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SUPPORTING INFORMATION FOR:

**Impact of water-sediment diversion and afflux on erosion-deposition in the Luoshan-Hankou reach,
middle Yangtze River, China**

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Table S1

Yearly and multi-year average water/sediment discharges at Xiantao and Hankou stations, and proportions of the former accounted in the latter.

Year	Water discharge (10 ⁸ m ³)		Sediment discharge (10 ⁸ t)		Proportion (%)		Year	Water discharge (10 ⁸ m ³)		Sediment discharge (10 ⁸ t)		Proportion (%)	
	Xiantao station	Hankou station	Xiantao station	Hankou station	Water discharge	Sediment discharge		Xiantao station	Hankou station	Xiantao station	Hankou station	Water discharge	Sediment discharge
1961	370	7049	0.55	4.32	5.25	12.73	1994	274	6479	0.08	2.33	4.23	3.43
1962	293	7401	0.47	4.08	3.96	11.52	1995	235	7247	0.08	3.30	3.24	2.42
1963	613	6756	1.22	5.12	9.07	23.83	1996	411	7329	0.26	2.91	5.61	8.93
1964	856	8807	1.59	5.79	9.72	27.46	1997	290	6272	0.10	3.04	4.62	3.29
1965	471	7426	0.85	5.15	6.34	16.50	1998	384	9068	0.16	3.64	4.23	4.40
1966	191	6202	0.15	4.80	3.08	3.13	1999	202	7628	0.04	2.82	2.65	1.42
1967	449	7219	0.67	5.04	6.22	13.29	2000	390	7420	0.21	3.36	5.26	6.25
1972	354	5670	0.26	3.74	6.24	6.95	2001	282	6553	0.08	2.85	4.30	2.81
1973	416	7696	0.29	3.86	5.41	7.51	2002	249	7687	0.05	2.39	3.24	2.09
1974	420	7094	1.32	4.62	5.92	28.57	2003	454	7380	0.25	1.65	6.15	15.15
1975	560	7453	0.50	4.80	7.51	10.42	2004	347	6773	0.14	1.36	5.12	10.29
1976	361	6669	0.46	3.65	5.41	12.60	2005	543	7443	0.38	1.74	7.30	21.84
1977	319	7099	0.20	4.23	4.49	4.73	2006	291	5341	0.10	0.58	5.45	17.24
1978	224	5713	0.08	3.93	3.92	2.04	2007	353	6450	0.11	1.14	5.47	9.65
1979	332	6171		4.33	5.38		2008	296	6728	0.08	1.01	4.40	7.92
1980	496	7835	0.32	4.00	6.33	8.00	2009	377	6278	0.11	0.87	6.01	12.64
1981	479	6903	0.28	4.88	6.94	5.74	2010	536	7472	0.20	1.11	7.17	18.02
1982	502	7718	0.31	4.34	6.50	7.14	2011	429	5495	0.15	0.69	7.81	21.74
1983	767	8655	0.64	4.55	8.86	14.07	2012	385	7576	0.10	1.26	5.08	7.94
1984	593	7150	0.43	5.01	8.29	8.58	2013	252	6358	0.05	0.93	3.96	5.38
1985	420	6846	0.18	4.11	6.13	4.38	2014	174	7200	0.02	0.81	2.42	2.47
1986	292	5892	0.09	3.24	4.96	2.78	2015	315	6752	0.04	0.63	4.67	6.35
1987	376	6846	0.18	4.18	5.49	4.31	2016	238	7487	0.02	0.68	3.18	2.94
1988	340	6642		3.52	5.12		2017	391	7373	0.09	0.70	5.30	12.86
1989	553	7864	0.33	4.31	7.03	7.66	2018	339	6695	0.04	0.80	5.06	5.00
1990	484	7328	0.27	3.89	6.60	6.94	2019	228	7132	0.02	0.57	3.20	3.51
1991	355	7381	0.18	4.35	4.81	4.14	1961-2002^a	401	7138	0.36	3.97	5.62	9.07
1992	265	6540	0.08	2.97	4.05	2.69	2003-2019^a	350	6820	0.11	0.97	5.13	11.34
1993	374	7527	0.17	3.45	4.97	4.93							

^a water/sediment discharges and proportions in these two periods are multi-year average values. The two periods are divided at 2003, the year when the TGD was initially impounded.

Text S1. Figs. S1 (a)-(c) show slack correlations between S_1 and $\eta_{Qilishan}-\eta_{TDM}$, $\eta_{s/Qilishan}-\eta_{s/TDM}$ and $S_{Qilishan}$, whereas Figs. S1 (d)-(e) exhibit tight correlations between S_1 and $S_{Zhicheng}$ and S_{Jianli} , suggesting that S_1 is not determined by water and sediment exchanges between the Yangtze River and Dongting Lake, but depends on the sediment concentration in the Yangtze mainstream. In other words, no matter whether or not water-sediment diversions and affluxes exist, S_1 retains almost constant for a given value of $S_{Zhicheng}$ or S_{Jianli} , owing to automatic riverbed adjustment caused by sediment erosion and deposition along the mainstream between Zhicheng station and 1-1 Cross-section (Fig. 2). The tight correlation between S_1 and $S_{Luoshan}$ in Fig. S1 (f) and short geographical distance between 1-1 cross-section and Luoshan station (Fig. 2) indicate that the correlations between $S_{Luoshan}$ and mainstream sediment concentration and water-sediment exchange should exhibit similar behavior.

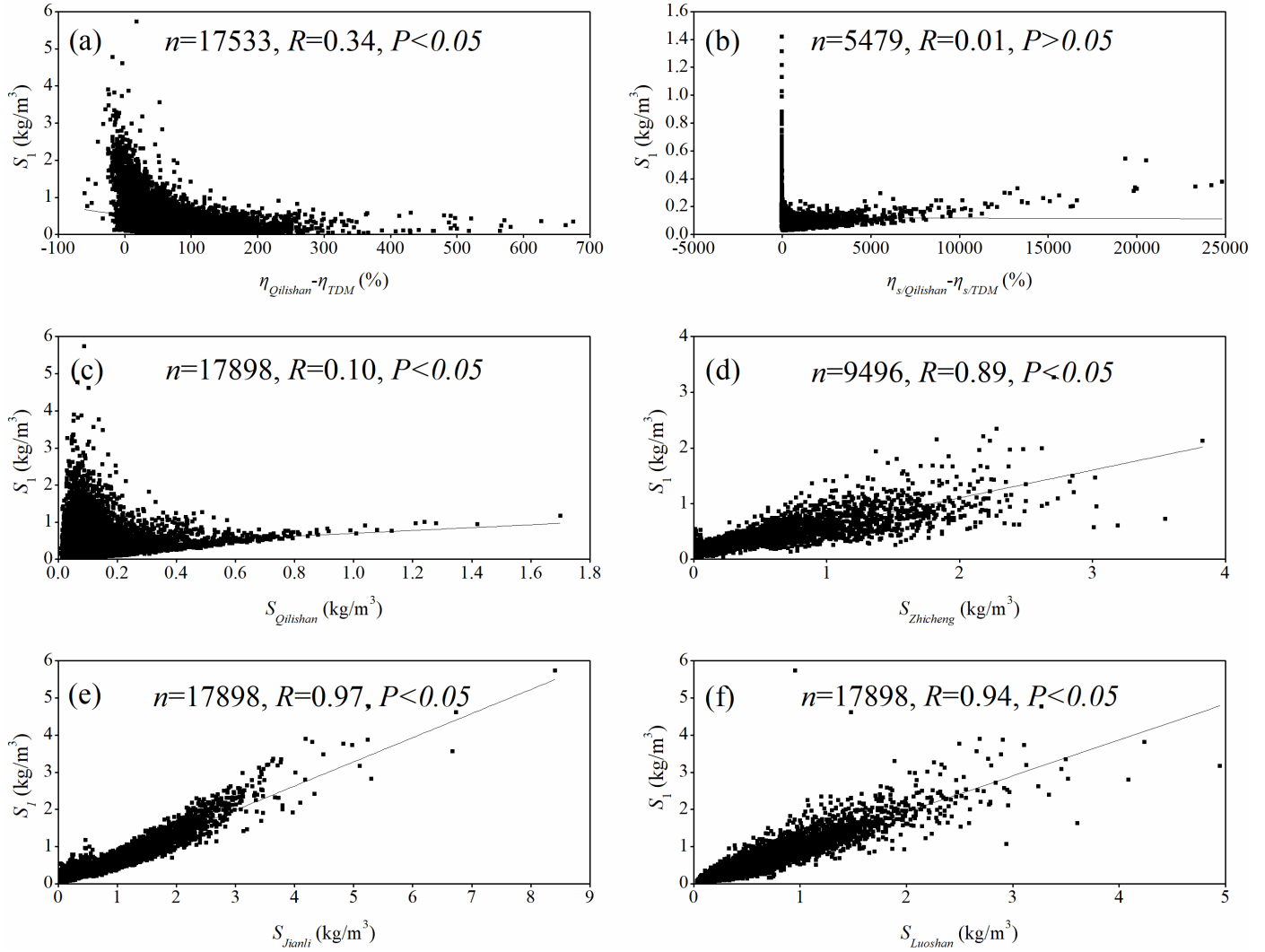


Fig. S1. Correlations between daily values of S_1 and $\eta_{Qilishan}-\eta_{TDM}$ (a), $\eta_{s/Qilishan}-\eta_{s/TDM}$ (b), $S_{Qilishan}$ (c), $S_{Zhicheng}$ (d), S_{Jianli} (e), and $S_{Luoshan}$ (f). Herein, $\eta_{s/Qilishan}-\eta_{s/TDM}$ is the proportion of net sediment supply from Dongting Lake to the actual Luoshan-Hankou reach accounted in the sediment discharge at Zhicheng station, and $S_{Zhicheng}$ is the sediment concentration at Zhicheng station. In the legends, n is the number of points, R is the correlation coefficient, and P is the significance level of the linear regression.

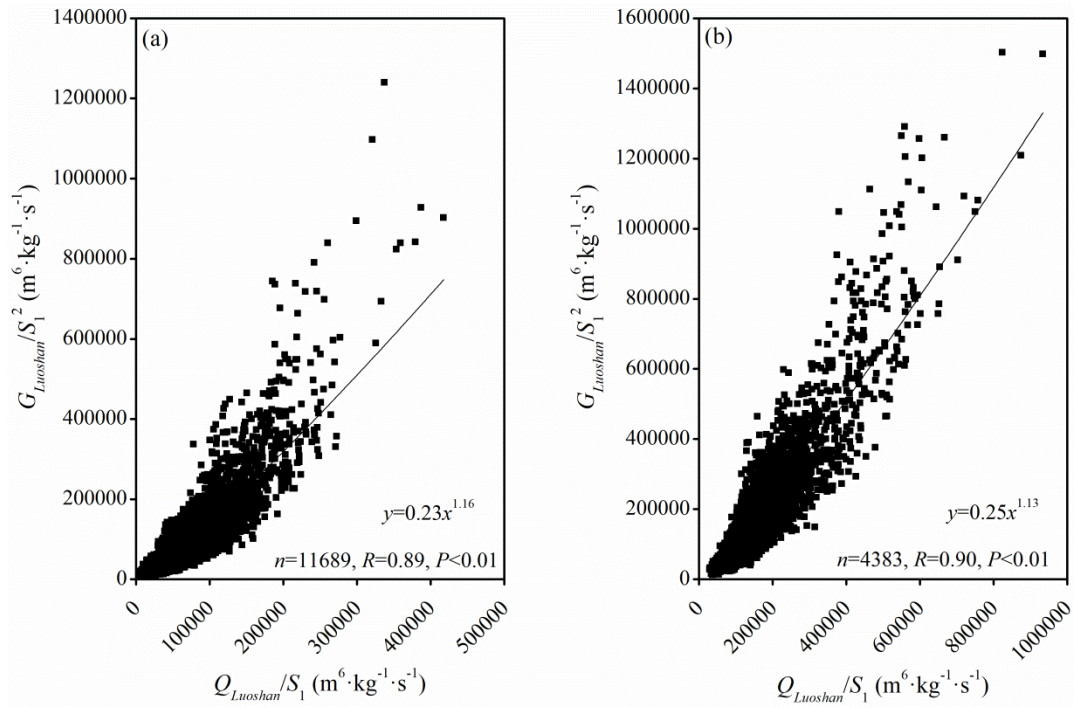


Fig. S2. Power-function regressions between $G_{Luoshan}/S_1^2$ and $Q_{Luoshan}/S_1$ using daily data during (a) pre-TGD (1956-2002) and (b) post-TGD (2003-2019) periods. In the legends, n is the number of data points, R is the correlation coefficient, and P is the significance level of the regression analysis.

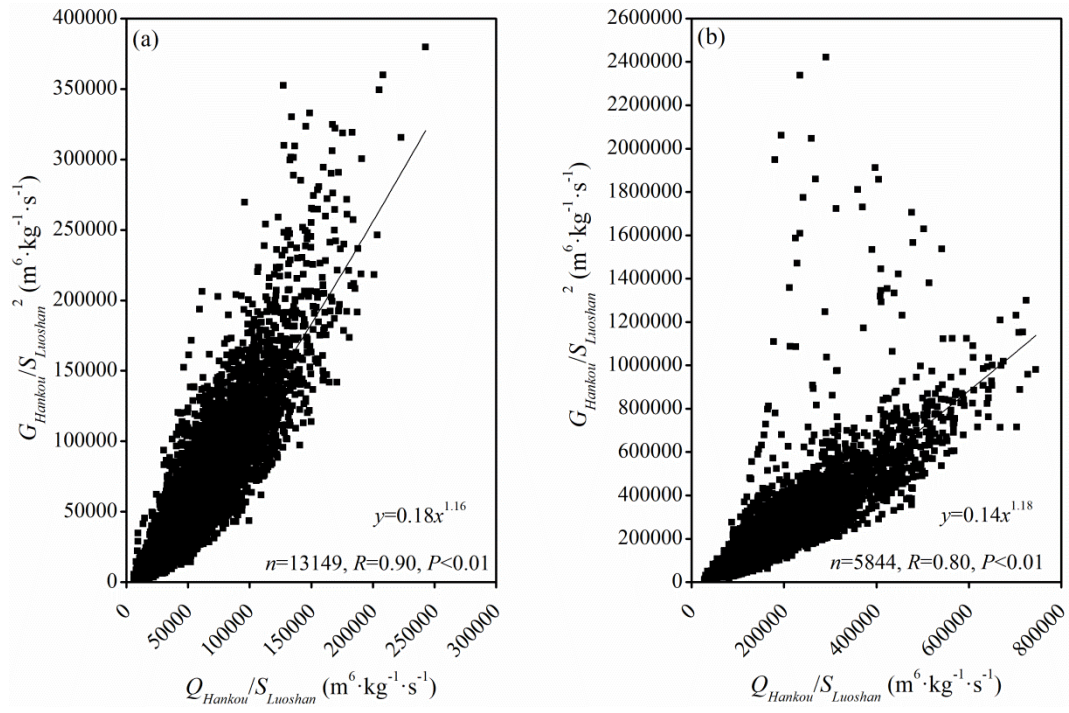


Fig. S3. Power-function regressions between $G_{Hankou}/S_{Luoshan}^2$ and $Q_{Hankou}/S_{Luoshan}$ using daily data during (a) pre-TGD (1961-2002) and (b) post-TGD (2003-2019) periods. In the legends, n is the number of data points, R is the correlation coefficient, and P is the significance level of the regression analysis.

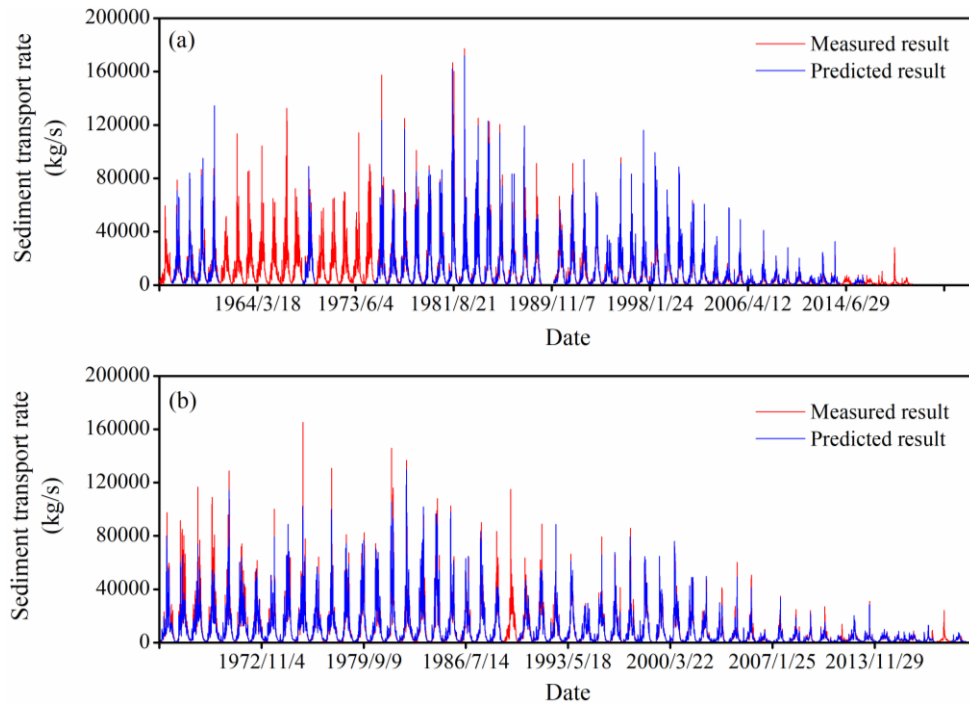


Fig. S4. Comparison between measured and predicted daily series of sediment transport rate at Luoshan (a) and Hankou (b) stations. The predicted series are based on Eq. (1) and calibrated K , α and β at the two stations.