The Decadal Climate Prediction Project

Overview

The term 'decadal prediction' encompasses predictions on annual, multi-annual to decadal timescales. The potential to make skillful forecasts on these timescales, and the ability to do so, is investigated by means of predictability studies and retrospective forecasts (termed hindcasts) using climate models and statistical approaches. Predictability and prediction studies have focused largely on temperature, and there is evidence of skill in the prediction of variations in annual means of temperature over much of the globe for several years, conditional on the initialization of the forecasts. As the forecast range increases initialized skill decreases but some skill is maintained due to external forcing from greenhouse gases, aerosols and volcanoes. There is currently less skill in predicting precipitation and other variables compared to temperature although progress is expected to be made as a consequence of the Decadal Climate Prediction Project (DCPP) and other projects and investigations.
Where does a decadal climate fit?

Decadal prediction:
- annual, multi-annual, up to a decade
- initialized forecasts of both forced and internally generated components of variability
The Decadal Climate Prediction Project (DCPP)

The term """"decadal prediction"""" encompasses predictions on annual, multi-annual to decadal timescales. The possibility of making skilful forecasts on these timescales and the ability to do so is investigated by means of predictability studies and retrospective predictions (hindcasts) made using the current generation of climate models and by empirical methods. Skilful decadal prediction of relevant climate parameters is a Key Deliverable of the WCRP’s Grand Challenge of Near-term Climate Prediction.

The DCPP envisions three components:

A o **Hindcasts**: the design and organization of a coordinated decadal prediction (hindcast) component of CMIP6 in conjunction with the seasonal prediction and climate modelling communities

B o **Forecasts**: the ongoing production of experimental quasi-operational decadal climate predictions in support of multi-model annual to decadal forecasting and the application of the forecasts

C o **Predictability, mechanisms and case studies**: the organization and coordination of decadal climate predictability studies and of case studies of particular climate shifts and variations including the study of the mechanisms that determine these behaviours
DCPP Website provides a focus

The experimental protocol for the Decadal Climate Prediction Project (DCPP) contribution to CMIP6 is described in detail in Boer et al. (2016). The paper is available here:

**The Decadal Climate Prediction Project (DCPP) contribution to CMIP6**

Geosci. Model Dev., 9, 1–27, 2016

There are three Technical Notes dealing with Component C experiments. They are available here:

**Tech Notes: Component C**

I. Definition of the Anomalous Sea Surface Temperature patterns

II. Recommendations for ocean restoring and ensemble generation

III. Guidelines for Component C Pacemaker Experiments

**Links to**
- Experimental protocol in GMD paper
- Tech notes and data for Component C
- Participant List
- Forum
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**20 Groups**
- 13 Countries
- Component A (hindcasts) - 16 Yes, 4 Maybe
- Component B (forecasts) - 11 Yes, 6 Maybe, 3 No
- Component C (mechanisms) - 11 Yes, 7 Maybe, 2 No
Where are we?

- **DCPP Phase 1 (nearing completion)**
  - experimental protocol endorsed and published
    - required data sets and tech notes
    - data retention tables specified
    - website and forum established
  - as contribution to
    - CMIP6
    - Grand Challenge of Near Term Climate Prediction
    - interest in decadal variability and prediction across WCRP

- **DCPP Phase 2**
  - Panel and WCRP organization/renewal
  - development and evolution of connections
    - within WCRP
    - WMO and operational aspects
    - IPCC, Stocktake, ...
  - support of activities in production, analysis and application
    - multi-model comparison with DCPP co-authors
    - actions in support of
      - drift amelioration, bias adjustment
      - statistical/empirical benchmarks
      - combination, calibration, skill assessment
    - climate services
  - meetings and workshops
    - s2S and S2d Workshop, NCAR, Sept 2018
Broad interests in decadal climate variability and prediction

- **WGSIP**
  - Sub-seasonal to (inter)annual prediction

- **WGCM**
  - Forced climate change and natural variability

- **CMIP**
  - Coordinated experimentation including scenarios, decadal prediction ....

- **CLIVAR**
  - "Focus" on decadal variability and predictability

- **Grand Challenge of Near Term Climate Prediction**
  - Research and development leading toward operational annual, multi-annual forecasts

- **IPCC**
  - Near term climate a contribution to AR6, Stocktake

- **DCPP**
  - Decadal climate prediction project currently reports to WGSIP and WGCM, is an endorsed CMIP MIP and has connections to all groups

- **WMO**
  - Coordination and production of annual to decadal outlook
What do we want from the meeting?

- To take advantage of the current energy and interest in decadal timescales
- Encourage the evolution of approaches to, and coordination of, WCRP research into decadal variability, predictability and prediction
  - new groupings?
  - matrix approach?
  - end-to-end focus?
  - applications?
  - .....