

(Clouds Above the United States and Errors at the Surface)

"A project with an observational focus,
which evaluates the role of clouds, radiation and precipitation
processes
in contributing to the surface temperature biases in the region of the
central United States and
which are seen in several weather and climate models."

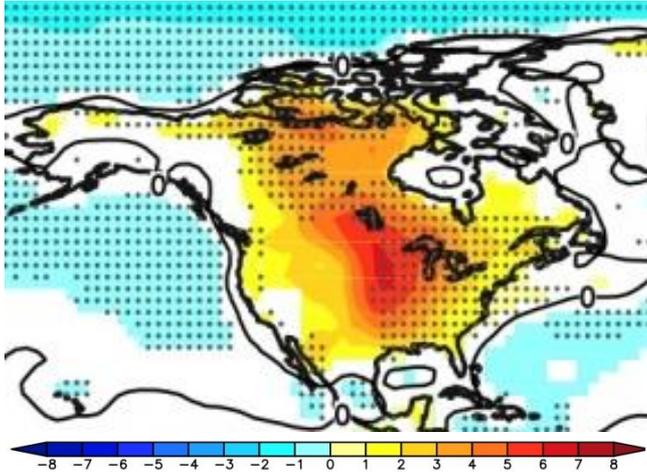
Agenda: Tuesday 3 May 2016

- 19:30 Introduction to CAUSES (Cyril Morcrette)
- 19:40 Warm bias contribution from surface water and energy budgets (Hsi-Yen Ma)
- 20:00 Diagnosis of the Warm Bias Exhibited in CMIP5 AMIP Simulations over ARM SGP Site (Chengzhu Zhang)
- 20:20 Attribution Study of Surface Temperature Biases in GCMs (Kwinten Van Weverberg)
- 20:40 Areas for future work (Cyril Morcrette)
- 20:45 Open discussion
- 21:00 Close



Introduction

2 Meter Temperature Bias



The warm bias over the US in summer is common to many GCMs.

It is seen in several climate models' long-term climate mean and it also shows up as a bias within a *few days* when running climate models from analysis in NWP mode.

Aims

A comparison project aiming to **evaluate clouds, radiation and precipitation** in several weather and climate models using ground-based observations to better understand the **reasons for the surface temperature error**.

Use data from **Southern Great Plains** (SGP) site (located within region of warm bias).

Choose a period with the richest possible source of observations. So can perform the most detailed analysis possible.

Focus on April-August 2011, which includes **MC3E** (Midlatitude Continental Convective Cloud Experiment: 22 April to 6 June 2011).



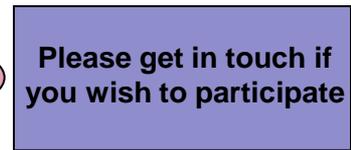
Research Focus

Radiation errors - particularly due to clouds

Led by Met Office, UK: Cyril Morcrette, Kwinten Van Weverberg, and Jon Petch

Precipitation and surface energy budget errors

Led by U.S. Department of Energy, LLNL: Hsi-Yen Ma, Stephen Klein and Shaocheng Xie



CAUSES consists of 3 experiments

Experiment 1

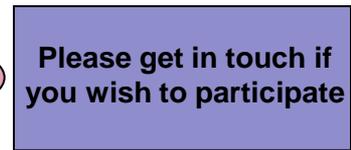
- 5-day hind-casts, starting from ERA-Interim analyses at 00Z for each day of April to August 2011.
- For column over SGP,
 - sub-hourly, profile of all thermodynamics, cloud cover, condensate & surface and TOA fields.
- For CONUS region, re-gridded onto 1 deg x 1 deg grid.
 - Hourly fields 2d fields of surface fluxes, precip and TOA radiation

Experiment 2

- Multi-month atmosphere-only hind-casts. Start each on first day of month of JFMAMJJA (2011).
- For CONUS region, re-gridded onto 1 deg x 1 deg grid
 - 3-hourly 2d fields of surface fluxes, precip and TOA radiation

Experiment 3

- AMIP-style 10-year climate simulation (2000-2011)
- For CONUS region, re-gridded onto 1 deg x 1 deg grid
 - Monthly mean, 2d fields of surface fluxes, precip and TOA radiation
- SGP column, sub-hourly, profile of all thermodynamics, cloud cover, condensate.



Progress since last ASR/ARM meeting (March 2015)

Logistics

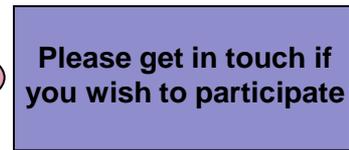
- Secured funding from ASR for Met Office effort on CAUSES.
- Email discussions with participants regarding definition of diagnostics, re-gridding, file formats (e.g. shallow convective cloud liquid water content).
- Participants have been uploading data to server at LLNL.

Data

- We now have data from 10 different GCMs.

Science

- 3 talks from: Hsi-Yen, Chengzhu and Kwinten.



List of Participants

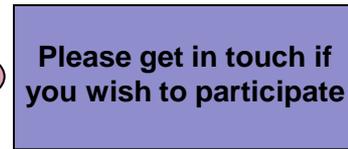
Model	Institute	Scientists
ARPEGE	Meteo France	Eric Bazile
CAM5	LLNL	Hsi-Yen Ma, Steve Klein, Chengzhu Zhang
CAM5-IHOC	NASA-LaRC	Anning Cheng
CanCM4	CCCMA	Jason Cole, Bill Merryfield
CNRM	Meteo France	Romain Roehrig
IFS	ECMWF	Maike Ahlgrimm, Richard Forbes
LMDZ	LMD	Frederique Cheruy, Catherine Rio, Frederic Hourdin
MetUM-GA6	Met Office	Cyril Morcrette, Kwinten Van Weverberg, Jon Petch
WRF-CAM5phys-CLM	PNNL	Bill Gustafson, Yun Qian, Larry Berg
WRF-CAM5phys-NOAH	PNNL	“



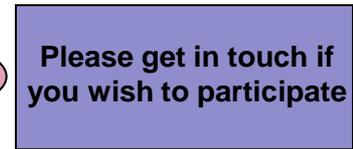
Please get in touch if you wish to participate



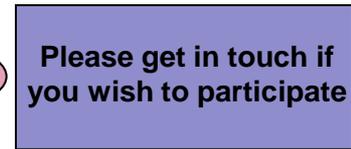
Hsi-Yen's talk



Chengzhu's talk



Kwinten's talk



Topics for discussion

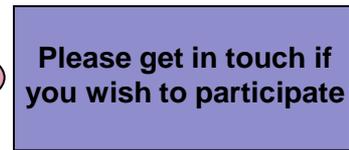
Suggestions for extra analysis for currently ongoing studies.

Suggestions for whole new areas to look at.

Would anyone like to suggest, and lead, a new analysis effort.

Work cycle 1: analyse and write up current state of models.

Work cycle 2: can we use information from WC1 to develop improved parametrizations, repeat some of the experiments and repeat the analysis.



Instructions for taking part

Full details of the experimental set-up and the diagnostics required is available from CAUSES website:

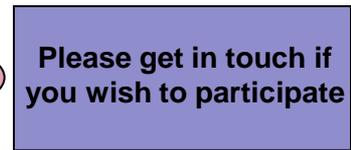
<http://portal.nersc.gov/project/capt/CAUSES/>



Please get in touch if you wish to participate



Extra slides



CAUSES experiments: A summary

Domain Grid Temporal freq Length of run	Column nearest to SGP Single Column Every timestep	300x300km region centred on SGP Native model grid Hourly	Whole of CONUS Re-gridded to 1degx1deg Hourly (instantaneous)	Whole of CONUS Re-gridded to 1degx1deg Hourly (hourly-mean)	Whole of CONUS Regridded to 1degx1deg 3-hourly	Whole of CONUS Regridded to 1degx1deg Monthly mean
1 5-day hindcasts	1a	1b	1c	1d		
2 Multi-month seasonal hindcasts					2a	2b
3 10-year climate run free-running	3b					3a
4 10-year Climate run, nudged	4b					4a