



Supplement of

Assessing evapotranspiration dynamics across central Europe in the context of land–atmosphere drivers

Anke Fluhrer et al.

Correspondence to: Anke Fluhrer (anke.fluhrer@dlr.de)

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Supplement

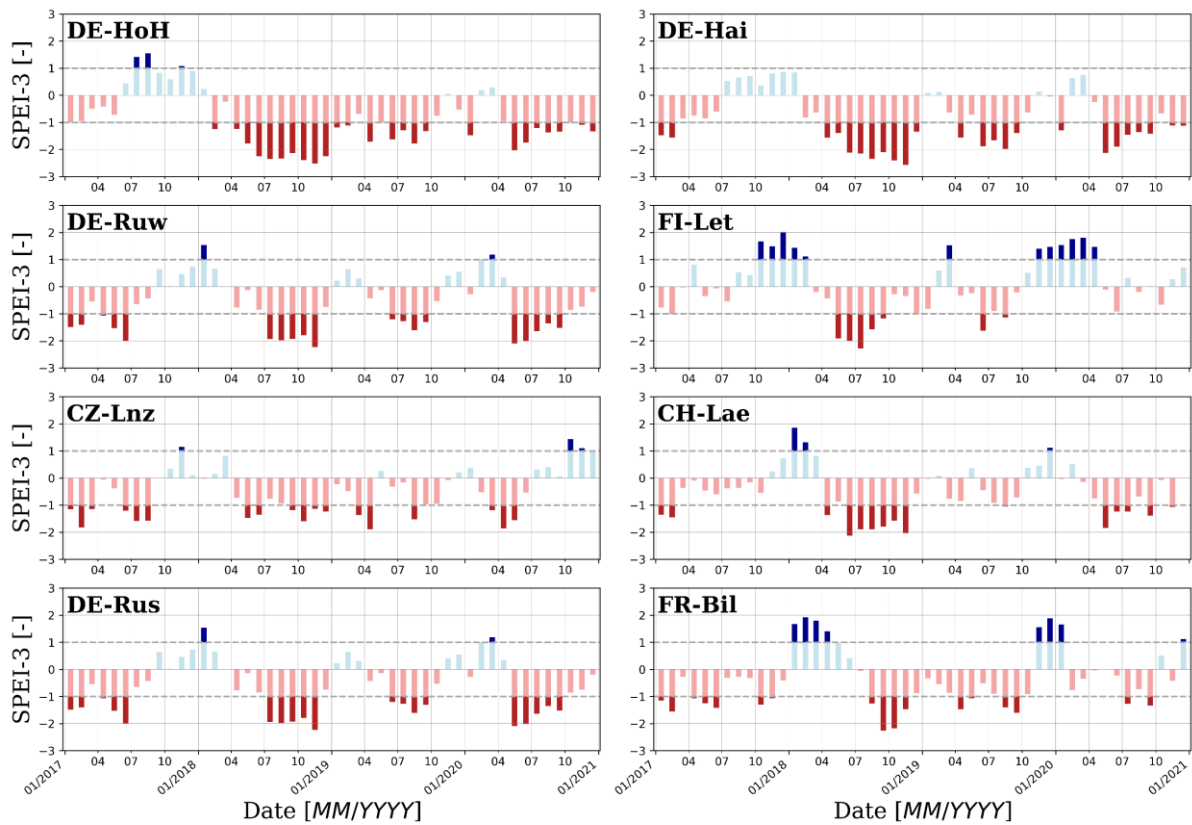


Figure S1. The 3-monthly standardized precipitation-evapotranspiration index, SPEI [-], (Beguería et al., 2023) for the period 2017-2020 at investigated ICOS stations. The vertical dashed lines give the thresholds at -1 and 1 for indicating too dry or too wet months, respectively.

5 Table S1. Coordinates, ecosystem type, altitude, climate zone and meteorological information for every investigated ICOS station.

ICOS Station	Coordinates (Latitude, Longitude)	Ecosystem type	Altitude [m]	Climate Zone (Köppen- Geiger)	Mean annual precipitation / air temperature
DE-HoH	52.08656, 11.22235	deciduous broad- leaved (DBF)	217	Cfb	1.26 [mm/day] / 10.36 [°C]
DE-Ruw	50.50493, 6.3309627	evergreen needle- leaved (ENF)	610	Cfb	2.89 [mm/day] / 8.98 [°C]
CZ-Lnz	48.68155, 16.946331	mixed forest (MF)	182	Dfb	1.42 [mm/day] / 11.44 [°C]
DE-Rus	50.865906, 6.4471445	agriculture	106	Cfb	1.45 [mm/day] / 11.59 [°C]
DE-Hai	51.079212, 10.452168	deciduous broad- leaved (DBF)	438	Cfb	1.87 [mm/day] / 9.55 [°C]
FI-Let	60.64183, 23.95952	evergreen needle- leaved (ENF)	125	Dfb	1.74 [mm/day] / 5.67 [°C]
CH-Lae	47.478333, 8.364389	mixed forest (MF)	682	Dfb	2.33 [mm/day] / 10.33 [°C]
FR-Bil	44.493652, - 0.956092	agriculture	39	Cfb	3.04 [mm/day] / 14.1 [°C]

Table S2. Percentages per landcover classes according to the Corine Land Cover (CLC) 2018 (European Environment Agency, 2019) within the 3 km x 3 km footprint around every investigated ICOS station (see Fig. 2).

Corine Land Cover (CLC) classes 2018 [%]	ICOS STATIONS							
	DE- HoH	DE- Hai	DE- Ruw	FI- Let	CZ- Lnz	CH- Lae	DE- Rus	FR- Bil
Urban	2.2				0.7	13.3	17.2	
Industrial or commercial units							5.1	
Mineral extraction sites							4.4	
Non-irrigated arable land	45.6	3.3			3.2	32.2	63.1	14.2
Pastures		11.0	4.5		3.9		6.7	
Complex cultivation patterns						4.3		
Land occupied by agriculture with areas of natural vegetation					6.7	7.7		
Broad-leaved forest	45.5	82.4	3.2		56.5	10.2	2	
Coniferous forest	2.7		86.7	51.1				41.4
Mixed forest	2.6		3.3	36.7		30.3	1.3	
Natural grasslands		3.2						
Transitional woodland-shrub				7.9	27.6			44.4
Water bodies				3.9				
Others	1.4	0.8	2.3	0.4	1.4	2.1	0.2	

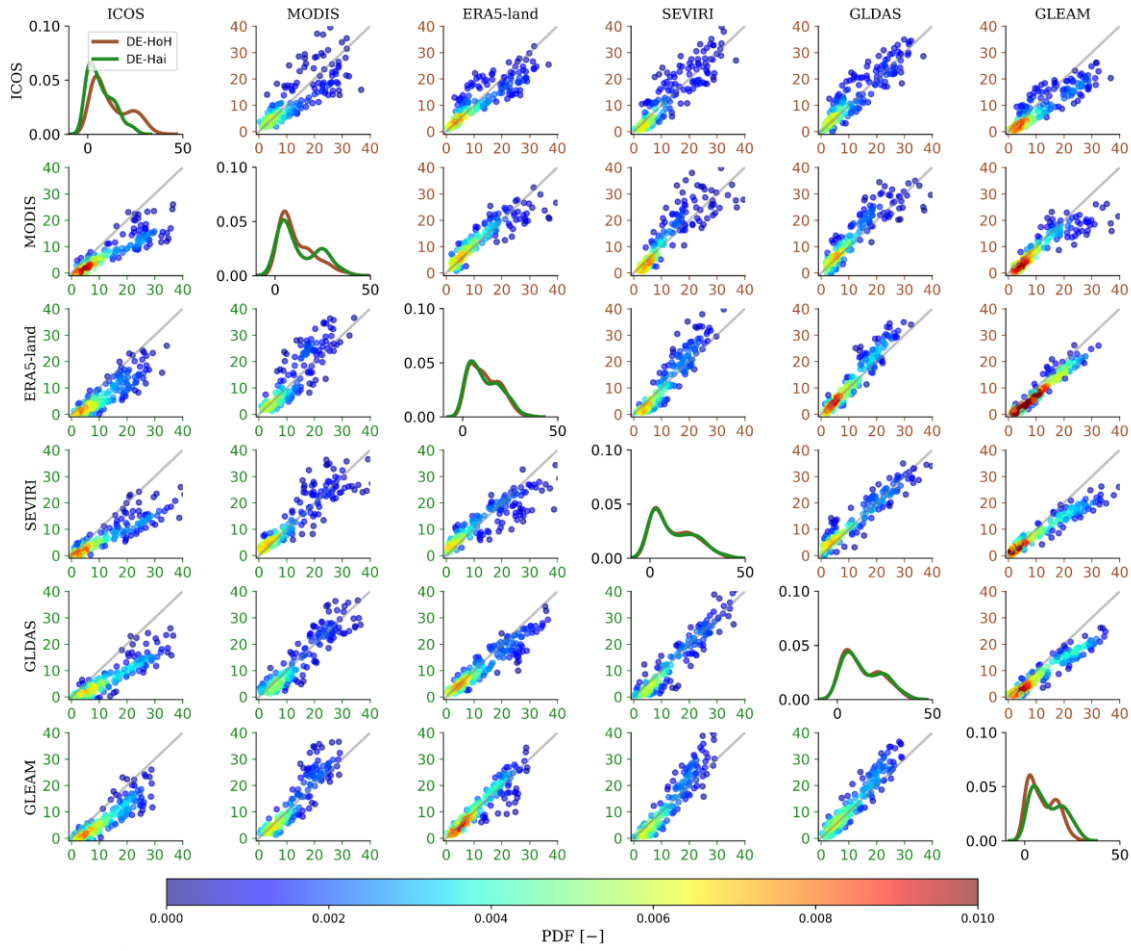


Figure S2. Comparison of seasonal dynamics of ET [mm/8-days] products for the period 2017-2020 at investigated ICOS stations DE-HoH (right panels above the diagonal of the matrix) and DE-Hai (left panels below the diagonal of the matrix). All time series were averaged to 8-daily sums at MODIS dates, and cleaned for daily and weekly dynamics using a Savitzky-Golay filter with a window size of 31 days.

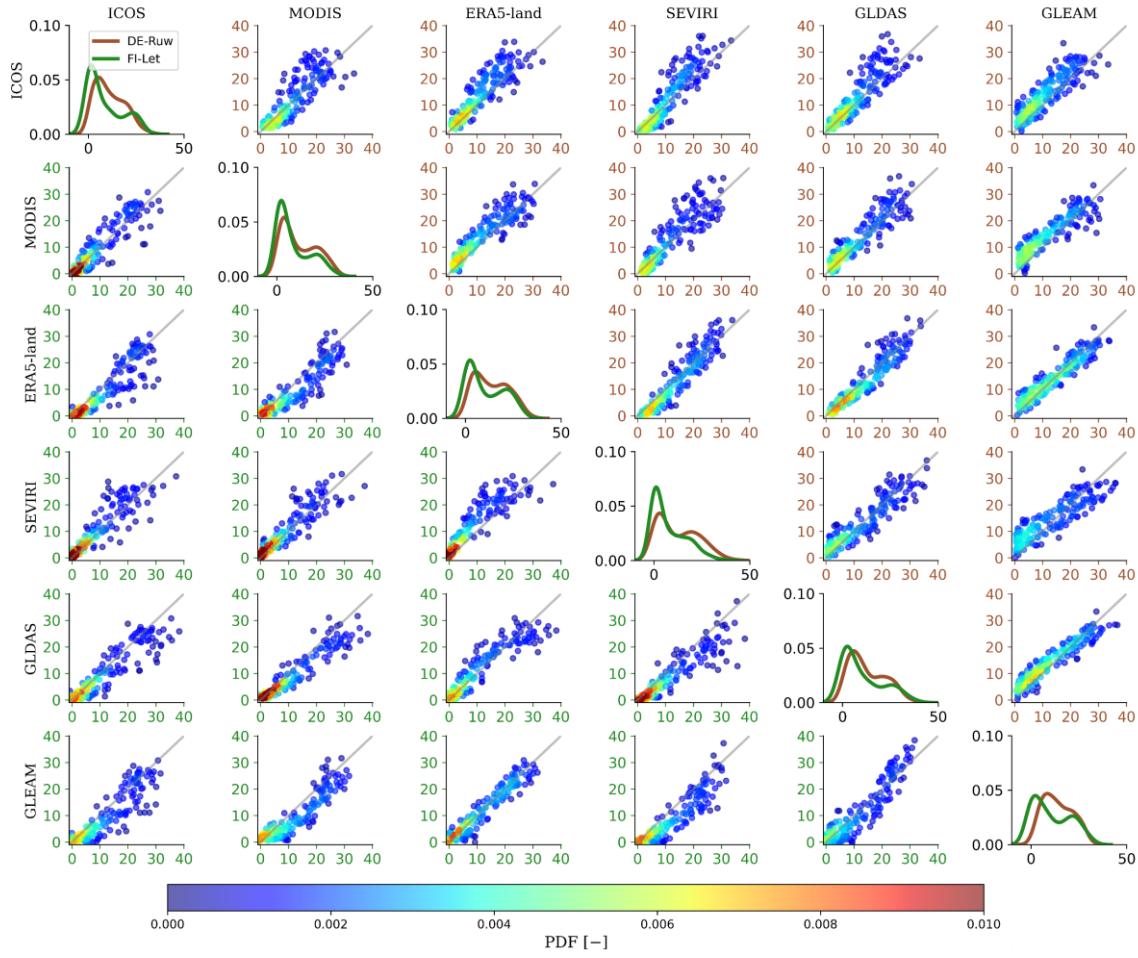
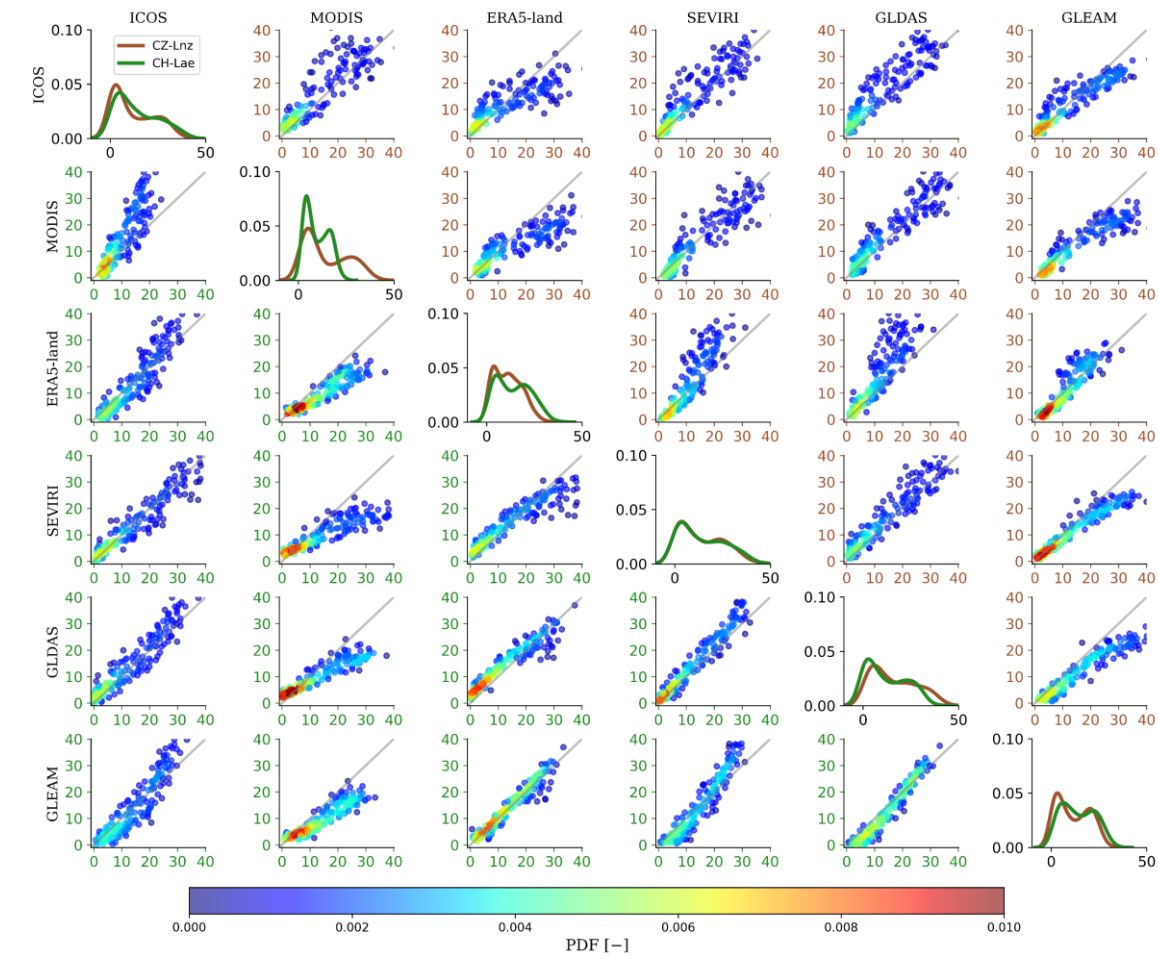


Figure S3. Same as figure S2 but for ICOS stations DE-Ruw (right panels above the diagonal of the matrix) and FI-Let (left panels below the diagonal of the matrix).



25 Figure S4. Same as figure S2 but for ICOS stations CZ-Lnz (right panels above the diagonal of the matrix) and CH-Lae (left panels below the diagonal of the matrix).

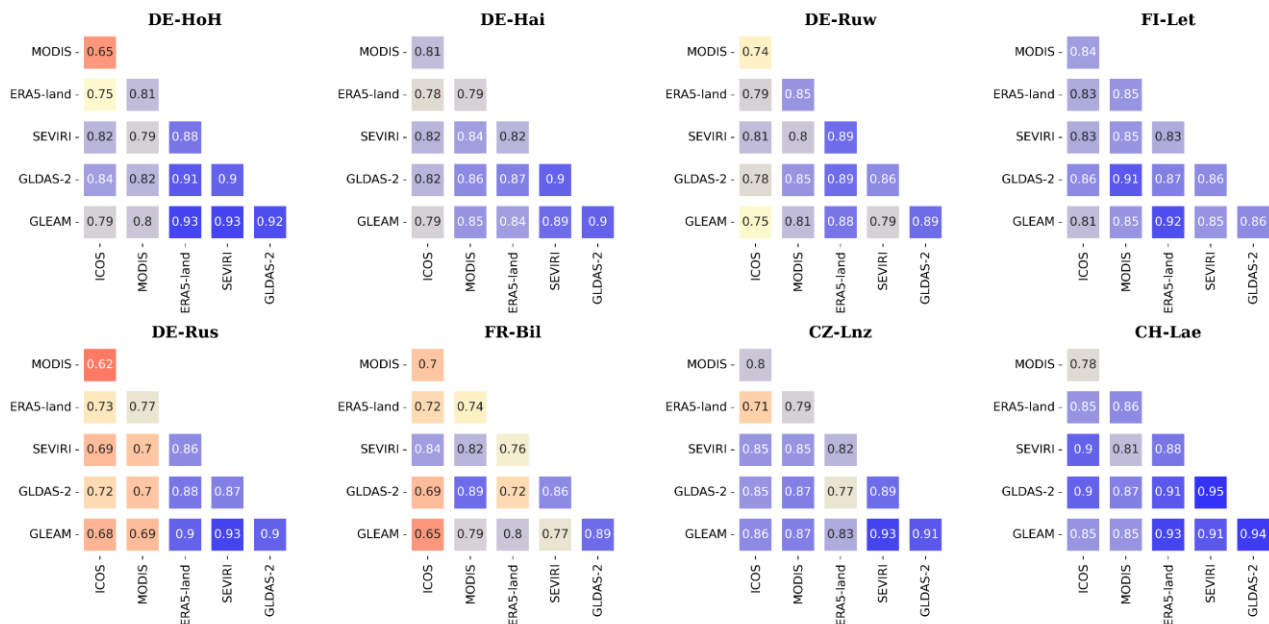


Figure S5. Pearson's coefficient of determination (R^2) among all ET [mm/8-days] products for the period 2017-2020 at investigated ICOS stations. All time series were averaged to 8-daily sums at MODIS dates, and cleaned for daily and weekly dynamics using a Savitzky-Golay filter with a window size of 31 days. The color ranges from low correlations (red) to high correlations (blue).

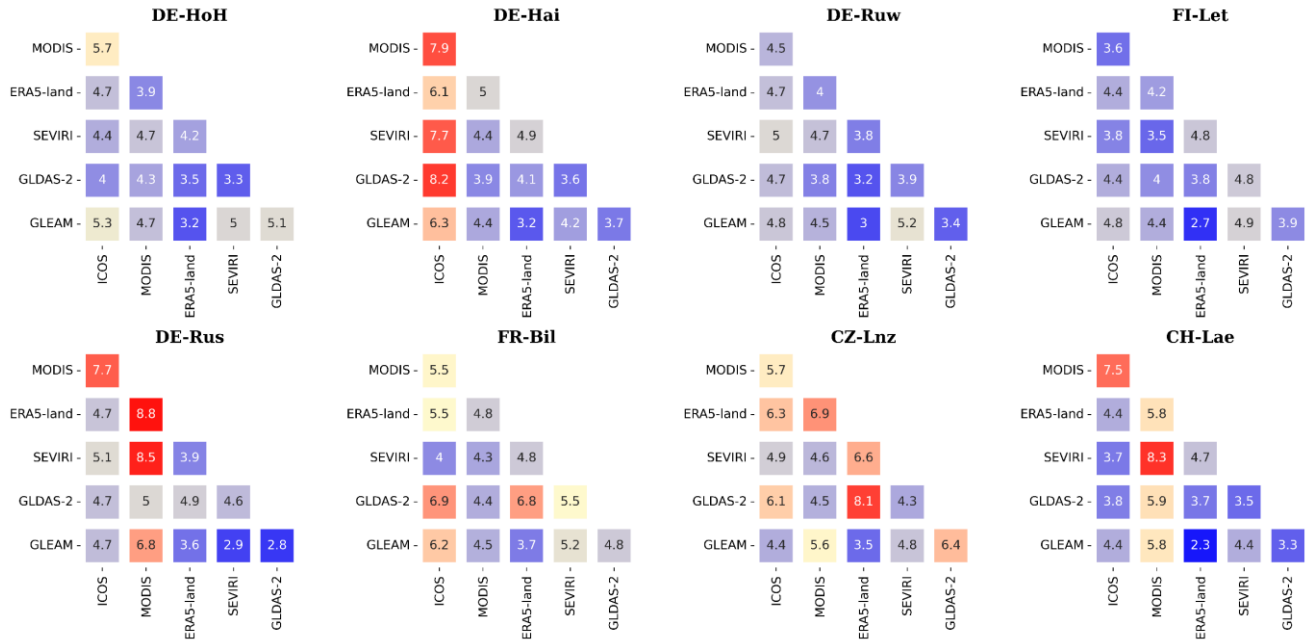


Figure S6. Root-mean square error (RMSE) [mm/8-days] between all ET [mm/8-days] products for the period 2017-2020 at investigated ICOS stations. All time series were averaged to 8-daily sums at MODIS dates, and cleaned for daily and weekly dynamics using a Savitzky-Golay filter with a window size of 31 days. The color ranges from low RMSE (blue) to high RMSE (red).

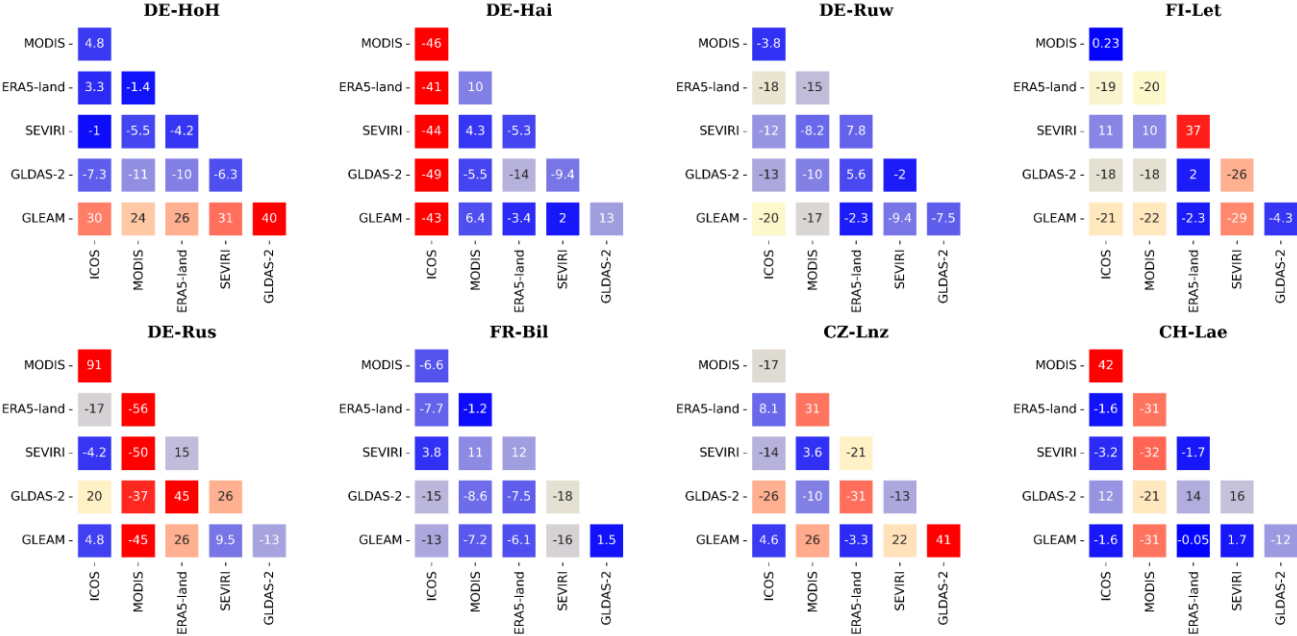
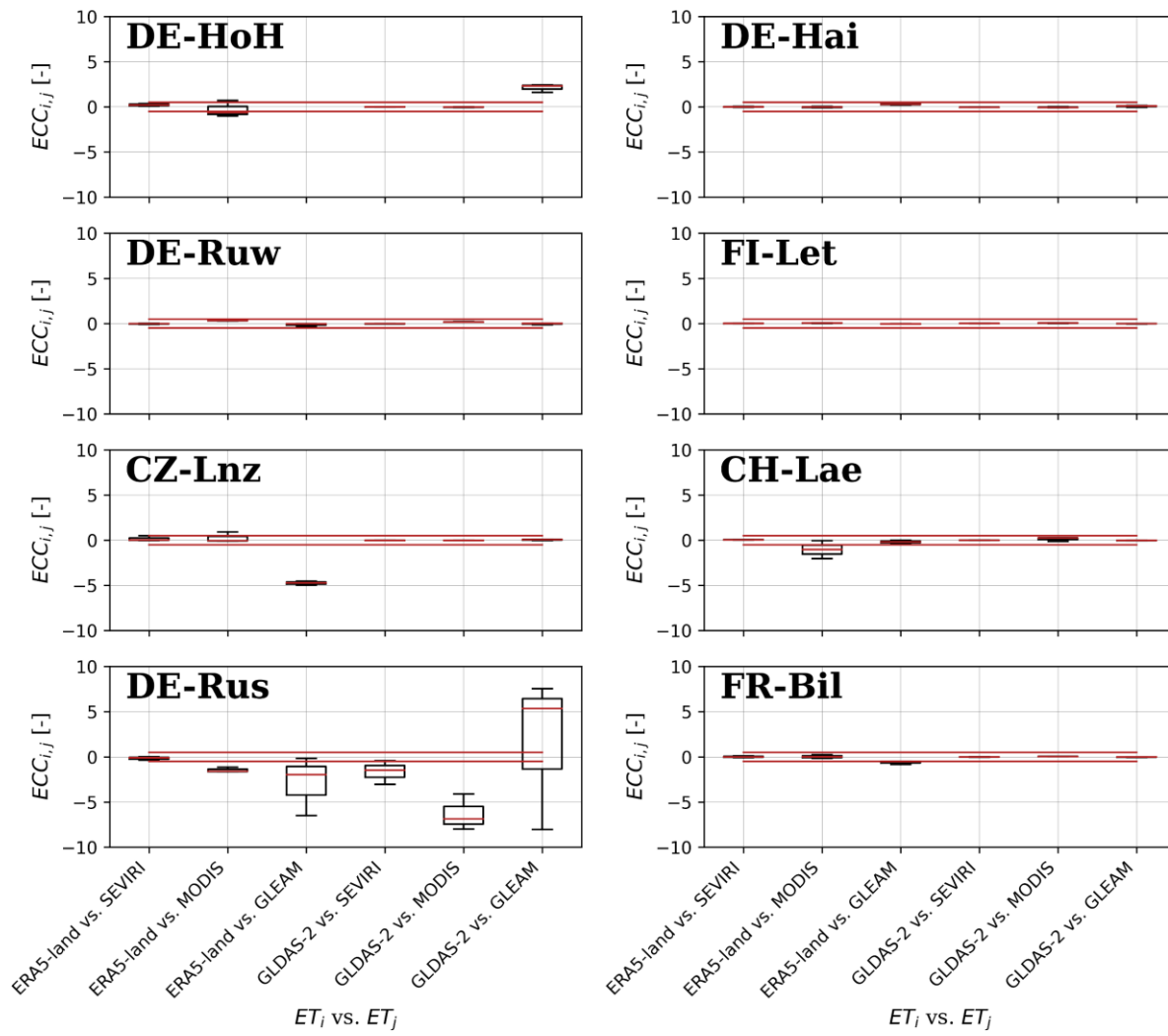


Figure S7. Percentage bias (PBIAS) [%] between all ET [mm/8-days] products for the period 2017-2020 at investigated ICOS stations. All time series were averaged to 8-daily sums at MODIS dates, and cleaned for daily and weekly dynamics using a Savitzky-Golay filter with a window size of 31 days. The color ranges from low PBIAS (blue) to high PBIAS (red).



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Figure S8. Error cross-correlation (ECC) results between ET products at investigated ICOS stations. The area between the horizontal red lines at -0.5 and 0.5 indicate the range of acceptable ECC (see Sec. 2.3.1).

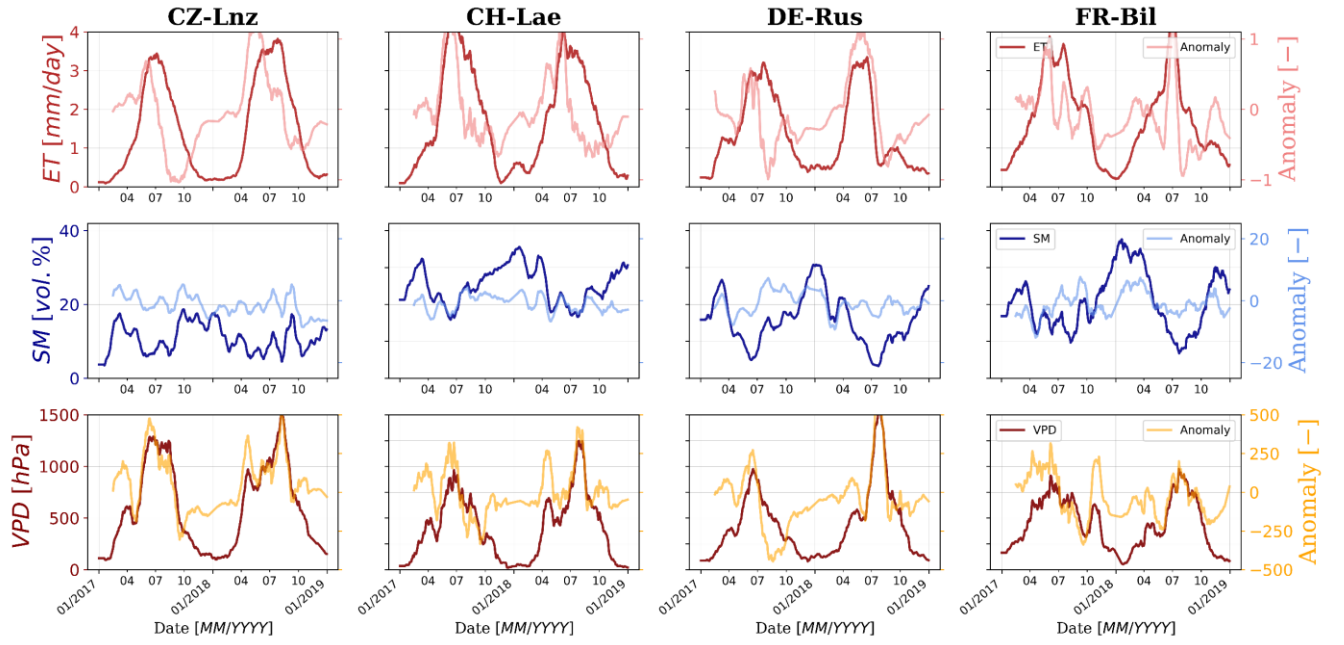


Figure S9. Time series of daily ICOS ET [mm/day], SMAP SM [vol.%], and in-situ VPD [hPa] for 2017 and 2018 at mixed forest (CZ-Lnz, CH-Lae), and agriculture (DE-Rus, FR-Bil) stations compared to their respective anomalies, calculated as described in sec. 2.3.2. All time series were cleaned for daily and weekly dynamics using a Savitzky-Golay filter with a window size of 31 days.

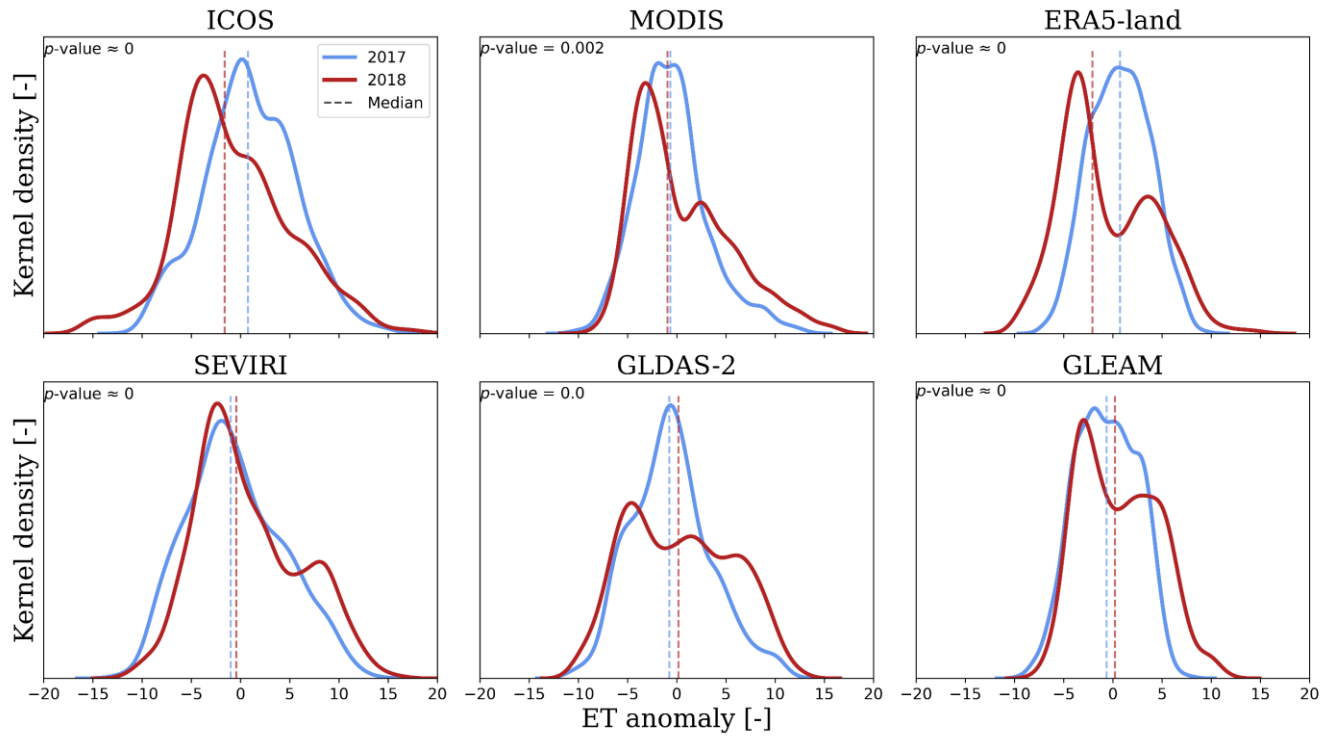


Figure S10. Kernel density estimates of 8-daily ET anomalies (see Sec. 2.3.2) for all investigated ET products during April to October of 2017 and 2018 across all investigated stations. The daily time series were aggregated to 8-daily sums before detrending to account for the temporal resolution of the MODIS ET product. The dashed lines represent the seasonal median of respective parameters and years. The p -values of a two-sided Wilcoxon rank-sum test indicate the acceptance (> 0.05) or rejection (< 0.05) of the null hypothesis regarding continuous distributions with equal medians at the 5% significance level.