



Supplement of

Accuracy of five ground heat flux empirical simulation methods in the surface-energy-balance-based remote-sensing evapotranspiration models

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Supplementary Materials

Table S1. FLUXNET observation sites used in this study

Site_ID	Stard	End	DOI	Site_ID	Stard	End	DOI
AR-SLu	2009	2011	10.18140/FLX/1440191	IT-Cp2	2012	2014	10.18140/FLX/1440233
AR-Vir*	2009	2012	10.18140/FLX/1440192	IT-Cpz	1997	2009	10.18140/FLX/1440168
AT-Neu	2002	2012	10.18140/FLX/1440121	IT-Isp	2013	2014	10.18140/FLX/1440234
AU-Ade	2007	2009	10.18140/FLX/1440193	IT-La2*	2000	2002	10.18140/FLX/1440235
AU-ASM	2010	2014	10.18140/FLX/1440194	IT-Lav	2003	2014	10.18140/FLX/1440169
AU-Cpr	2010	2014	10.18140/FLX/1440195	IT-MBo	2003	2013	10.18140/FLX/1440170
AU-Cum	2012	2014	10.18140/FLX/1440196	IT-Noe	2004	2014	10.18140/FLX/1440171
AU-DaP	2007	2013	10.18140/FLX/1440123	IT-PT1	2002	2004	10.18140/FLX/1440172
AU-DaS	2008	2014	10.18140/FLX/1440122	IT-Ren	1998	2013	10.18140/FLX/1440173
AU-Dry	2008	2014	10.18140/FLX/1440197	IT-Ro1*	2000	2008	10.18140/FLX/1440174
AU-Emr	2011	2013	10.18140/FLX/1440198	IT-Ro2	2002	2012	10.18140/FLX/1440175
AU-Fog	2006	2008	10.18140/FLX/1440124	IT-SR2	2013	2014	10.18140/FLX/1440236
AU-Gin	2011	2014	10.18140/FLX/1440199	IT-SRo	1999	2012	10.18140/FLX/1440176
AU-GWW	2013	2014	10.18140/FLX/1440200	IT-Tor	2008	2014	10.18140/FLX/1440237
AU-How	2001	2014	10.18140/FLX/1440125	JP-BBY	2015	2018	
AU-Lox	2008	2009	10.18140/FLX/1440247	JP-SwL*	2016	2016	
AU-RDF	2011	2013	10.18140/FLX/1440201	KR-CRK	2015	2018	
AU-Rig	2011	2014	10.18140/FLX/1440202	MY-PSO	2003	2009	10.18140/FLX/1440240
AU-Rob	2014	2014	10.18140/FLX/1440203	NL-Hor	2004	2011	10.18140/FLX/1440177
AU-Stp	2008	2014	10.18140/FLX/1440204	NL-Loo	1996	2014	10.18140/FLX/1440178
AU-TTE	2012	2014	10.18140/FLX/1440205	NZ-Kop*	2012	2015	
AU-Wac	2005	2008	10.18140/FLX/1440127	PA-SPn*	2007	2009	10.18140/FLX/1440180
AU-Whr	2011	2014	10.18140/FLX/1440206	PA-SPs*	2007	2009	10.18140/FLX/1440179
AU-Wom	2010	2014	10.18140/FLX/1440207	PH-RiF	2012	2014	
AU-Ync	2012	2014	10.18140/FLX/1440208	RU-Ch2*	2014	2016	
BE-Bra	1996	2014	10.18140/FLX/1440128	RU-Che	2002	2016	10.18140/FLX/1440181
BE-Lon	2004	2014	10.18140/FLX/1440129	RU-Cok*	2003	2016	10.18140/FLX/1440182
BE-Vie	1996	2014	10.18140/FLX/1440130	RU-Fy2	2015	2018	
BR-Npw*	2013	2016		RU-Fyo	1998	2014	10.18140/FLX/1440183
BR-Sa3	2000	2004	10.18140/FLX/1440033	RU-Ha1	2002	2004	10.18140/FLX/1440184
CA-Gro	2003	2014	10.18140/FLX/1440034	RU-Tks*	2010	2014	10.18140/FLX/1440244
CA-Man*	1994	2008	10.18140/FLX/1440035	SD-Dem	2005	2009	10.18140/FLX/1440186
CA-NS1*	2001	2005	10.18140/FLX/1440036	SE-Deg	2014	2018	
CA-NS2*	2001	2005	10.18140/FLX/1440037	SJ-Adv	2011	2014	10.18140/FLX/1440241
CA-NS3*	2001	2005	10.18140/FLX/1440038	SN-Dhr	2010	2013	10.18140/FLX/1440246
CA-NS4*	2002	2005	10.18140/FLX/1440039	US-A03*	2015	2018	
CA-NS5*	2001	2005	10.18140/FLX/1440040	US-A10*	2012	2018	
CA-NS6*	2001	2005	10.18140/FLX/1440041	US-AR1	2009	2012	10.18140/FLX/1440103
CA-NS7*	2002	2005	10.18140/FLX/1440042	US-AR2	2009	2012	10.18140/FLX/1440104
CA-Oas*	1996	2010	10.18140/FLX/1440043	US-ARb	2005	2006	10.18140/FLX/1440064
CA-Obs	1997	2010	10.18140/FLX/1440044	US-ARc	2005	2006	10.18140/FLX/1440065

CA-Qfo	2003	2010	10.18140/FLX/1440045	US-ARM	2003	2012	10.18140/FLX/1440066
CA-SF1	2003	2006	10.18140/FLX/1440046	US-Atq*	2003	2016	10.18140/FLX/1440067
CA-SF2	2001	2005	10.18140/FLX/1440047	US-Beo	2013	2014	
CA-SF3	2001	2006	10.18140/FLX/1440048	US-Bes	2013	2015	
CA-TP1	2002	2014	10.18140/FLX/1440050	US-Bi1*	2016	2018	
CA-TP2	2002	2007	10.18140/FLX/1440051	US-Bi2*	2017	2018	
CA-TP3	2002	2014	10.18140/FLX/1440052	US-Blo	1997	2007	10.18140/FLX/1440068
CA-TP4	2002	2014	10.18140/FLX/1440053	US-BZB*	2014	2016	
CA-TPD	2012	2014	10.18140/FLX/1440112	US-BZF	2014	2016	
CG-Tch*	2006	2009	10.18140/FLX/1440142	US-BZS	2015	2016	
CH-Cha	2005	2016	10.18140/FLX/1440131	US-CRT*	2011	2013	10.18140/FLX/1440117
CH-Dav	1997	2017	10.18140/FLX/1440132	US-EDN*	2018	2018	
CH-Fru	2005	2014	10.18140/FLX/1440133	US-EML	2015	2018	
CH-Oe1*	2002	2008	10.18140/FLX/1440135	US-GBT	1999	2006	10.18140/FLX/1440118
CN-Cha*	2003	2005	10.18140/FLX/1440137	US-GLE	2004	2014	10.18140/FLX/1440069
CN-Cng	2007	2010	10.18140/FLX/1440209	US-Goo	2002	2006	10.18140/FLX/1440070
CN-Dan*	2004	2005	10.18140/FLX/1440138	US-Ho1	2012	2018	
CN-Din*	2003	2005	10.18140/FLX/1440139	US-IB2	2004	2011	10.18140/FLX/1440072
CN-Du2	2006	2008	10.18140/FLX/1440140	US-ICs	2014	2016	
CN-Du3	2009	2010	10.18140/FLX/1440210	US-Ivo	2004	2016	10.18140/FLX/1440073
CN-Ha2*	2003	2005	10.18140/FLX/1440211	US-KS1	2002	2002	10.18140/FLX/1440074
CN-HaM	2002	2004	10.18140/FLX/1440190	US-KS2	2003	2006	10.18140/FLX/1440075
CN-Hgu	2015	2017		US-Lin	2009	2010	10.18140/FLX/1440107
CN-Qia*	2003	2005	10.18140/FLX/1440141	US-Los*	2000	2018	10.18140/FLX/1440076
CN-Sw2*	2010	2012	10.18140/FLX/1440212	US-LWW	1997	1998	10.18140/FLX/1440077
CZ-BK1*	2004	2014	10.18140/FLX/1440143	US-Me1	2004	2005	10.18140/FLX/1440078
CZ-BK2*	2004	2012	10.18140/FLX/1440144	US-Me2	2002	2014	10.18140/FLX/1440079
CZ-wet	2006	2014	10.18140/FLX/1440145	US-Me3*	2004	2009	10.18140/FLX/1440080
DE-Akm*	2009	2014	10.18140/FLX/1440213	US-Me4	1996	2000	10.18140/FLX/1440081
DE-Dgw*	2015	2018		US-Me5	2000	2002	10.18140/FLX/1440082
DE-Geb	2001	2014	10.18140/FLX/1440146	US-Me6	2010	2014	10.18140/FLX/1440099
DE-Gri	2004	2014	10.18140/FLX/1440147	US-MRM	2012	2013	
DE-Hai	2000	2012	10.18140/FLX/1440148	US-Myb*	2010	2018	10.18140/FLX/1440105
DE-Hte*	2011	2018		US-NC4*	2012	2016	
DE-Kli	2004	2014	10.18140/FLX/1440149	US-NGB*	2012	2018	
DE-Lkb	2009	2013	10.18140/FLX/1440214	US-NGC	2017	2018	
DE-Lnf	2002	2012	10.18140/FLX/1440150	US-NR1	1998	2014	10.18140/FLX/1440087
DE-Obe	2008	2014	10.18140/FLX/1440151	US-Oho	2004	2013	10.18140/FLX/1440088
DE-RuR	2011	2014	10.18140/FLX/1440215	US-ORv*	2011	2015	10.18140/FLX/1440102
DE-RuS	2011	2014	10.18140/FLX/1440216	US-OWC	2015	2016	
DE-Seh	2007	2010	10.18140/FLX/1440217	US-Prr	2010	2014	10.18140/FLX/1440113
DE-SfN	2012	2014	10.18140/FLX/1440219	US-Snd*	2010	2015	
DE-Spw*	2010	2014	10.18140/FLX/1440220	US-Sne*	2016	2018	
DE-Tha	1996	2014	10.18140/FLX/1440152	US-SRC	2008	2014	10.18140/FLX/1440098
DE-Zrk	2013	2018	10.18140/FLX/1440221	US-SRG	2008	2014	10.18140/FLX/1440114
DK-Eng	2005	2008	10.18140/FLX/1440153	US-SRM	2004	2014	10.18140/FLX/1440090
DK-Fou	2005	2005	10.18140/FLX/1440154	US-Srr	2014	2017	

DK-Sor	1996	2014	10.18140/FLX/1440155	US-StJ	2016	2016	
ES-Amo	2007	2012	10.18140/FLX/1440156	US-Syv	2001	2014	10.18140/FLX/1440091
ES-LgS	2007	2009	10.18140/FLX/1440225	US-Ton	2001	2014	10.18140/FLX/1440092
ES-LJu	2004	2013	10.18140/FLX/1440157	US-Tw1*	2011	2018	10.18140/FLX/1440108
FI-Hyy	1996	2016	10.18140/FLX/1440158	US-Tw2	2012	2013	10.18140/FLX/1440109
FI-Jok	2000	2003	10.18140/FLX/1440159	US-Tw3	2013	2014	10.18140/FLX/1440110
FI-Let	2009	2012	10.18140/FLX/1440227	US-Tw4	2013	2018	10.18140/FLX/1440111
FI-Lom	2006	2010	10.18140/FLX/1440228	US-Tw5*	2018	2018	
FI-Si2*	2012	2016		US-Twt	2009	2017	10.18140/FLX/1440106
FI-Sod	2001	2014	10.18140/FLX/1440160	US-Uaf	2011	2018	
FR-Fon*	2005	2014	10.18140/FLX/1440161	US-UMd*	2007	2014	10.18140/FLX/1440101
FR-Gri	2004	2014	10.18140/FLX/1440162	US-Var	2000	2014	10.18140/FLX/1440094
FR-LBr	1996	2008	10.18140/FLX/1440163	US-WCr	1999	2014	10.18140/FLX/1440095
FR-Pue	2000	2014	10.18140/FLX/1440164	US-Whs	2007	2014	10.18140/FLX/1440097
GF-Guy*	2004	2014	10.18140/FLX/1440165	US-Wi0	2002	2002	10.18140/FLX/1440055
GH-Ank	2011	2014	10.18140/FLX/1440229	US-Wi1	2003	2003	10.18140/FLX/1440054
GL-NuF*	2008	2014	10.18140/FLX/1440222	US-Wi2	2003	2003	10.18140/FLX/1440056
GL-ZaF	2008	2011	10.18140/FLX/1440223	US-Wi3	2002	2004	10.18140/FLX/1440057
GL-ZaH*	2000	2014	10.18140/FLX/1440224	US-Wi4	2002	2005	10.18140/FLX/1440058
HK-MPM	2016	2018		US-Wi5*	2004	2004	10.18140/FLX/1440059
ID-Pag	2016	2017		US-Wi6	2002	2003	10.18140/FLX/1440060
IT-BCi	2004	2018	10.18140/FLX/1440166	US-Wi7*	2005	2005	10.18140/FLX/1440061
IT-CA1	2011	2014	10.18140/FLX/1440230	US-Wi8	2002	2002	10.18140/FLX/1440062
IT-CA2	2011	2014	10.18140/FLX/1440231	US-Wi9*	2004	2005	10.18140/FLX/1440063
IT-CA3	2011	2014	10.18140/FLX/1440232	US-Wkg	2004	2014	10.18140/FLX/1440096
IT-Cas	2009	2010		US-WPT*	2011	2013	10.18140/FLX/1440116
IT-Col	1996	2014	10.18140/FLX/1440167	ZM-Mon	2000	2009	10.18140/FLX/1440189

Note: * represents the soil heat flux (G') is not observed.

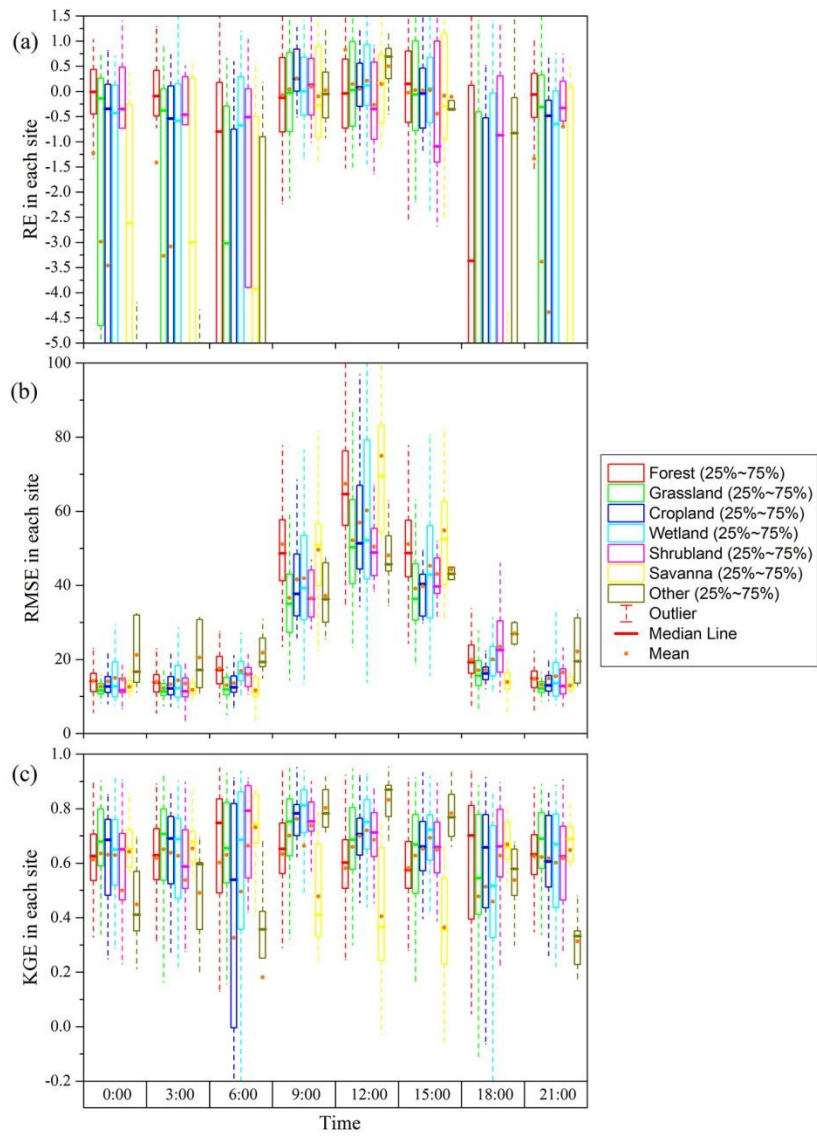


Figure S1: The RE, RMSE and KGE simulated by the LC method in each land cover type.

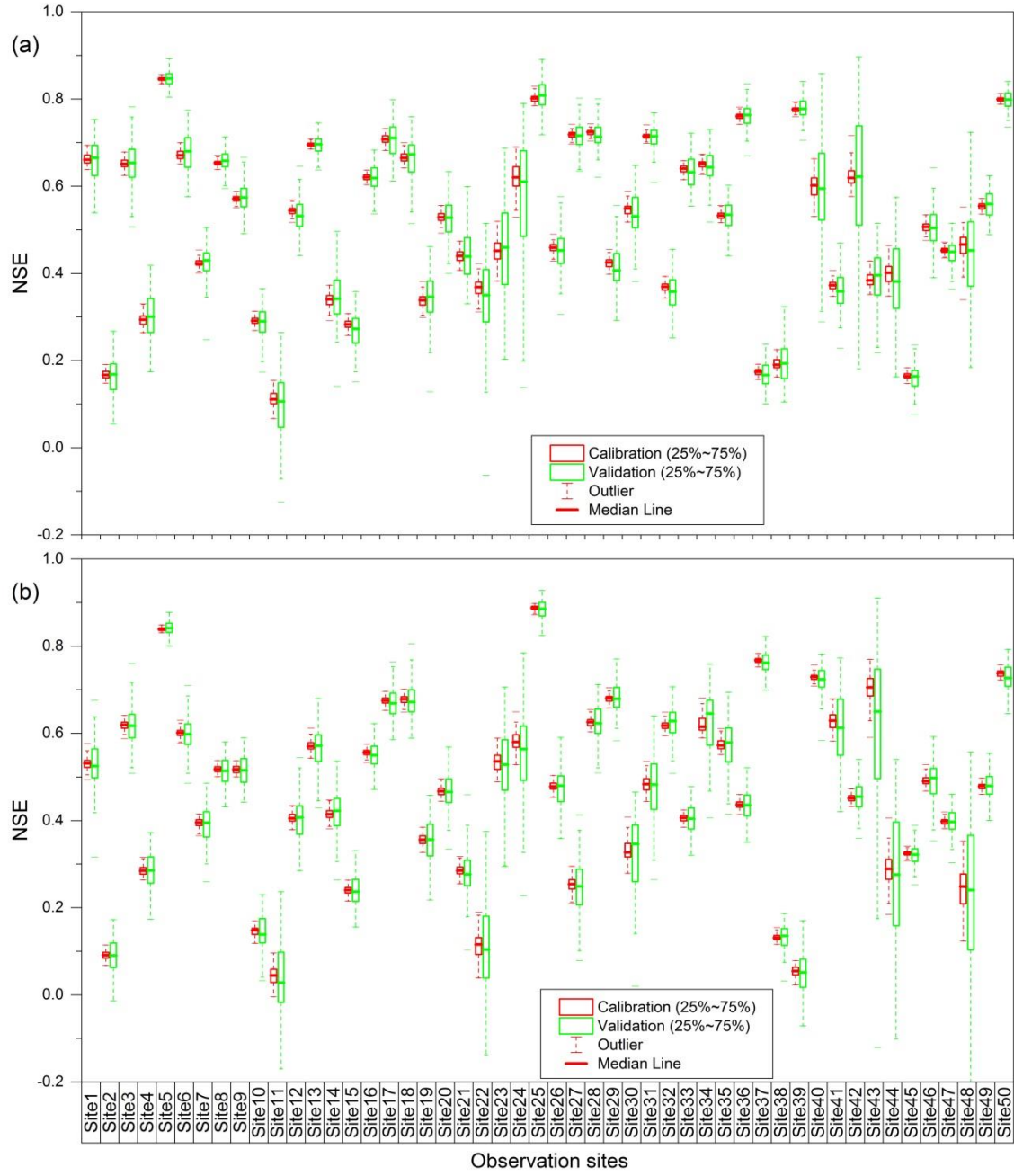


Figure S2: The performance of the LC_NDVI_P method in calibration and validation datasets at (a) 1030 and (b) 1330, respectively.