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Supplement of

Which global reanalysis dataset has better representativeness in snow cover on the Tibetan Plateau?

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Table S1: Characteristics of the GLDAS-2.1 snow cover products used in this study.

	Spatial resolution	Land Surface Model
GLDAS_NOAH025	0.25°×0.25°	NOAH
GLDAS_NOAH100	1°×1°	NOAH
GLDAS_VIC_100	1°×1°	VIC
GLDAS_CLSM100	1°×1°	CLSM

Table S2: The R, STDR, and RMSE of seasonal SCF between reanalysis datasets and SPIReS for SON, DJF, MAM, and JJA.

	R				STDR				RMSE			
	SON	**DJF**	**MAM**	**JJA**	**SON**	**DJF**	**MAM**	**JJA**	**SON**	**DJF**	**MAM**	**JJA**
HMASR	0.74	0.91	0.92	0.75	0.71	0.73	0.72	0.74	0.08	0.12	0.09	0.08
MERRA2	0.69	0.85	0.86	0.17	0.17	0.69	0.42	0.06	0.13	0.17	0.16	0.09
ERA5	0.80	0.68	0.73	0.83	1.68	1.34	1.57	1.80	0.27	0.47	0.45	0.13
ERA5L	0.80	0.74	0.79	0.88	1.56	1.41	1.60	1.68	0.19	0.38	0.35	0.10
CRAL	0.82	0.88	0.89	0.73	0.53	1.01	1.23	0.57	0.08	0.11	0.12	0.06
JRA55	0.75	0.66	0.79	0.77	1.36	1.35	1.46	1.00	0.16	0.48	0.33	0.06
CFSR	0.91	0.94	0.90	0.78	1.08	1.07	1.20	0.84	0.10	0.21	0.19	0.06
GLDAS	0.81	0.88	0.91	0.86	1.03	1.09	1.38	1.35	0.08	0.13	0.13	0.06

Table S3: The correlation of snowfall trend and temperature trend with SCF trend for eight reanalysis datasets and SPIReS from WY 2001 to WY 2017.

Dataset	$R_{Snowfall\ trend\ \&\ SCF\ trend}$	$R_{T2\ trend\ \&\ SCF\ trend}$
SPIReS & TPMFD	0.273*	-0.366*
MERRA2	0.784*	-0.650*
ERA5	0.359*	-0.759*
ERA5L	0.460*	-0.618*
JRA55	0.015	-0.543*
CRAL	0.397*	-0.576*
CFSR	0.213*	-0.354*
GLDAS	0.557*	-0.213*

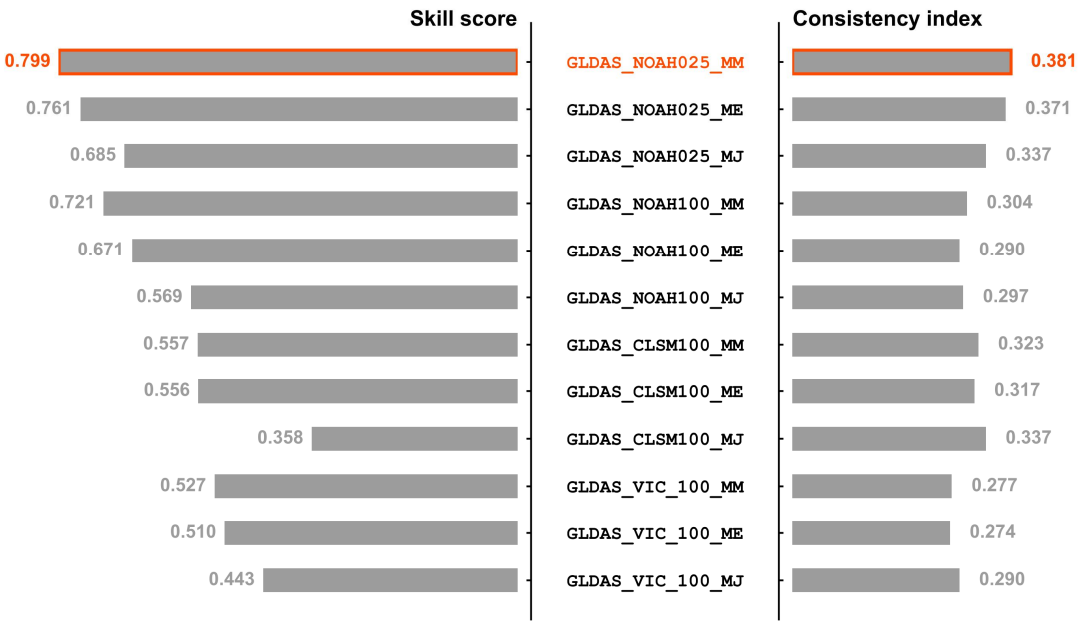

Figure S1: Taylor Skill Scores (SS) and Consistency Index (CI) values of Snow Cover Fraction (SCF) calculated offline using the MM_SCF, MJ_SCF, and ME_SCF parameterization methods and various products from GLDAS-2.1.

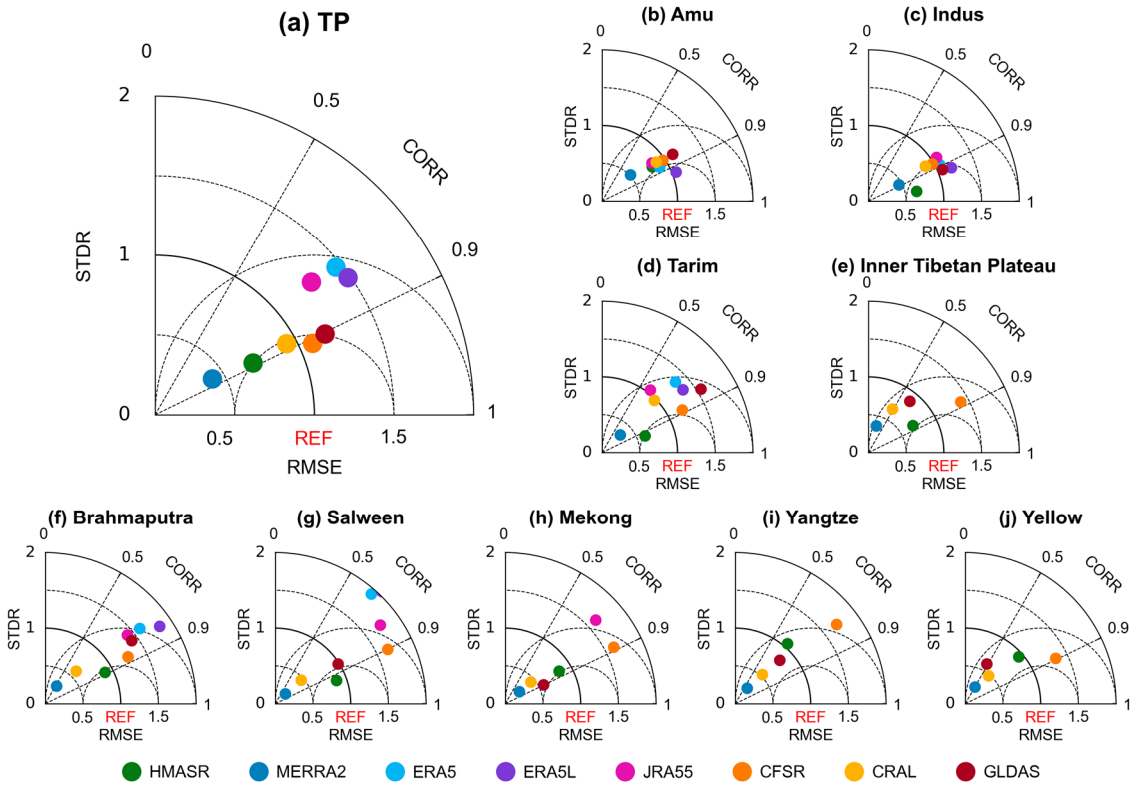

Figure S2: Taylor diagrams showing the correlation coefficients (R), Root Mean Square Error (RMSE), and Standard Deviation Ratio (STDR) of SCF between reanalysis datasets and SPIReS for each basin over the Tibetan Plateau (TP). A clearer version of Fig. 2b.

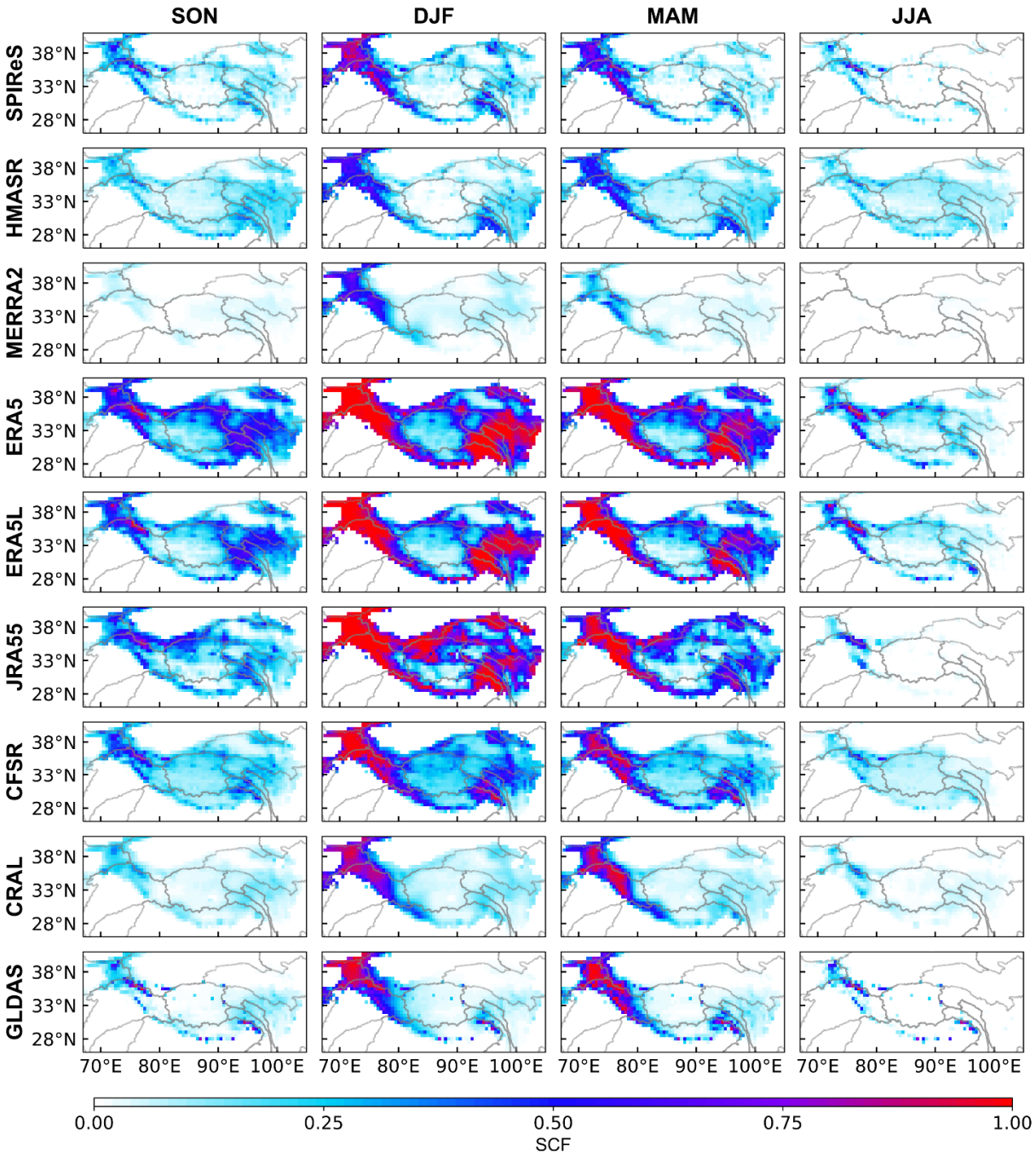

Figure S3: The first four columns show the spatial distribution of seasonal-averaged SCF from SPIReS and eight reanalysis datasets for Water Years (WYs) 2001–2017 over the TP during (left to right): autumn (September–November: SON), winter (December–February: DJF), spring (March–May: MAM), and summer (June–August: JJA).

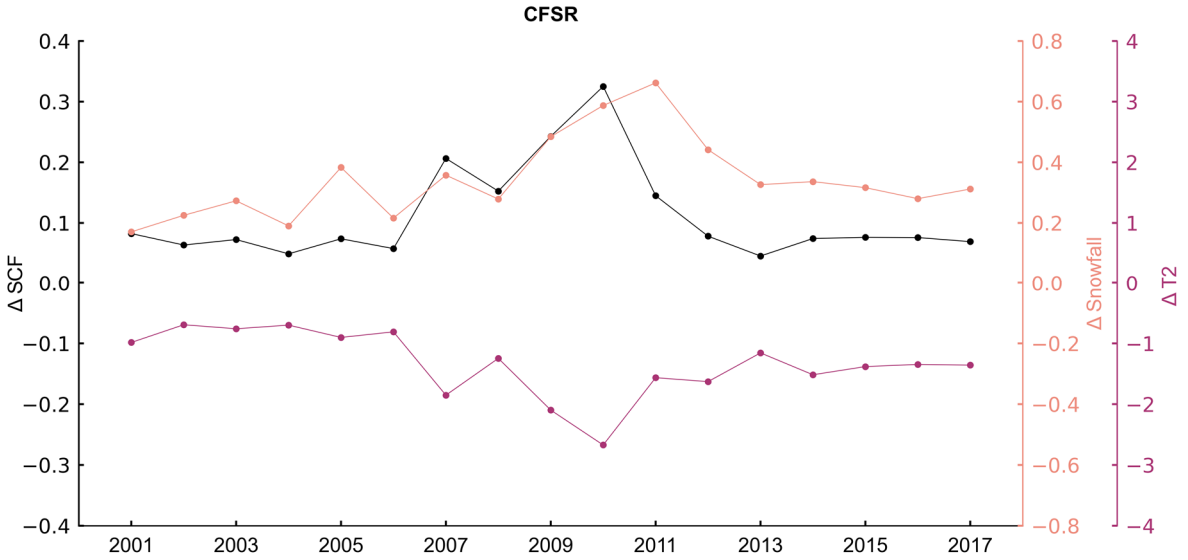

Figure S4: Time series of the annual SCF (black), snowfall (light pink), and T2 (purple) bias in the CFSR, based on SPIReS and TPMFD, over the TP for WYs 2001–2017.

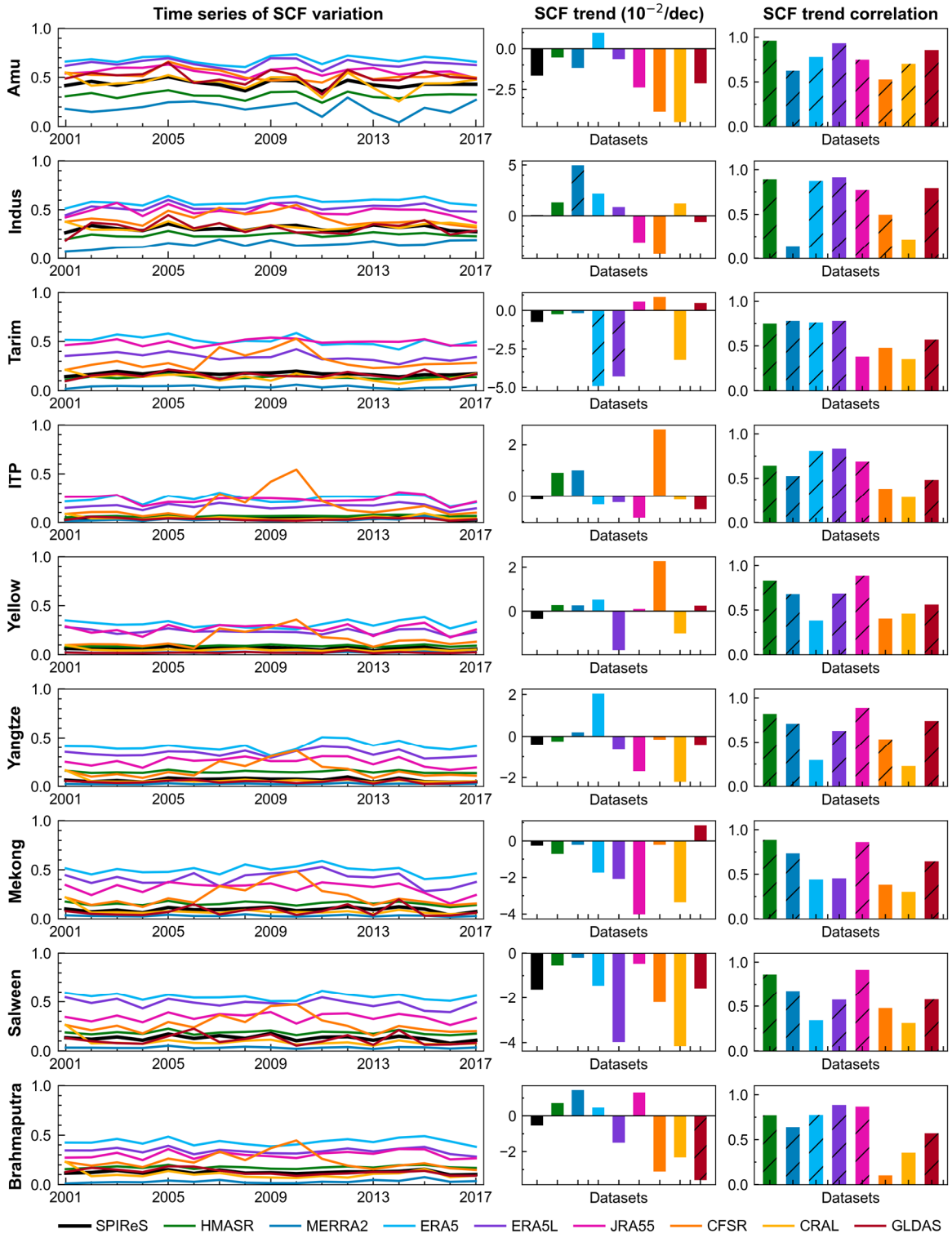

Figure S5: Same as Fig. 4, but for each basin.

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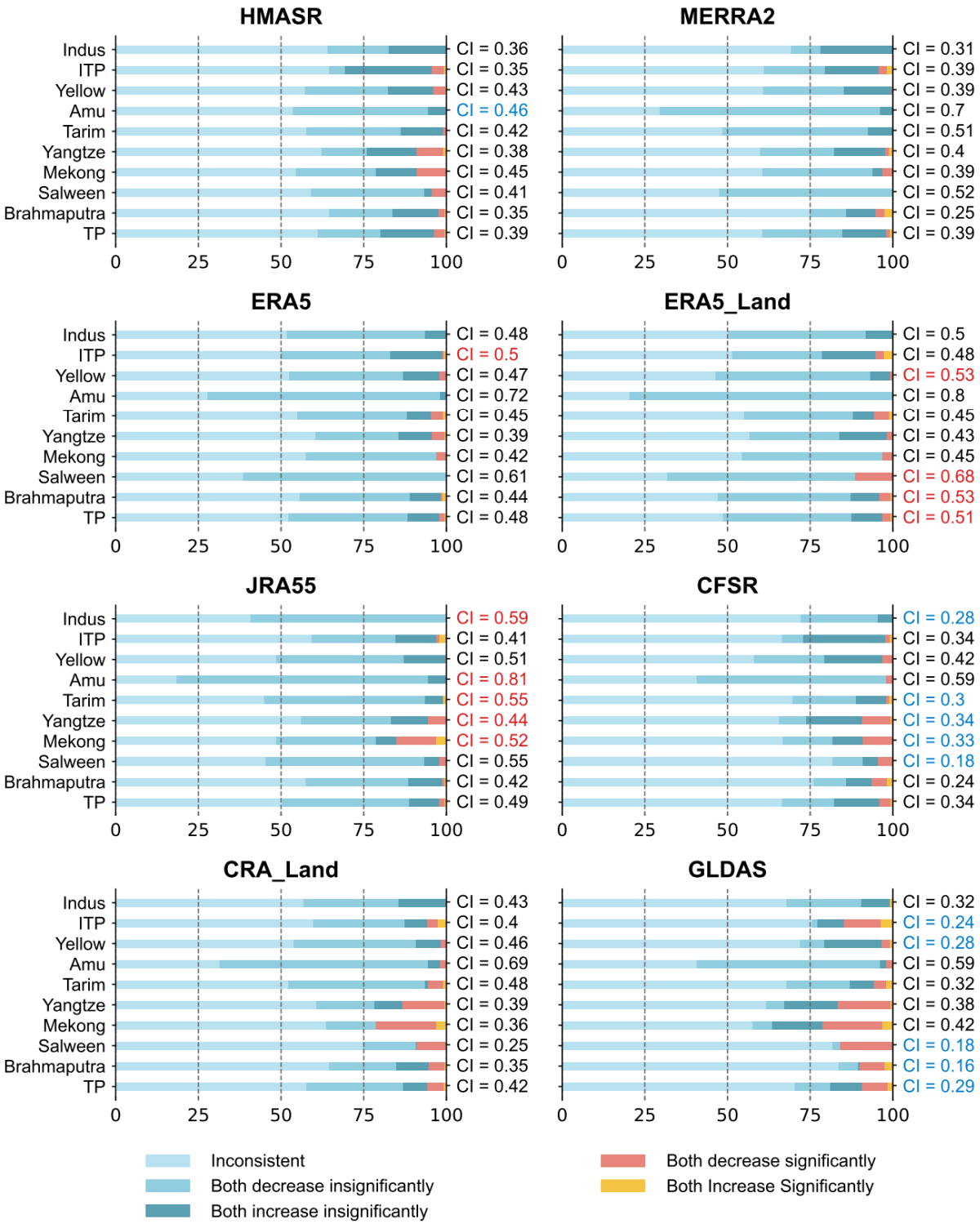

Figure S6: CI value for SCF from eight reanalysis datasets calculated by comparing with SPIReS annual trends from WY 2001 to WY 2017. The red text indicates the maximum CI value within each basin, and the blue text indicates the minimum value.

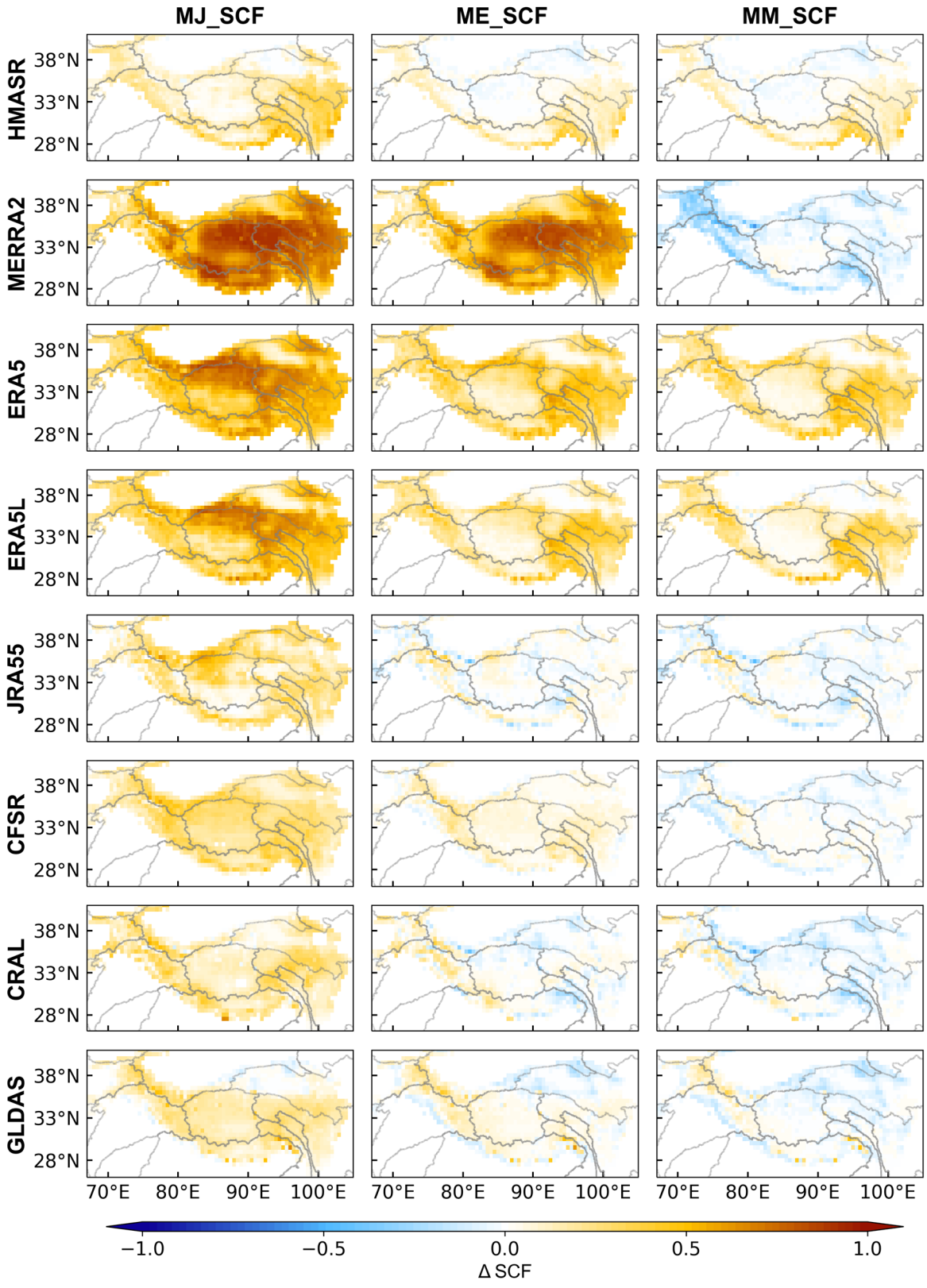

Figure S7: Spatial distribution of the SCF climatological bias for all reanalysis datasets calculated offline using the MM_SCF, MJ_SCF, and ME_SCF parameterization methods based on SPIReS over the TP.

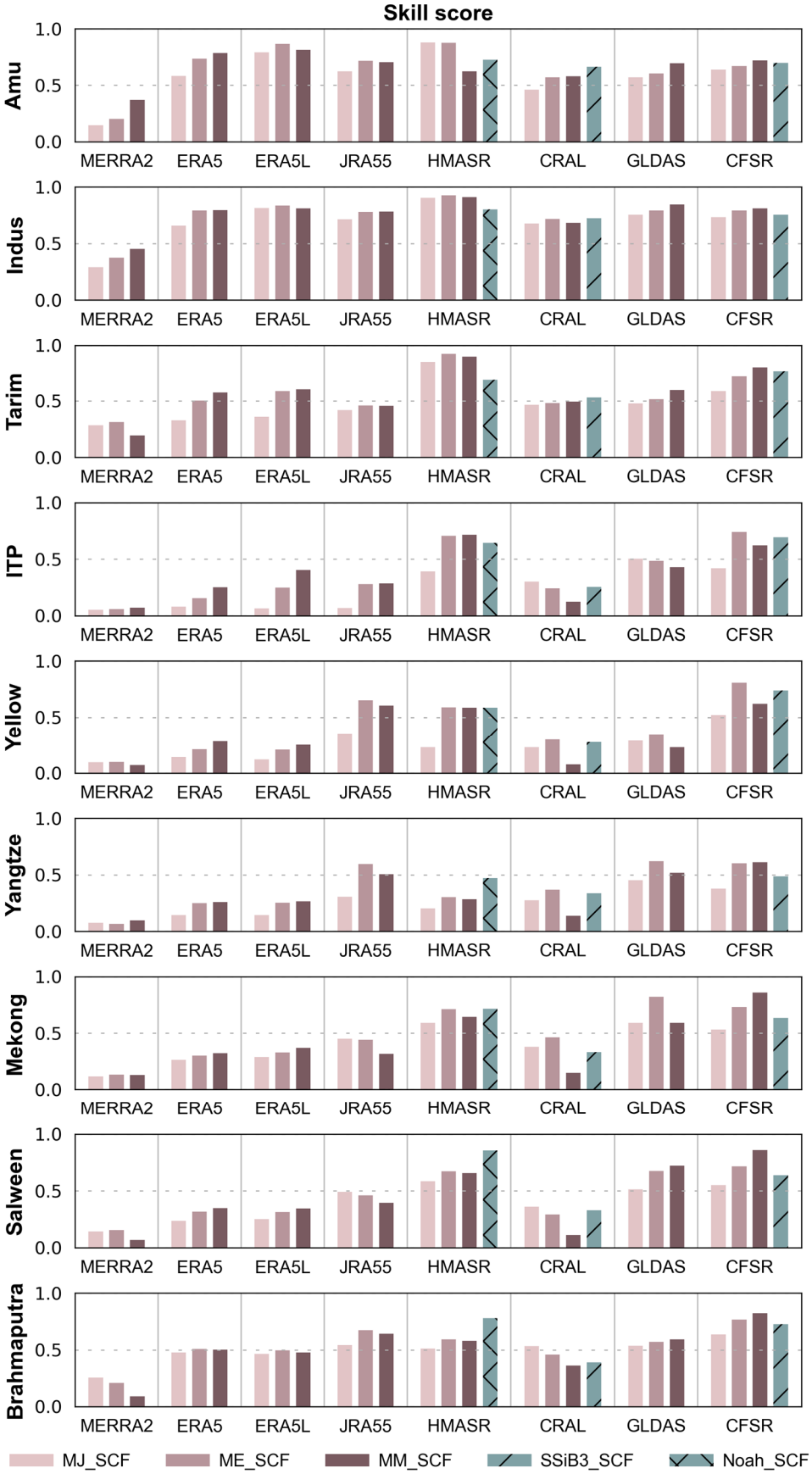

Figure S8: Same as Fig. 9a, but for each basin.