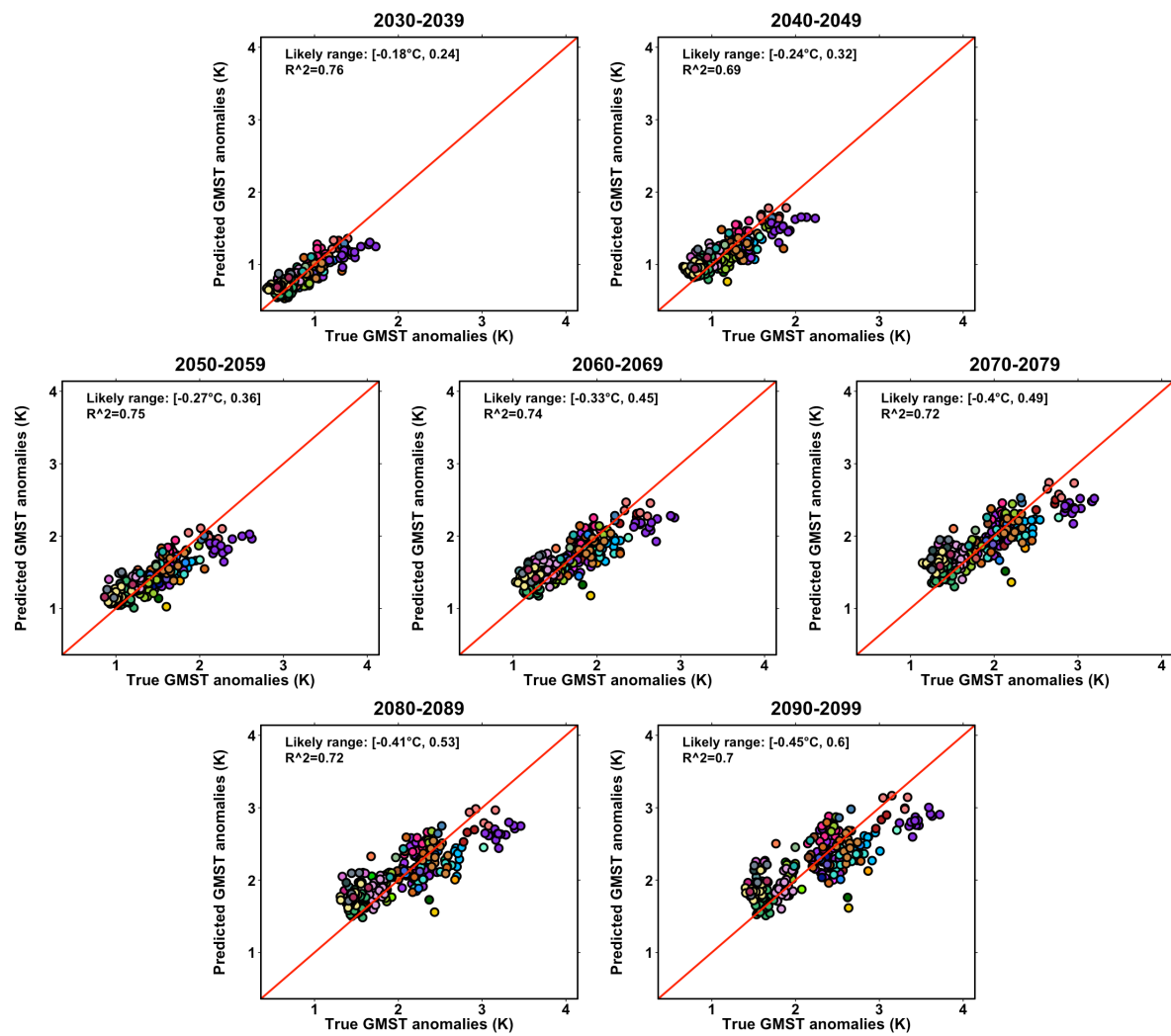


This Supplementary Information document contains:

- **Supplementary Fig. 1**
- **Supplementary Table 1**
- **An additional reference list**



Supplementary Figure 1: True and predicted global mean surface temperature (GMST) anomalies. Each forecast decade from 2030s to 2090s is represented by the different panels, from left to right and top to bottom. For each panel, the x-axis is the extracted GMST anomaly from the TC-UNet forecast, and the y-axis is the true GMST. The diagonal red line is the identity and represent perfect prediction. The likely range (5%-95%) indicated at the top left is determined from the empirical distribution of forecast errors (distance to identity line).

Model name	Model family ID	Members used	Reference
ACCESS-CM2	ACCESS	10	Bi et al. (2020)
ACCESS-ESM1-5	ACCESS	40	Ziehn et al. (2020)
BCC-CSM2-MR	BCC	1	Wu et al. (2019)
CanESM5-CanOE	CCCma	3	Swart et al. (2019)
CanESM5-1	CCCma	10	Sigmond et al. (2023)
CAS-ESM2-0	CAS	1	Zhang et al. (2020)
CESM2	CESM	3	Danabasoglu et al. (2020)
CESM2-WACCM	CESM	3	Danabasoglu et al. (2020)
CIESM	CIESM	1	Lin et al. (2020)
CMCC-CM2-SR5	CMCC	1	Cherchi et al. (2019)
CMCC-ESM2	CMCC	1	Lovato et al. (2022)
CNRM-CM6-1	CNRM	6	Voldoire et al. (2019)
CNRM-CM6-1-HR	CNRM	1	Voldoire et al. (2019)
CNRM-ESM2-1	CNRM	10	S��f��rian et al. (2019)
EC-Earth3	EC-Earth	9	D��scher et al. (2022)
EC-Earth3-CC	EC-Earth	1	D��scher et al. (2022)
EC-Earth3-Veg	EC-Earth	4	D��scher et al. (2022)
FGOALS-f3-L	CAS	1	He et al. (2020)
FIO-ESM2-0	FIO	3	Bao et al. (2020)
GFDL-CM4	GFDL	1	Held et al. (2019)
GFDL-ESM4	GFDL	3	Dunne et al. (2020)
GISS-E2-1-G	NASA-GISS	19	Kelley et al. (2020)
GISS-E2-1-H	NASA-GISS	1	Kelley et al. (2020)
HadGEM3-GC31-LL	MOHC	5	Andrews et al. (2019)
INM-CM4-8	INM	1	Volodin et al. (2018)
INM-CM5-0	INM	1	Volodin et al. (2017)
IPSL-CM6A-LR	IPSL	11	Boucher et al. (2020)
KACE-1-0-G	KACE	2	Lee et al. (2020)
KIOST-ESM	KIOST	1	Pak et al. (2021)
MCM-UA	MCM-UA	1	Stouffer (2019)
MIROC6	MIROC	50	Tatebe et al. (2019)
MIROC-ES2L	MIROC	29	Hajima et al. (2020)
MPI-ESM1-2-HR	MPI-M	2	Mauritsen et al. (2019)
MPI-ESM1-2-LR	MPI-M	30	Mauritsen et al. (2019)
MRI-ESM2-0	MRI	1	Yukimoto et al. (2019)
NESM3	NESM	2	Cao et al. (2018)
NorESM2-LM	NCC	4	Seland et al. (2020)
NorESM2-MM	NCC	2	Seland et al. (2020)
TaiESM1	TaiESM	1	Lee et al. (2021)
UKESM1-0-LL	MOHC	14	Sellar et al. (2019)

Supplementary Table 1: List of 290 simulations from 40 CMIP6 Earth System Models

(ESMs) used for the SSP2-4.5 experiment. ESM family IDs were determined based on the modelling center in which each ESM was developed. The third column indicate the

number of members used for each ESM, each representing a full historical to future trajectory after merging by member ID.

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