



ASILOMAR INTERNATIONAL CONFERENCE ON CLIMATE INTERVENTION TECHNOLOGIES

March 22-26, 2010

*A conference to develop risk assessment and
management strategies for climate engineering research*

The impacts of climate change are occurring more rapidly and more intensely than scientists projected just a few years ago in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). Ice sheet deterioration, rapid reductions in water stored in mountain snowpack, devastation of Pacific Northwest forests by pine-bark beetles, and changing ranges for plants and animals represent but a few examples of how recent events are pointing towards a more troubling future than that forecast just a few short years ago. Scientists are also alarmed that developments like the rapid decrease in Arctic summer sea ice and start of permafrost thawing may indicate that the climate is nearing 'tipping points' that would pose a profound threat to sustainability.

With impacts around the world intensifying and projections of more serious impacts ahead, substantial emissions reductions are going to be needed to stabilize atmospheric composition and avoid 'dangerous' human interference with the climate system, as called for by the 1992 UN Framework Convention on Climate Change. Recent model projections indicate, however, that current emissions trends could lead to global warming of 4°C before 2100, far exceeding the 2°C rise that, based on the IPCC findings, political leaders have set as the appropriate upper limit for global warming. International negotiations to agree on the timing and degree of emissions reductions are now underway and their success will be essential to moderating and then reducing global warming.

With elevated concentrations of at least some greenhouse gases, and therefore of climate change, likely to persist for many centuries, there has been, however, increasing discussion about the potential need for additional interventions— sometimes referred to as climate engineering or 'geoengineering.' Geoengineering has been suggested as a conceptual approach for responding since even before 1992 when possibilities were first evaluated in the US National Academy of Sciences report "Policy Implications of Greenhouse Warming: Mitigation, Adaptation, and the Science Base." Concerned about the slow progress in limiting global emissions, Nobel laureate Paul Crutzen again raised the issue in a 2006 paper. Since then, considerable scientific and public discussion has ensued.

Several events during 2009 have further brought attention to the issue. Concerned about the pace of climate change, the American Meteorological Society in July issued a statement calling for research into the scientific, technological, historical, ethical, legal, and social science aspects of geoengineering. In September, UK 's Royal Society expanded on the call for wide-ranging research and urged the development of guidelines for such research. In December, having hosted a geoengineering workshop in June, the US National Academy of Sciences will release its two-year study of America's Climate Choices, which is also expected to call for research on geoengineering.

While potentially beneficial in limiting climate change, proposals for climate intervention research have also met with understandable concern from scientists, environmental groups, the public, and government officials. Questions have ranged from the safety and side effects of such research to issues of ethical appropriateness and governance. What environmental impacts might result from such research? How can appropriate guidelines be put in place? Which organizations, agreements or laws have authority in these areas? What form of governance will be needed for the research? Who will decide which techniques are effective, safe, or needed? These questions, and many more, raise important and legitimate concerns that need to be addressed if a comprehensive research program is going to be able to proceed.

Scientists in other fields have previously faced public concerns about the risks of experimentation. In February of 1975, scientists studying recombinant DNA recognized that their experiments might result in release of modified organisms capable of causing cancer or other lethal diseases. Dr. Paul Berg, who won the Nobel Prize in 1980, co-chaired the historic **Asilomar Conference on Recombinant DNA Molecules** that to this day is recognized as a landmark effort in self-regulation by the scientific community. The purpose of the conference was to determine how the risks of promising research could be reduced and to achieve a consensus among scientists that they would follow a set of risk reduction strategies. The report, from which today's biosafety levels (BSL) for research were derived, was disseminated to the international scientific community and its summary statement was published in *Science*, *Nature* and the *Proceedings of the National Academy of Sciences*. Because of the effectiveness of the ultimate guidelines and procedures, there have been no dangerous releases of organisms modified with recombinant DNA technologies.

Using the historic Asilomar conference on recombinant DNA as a model, an international panel of experts, brought together as the Scientific Organizing Committee (SOC) has been assembled to organize the **Asilomar International Conference on Climate Intervention Technologies**. The goal of the Conference will be to propose strategies to minimize risk associated with scientific experimentation and research on approaches for climate intervention. The specific objectives of the conference will be to: **1) identify the potential risks associated with climate intervention experiments; 2) propose a system to assess experiments for their potential categorical risks and suggest precautions necessary for the experiments; and 3) propose research standards and guidelines for use by the international science community.**

The risk assessment and management guidelines for climate intervention experiments to be developed are intended to serve as an initial element of the governance mechanisms that will be essential before proceeding to climate engineering experimentation. A "Provisional Statement of the Conference Proceedings" will be developed during the conference and be discussed during the final session of the meeting. The SOC will then be responsible for finalizing the statement and its recommendations to reflect the discussions and, in consultation with the participants, to develop a consensus statement on behalf of the Conference. The final report will be published and posted online and further distributed for consideration by national and international organizations in cooperation with the Conference sponsors, strategic partners, and organizers.



Participants at the historic Asilomar Conference on Recombinant DNA Technologies in 1975 debate the guidelines for biosafety in RDNA research

*a conference to develop risk assessment and
management strategies for climate engineering research*



The Asilomar International Conference on Climate Intervention Technologies has been developed by the Climate Response Fund (CRF) under the leadership of Dr. Margaret Leinen. Dr. Leinen is an internationally known oceanographer whose research focused on the role of the oceans in carbon cycling. She has a long record of academic, governmental, and commercial leadership before joining CRF. She served as Dean of the Graduate School of Oceanography at the University of Rhode Island; as Assistant Director for Geosciences at the US National Science Foundation; and as Chief Scientist of Climos, Inc. before founding the CRF (www.climateinterventionfund.org). She is a Fellow of the Geological Society of America and the American Association for the Advancement of Science.



**DR. MARGARET
LEINEN**

Conference Developer

Scientific planning for The Asilomar International Conference on Climate Intervention Technologies is being led by an international Scientific Organizing Committee that has been assembled by the Climate Institute (<http://www.climate.org>) under the chairmanship of Dr. Michael MacCracken. Dr. MacCracken is the Chief Scientist for Climate Change Programs at the Climate Institute. His research has focused on understanding the causes of climate change and he served in leadership positions for the atmospheric and geophysical sciences at Lawrence Livermore National Laboratory (LLNL) from 1968-1993. From 1993-2002, he was detailed from LLNL to serve as Senior Scientist with the Office of the US Global Change Research Program, serving initially as its Executive Director and later in a similar position with the coordination office for the US National Assessment of the impacts of climate change. Dr. MacCracken has served as President of the International Association of Meteorology and Atmospheric Sciences (IAMAS), on the synthesis team for the Arctic Climate Impact Assessment, as a reviewer and contributor to the IPCC Assessments, and now serves on the Executive Committee of the Scientific Committee on Oceanic Research. He is a Fellow of the American Association for the Advancement of Science.



**DR. MICHAEL
MacCRACKEN**

Chair of the Scientific Organizing
Committee; and
Past President of IAMAS

Dr. Paul Berg, co-convenor of the historic Asilomar Conference on Recombinant DNA Molecules, has advised CRF and the Climate Institute on conference structure, processes for guideline development, and post-conference interactions with the science community. He is the Honorary Chair of the Asilomar International Conference on Climate Intervention Technologies. Dr. Berg is a distinguished biochemist whose work on nucleic acids won the Nobel Prize in Chemistry in 1980 and the US National Medal of Science in 1983. He is known worldwide for the pivotal role he played in early research on recombinant DNA and for his leadership in establishing safety guidelines for recombinant DNA research.



DR. PAUL BERG

Advisor / Honorary Chair
Chair 1975 Asilomar Conference on
Recombinant DNA Molecules
1980 Nobel Prize, Chemistry

SCIENTIFIC ORGANIZING COMMITTEE

Dr. Michael MacCracken, Chief Scientist for Climate Change programs, Climate Institute, US (**Chair**)

Dr. Paul Crutzen, Max Planck Institute, Germany, and Scripps Institution of Oceanography, US (**corresponding member**)

Dr. Scott Barrett, Lenfest Professor of Natural Resource Economics, Columbia University, US

Dr. Roger Barry, Director of the World Data Center for Glaciology and Distinguished Professor of Geography, University of Colorado, US

Dr. Steven Hamburg, Chief Scientist, Environmental Defense Fund, US

Dr. Richard Lampitt, Senior Scientist, National Oceanography Center and Professor, University of Southampton, UK

Dr. Diana Liverman, Director of the Institute of the Environment and Professor of Geography and Regional Development, University of Arizona, US. Senior Fellow in the Environmental Change Institute, Oxford University, UK.

Dr. Thomas Lovejoy, Heinz Center Biodiversity Chair at the Heinz Center for Science and the Environment, US

Dr. Gordon McBean, Professor, Departments of Geography and Political Science and Director of Policy Studies at the Institute for Catastrophic Loss Reduction, The University of Western Ontario, London, Canada.

Dr. John Shepherd, Professorial Research Fellow in Earth System Science, School of Ocean and Earth Science, National Oceanography Centre, University of Southampton, and Deputy Director (External Science Coordination) of the Tyndall Centre for Climate Change Research, UK

Mr. Stephen Seidel, Vice President for Policy Analysis and General Counsel at the Pew Center on Global Climate Change, US

Dr. Richard Somerville, Distinguished Professor Emeritus and Research Professor at Scripps Institution of Oceanography, University of California, San Diego, US

Dr. Tom M.L. Wigley, Professor, University of Adelaide, Australia and Senior Scientist, National Center for Atmospheric Research, US

Attendance at this international conference is by invitation of the Scientific Organizing Committee (SOC). To apply for consideration, please send a letter/email including: your full contact information (name, affiliation, address, email, phone), area of professional expertise, listing of geoengineering technologies and/or topics in which you are most interested, and a few sentences on your experience and interest in geoengineering that would contribute to discussions at the workshop. Communications should be sent to the SOC by email to asilomar@climate.org or by fax to: +1-202-737-6410. Inquiries can also be made to Corinne Kisner at the Climate Institute: +1-202-552-4723.