

Supplement materials

A comprehensive accuracy evaluation of latest GPM IMERG V06 Early, Late and Final precipitation products across China

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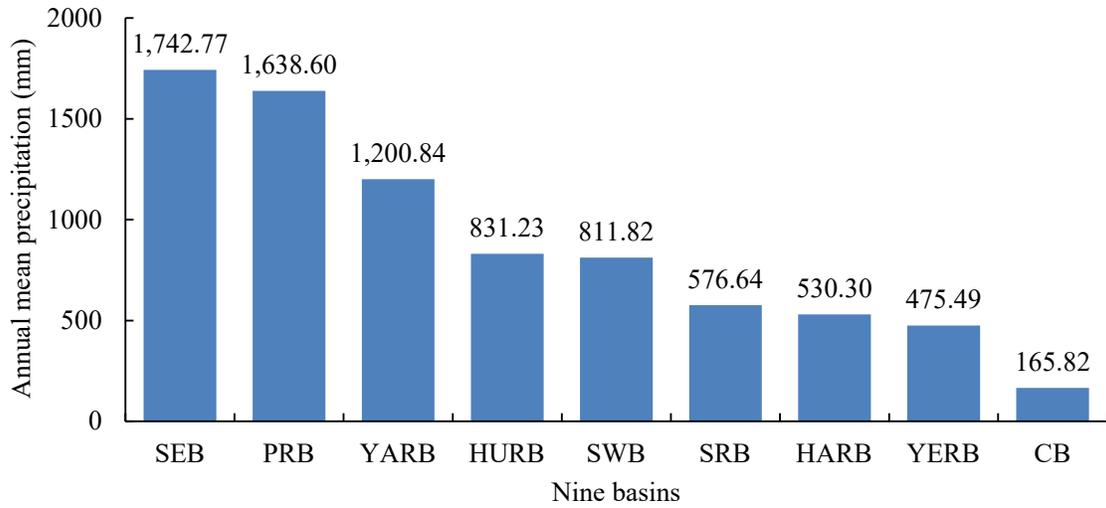


Figure S1. The annual mean rainfall regime based on rain gauge observations in nine basins during 2008–2017.
 Note: CB: Continental Basin, HARB: Haihe River Basin, HURB: Huaihe River Basin, PRB: Pearl River Basin, SEB: Southeast Basin, SRB: Songliao River Basin, SWB: Southwest Basin, YARB: Yangtze River Basin; YERB: Yellow River Basin.

CC											
Season	SPPs	CB	HARB	HURB	PRB	SEB	SRB	SWB	YARB	YERB	China
Spring	IMERG_E	0.19	0.32	0.36	0.40	0.34	0.34	0.29	0.35	0.35	0.39
	IMERG_L	0.17	0.33	0.36	0.39	0.36	0.34	0.29	0.34	0.35	0.39
	IMERG_F	0.22	0.36	0.41	0.43	0.39	0.39	0.38	0.37	0.40	0.42
Summer	IMERG_E	0.22	0.29	0.34	0.42	0.42	0.32	0.35	0.39	0.29	0.40
	IMERG_L	0.22	0.29	0.34	0.42	0.46	0.33	0.35	0.39	0.28	0.40
	IMERG_F	0.26	0.32	0.37	0.45	0.50	0.36	0.35	0.41	0.31	0.42
Autumn	IMERG_E	0.26	0.32	0.39	0.47	0.38	0.33	0.43	0.42	0.43	0.42
	IMERG_L	0.26	0.32	0.39	0.47	0.41	0.33	0.42	0.41	0.44	0.42
	IMERG_F	0.33	0.38	0.44	0.53	0.45	0.38	0.45	0.45	0.49	0.48
Winter	IMERG_E	0.08	0.18	0.36	0.48	0.44	0.09	0.47	0.41	0.24	0.44
	IMERG_L	0.08	0.19	0.38	0.49	0.49	0.09	0.48	0.43	0.25	0.46
	IMERG_F	0.14	0.30	0.44	0.58	0.51	0.21	0.55	0.49	0.31	0.53
KGE											
Season	SPPs	CB	HARB	HURB	PRB	SEB	SRB	SWB	YARB	YERB	China
Spring	IMERG_E	0.17	0.24	0.15	0.38	0.34	0.31	0.27	0.35	0.35	0.38
	IMERG_L	0.16	0.21	0.16	0.37	0.36	0.27	0.27	0.33	0.35	0.38
	IMERG_F	0.16	0.32	0.35	0.43	0.39	0.36	0.34	0.36	0.38	0.41
Summer	IMERG_E	0.01	0.25	0.32	0.42	0.40	0.29	0.34	0.38	0.28	0.38
	IMERG_L	0.05	0.26	0.33	0.42	0.46	0.30	0.34	0.39	0.27	0.39
	IMERG_F	0.17	0.29	0.35	0.44	0.49	0.33	0.30	0.39	0.29	0.40
Autumn	IMERG_E	0.02	0.19	0.29	0.44	0.38	0.08	0.40	0.41	0.35	0.41
	IMERG_L	0.01	0.23	0.31	0.44	0.41	0.02	0.41	0.40	0.39	0.41
	IMERG_F	0.24	0.35	0.39	0.53	0.45	0.34	0.42	0.45	0.47	0.47
Winter	IMERG_E	0.07	0.10	0.29	0.16	0.19	0.12	0.45	0.26	0.21	0.33
	IMERG_L	0.06	0.05	0.31	0.13	0.13	0.13	0.45	0.22	0.19	0.30
	IMERG_F	0.13	0.28	0.38	0.46	0.40	0.15	0.54	0.43	0.28	0.48
RMSE (mm/d)											
Season	SPPs	CB	HARB	HURB	PRB	SEB	SRB	SWB	YARB	YERB	China
Spring	IMERG_E	2.14	3.99	7.69	16.79	14.36	4.99	6.91	11.31	3.93	9.63
	IMERG_L	2.31	4.23	8.10	16.89	14.38	5.33	6.85	11.65	4.13	9.82
	IMERG_F	2.06	3.54	6.79	14.88	13.76	4.38	5.98	10.79	3.65	8.89
Summer	IMERG_E	4.56	12.69	15.96	19.75	17.08	11.32	10.20	15.99	9.44	14.15
	IMERG_L	4.83	13.13	16.65	20.21	16.79	11.64	10.40	16.24	9.91	14.52
	IMERG_F	4.03	12.52	15.60	18.67	16.34	11.46	11.14	15.75	8.92	13.91
Autumn	IMERG_E	2.67	5.79	8.71	12.27	12.40	6.18	6.34	9.35	5.33	8.46
	IMERG_L	2.76	6.12	9.34	12.74	12.75	6.45	6.55	9.84	5.47	8.86
	IMERG_F	2.14	4.93	7.76	12.50	11.82	4.37	6.91	8.63	4.58	7.98
Winter	IMERG_E	1.02	1.29	3.23	6.98	9.31	1.84	3.56	5.85	1.08	4.45
	IMERG_L	1.02	1.30	3.32	7.12	9.33	1.83	3.67	6.07	1.06	4.79
	IMERG_F	0.93	0.97	2.97	5.95	7.76	1.47	3.06	4.55	0.89	3.85

Figure S2. Correlation Coefficient (CC), Kling-Gupta Efficiency (KGE) and Root Mean Square Error (RMSE) of IMERG_E, IMERG_L and IMERG_F in different seasons and basins

POD											
Season	SPPs	CB	HARB	HURB	PRB	SEB	SRB	SWB	YARB	YERB	China
Spring	IMERG_E	0.46	0.59	0.72	0.67	0.75	0.61	0.66	0.72	0.62	0.68
	IMERG_L	0.45	0.58	0.70	0.66	0.76	0.61	0.64	0.71	0.59	0.66
	IMERG_F	0.51	0.60	0.67	0.66	0.75	0.62	0.69	0.71	0.64	0.67
Summer	IMERG_E	0.73	0.76	0.75	0.86	0.84	0.79	0.86	0.81	0.73	0.80
	IMERG_L	0.72	0.75	0.73	0.85	0.84	0.79	0.85	0.80	0.72	0.79
	IMERG_F	0.71	0.74	0.74	0.86	0.85	0.79	0.87	0.81	0.74	0.80
Autumn	IMERG_E	0.57	0.65	0.72	0.62	0.59	0.60	0.70	0.63	0.69	0.64
	IMERG_L	0.55	0.63	0.71	0.62	0.61	0.59	0.70	0.62	0.67	0.63
	IMERG_F	0.55	0.65	0.73	0.64	0.63	0.58	0.71	0.67	0.67	0.65
Winter	IMERG_E	0.23	0.38	0.62	0.31	0.50	0.40	0.37	0.46	0.28	0.42
	IMERG_L	0.23	0.37	0.61	0.33	0.52	0.40	0.36	0.46	0.26	0.42
	IMERG_F	0.24	0.37	0.62	0.35	0.54	0.39	0.40	0.47	0.30	0.43
FAR											
Season	SPPs	CB	HARB	HURB	PRB	SEB	SRB	SWB	YARB	YERB	China
Spring	IMERG_E	0.75	0.70	0.67	0.34	0.36	0.62	0.49	0.43	0.62	0.51
	IMERG_L	0.75	0.69	0.65	0.33	0.34	0.61	0.48	0.42	0.60	0.49
	IMERG_F	0.76	0.68	0.64	0.33	0.34	0.60	0.50	0.42	0.61	0.50
Summer	IMERG_E	0.63	0.51	0.52	0.32	0.37	0.45	0.29	0.40	0.49	0.43
	IMERG_L	0.63	0.50	0.50	0.31	0.34	0.44	0.28	0.39	0.48	0.42
	IMERG_F	0.62	0.50	0.50	0.32	0.34	0.44	0.29	0.39	0.47	0.42
Autumn	IMERG_E	0.75	0.64	0.59	0.40	0.41	0.63	0.45	0.43	0.57	0.52
	IMERG_L	0.74	0.62	0.57	0.40	0.38	0.62	0.44	0.42	0.55	0.51
	IMERG_F	0.72	0.61	0.56	0.41	0.39	0.61	0.43	0.42	0.53	0.50
Winter	IMERG_E	0.76	0.84	0.72	0.43	0.42	0.75	0.69	0.54	0.78	0.62
	IMERG_L	0.75	0.83	0.69	0.43	0.40	0.75	0.67	0.52	0.76	0.61
	IMERG_F	0.75	0.78	0.68	0.43	0.40	0.74	0.68	0.52	0.75	0.59
CSI											
Season	SPPs	CB	HARB	HURB	PRB	SEB	SRB	SWB	YARB	YERB	China
Spring	IMERG_E	0.19	0.24	0.29	0.50	0.52	0.31	0.40	0.46	0.31	0.40
	IMERG_L	0.19	0.26	0.30	0.50	0.54	0.31	0.41	0.47	0.31	0.40
	IMERG_F	0.20	0.26	0.31	0.50	0.54	0.32	0.41	0.47	0.32	0.40
Summer	IMERG_E	0.32	0.42	0.41	0.62	0.56	0.48	0.64	0.52	0.43	0.50
	IMERG_L	0.32	0.43	0.42	0.61	0.59	0.49	0.64	0.53	0.44	0.50
	IMERG_F	0.33	0.43	0.42	0.61	0.59	0.49	0.64	0.53	0.44	0.51
Autumn	IMERG_E	0.21	0.30	0.35	0.44	0.42	0.29	0.45	0.43	0.36	0.38
	IMERG_L	0.22	0.31	0.37	0.44	0.44	0.30	0.45	0.43	0.37	0.38
	IMERG_F	0.23	0.32	0.38	0.44	0.45	0.30	0.46	0.45	0.38	0.39
Winter	IMERG_E	0.13	0.13	0.24	0.26	0.37	0.18	0.20	0.30	0.14	0.24
	IMERG_L	0.13	0.13	0.26	0.26	0.38	0.18	0.21	0.31	0.14	0.25
	IMERG_F	0.14	0.16	0.27	0.28	0.40	0.19	0.22	0.31	0.16	0.26

Good performance

Bad performance

Figure S3. Probability of detection (POD), False Alarm Ratio (FAR) and Critical Success Index (CSI) of IMERG_E, IMERG_L and IMERG_F in different seasons and basins

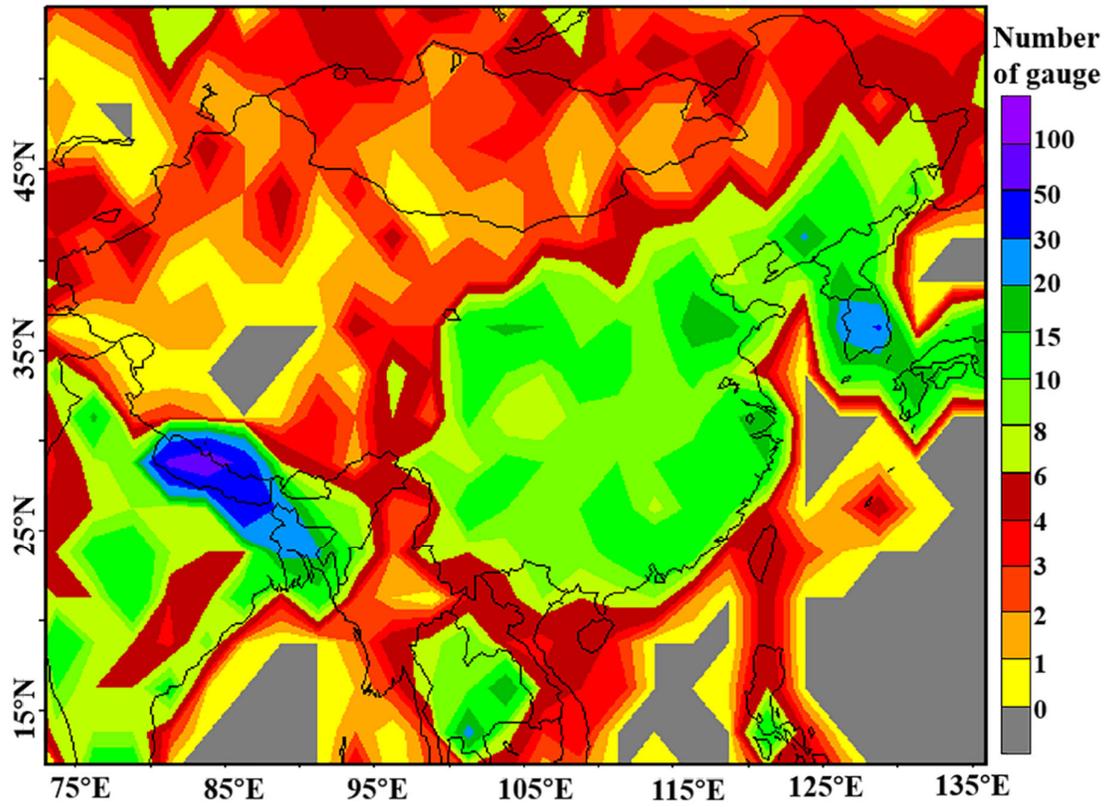


Figure S4. Spatial distribution number of rain gauges of Global Precipitation Climatology Centre (GPCC) Precipitation Climatology in 0.5° (a) and 2.5° (b) spatial resolution across China.

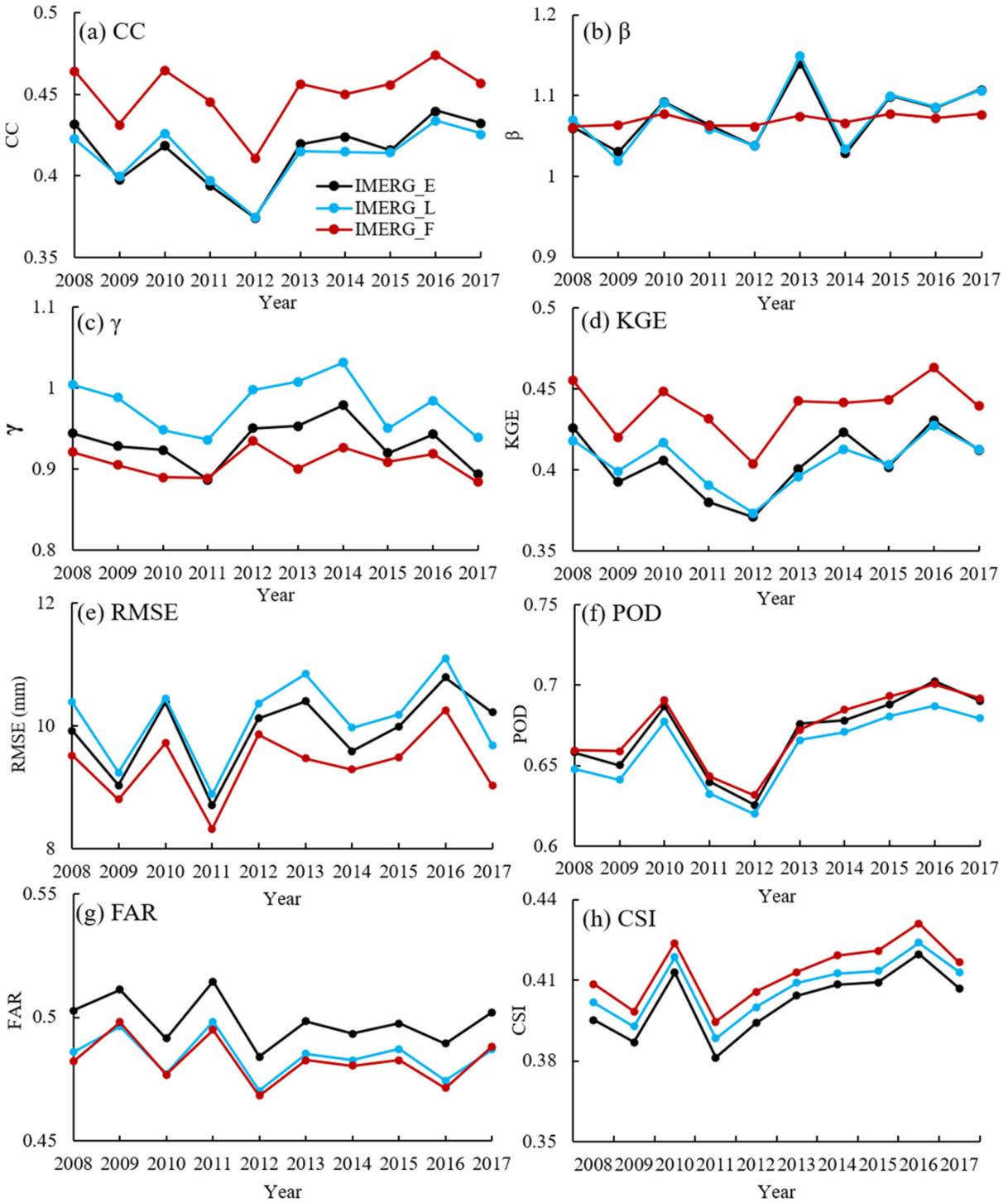


Figure S5. Annual evaluation metrics for IMERG_E, IMERG_F and IMERG_F products from 2008 to 2017