

Meeting report of the ad-hoc
group for the modelling and
assessment of contributions
to climate change (MATCH)

13 to 14 March 2006
Louvain-la-Neuve, Belgium

7 April 2006

Prepared by Niklas Höhne

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1. INTRODUCTION

As part of the negotiations on the Kyoto Protocol, the delegation of Brazil made a proposal, in May 1997, to set differentiated emissions reduction targets for Annex I Parties of the UNFCCC according to the impact of their historic emissions on temperature rise (UNFCCC document FCCC/AGBM/1997/MISC.1/Add.3).

After two expert meetings held under the auspices of the SBSTA (28 – 30 May 2001 in Bonn, Germany; 25 - 27 September 2002 in Bracknell, UK), the SBSTA agreed that the work should be continued by the scientific community. Subsequently, further expert meetings were held on the initiative of the governments of UK, Brazil and Germany.

In August 2003, the UK Department for the Environment (DEFRA) commissioned Ecofys to provide administrative, secretarial and scientific assistance as 'support unit' for the process until the end of 2005.

During the expert meeting held in Berlin on 8/9 September 2003, draft terms of reference and a draft work plan for a process until 2005 were discussed for the now called "Ad-hoc group for the modelling and assessment of contributions to climate change (MATCH)". Participants for a scientific coordination committee were selected, which guides and coordinates the process.

The meeting in Cologne, May 2004 consisted of the following: First, the Scientific Coordination Committee discussed organization aspects of MATCH. Second, authors presented the current status of the development of paper #1: "Analysing countries' contribution to climate change: Scientific uncertainties and methodological issues". Third, experts discussed themes of three additional scientific papers and the content of paper #2.

At the expert meeting in Rio de Janeiro, Brazil on 11/12 April 2005, the paper #1 was finalized. The content and approach for paper #2 "Attributing a fraction of climate change to a nation's historical emissions: closure and scientific uncertainty" was discussed as well as new ideas concerning the continuation of the process beyond November 2005.

At the expert meeting 27/28 October 2005 in Reading, UK, the content and approach for paper #2 was further discussed and the future of the process was further developed.

This document is the report of the meeting of MATCH held on 13/14 March 2006 in Louvain la Neuve. It was drafted by Niklas Höhne, Ecofys, Germany and reviewed by the participants of the meeting.

The agenda of the meeting (Annex A) consisted of three major parts. First, a quick review of timelines, tasks, goals and long-term work plan was presented and the status quo reported. Second, the paper #2 "Attributing a fraction of climate change to a nation's historical emissions: closure and scientific uncertainty" was introduced and each chapter presented by co-authors, followed by discussion of the participating experts. Third, the experts discussed the way forward of the MATCH group. All presentations held during the meeting are available on the web site www.match-info.net.

The meeting was hosted by Université Catholique de Louvain, Institut d'Astronomie et de Géophysique Georges Lemaître, and organized by Ecofys. 16 participants attended the meeting (Annex B).

2. ISSUES DISCUSSED BY THE SCIENTIFIC COORDINATION COMMITTEE

The members of the scientific coordination committee (SCC) Jan Fuglestedt, Joyce Penner, Jason Lowe, Michael Prather, Marco Tulio Cabral (for José Domingos Gonzalez Miguez) and Niklas Höhne met on Monday (13 March) to

- Review the agenda of the MATCH meeting in the light of the recent developments
- Update the status of funding of developing country experts
- Discuss on future work
- Discuss the presentation of MATCH at SBSTA

3. OPENING OF THE MEETING

Joyce Penner opened the meeting as Co-Chair of the scientific coordination committee of the MATCH group. She expressed his thanks on behalf of the experts to Université Catholique de Louvain, Institut d'Astronomie et de Géophysique Georges Lemaître for hosting this meeting.

Jean-Pascal van Ypersele welcomed the participants on behalf of the University of Louvain.

Niklas Höhne introduced all participants to the history of MATCH and listed agreements made during past expert meetings including timelines. He also mentioned that the SBSTA will discuss the matter in May 2006. This leaves 2 more months to complete the work of MATCH.

Niklas Höhne also mentioned that in total 15 experts from developing countries were supported with travel and subsistence costs. There is additional money for additional 5 experts trips available in the fund provided through the UK, German and Norwegian governments.

4. DISCUSSION OF PAPER #2

Michael Prather presented an **introduction of paper #2**: "Attributing a fraction of climate change to a nation's historical emissions: closure and scientific uncertainty". A draft of the paper was available to the participants. The group identified the major gaps of the paper. The outline of the paper is as follows:

- 1 Introduction
- 2 Long-lived greenhouse gases
- 3 Short-lived greenhouse agents and other forcings
- 4 RF and climate change
- 5 Uncertainty of impact of OECD Annex I emissions
- 6 Conclusions

Jason Lowe presented his input to the paper on section 4 for the reconciling bottom up estimates of radiative forcing with historical temperature records.

Atul Jain presented his new analysis on reconciling bottom up estimates CO₂ emissions with historical CO₂ concentration records.

Jan Fuglestvedt presented his new analysis on reconciling bottom up estimates CH₄ and N₂O emissions with historical CH₄ and N₂O concentration records.

Niklas Höhne outlined how the uncertainties of OECD Annex I countries' emissions were derived and fed into the simple climate model. Finally Jason Lowe explained how these data were used to calculate the impact and uncertainty of the emissions on temperature increase.

All presentations are available at the file exchange of the MATCH web side.

On day 2, Michael Prather presented and discussed an annotated outline of the paper with tasks and timelines attached to all sections (Annex C).

5. DISCUSSION ON FUTURE WORK

In the evening of the first day, Niklas Höhne introduced some ideas on the future of the MATCH process. He started introducing the options discussed at the last meeting:

- Option A: Continuation of present situation
- Option B: Development of a tool
- Option C: Application of the contribution results
- Option D: Assessment of future regime designs

He also noted that options B and D were those most preferred at the last meeting and presented a paper outlining these options (Annex D).

Ben Matthews presented his detailed remarks on future work: He mentioned that the Java Climate model is a readily available, freely accessible tool that can be used those that are interested. He also mentioned that in the future MATCH could look at physical indicators of damages to assess the vulnerability and adaptation (Annex E).

The full discussion on future work was held in the morning of day 2.

Luiz Pinguelli Rosa presented his and Maria Silvia Muylaert de Araujo's ideas of the future of the work of MATCH. He explained the history of the Brazilian Proposal. He mentioned that the period of 1990 to 2002, chosen for paper #2 would be too small and would not reflect the original idea of the Brazilian Proposal. But he saw that this cannot be changed in paper#2 at this stage. He also noted that the Brazilian Proposal was not meant to serve for discussion of the period after the Kyoto Protocol, but only for discussions of the second commitment period of the Kyoto Protocol. With the Annex I countries emissions increasing, developing countries can participate in the regime through the CDM and/or the proposals by Papua New Guinea on compensation for avoided deforestation. They voiced clear preference that the MATCH group should continue its work with the present scope (Option A) with better data, longer timescales and all models, including the JCM and IVIGs contribution to it. Further, they proposed to study new indicators for the origin of emissions: transport, industry and differentiation within countries (rich/poor population). Finally they noted that the Brazilian proposal was not meant for Article 2 (stabilization of the climate) but for Article 3 (common but differentiated responsibility) of the UNFCCC.

The discussion focussed around the chosen time period of 1990 to 2002 for the paper #2. It was acknowledged that this is a short time period, but that it was chosen to demonstrate the principle and since it a period where good emission data and associated uncertainties are available. Counter arguments were that this scientific paper will be read by the policy arena and this choice can be interpreted as a

preference. The authors of paper #2 will make every effort to describe this case as being merely an academic choice in light of the best data availability..

Ben Mathews and Christiano Pires de Campos presented their latest results with the Java climate models (available at www.climate.be/jcm). They presented probabilistic analysis of the carbon cycle and LUCF emissions. A poster of their work was made available. Experts congratulated Ben and Chris for their work and encouraged them to publish this work in a journal. The presentation and the poster is on the file exchange of the MATCH website.

Malte Meinshausen presented a discussion paper on the future of MATCH (Annex F) that attempts to address and combine the options A to D mentioned above. He mentioned that MATCH could fill the niche between science and policy. It could evolve into MATCHS (Modelling and assessment of contributions to climate change solutions) broadening its scope of work. It possibly should not be a number cruncher. It could encourage use of models, but do not endorse a particular one. It could have a strong element on capacity building for all countries, in particular developing countries on data and tools. MATCH would continue its work until SBSTA 24. In the optimal case, SBSTA would request MATCH to report back to SBSTA in 2 or 2.5 years. During 2006 and early 2007, the transition could be made to cautiously broaden the scope.

Christiano Pires de Campos mentioned that some members of the group already study other proposals without extra funding as part of a natural process. Using the name "Modelling and Assessment of Contributions to Climate Change Solutions – MATCHS" and extending the MATCH mandate would lead to a broader scope than the original Brazilian Proposal. But the original objective of the MATCH group to publish 4 papers until May 2006 was not yet accomplished. Therefore, there is no reason to change the MATCH mandate to study other proposals. First, the original task should be finished. He also mentioned that the capacity building component of MATCH could be improved to include also funds for research, not only travel. For example his one year research in Belgium was supported by a Brazilian grant (CNPq) and not through MATCH

MATCH welcomes government observers as guests to the scientific process and is interested in their views. Katherine Bass presented the views of UK government on the future of MATCH. She apologized for not being able to be more concrete, but the UK would have to wait for the consideration of SBSTA to have a clear view on the future of the MATCH process.

Marco Tulio Cabral presented the views of the Brazilian Government on the future work of MATCH. He recalled that one of the main original objectives of the Brazilian proposal was to assess historical contributions of countries and regions to climate change, in terms of mean surface temperature increase, in order to provide an important input for the policy debates regarding burden sharing of climate change mitigation activities. Given that anthropogenic emissions started to grow significantly after the advent of the industrial revolution, especially during the 19th Century, a meaningful analysis of historical anthropogenic contributions to climate change would necessarily cover a time period dating back to the eighteen hundreds. By developing a refined scientific analysis of the period between 1990 and 2002, Paper 2 is a part of this larger question, namely, the analysis of historical contributions to climate change since the 19th century. Another part of this question that remains to be addressed regards the scientific gaps identified in Paper 1. He therefore concurred with Luiz Pinguelli Rosa, Maria Silvia Muylaert de Araujo and Christiano Pires de Campos in that the natural choice for the future work of MATCH is that represented by Option A.

After some discussion, Niklas Höhne summarized the discussion as follows:

Five elements could be implemented as a sequence over time, overlapping where appropriate:

Element A - Continuation of present situation: The MATCH group could extend the time horizon of its work for e.g. 2 more years and continue to work on scientific and methodological aspects related to contributions to climate change. The group agreed that the insights from the second paper could result in a new paper with

- longer time scales including the 19th century
- uncertainty per region
- finer resolution of sources (countries, inside countries or over sectors)
- absolute and relative contributions
- substantial new work on uncertainties for early emissions

Element B - Development of a tool: It could be desirable to develop a computer tool that could widely be used to calculate contributions to climate change of various emission sources. The user would select the specific input emission data and would make the policy choices like a time horizon and indicator. Several tools already exist such as the JCM, the FAIR model and the CAIT tool. MATCH agreed that it would not develop a new tool, but would be available to assess and evaluate those tools.

Element C - Application of the contribution results: To move the content of the work one step further, the group could explore using the results of the contribution calculation, e.g. in burden sharing or contributions to adaptation fund. This element is one sub element of element D.

Element D - Assessment of alternative differentiation proposals: The group in its current form could broaden the scope to assess the options for the differentiation of emission reductions in a future international climate regime such as a staged approach, Triptych or converging per capita emissions or sectoral analysis. The focus of the work should be quantitative analysis resulting in scientific papers. The output would be joint scientific papers (and dialogue with policy makers) on the options for an international climate regimes post 2012.

Element E - Assessment of relative vulnerability to climate change / relative need for adaptation: The group could use the method of working to look into relative vulnerability and relative need for adaptation. This would require different expertise but could be accomplished with the same mode of working. The combination of historical responsibility and relative need for adaptation would cover a very comprehensive picture. As a first step the group could consider regional effects of climate change and physical indicators of damage. The MATCH group could prepare for this element in the long run.

On the process, the group agreed that some of these elements would be presented to the SBSTA in May 2006. Upon positive reaction, the work could continue and expand. The full new scope would be operational in 2007.

6. MATCH PRESENTATION AT THE SBSTA

Niklas Höhne presented an outline of the MATCH presentation at the SBSTA in May. The following was agreed:

SBSTA plenary: The SBSTA will officially consider the matter on Thursday 18 May in a plenary session. MATCH experts will most likely not have an opportunity to speak. MATCH will prepare a 1-2 page document of the work and possible future scope of MATCH. This will be used as an input for a possible joint submission by Brazil and the UK to be made available to all delegations as a MISC document. Niklas Höhne will send a draft to the SCC in 1 week.

Informal consultations: Friday 19 May, the issue will be discussed in “informal consultations”, open only to country delegations. At the first session of these informal consultations, experts from MATCH can be invited to provide their presentations. The group agreed on the following participation:

Title	Presenter	Time
Introduction to the MATCH process	Niklas Höhne	15 min
Main messages and options for the future	Joyce Penner	15 min

Side event: MATCH will in addition organize a public side event, where all participants of the conference can participate. Any organization accredited to the UNFCCC can register a side event. It should ideally be before the informal consultations, so best on Thursday 18 May in the evening. The following outline was agreed:

Title	Presenter	Time
Introduction to the MATCH process	Luiz Pinguelli	15 min
Analysing countries' contribution to climate change: Scientific and methodological choices	Michel den Elzen	30 min
Closure and scientific uncertainty	Jason Lowe or Joyce Penner	30 min
Possible future work of MATCH (including advertisement of JCM and FAIR demonstration)	Niklas Höhne	15min
Demonstration of JCM and FAIR to interested participants	Ben Matthews Michel den Elzen	1h

Ecofys will organize the side event and send a presentation template to the presenters.

7. CLOSING

In the closing session Jan Fuglestad reminded the group of the advantages of an update of paper #1. He mentioned that the finalization of paper #2 has top priority for the report to the SBSTA. He reviewed the elements of future work (described above).

He mentioned that if the reaction by the SBSTA is negative, this may have been the last meeting of MATCH, unless participants want to keep the network going independently of SBSTA.

In the case of a positive reaction and more support, a meeting in the autumn would be necessary to define a new work program. Many members of the group showed interest in such a meeting. The SCC should prepare a draft work plan in advance. Capacity building and broader participation would be very important.

After the SBSTA the SCC will inform the MATCH participants of the outcomes of the meeting.

Finally Jan Fuglestad thanked Ben Matthews and the University of Louvain La Neuve for hosting this MATCH meeting.

ANNEX A



The University of Reading



DRAFT AGENDA

AD HOC GROUP FOR THE MODELLING AND ASSESSMENT OF CONTRIBUTIONS OF CLIMATE CHANGE
(MATCH)

13 TO 14 MARCH 2006, LOUVAIN-LA-NEUVE, BELGIUM

UNIVERSITE CATHOLIQUE DE LOUVAIN
INSTITUT D'ASTRONOMIE ET DE GEOPHYSIQUE GEORGES LEMAITRE
2, CHEMIN DU CYCLOTRON (BATIMENT MARC DE HEMPTINNE, TOUR B, 4E ETAGE)

VERSION 7 MARCH 2005

Monday, 13 March 2005 Scientific coordination committee only

8.30 – 9.30	Chair: Jan Fuglestedt	Meeting of the scientific coordination committee	1h
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Monday, 13 March 2005

9.30 – 11.00	Chair: Joyce Penner	- Welcome (Jean-Pascal van Ypersele) - Review of timelines (SBSTA), tasks, goals of MATCH, review of our project list & long-term work plan (Niklas Höhne)	1.5h
11:00	Coffee Break		30'
11.30 – 13.00	Chair: Michael Prather	Introduction to the draft paper #2: "Attributing a fraction of climate change to a nation's historical emissions: closure and scientific uncertainty" Presentations on the chapters by the co-authors - CO ₂ : Atul Jain - N ₂ O, CH ₄ : Jan Fuglestedt - Aerosols: Joyce Penner - RF and climate change: Jason Lowe - Uncertainty of attribution to OECD Annex I emissions: Niklas Höhne for Atsushi Kurosawa, Atul Jain, Jan Fuglestedt	1.5h
13.00	Lunch		1h
14.00 – 15.30	Chair: Michael Prather	Discussion of the draft paper #2 - Discussion of the sections - Agreement on timeline and tasks - Agreement on target journal	1.5h
15:30			30'
16:00- 17:30	Chair: Joyce Penner	Short introduction to future work - Future scope of work for MATCH (Niklas Höhne)	1.5h
17:30	End		
19:00	Dinner		

Tuesday, 14 March 2006

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9.00 - 11.00	Chair: Joyce Penner	Detailed discussion on future work - The future of the Brazilian Proposal from a Brazilian point of view (Maria Silvia Muylaert / Luiz Pinguelli Rosa) - New work on contribution calculations (Ben Matthews, Chris Pires de Campos) - Discussion whether an update of paper #1 is necessary (Jan Fuglestedt) - Scope of future work for MATCH - The report and presentation of MATCH to the SBSTA May 2006 (Niklas Höhne)	2h
11:00	Coffee Break		30'
11:30 - 13:00	Chair: Michael Prather	- Discussion of the draft paper #2 continued	1.5h
13:00	Lunch		1h
14:00 - 16.00	Chair: Jan Fuglestedt	- Stocktaking - Work plan - Decision on next meeting - Distribution of tasks	2h
16:00	End		

Tuesday, 14 March 2005 Scientific coordination committee only

17.30 - 18.30	Chair: Jan Fuglestedt	Meeting of the scientific coordination committee	1h
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ANNEX B

Participants of the meeting

The following experts attended the expert meeting:

- Atul Jain
- Ben Matthews
- Christiano Pires de Campos
- Guoquan HU
- Katherine Bass
- Luiz Pinguelli Rosa
- Malte Meinshausen
- Marco Tulio Cabral
- Maria Silvia Muylaert de Araujo
- Michael Prather
- Jan Fuglestedt
- Jason Lowe
- Joyce Penner
- Michel den Elzen
- Niklas Höhne
- Jean-Pascal van Ypersele

ANNEX C

Outline and tasks of MATCH paper #2

MATCH – Modelling and Assessment of Contributions of Climate Change – Paper#2
Attributing a fraction of climate change to a nation's historical emissions:
closure and scientific uncertainty
Version 14 March 2005 (day 2)

1 INTRODUCTION

revise, shorten, make clear our goals for this paper: uncertainty in climate impact of 1990-2002 Annex I (OECD) emissions. present "Science Questions", note that this error analysis of one piece of the whole Brazil proposal – Prather & ...

****define "uncertainty" as 1-sigma, 2/3-likelihood interval, - Lowe ?

2 weeks

2 LONG-LIVED GREENHOUSE GASES

clean up, introduce Table 1 & 2, add Table 6: drop GWP-lifetimes, put uncertainty on RF, make USA+Canada=>N.Am (Annex I) – Prather & ...

2 weeks

2.1 CO2

2.1.1 GLOBAL CO2 BUDGET AND ABUNDANCE

update, check budget numbers, drop figure (put 1800-2002 CO2 abundance in "Supplementary Material"), add some of old Section 2.1.2 – Jain & ...

2 weeks

~~2.1.2 ESTIMATED AND DERIVED CO2 EMISSIONS~~

2.1.2 FOSSIL-FUEL CO2 EMISSIONS REPORTED BY ANNEX I COUNTRIES IN COMPARISON WITH BOTTOM-UP GLOBAL ESTIMATES

edit, tighten text, decide on which figure, combine Table 3 with equivalent for CH4 and N2O (FCCC reporting uncert). – Prather & ...

2 weeks

2.1.3 LAND-USE/LAND-CHANGE CO2 EMISSIONS REPORTED BY ANNEX I COUNTRIES IN COMPARISON WITH BOTTOM-UP GLOBAL ESTIMATES

New section – FCCC reporting (uncertainties from bottom up) of LUCF CO2, plus global LUCF CO2 based on activity data – Hoehne & Jain & ...

2 weeks

2.1.4 CARBON-CYCLE MODELING AND UNCERTAINTIES IN THE 1990-2002 ANNEX I (FOSSIL FUEL & LAND-USE.CHANGE)

New section – Use global carbon-cycle modeling to derive top-down LUCF CO2 emissions. Put together plot (like CH4) showing global and OECD emissions, also summarize fossil-fuel emissions and uncertainties in PDF-like figure (propose that 13-yr OECD emission have single PDF). – Jain & Prather...

2 weeks

** derived delta-CO2 abundance from OECD!

4-5 weeks

2.2 CH4

2.2.1 GLOBAL CH4 BUDGET AND ABUNDANCE

Done, drop figure, describe in text, put in Suppl Material.

2.2.2 CH4 EMISSIONS REPORTED BY ANNEX I COUNTRIES IN COMPARISON WITH GLOBAL ESTIMATES

Tighten writing.

2.2.3 ESTIMATED AND DERIVED CH4 EMISSIONS

Drop equations (?Suppl Mat), Show Figure 8 (emissions and uncert ranges for global (18xx-2002) and OECD (1990-2002), produce uncertainty PDF in OECD emissions, – Fuglestedt & Prather
derived delta-CH4 abundance from OECD!

2 weeks

2.3 N2O

same as for CH4.

2.3.1 N2O EMISSIONS REPORTED BY ANNEX I COUNTRIES IN COMPARISON WITH GLOBAL ESTIMATES

2.3.2 ESTIMATED AND DERIVED N2O EMISSIONS

derived delta-N2O abundance from OECD!

2 weeks

2.4 HFCS, PFC AND SF6

2.4.1 GLOBAL BUDGET AND ABUNDANCE

tighten.

2 weeks

2.4.2 ESTIMATED AND DERIVED EMISSIONS

shorten, decide which plot to show = 134a, put in Suppl Material all RF < .0XX W/m2 - Hoehne.

2 weeks

2.5 CFCS, HCFCs AND OTHER HALOCARBONS 20

tighten, kill Fig 16 (into Suppl Mat?).

2 weeks

3 SHORT-LIVED GREENHOUSE AGENTS & OTHER FORCINGS 21

3.1 OZONE 21

tighten, keep Fig 18 (RF+- for strat and trop), drop Fig 17.

2 weeks

3.2 DIRECT AEROSOL FORCING AND UNCERTAINTIES 23

tighten – Penner

5 weeks

3.3 INDIRECT AEROSOL FORCING AND UNCERTAINTIES 25

tighten, keep major figure! immediate resolve correct RF values?!?!? – Penner

5 weeks

3.4 DERIVED NET AEROSOLS FROM DETECTION AND ATTRIBUTION ANALYSIS

write! includes spatial pattern mapping, one figure, parallel to 3.3 total aerosol + trop-ozone RF (time) with 5%, 50%, 95% plus PDFs of both together—Lowe & Stott

New Figure: timeline median of all aerosol + trop-O₃, with PDF at some time
- Penner

discuss what aerosols & indirect aerosols are effectively included in 3.4 below
4 weeks

3.5 OTHER / NATURAL FORCINGS

write!, done, update volc. – Lowe
4 weeks

4 RF AND CLIMATE CHANGE

write! very short intro – Lowe
4 weeks

4.1 MAPPING ABUNDANCES TO RF + other RFs

write! explain abundances (global mean obs ± 0) => RF ($\pm X\%$), accumulate and present total bottom-up RF $\pm X$ (PDF) (time), 1 or 2 figures (aerosols hard to show?), - Hoehne

2 Weeks (depends on aerosol/UM)

4.2 RECONCILING RF WITH CLIMATE CHANGE RECORD (forward and reverse)

write! for simple climate model (tune only Clim-Sens & Kocean) & obs T derive many RF curves, think about generating weighting fn based on rms(RF – RF(4.1 prior has uncert). Possible option is to take external Clim-Sens \pm and covar with Kocean. Compare RF \pm (time) from 4.1 with this RF \pm (time): ?show time line with time slices of the RF difference PDF/CDF – Lowe

>>>problems: fix Kocean and take P[T₂] to generate P[RF(time)], minimum estimate of the error, then can look at a few different Kocean's to see if width or bias changes.
4 weeks for first look, final analysis of RF diff's 6 weeks

4.3 FORWARD MODELS OF ANNEX I EMISSIONS/ RF TO CLIMATE INDICES

4.4 SPATIAL PATTERNS AND ATTRIBUTION FROM THE 3 GCM RUNS

5 UNCERTAINTY OF IMPACT OF OECD ANNEX I EMISSIONS

write! Simple climate model calc delta-T for each case of RF-global (4.1) minus OECD(1990-2002) RF. Consider model ranges in Clim-Sens & Kocean (using prob from 4.2). consider range in RF-global also.

>>>still need to confirm details on prob weighting<<<< <<<< see 4.2 results

Decide on Figures. Show OECD delta-T and PDFs,

move Table 6 to section 2. – Lowe & Prather & ...

waiting on Atul, to begin with plan-B in 5 weeks no matter what
7 weeks (calculations and figures)

hence plan-B = PDF of CO₂ RFs from OECD emissions
5 weeks

6 CONCLUSIONS

write last! – Lowe, Hoehne, Penner, Fuglestedt

7 ACKNOWLEDGEMENTS

8 REFERENCES

TIME LINE:

ANNEX D

POSSIBLE FUTURE WORK OF MATCH

Niklas Höhne

Draft 07 March 2006

Several options exist how the MATCH group could continue its work beyond May 2006. Some options are sketched out in this paper to be discussed at the MATCH meeting on March 2006.

Option A: Development of a tool

It could be desirable to develop a computer tool that could widely be used to calculate contributions to climate change of various emission sources. The user would select the specific input emission data and would make the policy choices like a time horizon and indicator.

A standard tool would cope with the fact that for relative contributions the policy choices are more important than scientific uncertainties. It may be difficult to design the one standard tool.

Several MATCH experts would be interested in the development of such a tool. The MATCH network of scientists could be used for comments and discussions, but would not take the lead in the tool development. Funding would need for the software development.

Option B: Assessment of future regime designs

The group in its current form could broaden the scope to assess the options for the design of a future international climate regime such as a staged approach, Triptych or converging per capita emissions. The focus of the work should be quantitative analysis resulting in scientific papers. The output would be joint scientific papers (and dialogue with policy makers) on the options for an international climate regimes post 2012.

The group would continue to be inclusive, open and transparent, be of a standard consistent with the practices of peer-reviewed published science and would facilitate capacity-building in developing countries, including by hosting scientists from developing countries.

This topic is of very high interest by policy makers working on preparations for post 2012 regimes. It was recognized that this would move the group further towards difficult policy questions. As in the past, the MATCH group would only assess the implication of policy choices, without making any recommendations on these choices.

Most members of MATCH are interested in pursuing such an option. Current MATCH participants plus some additional experts would have the capabilities for the assessment of future regime designs.

The scope of the work could not only include future emission reductions but also approaches to address vulnerability and adaptation. It could e.g. address how calculations of contributions to climate change also can be used in connection with for transfer of funds to compensate impacts and support adaptation.

ANNEX E

Possible Future Work of MATCH from Ben Matthews 10th March 2006,

I make some comments in response to Niklas' document (please read that first)

Regarding the Tool option A:

Since the “tool option” remains on the agenda, I would like to mention that I have already made such an interactive tool, indeed I devoted a large part of my life to this during the last five years, including a disproportionate effort related to attribution calculations since the beginning of ACCC intercomparison in 2002.

It's called “Java Climate Model”, and is available at: www.climate.be/jcm

Since you are experts I invite you have a look at the new version JCM5 (updated this week)

No installation is needed, only Java 5, and it downloads in just a few seconds.

Admittedly, the documentation of this new version needs substantial tidying up, but this is rapidly being fixed, and the model itself is now stable (except for new parts noted as 'experimental').

To find the sections related to MATCH, in the tree (left), go to the “Regional Contributions”, then “Responsibility”, and explore plots (open plots by dragging to a panel -see also “how to use” link from welcome page).

Note in addition to the timescale options and various indicator plots in responsibility you can:

- Change the set of regions (see “Regional data”), including to individual nations.
- Adjust the land-use-change emissions module made by Christiano Pires de Campos of IVIG
- Adjust other carbon cycle parameters (from Bern model)
- Adjust other gas emissions and chemistry (see “Other Gases”, “Radiative Forcing”)
- Adjust the UDEB model (eg the fit to TAR GCMs, or individual parameters)

Note this model includes over 30 gases, and many ocean layers, it's much more complex than “ACCC model” yet still recalculates in a fraction of a second even with data for every nation. Indeed we also used it to run probabilistic analysis varying thousands of parameters in an hour or so, and hope to show you some such results of this next week. I would also be happy to demonstrate the model to individuals during the breaks.

Of course this tool can do many other things than calculate regional attribution. If we wanted a tool solely for this task, a variant of the interface might quite easily be created to bring the most relevant parameters together in one place, and to hide all irrelevant options and curves. To this might be added an option to import any emissions data from a text file. Such a version could be subject to an external review period in which modules, available options, and documentation are changed according to suggestions and thereafter “frozen” in a state known to be reliable and well explained (i.e. to stop forever adding more complicating factors...).

To me this would be a much easier option than building such a tool from scratch as proposed. Also in my experience, the proposed separation of scientific experts from software creators is not practical. Of course there are many nice models with user-interfaces, although few designed from the start to be so interactive, and few incorporating substantial modules for calculating attribution.

So perhaps if we consider the “tool option A” we should start by reviewing existing tools, and considering how these might be improved, rather than reinventing these wheels?

As you will recall from Reading, we also considered a paper#3 to create matrices which capture the essence of the emissions-indicator relationship, for use in a spreadsheet-style attribution system allowing anybody to paste in their own emissions data and choose time horizons etc. Considering that the choices regarding emissions make much more difference to the relative attribution than other model parameters (see paper#1), I continue to believe that such a system could be both convenient and accurate, and could generate such matrices using JCM5. On the other hand, since I already have a more flexible, as well as accurate and convenient tool to make such results, I am less enthusiastic to promote this simpler option.

Distribution of Impacts

Some of you may recall that on Jan 11th I sent a discussion text regarding extending the scope of MATCH to cover relative vulnerability, in response to the discussion in Reading, partly inspired by the idea of Mohan Munasinghe. Jan and Niklas made a reply to this (I'm not sure whether all of SCC have seen these texts, if not it may be useful to forward them.) Now I see that Niklas has incorporated this concept to some extent within Option B, which has an even broader scope.

I understand the concern expressed by Jan and others that calculating relative vulnerability would involve expertise well beyond that of the current group. I don't see that as a bad thing, indeed it may help to increase the participation especially of developing country experts. On the other hand, if we want to continue to focus on our existing know-how, there may be an intermediate step to consider. Specifically, whilst paper 1 attributed only CO₂, CH₄ and N₂O, we recognise in paper 2 the large absolute contribution of aerosols and ozone and other unevenly distributed forcings. However we should always bear in mind that the ultimate aim of climate policy community is to reduce climate change impacts, not global annual average temperature. In the case of forcing from well-mixed greenhouse gases, the global average temperature serves as a reasonable proxy for scaling impacts, however in the case of forcing from aerosols, ozone, aviation contrails etc. this is not the case – so we should consider the regional and seasonal distribution of each effect separately and especially avoid simply cancelling warming and cooling in different regions. This is a big challenge which large teams are already studying, but a specific niche for this group could be to investigate options for doing this in a way which preserves our regional cause-effect relative-attribution concept and may eventually be simple enough to adapt for a “policymaker model” (to recall original Brazilian concept). On the other hand, we could reduce the task compared to my earlier suggestion by calculating only as far as some clearly defined physical indicators, chosen to be relevant to specific regional sectoral impacts, whilst stopping short of evaluation and integration to compare relative total impacts by country since this step (as I mentioned in my previous text) involves more controversial risk/value judgements. Respecting the importance of socioeconomic factors to vulnerability, we could also explore spatial and temporal intercorrelations with such factors (e.g. experiments weighting the physical indicators according to population density, adaptation capacity, etc.).

Regarding the broader option B, the general concept is good however I fear the phrase “regime designs” may imply to some people heavy political structures. I suggest to express it instead as assessing various “dimensions of equity” (e.g.. responsibility, vulnerability, capacity, rights, incentives etc.), including the effect of scientific and methodological choices in quantifying these, and then as another step

assessing practical ways in which these dimensions might be combined together to satisfy diverse demands (as in the end none will “win”, we need a mixed approach).

Process

The future work discussion might also consider the working process.

I wonder whether plenary meetings focusing on completing one paper at a time are really the most effective way to stimulate work in parallel on this topic? On reflection I preferred the looser intercomparison system of ACCC whereby we agreed some common tasks and input and output criteria, went away to explore different ways of calculating it, and then each presented independent results. Such an intercomparison structure might be appropriate again at the beginning of a new task, although papers come at the end, as we have been doing.

ANNEX F

**DRAFT for discussion, 14. March 2006, Louvain-la-Neuve
Malte Meinshausen**

**From MATCH to MATCHS
(MATCHS=Modeling and AssessmentT of Contributions to climate cHange
Solutions)**

Vision

The long-term vision is built on the fact that MATCH offers a unique potential of scientifically highly qualified people with a fairly well developed understanding of the UNFCCC policy process. Thus, the scientists involved in the MATCH group could offer invaluable services to the policy process by investigating scientific issues in regard to differentiation proposals. Examples for such proposals are well known: Clearly, the Brazilian proposal and possibly upcoming variations of it, Contraction & Convergence, Multi-Stage, Tryptich, etc, etc. So far, such proposals were developed, proposed and quantified by individual scientists or groups. Clearly, a larger body of scientists can offer additional value by debating the scientific issues in regard to such proposals. As already seen in the current constellation of the MATCH group, the access to different datasets, the scientific discussions on the quality of each of those, and the range of skills among the various participants allow a scientifically rigorous modeling and assessment of different proposals (and their uncertainties). This could hardly be offered by any single scientist or research team. Two important differences between MATCH and IPCC-type of work: 1) IPCC does (for good reason) neither get involved in doing research itself nor 2) the assessment of policy-relevant “country-level” literature (cf. the IPCC SAR attempt to provide “country-level vulnerability indices” based on the existing literature, which was heavily criticized by some countries □ No “vulnerability indices” in the TAR any more.).

MATCHS as scientific assessment/inter-comparison exercise of differentiation proposals

Certainly, the final result of international negotiations on emission reductions or adaptation fund contributions will never follow a mathematically derived differentiation proposal. In other words, horse-trading will always be involved. However, a widening of the international framework for legally binding commitments can only be built on the trust among parties that the agreement is fair – at least to a certain extent. And here is where the differentiation proposals can contribute significantly to the success of the negotiations by providing transparent indicators with which policy makers can get a common picture of responsibilities, capabilities, vulnerability, etc. In this regard MATCHS could help to ensure that scientific rigor is applied in the quantification of these indicators – similar to the service that many of the model-inter-comparison projects provide by assessing different approaches to the same problem and by discussing possible differences in results. Furthermore, MATCHS should continue to provide policy makers with a clear distinction in regard to what are scientific and what are policy choices. Thus, MATCH could evolve into an assessment body that provides inter-comparisons of differentiation proposals and the (possibly diverging) implementations of each proposal in various models.

MATCHS – not a number cruncher

It might be a wise strategy though, that MATCHS is not going to deliver specific quantifications of differentiations proposals a la: “country x has to reduce by y%”. This should be left to individuals, individual groups and scientific governmental

advisors for two reasons: a) the overall work and scientific nature of MATCHS could be called into question, if specific countries don't feel fairly treated under a specific quantification /differentiation proposal. b) MATCHS could anyway not offer to provide specific quantifications on the relatively short timelines that are sometimes needed in the negotiation process. However, MATCHS will encourage individual groups and scientists to create such number crunching tools, which are immensely useful for outreach purposes, capacity building, and in the end vitally needed to support transparency in the negotiation process.

Capacity building

However, if properly organized, MATCHS could not only function as a scientific assessment body but as well as a main "capacity building" institution in regard to differentiation proposals. Particularly for developing countries, one of the hindrances in the past negotiations has been the limited access to data and timely information of the quantified implications of negotiation proposals. By fostering the exchange and scientific discussion among scientists from Annex-I and Non-Annex I countries, MATCHS could provide one of the prerequisites of successful future negotiations: the capacity building for developing country (governmental) experts, so that they can judge and quantify negotiation proposals independently. This involves the provision of access and a common understanding of (the quality of) the appropriate datasets, such as historic emissions, GDP projections, etc ., methods to derive other indicators, and methods of how to get from a set of indicators to differentiated commitments.

Funding

The funding of such a MATCHS enlargement would possibly require increased resources. In addition to travel support for developing country participants, a budget needs to be provided for a secretariat function (similar to the one by Ecofys currently) and the possible organization of workshops, as well as "outreach" conferences. Furthermore, it could be debated whether the lead authors of MATCH's scientific papers will be provided with a small funding – in particular for those scientific institutions that are dependent of third-party financing. However, given the high relevance of bringing some scientific rigor into the political discussion on future commitments, it might be not that difficult to find willing Annex-1 governments to provide the necessary support.

Transition from MATCH to MATCHS and a possible time-line

The sketched time line illustrates how elements of all four above options A-D are built into this possible way forward.

1. Continuation of current work until SBSTA-24, May 2006:

The MATCH group will anyway focus on the finalization of paper 2 with the intent to submit it in April 2006 and present results in May 2006 at SBSTA-24 (element of option A). Possibly, Ben Matthews and others will start to work in parallel on paper 3, which seems to come very close to a technical manual describing a tool for the application of the attribution results (element of option B). (See as well MATCH's agreed timeline above.)

2. SBSTA-24:

Presentation of MATCH results in regard to paper 1 and 2. Possibly, the group outlines vague working plans for the future, namely by proposing to built on the Brazilian proposal work. Ideally, parties will invite another "report back" from MATCH, encouraging MATCH to continue to look into scientific issues of indicator systems such as the Brazilian proposal. As mentioned before, it is probably not a good idea

by any party to get specific on which differentiation proposal should be looked at as other parties will possibly veto such a specific mandate for MATCH. MATCH does not necessarily need a mandate, but as a driving force for the group it would be very beneficial, if another 'reporting back' after two years could be agreed on by SBSTA.

3. Transition phase to a broader group until end of 2006:

Initially, continuation of Brazilian proposal work: MATCH continues to work on the Brazilian proposal and historic attribution for a little while – primarily to finish off started projects, including the revision of paper 2, possible launch of a tool in conjunction with paper 3 (see caveats in section 2). However, the group will start discussions on the appropriate approach to broaden the scope from historic attribution to other differentiation proposals. In particular the Scientific Steering Committee will do outreach activities to involve scientists/modeling-groups that are experts in the related fields, such as GDP projections, vulnerability, development indices, economic costs of mitigation actions etc. - depending on the differentiation proposals that are planned to be addressed. The latter decision on the set of analyzed differentiation proposals will probably be a decision that is best taken in knowledge of the at-that-time-mostly-discussed proposals in the policy arena.

4. MATCHS operational by 2007

By beginning 2007, the MATCHS group could be operational as a “scientific advisory and inter-comparison group on differentiation proposals”. Strong developing country participation will allow the capacity building aspect, as well as the direct channel to feed new differentiation proposals into the group, such as “Brazilian proposal II”. The group will serve as a central discussion forum of various scientists, governmental experts and other stakeholders in regard to the scientific choices to be made for differentiation proposals, available datasets, and quantification of different policy options. The joint preparation of peer-reviewed scientific literature on the scientific and methodological issues will remain one of the central driving forces for the MATCHS group.