Report

Joint IPCC/WCRP/IGBP Workshop: New Science Directions and Activities Relevant to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change

3-6 March, 2009
University of Hawaii, Honolulu, Hawaii

Hosted by the International Pacific Research Institute (IPRC), University of Hawaii
Sponsored by IPCC, WCRP, and IGBP

1. Rationale of the Workshop

From March 3 to 6, over 120 leading climate scientists from around the world gathered at the International Pacific Research Center of the University of Hawaii to discuss the latest developments in climate change science. The workshop was jointly sponsored by the Intergovernmental Panel on Climate Change (IPCC), the World Climate Research Programme (WCRP) and the International Geosphere-Biosphere Programme (IGBP), with additional support from the U.S. National Science Foundation and Climate Central. The format permitted extensive discussions of open gaps and their implications for our understanding of the Earth System and its response to ongoing accelerated emissions of greenhouse gases and other substances to the atmosphere, and deforestation. The findings of the scientists will provide input for the planning of the Fifth Assessment Report of the IPCC which is due in 2013.

2. Summary of Presentations and Discussions of the Workshop

After a review by the past Co-Chair of WGI, Susan Solomon, of lessons learned from AR4, Thomas Stocker, Co-Chair WGI, provided an introduction and presented the array of topics that require continued or renewed attention in AR5.

Solomon reviewed the enormous impact of the WGI contribution to AR4 and formulated the ingredients of a successful and effective assessment: (i) design the report such that the product is useful for both stakeholders and scientists, being policy-relevant but not policy-prescriptive; (ii) apply procedures in transparent and coherent ways; (iii) use scientific judgment as the overruling guideline; (iv) allocate adequate time and resources for proper analysis, assessment and synthesis.

Stocker stressed the importance of the bottom-up process of the content of IPCC products and noted that the scientific rigor is the most important asset of IPCC. According to Stocker, challenges are in three areas: (i) science; (ii) integration, and (iii) communication.

In the ***science***, important gaps in our knowledge comprise the areas of sea level rise and ice sheet instabilities, the full range of possible futures, cloud processes and aerosols producing considerable uncertainties, detection and attribution of climate change on regional level and extremes, model evaluation and ensembles, and carbon/nitrogen cycles including ocean acidification.

Integration across the WGs will be facilitated by continuously increasing model resolution which will permit the extraction of detailed regional information from global models. Therefore, a first step towards synthesis already at this level will be achieved. Integration of scientific results of colleagues from developing countries and countries in transition remain a challenge. One stumbling block for those colleagues is the cost of journal access and thus the availability of information and international exchange. What has been achieved during AR4 needs to be further fostered. On the other hand, the relative inaccessibility of climate change literature for specific regions due to language barriers or lack of a publishing infrastructure must be reduced. New climate change journals for entire regions with translated abstracts would be an idea. This may be a long shot, however, recent examples of success suggest that this may be possible.

Communication of complex scientific issues remains a difficult task. According to Stocker, the best and most authentic communicators are the scientists, those who produce the results. They are the ambassadors of IPCC. The credibility of communication is a further challenge. Scientists are responsible for the content of the Assessment Reports; governments review and approve the reports. When these clearly defined roles become blurred, credibility is at stake. Scientific rigor and clarity of the reports are important for high-quality inputs into the decision-making processes.
After this introduction, the scientific program (enclosed in Appendix I) of the meeting started. It was organized in 7 consecutive sessions which included one keynote lecture followed by a series of short pointer presentations by the participants to their poster which were then viewed.

Among the keynote speakers were Chris Field and Mack MacFarland who presented their views on WGII, on the policy interface, and the relations between the industry, public and science, respectively. These presentations help foster improved communication of WGI with its partners and users. In his keynote lecture, Ron Stouffer presented the plans for CMIP5 and the important continuing contributions of PCMDI towards the production of modeling results that will be available for AR5. Progress in the community efforts in the new scenarios will enable consistent use and discussion of the scenarios across modelling groups. Sir John Houghton, Co-Chair of WGI in SAR and TAR presented his views on the remarkable development and design of IPCC in the early days, including stumbling blocks along the past 20 years and what we can learn from them. In his keynote lecture, Jonathan Gregory reviewed the current status of knowledge on sea level rise, an issue that will require further consideration by the science community in the next assessment cycle. Finally, Brian Hoskins addressed the meeting by highlighting the continuum approach in timescale of climate and numerical prediction models which provides a new range of statistical tools of model evaluation to be applied to global climate models.

The meeting format allowed everybody to engage in intensive discussions about the new emerging topics in science relevant to Working Group I, identify the gaps and debate about the open issues. The most important are:

- sea level and ice sheet instabilities;
- detection & attribution on the regional level, and of extremes;
- methodology of multi-model ensembles;
- cloud and aerosol processes and associated uncertainties;
- atmospheric chemistry and climate;
- Earth System modeling of climate, including biogeochemistry and land-surface interactions;
- coverage of the full range of possible futures.

3. Workshop Outcomes

A press statement was released on March 5, 2009 to inform proactively the public about the purpose and some of the outcomes of this workshop (see Appendix 2).

At this meeting, decisions have been made to propose two **IPCC Expert Meetings** to the next IPCC Bureau and Plenary meetings in Antalya in April 2009. The goal is to accelerate the science and coordination in two very critical areas most relevant for AR5. These are:

1. ***Joint WGI-WGII IPCC Expert Meeting on "The Methodology of Detection and Attribution on Decreasing Space Scales and Extremes"***.

   The joint effort shall provide much needed coherency between the WGs on this important topic already at an early stage of AR5. It will be an important component of later synthesis between the WGs. This EM combines the expertise built up in WGI under the umbrella of IDAG and recent activity by a group within WGII.

   Committee nucleus: G. Hegerl (UK) and D. Karoly (AU).

2. ***WGI Expert Meeting on "The Methodology Multi-Model Ensembles and Model Metrics"***

   This EM shall provide a rationale for better utilization of the climate model output available to AR5 and show the way forward beyond simple multi-model averages in the light of a rapidly growing number of models of different sophistication and complexity. Participation of a number of key WGII scientists is planned to secure the usefulness of the model products for impact studies

   Committee nucleus: B. Santer (USA) and R. Knutti (CH).

The nucleus of the committees for the two EMs will prepare by the end of March 2009 two proposals of 1-1.5 pages for submission to the IPCC Bureau and Plenary Meetings. The plan is to co-sign the first proposal by all four Co-Chairs of WGI and WGII, the second by the Co-Chairs of WGI.

March 23, 2009

G. Meehl (Chair), J. Overpeck, S. Solomon,.T. Stocker, R. Stouffer

Scientific Steering Committee
Joint IPCC/WCRP/IGBP Workshop, University of Hawaii, March 2009

Sponsor Representatives:

V. Ramaswamy (WCRP)
K. Hibbard (IGBP)

Appendix 1: Workshop Program

Joint IPCC-WCRP-IGBP Workshop: New Science Directions and Activities Relevant to the IPCC AR5

3-6 March, 2009
University of Hawaii, Honolulu, Hawaii *Hosted by IPRC*
sponsored by WCRP, IGBP, US National Science Foundation, Climate Central

Agenda

The workshop will be run like the IPCC model analysis workshop held in 2005. The format will be all posters, with a few invited overview plenary talks. Each of the seven half day sessions will start out with a panel of no more than 20 presenters in plenary, and each will present one slide (3 minute presentation) to introduce their main result. Then the rest of each half day session will be discussion around the posters in the same room. Workshop topic descriptions are given at the end of the agenda.

Tuesday, March 3, 2009

8:00AM Buses depart hotels for UH campus

8:30AM – 9:00AM: Registration

9:00AM – 9:15AM: Welcoming addresses (5 minutes each by representatives from IPRC, IPCC WG1)

9:15AM – 9:30AM: Purpose/objectives of workshop (Gerald Meehl)

9:30AM-9:45AM: Some lessons from the AR4 to AR5 (Susan Solomon)

9:45AM-10:00AM: Challenges of WGI to AR5 of IPCC (Thomas Stocker)

10:00AM ***Session 1: Observations (part 1)*** (session chair Gerald Meehl)

10:00AM – 11:000AM: Presenter Panel and short presentations (each 3 minutes/one slide)

11:00AM – 12:30PM: View/discuss posters (with coffee/refreshments provided)

12:30PM – 2:00PM: Lunch

2:00PM ***Session 2: Observations (part 2); Detection/attribution; Physical and biogeochemical feedbacks, forcing and climate sensitivity (part 1)*** (session chair Gerald Meehl)

2:00PM – 3:00PM: Presenter Panel and short presentations (each 3 minutes/one slide)

3:00PM – 4:30PM: View/discuss posters (with coffee/refreshments provided)

4:30-5:00PM: Plenary talk: Meeting Needs of Industry: How IPCC can help (Mack MacFarland)

5:00PM – 5:30PM: Plenary talk: IPCC and the policy community (Sir John Houghton)

5:30PM – 7:30PM: Reception

Wednesday, March 4, 2009

8:30AM Buses depart hotels for UH campus

9:00AM – 9:30AM: Plenary talk: CMIP5 coordinated experiments for assessment in the AR5 (Ron Stouffer)

9:30AM ***Session 3: Physical and biogeochemical feedbacks, forcing, and climate sensitivity (part 2)*** (session chair Thomas Stocker)

9:30AM – 10:30AM: Presenter Panel and short presentations (each 3 minutes/one slide)

10:30AM – 12:30PM: View/discuss posters (coffee/refreshments provided)

12:30PM – 2:00PM: Lunch

2:00PM ***Session 4: Physical and biogeochemical feedbacks, forcing and climate sensitivity (part 3); Cryosphere, sea level and hydrological cycle*** (session chair Thomas Stocker)

2:00PM – 3:00PM: Presenter Panel and short presentations (each 3 minutes/one slide)

3:00PM – 4:30PM: View/discuss posters (coffee/refreshments provided)

4:30PM-5:00PM: Plenary Talk: Progress in understanding ice sheet instabilities in Greenland and Antarctica (Jonathan Gregory)

6:00PM Dinner at Sheraton Hotel

Thursday, March 5, 2009

8:30AM Buses depart hotels for UH campus

9:00AM ***Session 5: Extreme events and regional climate change (part 1)*** (session chair Ron Stouffer)

9:00AM – 10:00AM: Presenter Panel and short presentations (each 3 minutes/one slide)

10:00AM – Noon: View/discuss posters (coffee/refreshments provided)

Noon – 1:30PM: Lunch

1:30PM – 2:00PM: Plenary talk: Connecting WG1 and WG2 (Chris Field/Vincente Barros)

2:00PM ***Session 6: Extreme events and regional climate change (part 2); Decadal prediction and climate variability*** (session chair Ron Stouffer)

2:00PM – 3:00PM: Presenter Panel and short presentations (each 3 minutes/one slide)

3:00PM – 5:00PM: View/discuss posters (coffee/refreshments provided)

5:00-5:30PM: From NWP to Climate Projections (Brian Hoskins)

Friday, March 6, 2009

8:30AM Buses depart hotels for UH campus

9:00AM ***Session 7: Model evaluation and ensembles*** (session chair Susan Solomon)

9:00AM – 10:00AM: Presenter Panel and short presentations (each 3 minutes/one slide)

10:00AM – Noon: View/discuss posters (coffee/refreshments provided)

Noon – 1:00PM: IPCC Assessments of the Physical Climate System: A view from the past to the future (John Houghton, Susan Solomon and Thomas Stocker)

1:00PM: Adjourn workshop

Workshop topic descriptions:

Observations: Observations of changes in the climate system up to 2008, including updates on data corrections and homogenization from various data sources from climate system components atmosphere, ocean, biosphere, and chemosphere. Of special interest is the evolution of rates of changes.

Detection/attribution: Detection/Attribution (D/A) beyond surface temperature and large-scale fields. In particular recent progress in D/A of changes in precipitation, regional patterns, ocean quantities, climate modes, and in the vertical structure of physical quantities. In this session we also encourage contributions of research at the interfaces between D/A, policy decisions, and scenario development.

Physical and biogeochemical feedbacks, forcing, and climate sensitivity: Further constraining radiative forcing, including aerosol-black carbon. Latest results on carbon cycle-climate feedbacks, feedbacks associated with land use change and dynamic vegetation responses. New results on climate sensitivity including excluding low sensitivities and better constraining large sensitivities.

Cryosphere, sea level, and hydrological cycle*:* Latest results on the physics of ice sheet instabilities in Greenland and Antarctica and their sensitivity to warming and implications on sea level rise. Understanding sea ice response, including possible rapid changes and associated feedback mechanisms, regional changes in snow cover and glacier extent and their consequences on the regional water regimes. New research on changes in the large-scale water cycle, regional freshwater balance.

Extreme events and regional climate change: Observation, statistics, D/A, and projection of extreme events, including regional extremes, tropical cyclones, drought, floods, heat waves, regionally-specific climate change.

Decadal prediction and climate variability*:* Progress in narrowing the gap between decadal prediction and global climate projection. Better understanding the response of climate modes such ENSO, PDO, NAO, AO and AMO to an increase in radiative forcing. Focus on changes in monsoon.

Model evaluation and ensembles: New progress in the quantitative evaluation of comprehensive climate models (Bayesian, ranking, indices, etc.) and their combination into multi-model means. Methodologies of defining metrics for potential use in AR5. Including observations and paleoclimate information for model evaluation. Physics tests, multi-member single model, multi-model, stochastic-dynamic parameterization,

Appendix 2: Press Statement

Media Statement (Honolulu, 5. March, 2009)

Joint IPCC-WCRP-IGBP Workshop: New Science Directions and Activities Relevant to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change

3-6 March, 2009
University of Hawaii, Honolulu, Hawaii
Hosted by IPRC, Sponsored by IPCC, WCRP, and IGBP

From March 3 to 6, over 150 leading climate scientists from around the world gathered at the International Pacific Research Center of the University of Hawaii to discuss the latest developments in Climate Change science. The hosting institute is internationally known for its research in climate variability and climate change and serves as a meeting place for scientists from all over the world. The workshop was jointly sponsored by the Intergovernmental Panel on Climate Change (IPCC), the World Climate Research Programme (WCRP) and the International Geosphere-Biosphere Programme (IGBP).

The goal of this workshop was to identify the latest developments in Climate Change science and discuss their implications for our understanding of the Earth System and its response to ongoing accelerated emissions of greenhouse gases and pollution particulates (aerosols), and deforestation. The findings of the scientists will be made available for the planning of the Fifth Assessment Report of the IPCC which is due in 2013.

Increasing computational power, and advances in process understanding and observations, now permit global climate models to address regional climate change and extreme events in much greater detail. In an unprecedented effort involving all climate modelling centers around the world, including the participation of developing countries, the World Climate Research Programme (WCRP) is coordinating climate model experiments and their analyses which will be assessed for the next IPCC report. This will result in a better estimate of the uncertainty involved in climate change projections and accelerate the development of climate models.

In the framework of the International Geosphere-Biosphere Programme (IGBP), these computer models are now evolving into “Earth System” models which are more inclusive of the roles of biology and chemistry, and the role of human activities, in the climate system. These models will be the tools to understand how current and future changes in energy use and environmental management will affect our climate and ecosystems worldwide.

Among the findings that were discussed by the scientists are interactions between the cycling of carbon and nitrogen in the climate system and new feedback processes involving the atmosphere, oceans, land and ice, details of which are yet to be fully understood and quantified. The fate of the large ice sheets of Greenland and Antarctica in a warmer world and the role of warming oceans in promoting ice-shelf melt, is a continuing concern that has direct implications for uncertainties in the projection of global sea level rise.

The scientists, gathered from all over the world, who participated in the workshop have extensive experience in performing scientific assessments for policy makers worldwide. In seeking to advance knowledge about the vulnerability of this planet to human-induced climate change, scientific rigor must remain a hallmark of the information that will be used for responsible decisions and wise stewardship.

T. Stocker (IPCC), K. Hibbard (IGBP), V. Ramaswamy (WCRP)

Contact Information:

Prof. Thomas Stocker
Climate and Environmental Physics
University of Bern
Sidlerstrasse 5
3012 Bern, Switzerland

stocker@climate.unibe.ch

Host and Sponsor Descriptions:

IPRC: "The International Pacific Research Center (IPRC) was founded to gain greater understanding of the nature and causes of climate variation in the Asia-Pacific region, to determine whether such variations are predictable, and to discover how global climate change affects the region. The center's mission is "to provide an international, state-of-the art research environment to improve understanding of the nature and predictability of climate variability in the Asia-Pacific sector, including regional aspects of global environmental change". The IPRC was conceived under the "U.S.-Japan Common Agenda for Cooperation in Global Perspective" and was established October 1997 in a cooperative agreement between the University of Hawaii and the Japan Marine Science and Technology Center and the National Space Development Agency of Japan. The agreement concerned the efforts of Japan's Frontier Research System for Global Change at the University of Hawaii."

IPCC: "The Intergovernmental Panel on Climate Change (IPCC) is a scientific body set up by the World Meteorological Organization (WMO) and the United Nations Environmental Programme (UNEP). The IPCC was established to provide the decision-makers and others interested in climate change with an objective source of information about climate change. The IPCC does not conduct any research nor does it monitor climate related data or parameters. Its role is to assess on a comprehensive, objective, open and transparent basis the latest scientific, technical and socio-economic literature produced worldwide relevant to the understanding of the risk of human-induced climate change, its observed and projected impacts and options for adaptation and mitigation. IPCC reports should be neutral with respect to policy, although they need to deal objectively with policy relevant scientific, technical and socio-economic factors. They should be of high scientific and technical standards, and aim to reflect a range of views, expertise and wide geographical coverage."

WCRP: "The World Climate Research Programme (WCRP), sponsored by the International Council for Science (ICSU), the World Meteorological Organization (WMO) and the Intergovernmental Oceanographic Commission (IOC) of UNESCO, is uniquely positioned to draw on the totality of climate-related systems, facilities and intellectual capabilities of more than 185 countries. Integrating new observations, research facilities and scientific breakthroughs is essential to progress in the inherently global task of advancing understanding of the processes that determine our climate. The two overarching objectives of the WCRP are to determine the predictability of climate; and to determine the effect of human activities on climate to facilitate analysis and prediction of Earth system variability and change for use in an increasing range of practical application of direct relevance, benefit and value to society. "

IGBP: "The International Geosphere-Biosphere Programme (IGBP) is a research programme that studies the phenomenon of Global Change. The vision of IGBP is to provide scientific knowledge to improve the sustainability of the living Earth. IGBP studies the interactions between biological, chemical and physical processes and interactions with human systems and collaborates with other programmes to develop and impart the understanding necessary to respond to global change. IGBP's research goals are to analyze the interactive physical chemical and biological processes that define Earth System dynamics; the changes that are occurring in these dynamics; and the role of human activities on these changes."

Appendix 3: List of Participants

(late cancellations are not included)

Name	First Name	Affiliation	City	Country
Allison	Ian	Australian Antarctic Division CRC	Hobart	Australia
Andreae	Meinrat	Max Planck Institute for Chemistry	Mainz	Germany
Artale	Vincenzo	ENEA	Roma	Italy
Artaxo	Paulo	Physics, University of Sao Paulo	Sao Paulo	Brazil
Barnett	Tim	Scripps Institution of Oceanography	La Jolla	United States
Betts	Richard	Met Office Hadley Centre	Exeter Devon	United Kingdom
Bindoff	Nathaniel	ACE CRC	Hobart	Australia
Boer	George	CCCMA Environment Canada	Victoria	Canada
Bojariu	Roxana	National Meteorological Administration	Bucharest	Romania
Bony	Sandrine	LMD/IPSL, CNRS	Paris cedex 05	France
Braconnot	Pascale	IPSL/LSCE	Gif sur Yvette	France
Brasseur	Guy	NCAR	Boulder	United States
Carrasco	Jorge	Chilean Weather Service	Santiago	Chile
Carter	Timothy	Finnish Environment Institute	Helsinki	Finland
Cazeanve	Anny	LEGOS-CNES	Toulouse	France
Chen	A. Anthony	University of the West Indies	Mona	Jamaica
Chidthaisong	Amnat	Univ of Tehcnology Thonburi	Bangkok	Thailand
Christensen	Jens	Danish Climate Centre	Copenhagen Ö	Denmark
Christy	John	UAHuntsville	Huntsville	United States
Church	John	CSIRO	Hobart, Tasmania	Australia
Clarke	Garry	University of British Columbia	Vancouver	Canada
Collins	William	Lawrence Berkeley Lab and UC Berkeley	Berkeley	United States
Colman	Robert	Centre for Australian Weather and Climate	Melbourne	Australia
Covey	Curt	PCMDI / LLNL	Livermore	United States
Cubasch	Ulrich	Meteorlogisches Institut	Berlin	Germany
Denman	Kenneth	CCCMA	Victoria	Canada
Dorland	Rob	KNMI	De Bilt	Netherlands
Fichefet	Thierry	U Georges Lemaître	Louvain-la-Neuve	Belgium
Field	Chris	Stanford University	Standford	United States
Flato	Gregory	CCCSM	Victoria	Canada
Friedlingstein	Pierre	IPSL/LSCE	Gif sur Yvette	France
Fyfe	John	Environment Canada	Victoria	Canada
Gaye	Amadou	University Cheikh Anta Diop Dakar	DAKAR	Senegal
Gillett	Nathan	University of East Anglia	Norwich	United Kingdom
Giorgi	Filippo	Abdus Salam Int C for Theoretical Physics	Trieste	Italy
Gregory	Jonathan	Met Office Hadley Centre	READING	United Kingdom
Gulev	Sergey	IORAS	Moscow	Russia
Hamilton	Kevin	IPRC	Honolulu	United States
Hegerl	Gabriele	GeoSciences	Edinburgh	United Kingdom
Heinze	Christoph	University of Bergen	Bergen	Norway
Hewitson	Bruce	University of Capetown	Rondebosch	South Africa
Hibbard	Kathy	NCAR	Boulder	United States
Holland	Elisabeth	NCAR/TIIMES	Boulder	United States
Hoskins	Brian	University of Reading	Reading	United Kingdom
Houghton	John	University of Gloustershire	Cheltenham	United Kingdom
Isaksen	Ivar	UNIVERSITY OF OSLO, NORWAY	Oslo	Norway
JANSEN	EYSTEIN	Bjerknes. Centre for Climate Research	Bergen	Norway
JOUSSAUME	Sylvie	CNRS/LSCE	Gif sur Yvette	France
Jouzel	Jean	LSCE/IPSL	Gif sur Yvette	France
Jones	Richard	Met Office Hadley Centre (Reading Unit)	Reading	United Kingdom
Karoly	David	University of Melbourne	Melbourne, VIC	Australia
Kaser	Georg	University of Innsbruck	Innsbruck	Austria
Kattsov	Vladimir	Voeikov Main Geophysical Observatory	St.Petersburg	Russia
Kheshgi	Haroon	ExxonMobil	Annandale	United States
Kitoh	Akio	Meteorological Research Institute	Tsukuba	Japan
Klein Tank	Albert	Royal Netherlands Meteorological Institute	De Bilt	Netherlands
Knutti	Reto	ETH Zurich	Zurich	Switzerland
Kwon	Won-Tae	Natl Institute of Meteorological Research	Seoul	Korea, Republic of
Le Treut	Hervé	CNRS	Paris	France
Lemke	Peter	Alfred Wegener Institute	Bremerhaven	Germany
Lohmann	Ulrike	ETH Zurich	Zurich	Switzerland
Luo	Yong	China Meteorological Administration	Beijing	China
Mann	Michael	Penn State University	University Park	United States
Marengo	Jose	INPE	Sao Paulo	Brazil

Masson	Valerie	LSCE	Gif sur Yvette	France
McFarland	Mack	DuPont Fluoroproducts	Wilmington	United States
Mearns	Linda	NCAR	Boulder	United States
Meehl	Gerald	NCAR	Boulder	United States
Meier	Mark	univ. colorado	boulder	United States
Midgley	Pauline	University of Stuttgart	Stuttgart	Germany
Moore	Berrien	Climate Central	Princeton	United States
Mote	Philip	Univ. of Washington	Seattle	United States
Murphy	Daniel	NOAA	Boulder	United States
Myhre	Gunnar	CICERO	Oslo	Norway
Nakajima	Teruyuki	Center for Climate System Research	Chiba	Japan
Noda	Akira	FRCGC/JAMSTEC	Yokohama	Japan
Noguer	Maria	Walker Institute for Climate System Res	Reading	United Kingdom
Oppenheimer	Michael	Princeton University	Princeton	United States
Otto-Bliesner	Bette	NCAR	Boulder	United States
Peltier	Richard	University of Toronto	Toronto	Canada
Penner	Joyce	University of Michigan	Ann Arbor	United States
Plattner	Gian-Kasper	WGI TSU, University of Bern	Bern	Switzerland
Prather	Michael	UC Irvine	Irvine	United States
Prentice	Colin	University of Bristol	Bristol	United Kingdom
Raes	Frank	JRC	Stanford	United States
Ramaswamy	Ven	NOAA/ GFDL	Princeton	United States
Randall	David	Colorado State University	Fort Collins	United States
Rinke	Annette	Alfred Wegener Institute	Potsdam	Germany
Rusticucci	Matilde	Universidad de Buenos Aires	Buenos Aires	Argentina
Sarr	Abdoulaye	DMN	Dakar-Fann	Senegal
Santer	Benjamin	PCMDI, Lawrence Livermore National Lab	Livermore	United States
Schimel	David	NCAR	Boulder	United States
Scholes	Robert	CSIR-NRE	Pretoria	South Africa
Schulz	Michael	LSCE/CEA/IPSL	Gif-sur-Yvette	France
Schulze	Detlef	Max-Planck-Institut für Biogeochemie	Jena	Germany
Shukla	Jagadish	GMU / IGES	Calverton	United States
Shum	C K	Ohio State University	Columbus	United States
Soden	Brian	Univ of Miami	Miami	United States
Solomina	Olga	Institute of Geography RAS	Moscow	Russian Federation
Solomon	Susan	NOAA	Boulder	United States
Somerville	Richard	Scripps Institution of Oceanography	La Jolla	United States
Srinivasan	Jayaraman	Indian Institute of Science	Bangalore	India
Stocker	Thomas	University of Bern	Bern	Switzerland
Stott	Peter	Met Office Hadley Centre	Exeter	United Kingdom
Stouffer	Ronald	GFDL/NOAA	Princeton	United States
Sumi	Akimasa	IR3S/TIGS The University of Tokyo	Tokyo	Japan
Talley	Lynne	Scripps Institution of Oceanography	La Jolla	United States
Taylor	Karl	PCMDI	Livermore	United States
Trenberth	Kevin	National Center for Atmospheric Research	Boulder	United States
van Ypersele	Jean-Pascal	UCL	Louvain	Belgium
Warrick	RIchard	International Global Change Institute	Hamilton	New Zealand
Watterson	Ian	CSIRO	Aspendale	Australia
Weaver	Andrew	University of Victoria	Victoria	Canada
Whetton	Penny	CSIRO	Aspendale	Australia
Wigley	Tom	NCAR	Boulder	United States
Wood	Richard	Met Office Hadley Centre	Exeter	United Kingdom
Wratt	David	NIWA	Wellington	New Zealand
Wuebbles	Don	University of Illinois	Urbana	United States
Yihui	Ding	Meteorological Administration	Beijing	China
Zerefos	Christos	University of Athens	Athens	Greece
Zhai	Panmao	China Meterological Administraion	Beijing	China
Zhang	Tingjun	University of Colorado	Boulder	United States
Zhang	Xiaoye	Chinese Acad of Meteorological Sciences	Beijing	China
Zwiers	Francis	Environment Canada	Toronto	Canada