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Using GRACE in a streamflow recession to determine drainable water storage in the Mississippi River basin

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Figure S1; Tables S1 and S2

Introduction

This document offers the supporting information for our manuscript. Figure S1 shows the sensitivity analysis performed to select the number of forward-looking values (n) to be used in the low-flow filter method. Table S1 includes the α and β parameters for all 12 stations, which can be seen at Figure 3. Table S2 lists the storage offsets used to convert GRACE TWSA into absolute drainable storage values, used to create Figure 4.
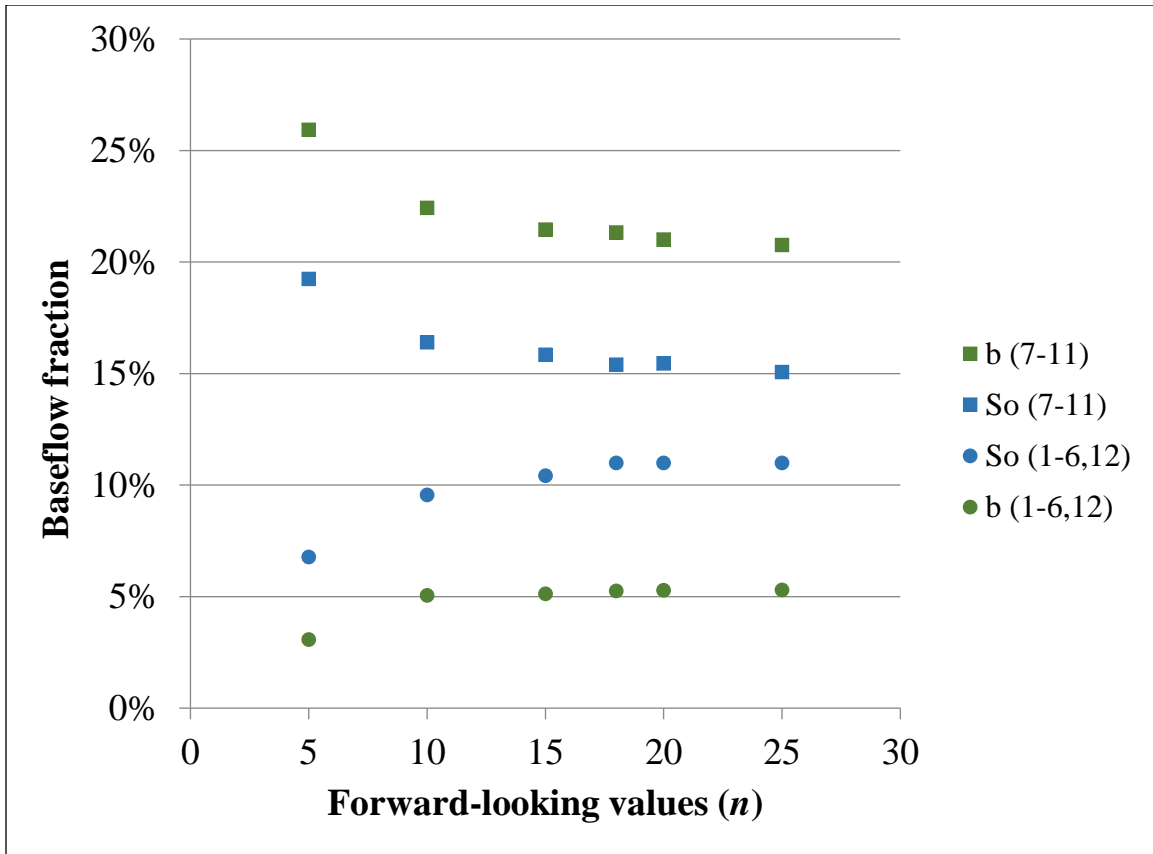
Figure S1. Sensitivity analysis of the number of forward-looking values (*n*) used in the low-flow filter method. The baseflow fraction of storage offset (So) and β coefficient were estimated for 6 different *n* filter scenarios (5, 10, 15, 18, 20, 25) for each station. For clarity, stations with similar relationships were aggregated in two groups (1-6,12 and 7-11). In general, the baseflow fraction of both parameters stabilizes for an *n* value of roughly 18.

Table S1. Resulting storage-discharge coefficients for overall discharge and baseflow with associated R^2 values.

ID	α_o	β_o	R^2	α_b	β_b	R^2
1	2.7230	0.1048	0.78	1.4223	0.0876	0.85
2	2.4810	0.1108	0.80	1.3029	0.1022	0.88
3	2.7214	0.0759	0.75	1.5374	0.0761	0.92
4	1.8031	0.0875	0.59	1.1570	0.0781	0.88
5	1.8557	0.0999	0.66	1.2188	0.1066	0.91
6	1.9825	0.0992	0.74	1.2844	0.1055	0.91
7	0.2209	0.0511	0.46	0.1534	0.0319	0.72
8	0.2616	0.0466	0.40	0.1834	0.0162	0.46
9	0.2848	0.0441	0.45	0.2133	0.0184	0.71
10	0.2854	0.0508	0.51	0.2142	0.0248	0.91
11	0.4224	0.0691	0.54	0.2659	0.0358	0.90
12	1.1009	0.0830	0.80	0.8299	0.0914	0.92

Table S2. Storage offsets (S_o) for near zero flow conditions of 0.01% and 0.1% of the minimum non-winter monthly discharge (Q_{min}) observed during the period of study and maximum and minimum basin-average GRACE TWSA observed during the period of study.

ID	S_o (0.1% Q_{min})	S_o (0.01% Q_{min})	$TWSA_{max}$	$TWSA_{min}$
1	84	106	12.5	-18.0
2	79	100	14.0	-17.9
3	114	145	15.2	-20.5
4	93	119	10.7	-14.0
5	84	107	10.9	-13.8
6	84	108	12.6	-14.4
7	145	190	18.9	-7.9
8	158	207	20.8	-7.2
9	168	220	21.3	-7.6
10	146	191	20.1	-8.1
11	111	144	18.4	-7.7
12	96	123	14.6	-9.7