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FRAMEWORK CONVENTION ON CLIMATE CHANGE - Secretariat
CONVENTION - CADRE SUR LES CHANGEMENTS CLIMATIQUES - Secrétariat

Bonn, 26 March 2002

Invitation to Research Institutions

During the negotiations of the Kyoto Protocol, the delegation of Brazil presented an approach for distributing the burden of emissions reductions among Annex I Parties based on the effect of their cumulative historical emissions from 1840 on the global-average surface temperature (FCCC/AGBM/1997/MISC.1/Add.3). The scientific and methodological aspects of the proposal were referred to the Subsidiary Body for Scientific and Technological Advice (SBSTA) for further consideration.

After a first expert meeting in 2001 organized by the UNFCCC secretariat,[1] the SBSTA encouraged Parties to pursue and support the research effort on the scientific and methodological aspects of the proposal by Brazil as recommended in the report of the expert meeting (document FCCC/SBSTA/2001/INF.2) and to communicate such activities to the secretariat.

The SBSTA also requested the secretariat to continue to coordinate the review of this proposal, to facilitate the dissemination of scientific and methodological information on this proposal, to organize an expert meeting to share information on the development of the scientific and methodological aspects of the proposal by Brazil, to broaden participation and to build scientific understanding of this subject before its seventeenth session (November 2002).

To this end, **the secretariat would like to encourage research institutions active in the field of climate change modelling to participate in a coordinated modelling exercise.** The objective of this exercise is to generate new and comparable results that could be discussed at an expert meeting to be organized by the secretariat later this year.

Who can participate?

Any modelling group can participate that uses simple carbon cycle models and/or simple climate models, including impulse response models, energy balance models and upwelling diffusion models. The secretariat can not provide financial support for this work; support needs to be sought from other sources.

What needs to be done?

First, the participating groups should demonstrate the ability of their simple models to reproduce the global mean results of more complex models (such as GCMs) for historical

[1] see also http://unfccc.int/sessions/workshop/010528/index.html

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emissions and the SRES A2 emissions scenario. This model validation exercise should be completed by **1 June 2002**.

Second, global mean changes (concentrations, temperature, etc.) should be calculated using an agreed set of parameters. These changes should be attributed to four country groups and the sensitivity of simple model results to this set of parameters should be analyzed. Results should be submitted by **1 August 2002.**

What will happen next?

The results will be placed on a central web site (http://unfccc.int/issues/ccc.html) and will be discussed at the expert meeting. The secretariat will provide a summary of the workshop for consideration at the seventeenth session of the Subsidiary Body for Scientific and Technical Advice.

Details of this exercise are described in the attached terms of reference and can be found on the project website (http://unfccc.int/issues/ccc.html). The University of East Anglia in Norwich, United Kingdom, has agreed to cooperate and assist the secretariat with this activity. Interested institutions are encouraged to contact Dr. Sarah Raper (unfccc_assessment@uea.ac.uk).

Yours sincerely,

Dennis Tirpak
Coordinator
Methods Inventories and Science

Assessment of Contributions to Climate Change

TERMS OF REFERENCE

Phase 1 - Initial check

In a first phase, all groups that wish to participate should assess whether their simple models can represent the results of more complex carbon cycle and climate models. To this end, groups should calculate the increase in global-average surface temperature for historical emissions and the SRES A2 future emissions scenario. The results of this initial check will then be compared between the models and changes can be made to the models, if necessary.

RIVM in the Netherlands and the Met Office's Hadley Centre in the United Kingdom have provided a set of parameters that can be used to tune simple carbon cycle and simple climate models or to complete those models if they do not include all aspects that are included in the complex models used for the SRES scenarios. Those data are available at the project web site http://unfccc.int/issues/ccc.html

Timeframe

1760 to 2100

Historical emissions data

CDIAC database (http://cdiac.esd.ornl.gov/trends/trends.htm) for

- Carbon Dioxide Emissions from Fossil-Fuel Consumption
- Carbon Flux from Land-Cover Change

Future emission scenarios

Future emissions scenarios A2 from the IPCC Special report on emission scenarios. (http://www.grida.no/climate/ipcc/emission/index.htm)

Countries/regions

Global (No regional groups)

Model parameters

Emissions to concentrations:

- Carbon cycle parameters, representing the Bern carbon cycle model (see project web site)
- Single (IPCC TAR) lifetimes should be used for other greenhouse gases, the OH chemical feedback effects will be neglected.

Concentrations to radiative forcing:

- The saturation of the absorption bands for CO_2 should be included as a logarithmic relationship, as in the IPCC TAR.
- The N_2O-CH_4 band overlap should be included as in the IPCC TAR.
- Global mean aerosol particle forcing as provided by the Hadley Centre (see project web site).

Radiative forcing to temperature increase:

- Climate response parameters obtained from the HadCM3 climate model (see project web site).

Climate output indicators

Output indictors should include
- Cumulative emissions
- Concentration
- Radiative forcing
- Global-average surface air temperature change

Output requirements

To satisfy the project output requirements participating institutions will need to produce both graphical results and simple ASCII files of their outputs. The results must be submitted to the project web site.

Submission of results

The results of this phase should be submitted to Dr. Sarah Raper (unfccc_assessment@uea.ac.uk) by **1 June 2002** and will be placed on the web (http://unfccc.int/issues/ccc.html) as to enable the modelling groups to adjust their models if necessary. The results will be compiled for the expert meeting in September 2002.

Phase 2 - Sensitivity study

As a second step, the modelling groups should present their results in terms of the contributions made by four country groups (specified below). This will be referred to in this document as an attribution calculation. Group should also analyse the influence of changes in the model parameters. To ensure that all institutions undertake a few similar model runs that can be compared, a default parameter is underlined. All participants are required to undertake one run with the default parameters. Only one parameter should be varied at the time when assessing the sensitivity to of the parameters listed below. Participants are free to undertake any number of additional sensitivity runs for other parameters than those specified below.

Timeframe

- Emissions start dates: 1890, 1950 and 1990
- Emission end dates: 1990, 2000, 2050 and 2100
- The time for which the attribution calculations will be performed: 2000, 2050, 2100, 2500

Clearly not all combinations of start and end date are meaningful. Start dates must always be before the end date. Attribution calculations made for a point in time before the emissions end dates will not include the effect of emissions beyond the date of the attribution calculation. Attribution calculation made for a point in time after the emissions end date assumes zero emissions after the end date.

Historical emissions data

- CDIAC database (http://cdiac.esd.ornl.gov/trends/trends.htm) and
- EDGAR database (http://www.rivm.nl/env/int/coredata/edgar/)

Bunker emissions should be treated as a separate country/group.

Future emission scenarios

Future emissions scenarios should comprise the B1, A2 and A1FI emission scenario from the IPCC Special report on emission scenarios.
http://www.grida.no/climate/ipcc/emission/index.htm

Countries/regions

The groups of countries considered should include at least the groups used in the IPCC Special report on emission scenarios, which consist of

- States that were members of the OECD in 1990 (OECD90)
- Eastern Europe and former Soviet Union (REF)
- Asia (ASIA)
- Africa and Latin America (ALM)

Model parameters

Emissions to concentrations:

- A range of carbon cycle parameters from the Bern CC model with a low, reference and high CO_2 case (see project web site) or other own carbon cycle representation.
- Single (IPCC TAR) lifetimes should be used for other greenhouse gases, the OH chemical feedback effects will be neglected.

Concentrations to radiative forcing:

- The saturation of the absorption bands for CO_2 should be included as a logarithmic relationship, as in the IPCC TAR.
- The N_2O-CH_4 band overlap should be included as in the IPCC TAR.
- Global mean aerosol particle forcing as provided by the Hadley Centre (see project web site). These forcings can be used in the calculation of global mean climate change, but not in the attribution of responsibility calculations.

Radiative forcing to temperature increase:

- A range of climate response parameters, representing several different GCM models (see project web site for the default values) or own climate response, default is the HadCM3 climate model used also in phase I. Non-linearities in the carbon cycle, radiative forcing and climate model may be investigated, but feedback between temperature and chemistry will not be included at this stage.

Climate output indicators

- Cumulative emissions
- Concentration
- Radiative forcing
- Global-average temperature change
- Rate of change of temperature
- Global-average sea level rise (only the thermal expansion component of sea level rise)

A damage function is optional at this stage.

Socio-economic indicators

In addition to the basic attribution calculations, groups may wish to present results using also socio-economic factors, such as GDP or population. This is at the discretion of the modelling groups.

Output requirements

To satisfy the project output requirements groups will need to produce both graphical results and simple ASCII files of the their outputs. The results must be submitted to the project web site.

Submission of results

The results of this phase should be submitted to Dr. Sarah Raper (unfccc_assessment@uea.ac.uk) by **1 August 2002** and will be placed on the web (http://unfccc.int/issues/ccc.html). The results will be compiled for an expert meeting in September 2002.

For some literature on the Brazilian proposal please refer to http://unfccc.int/sessions/workshop/010528/index.html.