

**10TH SESSION OF WORKING GROUP I OF
THE INTERGOVERNMENTAL PANEL ON
CLIMATE CHANGE:
29 JANUARY – 1 FEBRUARY 2007**

The Tenth Session of the Intergovernmental Panel on Climate Change (IPCC) Working Group I (WGI) took place at UNESCO Headquarters, Paris, from 29 January to 1 February 2007. The meeting was attended by 311 participants, including scientists and representatives from governments, UN agencies, and non-governmental organizations. The meeting resulted in the acceptance of the WGI contribution to the IPCC Fourth Assessment Report (AR4), titled “Climate Change 2007: the Physical Science Basis,” including approval of the Summary for Policy Makers (SPM) and acceptance of the underlying report and Technical Summary. More than 350 members of the media were present for the release of the SPM on Friday, 2 February 2007. The SPM finds that there is more than a 90 percent probability that human action has contributed towards recent climate change, and contains a series of projections for future impacts, including on temperatures, sea level rise, and extreme weather events.

A BRIEF HISTORY OF THE IPCC AND AR4

The IPCC was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP). The purpose of the IPCC is to assess the scientific, technical and socioeconomic information relevant to understanding the risks associated with human-induced climate change. The IPCC does not undertake new research, nor does it monitor climate-related data, but bases its assessments on published and peer-reviewed scientific and technical literature. The IPCC Secretariat is located in Geneva, Switzerland, and is staffed by the WMO and UNEP.

The IPCC currently has three working groups: Working Group I (WGI) addresses the scientific aspects of the climate system and climate change; Working Group II (WGII) addresses the vulnerability of socioeconomic and natural systems to climate change, negative and positive consequences of climate

change, and adaptation options; and Working Group III (WGIII) addresses options for limiting greenhouse gas emissions and otherwise mitigating climate change.

The IPCC also has a Task Force on National Greenhouse Gas Inventories. The Task Force oversees the IPCC National Greenhouse Gas Inventories Programme, which aims to develop and refine an internationally-agreed methodology and software for the calculation and reporting of national greenhouse gas emissions and removals, and to encourage the use of this methodology by countries participating in the IPCC and by signatories to the United Nations Framework Convention on Climate Change (UNFCCC). The IPCC Bureau, composed of 30 members elected by the Panel, assists the IPCC Chair in planning, coordinating and monitoring progress in the work of the IPCC.

Since its inception, the IPCC has prepared a series of comprehensive assessments, special reports and technical papers, which provide scientific information on climate change to the international community, including policy makers and the public. This information has played an important role in negotiations under the UNFCCC and in framing national and regional policies.

The IPCC completed its initial comprehensive assessments of climate change in the First Assessment Report in 1990 and the Second Assessment Report in 1995. The IPCC’s Third

IN THIS ISSUE

A Brief History of the IPCC and AR4	1
Report of IPCC WGI	2
Opening Ceremony	2
Summary for Policy Makers	2
Technical Assessment	7
Closing Ceremony	7
Upcoming Meetings	7
Glossary	8

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Assessment Report (TAR), completed in 2001, addresses policy-relevant scientific, technical, and socioeconomic dimensions of climate change, and concentrates on findings since 1995 at both regional and global levels. The TAR, which was subject to extensive review from experts and governments, is composed of a comprehensive assessment from the three IPCC Working Groups, a Summary for Policy Makers (SPM) and Technical Summary of each Working Group report, and a Synthesis Report. The TAR Synthesis Report is written in a non-technical style aimed at policy makers, and discusses nine policy-relevant questions identified by the IPCC based on submissions by governments. The IPCC's Fourth Assessment Report (AR4) is due to be released in late 2007.

Recent special reports include the Special Report on Safeguarding the Ozone Layer and the Global Climate System, accepted at IPCC-23 (8 April 2005, Addis Ababa, Ethiopia) and the Special Report on Carbon Dioxide Capture and Storage, accepted at IPCC-24 (26-28 September 2005, Montreal, Canada).

The IPCC Guidelines for National Greenhouse Gas Inventories were first released in 1994, and a revised set was completed in 1996. In 2000 and 2003, the Panel approved additional good practice guidance reports that complement the Revised 1996 Guidelines. In 2006, the IPCC approved the 2006 IPCC Guidelines.

RECENT IPCC SESSIONS: The IPCC decided to continue preparing comprehensive assessment reports at IPCC-18 (24-29 September 2001, London, UK) aiming to emphasize new findings. Subsequent meetings discussed the timing and other details of the next report, with participants agreeing to late 2007 as the completion date for the AR4. The overall outline of the WG contributions to the AR4 was accepted at IPCC-21 (19-21 February 2003 in Paris, France). That same year, the scope and outline of AR4 were developed during two scoping meetings (April, Marrakesh, Morocco, and September, Potsdam, Paris), and the author teams were assembled. Another scoping meeting was held in 2004 in Geneva, Switzerland, on the AR4 Synthesis Report (SYR). IPCC-22 (9-11 November 2004, New Delhi, India) decided the SYR outlines of topics to be addressed. The IPCC Bureau at its 35th session agreed on the composition of the Core Writing Team and Review Editors for the SYR, and the list was presented to the Panel at IPCC-25 (26-28 April 2006, Port Louis, Mauritius). WGII will meet in April 2007 in Brussels, Belgium, and WGIII will meet in Bangkok, Thailand, in May 2007. The final AR4 is scheduled to be accepted at IPCC-27, in November 2007, in Valencia, Spain.

REPORT OF IPCC WGI

The Tenth Session of Working Group I (WGI) of the IPCC opened on Monday, 29 January 2007. During the four-day meeting, delegates met in plenary, informally and in contact groups to consider the WGI contribution to the IPCC Fourth Assessment Report (AR4), titled "Climate Change 2007, the Physical Science Basis." Delegates were assisted by short, informal presentations by the Coordinating Lead Authors on various sections and topics of the SPM. By the end of the meeting, WGI had approved the Summary for Policy Makers (SPM) and accepted the underlying report and technical summary.

This report of the meeting is organized according to the agenda of the meeting, addressing first the opening ceremony, then the line-by-line approval of each section of the draft SPM, followed by the consideration and acceptance of the underlying report and technical summary, and the closing session.

OPENING CEREMONY

On Monday morning, Dahe Qin, Co-Chair of IPCC Working Group I, opened the Session. Christian Bordhag, Interministerial Delegate for Sustainable Development, France, highlighted the role of clear communication with the media. Bordhag underscored the importance of consensus and certainty for policy makers. He stressed the role of IPCC in the climate change process and stated France's support for a similar body for biodiversity.

Patricio Bernal, Assistant Director-General, UNESCO, noted that relevant UNESCO programmes will seek to identify priority areas of monitoring and research and reminded delegates of the importance of education and both scientific and social knowledge in combating climate change.

Jeremiah Lengoasa, Assistant Secretary-General, WMO, stressed the importance of disseminating the contents of the report and encouraged visualizing this meeting as an opportunity for networking and dialogue between scientists and policy makers.

Alex Alusa, UNEP, drew attention to the IPCC's scientific integrity and transparent and participatory procedures. He highlighted the expected contribution of IPCC to the UNFCCC dialogue on long-term cooperative action on climate change, and noted the need for engaging expert authors from a wider range of countries and disciplines.

IPCC Chair Rajendra Pachauri underscored the world's "appetite" for scientific knowledge on climate change. Noting that the outcome of this meeting represents launching the first of the four products that will constitute the AR4, Pachauri stressed that the WGI report is a significant advance over the Third Assessment Report (TAR).

Susan Solomon, Co-Chair of IPCC Working Group I, noted that the selection of co-authors was based on their scientific publications. She explained the revision process for the report, noting that over 30,000 comments from experts and governments had already been incorporated. Participants then agreed to the proposed agenda (WG-I:10th/Doc.1).

On Thursday morning, Nelly Olin, France's Minister of Ecology and Sustainable Development, addressed participants. Olin commended the work of the IPCC, stressing the importance of international solidarity. She noted various recent initiatives that will allow France to meet its commitments under the Kyoto Protocol and drew attention to the upcoming Paris conference on global ecological governance.

SUMMARY FOR POLICY MAKERS

Co-Chaired by Susan Solomon and Dahe Qin, and assisted by the Coordinating Lead Authors, WGI discussed the SPM line-by-line in plenary and in four contact groups from Monday through Thursday night. Discussions were based on the draft SPM (WG-I:10th/Doc.2a) with a number of changes introduced to reflect comments by governments and organizations (WG-I:10th/INF.1).

Four contact groups were convened during the meeting to discuss unresolved issues: one on greenhouse gas concentrations and land use change, co-chaired by Jean-Pascale van Ypersele (Belgium) and Xiaosu Dai (China); one on solar radiative forcing co-chaired by El-Sayed Mansour (Egypt) and Sylvie Joussaume (France); one on tropical cyclones co-chaired by Nirivololona Raholijao (Madagascar) and Ian Carruthers (Australia); and one on projections on temperature increases and sea level rise, co-chaired by Halldor Thorgeirsson (UNFCCC Secretariat) and Arthur Rolle (Bahamas).

In addition, participants heard short informal presentations from the Coordinating Lead Authors on the figures and text in the different sections of the SPM. On Monday afternoon, participants heard presentations on the drivers of climate change and on uncertainty. On Tuesday morning, participants heard presentations on the observations of climate change, on a draft table on temperature and weather extremes, and on paleoclimate. On Tuesday afternoon participants heard presentations on attribution and sea level rise. On Wednesday morning participants heard presentations on equilibrium climate sensibility and projections for temperature increases.

Discussions and key outcomes of the SPM are summarized below, based on the order the different sections appear in the approved text, as participants proceeded through a line-by-line consideration of the SPM. The full adopted text of the SPM can be downloaded from the IPCC website at <http://www.ipcc.ch>.

INTRODUCTION: The introduction section in the SPM was discussed on Monday morning and early afternoon. Discussion focused on the scope and extent of the introduction, and how to best express the relationship of the AR4 to the TAR, the level of progress, and the levels of confidence and uncertainty.

Participants agreed to language proposed by the UK, supported by Canada and Norway, to clarify that the Report concerns scientific progress since the TAR. Citing the example of sea ice, Co-Chair Solomon suggested, and participants agreed, to textual changes to clarify that improvements in models were a result of increased understanding of processes and their simulation in models.

Other suggestions did not find universal approval to be included in the text, however. The suggestions that were not ultimately incorporated included South Africa's suggestion for changes in the wording to indicate that new climate data derives from broader coverage; Argentina's proposal to note the lack of data from certain regions; and China's call for referencing outstanding uncertainties.

Final Text: The final version of the text explains that WGI's contribution to the AR4 is to describe progress in understanding the drivers of climate change, observed climate change, climate process and attribution, and estimates of projected future climate change. The introduction clarifies that it builds on the TAR by considering new findings from the past six years.

DRIVERS OF CLIMATE CHANGE: This section, which deals with the underlying causes of climate change, was addressed in plenary on Monday afternoon, as well as on Tuesday and Thursday. Co-Chair Solomon introduced the section by noting that, in contrast to the TAR, drivers of climate change are addressed prior to observations of climate change within the

document. Solomon said this is meant to convey the improved information on the drivers since the TAR. On a statement on improvements in the quantitative estimates of radiative forcing, China noted insufficient understanding of the indirect effects of aerosols. Participants agreed to refer to "some aspects" of aerosols. Germany proposed, and participants decided, to reference improved understanding of land surface properties. In a footnote defining radiative forcing, participants agreed to Norway's suggestion to clarify the existence of both positive and negative forcing.

On text regarding atmospheric concentrations of greenhouse gases for the last 10,000 years, the UK, supported by Germany, noted that the draft figure on atmospheric concentrations (Figure SPM-1) only depicts carbon dioxide levels over the last 10,000 years, and suggested that the accompanying text reflect the fact that the present carbon dioxide concentration exceeds by far the natural range over the last 650,000 years. The relevant text was changed to reflect this suggestion and to note that past atmospheric carbon dioxide levels were determined from ice core data.

The UK queried the choice of two overlapping averaging periods to demonstrate the growth of atmospheric carbon dioxide concentrations, suggesting that comparing growth rates from 1960-1970 or 1960-1995 with those from 1995-2005 would be stronger and clearer than comparing with growth rates from 1960-2005. Co-Chair Solomon explained the rationale of avoiding arbitrary breakpoints.

France, supported by Belgium, proposed that measurements in gigatonnes of carbon (GtC) be accompanied by conversions into gigatonnes of carbon dioxide (GtCO₂). Participants agreed to this suggestion.

The UK asked that an explicit link be made between increases in carbon dioxide emissions and carbon dioxide concentrations in the atmosphere. Norway proposed a comparison of 2000-2005 carbon dioxide emission levels with the year 1990 level rather than the 1990-1999 averaged level, in order to ensure consistency with the UNFCCC. China noted that text stating that the growth rate of carbon dioxide emissions had increased during the last ten years could be misleading due to the high variability in carbon dioxide measurements. A contact group agreed to China's request to include a reference to year-to-year variability in carbon dioxide concentrations, as well as to the UK's proposal to attribute increased atmospheric concentrations to carbon dioxide emissions.

Regarding land use change, Peru suggested the addition of a statement noting the net land-to-atmosphere fluxes for carbon dioxide. On quantifying carbon dioxide emissions associated with land use change, Brazil preferred using a central estimate instead of a range. During contact group discussions, participants agreed to include both a central estimate and the range for emissions associated with land use change, and to insert language noting that these estimates have a large uncertainty. Participants also agreed to state that the primary source of the increase in atmospheric concentrations of carbon dioxide since the pre-industrial period results from fossil fuel use, with land use change "providing another significant but smaller contribution."

Participants also discussed the choice of uncertainty categories listed within a footnote, deciding to include only those referenced within the SPM and not the entire AR4 (i.e. *extremely likely*, *very likely*, *likely*, etc.). Following a comment from Belgium, text was added within a footnote to clarify that a number of uncertainty ranges in the TAR corresponded to 95% (2-sigma), often using expert judgment, whereas in the AR4 the uncertainty bounds were decreased to 90%.

Regarding text on methane concentrations, participants agreed to add language noting that it is *very likely* that the observed increase in methane concentrations is due to anthropogenic activities. They also agreed to a proposal by Mali to include precise values for methane concentrations in the early 1990s.

Switzerland proposed including emission rates within the figure on changes in greenhouse gases from ice-core and modern data (Figure SPM-1), as the section considers both human and natural drivers. Austria opposed this, however, noting the different time scales in the figure.

Algeria proposed an explicit reference to Africa's lack of responsibility in carbon dioxide emissions. Co-Chair Solomon noted that WGIII will probably address the fact that Africa emits less carbon dioxide, but that this issue is not addressed in WGI's report.

Following comments from Norway and Switzerland, a footnote was included to state that radiative forcing from halocarbons has been assessed in an IPCC Special Report.

There was disagreement on whether to maintain text in the section in bold font comparing the anthropogenic contribution with the solar contribution to radiative forcing. The UK, France, Germany, New Zealand and others proposed keeping the explicit comparison, while China and Saudi Arabia proposed deleting it. A contact group was convened. The original bold text included language stating that the change in radiative forcing from human activities is *likely* to have been at least five times greater than that due to solar forcing. The issues under discussion were whether to include the comparison in the bold text and how to reflect the level of uncertainty associated with the affirmation. China and Saudi Arabia said the levels of confidence could not be compared. The US and others noted that data on solar radiative forcing was extremely good after the satellite era. Japan asked why it was five times and not ten times, given the respective best estimates of 1.6 and 0.12 W m⁻². The Coordinating Lead Authors explained that the factor was chosen because of the error bars. Agreement was not reached and the matter was referred back to Co-Chair Solomon. With no agreement reached by late Thursday night, Co-Chair Solomon proposed, and participants agreed, to remove the text on the comparison.

Final Text: The final text confirms that global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have "increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values." It finds more than a 90 percent chance that human activities have had a warming impact, and that the rate of increase of radiative forcing from these greenhouse gases during the industrial era exceeds anything experienced in more than 10,000 years.

DIRECT OBSERVATIONS OF RECENT CLIMATE

CHANGE: This section was addressed in plenary and contact groups on Tuesday afternoon and throughout Wednesday. Discussions began with the proposed title of the section "Direct Observations Of Changes In Current Climate." The UK, supported by Belgium, suggested wording to reflect the fact that the direct observations described date back to 1850. Noting the possibility that "current" could be interpreted as the last five to ten years, participants agreed on the term "recent" as a replacement.

For the boxed text that introduces the section, Costa Rica proposed language highlighting the incremental progress in climate change science since the establishment of the IPCC, with a Coordinating Lead Author clarifying that the AR4 is meant to focus on scientific findings since the TAR. Argentina, supported by Morocco, Egypt, and others, requested that the paragraph emphasize the fact that climate observations are insufficient in many parts of the world. The Coordinating Lead Authors echoed concerns about the degradation of observing systems in certain areas and suggested that these concerns are better expressed in other fora, such as the World Climate Research Programme or the Global Climate Observing System. Language was added to note that data coverage remains limited in some regions.

On warming trends, Belgium, supported by Germany and others, stressed the need for consistency with the TAR and proposed using 1860 or the 1900s as reference years in a statement on total temperature increase. Participants agreed to refer to 1850-1899. Germany and Canada suggested a new sentence highlighting the increased warming trend in the last 25 years. However, China, supported by the Coordinating Lead Authors, opposed this, noting possible decadal variability.

Co-Chair Qin explained the incorporation of a new table (Table SPM-0) on the observed rate of sea level rise and estimated contributions from different sources. Participants agreed to Austria's proposal to list the rate of sea level rise in millimeters per year instead of meters per century, and to Germany's suggestion to list Greenland and Antarctic ice sheet contributions separately within the table.

A proposal by Saudi Arabia for specification of the time period for observations of sea level rise within the text was approved.

Regarding declines in mountain glaciers and snow cover, Belgium proposed specific reference to declines in glacier "volume" and snow cover "extent." The Coordinating Lead Authors explained their preference for more general terminology due to variations in the way declines have been measured. The text was left as originally proposed. Participants agreed to a suggestion from the US that a statement that ice caps do not include the Antarctic and Greenland ice sheets be moved from a footnote to a parenthetical comment within the main text.

Participants discussed whether the differences between ice sheets, ice shelves, and glacial tongues were clear within the text. Regarding ice sheets, the UK, supported by Switzerland, explained that referencing dynamical ice loss as half the cause of Greenland's net mass loss could be misleading because it suggests that only half of the overall process is understood.

A new sentence was added to explain that the remainder of Greenland's ice loss has occurred because losses due to melting have exceeded snowfall accumulation.

Germany proposed to remove text indicating that the 1993-2003 rate of sea level rise was similar to other ten-year periods since 1950, noting that if a longer period, such as twenty years, was considered then the rate would no longer be similar. Participants agreed to remove the text

Participants discussed whether it would be clearer to state that warming of the climate system is "unequivocal" or "evident." Participants agreed to state that warming is "unequivocal." Canada, with Germany and Switzerland, suggested adding a reference to the accelerating trend of warming. China, New Zealand, and South Africa, supported by the Coordinating Lead Authors, opposed this, given the possibility of decadal variability, and the reference was not included in this section.

On text noting high decadal variability in Arctic temperatures, Canada, supported by Norway, suggested removing a specific reference to a warm period observed from 1925 to 1945. The Coordinating Lead Authors explained that "climate sceptics" often point to this warm spell to question the IPCC for not acknowledging such warm spells. Participants agreed to keep the reference.

Regarding the general increase in temperature at the top of the Arctic permafrost, Canada proposed, and participants agreed, to add a sentence noting a spring decrease of up to 15 percent of the frozen ground in the Northern Hemisphere.

In response to a request by Australia, Algeria and others on precipitation long-term trends, a footnote was inserted to draw attention to the fact that the assessed regions are those considered in the TAR and in Chapter 11 of the underlying report.

The US proposed adding language to explain limitations in the availability of precipitation data in some regions. However, given the variety and complexity of reasons for this shortage of data noted by the Coordinating Lead Authors, and also in light of the focus on long-term trends, participants agreed to add language simply noting that data is limited in some regions.

The Netherlands suggested noting that there are virtually no direct observations of droughts. Sudan, Kenya, and Algeria disagreed, with the Coordinating Lead Authors elaborating on various measures of drought. After Australia expressed concern about text conclusively stating that increased drying was "due to" higher temperatures and increased precipitation, the language was changed to "linked with."

Regarding heavy precipitation, France requested the inclusion of additional information about the time and intensity scales, and Egypt asked to reflect the fact that some regions suffer greatly from a precipitation deficiency. These suggestions were deemed overly specific and were not included.

Regarding tropical cyclones, the US drew attention to a consensus statement produced at a recent WMO cyclone workshop about the difficulties of detecting cyclone trends, and cautioned that using the terms "global" and "trend" to describe an increase in the intensity of tropical cyclones could open the IPCC to criticism. The Netherlands and the Philippines agreed that the proposed language, "satellite records suggest a global trend toward more intense tropical cyclones since about 1970, correlated with observed warming of tropical sea surfaces

temperatures," was too strong. Germany and Kenya disagreed, deferring to the judgment of the Coordinating Lead Authors in assessing the scientific literature. The Coordinating Lead Authors clarified that the WMO workshop participants were hurricane scientists and not climate scientists, and that this statement, released six months after the WGI AR4 underlying report was submitted, was not peer-reviewed or open to comment. The issue was referred to a contact group, where participants discussed variability in the data and shortcomings in the modeling approaches, highlighted the importance of reflecting the main conclusions of the underlying chapter, and noted recent studies in support of both sides. As there was common ground on the robustness of evidence within the North Atlantic, the agreed text focused on the "observational evidence for an increase of intense tropical cyclone activity in the North Atlantic" and included a more detailed discussion of the factors that complicate identification of long-term patterns. A row in the table on extreme weather events (Table SPM-1) on "intense tropical cyclone activity increases" was modified to reflect the text agreed in the contact group, adding "in some regions."

Final Text: The agreed text for this section notes evidence of recent warming, including increases in temperatures, widespread melting of snow and ice, and rising global mean sea level. It indicates that eleven of the last twelve years (1995-2006) rank among the 12 warmest years recorded since 1850. It also includes a table on recent and projected trends and human contribution to them for various phenomena and extreme weather events, including increases in heat waves, droughts, heavy precipitation events, tropical cyclone activity, and "incidence of extreme high sea level."

A PALEOCLIMATIC PERSPECTIVE: This section was addressed early Thursday afternoon, and was approved with no discussion.

Final Text: This short section explains the use and interpretation of long-term paleoclimatic information, suggesting that evidence from this source supports the view that "the warmth of the last half century is unusual in at least the previous 1300 years" and that the "last time the polar regions were significantly warmer than present for an extended period (about 125,000 years ago), reductions in polar ice volume led to 4 to 6 meters of sea level rise."

UNDERSTANDING AND ATTRIBUTING CLIMATE CHANGE: This section was addressed on Thursday morning. Following concerns expressed by China and Saudi Arabia on the introductory boxed text, Co-Chair Solomon proposed, and participants agreed, to move a sentence quoting the TAR conclusions on attributing observed warming to the increase in greenhouse gas concentrations, to the text underneath.

On language stating that anthropogenic greenhouse gas increase has *very likely* caused most of the observed increase in global temperature, China and Saudi Arabia proposed using the term qualifying the probability of *very likely*, suggesting the use of *likely* or "increasingly" *very likely*. New Zealand, UK, Norway, Switzerland, Argentina, US, France, Canada, Australia, Germany, Austria, Japan, Kenya, Sweden, and the Coordinating Lead Authors opposed this suggestion. The US urged participants not to reassess the underlying assessment, and Belgium reminded participants that the SPM was a summary "for" policy makers

and not “by” policy makers. Co-Chair Solomon and Australia drew attention to the rules of procedure, noting that if one country disagrees, this disagreement can be recorded in a footnote. Colombia suggested adding a footnote restating the report’s definition of *very likely*. China requested a reference to model uncertainty. Agreement was reached by adding a footnote noting that “consideration of remaining uncertainty is based on current methodologies.”

Following comments from Saudi Arabia and Austria, text stating that “warming of the climate system has been detected and attributed to anthropogenic forcing” was modified, with language separating the detection and attribution components into two separate sentences.

On “equilibrium climate sensitivity,” Belgium proposed that a statement indicating that values substantially higher than 4.5°C “cannot be excluded” be replaced with a likelihood estimate in order to avoid the impression that the probability is extremely low. Co-Chair Solomon explained that the Coordinating Lead Authors had previously attempted to calculate such an estimate but that it had not been possible, and that the wording had been carefully selected. The sentence was approved as it stood.

Final Text: This section notes that most of the observed increase in temperatures since the mid-20th Century is *very likely* (more than 90 percent probability) due to human activity. It notes that this is a stronger conclusion than in the TAR, which only found it *likely* (more than 66 percent probability). The text also highlights increased confidence in the understanding of the climate system response to forcing.

PROJECTIONS OF FUTURE CHANGES: This section was first addressed on Wednesday night, with discussions continuing throughout Thursday. In the opening boxed text, Germany, Belgium, the Netherlands and Spain called for language noting the lack of consideration of mitigation scenarios in the WGI assessment. They were opposed by Kenya, China, Saudi Arabia, and Australia, who said WGI does not deal with mitigation and that this issue was already clear from other references in the SPM. No reference to mitigation scenarios was included.

On “committed warming” (the warming expected to occur even if all radiative forcing agents remained at 2000 levels), China, with the Netherlands, Morocco and others, objected to the wording “committed” given the potential for misinterpretation. Switzerland, supported by Belgium, Germany and others, proposed replacing it with “resulting” warming. Co-Chair Solomon explained that “resulting warming” did not include past trends the way that “committed warming” is meant to do. Austria, supported by Ireland, preferred retention of “committed” as a precise scientific term. With Norway, he suggested improving the definition by using text from the underlying report. Co-Chair Solomon proposed, and participants agreed, to use “further” warming instead.

Regarding climate projections based on scenarios from the IPCC Special Report on Emission Scenarios (SRES), the UK suggested, and participants approved, language to clarify the two sources of uncertainty (the uncertainty in future emissions and the uncertainty in models). Given the recent attention from the media, Belgium, supported by France, called for the new range for the AR4 warming projections to be clearly stated within

the text to enable a straightforward comparison to the previous TAR range of 1.4-5.8°C. The Coordinating Lead Authors expressed hesitation, and Co-Chair Solomon underscored that the TAR did not employ an assessed likelihood range, but relied instead largely upon expert judgment. The Netherlands, Austria, Germany, and Australia asked that an explanation to this effect be incorporated into the text, and China and Cuba cautioned against negative language to describe the approach used in the TAR.

A contact group was convened to consider this matter further. In the contact group, Germany asked that a column be added to a table of 21st century warming and sea level rise projections (Table SPM-2) to denote carbon dioxide emission levels. The Coordinating Lead Authors explained the difficulties in simply depicting the range of other greenhouse gases and aerosols included within the SRES scenarios. China, supported by Switzerland, asked, and participants agreed, that the words “Year 2000 Committed” be rephrased to “Constant Year 2000 Concentrations.” Participants expressed concern that the media may interpret the new temperature projections to be lower than those in the TAR (i.e. 1.4-5.8°C), particularly if AR4 best estimates (i.e. 1.8-4.0°C) are highlighted as opposed to the lower and upper AR4 *likely* range values (i.e. 1.1-6.4°C). Italy stressed that the AR4 message to the general public will be whether the problem is deemed to be more or less serious than before. The Coordinating Lead Authors noted that the projections in the TAR primarily demonstrate the existence of climate change, while projections in the AR4 provide quantitative information of the climate change outcomes depending on the choices of policy makers. The final language reflected both the best estimates and the *likely* ranges, explicitly stating that the AR4 projections are broadly consistent with the TAR although the quantities are not directly comparable. The approved text also listed the advances of AR4 over TAR. The UK, supported by Germany and Belgium, called for a statement at the end of the section to indicate that there are other warming possibilities outside the SRES scenarios. New Zealand, seconded by Co-Chair Solomon, said the proposed inclusion is probably evident from other parts of the text, and the statement was not included.

Regarding differences in sea level rise projections between the TAR and AR4, Germany noted that this could be a source of confusion for the media. Solomon clarified that the confusion has to do with the upper ranges. The Coordinating Lead Authors explained that comparison was difficult, but that midpoints differed partly as a result of the different uncertainty assessments. Text was included noting that the AR4 midpoints were within 10% of those in the TAR.

Regarding projections for sea level rise and changes in ice flow, the Coordinating Lead Authors expressed frustration that it was not yet possible to include the full effects of ice sheet flow in the models. Germany stressed the potentially important contributions from melting of the Greenland and Antarctic ice sheets. Austria underscored the importance of reflecting in the text that the rates are current best estimates, but that they could increase or decrease in the future. Germany emphasized the need for clarity on what is and what is not included in the sea level rise projections, and Kenya, Sudan, the US, Canada, and others asked that the language remain understandable.

Participants decided to add a sentence proposed by the UK stating that models used to date do not include the full effects of dynamical changes in ice flow, and to include this understanding within the projections table (Table SPM-2). Belgium suggested, and participants agreed, to make it clear that uncertainties in climate-carbon cycle feedbacks are also not included in sea level rise projections due to lack of published literature. Noting recent observations on accelerated ice flow, Germany requested additional language indicating a discrepancy between positive recent observations of ice sheet flow and negative projections from models. Participants decided to note that dynamical ice flow processes are not included in the models, but suggested by recent observations, could increase future sea level rise.

Regarding regional scale projections on cyclones, participants approved a suggestion by the US to add the phrasing "in some regions" in referencing an apparent trend in the proportion of very intense cyclones since the 1970s. Regarding regional scale projections on the possibility of a large abrupt transition of the meridional overturning circulation, Germany suggested changing the term *very unlikely* to *unlikely* as many studies do not include the possibility of melt water from Greenland, but the Coordinating Lead Authors explained their rationale, noting that possibility was well below the *very unlikely* definition (a 1 in 10 possibility).

Regarding the impact of carbon cycle feedbacks on atmospheric carbon dioxide stabilization, China expressed concern about the uncertainty in using only three models to ascertain needed reductions in carbon dioxide emissions and asked for the associated sentences to be removed. The Coordinating Lead Authors stated that the uncertainty from these models is representative of that from a more comprehensive study involving eleven models, although there are not best estimates and assessed likelihood ranges associated with these findings. Participants agreed to use less emphatic wording regarding uncertainty.

China, with the Bahamas and Saudi Arabia, said a sentence comparing temperature changes in Greenland with the temperatures and the 4-6 meter sea level change from 125,000 years ago was repetitive with text approved in the paleoclimate section. Mexico suggested referring to "future" temperatures in Greenland to clarify that it is a comparison. China added that such a comparison could lead policy makers to the conclusion that in the next 100 years we might experience events such as those 125,000 years ago. The text was bracketed and addressed again late on Thursday night. By then, it was the only outstanding text. Noting its willingness to finish approval of the SPM, China agreed to the proposed text. This was approved, thus completing the work on the SPM.

Final Text: This section finds that, for the next two decades, a warming of about 0.2°C per decade is projected, that many changes in the global climate system during the next century would *very likely* be larger than those observed in the past century, and that anthropogenic warming and sea level rise are expected to continue for centuries to come even if greenhouse gas concentrations were to be stabilized. The section also notes increased confidence in the projected warming patterns and other regional-scale features.

FIGURES: All Figures for the SPM were approved on Thursday night. Three figures were approved without discussion, namely those on: changes in temperature, sea level and snow cover (Figure SPM-3); continental temperature change (Figure SPM-4); and projected patterns of precipitation changes (Figure SPM-6). A figure on changes in greenhouse gas concentrations (Figure SPM-1) and a figure on projections of surface temperatures and its caption (Figure SPM-5) were approved with minor amendments.

Regarding radiative forcing components (Figure SPM-2), Canada's suggestion to include "net" to total anthropogenic forcing was accepted. Belgium proposed using language "linear contrails" instead of "linear contrail cirrus," to which delegates also agreed. In addition, participants accepted Belgium's proposal to add language in the caption noting that the range for contrails does not include other effects of aviation on cloudiness. As well, participants agreed to language suggested by the US to clarify that, while many of these radiative forcing phenomena have natural components, the figure only reflects the anthropogenic contribution.

During discussions on projections, the Netherlands, supported by the UK, Italy, Belgium, and Cuba, requested that a new figure accompany the table of warming projections. One was introduced by Italy in plenary on Thursday night. Following minor amendments, the figure (Figure SPM-7) was approved.

Final Figures: The figures in the final version of the SPM cover a range of relevant issues, including: changes in greenhouse gas concentrations; components of radiative forcing; observed changes in temperature, sea level, and Northern Hemisphere snow cover; projections of changes in surface temperatures and patterns of precipitation; and projections of global warming according to different SRES scenarios.

TECHNICAL ASSESSMENT

Participants met on Thursday night to review the corrections to the underlying report and technical summary. The WGI accepted these.

CLOSING CEREMONY

Late on Thursday night, Co-Chair Solomon and Co-Chair Qin thanked the Lead Authors, delegates, translators, IPCC Chairman Rajendra Pachauri, government delegates, the WGI Technical Support Unit, Halldor Thorgeirsson of the UNFCCC Secretariat, and others, and gavelled the meeting to a close at 12:45 am.

UPCOMING MEETINGS

CSD INTERGOVERNMENTAL PREPARATORY MEETING:

The fifteenth session of the Commission on Sustainable Development will be preceded by an Intergovernmental Preparatory Meeting, which will take place from 26 February - 2 March 2007, at UN headquarters in New York. This is the second, or policy year, of the implementation cycle during which the Commission will continue its focus on energy for sustainable development, industrial development, air pollution/atmosphere and climate change. For more information,

contact: UN Division for Sustainable Development; tel: +1-212-963-8102; fax: +1-212-963-4260; e-mail: dsd@un.org; internet: http://www.un.org/esa/sustdev/csd/csd15/csd15_ipm.htm

CARBON MARKET INSIGHTS 2007: Point Carbon's annual event on the carbon market will take place in Copenhagen, Denmark, from 13-15 March 2007. This event will reflect on, among other major issues, the opening of the EU emissions trading scheme to the global carbon markets. For more information, contact: Point Carbon; tel: +47-2240-5340; fax: +47-2240-5341; e-mail: conference@pointcarbon.com; internet: <http://www.pointcarbon.com>

CLIMATE CHANGE AND HYDROLOGY CONGRESS: This Congress will be held in Lyon, France, from 27-28 March 2007, and aims to analyze the relationship between hydrology and climate change. The meeting will focus on issues such as: alpine glacier hydrology; mass fluctuations of glaciers in relation to the air temperature and precipitations; nivology; and extreme hydrological events such as drought/low water and floods/high water. For more information, contact: B. Biton, French Hydrotechnical Society; tel: +33(0)1-42-50-91-03; fax: +33(0)1-42-50-59-83; e-mail: b.biton@shf.asso.fr; internet: http://www.shf.asso.fr/upload/manifestation_programme69.pdf (in French).

IPCC WORKING GROUP II: The Eighth Session of IPCC Working Group II will be held in Brussels, Belgium, from 2-5 April 2007. For more information, contact: Rudie Bourgeois, IPCC Secretariat; tel: +41-22-730-8208; fax: +41-22-7 30-8025; e-mail: IPCC-Sec@wmo.int; internet: <http://www.ipcc.ch/>

IPCC WORKING GROUP III AND IPCC-26. IPCC-26 is scheduled for 4 May 2007, in Bangkok, Thailand, immediately following the Ninth Session of IPCC Working Group III, to be held from 30 April - 3 May 2007. For more information, contact: Rudie Bourgeois, IPCC Secretariat; tel: +41-22-730-8208; fax: +41-22-7 30-8025; e-mail: IPCC-Sec@wmo.int; internet: <http://www.ipcc.ch/>

CSD-15: The Fifteenth Session of the UN Commission on Sustainable Development (CSD-15) will be held from 30 April - 11 May 2007 at UN Headquarters in New York. For more information, contact: UN Division for Sustainable Development; tel: +1-212-963-8102; fax: +1-212-963-4260; e-mail: dsd@un.org; internet: <http://www.un.org/esa/sustdev/csd/policy.htm>

TWENTY-SIXTH SESSIONS OF THE UNFCCC SUBSIDIARY BODIES AND KYOTO PROTOCOL AD HOC WORKING GROUP: The 26th Sessions of the Subsidiary Bodies to the UN Framework Convention on Climate Change (UNFCCC) will take place in Bonn, Germany, from 7-18 May 2007. They are to be held alongside the third session of the Kyoto Protocol's *Ad Hoc* Working Group on further commitments for Annex I Parties (AWG) and various workshops and other events. For more information, contact: UNFCCC Secretariat; tel: +49-228-815-1000; fax: +49-228-815-1999; e-mail: secretariat@unfccc.int; internet: <http://www.unfccc.int>

IPCC-TGICA REGIONAL MEETING: This meeting, sponsored by the IPCC's Task Group on Data and Scenario Support for Impact and Climate Analysis (TGICA), the Global Change System for Analysis, Research and Training (START), and the Pacific Centre for Environment and Sustainable Development at the University of South Pacific (PACE/USP), will take place in Nadi, Fiji, from 20-22 June 2007. The meeting

will explore innovative research approaches for addressing the multi-scale and multi-disciplinary challenges associated with climate change impacts, adaptation, vulnerability, and mitigation. For more information, contact: IPCC Secretariat; tel: +41-22-730-8208; fax: +41-22-7 30-8025; e-mail: ipcc-wg1@al.noaa.gov; internet: http://ipcc-wg1.ucar.edu/meeting/TGICA-Regional/TGICA-Regional_public.html

UNFCCC DIALOGUE AND AWG-4: The fourth workshop of the "Dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention" and the fourth session of the AWG are expected to take place in September or October 2007, possibly in Bonn, Germany. For more information, contact: UNFCCC Secretariat; tel: +49-228-815-1000; fax: +49-228-815-1999; e-mail: secretariat@unfccc.int; internet: <http://www.unfccc.int>

IPCC-27: IPCC-27, focusing on the adoption of the AR4 SYR, is scheduled for 12-16 November 2007, in Valencia, Spain. For more information, contact: Rudie Bourgeois, IPCC Secretariat; tel: +41-22-730-8208; fax: +41-22-7 30-8025; e-mail: IPCC-Sec@wmo.int; internet: <http://www.ipcc.ch/>

THIRTEENTH CONFERENCE OF THE PARTIES TO THE UNFCCC AND THIRD MEETING OF THE PARTIES TO THE KYOTO PROTOCOL: UNFCCC COP 13 and Kyoto Protocol COP/MOP 3 will take place from 3-14 December 2007, in Bali, Indonesia. For more information, contact: the UNFCCC Secretariat; tel: +49-228-815-1000; fax: +49-228-815-1999; e-mail: secretariat@unfccc.int; internet: <http://www.unfccc.int>

For more upcoming meetings, please visit: <http://www.iisd.ca/upcoming/linkagesmeetings.asp?id=5>

GLOSSARY

2006 Guidelines	2006 IPCC Guidelines for National Greenhouse Gas Inventories
AR4	Fourth Assessment Report
CLA	Coordinating Lead Author
EFDB	Emission Factor Database
IPCC	Intergovernmental Panel on Climate Change
NGGIP	IPCC National Greenhouse Gas Inventories Programme
SPM	Summary for Policy Makers
SRES	IPCC Special Report on Emission Scenarios (2000)
SYR	Synthesis Report
TAR	Third Assessment Report of the IPCC (2001)
TFB	Task Force Bureau on National Greenhouse Gas Inventories
TFI	Task Force on National Greenhouse Gas Inventories
TGICA	Task Group on Data and Scenario Support for Impact and Climate Analysis
TGNES	Task Group on New Emission Scenarios
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WMO	World Meteorological Organization