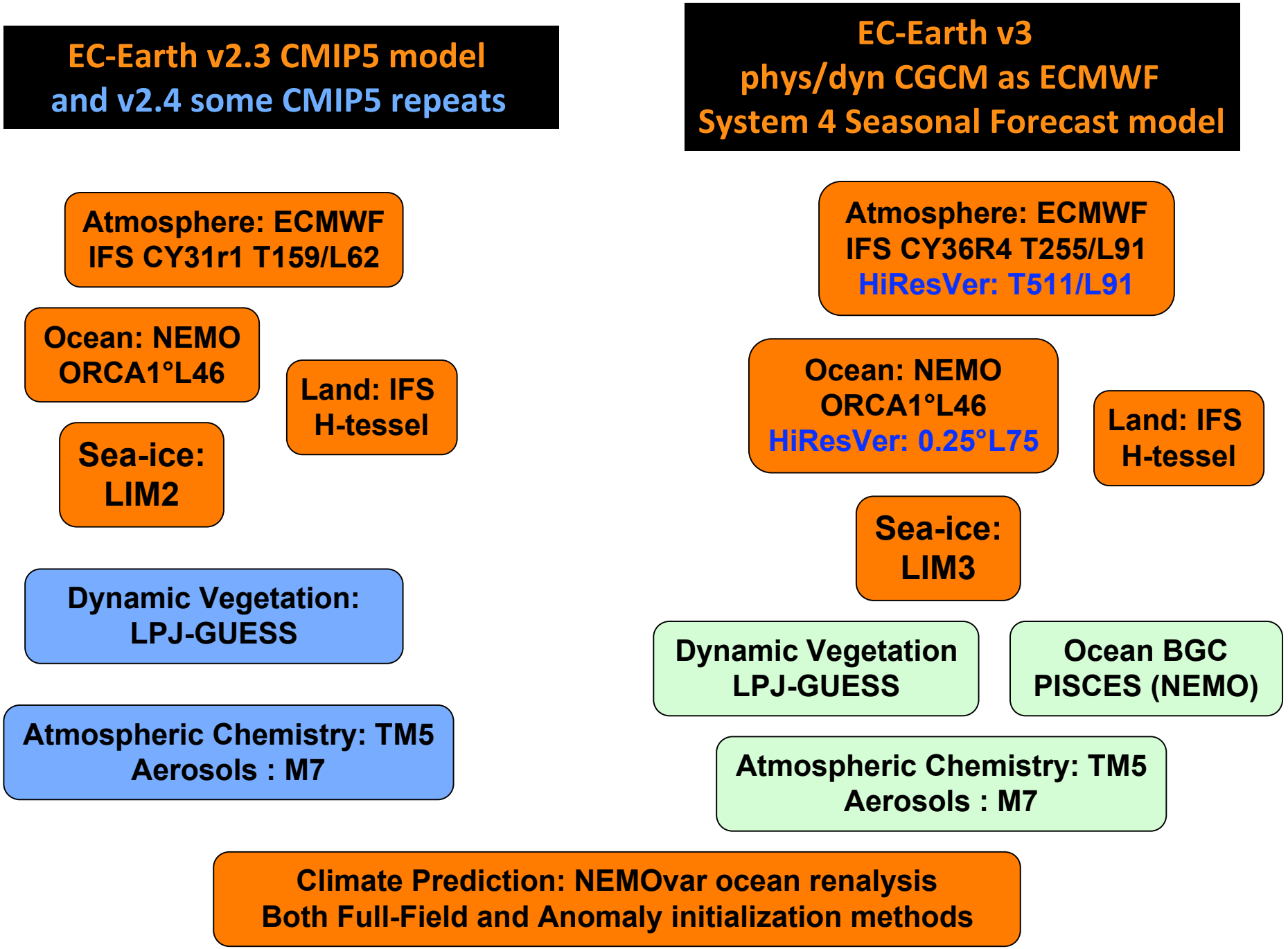
A consortium of more than 20 European Meteorological/Climate centres and universities developing & applying a common Global Climate and Earth System Model

Based on the ECMWF Seasonal Prediction System


EC-Earth v2.3 CMIP5 model
and v2.4 some CMIP5 repeats
Atmosphere: ECMWF
IFS CY31r1 T159/L62
Ocean: NEMO
ORCA1°L46
Land: IFS
H-tessel
Sea-ice:
LIM2
Dynamic Vegetation:
LPJ-GUESS
Atmospheric Chemistry: TM5
Aerosols : M7
EC-Earth v3
phys/dyn CGCM as ECMWF
System 4 Seasonal Forecast model
Atmosphere: ECMWF
IFS CY36R4 T255/L91
HiResVer: T511/L91
Ocean: NEMO
ORCA1°L46
HiResVer: 0.25°L75
Land: IFS
H-tessel
Sea-ice:
LIM3
Dynamic Vegetation
LPJ-GUESS
Ocean BGC
PISCES (NEMO)
Atmospheric Chemistry: TM5
Aerosols : M7
Climate Prediction: NEMOvar ocean renalysis
Both Full-Field and Anomaly initialization methods

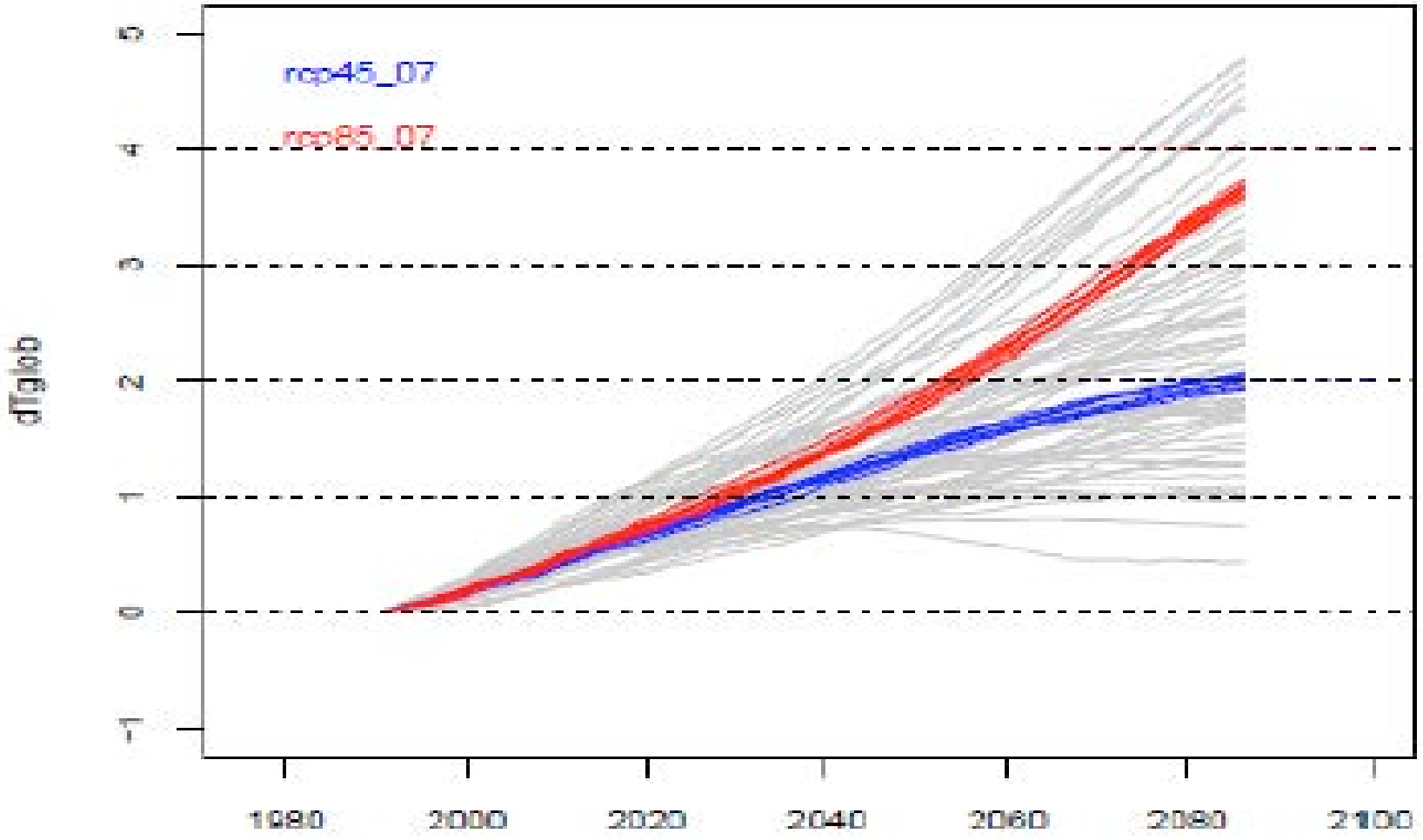
Status of CMIP5 runs (Sept 2012)

	Ensemble size	Completed	In progress
Pre-industrial control	1	1	-
Historical	14	14	0
RCP4.5	14	13	1
RCP8.5	14	13	1
RCP2.6	3	2	1
Decadal (full field)	10	10	0
Decadal (anomaly)	10	10	1
Decadal (full field) Annual restarts	**5**	**5**	**0**
Decadal (anomaly) Annual resatrts	**10**	**6**	**4**

Ensemble produced by 9 institutes in 7 different countries

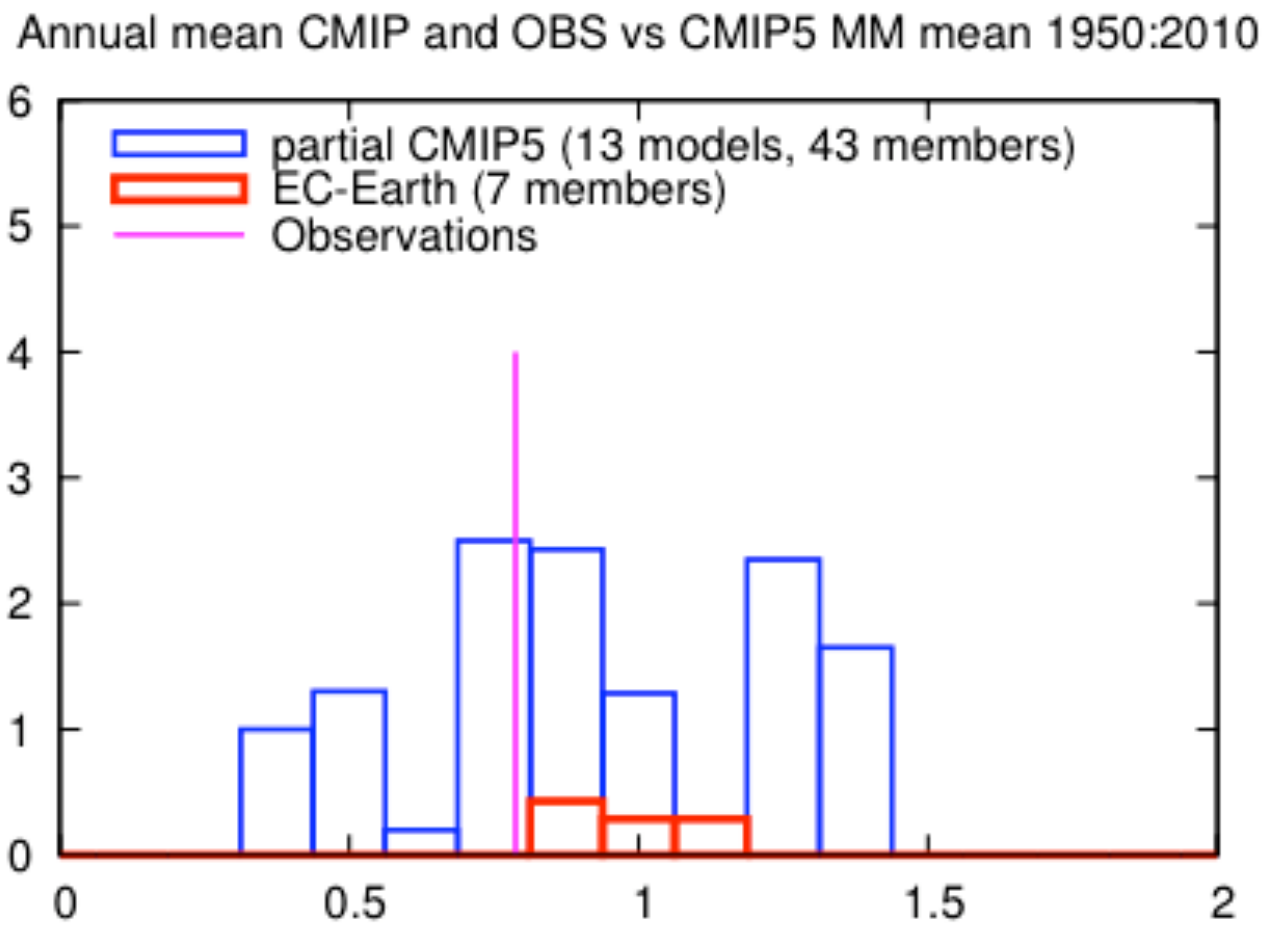
CMORization + archival of this distributed ensemble proved a BIGGER challenge than anticipated. Some EC-Earth data visible thru BADC Gateway. Ensemble data is available contact: Colin.Jones@smhi.se Wilco.Hazeleger@knmi.nl f.doblas-reyes@ic3.cat

EC-Earth projected warming



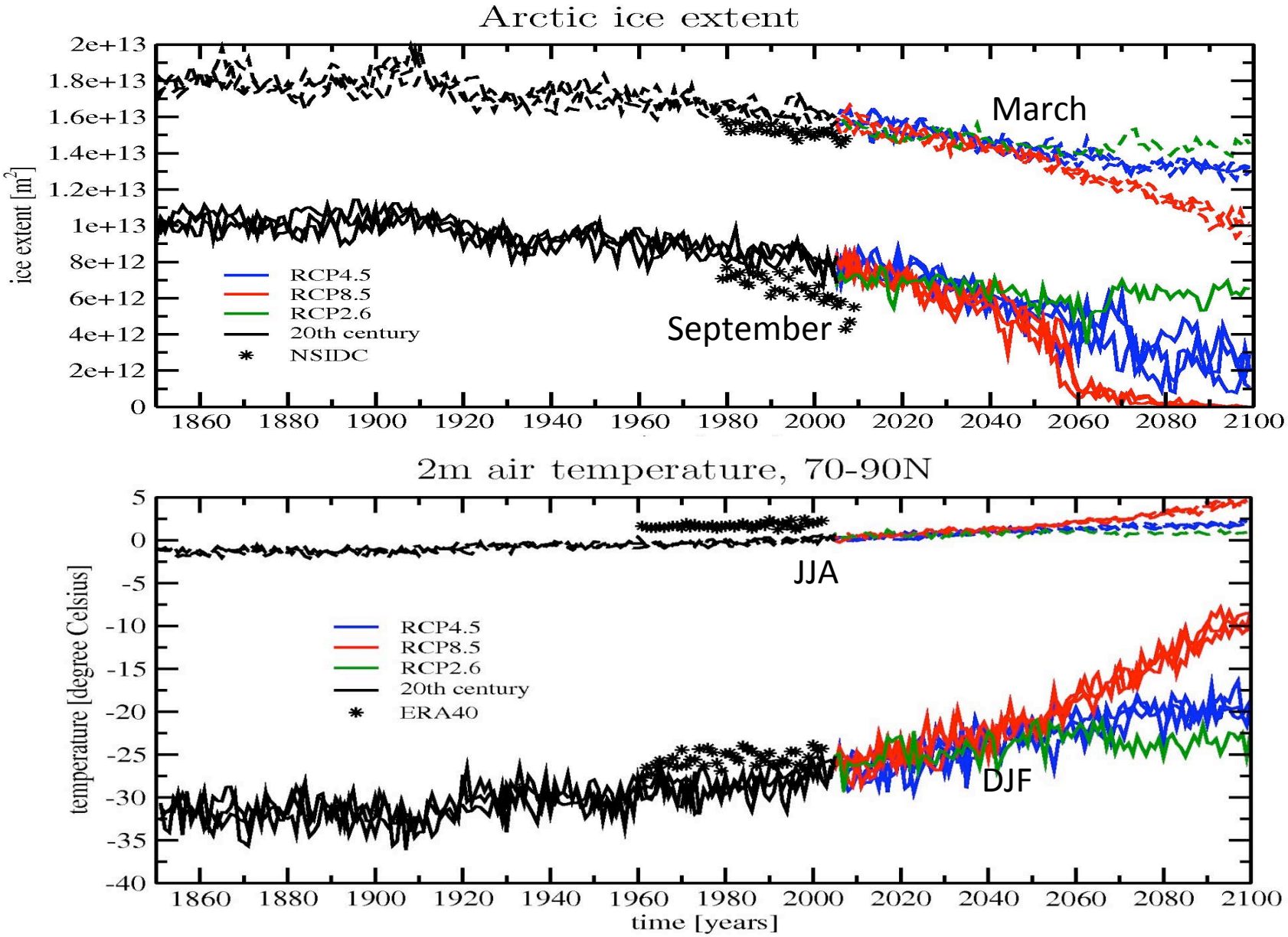
Van den Hurk et al in prep

Trends in EC-Earth and CMIP5 vs observations



CMIP5 multimodel mean has slightly larger trend than observed.
Idem dito for EC-Earth (van Oldenborgh pers comm.)

Arctic : sea ice extent and 2m-temperature



Koenigk et al

EC-Earth: Arctic amplification mechanisms

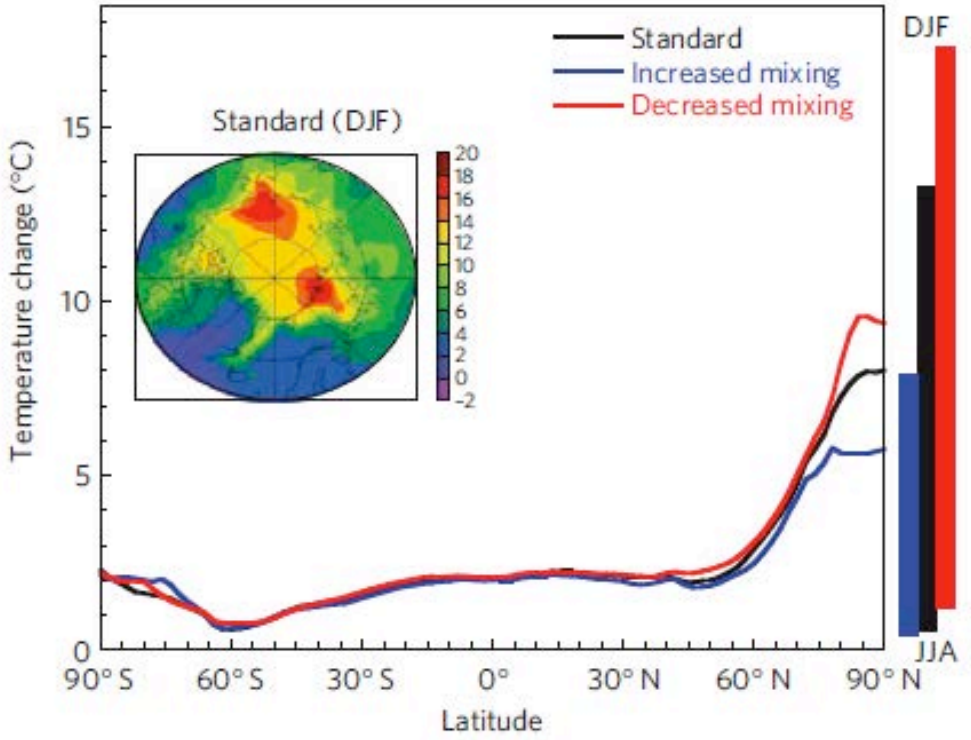


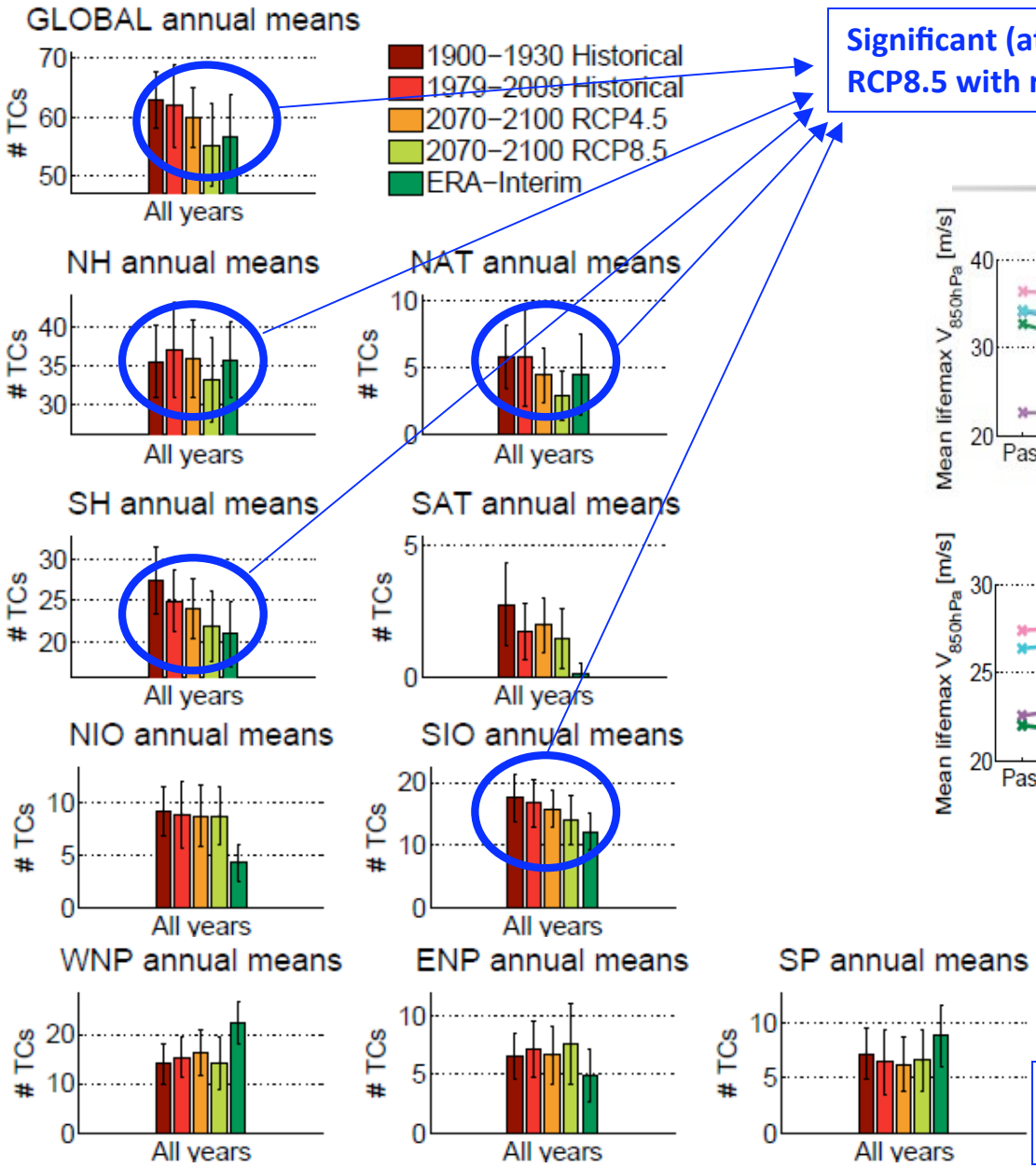
Figure 1 | Arctic amplification of zonal mean surface air temperature change for a doubling of CO_2. Annual mean temperature change as a function of latitude for standard mixing (black line), for increased mixing (blue line) and decreased mixing (red line) in stable conditions (see Supplementary Information). The vertical bars on the right denote the mean Arctic (70°–90° N) seasonal range in the temperature change for each case. The inset shows the geographical distribution of surface air temperature change (K) for the standard model in winter.

Bintanja et al, Nature Geoscience 2011

Tropical Cyclones in EC-Earth CMIP5 Experiments

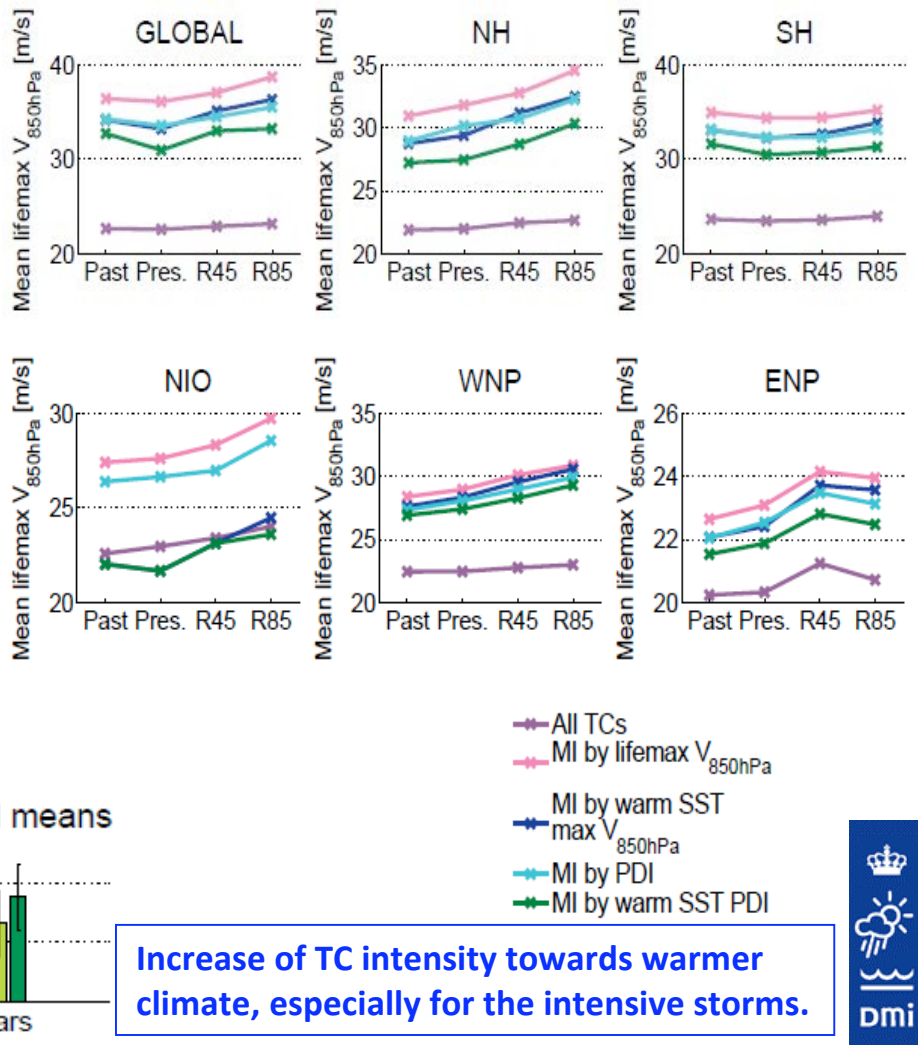
Rathmann, Yang and Kaas, 2012, Submitted to Clim. Dyn.

Frequencies



Significant (at 95% level) decrease of frequency for RCP8.5 with respect to 1970-2009

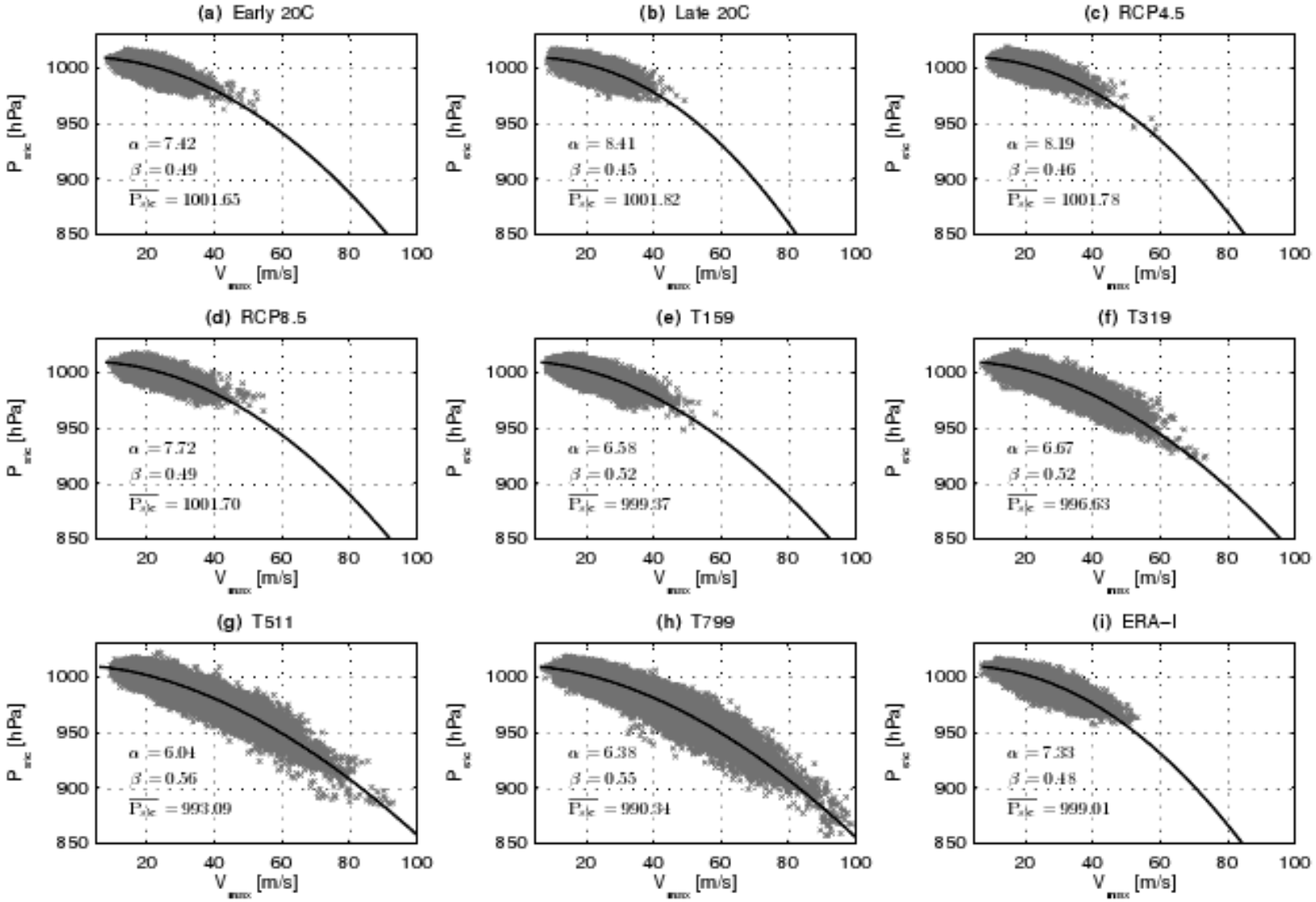
Intensities



Increase of TC intensity towards warmer climate, especially for the intensive storms.

EC-Earth simulated TC central pressure vs maximum wind speed

CMIP5 historical/projections and AMIP runs with increasing resolution

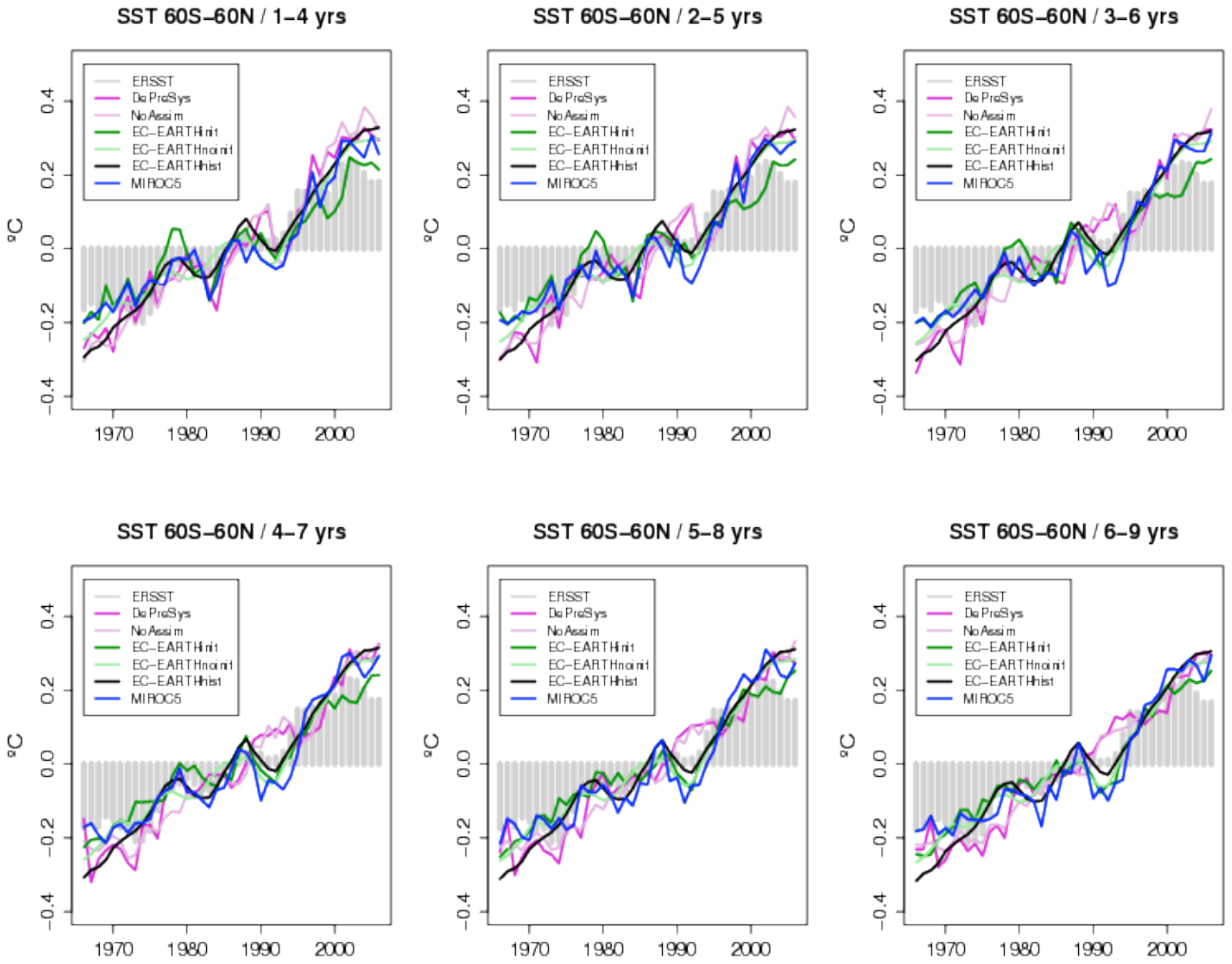


Rathman et al. (2012) Submitted Climate Dynamics

Decadal Prediction: Global SST skill

Global-average hindcast SSTs : DePreSys, EC-Earth2.3, MIROC5 yearly start date

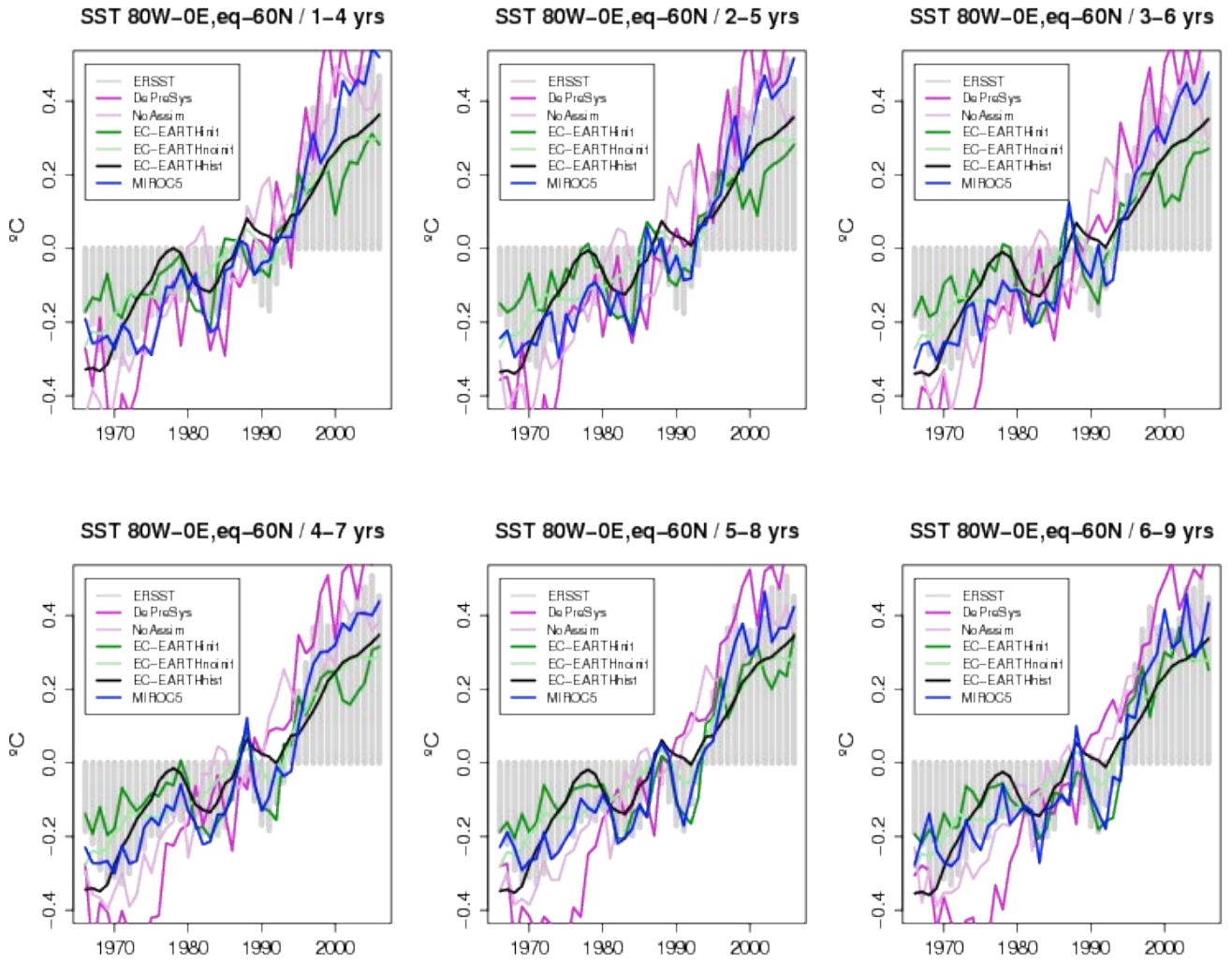
EC-Earth historical (8 members) are shown in black.



Doblas-Reyes 2012

Decadal Prediction: North Atlantic SST skill

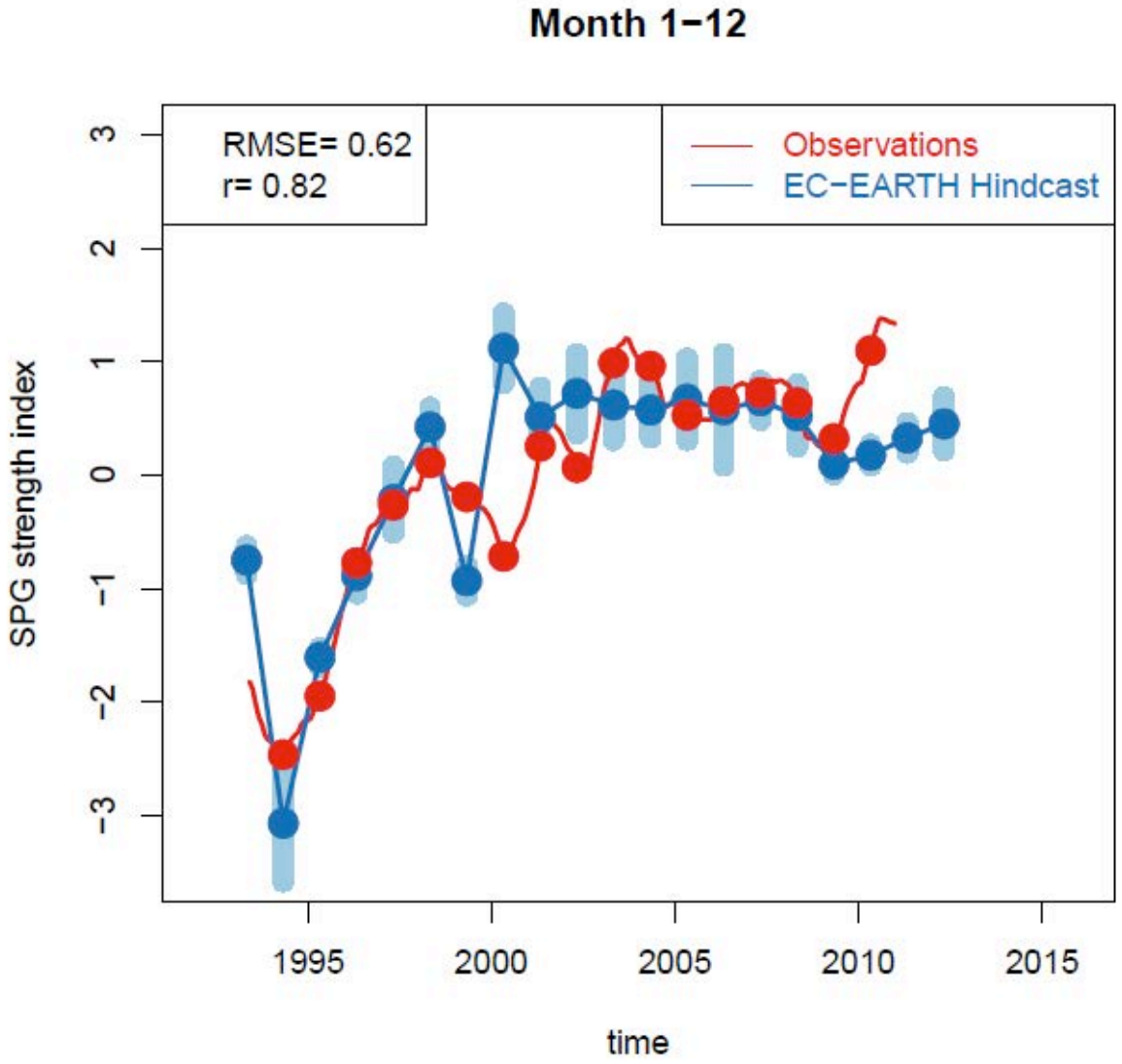
Average North Atlantic SST anomalies: DePreSys, EC-Earth2.3 and MIROC5 yearly start date predictions. EC-Earth historical (8 members) are shown in black.



Doblas-Reyes 2012

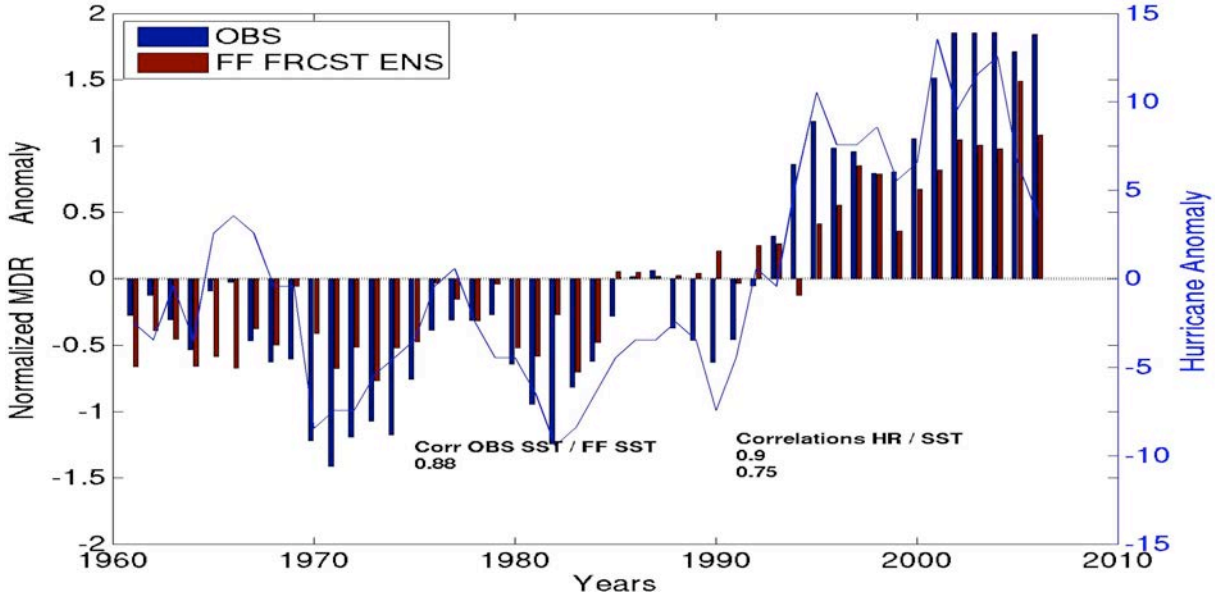
Subpolar gyre decadal prediction

Coupled CMIP5 decadal hindcasts with annual restarts EC-Earth 2.3:

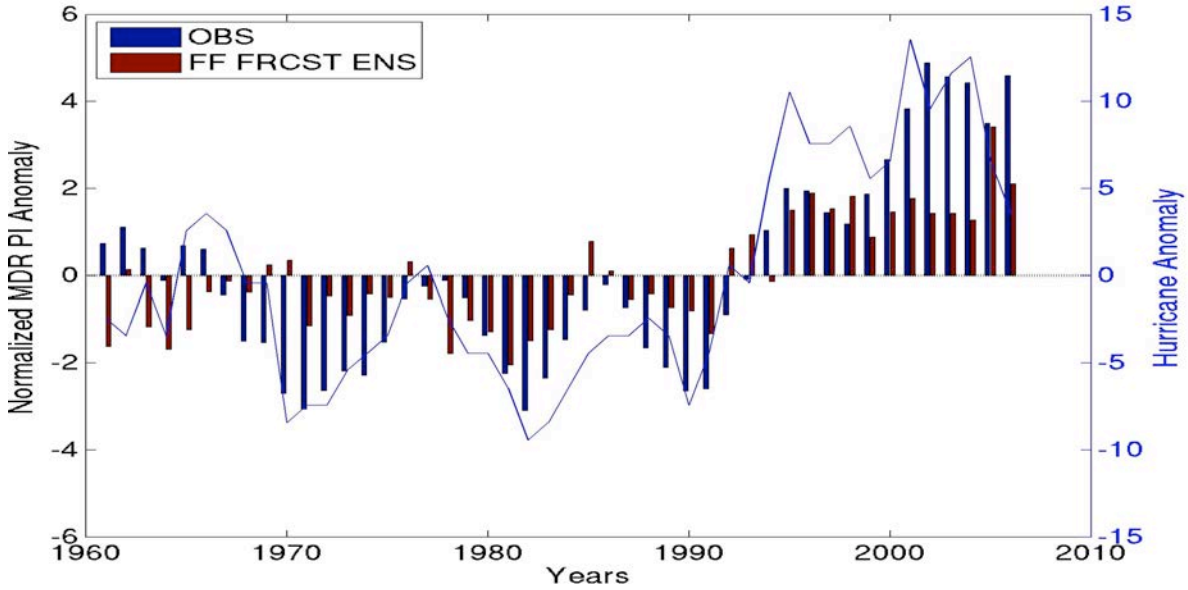


Wouters et al, in revision

Decadal Prediction: Year 1-5 mean forecast SST anomalies (ASO) for the main development region (MDR) of Atlantic Tropical Cyclones. Annual restarts every Nov

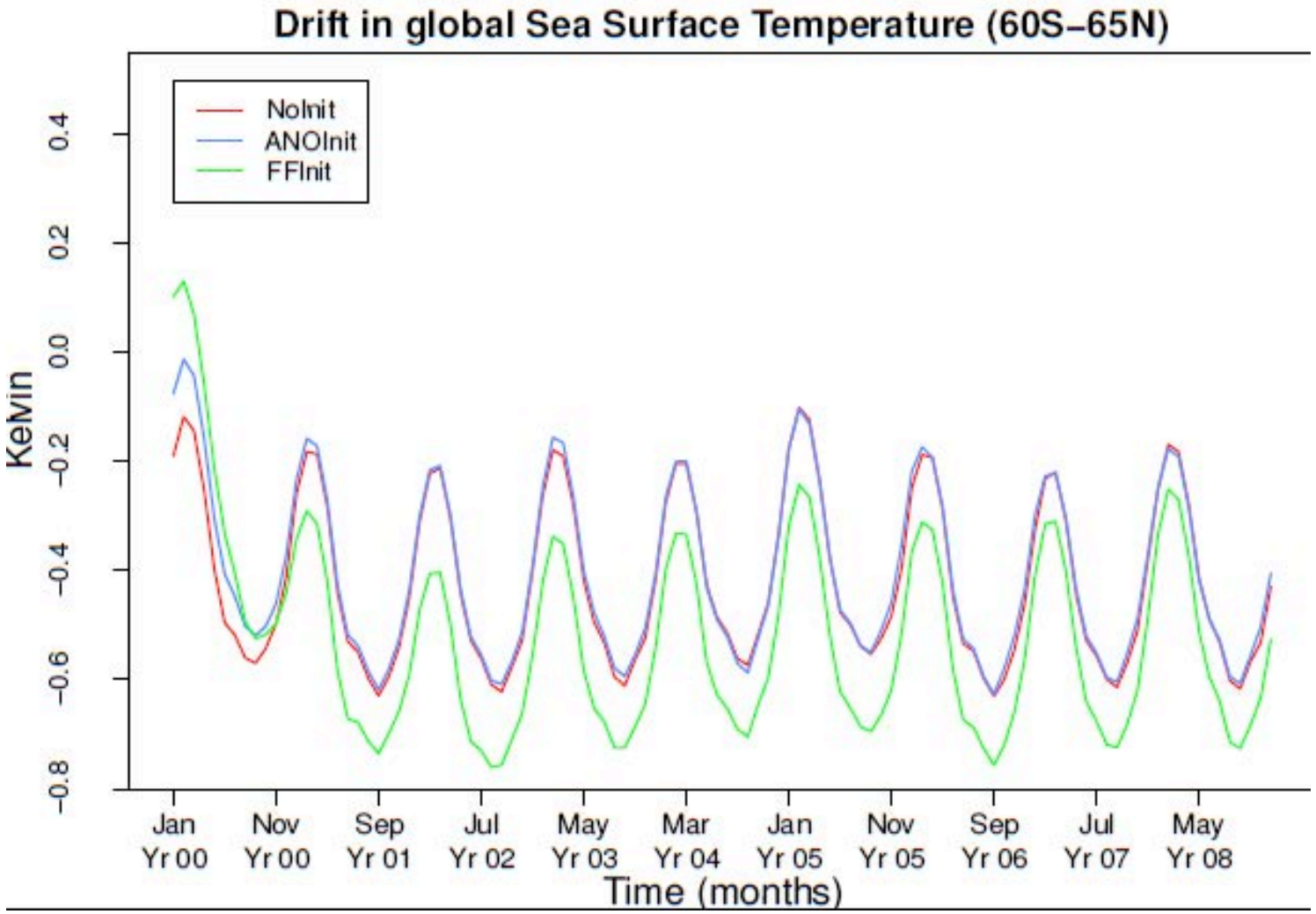


Year 1-5 mean forecast of Atlantic MDR Hurricane Potential Intensity anomaly (ASO)



Caron 2012

EC-Earth decadal prediction: different initialisation strategies

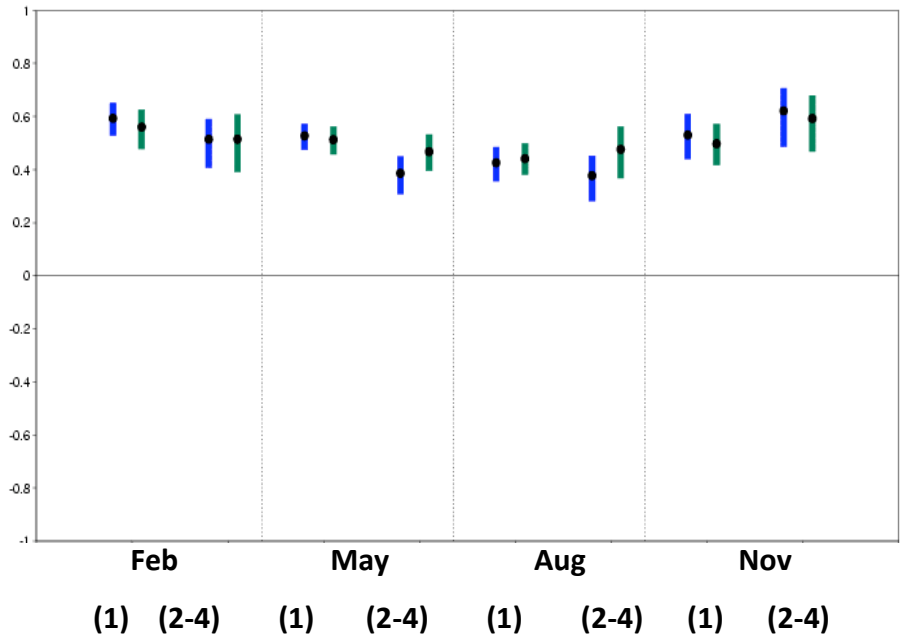


Hazeleger et al, in revision.

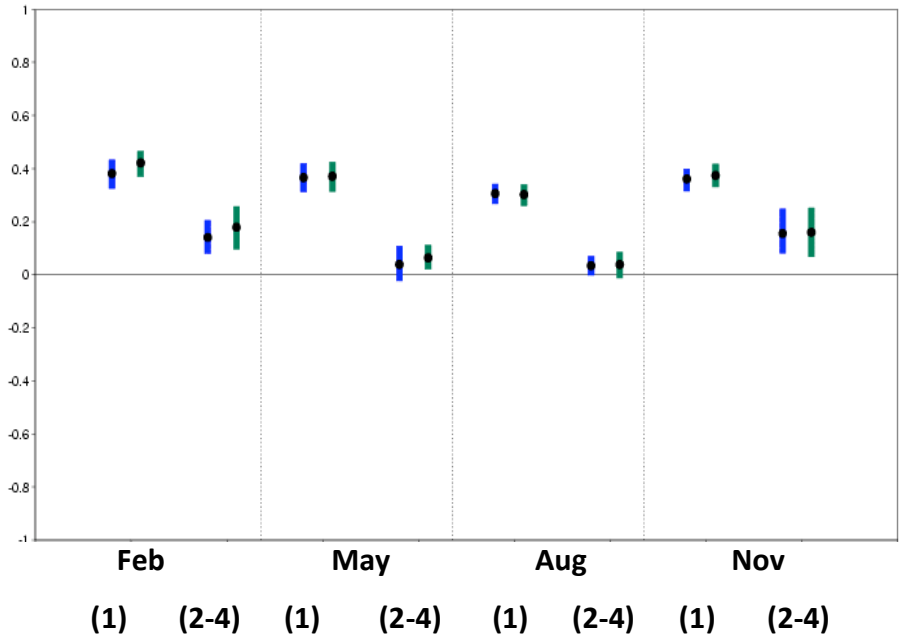
EC-Earth Seasonal predictions: regional skill

Anomaly correlation coefficient (and bootstrapped 95% confidence intervals) for 1st and 2nd-4th month seasonal predictions of EC-Earth2.3 and System 3 ensemble precipitation wrt GPCP over 1981-2005.

Tropics



Northern Extratropics



Doblas-Reyes 2012

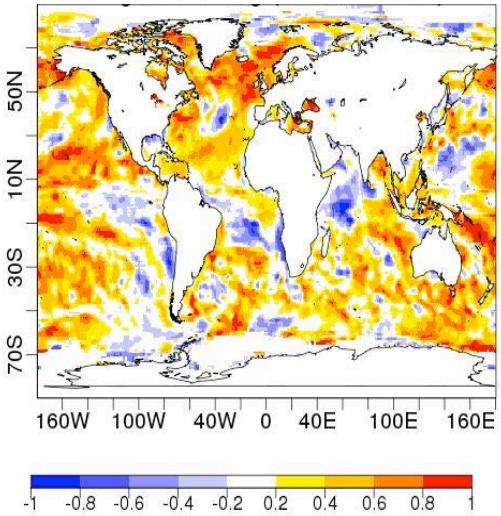
Seasonal predictions: EC-Earth3

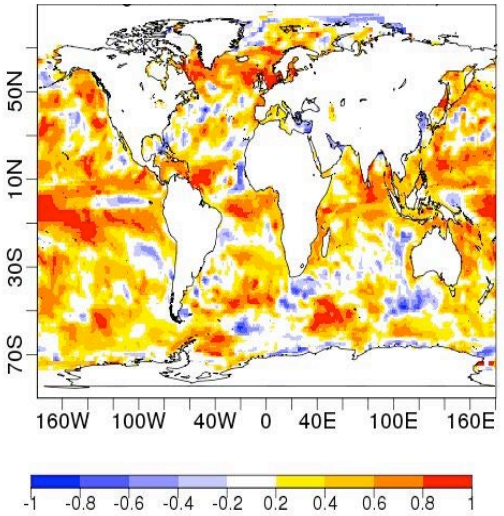
3 month lead time ensemble-mean correlation of EC-Earth v3 and ECMWF System 4 sea surface temperature re-forecasts wrt ERSST over 1992-2009.

May start date

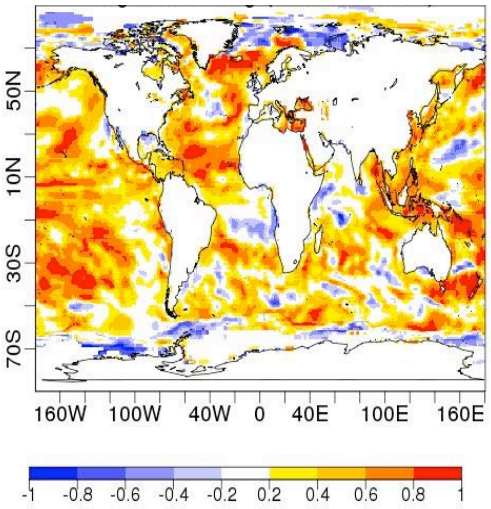
Nov start date

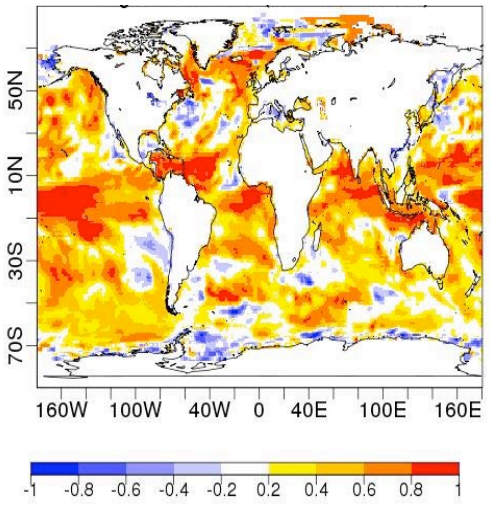
EC-Earth v3



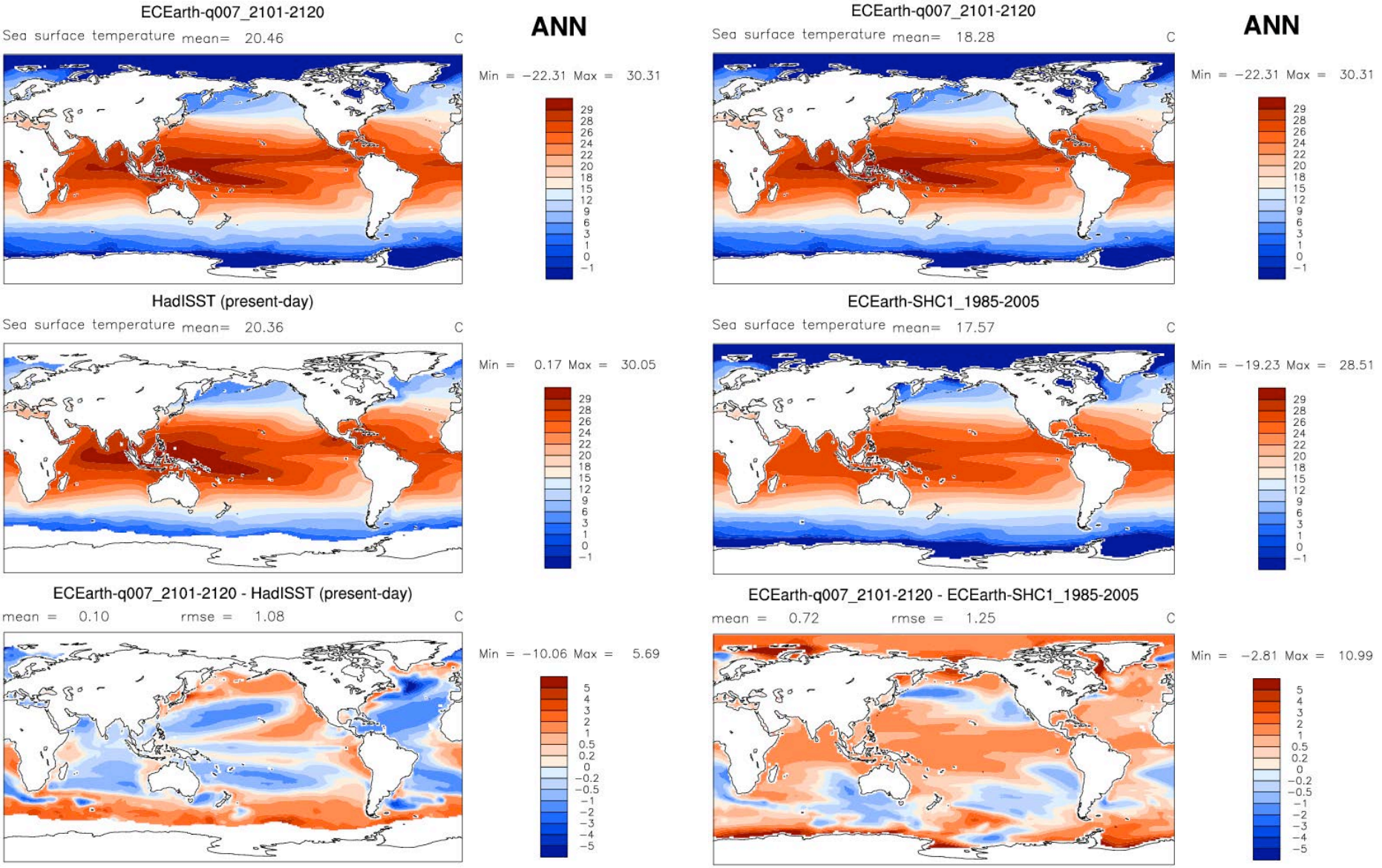


System 4





Annual Mean SST: EC-Earth v3, HadISST and difference

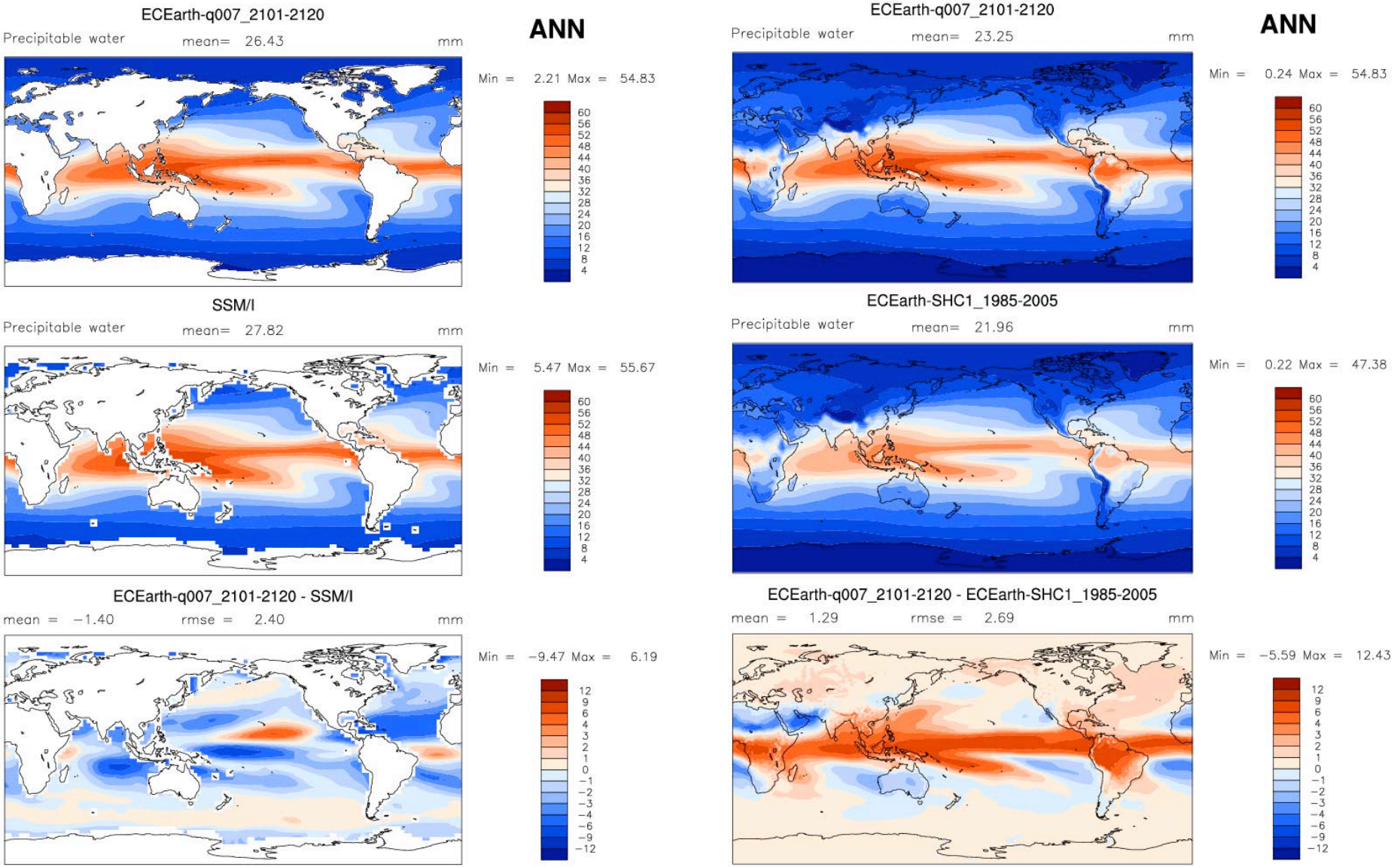


V3 – HadISST

V3 – V2

Wyser et al.2012

Annual Mean precipitatble water: EC-Earth v3, SSM/I and difference

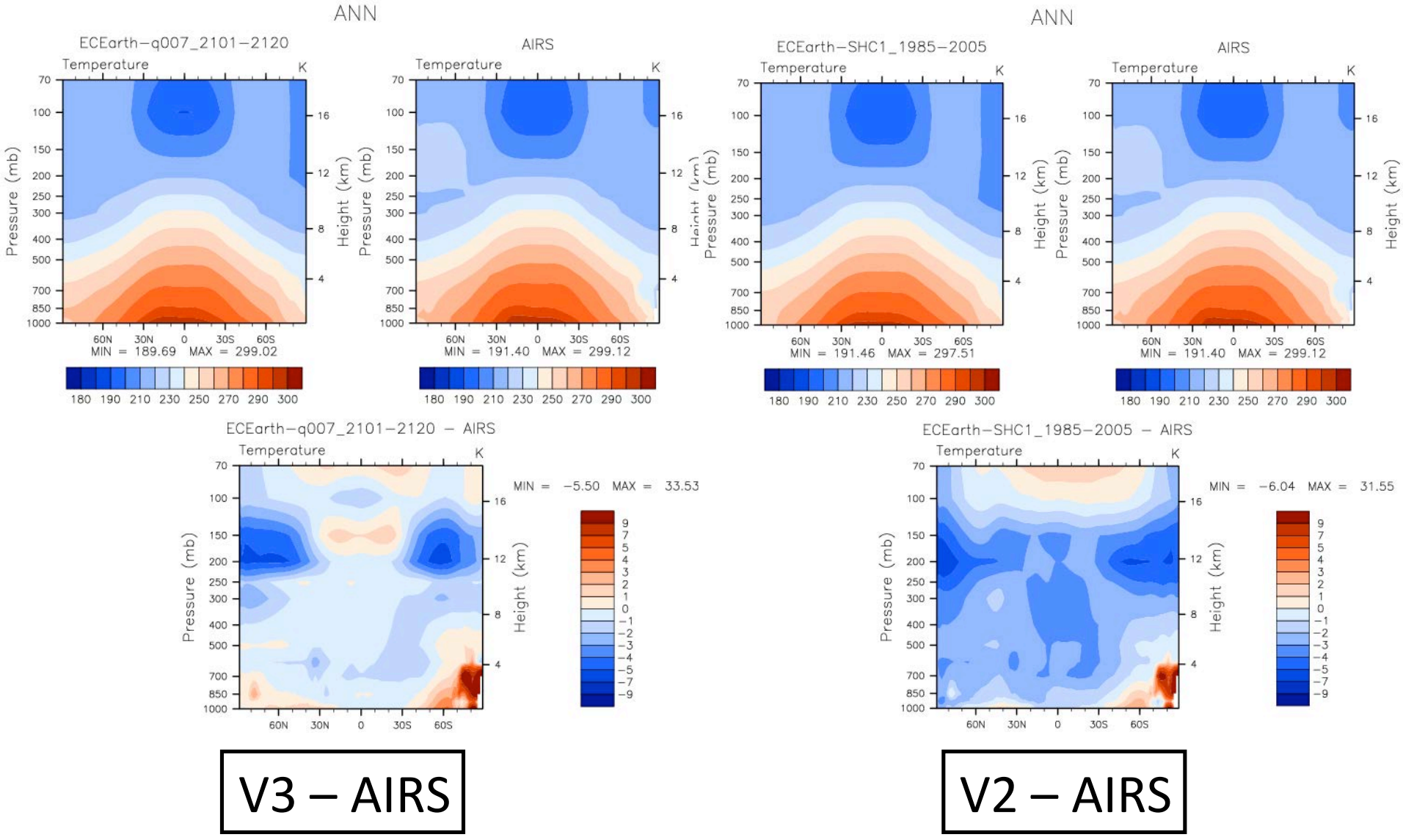


V3 – SSM/I

V3 – V2

Wyser et al.2012

Zonal mean – vertical temperature



V3 – AIRS

V2 – AIRS

Wyser et al.2012

Some ESG comments from our users…..

EC-Earth (ESG data) goes via ICHEC to BADC; often frustrating that data is on the ESG but not visible. Plus frequent updating of data leads to loss (non-visibility) of earlier (visible) data.

ESG organization in "realms" at the portal level not liked.
search for e.g. "air temperature", you don't know if a hit means 2m or 500hpa temperature

Not possible to download say 2m temperature from all available models, instead have to click on every model, check if it has 2m temp, and then order dataset individually from each model.

Another drawback of the "realm" organization concerns uploading of datasets. Say you *already have T2M and PRECIP published on an ESG and you like to add SLP. To do this, you first have to unpublish the realm "atmos", then republish the data with the new variable added.*

I'd prefer a system that is based on variables, where you can add (or delete) individual variables. And the search functionality should also build on variables, a search request for a variable should result in a list of files from different models/members.

Publishing process is reputed to be rather tedious!

Decadal hindcasts initialized every year are not visible at the BADC ESG, only those that are started every 5 years are. It may still be possible to upload the yearly startdates to ESG Data-node, but I cannot find an experiment type "decadal experiment that starts 1961" or so in the list of experiments at the ESG portal. I wonder how these data can be accessed.