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Systematic underestimation of type-specific ecosystem process variability in the Community Land Model v5 over Europe

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Supplement

Table S1: A list of ICOS stations, their land cover, coordinates, years of data availability for our study period (1995 – 2018), the coordinates of the corresponding grid cell of the 3 km European Coordinated Regional Climate Downscaling Experiment (CORDEX) grid used in our simulations, and the number of 8-daily data points available for the analyses for evapotranspiration (ET) and gross primary production (GPP). Note that stations that do not belong to the plant functional types (PFT) of evergreen needleleaf forest (ENF), deciduous broadleaf forest (DBF), grasslands (GRA), and croplands (CRO) were omitted, and some included sites did not have data corresponding with the study period, thus having a count of 0 data points. See Section 2.2.1. The indicated PFT is the predominant PFT in the footprint of the ICOS eddy covariance towers. Stations, where the land cover was not directly indicated in the metadata sites were also left out in our analyses.

ID	**country**	**PFT**	**lat**	**lon**	years	**lat (cell)**	**lon (cell)**	**N (ET)**	**N (GPP)**
BE-Bra	Belgium	ENF	51.31	4.52	1996 – 2018	51.29	4.51	608	670
BE-Dor	Belgium	GRA	50.31	4.97	2011 – 2018	50.31	4.96	0	270
BE-Lcr	Belgium	DBF	51.11	3.85		51.10	3.85	0	0
BE-Lon	Belgium	CRO	50.55	4.75	2004 – 2018	50.57	4.76	519	476
CH-Cha	Switzerland	GRA	47.21	8.41	2005 – 2018	47.21	8.43	423	459
CH-Dav	Switzerland	ENF	46.82	9.86	1997 – 2018	46.80	9.84	578	866
CH-Fru	Switzerland	GRA	47.12	8.54	2005 – 2018	47.11	8.53	284	447
CH-Oe2	Switzerland	CRO	47.29	7.73	2004 – 2018	47.28	7.72	0	592

CZ-BK1	Czech Republic	ENF	49.50	18.54	2004 – 2018	49.50	18.54	146	389
CZ-Lnz	Czech Republic	DBF	48.68	16.95	2015 – 2018	48.67	16.95	0	145
DE-Geb	Germany	CRO	51.10	10.91	2001 – 2020	51.10	10.93	824	638
DE-Gri	Germany	GRA	50.95	13.51	2001 – 2018	50.95	13.49	673	492
DE-Hai	Germany	DBF	51.08	10.45	2000 – 2018	51.07	10.45	813	548
DE-HoH	Germany	DBF	52.09	11.22	2015 – 2018	52.09	11.23	184	113
DE-Kli	Germany	CRO	50.89	13.52	2004 – 2018	50.90	13.54	481	450
DE-RuR	Germany	GRA	50.62	6.30	2011 – 2018	50.62	6.28	336	309
DE-RuS	Germany	CRO	50.87	6.45	2011 – 2018	50.86	6.44	285	224
DE-RuW	Germany	ENF	50.50	6.33	2012 – 2018	50.51	6.31	0	125
DE-Tha	Germany	ENF	50.96	13.57	1996 – 2018	50.96	13.58	1012	888
DK-Gds	Denmark	ENF	56.07	9.33		56.07	9.34	0	0
DK-Sor	Denmark	DBF	55.49	11.64	1996 – 2018	55.48	11.65	437	882

FI-Hyy	Finland	ENF	61.85	24.29	1996 – 2018	61.86	24.29	435	812
FI-Ken	Finland	ENF	67.99	24.24	2018	67.99	24.23	0	18
FI-Let	Finland	ENF	60.64	23.96	2009 – 2018	60.63	23.96	412	254
FI-Var	Finland	ENF	67.75	29.61	2016 – 2018	67.76	29.63	135	133
FR-Aur	France	CRO	43.55	1.11	2005 – 2018	43.54	1.12	470	483
FR-Bil	France	ENF	44.49	-0.96	2014 – 2020	44.50	-0.98	203	144
FR-FBn	France	ENF	43.24	5.68	2008 – 2018	43.25	5.69	0	358
FR-Fon	France	DBF	48.48	2.78	2005 – 2018	48.47	2.80	0	566
FR-Gri	France	CRO	48.84	1.95	2004 – 2018	48.86	1.95	563	313
FR-Hes	France	DBF	48.67	7.06	2014 – 2018	48.67	7.05	229	219
FR-Lam	France	CRO	43.50	1.24	2005 – 2018	43.51	1.25	548	431
FR-Tou	France	GRA	43.57	1.37	2018	43.58	1.38	46	28
IT-BFt	Italy	DBF	45.20	10.74		45.21	10.75	0	0

IT-MBo	Italy	GRA	46.01	11.05	2003 – 2018	46.00	11.04	616	582
IT-Ren	Italy	ENF	46.59	11.43	1999 – 2018	46.58	11.44	531	525
IT-SR2	Italy	ENF	43.73	10.29	2013 – 2018	43.74	10.31	255	214
IT-Tor	Italy	GRA	45.84	7.58	2008 – 2018	45.85	7.57	481	251
RU-Fy2	Russia	ENF	56.45	32.90	2015 – 2018	56.46	32.89	156	138
SE-Htm	Sweden	ENF	56.10	13.42	2015 – 2018	56.10	13.42	177	152
SE-Nor	Sweden	ENF	60.09	17.48	2014 – 2018	60.09	17.50	229	181
SE-Svb	Sweden	ENF	64.26	19.77	2014 – 2018	64.26	19.77	161	109

Table S2: The root mean square error (RMSE) and percent bias (PBIAS) for model evapotranspiration (ET) in relation to the Integrated Carbon Observation System (ICOS) observations. Stations from ICOS that did not belong to plant functional types (PFTs) of evergreen needleleaf forest (ENF), broadleaf deciduous forest (DBF), croplands (CRO), or grasslands (GRA) or did not have overlapping periods were omitted. See Section 2.4.2. For the amount of data points per station used for the calculations, see Table S1.

	ET RMSE [mm day^{-1}]					**ET PBIAS [%]**				
	CLM5$_{grid}$	**CLM5$_{PFT}$**	**ERA5L**	**GLASS**	**GLEAM**	**CLM5$_{grid}$**	**CLM5$_{PFT}$**	**ERA5L**	**GLASS**	**GLEAM**
BE-Bra	0.54	0.51	1.12	1.1	0.65	20.53	22.4	103.3	86.1	53.95
BE-Lon	0.67	0.99	0.82	0.91	0.49	12.76	24.31	66.69	43.88	19.71
CH-Cha	0.8	0.85	0.59	0.54	0.56	-33.03	-21.19	-13.73	-10.68	-8.47

CH-Dav	1.2	0.95	0.91	1.35	0.85	-51.08	-33.29	-54.41	-32.38	-27.66
CH-Fru	0.62	0.85	0.52	0.62	0.62	-23.73	-8.69	-6.68	-5.21	7.17
CZ-BK1	0.48	0.54	0.76	0.57	0.52	-23.06	-26.04	29.54	19.72	25.78
DE-Geb	0.51	0.82	0.7	0.85	0.48	-7.61	-5.35	64.26	40.08	14.93
DE-Gri	0.48	0.77	0.57	0.55	0.36	2.45	11.15	33.24	20.49	9.14
DE-Hai	0.49	0.6	0.73	0.76	0.52	2.64	8.99	58.52	46.6	31.18
DE-HoH	0.69	0.65	0.6	0.58	0.66	-28.06	-16.86	-1.62	-10.44	-24.37
DE-Kli	0.69	1	0.79	0.74	0.63	6.77	19.04	38.9	27.7	21.78
DE-RuR	0.39	0.76	0.6	0.54	0.45	-17.86	5.37	28.01	9.89	17.22
DE-RuS	0.78	0.97	0.68	0.55	0.68	-32.8	-31.45	7.9	-12.81	-24.98
DE-Tha	0.62	0.5	0.72	0.71	0.48	0.59	-0.52	39.68	20.84	13.92
DK-Sor	0.6	0.6	0.57	0.66	0.5	-26.29	-14.98	42.64	20.57	2.18
FI-Hyy	0.5	0.51	0.49	0.41	0.62	-35.58	-27.65	20.64	11.27	41.7
FI-Let	0.68	0.65	0.63	0.8	0.73	-31.77	-21.53	51.02	11.16	40.21
FI-Var	0.37	0.49	0.73	0.48	0.6	-30.13	-9.59	67.09	58.22	84.39
FR-Aur	0.85	1.19	1.1	1.05	0.78	5.44	45.08	52.04	37.1	16.89
FR-Bil	0.67	0.92	1.46	0.72	0.67	-25.5	-28.35	24.98	48.24	24.47
FR-Gri	0.77	1.01	0.9	0.85	0.58	-1.63	0.98	44.94	30.06	3.86
FR-Hes	0.58	0.67	0.83	0.86	0.72	0.19	13.09	51.71	35.65	36.79
FR-Lam	0.86	1.09	0.97	1.01	0.79	-6.76	20.9	31.79	17.15	-1.53
FR-Tou	0.69	0.89	0.86	1.04	0.49	-36.01	-45.95	60.87	30.99	17.48
IT-MBo	0.55	0.84	0.5	0.49	0.72	-2.29	-17.01	8.99	6.24	16.68
IT-Ren	0.85	0.81	0.74	0.72	0.76	-23.81	-3.55	-9.57	-15.41	2.18
IT-SR2	0.89	1.53	0.73	0.76	0.8	-34.1	-60.81	28.98	3.25	-23.83

IT-Tor	0.91	1.01	0.6	0.78	0.75	-45.19	-48.2	-38.59	-10.22	-28.59
RU-Fy2	0.4	0.51	0.65	0.69	0.7	-4.43	-16.31	52.09	26.21	54.79
SE-Htm	0.45	0.45	1.19	0.88	0.9	-7.31	-3.36	72.78	61.52	79.05
SE-Nor	0.36	0.37	0.66	0.58	0.59	-14.29	-4.12	47.2	22.25	46.44
SE-Svb	0.45	0.64	0.55	0.35	0.56	-18.82	-0.66	16.38	16.8	35.55

Table S3: The root mean square error (RMSE) and percent bias (PBIAS) for model gross primary production (GPP) in relation to the Integrated Carbon Observation System (ICOS) observations. Stations from ICOS that did not belong to the plant functional types (PFTs) of evergreen needleleaf forest (ENF), deciduous broadleaf forest (DBF), croplands (CRO), or grasslands (GRA) or did not have overlapping periods were omitted. See Section 2.4.2. For the amount of data points per station used for the calculations, see Table S1.

	GPP RMSE [g C day^{-1}]			**GPP PBIAS [%]**		
	CLM5$_{gri}$$_{d}$	**CLM5$_{PF}$$_{T}$**	**GLASS**	**CLM5$_{gri}$$_{d}$**	**CLM5$_{PF}$$_{T}$**	**GLASS**
BE-Bra	2.29	1.69	1.3	-35.36	0.58	4.7
BE-Dor	3.19	3.39	2.74	-41.69	-40.3	-35.11
BE-Lon	4.31	4.31	3.98	-18.21	-8.23	-11.32
CH-Cha	4.61	3.94	4.29	-50.9	-38.52	-47.17
CH-Dav	2.4	2.13	2.13	-16.93	31.37	-25.57
CH-Fru	3.6	2.84	2.62	-40.1	-23.16	-23.97
CH-Oe2	3.75	3.95	3.53	-10.8	-12.63	2.72
CZ-BK1	2.79	2.31	1.95	-37.05	-22.83	-20.65
CZ-Lnz	4.64	3.44	2.9	-62.06	-49.31	-28.91
DE-Geb	3.63	4.32	2.98	-35.96	-40.43	-1.84
DE-Gri	2.61	2.68	2.02	-21.19	-11.94	-9.65
DE-Hai	2.83	2.59	1.7	-34.83	-42.5	-1.51
DE-HoH	2.94	2.51	3.04	-30.53	-40.55	-27.82
DE-Kli	3.5	3.66	3.15	1.74	2.04	-2.73
DE-RuR	2.4	2.39	2	-26.99	-10.45	-19.5
DE-RuS	4.74	5.05	4.34	-43.49	-45.67	-34.68
DE-RuW	2.63	2.61	2.14	-32.13	-27.64	-23.88
DE-Tha	1.87	1.48	1.29	-28.99	-3.95	-19.27

DK-Sor	4.39	4.07	3.21	-47.99	-49.66	-35.24
FI-Hyy	1.3	1.29	0.81	-14.92	-0.32	-8.91
FI-Ken	1.16	2.34	0.72	-2.8	54.7	-14.37
FI-Let	2.05	2.02	1.53	-19.16	-4.72	-19.98
FI-Var	1.4	3.22	0.89	60.3	159.3	21.48
FR-Aur	3.28	4.05	3.25	9.39	68.57	9.03
FR-Bil	1.75	2.23	1.67	-24.81	-24.43	-0.67
FR-FBn	2.38	3.73	1.82	-48.88	-77.01	15.32
FR-Fon	3.1	2.87	2.74	-27	-36.28	-21.96
FR-Gri	4.16	4.24	3.73	-18.71	-13.87	-15.53
FR-Hes	3.7	3.24	3.32	-24.49	-36.28	-17.36
FR-Lam	3.91	4.5	3.95	-4.09	44.8	-8.88
FR-Tou	3.44	2.53	1.77	-73.37	-47.07	-10.42
IT-MBo	2.42	2.89	1.84	-7.9	-31.89	3.26
IT-Ren	1.53	2.32	1.77	11.62	33.32	-2.04
IT-SR2	5.12	6.78	4.07	-67.17	-88.85	-53.94
IT-Tor	1.82	2.49	1.66	-0.74	1.02	1.17
RU-Fy2	2.63	2.84	1.93	-26.11	-22.3	-23.45
SE-Htm	2.74	2.24	1.95	-38.04	-25.42	-26.84
SE-Nor	1.59	1.37	1.35	-25.59	-3.8	-21.62
SE-Svb	1.13	2.02	1.22	5.64	25.07	-24.24

Table S4: The evapotranspiration (ET) root mean square error (RMSE) indicates the general model approximations and the percent bias (PBIAS), demonstrating systematic bias of the models (Community Land Model v5 (CLM5) on grid-scale ($CLM5_{grid}$), CLM5 on PFT scale ($CLM5_{PFT}$), from the European Center of Medium-Range Weather Forecasts Renalysis 5 Land (ERA5-Land), the Global Land Surface Satellite (GLASS), and the Global Land Evaporation Amsterdam Model (GLEAM)) to the observations. Each value corresponds to a group of stations representing the same plant functional type (PFT; Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF), Grasslands (GRA), and Croplands (CRO)). The amount of data points (N) for each PFT is also indicated.

	PFT	**N**	**$CLM5_{grid}$**	**$CLM5_{PFT}$**	**ERA5L**	**GLASS**	**GLEAM**
RMSE [mm day^{-1}]	**ENF**	5038	0.71	0.72	0.84	0.83	0.67
	DBF	1663	0.56	0.62	0.73	0.70	0.56
	GRA	2859	0.65	0.85	0.60	0.57	0.59
	CRO	3690	0.72	1.00	0.88	0.86	0.63
	mean	3285	0.66	0.80	0.76	0.74	0.61
PBIAS [%]	**ENF**	5038	-20.57	-15.42	21.86	13.32	15.43
	DBF	1663	-9.90	-0.54	44.55	29.74	16.24
	GRA	2859	-18.62	-13.94	3.14	2.63	2.41
	CRO	3690	-3.24	11.20	44.99	27.30	7.58
	mean	3285	-13.08	-4.68	28.64	18.25	10.42

Table S5: The gross primary production (GPP) root mean square error (RMSE) indicates the general model approximation and the percent bias (PBIAS), demonstrating systematic bias of the models (Community Land Model v5 (CLM5) on grid-scale ($CLM5_{grid}$), CLM5 on PFT scale ($CLM5_{PFT}$), from the European Center of Medium-Range Weather Forecasts Renalysis 5 Land (ERA5-Land), the Global Land Surface Satellite (GLASS), and the Global Land Evaporation Amsterdam Model (GLEAM)) to the observations. Each value corresponds to a group of stations representing the same plant functional type (PFT: Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF), Grasslands (GRA), and Croplands (CRO)). The amount of data points (N) for each PFT is also indicated.

	PFT	**N**	**$CLM5_{grid}$**	**$CLM5_{PFT}$**	**GLASS**
RMSE [g C day^{-1}]	**ENF**	5976	2.25	2.44	1.75
	DBF	2473	3.71	3.35	2.81
	GRA	2838	3.14	3.01	2.63
	CRO	3607	3.85	4.21	3.55
	mean	3723.5	3.24	3.25	2.69
PBIAS [%]	**ENF**	5976	-26.00	-7.7	-14.53
	DBF	2473	-38.88	-43.76	-24.51
	GRA	2838	-30.73	-25.5	-21.34
	CRO	3607	-14.99	-1.48	-6.29
	mean	3723.5	-27.65	-19.61	-16.67

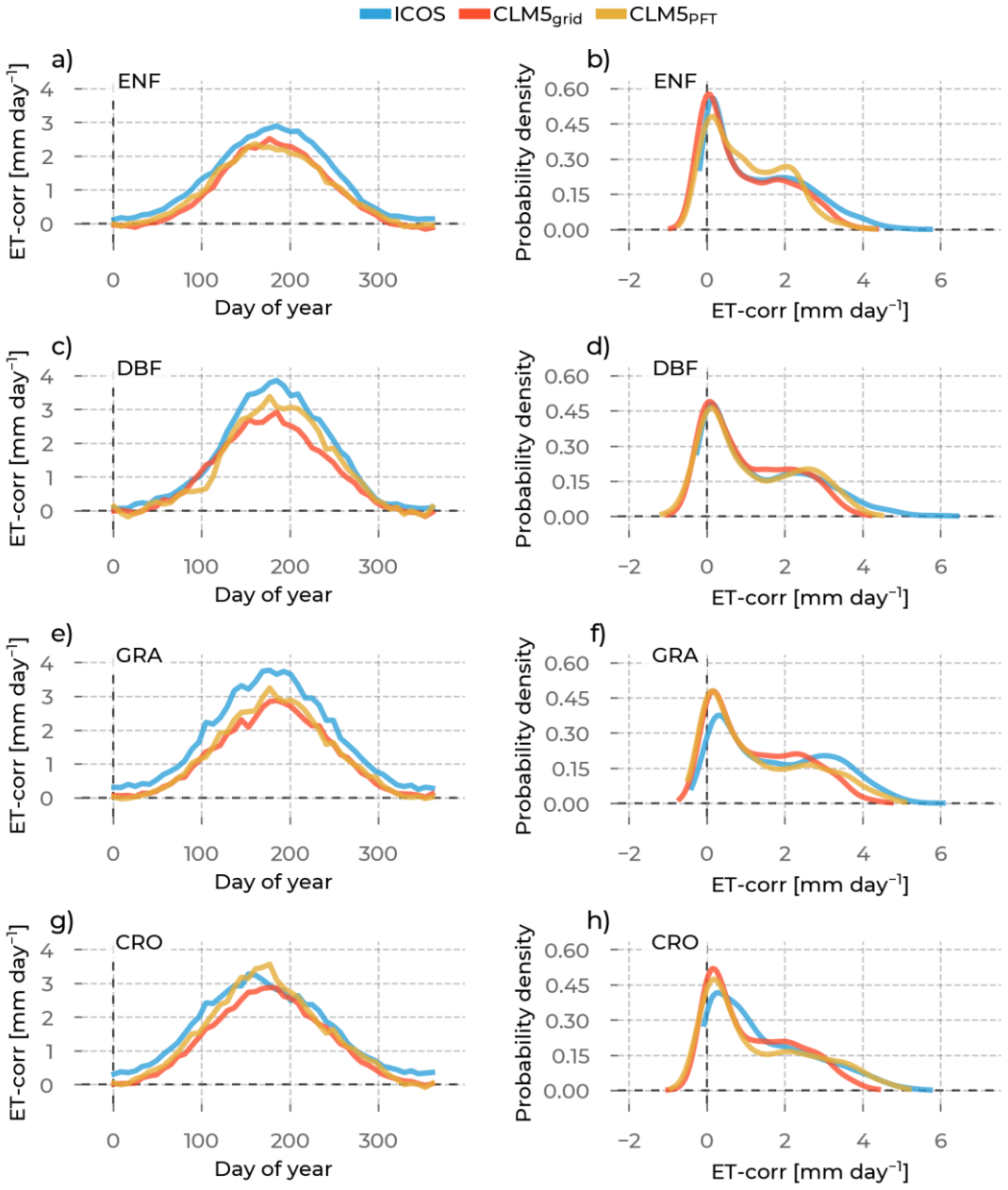

Figure S1: In the left column are the yearly energy balance corrected evapotranspiration (ET-corr) evolutions averaged across stations belonging to one PFT (rows). We differentiate the data source by color (ICOS observations: blue, CLM5$_{grid}$: red, CLM5$_{PFT}$: yellow, GLASS: green, ERA5L: brown, GLEAM: purple). The

probability density curves for all ET-corr values from stations belonging to the selected PFT are in the right column. Each row shows these plots for one PFT: Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF), Grasslands (GRA), and Croplands (CRO).

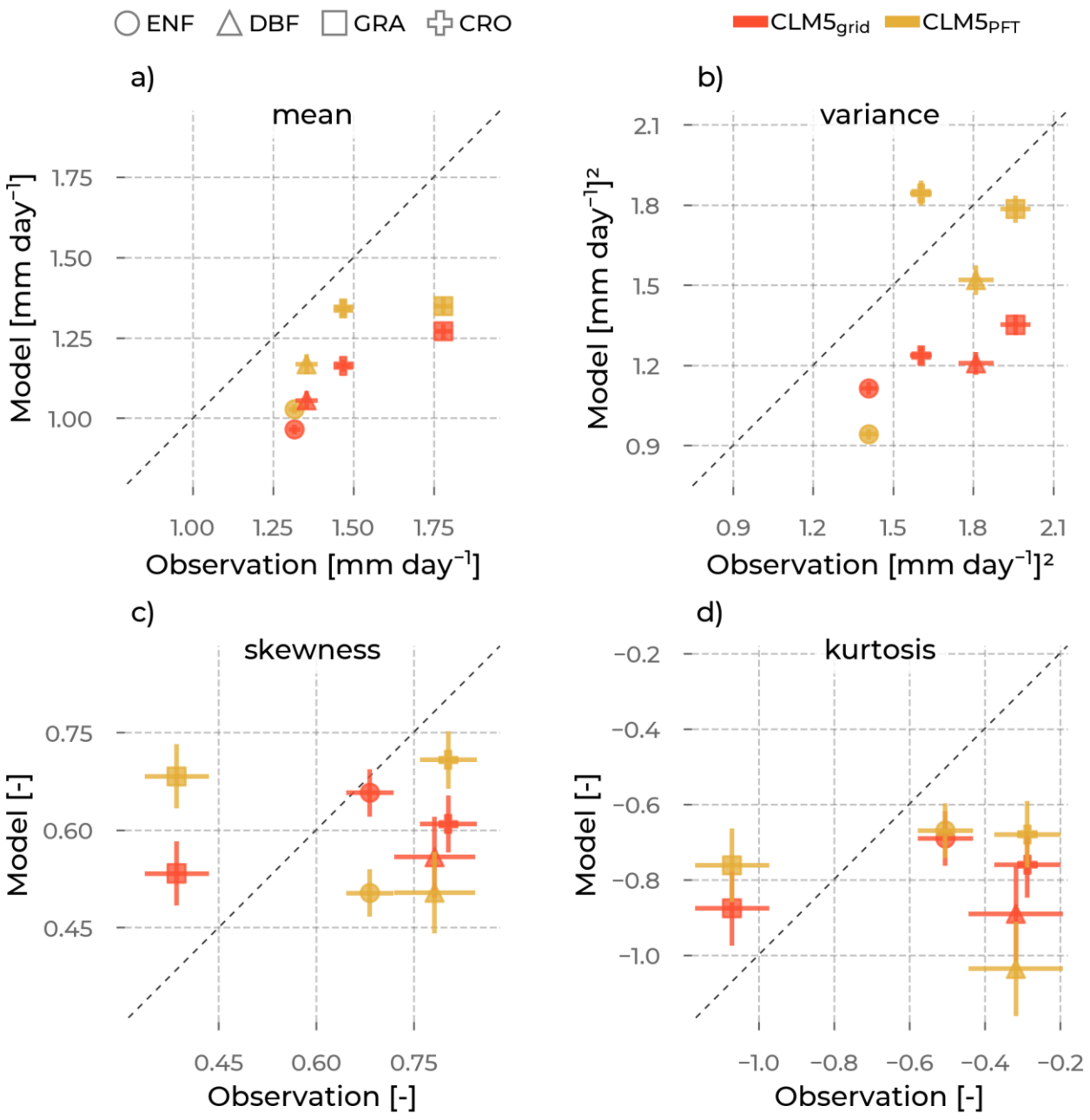

Figure S2: The mean (a), variance (b), skewness (c), and excess kurtosis (d) of the ET-corr distributions (visualized in Figure S1) from the models (color, y-axis), as opposed to the corresponding values from observations (x-axis) aggregated for each PFT (marker type): Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF),

Grasslands (GRA), Croplands (CRO). The error bars are the standard errors of the respective moment, depending on the sample size.

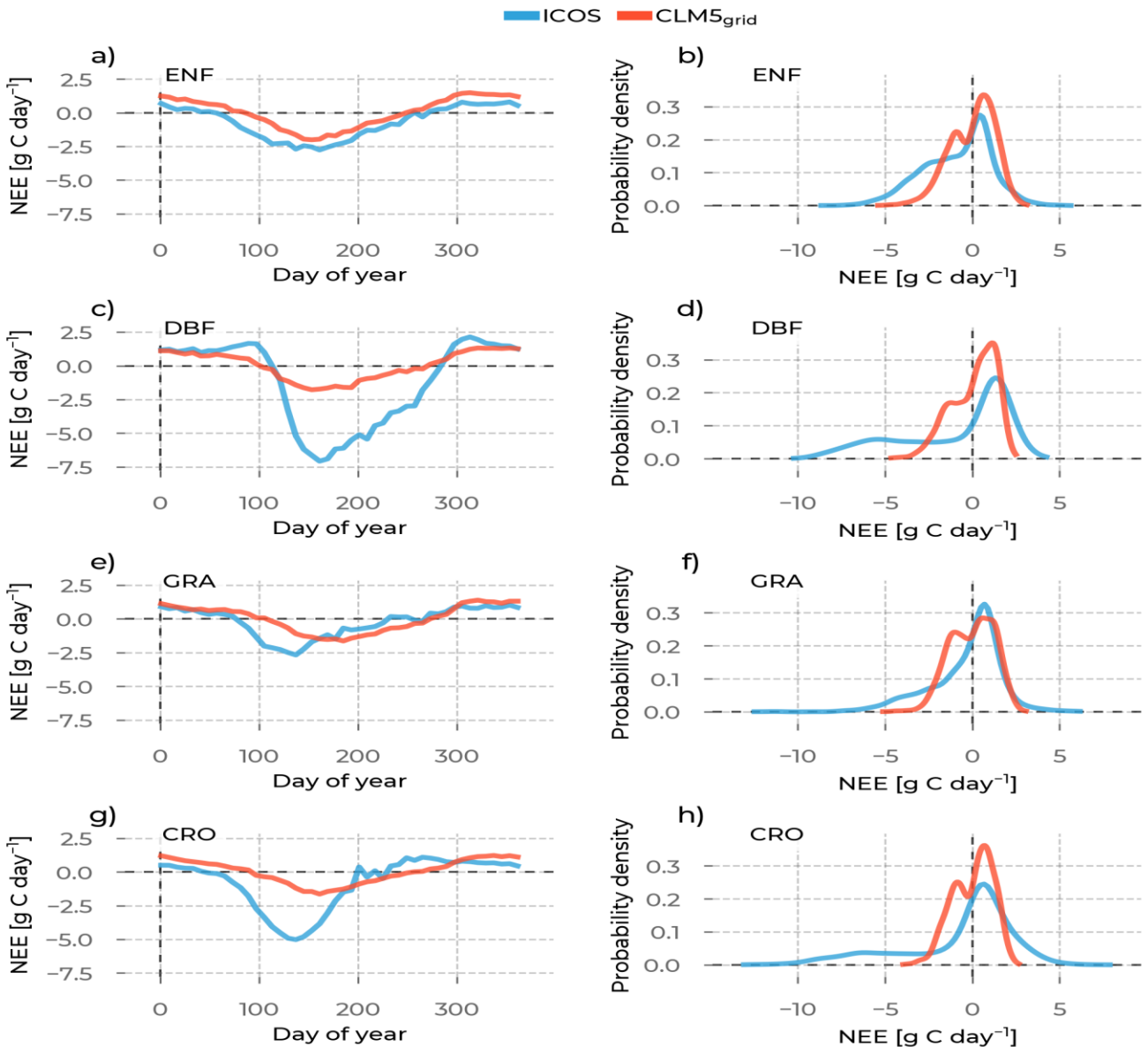

Figure S3: In the left column are the yearly net ecosystem exchange (NEE) evolutions averaged across stations belonging to one PFT (rows). We differentiate the data source by color (ICOS observations: blue, $CLM5_{grid}$: red, $CLM5_{PFT}$: yellow, GLASS: green, ERA5L: brown, GLEAM: purple). The probability density curves for all NEE values from stations belonging to the selected PFT are in the right column. Each row shows these plots for one

PFT: Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF), Grasslands (GRA), and Croplands (CRO).

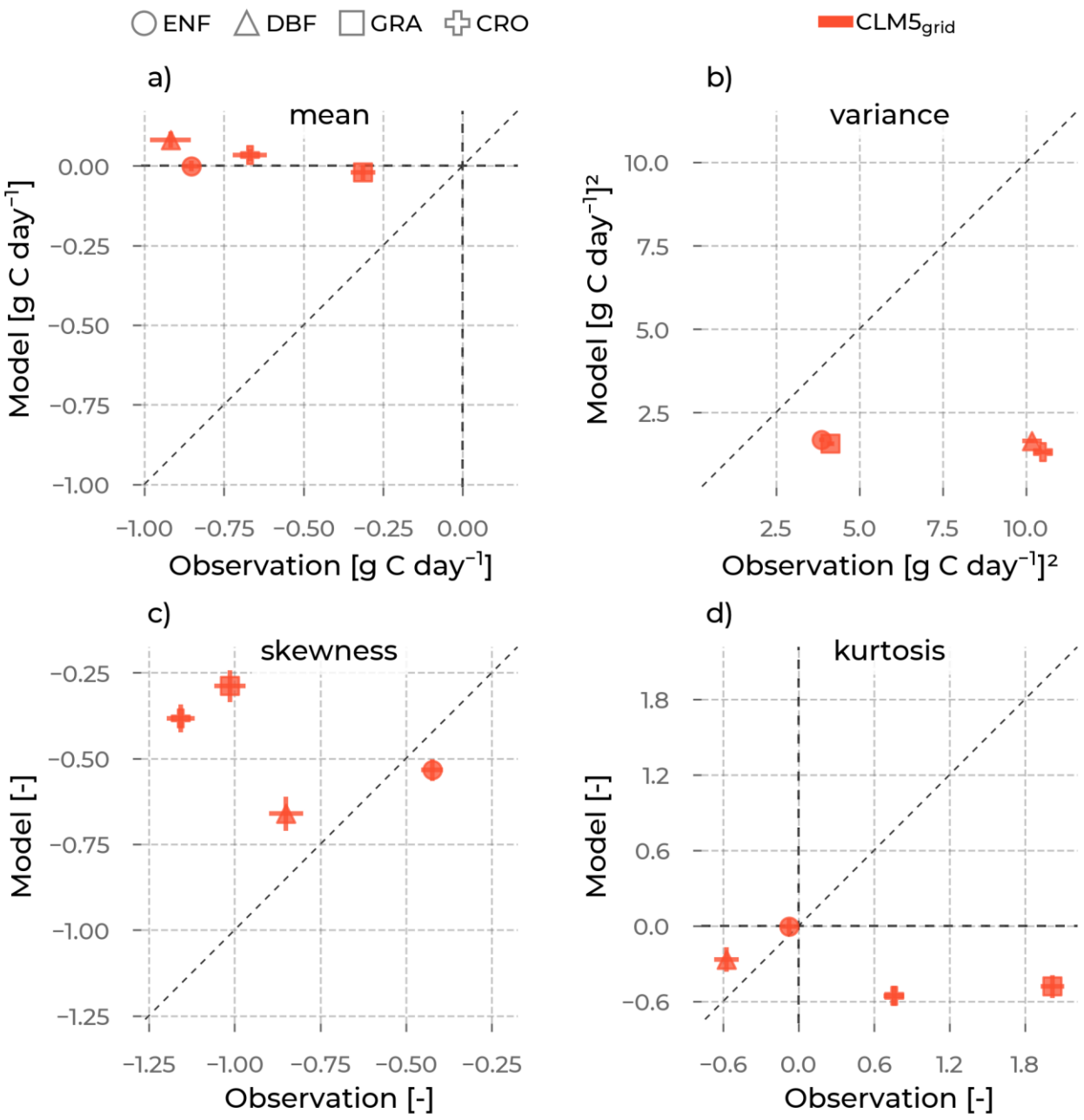

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Figure S4: The mean (a), variance (b), skewness (c), and excess kurtosis (d) of the NEE distributions (visualized in Figure S3) from the models (color, y-axis), as opposed to the corresponding values from observations (x-axis) aggregated for each PFT (marker type): Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF),

Grasslands (GRA), Croplands (CRO). The error bars are the standard errors of the respective moment, depending on the sample size.

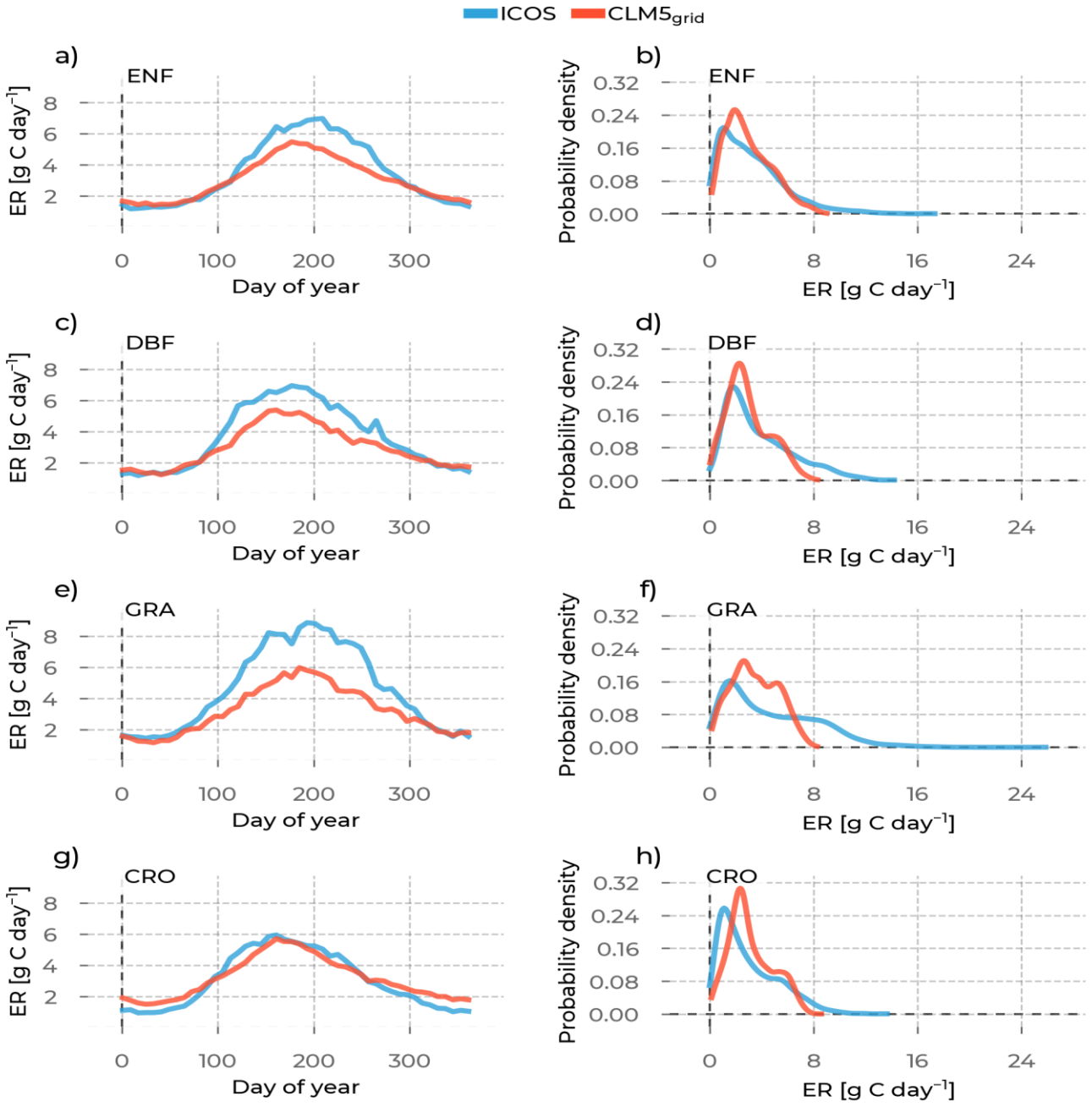

Figure S5: In the left column are the yearly ecosystem respiration (ER) evolutions averaged across stations belonging to one PFT (rows). We differentiate the data source by color (ICOS observations: blue, $CLM5_{grid}$: red, $CLM5_{PFT}$: yellow, GLASS: green, ERA5L: brown, GLEAM: purple). The probability density curves for all ER values from stations belonging to the selected PFT are in the right column. Each row shows these plots for one

PFT: Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF), Grasslands (GRA), and Croplands (CRO).

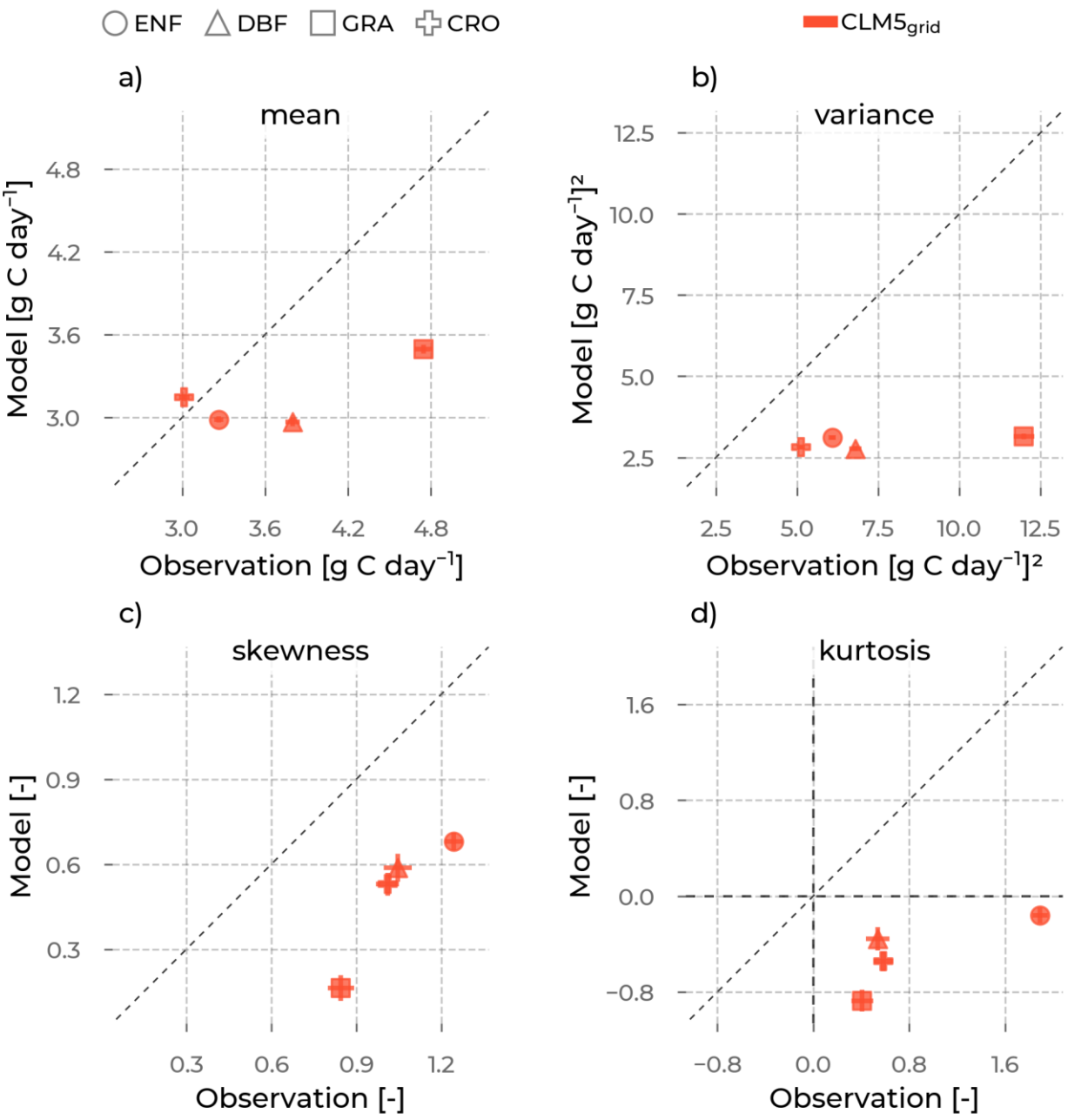

Figure S6: The mean (a), variance (b), skewness (c), and excess kurtosis (d) of the ER distributions (visualized in Figure S5) from the models (color, y-axis), as opposed to the corresponding values from observations (x-axis) aggregated for each PFT (marker type): Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF),

Grasslands (GRA), Croplands (CRO). The error bars are the standard errors of the respective moment, depending on the sample size.

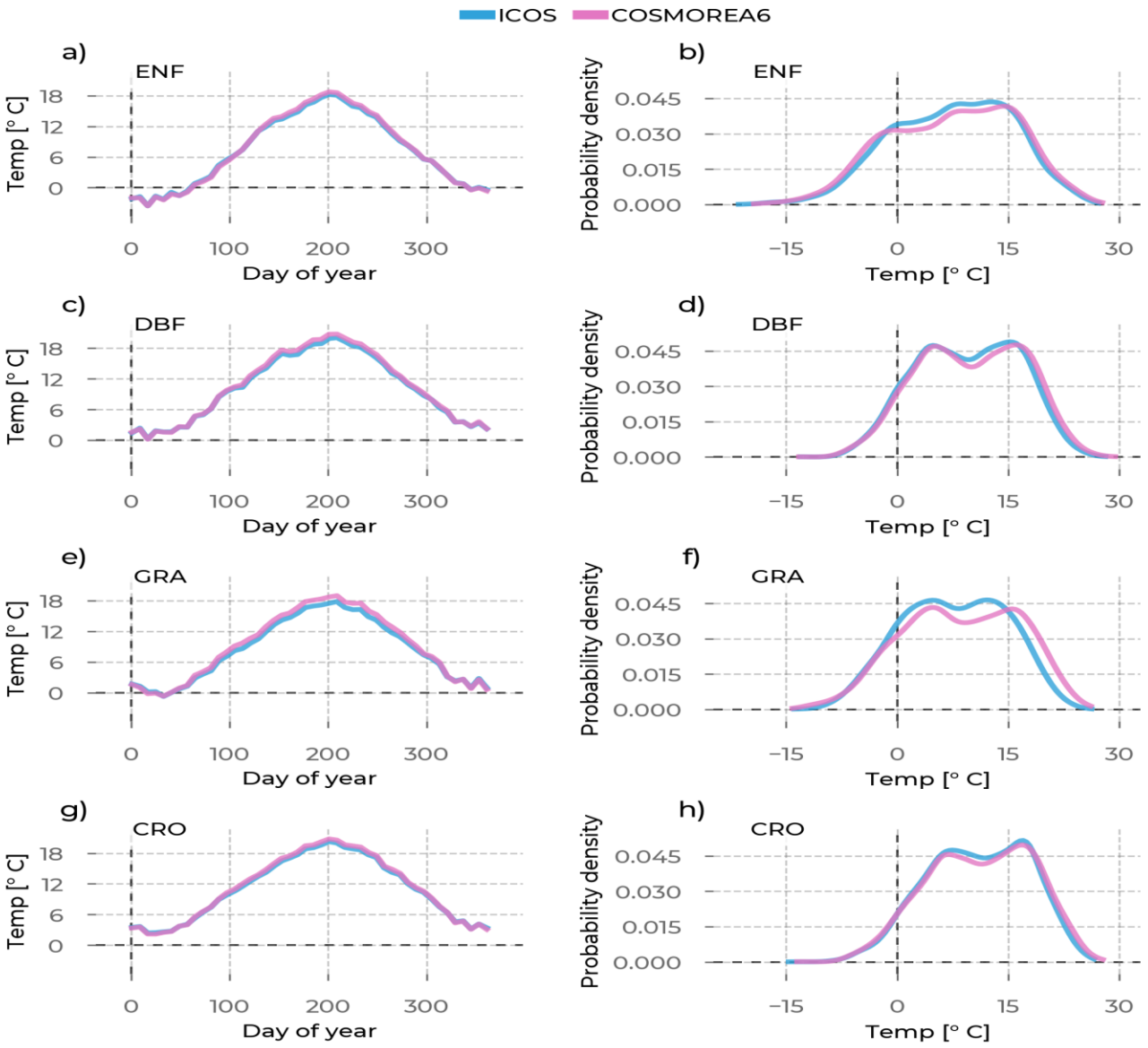

Figure S7: In the left column are the yearly Temperature (Temp) evolutions averaged across stations belonging to one PFT (rows). We differentiate the data source by color (ICOS observations: blue, $CLM5_{grid}$: red, $CLM5_{PFT}$: yellow, GLASS: green, ERA5L: brown, GLEAM: purple). The probability density curves for all Temp values from stations belonging to the selected PFT are in the right column. Each row shows these plots for one PFT: Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF), Grasslands (GRA), and Croplands (CRO).

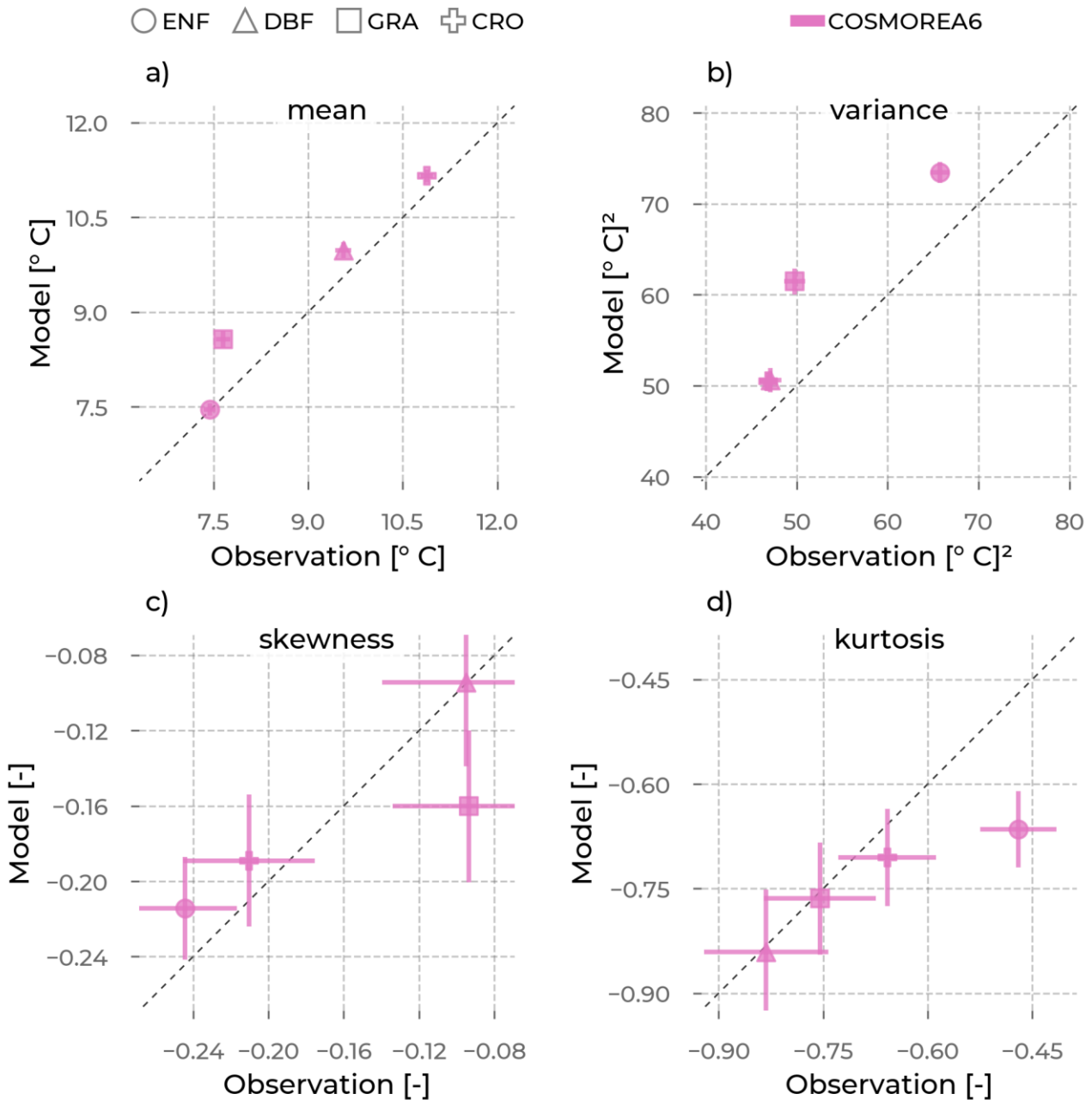

Figure S8: The mean (a), variance (b), skewness (c), and excess kurtosis (d) of the Temp distributions (visualized in Figure S7) from the models (color, y-axis), as opposed to the corresponding values from observations (x-axis) aggregated for each PFT (marker type): Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF),

Grasslands (GRA), Croplands (CRO). The error bars are the standard errors of the respective moment, depending on the sample size.

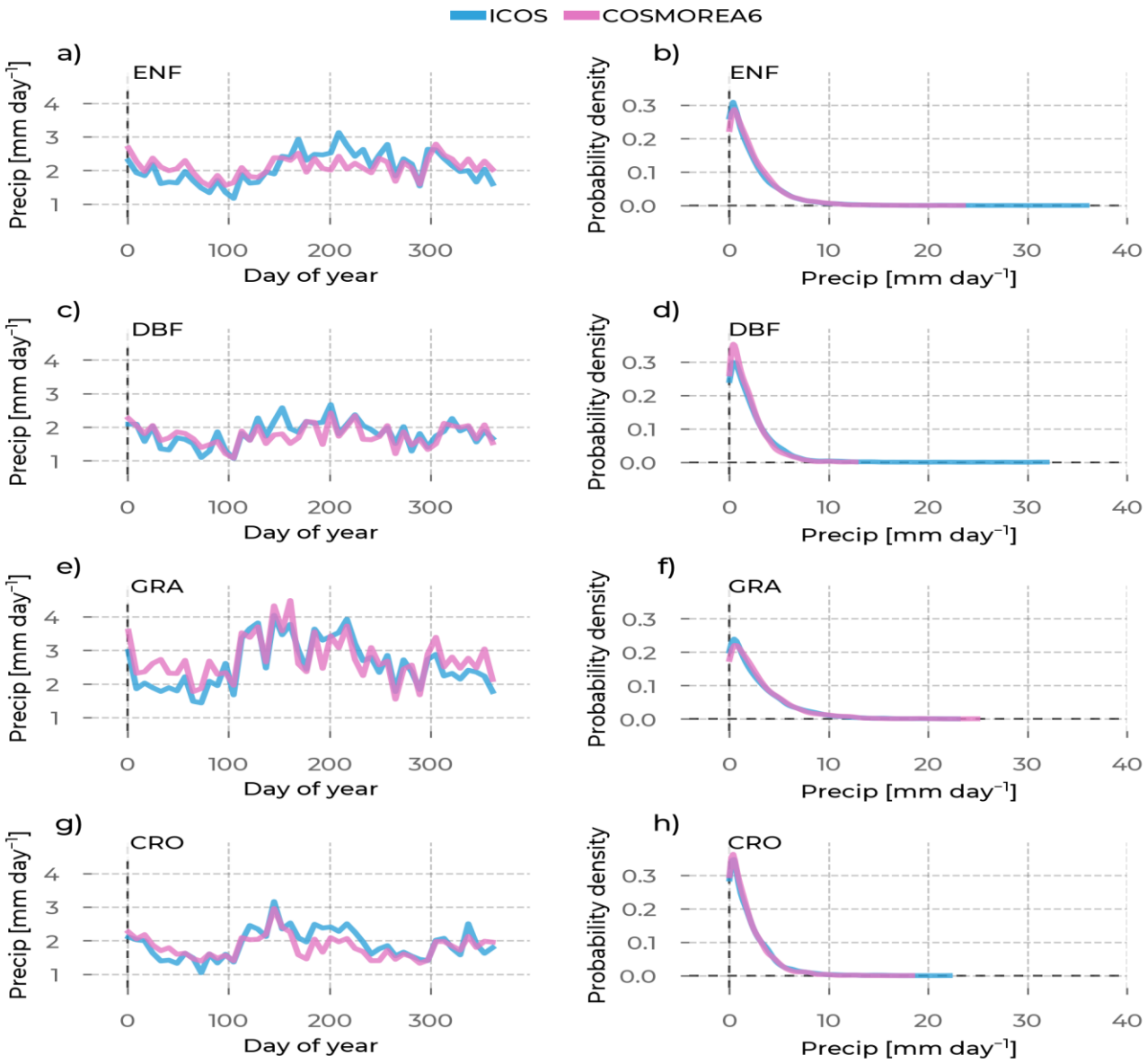

Figure S9: In the left column are the yearly Precipitation (Precip) evolutions averaged across stations belonging to one PFT (rows). We differentiate the data source by color (ICOS observations: blue, $CLM5_{grid}$: red, $CLM5_{PFT}$: yellow, GLASS: green, ERA5L: brown, GLEAM: purple). The probability density curves for all Precip values from

stations belonging to the selected PFT are in the right column. Each row shows these plots for one PFT: Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF), Grasslands (GRA), and Croplands (CRO).

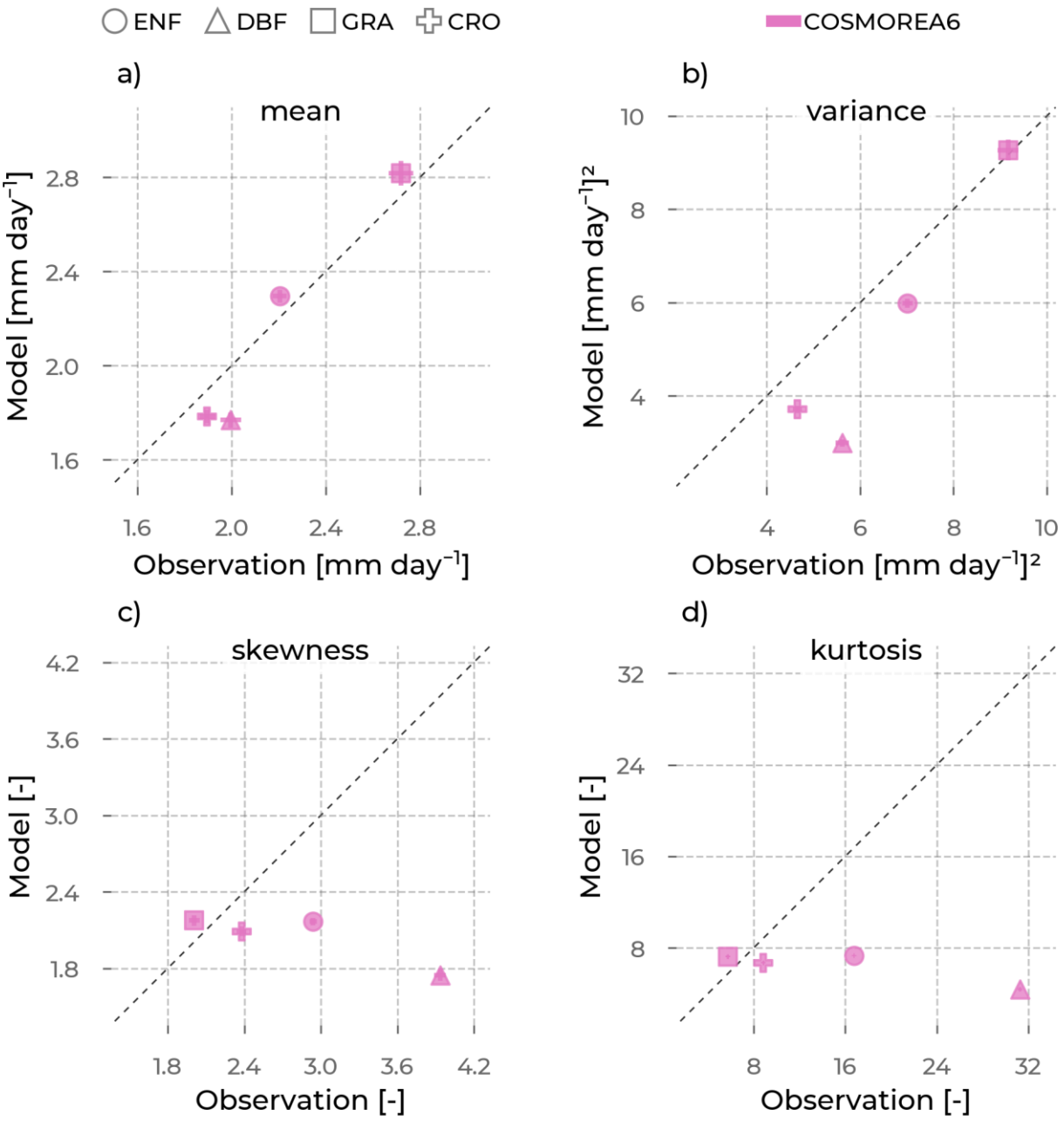

Figure S10: The mean (a), variance (b), skewness (c), and excess kurtosis (d) of the Precip distributions (visualized in Figure S9) from the models (color, y-axis), as opposed to the corresponding values from observations (x-axis) aggregated for each PFT (marker type): Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF),

Grasslands (GRA), Croplands (CRO). The error bars are the standard errors of the respective moment, depending on the sample size.

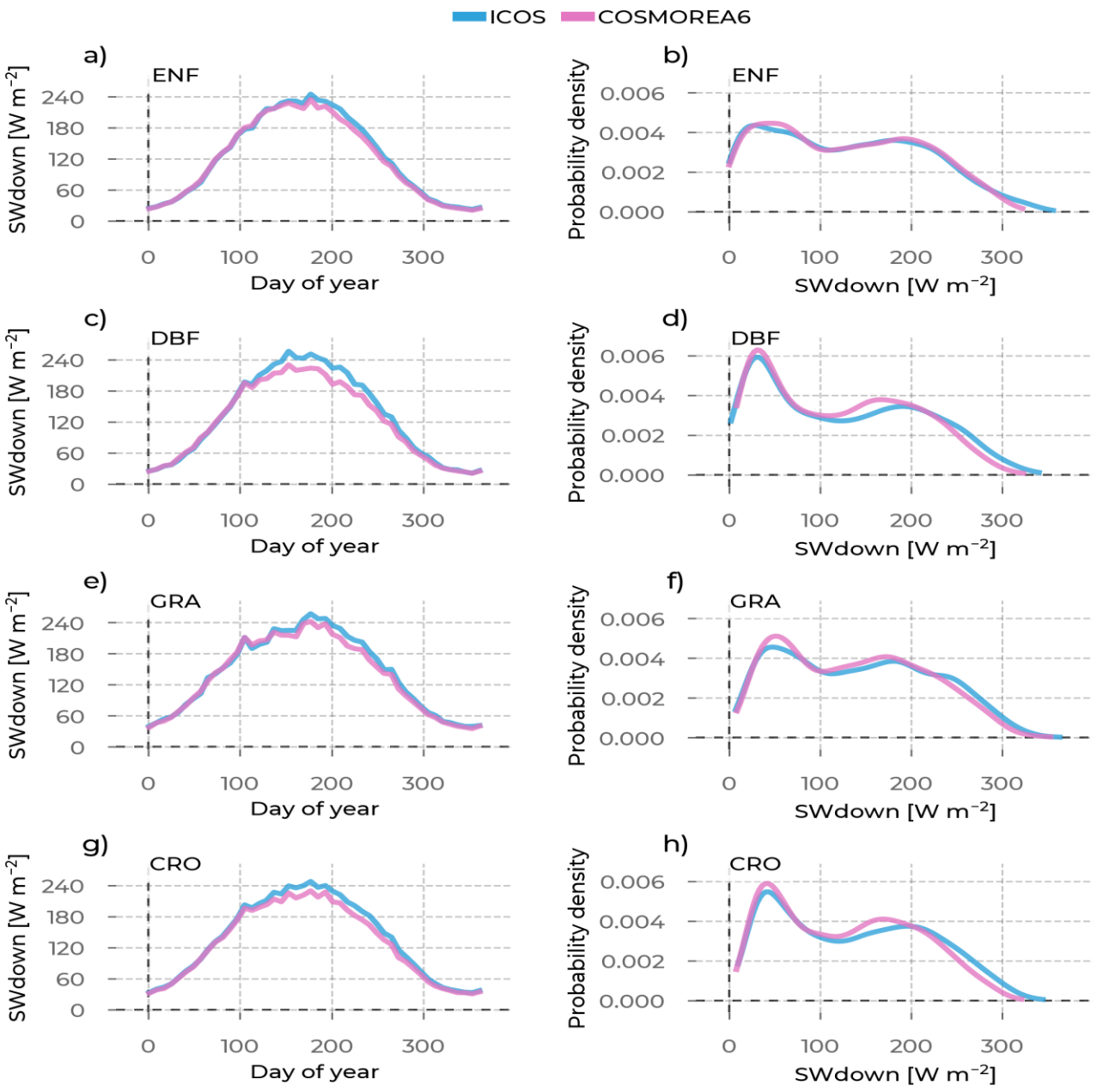

Figure S11: In the left column are the yearly shortwave downward radiation (SWdown) evolutions averaged across stations belonging to one PFT (rows). We differentiate the data source by color (ICOS observations: blue,

$CLM5_{grid}$: red, $CLM5_{PFT}$: yellow, GLASS: green, ERA5L: brown, GLEAM: purple). The probability density curves for all SWdown values from stations belonging to the selected PFT are in the right column. Each row shows these plots for one PFT: Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF), Grasslands (GRA), and Croplands (CRO).

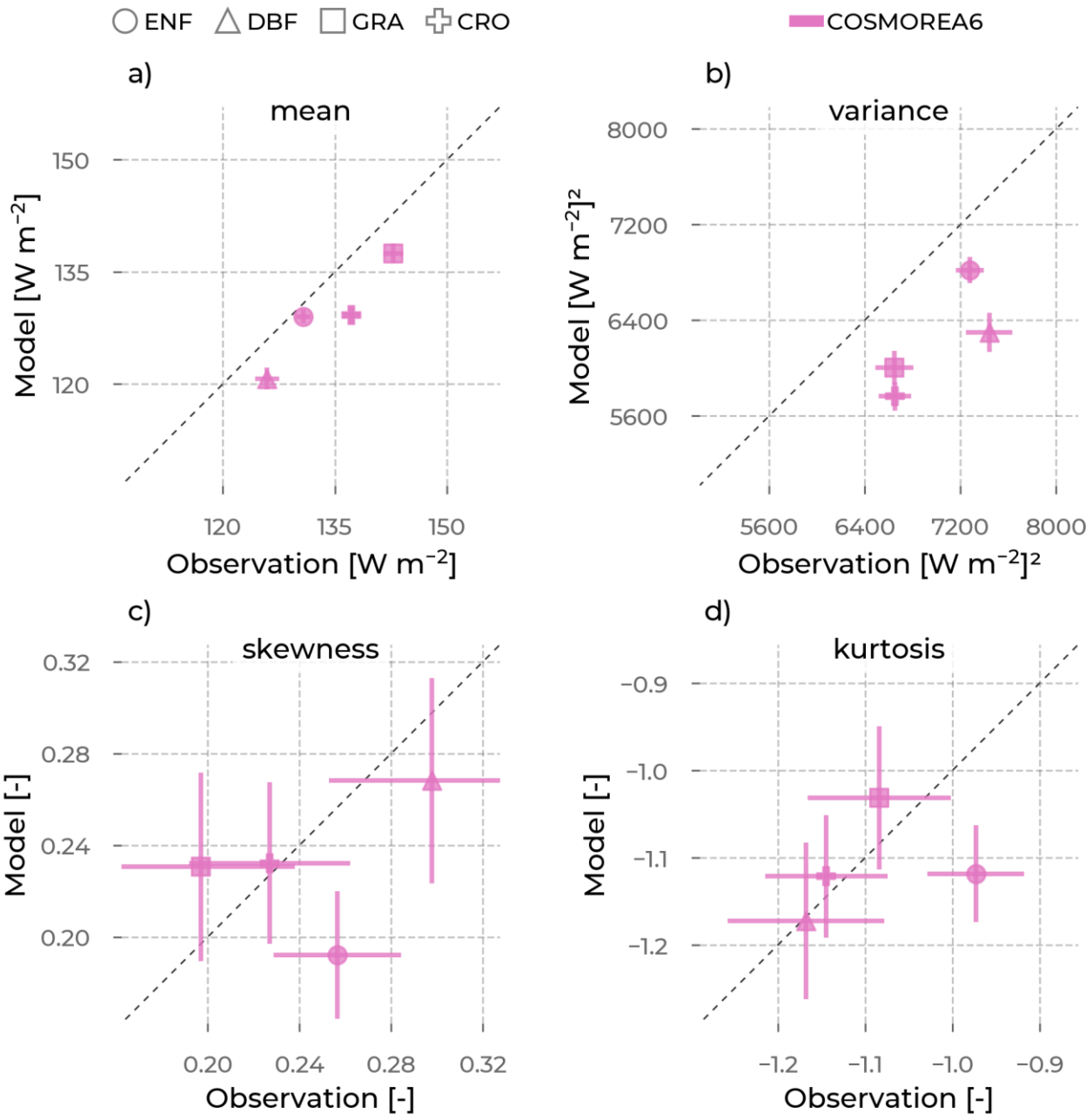

Figure S12: The mean (a), variance (b), skewness (c), and excess kurtosis (d) of the SWdown distributions (visualized in Figure S11) from the models (color, y-axis), as opposed to the corresponding values from observations (x-axis) aggregated for each PFT (marker type): Evergreen Needleleaf Forest (ENF), Deciduous

Broadleaf Forest (DBF), Grasslands (GRA), Croplands (CRO). The error bars are the standard errors of the respective moment, depending on the sample size.

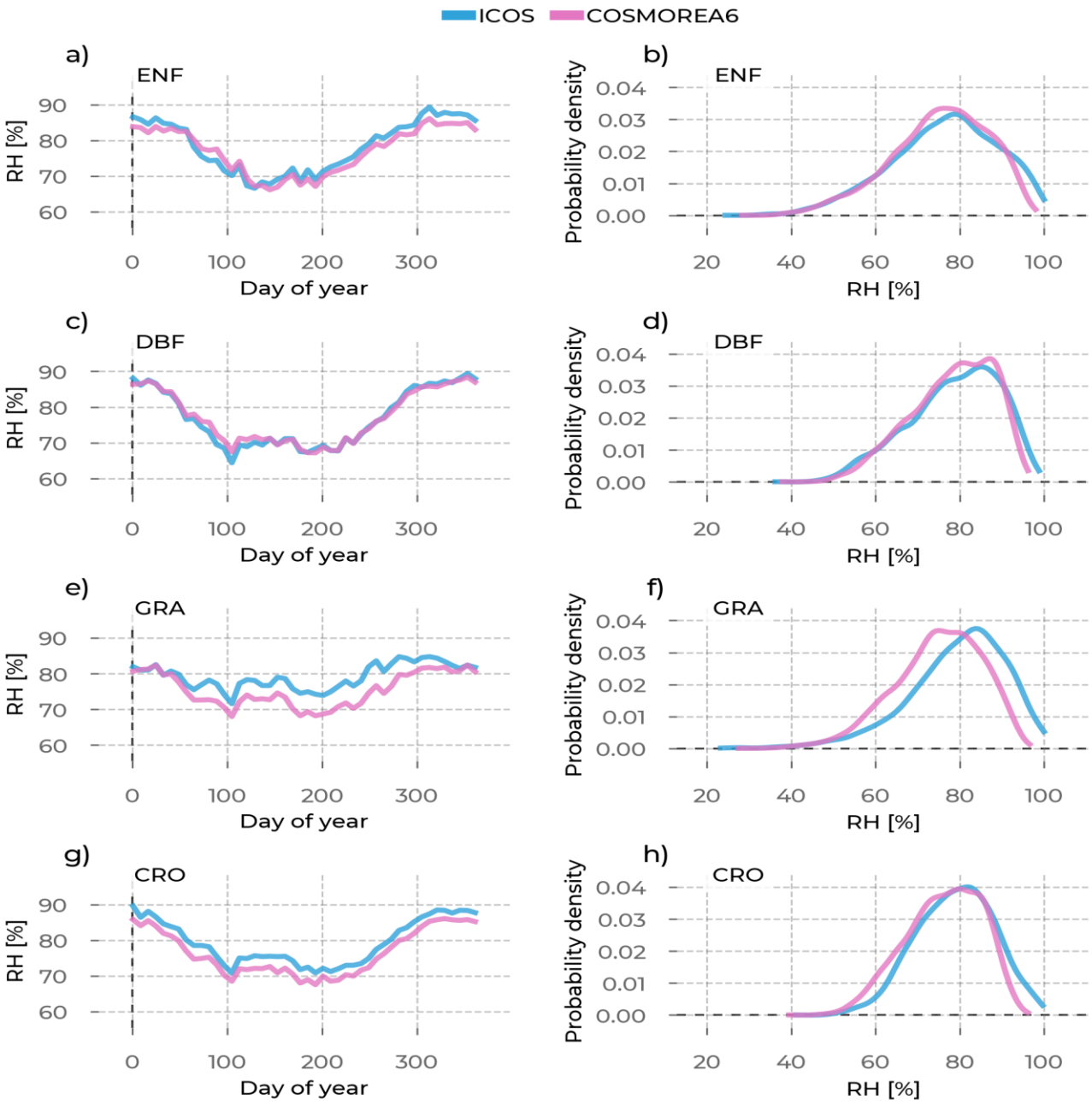

Figure S13: In the left column are the yearly relative humidity (RH) evolutions averaged across stations belonging to one PFT (rows). We differentiate the data source by color (ICOS observations: blue, $CLM5_{grid}$: red, $CLM5_{PFT}$: yellow, GLASS: green, ERA5L: brown, GLEAM: purple). The probability density curves for all RH values from

stations belonging to the selected PFT are in the right column. Each row shows these plots for one PFT: Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF), Grasslands (GRA), and Croplands (CRO).

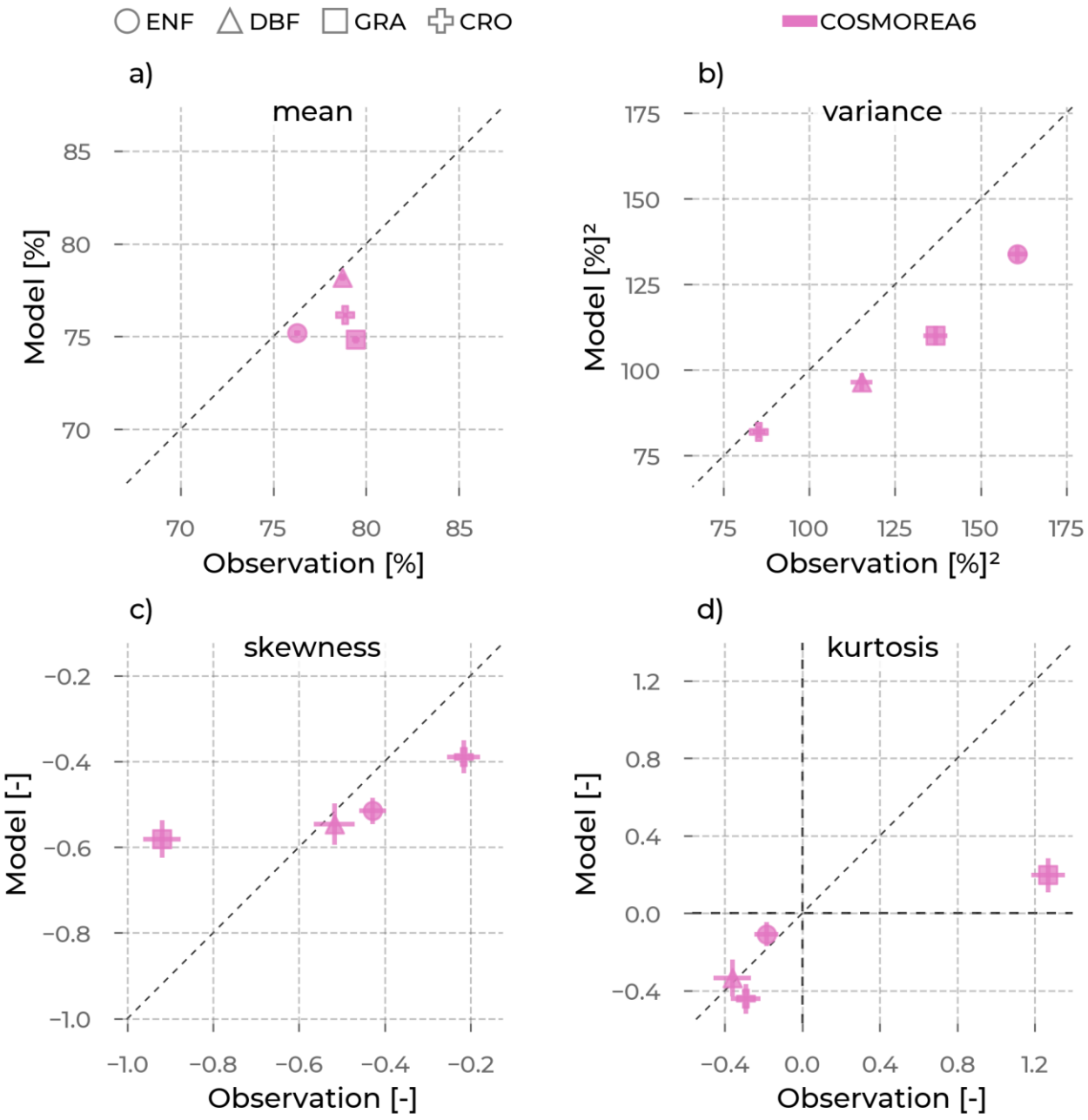

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Figure S14: The mean (a), variance (b), skewness (c), and excess kurtosis (d) of the RH distributions (visualized in Figure S13) from the models (color, y-axis), as opposed to the corresponding values from observations (x-axis) aggregated for each PFT (marker type): Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF),

Grasslands (GRA), Croplands (CRO). The error bars are the standard errors of the respective moment, depending on the sample size.

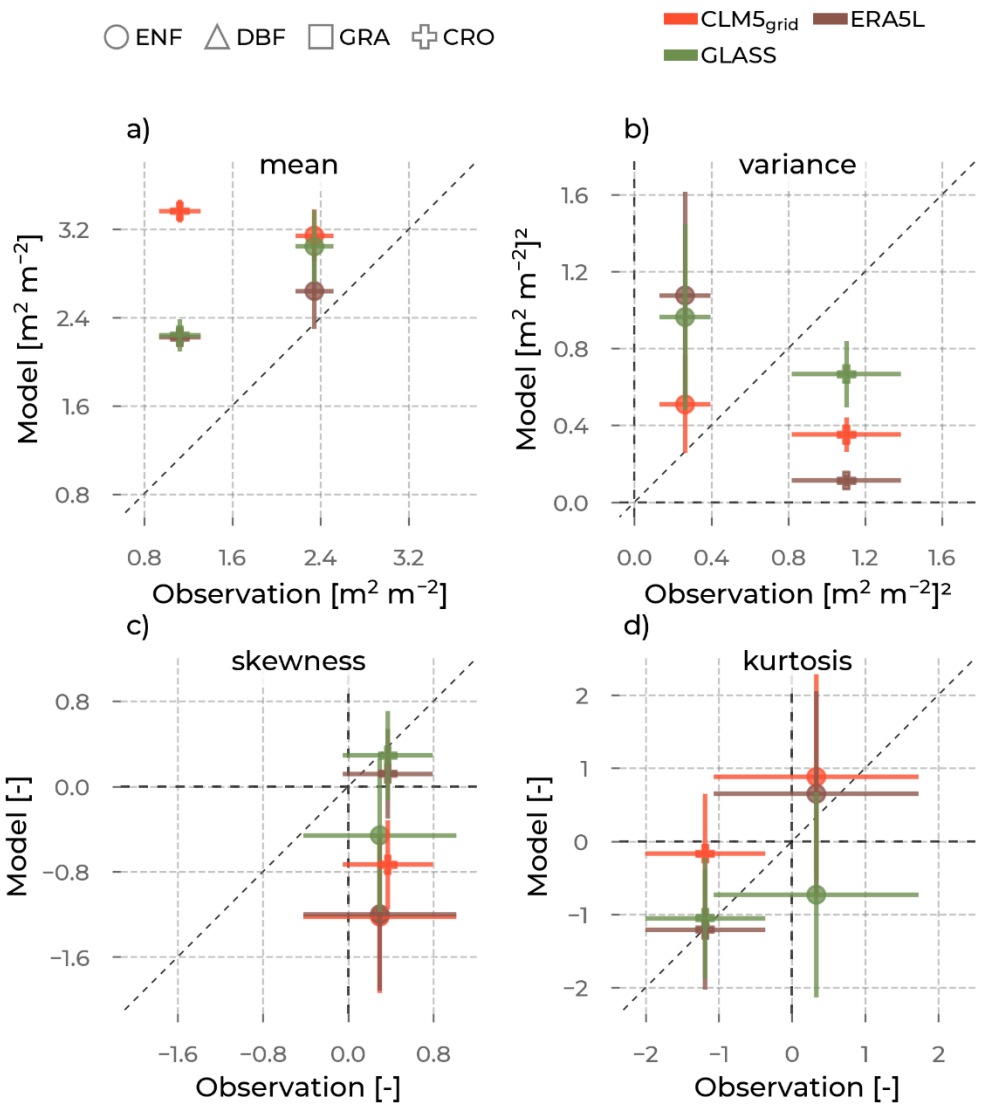

Figure S15: The mean (a), variance (b), skewness (c), and excess kurtosis (d) of the leaf area index (LAI) distributions from the models (color, y-axis), as opposed to the corresponding values from observations (x-axis) aggregated for each plant functional type (marker type): Evergreen Needleleaf Forest (ENF), Deciduous Broadleaf Forest (DBF), Grasslands (GRA), Croplands (CRO). The error bars are the standard errors of the respective moment, depending on the sample size.