WCRP
World Climate Research Programme

ESMO
Earth System Modelling and Observations

Decadal Climate Prediction Project (DCPP):

Update on activities, progress and future plans

Jon Robson and Steve Yeager (DCPP Co-Chairs)

Overview and goals

DCPP's primary mission is

- to coordinate the production of multi-model experiments that furthers the science of near-term climate prediction
- to understand prediction skill and the processes that lead to successful predictions

DCPP is a subpanel of WGSIP

Obvious links between DCPP and the WMO activity on annual-to-decadal climate predictions (LC-ADCP), and WCRP lighthouse activity on Explaining and Predicting Earth System Change (EPESC)

Current Panel

Name	Centre
Steve Yeager (*co-chair*)	NSF NCAR, US
Jon Robson (*co-chair*)	NCAS/Uni Reading, UK
Panos Athanasiadis	CMCC, Italy
Ingo Bethke	BCCR, Norway
Chellappan Gnanaseelan	IITM, India
Takahito Kataoka	JAMSTEC, Japan
Jerry Meehl	NSF NCAR, US
Bill Merryfield (*WGSIP*)	ECCC/CCCma, Canada
Pablo Ortega	BSC, Spain
Iuliia Polkova	DWD, Germany
Doug Smith (*EPESC*)	Met Office, UK
Didier Swingedouw	Uni Bordeaux, France
Liping Zhang	NOAA/GFDL, US
Tatiana Ilyina (*ex-officio*, *WGCM*)	Uni Hamburg, Germany

DCPP panel circa 2024.

Panel was updated in 2023 to include most centres that have the capacity to run initialised decadal predictions

Members of the panel ensure links to other ESMO/WCRP activities, including WGCM, WGSIP, and EPESC, as well as the WMO LC-ADCP

Main activities

- Development of the new DCPP protocol to CMIP7 (*ongoing*)
- Successfully advocated for initialised decadal prediction to be included in the CMIP7 AR7 Fast Track (initialised predictions from 2025)
- Have fed into the CMIP7 data harmonization consultation
- Helped to advocate for the inclusion of predictions of CO2 into the WMO LC-ADCP
- We tried to organise a winter 2024/2025 workshop to discuss CMIP7 protocol, but did not get funding from US CLIVAR.

DCPP progress towards CMIP7

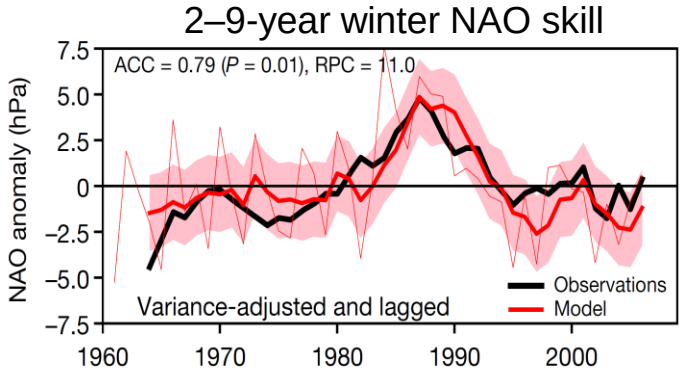
DCPP in CMIP6

DCPP is broken into three components

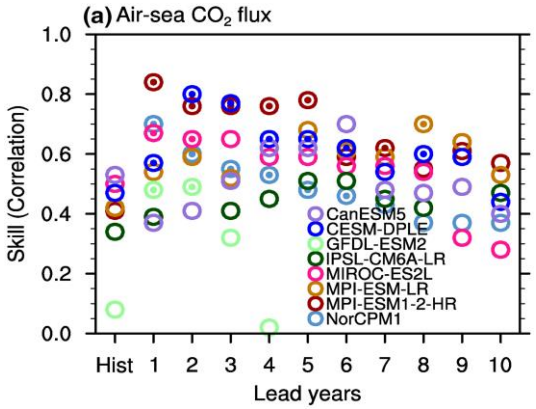
Component A: Retrospective predictions

Component B: Future predictions

Component C: Process focused experiments



Smith et al, 2020



Ilyina et al, 2021

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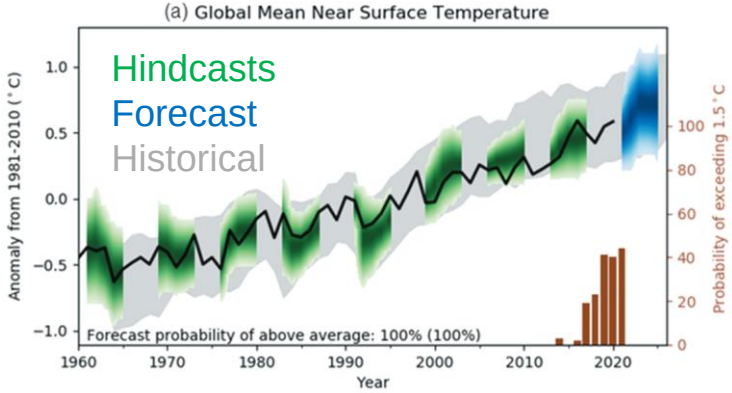

Hermanson et al, 2022

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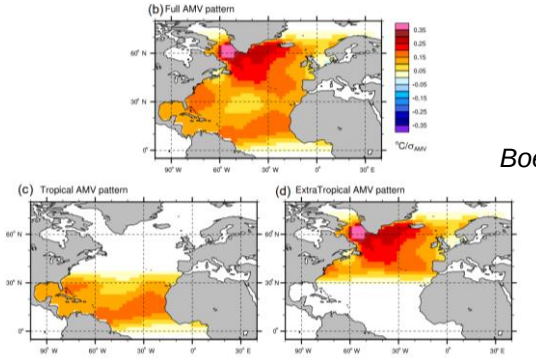
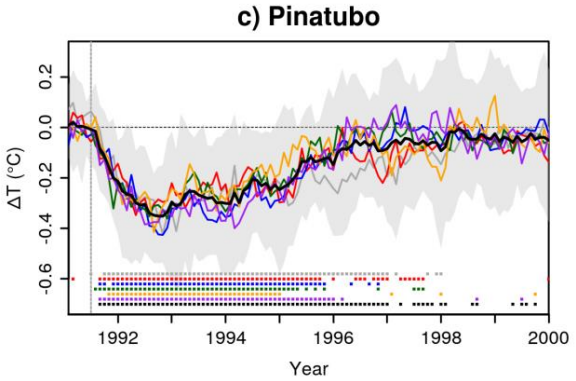


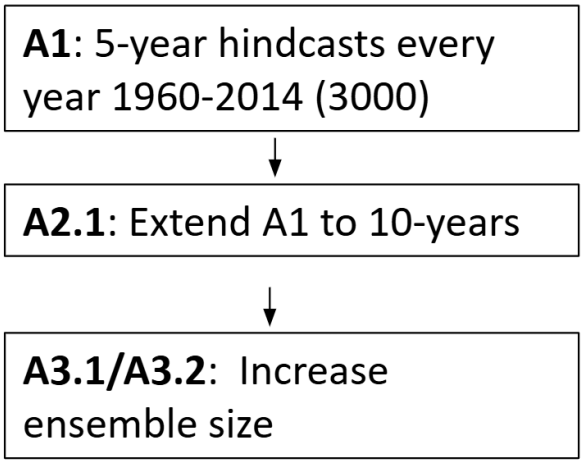
Boer et al, 2016



Bilbao et al, 2024

Updating DCPP for CMIP7

Component A (Retrospective predictions)
DCPP-A in CMIP6 was simple, but a considerable expense (3000-6000 SYs per model, >120,000 SYs in total)



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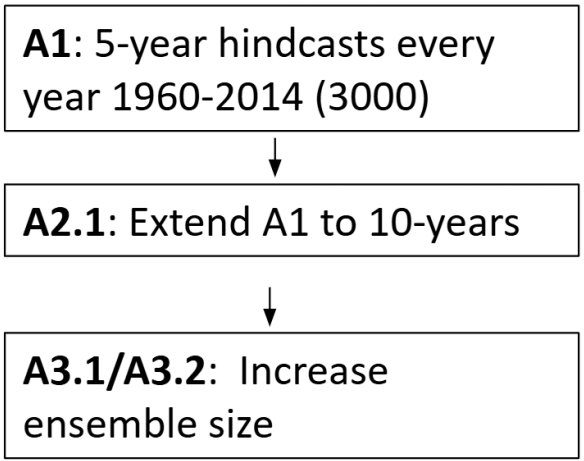
However, significant competition for new science priorities…
- impact of higher-resolution…
- more ensemble members…
- multi-year predictions…
- initialised projections…
- role of different forcings…

However…
- …CMIP have asked for reduced simulation sizes where possible



Updating DCPP for CMIP7

Still Under Development!

We will reduce the core hindcast experiment – the '***DCPP-DECK***' – and have a range of extensions of different priorities...

DCPP-DECK

A1: 64-mo, every Nov 1980-2024 *(2400)*

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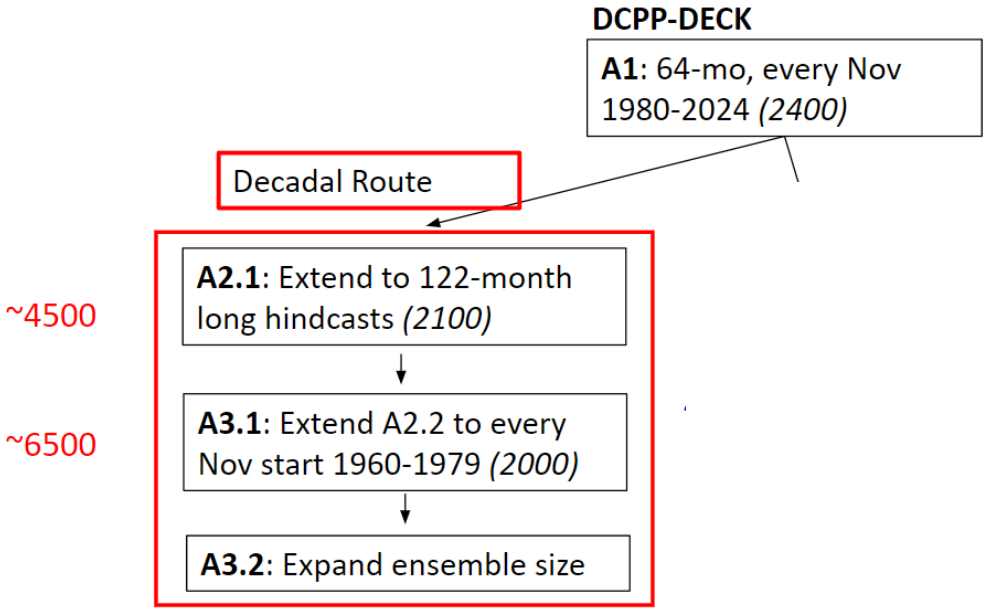

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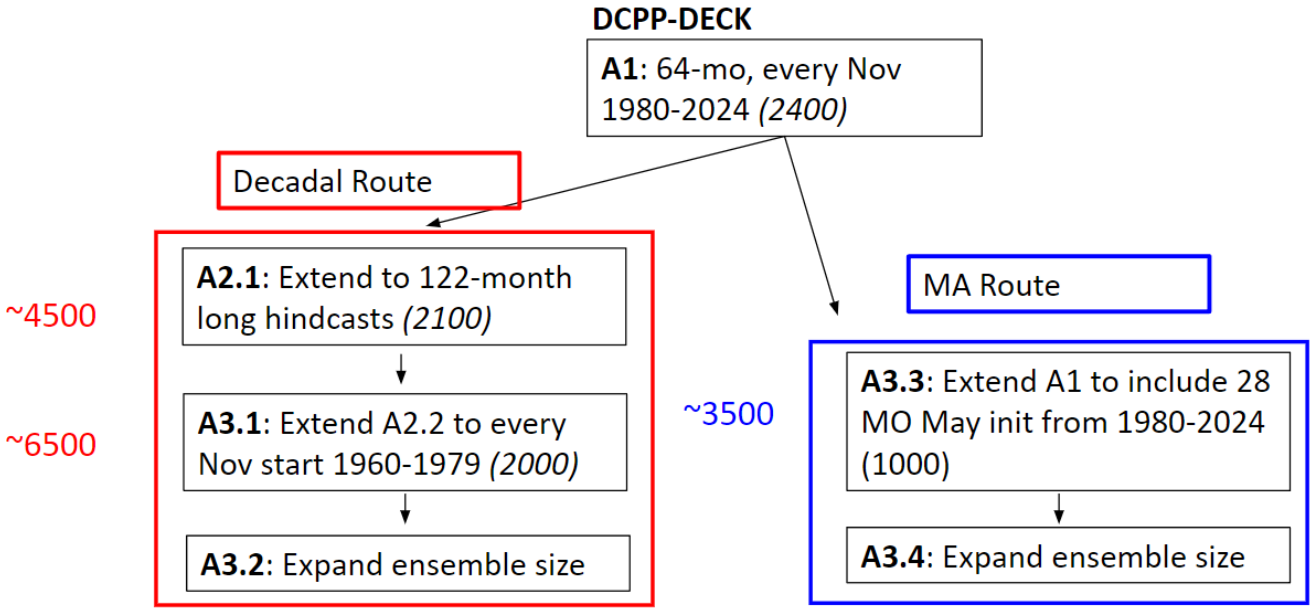

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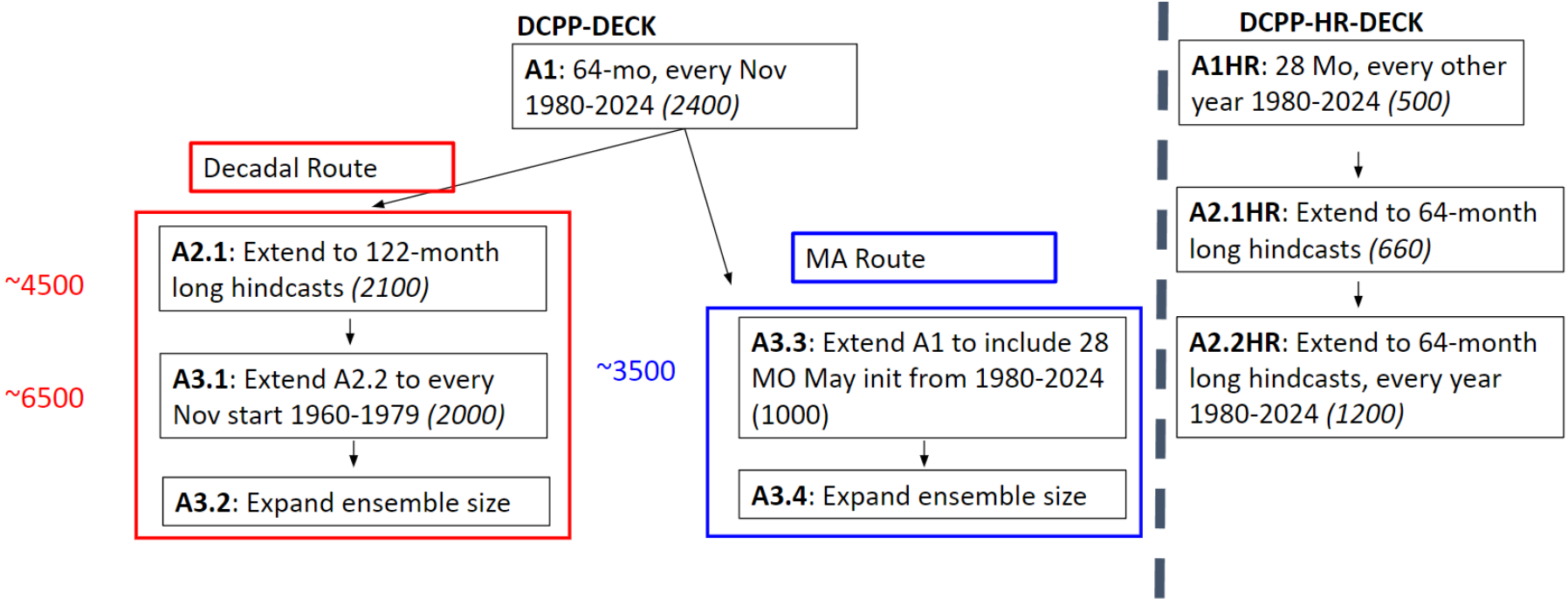

Updating DCPP for CMIP7

Component B (Forecasts)

Will continue to include forecasts and encourage centres to make data available in near-real-time.

- Need to coordinate with WMO activity on forcings.
- May include periodic re-running with updated ‘historical’ forcing and real-time attribution experiments

Updating DCPP for CMIP7

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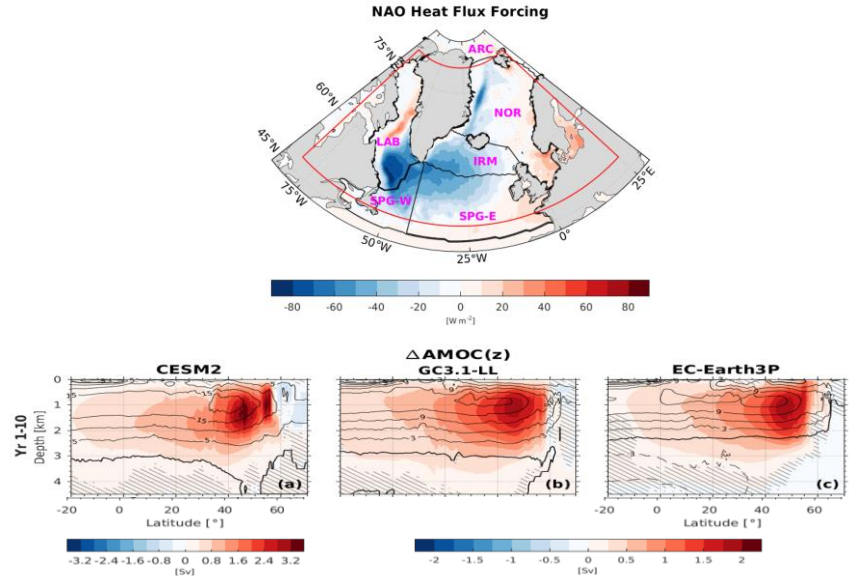
Component C (Process attribution experiments)

There was broad support to continue more focused hypothesis testing experiments within DCPP (*39/45 said they were interested in contributing to DCPP-C*).

Not yet a clear consensus on what should be included

- Clear interest in primarily Pacific or North Atlantic
- …but we only want to include experiments that have high level of “readiness”
- New task team to lead focused discussions (Pablo Ortega, BSC to lead)



Kim et al, 2024

Updating DCPP for CMIP7

Future plans for CMIP7 protocol

- Hope to have Component A and B agreed by mid 2025.
- Agreed protocol published on ESMO website

- Aim to finalise plans for Component C by late 2025 with submission of MIP overview paper (e.g., GMD).

DCPP CMIP7 fast track

Initialised 10-year prediction started as close to the IPCC deadlines as possible (**Nov 2025** ~~or 2026~~) to provide a multi-model outlook
- 100 years overall

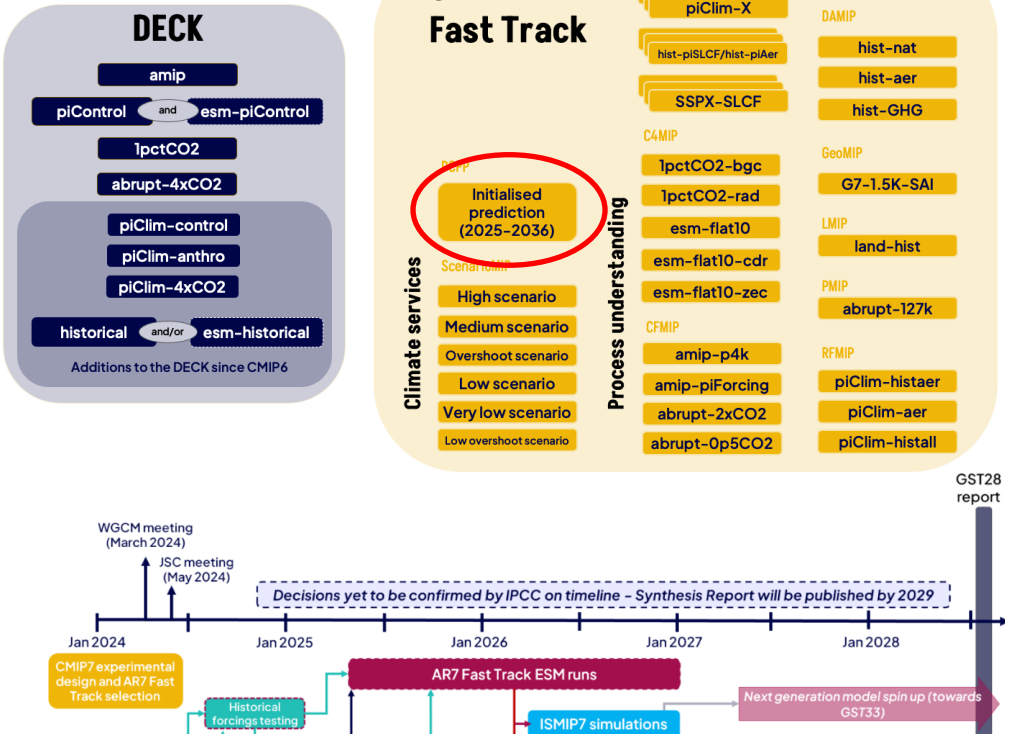
Centres will only contribute with CMIP6-era systems and follow the protocol for ***CMIP6 DCPP-B***

Simulations to be completed by Dec 2026

Rationale for including DCPP in CMIP7 fast track

- Ensures AR7 will have access to most up-to-date decadal outlook

- Will encourage more modelling centres to take part, and share data via ESGF



Summary

DCPP's primary mission is to coordinate the production of multi-model experiments

DCPP is currently designing the CMIP7 protocol

- likely follow a similar structure to CMIP6, but with new science foci
- hope to have component A and B agreed by mid 2025.
- DCPP-C may take a little longer, but aim to finalise plans late 2025.

DCPP has successfully advocated to be included in the AR7 fast track simulations, and has helped update the scope of the WMO LC-ADCP

Future meetings and activities

- *Co-organise a workshop on decadal prediction Autumn 2025 with EU ASPECT project.*
- *Happy to support the WCRP school on Climate Prediction Across Timescales*