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]	0.664 ± 0.378	20992254	0.995	0.680	0.890	0.0	1.000
cloud fraction [1]	0.565 ± 0.353	20992254	0.995	0.756	0.554	7.771×10^{-3}	1.000
cloud top height [m]	$(0.388 \pm 0.269) \times 10^4$	20992254	1.425×10^3	3.617×10^3	3.247×10^3	0.0	2.000×10^4
cloud optical thickness [1]	22.8 ± 37.7	20992254	10.7	13.1	11.8	1.000	250
cloud fraction crb [1]	0.564 ± 0.353	20992254	0.995	0.757	0.551	8.181×10^{-3}	1.000
cloud height crb [m]	$(0.308 \pm 0.229) \times 10^4$	20992254	975	3.171×10^3	2.551×10^3	0.0	2.000×10^4
cloud albedo crb [1]	0.608 ± 0.183	20992254	0.995	0.212	0.592	0.0	1.000
surface albedo fitted [1]	0.161 ± 0.209	20992254	1.500×10^{-2}	0.211	4.870×10^{-2}	0.0	1.000
surface albedo fitted crb [1]	0.149 ± 0.200	20992254	1.500×10^{-2}	0.213	3.313×10^{-2}	0.0	1.000
fitted root mean square [1]	$(6.146 \pm 7.942) \times 10^{-4}$	20992254	5.000×10^{-5}	6.797×10^{-4}	3.352×10^{-4}	1.256×10^{-6}	0.302
fitted root mean square crb [1]	$(5.550 \pm 7.601) \times 10^{-4}$	20992254	5.000×10^{-5}	6.189×10^{-4}	2.680×10^{-4}	1.190×10^{-6}	0.525
wavelength shift [nm]	$(8.020 \pm 6.815) \times 10^{-3}$	20992254	6.900×10^{-3}	9.105×10^{-3}	7.535×10^{-3}	-5.231×10^{-2}	0.114
cloud fraction apriori [1]	0.566 ± 0.359	20992254	0.995	0.788	0.556	0.0	1.000
reflectance blue ocra [1]	0.525 ± 0.202	20992254	0.265	0.316	0.501	0.131	1.90
reflectance green ocra [1]	0.472 ± 0.227	20992254	0.185	0.378	0.450	7.028×10^{-2}	1.97
reflectance continuum aband [1]	0.430 ± 0.252	20992254	4.500×10^{-2}	0.390	0.417	1.190×10^{-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	6.000×10^{-2}	0.300	0.980	1.000	1.000	1.000	1.000
cloud fraction [1]	2.376×10^{-2}	6.076×10^{-2}	9.479×10^{-2}	0.138	0.221	0.977	1.000	1.000	1.000	1.000
cloud top height [m]	284	738	1.061×10^{3}	1.345×10^{3}	1.766×10^{3}	5.383×10^{3}	6.617×10^{3}	7.729×10^{3}	9.122×10^{3}	1.181×10^{4}
cloud optical thickness [1]	1.77	3.77	4.87	5.87	7.55	20.6	29.9	43.7	76.6	250
cloud fraction crb [1]	2.342×10^{-2}	5.984×10^{-2}	9.385×10^{-2}	0.137	0.219	0.976	1.000	1.000	1.000	1.000
cloud height crb [m]	30.4	387	638	873	1.231×10^{3}	4.402×10^{3}	5.452×10^{3}	6.427×10^{3}	7.638×10^{3}	9.673×10^{3}
cloud albedo crb [1]	0.114	0.319	0.409	0.456	0.501	0.713	0.788	0.862	0.970	1.000
surface albedo fitted [1]	0.0	8.707×10^{-3}	1.290×10^{-2}	1.675×10^{-2}	2.254×10^{-2}	0.233	0.337	0.517	0.648	0.847
surface albedo fitted crb [1]	4.787×10^{-4}	6.229×10^{-3}	9.098×10^{-3}	1.182×10^{-2}	1.580×10^{-2}	0.229	0.330	0.490	0.605	0.798
fitted root mean square [1]	1.604×10^{-5}	3.347×10^{-5}	5.467×10^{-5}	8.171×10^{-5}	1.297×10^{-4}	8.093×10^{-4}	1.172×10^{-3}	1.565×10^{-3}	2.147×10^{-3}	3.405×10^{-3}
fitted root mean square crb [1]	8.654×10^{-6}	2.232×10^{-5}	3.808×10^{-5}	5.886×10^{-5}	9.726×10^{-5}	7.162×10^{-4}	1.087×10^{-3}	1.494×10^{-3}	2.098×10^{-3}	3.313×10^{-3}
wavelength shift [nm]	-7.734×10^{-3}	-7.596×10^{-4}	2.808×10^{-4}	1.402×10^{-3}	3.178×10^{-3}	1.228×10^{-2}	1.464×10^{-2}	1.675×10^{-2}	1.964×10^{-2}	2.602×10^{-2}
cloud fraction apriori [1]	1.577×10^{-2}	5.752×10^{-2}	8.721×10^{-2}	0.129	0.212	1.000	1.000	1.000	1.000	1.000
reflectance blue ocra [1]	0.229	0.256	0.280	0.308	0.353	0.670	0.742	0.800	0.871	1.03
reflectance green ocra [1]	0.151	0.174	0.194	0.219	0.266	0.644	0.723	0.785	0.860	1.01
reflectance continuum aband [1]	3.141×10^{-2}	5.952×10^{-2}	9.661×10^{-2}	0.143	0.224	0.614	0.699	0.770	0.853	1.00

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]	0.659 ± 0.376	11992002	0.660	0.870	0.0	1.000	0.300	0.960
cloud fraction [1]	0.590 ± 0.356	11992002	0.763	0.611	7.771×10^{-3}	1.000	0.236	0.999
cloud top height [m]	$(0.396 \pm 0.272) \times 10^4$	11992002	3.711×10^3	3.408×10^3	0.0	2.000×10^4	1.809×10^3	5.520×10^3
cloud optical thickness [1]	21.2 ± 33.3	11992002	12.6	11.7	1.000	250	7.60	20.2
cloud fraction crb [1]	0.589 ± 0.356	11992002	0.764	0.609	8.380×10^{-3}	1.000	0.234	0.998
cloud height crb [m]	$(0.314 \pm 0.231) \times 10^4$	11992002	3.173×10^3	2.697×10^3	0.0	2.000×10^4	1.273×10^3	4.446×10^3
cloud albedo crb [1]	0.602 ± 0.180	11992002	0.217	0.591	0.0	1.000	0.496	0.712
surface albedo fitted [1]	0.176 ± 0.198	11992002	0.234	8.319×10^{-2}	0.0	1.000	2.538×10^{-2}	0.260
surface albedo fitted crb [1]	0.166 ± 0.193	11992002	0.237	6.532×10^{-2}	0.0	1.000	1.783×10^{-2}	0.255
fitted root mean square [1]	$(6.884 \pm 8.884) \times 10^{-4}$	11992002	7.740×10^{-4}	3.817×10^{-4}	1.256×10^{-6}	0.302	1.471×10^{-4}	9.211×10^{-4}
fitted root mean square crb [1]	$(6.524 \pm 8.624) \times 10^{-4}$	11992002	7.671×10^{-4}	3.267×10^{-4}	1.190×10^{-6}	0.525	1.206×10^{-4}	8.878×10^{-4}
wavelength shift [nm]	$(8.314 \pm 6.662) \times 10^{-3}$	11992002	8.790×10^{-3}	7.957×10^{-3}	-5.231×10^{-2}	0.114	3.708×10^{-3}	1.250×10^{-2}
cloud fraction apriori [1]	0.592 ± 0.361	11992002	0.772	0.615	0.0	1.000	0.228	1.000
reflectance blue ocra [1]	0.517 ± 0.195	11992002	0.310	0.501	0.131	1.87	0.348	0.658
reflectance green ocra [1]	0.467 ± 0.219	11992002	0.370	0.454	7.028×10^{-2}	1.97	0.264	0.634
reflectance continuum aband [1]	0.439 ± 0.242	11992002	0.366	0.430	1.190×10^{-2}	3.51	0.249	0.614

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]	0.670 ± 0.382	9000252	0.600	0.900	0.0	1.000	0.400	1.000
cloud fraction [1]	0.532 ± 0.346	9000252	0.707	0.488	8.014×10^{-3}	1.000	0.205	0.913
cloud top height [m]	$(0.377 \pm 0.265) \times 10^4$	9000252	3.479×10^3	3.035×10^3	0.0	2.000×10^4	1.723×10^3	5.201×10^3
cloud optical thickness [1]	25.0 ± 42.7	9000252	13.8	11.9	1.000	250	7.47	21.3
cloud fraction crb [1]	0.530 ± 0.346	9000252	0.707	0.485	8.181×10^{-3}	1.000	0.204	0.911
cloud height crb [m]	$(0.300 \pm 0.226) \times 10^4$	9000252	3.148×10^3	2.343×10^3	0.0	2.000×10^4	1.192×10^3	4.340×10^3
cloud albedo crb [1]	0.617 ± 0.186	9000252	0.206	0.594	0.0	1.000	0.507	0.713
surface albedo fitted [1]	0.141 ± 0.221	9000252	9.967×10^{-2}	3.556×10^{-2}	0.0	1.000	2.039×10^{-2}	0.120
surface albedo fitted crb [1]	0.126 ± 0.206	9000252	8.147×10^{-2}	2.402×10^{-2}	0.0	1.000	1.426×10^{-2}	9.573×10^{-2}
fitted root mean square [1]	$(5.163 \pm 6.347) \times 10^{-4}$	9000252	5.668×10^{-4}	2.834×10^{-4}	1.593×10^{-6}	4.820×10^{-2}	1.105×10^{-4}	6.774×10^{-4}
fitted root mean square crb [1]	$(4.254 \pm 5.721) \times 10^{-4}$	9000252	4.512×10^{-4}	2.073×10^{-4}	1.974×10^{-6}	3.553×10^{-2}	7.655×10^{-5}	5.277×10^{-4}
wavelength shift [nm]	$(7.630 \pm 6.996) \times 10^{-3}$	9000252	9.365×10^{-3}	6.907×10^{-3}	-4.804×10^{-2}	6.260×10^{-2}	2.587×10^{-3}	1.195×10^{-2}
cloud fraction apriori [1]	0.532 ± 0.353	9000252	0.745	0.487	0.0	1.000	0.195	0.940
reflectance blue ocra [1]	0.536 ± 0.211	9000252	0.329	0.501	0.141	1.90	0.360	0.689
reflectance green ocra [1]	0.479 ± 0.238	9000252	0.393	0.444	8.362×10^{-2}	1.91	0.268	0.661
reflectance continuum aband [1]	0.417 ± 0.264	9000252	0.419	0.396	1.318×10^{-2}	4.42	0.194	0.613

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]	0.669 ± 0.372	15441966	0.630	0.900	0.0	1.000	0.350	0.980
cloud fraction [1]	0.567 ± 0.351	15441966	0.746	0.560	8.014×10^{-3}	1.000	0.226	0.971
cloud top height [m]	$(0.381 \pm 0.265) \times 10^4$	15441966	3.533×10^3	3.152×10^3	0.0	2.000×10^4	1.732×10^3	5.265×10^3
cloud optical thickness [1]	24.6 ± 39.8	15441966	13.5	12.6	1.000	250	8.40	21.9
cloud fraction crb [1]	0.565 ± 0.351	15441966	0.747	0.557	8.407×10^{-3}	1.000	0.223	0.970
cloud height crb [m]	$(0.301 \pm 0.227) \times 10^4$	15441966	3.123×10^3	2.457×10^3	0.0	2.000×10^4	1.179×10^3	4.303×10^3
cloud albedo crb [1]	0.603 ± 0.174	15441966	0.200	0.587	0.0	1.000	0.499	0.699
surface albedo fitted [1]	0.112 ± 0.190	15441966	4.553×10^{-2}	3.188×10^{-2}	0.0	1.000	1.841×10^{-2}	6.394×10^{-2}
surface albedo fitted crb [1]	$(9.920 \pm 18.017) \times 10^{-2}$	15441966	3.112×10^{-2}	2.191×10^{-2}	0.0	1.000	1.296×10^{-2}	4.409×10^{-2}
fitted root mean square [1]	$(5.145 \pm 7.392) \times 10^{-4}$	15441966	5.345×10^{-4}	2.551×10^{-4}	1.315×10^{-6}	0.302	1.028×10^{-4}	6.374×10^{-4}
fitted root mean square crb [1]	$(4.587 \pm 7.040) \times 10^{-4}$	15441966	4.512×10^{-4}	2.010×10^{-4}	1.190×10^{-6}	0.525	7.971×10^{-5}	5.309×10^{-4}
wavelength shift [nm]	$(7.777 \pm 6.959) \times 10^{-3}$	15441966	9.207×10^{-3}	7.161×10^{-3}	-5.231×10^{-2}	0.114	2.863×10^{-3}	1.207×10^{-2}
cloud fraction apriori [1]	0.566 ± 0.357	15441966	0.785	0.561	0.0	1.000	0.215	1.000
reflectance blue ocra [1]	0.522 ± 0.189	15441966	0.296	0.504	0.157	1.90	0.363	0.659
reflectance green ocra [1]	0.466 ± 0.215	15441966	0.359	0.451	9.235×10^{-2}	1.80	0.272	0.630
reflectance continuum aband [1]	0.400 ± 0.249	15441966	0.416	0.394	1.190×10^{-2}	4.42	0.173	0.589

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]	0.615 ± 0.410	3660666	0.850	0.850	0.0	1.000	0.110	0.960
cloud fraction [1]	0.511 ± 0.353	3660666	0.742	0.437	8.444×10^{-3}	1.000	0.179	0.921
cloud top height [m]	$(0.440 \pm 0.293) \times 10^4$	3660666	3.975×10^3	3.910×10^3	0.0	2.000×10^4	2.119×10^3	6.093×10^3
cloud optical thickness [1]	16.5 ± 29.8	3660666	9.20	8.56	1.000	250	5.40	14.6
cloud fraction crb [1]	0.511 ± 0.353	3660666	0.742	0.435	8.380×10^{-3}	1.000	0.179	0.921
cloud height crb [m]	$(0.353 \pm 0.242) \times 10^4$	3660666	3.418×10^3	3.017×10^3	0.0	2.000×10^4	1.584×10^3	5.002×10^3
cloud albedo crb [1]	0.635 ± 0.214	3660666	0.266	0.623	0.0	1.000	0.513	0.779
surface albedo fitted [1]	0.348 ± 0.217	3660666	0.158	0.263	0.0	1.000	0.209	0.368
surface albedo fitted crb [1]	0.335 ± 0.201	3660666	0.157	0.257	5.159×10^{-3}	1.000	0.205	0.362
fitted root mean square [1]	$(9.772 \pm 8.972) \times 10^{-4}$	3660666	9.408×10^{-4}	7.189×10^{-4}	2.379×10^{-6}	7.776×10^{-2}	3.611×10^{-4}	1.302×10^{-3}
fitted root mean square crb [1]	$(8.821 \pm 8.674) \times 10^{-4}$	3660666	9.290×10^{-4}	6.261×10^{-4}	1.379×10^{-6}	3.553×10^{-2}	2.744×10^{-4}	1.203×10^{-3}
wavelength shift [nm]	$(8.505 \pm 6.153) \times 10^{-3}$	3660666	8.274×10^{-3}	8.241×10^{-3}	-4.043×10^{-2}	5.515×10^{-2}	4.169×10^{-3}	1.244×10^{-2}
cloud fraction apriori [1]	0.516 ± 0.360	3660666	0.803	0.441	0.0	1.000	0.173	0.976
reflectance blue ocra [1]	0.536 ± 0.254	3660666	0.432	0.474	0.131	1.88	0.315	0.746
reflectance green ocra [1]	0.494 ± 0.278	3660666	0.495	0.429	7.028×10^{-2}	1.91	0.240	0.735
reflectance continuum aband [1]	0.526 ± 0.248	3660666	0.398	0.476	1.776×10^{-2}	4.29	0.319	0.717

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	2.297×10^{-2}	-1.981×10^{-2}	9.717×10^{-3}	5.248×10^{-2}	-1.085×10^{-2}	9.227×10^{-3}	8.632×10^{-2}	0.106	8.075×10^{-3}
2.297×10^{-2}	1.000	-2.676×10^{-2}	0.212	-7.959×10^{-3}	0.219	0.213	-2.060×10^{-2}	0.111	0.211
-1.981×10^{-2}	-2.676×10^{-2}	1.000	0.124	-6.409×10^{-2}	-5.397×10^{-2}	0.125	-7.230×10^{-2}	-0.111	0.124
9.717×10^{-3}	0.212	0.124	1.000	-5.262×10^{-2}	0.257	1.000	1.988×10^{-2}	0.158	0.993
5.248×10^{-2}	-7.959×10^{-3}	-6.409×10^{-2}	-5.262×10^{-2}	1.000	9.529×10^{-2}	-5.222×10^{-2}	0.954	0.176	-5.582×10^{-2}
-1.085×10^{-2}	0.219	-5.397×10^{-2}	0.257	9.529×10^{-2}	1.000	0.252	0.123	0.476	0.254
9.227×10^{-3}	0.213	0.125	1.000	-5.222×10^{-2}	0.252	1.000	2.025×10^{-2}	0.156	0.993
8.632×10^{-2}	-2.060×10^{-2}	-7.230×10^{-2}	1.988×10^{-2}	0.954	0.123	2.025×10^{-2}	1.000	0.123	1.697×10^{-2}
0.106	0.111	-0.111	0.158	0.176	0.476	0.156	0.123	1.000	0.164
8.075×10^{-3}	0.211	0.124	0.993	-5.582×10^{-2}	0.254	0.993	1.697×10^{-2}	0.164	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
385	9.52	−19.8	6.723×10^{-2}	2.769×10^{3}	−8.02	6.390×10^{-2}	3.881×10^{3}	0.380	5.688×10^{-2}
9.52	446	−28.7	1.58	−452	174	1.59	−997	0.430	1.60
−19.8	−28.7	2.583×10^{3}	2.23	-8.760×10^{3}	−103	2.24	-8.422×10^{3}	−1.03	2.27
6.723×10^{-2}	1.58	2.23	0.124	−49.9	3.41	0.124	16.1	1.019×10^{-2}	0.126
2.769×10^{3}	−452	-8.760×10^{3}	−49.9	7.231×10^{6}	9.654×10^{3}	−49.6	5.876×10^{6}	86.6	−53.9
−8.02	174	−103	3.41	9.654×10^{3}	1.419×10^{3}	3.35	1.064×10^{4}	3.28	3.43
6.390×10^{-2}	1.59	2.24	0.124	−49.6	3.35	0.125	16.4	1.007×10^{-2}	0.126
3.881×10^{3}	−997	-8.422×10^{3}	16.1	5.876×10^{6}	1.064×10^{4}	16.4	5.252×10^{6}	51.4	14.0
0.380	0.430	−1.03	1.019×10^{-2}	86.6	3.28	1.007×10^{-2}	51.4	3.341×10^{-2}	1.077×10^{-2}
5.688×10^{-2}	1.60	2.27	0.126	−53.9	3.43	0.126	14.0	1.077×10^{-2}	0.129

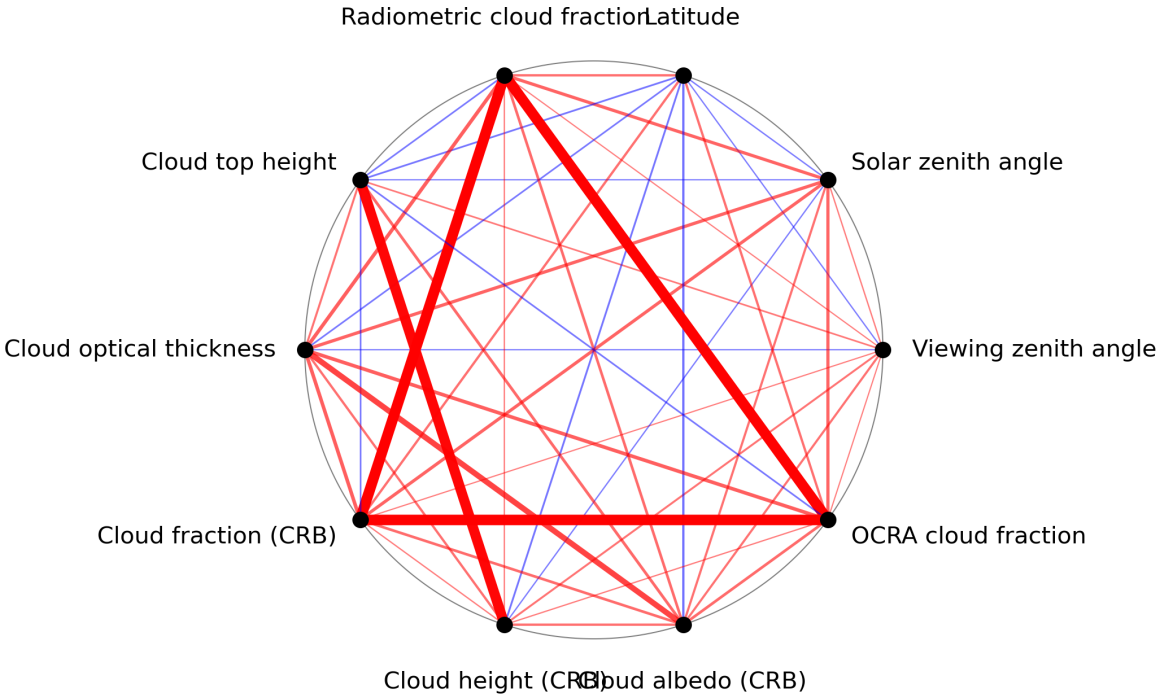


Figure 1: Map of correlation graph for 2023-08-28 to 2023-08-30.

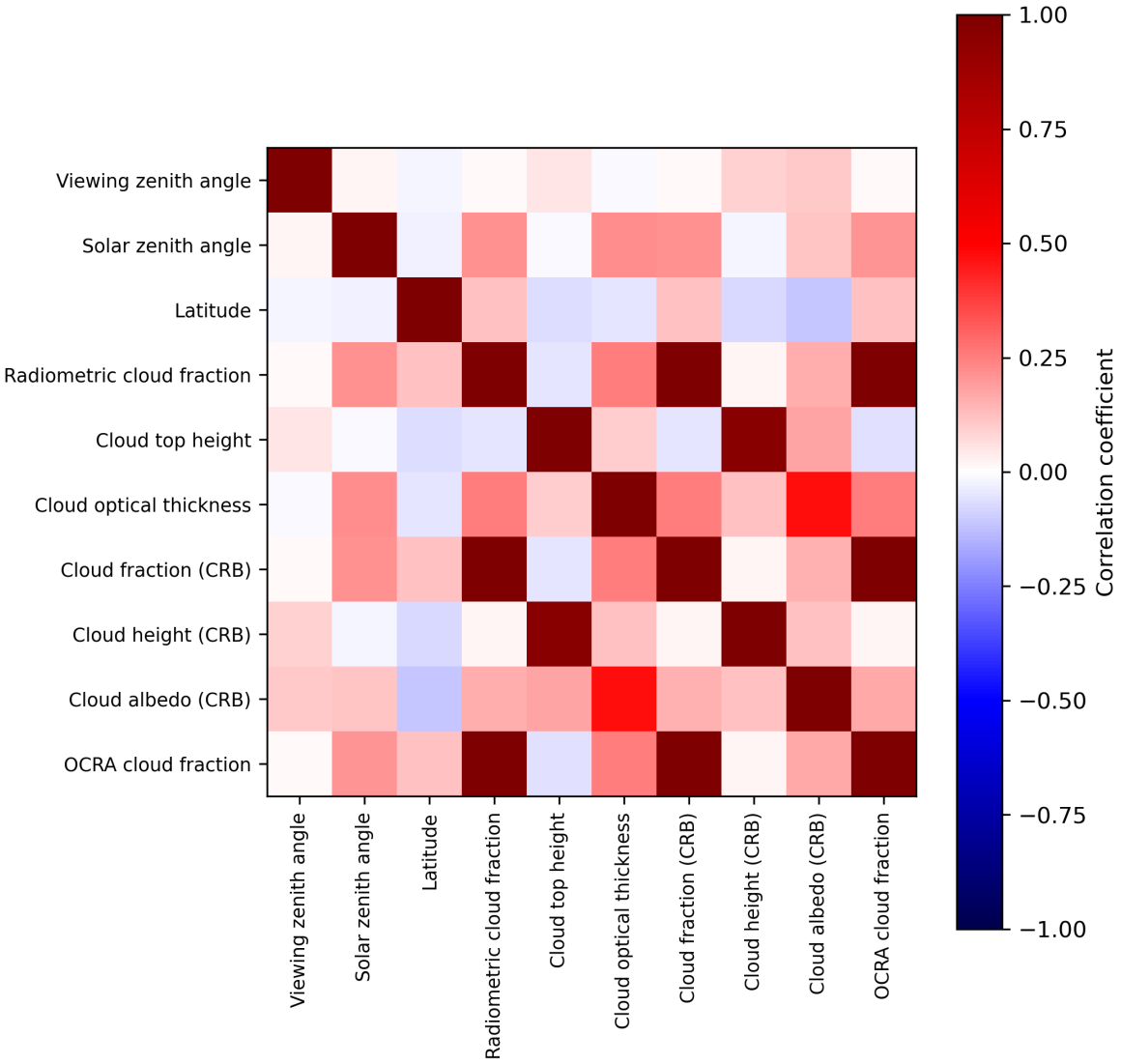


Figure 2: Map of correlation matrix for 2023-08-28 to 2023-08-30.

3 Granule outlines

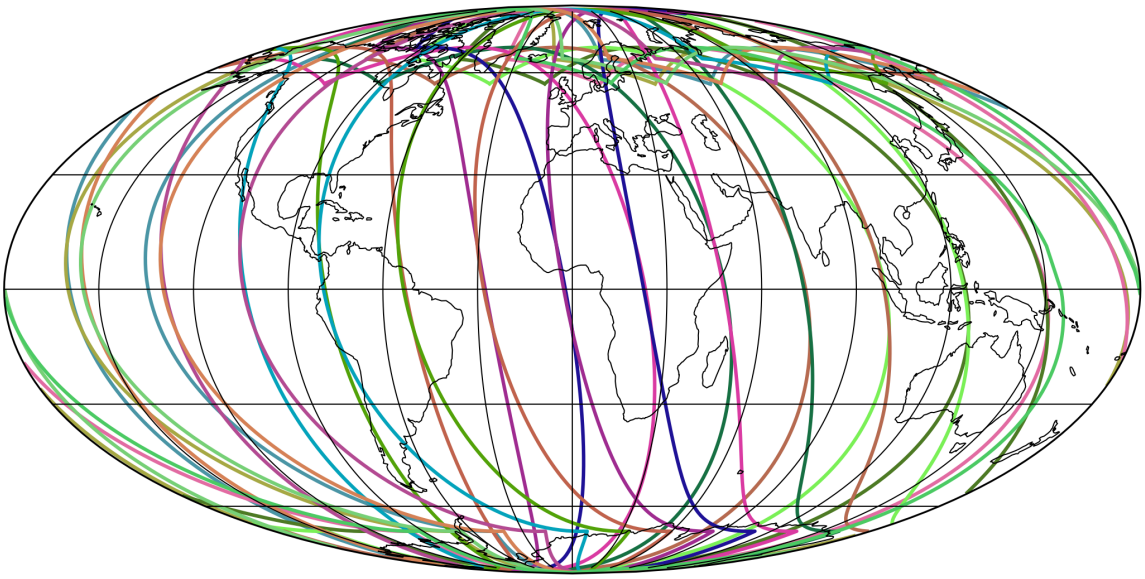


Figure 3: Outline of the granules.

4 Input data monitoring

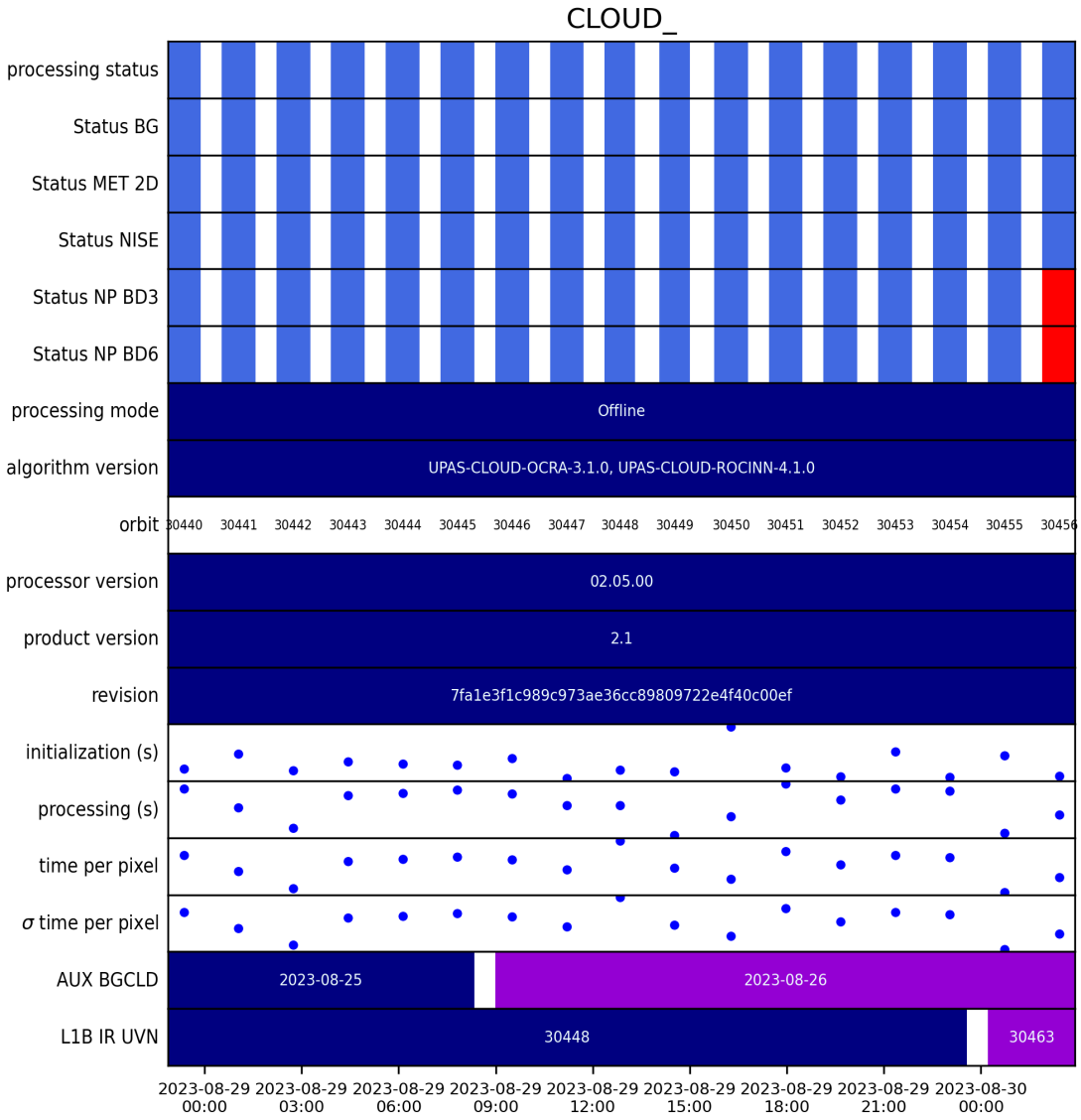


Figure 4: Input data per granule

5 Warnings and errors

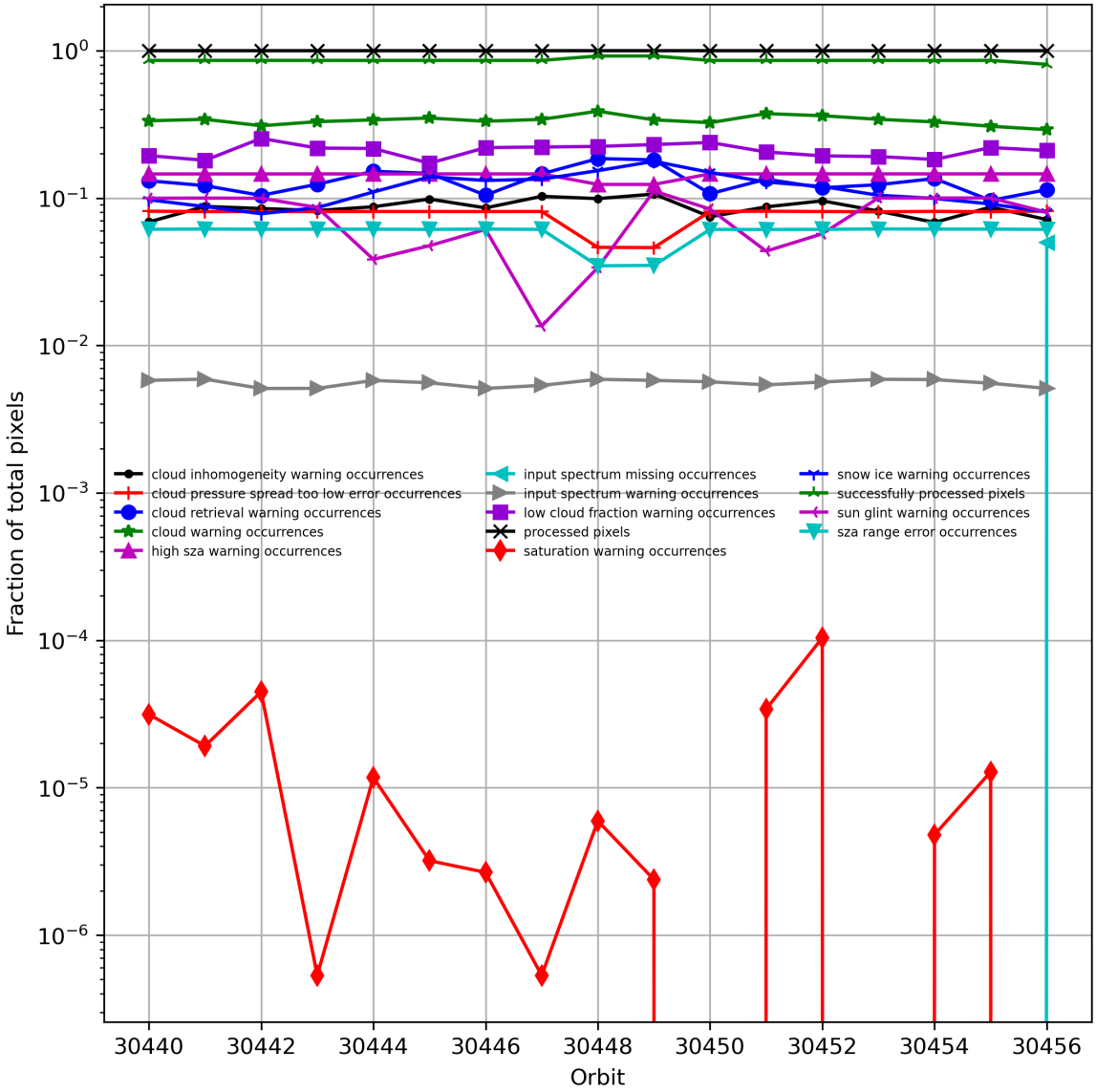


Figure 5: Fraction of pixels with specific warnings and errors during processing

6 World maps

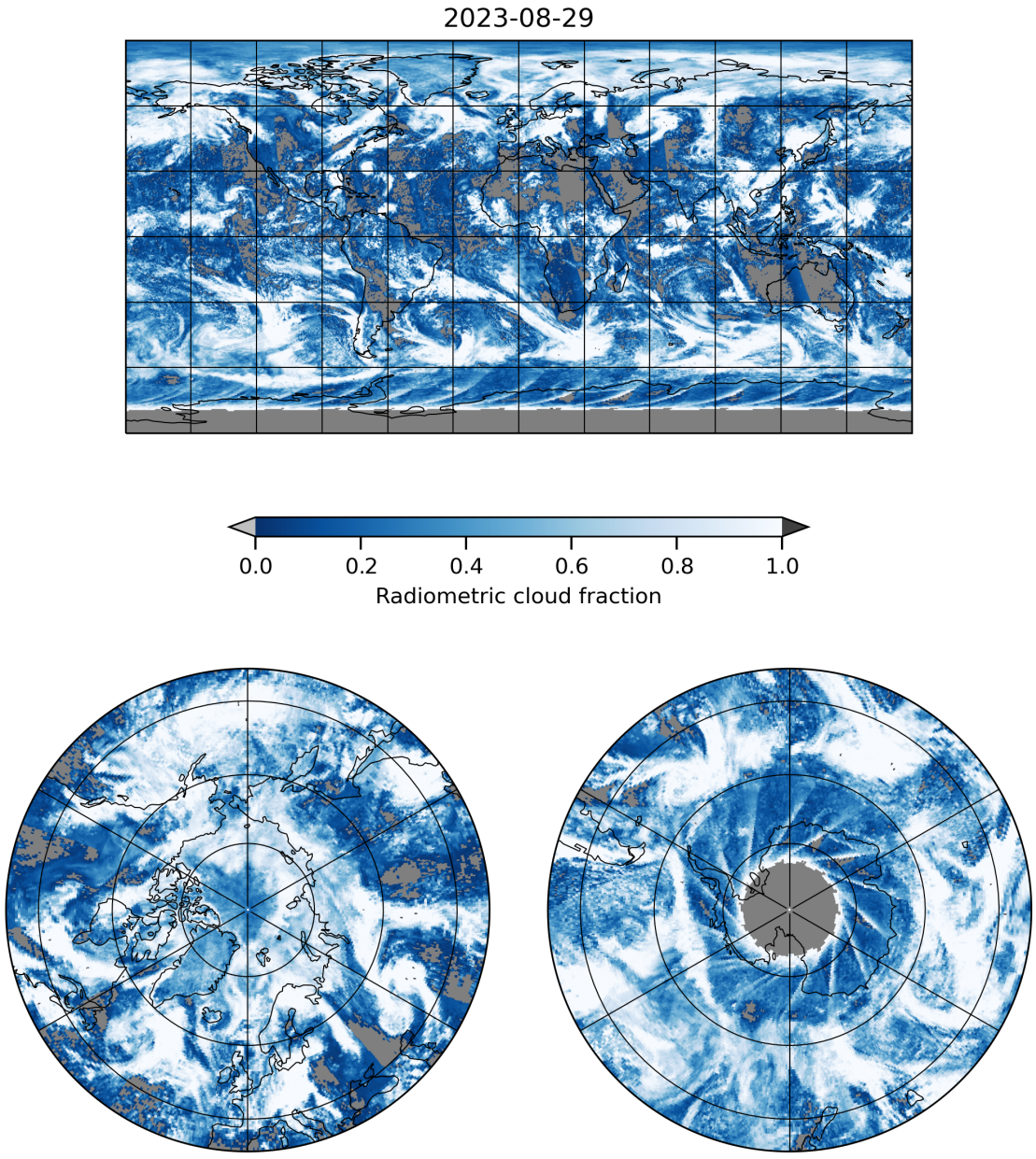


Figure 6: Map of “Radiometric cloud fraction” for 2023-08-28 to 2023-08-30

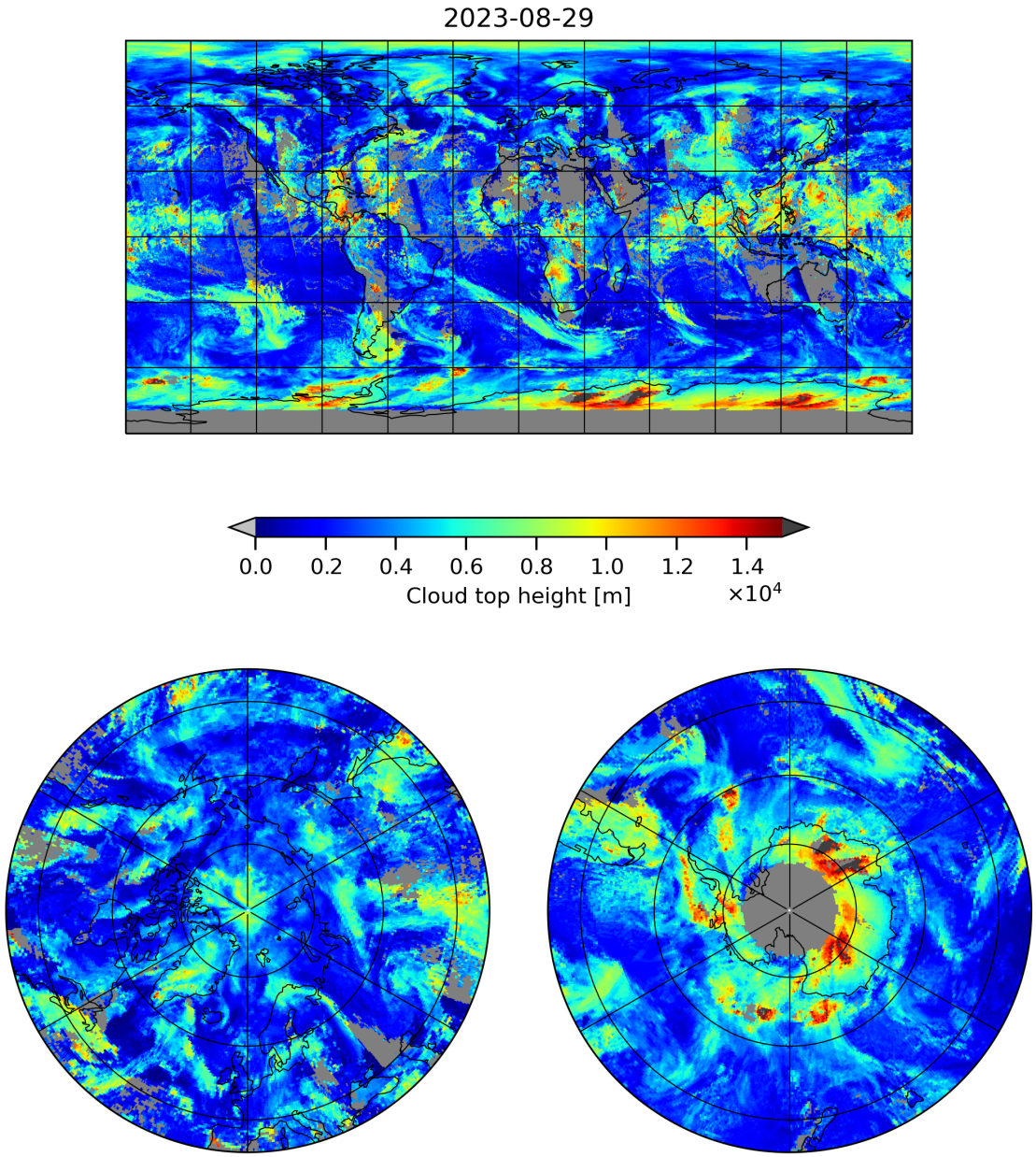


Figure 7: Map of “Cloud top height” for 2023-08-28 to 2023-08-30

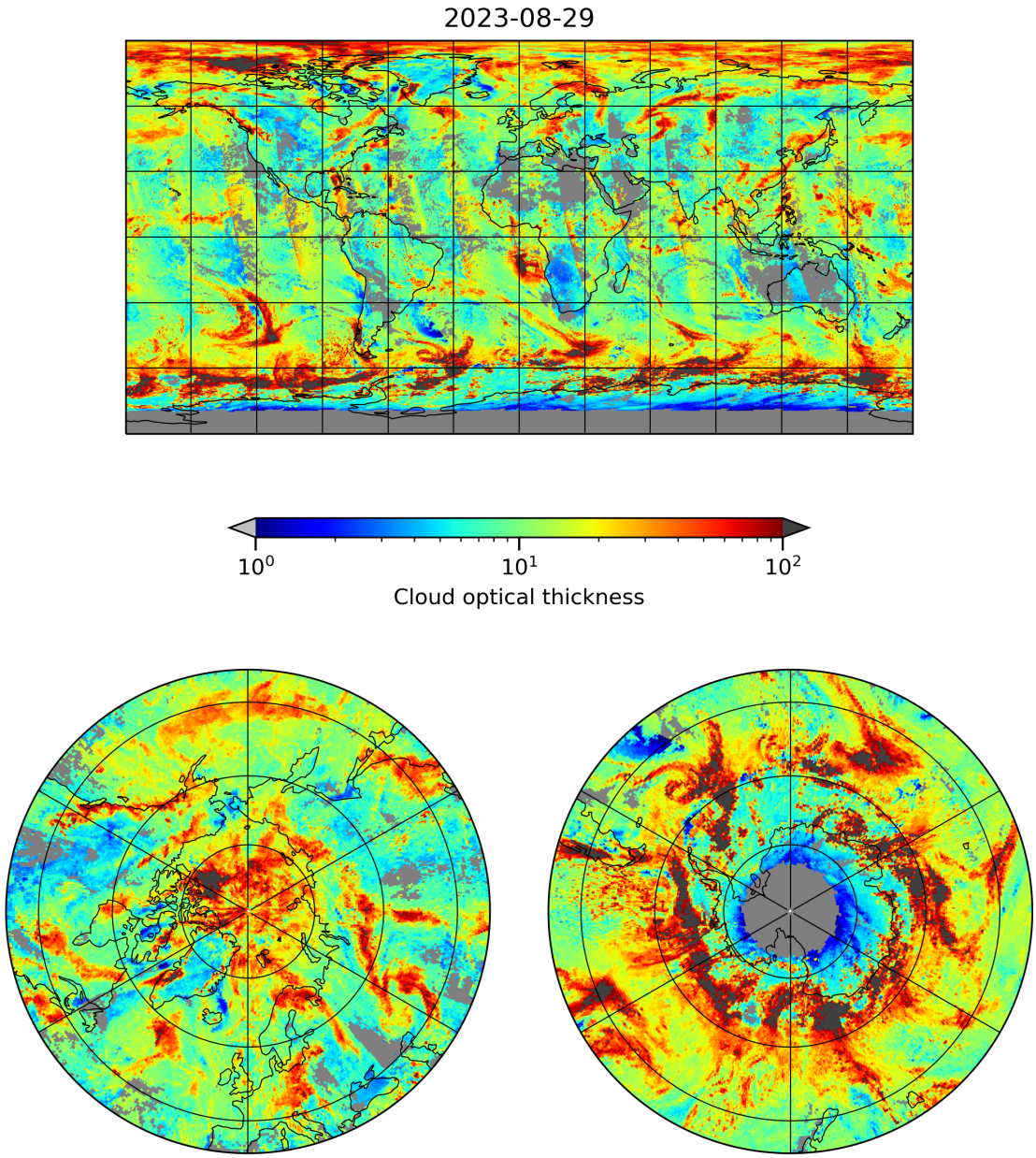


Figure 8: Map of “Cloud optical thickness” for 2023-08-28 to 2023-08-30

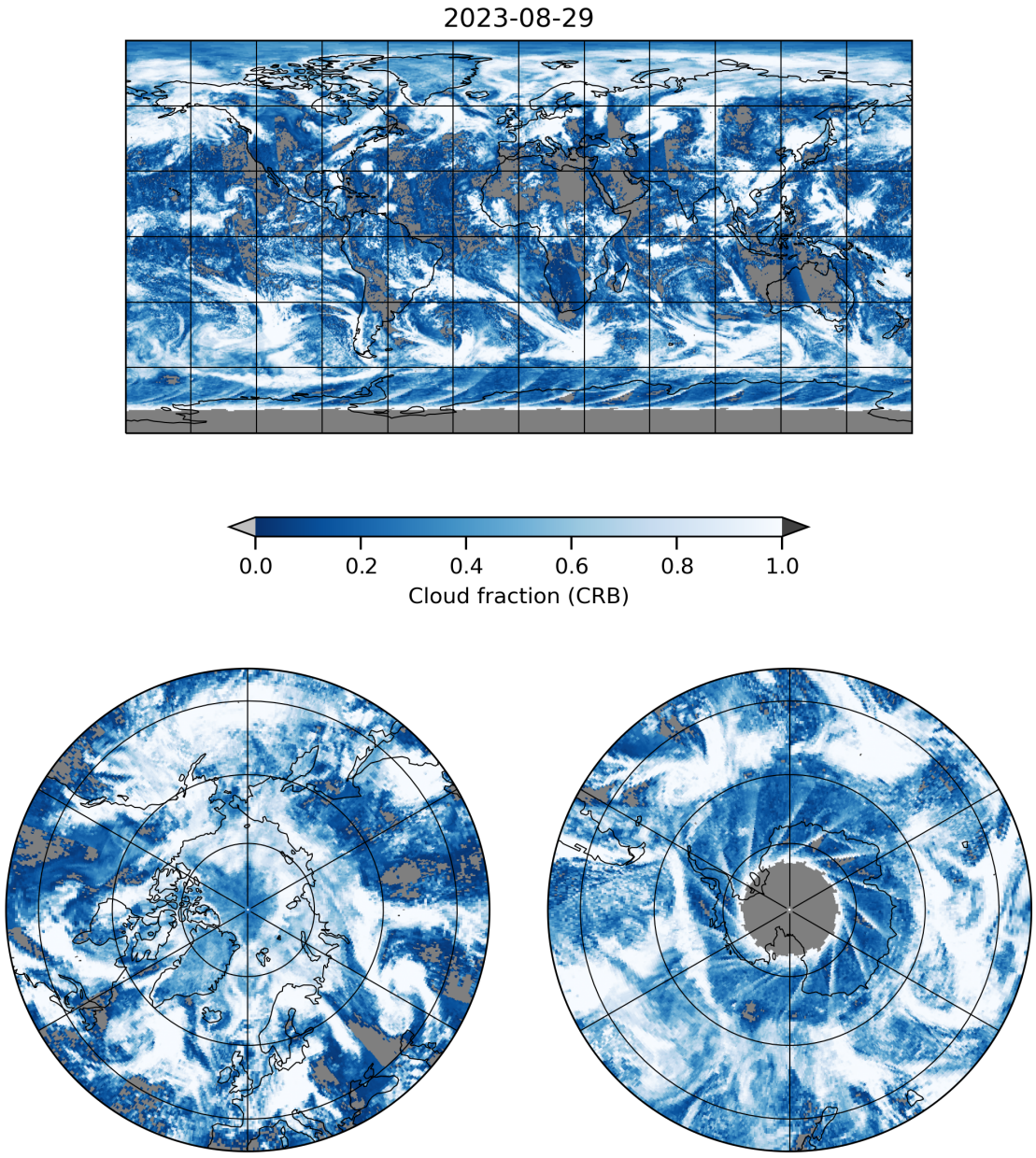


Figure 9: Map of “Cloud fraction (CRB)” for 2023-08-28 to 2023-08-30

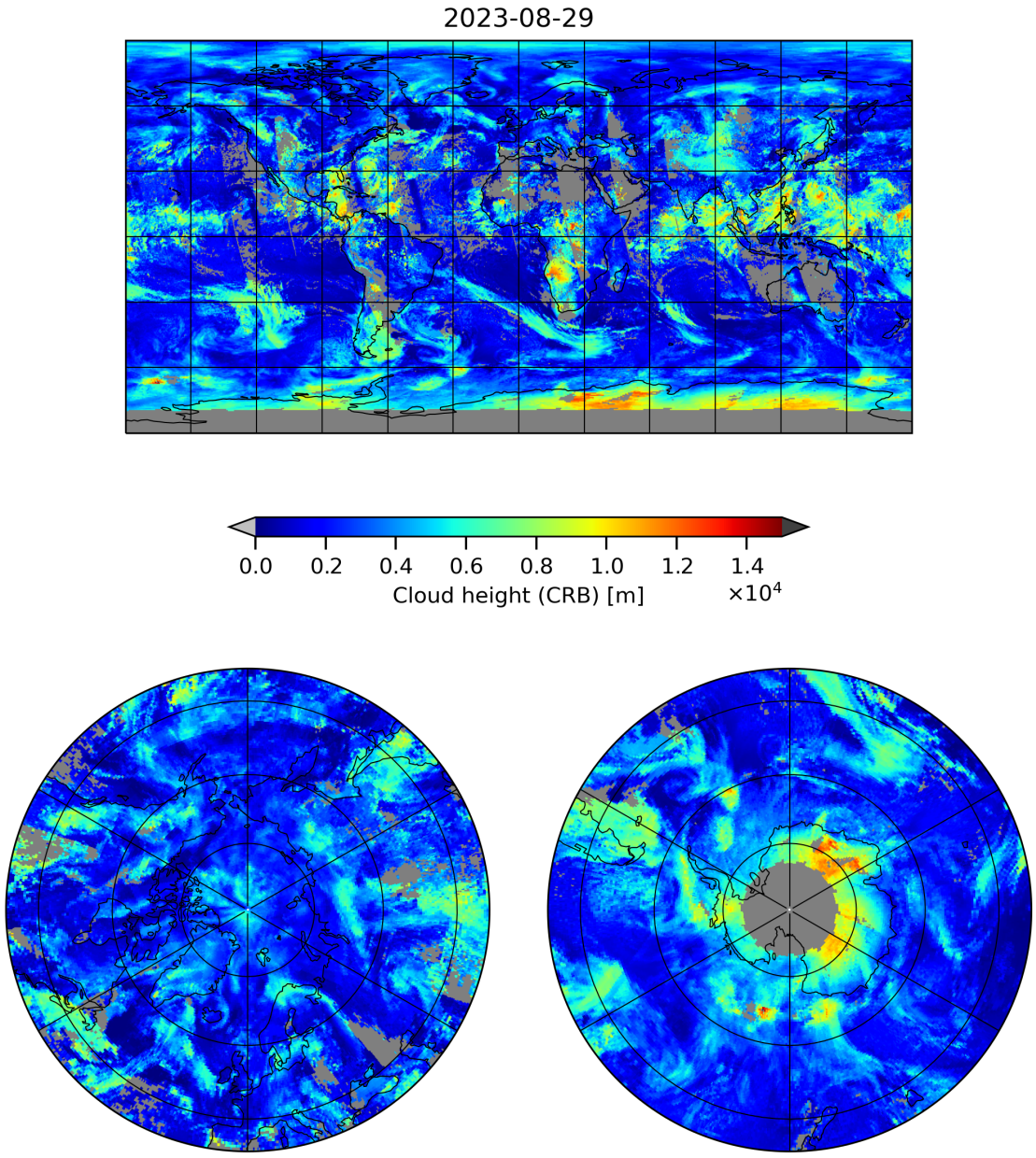


Figure 10: Map of “Cloud height (CRB)” for 2023-08-28 to 2023-08-30

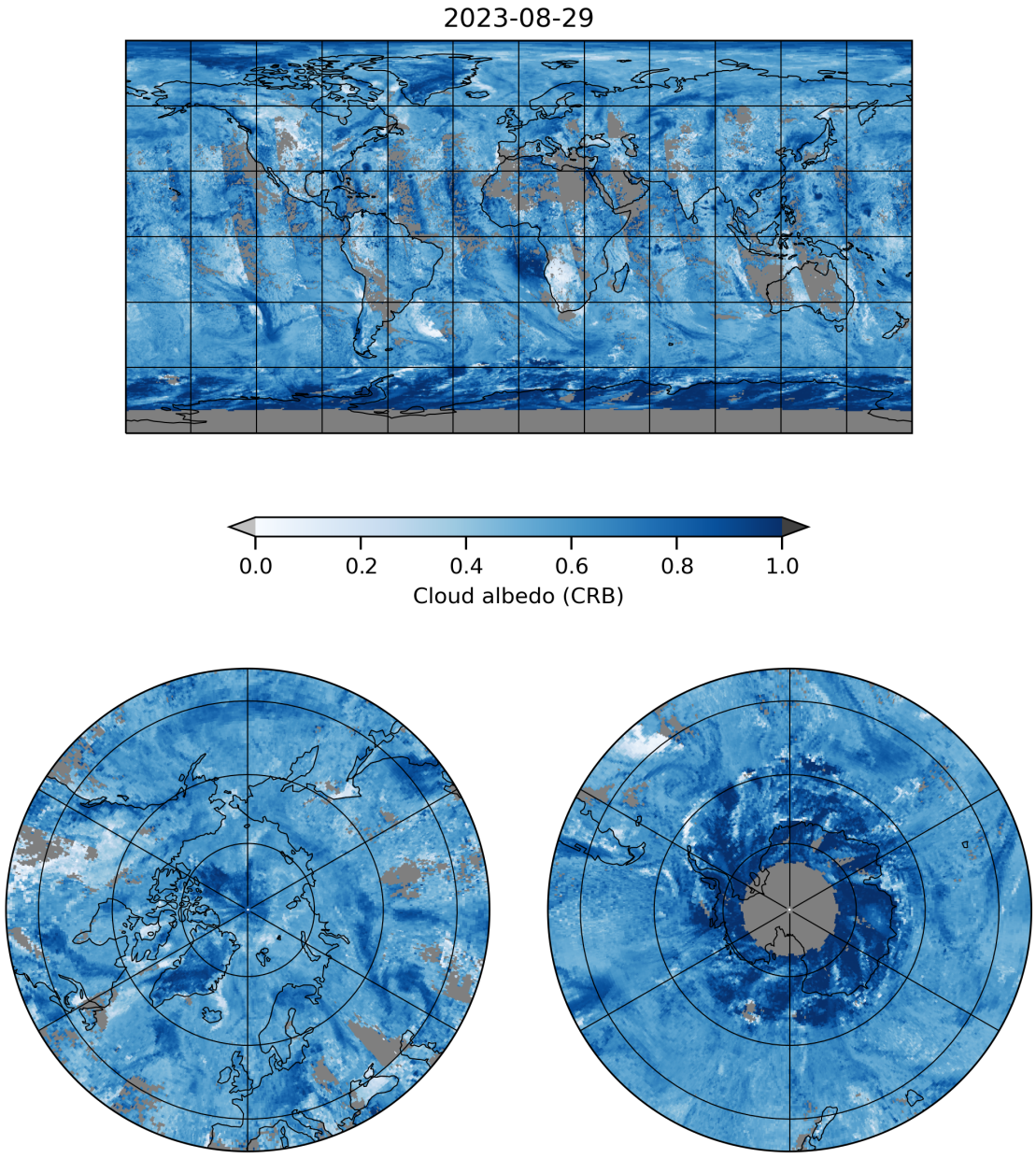


Figure 11: Map of “Cloud albedo (CRB)” for 2023-08-28 to 2023-08-30

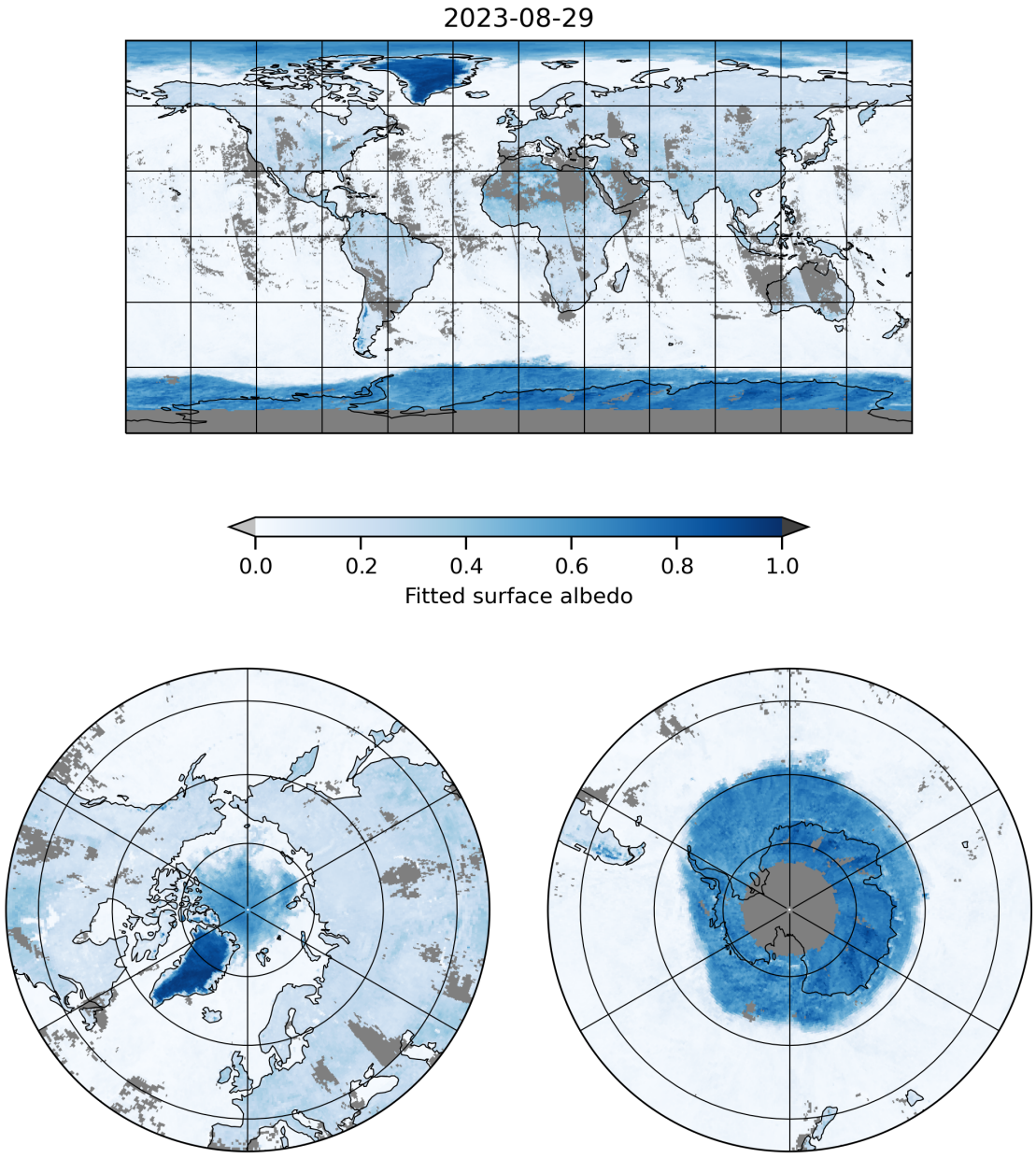


Figure 12: Map of “Fitted surface albedo” for 2023-08-28 to 2023-08-30

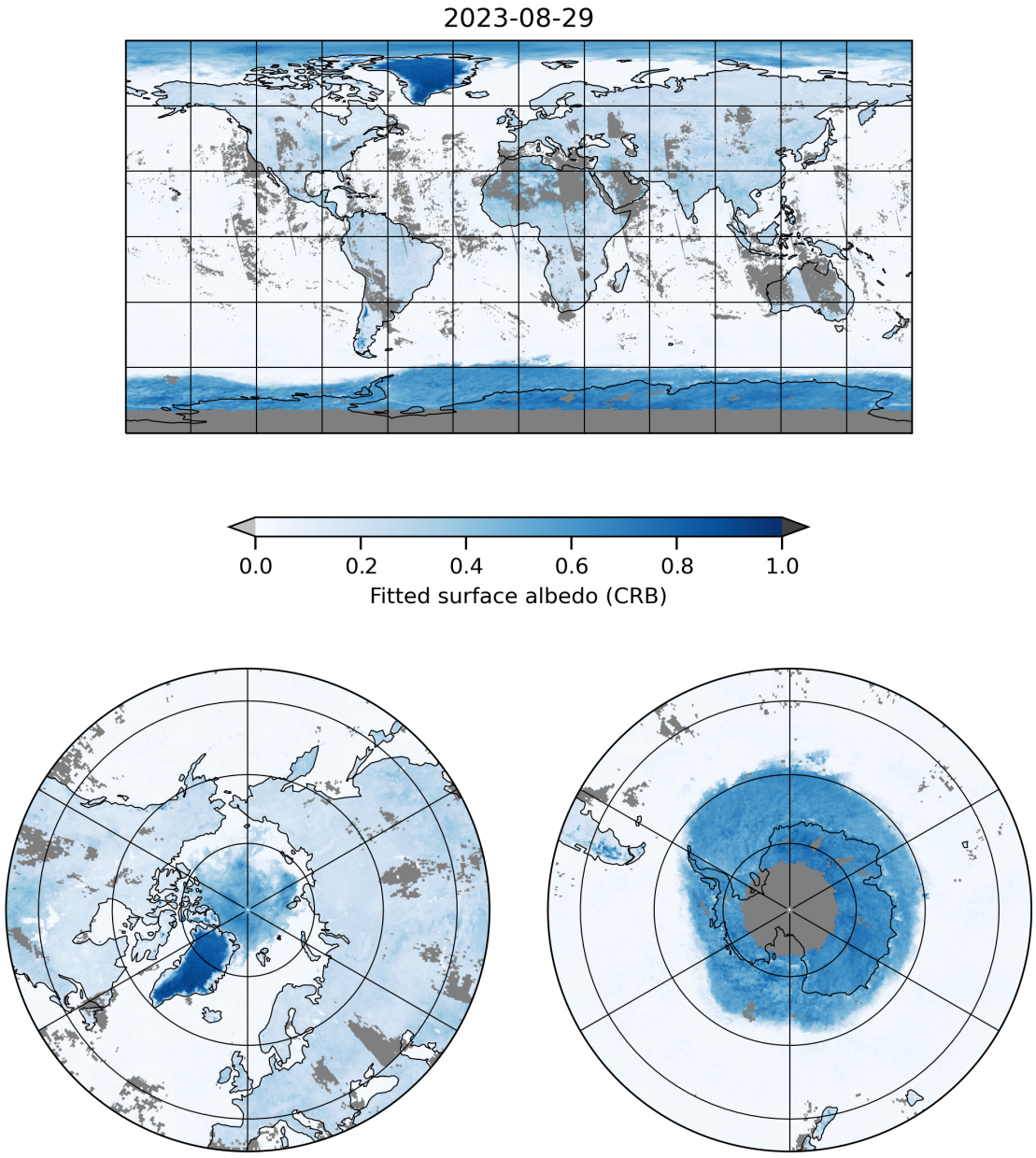


Figure 13: Map of “Fitted surface albedo (CRB)” for 2023-08-28 to 2023-08-30

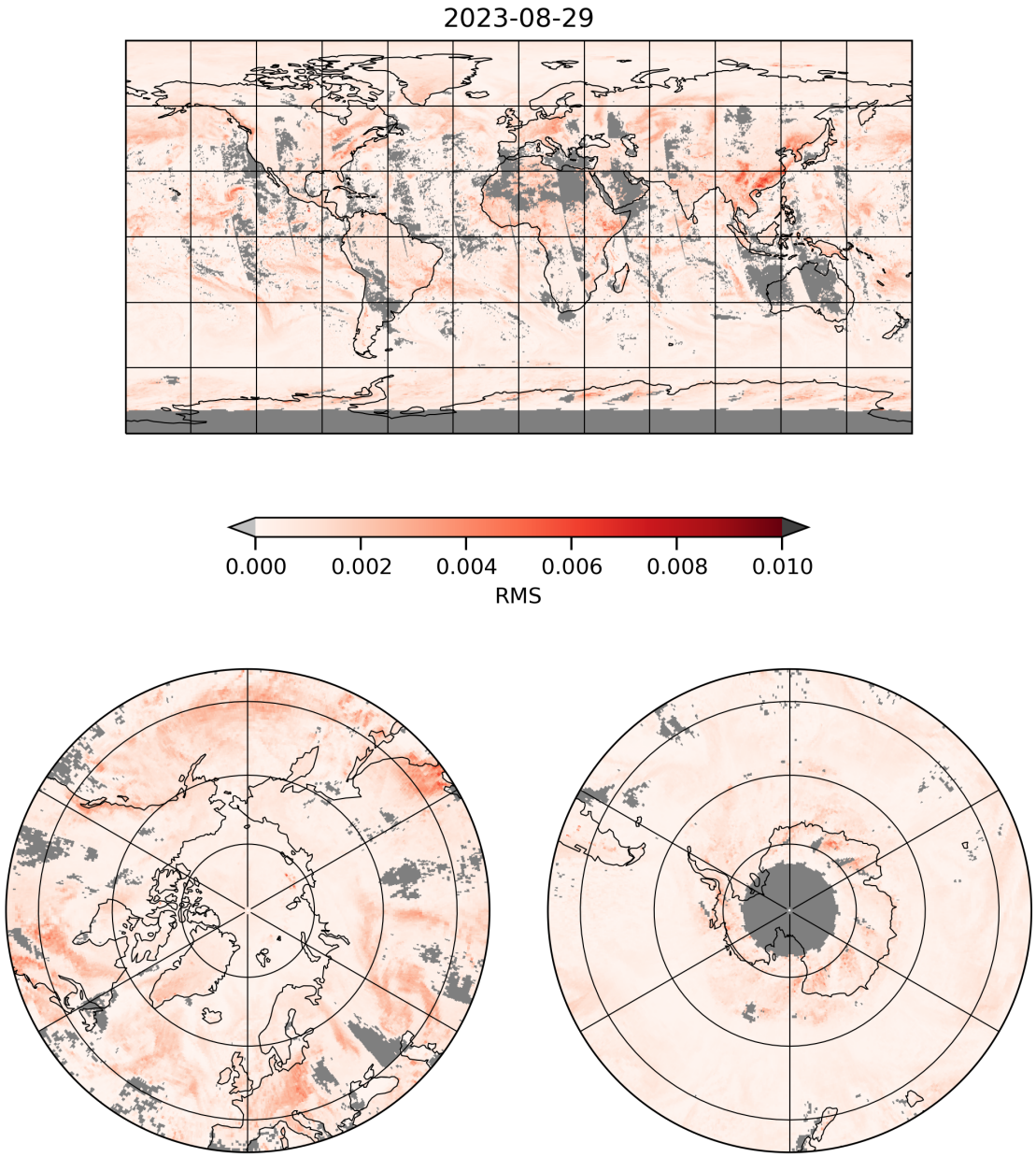


Figure 14: Map of “RMS” for 2023-08-28 to 2023-08-30

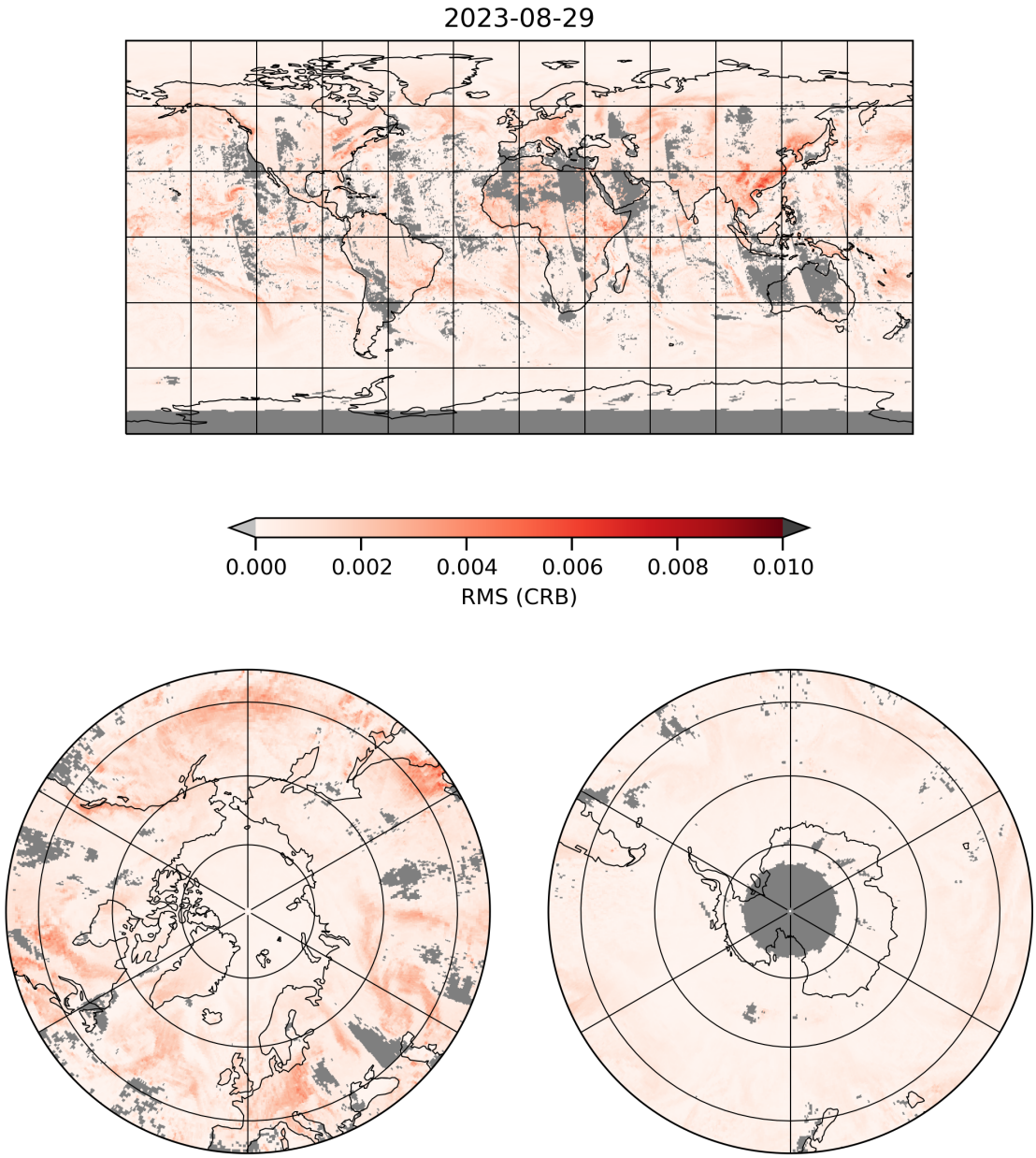


Figure 15: Map of “RMS (CRB)” for 2023-08-28 to 2023-08-30

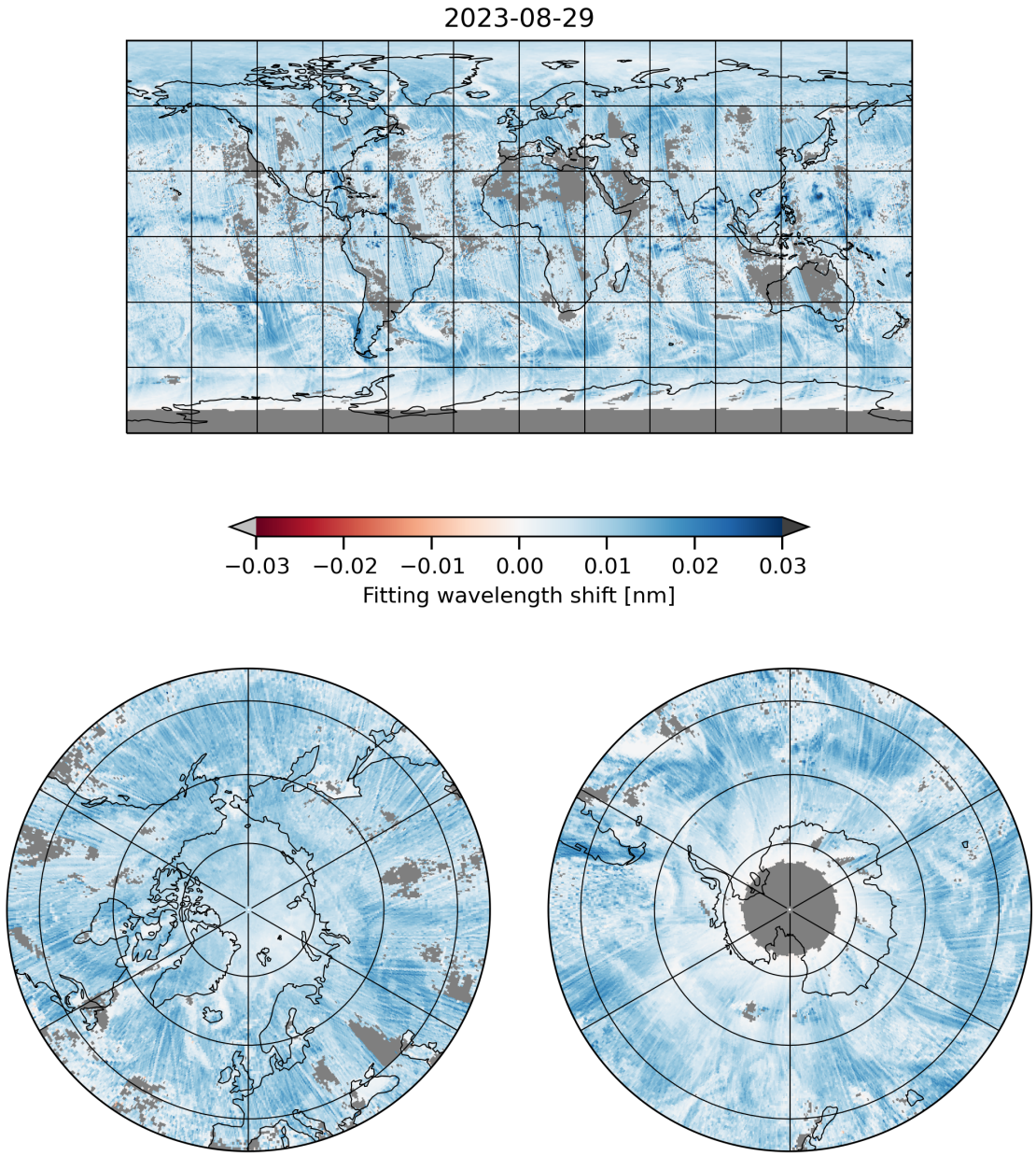


Figure 16: Map of “Fitting wavelength shift” for 2023-08-28 to 2023-08-30

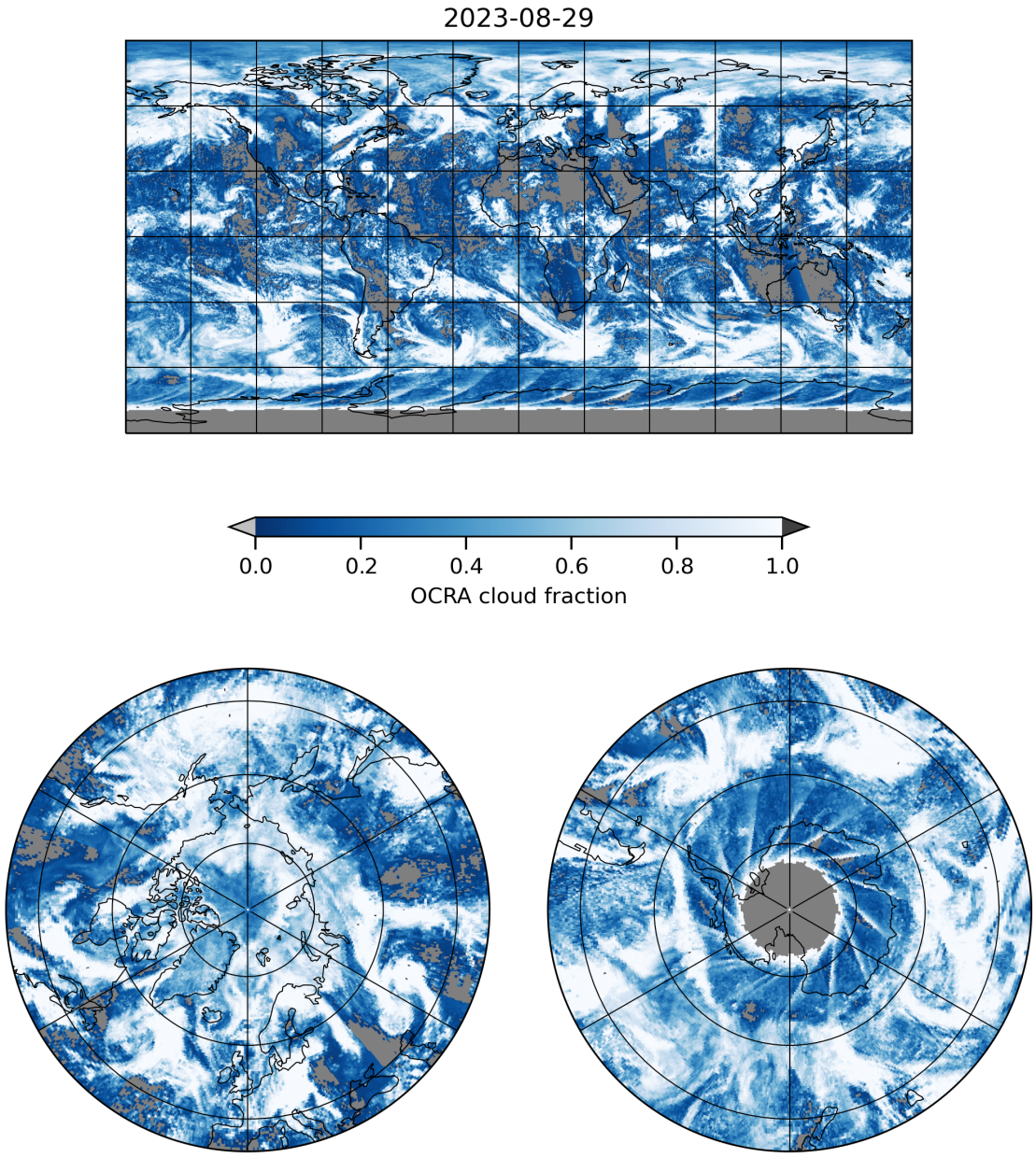


Figure 17: Map of “OCRA cloud fraction” for 2023-08-28 to 2023-08-30

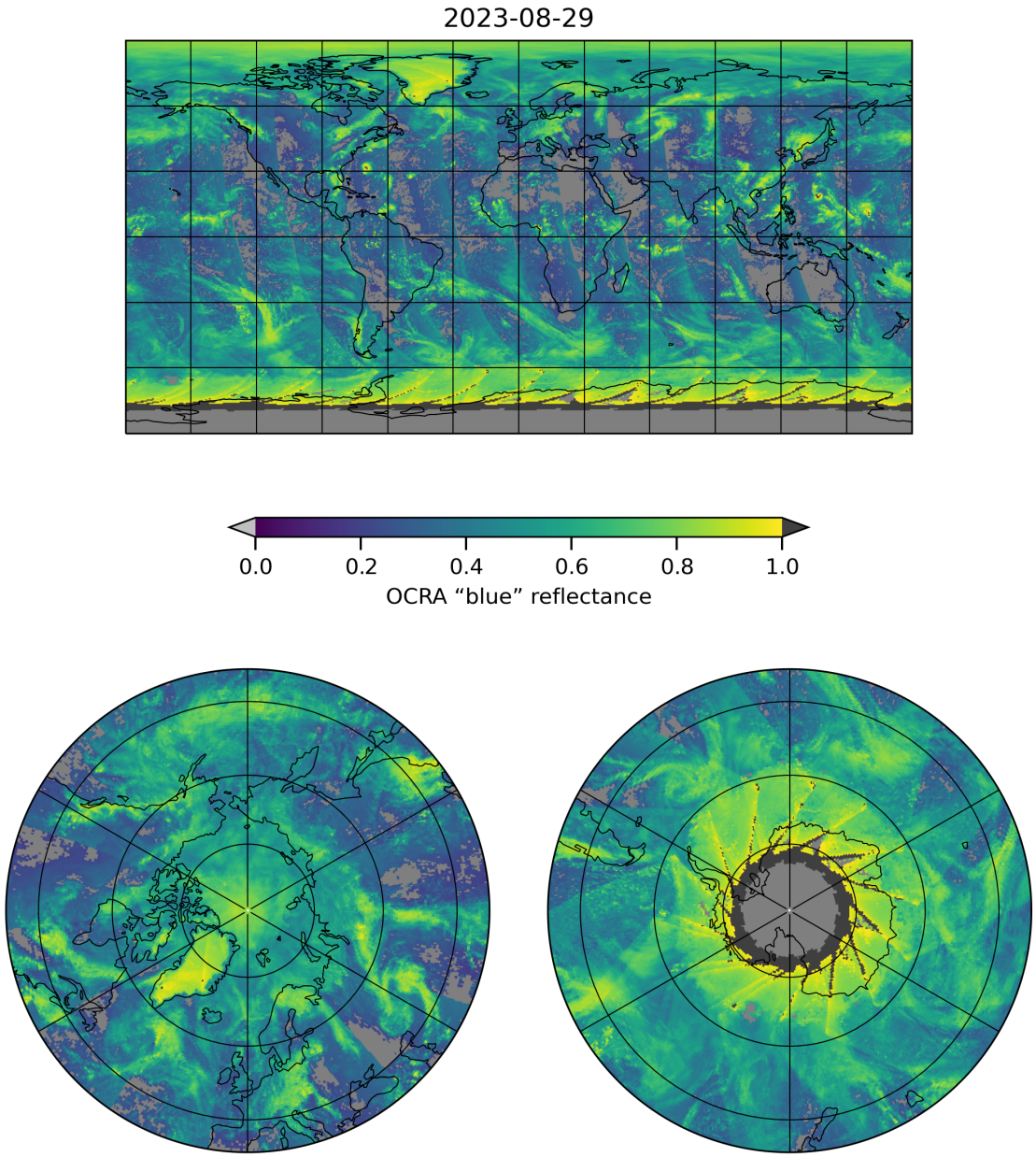


Figure 18: Map of “OCRA “blue” reflectance” for 2023-08-28 to 2023-08-30

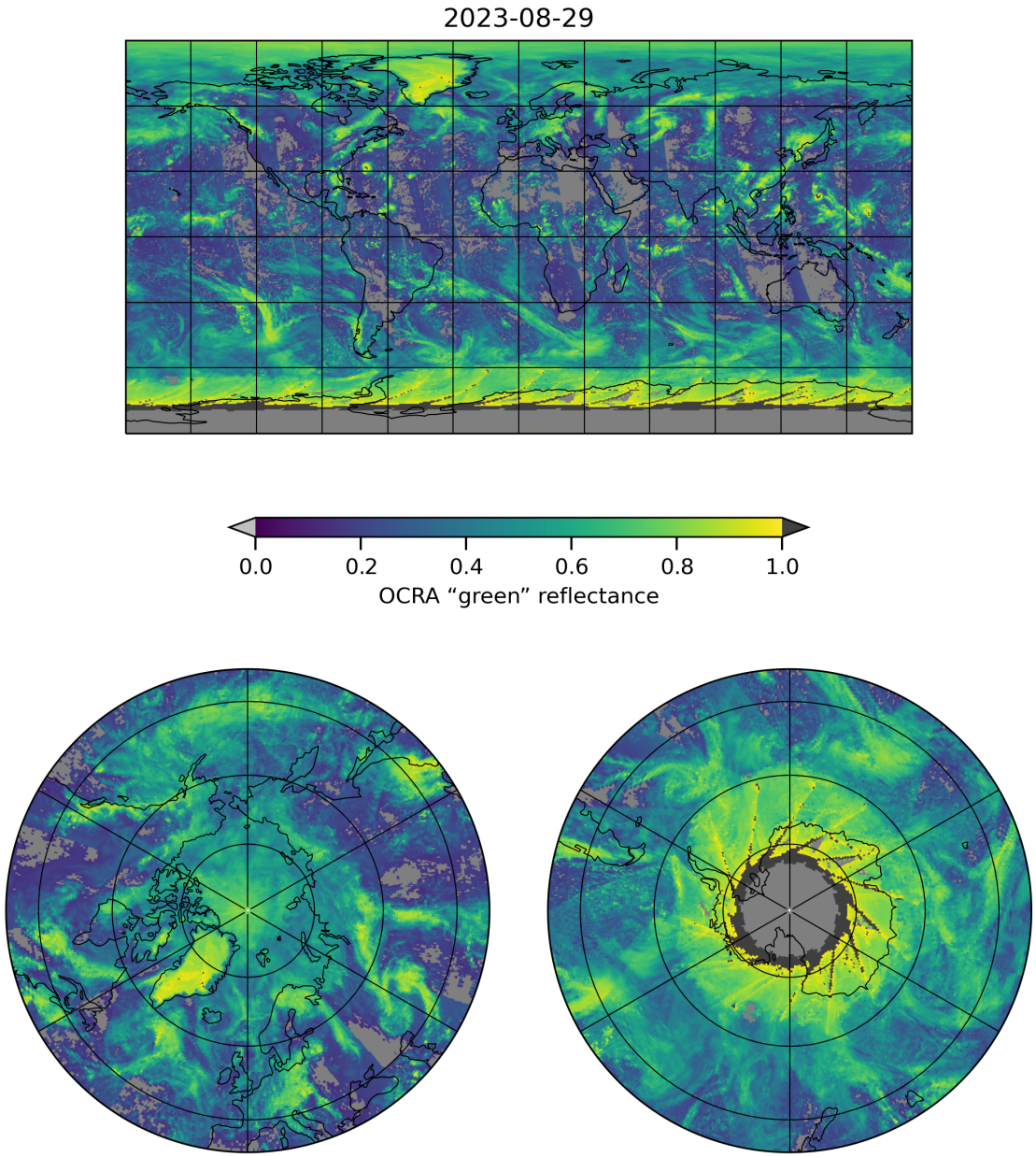


Figure 19: Map of “OCRA “green” reflectance” for 2023-08-28 to 2023-08-30

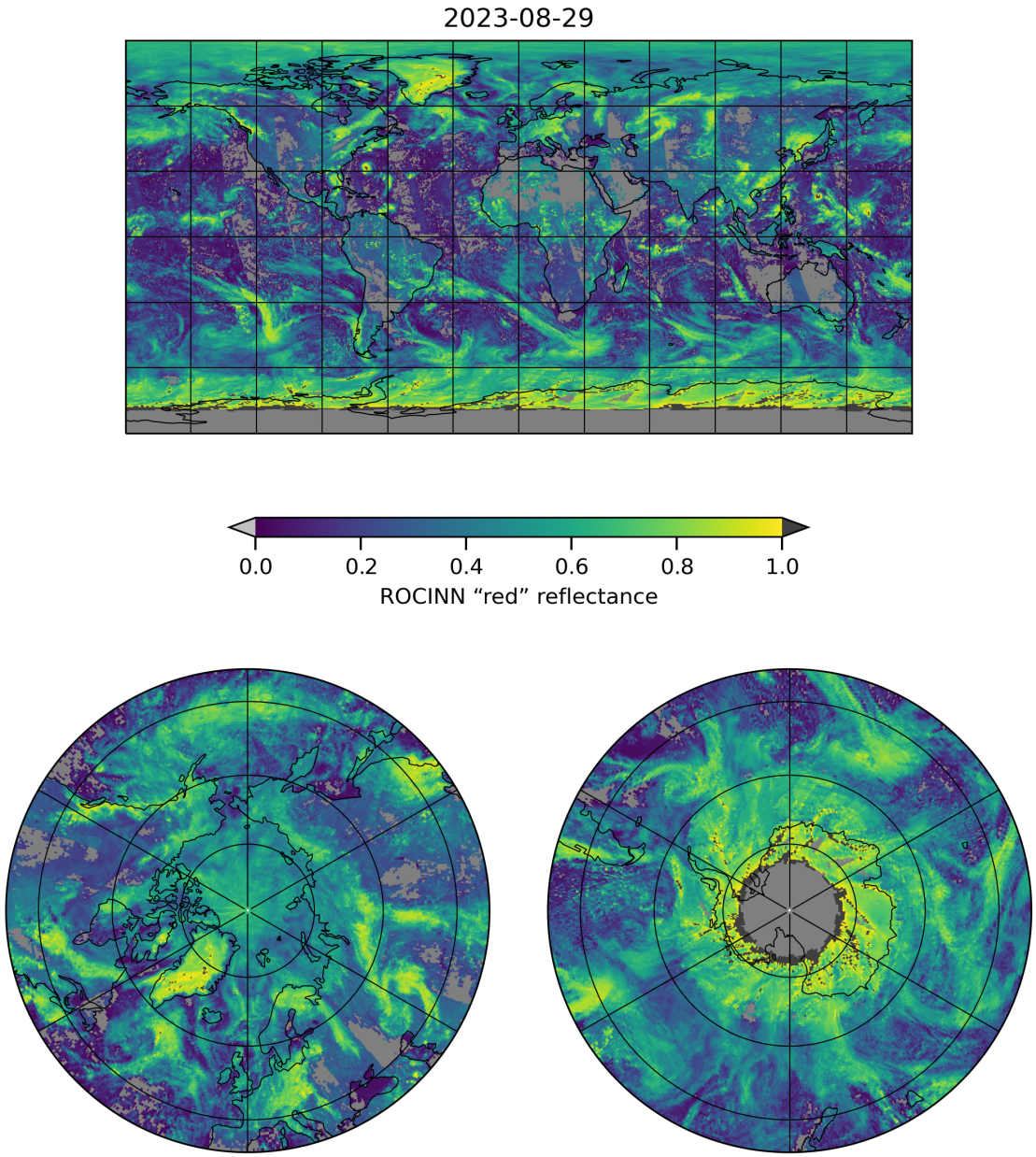


Figure 20: Map of “ROCINN “red” reflectance” for 2023-08-28 to 2023-08-30

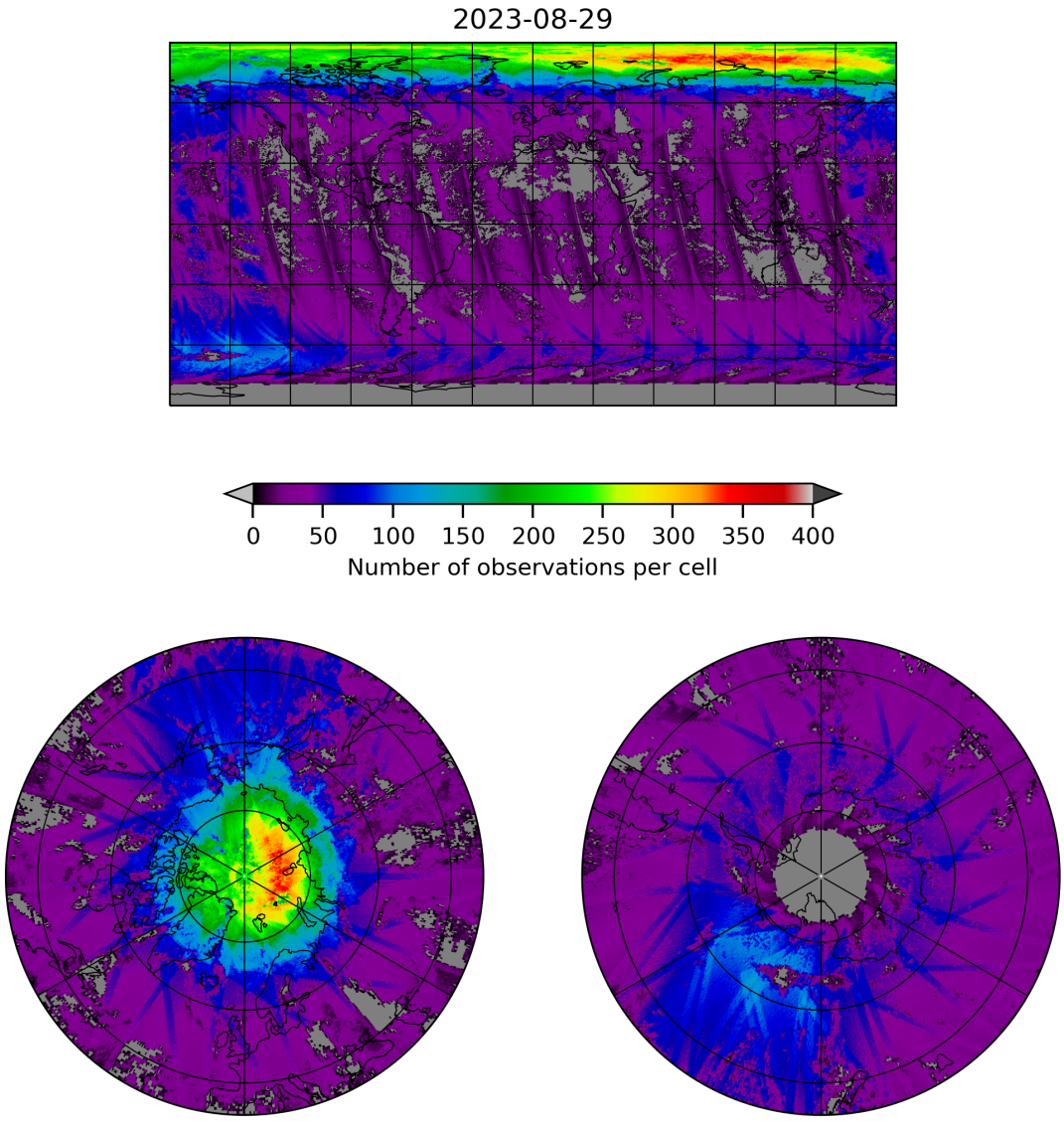


Figure 21: Map of the number of observations for 2023-08-28 to 2023-08-30

7 Zonal average

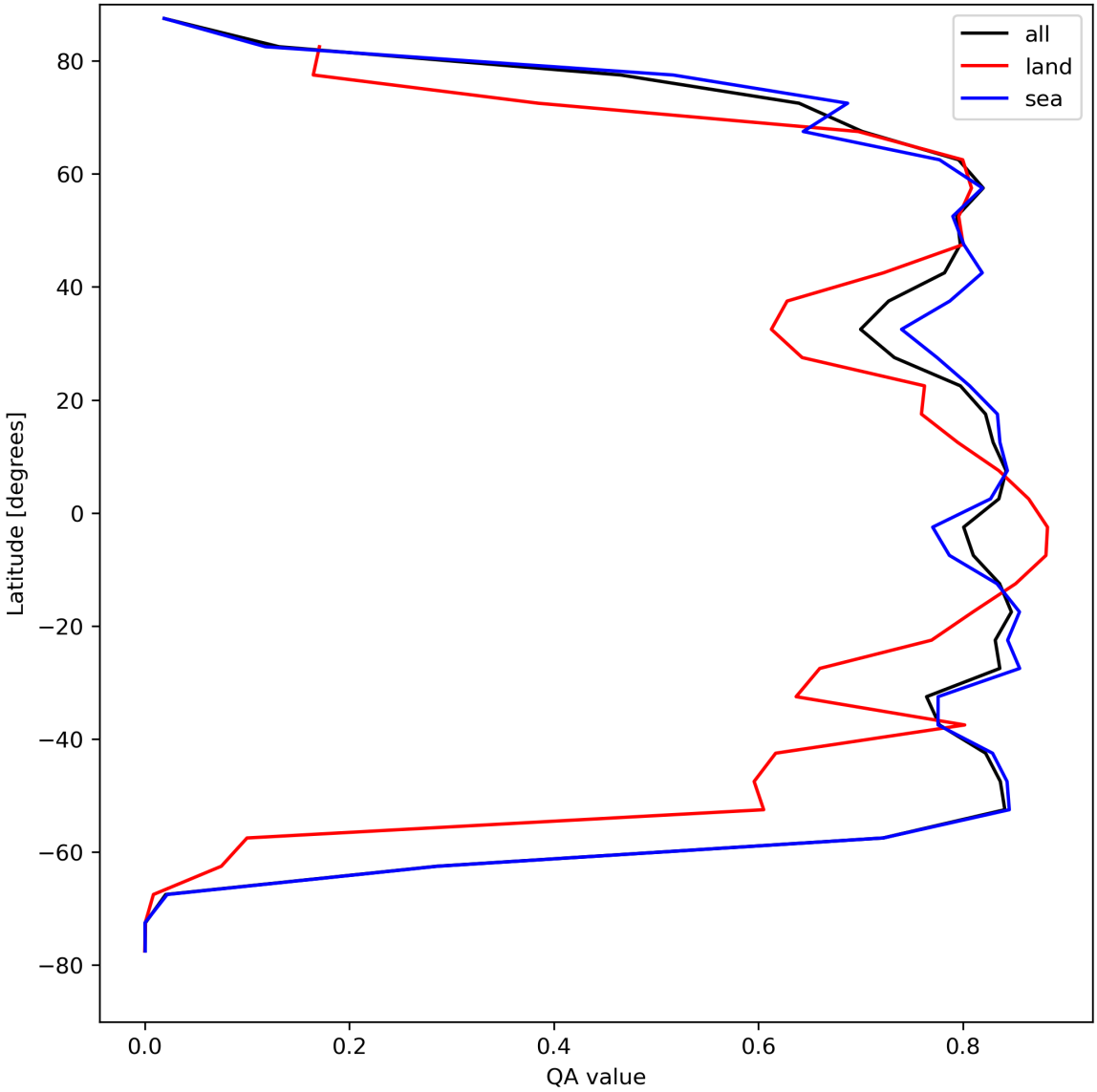


Figure 22: Zonal average of “QA value” for 2023-08-28 to 2023-08-30.

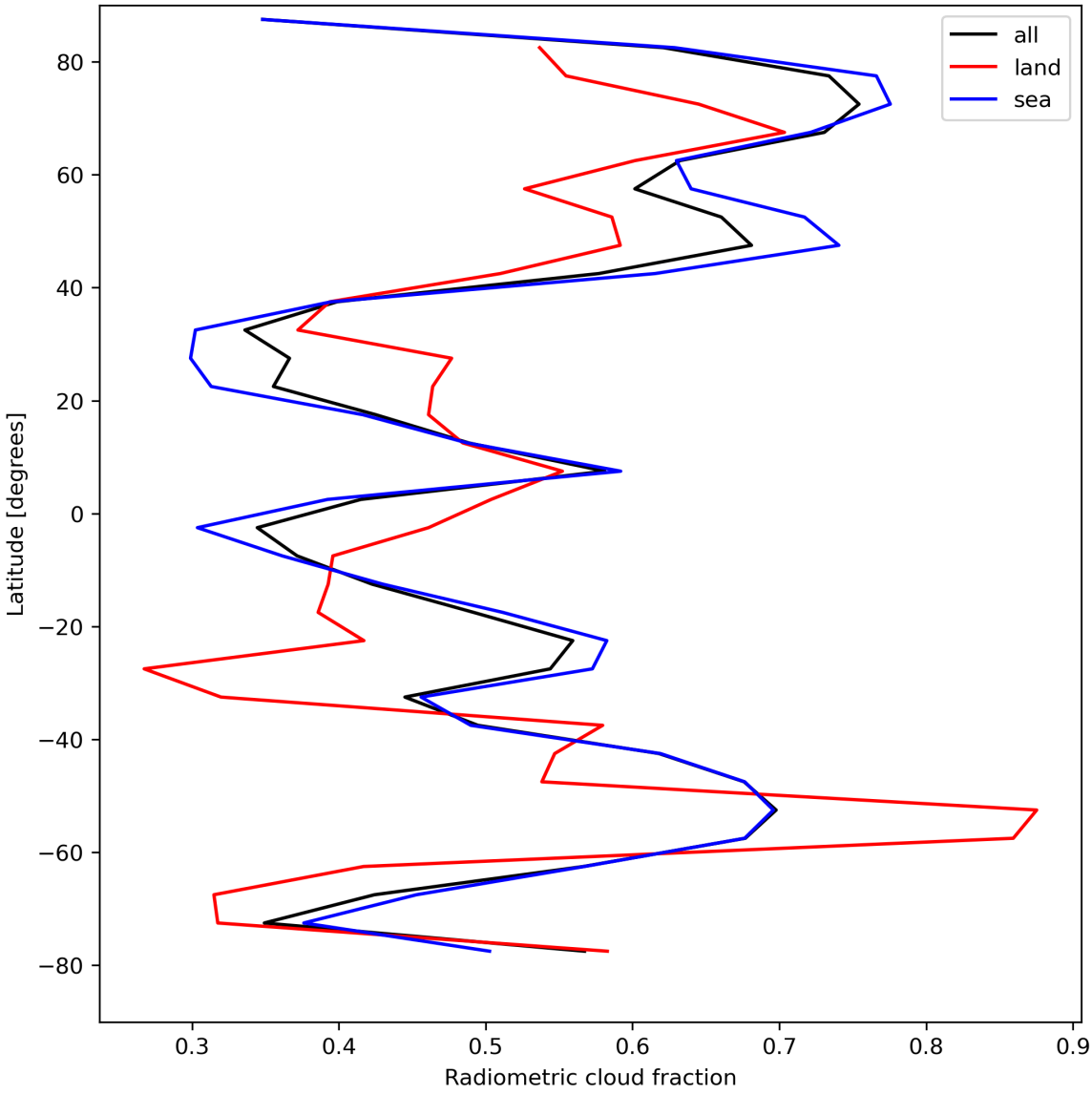


Figure 23: Zonal average of “Radiometric cloud fraction” for 2023-08-28 to 2023-08-30.

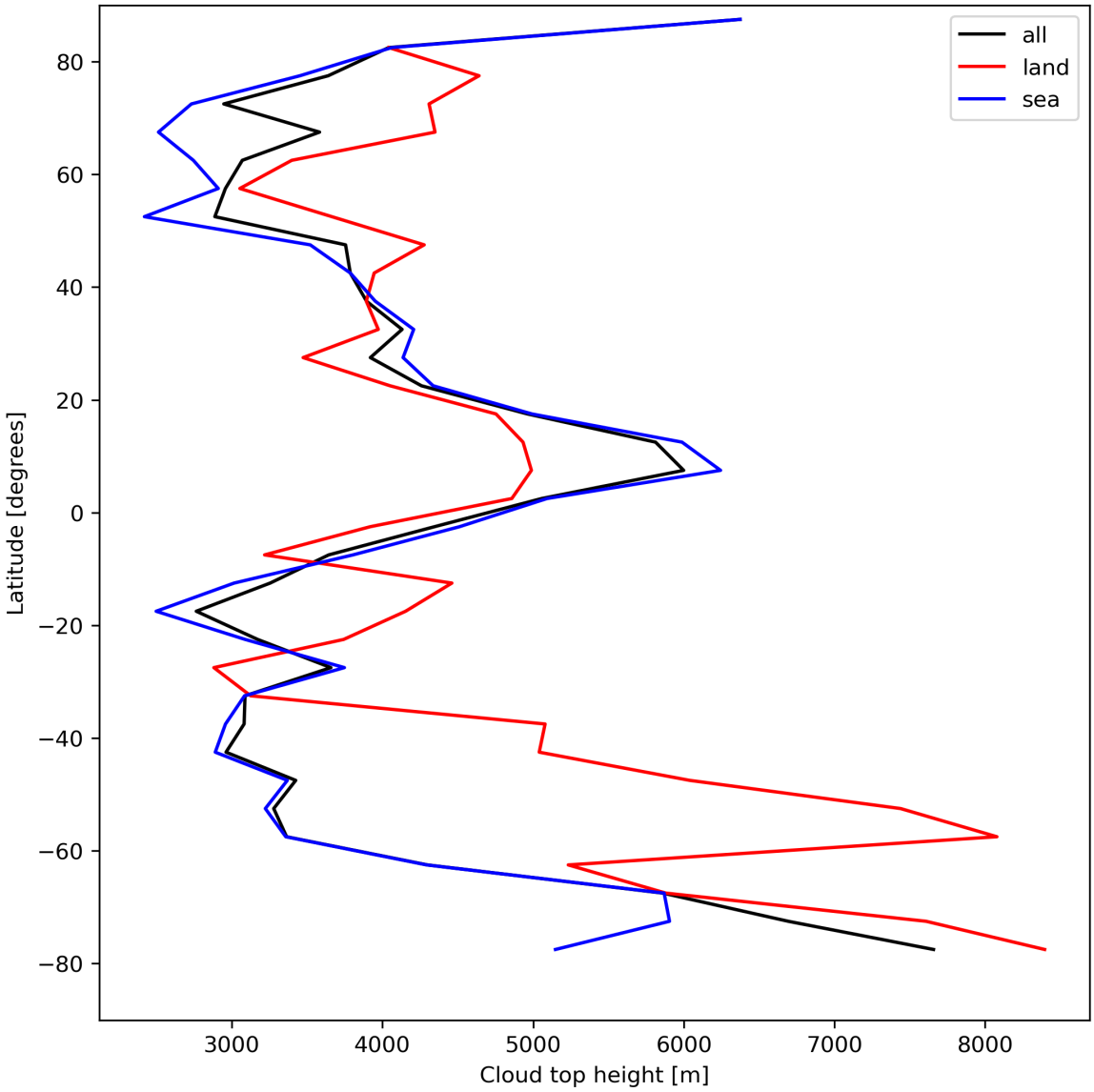


Figure 24: Zonal average of “Cloud top height” for 2023-08-28 to 2023-08-30.

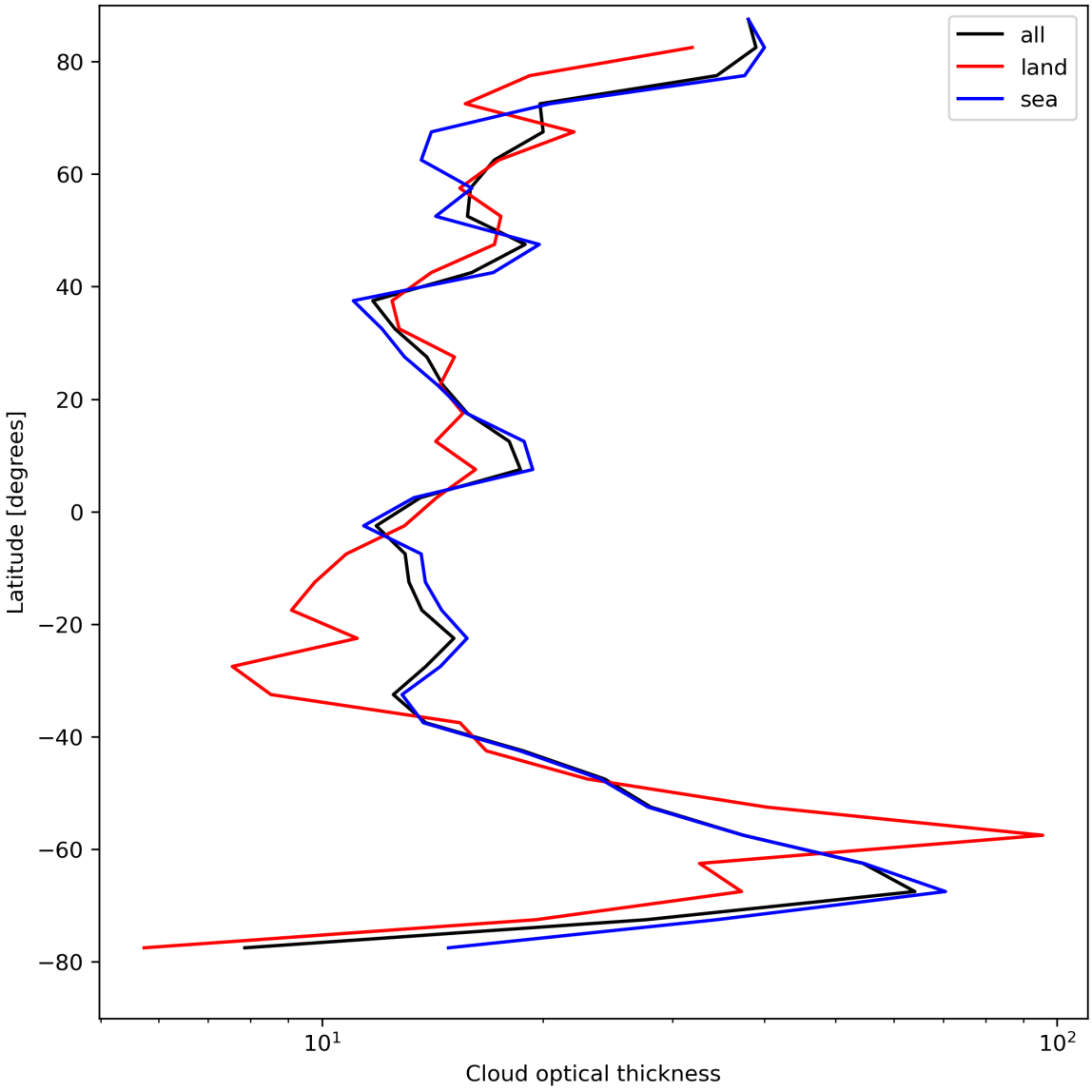


Figure 25: Zonal average of “Cloud optical thickness” for 2023-08-28 to 2023-08-30.

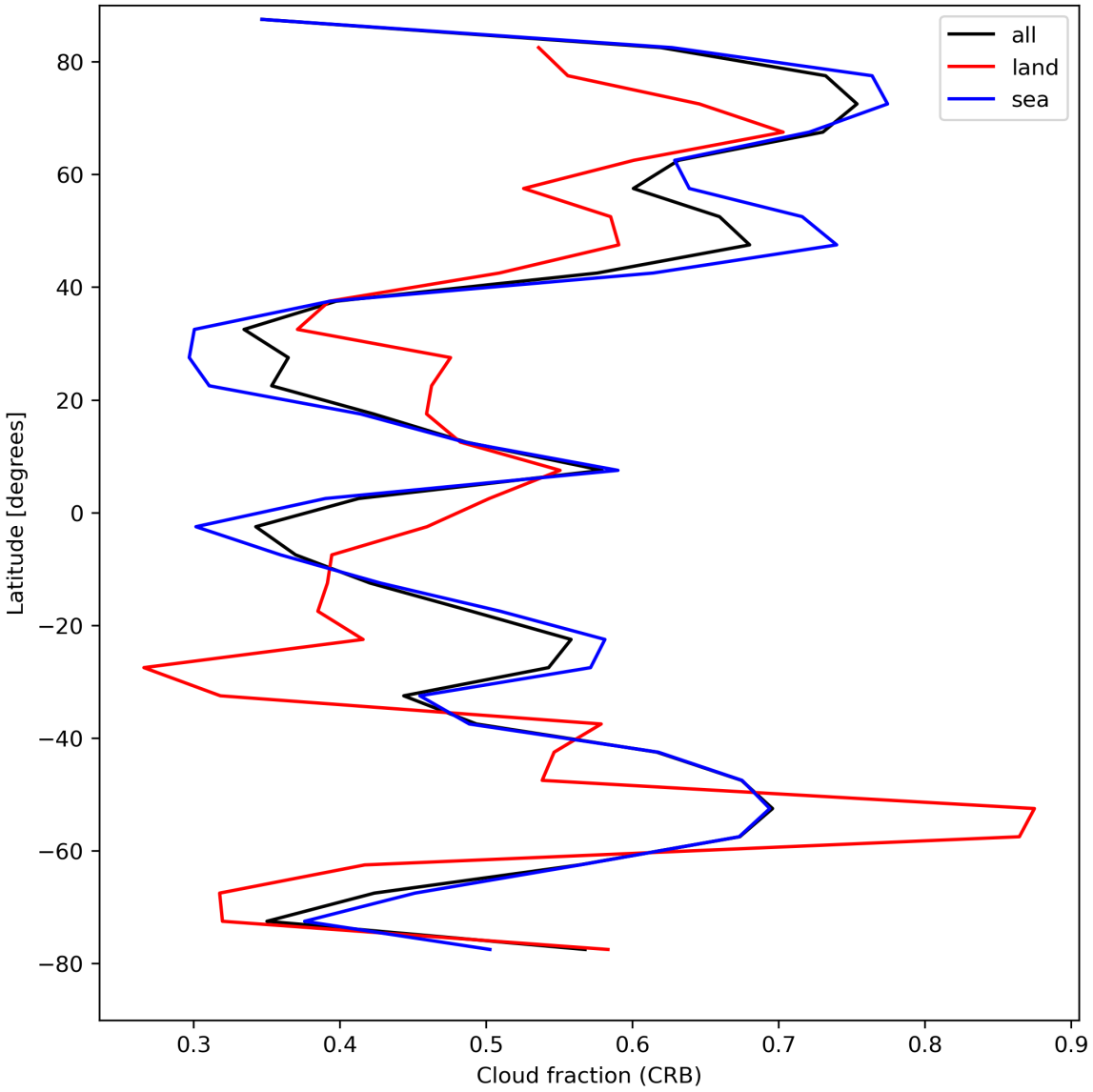


Figure 26: Zonal average of “Cloud fraction (CRB)” for 2023-08-28 to 2023-08-30.

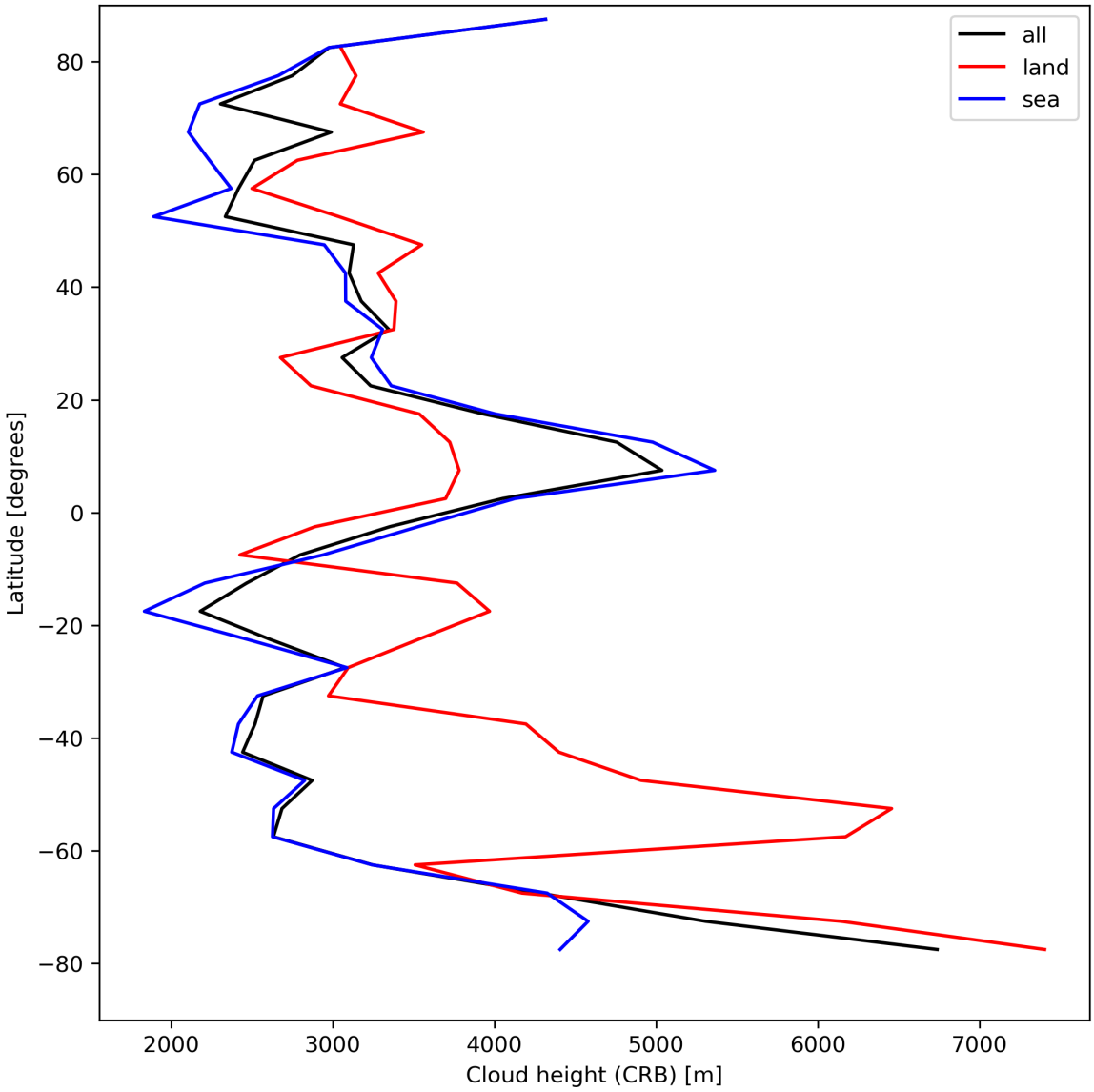


Figure 27: Zonal average of “Cloud height (CRB)” for 2023-08-28 to 2023-08-30.

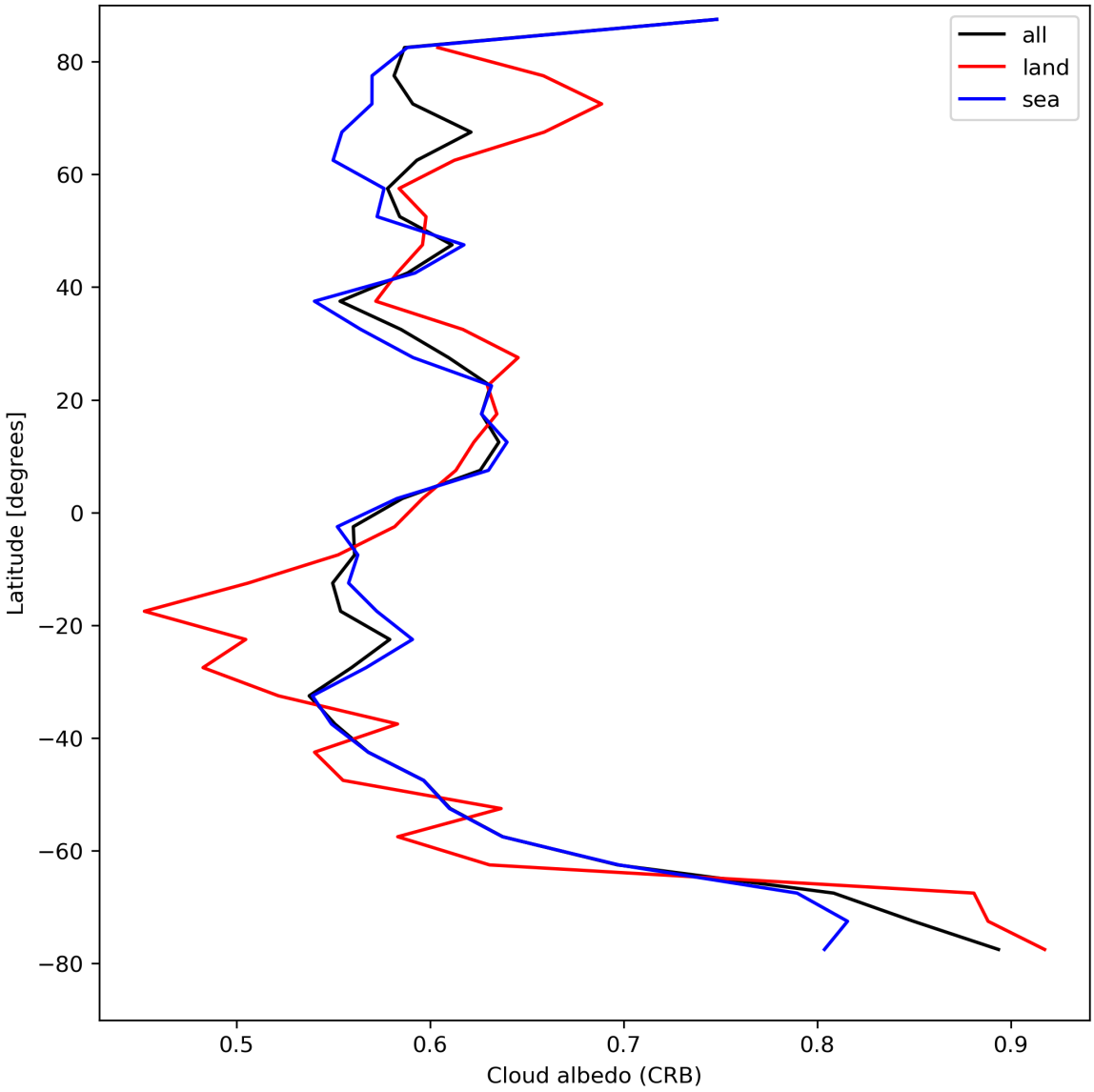


Figure 28: Zonal average of “Cloud albedo (CRB)” for 2023-08-28 to 2023-08-30.

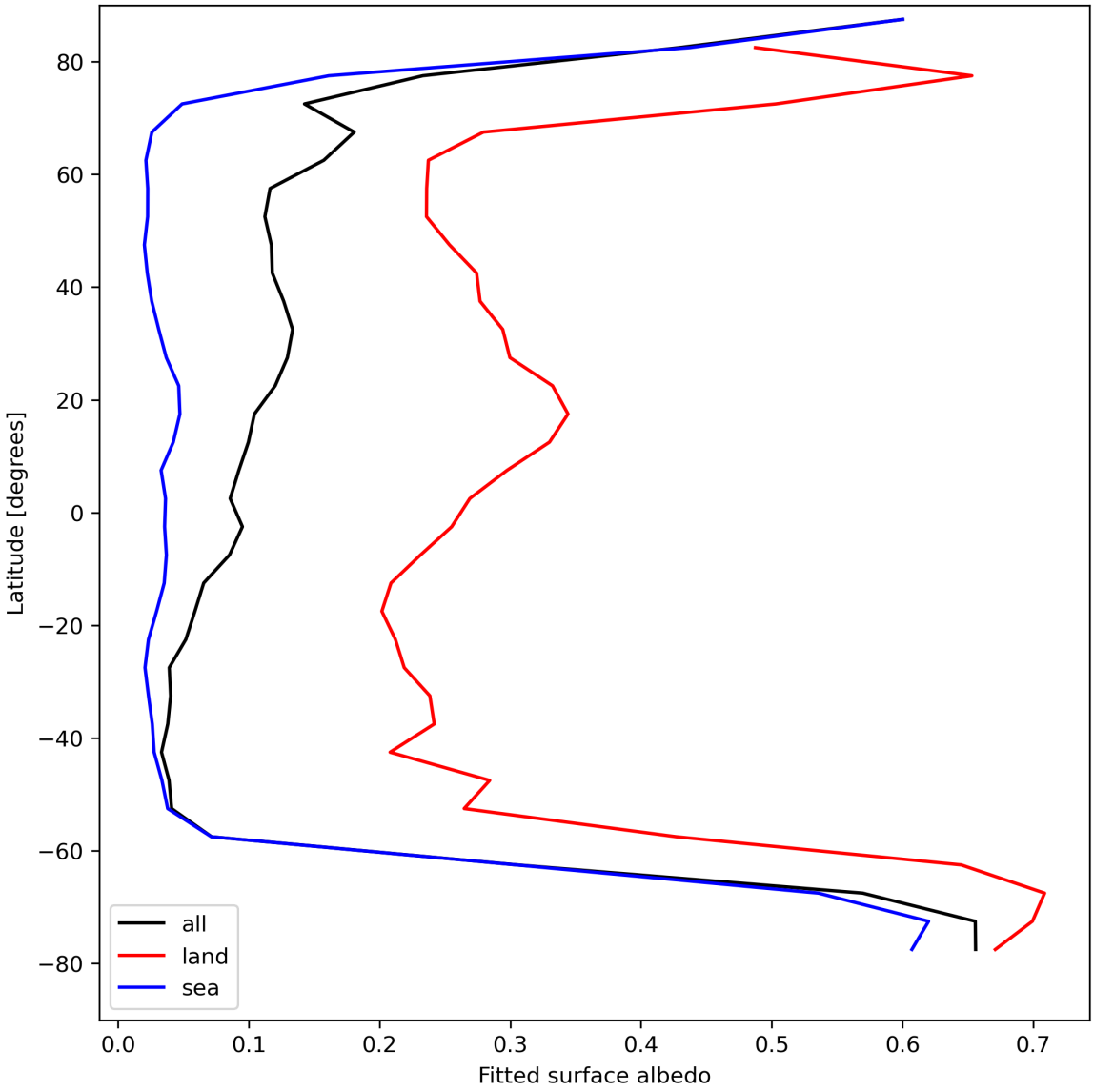


Figure 29: Zonal average of “Fitted surface albedo” for 2023-08-28 to 2023-08-30.

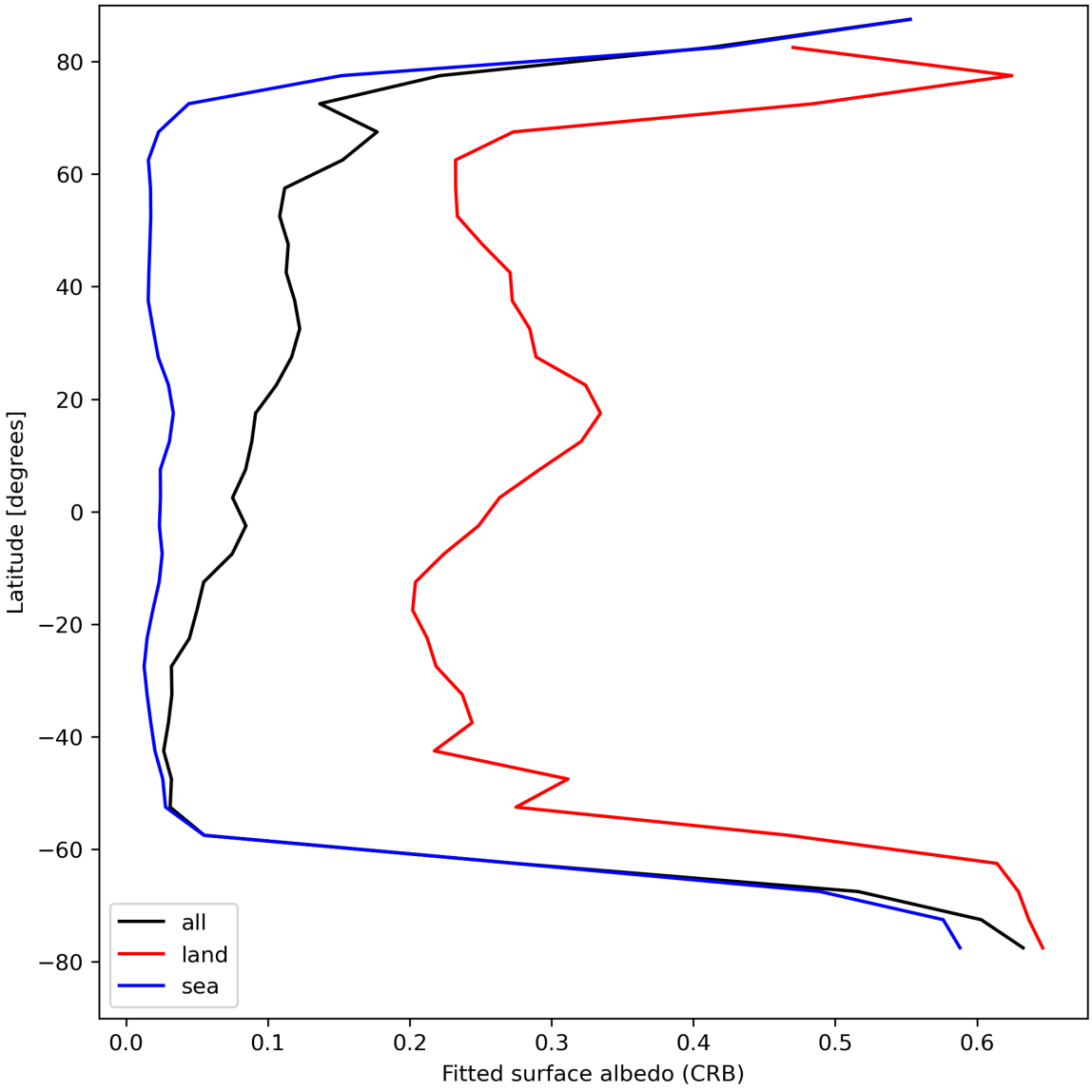


Figure 30: Zonal average of “Fitted surface albedo (CRB)” for 2023-08-28 to 2023-08-30.

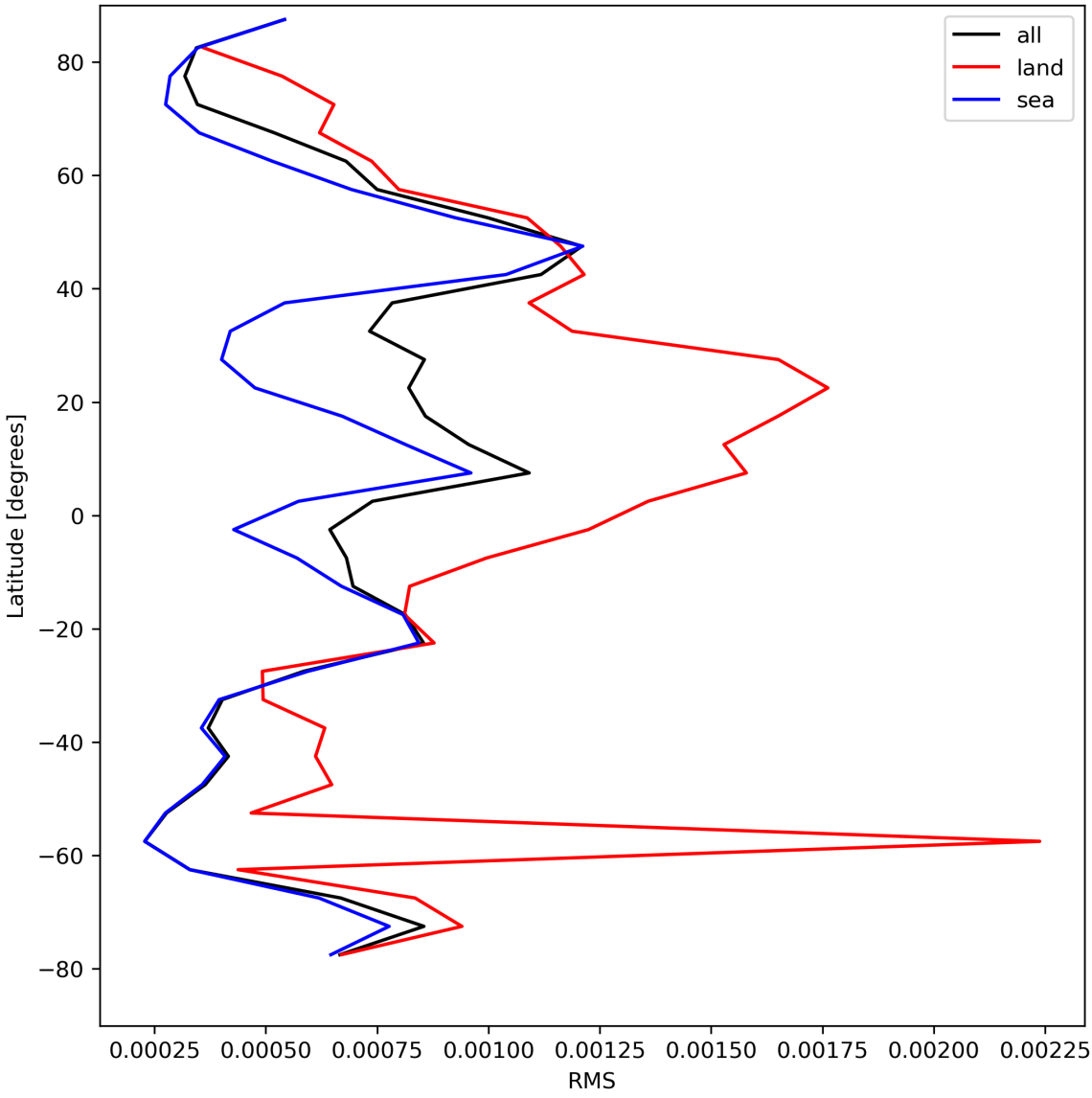


Figure 31: Zonal average of “RMS” for 2023-08-28 to 2023-08-30.

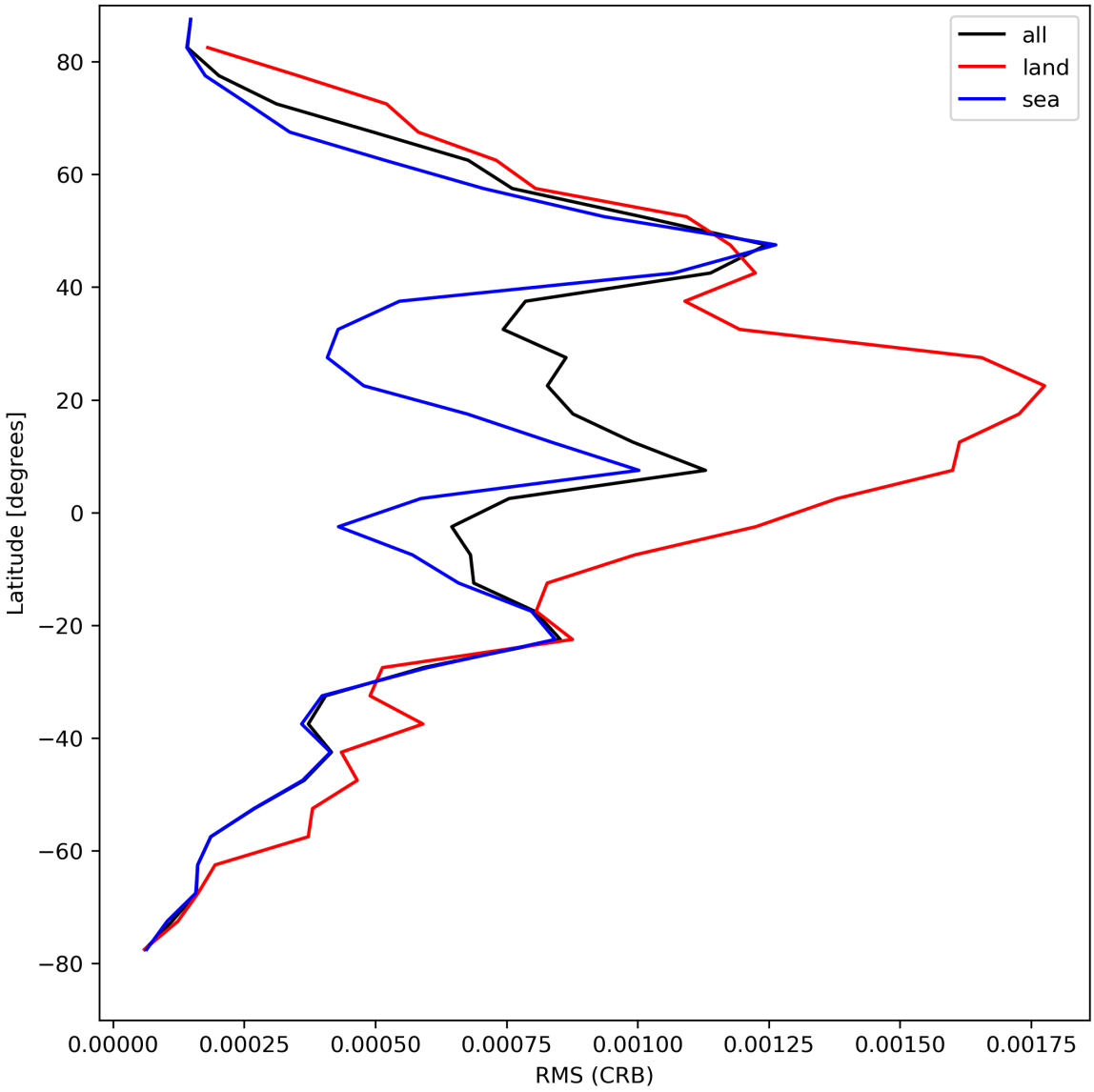


Figure 32: Zonal average of “RMS (CRB)” for 2023-08-28 to 2023-08-30.

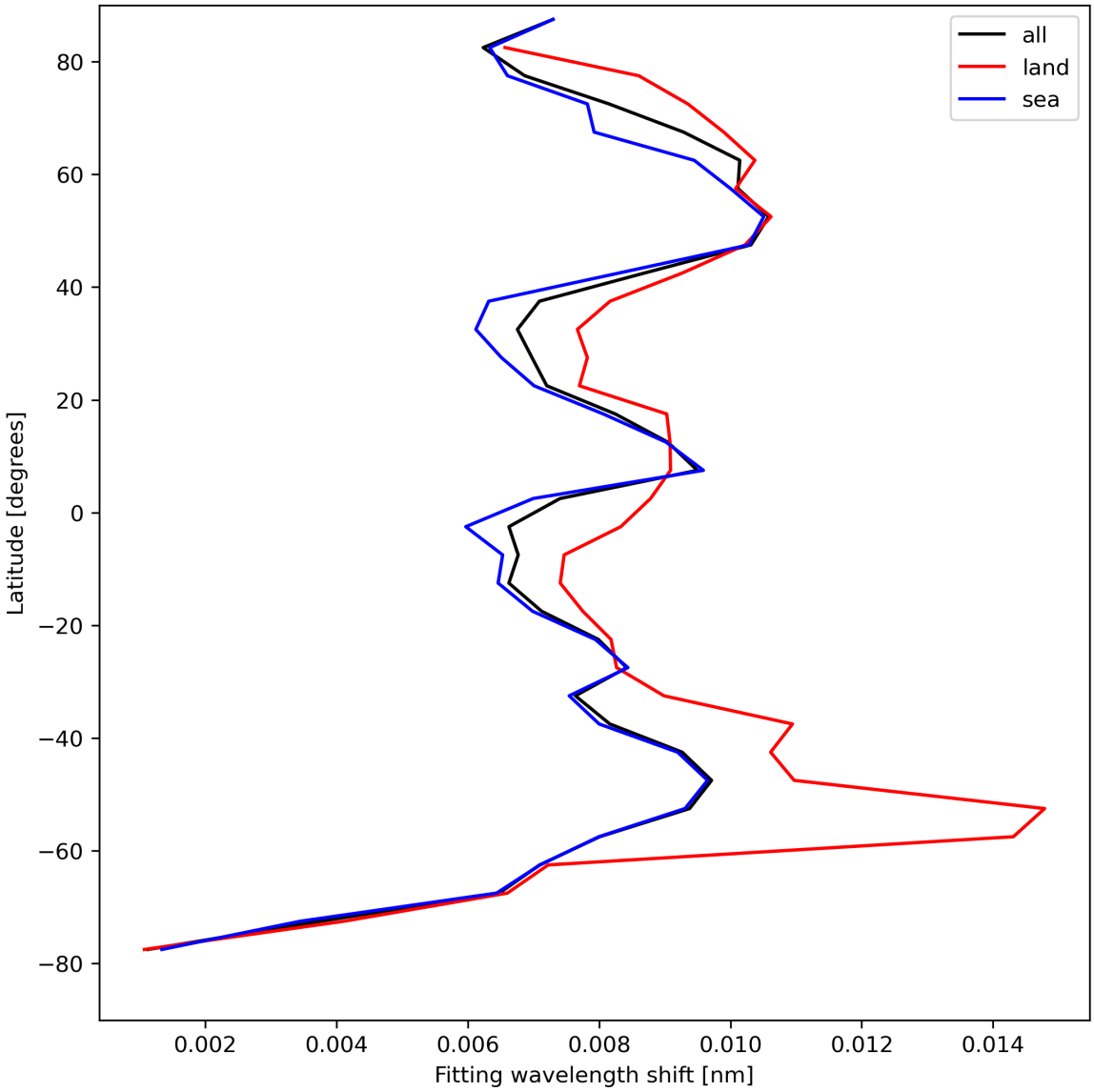


Figure 33: Zonal average of “Fitting wavelength shift” for 2023-08-28 to 2023-08-30.

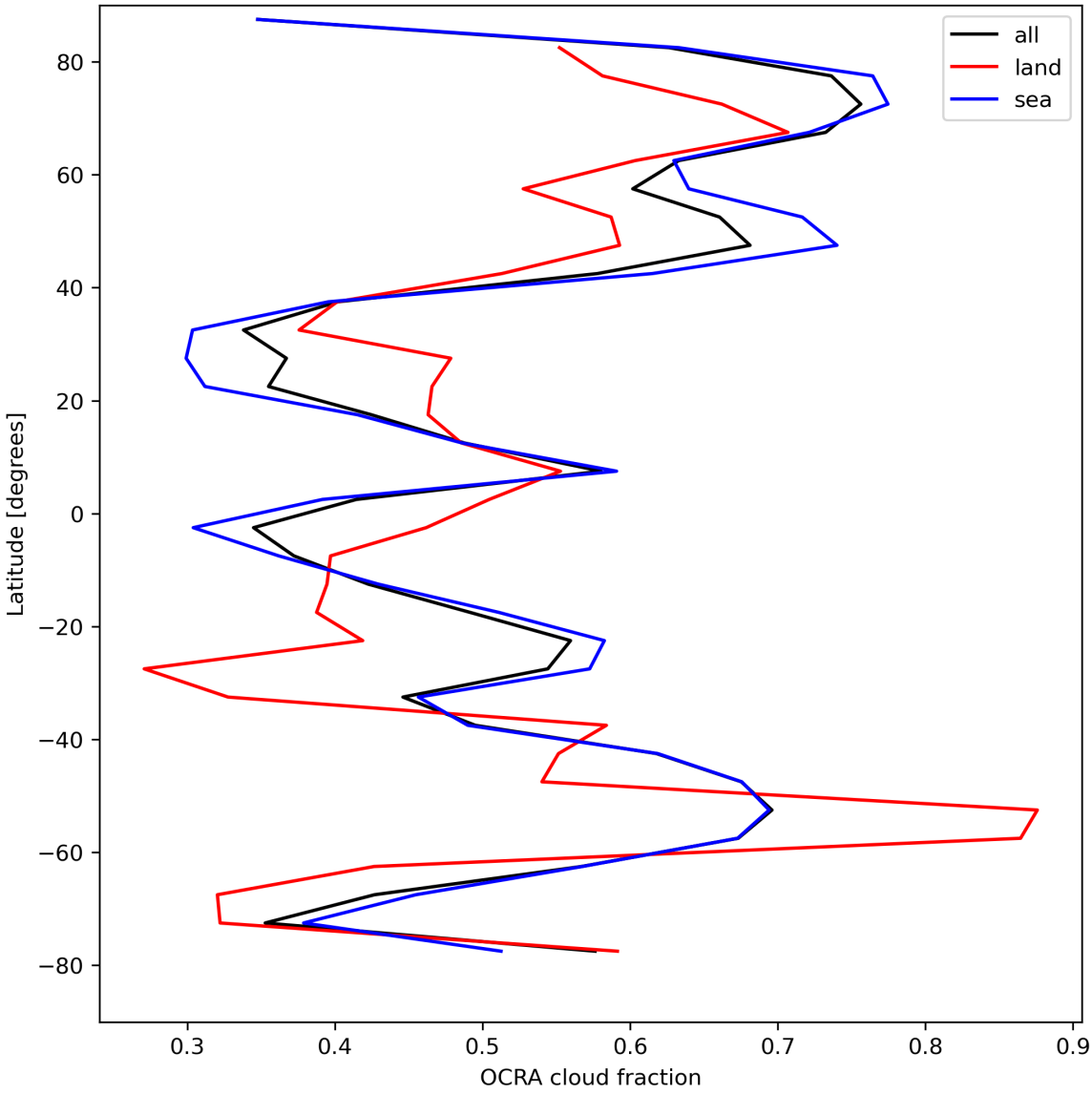


Figure 34: Zonal average of “OCRA cloud fraction” for 2023-08-28 to 2023-08-30.

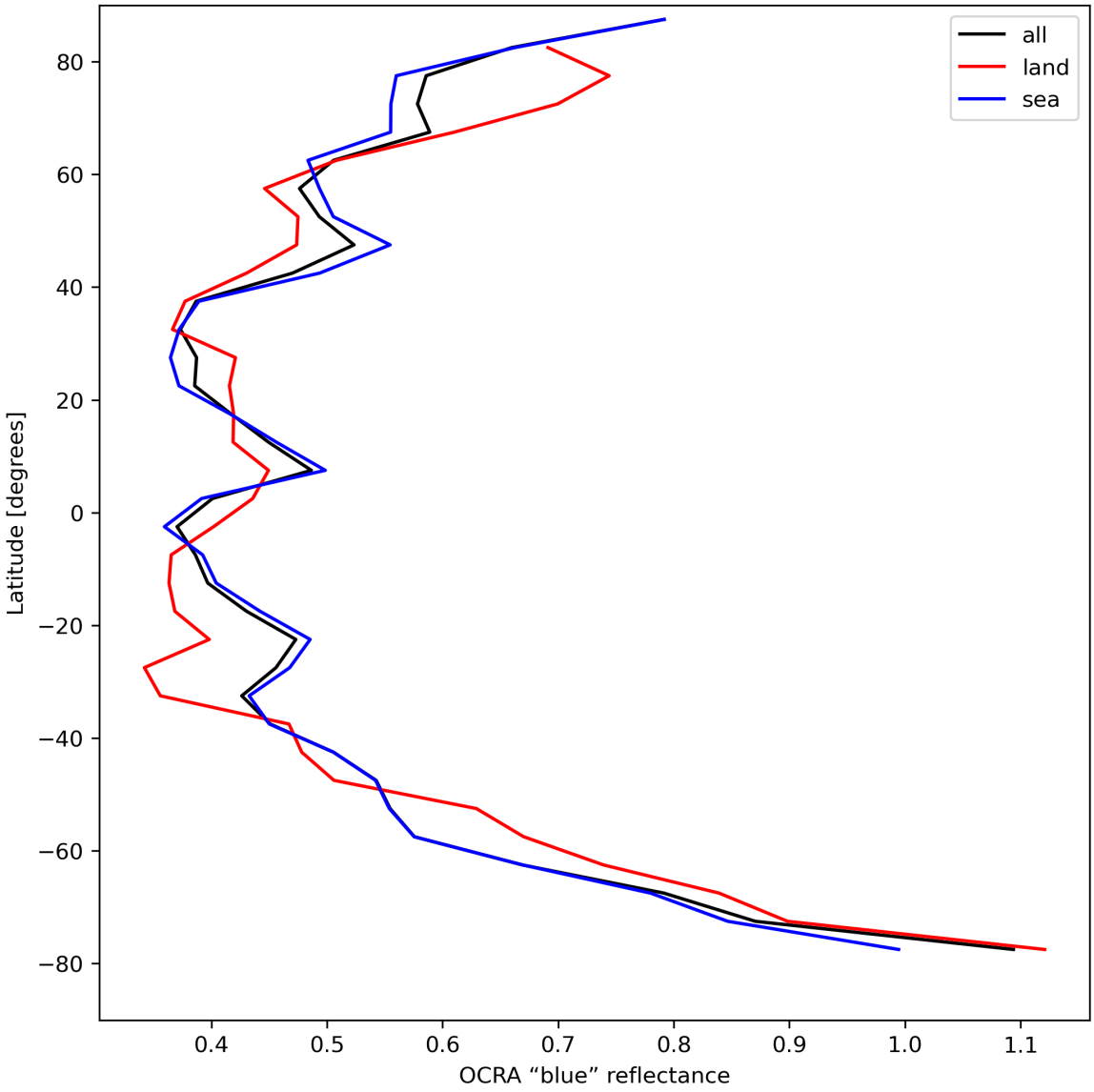


Figure 35: Zonal average of “OCRA “blue” reflectance” for 2023-08-28 to 2023-08-30.

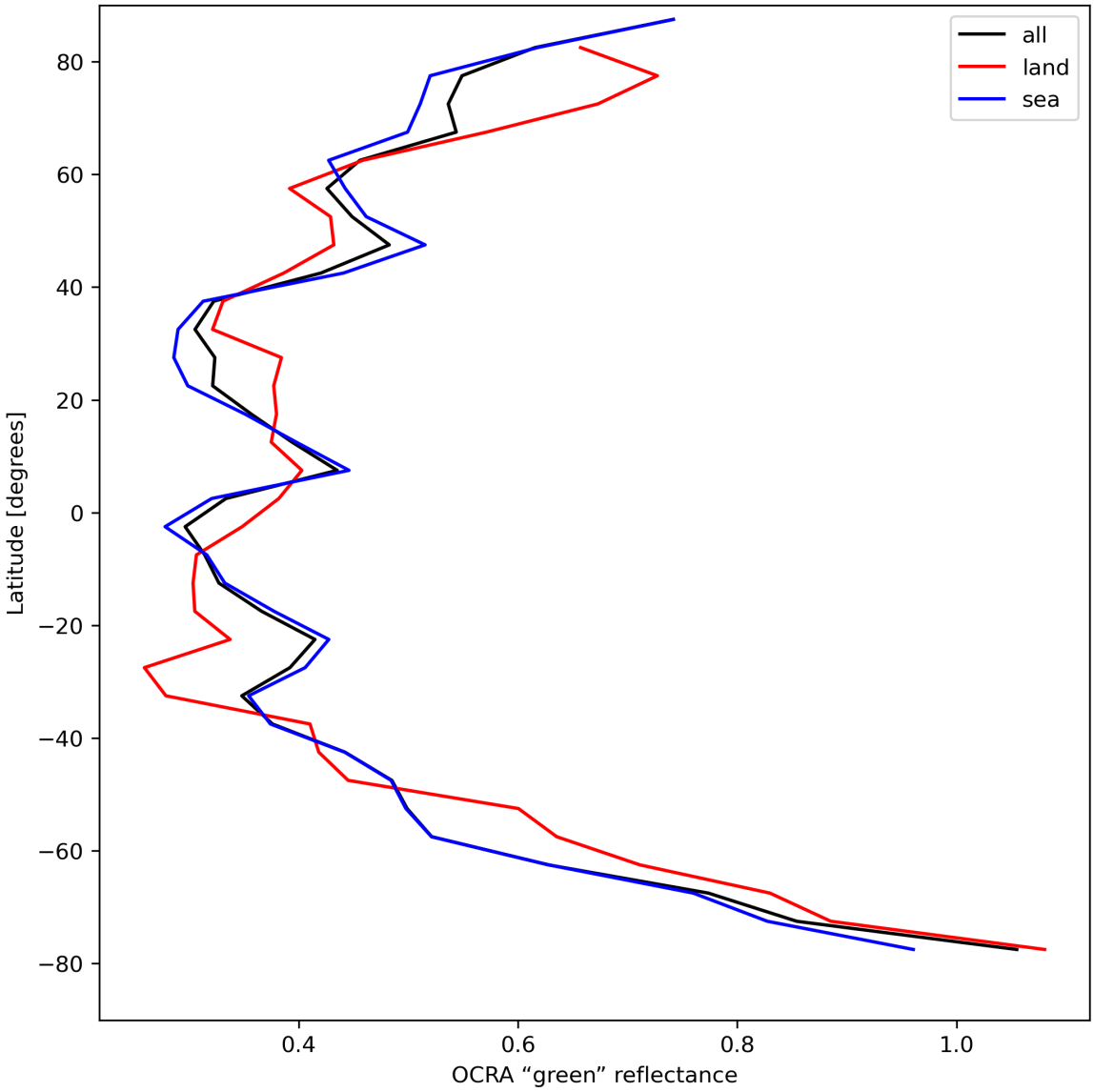


Figure 36: Zonal average of “OCRA “green” reflectance” for 2023-08-28 to 2023-08-30.

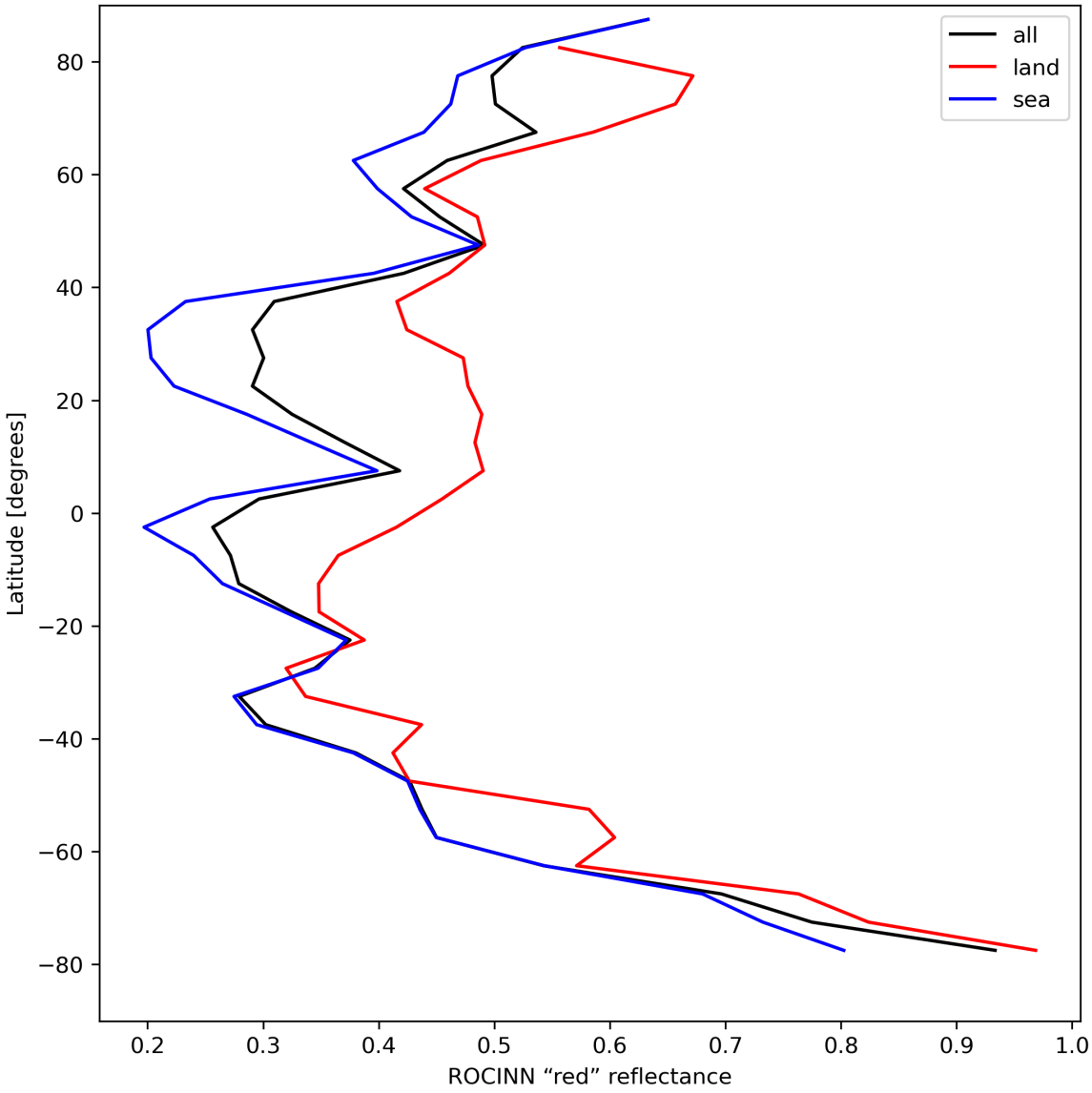


Figure 37: Zonal average of “ROCINN “red” reflectance” for 2023-08-28 to 2023-08-30.

8 Histograms

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

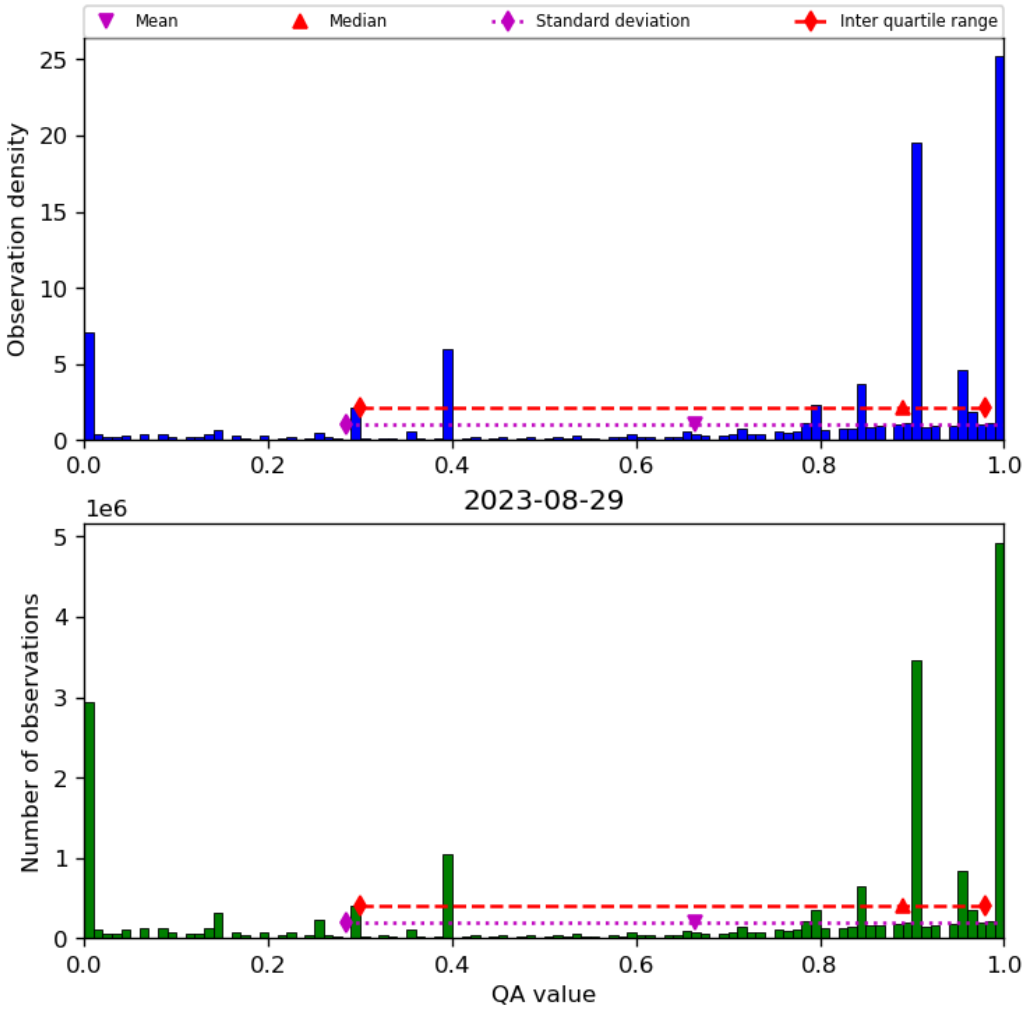


Figure 38: Histogram of “QA value” for 2023-08-28 to 2023-08-30

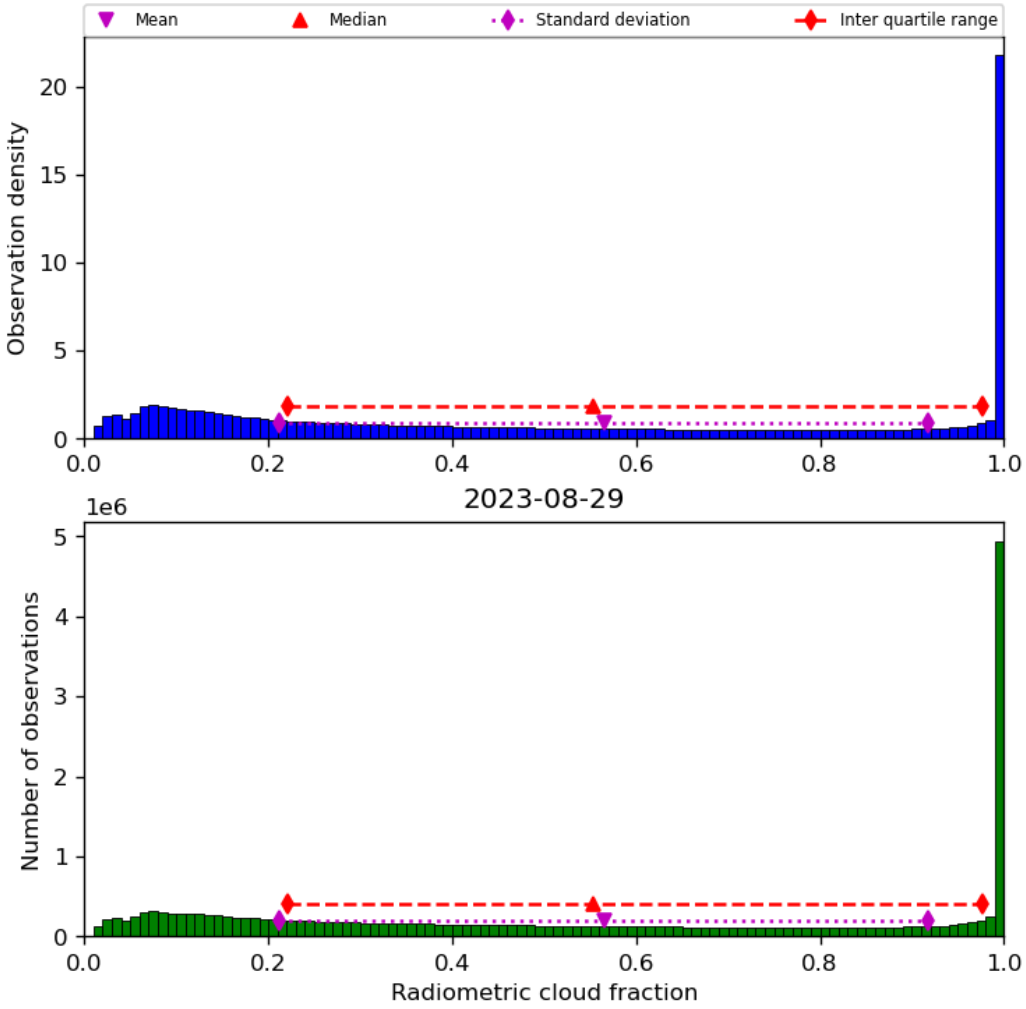


Figure 39: Histogram of “Radiometric cloud fraction” for 2023-08-28 to 2023-08-30

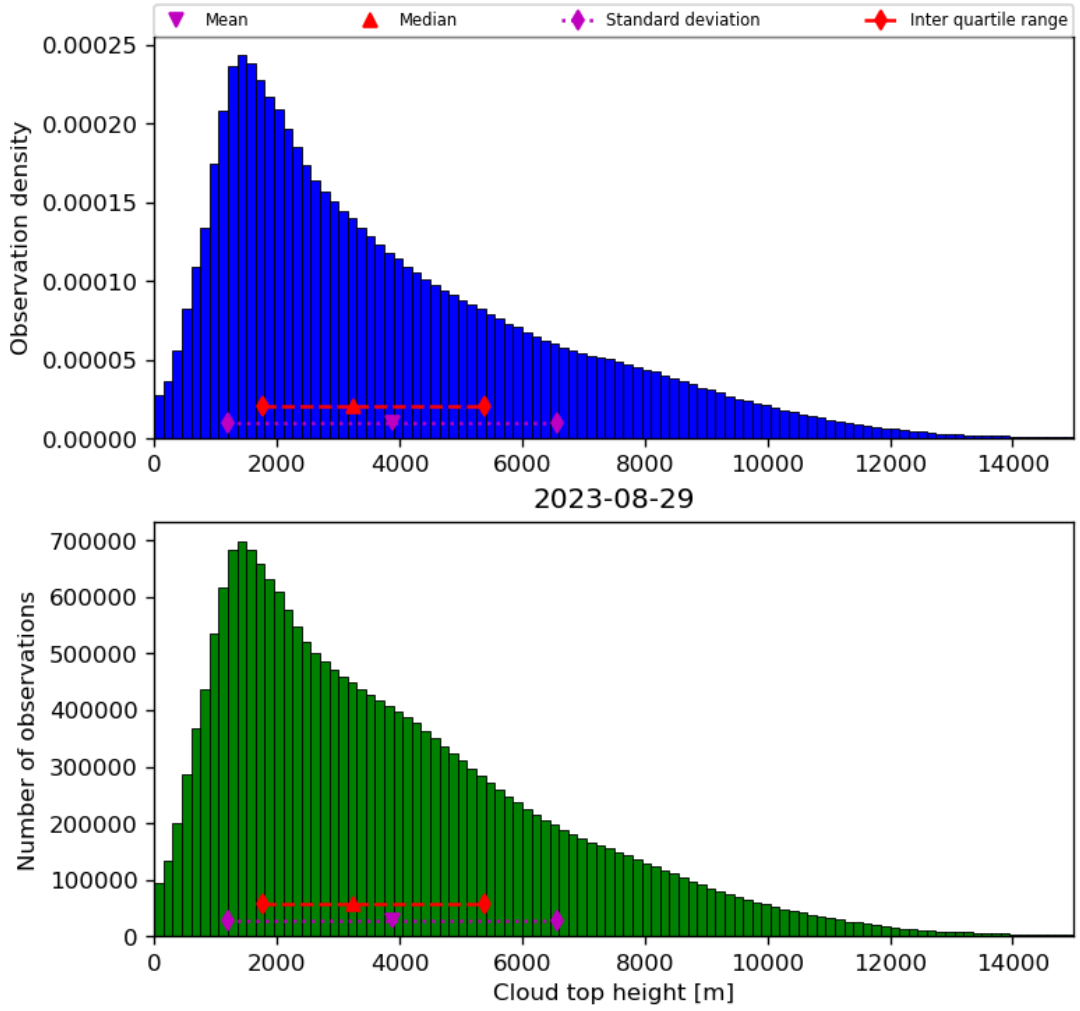


Figure 40: Histogram of “Cloud top height” for 2023-08-28 to 2023-08-30

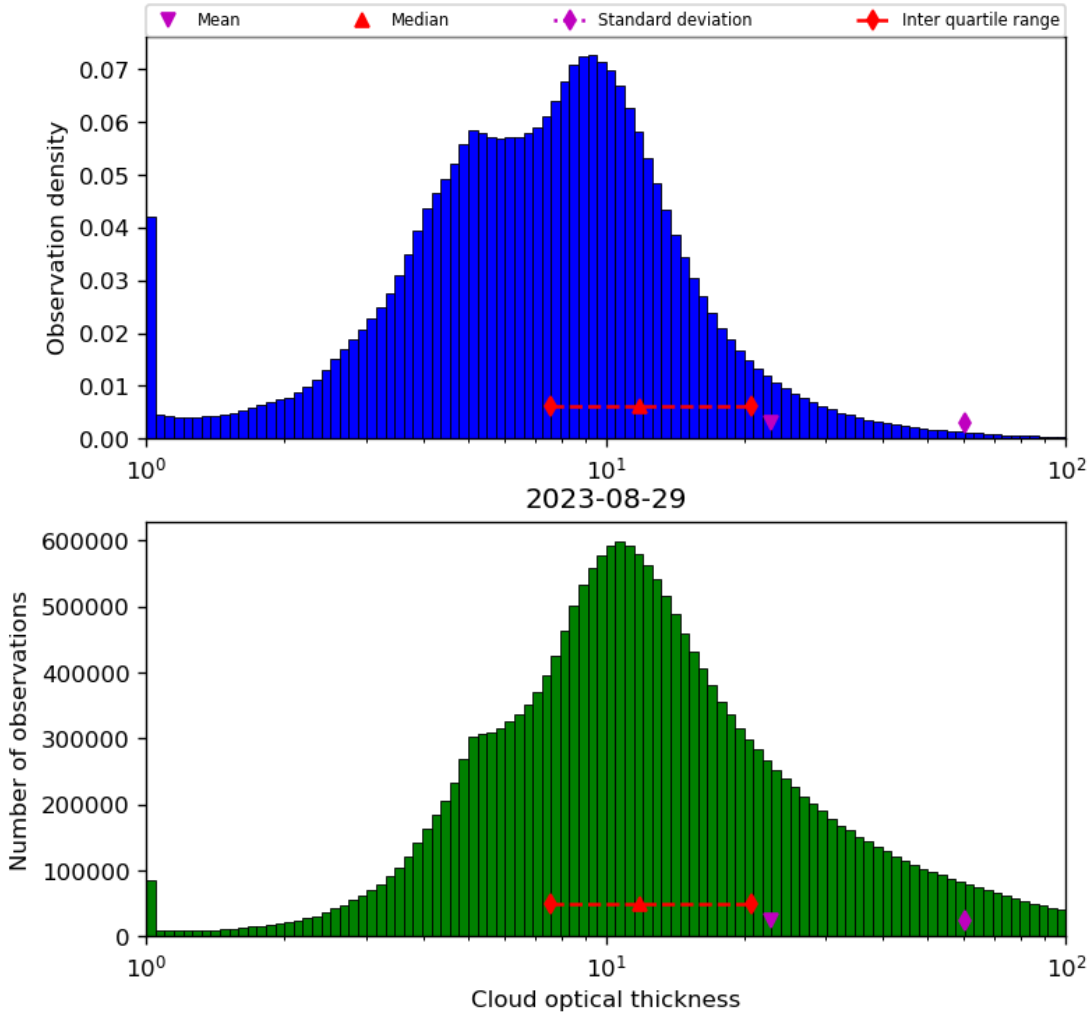


Figure 41: Histogram of “Cloud optical thickness” for 2023-08-28 to 2023-08-30

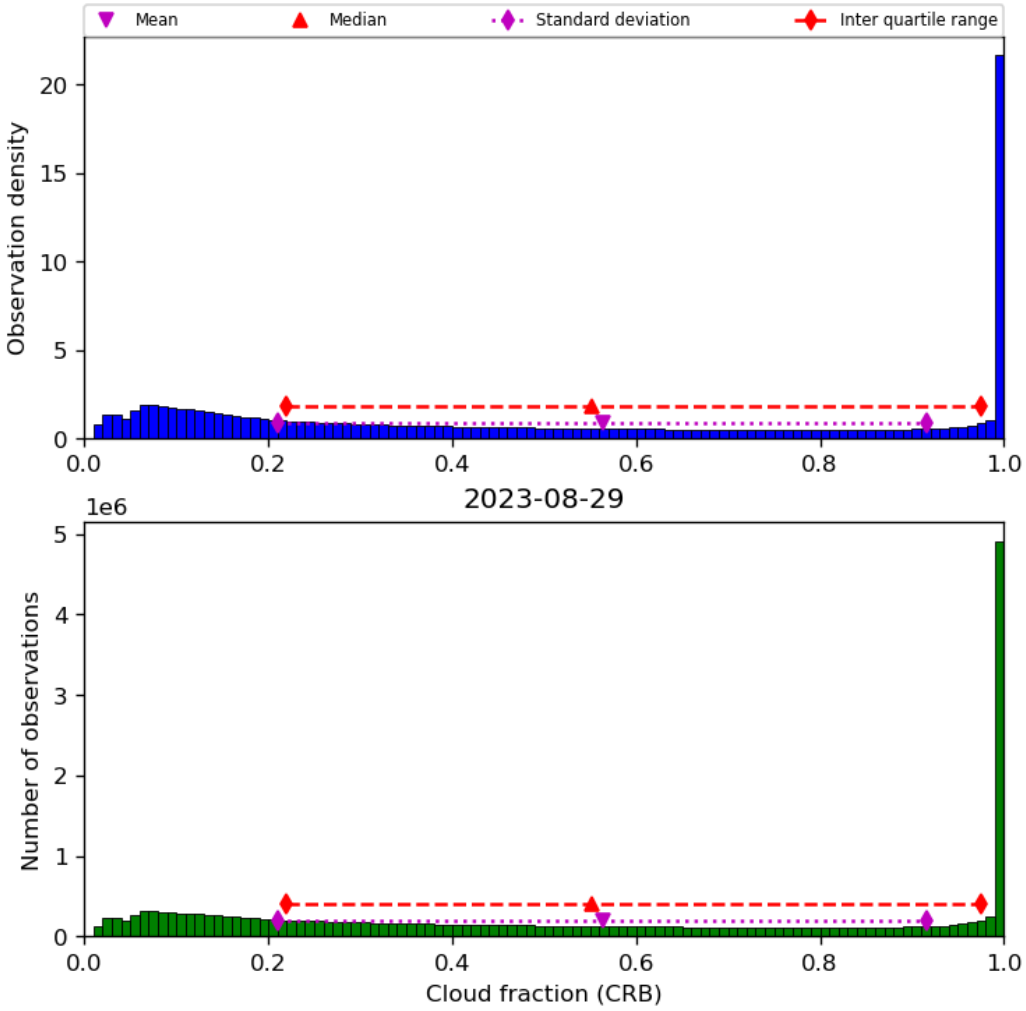


Figure 42: Histogram of “Cloud fraction (CRB)” for 2023-08-28 to 2023-08-30

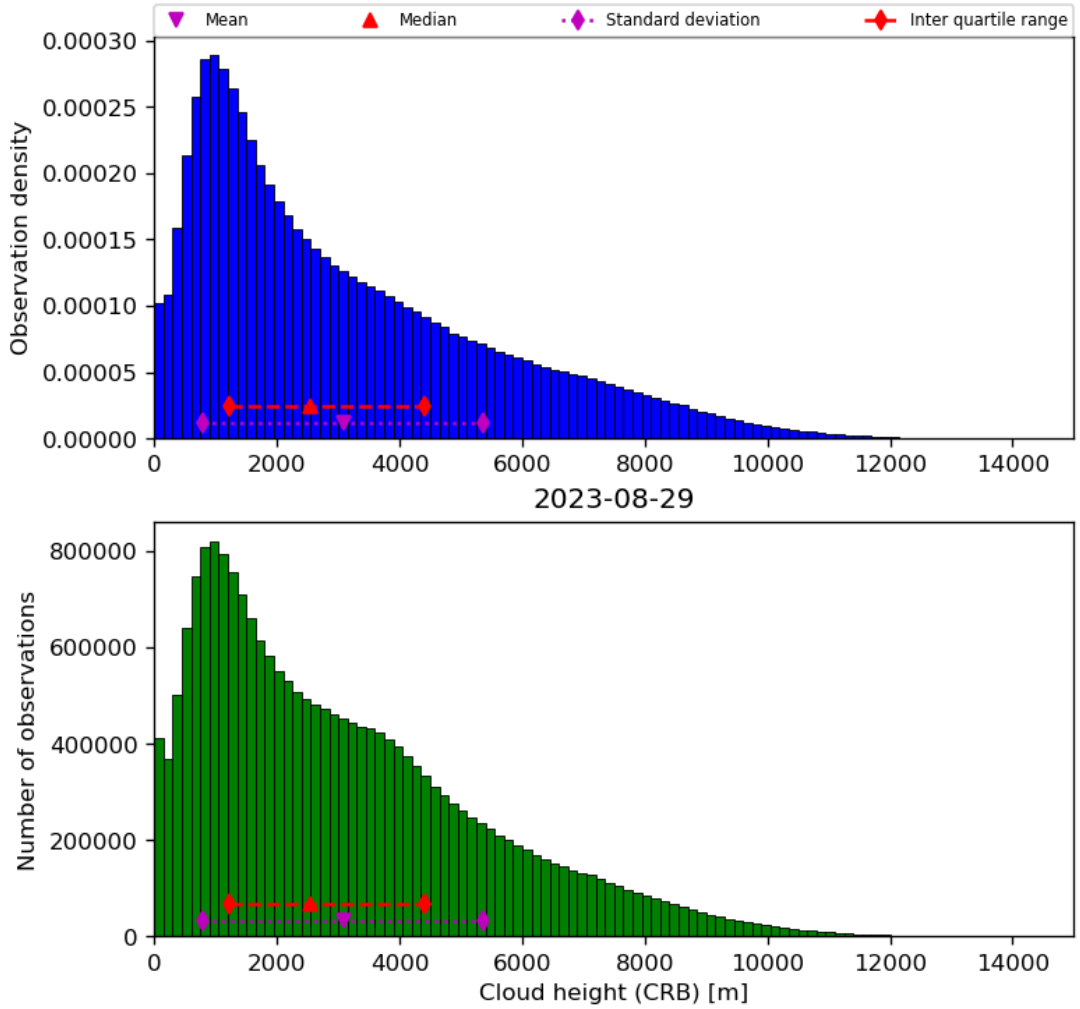


Figure 43: Histogram of “Cloud height (CRB)” for 2023-08-28 to 2023-08-30

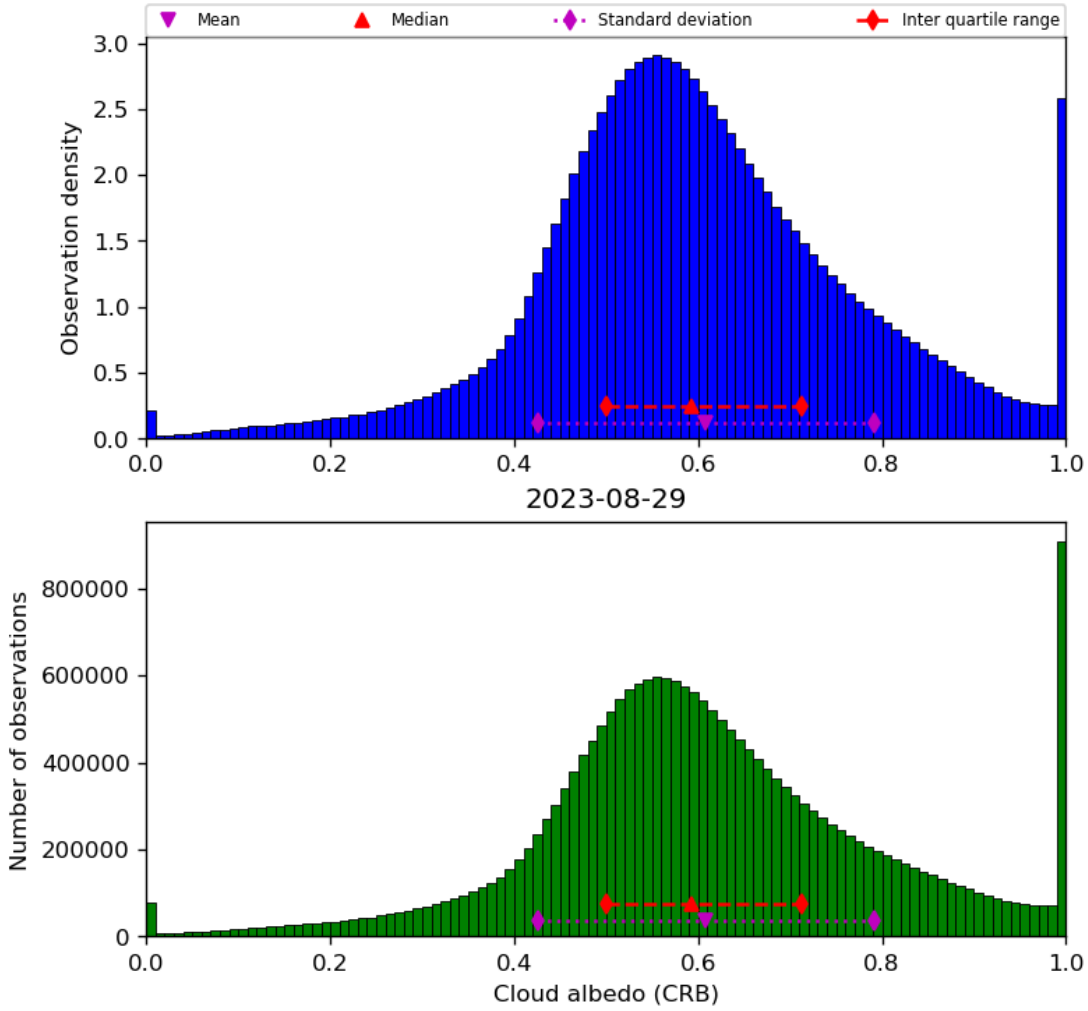


Figure 44: Histogram of “Cloud albedo (CRB)” for 2023-08-28 to 2023-08-30

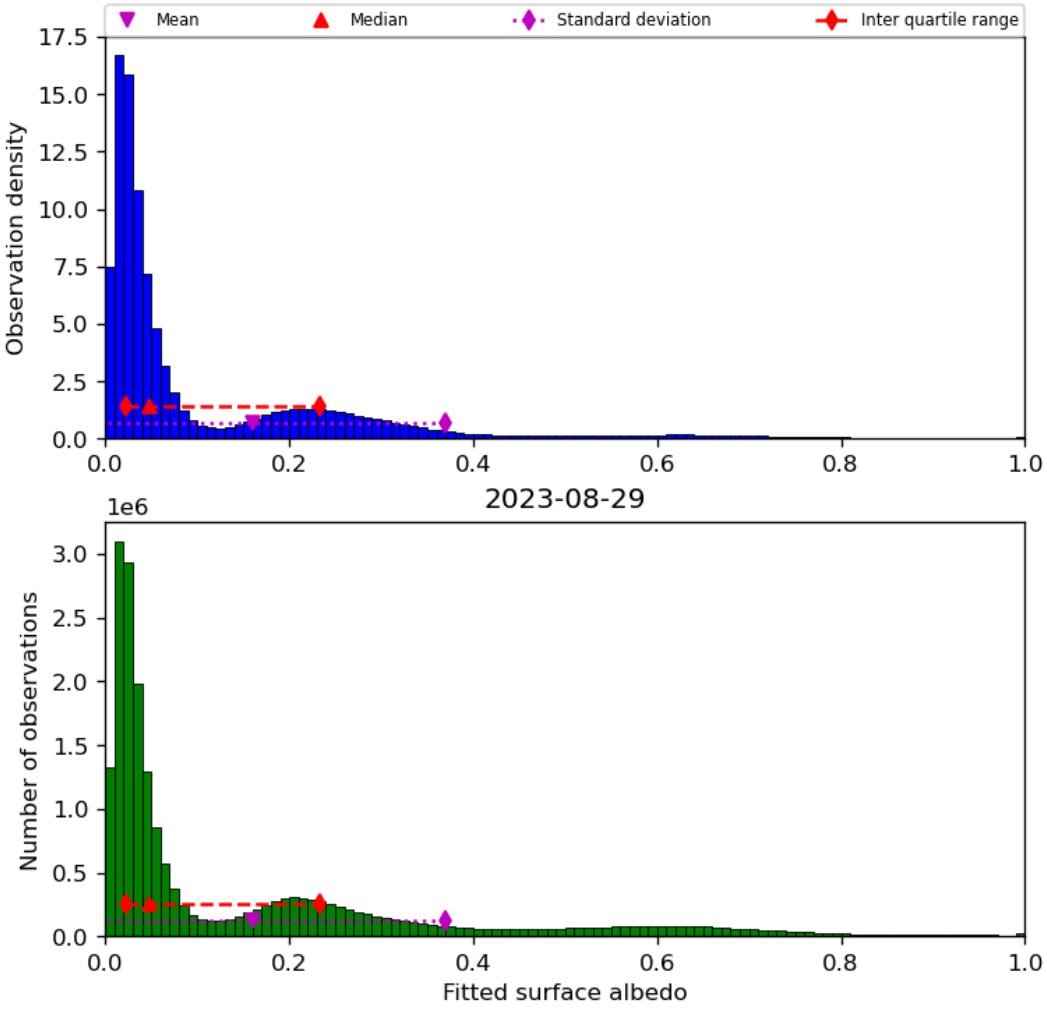


Figure 45: Histogram of “Fitted surface albedo” for 2023-08-28 to 2023-08-30

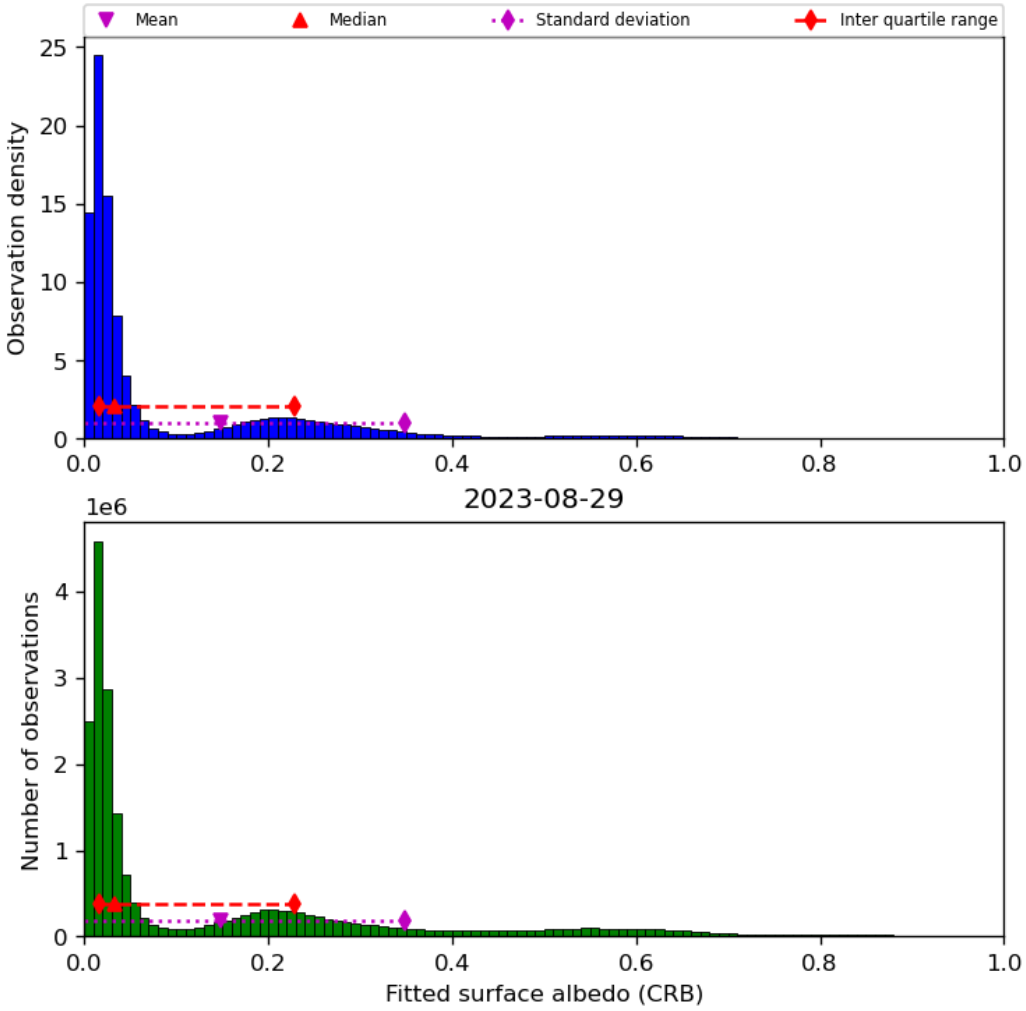


Figure 46: Histogram of “Fitted surface albedo (CRB)” for 2023-08-28 to 2023-08-30

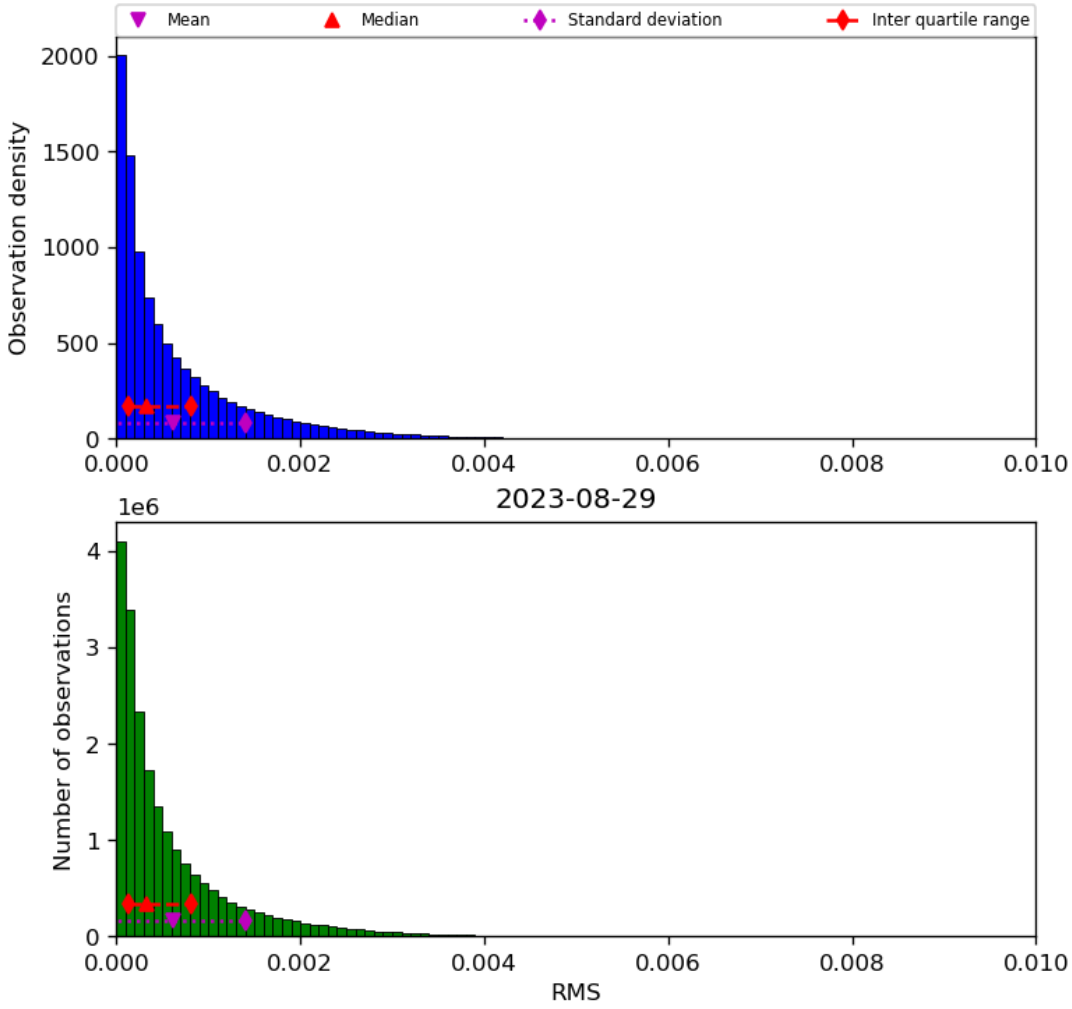


Figure 47: Histogram of “RMS” for 2023-08-28 to 2023-08-30

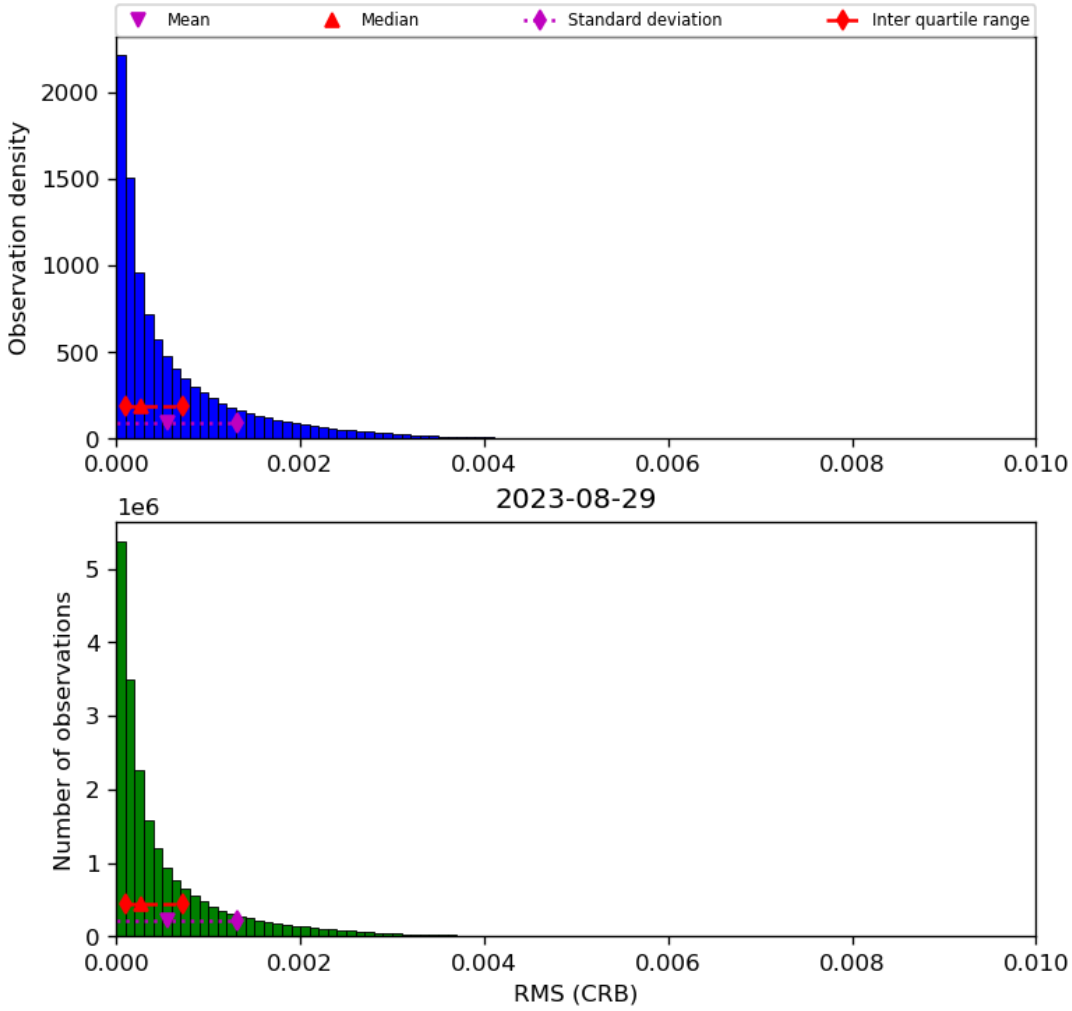


Figure 48: Histogram of “RMS (CRB)” for 2023-08-28 to 2023-08-30

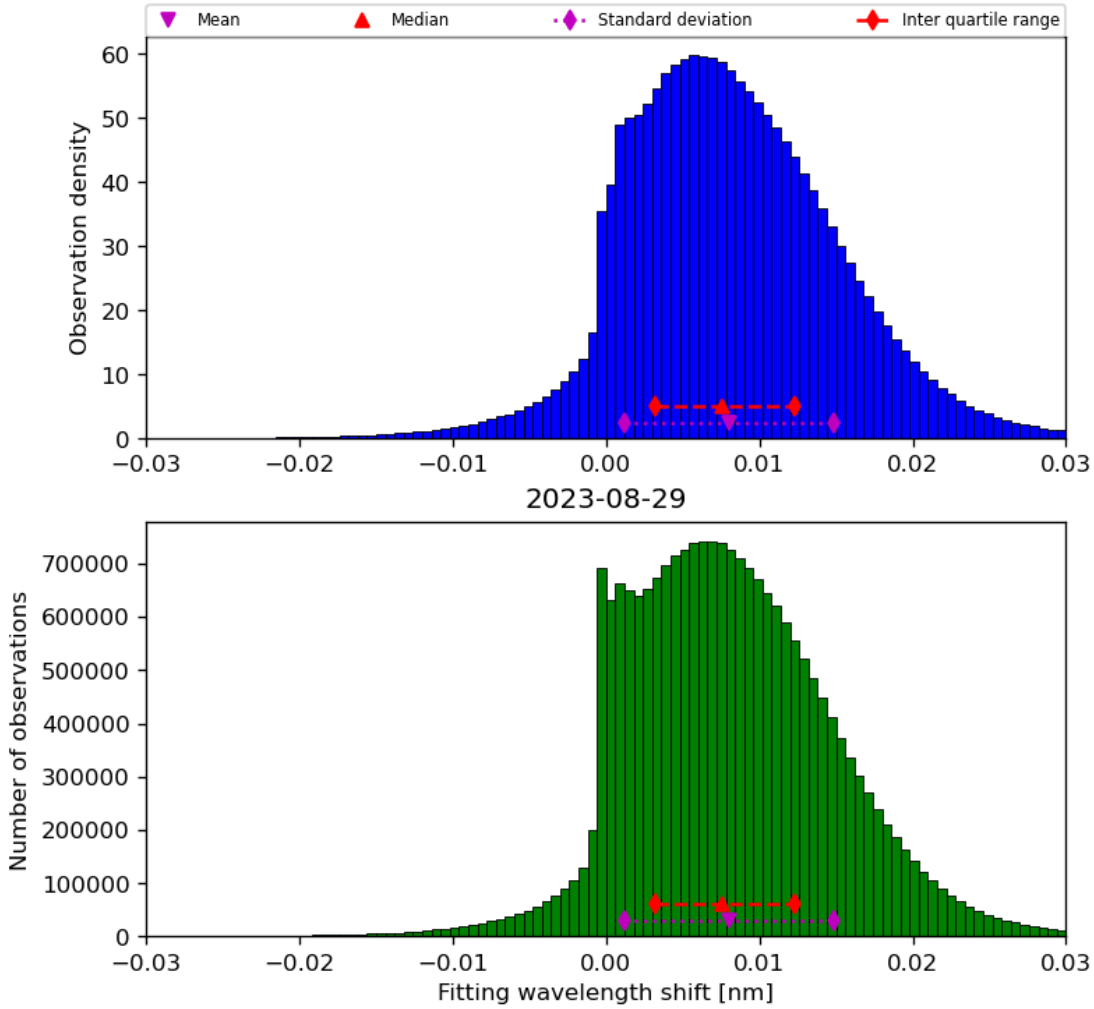


Figure 49: Histogram of “Fitting wavelength shift” for 2023-08-28 to 2023-08-30

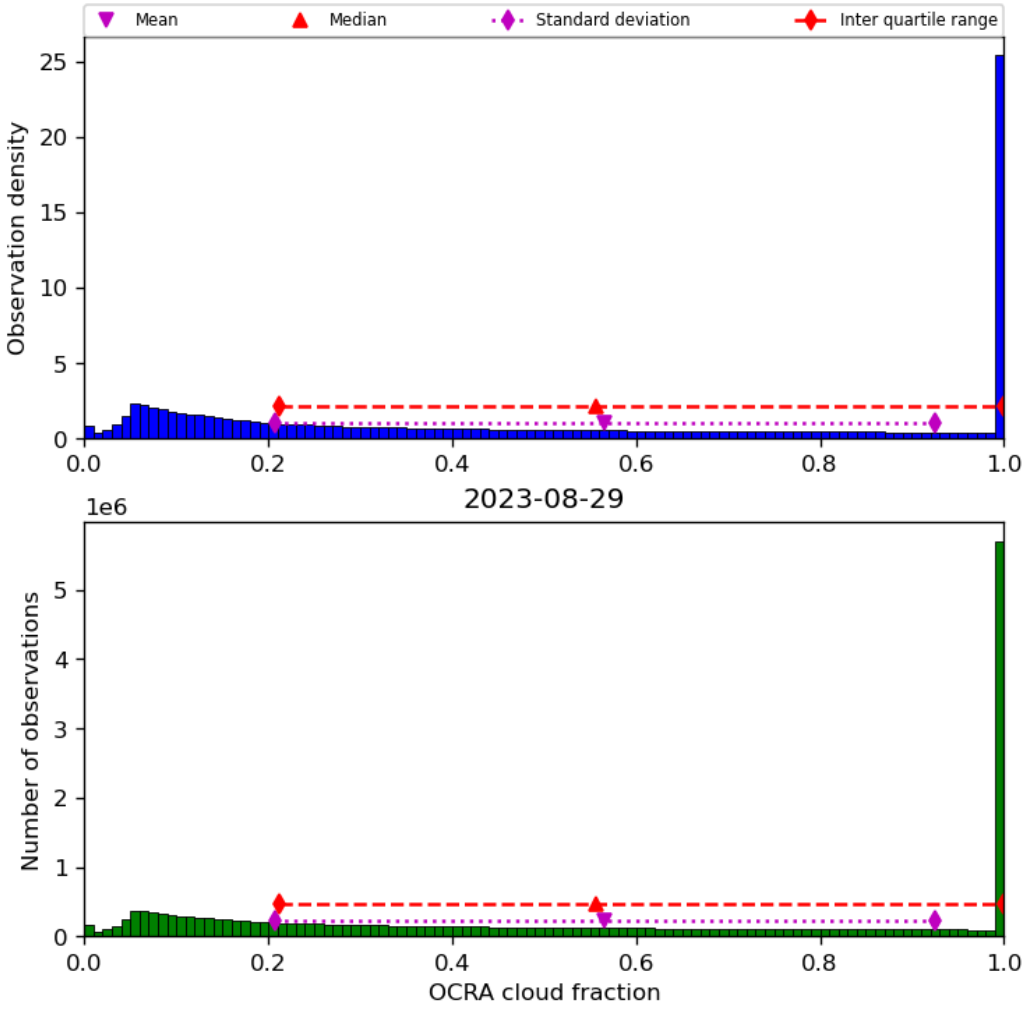


Figure 50: Histogram of “OCRA cloud fraction” for 2023-08-28 to 2023-08-30

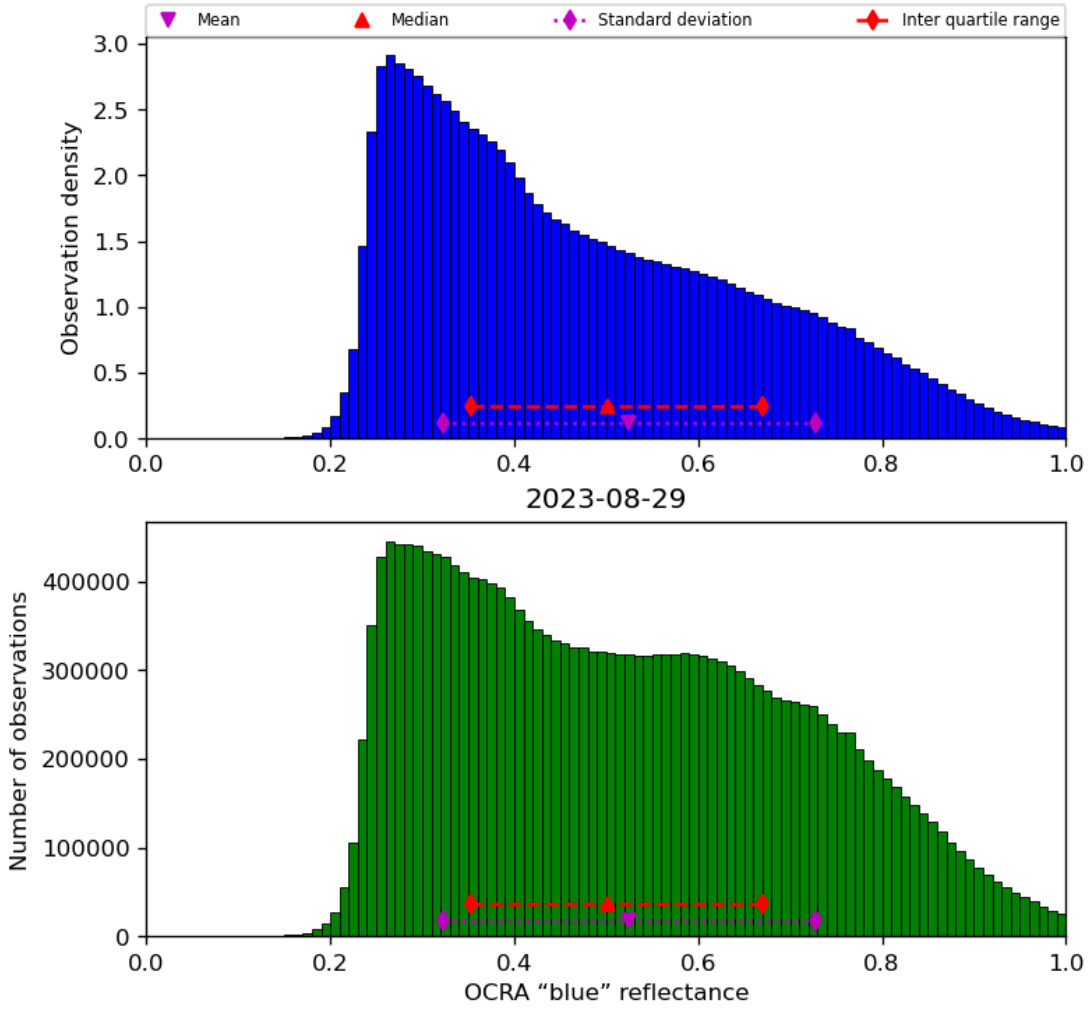


Figure 51: Histogram of “OCRA “blue” reflectance” for 2023-08-28 to 2023-08-30

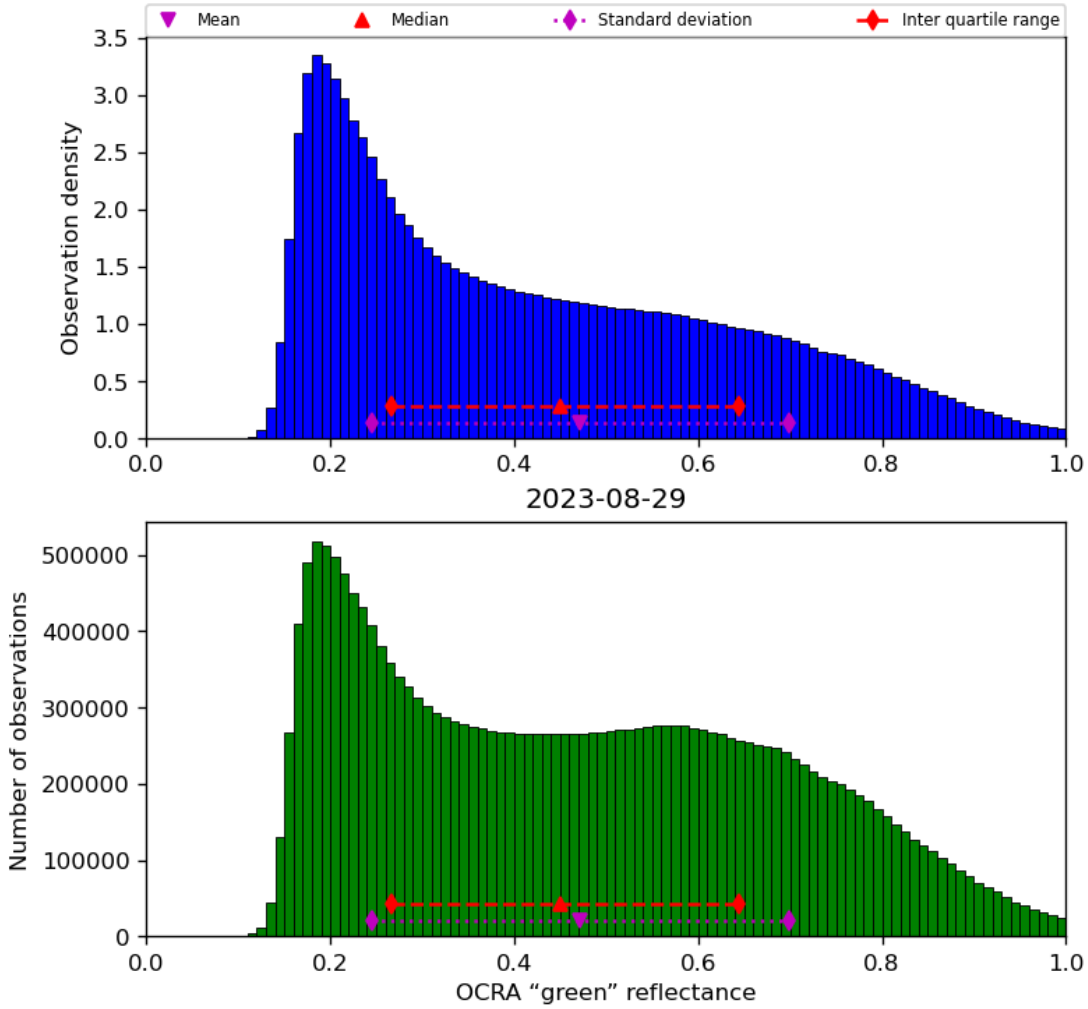


Figure 52: Histogram of "OCRA "green" reflectance" for 2023-08-28 to 2023-08-30

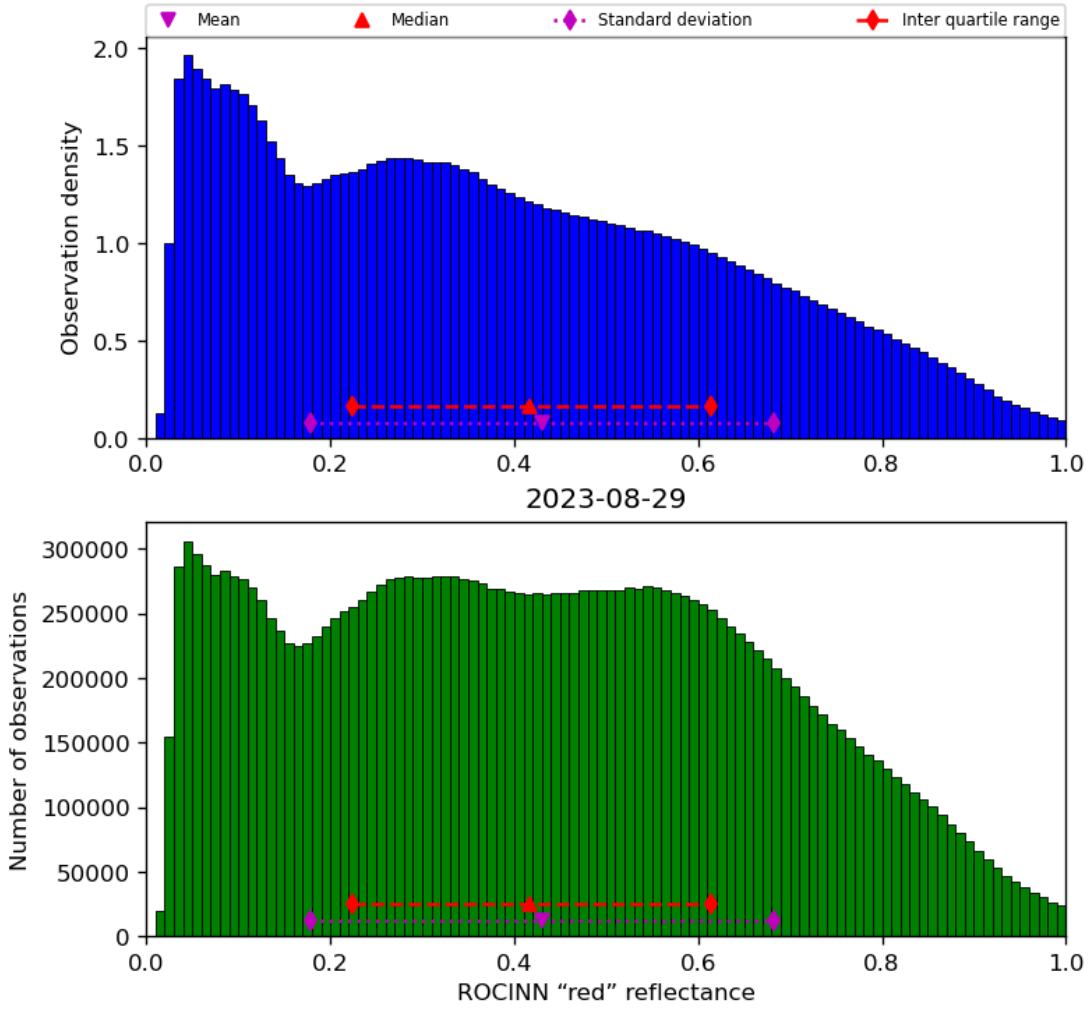


Figure 53: Histogram of “ROCINN “red” reflectance” for 2023-08-28 to 2023-08-30

9 Along track statistics

The TROPOMI instrument uses different binned detector rows for different viewing directions. In this section statistics are presented for each of the binned rows in the instrument.

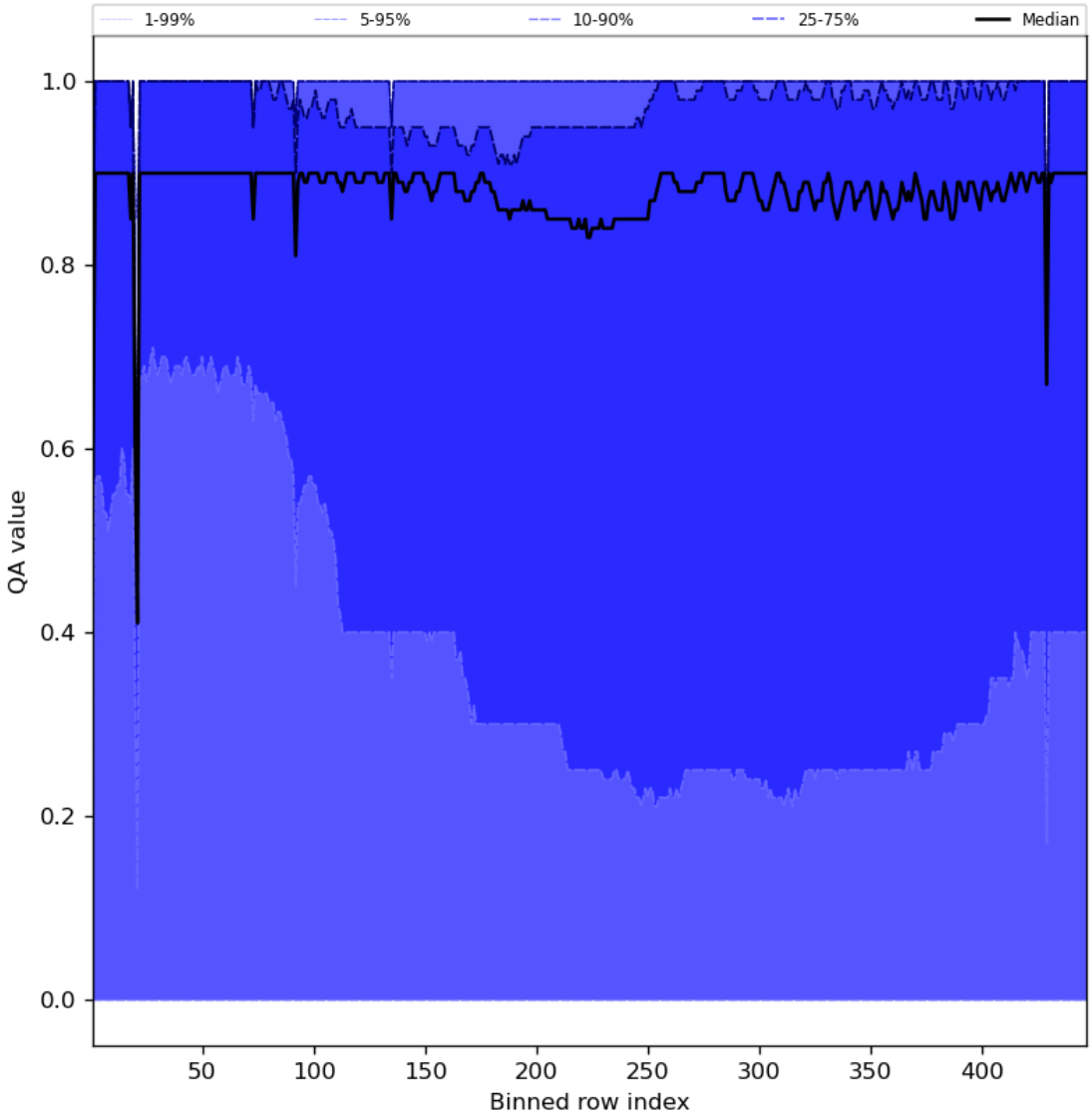


Figure 54: Along track statistics of “QA value” for 2023-08-28 to 2023-08-30

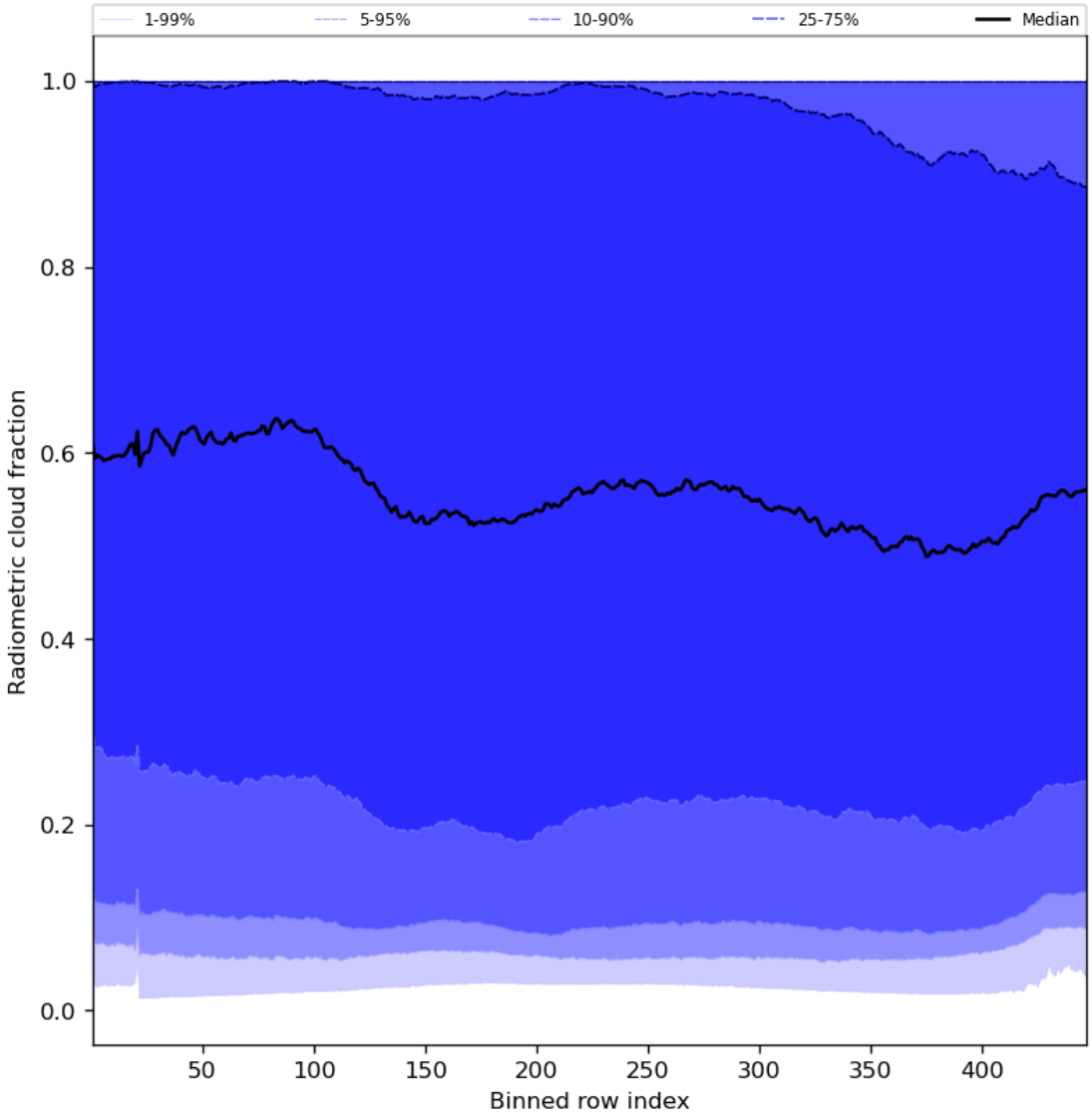


Figure 55: Along track statistics of “Radiometric cloud fraction” for 2023-08-28 to 2023-08-30

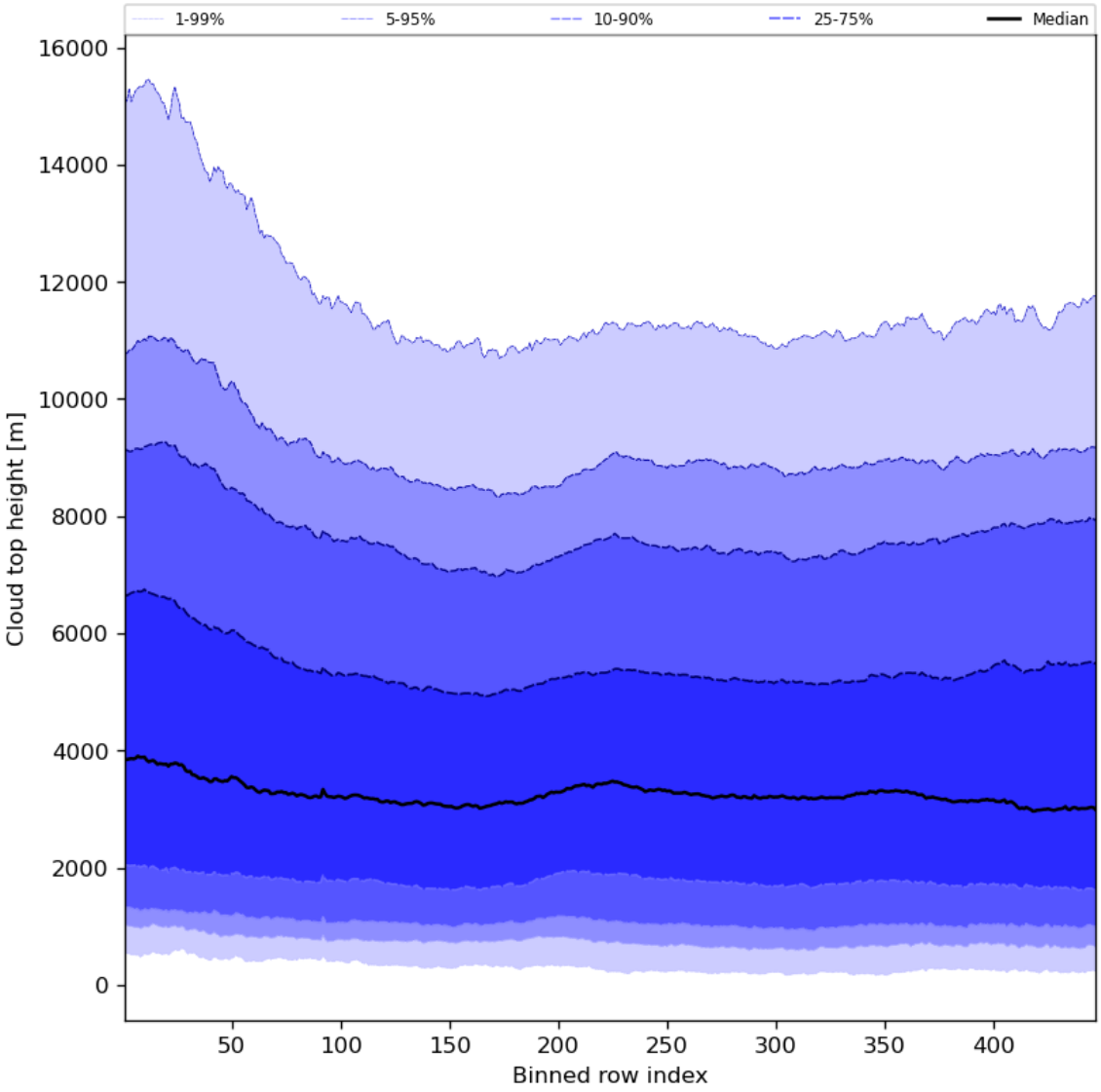


Figure 56: Along track statistics of “Cloud top height” for 2023-08-28 to 2023-08-30

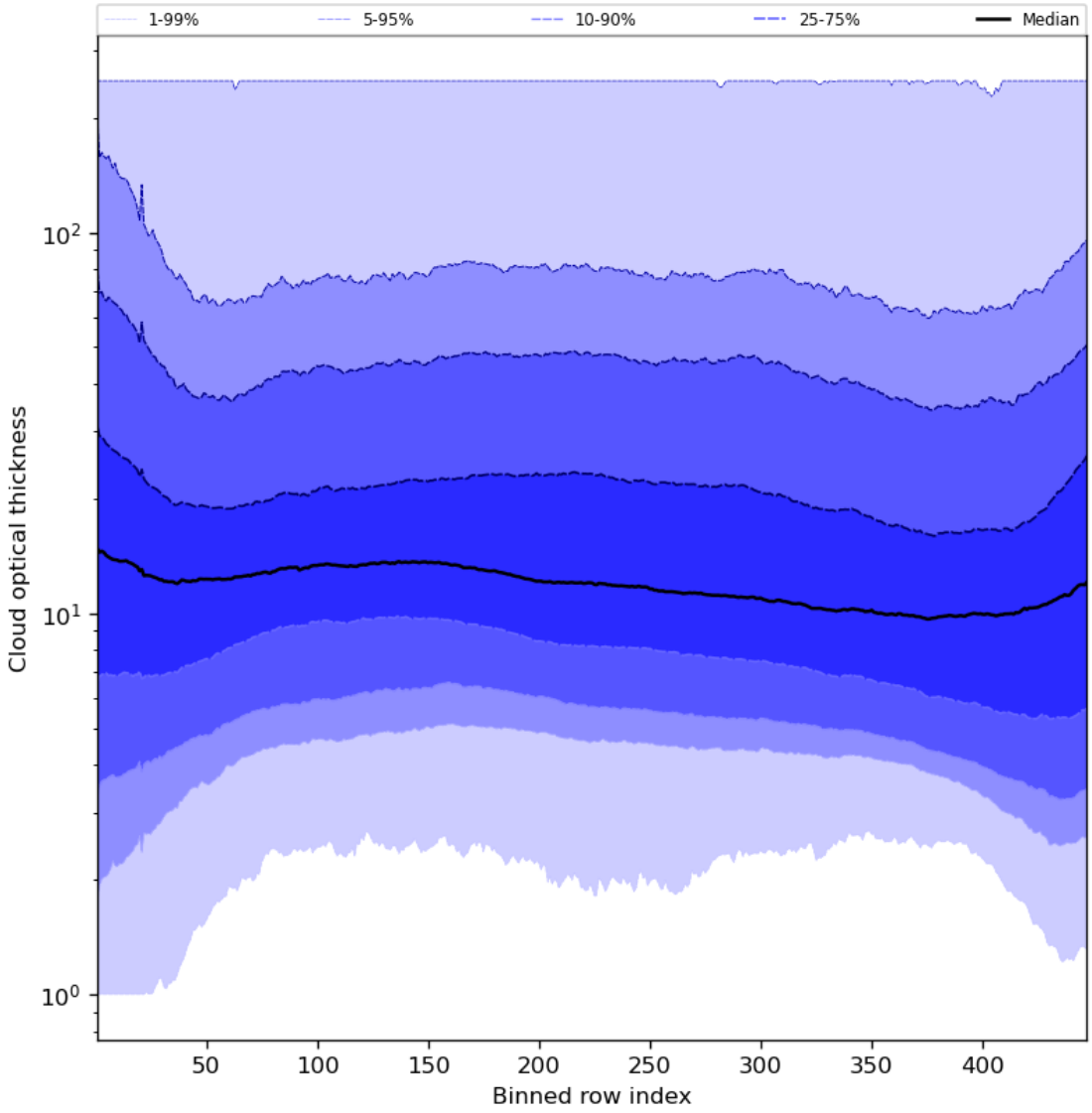


Figure 57: Along track statistics of “Cloud optical thickness” for 2023-08-28 to 2023-08-30

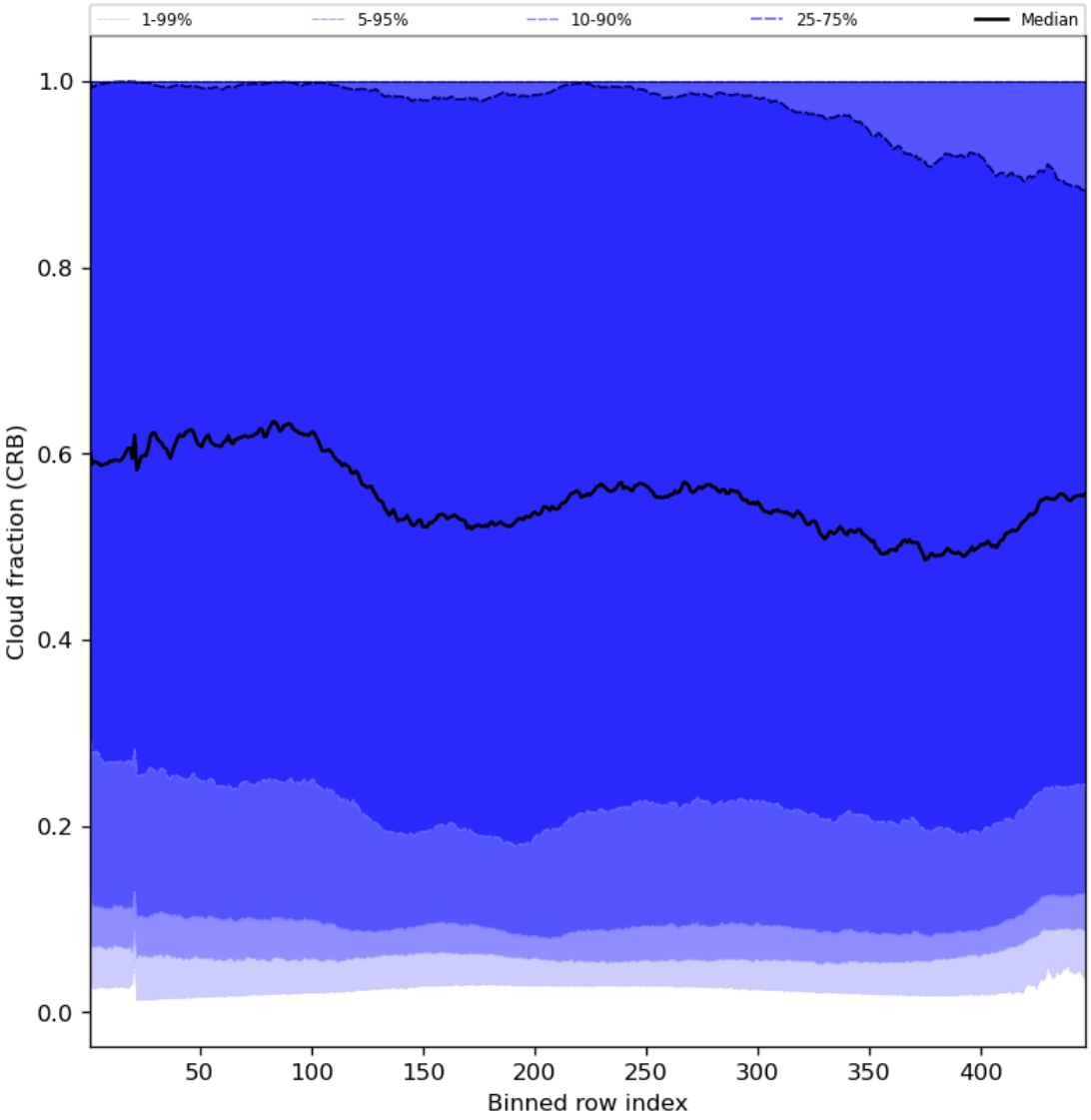


Figure 58: Along track statistics of “Cloud fraction (CRB)” for 2023-08-28 to 2023-08-30

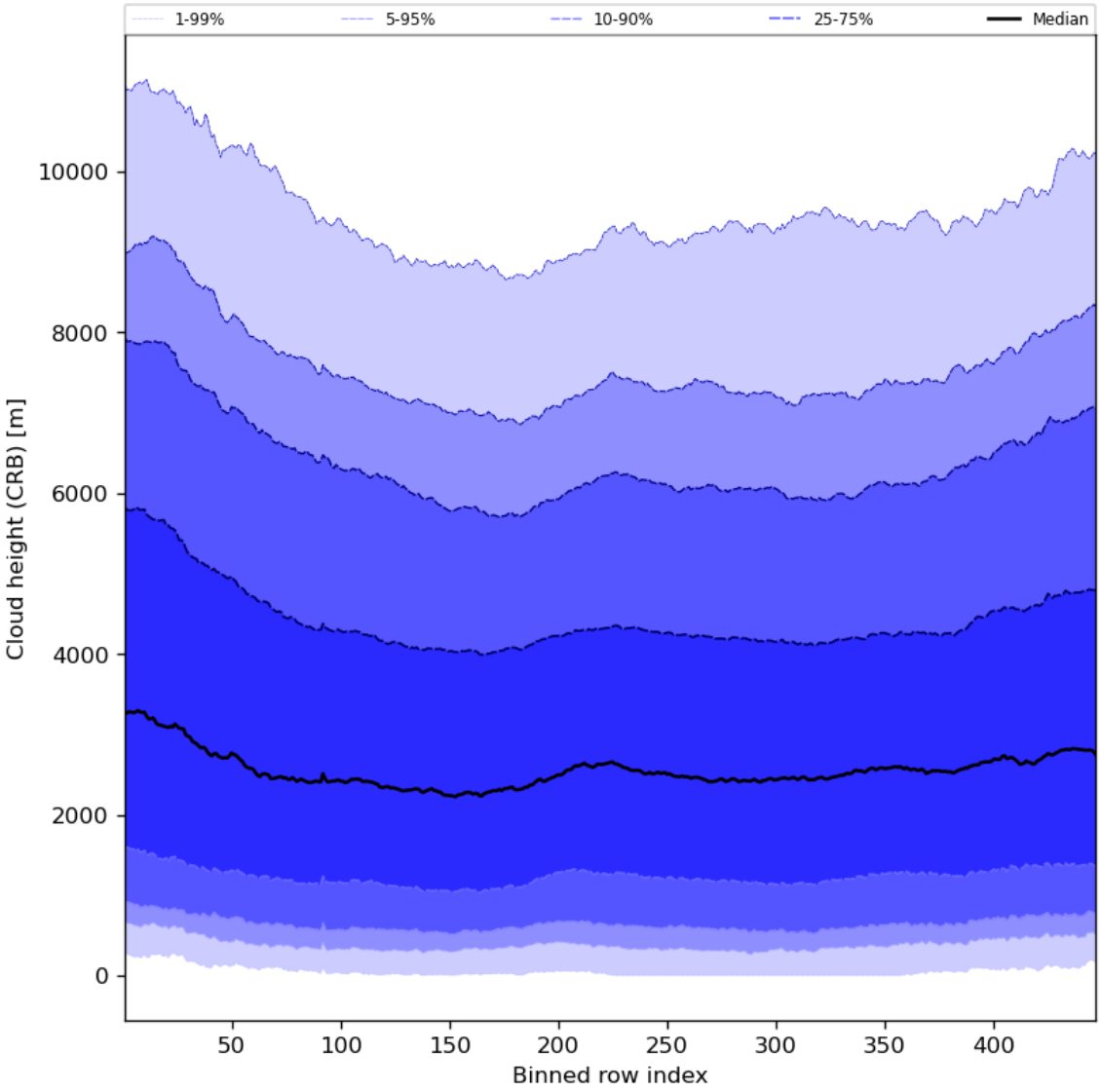


Figure 59: Along track statistics of “Cloud height (CRB)” for 2023-08-28 to 2023-08-30

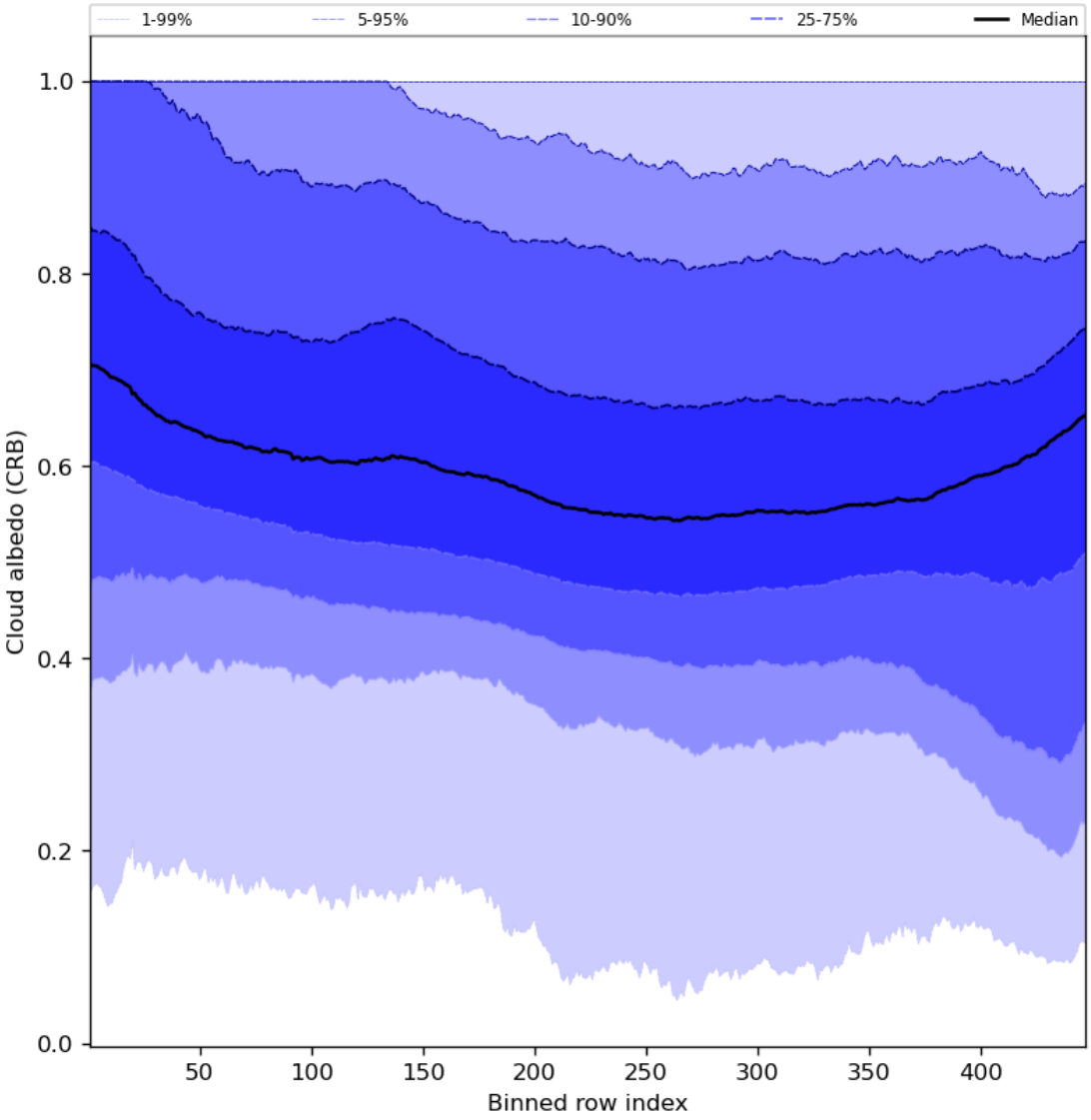


Figure 60: Along track statistics of “Cloud albedo (CRB)” for 2023-08-28 to 2023-08-30

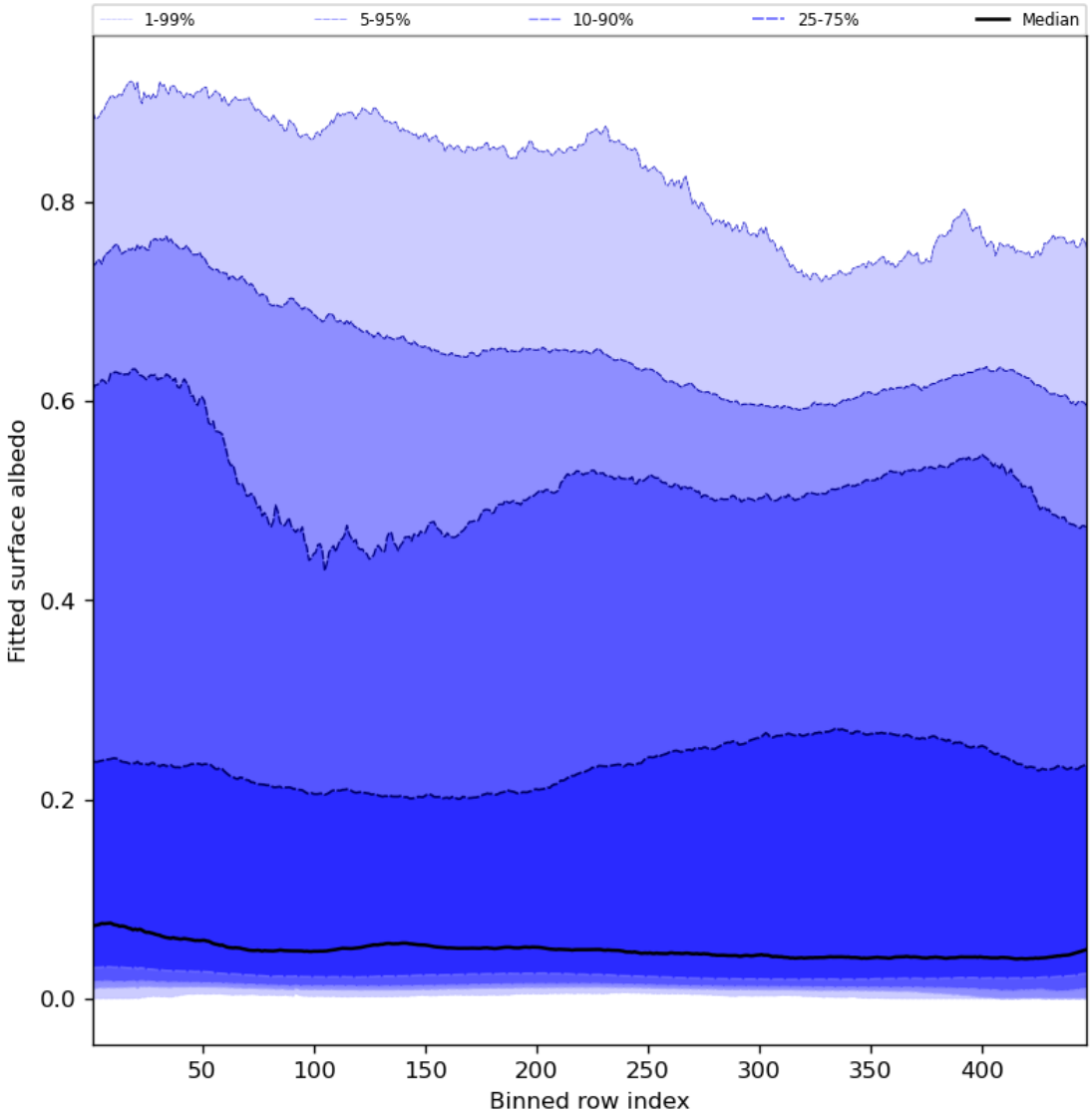


Figure 61: Along track statistics of “Fitted surface albedo” for 2023-08-28 to 2023-08-30

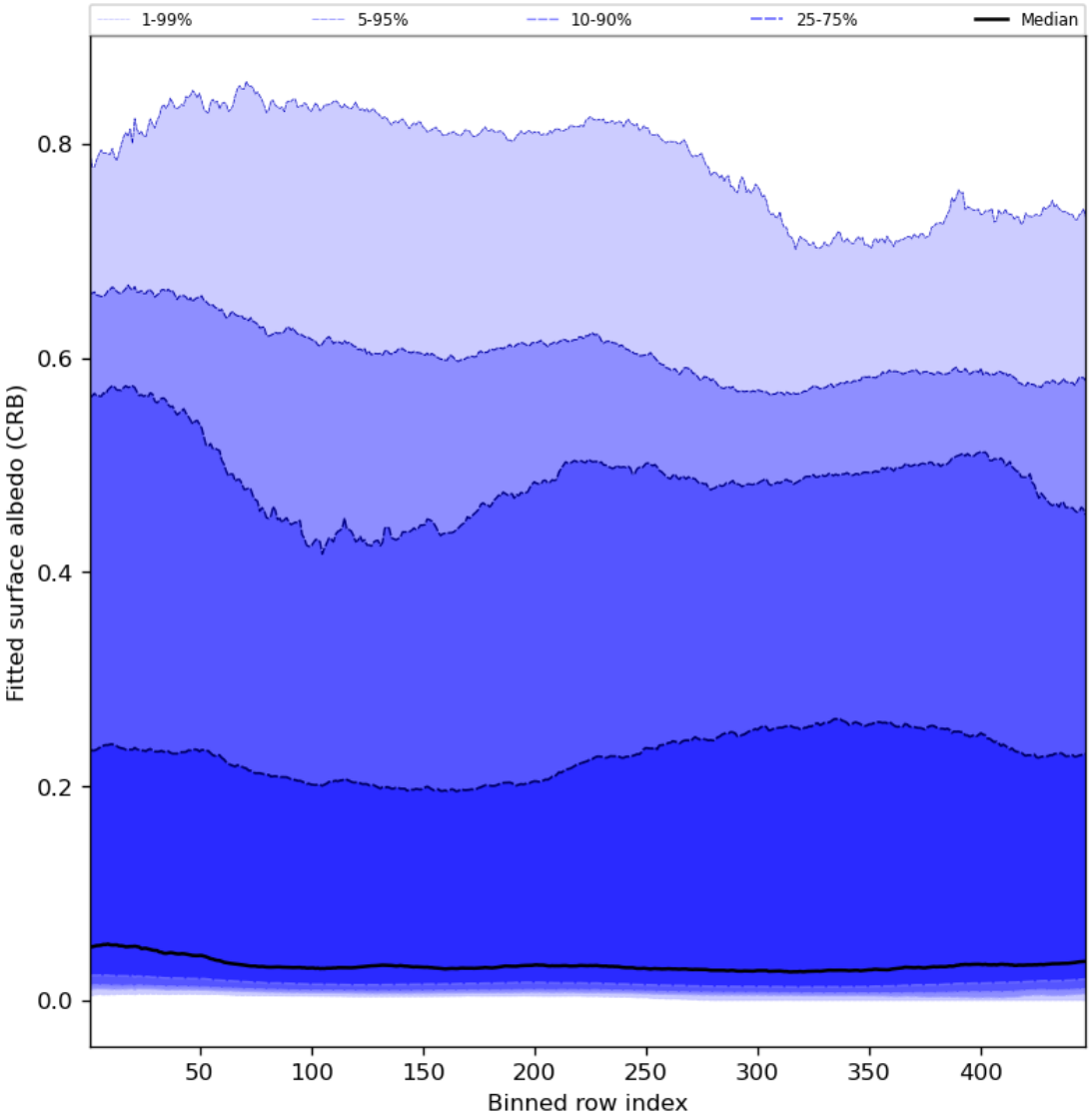


Figure 62: Along track statistics of “Fitted surface albedo (CRB)” for 2023-08-28 to 2023-08-30

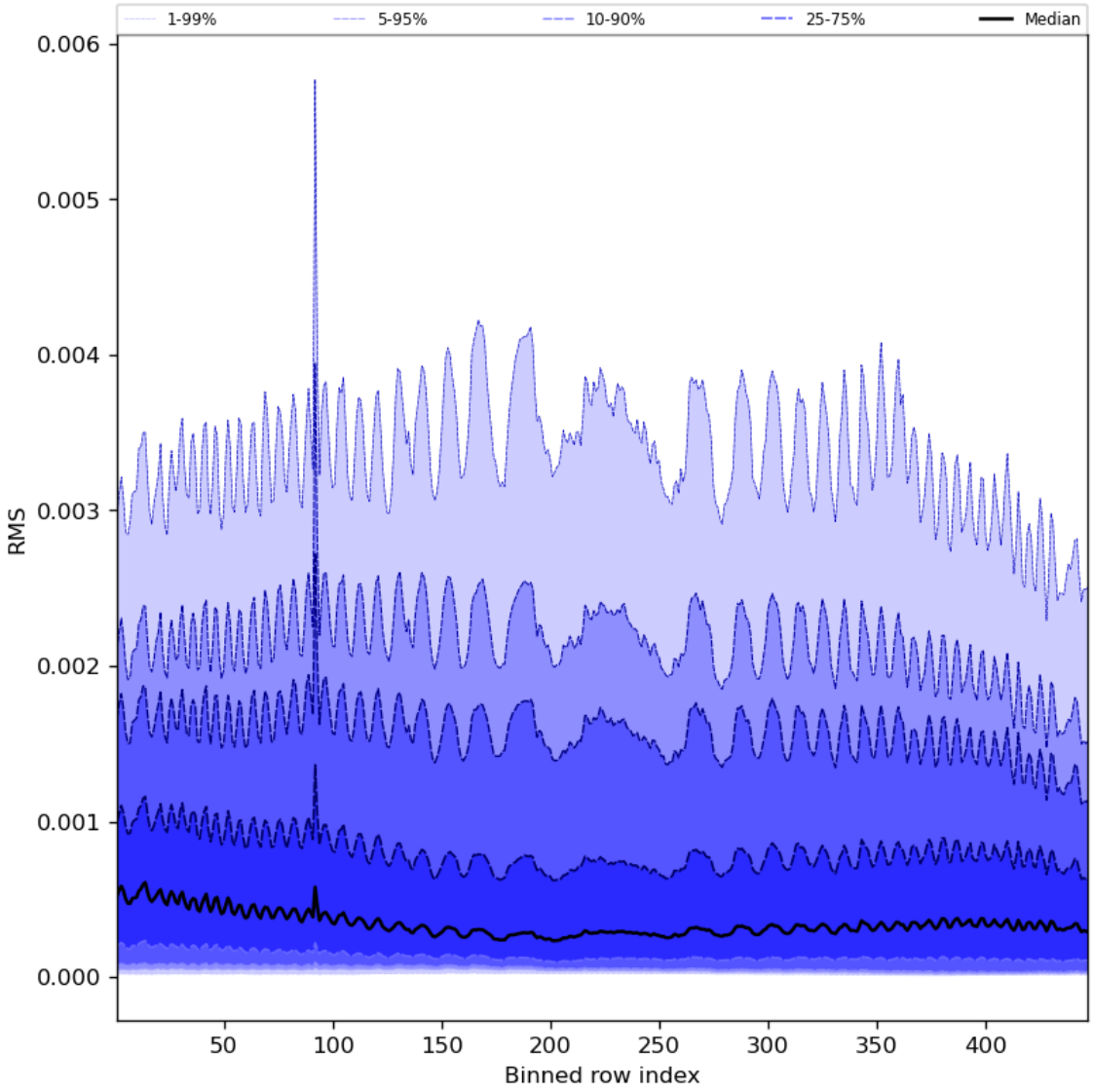


Figure 63: Along track statistics of “RMS” for 2023-08-28 to 2023-08-30

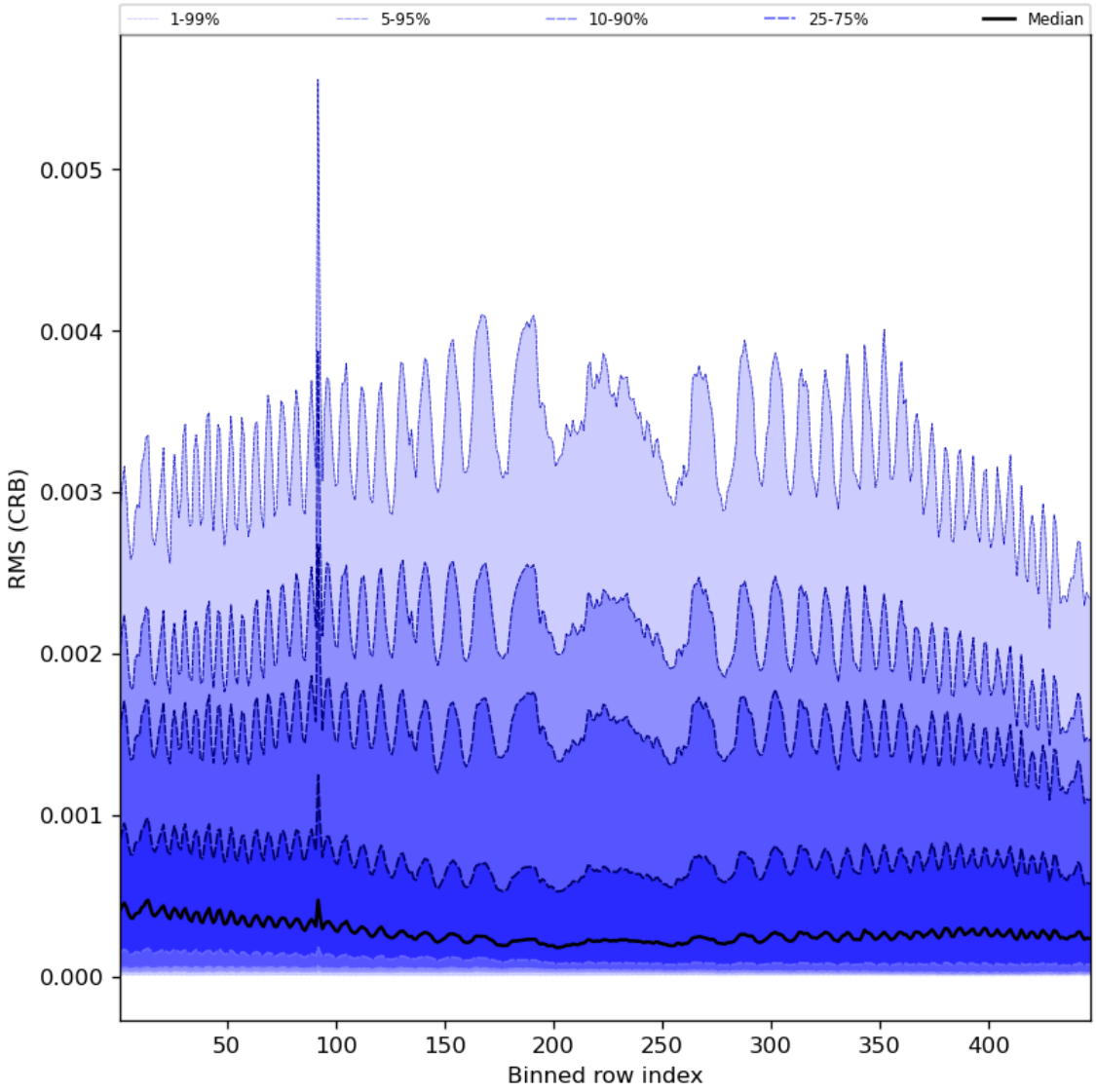


Figure 64: Along track statistics of “RMS (CRB)” for 2023-08-28 to 2023-08-30

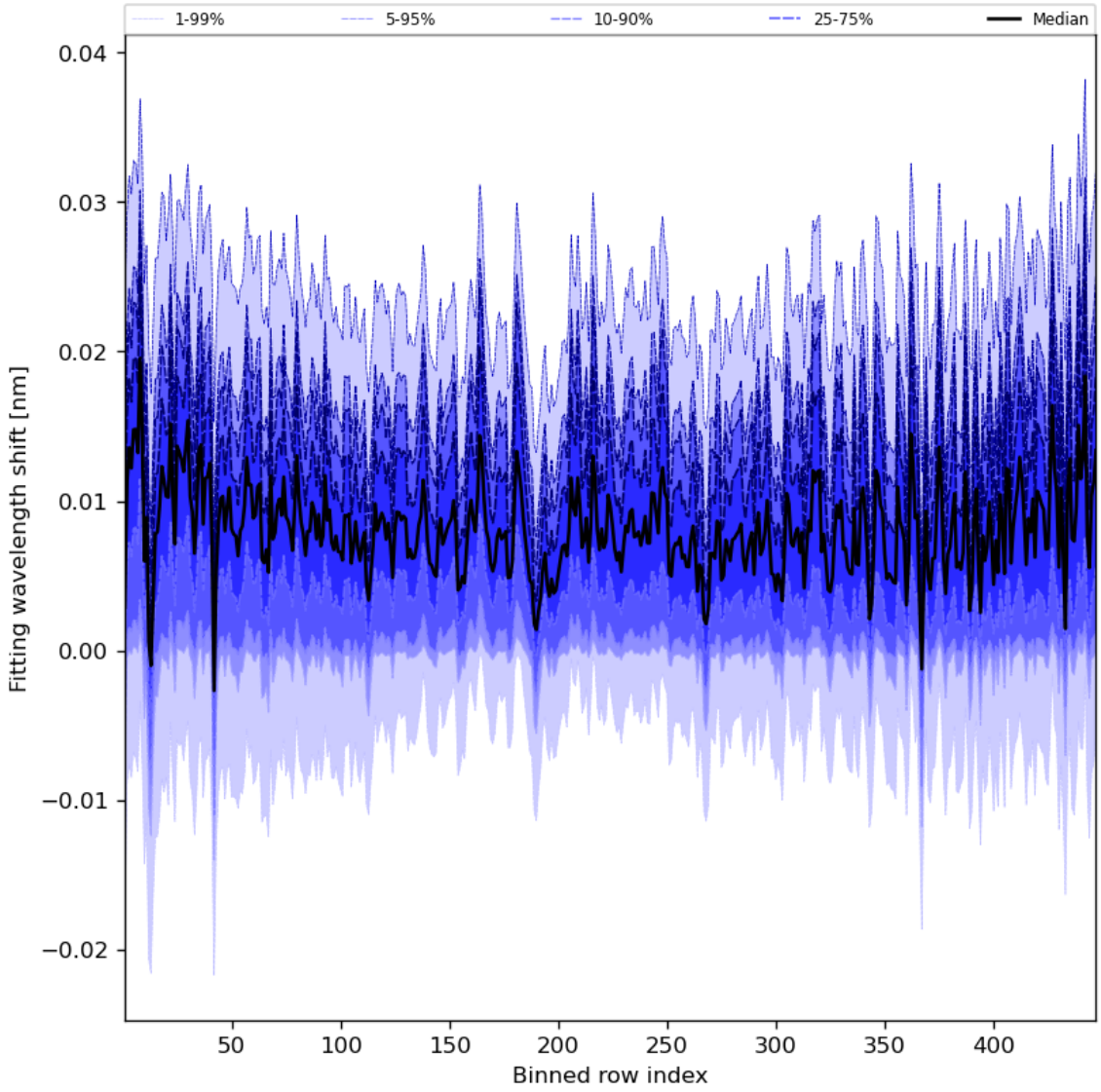


Figure 65: Along track statistics of “Fitting wavelength shift” for 2023-08-28 to 2023-08-30

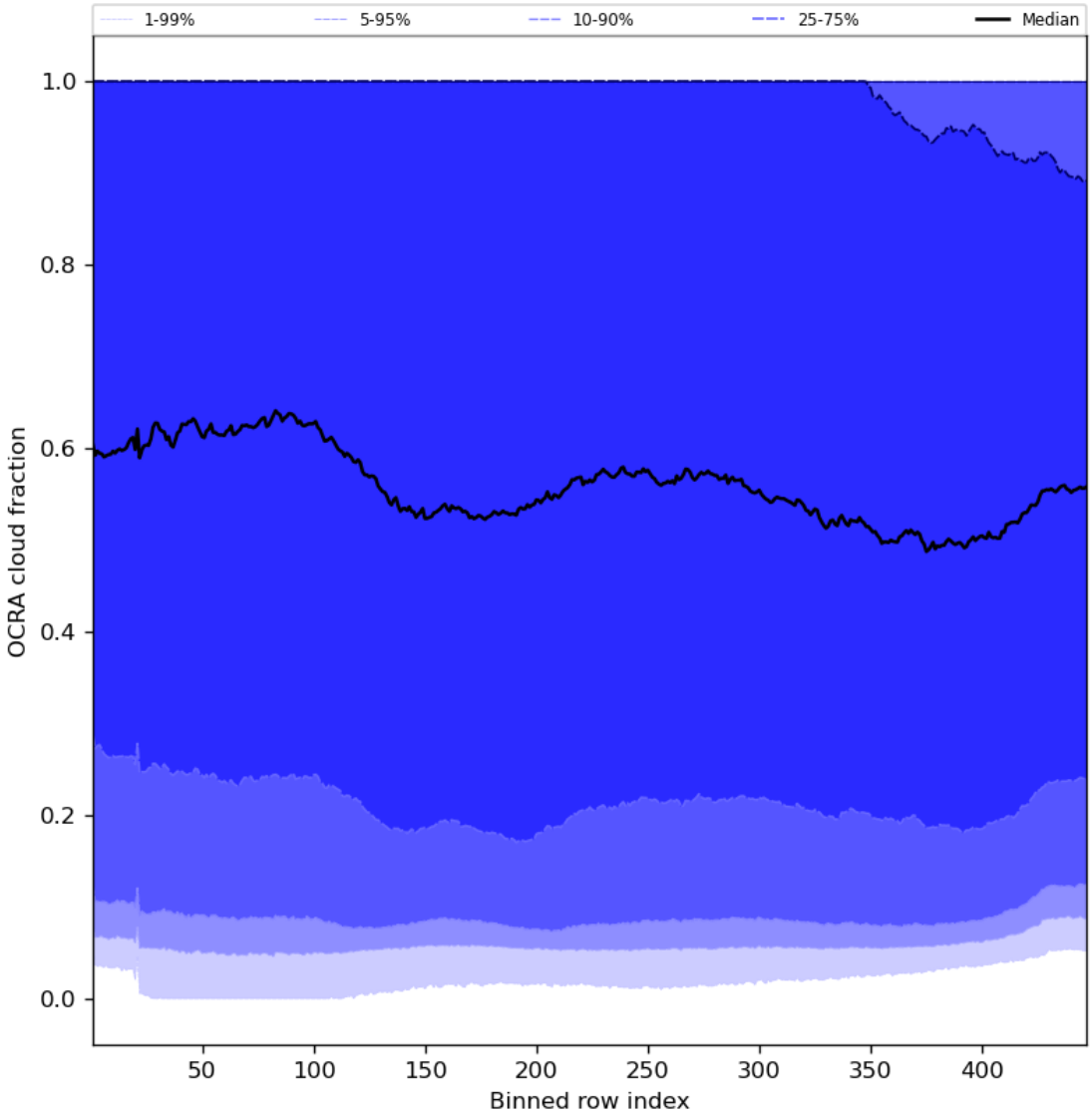


Figure 66: Along track statistics of “OCRA cloud fraction” for 2023-08-28 to 2023-08-30

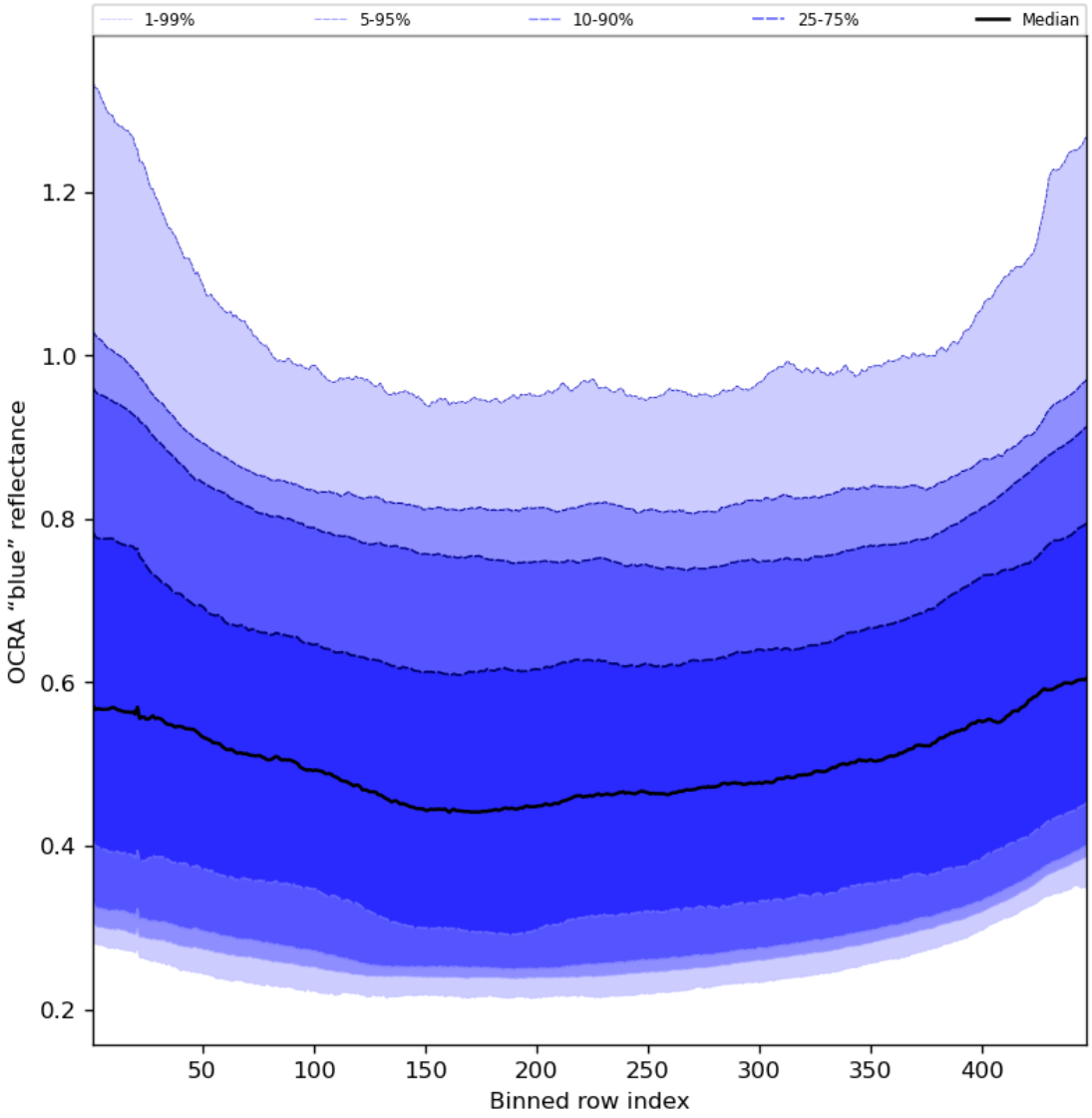


Figure 67: Along track statistics of "OCRA "blue" reflectance" for 2023-08-28 to 2023-08-30

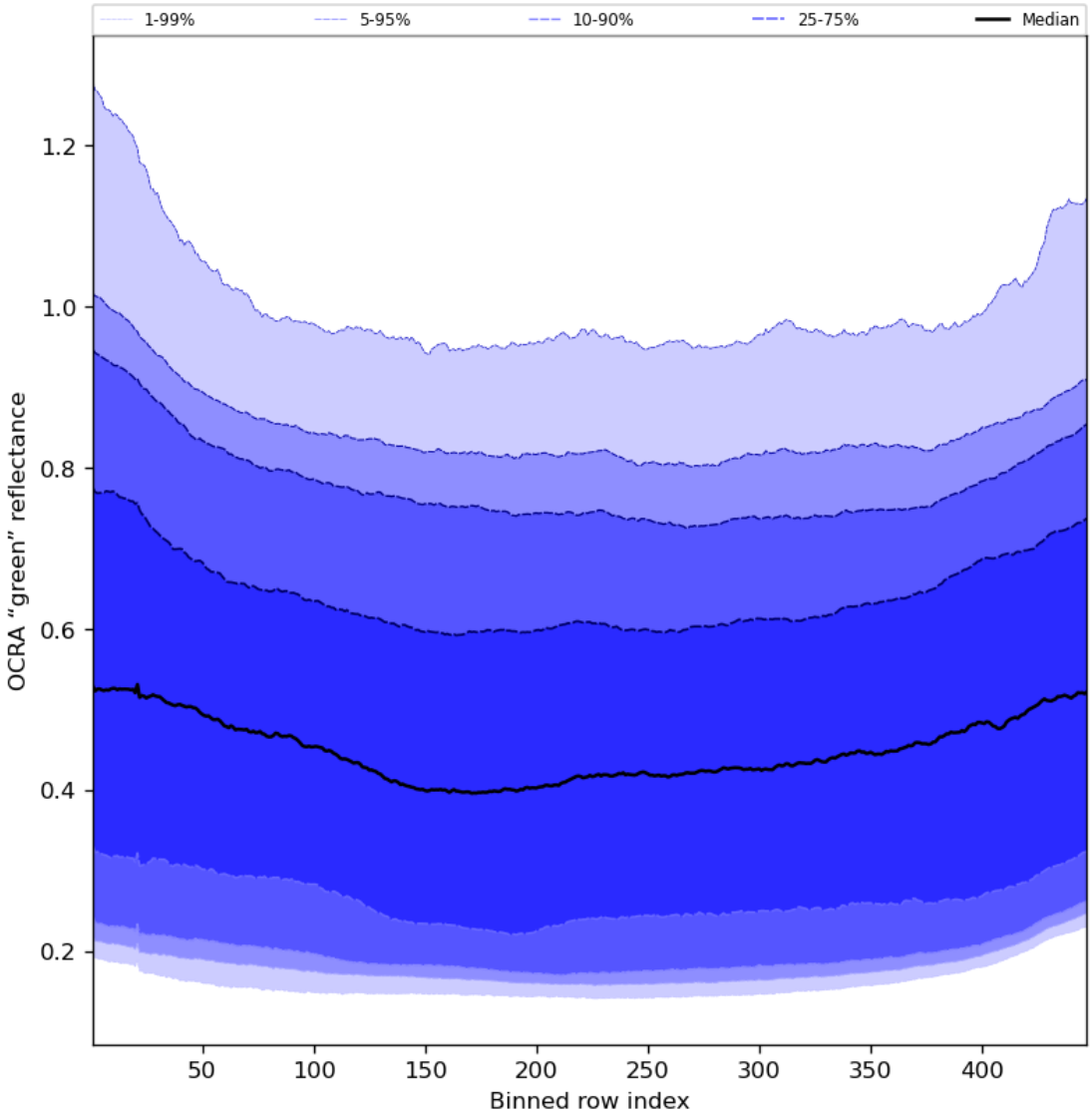


Figure 68: Along track statistics of "OCRA "green" reflectance" for 2023-08-28 to 2023-08-30

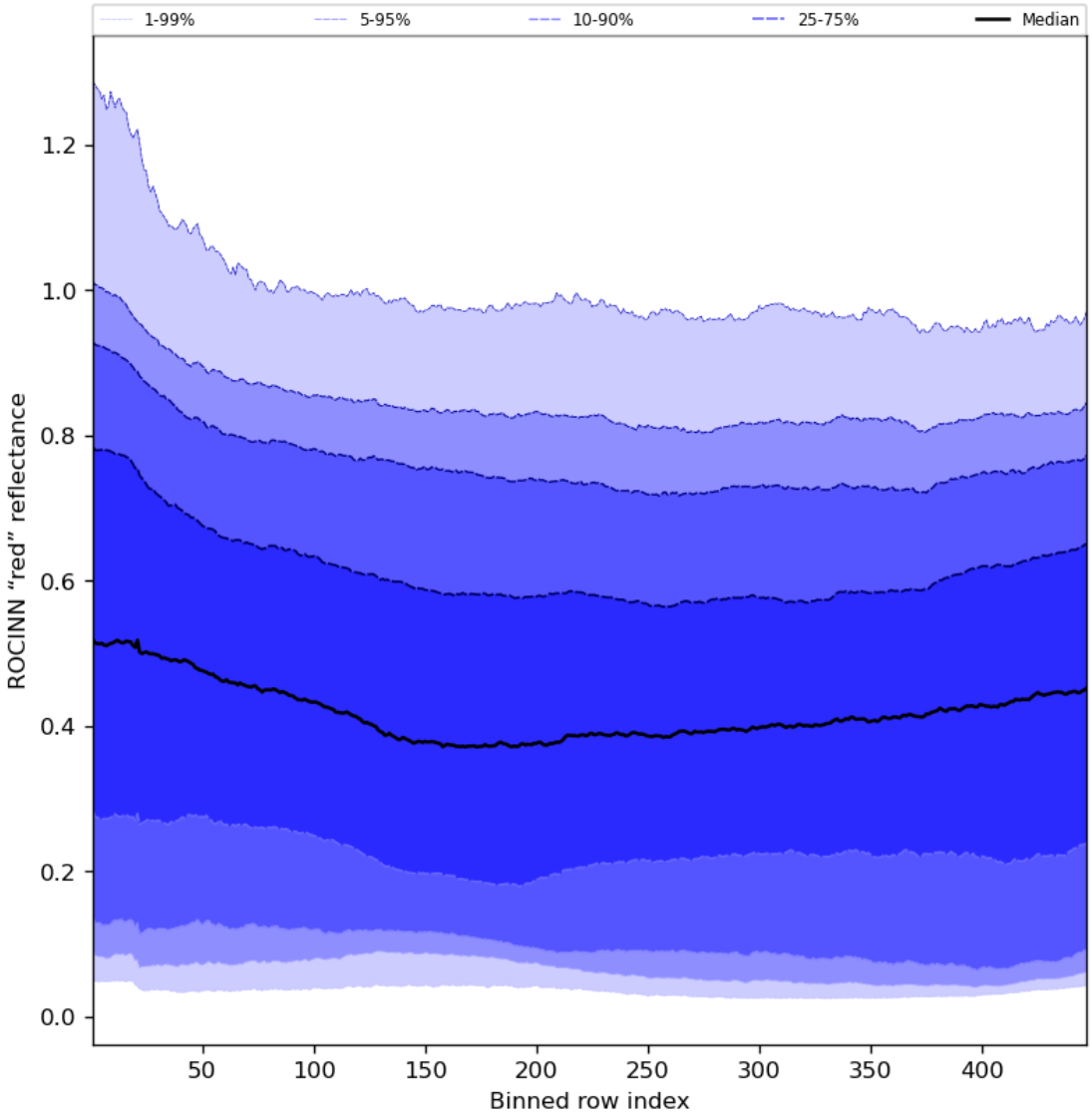


Figure 69: Along track statistics of "ROCINN "red" reflectance" for 2023-08-28 to 2023-08-30

10 Coincidence density

To investigate the relation between parameters scatter density plots are produced. These include some 'hidden' parameters, latitude and the solar- and viewing geometries, in addition to all configured parameters. All combinations of pairs of parameters are included *once*, in one direction alone.

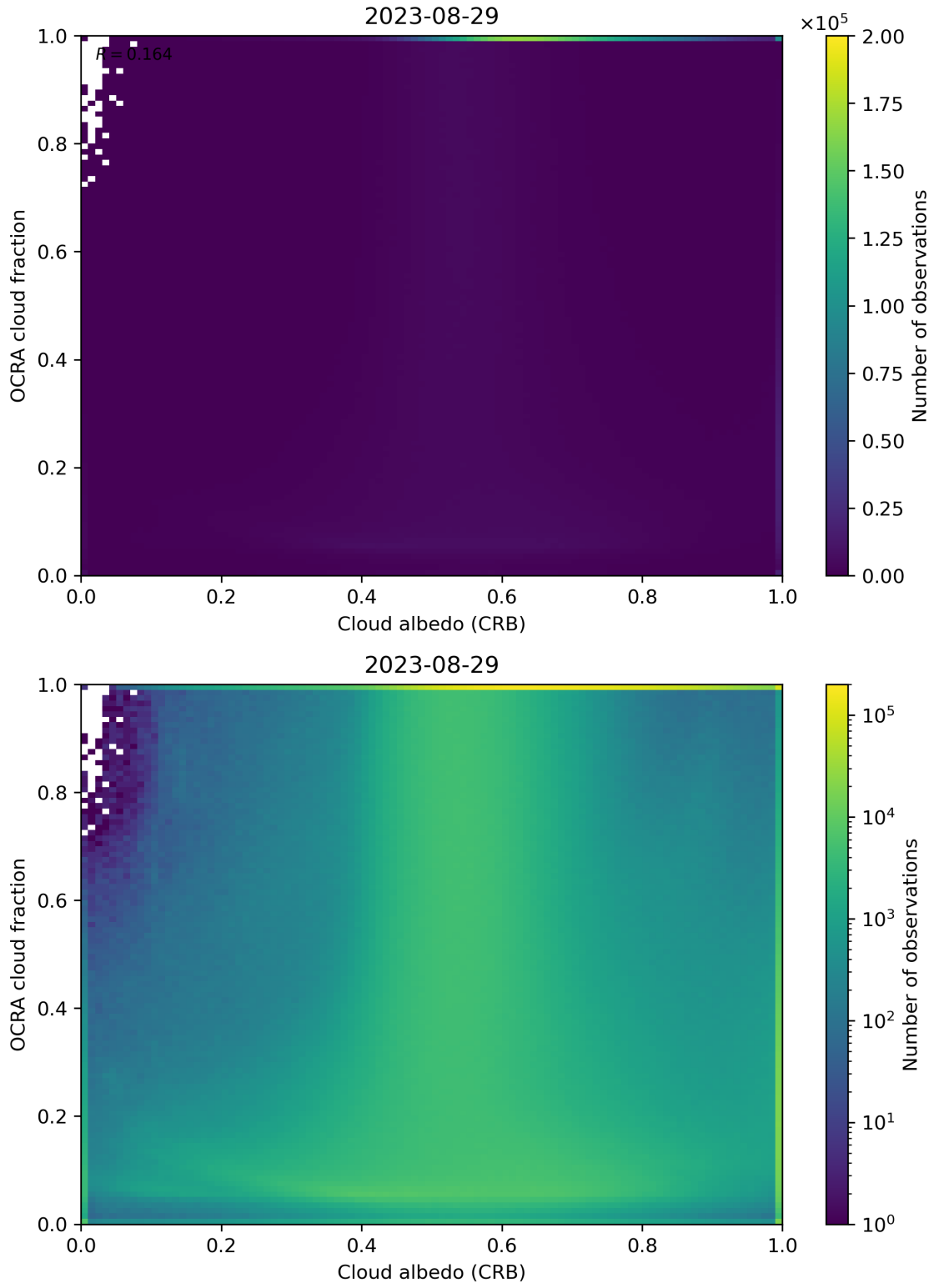


Figure 70: Scatter density plot of "Cloud albedo (CRB)" against "OCRA cloud fraction" for 2023-08-28 to 2023-08-30.

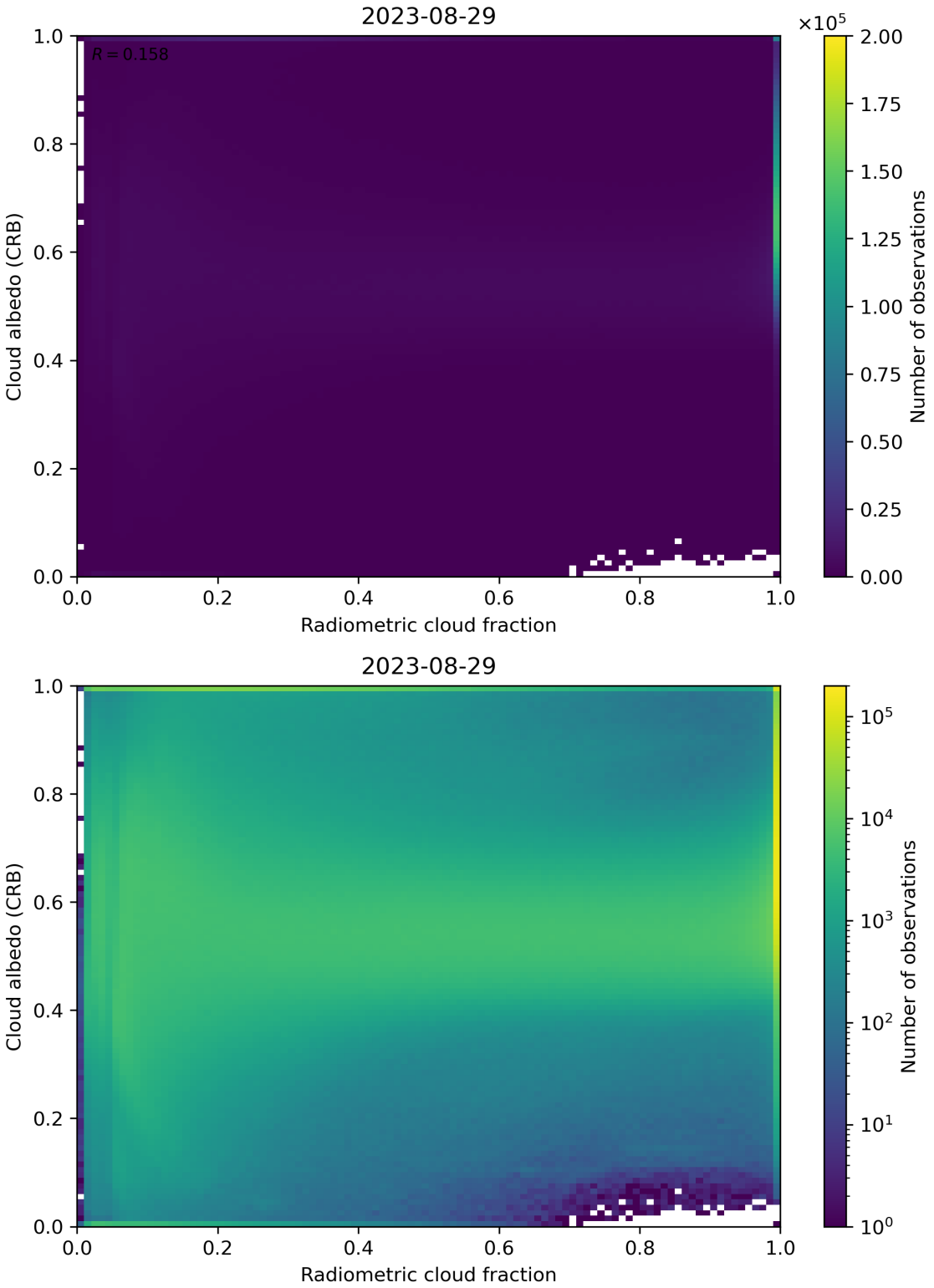


Figure 71: Scatter density plot of “Radiometric cloud fraction” against “Cloud albedo (CRB)” for 2023-08-28 to 2023-08-30.

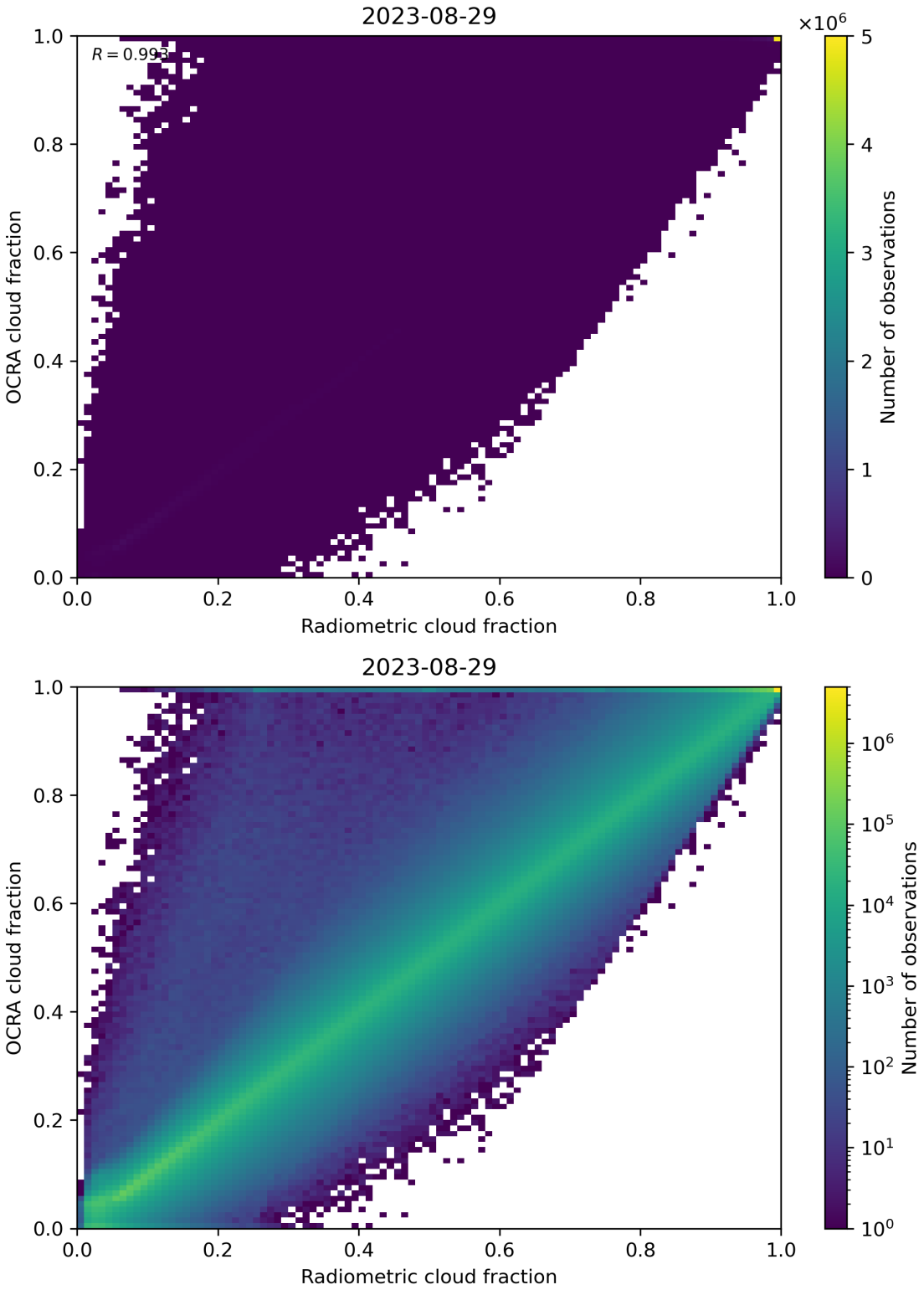


Figure 72: Scatter density plot of “Radiometric cloud fraction” against “OCRA cloud fraction” for 2023-08-28 to 2023-08-30.

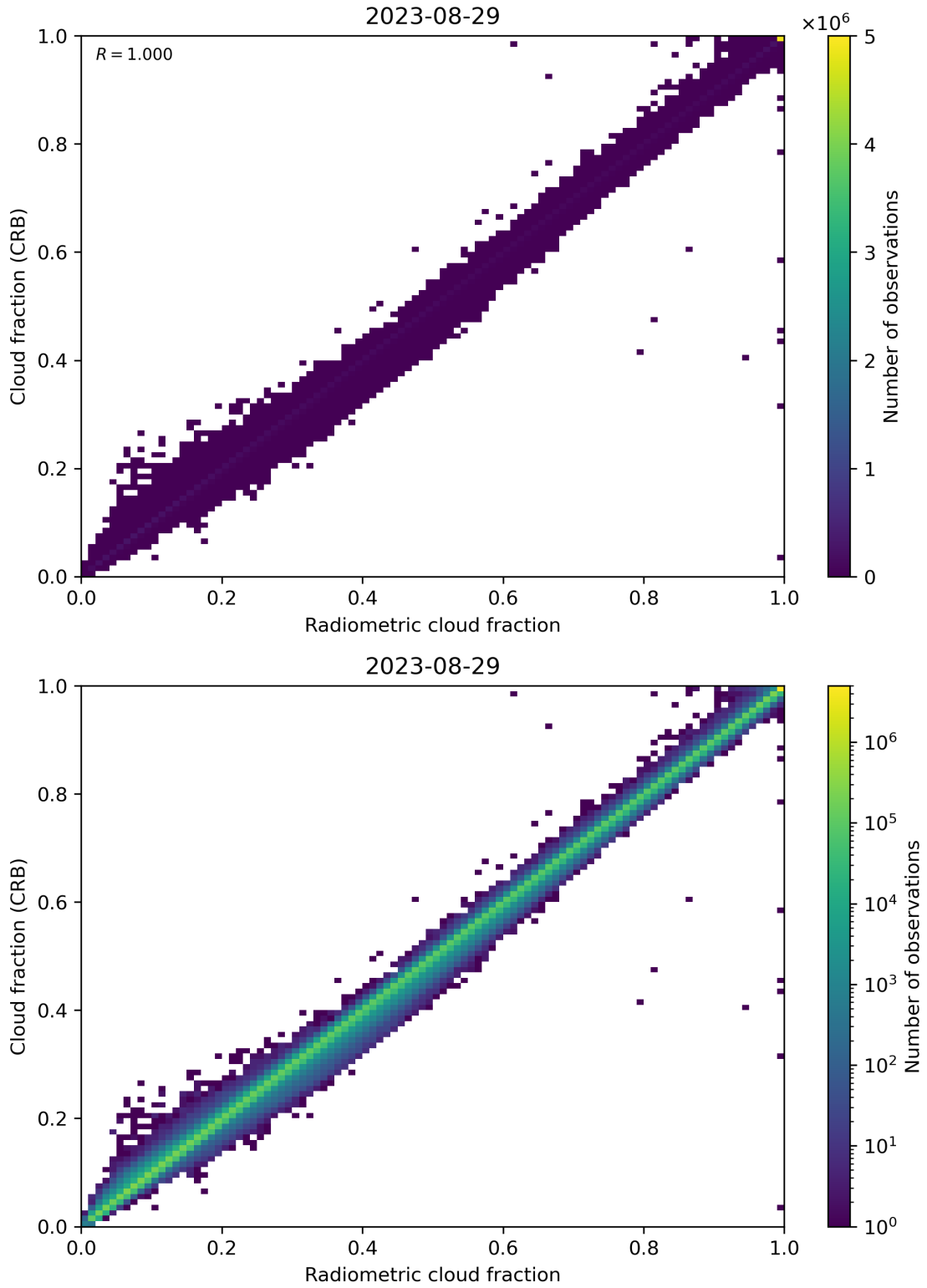


Figure 73: Scatter density plot of “Radiometric cloud fraction” against “Cloud fraction (CRB)” for 2023-08-28 to 2023-08-30.

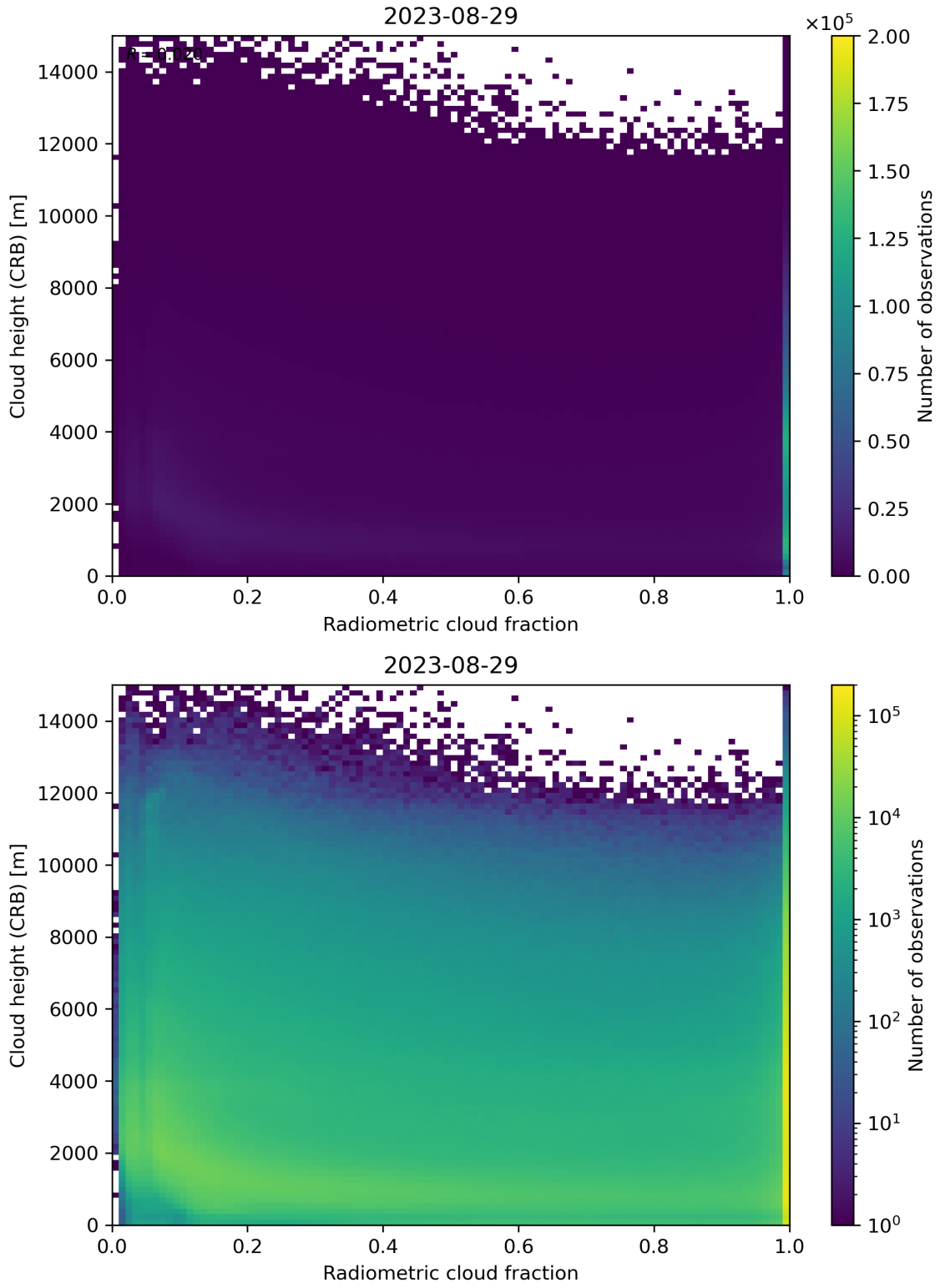


Figure 74: Scatter density plot of “Radiometric cloud fraction” against “Cloud height (CRB)” for 2023-08-28 to 2023-08-30.

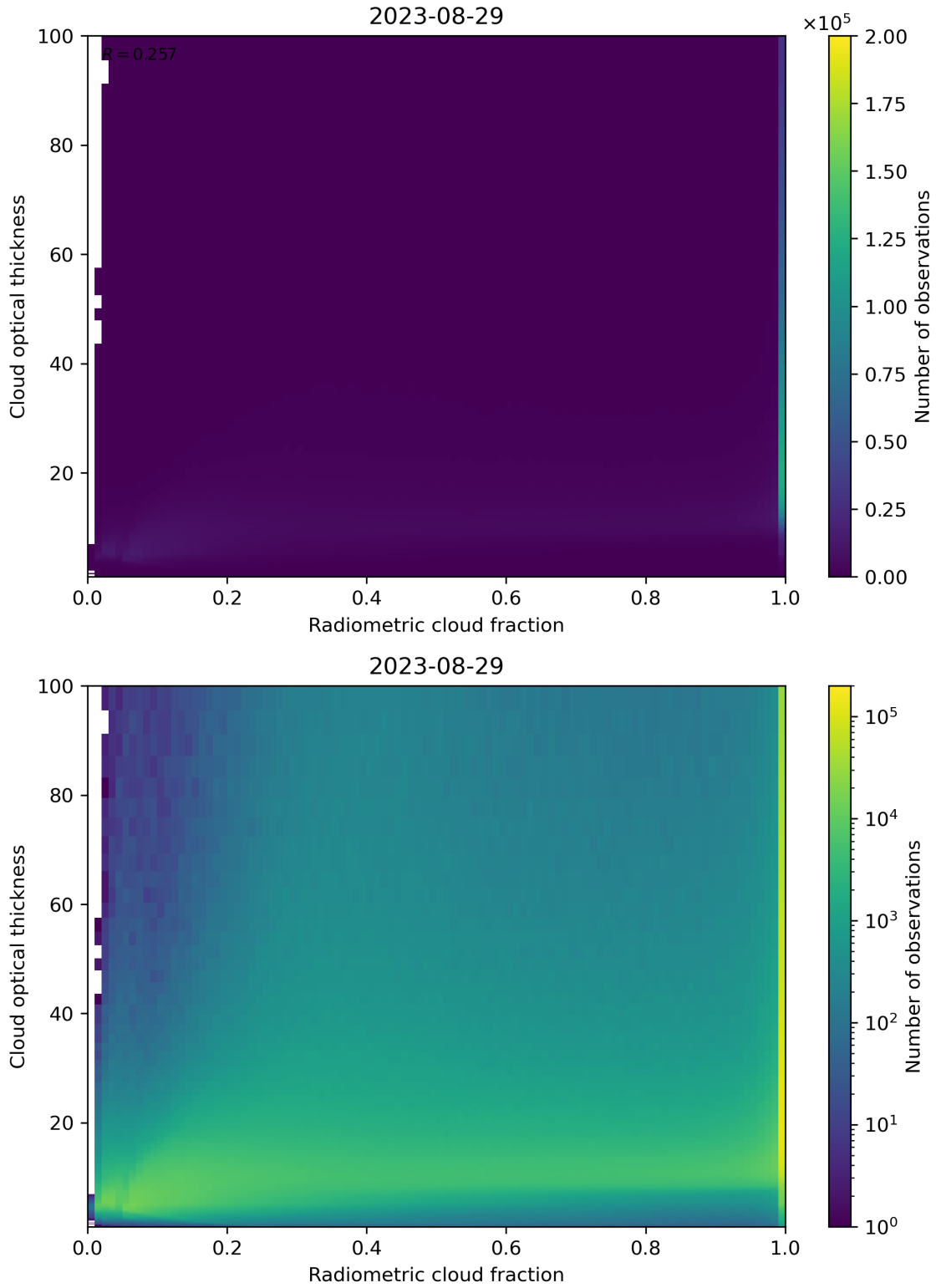


Figure 75: Scatter density plot of “Radiometric cloud fraction” against “Cloud optical thickness” for 2023-08-28 to 2023-08-30.

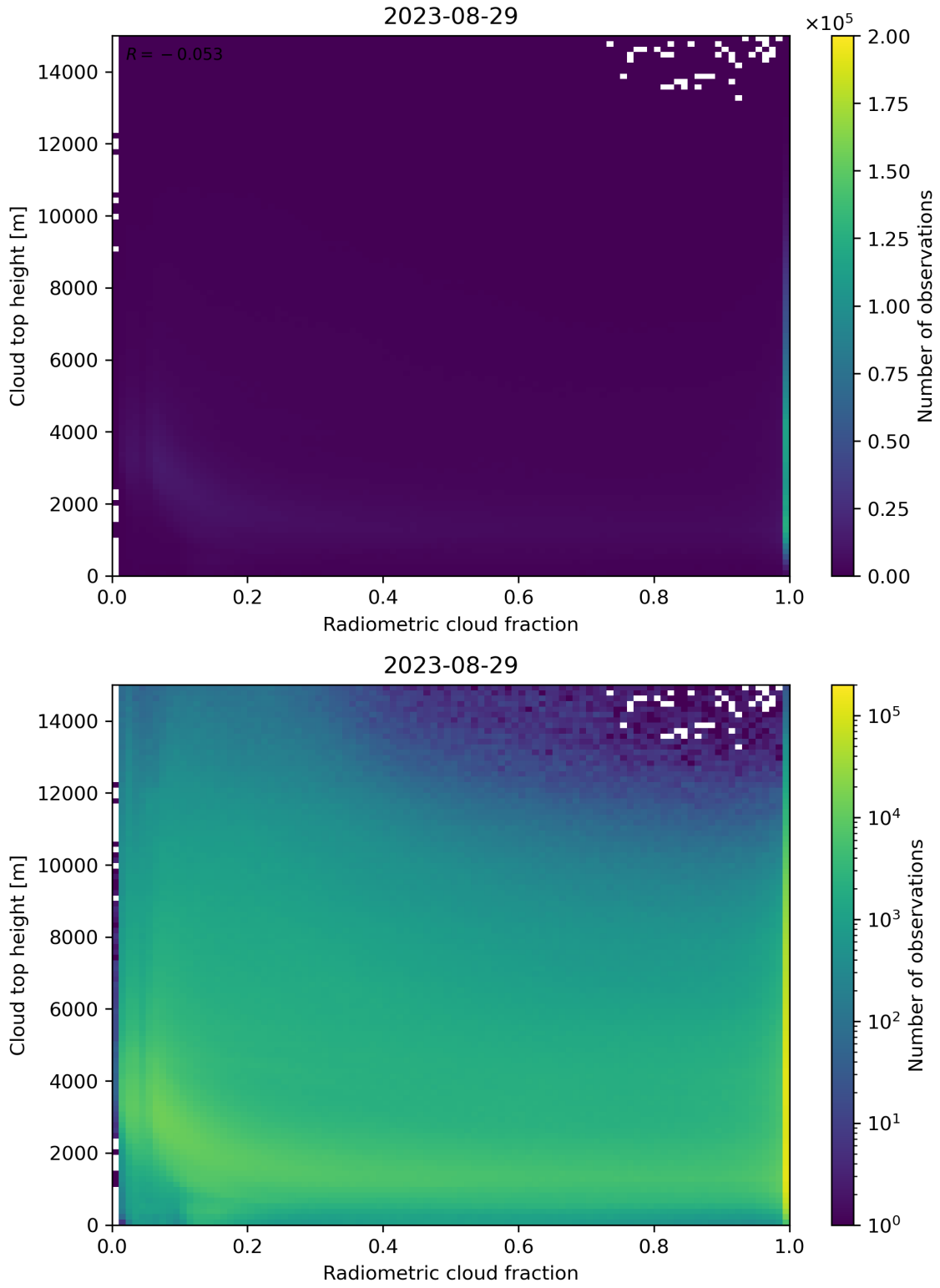


Figure 76: Scatter density plot of “Radiometric cloud fraction” against “Cloud top height” for 2023-08-28 to 2023-08-30.

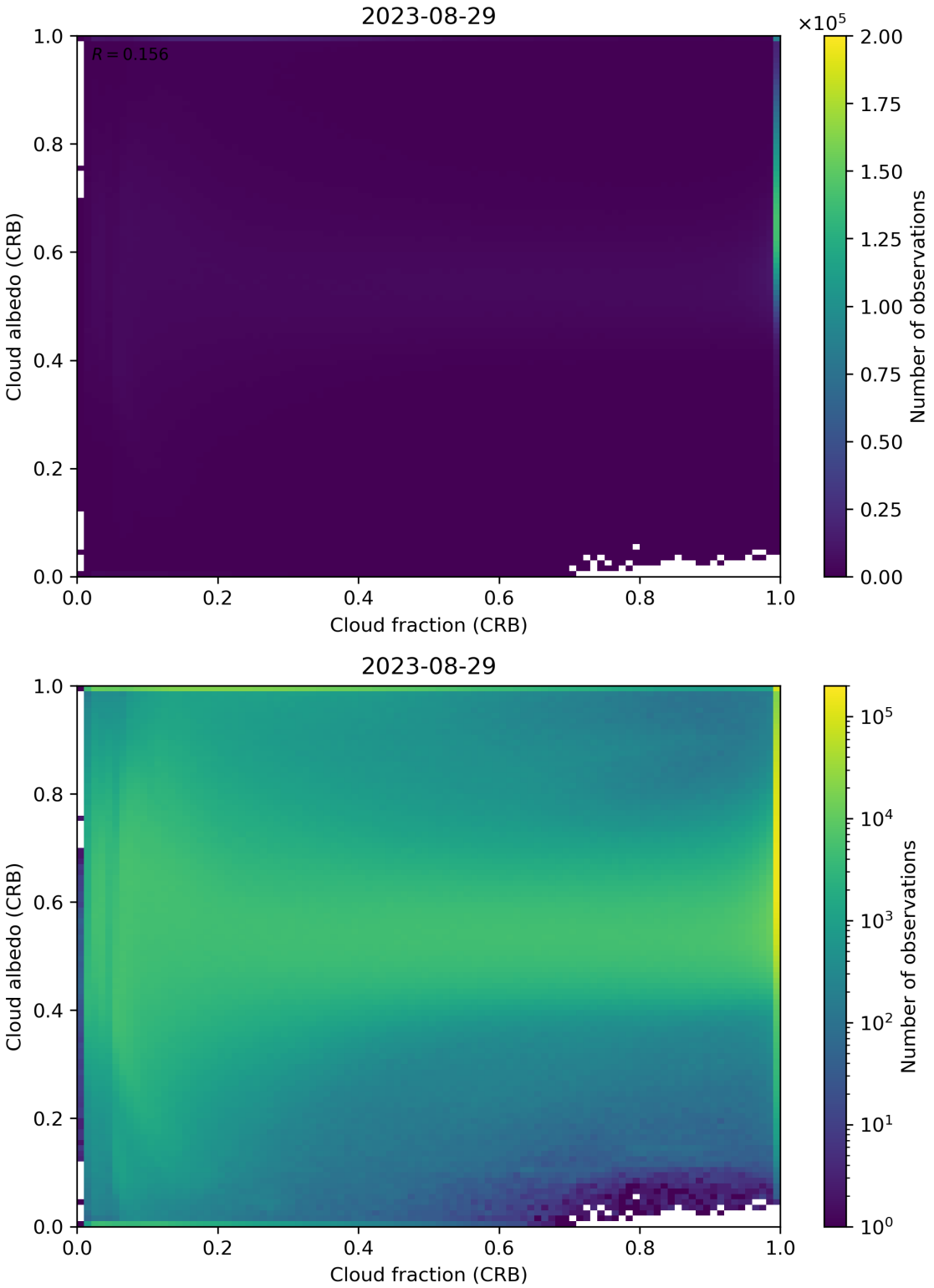


Figure 77: Scatter density plot of “Cloud fraction (CRB)” against “Cloud albedo (CRB)” for 2023-08-28 to 2023-08-30.

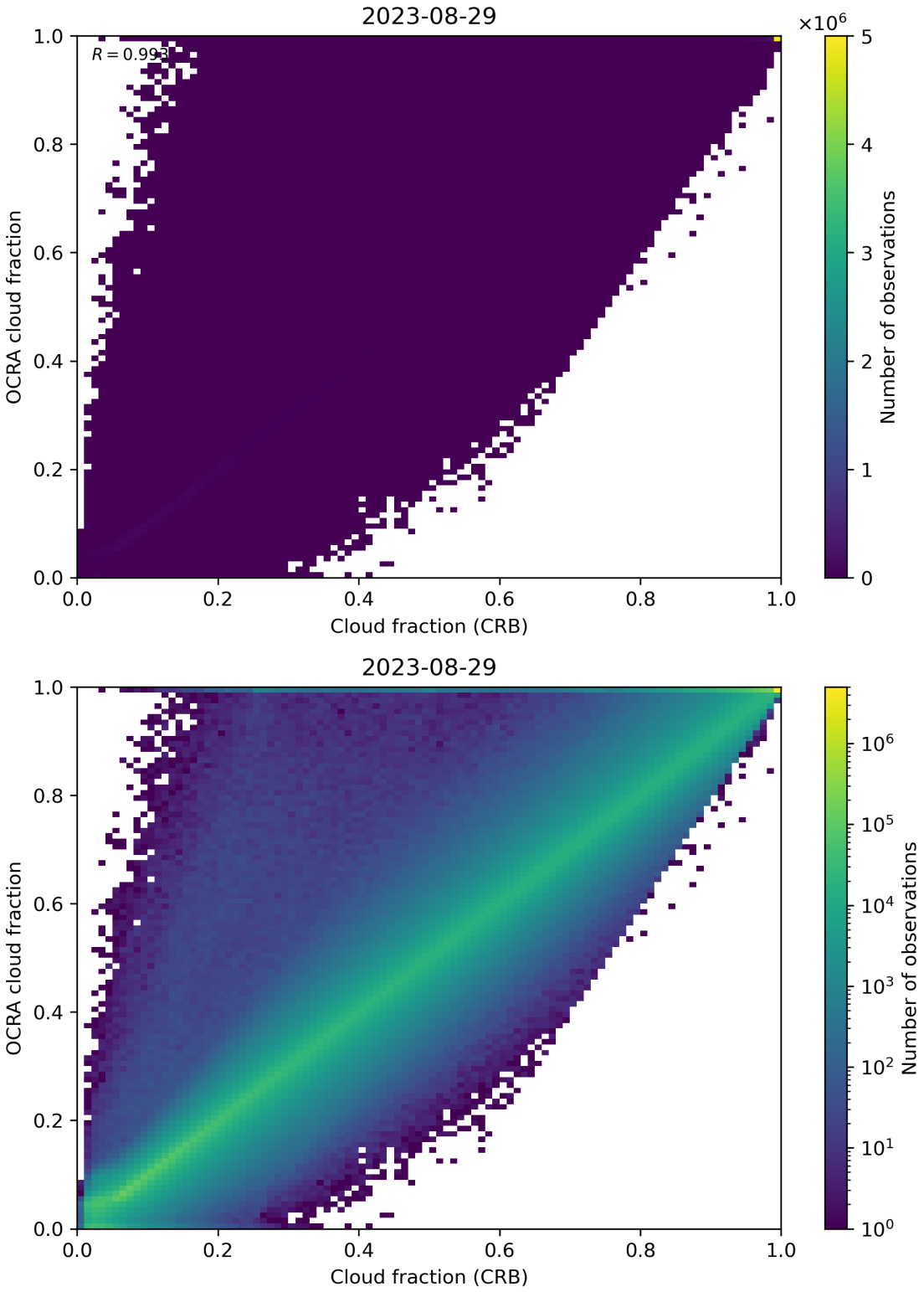


Figure 78: Scatter density plot of “Cloud fraction (CRB)” against “OCRA cloud fraction” for 2023-08-28 to 2023-08-30.

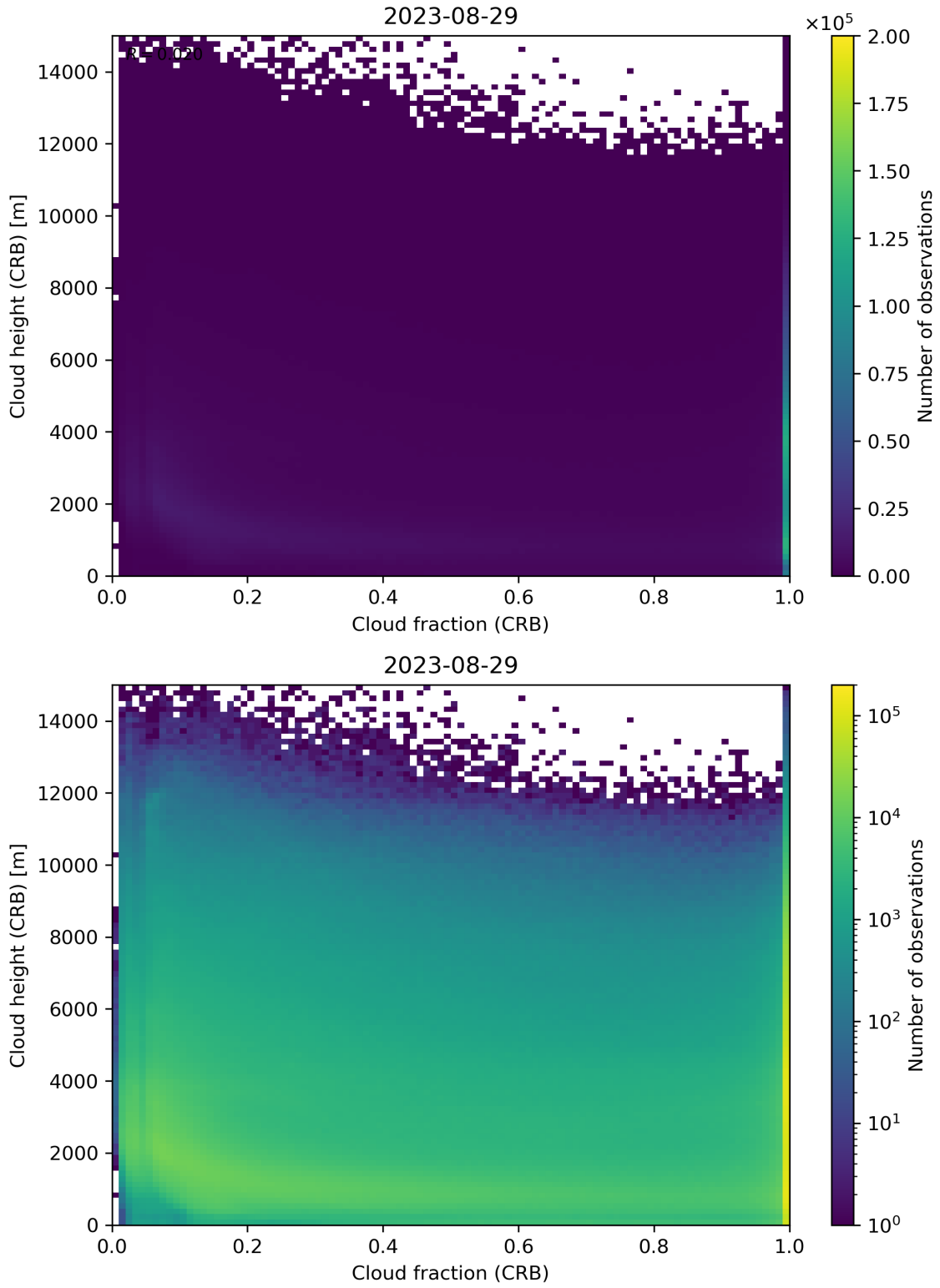


Figure 79: Scatter density plot of “Cloud fraction (CRB)” against “Cloud height (CRB)” for 2023-08-28 to 2023-08-30.

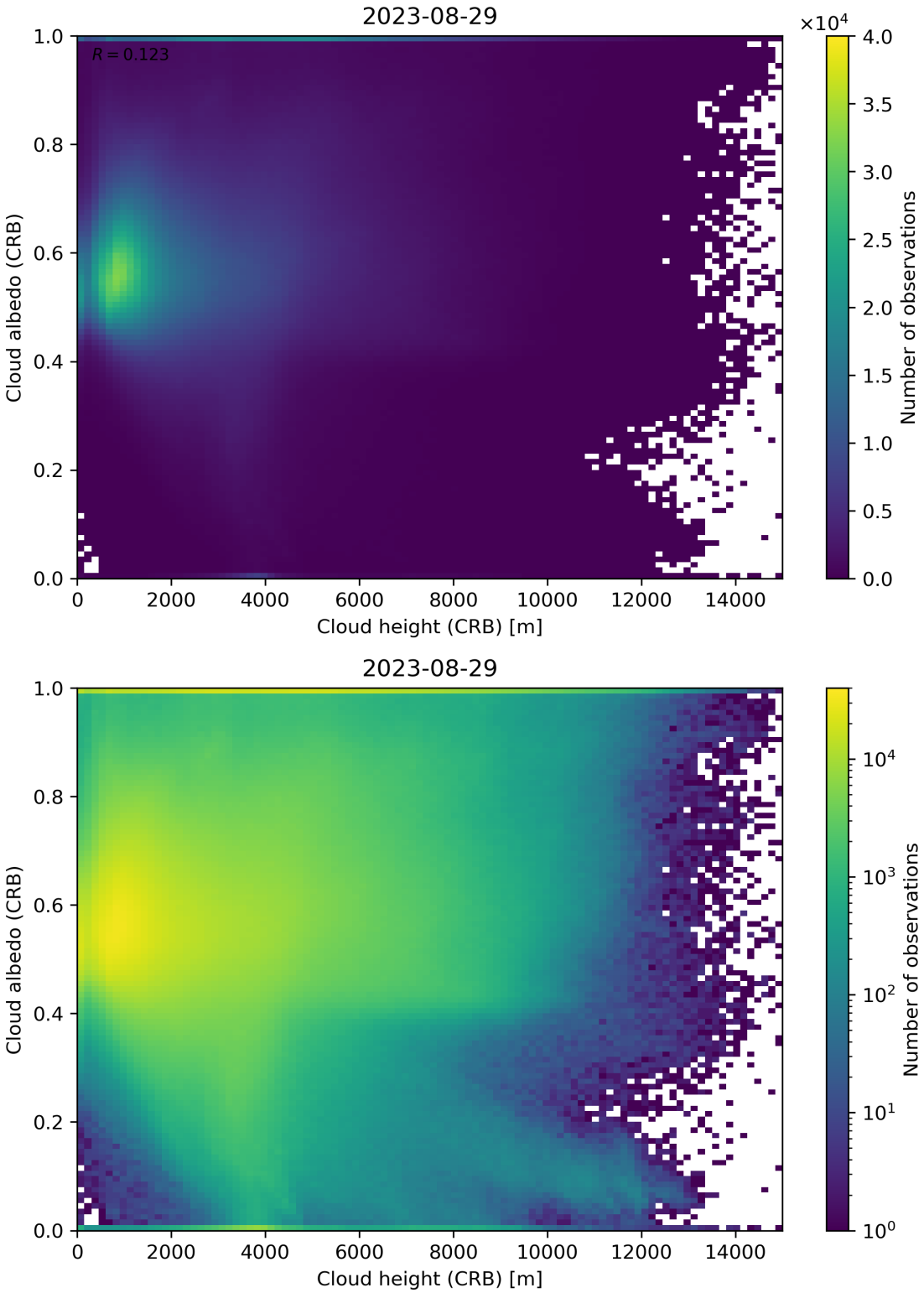


Figure 80: Scatter density plot of “Cloud height (CRB)” against “Cloud albedo (CRB)” for 2023-08-28 to 2023-08-30.

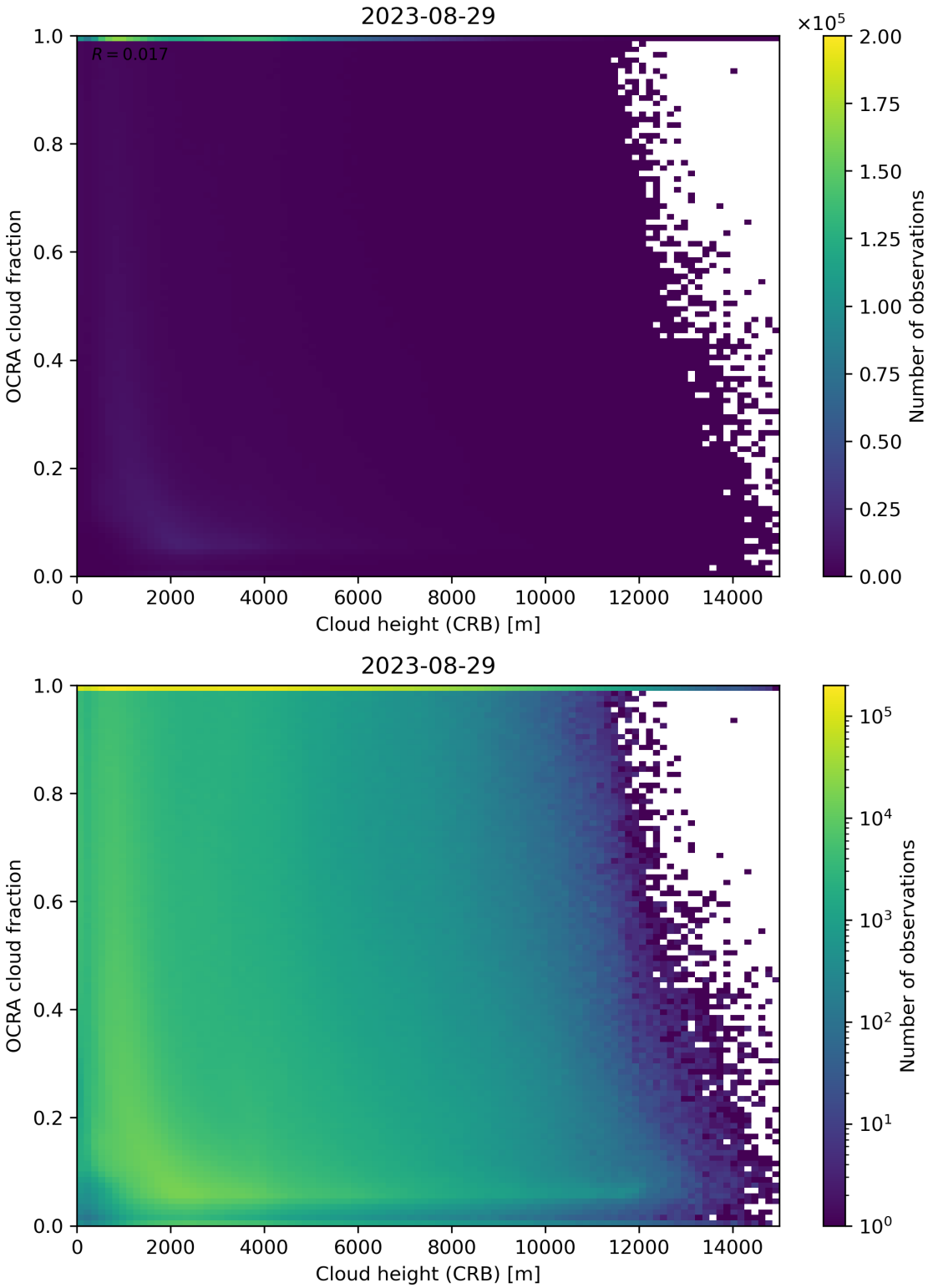


Figure 81: Scatter density plot of “Cloud height (CRB)” against “OCRA cloud fraction” for 2023-08-28 to 2023-08-30.

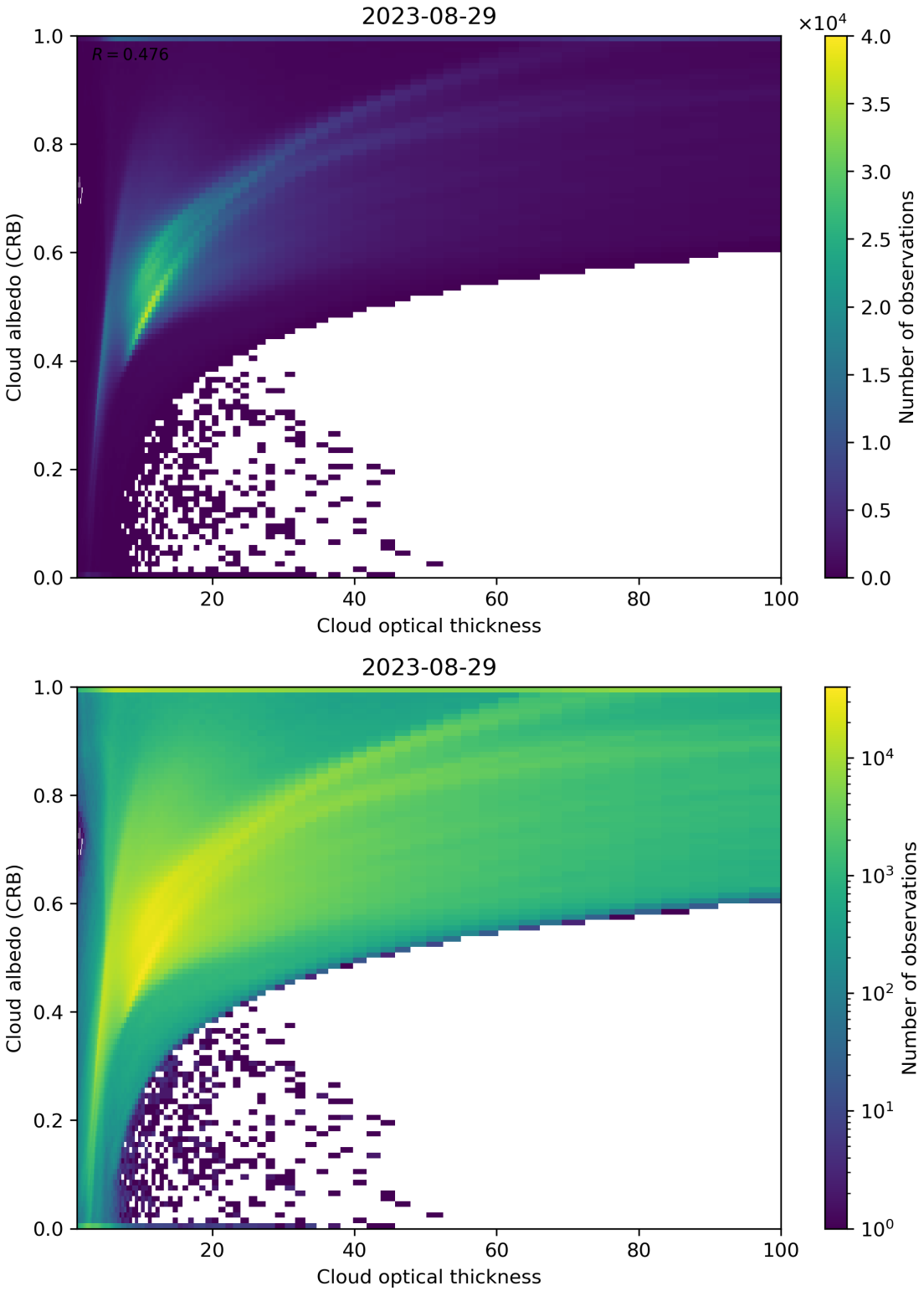


Figure 82: Scatter density plot of “Cloud optical thickness” against “Cloud albedo (CRB)” for 2023-08-28 to 2023-08-30.

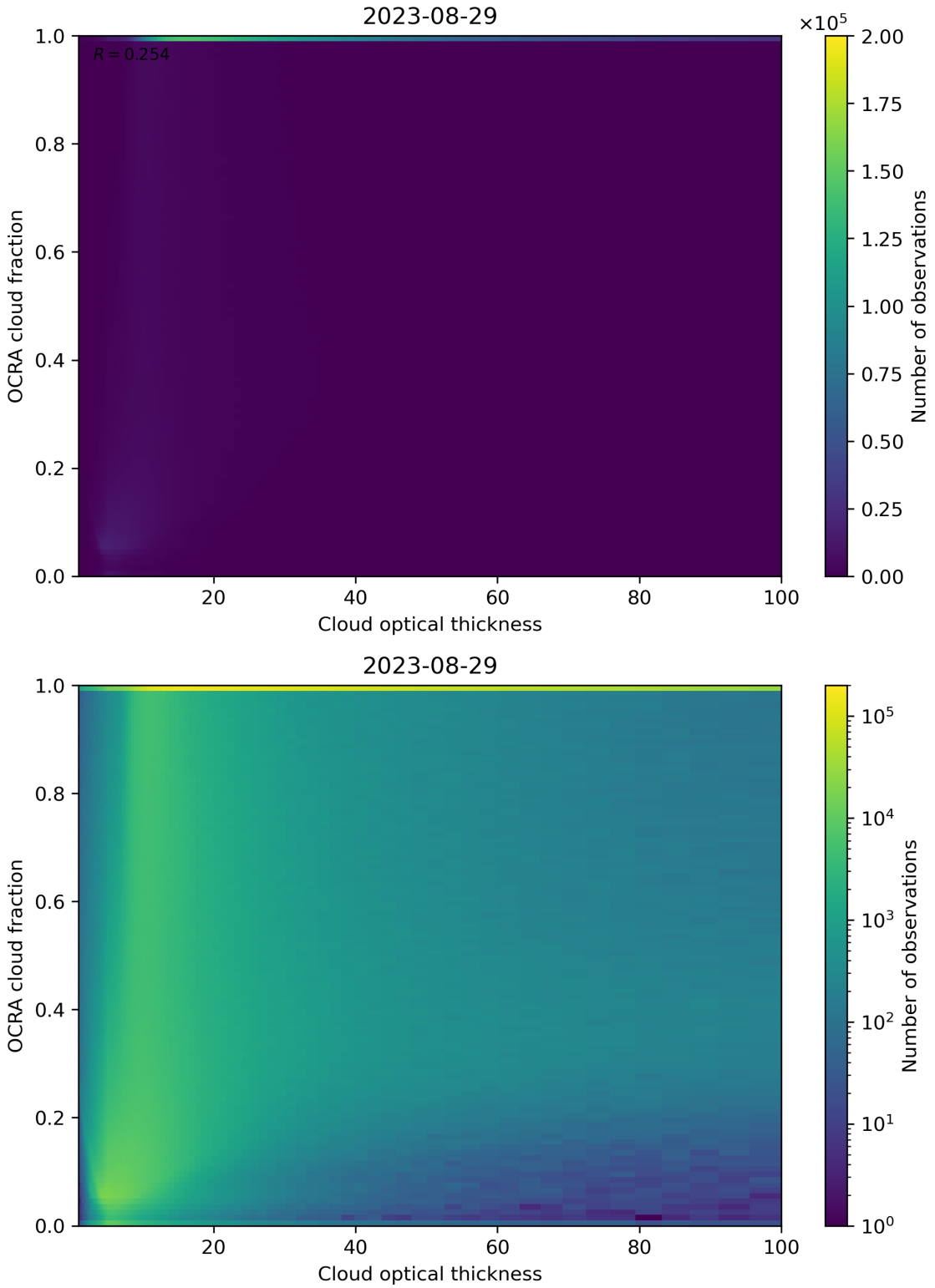


Figure 83: Scatter density plot of “Cloud optical thickness” against “OCRA cloud fraction” for 2023-08-28 to 2023-08-30.

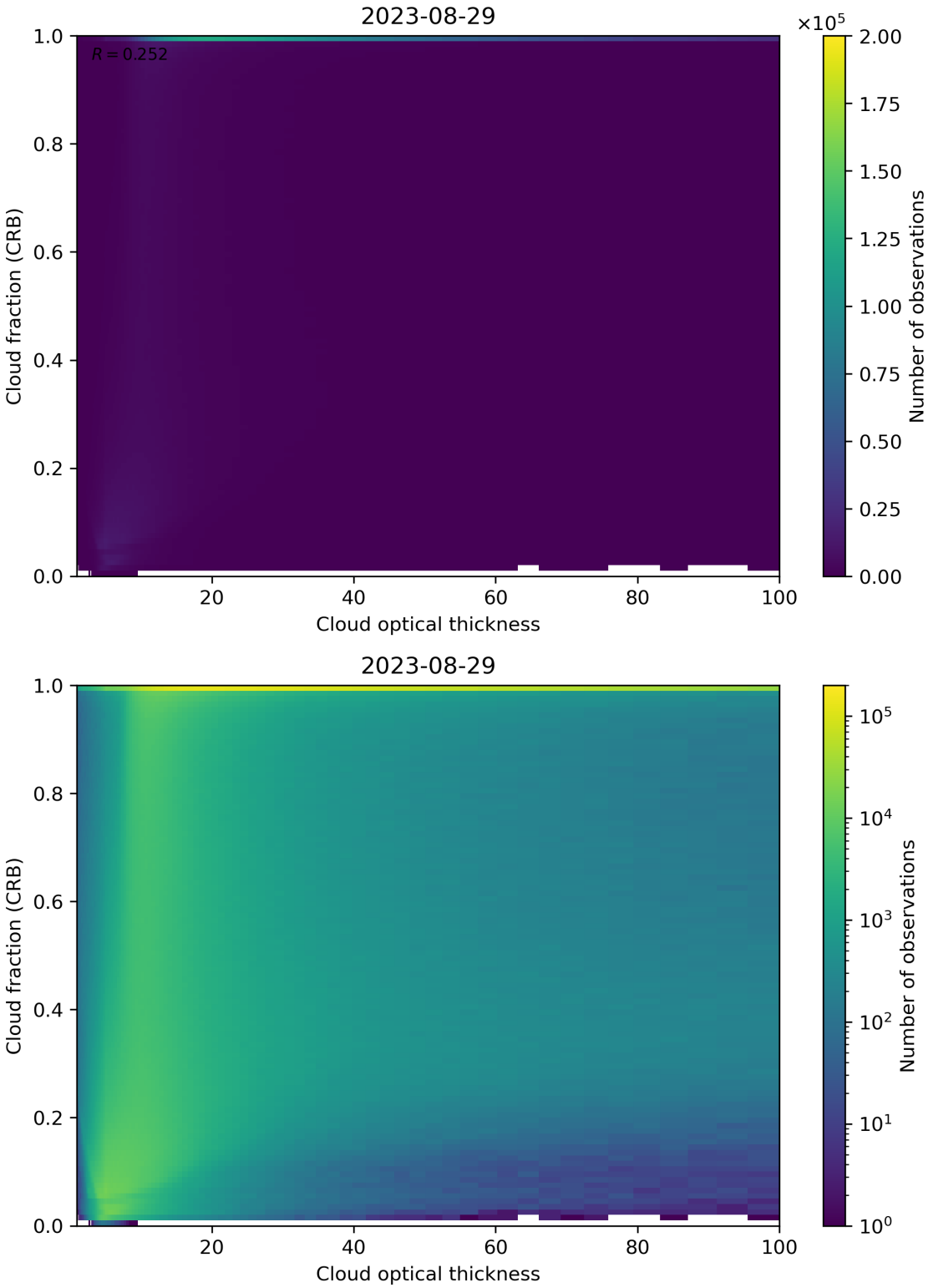


Figure 84: Scatter density plot of “Cloud optical thickness” against “Cloud fraction (CRB)” for 2023-08-28 to 2023-08-30.

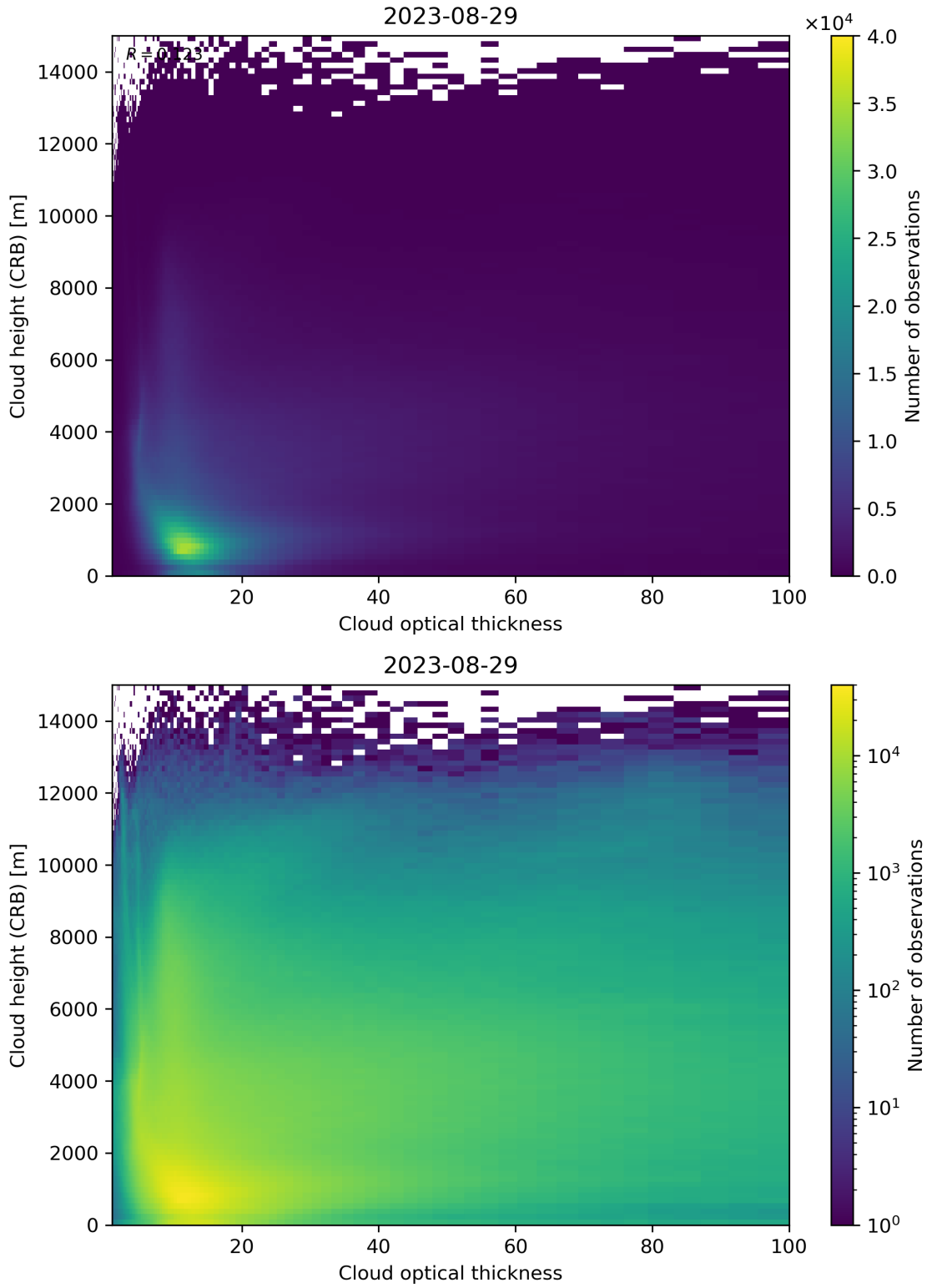


Figure 85: Scatter density plot of “Cloud optical thickness” against “Cloud height (CRB)” for 2023-08-28 to 2023-08-30.

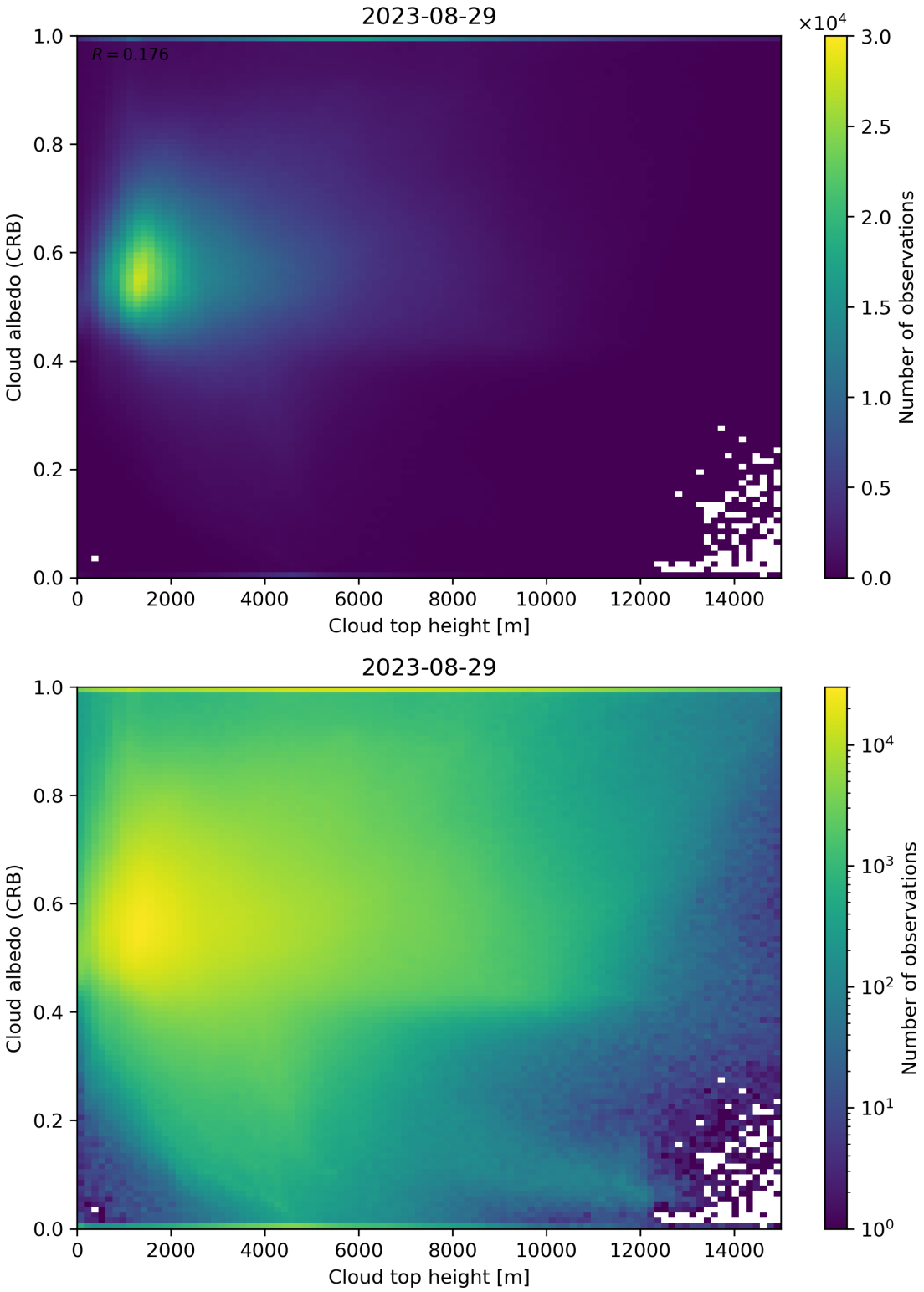


Figure 86: Scatter density plot of “Cloud top height” against “Cloud albedo (CRB)” for 2023-08-28 to 2023-08-30.

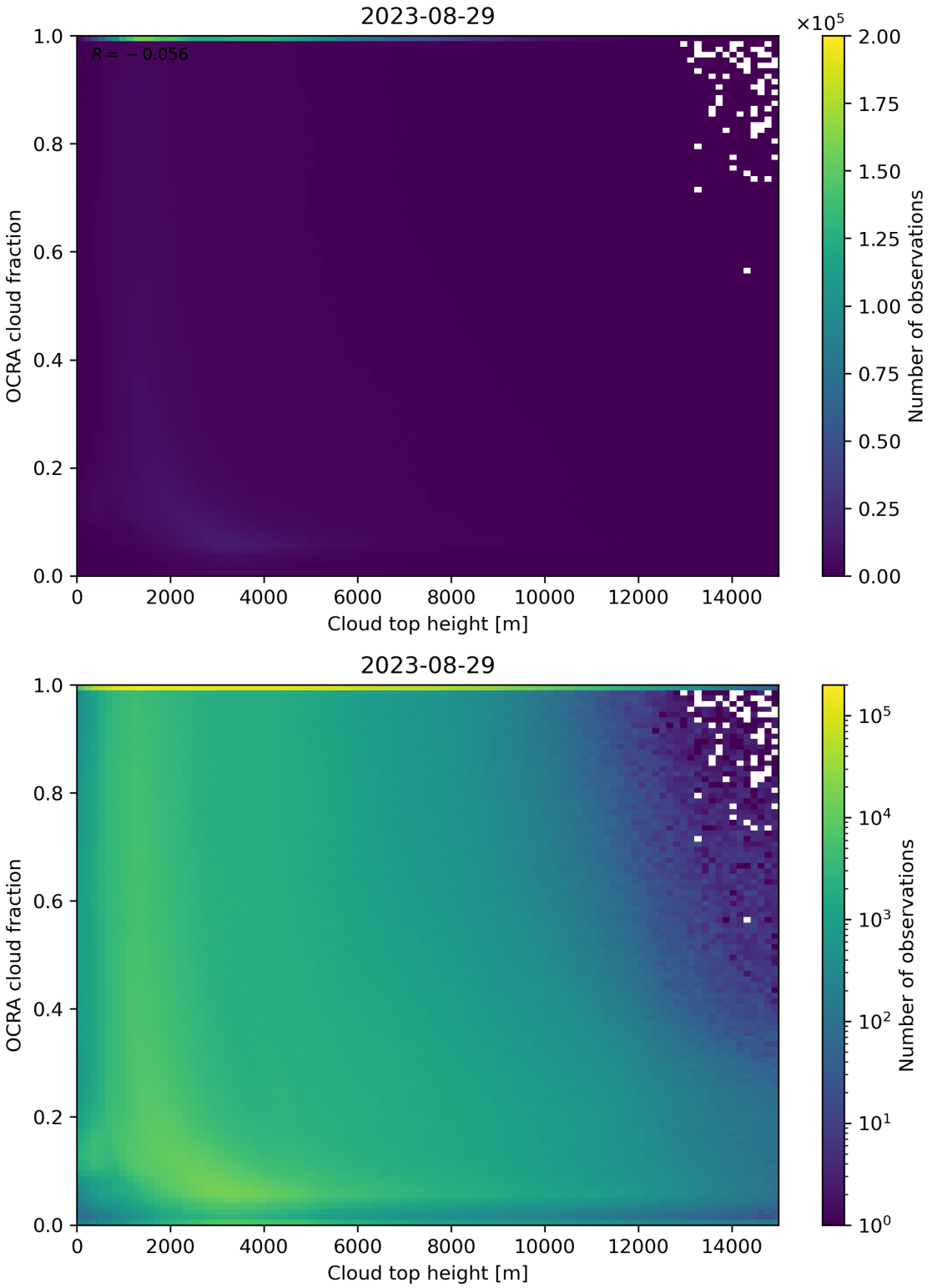


Figure 87: Scatter density plot of “Cloud top height” against “OCRA cloud fraction” for 2023-08-28 to 2023-08-30.

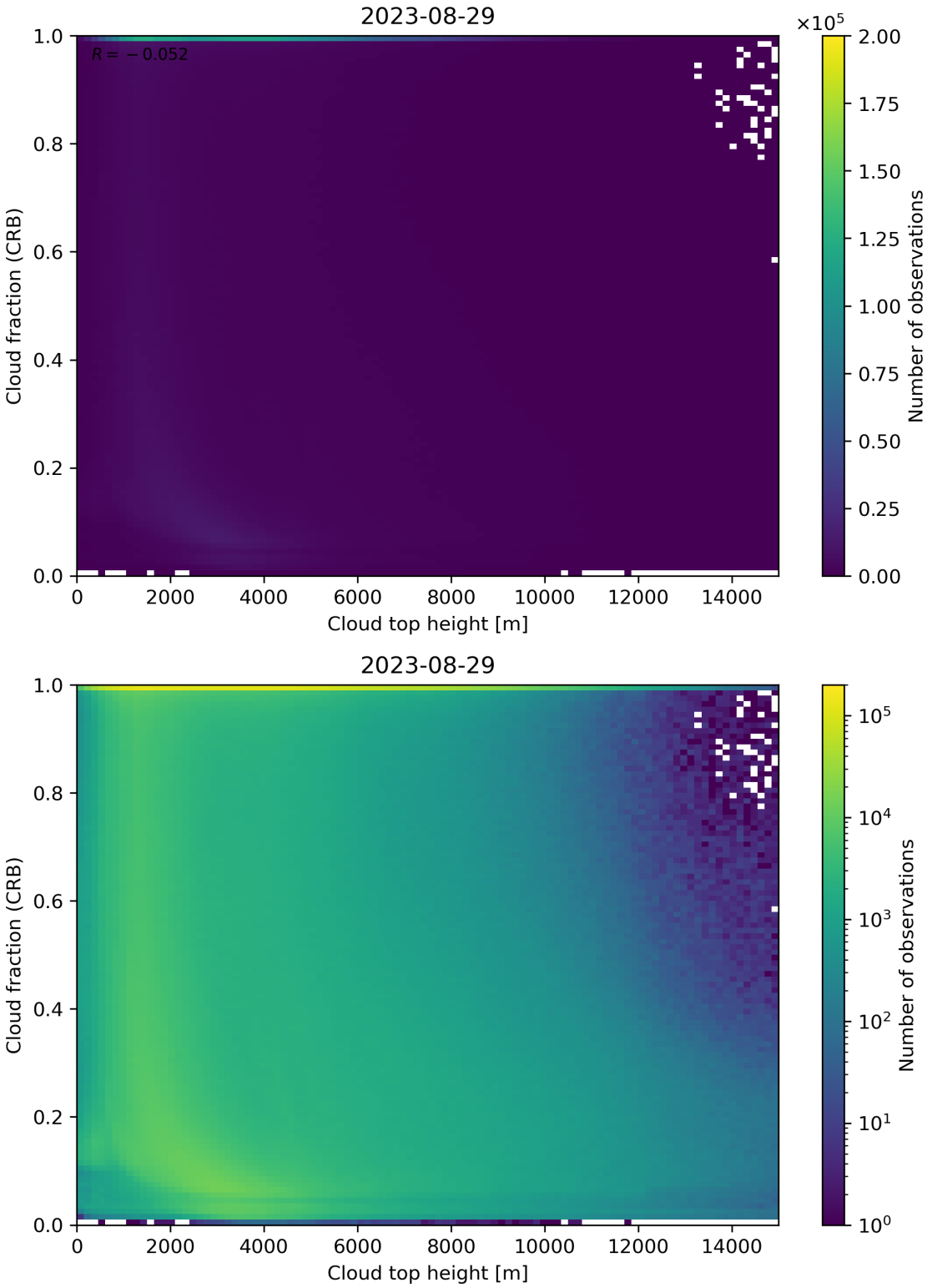


Figure 88: Scatter density plot of “Cloud top height” against “Cloud fraction (CRB)” for 2023-08-28 to 2023-08-30.

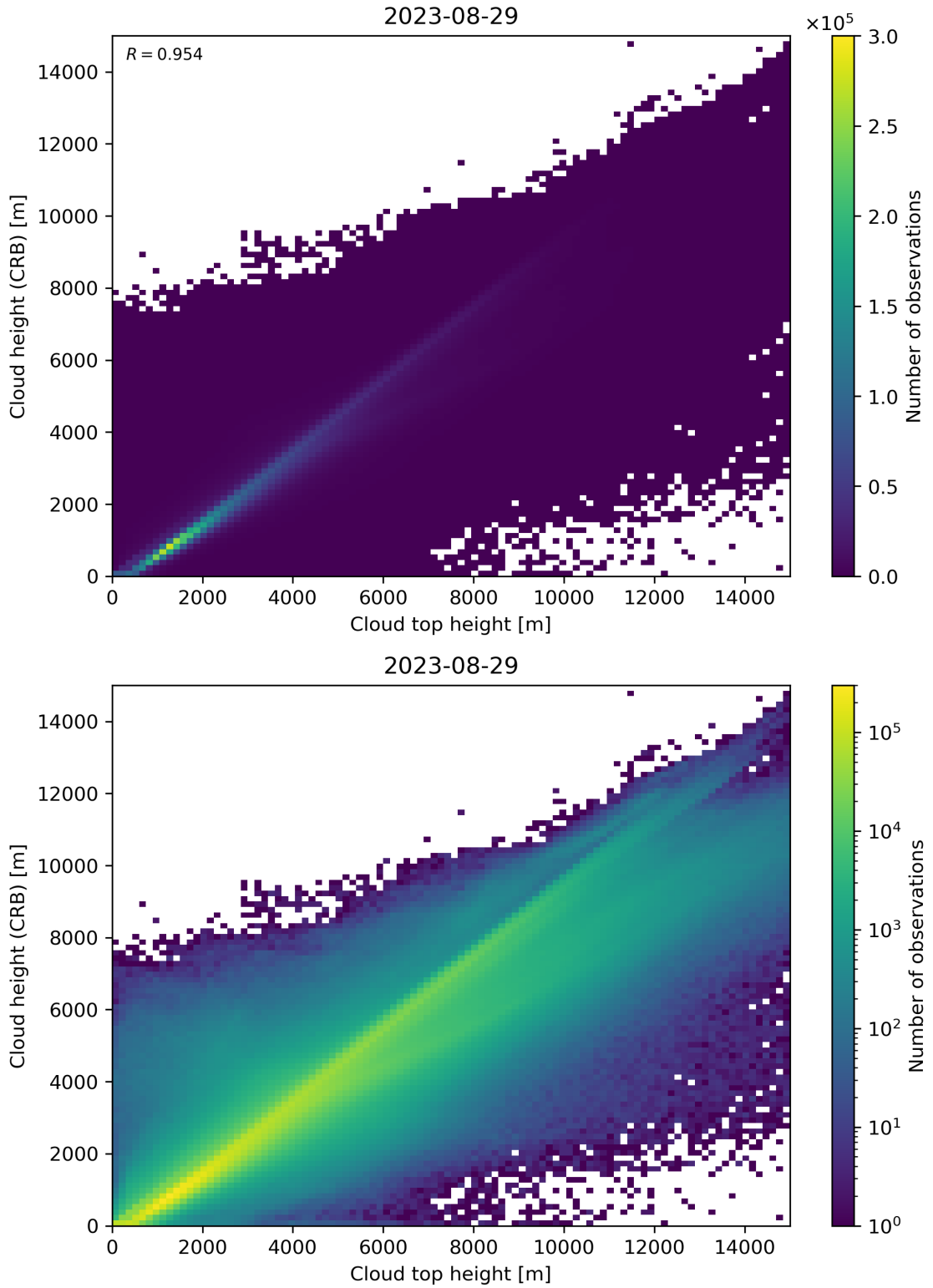


Figure 89: Scatter density plot of “Cloud top height” against “Cloud height (CRB)” for 2023-08-28 to 2023-08-30.

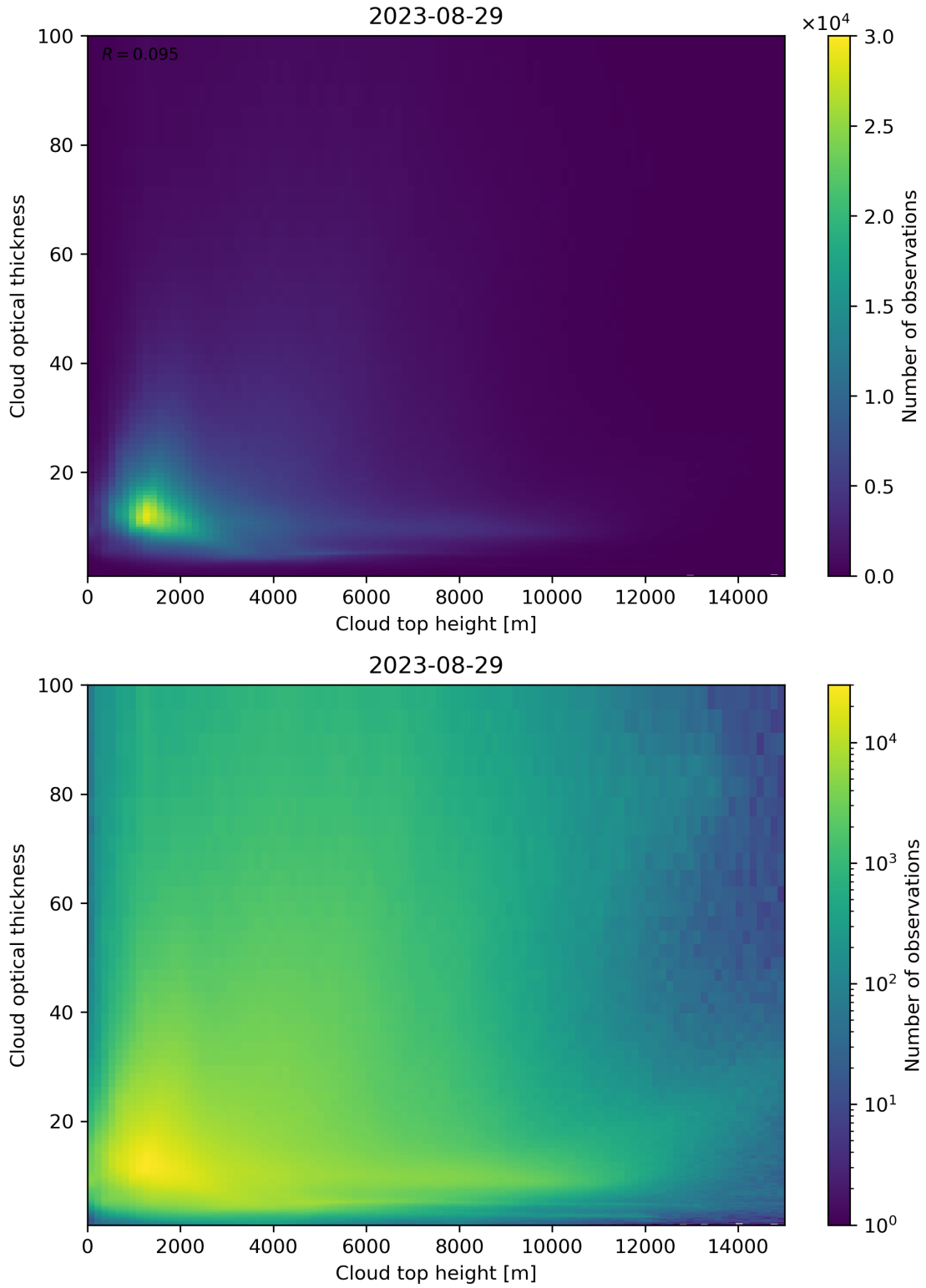


Figure 90: Scatter density plot of “Cloud top height” against “Cloud optical thickness” for 2023-08-28 to 2023-08-30.

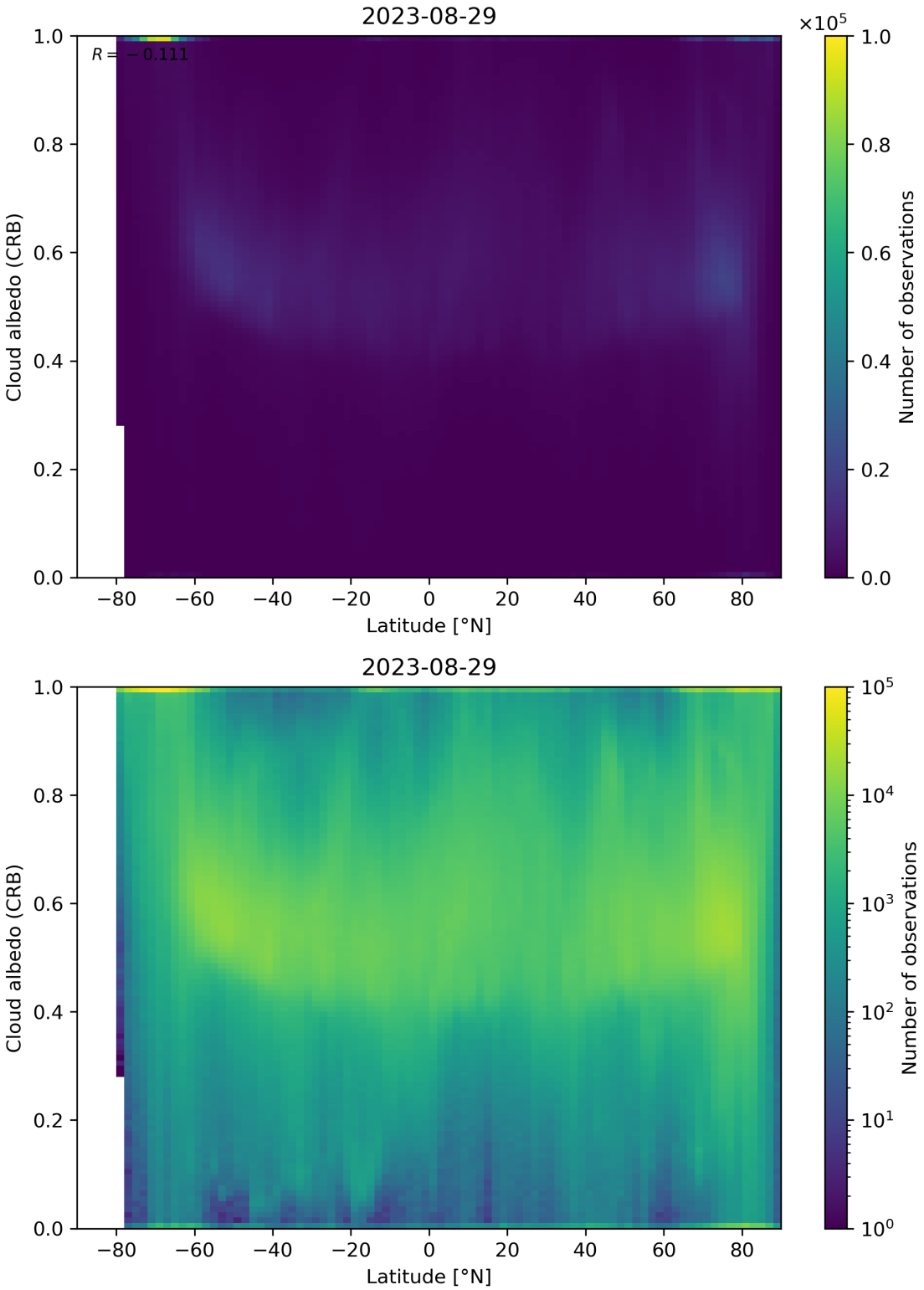


Figure 91: Scatter density plot of “Latitude” against “Cloud albedo (CRB)” for 2023-08-28 to 2023-08-30.

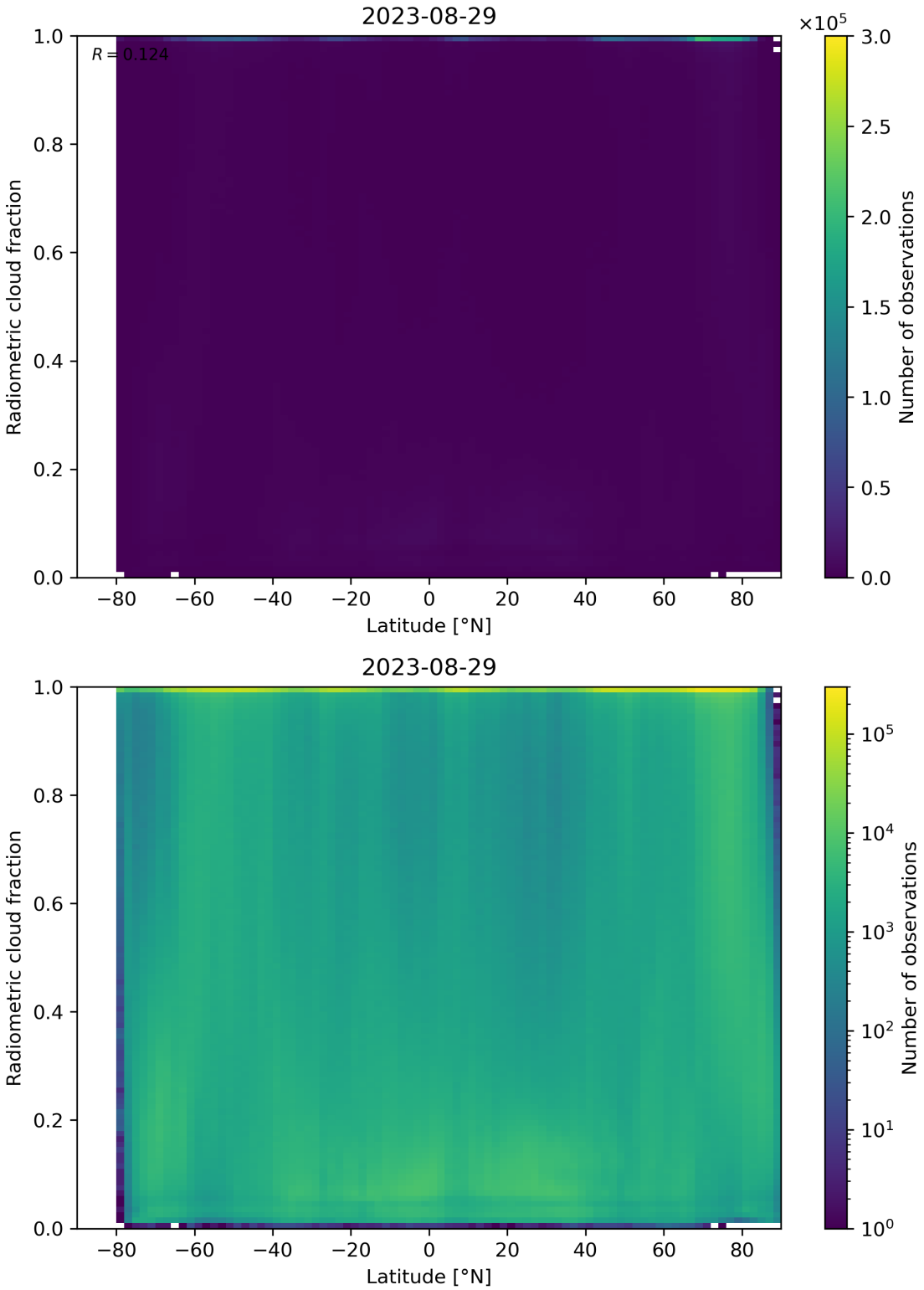


Figure 92: Scatter density plot of “Latitude” against “Radiometric cloud fraction” for 2023-08-28 to 2023-08-30.

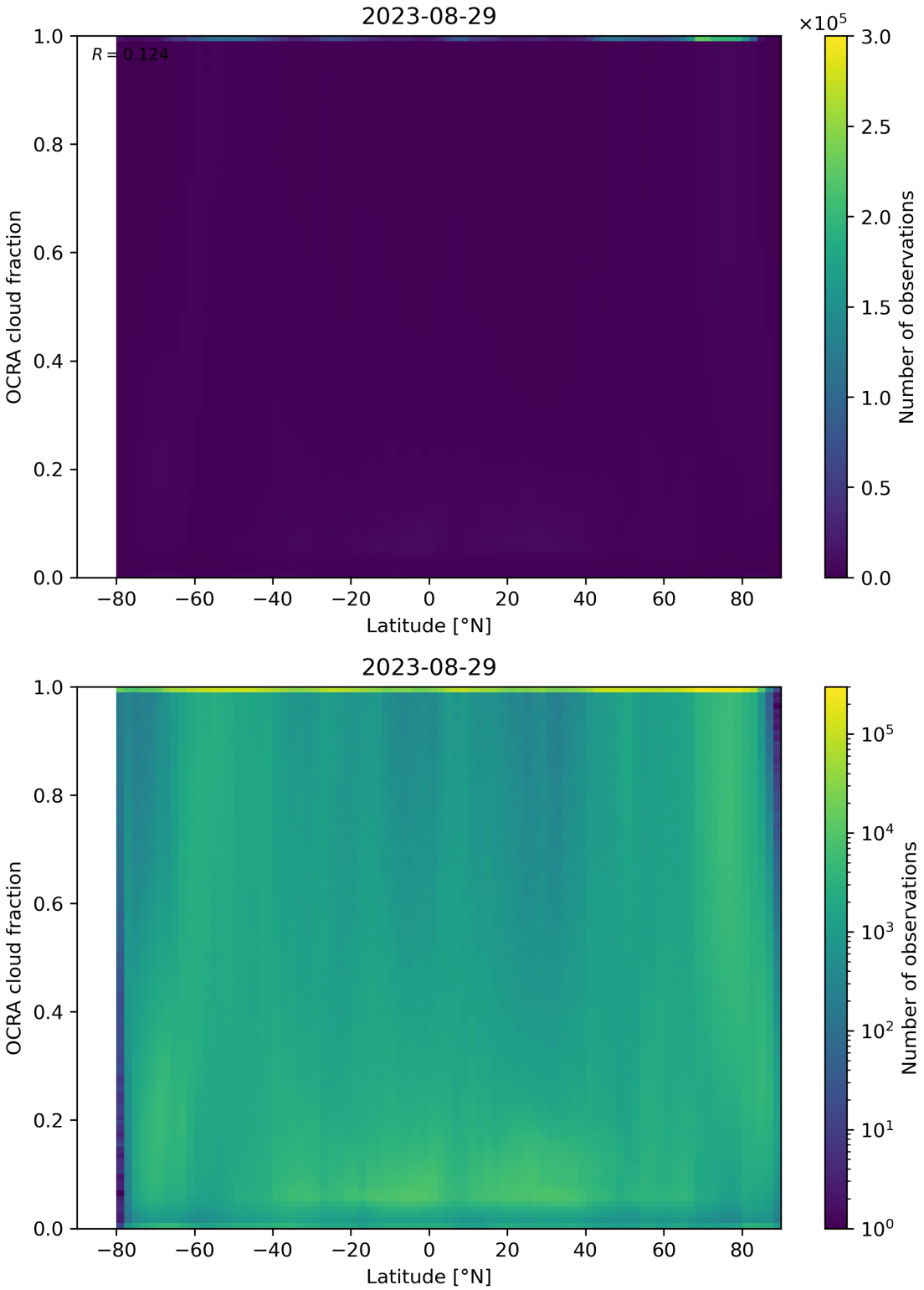


Figure 93: Scatter density plot of “Latitude” against “OCRA cloud fraction” for 2023-08-28 to 2023-08-30.

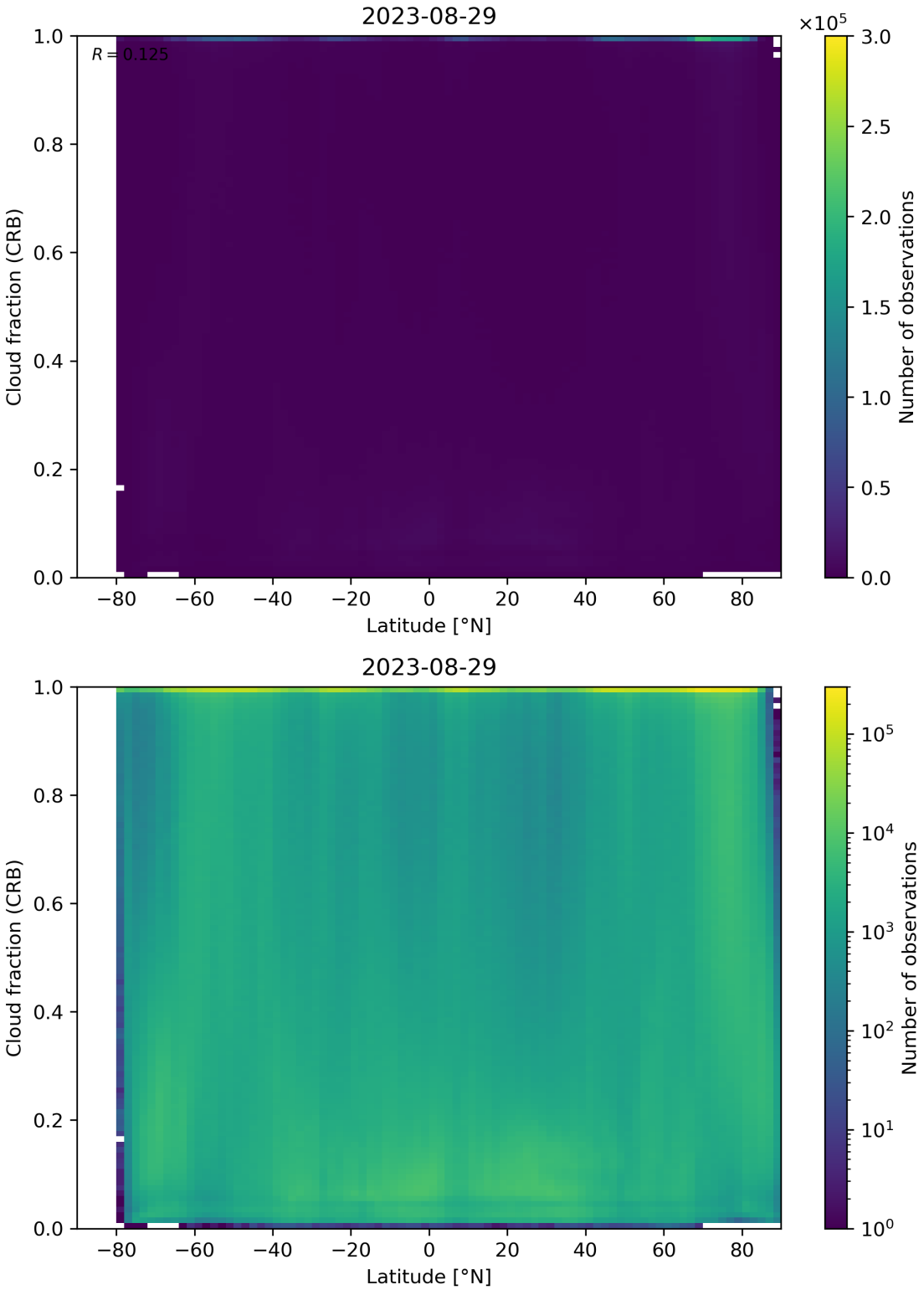


Figure 94: Scatter density plot of “Latitude” against “Cloud fraction (CRB)” for 2023-08-28 to 2023-08-30.

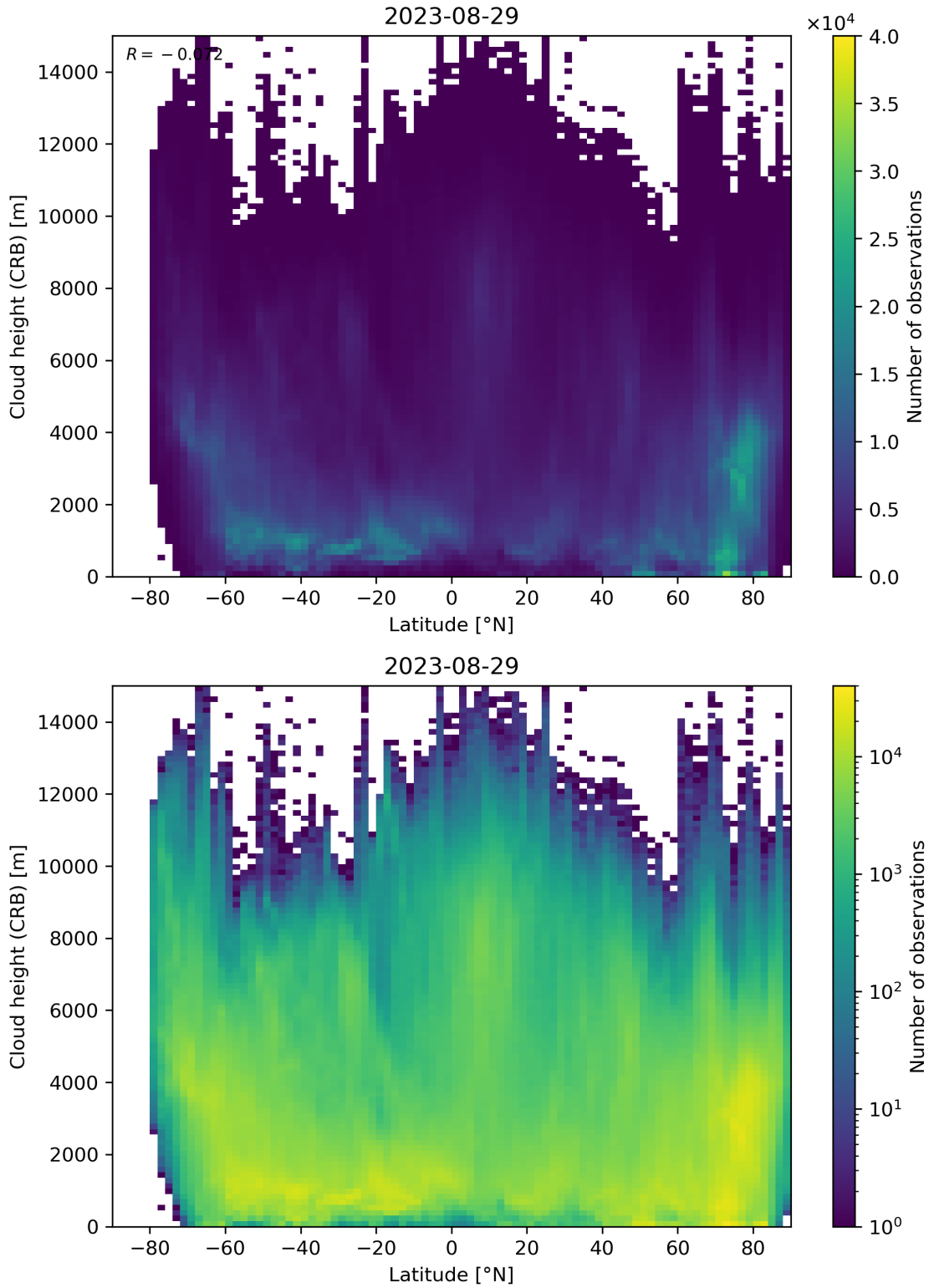


Figure 95: Scatter density plot of “Latitude” against “Cloud height (CRB)” for 2023-08-28 to 2023-08-30.

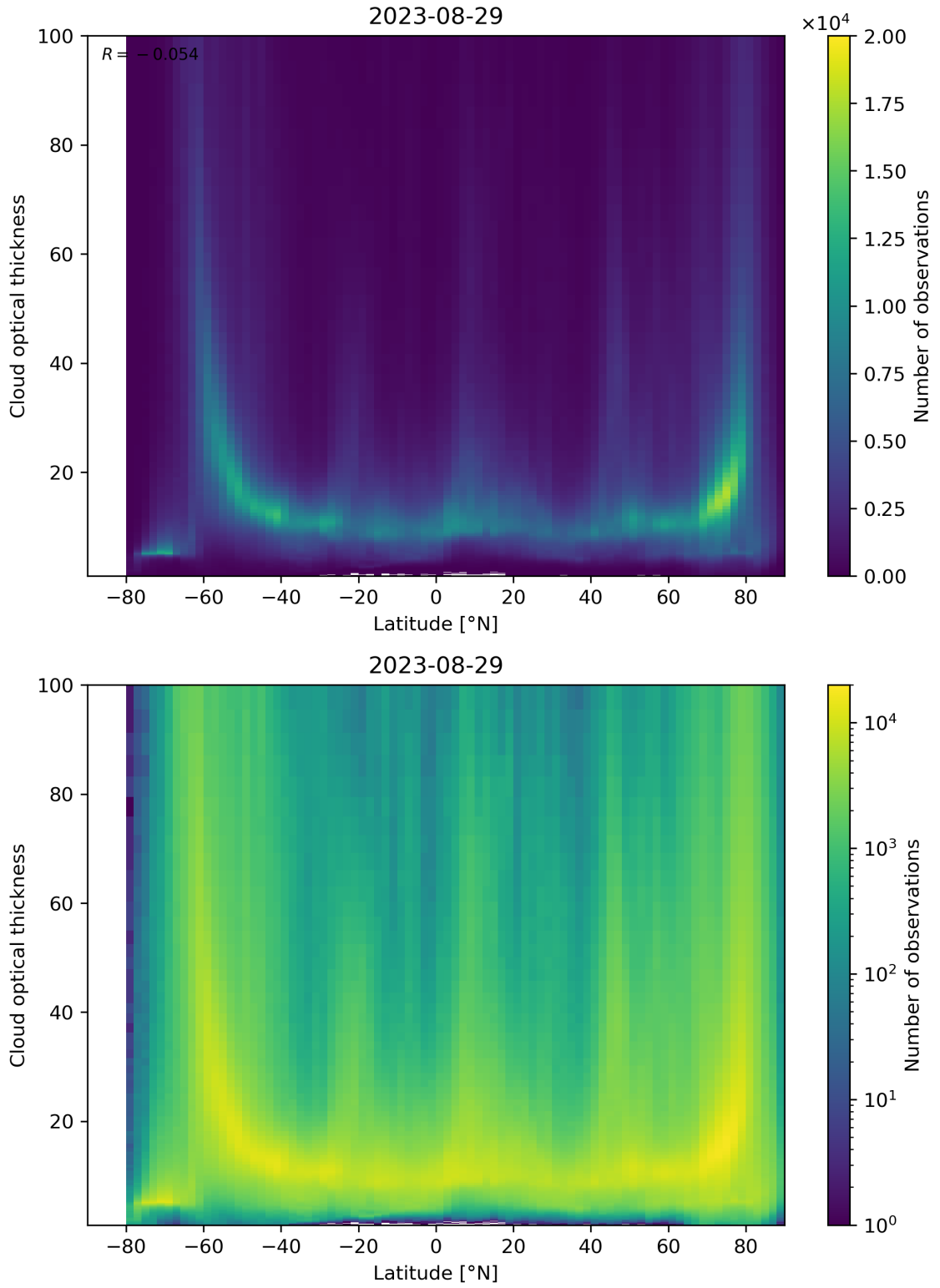


Figure 96: Scatter density plot of “Latitude” against “Cloud optical thickness” for 2023-08-28 to 2023-08-30.

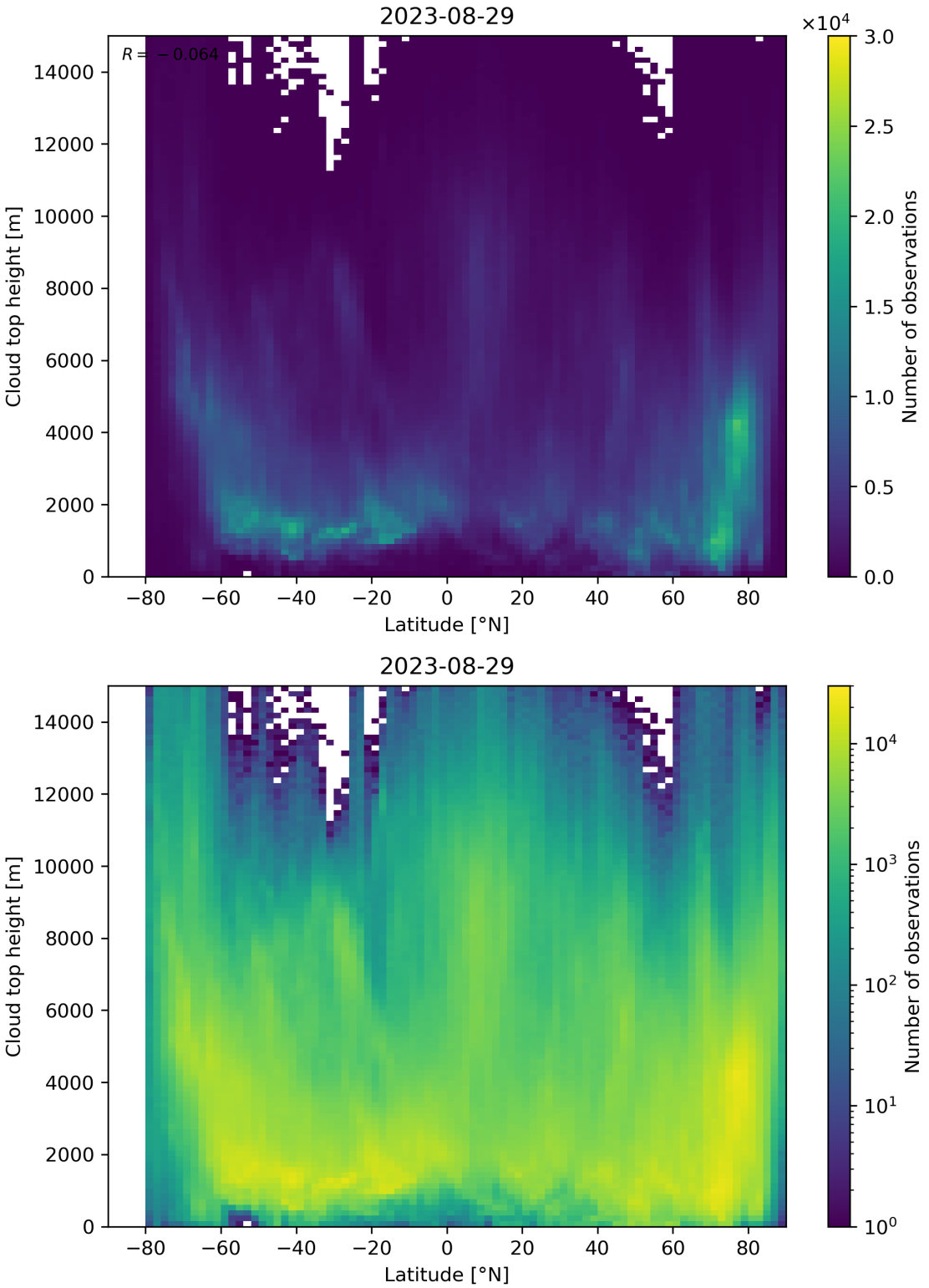


Figure 97: Scatter density plot of “Latitude” against “Cloud top height” for 2023-08-28 to 2023-08-30.

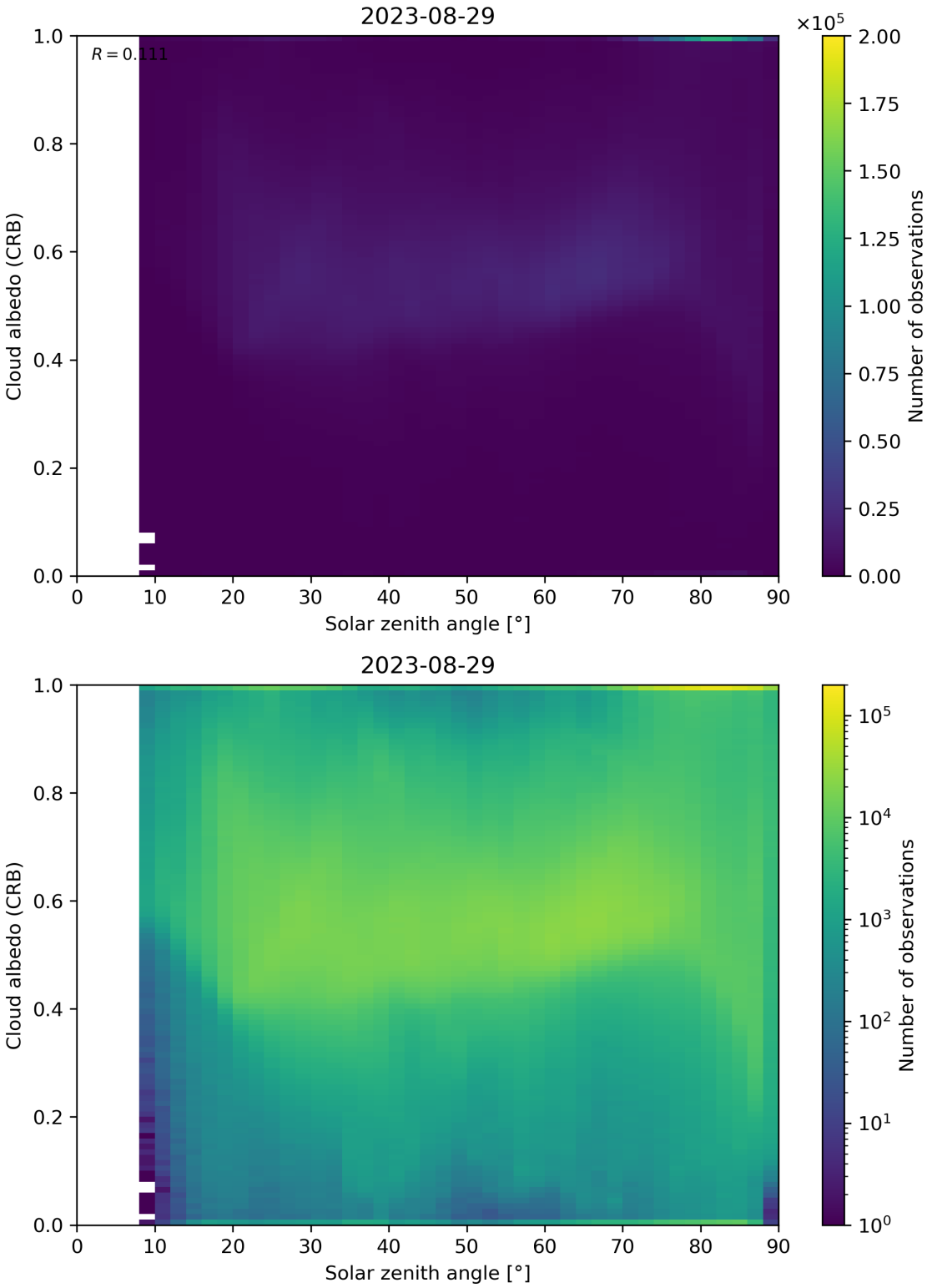


Figure 98: Scatter density plot of “Solar zenith angle” against “Cloud albedo (CRB)” for 2023-08-28 to 2023-08-30.

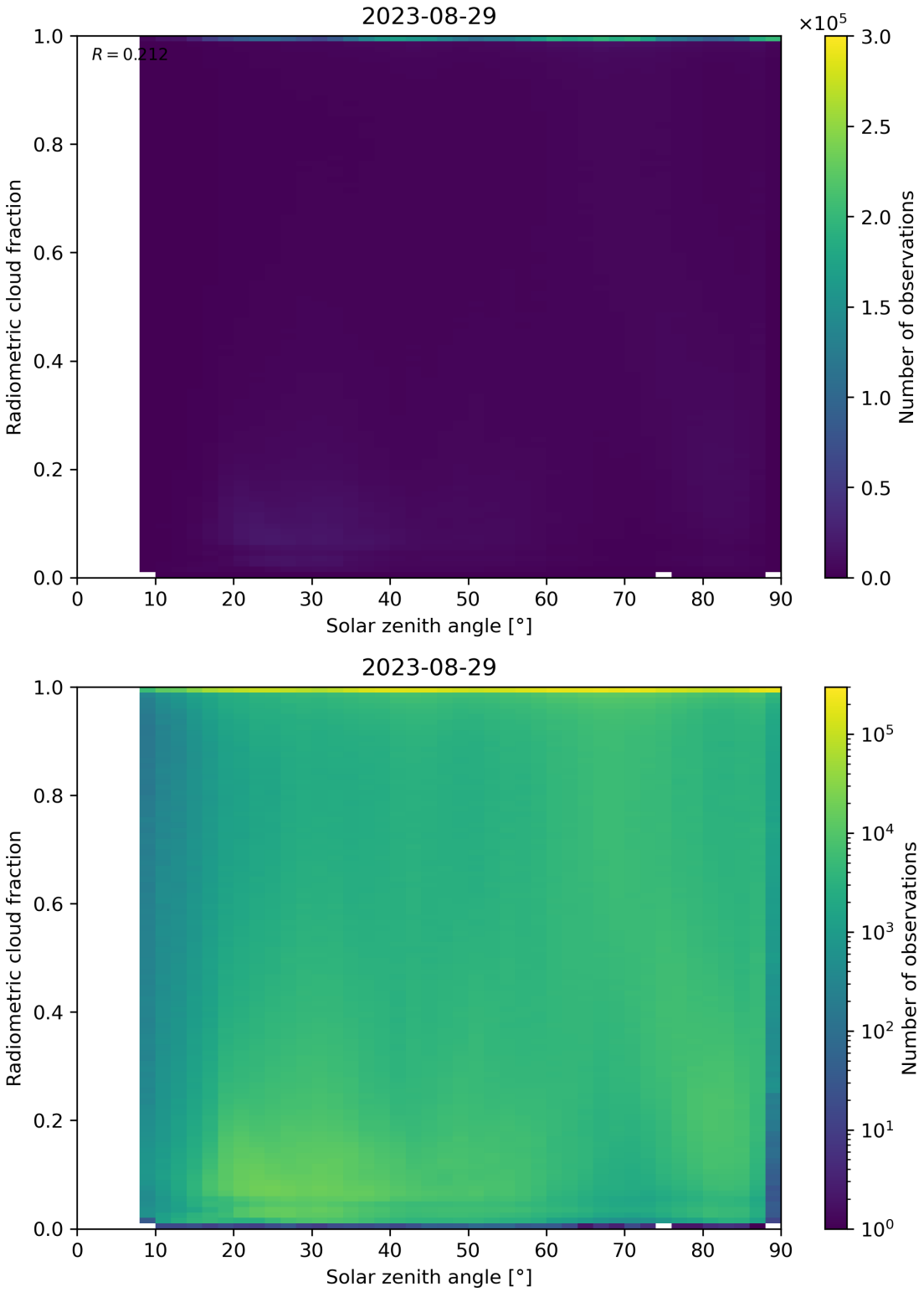


Figure 99: Scatter density plot of “Solar zenith angle” against “Radiometric cloud fraction” for 2023-08-28 to 2023-08-30.

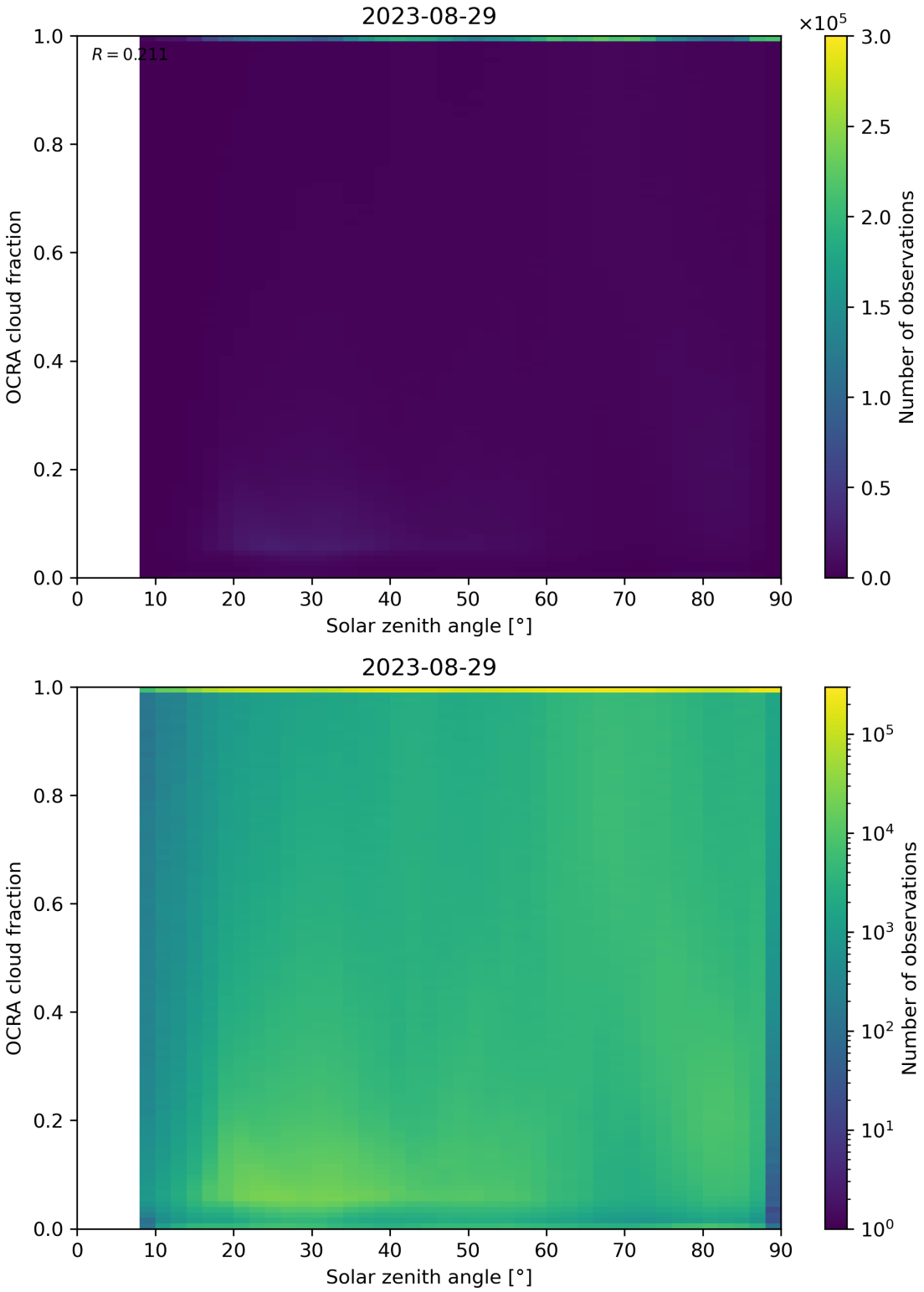


Figure 100: Scatter density plot of “Solar zenith angle” against “OCRA cloud fraction” for 2023-08-28 to 2023-08-30.

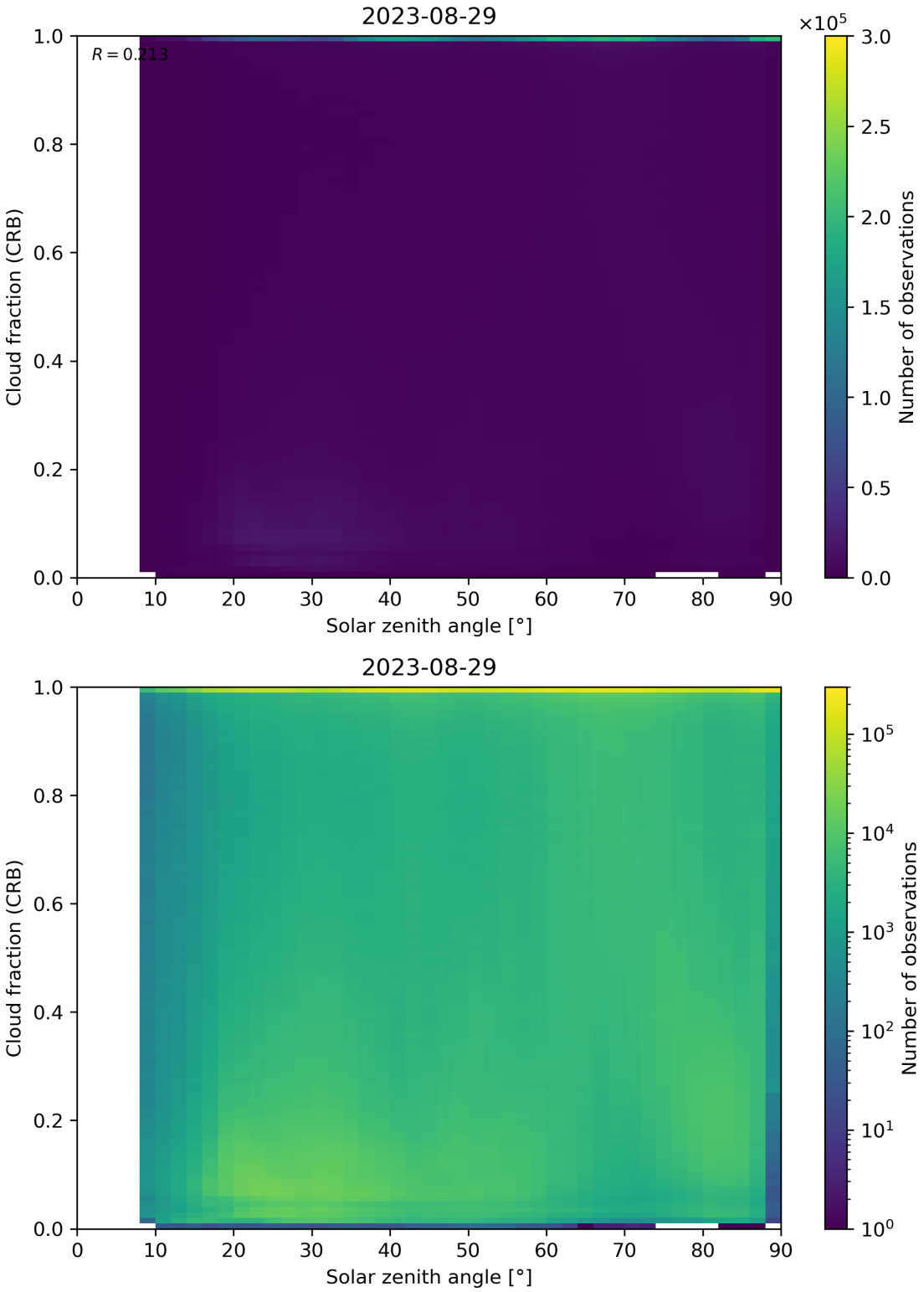


Figure 101: Scatter density plot of “Solar zenith angle” against “Cloud fraction (CRB)” for 2023-08-28 to 2023-08-30.

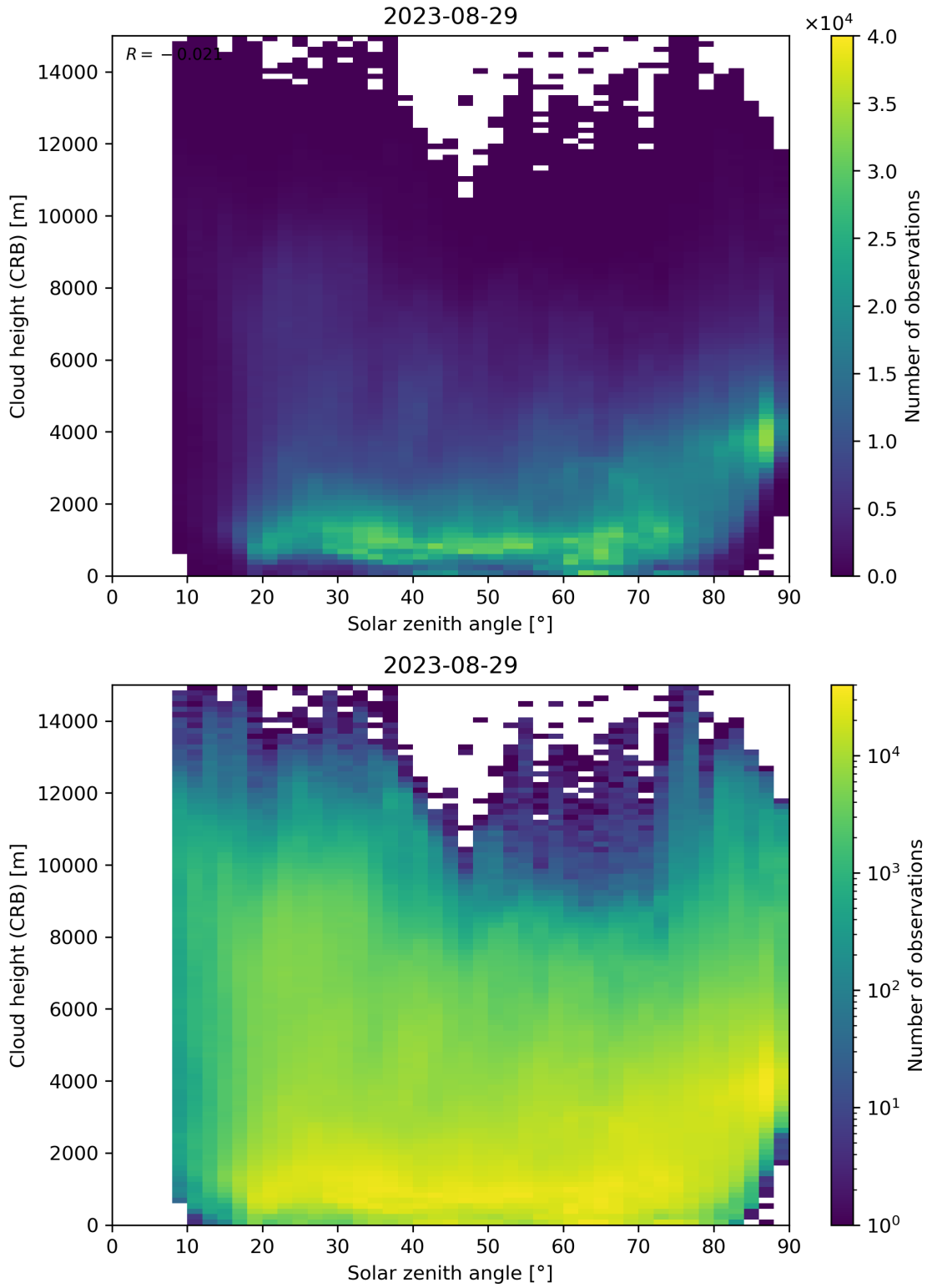


Figure 102: Scatter density plot of “Solar zenith angle” against “Cloud height (CRB)” for 2023-08-28 to 2023-08-30.

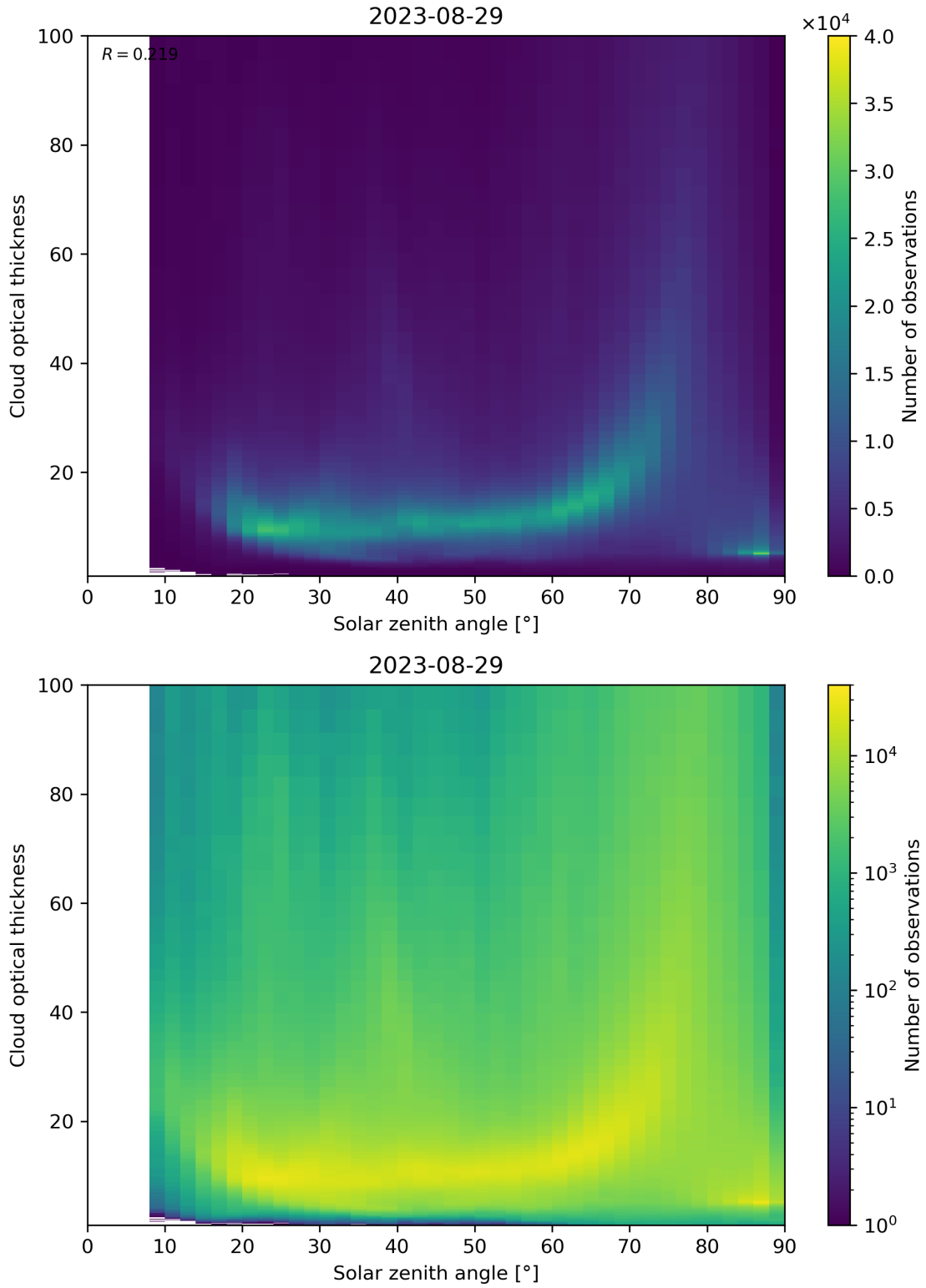


Figure 103: Scatter density plot of “Solar zenith angle” against “Cloud optical thickness” for 2023-08-28 to 2023-08-30.

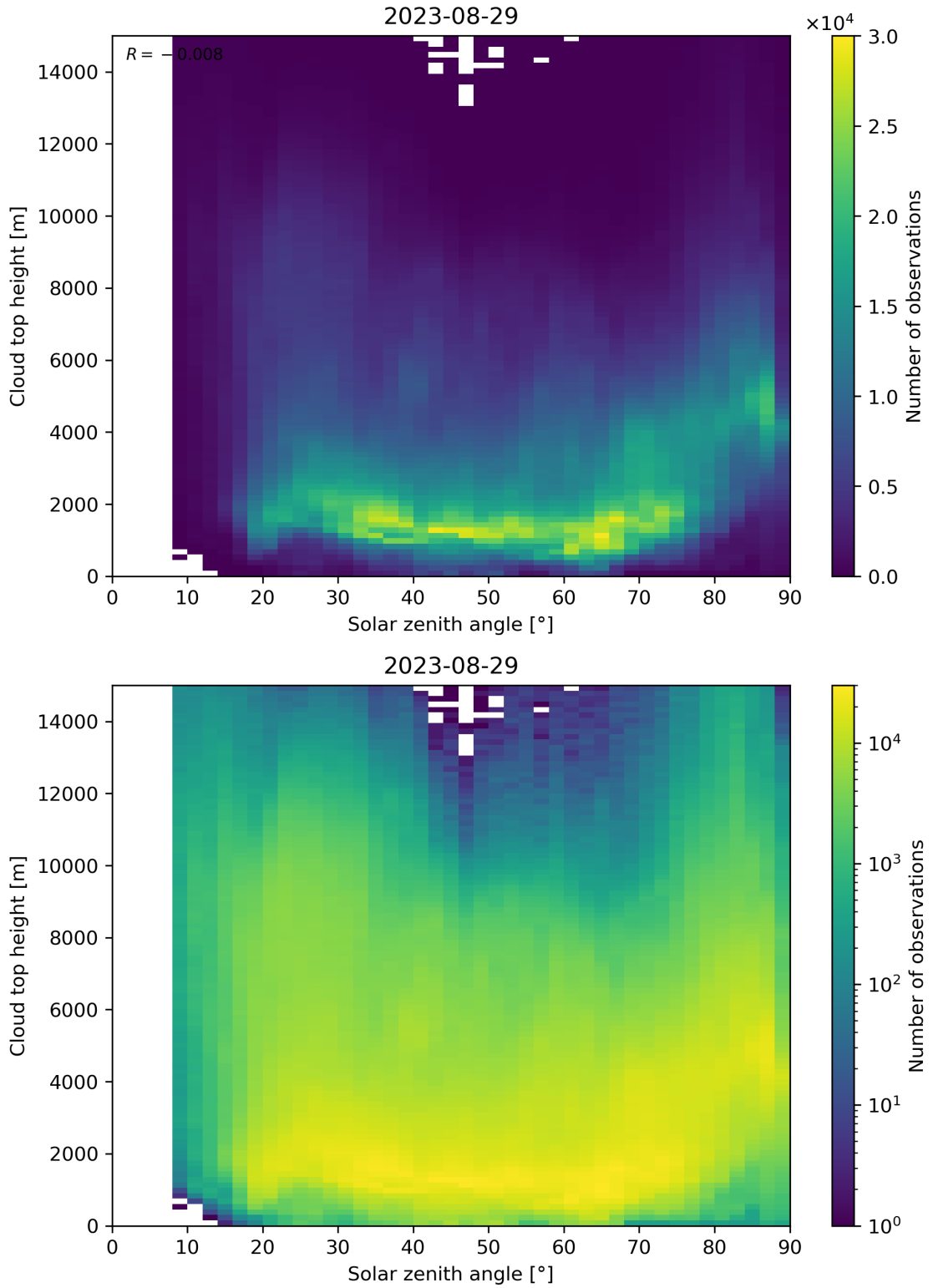


Figure 104: Scatter density plot of “Solar zenith angle” against “Cloud top height” for 2023-08-28 to 2023-08-30.

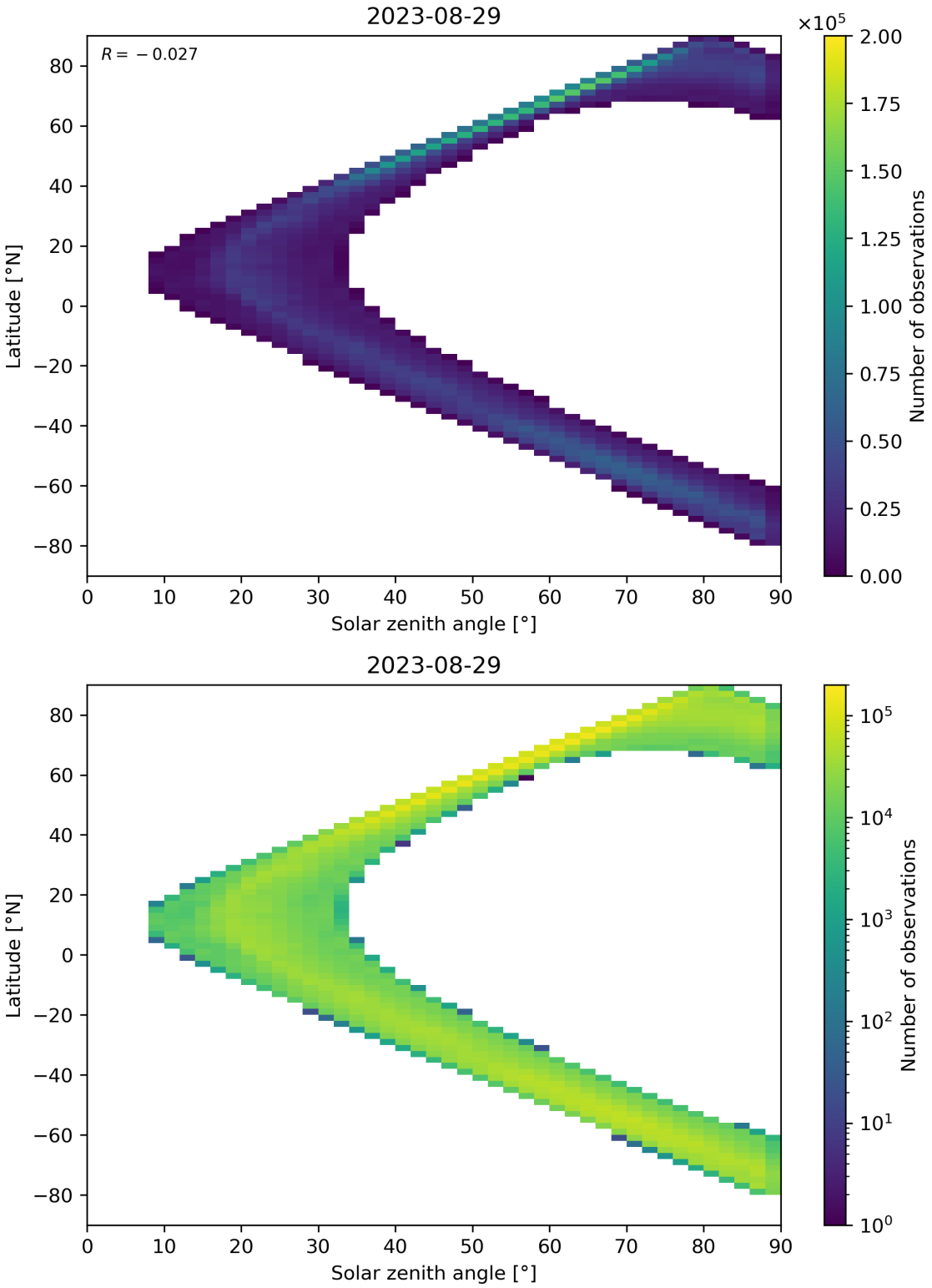


Figure 105: Scatter density plot of “Solar zenith angle” against “Latitude” for 2023-08-28 to 2023-08-30.

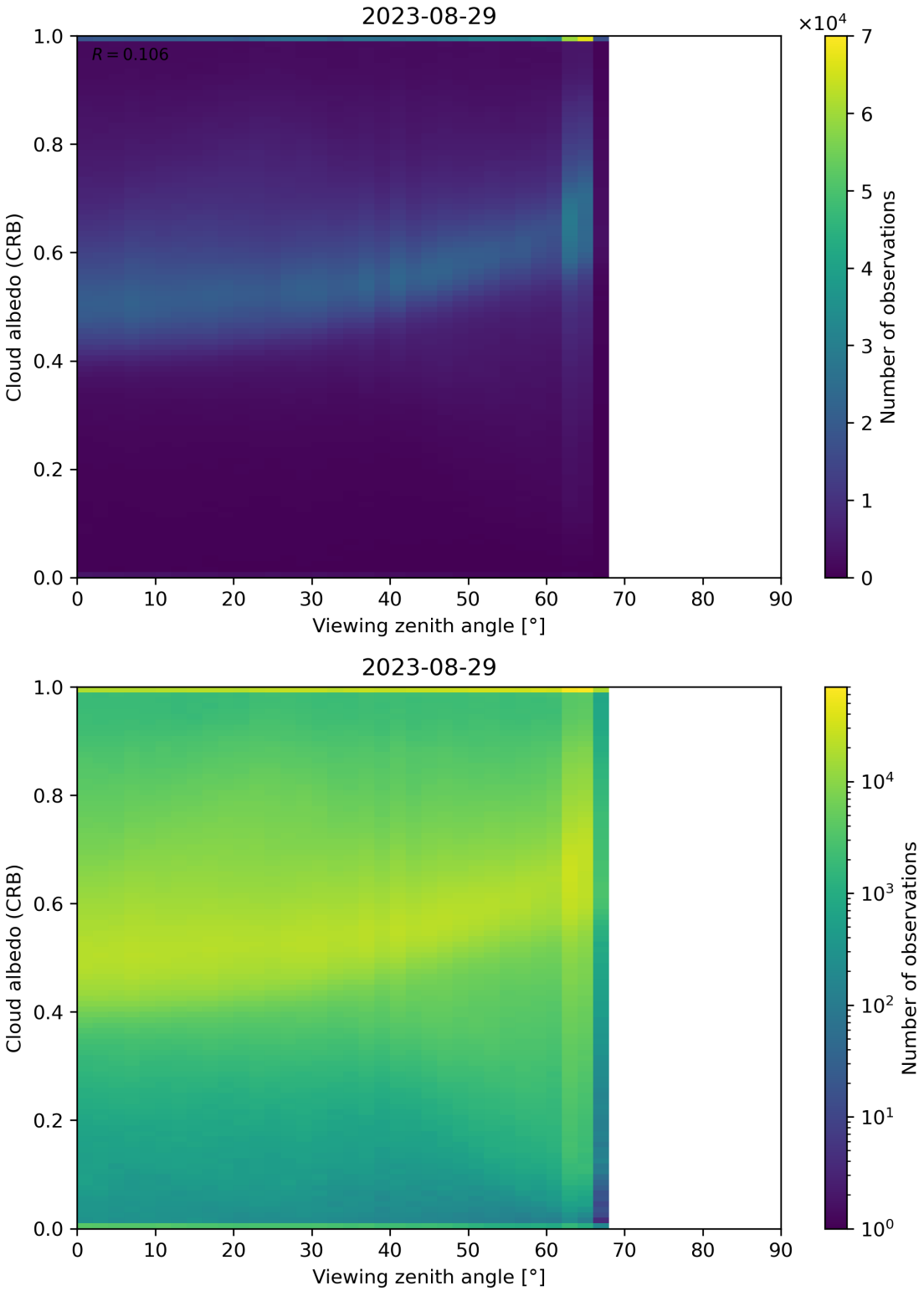


Figure 106: Scatter density plot of “Viewing zenith angle” against “Cloud albedo (CRB)” for 2023-08-28 to 2023-08-30.

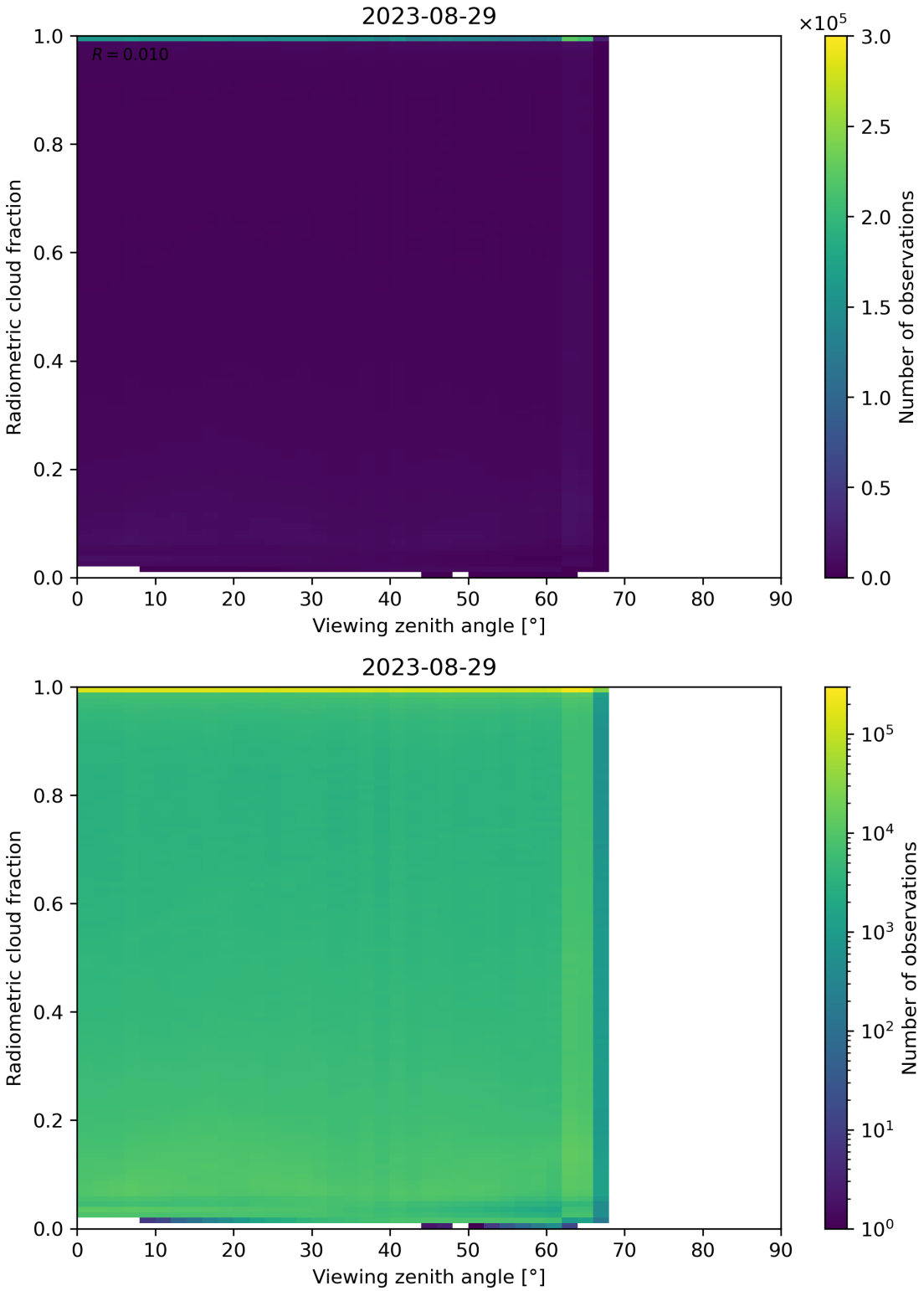


Figure 107: Scatter density plot of “Viewing zenith angle” against “Radiometric cloud fraction” for 2023-08-28 to 2023-08-30.

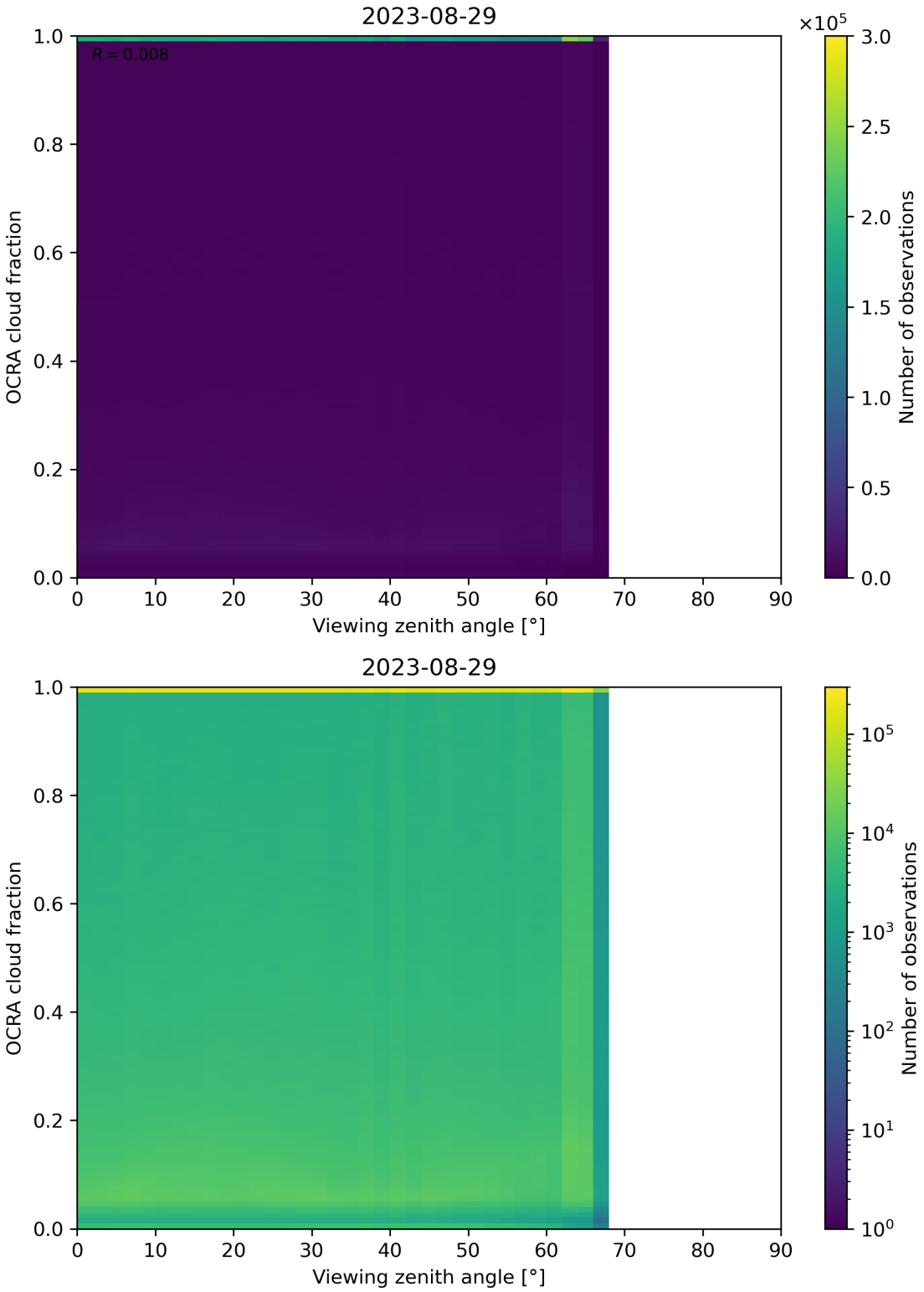


Figure 108: Scatter density plot of “Viewing zenith angle” against “OCRA cloud fraction” for 2023-08-28 to 2023-08-30.

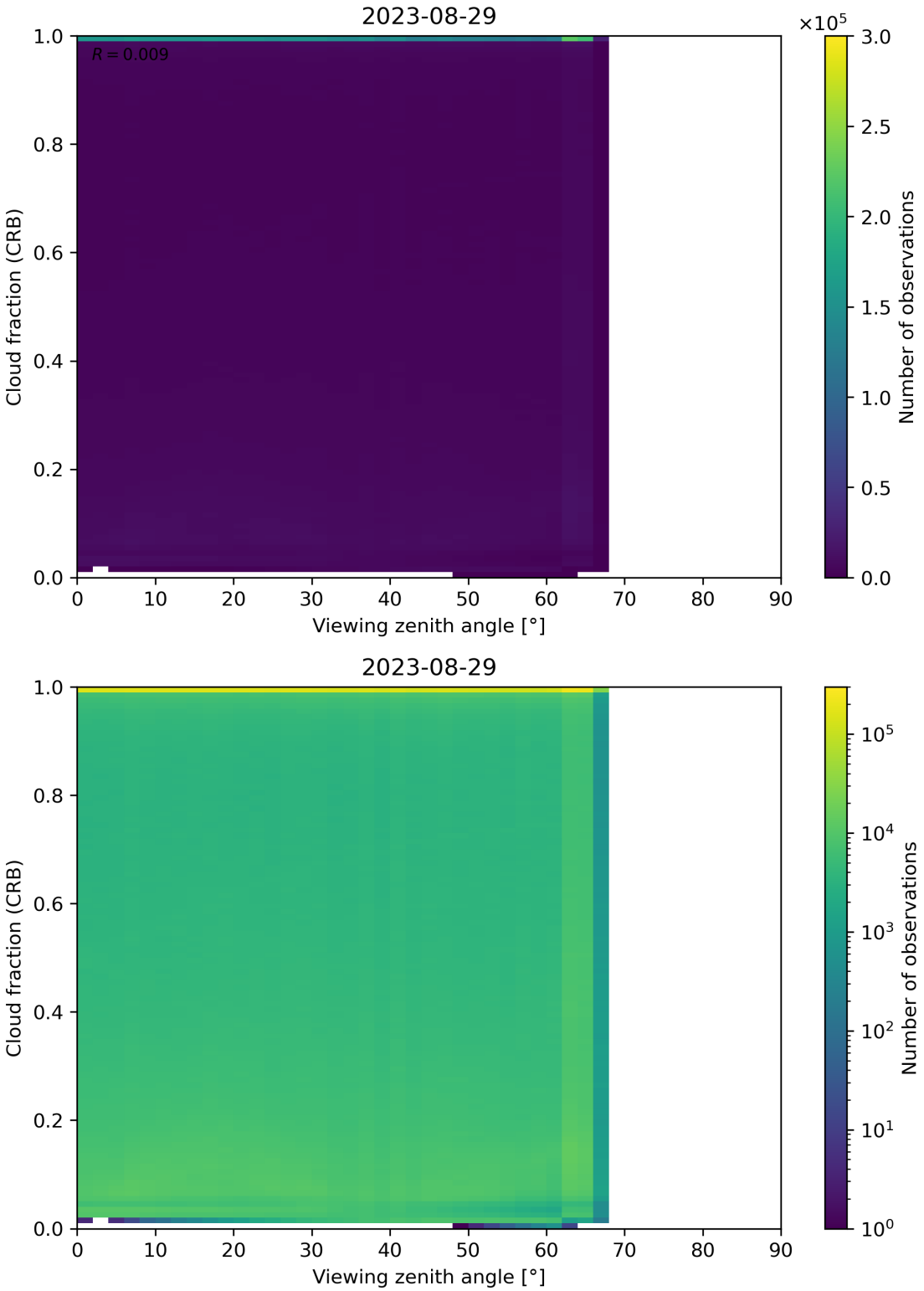
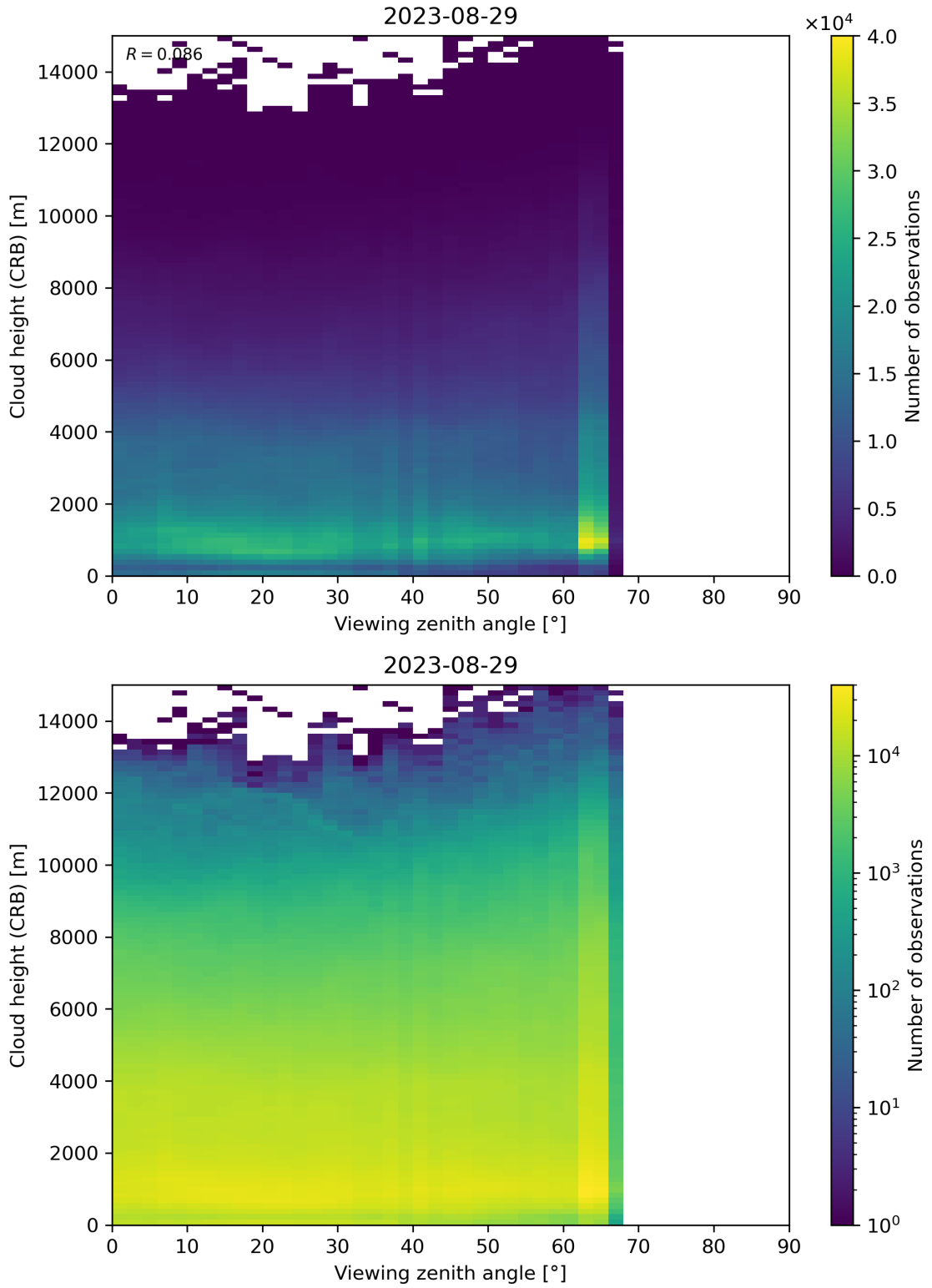


Figure 109: Scatter density plot of “Viewing zenith angle” against “Cloud fraction (CRB)” for 2023-08-28 to 2023-08-30.



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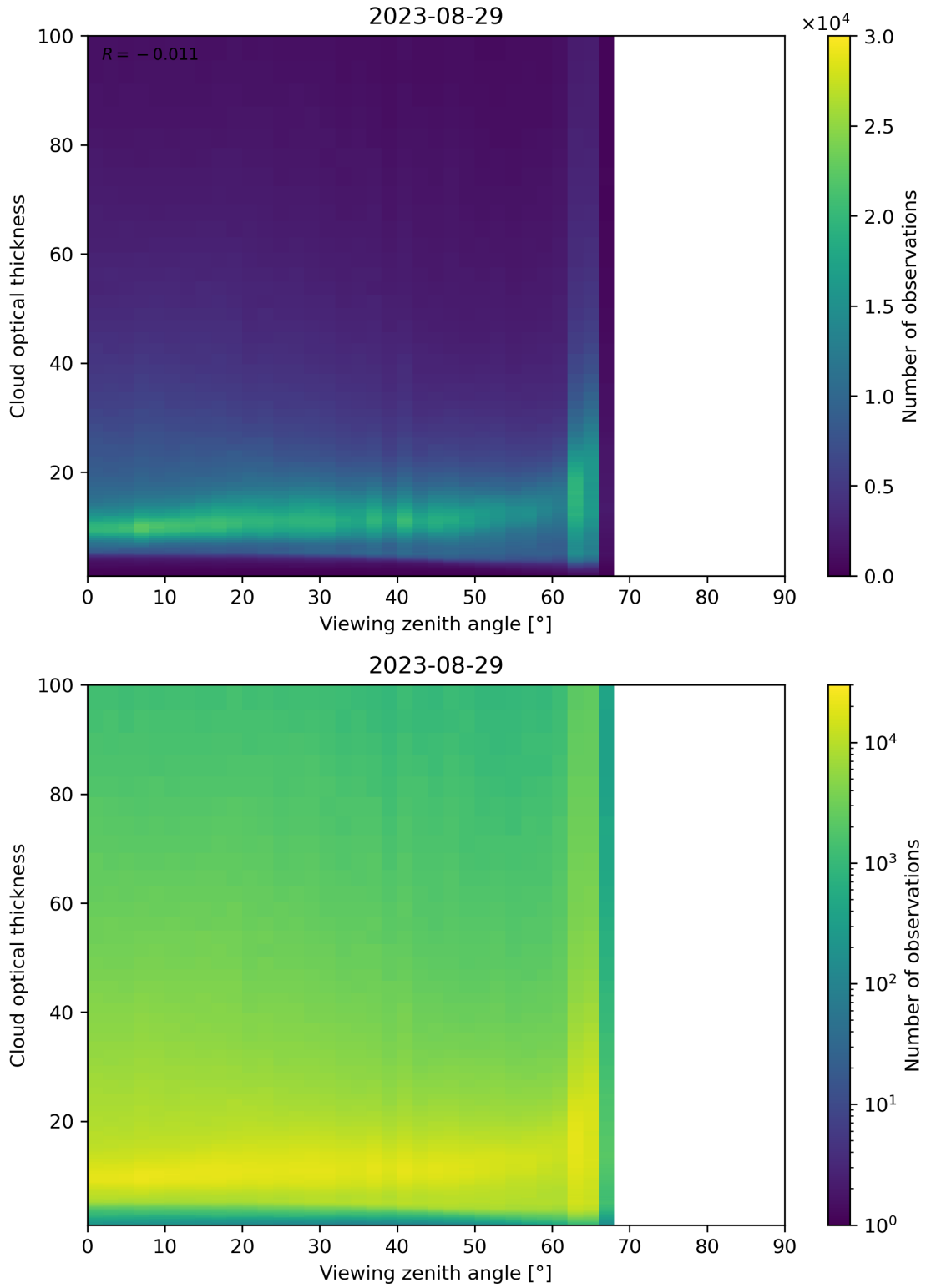
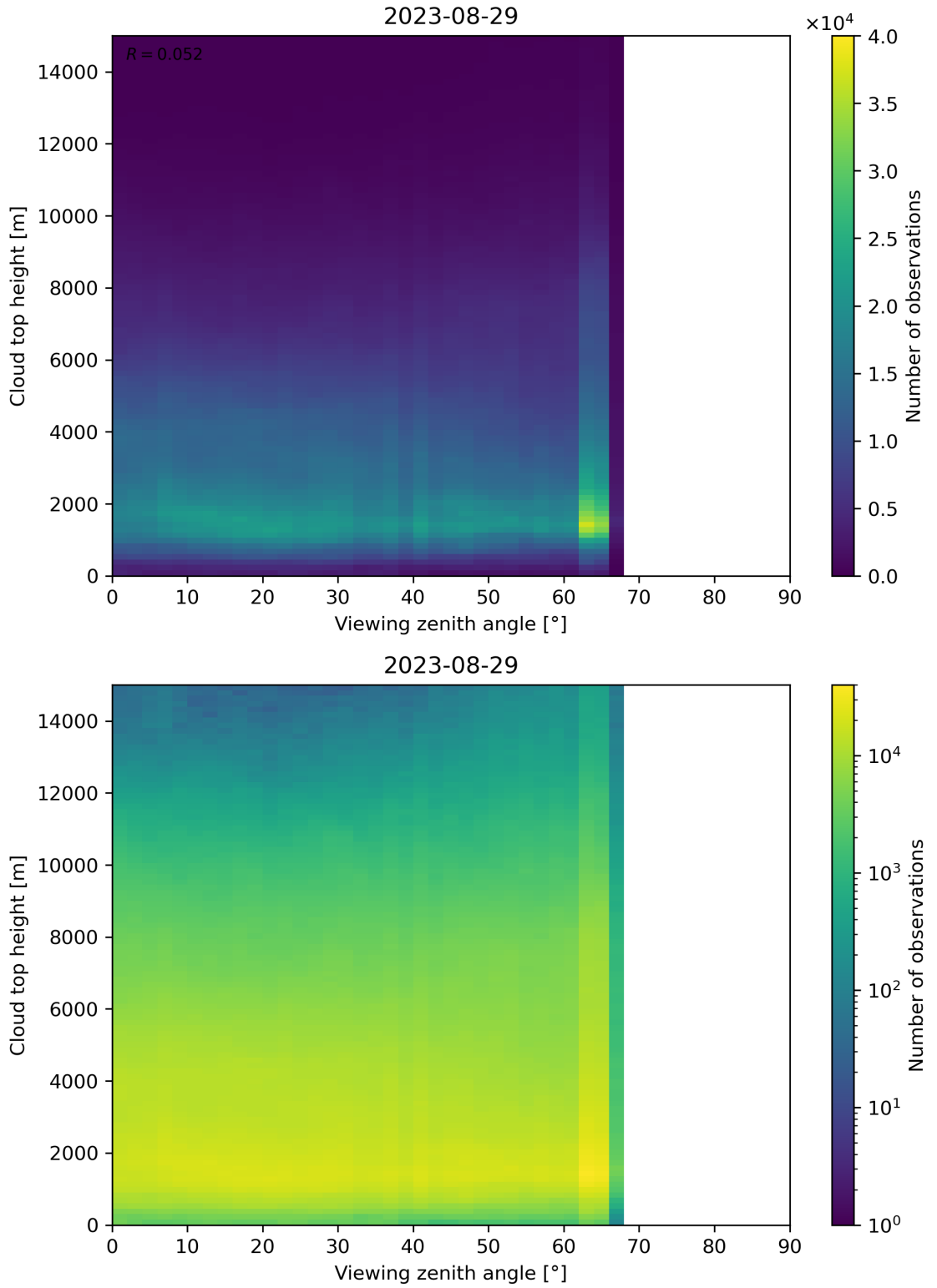


Figure 111: Scatter density plot of “Viewing zenith angle” against “Cloud optical thickness” for 2023-08-28 to 2023-08-30.



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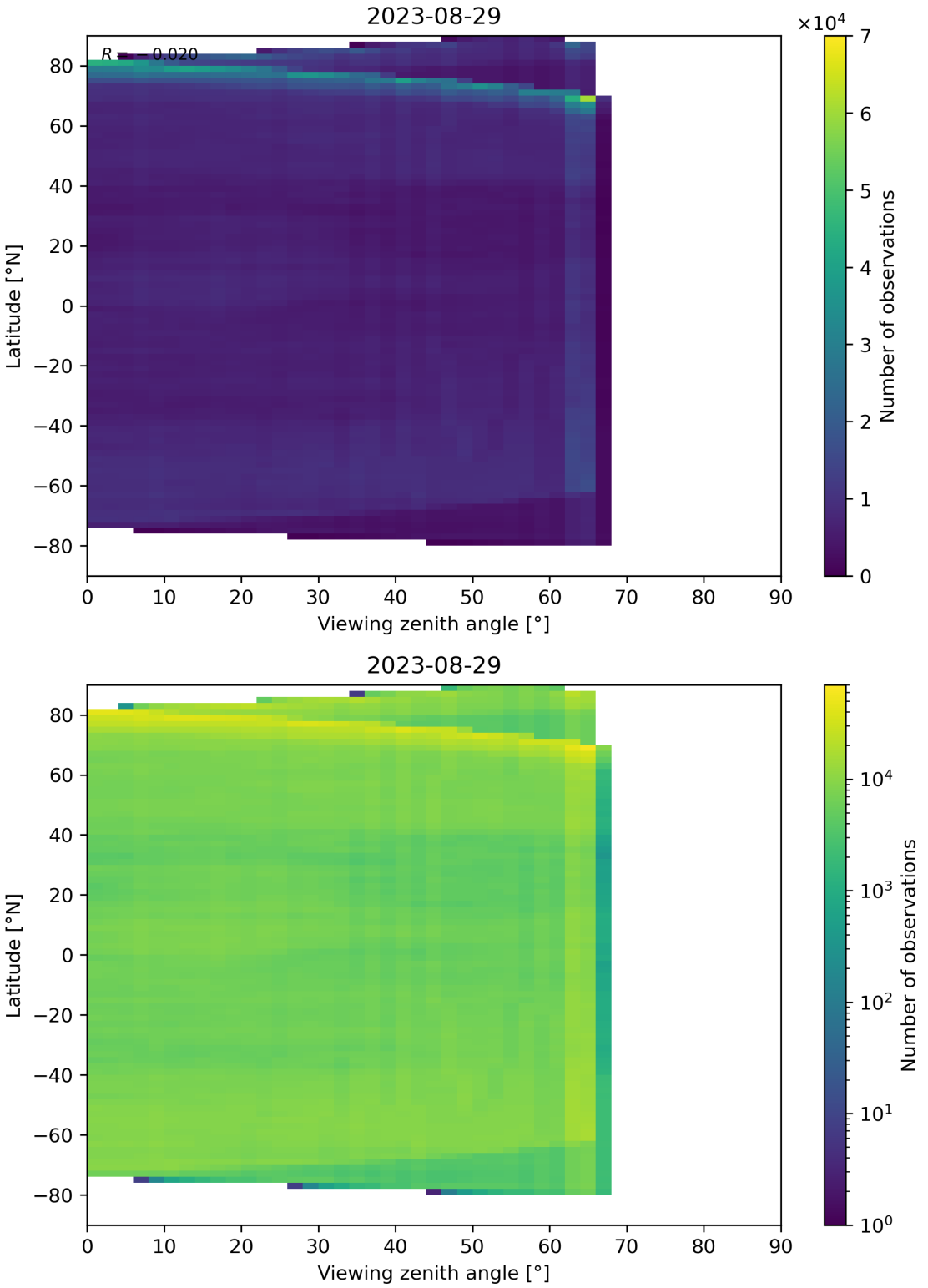
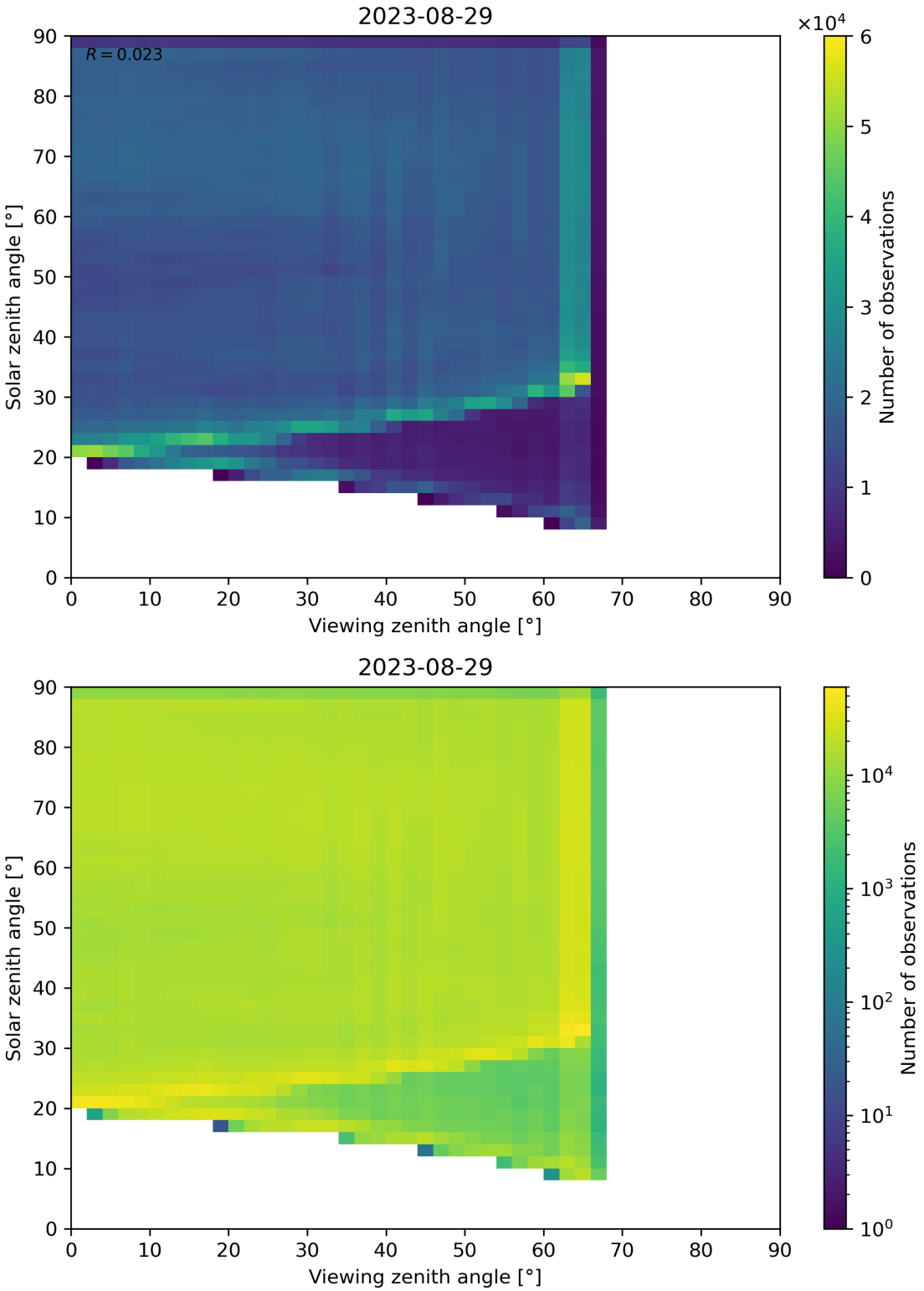


Figure 113: Scatter density plot of “Viewing zenith angle” against “Latitude” for 2023-08-28 to 2023-08-30.



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