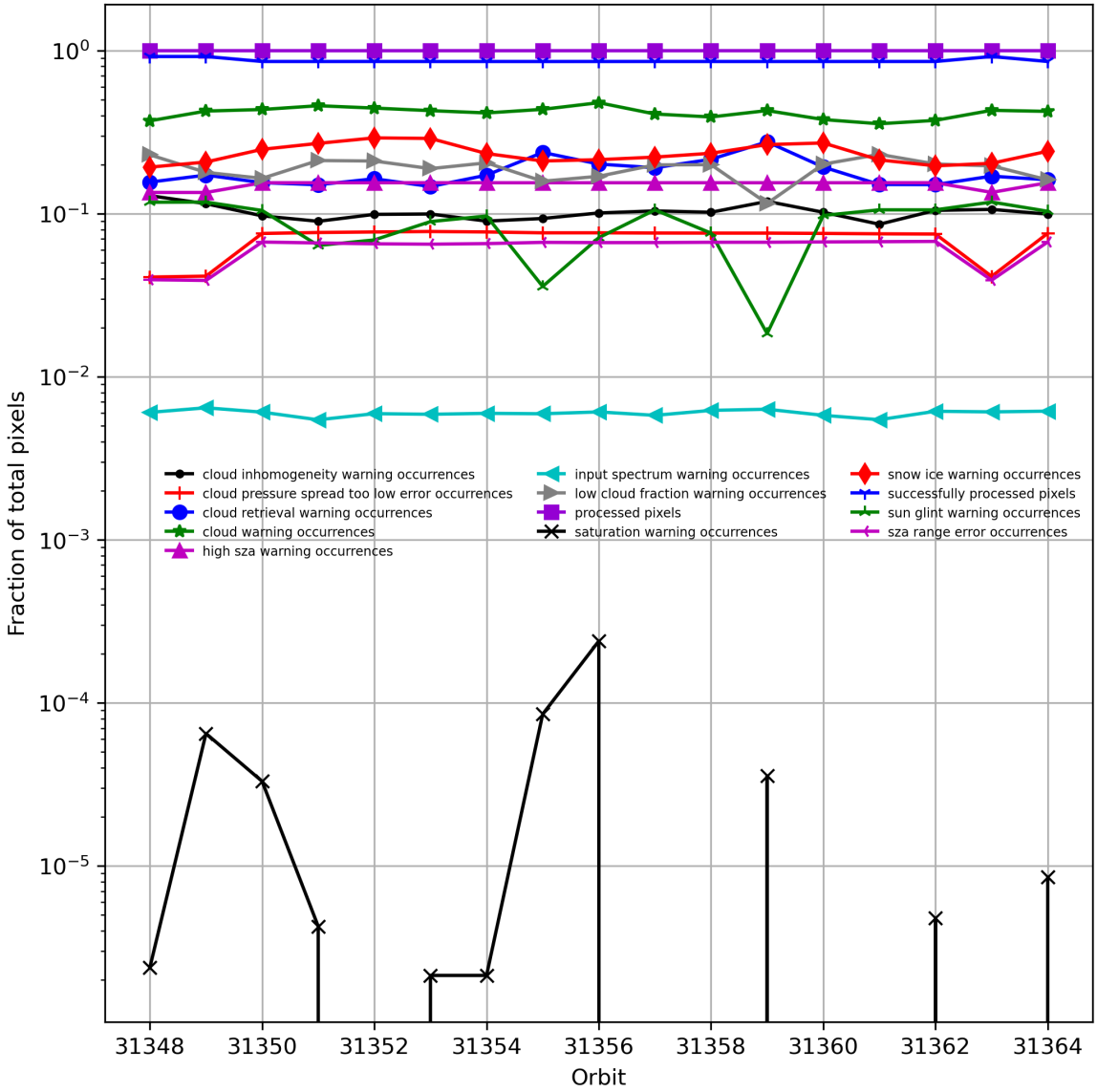


Figure 5: Fraction of pixels with specific warnings and errors during processing

6 World maps

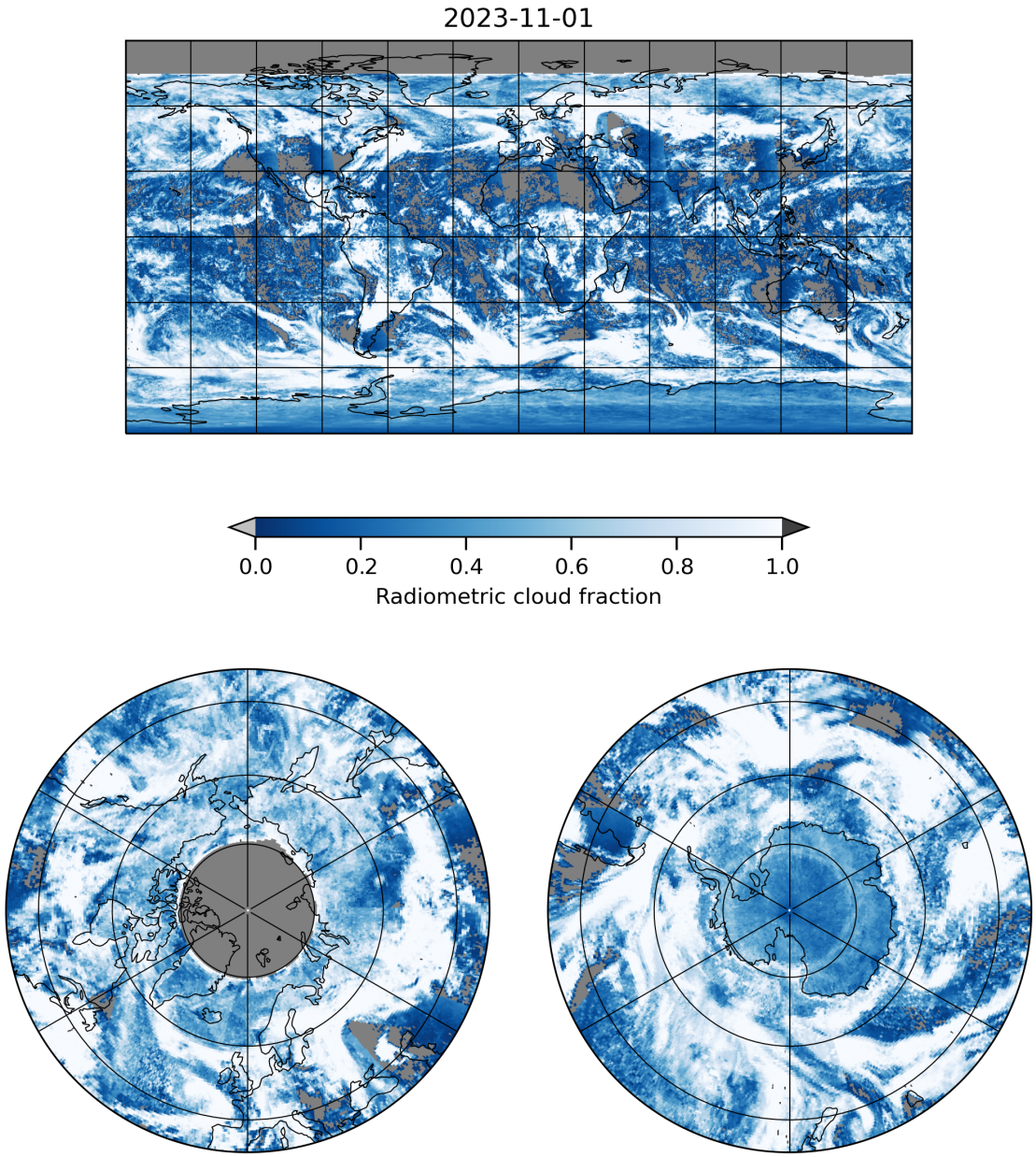


Figure 6: Map of “Radiometric cloud fraction” for 2023-10-31 to 2023-11-02

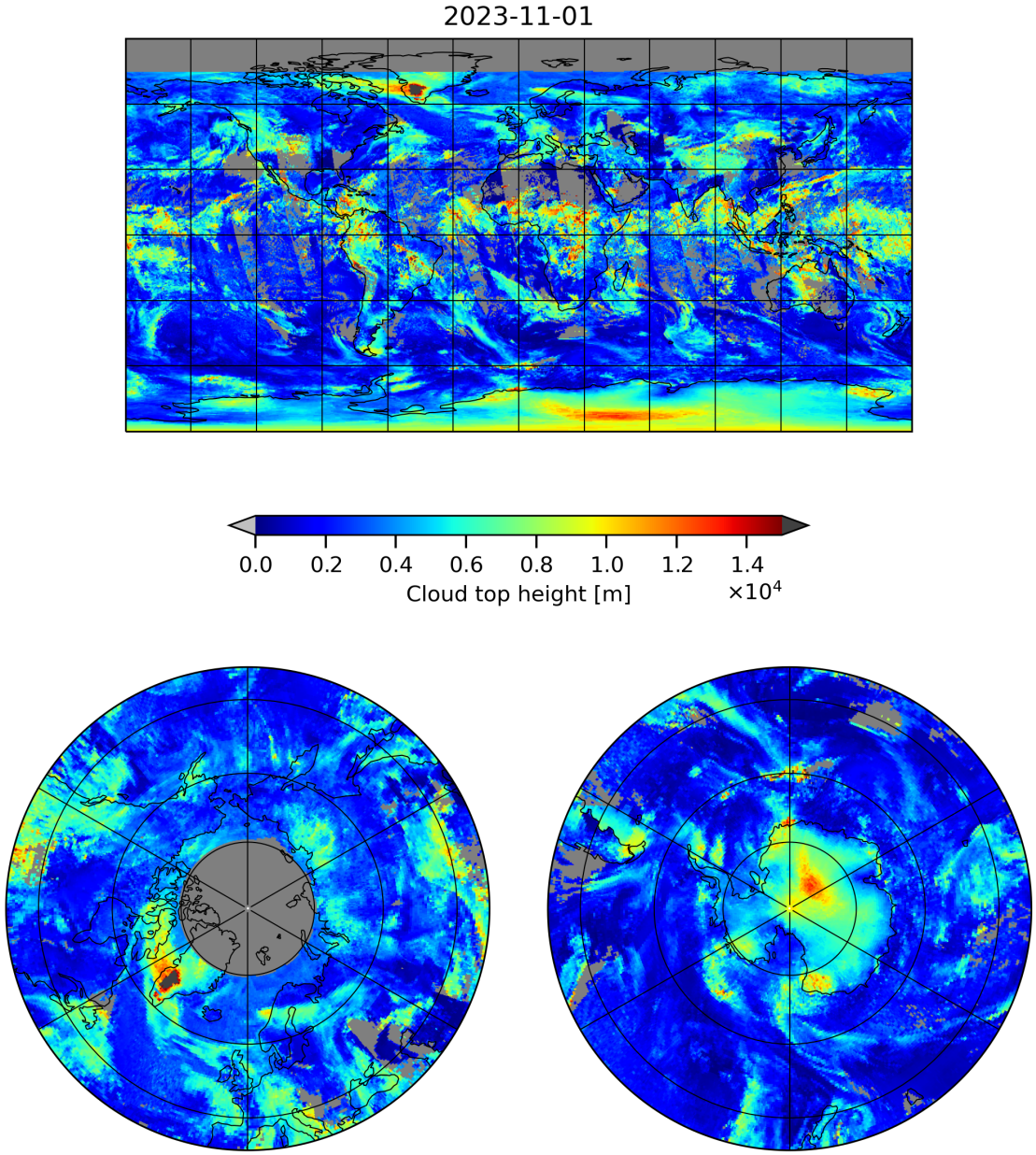


Figure 7: Map of “Cloud top height” for 2023-10-31 to 2023-11-02

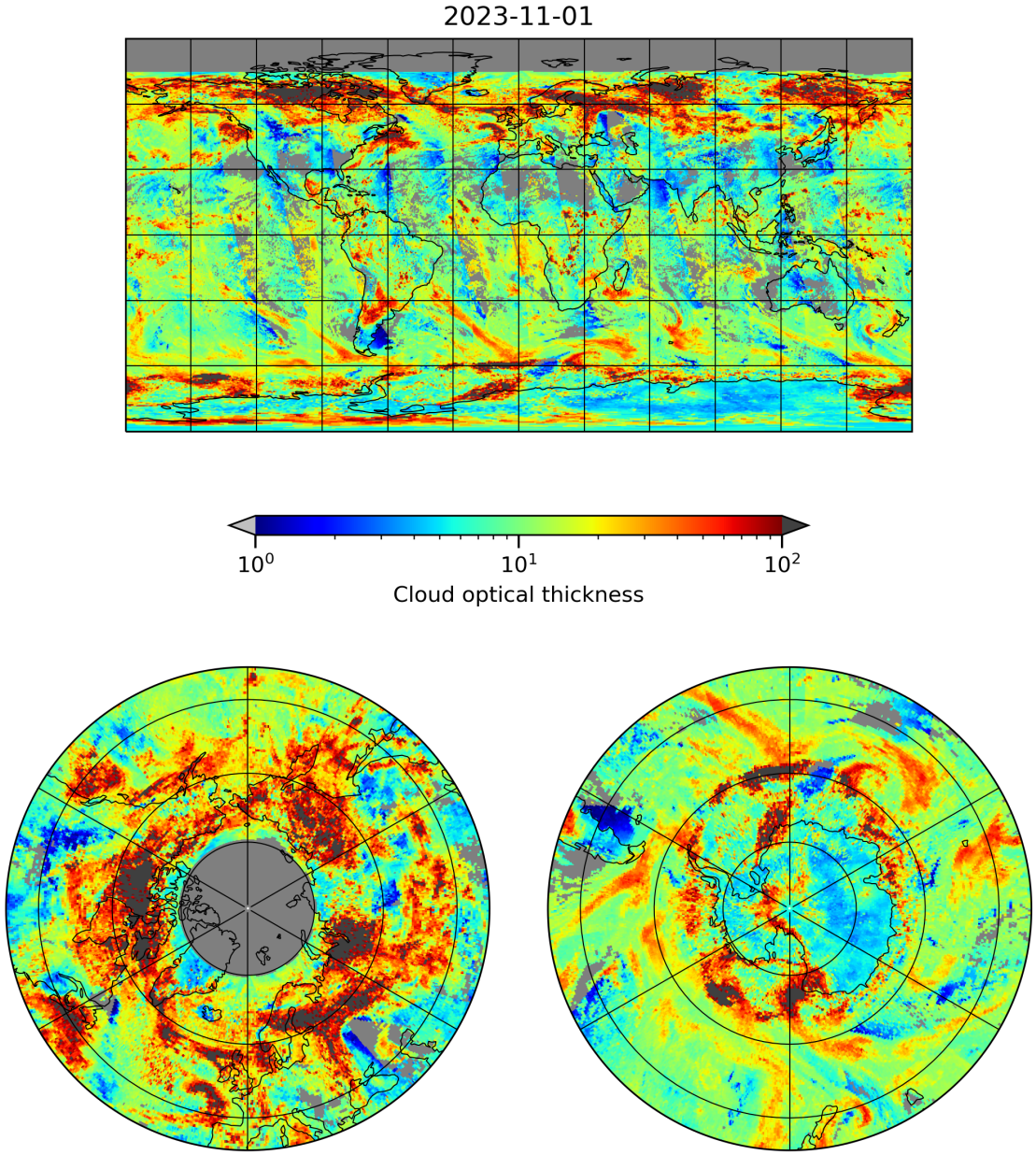


Figure 8: Map of “Cloud optical thickness” for 2023-10-31 to 2023-11-02

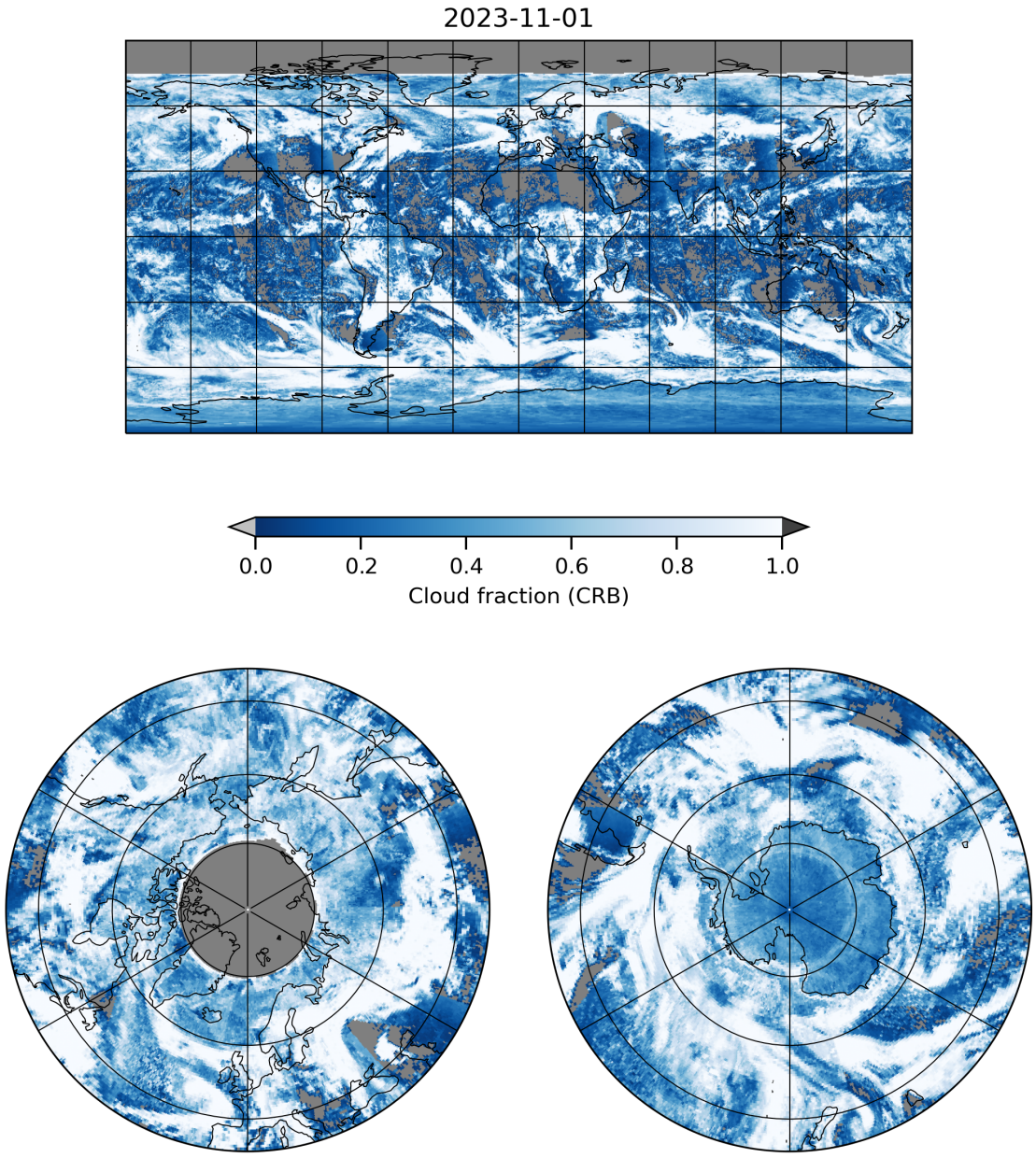


Figure 9: Map of “Cloud fraction (CRB)” for 2023-10-31 to 2023-11-02

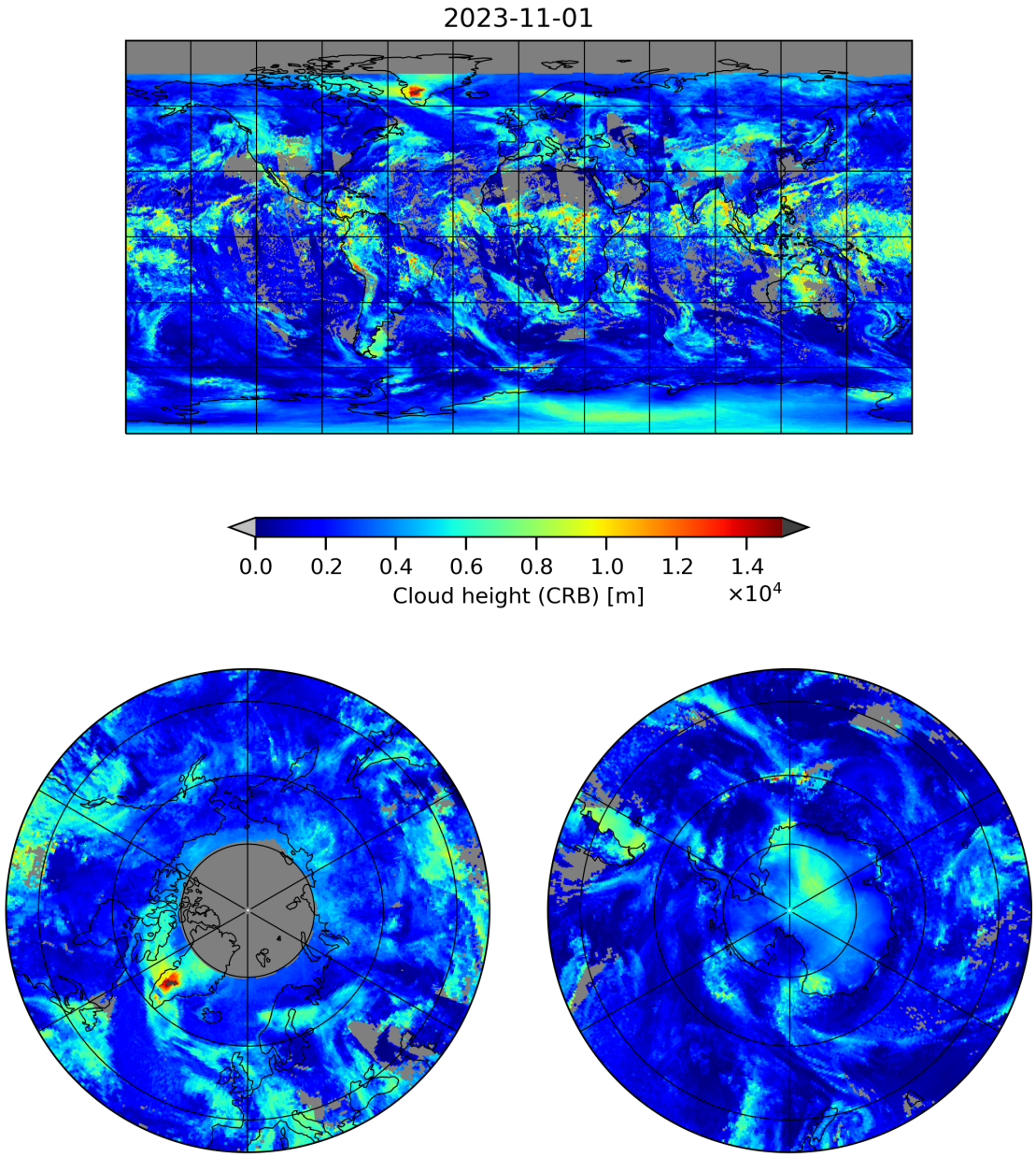


Figure 10: Map of “Cloud height (CRB)” for 2023-10-31 to 2023-11-02

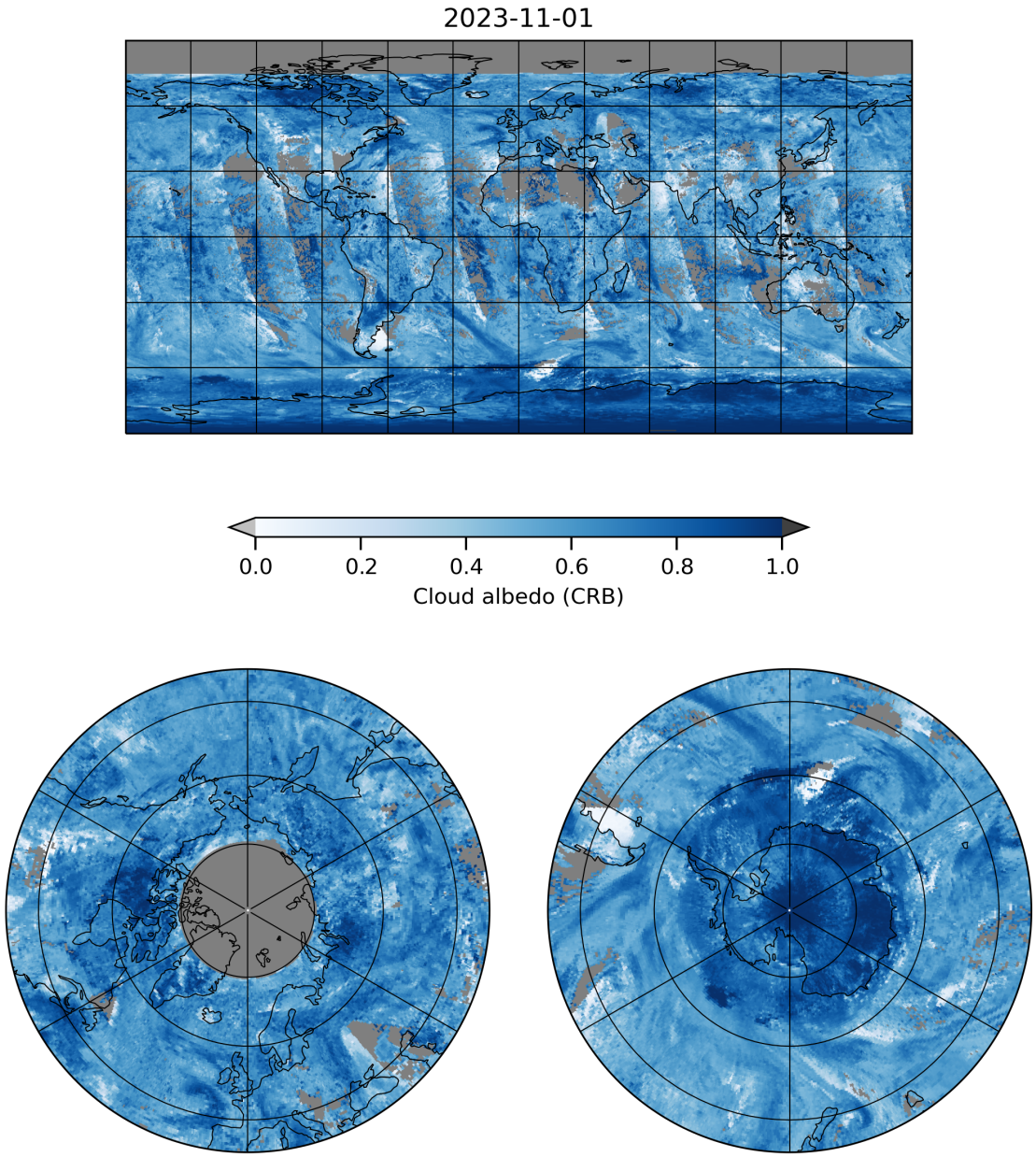


Figure 11: Map of “Cloud albedo (CRB)” for 2023-10-31 to 2023-11-02

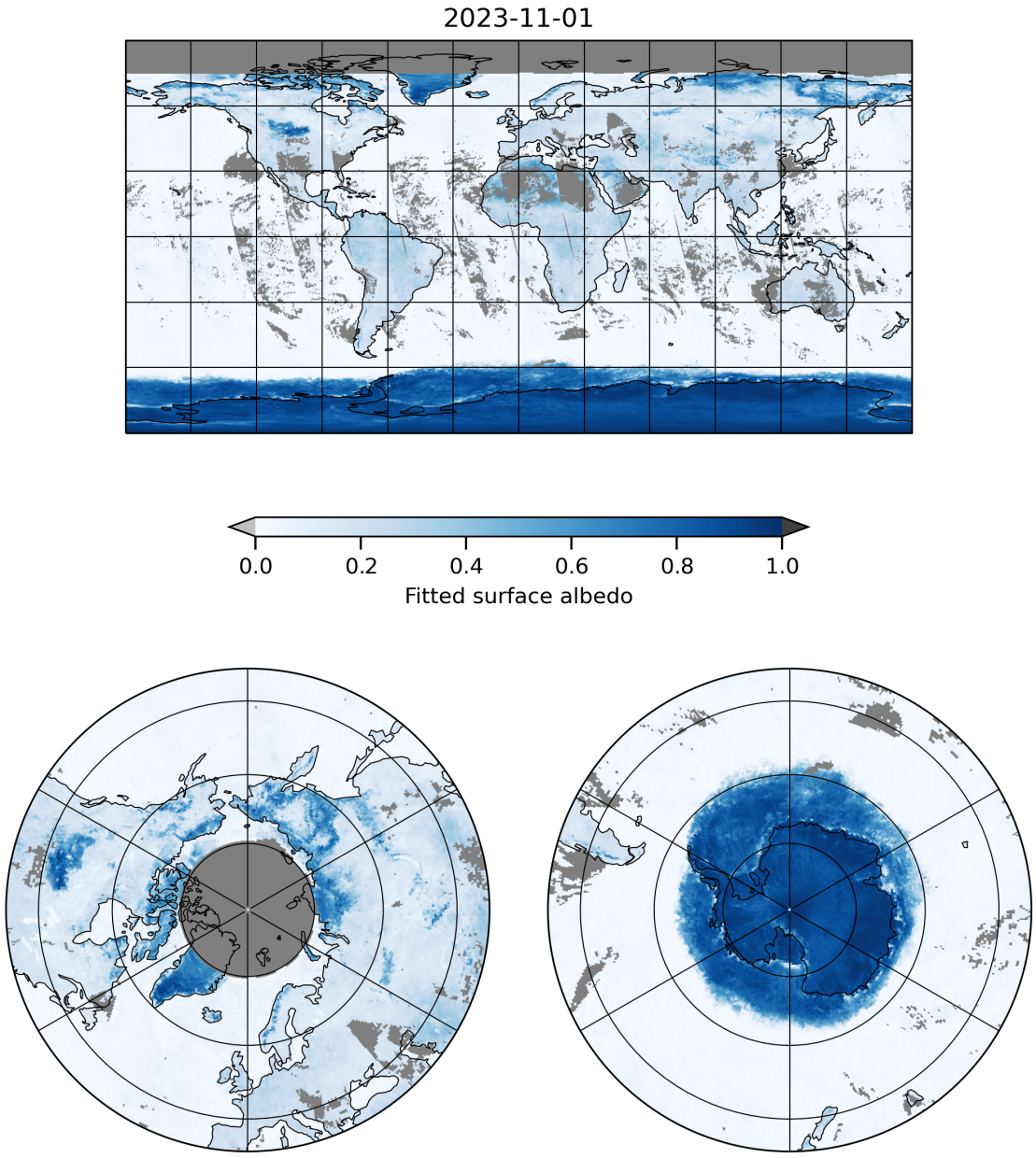


Figure 12: Map of “Fitted surface albedo” for 2023-10-31 to 2023-11-02

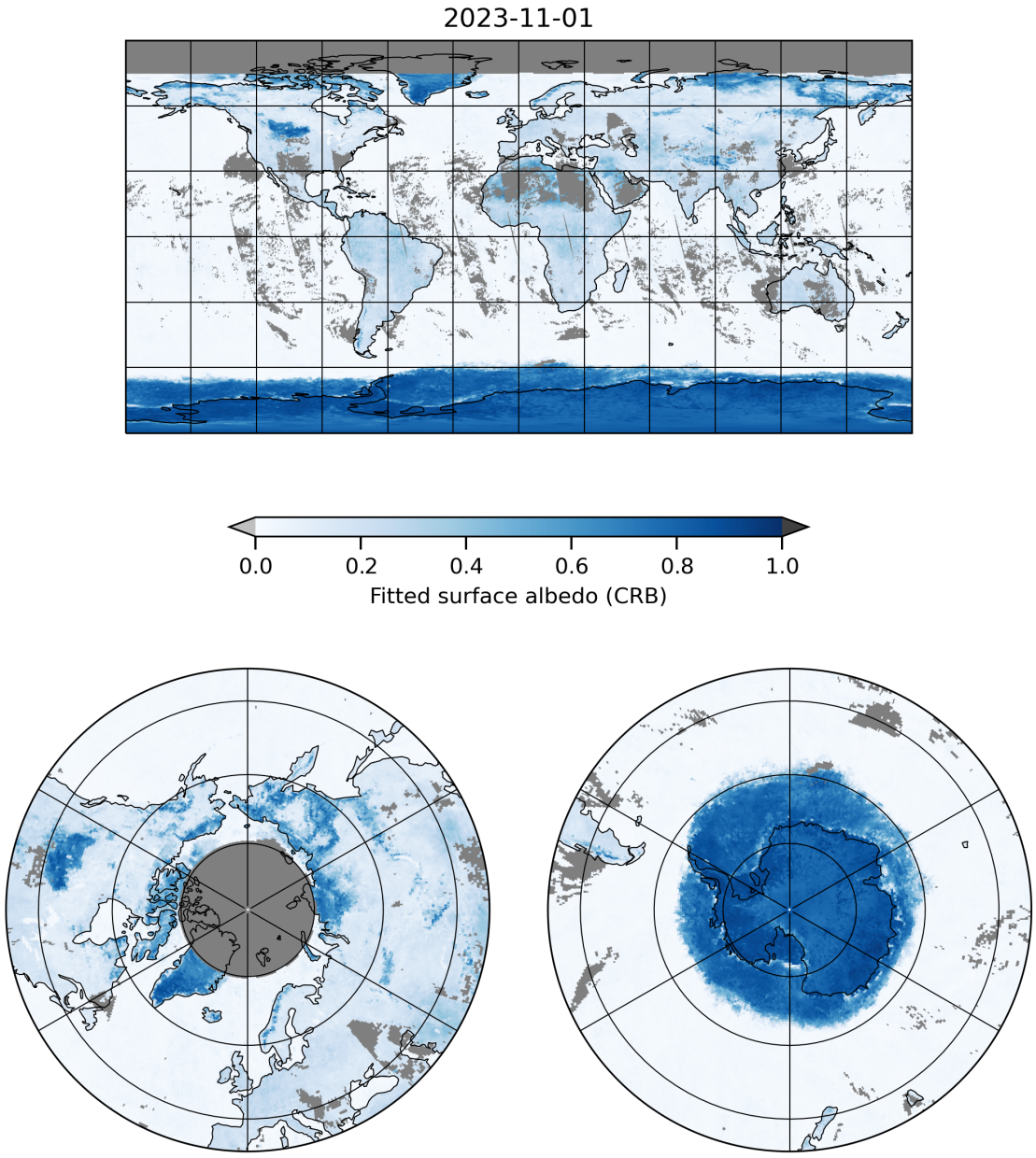


Figure 13: Map of “Fitted surface albedo (CRB)” for 2023-10-31 to 2023-11-02

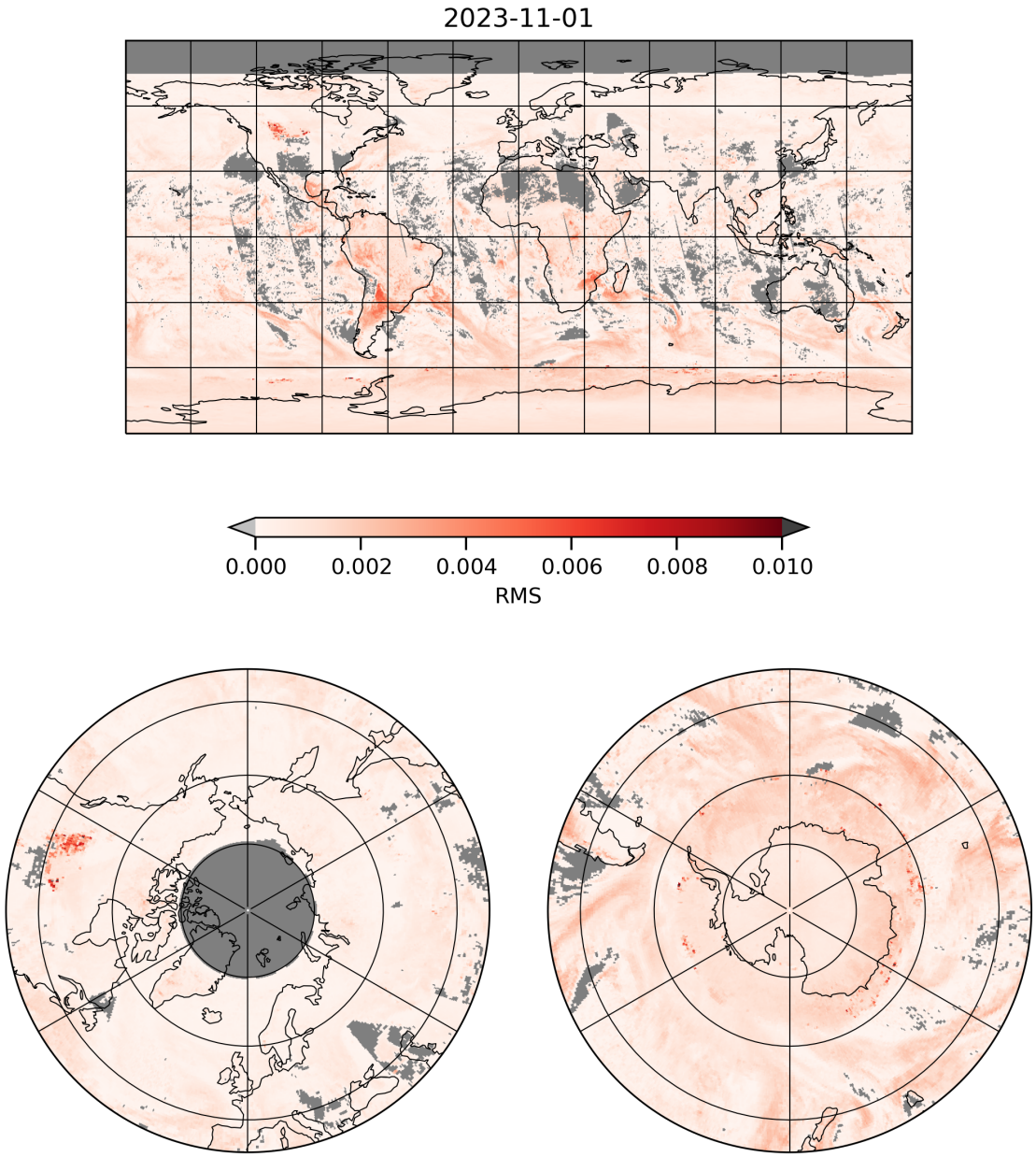


Figure 14: Map of “RMS” for 2023-10-31 to 2023-11-02

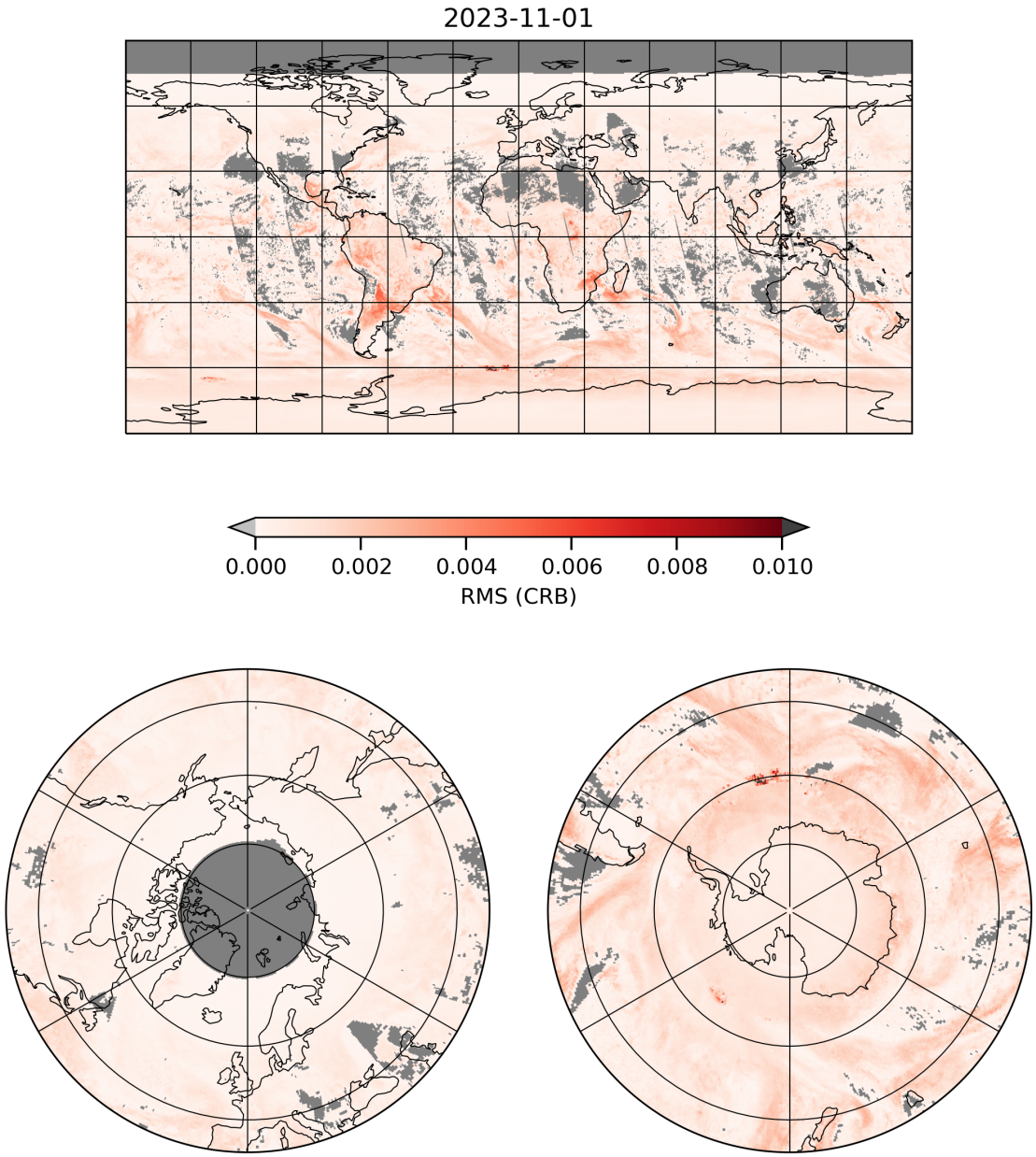


Figure 15: Map of “RMS (CRB)” for 2023-10-31 to 2023-11-02

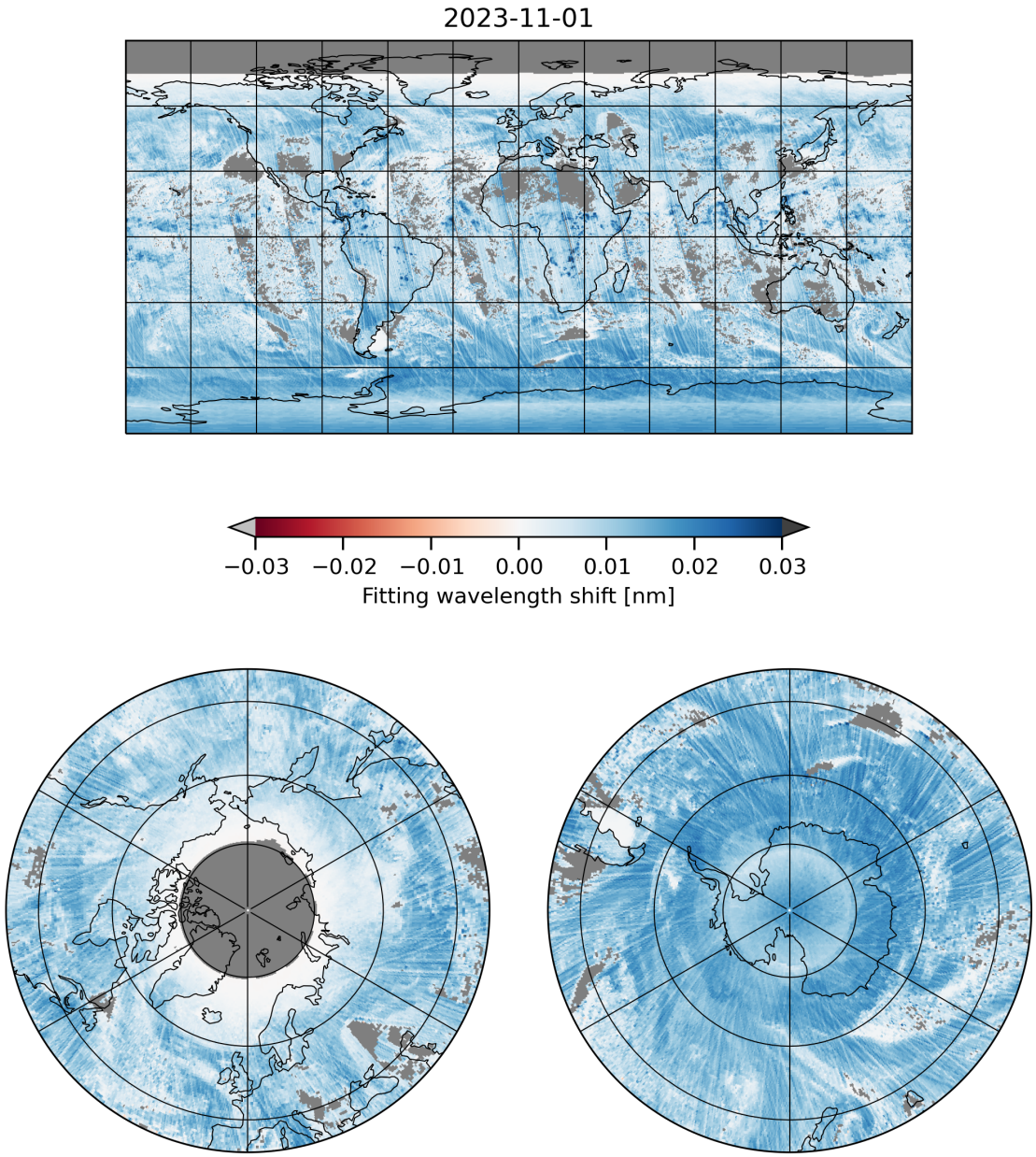


Figure 16: Map of “Fitting wavelength shift” for 2023-10-31 to 2023-11-02

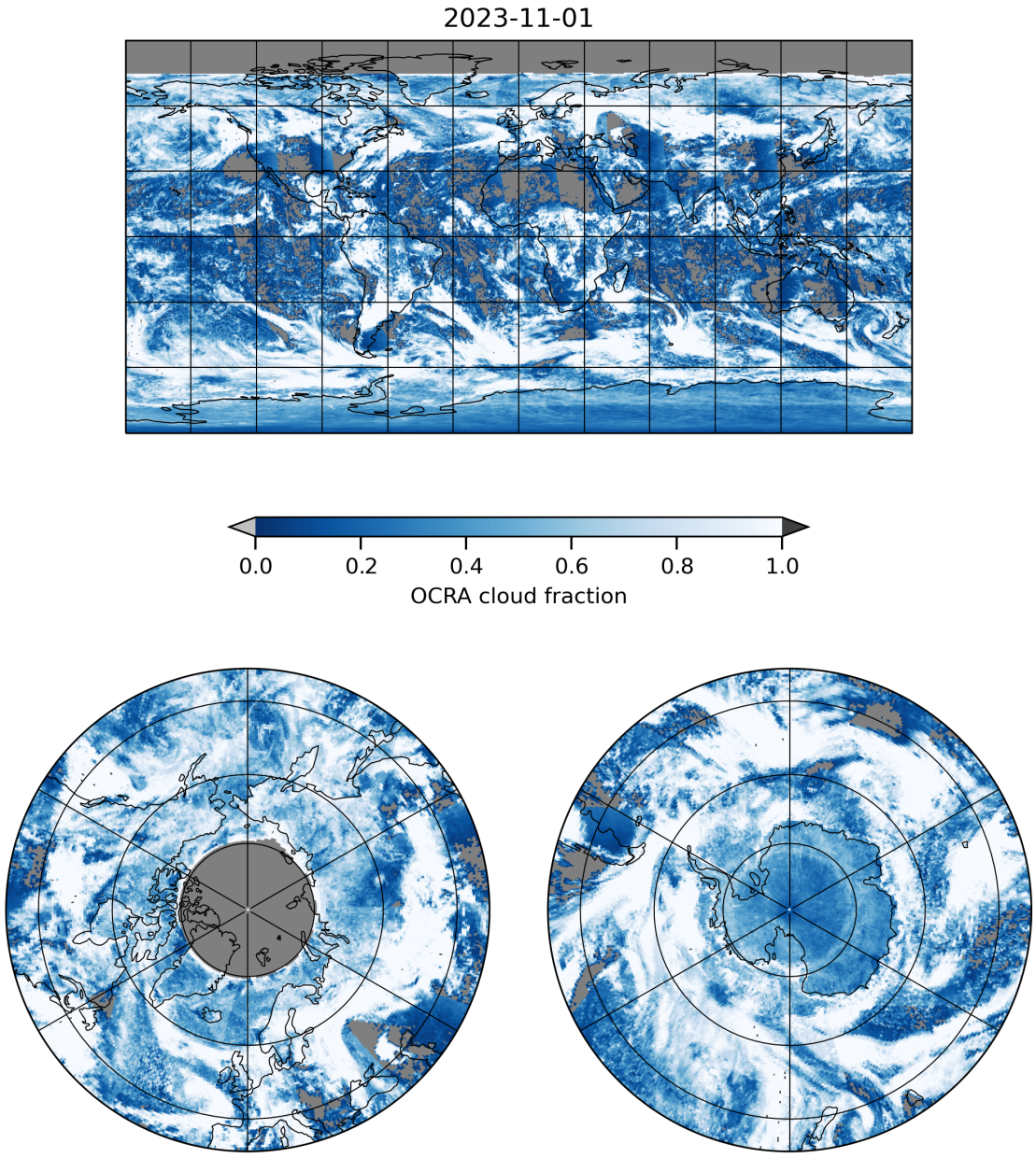


Figure 17: Map of “OCRA cloud fraction” for 2023-10-31 to 2023-11-02

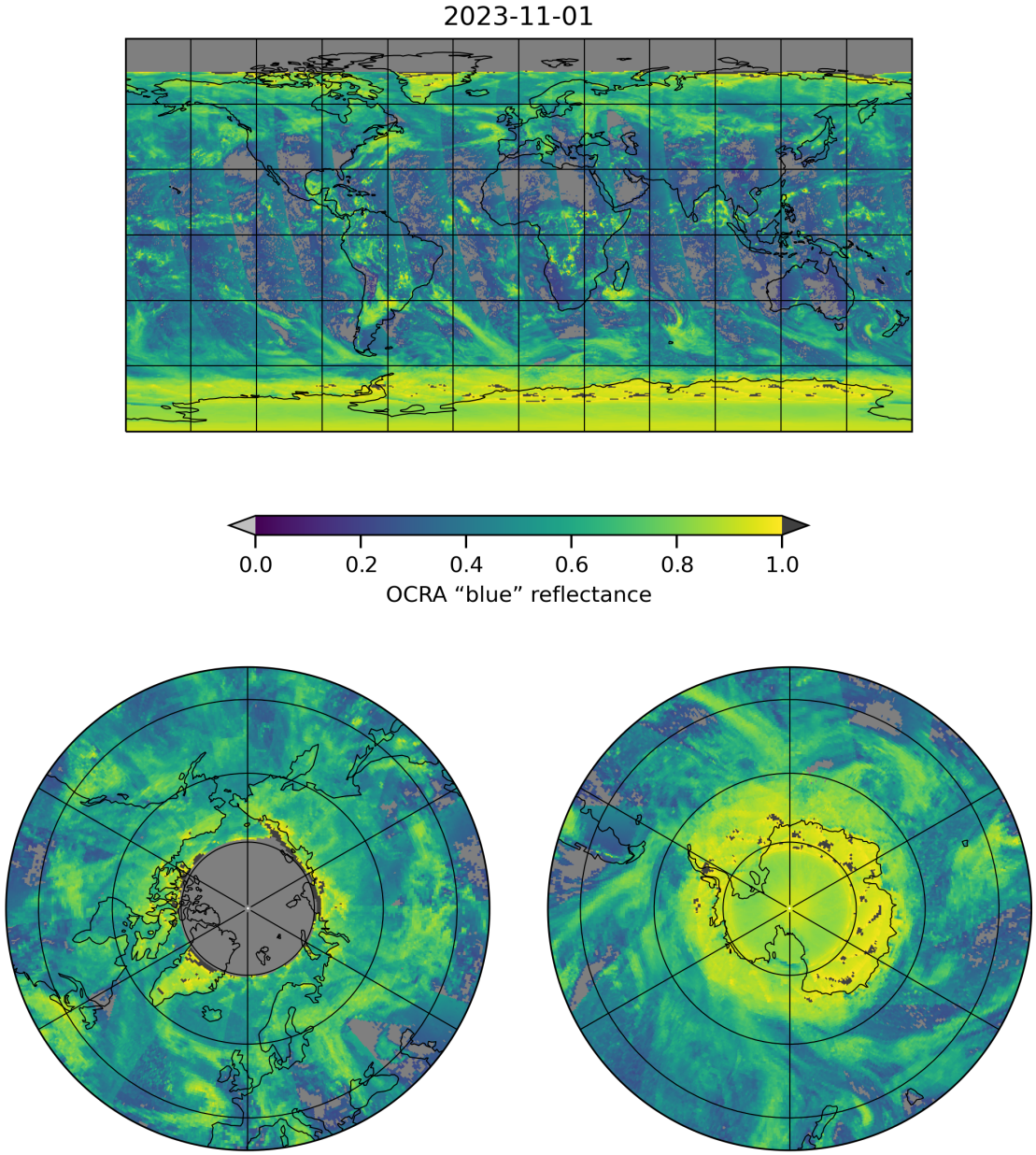


Figure 18: Map of “OCRA “blue” reflectance” for 2023-10-31 to 2023-11-02

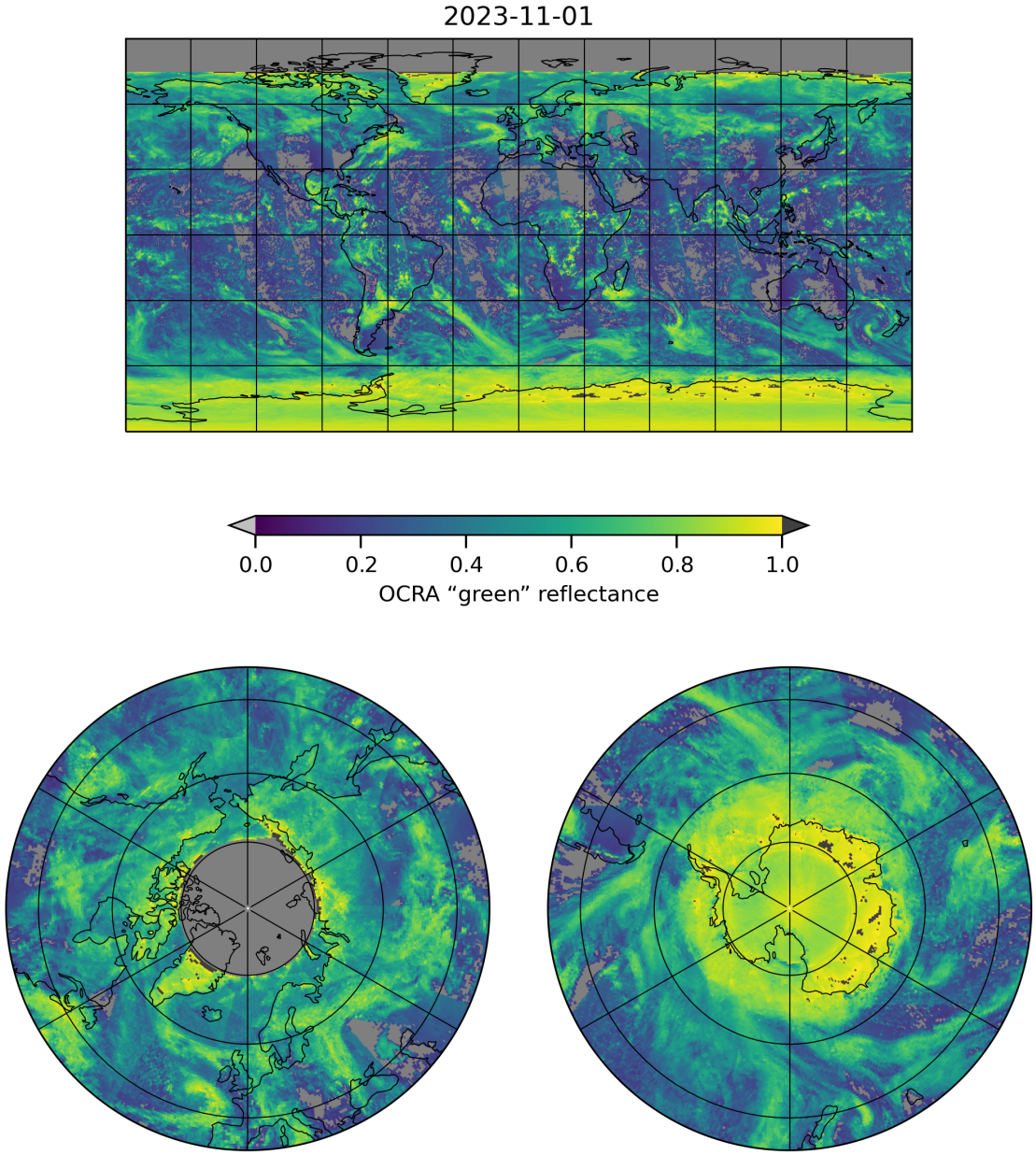


Figure 19: Map of “OCRA “green” reflectance” for 2023-10-31 to 2023-11-02

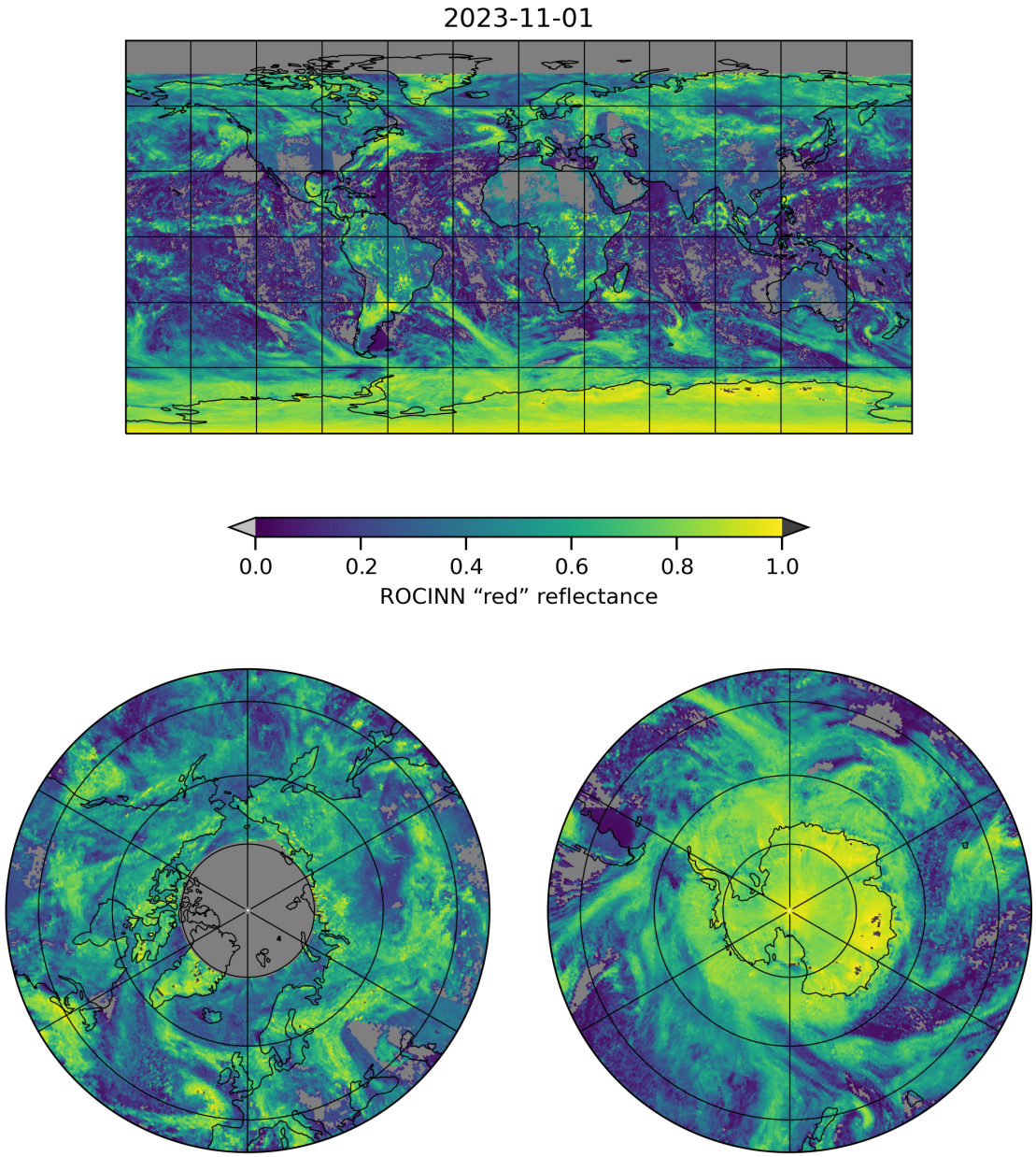


Figure 20: Map of “ROCINN “red” reflectance” for 2023-10-31 to 2023-11-02

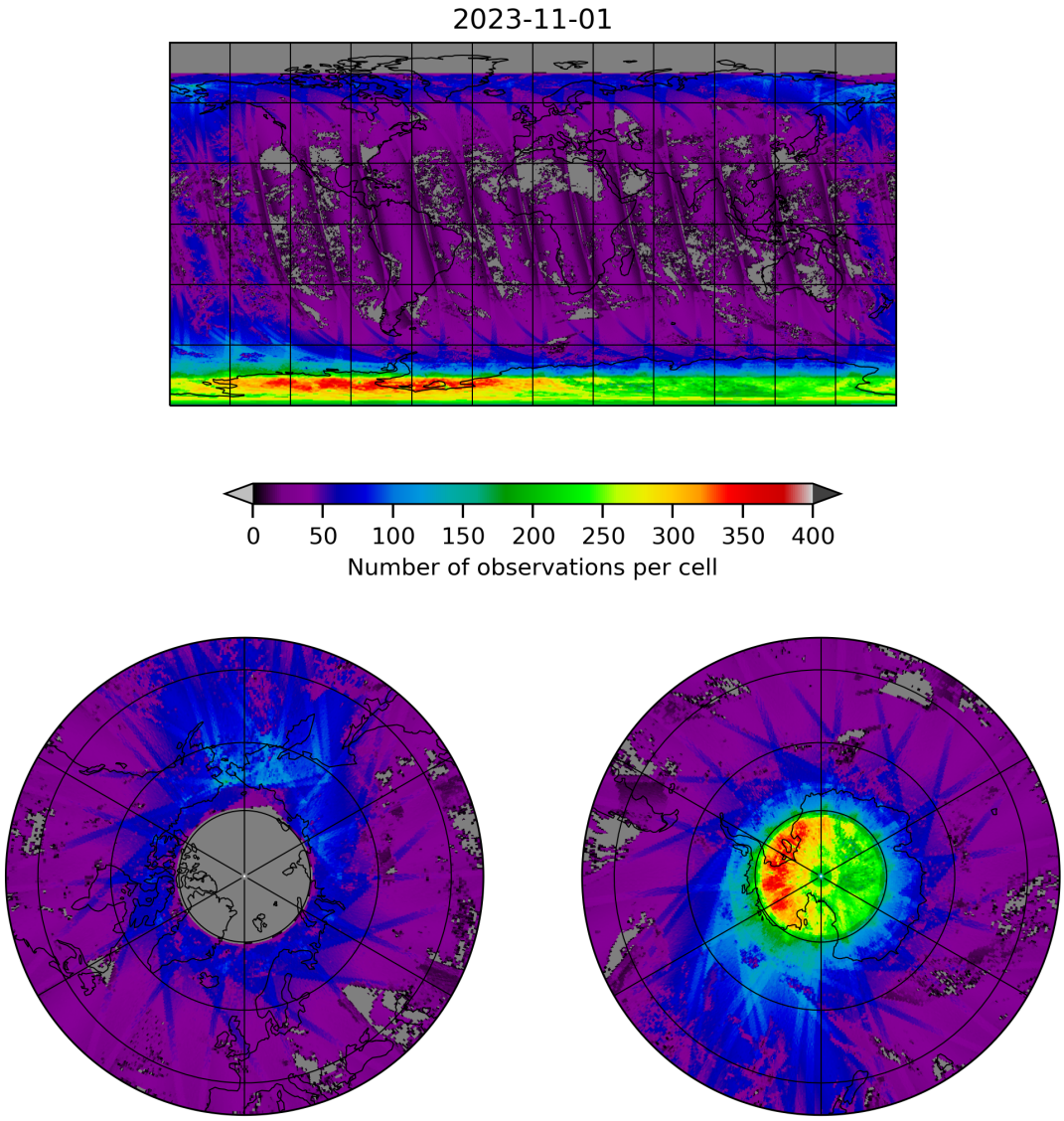


Figure 21: Map of the number of observations for 2023-10-31 to 2023-11-02

7 Zonal average

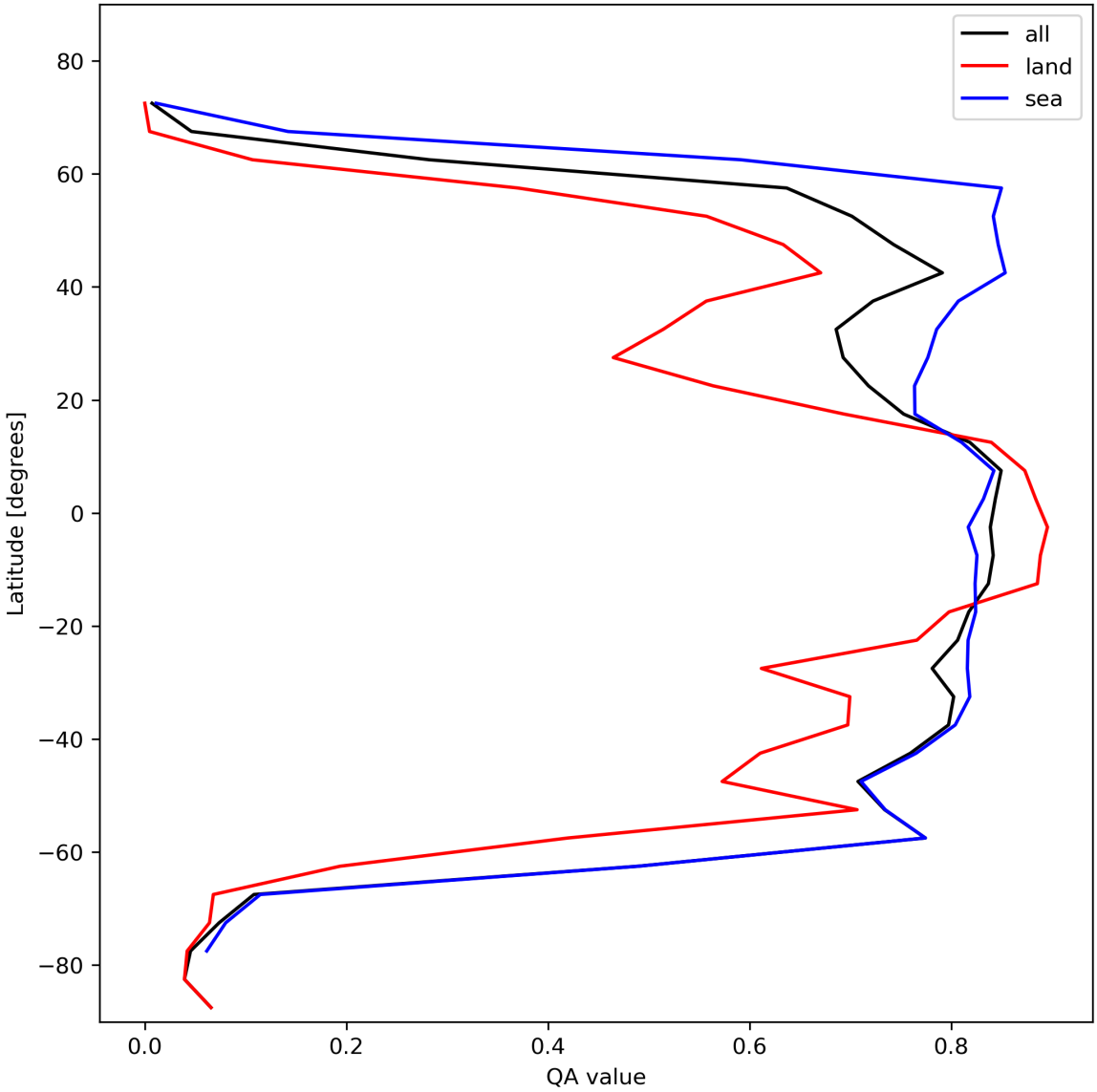


Figure 22: Zonal average of “QA value” for 2023-10-31 to 2023-11-02.

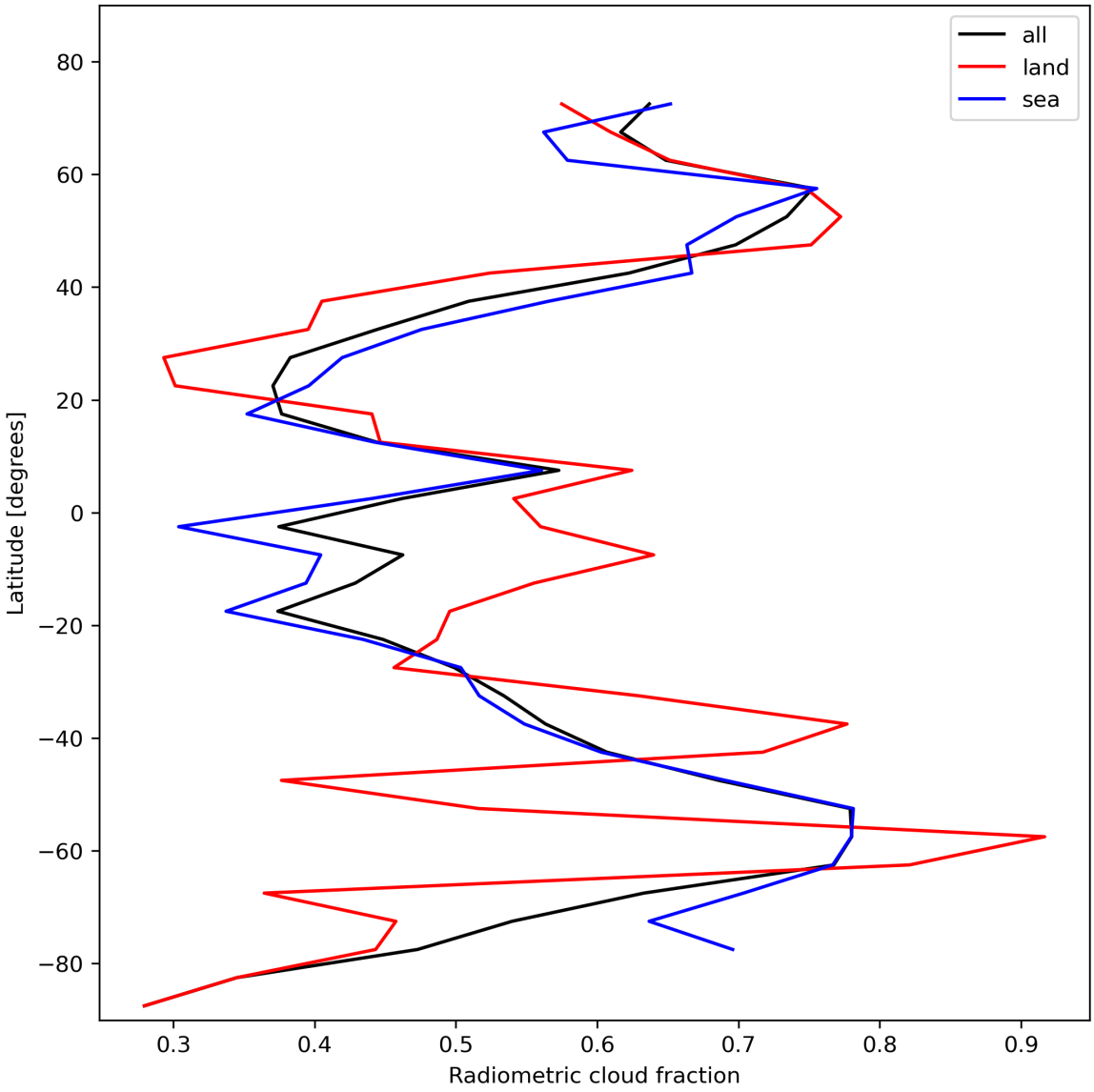


Figure 23: Zonal average of “Radiometric cloud fraction” for 2023-10-31 to 2023-11-02.

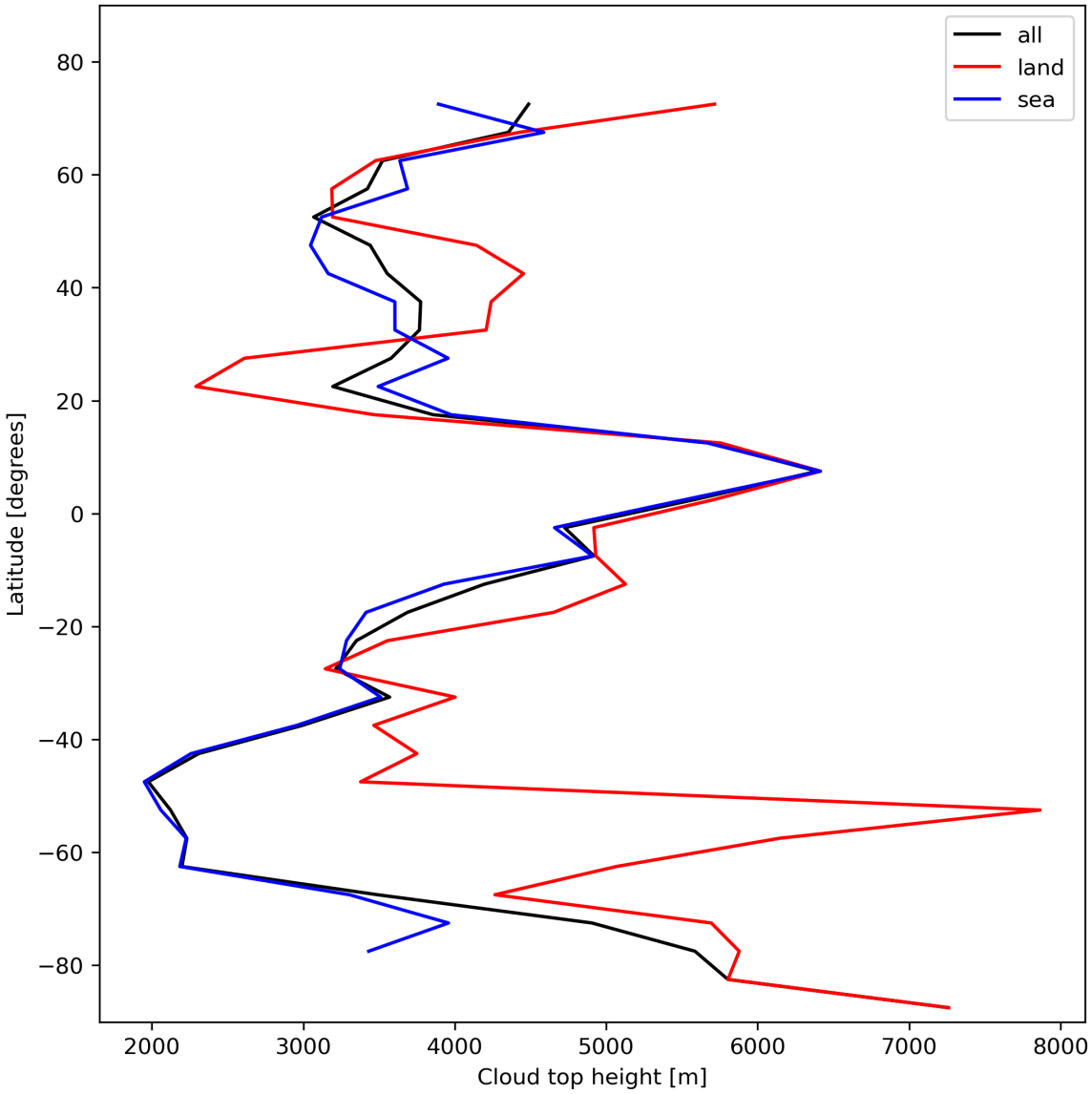


Figure 24: Zonal average of “Cloud top height” for 2023-10-31 to 2023-11-02.

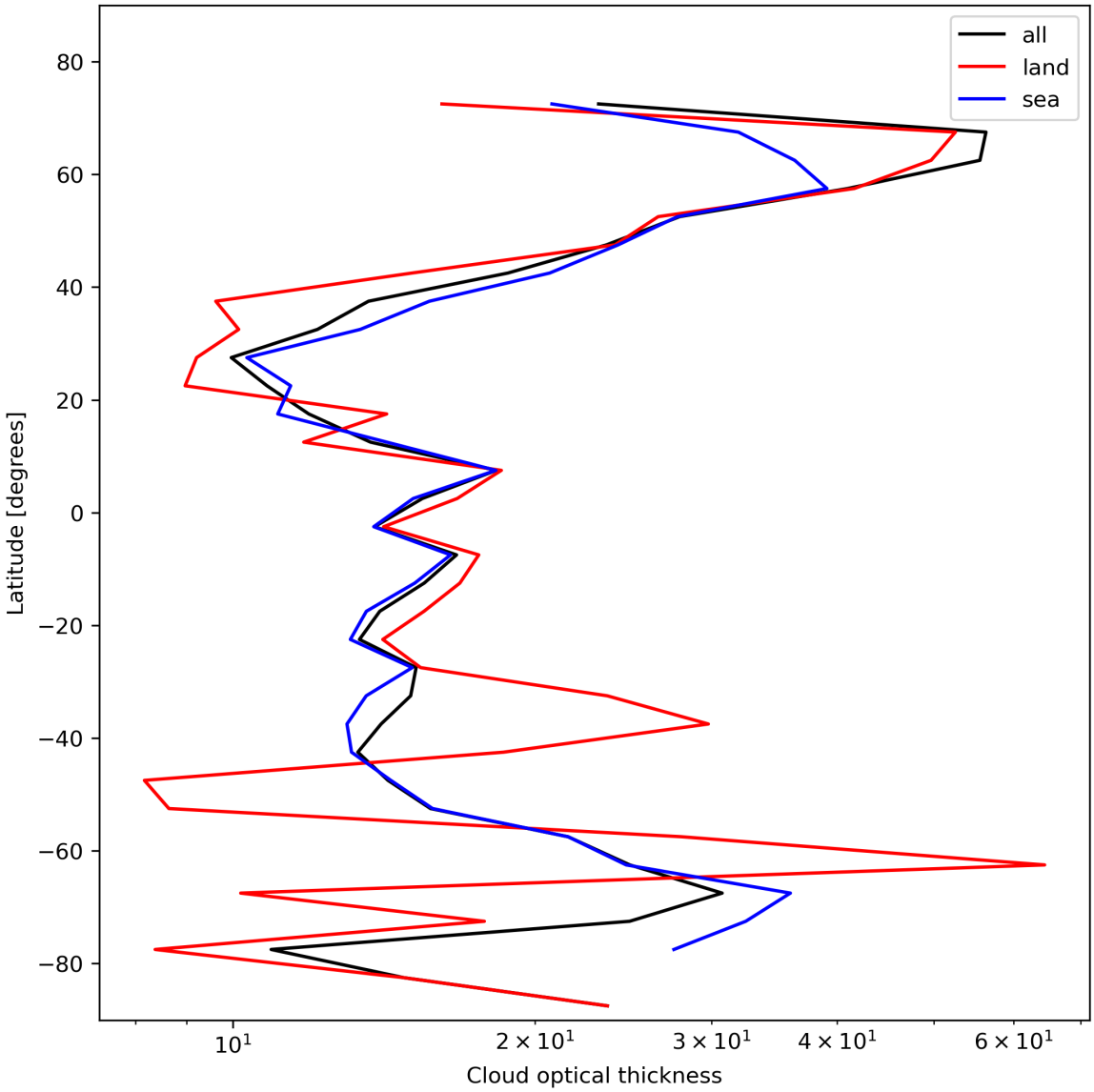


Figure 25: Zonal average of “Cloud optical thickness” for 2023-10-31 to 2023-11-02.

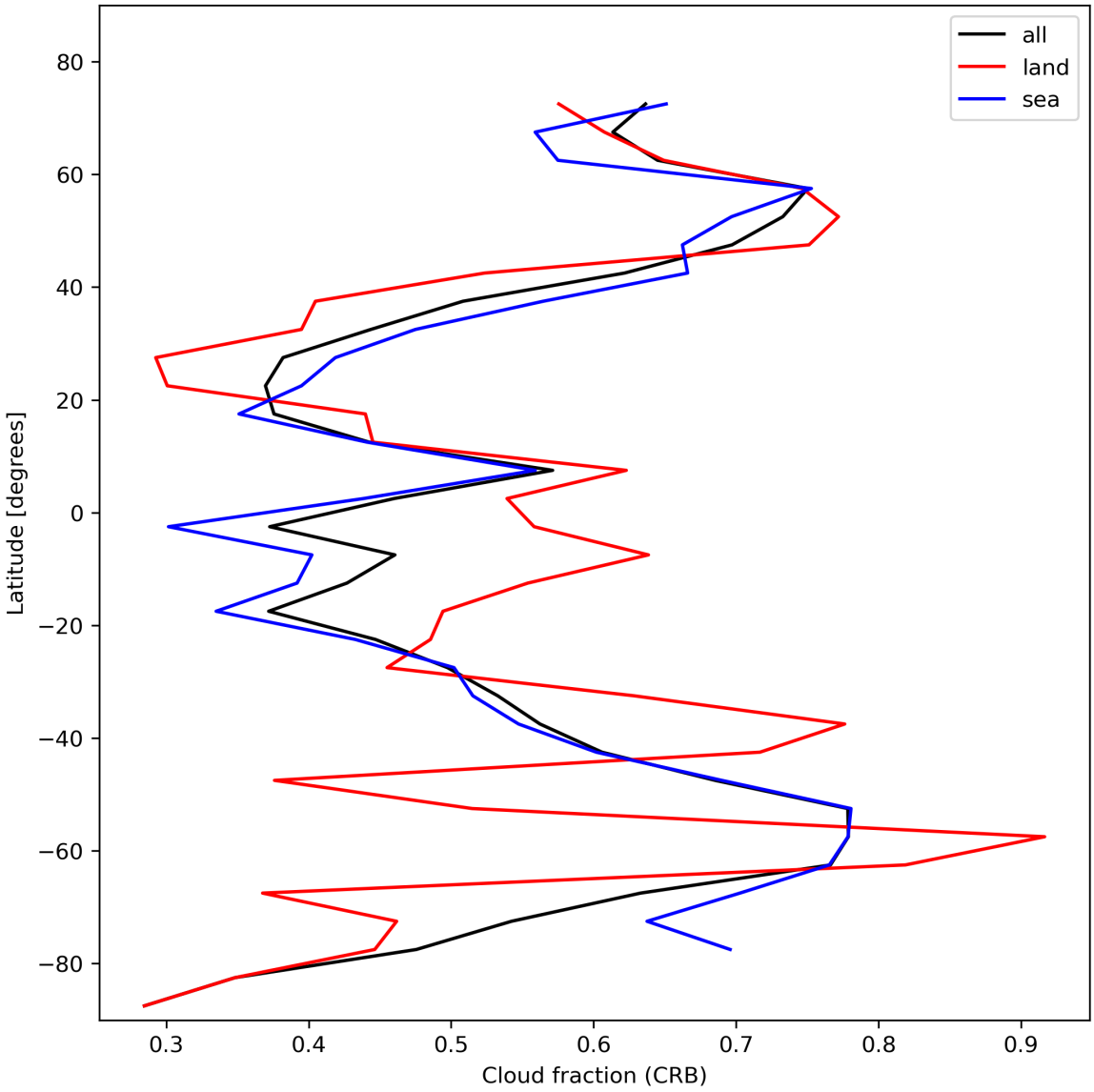


Figure 26: Zonal average of “Cloud fraction (CRB)” for 2023-10-31 to 2023-11-02.

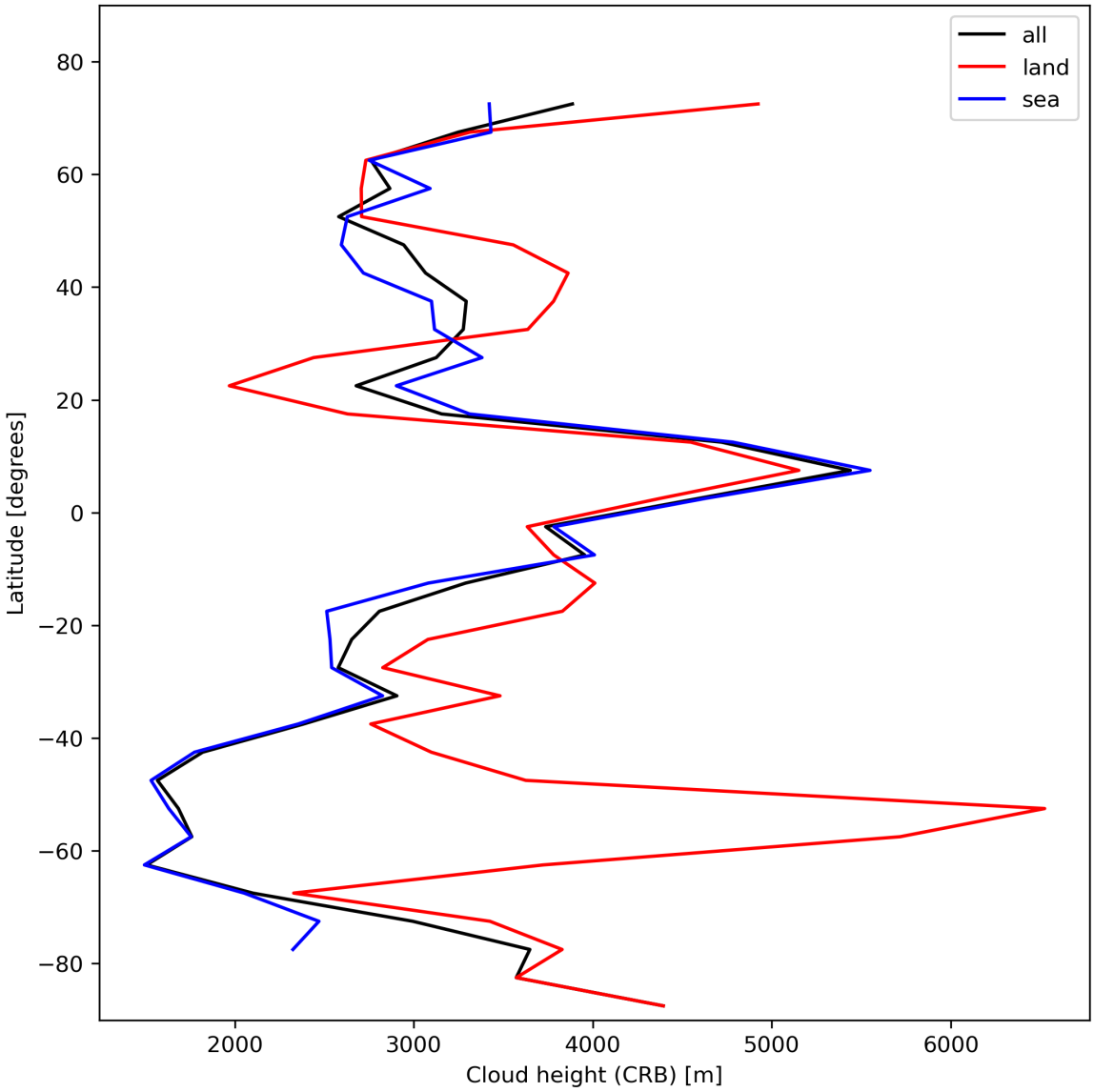


Figure 27: Zonal average of “Cloud height (CRB)” for 2023-10-31 to 2023-11-02.

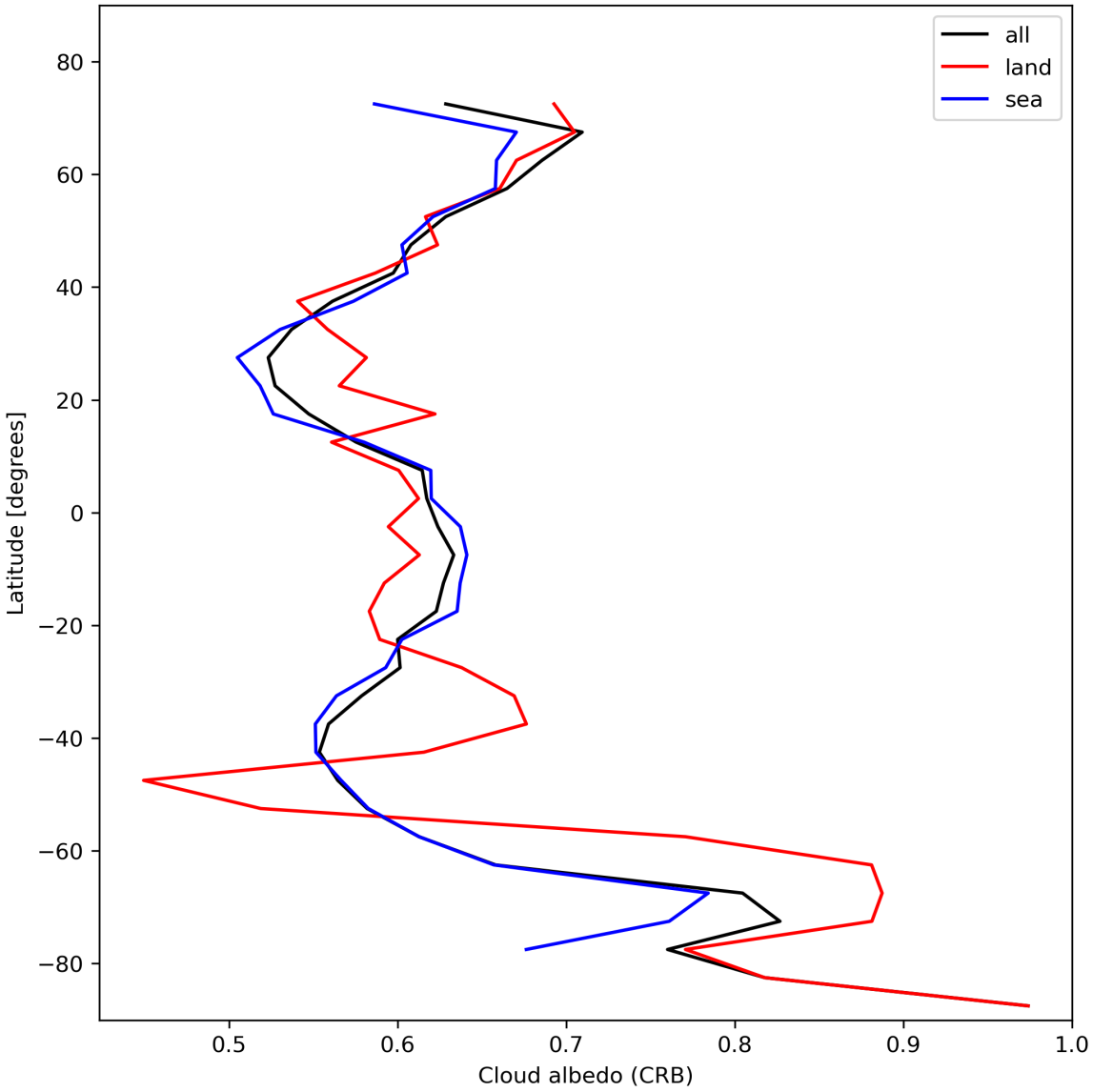


Figure 28: Zonal average of “Cloud albedo (CRB)” for 2023-10-31 to 2023-11-02.

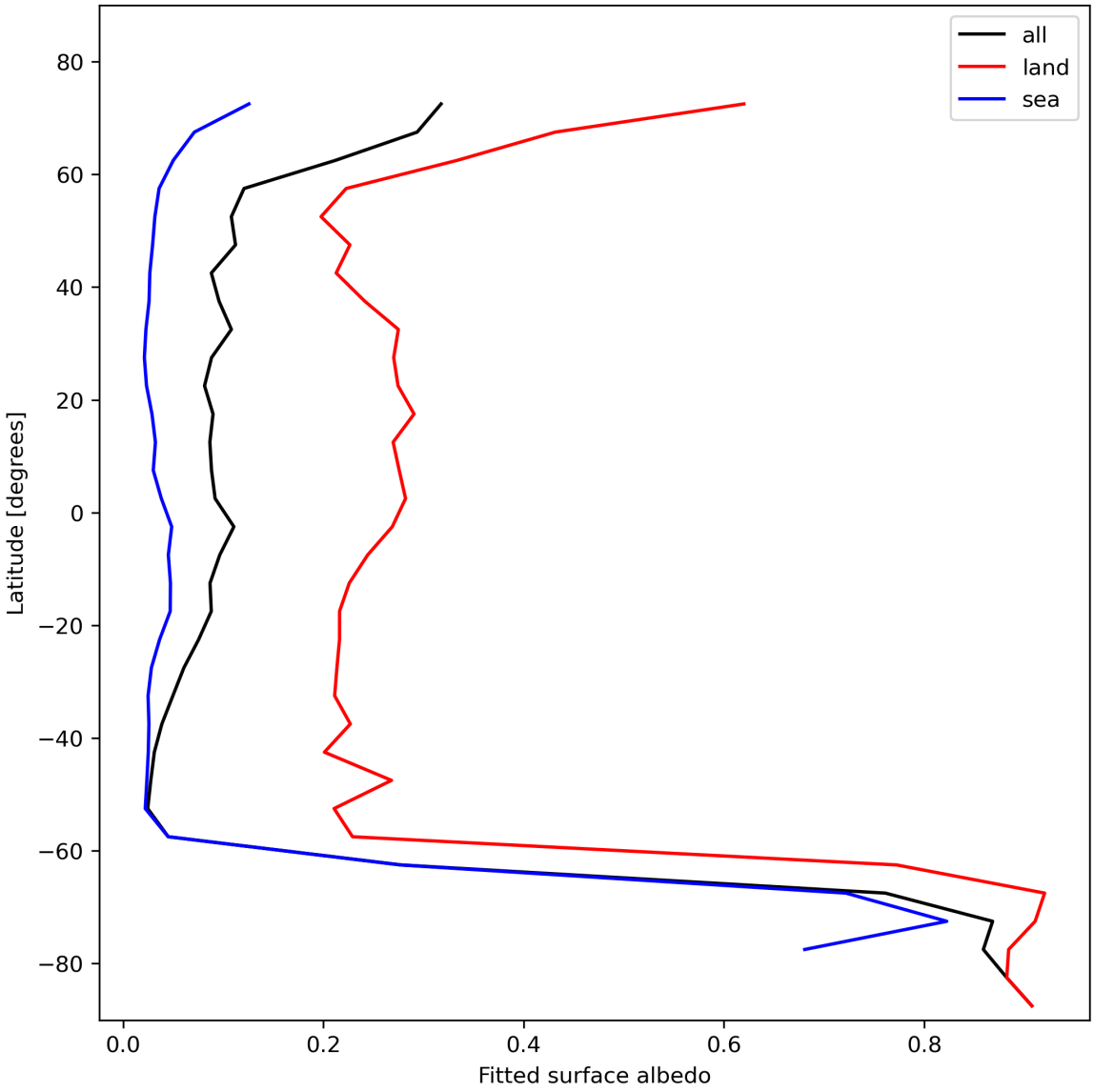


Figure 29: Zonal average of “Fitted surface albedo” for 2023-10-31 to 2023-11-02.

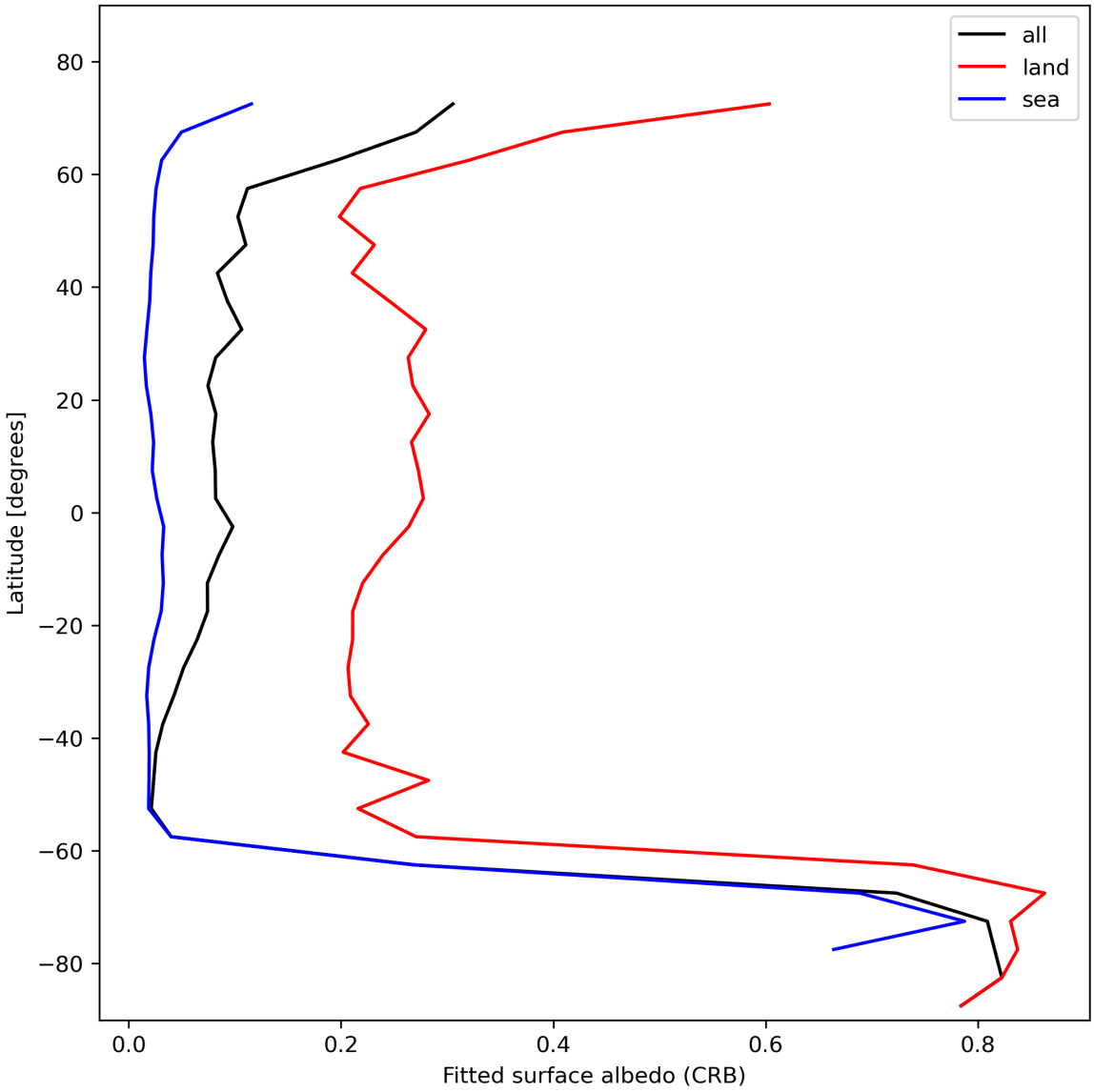


Figure 30: Zonal average of “Fitted surface albedo (CRB)” for 2023-10-31 to 2023-11-02.

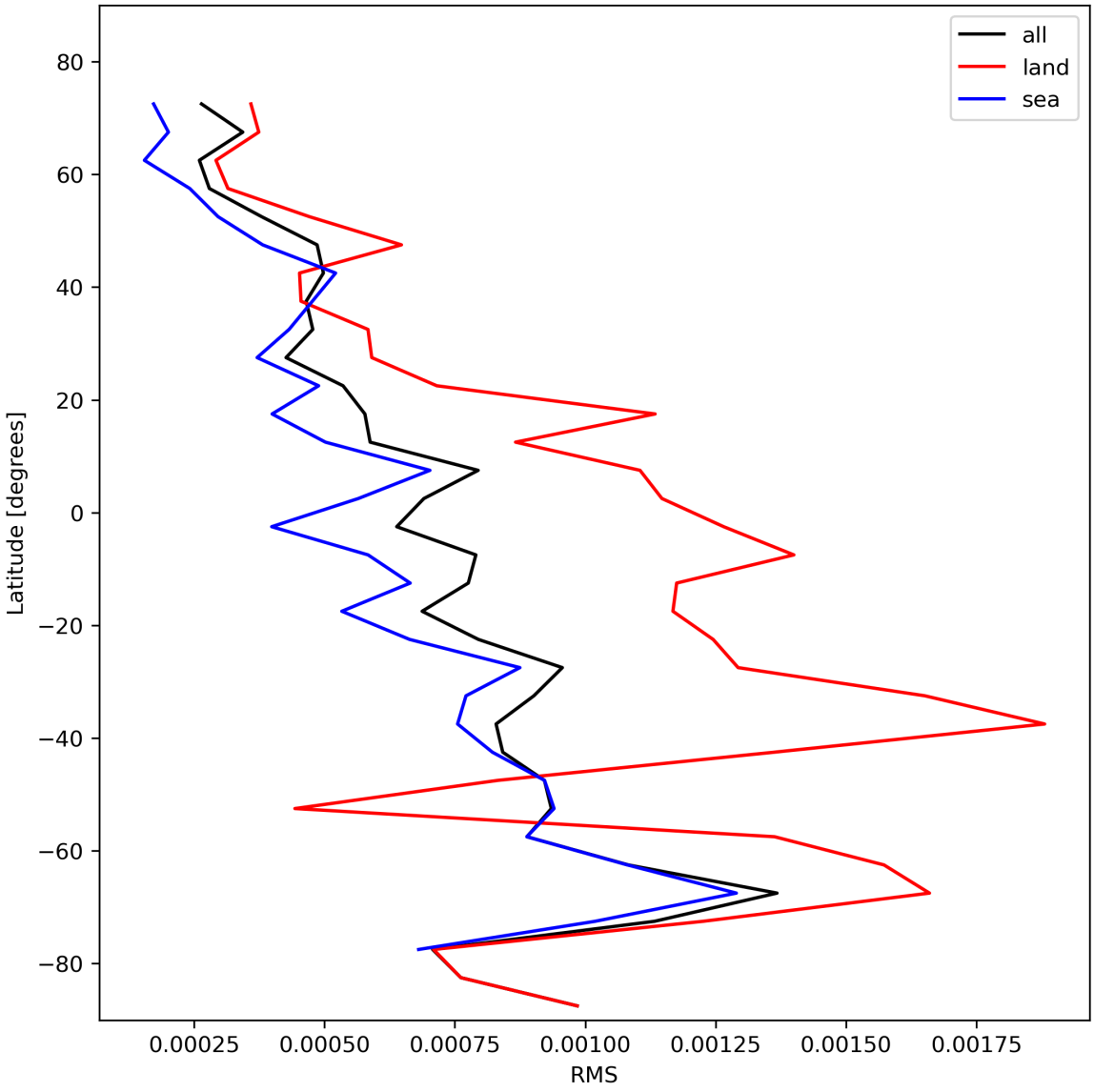


Figure 31: Zonal average of “RMS” for 2023-10-31 to 2023-11-02.

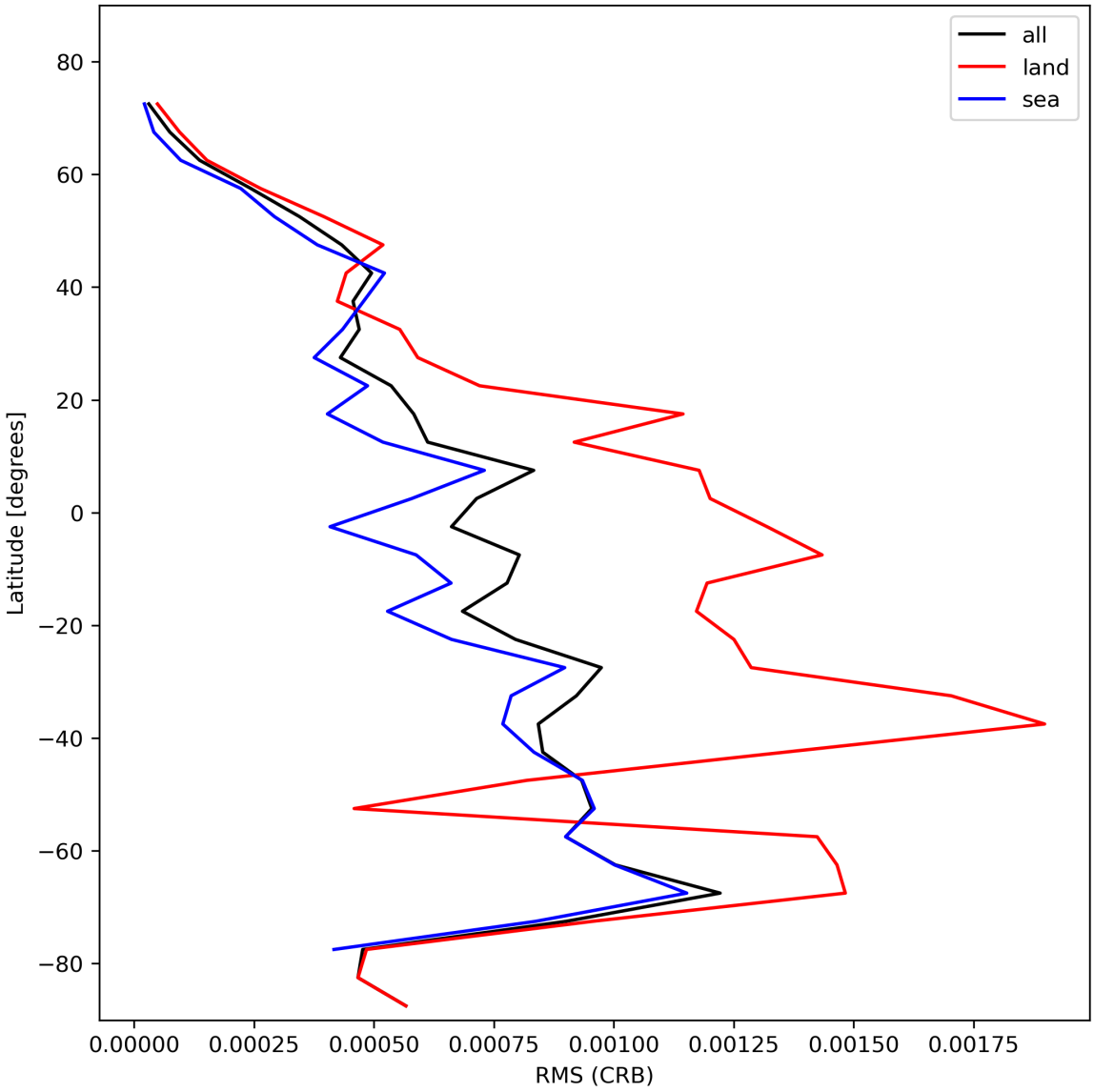


Figure 32: Zonal average of “RMS (CRB)” for 2023-10-31 to 2023-11-02.

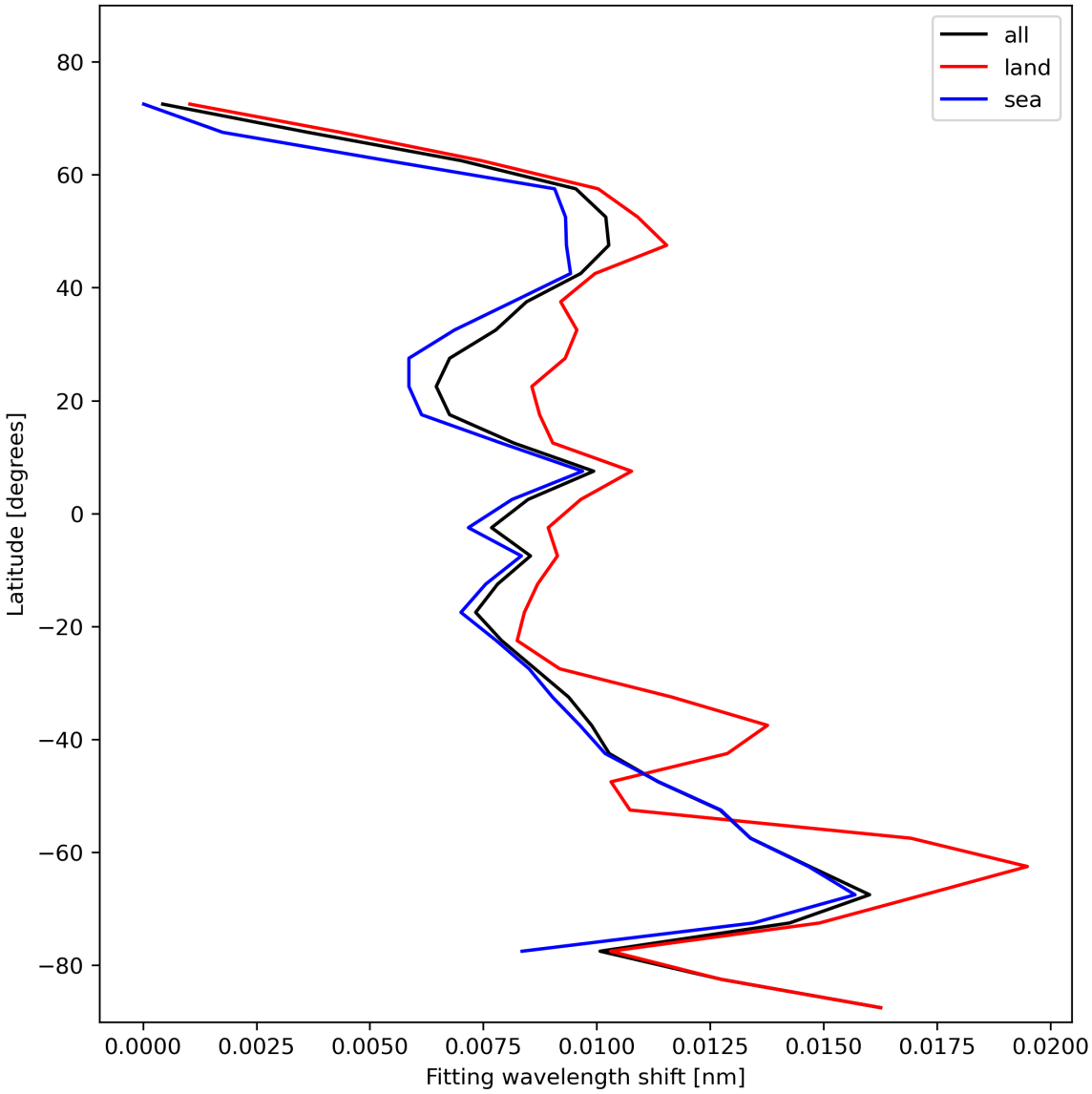


Figure 33: Zonal average of “Fitting wavelength shift” for 2023-10-31 to 2023-11-02.

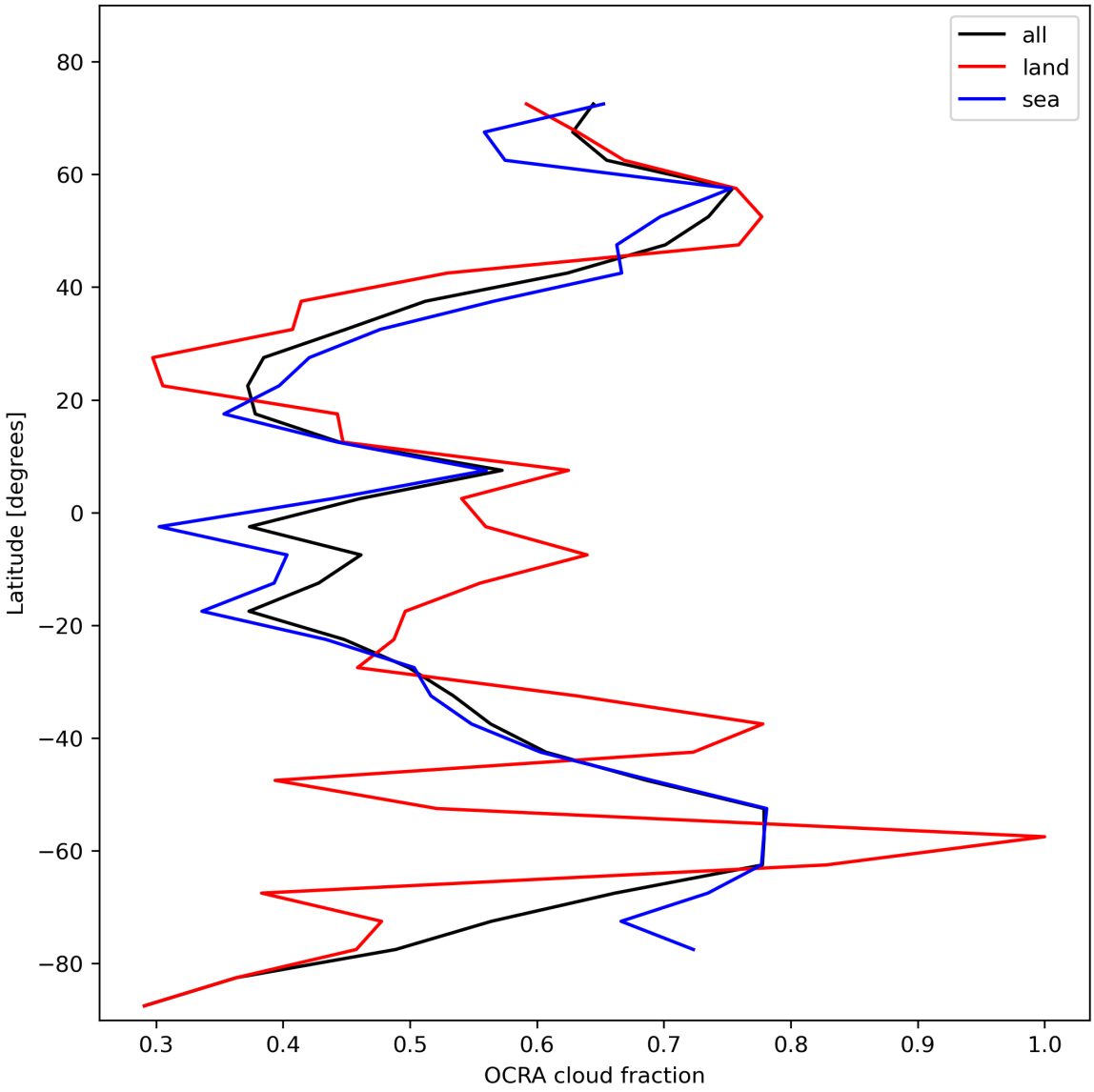


Figure 34: Zonal average of “OCRA cloud fraction” for 2023-10-31 to 2023-11-02.

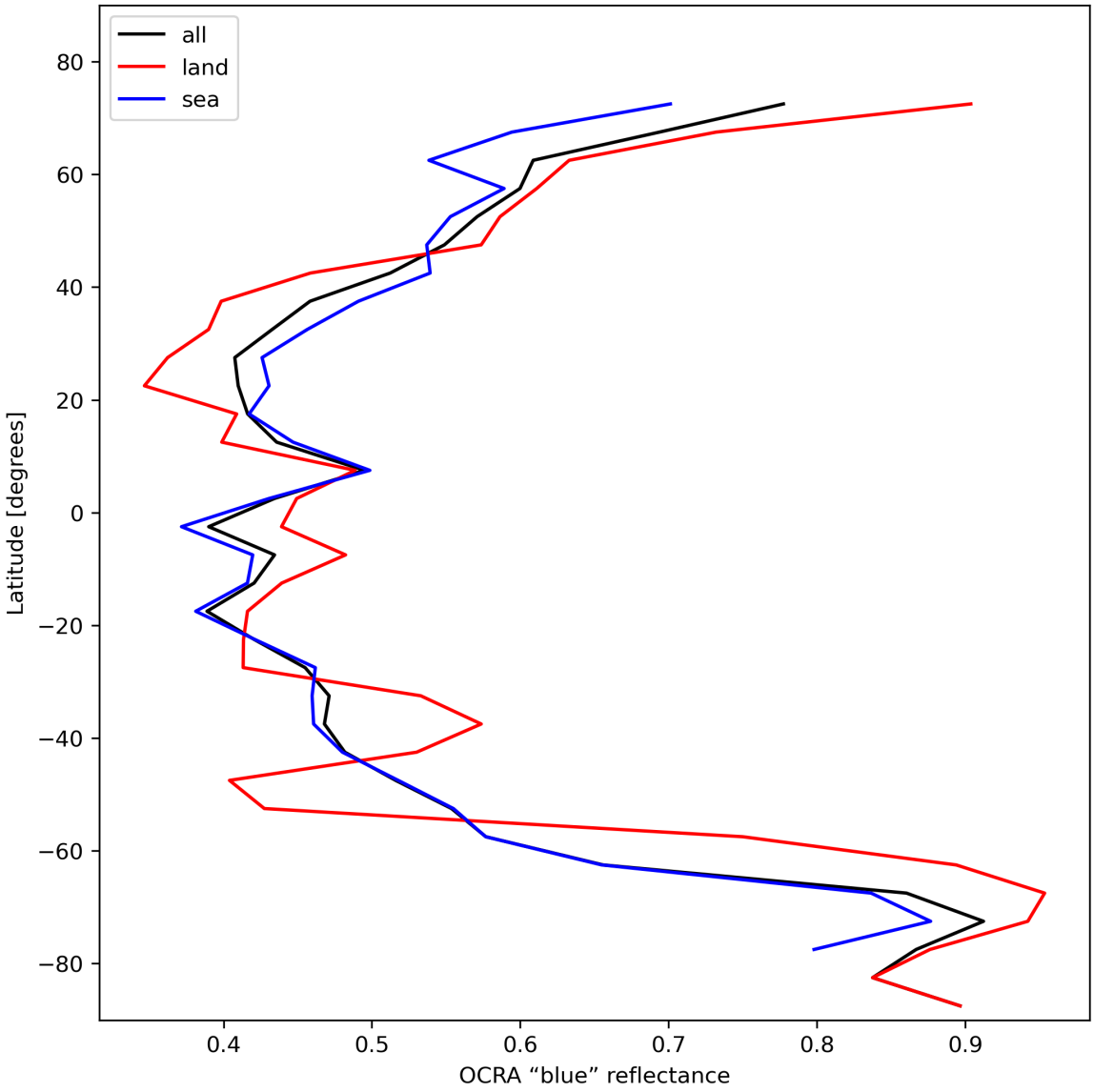


Figure 35: Zonal average of “OCRA “blue” reflectance” for 2023-10-31 to 2023-11-02.

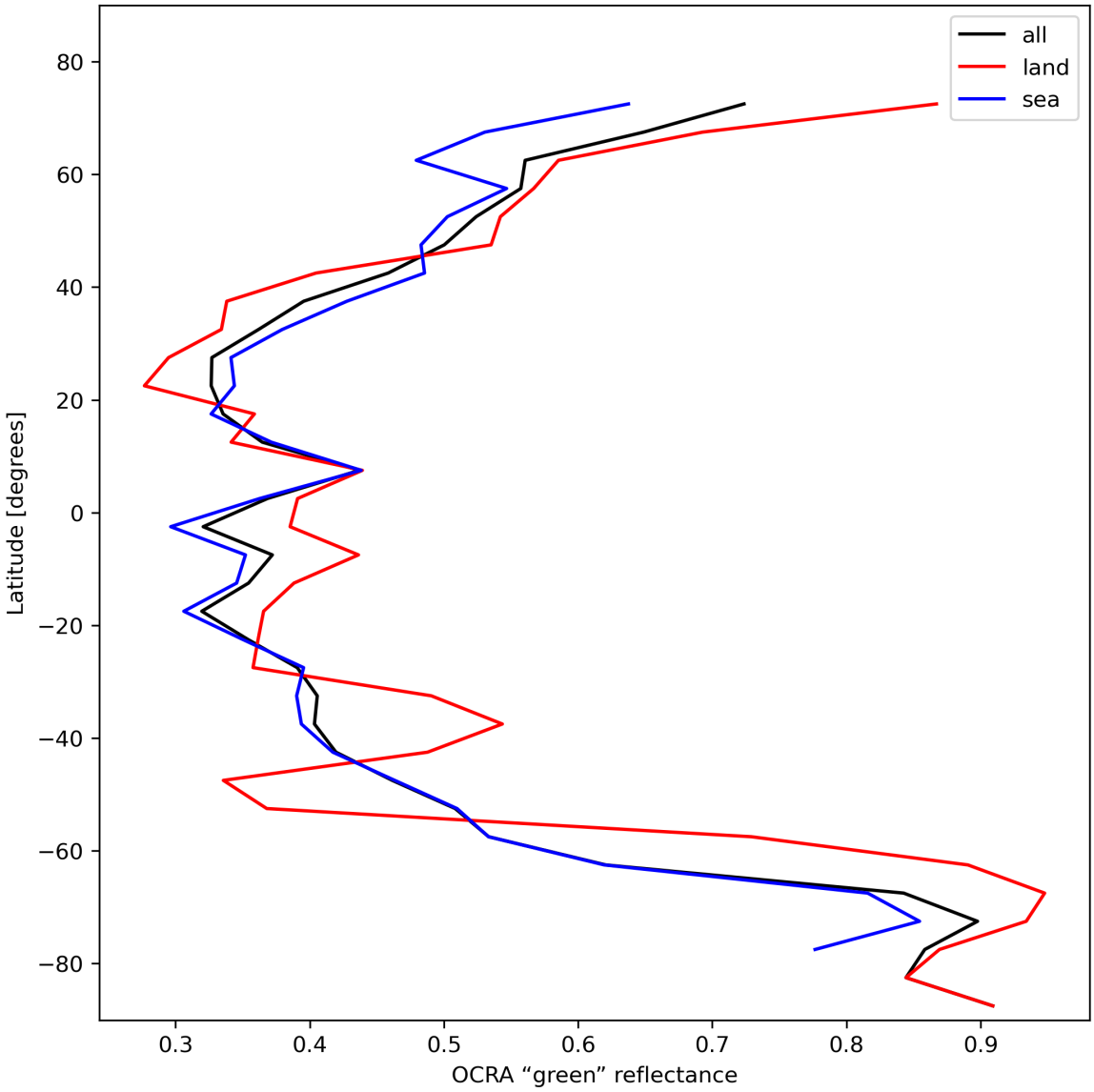


Figure 36: Zonal average of “OCRA “green” reflectance” for 2023-10-31 to 2023-11-02.

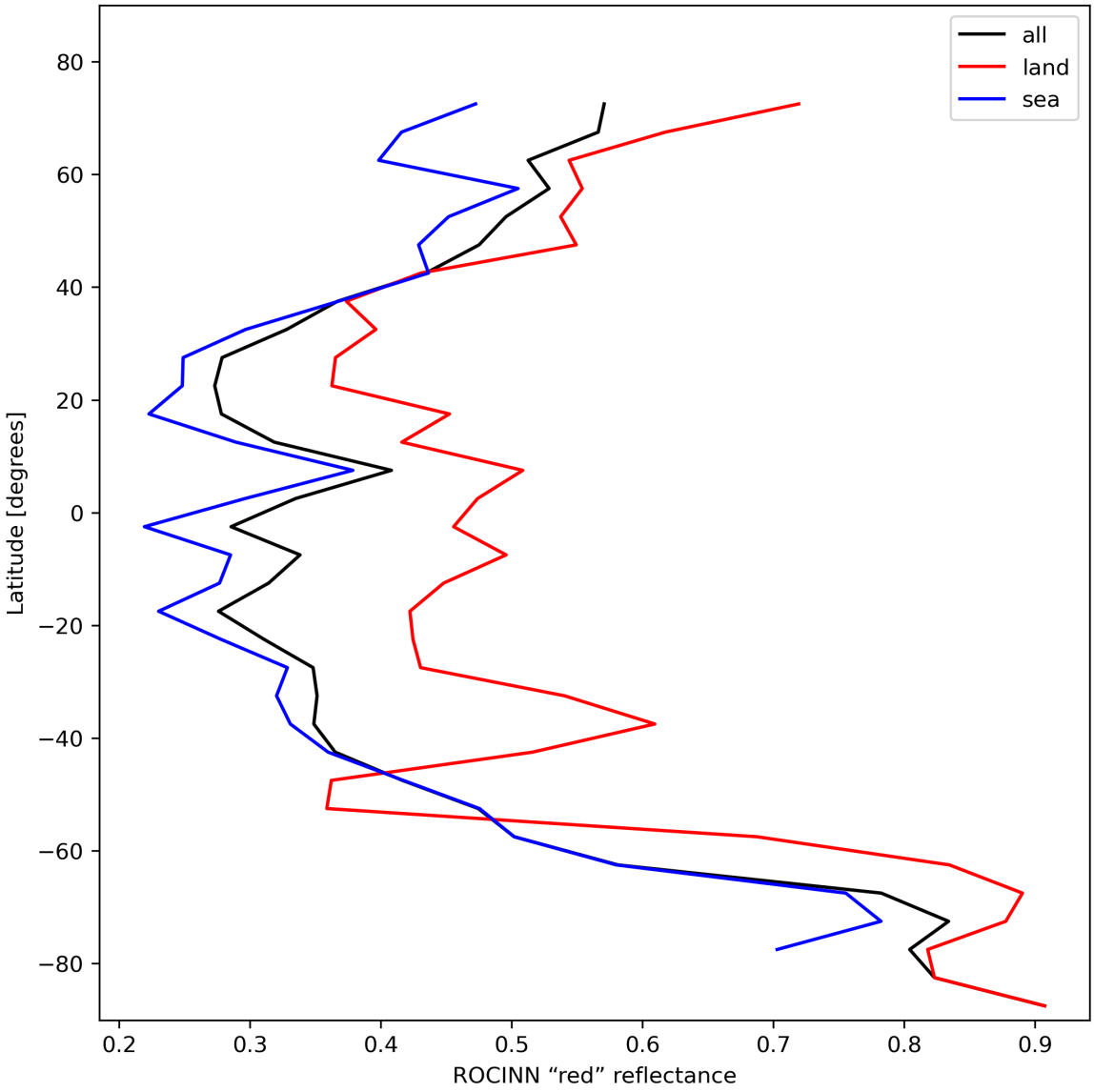


Figure 37: Zonal average of “ROCINN “red” reflectance” for 2023-10-31 to 2023-11-02.

8 Histograms

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

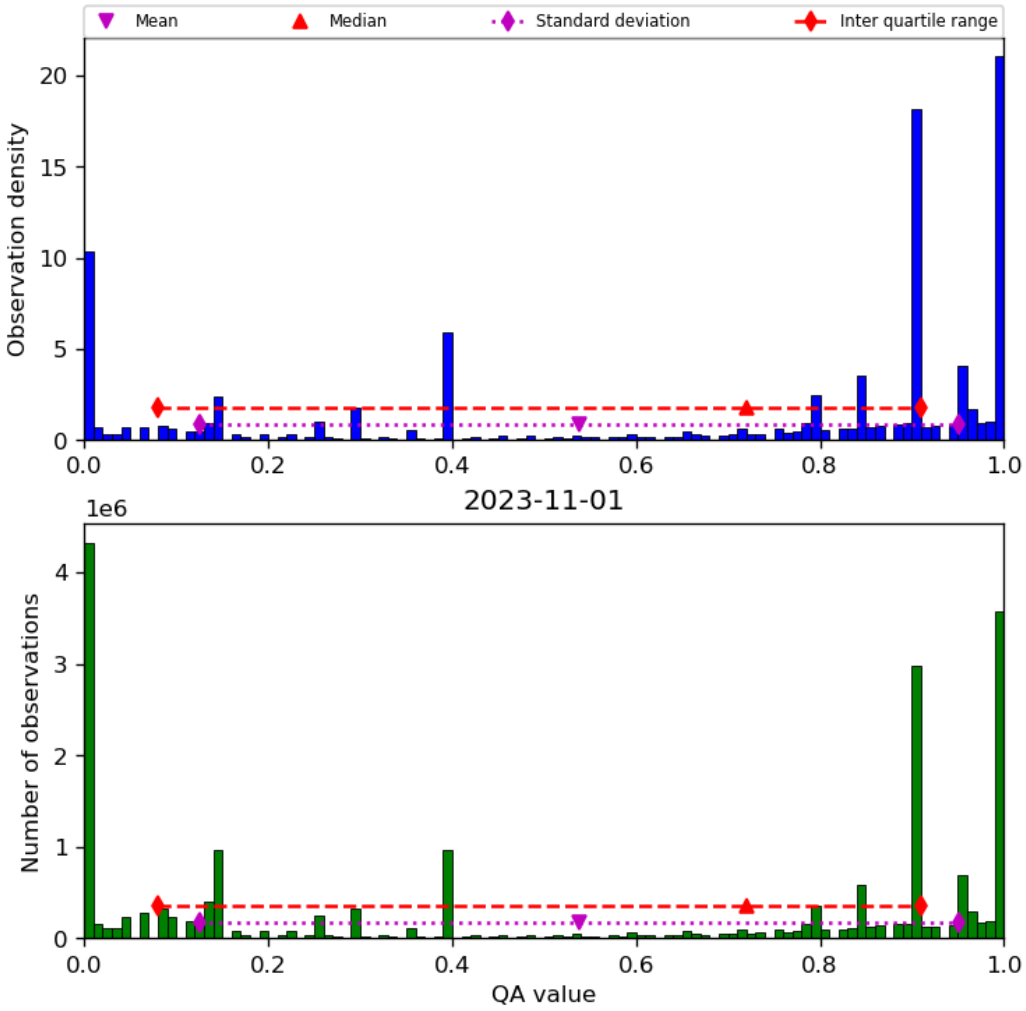


Figure 38: Histogram of “QA value” for 2023-10-31 to 2023-11-02

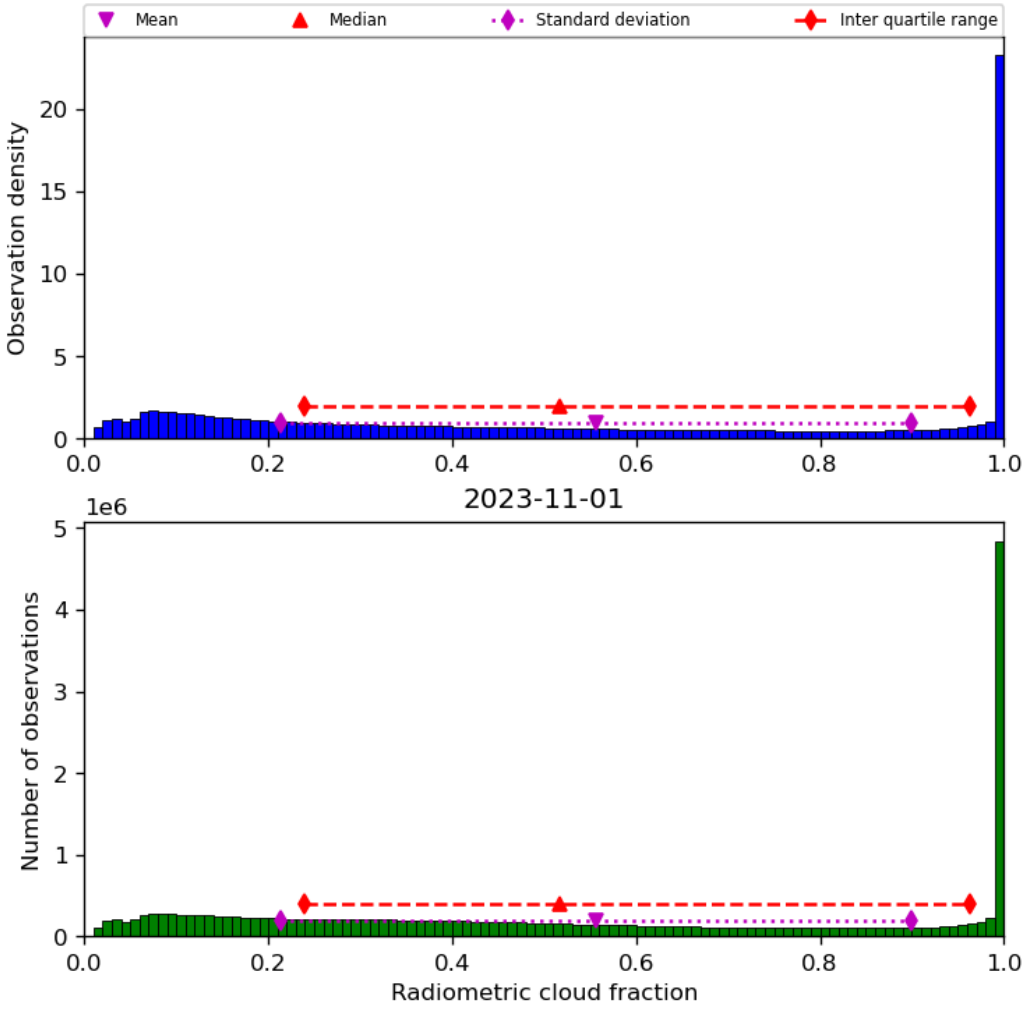


Figure 39: Histogram of “Radiometric cloud fraction” for 2023-10-31 to 2023-11-02

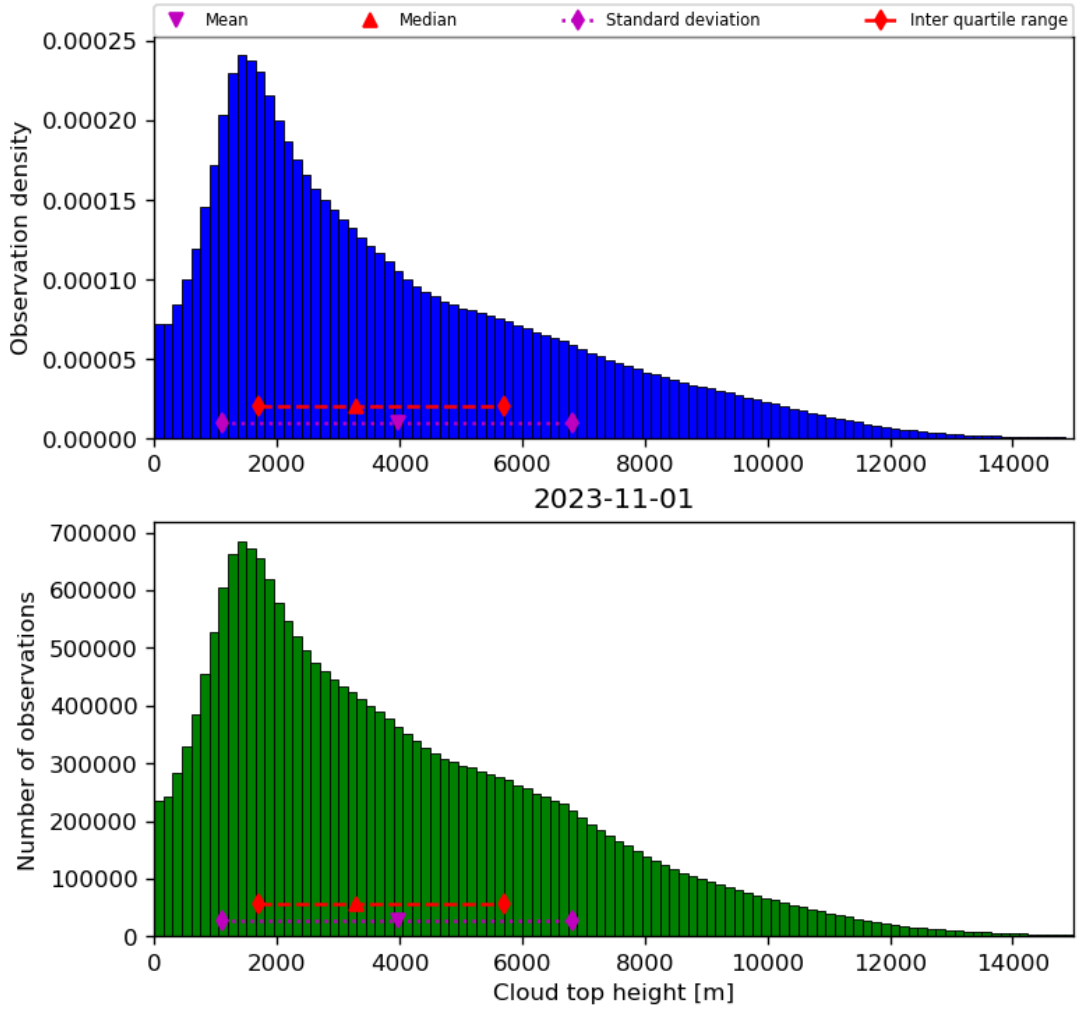


Figure 40: Histogram of “Cloud top height” for 2023-10-31 to 2023-11-02

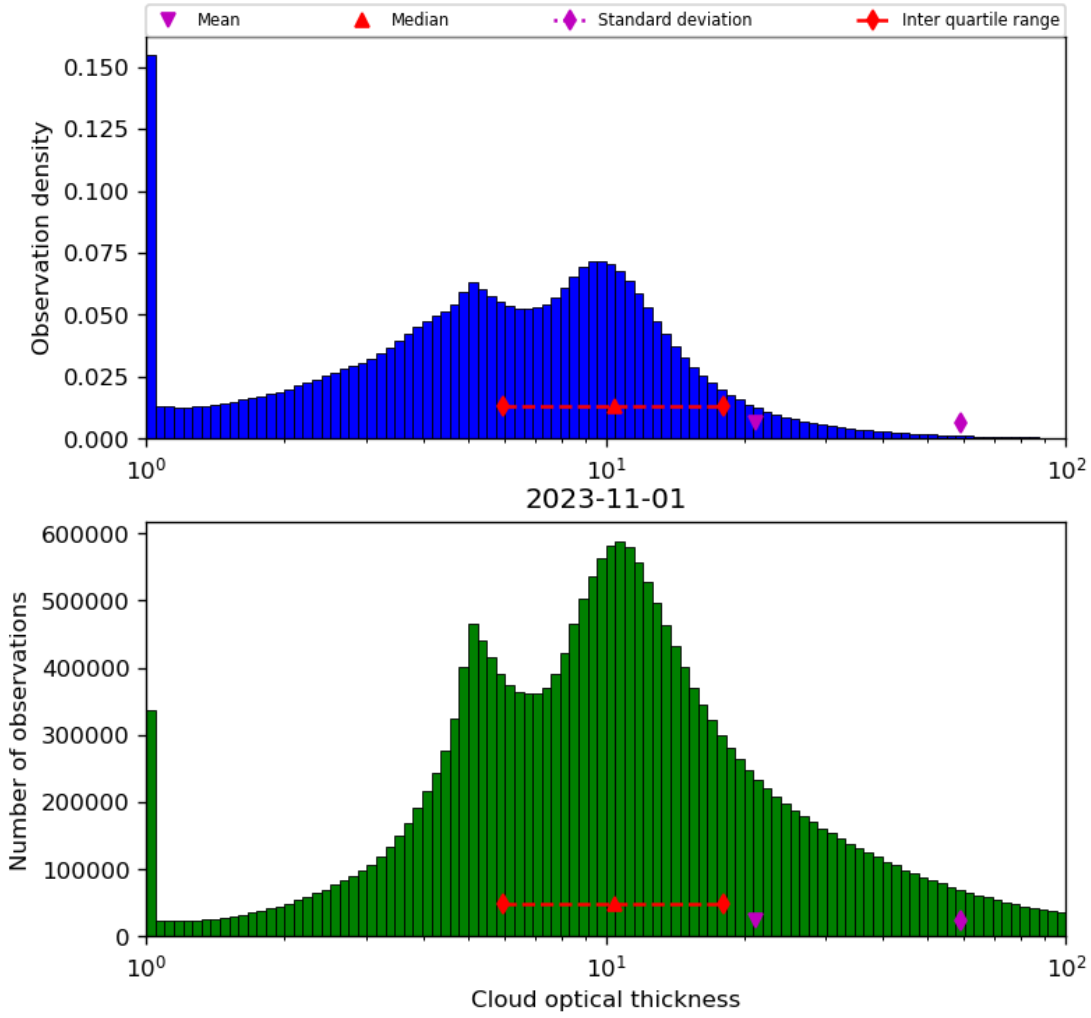


Figure 41: Histogram of “Cloud optical thickness” for 2023-10-31 to 2023-11-02

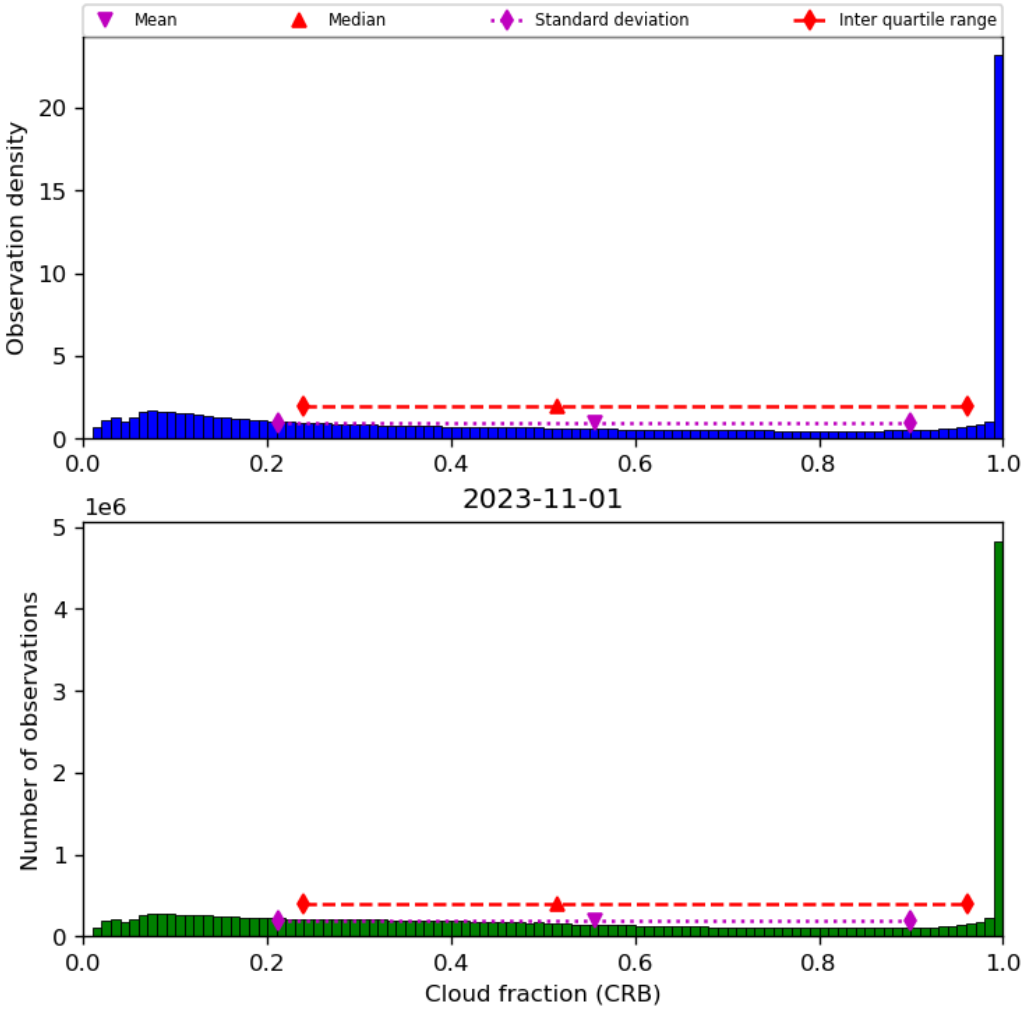


Figure 42: Histogram of “Cloud fraction (CRB)” for 2023-10-31 to 2023-11-02

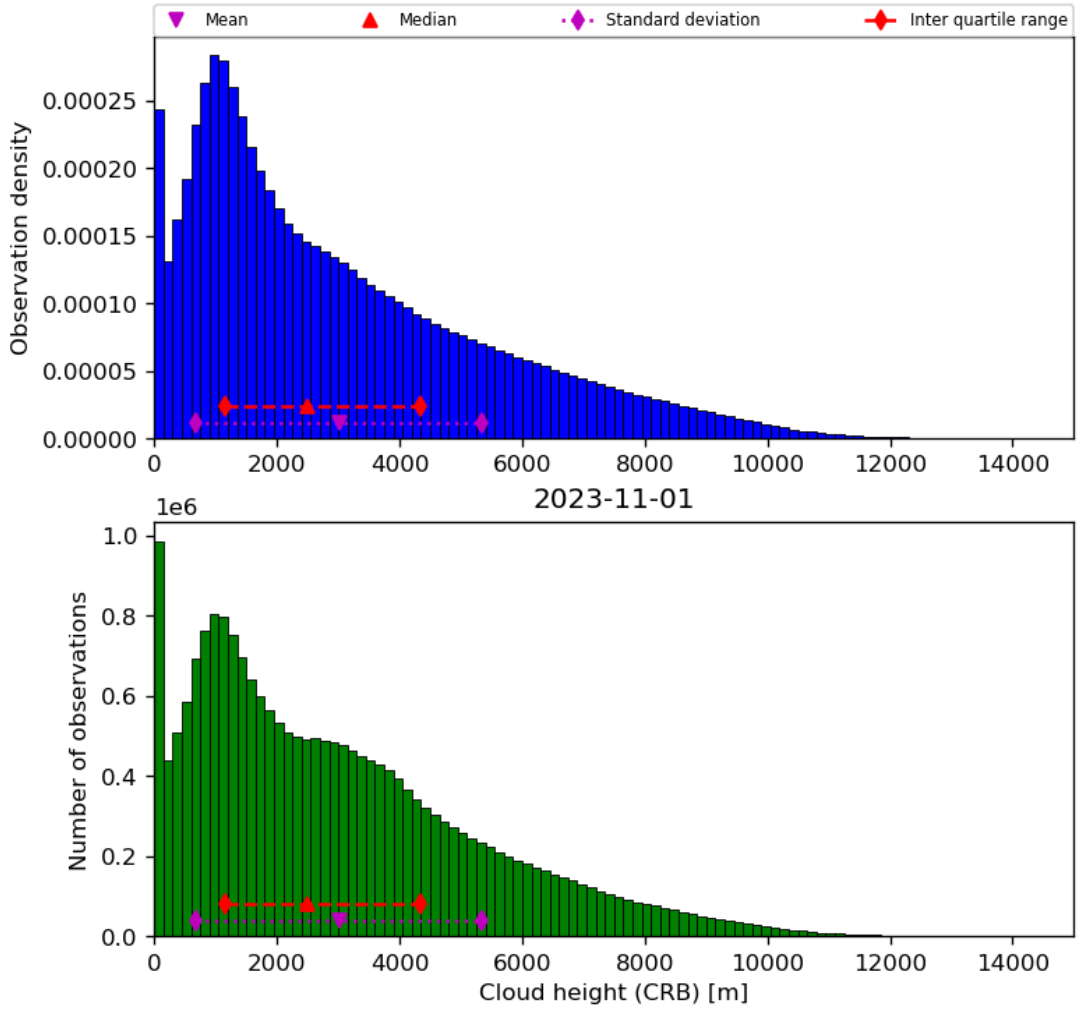


Figure 43: Histogram of “Cloud height (CRB)” for 2023-10-31 to 2023-11-02

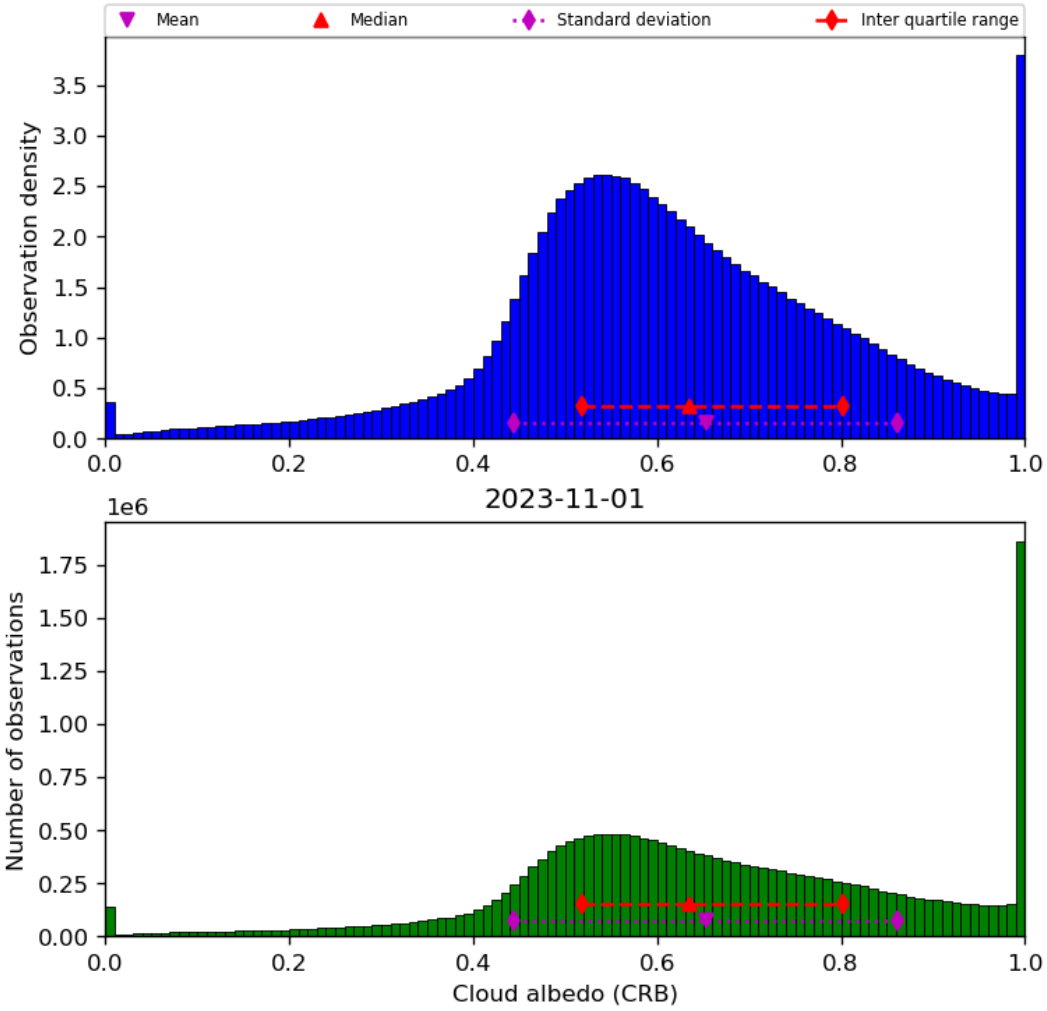


Figure 44: Histogram of “Cloud albedo (CRB)” for 2023-10-31 to 2023-11-02

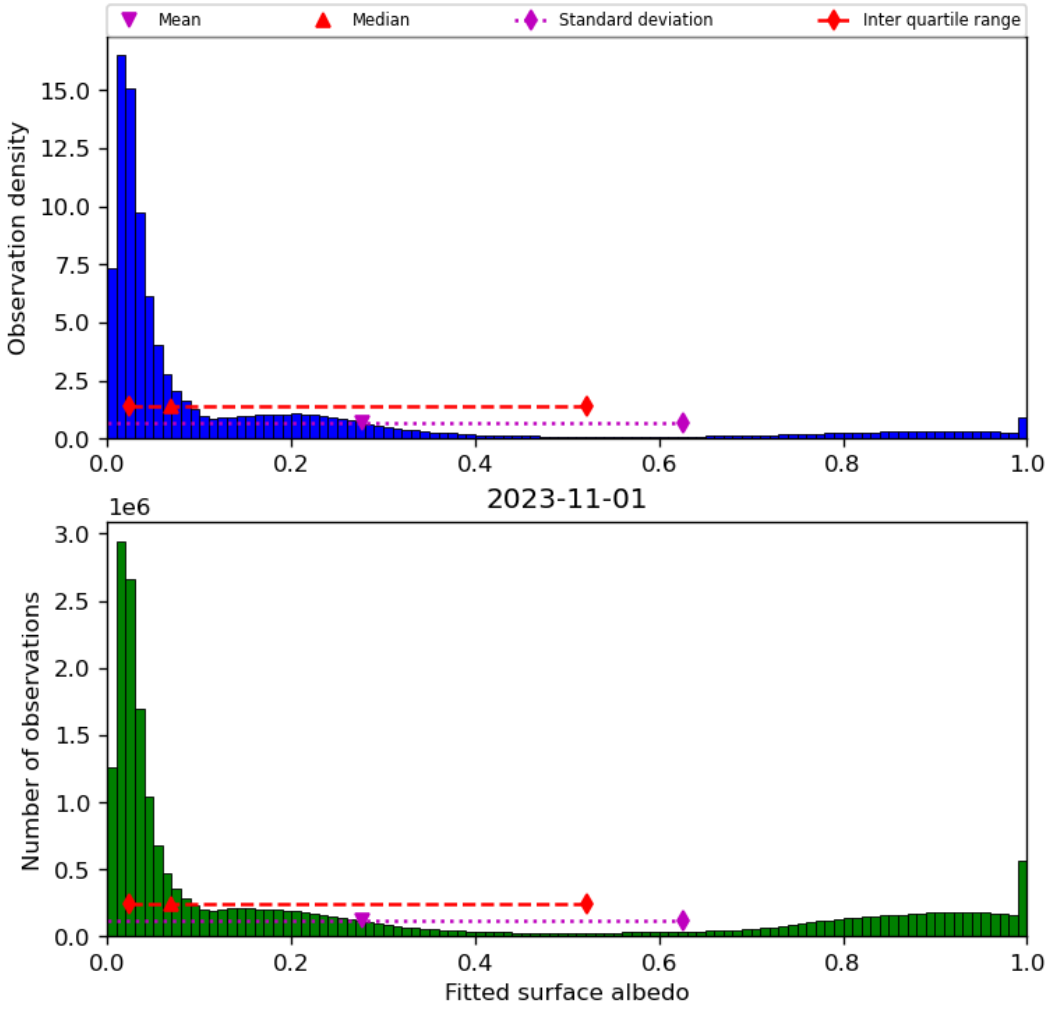


Figure 45: Histogram of “Fitted surface albedo” for 2023-10-31 to 2023-11-02

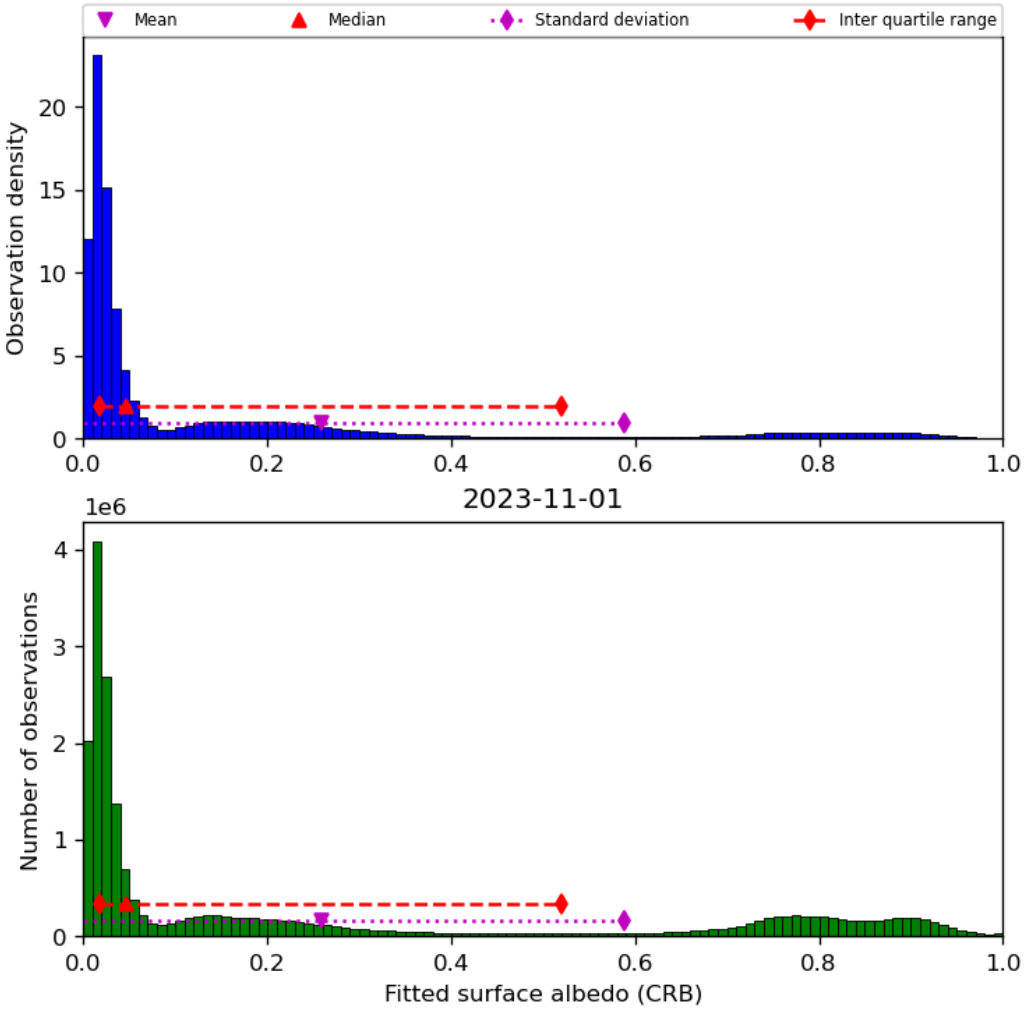


Figure 46: Histogram of “Fitted surface albedo (CRB)” for 2023-10-31 to 2023-11-02

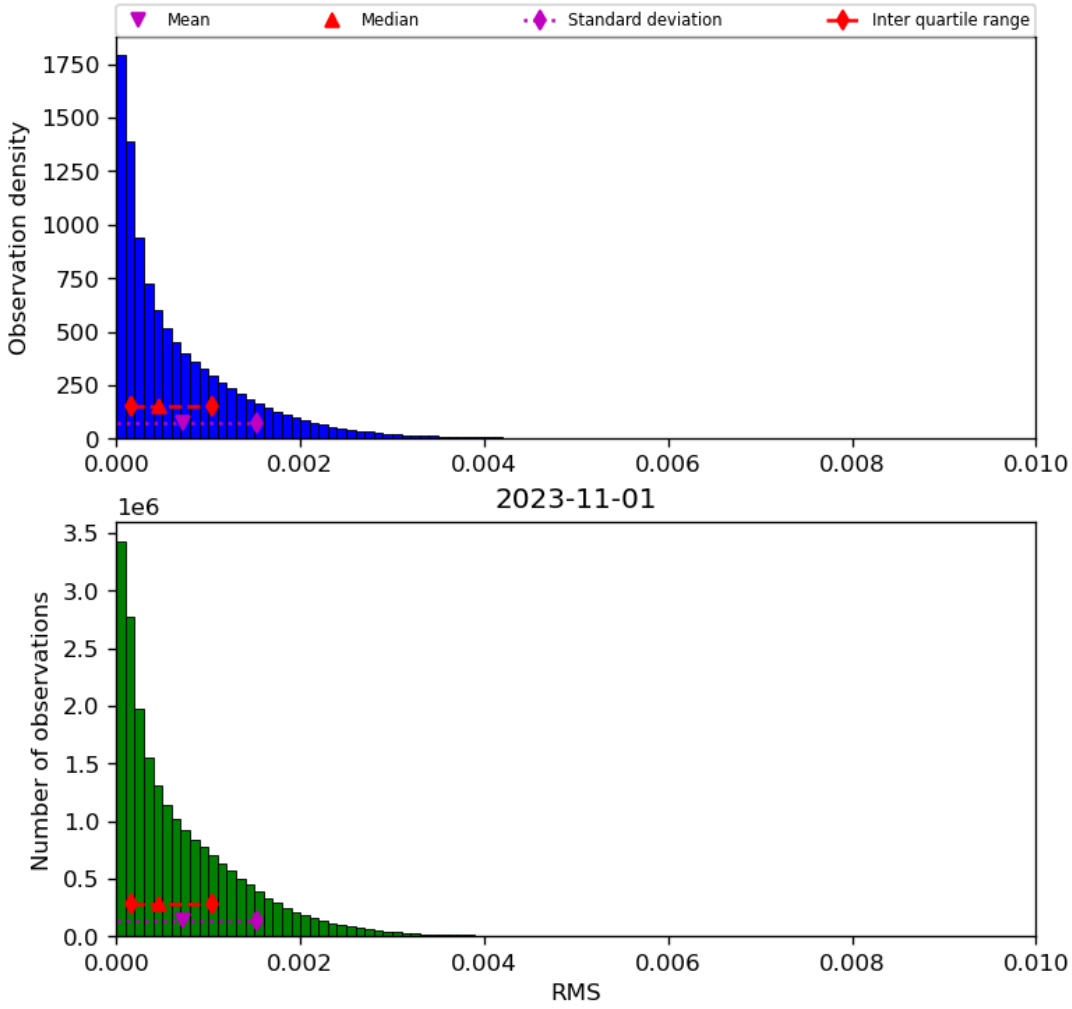


Figure 47: Histogram of “RMS” for 2023-10-31 to 2023-11-02

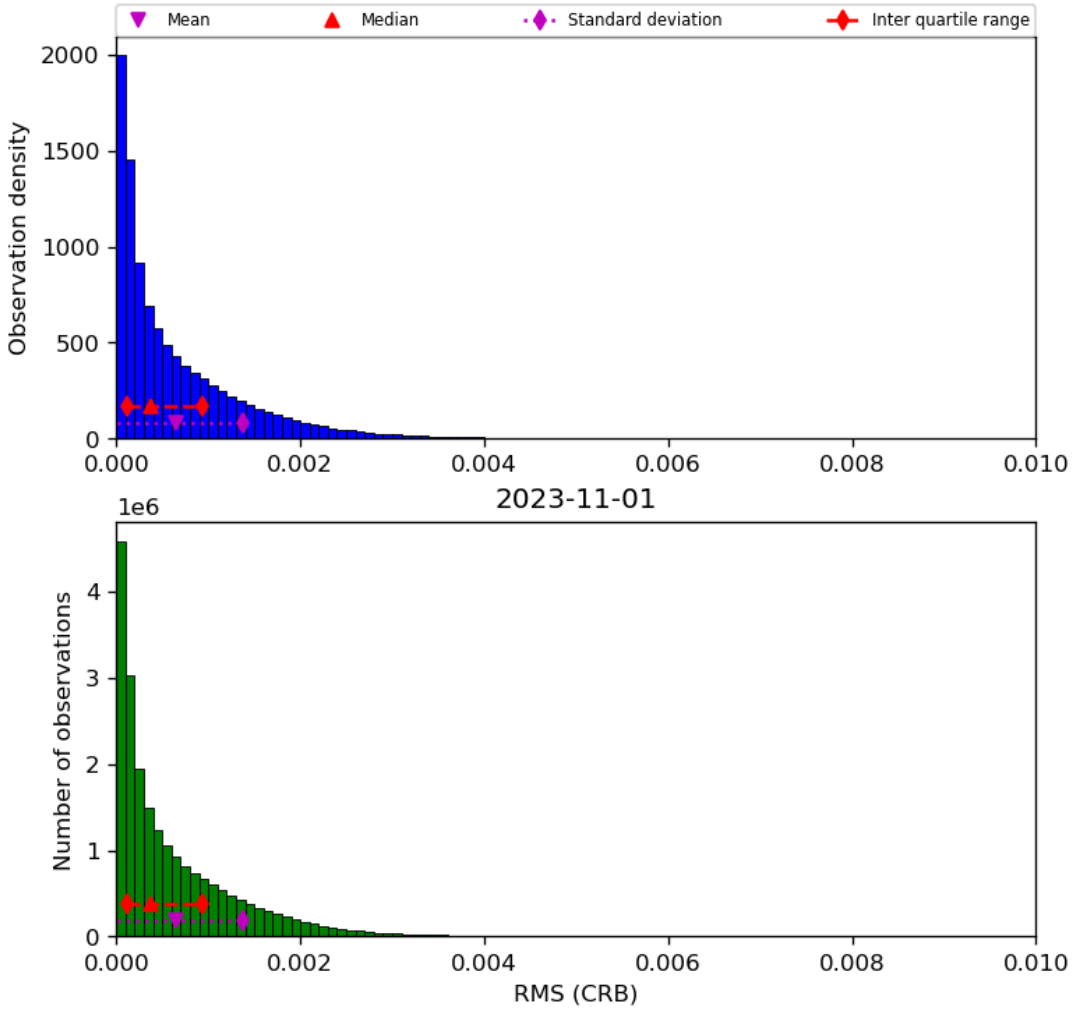


Figure 48: Histogram of “RMS (CRB)” for 2023-10-31 to 2023-11-02

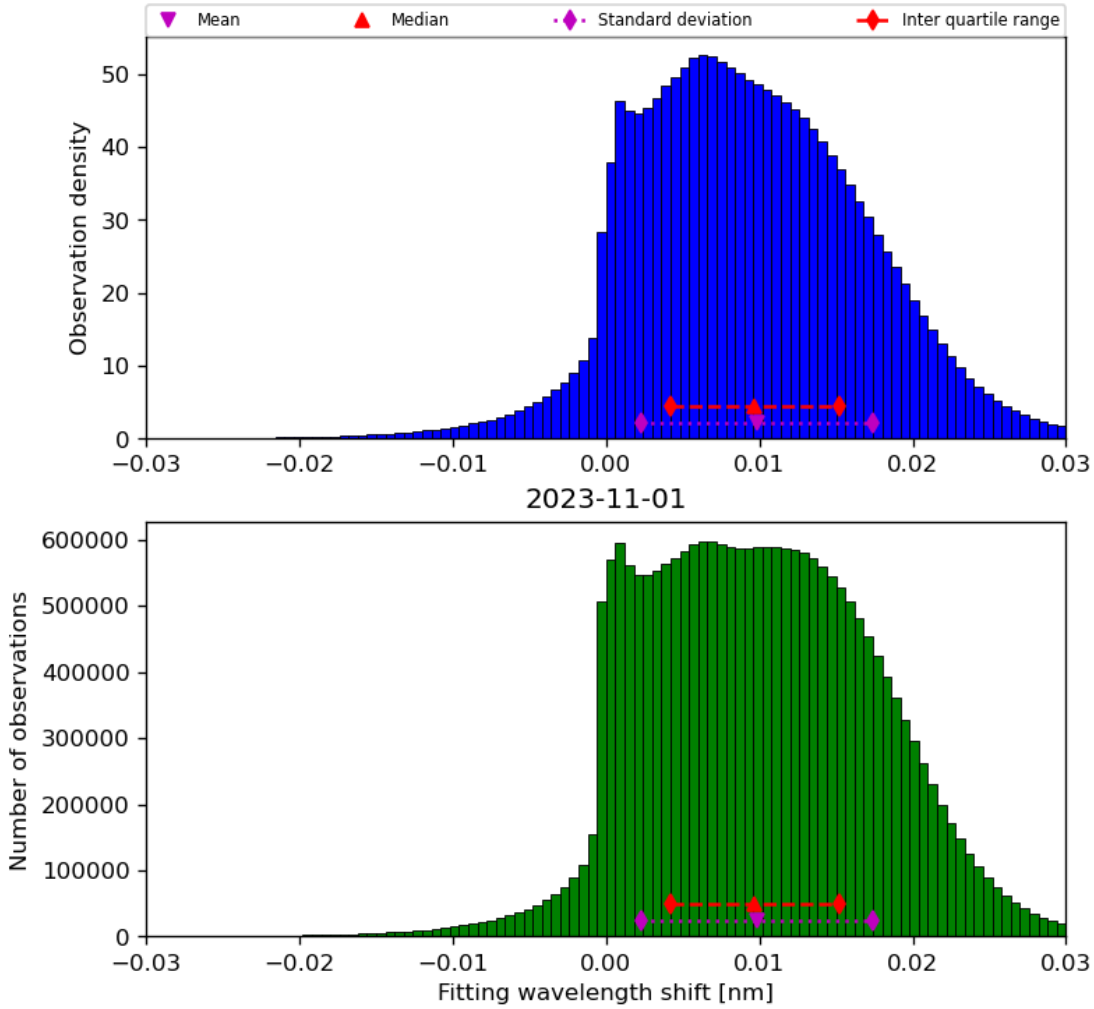


Figure 49: Histogram of “Fitting wavelength shift” for 2023-10-31 to 2023-11-02

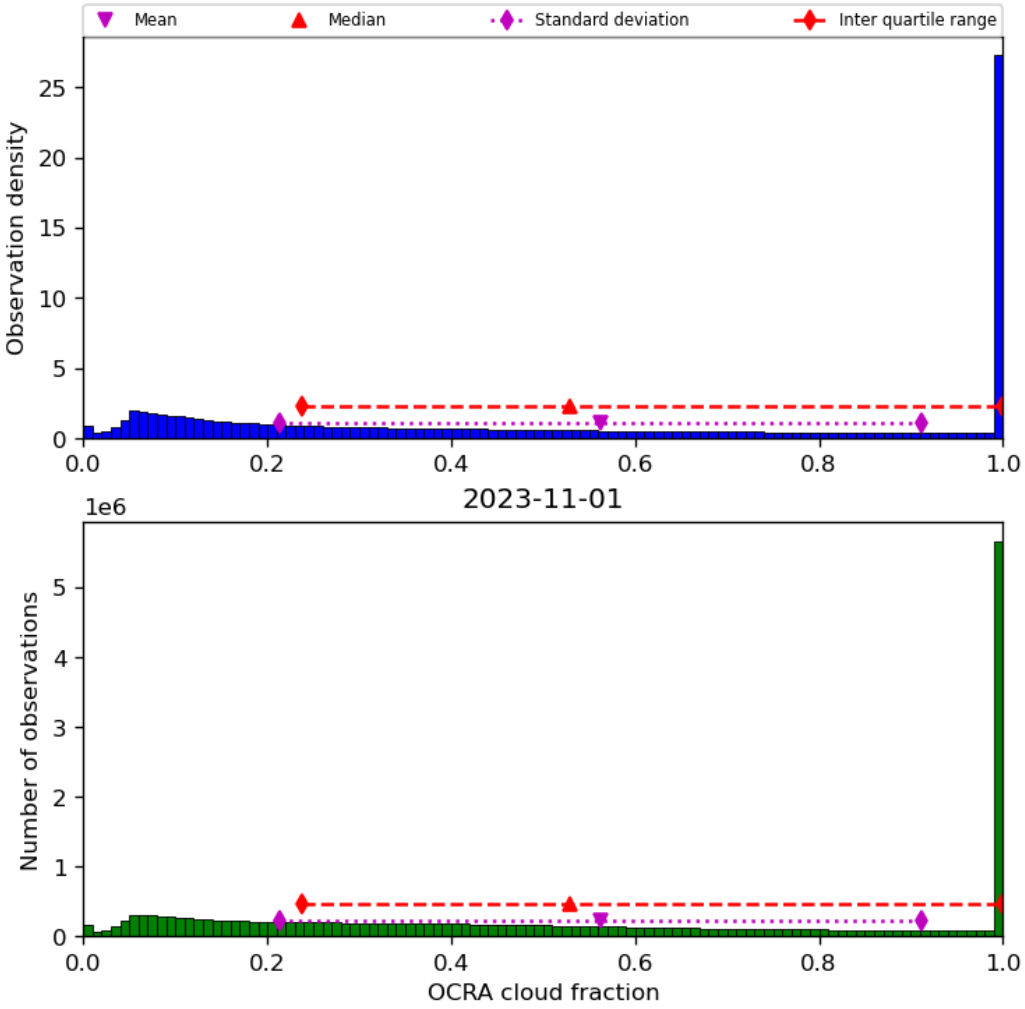


Figure 50: Histogram of “OCRA cloud fraction” for 2023-10-31 to 2023-11-02

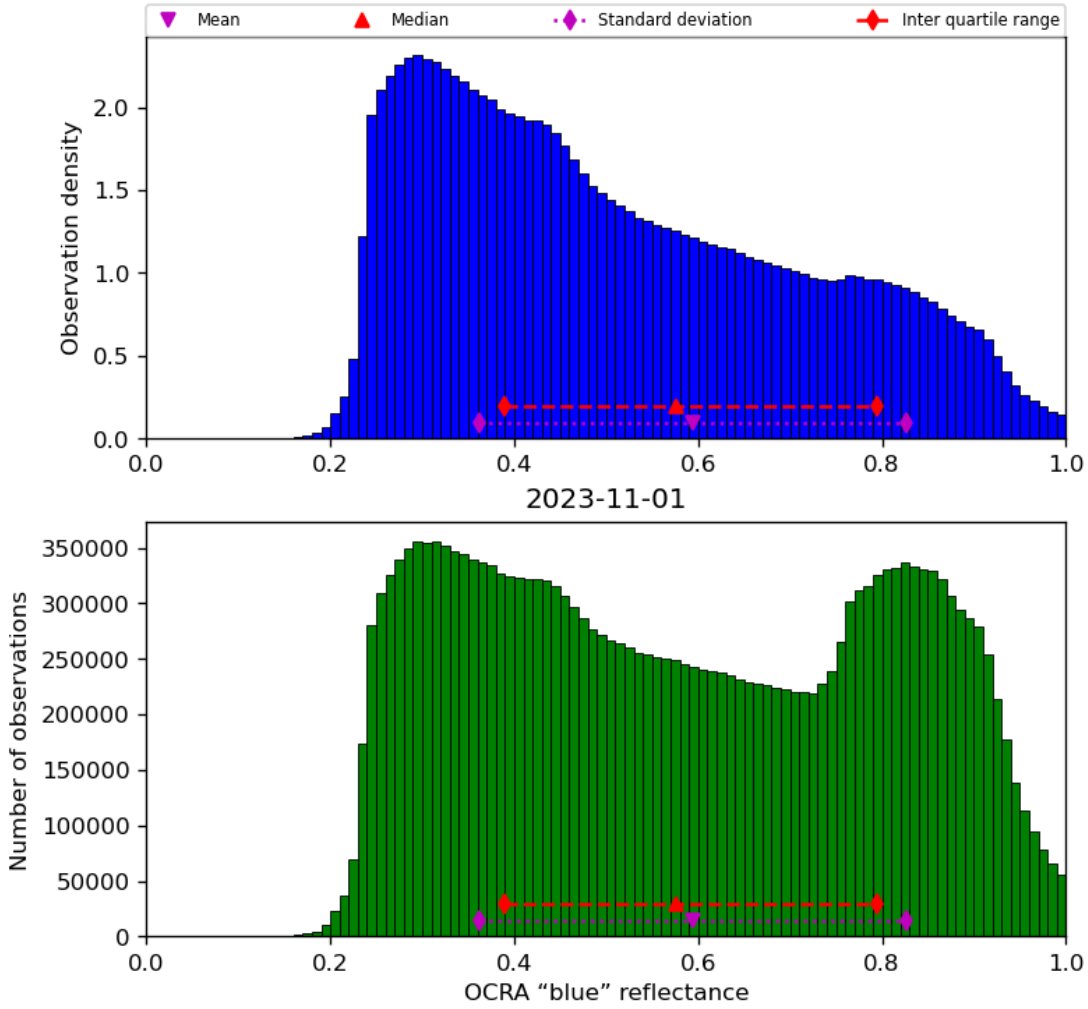


Figure 51: Histogram of “OCRA “blue” reflectance” for 2023-10-31 to 2023-11-02

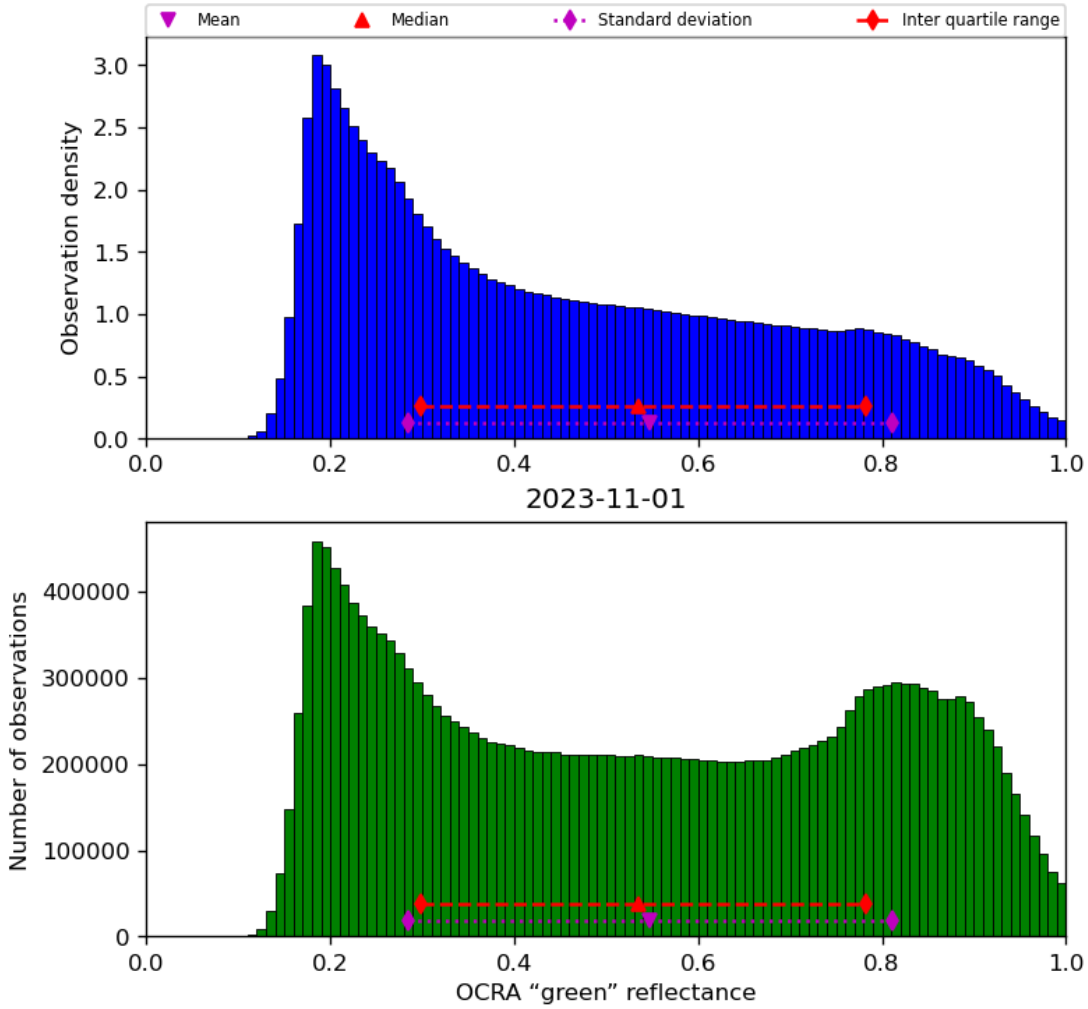


Figure 52: Histogram of "OCRA "green" reflectance" for 2023-10-31 to 2023-11-02

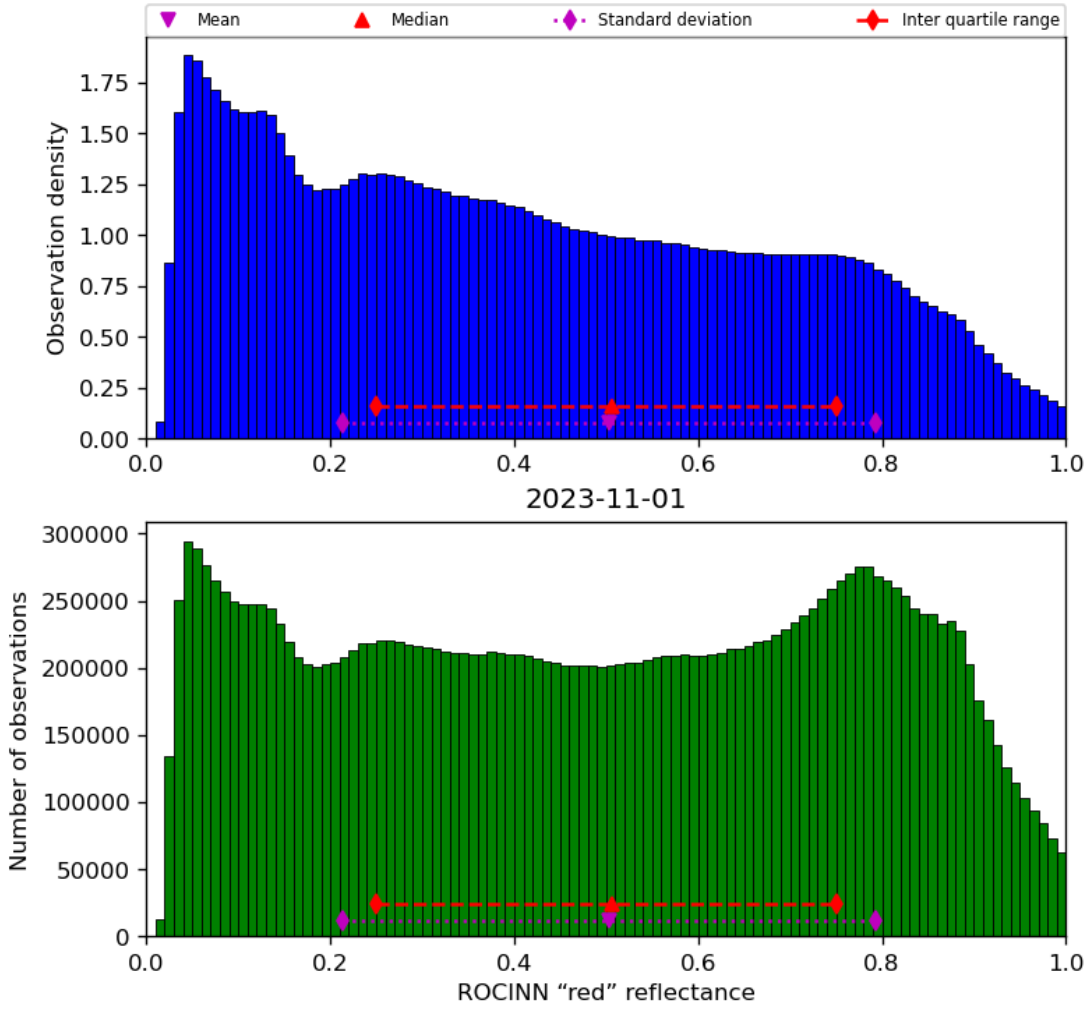


Figure 53: Histogram of “ROCINN “red” reflectance” for 2023-10-31 to 2023-11-02

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.

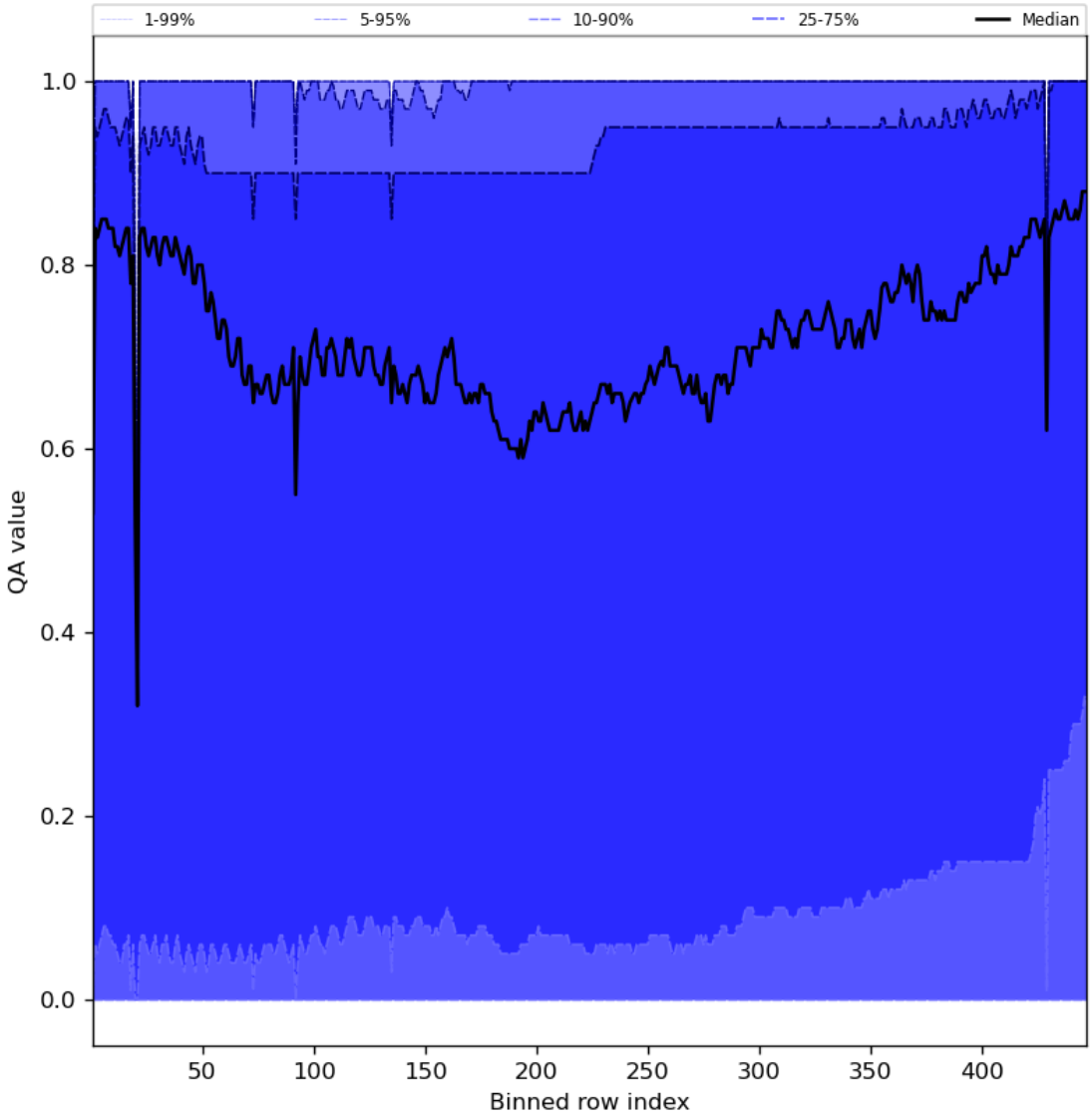


Figure 54: Along track statistics of “QA value” for 2023-10-31 to 2023-11-02

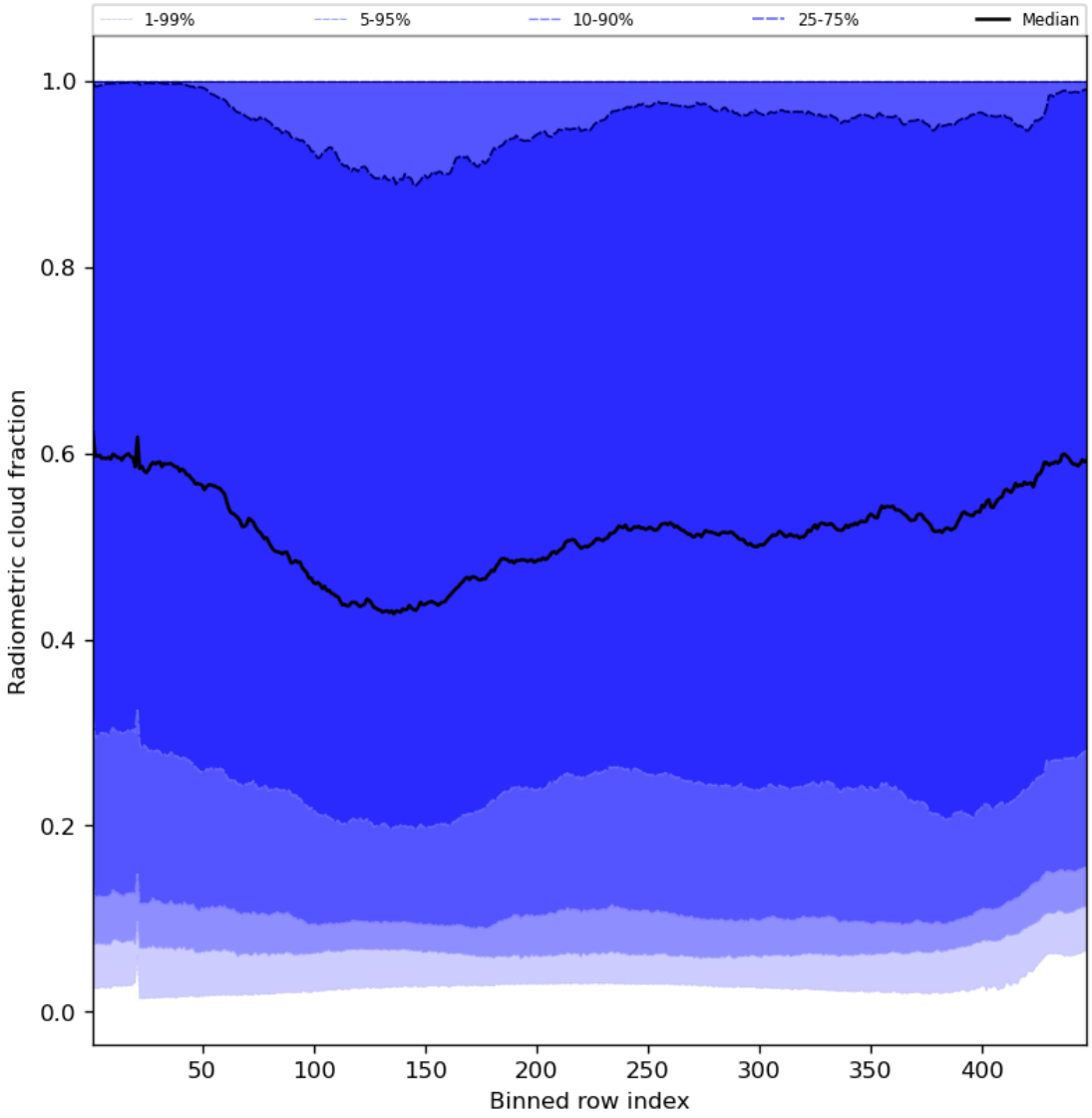


Figure 55: Along track statistics of “Radiometric cloud fraction” for 2023-10-31 to 2023-11-02

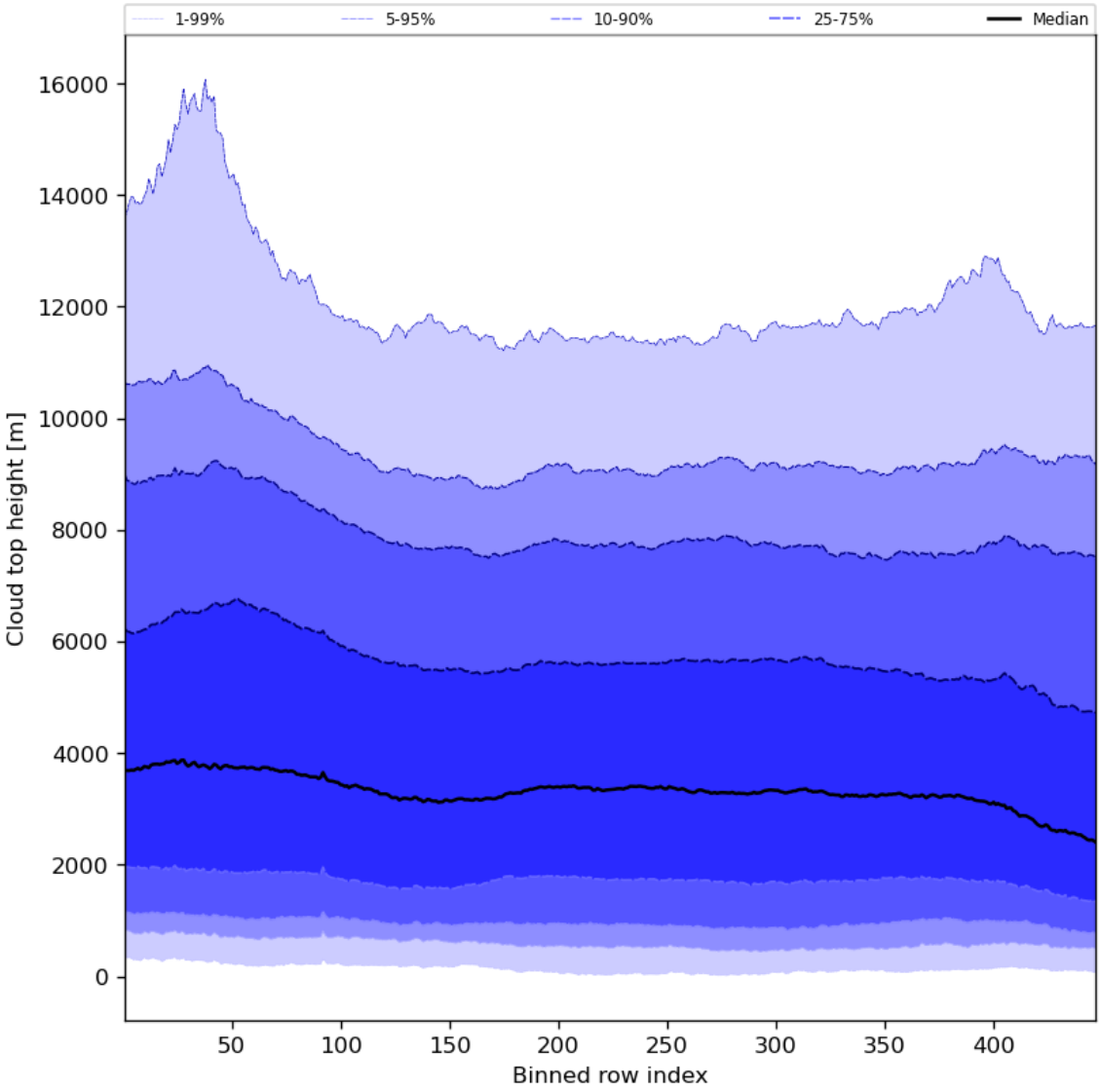


Figure 56: Along track statistics of “Cloud top height” for 2023-10-31 to 2023-11-02

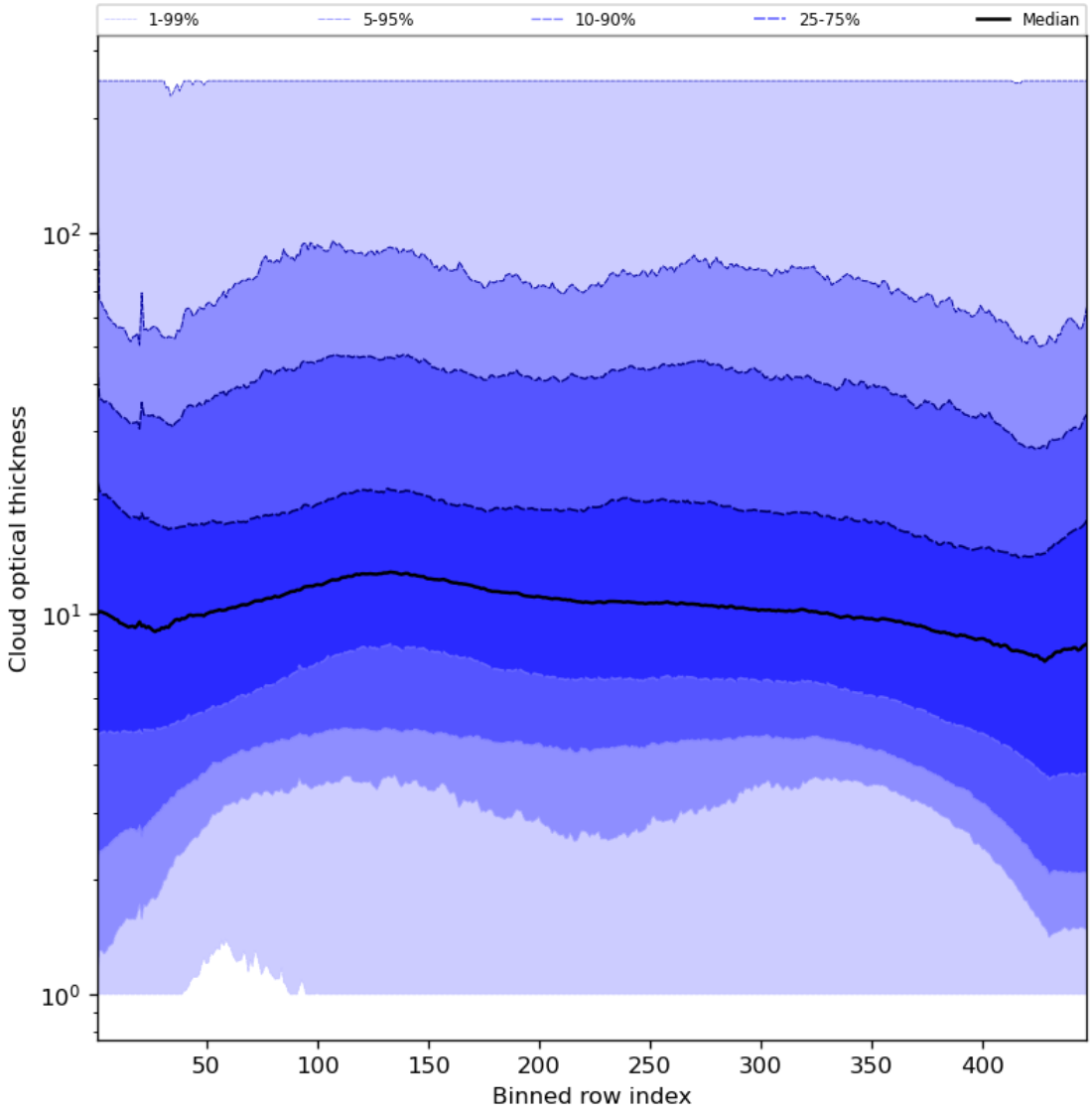


Figure 57: Along track statistics of “Cloud optical thickness” for 2023-10-31 to 2023-11-02

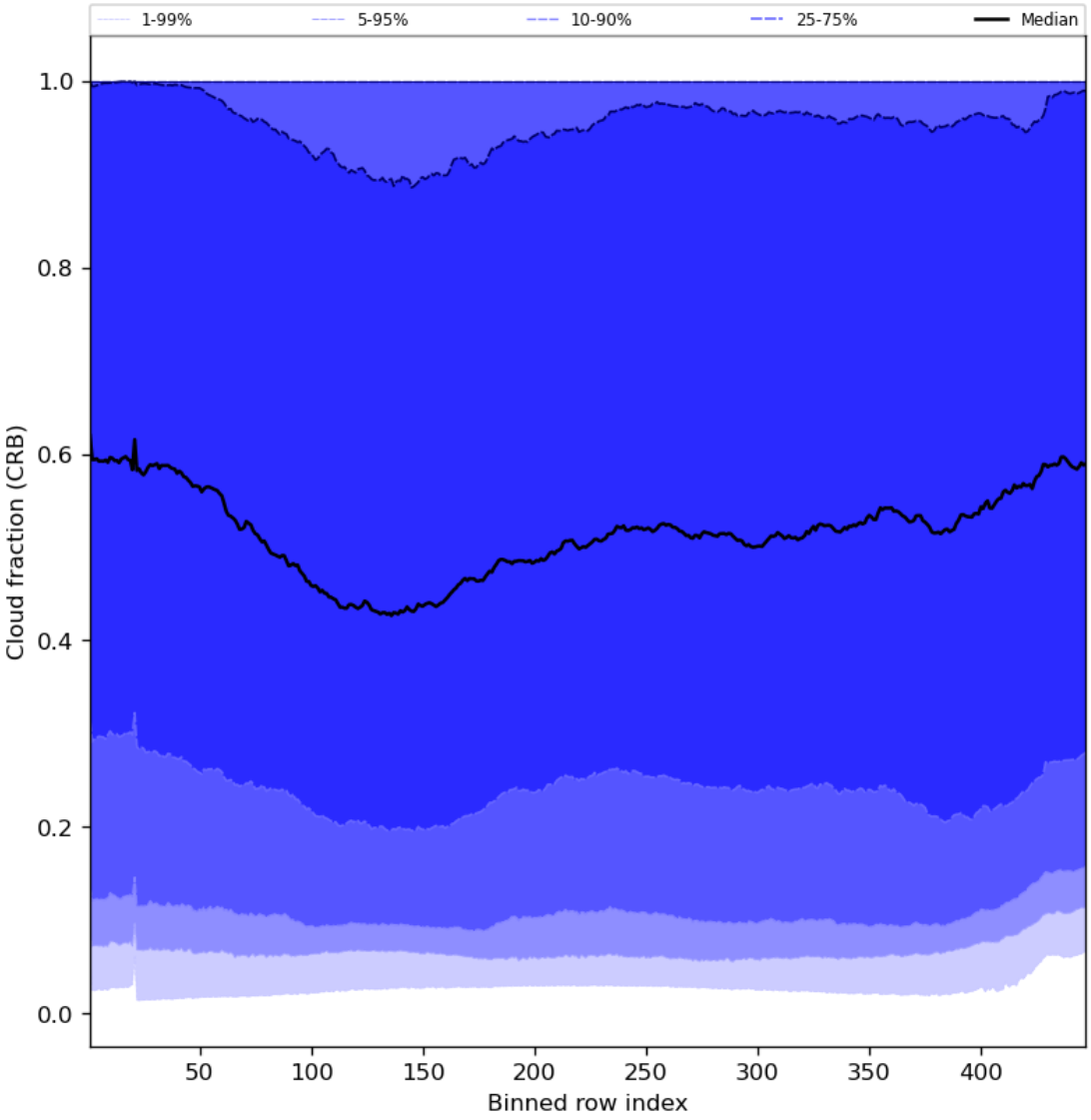


Figure 58: Along track statistics of “Cloud fraction (CRB)” for 2023-10-31 to 2023-11-02

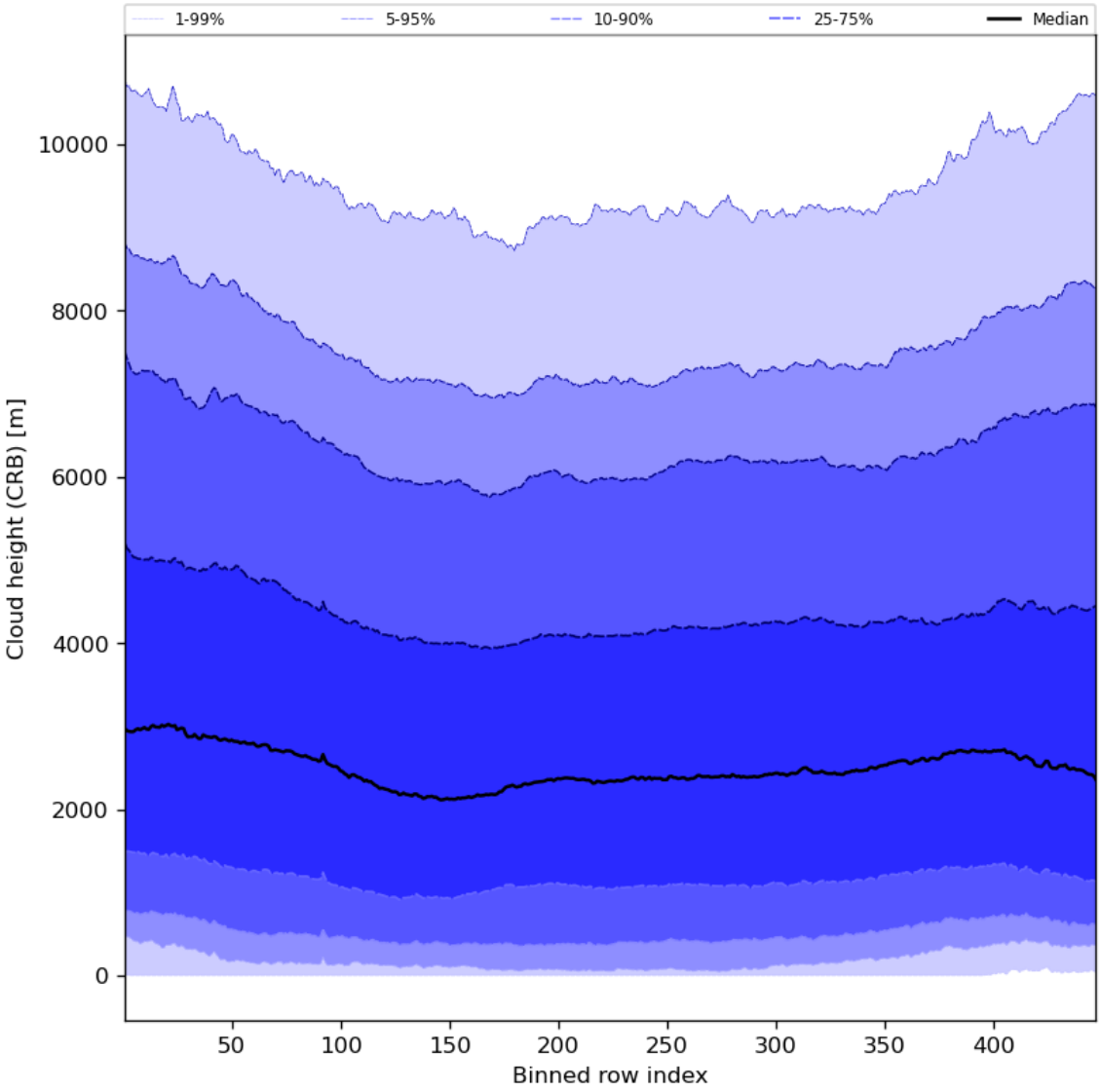


Figure 59: Along track statistics of “Cloud height (CRB)” for 2023-10-31 to 2023-11-02

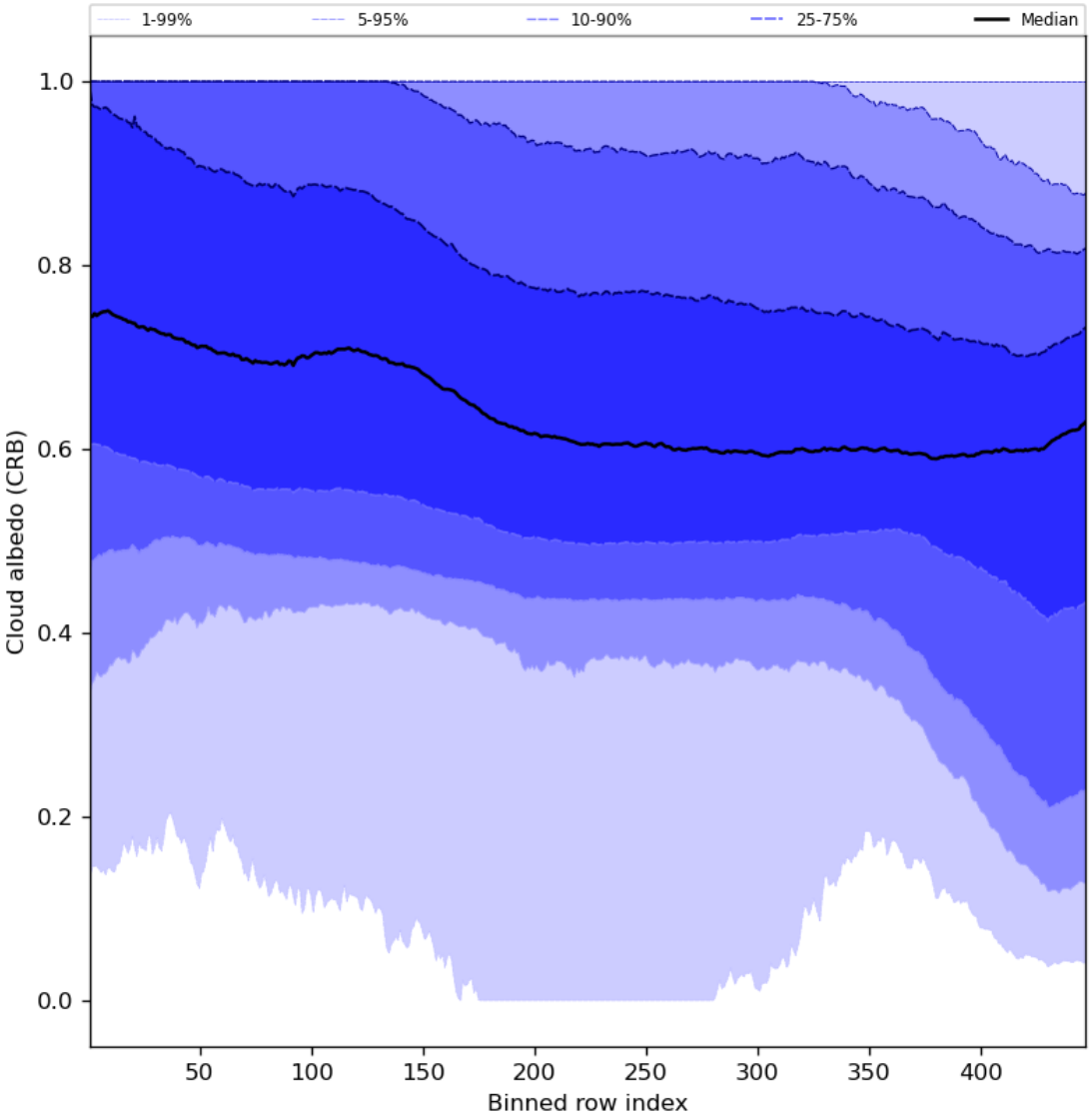


Figure 60: Along track statistics of “Cloud albedo (CRB)” for 2023-10-31 to 2023-11-02

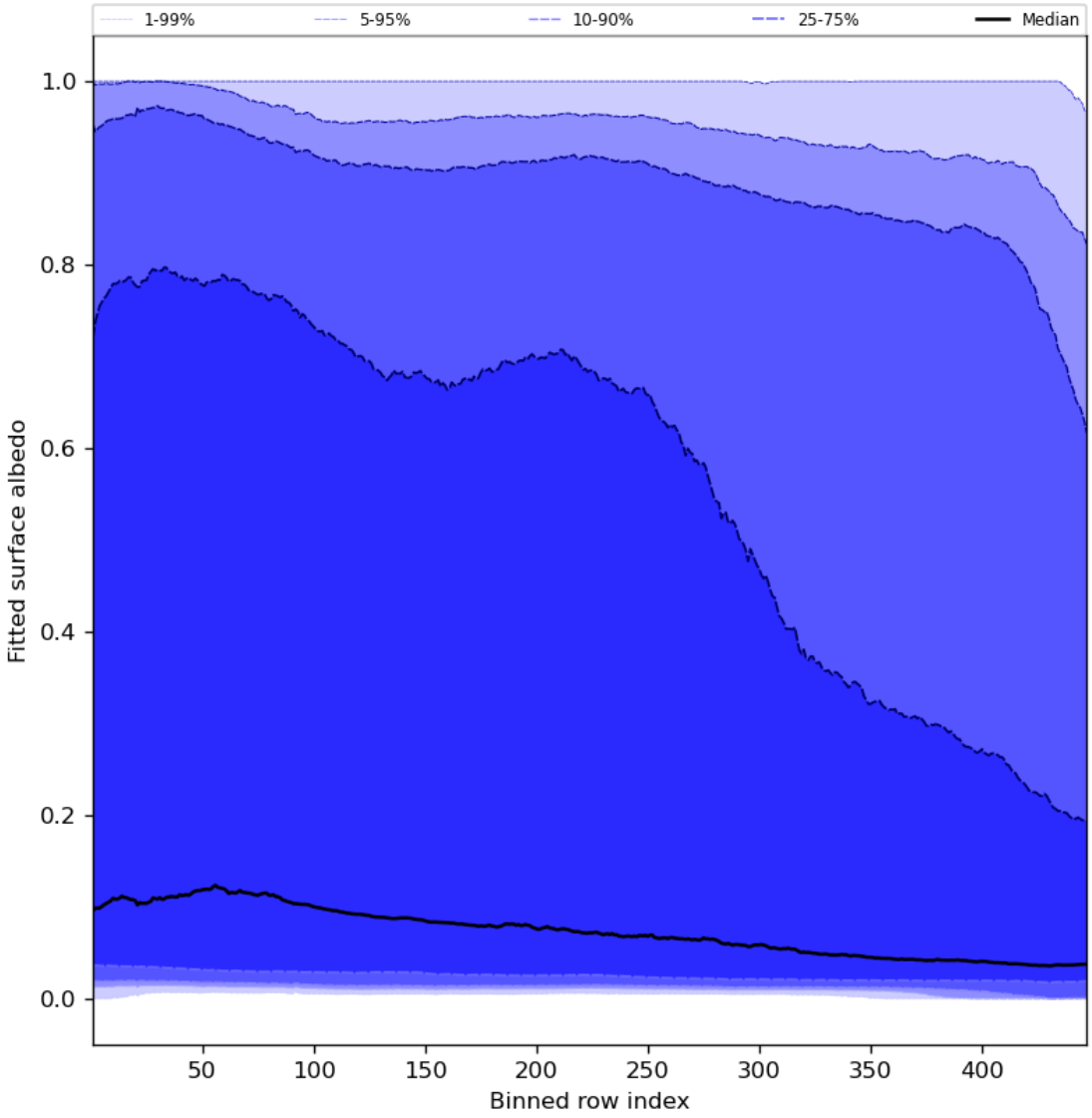


Figure 61: Along track statistics of “Fitted surface albedo” for 2023-10-31 to 2023-11-02

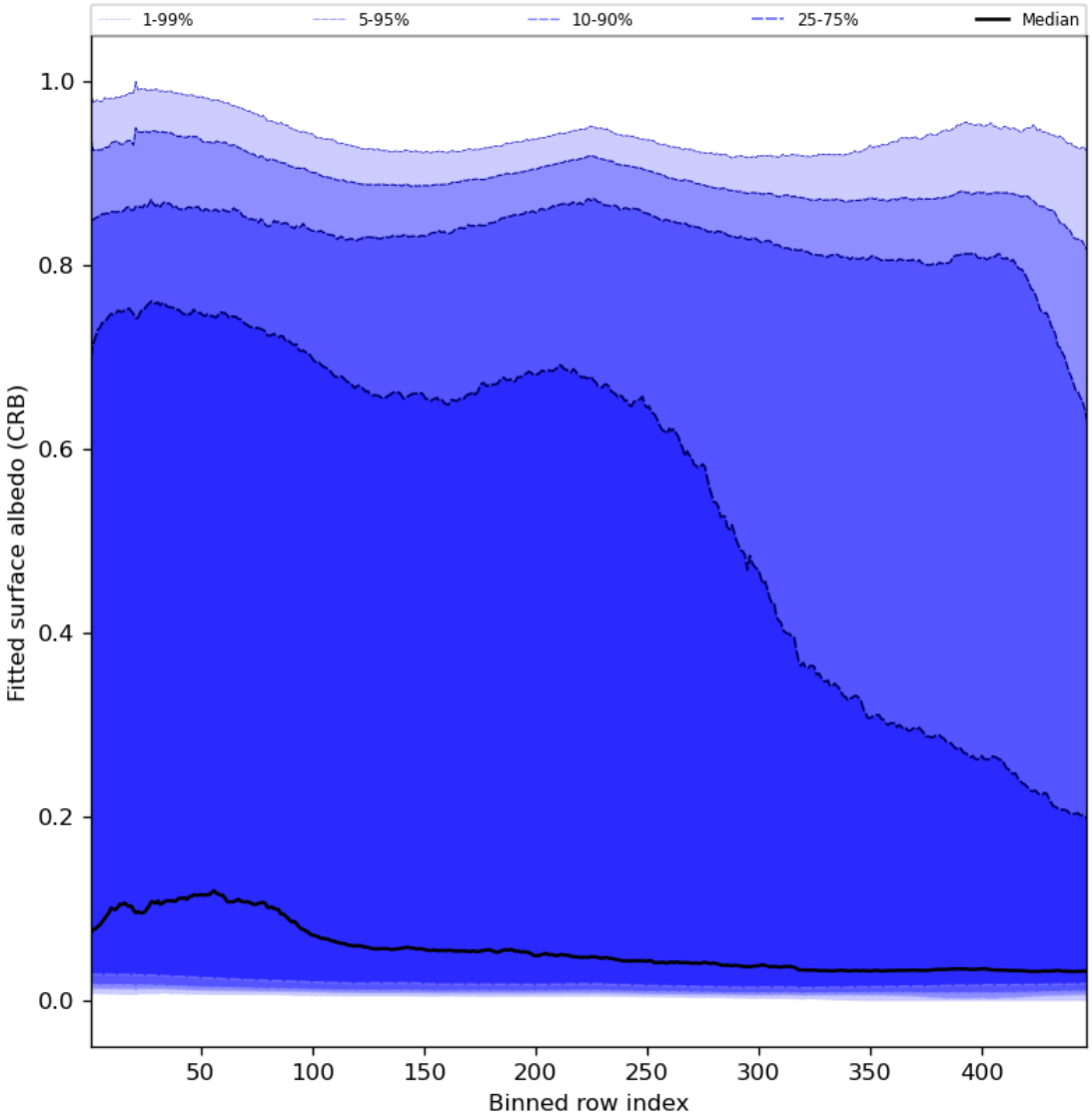


Figure 62: Along track statistics of “Fitted surface albedo (CRB)” for 2023-10-31 to 2023-11-02

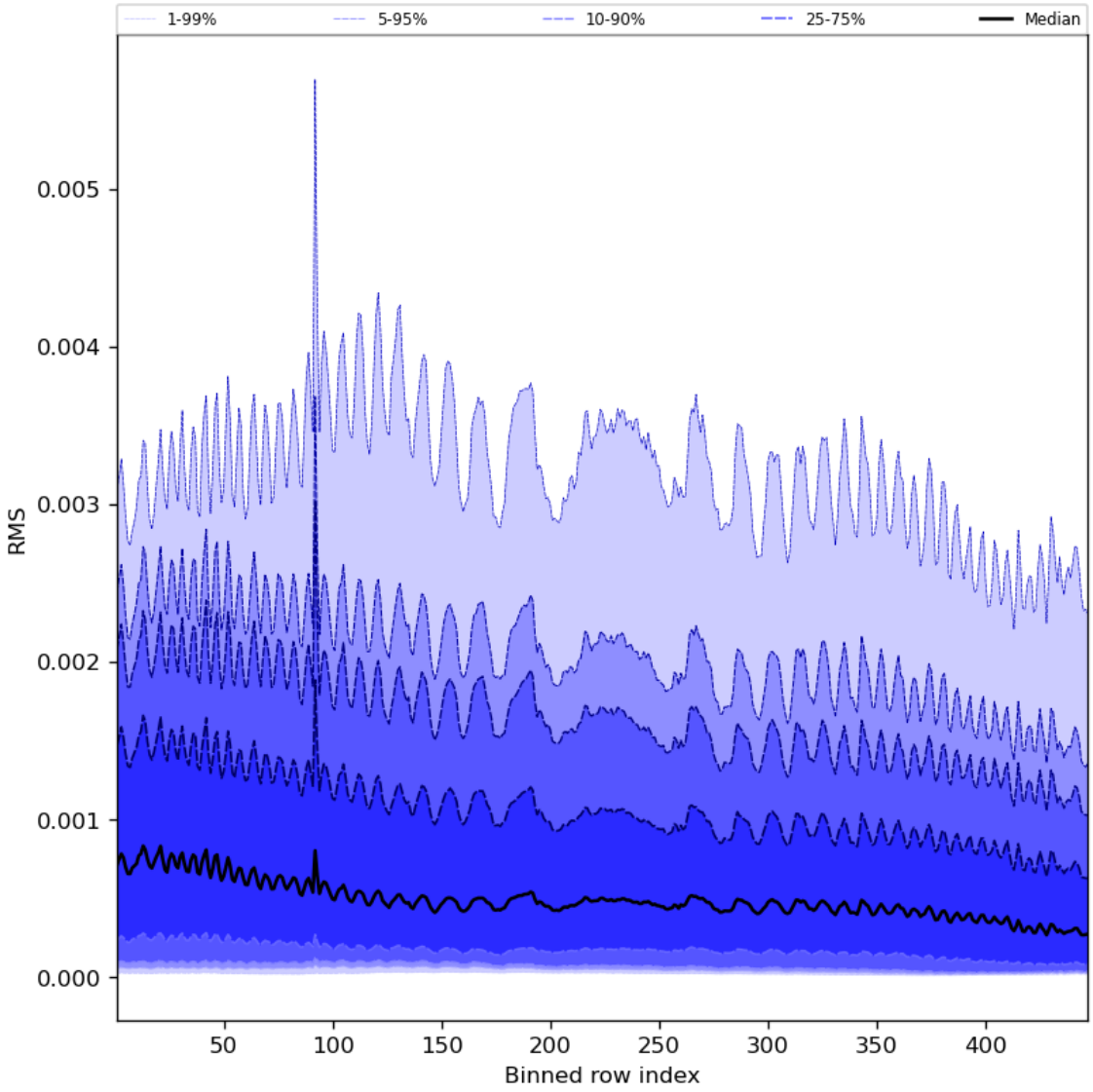


Figure 63: Along track statistics of “RMS” for 2023-10-31 to 2023-11-02

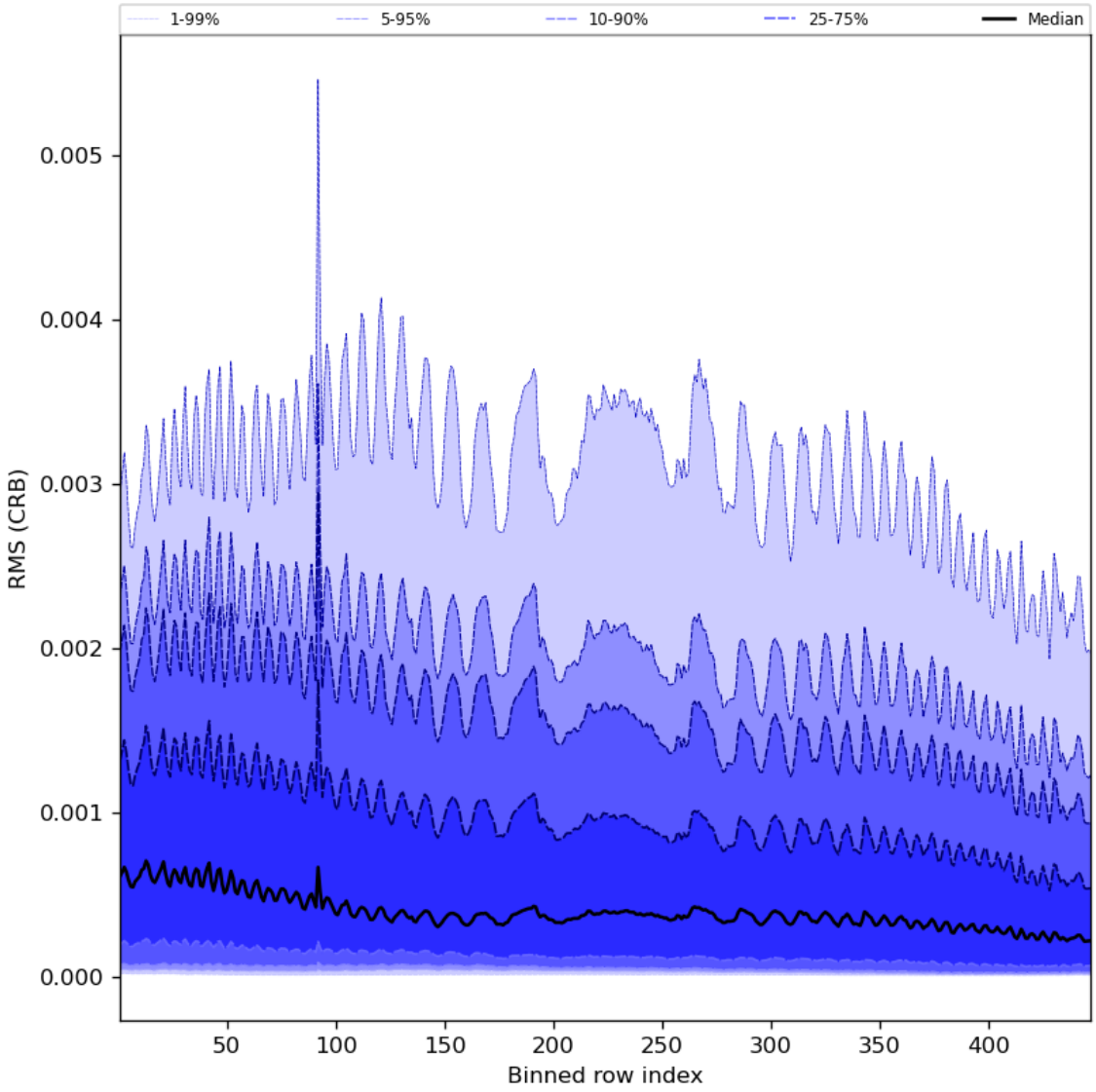


Figure 64: Along track statistics of “RMS (CRB)” for 2023-10-31 to 2023-11-02

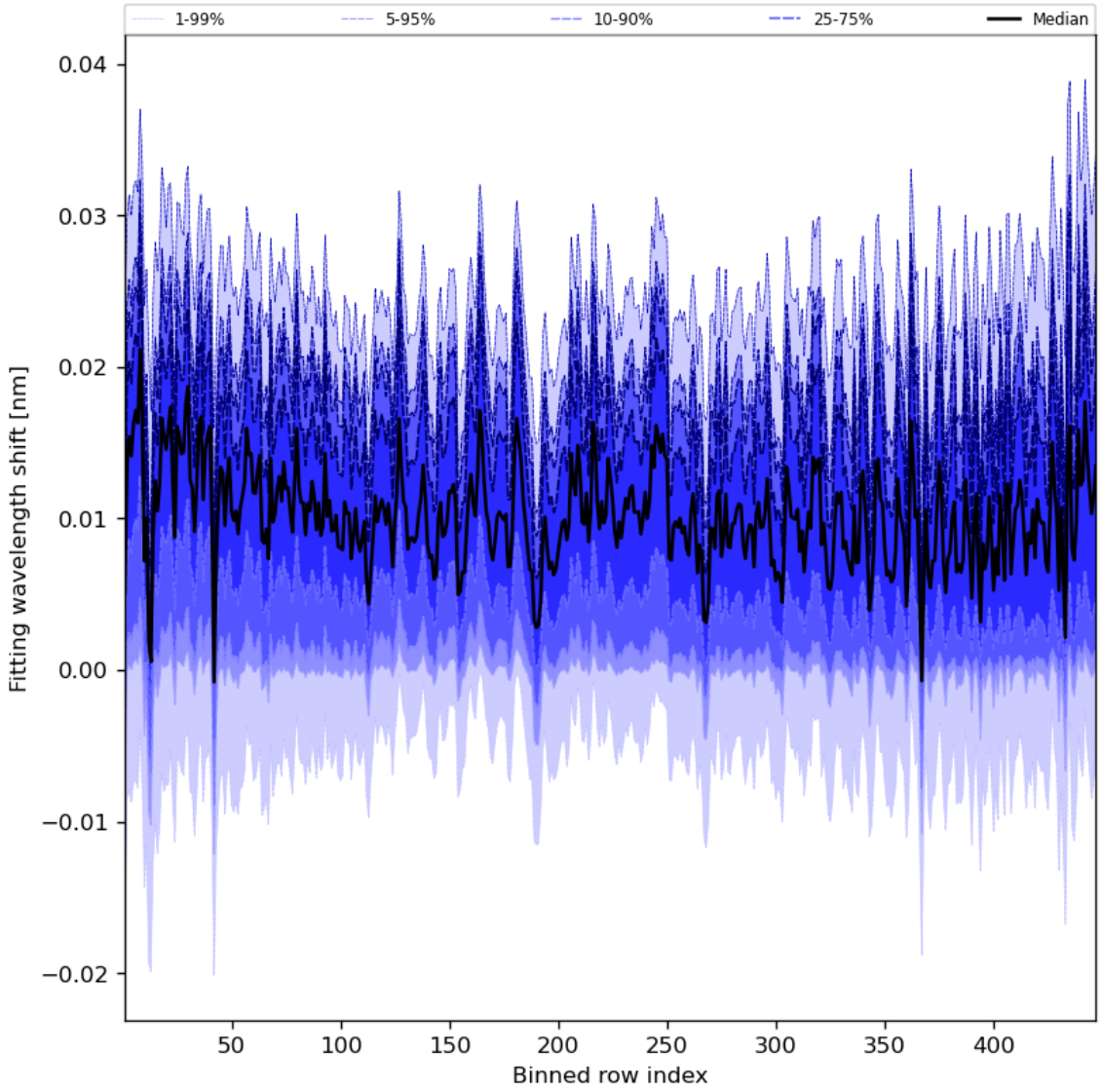


Figure 65: Along track statistics of “Fitting wavelength shift” for 2023-10-31 to 2023-11-02

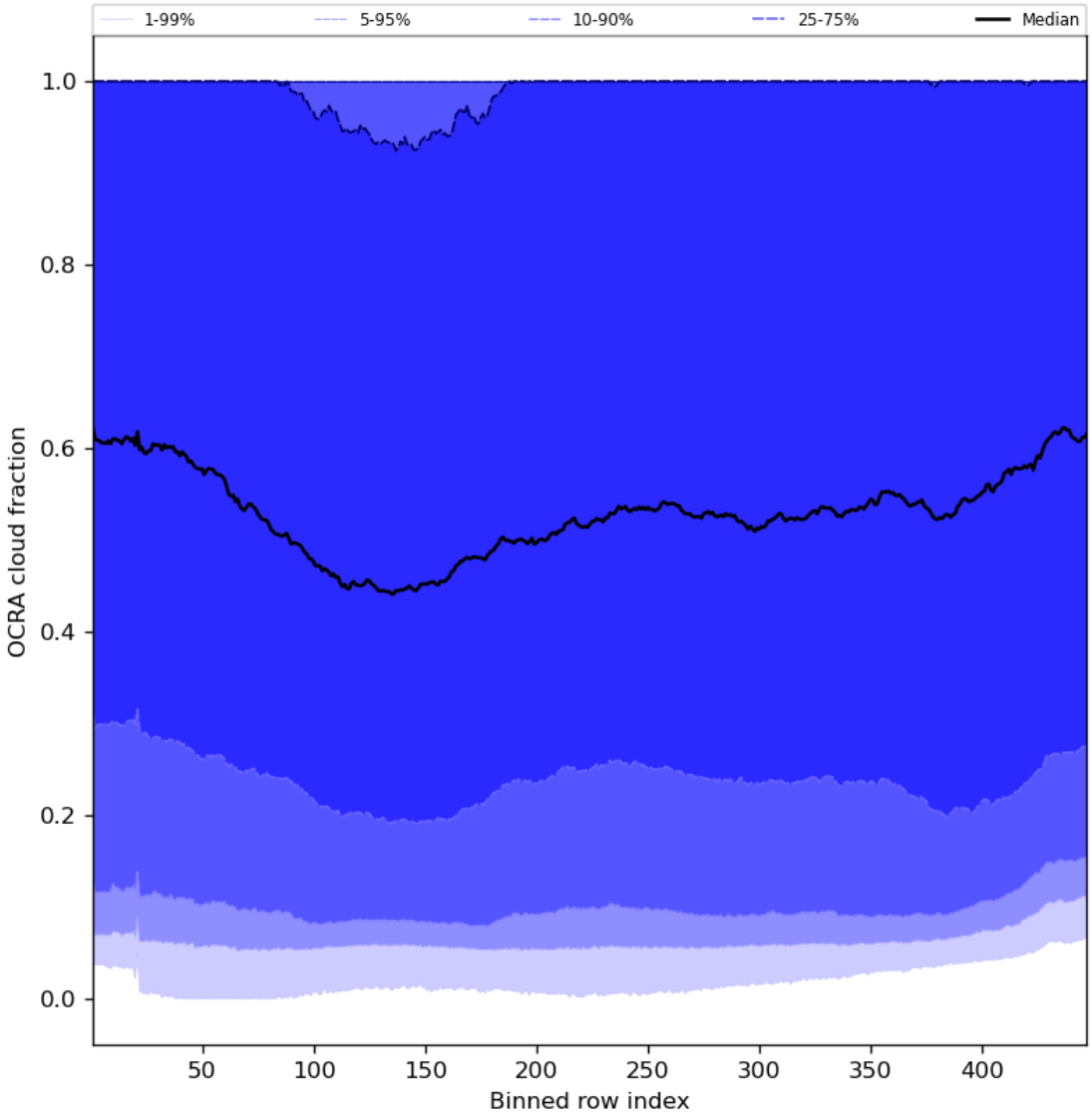


Figure 66: Along track statistics of “OCRA cloud fraction” for 2023-10-31 to 2023-11-02

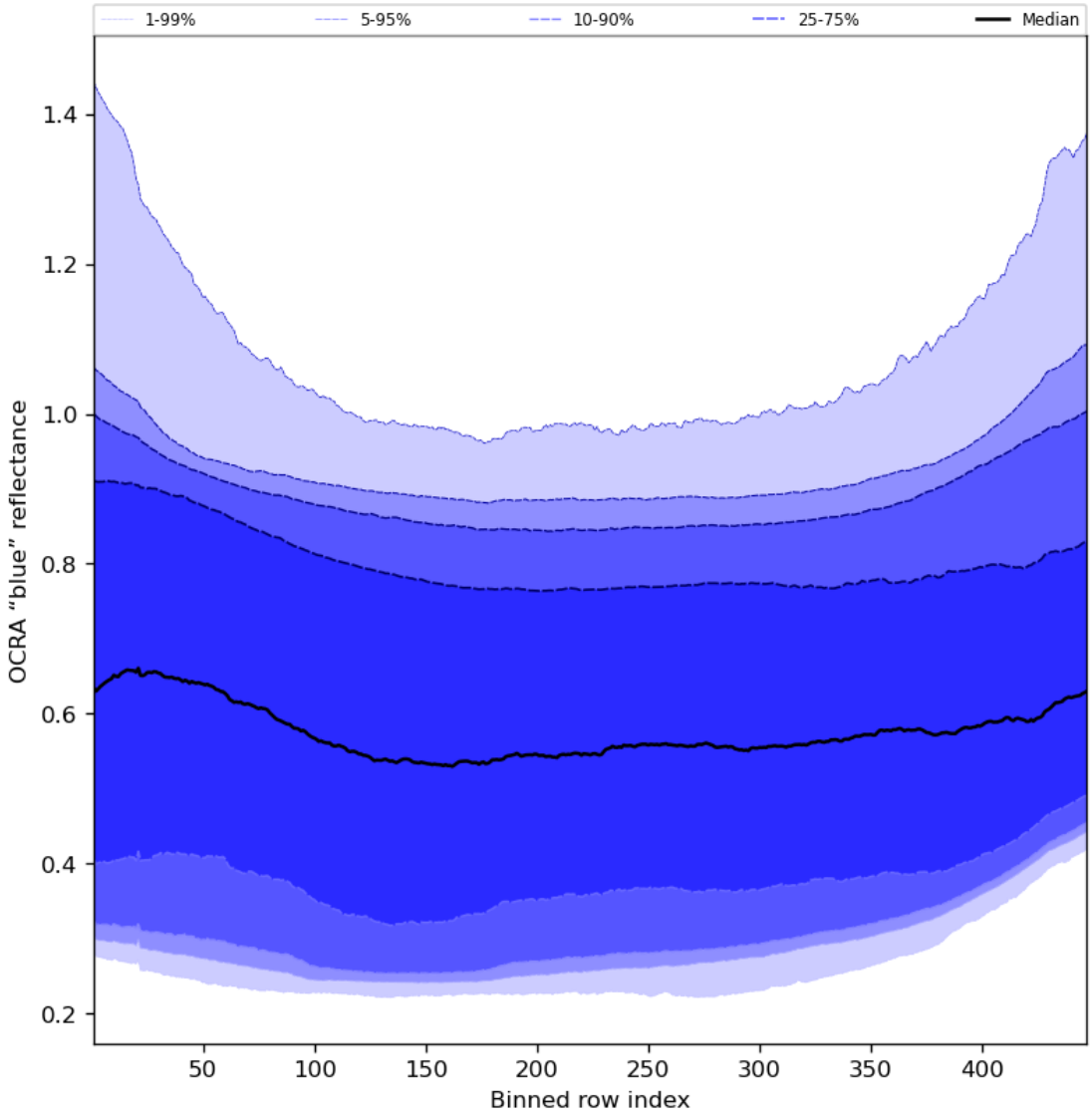


Figure 67: Along track statistics of "OCRA "blue" reflectance" for 2023-10-31 to 2023-11-02

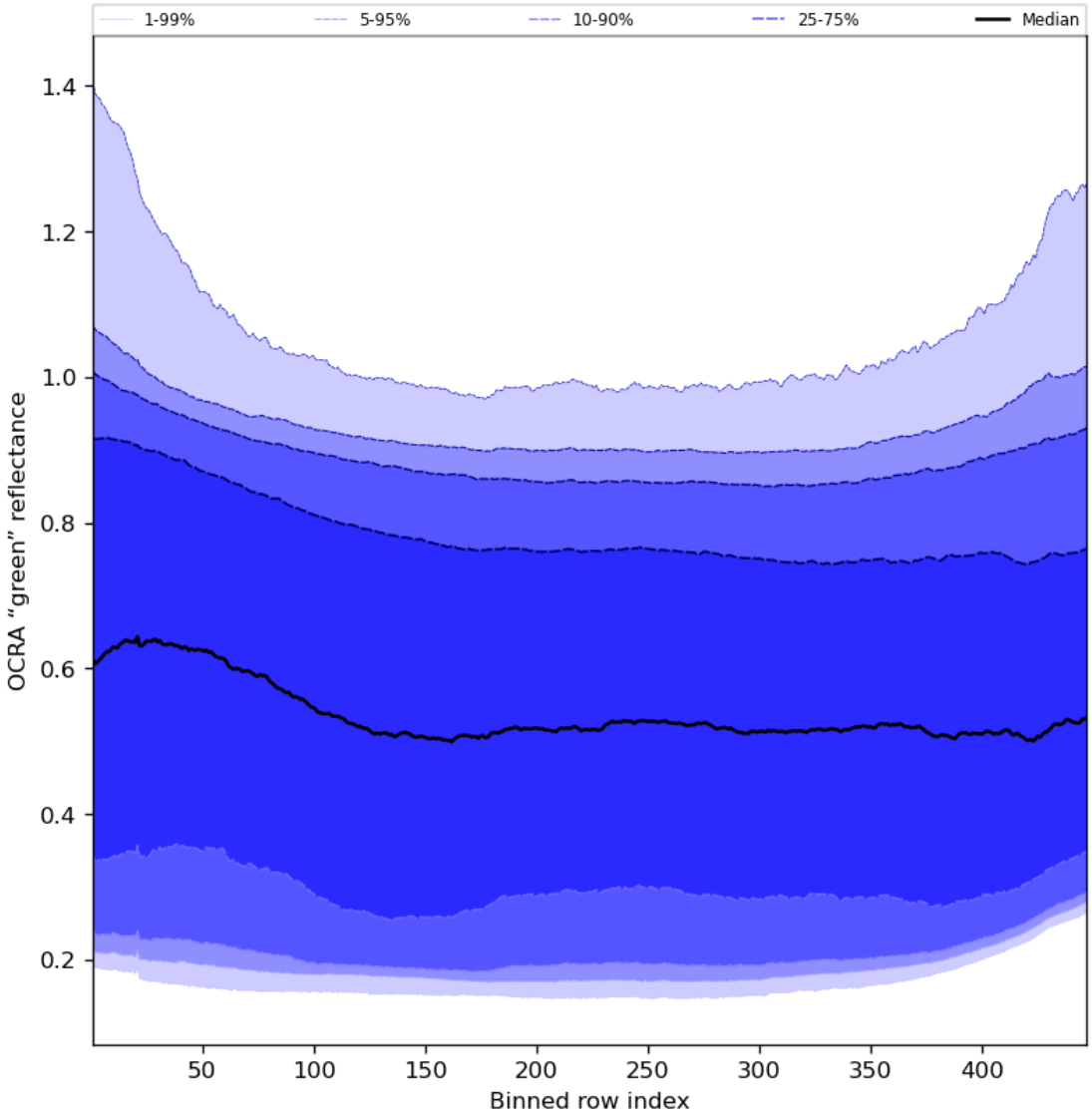


Figure 68: Along track statistics of "OCRA "green" reflectance" for 2023-10-31 to 2023-11-02

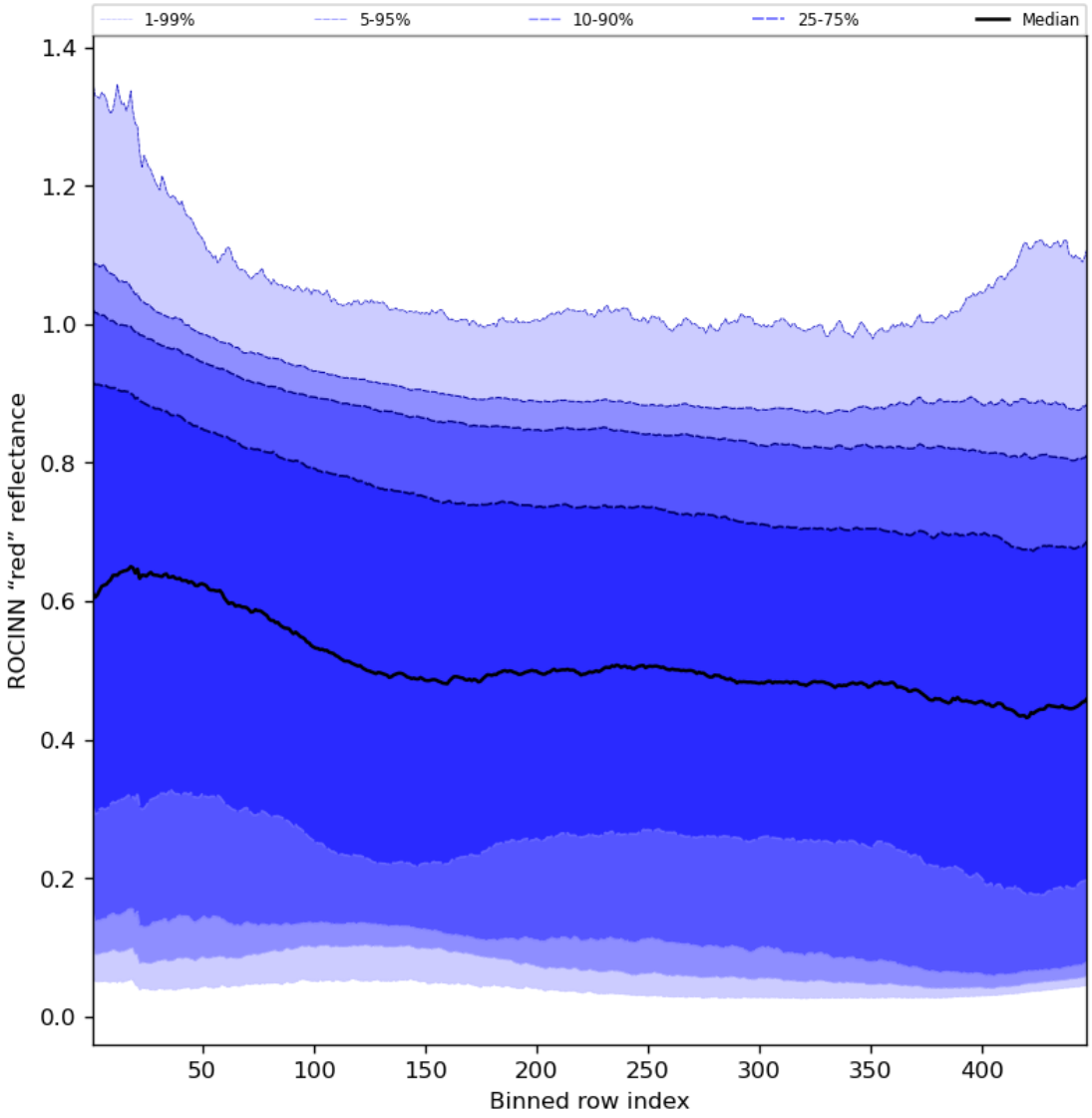


Figure 69: Along track statistics of "ROCINN "red" reflectance" for 2023-10-31 to 2023-11-02

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.

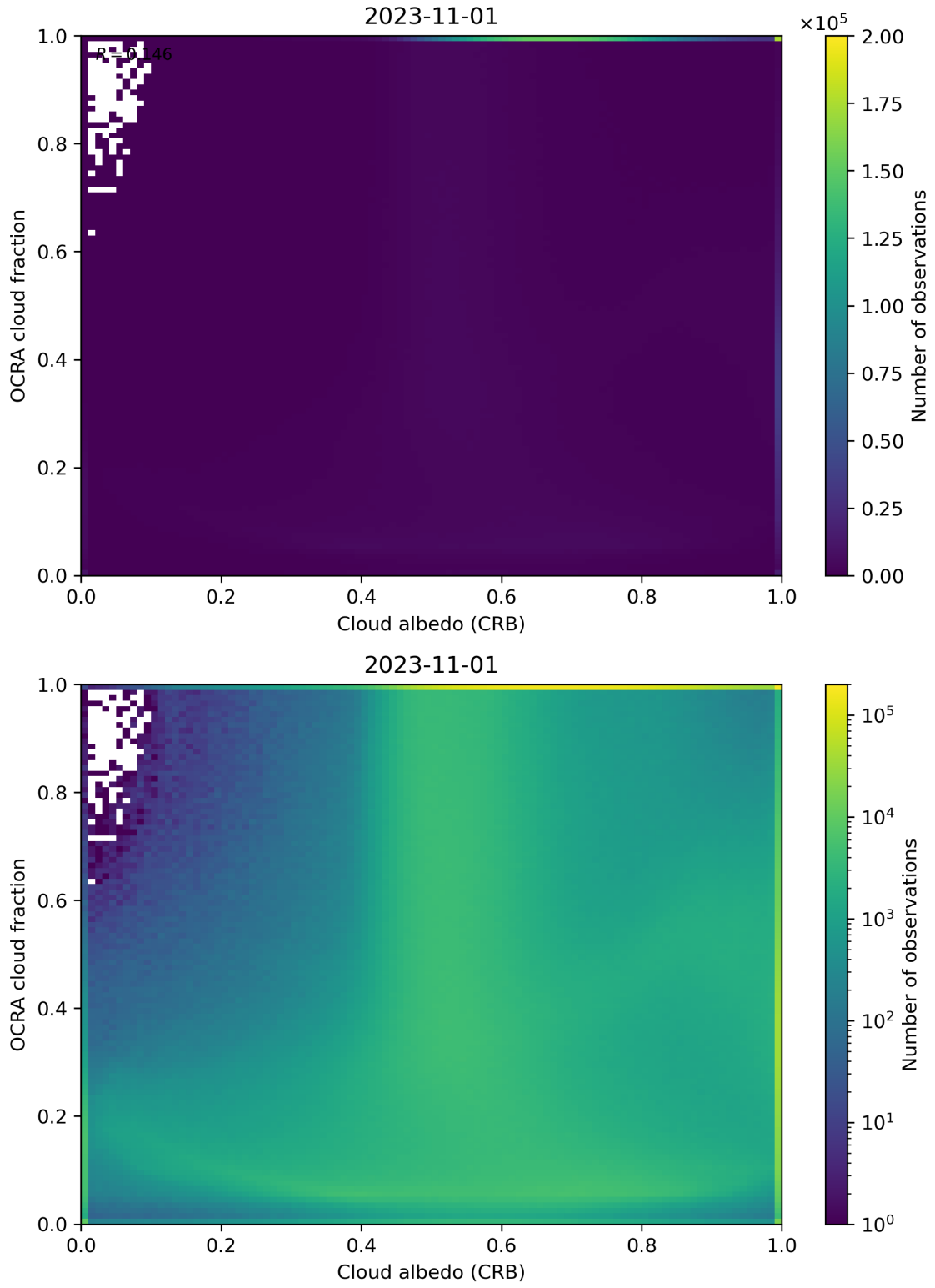


Figure 70: Scatter density plot of "Cloud albedo (CRB)" against "OCRA cloud fraction" for 2023-10-31 to 2023-11-02.

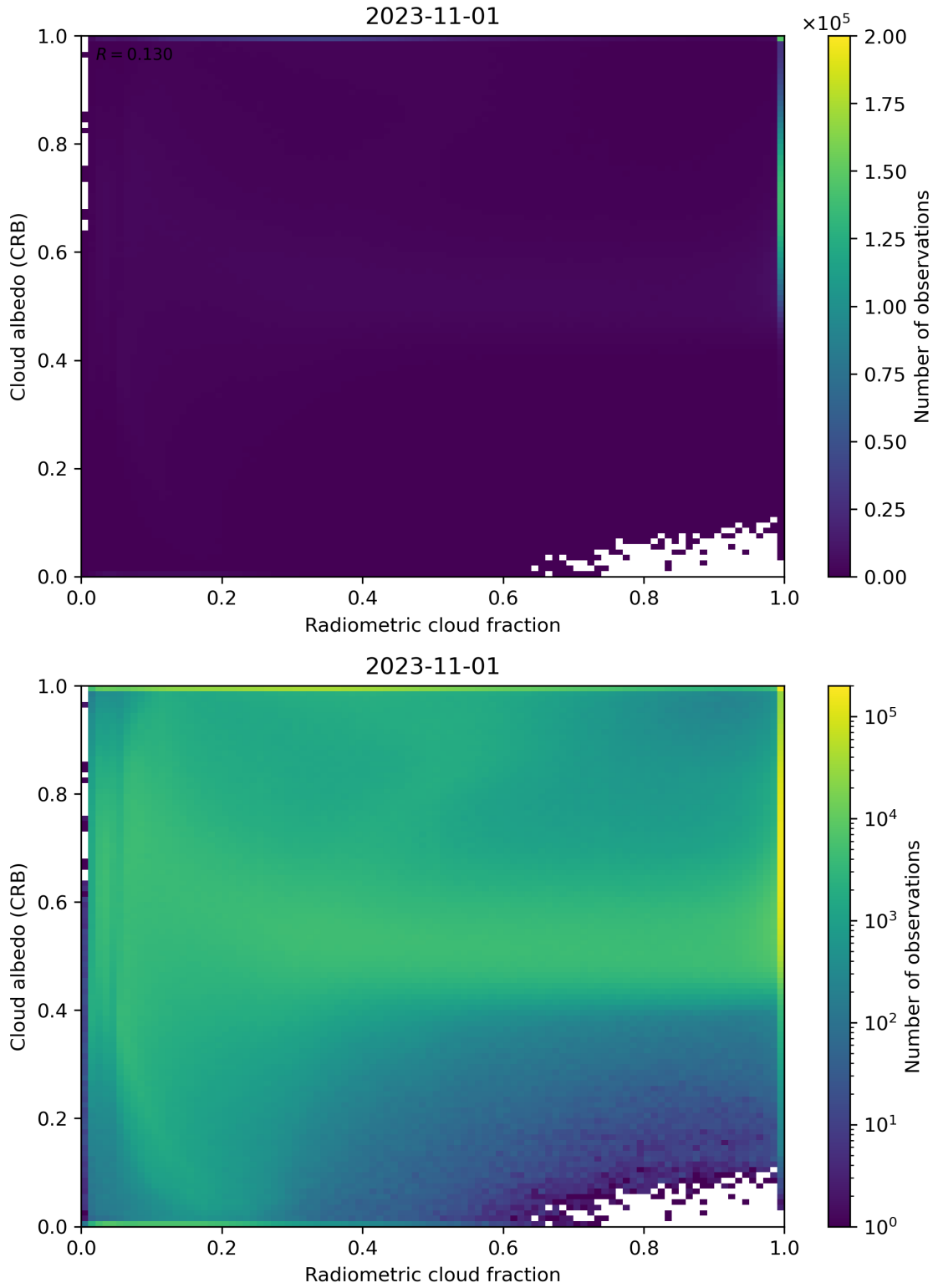


Figure 71: Scatter density plot of “Radiometric cloud fraction” against “Cloud albedo (CRB)” for 2023-10-31 to 2023-11-02.

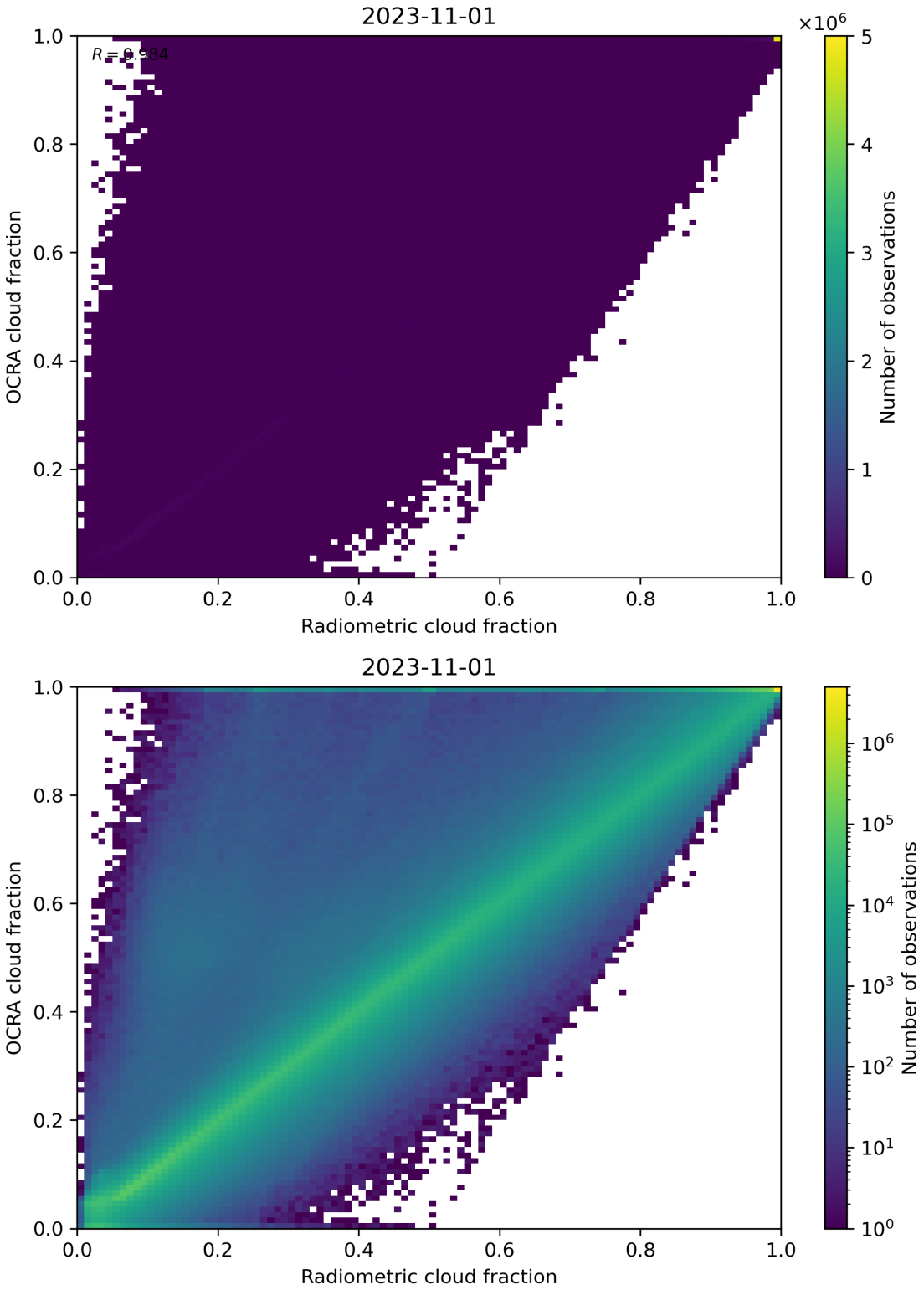


Figure 72: Scatter density plot of “Radiometric cloud fraction” against “OCRA cloud fraction” for 2023-10-31 to 2023-11-02.

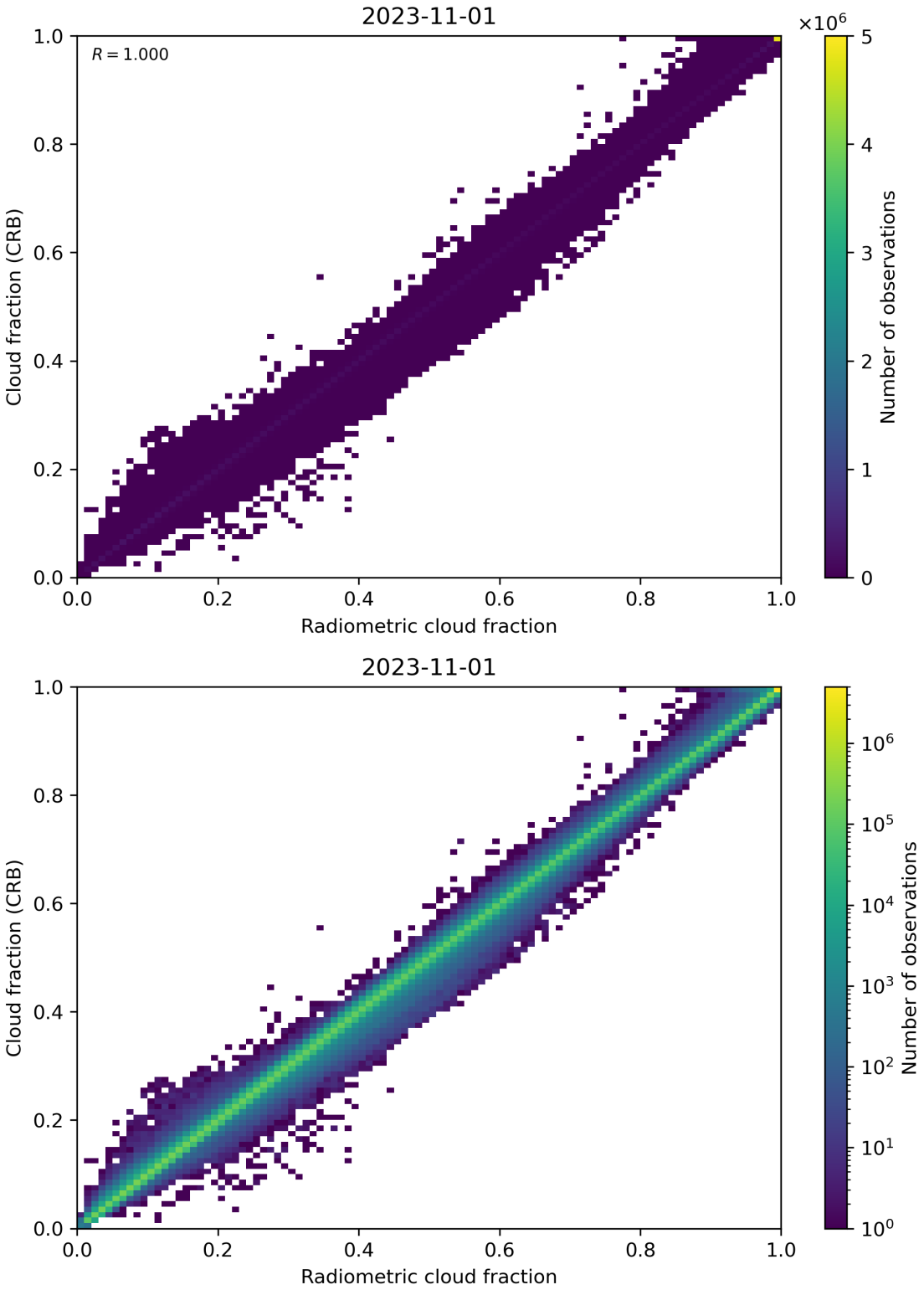


Figure 73: Scatter density plot of “Radiometric cloud fraction” against “Cloud fraction (CRB)” for 2023-10-31 to 2023-11-02.

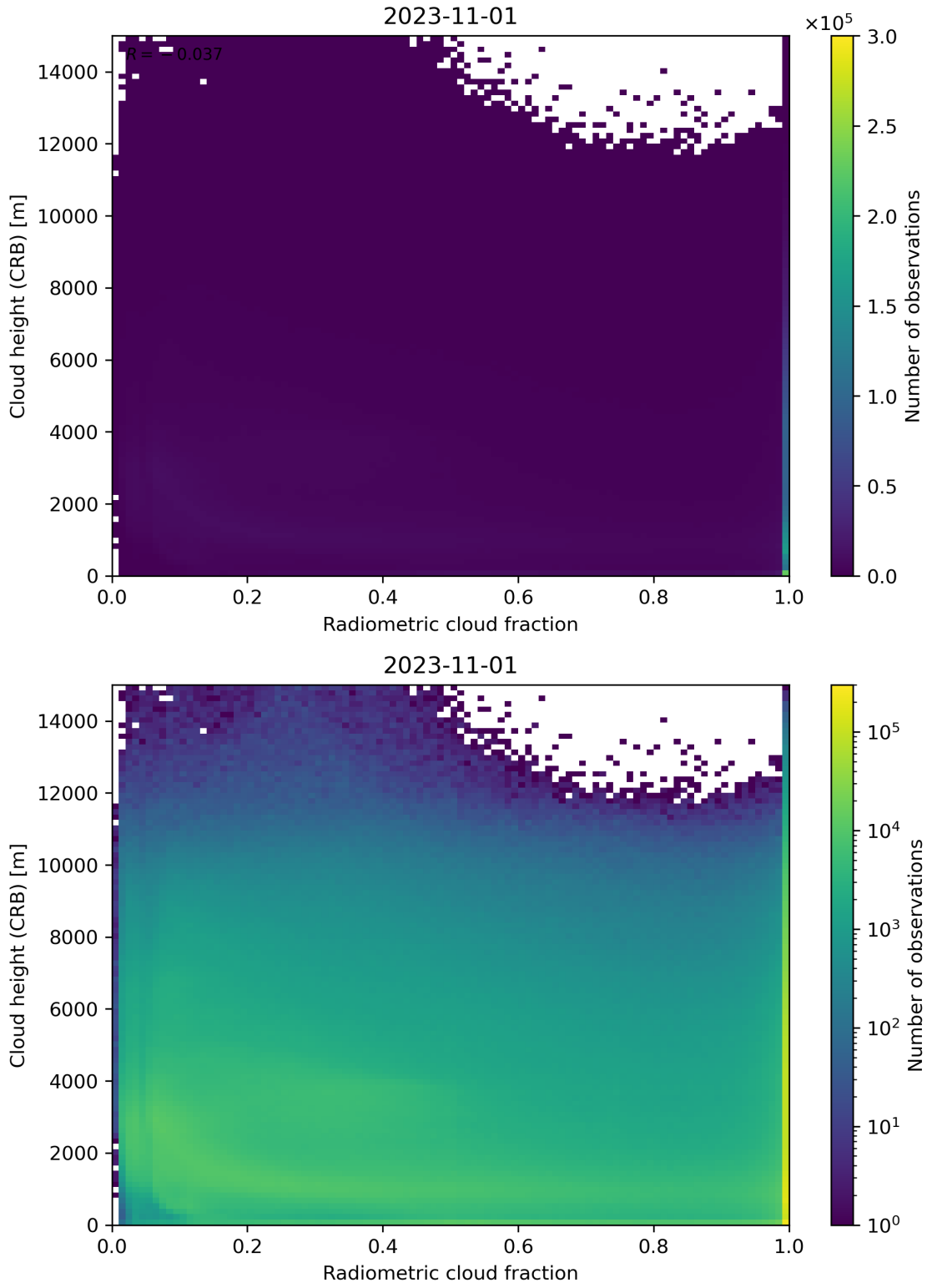


Figure 74: Scatter density plot of “Radiometric cloud fraction” against “Cloud height (CRB)” for 2023-10-31 to 2023-11-02.

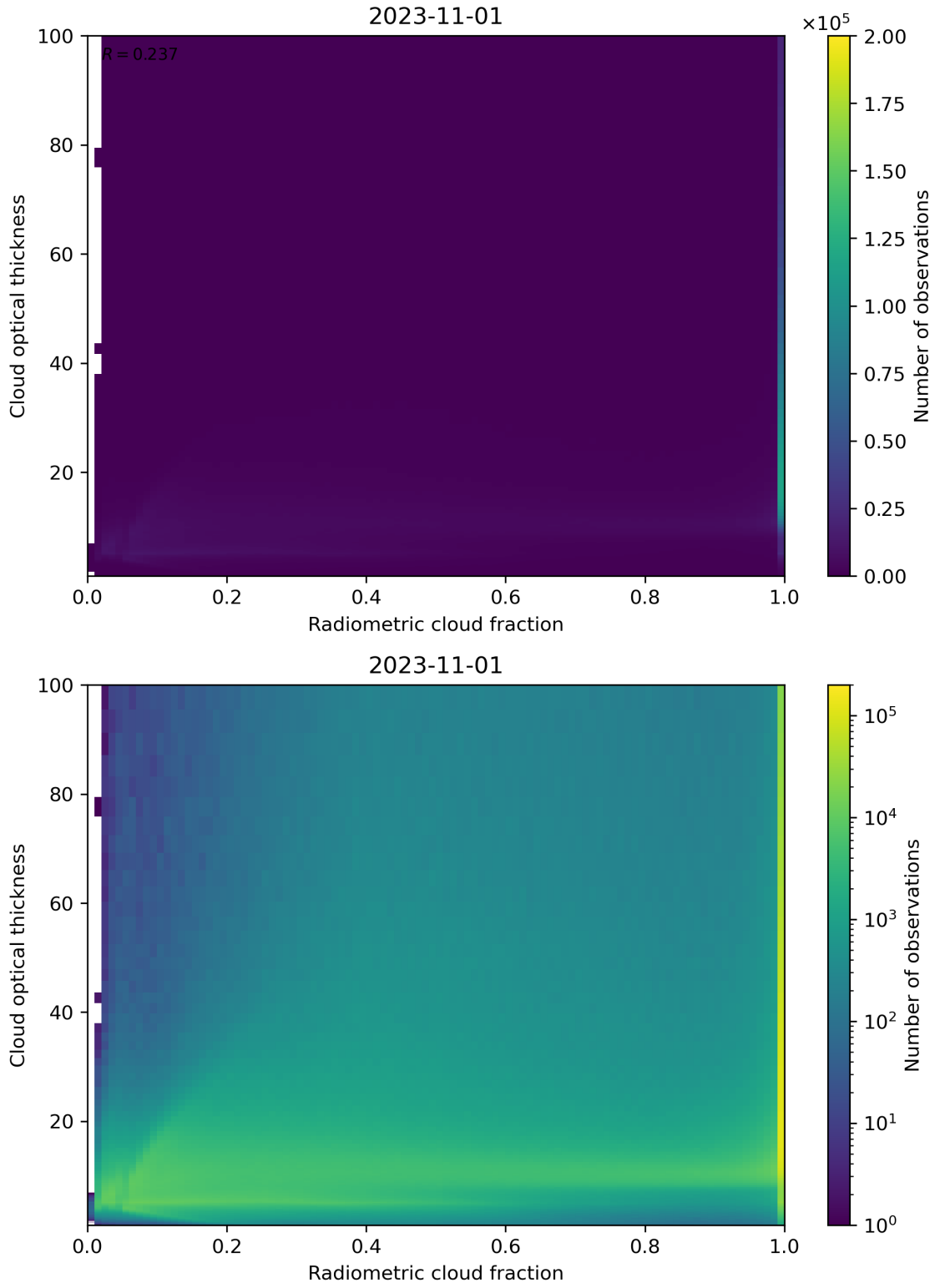


Figure 75: Scatter density plot of “Radiometric cloud fraction” against “Cloud optical thickness” for 2023-10-31 to 2023-11-02.

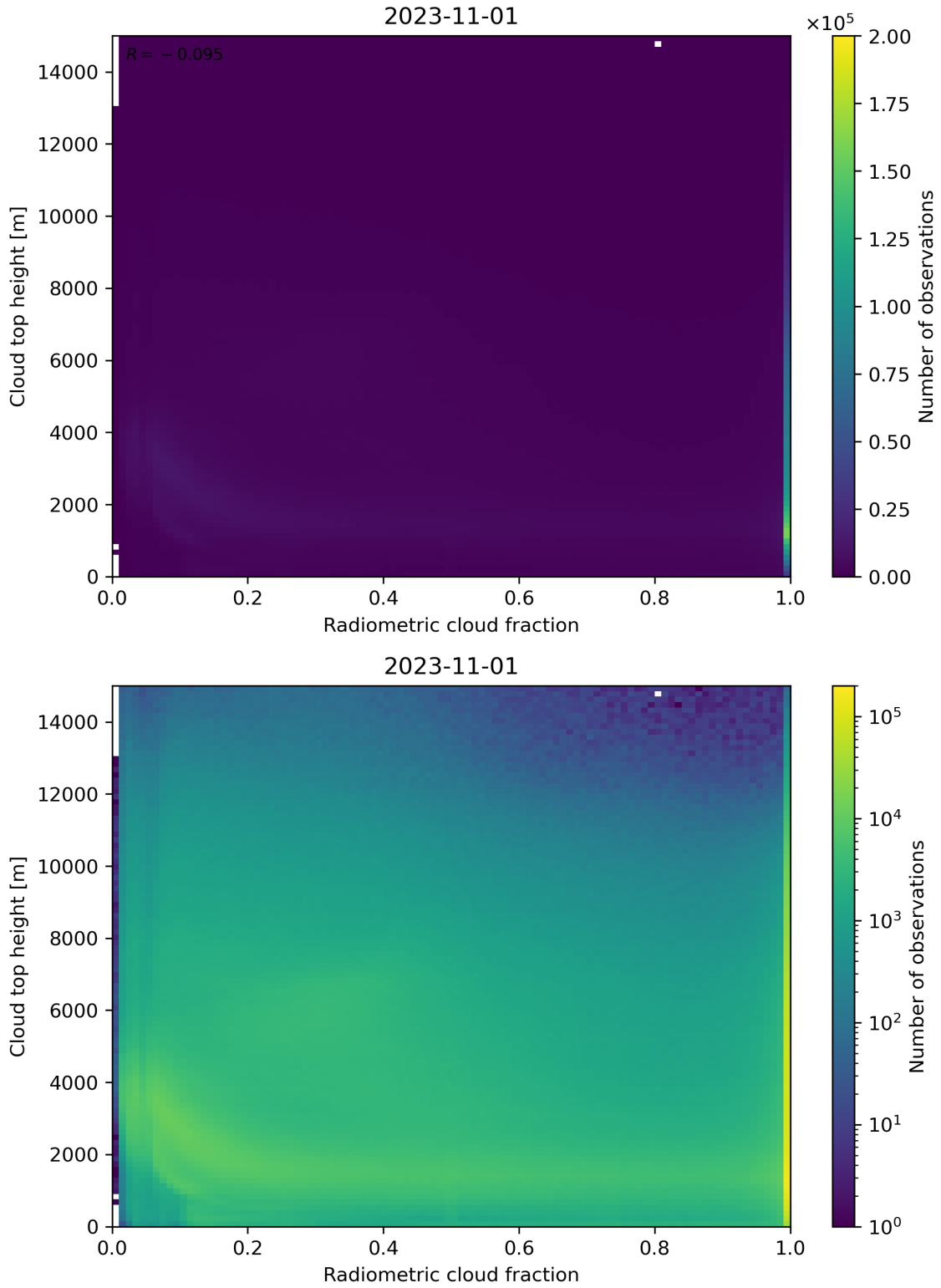


Figure 76: Scatter density plot of “Radiometric cloud fraction” against “Cloud top height” for 2023-10-31 to 2023-11-02.

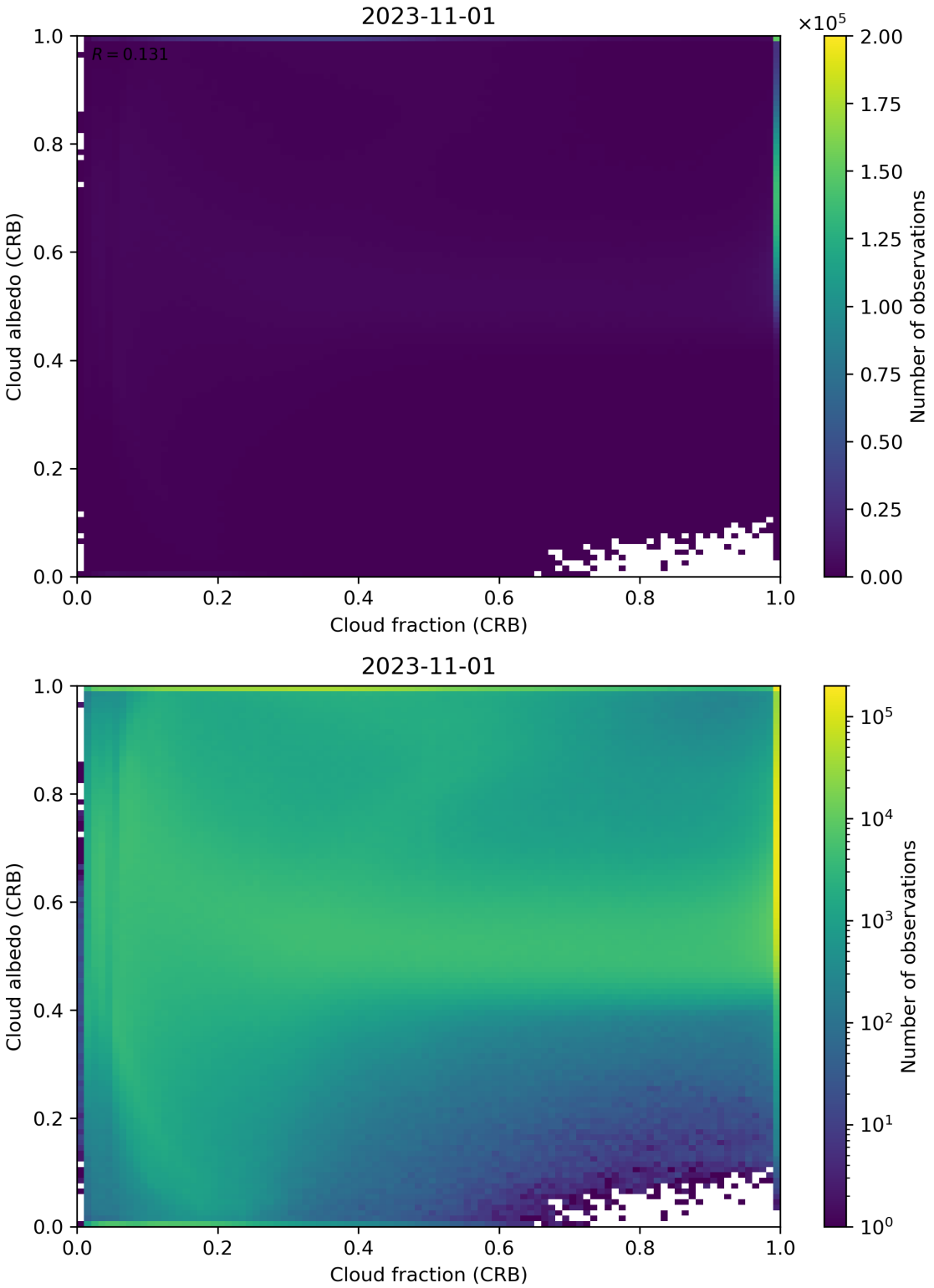


Figure 77: Scatter density plot of “Cloud fraction (CRB)” against “Cloud albedo (CRB)” for 2023-10-31 to 2023-11-02.

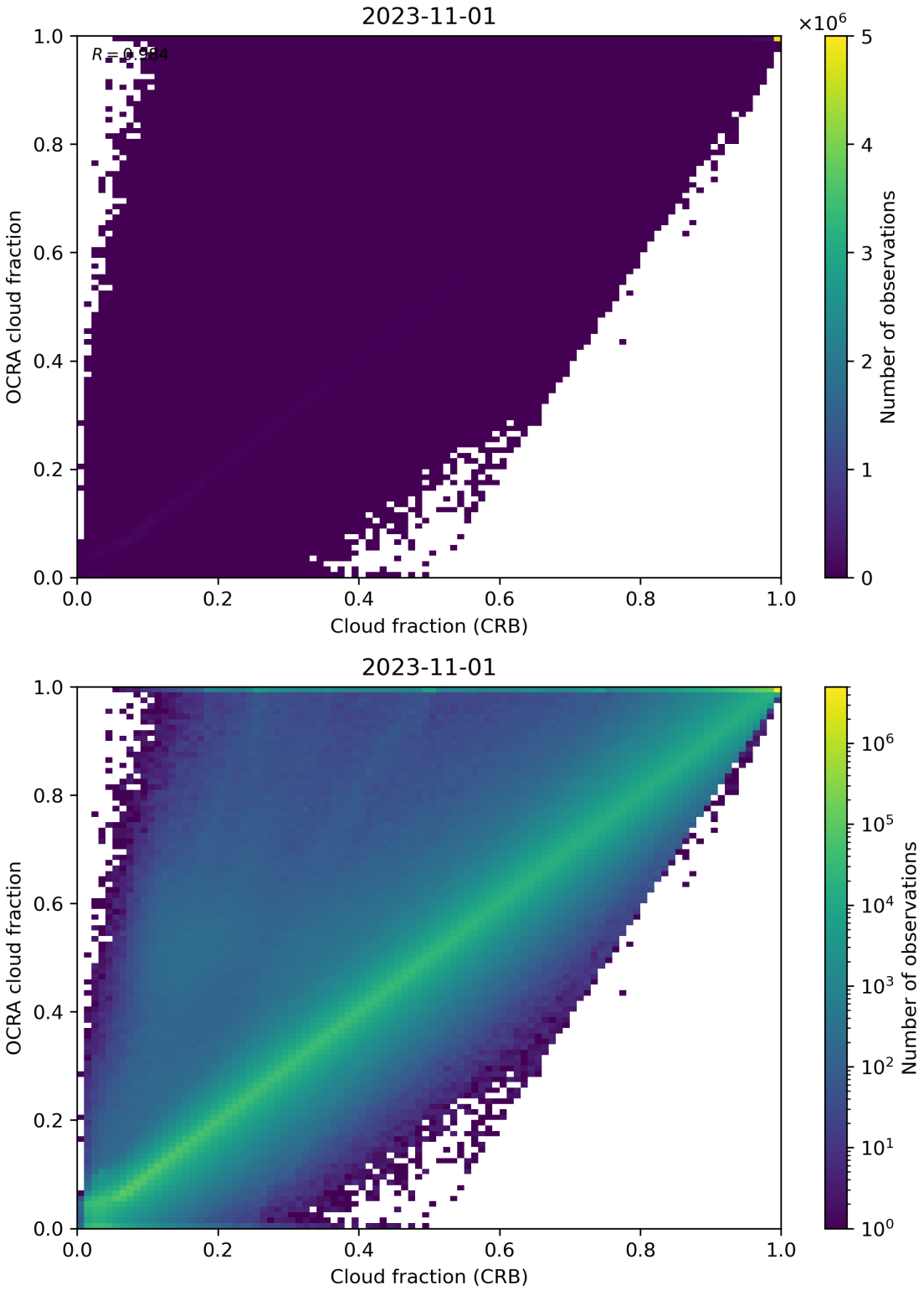


Figure 78: Scatter density plot of “Cloud fraction (CRB)” against “OCRA cloud fraction” for 2023-10-31 to 2023-11-02.

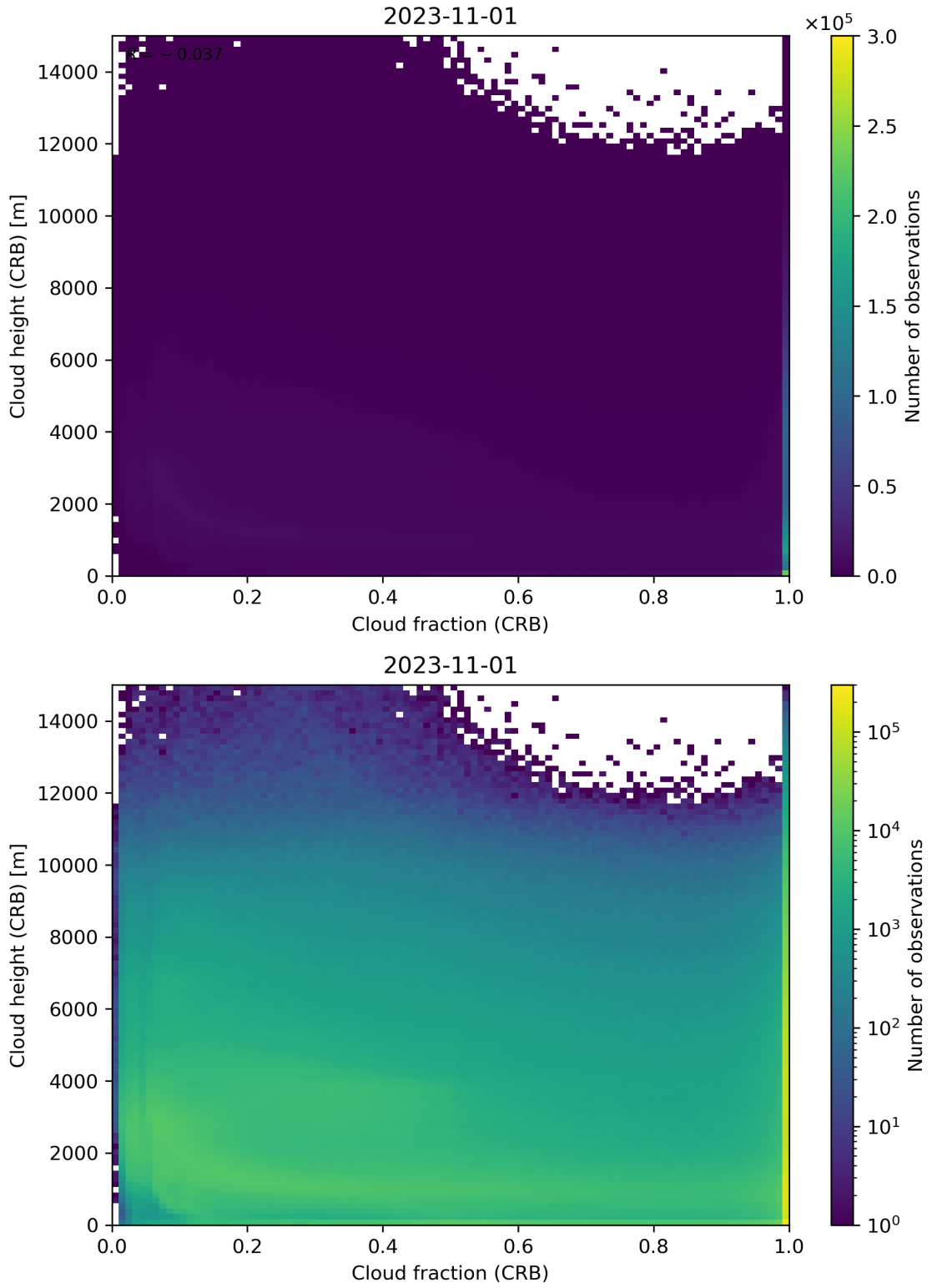


Figure 79: Scatter density plot of “Cloud fraction (CRB)” against “Cloud height (CRB)” for 2023-10-31 to 2023-11-02.

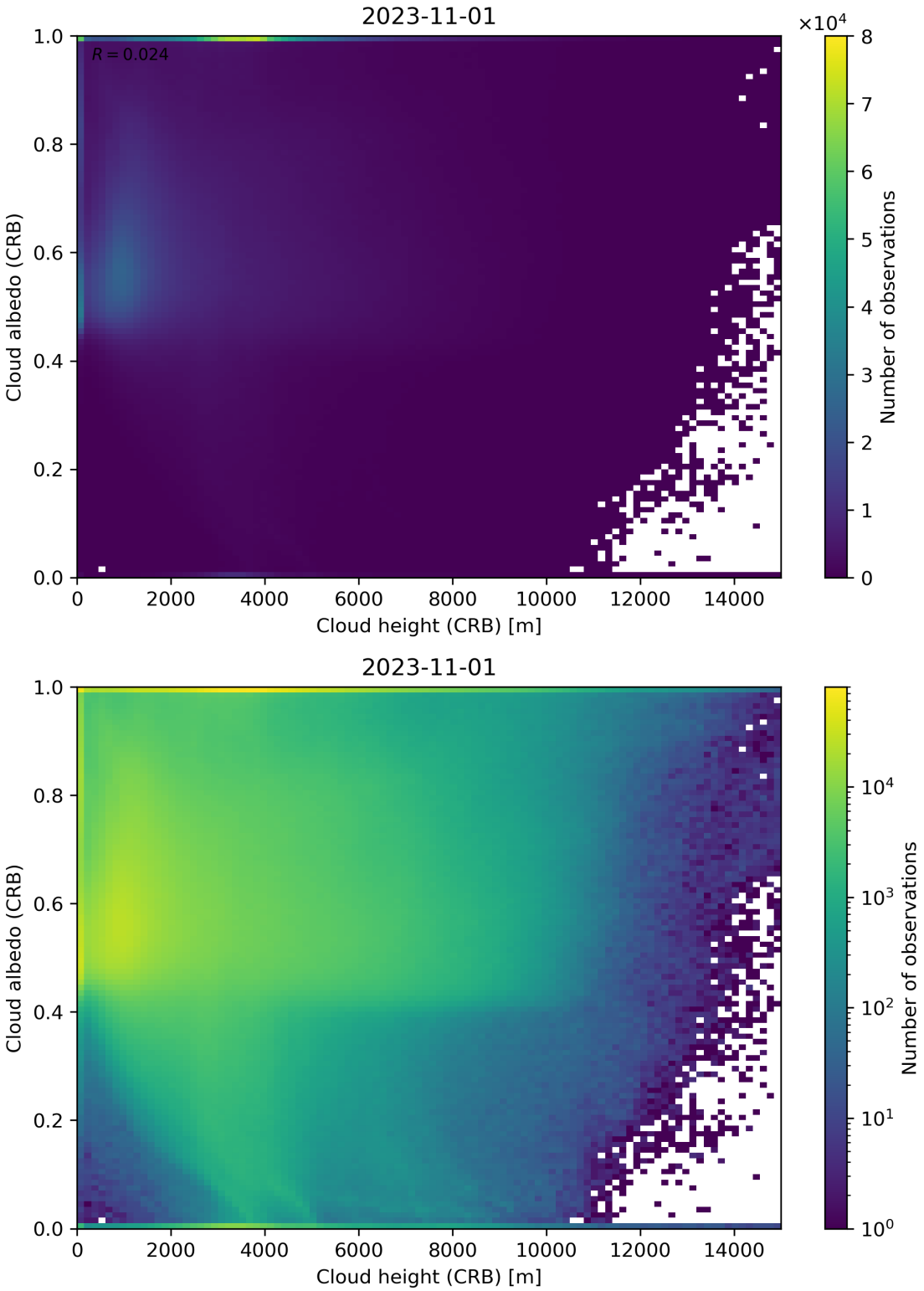


Figure 80: Scatter density plot of “Cloud height (CRB)” against “Cloud albedo (CRB)” for 2023-10-31 to 2023-11-02.

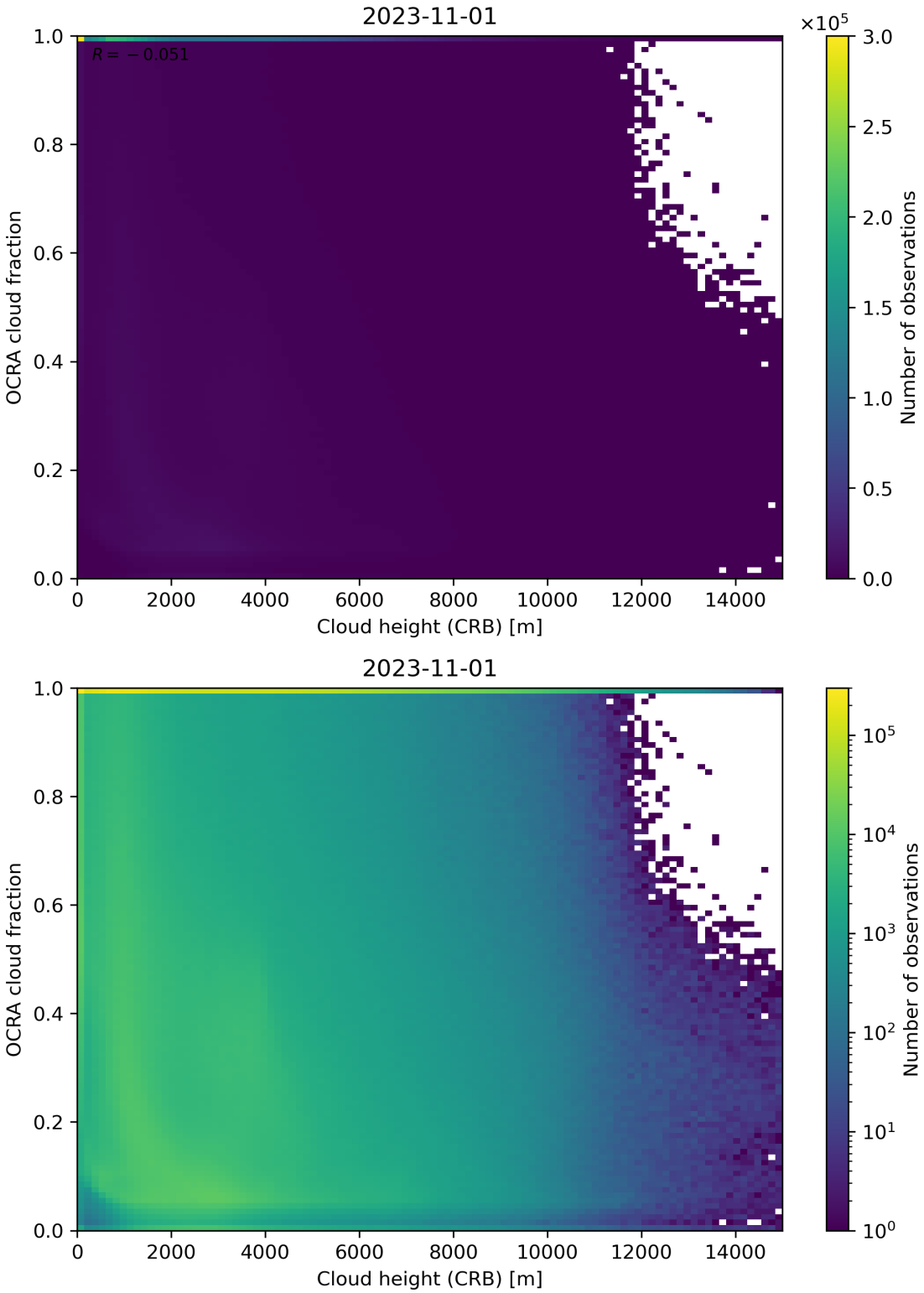


Figure 81: Scatter density plot of “Cloud height (CRB)” against “OCRA cloud fraction” for 2023-10-31 to 2023-11-02.

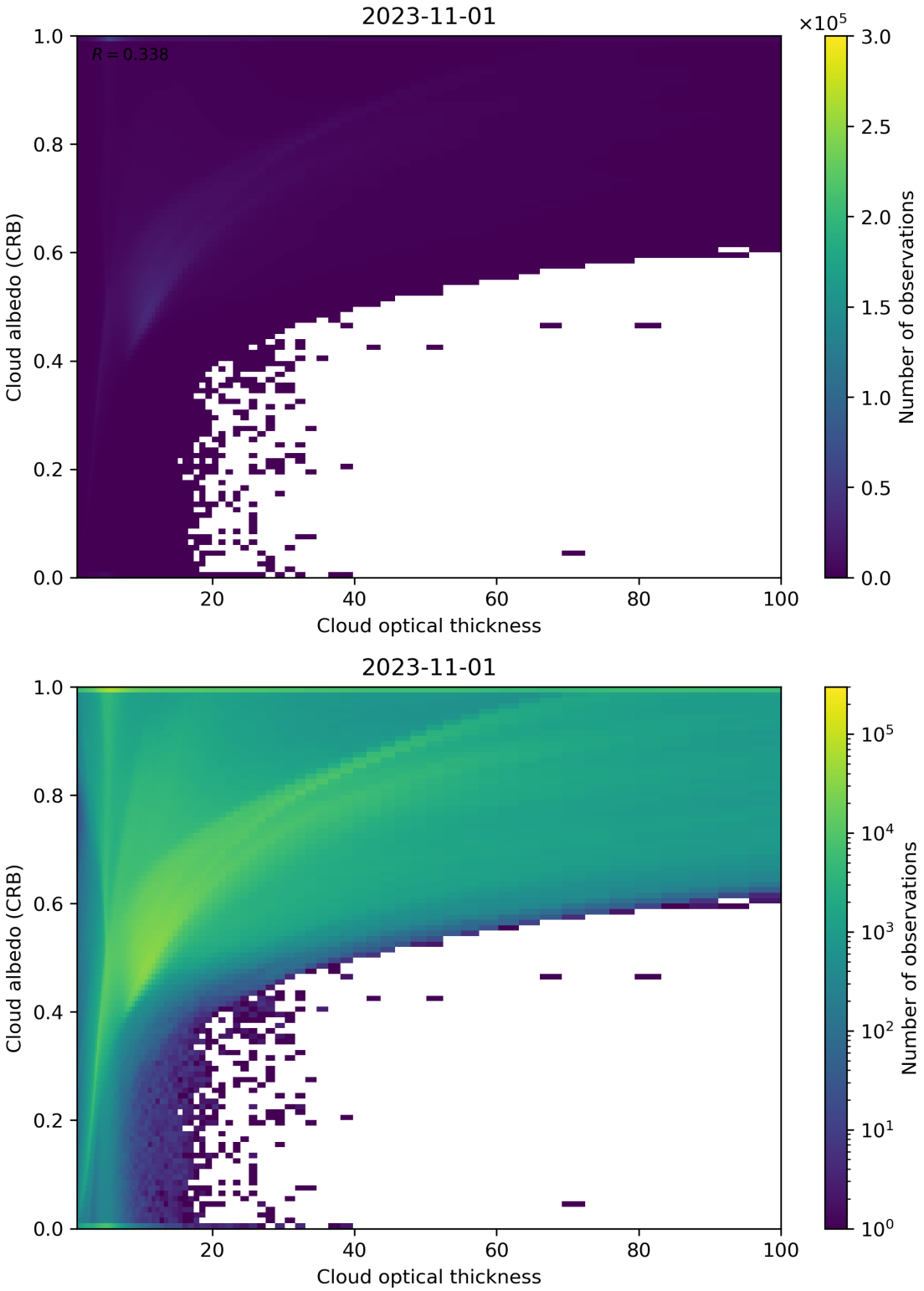


Figure 82: Scatter density plot of “Cloud optical thickness” against “Cloud albedo (CRB)” for 2023-10-31 to 2023-11-02.

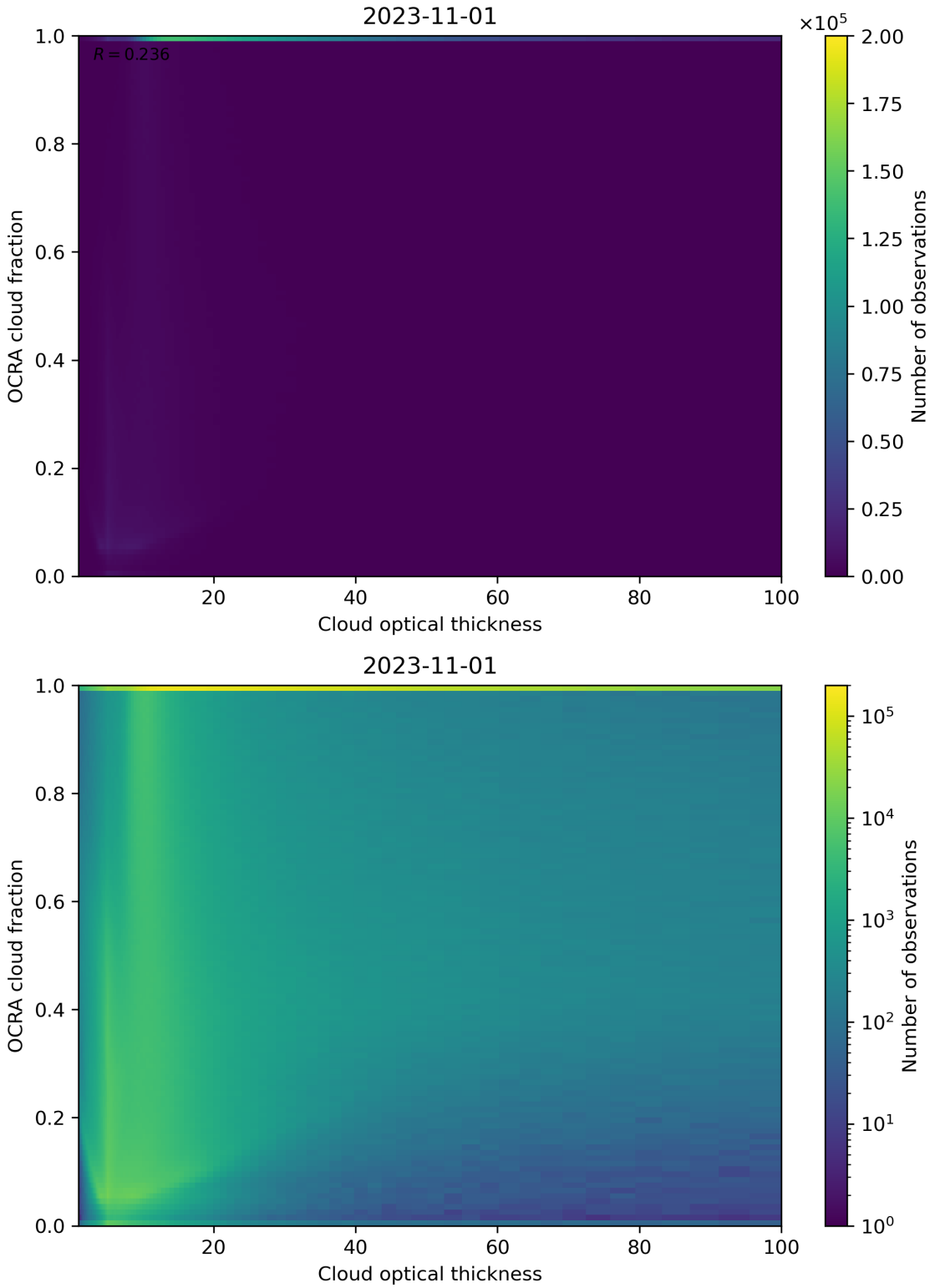


Figure 83: Scatter density plot of “Cloud optical thickness” against “OCRA cloud fraction” for 2023-10-31 to 2023-11-02.

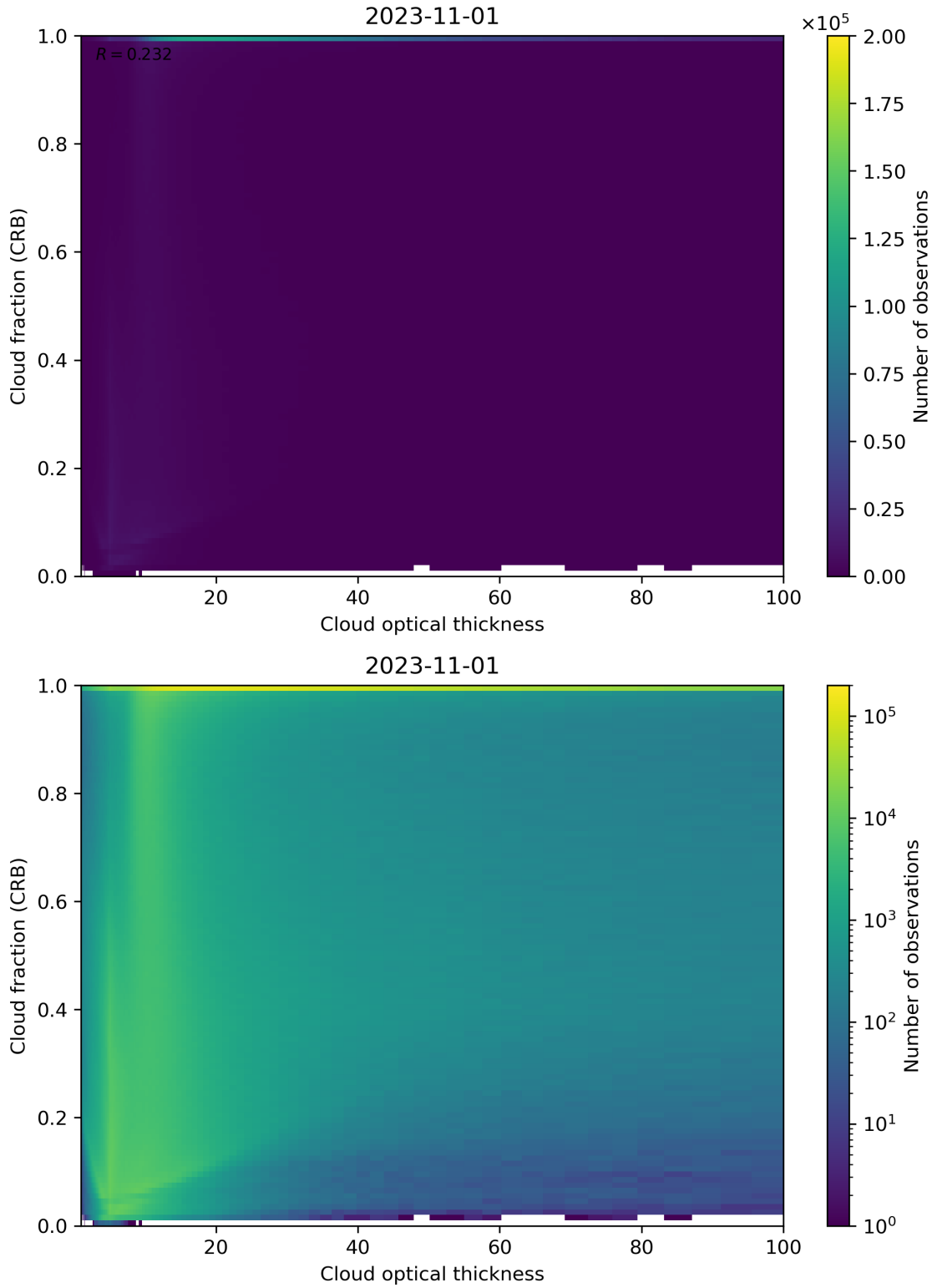


Figure 84: Scatter density plot of “Cloud optical thickness” against “Cloud fraction (CRB)” for 2023-10-31 to 2023-11-02.

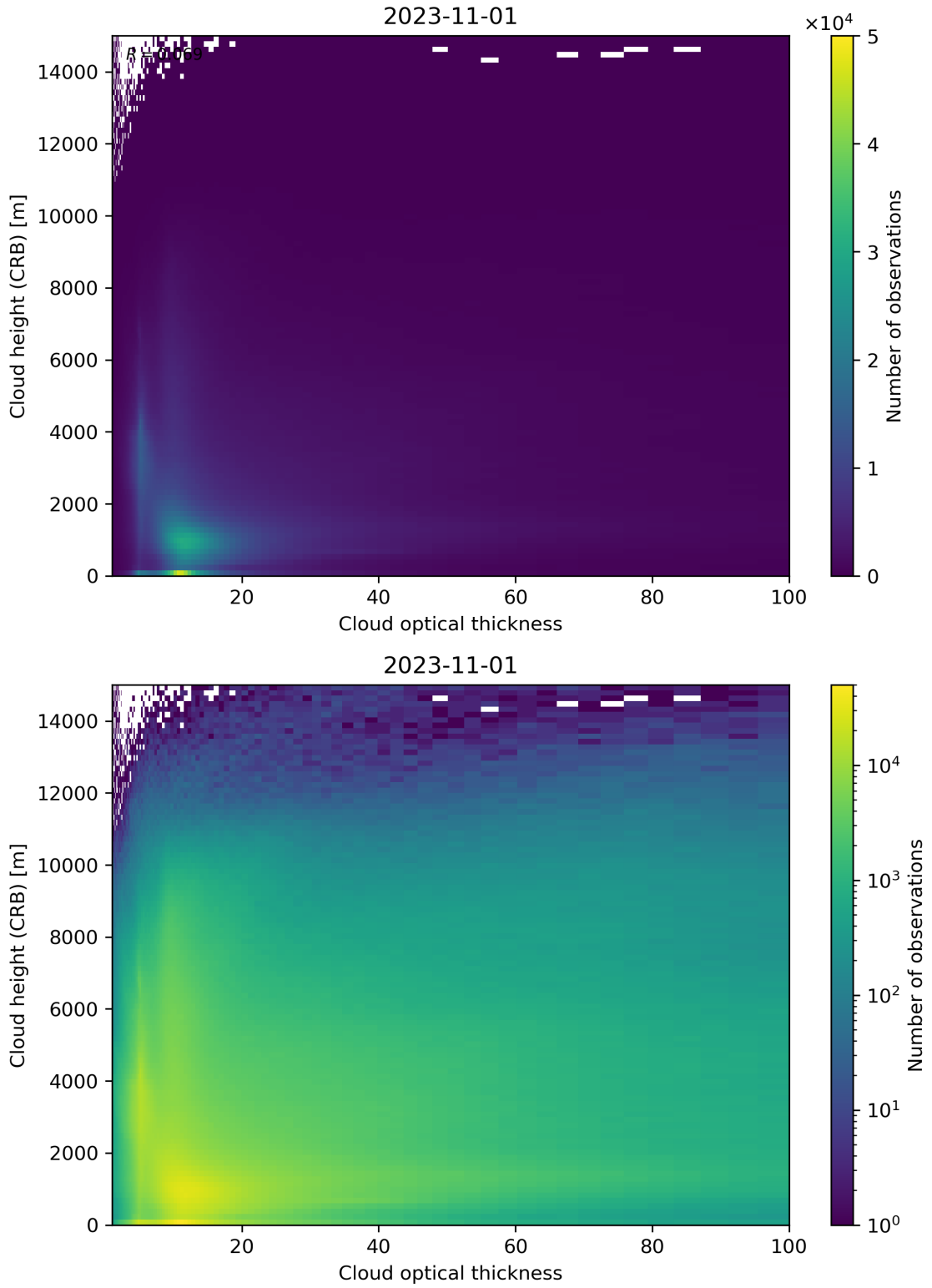


Figure 85: Scatter density plot of “Cloud optical thickness” against “Cloud height (CRB)” for 2023-10-31 to 2023-11-02.

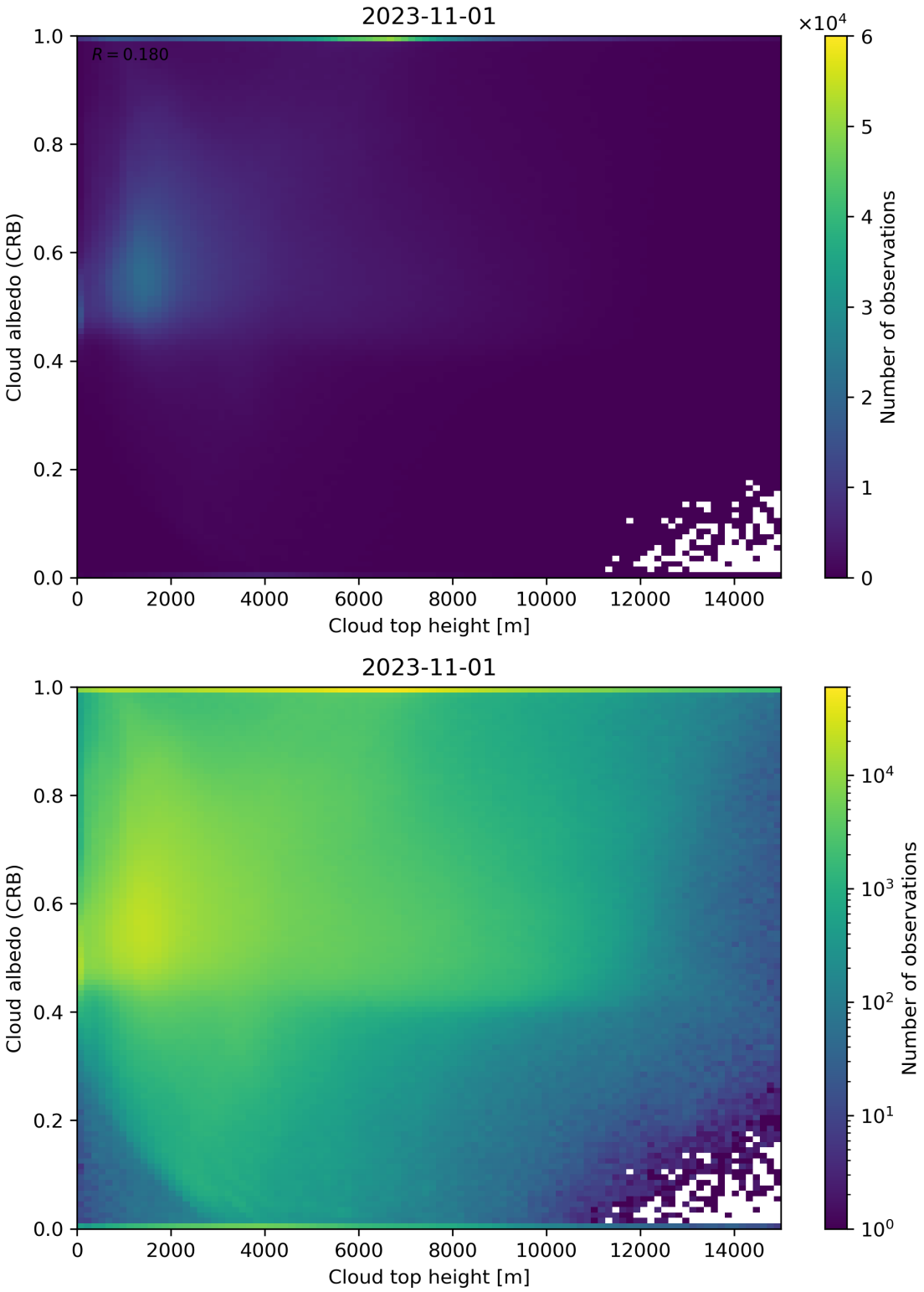


Figure 86: Scatter density plot of “Cloud top height” against “Cloud albedo (CRB)” for 2023-10-31 to 2023-11-02.

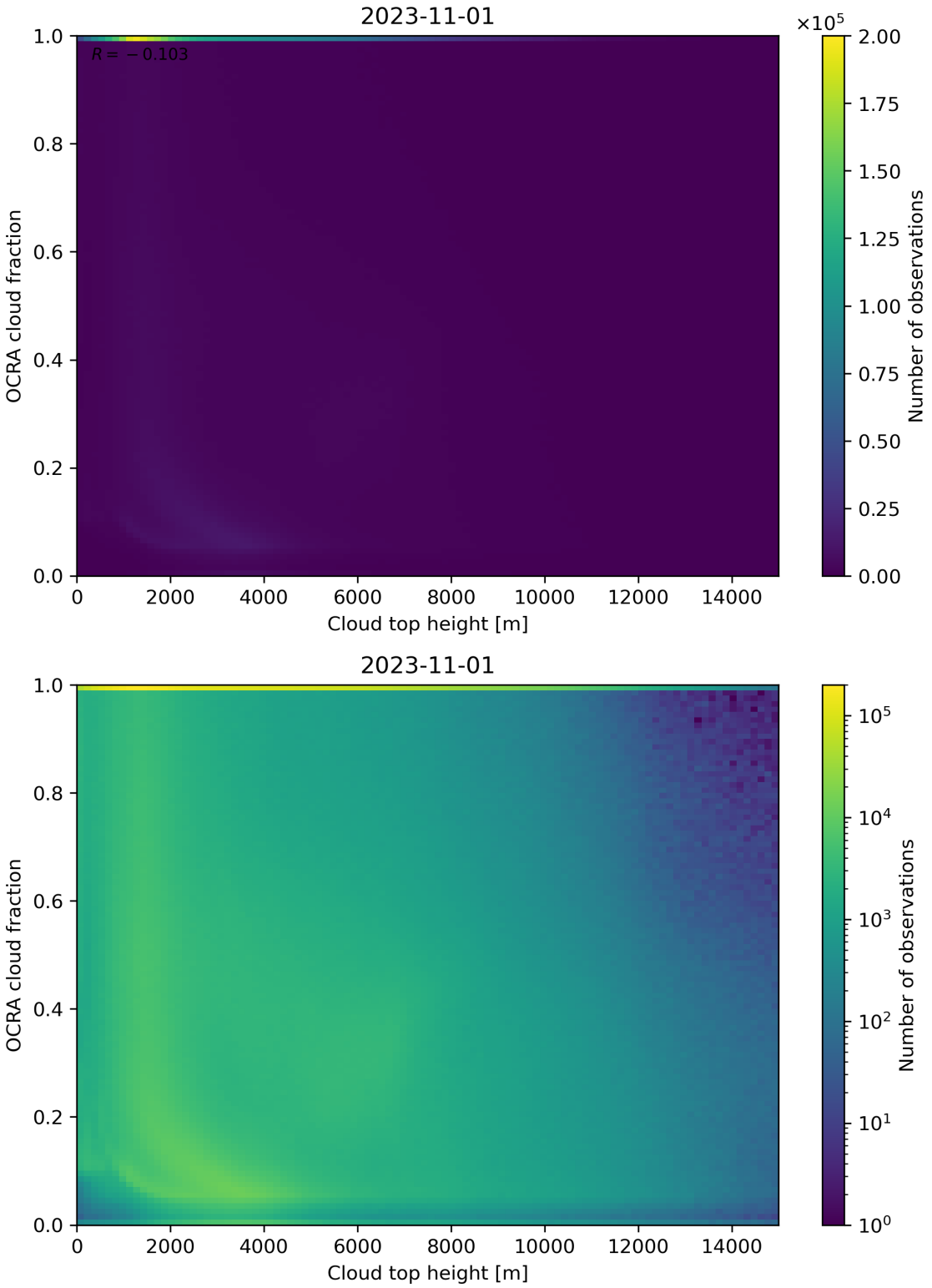


Figure 87: Scatter density plot of “Cloud top height” against “OCRA cloud fraction” for 2023-10-31 to 2023-11-02.

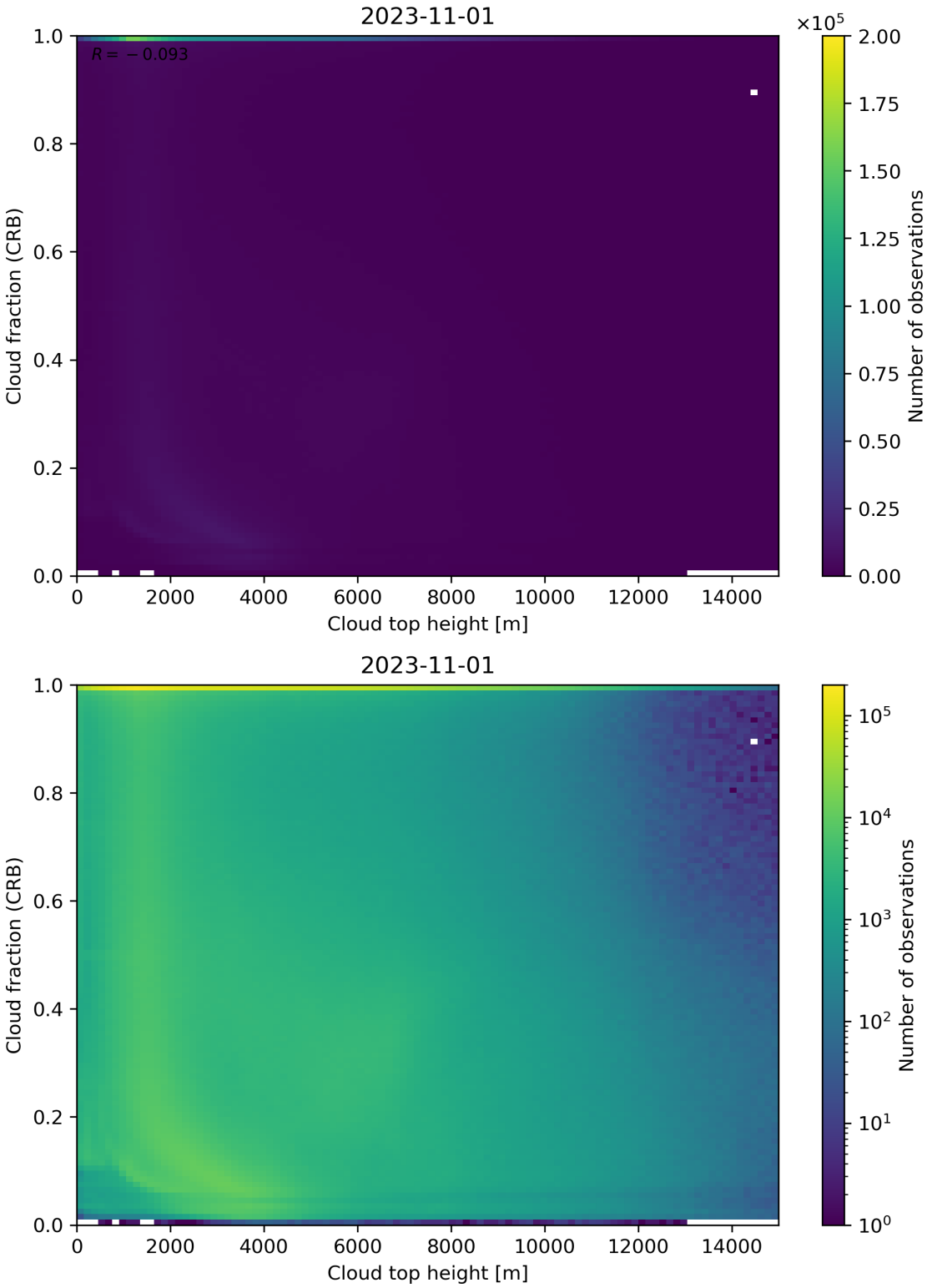


Figure 88: Scatter density plot of “Cloud top height” against “Cloud fraction (CRB)” for 2023-10-31 to 2023-11-02.

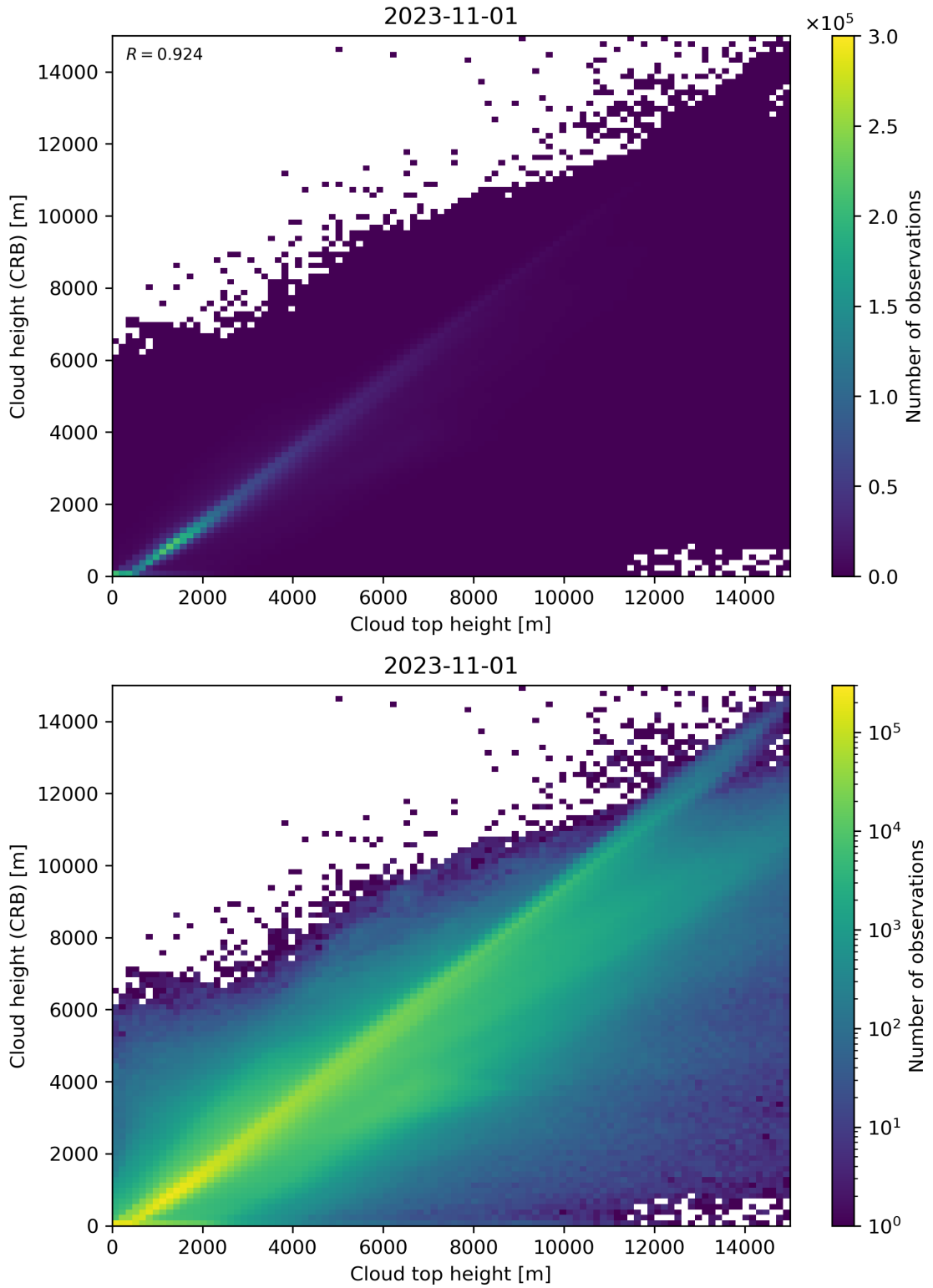


Figure 89: Scatter density plot of “Cloud top height” against “Cloud height (CRB)” for 2023-10-31 to 2023-11-02.

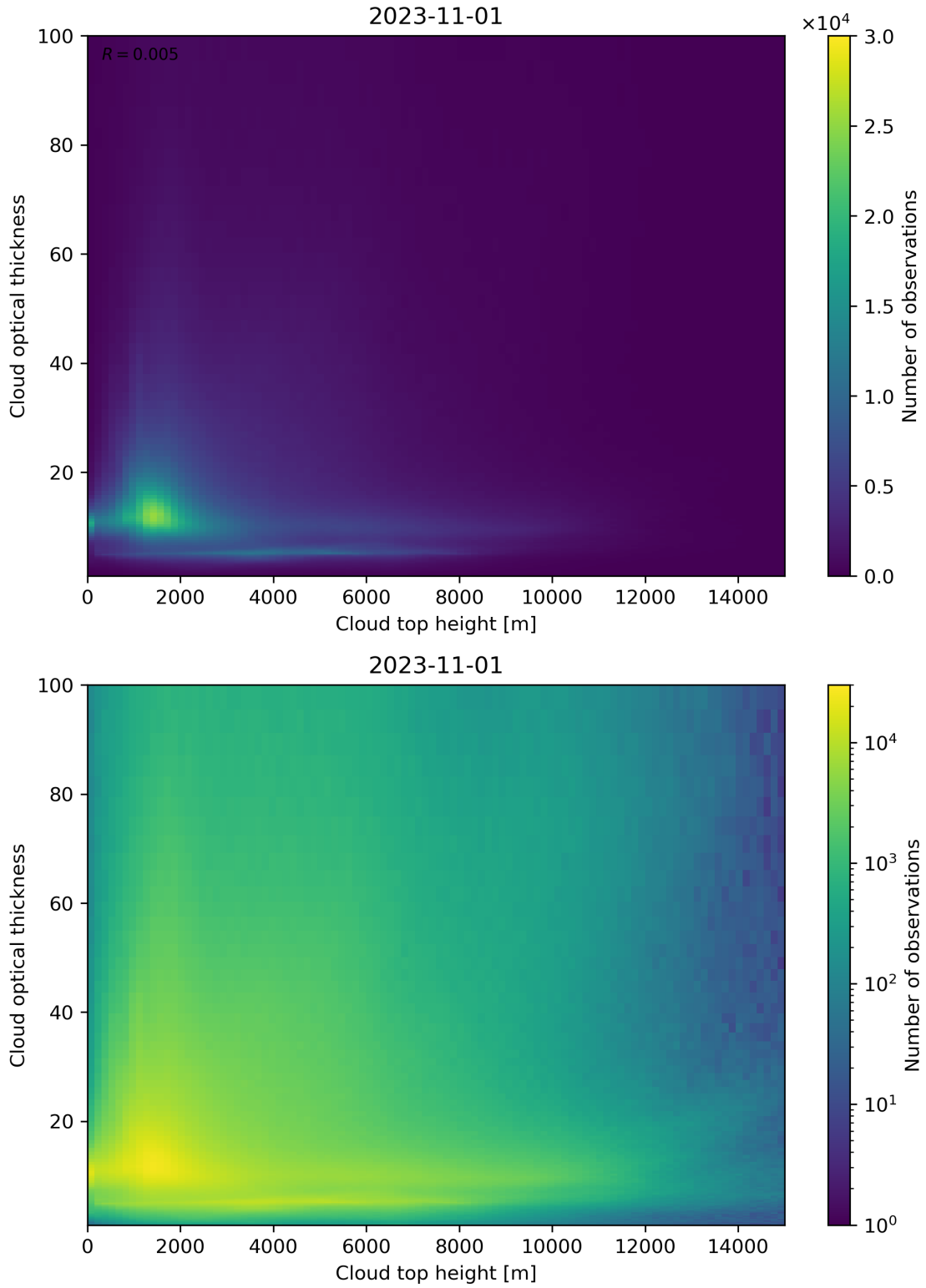


Figure 90: Scatter density plot of “Cloud top height” against “Cloud optical thickness” for 2023-10-31 to 2023-11-02.

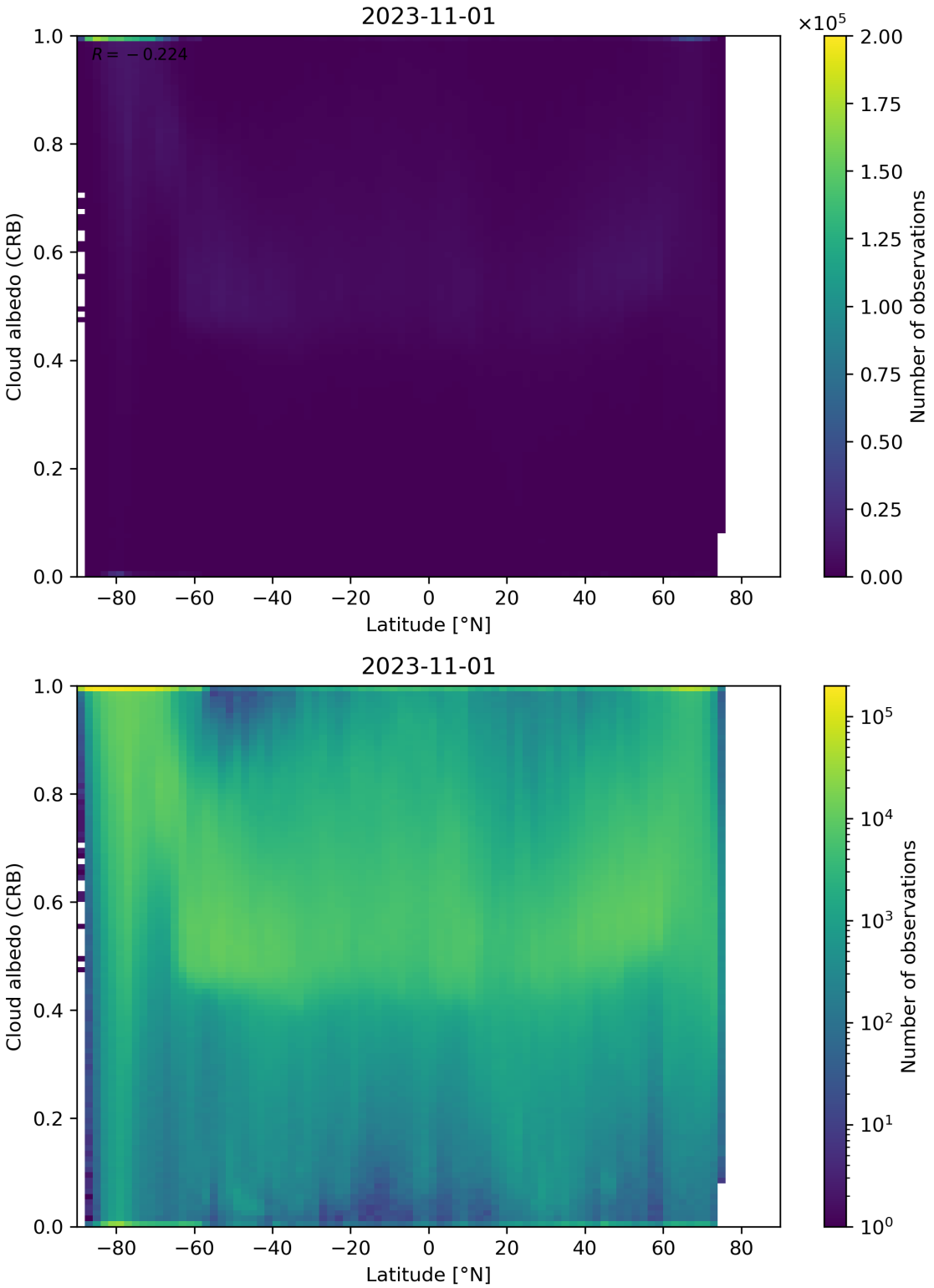


Figure 91: Scatter density plot of “Latitude” against “Cloud albedo (CRB)” for 2023-10-31 to 2023-11-02.

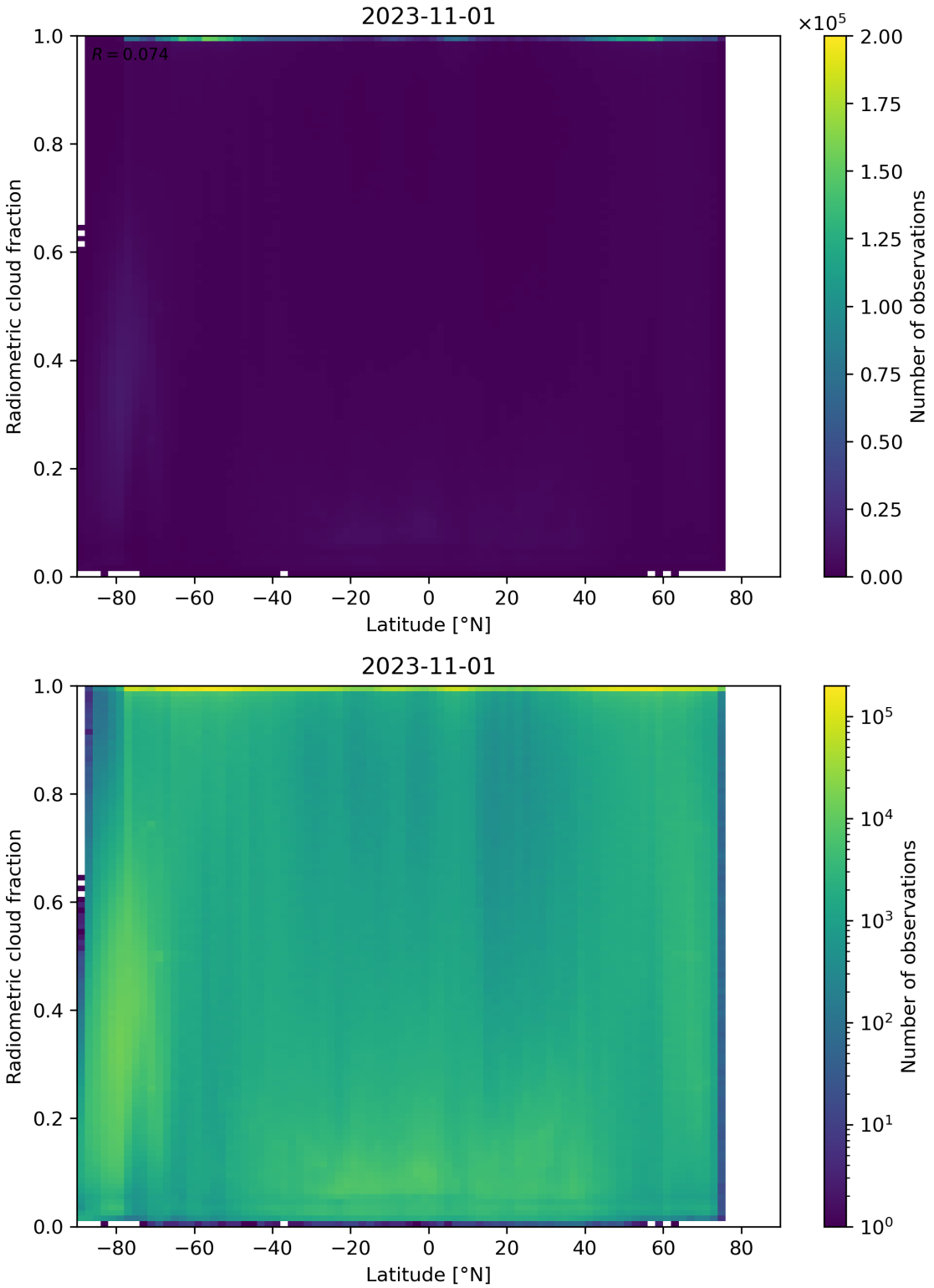


Figure 92: Scatter density plot of “Latitude” against “Radiometric cloud fraction” for 2023-10-31 to 2023-11-02.

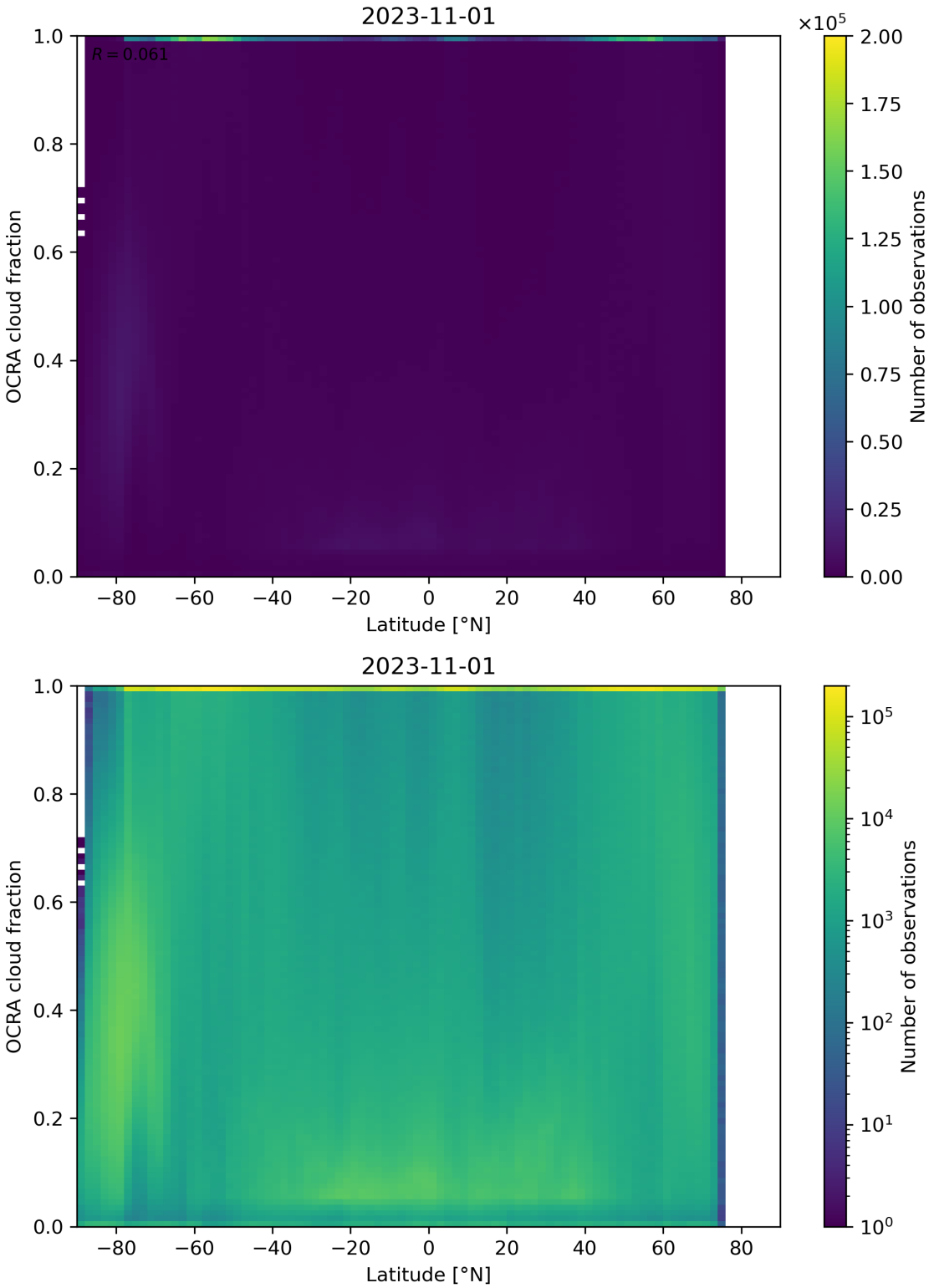


Figure 93: Scatter density plot of “Latitude” against “OCRA cloud fraction” for 2023-10-31 to 2023-11-02.

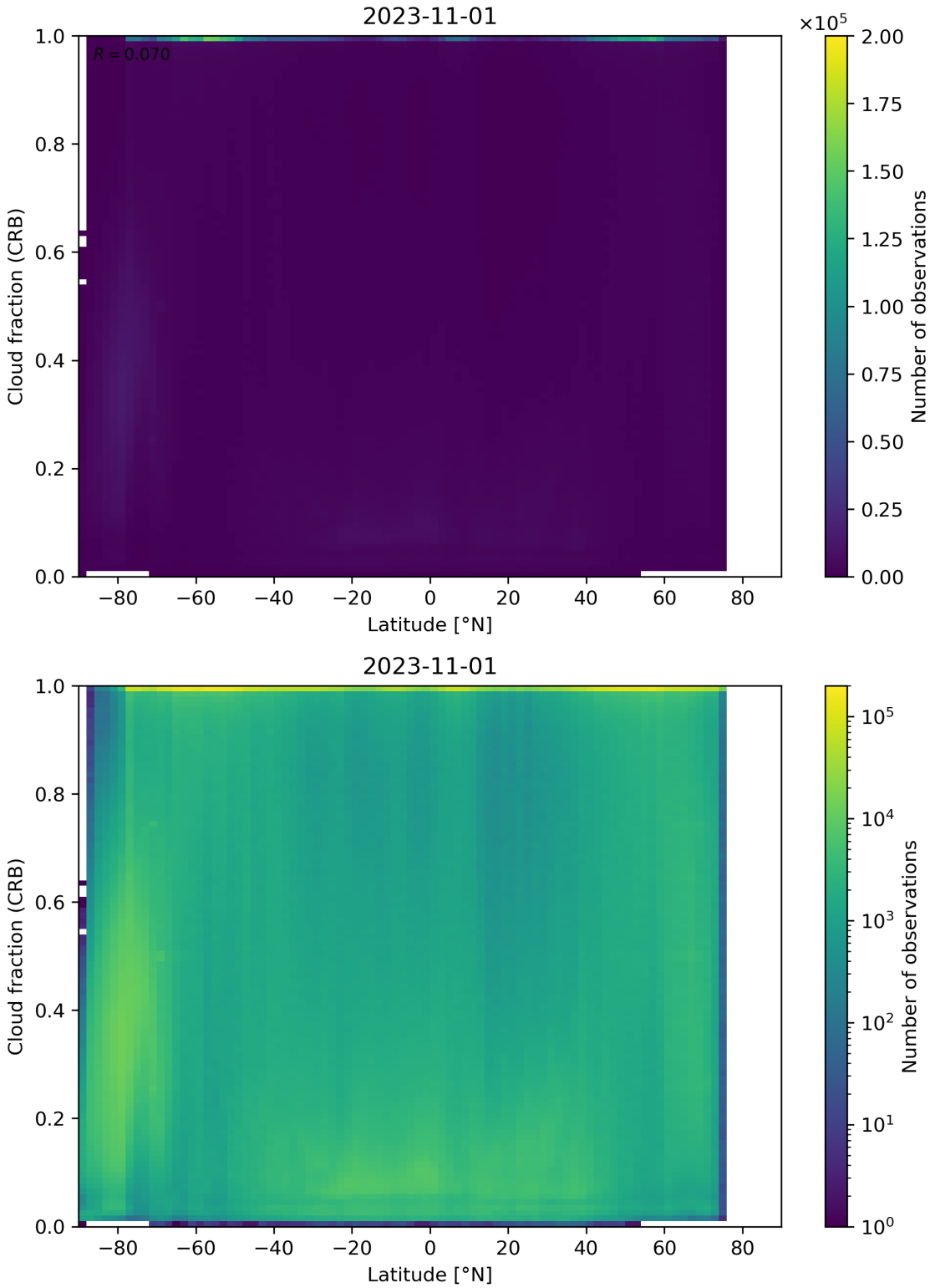


Figure 94: Scatter density plot of “Latitude” against “Cloud fraction (CRB)” for 2023-10-31 to 2023-11-02.

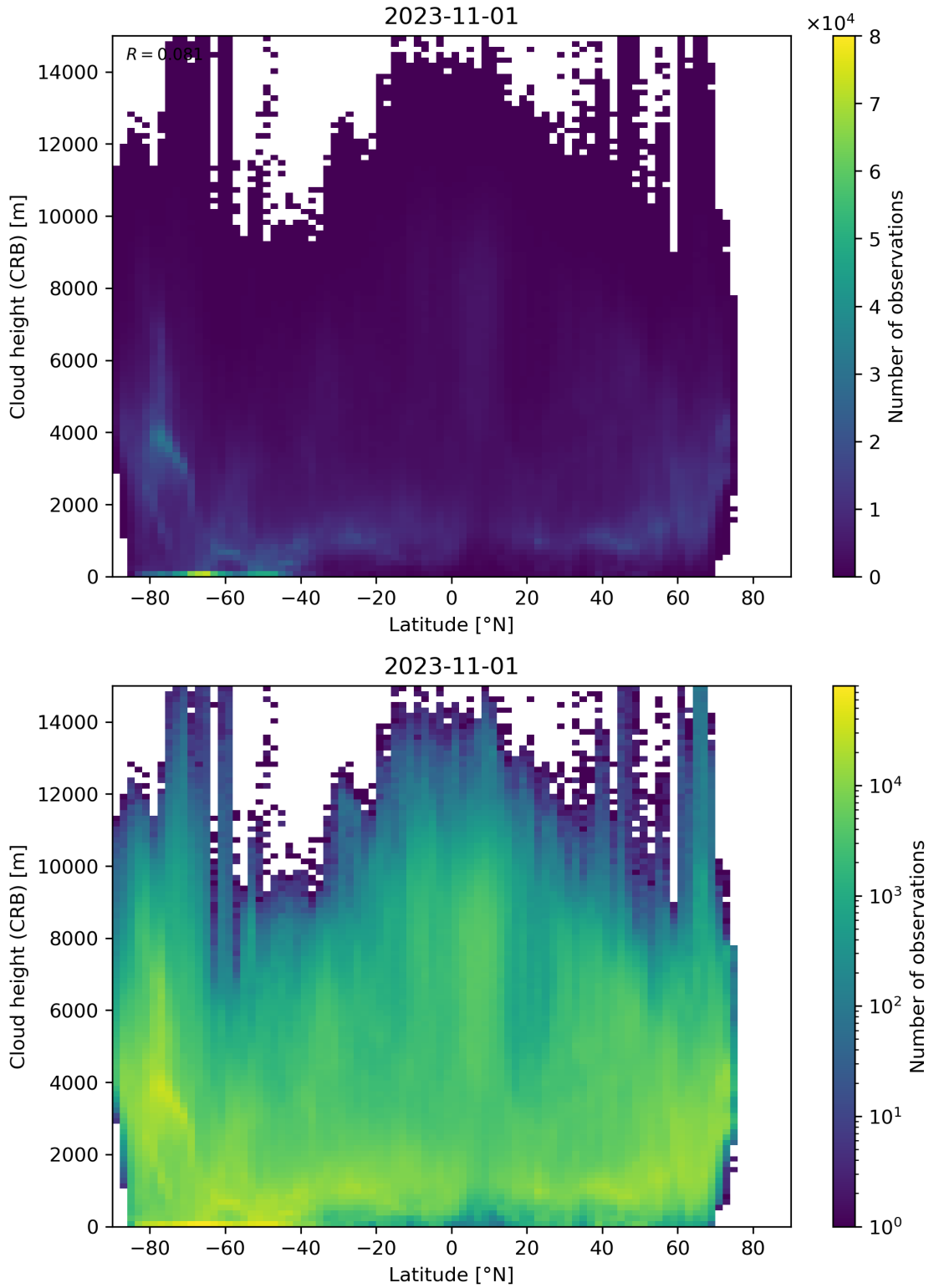


Figure 95: Scatter density plot of “Latitude” against “Cloud height (CRB)” for 2023-10-31 to 2023-11-02.

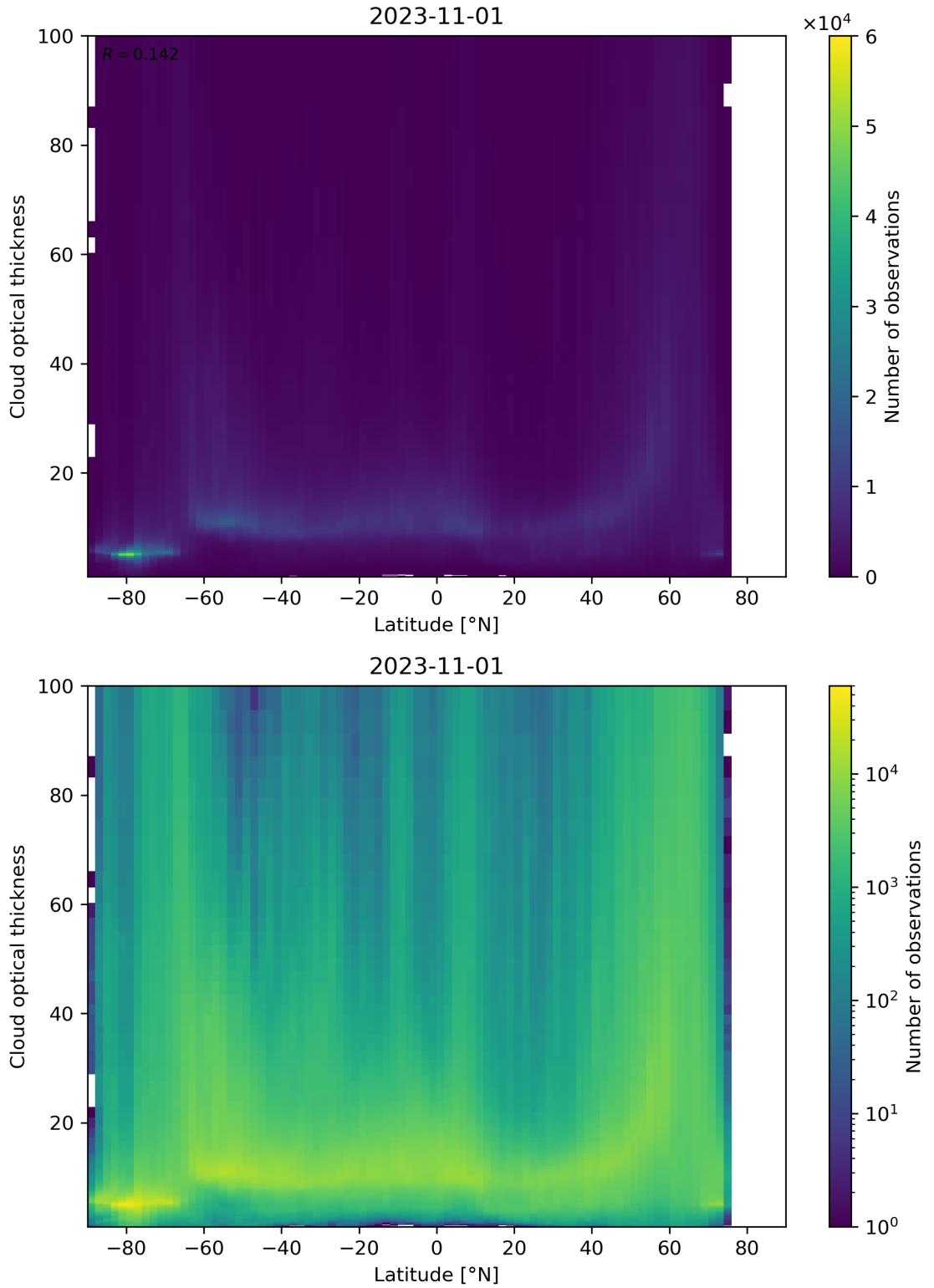


Figure 96: Scatter density plot of “Latitude” against “Cloud optical thickness” for 2023-10-31 to 2023-11-02.

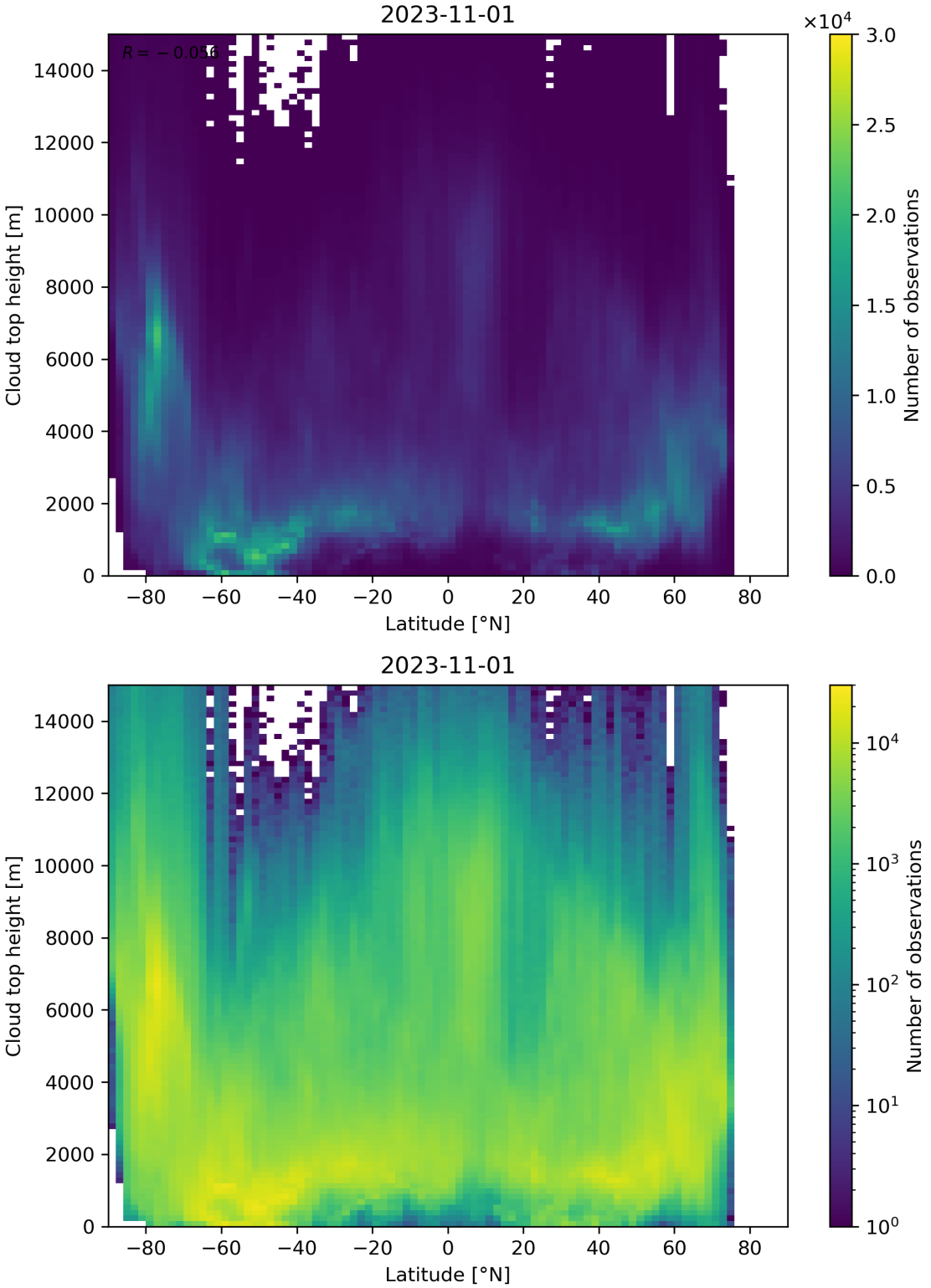


Figure 97: Scatter density plot of “Latitude” against “Cloud top height” for 2023-10-31 to 2023-11-02.

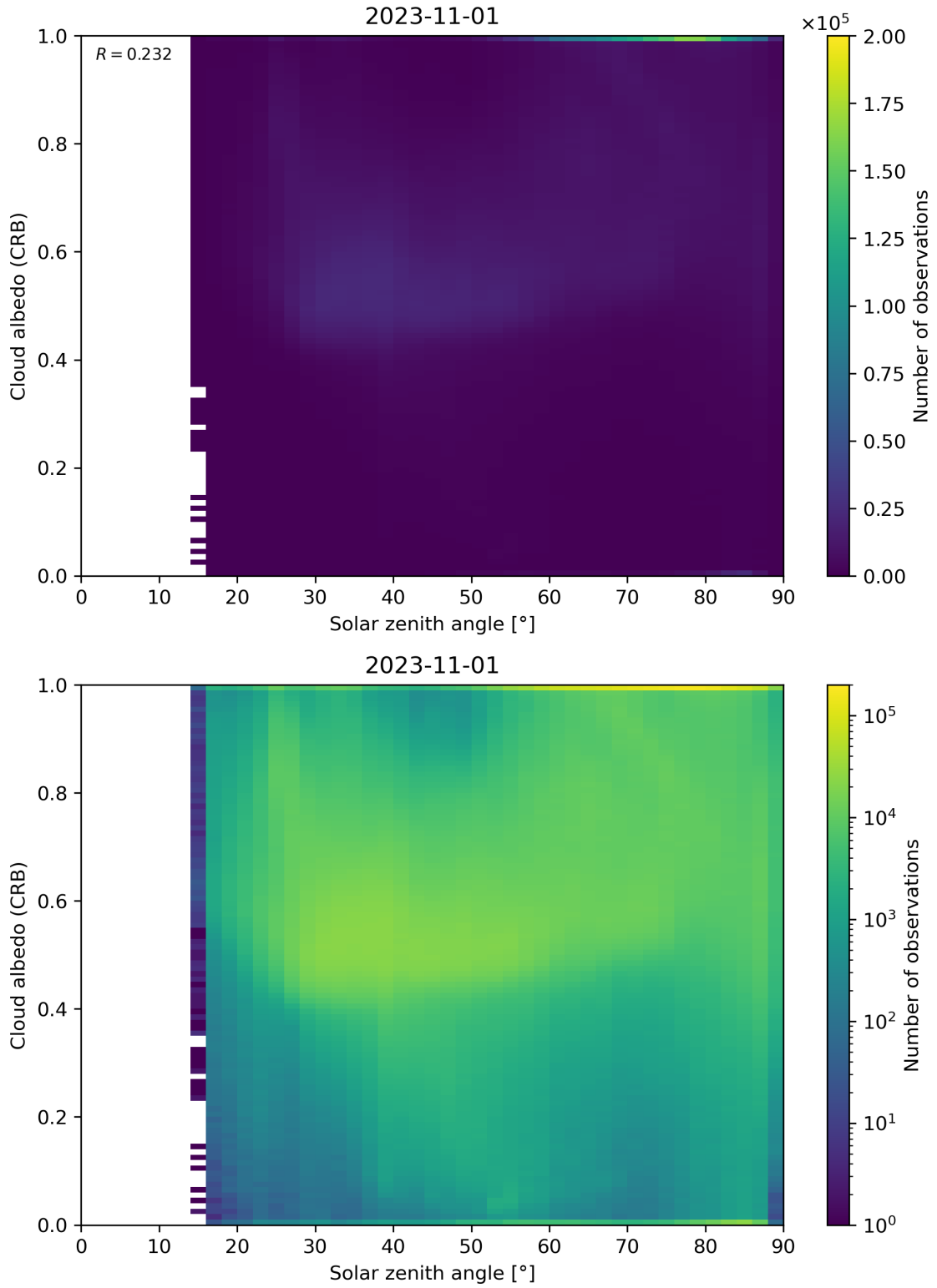


Figure 98: Scatter density plot of “Solar zenith angle” against “Cloud albedo (CRB)” for 2023-10-31 to 2023-11-02.

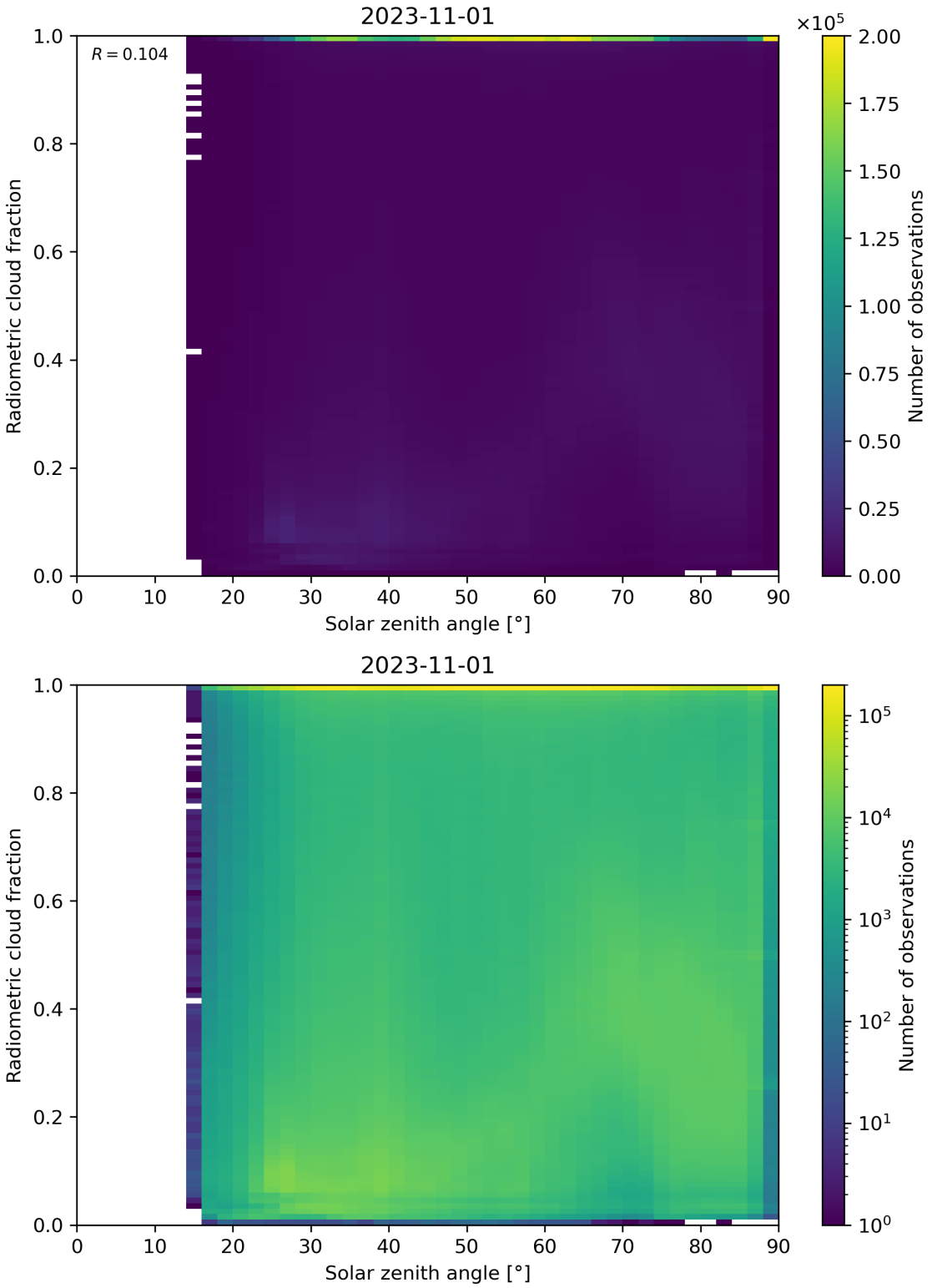


Figure 99: Scatter density plot of “Solar zenith angle” against “Radiometric cloud fraction” for 2023-10-31 to 2023-11-02.

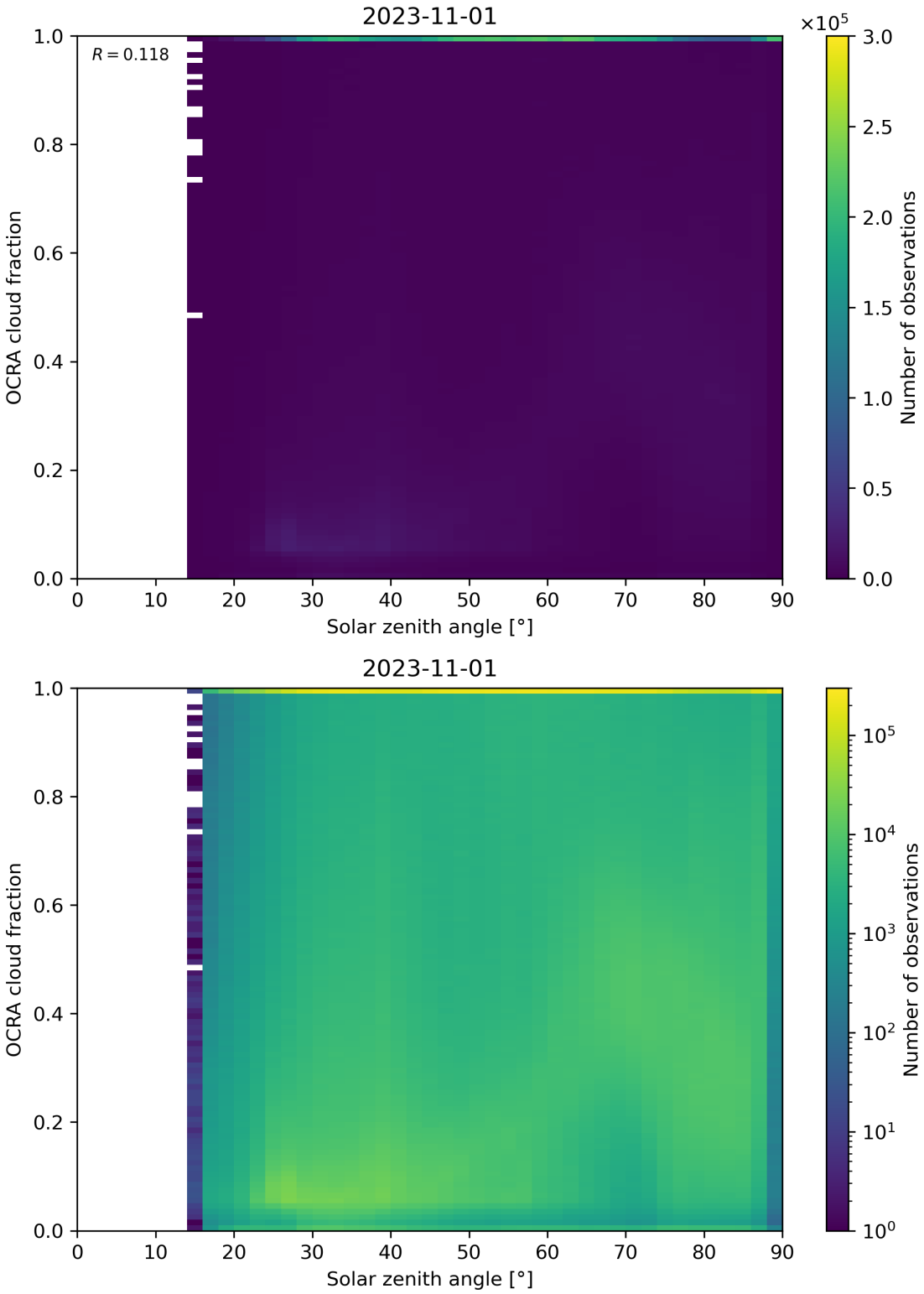


Figure 100: Scatter density plot of “Solar zenith angle” against “OCRA cloud fraction” for 2023-10-31 to 2023-11-02.

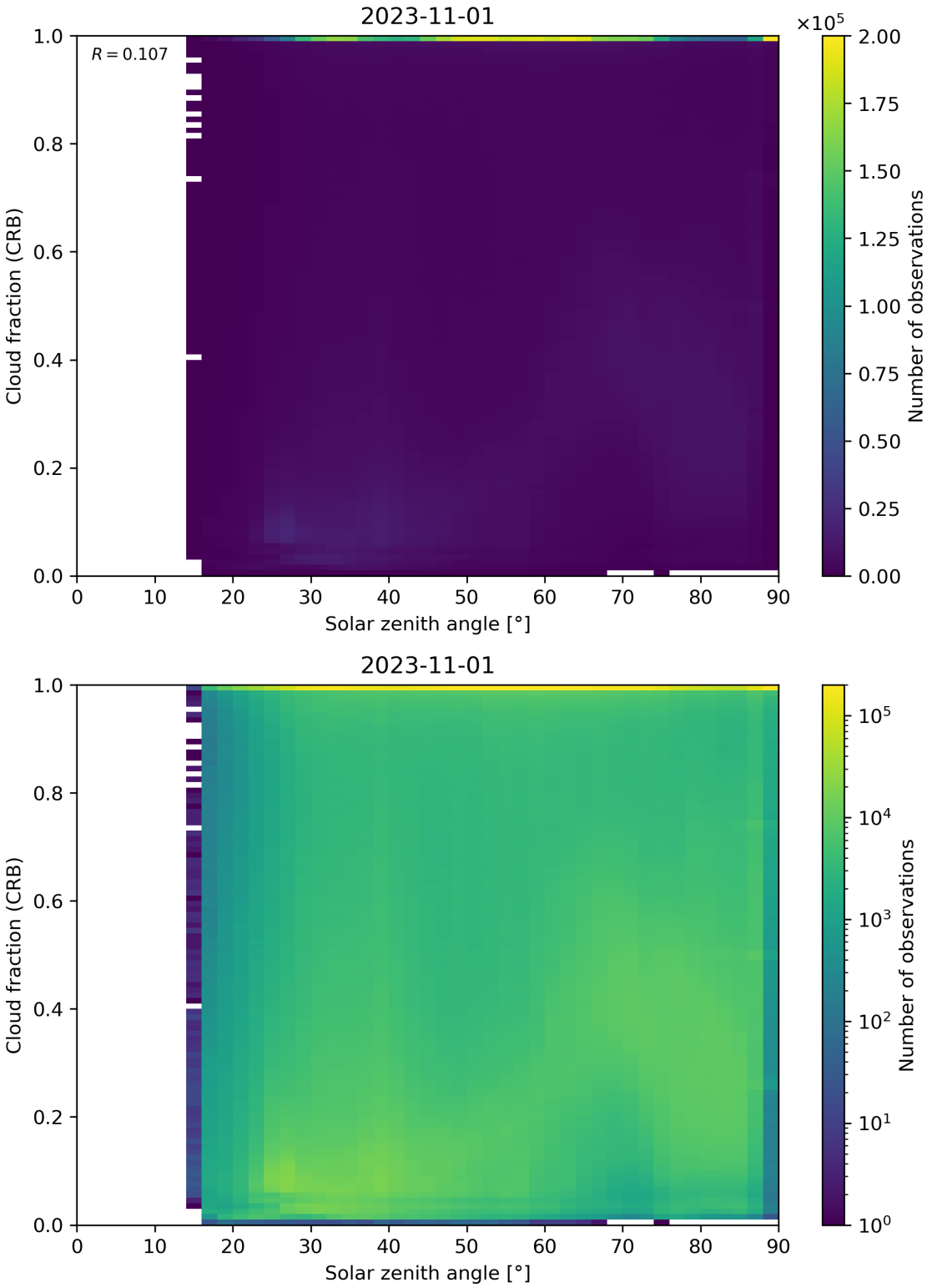


Figure 101: Scatter density plot of “Solar zenith angle” against “Cloud fraction (CRB)” for 2023-10-31 to 2023-11-02.

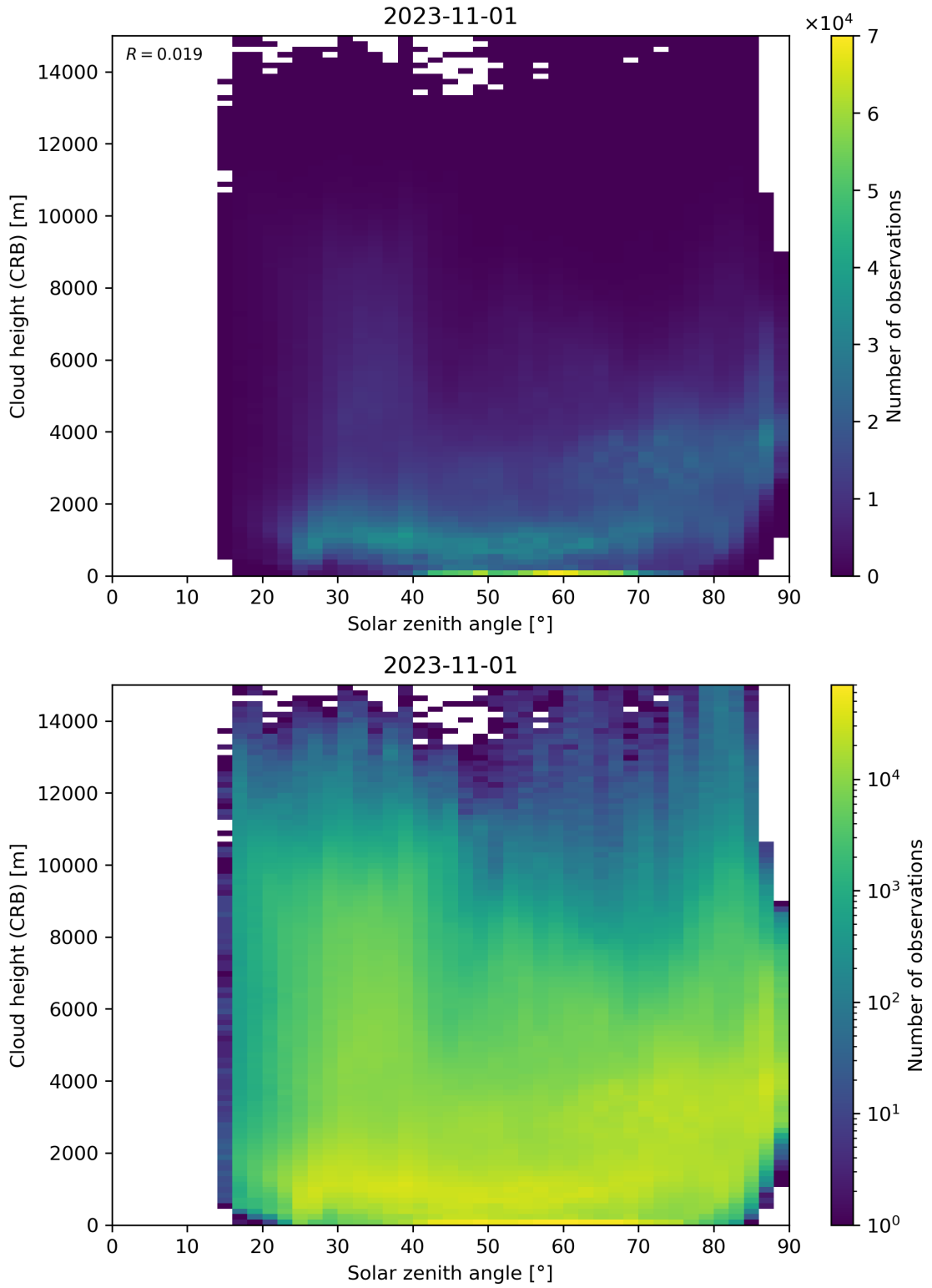


Figure 102: Scatter density plot of “Solar zenith angle” against “Cloud height (CRB)” for 2023-10-31 to 2023-11-02.

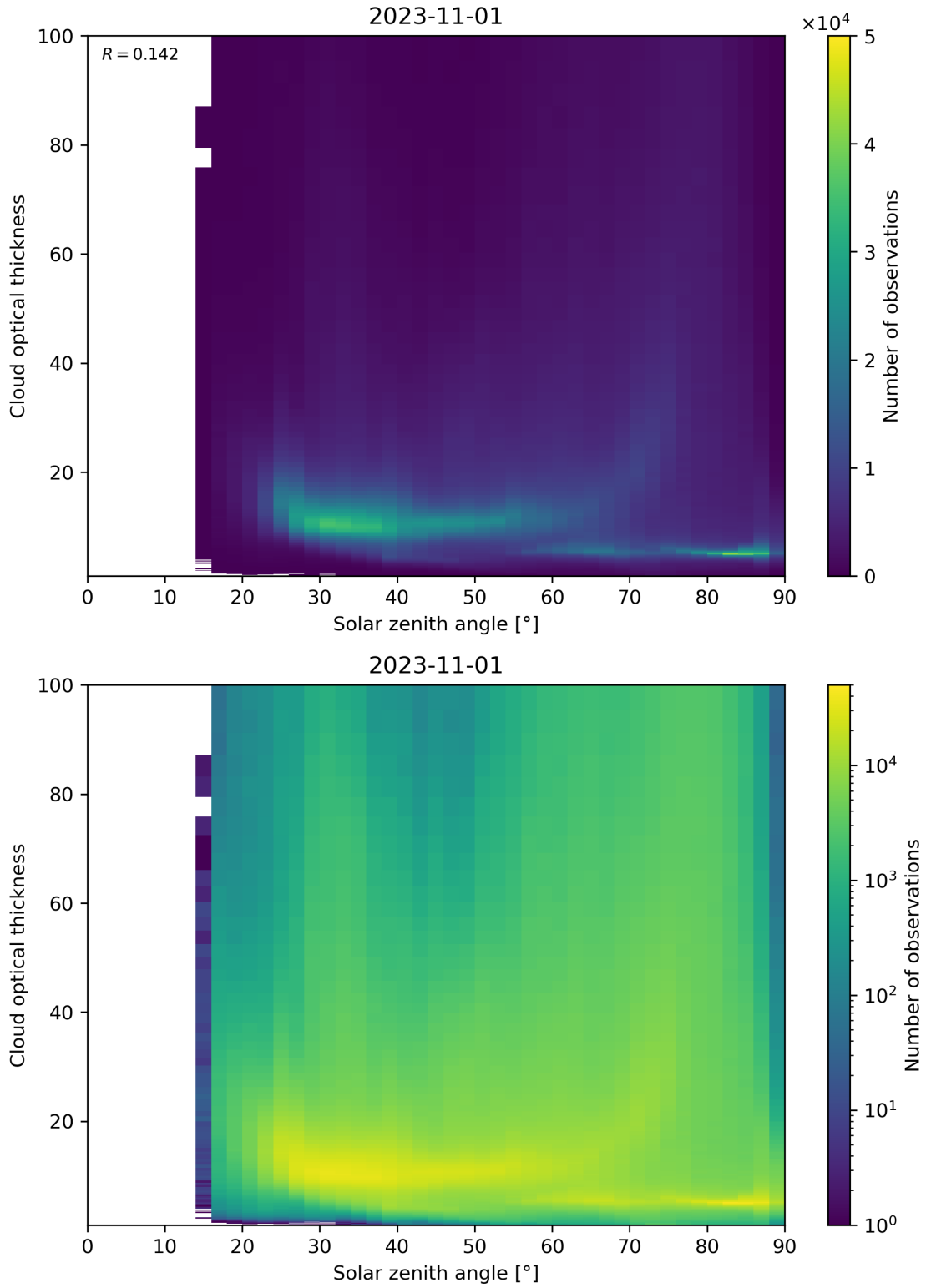


Figure 103: Scatter density plot of “Solar zenith angle” against “Cloud optical thickness” for 2023-10-31 to 2023-11-02.

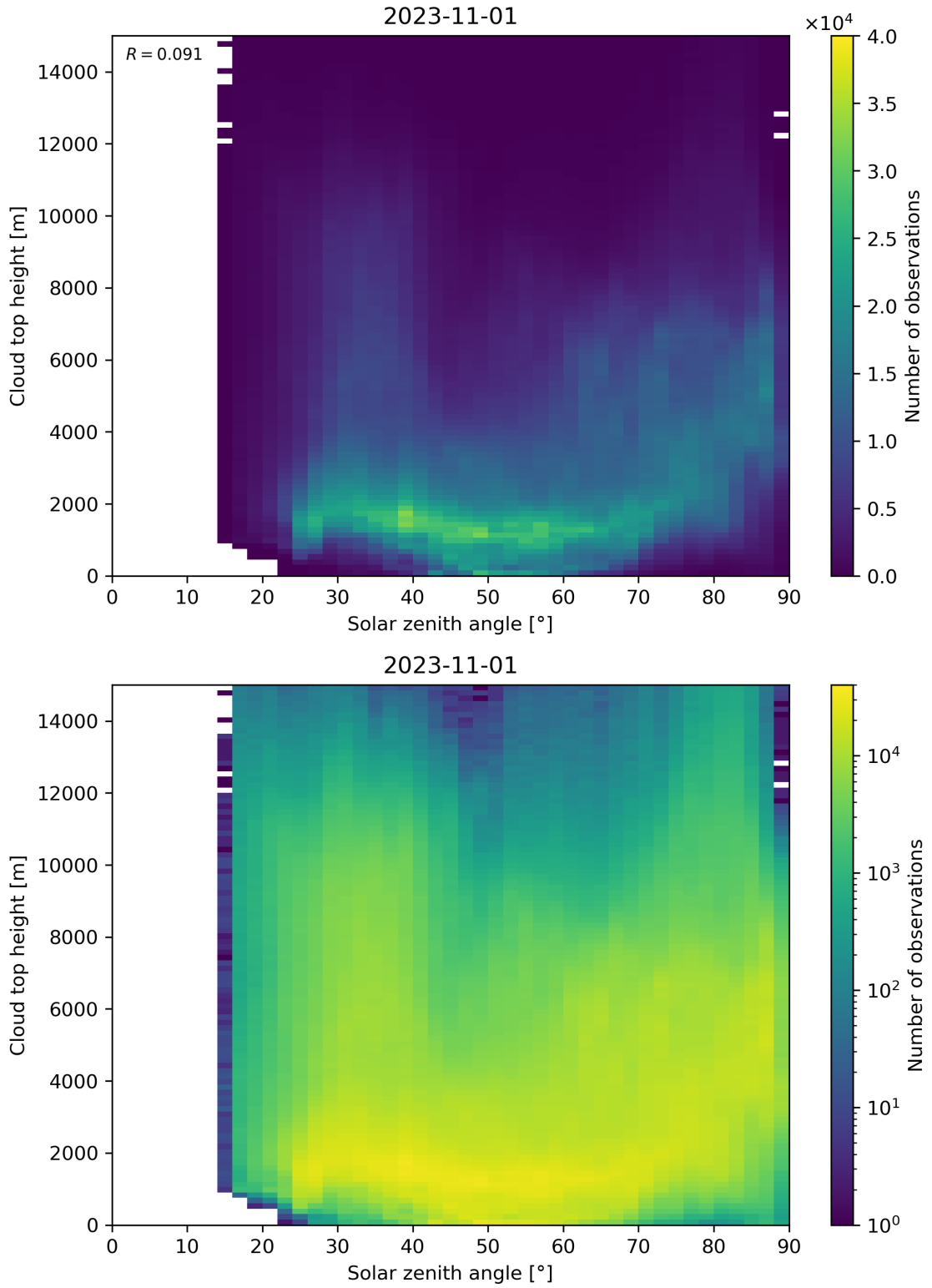


Figure 104: Scatter density plot of “Solar zenith angle” against “Cloud top height” for 2023-10-31 to 2023-11-02.

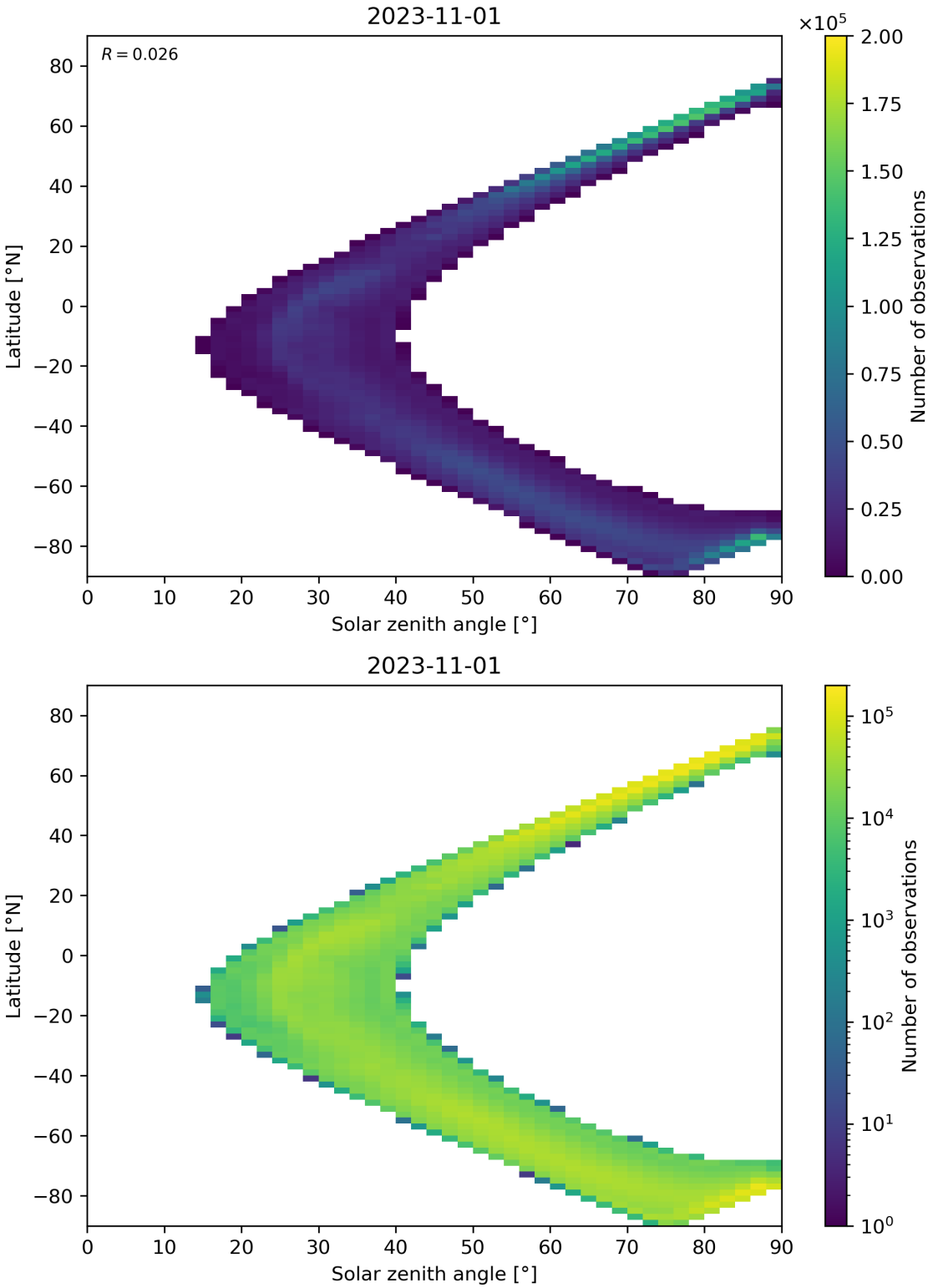


Figure 105: Scatter density plot of “Solar zenith angle” against “Latitude” for 2023-10-31 to 2023-11-02.

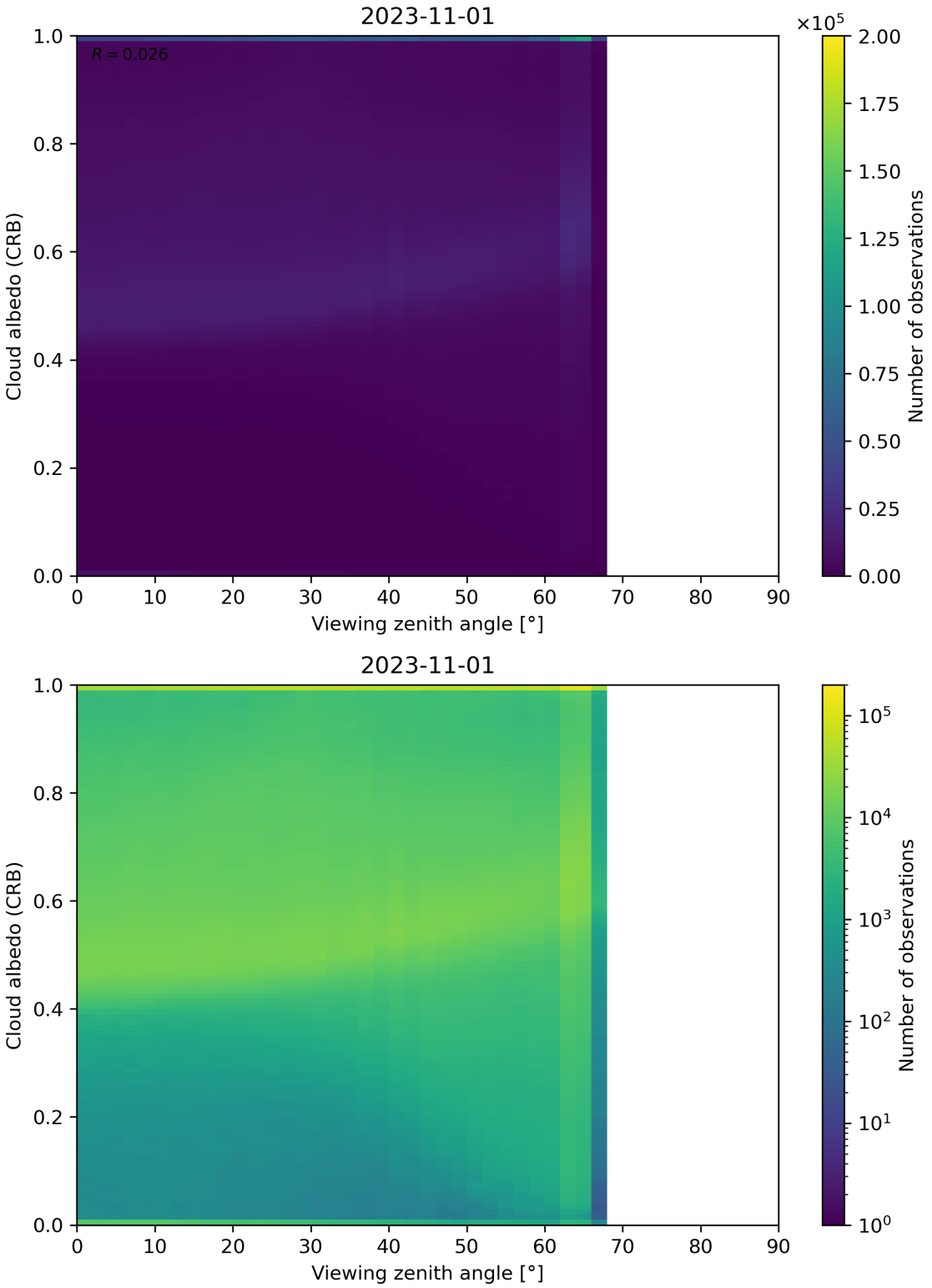


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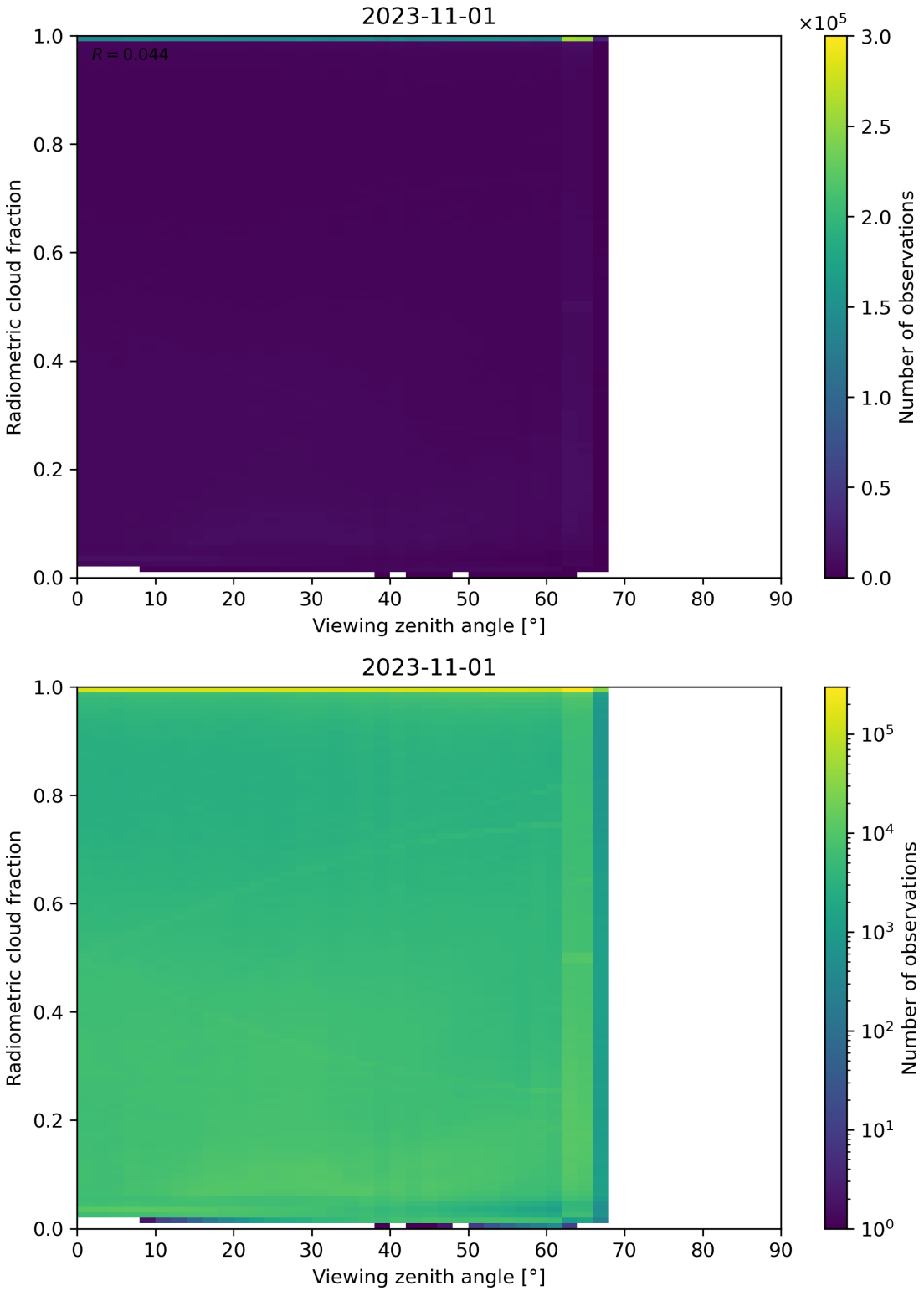


Figure 107: Scatter density plot of “Viewing zenith angle” against “Radiometric cloud fraction” for 2023-10-31 to 2023-11-02.

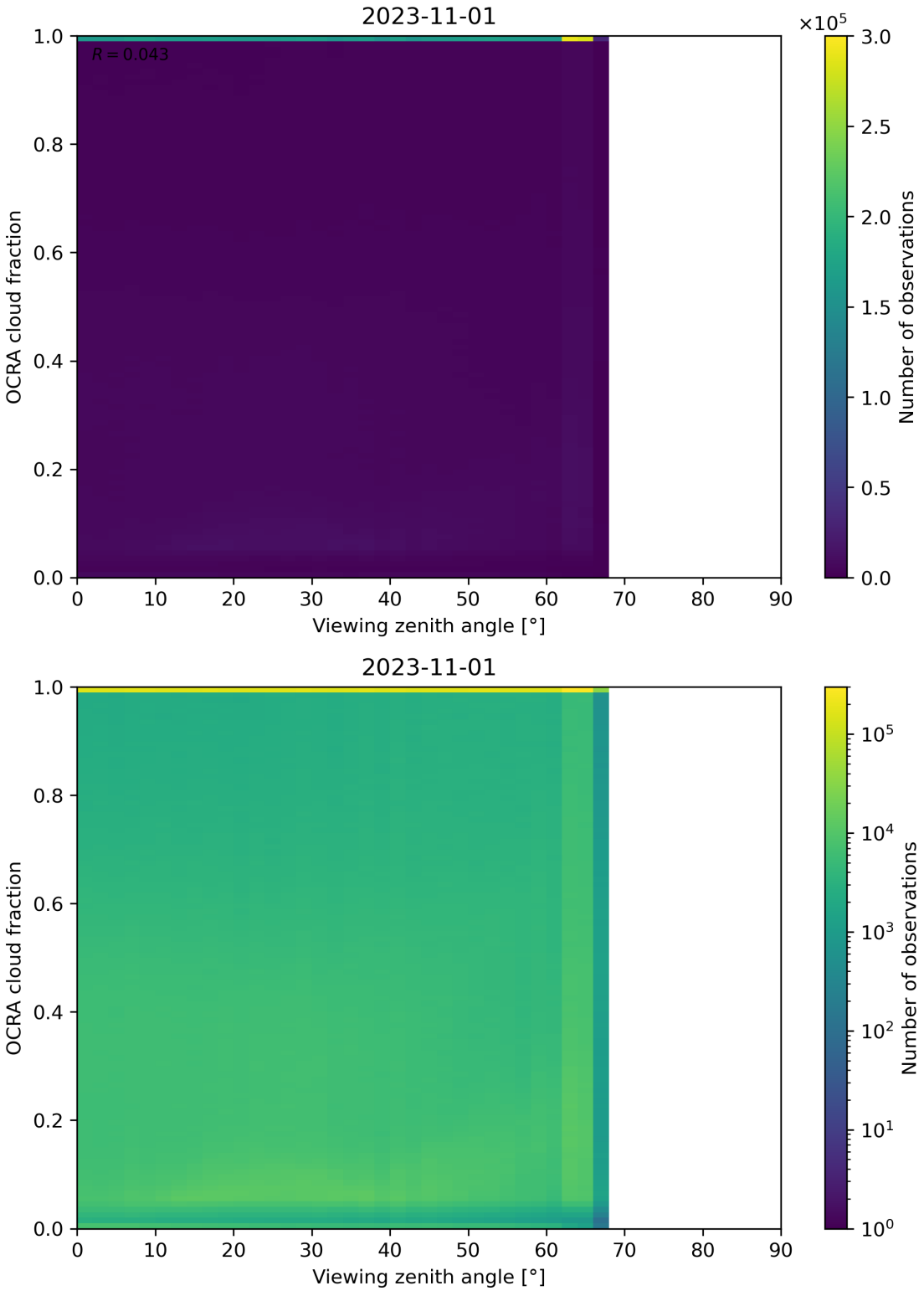


Figure 108: Scatter density plot of “Viewing zenith angle” against “OCRA cloud fraction” for 2023-10-31 to 2023-11-02.

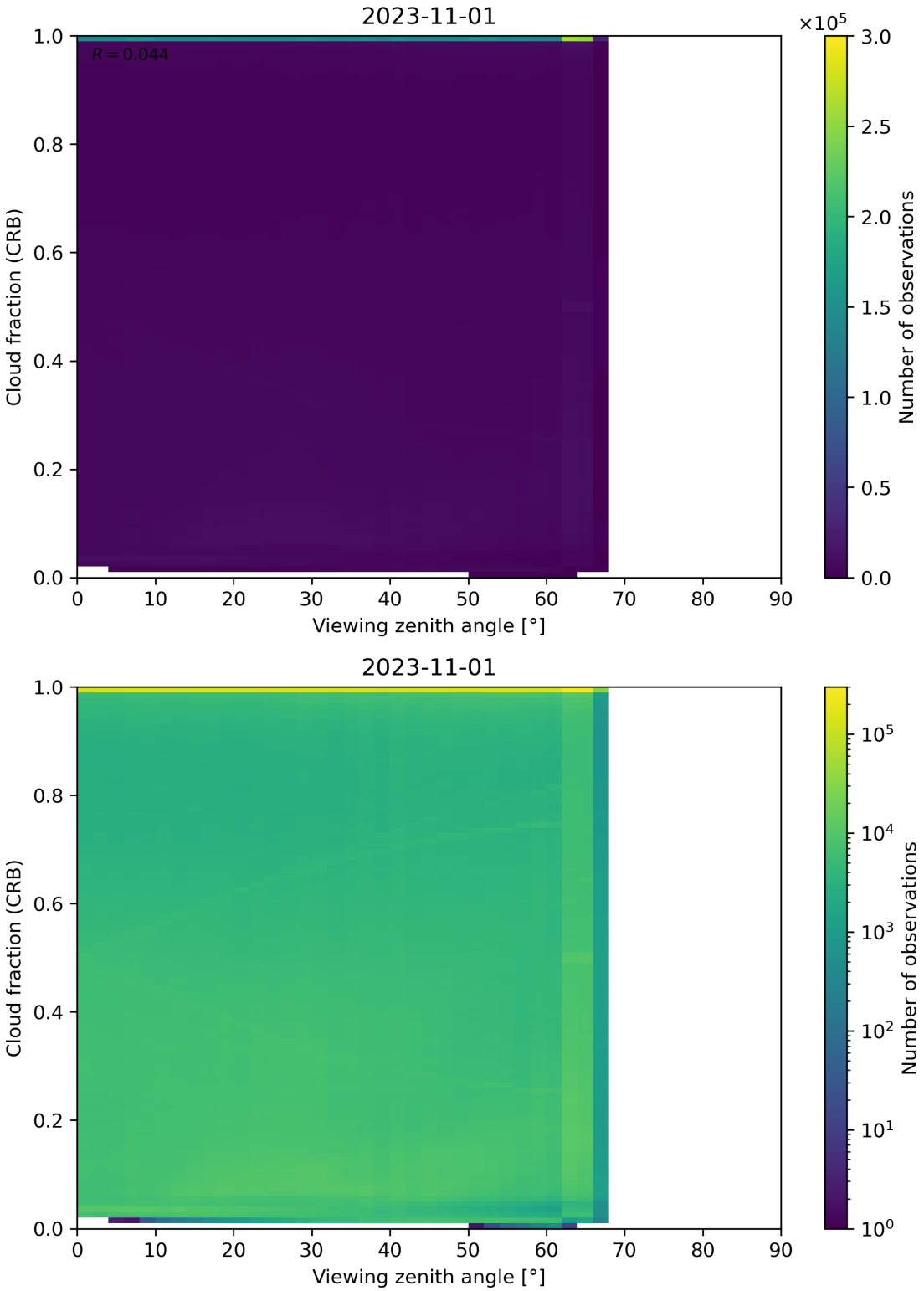


Figure 109: Scatter density plot of “Viewing zenith angle” against “Cloud fraction (CRB)” for 2023-10-31 to 2023-11-02.

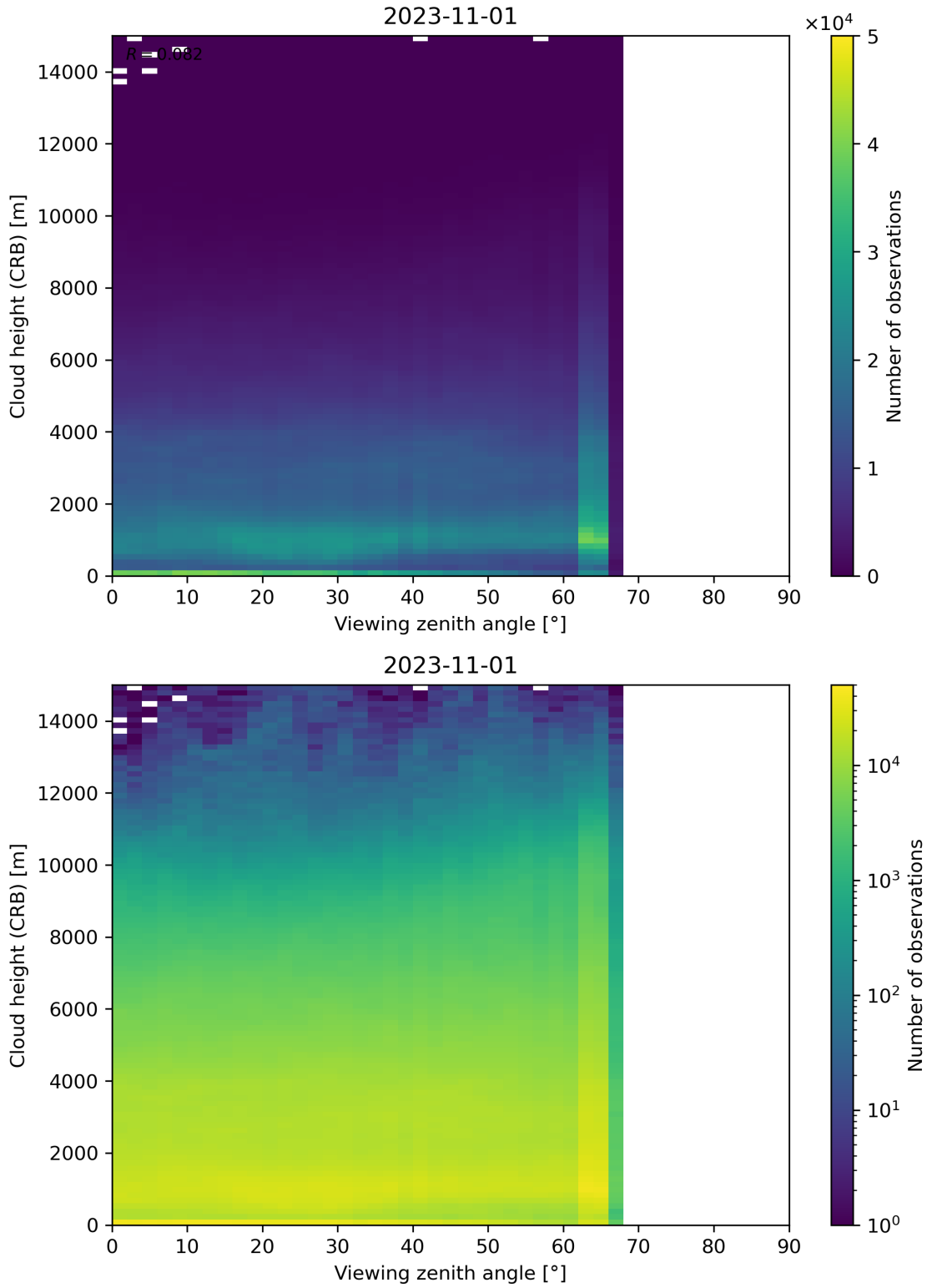


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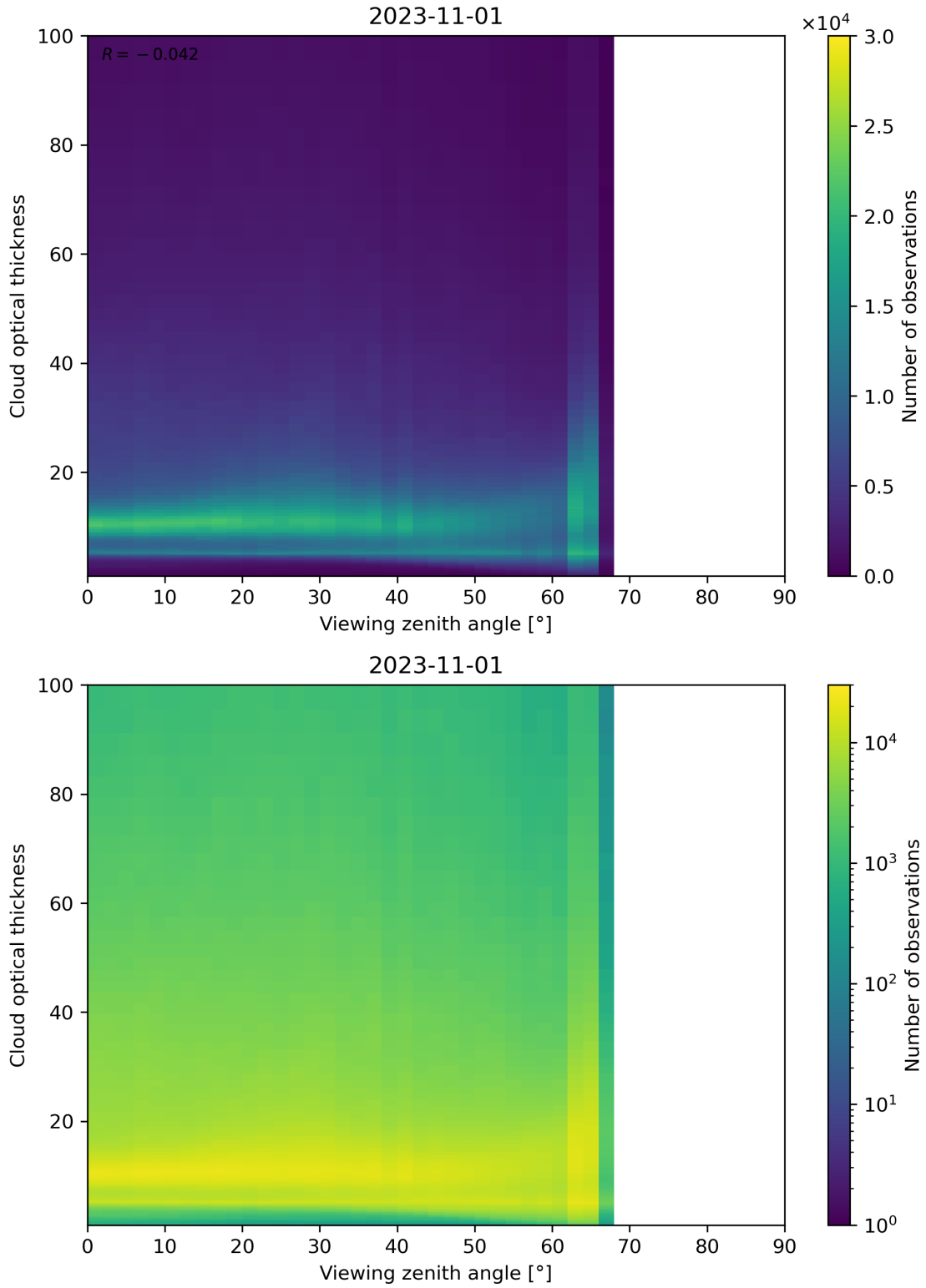


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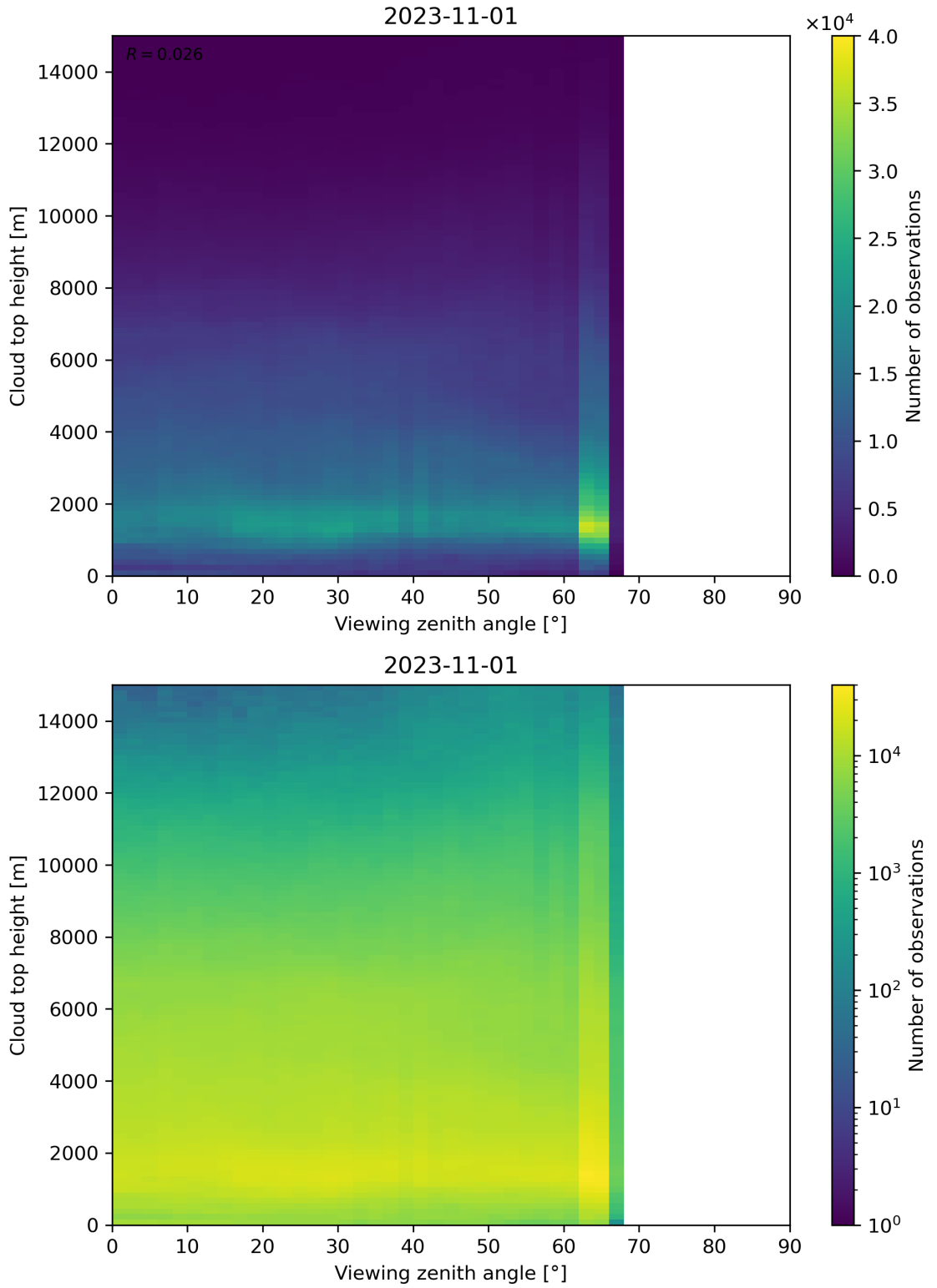


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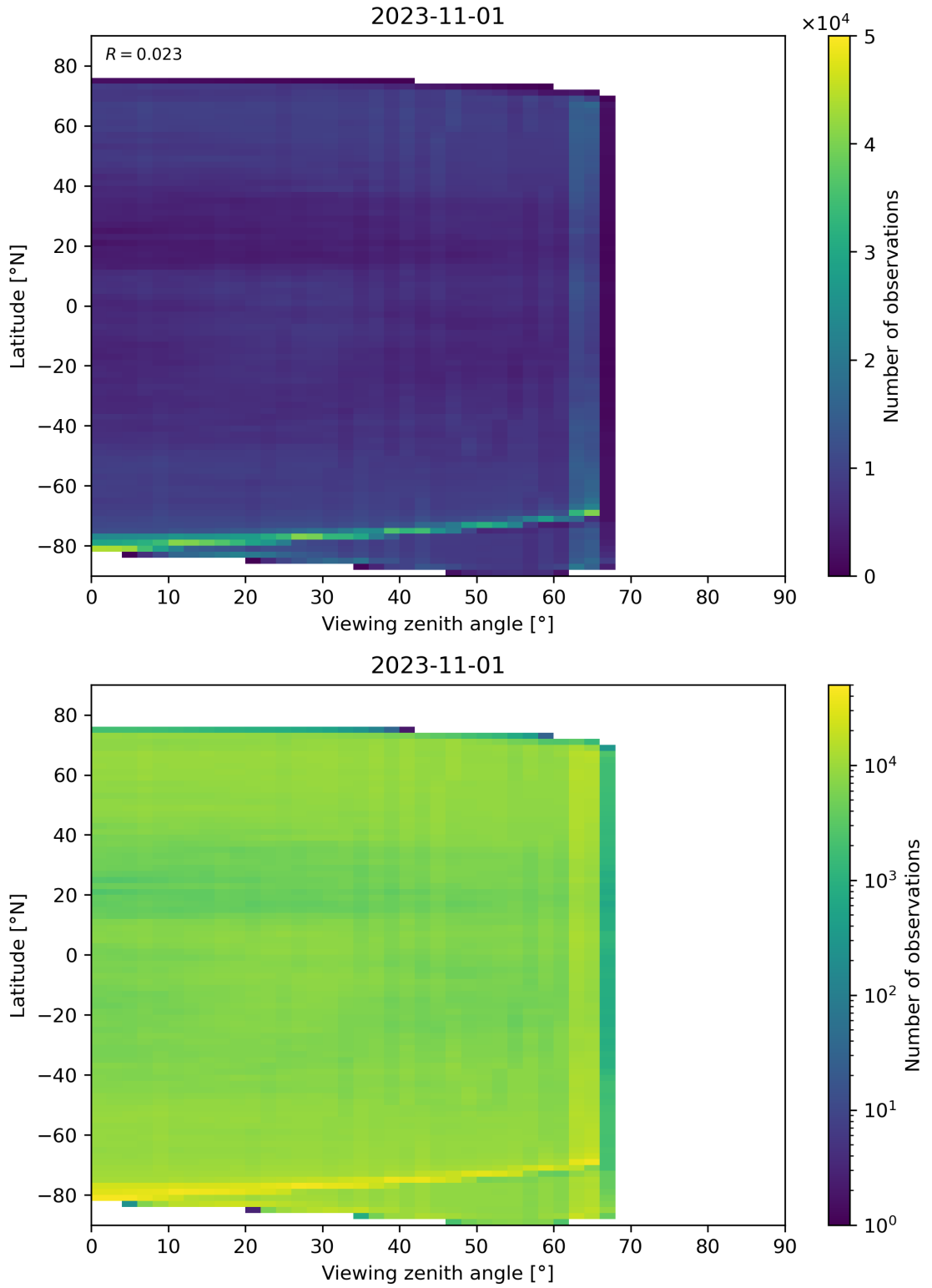


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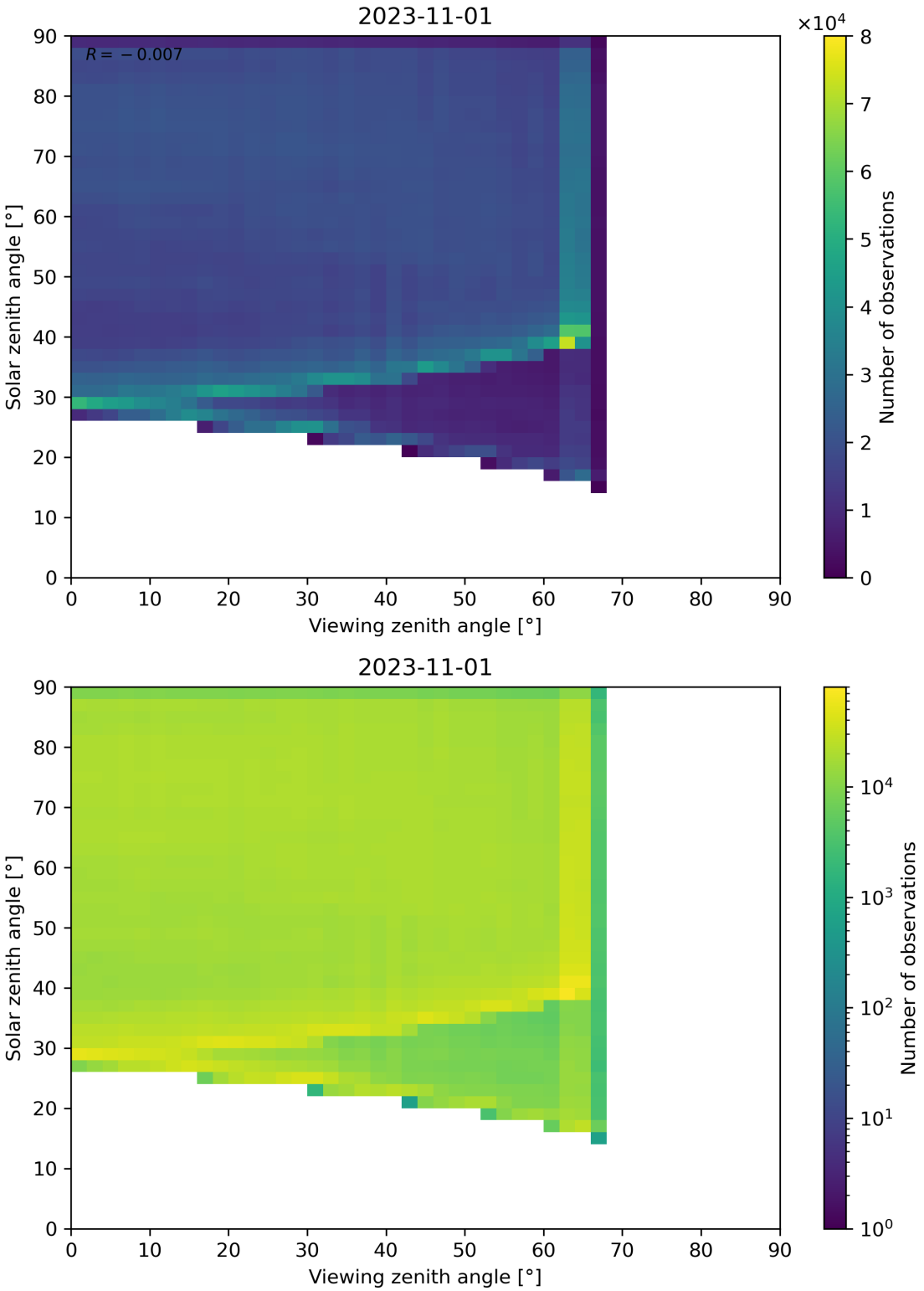


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Maarten Sneep (maarten.sneep@knmi.nl).