

Decadal Climate Prediction Project (DCPP) : CMIP6

Co-chairs: George Boer and Doug Smith

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- **Component A: hindcasts**

- Start every year from 1960
- 10 ensemble members
- Much more robust assessment compared to CMIP5
- New improved models

- **Component B: ongoing forecasts**

- Input to WCRP Grand Challenge on Near Term Climate Prediction

- **Component C: assessment of processes**

- Hiatus+: investigate ocean influence on decadal anomalies (including reduced and enhanced warming)
- Volcanoes: investigate the effects of volcanoes on climate and decadal predictions

Groups may participate in any component

Boer et al. (2016) The Decadal Climate Prediction Project (DCPP) contribution to CMIP6, Geosci. Model Dev., 9, 3751-3777, <http://www.geosci-model-dev.net/9/3751/2016/doi:10.5194/gmd-9-3751-2016>



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.

Decadal Climate Prediction Project

Overview

[Experimental Protocol](#)

Other Activities

[Multi-model Decadal Forecast Exchange](#)
[CMIP5 Decadal Prediction](#)

[Panel](#)

[Meetings](#)

[← Back to Modelling Overview](#)

DCPP website is
focus for the Project

Experimental Protocol

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:

[Geoscientific Model Development website](#)

Or click the .pdf thumbnail below to directly access the article.



The Decadal Climate Prediction Project (DCPP) contribution to CMIP6
Geosci. Model Dev., 9, 1–27, 2016

Decadal Climate Prediction Project

- Overview
- Experimental Protocol**
- Other Activities
 - Multi-model Decadal Forecast Exchange
 - CMIP5 Decadal Prediction
- Panel
- Meetings

[← Back to Modelling Overview](#)

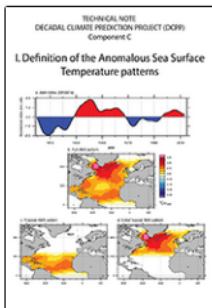
Some of the experiments in Component C of the DCPP make use of prescribed sea surface temperature (SST) patterns. These data will be available here soon:

- AMV SST data
- PDV SST data
- Pacemaker SST data

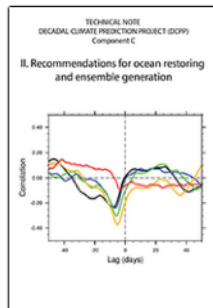
The CMIP6 Panel is coordinating the production of forcing datasets and the output data request. See the [CMIP6 webpage](#) for these links.

Questions and comments concerning the DCPP may be conveyed via the [Decadal Climate Prediction Project \(DCPP\) Participant Forum](#).

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



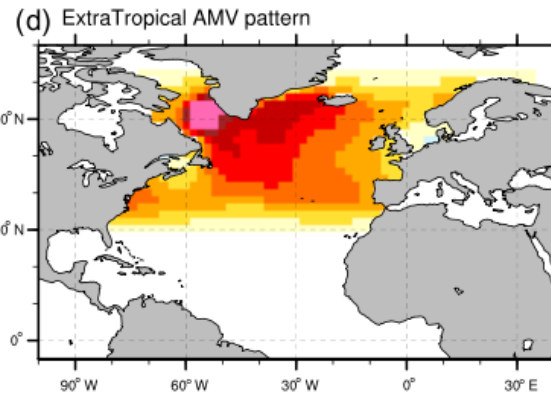
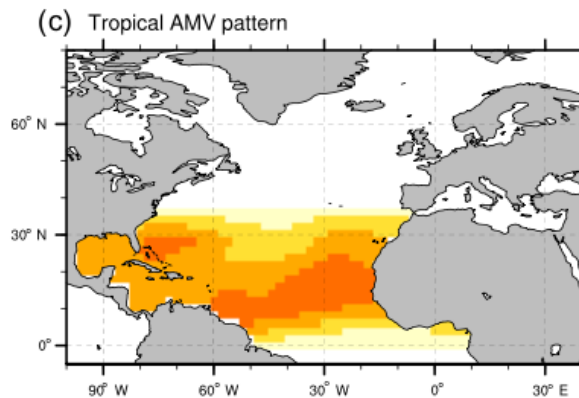
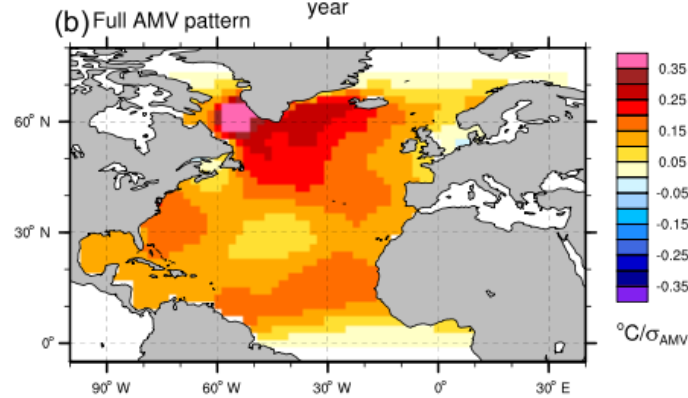
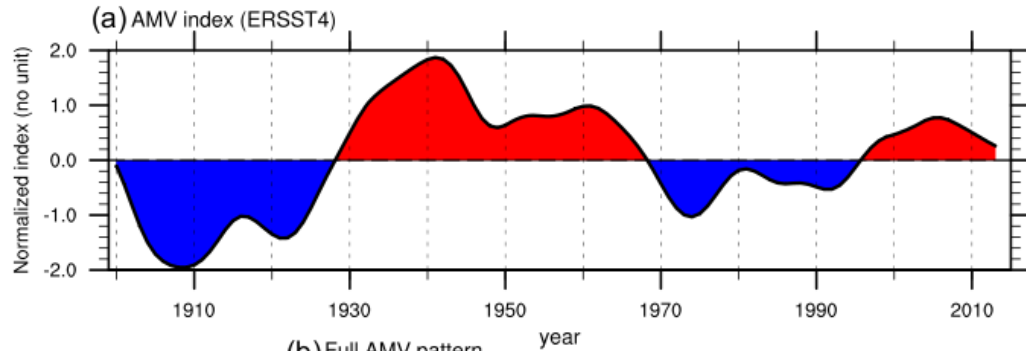
I. Definition of the Anomalous Sea Surface Temperature patterns
TECHNICAL NOTE 1, DECADEAL CLIMATE PREDICTION PROJECT (DCPP) - Component C



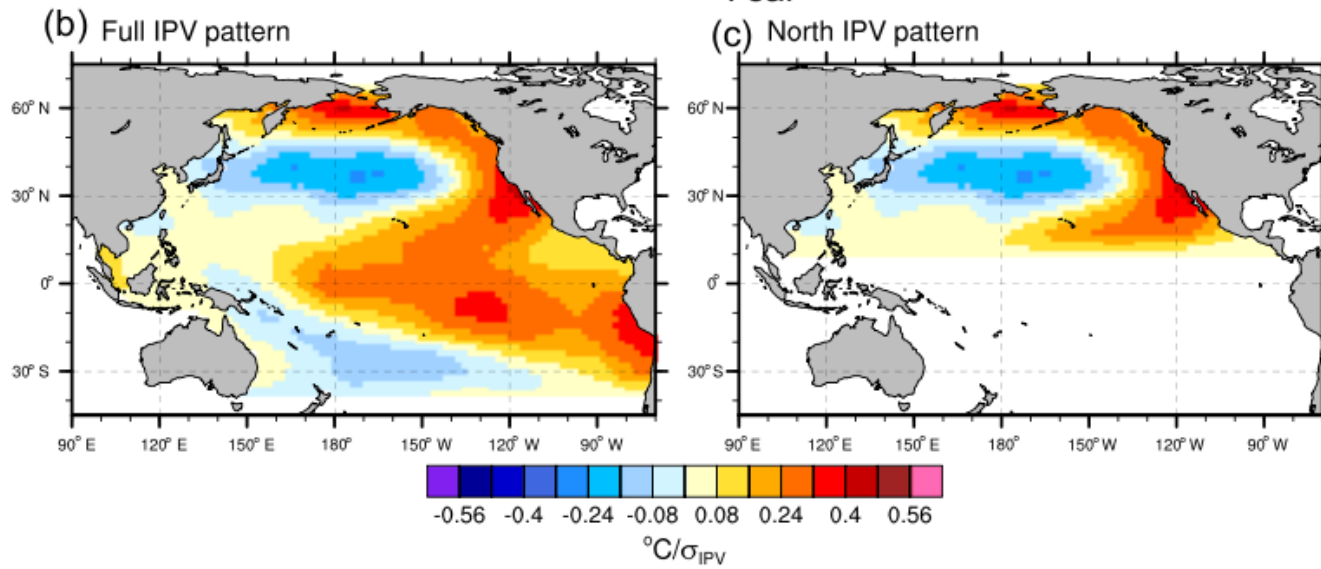
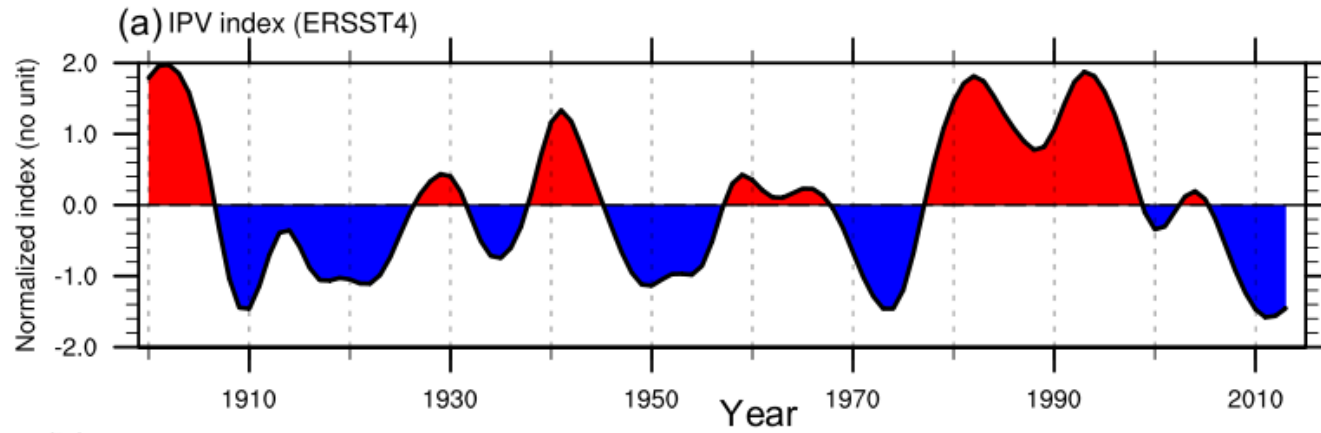
II. Recommendations for ocean restoring and ensemble generation
TECHNICAL NOTE 2, DECADEAL CLIMATE PREDICTION PROJECT (DCPP) - Component C

Protocol and links

Idealised SST forcing: Atlantic



Idealised SST forcing: Pacific



WCRP Grand challenge on Near Term Climate Prediction

Lead Coordinators: Adam Scaife and Yochanan Kushnir

Members: Raymond Arritt, Gianpaolo Balsamo, George Boer, David Carlson, Francisco Doblas-Reyes, Ed Hawkins, Masahide Kimoto, Arun Kumar, Daniela Matei, Katja Matthes, Wolfgang Müller, Terence O’Kane, Judith Perlwitz, Scott Power, Marilyn Raphael, Akihiko Shimpo and Doug Smith

Aims:

- 1) **Research and development** to improve multi-year to decadal climate predictions (fundamental understanding of predictability, specification of forcing, forecast initialization and model bias/drift)
- 2) Collate and synthesize prediction output and tailor climate information (including assessments of uncertainty) to form the basis of a **service addressing stakeholder needs**.
- 3) Develop **organizational and technical processes**, including international coordination to underpin future routine provision of scientifically-sound prediction services.

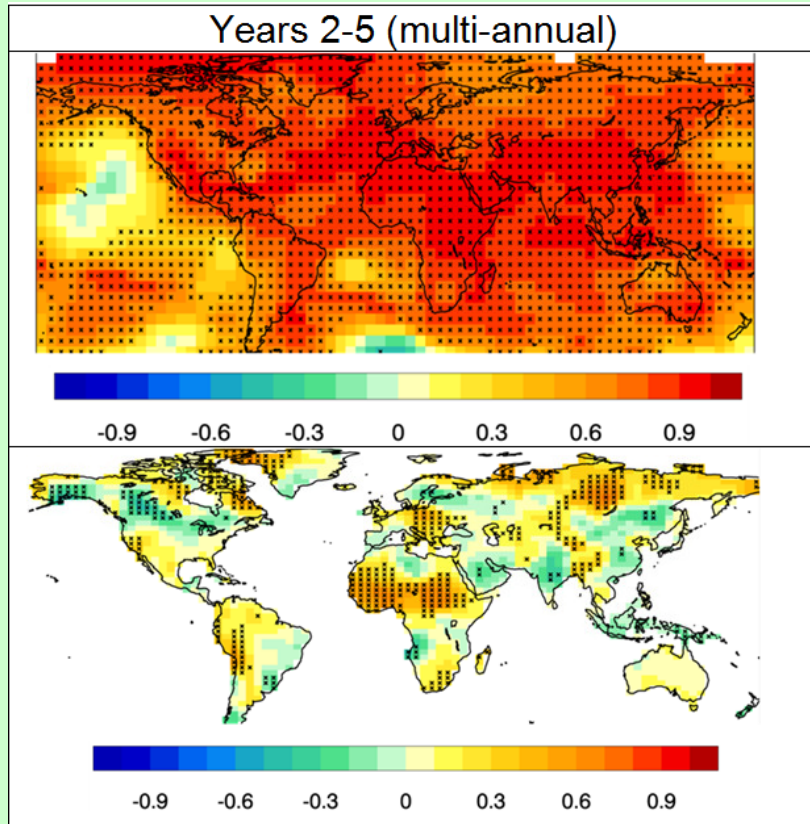
The GC on Near-Term Climate Prediction will fill an important gap in **provision of seamless climate information, between seasonal climate predictions and long-term projections**, as recommended by the GFCS.

Deliverables:

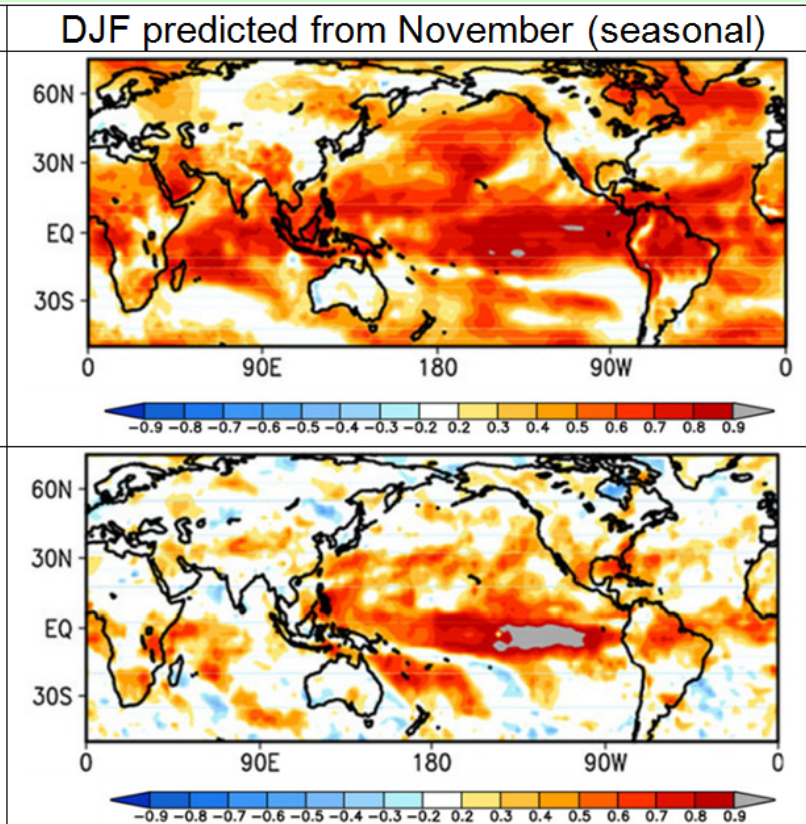
1. Develop a **white paper** on the “Challenge of Near-Term Climate Prediction” with more details on the motivation, aims, existing and proposed research and implementation (Kushnir et al, in prep)
2. The **production of standards, verification methods and guidance** for near term predictions which are seamless with long-term projections in collaboration with the WMO CBS/CCI Expert Team (Doblas-Reyes et al, 2018)
3. Pursue **WMO recognition for operational decadal predictions** (Scaife et al, 2019)
4. Initiate and issue a real-time **Global Annual to Decadal Climate Outlook** once each year (2016 onwards, with 2 years of dry running) in consultation with CBS-CCL, following the Global Seasonal Climate Update (Smith et al).

Near Term Prediction Skill

Skill for years 2-5



Skill for months 2-4



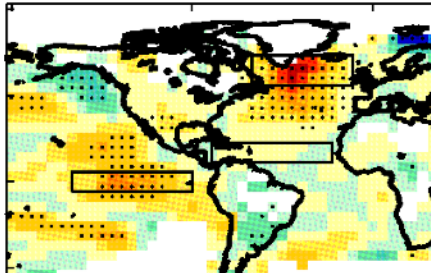
Correlation skill over the period 1960 to 2005 from UKMO decadal predictions

Correlation skill for DJF temperature from a typical seasonal hindcast.

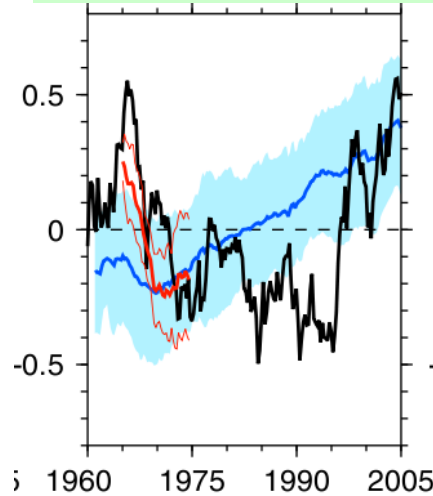
Decadal prediction skill is higher than seasonal skill!

Multi-year predictions

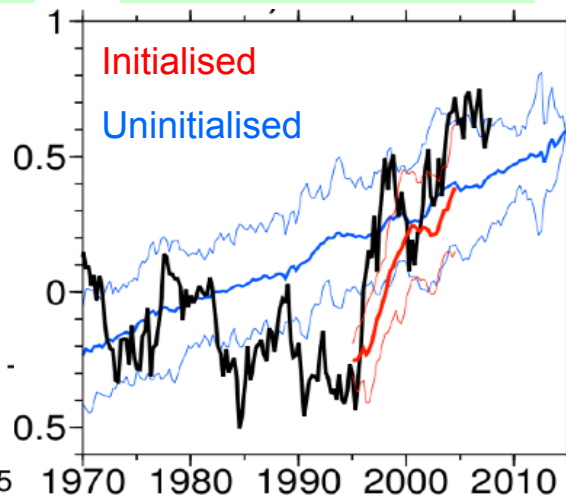
Improved skill from
initialisation



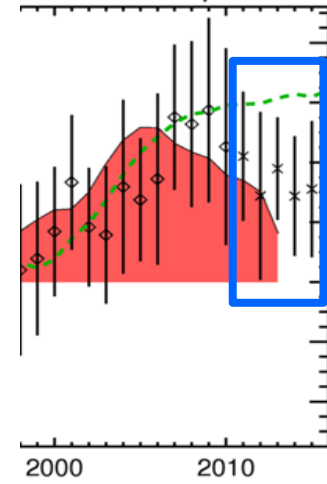
1960s cooling



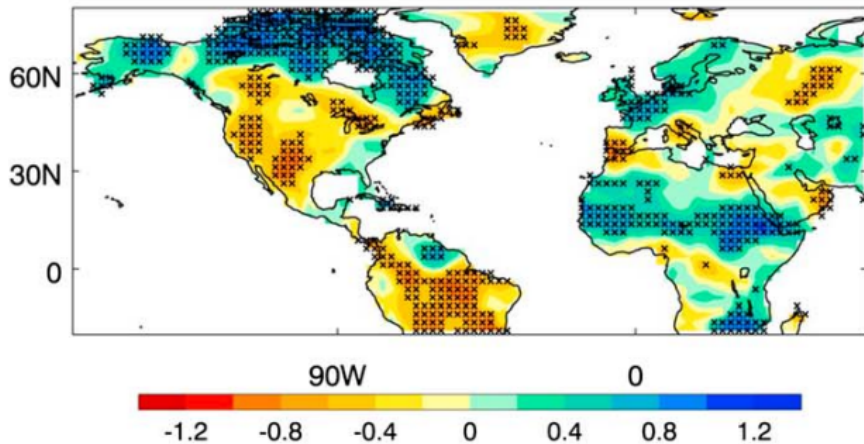
1990s warming



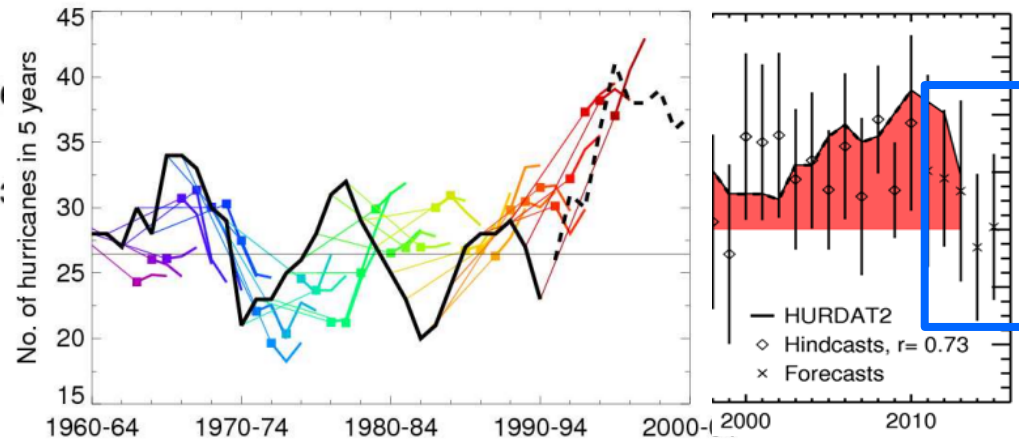
Forecast cooling



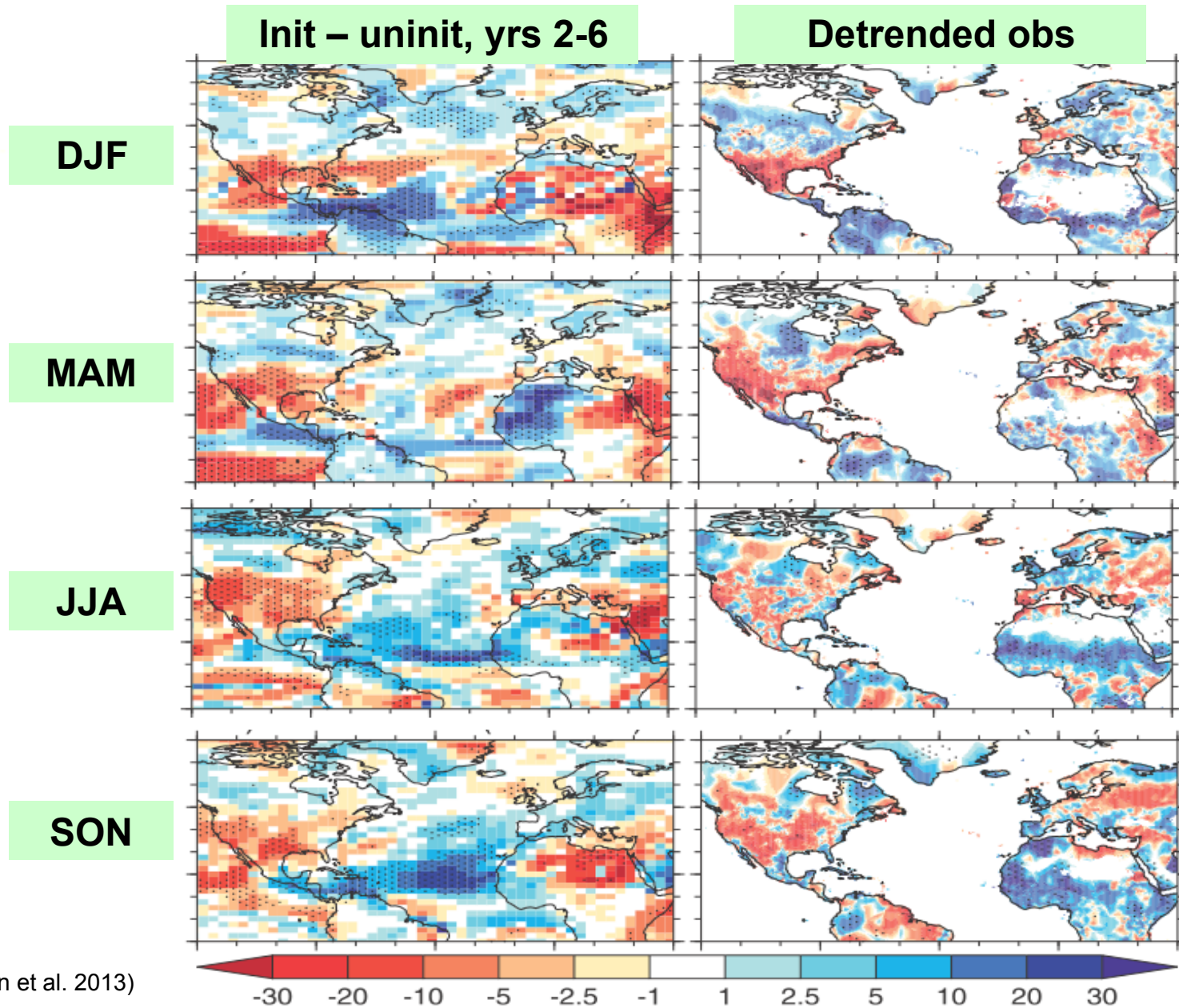
Impacts: rainfall



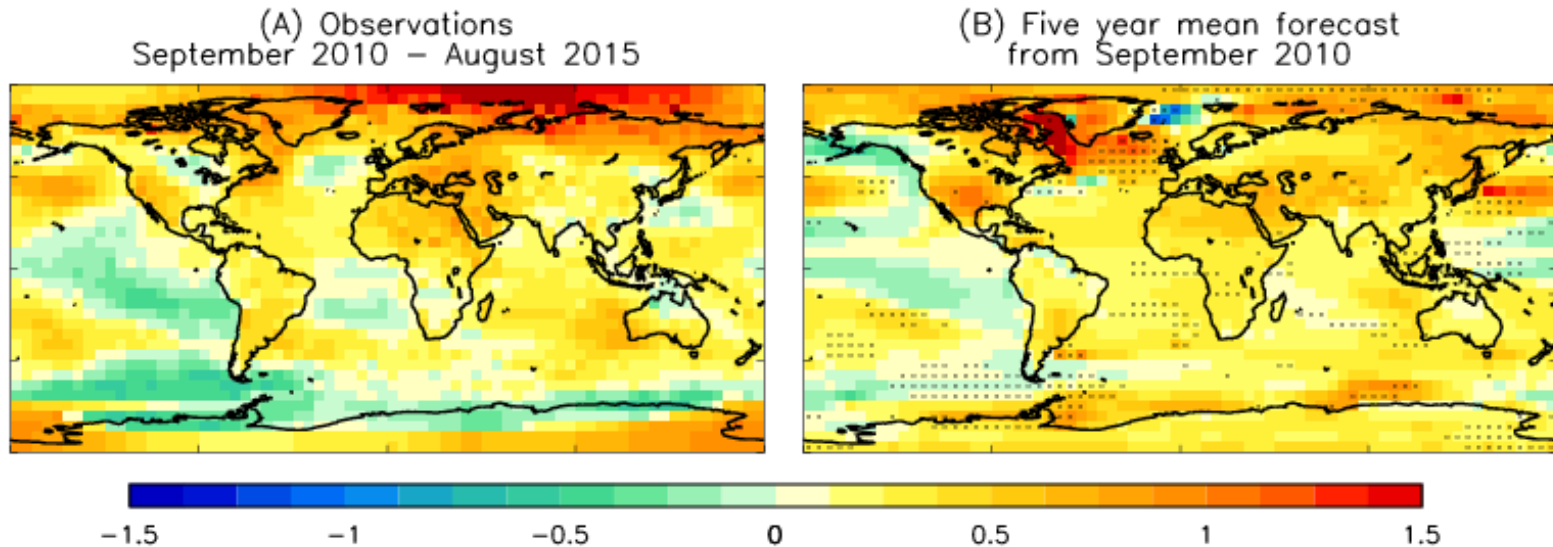
Impacts: hurricanes



1995 Atlantic warming: rainfall



Verification of issued forecasts



- Forecast of 5-year mean near surface temperature issued in 2010 compared to verifying observations
- Stippling shows where the observations lie outside the 5-95% range of the forecast
- Issued on Met Office web site: <http://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/long-range/decadal-fc>

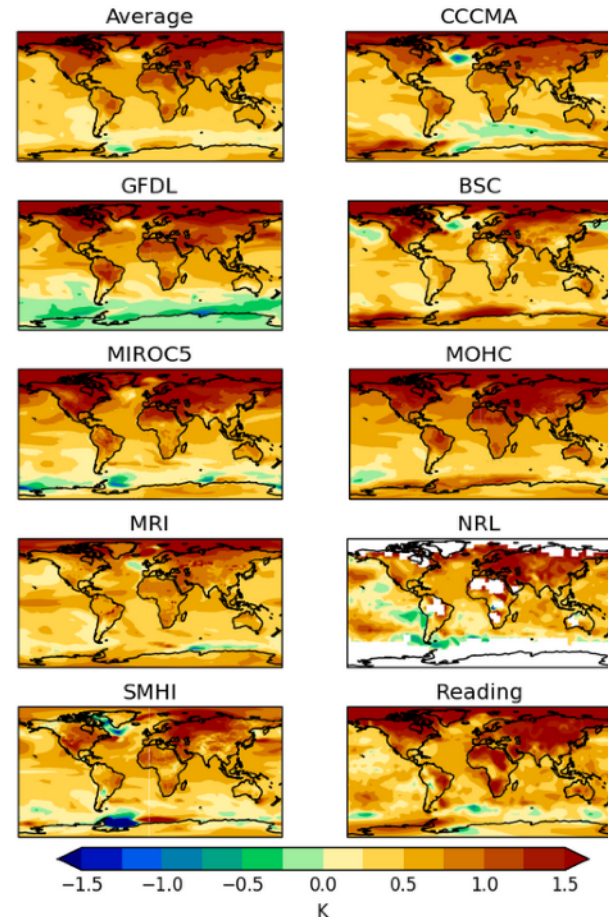
Informal exchange of decadal predictions

- Met Office has coordinated an informal exchange of multi-model real-time near term climate forecasts
- Every year since 2010 (six exchanges so far)
- About 10 systems contributing
- Near surface temperature, rainfall, sea level pressure, Atlantic overturning circulation
- Plots available from: <http://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/long-range/decadal-multimodel>

Decadal forecast exchange 2015 predictions for years 1 to 5 surface air temperature

Decadal prediction is still experimental and the forecasts should not be relied on for making decisions, particularly on regional scales.

2015 predictions for 2016-2020 surface temperature



WMO and operational decadal predictions

- Real time seasonal forecasts are produced and issued worldwide under the WMO Lead Centre at KMA
- Global Producing Centres deliver the forecasts
- We plan a similar structure with WMO for Near Term Prediction
- Contributing centres will deliver real-time predictions each year to a Lead Centre
- Minimum requirements: data, verification, timeliness etc
- Approved by ET-OPSLS (within CBS and CCL)
- **CBS meeting this week...**
- Fills the gap in GFCS between seasonal and centennial info'

Existing Global Seasonal Climate Outlook

WORLD METEOROLOGICAL ORGANIZATION
Commission for Climatology

Global Seasonal Climate Update

(TRIAL PHASE)

Issued: February 2016

Target Season: March-April-May 2016

Summary

A strong El Niño episode has prevailed from the second half of 2015 through to the present, and it is predicted to continue, while slowly weakening, during March-May 2016 (see the WMO El Niño/La Niña Update). All models predict maintenance of the strong El Niño levels through March 2016, moderating during April and weakening further during May, not to return to neutral until after the March-May season. The model consensus for continuing El Niño conditions is reflected in some predicted large-scale seasonal anomalies for March-May, such as the strong tendency towards above-normal temperature over much of the globe and also precipitation effects in some regions (e.g. northeast Brazil, and the northwest and southwest tropical Pacific islands), which are consistent with canonical responses to a mature and weakening El Niño.

A tilt of the odds towards above-normal 2-metre temperature is forecast in virtually all of Africa, much of the tropical Pacific islands, nearly all of Asia and Europe, and large portions of Australia, North America and South America. Some of these areas also experienced above-normal temperature during November-January 2015-16, including most of Australia, southern and northwest Africa, northern South America, Central America, western Europe, and southwest Asia. Exceptions to this persistence of the observations in the December-February forecast are found in part of northern Africa, part of western North America and a substantial portion of Asia. While most of the globe shares a forecast tendency towards above-normal temperature, exceptions are noted in western Australia, southeastern South America and in southern North America, where there is mainly no forecast signal.

Probabilities tilt towards above-normal precipitation for southeast South America, the southern and parts of northern North America, eastern Europe, western and central Asia, southern and central Australia and eastern equatorial Africa. Below-normal precipitation is favoured in northeast South America, southeastern Africa and many of the South Pacific islands. Some of these regions experienced these same precipitation tendencies in November to January 2015, such as northeast South America (dry), southeast South America (wet), southeastern Africa (dry), part of eastern equatorial Africa (wet), tropical South Pacific and North Pacific islands (dry), and the western Caribbean (wet).

Plan for Global *Annual to Decadal* Outlook

Issued once each year

2017 onwards with 2 years of 'dry running'

First issue is Feb 2017

Updated forecasts submitted each year by March

Issued April each year thereafter

Aim for Jan data exchange and Feb issue by ~2019