

CLIVAR Working Group on Ocean Model Development (WGOMD)



- CORE-II and CMIP5
- Some thoughts

Members

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Information on other activities where WGOMD members are serving:

- 1 - Member of US CLIVAR AMOC Program Executive Committee
- 2 - WGOMD representative on WCRP Climate Model Metrics Panel (WCMMP)
- 3 - Co-Principal Investigator of the Arctic Ocean Model Intercomparison Project (AOMIP)
- 4 - Member of the CLIVAR Atlantic Implementation Panel (AIP)

The ICPO contact for the CLIVAR Working Group on Ocean Model Development is [Anna Pirani](#)

WGOMD

Coordinated Ocean-ice Reference Experiments phase II (CORE-II)

CORE-II: An experimental protocol for ocean - ice coupled simulations forced with inter-annually varying atmospheric data sets for the 1948-2007 period (Large and Yeager 2009). This effort is coordinated by the CLIVAR WGOMD.

These CORE-II hindcast simulations serve the CMIP5 community in evaluation of historical coupled climate simulations of the 20th Century as well as in initialization and evaluation of decadal prediction experiments.

Coordinated Ocean-ice Reference Experiments phase II (CORE-II)

These hindcast simulations provide a framework to

- evaluate ocean components of ESM (provides more robust understanding; improves the models, especially by identifying outliers),
- Study / develop mechanisms of ocean phenomena and their variability (observed climate variability and change) from seasonal to decadal timescales,
- identify forced variability changes,
- evaluation of robustness of mechanisms across models,
- bridge observations and modeling, complementing reanalysis products from data assimilation, particularly for pre-ARGO period,
- an alternative to data assimilation in providing ocean initial conditions for decadal prediction simulations.

ALL RELEVANT TO CMIP5 and FUTURE CMIPs

Ongoing and planned studies (next 1-1.5 years):

- North Atlantic mean and variability with a focus on Atlantic Meridional Overturning Circulation (AMOC) and sub-polar gyre
- South Atlantic mean and variability
- Sea surface height and variability
- Arctic Ocean and AOMIP related analysis
- Ventilation with a focus on the Southern Ocean

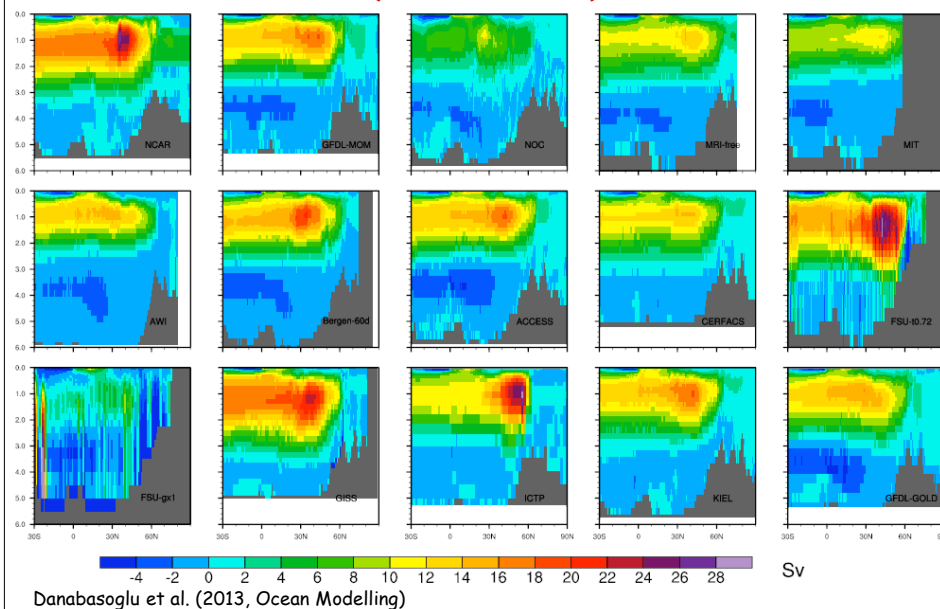
Hypothesis: Models forced with the same CORE-II inter-annually varying data will produce similar solutions (mean and variability).

Participating groups:

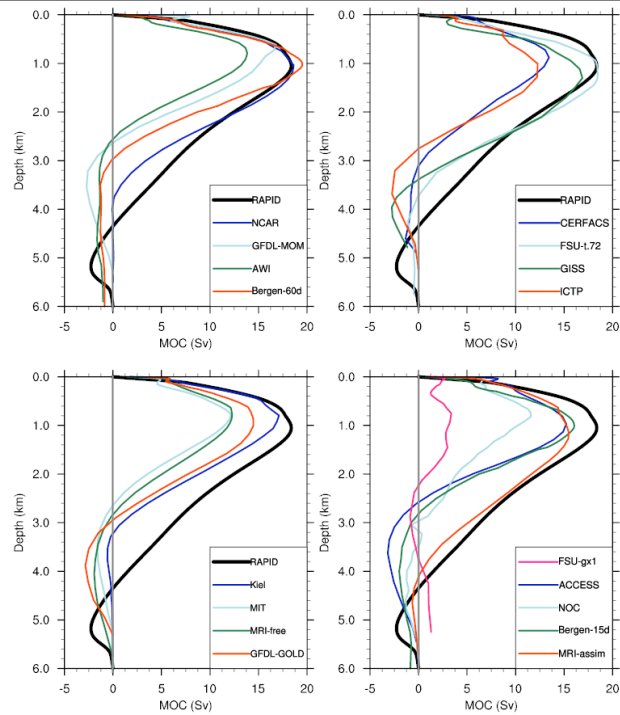
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|-------------------------|-----------------------|
| - NCAR, USA | - IfM-GEOMAR, Germany |
| - GFDL (MOM, GOLD), USA | - FSU, USA |
| - MRI (free, DA), Japan | - CERFACS, France |
| - ICTP, Italy | - NOCS, UK |
| - CSIRO, Australia | - MIT, USA |
| - U. Bergen, Norway | - NASA GISS, USA |
| - CNRM, France | - AWI, Germany |
| - RAS, Russia | - CMCC, Italy |

Level, isopycnal, sigma coordinates; free models; DA; mostly nominal 1° resolution

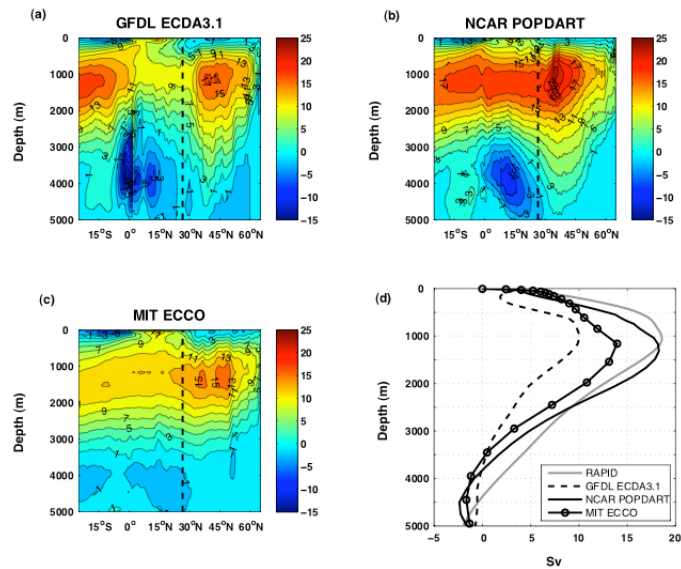
ATLANTIC MERIDIONAL OVERTURNING CIRCULATION (1988-2007 mean)



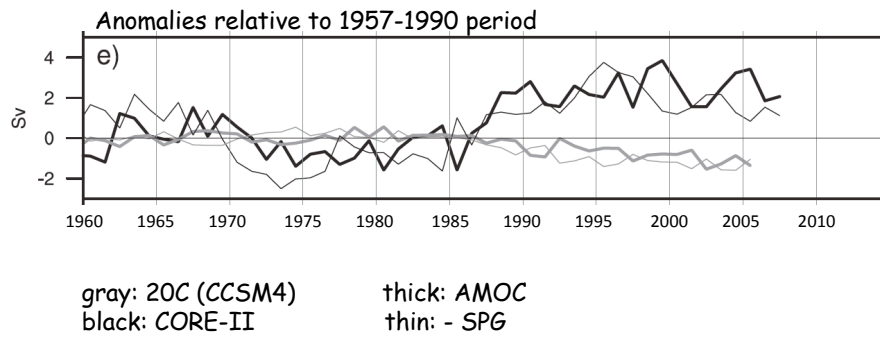
Model AMOC
comparisons
with the
RAPID data
at 26.5°N
(2004-2007 mean)



AMOC (2000-2005 MEAN)

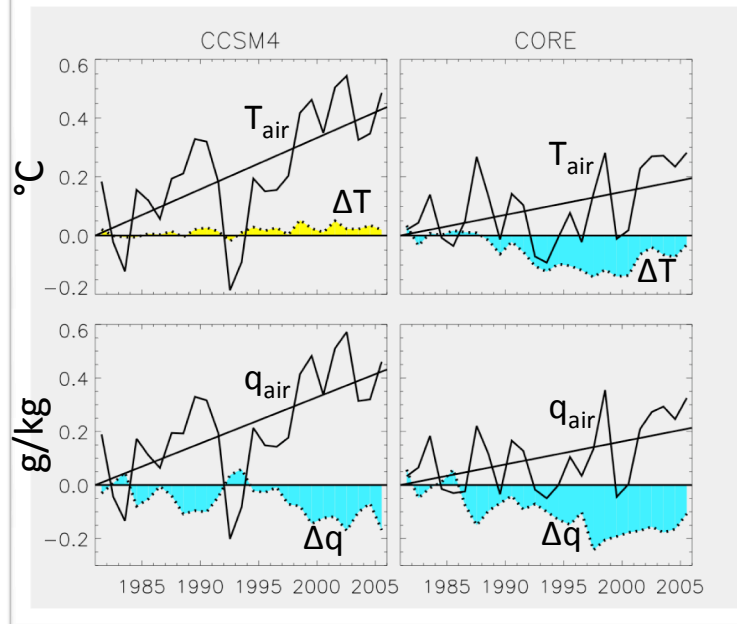


COMPARISON OF AMOC AND SPG TRANSPORTS FROM 20C and CORE-II SIMULATIONS



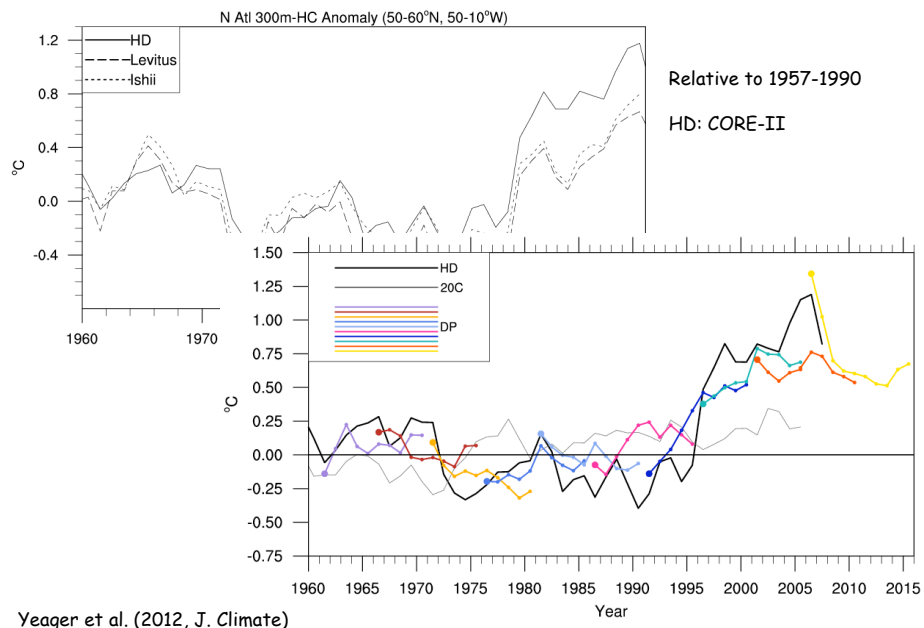
Yeager et al. (2012, J. Climate)

Assessment of sensible and latent heat fluxes in coupled models using CORE-II



Bates et al. (2012, J. Climate)

DECADAL PREDICTION CASE STUDY: Mid-1990s warming of the North Atlantic SPG



Some thoughts on CMIP5 and beyond...

Too early to get a complete picture of gaps or issues.

Data flow / transfer requirements that the participants are committing to should be determined up front. This includes storage, post-processing, and people time.

There should be a longer period between CMIPs so that the results can be analyzed more thoroughly, leading to meaningful improvements in models.

Feasibility of requested configurations, additional model physics, new sets of experiments, etc. should be seriously assessed a priori, e.g., were decadal prediction experiments too premature?