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Technical note: Diagnostic efficiency – specific evaluation of model performance

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Supplement

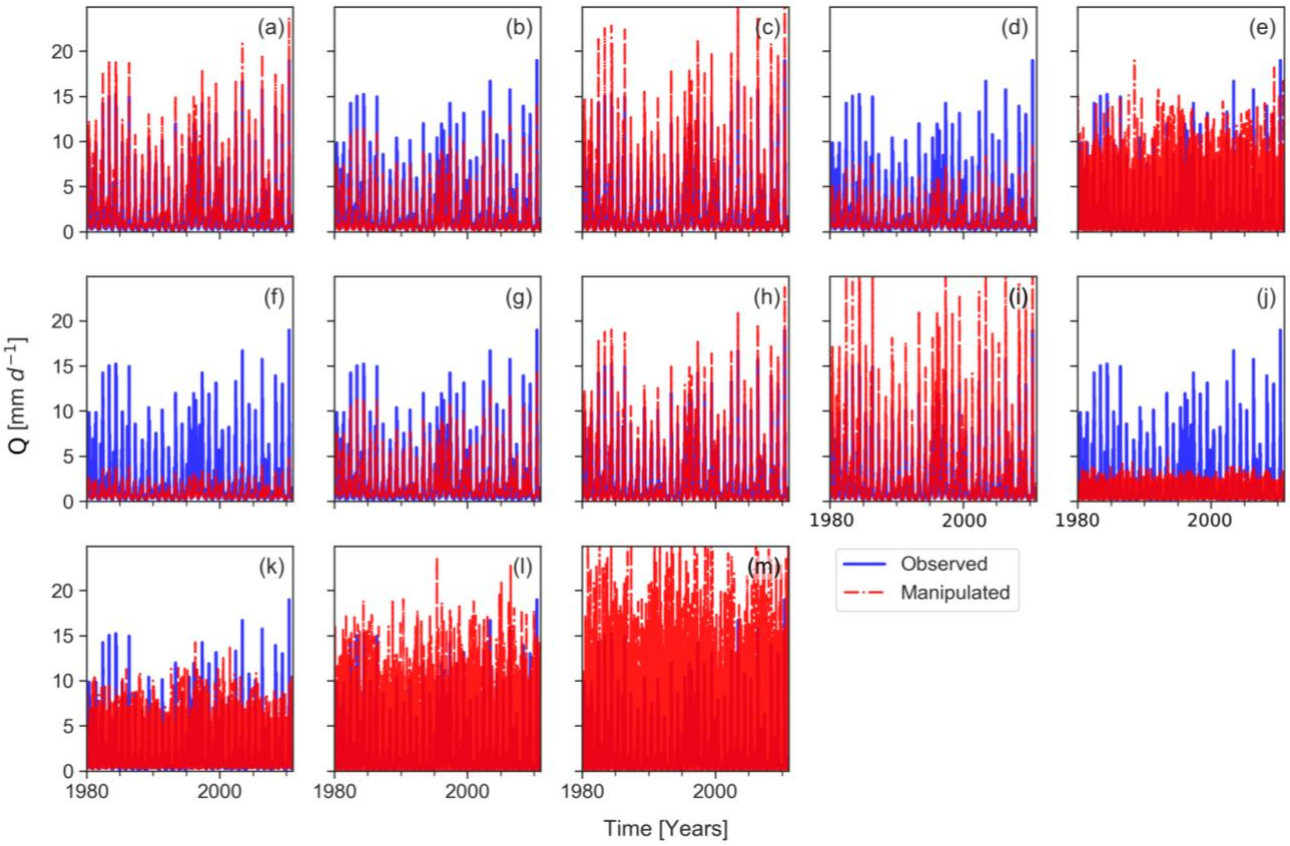

Figure S1: Observed streamflow time series and manipulated streamflow time series generated by mimicking constant errors, dynamic errors and timing errors (a-m)

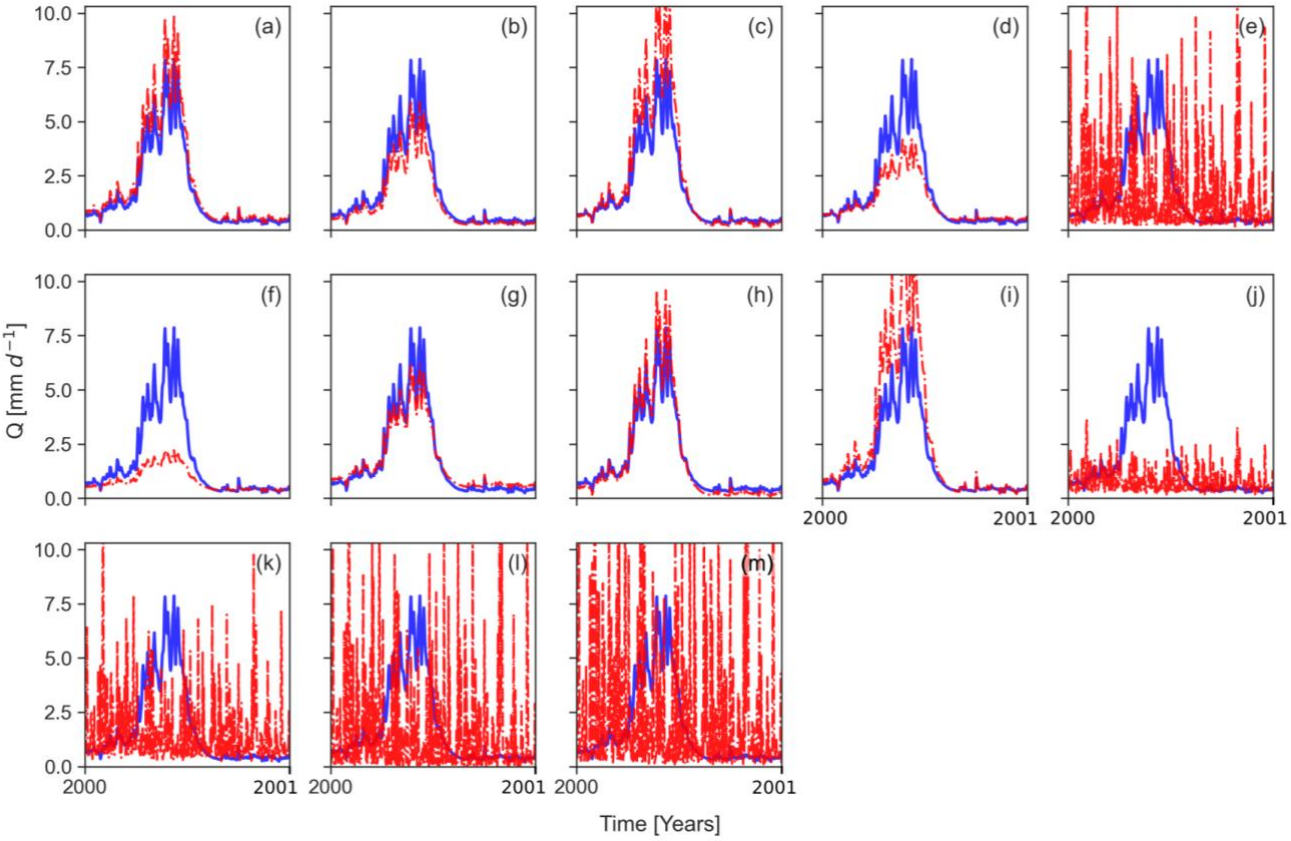

Figure S2: Observed streamflow time series and manipulated streamflow time series for a single year generated by mimicking constant errors, dynamic errors and timing errors (a-m)

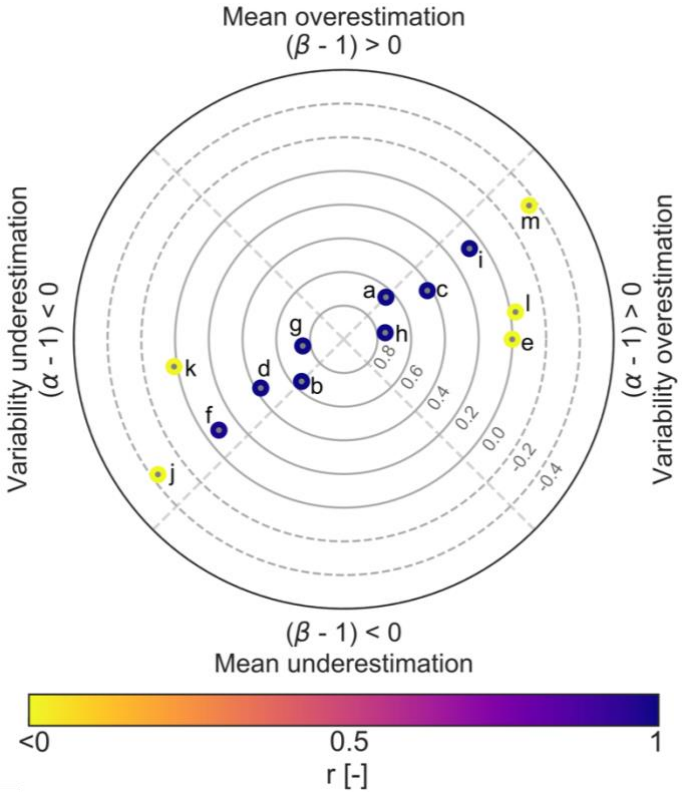

Figure S3: Polar plot of *KGE* for manipulated time series generated by mimicking constant errors, dynamic errors and timing errors (a-m)

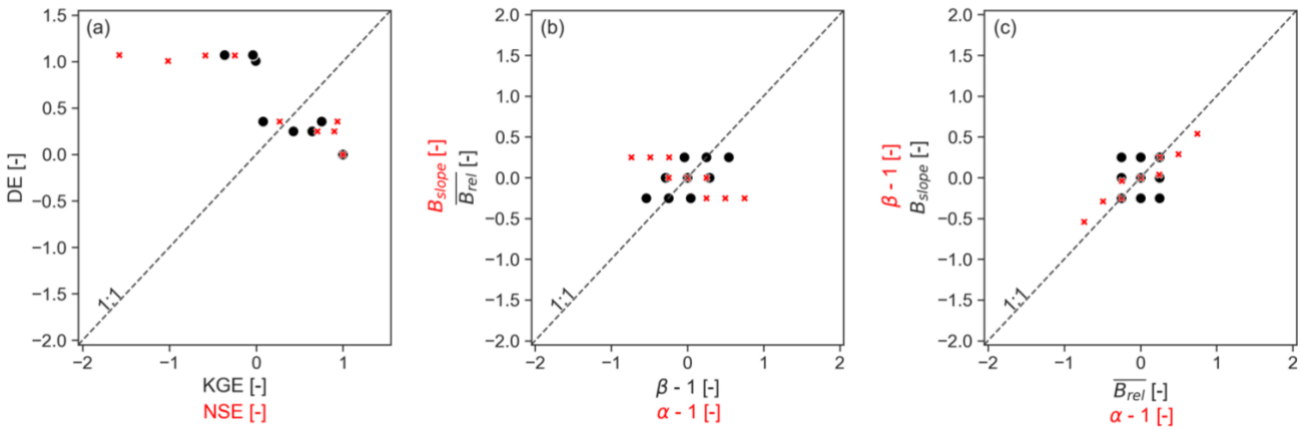

Figure S4: (a) Scatterplot to compare *DE* with *KGE* (black) and *DE* with *NSE* (red), respectively. (b) Scatterplot to compare $\overline{B_{rel}}$ with β (black) and B_{slope} with α (red), respectively. (c) Scatterplot to compare $\overline{B_{rel}}$ with B_{slope} (black) and β with α (red), respectively. Metrics are calculated for manipulated time series (see Fig. S1)

Table S1: Comparison of *DE* metric terms and *KGE* metric terms for manipulated time series generated by mimicking constant errors, dynamic errors and timing errors (a-m)

	a	b	c	d	e	f	g	h	i	j	k	l	m
$\overline{B_{rel}}$	0.25	-0.25	0	0	0	-0.25	0.25	-0.25	0.25	-0.25	0.25	-0.25	0.25
$\lvert B_{area} \rvert$	0	0	0.25	0.25	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
r	1	1	1	1	0	0.98	1	1	1	0	0	0	0
B_{dir}	0	0	-1	1	0	1	1	-1	-1	1	1	-1	-1
B_{slope}	0	0	-0.25	0.25	0	0.25	0.25	-0.25	-0.25	0.25	0.25	-0.25	-0.25
B_{hf}	0.13	-0.13	0.13	-0.13	0	-0.25	0	0	0.25	-0.25	0	0	0.25
B_{lf}	0.13	-0.13	-0.13	0.13	0	0	0.25	-0.25	0	0	0.25	-0.25	0
B_{tot}	0.25	0.25	0.25	0.25	0	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
ε_{hf}	0.5	-0.5	0.5	-0.5	0	-0.8	0	0	0.8	-0.8	0	0	0.8
ε_{lf}	0.5	-0.5	-0.5	0.5	0	0	0.8	-0.8	0	0	0.8	-0.8	0
β	1.25	0.75	1.29	0.71	1	0.46	0.96	1.04	1.54	0.46	0.96	1.04	1.54
α	1.25	0.75	1.49	0.51	1	0.25	0.76	1.24	1.75	0.25	0.76	1.24	1.75

Table S2: DE and its metric terms for the modelling example. Simulations were realised with different parameter sets (set_id).

set_id	$\overline{B_{rel}}$	$\lvert B_{area} \rvert$	r	B_{dir}	B_{slope}	DE	B_{hf}	B_{lf}	B_{tot}	ε_{hf}	ε_{lf}
05	0.16	0.32	0.88	1	0.32	0.38	-0.07	0.23	0.31	-0.24	0.76
48	0.16	0.34	0.89	1	0.34	0.40	-0.08	0.24	0.32	-0.26	0.74
94	0.11	0.28	0.89	1	0.28	0.32	-0.07	0.18	0.26	-0.28	0.72

Table S3: KGE (with metric terms) and NSE for the modelling example. Simulations were realised with different parameter sets (set_id).

set_id	β	α	r	KGE	NSE
05	0.90	0.79	0.88	0.74	0.77
48	0.89	0.79	0.89	0.74	0.77
94	0.90	0.83	0.89	0.77	0.78

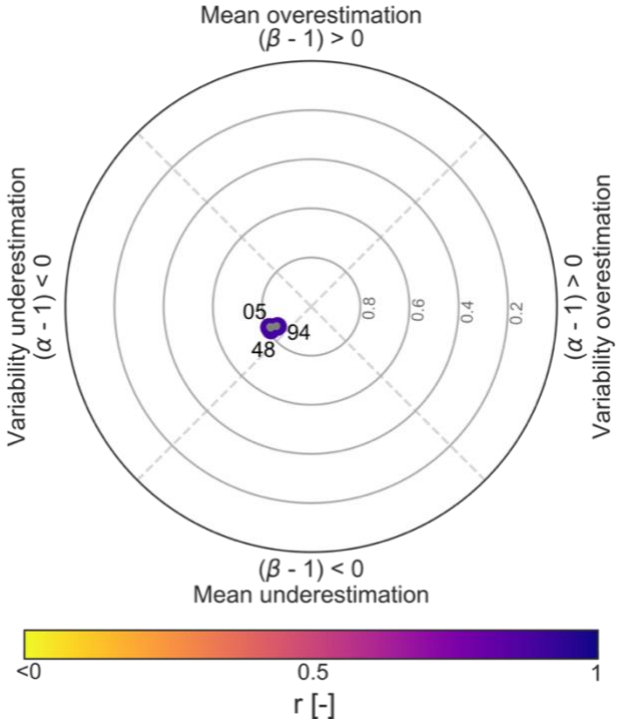

Figure S5: Polar plot of *KGE* for modelling example. Simulations were realised with three different parameter sets (05, 48, 94; see Fig. 4).