



WMO

# INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE



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## **FOLLOW-UP TO THE IPCC EXPERT MEETING ON EMISSION ESTIMATION OF AEROSOLS RELEVANT TO CLIMATE CHANGE**

(Draft proposal by the TFB Co-chairs)

**Follow-up to the IPCC Expert Meeting on  
Emission Estimation of Aerosols Relevant to Climate Change**  
held on 2-4 May 2005, Geneva, Switzerland

**Draft Proposal by TFB Co-chairs**

**Background**

1. The IPCC Expert Meeting on Emission Estimation of Aerosols Relevant to Climate Change was held successfully on 2-4 May 2005 in Geneva, Switzerland. There were 31 participants; the list of invitees was produced by the TFB in consultation with WG-I Co-chairs. The Meeting Report has been finalised after two rounds of review by the participants.
2. The meeting concluded that this was a useful step and proposed follow-up meetings where a number of specific topics could be discussed.

**Rationale for the follow-up meeting**

3. The meeting noted that one of the major sources of uncertainty in the understanding of the contribution of aerosols to climate change was in the emissions of aerosols. There are significant uncertainties in the magnitude of emissions, the relevant properties of aerosols and even the exact definitions of carbonaceous aerosols which lack standardised measurement methods. These uncertainties contribute directly to uncertainties in climate model results.
4. The meeting concluded that, while the IPCC is not itself the body to take responsibility for carrying out research programmes for setting aerosol measurement standards, the role of the IPCC could be to encourage and facilitate relevant discussions..
5. The meeting also concluded that inventory experts, in consultation with other experts as necessary, could assist climate change research by addressing some of the some other issues identified in emission estimates of aerosols. These issues include: better definition of aerosols; consideration of how the results of differing measurement techniques relate to each other; how existing aerosol inventories produced for other purposes may be used to help develop climate relevant inventories; the impact of uncertainties in mass of biomass burnt; and quantifying the effect of emission control technologies and differing management practices.
6. The meeting considered that currently it is not possible to produce emission estimates that include the impact of differences between countries such as: technological differences; management practices; differences in land use and soil properties; fuel loadings for open burning; methods of biomass burning and differing optical properties. Thus national inventories of aerosols relevant to climate change cannot be reliably produced at this time. Further consideration should be on anthropogenic aerosol emissions: some of these sectoral considerations may be of wider applicability especially where emissions from which human activities, such as land use change, will have significant wide scale impacts.

**Meeting Objective**

7. The TFB at its 15<sup>th</sup> session (Moscow, 8<sup>th</sup> July 2005) broadly endorsed these conclusions and proposes to hold the second session of the Expert Meeting on Emission Estimation of Aerosols Relevant to Climate Change. The overall aim of this meeting will be :

**to review what inventory science relating to anthropogenic aerosol emissions and human impacts on natural aerosols emissions can contribute to climate change research.**

8. To achieve this it will be necessary to explore some of the conclusions of the 2005 IPCC Expert Meeting on Emission Estimation of Aerosols Relevant to Climate Change in more detail. That meeting identified significant areas of uncertainty in the current global estimates of emissions and highlighted their importance to climate change modelling and research. The IPCC WG1 AR4 (2007) will provide a comprehensive and thorough review of these and other matters critical to the role of aerosols in climate change. The WG1 AR4 findings, as well as activities already underway within international research organizations, require careful consideration in designing appropriate future work within IPCC. Thus TFB considers that specific objectives for the meeting are:

- *to consider areas in which the methodology work under the IPCC Inventory Programme can contribute to improving estimates and reducing uncertainties in current global estimates of aerosol emissions;*

- *taking into account the medium-term needs of climate change researchers, to elaborate a future work programme of the IPCC inventory Programme that would contribute to the improvement in the understanding of emissions of aerosols of relevance to climate change. Such a future work programme would be considered by the TFB at its late 2007 session.*

## Timing

9. To be held in mid-2007. The meeting should last three days.

## Participants

10. For this meeting we would need experts in the use of aerosol data and climate models and experts in the production of aerosol inventories. Some experts on the measurement of carbonaceous aerosols would be useful. The participants should also include relevant experts for other areas, in particular, climate change research and air quality studies. There will need to be a good geographical and technical representation, by some 60 experts including about 20 participants from developing countries and the economies in transition.

## Structure of Meeting

11. It is proposed that background papers be prepared on the topics listed below. These papers will form the basis of discussion at the meeting. Following a general discussion of the main issues the meeting will split into smaller groups for more detailed discussions.

## Specific Topics

12. In order to focus the meeting it is proposed that discussions be centred around the two topics identified at the Geneva Expert Meeting (see para 8 above). Participants should consider: the issues, including what is understood now, and what could be achieved through further workshops and exchanges, and how the IPCC inventory programme can contribute.

13. The issues are:

**Use of Existing Inventories.** Consider the methods needed to use existing particulate inventories and/or emission factors in the development of inventories of aerosols of climate change interest (usually these existing data will be mass based, developed for local and/or regional air quality reasons). The appropriateness of PM<sub>10</sub>, PM<sub>2.5</sub> and PM<sub>1</sub> inventories for this task will be considered. This will include agreement on size cut-offs for particulate consideration for climate change relevance and, more generally, on the definition of parameters needed for climate modelling. This will cover carbonaceous aerosols and other aerosols with impacts on climate change.

**Sources of Uncertainty in individual methodologies.** Some major sources of uncertainty in specific methodologies for specific sources were identified in the Geneva meeting and further consideration of them would be useful here. They are relevant to:

- **Activity Data** for the use of biomass as a fuel and for open burning (i.e. the amounts burnt) is not well known in many areas. Ways to improve estimates of the activity data are needed.
- **Management Practices.** This includes the ways in which fuels are burnt (especially biomass), the specific technologies or designs used, levels of maintenance and training of operators. It applies to sources from small individual biomass fuelled stoves to large industrial boilers. All of these significantly effect both the magnitude of emissions and their characteristics. An understanding of how this can be quantified is needed.
- **Abatement.** The type of abatement, its utilisation and market penetration all can have significant impact on the amount and type of emissions. This is also true for other pollution estimates and is an area where existing inventory expertise may assist these aerosol emission estimates.
- **Review of Inventory Sources.** To ensure completeness, the understanding of aerosol emissions within each sector identified in the 2006 Guidelines needs to be reviewed. Significant sources (either globally or regionally) should be focus of attention. For each significant source the availability of estimation methodologies and data sources for these methods should be reviewed
- **Methodologies for biogenic aerosols.** For biogenic aerosols the emission processes and estimations methodologies are not well understood and need to be further developed.
- **Dust Emissions.** Models are available for emissions of dust but often the data needed is not available at a regional level (e.g. soil characteristics and moisture). Sources of this data need to be reviewed.

- **Anthropogenic**. Consideration of the magnitude of the global aerosol emission estimates split by the differing definitions of anthropogenic as identified in the Geneva meeting report.
- **Measurement uncertainties**. Review the uncertainties introduced into emission estimates by use of differing source measurement techniques for carbonaceous aerosols and other primary aerosols, and how these can be addressed. How representative are the measurements?

#### **Future Work.**

14. The meeting should, if it decides this is needed, provide a clear programme of how inventory experts can contribute to climate change studies in the medium-term future – for the post-AR-4 period. This will be based on a more detailed consideration of the issues raised in the Geneva meeting. There should be a plan for achieving this.

#### **Outputs**

15. The main output of the meeting will be a report of the meeting. It will contain the following:

**Topic conclusions.** For each of the topics there should be a summary of the conclusions and identification of further work that could be undertaken by the NGGIP. The results of discussions of the background papers should be summarised as well.