Electronic Supplementary Material to: Assessment of Crop Yield in China Simulated by Thirteen Global Gridded Crop Models*

Dezhen YIN[1,2], Fang LI[1,2], Yaqiong LU[3], Xiaodong ZENG[1,2], Zhongda LIN[4,2], and Yanqing ZHOU[5,2]

[1]*International Center for Climate and Environment Sciences*, *Institute of Atmospheric Physics*, *Chinese Academy of Sciences*, *Beijing* 100029, *China*

[2]*University of Chinese Academy of Sciences*, *Beijing* 100049, *China*

[3]*Institute of Mountain Hazards and Environment*, *Chinese Academy of Sciences*, *Chengdu* 610041, *China*

[4]*State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics*, *Institute of Atmospheric Physics*, *Chinese Academy of Sciences*, *Beijing* 100029, *China*

[5]*State Key Laboratory of Desert and Oasis Ecology*, *Xinjiang Institute of Ecology and Geography*, *Chinese Academy of Sciences*, *Urumqi* 830011, *China*

ESM to: Yin, D. Z., F. Li, Y. Q. Lu, X. D. Zeng, Z. D. Lin, and Y. Q. Zhou, 2024: Assessment of crop yield in China simulated by thirteen global gridded crop models. *Adv. Atmos. Sci.*, **41**(3), 420–434, https://doi.org/10.1007/s00376-023-2234-3.

Table S1. Multi-year average national yield (units: 10^{-1} kg m^{-2}) for four crop types from observations and simulations during 1980–2009. Orange cells indicate the simulated yield is higher than observed, and vice versa if colored blue.

	Wheat	Maize	Rice	Soybean
Obs	3.51	4.49	5.79	1.53
CLM4.5post-crop	3.10	7.72	0.83	2.54
LPJ-GUESS	4.40	3.38	1.63	1.28
LPJmL	5.78	6.29	6.78	1.65
ORCHIDEE-crop	3.32	4.27	7.42	0.87
PEGASUS	4.45	5.85	N/A	1.55
CGMS-WOFOST	4.74	6.82	3.24	4.10
EPIC-Boku	2.42	7.54	2.58	2.31
EPIC-IIASA	3.58	4.53	5.50	1.98
GEPIC	2.56	3.88	4.83	1.99
pAPSIM	5.51	5.41	N/A	2.73
pDSSAT	4.99	6.60	6.61	2.72
PEPIC	2.48	4.78	4.19	2.20
GGCMI-MME	3.94±1.19	5.59±1.44	4.36±2.26	2.16±0.84
CLM5-crop	3.96	4.92	5.97	2.22

* The online version of this article can be found at https://doi.org/10.1007/ s00376-023-2234-3.

Table S2. Long-term trend (units: 10^{-1} kg m^{-2} yr^{-1}) of observed and simulated national yield during 1980–2009. An asterisk (*) denotes statistical significance according to the Mann–Kendall test at the 0.05 level. Significant increases are colored orange and significant decreases blue.

	Wheat	Maize	Rice	Soybean
Obs	0.080*	0.074*	0.065*	0.020*
CLM4.5post-crop	0.019*	−0.003	0.001	0.021*
LPJ-GUESS	0.006	−0.002	0.005	0.002
LPJmL	0.017*	−0.005	0.014*	0.004*
ORCHIDEE-crop	0.007	−0.007*	0.0	−0.008*
PEGASUS	0.019	0.036*	N/A	0.021*
CGMS-WOFOST	0.041*	−0.003	−0.003	0.0
EPIC-Boku	−0.012*	−0.011	−0.001	−0.003
EPIC-IIASA	0.003	−0.012	−0.004	−0.001
GEPIC	−0.003	−0.011	−0.002	−0.002
pAPSIM	−0.003	−0.014	N/A	0.002
pDSSAT	−0.020	−0.008	0.006	0.005
PEPIC	−0.021*	−0.013	−0.002	0.005
GGCMI-MME	0.004	−0.004	0.001	0.004
CLM5-crop	0.030*	0.034*	0.103*	0.003

Table S3. Amplitude of interannual variability of observed and simulated national yield, which is calculated using the coefficient of variation (CV) of detrended time series.

	Wheat	Maize	Rice	Soybean
Obs	0.06	0.07	0.04	0.09
CLM4.5post-crop	0.04	0.03	0.17	0.09
LPJ-GUESS	0.04	0.04	0.06	0.07
LPJmL	0.04	0.04	0.03	0.06
ORCHIDEE-crop	0.05	0.03	0.01	0.12
PEGASUS	0.11	0.08	N/A	0.08
CGMS-WOFOST	0.18	0.06	0.08	0.06
EPIC-Boku	0.07	0.08	0.03	0.06
EPIC-IIASA	0.07	0.07	0.03	0.06
GEPIC	0.05	0.07	0.04	0.07
pAPSIM	0.02	0.07	N/A	0.07
pDSSAT	0.23	0.07	0.05	0.10
PEPIC	0.05	0.06	0.04	0.04
GGCMI-MME	0.04±0.06	0.04±0.02	0.03±0.05	0.05±0.02
CLM5-crop	0.07	0.07	0.05	0.07

Table S4. Temporal correlation of national yield between observations and simulations based on detrended time series. An asterisk (*) denotes statistically significance according to Student's *t*-test at the 0.05 level. Significant positive correlations are colored orange and significant negative correlations blue.

	Wheat	Maize	Rice	Soybean
CLM4.5post-crop	0.23	0.23	−0.30	0.08
LPJ-GUESS	0.18	0.08	0.19	−0.22
LPJmL	0.17	0.35	0.27	0.16
ORCHIDEE-crop	−0.23	0.22	−0.25	0.01
PEGASUS	0.02	−0.45*	N/A	−0.3
CGMS-WOFOST	0.38*	0.35	0.49*	0.34
EPIC-Boku	0.0	0.70*	0.25	0.36
EPIC-IIASA	0.07	0.59*	0.30	0.34
GEPIC	−0.39*	0.63*	0.25	0.36*
pAPSIM	0.37*	0.22	N/A	0.31
pDSSAT	0.02	0.30	0.11	0.04
PEPIC	0.21	0.68*	0.37*	0.28
$MME_{Ecosystem}$	0.10	−0.02	0.05	−0.06
$MME_{Site\text{-}based}$	0.23	0.57*	0.33	0.34
CLM5-crop	0.16	0.64*	0.18	0.09

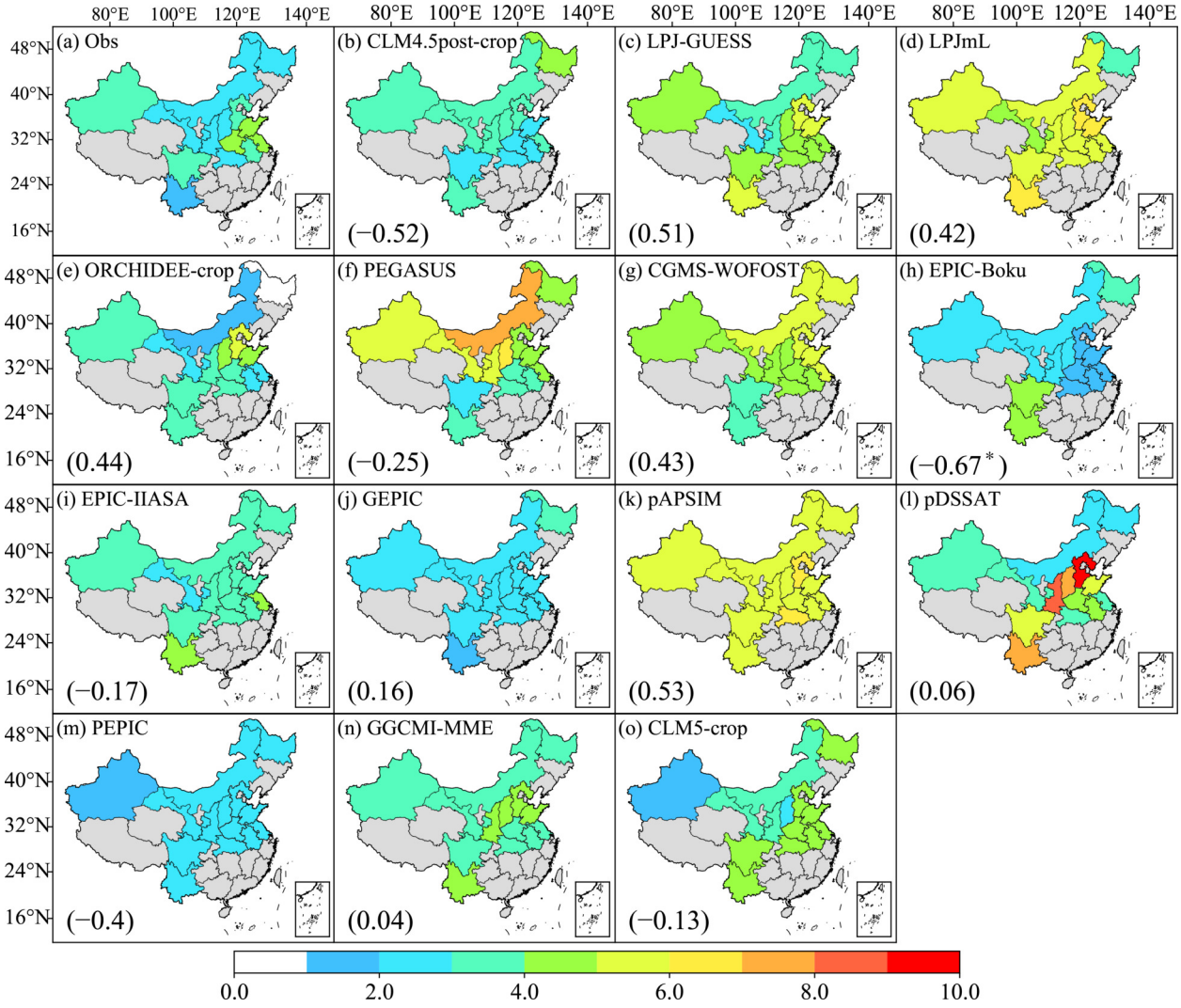

Fig. S1. Spatial distribution of observed and simulated wheat yields (units: 10^{-1} kg m^{-2}) averaged over 1980–2009. Only provinces where production accounts for more than 1% of the national total are considered. The numbers in parentheses are the spatial correlation coefficient between observations and simulations. An asterisk (*) denotes statistical significance according to Student's *t*-test at the 0.05 level.

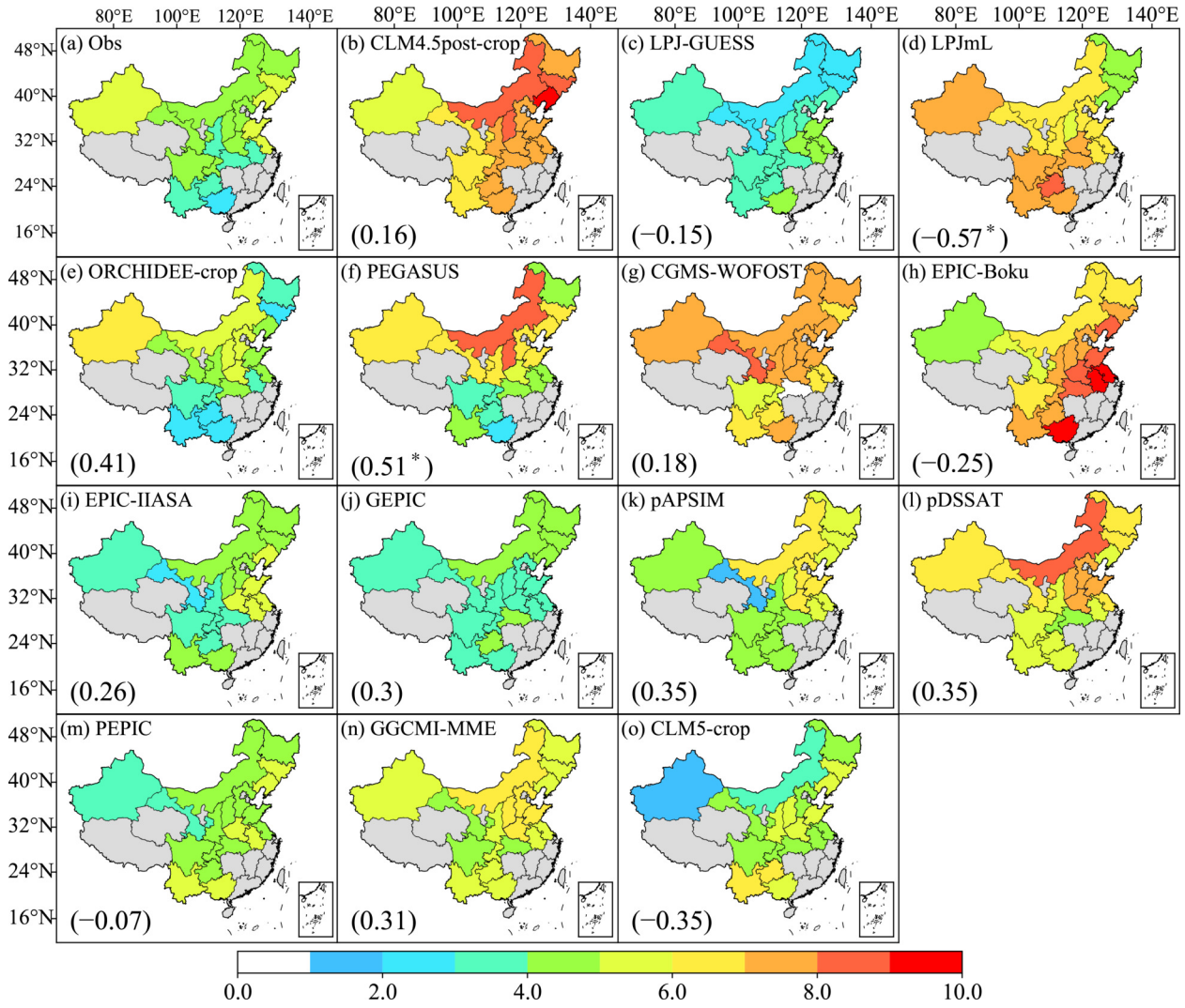

Fig. S2. As in Fig. S1 but for maize.

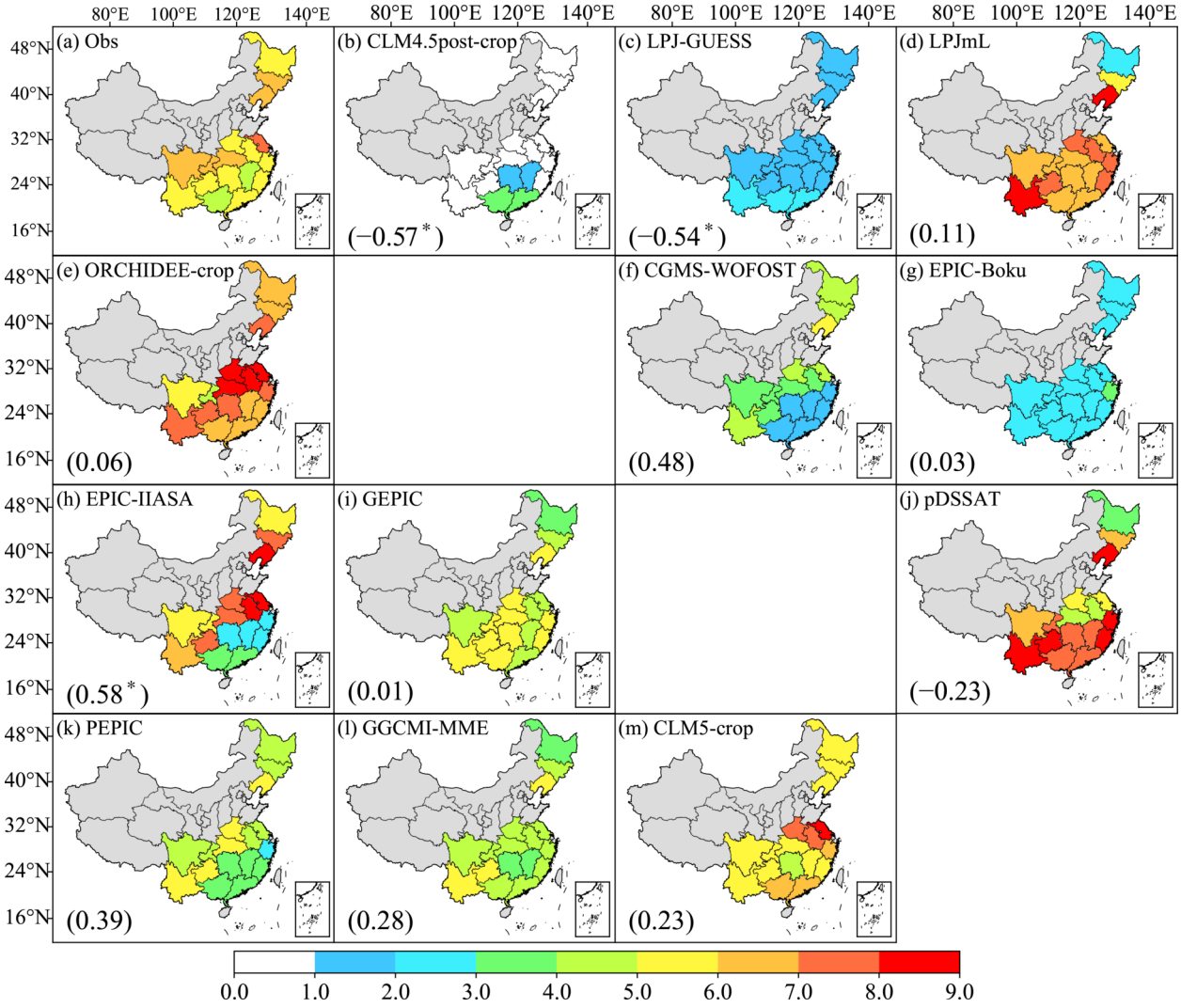

Fig. S3. As in Fig. S1 but for rice. Note that PEGASUS and pAPSIM did not provide simulations for rice.

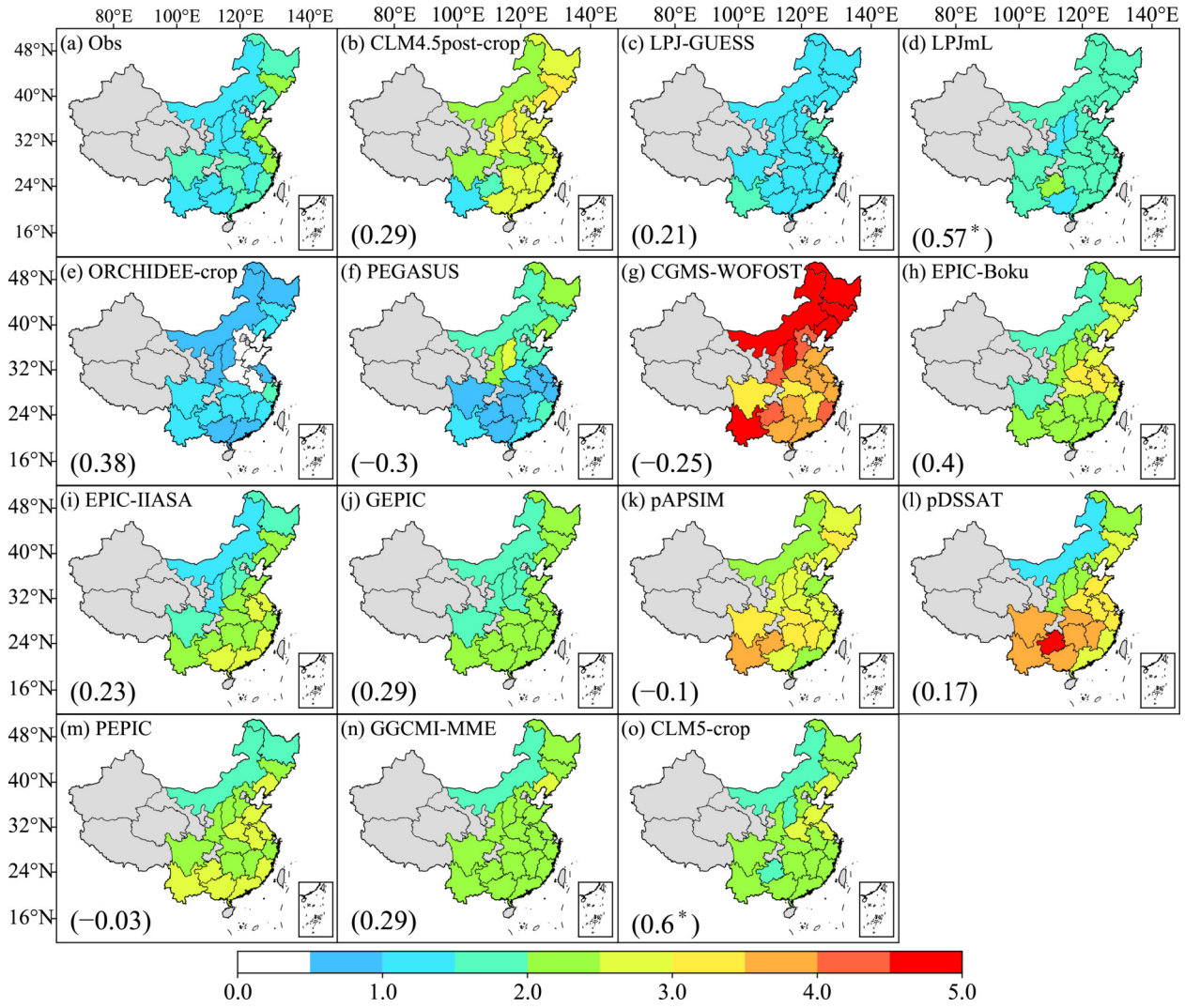

Fig. S4. As in Fig. S1 but for soybean.

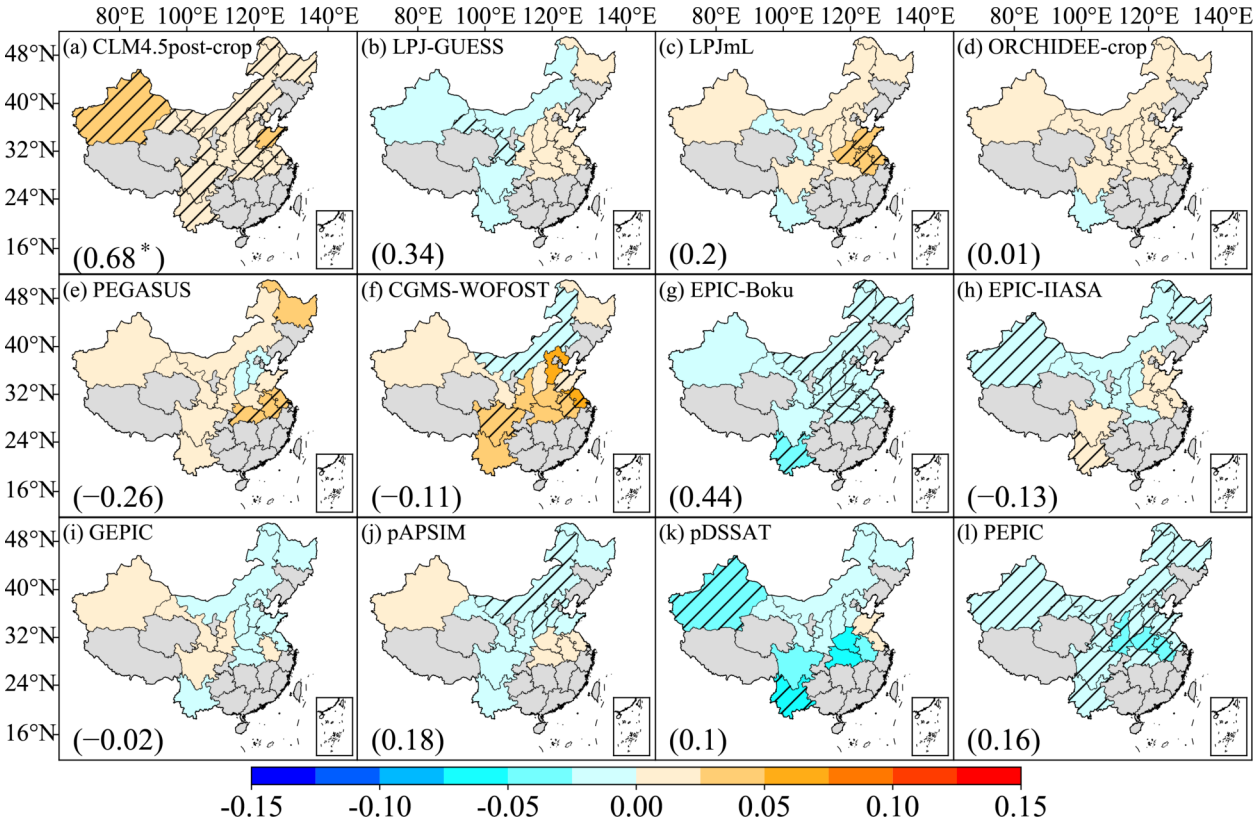

Fig. S5. As in Fig. 5 but for the spatial distribution of the long-term trend (units: 10^{-1} kg m^{-2} yr^{-1}) of GGCMI models for wheat.

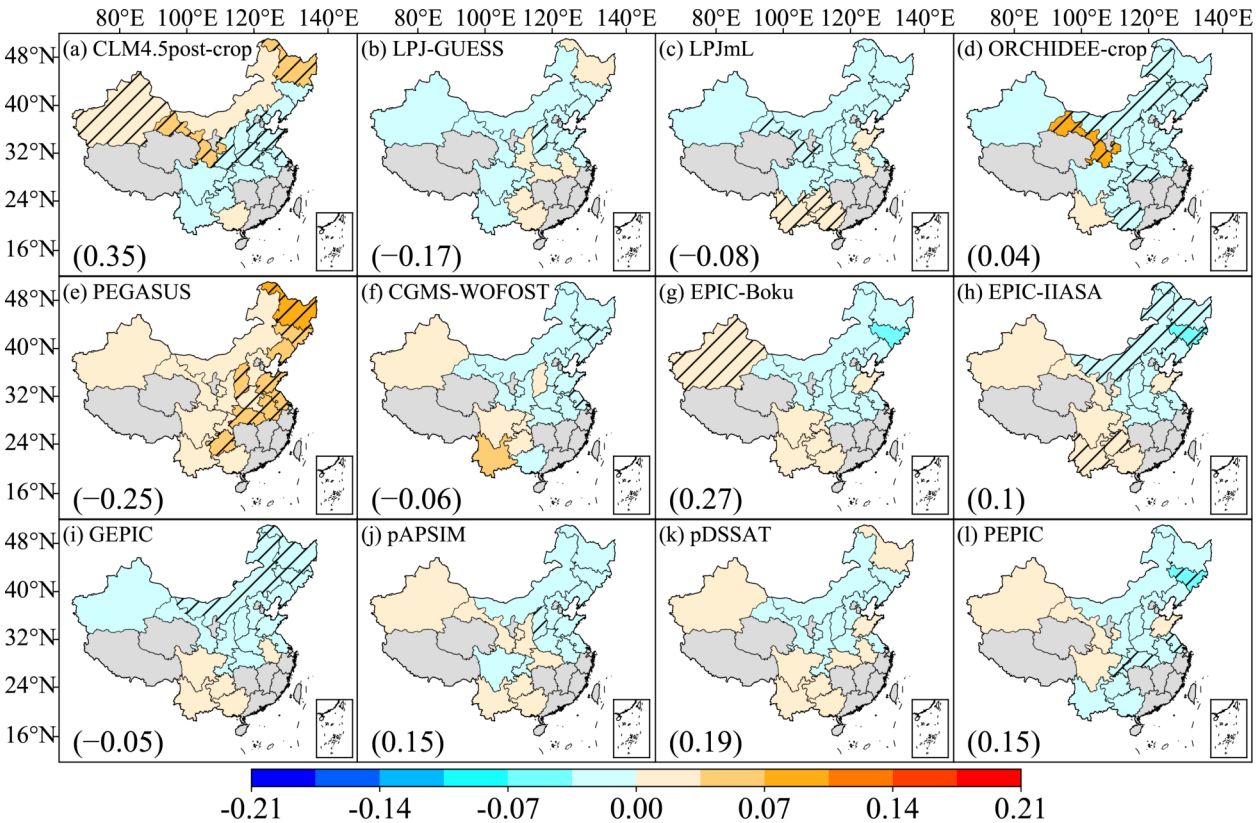

Fig. S6. As in Fig. S5 but for maize.