

Dynamic changes, spatiotemporal differences, and ecological effects of impervious surfaces in the Yellow River Basin, 1986–2020

Supplementary Materials

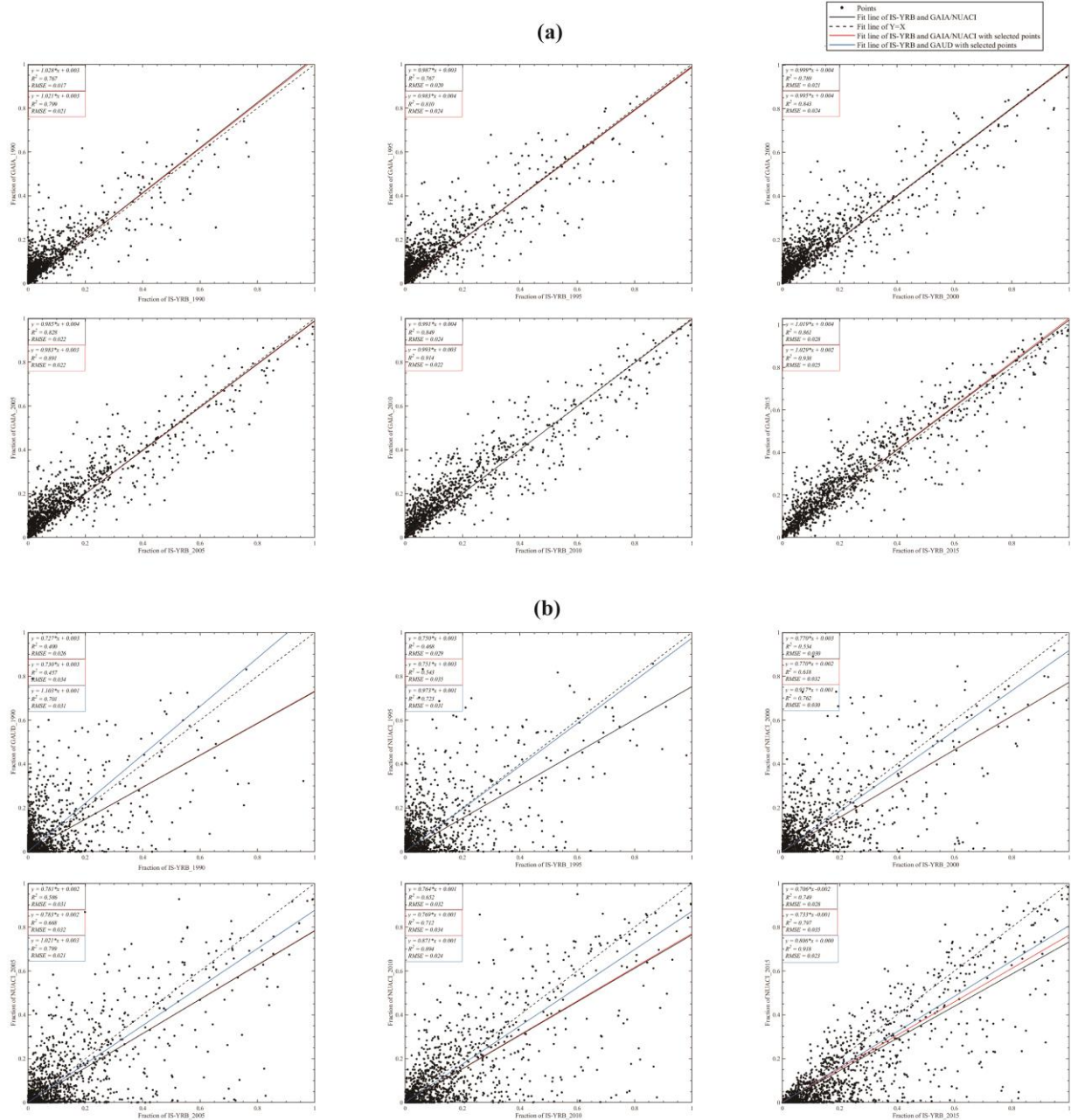


Figure S1. Scatterplots between impervious surfaces-Yellow River Basin (IS-YRB) and global artificial impervious areas/normalized urban areas composite index/global annual urban dynamics (GAIA/NUACI/GAUD) datasets with selected points which stripped the villages and towns agglomeration areas in 1990, 1995, 2000, 2005, 2010, and 2015: the scatterplots between (a) IS-YRB and GAIA and (b) between IS-YRB and NUACI/GAUD.

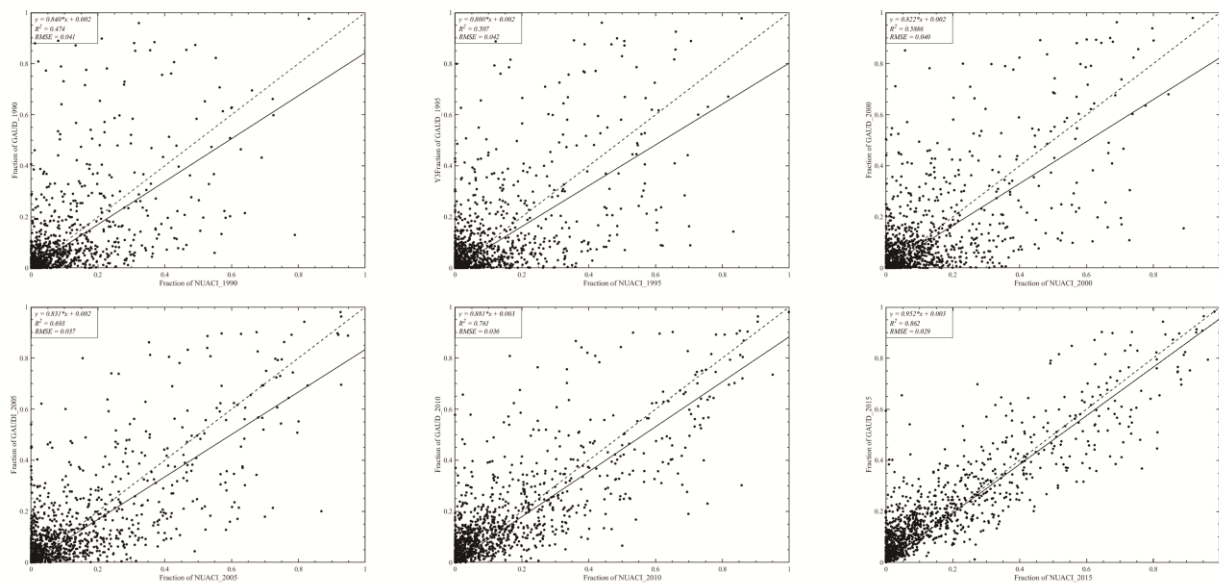


Figure S2. Scatterplots between normalized urban areas composite index (NUACI) and global annual urban dynamics (GAUD) datasets in 1990, 1995, 2000, 2005, 2010, and 2015.

Table S1 ES of cities with impervious surfaces areas over 100km² in 2020

	ES ₈₆₋₉₀	ES ₉₁₋₉₅	ES ₉₆₋₀₀	ES ₀₁₋₀₅	ES ₀₆₋₁₀	ES ₁₁₋₁₅	ES ₁₆₋₂₀		ES ₈₆₋₉₀	ES ₉₁₋₉₅	ES ₉₆₋₀₀	ES ₀₁₋₀₅	ES ₀₆₋₁₀	ES ₁₁₋₁₅	ES ₁₆₋₂₀
Xining	1.47	1.27	2.22	3.26	5.27	6.86	9.20	Yuncheng	1.23	1.78	3.47	7.29	12.38	26.87	38.49
Lanzhou	6.33	2.26	4.89	9.06	7.81	11.77	23.56	Jinzhong	4.03	3.94	5.61	8.75	12.24	20.58	22.30
Qingyang	0.97	1.00	0.93	4.65	1.19	4.02	9.12	Xi'an	4.10	3.43	7.47	22.81	16.91	34.13	39.66
Tianshui	0.68	0.50	0.79	2.70	1.76	5.75	7.03	Yanan	7.58	2.35	2.78	2.63	2.58	6.68	13.30
Dingxi	0.78	0.86	0.94	1.42	1.52	3.96	10.33	Baoji	0.95	0.36	0.92	4.85	3.55	12.66	16.53
Baiyin	1.37	1.01	1.95	3.21	4.22	4.86	16.37	Xianyang	1.42	0.96	2.25	6.58	5.08	18.26	25.75
Yinchuan	4.08	2.59	6.25	7.57	18.02	34.38	38.15	Yulin	2.61	-3.28	-3.55	32.00	6.70	31.41	29.24
Zhongwei	0.66	0.50	0.92	1.89	4.43	10.23	18.21	Weinan	0.97	1.33	2.22	7.77	6.64	18.08	32.74
Wuzhong	1.76	1.29	1.40	4.58	5.07	10.31	18.24	Zhengzhou	2.64	7.57	9.73	18.87	18.20	43.19	49.45
Shizuishan	1.28	1.21	3.35	2.81	7.23	19.36	11.99	Sanmenxia	0.38	0.94	1.31	2.60	4.71	7.61	10.25
Huhehaote	4.95	4.08	5.21	7.78	9.68	17.30	19.53	Xinxiang	0.20	3.05	2.17	4.50	3.96	15.03	40.74
Wuhai	1.026	1.73	1.94	3.34	5.32	11.20	7.75	Luoyang	2.49	2.03	2.69	7.00	8.38	27.02	26.93
Baotou	9.81	6.63	9.13	11.65	10.66	14.54	14.47	Puyang	0.16	1.14	0.45	1.24	0.50	4.74	21.26
Bayan Nur	0.46	0.45	2.90	2.17	6.26	11.03	20.70	Jiaozuo	0.06	0.65	1.17	1.90	4.58	16.74	16.42
Ordos	0.58	-1.20	-2.73	27.99	13.47	37.72	40.55	AnYang	0.09	1.03	0.37	0.88	1.02	3.70	12.80
Taiyuan	12.28	12.94	11.12	25.61	12.72	16.60	13.22	Dongying	8.44	18.99	6.02	18.57	4.92	40.58	20.99
Linfen	3.00	3.18	3.13	6.85	13.89	22.50	17.81	Tai'an	4.66	7.55	4.88	9.78	10.88	43.54	44.41
Luliang	5.12	4.29	3.71	11.11	21.11	26.25	28.79	Jining	1.77	3.42	1.65	5.22	5.24	16.06	35.13
Qizhou	2.11	0.84	0.88	3.78	1.01	6.65	6.03	Laiwu	1.50	4.21	2.21	2.98	3.86	17.98	14.71
Jincheng	0.22	0.83	1.16	1.54	4.82	8.68	7.64	Bingzhou	1.52	1.92	0.57	1.84	1.60	5.51	6.73

Note: ES: expansion speed.

Table S2 EI of cities with impervious surfaces areas over 100km² in 2020

	EI ₈₆₋₉₀	EI ₉₁₋₉₅	EI ₉₆₋₀₀	EI ₀₁₋₀₅	EI ₀₆₋₁₀	EI ₁₁₋₁₅	EI ₁₆₋₂₀		EI ₈₆₋₉₀	EI ₉₁₋₉₅	EI ₉₆₋₀₀	EI ₀₁₋₀₅	EI ₀₆₋₁₀	EI ₁₁₋₁₅	EI ₁₆₋₂₀
Xining	0.04	0.03	0.04	0.04	0.05	0.05	0.05	Yuncheng	0.05	0.05	0.06	0.08	0.08	0.10	0.09
Lanzhou	0.05	0.01	0.03	0.04	0.03	0.04	0.06	Jinzhong	0.04	0.03	0.04	0.04	0.04	0.05	0.04
Qingyang	0.09	0.06	0.04	0.18	0.03	0.07	0.10	Xi'an	0.04	0.02	0.04	0.11	0.05	0.07	0.06
Tianshui	0.09	0.04	0.05	0.14	0.06	0.11	0.07	Yanan	0.35	0.04	0.04	0.03	0.02	0.05	0.07
Dingxi	0.27	0.10	0.06	0.06	0.05	0.08	0.12	Baoji	0.05	0.02	0.03	0.19	0.07	0.13	0.10
Baiyin	0.06	0.04	0.05	0.06	0.06	0.05	0.11	Xianyang	0.06	0.03	0.05	0.15	0.07	0.13	0.10
Yinchuan	0.08	0.04	0.06	0.05	0.08	0.09	0.07	Yulin	0.02	-0.03	-0.03	0.22	0.06	0.13	0.08
Zhongwei	0.07	0.04	0.05	0.07	0.10	0.12	0.11	Weinan	0.03	0.03	0.04	0.14	0.07	0.10	0.11
Wuzhong	0.08	0.04	0.04	0.10	0.07	0.09	0.10	Zhengzhou	0.01	0.02	0.02	0.04	0.03	0.05	0.04
Shizuishan	0.05	0.04	0.07	0.03	0.06	0.10	0.04	Sanmenxia	0.08	0.10	0.08	0.10	0.10	0.09	0.08
Huhehaote	0.06	0.04	0.04	0.04	0.04	0.06	0.05	Xinxiang	0.00	0.04	0.02	0.04	0.03	0.08	0.13
Wuhai	0.04	0.05	0.04	0.05	0.06	0.08	0.04	Luoyang	0.02	0.02	0.02	0.04	0.03	0.07	0.05
Baotou	0.11	0.05	0.05	0.05	0.03	0.04	0.03	Puyang	0.01	0.07	0.02	0.05	0.01	0.11	0.22
Bayan Nur	0.04	0.03	0.13	0.04	0.09	0.09	0.10	Jiaozuo	0.00	0.01	0.01	0.01	0.03	0.08	0.05
Ordos	0.01	-0.02	-0.04	0.24	0.11	0.13	0.09	AnYang	0.02	0.12	0.03	0.06	0.05	0.12	0.19
Taiyuan	0.07	0.05	0.03	0.07	0.03	0.03	0.02	Dongying	0.05	0.07	0.02	0.05	0.01	0.08	0.03
Linfen	0.08	0.06	0.04	0.06	0.08	0.08	0.05	Tai'an	0.08	0.06	0.03	0.04	0.04	0.10	0.07
Luliang	0.07	0.04	0.03	0.05	0.07	0.06	0.05	Jining	0.03	0.04	0.02	0.04	0.03	0.08	0.10
Qizhou	0.19	0.04	0.03	0.12	0.02	0.10	0.06	Laiwu	0.06	0.10	0.04	0.03	0.03	0.11	0.06
Jincheng	0.00	0.00	0.01	0.01	0.02	0.04	0.03	Bingzhou	0.10	0.07	0.02	0.04	0.03	0.08	0.06

Note: EI: expansion intensity.