



Project no. GOCE-CT-2003-505539

Project acronym: ENSEMBLES

Project title: ENSEMBLE-based Predictions of Climate Changes and their Impacts

Instrument: Integrated Project

Thematic Priority: Global Change and Ecosystems

Milestone M4.0.2

Meeting on the progress of the coordinated time-slice experiments

Due date of deliverable: month 40
Actual submission date: 16 January 2008

Start date of project: 1 September 2004

Duration: 60 Months

Organisation name of lead contractor for this deliverable: UREADMM

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
PU	Public	PU
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the Consortium (including the Commission Services)	

1. ENSEMBLES RT4 coordinated time-slice experiments

Broad aims:

- a. Understanding climate, and climate forecast uncertainty (WP4.4), at a mechanistic/process level, particularly in terms of the role of specific feedbacks (WP4.1), the regional patterns of climate change (WP4.2), and the factors governing the frequency and characteristics of extreme events (WP4.3).
- b. Add value to information available from core ENSEMBLES hindcasts, forecasts and scenario integrations.
- c. Need a simple core set of computationally cheap experiments so that they can be done by all groups (including where possible different model resolutions etc).

Proposed AGCM experiments

I. Core set: control and 2xCO₂ experiments using common time invariant, SST and ice fields as lower boundary conditions, taken from a coupled experiment with the Hadley Centre model. The purpose of using common lower boundary conditions is to remove some sources of inter-model variance (e.g. sea ice-albedo feedback) in order to better understand others.

II. Enhanced set: additional experiments to involve perturbations which may influence, e.g., cloud or land-surface feedbacks, effect of SST or sea-ice anomalies etc.

2. Status of ENSEMBLES RT4 coordinated time-slice experiments

The RT4 coordinate time-slice (core set) experiments, which have been conducted with different atmospheric GCMs, are designed to help understand model uncertainty in predictions of the response to greenhouse gas induced warming. They are an invaluable resource for understanding many aspects of model uncertainty in response to climate change. The simulations of 7 models from 6 groups are archived in the database and they are available for downloading and for analyzing. The web site is: http://www.cgam.nerc.ac.uk/research/ensembles-rt4/coord_exp/design.html

Where detailed descriptions of the experiment design, available diagnostics (monthly mean, some daily mean fields, and limited 6 hourly fields) can be found.

3. Meeting on the progress of RT4 coordinated time-slice experiments

A sub-workshop on the RT4 coordinated time-slice experiments was held in the morning on the 12th November in the ENSEMBLES 4th General Assembly (GA4) in Prague, where most partners participating in the RT4 coordinated time-slice experiments were present.

a. Purpose of the meeting

To report the progress made in each group

To make plans to exploit these experiments.

b. Progress

In the workshop, partner UREADMM presented the progress in terms of analysing land-sea warming contrast and Asian summer monsoon by using the RT4 coordinated time-slice experiments. These experiments indicate a land-sea warming ratio ranging from of 1.54 to 1.78 with a mean of 1.61 and standard deviation of 0.08. The small spread in these experiments than the IPCC AR4 experiments (1.36-1.84, Sutton et al. 2007) indicates that ocean temperature difference, both its magnitude and spatial pattern in response to CO₂ forcing, is partly a factor for the large spread of land sea warming ratio seen in IPCC AR4 models. Understanding the land-sea warming contrast, its seasonal evolution, and its difference from model to model in RT4 coordinated time-slice experiments are under going.

Most models participating in RT4 coordinated time-slice experiments show an enhanced Indian summer monsoon precipitation despite the fact that some models have a problem to correctly simulate the onset of monsoon in the control simulations. However, there are considerably seasonal variations in terms of change of precipitation over India among models.

All models show an enhanced East Asian summer monsoon precipitation. More consistent seasonal variations among models suggest a lengthening of East Asian summer monsoon season. Results also show that the enhanced subtropical high in the tropical western Pacific is a common feature for all models in response to the prescribed SST and CO₂ changes. More detailed analysis and understanding these changes will be performed.

While changes in global mean surface temperature are a useful indicator of climate change and variability, changes in daily maximum and minimum temperatures provide more information than the mean alone. Partner CERFACS presented some preliminary analysis of changes in diurnal temperature range (DTR) in response to climate change by using the RT4 coordinated time-slice experiments. The results (based on 4 model simulations) suggest that consistent global features among models. All models show that the increase in T_{\min} is bigger than the increase in T_{\max} on global average, and this leads to a decrease in DTR. Understanding change in DTR, its spatial distribution, and differences among models will be investigated further.

c. Proposed further sub diagnostic projects

The workshop also clarified plans of analysing the RT4 coordinated experiments. In addition to three sub diagnostic projects, 1) Understanding the factors that determine the land sea-warming contrast, 2) Analyzing the changes in diurnal temperature range, and 3) Changes of Asian summer monsoon, which have started, further possible diagnostic subprojects are proposed. They are: 1) Changes of NAO and its teleconnection pattern (INGV will be leading), 2) Changes of African monsoon (leading partner to be conformed, and 3) Changes of stormtracks in midlatitudes (leading partner to be confirmed).

References

Sutton, R. T., B.-W. Dong, and J. M. Gregory, 2007: Land/sea warming ratio in response to climate change: IPCC AR4 model results and comparison with observations. *Geophys. Res. Lett.*, 34, L02701, doi:10.1029/2006GL028164.

Appendix

1. A list of attendees of the workshop on the RT4 coordinated time-slice experiments

Antonella Sanna (INGV)

Buwen Dong (UREADMM)

Eduardo D. da Costa (CERFACS)

Herve Douville (CNRM)

Jean-Louis Dufresne (IPSL)

Konstantia Tolika (AUTH)

Silvio Gualdi (INGV)

Wolfgang Muller (MPI)

2. The meeting agenda of the workshop on the RT4 coordinated time-slice experiments

a. Presentations

Buwen Dong: Overview of the RT4 coordinated time-slice experiments and progress of analysis in land-sea warming contrast and Asian summer monsoon.

Eduardo D. da Costa: Preliminary analysis of changes in diurnal temperature range (DTR) in response to climate change by using the RT4 coordinated time-slice experiments.

b. Discussion about future plans