What is the Priestley-Taylor Wet-Surface Evaporation Parameter? Testing Four Hypotheses

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S1. **Supplemental Information**

A list of all the sites, with FLUXNET site name, latitude, longitude, measurement height, canopy height, and IGBP land cover class is included in Table S1. Sites comprising six IGBP classes (CRO, GRA, ENF, OSH, DBF, and WET) were included. All information provided in Table S1 came from Wang et al. (2020).

Table S1. Sites and site information

	Site	Lat	Lon	Measure_height (m)	Canopy_height (m)	IGBP_Class
0	AU-How	-12.494	131.152	23	15	WSA
1	AU-Rig	-36.65	145.576	5	0.4	GRA
2	AU-Stp	-17.151	133.35	4.2	0.2	GRA
3	AU-Tum	-35.657	148.152	70	40	EBF
4	AU-Wac	-37.426	145.188	95	70	EBF
5	AU-Whr	-36.673	145.029	35	28	EBF
6	AU-Wom	-37.422	144.094	29	25	EBF
7	AU-Ync	-34.989	146.291	20	0.5	GRA
8	BE-Lon	50.552	4.746	2.7	0.5	CRO
9	BR-Sa3	-3.018	-54.971	64	27	EBF
10	CA-Qfo	49.693	-74.342	24	13.8	ENF
11	CA-SF1	54.485	-105.818	12	6	ENF
12	CA-SF2	54.254	-105.878	10	4	ENF
13	AT-Neu	47.117	11.318	2	0.76	GRA
14	AU-ASM	-22.283	133.249	11.7	6.5	ENF
15	AU-Cpr	-34.002	140.589	20	5	SAV
16	AU-DaP	-14.063	131.318	18	0.5	GRA
17	AU-DaS	-14.159	131.388	20.4	16.4	SAV
18	AU-Dry	-15.259	132.371	16.3	12.3	SAV
19	AU-Emr	-23.859	148.475	6.7	0.4	GRA
20	AU-Gin	-31.376	115.714	15	6.8	WSA
21	CH-Cha	47.21	8.41	2	0.5	GRA
22	CH-Dav	46.815	9.856	35	18	ENF

23	CH-Fru	47.116	8.538	2	0.5	GRA
24	CN-Cng	44.593	123.509	6	0.5	GRA
25	DE-Geb	51.1	10.914	6	1	CRO
26	DE-Gri	50.95	13.513	3	0.5	GRA
27	DE-Hai	51.079	10.453	43.5	33	DBF
28	DE-Lkb	49.1	13.305	9	0.4	ENF
29	DE-Obe	50.787	13.721	42	13.5	ENF
30	DE-Seh	50.871	6.45	2	0.5	CRO
31	DE-Tha	50.962	13.565	42	30	ENF
32	DK-Sor	55.486	11.645	57	25	DBF
33	FI-Hyy	61.847	24.295	67.2	15	ENF
34	FI-Jok	60.899	23.513	3	0.2	CRO
35	FI-Sod	67.362	26.639	23	12.7	ENF
36	FR-Gri	48.844	1.952	2.8	2	CRO
37	FR-LBr	44.717	-0.769	25	18	ENF
38	IT-CA1	42.38	12.027	5	1	DBF
39	IT-CA2	42.377	12.026	5	0.5	CRO
40	IT-CA3	42.38	12.022	5	1	DBF
41	IT-Col	41.849	13.588	25.2	20.2	DBF
42	IT-Cp2	41.704	12.357	15	12	EBF
43	IT-Cpz	41.705	12.376	15	12	EBF
44	IT-Lav	45.956	11.281	28	28	ENF
45	IT-MBo	46.015	11.046	2.5	0.3	GRA
46	IT-Noe	40.606	8.151	2	1.75	CSH
47	IT-PT1	45.201	9.061	33	26.6	DBF
48	IT-Ren	46.587	11.434	41	31	ENF
49	IT-SRo	43.728	10.284	23.5	18	ENF
50	IT-Tor	45.844	7.578	2.5	0.5	GRA
51	NL-Loo	52.167	5.744	52	15.9	ENF
52	RU-Ha1	54.725	90.002	2.5	0.5	GRA
53	SD-Dem	13.283	30.478	9	5	SAV
54	US-AR1	36.427	-99.42	4	1	GRA
55	US-AR2	36.636	-99.598	4	1	GRA
56	US-ARM	36.606	-97.489	60	0.5	CRO
57	US-Blo	38.895	-120.633	8.5	4	ENF
58	US-GLE	41.367	-106.24	22.65	18	ENF
59	US-KS2	28.609	-80.672	4.1	2	CSH
60	US-Me2	44.452	-121.557	32	16	ENF
61	US-MMS	39.323	-86.413	46	27	DBF

62	US-Ne1	41.165	-96.477	6.2	2	CRO
63	US-Ne2	41.165	-96.47	6.2	2	CRO
64	US-Syv	46.242	-89.348	36	27	MF
65	US-Wi9	46.619	-91.081	9	2.3	ENF
66	US-Wi8	46.722	-91.252	3	1.5	DBF
67	US-Wi7	46.649	-91.069	3	0.5	OSH
68	US-Wi6	46.625	-91.298	3	0.5	OSH
69	US-Var	38.413	-120.951	2	0.3	GRA
70	US-Wi5	46.653	-91.086	6	4	ENF
71	US-Wi4	46.739	-91.166	23	18	ENF
72	US-Wi3	46.635	-91.099	26	21	DBF
73	US-WCr	45.806	-90.08	29.6	24	DBF
74	US-Wi2	46.687	-91.153	9	6	ENF
75	US-Wi1	46.73	-91.233	9	6	DBF
76	US-UMd	45.563	-84.698	34	22	DBF
77	US-Twt	38.109	-121.653	3.15	0.5	CRO
78	US-UMB	45.56	-84.714	46	22	DBF
79	US-Ton	38.432	-120.966	23	9.41	WSA
80	US-Tw3	38.116	-121.647	2.8	0.5	CRO
81	US-Tw4	38.103	-121.641	3.7	0.1	WET
82	US-Tw2	38.105	-121.643	5.15	2	CRO
83	US-SRG	31.789	-110.828	8	2.5	GRA
84	US-SRM	31.821	-110.866	6.4	2.5	WSA
85	US-Tw1	38.107	-121.647	4.64	0.1	WET
86	US-SRC	31.908	-110.84	4.25	1.7	MF
87	US-Oho	41.555	-83.844	32	20	DBF
88	US-Prr	65.124	-147.488	11	2.44	ENF
89	US-Ne3	41.18	-96.44	6.2	2	CRO
90	US-ORv	40.02	-83.018	9.6	0.5	WET
91	US-Myb	38.05	-121.765	4.6	0.5	WET
92	US-Me6	44.323	-121.608	12	5.2	ENF
93	US-Me3	44.315	-121.608	12	3.1	ENF
94	US-Me5	44.437	-121.567	20	4	ENF
95	US-Me4	44.499	-121.622	47	33	ENF
96	US-LWW	34.96	-97.979	3	0.6	GRA
97	US-Me1	44.579	-121.5	47	33	ENF
98	US-Ha1	42.538	-72.172	30	26	DBF
99	US-IB2	41.841	-88.241	3.76	0.5	GRA
100	US-Ivo	68.487	-155.75	3	0.5	WET

101	US-Goo	34.255	-89.874	4	0.3	GRA
102	RU-Fyo	56.462	32.922	42.8	34.8	ENF
103	US-CRT	41.628	-83.347	2	1	CRO
104	US-Atq	70.47	-157.409	2.5	0.5	WET
105	US-GBT	41.366	-106.24	29	1	ENF
106	US-ARc	35.546	-98.04	4	0.5	GRA
107	SN-Dhr	15.403	-15.432	9	3	SAV
108	RU-Cok	70.829	147.494	4.7	0.3	OSH
109	US-ARb	35.55	-98.04	4	0.5	GRA
110	NL-Hor	52.24	5.071	4.3	0.5	GRA
111	PA-SPs	9.314	-79.631	3	0.09	GRA
112	PA-SPn	9.318	-79.635	15	10	DBF
113	MY-PSO	2.973	102.306	52	35	EBF
114	IT-Ro2	42.39	11.921	18.6	17	DBF
115	IT-Ro1	42.408	11.93	18.6	17	DBF
116	IT-SR2	43.732	10.291	23.5	18	ENF
117	IT-BCi	40.524	14.957	3.8	0.3	CRO
118	FR-Pue	43.741	3.596	11	6	EBF
119	IT-La2	45.954	11.285	33	30	ENF
120	IT-Isp	45.813	8.634	24	19	DBF
121	GF-Guy	5.279	-52.925	52	32	EBF
122	FR-Fon	48.476	2.78	35	25	DBF
123	GH-Ank	5.269	-2.694	65	30	EBF
124	FI-Lom	67.997	24.209	3	0.1	WET
125	FI-Let	60.642	23.96	2.75	0.1	ENF
126	ES-Amo	36.834	-2.252	3.05	0.3	OSH
127	ES-LgS	37.098	-2.966	2.25	0.2	OSH
128	DK-Fou	56.484	9.587	3.5	2	CRO
129	DE-RuS	50.866	6.447	2.2	2	CRO
130	DE-Zrk	53.876	12.889	2.63	0.1	WET
131	DE-SfN	47.806	11.328	6	2	WET
132	DE-RuR	50.622	6.304	2.6	0.1	GRA
133	DE-Lnf	51.328	10.368	44	34	DBF
134	CZ-wet	49.025	14.77	2.7	0.1	WET
135	CZ-BK1	49.502	18.537	15	9.5	ENF
136	CN-Qia	26.741	115.058	39	12	ENF
137	CN-Sw2	41.79	111.897	2	0.5	GRA
138	CN-HaM	37.37	101.18	2.5	0.2	GRA
139	CN-Ha2	37.609	101.327	2.5	0.55	WET

140	CN-Du3	42.055	116.281	4	0.2	GRA
141	CN-Din	23.173	112.536	27	20	EBF
142	CN-Du2	42.047	116.284	4	0.45	GRA
143	CH-Oe1	47.286	7.732	1.2	0.5	GRA
144	CN-Dan	30.498	91.066	2.2	0.1	GRA
145	CN-Cha	42.403	128.096	40	26	MF
146	CA-TP3	42.707	-80.348	16	13.1	ENF
147	CG-Tch	-4.289	11.656	3.8	1	SAV
148	CA-TP4	42.71	-80.357	28	21.8	ENF
149	CA-TPD	42.635	-80.558	35.7	25.7	DBF
150	CA-Obs	53.987	-105.118	25	7.2	ENF
151	CA-TP1	42.661	-80.56	3	2.8	ENF
152	CA-TP2	42.774	-80.459	15	11.1	ENF
153	CA-Oas	53.629	-106.198	39	22	DBF
154	CA-NS6	55.917	-98.964	8	4	OSH
155	CA-NS5	55.863	-98.485	9	2	ENF
156	CA-NS7	56.636	-99.948	4.25	0.25	OSH
157	CA-NS4	55.914	-98.381	10	7	ENF
158	CA-Man	55.88	-98.481	30	10	ENF
159	CA-NS3	55.912	-98.382	10	7	ENF
160	CA-NS2	55.906	-98.525	20	16	ENF
161	CA-NS1	55.879	-98.484	24	18	ENF
162	BE-Vie	50.305	5.998	40	35.2	MF
163	CA-Gro	48.217	-82.156	43.3	30	MF
164	BE-Bra	51.308	4.52	42	23	MF
165	BR-Sa1	-2.857	-54.959	57.8	41	EBF
166	AU-Ade	-13.077	131.118	16.5	12.5	WSA
167	AU-TTE	-22.287	133.64	10	4.85	OSH
168	AU-Rob	-17.118	145.63	40	28	EBF
169	AU-Fog	-12.545	131.307	5.5	1.5	WET
170	AU-Cum	-33.615	150.724	29	24	EBF

S2. Formulae from Andreas et al. (2013)

The formulae cited in section 2.1 coming from Andreas et al. (2013) are all functions of temperature (in degrees Celsius).

Saturation vapor pressure e^* (Pa) is given by:

$e^*(T) = 6.1121*1.004\exp[17.502T/(240.97+T)]$, when $T>0$, and

$e^*(T) = 6.1115*1.004\exp[22.452T/(272.55+T)]$, when $T\leq 0$.

The slope of the saturate vapor pressure curve Δ (Pa/K) is given by:

$\Delta(T) = e^{*}(T)\ [17.502*240.97/(240.97+T)]^{2}$, where $T>0$, and

$\Delta(T) = e^{*}(T)[22.452*272.55/(272.55+T)]^{2}$, where $T\leq 0$.

The latent heat of evaporation lv (J/kg) is given by:

$l_v = (25-0.02274T)100000$, when $T>0$ and

$l_v = (28.34-0.00149T)100000$, when $T\leq 0$.