



# Transpose-AMIP

Keith Williams

Steering committee: Keith Williams (chair), David Williamson, Steve Klein, Christian Jakob, Catherine Senior

EUCLIPSE meeting, 10/10

© Crown copyright Met Office



# More information

[www.transpose-amip.info](http://www.transpose-amip.info)



# What is Transpose-AMIP?

- Basically, running climate models in NWP mode.
- Core expt for Transpose-AMIP II is to run 64 hindcasts, each 5 days long, initialised from ECMWF YOTC analysis.
- Optional expt to repeat the same set of hindcasts with NASA MERRA re-analysis or own analysis.
- The hindcasts are spread through the annual and diurnal cycles during 2008/9 and were chosen to tie in with YOTC and coincide with some of the IOPs in:
  - VOCALS (SE Pacific stratocumulus)
  - AMY (Asian monsoon)
  - T-PARC (mid-latitude Pacific)
- Any global modelling centre (NWP or climate) can submit data. Those taking part in CMIP5 should use the same model as is being used for their AMIP simulation.

[www.transpose-amip.info](http://www.transpose-amip.info)

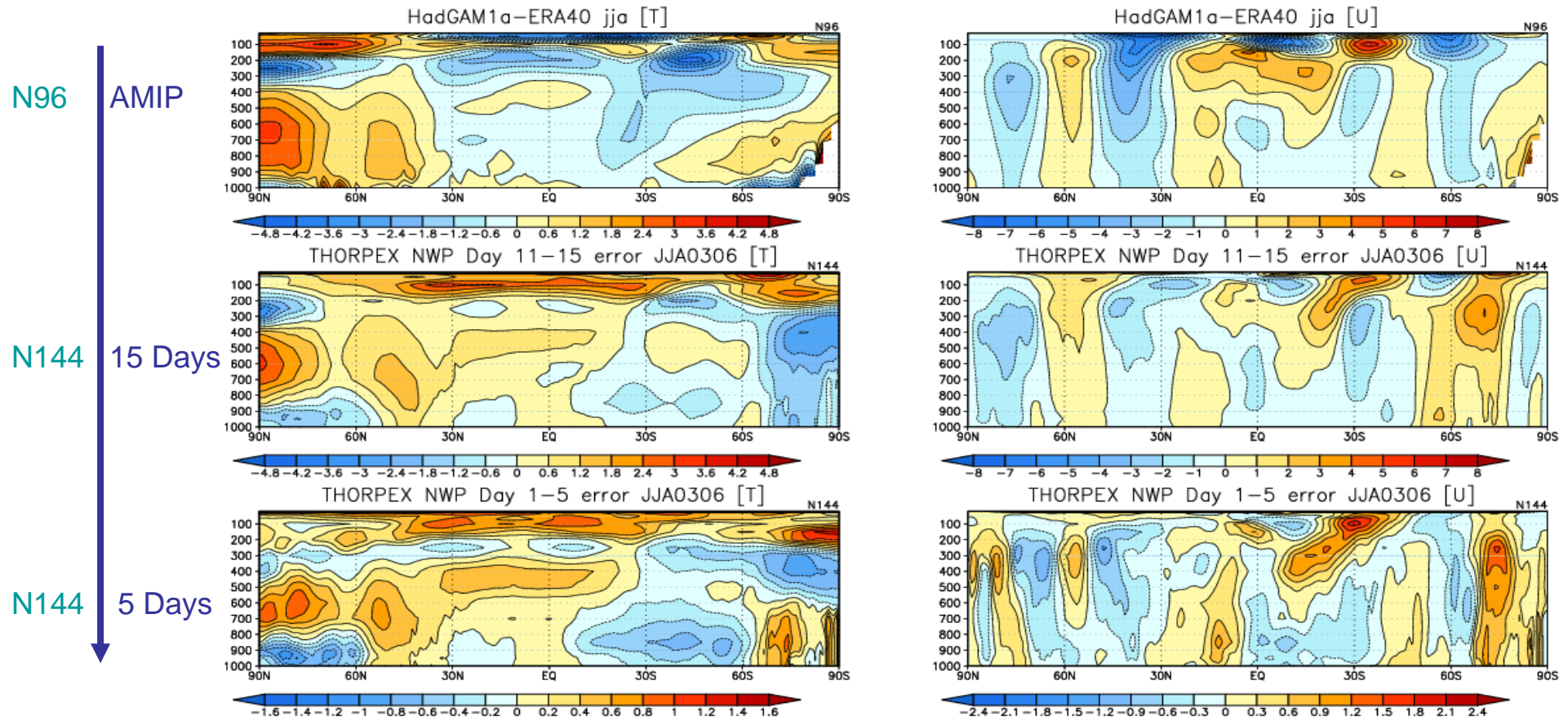


# Why would I want to do that?

- To test model's parametrizations while the circulation is still close to observed.
- To evaluate processes operating in the model against observations for particular events (e.g. ARM/Cloudnet sites, actual A-train passes, etc.)
- To compare SCM case study results to full GCM.
- To be able to comment on the ability of models taking part in CMIP5 to accurately represent fast processes.

[www.transpose-amip.info](http://www.transpose-amip.info)

# Met Office zonal T & u biases



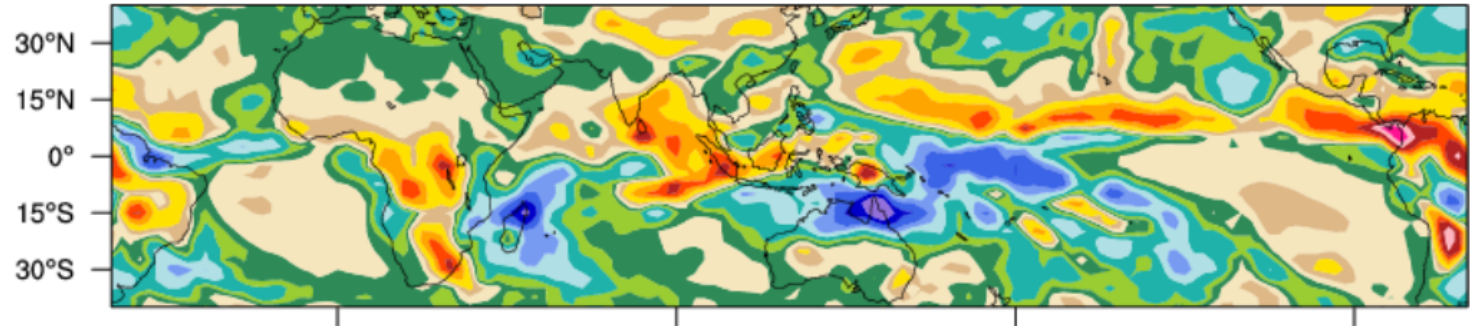
[www.transpose-amip.info](http://www.transpose-amip.info)



# GFDL precipitation biases

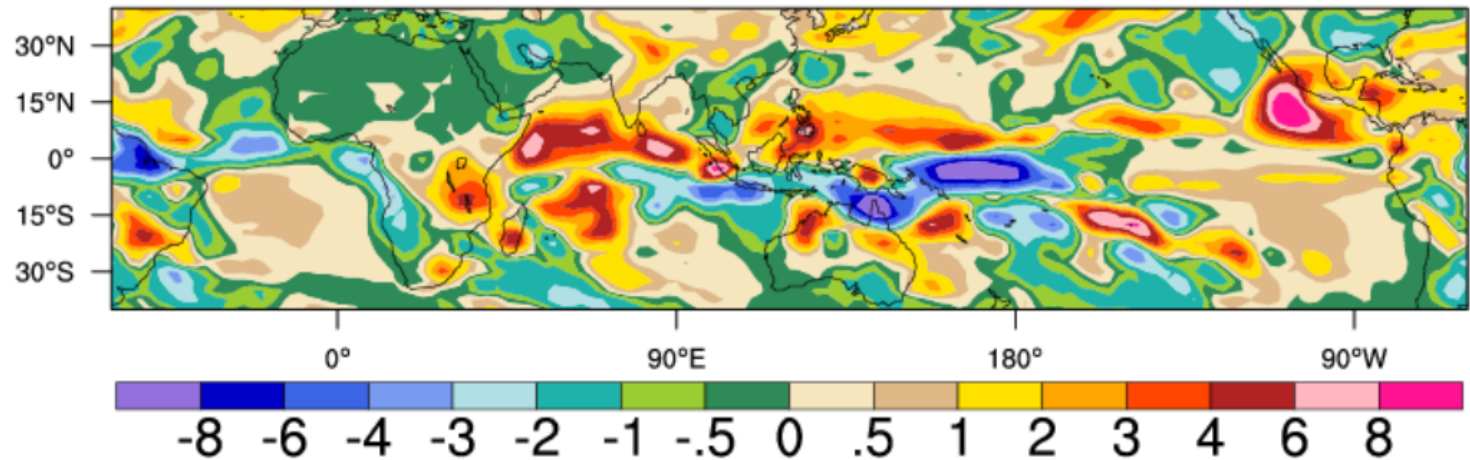
PPT Day3 AM2-CMAP DJF

Day 3 error



AM2-CMAP\_DJF\_1992-3

AMIP error



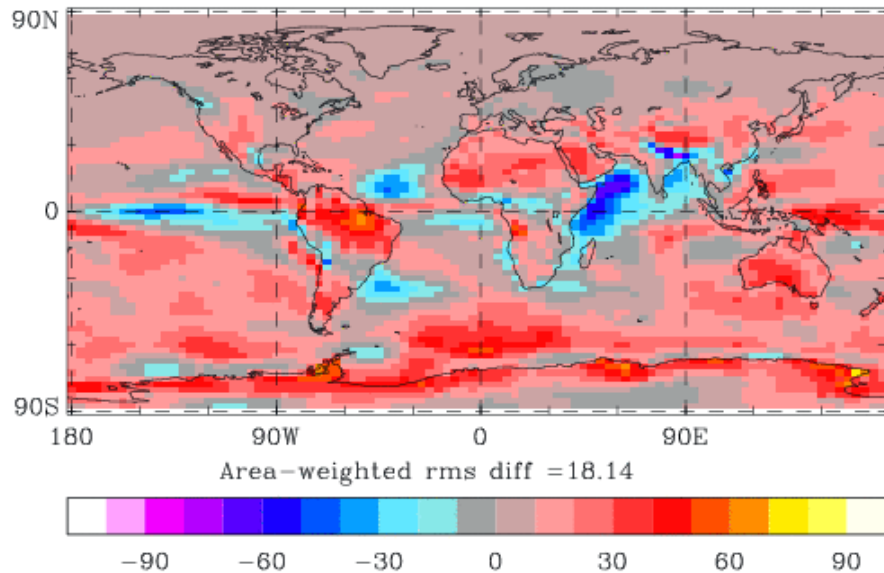
[www.transpose-amip.info](http://www.transpose-amip.info)



# Example analysis 1: Southern Ocean warm bias (MetUM)

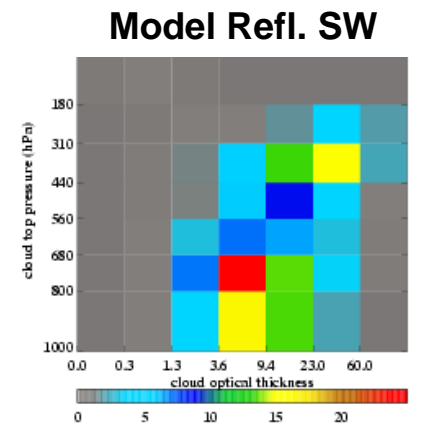
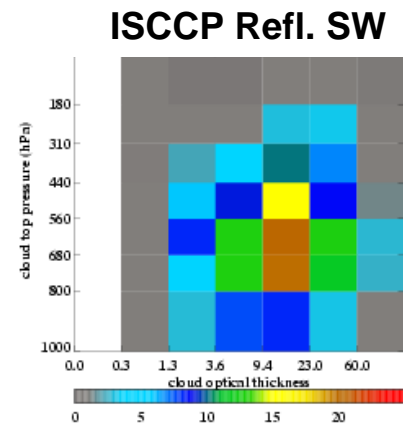
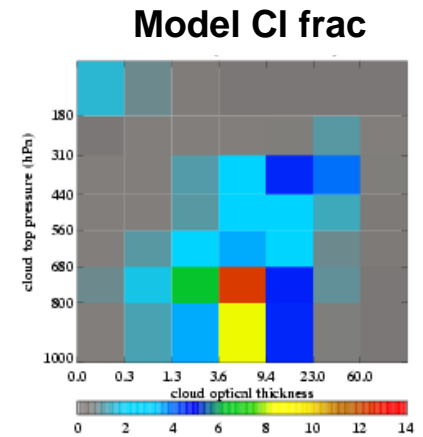
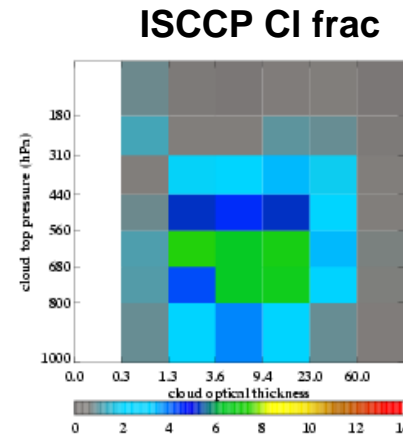
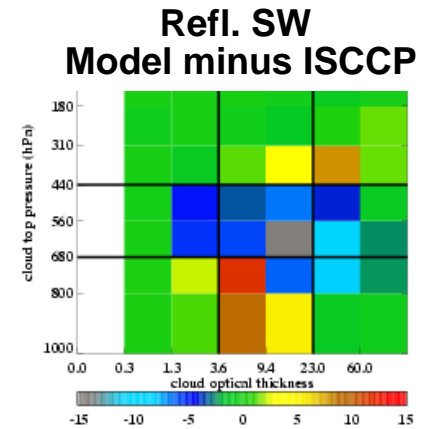
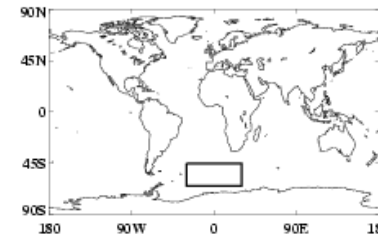
# Climate model bias

DJF surface net down SW bias



Warm Southern Ocean due, in part to excessive surface downward SW.

This is due to a lack of bright mid-level-top cloud.

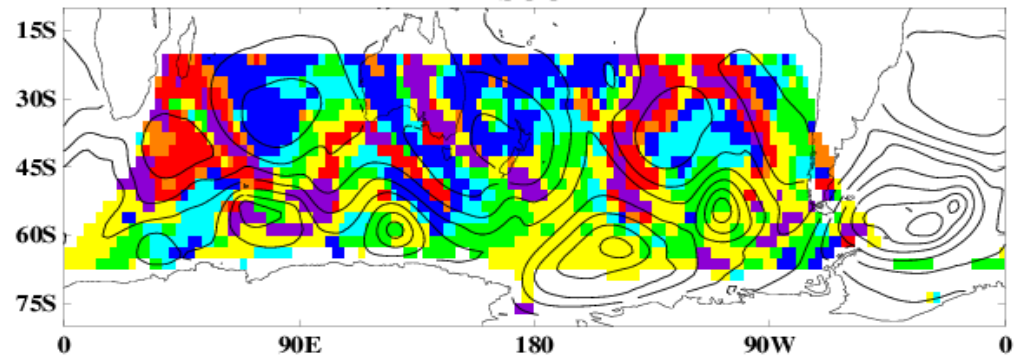




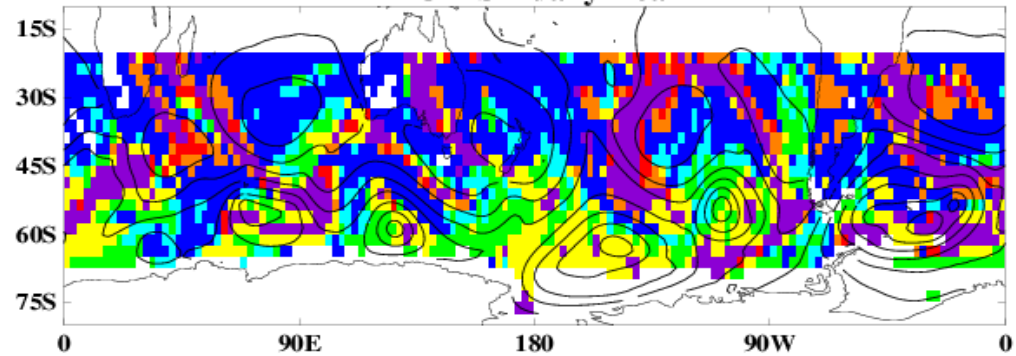


- Clear-sky
- Shallow Cu.
- Transition
- Stratocu.
- Mid-level
- Thin Cirrus
- Cirrus
- Frontal

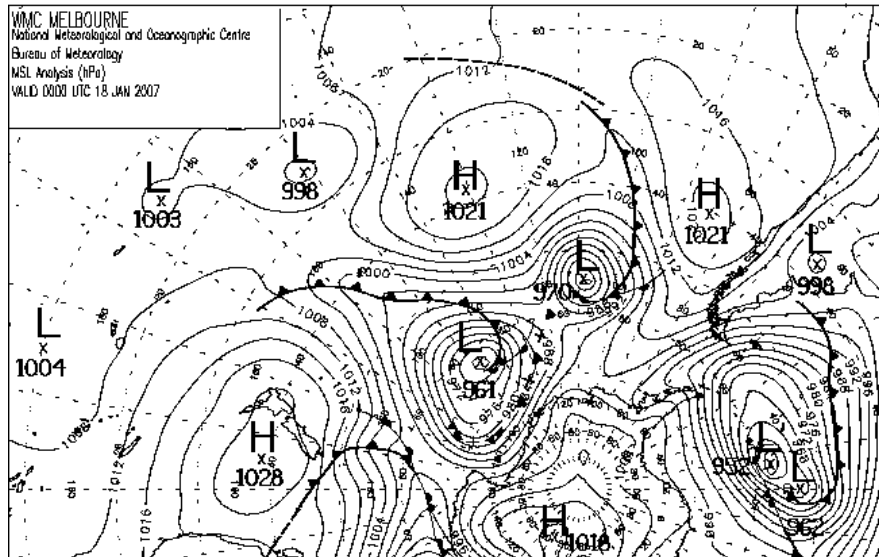
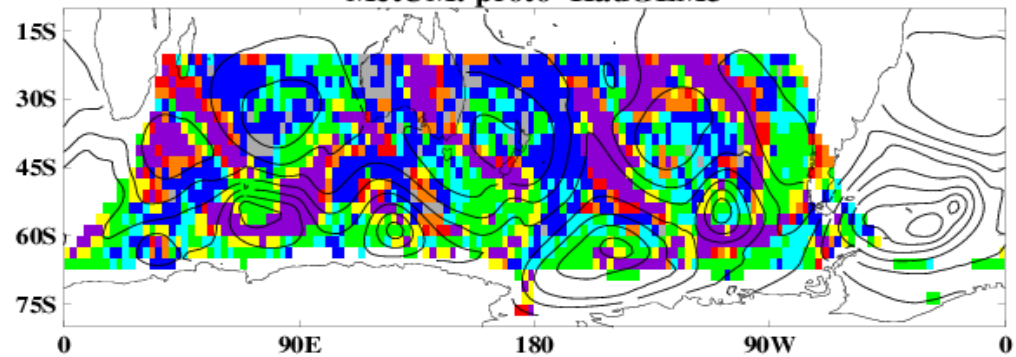
ISCCP



MODIS – daily mean



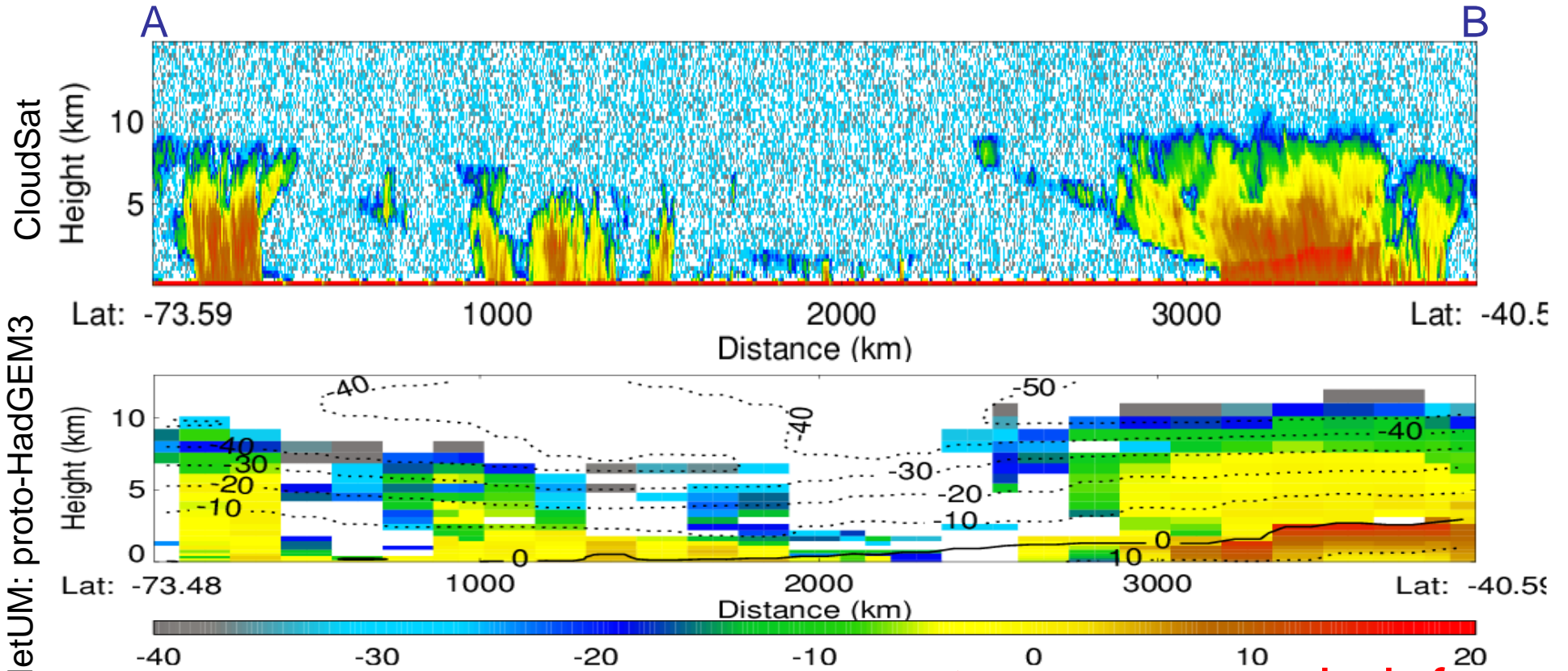
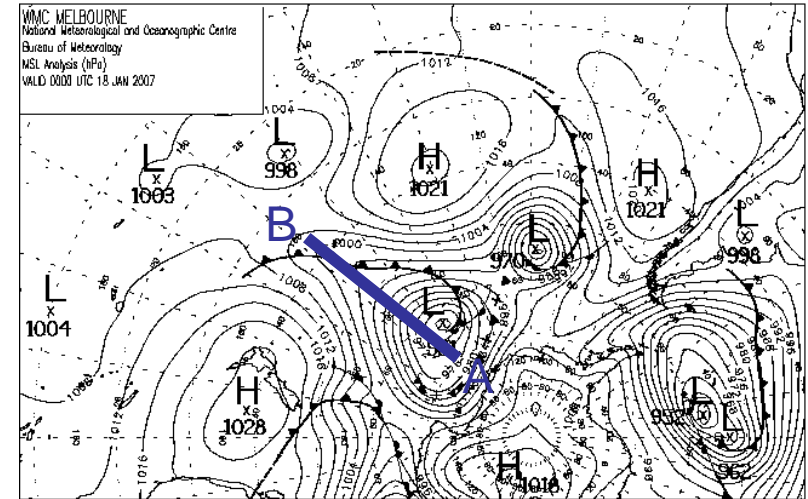
MetUM: proto-HadGEM3



[www.transpose-amip.info](http://www.transpose-amip.info)



# Comparison with CloudSat using COSP



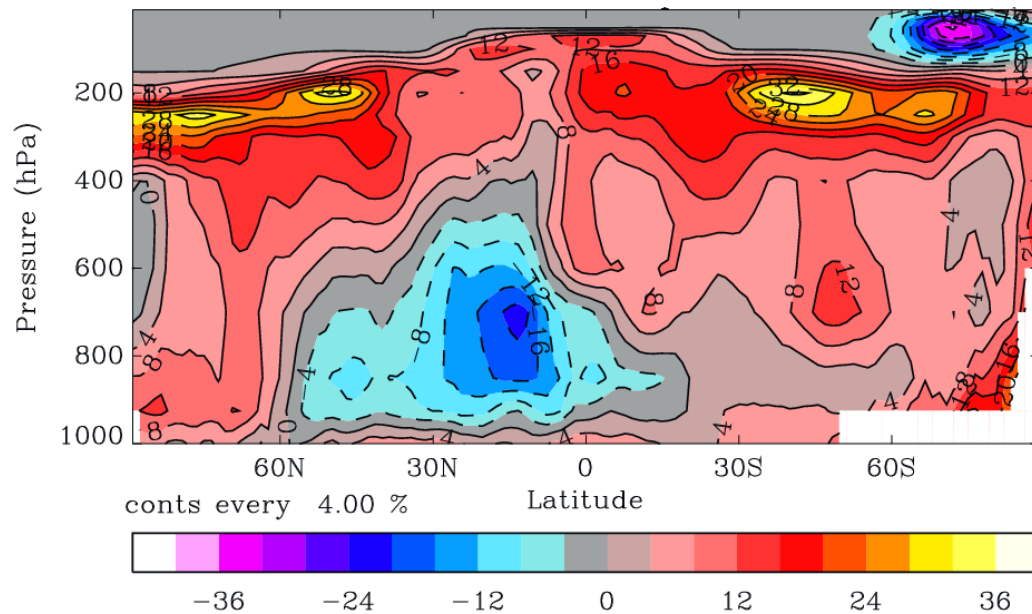
[www.transpose-amip.info](http://www.transpose-amip.info)



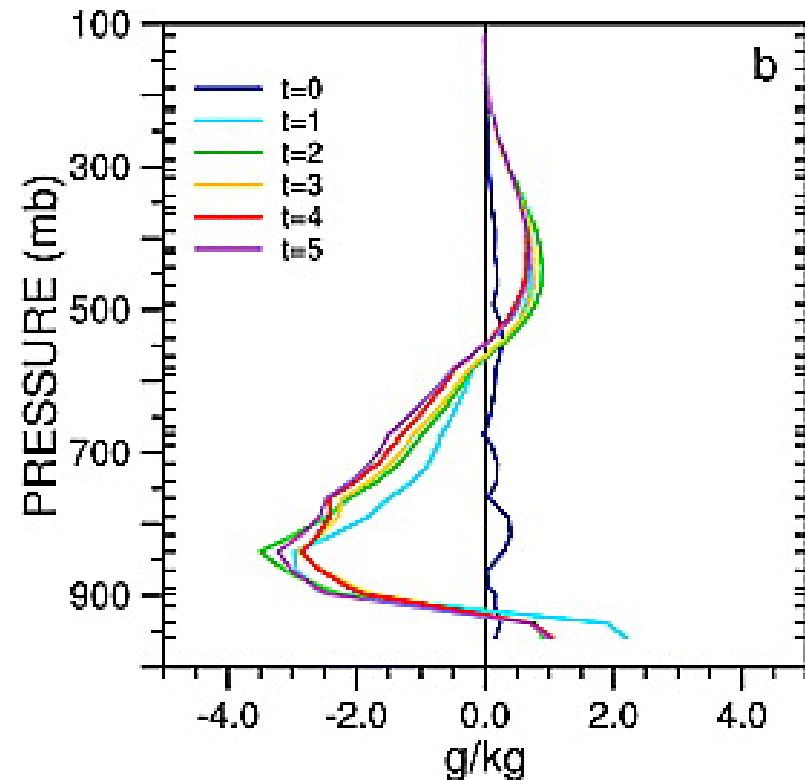
# Example analysis 2: Dry lower troposphere (NCAR CAM)

# CAM humidity errors

Zonal mean climatological RH bias

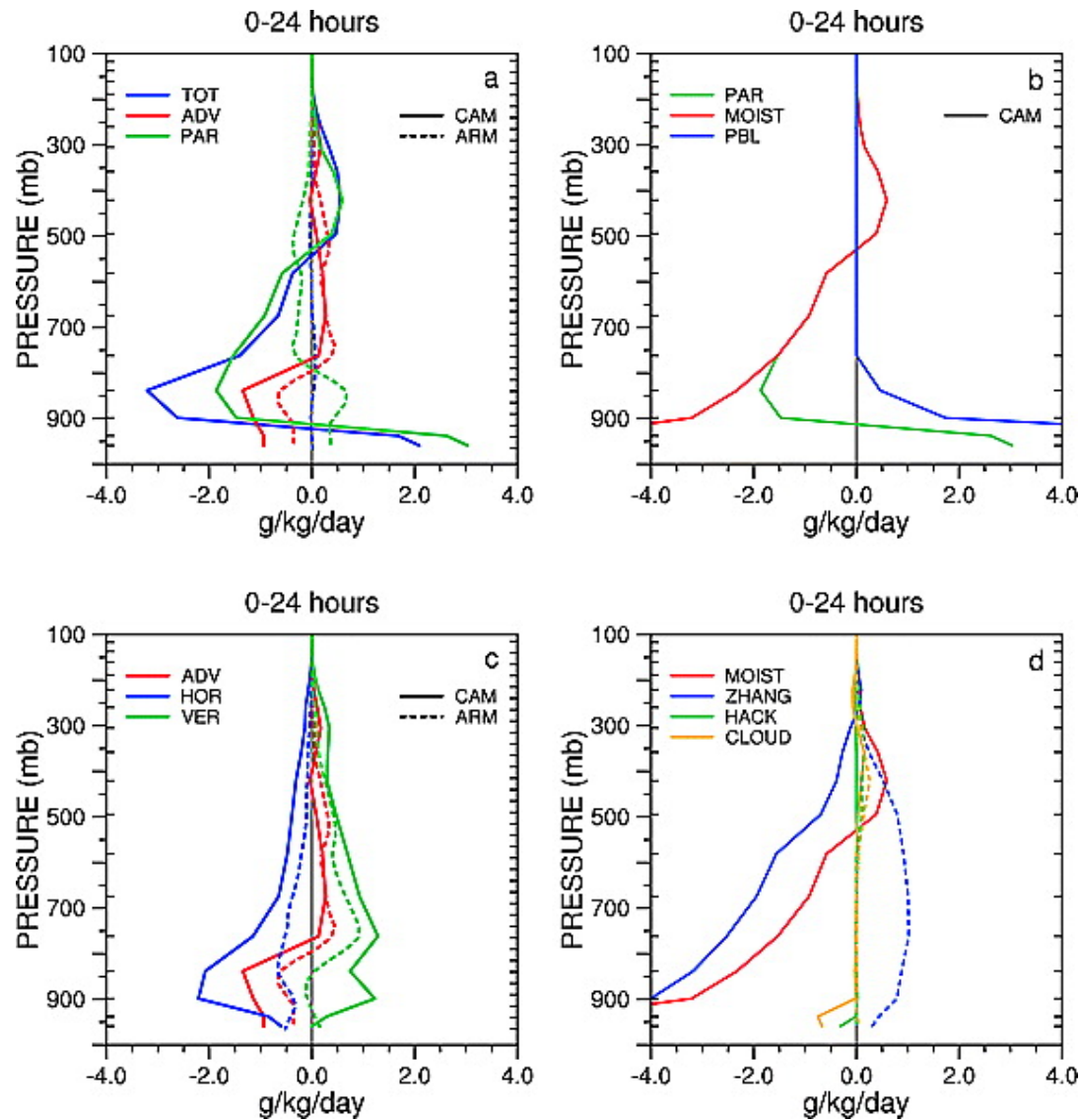


Hindcast evolution of q biases over SGP site



Williamson et al. (2005)

# Breakdown of hindcast tendencies



Williamson et al. (2005)

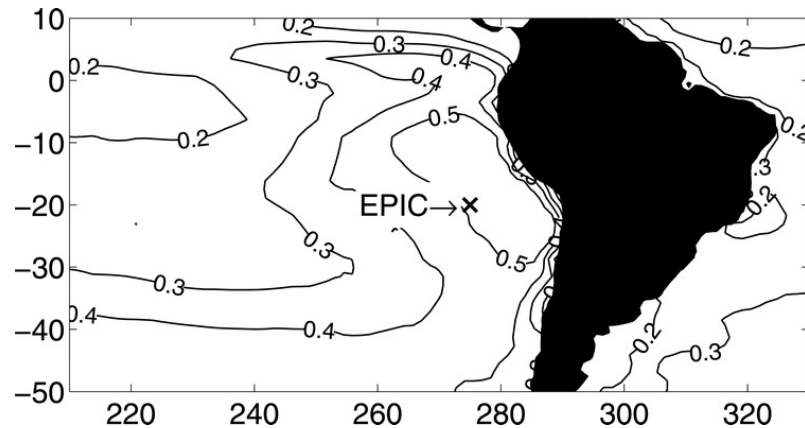
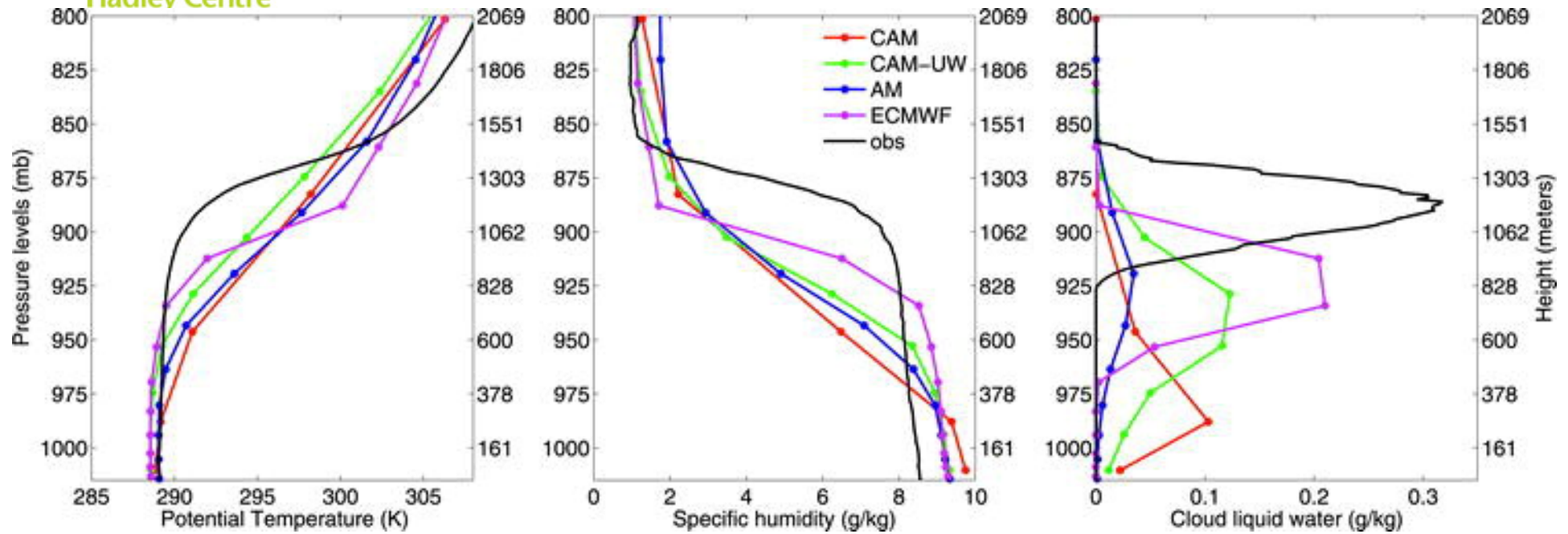
© Crown copyright Met Office

[www.transpose-amip.info](http://www.transpose-amip.info)

# Example analysis 3: SE Pacific Stratocumulus (CAM, GFDL, ECMWF)



# Investigation of PBL height against EPIC



Hannay et al. (2009)

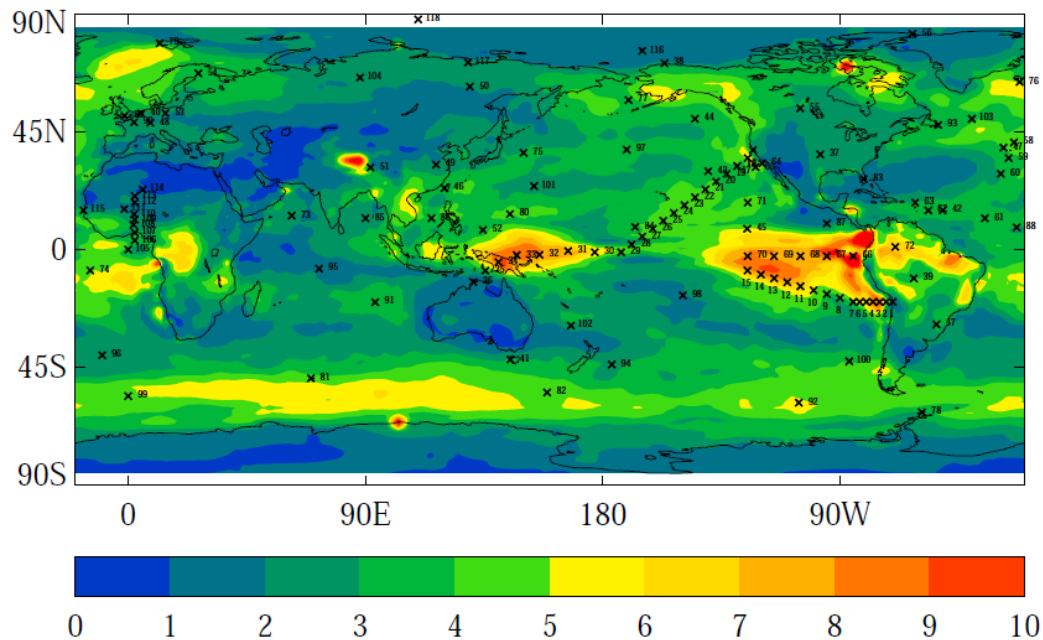
[www.transpose-amip.info](http://www.transpose-amip.info)



# Links with CFMIP



- Transpose-AMIP can provide a valuable link between the model understanding work and case studies where the processes which are operating can be evaluated.
- The transpose-AMIP II diagnostic lists are largely based on the CFMIP component of the CMIP5 lists (including COSP output, etc.).
- Data will be saved globally every 3 hours and the CFMIP sites diagnostic list will be saved every 30 mins.



Includes:  
ARM sites  
Cloudnet sites  
GPCI  
...

[www.transpose-amip.info](http://www.transpose-amip.info)



# Sounds great! What can I do now?

- Run the transpose-AMIP II experiment with your model!
  - MIP tables will be available from the website in the next few weeks and data centres able to receive data. The Met Office simulations have just completed!
- Submit a diagnostic subproject summary – i.e. a paragraph saying what do you want to do with the data when it becomes available.
  - If there is a lot of interest in the data, more modelling centres will conduct the experiment.

[www.transpose-amip.info](http://www.transpose-amip.info)



# Groups who have expressed an intention submit to Transpose-AMIP II

- Met Office (Keith Williams)
- NCAR (David Williamson)
- MPI (Bjorn Stevens)
- IPSL (Sandrine Bony)
- EC-Earth (Frank Selten)
- Meteo France (Michel Deque)

**The first data should become available to download within the next few months.**

[www.transpose-amip.info](http://www.transpose-amip.info)



# More information

[www.transpose-amip.info](http://www.transpose-amip.info)





**Met Office**  
Hadley Centre





# Supplementary slides



# Concerns people have raised

- It's hard to initialise from another model's analysis.
  - It's straightforward. Anyone can download ECMWF YOTC fields from ECMWF's website in netCDF or GRIB. Guidance on how to do the interpolation is provided. It's then only as hard as forming an initial condition file for your system
- It's hard to initialise land surface/aerosols/model specific prognostics.
  - The experimental design has been left quite open to allow centres to choose the option which suits them best.
- There is a large initial adjustment when starting from an alien analysis so analysing the first 5 days is meaningless.
  - Experience at the Met Office suggests that the gross climate errors are apparent after 6-12 hours regardless of the analysis. However, this can be checked by comparing the core and optional expts.

[www.transpose-amip.info](http://www.transpose-amip.info)



# Concerns people have raised

- Climate model errors have nothing to do with short-range forecast errors.
  - Studies with many different models show that this is untrue. Most model systematic errors occur early in the forecast.
- Our centre has enough to do already with CMIP5.
  - We are sympathetic to this, but these expts comprise less than 1 year of model simulation and typical data volume is less than 0.5TB. All diagnostics already appear in the CMIP5 lists and data submission follows the same format as for CMIP5.
- You would say it's easy, the Met Office has a Unified Model.
  - The CAPT team in the US have shown conclusively that this approach can be used for climate models which don't have an NWP counterpart and have learnt things about their model from doing the expt.

[www.transpose-amip.info](http://www.transpose-amip.info)