

Current relevant interests and plans

Carsten Frederiksen, Simon Grainger, Stacey Osbrough (CAWCR):

- Decadal variability of Southern Hemisphere circulation. Understanding of relationships between Australian climatic extremes, atmospheric circulation and climate forcings. Attribution changes in climate forcing function (inverse modeling) – feedbacks from weather systems onto climate. Estimation of Climatic Noise and Climatic Signal in interannual and decadal variability SH and NH circulation, rainfall and temperature – isolation of Externally-forced component – potential for seasonal and decadal prediction. Three-way interaction between Climate Change, Changes in Low Frequency Variability and Weather Systems.
- Climatic Extremes – Flooding: 1973-1976, 2010-2012, Droughts: Federation Drought (around 1900), World War 2, Millennium Drought (1997-2010). Study changes in background climate and impacts on weather systems during these periods. Identify forcing function.

Chris Folland (UK Met Office Hadley Centre, University of Gothenburg):

- Seasonal and decadal variability of European summer and winter climate. Understanding sources of predictability in summer in particular. Taking a global perspective with emphasis on teleconnections with the West African Monsoon. Understanding NH modes of variability in all seasons. Focus on summer NAO – models not performing well in summer, better in winter. Role of North Atlantic, influence of diabatic heating, evidenced by precipitation. Influences of SST gradients globally. Forcing of extratropical shift in storm tracks. Tropical storm activity shifts towards US coast in anti-cyclonic phase of summer NAO.
- Use of the following tools:
 - Observed and reanalysis datasets.
 - C20C detection and attribution runs (1960-current) with full forcing.
 - HadGEM3 N216 coupled runs (1960-current).

Phil Arkin (University of Maryland):

- Creation and validation, through diagnostic analyses and intercomparisons, of precipitation datasets. Making them available and useful for model analysis by determining where they are good and characterizing dataset issues. Extending rainfall reconstructions further into the past and improving spatial and temporal resolution where possible.
- Descriptive and diagnostic studies of variability in rainfall. Focus on centennial-scale trends, and phenomena with seasonal to decadal scales and their manifestations in models. Use newer high-resolution datasets to investigate specific events, such as the recent extreme Pakistan and Colorado floods.

Ben Cash (COLA, George Mason University):

- Monsoon simulation, understanding of rainfall datasets in the Indian Ocean region. Remote forcing of Monsoon, health impacts. Experience with logistics of ensemble simulations with high resolution models.
- IFS 16km – T1279 and 1° ocean resolution appears realistic. Has 50-member ensemble 1980-2010. Monthly data relatively accessible, daily data has logistical issues.

Ed Schneider (COLA, George Mason University):

- Long time-scale may be forced by atmospheric noise, due to coupled, atmosphere-ocean processes, or ocean internal variability. Infer atmospheric weather noise from AMIP-type ensembles. Estimate noise in key drivers of decadal variability in CGCM control experiments and decadal prediction experiments using diagnostic models (interactive ensemble). SST variability and its atmospheric response not explained by atmospheric noise is due to coupled internal variability or ocean noise.

Lawrie Rikus (CAWCR):

- Evaluation of atmospheric circulation in reanalysis products and climate models.

Potential C20C activities

Carsten Frederiksen, Simon Grainger, Stacey Osbrough (CAWCR):

- Papers on Assessment and Projections of modes of interannual variability in the Southern Hemisphere in CMIP5 models.
- Paper(s) on modes of interannual variability of NH circulation (with Zheng (BNU), Ying (IAP) and Folland).
- Proof of concept of decadal variability methodology with existing CMIP5 1850-2100/2300 (2014, with Zheng).
- Analysis of decadal variability in C20C HadISST2 decadal experiment (2015-16).

Chris Folland (UK Met Office Hadley Centre, University of Gothenburg):

Hans Linderholm, University of Gothenburg

- CKF Lead paper on climatic influencing factors on the winter hydrological half year in UK (early 2014) – part of interests in seasonal forecasting.
- CKF Paper on relationship between European summer climate and climate forcing, particular West African Monsoon (end 2014).
- Co-author paper on NH interannual modes of variability in all seasons (with Frederiksen et al.).
- Decadal modes of variability in CMIP5 and/or C20C HadISST2 decadal experiment with reference to European summer climate (and winter UK climate) (2015-16).
- Linderholm: Extension of European summer climate time series over millennium (2015).
- Special study led by Hans Linderholm of potential influence of decadal AMO on European summer climate over the last millennium (2016).
- CKF: Issuing annual Global Surface Temperature forecasts, and understanding the global Surface Temperature Pause – paper 2014?

Phil Arkin (University of Maryland):

- Providing advice on best use of available and planned observational precipitation datasets.

Ben Cash (COLA, George Mason University):

- Analysis of modes of interannual variability in “low resolution” (60km) IFS coupled ensemble simulations of Indian monsoon, with emphasis on the intraseasonal component. Seasonal runs starting May, November 1980-2013 (with Frederiksen et al., 2014-15).
- Support for C20C HadISST2 decadal experiment – dependent on end-user data requirements (by 2017).
- AGCM ensemble(s) forced by HadISST2 and RCP85 anomalies (details yet to be worked out, 2015-16).

- Potentially small ensemble (~4 members) of coupled Historical and RCP85 forcings (2016-17).

Ed Schneider (COLA, George Mason University):

- Write a paper on role of weather noise in forcing Atlantic SST variability of a long CGCM simulation with constant external forcing (2014).
- Write a paper on separating observed atmospheric variability into a) response to SST+external forcing and b) weather noise (2014).
- Write a paper on roles of weather noise and external forcing in Atlantic SST variability in an ensemble of CGCM simulations forced by 20th century external forcing (2015).
- Attribution of response in coupled climate models to weather noise forcing. Like to be able to do this in multiple CGCMs (by 2017).
- Understand differences between C20C pacemaker experiments and AMIP-type simulations in a Perfect Model framework (by 2017).

Lawrie Rikus (CAWCR):

- Write a paper on tropospheric jets in reanalysis products (for comment from interested C20C participants).
- Providing advice on best use of reanalysis products for evaluating C20C experiment output.

Proposed experiment requirements

- Long (250+ years) ensemble (4+ members) of GCM realizations for decadal variability analysis. Low resolution (~200km/N96/T63) acceptable for atmospheric circulation. Details to be discussed with modeling groups in the near future.
- High-resolution coupled model ensembles for short periods (30 years). Many simulations already completed in IFS. Availability of such experiments for major recent global rainfall events (eg Queensland, Pakistan, Colorado).
- New/extended/high-resolution observational datasets for composites, variability analysis, intercomparisons etc.

To do list

- Summary of existing and new ocean rainfall datasets, their strengths and weaknesses, relevant websites (eg KNMI explorer) (Arkin).
- Documentation of available IFS simulations at COLA (Cash).
- Specification of data requirements for individual projects (advised by Folland).

Major relevant recent publications (2008-13)

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