Supplementary Information for

ChinaMet: A multisource integrated high-resolution multi-variable meteorological dataset for China

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Introduction

This supplementary information includes 9 figures and 2 tables, which provide supplements to the descriptions of the data sets, methods, and results given in the main paper.

1 Supplementary Figures

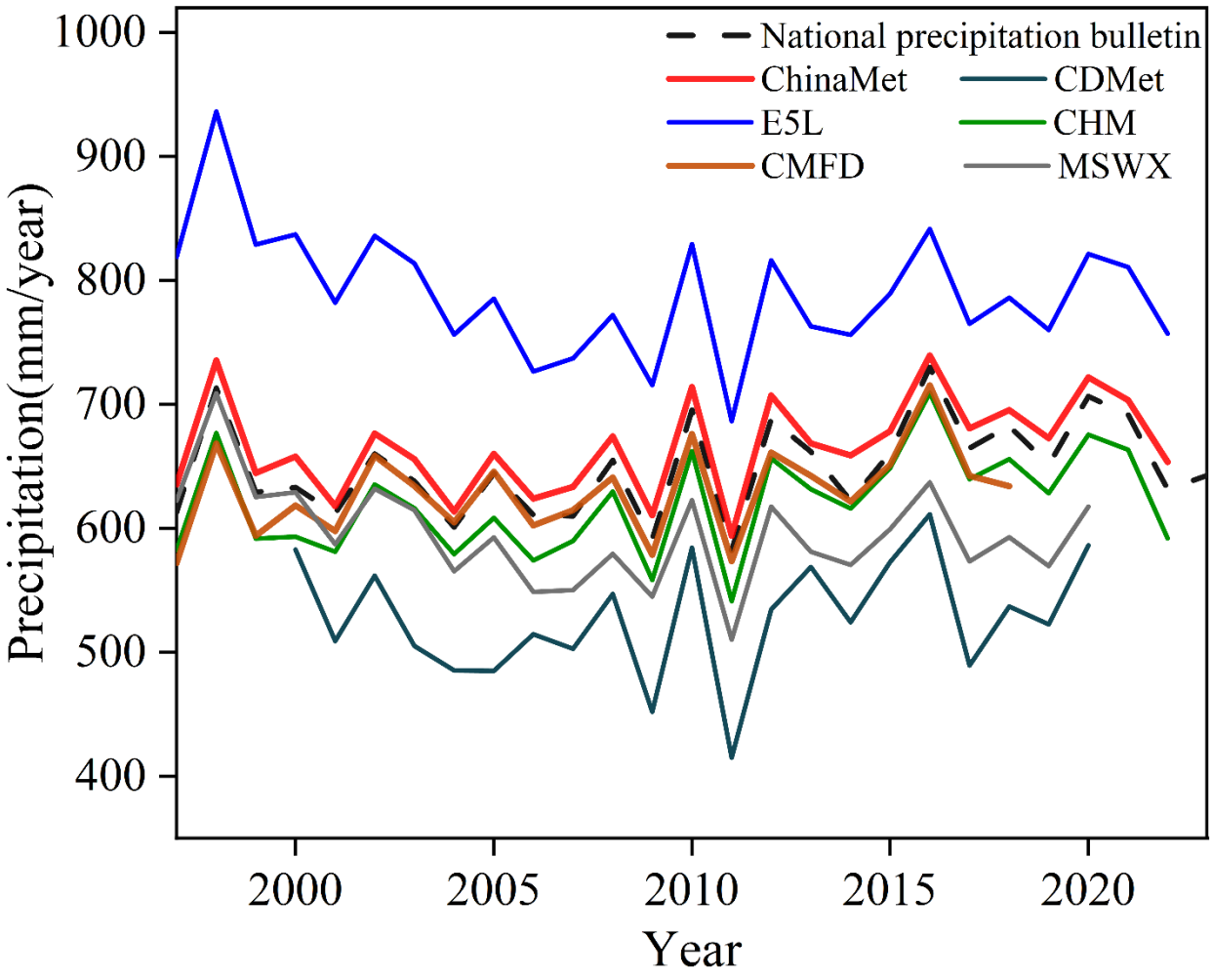


Figure S1. Comparison of six precipitation products with the national annual precipitation records reported in China's Water Resources Bulletins from 1997 to 2022.

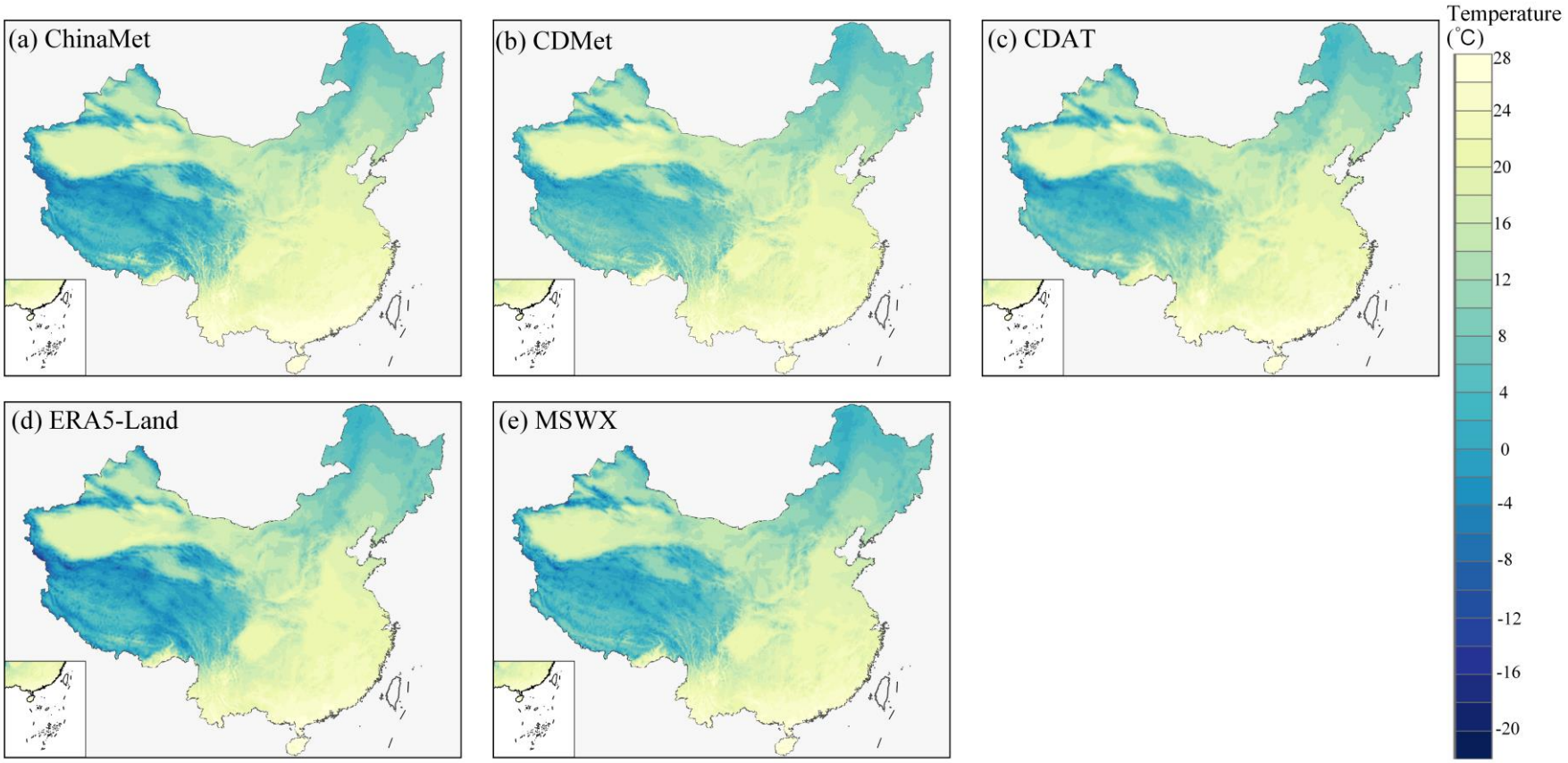


Figure S2. Spatial distributions of mean annual maximum air temperature from five products from 2000 to 2018.

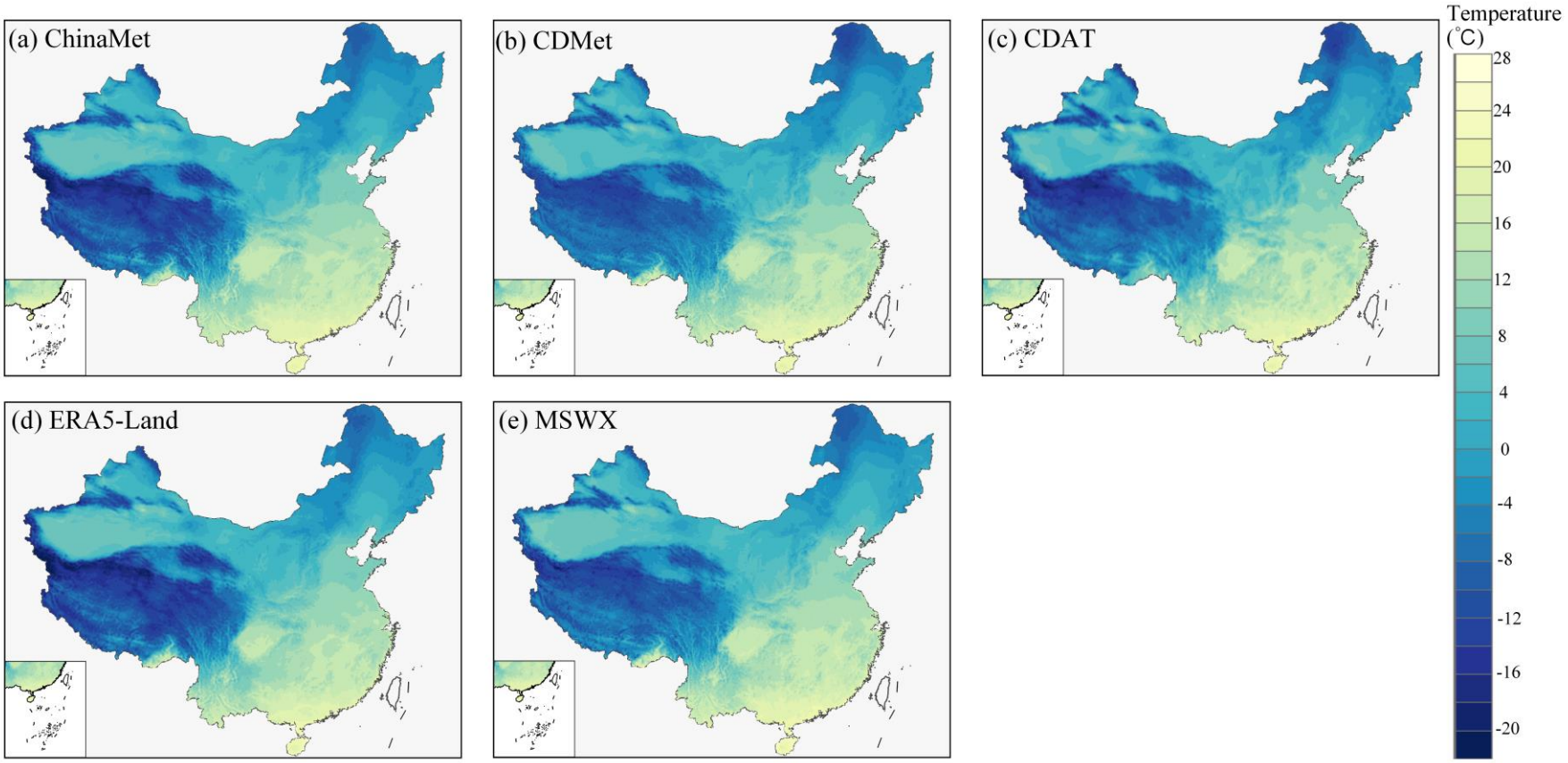


Figure S3. Spatial distributions of mean annual minimum air temperature from five products from 2000 to 2018.

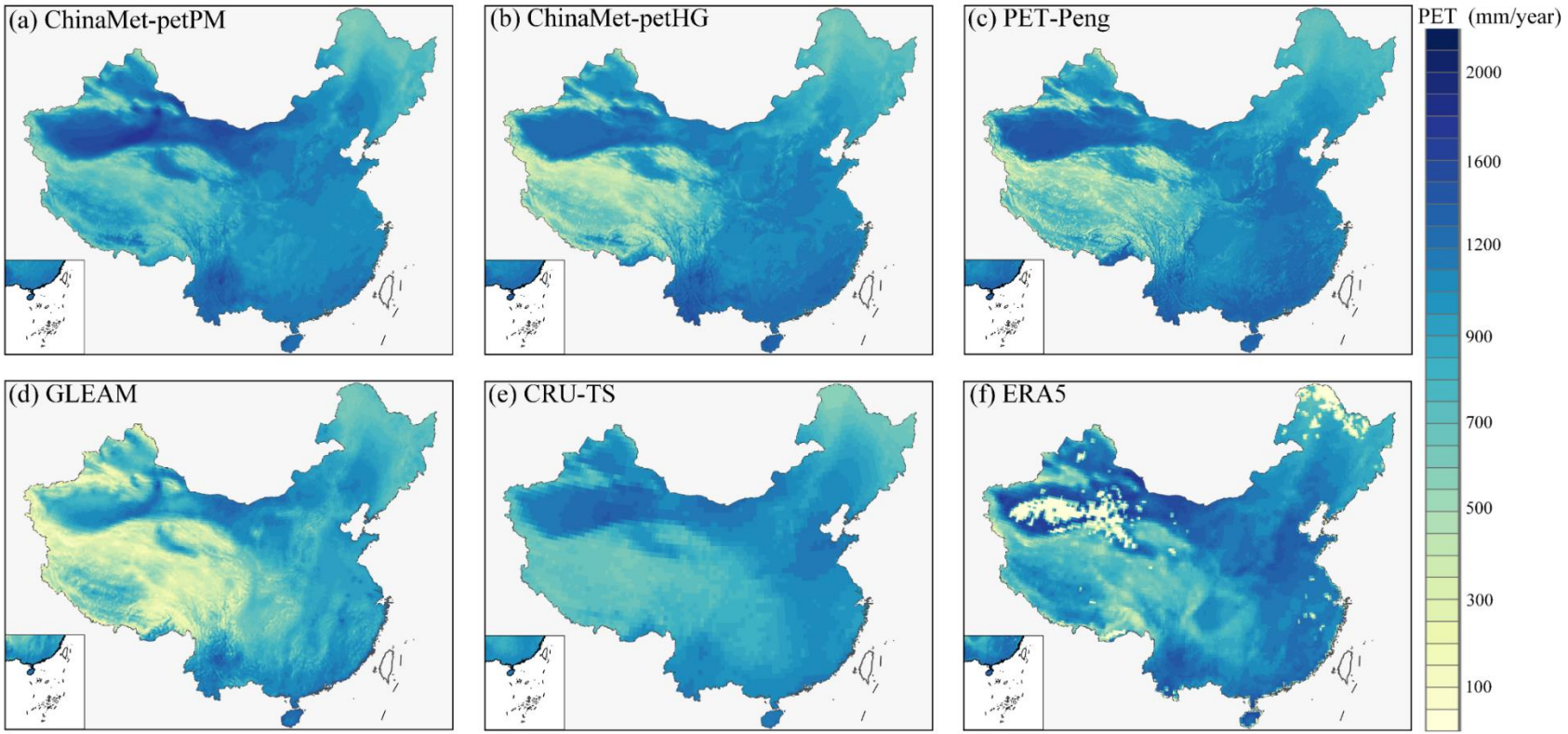


Figure S4. Spatial distributions of mean annual potential evapotranspiration from six products from 2000 to 2018.

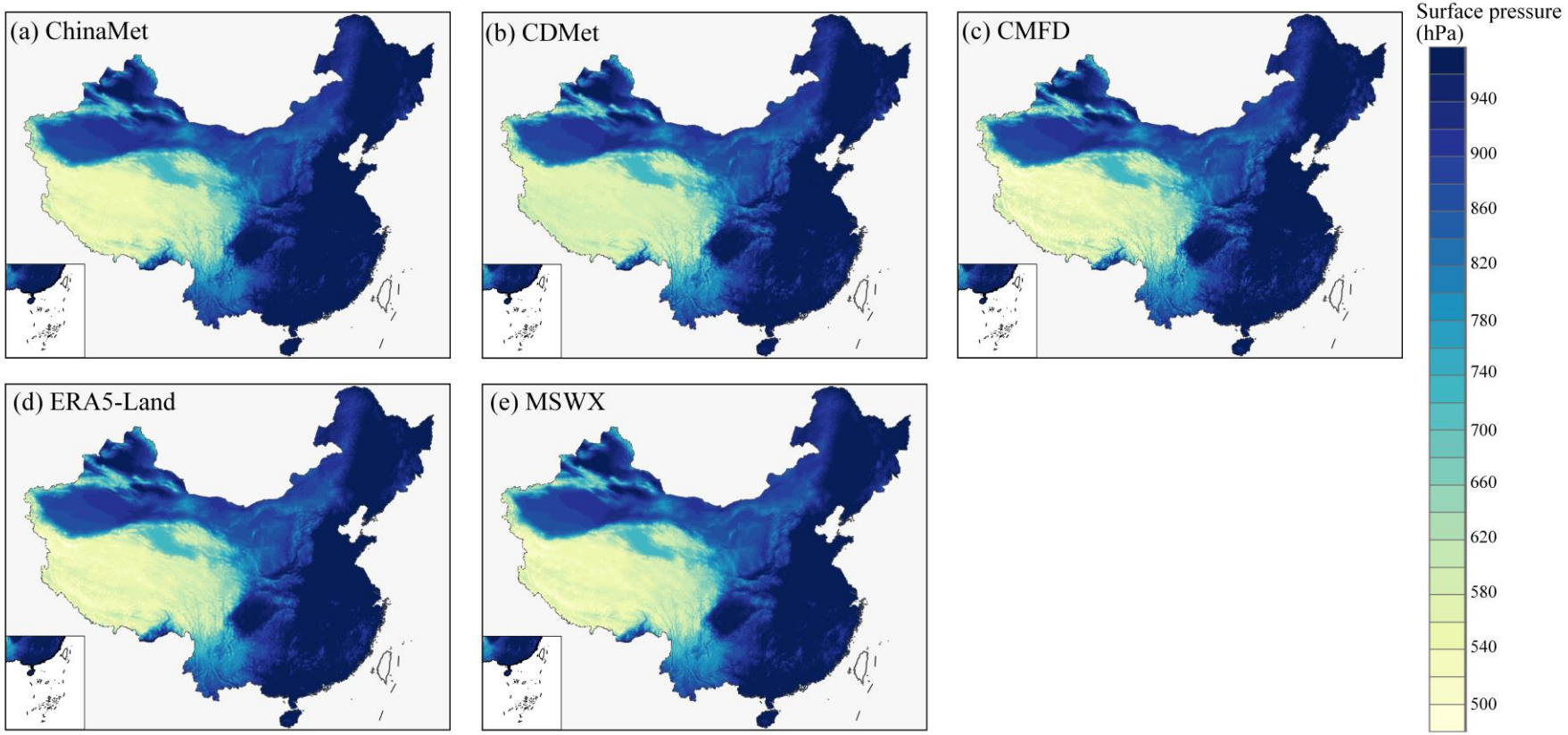


Figure S5. Spatial distributions of mean annual surface pressure from five products from 2000 to 2018.

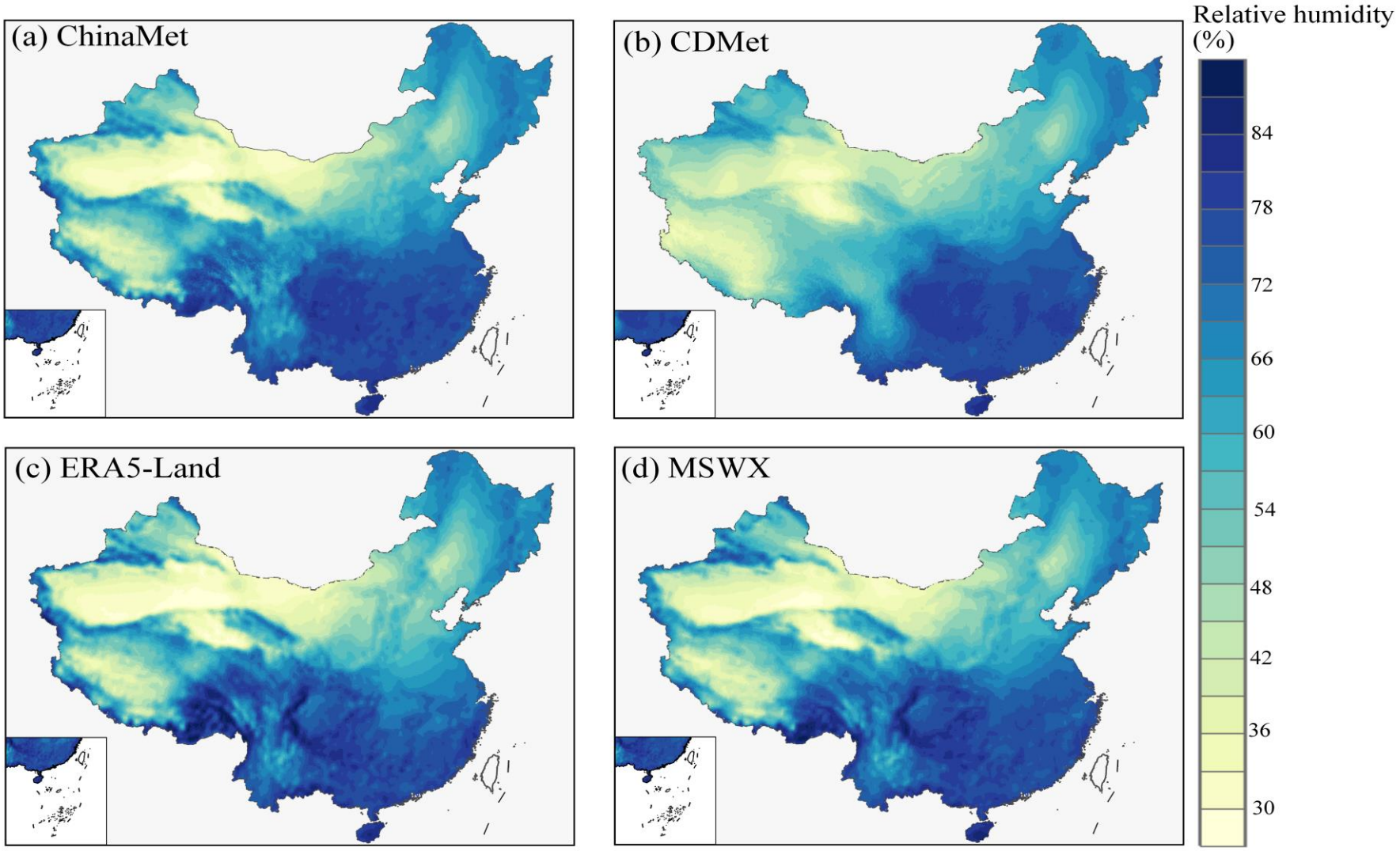


Figure S6. Spatial distributions of mean annual relative humidity from four products from 2000 to 2018.

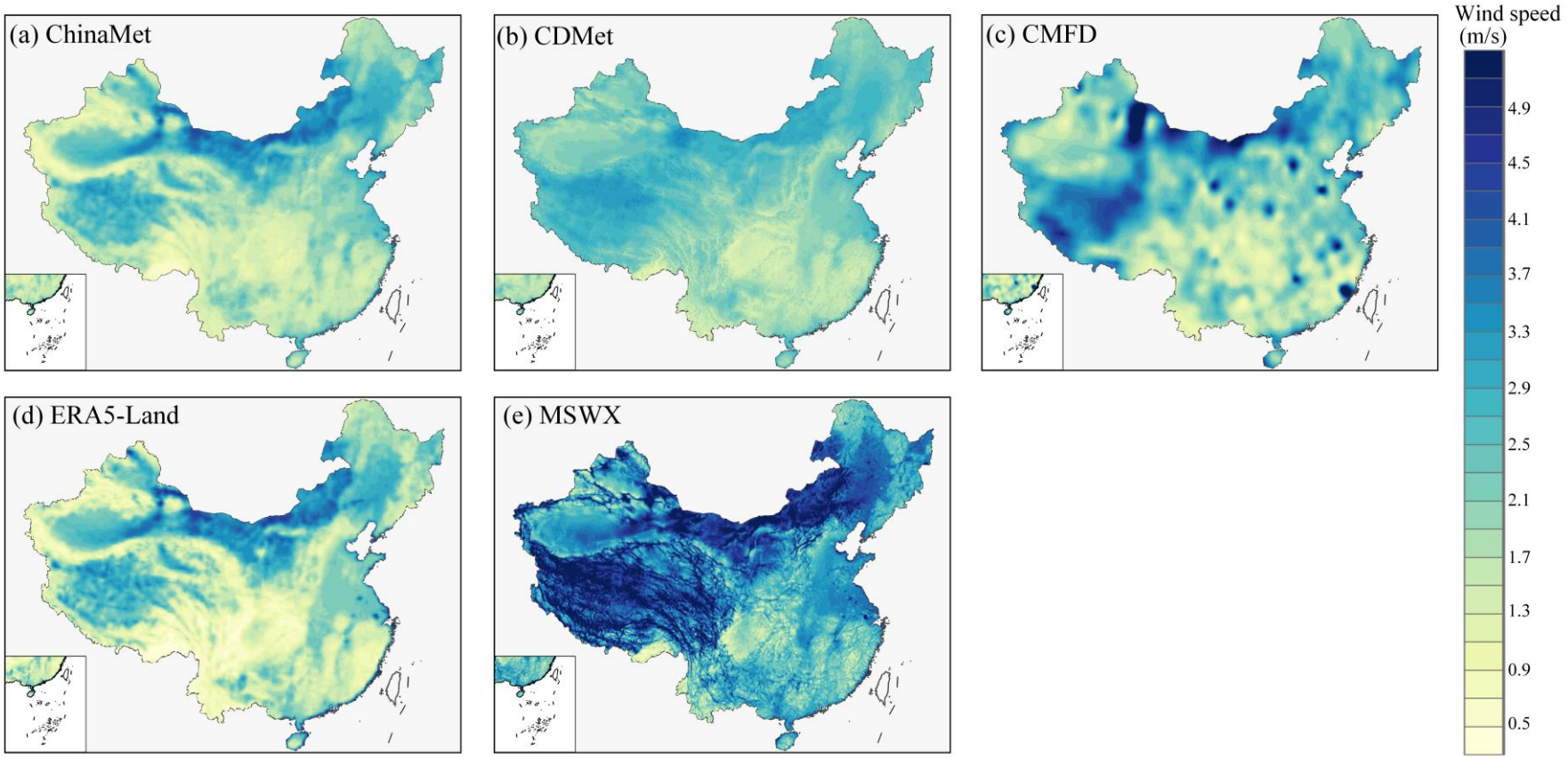


Figure S7. Spatial distributions of mean annual wind speed from five products from 2000 to 2018.

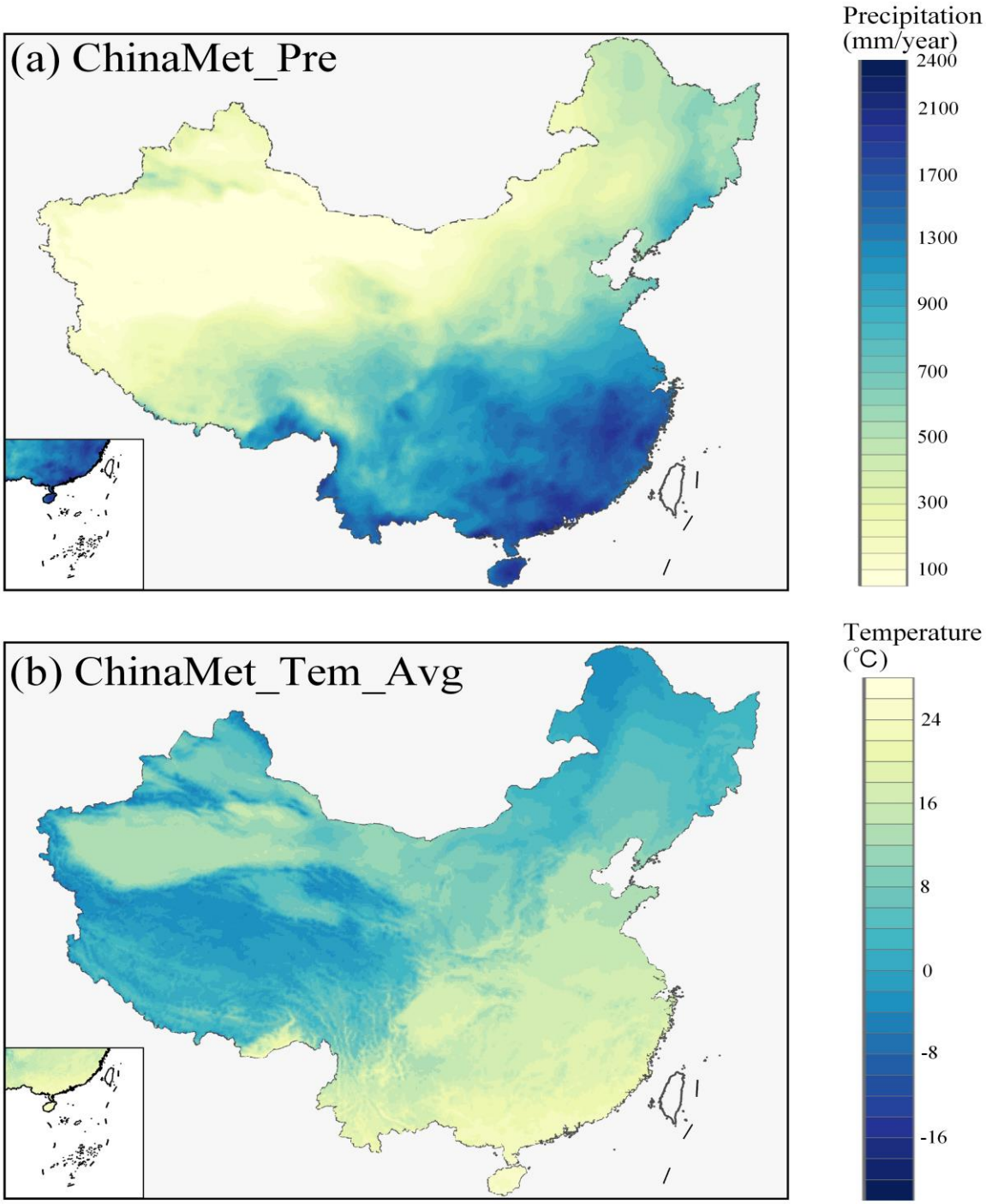


Figure S8. Spatial distributions of (a) multiyear mean annual precipitation and (b) multiyear mean air temperature from ChinaMet generated without virtual stations during 2000–2018.

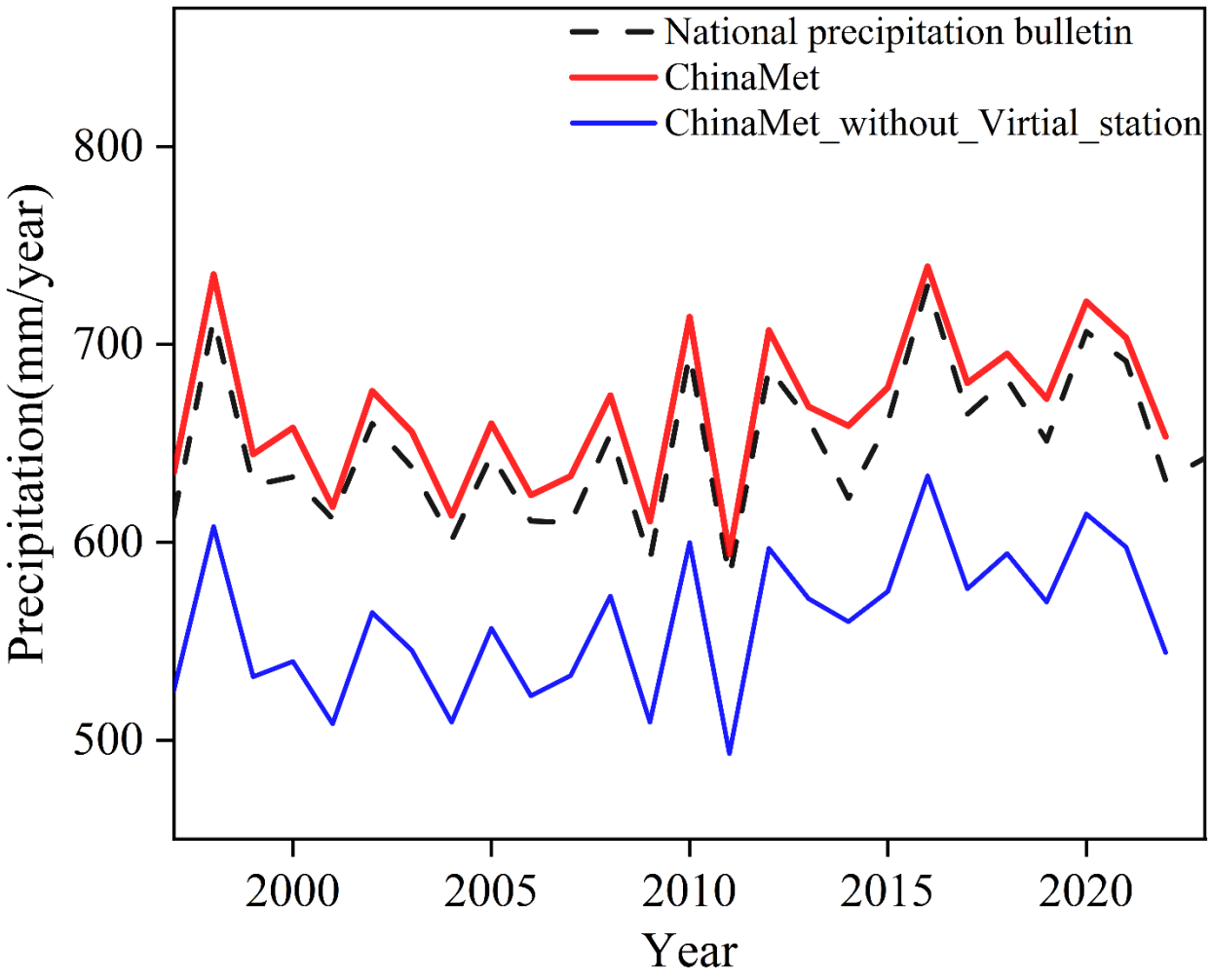


Figure S9. Comparison of ChinaMet generated with and without virtual stations against the national annual precipitation records reported in China's Water Resources Bulletins from 1997 to 2022.

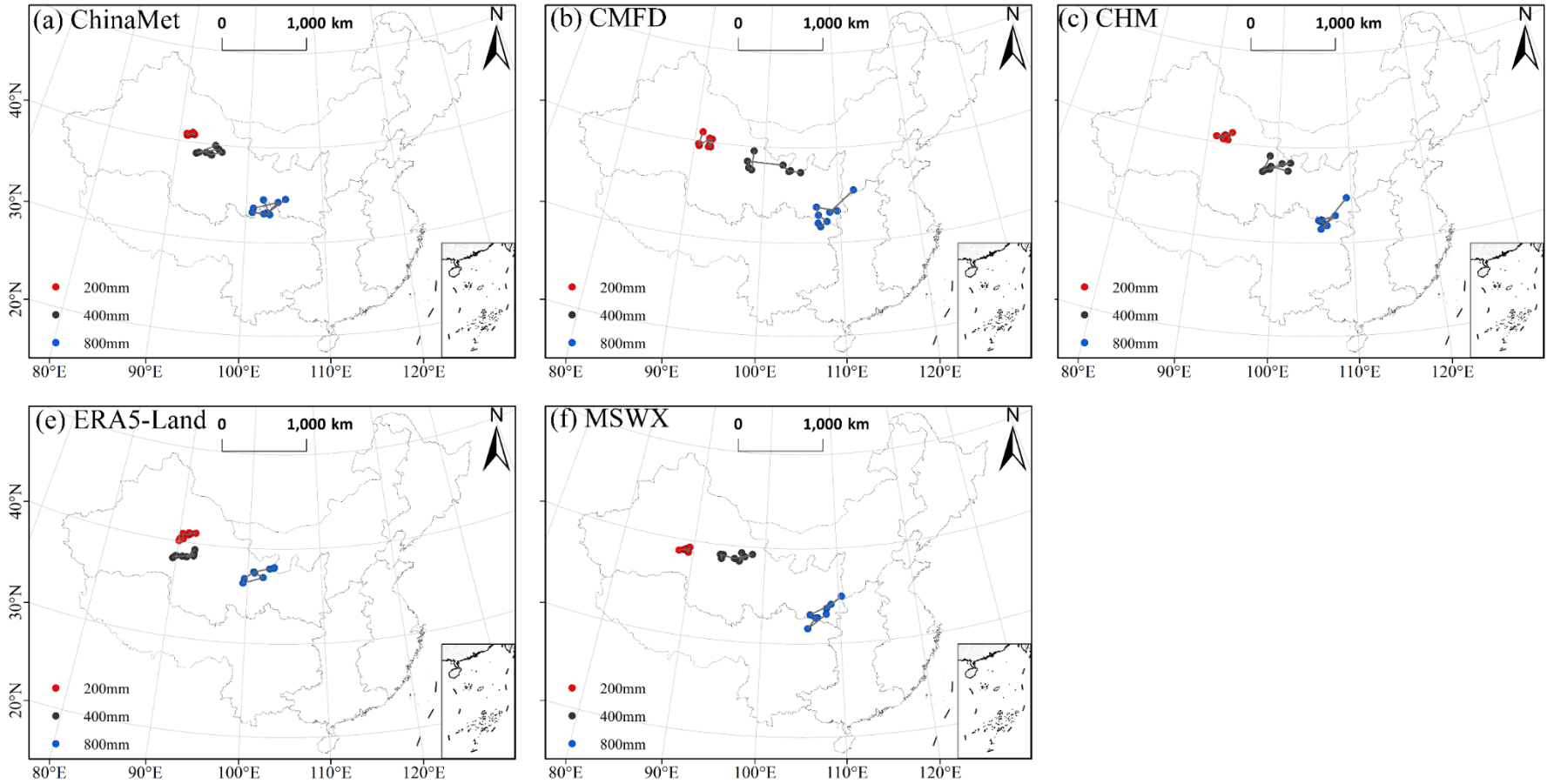


Figure S10. Analysis of the migration trends of precipitation isohyets from 1981 to 2018. Each point represents the centroid of an isohyet derived from five-year mean annual precipitation.

2 Supplementary Tables

Table S1. A non-exhaustive summary of multi-variable meteorological products.

Name	Spatiotemporal resolution	Temporal span	Variables	Generation approach	Data source	Reference
ChinaMet	0.01° × 0.01° Daily	1980-2022	P,T_{mean},T_{max},T_{min}, RH,WS,Prs,Pet	Merging and downscaling strategy	ground-based observations, remote sensing data, reanalysis data	(Hu et al., 2024)
CDMet	0.1° × 0.1° Daily	2000-2020	P,T_{mean},T_{max},T_{min}, T_{skin},RH,WS,Prs. Ssd	Thin-plate spline and random forest methods	ground-based observations, reanalysis data	(Zhang et al., 2024)
CMFD	0.1° × 0.1° 3 Hourly	1980-2018	P,T_{mean},T_{max},T_{min}, Sh,WS,Prs,Srad,Lrad	ANU-Spline interpolation	ground-based observations, remote sensing data, reanalysis data	(He et al., 2020)
CN05	0.25° × 0.25° Daily	1961-2005	P,T_{mean},T_{max},T_{min}	Anomaly app-roach interpolation	ground-based observations	(Jia and Xue-Jie, 2013)
CLIMEA-BCUD	0.1° × 0.1° Daily	1950-2014	P,T_{mean},T_{max},T_{min}, Rh,WS,Srad,Lrad	Bias correction and UNet downscaling approaches	remote sensing data	(Lin et al., 2023)

HRLT	0.01° × 0.01° Daily	1961-2019	P,T_{max},T_{min}	comprehensive statistical analyses interpolation	ground-based observations	(Qin et al., 2022)
1 km monthly temperature and precipitation dataset for China from 1901 to 2017	0.01° × 0.01° Monthly	1901-2023	P, T_{mean}, T_{max}, T_{min}	Bilinear interpolation	ground-based observations, CRU TS	(Peng et al., 2019)
CHM	0.1° × 0.1° Daily	1961-2022	P	Climatologically aided interpolation	ground-based observations, remote sensing data	(Han et al., 2023)
CHM_V2	0.1° × 0.1° Daily	1960-2023	P	Light gradient boosting machine (LGBM)	ground-based observations, remote sensing data reanalysis data	(Hu et al., 2025)
AERA5-Asia	0.1° × 0.1° Daily	1951-2015	P	Daily total volume controlled merging	ground-based observations, reanalysis data	(Ma et al., 2022)

				and disaggregation algorithm		
CDAT	0.1° × 0.1° Daily	1979-2018	T_{mean},T_{max},T_{min}	Two steps of weather conditions and estimation	ground-based observations, remote sensing data, reanalysis data	(Fang et al., 2022)
China's 1km daily reconstructed product of six meteorological elements (1961–2021)	0.01° × 0.01° Daily	1961-2021	T_{mean},T_{max},T_{min},RH, Prs,Ssd	Multilayer perceptron (MLP) models	ground-based observations,	(Zhao et al., 2025)

Table S2. Slopes and P values of the 200, 400, and 800 mm precipitation isohyets derived from five precipitation products.

Product	Product	Slope		P value	
		Longitude	Latitude	Longitude	Latitude
200mm	ChinaMet	0.14	0.05	0.01	0.002
	CMFD	-0.27	0.08	0.004	0.37
	CHM	-0.16	-0.02	0.09	0.72
	ERA5-Land	0.29	0.14	0.0007	0.003
	MSWX	0.07	0.01	0.38	0.69
400mm	ChinaMet	-0.10	0.09	0.64	0.13
	CMFD	-1.12	0.18	0.003	0.09
	CHM	-0.31	0.09	0.18	0.36
	ERA5-Land	0.44	0.11	0.005	0.02
	MSWX	0.51	0.03	0.03	0.55
800mm	ChinaMet	-0.29	-0.07	0.23	0.58
	CMFD	0.52	0.42	0.03	0.005
	CHM	0.20	0.13	0.33	0.42
	ERA5-Land	-0.43	-0.17	0.09	0.07
	MSWX	-0.33	-0.30	0.17	0.04

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