PyCAMA report generated by tropl2-proc

tropl2-proc

2024-09-15 (02:30)

1 Short Introduction

1.1 The list of parameters

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

2 Definitions

The averages shown here are *unweighed* averages:

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

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]	0.638 ± 0.385	22058507	0.995	0.680	0.850	0.0	1.000
cloud fraction [1]	0.583 ± 0.349	22058507	0.995	0.743	0.588	0.0	1.000
cloud top height [m]	$(0.382 \pm 0.274) \times 10^4$	22058507	1.575×10^3	3.704×10^3	3.155×10^3	0.0	2.000×10^4
cloud optical thickness [1]	24.9 ± 44.5	22058507	9.34	13.4	10.7	1.000	250
cloud fraction crb [1]	0.582 ± 0.350	22058507	0.995	0.744	0.586	0.0	1.000
cloud height crb [m]	$(0.302 \pm 0.233) \times 10^4$	22058507	825	3.261×10^3	2.476×10^3	0.0	2.000×10^4
cloud albedo crb [1]	0.582 ± 0.192	22058507	0.995	0.229	0.561	0.0	1.000
surface albedo fitted [1]	0.158 ± 0.216	22058507	1.500×10^{-2}	0.208	3.924×10^{-2}	0.0	1.000
surface albedo fitted crb [1]	0.148 ± 0.205	22058507	1.500×10^{-2}	0.211	2.852×10^{-2}	0.0	1.000
fitted root mean square [1]	$(6.218 \pm 10.864) \times 10^{-4}$	22058507	5.000×10^{-5}	7.220×10^{-4}	3.432×10^{-4}	1.268×10^{-6}	0.587
fitted root mean square crb [1]	$(5.581 \pm 12.763) \times 10^{-4}$	22058507	5.000×10^{-5}	6.423×10^{-4}	2.619×10^{-4}	9.928×10^{-7}	0.932
wavelength shift [nm]	$(7.976 \pm 6.903) \times 10^{-3}$	22058507	9.000×10^{-4}	9.383×10^{-3}	7.467×10^{-3}	-6.187×10^{-2}	0.596
cloud fraction apriori [1]	0.582 ± 0.354	22058507	0.995	0.764	0.585	0.0	1.000
reflectance blue ocra [1]	0.530 ± 0.206	22058507	0.275	0.329	0.507	0.129	1.93
reflectance green ocra [1]	0.476 ± 0.234	22058507	0.175	0.394	0.455	7.664×10^{-2}	2.30
reflectance continuum aband [1]	0.431 ± 0.263	22058507	4.500×10^{-2}	0.415	0.420	1.115×10^{-2}	5.87

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	2.000×10^{-2}	0.300	0.980	1.000	1.000	1.000	1.000
cloud fraction [1]	1.982×10^{-2}	6.679×10^{-2}	0.103	0.152	0.245	0.989	1.000	1.000	1.000	1.000
cloud top height [m]	188	616	960	1.260×10^{3}	1.670×10^{3}	5.374×10^{3}	6.627×10^{3}	7.742×10^{3}	9.159×10^{3}	1.171×10^{4}
cloud optical thickness [1]	1.51	3.41	4.43	5.34	6.80	20.2	31.5	49.6	100.0	250
cloud fraction crb [1]	1.944×10^{-2}	6.569×10^{-2}	0.102	0.151	0.244	0.988	1.000	1.000	1.000	1.000
cloud height crb [m]	0.0	251	533	777	1.135×10^{3}	4.397×10^{3}	5.500×10^{3}	6.444×10^{3}	7.608×10^{3}	9.577×10^{3}
cloud albedo crb [1]	9.115×10^{-2}	0.280	0.370	0.420	0.465	0.694	0.776	0.854	0.969	1.000
surface albedo fitted [1]	0.0	7.795×10^{-3}	1.220×10^{-2}	1.562×10^{-2}	2.041×10^{-2}	0.228	0.346	0.526	0.654	0.891
surface albedo fitted crb [1]	0.0	5.974×10^{-3}	8.915×10^{-3}	1.138×10^{-2}	1.481×10^{-2}	0.226	0.341	0.501	0.607	0.834
fitted root mean square [1]	1.427×10^{-5}	2.826×10^{-5}	4.616×10^{-5}	7.174×10^{-5}	1.204×10^{-4}	8.424×10^{-4}	1.206×10^{-3}	1.585×10^{-3}	2.129×10^{-3}	3.344×10^{-3}
fitted root mean square crb [1]	7.874×10^{-6}	2.034×10^{-5}	3.508×10^{-5}	5.430×10^{-5}	9.053×10^{-5}	7.329×10^{-4}	1.118×10^{-3}	1.521×10^{-3}	2.079×10^{-3}	3.240×10^{-3}
wavelength shift [nm]	-7.821×10^{-3}	-8.546×10^{-4}	2.614×10^{-4}	1.275×10^{-3}	2.964×10^{-3}	1.235×10^{-2}	1.473×10^{-2}	1.684×10^{-2}	1.971×10^{-2}	2.610×10^{-2}
cloud fraction apriori [1]	3.053×10^{-2}	6.458×10^{-2}	9.739×10^{-2}	0.143	0.236	1.000	1.000	1.000	1.000	1.000
reflectance blue ocra [1]	0.234	0.258	0.281	0.307	0.352	0.682	0.753	0.809	0.880	1.04
reflectance green ocra [1]	0.152	0.171	0.190	0.215	0.261	0.655	0.734	0.796	0.870	1.02
reflectance continuum aband [1]	3.034×10^{-2}	5.207×10^{-2}	8.223×10^{-2}	0.124	0.210	0.625	0.713	0.783	0.865	1.02

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]	0.650 ± 0.376	12630150	0.660	0.850	0.0	1.000	0.300	0.960
cloud fraction [1]	0.612 ± 0.357	12630150	0.743	0.660	0.0	1.000	0.257	1.000
cloud top height [m]	$(0.396 \pm 0.275) \times 10^4$	12630150	3.824×10^3	3.389×10^3	0.0	2.000×10^4	1.767×10^3	5.591×10^3
cloud optical thickness [1]	23.0 ± 40.4	12630150	12.8	10.4	1.000	250	6.78	19.6
cloud fraction crb [1]	0.611 ± 0.357	12630150	0.745	0.659	0.0	1.000	0.255	1.000
cloud height crb [m]	$(0.315 \pm 0.235) \times 10^4$	12630150	3.329×10^3	2.691×10^3	0.0	2.000×10^4	1.223×10^3	4.552×10^3
cloud albedo crb [1]	0.574 ± 0.193	12630150	0.236	0.558	0.0	1.000	0.457	0.693
surface albedo fitted [1]	0.162 ± 0.199	12630150	0.223	5.435×10^{-2}	0.0	1.000	2.133×10^{-2}	0.244
surface albedo fitted crb [1]	0.154 ± 0.191	12630150	0.225	4.029×10^{-2}	0.0	1.000	1.631×10^{-2}	0.241
fitted root mean square [1]	$(7.078 \pm 13.234) \times 10^{-4}$	12630150	8.600×10^{-4}	4.003×10^{-4}	1.268×10^{-6}	0.587	1.348×10^{-4}	9.948×10^{-4}
fitted root mean square crb [1]	$(6.683 \pm 16.080) \times 10^{-4}$	12630150	8.348×10^{-4}	3.358×10^{-4}	9.928×10^{-7}	0.932	1.085×10^{-4}	9.433×10^{-4}
wavelength shift [nm]	$(8.221 \pm 6.856) \times 10^{-3}$	12630150	9.271×10^{-3}	7.806×10^{-3}	-6.187×10^{-2}	0.596	3.317×10^{-3}	1.259×10^{-2}
cloud fraction apriori [1]	0.612 ± 0.361	12630150	0.752	0.660	0.0	1.000	0.248	1.000
reflectance blue ocra [1]	0.521 ± 0.201	12630150	0.324	0.504	0.129	1.93	0.345	0.669
reflectance green ocra [1]	0.469 ± 0.228	12630150	0.389	0.454	7.664×10^{-2}	1.92	0.255	0.643
reflectance continuum aband [1]	0.439 ± 0.258	12630150	0.401	0.430	1.115×10^{-2}	5.49	0.228	0.629

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]	0.622 ± 0.398	9428357	0.750	0.860	0.0	1.000	0.250	1.000
cloud fraction [1]	0.545 ± 0.336	9428357	0.667	0.515	0.0	1.000	0.234	0.902
cloud top height [m]	$(0.362 \pm 0.272) \times 10^4$	9428357	3.487×10^3	2.855×10^3	0.0	2.000×10^4	1.577×10^3	5.064×10^3
cloud optical thickness [1]	27.4 ± 49.5	9428357	14.2	11.2	1.000	250	6.84	21.0
cloud fraction crb [1]	0.543 ± 0.336	9428357	0.666	0.512	0.0	1.000	0.233	0.899
cloud height crb [m]	$(0.285 \pm 0.229) \times 10^4$	9428357	3.118×10^3	2.186×10^3	0.0	2.000×10^4	1.054×10^3	4.172×10^3
cloud albedo crb [1]	0.593 ± 0.192	9428357	0.221	0.565	0.0	1.000	0.475	0.696
surface albedo fitted [1]	0.153 ± 0.237	9428357	0.145	3.252×10^{-2}	0.0	1.000	1.953×10^{-2}	0.164
surface albedo fitted crb [1]	0.139 ± 0.222	9428357	0.143	2.261×10^{-2}	0.0	1.000	1.348×10^{-2}	0.156
fitted root mean square [1]	$(5.065 \pm 6.261) \times 10^{-4}$	9428357	5.648×10^{-4}	2.853×10^{-4}	1.856×10^{-6}	4.758×10^{-2}	1.046×10^{-4}	6.694×10^{-4}
fitted root mean square crb [1]	$(4.105 \pm 5.560) \times 10^{-4}$	9428357	4.345×10^{-4}	1.979×10^{-4}	1.972×10^{-6}	4.095×10^{-2}	7.490×10^{-5}	5.094×10^{-4}
wavelength shift [nm]	$(7.649 \pm 6.951) \times 10^{-3}$	9428357	9.430×10^{-3}	6.992×10^{-3}	-4.388×10^{-2}	6.788×10^{-2}	2.565×10^{-3}	1.200×10^{-2}
cloud fraction apriori [1]	0.542 ± 0.341	9428357	0.691	0.509	0.0	1.000	0.223	0.914
reflectance blue ocra [1]	0.542 ± 0.213	9428357	0.339	0.510	0.145	1.91	0.361	0.701
reflectance green ocra [1]	0.485 ± 0.240	9428357	0.403	0.455	9.518×10^{-2}	2.30	0.268	0.671
reflectance continuum aband [1]	0.420 ± 0.268	9428357	0.433	0.405	1.188×10^{-2}	5.87	0.187	0.620

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]	0.635 ± 0.381	16325294	0.670	0.850	0.0	1.000	0.300	0.970
cloud fraction [1]	0.568 ± 0.347	16325294	0.728	0.562	0.0	1.000	0.234	0.962
cloud top height [m]	$(0.372 \pm 0.271) \times 10^4$	16325294	3.603×10^3	3.030×10^3	0.0	2.000×10^4	1.606×10^3	5.209×10^3
cloud optical thickness [1]	26.6 ± 46.9	16325294	13.7	11.3	1.000	250	7.51	21.2
cloud fraction crb [1]	0.566 ± 0.347	16325294	0.729	0.559	0.0	1.000	0.232	0.960
cloud height crb [m]	$(0.295 \pm 0.234) \times 10^4$	16325294	3.251×10^3	2.390×10^3	0.0	2.000×10^4	1.062×10^3	4.314×10^3
cloud albedo crb [1]	0.569 ± 0.185	16325294	0.211	0.549	0.0	1.000	0.460	0.671
surface albedo fitted [1]	0.105 ± 0.188	16325294	3.315×10^{-2}	2.771×10^{-2}	0.0	1.000	1.709×10^{-2}	5.024×10^{-2}
surface albedo fitted crb [1]	$(9.374 \pm 17.703) \times 10^{-2}$	16325294	2.409×10^{-2}	2.005×10^{-2}	0.0	1.000	1.240×10^{-2}	3.650×10^{-2}
fitted root mean square [1]	$(5.100 \pm 11.204) \times 10^{-4}$	16325294	5.642×10^{-4}	2.517×10^{-4}	1.268×10^{-6}	0.587	9.171×10^{-5}	6.559×10^{-4}
fitted root mean square crb [1]	$(4.501 \pm 13.484) \times 10^{-4}$	16325294	4.574×10^{-4}	1.918×10^{-4}	9.928×10^{-7}	0.932	7.368×10^{-5}	5.311×10^{-4}
wavelength shift [nm]	$(7.649 \pm 7.008) \times 10^{-3}$	16325294	9.409×10^{-3}	6.952×10^{-3}	-5.771×10^{-2}	0.596	2.595×10^{-3}	1.200×10^{-2}
cloud fraction apriori [1]	0.565 ± 0.352	16325294	0.769	0.557	0.0	1.000	0.222	0.991
reflectance blue ocra [1]	0.520 ± 0.194	16325294	0.311	0.500	0.152	1.90	0.352	0.664
reflectance green ocra [1]	0.461 ± 0.222	16325294	0.378	0.444	8.960×10^{-2}	2.02	0.255	0.633
reflectance continuum aband [1]	0.393 ± 0.259	16325294	0.438	0.383	1.188×10^{-2}	5.49	0.151	0.588

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]	0.610 ± 0.412	3865433	0.870	0.850	0.0	1.000	0.1000	0.970
cloud fraction [1]	0.594 ± 0.353	3865433	0.747	0.594	0.0	1.000	0.253	1.000
cloud top height [m]	$(0.449 \pm 0.293) \times 10^4$	3865433	3.988×10^3	3.973×10^3	0.0	2.000×10^4	2.234×10^3	6.222×10^3
cloud optical thickness [1]	18.3 ± 35.6	3865433	9.96	8.10	1.000	250	5.11	15.1
cloud fraction crb [1]	0.594 ± 0.353	3865433	0.745	0.593	0.0	1.000	0.254	0.998
cloud height crb [m]	$(0.346 \pm 0.238) \times 10^4$	3865433	3.322×10^3	2.936×10^3	0.0	2.000×10^4	1.587×10^3	4.909×10^3
cloud albedo crb [1]	0.633 ± 0.219	3865433	0.303	0.618	0.0	1.000	0.492	0.795
surface albedo fitted [1]	0.367 ± 0.235	3865433	0.230	0.267	0.0	1.000	0.208	0.439
surface albedo fitted crb [1]	0.355 ± 0.214	3865433	0.233	0.266	4.101×10^{-3}	1.000	0.206	0.438
fitted root mean square [1]	$(1.043 \pm 0.933) \times 10^{-3}$	3865433	1.011×10^{-3}	7.864×10^{-4}	1.496×10^{-6}	9.409×10^{-2}	4.018×10^{-4}	1.413×10^{-3}
fitted root mean square crb [1]	$(9.425 \pm 9.435) \times 10^{-4}$	3865433	1.048×10^{-3}	6.706×10^{-4}	1.742×10^{-6}	0.349	2.804×10^{-4}	1.329×10^{-3}
wavelength shift [nm]	$(8.692 \pm 6.354) \times 10^{-3}$	3865433	8.593×10^{-3}	8.521×10^{-3}	-3.796×10^{-2}	5.423×10^{-2}	4.202×10^{-3}	1.280×10^{-2}
cloud fraction apriori [1]	0.598 ± 0.357	3865433	0.750	0.599	0.0	1.000	0.250	1.000
reflectance blue ocra [1]	0.570 ± 0.252	3865433	0.432	0.532	0.129	1.93	0.343	0.775
reflectance green ocra [1]	0.531 ± 0.275	3865433	0.495	0.498	7.664×10^{-2}	2.30	0.273	0.768
reflectance continuum aband [1]	0.558 ± 0.246	3865433	0.405	0.534	1.517×10^{-2}	5.87	0.345	0.750

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	-1.432×10^{-2}	-7.255×10^{-3}	-7.208×10^{-2}	7.534×10^{-2}	-2.676×10^{-2}	-7.276×10^{-2}	0.107	5.039×10^{-2}	-7.353×10^{-2}
-1.432×10^{-2}	1.000	-4.487×10^{-2}	0.217	-6.781×10^{-3}	0.290	0.216	-1.696×10^{-2}	0.255	0.218
-7.255×10^{-3}	-4.487×10^{-2}	1.000	0.136	-5.043×10^{-2}	-3.621×10^{-2}	0.136	-5.041×10^{-2}	-6.636×10^{-2}	0.138
-7.208×10^{-2}	0.217	0.136	1.000	-5.502×10^{-2}	0.253	1.000	1.814×10^{-3}	0.298	0.990
7.534×10^{-2}	-6.781×10^{-3}	-5.043×10^{-2}	-5.502×10^{-2}	1.000	0.130	-5.527×10^{-2}	0.952	0.180	-5.689×10^{-2}
-2.676×10^{-2}	0.290	-3.621×10^{-2}	0.253	0.130	1.000	0.248	0.160	0.532	0.253
-7.276×10^{-2}	0.216	0.136	1.000	-5.527×10^{-2}	0.248	1.000	1.677×10^{-3}	0.295	0.990
0.107	-1.696×10^{-2}	-5.041×10^{-2}	1.814×10^{-3}	0.952	0.160	1.677×10^{-3}	1.000	0.138	4.488×10^{-4}
5.039×10^{-2}	0.255	-6.636×10^{-2}	0.298	0.180	0.532	0.295	0.138	1.000	0.309
-7.353×10^{-2}	0.218	0.138	0.990	-5.689×10^{-2}	0.253	0.990	4.488×10^{-4}	0.309	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
386	−6.05	−7.22	−0.495	4.058×10^3	−23.4	−0.500	4.885×10^3	0.191	−0.512
−6.05	463	−48.8	1.63	−400	278	1.63	−850	1.05	1.66
−7.22	−48.8	2.560×10^3	2.40	-6.991×10^3	−81.6	2.41	-5.946×10^3	−0.646	2.47
−0.495	1.63	2.40	0.122	−52.7	3.93	0.122	1.48	2.003×10^{-2}	0.123
4.058×10^3	−400	-6.991×10^3	−52.7	7.508×10^6	1.581×10^4	−53.0	6.081×10^6	94.8	−55.2
−23.4	278	−81.6	3.93	1.581×10^4	1.983×10^3	3.86	1.659×10^4	4.56	3.99
−0.500	1.63	2.41	0.122	−53.0	3.86	0.122	1.37	1.987×10^{-2}	0.123
4.885×10^3	−850	-5.946×10^3	1.48	6.081×10^6	1.659×10^4	1.37	5.434×10^6	61.8	0.371
0.191	1.05	−0.646	2.003×10^{-2}	94.8	4.56	1.987×10^{-2}	61.8	3.702×10^{-2}	2.108×10^{-2}
−0.512	1.66	2.47	0.123	−55.2	3.99	0.123	0.371	2.108×10^{-2}	0.126

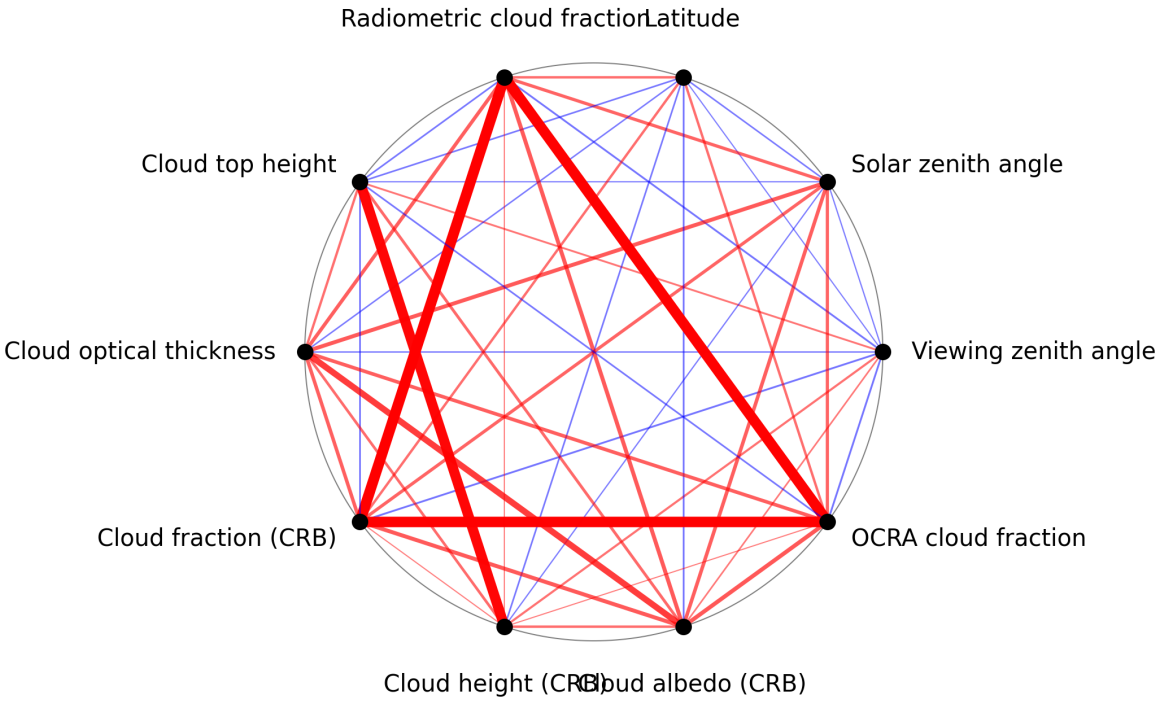

Figure 1: Map of correlation graph for 2024-08-30 to 2024-09-01.

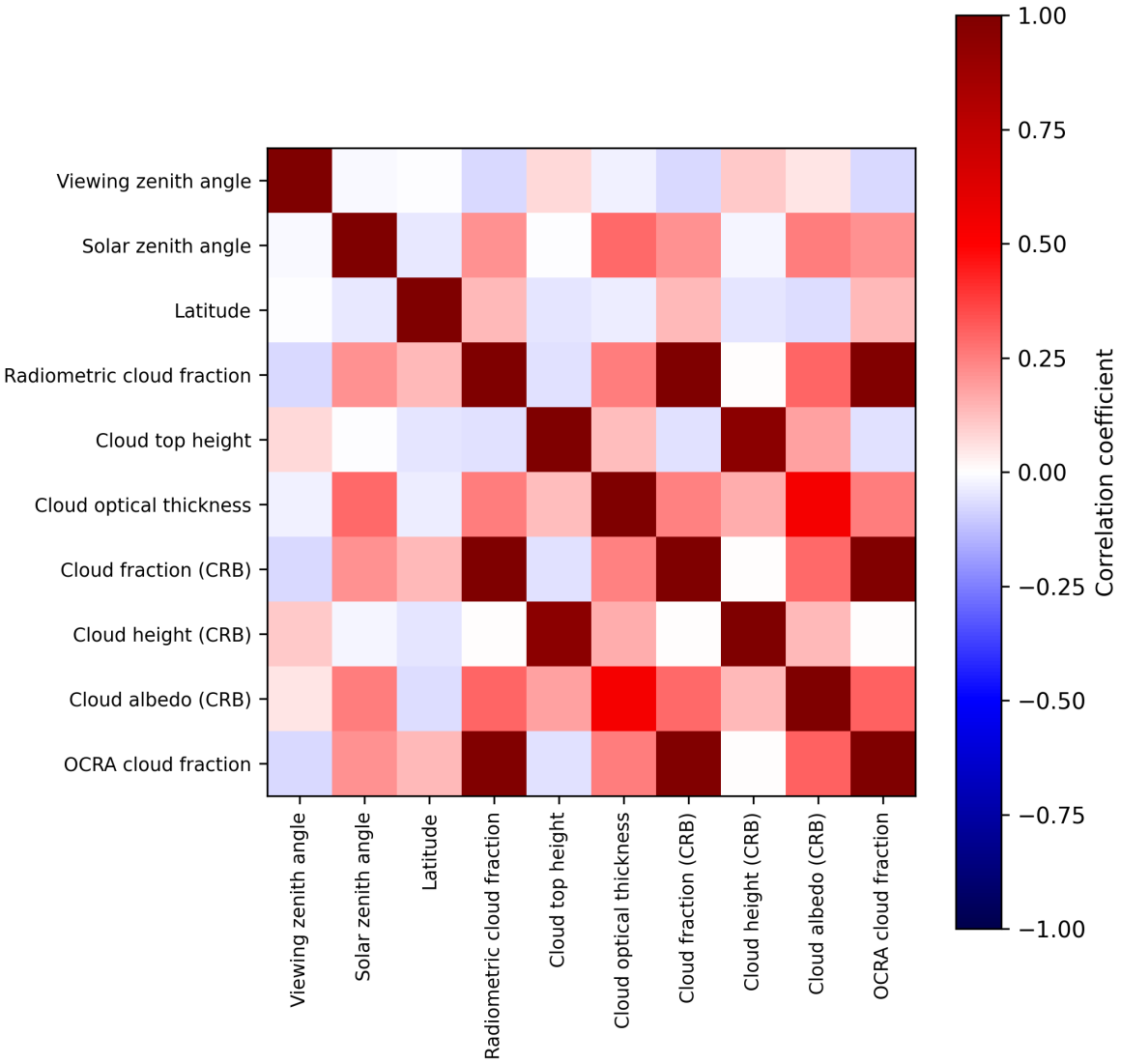

Figure 2: Map of correlation matrix for 2024-08-30 to 2024-09-01.

3 Granule outlines

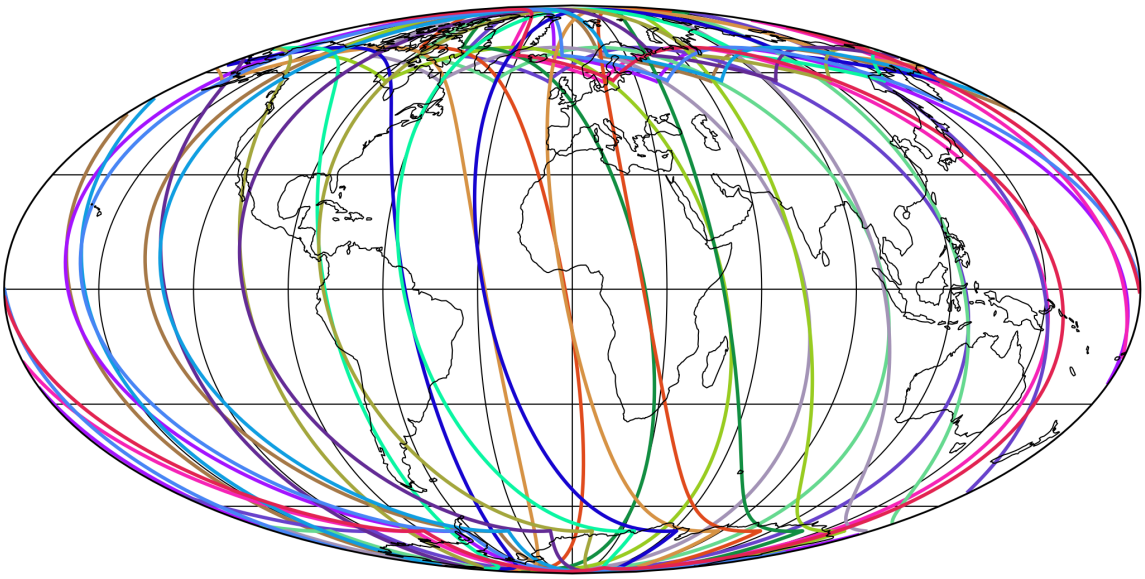

Figure 3: Outline of the granules.

4 Input data monitoring

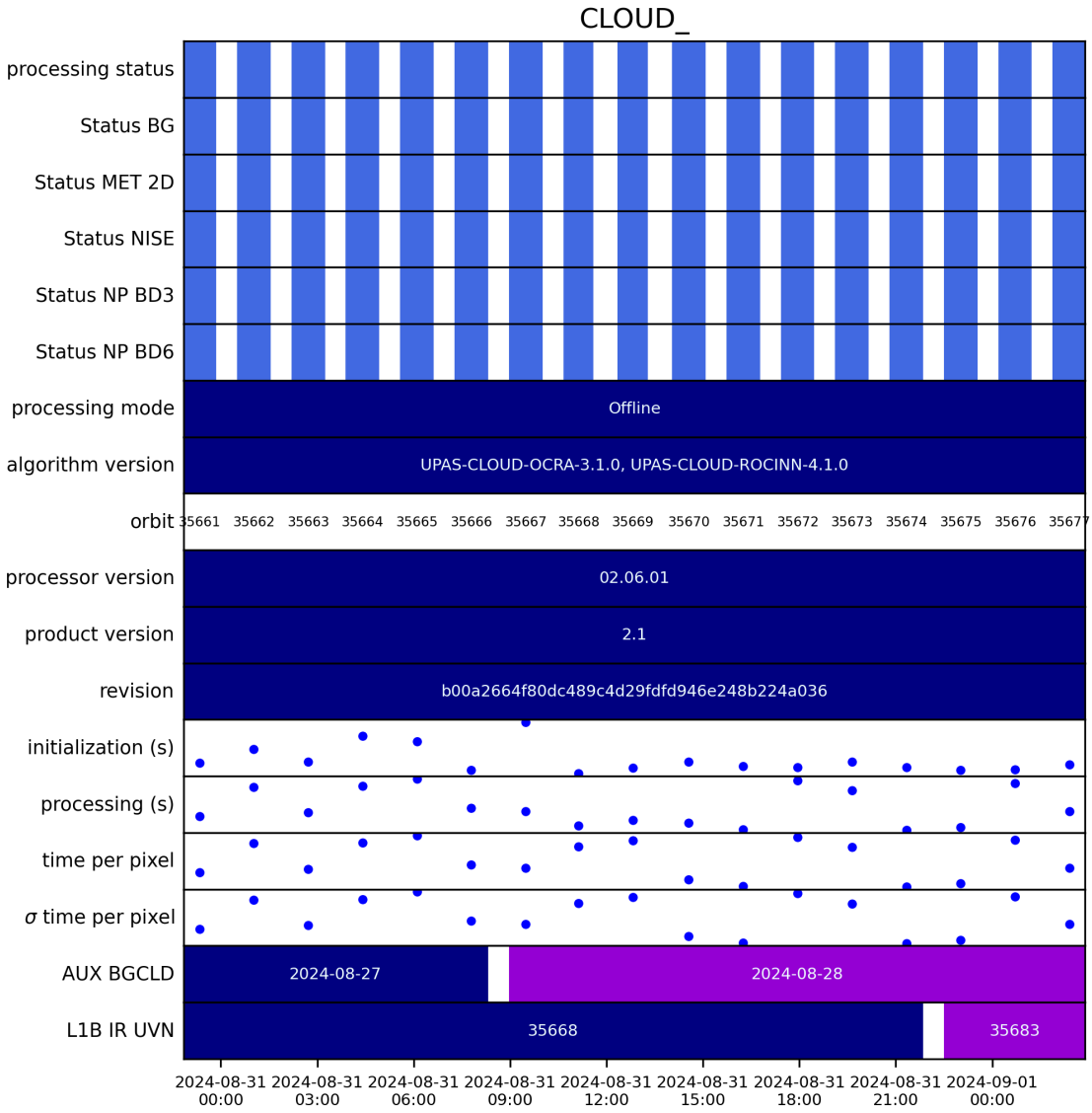

Figure 4: Input data per granule

5 Warnings and errors

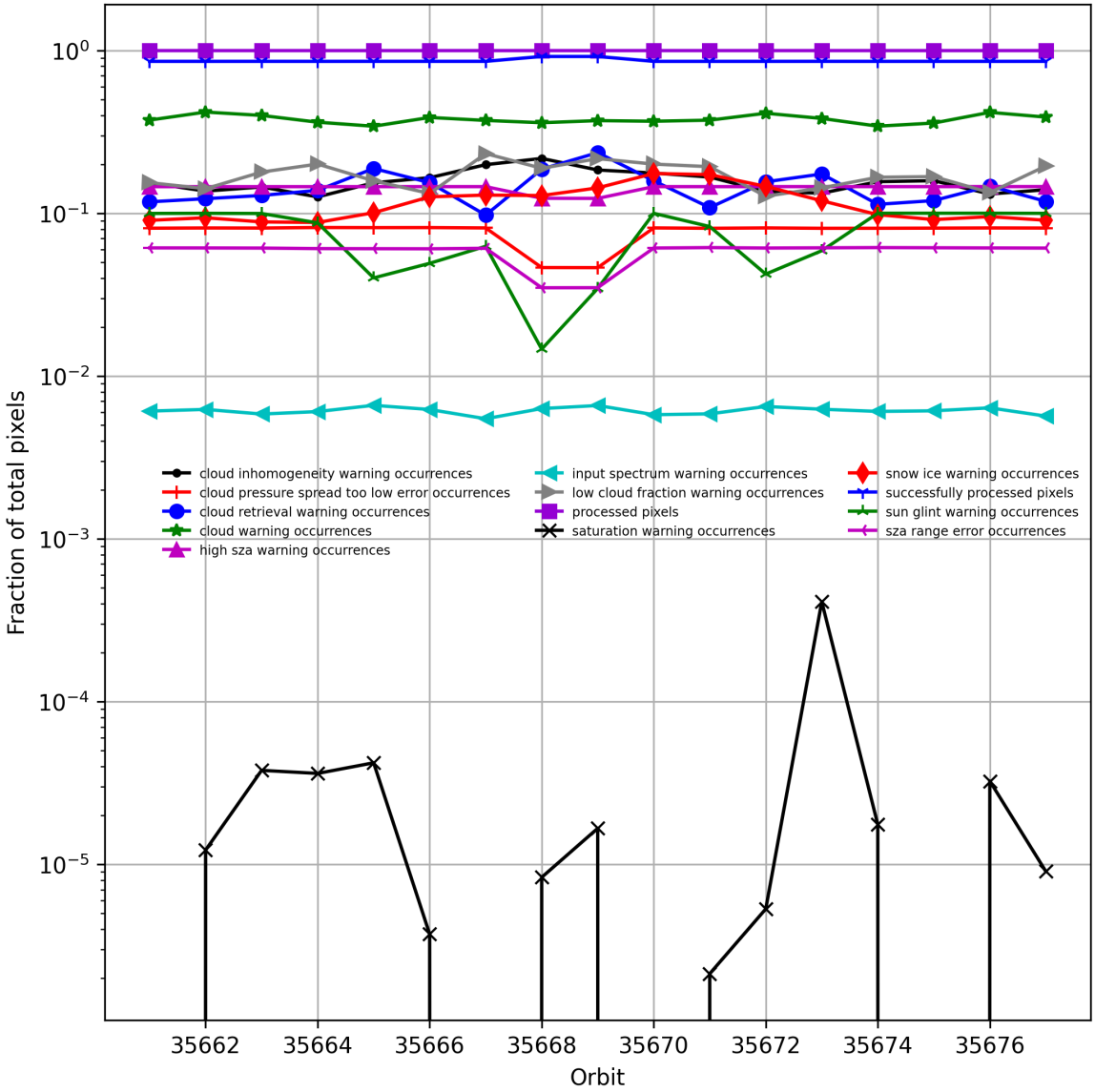

Figure 5: Fraction of pixels with specific warnings and errors during processing

6 World maps

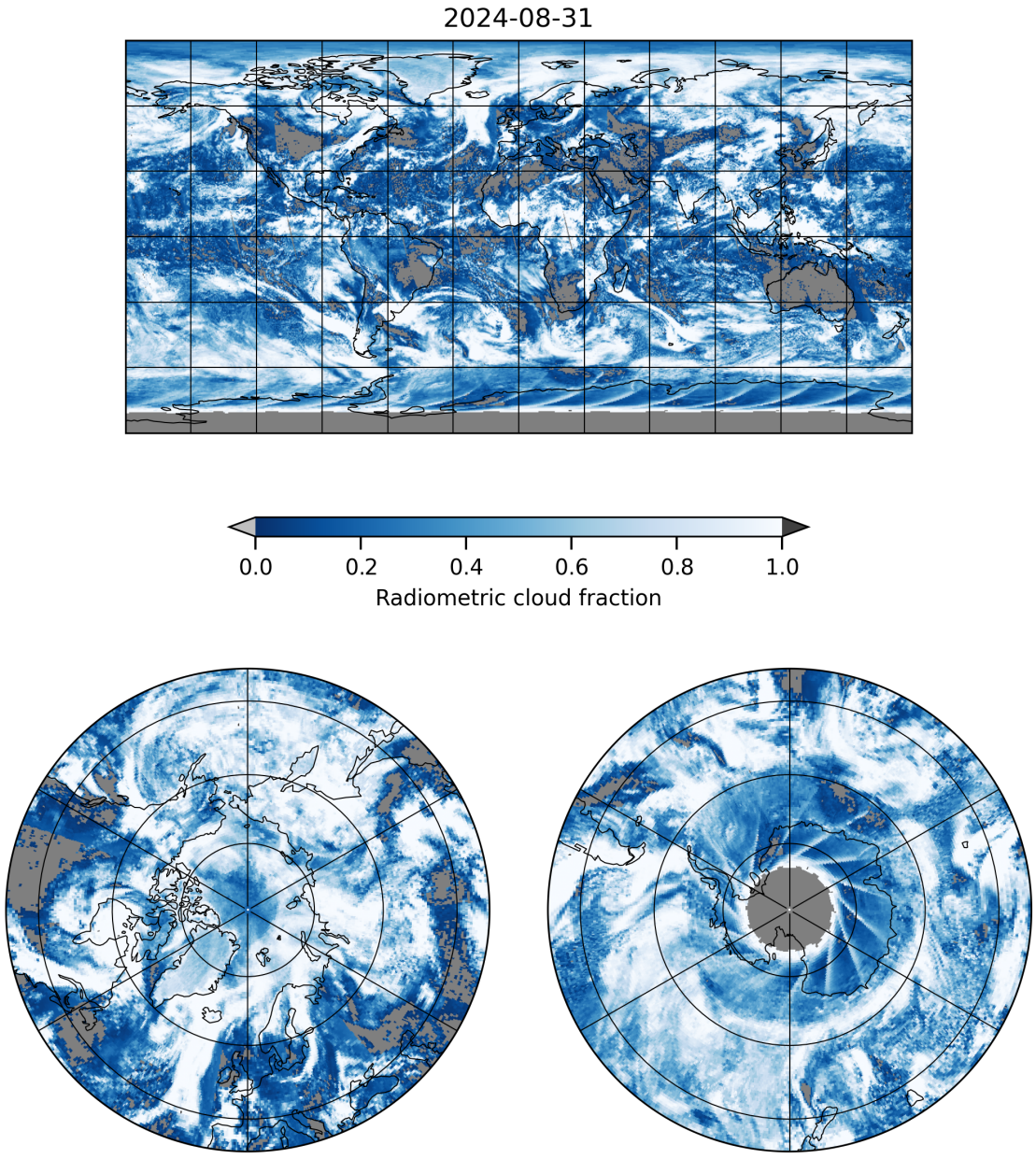

Figure 6: Map of “Radiometric cloud fraction” for 2024-08-30 to 2024-09-01

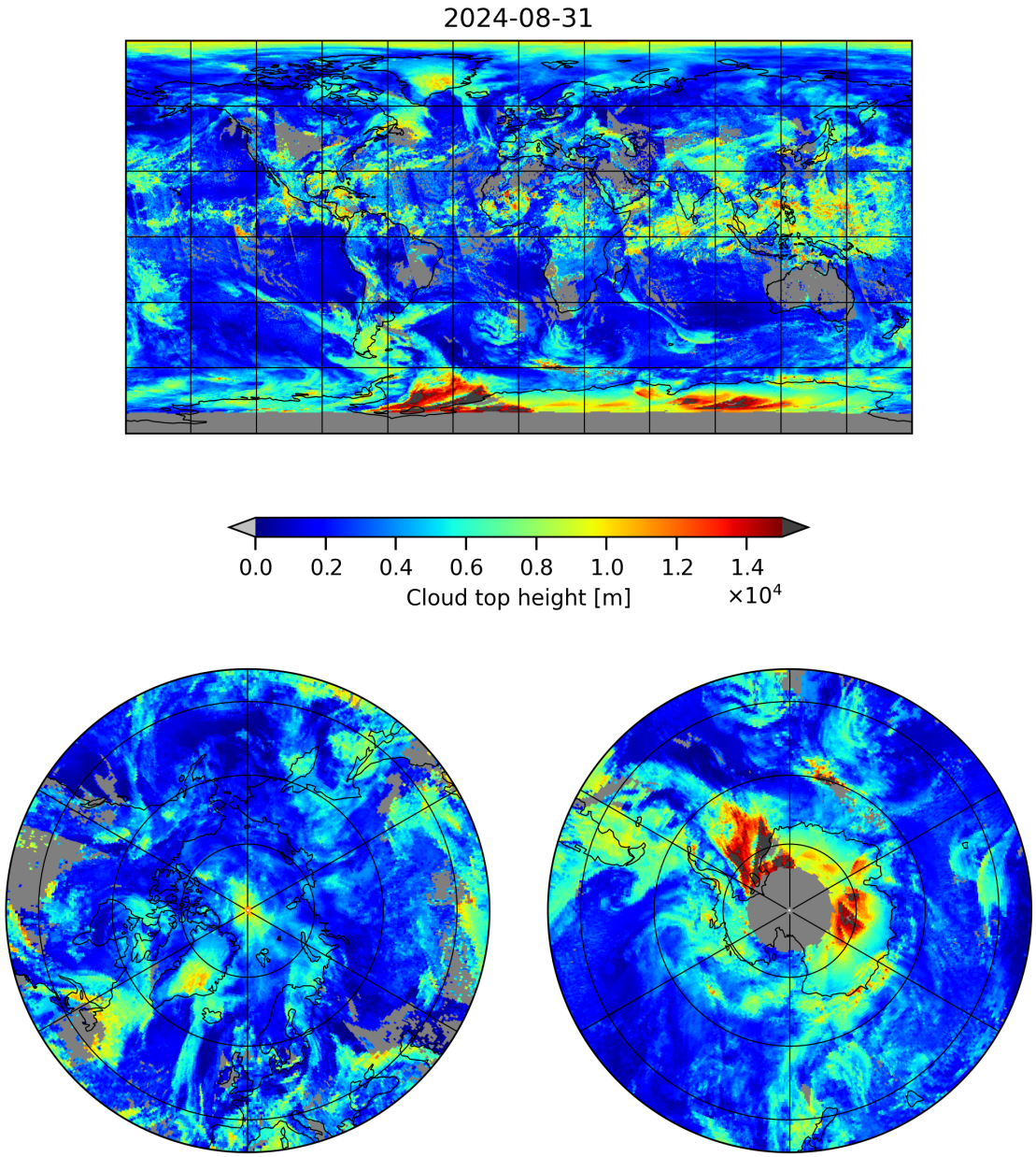

Figure 7: Map of “Cloud top height” for 2024-08-30 to 2024-09-01

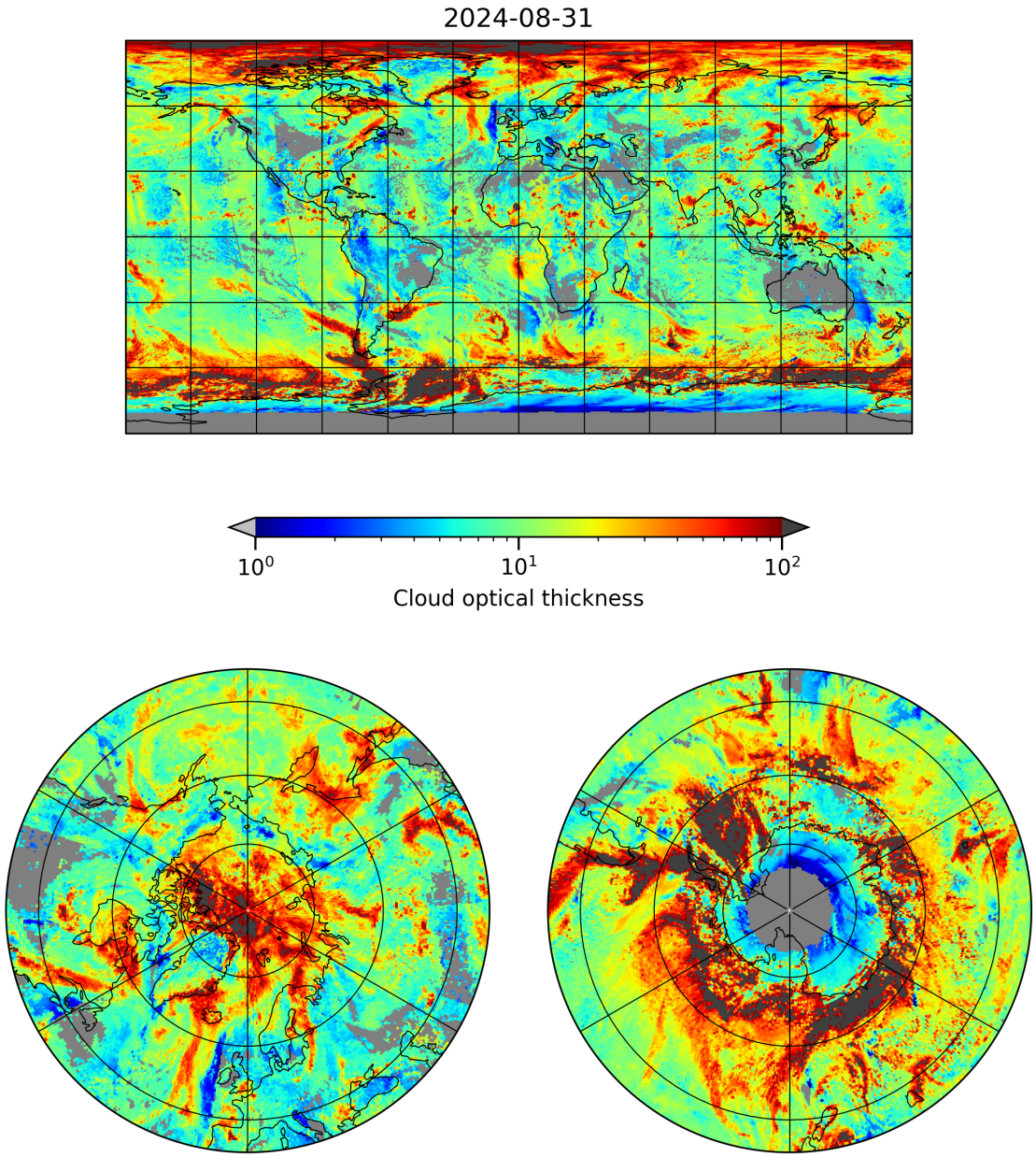

Figure 8: Map of “Cloud optical thickness” for 2024-08-30 to 2024-09-01

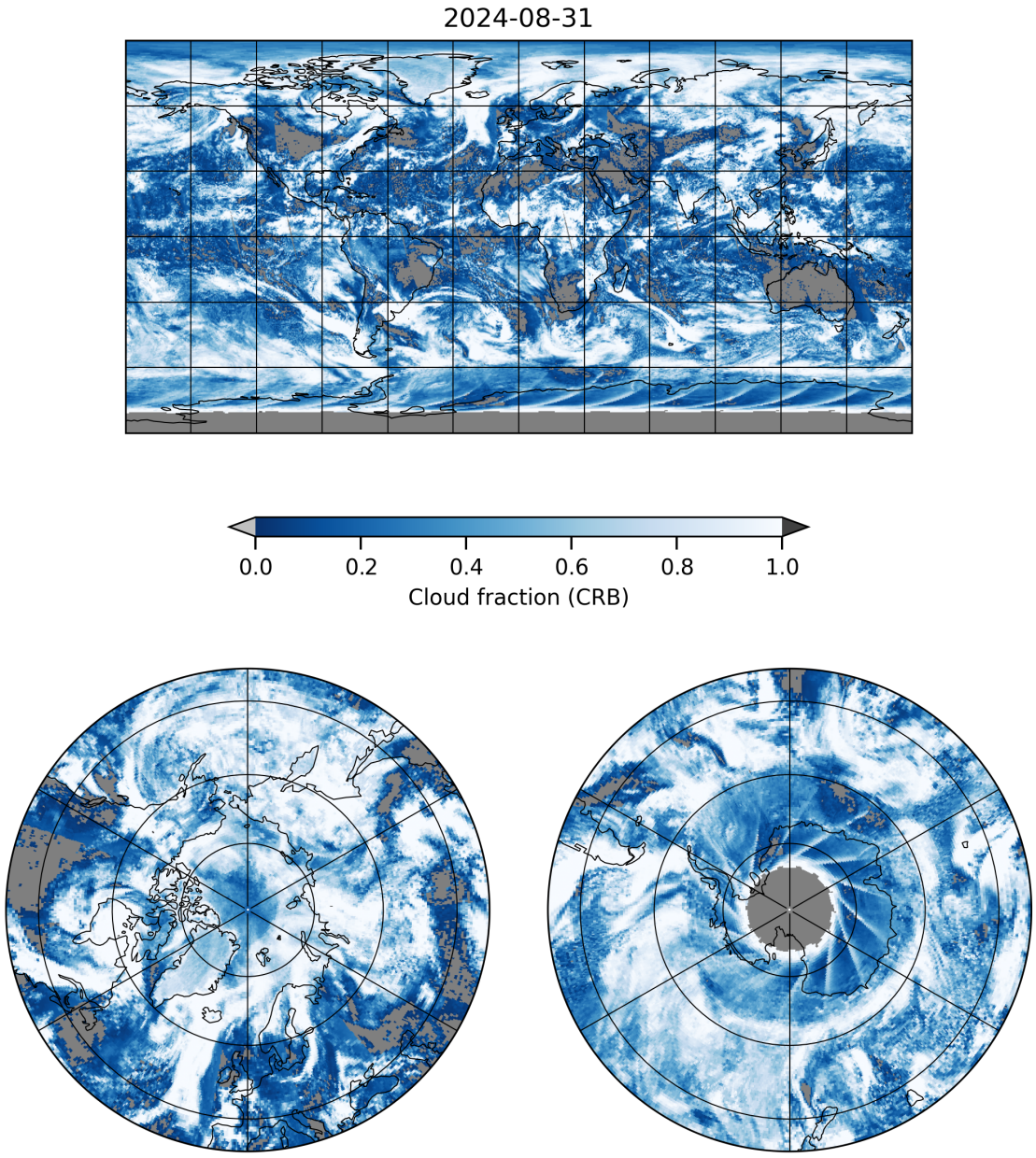

Figure 9: Map of “Cloud fraction (CRB)” for 2024-08-30 to 2024-09-01

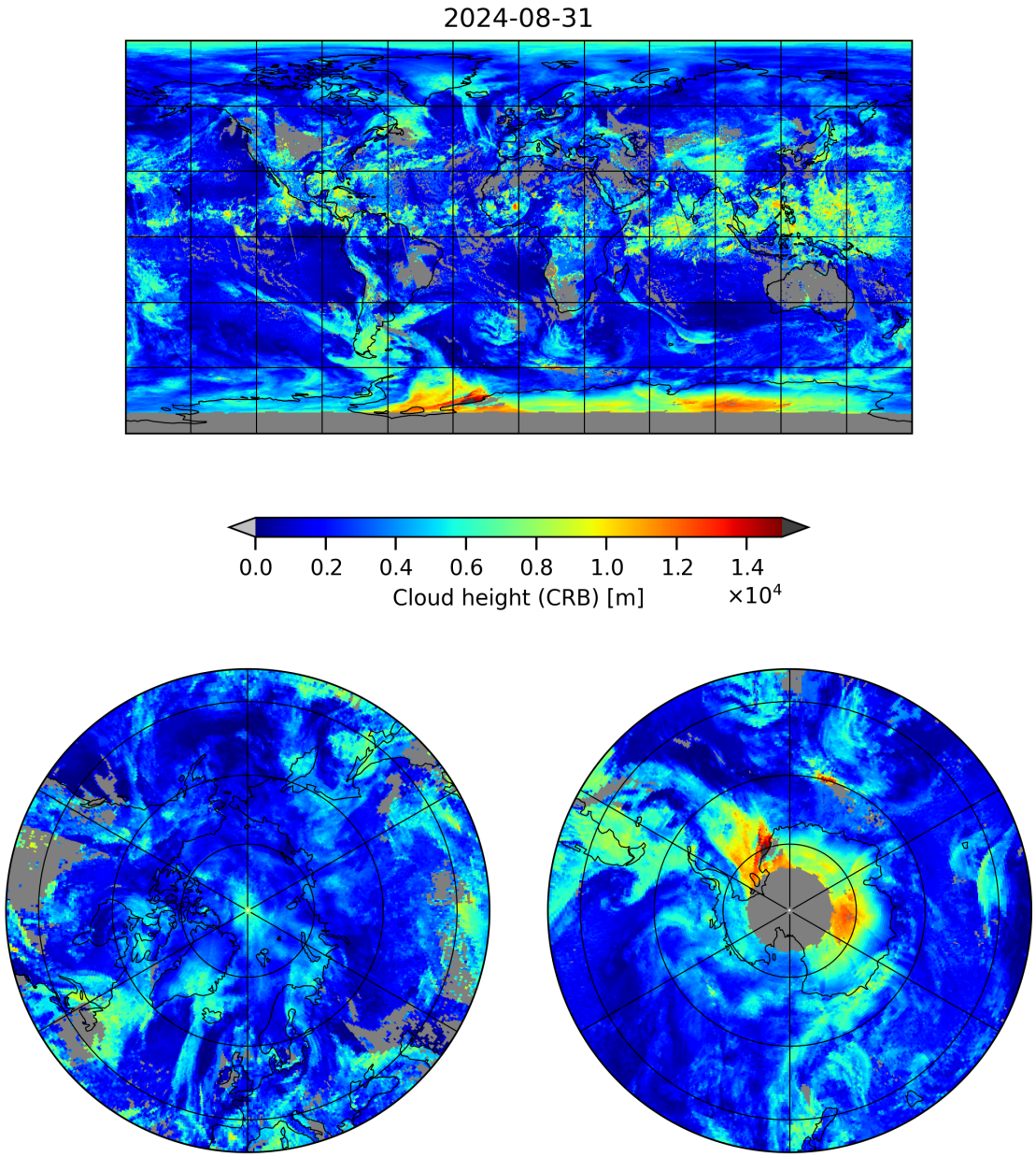

Figure 10: Map of “Cloud height (CRB)” for 2024-08-30 to 2024-09-01

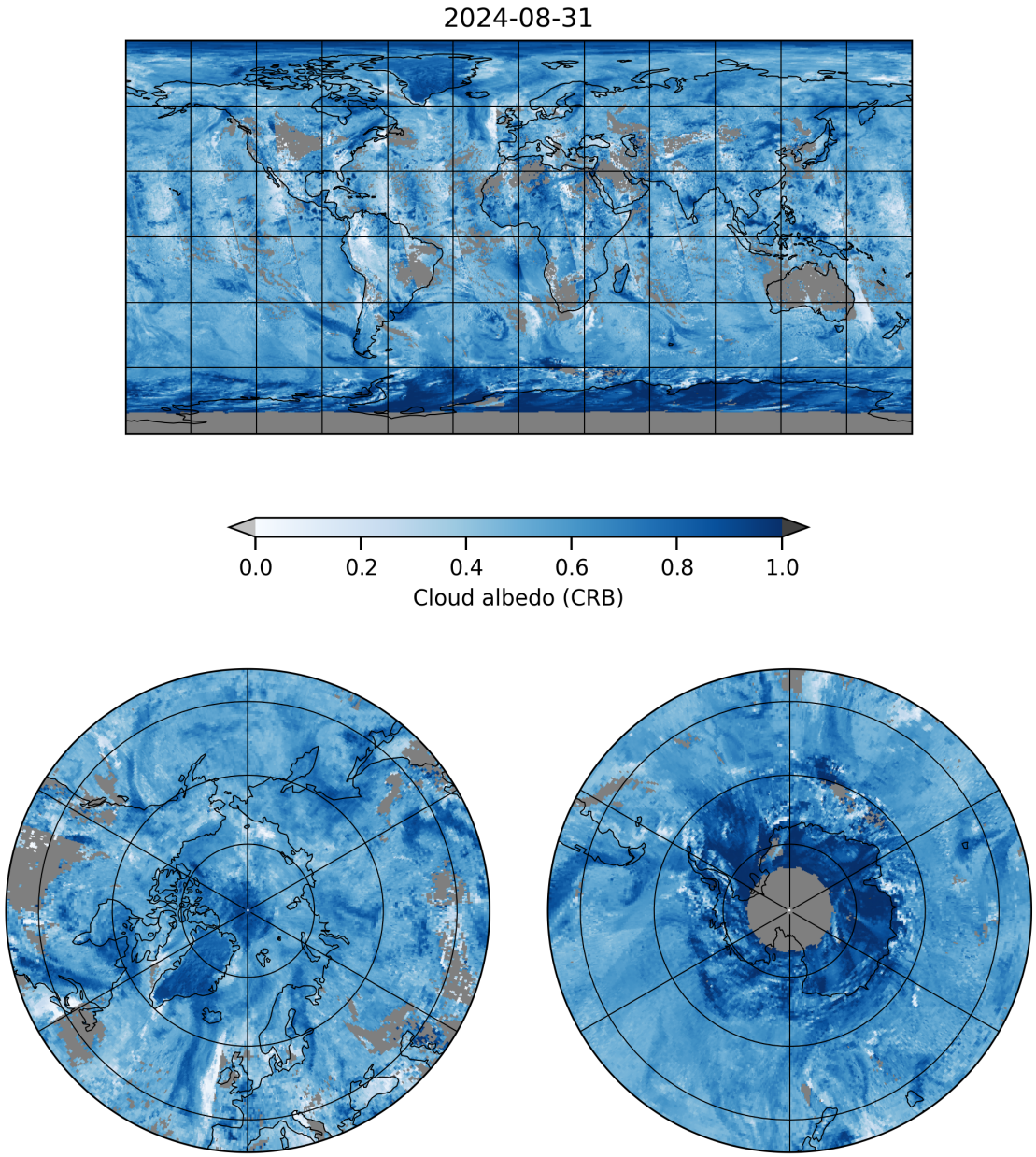

Figure 11: Map of “Cloud albedo (CRB)” for 2024-08-30 to 2024-09-01

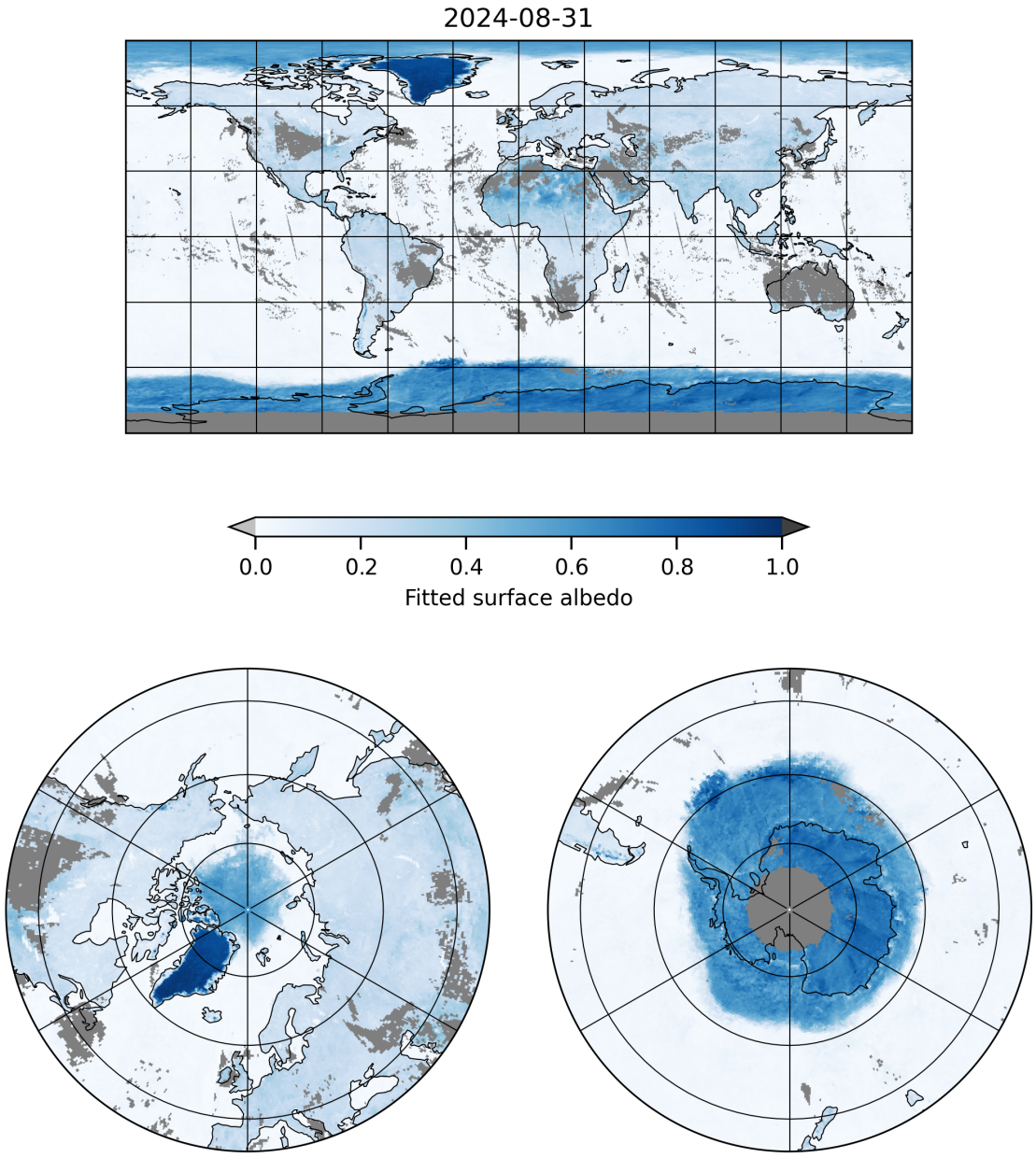

Figure 12: Map of “Fitted surface albedo” for 2024-08-30 to 2024-09-01

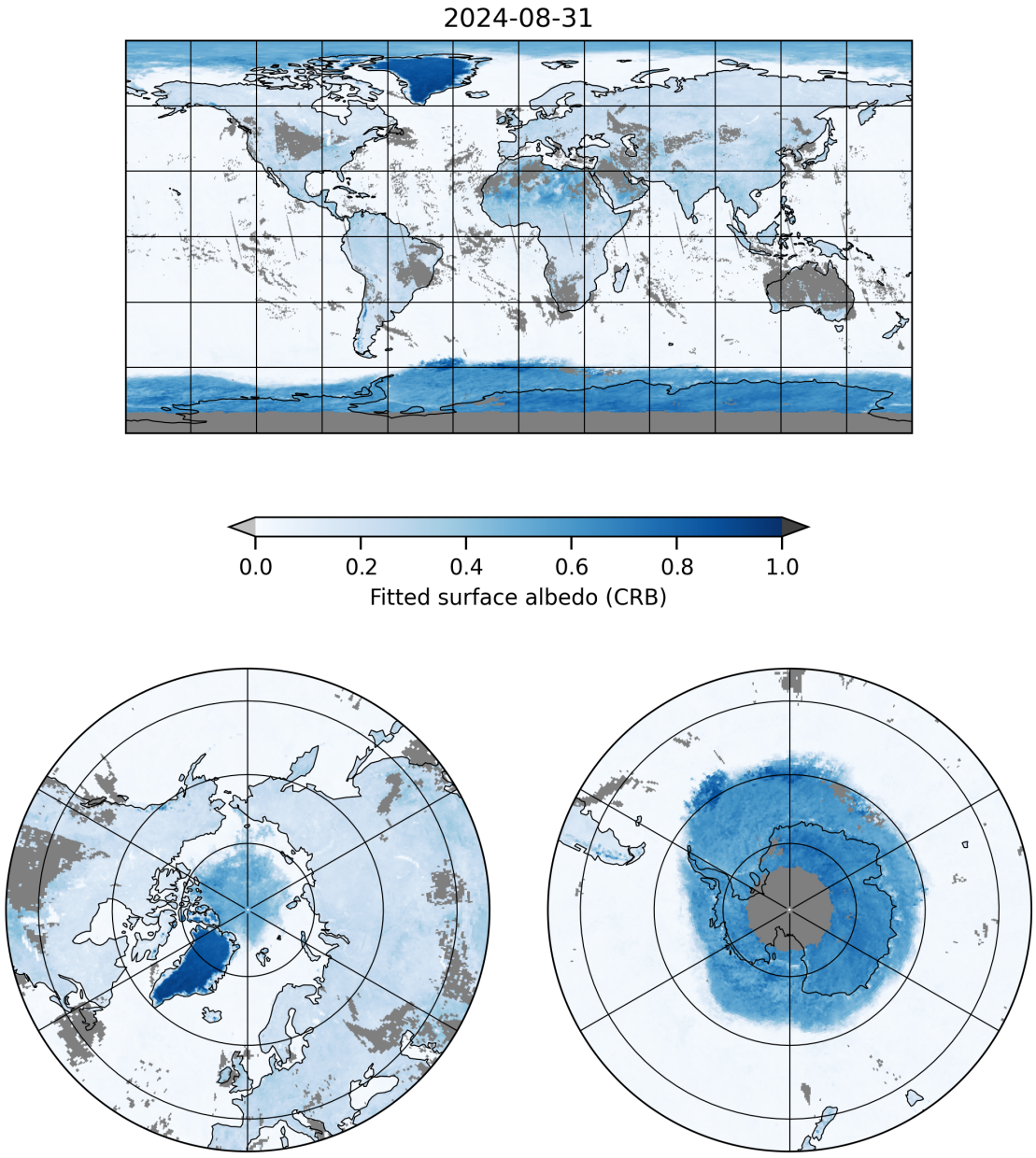

Figure 13: Map of “Fitted surface albedo (CRB)” for 2024-08-30 to 2024-09-01

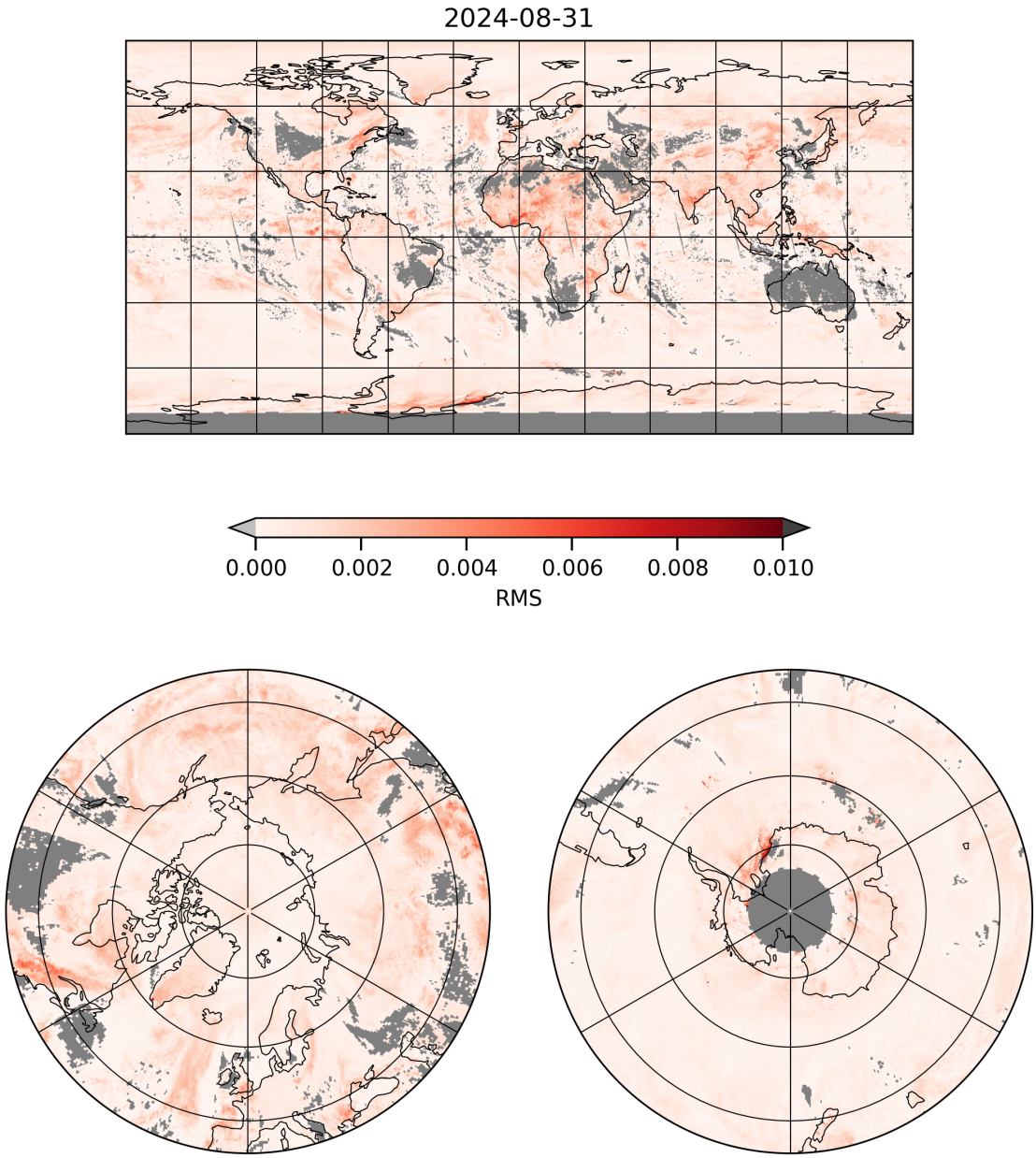

Figure 14: Map of “RMS” for 2024-08-30 to 2024-09-01

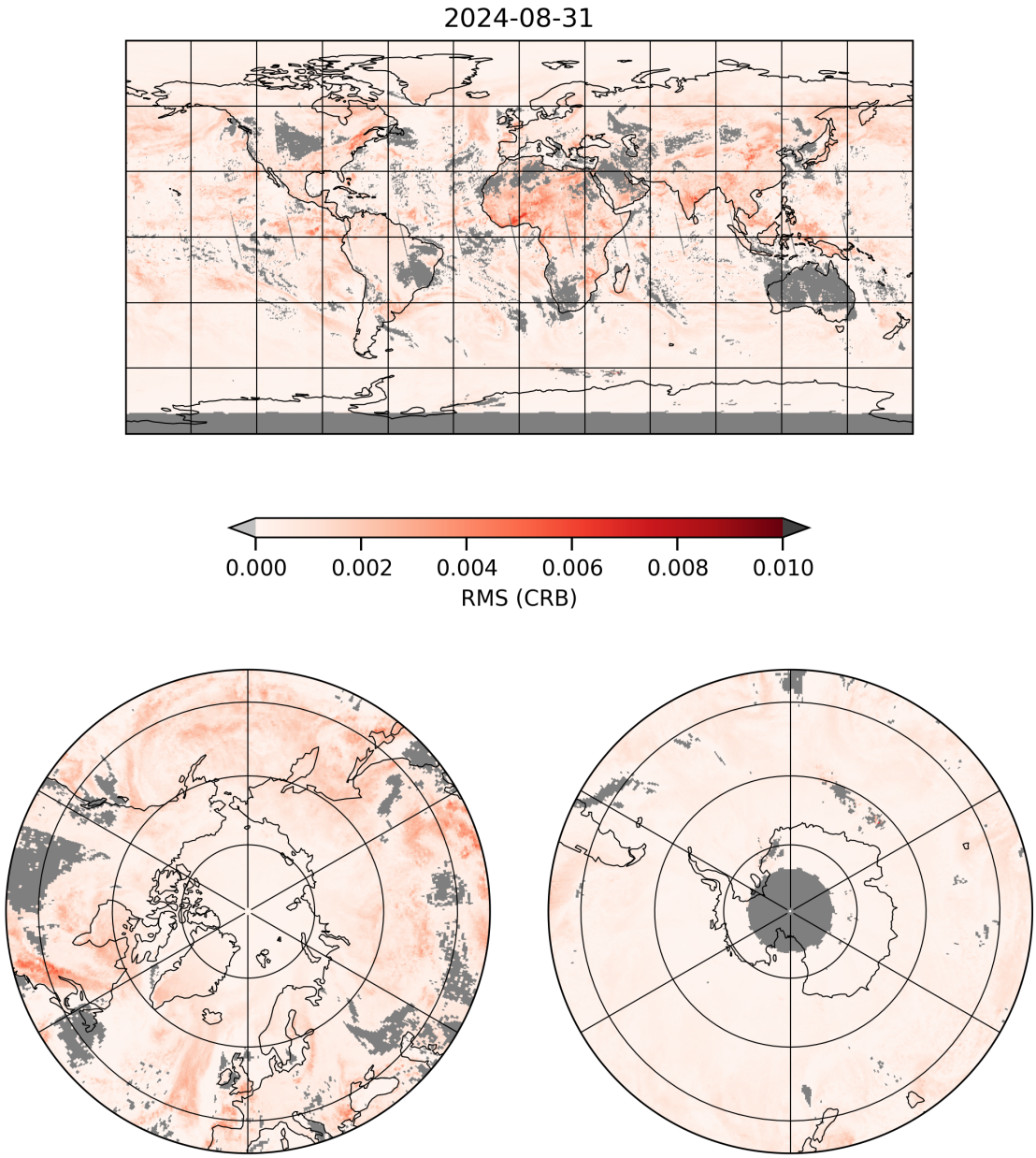

Figure 15: Map of “RMS (CRB)” for 2024-08-30 to 2024-09-01

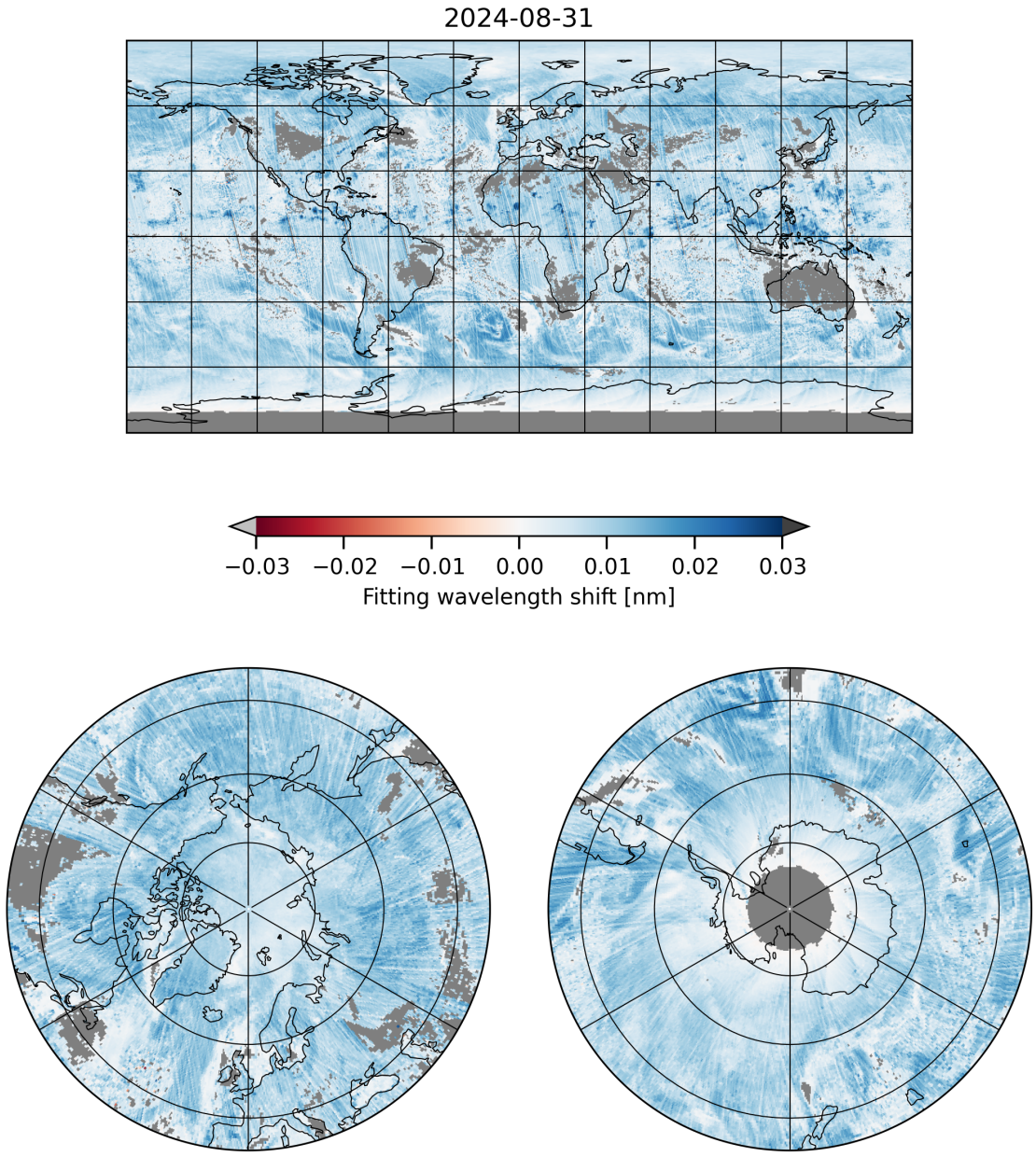

Figure 16: Map of “Fitting wavelength shift” for 2024-08-30 to 2024-09-01

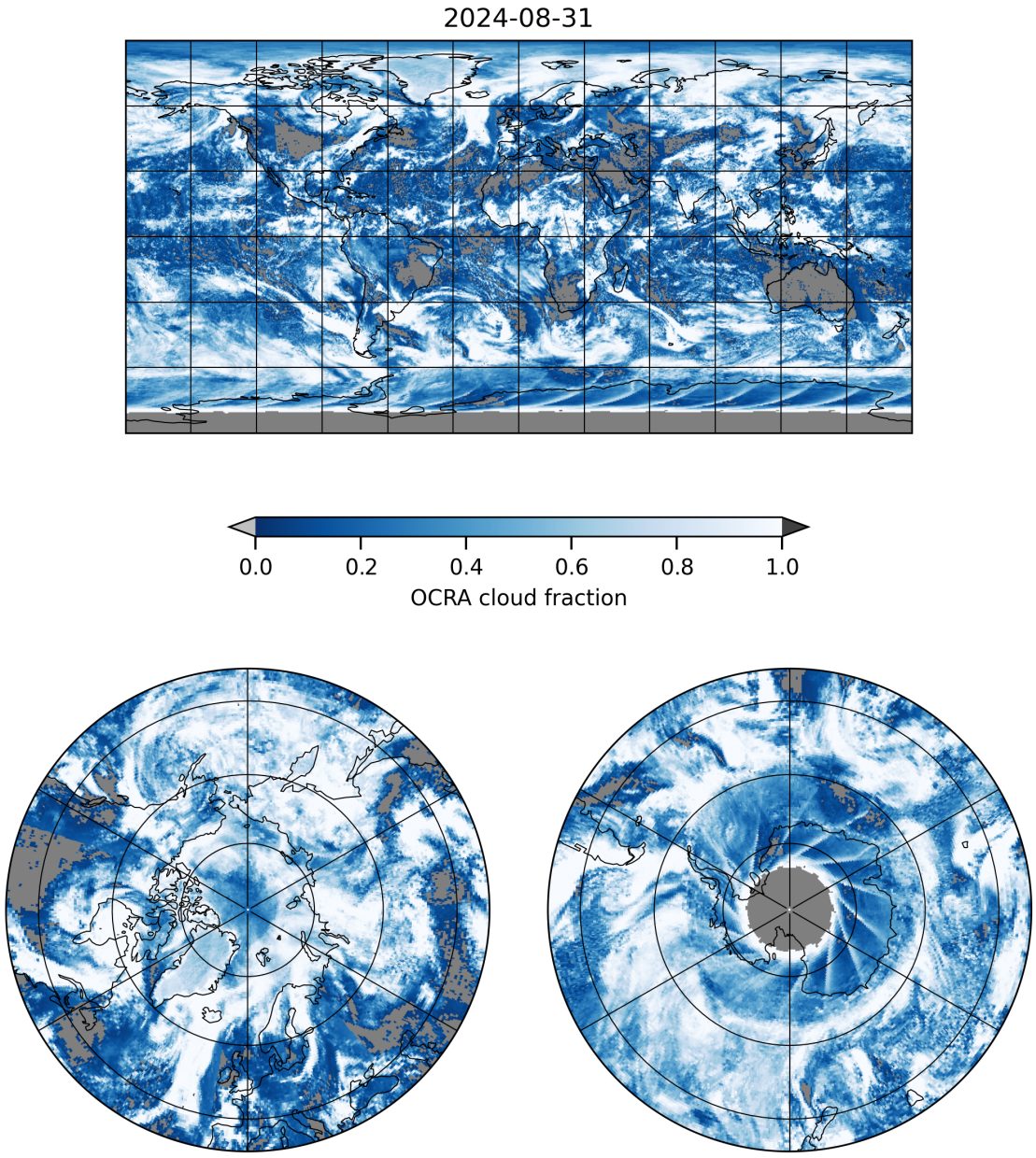

Figure 17: Map of “OCRA cloud fraction” for 2024-08-30 to 2024-09-01

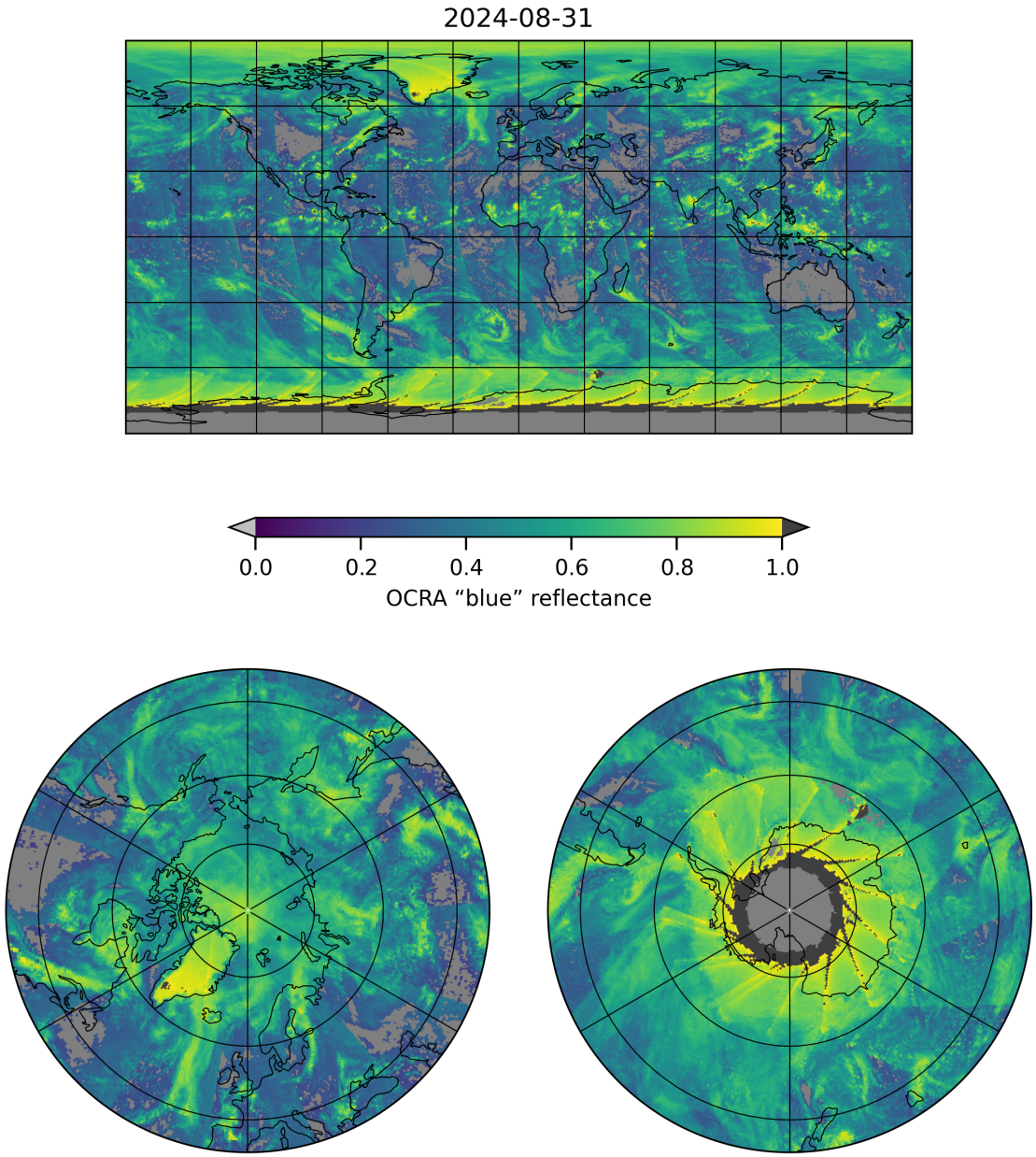

Figure 18: Map of “OCRA “blue” reflectance” for 2024-08-30 to 2024-09-01

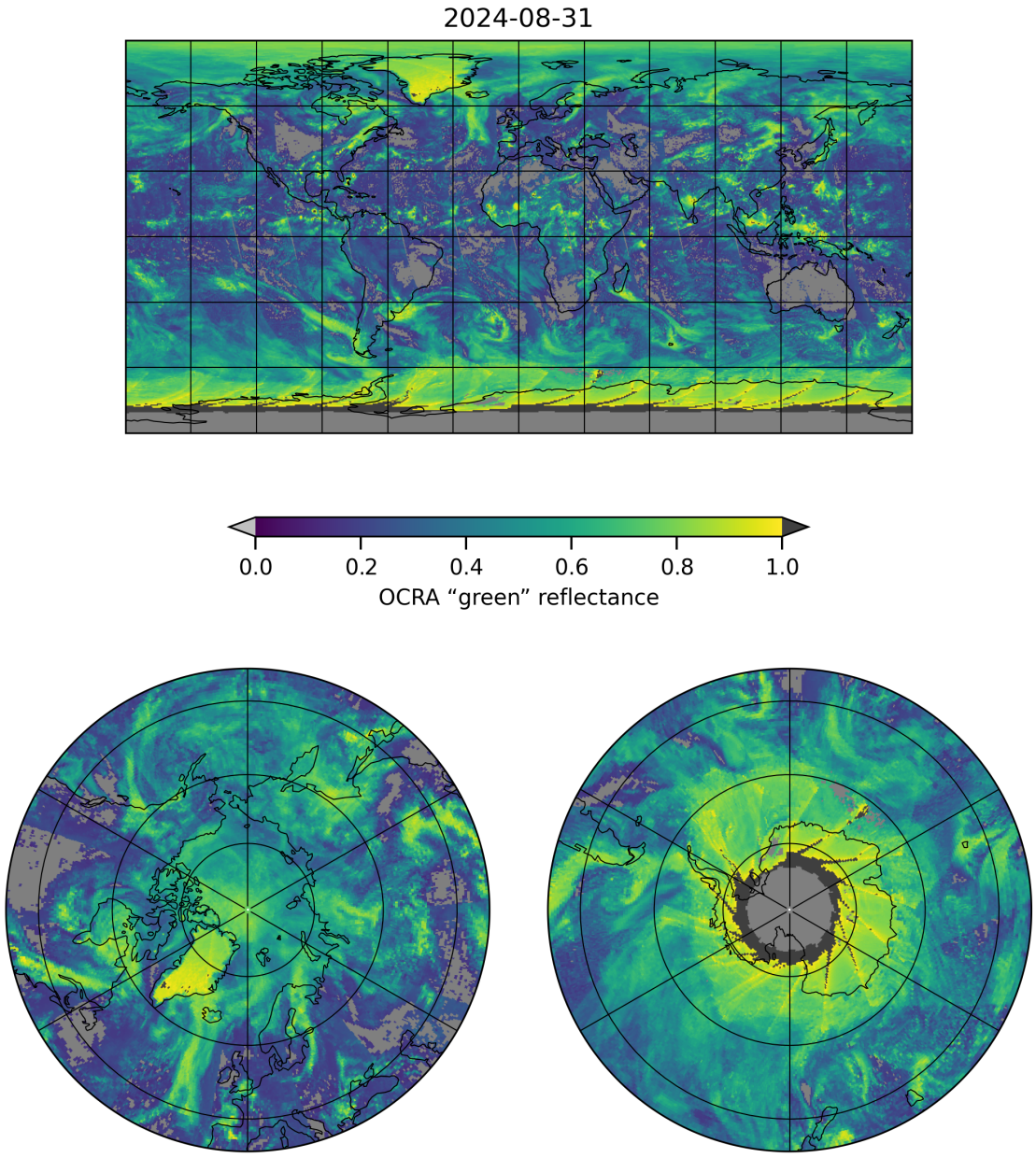

Figure 19: Map of “OCRA “green” reflectance” for 2024-08-30 to 2024-09-01

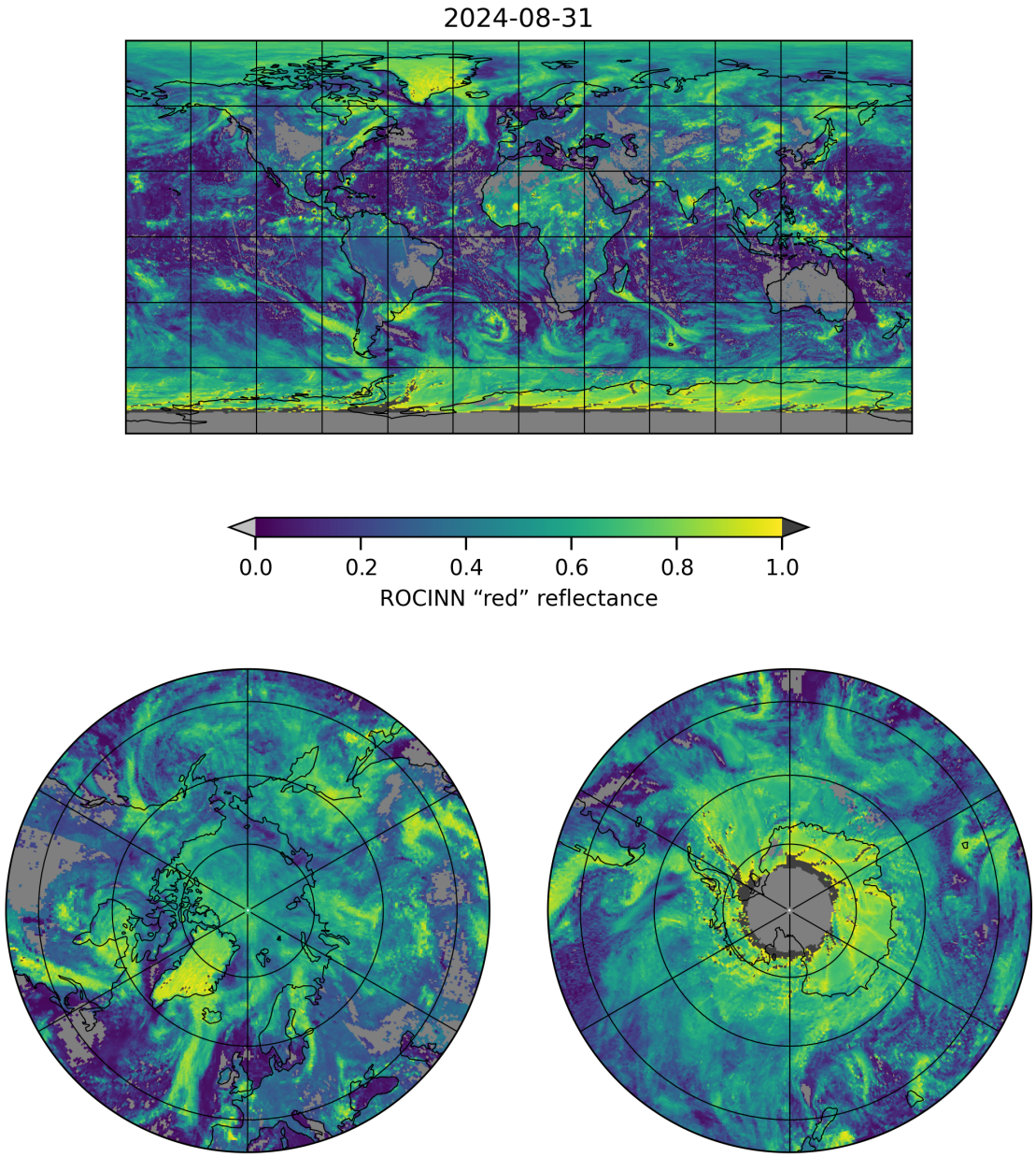

Figure 20: Map of “ROCINN “red” reflectance” for 2024-08-30 to 2024-09-01

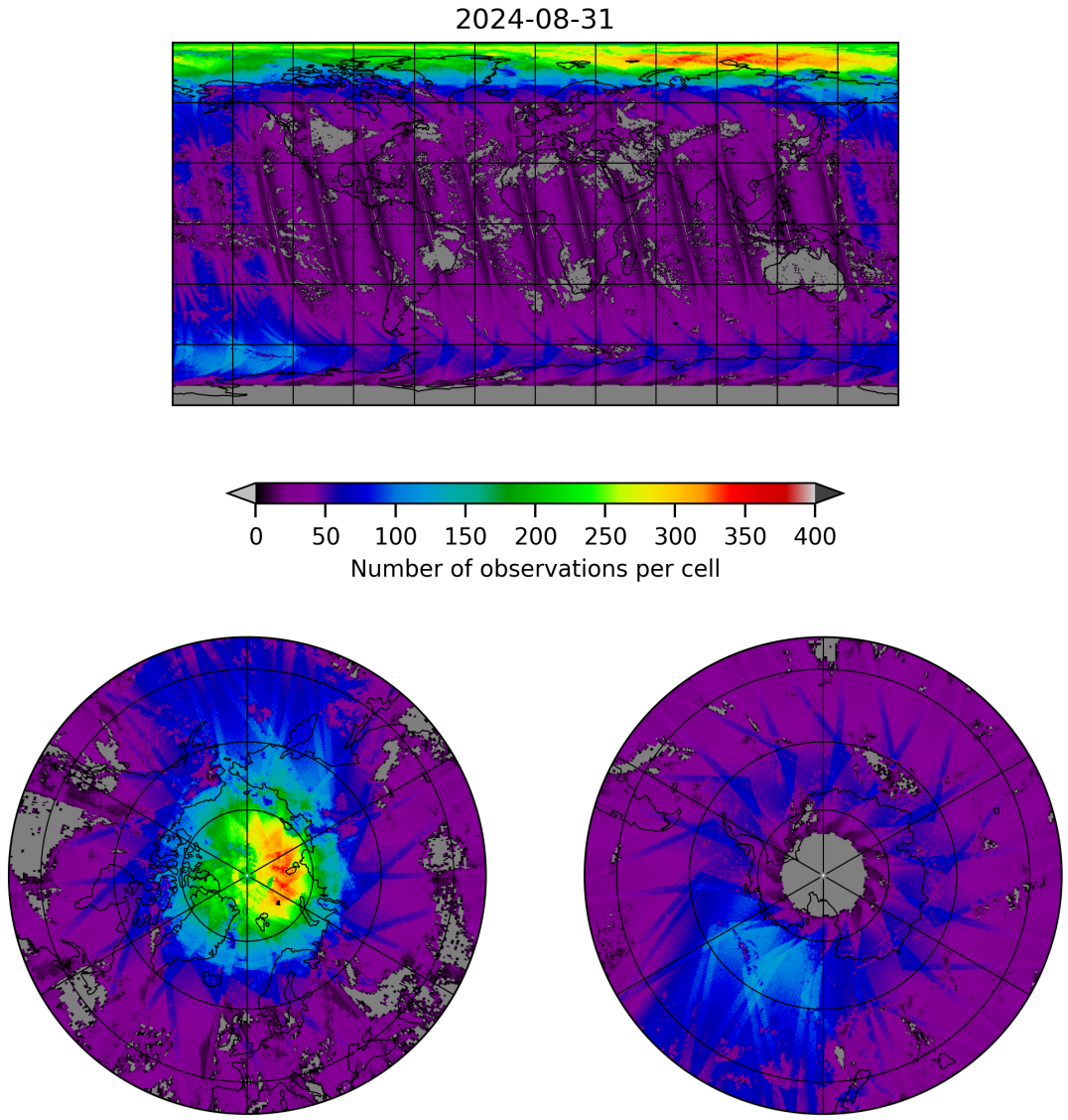

Figure 21: Map of the number of observations for 2024-08-30 to 2024-09-01

7 Zonal average

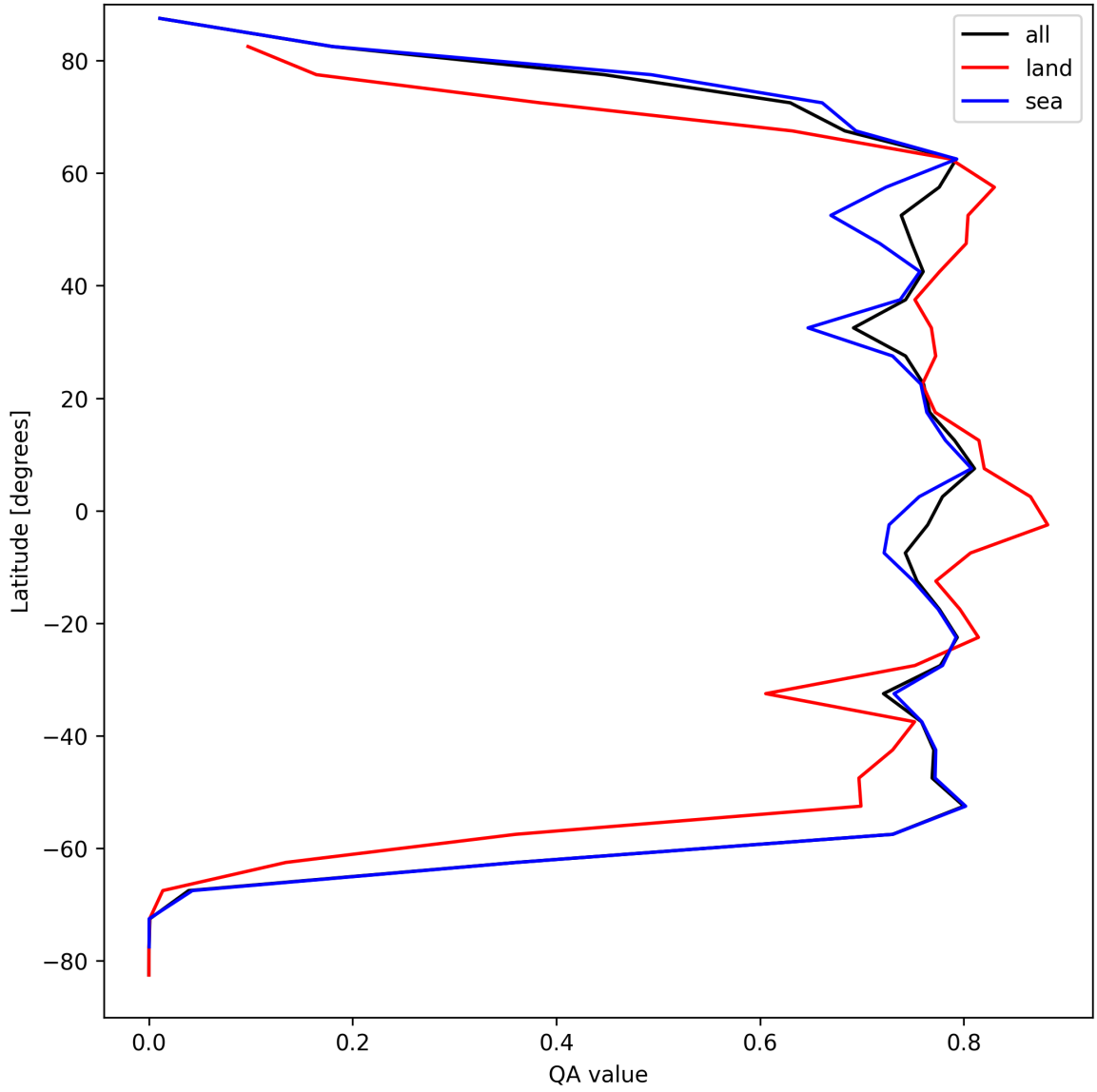

Figure 22: Zonal average of “QA value” for 2024-08-30 to 2024-09-01.

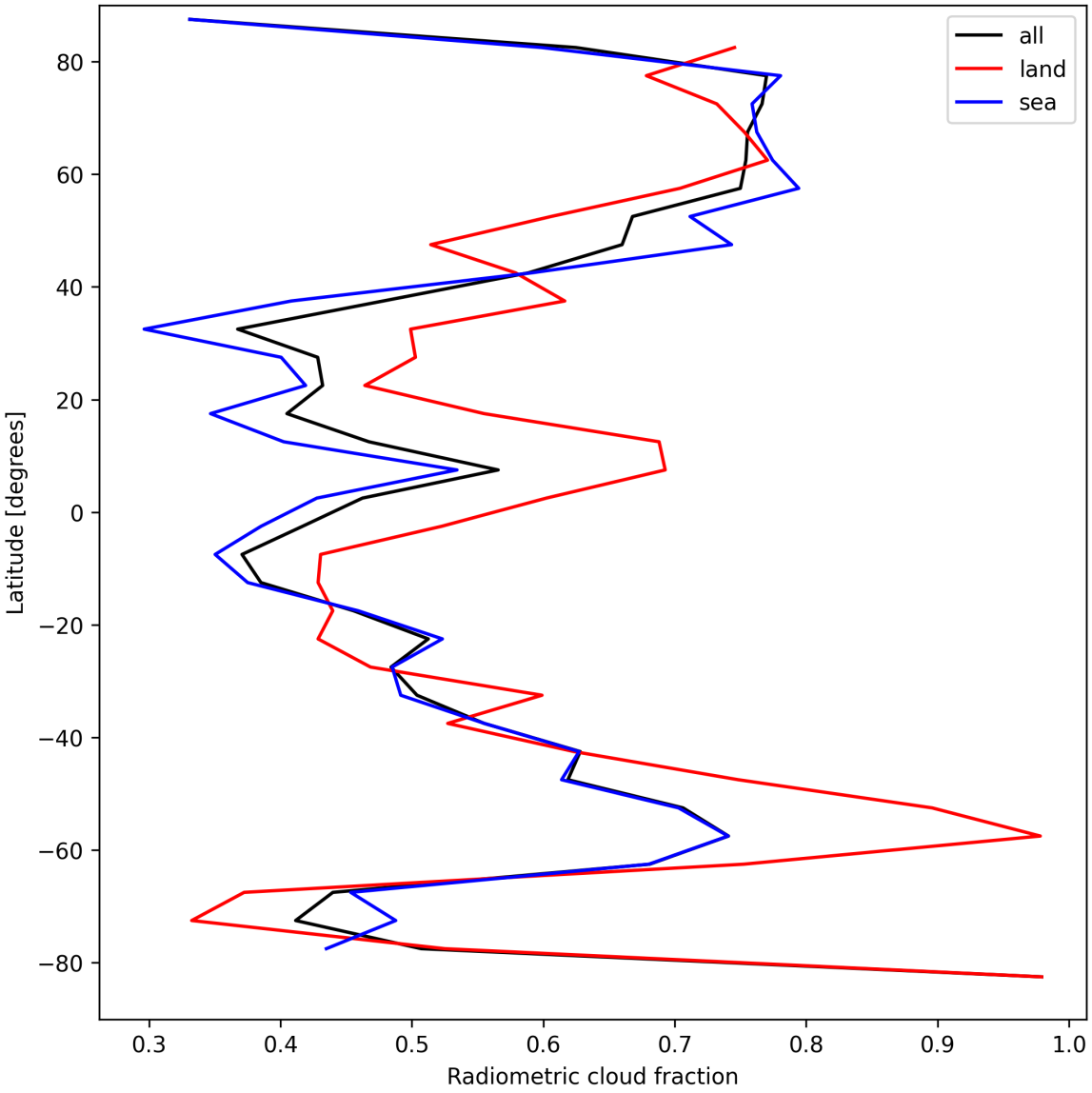

Figure 23: Zonal average of “Radiometric cloud fraction” for 2024-08-30 to 2024-09-01.

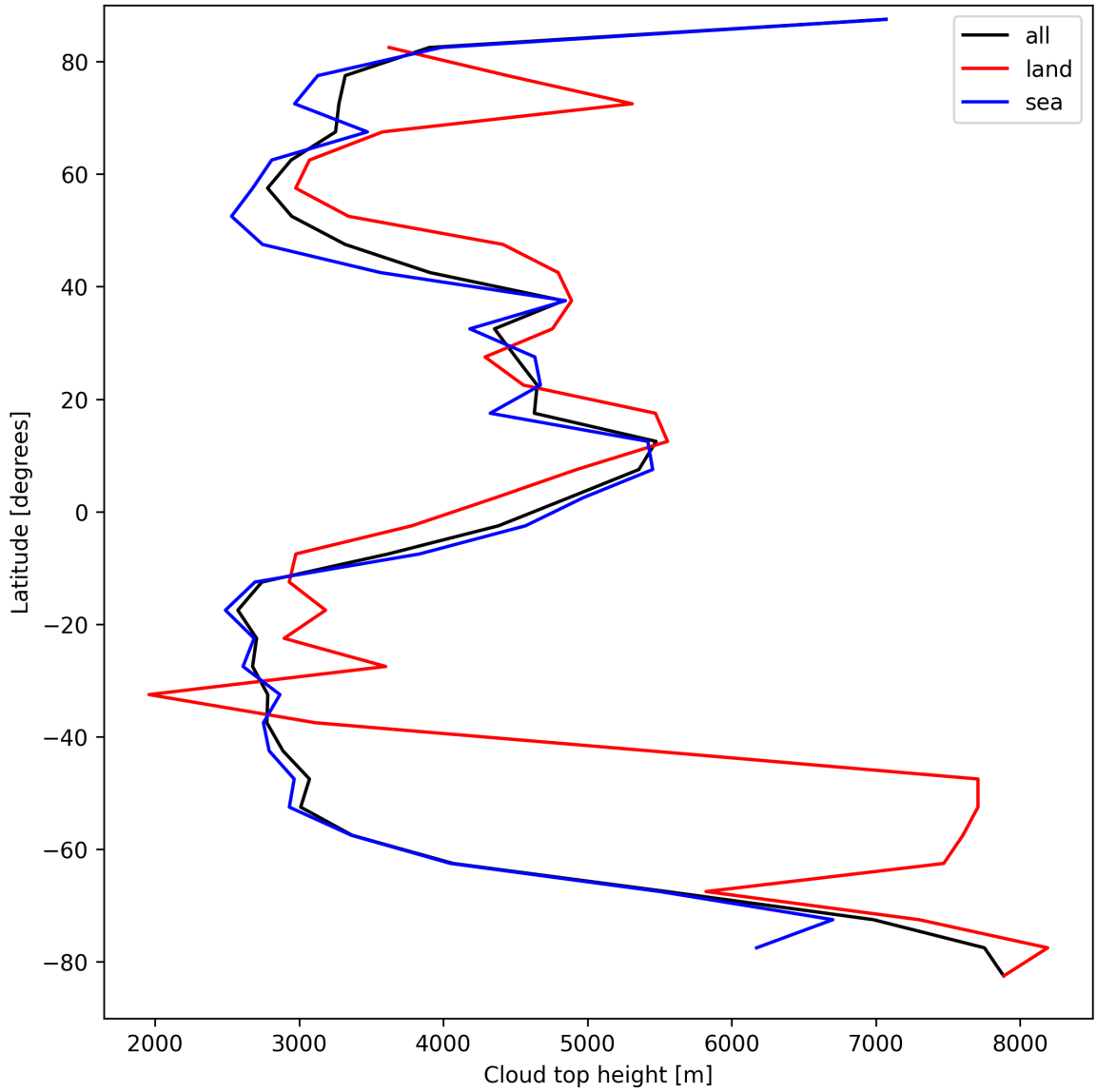

Figure 24: Zonal average of “Cloud top height” for 2024-08-30 to 2024-09-01.

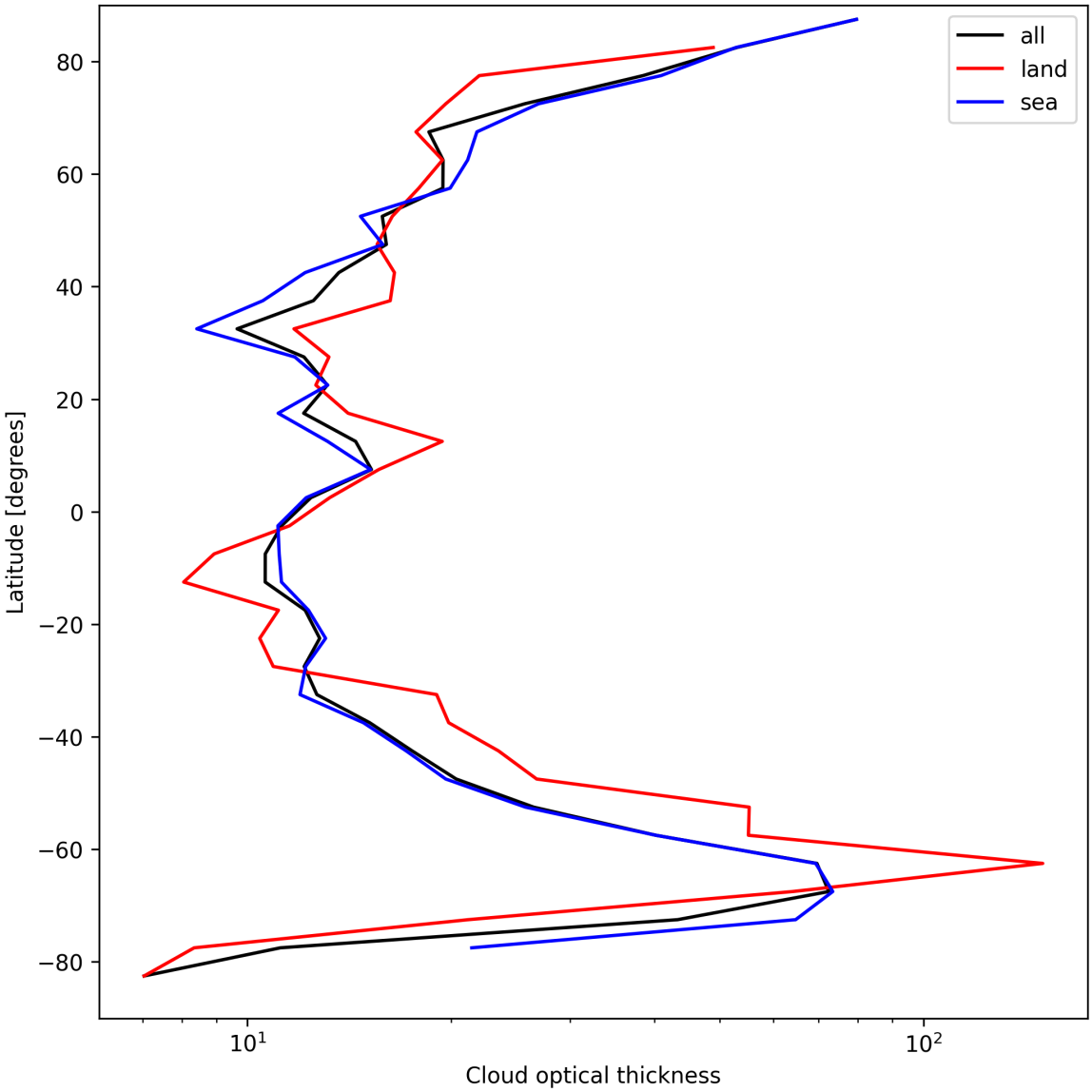

Figure 25: Zonal average of “Cloud optical thickness” for 2024-08-30 to 2024-09-01.

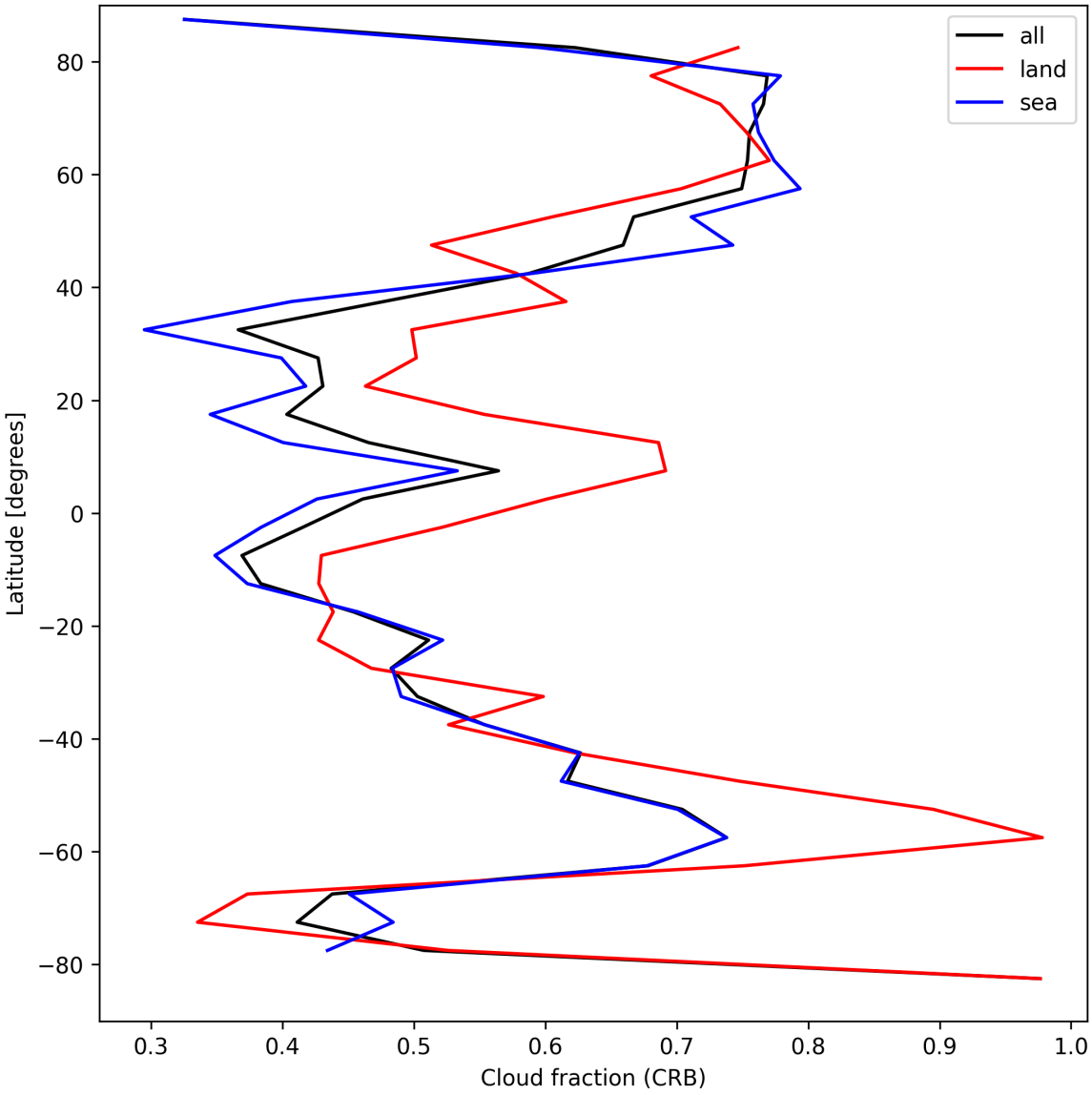

Figure 26: Zonal average of “Cloud fraction (CRB)” for 2024-08-30 to 2024-09-01.

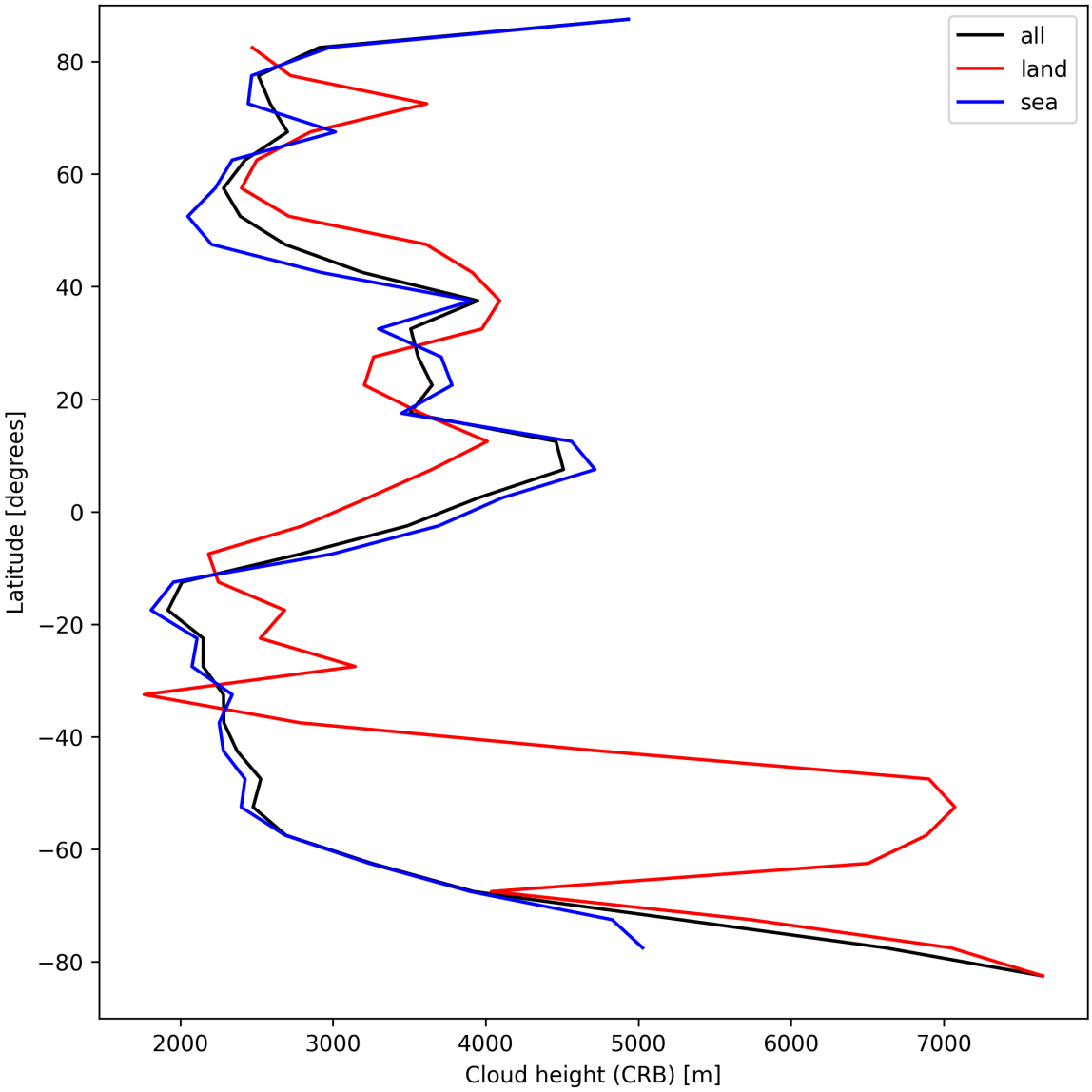

Figure 27: Zonal average of “Cloud height (CRB)” for 2024-08-30 to 2024-09-01.

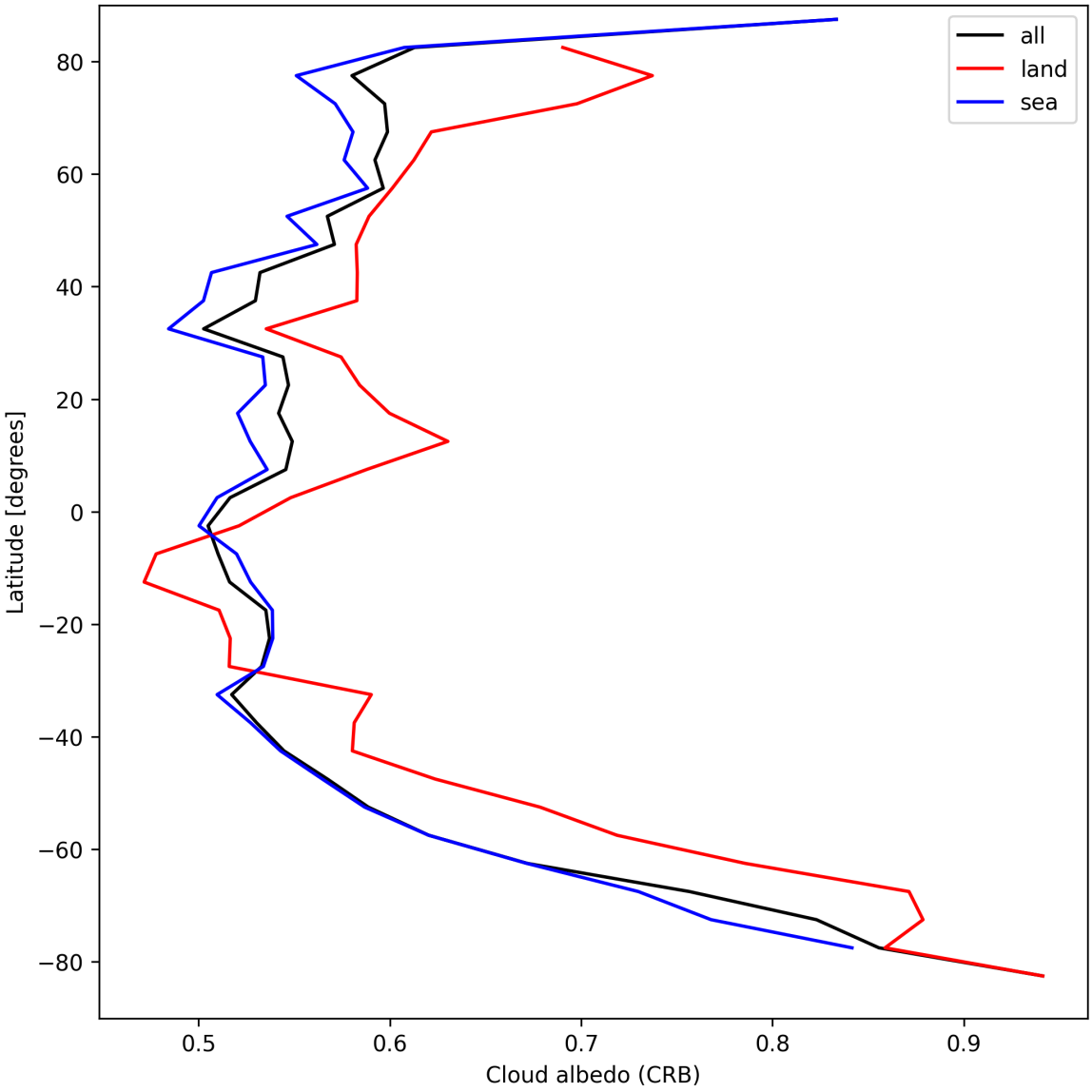

Figure 28: Zonal average of “Cloud albedo (CRB)” for 2024-08-30 to 2024-09-01.

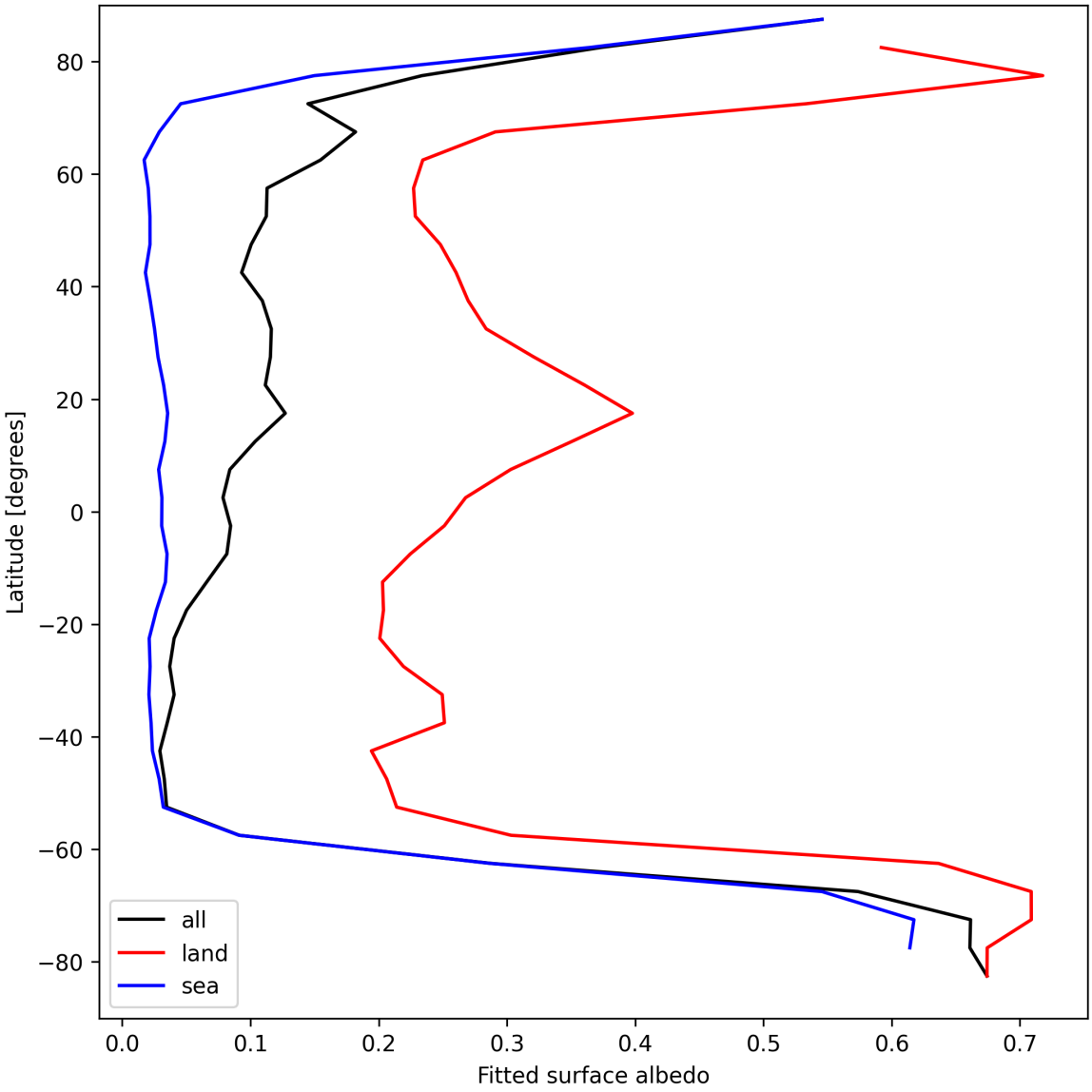

Figure 29: Zonal average of “Fitted surface albedo” for 2024-08-30 to 2024-09-01.

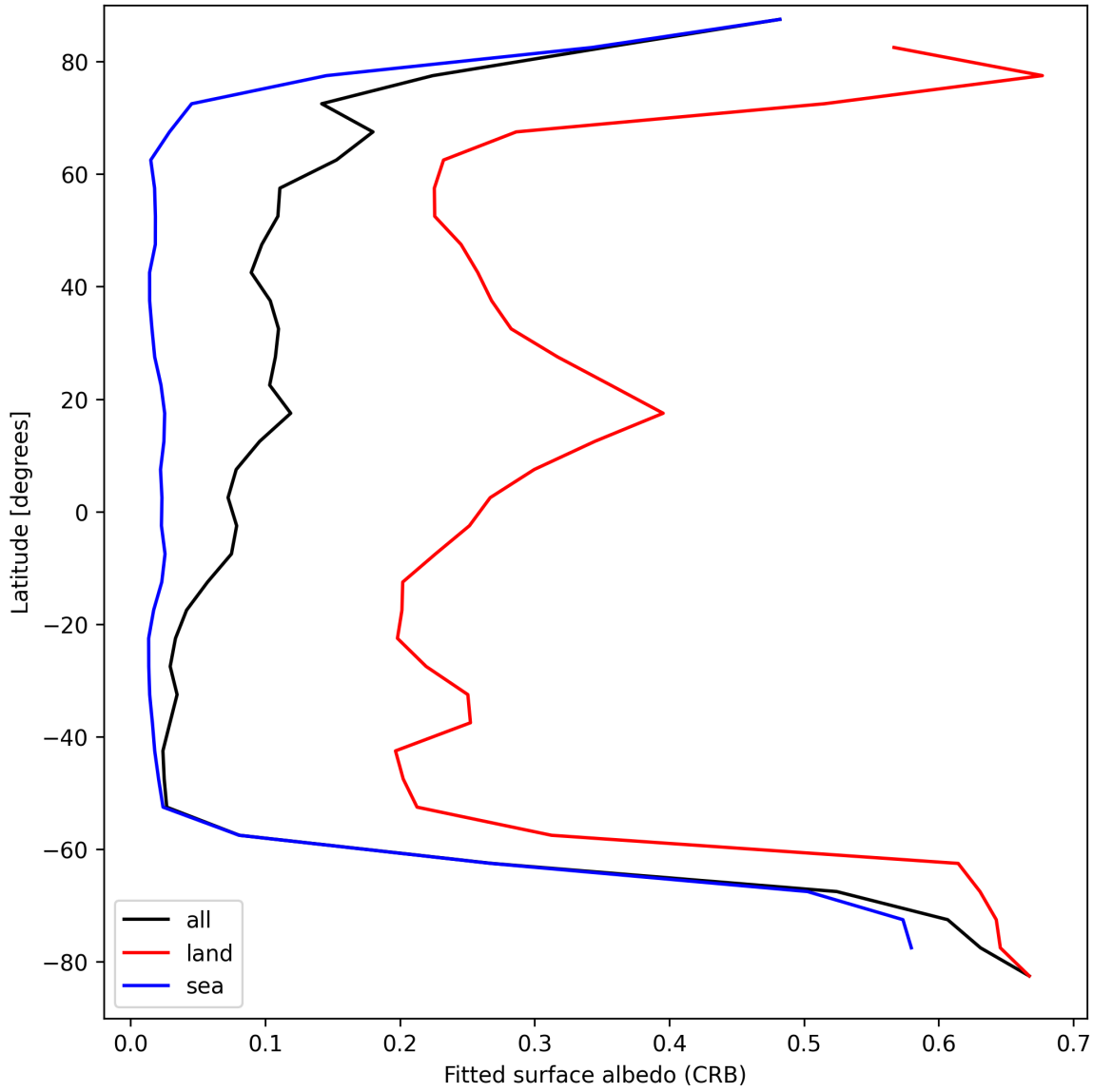

Figure 30: Zonal average of “Fitted surface albedo (CRB)” for 2024-08-30 to 2024-09-01.

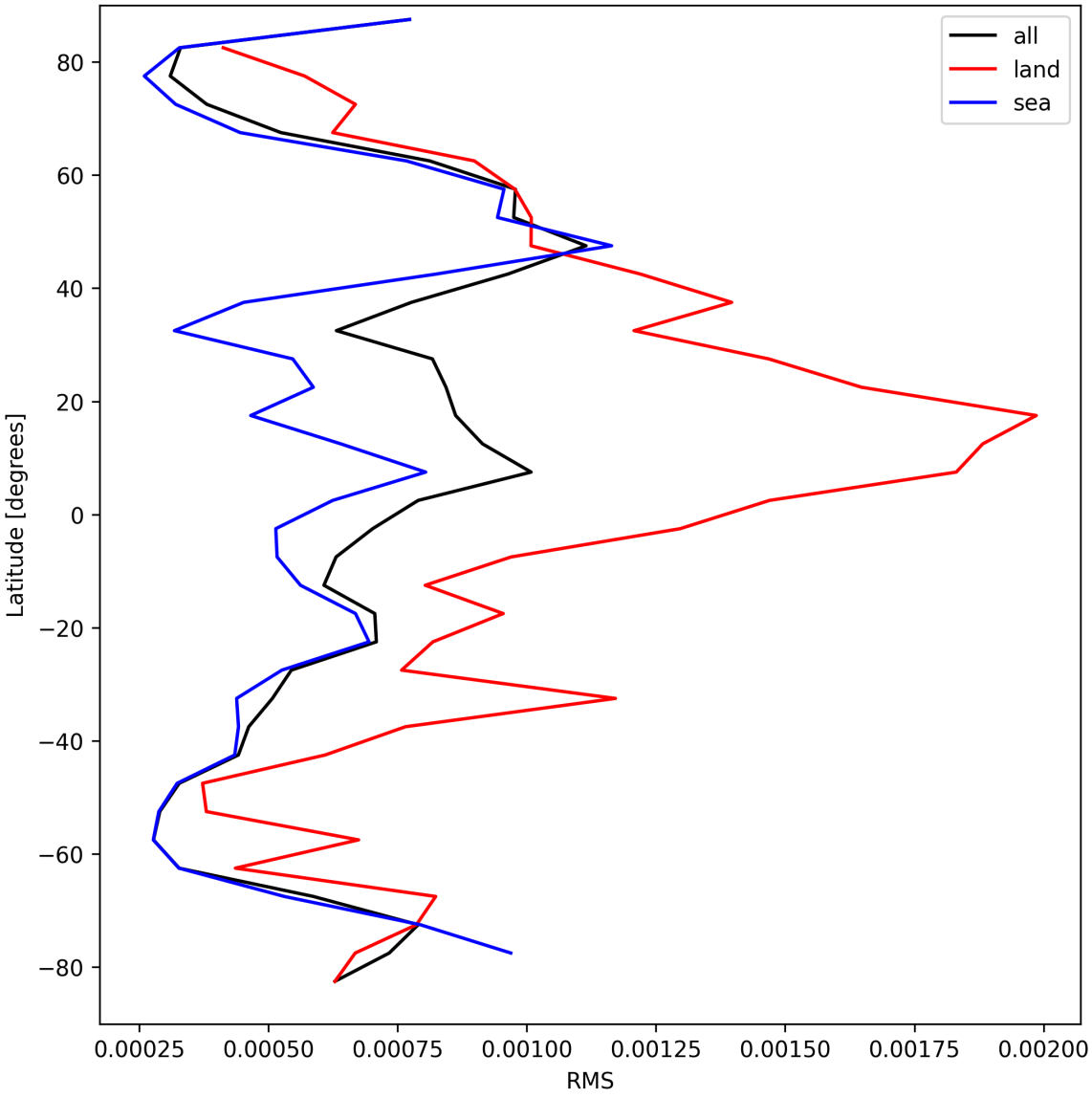

Figure 31: Zonal average of “RMS” for 2024-08-30 to 2024-09-01.

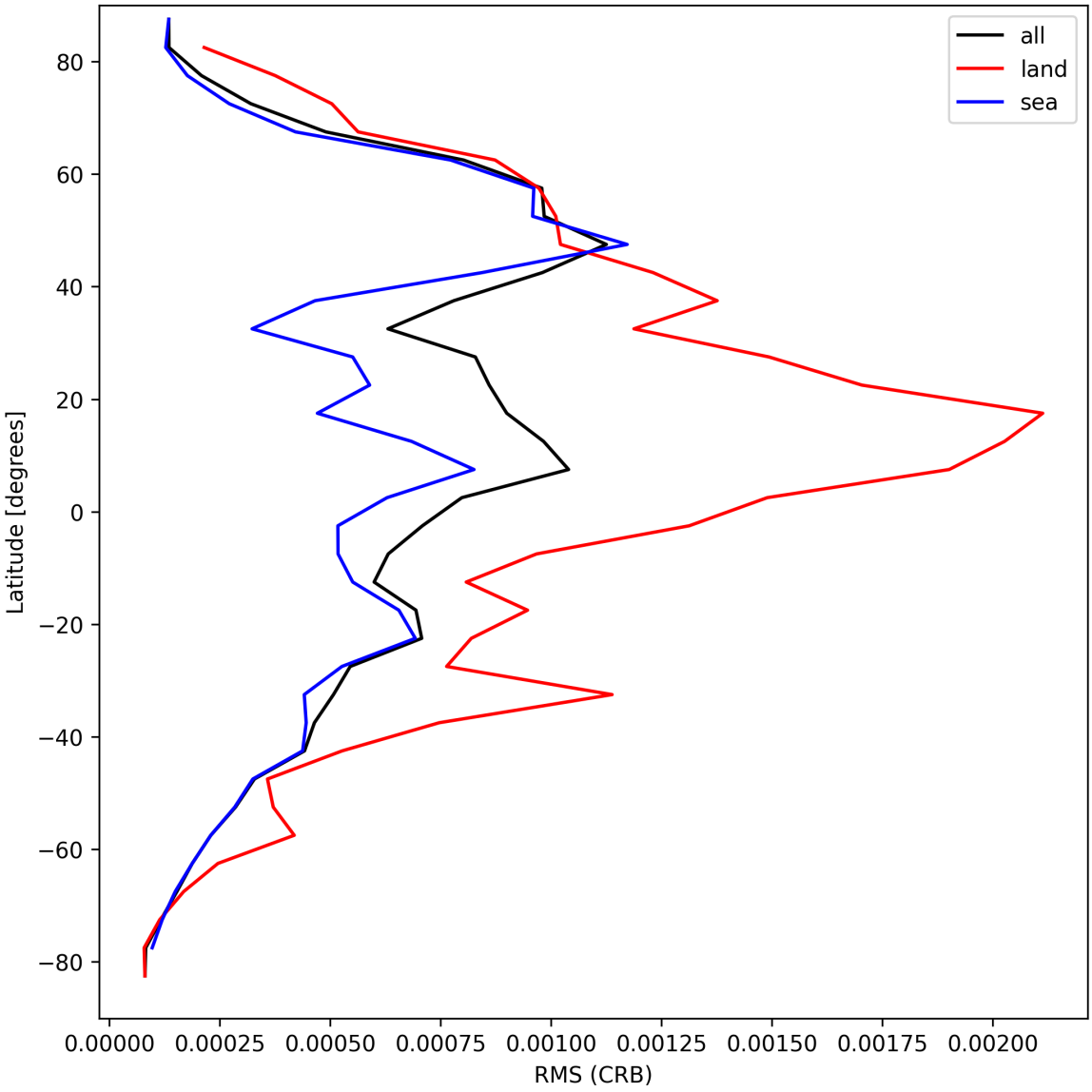

Figure 32: Zonal average of “RMS (CRB)” for 2024-08-30 to 2024-09-01.

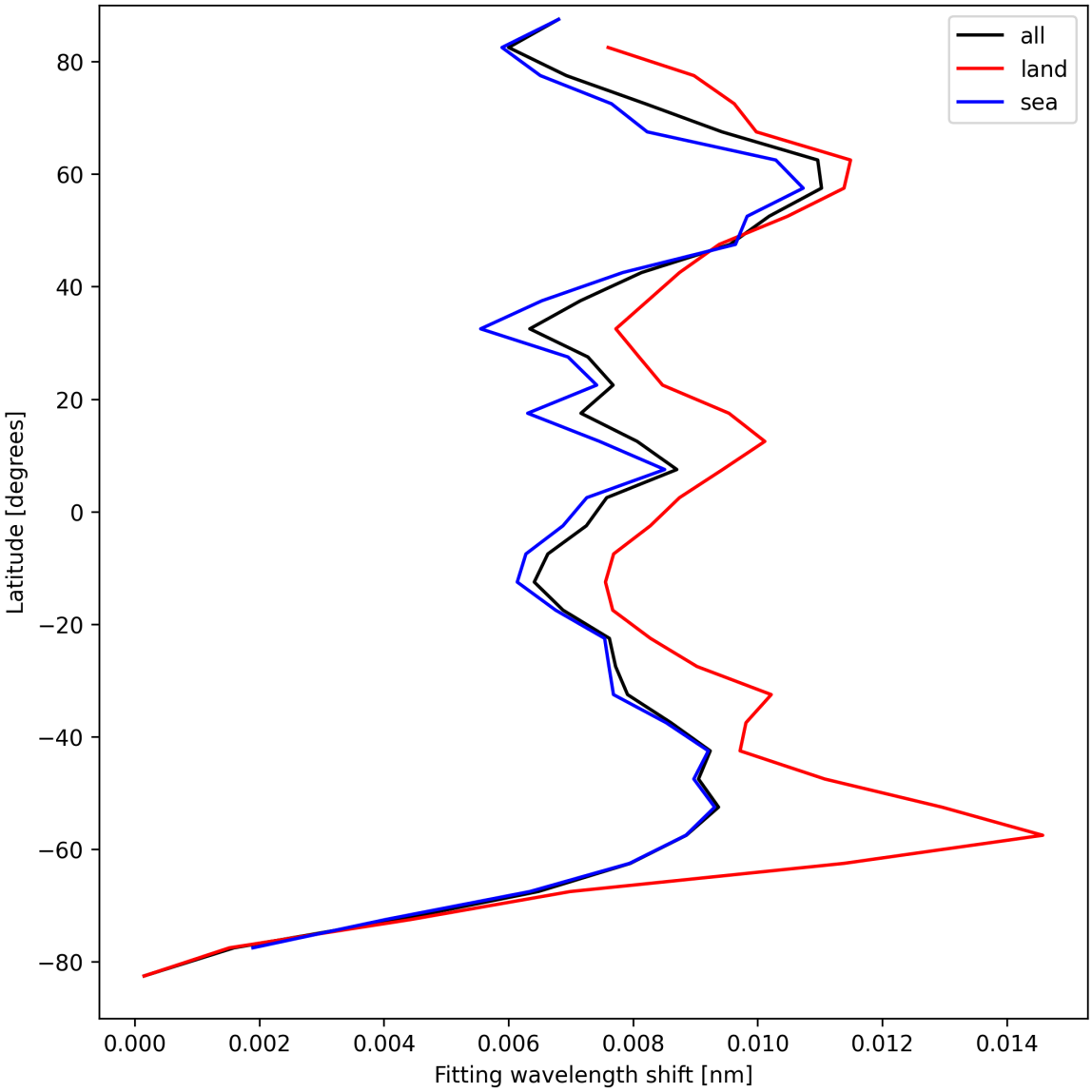

Figure 33: Zonal average of “Fitting wavelength shift” for 2024-08-30 to 2024-09-01.

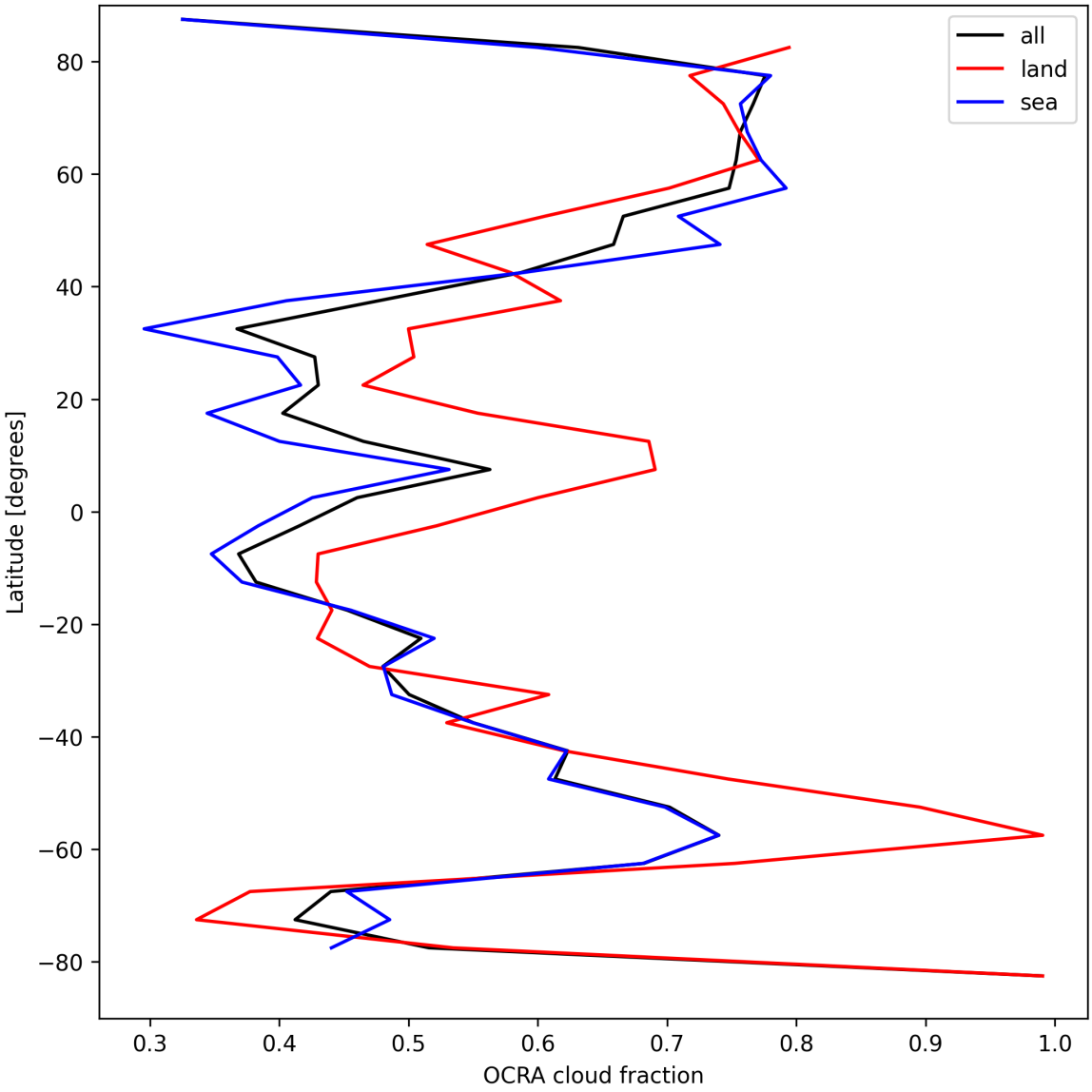

Figure 34: Zonal average of “OCRA cloud fraction” for 2024-08-30 to 2024-09-01.

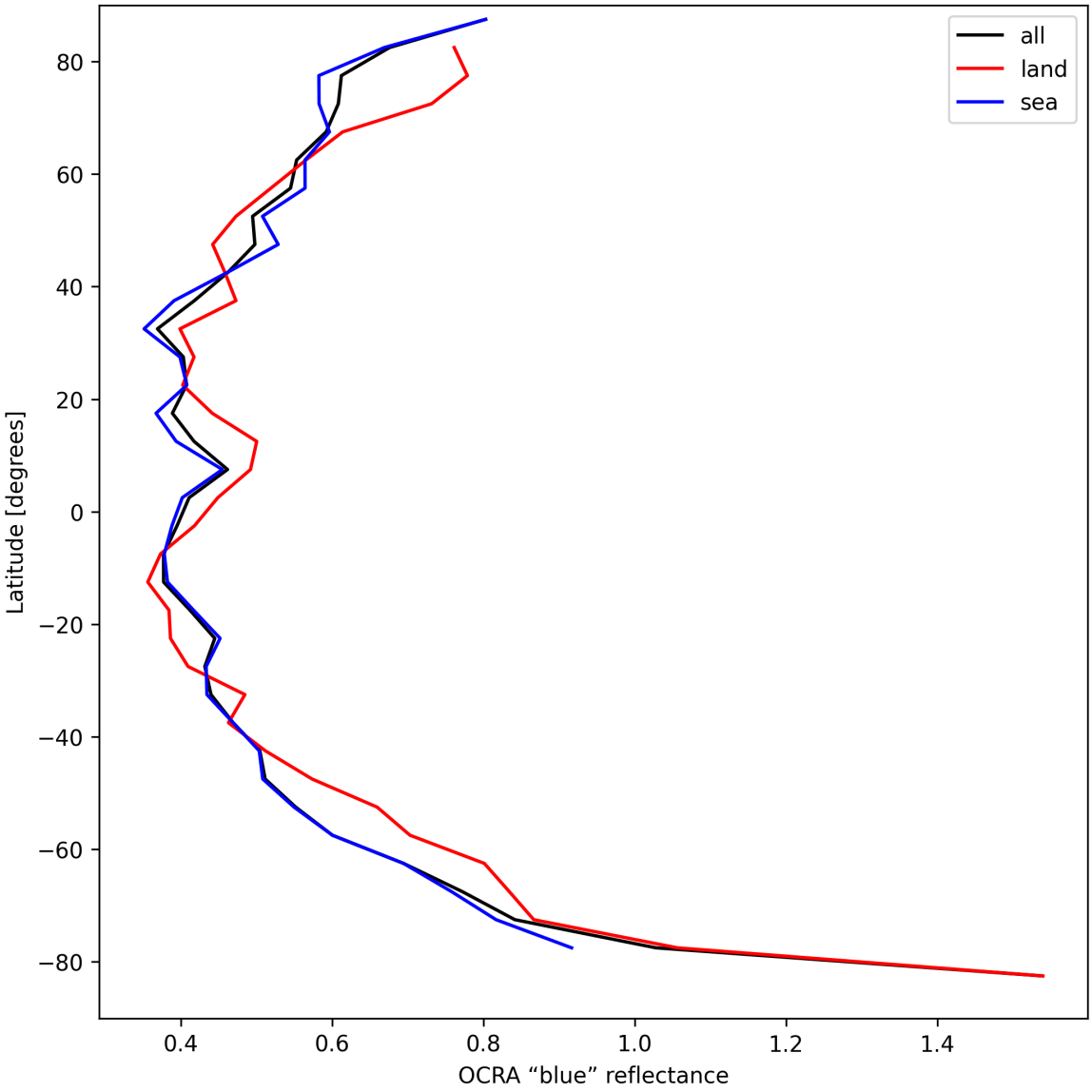

Figure 35: Zonal average of “OCRA “blue” reflectance” for 2024-08-30 to 2024-09-01.

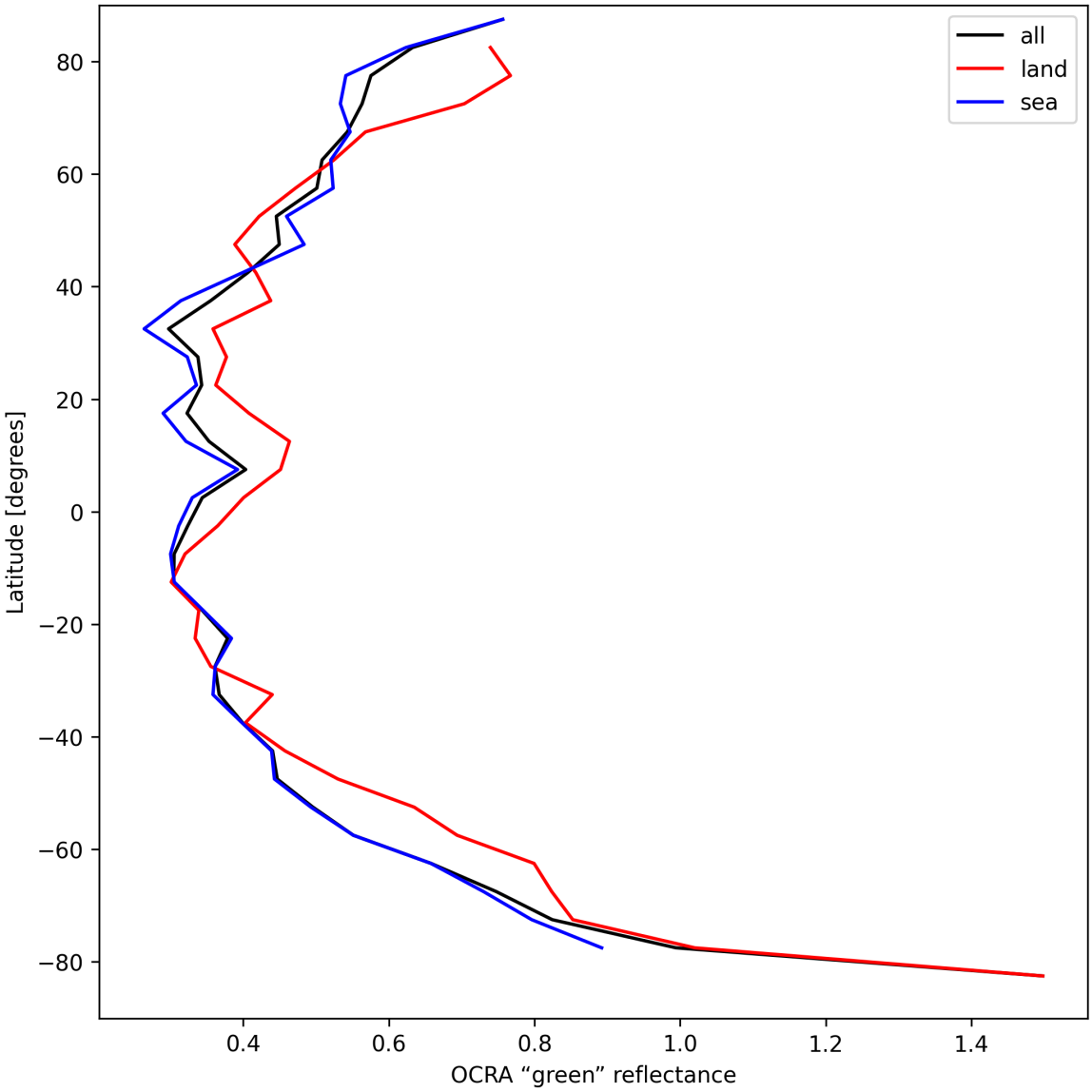

Figure 36: Zonal average of “OCRA “green” reflectance” for 2024-08-30 to 2024-09-01.

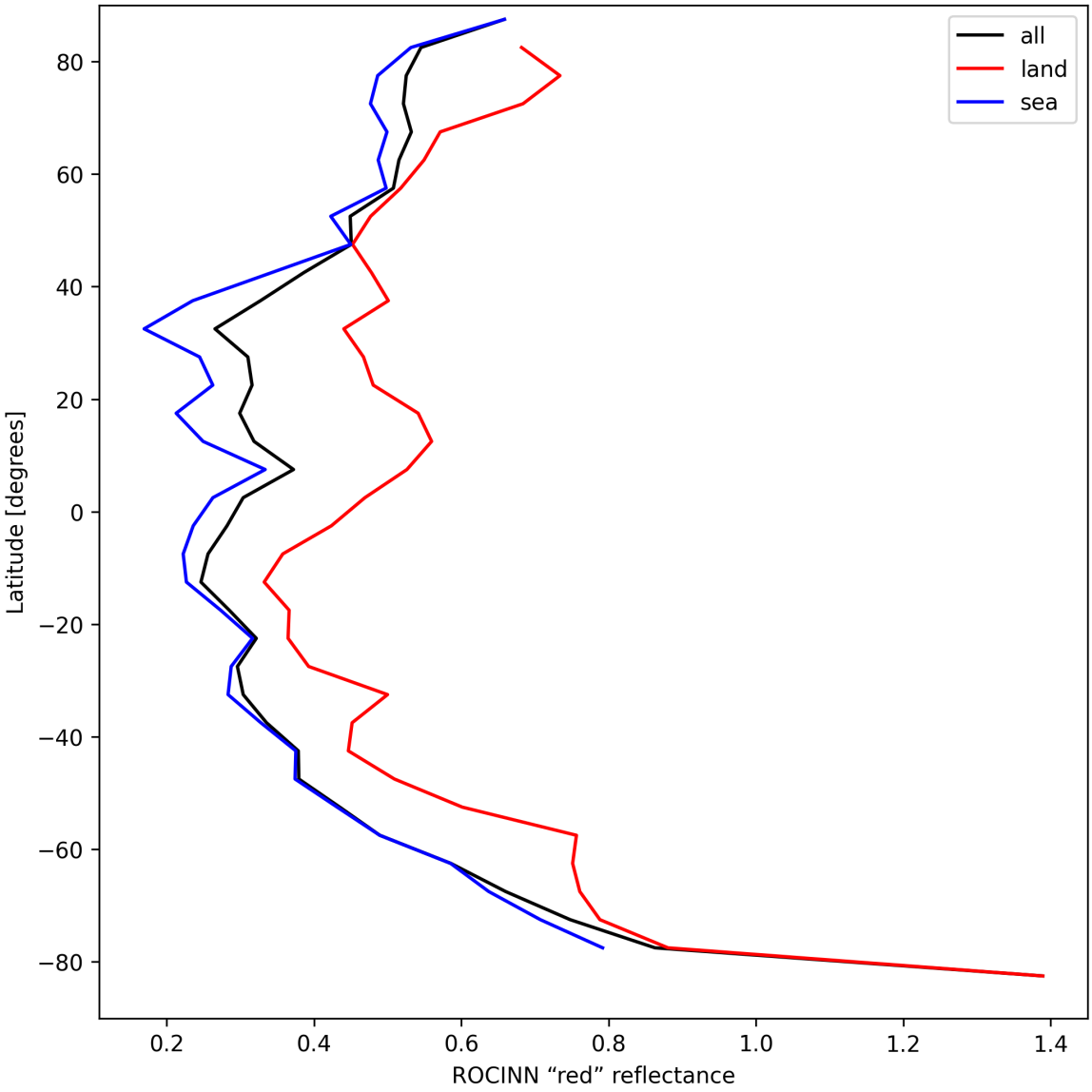

Figure 37: Zonal average of “ROCINN “red” reflectance” for 2024-08-30 to 2024-09-01.

8 Histograms

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

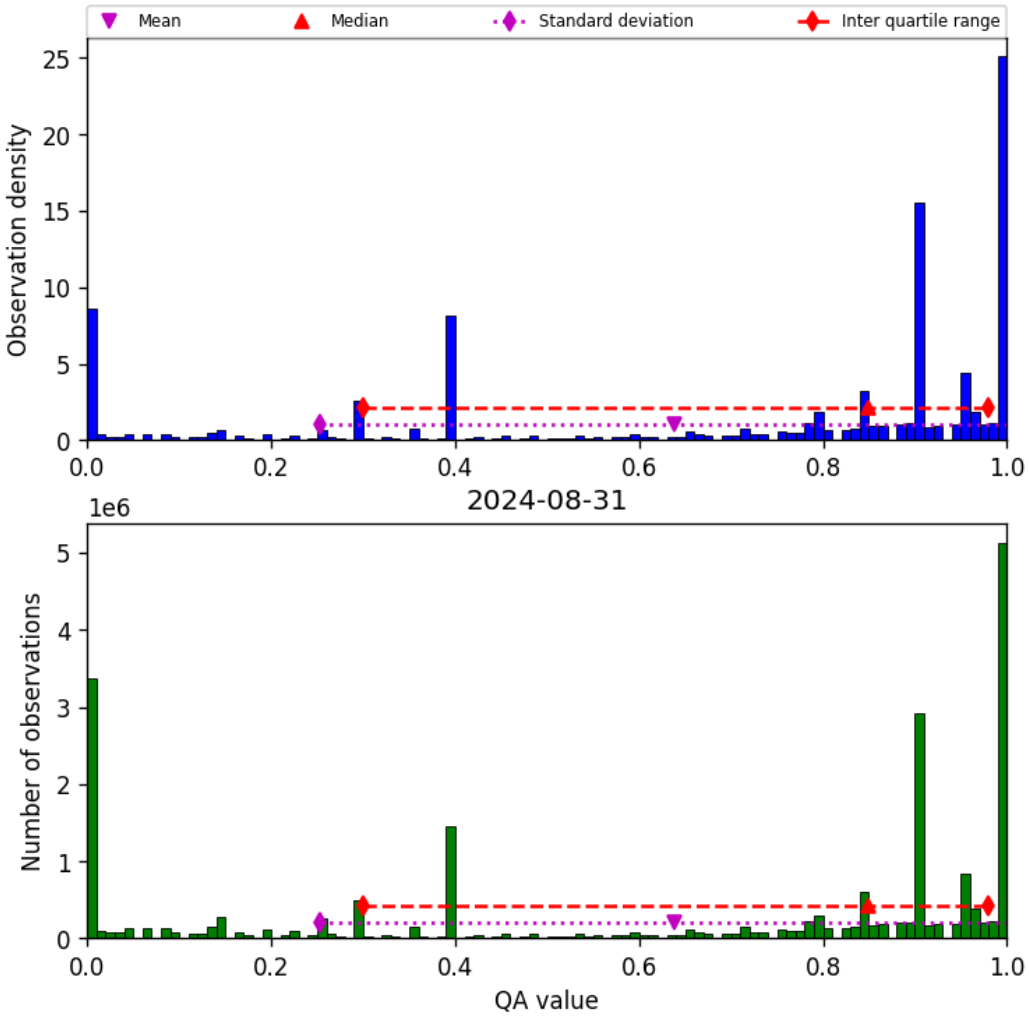

Figure 38: Histogram of “QA value” for 2024-08-30 to 2024-09-01

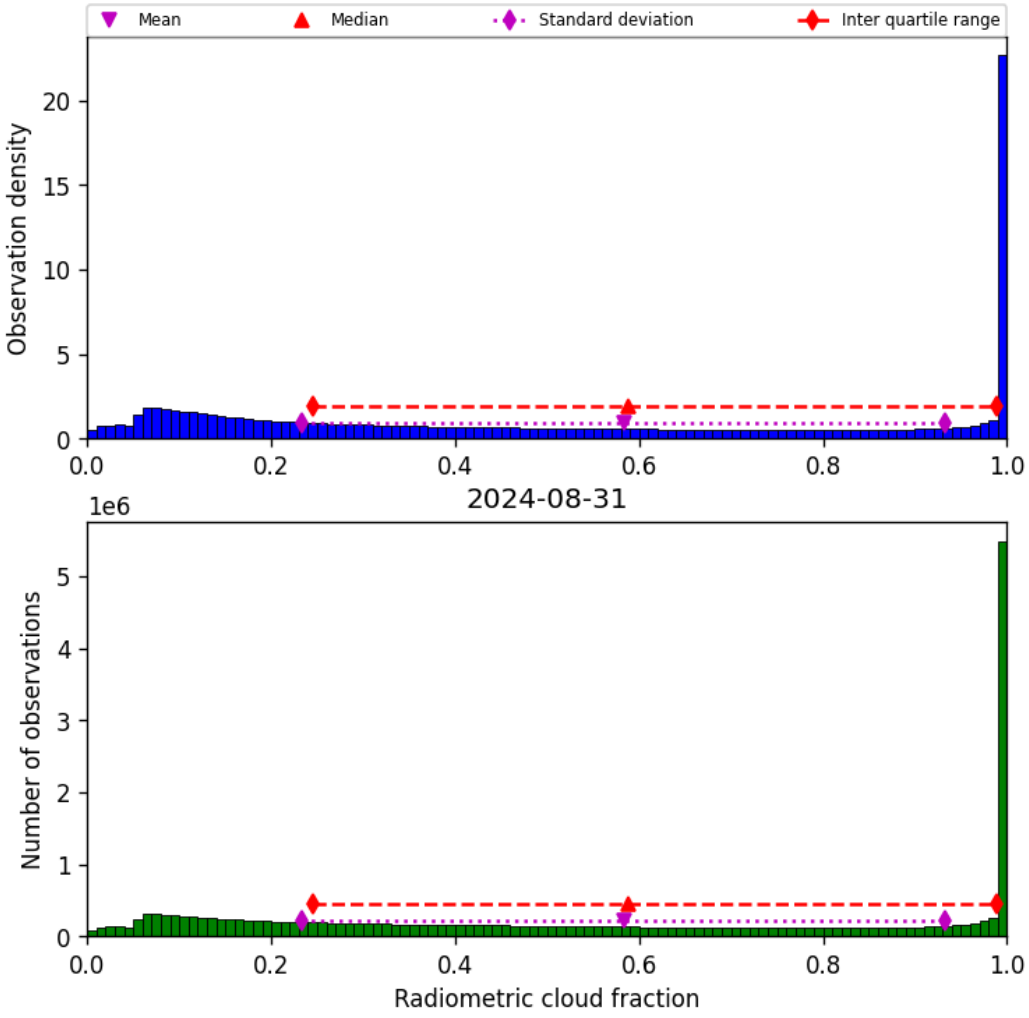

Figure 39: Histogram of “Radiometric cloud fraction” for 2024-08-30 to 2024-09-01

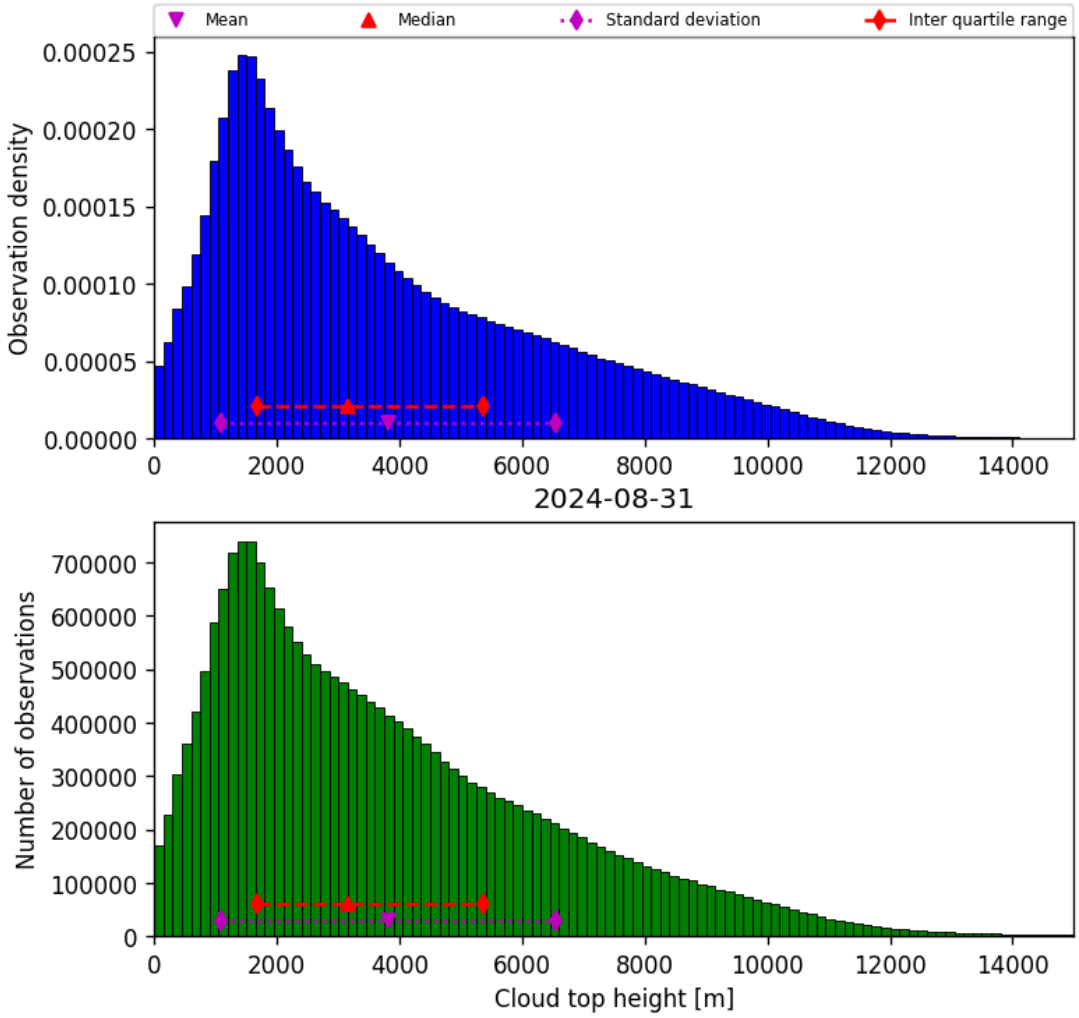

Figure 40: Histogram of “Cloud top height” for 2024-08-30 to 2024-09-01

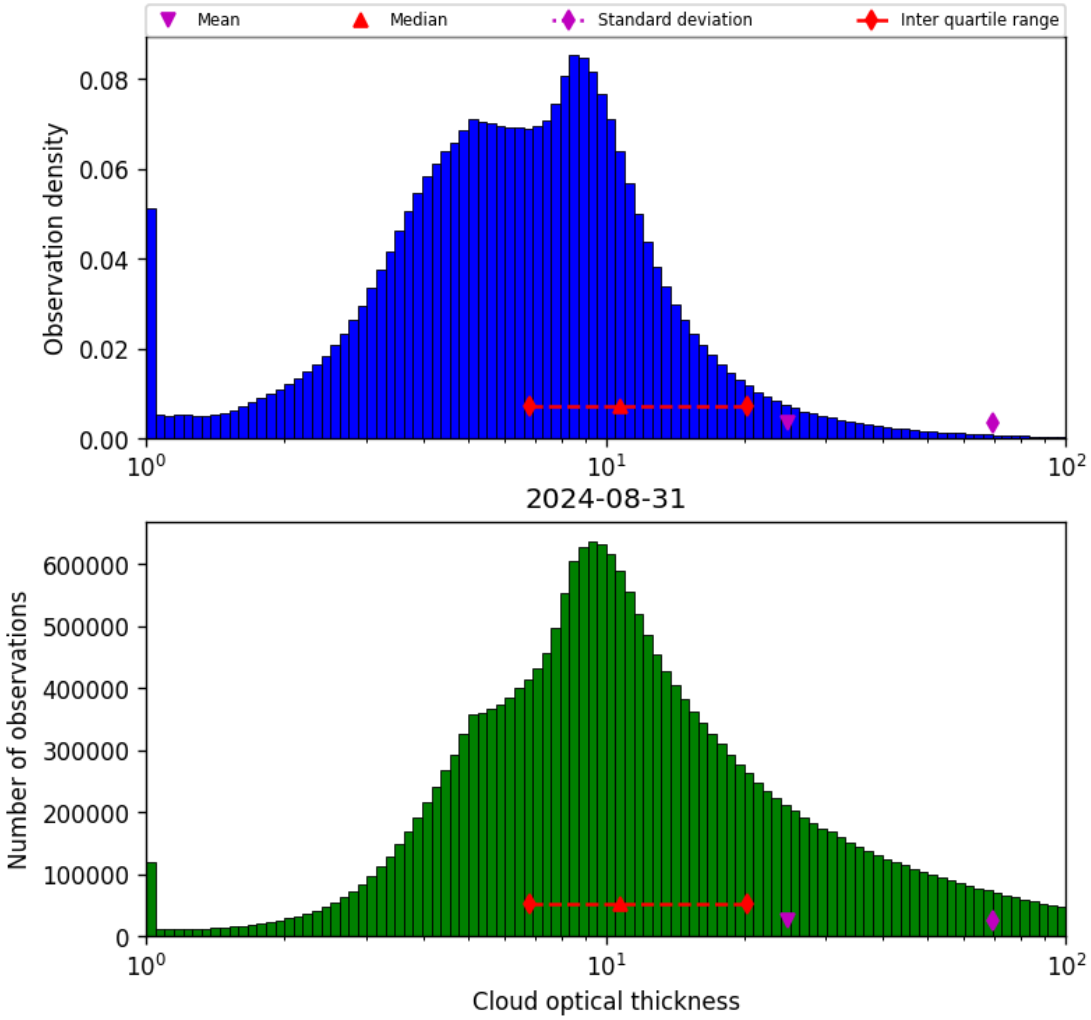

Figure 41: Histogram of “Cloud optical thickness” for 2024-08-30 to 2024-09-01

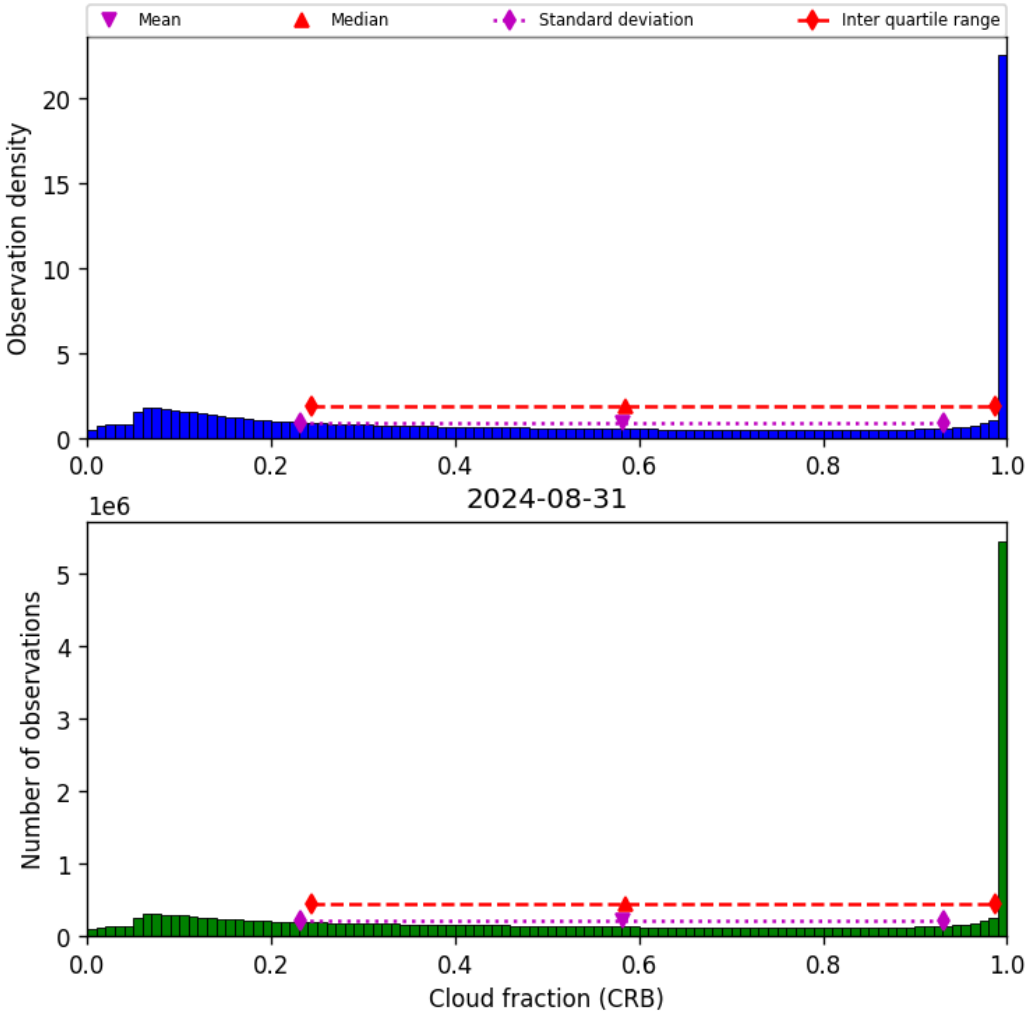

Figure 42: Histogram of “Cloud fraction (CRB)” for 2024-08-30 to 2024-09-01

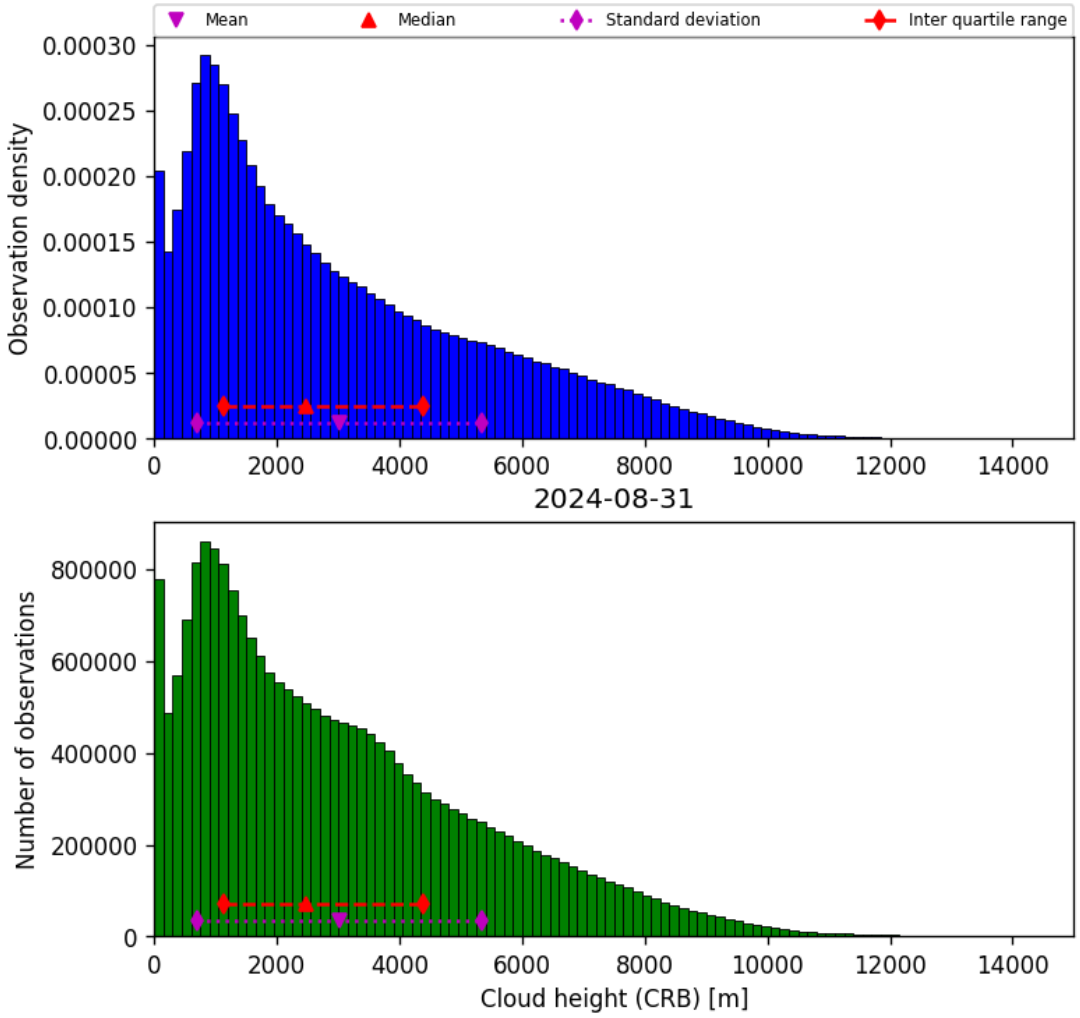

Figure 43: Histogram of “Cloud height (CRB)” for 2024-08-30 to 2024-09-01

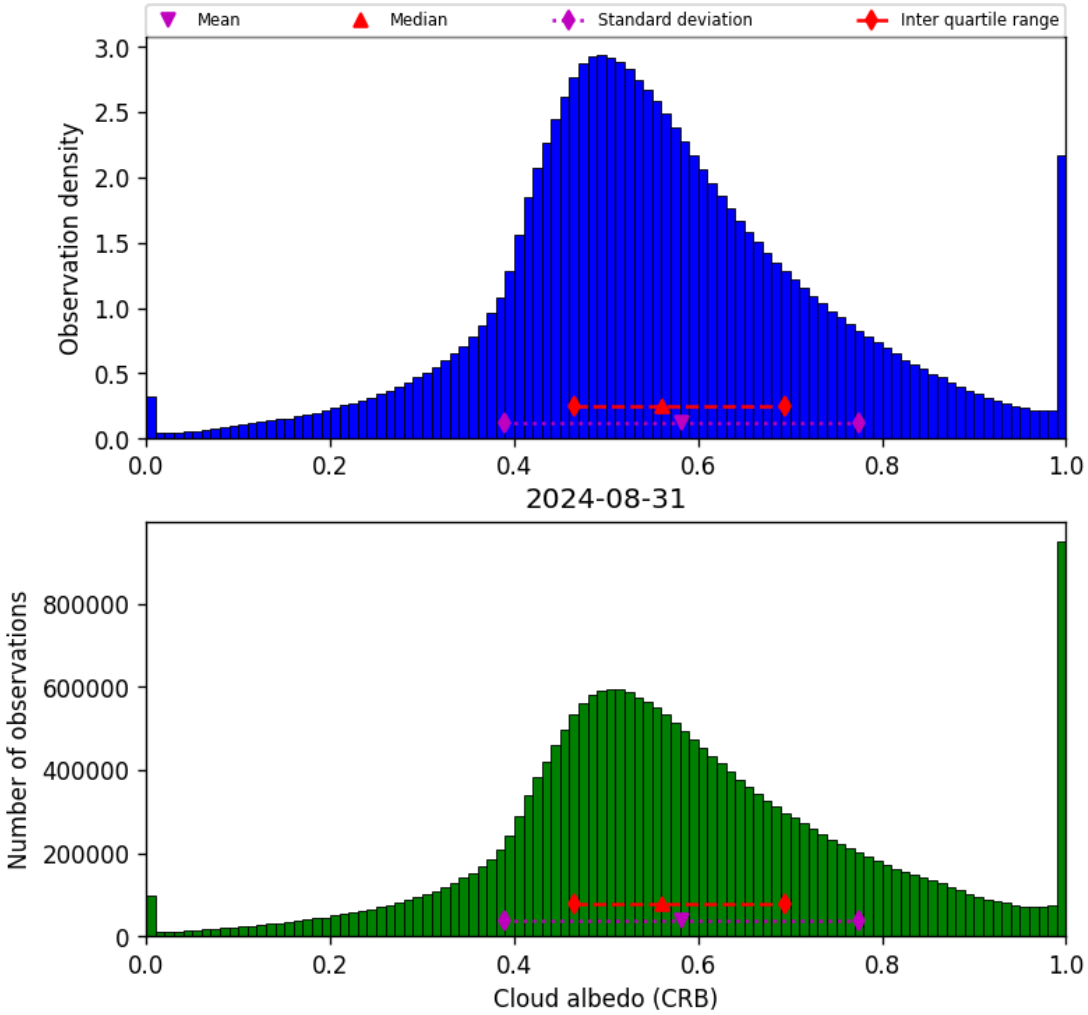

Figure 44: Histogram of “Cloud albedo (CRB)” for 2024-08-30 to 2024-09-01

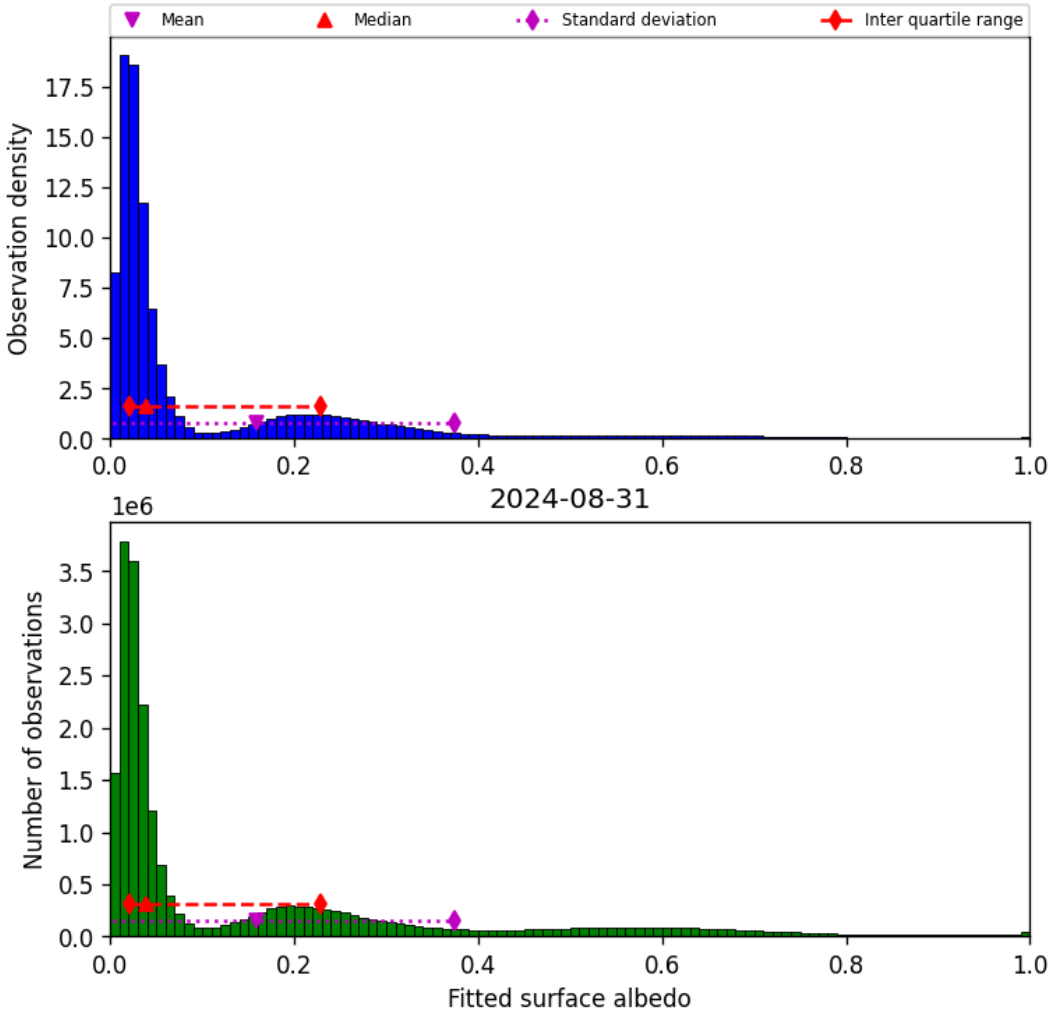

Figure 45: Histogram of “Fitted surface albedo” for 2024-08-30 to 2024-09-01

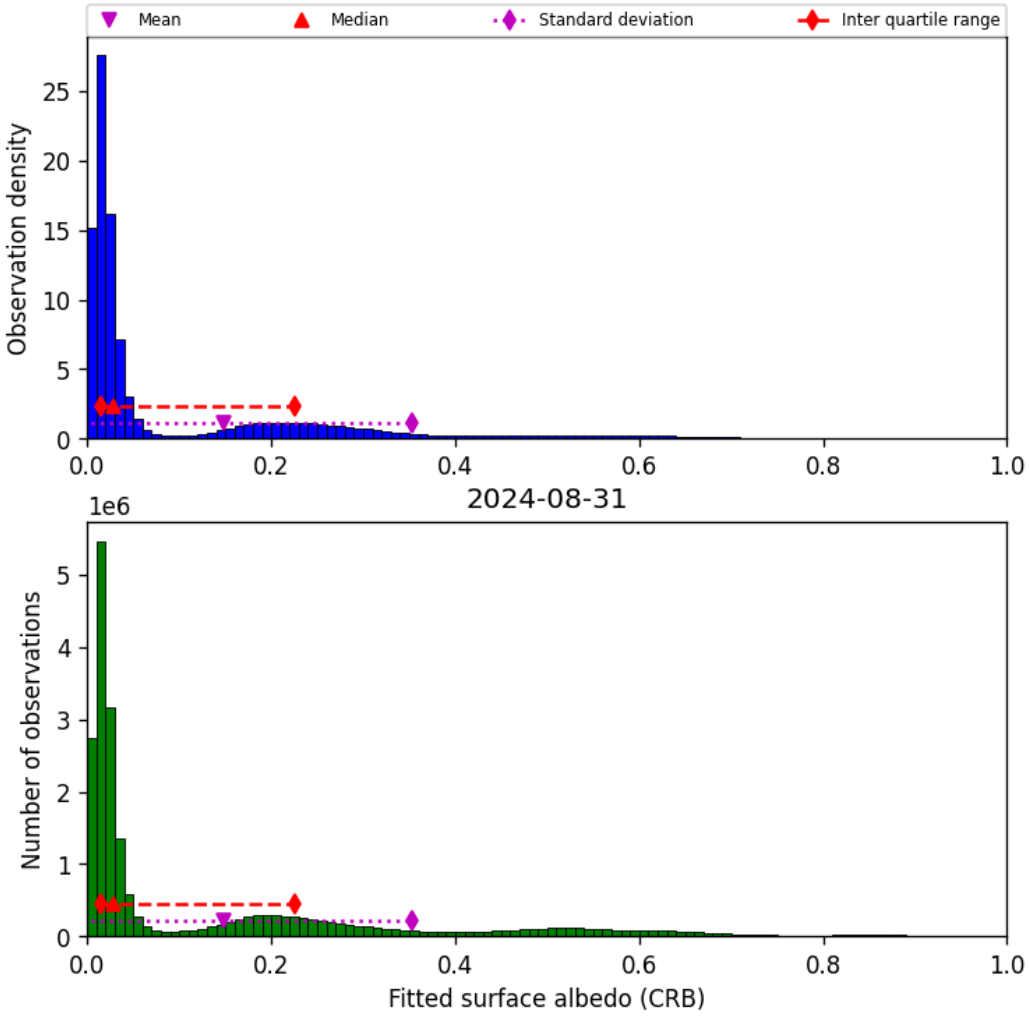

Figure 46: Histogram of “Fitted surface albedo (CRB)” for 2024-08-30 to 2024-09-01

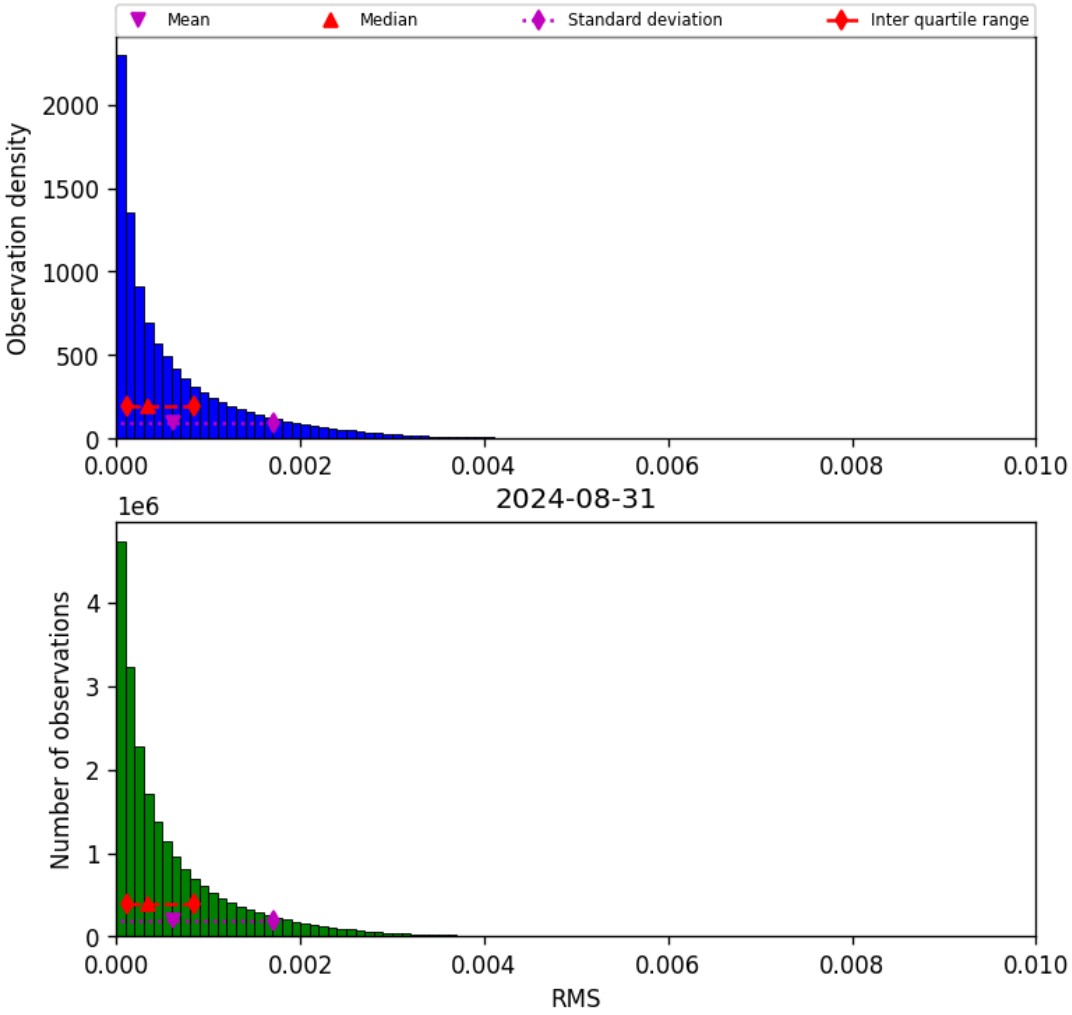

Figure 47: Histogram of “RMS” for 2024-08-30 to 2024-09-01

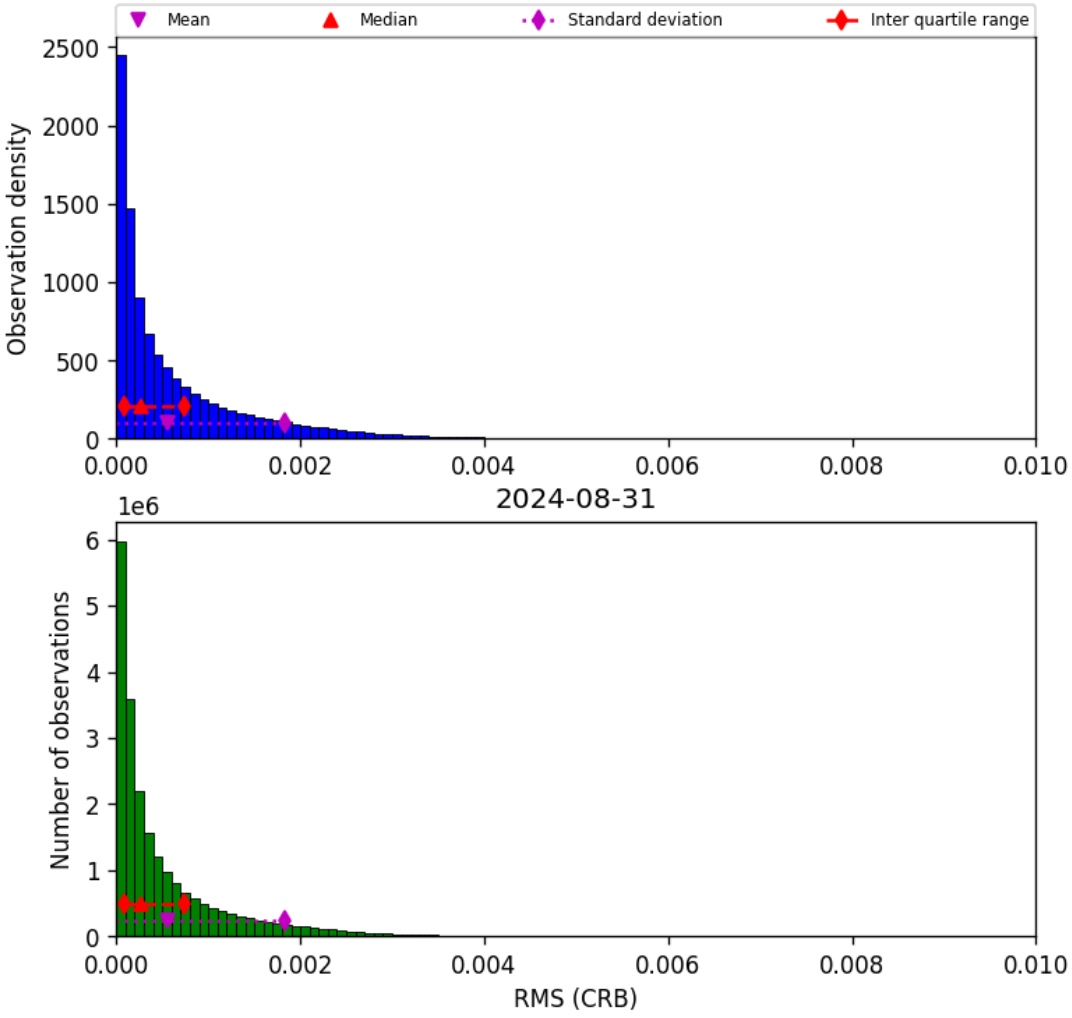

Figure 48: Histogram of “RMS (CRB)” for 2024-08-30 to 2024-09-01

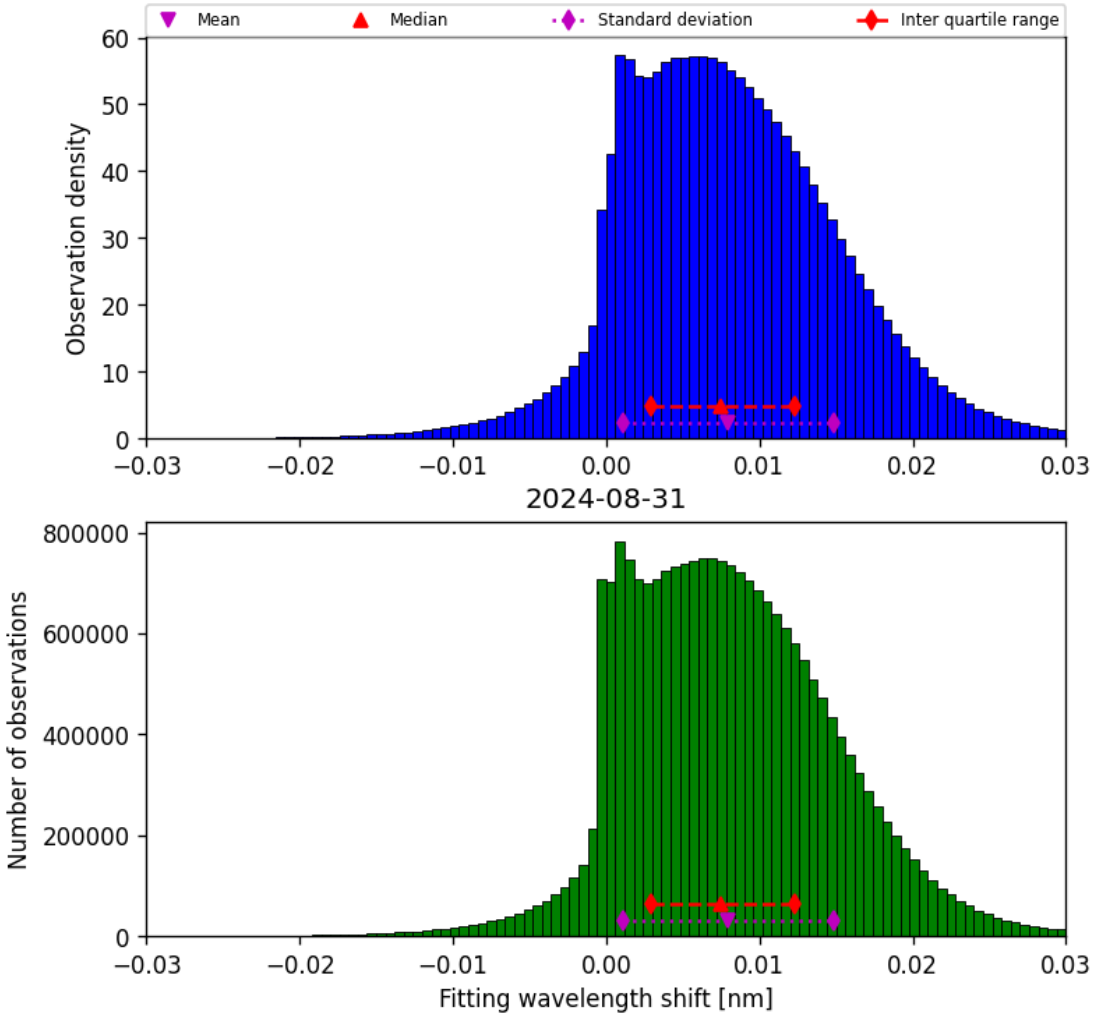

Figure 49: Histogram of “Fitting wavelength shift” for 2024-08-30 to 2024-09-01

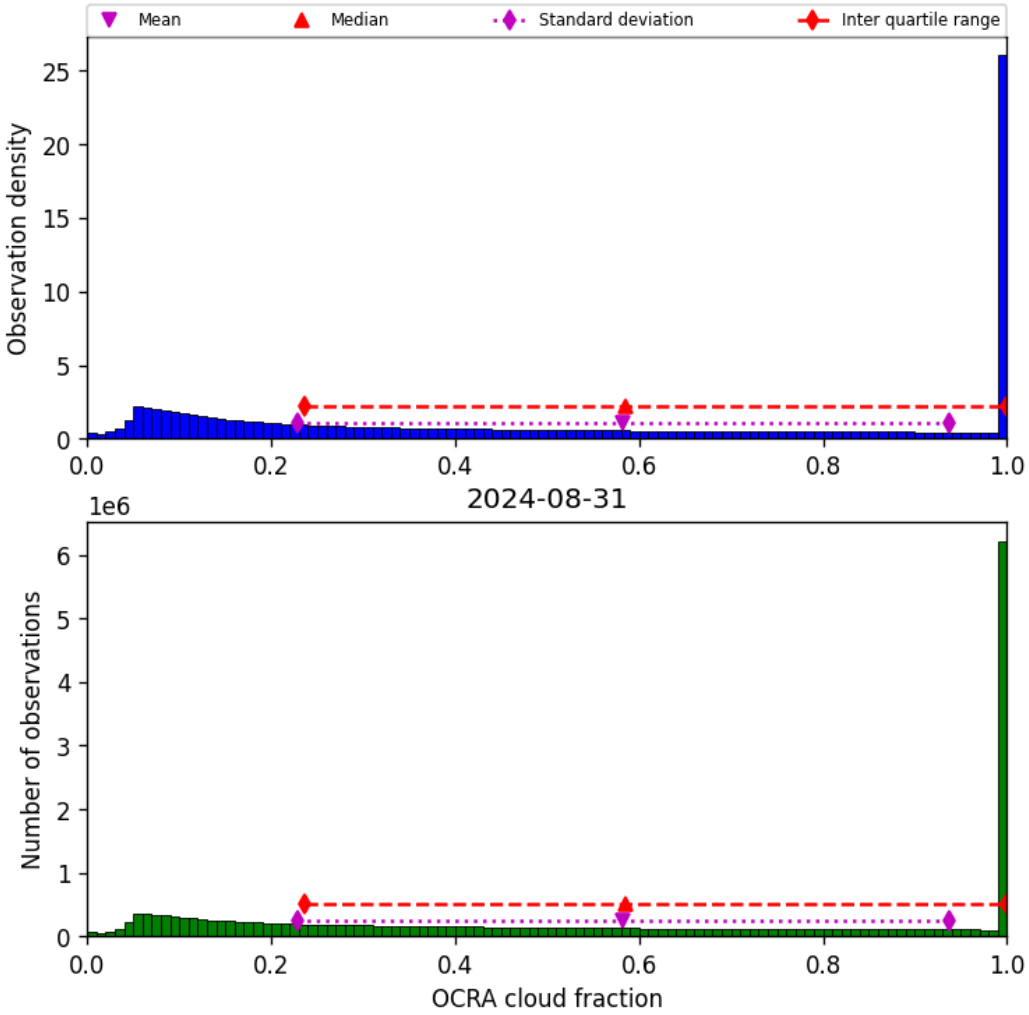

Figure 50: Histogram of “OCRA cloud fraction” for 2024-08-30 to 2024-09-01

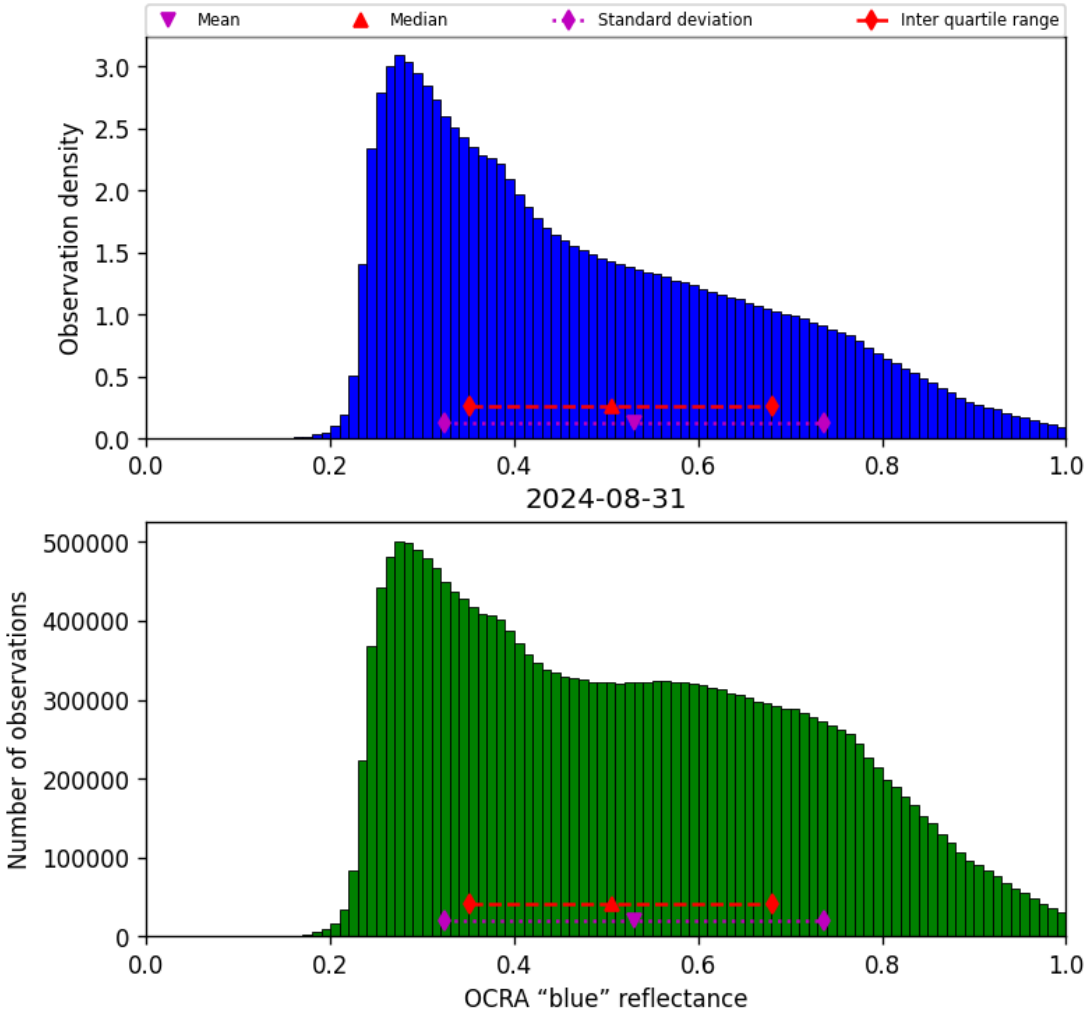

Figure 51: Histogram of “OCRA “blue” reflectance” for 2024-08-30 to 2024-09-01

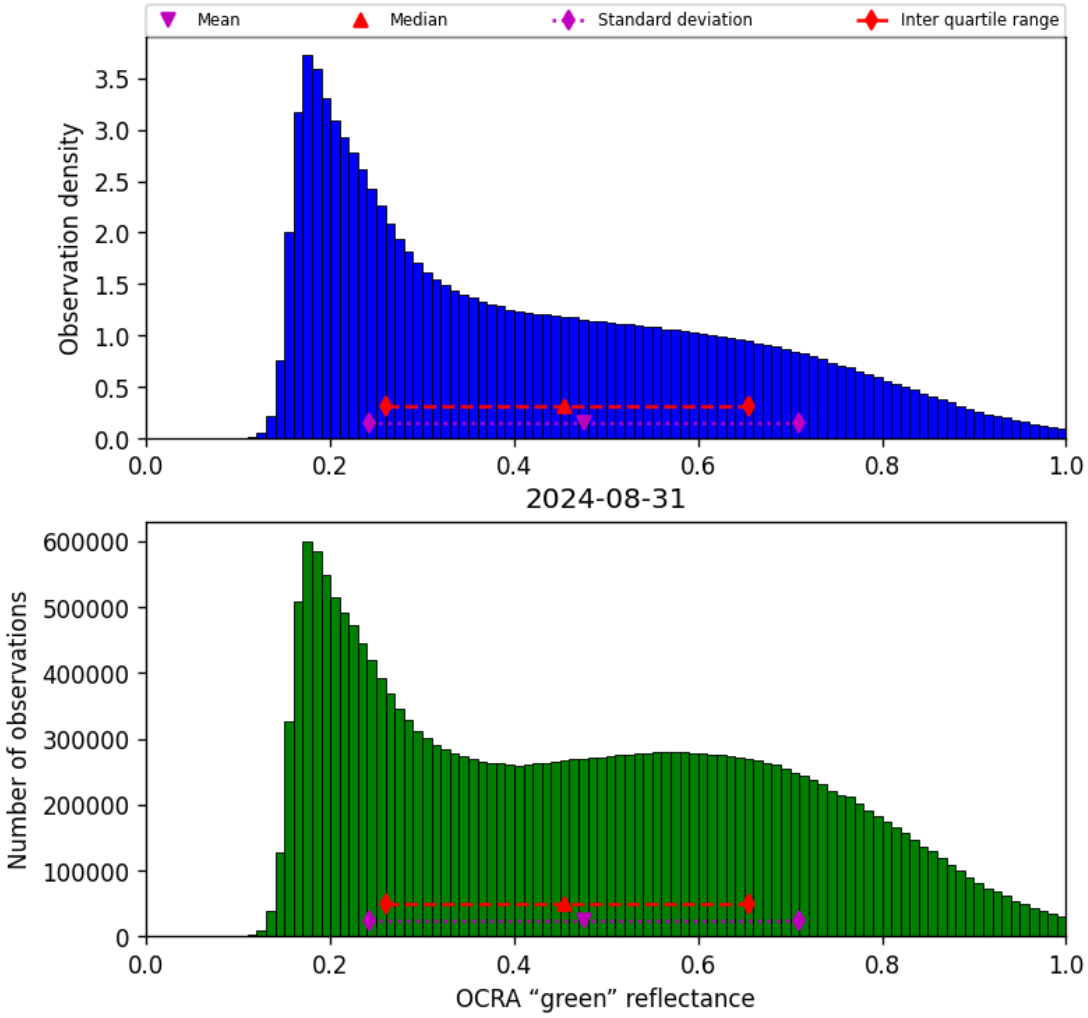

Figure 52: Histogram of “OCRA “green” reflectance” for 2024-08-30 to 2024-09-01

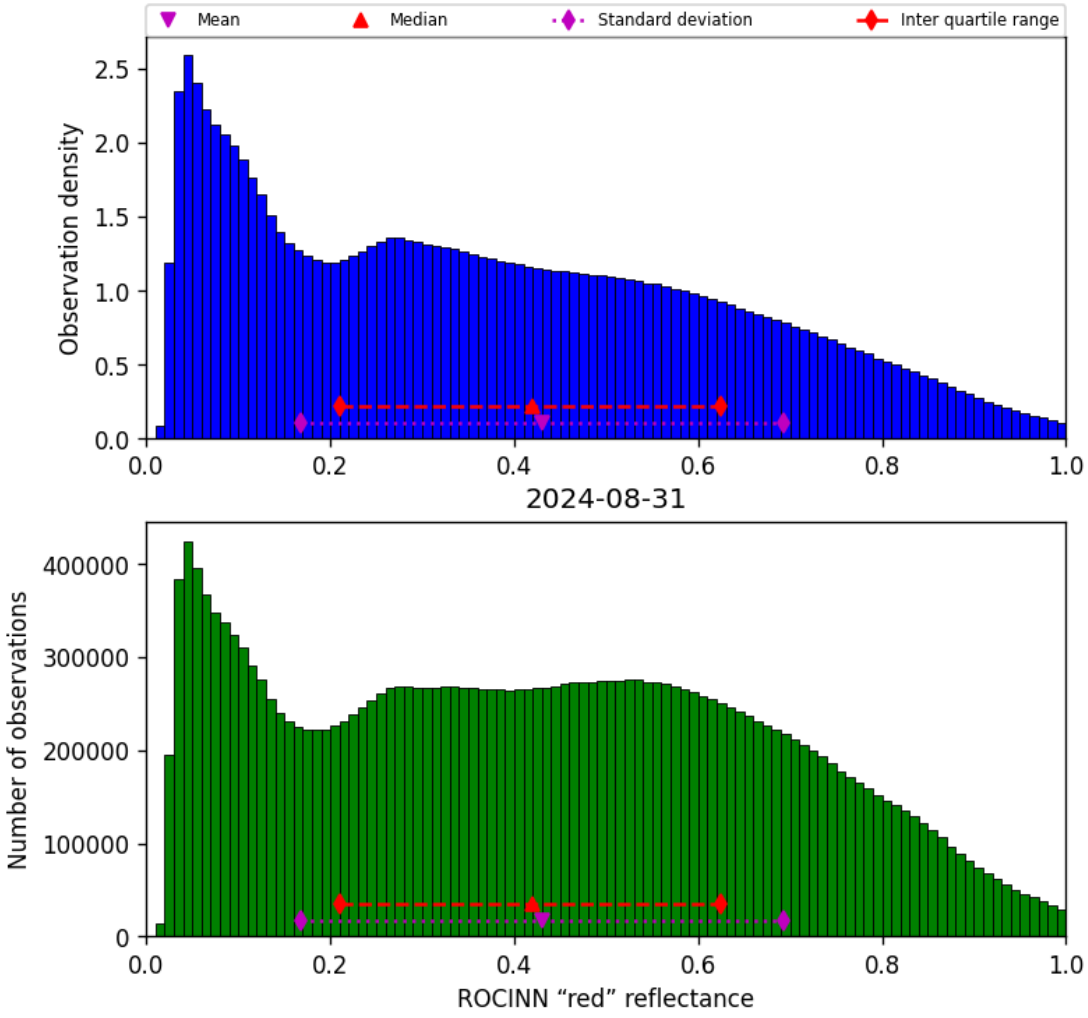

Figure 53: Histogram of “ROCINN “red” reflectance” for 2024-08-30 to 2024-09-01

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.

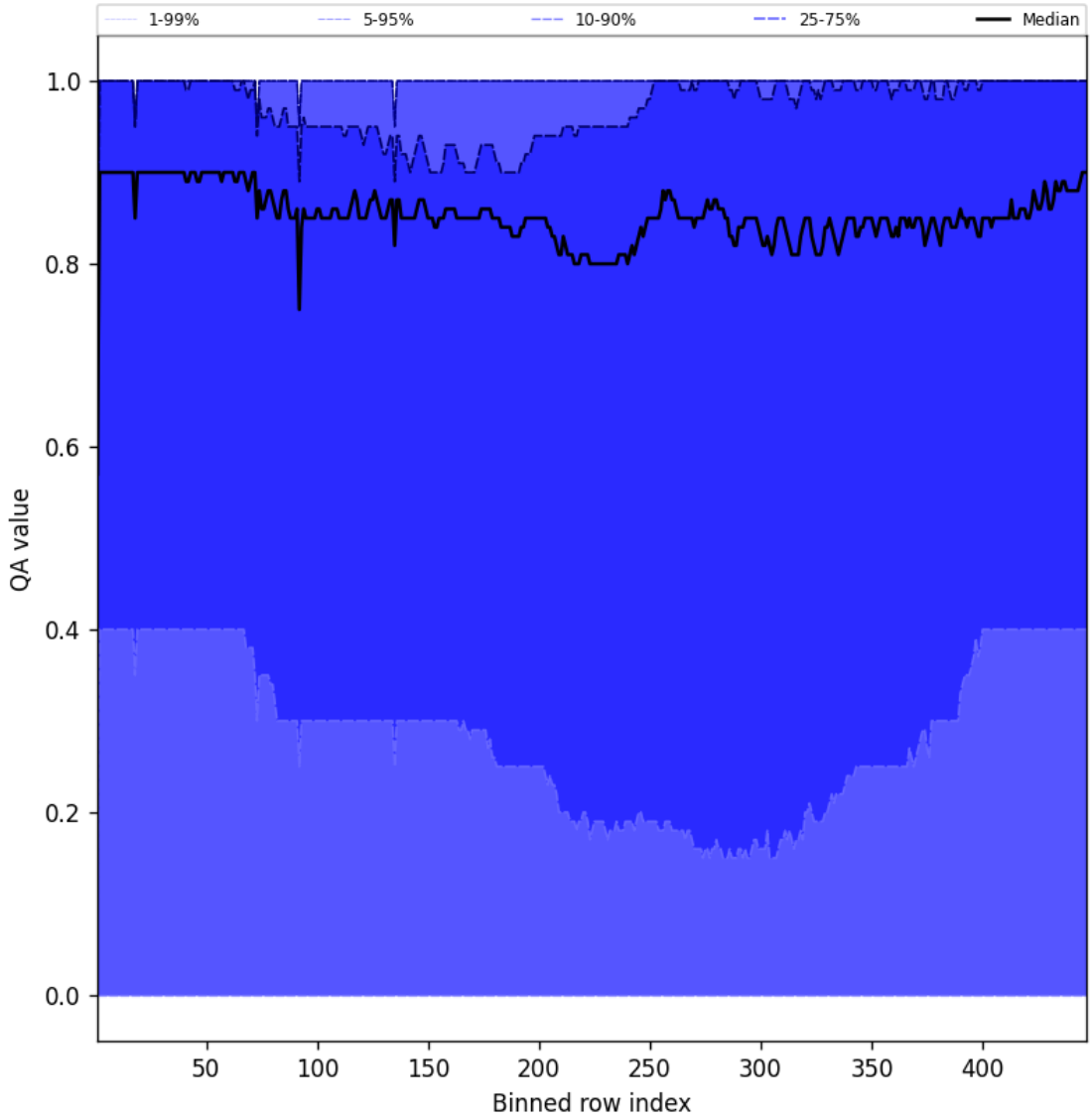

Figure 54: Along track statistics of “QA value” for 2024-08-30 to 2024-09-01

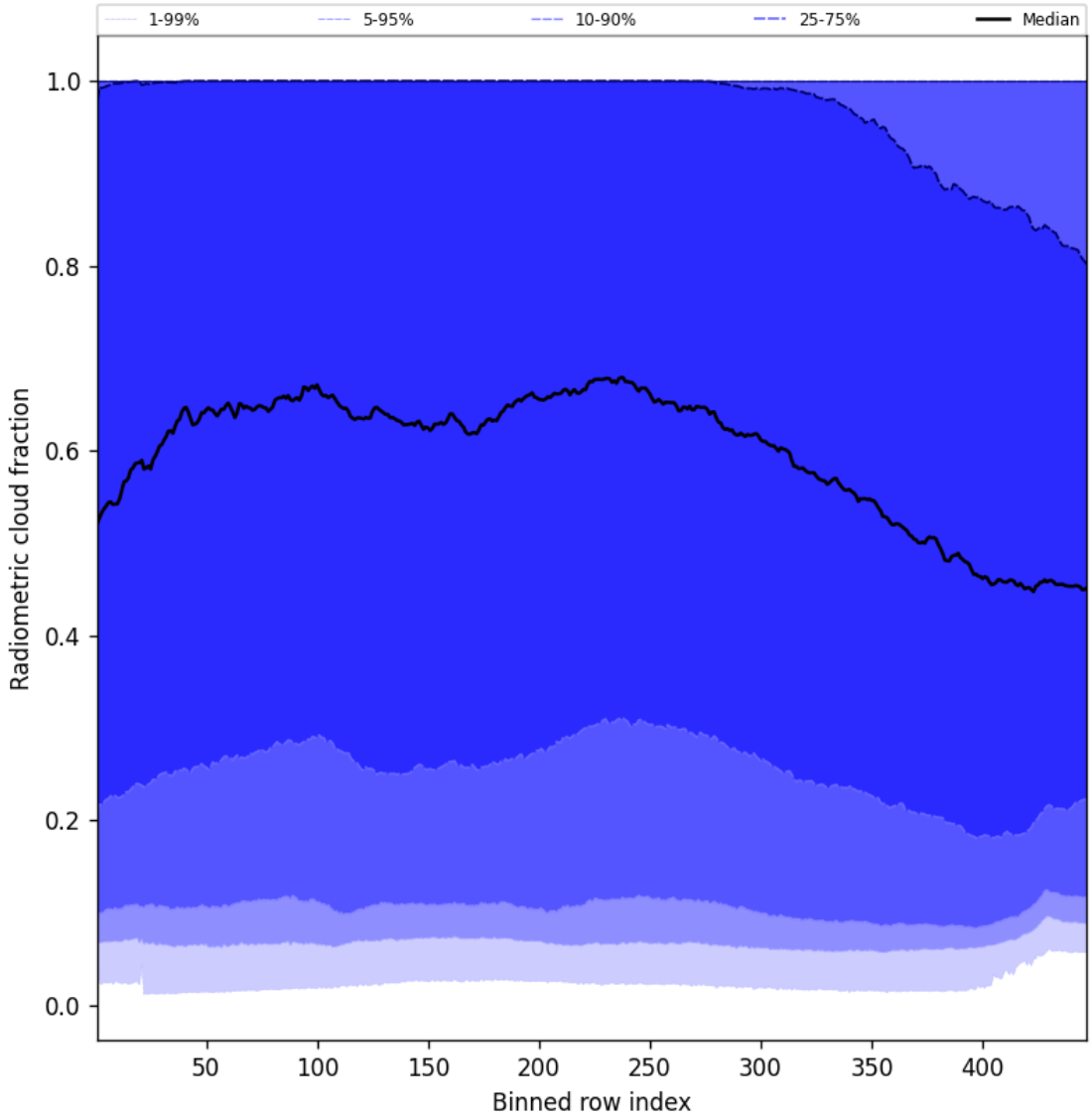

Figure 55: Along track statistics of “Radiometric cloud fraction” for 2024-08-30 to 2024-09-01

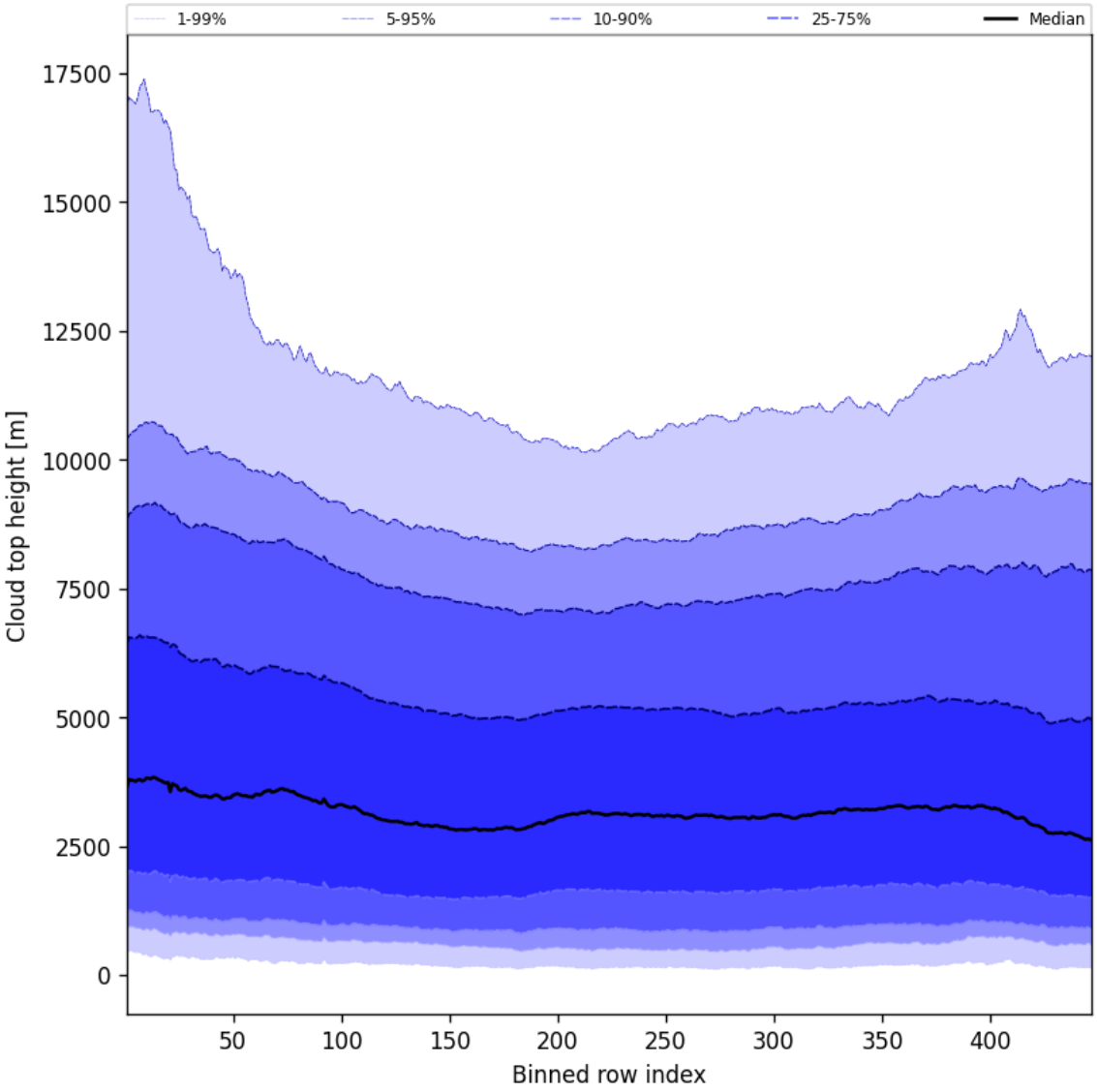

Figure 56: Along track statistics of “Cloud top height” for 2024-08-30 to 2024-09-01

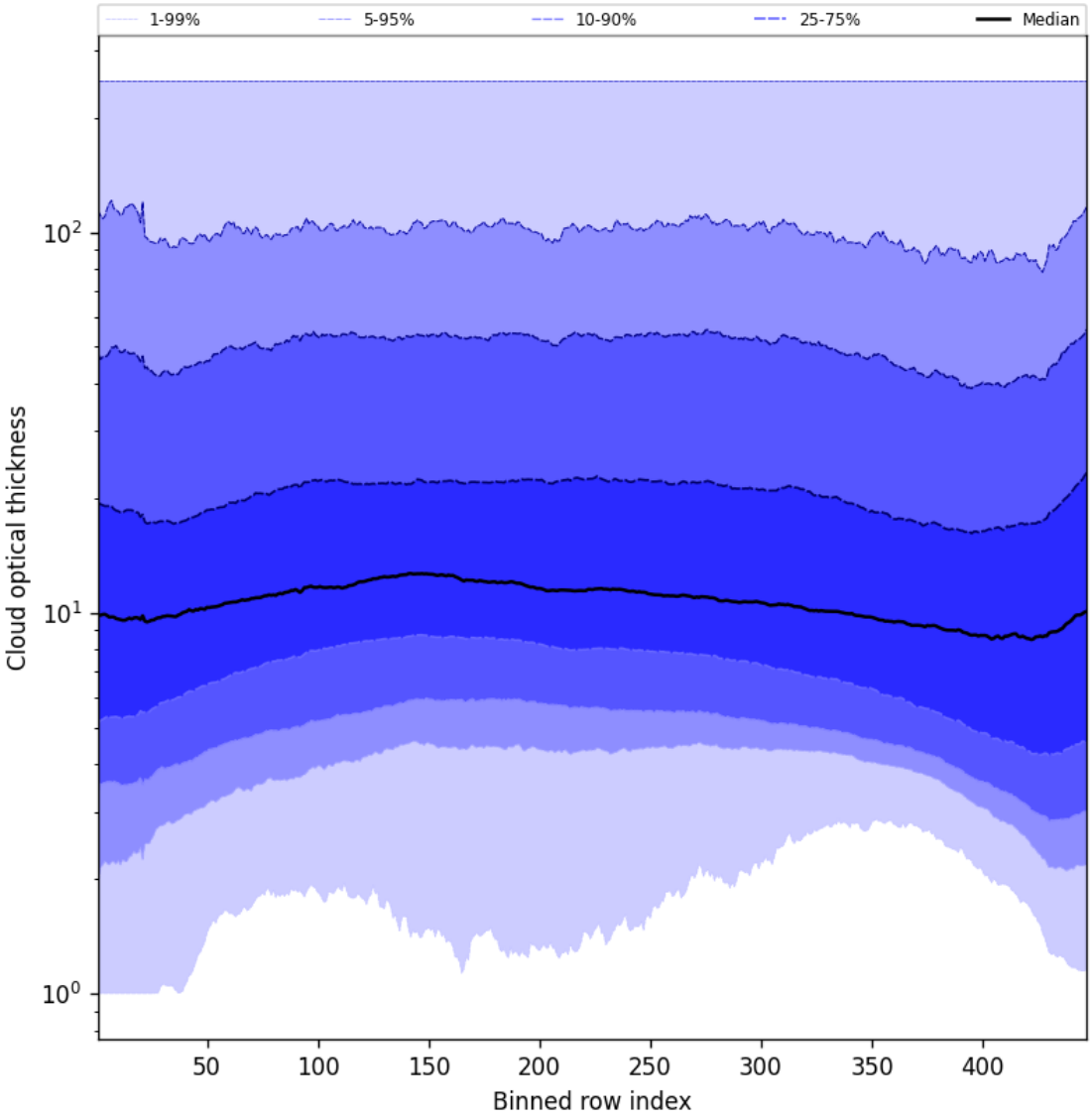

Figure 57: Along track statistics of “Cloud optical thickness” for 2024-08-30 to 2024-09-01

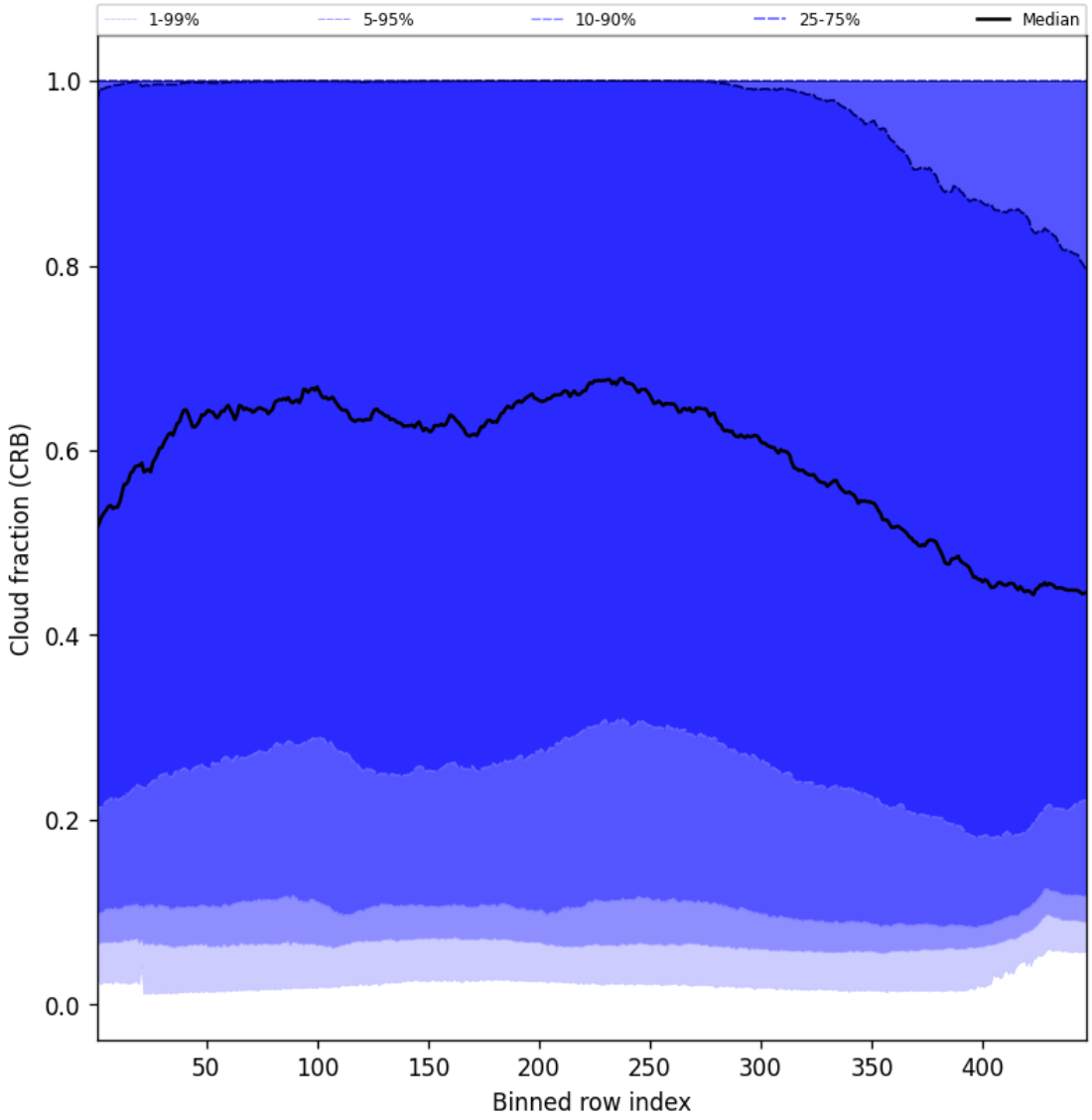

Figure 58: Along track statistics of “Cloud fraction (CRB)” for 2024-08-30 to 2024-09-01

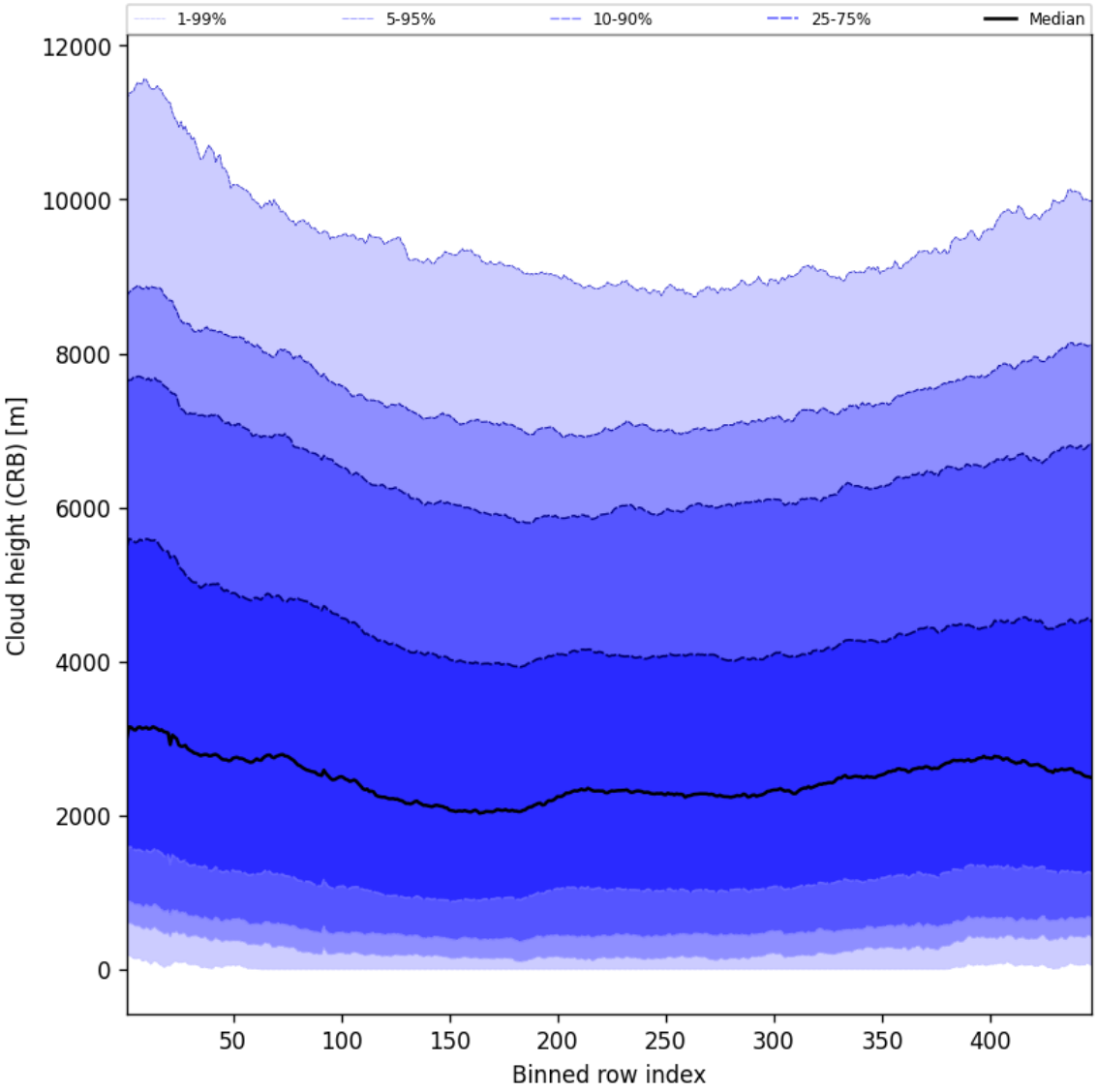

Figure 59: Along track statistics of “Cloud height (CRB)” for 2024-08-30 to 2024-09-01

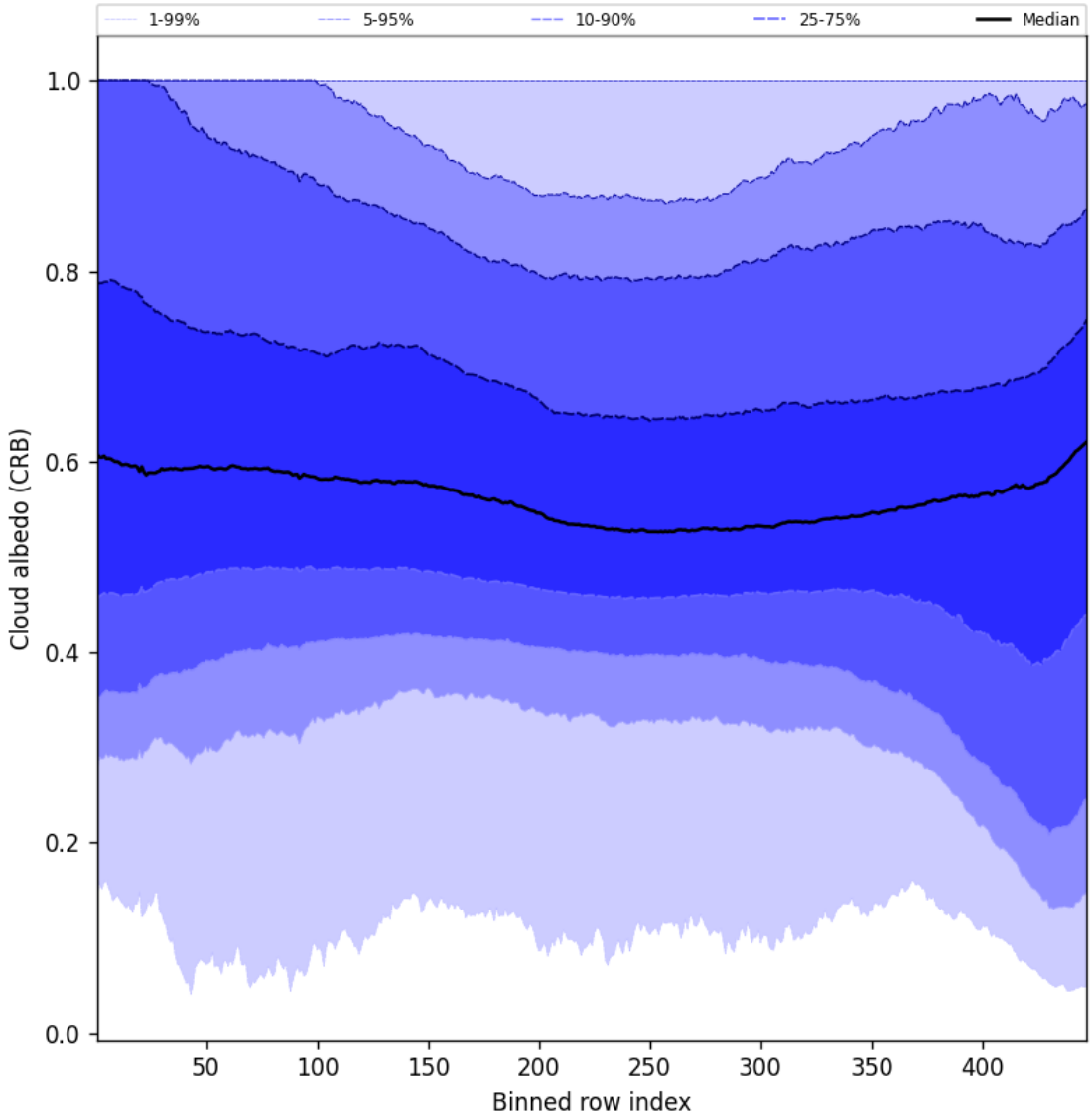

Figure 60: Along track statistics of “Cloud albedo (CRB)” for 2024-08-30 to 2024-09-01

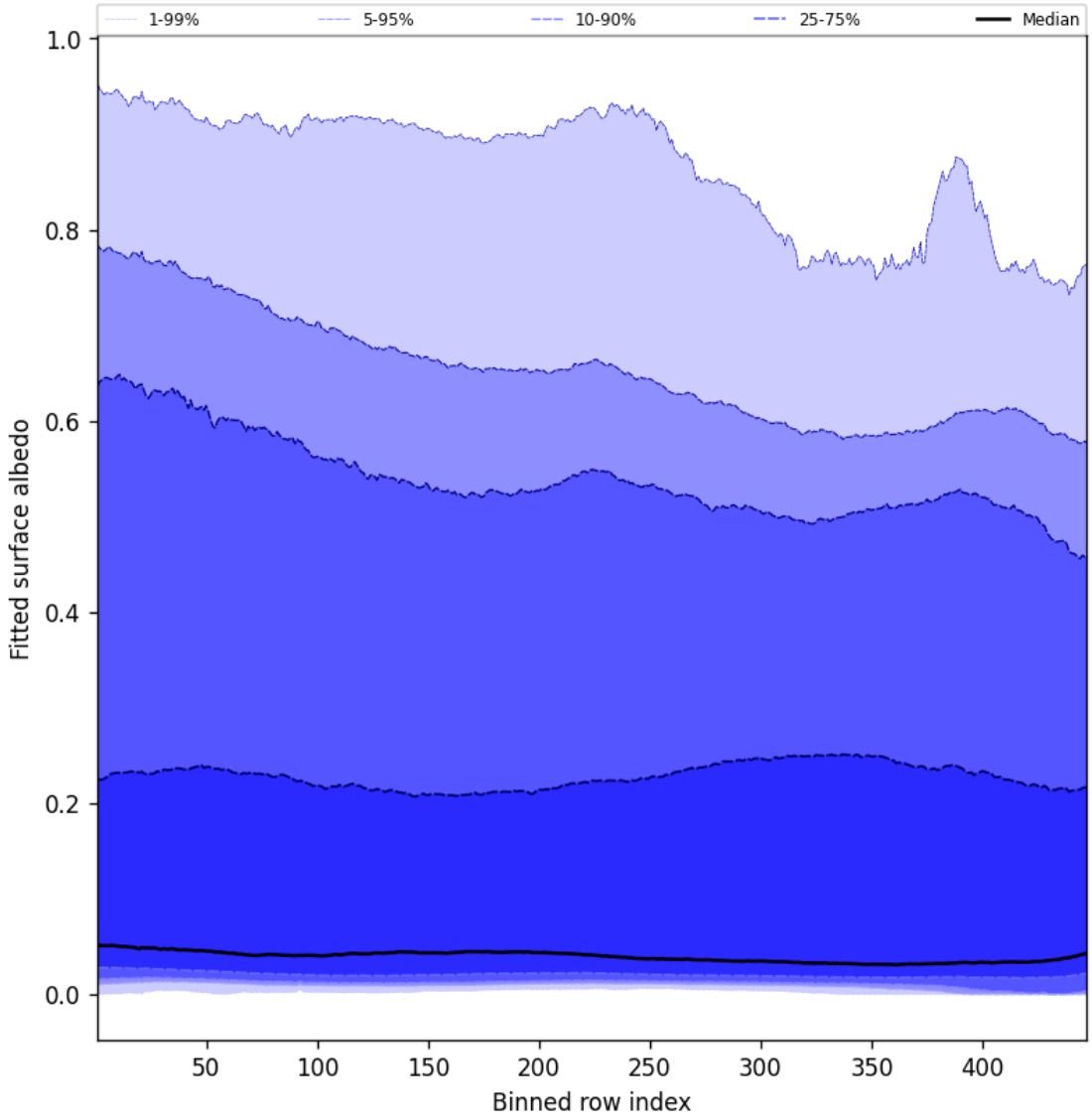

Figure 61: Along track statistics of “Fitted surface albedo” for 2024-08-30 to 2024-09-01

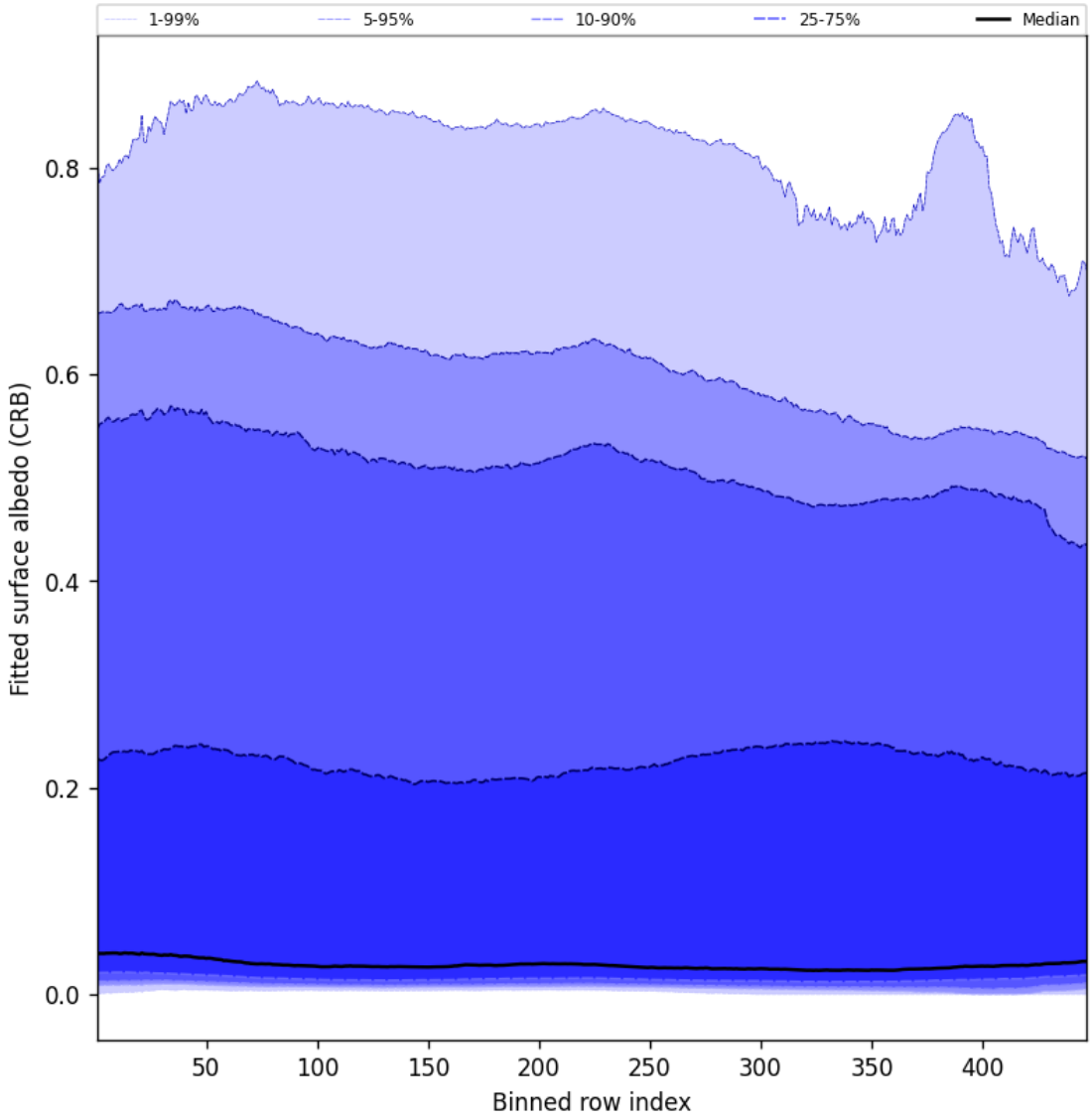

Figure 62: Along track statistics of “Fitted surface albedo (CRB)” for 2024-08-30 to 2024-09-01

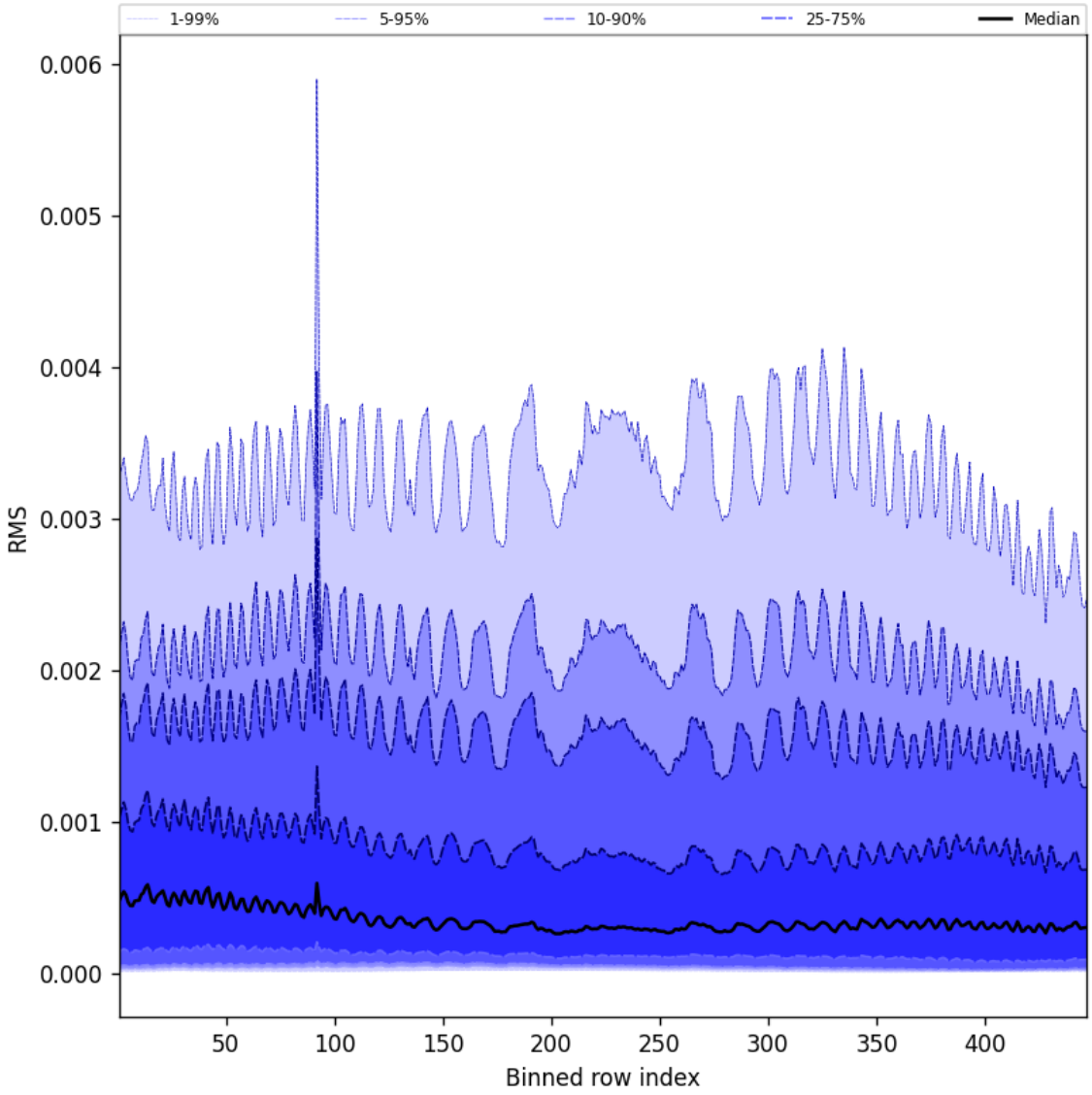

Figure 63: Along track statistics of “RMS” for 2024-08-30 to 2024-09-01

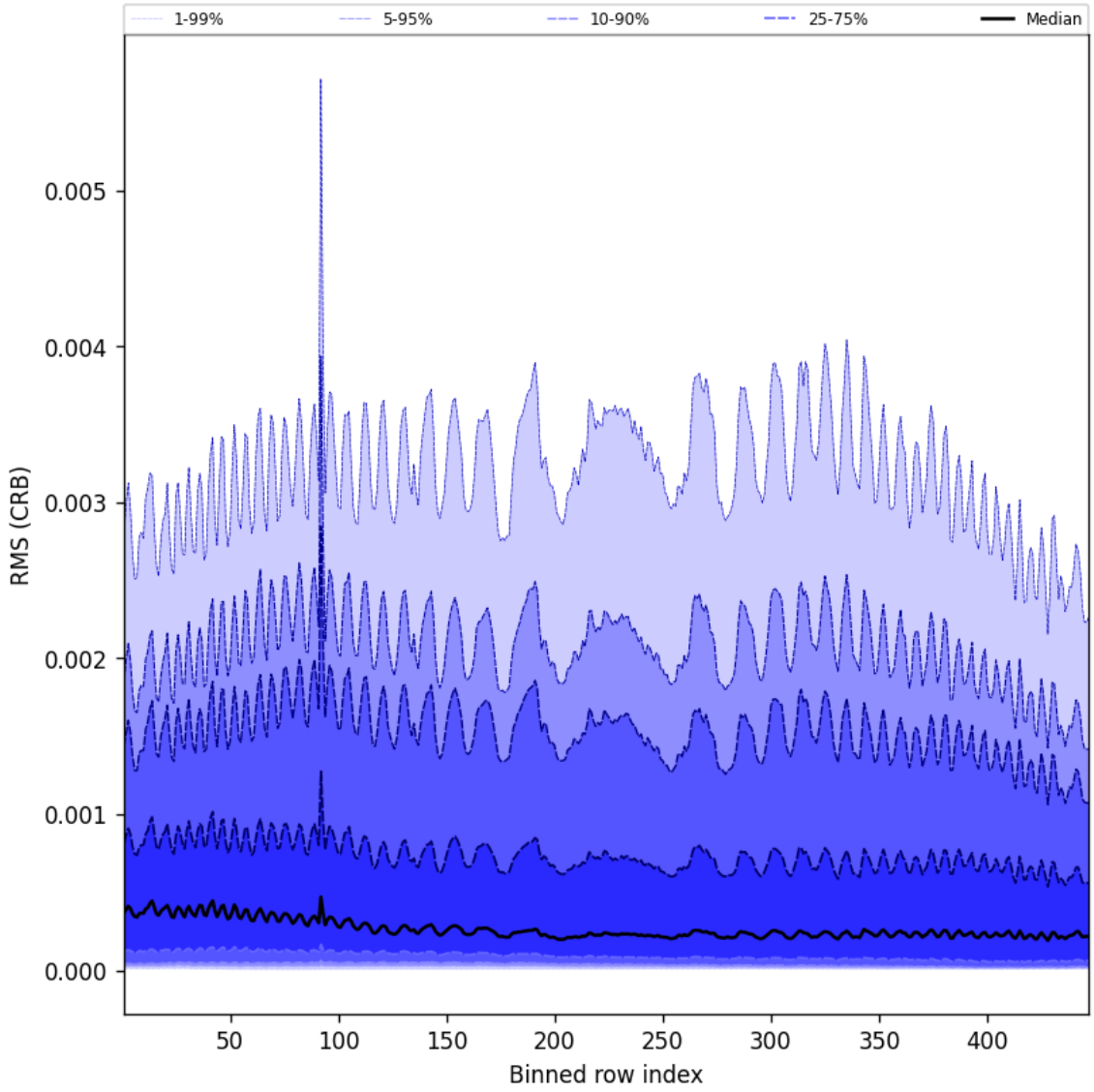

Figure 64: Along track statistics of “RMS (CRB)” for 2024-08-30 to 2024-09-01

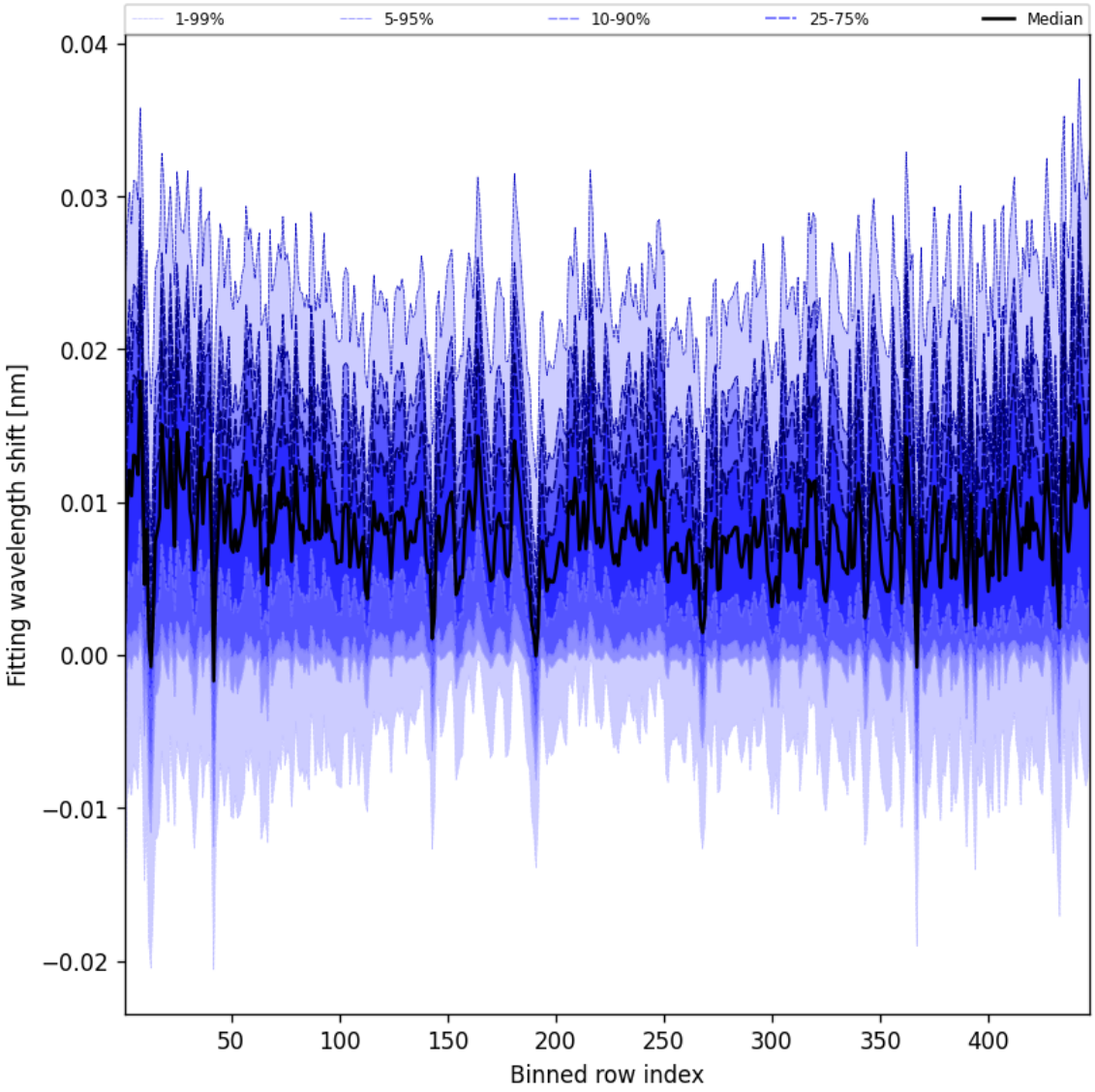

Figure 65: Along track statistics of “Fitting wavelength shift” for 2024-08-30 to 2024-09-01

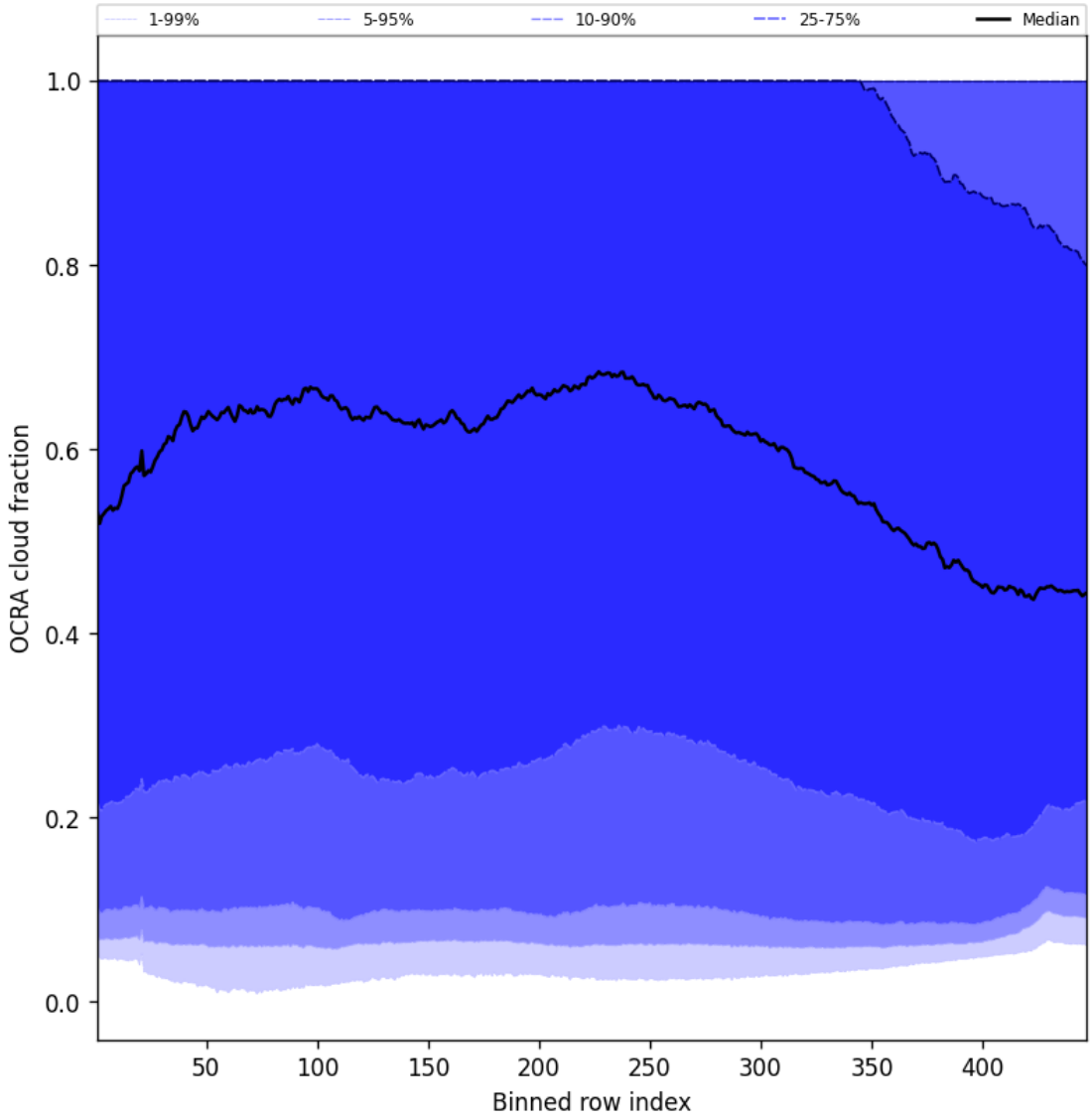

Figure 66: Along track statistics of “OCRA cloud fraction” for 2024-08-30 to 2024-09-01

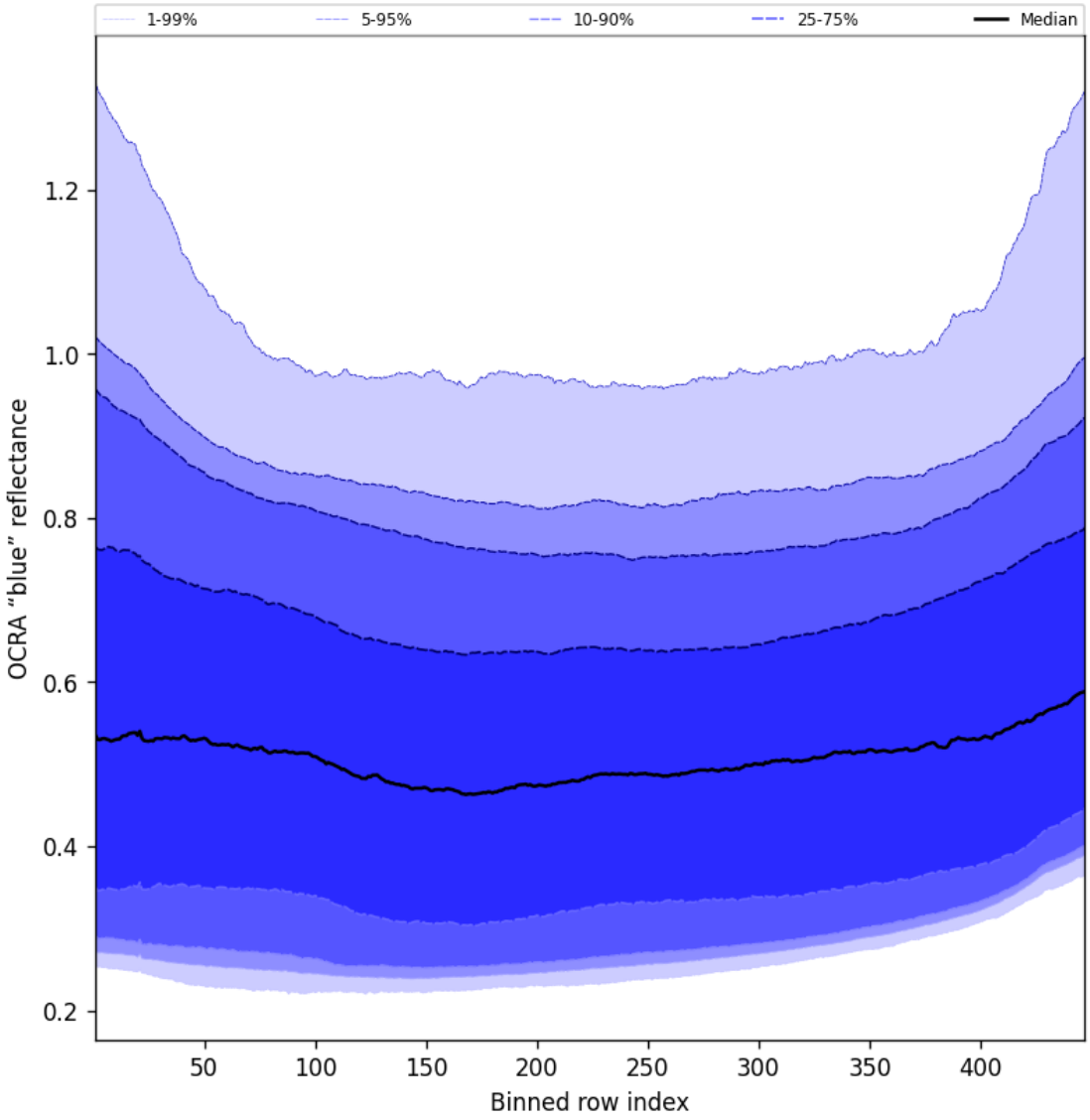

Figure 67: Along track statistics of “OCRA “blue” reflectance” for 2024-08-30 to 2024-09-01

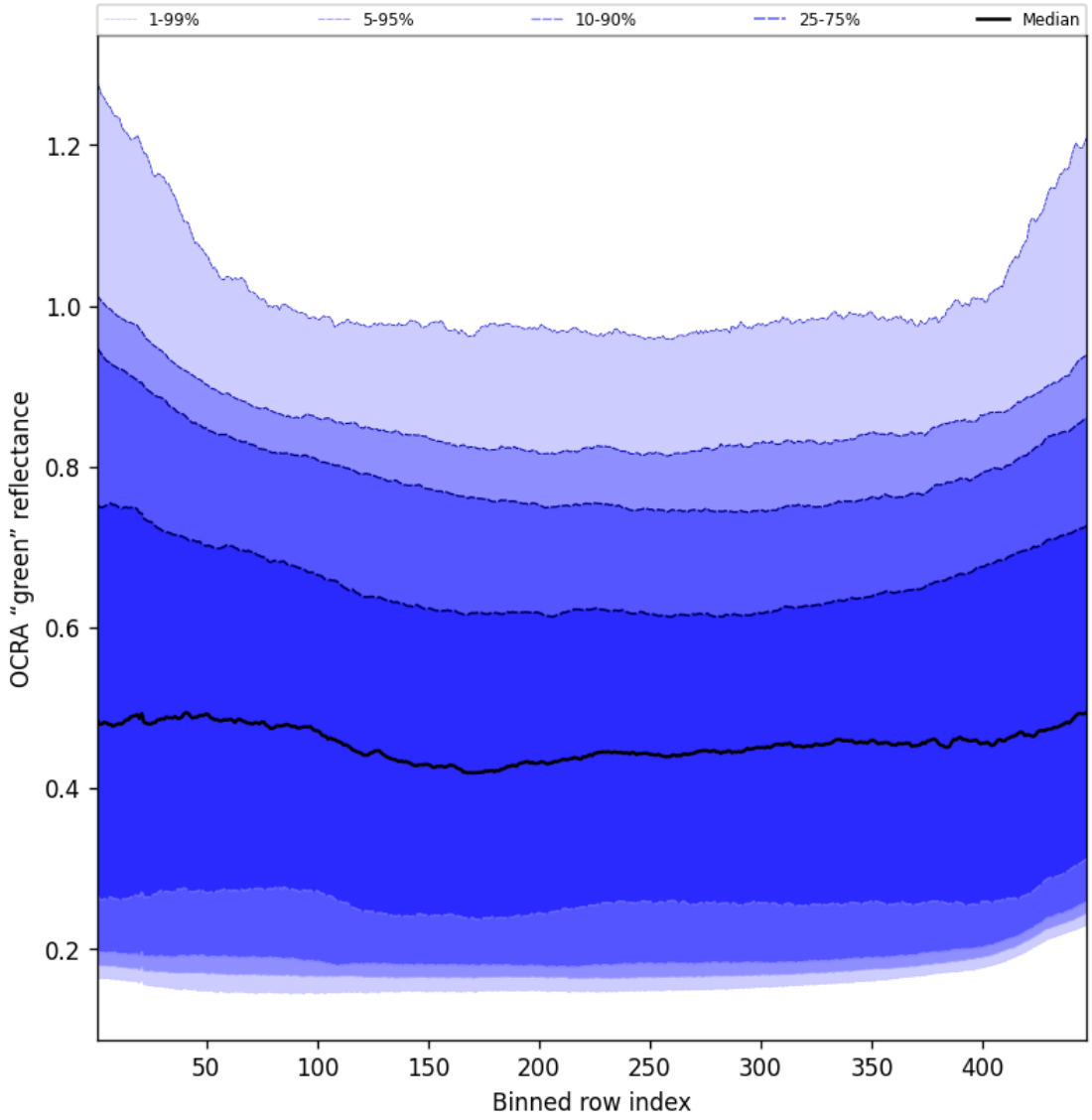

Figure 68: Along track statistics of "OCRA "green" reflectance" for 2024-08-30 to 2024-09-01

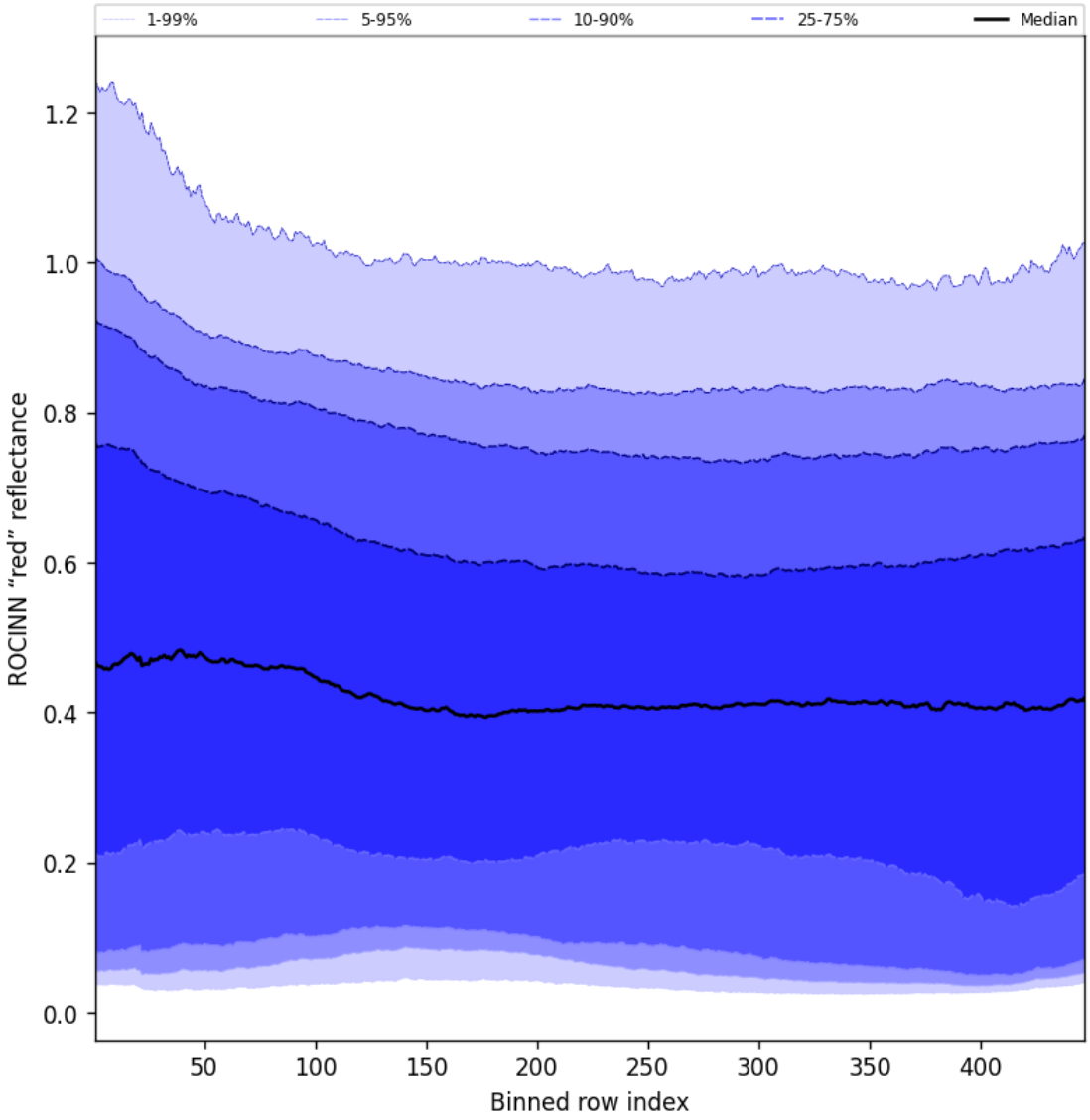

Figure 69: Along track statistics of “ROCINN “red” reflectance” for 2024-08-30 to 2024-09-01

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.

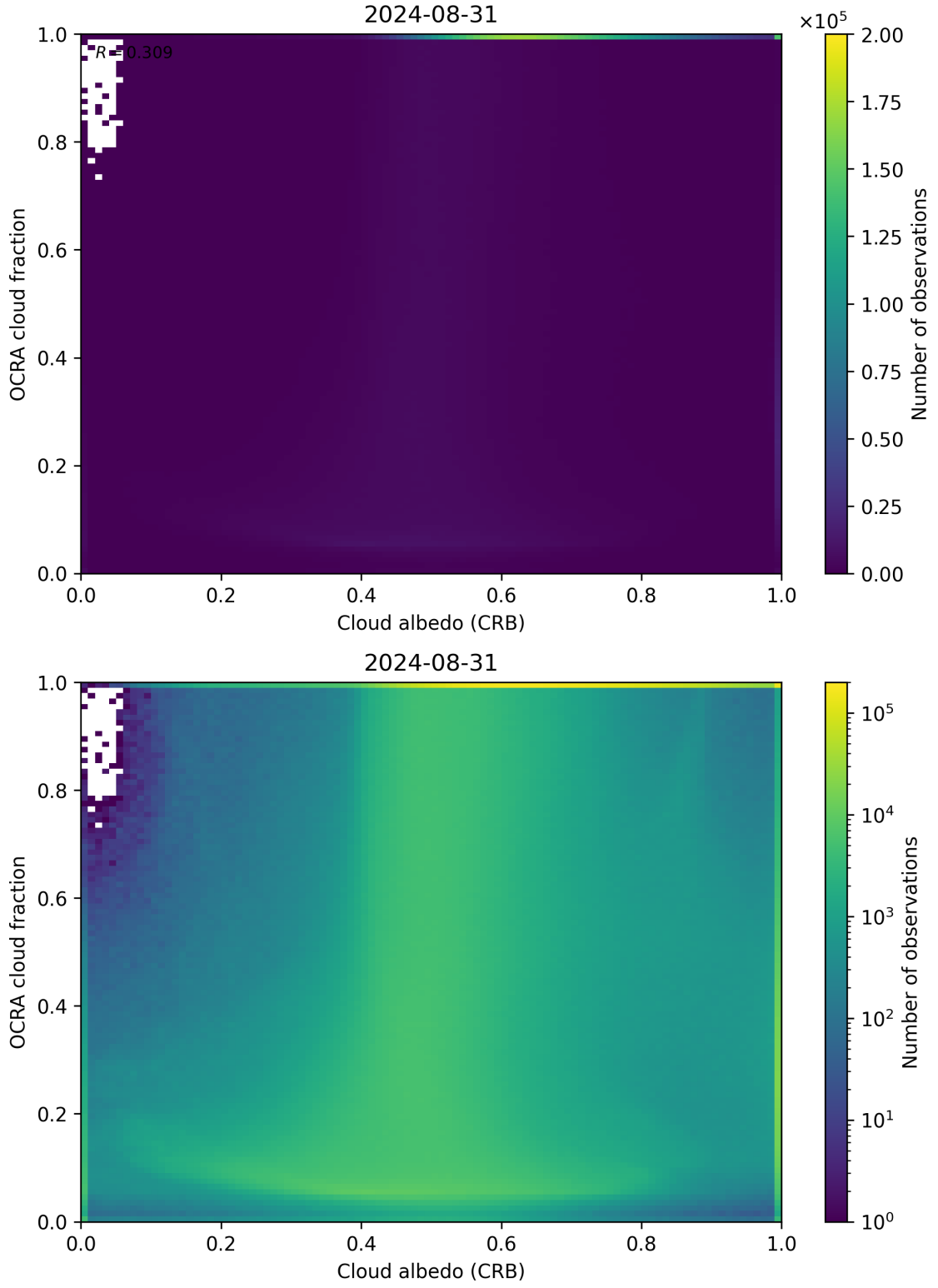

Figure 70: Scatter density plot of "Cloud albedo (CRB)" against "OCRA cloud fraction" for 2024-08-30 to 2024-09-01.

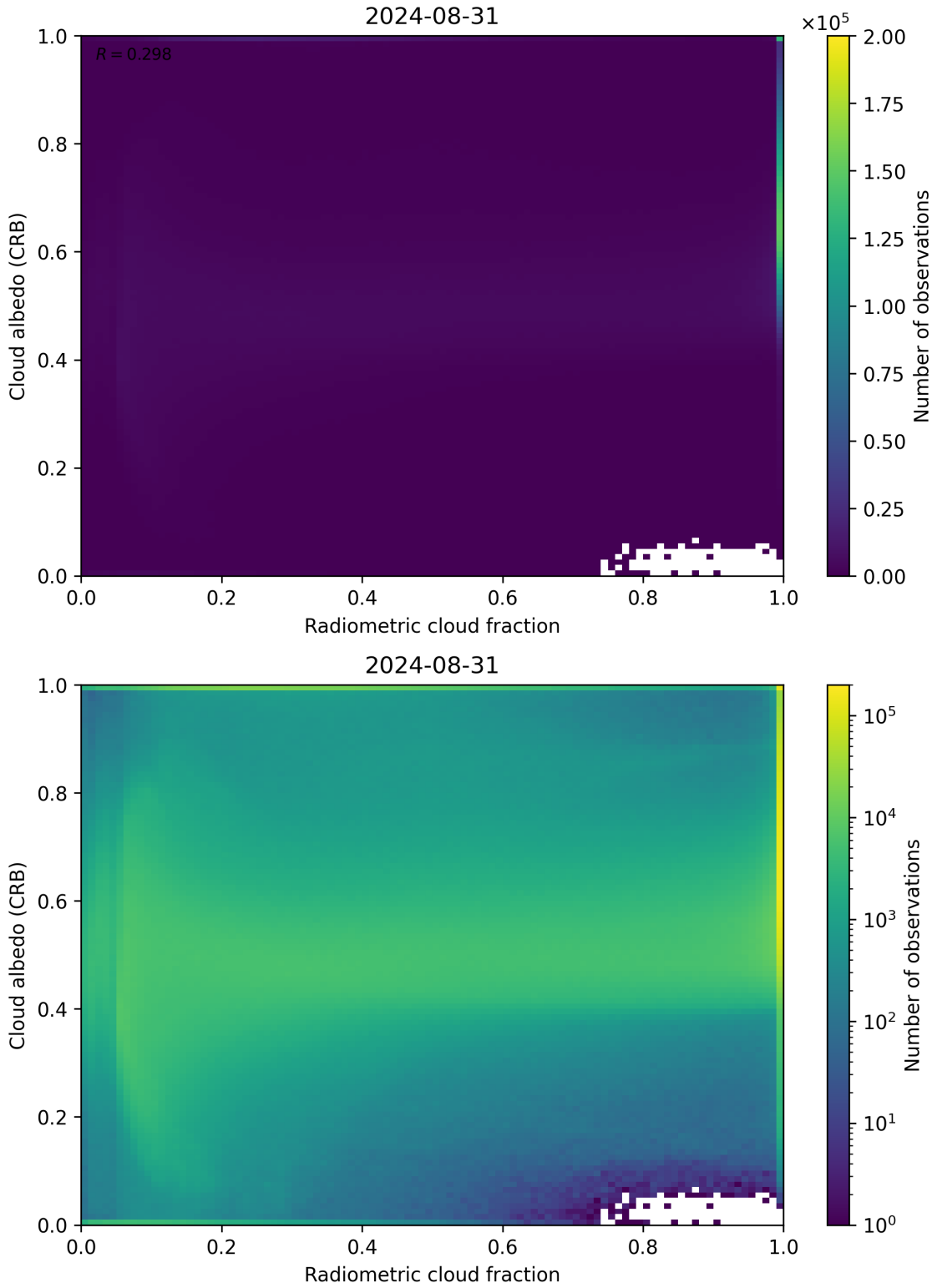

Figure 71: Scatter density plot of “Radiometric cloud fraction” against “Cloud albedo (CRB)” for 2024-08-30 to 2024-09-01.

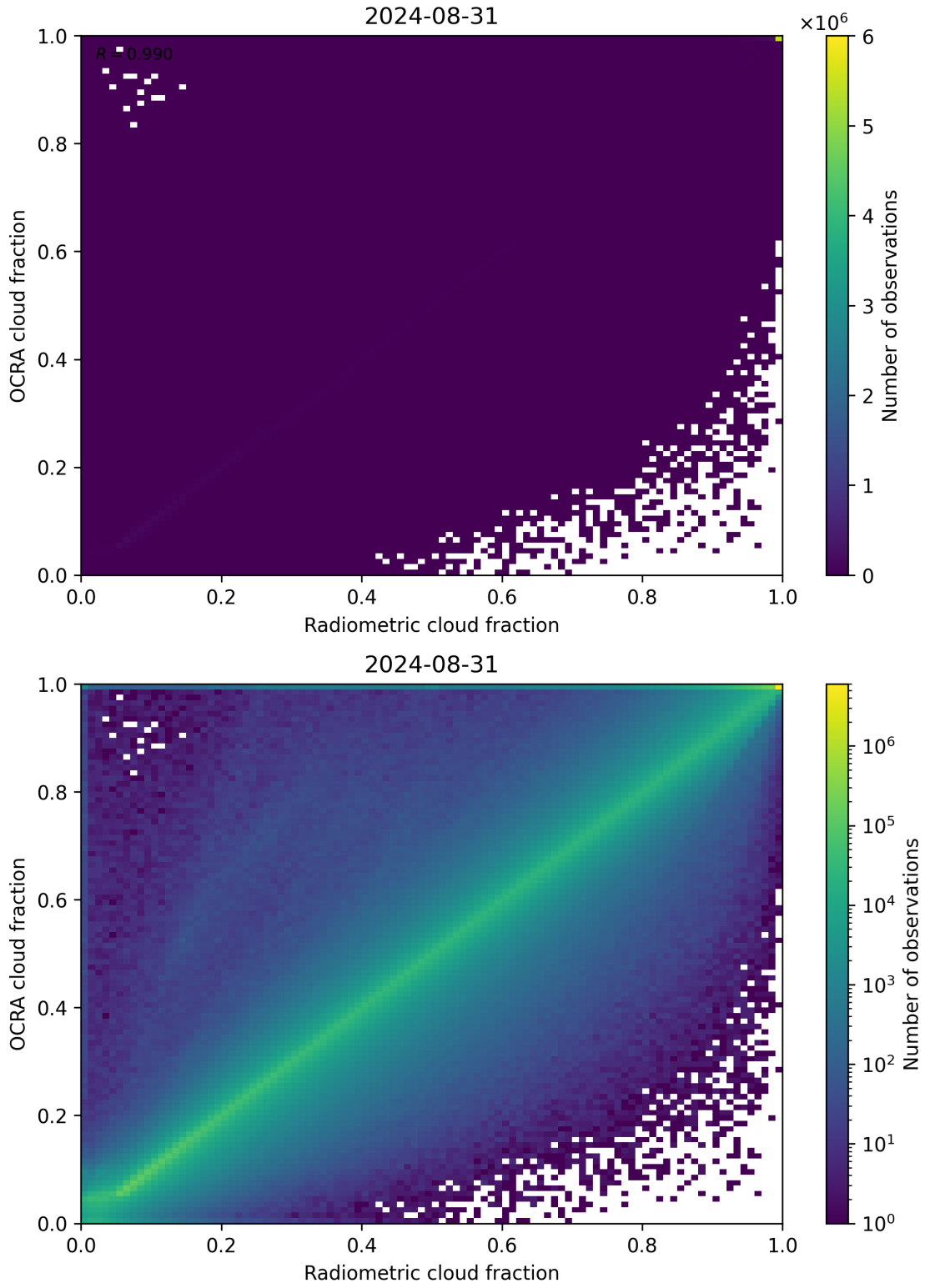

Figure 72: Scatter density plot of “Radiometric cloud fraction” against “OCRA cloud fraction” for 2024-08-30 to 2024-09-01.

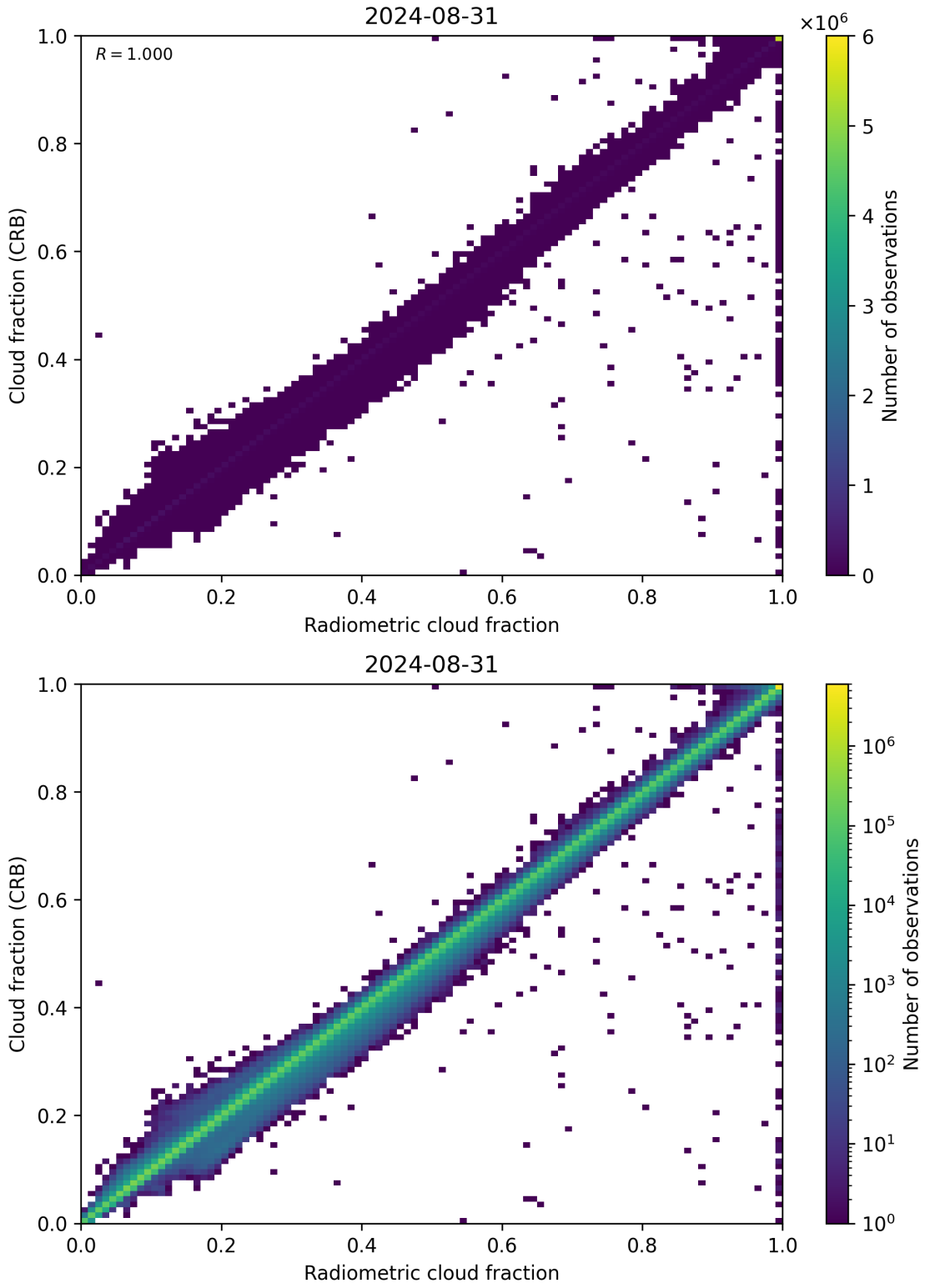

Figure 73: Scatter density plot of “Radiometric cloud fraction” against “Cloud fraction (CRB)” for 2024-08-30 to 2024-09-01.

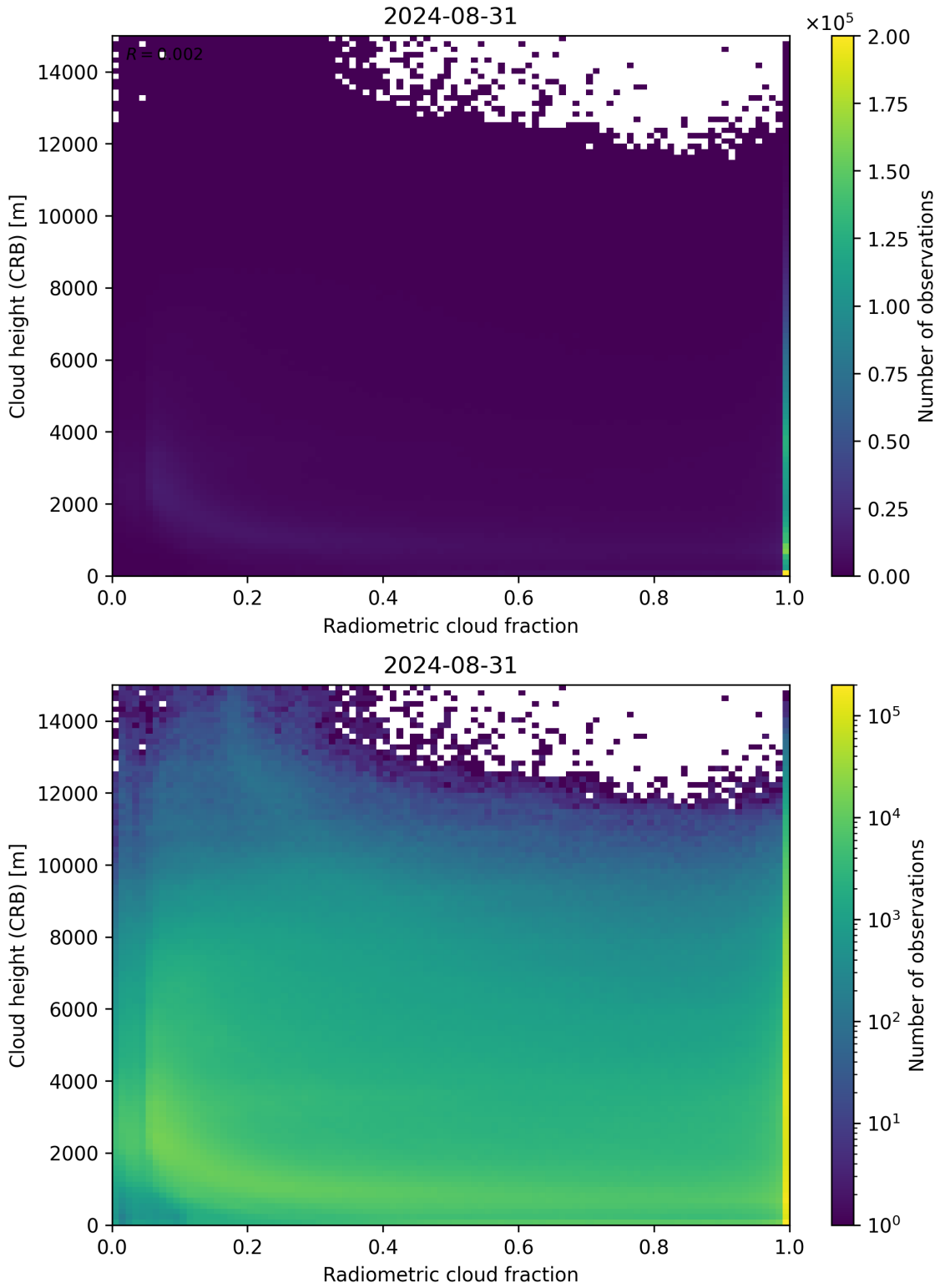

Figure 74: Scatter density plot of “Radiometric cloud fraction” against “Cloud height (CRB)” for 2024-08-30 to 2024-09-01.

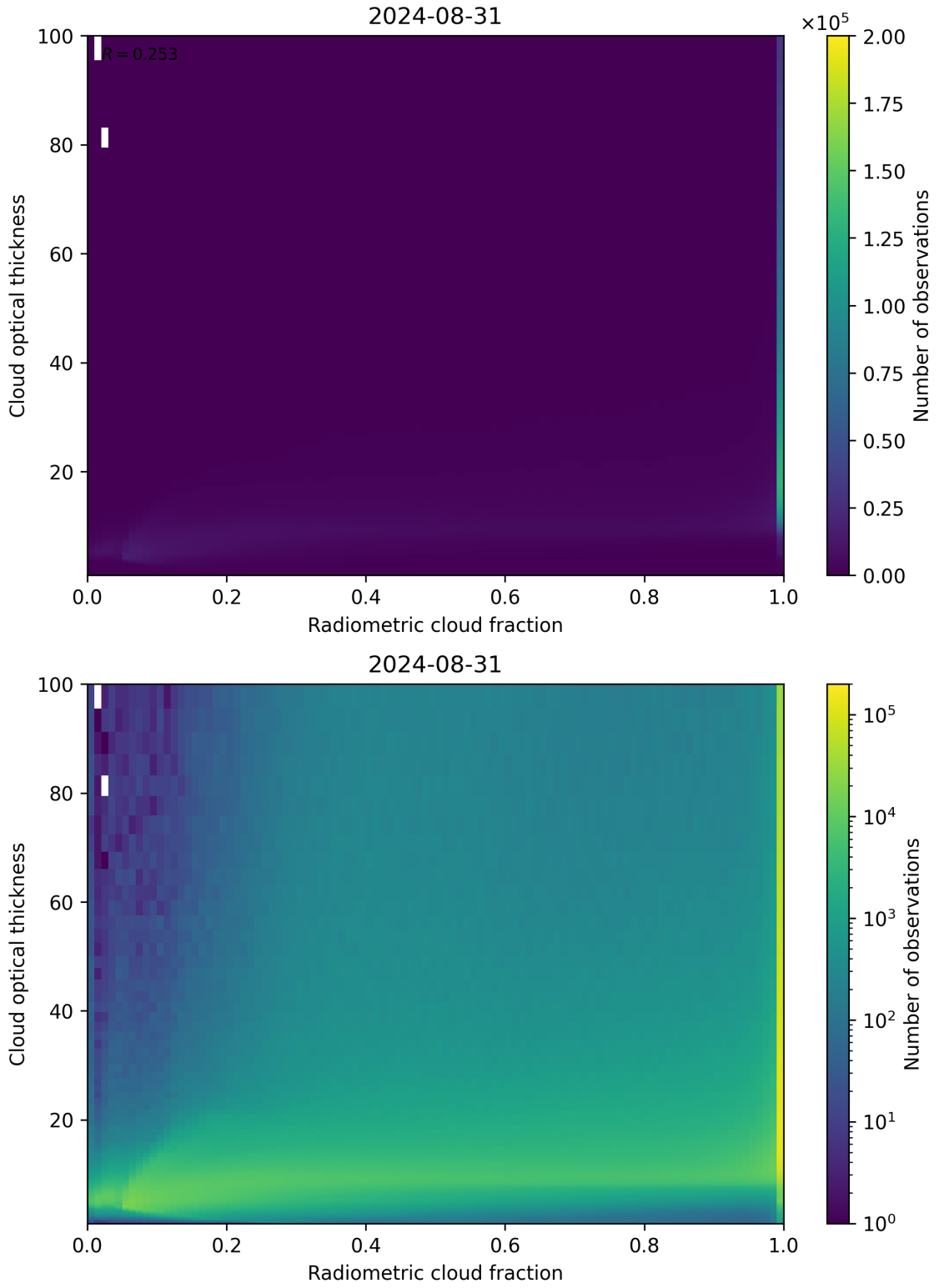

Figure 75: Scatter density plot of “Radiometric cloud fraction” against “Cloud optical thickness” for 2024-08-30 to 2024-09-01.

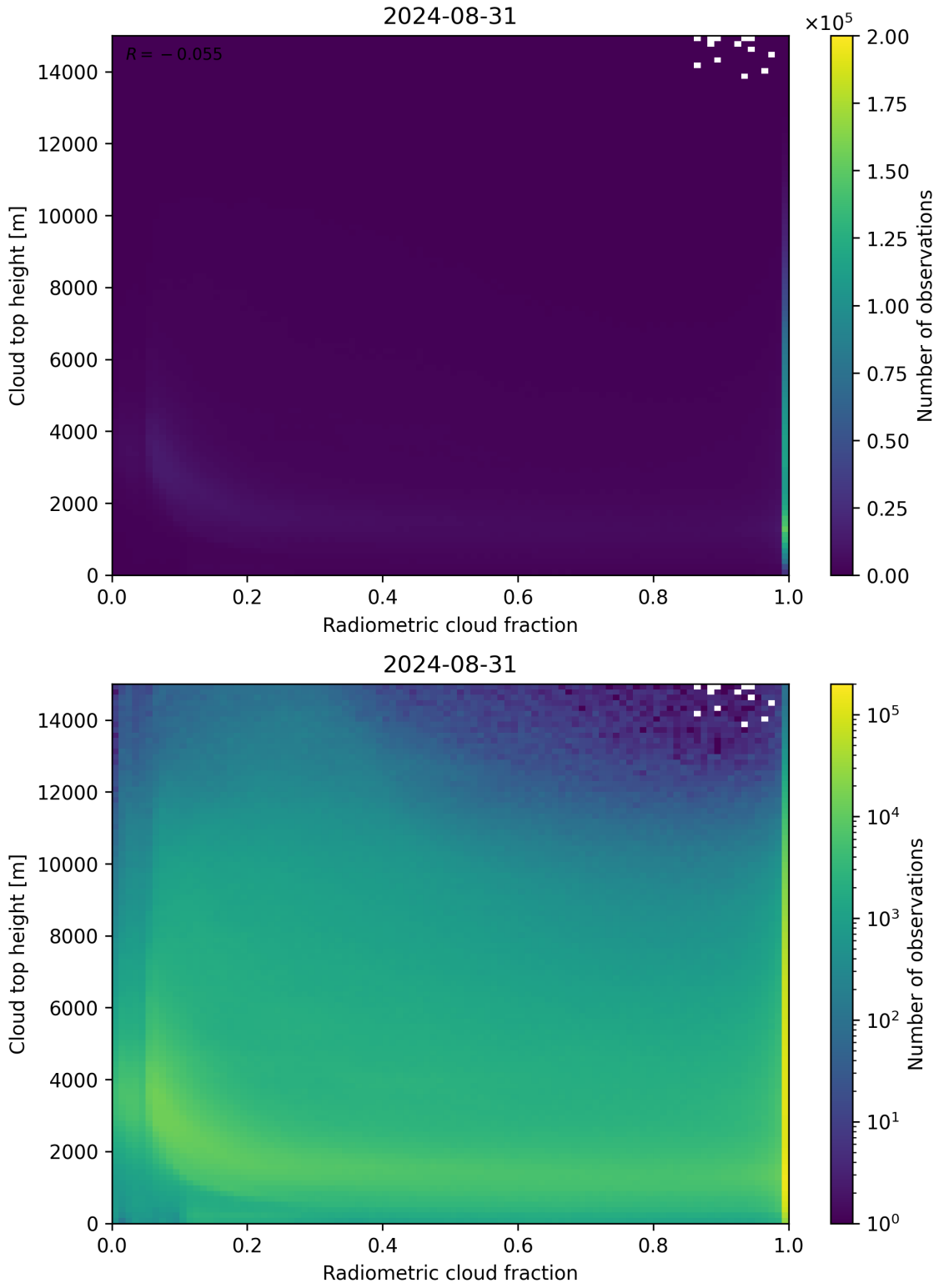

Figure 76: Scatter density plot of “Radiometric cloud fraction” against “Cloud top height” for 2024-08-30 to 2024-09-01.

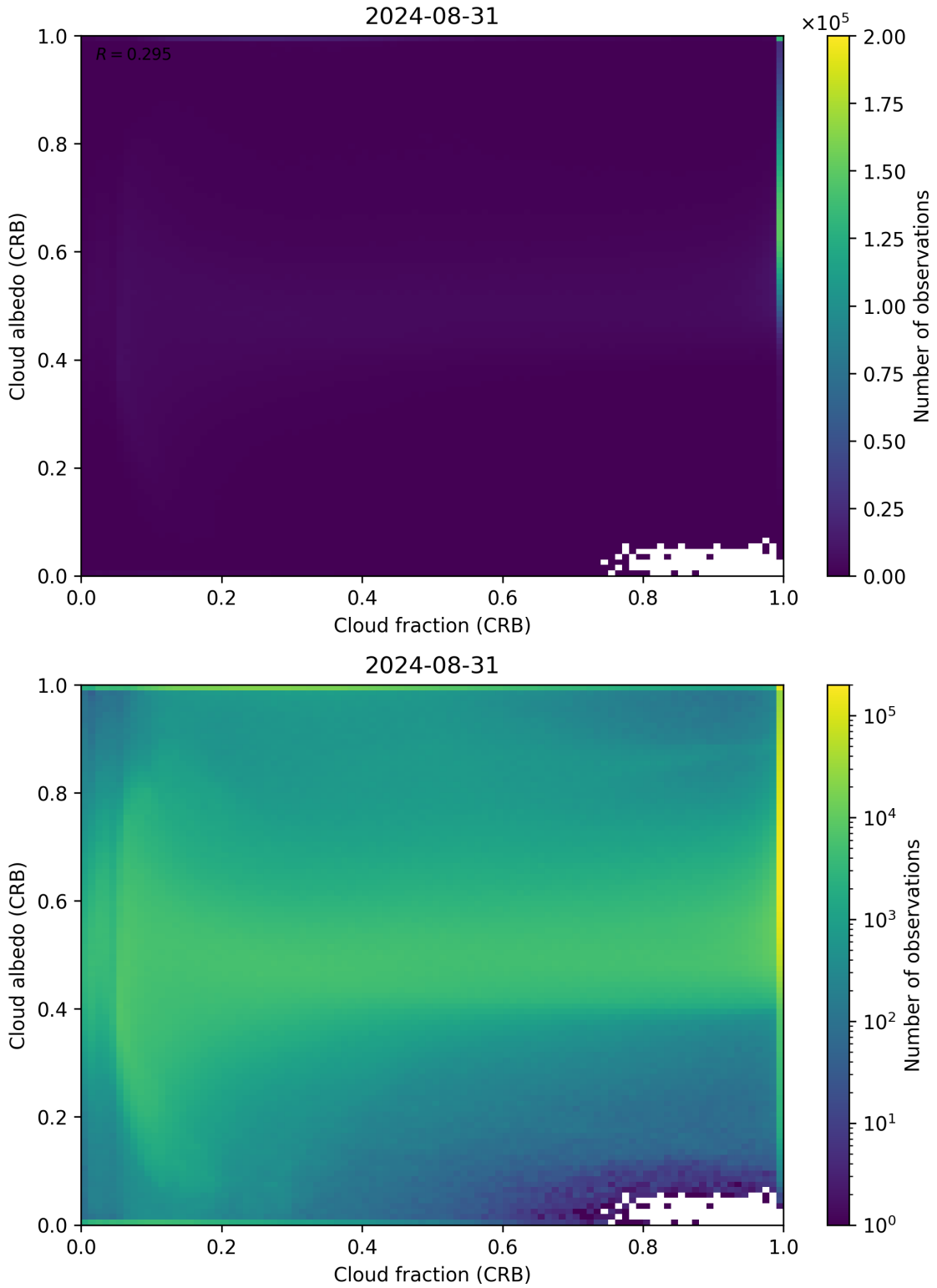

Figure 77: Scatter density plot of “Cloud fraction (CRB)” against “Cloud albedo (CRB)” for 2024-08-30 to 2024-09-01.

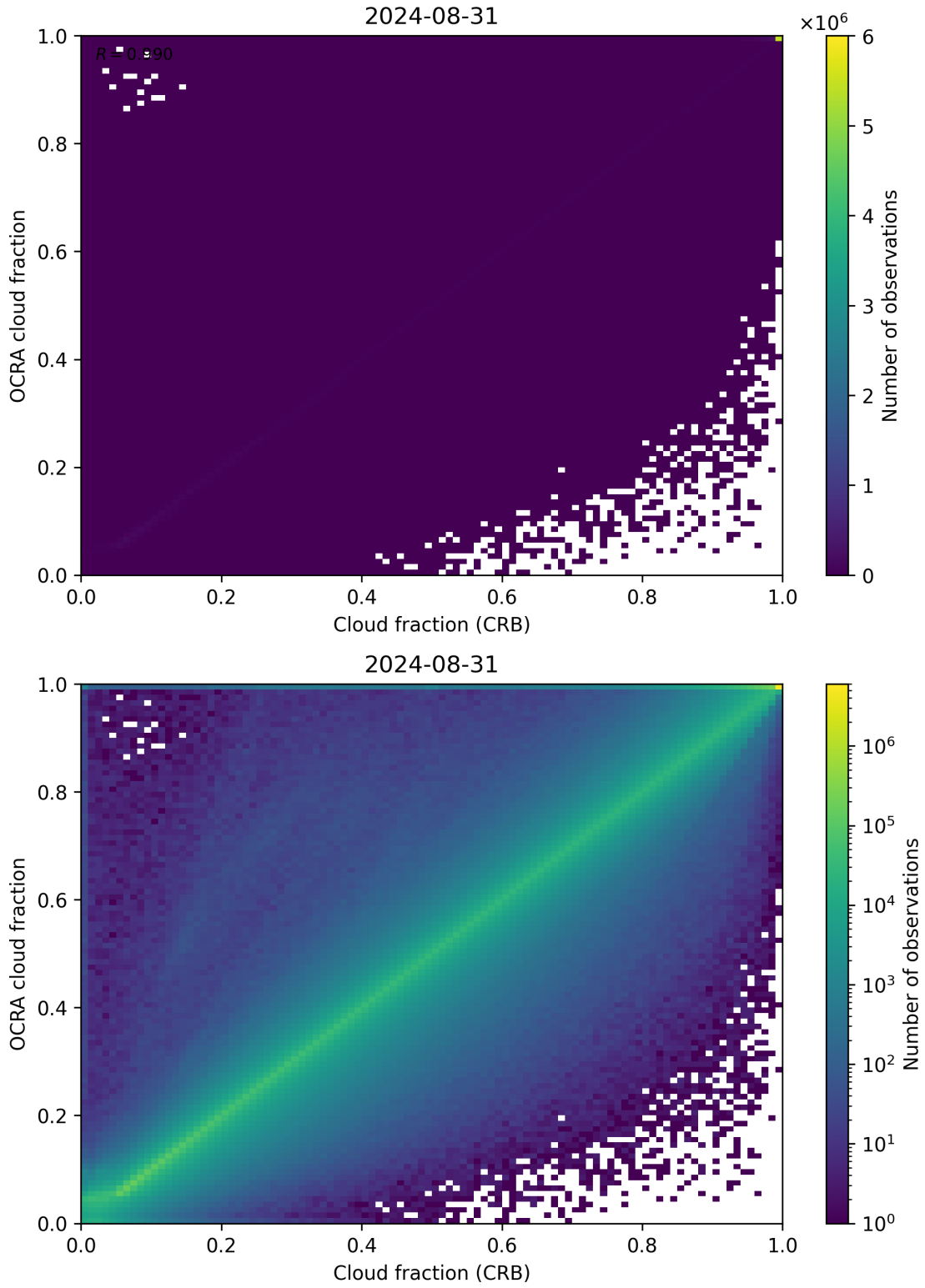

Figure 78: Scatter density plot of “Cloud fraction (CRB)” against “OCRA cloud fraction” for 2024-08-30 to 2024-09-01.

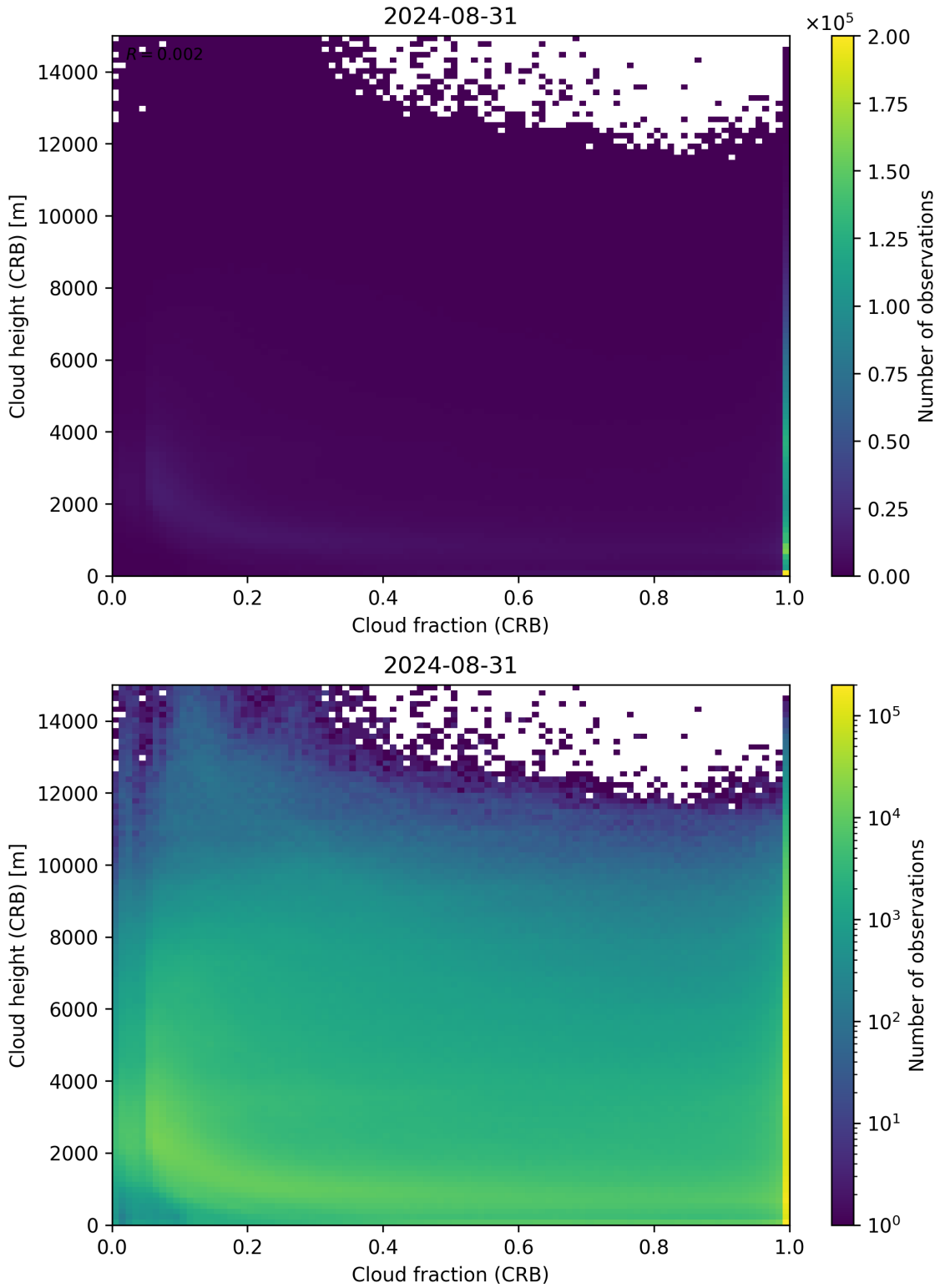

Figure 79: Scatter density plot of “Cloud fraction (CRB)” against “Cloud height (CRB)” for 2024-08-30 to 2024-09-01.

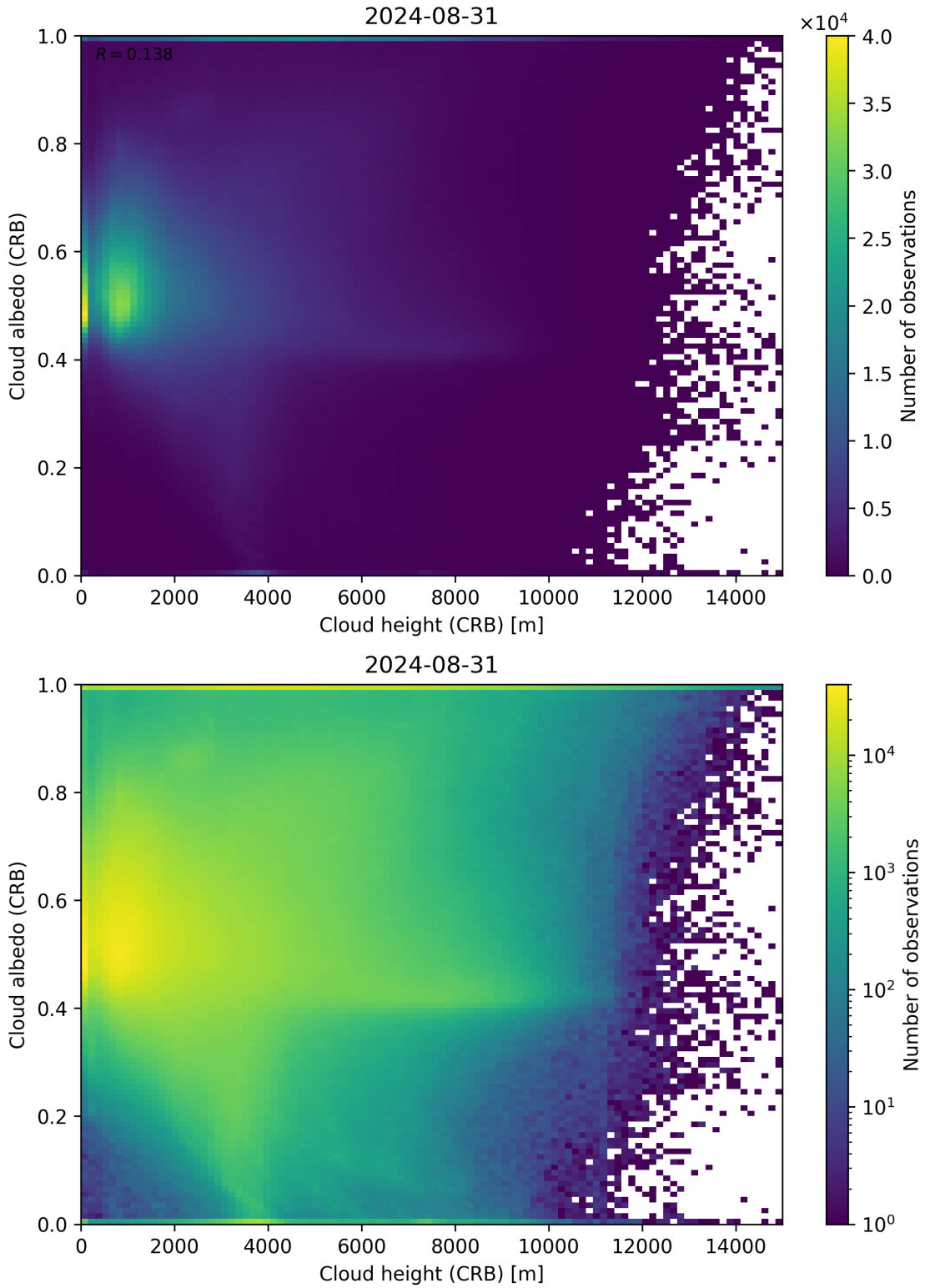

Figure 80: Scatter density plot of “Cloud height (CRB)” against “Cloud albedo (CRB)” for 2024-08-30 to 2024-09-01.

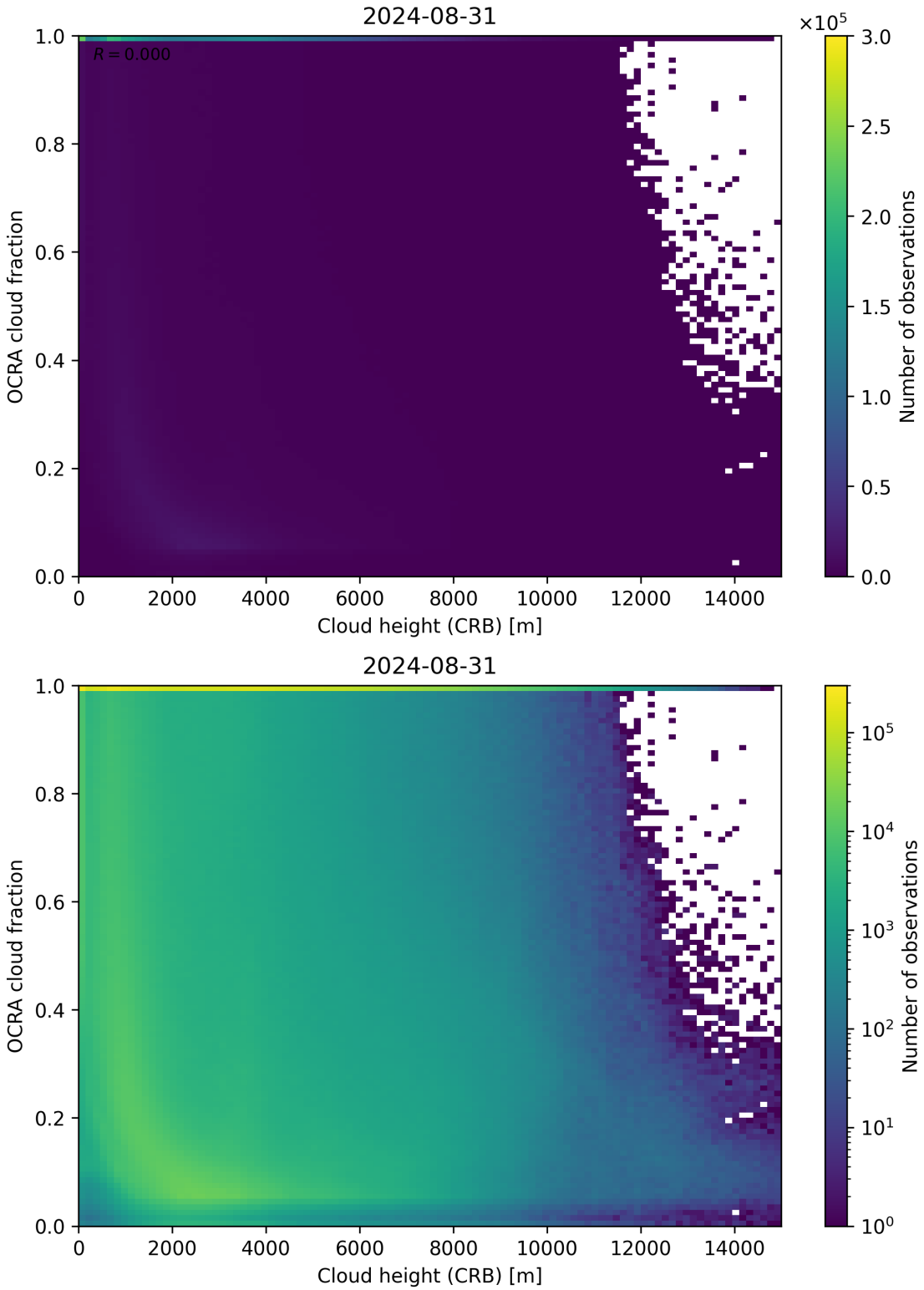

Figure 81: Scatter density plot of “Cloud height (CRB)” against “OCRA cloud fraction” for 2024-08-30 to 2024-09-01.

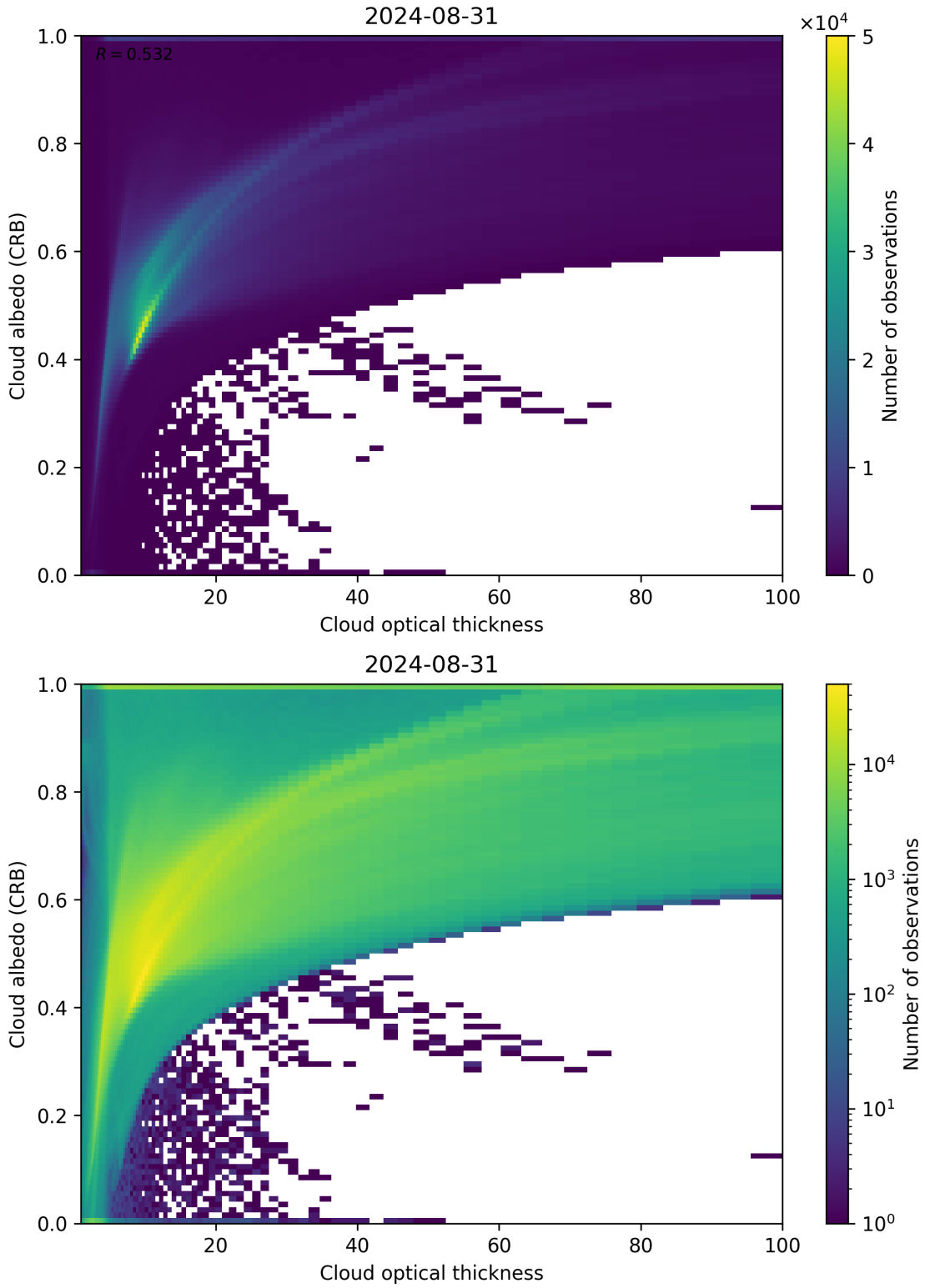

Figure 82: Scatter density plot of “Cloud optical thickness” against “Cloud albedo (CRB)” for 2024-08-30 to 2024-09-01.

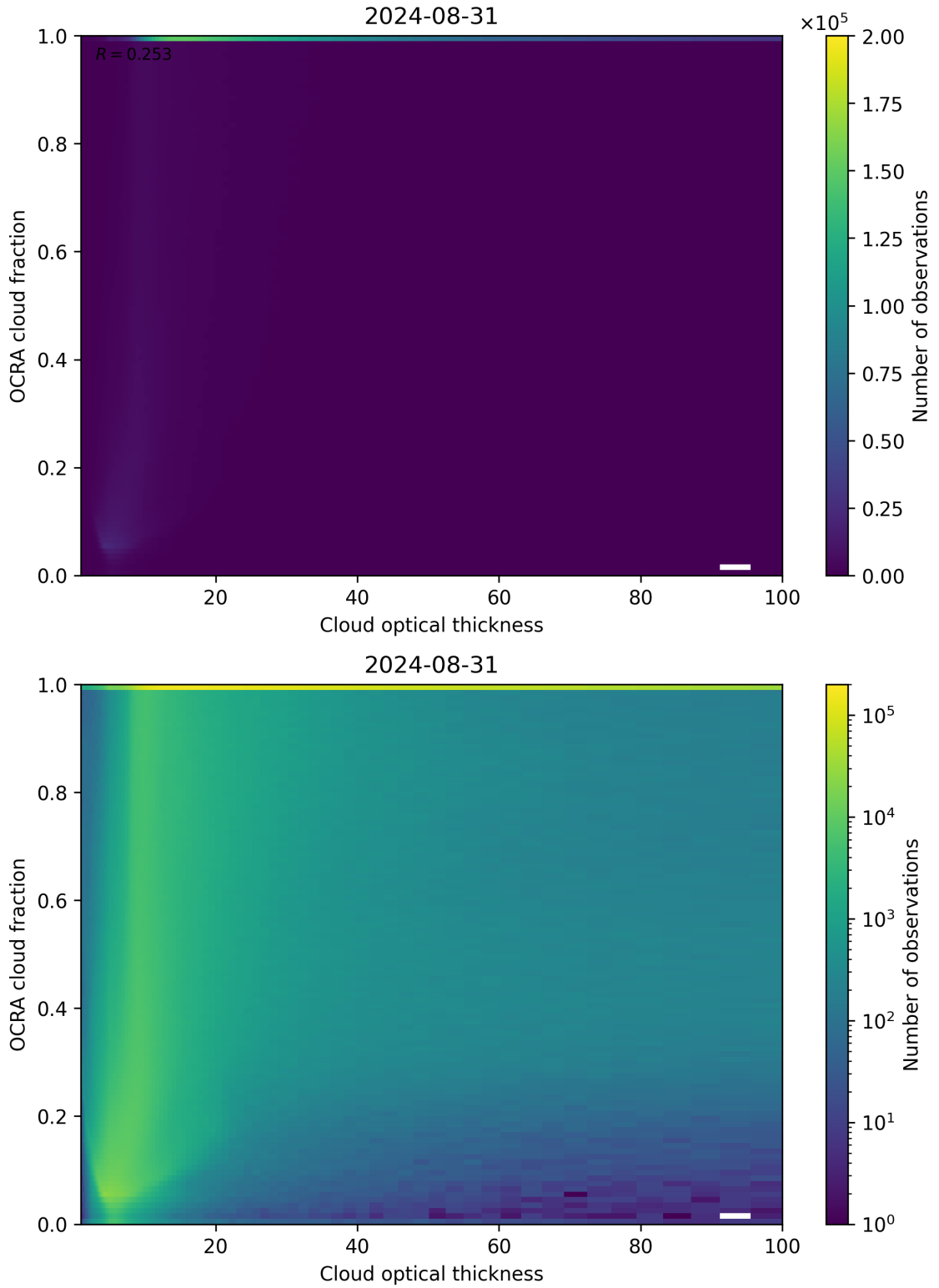

Figure 83: Scatter density plot of “Cloud optical thickness” against “OCRA cloud fraction” for 2024-08-30 to 2024-09-01.

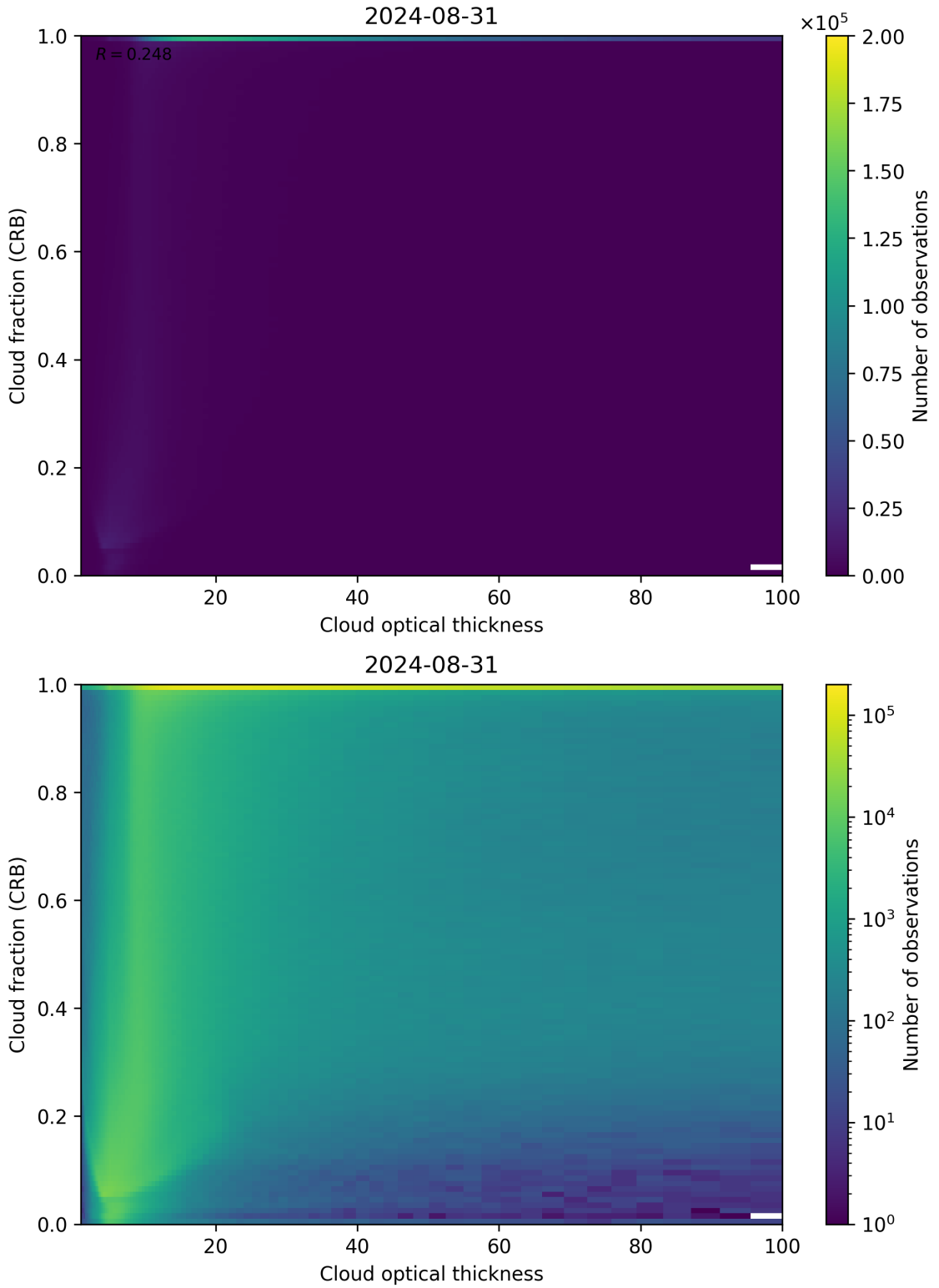

Figure 84: Scatter density plot of “Cloud optical thickness” against “Cloud fraction (CRB)” for 2024-08-30 to 2024-09-01.

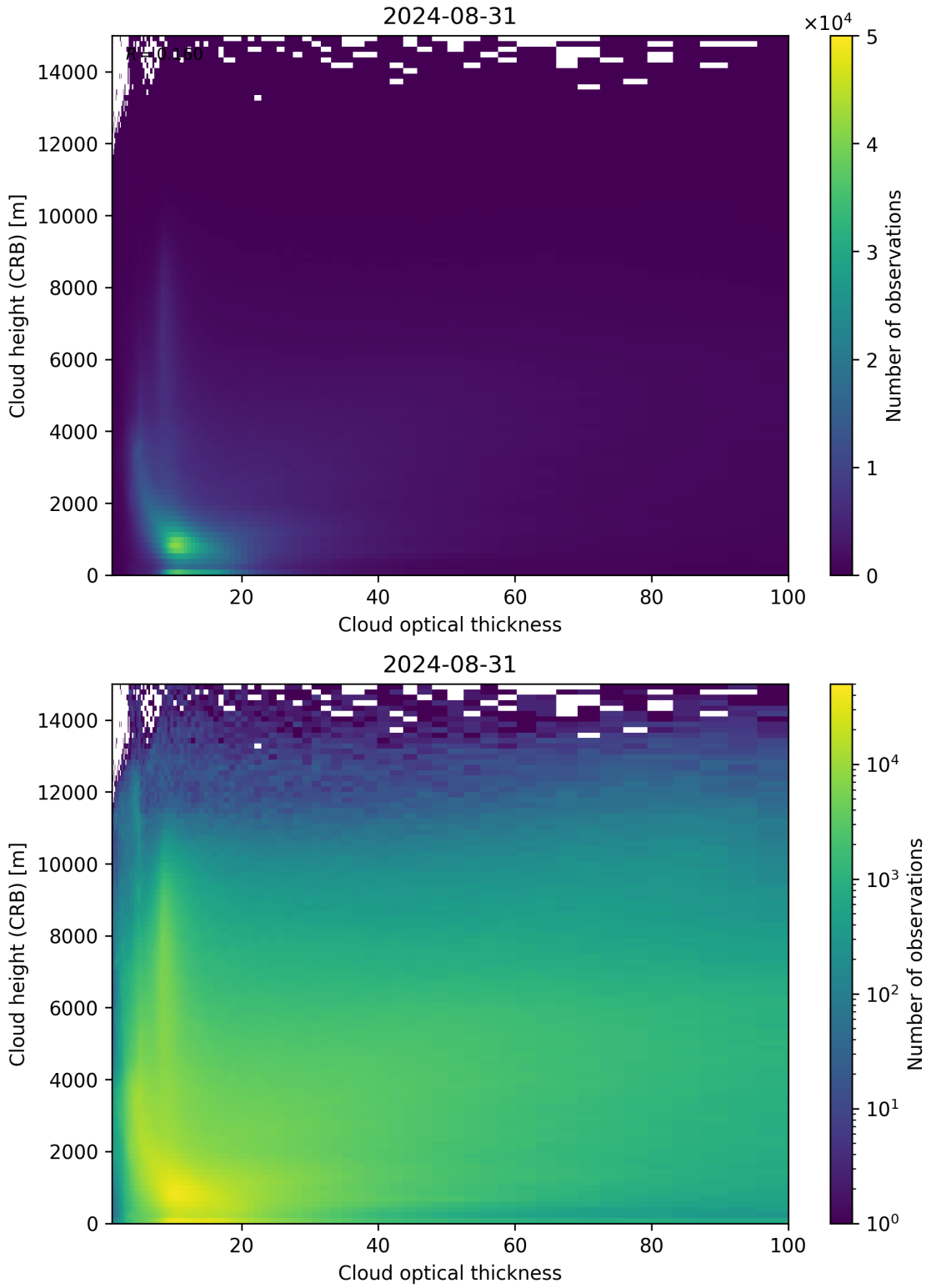

Figure 85: Scatter density plot of “Cloud optical thickness” against “Cloud height (CRB)” for 2024-08-30 to 2024-09-01.

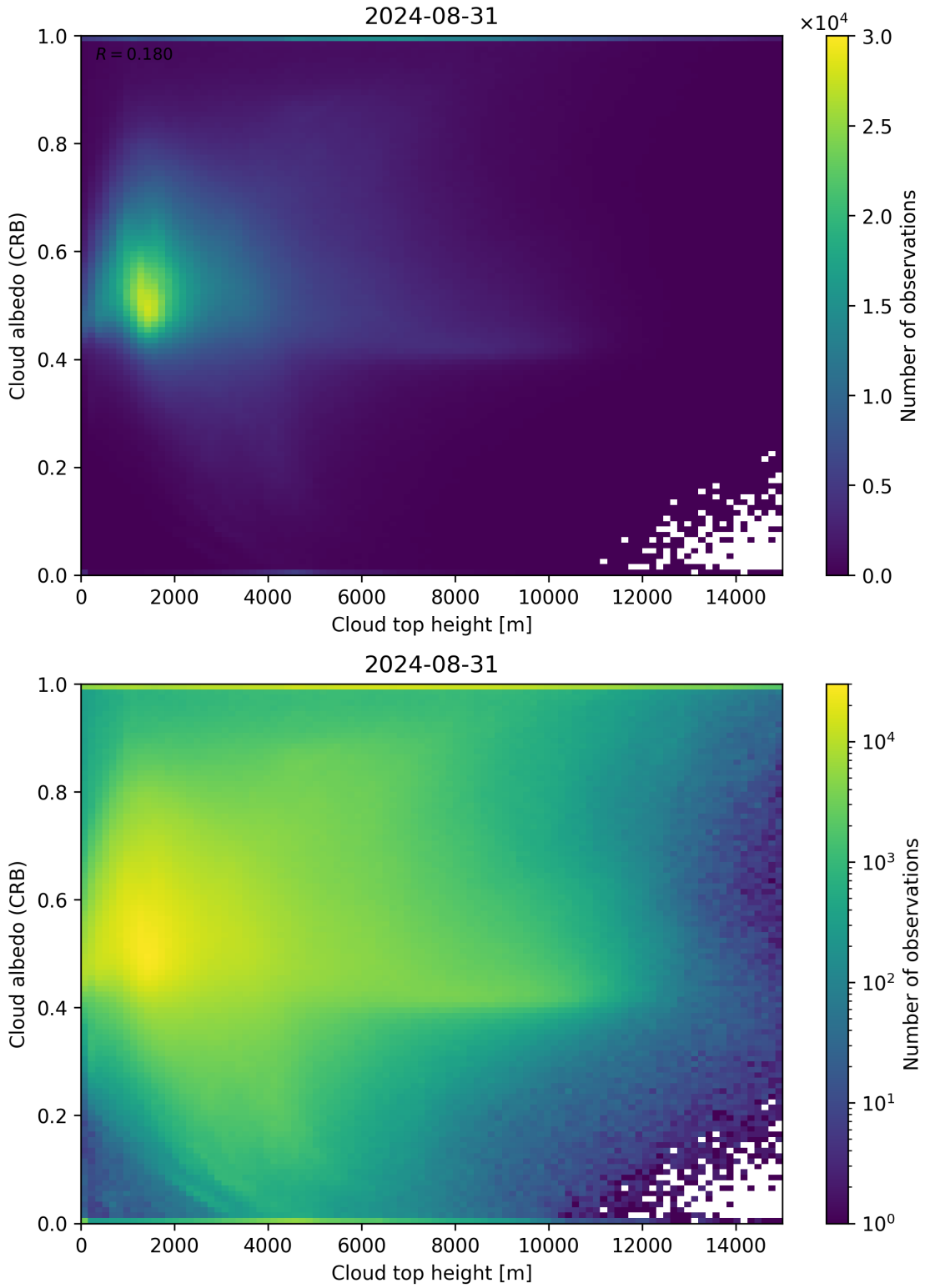

Figure 86: Scatter density plot of “Cloud top height” against “Cloud albedo (CRB)” for 2024-08-30 to 2024-09-01.

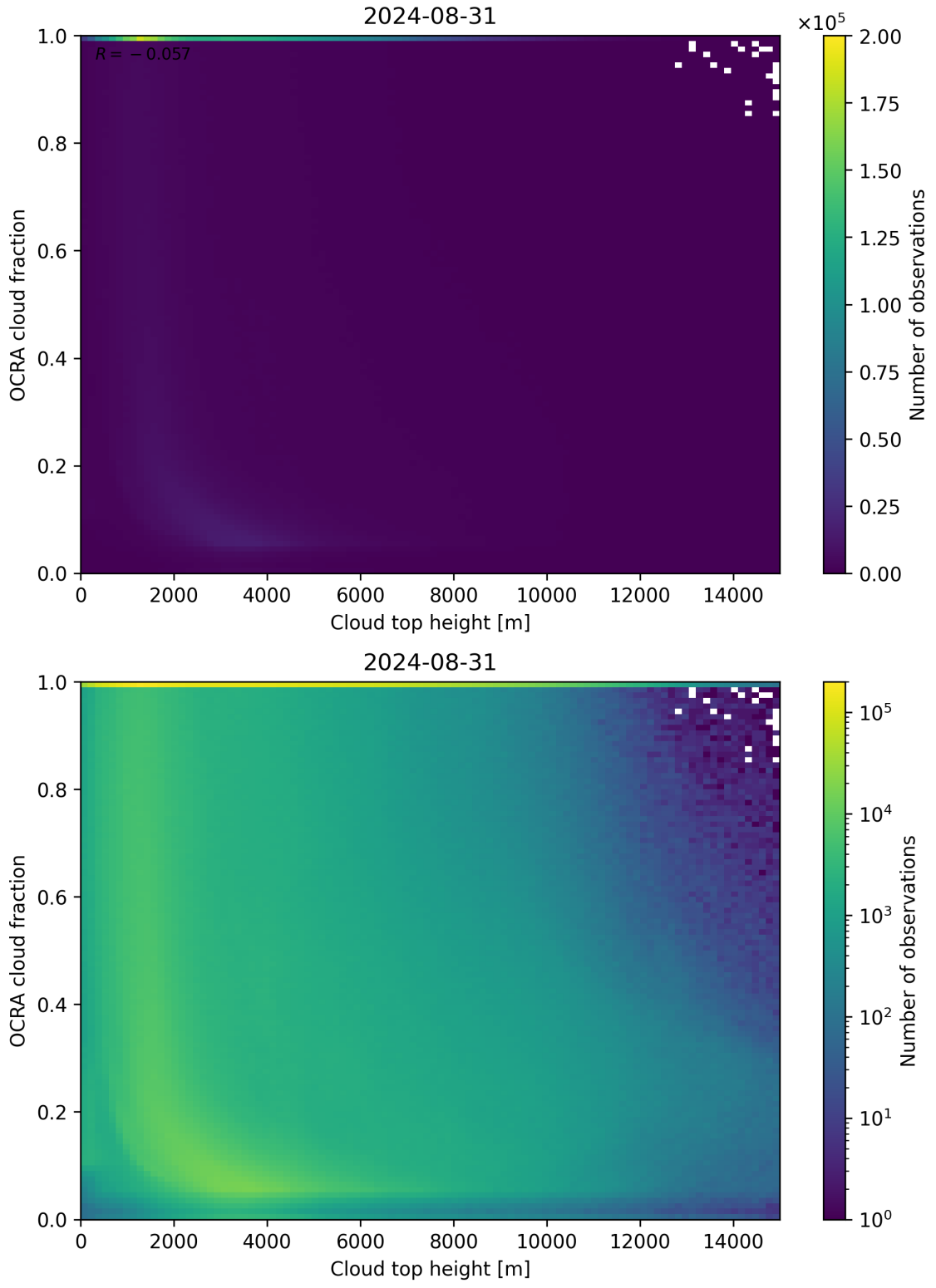

Figure 87: Scatter density plot of “Cloud top height” against “OCRA cloud fraction” for 2024-08-30 to 2024-09-01.

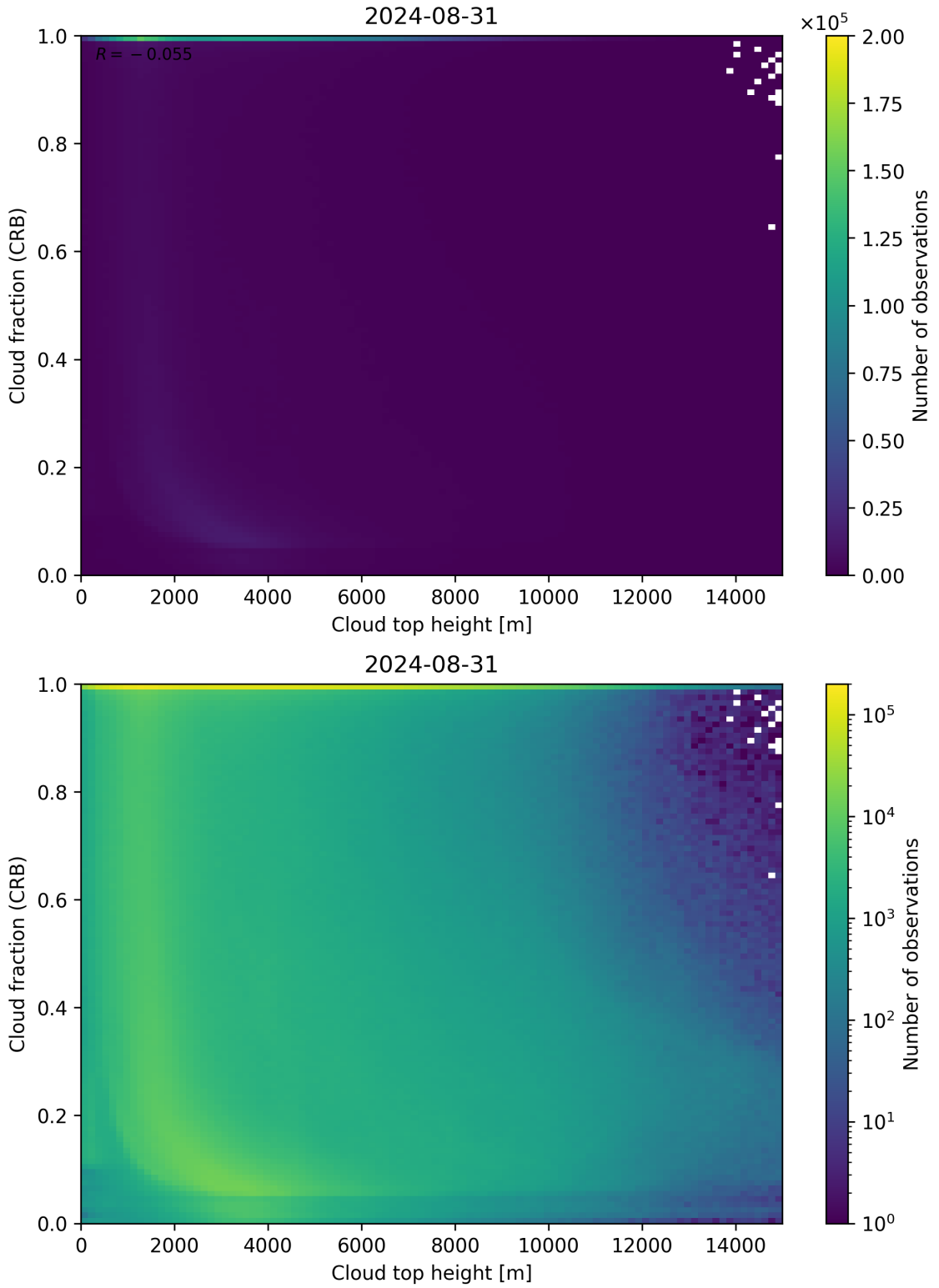

Figure 88: Scatter density plot of “Cloud top height” against “Cloud fraction (CRB)” for 2024-08-30 to 2024-09-01.

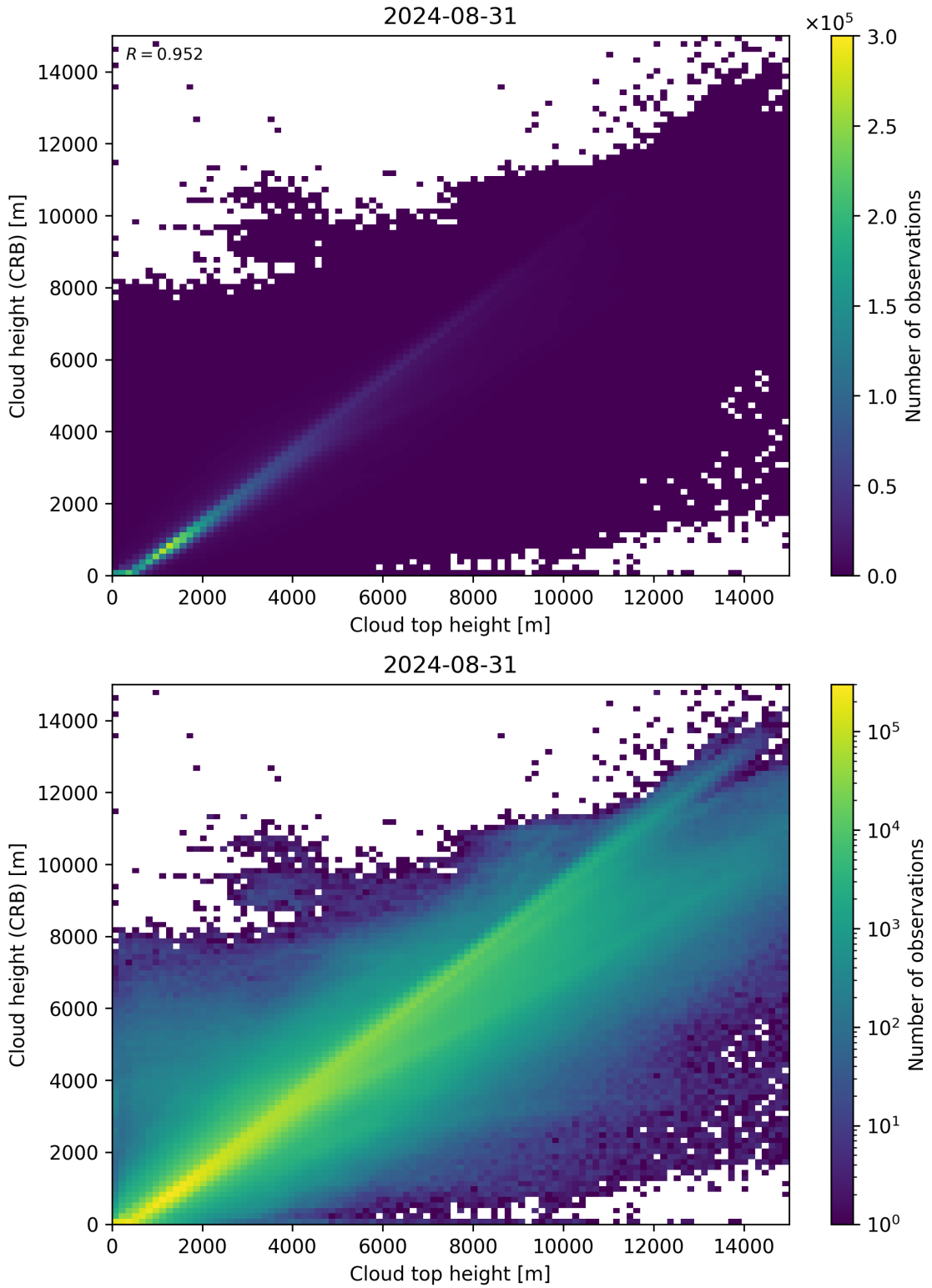

Figure 89: Scatter density plot of “Cloud top height” against “Cloud height (CRB)” for 2024-08-30 to 2024-09-01.

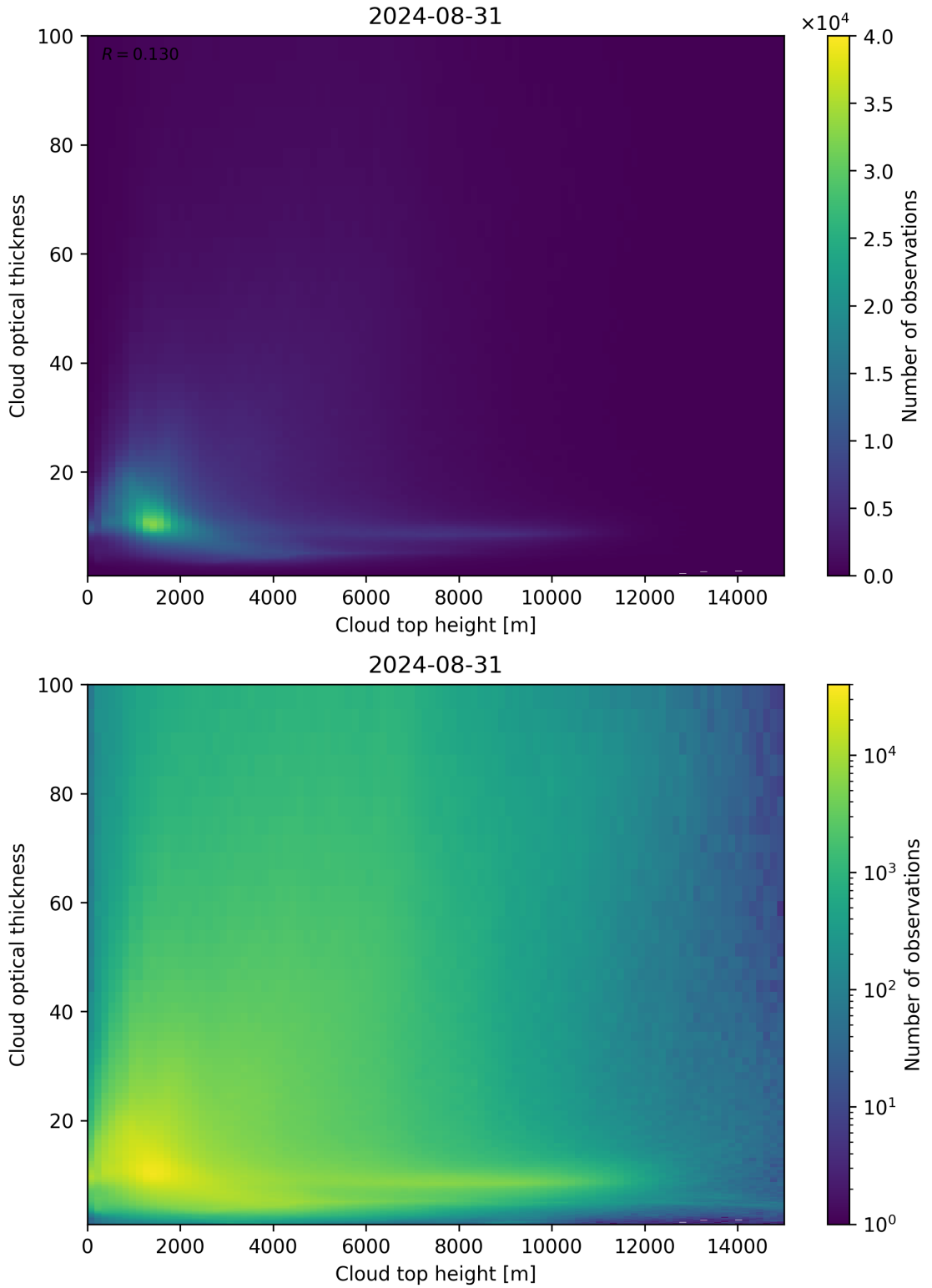

Figure 90: Scatter density plot of “Cloud top height” against “Cloud optical thickness” for 2024-08-30 to 2024-09-01.

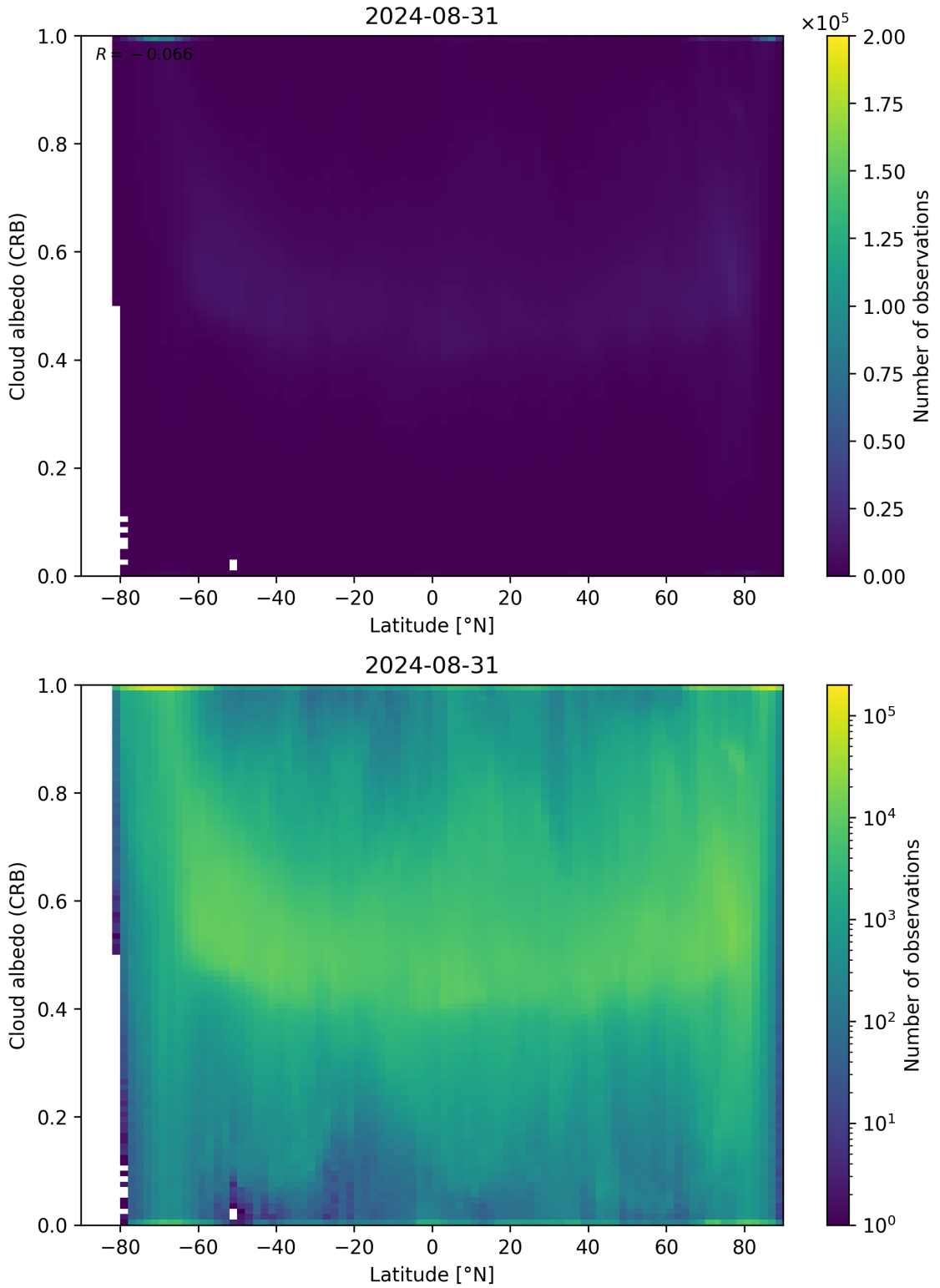

Figure 91: Scatter density plot of “Latitude” against “Cloud albedo (CRB)” for 2024-08-30 to 2024-09-01.

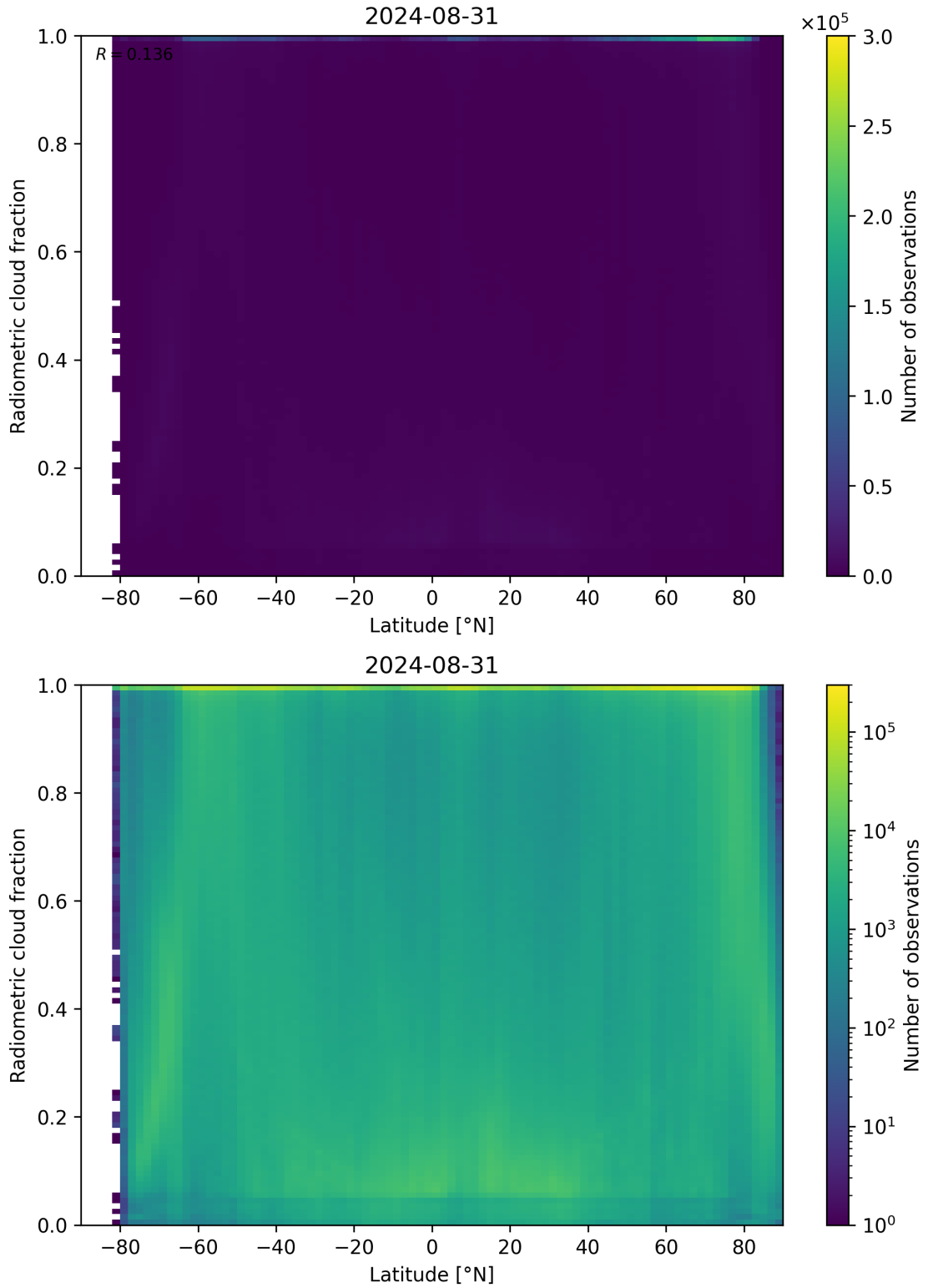

Figure 92: Scatter density plot of “Latitude” against “Radiometric cloud fraction” for 2024-08-30 to 2024-09-01.

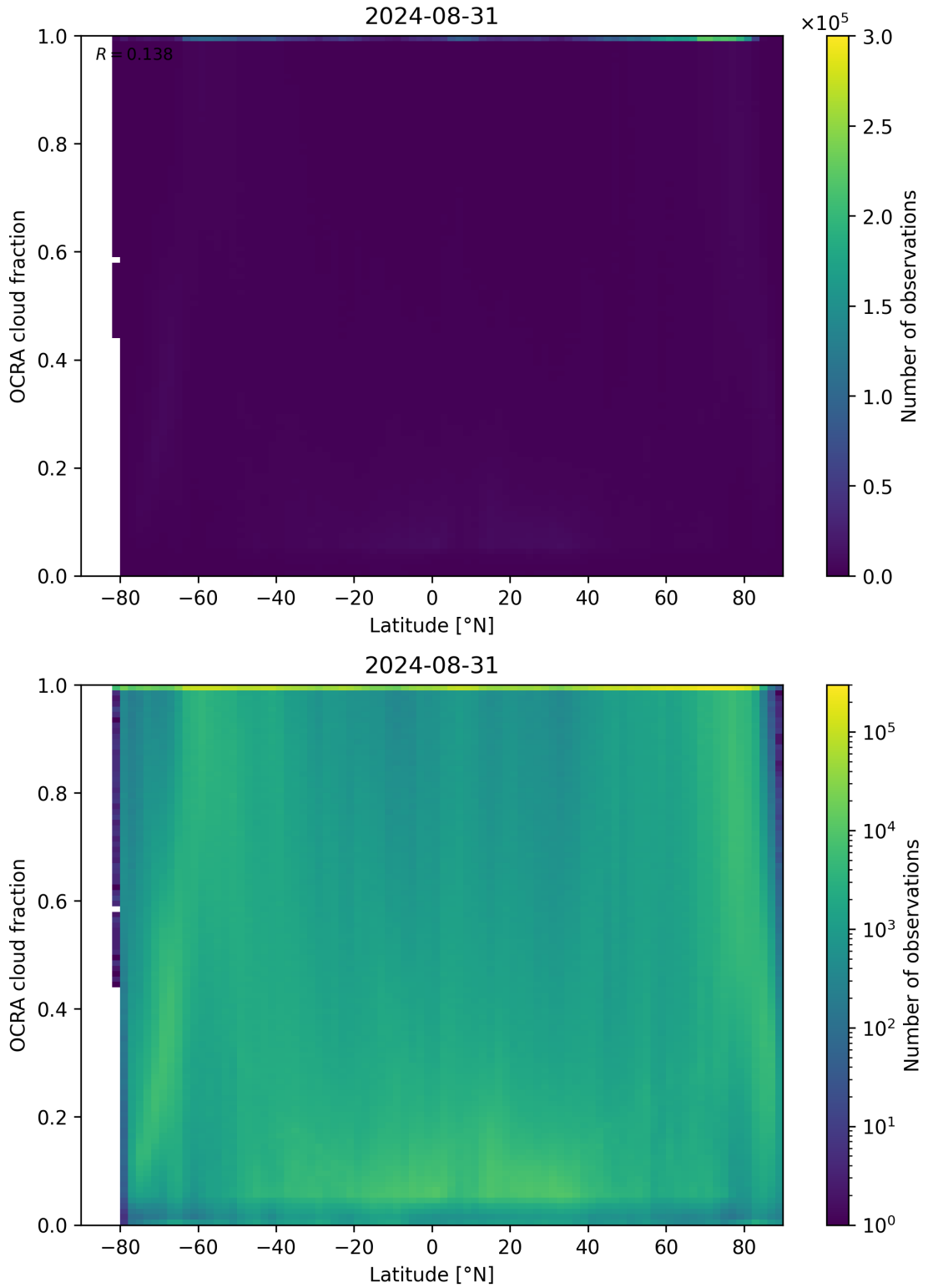

Figure 93: Scatter density plot of “Latitude” against “OCRA cloud fraction” for 2024-08-30 to 2024-09-01.

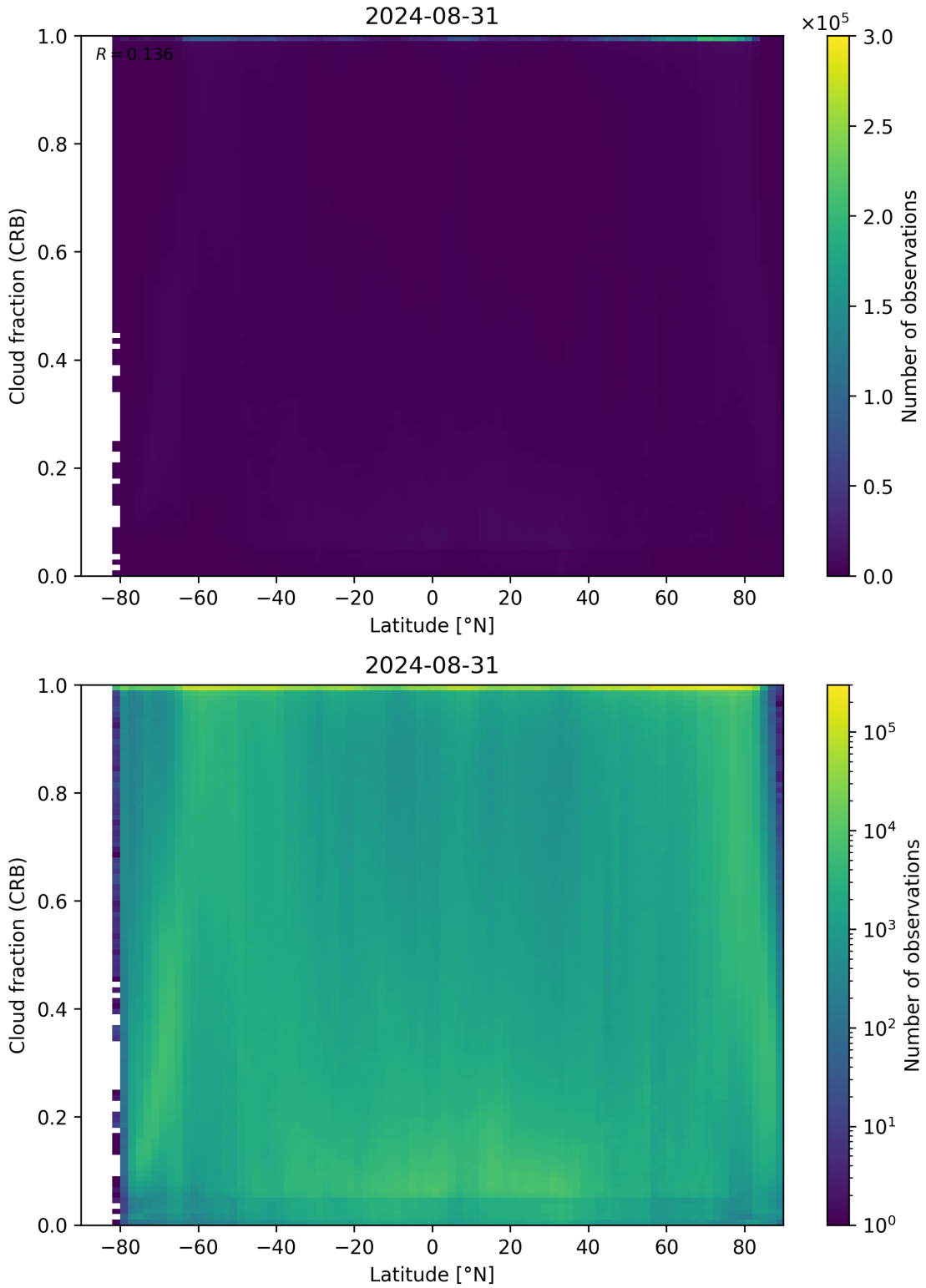

Figure 94: Scatter density plot of “Latitude” against “Cloud fraction (CRB)” for 2024-08-30 to 2024-09-01.

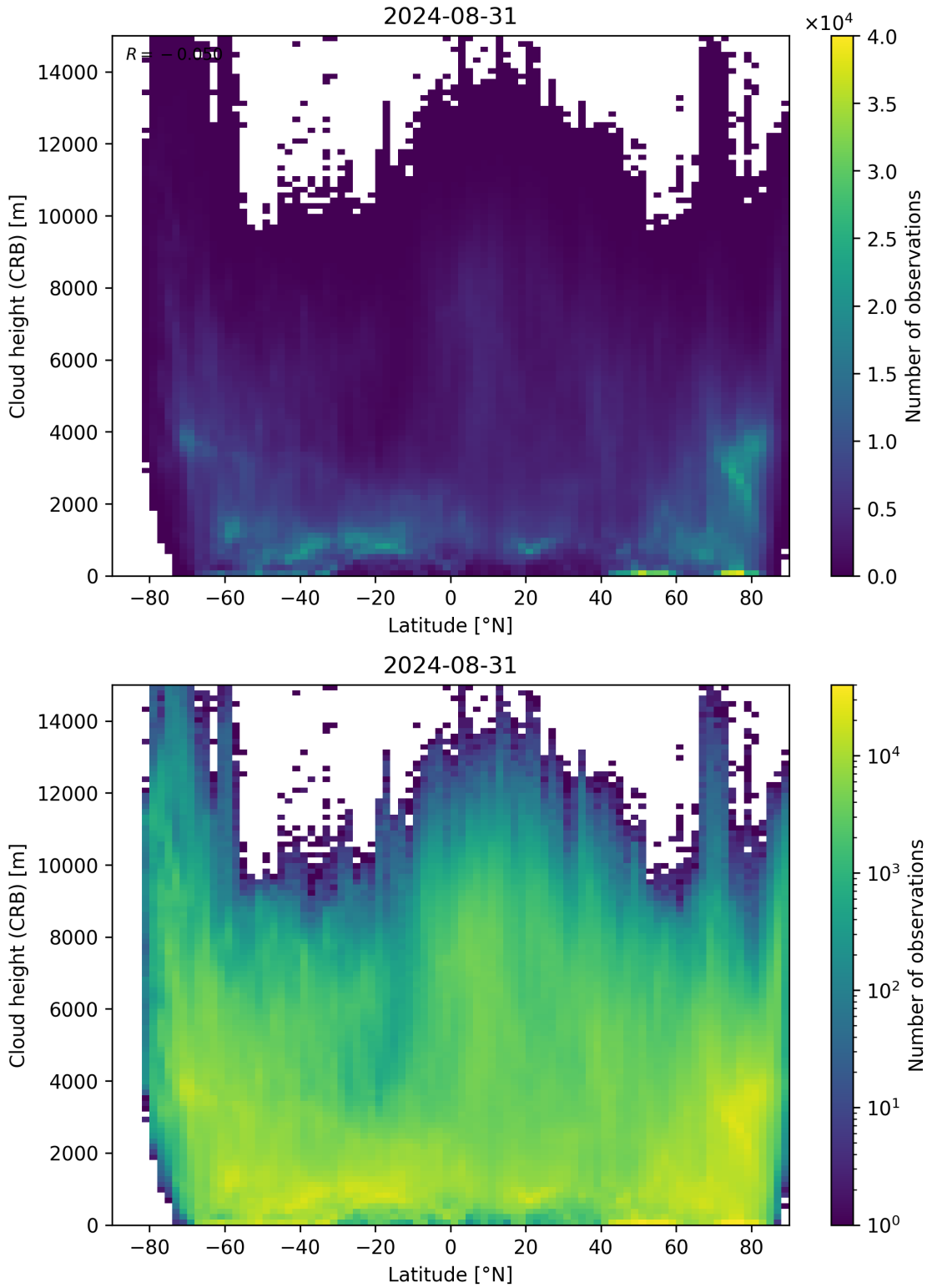

Figure 95: Scatter density plot of “Latitude” against “Cloud height (CRB)” for 2024-08-30 to 2024-09-01.

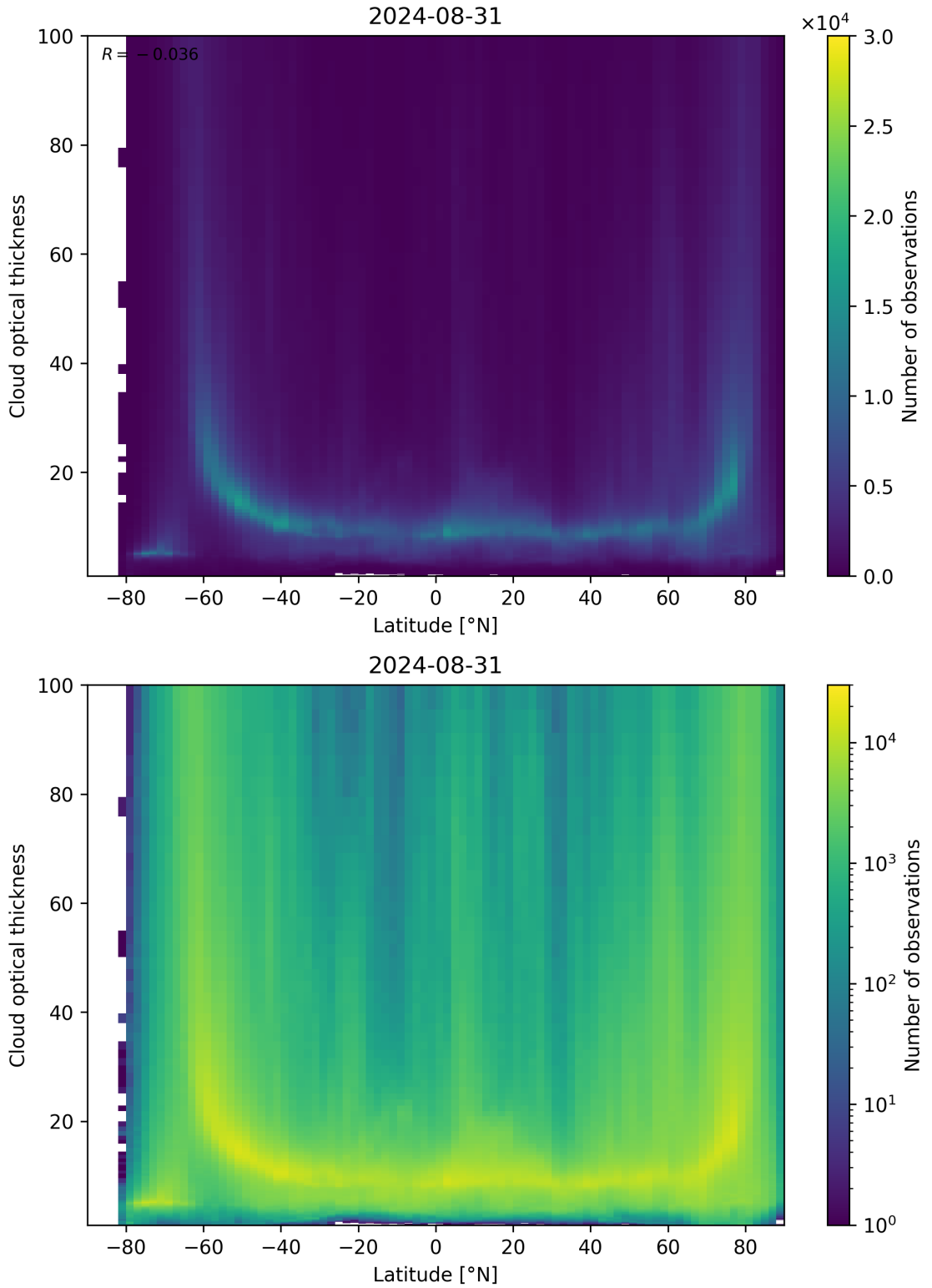

Figure 96: Scatter density plot of “Latitude” against “Cloud optical thickness” for 2024-08-30 to 2024-09-01.

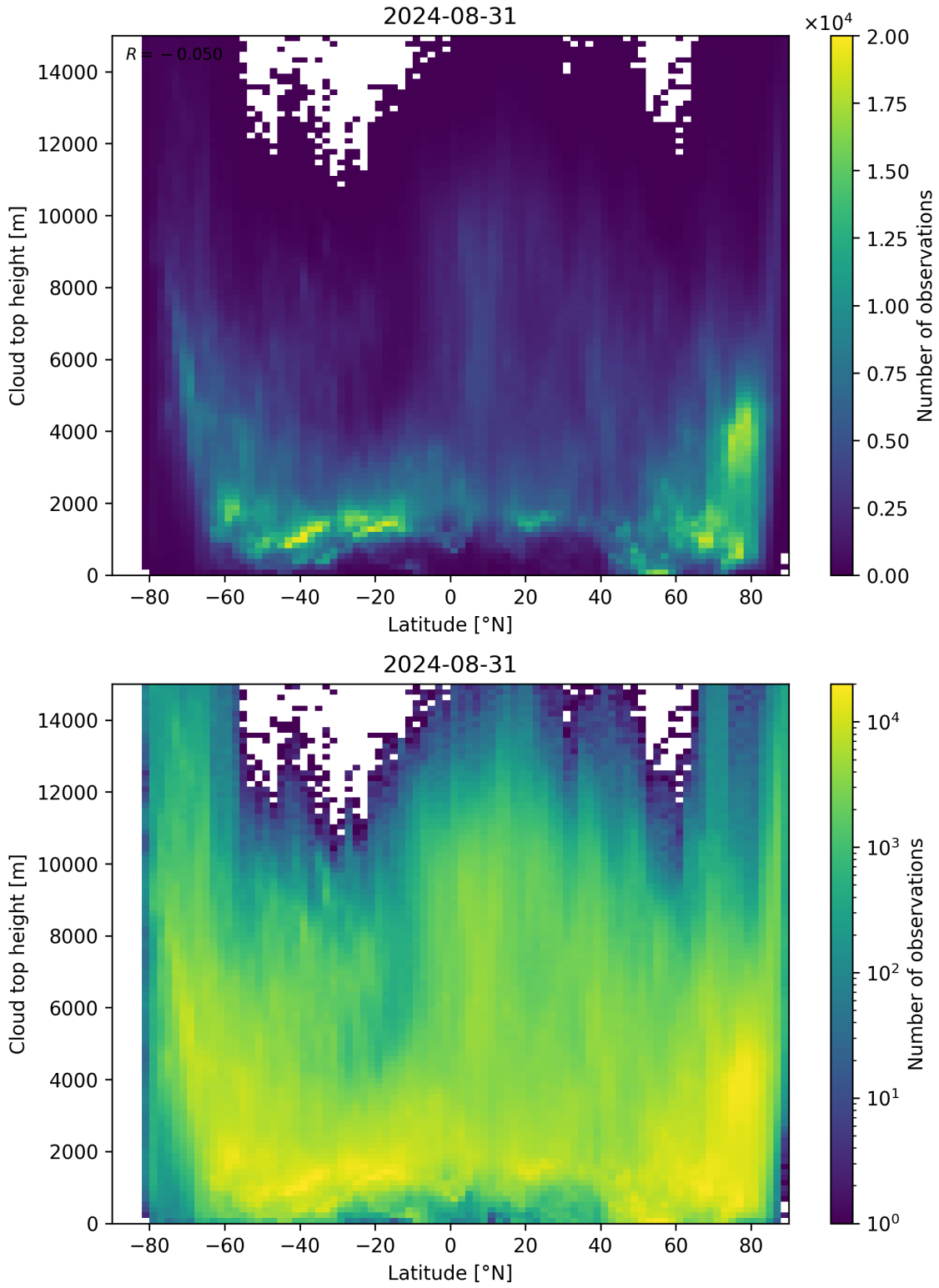

Figure 97: Scatter density plot of “Latitude” against “Cloud top height” for 2024-08-30 to 2024-09-01.

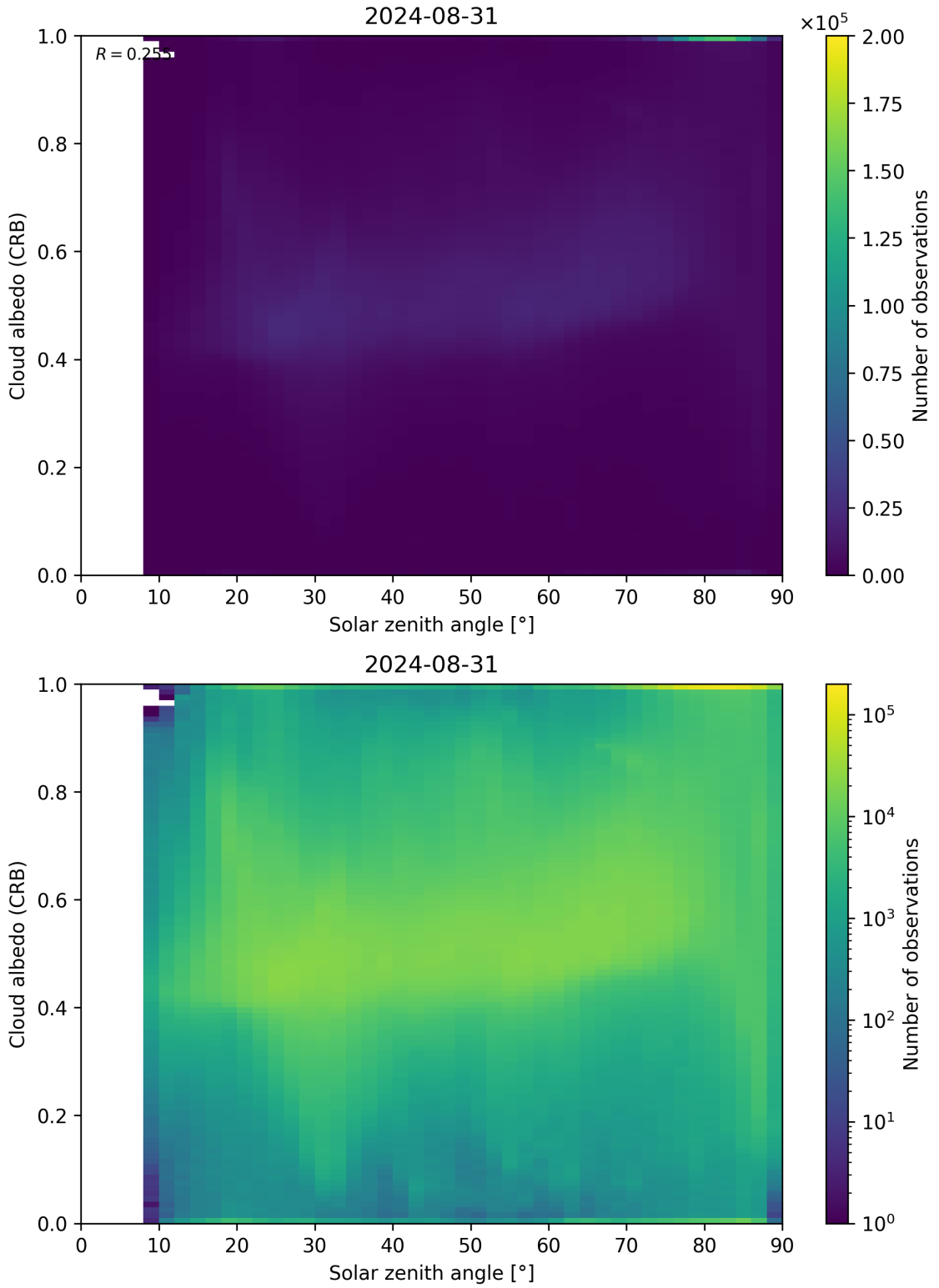

Figure 98: Scatter density plot of “Solar zenith angle” against “Cloud albedo (CRB)” for 2024-08-30 to 2024-09-01.

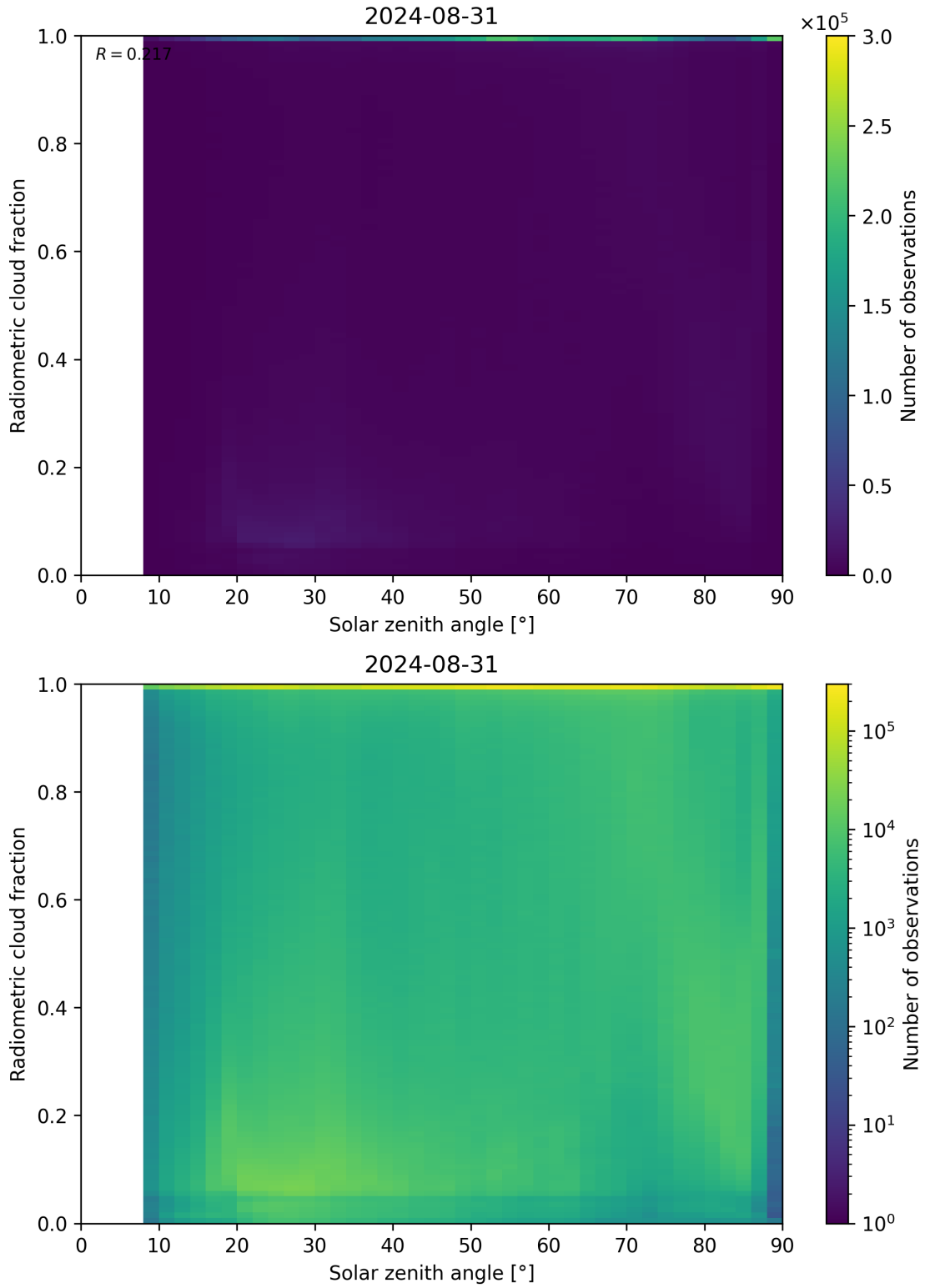

Figure 99: Scatter density plot of “Solar zenith angle” against “Radiometric cloud fraction” for 2024-08-30 to 2024-09-01.

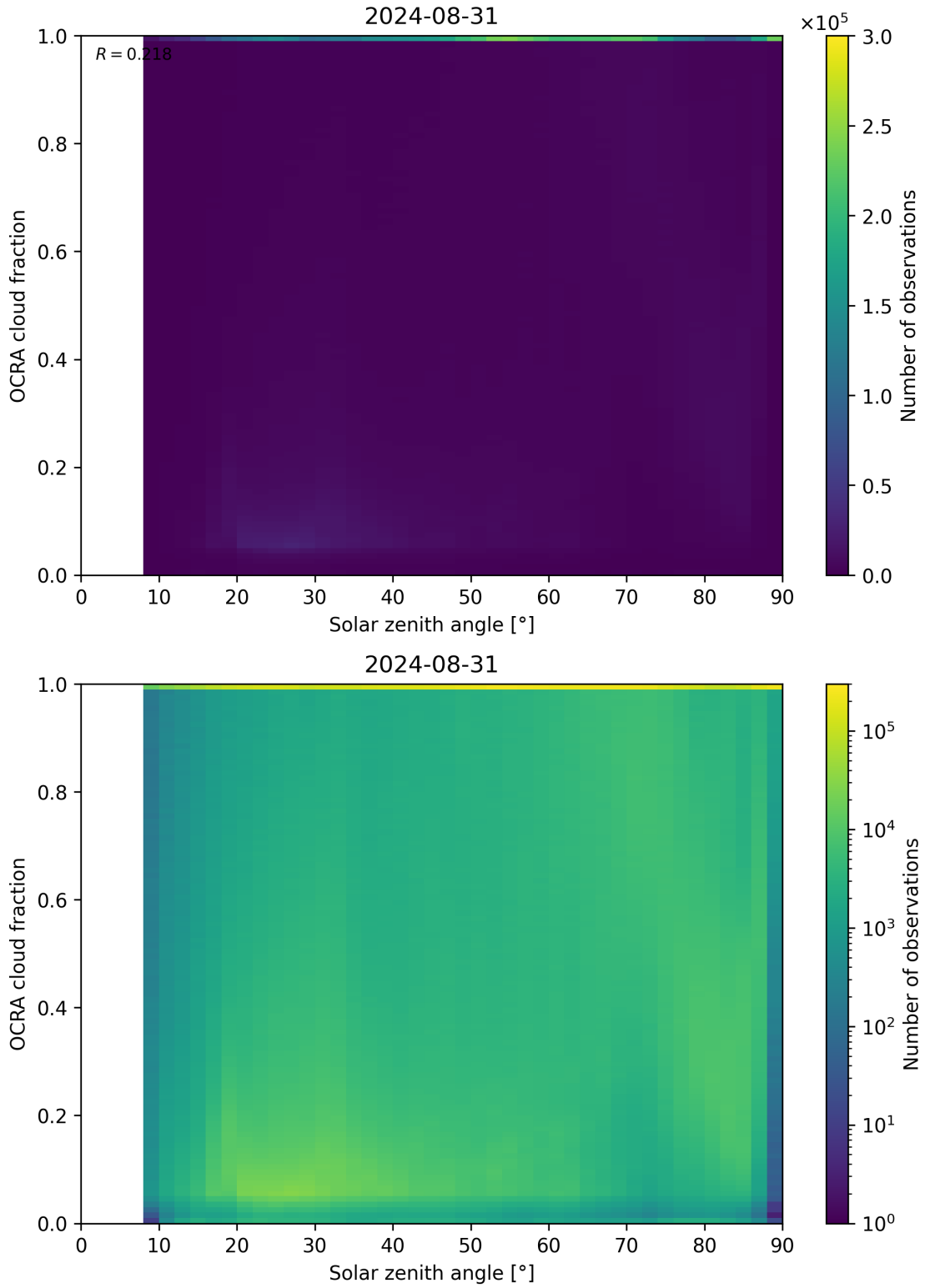

Figure 100: Scatter density plot of “Solar zenith angle” against “OCRA cloud fraction” for 2024-08-30 to 2024-09-01.

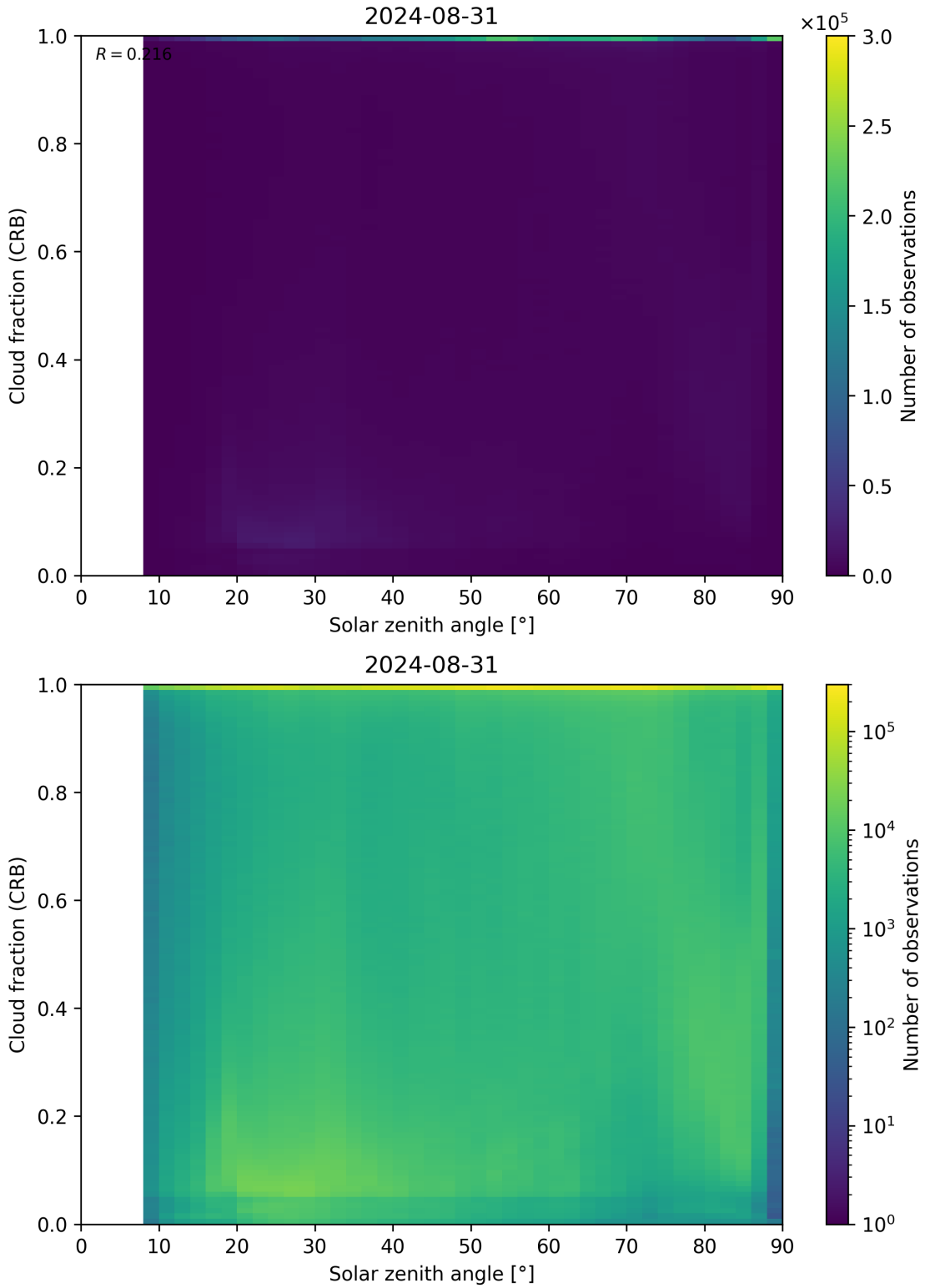

Figure 101: Scatter density plot of “Solar zenith angle” against “Cloud fraction (CRB)” for 2024-08-30 to 2024-09-01.

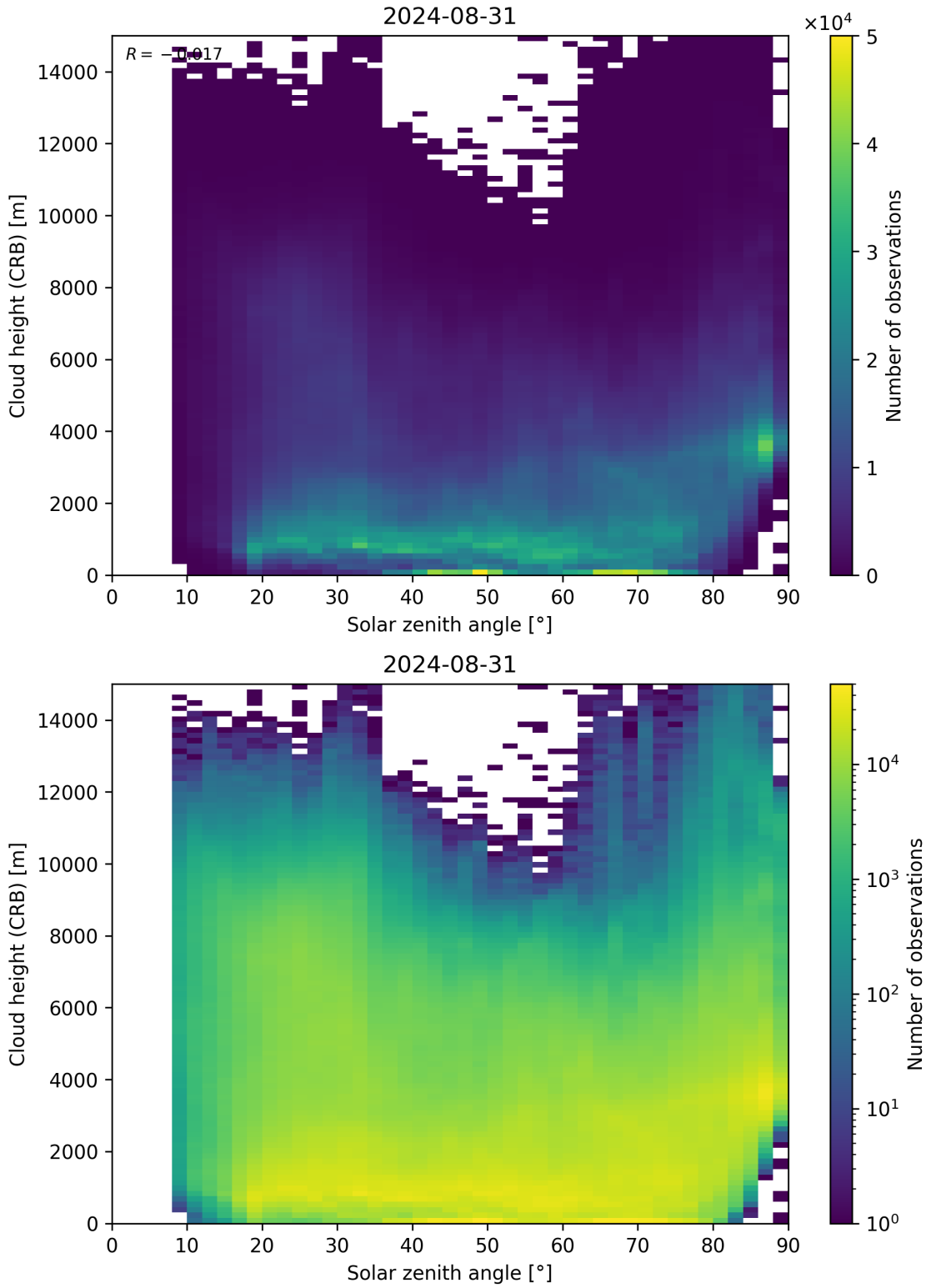

Figure 102: Scatter density plot of “Solar zenith angle” against “Cloud height (CRB)” for 2024-08-30 to 2024-09-01.

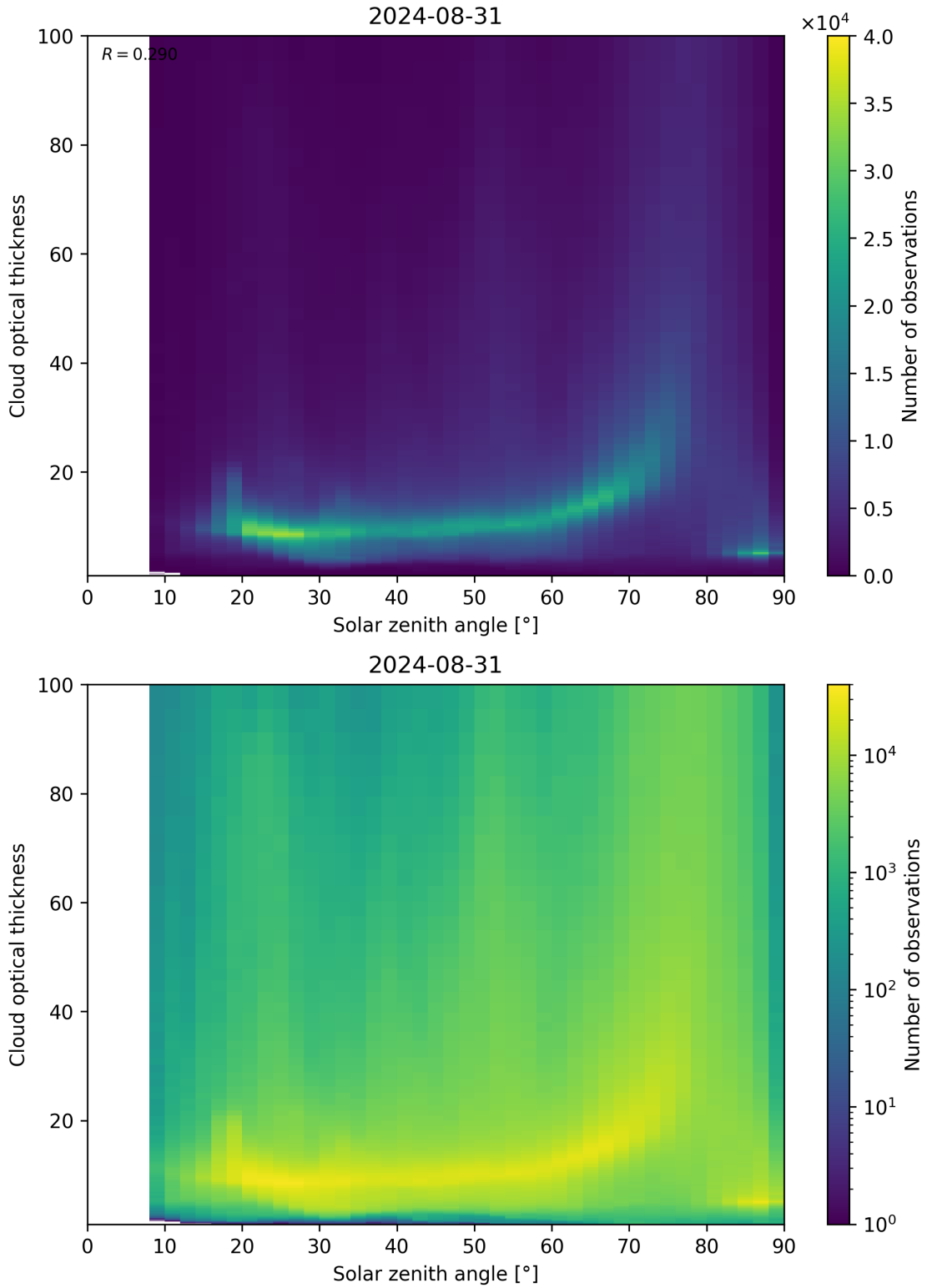

Figure 103: Scatter density plot of “Solar zenith angle” against “Cloud optical thickness” for 2024-08-30 to 2024-09-01.

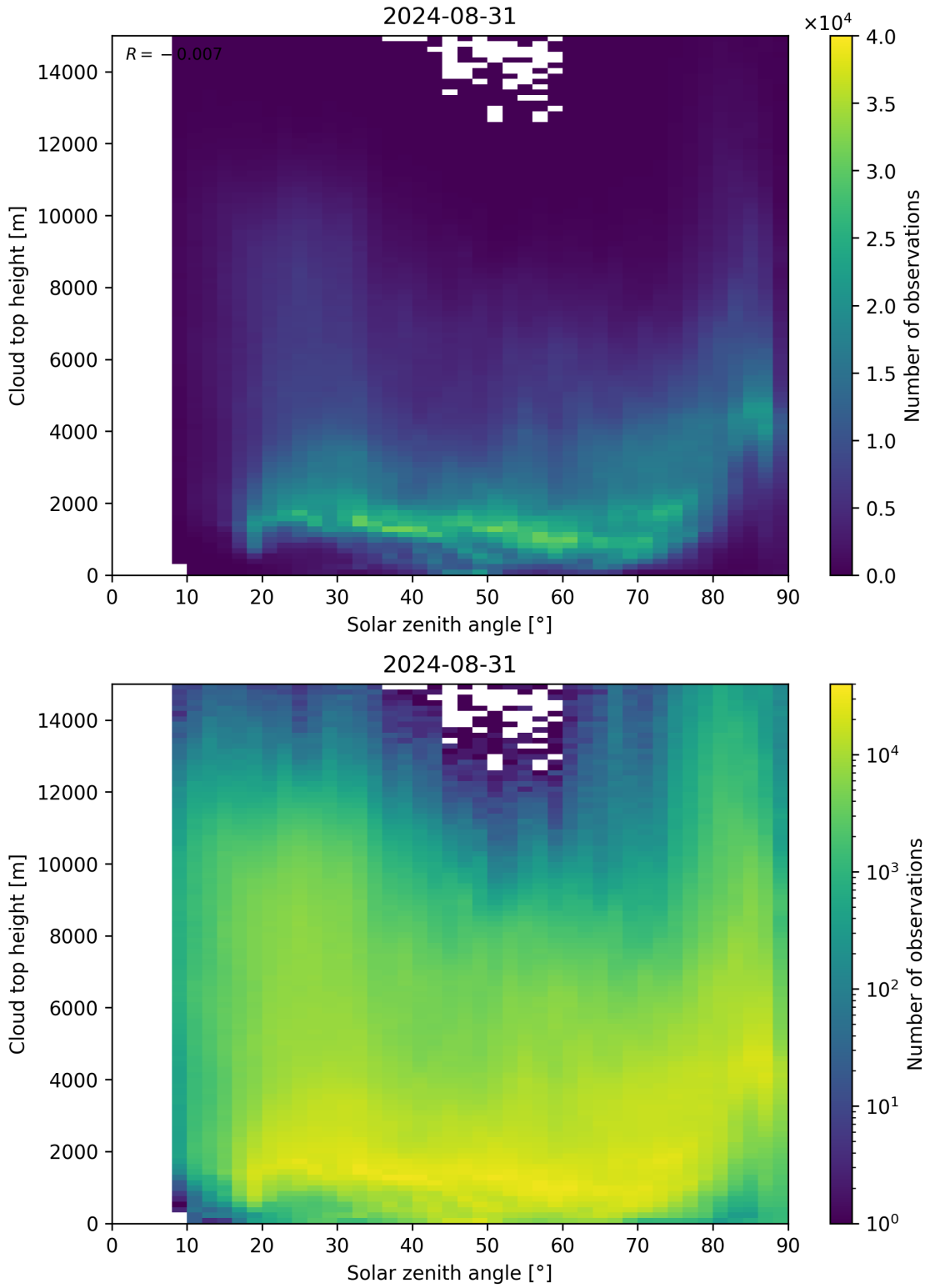

Figure 104: Scatter density plot of “Solar zenith angle” against “Cloud top height” for 2024-08-30 to 2024-09-01.

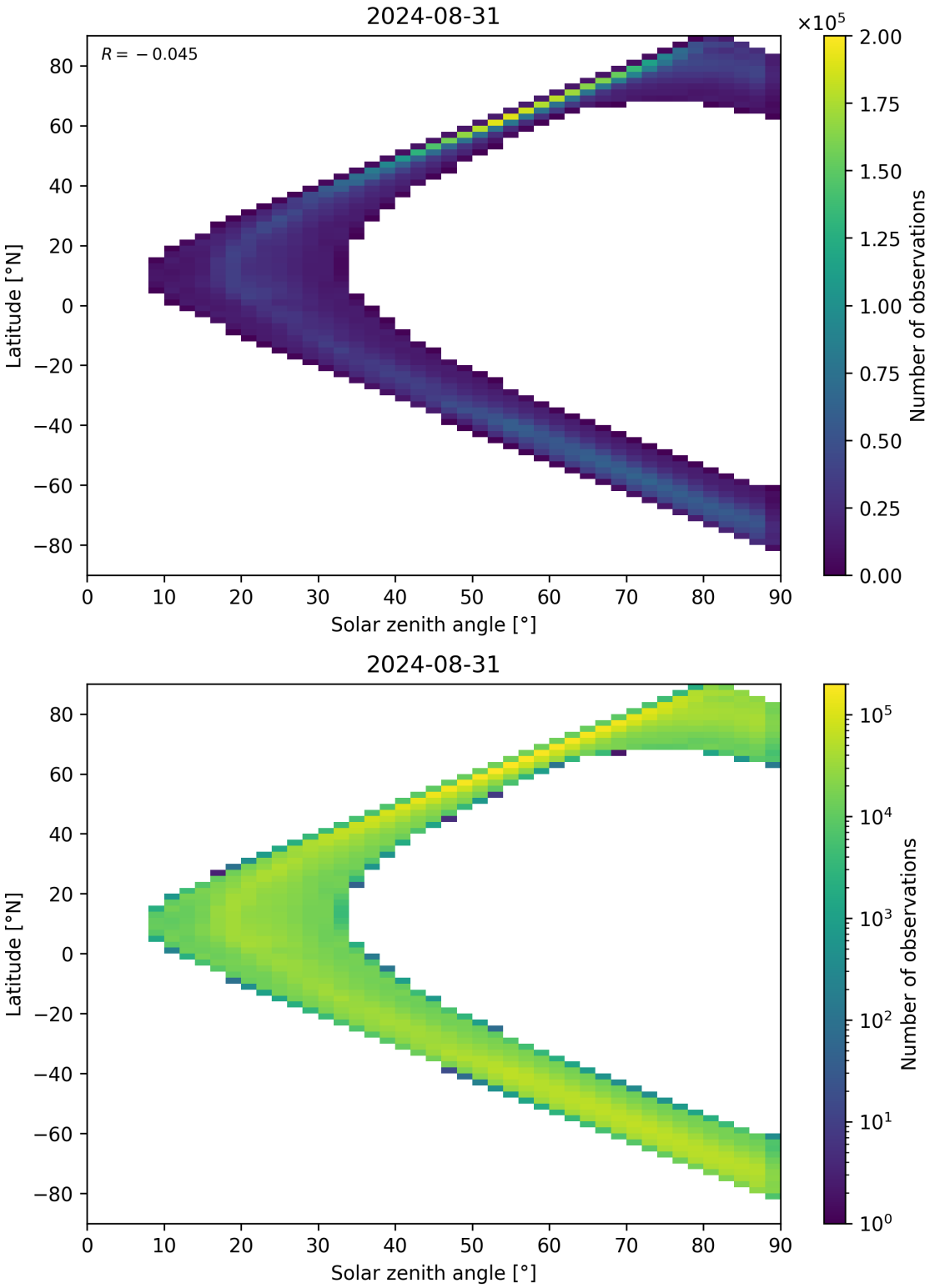

Figure 105: Scatter density plot of “Solar zenith angle” against “Latitude” for 2024-08-30 to 2024-09-01.

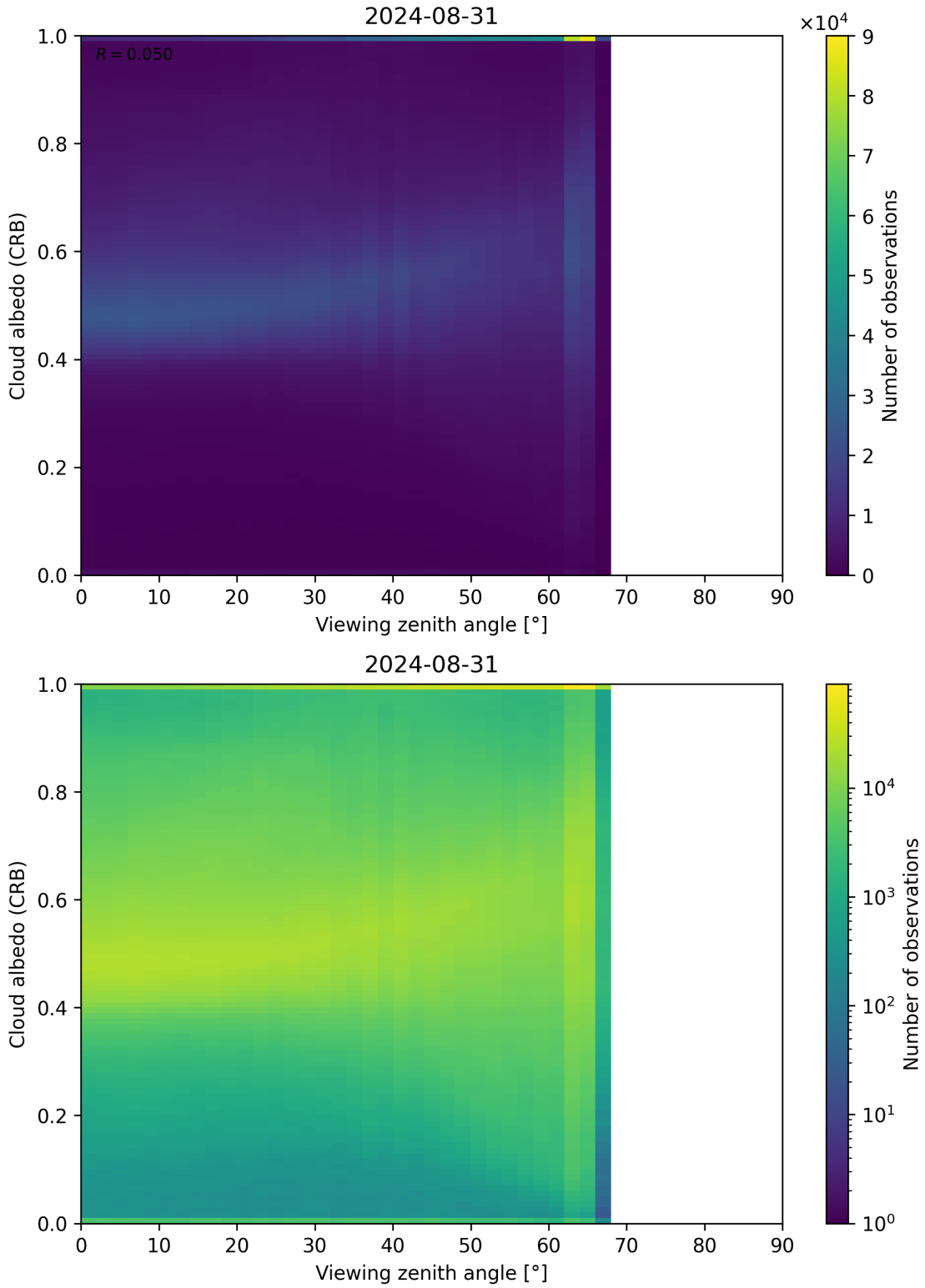

Figure 106: Scatter density plot of “Viewing zenith angle” against “Cloud albedo (CRB)” for 2024-08-30 to 2024-09-01.

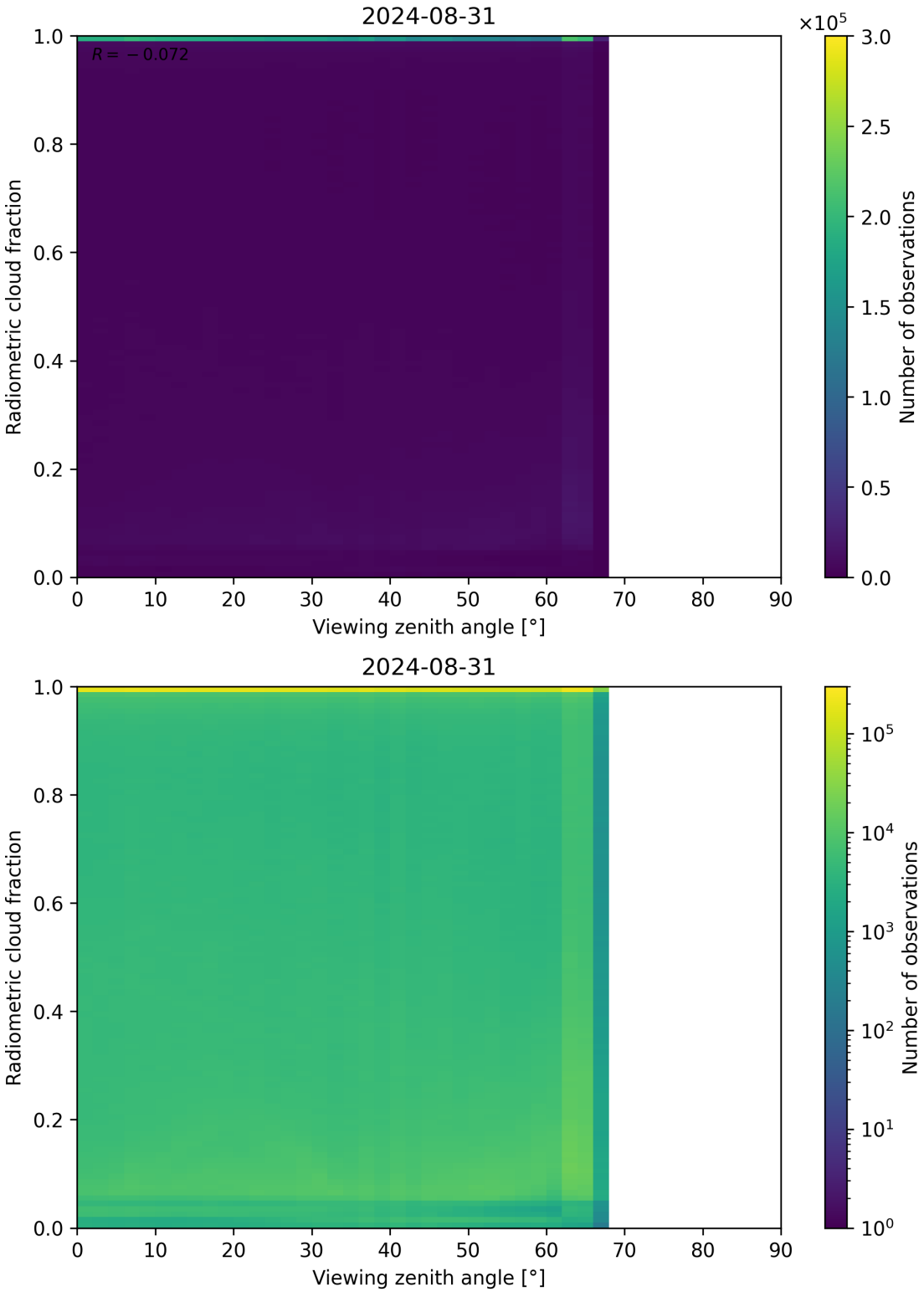

Figure 107: Scatter density plot of “Viewing zenith angle” against “Radiometric cloud fraction” for 2024-08-30 to 2024-09-01.

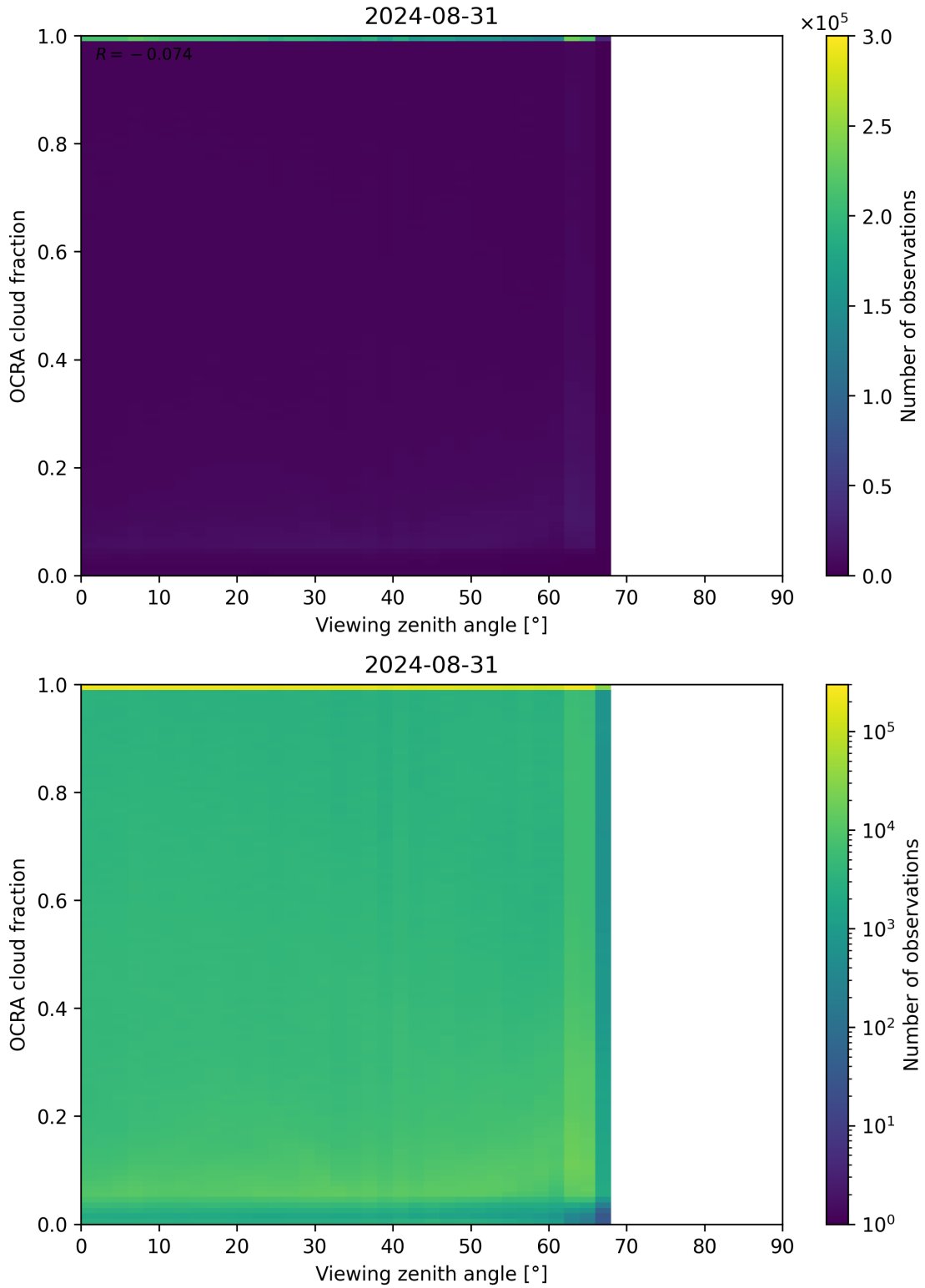

Figure 108: Scatter density plot of “Viewing zenith angle” against “OCRA cloud fraction” for 2024-08-30 to 2024-09-01.

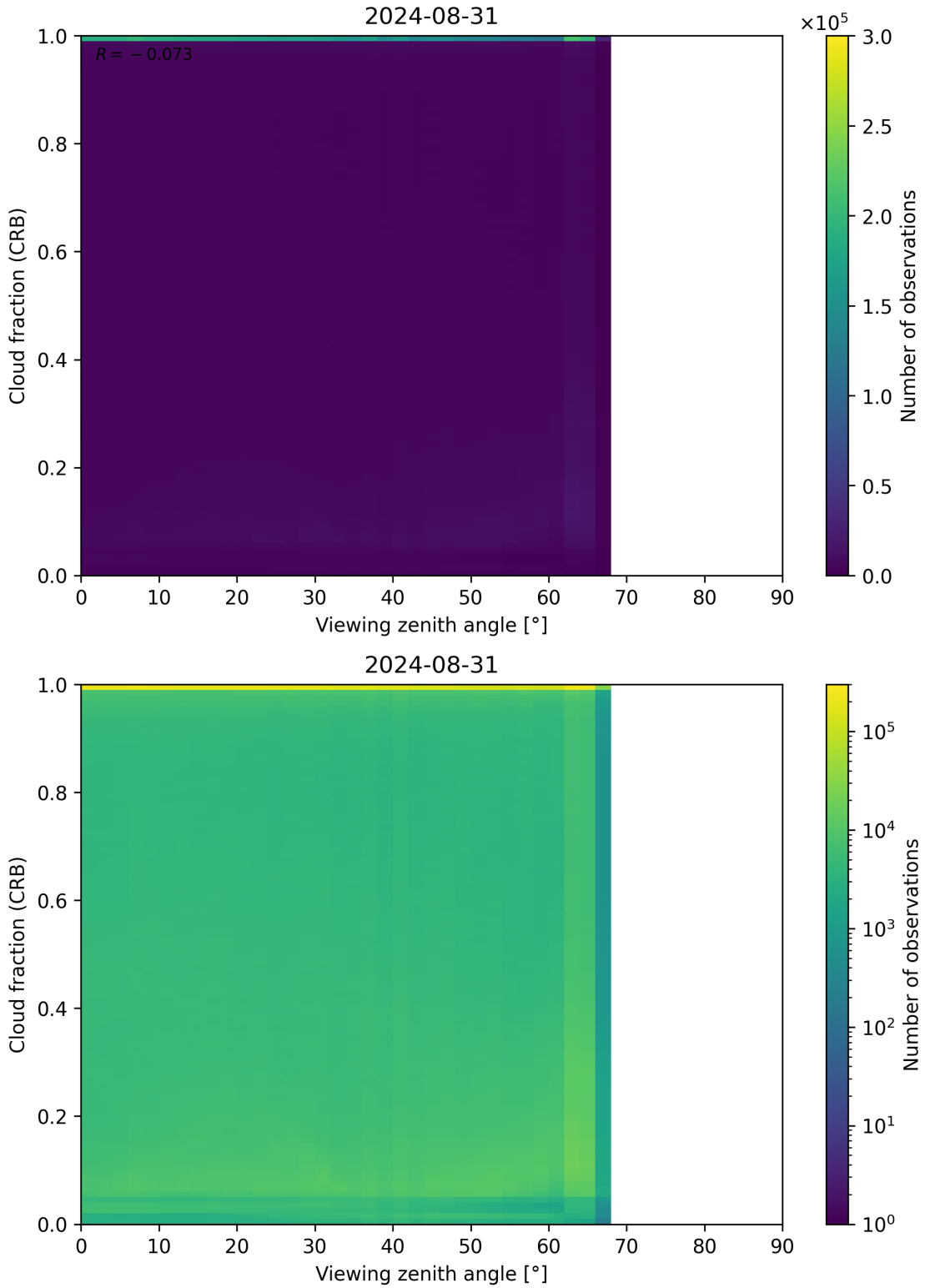

Figure 109: Scatter density plot of “Viewing zenith angle” against “Cloud fraction (CRB)” for 2024-08-30 to 2024-09-01.

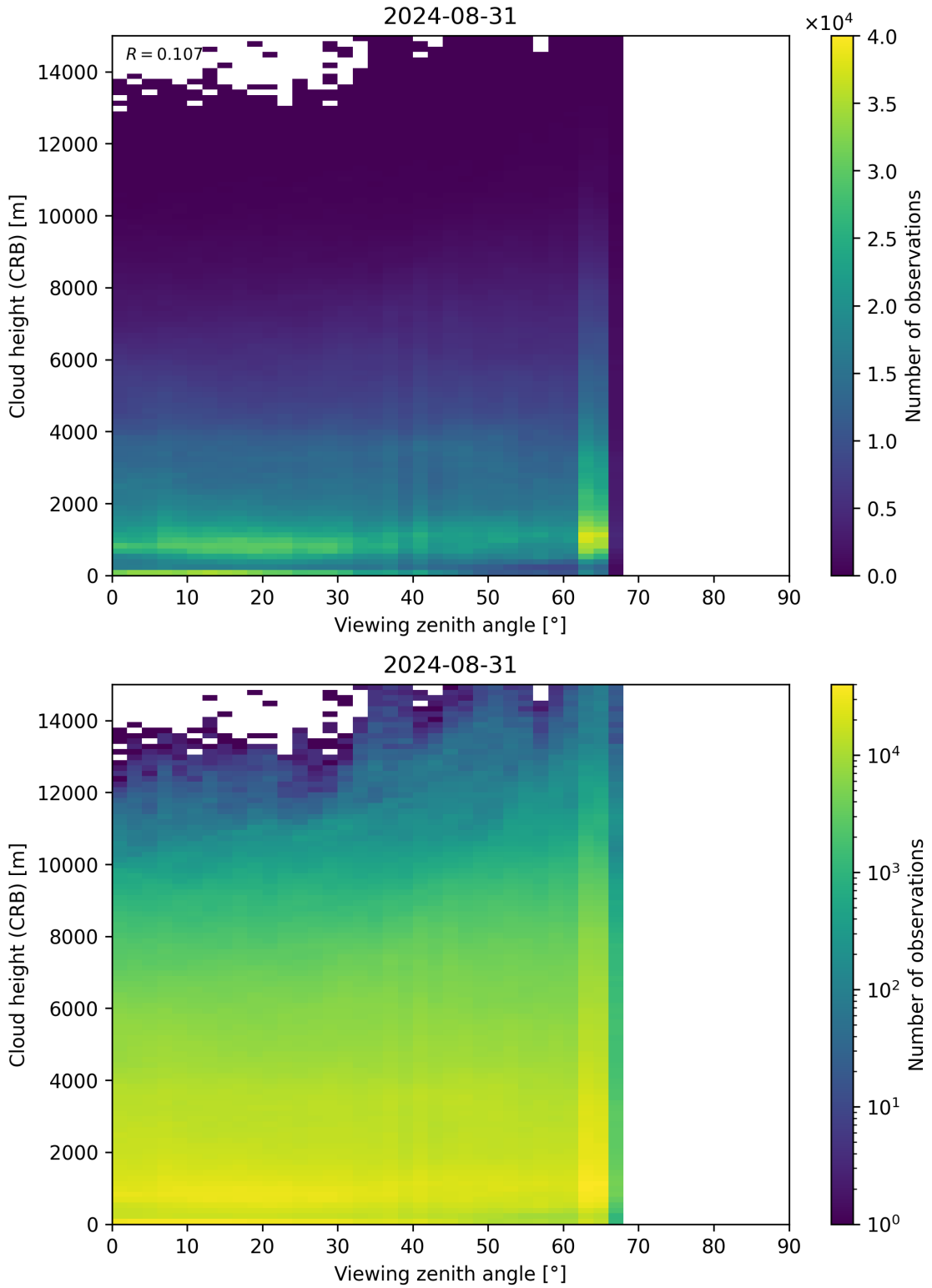

Figure 110: Scatter density plot of “Viewing zenith angle” against “Cloud height (CRB)” for 2024-08-30 to 2024-09-01.

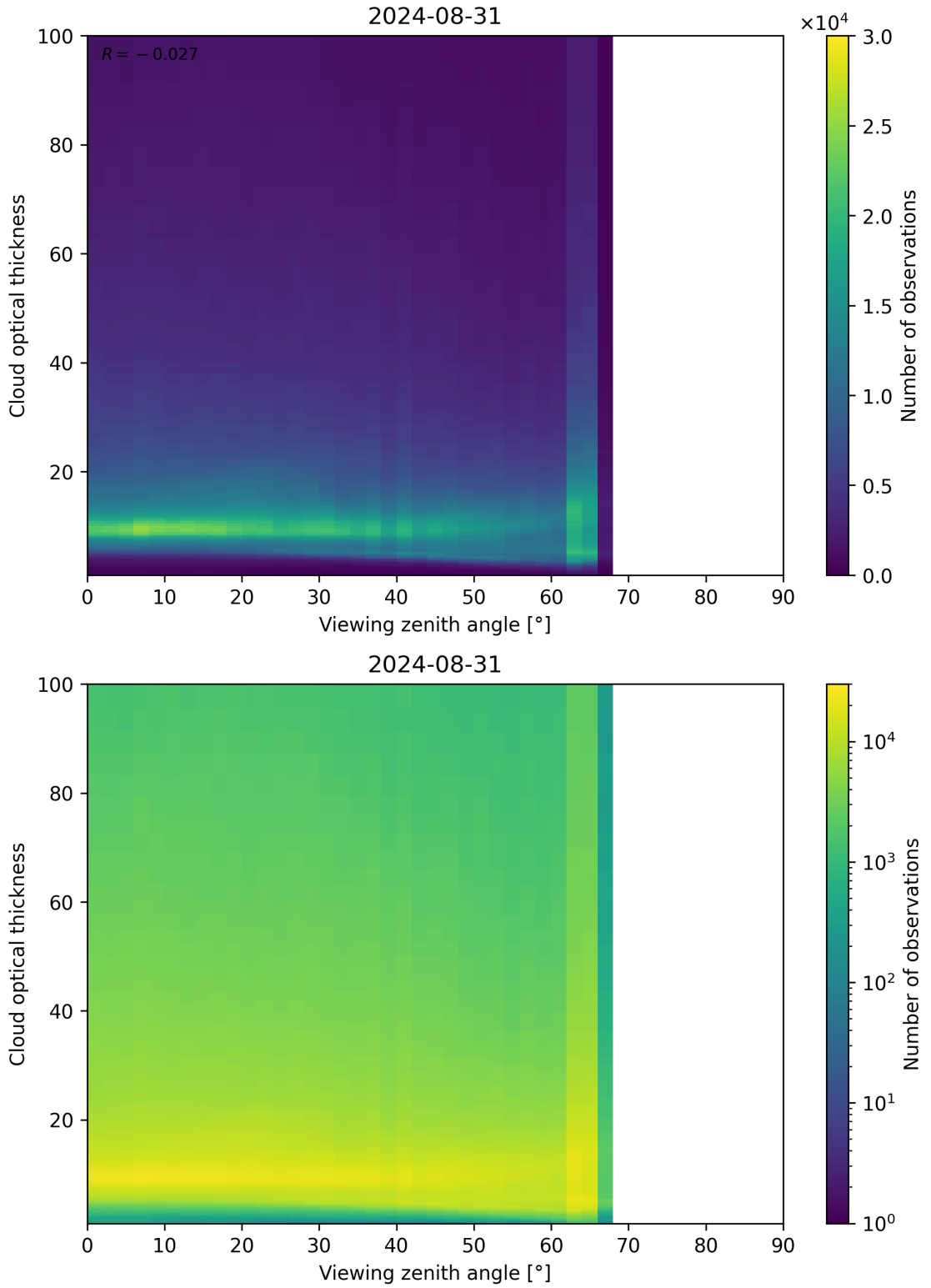

Figure 111: Scatter density plot of “Viewing zenith angle” against “Cloud optical thickness” for 2024-08-30 to 2024-09-01.

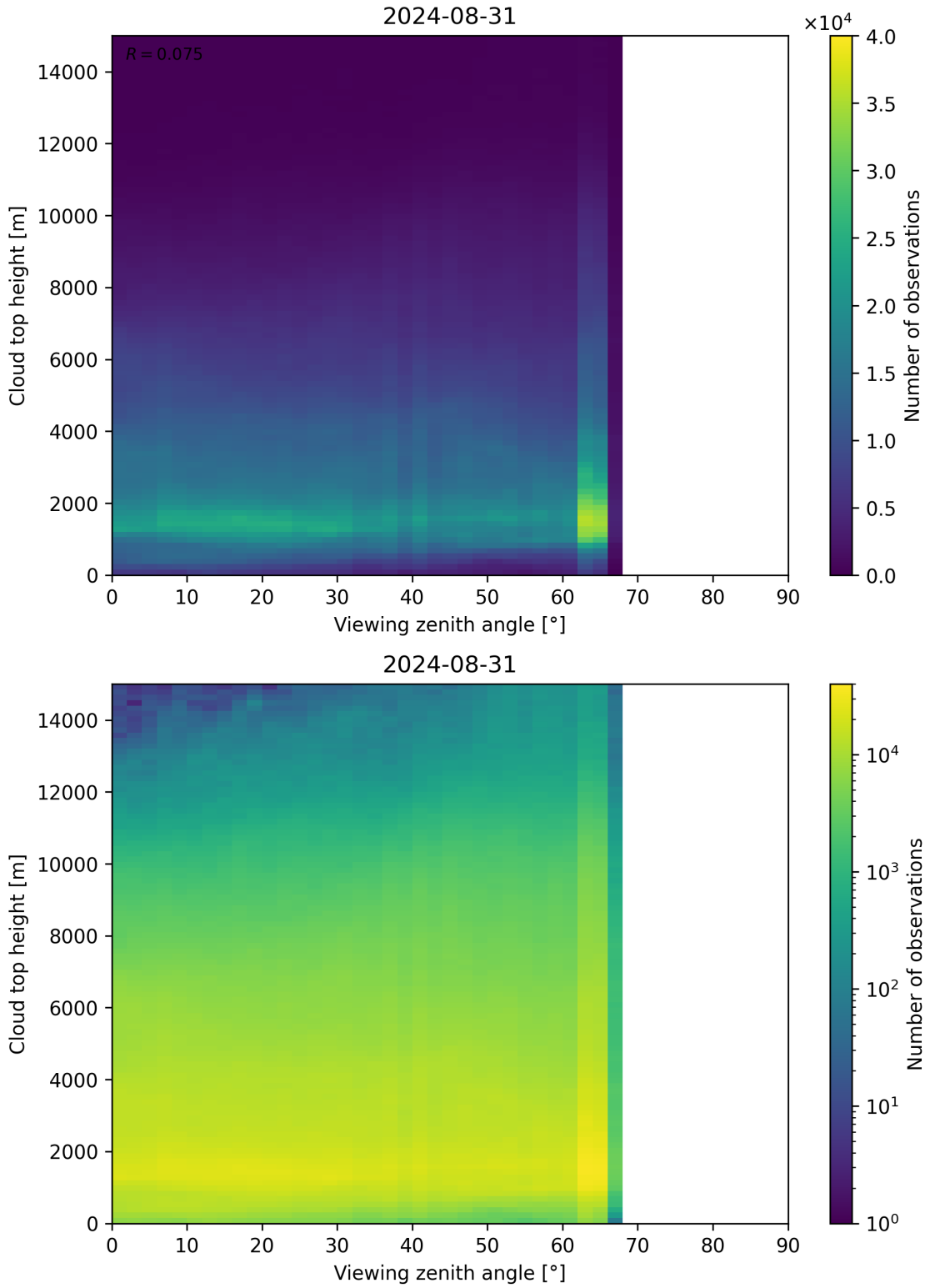

Figure 112: Scatter density plot of “Viewing zenith angle” against “Cloud top height” for 2024-08-30 to 2024-09-01.

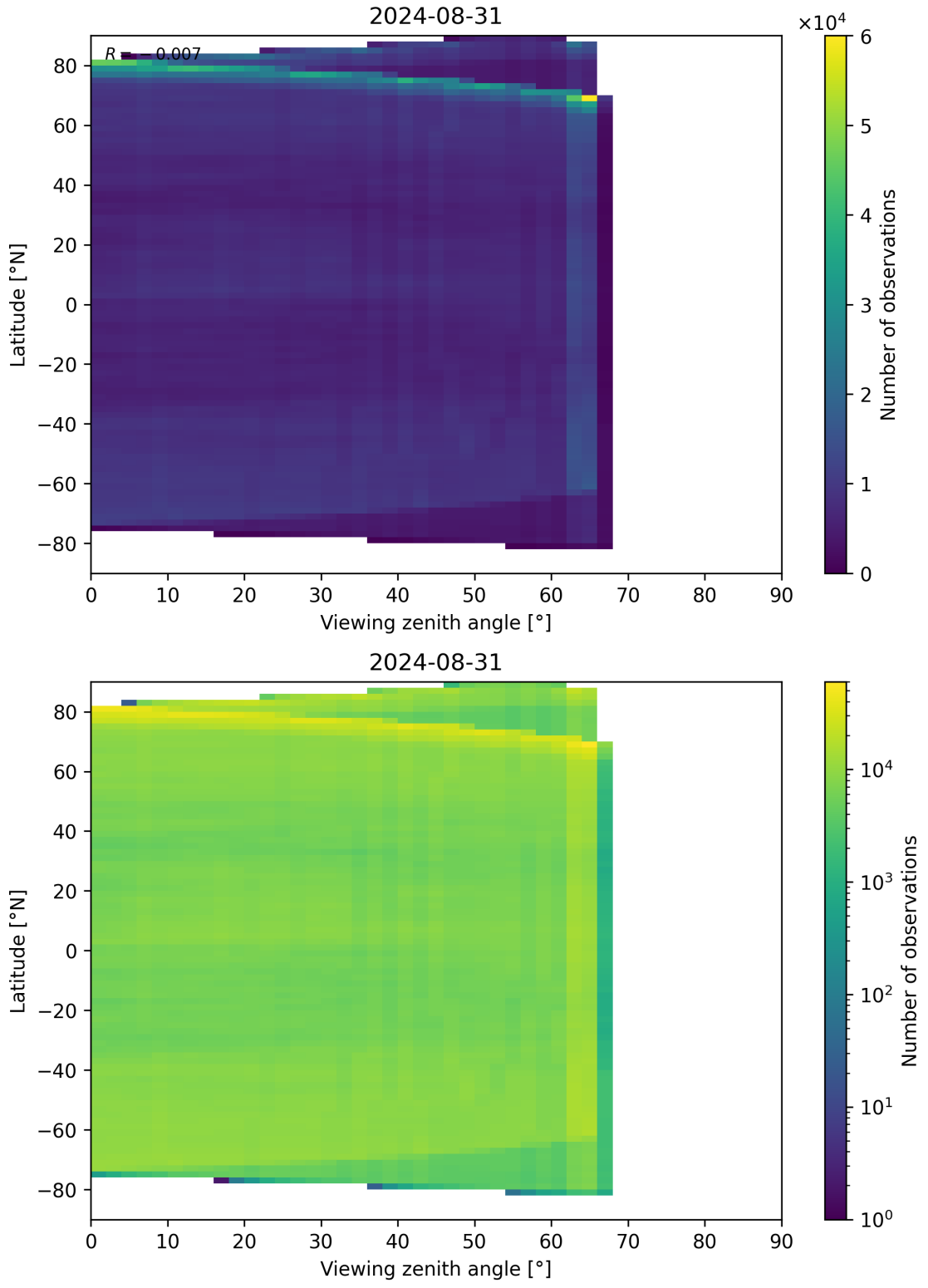

Figure 113: Scatter density plot of “Viewing zenith angle” against “Latitude” for 2024-08-30 to 2024-09-01.

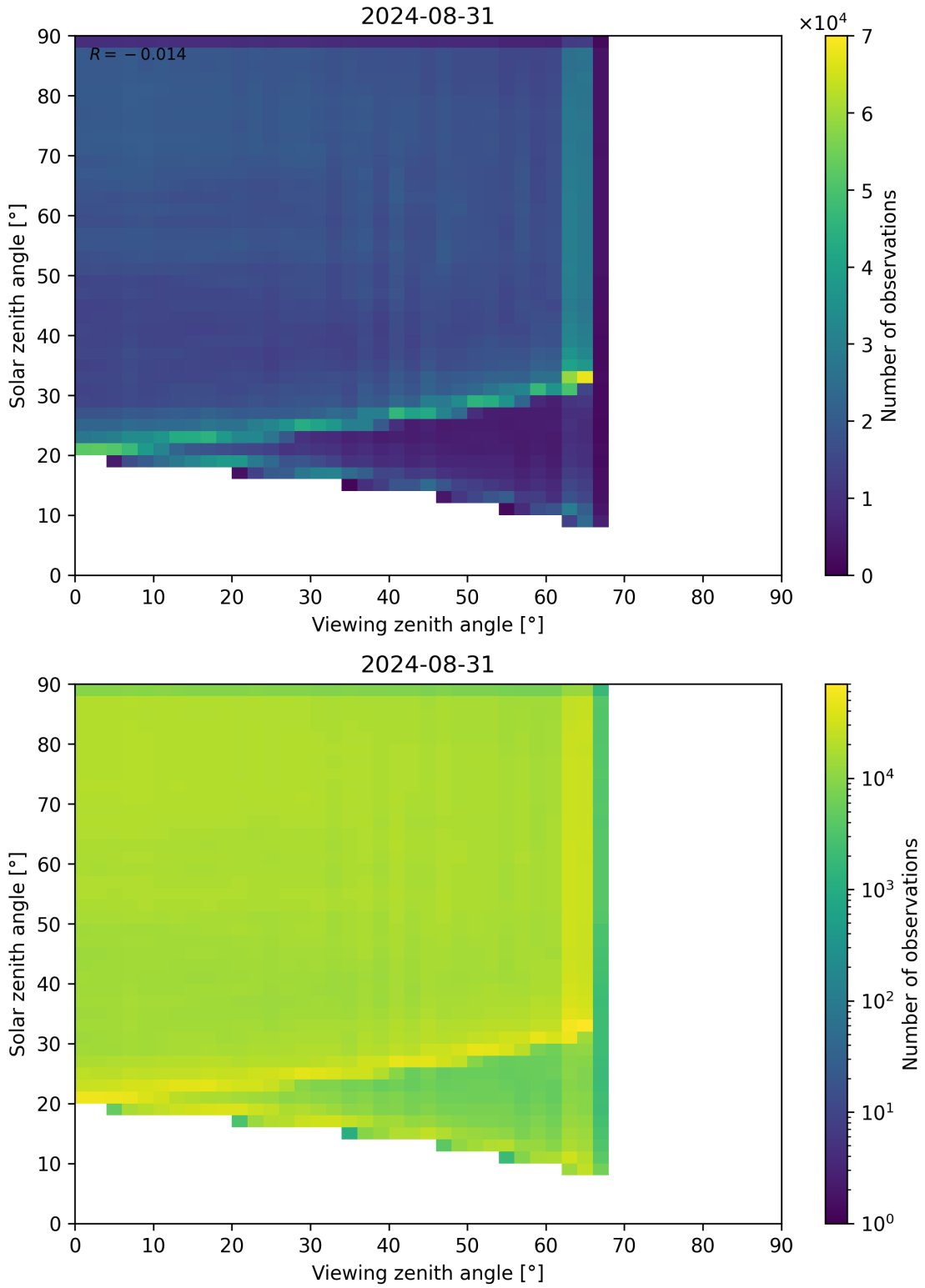

Figure 114: Scatter density plot of “Viewing zenith angle” against “Solar zenith angle” for 2024-08-30 to 2024-09-01.

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