

Table S1: Statistical indices for the different formulas (see table 1) with the original coefficients applied to THAAO data from 2017; the best performances of the main statistical indices are highlighted in bold.

Formula number	Bias (W/m2)	Standard difference (W/m2)	R ²	Slope	Skewness of the differences	Kurtosis of the differences	KGE	T_Skill	5 th percentile	25 th percentile	50 th percentile	75 th percentile	95 th percentile	RMSE (W/m2)
1	29.1	8.0	0.964	0.925	-0.207	0.751	0.834	0.962	15.71	23.67	29.08	34.65	42.08	30.16
2	17.8	9.0	0.971	1.098	0.176	1.051	0.851	0.960	4.56	11.5	17.31	23.35	33.46	19.93
3	-5.6	12.0	0.962	1.165	0.670	0.844	0.804	0.933	-21.19	-14.32	-7.28	1.11	17.89	13.26
4	26.1	14.2	0.938	0.676	-0.102	-0.997	0.701	0.857	3.46	14.22	26.92	38.01	47.11	29.75
5	8.1	8.2	0.964	1.001	0.061	1.250	0.947	0.963	-4.96	3.02	7.52	13.2	22.01	11.5
6	-18.5	13.1	0.975	1.238	0.279	-0.236	0.725	0.926	-37.2	-28.42	-20.45	-8.98	3.91	22.66
7	1.7	9.8	0.965	0.823	-0.304	-0.307	0.840	0.937	-14.84	-5.43	2.56	8.91	16.68	9.95
8	16.2	7.5	0.971	1.030	-0.182	1.591	0.902	0.970	3.87	11.53	16.09	21.05	28.35	17.88
9	-10.9	7.5	0.972	0.911	-0.246	0.449	0.903	0.966	-23.53	-15.92	-10.7	-5.67	1.35	13.22
10	-51.7	10.9	0.973	0.772	-0.212	-0.743	0.648	0.917	-69.71	-60.14	-51.04	-42.82	-35.14	52.85
11	3.9	7.2	0.972	0.925	-0.321	0.578	0.940	0.969	-8.75	-0.77	4.2	9.04	15.09	8.23
12	5.9	6.6	0.974	0.971	-0.288	2.622	0.963	0.974	-4.94	1.79	5.69	10.09	16.73	8.83
13	39.8	47.5	0.924	1.989	-0.336	-0.317	-0.104	0.564	-37.48	4.98	47.39	73.39	112.9	61.98
14	47.1	44.1	0.924	1.907	-0.358	-0.256	-0.028	0.593	-24.96	15.04	53.99	77.94	114.95	64.48
15	18.8	11.4	0.924	0.889	-0.338	0.675	0.872	0.920	-0.84	11.74	18.74	26.83	37.14	21.95
16	0.9	6.9	0.982	0.874	-0.375	0.870	0.891	0.969	-10.41	-4.18	1.19	6.13	11.36	6.91
17	0.9	5.8	0.984	0.912	-0.671	3.483	0.930	0.979	-8.67	-3.15	1.35	5.03	9.7	5.9

Table S2: Statistical indices for the different formulas (see table 1) with the original coefficients applied to THAAO data from 2018; the best performances of the main statistical indices are highlighted in bold.

Formula number	Bias (W/m2)	Standard difference (W/m2)	R ²	Slope	Skewness of the differences	Kurtosis of the differences	KGE	T_Skill	5 th percentile	25 th percentile	50 th percentile	75 th percentile	95 th percentile	RMSE (W/m2)
1	29.7	7.1	0.970	0.922	-0.451	2.180	0.822	0.967	18.55	25.24	29.66	34.26	41.00	30.49
2	16.9	8.2	0.974	1.107	-0.142	1.291	0.849	0.963	5.20	11.02	16.67	22.67	30.32	18.82
3	-7.1	10.7	0.968	1.150	0.707	1.969	0.809	0.941	-20.49	-14.42	-8.97	-1.08	11.61	12.85
4	28.9	13.3	0.949	0.672	-0.261	-0.588	0.683	0.860	6.54	19.54	29.18	39.37	49.24	31.78
5	8.0	7.0	0.970	0.993	-0.286	2.921	0.949	0.970	-2.48	3.53	7.94	12.43	19.63	10.67
6	-21.1	13.2	0.974	1.267	0.419	-0.659	0.700	0.919	-37.11	-31.24	-24.81	-9.57	1.54	24.84
7	3.2	9.0	0.971	0.820	-0.448	0.325	0.835	0.941	-12.07	-2.33	3.70	9.88	16.74	9.55
8	16.1	6.7	0.975	1.039	-0.658	2.750	0.897	0.973	5.65	11.43	16.60	20.91	26.14	17.47
9	-10.0	6.7	0.975	0.923	-0.382	2.018	0.909	0.970	-20.45	-14.39	-10.24	-5.34	1.08	12.02
10	-49.9	10.1	0.975	0.783	-0.395	-0.222	0.648	0.923	-67.20	-56.62	-49.19	-42.22	-34.80	50.89
11	4.1	7.0	0.969	0.959	-0.589	1.066	0.958	0.968	-7.89	-0.46	4.73	9.19	14.55	8.14
12	6.6	5.6	0.980	0.972	-0.950	7.183	0.959	0.980	-1.49	3.08	6.51	10.20	15.50	8.69
13	39.1	45.8	0.910	1.984	-0.309	0.399	-0.094	0.559	-35.30	9.76	37.26	74.23	110.00	60.24
14	46.6	42.6	0.910	1.902	-0.351	0.513	-0.020	0.588	-22.83	19.79	45.43	78.98	112.37	63.15
15	22.3	11.9	0.910	0.887	-1.145	2.505	0.848	0.906	-0.67	16.41	24.12	30.48	37.46	25.25
16	2.8	6.2	0.985	0.886	-0.920	4.687	0.893	0.973	-6.81	-0.85	2.57	7.25	12.24	6.80
17	2.4	5.1	0.987	0.925	-1.290	10.662	0.931	0.982	-4.96	-0.79	2.19	5.98	10.28	5.66

Table S3: Statistical indices for the different formulas (see table 1) with the coefficients derived from the THAAO data for 2017; the best performances of the main statistical indices are highlighted in bold.

Formula number	Bias (W/m2)	Standard difference (W/m2)	R ²	Slope	Skewness of the differences	Kurtosis of the differences	KGE	T_Skill	5 th percentile	25 th percentile	50 th percentile	75 th percentile	95 th percentile	RMSE (W/m2)
1	-1.26	10.61	0.964	0.794	-0.335	-0.432	0.812	0.924	-19.3	-8.99	-0.27	6.75	14.65	10.68
2	0.14	7.23	0.970	0.985	-0.256	1.390	0.985	0.970	-12.34	-4.29	0	4.94	11.88	7.24
3	0.93	13.42	0.962	1.206	0.699	0.610	0.763	0.921	-16.08	-9.03	-1.3	8.33	27.19	13.45
4	0.02	8.48	0.961	0.915	-0.145	0.840	0.933	0.957	-13.67	-5.54	0	5.72	13.93	8.48
5	-0.03	7.96	0.964	0.959	-0.117	0.974	0.973	0.964	-13.31	-5.07	-0.41	5.35	13.19	7.96
6	0.88	18.55	0.975	1.381	0.378	-0.702	0.599	0.872	-24.77	-13.9	-3.05	15.38	32.74	18.57
7	0.00	7.58	0.971	1.030	-0.107	1.637	0.949	0.969	-11.99	-5.08	-0.09	4.76	12.79	7.58
8	-0.01	7.04	0.972	0.986	-0.344	1.509	0.986	0.972	-12.35	-4.35	0	4.71	11	7.04
10	-5.38	7.10	0.971	0.968	-0.265	1.463	0.964	0.971	-17.54	-9.75	-5.58	-0.61	6.21	8.91
11	0.01	6.58	0.975	0.974	-0.454	1.895	0.984	0.975	-11.26	-4.13	0.3	4.35	10.17	6.58
12	0.25	5.95	0.980	0.999	-0.455	6.606	0.978	0.980	-8.72	-3.2	0.02	3.46	10.46	5.96
14	-0.09	11.32	0.924	0.928	-0.361	0.993	0.952	0.924	-18.8	-7.03	0	7.62	18.33	11.33
16	0.18	5.40	0.983	0.977	-0.759	7.358	0.991	0.983	-8.68	-3.06	0.4	3.48	8.28	5.4
17	0.00	5.21	0.984	0.972	-0.982	8.785	0.989	0.984	-8.66	-3.06	0.29	3.35	7.52	5.21

Table S4: Statistical indices for the different formulas (see table 1) with the coefficients derived from the THAAO data for 2018; the best performances of the main statistical indices are highlighted in bold.

Formula number	Bias (W/m2)	Standard difference (W/m2)	R ²	Slope	Skewness of the differences	Kurtosis of the differences	KGE	T_Skill	5 th percentile	25 th percentile	50 th percentile	75 th percentile	95 th percentile	RMSE (W/m2)
1	-1.18	10.03	0.970	0.784	-0.514	0.040	0.801	0.924	-18.9	-7.5	-0.3	6.4	13.3	10.1
2	-0.22	6.38	0.974	0.982	-0.630	3.178	0.985	0.974	-10.2	-4.4	0.0	4.1	9.6	6.38
3	0.83	12.44	0.968	1.204	0.835	1.537	0.758	0.925	-14.1	-7.8	-2.2	8.3	23.1	12.47
4	0.22	7.48	0.965	0.941	-0.241	2.144	0.953	0.964	-11.3	-4.1	0.0	4.8	12.4	7.48
5	-0.08	6.92	0.970	0.950	-0.416	2.604	0.969	0.969	-10.6	-4.5	-0.1	4.4	11.1	6.92
6	0.68	19.62	0.974	1.444	0.664	-0.831	0.547	0.850	-20.5	-14.5	-7.8	18.4	35.8	19.63
7	0.01	7.14	0.975	1.060	-0.403	2.080	0.928	0.970	-10.6	-4.9	0.2	4.8	11.4	7.14
8	-0.24	6.32	0.975	0.975	-0.666	3.144	0.977	0.974	-10.2	-4.4	0.0	4.0	9.4	6.33
10	-5.46	6.33	0.975	0.971	-0.585	3.066	0.962	0.974	-15.2	-9.5	-5.3	-1.2	4.4	8.36
11	0.09	6.95	0.970	0.985	-0.588	1.043	0.984	0.970	-11.2	-4.6	1.0	5.2	10.0	6.96
12	0.18	5.17	0.983	1.003	-1.385	11.710	0.984	0.983	-7.0	-2.7	0.1	3.1	8.2	5.17
14	-2.02	11.89	0.910	0.932	-1.211	3.126	0.946	0.911	-23.7	-8.1	0.0	6.1	13.1	12.06
16	0.14	4.68	0.986	0.985	-2.090	18.156	0.991	0.986	-6.7	-2.6	0.4	3.2	6.6	4.68
17	0.00	4.51	0.987	0.985	-2.331	21.330	0.991	0.987	-6.6	-2.5	0.2	2.8	6.2	4.51

Table S5: Statistical indices for the different formulas (see table 1) with the coefficients derived from the THAAO data for 2018; the statistical indices are calculated with respect to data for 2017. The best performances of the main statistical indices are highlighted in bold.

Formula number	Bias (W/m2)	Standard difference (W/m2)	R ²	Slope	Skewness of the differences	Kurtosis of the differences	KGE	T_Skill	5 th percentile	25 th percentile	50 th percentile	75 th percentile	95 th percentile	RMSE (W/m2)
1	-3.00	10.82	0.964	0.787	-0.335	-0.474	0.804	0.921	-21.41	-10.92	-2.00	5.25	13.16	11.23
2	-0.44	7.22	0.970	0.975	-0.270	1.300	0.982	0.970	-12.98	-4.87	-0.55	4.41	11.22	7.24
3	2.87	13.85	0.962	1.219	0.703	0.545	0.750	0.916	-14.62	-7.44	0.48	10.52	29.98	14.14
4	-0.25	8.49	0.959	0.938	-0.071	0.985	0.957	0.958	-13.34	-6.15	-0.44	5.48	13.87	8.50
5	-0.39	7.96	0.964	0.957	-0.124	0.958	0.972	0.964	-13.67	-5.45	-0.74	5.00	12.82	7.97
6	4.81	19.71	0.975	1.410	0.386	-0.752	0.568	0.860	-22.29	-11.04	0.58	20.31	38.67	20.29
7	0.71	7.83	0.971	1.047	-0.062	1.539	0.933	0.968	-11.42	-4.61	0.67	5.59	14.11	7.86
8	-0.72	7.06	0.972	0.963	-0.335	1.267	0.971	0.971	-13.05	-5.09	-0.66	4.09	10.53	7.09
10	-5.62	7.13	0.971	0.961	-0.270	1.365	0.960	0.971	-17.85	-10.05	-5.76	-0.77	5.94	9.07
11	0.24	6.67	0.975	0.951	-0.386	1.595	0.967	0.974	-10.95	-4.10	0.43	4.81	10.69	6.67
12	-0.46	5.93	0.980	0.997	-0.482	6.836	0.980	0.980	-9.38	-3.89	-0.68	2.74	9.74	5.95
13	-5.35	11.34	0.924	0.934	-0.367	1.041	0.947	0.925	-24.01	-12.30	-5.24	2.37	13.12	12.53
16	-1.04	5.39	0.983	0.972	-0.780	7.124	0.987	0.983	-9.93	-4.32	-0.76	2.29	7.00	5.49
17	-1.19	5.23	0.984	0.971	-0.952	8.561	0.986	0.984	-9.84	-4.32	-0.92	2.09	6.42	5.36

Table S6: Statistical indices for the different formulas (see table 1) with the coefficients derived from the THAAO data for 2017; the statistical indices are calculated with respect to data for 2018. The best performances of the main statistical indices are highlighted in bold.

Formula number	Bias (W/m2)	Standard difference (W/m2)	R ²	Slope	Skewness of the differences	Kurtosis of the differences	KGE	T_Skill	5 th percentile	25 th percentile	50 th percentile	75 th percentile	95 th percentile	RMSE (W/m2)
1	0.49	9.81	0.970	0.792	-0.508	0.100	0.808	0.928	-16.78	-5.65	1.33	7.87	14.77	9.82
2	0.26	6.40	0.974	0.992	-0.652	3.197	0.987	0.974	-9.72	-3.96	0.60	4.59	9.99	6.41
3	-1.00	12.03	0.968	1.191	0.811	1.628	0.771	0.929	-15.53	-9.29	-3.72	6.08	20.44	12.07
4	0.71	7.53	0.967	0.916	-0.350	1.876	0.928	0.962	-11.36	-3.59	0.76	5.38	12.74	7.56
5	0.26	6.92	0.970	0.951	-0.413	2.629	0.971	0.969	-10.20	-4.19	0.26	4.70	11.47	6.92
6	-2.99	18.50	0.974	1.414	0.640	-0.821	0.576	0.862	-23.24	-17.24	-10.67	13.88	30.00	18.74
7	-0.54	6.85	0.975	1.042	-0.482	2.491	0.945	0.972	-10.88	-5.17	-0.23	4.03	10.12	6.87
8	0.28	6.39	0.975	0.999	-0.749	3.100	0.986	0.975	-9.75	-4.03	0.79	4.76	9.68	6.39
10	-5.30	6.32	0.975	0.979	-0.603	3.136	0.966	0.975	-15.03	-9.31	-5.13	-1.09	4.53	8.25
11	-0.28	6.88	0.971	1.004	-0.650	1.196	0.980	0.971	-11.63	-4.91	0.65	4.86	9.39	6.89
12	0.87	5.18	0.983	1.005	-1.383	11.652	0.982	0.983	-6.31	-2.03	0.86	3.84	8.94	5.25
13	3.26	11.87	0.910	0.926	-1.202	3.043	0.940	0.910	-18.55	-2.72	5.22	11.34	18.40	12.31
16	1.33	4.69	0.986	0.990	-2.105	18.295	0.990	0.986	-5.55	-1.38	1.60	4.34	7.70	4.87
17	1.25	4.53	0.987	0.985	-2.355	21.451	0.989	0.987	-5.54	-1.21	1.48	4.10	7.35	4.70