

Summary of discussions relevant to RT1.

Earth System Model (ESM) Work

The importance of the work on construction and testing of ESMs in WP 1.1 was emphasised. During the first 18 months RT1 will produce a small ensemble of comprehensive ESMs constructed from existing component modules. A larger ensemble of less comprehensive models will also be available. All of these will contain physical ocean-atmosphere climate system cores and some will contain selected additional Earth System components. The availability of ESMs will provide an opportunity to improve version 2 of the ensemble prediction system relative to version 1 by designing ensembles which sample uncertainties in modules such as the terrestrial biosphere, ocean biogeochemistry, and atmospheric aerosol and non-aerosol chemistry. A comprehensive sampling of Earth System uncertainties will not be possible during the lifetime of ENSEMBLES, however a feasible strategy could be to construct a multi-model Earth System ensemble to compare against an updated perturbed parameter ensemble sampling Earth System uncertainties in the Hadley Centre model. . At present there is no plan to produce an ensemble of long term climate change predictions sampling stochastic parameterisation uncertainties. The facility will also exist to perturb model structures by reassembling sets of component modules in different combinations using PRISM, though some reservations were expressed about the practicality of this. The possibility of using the less comprehensive ESMs to test ensemble strategies for use with the more comprehensive ESMs should be considered.

Initialisation of seasonal-decadal experiments

Matt Huddleston summarised the deliverables from the ENACT project, which will include a dataset of *in situ* ocean temperatures and salinities from 1957-2001 along with surface fluxes from the ERA-40 dataset, altimeter data from 1993 onwards and a set of advanced ocean data assimilation systems. The observational datasets will be updated as necessary within RT1 and used to provide initial conditions for seasonal-decadal experiments. There was discussion concerning the best way to provide ensembles of initial states for the “pre-production” hindcasts needed for version 1 of the ensemble prediction system. Given the need to complete these runs in time to allow assessment of the results by month 18, it was recognised that a simple, pragmatic method would be needed at first. It was therefore suggested that we should follow an approach similar to that taken in DEMETER, based on the application of perturbations to the winds, surface water fluxes and SSTs to generate alternative analyses from each of the ENACT assimilation methods. However the importance of investigating more sophisticated methods of generating ensembles of initial conditions was recognised, and this should be investigated with a view to improving the representation of uncertainty in the initial state for version 2 of the ensemble prediction system. The strategy and timetable for the production of ocean initial conditions and their use in pre-production hindcasts will be finalised with seasonal to decadal partners within the next month or so (ACTION: Paco Doblas-Reyes).

Design of Seasonal to Decadal Experiments

We discussed the draft plan for pre-production integrations for version 1 of the ensemble prediction system, summarised in the minutes of the meeting held at ECMWF on

03/09/2004 (see

http://www.ecmwf.int/research/EU_projects/ENSEMBLES/meetings/index.html). Lenny Smith led a discussion of how we might modify the design in order to improve the extent to which the first set of experiments might allow us to infer improvements for the second version (due at month 60). In other words, how might we improve our ability to identify designs which efficiently maximise the information content of the ensemble by looking at the relative value of perturbing model versions, sampling variations in model structure, quantifying variations in model quality, varying ensemble size and varying the spread of initial conditions. In the limited time available we focused mainly on the possibility of changing the design to have some larger ensembles, or some ensembles with start dates closer together, while recognising that limitations of computational resource and time constrain the set of runs the modelling groups will be able to complete during the first 18 months. We proposed a modest revision to existing plans in which groups would increase the ensemble size from 9 to 18 for two consecutive start dates, suggested as May and November 1997. Paco will consult the seasonal to decadal partners, aiming to finalise a definite set of required experiments within a month or so. Lenny will continue to promote discussion of ideas for improving the experimental design, aiming to suggest an additional set of integrations which could optionally be performed during months 1-18 by modelling groups able to accommodate them. (ACTION: Paco, Lenny)

Climateprediction.net experiment

We discussed Myles Allen's idea of producing a very large ensemble prediction using the distributed computing resource available through the *climateprediction.net* project available to RT1 through the contribution of the University of Oxford. It was agreed that a multi-thousand member ensemble forecast, initially for the decadal timescale, should be pursued. This would be created by adding perturbations to an observed initial state and producing a forecast using a version of the HadCM3 model. Such an experiment is facilitated by the presence in cp.net of around 3,000 "power-users". It would nicely complement the smaller ensembles comprising different GCMs, or different versions of a given GCM, run using the supercomputing resources of other RT1 partners. The cp.net facility will eventually enable large ensemble predictions to be produced which sample modelling uncertainties using other variants of HadCM3 and other GCMs.

Coordination with RT2A

The importance of coordinating the first multi-model ensemble of centennial predictions in RT2A and the first perturbed physics ensemble done with HadCM3 in RT1 was discussed. The Hadley Centre will produce an ensemble based on the SRES A1B scenario, which will also be one of the scenarios run by the groups in RT2A for IPCC AR4. The list of model variables produced by RT2A was felt to provide a sound basis for the assessment and intercomparison of those ensembles, which will form the basis of recommendations for version 1 of the ensemble prediction system for centennial time scales to be delivered at month 18.

Data for Regional Modelling Experiments

During the first 18 months of ENSEMBLES the regional modelling groups will concentrate on validating their models by driving them with ERA-40 data, considering both 50km and

20km resolution versions. Thereafter they will be doing GCM-driven ensemble runs, focusing mainly on the period 1950-2050 with some runs to 2100. The main source of GCM driving data for these experiments will be the RT2A production runs, however interest was expressed in using data from the pre-production HadCM3 perturbed physics ensemble to be done in RT1 (see above). The possibility of doing seasonal to decadal RCM runs was also raised (ACTION: Paco to follow up discussion of this idea with seasonal to decadal and regional modelling partners). Note that RCM groups will need lateral boundary driving data on model levels, not pressure levels. DMI offered to host a central server for this data.

Ensemble Strategy Discussion Group

It became clear that a cross-cutting group needs to be set up to discuss strategies for the design of experiments, weighting of models and model versions, combination of information from different types of ensemble, inference of probabilities, propagation of weights/probabilities from global models through regional models to application models and so forth. Filippo Giorgi agreed to set this up. The discussion could progress initially by email, with a meeting to follow if required. James will provide Filippo with an initial list of key participants from RT1. (ACTION: James Murphy).

Additional emissions scenarios

RT7 plans to produce new “SRES-C” scenarios, which will be available to GCM groups for use in the second stream of model runs during the second phase of ENSEMBLES (i.e. after year 2). GCM groups will undertake to run one or two of these additional scenarios in the second stream.

Communication with RT8

Each RT is required to nominate a contact point for liaison with RT8. James Murphy will seek a volunteer (ACTION: James)

Website Development

A list of RT1 partners and email addresses should be posted on the RT1 website. The presentations given by James Murphy (RT1 overview in the Plenary Session on day 1) and Matt Huddleston (ENACT summary on day 2) should also be placed on the website (ACTION: James, Matt and Paco). The project website will be updated to include a roadmap showing runs, scenarios and delivery dates needed to achieve the required propagation of information from GCM experiments through RCM experiments to impacts application models.

Meetings

It is planned to hold a joint 3-day RT1/RT2A meeting in Toulouse, in June 2005. Jean-Francois Royer will suggest a few possible dates, which will then be put to RT1 partners.

Management Board meetings will be held every 6 months. The next will be on 23 March 2005 in Copenhagen

The next Annual Assembly will be a three day meeting during the week of 19-23 September, 2005, possibly in Athens.

Reporting Timetable

An annual activity report plus an updated 18 month workplan will be required from each RT at the end of each year (1 September). This must be initially sent to the Project Office, who will merge the reports from individual RTs and provide the final version to the Commission by 15 October. Allowing for the summer holiday season this implies that planning for the report and workplan will need to be in place by the previous June. We will therefore need to plan the documents (structure, writing assignments) at our meeting in Toulouse.