



# INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE



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IPCC-XIX/Doc. 10  
(2.IV.2002)

NINETEENTH SESSION  
Geneva, 17-20 (morning only) April 2002

Agenda item: 7  
ENGLISH ONLY

## **PROGRESS REPORT:**

### **TASK GROUP ON CLIMATE SCENARIOS FOR IMPACT ASSESSMENTS (TGCIA)**

(Submitted by Dr Martin Parry, TGCIA Chairman)

# TGCIA

## Report of the 5th meeting – Barbados. 26-29 November 2001

### Participants

#### *TGCIA members:*

##### *Attendees:*

M Parry (Chairman)

T Carter, U Cubasch, M Hulme, N Leary, L Mata, L Mearns, J Mitchell, T Morita, M Noguer, D Pabon, H Pitcher, M Ratag, C Rosenzweig, R Swart, P Whetton,

##### *Could not attend:*

X Dai, P Desanker, M El-Raey, F Giorgi, D Griggs, M Lal, M Lautenschlager, R Moss, N Nghia, C Nobre,

#### *Invited participants:*

M Amann (International Institute for Applied Systems Analysis (IIASA))

E Barrow (Canadian Institute for Climate Studies)

R Christ (IPCC Secretariat)

S Gaffin (CIESIN)

B Lim (UNDP)

N Nakicenovic (International Institute for Applied Systems Analysis (IIASA))

R Nicholls (School of Geography & Environmental Management)

J Penner (University of Michigan)

M Prather (University of California)

N Sundararaman (IPCC Secretariat)

#### *Local hosts:*

L Nurse (Coastal Conservation Unit)

N Trotz (Caribbean Planning for Adaptation to Global Climate Change, CPACC)

### Summary

This is the summary of the main recommendation that came out of the 5<sup>th</sup> TGCIA meeting:

- That the CIESIN Website would provide gridded information and national data on current population and income plus ungridded linear annual projections for the SRES regions up to 2100 with Guidelines on how to apply one to the other. The aim is to produce gridded populations and income projections presented in a draft paper by June 2002
- That the modelling community should consider running all 6 SRES illustrative scenarios and stabilisation scenarios at 450, 550, 650, and 750. Note that 3 of the SRES scenarios provide climate outputs similar to the post-SRES stabilisation profiles at 550, 650 and 750
- That the impact community conduct impact assessments for 450, 550, 650 and 750 ppm stabilisation levels under the post-SRES scenarios.
- That the DDC will provide the following extra datasets: tropospheric and near-surface O<sub>3</sub>, deposition and surface concentration data, sea level rise
- That the impact community consider using RCM results for its assessments
- That a criteria for “approving” RCMs be developed with the aim of introducing RCM results in the DDC in the future
- That the Guidance material be re-structured, including pointers to the new detailed Guidelines (on RCMs, on atmospheric chemistry data, on SRES).

# Agenda

Welcome by the Minister of Physical Development and Environment, Hon. Elizabeth Thompson.

Agenda items	Papers
1. SRES gridded pop and income data on CIESIN website.. <u>S.Gaffin</u> , (with <u>M.Hulme</u> and <u>U. Cubasch</u> comment)	5.1 and 5.2 5.1comment
2. Discussion of draft guidelines for use of the SRES data. <u>S. Gaffin</u>	5.1 and 5.2
3. Progress report on provision of more detailed SRES data. <u>S.Gaffin</u>	5.3
4. Data on sea-level rise derived from SRES on the DDC. <u>M. Hulme</u> and <u>U Cubasch</u>	5.4
5. Progress report on: a) Incorporation into the DDC of GCM experiments for the 6 SRES illustrative scenarios. <u>U. Cubasch</u> and <u>M. Hulme</u> , b) Some developments about the UEA DDC webpages. <u>M Hulme</u>	5.5a 5.5b
6. Draft set of recommendations of selected SRES scenarios for impact assessment, including recommended stabilisation levels. <u>R. Swart</u> , <u>T. Morita</u> , <u>T.Carter</u> , <u>J Mitchell</u>	5.6 5.6comment
7. CD-ROM of DDC and CIESIN data on climate and socio-economic futures. <u>M.Hulme</u> , <u>U.Cubasch</u> , <u>S.Gaffin</u> , <u>B. Lim</u>	5.7
8. To consider additional variables (e.g. solar radiation, windspeed, snowcover and snowmelt) that should be archived on the DDC. <u>M.Hulme</u> , <u>U.Cubasch</u> .	5.8
9. Mirror site of DDC at CSIRO.. <u>M.Hulme</u> , <u>U. Cubasch</u>	5.9
10. Guidance material on the DDC website will have been revised. <u>T. Carter</u> a) The Group will consider a proposal for version 2.0 revisions (including e.g. SRES scenarios, climate integrations, updated GCM results, GCM intercomparisons) <u>T. Carter</u> , b) Consideration of a report on how the usefulness of current DDC and SRES Guidelines can subsequently be further enhanced for users in impact assessment. <u>N.Leary</u>	5.10
11. Provision of environmental data on the DDC. (5.11) a) Consideration of a report recommending data on atmospheric chemistry. <u>T. Carter</u> , <u>J. Penner</u> , <u>M. Prather</u> b) Consideration of a note regarding data on transboundary air pollution and its relevance to the DDC. <u>M.Amann</u> c) Consideration of a report recommending land use data. <u>S. Gaffin</u> d) Consideration of a note regarding further information on sea-level rise in the DDC. <u>R. Nicholls</u> e) The addition to the DDC of reference to data sets on current environmental conditions (e.g. elevation, soils, coastal subsidence). <u>T. Carter</u>	5.11 Introduction 5.11a  5.11b  5.11c 5.11d 5.11e
12. Progress report on pattern scaling of available GCM experiments for 32 regions for the 6 SRES marker scenarios. <u>T. Carter</u>	5.12
13. Consideration of a draft set of criteria regarding regionalization techniques to ensure their usefulness for the impacts community. <u>L. Mearns</u> , <u>P. Giorgi</u> , <u>P. Whetton</u> , <u>M. Lal</u> , <u>J.D.Pabon</u> , <u>M. Hulme</u> . Comments to this paper by <u>J Mitchell</u>	5.13 5.13comment
14. Inventories: a) Updated inventory of regional models. <u>M. Noguer</u> b) Statistical downscaling studies. Appendix 4 of WGI TAR	5.14a 5.14b
15. Demonstration of the UK regional model. <u>J. Mitchell</u> and <u>B. Lim</u>	PRECIS brochures
16. Training. Previously, the Group agreed to re-consider this after finalising its research priorities.	
17. Membership of the TGCIA.	
18. Next meeting: 5-7 June 2002, Finland; and November/December at location TBD.	

## Agreed Actions

**1 and 2. SRES pop and income data: website and guidelines.** The Group agreed:

- 1) that Version 1 would include: a) a draft website containing gridded information and national data on current pop and income; (ungridded) linear projections for SRES regions in annual increments to 2100, with highlighted timeslices for 2025, 2055 and 2085; b) draft guidelines explaining the derivation and illustrative application of these data. The draft will be pre-circulated to the Group for comment and revisions subsequently tabled for approval in (June) 2002. Action: S. Gaffin, liaising with U. Cubasch and M. Hulme.
- 2) that Version 2 would initially constitute a draft journal paper giving a) the above plus: b) gridded pop and income projections (linear and annual increments to 2100) for comment by the Group in (June) 2002, leading to submission by the authors and, once accepted via peer review, to a revised website and guidelines. Action: S. Gaffin.

**3. More detailed SRES data.** See 11, below.

**4 Data on sea-level rise derived from SRES on the DDC.** Global fields had been requested and will be placed on the DDC. Progress to be reported in (June) 2002. Action: M. Hulme and U. Cubasch.

**5 Progress report on incorporation into the DDC of GCM experiments for the 6 SRES illustrative scenarios.** The Group noted the completed, current and likely future experiments (see description in minutes attached), and agreed: a) continuation of the collection and processing. Further progress to be reported (June) 2002. Action: U. Cubasch and M. Hulme; b) to re-confirm its recommendation to the modelling community (re 6 SRES illustrative scenarios, with a minimum of A2 and B2). Action: letter from Chair of IPCC and TGCIA, M. Noguer to draft.

**6 Draft set of recommendations of selected SRES scenarios for impact assessment, including recommended stabilisation levels.** The Group:

- a) agreed to recommend that the research community conduct a range of impact assessments for varying stabilisation levels under 'post- SRES' scenarios, viz. : 450, 550, 650 and 750 ppm stabilisations either using climate results from stabilisation experiments or their equivalents identified by the Group (see table and description in attached minutes). Action: briefing to IPCC Bureau, followed by letter from Chairman of IPCC and TGCIA to impacts research groups [M. Noguer to draft] and (to be agreed) viewpoint/editorial/commentary in journal(s) with offprints distributed widely;
- b) re-confirmed its agreement to encourage the modelling community to analyse all 6 SRES illustrative scenarios (letter previously sent following TGCIA4 Amsterdam) and, noting that 3 of these provide climate outputs that are similar to the effects of stabilisations at 550, 650 and 750 ppm concentrations (see minutes), agreed to recommend that modellers include a 450 ppm stabilisation experiment (see minutes for its characterisation). Action: letter from Chairs of IPCC and TGCIA, M. Noguer to draft.
- c) agreed to recommend further elaboration of the SRES baseline scenarios in order to support further impact and adaptation assessment (for details see minutes), and to organise a series of expert meetings to facilitate this. Action: R. Swart, H. Pitcher, T. Morita, J. Mitchell and T. Carter; to submit an outline proposal by December 10 which will be presented to IPCC Bureau on Dec 18, followed by a workplan for consideration by the TGCIA in January 2002.

**7 CD-ROM of DDC and CIESIN data on climate and socio-economic futures.** The Group agreed to re-consider the values of this at a later date, when more climate and SRES data have been accessed, and following evaluation of its need by the user community. Action: M. Hulme, U. Cubasch, S. Gaffin and B. Lim.

**8 To consider additional variables for the DDC.** This is in hand. Subsequent progress will be reported. Action: M. Hulme, U. Cubasch. Consideration will be given to the collation of data on (e.g.) sea-surface temperatures, salinity, and sea ice. Action: E. Barrow, U. Cubasch and M. Hulme (to report in (June) 2002.

**9 Mirror sites of the DDC.** The CSIRO site is now functioning. Consideration is being given to sites in Canada and Brazil. For the latter, the Group approved in principle a Portuguese version, providing integrity is maintained. Action: M. Hulme, U. Cubasch.

**10 Guidance material on the DDC website.** The Group agreed: a) that the revised generic Guidelines on the DDC would cross-refer to the RCMs and SRES Guidelines; b) that the SRES Guidelines would be on a CIESIN website, and would cross-refer to the DDC; c) that RCMs Guidelines would be on the DDC; d) that

the additional environmental data and accompanying guidelines would be on the DDC; and e) that the generic guidelines would refer to the Group's current consideration of developing further guidance on statistical downscaling (see Item 11, below). Action: T. Carter. Revised generic Guidelines on DDC December 2001; outline draft of proposed revisions to create Version 2 Guidelines, for discussion in June 2002.

- 11 Provision of environmental data on the DDC.** (all actions by [June] 2002). The Group agreed:
  - a) that tropospheric and near-surface ozone data should be placed on the DDC. Action: M. Prather, with M.Hulme;
  - b) that deposition data should be placed on the DDC. Action: J. Penner, with M.Hulme;
  - c) that the DDC Guidelines will provide user direction to data on transboundary air pollution. Action: M.Amann and T.Carter.
  - d) that the CIESIN SRES Guidelines will provide user direction to SRES land use data on other CIESIN archives. Action: S. Gaffin.
  - e) That the DDC Guidelines will provide information on using global sea-level rise data. Action: T. Carter and R. Nicholls; and that consideration will be given to incorporation of regional sea-level rise information on the DDC. Action: T.Carter, M. Hulme, R. Nicholls.
  - f) That the DDC Guidelines provide user direction to existing current data sets, e.g. on elevation, soils. Action: T. Carter.
- 12 Progress report on pattern scaling.** Sufficient funds are now available. To start when more results are available. Action: T. Carter.
- 13 Guidelines on RCMs.** The Group:
  - a) approved the first draft and requested it be completed. Action: L. Mearns, at al., with the aim of distributing before (June) 2002;
  - b) agreed the implicit recommendation that the impacts community consider using RCMs;
  - c) agreed to develop a set of criteria for 'approving' RCMs similar to those it had adopted for GCMs. Action: L. Mearns, M.Hulme et al. (June) 2002;
  - d) agreed to consider development of a separate document on statistical downscaling. Action: P. Whetton: to propose outline content and authorship, June 2002.
- 14 Inventory of regional models.** This would be an appendix to the RCM Guidelines, with a distinction added regarding those modellers willing to be contacted by potential users. Action: M. Noguer.
- 16 Training.** The Group agreed to conduct a poll of members to better ascertain what training (specifically in scenario development for climate impacts and adaptation assessment) is currently being offered (where and by whom). Action: B. Lim, L. Mata, M. Ratag; survey results to Group in c. March 2002, followed by e-conference, then development of appropriate for consideration in June 2002.
- 17 Membership of TG CIA.** This will be reviewed after June 2002. Areas needing better representation include: Africa, adaptation, water, human health.
- 18 Any other Business.**
  - a) Costs. The Group agreed to compile a note on costs to date and on future costs of planned activities, and to present these to IPC Bureau on December 17-18 2001, followed by a proposed budget presented to IPCC Plenary in April 2002 (which needs to be submitted February).
  - b) Communication. The Group agreed: 1) to communicate its products (DDC and Guidelines, etc) and recommendations in newsletters and journals commentaries; 2) propose a side event on research to address key policy questions, at SBSTA June 2002 and at the next CoP.
  - c) The Group identified that other key issues needing attention include, *inter alia*: scenarios for adaptation; scenarios of uncertainty/risk/probability, etc; scenarios for research on early impacts and early indicators.
- 19 Next meeting TG CIA6 :** 5-7 June 2002 in Finland (unless this conflicts with SBSTA) or a May date is preferable. TG CIA7 in late November/early December 2002 (Cairo/Alexandria (Egypt); and Boulder (USA) had previously offered to host; Australia also now has offered; these to be considered).

## Adoption of the Agenda

The meeting was opened by the Hon. H Elizabeth Thompson, M. P. Minister of Physical development and Environment. She welcomed all the participants and gave a very pertinent speech. She reminded us of the IPCC leading role in providing objective, policy relevant assessments of climate change, its impacts and mitigation and adaptation options and in particular the role of the TGCIA in providing climate change scenarios to the impact community and essential data to carry out impact assessments. She stressed the need to consider regional variations in climate, economic and social circumstances and the necessity of good local databases in order to conduct local scale assessments.

The draft Agenda was adopted. The issues were taken in order, with some minor alterations. The following new items were also discussed (added under “Any other business”):

- Costing: Resources used thus far and planing costing for the future.
- Communication: How can we let the user know of the TGCIA and DDC existence?
- What are the next research priorities? Adaptation for the future

N Trotz gave a very useful presentation on the programmes that Caribbean: Planning for Adaptation to Global Climate Change (CPACC) is undertaking. The overall purpose of CPACC is to support Caribbean countries to cope with the potential adverse effects of global climate change, particularly sea-level rise, in coastal areas, through vulnerability assessment, adaptation planning, and capacity building.

This report will be structured as follows:

### **A. SRES gridded population and GDP from CIESIN and its relationship with the DDC**

### **B. Recommendation of selected SRES scenarios for impact assessments, including recommended stabilisation levels**

B.1 Recommendation for GCM experiments and for impact assessments

B.2 Possible combinations for impact analysts

B.3 Availability of stabilisation profiles

B.4 Additional research on mitigation scenarios

B.5 Improvement on the post-SRES stabilisation scenarios

B.6 Proposed IPCC expert meetings on SRES and post -SRES

### **C. Enhancing the DDC**

C.1 SRES-based results on the DDC

Sea-level rise data

GCM experiments

Additional variables from the GCM experiments

C.2 Provision of environmental data

Atmospheric chemistry

Tropospheric and near-surface O<sub>3</sub>

Deposition and surface concentration data

Regional air pollution datasets

Land use data (Gaffin)

Present-day or reference datasets on current environmental conditions

C.3 CD-ROM of DDC and CIESIN data

C.4 Mirror site

C.5 Pattern scaling of available GCM experiments for 32 regions

### **D. Regionalization**

D.1 Criteria regarding regionalization techniques to ensure their usefulness for the impact community

D.2 Inventory of regional climate models

D.3 Demonstration of the UK regional climate model

### **E Guidance material**

### **F. Training**

### **G. Membership of the TGCIA**

### **H. Any other business**

H.1 Cost

H.2 Communication

H.3 Research priorities

### **I. Next meeting**

## **A. SRES gridded population and GDP from CIESIN and its relationship with the DDC**

The provision of projections of spatial distribution of population and income based for the four SRES families (A1<sup>1</sup>, A2, B1, B2) have been considered by the group as an important step to help the impact assessors. To this respect, Stuart Gaffin presented a paper on “Guidance materials on spatially distributed socio-economic projections of population and GDP per unit area”. His papers describes the methodology and initial results for A2 and B2 of projected gridded population and GDP<sup>2</sup>. Some participants were concerned about the uncertainties of these projections. Issues such as migration were discussed. One the major caveats of these projections is that hey are based on straight forward linear scaling. The GDP projections from Gaffin are based on population projections. Nakicenovic showed another method to calculate gridded GDP based on energy consumption (based on night lighting). These two ways of projecting GDP yield two different spatial results.

After a very useful discussion of all these issues, the Group agreed that there will be two steps in the production of the projected SRES gridded population and GDP data:

Version 1:

- a) Provision of current gridded distribution of population and GDP for A1, A2, B1 and B2 (Population map already done, GDP to be worked out)
- b) Provision of current national data of population and GDP for A1, A2, B1 and B2
- c) Provision of linear projections (ungridded) for SRES regions in annual increments up to 2100, with highlighted timeslices for 2025, 2055 and 2085
- d) Draft guidelines explaining the derivation and illustrative application of these datasets in order to create gridded projections.

Version 2: Draft paper to appear in a peer review journal giving

- a) Version 1 datasets, and
- b) Gridded population and income projections up to 2100

Version 1 would be placed on the DDC website as soon as possible. The draft paper (the results of Version 2) will be circulated to the Group for comments by June 2002 and then submitted by the authors. Once accepted, the website and guidelines will be updated.

Action: S Gaffin, liasing with U Cubasch and M Hulme

## **B. Recommendation of selected SRES scenarios for impact assessment, including recommended stabilisation levels**

### **B.1 Recommendation for GCM experiments and for impact assessments**

The TGCIA recommends analysis by GCMs of (a) all six SRES illustrative scenarios and (b) stabilisation of GHG concentrations associated with CO<sub>2</sub> stabilisation levels at 450, 550, 650, and 750 ppm. However, noting that

- some modelling teams have already started doing analysis of A2 and B2 based on earlier TGCIA recommendations;
- B1 and A1FI represent the lowest and the highest of the SRES baseline scenarios, receptively;
- The climatic effects of B1 and of stabilising CO<sub>2</sub> concentrations at 550 ppm are expected to be very similar<sup>3</sup> over the 21<sup>st</sup> century;
- The climatic effects of B2, A1T and stabilising CO<sub>2</sub> concentrations at 650 ppm are expected to be very similar over the 21<sup>st</sup> century;
- The climatic effects of A1B and stabilising CO<sub>2</sub> concentrations at 750 ppm are expected to be very similar over the 21<sup>st</sup> century;
- The climatic effects of stabilising CO<sub>2</sub> concentrations at 450 ppm are expected to be significantly different from (smaller than) those of any of the SRES base cases;
- GCM analysis is a time consuming and costly affair.

Action: letter from Chairs of the IPCC and TGCIA to re-confirm agreement (M Noguera to draft)

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<sup>1</sup> The illustrative scenarios A1FI, A1T and A1B share the same population and GDP assumptions of the A1 family.

<sup>2</sup> GDP is the Gross Domestic Product and is the common indicator of prosperity

<sup>3</sup> This is based on the assumption that differences in radiative forcing of 0.5 W/m<sup>2</sup> or below are not distinguishable in GCM output.

The TGCIA suggests that only a subset of these scenarios are sufficient for a comprehensive analysis of impacts of baseline and stabilisation scenarios, notably

- A1FI (high end of the range of SRES baselines),
- A1B (medium case and associated climate changes are similar to 750 ppm),
- A2 (as this case has been recommended before),
- B1 (low end of the SRES baselines and 550 ppm stabilisation),
- B2 (as this case has been recommended before, and associated climate changes are similar to A1T and 650 ppm)
- A new 450 ppm CO<sub>2</sub> stabilisation case<sup>4</sup>.

Some impact analysts may be interested in the very long-term impacts associated with stabilisation scenarios. It is recommended to apply a fixed radiative forcing beyond 2100 to analyse such impacts.

Action: briefing to IPCC Bureau, followed by letter from Chairman of IPCC and TGCIA to impacts research groups [M. Noguer to draft] and (to be agreed) viewpoint/editorial/commentary in journal(s) with offprints distributed widely;

## B.2 Possible combinations for impact analysts

Impact analysts would select combinations of base cases and stabilisation levels they would like to compare, take associated GCM output for the above runs as relevant, and would take socio-economic information from the SRES cases (see Table 1). E.g. if one would be interested in analysing the avoided damage from stabilising at 550 ppm in an A2 world, one would take the climate changes from the A2 and B1 GCM runs available, and combine them with the socio-economic data from A2. This assumes that the mitigation actions associated with stabilisation do not affect the demographic and economic development in a way which would change the baseline scenario in such a way that the adaptive capacity would significantly be affected. Some possible combinations can be disregarded, e.g. combinations between particular baseline SRES scenarios and stabilisation scenarios which would lead to CO<sub>2</sub> concentrations by 2100 which are higher than the base cases (e.g. B1 < 650, 750 ppm; A1T and B2 < 750 ppm). Other combinations could be considered to be too expensive and therefore infeasible, e.g. stabilisation at 450 ppm in the A1FI, A2 and possibly even A1B scenario families.

scenario	450 ppm	550 ppm	650 ppm	750 ppm
<i>A1FI</i>	[low feasibility]	see B1 base case	see B2 base case	see A1B base case
<i>A1B</i>	[low feasibility]	see B1 base case	see B2 base case	see A1B base case
<i>A1T</i>	see TGCIA-450	see B1 base case	see B2 base case	not relevant
<i>A2</i>	[low feasibility]	see B1 base case	see B2 base case	see A1B base case
<i>B1</i>	see TGCIA-450	see B1 base case	not relevant	not relevant
<i>B2</i>	see TGCIA-450	see B1 base case	see B2 base case	not relevant
<i>TGCIA-450</i>	stylised profiles	not relevant	not relevant	not relevant

Table 1: Six scenarios recommended (*italics*) by the TGCIA for further climate model analysis covering climatic changes for all combinations of 6 SRES base cases and 4 different CO<sub>2</sub> stabilisation levels. Note: for impact, adaptation and mitigation analysis a larger set of scenario combinations has to be considered because of different socio-economic characteristics (but similar climatic changes).

## B.3 Availability of stabilisation profiles

The emissions data for the first 5 cases are already available through the CIESIN/SRES and DDC websites. For the new 450 ppm stabilisation cases the TGCIA recommends “stylised” emissions profiles for the various gases which have been derived from the WG3 TAR “post-SRES” scenario work (see attachment for CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, SO<sub>2</sub>, NO<sub>x</sub>, CO, NMVOC; halocarbons from SRES-B1). These profiles are taken as an illustrative case in the relatively narrow range of 450 ppm stabilisation scenarios. The rationale for not selecting one particular run from the post-SRES analysis is that (a) additional work had to be performed to develop emissions profiles for all non-CO<sub>2</sub> emissions (something that was not done for the post-SRES work assessed in the TAR), (b) additional work had to be performed to extend the emissions profiles beyond 2100, and (c) selecting one particular run would not give justice to the many pathways stabilisation of GHG concentrations could be achieved. It is however believed that although these different pathways have very different implications for the assessment of adaptation and mitigation, they are unlikely to lead to significantly different GCM output in terms of climatic changes.

<sup>4</sup> In case such a dynamic 450 ppm stabilisation case could not be run, existing stabilisation runs at double CO<sub>2</sub> could be used here, double CO<sub>2</sub> approximating 450 ppm CO<sub>2</sub> plus about 100 ppm CO<sub>2</sub> equivalent contributed by the non-CO<sub>2</sub> GHGs.



#### **B.4 Additional research on mitigation scenarios**

In addition to the recommended climate change analysis, the TGCIA recommends additional scenario research to be done in support of the Fourth Assessment Report (FAR) that would allow for a better assessment of adaptation and mitigation implications of the SRES baseline and stabilisation analysis. Even if the TGCIA considers the SRES storylines and broad long-term emissions profiles adequate as a basis for future climate and impact analysis for the FAR, it recommends that in parallel to the climate analysis the SRES baseline scenarios are further elaborated for integrated assessments in three ways:

- The base year emissions estimates (1990) should be updated to 2000 in order to provide a credible basis for the FAR, using a standardisation approach as was used in SRES;
- Important socio-economic and emissions information should be developed on a regionalized/gridded basis, more detailed than available in SRES. While on the short term some of this work may be done in a simple, linear fashion, more work is needed in areas such as migration (from developing countries to industrialised countries, from rural to urban areas, from inland to coastal areas) and emissions of local and regional air pollution (driven by local air pollution concerns and thus not homogeneous in large SRES regions, Asia/Europe info available);
- Important substances such as black carbon, nitrate aerosols, ammonia should be added to the SRES profiles. If time permits, climate model runs could be pursued using this information.

#### **B.5 Improvement on the post-SRES stabilisation scenarios**

Finally, the preliminary work on the post-SRES stabilisation scenarios should be improved to form a sound basis for the Fourth Assessment Report. Areas of attention include:

- analyses of costs and benefits of different time paths for stabilisation;
- analyses of ancillary benefits and costs, notably those related to local and regional air pollution (ozone, PM, ammonia, SO<sub>2</sub>, NO<sub>x</sub>, etc.);
- implications of stabilisation of radiative forcing rather than CO<sub>2</sub> concentration in line with UNFCCC Article 2;
- detailed analyses of land-use changes accounting for biofuel supply in mitigation scenarios and the demand for food and fiber, as well as the relationship with water availability;
- analyses of different regional emissions distributions based on different equity principles.

#### **B.6 Proposed IPCC expert meetings on SRES and post -SRES**

To encourage and facilitate the work as proposed in 4 and 5 above, it is suggested to organise a series of three IPCC expert meetings to address both the issue of elaboration of the SRES scenarios (see 4 above) as well as the issue of improving the stabilisation scenarios (see 5 above). These expert meetings would involve

- the modelling teams which participated in the SRES and post-SRES exercises,
- additional experts (adaptation, mitigation, local and regional air pollution),
- experts from WG1 and WG2, representing the “user community”
- some external experts from stakeholder groups.

The first meeting would take place in the spring of 2002 and focus on the key research and policy questions and the subsequent development of a detailed workplan. In this meeting, climate, atmospheric chemistry and (ecological) impacts experts should be involved. The second meeting, in the spring of 2003 would offer a mid-term opportunity for the teams to discuss their results, and the third meeting in late 2003 would allow for a detailed comparison of the results. The proceedings of this last meeting should also appear in a peer reviewed journal to facilitate assessment of the results by the writing team of the FAR.

Action of 4, 5 and 6: R. Swart, H. Pitcher, T. Morita, J. Mitchell and T. Carter; to submit an outline proposal by December 10 which will be presented to IPCC Bureau on Dec 18, followed by a workplan for consideration by the TGCIA in January 2002.

### **C. Enhancing the DDC**

#### **C.1 SRES-based results on the DDC**

##### **Sea-level rise data**

Global fields of sea level change based on the six illustrative scenarios (A1FI, A1T, A1B, A2, B1 and B2) will be placed on the DDC -the total sea level change field and also the contribution from each of the different components (thermal expansion, glaciers and ice caps, Greenland and Antarctica). Progress will be reported in June 2002.

Action: M Hulme and U Cubasch

R Nicholls presented a paper on “Coastal Impact and Adaptation Assessments” which highlighted the data and scenario needs for coastal vulnerability assessments. He proposed a stepwise approach to tackle the problem. The Group agreed that a section should be added to the generic Guidelines on using global sea level rise data

Action: T Carter, R Nicholls and D Pabon

The Group also consider the possibility to incorporate regional sea-level rise information on the DDC. This consideration has to be put forward to Jonathan Gregory, who provided the sea-level rise results for Chapter 11 of WGI TAR. Some concerns were raised on how would the uncertainty range would be capture as only the Hadley Centre had results for all the sea-level rise components. Further thoughts on this are needed.

Action: T Carter, M Hulme and R Nichols

### GCM experiments

A letter encouraging modelling centres to perform GCM experiments for the six illustrative SRES scenarios under the specified criteria was sent in December 2000. As a result, some modelling centres have sent their model results to the DDC and others are in the process of doing so. The status of the data to be incorporated in the DDC is showed in the following Table

Centre	Acron	Model	SRES scenario runs				Status	Hamrg/DDC
Max Planck Institute for Meteorology (Germany)	MPIfM/DMI	ECHAM4/OPYC		A2		B2	delayed due to technical problems at MPI/DMI	yes/no
Hadley Centre (UK)	HCCPR	HADCM3	A1FI	A2	B2	B2	available, ensemble runs come later	yes/yes
Commonwealth Scientific and Industrial Research Organization (Australia)	CSIRO	CSIRO-Mk2	A1	A2	B1	B2	data send to DDC only on model levels, will send 5 member ensemble	yes/no
National Centre for Atmospheric Research (USA)	NCAR	PCM		A2		B2	organisational problems at NCAR delay the transfer of data to the DDC	no/no
		CSM		A2		B2		yes (only A2)/no
Geophysical Fluid Dynamics Laboratory (USA)	GFDL	R30		A2		B2	data send to DDC only on model levels	yes/no
Canadian Centre for Climate Modelling and Analysis (Canada)	CCCma	CGCM2		A2		B2	will send 3 member ensemble later	yes/no
Centre for Climate System Research/ National Institute for Environmental Studies (Japan)	CCSR/NIES		A1	A2		B2	A1 running, others have finished, no data have yet been send to DDC	no/no
Meteorological Research Institute (Japan)	MRI	MRI2		A2		B2		no/no
Laboratoire de Météorologie Dynamique du CNRS (France)	IPSL/LMD						Intention to send data	No/no
(Italy)								

The Group agreed with the continuation of the collection and processing of these GCM results with a further progress report to be delivered in June 2002

Action: U Cubasch and M Hulme

The group felt the need to re-confirm its recommendation to the modelling groups (i.e. to encourage GCM experiments for the six illustrative scenarios, with a minimum of A2 and B2).

Action: letter from chair of IPCC and TGCIA, M Noguer to draft.

Note: this letter will be part of the letter agreed to be sent under item B.1 above.

#### **Additional variables from the GCM experiments**

Total incident solar radiation and mean wind speed have been requested to the modelling community as part of the core list of variables. Snowcover and snowmelt have also been requested.

Daily data will continue to be available in a decentralised way via the respective modelling centres, but will not be stored at the DDC. Progress on the status of these additional variables will be reported in June 2002

Action: M Hulme and U Cubasch

The Group agreed to give consideration to the collation of data on sea surface temperature, salinity and sea-ice. A report regarding the procedures of acquiring such data will be presented in June 2002.

Action: E. Barrow, U Cubasch and M Hulme

### **C.2 Provision of environmental data**

#### **Atmospheric chemistry**

The global mean, every 10 years, of the abundances of all greenhouse agents (gases and aerosols) for the 6 illustrative SRES scenarios and preliminary ones are part of Appendix II of WGI TAR. These tables could be placed on the DDC. We have also requested the yearly values for some of these agents (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, tropospheric O<sub>3</sub> burden, gridded sulphate aerosol burden). The response has been very positive and the owners of these datasets will be sending them to the DDC.

Action: M Noguer transferring data to M Hulme

#### **Tropospheric and near-surface O<sub>3</sub>**

Michael Prather presented his paper on the availability of atmospheric chemistry data that resulted from the IPCC OxComp workshop (15 global chemistry-transport models (CTM) contributed to this Workshop). He showed how surface O<sub>3</sub> abundances on a regional scale impact human health and agriculture and also how mean tropospheric O<sub>3</sub> increases are predicted to be regional, primarily near major emissions of NO<sub>x</sub>, CO and VOC. The Group agreed that near surface and total tropospheric O<sub>3</sub> on a 5x5 lat/long grid should be placed on the DDC. The Group agreed with the proposal by Prather to calculate a composite perturbation for tropospheric and near surface O<sub>3</sub> from all the CTMs along with a variance or min/max. Some guidance on the use of this data should also be provided.

Action: M Prather with Hulme

#### **Deposition and surface concentration data**

Joyce Penner showed the Group the availability of monthly average deposition data for SO<sub>2</sub>, SO<sub>4</sub><sup>2-</sup> Black Carbon, Organic Carbon, Dust and Seasalt interpolated to a 5x5 grid from several chemistry models. A similar approach to the data from Michael Prather will be followed here (i.e. create composite of all models's data). The data will be placed on the DDC. Some guidance on the use of this data should also be provided.

Action: J Penner with M Hulme

#### **Regional air pollution datasets**

Markus Amann presented a paper reviewing the availability of emission and concentration/deposition data for regional pollutants (SO<sub>2</sub>, NO<sub>x</sub>, NH<sub>3</sub> VOC and PM). Exposure to these pollutants causes negative impacts to human health, vegetation, fauna and material, hence the need to make the impact community aware of the existence of these regional datasets. The Group agreed that the best way to deliver this was via the DDC Guidelines by providing links to the sources of these regional air pollution datasets.

Action: M Amann with T Carter

#### **Land use data and other SRES-based data**

CIESIN has already a very extensive archive of land use datasets. The Group agreed that the DDC should link to CIESIN for land use data.

The Group was posed with a question regarding the priority for requesting data to the SRES modelling teams. The Group considered that land use data was next on the list after population and GDP (see item A) and before energy and technology change.

It was agreed that the CIESIN SRES Guidelines, agreed under item A will include links to the SRES land use data archived at the CIESIN.

Action: S Gaffin

#### **Present-day or reference datasets on current environmental conditions**

Impact assessors require information about the present-day or reference situation with which to compare future changes. Some reference data are provided at the DDC (some socio-economic factors, climate and CO<sub>2</sub> concentration). The group felt that links to other reference data, such as on elevation and soils, should be provided in the DDC Guidelines. The Group should inform T Carter of the existence of any relevant reference data that they would know about.

Action: T Carter

### **C.3 CD-ROM of DDC and CIESIN data**

The Group agreed to re-consider the values of a new CD-ROM at a later date, when more climate and SRES data have been accessed, and following evaluation of the needs for a CD-ROM by the user community.

Action: M. Hulme, U. Cubasch, S.Gaffin and B. Lim.

### **C.4 Mirror site**

The CSIRO mirror site is active. Only the blue<sup>5</sup> and green<sup>6</sup> pages can be mirrored. The yellow<sup>7</sup> pages cannot be mirrored because the model time series are stored in Oracle database tables. Mirroring these data would mean to duplicate the entire database system.

Action: M Hulme and U Cubasch

Canada and Brazil are also interested in setting mirror sites. A dialogue has started with these countries regarding the issue. For Brazil a proposal to translate the site to Portuguese was considered by the Group. It was felt that having the pages in other languages would help usability, however issues of integrity and updates were raised as concerns. The Group felt that priority was for the mirror site to function and that further discussions on the subject of translation were needed between the mirror site hosts and the DDC managers.

Action: M Hulme and U Cubasch (with Canadian and Brazilian mirror site hosts)

### **C.5 Pattern scaling of available GCM experiments for 32 regions**

Funds to support the work on pattern scaling are now secured by the IPCC Trust Fund (US\$15,000), Canadian Government (CAD\$15,000) and Finnish Government. The work will commence as soon as the GCM results are available from the DDC. The group raised concerns about the characterisation of the range uncertainties. The quantification of uncertainties in the pattern scaling calculation will be highlighted.

Action: T Carter

## **D. Regionalization**

### **D.1 Criteria regarding regionalization techniques to ensure their usefulness for the impact community**

L Mearns presented the paper "Guidelines for use of climate scenarios developed from regional climate models experiments". She highlighted the changes that the paper will be incorporated in the light of the comments by the other authors. The Group agreed with those changes and with the paper in general and requested it to be completed and distributed before June 2002. The generic Guidelines will have a pointer to the RCM guidelines.

Action: L Mearns, F Giorgi, P Whetton, M Hulme, M Lal and D Pabon

The group agreed to recommend to the impact community to consider the use of Regional Climate Models. This recommendation will be placed in the RCM Guidelines.

Action: L Mearns, F Giorgi, P Whetton, M Hulme, M Lal and D Pabon

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<sup>5</sup> The blue pages contains the basic information about the DDC.

<sup>6</sup> The green pages comprise user support, data description, data visualisation, data download and related links.

<sup>7</sup> The yellow pages contain the raw monthly data from the GCM modelling teams

The Group also agreed to develop a set of criteria for RCMs integrations in the same lines as those adopted for GCMs. One of the criteria that was considered and agreed was to recommend the following time periods to Regional Climate modelling Groups for new runs: 1961-1990 and 2071-2100

Action: L Mearns, F Giorgi, P Whetton, M Hulme, M Lal and D Pabon

The Group agreed to consider a separate document on statistical downscaling

Action: P Whetton to propose outline content and authorship by June 2002.

## **D.2 Inventory of regional climate models**

This would be an appendix to the RCM Guidelines, with a distinction added regarding those modellers willing to be contacted by potential users.

Action: M. Noguer.

## **D.3 Demonstration of the UK regional climate model**

The Hadley Centre regional climate modelling system (PRECIS Providing Regional Climates for Impacts Studies) was presented by J Mitchell. This system can be run on a PC and can be applied easily to any area of the globe to generate detailed climate change predictions. The intention is to make this modelling system, PRECIS, freely available to groups of developing countries so that climate change scenarios can be developed at national centres of expertise.

## **E. Guidance material**

T Carter presented a progress report on the status of the revisions to the Guidance material agreed in the Amsterdam meeting (May 2001). The essential revisions will be completed by December 2001.

Action: T Carter to revised Generic Guidelines on DDC by December 2001

He also expressed his concerns regarding the function and role of the Guidance material and proposed to re-examine the document in the light of a) new material, b) new data added to DDC, c) new methods for scenario construction, and d) addition of links to other research programmes. The group agreed to have a Generic Guidance covering all the issues with detailed documents for specific items.

Action: T Carter to circulate the new structure of the Guidelines prior to June 2002

The new version of the Guidelines would include:

- a) cross-reference to the RCMs, SRES, and environmental data Guidelines
- b) cross-reference to the proposed statistical downscaling Guidelines

The Group also agreed upon the location of all these different Guidelines documents:

- a) The Generic Guidance material on the DDC Website
- b) The RCM Guidelines on the DDC Website
- c) The SRES Guidelines on CIESIN Website (with cross-reference to the DDC Website)
- d) The additional environmental data and accompanying Guidelines on the DDC Website
- e) The future Statistical downscaling Guidelines on the DDC Website

## **F. Training**

The Group agreed to conduct a poll of members to better ascertain what training (specifically in scenario development for climate impacts and adaptation assessment) is currently being offered (where and by whom).

Action: B. Lim, L. Mata, M. Ratag: survey results to Group in March 2002, followed by e-conference, then development of appropriate results for consideration in June 2002.

## **G. Membership of the TG CIA**

D. Murdiyarso will not be able to serve as a member of this Task Group any longer. Instead M. Ratag from the Indonesian National Institute of Aeronautics & Space has been appointed to take Dr Murdiyarso's place.

The Group considered the following areas of expertise to be under-represented in the Task Group: adaptation, human health and water. The geographical balance was also reviewed and it was felt that a representative from Africa was needed.

Action: The whole Group to suggest names to be reviewed in June 2002.

## **H. Any other business**

### **H.1 Costing**

In order to continue the work of the Task Group and the dissemination of new products through the DDC in a secured way, the Group felt that current funding was not appropriate and hence more financial resources were needed. The Group agreed to compile a note on costs to date and on future costs of planned activities, and to present these to the IPCC Bureau on 17-18 December 2001, followed by a proposed budget presented to the IPCC Plenary in April 2002 (which needs to be submitted February).

Action: M Noguer to draft note

### **H.2 Communication**

The Group considered different actions to communicate its products (DDC, Guidelines, etc) and recommendations:

- a) mailout a new leaflet to the WGs databases and to the IGBP and HDBP registration list
- b) write commentaries on the TGCIA in journals (Science, Nature, ...) and Newsletters (Tiempo, WMO, START, NCAR,...)
- c) Invite other environmental centres websites to link to the DDC Website.

Action: M Noguer to do some groundwork

- d) Propose a side event on research to address key policy questions, at SBSTA June 2001 and the next Cop (see research priorities below)Action: M Parry

### **H.3 Research priorities**

The Group identified the following questions regarding the research priorities:

- What does the negotiating community needs?
- Where are the main gaps in knowledge
- Which of these gaps need to be filled in the next phase?
- What do we need to fill them?

The Group identified the following key issues needing attention:

- a) scenarios for adaptation rather than for impacts only
- b) Description of uncertainties in probabilistic terms
- c) Ensuring data provision for assessing early impacts. Research on early impacts and early indicators.

## **J. Next meeting**

5-7 June 2002 in Finland (SBSTA meeting is 3-14 June, Bonn) or a May date is preferable. TGCIA7 in late November/early December 2002 (Cairo/Alexandria (Egypt) ; and Boulder (USA) had previously offered to host; Australia also now has offered; these to be considered).



# ATTACHMENT: STYLIZED 450 PPM CO2 STABILIZATION EMISSIONS PROFILES

## FOR HALOCARBONS SEE SRES B1

							1990	2000	2010	2020	2030	2040	2050	2060	2070	2080	2090	2100	
450 TGCIA	CO2 world						7,10	7,97	8,78	8,89	7,97	6,70	5,69	4,64	3,19	2,74	2,25	1,77	
450 TGCIA	SO2 world						67,9	66,0	60,7	54,5	47,9	33,9	24,6	18,9	14,7	11,8	9,2	7,5	
450 TGCIA	SO2 OECD						22,7	17,0	8,7	4,5	3,2	2,1	1,4	1,1	1,0	0,9	0,8	0,7	
450 TGCIA	SO2 EFSU						17,0	11,0	7,4	4,4	3,0	1,7	0,9	0,7	0,6	0,6	0,5	0,4	
450 TGCIA	SO2 ASIA						17,7	25,3	28,8	28,0	25,1	16,2	9,8	6,6	4,7	3,5	2,6	2,2	
450 TGCIA	SO2 ALM						10,5	12,8	15,8	17,6	16,6	13,8	12,6	10,5	8,4	6,9	5,4	4,3	
450 TGCIA	CH4 world						310	323	358	397	433	436	436	423	393	357	310	266	
450 TGCIA	N2O world						6,68	6,80	6,90	7,00	7,10	7,20	7,26	7,09	6,88	6,67	6,38	6,09	
450 TGCIA	NOx world						30,9	32,0	33,6	35,0	36,2	34,8	33,9	32,6	28,5	24,7	21,5	20,1	
450 TGCIA	CO world						879	877	872	851	823	800	779	756	740	722	698	674	
450 TGCIA	NMVOC world						139	141	156	160	154	134	116	96	78	68	58	50	
2110	2120	2130	2140	2150	2160	2170	2180	2190	2200	2210	2220	2230	2240	2250	2260	2270	2280	2290	2300
1,49	1,55	1,81	2,13	2,38	2,48	2,42	2,27	2,07	1,86	1,70	1,57	1,48	1,41	1,36	1,33	1,29	1,26	1,21	1,15
7,1	6,6	6,1	5,6	5,1	4,8	4,6	4,5	4,4	4,4	4,3	4,2	4,1	4,0	3,9	3,8	3,7	3,6	3,5	3,4
0,6	0,6	0,6	0,5	0,5	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,3	0,3	0,3	0,3	0,3
0,4	0,4	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
2,0	1,9	1,7	1,6	1,5	1,4	1,3	1,3	1,3	1,3	1,2	1,2	1,2	1,2	1,1	1,1	1,1	1,0	1,0	1,0
4,0	3,7	3,4	3,1	2,9	2,7	2,6	2,5	2,5	2,5	2,4	2,4	2,3	2,3	2,2	2,1	2,1	2,0	2,0	1,9
263	254	242	229	217	210	206	204	188	171	157	146	138	132	127	124	121	117	113	108
6,06	5,88	5,64	5,39	5,17	5,03	4,95	4,91	4,49	4,03	3,66	3,38	3,17	3,02	2,92	2,84	2,77	2,70	2,60	2,47
19,7	18,7	17,3	15,9	14,7	13,9	13,4	13,2	12,5	11,8	11,2	10,7	10,3	9,9	9,6	9,4	9,1	8,8	8,5	8,2
667	643	610	576	546	526	515	511	471	430	395	369	349	334	323	314	306	298	288	274
49	47	44	40	37	35	34	34	32	30	28	27	26	25	24	23	23	22	21	21