Supporting information for "Decorrelation is not dissociation: there is no rational solution to the Brutsaert-Nieber parameter association problem"

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Description

This document contains supporting information from the analysis of the real and synthetic recession curves are given respectively in Tables S1 and S2 below.

Table S1: Column 1: USGS basin ID. Columns 2 and 3 respectively give latitude and longitude of the basin. Column 4: drainage area of the basin in sq km unit. Column 5: the median of the α values (α_m) considering all the recession curves from the basin. Column 6: Rescaling factor (Z_{dc}) required to decorrelate k from α. Column 7: coefficient of determination (R_o^2) between k_o ($\mathrm{mm}^{1-\alpha}/\mathrm{day}^{2-\alpha}$) vs. Q_5, average discharge during 5th day of the recession event (mm/day) for the basin. Column 8: coefficient of determination ($\mathrm{R}_{\mathrm{dc}}^2$) between k_{dc} (decorrelated BN coefficient; unit depends on the rescaling factor Z_{dc}) and Q_5. Column 9: coefficient of determination ($\mathrm{R}_{\mathrm{m}}^2$) between k_m (BN coefficient obtained after fixed the exponent at α_{m}; unit: $\mathrm{mm}^{1-\alpha_{\mathrm{m}}}/\mathrm{day}^{2-\alpha_{\mathrm{m}}}$) and Q_5. Note that Q_0 (0th day discharge) was not considered for computation of k_o, k_{dc} and k_m. The computations were performed following the least squares linear regression method. The * symbol highlights the basin for which $R_o^2 > R_{dc}^2$.

Basin ID	Latitude	Longitude	Area (km^2)	α_m	Z_{dc}	R_o^2	R_{dc}^2	R_m^2
01534000*	41°33'30"	75°53'42"	991.97	2.31	2.39	0.47	0.46	0.92
02427250	31°59'46"	87°04'06"	675.99	3.20	3.03	0.53	0.56	0.95
02450250	34°17'07"	87°23'56"	238.54	2.13	6.11	0.42	0.48	0.91
02450825*	34°04'52"	87°25'22"	261.59	2.70	1.41	0.59	0.51	0.91
03574500	34°37'27"	86°18'23"	828.80	2.30	2.46	0.51	0.53	0.92
06659580	40°59'37"	105°45'35"	75.63	1.81	3.16	0.11	0.24	0.91
07054410*	36°26'58"	93°04'31"	344.47	2.05	4.22	0.43	0.33	0.77
07056000	35°58'59"	92°44'50"	2147.11	2.11	4.10	0.23	0.27	0.81
07058980	36°25'22"	92°07'06"	176.64	1.97	5.53	0.11	0.32	0.84
07160500	36°03'36"	97°35'05"	1067.08	2.26	11.25	0.16	0.60	0.94
07362587	34°47'51"	92°56'02"	69.93	1.60	4.39	0.04	0.18	0.77
08091500	32°13'53"	97°46'37"	1061.90	2.34	8.85	0.04	0.26	0.93
09306242	39°55'13"	108°28'20"	81.84	2.03	16.12	0.12	0.31	0.90
09470800	31°28'22"	110°20'50"	21.70	1.82	3.95	0.07	0.17	0.54
09505200*	34°40'29"	111°40'17"	287.49	2.16	12.30	0.15	0.01	0.16
09512280*	33°53'14"	111°57'12"	214.19	1.91	41.88	0.08	0.00	0.26
10259200	33°37'52"	116°23'29"	79.25	2.08	14.54	0.02	0.26	0.54
10336660	39°06'27"	120°09'40"	29.01	2.27	1.01	0.30	0.30	0.76

11015000	32°50'05"	116°37'20"	117.59	1.89	10.26	0.08	0.36	0.94
11027000	33°06'57"	116°57'08"	58.28	2.33	9.23	0.03	0.43	0.94
11062000	34°12'44"	117°27'26"	120.69	1.89	2.16	0.10	0.24	0.87
11098000	34°13'20"	118°10'36"	41.44	2.42	3.42	0.20	0.33	0.74
11274630	37°29'12"	121°12'29"	188.03	2.08	14.15	0.00	0.26	0.92
11451100	39°09'56"	122°37'08"	155.92	2.11	4.62	0.24	0.36	0.85
11467200	38°30'24"	123°04'07"	162.65	2.12	4.18	0.18	0.23	0.74
11467510	38°42'33"	123°25'32"	416.99	1.88	11.43	0.21	0.38	0.92
11473900	39°42'23"	123°19'27"	1929.55	2.40	1.54	0.40	0.43	0.94
11475000	40°13'06"	123°37'53"	5457.13	2.22	2.92	0.37	0.39	0.93
11481500	40°54'22"	123°48'51"	175.34	2.54	1.15	0.45	0.45	0.96
12413370*	47°28'36"	116°13'18"	73.04	2.69	4.22	0.46	0.25	0.90
12422990	47°12'10"	117°02'23"	328.93	1.91	19.30	0.21	0.41	0.89

Table S2: Column 1: Synthetic basin serial number. Column 2: range of Q_0 (mm/day) for the recession curves of the basin. Note that for each basin 1000 recession curves were produced for the numerical experiment here. Column 3: range of k_o ($\mathrm{mm}^{1-\alpha_m}/\mathrm{day}^{2-\alpha_m}$) for the basin. Column 4: range of α for the basin. Column 5: coefficient of determination (R_o^2) between k_o ($\mathrm{mm}^{1-\alpha}/\mathrm{day}^{2-\alpha}$) vs. Q_5 (mm/day) for the basin. Column 6: coefficient of determination ($\mathrm{R}_{\mathrm{dc}}^2$) between k_{dc} and Q_5. Column 7: coefficient of determination ($\mathrm{R}_{\mathrm{m}}^2$) between k_m and Q_5. Note that for each synthetic basin one thousand recession curves were generated by allowing Q_0, k_o and α to vary in their specified ranges on a logarithmic scale.

Synthetic basin no.	**Q_0 range**	**Range of k_o**	**Range of α**	**Range of R_o^2**	**Range of R_{dc}^2**	**Range of R_m^2**
1	0.37-1.00	0.0067-1.00	0.61-1.65	0.42	0.45	0.56
2	0.37-1.00	0.0067-1.00	2.72-54.60	0.04	0.14	0.18
3	0.37-1.00	0.61-90.01	0.61-1.65	0.37	0.66	0.91
4	0.37-1.00	0.61-90.01	2.72-54.60	0.04	0.14	0.81
5	2.72-54.60	0.0067-1.00	0.61-1.65	0.30	0.30	0.30
6	2.72-54.60	0.0067-1.00	2.72-54.60	0.41	0.41	0.96
7	2.72-54.60	0.61-90.01	0.61-1.65	0.57	0.44	0.89
8	2.72-54.60	0.61-90.01	2.72-54.60	0.00	0.00	1.00