

Supplements of The role of individual forcings in driving the wave-like recent trends in northern hemisphere summer atmospheric circulation.

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S1 Supplementary tables.

Table S1: LESFMIP models and members used in the analysis.

Forcing	Model	Members
hist-aer	CanESM5	r(1:15)i1p1f1
hist-aer	CanESM5-p2	r(1:15)i1p2f1
hist-aer	CMCC-CM2-SR5	r(2:11)i1p1f1
hist-aer	GISS-E2-1-G	r(1:20)i1p1f2
hist-aer	GISS-E2-1-G-p3	r(1:20)i1p3f1
hist-aer	HadGEM3-GC31-LL	r(1:5,10:60)i1p1f3
hist-aer	IPSL-CM6A-LR	r(1:10)i1p1f1
hist-aer	MIROC6	r(1:10)i1p1f1
hist-aer	MPI-ESM1-2-LR	r(1:30)i1p1f1
hist-aer	NorESM2-LM	r(1:23)i1p1f1
hist-GHG	ACCESS-ESM1-5	r(1:10)i1p1f1
hist-GHG	CanESM5	r(1:25)i1p1f1
hist-GHG	CanESM5-p2	r(1:25)i1p2f1

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Table S1: LESFMIP models and members used in the analysis.
(Continued)

Forcing	Model	Members
hist-GHG	CMCC-CM2-SR5	r(2:11)i1p1f1
hist-GHG	GISS-E2-1-G	r(1:15, 17:20)i1p1f2
hist-GHG	GISS-E2-1-G-p3	r(1:4, 6:20)i1p3f1
hist-GHG	HadGEM3-GC31-LL	r(1:5, 10:60)i1p1f3
hist-GHG	IPSL-CM6A-LR	r(1:10)i1p1f1
hist-GHG	MIROC6	r(1:50)i1p1f1
hist-GHG	MPI-ESM1-2-LR	r(1:30)i1p1f1
hist-GHG	NorESM2-LM	r(4:23)i1p1f1
hist-nat	CanESM5	r(1:25)i1p1f1
hist-nat	CanESM5-p2	r(1:25)i1p2f1
hist-nat	GISS-E2-1-G	r(1:10)i1p1f2
hist-nat	GISS-E2-1-G	r(1:5)i1p1f3
hist-nat	HadGEM3-GC31-LL	r(1:60)i1p1f3
hist-nat	IPSL-CM6A-LR	r(1:10)i1p1f1
hist-nat	MIROC6	r(1:50)i1p1f1
hist-nat	MPI-ESM1-2-LR	r(1:30)i1p1f2
hist-nat	NorESM2-LM	r(1:23)i1p1f1
historical	ACCESS-ESM1-5	r(1:40)i1p1f1
historical	CanESM5	r(1:25)i1p1f1
historical	CanESM5-p2	r(1:40)i1p2f1
historical	CMCC-CM2-SR5	r(2:11)i1p1f1
historical	E3SM-2-0	r(1:21)i1p1f1
historical	GISS-E2-1-G	r(1:11)i1p1f2
historical	HadGEM3-GC31-LL	r(1:5, 10:60)i1p1f3

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Table S1: LESFMIP models and members used in the analysis.
(Continued)

Forcing	Model	Members
historical	IPSL-CM6A-LR	r(1:33)i1p1f1
historical	MIROC6	r(1:50)i1p1f1
historical	MPI-ESM1-2-LR	r(1:50)i1p1f1
historical	MRI-ESM2-0	r(1:10)i1p1f1
historical	NorESM2-LM	r(1:43)i1p1f1
hist-sol	CanESM5	r(1:25)i1p1f1
hist-sol	CanESM5-p2	r(1:25)i1p2f1
hist-sol	GISS-E2-1-G	r(1:20)i1p1f2
hist-sol	GISS-E2-1-G-p3	r(1:20)i1p3f1
hist-sol	HadGEM3-GC31-LL	r(11:60)i1p1f3
hist-sol	MIROC6	r(1:10)i1p1f1
hist-sol	MPI-ESM1-2-LR	r(1:30)i1p1f2
hist-sol	NorESM2-LM	r(4:23)i1p1f1
hist-totalO3	CanESM5	r(1:10)i1p1f1
hist-totalO3	GISS-E2-1-G	r(1:20)i1p1f2
hist-totalO3	GISS-E2-1-G-p3	r(1:20)i1p3f1
hist-totalO3	HadGEM3-GC31-LL	r(11:60)i1p1f3
hist-totalO3	MIROC6	r(1:10)i1p1f1
hist-totalO3	MPI-ESM1-2-LR	r(1:30)i1p1f1
hist-totalO3	NorESM2-LM	r(4:23)i1p1f1
hist-volc	ACCESS-ESM1-5	r(1:10)i1p1f1
hist-volc	CanESM5	r(1:25)i1p1f1
hist-volc	CanESM5-p2	r(1:25)i1p2f1
hist-volc	CMCC-CM2-SR5	r(2:11)i1p1f1

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Table S1: LESFMIP models and members used in the analysis.
(Continued)

Forcing	Model	Members
hist-volc	GISS-E2-1-G	r(1:20)i1p1f2
hist-volc	GISS-E2-1-G-p3	r(1:20)i1p3f1
hist-volc	HadGEM3-GC31-LL	r(11:60)i1p1f3
hist-volc	IPSL-CM6A-LR	r(1:10)i1p1f1
hist-volc	MIROC6	r(1:10)i1p1f1
hist-volc	MPI-ESM1-2-LR	r(1:30)i1p1f1
hist-volc	NorESM2-LM	r(4:23)i1p1f1

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Table S2. AMIP models and members used in the analysis.

Model	Members
ACCESS-ESM1-5	r(1:4)i1p1f1
CanESM5	r(1:5)i1p2f1
E3SM-2-0	r(1:3)i1p1f1
GISS-E2-1-G	r(1:5)i1p1f1
HadGEM3-GC31-LL	r(1:5)i1p1f3
IPSL-CM6A-LR	r(1:22)i1p1f1
MIROC6	r(1:10)i1p1f1
MPI-ESM1-2-LR	r(1:3)i1p1f1
MRI-ESM2-0	r(1:3)i1p1f1

S2 Supplementary figures.

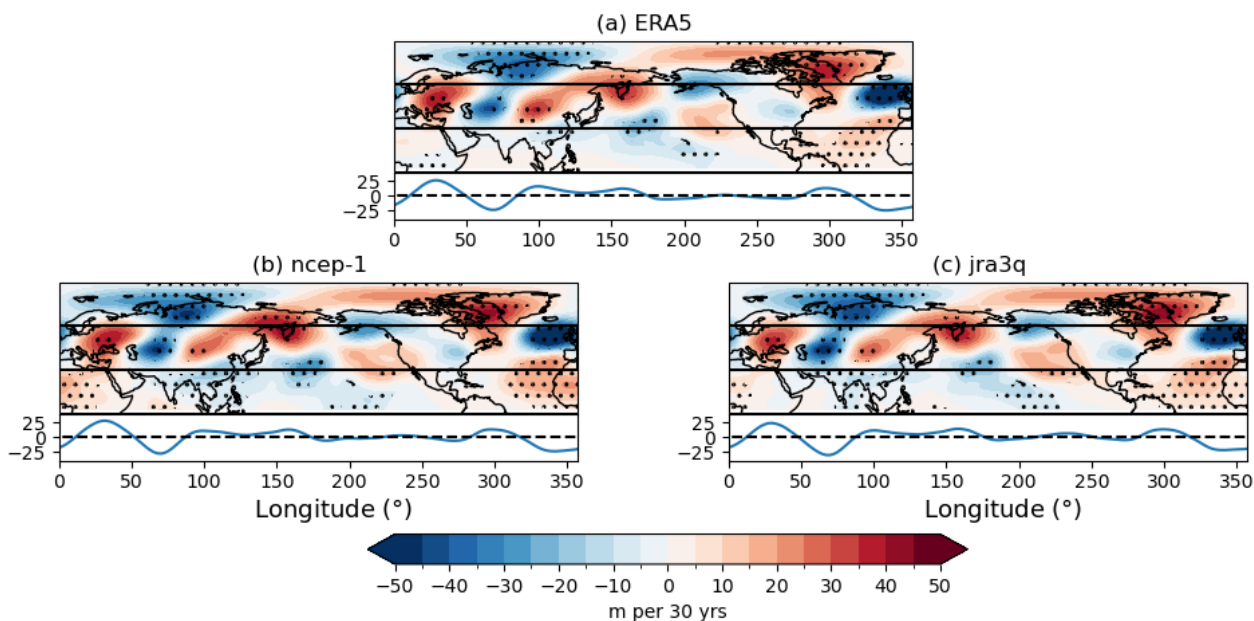


Figure S1. Trends of Z200_az [m per 30 yr] for the period 1979-2014 obtained with the ERA5 reanalysis (a) NCEP-1 reanalysis (b) and JRA-3Q reanalysis (c). The line plot under each map represents the meridionally averaged trend from 30° N to 60° N (region enclosed by a black box in the maps). Stippling indicates statistically significant trends using a two-sided t-test at 95 % confidence level.

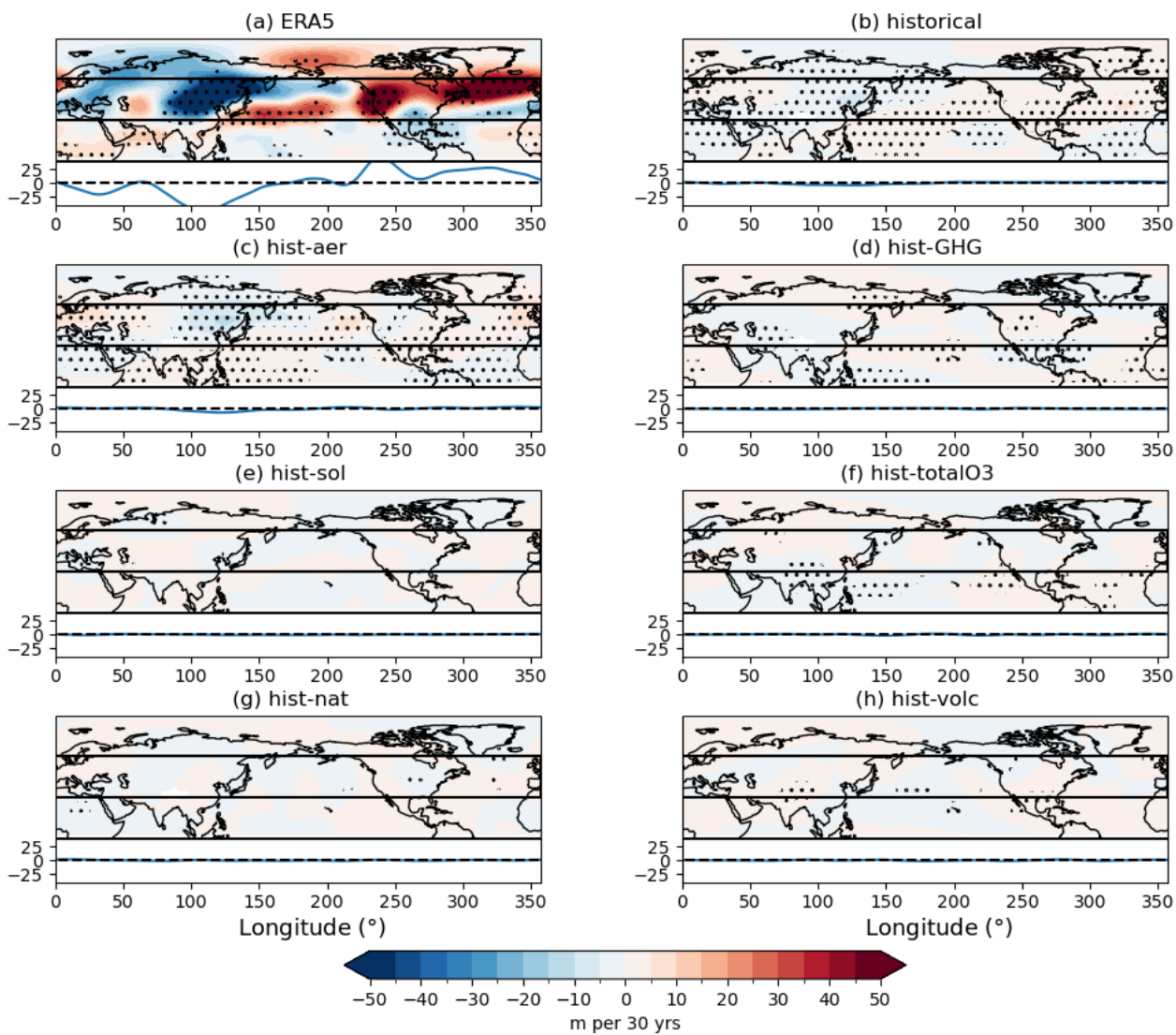


Figure S2. As Fig. 1, but for 1943-1978. AMIP simulations are not available for this period.

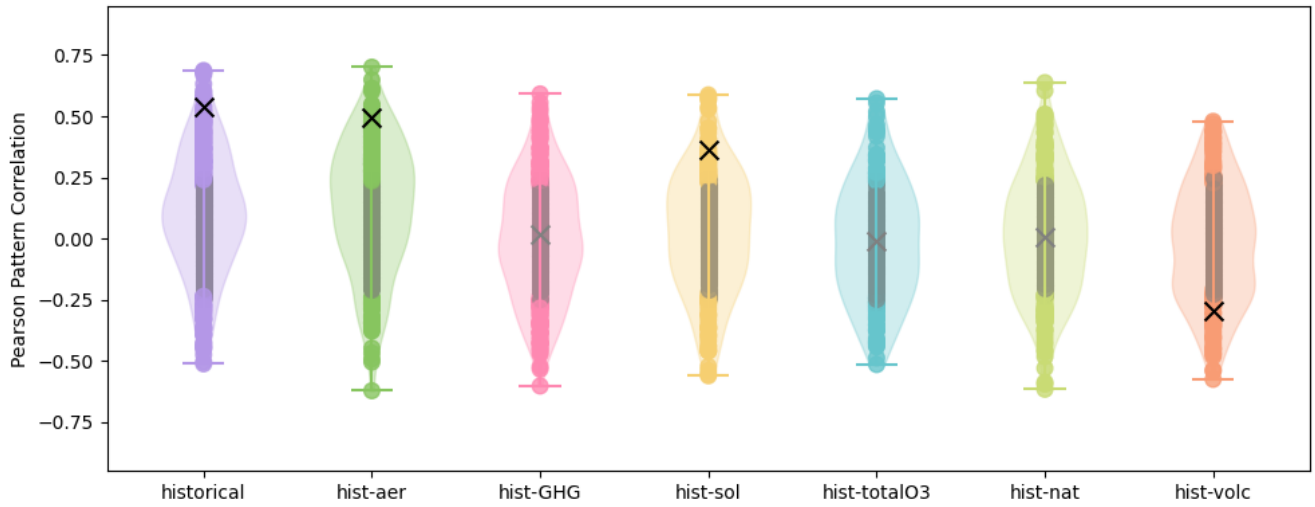


Figure S3. As Fig. 5, but for 1943-1978. AMIP simulations are not available for this time period.

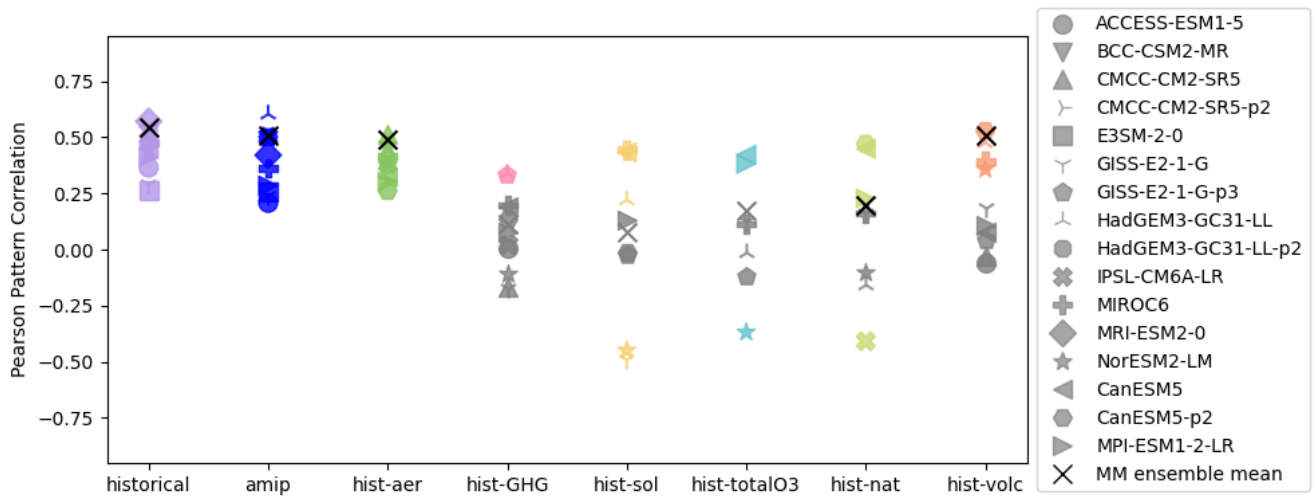


Figure S4. As Fig. 3, but using JRA-3Q reanalysis.

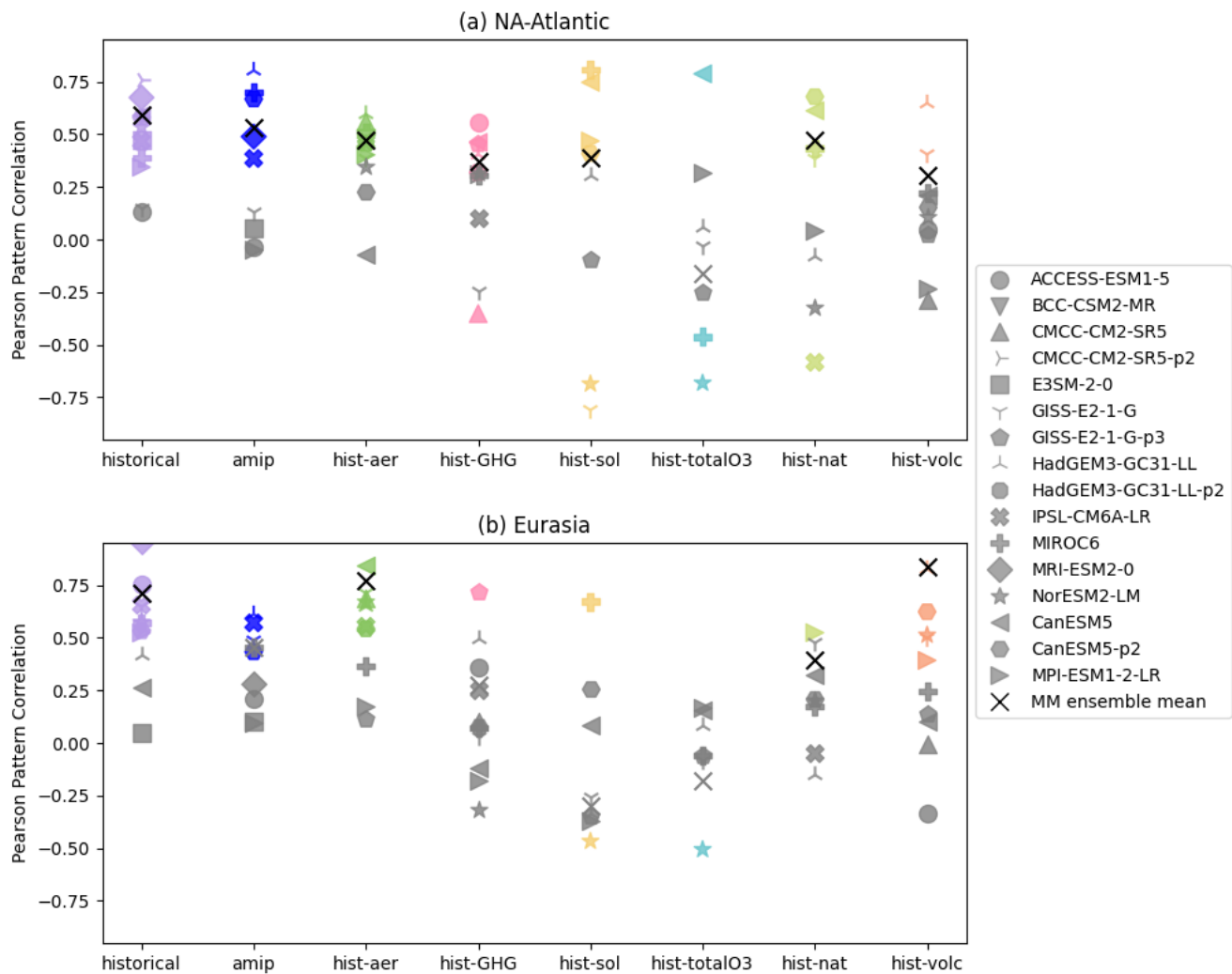


Figure S5. As Fig. 4, but using JRA-3Q reanalysis.

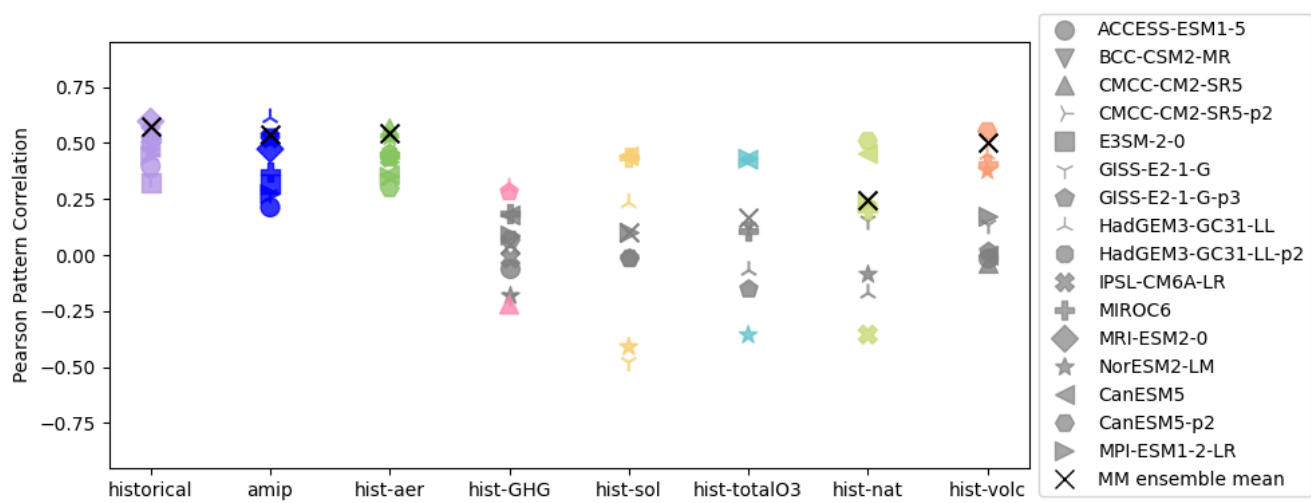


Figure S6. As Fig. 3, but using NCEP-1 reanalysis.

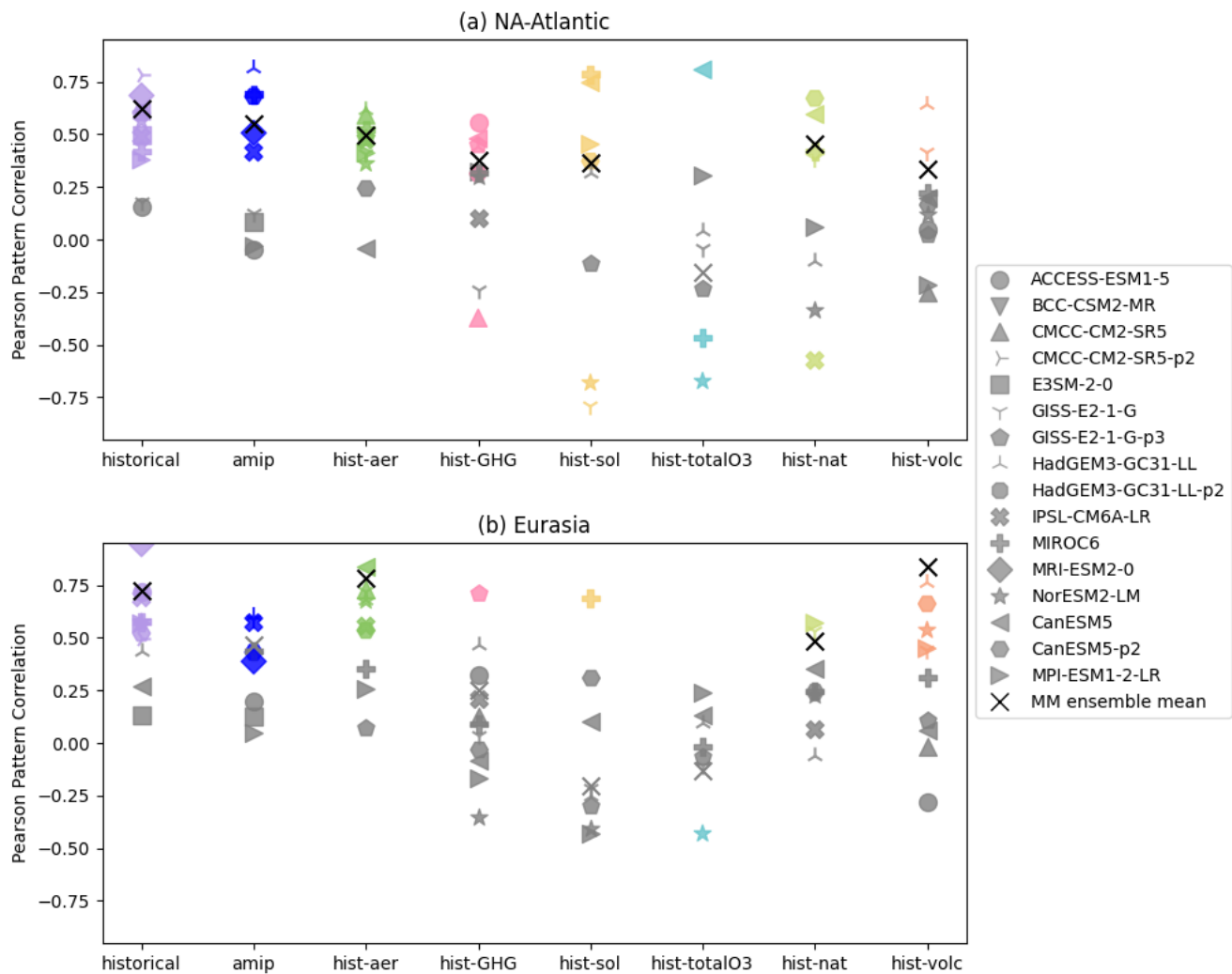


Figure S7. As Fig. 4, but using NCEP-1 reanalysis.