PyCAMA report generated by tropl2-proc

tropl2-proc

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1 Short Introduction

1.1 The list of parameters

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

2 Definitions

The averages shown here are *unweighed* averages:

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

with N the number of observations in the dataset.

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

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

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

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

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

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

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

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

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

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

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

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

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

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm\sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.538 ± 0.414	20390401	5.000×10^{-3}	0.840	0.730	0.0	1.000
cloud fraction [1]	0.563 ± 0.340	20390401	0.995	0.716	0.535	5.256×10^{-3}	1.000
cloud top height [m]	$(0.398 \pm 0.275) \times 10^4$	20390401	1.575×10^3	3.963×10^3	3.400×10^3	0.0	2.000×10^4
cloud optical thickness [1]	19.0 ± 33.7	20390401	5.13	11.4	9.78	1.000	250
cloud fraction crb [1]	0.563 ± 0.340	20390401	0.995	0.716	0.535	1.530×10^{-3}	1.000
cloud height crb [m]	$(0.299 \pm 0.229) \times 10^4$	20390401	75.0	3.156×10^3	2.507×10^3	0.0	2.000×10^4
cloud albedo crb [1]	0.650 ± 0.212	20390401	0.995	0.293	0.635	0.0	1.000
surface albedo fitted [1]	0.299 ± 0.359	20390401	1.500×10^{-2}	0.606	7.618×10^{-2}	0.0	1.000
surface albedo fitted crb [1]	0.282 ± 0.342	20390401	1.500×10^{-2}	0.608	5.603×10^{-2}	0.0	1.000
fitted root mean square [1]	$(7.932 \pm 10.374) \times 10^{-4}$	20390401	5.000×10^{-5}	9.879×10^{-4}	5.009×10^{-4}	9.117×10^{-7}	0.239
fitted root mean square crb [1]	$(7.125 \pm 8.371) \times 10^{-4}$	20390401	5.000×10^{-5}	9.405×10^{-4}	4.086×10^{-4}	7.462×10^{-7}	0.559
wavelength shift [nm]	$(9.774 \pm 7.526) \times 10^{-3}$	20390401	9.000×10^{-4}	1.097×10^{-2}	9.462×10^{-3}	-5.035×10^{-2}	7.757×10^{-2}
cloud fraction apriori [1]	0.571 ± 0.346	20390401	0.995	0.752	0.551	0.0	1.000
reflectance blue ocra [1]	0.602 ± 0.235	20390401	0.295	0.414	0.588	0.132	2.10
reflectance green ocra [1]	0.557 ± 0.266	20390401	0.195	0.491	0.549	8.093×10^{-2}	2.01
reflectance continuum aband [1]	0.513 ± 0.291	20390401	0.795	0.503	0.520	1.231×10^{-2}	4.42

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	7.000×10^{-2}	0.910	1.000	1.000	1.000	1.000
cloud fraction [1]	2.638×10^{-2}	6.957×10^{-2}	0.110	0.161	0.248	0.964	1.000	1.000	1.000	1.000
cloud top height [m]	229	673	1.016×10^{3}	1.336×10^{3}	1.744×10^{3}	5.707×10^{3}	6.785×10^{3}	7.820×10^{3}	9.213×10^{3}	1.176×10^{4}
cloud optical thickness [1]	1.000	2.37	3.60	4.53	5.48	16.8	24.6	36.3	65.0	240
cloud fraction crb [1]	2.613×10^{-2}	6.914×10^{-2}	0.110	0.161	0.247	0.963	1.000	1.000	1.000	1.000
cloud height crb [m]	0.0	205	511	798	1.156×10^{3}	4.312×10^{3}	5.400×10^{3}	6.383×10^{3}	7.546×10^{3}	9.454×10^{3}
cloud albedo crb [1]	5.576×10^{-2}	0.294	0.413	0.466	0.513	0.807	0.894	0.962	1.000	1.000
surface albedo fitted [1]	0.0	9.410×10^{-3}	1.434×10^{-2}	1.885×10^{-2}	2.604×10^{-2}	0.632	0.855	0.927	0.975	1.000
surface albedo fitted crb [1]	2.213×10^{-3}	7.592×10^{-3}	1.093×10^{-2}	1.430×10^{-2}	1.972×10^{-2}	0.627	0.806	0.865	0.908	0.956
fitted root mean square [1]	1.821×10^{-5}	3.896×10^{-5}	6.580×10^{-5}	1.020×10^{-4}	1.678×10^{-4}	1.156×10^{-3}	1.567×10^{-3}	1.937×10^{-3}	2.412×10^{-3}	3.404×10^{-3}
fitted root mean square crb [1]	1.113×10^{-5}	2.767×10^{-5}	4.689×10^{-5}	7.290×10^{-5}	1.244×10^{-4}	1.065×10^{-3}	1.478×10^{-3}	1.846×10^{-3}	2.315×10^{-3}	3.255×10^{-3}
wavelength shift [nm]	-7.123×10^{-3}	-3.847×10^{-4}	6.983×10^{-4}	1.982×10^{-3}	4.072×10^{-3}	1.504×10^{-2}	1.750×10^{-2}	1.957×10^{-2}	2.222×10^{-2}	2.763×10^{-2}
cloud fraction apriori [1]	1.711×10^{-2}	6.394×10^{-2}	0.102	0.155	0.248	1.000	1.000	1.000	1.000	1.000
reflectance blue ocra [1]	0.235	0.266	0.297	0.334	0.393	0.807	0.868	0.907	0.944	1.10
reflectance green ocra [1]	0.158	0.186	0.210	0.242	0.304	0.796	0.863	0.910	0.949	1.06
reflectance continuum aband [1]	3.502×10^{-2}	6.783×10^{-2}	0.111	0.163	0.260	0.763	0.835	0.886	0.939	1.06

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]	0.622 ± 0.399	7676766	0.790	0.870	0.0	1.000	0.180	0.970
cloud fraction [1]	0.579 ± 0.355	7676766	0.765	0.579	5.256×10^{-3}	1.000	0.230	0.995
cloud top height [m]	$(0.441 \pm 0.278) \times 10^4$	7676766	4.263×10^3	3.838×10^3	0.0	2.000×10^4	2.050×10^3	6.313×10^3
cloud optical thickness [1]	26.5 ± 43.9	7676766	17.3	11.0	1.000	250	6.34	23.6
cloud fraction crb [1]	0.578 ± 0.356	7676766	0.766	0.576	8.445×10^{-3}	1.000	0.229	0.995
cloud height crb [m]	$(0.370 \pm 0.241) \times 10^4$	7676766	3.847×10^3	3.246×10^3	0.0	2.000×10^4	1.593×10^3	5.440×10^3
cloud albedo crb [1]	0.601 ± 0.198	7676766	0.233	0.591	0.0	1.000	0.489	0.723
surface albedo fitted [1]	0.139 ± 0.170	7676766	0.177	5.508×10^{-2}	0.0	1.000	2.493×10^{-2}	0.202
surface albedo fitted crb [1]	0.132 ± 0.169	7676766	0.172	4.219×10^{-2}	0.0	1.000	1.949×10^{-2}	0.191
fitted root mean square [1]	$(4.408 \pm 5.751) \times 10^{-4}$	7676766	4.724×10^{-4}	2.478×10^{-4}	9.117×10^{-7}	8.828×10^{-2}	1.032×10^{-4}	5.755×10^{-4}
fitted root mean square crb [1]	$(3.860 \pm 4.999) \times 10^{-4}$	7676766	4.454×10^{-4}	1.867×10^{-4}	7.462×10^{-7}	4.042×10^{-2}	6.816×10^{-5}	5.136×10^{-4}
wavelength shift [nm]	$(7.177 \pm 6.827) \times 10^{-3}$	7676766	9.237×10^{-3}	6.334×10^{-3}	-4.217×10^{-2}	5.718×10^{-2}	2.138×10^{-3}	1.137×10^{-2}
cloud fraction apriori [1]	0.582 ± 0.362	7676766	0.777	0.586	0.0	1.000	0.223	1.000
reflectance blue ocra [1]	0.539 ± 0.201	7676766	0.302	0.512	0.134	2.03	0.374	0.676
reflectance green ocra [1]	0.480 ± 0.228	7676766	0.366	0.453	8.280×10^{-2}	2.01	0.281	0.647
reflectance continuum aband [1]	0.434 ± 0.262	7676766	0.398	0.412	1.231×10^{-2}	4.42	0.224	0.622

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]	0.487 ± 0.415	12713635	0.870	0.460	0.0	1.000	3.000×10^{-2}	0.900
cloud fraction [1]	0.553 ± 0.330	12713635	0.668	0.518	7.246×10^{-3}	1.000	0.258	0.926
cloud top height [m]	$(0.373 \pm 0.269) \times 10^4$	12713635	3.799×10^3	3.133×10^3	0.0	2.000×10^4	1.566×10^3	5.365×10^3
cloud optical thickness [1]	14.5 ± 24.6	12713635	9.45	9.15	1.000	250	5.22	14.7
cloud fraction crb [1]	0.553 ± 0.330	12713635	0.668	0.519	1.530×10^{-3}	1.000	0.258	0.926
cloud height crb [m]	$(0.256 \pm 0.211) \times 10^4$	12713635	2.757×10^3	2.110×10^3	0.0	2.000×10^4	913	3.670×10^3
cloud albedo crb [1]	0.680 ± 0.215	12713635	0.323	0.674	0.0	1.000	0.530	0.853
surface albedo fitted [1]	0.395 ± 0.405	12713635	0.830	0.150	0.0	1.000	2.683×10^{-2}	0.857
surface albedo fitted crb [1]	0.373 ± 0.385	12713635	0.788	0.144	0.0	1.000	1.990×10^{-2}	0.808
fitted root mean square [1]	$(1.006 \pm 1.186) \times 10^{-3}$	12713635	1.200×10^{-3}	7.640×10^{-4}	1.086×10^{-6}	0.239	2.818×10^{-4}	1.482×10^{-3}
fitted root mean square crb [1]	$(9.096 \pm 9.326) \times 10^{-4}$	12713635	1.183×10^{-3}	6.530×10^{-4}	9.724×10^{-7}	0.559	2.075×10^{-4}	1.390×10^{-3}
wavelength shift [nm]	$(1.134 \pm 0.749) \times 10^{-2}$	12713635	1.065×10^{-2}	1.160×10^{-2}	-5.035×10^{-2}	7.757×10^{-2}	5.921×10^{-3}	1.657×10^{-2}
cloud fraction apriori [1]	0.564 ± 0.336	12713635	0.716	0.538	0.0	1.000	0.263	0.979
reflectance blue ocra [1]	0.640 ± 0.245	12713635	0.441	0.676	0.132	2.10	0.411	0.852
reflectance green ocra [1]	0.604 ± 0.276	12713635	0.517	0.654	8.093×10^{-2}	1.95	0.330	0.847
reflectance continuum aband [1]	0.561 ± 0.297	12713635	0.516	0.618	1.363×10^{-2}	4.39	0.296	0.811

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]	0.695 ± 0.348	12544437	0.560	0.890	0.0	1.000	0.400	0.960
cloud fraction [1]	0.600 ± 0.357	12544437	0.757	0.635	7.246×10^{-3}	1.000	0.243	1.000
cloud top height [m]	$(0.345 \pm 0.263) \times 10^4$	12544437	3.354×10^3	2.537×10^3	0.0	2.000×10^4	1.505×10^3	4.859×10^3
cloud optical thickness [1]	19.2 ± 28.9	12544437	10.7	11.4	1.000	250	7.80	18.5
cloud fraction crb [1]	0.599 ± 0.358	12544437	0.759	0.633	1.530×10^{-3}	1.000	0.241	1.000
cloud height crb [m]	$(0.271 \pm 0.234) \times 10^4$	12544437	3.066×10^3	1.862×10^3	0.0	2.000×10^4	951	4.017×10^3
cloud albedo crb [1]	0.608 ± 0.176	12544437	0.224	0.596	0.0	1.000	0.501	0.725
surface albedo fitted [1]	0.124 ± 0.235	12544437	4.213×10^{-2}	3.179×10^{-2}	0.0	1.000	1.856×10^{-2}	6.069×10^{-2}
surface albedo fitted crb [1]	0.116 ± 0.234	12544437	3.020×10^{-2}	2.394×10^{-2}	0.0	1.000	1.408×10^{-2}	4.428×10^{-2}
fitted root mean square [1]	$(7.584 \pm 11.448) \times 10^{-4}$	12544437	1.009×10^{-3}	4.044×10^{-4}	9.117×10^{-7}	0.147	1.257×10^{-4}	1.135×10^{-3}
fitted root mean square crb [1]	$(7.213 \pm 8.659) \times 10^{-4}$	12544437	9.957×10^{-4}	3.752×10^{-4}	7.462×10^{-7}	0.124	1.100×10^{-4}	1.106×10^{-3}
wavelength shift [nm]	$(9.293 \pm 7.749) \times 10^{-3}$	12544437	1.106×10^{-2}	8.906×10^{-3}	-4.806×10^{-2}	7.506×10^{-2}	3.556×10^{-3}	1.462×10^{-2}
cloud fraction apriori [1]	0.604 ± 0.365	12544437	0.766	0.648	0.0	1.000	0.234	1.000
reflectance blue ocra [1]	0.536 ± 0.206	12544437	0.328	0.504	0.139	2.07	0.363	0.691
reflectance green ocra [1]	0.479 ± 0.232	12544437	0.401	0.446	9.489×10^{-2}	1.91	0.267	0.668
reflectance continuum aband [1]	0.418 ± 0.271	12544437	0.486	0.399	1.284×10^{-2}	4.42	0.162	0.648

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]	0.271 ± 0.379	6574609	0.460	8.000×10^{-2}	0.0	1.000	0.0	0.460
cloud fraction [1]	0.482 ± 0.288	6574609	0.424	0.433	5.256×10^{-3}	1.000	0.248	0.672
cloud top height [m]	$(0.490 \pm 0.269) \times 10^4$	6574609	3.345×10^3	4.781×10^3	0.0	2.000×10^4	3.000×10^3	6.346×10^3
cloud optical thickness [1]	15.2 ± 34.4	6574609	6.09	5.68	1.000	250	4.26	10.4
cloud fraction crb [1]	0.483 ± 0.288	6574609	0.425	0.435	6.340×10^{-3}	1.000	0.249	0.674
cloud height crb [m]	$(0.341 \pm 0.209) \times 10^4$	6574609	2.509×10^3	3.189×10^3	0.0	2.000×10^4	1.943×10^3	4.452×10^3
cloud albedo crb [1]	0.730 ± 0.247	6574609	0.390	0.778	0.0	1.000	0.564	0.954
surface albedo fitted [1]	0.635 ± 0.337	6574609	0.688	0.815	0.0	1.000	0.257	0.945
surface albedo fitted crb [1]	0.600 ± 0.311	6574609	0.628	0.769	0.0	1.000	0.251	0.878
fitted root mean square [1]	$(9.040 \pm 8.260) \times 10^{-4}$	6574609	9.344×10^{-4}	6.813×10^{-4}	1.635×10^{-6}	0.239	3.281×10^{-4}	1.262×10^{-3}
fitted root mean square crb [1]	$(7.548 \pm 7.401) \times 10^{-4}$	6574609	8.912×10^{-4}	5.267×10^{-4}	2.278×10^{-6}	7.708×10^{-2}	2.014×10^{-4}	1.093×10^{-3}
wavelength shift [nm]	$(1.125 \pm 0.698) \times 10^{-2}$	6574609	1.042×10^{-2}	1.117×10^{-2}	-4.074×10^{-2}	6.953×10^{-2}	5.867×10^{-3}	1.629×10^{-2}
cloud fraction apriori [1]	0.497 ± 0.293	6574609	0.439	0.454	0.0	1.000	0.259	0.698
reflectance blue ocra [1]	0.724 ± 0.239	6574609	0.370	0.812	0.132	2.10	0.531	0.901
reflectance green ocra [1]	0.701 ± 0.268	6574609	0.425	0.805	8.093×10^{-2}	2.01	0.483	0.907
reflectance continuum aband [1]	0.690 ± 0.248	6574609	0.402	0.767	1.363×10^{-2}	4.39	0.480	0.882

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
Viewing zenith angle	1.000	5.381×10^{-3}	3.063×10^{-2}	3.046×10^{-2}	-6.197×10^{-3}	-4.454×10^{-2}	3.038×10^{-2}	4.758×10^{-2}	2.644×10^{-2}	2.734×10^{-2}
Solar zenith angle	5.381×10^{-3}	1.000	5.899×10^{-2}	9.015×10^{-2}	0.147	0.122	9.269×10^{-2}	9.281×10^{-2}	0.190	0.105
Latitude	3.063×10^{-2}	5.899×10^{-2}	1.000	4.752×10^{-2}	8.957×10^{-2}	0.215	4.373×10^{-2}	0.244	-0.240	2.793×10^{-2}
Radiometric cloud fraction	3.046×10^{-2}	9.015×10^{-2}	4.752×10^{-2}	1.000	-7.857×10^{-2}	0.266	1.000	-3.583×10^{-2}	0.148	0.981
Cloud top height	-6.197×10^{-3}	0.147	8.957×10^{-2}	-7.857×10^{-2}	1.000	6.070×10^{-2}	-7.731×10^{-2}	0.923	0.119	-9.136×10^{-2}
Cloud optical thickness	-4.454×10^{-2}	0.122	0.215	0.266	6.070×10^{-2}	1.000	0.262	0.131	0.299	0.260
Cloud fraction (CRB)	3.038×10^{-2}	9.269×10^{-2}	4.373×10^{-2}	1.000	-7.731×10^{-2}	0.262	1.000	-3.583×10^{-2}	0.149	0.981
Cloud height (CRB)	4.758×10^{-2}	9.281×10^{-2}	0.244	-3.583×10^{-2}	0.923	0.131	-3.583×10^{-2}	1.000	-2.713×10^{-2}	-5.365×10^{-2}
Cloud albedo (CRB)	2.644×10^{-2}	0.190	-0.240	0.148	0.119	0.299	0.149	-2.713×10^{-2}	1.000	0.167
OCRA cloud fraction	2.734×10^{-2}	0.105	2.793×10^{-2}	0.981	-9.136×10^{-2}	0.260	0.981	-5.365×10^{-2}	0.167	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
382	2.02	29.2	0.202	-332	-29.3	0.202	2.132×10^3	0.110	0.185
2.02	371	55.5	0.591	7.792×10^3	79.3	0.607	4.102×10^3	0.776	0.699
29.2	55.5	2.384×10^3	0.789	1.201×10^4	354	0.727	2.736×10^4	-2.48	0.472
0.202	0.591	0.789	0.116	-73.4	3.05	0.116	-28.0	1.071×10^{-2}	0.116
-332	7.792×10^3	1.201×10^4	-73.4	7.538×10^6	5.615×10^3	-72.2	5.812×10^6	69.5	-86.8
-29.3	79.3	354	3.05	5.615×10^3	1.135×10^3	3.00	1.015×10^4	2.14	3.03
0.202	0.607	0.727	0.116	-72.2	3.00	0.116	-28.0	1.079×10^{-2}	0.116
2.132×10^3	4.102×10^3	2.736×10^4	-28.0	5.812×10^6	1.015×10^4	-28.0	5.265×10^6	-13.2	-42.6
0.110	0.776	-2.48	1.071×10^{-2}	69.5	2.14	1.079×10^{-2}	-13.2	4.508×10^{-2}	1.228×10^{-2}
0.185	0.699	0.472	0.116	-86.8	3.03	0.116	-42.6	1.228×10^{-2}	0.120

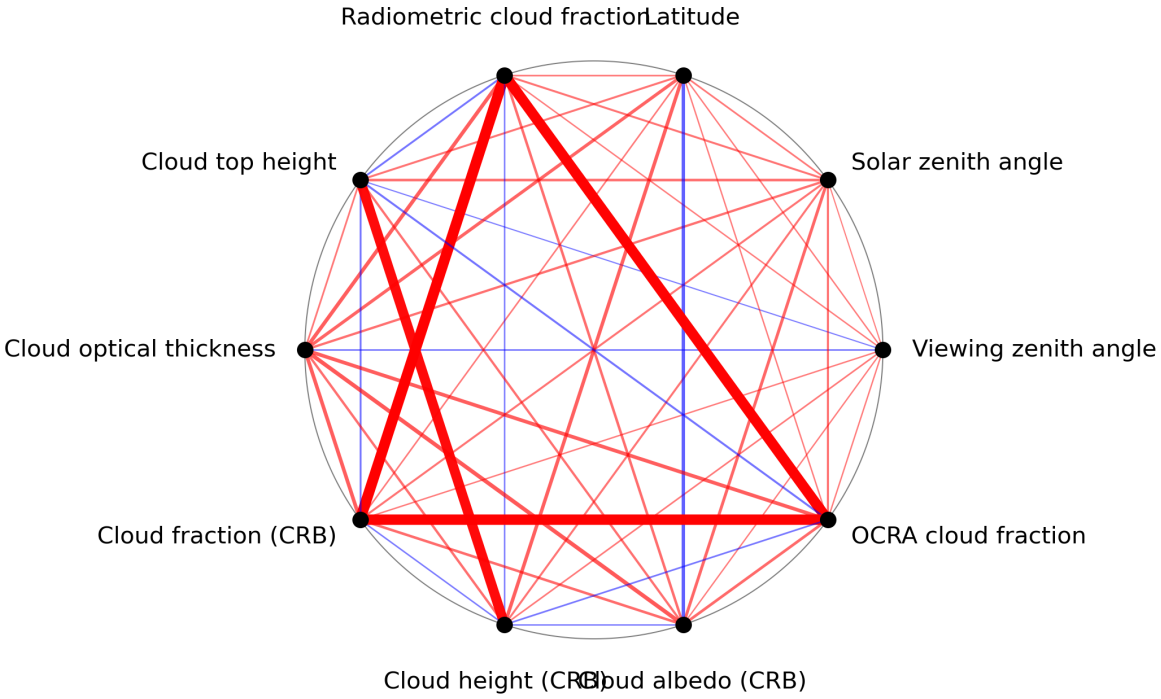

Figure 1: Map of correlation graph for 2023-11-20 to 2023-11-22.

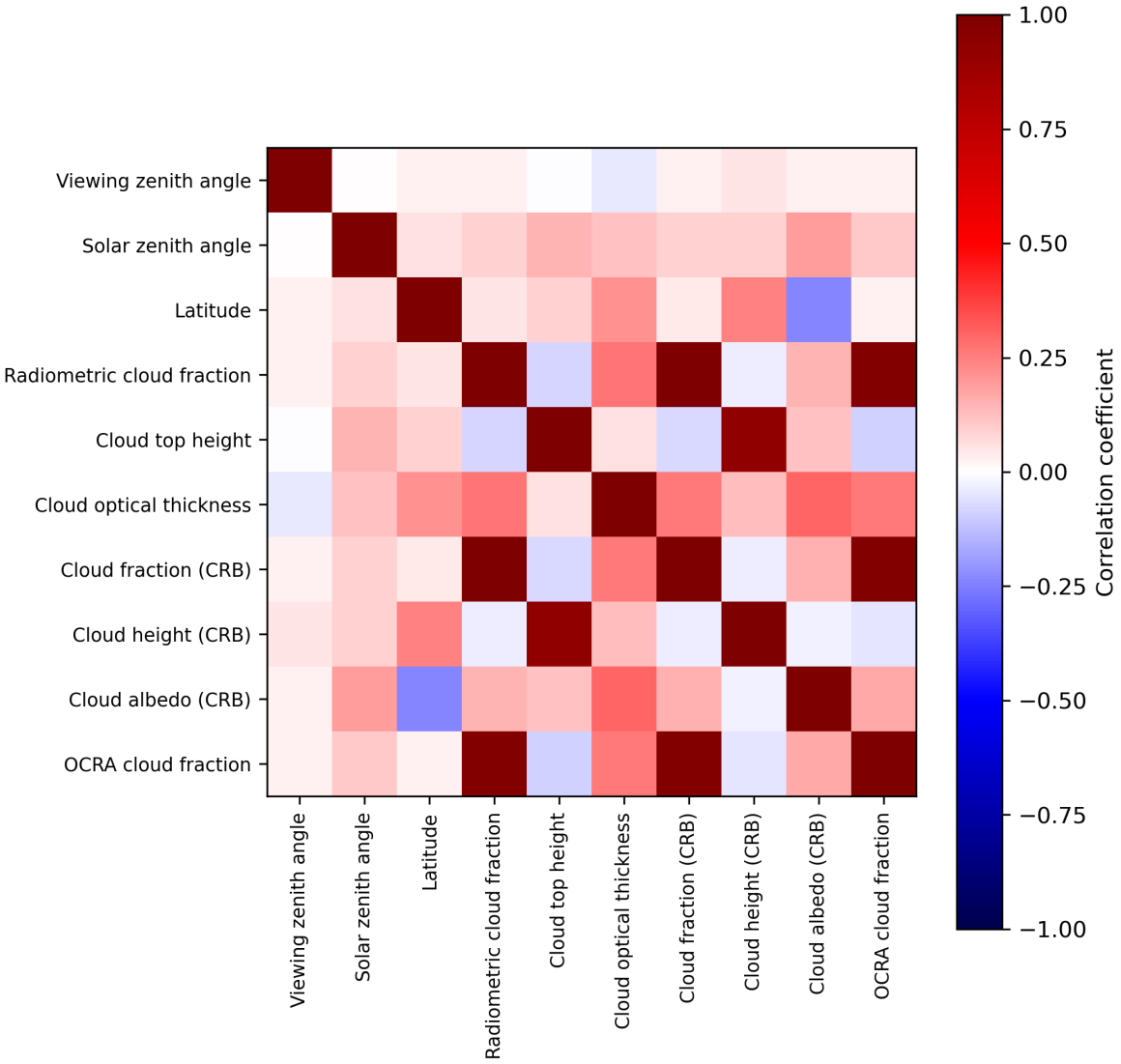

Figure 2: Map of correlation matrix for 2023-11-20 to 2023-11-22.

3 Granule outlines

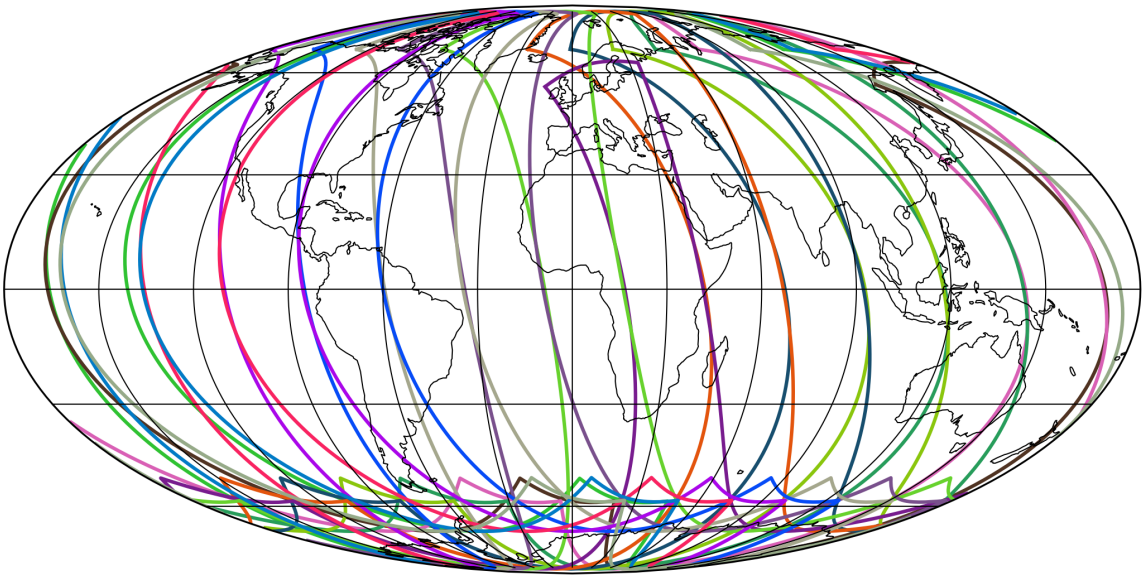

Figure 3: Outline of the granules.

4 Input data monitoring

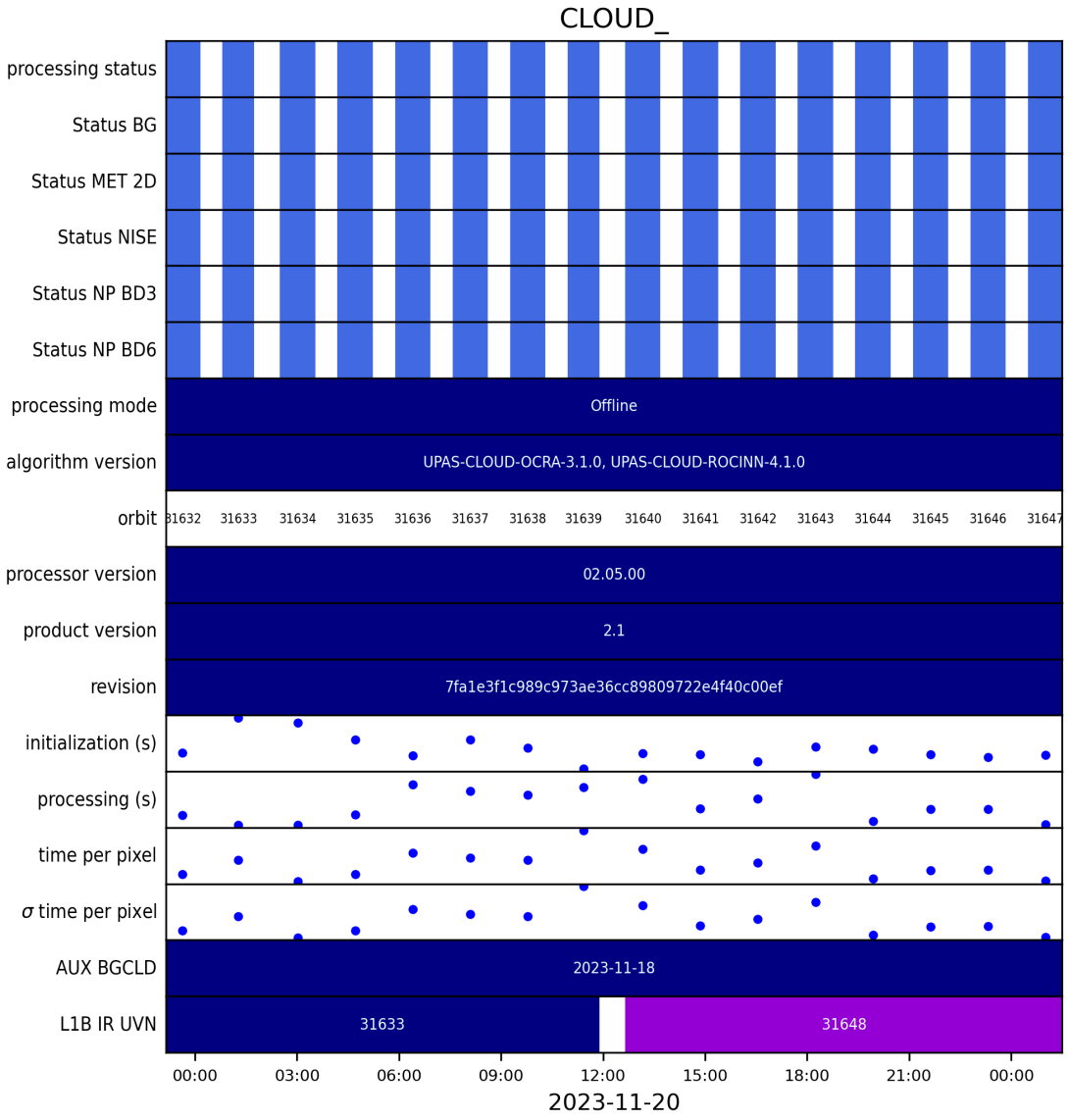

Figure 4: Input data per granule

5 Warnings and errors

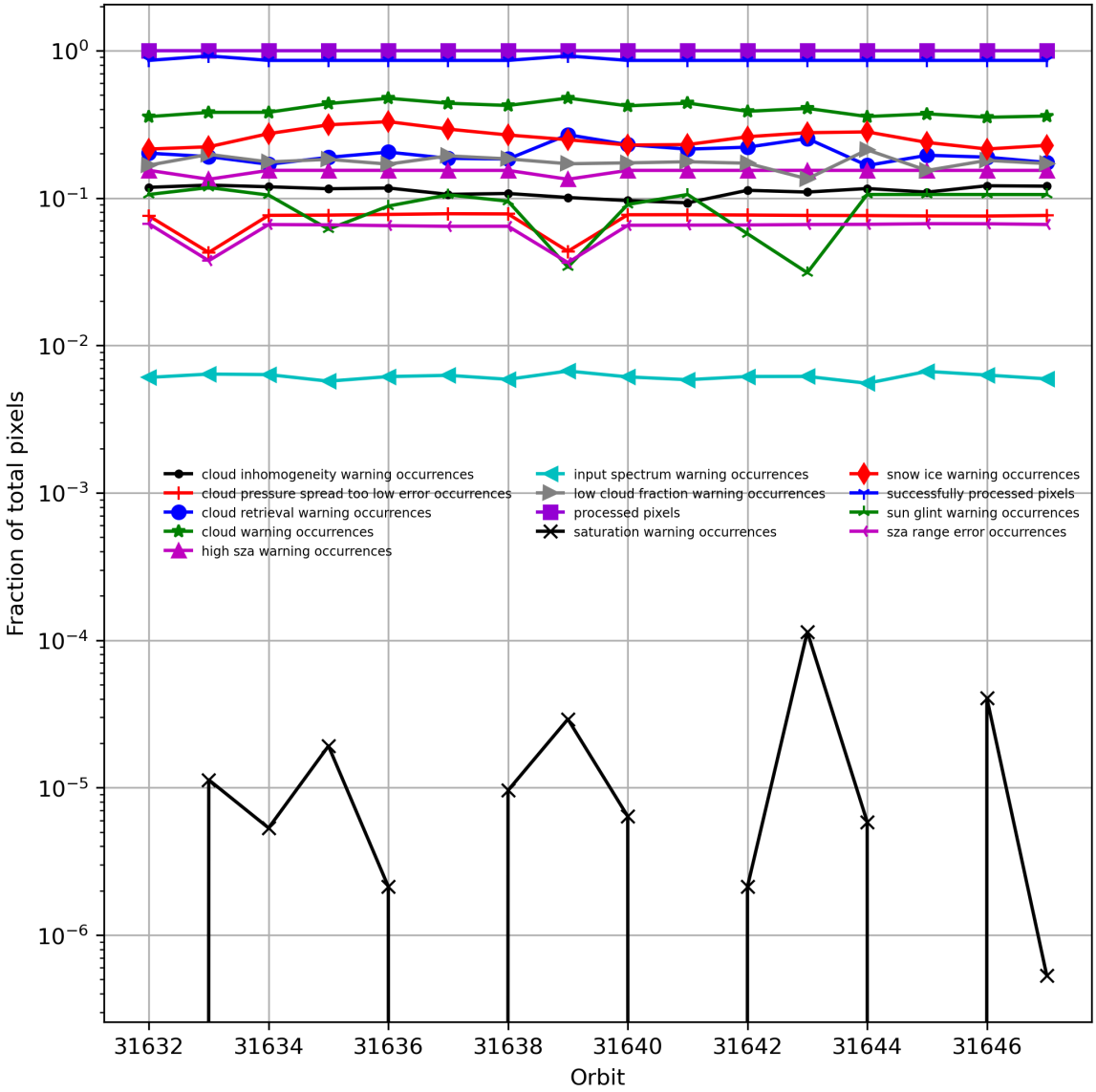

Figure 5: Fraction of pixels with specific warnings and errors during processing

6 World maps

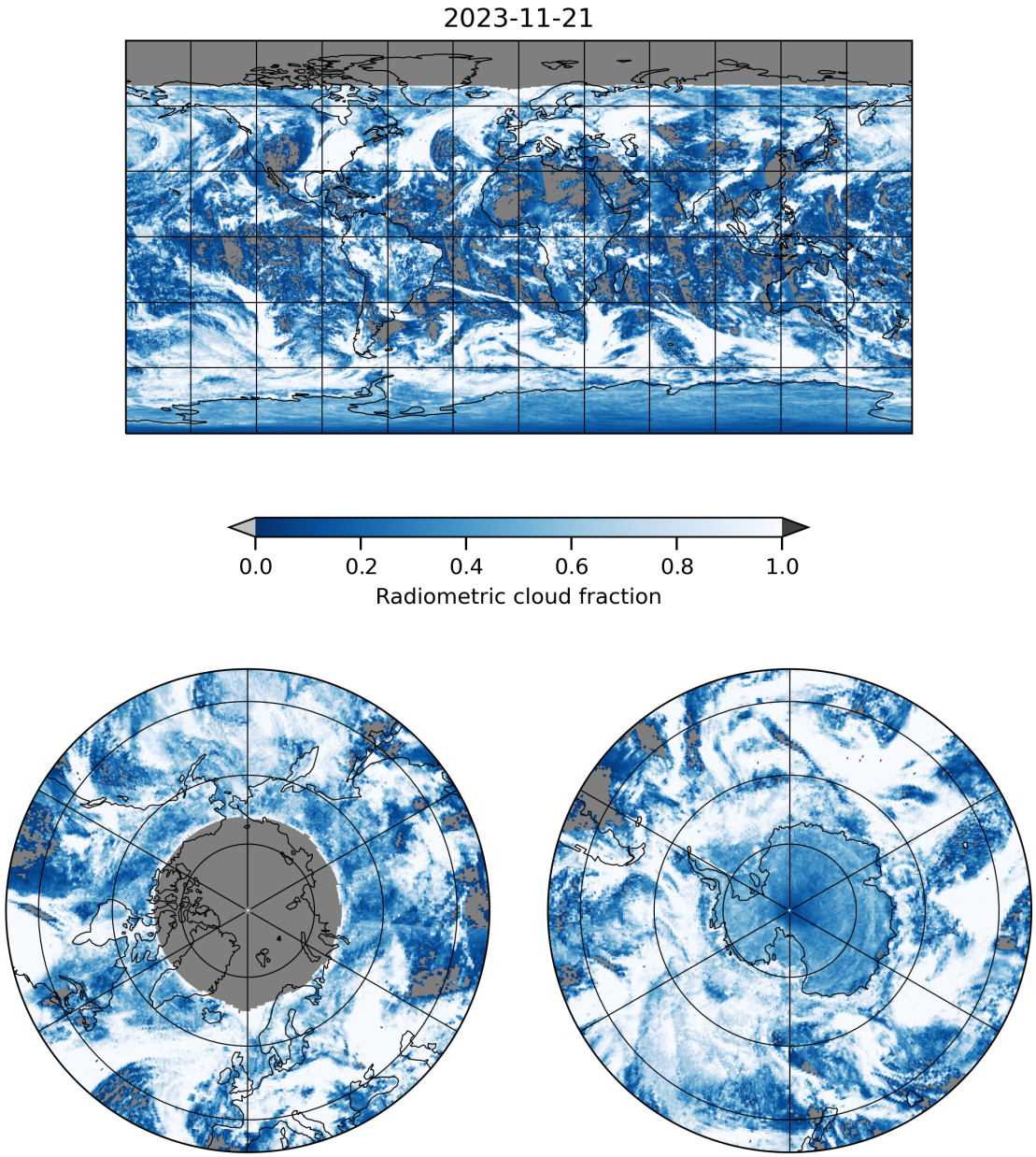

Figure 6: Map of “Radiometric cloud fraction” for 2023-11-20 to 2023-11-22

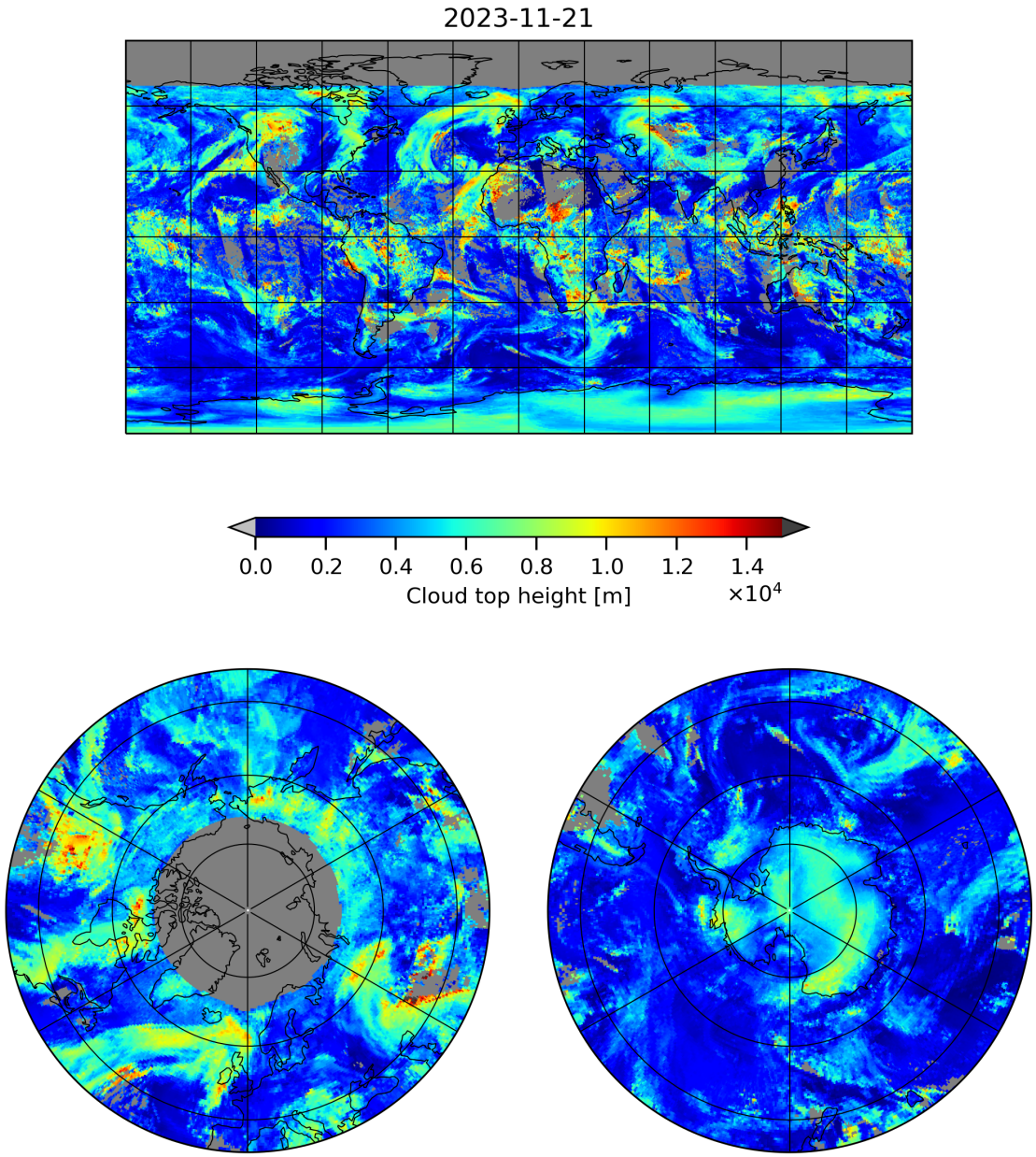

Figure 7: Map of “Cloud top height” for 2023-11-20 to 2023-11-22

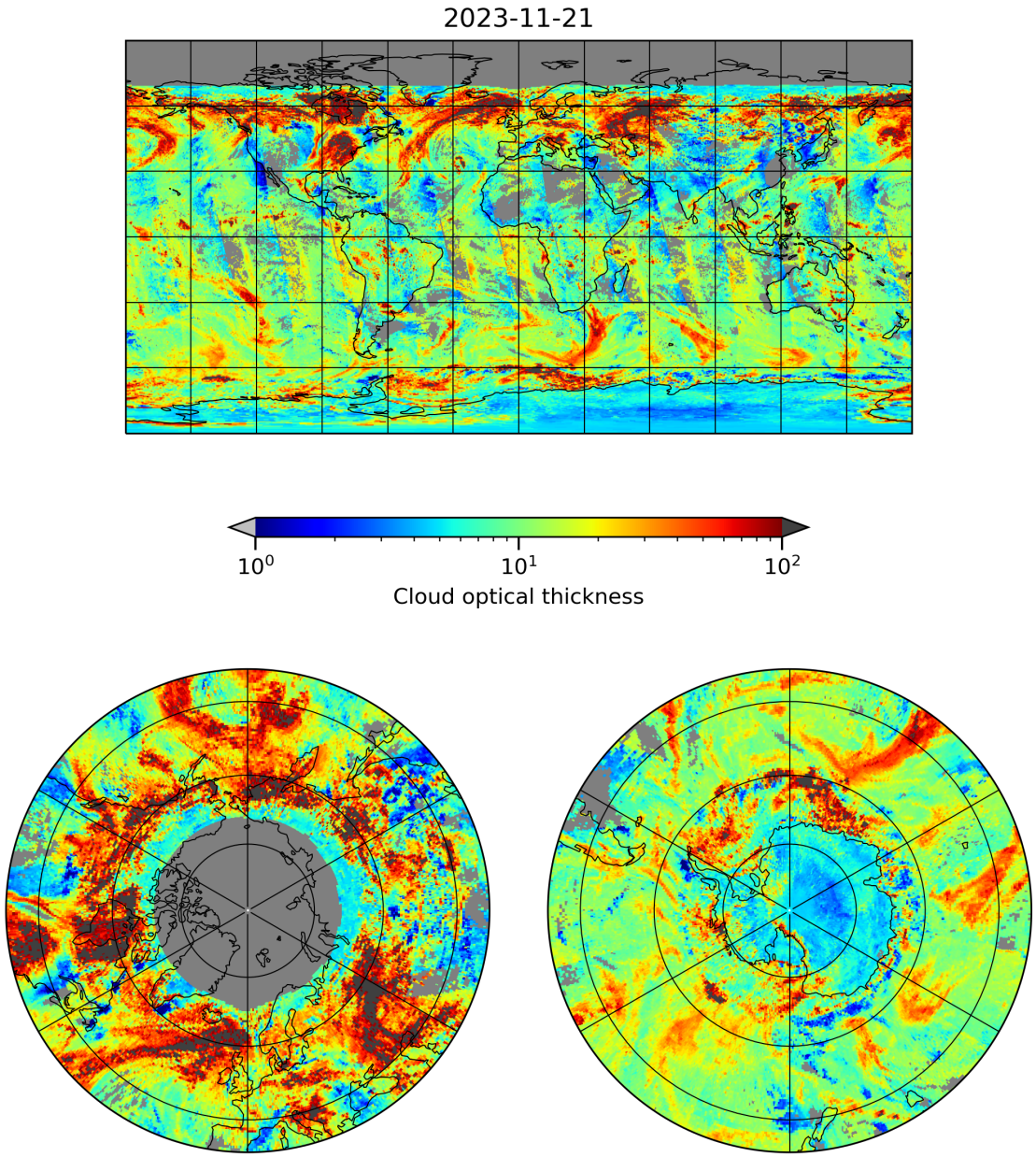

Figure 8: Map of “Cloud optical thickness” for 2023-11-20 to 2023-11-22

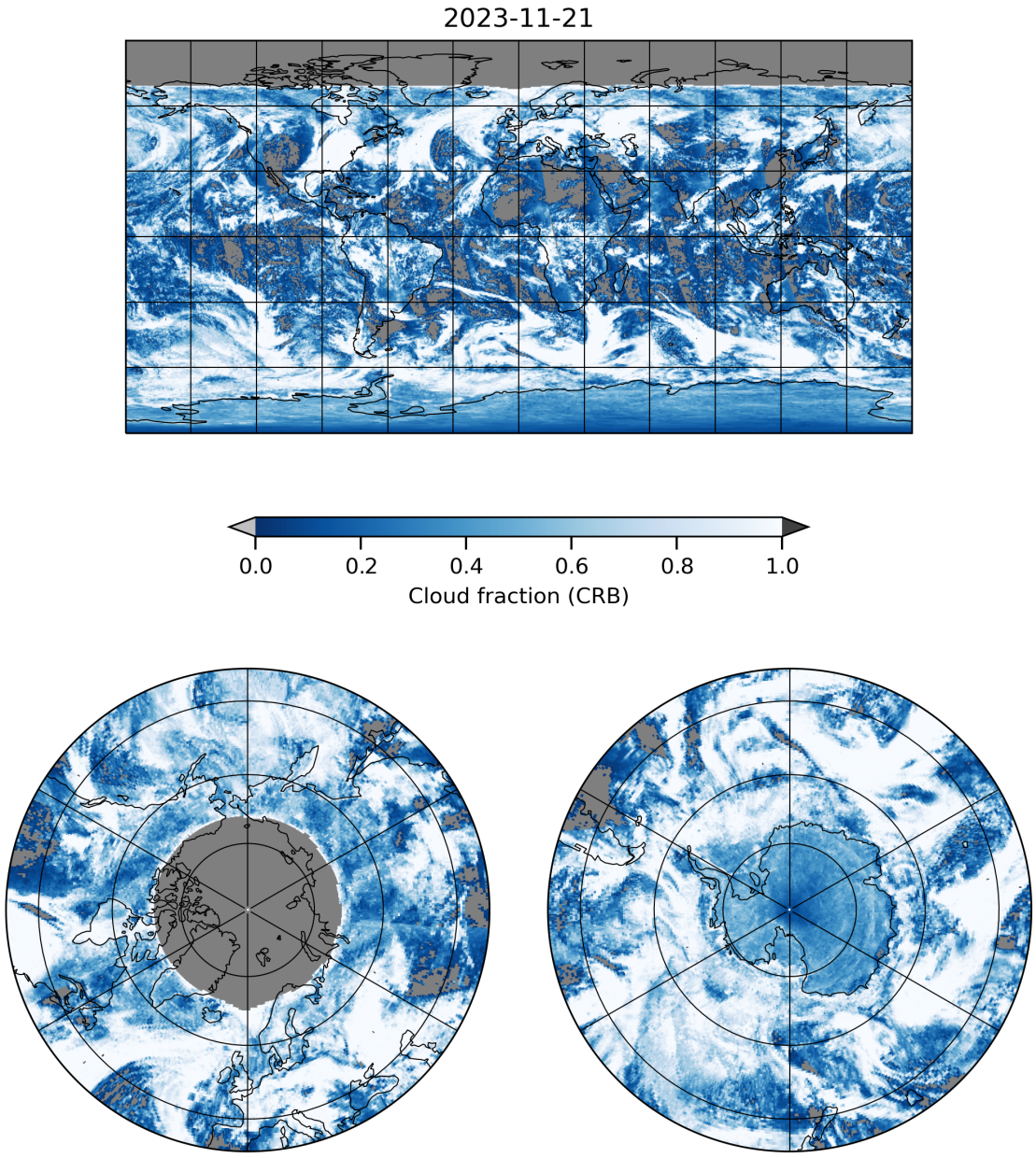

Figure 9: Map of “Cloud fraction (CRB)” for 2023-11-20 to 2023-11-22

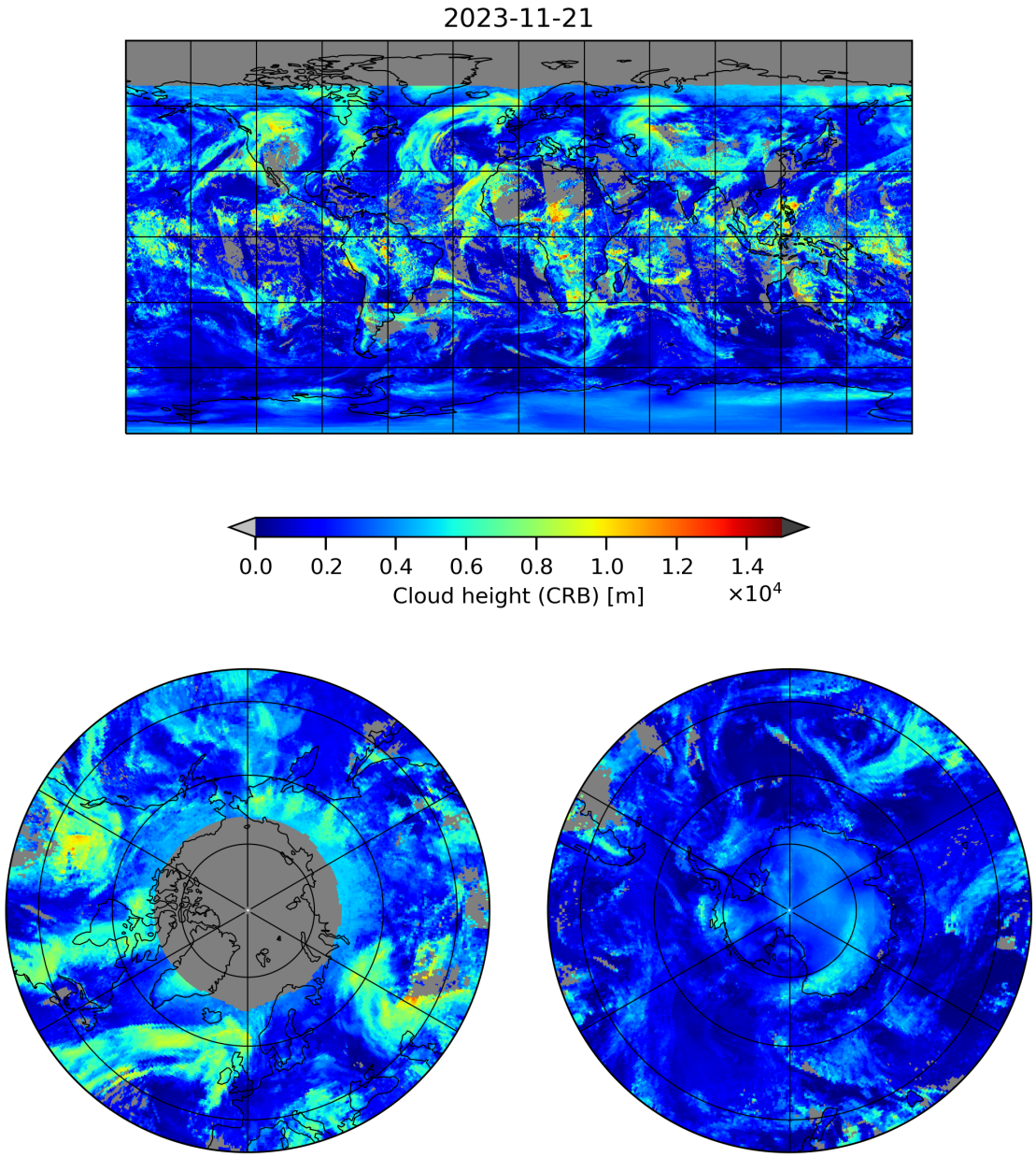

Figure 10: Map of “Cloud height (CRB)” for 2023-11-20 to 2023-11-22

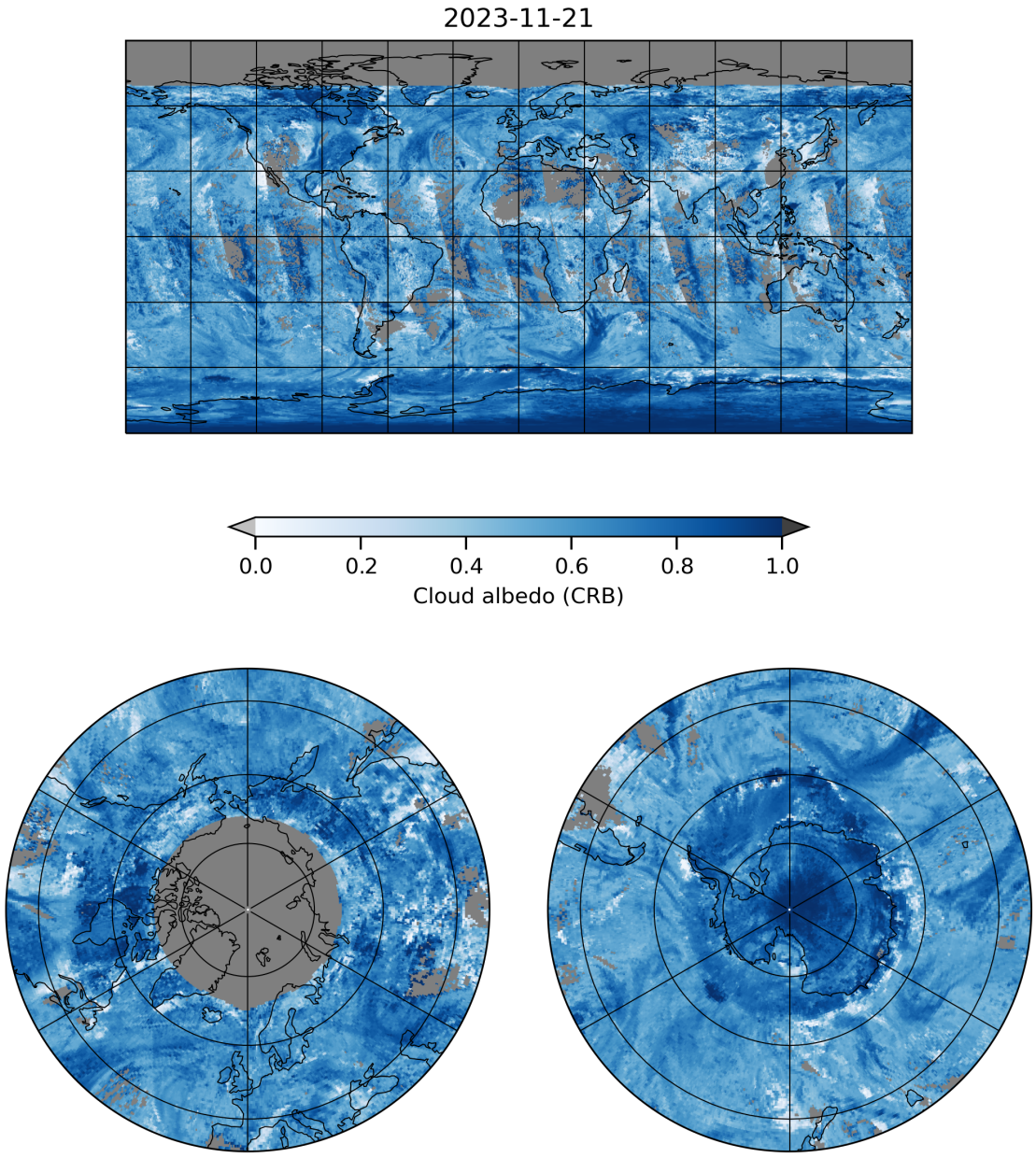

Figure 11: Map of “Cloud albedo (CRB)” for 2023-11-20 to 2023-11-22

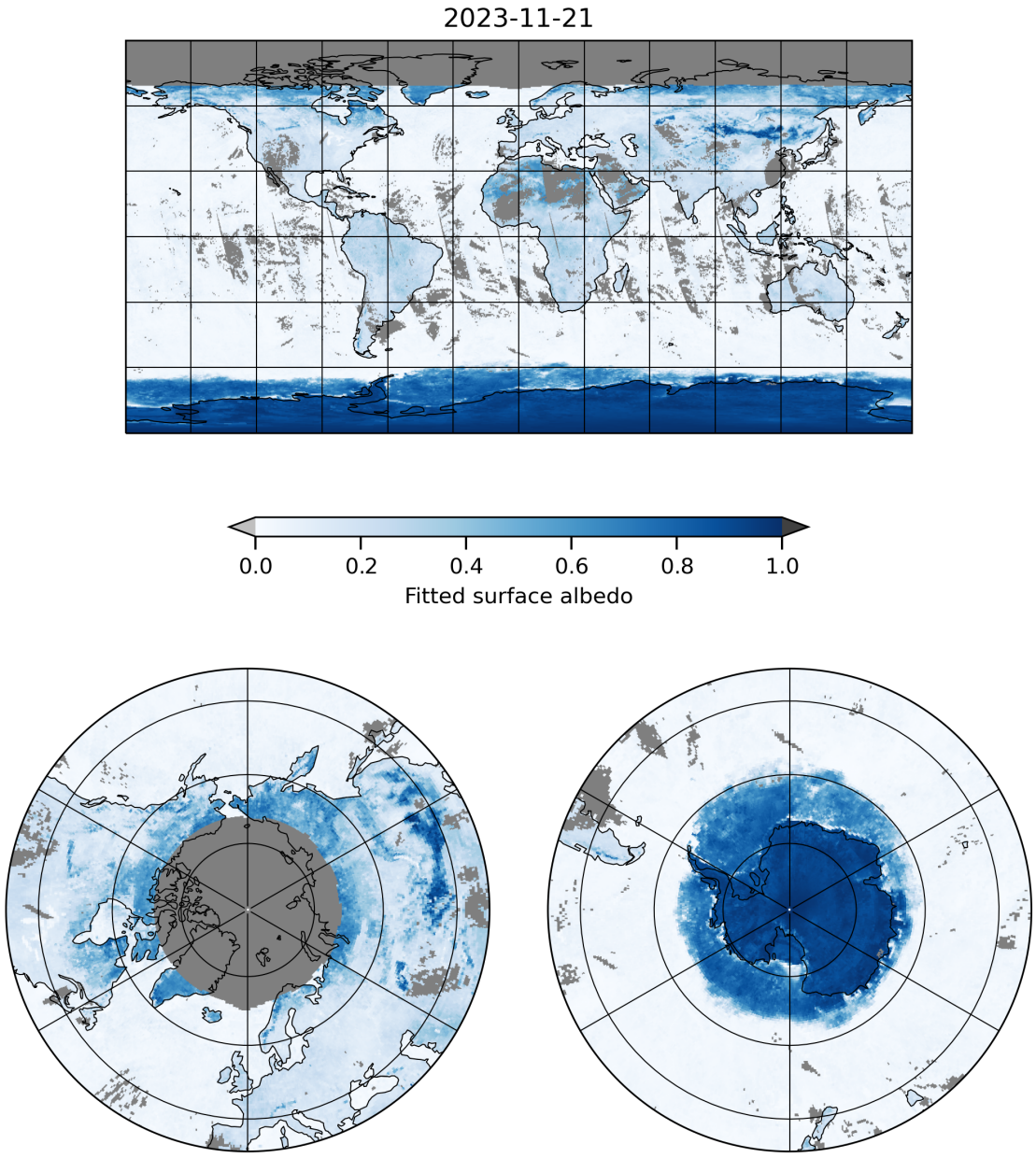

Figure 12: Map of “Fitted surface albedo” for 2023-11-20 to 2023-11-22

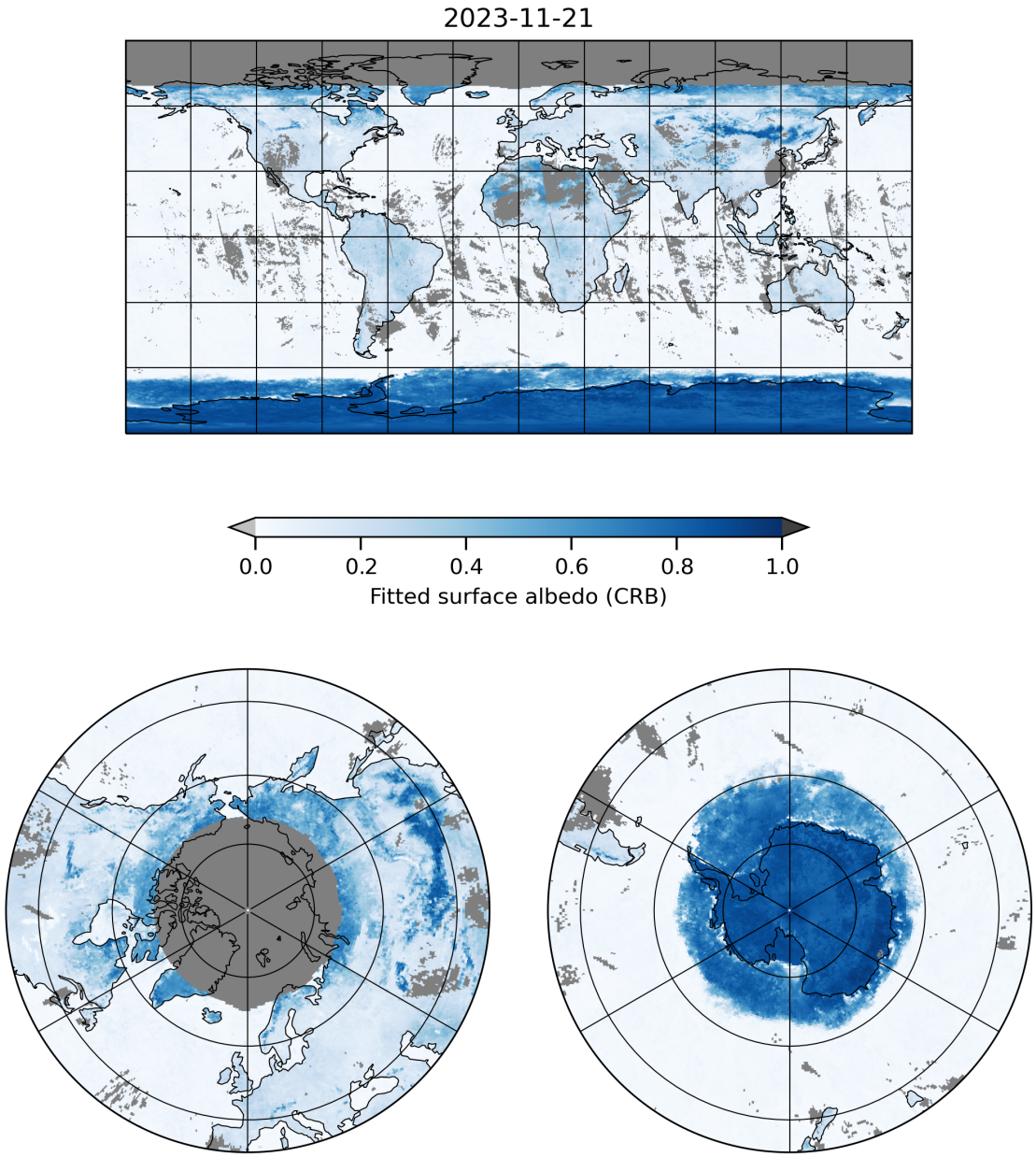

Figure 13: Map of “Fitted surface albedo (CRB)” for 2023-11-20 to 2023-11-22

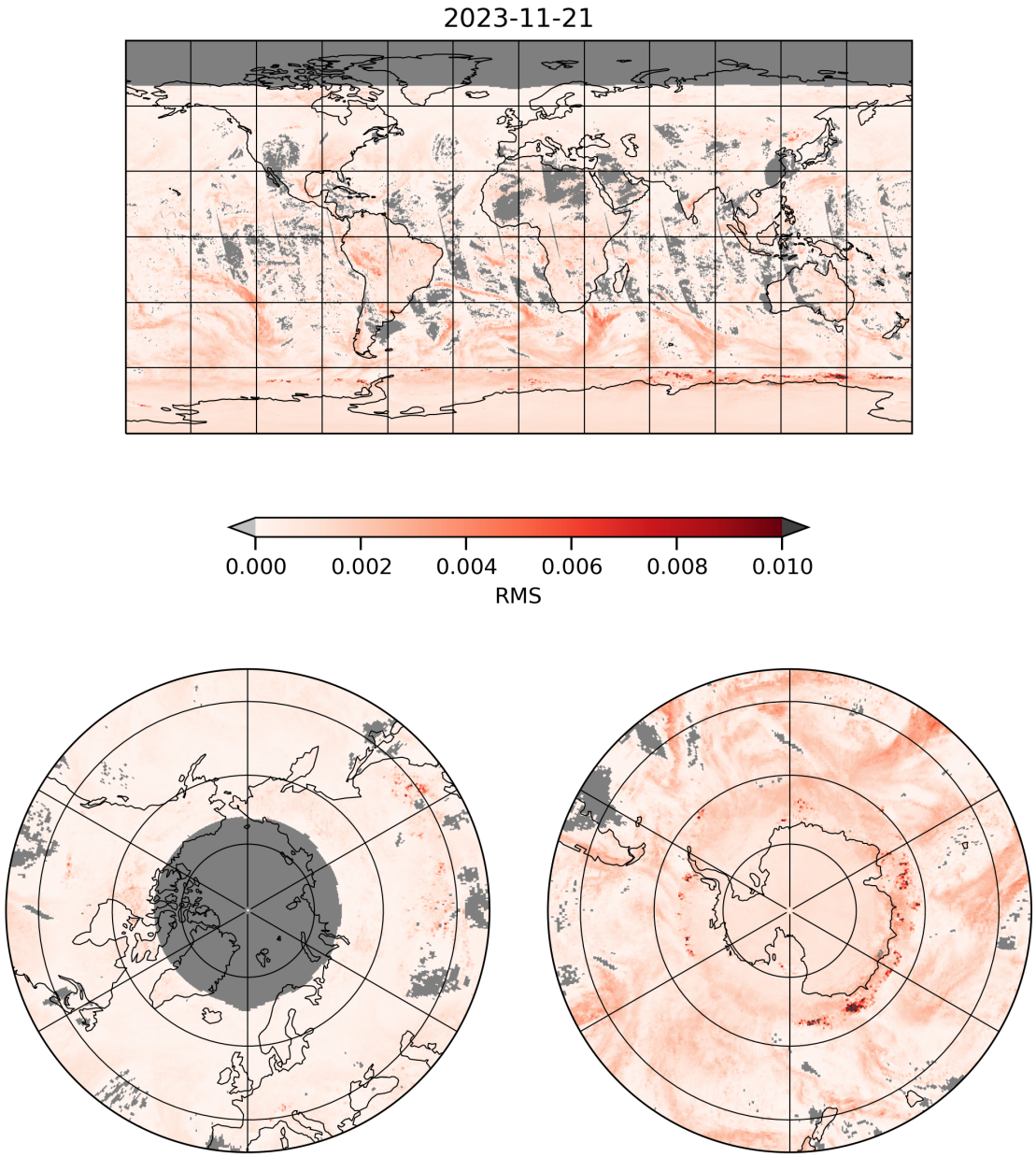

Figure 14: Map of “RMS” for 2023-11-20 to 2023-11-22

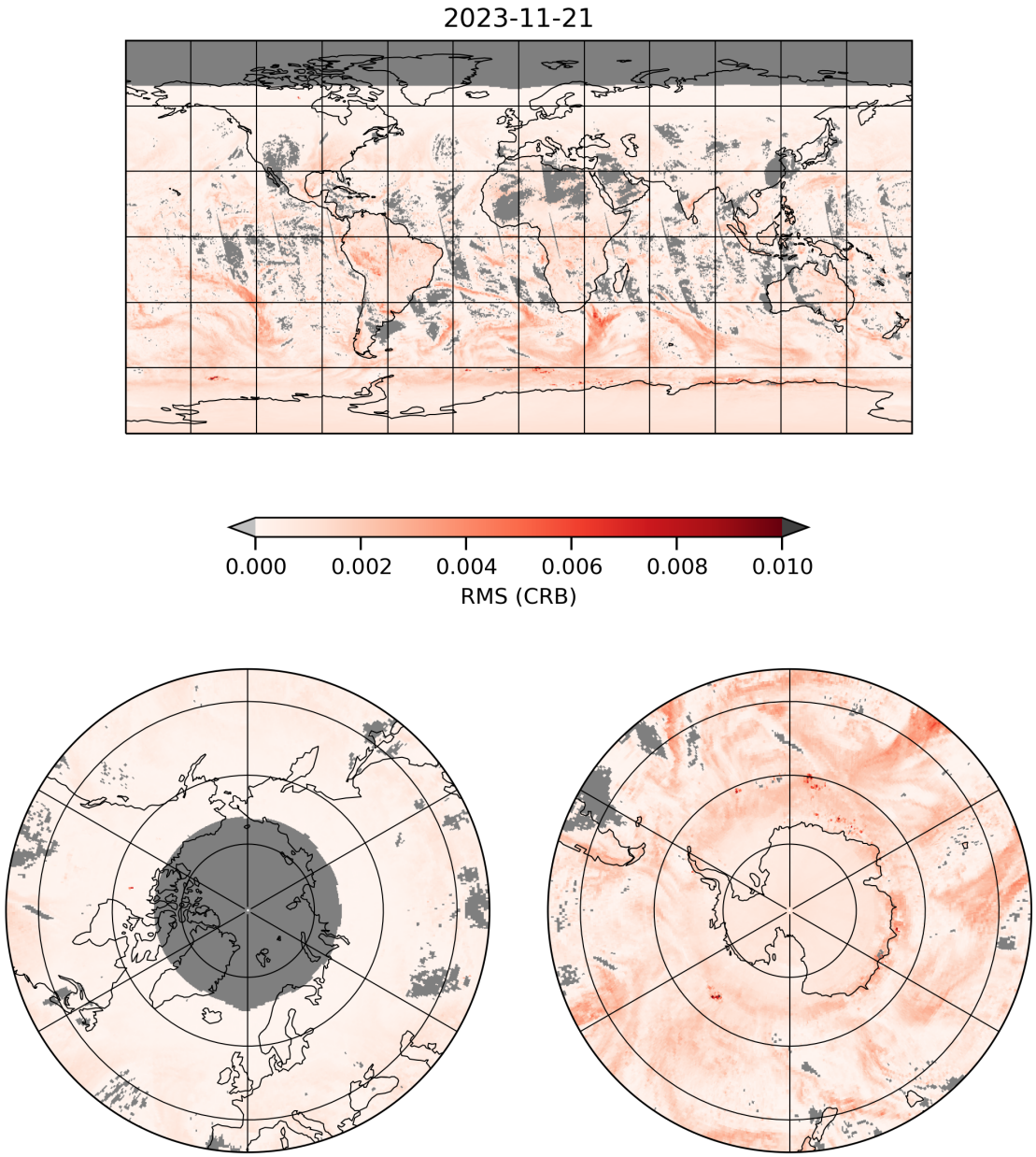

Figure 15: Map of “RMS (CRB)” for 2023-11-20 to 2023-11-22

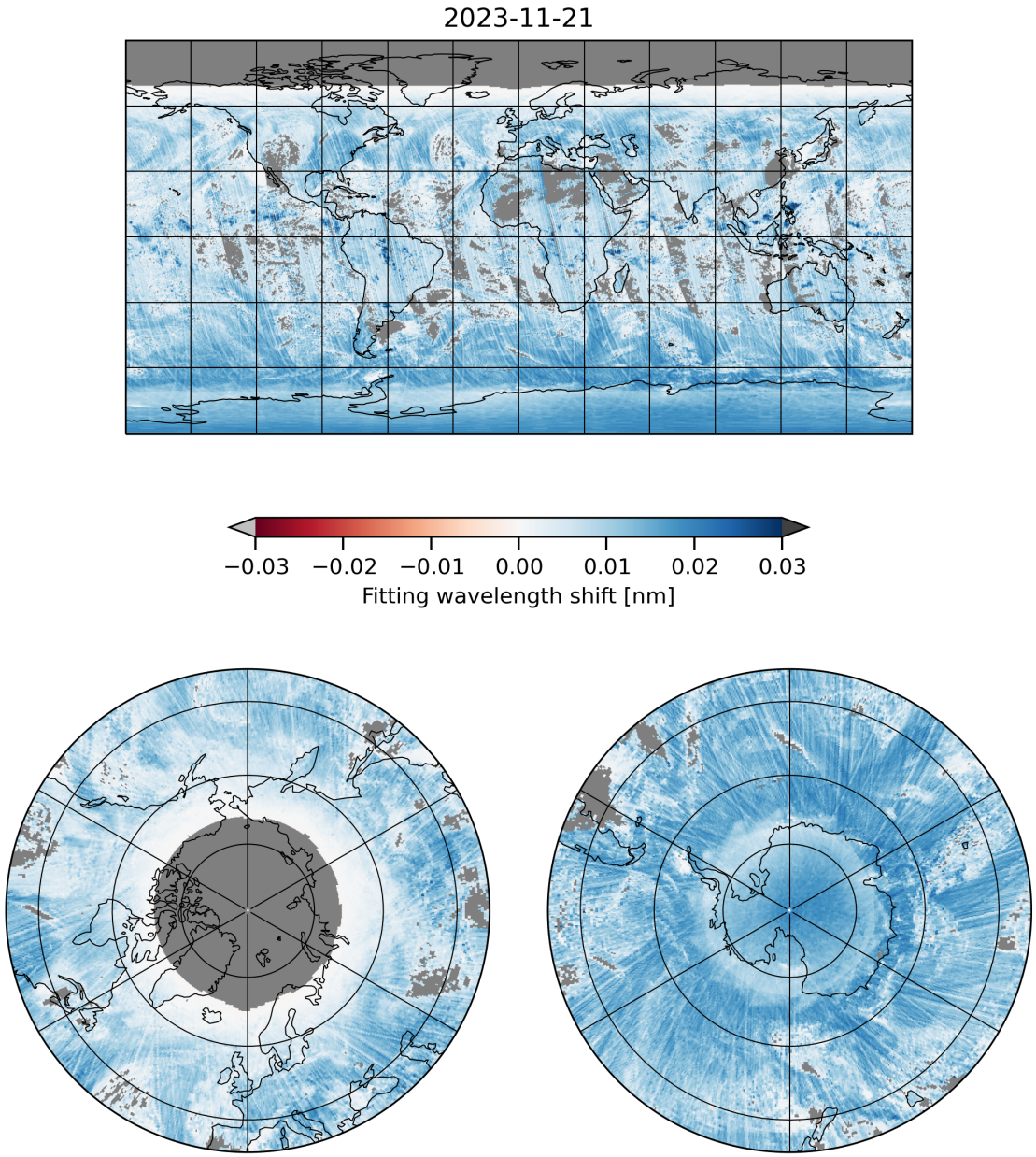

Figure 16: Map of “Fitting wavelength shift” for 2023-11-20 to 2023-11-22

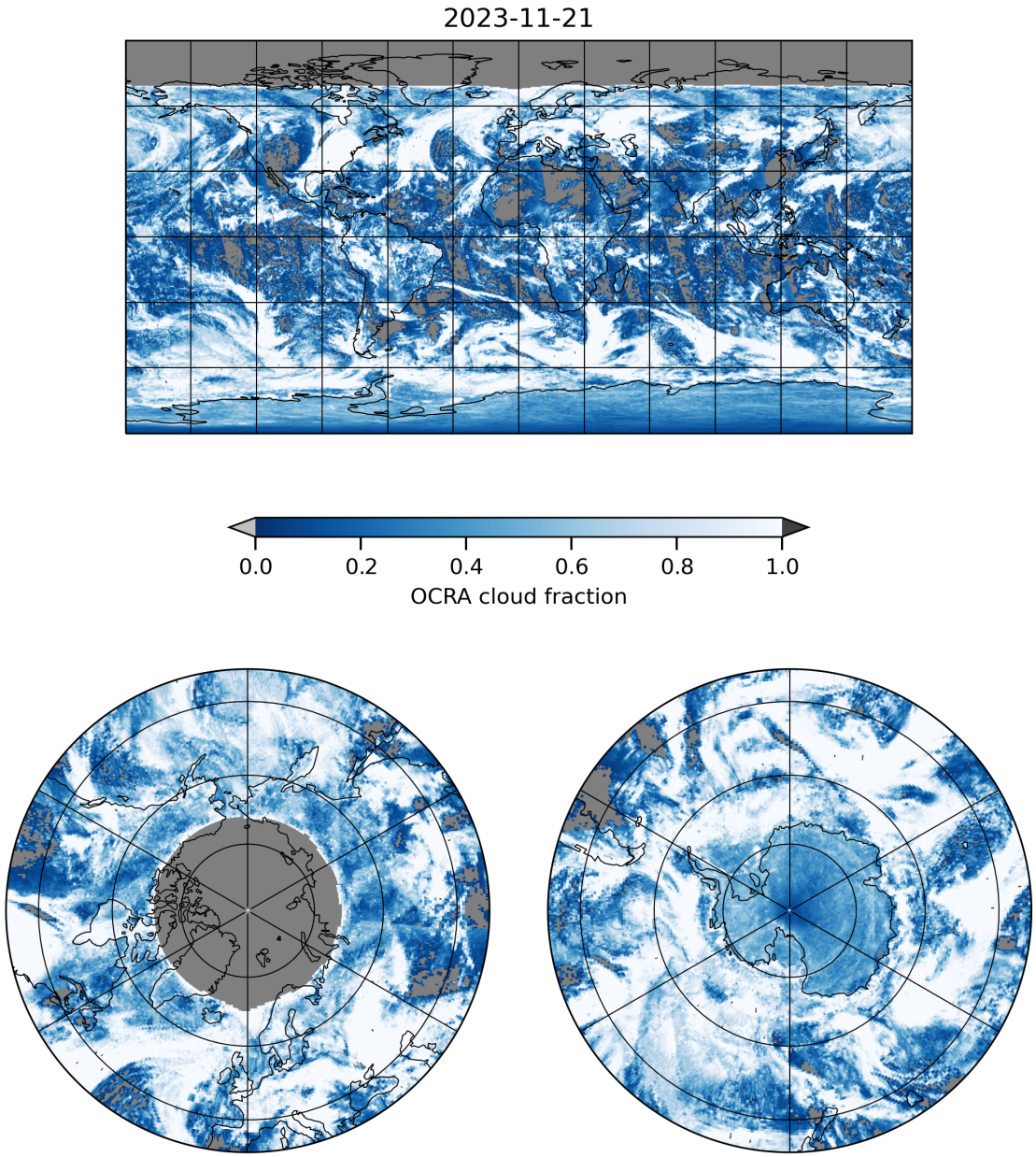

Figure 17: Map of “OCRA cloud fraction” for 2023-11-20 to 2023-11-22

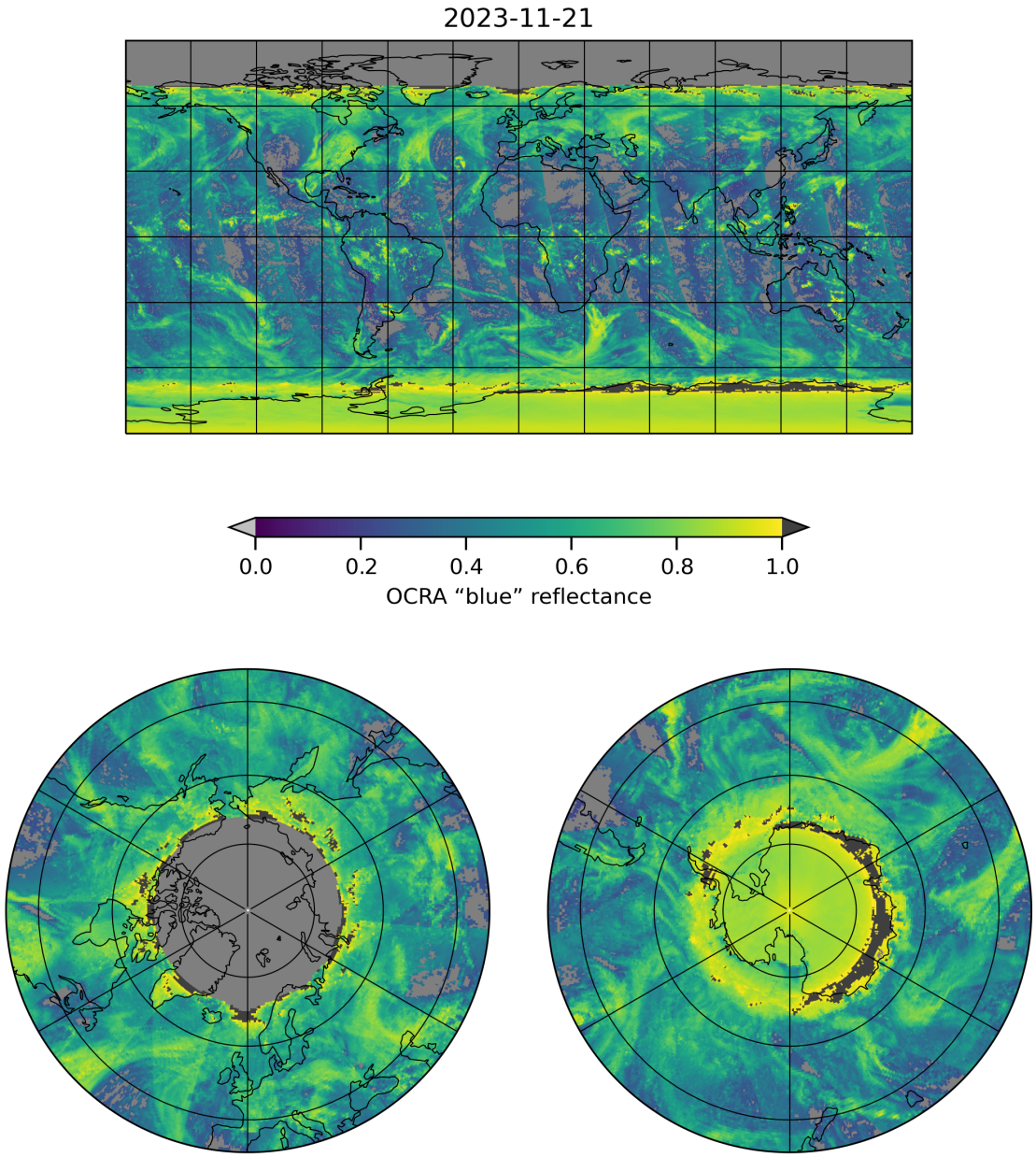

Figure 18: Map of “OCRA “blue” reflectance” for 2023-11-20 to 2023-11-22

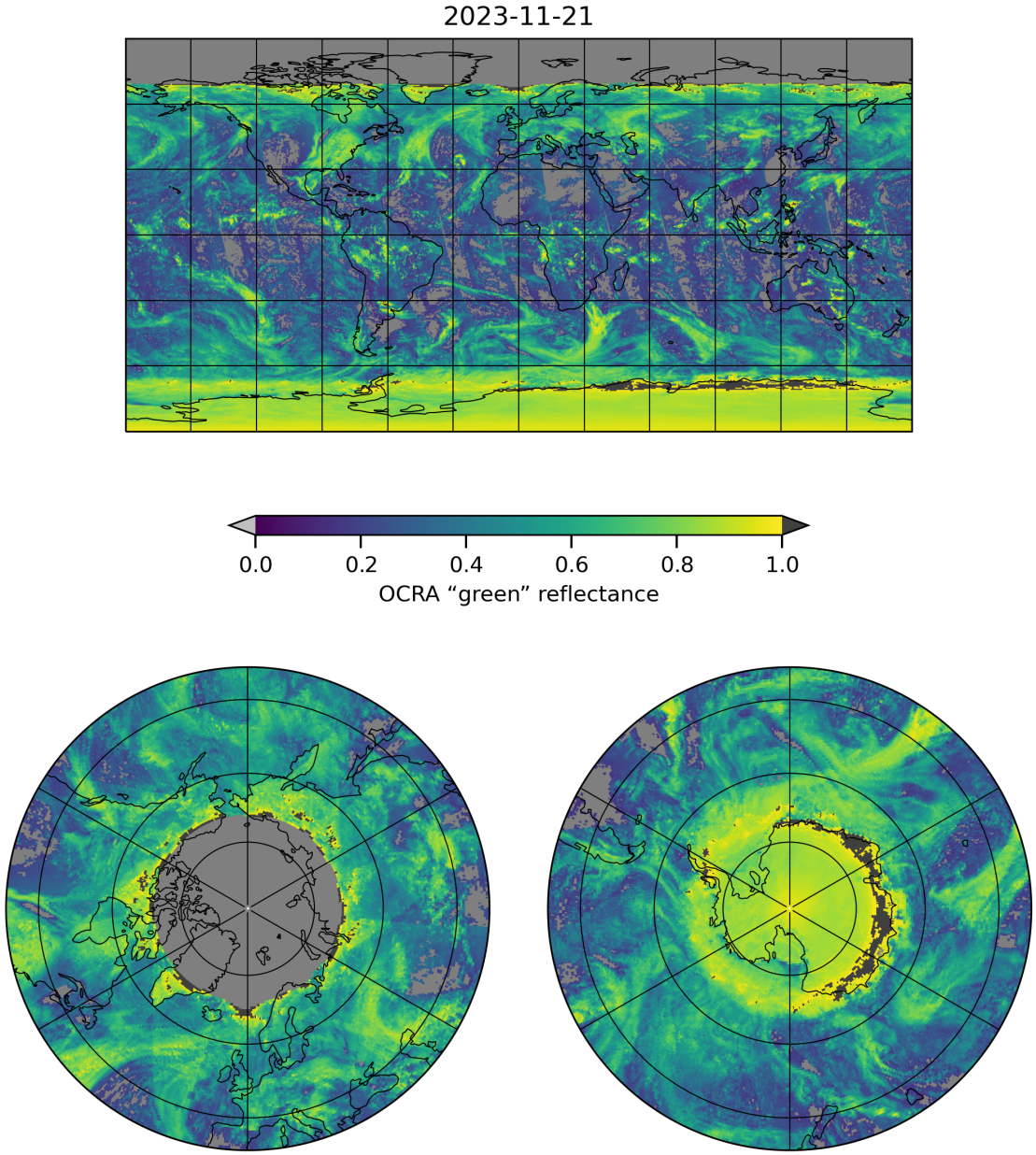

Figure 19: Map of “OCRA “green” reflectance” for 2023-11-20 to 2023-11-22

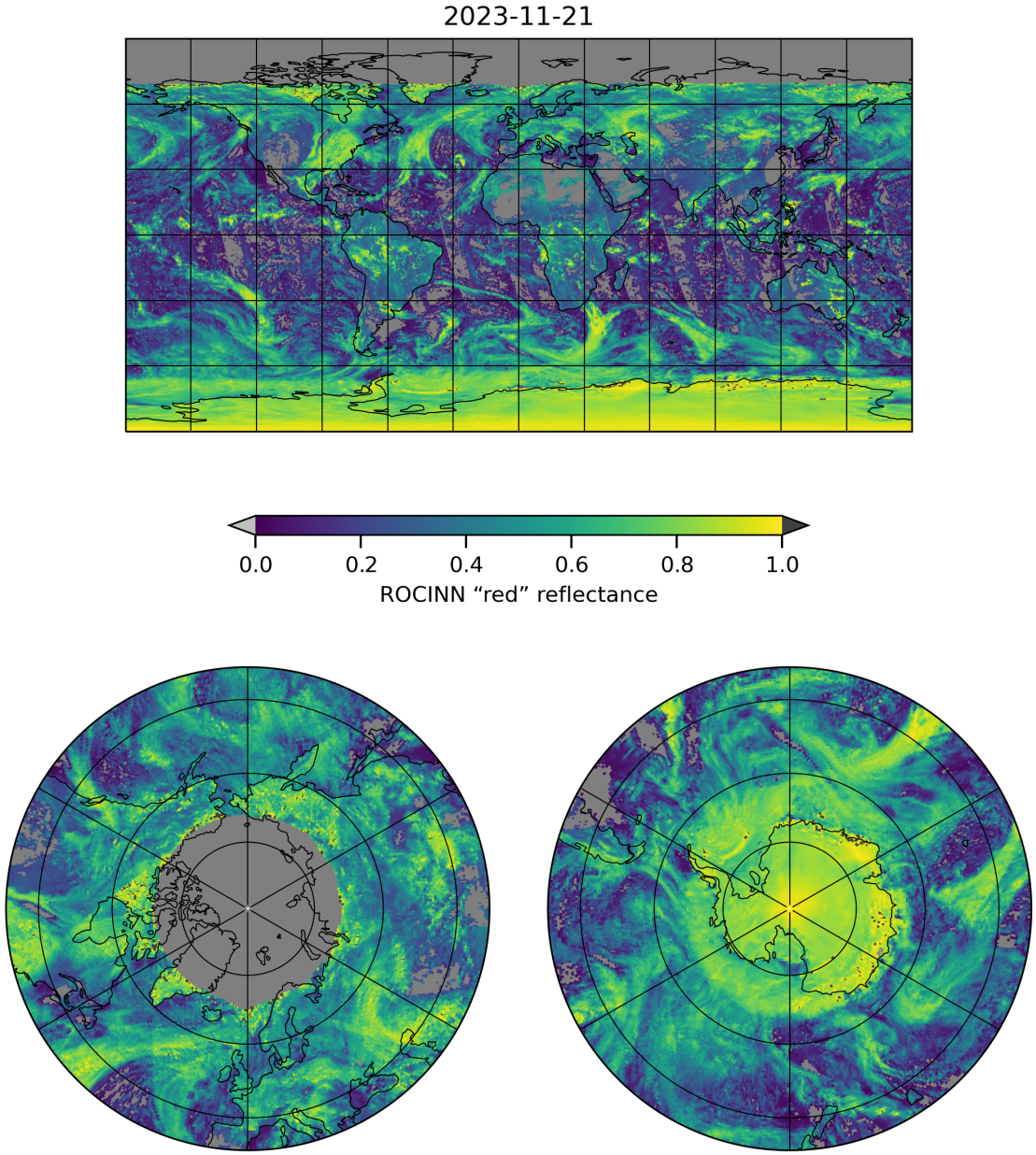

Figure 20: Map of “ROCINN “red” reflectance” for 2023-11-20 to 2023-11-22

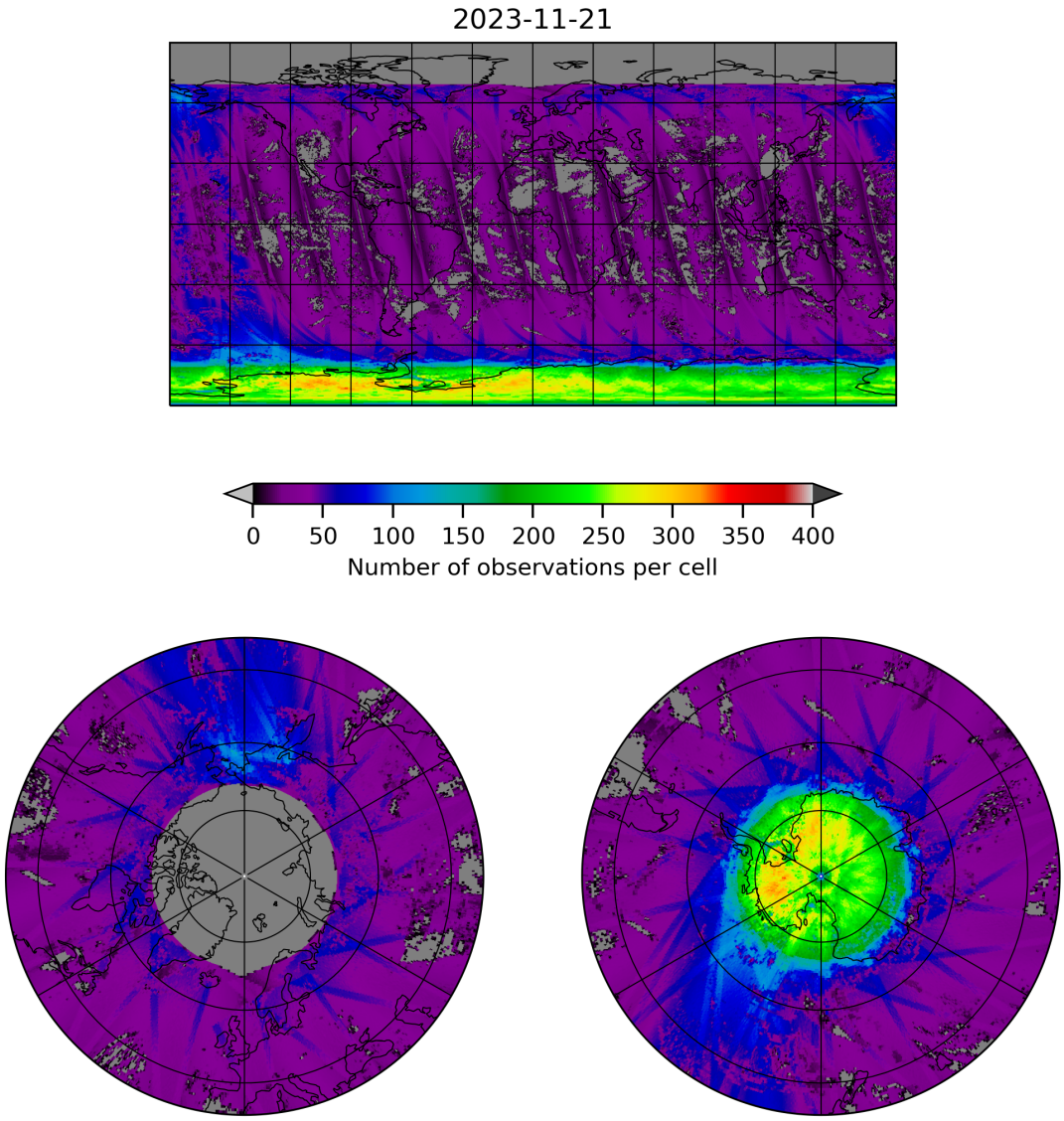

Figure 21: Map of the number of observations for 2023-11-20 to 2023-11-22

7 Zonal average

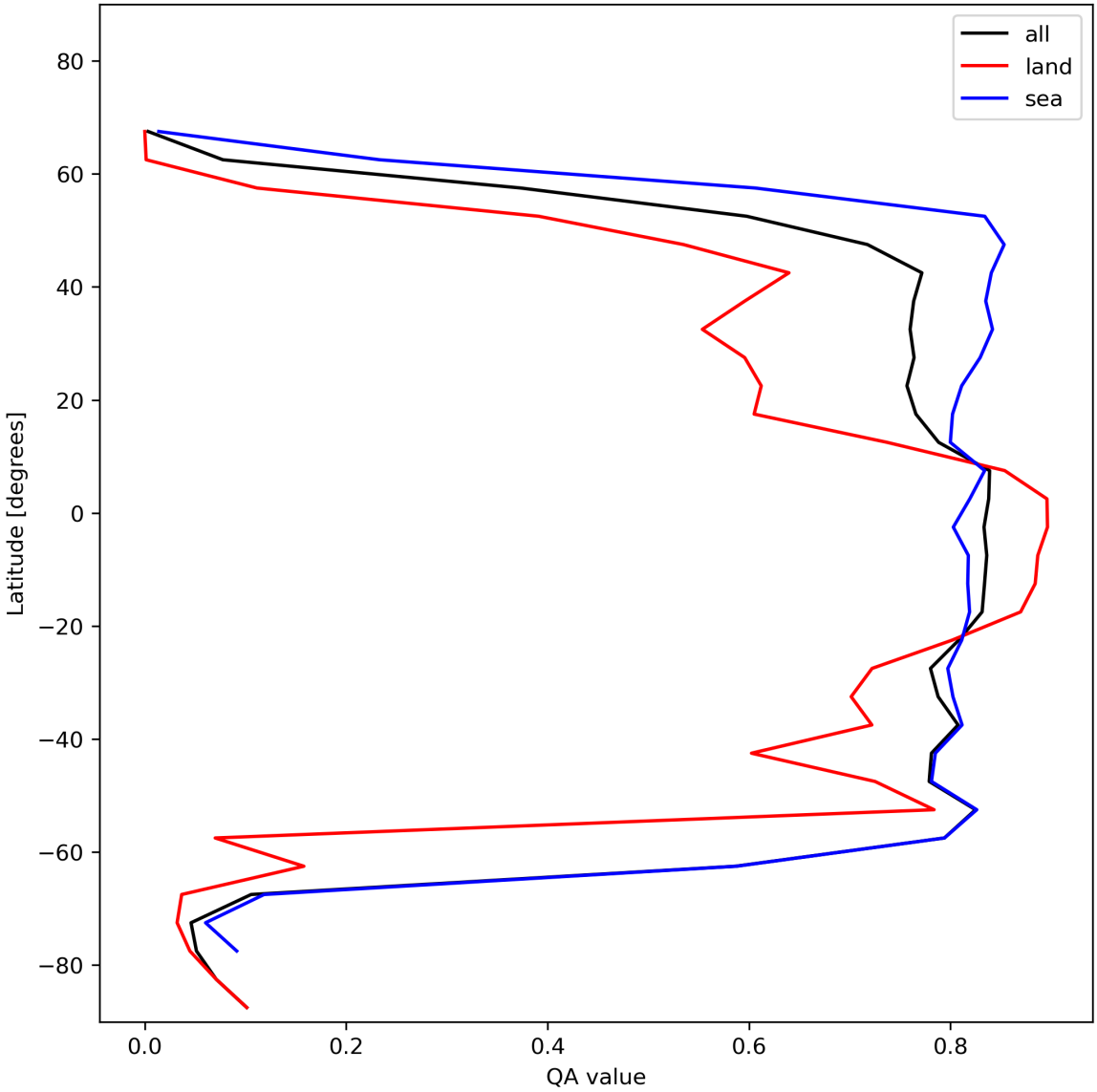

Figure 22: Zonal average of “QA value” for 2023-11-20 to 2023-11-22.

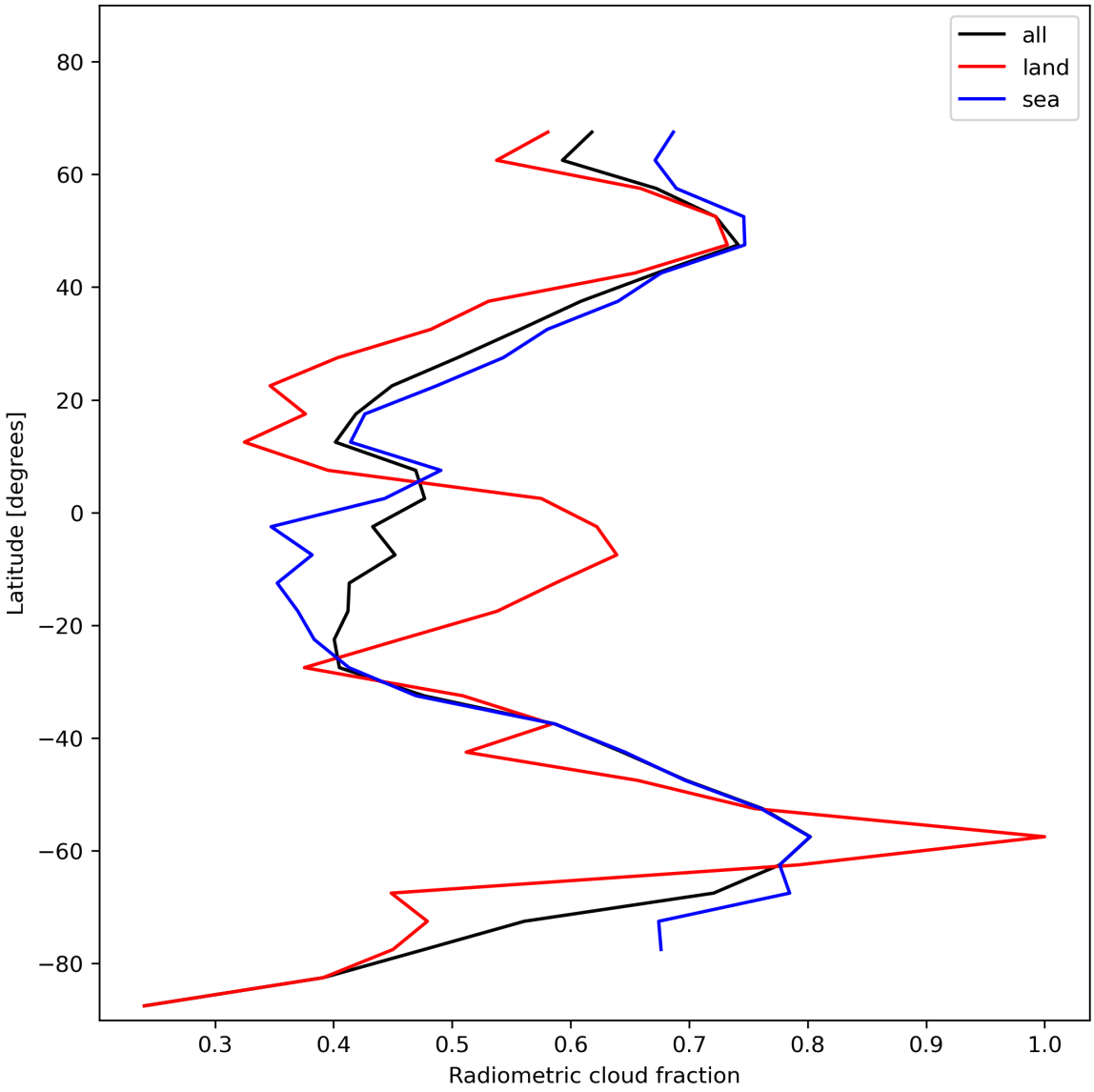

Figure 23: Zonal average of “Radiometric cloud fraction” for 2023-11-20 to 2023-11-22.

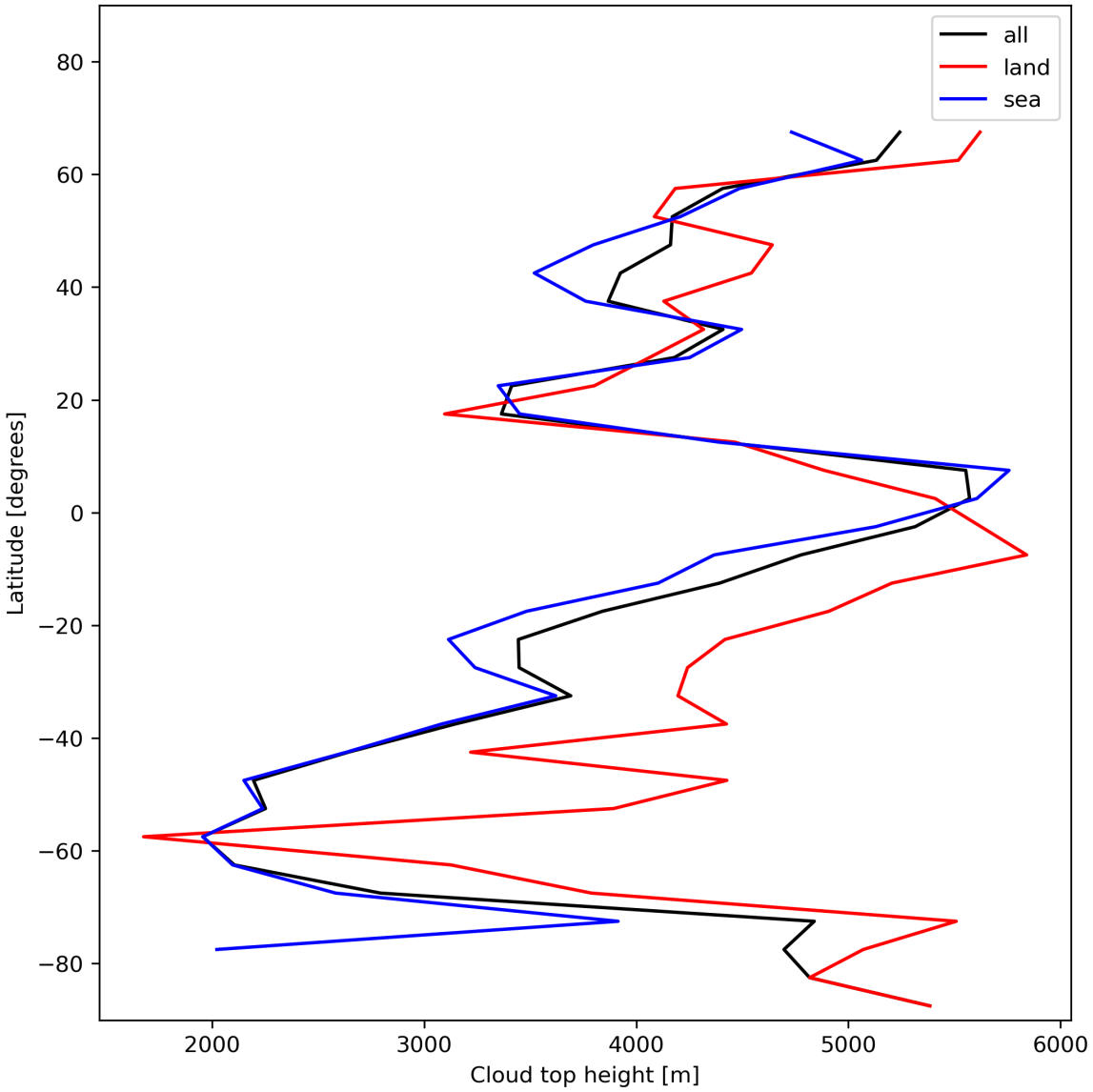

Figure 24: Zonal average of “Cloud top height” for 2023-11-20 to 2023-11-22.

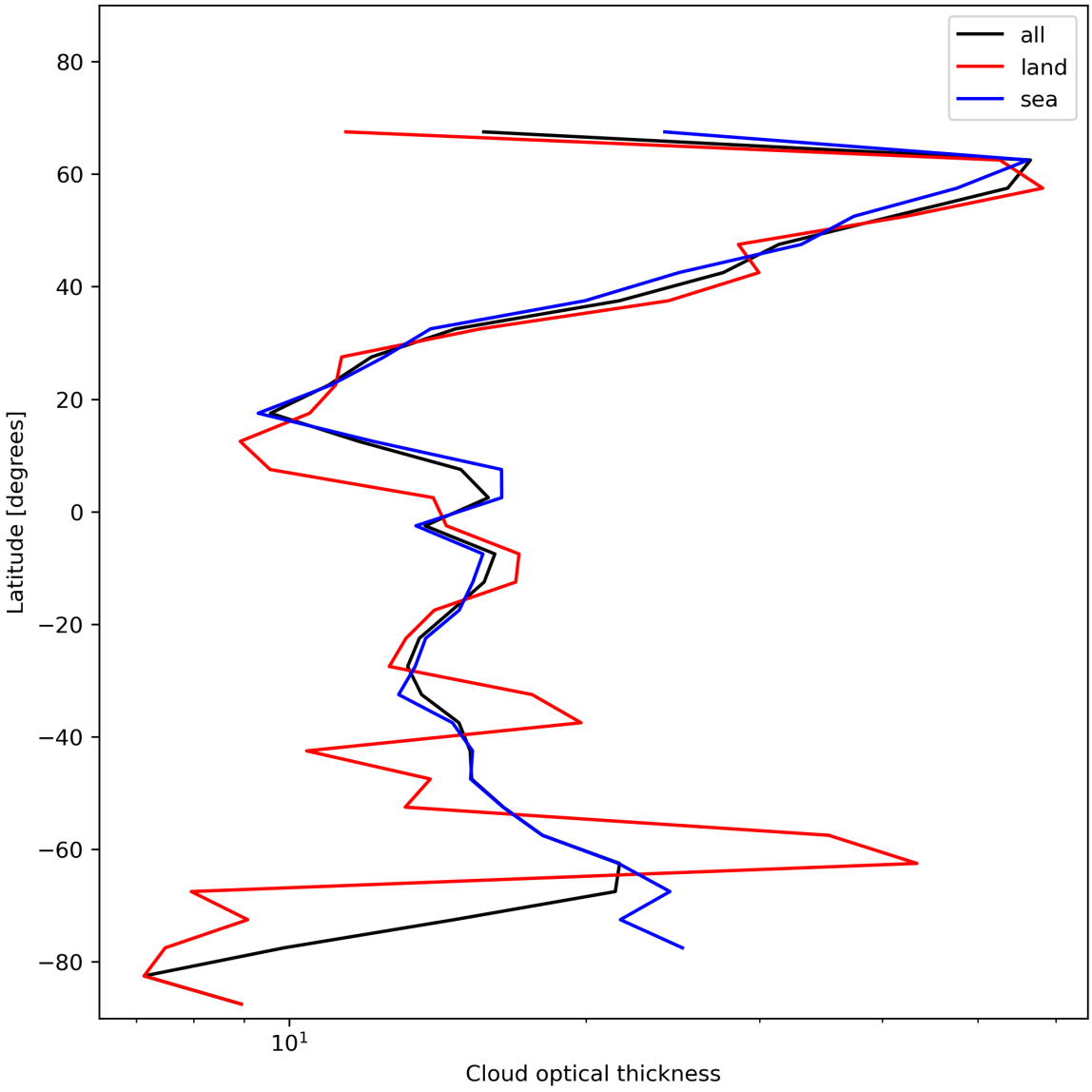

Figure 25: Zonal average of “Cloud optical thickness” for 2023-11-20 to 2023-11-22.

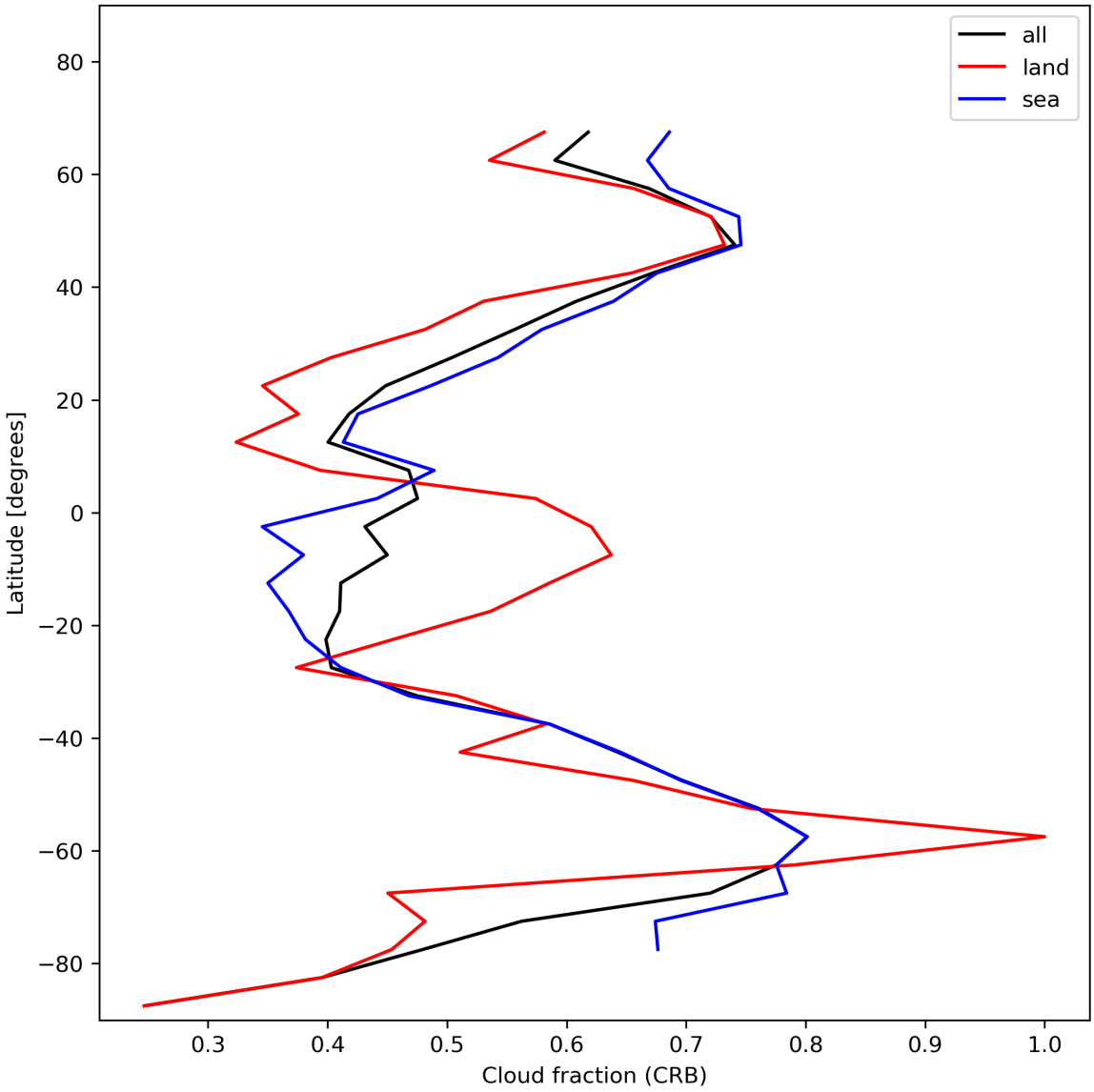

Figure 26: Zonal average of “Cloud fraction (CRB)” for 2023-11-20 to 2023-11-22.

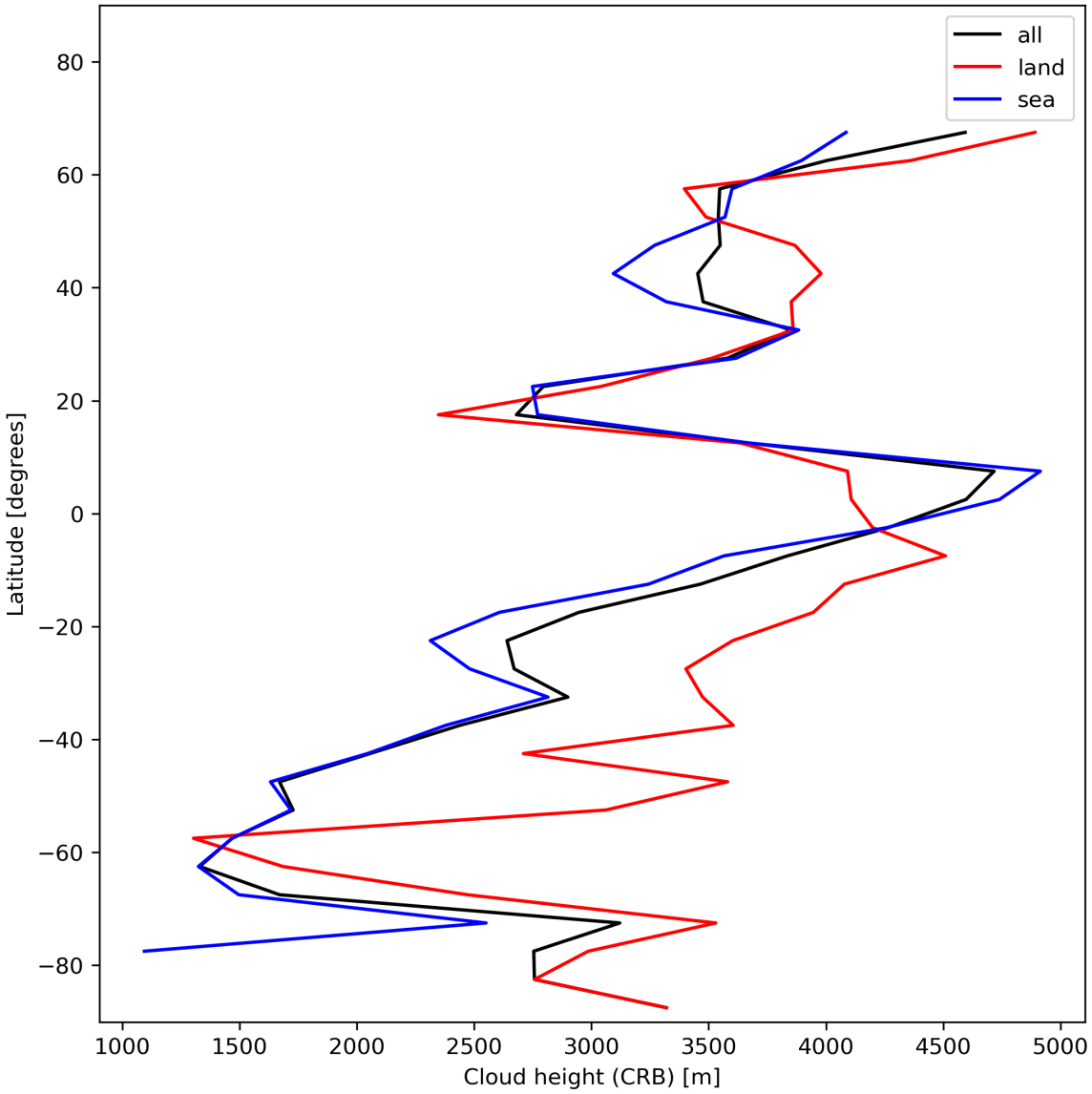

Figure 27: Zonal average of “Cloud height (CRB)” for 2023-11-20 to 2023-11-22.

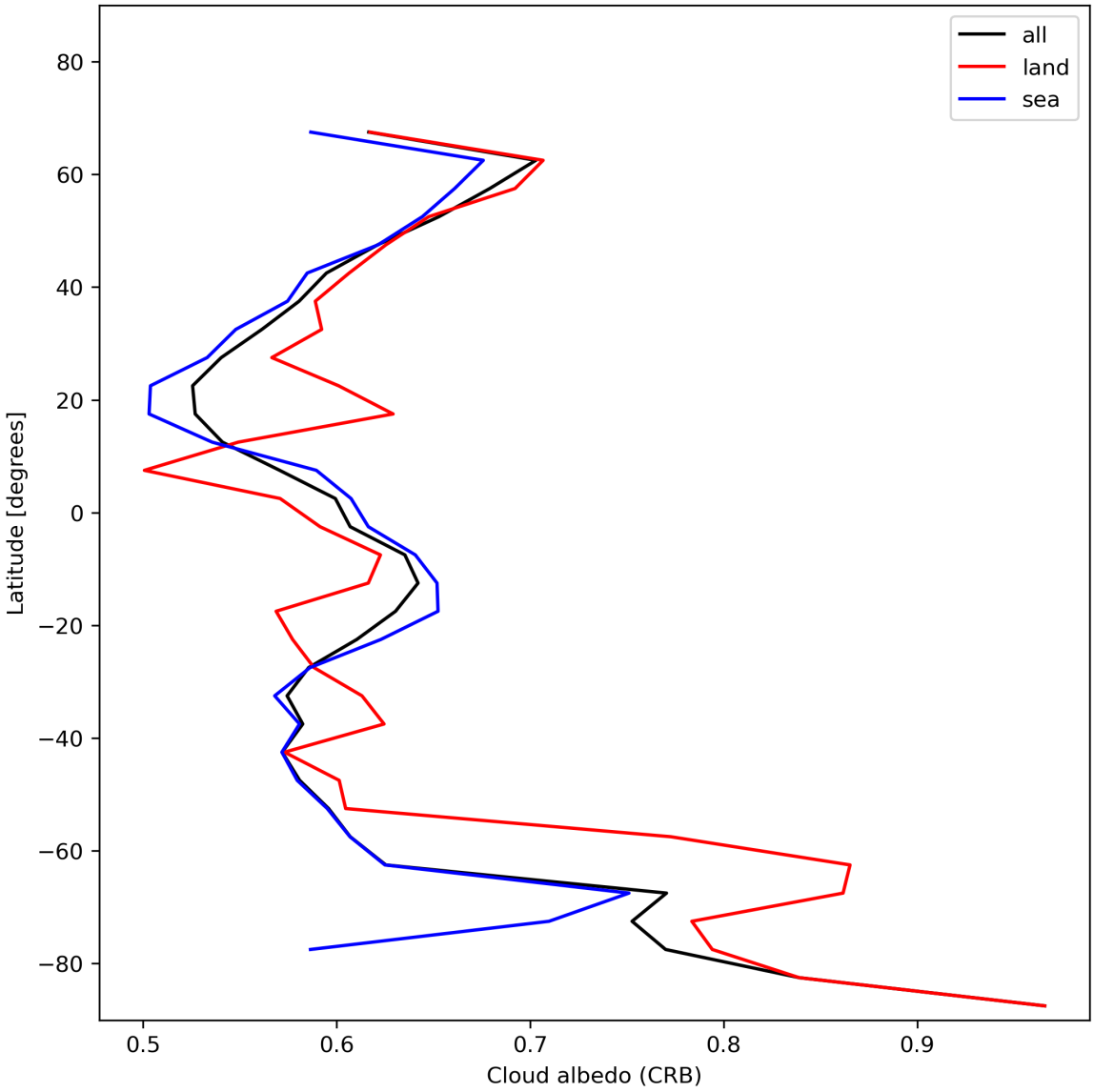

Figure 28: Zonal average of “Cloud albedo (CRB)” for 2023-11-20 to 2023-11-22.

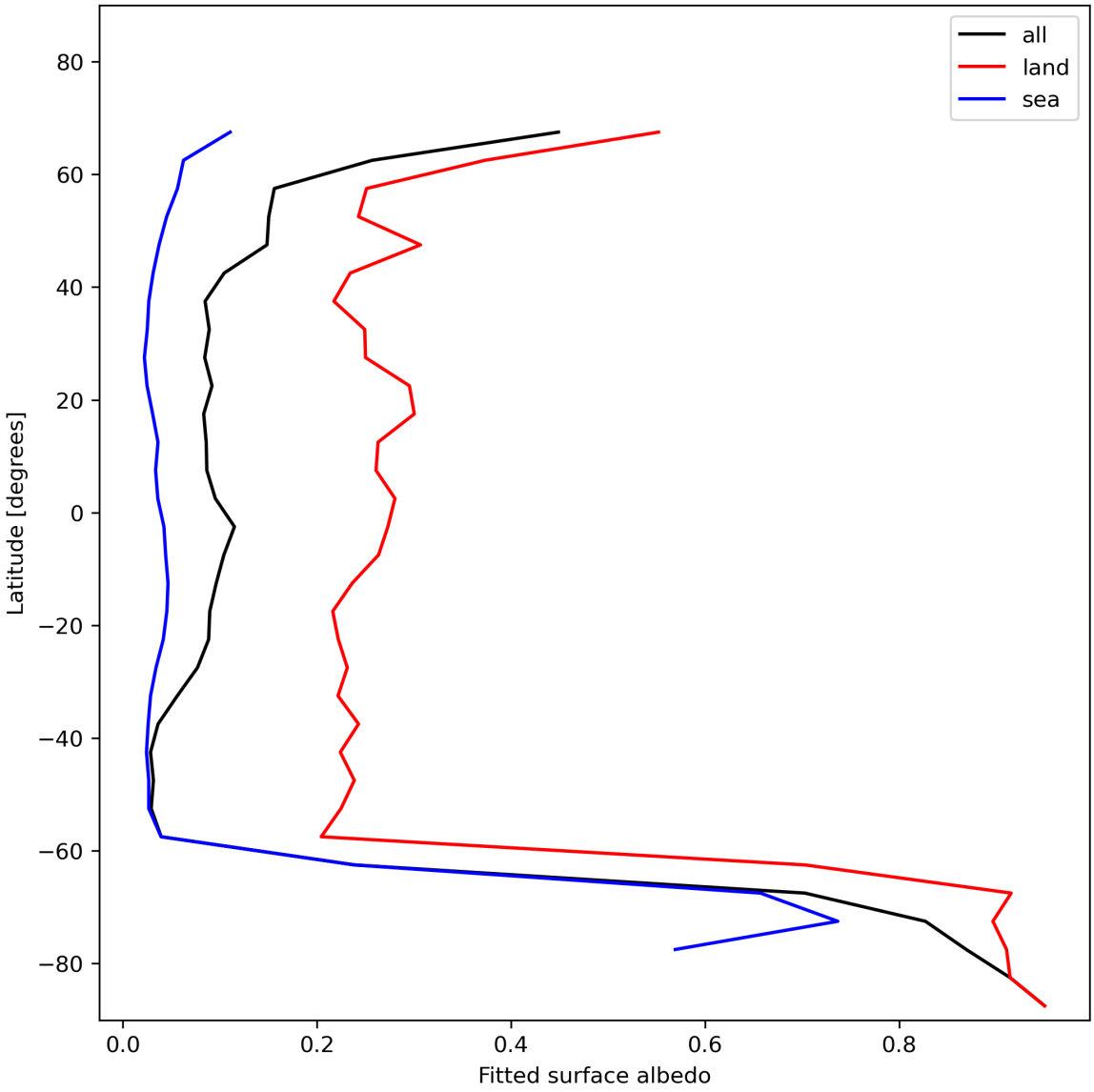

Figure 29: Zonal average of “Fitted surface albedo” for 2023-11-20 to 2023-11-22.

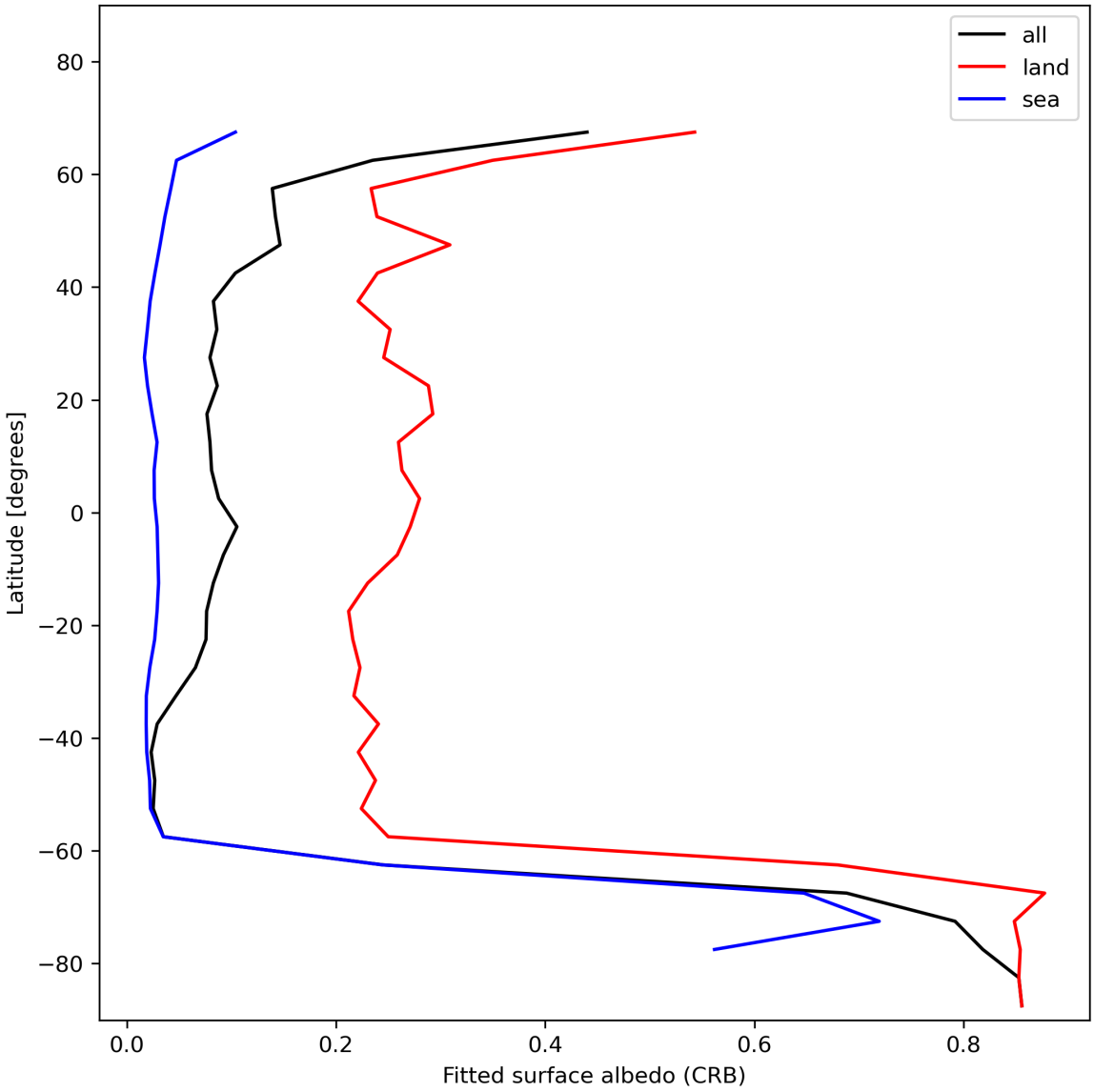

Figure 30: Zonal average of “Fitted surface albedo (CRB)” for 2023-11-20 to 2023-11-22.

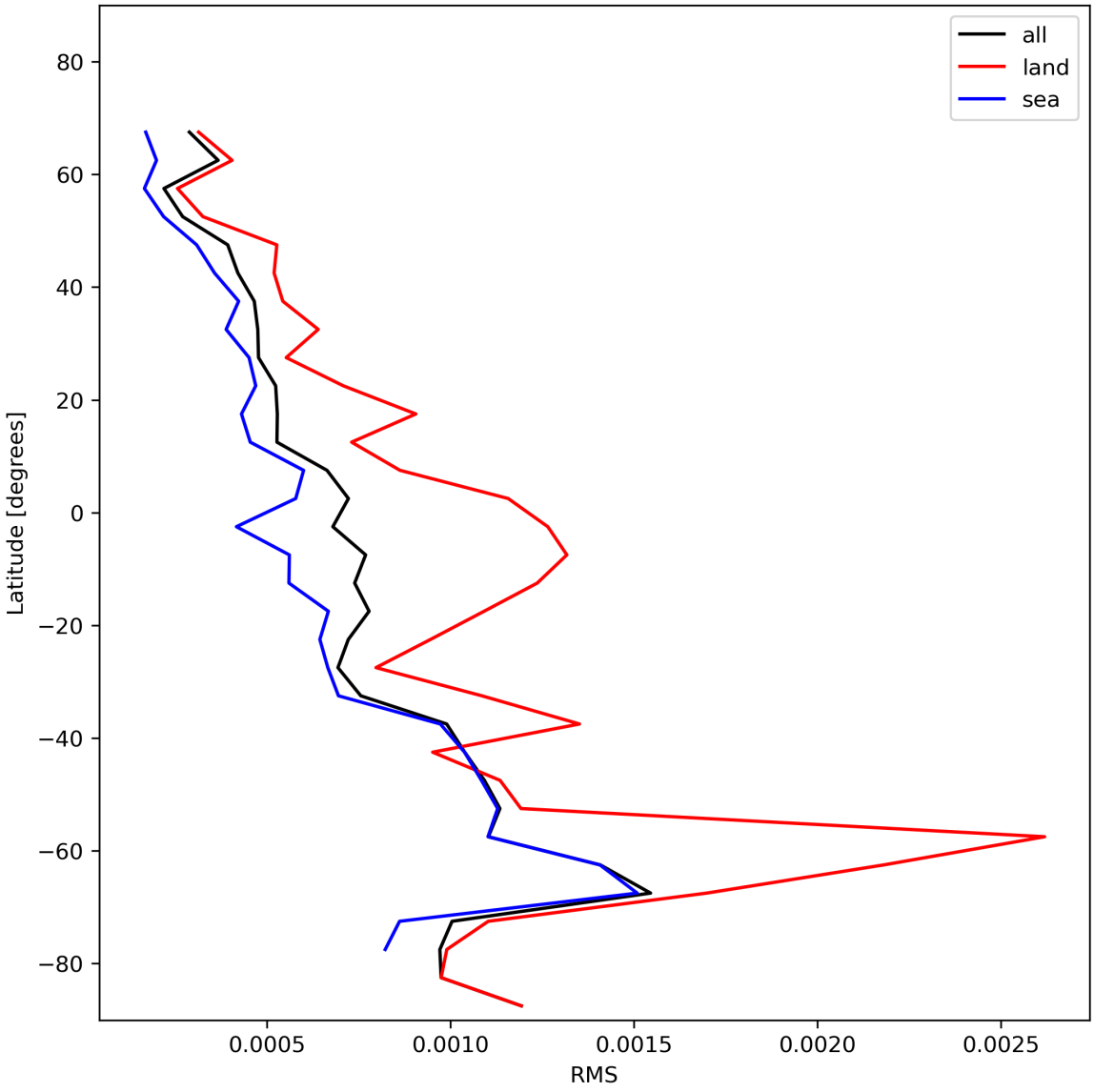

Figure 31: Zonal average of “RMS” for 2023-11-20 to 2023-11-22.

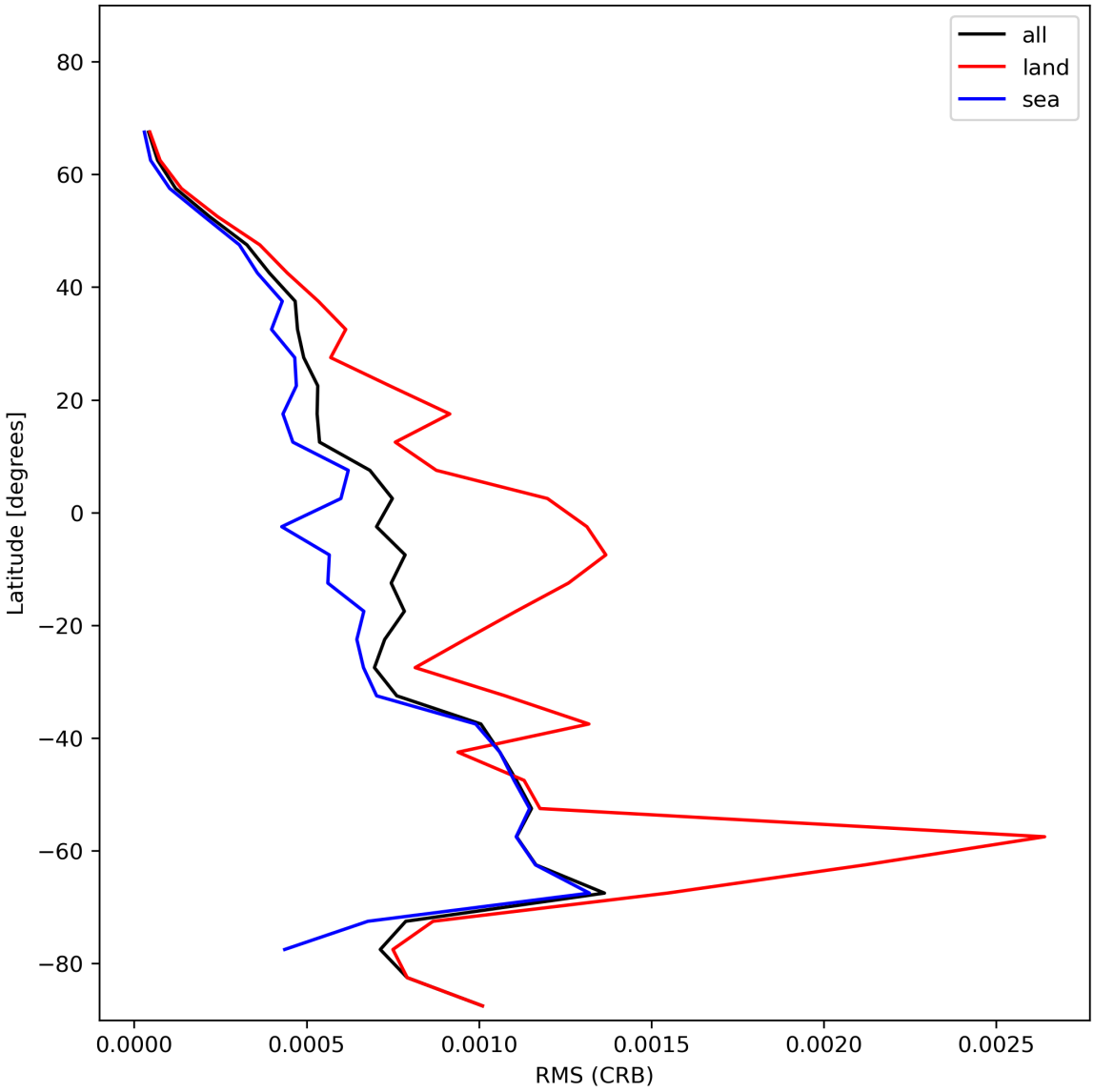

Figure 32: Zonal average of “RMS (CRB)” for 2023-11-20 to 2023-11-22.

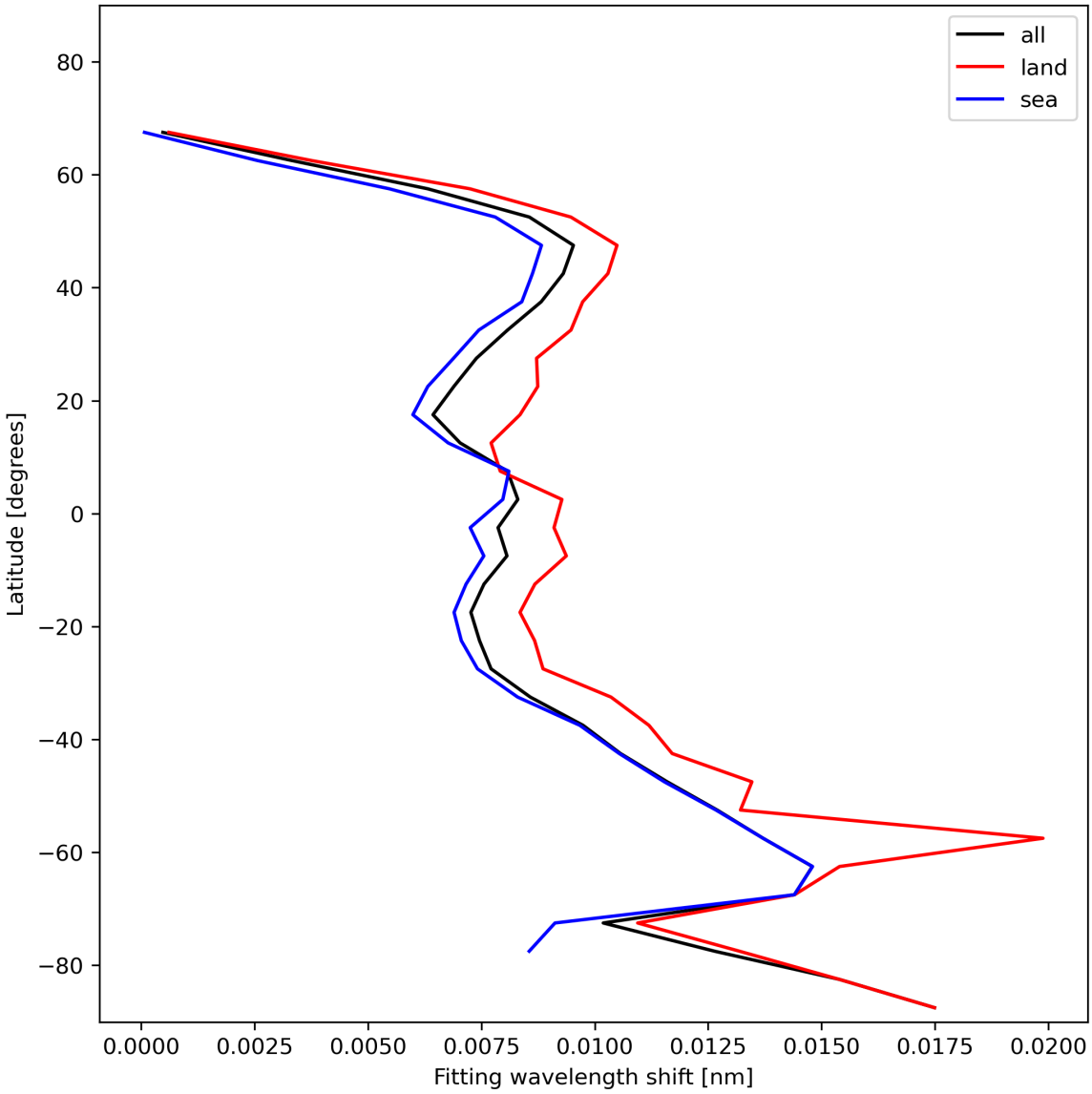

Figure 33: Zonal average of “Fitting wavelength shift” for 2023-11-20 to 2023-11-22.

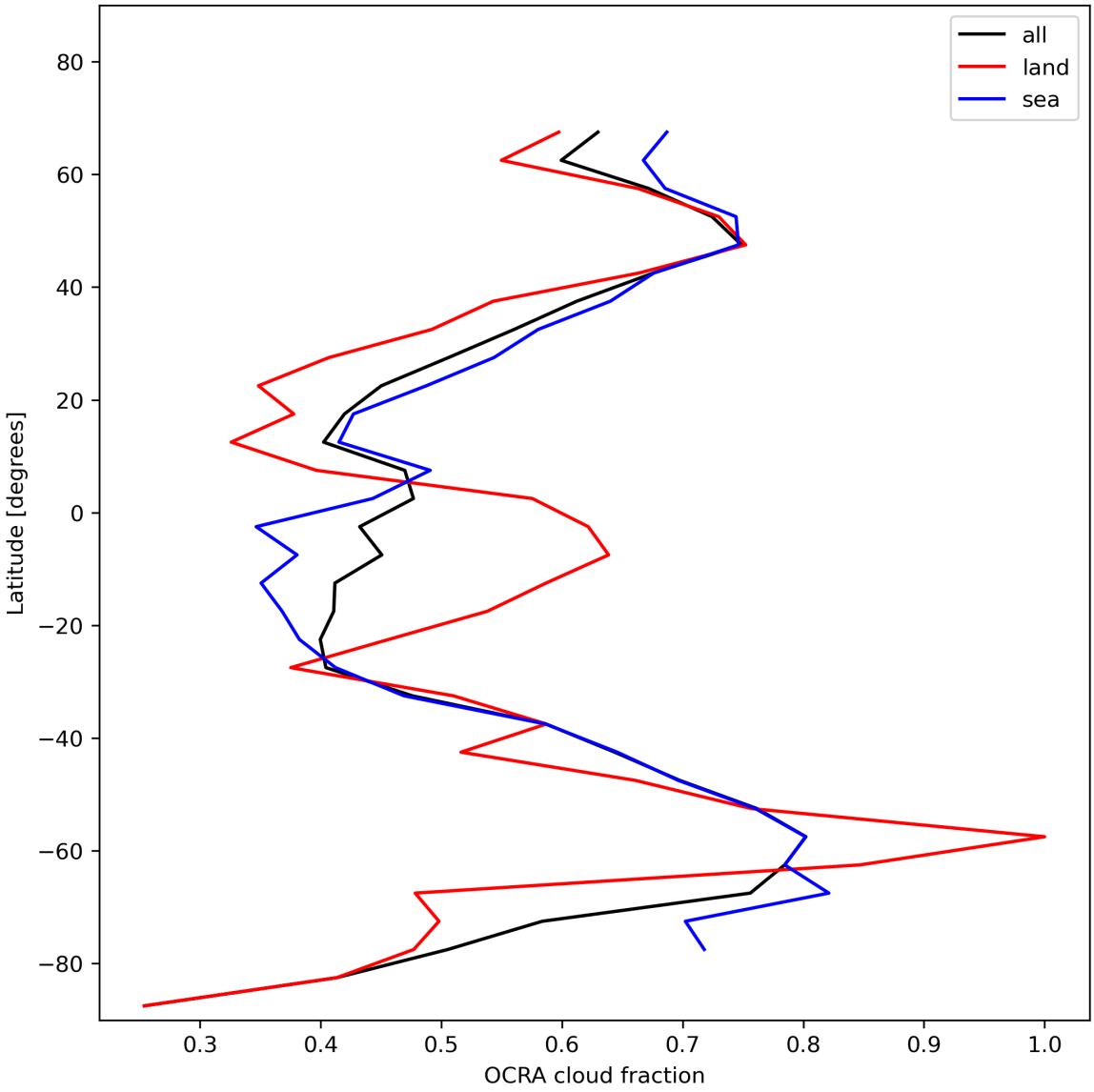

Figure 34: Zonal average of “OCRA cloud fraction” for 2023-11-20 to 2023-11-22.

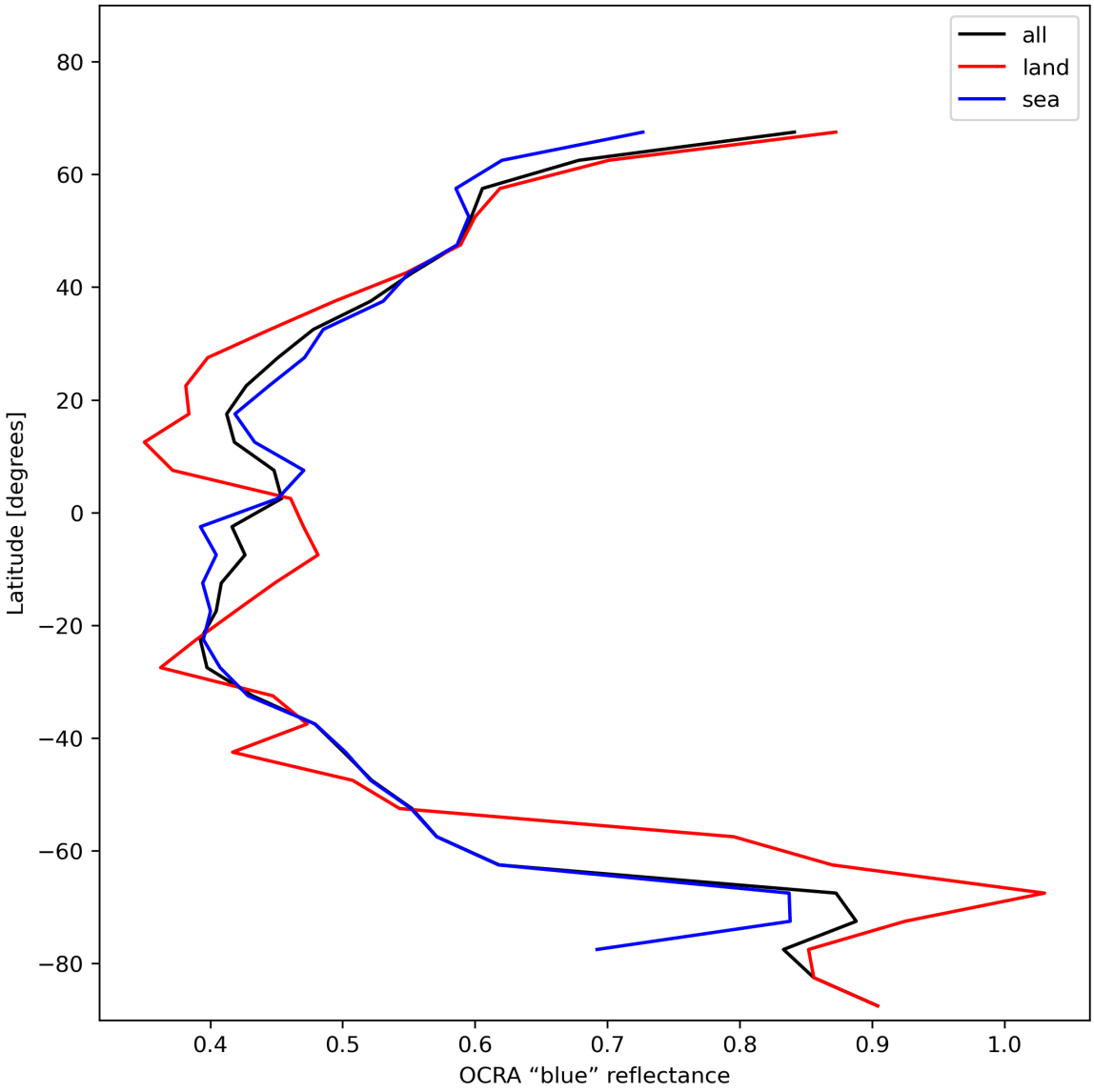

Figure 35: Zonal average of “OCRA “blue” reflectance” for 2023-11-20 to 2023-11-22.

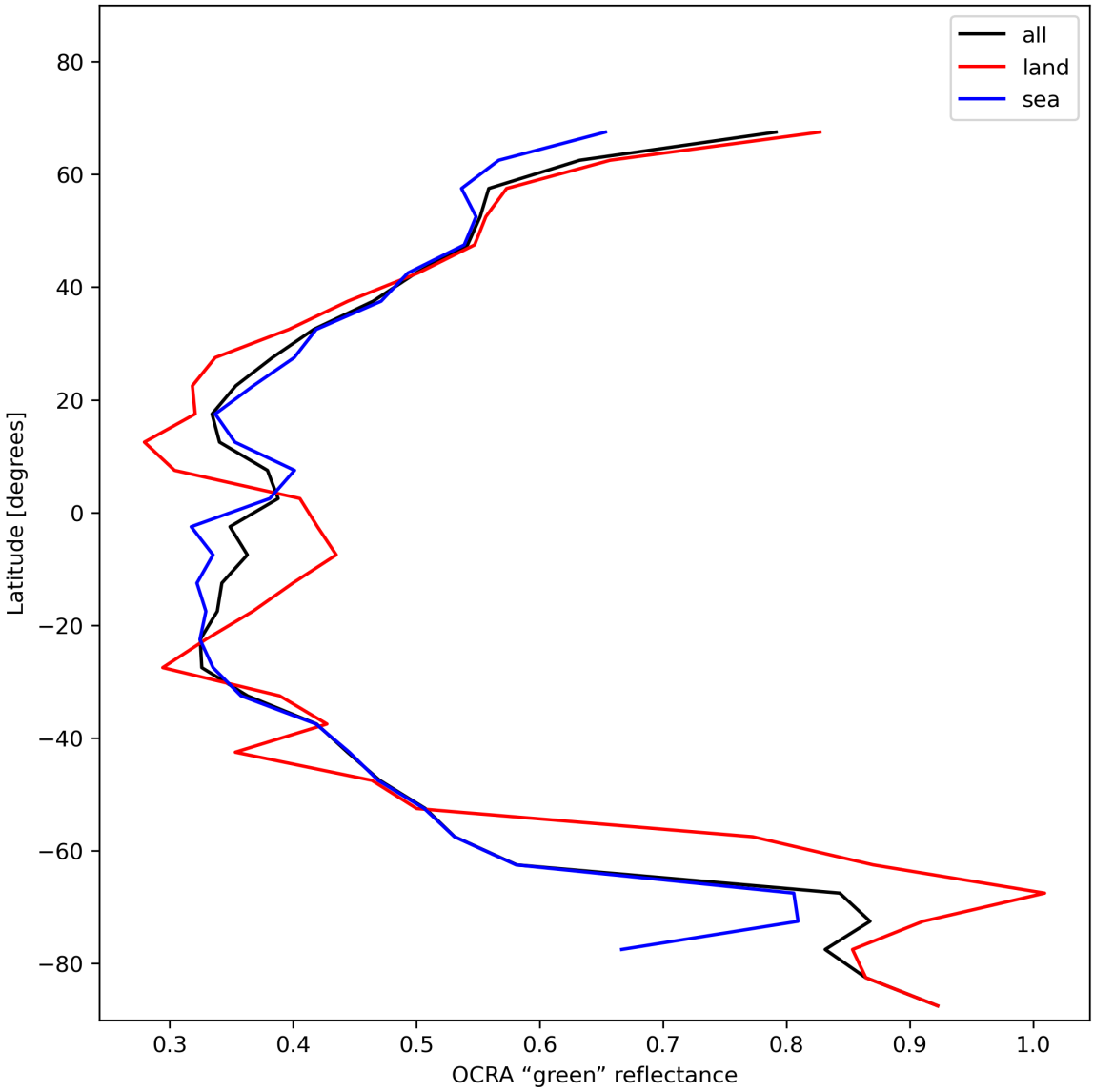

Figure 36: Zonal average of “OCRA “green” reflectance” for 2023-11-20 to 2023-11-22.

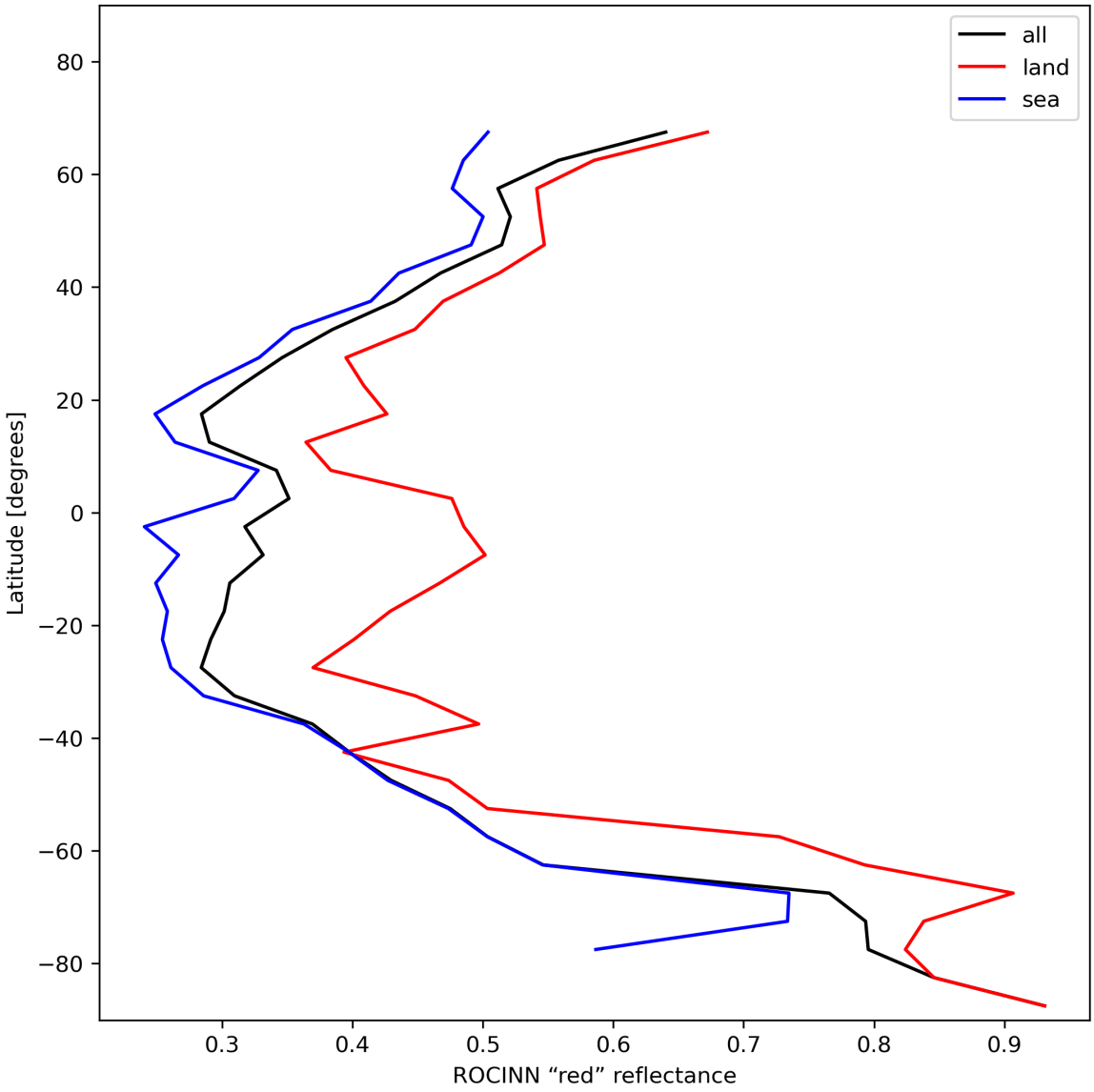

Figure 37: Zonal average of “ROCINN “red” reflectance” for 2023-11-20 to 2023-11-22.

8 Histograms

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

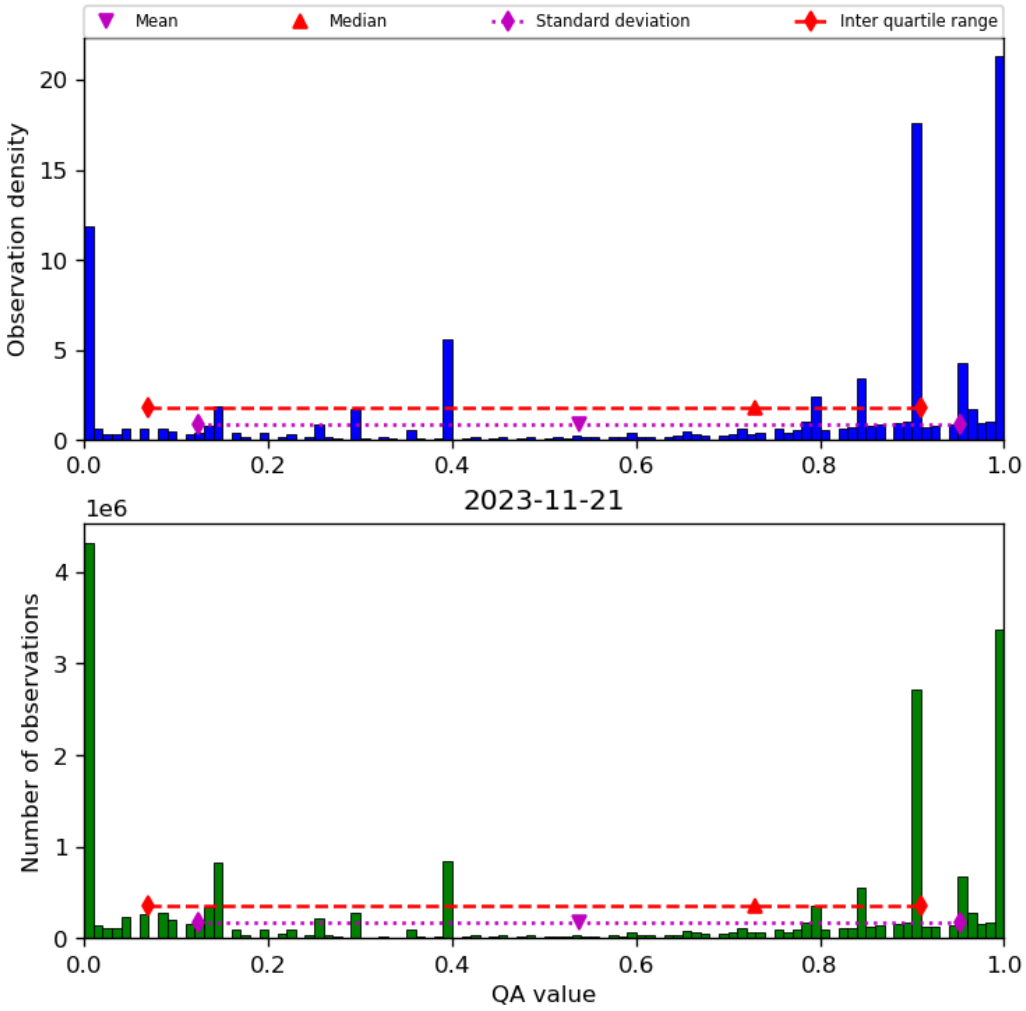

Figure 38: Histogram of “QA value” for 2023-11-20 to 2023-11-22

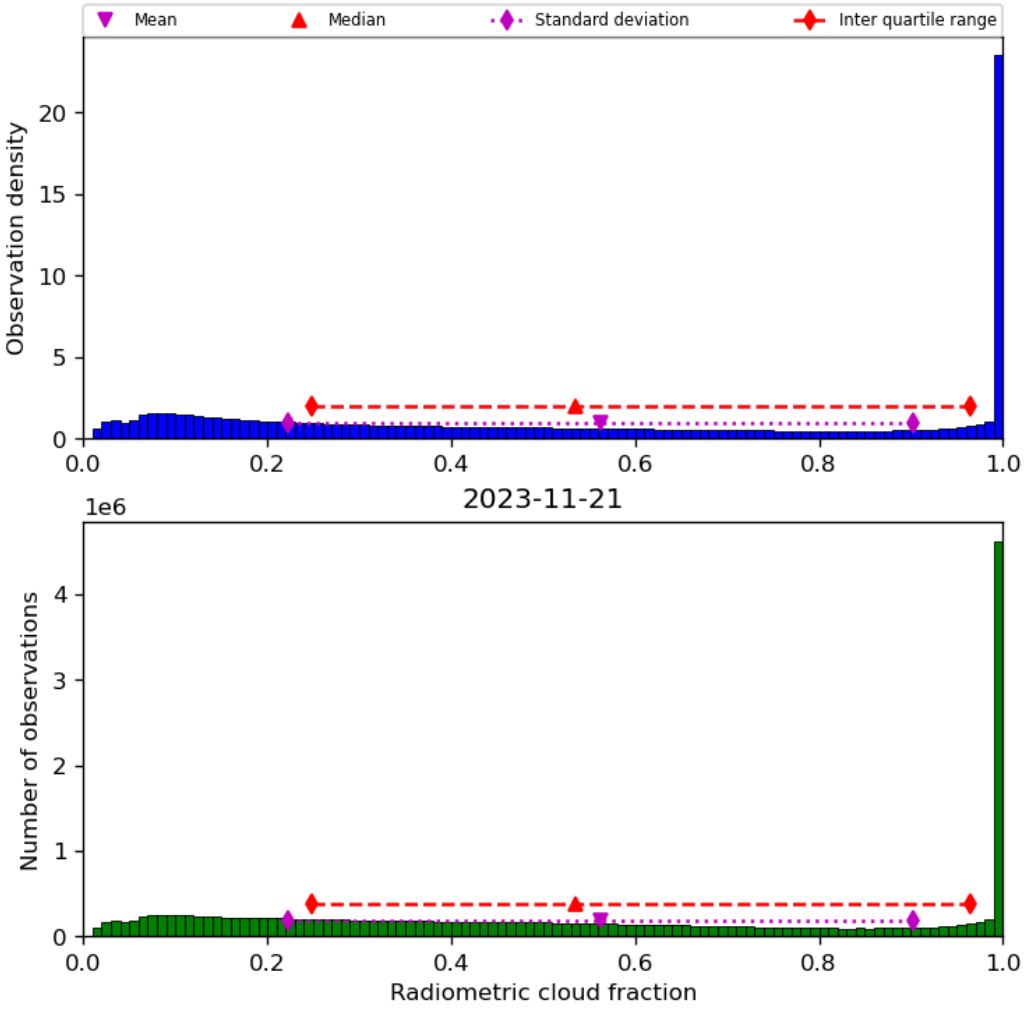

Figure 39: Histogram of “Radiometric cloud fraction” for 2023-11-20 to 2023-11-22

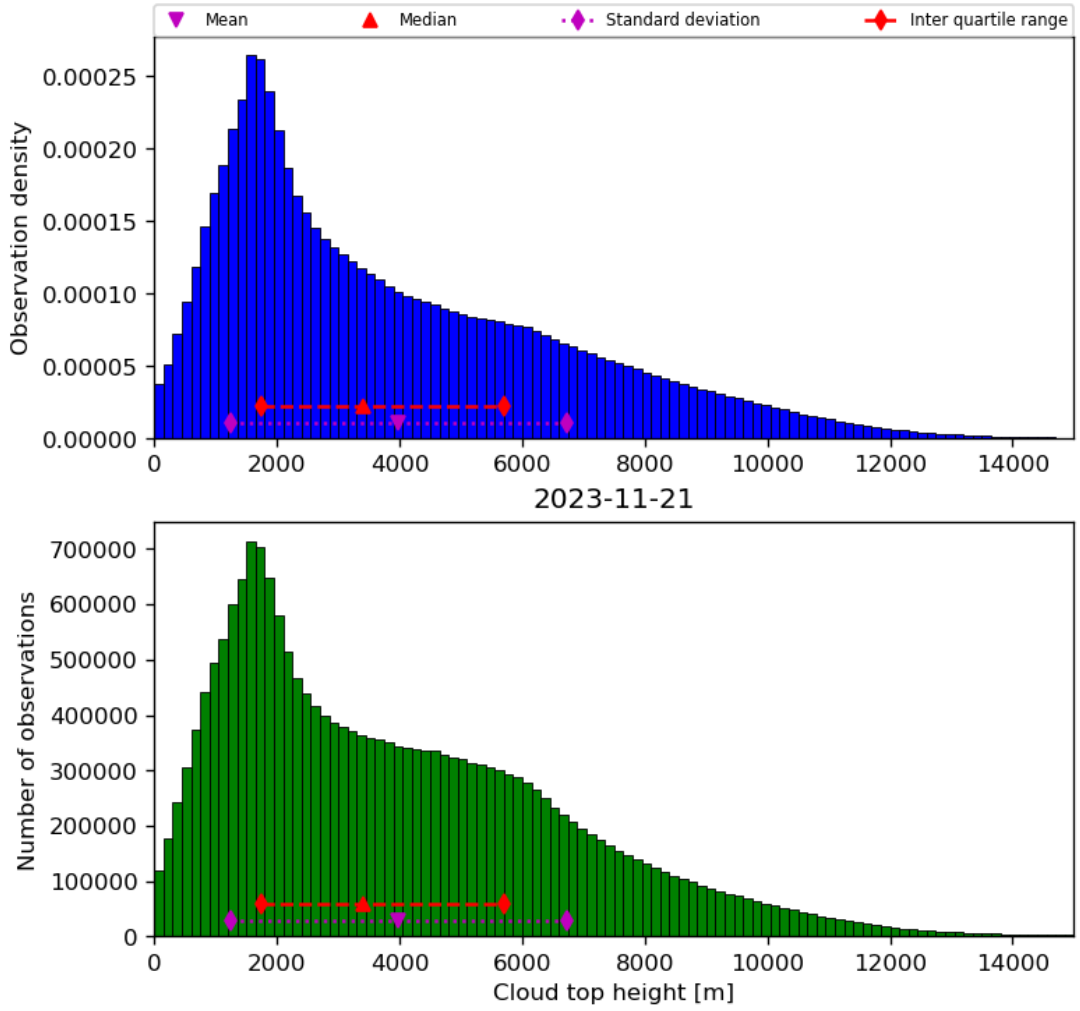

Figure 40: Histogram of “Cloud top height” for 2023-11-20 to 2023-11-22

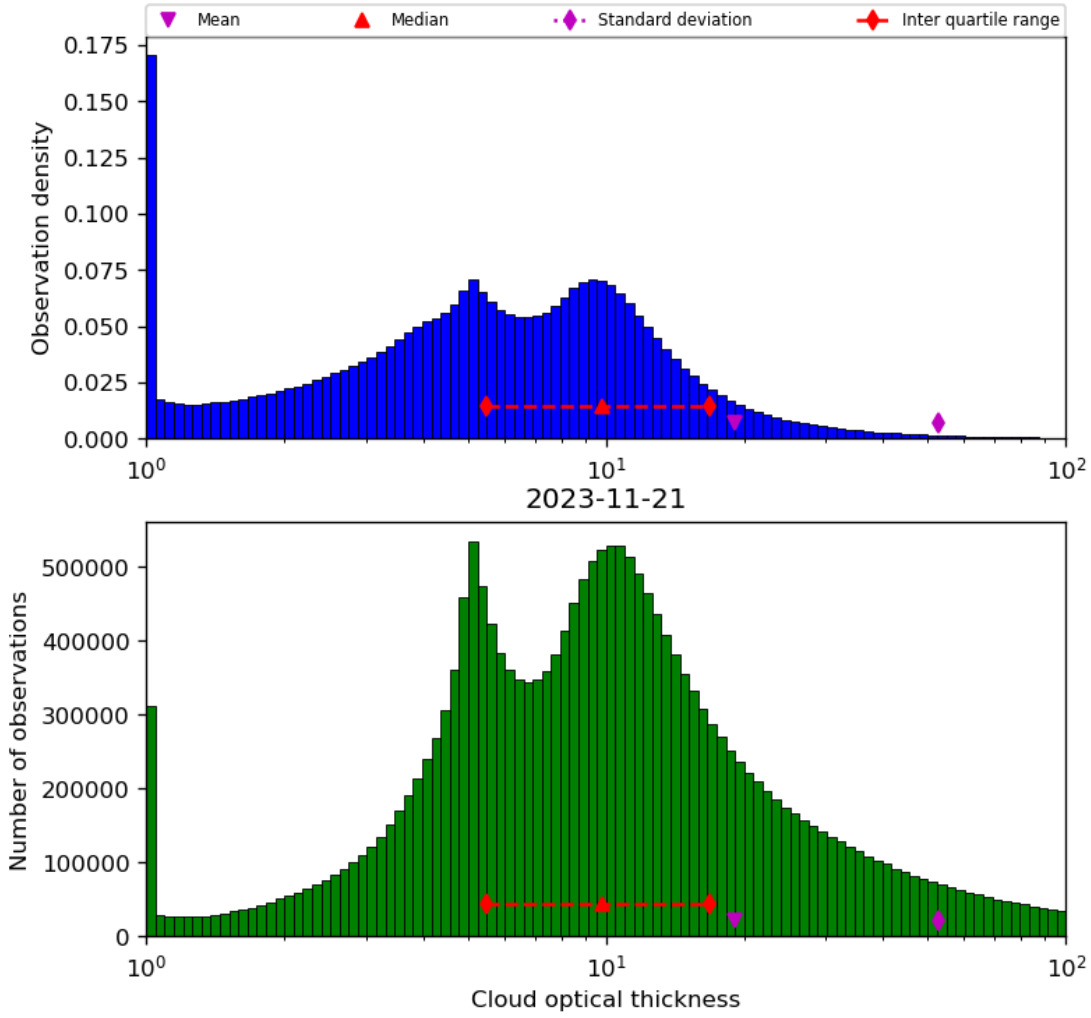

Figure 41: Histogram of “Cloud optical thickness” for 2023-11-20 to 2023-11-22

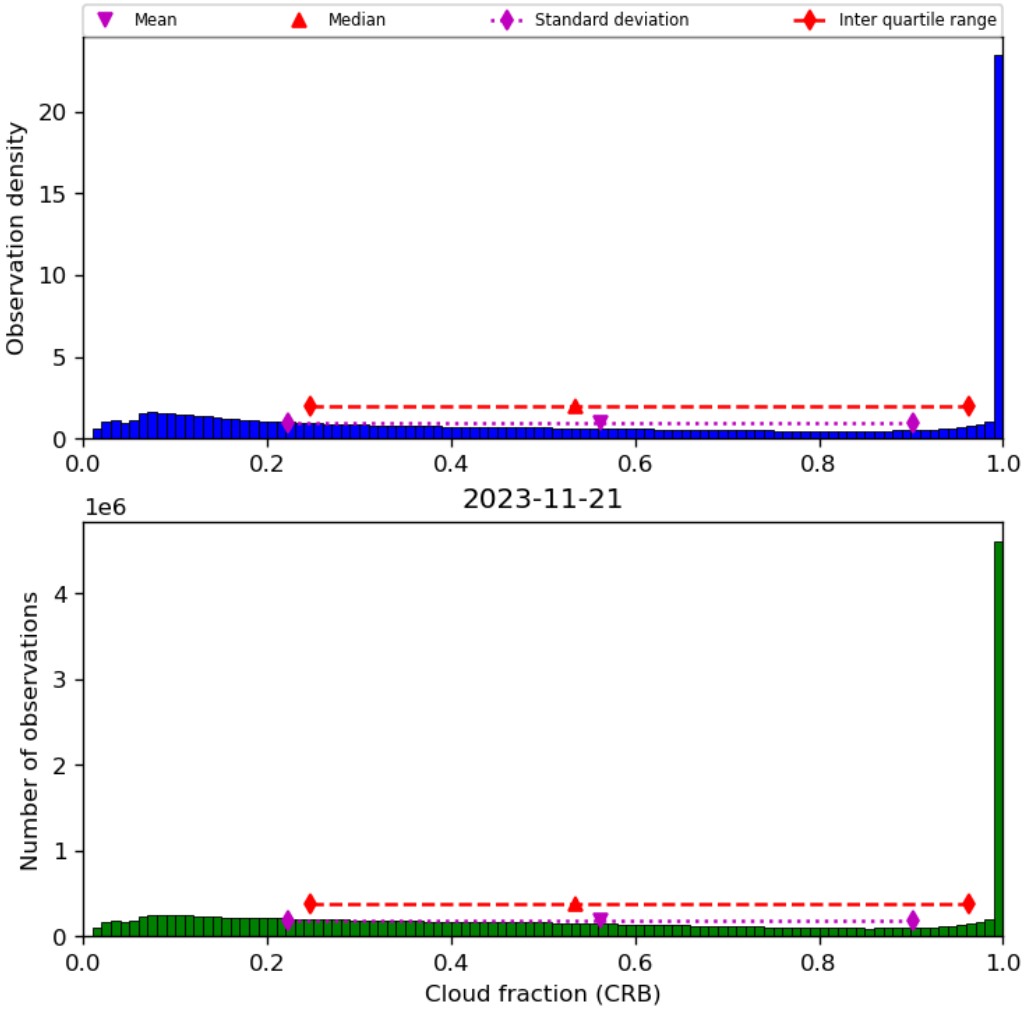

Figure 42: Histogram of “Cloud fraction (CRB)” for 2023-11-20 to 2023-11-22

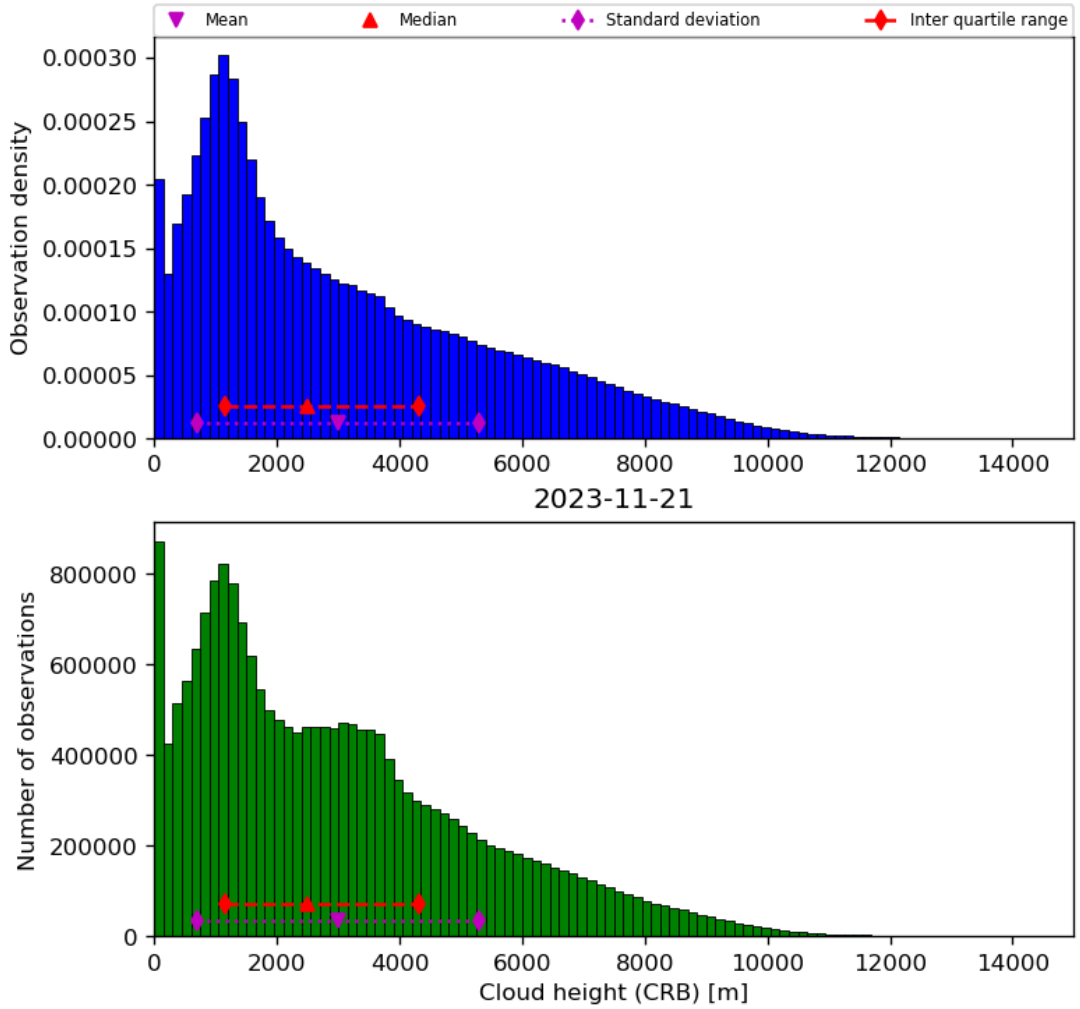

Figure 43: Histogram of “Cloud height (CRB)” for 2023-11-20 to 2023-11-22

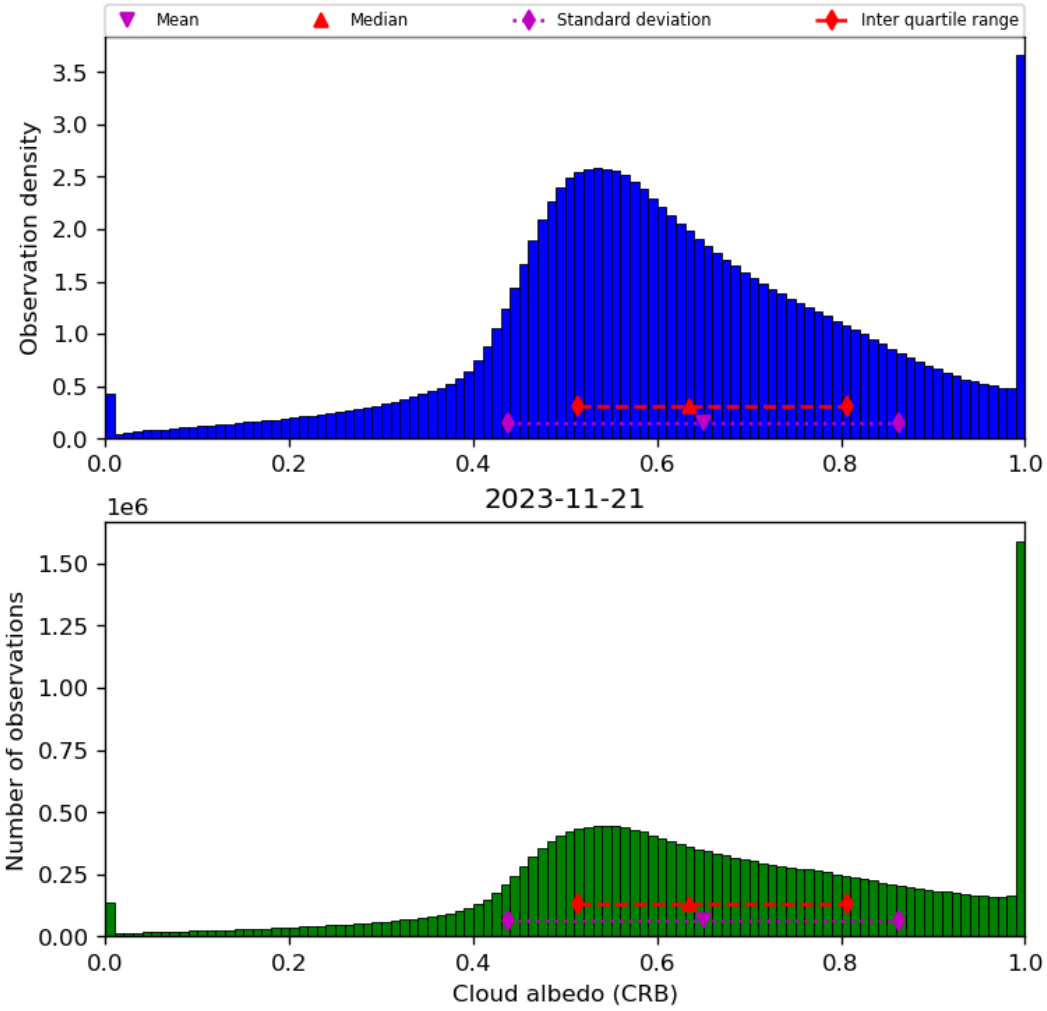

Figure 44: Histogram of “Cloud albedo (CRB)” for 2023-11-20 to 2023-11-22

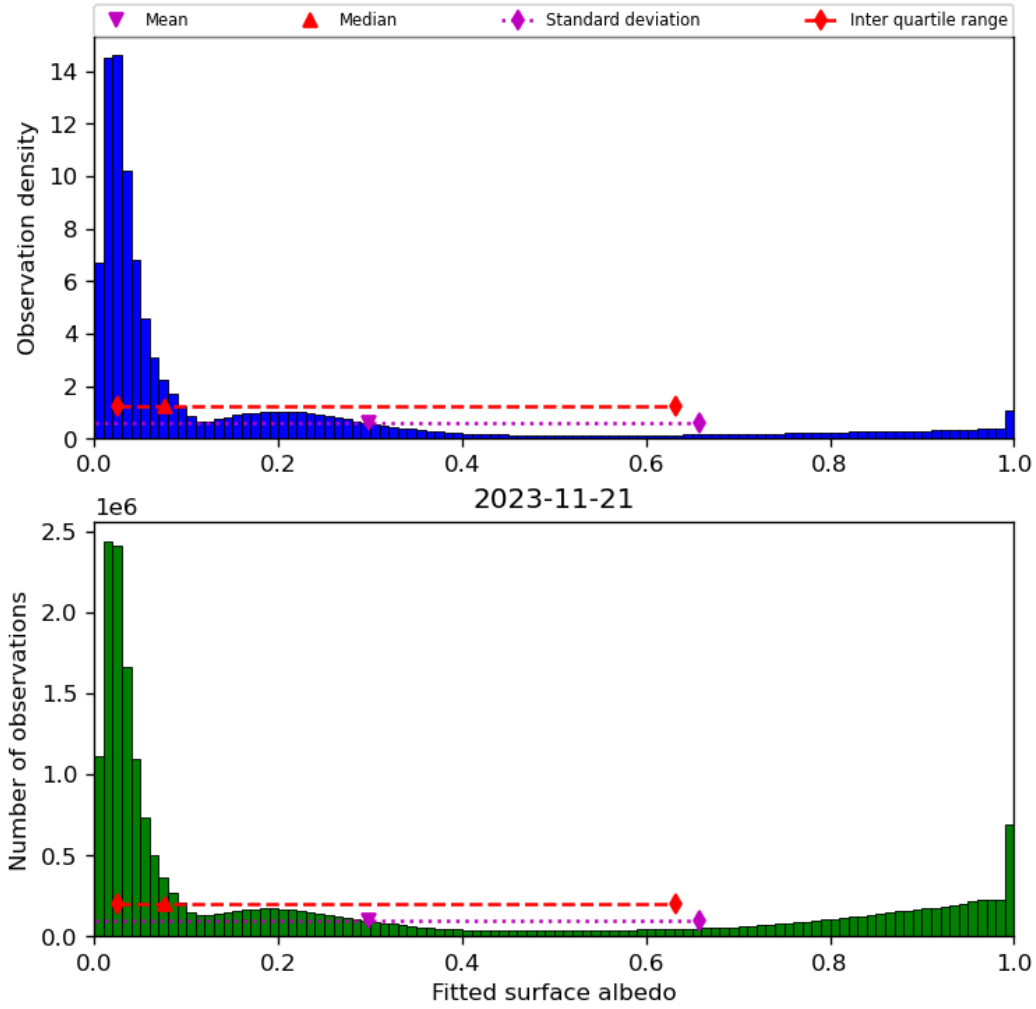

Figure 45: Histogram of “Fitted surface albedo” for 2023-11-20 to 2023-11-22

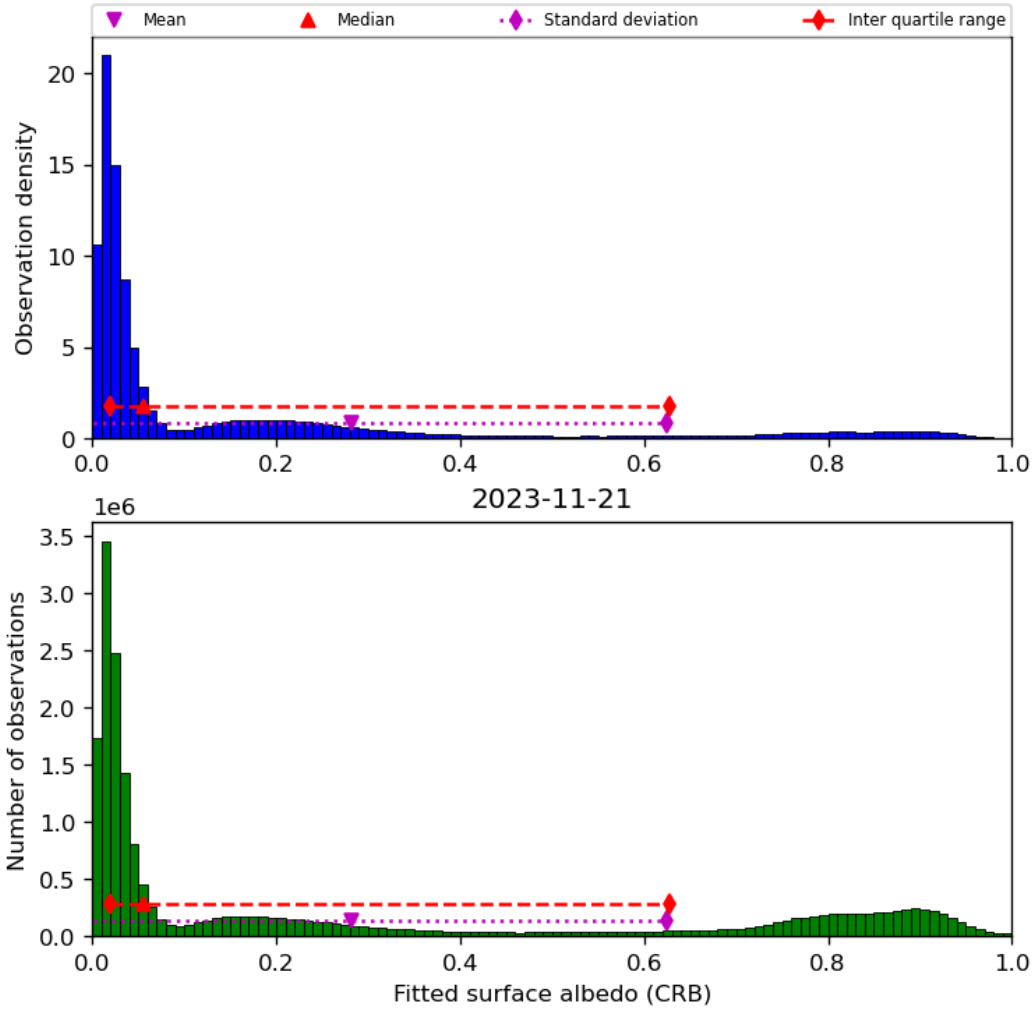

Figure 46: Histogram of “Fitted surface albedo (CRB)” for 2023-11-20 to 2023-11-22

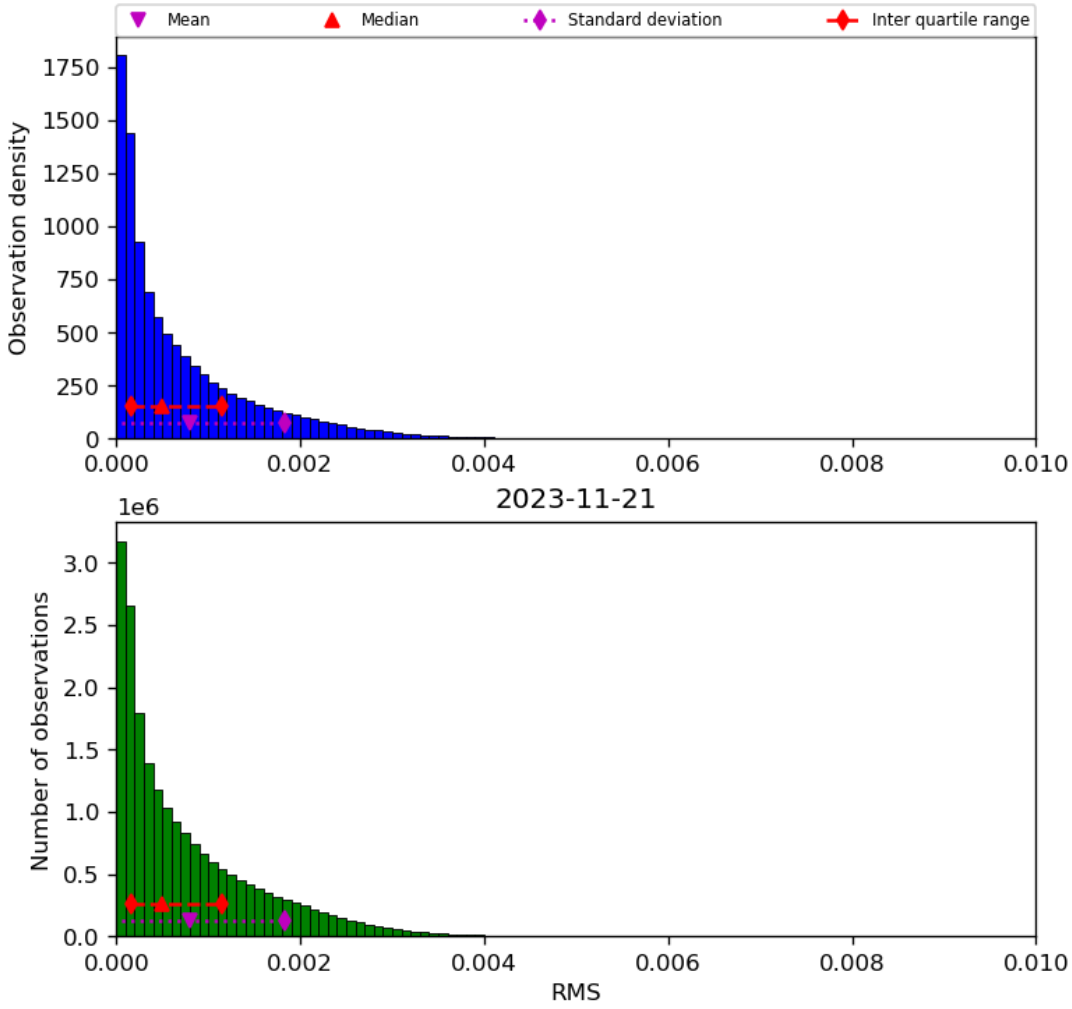

Figure 47: Histogram of “RMS” for 2023-11-20 to 2023-11-22

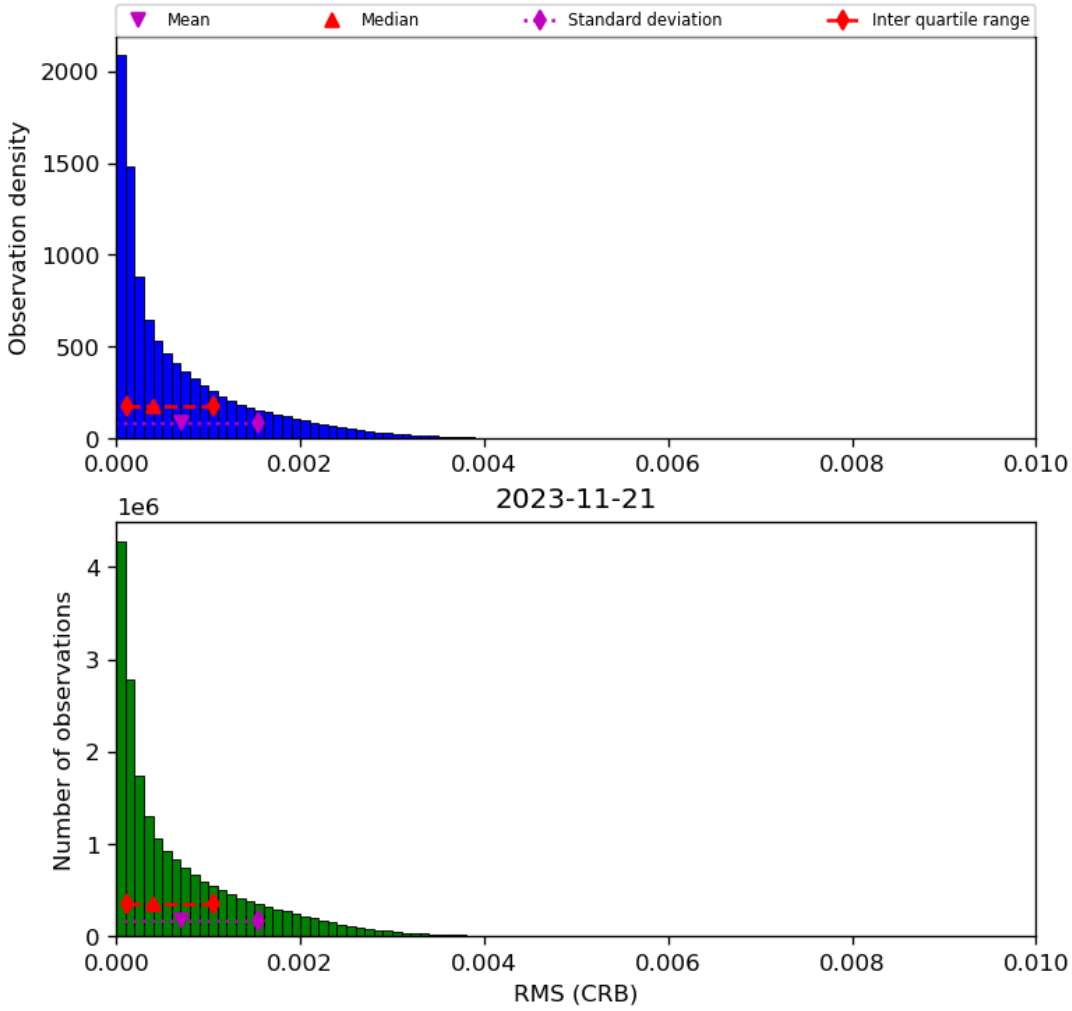

Figure 48: Histogram of “RMS (CRB)” for 2023-11-20 to 2023-11-22

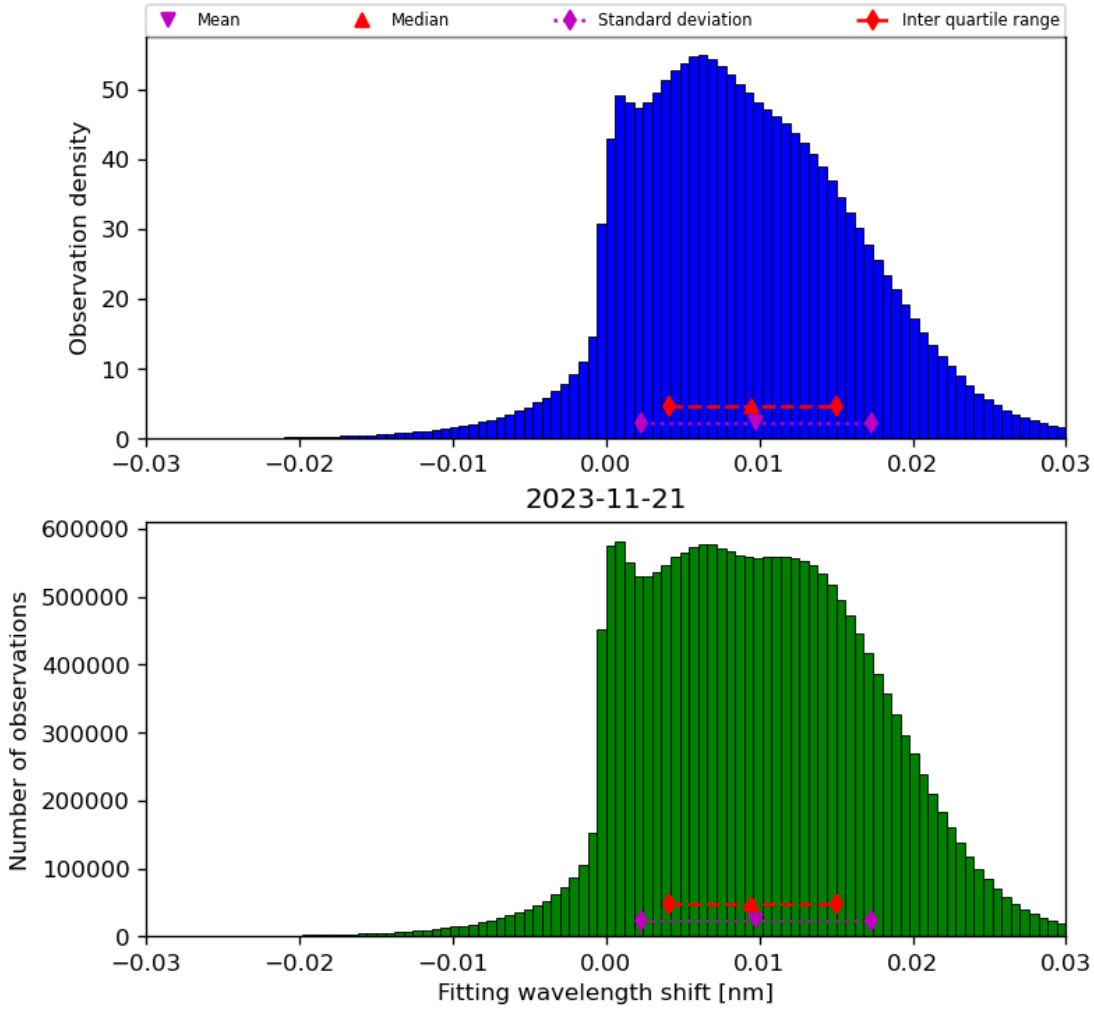

Figure 49: Histogram of “Fitting wavelength shift” for 2023-11-20 to 2023-11-22

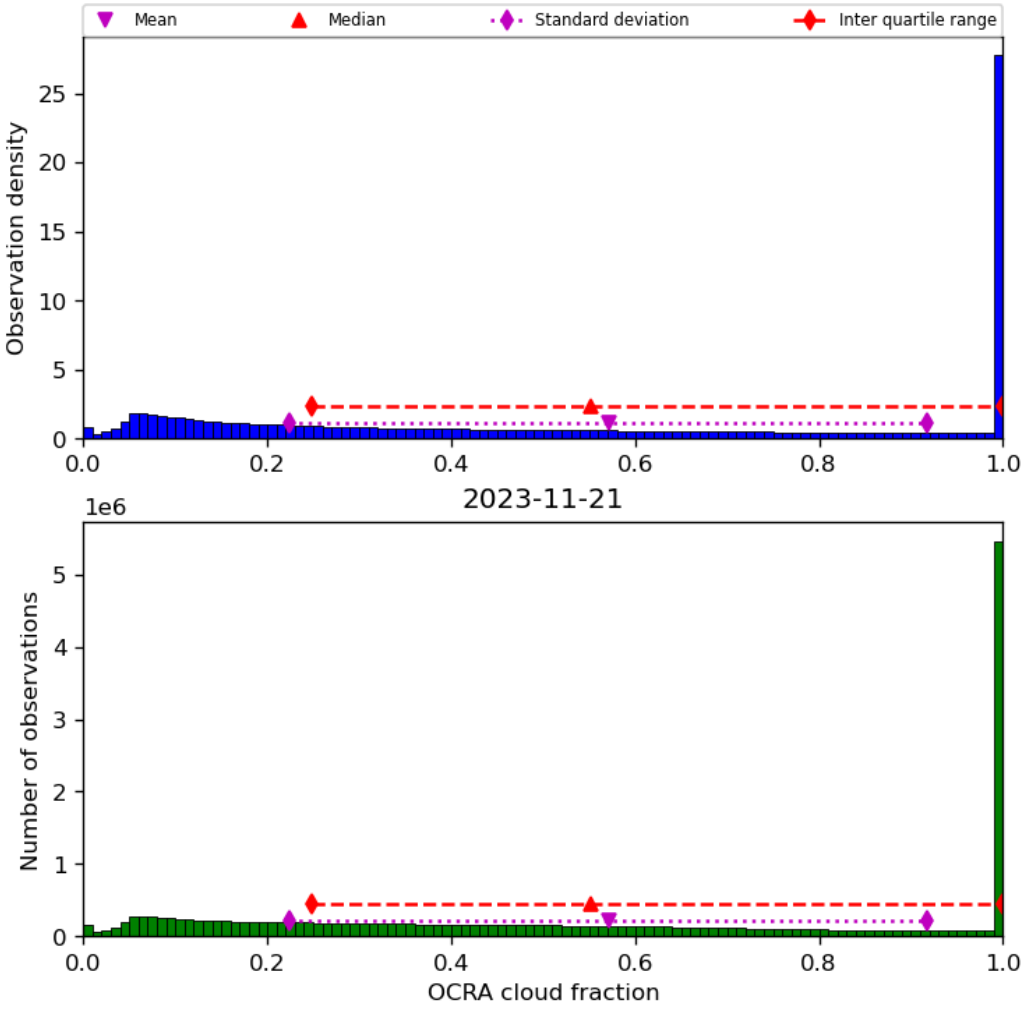

Figure 50: Histogram of “OCRA cloud fraction” for 2023-11-20 to 2023-11-22

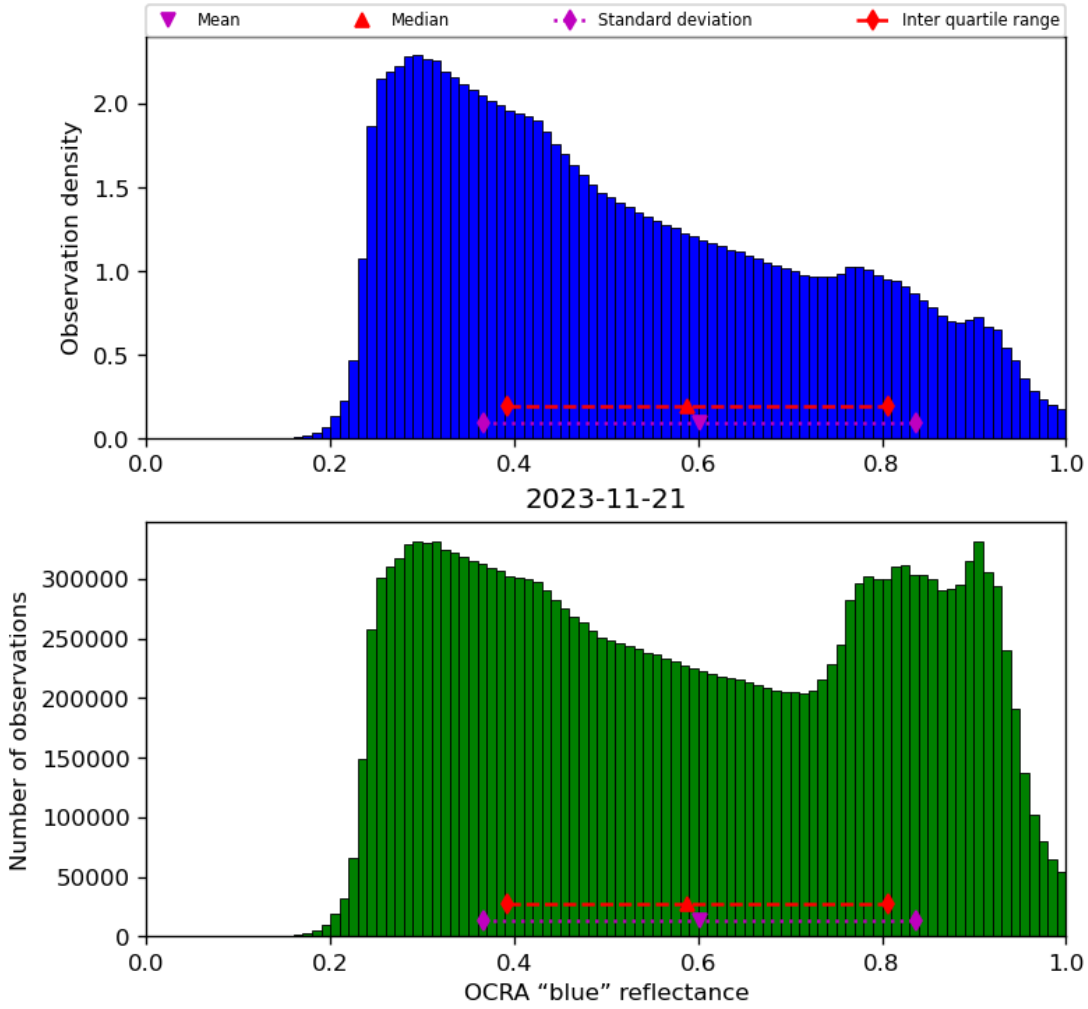

Figure 51: Histogram of “OCRA “blue” reflectance” for 2023-11-20 to 2023-11-22

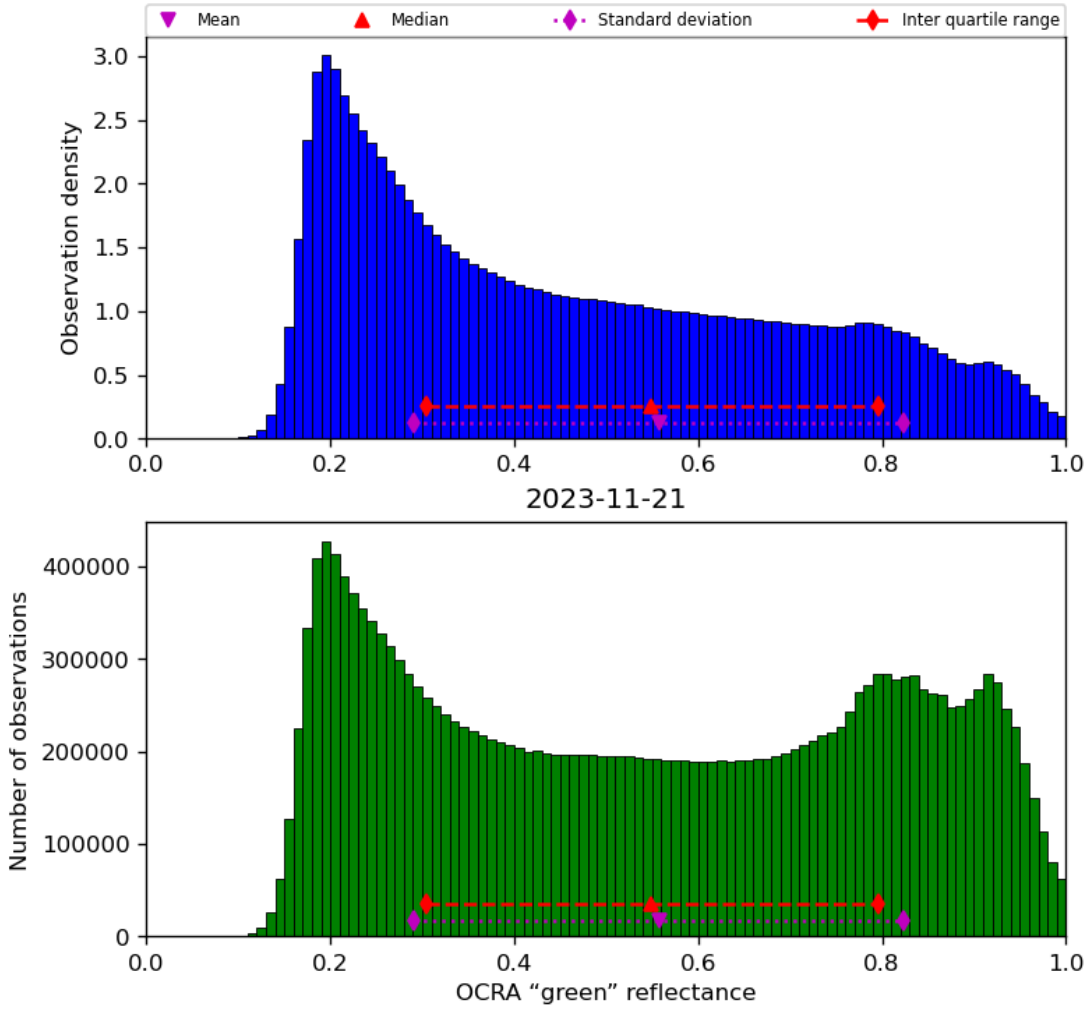

Figure 52: Histogram of “OCRA “green” reflectance” for 2023-11-20 to 2023-11-22

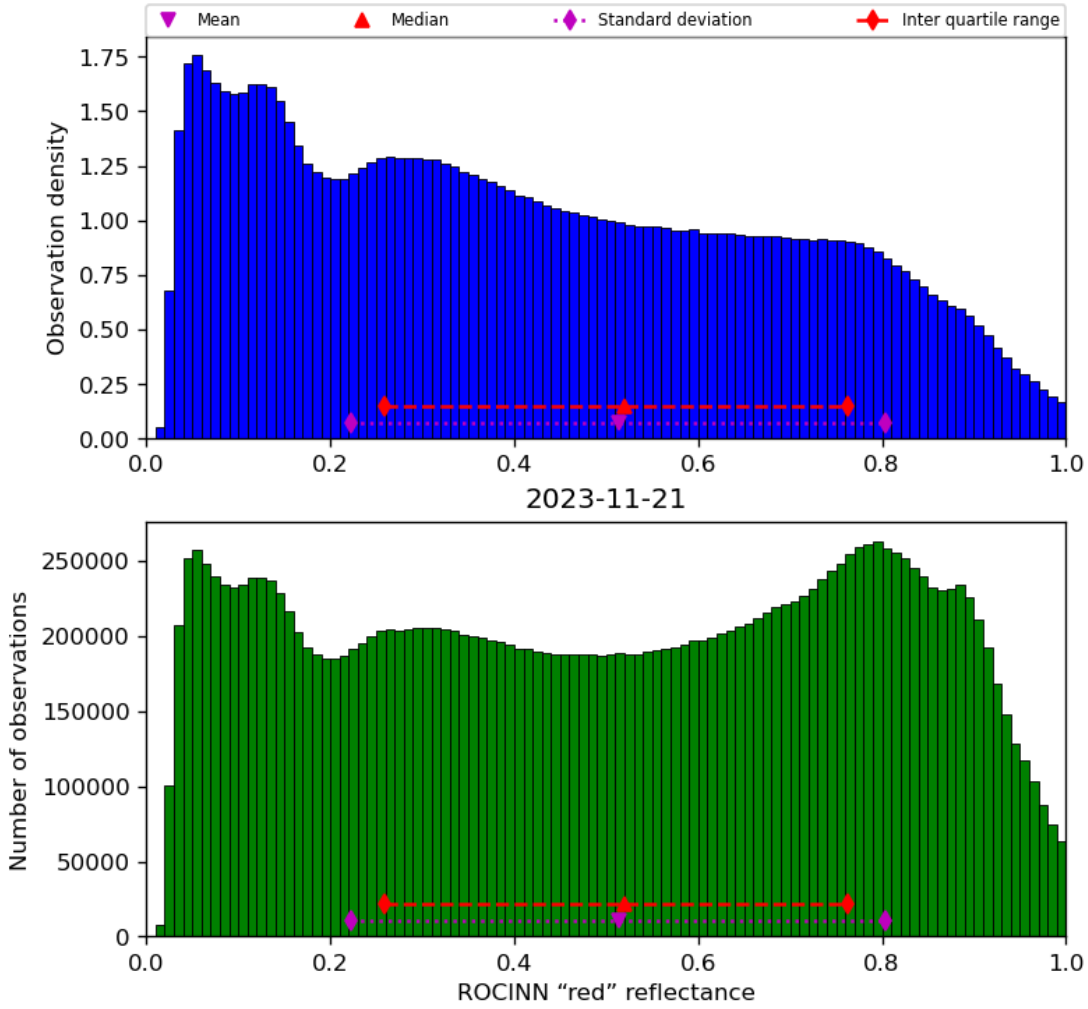

Figure 53: Histogram of “ROCINN “red” reflectance” for 2023-11-20 to 2023-11-22

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.

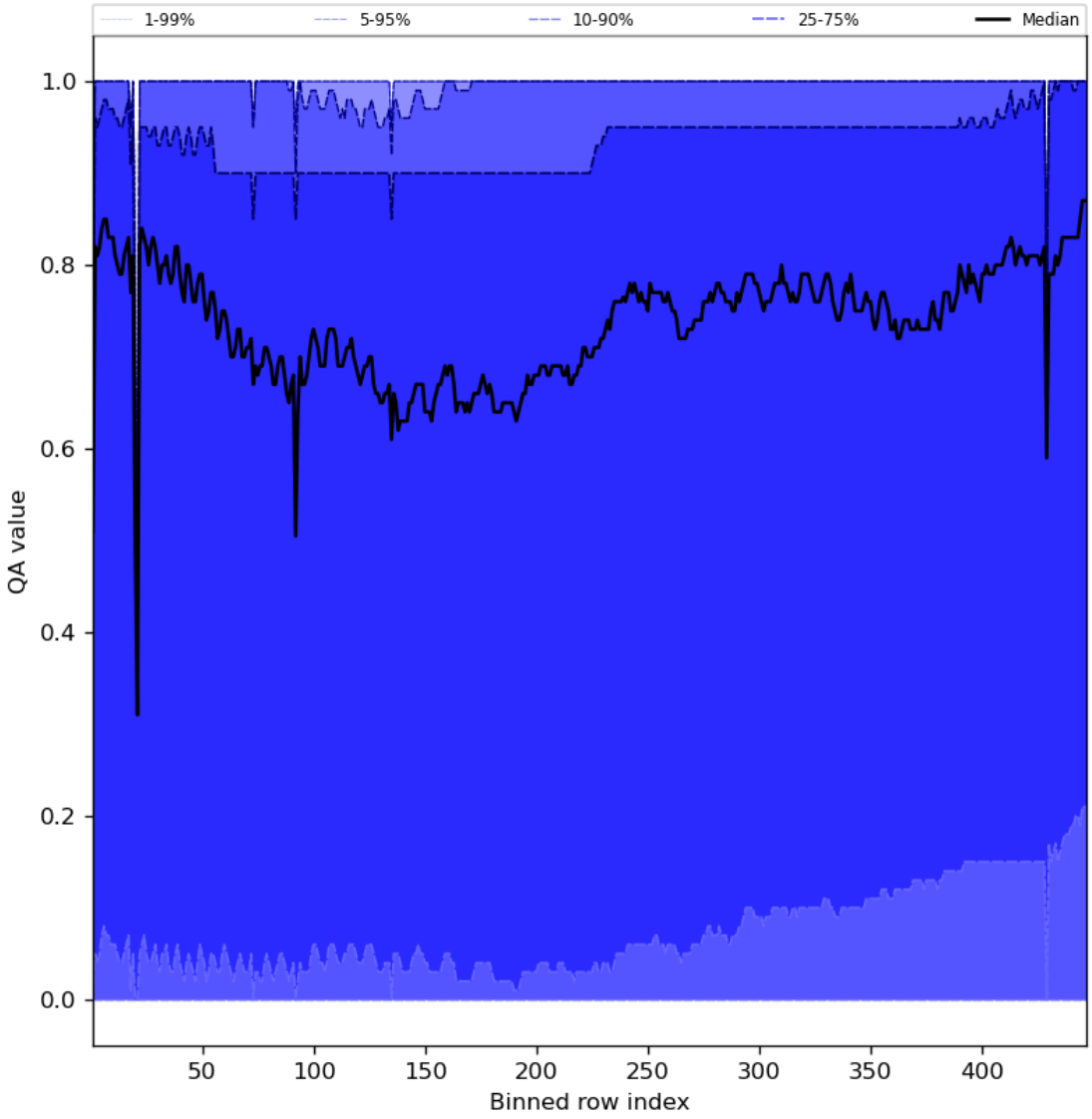

Figure 54: Along track statistics of “QA value” for 2023-11-20 to 2023-11-22

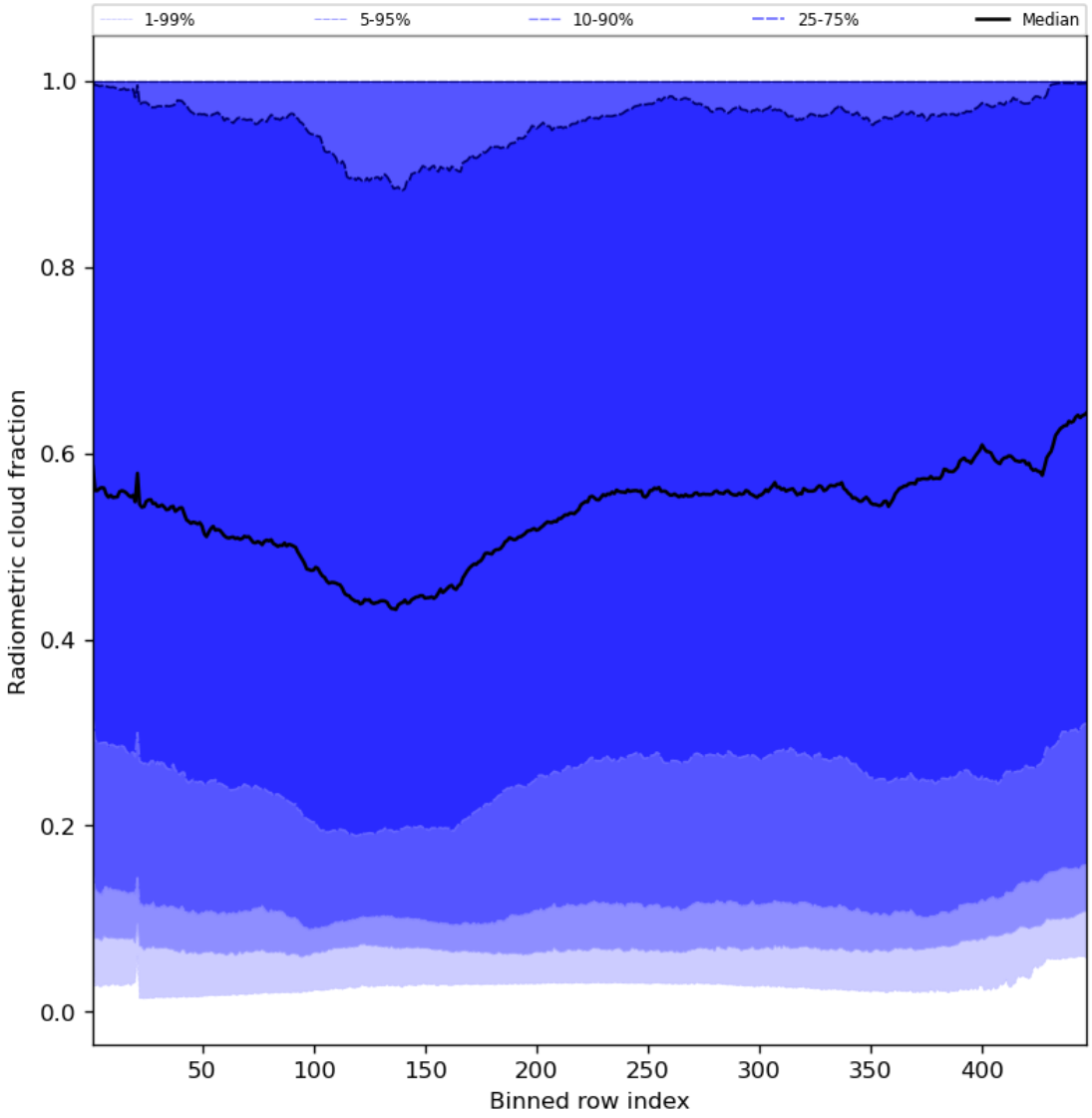

Figure 55: Along track statistics of “Radiometric cloud fraction” for 2023-11-20 to 2023-11-22

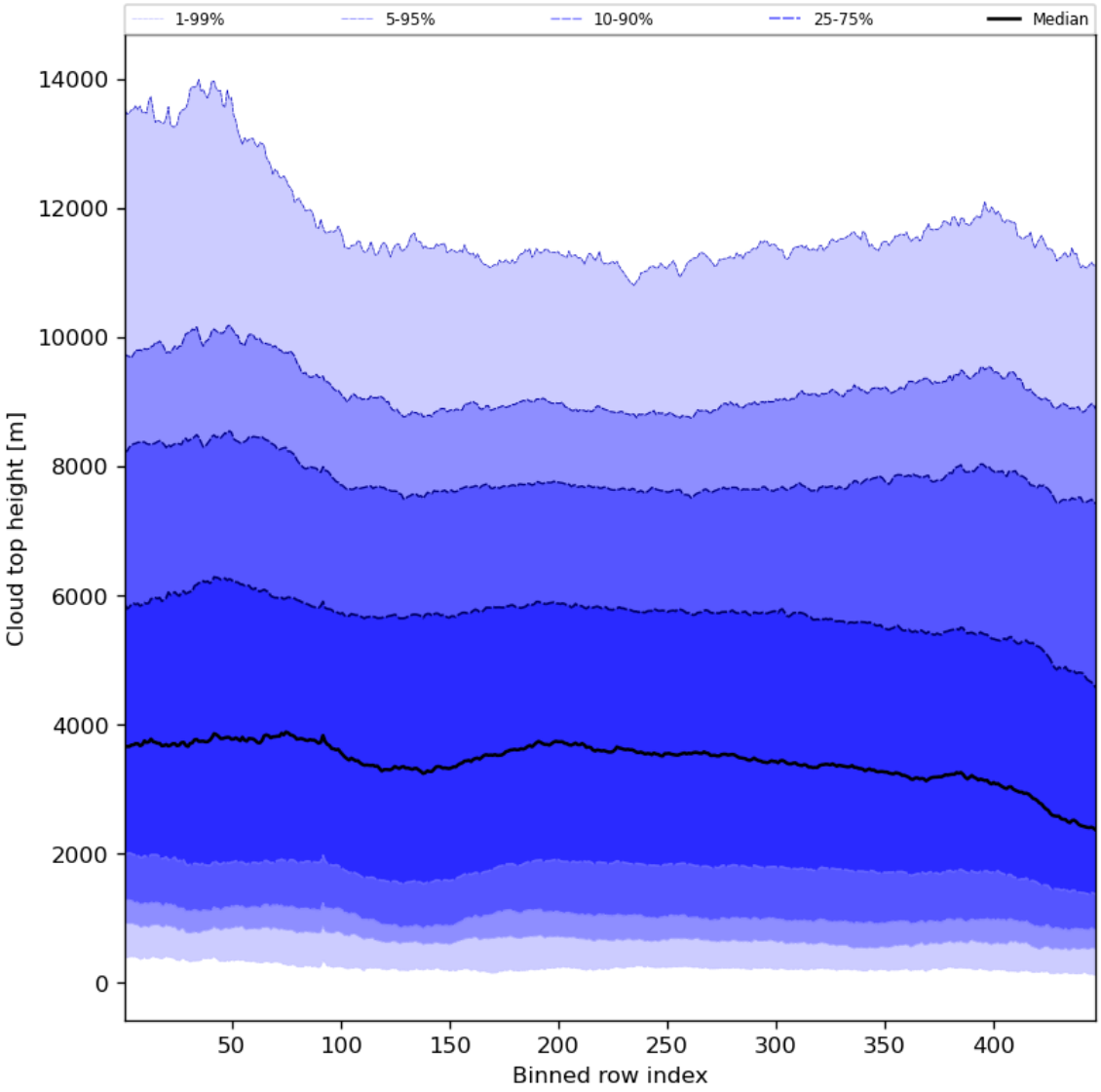

Figure 56: Along track statistics of “Cloud top height” for 2023-11-20 to 2023-11-22

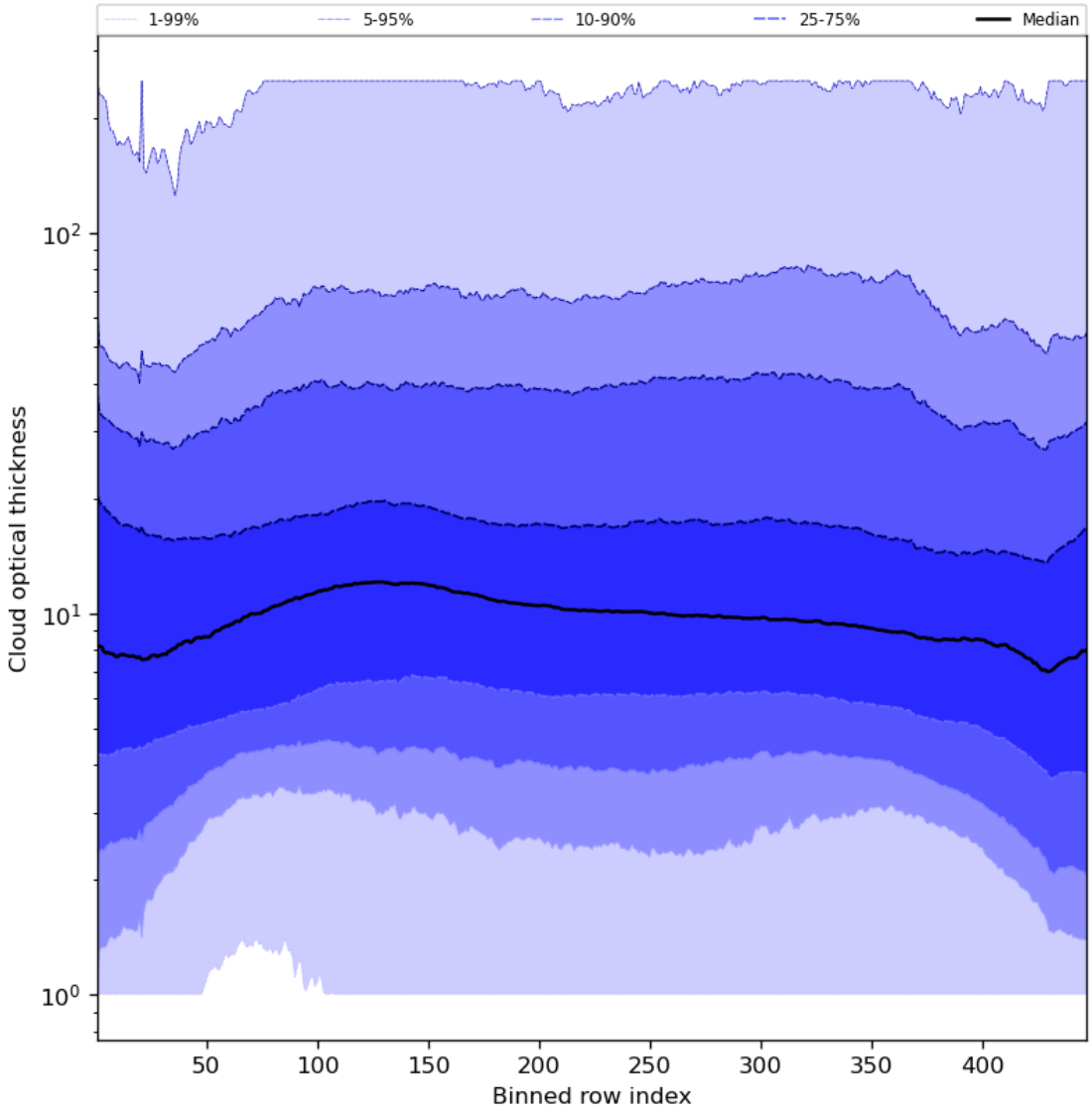

Figure 57: Along track statistics of “Cloud optical thickness” for 2023-11-20 to 2023-11-22

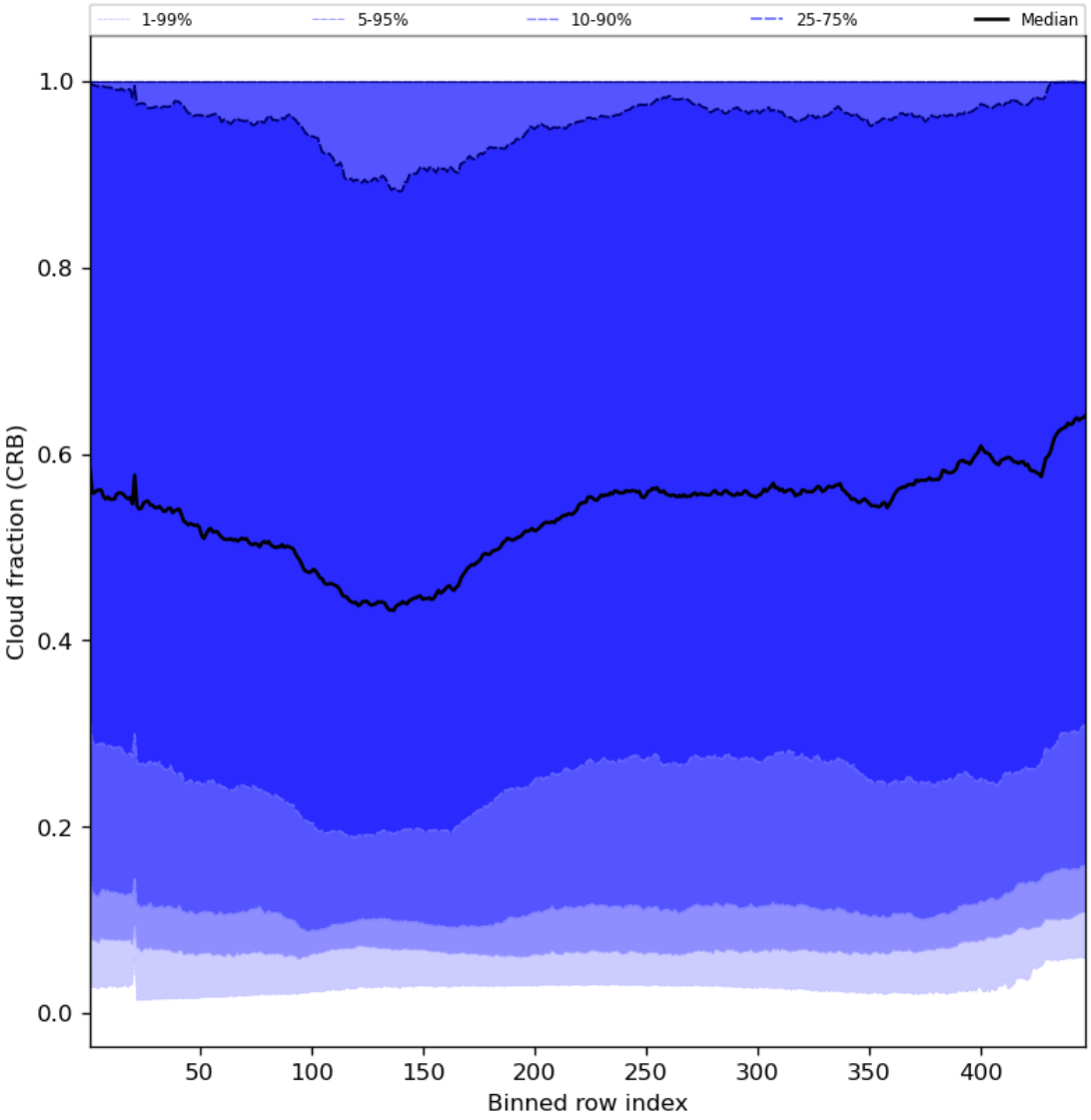

Figure 58: Along track statistics of “Cloud fraction (CRB)” for 2023-11-20 to 2023-11-22

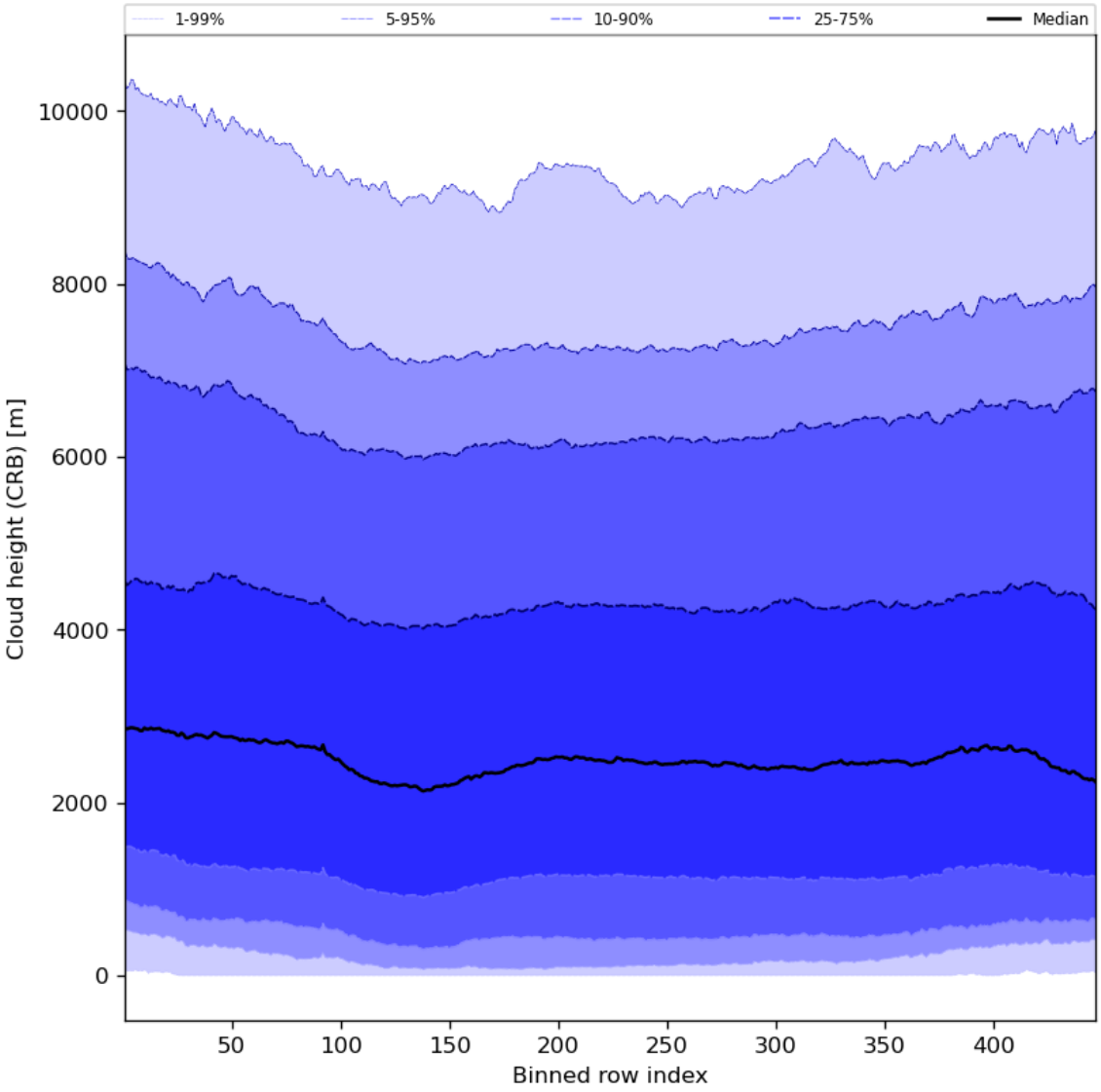

Figure 59: Along track statistics of “Cloud height (CRB)” for 2023-11-20 to 2023-11-22

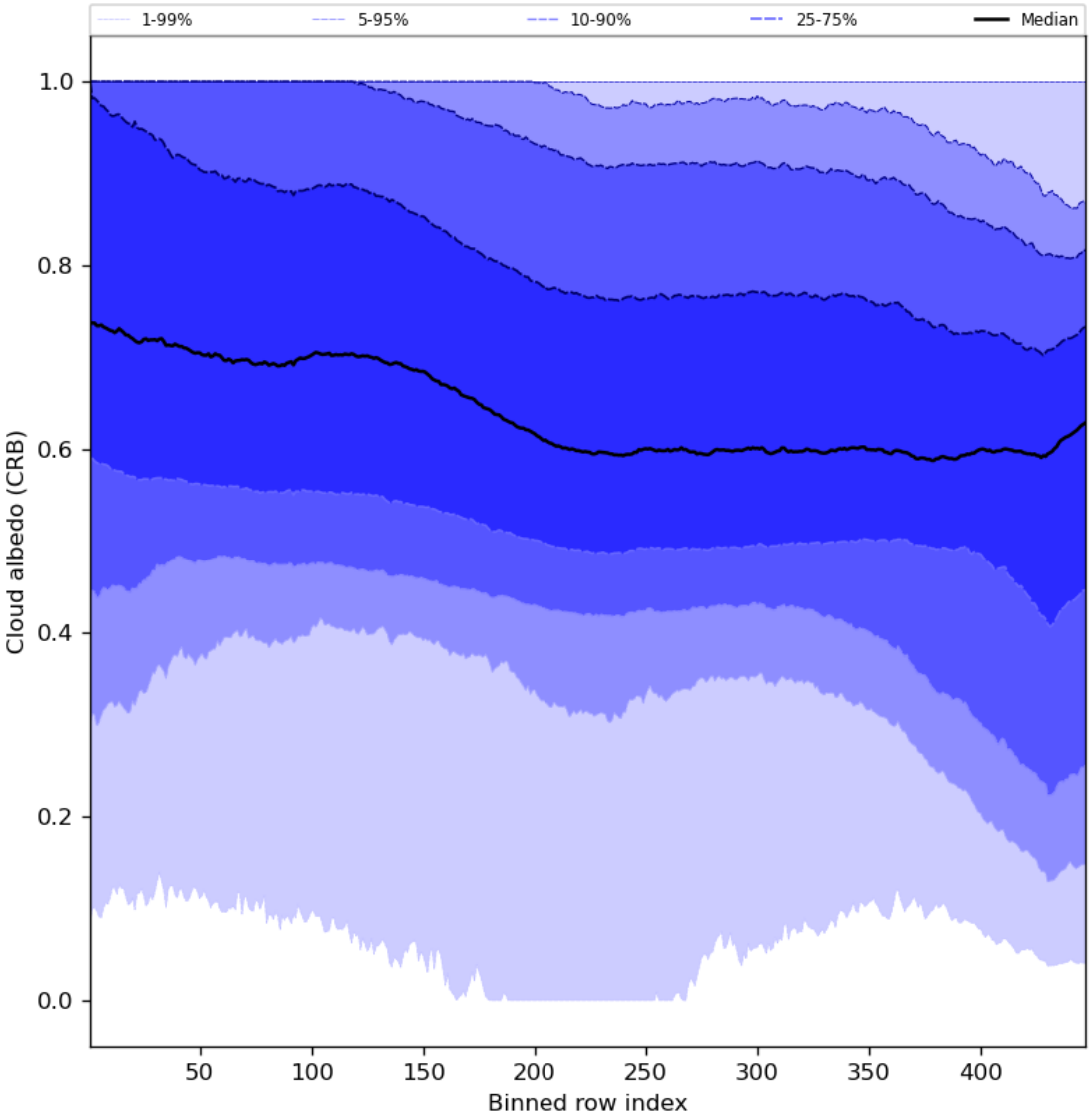

Figure 60: Along track statistics of “Cloud albedo (CRB)” for 2023-11-20 to 2023-11-22

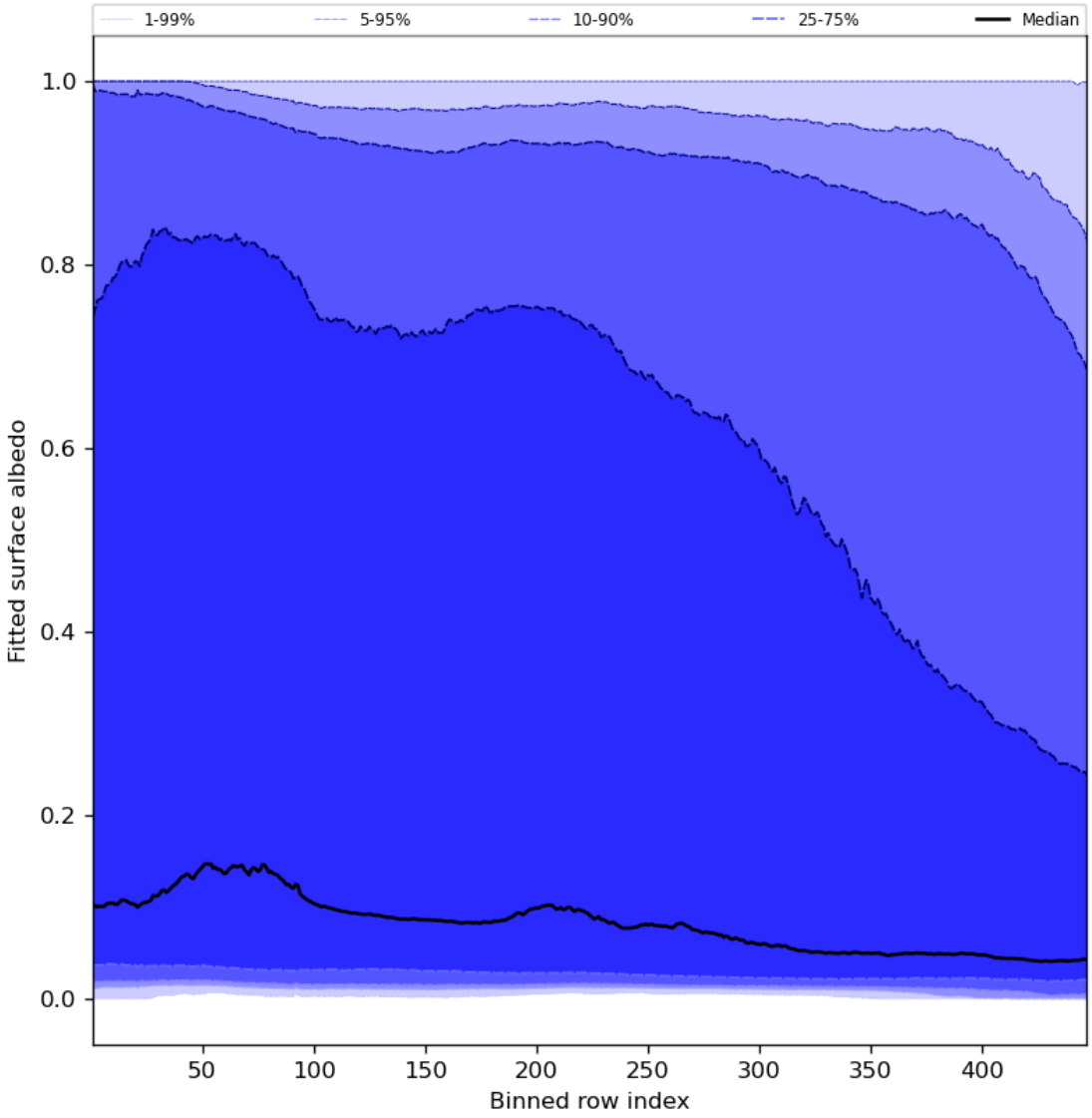

Figure 61: Along track statistics of “Fitted surface albedo” for 2023-11-20 to 2023-11-22

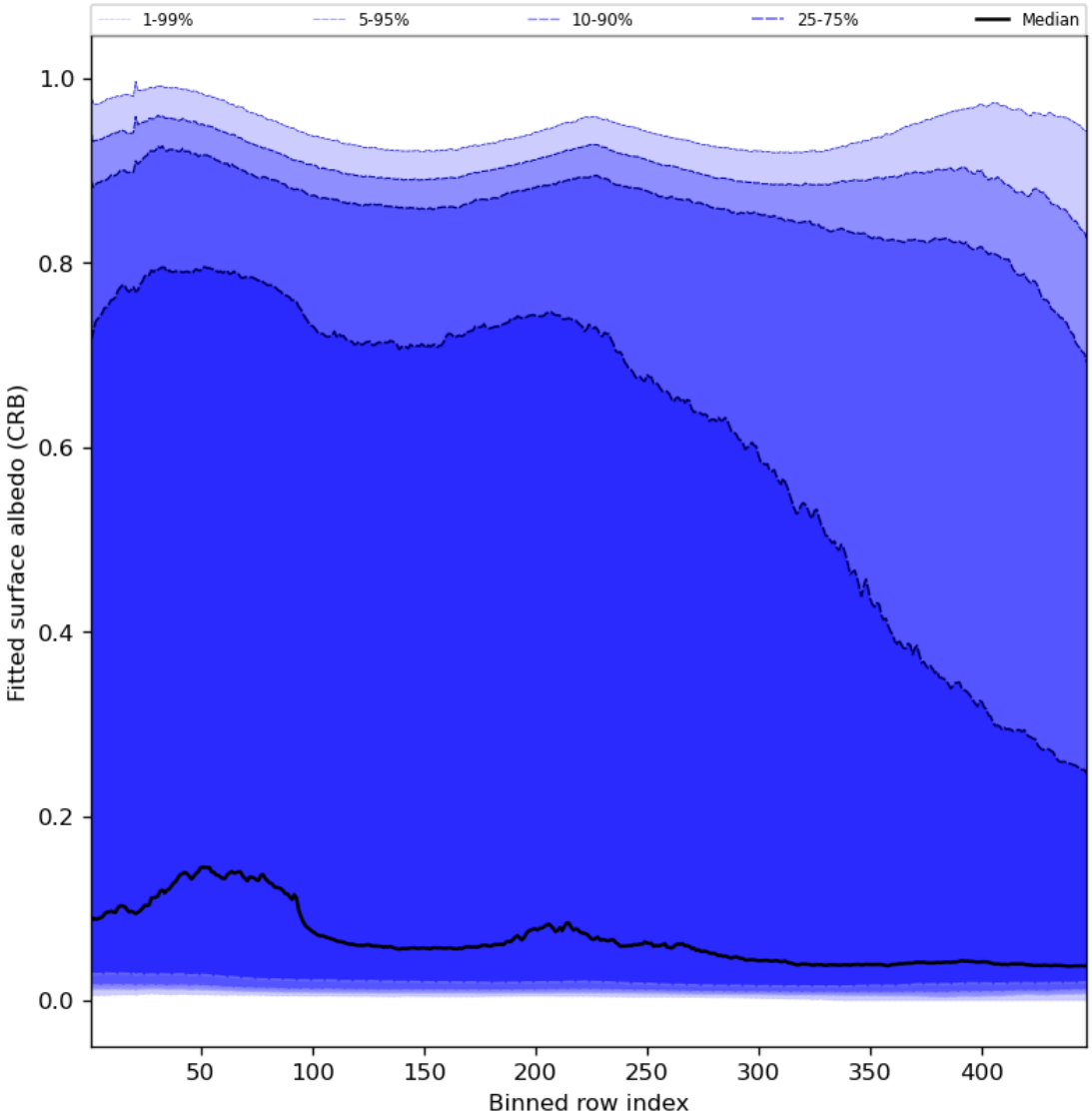

Figure 62: Along track statistics of “Fitted surface albedo (CRB)” for 2023-11-20 to 2023-11-22

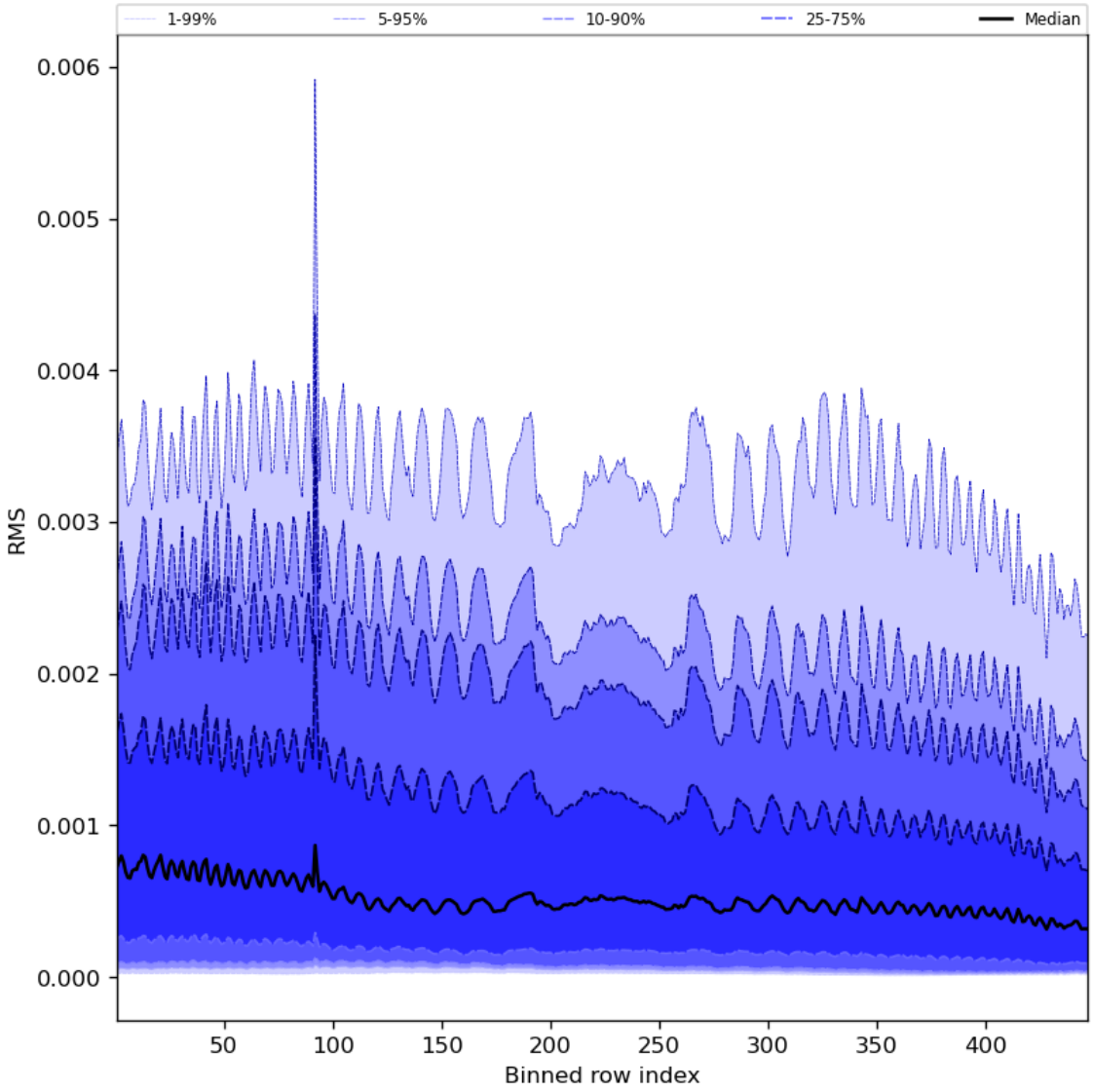

Figure 63: Along track statistics of “RMS” for 2023-11-20 to 2023-11-22

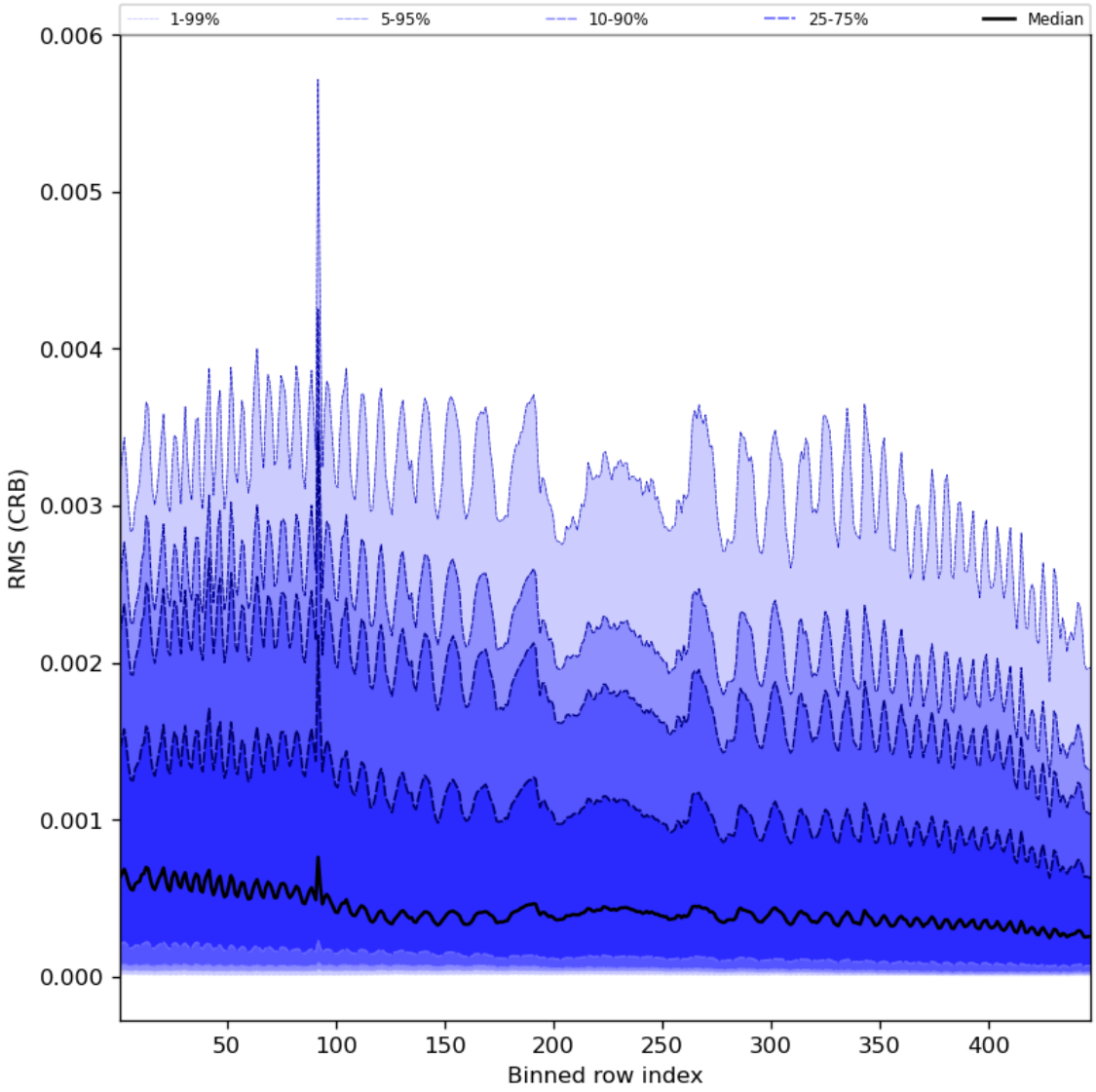

Figure 64: Along track statistics of “RMS (CRB)” for 2023-11-20 to 2023-11-22

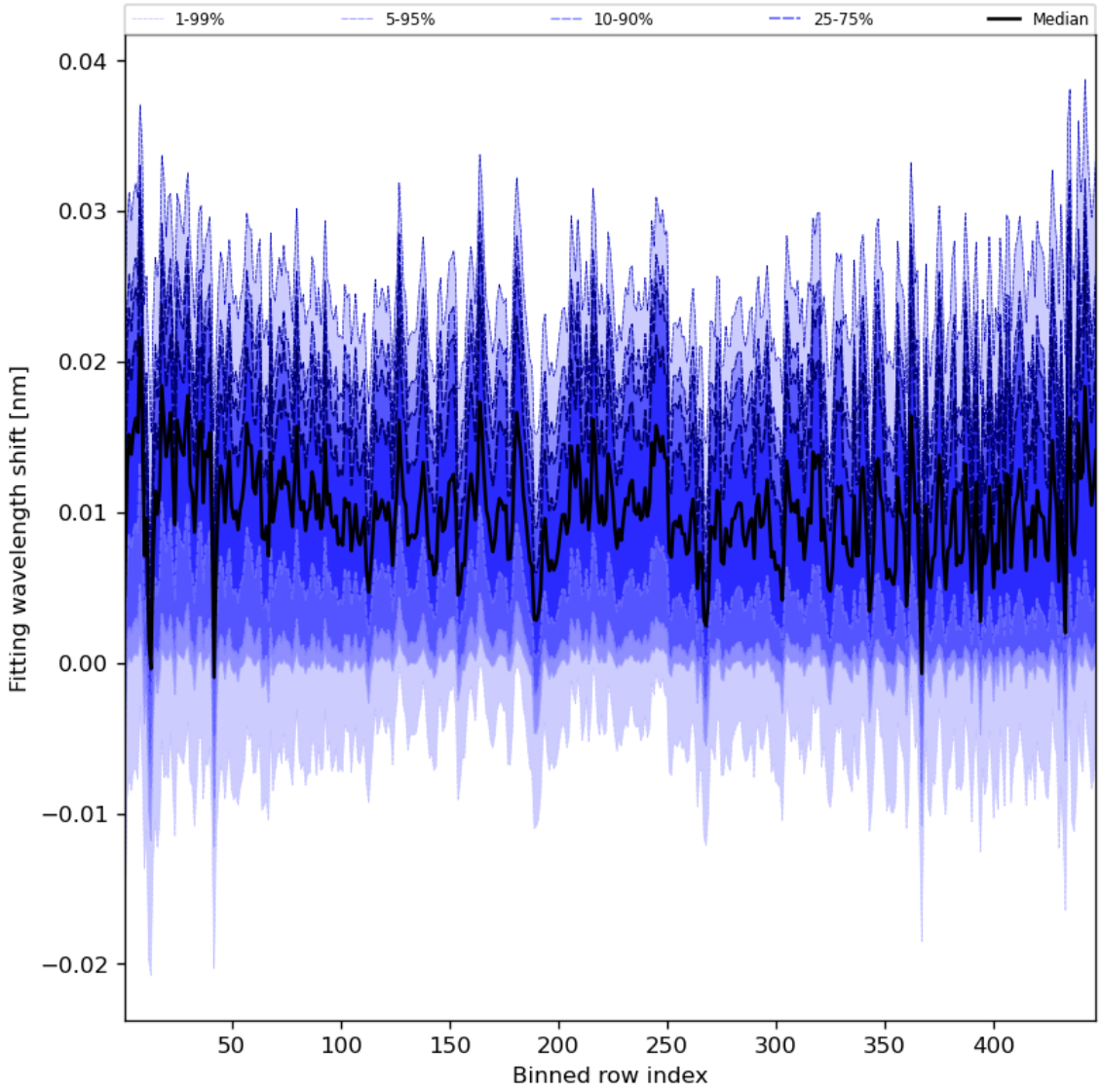

Figure 65: Along track statistics of “Fitting wavelength shift” for 2023-11-20 to 2023-11-22

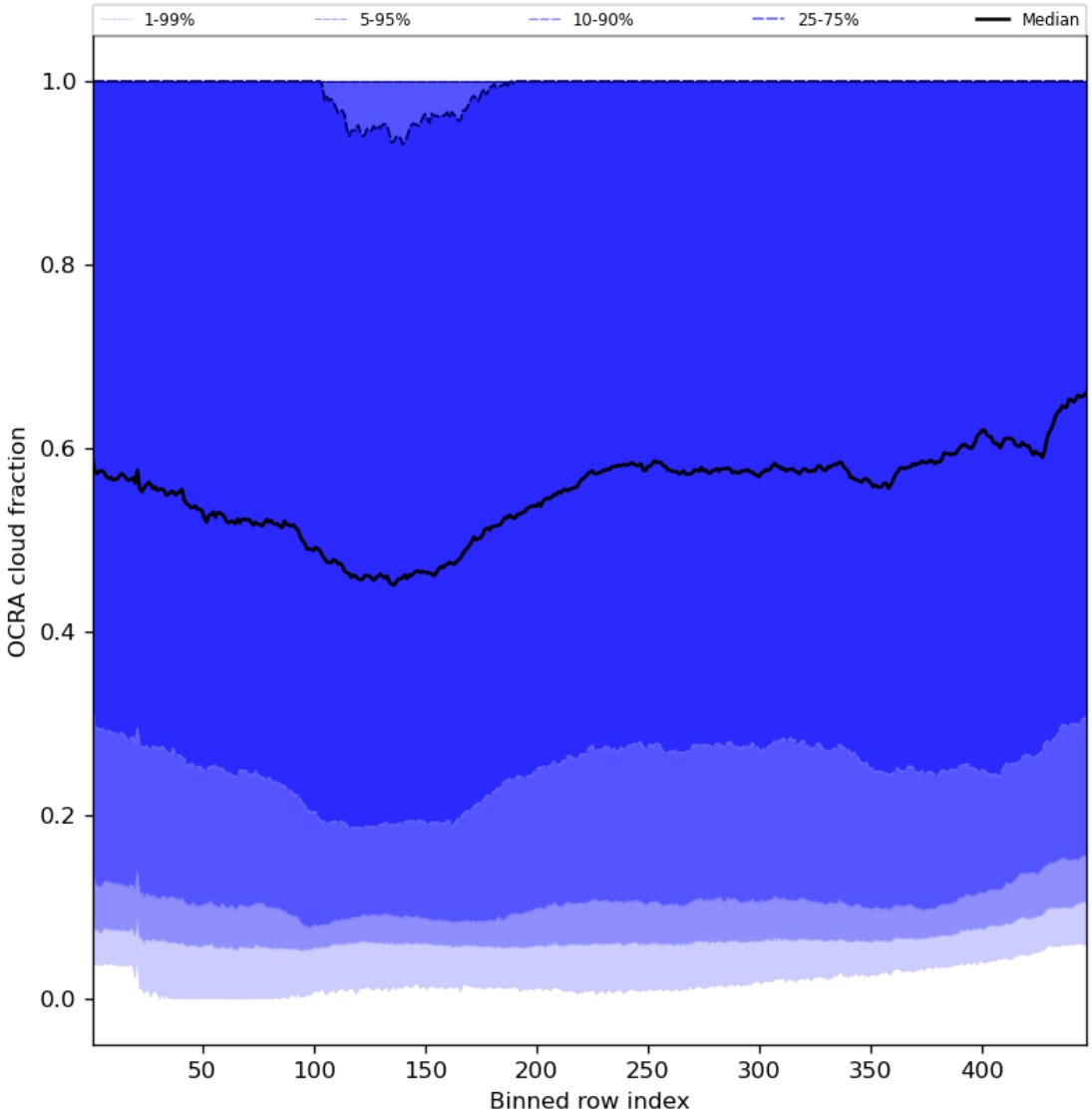

Figure 66: Along track statistics of “OCRA cloud fraction” for 2023-11-20 to 2023-11-22

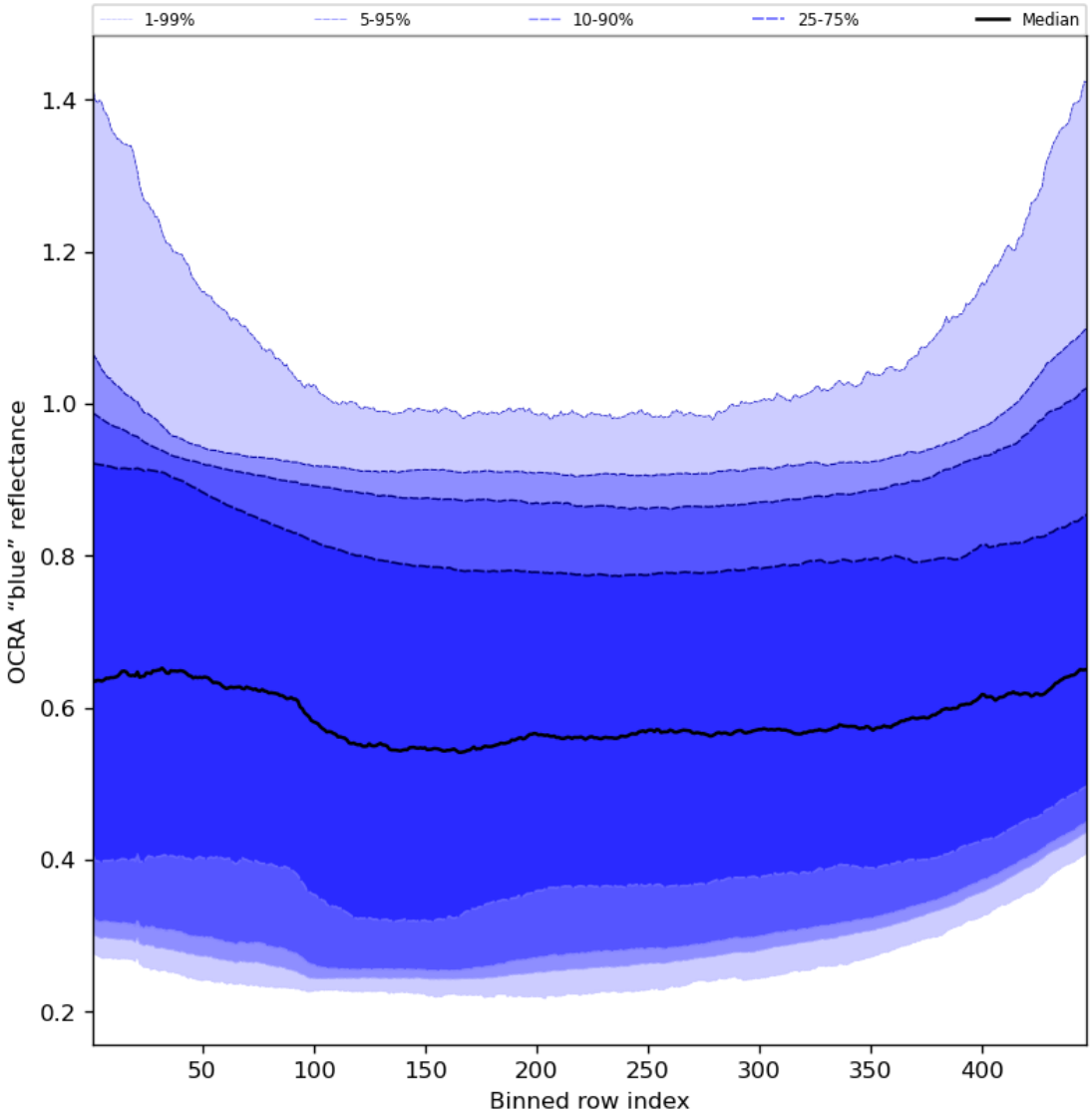

Figure 67: Along track statistics of "OCRA "blue" reflectance" for 2023-11-20 to 2023-11-22

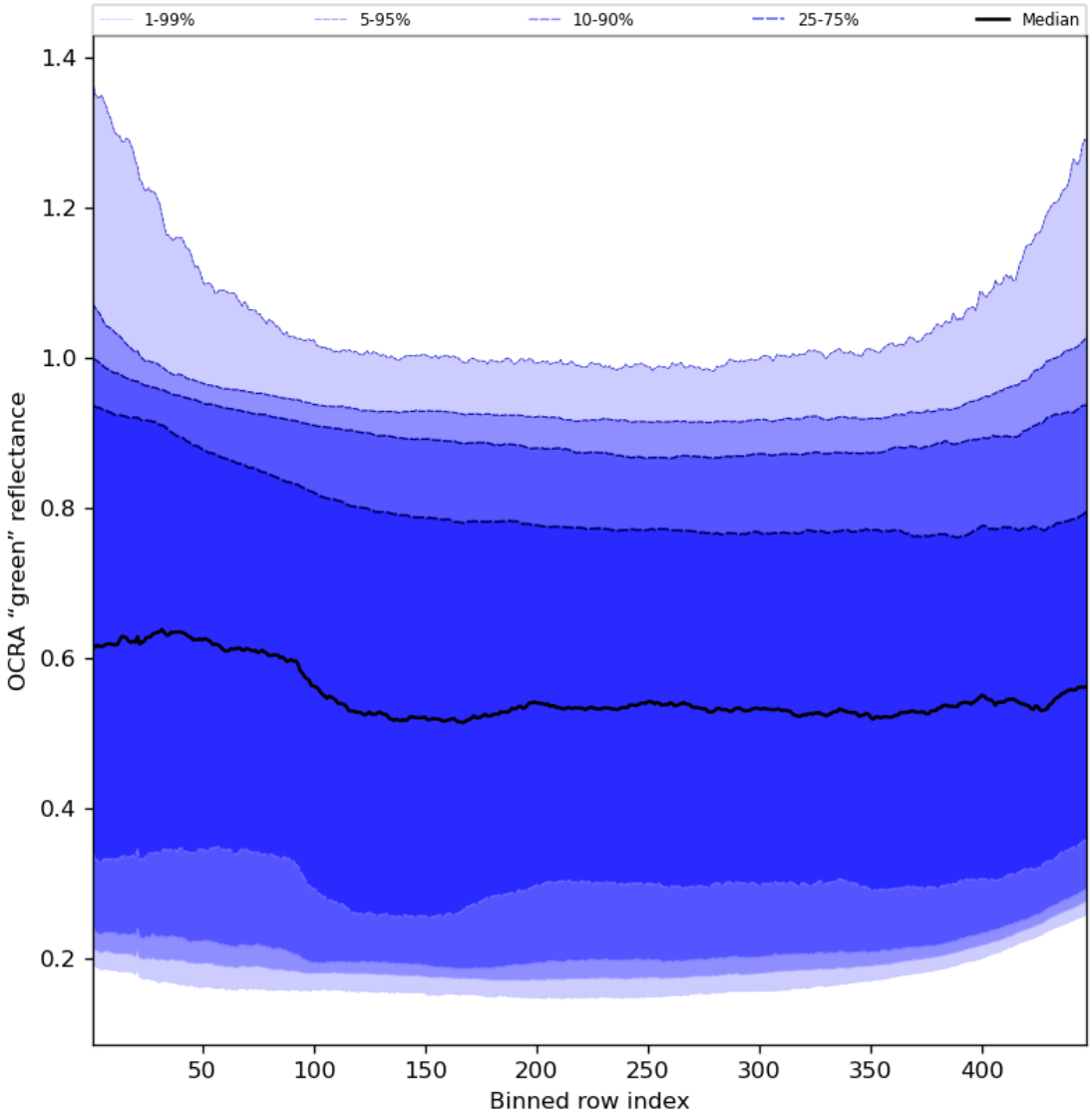

Figure 68: Along track statistics of "OCRA "green" reflectance" for 2023-11-20 to 2023-11-22

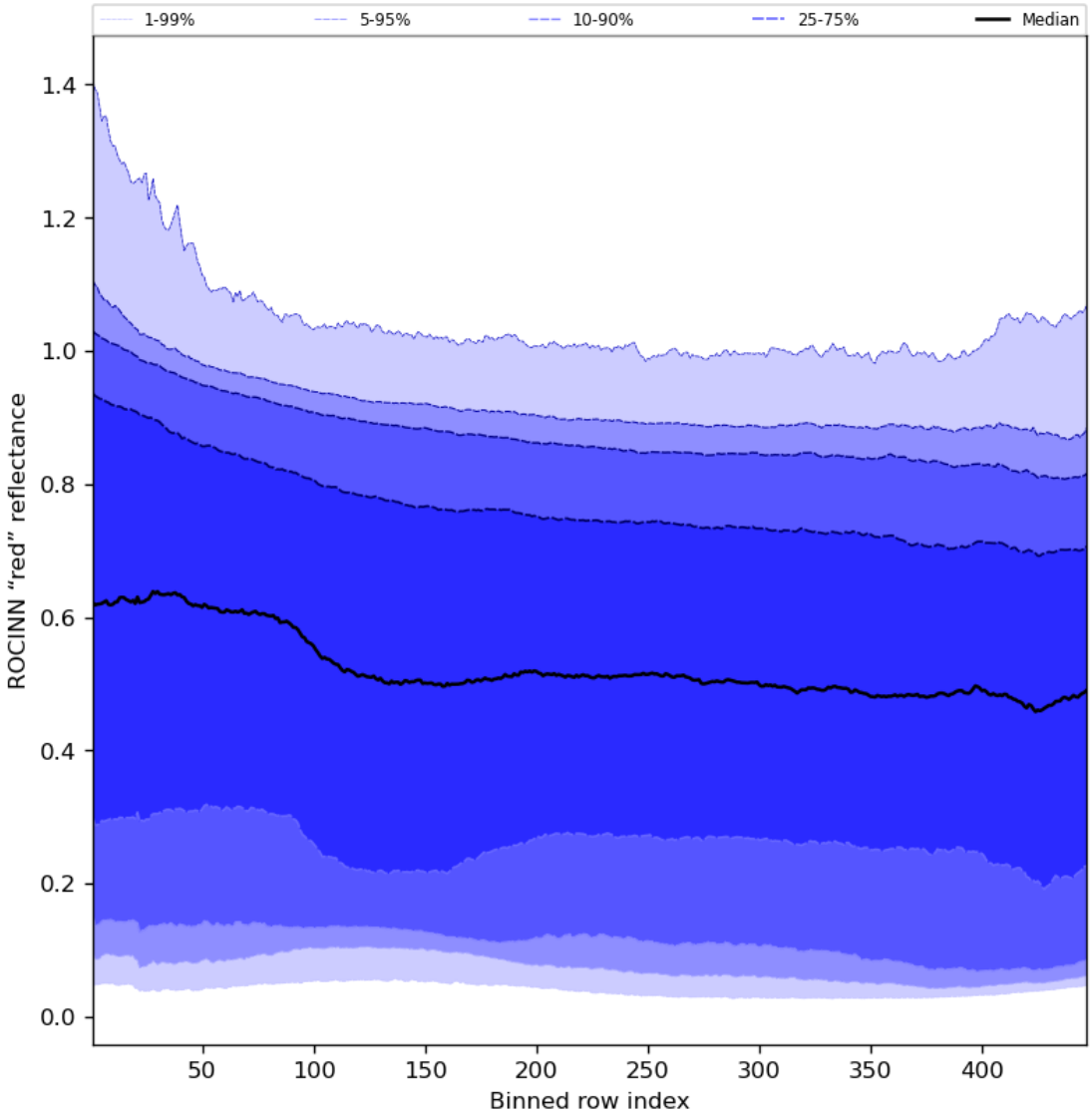

Figure 69: Along track statistics of “ROCINN “red” reflectance” for 2023-11-20 to 2023-11-22

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.

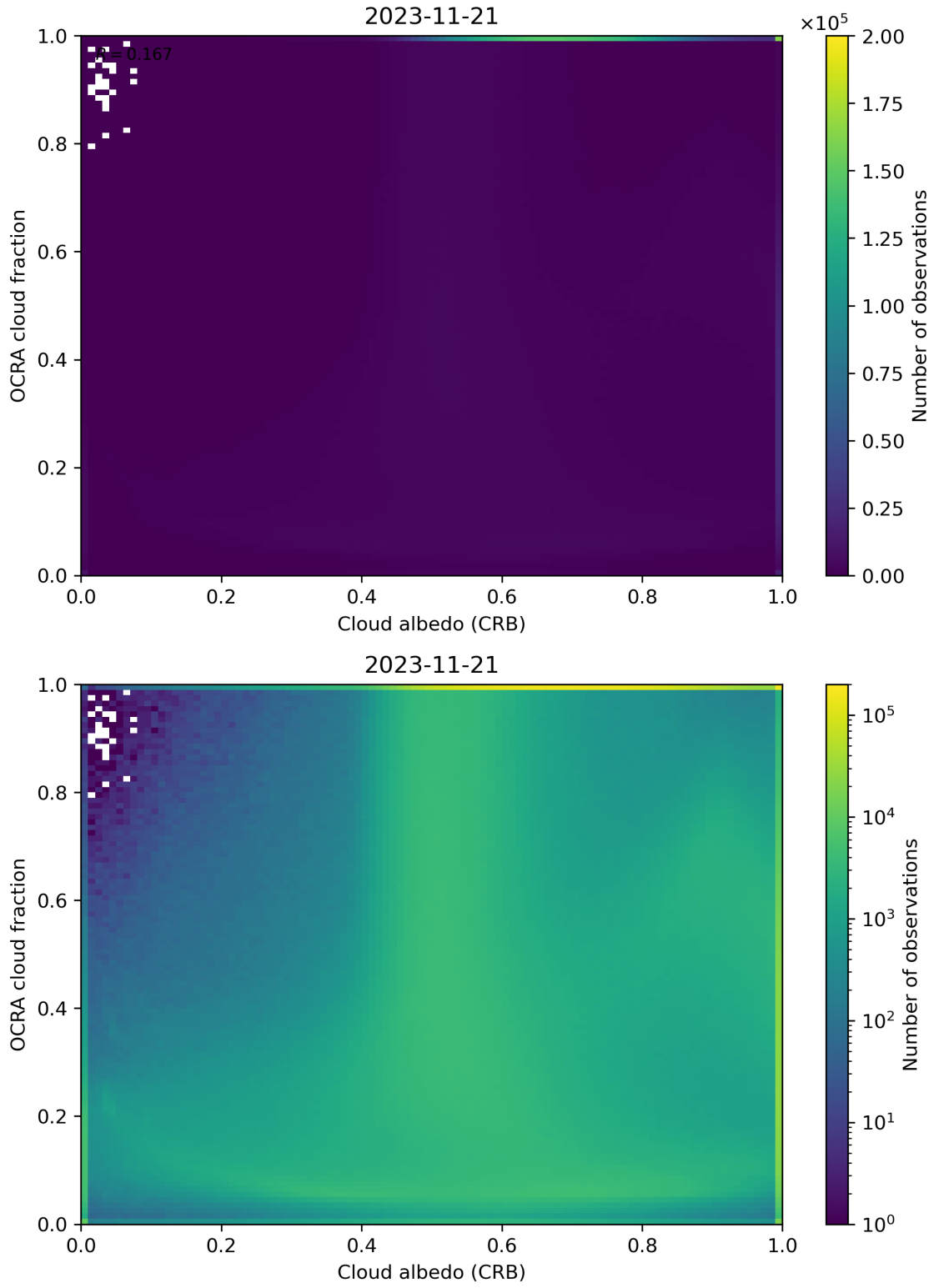

Figure 70: Scatter density plot of "Cloud albedo (CRB)" against "OCRA cloud fraction" for 2023-11-20 to 2023-11-22.

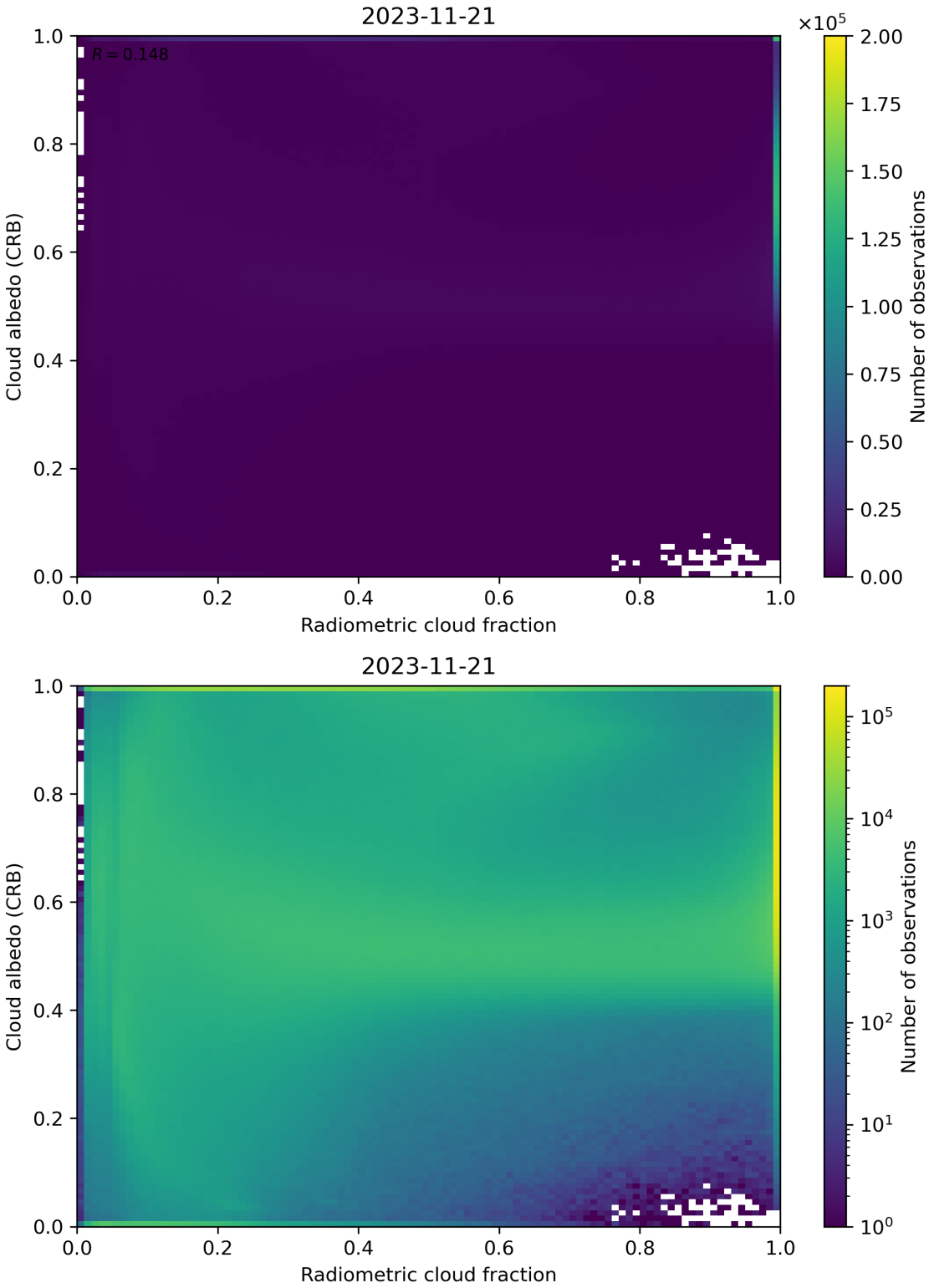

Figure 71: Scatter density plot of “Radiometric cloud fraction” against “Cloud albedo (CRB)” for 2023-11-20 to 2023-11-22.

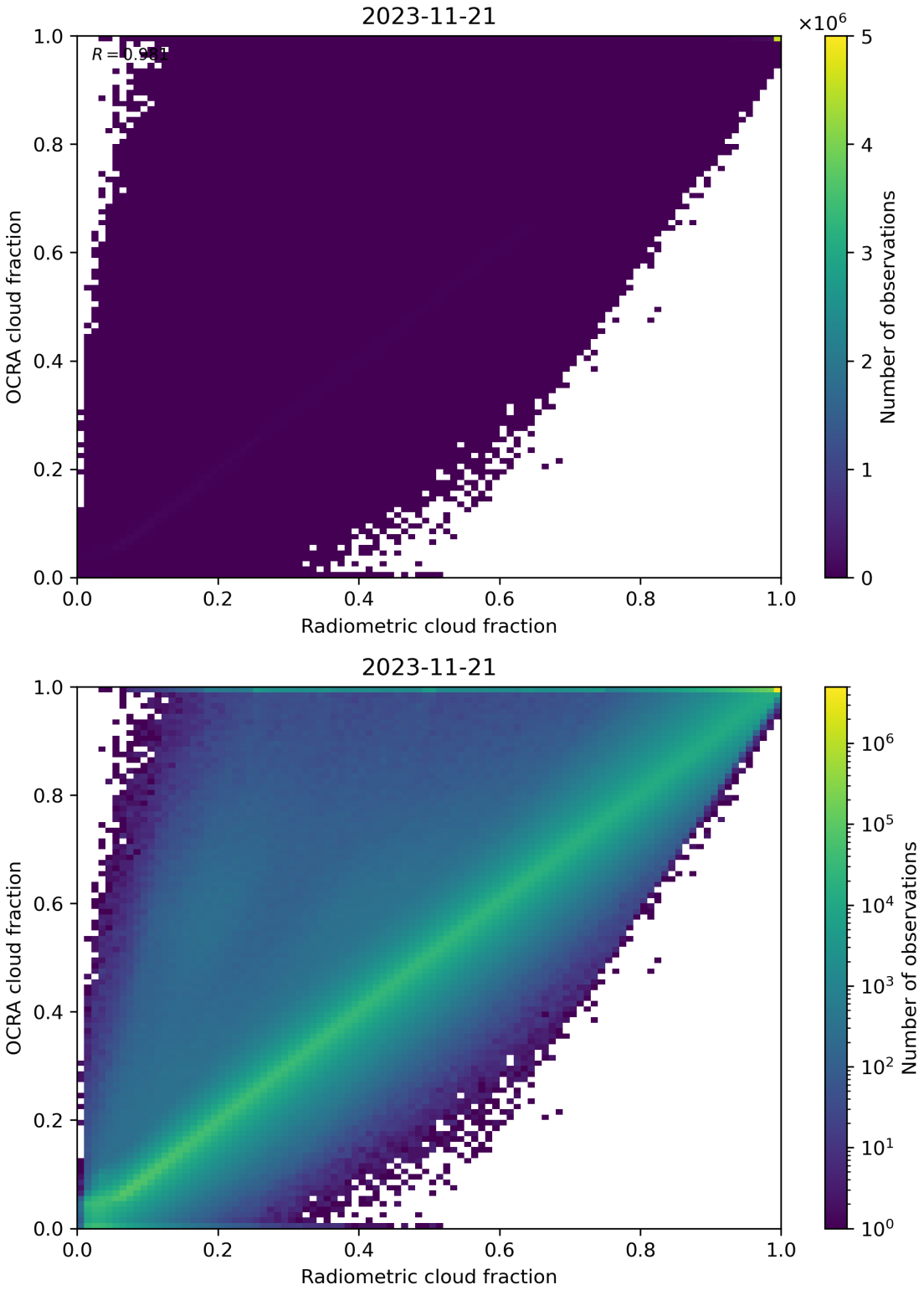

Figure 72: Scatter density plot of “Radiometric cloud fraction” against “OCRA cloud fraction” for 2023-11-20 to 2023-11-22.

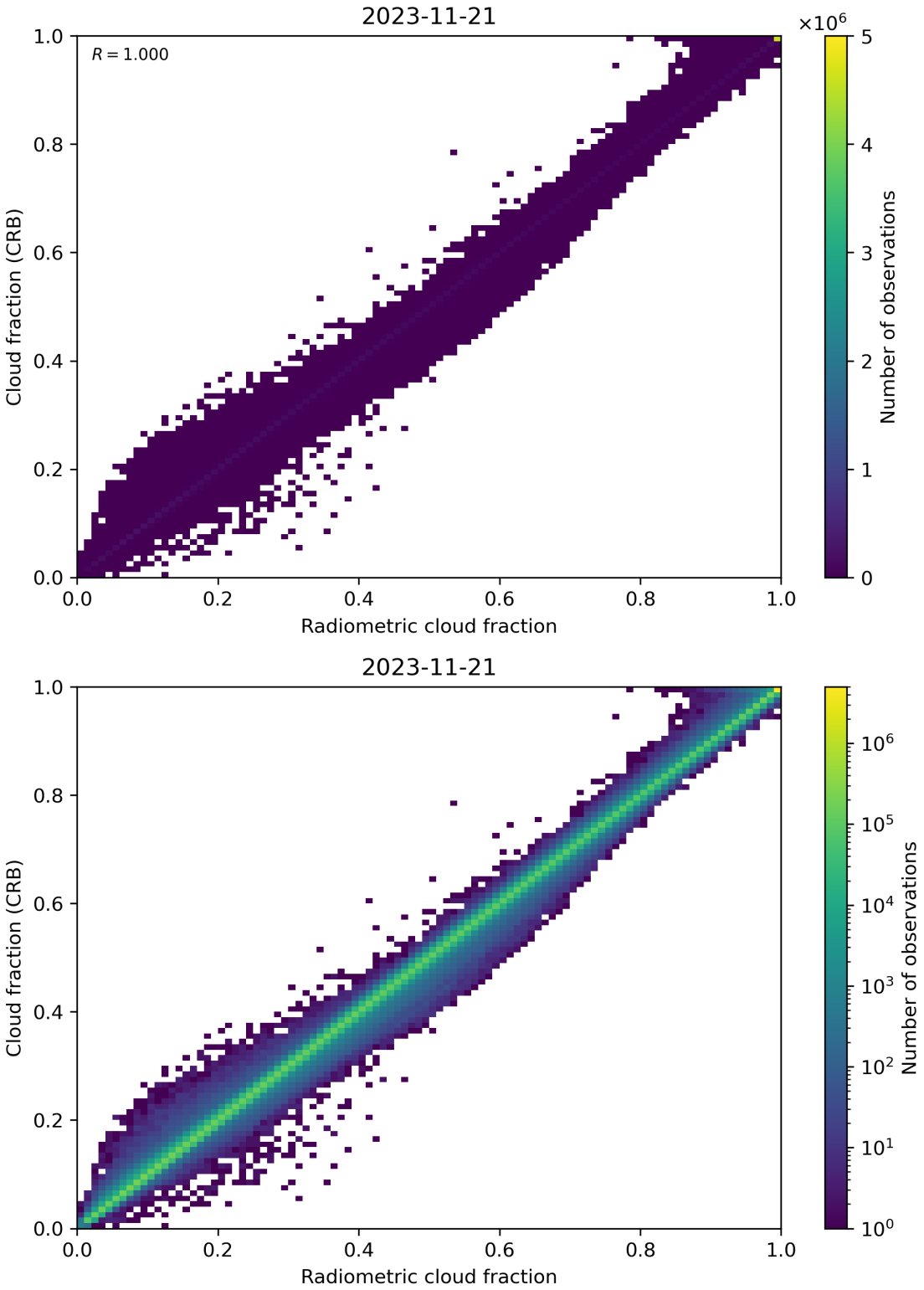

Figure 73: Scatter density plot of “Radiometric cloud fraction” against “Cloud fraction (CRB)” for 2023-11-20 to 2023-11-22.

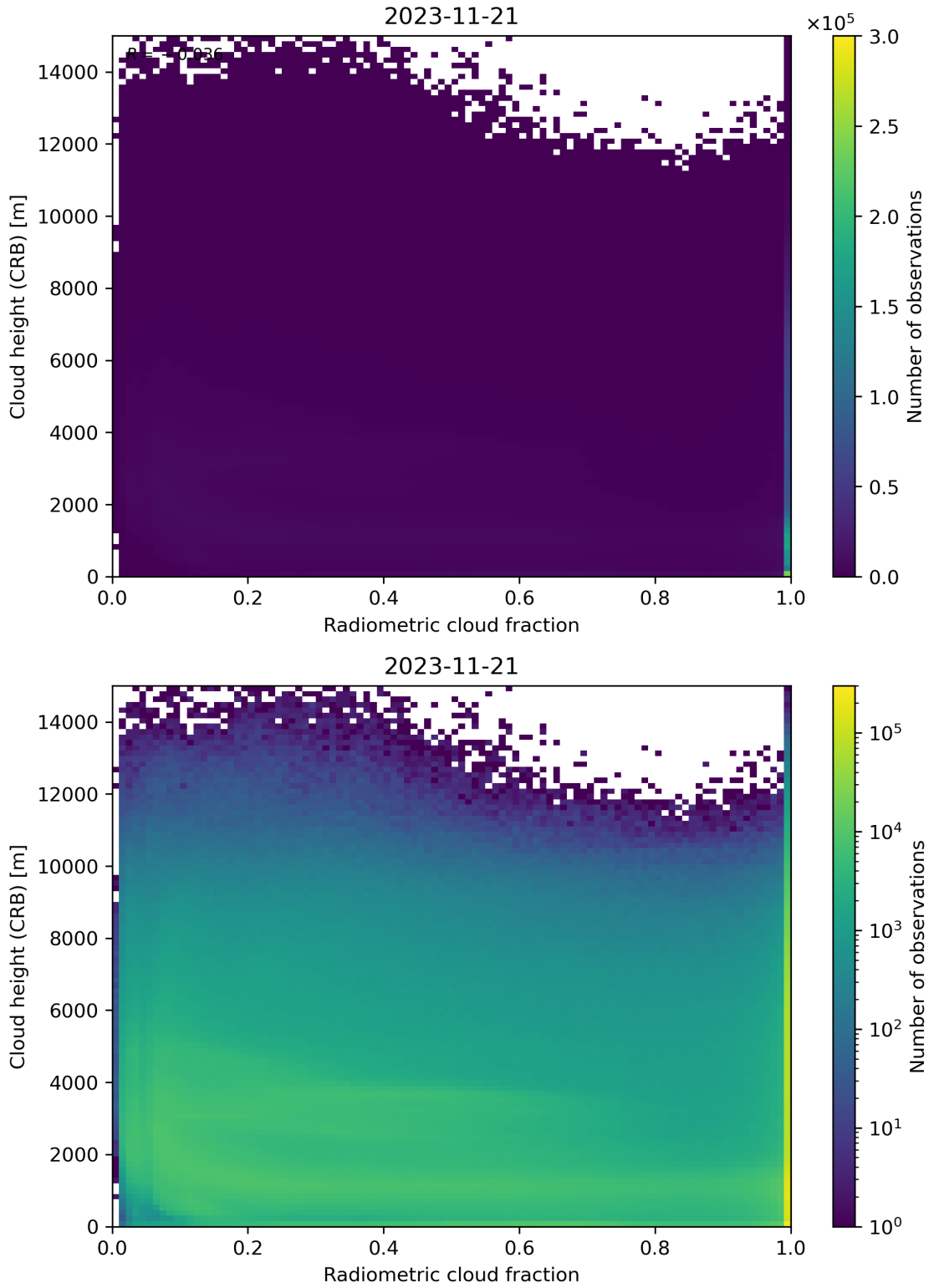

Figure 74: Scatter density plot of “Radiometric cloud fraction” against “Cloud height (CRB)” for 2023-11-20 to 2023-11-22.

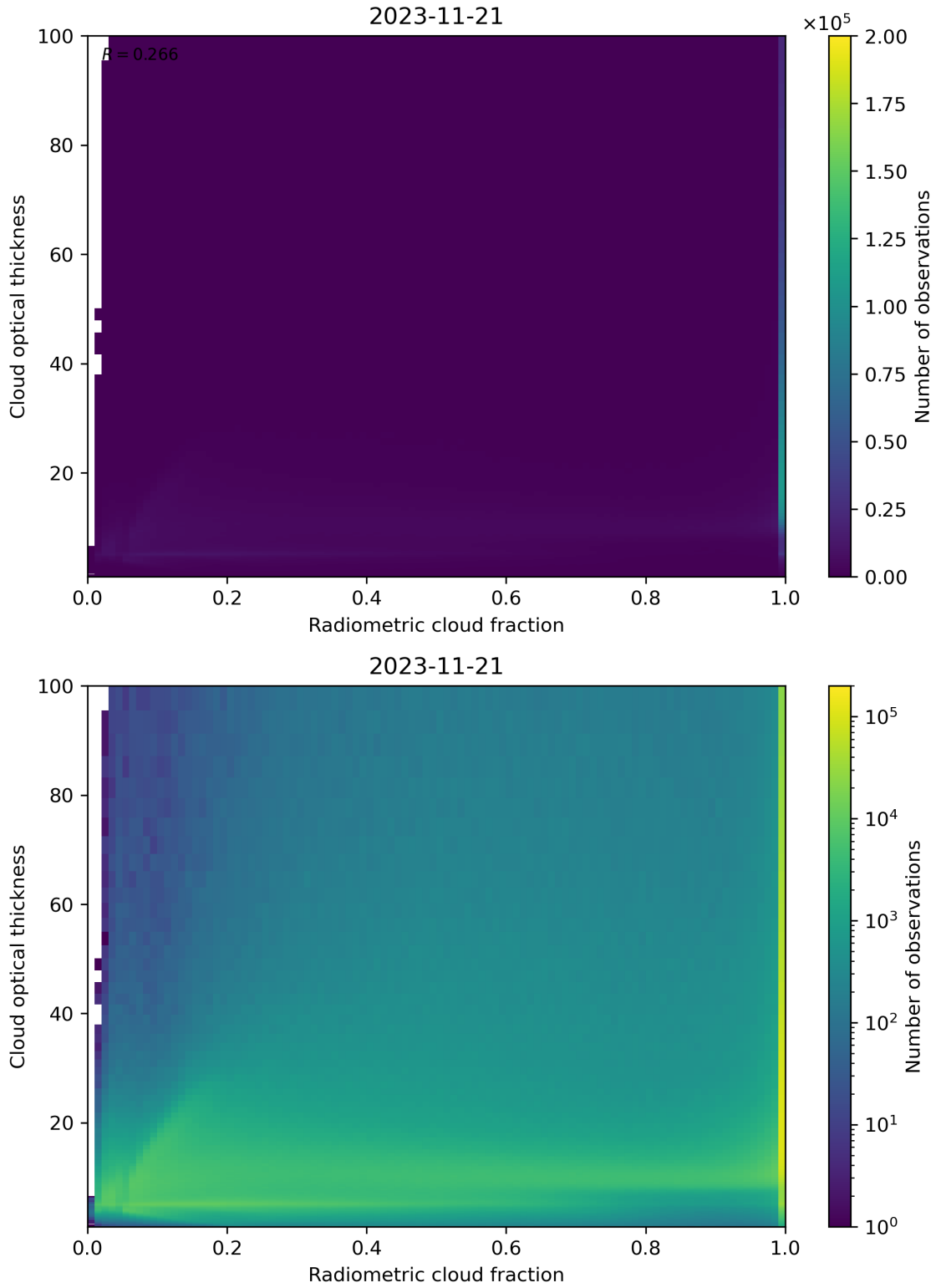

Figure 75: Scatter density plot of “Radiometric cloud fraction” against “Cloud optical thickness” for 2023-11-20 to 2023-11-22.

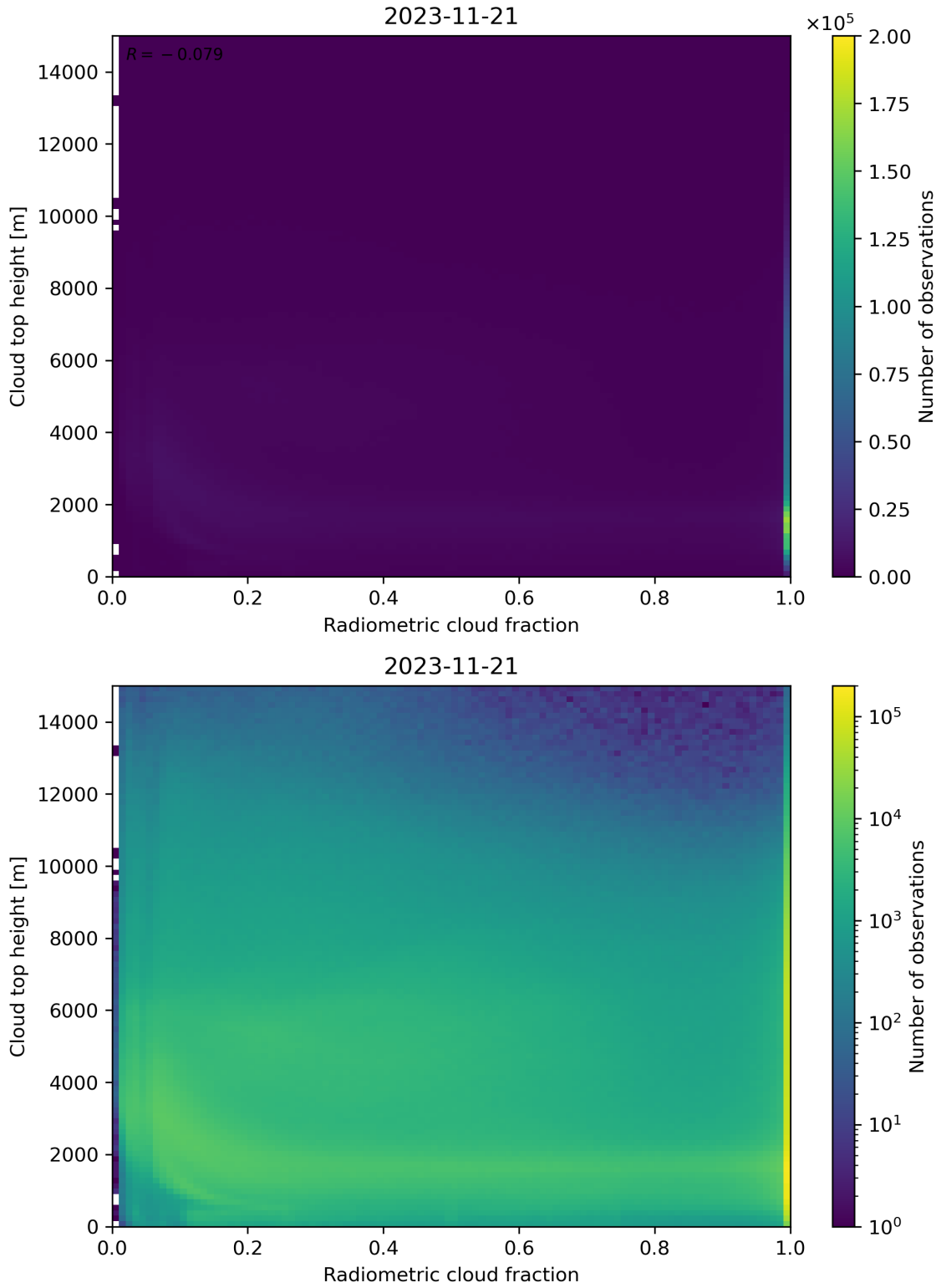

Figure 76: Scatter density plot of “Radiometric cloud fraction” against “Cloud top height” for 2023-11-20 to 2023-11-22.

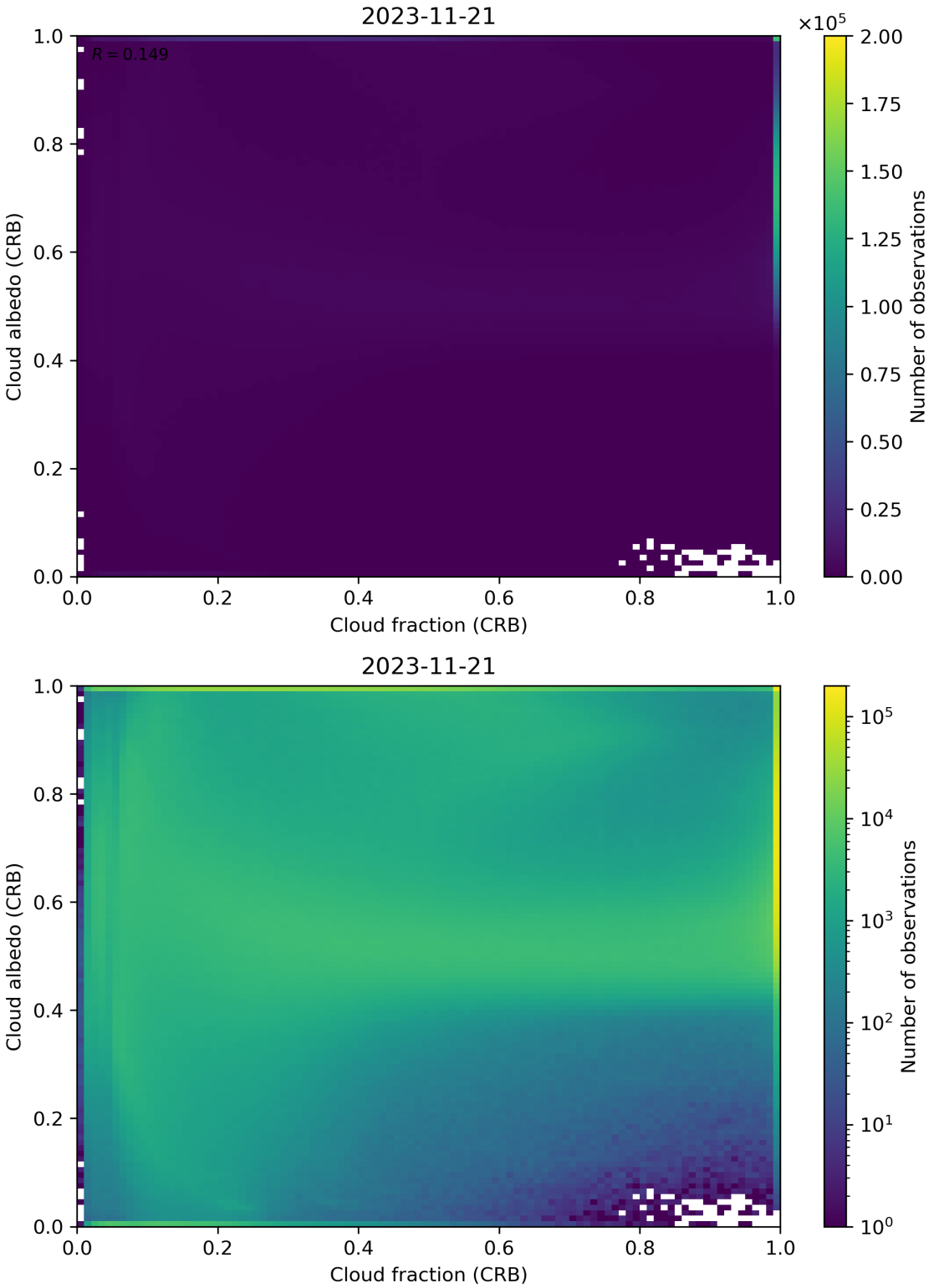

Figure 77: Scatter density plot of “Cloud fraction (CRB)” against “Cloud albedo (CRB)” for 2023-11-20 to 2023-11-22.

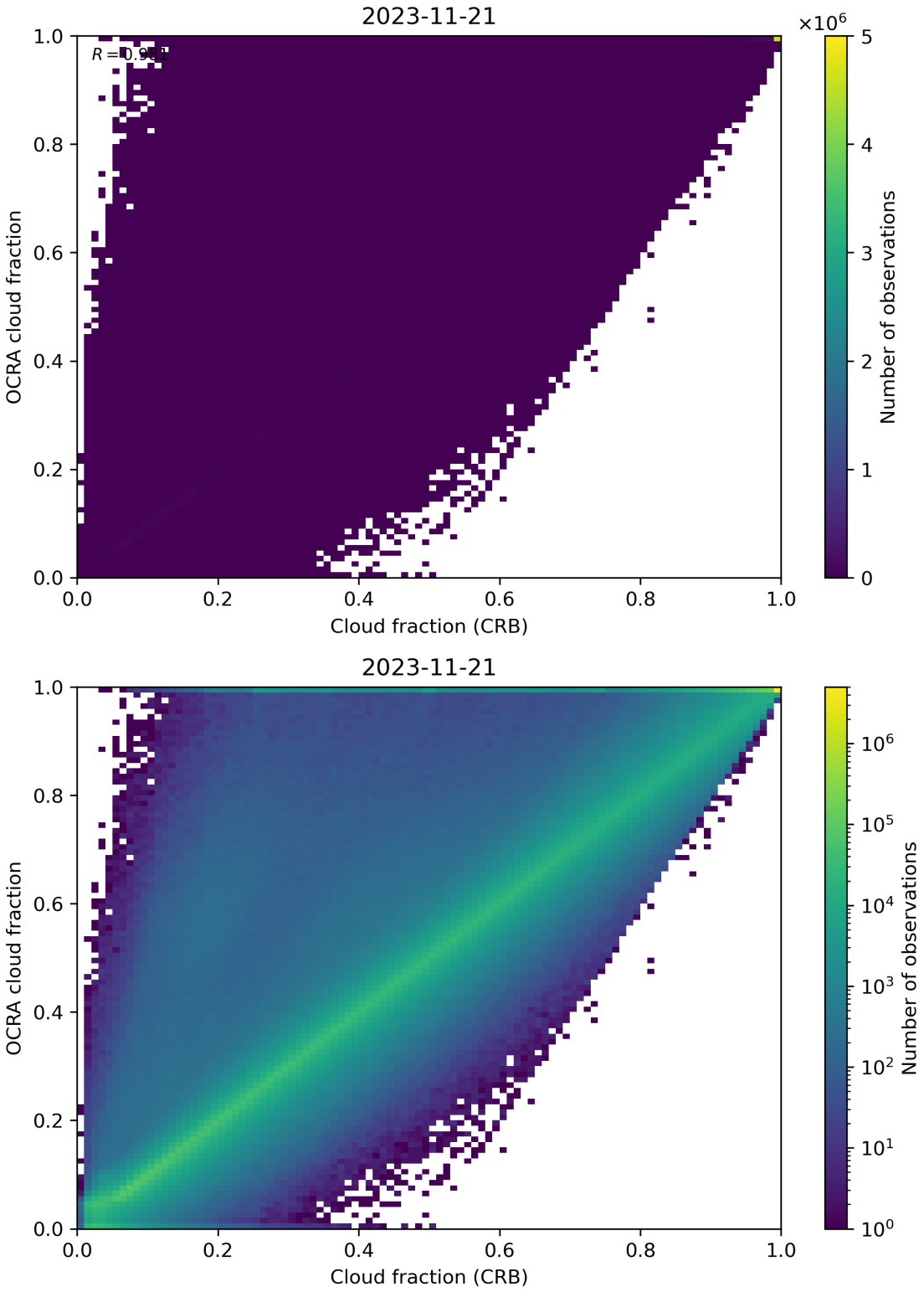

Figure 78: Scatter density plot of “Cloud fraction (CRB)” against “OCRA cloud fraction” for 2023-11-20 to 2023-11-22.

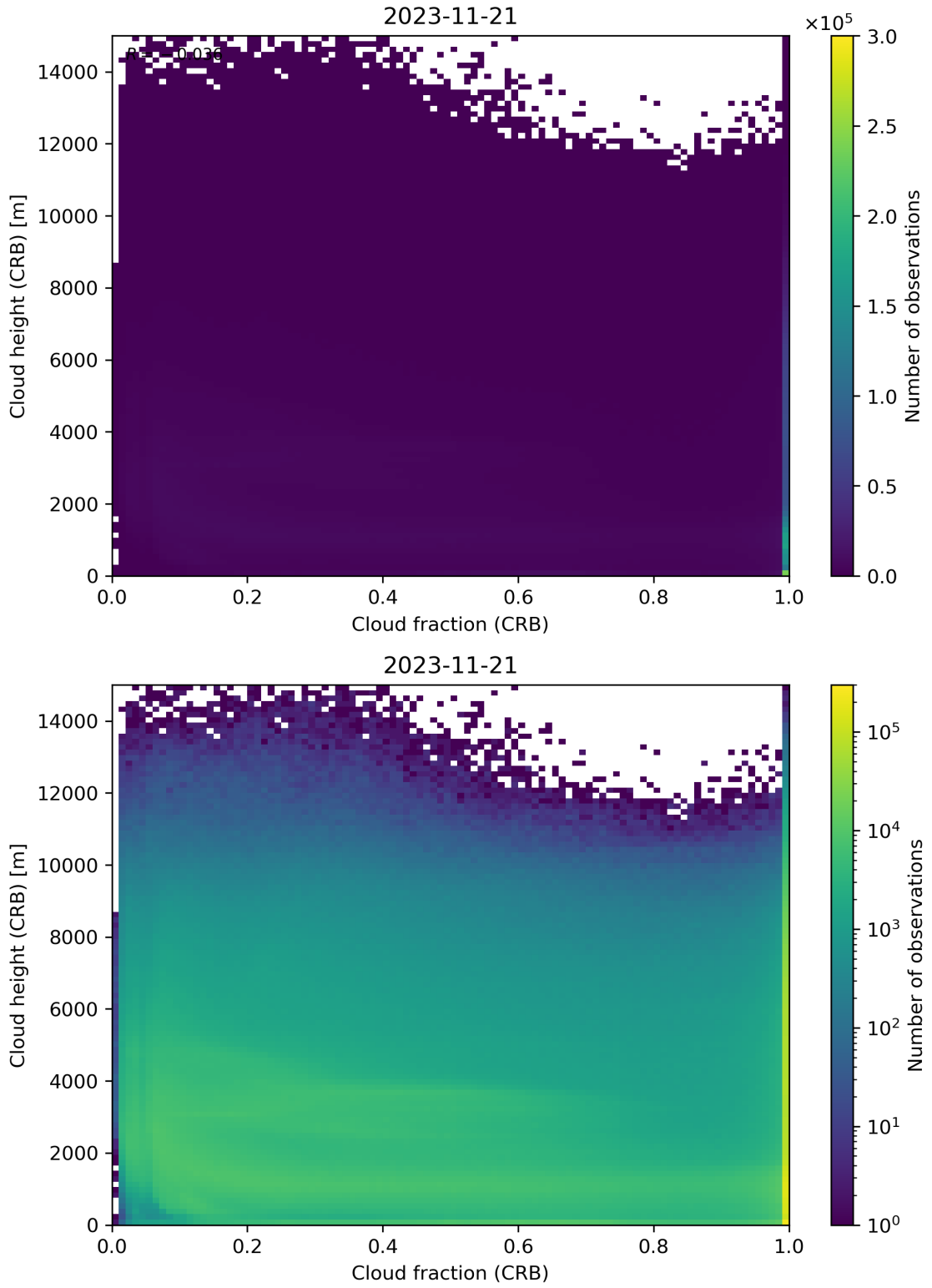

Figure 79: Scatter density plot of “Cloud fraction (CRB)” against “Cloud height (CRB)” for 2023-11-20 to 2023-11-22.

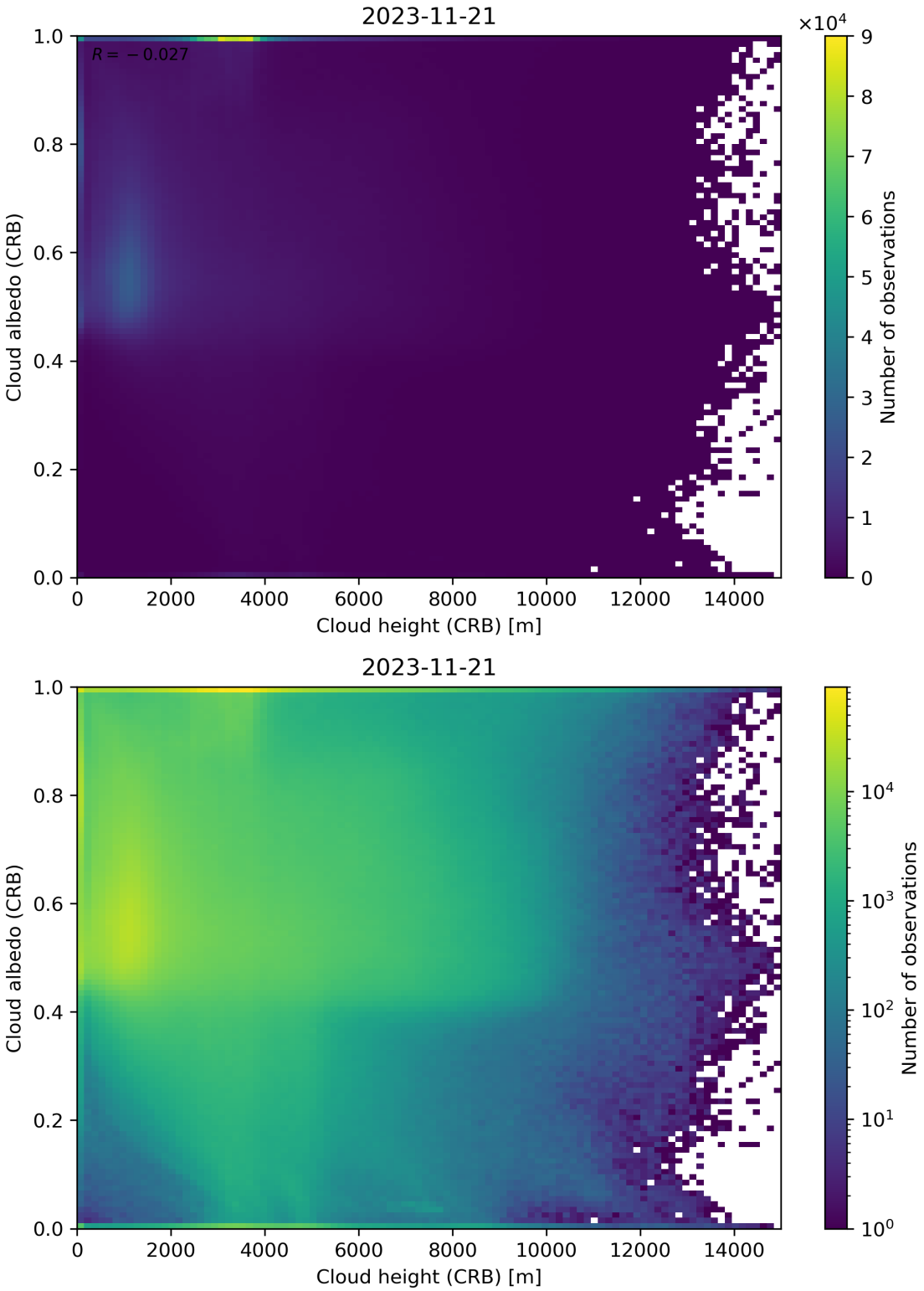

Figure 80: Scatter density plot of “Cloud height (CRB)” against “Cloud albedo (CRB)” for 2023-11-20 to 2023-11-22.

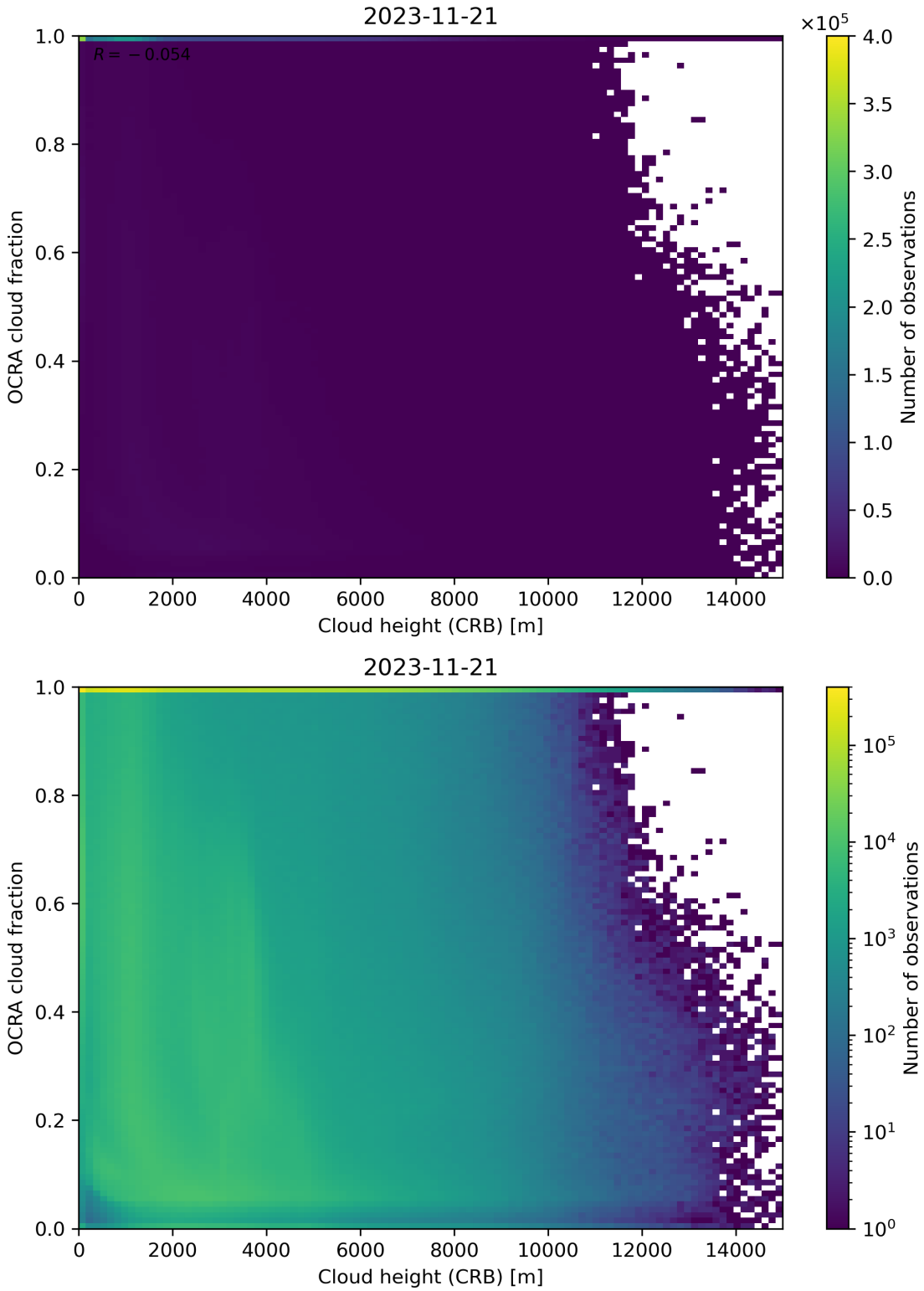

Figure 81: Scatter density plot of “Cloud height (CRB)” against “OCRA cloud fraction” for 2023-11-20 to 2023-11-22.

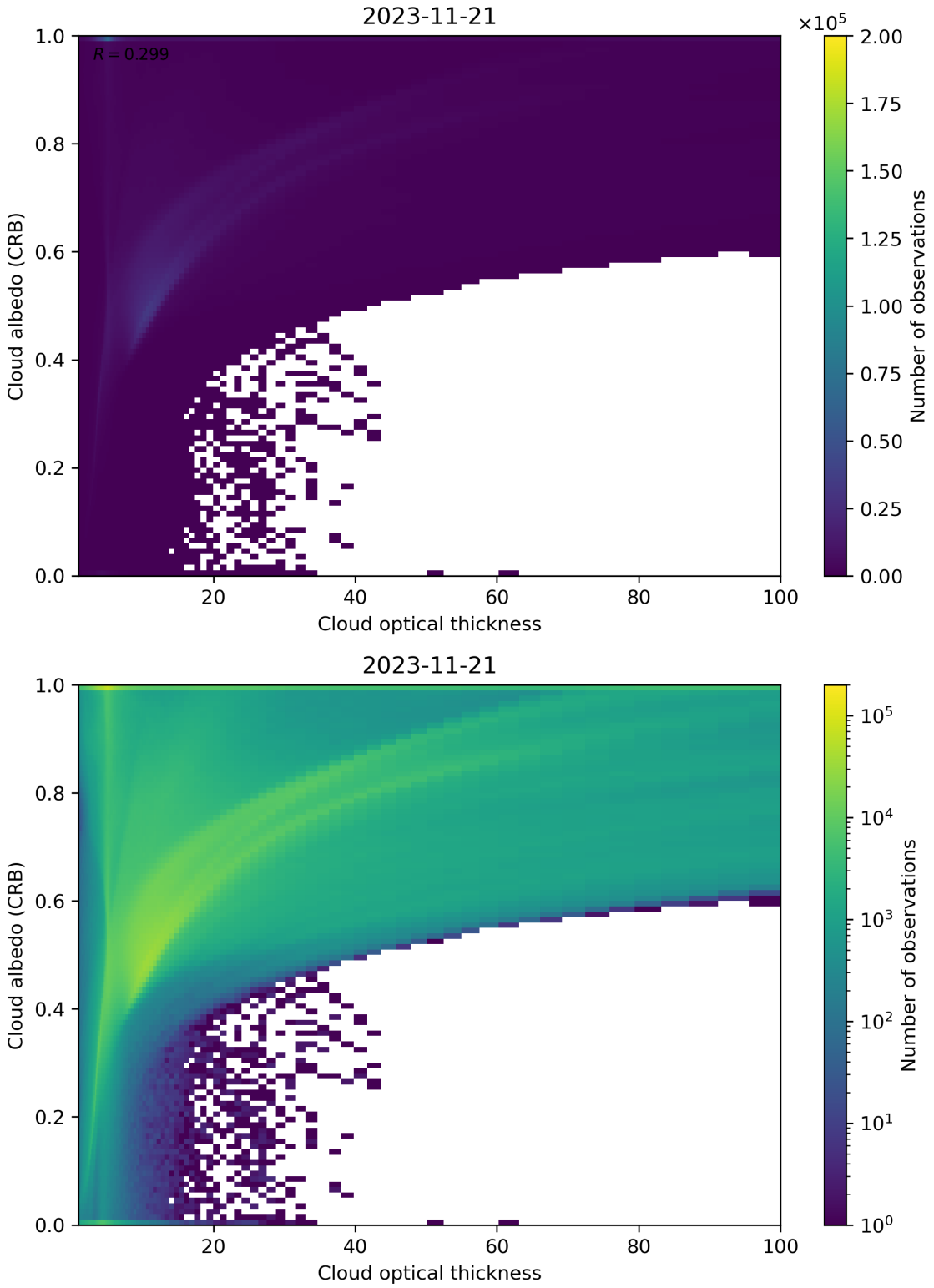

Figure 82: Scatter density plot of “Cloud optical thickness” against “Cloud albedo (CRB)” for 2023-11-20 to 2023-11-22.

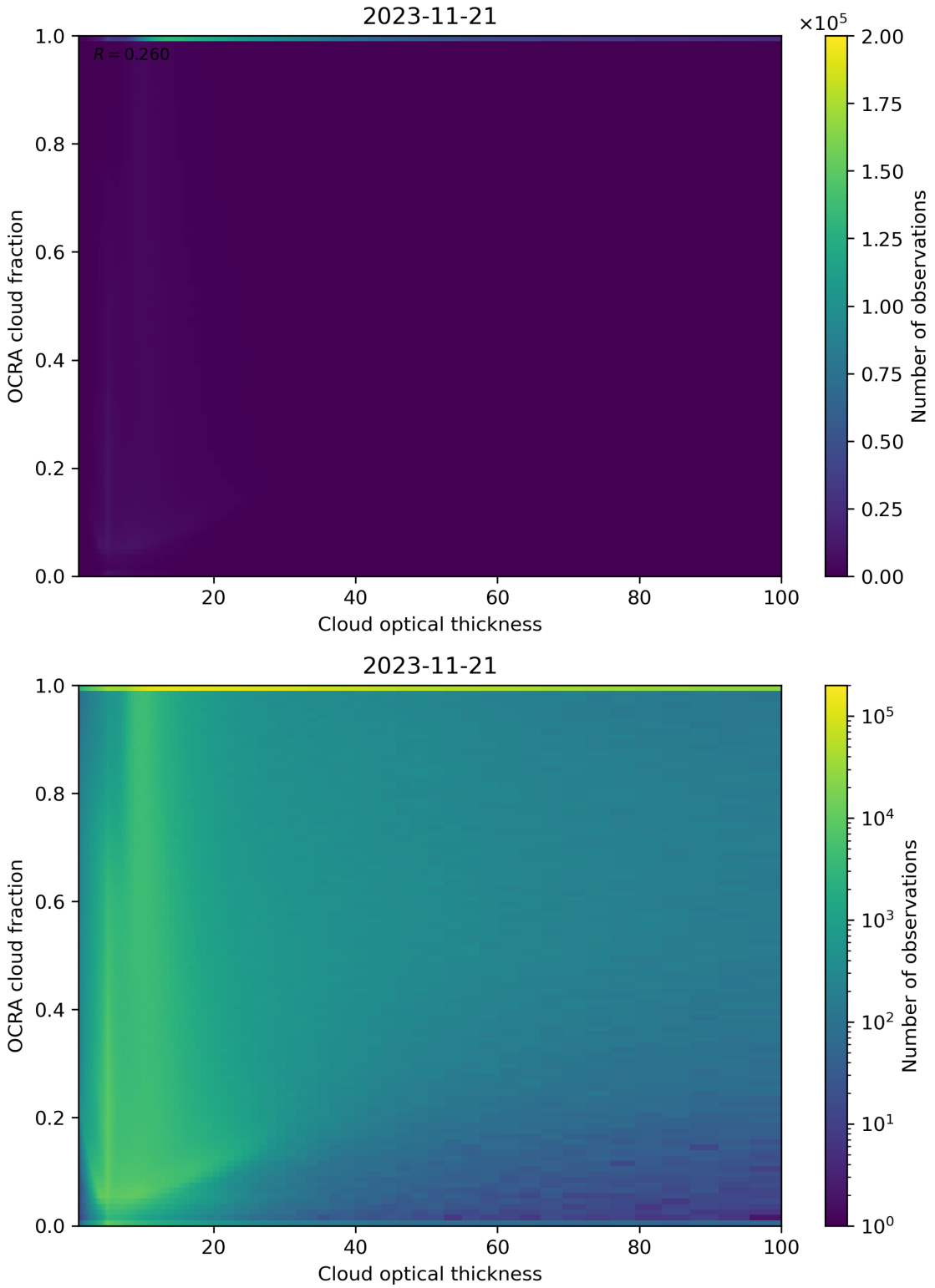

Figure 83: Scatter density plot of “Cloud optical thickness” against “OCRA cloud fraction” for 2023-11-20 to 2023-11-22.

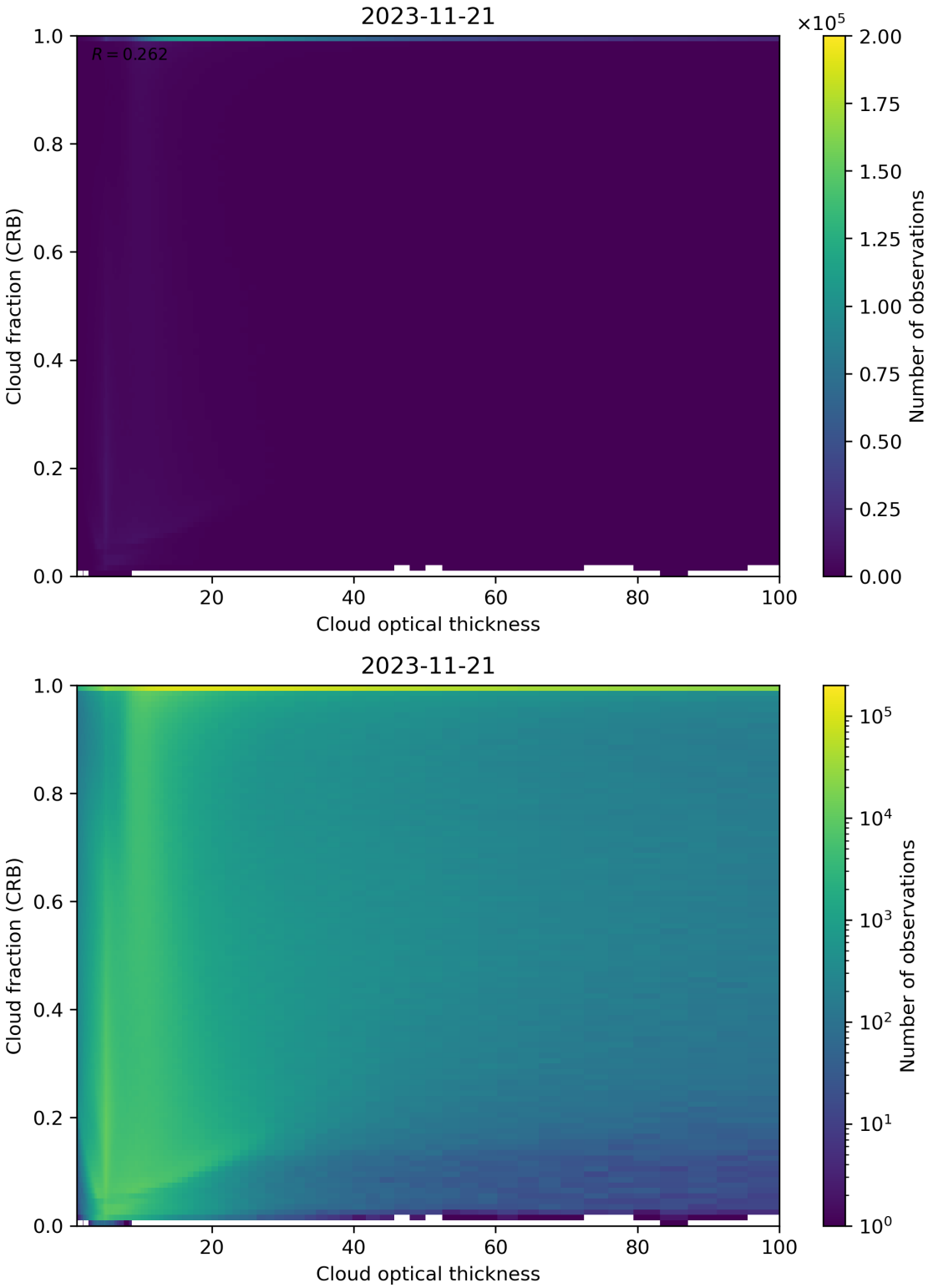

Figure 84: Scatter density plot of “Cloud optical thickness” against “Cloud fraction (CRB)” for 2023-11-20 to 2023-11-22.

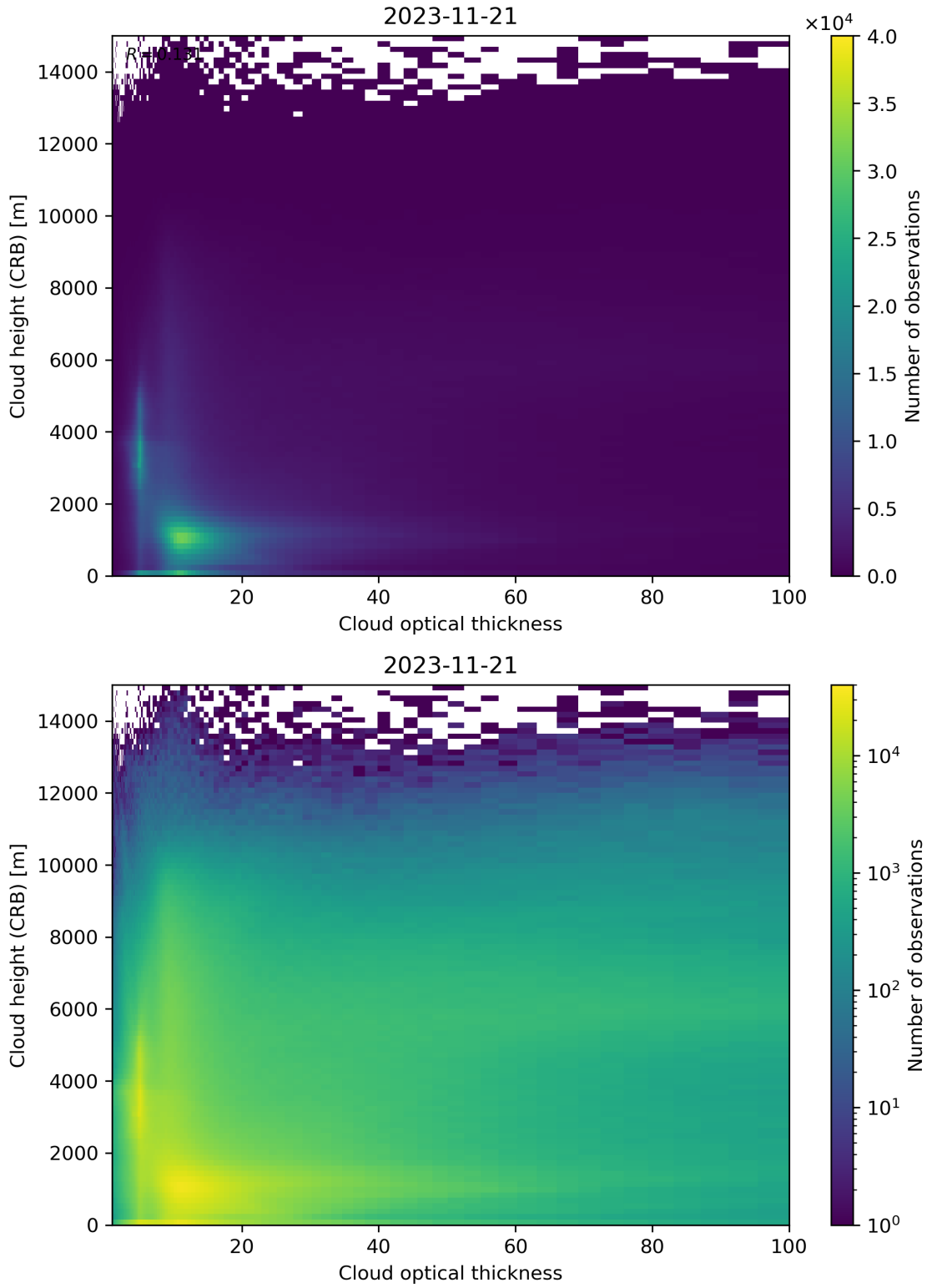

Figure 85: Scatter density plot of “Cloud optical thickness” against “Cloud height (CRB)” for 2023-11-20 to 2023-11-22.

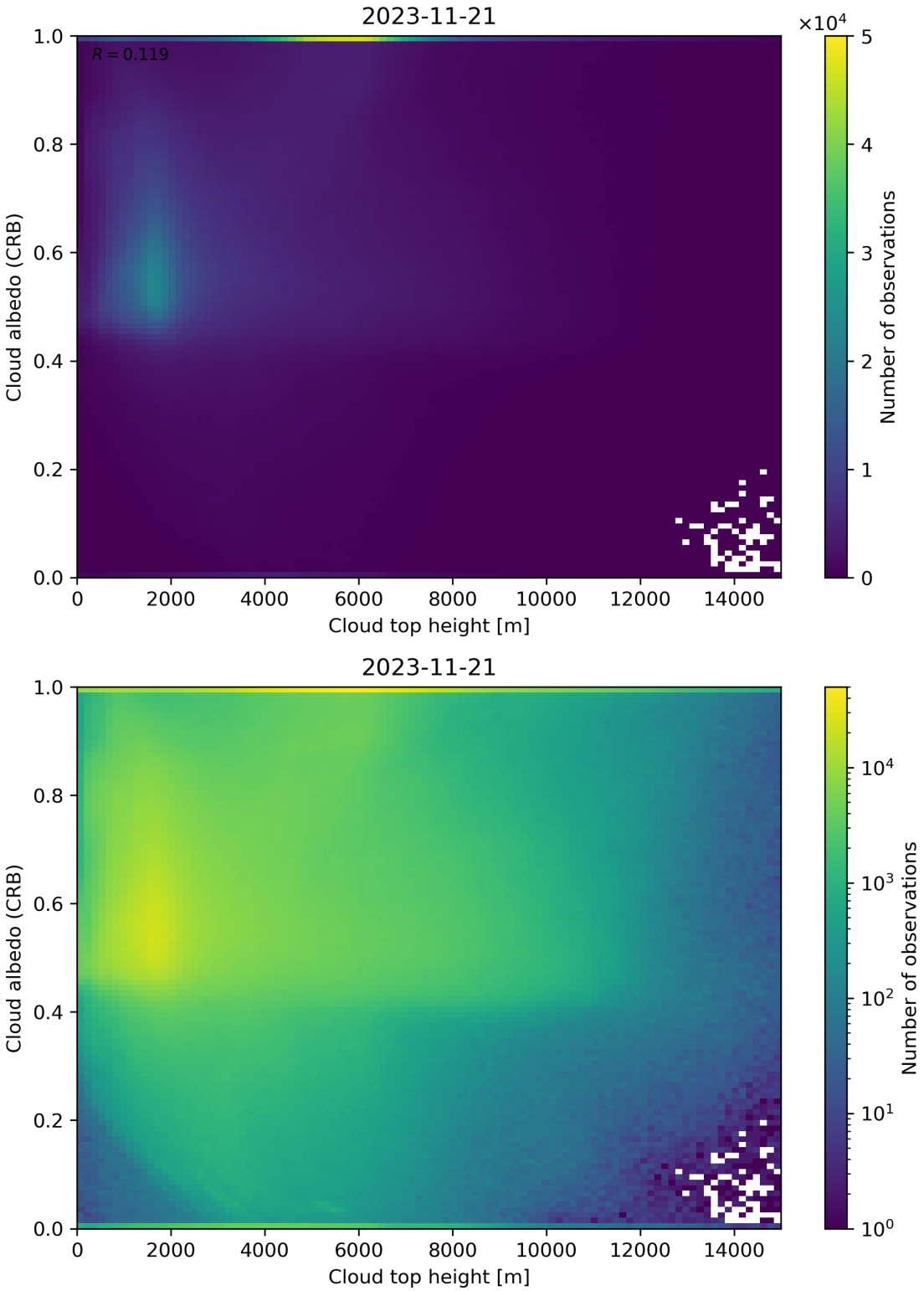

Figure 86: Scatter density plot of “Cloud top height” against “Cloud albedo (CRB)” for 2023-11-20 to 2023-11-22.

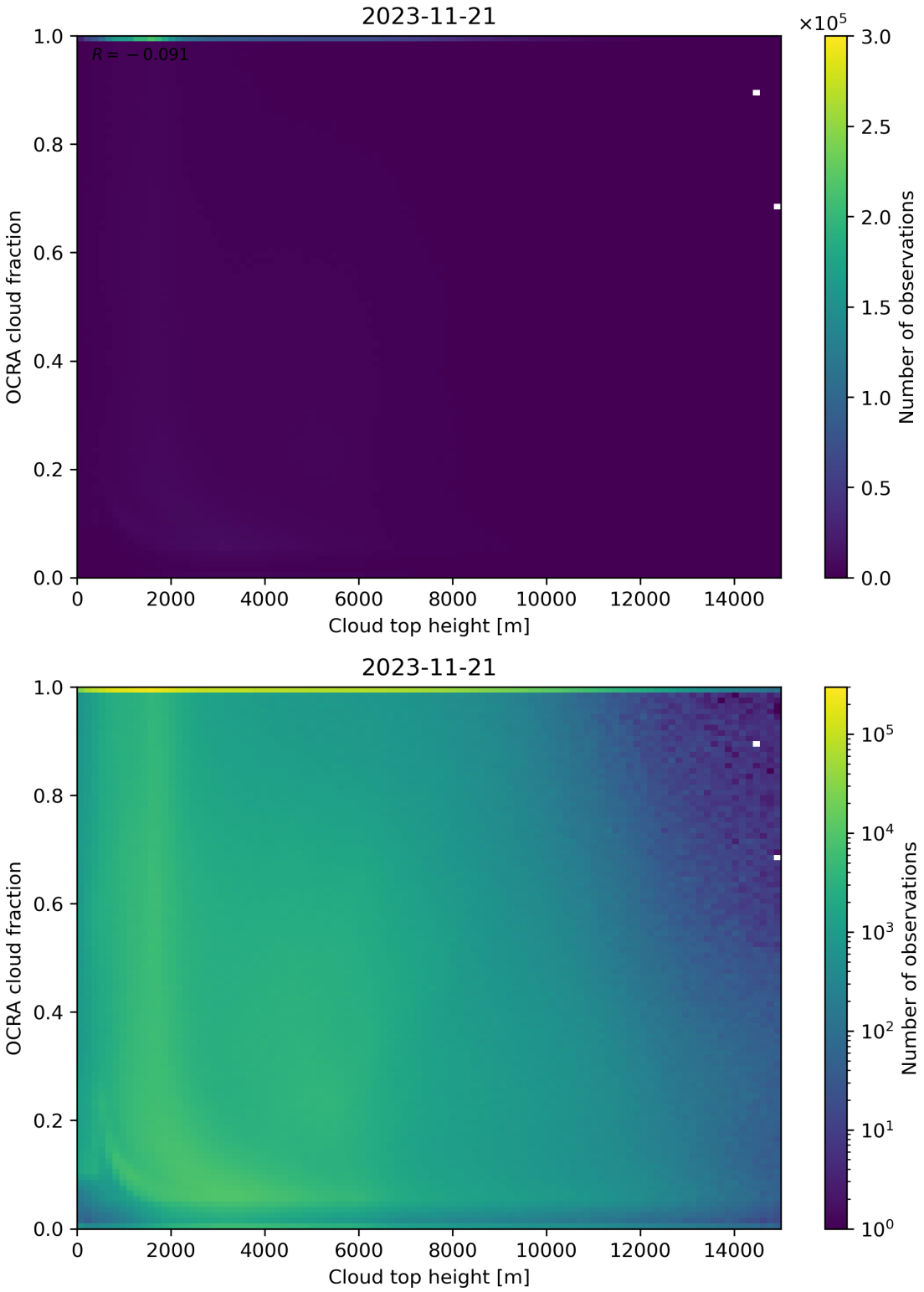

Figure 87: Scatter density plot of “Cloud top height” against “OCRA cloud fraction” for 2023-11-20 to 2023-11-22.

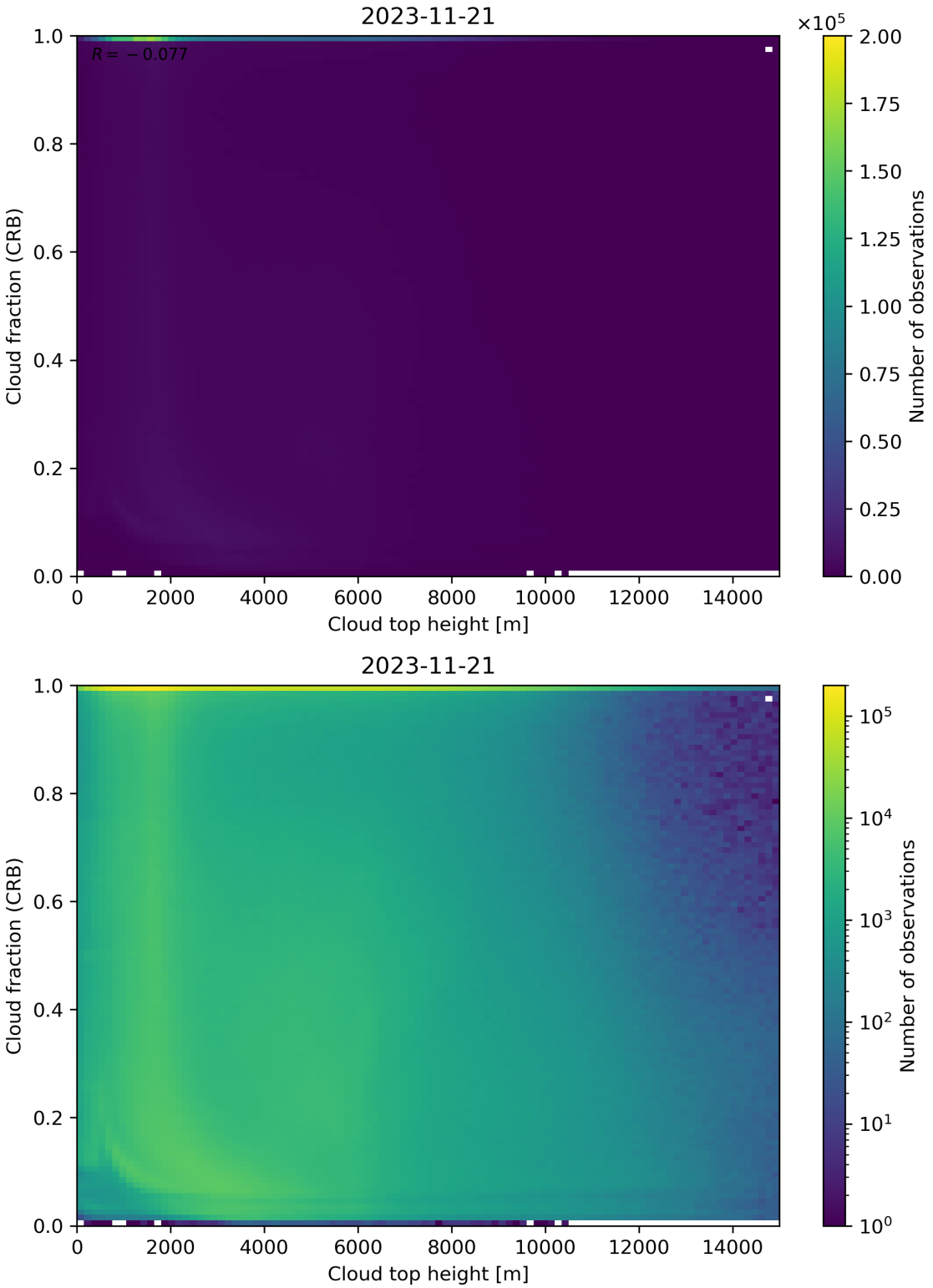

Figure 88: Scatter density plot of “Cloud top height” against “Cloud fraction (CRB)” for 2023-11-20 to 2023-11-22.

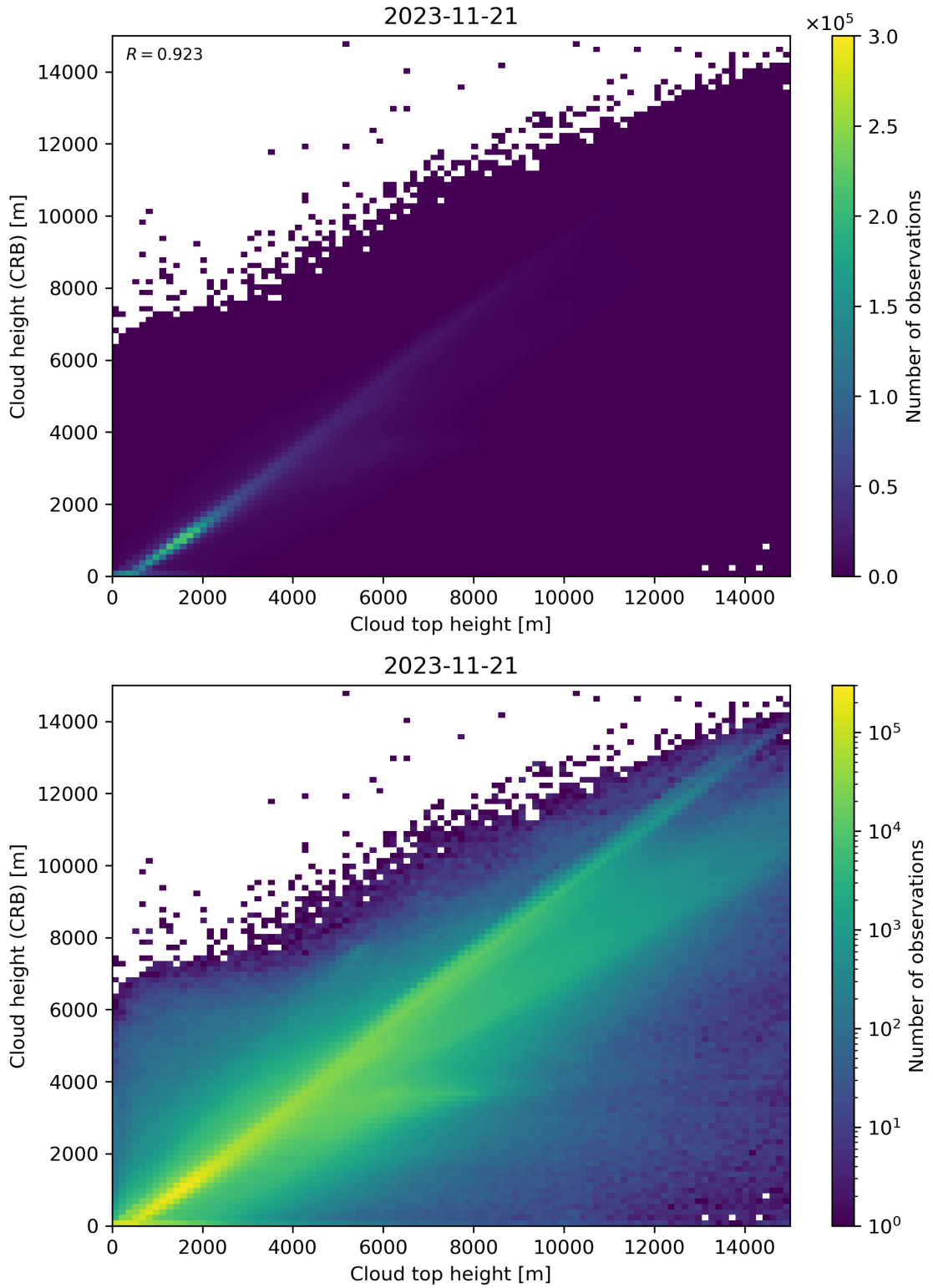

Figure 89: Scatter density plot of “Cloud top height” against “Cloud height (CRB)” for 2023-11-20 to 2023-11-22.

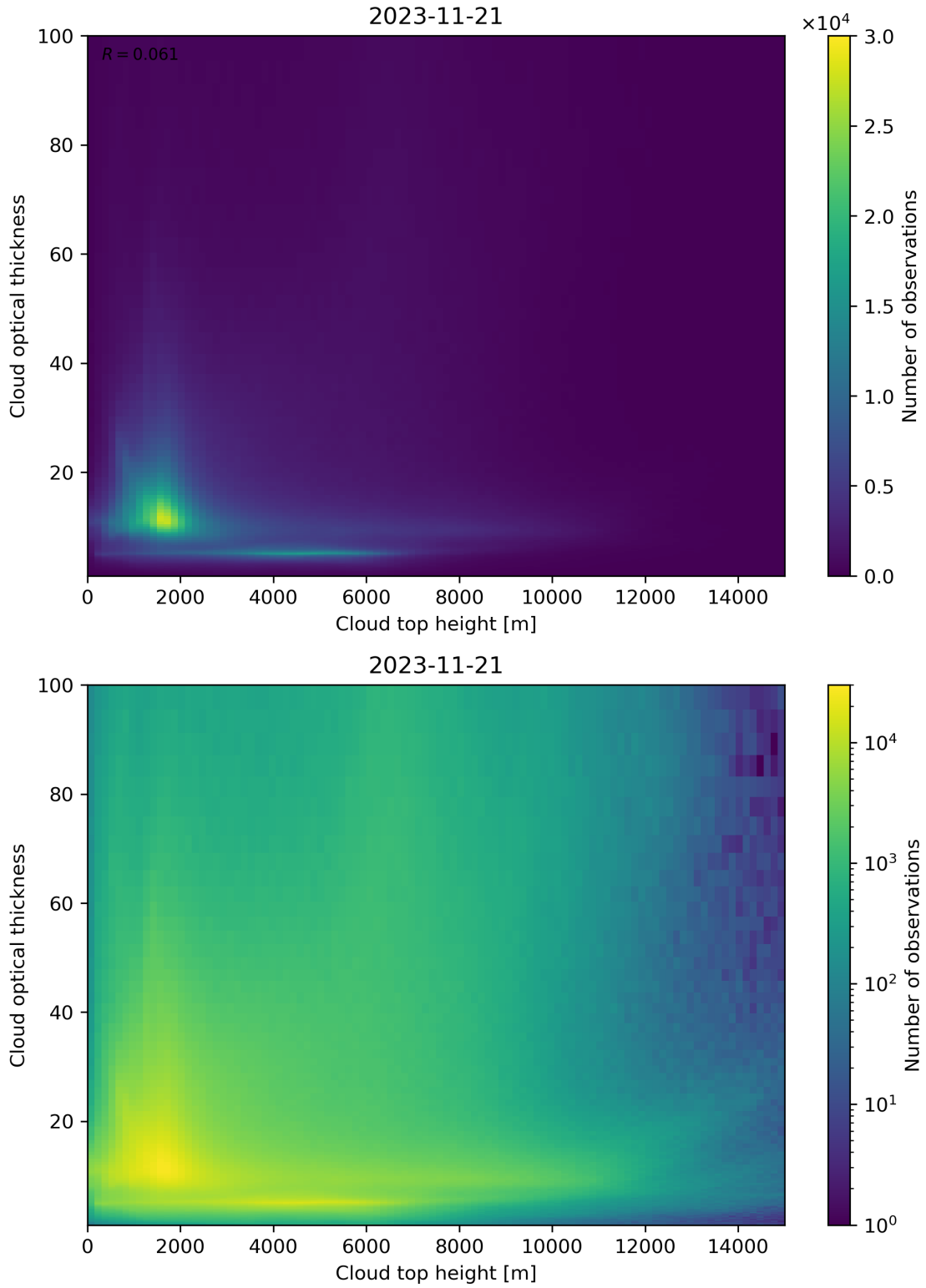

Figure 90: Scatter density plot of “Cloud top height” against “Cloud optical thickness” for 2023-11-20 to 2023-11-22.

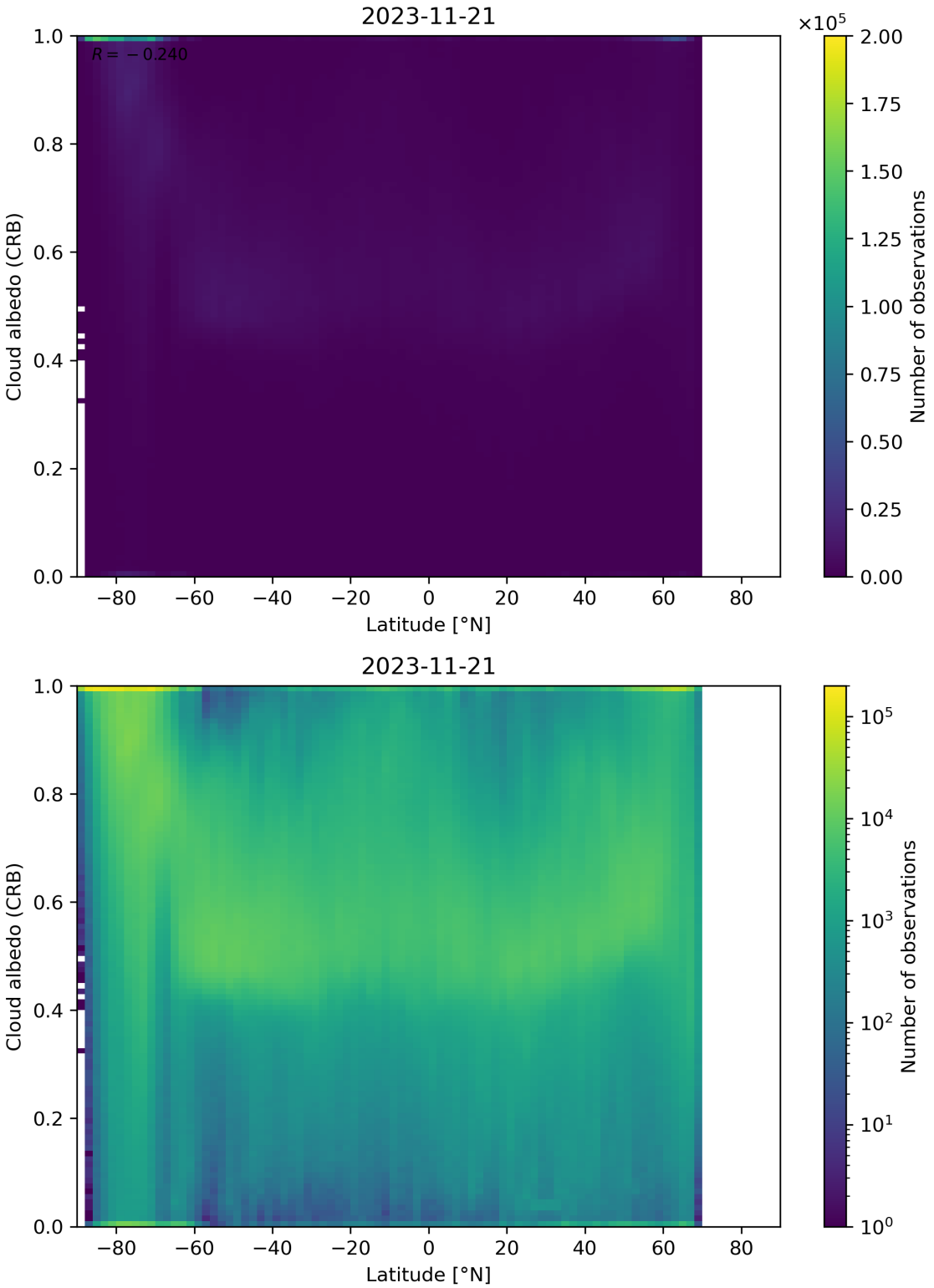

Figure 91: Scatter density plot of “Latitude” against “Cloud albedo (CRB)” for 2023-11-20 to 2023-11-22.

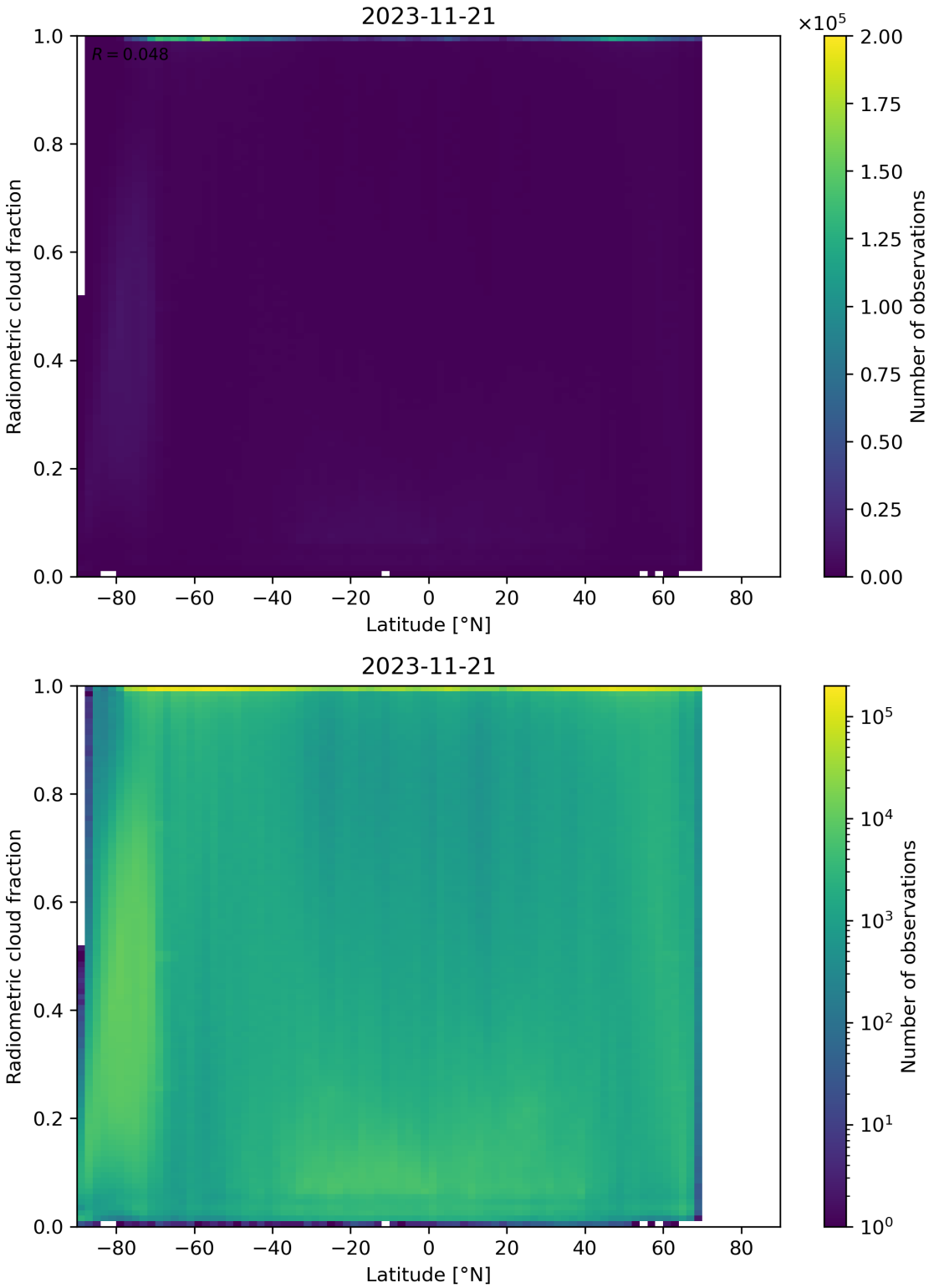

Figure 92: Scatter density plot of “Latitude” against “Radiometric cloud fraction” for 2023-11-20 to 2023-11-22.

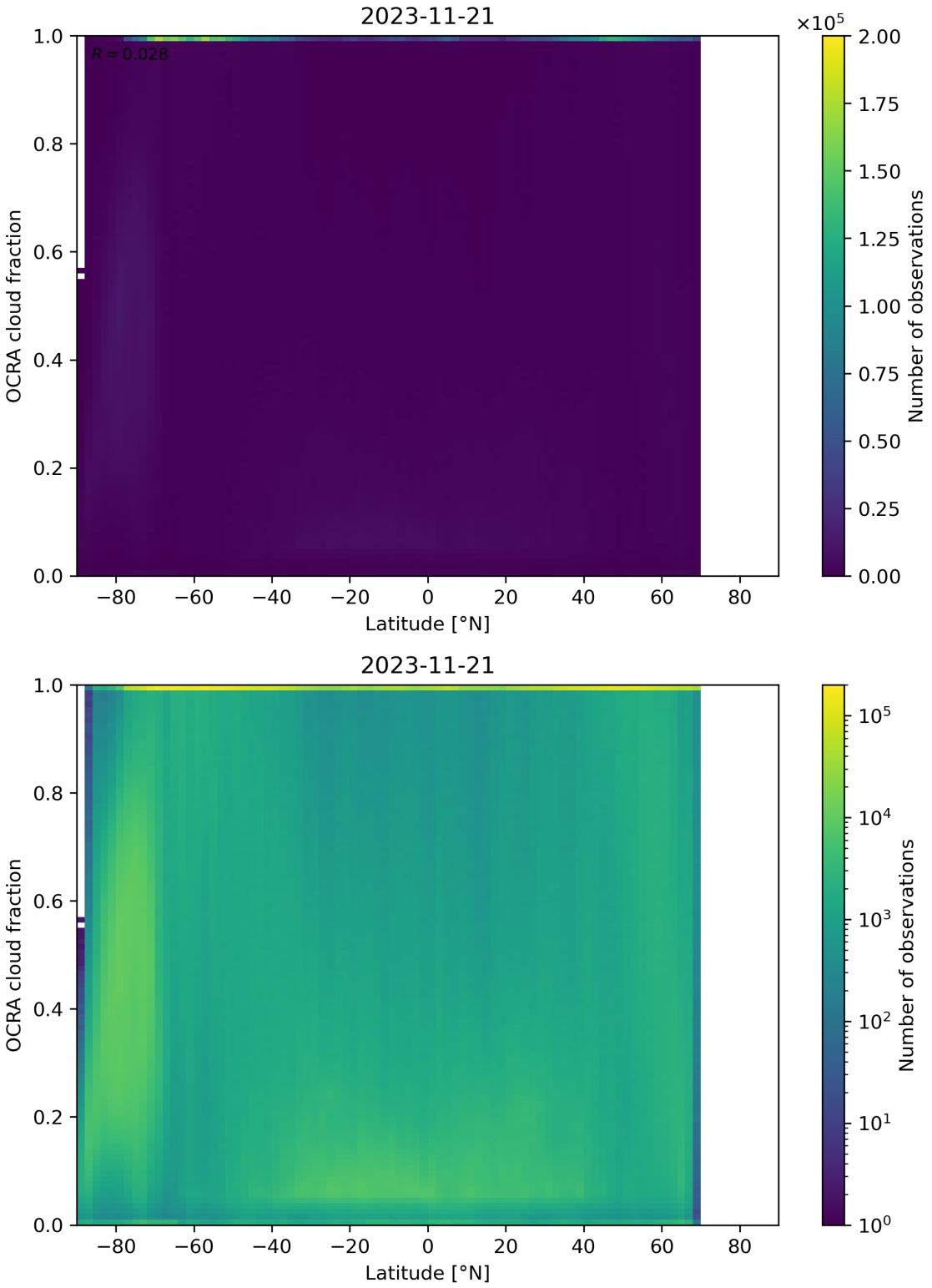

Figure 93: Scatter density plot of “Latitude” against “OCRA cloud fraction” for 2023-11-20 to 2023-11-22.

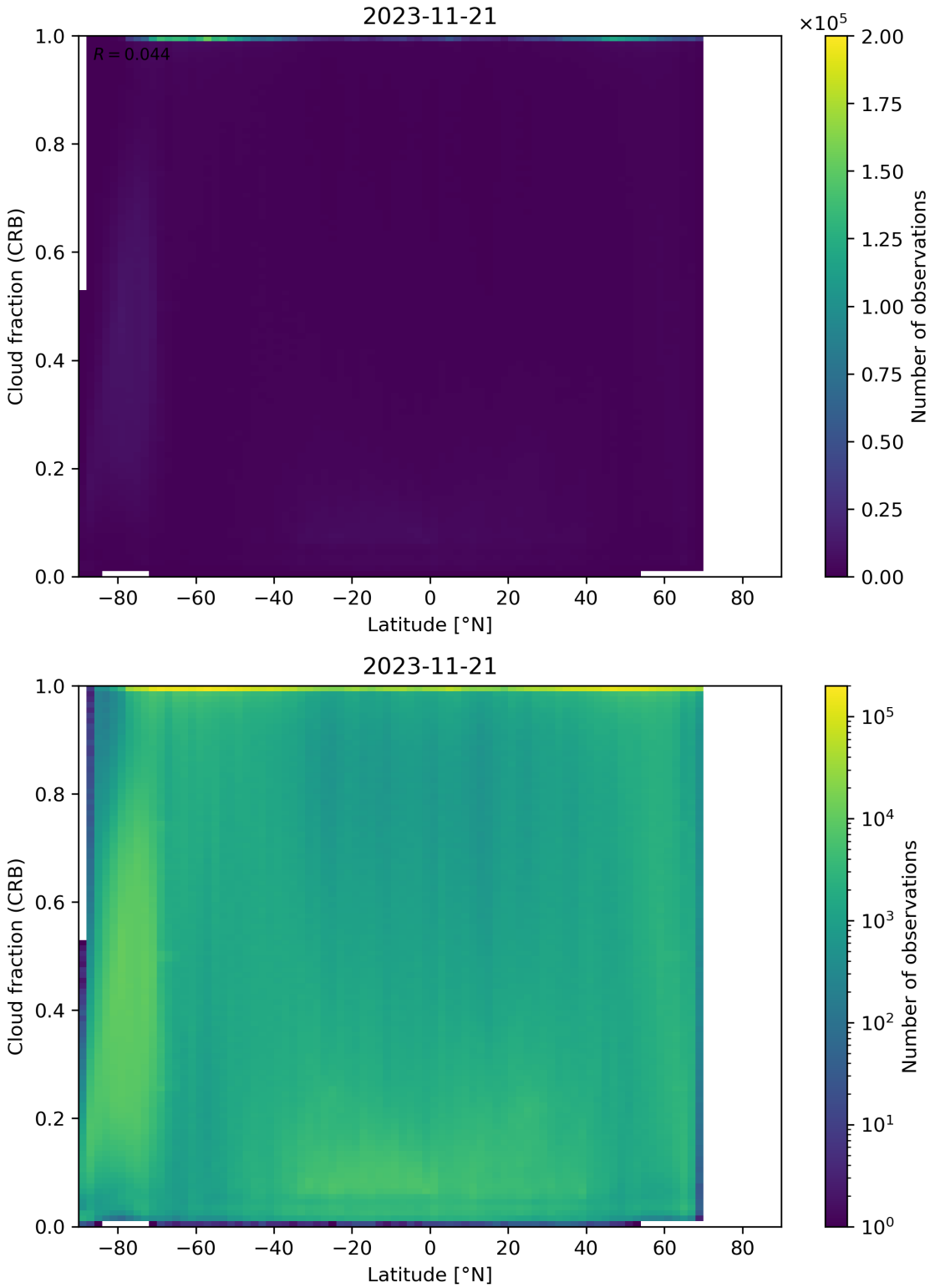

Figure 94: Scatter density plot of “Latitude” against “Cloud fraction (CRB)” for 2023-11-20 to 2023-11-22.

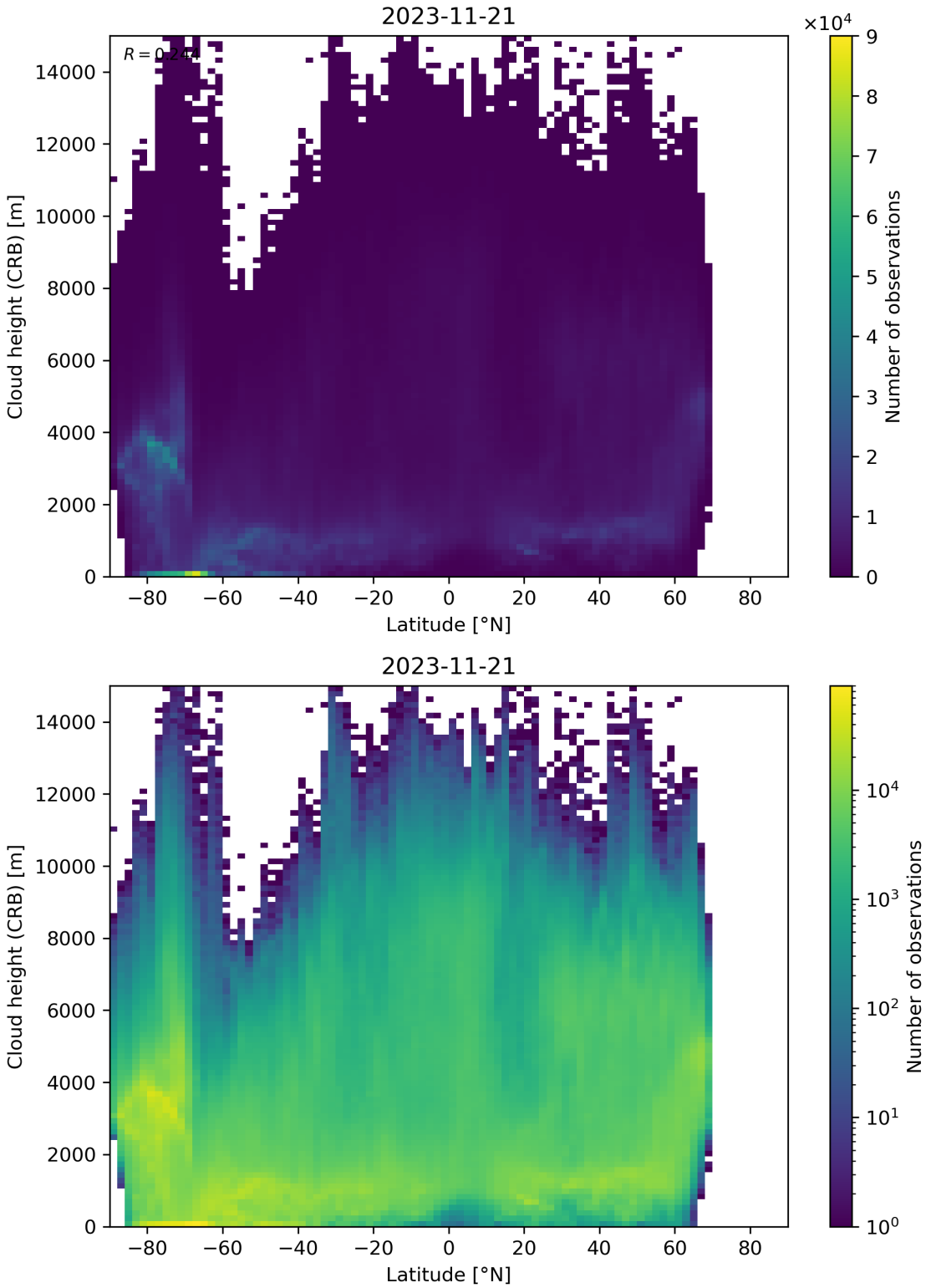

Figure 95: Scatter density plot of “Latitude” against “Cloud height (CRB)” for 2023-11-20 to 2023-11-22.

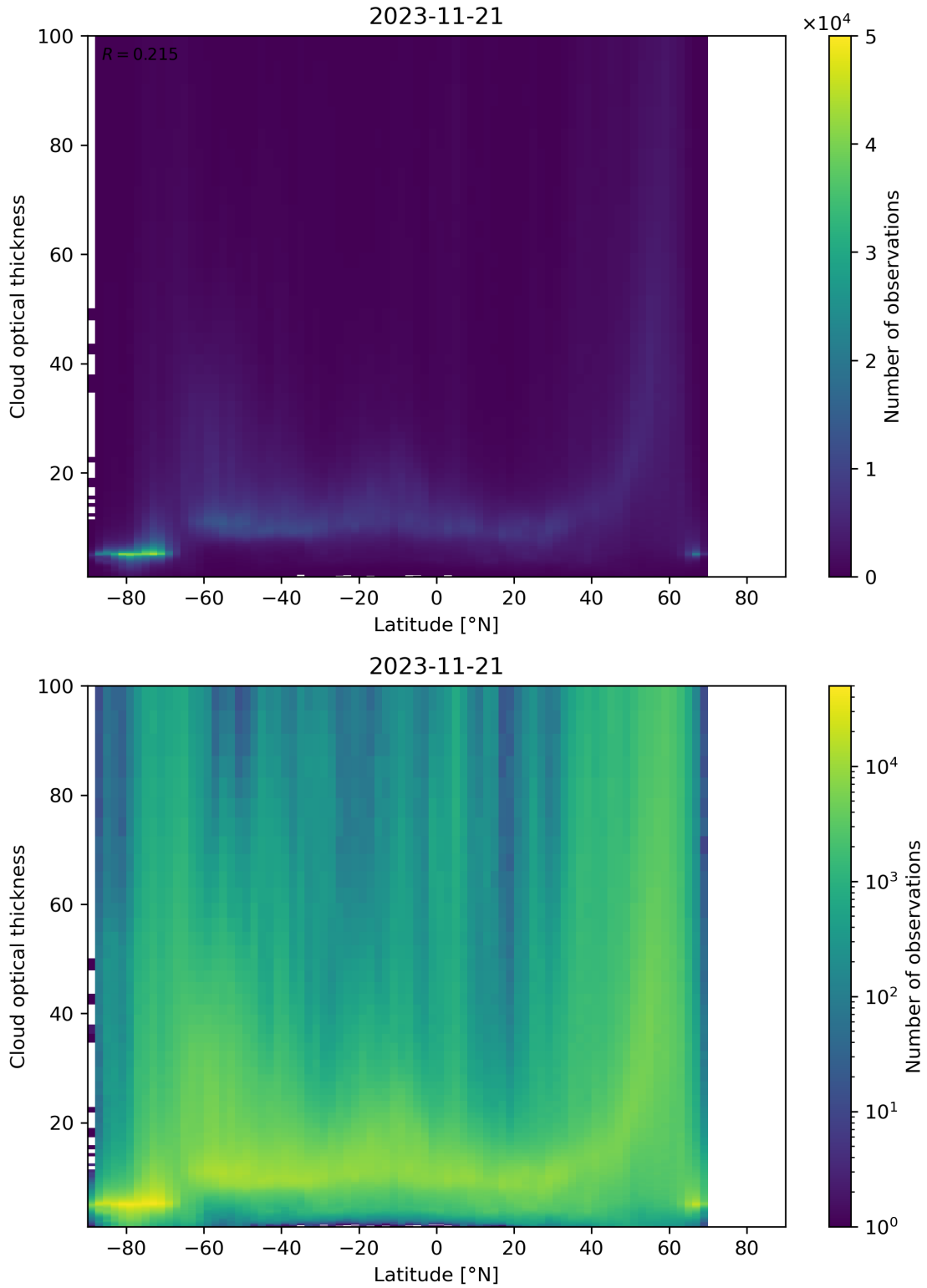

Figure 96: Scatter density plot of “Latitude” against “Cloud optical thickness” for 2023-11-20 to 2023-11-22.

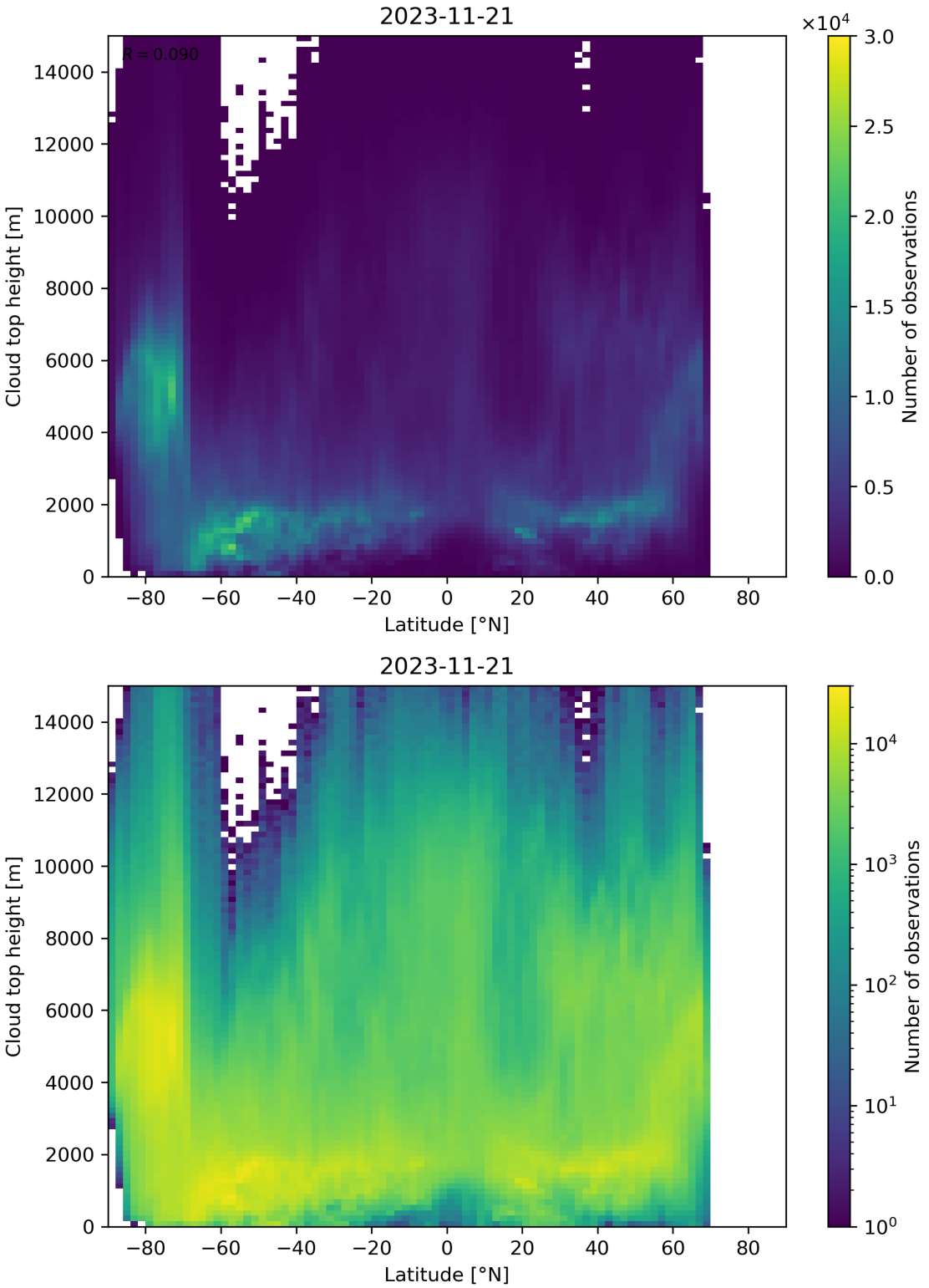

Figure 97: Scatter density plot of “Latitude” against “Cloud top height” for 2023-11-20 to 2023-11-22.

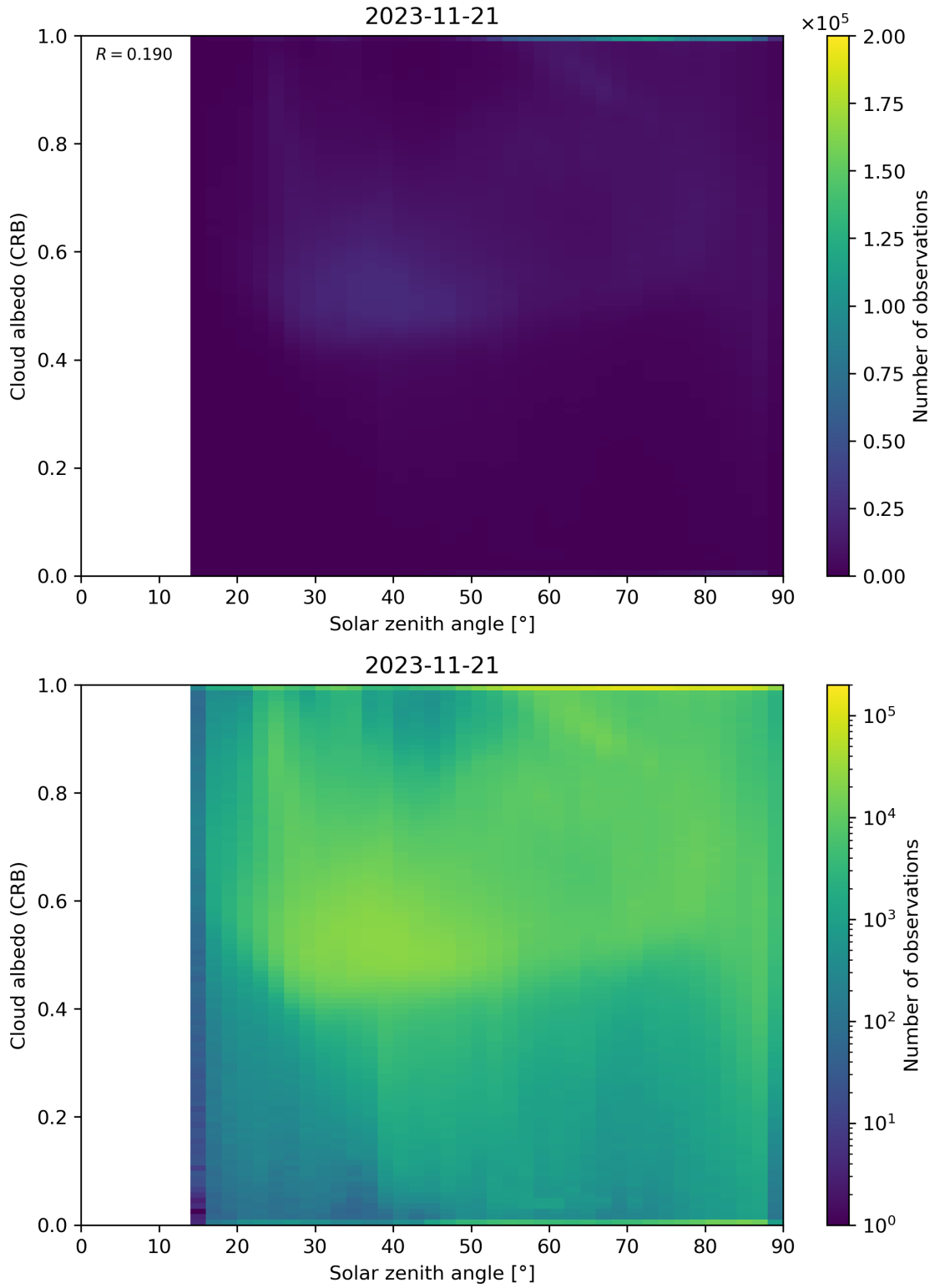

Figure 98: Scatter density plot of “Solar zenith angle” against “Cloud albedo (CRB)” for 2023-11-20 to 2023-11-22.

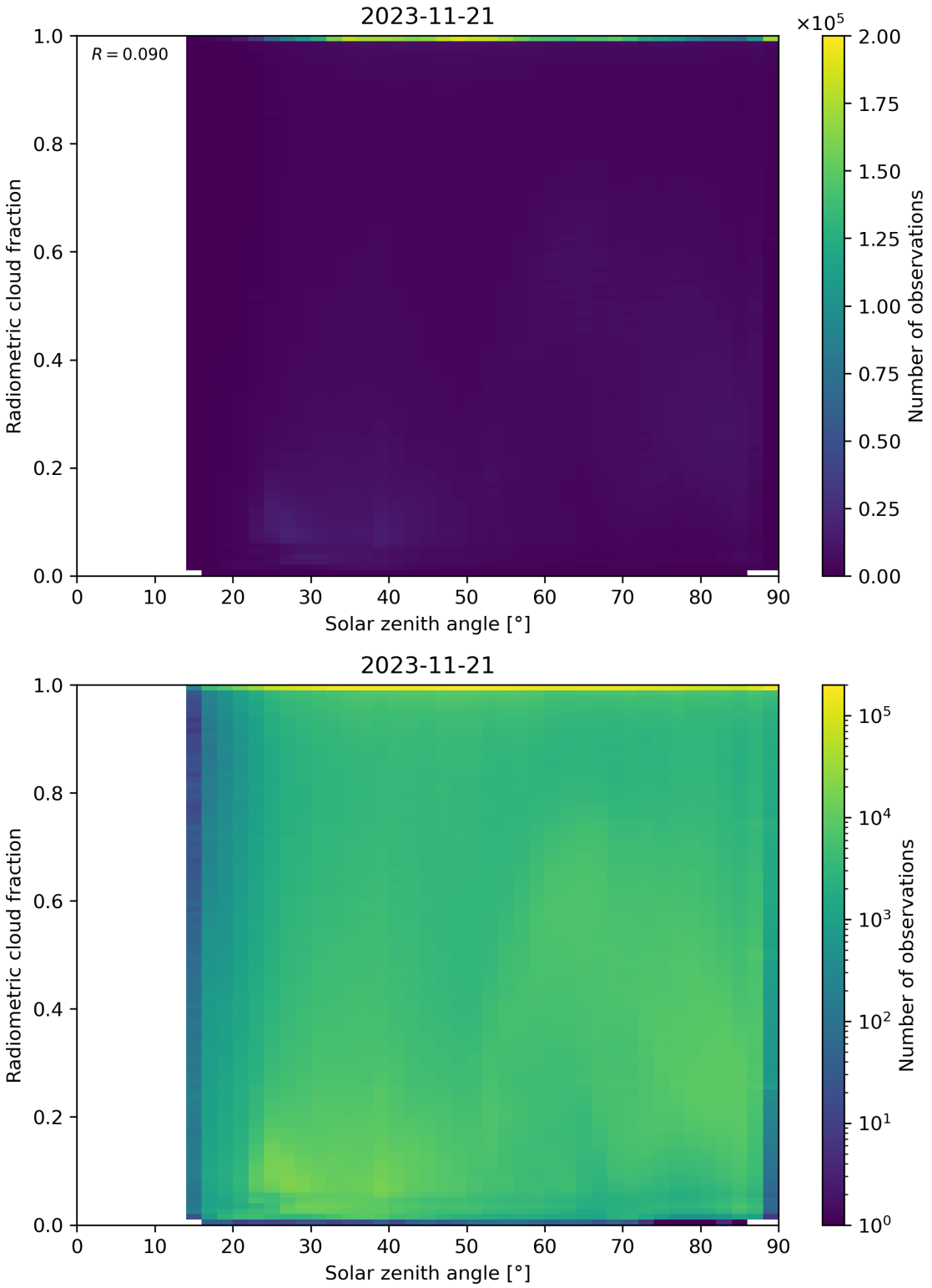

Figure 99: Scatter density plot of “Solar zenith angle” against “Radiometric cloud fraction” for 2023-11-20 to 2023-11-22.

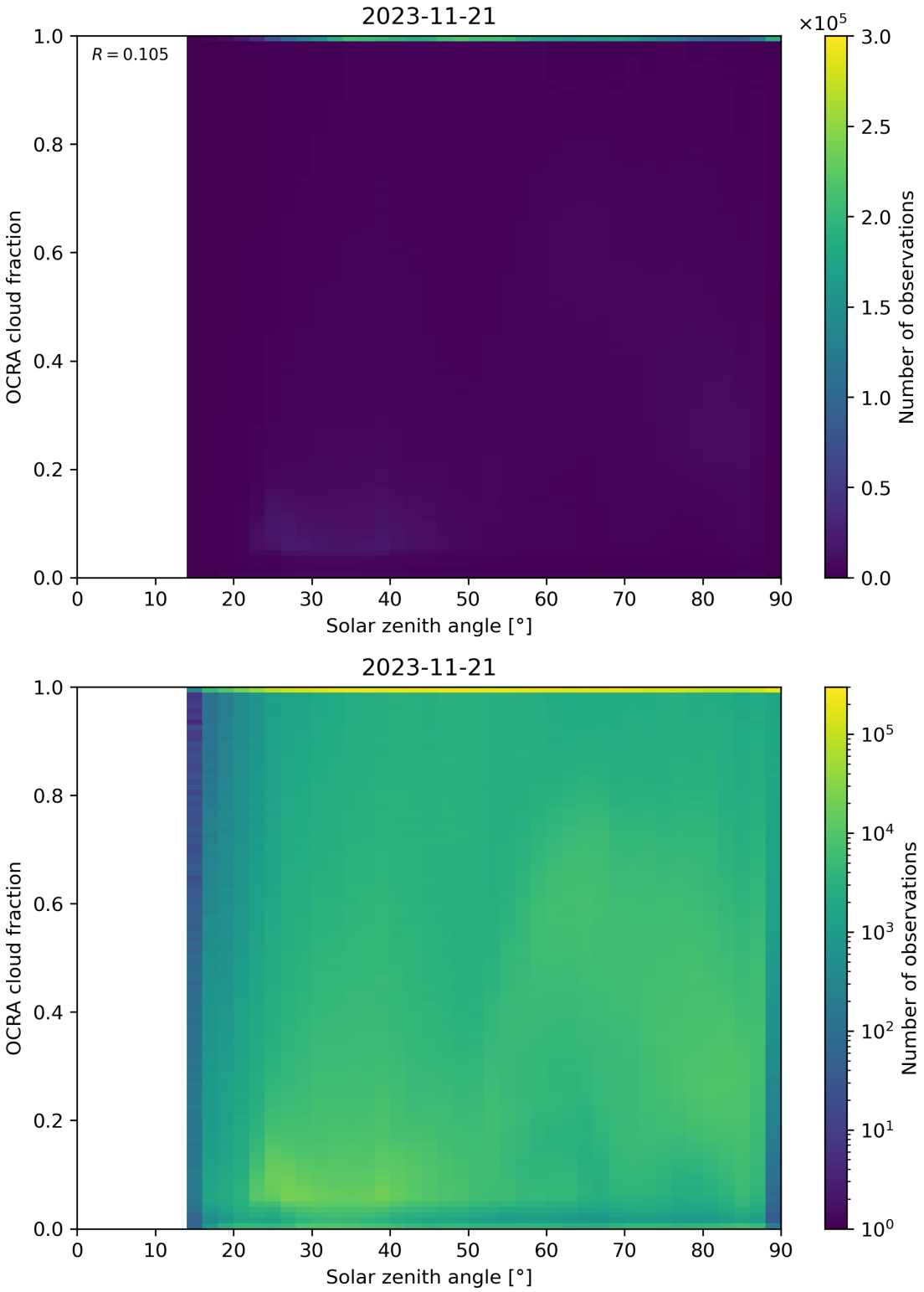

Figure 100: Scatter density plot of “Solar zenith angle” against “OCRA cloud fraction” for 2023-11-20 to 2023-11-22.

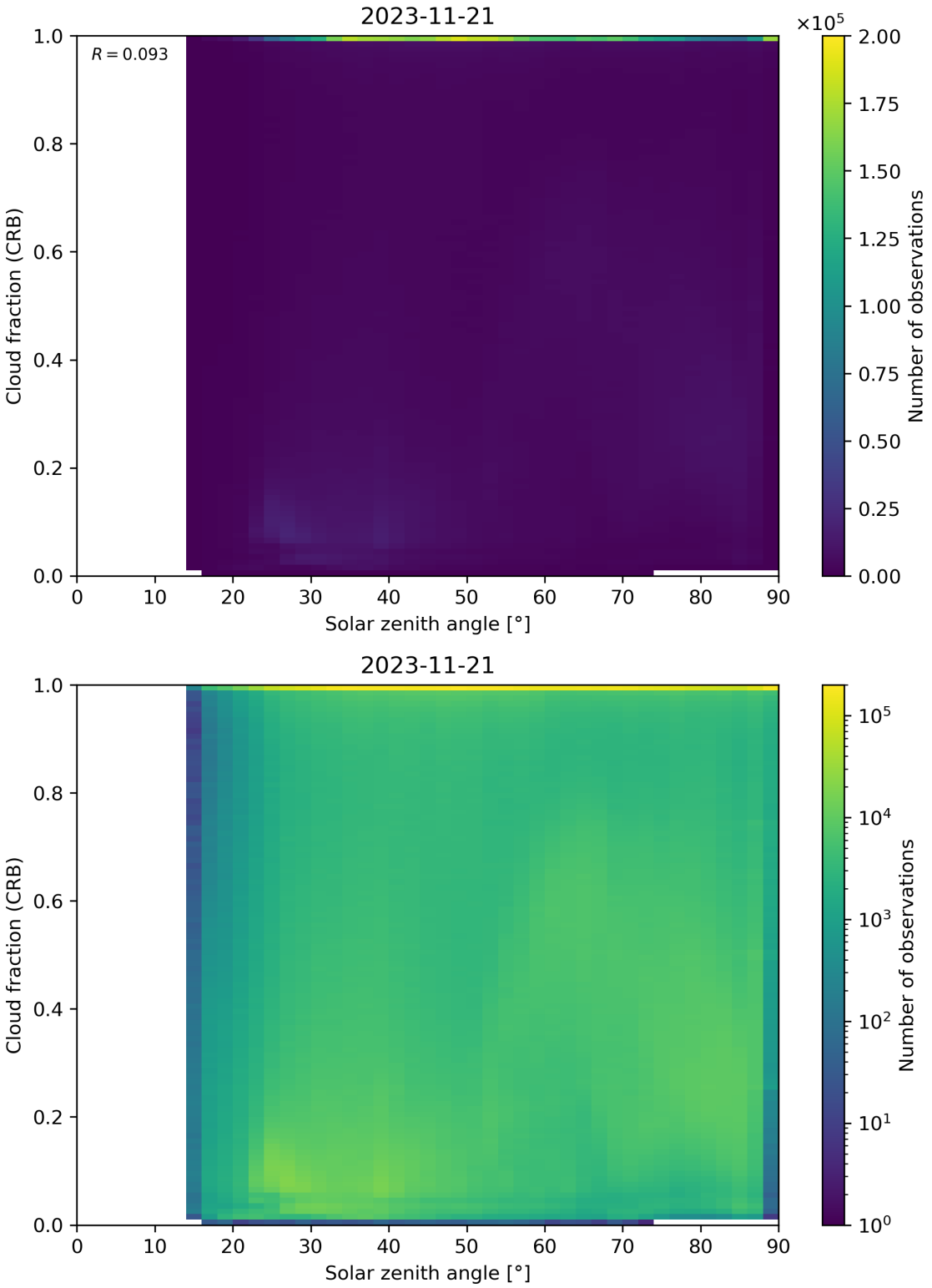

Figure 101: Scatter density plot of “Solar zenith angle” against “Cloud fraction (CRB)” for 2023-11-20 to 2023-11-22.

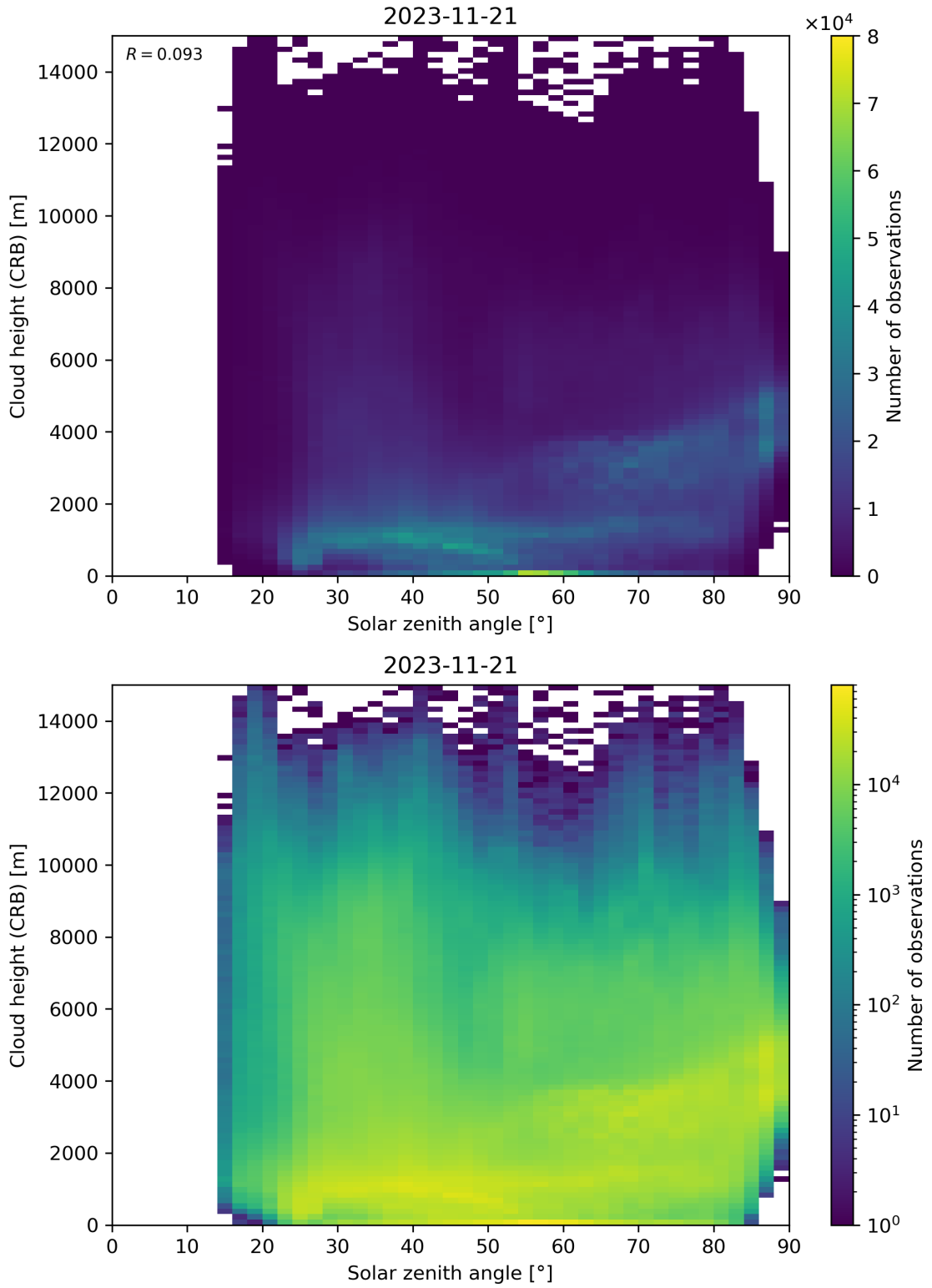

Figure 102: Scatter density plot of “Solar zenith angle” against “Cloud height (CRB)” for 2023-11-20 to 2023-11-22.

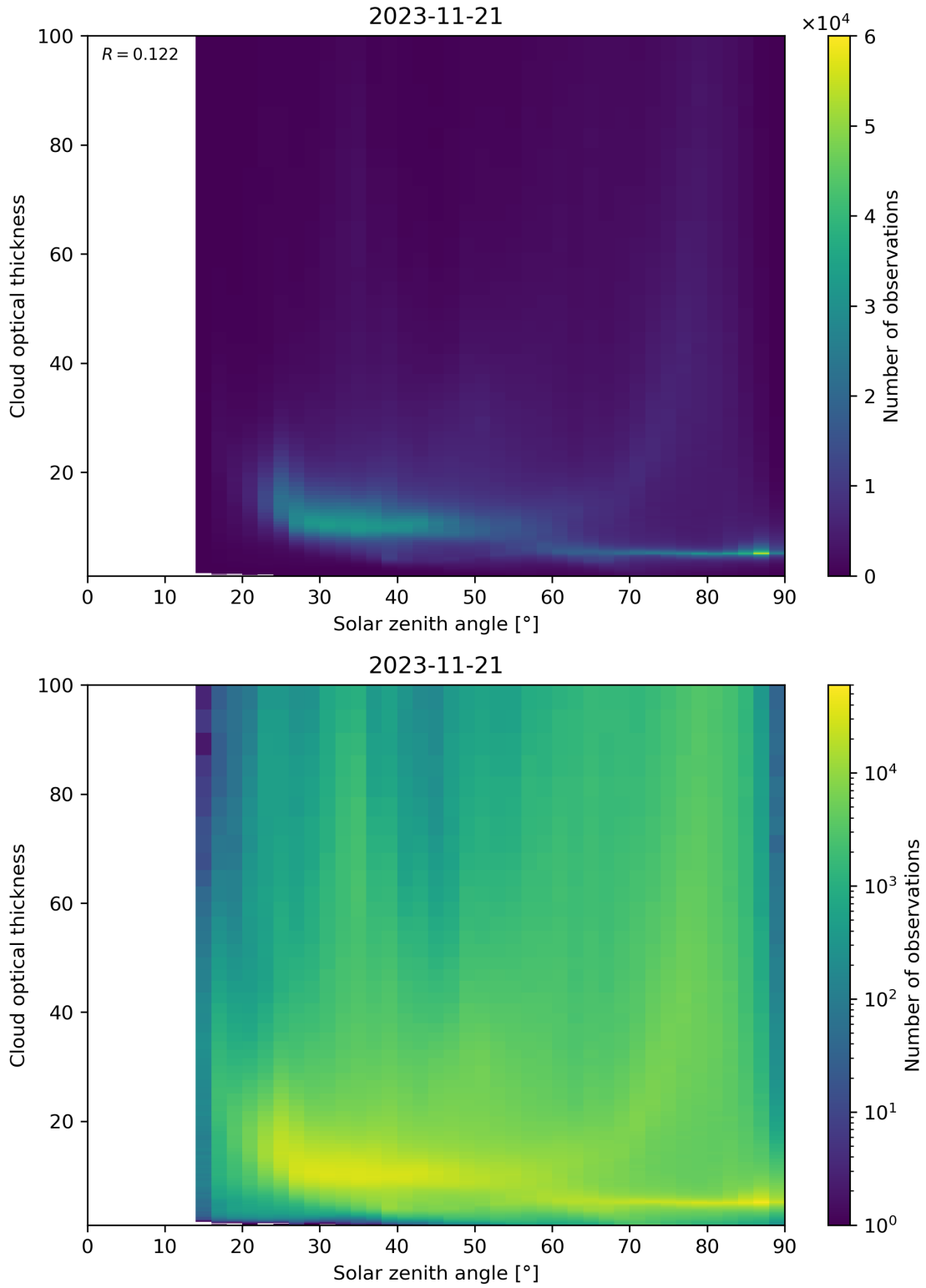

Figure 103: Scatter density plot of “Solar zenith angle” against “Cloud optical thickness” for 2023-11-20 to 2023-11-22.

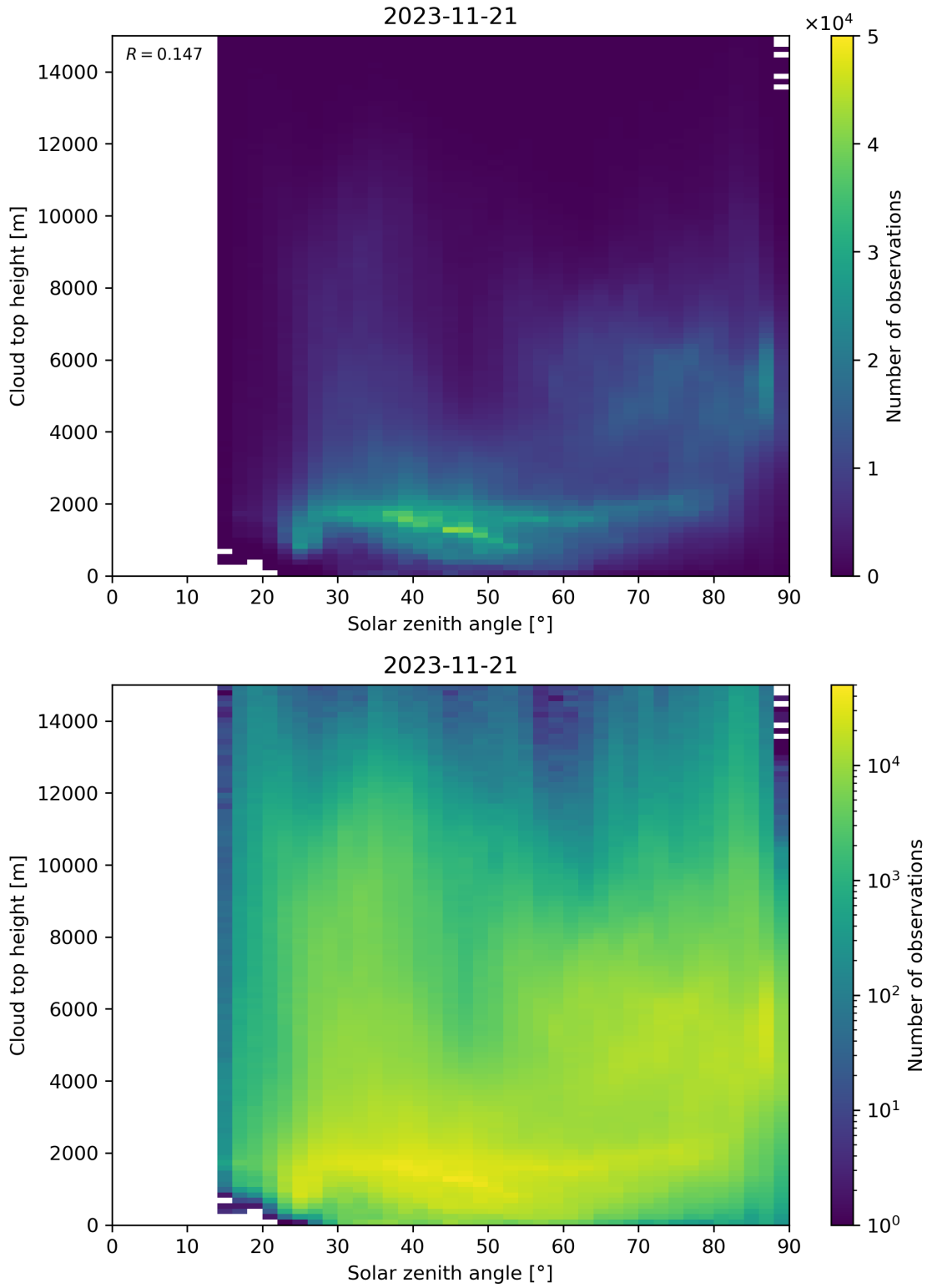

Figure 104: Scatter density plot of “Solar zenith angle” against “Cloud top height” for 2023-11-20 to 2023-11-22.

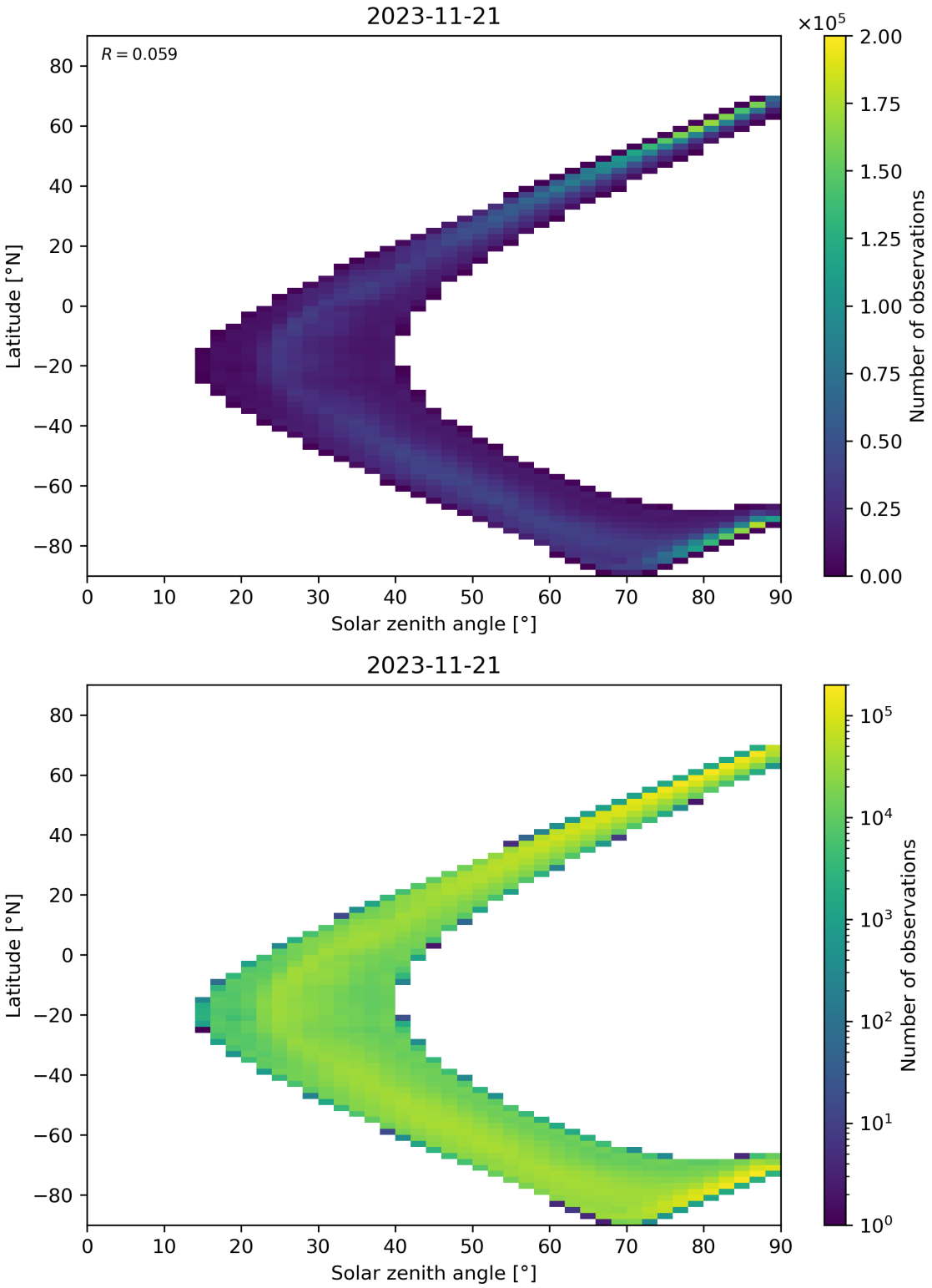

Figure 105: Scatter density plot of “Solar zenith angle” against “Latitude” for 2023-11-20 to 2023-11-22.

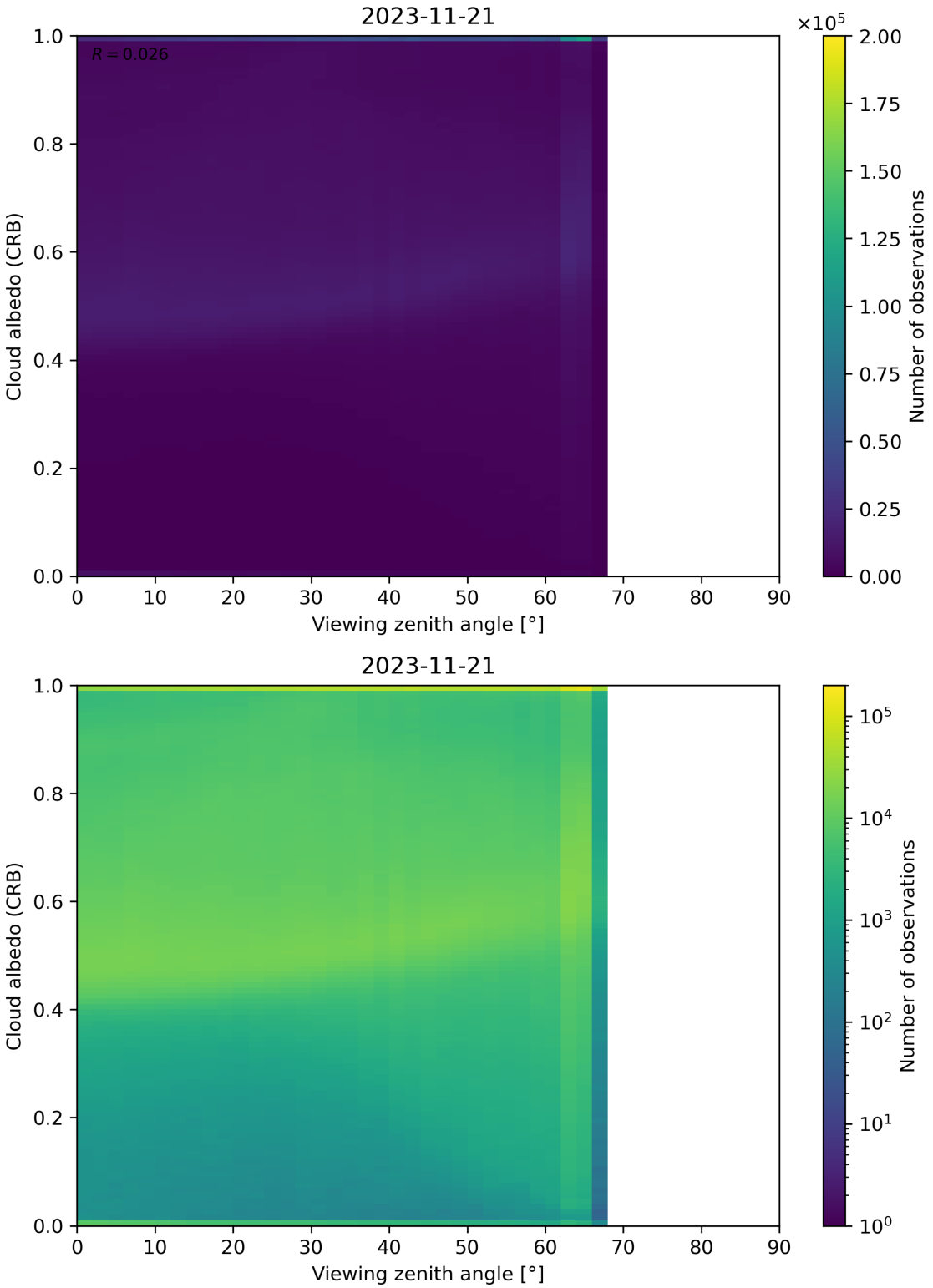

Figure 106: Scatter density plot of “Viewing zenith angle” against “Cloud albedo (CRB)” for 2023-11-20 to 2023-11-22.

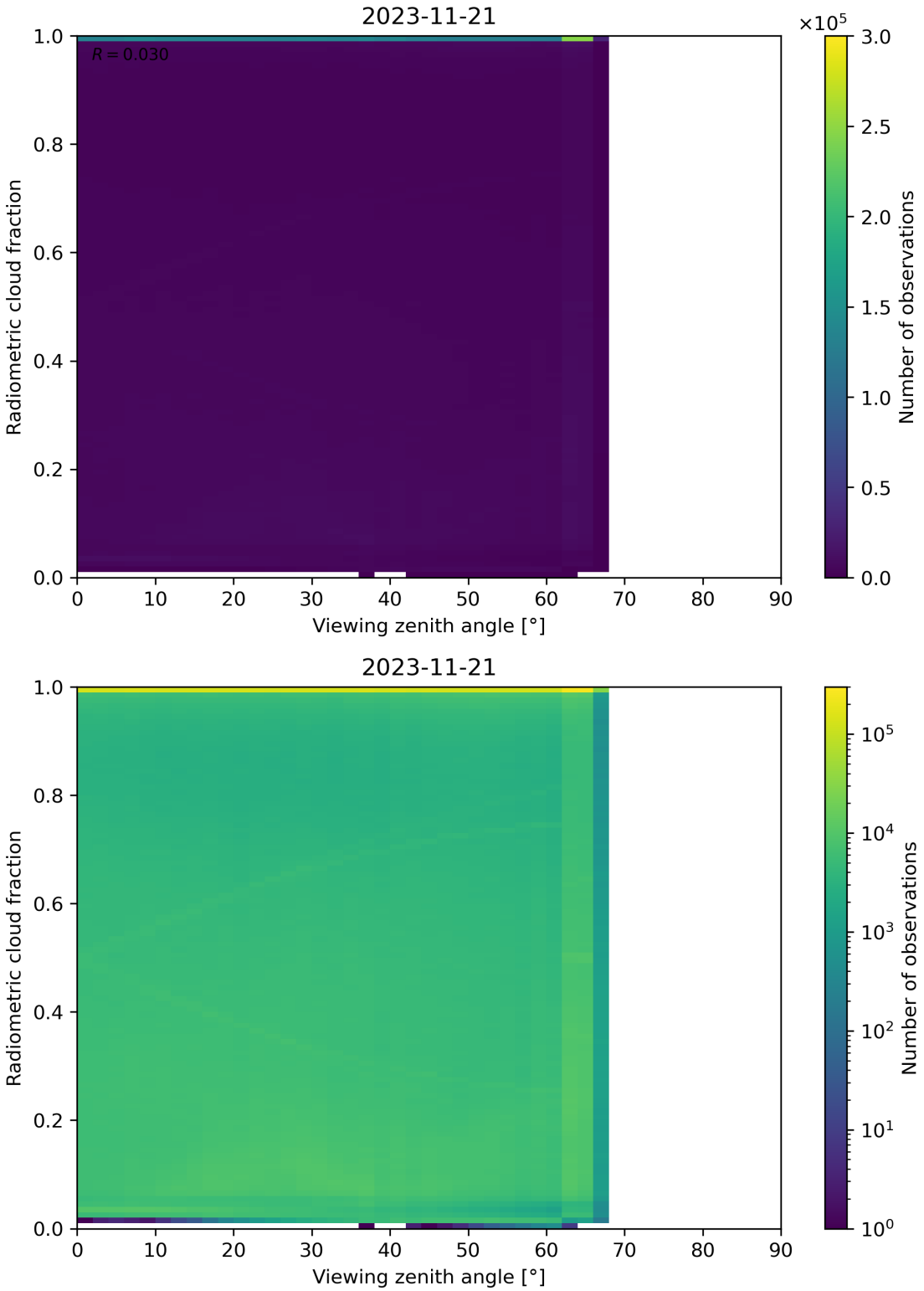

Figure 107: Scatter density plot of “Viewing zenith angle” against “Radiometric cloud fraction” for 2023-11-20 to 2023-11-22.

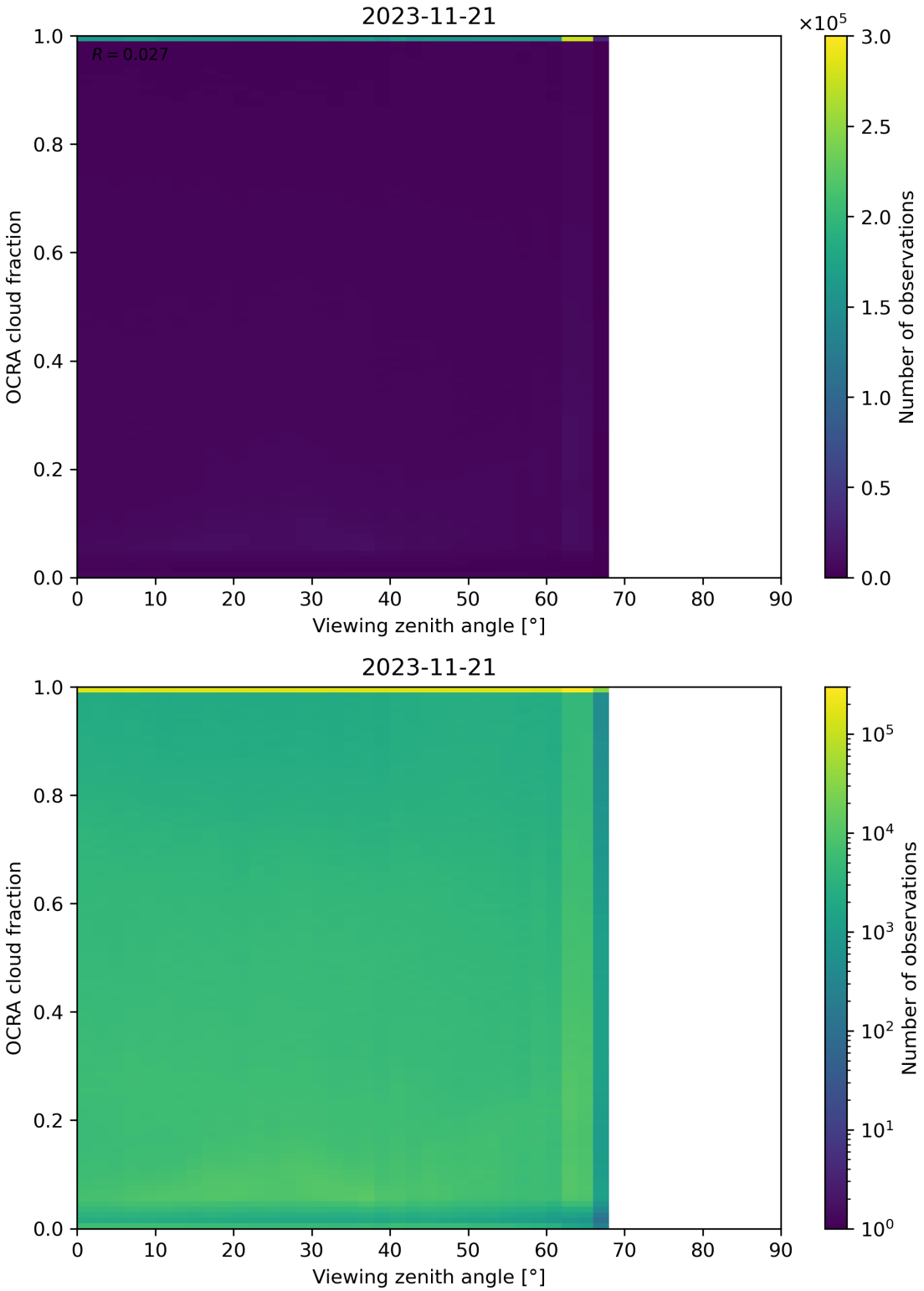

Figure 108: Scatter density plot of “Viewing zenith angle” against “OCRA cloud fraction” for 2023-11-20 to 2023-11-22.

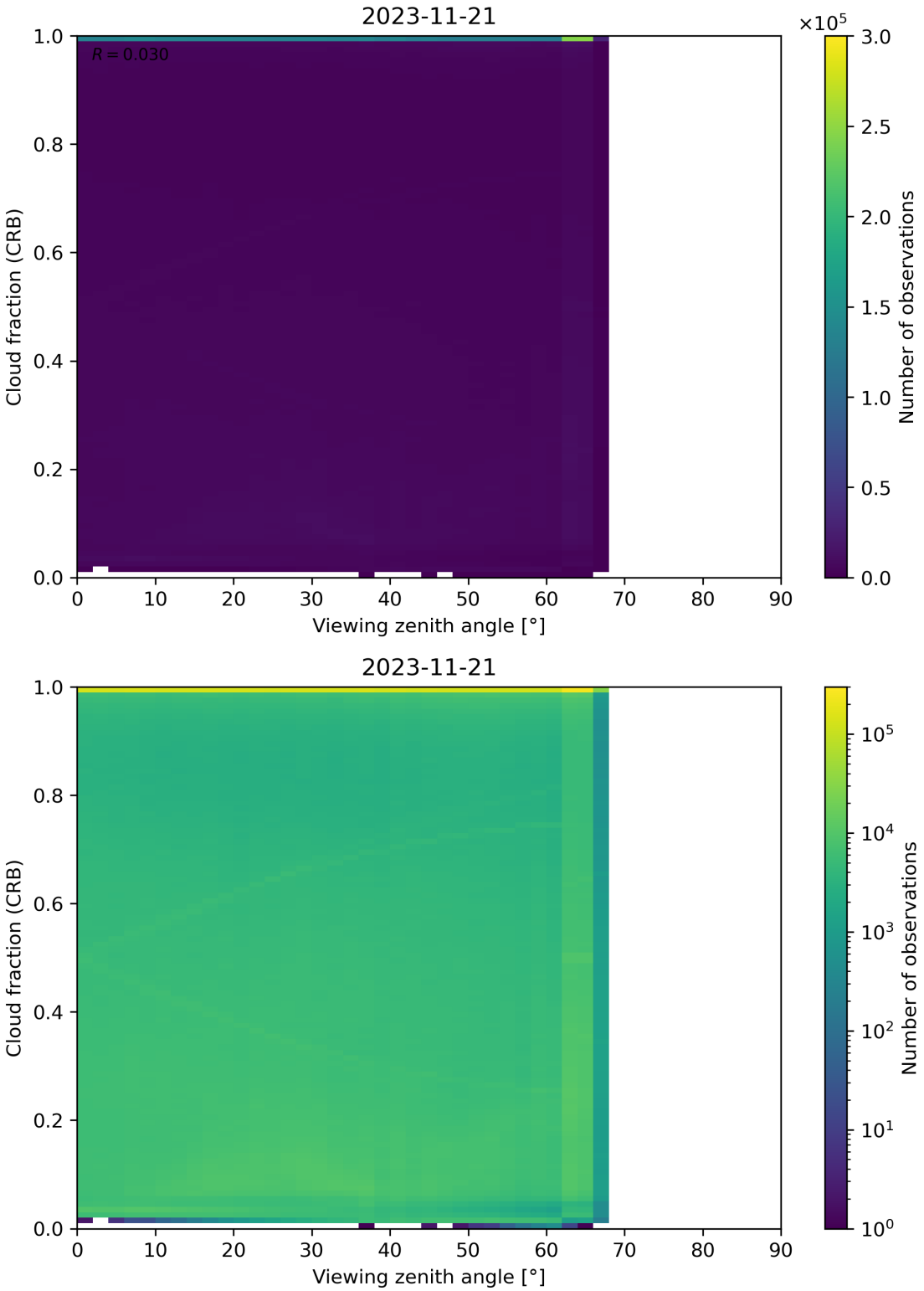

Figure 109: Scatter density plot of “Viewing zenith angle” against “Cloud fraction (CRB)” for 2023-11-20 to 2023-11-22.

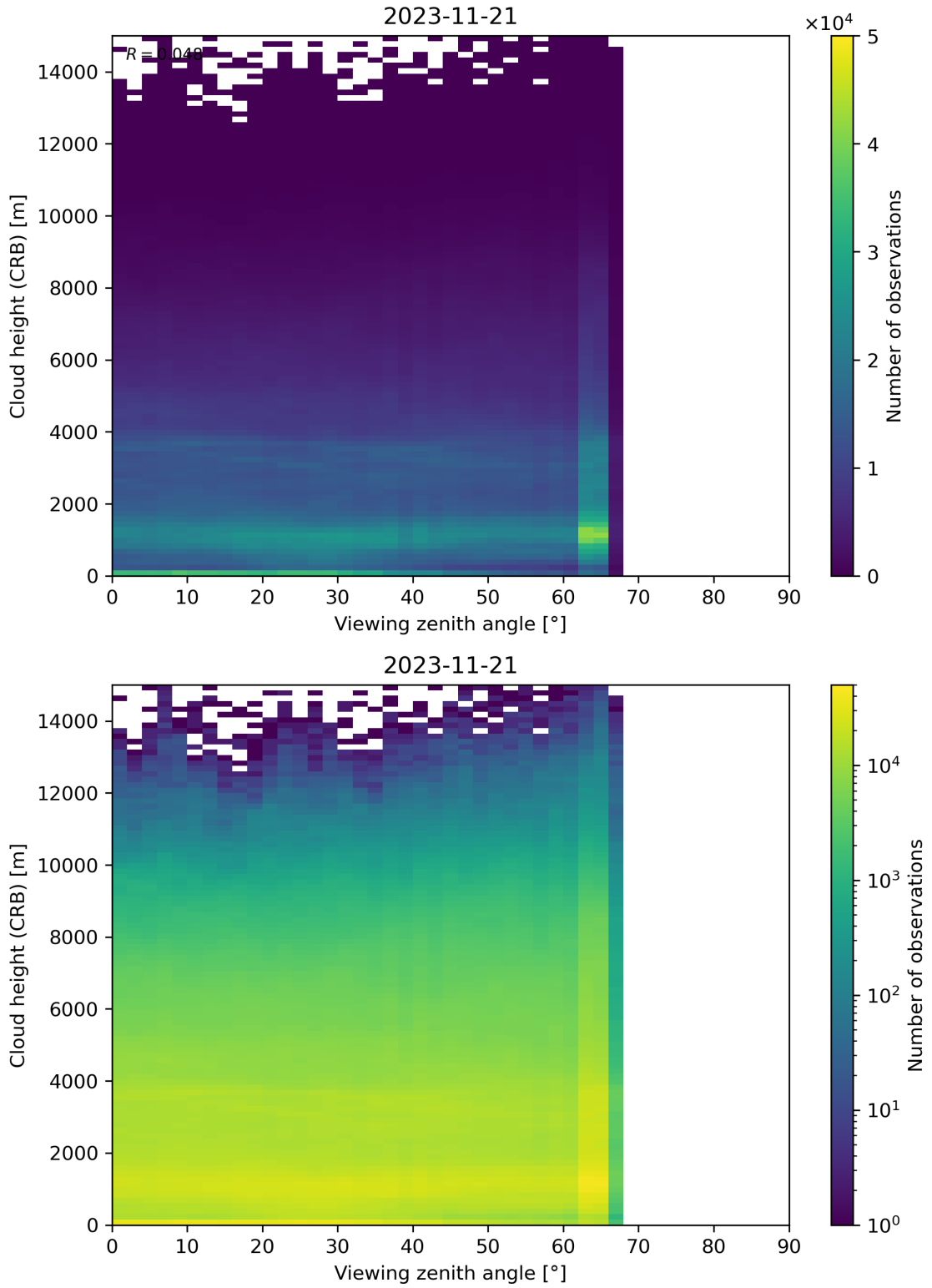

Figure 110: Scatter density plot of “Viewing zenith angle” against “Cloud height (CRB)” for 2023-11-20 to 2023-11-22.

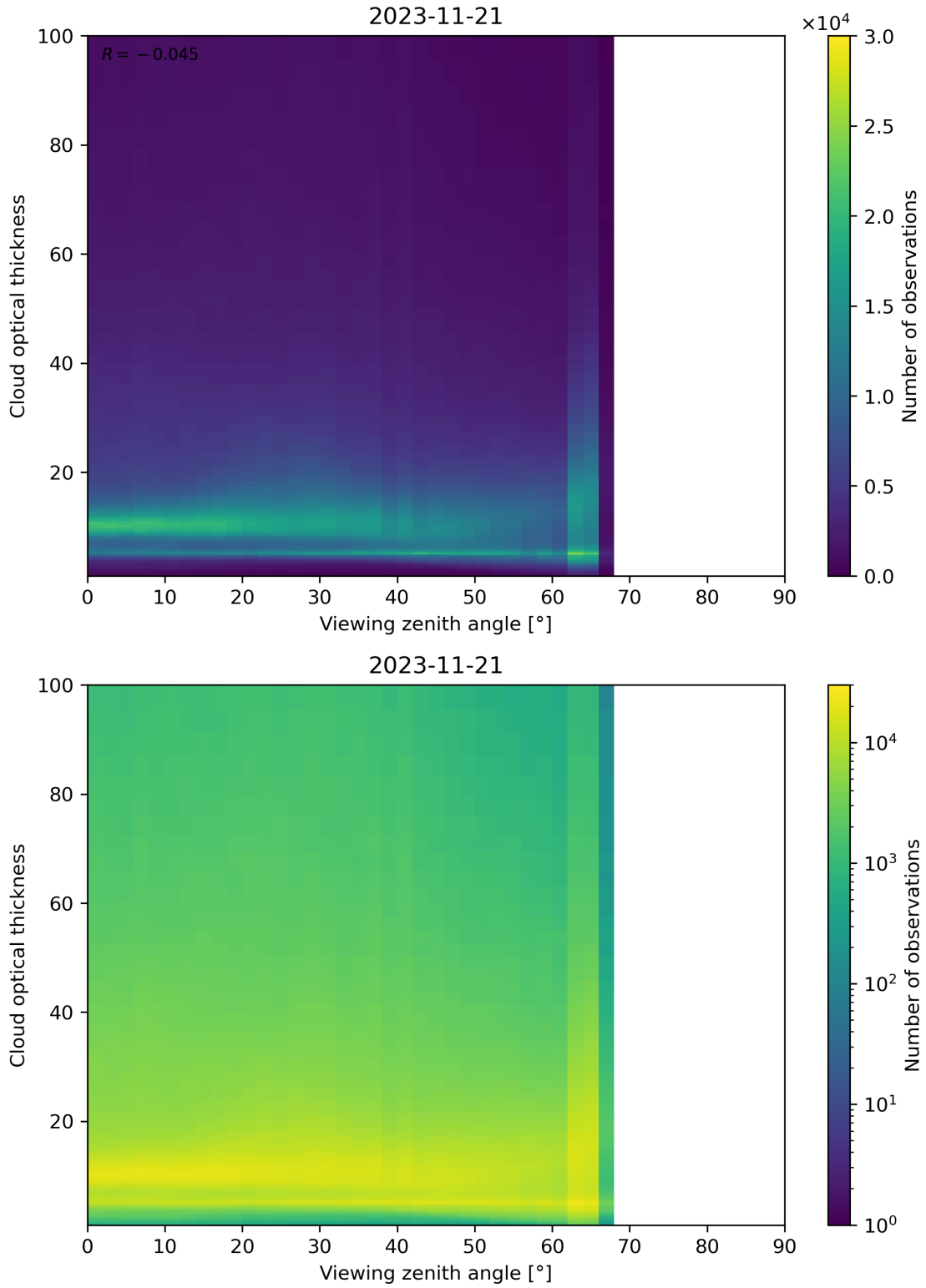

Figure 111: Scatter density plot of “Viewing zenith angle” against “Cloud optical thickness” for 2023-11-20 to 2023-11-22.

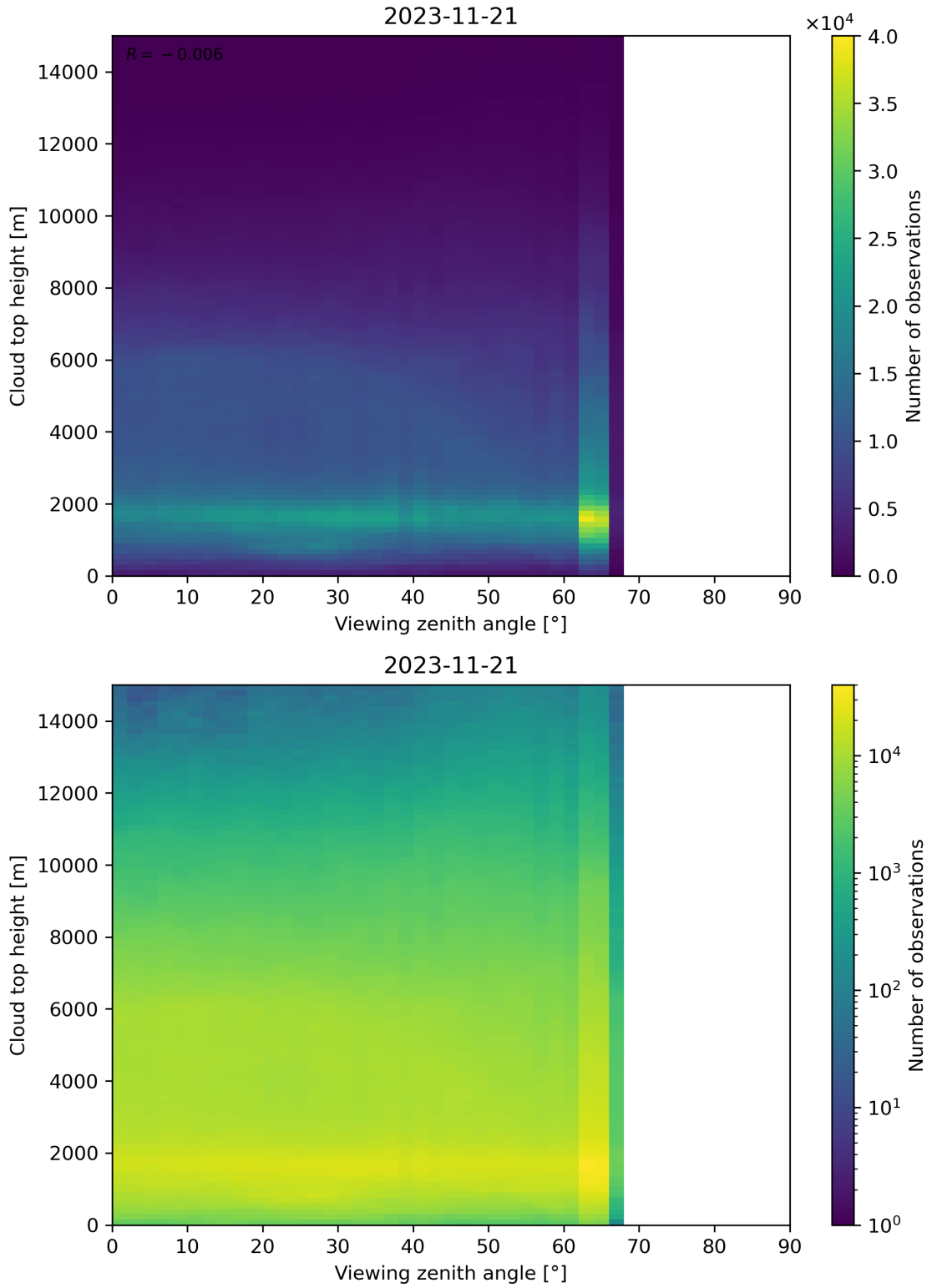

Figure 112: Scatter density plot of “Viewing zenith angle” against “Cloud top height” for 2023-11-20 to 2023-11-22.

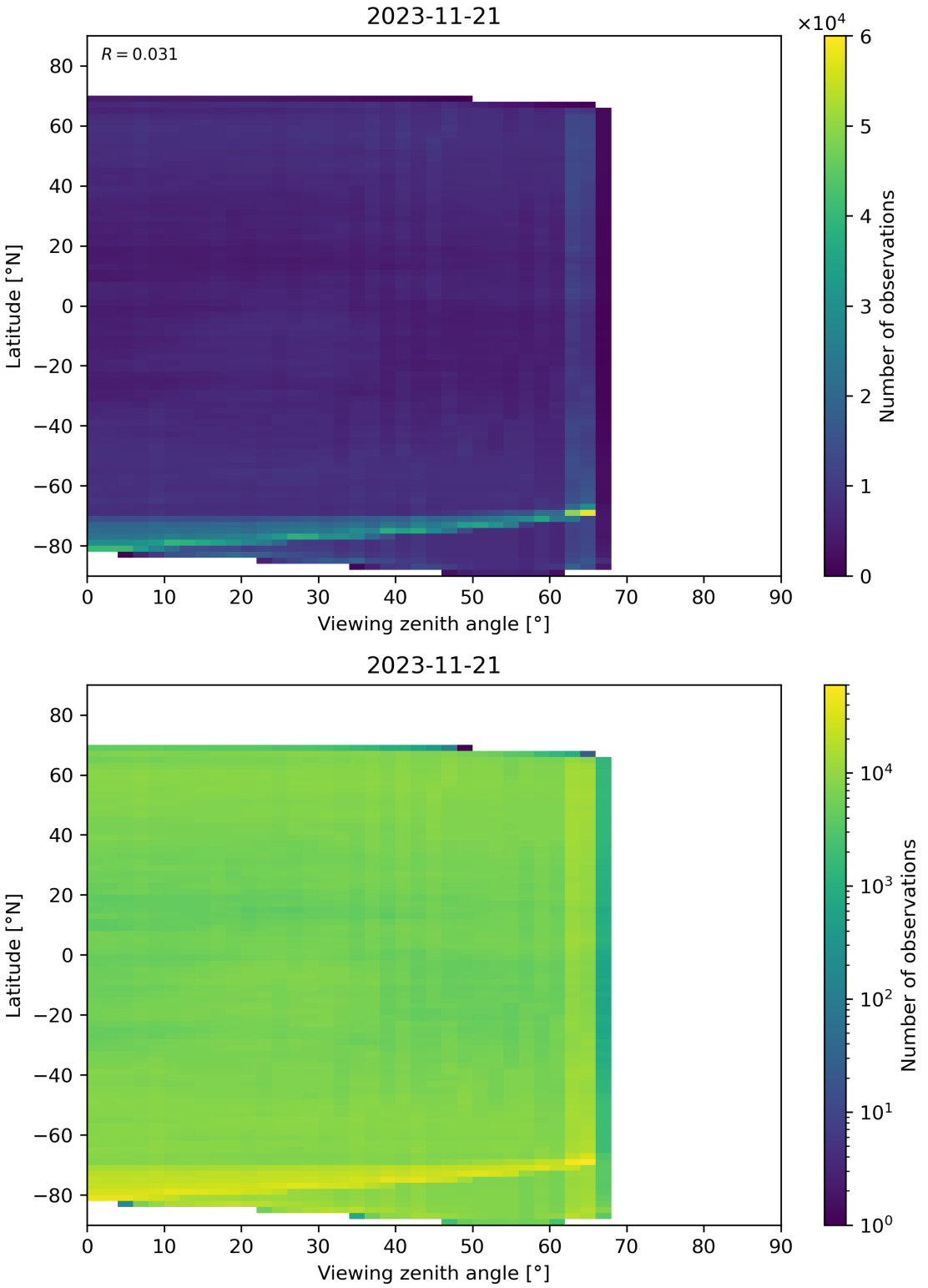

Figure 113: Scatter density plot of “Viewing zenith angle” against “Latitude” for 2023-11-20 to 2023-11-22.

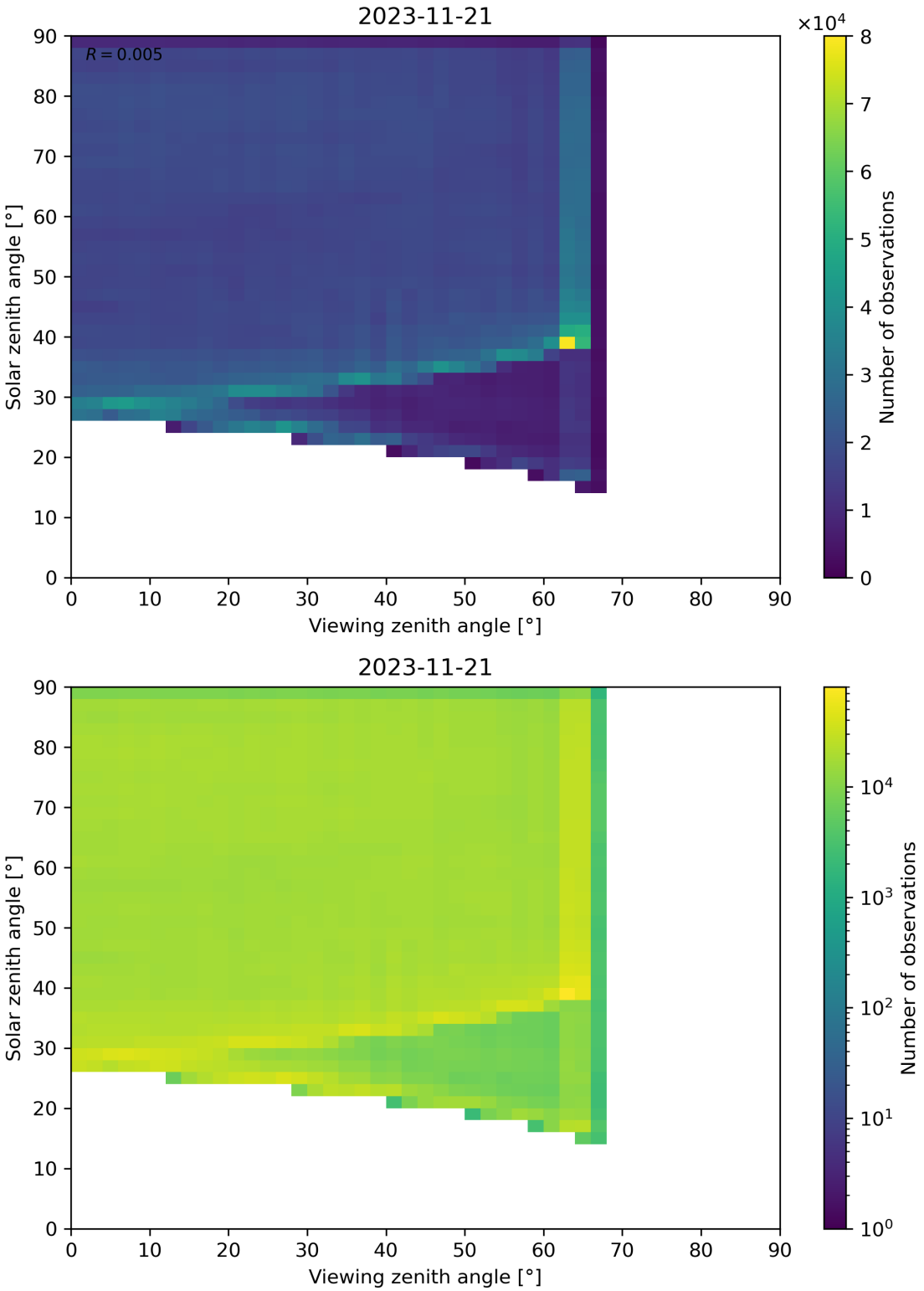

Figure 114: Scatter density plot of “Viewing zenith angle” against “Solar zenith angle” for 2023-11-20 to 2023-11-22.

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