



Photo: PhotoDisc



Significant progress in understanding and projecting climate change has been made over the last decade. However, large uncertainties remain, particularly in the determination of the rate of climate change, the impacts on regional scales where society and environment are most vulnerable and the occurrence of extremes. Reduction of these uncertainties requires filling significant gaps in observational programmes and understanding, and improved models for projection of climate change, both globally and regionally. This information is critical to enable individual nations to plan for and adapt effectively to climate and global change.

WCRP scientists and projects contribute significantly to the collection and assembly of climate observations, process studies, model development and understanding of the climate system. These contributions are necessary for the detection and attribution of past climate change, and the provision of climate information, including projections of future change. The majority of this research is assessed by the IPCC Working Group (WG) I, and provides much of the scientific input to the impacts, adaptation and mitigation research assessed by WG II and WG III. [http://wcrp.wmo.int/Special\\_IPCC.html](http://wcrp.wmo.int/Special_IPCC.html)

## Steps Needed to Deliver Relevant Research Outcomes

### Better Observations of the Climate System Requires:

- full implementation of the Global Climate Observing System (GCOS);
- more comprehensive information system;
- observations that are of climate quality and contribute to the understanding of key climate processes.

### Understand and Quantify the Changes in the Atmospheric Composition of Greenhouse Gases and Aerosols, and their Roles in Forcing Climate Change by Focusing on:

- short-lived species, such as tropospheric and stratospheric ozone, and the effects of tropospheric aerosols;
- the physical and chemical processes controlling the global distributions;
- interactions involving aerosols and clouds.

### Understand the Role of Land Use Changes, Aviation Influences, and Solar Variations and Volcanic Eruptions by Addressing:

- the role of land-cover and land-use changes;
- the effects due to aircraft contrails;
- solar variations;
- sustained observations of stratospheric aerosols from explosive volcanic eruptions.

### Improve Climate Models and Reduce Uncertainties in Climate Change Projections by Identifying and Incorporating:

- existing critical research and new elements;
- the uncertainty of global mean temperature sensitivity, especially at regional scales;
- processes that are most important in determining climate sensitivity;
- the response of the carbon cycle to climate change as well as the treatment of sea-ice, land-surface processes, clouds and oceans.

### Multi-National Plan for Providing Regional Projections of Climate Change Requires:

- regional projections (with reliable confidence limits) of climate change at the scale necessary for local risk analysis and for adaptation purposes;
- the implementation of multi-national petascale computing facilities dedicated to the climate change challenge;
- the collaboration of operational agencies.

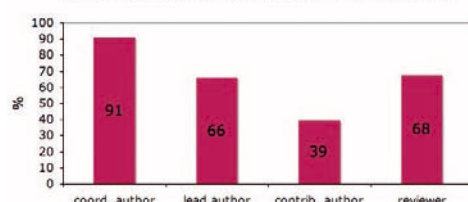
### Support for the Implementation of the UNFCCC Necessitates:

- monitoring of past forcings of the climate system and making future climate projections;
- verifying emission reductions;
- evaluating the impact of emission changes on climate projections.

### Produce Credible Information about Regional Climate on Multiple Timescales by:

- working closely with national operational agencies and intergovernmental organizations;
- integrating multidisciplinary assessments that are place-based;
- focusing on the information needs of stakeholders and decision-makers.

WCRP scientists' contribution to IPCC WG1 AR4



The WCRP, as a world body of scientists facilitating/coordinating world climate research, works with the major modelling centres and governments to enhance the IPCC assessment and enable it to be fully state-of-the-art.

## WCRP – at the forefront of understanding human-induced climate change



Photo: UCAR

### WCRP is providing direct input to the Subsidiary Body for Scientific and Technological Advice (SBSTA) on research gaps and needs for the UNFCCC:

The UNFCCC and the SBSTA have become increasingly aware of and engaged with research requirements for climate change. As a result and at the request of SBSTA, WCRP

- Prepared a statement on research gaps for SBSTA 24;
- Participated in the "official" side event on research gaps at SBSTA 24 and 26;
- Held an additional side event on WCRP and ESSP research at SBSTA 24 and 26;
- Submitted a document on research needs for SBSTA 25 with its partners in the ESSP.

### Creating and Delivering Value: 2007 WCRP Climate Change Initiatives

- Future Climate Change Research and Observations: GCOS and WCRP Learning from the IPCC Fourth Assessment Report, Workshop, October 4-6 2007, Sydney, Australia.
- Interpreting Climate Change Simulations: Capacity Building for Developing Nations, ICTP and WCRP Training Seminar, November 26-30 2007, Trieste, Italy.



Photo: World Bank