

# Decadal Climate Prediction Panel (DCPP)

- DCPP

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

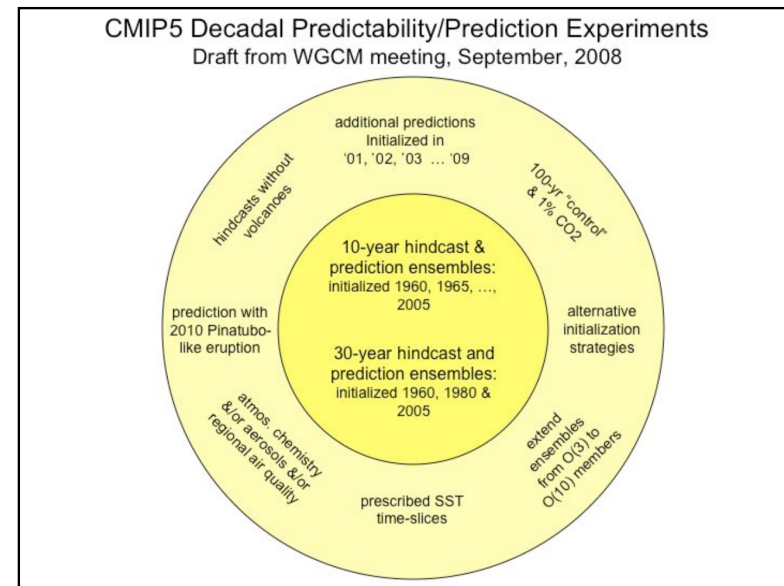
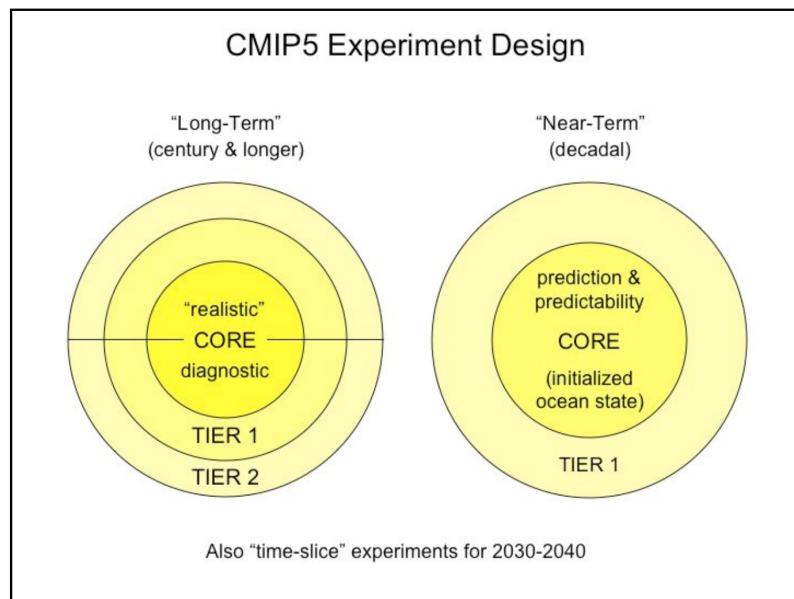
- DCPP focus

- 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 DCPD

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

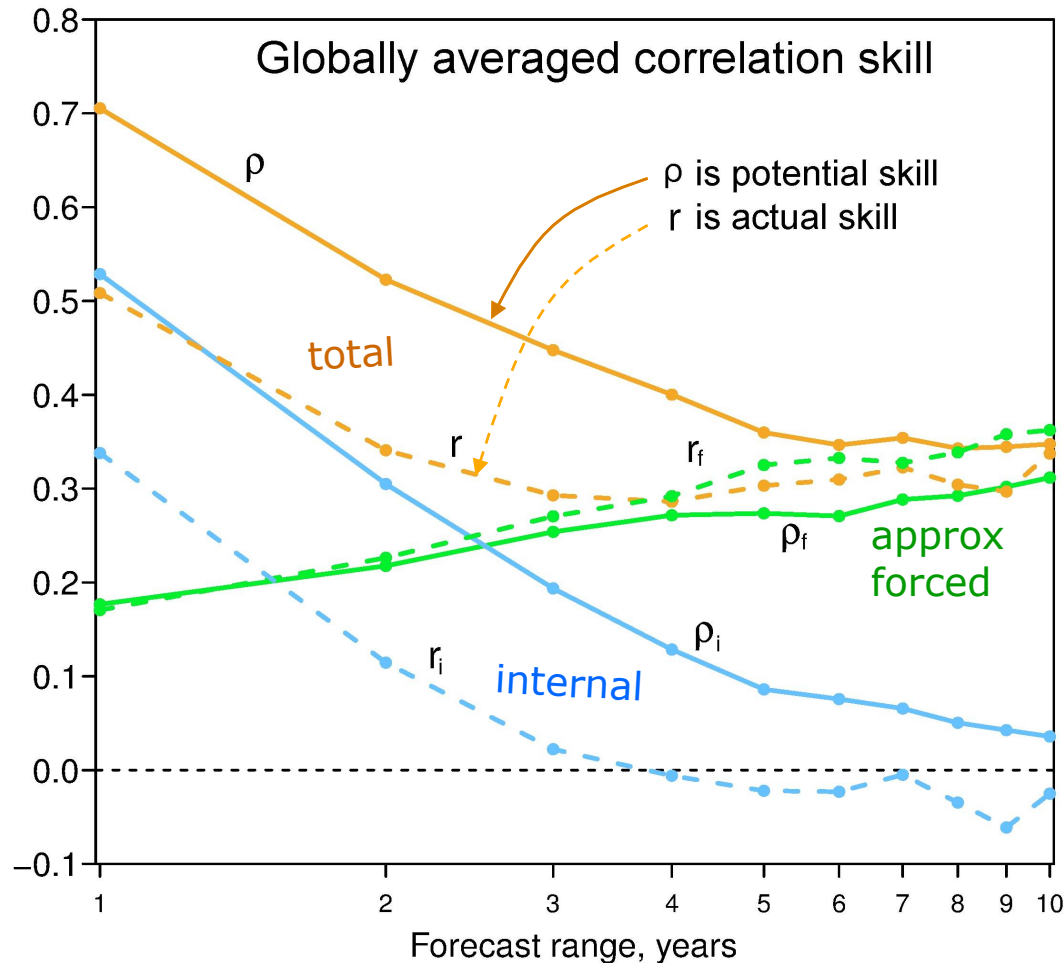
# CMIP5 decadal prediction component

- 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

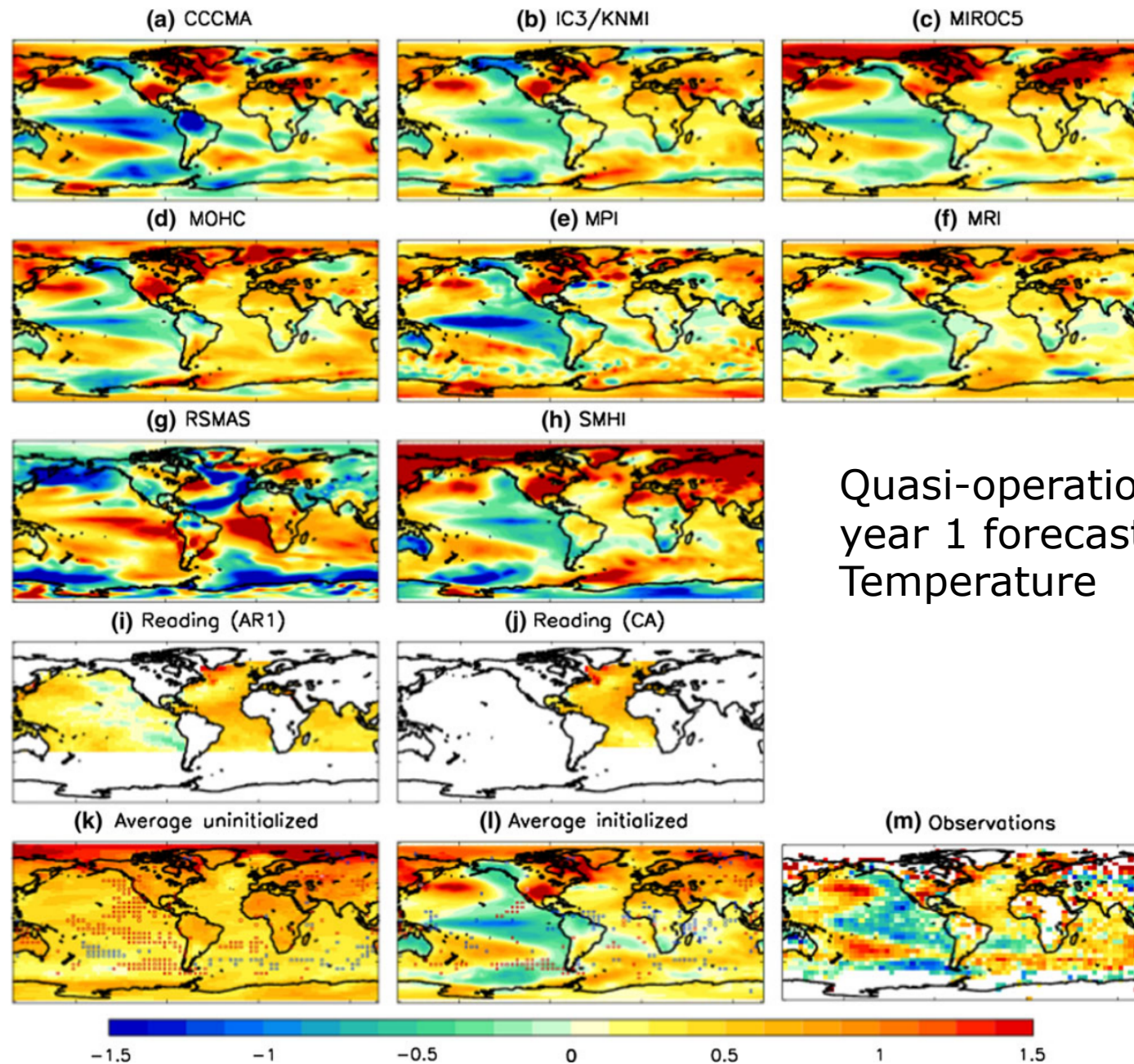
# Predictability/prediction questions



Annual means of surface air temperature

- system “predictability” and “skill” as a function of forecast range
  - does difference between  $r$  and  $\rho$  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





# 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