Supporting Information for

A new upgraded high-precision gridded precipitation dataset considering spatiotemporal and physical correlations for mainland China

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Introduction

Here we provide supporting information on other gridded precipitation datasets used for comparison and the accuracy information for precipitation values and precipitation events in the paper, "A new upgraded high-precision gridded precipitation dataset considering spatiotemporal and physical correlations for mainland China"

Table S1. Gridded precipitation dataset used for comparison.

Dataset Name	Data Generation Methods	Spatial Resolution	Temporal Resolution	Data Availability Time Range
CHM_PRE V1	Gauge-based Interpolation	0.10°	1d	1961–2022
GSMaP V8	Remote Sensing	0.10°	1h	1998–Present
PERSIANN-CDR	Remote Sensing	0.25°	1d	1983–Present
GLDAS_Noah025 V2.1	Data Assimilation	0.25°	3h	2000–Present
IMERG Final L3 V7	Remote Sensing	0.10°	1d	2000.06–Present

Table S2. Contingency table for comparing the precipitation and no-precipitation events detected by gauge and products.

Threshold	**Product≥threshold**	**Product＜threshold**
Gauge≥threshold	Hits (TP)	Misses (FN)
Gauge＜threshold	False alarms (FP)	Correct negatives (TN)

Table S3. Precipitation accuracy of different datasets validated by high-density gauge data. The bolded numbers in the column represent the optimal accuracy values for that metric.

Dataset Name	MAE (mm/day)	KGE	Bias	RSD
CHM_PRE V2	**1.48**	**0.79**	1.05	**0.88**
CHM_PRE V1	1.67	0.70	1.12	0.78
GSMaP	2.94	0.48	**1.04**	0.80
IMERG	3.27	0.44	1.12	0.84
PERSIANN-CDR	3.70	0.29	1.12	0.70
GLDAS	3.69	0.31	1.04	0.79

Table S4. Precipitation accuracy validated by high-density gauge data in different regions. The bolded numbers in the column represent the optimal accuracy values for that metric.

Region Abbreviation	Dataset Name	MAE (mm/day)	KGE	Bias	RSD
NEC	CHM_PRE V2	**1.00**	**0.63**	**1.19**	**0.79**
	CHM_PRE V1	1.06	0.58	1.23	0.73
	GSMaP	1.74	0.42	1.12	0.77
	GLDAS	2.21	0.15	1.25	0.55
	PERSIANN-CDR	2.35	0.10	1.35	0.54
	IMERG	2.08	0.29	1.32	0.76
NC	CHM_PRE V2	**0.85**	**0.76**	**1.11**	**0.85**
	CHM_PRE V1	0.97	0.66	1.16	0.75
	GSMaP	1.87	0.42	1.12	0.75
	PERSIANN-CDR	2.41	0.15	1.24	0.53
	IMERG	2.11	0.33	1.22	0.73
	GLDAS	2.37	0.22	1.14	0.66
SCC	CHM_PRE V2	**1.94**	**0.80**	1.04	**0.90**
	CHM_PRE V1	2.21	0.71	1.11	0.79
	GSMaP	3.92	0.48	1.03	0.80
	IMERG	4.35	0.45	1.10	0.86
	PERSIANN-CDR	4.88	0.32	1.09	0.73
	GLDAS	4.89	0.33	**1.01**	0.82
SWC	CHM_PRE V2	**1.92**	**0.69**	0.96	0.85
	CHM_PRE V1	2.06	0.64	1.07	0.78
	GSMaP	3.03	0.41	0.92	0.82
	IMERG	3.39	0.38	**1.02**	**0.89**
	PERSIANN-CDR	3.87	0.23	1.03	0.78
	GLDAS	4.03	0.23	1.05	0.87
IM	CHM_PRE V2	**0.57**	**0.71**	1.15	**0.85**
	CHM_PRE V1	0.61	0.65	1.18	0.78
	GSMaP	1.12	0.41	**1.11**	0.83
	PERSIANN-CDR	1.43	0.14	1.27	0.56
	IMERG	1.26	0.32	1.26	0.78
	GLDAS	1.45	0.16	1.27	0.65
NWC	CHM_PRE V2	**0.47**	**0.56**	1.12	0.73
	CHM_PRE V1	0.52	0.49	1.18	0.66
	GSMaP	0.71	0.33	**0.96**	**0.81**
	PERSIANN-CDR	0.96	-0.02	1.26	0.41
	IMERG	0.82	0.21	1.15	0.67
	GLDAS	0.91	0.09	1.07	0.64
QT	CHM_PRE V2	**1.18**	**0.71**	**1.02**	0.84
	CHM_PRE V1	1.27	0.66	1.11	0.79
	GSMaP	2.17	0.37	1.01	0.81

	IMERG	2.35	0.34	1.03	0.93
	PERSIANN-CDR	2.91	0.15	1.35	0.73
	GLDAS	2.82	0.23	1.14	**0.95**

Table S5. Precipitation event accuracy of different datasets validated by high-density gauge data. The bolded numbers in the column represent the optimal accuracy values for that metric.

Dataset Name	HSS	F1 Score	Accuracy	POD	FAR
CHM_PRE V2	**0.68**	**0.80**	**0.85**	0.84	**0.24**
CHM_PRE V1	0.58	0.75	0.79	**0.93**	0.37
GSMaP	0.50	0.67	0.78	0.65	0.31
IMERG	0.39	0.62	0.71	0.69	0.43
PERSIANN-CDR	0.21	0.54	0.59	0.70	0.55
GLDAS	0.29	0.54	0.68	0.55	0.47

Table S6. Precipitation event accuracy validated by high-density gauge data in different regions. The bolded numbers in the column represent the optimal accuracy values for that metric.

Region Abbreviation	Dataset Name	HSS	F1 Score	Accuracy	POD	FAR
NEC	CHM_PRE V2	**0.61**	**0.72**	**0.84**	0.84	**0.37**
	CHM_PRE V1	0.54	0.68	0.79	**0.90**	0.45
	GSMaP	0.49	0.62	0.81	0.63	0.39
	IMERG	0.38	0.56	0.74	0.68	0.53
	GLDAS	0.37	0.55	0.73	0.69	0.54
	PERSIANN-CDR	0.16	0.45	0.54	0.78	0.68
NC	CHM_PRE V2	**0.67**	**0.74**	**0.88**	0.80	**0.30**
	CHM_PRE V1	0.55	0.67	0.81	**0.90**	0.46
	GSMaP	0.47	0.59	0.82	0.61	0.44
	IMERG	0.34	0.51	0.73	0.67	0.58
	GLDAS	0.27	0.45	0.72	0.55	0.61
	PERSIANN-CDR	0.16	0.42	0.54	0.78	0.71
SCC	CHM_PRE V2	**0.68**	**0.83**	**0.84**	0.84	**0.19**
	CHM_PRE V1	0.56	0.79	0.77	**0.94**	0.32
	GSMaP	0.47	0.69	0.74	0.66	0.27
	IMERG	0.37	0.66	0.68	0.68	0.36
	GLDAS	0.25	0.56	0.63	0.53	0.40
	PERSIANN-CDR	0.24	0.61	0.62	0.67	0.44
SWC	CHM_PRE V2	**0.67**	**0.81**	**0.84**	0.85	**0.23**
	CHM_PRE V1	0.58	0.77	0.78	**0.94**	0.35
	GSMaP	0.54	0.71	0.78	0.69	0.26
	IMERG	0.47	0.69	0.74	0.74	0.35
	PERSIANN-CDR	0.39	0.65	0.70	0.70	0.40
	GLDAS	0.37	0.62	0.70	0.63	0.39
IM	CHM_PRE V2	**0.66**	**0.73**	**0.89**	0.82	**0.35**
	CHM_PRE V1	0.59	0.68	0.85	**0.90**	0.45
	GSMaP	0.48	0.57	0.85	0.58	0.43
	IMERG	0.38	0.51	0.79	0.61	0.56
	GLDAS	0.32	0.47	0.76	0.58	0.61
	PERSIANN-CDR	0.20	0.41	0.61	0.77	0.72
NWC	CHM_PRE V2	**0.52**	**0.61**	0.85	0.80	0.51
	CHM_PRE V1	0.45	0.56	0.79	**0.89**	0.59
	GSMaP	0.41	0.50	**0.85**	0.51	**0.51**
	IMERG	0.31	0.44	0.76	0.65	0.67
	GLDAS	0.21	0.36	0.75	0.48	0.71
	PERSIANN-CDR	0.12	0.32	0.53	0.78	0.80
QT	CHM_PRE V2	**0.61**	**0.77**	**0.81**	0.88	**0.32**
	CHM_PRE V1	0.55	0.75	0.77	**0.94**	0.38

GSMaP	0.51	0.69	0.77	0.69	0.32
IMERG	0.41	0.65	0.71	0.74	0.42
GLDAS	0.33	0.57	0.69	0.56	0.42
PERSIANN-CDR	0.19	0.57	0.56	0.82	0.56