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Supplementary material for

Estimating soil organic carbon redistribution in three major river basins of China based on erosion processes

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Contents

Table S1 Observed and simulated regional soil erosion rates used to verify the simulated result in this study; 91 samples are included

Site	Lat	Long	Area(km^2)	Year	Erosion rate (ton ha^{-1} yr^{-1})	Methods	Reference
Xinzhengcun	30°24'36″	108°38'48″	4.02	1980	12.946	^{137}Cs	Li et al. 2009
Dean	29°10′	115°23′	100×10^{-6}	2002-2006	22.59	CSLE	Qin et al. 2013
Wudaogou	41°3'7″	118°33'9″	36.8×10^{-6}	1980-2009	23.043	observation	Jiang et al. 2011
Wudaogou	41°3'7″	118°33'9″	22.9×10^{-6}	1980-2009	39.847	observation	Jiang et al. 2011
Wudaogou	41°3'7″	118°33'9″	110.5×10^{-6}	1980-2009	37.7	observation	Jiang et al. 2011
Wudaogou	41°3'7″	118°33'9″	49.7×10^{-6}	1980-2009	48.7	observation	Jiang et al. 2011
Wudaogou	41°3'7″	118°33'9″	50.1×10^{-6}	1980-2009	64.7	observation	Jiang et al. 2011
Xiaofanjiagou	36 °42 ′42 ″	109 °13 ′46 ″	0.01816	1988	46.742	Observation	Jiang et al. 1996
Yangzonghai	24°27'0″	102°55'0″	192	2007	22.45	USLE	Zhao et al. 2007
Taipingxi	30°52′	109°57′	26.136	2005	30.27	RUSLE	Luo et al. 2005
Heimiaogou	32°44'30″	111°13'09″	1.92	2011	36.106	USLE/RUSLE	Yang et al. 2011
Yingwugou	33°29'55″	110°52'16″	1.86	2013	31.4	RUSLE	Xu et al. 2013
Simianyaogou	36°54'08″	107°45'47″	32.68	2009	43.9979	RUSLE	Qin et al. 2009
Caohai	26°51'25″	104°16'37″	99	2014	12.549	^{137}Cs	Liang et al. 2014
Gongnonggou	34°27′44″	108°08'15″	0.085	2002-2014	2.6909	CSLE	Ju et al. 2015
Shihuimiao	39°28′48″	110°10'12″	13.93	1985	15.5	TEsim 2.0	Gao et al. 2007
Shihuimiao	39°28′48″	110°10'12″	13.93	1986	12.3	TEsim 2.0	Gao et al. 2007
Shihuimiao	39°28′48″	110°10'12″	13.93	1987	10.7	TEsim 2.0	Gao et al. 2007
Shihuimiao	39°28′48″	110°10'12″	13.93	1988	22.4	TEsim 2.0	Gao et al. 2007
Shihuimiao	39°28′48″	110°10'12″	13.93	1989	15.5	TEsim 2.0	Gao et al. 2007
Shihuimiao	39°28′48″	110°10'12″	13.93	1990	22.4	TEsim 2.0	Gao et al. 2007
Shihuimiao	39°28′48″	110°10'12″	13.93	1991	15.5	TEsim 2.0	Gao et al. 2007
Shihuimiao	39°28′48″	110°10'12″	13.93	1992	18.1	TEsim 2.0	Gao et al. 2007
Shihuimiao	39°28′48″	110°10'12″	13.93	1993	10.7	TEsim 2.0	Gao et al. 2007
Dongbeigou	41°3'7″	118°33'9″	19.396	1983-1985	23.59	CSLE	Jiang et al. 2011
Dongbeigou	41°3'7″	118°33'9″	19.396	2009	18.23	RUSLE	Lv et al. 2011
Mojiagou	43°53'0″	125°43'0″	1.667	1963-2008	20	^{137}Cs	Yang et al. 2011

Songling	50.00°	125.00°	3094	1977-1986	4.78	RUSLE	Wang et al. 2013
Qinjiagang	47°27'	127°5'24″	9809	1980-1989	4.02	RUSLE	Wang et al. 2013
Nianzishan	47°18'	122°52'48″	1.36×10^4	1972-1989	17.79	RUSLE	Wang et al. 2013
Yanshou	45°27'	128°19'48″	4580	1980-1989	10.99	RUSLE	Wang et al. 2013
Nongxin	44°37'48″	125°45'	4396	1980-1989	3.7	RUSLE	Wang et al. 2013
Yuzigou	31°30'36″	108°24'	9.95	1994-1998	38.93	USLE	Ni et al. 2001
Shanggou	32°45′- 32°54′	104°48 - 105°55′	135.55	1998	65.98	Geo_CA	Pan et al. 2009
Shanggou	32°45′- 32°54′	104°48 - 105°55′	135.55	2004	59.23	Geo_CA	Pan et al. 2009
Luoyugou	34°35′20″-34°39′20″	105°30'30″- 105°44′20″	72.79	1986-1993	72.31	USLE	Ma et al. 2007
Luoyugou	34°35′20″-34°39′20″	105°30'30″- 105°44′20″	72.79	1999-2004	60.6	USLE	Ma et al. 2007
Hongfenghu	26°0′0″-26°25′0″	106°00'30″- 106°26′0″	1591	1987-1997	52.8	RUSLE	Zeng et al. 2008
Hongfenghu	26°0′0″-26°25′0″	106°00'30″- 106°26′0″	1591	1998-2004	40.24	RUSLE	Zeng et al. 2008
Xiazhuang	24°25′00″-24°27′30″	117°30′00″- 117°35′00″	6.7	2005	25.4166	USLE	Hong et al. 2005
Maotiaohe	26°00′-26°52′	106°00′-106°53′	3109	2007	26.37	USLE	Xu et al. 2011
Maotiaohe	26°00′-26°52′	106°00′-106°53′	3109	1980-1990	30.29	RUSLE	Xu et al. 2011
Maotiaohe	26°00′-26°52′	106°00′-106°53′	3109	1990-2000	20.15	RUSLE	Xu et al. 2011
Yanhe	36°21' - 37°19'	108°38'- 110°29'	7725	1978	44.34	RUSLE	Miao et al. 2015
Panzhou	25°28'4″-26°6'0	104°26'34″-104°57'0″	4057	2000	67.97	RUSLE	Hu et al. 2018
Lizixi	30°22'0″-30°42'0	105°41'0″-106°06'0″	437	1980-1987	30.76	USLE	Jin et al. 2012
Baoxianghe	24°58'0″N-25°03'0	102°41'0″-102°56'0″	302	2004	8.792	USLE	Zhao et al. 2007
Baoxianghe	24°58'0″-25°03'0″	102°41'0″-102°56'0″	302	2004	10.8782	USLE	Zhao et al. 2007
Qingshuigou	35°33′36″-35°34′48″	105°42′36″- 105°43′48″	346.67	2006	75.02	RUSLE	Pan et al. 2006
Dongjiang	22°38′-25°14′	113°52′- 115°52′	3.49×10^4	1959-2004	18.73	USLE	Pan et al. 2010
Ximengxian	22°27' -22°56'	99°18' -99°42'	1256.31	2000	39.75	USLE	Gao et al. 2016
Wujiang	26°58′55″-30°7′59″	104°18′25″- 109°19′55″	5.18×10^4	1980-1989	26.78	RUSLE	Wang et al. 2014
Wujiang	26°58′55″-30°7′59″	104°18′25″- 109°19′55″	5.18×10^4	1990-2000	23.13	RUSLE	Wang et al. 2014
Mingjiangshangyou	31°26′- 33°16′	102°59′- 104°14′	2.24×10^5	1995	10.4874	RUSLE	He et al. 2005
Mingjiangshangyou	31°26′- 33°16′	102°59- 104°14′	2.24×10^5	2000	13.6211	RUSLE	He et al. 2005
Jiangxi	24°29′14″-30°04′41″	113°34′36″-118°28′58″	1.67×10^5	2001	70.42	USLE	Zhou et al. 2018
Jiangxi	24°29′14″-30°04′41″	113°34′36″-118°28′58″	1.67×10^5	2015	63.75	USLE	Zhou et al. 2018
Lasahe	29°20′-31°15′	90°05′-93°20′	3.32×10^4	2010	30.76	RUSLE	Fang et al. 2015
Zulihe	35°18′-36°34′	104°12′-105°33′	1.06×10^4	1995	28.77	RUSLE	Jiao et al. 2016
Zulihe	35°18′-36°34′	104°12′-105°33′	1.06×10^4	2005	33.72	RUSLE	Jiao et al. 2016

Zulihe	35°18′-36°34′	104°12′-105°33，	1.06×10^4	2015	37.13	RUSLE	Jiao et al. 2016
Yihe	33°30′-36°20′	117°25′-119°49′	1.00×10^4	1975	19.64	RUSLE	Li et al. 2017
Yihe	33°30′-36°20′	117°25′-119°49′	1.00×10^4	1985	22.11	RUSLE	Li et al. 2017
Yihe	33°30′-36°20′	117°25′-119°49′	1.00×10^4	1995	25.76	RUSLE	Li et al. 2017
Yihe	33°30′-36°20′	117°25′-119°49′	1.00×10^4	2005	21.93	RUSLE	Li et al. 2017
Yihe	33°30′-36°20′	117°25′-119°49′	1.00×10^4	2010	20.5	RUSLE	Li et al. 2017
Yihe	33°30′-36°20′	117°25′-119°49′	1.00×10^4	2015	16.92	RUSLE	Li et al. 2017
Jialuhe	38°29′46″-38°3′0″	109°57′54″-110°18′14″	1134	1988-1996	45.13	CSLE	Yang et al. 2017
Jialuhe	38°29′46″-38°3′0″	109°57′54″-110°18′14″	1134	1997-2004	58.55	CSLE	Yang et al. 2017
Jialuhe	38°29′46″-38°3′0″	109°57′54″-110°18′14″	1134	2005-2013	35.56	CSLE	Yang et al. 2017
Yihe	33°30′-36°20′	117°25′-119°49′	6089	2012	30.98	RUSLE	He et al. 2012
Nantinghe	23°18′-24°20′	98°41′-100°14′	9170	1990	24.75	USLE	Gu et al. 2015
Nantinghe	23°18′-24°20′	98°41′-100°14′	9170	2000	30.05	USLE	Gu et al. 2015
Nantinghe	23°18′-24°20′	98°41′-100°14′	9170	2010	25.87	USLE	Gu et al. 2015
Yangbijiang	25°38'24″ -26°38'24″	99°26'35″ -100°25'26″	4353	1990	18.3037	RS/GIS	Wang et al. 2010
Lijiang	26°34′-27°46′	99°23′- 100°32′	7648	2007	52.5	RUSLE	Peng et al. 2007
Luochuan	35°26'29″ -36°04'12″	109°13'14″- 109°45'47″	1886	1951-2009	34.1267	CSLE	Li et al. 2007
Datong	36°43′-37°23′	100°51′-101°56′	3090	1995	68.55	RUSLE	Jia et al. 2012
Datong	36°43′-37°23′	100°51′-101°56′	3090	2010	51.83	RUSLE	Jia et al. 2012
Beipanjiang	24°51'- 26°45'	103°50'- 106°20'	2.66×10^4	2015	34.32	RUSLE	Qian et al. 2018
Dafang	26°50'02″-27°36'04″	105°15′47 ″-106°08'04″	3505	2005	55	USLE	Yang et al. 2018
Yanhe	36°21' -37°19'	108°38' -110°29'	7725	2001	65.9672	RUSLE	Li et al. 2012
Yanhe	36°21' -37°19'	108°38' -110°29'	7725	2002	54.5	RUSLE	Li et al. 2012
Yanhe	36°21' -37°19'	108°38' -110°29'	7725	2003	46.75	RUSLE	Li et al. 2012
Yanhe	36°21' -37°19'	108°38' -110°29'	7725	2004	50	RUSLE	Li et al. 2012
Yanhe	36°21' -37°19'	108°38' -110°29'	7725	2005	49.75	RUSLE	Li et al. 2012
Yanhe	36°21' -37°19'	108°38' -110°29'	7725	2006	30.5	RUSLE	Li et al. 2012
Yanhe	36°21' -37°19'	108°38' -110°29'	7725	2007	32.5	RUSLE	Li et al. 2012
Yanhe	36°21' -37°19'	108°38' -110°29'	7725	2008	24.85	RUSLE	Li et al. 2012
Yanhe	36°21' -37°19'	108°38' -110°29'	7725	2009	58.5	RUSLE	Li et al. 2012
Yanhe	36°21' -37°19'	108°38' -110°29'	7725	2010	33.5	RUSLE	Li et al. 2012

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Table S2. Conversion from erosion grade to erosion/deposition rate

Erosion Grade	Erosion Rate (Mg ha^{-1} yr^{-1})
1 (high)	<–20
2 (moderate erosion)	–12 to –20
3 (low erosion)	–1 to –12
4 (very low erosion)	–1–0
5 (very low deposition)	0–1
6 (low-moderate deposition)	1–20
7 (high deposition)	>20

Table S3. Total eroded SOC and average precipitation in the Yangtze River Basin from 1992 to 2013

Year	Total Eroded SOC (Pg)	Average Precipitation (mm)
1992	0.005891528	999.398
1993	0.005872764	1144.842
1994	0.00571947	1053.838
1995	0.008282545	1214.908
1996	0.006134784	1085.115
1997	0.00542095	1040.861
1998	0.006080839	1061.591
1999	0.005484846	1165.914
2000	0.008589099	1178.423
2001	0.005463055	992.122
2002	0.006804535	1088.647
2003	0.005686877	1025.078
2004	0.006355594	1038.016
2005	0.005673903	1061.71
2006	0.005194814	960.398
2007	0.00560525	1010.626
2008	0.005788801	1064.107
2009	0.006186314	994.5
2010	0.006355531	978.489
2011	0.005313084	917.122
2012	0.006469479	1000.548
2013	0.008749061	1184.945

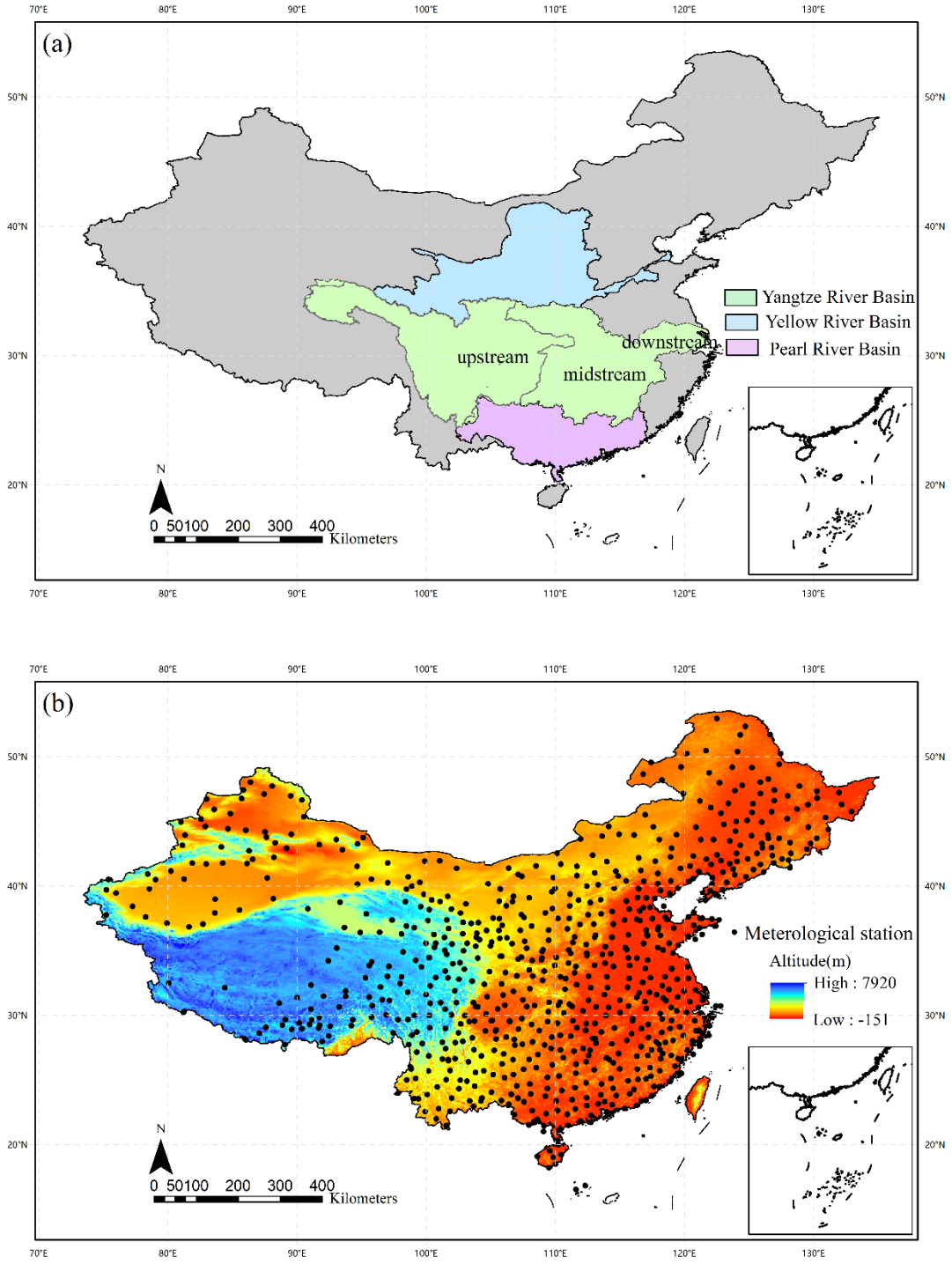

Fig. S1. (a) The location of Yangtze River Basin (divided into upstream, midstream and downstream), Yellow River Basin and Pearl River Basin in China; (b) location of the 756 meteorology stations in China for interpolating annual precipitation in the period of 1992-2013.

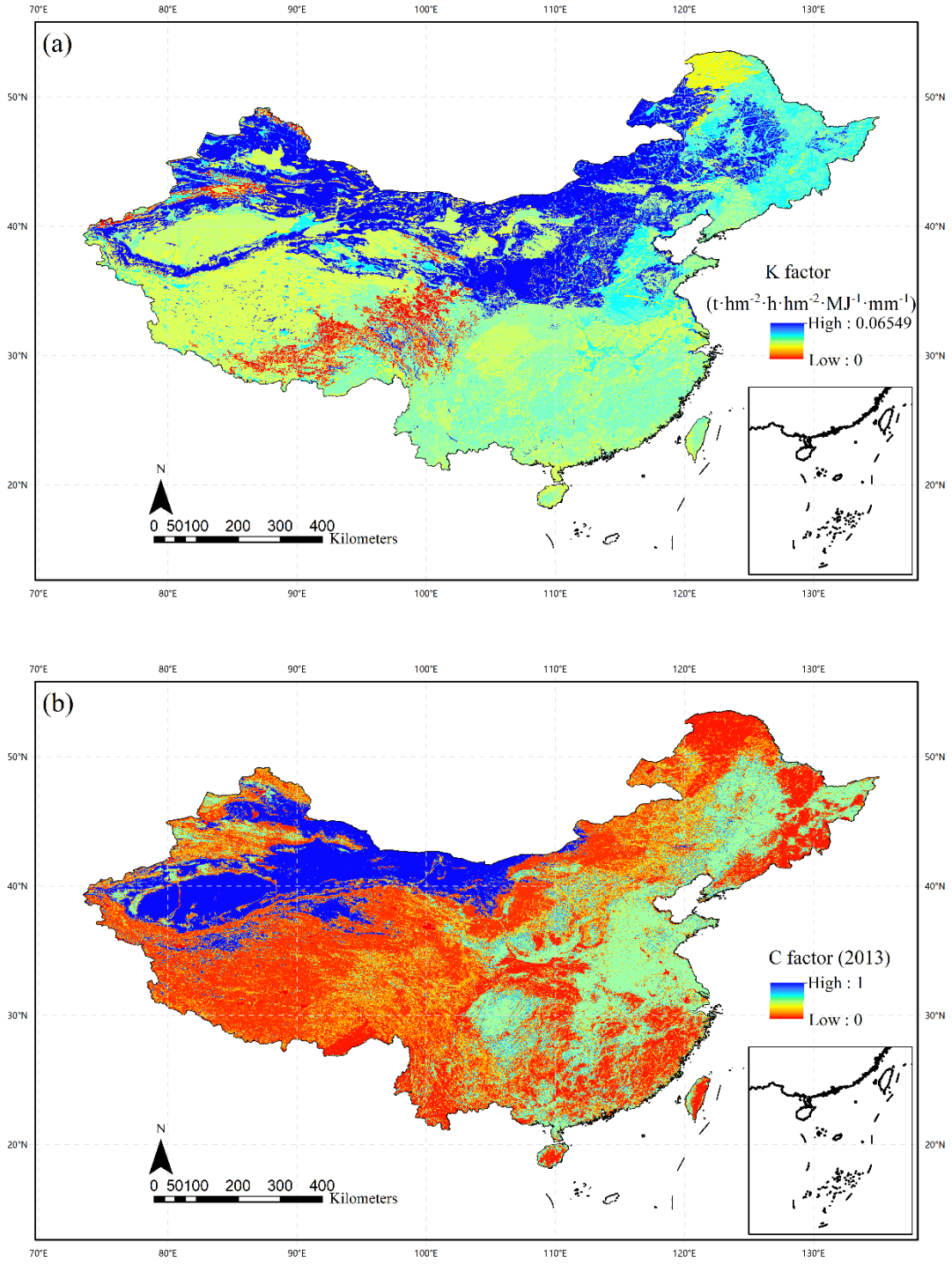

Fig. S2. (a) Distribution of the K value of the soil erodibility index; (b) distribution of the C factor as the land cover and management factor in 2013. This study used a C factor value of 22 years based on data from the European Space Agency for 1992-2013.

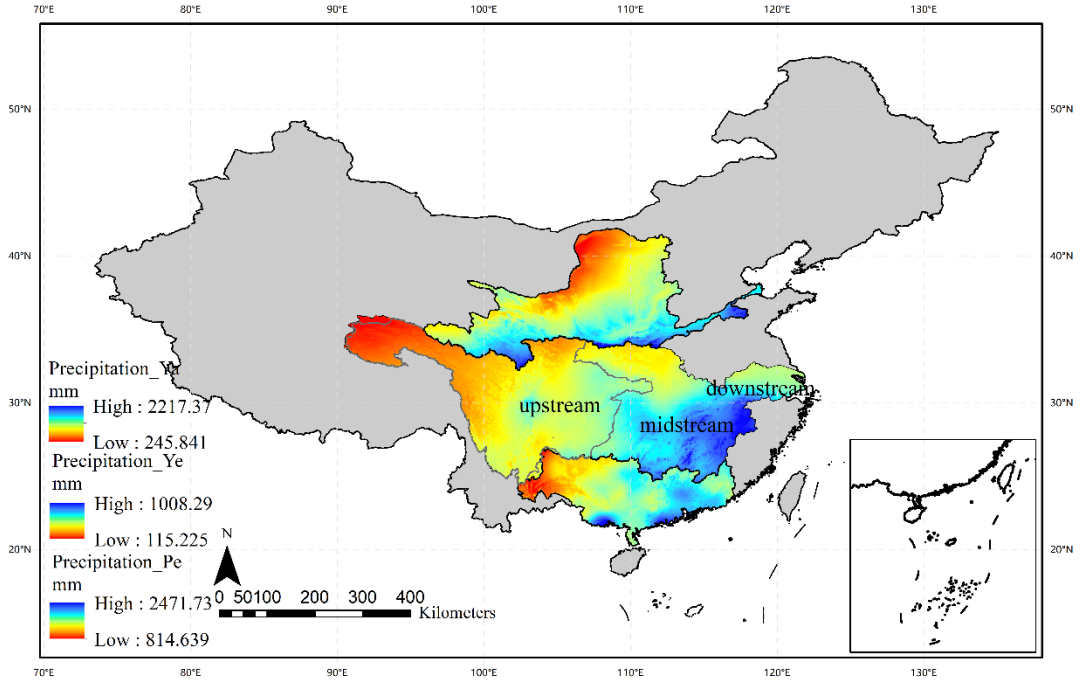

Fig. S3. The annual average precipitation in the three basins from 1992 to 2013.
† the original daily station-based meteorological data were interpolated at a national scale using the program ANUSPLIN with the support of DEM. ANUSPLIN is an interpolation tool based on the partial thin plate smoothing splines principle which can be understood as the standard multivariate liner regression models (Hutchinson *et al*.1994).

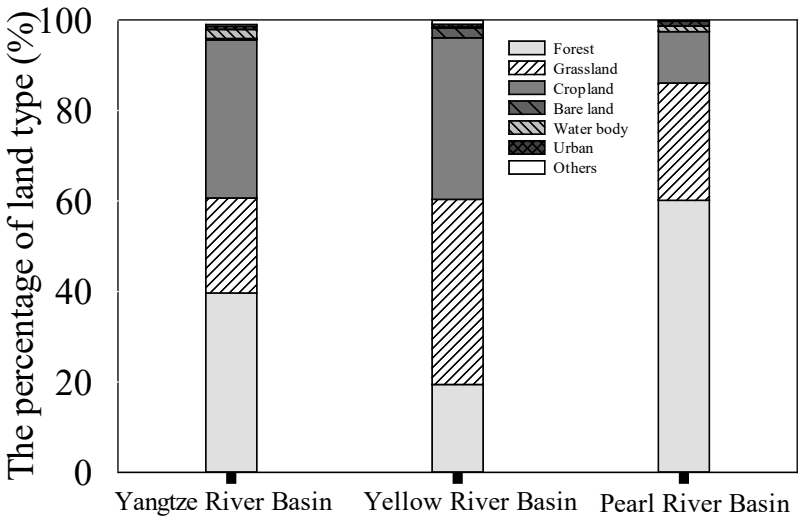

Fig. S4. The percentage of land types in the three basins in the period of 1992-2013.