

AAAS
ANNUAL MEETING
PROGRAM
14-19 JANUARY 1989
SAN FRANCISCO



AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

1:30 am / Thu / 19 Jan

Hilton / Continental 1

Remote and in situ Observation Systems

Presiding: Thomas Dickey (*Professor, Ocean Physics Group, Dept. of Geological Sciences, Univ. of Southern California, Los Angeles, CA*)

Advances in Remote Sensing and Optical Oceanography
Mark Abbott (*Associate Professor, College of Oceanography, Oregon State Univ., Corvallis, OR*)

Applications of New Acoustical Tools in Biological Oceanography
Peter Wiebe

Observing the Live Animal: In vitro, in situ, by Day and by Night
Rudi Strickler (*Professor and Director, Boston Univ. Marine Program, Woods Hole, MA*)

In situ Images in the Sea: Binocular Vision and the Vertebrate Eye
William Hammer (*Professor of Zoology, Univ. of California, Los Angeles, CA*)

Considerations for the Experimental Study of Predator/Prey Interactions in a Turbulent Flow: Parameters, Scales, and Sampling
Timothy Granata (*Postdoctoral Fellow, Ocean Physics Group, Dept. of Geological Sciences, Univ. of Southern California, Los Angeles, CA*)

2:30 pm / Thu / 19 Jan

Hilton / Continental 1

Modelling of Biological/Physical Interactions in the Sea

Presiding: Eileen Hofman (*Associate Professor, Dept. of Oceanography, Texas A&M Univ., College Station, TX*)

Physical/Chemical Modelling of Interactions Between Planktonic Organisms
George Jackson (*Associate Professor, Scripps Institution of Oceanography, La Jolla, CA*)

New Insights into Physical/Biological Interactions Through Modelling
Joseph Wroblewski (*Research Scientist, Bigelow Laboratory for Ocean Sciences, West Boothbay Harbor, ME*)

Implications of Complex Physical/Biological Modelling: Examples from the Southeastern Continental Shelf System and the Antarctic
Eileen Hofmann

Models Guiding Research: Physiology + Physics = Ecology
James Kremer (*Associate Professor, Dept. of Biological Sciences, Univ. of Southern California, Los Angeles, CA*)

Interdisciplinary research in oceanography is rapidly expanding our understanding of the mechanisms of interaction between biological and physical processes. Process-oriented studies, using new instrumentation and sampling strategies, are now yielding biological and physical data that are collected on similar time and space scales. This coherence in temporal and spatial sampling scales is providing new insights into ocean processes. This symposium is intended to explore this critical and rapidly growing area of oceanographic research, and to provide informed discussion on the implications of this work for future research in the ocean sciences.

The effects of spatial and temporal scale differences in ocean processes will be examined through presentations covering biophysical interactions across a range of scales. Recent technological advances in these research areas will be highlighted, with particular emphasis on the long-range implications of new technology in the ocean sciences. Biological/physical modelling will provide

another focus for the symposium, and will address the issues within this new and growing field, which seeks to explain and predict complex biological and physical interactions.

[Sponsor: AAAS Section G. Cosponsor: AAAS Section E.]

16. Atmospheric Science; Climate

16-1. Effects of Global Change on Vegetation and Crops

Organized by: Eugene S. Takle (*Professor of Agronomy and Earth Sciences, Iowa State Univ., Ames, IA*) and Kenneth J. Frey (*Professor of Agronomy, Iowa State Univ., Ames, IA*)

8:30 am / Sun / 15 Jan

Hilton / Yosemite C

Presiding: Eugene S. Takle

Global Changes: Past, Present, and Future
John A. Eddy (*Director, Office of Interdisciplinary Earth Studies, University Corporation for Atmospheric Research, Boulder, CO*)

Plant Responses to Elevated CO₂ and Changing Climate Variables

Bruce A. Kimball (*Soil Scientist, U.S. Dept. of Agriculture-Agricultural Research Service, U.S. Water Conservation Laboratory, Phoenix, AZ*)

Impacts of Climate Change on U.S. Agriculture
Cynthia Rosenzweig (*Research Associate, Dept. of Geography, Columbia Univ. and National Aeronautics and Space Administration Goddard Institute for Space Studies, New York, NY*)

Changes in Climatic Variability Due to Climate Change
Linda O. Mcarns (*Scientist, Climate and Global Dynamics Division, National Center for Atmospheric Research, Boulder, CO*)

Effects of CO₂-Induced Climate Change on Forests
Daniel B. Botkin (*Professor of Biology and Environmental Studies, Univ. of California, Santa Barbara, CA*)

This symposium will examine the implications of global environmental change for natural vegetation and agricultural crops. A survey of observed and projected changes in our global environment and the role of human activities in these changes will be presented to provide an overview for assessing possible impacts on vegetation. The effects of globally changing variables will be considered at the plant level by discussion of plant response to an altered climatic environment and to elevated levels of CO₂. The impact of expected changes on cropping patterns, on agricultural pest populations and disease likelihood, and on U.S. and global crop production also will be addressed. Vegetative growth can be influenced as much by variability of climate factors as by mean values. Model simulations of variability of temperature, precipitation, relative humidity, and solar radiation under CO₂-altered climate will be presented in terms of their effect on U.S. agricultural production. Model projections of changes in biomass, productivity, and species composition of Great Lakes states forests under changes in CO₂, temperature, and rainfall will be presented. The prospect of predictable climate and the practical consequences of this unprecedented knowledge for

agricultural planning is a significant element of global change that requires additional clarification.

[Sponsor: AAAS Section O. Cosponsors: AAAS Section G; AAAS Southwestern and Rocky Mountain Division; AAAS Committee on Arid Lands; AAAS Population, Resources, and the Environment Program.]

16-2. Potential Impacts of Climate Change on California

Organized by: Stanley M. Greenfield (*President, Systems Applications, Inc., San Rafael, CA*) and Dennis Tirpak (*Director of Strategic Studies Branch, Office of Policy Analysis, U.S. Environmental Protection Agency, Washington, DC*)

2:30 pm / Sun / 15 Jan Hilton / Yosemite C

Presiding: Stanley M. Greenfield

Potential Impact of Climate Change on California Agriculture
Daniel J. Dudek (*Senior Economist, Environmental Defense Fund, New York, NY*)

Potential Impact of Climate Change on Ozone in the Central Valley of California
M.K. Liu (*Senior Vice President, Systems Applications, Inc., San Rafael, CA*)

Potential Impact of Climate Change on San Francisco Bay and Estuary
Philip B. Williams (*Principal, Philip Williams and Associates, San Francisco, CA*)

Potential Impact of Climate Change on Water Management in California
Daniel P. Sheer (*Principal, Water Resources Management, Inc., Columbia, MD*)

Strategies and Choices for Stabilizing the Global Climate
Dennis Tirpak

There is a growing concern with regard to the potential for regional climate change due to the continued emission of trace gases into the atmosphere. These concerns have given rise to an increasing research effort, sponsored primarily by the federal government, directed both at the climate changes that might occur and the potential impacts of these changes on society. As an initial step in the understanding process, particularly with regard to potential environmental impacts of climate change, the U.S. Environmental Protection Agency has been holding a series of workshops in an attempt to establish a baseline of our current knowledge. This symposium draws from the material presented at these workshops and is directed toward a specific region—California.

[Cosponsor: AAAS Section X.]

16-3. Climate Change and U.S. Water Resources

Organized by: David M. Burns (*Director, Climate Project, Office of International Science, AAAS, Washington, DC*) and Paul E. Waggoner (*Distinguished Scientist, Connecticut Agricultural Experiment Station, New Haven, CT*)

8:30 am / Mon / 16 Jan Hilton / Yosemite C

Presiding: Roger R. Revelle (*Professor of Science and Public Policy, Univ. of California, San Diego, La Jolla, CA, and Chairman, AAAS Committee on Climate*)

Climate Change and U.S. Water Resources: The Issues
Paul E. Waggoner

Climate Change and CO₂ Enrichment and Evapotranspiration
Norman J. Rosenberg (*Director, Climate Resource Program, Resources for the Future, Washington, DC*)

Sensitivities and Vulnerabilities of Water Supply Systems to Climatic Change
Peter H. Gleick (*Director, Global Environment Program, The Pacific Institute, Berkeley, CA*)

Climate Change and U.S. Irrigated Agriculture
Dean F. Peterson (*Dean Emeritus, College of Engineering, Utah State Univ., Logan, UT*)

Urban Water
Harry E. Schwarz (*Professor Emeritus, Clark Univ., Worcester, MA*)

Although the subject of climate change has recently received attention, its effects on water resources have not. In fact, climate change may affect affairs mainly by changing the water resource that humanity can use. This symposium will examine the evaporation that reduces precipitation to the runoff that becomes water resources and the vulnerability of our water supply to climate change. Speakers will discuss the effect of climate change on the large use—irrigation—and also on urban water systems.

[Sponsors: AAAS Section W; AAAS Committee on Climate. Cosponsors: AAAS Southwestern and Rocky Mountain Division; AAAS Committee on Arid Lands.]

16-4. Policy Implications of Climate Change

Organized by: Mark Meo (*Research Fellow, Science and Public Policy Program, Univ. of Oklahoma, Norman, OK*)

2:30 pm / Mon / 16 Jan Hilton / Yosemite C

Presiding: Mark Meo

The Greenhouse Effect: Is Major Policy Response Needed?
Stephen H. Schneider (*Head, Interdisciplinary Climate System, National Center for Atmospheric Research, Boulder, CO*)

Policy Implications of Accelerated Sea-Level Rise
Donald F. Boesch (*Executive Director, Louisiana Universities Marine Consortium, Chauvin, LA*)

Climate Change, Forests, and Forest Policy
Frederick W. Cubbage (*Professor of Forestry, Univ. of Georgia, Athens, GA*)

Institutional Implications of Climate Change Impacts
Mark Meo

Agenda Setting and Public Policy Related to Global Climate Change
Helen M. Ingram (*Professor of Political Science, Univ. of Arizona, Tucson, AZ*)

Discussant:
S. Fred Singer (*Professor, Dept. of Environmental Sciences, Univ. of Virginia, Charlottesville, VA*)

As scientific reports continue to link anthropogenic emissions of radiatively active gases with changing climate, concern has grown over the near-term implications of climate change for public policies that strongly influence natural resources management. Increases in global atmospheric temperatures brought about by a "greenhouse"

warming are expected to exert a range of impacts upon natural resources within the next several decades.

This symposium addresses the policy implications of changing climate and its impacts upon renewable resources, with specific attention given to the key issues that will most likely affect current and proposed management strategies and related decision-making criteria. In regard to the uncertainty that exists currently with respect to the timing and magnitude of projected climate change impacts, speakers will address the issues associated with policy options suggested for impact mitigation, prevention, or adaptation. For specific resource areas, discussion will focus on the contribution of science and technology, institutional and organizational change, and the role of government and the press. In addition, the symposium will address the broader issues that are likely to affect resource quality, supply, and demand over time.

[Cosponsors: AAAS Section X; AAAS Population, Resources, and the Environment Program.]

16-5. Weather and Climate: The Solar Variability and QBO Connections

Organized by: **Brian A. Tinsley** (*Professor of Physics, Center for Space Sciences, Univ. of Texas, Dallas, Richardson, TX*)

8:30 am / Tue / 17 Jan Hilton / Yosemite A

Presiding: Brian A. Tinsley

11-Year Solar Cycle and QBO-Related Changes in the Atmosphere

Karin Labitzke (*Professor, Institut für Meteorologie, Freie Univ. Berlin, West Berlin, Federal Republic of Germany*)

Carriers of Solar Variations and Response in the Thermosphere and Polar Caps

Raymond G. Roble (*Head, Terrestrial Interactions Section, National Center for Atmospheric Research, Boulder, CO*)

Atmospheric Response to Short-Term Solar Variations

Gerald M. Keating (*Senior Research Scientist, Atmospheric Sciences Division, National Aeronautics and Space Administration Langley Research Center, Hampton, VA*)

QBO-Solar Variation Atmospheric Effects: Discussion of Some Dynamical Mechanisms

Marvin A. Geller (*Chief, Laboratory for Atmospheres, National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, MD*)

Tropospheric Storm Response to QBO and Solar Variability: Observations and Scenarios for Mechanisms

Brian A. Tinsley

A breakthrough has occurred in relating seasonal weather patterns to solar variability and the quasi-biennial oscillation of stratospheric winds at equatorial latitudes (QBO). Historically a controversial subject, the study of the effects of solar variability on climate is now on a firmer basis because of the advances made by Labitzke and van Loon in finding the QBO dependence of the atmospheric effects of the 11-year solar cycle. Atmospheric variations with the 27-day period of solar rotation and even shorter periods have also been established. Candidates for the carrier of the solar variations are total solar radiation, solar ultraviolet, galactic cosmic rays, MeV electrons, and solar flare protons. A large amount of amplification is required to produce the observed effects.

The symposium speakers will discuss observational data and the clues that they give to possibilities for mechanisms. Without knowledge of the mechanism(s), seasonal forecasts are not likely to

be reliable; with a confirmed mechanism, the benefits in such areas as agriculture and energy distribution are likely to be great.

[Sponsor: AAAS Section W. Cosponsors: AAAS Section E; AAAS Southwestern and Rocky Mountain Division; AAAS Committee on Arid Lands.]

17. Engineering & Technology

17-1. New Technology for People with Disabilities

Organized by: **Virginia W. Stern** (*Director, Project on Science, Technology, and Disability, Office of Opportunities in Science, AAAS, Washington, DC*) and **Deborah Gilden** (*Assistant Director, The Smith-Kettlewell Eye Research Institute, San Francisco, CA*)

2:30 pm / Mon / 16 Jan

Hilton / Yosemite A

Presiding: Virginia W. Stern

Human-Machine and Human-Information Interfaces

David L. Jaffe (*Biomedical Engineer, Palo Alto Veterans Administration Medical Center, Palo Alto, CA*)

Access to Graphic Information by Blind Computer Users

Lawrence A. Scadden (*Director of Rehabilitative Engineering, Electronic Industries Foundation, Washington, DC*)

Dexter, The Robotic Hand: A "Conversation Piece" for Deaf-Blind Users

Deborah Gilden

The Talking Glove: A Speaking Aid for Nonvocal Deaf and Deaf-Blind Individuals

James Kramer (*Doctoral Candidate, Electrical Engineering Dept., Stanford Univ., Stanford, CA*)

Brain Response Interface: Communication Using Brain Signals

Erich E. Sutter (*Scientist, The Smith-Kettlewell Eye Research Institute, San Francisco, CA*)

The National Special Education Alliance: A Model Collaboration Among Parents, Consumers, and Professionals

Jacquelyn Brand (*Executive Director, National Special Education Alliance, Apple Computer, Inc., Cupertino, CA*)

This symposium will present innovative technology for people with visual, hearing, voice, and mobility impairments. Prototypes of the technology will be available for examination by the audience in addition to slide and video presentations demonstrating the devices in use by persons with disabilities. There will also be a presentation about the National Special Education Alliance (NSEA), a network of community resource centers throughout the country, including the Disabled Children's Computer Group, a model project in Berkeley, CA, which places computers in the hands of disabled youth and their families to develop technological resources for education and employment.

[Sponsor: Foundation for Science and the Handicapped. Cosponsors: AAAS Sections M and P.]