

SUPPLEMENTARY MATERIAL

Table A1: MAPE for all combinations of (i) temperature-based PET equations, (ii) calibration approaches and (iii) input temperature data.

Calibration approach	PET equation	Input temperature data						
		CHES- temp daily	CHES- temp clim	CHES- temp monthly I	CHES- temp monthly II	CHES- temp monthly III	UKCP09- temp monthly I	UKCP09- temp monthly II
No Calibration	Hamon	34.73	36.99	34.98	35.23	34.84		
	McGuinness-Bordne	75.12	80.46	75.18	75.80	75.28		
	Blaney-Criddle	60.88	61.77	58.33	58.89	57.63		
	Kharrufa	66.52	67.80	63.88	64.57	63.09		
	Oudin	38.57	40.42	38.59	38.86	38.45		
	MOHYSE	51.47	48.16	49.03	48.89	47.97		
	Thornthwaite	48.74	47.74	47.05	47.46	46.61		
IP-GB	Hamon	36.24	36.73	36.39	36.60	35.61		
	McGuinness-Bordne	32.02	32.58	32.02	32.14	31.67	31.65	32.06
	Blaney-Criddle	38.69	37.63	37.70	37.90	37.07		
	Kharrufa	35.04	36.24	36.51	36.41	35.48		
12P-GB	Hamon	37.22	37.89	37.50	37.65	37.60		
	McGuinness-Bordne	32.11	32.50	32.02	32.14	32.07		
	Blaney-Criddle	39.41	38.47	38.53	38.71	37.98		
	Kharrufa	36.38	37.31	37.65	37.59	37.48		
IP-ind	Hamon	36.37	36.77	36.39	36.60	35.59		
	McGuinness-Bordne	32.20	32.61	32.16	32.27	31.78		
	Blaney-Criddle	38.59	37.50	37.60	37.80	36.95		
	Kharrufa	34.88	37.87	36.92	36.72	35.74		
12P-ind	Hamon	37.50	38.14	37.65	37.80	37.76		
	McGuinness-Bordne	32.45	32.63	32.28	32.39	32.32		
	Blaney-Criddle	39.36	38.44	38.50	38.67	37.95		
	Kharrufa	36.22	39.30	38.06	37.89	37.91		
Benchmark (CHES daily PET climatology): 33.61								

Table A2: NSE for all combinations of (i) temperature-based PET equations, (ii) calibration approaches and (iii) input temperature data.

Calibration approach	PET equation	Input temperature data						
		CHESS-temp daily	CHESS-temp clim	CHESS-temp monthly I	CHESS-temp monthly II	CHESS-temp monthly III	UKCP09-temp monthly I	UKCP09-temp monthly II
No Calibration	Hamon	0.673	0.619	0.661	0.656	0.663		
	McGuinness-Bordne	-0.430	-0.592	-0.401	-0.424	-0.405		
	Blaney-Criddle	0.163	0.107	0.222	0.211	0.238		
	Kharrufa	-0.124	-0.118	0.028	0.008	0.053		
	Oudin	0.661	0.608	0.649	0.644	0.651		
	MOHYSE	-0.388	-0.307	-0.318	-0.309	-0.269		
	Thorntwaite	0.406	0.432	0.458	0.451	0.466		
1P-GB	Hamon	0.662	0.631	0.642	0.640	0.655		
	McGuinness-Bordne	0.738	0.709	0.720	0.719	0.722	0.720	0.720
	Blaney-Criddle	0.626	0.621	0.626	0.627	0.638		
	Kharrufa	0.510	0.581	0.531	0.536	0.546		
12P-GB	Hamon	0.643	0.609	0.623	0.622	0.628		
	McGuinness-Bordne	0.736	0.709	0.719	0.719	0.720		
	Blaney-Criddle	0.610	0.604	0.609	0.611	0.622		
	Kharrufa	0.461	0.552	0.494	0.499	0.512		
1P-ind	Hamon	0.657	0.634	0.644	0.642	0.658		
	McGuinness-Bordne	0.737	0.711	0.722	0.721	0.724		
	Blaney-Criddle	0.628	0.625	0.629	0.630	0.641		
	Kharrufa	0.521	0.596	0.550	0.555	0.569		
12P-ind	Hamon	0.631	0.607	0.622	0.621	0.627		
	McGuinness-Bordne	0.733	0.710	0.720	0.719	0.721		
	Blaney-Criddle	0.611	0.606	0.611	0.613	0.624		
	Kharrufa	0.474	0.569	0.517	0.523	0.538		
Benchmark (CHESS daily PET climatology): 0.704								

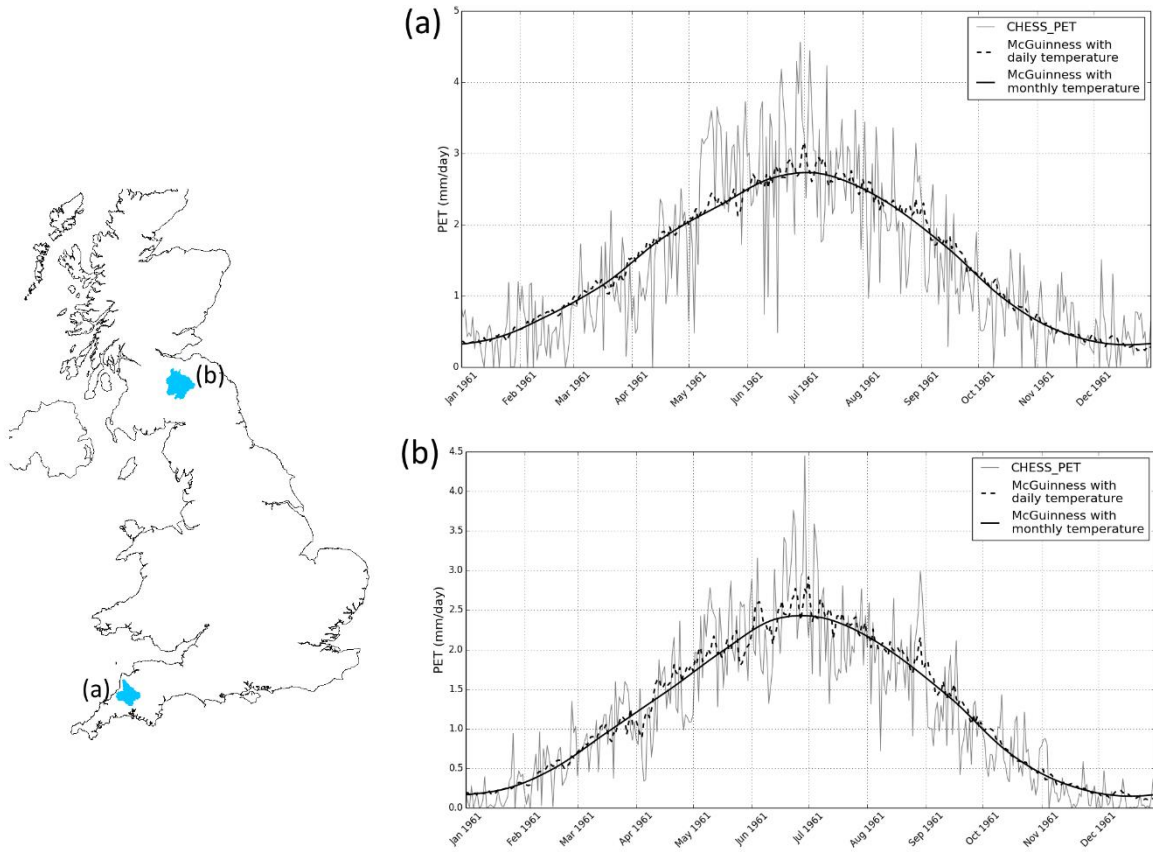


Figure A1: Comparison of different PET estimations for two example catchments ((a) river Tamar in South-West England and (b) river Tweed in Scotland) and a typical example year (1961). Difference in daily variability of PET can be observed between the different versions of PET.

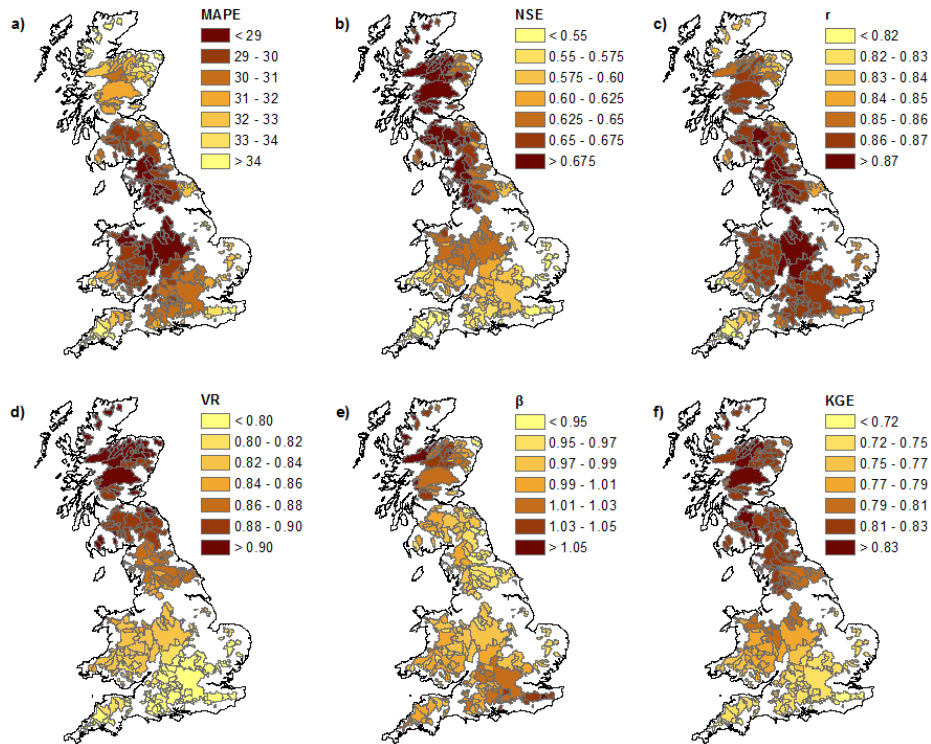


Figure A2: Evaluation metrics for daily PET dataset for the 306 evaluation catchments. The darker the colour, the better the performance for all metrics represented, except for the Bias ratio (β) (Fig. A2e) where the middle-range colour is optimal.

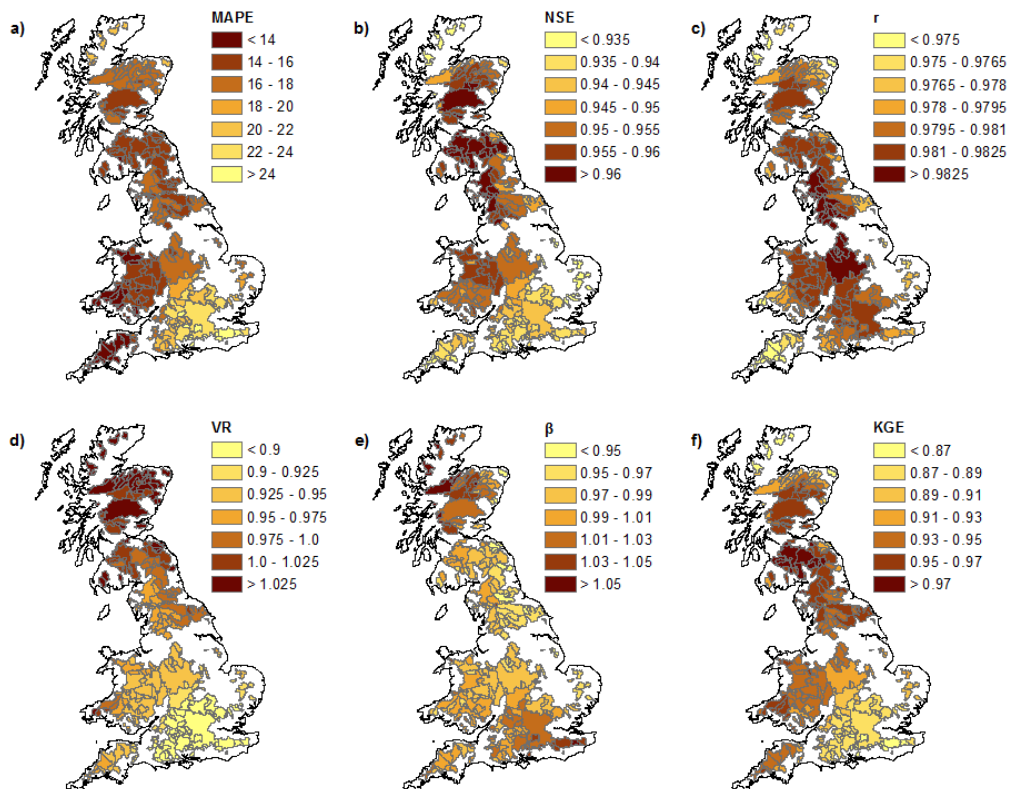


Figure A3: Evaluation metrics for monthly PET dataset for the 306 evaluation catchments. The darker the colour, the better the performance for all metrics represented, except for the Variability Ratio (VR) (Fig. A3d) where 1 is the optimum, and the Bias ratio (β) (Fig. A3e) where the middle-range colour is optimal.