

WGSIP: Working Group on Seasonal to Interannual Prediction

Adam Scaife, Ben Kirtman and Francisco Doblas-Reyes (co-chairs)
George Boer, Arun Kumar, Andy Morse, Celeste Saulo, Swadhin Behera, Andy
Robertson, Oscar Alves, Herve Douville, Sonia Seneveratne, William Merryfield and
Toshio Yasuda.

Three WCRP modelling groups:

Working Group on Coupled Modelling (WGCM)

**Working Group on Seasonal to interannual
Prediction (WGSIP)**

**Working Group on Numerical Experimentation
(WGNE)**



WGSIP

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Data Server LOGIN

CHFP
The Climate-system Historical Forecast Project
Page at
Centro de Investigaciones del Mar y la Atmosfera

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CIMA
*Centro de investigaciones
del mar y la atmósfera*

Welcome

CHFP

The Climate-system
Historical Forecast Project

<http://chfps.cima.fcen.uba.ar/>
CIMA CHFP Data Server

Current status

chfps.cima.fcen.uba.ar/DS/hf_select.php?co=A&tl=S&fr=M&hf=ch

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CIMA-CHFP/SHFP
Home Data Catalog

CHFP/SHFP Atmosphere - Surface - Monthly

Component

Atmosphere
[Ocean](#)
[Land](#)

Type of level

[Levels](#)
Surface
[Invariant](#)

Frequency

[6 hs](#)
[Daily](#)
Monthly
[Invariant](#)

Select Initial Start Month

	Feb	May	Aug	Nov		Feb	May	Aug	Nov		Feb	May	Aug	Nov
1979	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
1980	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1990	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1981	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1991	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2001	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1982	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1992	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2002	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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1984	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1994	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2004	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1985	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1995	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2005	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1986	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1996	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2006	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1987	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1997	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2007	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1988	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1998	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2008	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1989	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1999	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2009	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[Clear all](#)

Select Model

☐ ARPEGE* ☐ CFS* ☐ CMAM* ☐ CMAMlo ☐ JMAMRI-CGCM3
☐ L38GloSea4 ☐ L85GloSea4* ☐ POAMA

(*) stratosphere resolving models
[Select all](#) [Deselect all](#)

Select Variables

<input type="checkbox"/> clt - Total cloud cover	<input type="checkbox"/> hflsd - Surface latent flux
<input type="checkbox"/> hfssd - Surface sensible flux	<input type="checkbox"/> mrsov - Total soil moisture
<input type="checkbox"/> prlr - Total precipitation	<input type="checkbox"/> psl - Mean sea level pressure
<input type="checkbox"/> rlds - Downward surface longwave	<input type="checkbox"/> ris - Net surface longwave
<input type="checkbox"/> rlt - Top net longwave	<input type="checkbox"/> rsds - Downward surface solar
<input type="checkbox"/> rss - Net surface solar	<input type="checkbox"/> rst - Top net solar
<input type="checkbox"/> snld - Snow depth	<input type="checkbox"/> tas - 2m temperature
<input type="checkbox"/> tasmax - 2m T daily max	<input type="checkbox"/> tasmin - 2m T daily min
<input type="checkbox"/> tauu - Surface DownEast stress	<input type="checkbox"/> tauy - Surface DownNorth stress
<input type="checkbox"/> tdps - 2m dewpoint temperature	<input type="checkbox"/> ts - Surface temperature (SST+land)
<input type="checkbox"/> uas - 10m wind (u)	<input type="checkbox"/> vas - 10m wind (v)

[Clear all](#)

Sub-projects: three experiments

Land Surface: the GLACE experiment:

Soil moisture experiments in seasonal mode

Led by R Koster

Stratosphere: Stratospheric Historical Forecast Project

High Top – Low Top hindcasts

Led by A Butler

Sea Ice: Ice Historical Forecast Project

Case studies with/without initial sea-ice data (2007/1996)

Led by D Peterson

Ice Historical Forecast Project

Drew Peterson, Dirk Notz, Steffen Tietsche, Matthieu Chevallier, William Merryfield, Adam Scaife

Max Planck Institute MPI-ESM (Steffen Tietsche and Dirk Notz)

UKMO GloSea4 (Arribas et al., 2011, 2012)

Meteo-France CNRM CM5.1 (Voldoire et al., 2012, Chevallier et al., 2012)

CCCma CanSIPS (Merryfield et al., 2012)

- 9 members for 2007 and 1996**
- with and without sea ice initialised according to observed extents**
- 1 November and 1 August initialisation for Winter and Autumn**

Difference in Sea Ice due to Initialisation

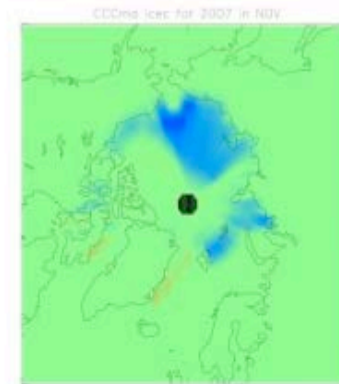
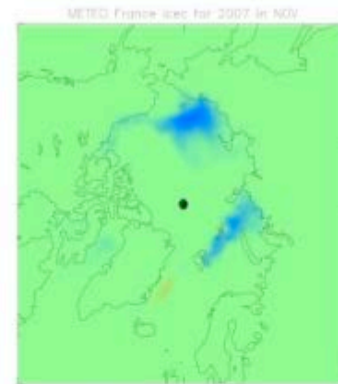
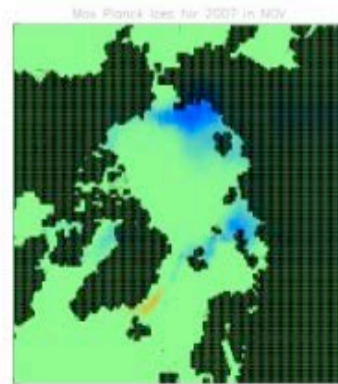
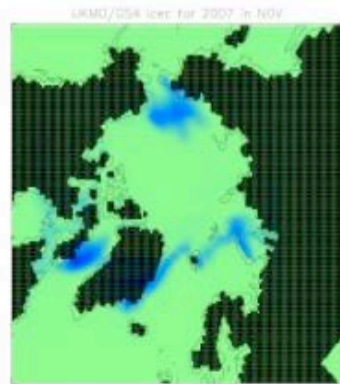
UKMO

MPI

MeteoFr

CCCma

Nov



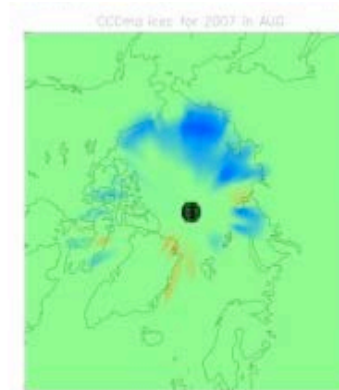
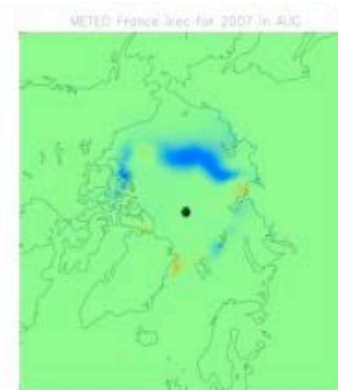
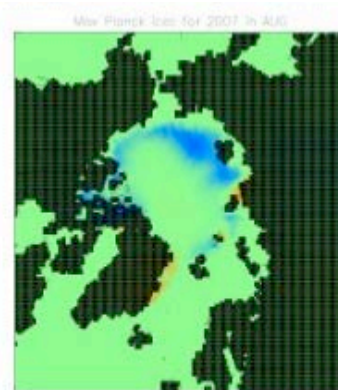
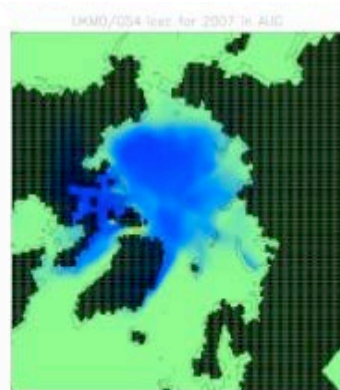
b)



c)



d)



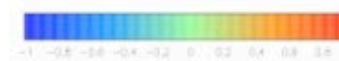
f)



g)

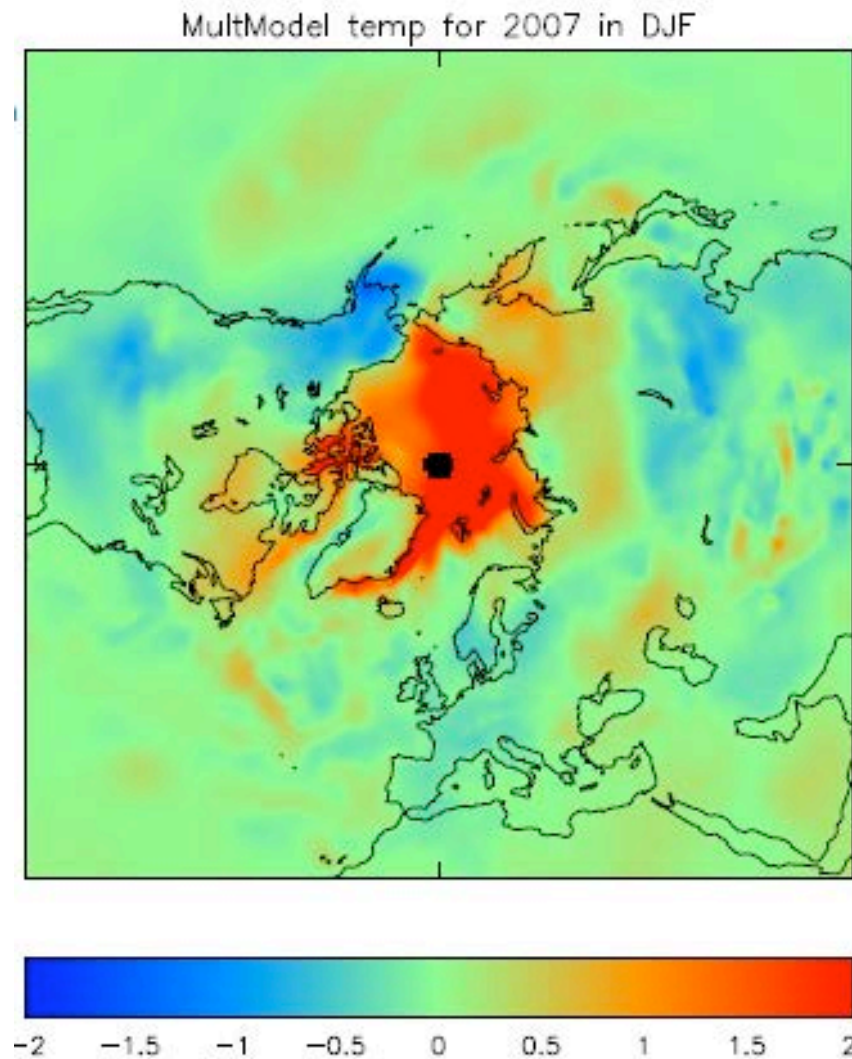


h)

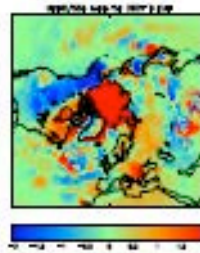


Aug

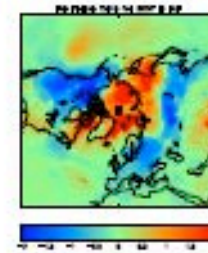
Winter Near Surface Temperature Response



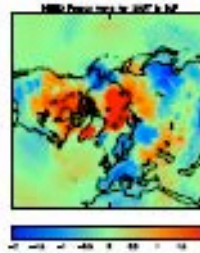
UKMO



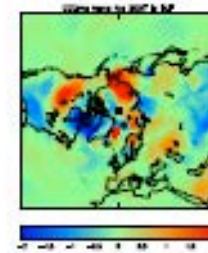
Max Planck



MétéoFrance

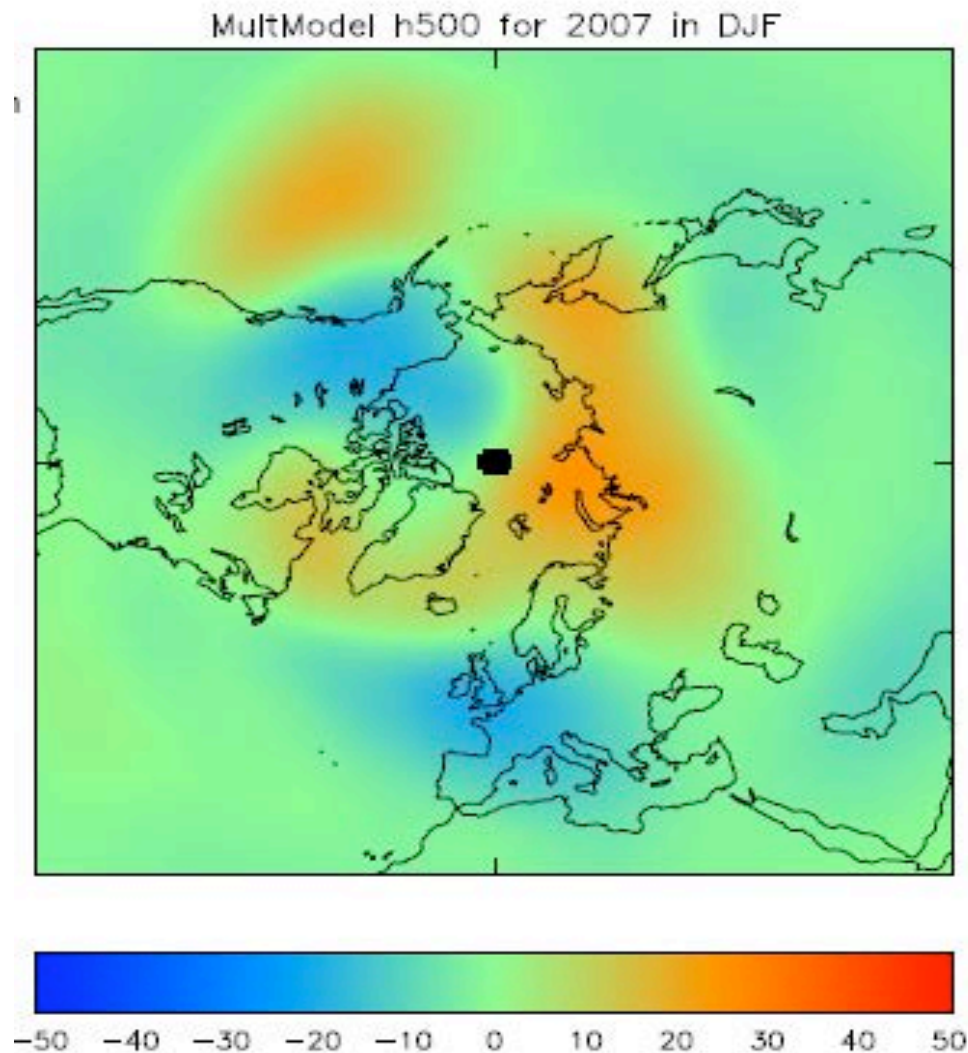


CCCma

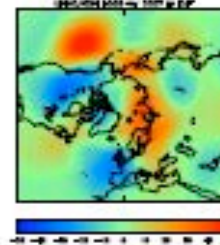


Winter Geopotential Height Response

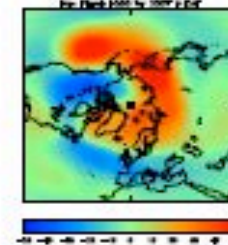
(@ 500hPa)



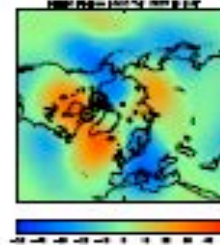
UKMO



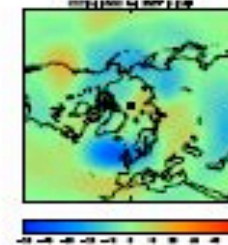
Max Planck



MétéoFrance



CCCma



Summary

Multiple Models show similar effects of ice initialization

Also similar to observed regressions

Winter circulation has blocking pattern over Scandanavia, reduced European temperatures

Also blocking pattern over west Pacific and reduced North American temperatures

Autumn circulation has jet stream returning south over Europe

Exact location varies with model

Paper in preparation:

Peterson et al 2012: The Effects of Sea Ice initialisation on Seasonal Forecasts – the WGSIP IceHFP Project

Stratosphere Historical Forecast Project

a WGSIP-SPARC project

**Amy Butler, Adam Scaife, Alexander Lawes, Natalia Calvo,
Andrew Charlton-Perez + WGSIP members**

High Top Hindcasts

Parallel to WGSIP-CHFP

Extended models

Initialising extra atmosphere, better represented stratosphere

Integrations

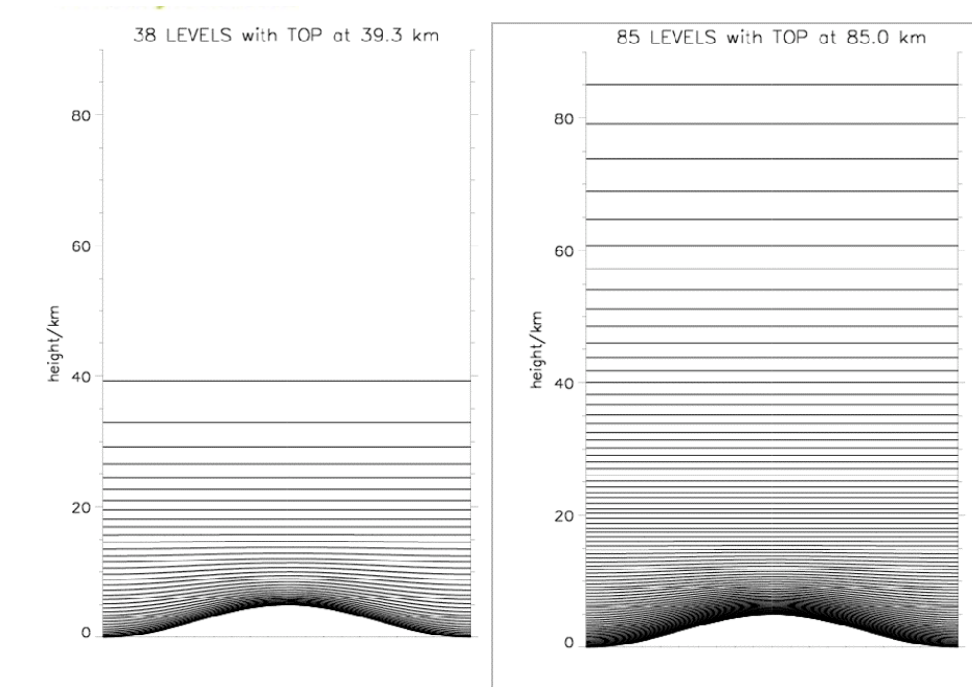
- 4 month lead times (1st November and 1st May start dates)
- 2 seasons (DJF and JJA)
- Case study years: 1989 onwards
- At least 6 members per year, preferably more

Participants and Status

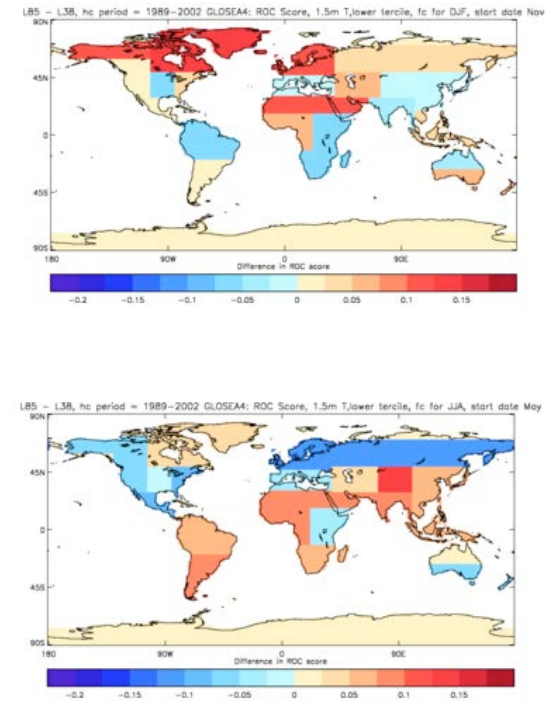
<u>Institute</u>	<u>Model</u>	<u>Resolution</u>	<u>Reference</u>	<u>Status</u>	<u>Contact</u>
UKMO	HadGEM	N96L85, 85km N96L38, 40km	Martin et al 2006, J. Clim., 19, 1217-1301	DONE IN SERVER	Adam.scaife@metoffice.gov.uk
Meteo France	Arpege 4.4 + OPA	L91, 0.01hPa L31, 10hPa	Gueremy et al, 2005, Tellus, 57A, p308-319	DONE IN SERVER	Michel.deque@meteo.fr jean.philippe.piedelievre@meteo.fr
CCCMA	CMAM	T63L71, ~100km T63L41, ~31km	Scinocca et al 2008, ACP, 8, 7055-7074	DONE IN SERVER	John.Scinocca@ac.gc.ca George.Boer@ec.gc.ca
NCEP	CFS v1	L64, 0.2hPa	Saha et al, J. Clim., vol.19, no.15, p3483-3517	DONE IN SERVER	Amy.Butler@noaa.gov Arun.Kumar@noaa.gov

What are we expecting to see?

Analysis of UKMO stratosphere resolving hindcasts:



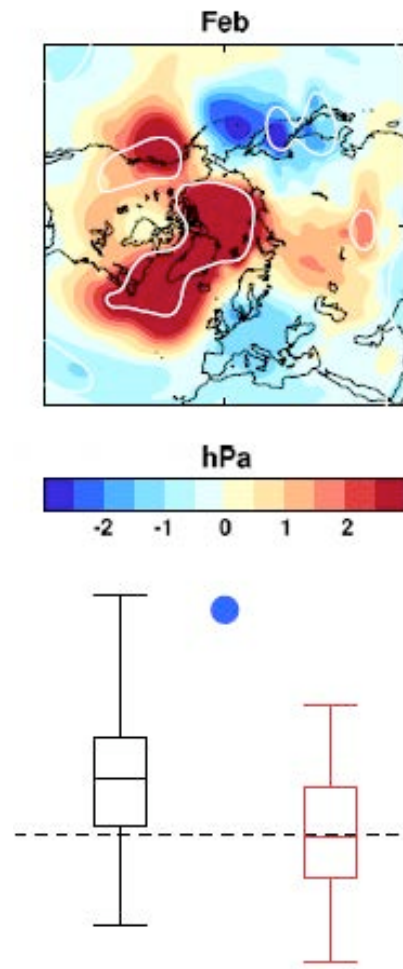
Low top and high top models



Possible improvement in ROC scores in winter but not significant

What are we expecting to see?

Analysis of UKMO stratosphere resolving hindcasts:

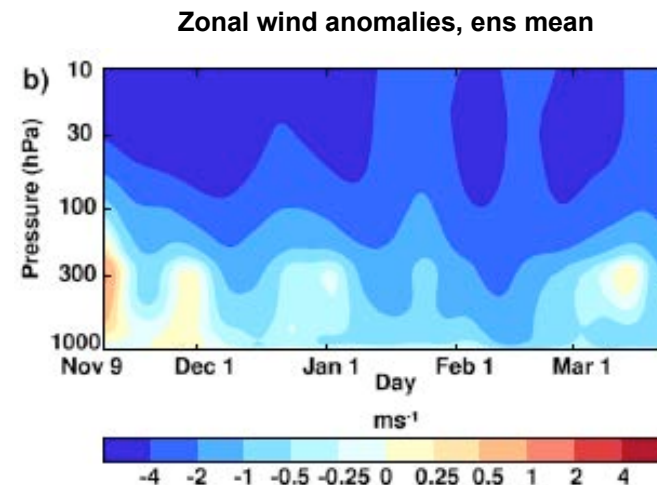


Winter 2009/10: stronger Arctic pressure signal

Significant

High top spans observations but low top doesn't

Conditional predictability for AO given active stratosphere....



Summary

High top and low top hindcasts now in CHFP database

Multimodel analysis underway

Analysis of individual systems implies no big gains in overall skill

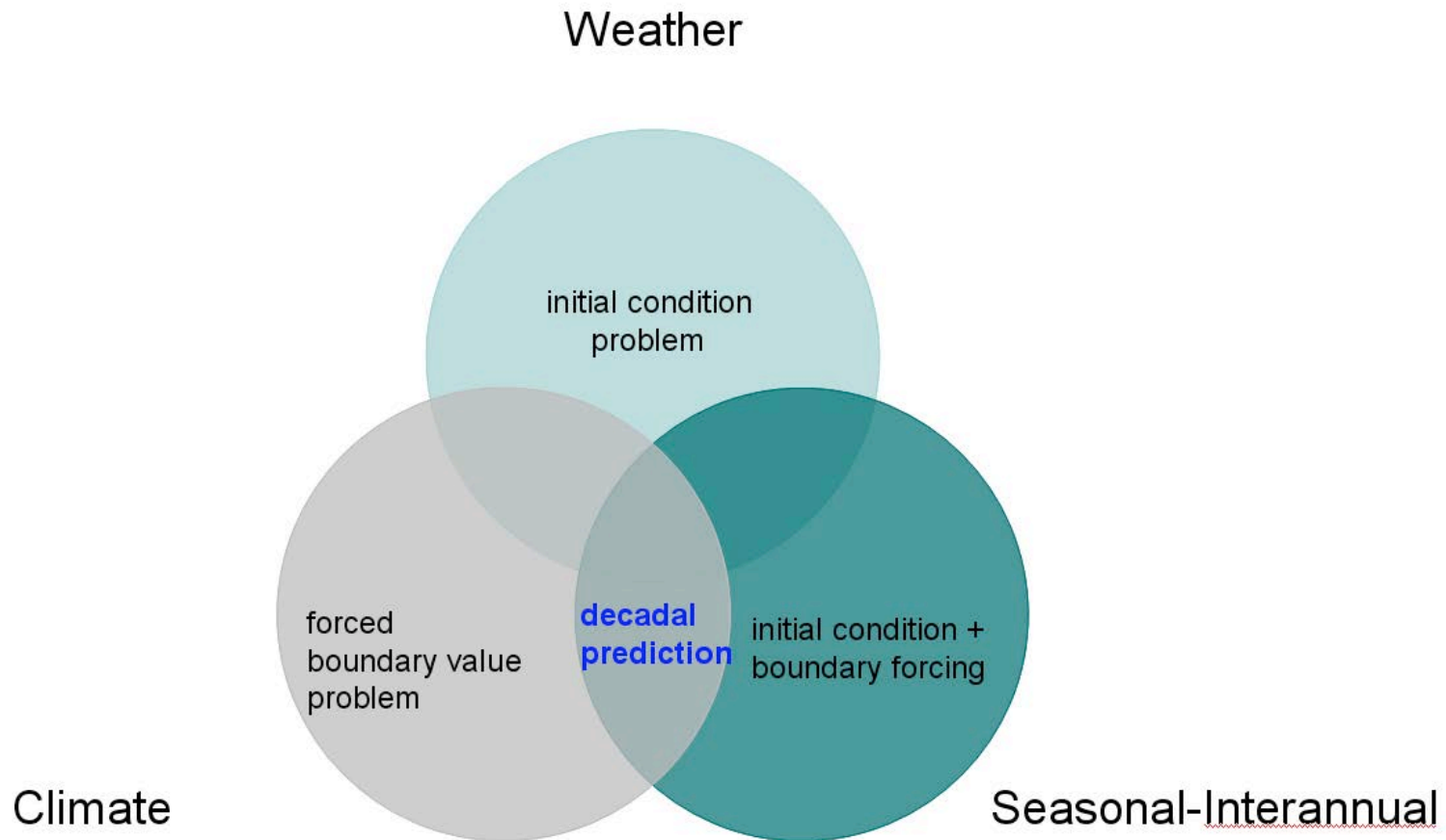
However

Improved representation of stratospheric processes

Clear signatures of stratosphere-troposphere coupling in surface climate

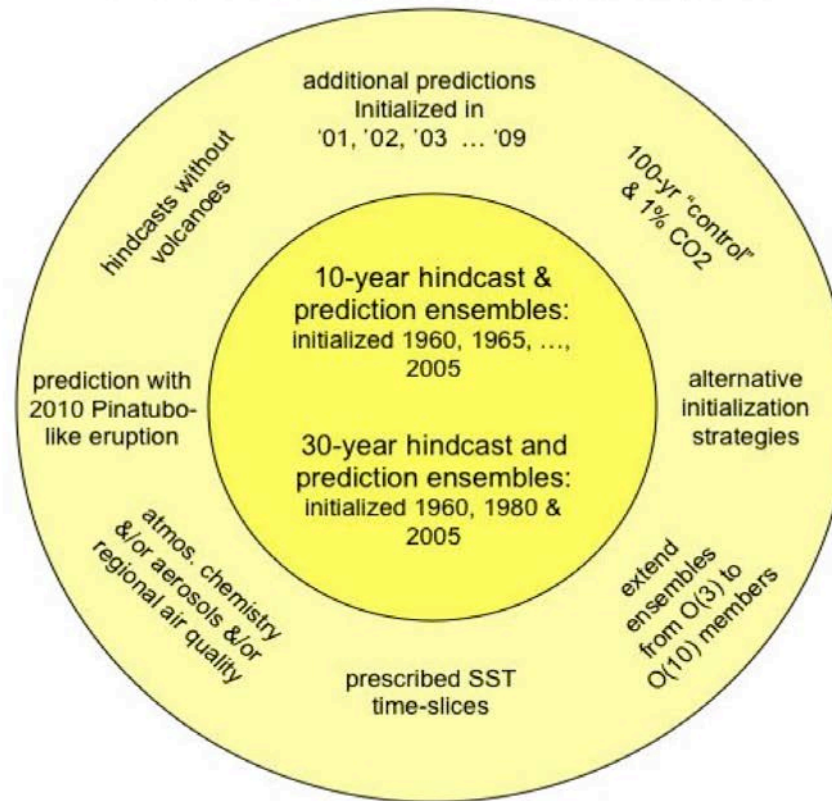
Improved conditional predictability for key events like the record low AO in winter 2009/10

Where does Decadal Prediction fit?



Decadal Predictions

CMIP5 Protocol



CMIP-WGCM-WGSIP oversee this framework

Part of our discussion this morning is to think about 'What next?'

Decadal Forecast Exchange

Doug Smith, Adam Scaife and the decadal prediction community....

- Many groups are now developing decadal predictions
- Key experiments done and analysed for CMIP5
- What about *real time* predictions?

15th session of the WMO Commission for Climatology recommended action to start the coordination and exchange of decadal predictions

Proposal went out to various groups to exchange decadal prediction information

***research exercise – we can learn a lot from this
prevent over-confidence from a single model
equal access, ownership and recognition***

We had an overwhelmingly positive response:

Uni. Tokyo – *Kimoto Masahide* **MRI** – Masayoshi Ishii
SMHI – *Klaus Wyser, Colin Jones* **KNMI** – *Wilco Hazeleger, Bert Wouters*
IC3 – *Francisco Doblas-Reyes, Virginie Guemas* **GFDL** – *Tony Rosatti*
MPI – *Daniela Matej, Wolfgang Muller, Holger Pohlman* **RSMAS** – *Ben Kirtman*
CCCMA – *George Boer, Bill Merryfield* **UKMO-Hadley** – *Doug Smith, Adam Scaife*
NRL – *Judith Lean, David Rind* **NOAA** – *Arun Kumar*

Are others planning to make regular decadal predictions? If so, would you like to take part?

We are exchanging very basic quantities:

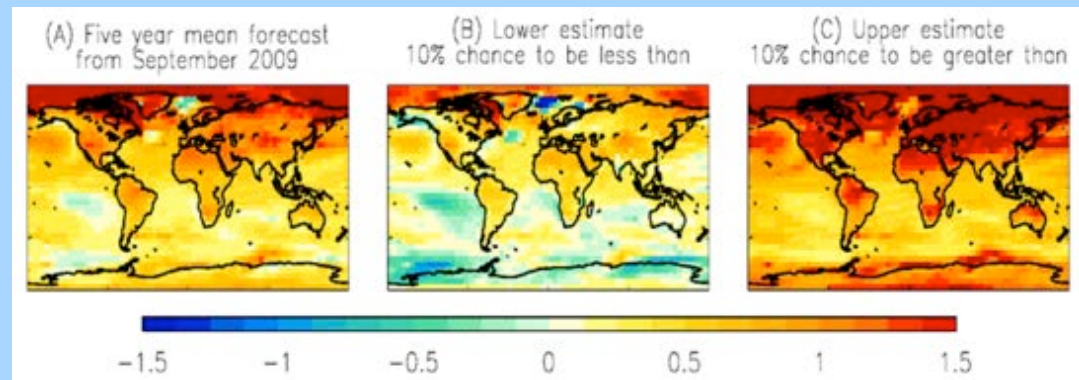
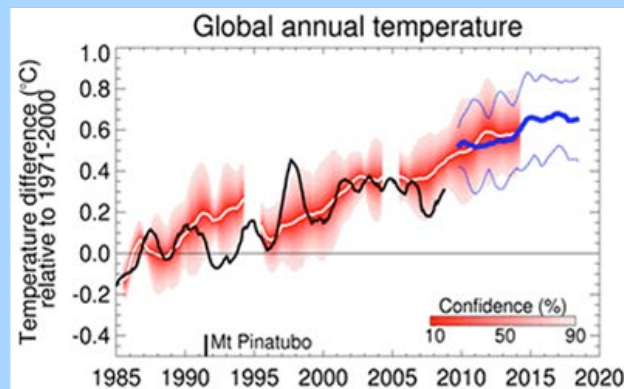
Global Annual Mean Temperature

One file for each year, each member

Exchanged once per year around November

Equal ownership

Example diagnostics:



Surface temperature: 2012-2016 relative to 1971-2000

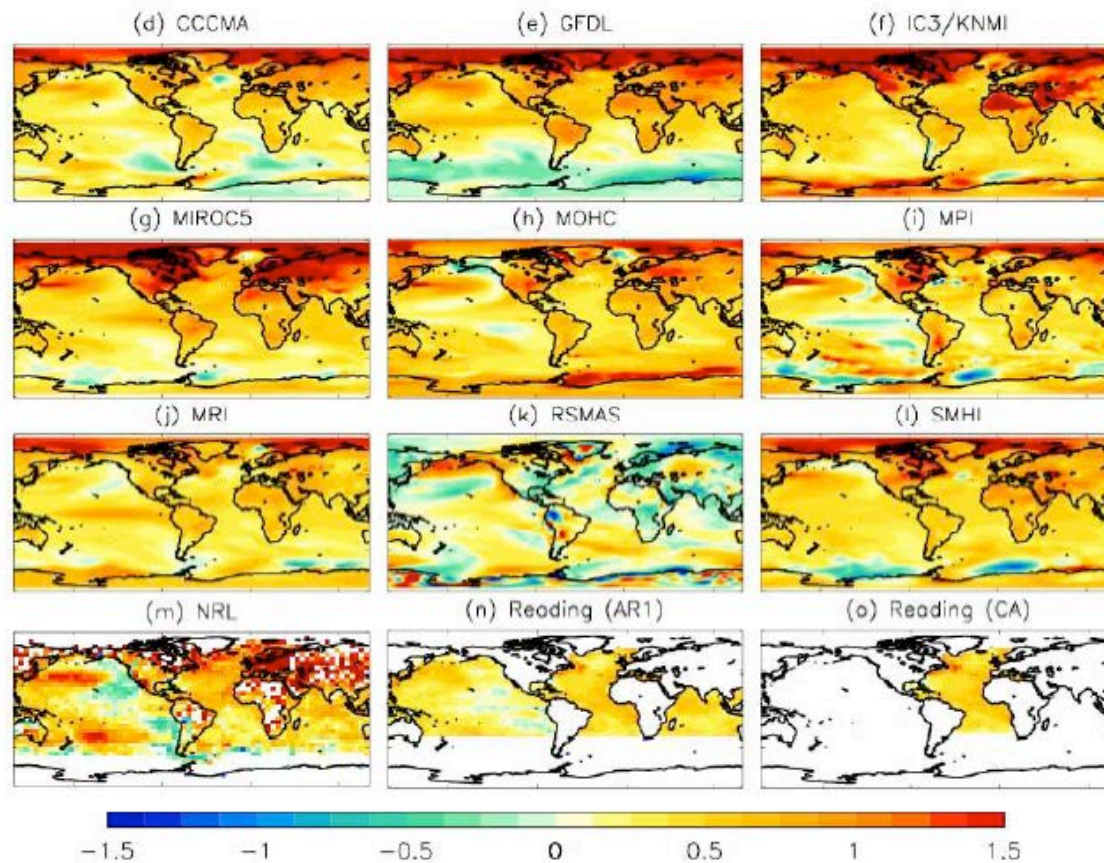


Figure 3: Forecast temperature anomalies (as Fig. 2) for the 5-year period 2012 to 2016.

Surface temperature: 2012-2016

effect of initialisation

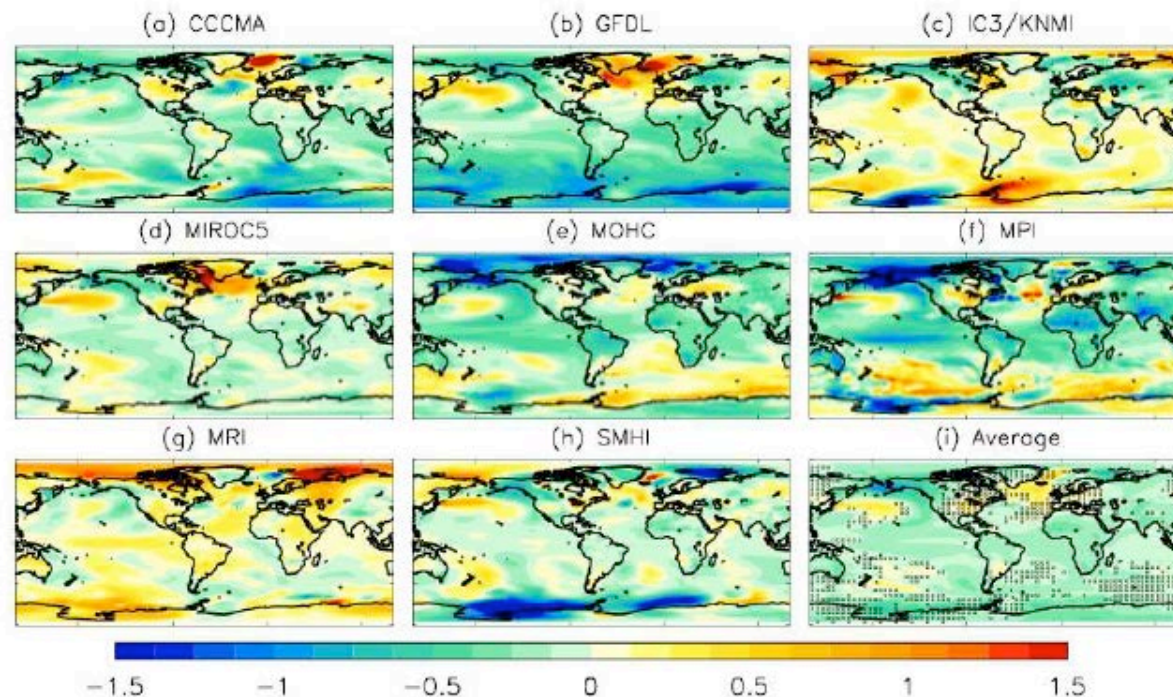


Figure 6: Impact of initialization (initialized minus uninitialized ensemble means) on forecasts of the period 2012 to 2016. Unstippled regions in (i) indicate a 90% or higher probability that differences between the initialized and uninitialized ensemble means did not occur by chance (based on a 2 tailed t-test of differences between the two ensemble means assuming the ensembles are normally distributed).

SUMMARY

Real-time multi-model decadal climate predictions

Doug M. Smith, Adam A. Scaife, George J. Boer, Mihaela Caian, Francisco J. Doblas-Reyes, Virginie Guemas, Ed Hawkins, Wilco Hazeleger, Leon Hermanson, Chun Kit Ho, Masayoshi Ishii, Viatcheslav Kharin, Masahide Kimoto, Ben Kirtman, Judith Lean, Daniela Matei, William J. Merryfield, Wolfgang A. Müller, Holger Pohlmann, Anthony Rosati, Bert Wouters and Klaus Wyser.

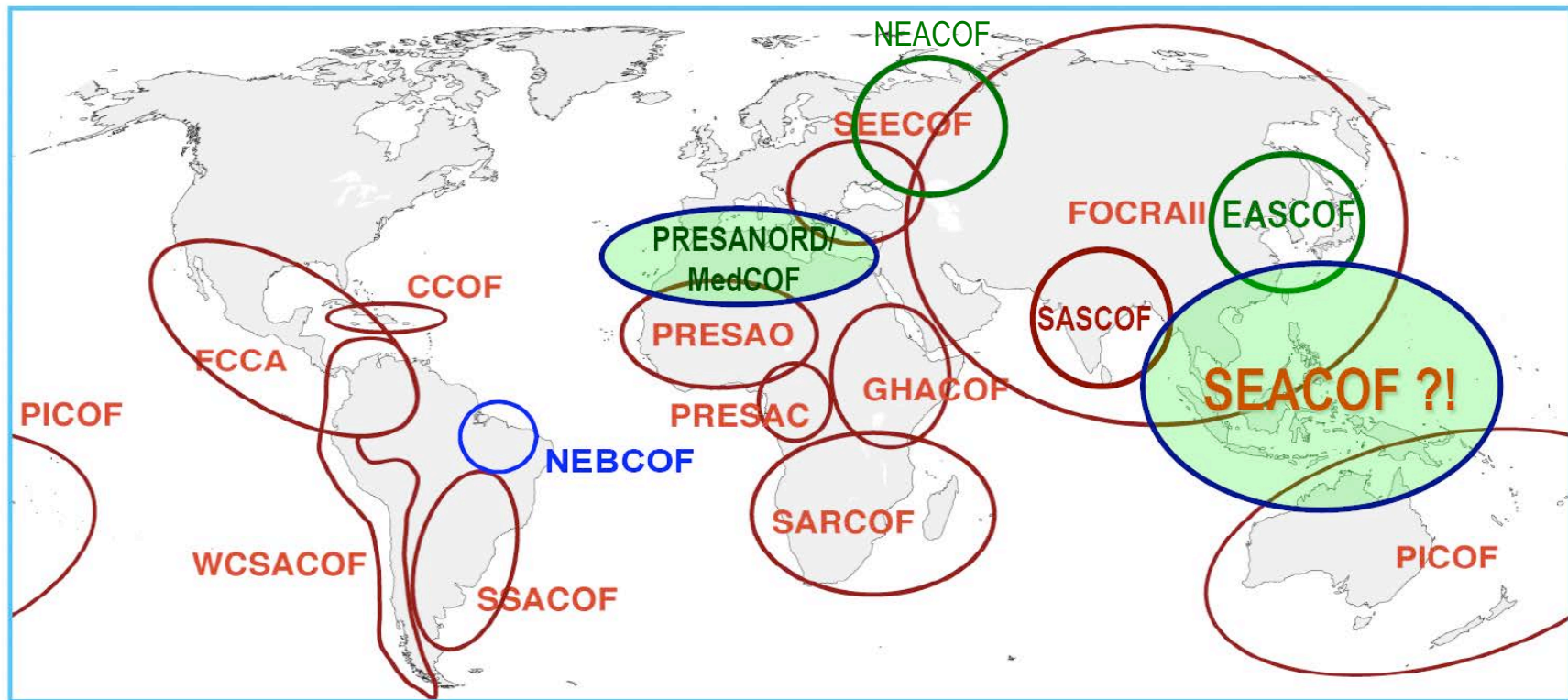
Climate Dynamics, submitted 2012. Also IPCC AR5...

Please contact Doug Smith or Adam Scaife to contribute your forecasts to the exchange for 2013...

WMO Global Producing Centres

WMO Global Producing Centres			
 Canada	Montreal	 BCC	Beijing
 ECMWF		 HYDROMETEOROLOGICAL CENTRE OF RUSSIA	Moscow
	Seoul		Tokyo
			Washington
	Exeter	 POAMA	Melbourne
		 CPTEC	CPTEC

WCRP Regional Climate Outlook Forums worldwide



WGSIP/WGCM discussion points

Decadal prediction protocol for CMIP6

- Address bias adjustment issues
- Number of start dates – every year? Case studies?
- No need for sub-daily output?
- Length 5,10,30 years?
- Coordinated assessment to accelerate development? Test for overconfidence?
- “No Assimilation” runs in parallel
- Ensemble size, is 3 too small?
- Include ESMs?

Decadal prediction: a sensitive test of climate sensitivity?

CORDEX downscaling of decadal predictions – try stats?

**Scenarios: aerosols and solar important for decadal predictions but
initialisation and future behaviour not properly catered for**

Decadal prediction exchange: future? Near real-time?

AMIP: larger ensemble size to compare with hindcasts?

Relative Benefit? Decadal, Seasonal, Projections (2500, 1800, 2000)