

Supporting Information for "Separation of internal and forced variability of climate using a U-Net"

Constantin Bône¹², Guillaume Gastineau¹, Sylvie Thiria¹, Patrick

Gallinari²³ and Carlos Mejia¹

¹UMR LOCEAN, IPSL, Sorbonne Université, IRD, CNRS, MNHN

²UMR ISIR, Sorbonne Université, CNRS, INSERM

³Criteo AI Lab

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Table 1. List of climate CMIP5 climate model used. Nb indicates the ensemble size of each simulation.

Table 1.		
Name	Nb Historical	Nb RCP8.5
GISS-E2-R-p1	2	2
MPI-ESM-LR	3	3
CanESM2	5	5
CESM1-CAM5	3	3
FIO-ESM	3	3
CNRM-CM5	10	5
CSIRO-Mk3-6-0	10	10
FGOALS-g3-s2	3	3
GISS-E2-H-p1	6	3
GISS-E2-H-p3	2	2
HadGEM2-ES	3	3
IPSL-CM5A-LR	6	4
GISS-E2-R-p3	3	2

Table 2. List of climate CMIP6 climate model used. Nb indicates the ensemble size of each simulation.

Name	Nb Historical	Nb SSP2-4.5
ACCESS-CM2	3	3
CanESM5	25	25
CESM2	11	3
CanESM5-CanOE	3	3
GISS-E2-1-G	27	27
EC-Earth3	16	16
MIROC-ES2L	23	23
HadGEM3-GC31-LL	5	4
GFDL-ESM4	3	3
FIO-ESM-2-0	3	3
KACE-1-0-G	3	3
GISS-E2-1-G-p3	9	4
ACCESS-ESM1-5	40	30
CAS-ESM2-0	4	2
NESM3	5	2
MPI-ESM1-2-HR	10	2
NorESM2-LM	3	3
GISS-E2-1-G-p5	9	9
IPSL-CM6A-LR	33	11
GISS-E2-1-H	14	5
CESM2-WACCM	3	3
CNRM-CM6-1	30	10
CAMS-CSM1-0	3	2
UKESM1-0-LL	19	17
MPI-ESM1-2-LR	10	10
MRI-ESM2-0	9	9
CNRM-ESM2-1	10	6
FGOALS-f3	6	4
CanESM5	40	25
MIROC6	50	50

Table 3. List of climate SMILE climate model used. Nb indicates the ensemble size of each simulation.

Name of the model	Nb of historical members	Nb scenario members	Origin of forcings	Scenario
CSIRO-Mk3-6-0	29	29	CMIP5	RCP8.5
EC-EARTH	15	15	CMIP6	SSP2-4.5
MPI-ESM	100	100	CMIP6	SSP2-4.5
FGOALS-g3	110	110	CMIP6	SSP2-4.5

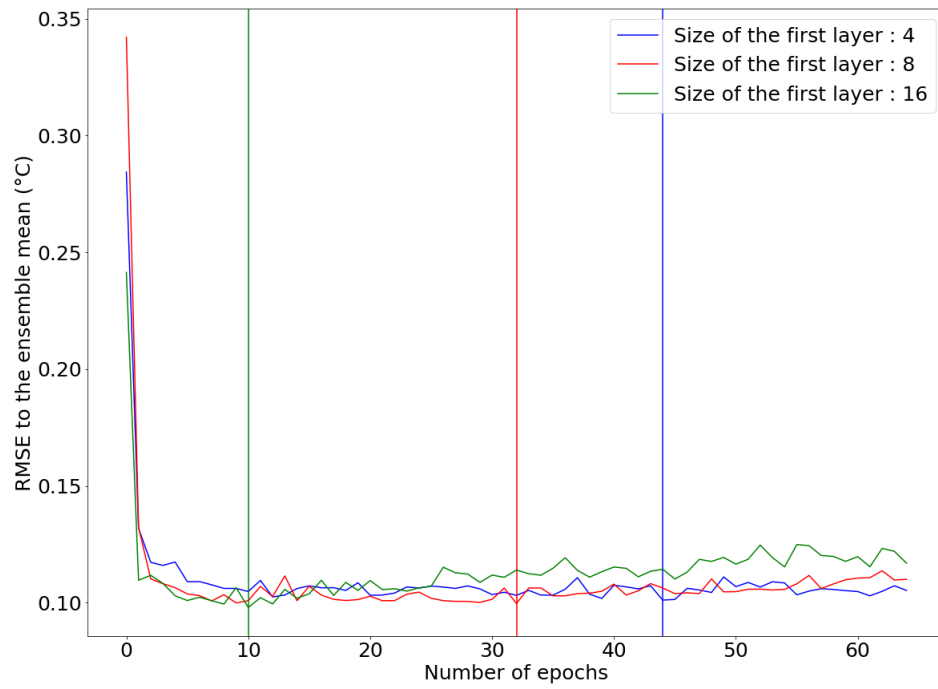


Figure S1. Validation RMSE (in °C) using the ensemble mean of MIROC6 outputs as a target, and each member as inputs for different epochs and when varying the numbers of filters for each convolutional layer of the U-Net. Vertical line of the same colour shows the epoch where the minimum RMSE is obtained for the three changes in the number of filters.

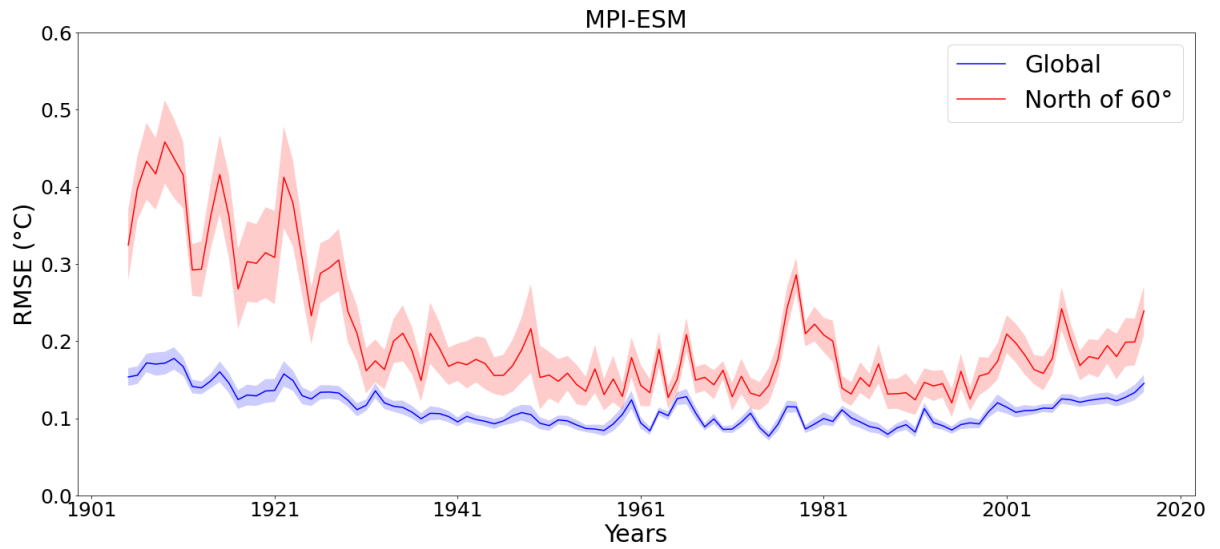
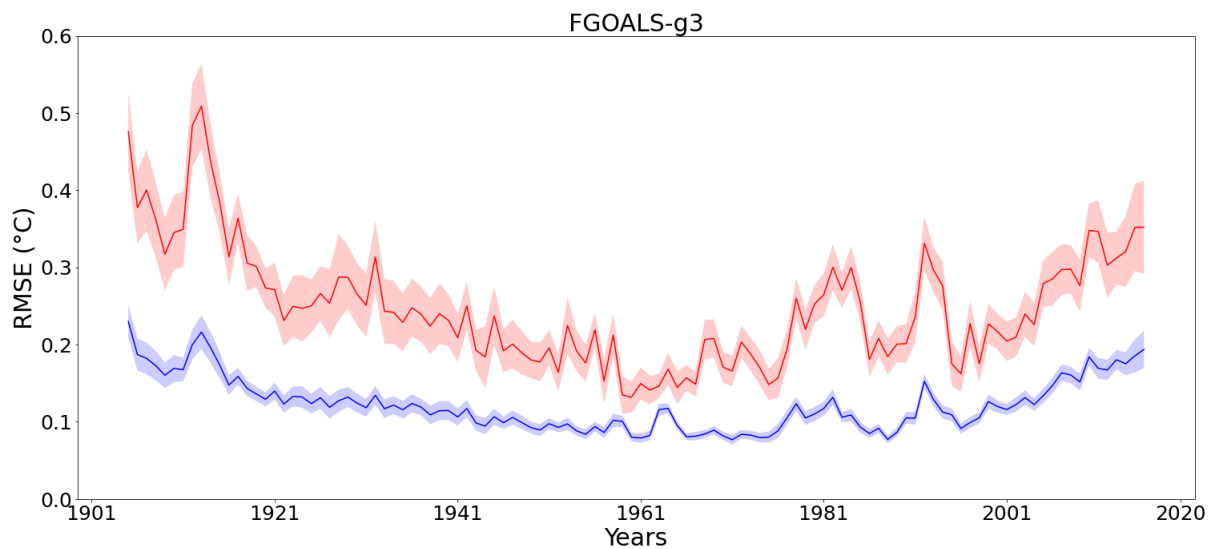
a)**b)**

Figure S2. a) Spatial average of the RMSE, in °C, between the U-Net output obtained from each member of MPI-ESM and the ensemble average (blue) over 90°S-90°N and (red) over 60°N-90°N. The line provides the ensemble mean error obtained with an average from the errors of all U-Net outputs. Colour shade shows one standard deviation among the error of the outputs from all members. b) Same as a) but for FGOALS-g3 members.