Decadal Climate Prediction Panel (DCPP)

- DCPP
  - a child of WGSIP and WGCM and the decadal prediction component of CMIP5

- DCPP focus
  - the development and support of both the science and practice of decadal prediction
  - the provision of an archive of decadal prediction information for research and applications
Wherefore the DCPP?

- **WGCM Paris (2008):**
  - formation of a “Joint WGCM-WGSIP Contact Group on Decadal Predictability/Prediction”

(Taylor et al., 2009...11)
Origin and activities of the DCPP

- WGCM-WGSIP Decadal Climate Prediction Panel (DCPP) formed following WGCM (Exeter, 2009)

- Some DCPP actions
  - produced document on *bias adjustment*
  - recommended updates to CMIP5 protocol
    - produce forecasts initialized *every year* over the period
    - reduce the priority of “high frequency” multi-level decadal prediction data (3 and 6-hourly) in the archive
    - add the historical climate simulations made with the same model as used for decadal predictions (to compare simulations with predictions)
CMIP5 decadal prediction component

- Has had a positive affect on research and offers promise for applications:
  - many investigations and publications based on results
  - input to Chapter 11 IPCC
  - expanded interest and activity in decadal prediction
    - predictability studies
    - assessment of local, global and modal skill
    - quasi-operational decadal prediction
Why CMIP6-decadal?

- **to provide scientific focus**
  - system view (data; analyses; initial conditions; ensemble generation; models and forecast production; post processing and assessment)
  - answer broad questions (e.g. sources and limits of predictability, current abilities wrt decadal prediction, potential applications, ...)
  - furnish benchmarks against which to compare improvements in models and prediction quality
  - allow investigations of processes and mechanisms of interest, e.g., the hiatus, climate shifts, AMOC etc ...

- **to coordinate efforts**
  - experiment structure and timeliness (promote research, intercomparison, multimodel approaches, applications, ...)
  - to help justify research directions and funding in some cases

- **to provide infrastructure**
  - in particular a multi-purpose data archive
    - useful for a broad range of scientific and application questions
    - of benefit to national and international climate prediction and climate services organizations
Predictability/prediction questions

- system “predictability” and “skill” as a function of forecast range
  - does difference between \( r \) and \( r \) offer guidance and hope for improvement
- question of initialization vs external forcing
- historical forecasts as basis for
  - future forecasts and applications
  - improvements in all aspects of the “forecast system”
  - understanding climate system behaviour

Annual means of surface air temperature
Quasi-operational year 1 forecast 2011 Temperature
Proposed Basic CMIP6 Experiment: Hindcasts from 1960 to present

- **Basis** for future forecasting:
  - hindcast data needed for bias correction, combination, calibration, skill measures, ... to enable actual decadal forecasts

- **Features of the Basic Experiment**
  - 10-member ensembles, 10-year forecasts, starting each year from 1960 => 6000yrs
  - no information from the future with respect to the forecast
  - external forcings separately projected for the forecast period
    - sources/concentrations persisted from current values or projected in a transparent way (e.g. GHGs, aerosols/volcano/solar ...)
  - initial conditions
    - as developed for the particular forecast system
    - based on observations up to the start time
Details and questions

- Start dates every year
  - 1 November of the year preceding the year of the forecast is recommended
    - allows DJF seasonal forecast also and similar to some existing projects
    - problematic if large volcano or other perturbation occurs after 1 Nov but before 31 December
    - any standard start date on or before 31 Dec is necessarily acceptable as legitimate forecast

- Ensemble size
  - 10 members recommended
  - fewer members if resources do not permit

- Forecast length
  - 10 years recommended
  - some suggestion of 5 years as capturing much of the initialization-based skill of internal component
Other possible experiments of Lower Priority

- Experiments of interest which might partake in organization and infrastructure of CMIP6
  - Experiments LP.1
    - possible decadal predictability experiment
  - Experiment LP.2: initialized forecasts vs climate simulations
    - as Basic Experiment but initial conditions from simulations
    - intent would be a clear separation of skill between initialized forecasts and uninitialized climate simulations
    - pure but expensive so low priority
  - Experiments LP.3, LP.4 .....  
    - possibility of special purpose experiments in support of climate science and decadal prediction
    - to address questions that cannot be investigated using the Basic Experiment results
Data

- data protocol for decadal prediction critical part of CMIP6
- review of basic and extended data sets for decadal prediction
  - availability of suitable data is basis for analysis and diagnostics of many kinds
  - devil in the details, need for close MIP input
  - need for coordination with, contribution to CFCS
- important to align decadal prediction data with overall CMIP6 data treatment
Summary: CMIP6 decadal prediction component

- **Basic Experiment** is decadal prediction hindcast set
  - 10-member ensemble, forecast every year from 1960
  - extension and improvement of CMIP5
  - pure *forecast* approach, i.e. no information from the future
  - data protocol aligned with rest of CMIP6 to include basic, quick access data set
  - need **focus and timing** for international multi-model coordinated reforecast project like this
  - coordinated data set as basis for applications and future forecasts
  - in support of Regional Climate Grand Challenge and GFCS

- **Next**
  - feedback from WGCM and WGSIP meetings
  - data considerations including needs for applications
  - possible survey of potential participants