Supplemental Material for

Distinguishing spread among ensemble members between drought and flood Indian summer monsoon years in the Past 58 Years (1958–2015) reforecasts

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Supplementary Tables:

Table S1: Anomaly Correlation Coefficient (ACC) between predicted JJAS rainfall and IMD (GPCP) rainfall averaged over Indian landmass (see a green box in Fig 1c) during four different periods. The ACCs for the period of 1979-2015 and 1997-2015 are statistically significant. Potential prediction skill of predicted ISMR for 1958-2015 lies in 0.50 to 0.76 and its average is 0.62, which is defined by ACC of ISMR between one ensemble member and mean of all the other ensemble members. It demonstrates that actual prediction skill in CFSv2 reforecasts is lower than the potential prediction skill.

Table S2: The ensemble spread (ESP) of predicted ISMR averaged over Indian landmass (green box in Fig 1c) among 20 members during flood and drought years, La Niña years and El Niño years in April initialized CFSv2 reforecasts (1958-2015). See the text more details about how those years are determined.

Table S3: ISMR anomalies averaged over Indian landmass (green box in Fig 1c) during drought ISM years (blue font) and flood ISM years (red font) in April initialized reforecasts (left column) and IMD (middle column). For the period of 1958-2015, the time mean of ISMR is 4.46 mm/day for CFSv2 reforecasts and 6.57 mm/day for IMD. Spatial pattern correlation coefficient of ISMR anomalies between prediction and IMD over Indian landmass (green box in Fig 1c) is in the right column.

Periods	ACC of ISMR index over India
1958-2015	0.31
1958-1978	0.30
1979-2015	0.32 (0.42)
1997-2015	0.40 (0.55)

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Cases (1958-2015)	ESP of ISMR over Indian landmass among 20 members (mm/day)
Flood ISM years	0.58
Drought ISM years	0.67
La Niña years and Flood ISM years (9 cases)	0.57
El Niño years and Drought ISM years (8 cases)	0.68

Table S2: The ensemble spread (ESP) of predicted ISMR averaged over Indian landmass (green box in Fig 1c) among 20 members during flood and drought years, La Niña years and El Niño years in April initialized CFSv2 reforecasts (1958-2015). See the text more details about how those years are determined.

(Year)	CFSv2 Apr IC (Ensemble mean JJAS rainfall anomaly) (mm/day)	IMD (JJAS Rainfall anomaly) (mm/day)	Spatial Correlation Between CFSv2 Apr IC and IMD rainfall anomaly
1960	-0.75	-0.08	0.03
1961	-0.64	1.52	-0.37
1963 (El Niño)	-0.74	-0.13	-0.19
1965 (El Niño)	-0.69	-1.40	0.31
1972 (El Niño)	-0.88	-1.62	0.27
1980 (El Niño)	-0.82	0.50	-0.21
1986	-0.67	-0.65	0.11
1993 (El Niño)	-0.86	-0.04	0.05
2001 (El Niño)	-0.86	-0.29	0.10
2014 (El Niño)	-0.93	-0.79	0.09
2015 (El Niño)	-0.93	-0.98	0.27
1962	0.66	0.28	-0.17
1964 (La Niña)	0.68	0.57	0.06
1968	0.66	-0.83	-0.11
1973 (La Niña)	1.32	0.49	0.00
1978 (La Niña)	0.87	0.82	0.00
1984 (La Niña)	0.73	-0.14	0.15
1985 (La Niña)	0.60	-0.53	-0.02
1988 (La Niña)	1.06	1.18	-0.03
1995 (La Niña)	0.89	-0.03	-0.21
1998	0.62	-0.04	0.04
1999 (La Niña)	0.60	-0.30	0.32
2007	1.04	0.80	0.04
2008 (La Niña)	0.96	0.31	-0.08

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