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

[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 $\eta_{Qilishan}$-η_{TMD}, $\eta_{s/Qilishan}$-$\eta_{s/TMD}$ 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.

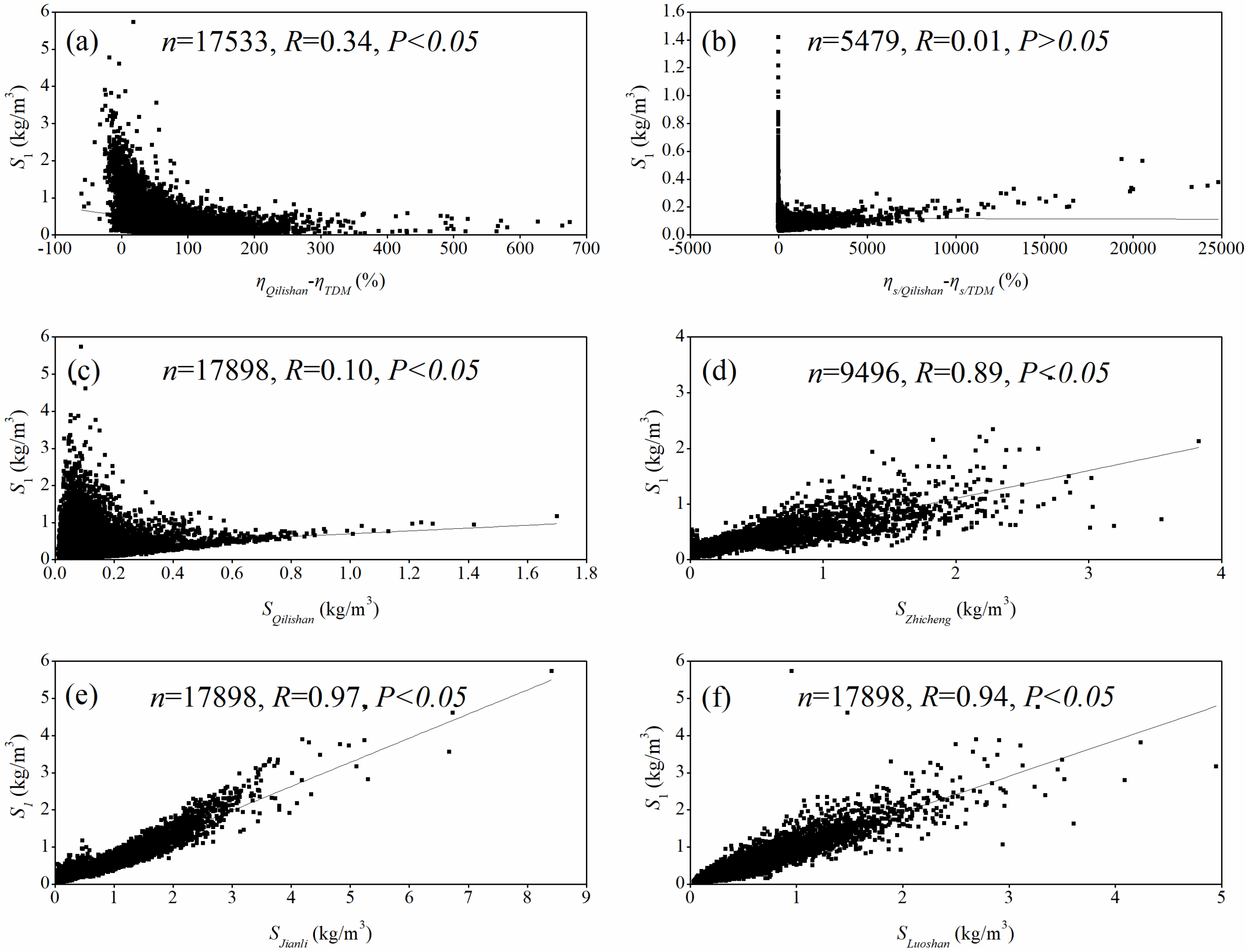

Fig. S1. Correlations between daily values of S_1 and $\eta_{Qilishan}$-η_{TDM} (a), $\eta_{s/Qilishan}$-$\eta_{s/TDM}$ (b), $S_{Qilishan}$ (c), $S_{Zhicheng}$ (d), S_{Jianli} (e), and $S_{Luoshan}$ (f). Herein, $\eta_{s/Qilishan}$-$\eta_{s/TMD}$ is the proportion of net sediment supply from Dongting 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.

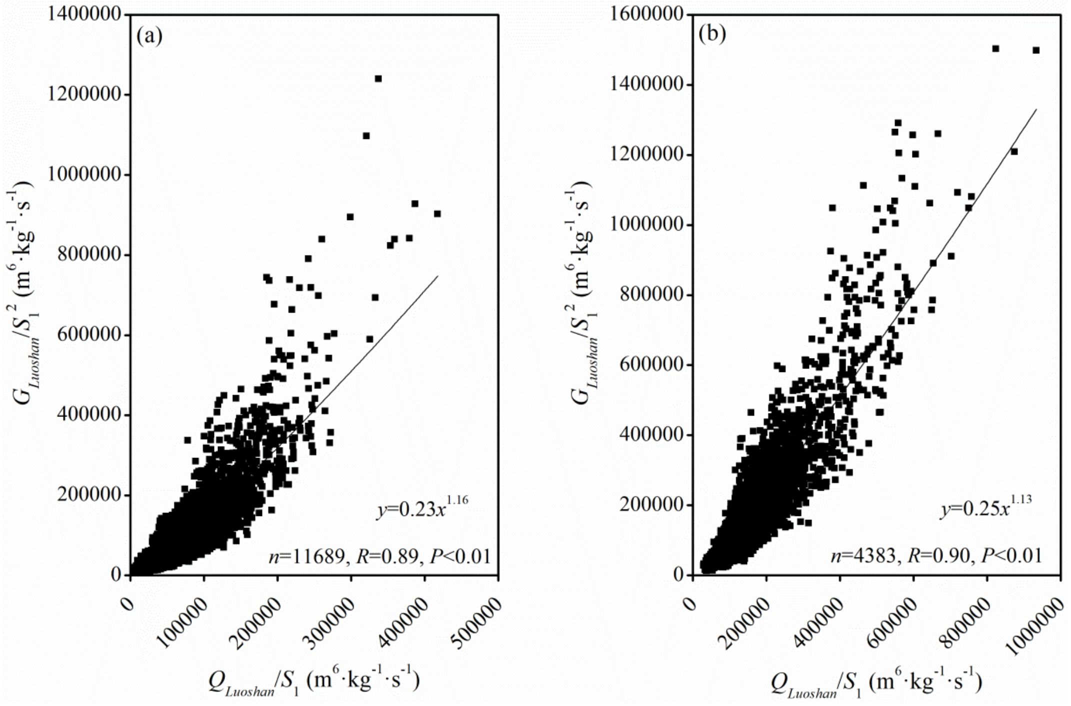

Fig. S2. Power-function regressions between $G_{Luoshan}/S_1^2$ and $Q_{Luoshan}/S_1$ using daily data during (a) pre-TGD (1956-2002) and (b) post-TGD (2003-2019) periods. In the legends, *n* is the number of data points, *R* is the correlation coefficient, and *P* is the significance level of the regression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

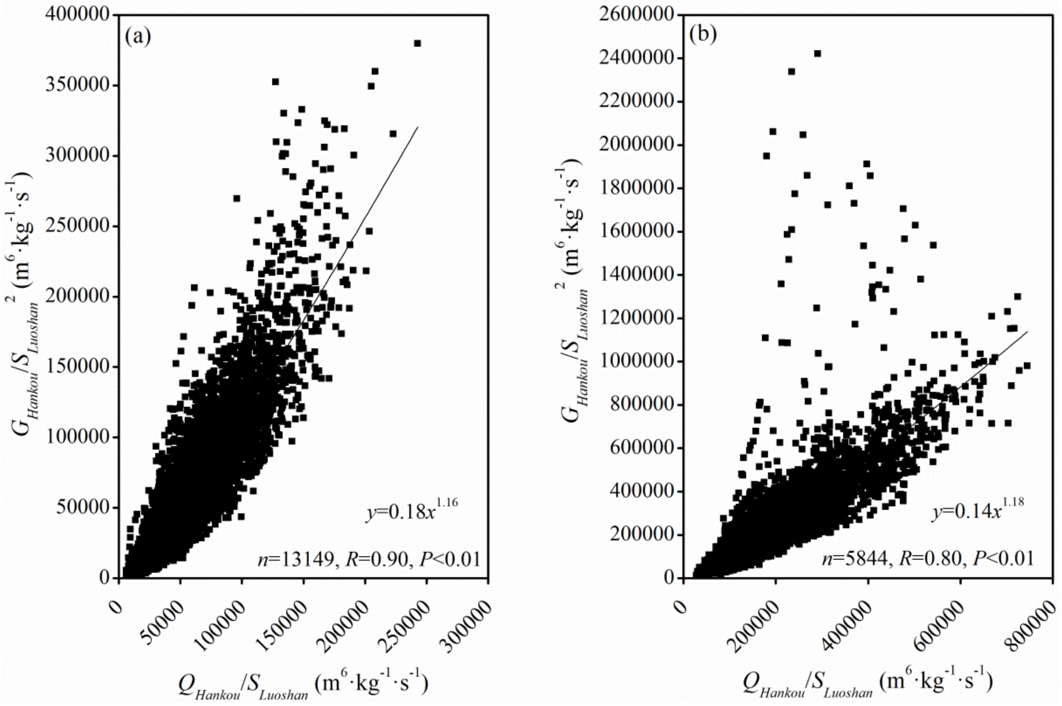

Fig. S3. Power-function regressions between $G_{Hankou}/S_{Luoshan}^{2}$ and $Q_{Hankou}/S_{Luoshan}$ using daily data during (a) pre-TGD (1961-2002) and (b) post-TGD (2003-2019) periods. In the legends, *n* is the number of data points, *R* is the correlation coefficient, and *P* is the significance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

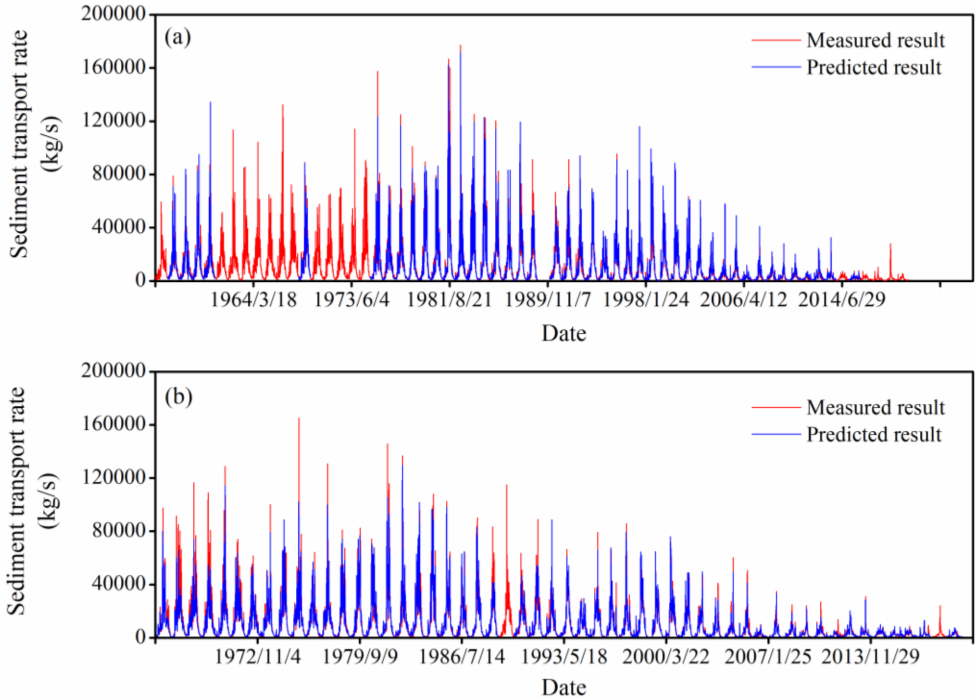

Fig. S4. Comparison between measured and predicted daily series of sediment transport rate at Luoshan (a) and Hankou (b) stations. The predicted series are based on Eq. (1) and calibrated K, α and β at the two stations.