



Journal of Geophysical Research Letters

Supporting Information for

**SEBALIGEE v2: Global Evapotranspiration Estimation Replacing
Hot/Cold Pixels with Machine Learning**

Mario Mhawej¹, Xiang Gao², John M. Reilly², and Yaser Abunnasr^{1, †}

¹ Department of Landscape Design and Ecosystem Management, Faculty of Agricultural and Food Sciences, American University of Beirut, Bliss St., Beirut 2020-1100, Lebanon;

² Massachusetts Institute of Technology (MIT), Department of Earth, Atmospheric and PlanETry Sciences 77 Massachusetts Avenue, 54-918, Cambridge, MA 02139.

Contents of this file

Tables S1 to S3

Figure S1 to S3

Table S1: SPEI Thresholds for Drought/Wet Classification

SPEI Value	Meaning
2.0 or more	extremely wet
1.6 to 1.99	very wet
1.3 to 1.59	moderately wet
0.8 to 1.29	slightly wet
0.5 to 0.79	incipient wet spell
-0.49 to 0.49	near normal
-0.79 to -0.5	incipient dry spell
-1.29 to -0.8	mild drought
-1.59 to -1.3	moderate drought
-1.99 to -1.6	severe drought
-2.0 or less	extreme drought

Table S2: Description of various Eddy Covariance Flux towers sites used in our study

Country	Flux tower name	Location (longitude, latitude)	Data DOI	Dates
Belgium	BE_LON	4.746E, 50.551N	10.18140/FLX/1440129	Jan 2014 – Nov 2014
China	-	115.788E, 40.349N	-	Jan 2016 – Dec 2017
France	FR_GRI	1.951E, 48.844N	10.18140/FLX/1440162	Sep 2013 – Oct 2014
Germany	DE_KLI	13.522E, 50.893N	10.18140/FLX/1440149	Feb 2014 – Oct 2014
	DE_GEB	10.914E, 51.099N	10.18140/FLX/1440146	Apr 2014 – Oct 2014
Italy	IT_CA2	12.026E, 42.377N	10.18140/FLX/1440231	Sep 2013 – Dec 2014
United States	US_Bi1	121.499W, 38.099N	10.17190/AMF/1480317	Jan 2017 – Dec 2021
	US_Bi2	121.535W, 38.109N	10.17190/AMF/1419513	Jan 2018 – Dec 2021
	US_Ro6	93.058W, 44.695N	10.17190/AMF/1419509	Feb 2017 – Dec 2017
	US_TW3	121.646W, 38.115N	10.18140/FLX/1440110	Sep 2013 – Oct 2014
	US_TWT	121.653W, 38.108N	10.18140/FLX/1440106	Sep 2013 – Oct 2014

Table S3: Highest R^2 values for the step-wise regressions between ET/aKc of corn, soybeans and winter and various variables from 2013 to 2021. AT, DT, RN, and WIND represent air temperature; dewpoint temperature, surface net solar radiation and wind speed, respectively. SPEI-14 and SPEI-30 are SPEI calculated on 14 days and 30-days, respectively.

	Highest R^2				
	One variable	Two variables	Three variables	Four variables	Five variables
Corn aKc	WIND (0.2)	WIND + DT (0.24)	WIND + DT + AT (0.31)	WIND + DT + AT + SPEI-90 (0.34)	WIND + DT + AT + SPEI-30 + RN (0.35)
Soybeans aKc	WIND (0.14)	WIND + DT (0.2)	WIND + DT + AT (0.26)	WIND + DT + AT + SPEI-14 (0.29)	WIND + DT + AT + SPEI-14 + RN (0.31)
Winter Wheat aKc	WIND (0.01)	WIND + DT (0.11)	WIND + DT + AT (0.14)	WIND + DT + AT + SPEI-30 (0.19)	WIND + DT + AT + SPEI-30 + RN (0.20)
Corn ET	RN (0.71)	RN + WIND (0.75)	RN + WIND + DT (0.77)	RN + WIND + DT + SPEI-14 (0.79)	RN + WIND + DT + SPEI-14 + AT (0.8)
Soybeans ET	RN (0.73)	RN + WIND (0.78)	RN + WIND + DT (0.79)	RN + DT + AT + SPEI-14 (0.81)	RN + WIND + DT + AT + SPEI-14 (0.84)
Winter Wheat ET	RN (0.54)	RN + SPEI-30 (0.60)	RN + SPEI-30 + AT (0.60)	RN + SPEI-30 + AT + DT (0.63)	RN + SPEI-30 + AT + DT + WIND (0.65)

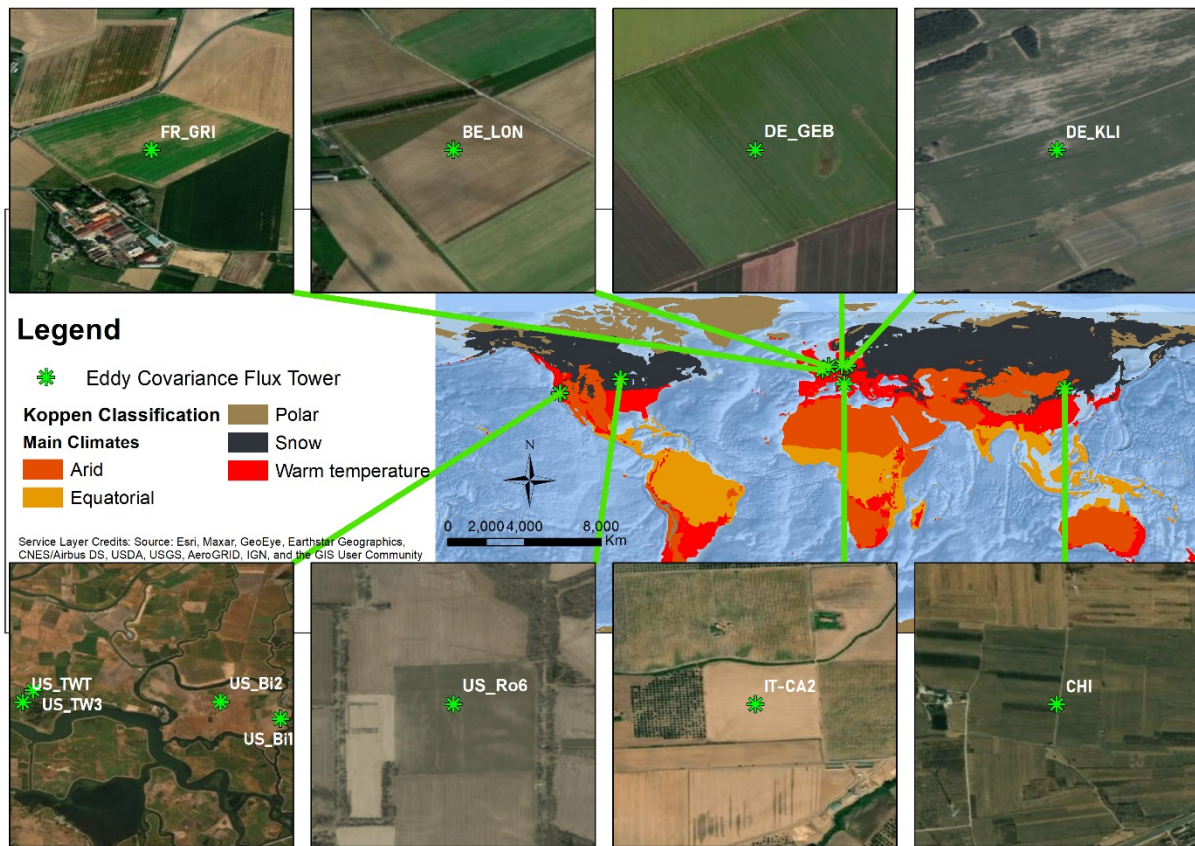


Figure S1: Location of the flux towers in six countries as well as a Google Earth satellite view above each tower. The world map at the middle corresponds to Koppen climate classification

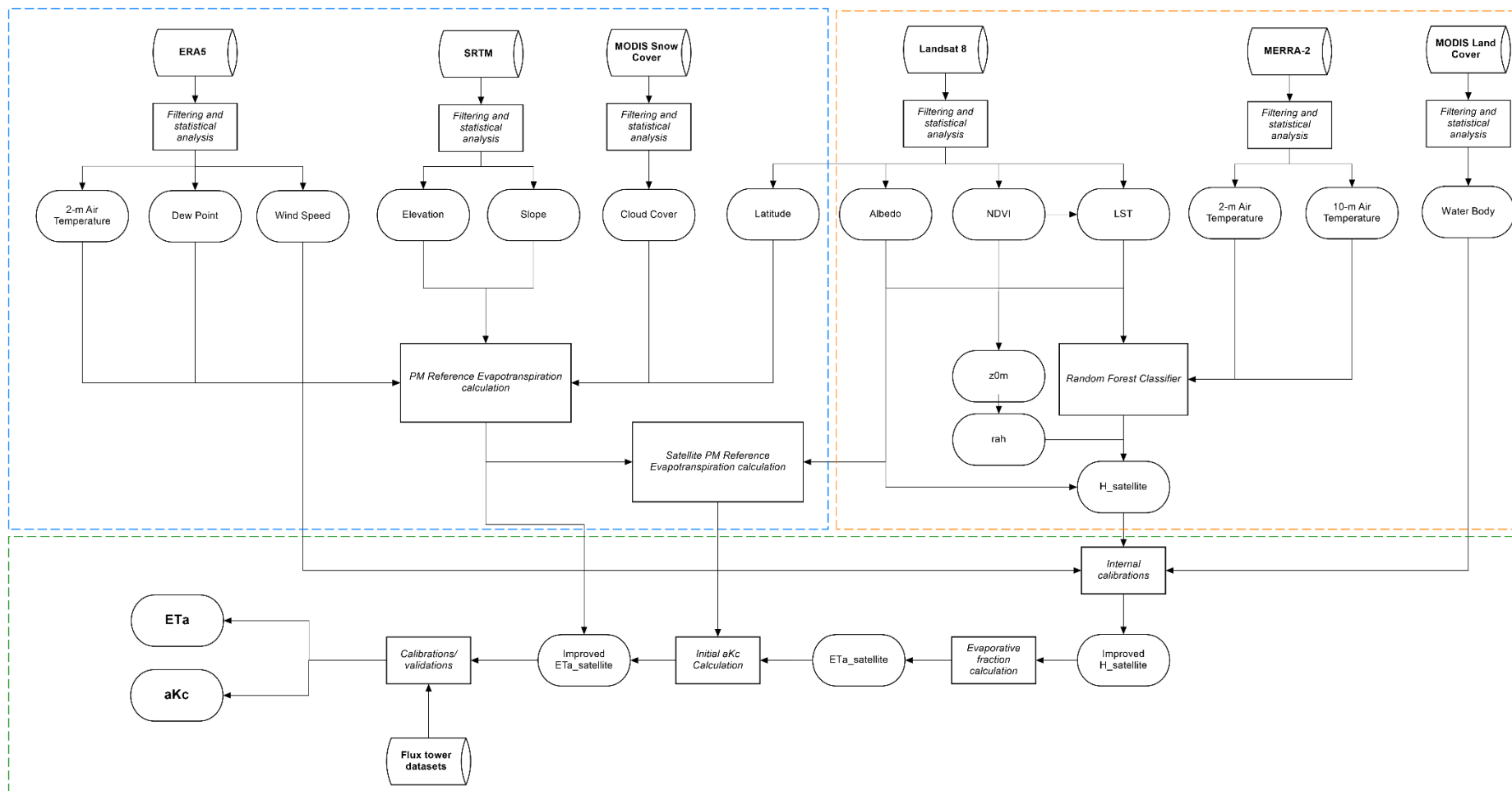


Figure S2: SEBALIGEE v2 simplified flowchart of the used inputs and generated output

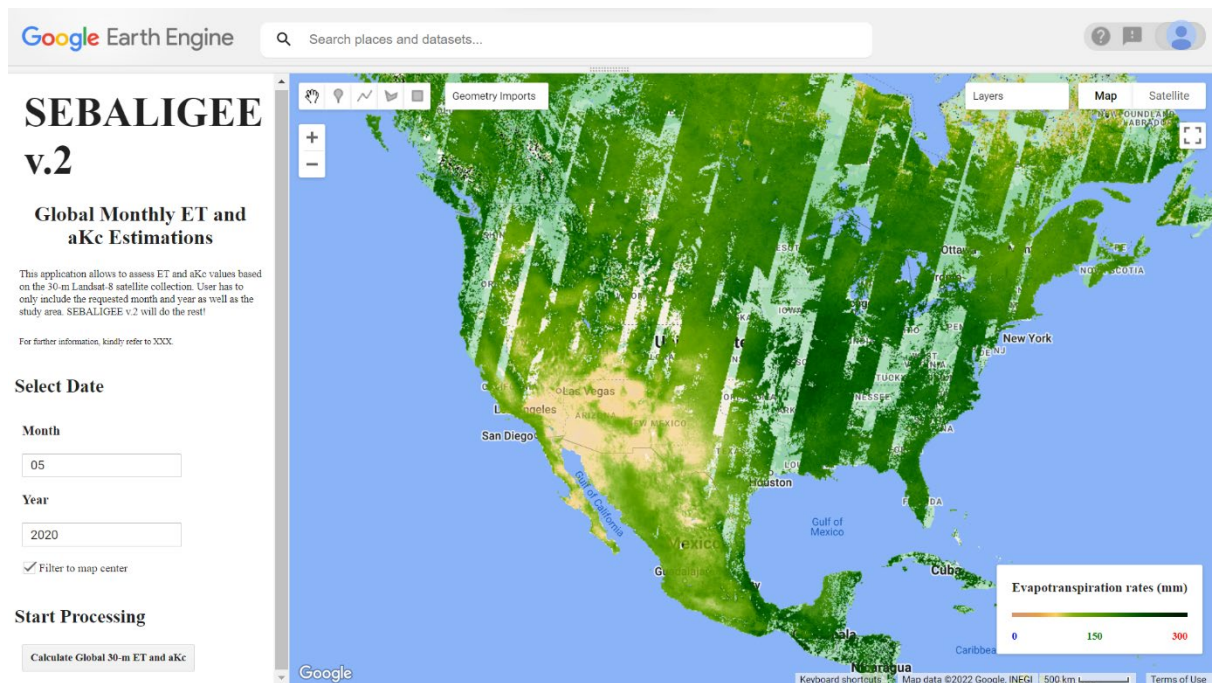


Figure S3: Snapshot of the SEBALIGEE v.2 system interface hosted over the GEE platform