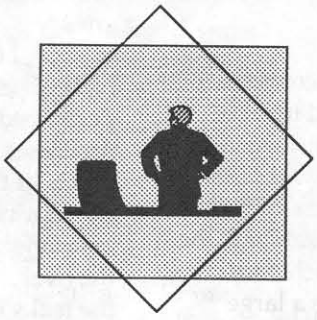
IGAC *tivities*
NewsLetter
of the International Global Atmospheric Chemistry Project

Issue No: 2
September 1995

In this issue



A Note From the IGAC Chair

Ronald G. Prinn

I am pleased to tell you that the first issue of IGAC*tivities* was distributed to nearly 1,800 people and we received a good deal of positive feedback. So here we are already with the second issue. Progress in several IGAC endeavors has been substantial and I am personally looking forward to the presentations of results at the WMO/IGAC conference, now just a month away. This will be the third scientific conference for IGAC and we are delighted to be cooperating with the WMO on this one. Quite a few IGAC folk (myself included) have been concerned about balancing the global budget on nitrous oxide; a gas important for both the ozone layer and radiative forcing of climate. In this issue you can read about the role of microbial processes in fertilized soils as one of the significant sources of this gas. Plans for IGAC's new *Focus on Atmospheric Aerosols* were discussed at a workshop during the July 1995 IUGG General Assembly in Boulder, U.S.A. and we have a report here for you on the status of these important plans. Do not hesitate to contact the co-leaders of the planning process for the Aerosol Focus if you have ideas to contribute. You can also read about the new implementation plan for IGAC's Atmospheric Chemistry ad Environmental Education in Global Change (ACE[ED]) Activity. It is a pleasure to see this important endeavor moving forward under new leadership. Again, your input is welcome on the Activity also. Finally it is my pleasure to tell you that Dr. Guy Brasseur, Director of the Atmospheric Chemistry Division at the National Center for Atmospheric Research, U.S.A has been chosen by IGAC's two parent organizations (IGBP and CACGP/IAMAS) as my successor to chair the IGAC Scientific Steering Committee (SSC). His term begins in January, 1996. Since my election as the inaugural chair back in 1988, I and the other members of the SSC have been blessed by the unselfish help and cooperation of the atmospheric chemistry and biospheric sciences communities in carrying out our challenging tasks. I hope you will all welcome Guy and give him and the SSC the same remarkable support that you gave to me in the very challenging years that lie ahead. I hope you enjoy this issue of IGAC*tivities* and remember that the editors, Alex Pszenny and Elaine Robbins, need your input for future issues and welcome your suggestions for improvements to the Newsletter.

GLOBAL CHANGE
IGBP

Science Feature: Where does N_2O Come From? An Aspect of BATGE Research.

Contributed by M. Keller, USDA Forest Service, Rio Pedras, Puerto Rico

In many ways, nitrous oxide (N_2O) is a forgotten greenhouse gas. Its rate of increase, 0.3% per year during the 1980's, does not sound terribly shocking. Its sources are poorly known and the prospects for "instant gratification" following possible controls of N_2O emissions are small because of its 150 year atmospheric lifetime. From another vantage, the long atmospheric lifetime of N_2O gives each additional molecule emitted to the atmosphere a large global warming potential. The effects of increasing concentrations of atmospheric N_2O will be with us for a long time.

Our ignorance of N_2O sources and sinks is troubling. The current budget is seriously unbalanced. Sources (14 Tg-N/yr) exceed sinks (10 Tg-N/yr) by 40%. Data from polar ice cores show that N_2O concentrations in the pre-industrial atmosphere hovered around 280 ppb. Today the concentration exceeds 310 ppb. Where does the excess contribution to the N_2O budget come from? Based on numerous measurements, we know that fossil fuel combustion cannot be a major source. Other industrial processes such as the manufacture of adipic acid (for nylon) and nitric acid contribute perhaps one eighth of the imbalance.

Looking to the natural biological sources of N_2O gives us strong hints about where to find the perturbed sources. N_2O is formed by microbial processes. For soil processes which produce about two thirds of the natural N_2O, the "Hole-In-the-Pipe" conceptual model (Figure 1) relates the total amount of N_2O released through "leaks" in the pipe directly to the overall "flow" of N through the pipe. The size of the leaks may be controlled by a number of soil properties, chief among them soil moisture content. From our understanding of terrestrial ecology, we know that most temperate ecosystems are nitrogen poor. In contrast many natural tropical ecosystems are nitrogen rich. And recent budgets suggest that while unmanaged temperate and boreal ecosystems produce about 1.2 Tg N_2O-N annually, unmanaged tropical ecosystems produce 4 times as much: 4.8 Tg annually.

What happens when these ecosystems are disturbed? Disturbance of temperate ecosystems generally does not lead to large releases of N_2O because nitrogen is in short supply. In contrast, large

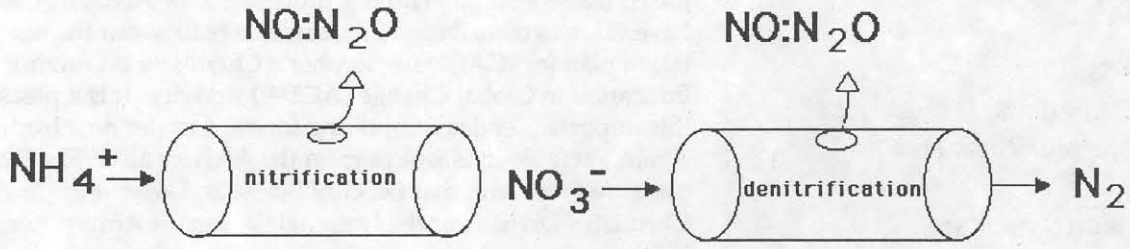


Figure 1. The "Hole in the Pipe" conceptual model indicates the flows of inorganic nitrogen through the microbial processes of nitrification and denitrification. Nitrogen oxides escape through "leaks" in the pipe. (Adapted from Firestone and Davidson, 1989).

N_2O emissions have been observed following natural (e.g., hurricanes) and anthropogenic disturbances of tropical forest. Figure 2 shows findings from a study of N_2O release from a sequence of pastures representing various times following deforestation. Because forest to pasture conversion is a dominant land-use in tropical America, this effect may account for a tenth of the annual global imbalance of N_2O.

While forest disturbance is important, we need to look for higher flows in our plumbing if we are going to find a big enough leak. Big flows of nitrogen can be found wherever farmers are applying nitrogen fertilizer to fields and also where domestic animals are kindly returning much of what they take in. The annual use of nitrogen fertilizer, about 80 Tg-N, is now greater than natural biological nitrogen fixation. It has been known for two decades that fertilizer use increases N_2O emissions from farm soils. Fertilizer use in the developed world appears to have reached a plateau. In contrast, in the developing world (a near synonym for the tropical world), fertilizer use nearly doubled during the 1980's. Moreover, we have indications that the same amount of nitrogen fertilizer yields more N_2O under tropical conditions than under temperate conditions.

Is the world faced with agonizing decisions pitting food production against atmospheric composition change? Not necessarily. Through improved fertilizer management, we may be able to re-adjust the nitrogen plumbing with the help of plants. We need to design agronomic systems for the tropics that reduce the nitrogen flow through the pipe by directing more fertilizer to the crops and less to the microbes that make N_2O. Results from studies of sugar cane in Hawaii and wheat in Mexico suggest that careful fertilizer management can significantly limit emissions of N_2O while at the same time cutting fertilizer costs and increasing crop yields. Reduced N_2O emissions to the atmosphere may someday be the result of richer harvests by farmers in the tropics.

Selected References:

Bouwman, A. F., K. W. Van der Hoeck, J. G. J. Olivier. 1995. Uncertainties in the global source distribution of nitrous oxide. *Journal of Geophysical Research*, **100**, 2785-2800.

Firestone, M. K. and E. A. Davidson. 1989. Microbiological basis of NO and N_2O production and consumption in soil, in: *Exchange of Trace Gases between Terrestrial Ecosystems and the Atmosphere*, edited by M. O. Andreae and D. S. Schimel, pp. 7-21, John Wiley & Sons, New York.

M. Keller and P. A. Matson. 1994. Evaluating the effects of tropical land use changes on atmospheric composition, R. G. Prinn (ed.) *Global Atmospheric-Biospheric Chemistry*, pp. 103-118 in: Plenum Publishing Company, New York.

M. Keller and W. A. Reiners. 1994 Soil-atmosphere exchange of nitrous oxide, nitric oxide, and methane under secondary succession of pasture to forest in the Atlantic lowlands of Costa Rica. *Global Biogeochemical Cycles*, 8,399-409.

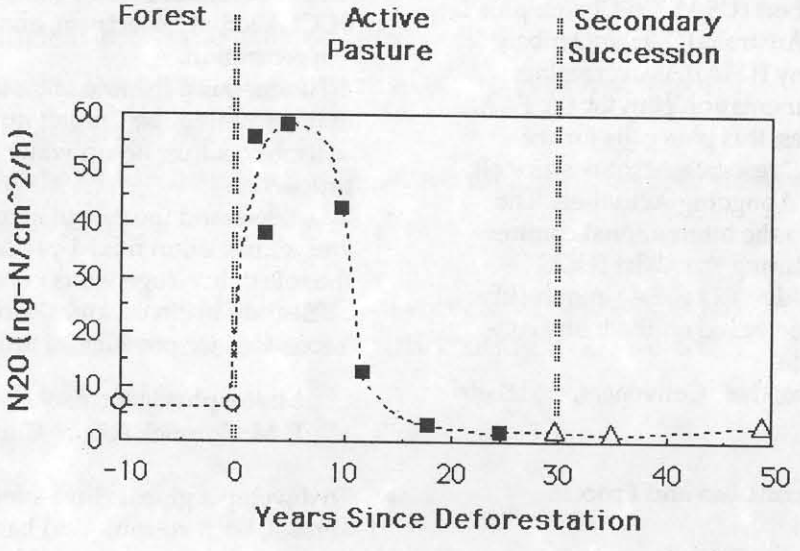


Figure 2. Emissions of nitrous oxide from soils along a chronosequence following the conversion of forest (0 years) to pasture through secondary succession in the Atlantic Lowlands of Costa Rica. (Adapted from Keller and Reiners, 1994).

IGAC's New *Focus on Atmospheric Aerosols*

The long-term aim of IGAC is to develop models that integrate relevant biospheric and atmospheric processes for a wide suite of atmospheric species, contributing to a predictive capability for atmospheric composition and the Earth system as a whole under conditions of global change. In the past 5 years significant progress has been made in understanding the significant role of aerosols in radiative forcing of climate. However, as emphasized in the 1994 IPCC Report, the magnitude of the forcing, while apparently large (and negative), is highly uncertain; much research needs to be done to reduce this uncertainty.

Early this year, Ron Prinn, Chair of the IGAC Scientific Steering Committee, and Peter Hobbs, Chair of the Scientific Steering Committee of the International Global Aerosol Program (IGAP) announced the merging of IGAP with IGAC to form a new IGAC *Focus on Atmospheric Aerosols* (FAA). This merger will enhance significantly the important ongoing studies of atmospheric aerosol budgets, processes, and effects, and better link them to studies of the relevant gas phase chemistry and biospheric, geospheric and anthropogenic source/sink processes.

The initial principal objective of the FAA is to improve understanding of the role of atmospheric aerosols in climate forcing and in the prediction of changes in the global climate and geospheric-biospheric processes. An IGAP-IGAC Merger Panel (P. Hobbs (USA) and B. Huebert (USA), Co-Chairs; plus L. Barrie (Canada), J. Gras (Australia), J. Heintzenberg (Germany), V. Ramaswamy (USA)), is overseeing development of an implementation plan for the FAA. Still in its early draft stages, this plan calls for the creation of four new IGAC research Activities as well as augmentation of several ongoing Activities. The plan was first presented to the international community at a workshop held during the XXIst IUGG General Assembly in Boulder, CO (USA) in mid-July and is now being improved based on the many constructive suggestions made.

The new Activities, their Conveners, and their proposed goals are:

1 Aerosol Characterization and Process Studies (ACAPS)
T. Bates (USA) and J. Gras (Australia) Co-Conveners

- To understand the spatial and temporal distributions of the chemical, physical, radiative and cloud nucleating properties of the atmospheric aerosol and to investigate the relationships between these properties.
- To determine the chemical, physical, and biological processes controlling the formation and fate of aerosols and how these processes affect the number size distribution, the chemical composition, and the radiative and cloud nucleating properties of the particles.
- To quantify the role of aerosol related heterogeneous processes in gas phase atmospheric chemistry and the major biogeochemical cycles.

2 Direct Aerosol Radiative Forcing
T. Nakajima (Japan) and J. Ogren (USA), Co-Conveners

- To determine, primarily through observations, the magnitude, uncertainty, chemical sources, and temporal and spatial variations of the direct radiative climate forcing by aerosols of various types (e.g., sulfates, organics, mineral dust).

3 Indirect Aerosol Radiative Forcing
T. Choularton (UK) and D. Hegg (USA), Co-Conveners

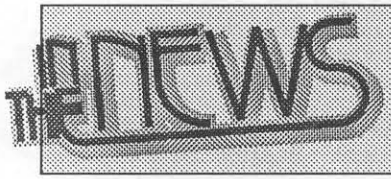
- To understand the relationships between aerosol number concentration, chemical composition, size distribution, cloud condensation nucleus (CCN) activity spectrum, and cloud droplet concentration.
- To understand the role of cloud physical processes in determining the droplet number, droplet effective radius, liquid water path, and radiative properties.
- To understand the role of aerosols (acting as CCN and ice nuclei) in mixed-phase clouds, including the role of heterogeneous versus homogeneous nucleation in cirrus, and the role of aerosols in secondary ice production processes.

4 Stratospheric Aerosols
P. McCormick (USA), Convener

- To develop a global climatology for stratospheric aerosol, both volcanic and background, including the growth, dispersion and loss mechanisms of the aerosol, and aerosol characteristics important for understanding their radiative, chemical, and indirect effects, their use as tracers of atmospheric motions, and their effects on remote sensors.

Current IGAC Activities that will be enhanced under the FAA are Marine Aerosol and Gas Exchange (MAGE), Biomass Burning Experiment: Impact on the Biosphere and Atmosphere (BIBEX), Polar Atmospheric and Snow Chemistry (PASC), and Global Integration and Modeling (GIM). Updated descriptions of these Activities (now given in *IGAC: The Operational Plan*, IGBP Report No. 32, 1994, available from the IGAC Core Project Office) will be part of the FAA implementation plan. It is anticipated that the plan will be finalized and available in early 1996. Requests to be put on the FAA mailing list, and general expressions of interest in the FAA, should be directed to the IGAC Core Project Office.

The Merger Panel wishes to acknowledge the partial financial support for the Boulder workshop provided by IGAC's parent organization, the International Geosphere-Biosphere Programme (IGBP), and the former International Global Aerosol Program (IGAP).



IGAC's "Atmospheric Chemistry and Environmental Educationin Global Change" (ACE^{ED}) Activity Begins Implementation

Over the past year, this Activity under IGAC's *Fundamental* Focus has been reorganized under the new leadership of Professor Kenneth L. Demerjian of the State University of New York at Albany. Other initial members of the new ACE^{ED} Coordinating Committee are: P. Artaxo (Brazil), E. Bierly (USA), J. Calvert (USA), R. Duce (USA), M. Ilyas (Malaysia), P. Matson (USA), J. Miller (Switzerland), V. Mohnen (Germany & USA), A. Pszenny (USA), H. Rodhe (Sweden), and H. Virji (USA). The remainder of this feature presents the new implementation plan for ACE^{ED} approved by the IGAC Scientific Steering Committee during its meeting in early May; it supersedes the description of IGAC Activity 7.2 as published in IGBP Report No. 32 (IGAC: The Operational Plan) in August of 1994.

Introduction

The growing need to understand the composition of the Earth's atmosphere and how and why it changes has become increasingly apparent in the last decade. Issues of stratospheric ozone depletion, global climate change and regional pollution are problems of great interest to today's society and require substantial scientific insight to address in a meaningful and cost effective manner.

Scientists trained and educated in atmospheric chemistry and the environment are in limited supply and the need in developing countries is especially critical. The IGAC Project recognizes the importance of a strong emphasis on education and training and the need to create the appropriate infrastructure within developing countries to enhance their scientific capacity to realize the full benefits of participation in IGAC as well as deal with the scientific and environmental policy challenges facing the global community.

Goal

- To coordinate education activities aimed at promoting understanding of global change in the chemistry of the atmosphere, and its relationship to the biosphere, geosphere and to anthropogenic activities, internationally, both in the developing and developed countries and countries in all climate regions.

Implementation: Capacity Building in Developing Countries

To promote education and training in this field, scientists in IGAC and the World Meteorological Organization's Global Atmosphere Watch (WMO/GAW) have agreed to join forces with those in START to design and execute an integrated approach to "academic capacity building" in developing countries. The mechanism involves the establishment of a pool of voluntary lecturers recruited from the international scientific community to carry out the educational mission. This highly interactive and interrelated education/training program will:

- Establish atmospheric chemistry programs at the undergraduate level at universities in developing countries

- Provide graduate research assistantships at cooperating universities with Ph.D. programs in atmospheric chemistry for qualified students from developing countries.

- Initiate and expedite employment opportunities at all levels (B.S., M.S., Ph.D.) in support of IGAC, WMO/GAW and START activities in developing

countries (open to students who successfully participated in (1) and/or (2) above)

- Develop and offer short courses/training workshops on topics of interest to IGAC, WMO/GAW (participants to include professionals from universities, research projects, and monitoring programs)

The "academic capacity building" process is an extremely challenging opportunity and one that is long term in nature. The intent of ACE^{ED} will be to develop a strategic plan which outlines a methodical approach for identifying the incremental steps to be taken in pursuit of basic goals of the program. In this context the establishment of a *Volunteer Teaching Corps* is an important first step in the ACE^{ED} strategic plan and essential component of the capacity building activity (see Call for Volunteers on p. 8 of this issue of IGAC*tivities*).

Through the coordination of IGAC, START, WMO/GAW and the Inter-American Institute for Global Change Research (IAI) in a series of workshops under the auspices of the WMO, a plan to design and jointly implement a capacity building program for atmospheric chemistry in developing countries has been prepared. The goal of this effort is to provide an integrated approach to academic capacity building in atmospheric and environmental chemistry in cooperation with multinational research/monitoring/assessment programs with the participation of the international *Volunteer Teaching Corps* of scientists.

Short Term Objectives (1995-1996)

- Initiate implementation of a *Volunteer Teaching Corps* of scientists through a recruitment under the auspices of the American Geophysical Union (AGU) and the International Union of Pure and Applied Chemistry (IUPAC).

- Establish a steering committee responsible for the development of curricula and courses designed for:
  - Training professionals/researchers/teachers from the physical sciences in atmospheric chemistry as it relates to global change processes, environmental quality and related research monitoring and assessment activities;
  - Training science faculty interested in introducing atmospheric chemistry and its related areas into the undergraduate program.

- Convene workshops for selected members from the *Volunteer Teaching Corps* to define course offerings for designated programs and develop detailed outlines of course content.

- Implement an academic capacity building pilot project in Latin America (see short-course announcement on p. 9 of this issue of IGAC*tivities*)

- Prepare a proposal for submission to an international funding agency to fully implement a global education and training program in atmospheric chemistry.

Long Term Objectives (1997 and beyond)

- Establish atmospheric chemistry programs at the undergraduate level at universities in developing countries

- Develop career opportunities at all professional levels within the multinational research/monitoring/assessment programs that are operational in developing countries

- Design and conduct training workshops for the WMO/GAW program responsive to the research and operational support needs for professional and technical personnel in developing countries.

- Develop and offer short courses and training workshops on topics of interest to IGAC and WMO/GAW (participants include professionals from universities, research projects, and monitoring programs).

- Prepare a proposal for submission to an international funding agency to establish education and training programs in environment/air pollution chemistry for developing countries.

New IUPAC Recommendations for Atmospheric Chemistry Units

The International Union of Pure and Applied Chemistry (IUPAC), Division of Applied Chemistry, Commission on Atmospheric Chemistry has published a new set of recommendations for the use of units in atmospheric chemistry:

Schwartz, S.E., and P. Warneck, Units for use in atmospheric chemistry (IUPAC recommendations 1995), *Pure & Appl. Chem.*, **67(8/9)**, 1377-1406, 1995.

Synopsis This document examines the utility and suitability of the International System of Units (Système International, SI) as a framework for units in atmospheric chemistry and presents recommendations regarding use of these units in reporting atmospheric chemistry data consistent with the special requirements of this subdiscipline. In general, SI is well suited for application to atmospheric chemistry; specifically the wide range of magnitudes that are encountered can be dealt with by the prefixes denoting multiples and submultiples of units, and the application of SI units leads automatically to consistency in unit calculus. The use of special names and symbols for units that are not part of the SI, and are not products of powers of SI base units is discouraged; examples are atmosphere, Dobson unit, hectare. However, continued use of such units (especially the Dobson unit) alongside SI units is advisable for a time until the SI units become more familiar. Local abundances of substances in air may be expressed as mixing ratios or concentrations. Mixing ratio has the advantage of being independent of pressure or temperature, but concentration has advantages for reaction kinetics and material transport. Amount-based units for mixing ratios or concentrations of substances of known chemical composition are preferable to mass-based units. The dimensionless unit mol per mol of air is recommended for mixing ratio of a substance in air, e.g. nmol/mol, rather than the customary parts per billion (ppb). It is necessary to specify whether a mixing ratio refers to dry or moist air. Expressing mixing ratios as "reduced concentrations" relative to standard conditions of pressure and temperature leads to ambiguity and should be avoided where possible. Gas-phase concentrations may be expressed on the basis of either mole ($mol\ m^{-3}$) or molecule ($molecule\ m^{-3}$; $SI\ m^{-3}$). The universal use of a single set of units for gas-phase concentration does not seem forthcoming in the immediate future, although the use of $mol\ m^{-3}$ affords advantages of consistency and convenience. An extensive table of recommended symbols and SI units for quantities in atmospheric chemistry is presented.

IGAC *tivities* NewsLetter

Edited by Alex Pszenny and Elaine Robbins
Logos by Linda Kubrick
Newsletter requests and change of address information should be sent to:
The IGAC Core Project Office
MIT, Bldg. 24-409
Cambridge, MA 02139-4307
USA

Tel: (617)253-9887
Fax: (617)253-9886
e-mail: erobbins@MIT.edu

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The editors thank C. Dabrowski and H. O'Neil for assistance with preparing IGAC*tivities issue No.1.*

Events

International Project Seeks Volunteer Teachers

Under the auspices of the Global Atmosphere Watch (GAW), a World Meteorological Organization (WMO) program, The International Geosphere-Biosphere Program's International Global Atmospheric Chemistry Project (IGAC) and the Global Change System for Analysis, Research and Training (START), the American Geophysical Union is recruiting an international team of lecturers to help establish atmospheric chemistry programs at universities and training centers in developing countries. GAW, an integral part of the World Climate Program, plays a key role in determining whether the composition of the atmosphere is changing and if so, how, where, and in what ways. GAW's primary focus is on atmospheric chemistry.

The new *Volunteer Teaching Corps* will help build the capacity for atmospheric chemistry in developing countries. The volunteers also will work to establish long-term co-operative arrangements with academic global research and monitoring programs, and professional societies.

The lecturers will teach for 2-4 weeks at a given location and then turn the class over to another lecturer. Although lecturers will receive no honorarium, they will be reimbursed for travel and per diem.

Lecturers will be chosen by a committee comprised of representatives from GAW, IGAC, and START in collaboration with the Inter-American Institute for Global Change Research (IAI).

The U.S. National Science Foundation and the IAI have granted funds for the first courses to be taught in Latin America. To volunteer, send in the information requested below to:

American Geophysical Union
2000 Florida Ave, NW
Washington, DC 20009, USA
Attn.: Dr. Eugene W. Bierly, Director, Education & Research
Fax: (+1-202)328-0566 E-mail: ebierly@kosmos.agu.org

International Program for Training of Atmospheric Scientists

Yes, I am interested in participating as a volunteer teacher in the international program for the training of atmospheric scientists and provide the following information which will be added to the data base related to this activity.

Name: .....
Affiliation: .....
Address: .....
.....
Telephone: .....
E-mail address: .....
Areas of Experience in which participation as a course instructor/lecturer is possible: .....
.....
.....
Relevant Teaching Experience: .....
.....
.....
Language Abilities: .....
.....
Time Periods during the year when your availability is most convenient to you and to your employer (please name months): .....
.....
Areas of the world in which you would be prepared to instruct: .....
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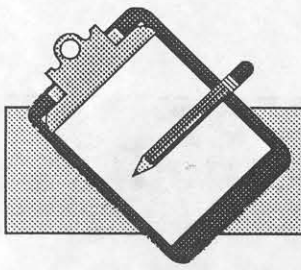


Announcements

Short Course For Latin American Scientists on PHOTOCHEMICAL AIR QUALITY MODELING UNIVERSITY OF CHILE, SANTIAGO, CHILE 20-31 MAY 1996

IGAC's Atmospheric Chemistry and Environmental Education in Global Change (ACE^{ED}) Activity, the InterAmerican Institute for Global Change Research (IAI), The Global Change System for Analysis, Research and Training (START), The American Geophysical Union (AGU), and the World Meteorological Organization's Global atmospheric Watch (GAW) will sponsor a two week Advanced Study Short Course for Latin American Scientists, given by members of ACE^{ED}'s Volunteer Teaching Corps. Funds are expected to be available to cover partial travel and per diem costs for all participants.

General topics:

- Fundamental process components of air quality simulation models
- Overview of operational approaches used in ozone air quality management
- Description and application of photochemical models
- Fundamentals, description, and applications of observationally-based modeling approaches

There will be space for 20 participants. The course will be conducted in English.

To apply, please complete the form below and send it to:

Caroline J. Gilman, American Geophysical Union 2000 Florida Avenue, N.W
Washington, DC 20009-1277, USA
Tel: (+1-202) 939 3220. Fax (+1-202) 328 0566
E-mail:gilman@kosmos.agu.org

APPLICATION FOR COURSE

Name:.....
Adress:.....
.....
Telephone:.....
Fax:.....
E-mail address:.....
Highest academic degree:.....
University/Institution:.....
Year:.....
Academic background (courses, thesis or dissertation title):.....
.....
.....
Professional Experience:.....

Please Return this form by 15 November 1995 to
Caroline J. Gilman, American Geophysical Union, 2000 Florida Avenue, N.W.
Washington, DC 20009-1277, USA
Tel: (+1-202) 939 3220, Fax (+1-202) 328 0566, E-mail: cgilman@kosmos.agu.org

Announcements (Continued)

Fourteenth International Conference on
Nucleation and Atmospheric Aerosols
26-30 August 1996
Helsinki, Finland

Sponsors and Supporting Organizations:

International Association of Meteorology and Atmospheric Sciences (IAMAS)
International Commission on Clouds and Precipitation (ICCP)
Committee on Nucleation and Atmospheric Aerosols (CNAA)
University of Helsinki, Department of Physics
Finnish Meteorological Institute
Finnish Association for Aerosol Research (FAAR)
Lahti Research and Training Centre
International Global Atmospheric Chemistry Project (IGAC)

This Conference is one of a series held regularly at three to four year intervals. The Nucleation Symposium 1996 will be held jointly with the Conference.

Conference Co-Chairs:

M. Kulmala, Finland
P.E. Wagner, Austria

Preliminary Scientific Program:

1 **Fundamental processes of nucleation and condensation**
Homogeneous, heterogeneous and ion induced nucleation, cluster formation and properties, condensation and evaporation, heat and mass transport, experimental, theoretical and numerical investigations, studies on single and multi-component systems.

2 **Cloud droplet nucleation in the atmosphere**
CCN and aerosol size distributions, origin, composition, spatial and temporal variation of CCN, experiments, theoretical formulations.

3 **Ice nucleation in the atmosphere**
Detection, observed modes and the mechanisms of activity, origin, composition, spatial and tempo-

4 **Chemical and physical properties of atmospheric aerosols**
Aerosol number concentrations, size, composition and hygroscopicity distributions, aerosol dynamics models, experimental evidence concerning physico-chemical properties and chemical reactions.

5 **Aerosol-climate interactions**
Direct and indirect effects of atmospheric aerosols, field experiments, numerical simulations

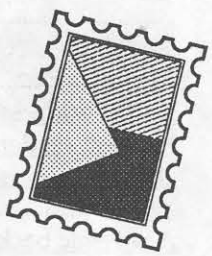
6 **Methods and instrumentation for atmospheric aerosol measurements**
Methods for determining physico-chemical properties of atmospheric aerosols, development of instrumentation, comparison of different instruments

7 **General aspects of atmospheric aerosols and nucleation**
Investigations concerning general aspects of atmospheric aerosols and nucleation

Call for Papers

One page abstracts of papers to be presented at the Conference should be submitted along with the accompanying form by 30 September 1995 to:

M. Kulmala
Department of Physics
University of Helsinki
P.O. Box 9
FIN-00014 Helsinki
FINLAND
Tel: (+358) 0 191 8308
Fax: (+358) 0 191 8680
Email: kulmala@phcu.helsinki.fi



14th International Conference on Nucleation and Atmospheric Aerosols
Helsinki, Finland, 26-30 August 1996
Preliminary Form

Name (print or type):
( )Prof. ( )Dr. ( )Ms./Mr. _____

Address: _____

_____

_____

Phone: _____ Fax: _____

Email: _____

- ( ) I do not plan to present a paper. ( ) I plan to present a paper in the area of:

  ( ) Fundamental processes of nucleation and condensation
  ( ) Cloud droplet nucleation in the atmosphere
  ( ) Ice nucleation in the atmosphere
  ( ) Chemical and physical properties of atmospheric aerosols
  ( ) Aerosol-climate interactions
  ( ) Methods and instrumentation for atmospheric aerosol measurement
  ( ) General aspects

- I ( ) shall, ( ) shall not be in need of travel grant support to attend the Conference
- I ( ) am, ( ) am not interested in participating in a tour to
  1. ( ) St. Petersburg
  2. ( ) Lapland
  3. ( ) Talinn, Estonia

Announcements (Continued)

CALL FOR PAPERS:
OPEN MEETING ON THE IGBP NORTHERN EURASIA STUDY
Tsukuba, Japan
28 November - 1 December 1995

The Environment Agency of Japan, the Japanese National Institute for Environmental Studies, and the IGBP are sponsoring an open meeting on the proposed IGBP Northern Eurasia Study. The unifying theme of the Study is the terrestrial carbon cycle in the Northern Eurasian region. The Study's most important overall objective is to determine how this cycle will be affected by global change, and how the consequent alterations to the cycle will feed back to further change.

The objectives of the Open Meeting are: (i) to introduce the prospectus for the Study, developed at an initial planning workshop held in Stockholm in November 1994, to the broader scientific community, and (ii) to get input from the broader community to improve and refine the science plan as outlined in the prospectus.

We invite papers from interested scientists to be presented at the Open Meeting. The four major themes of the meeting (relating to Northern Eurasia) are:

- Water, energy and carbon exchange
- Trace gas emissions
- Ecosystem studies: impacts and feedbacks
- Land-use/cover change

The papers should focus on the interactions and cross-links between these themes, and should address an aspect of the overall goal of the Study.

Abstracts should be one page or less in length, and should include a contact name, postal and Email addresses, and telephone and fax numbers.

Abstracts should be sent to:

Gen Inoue
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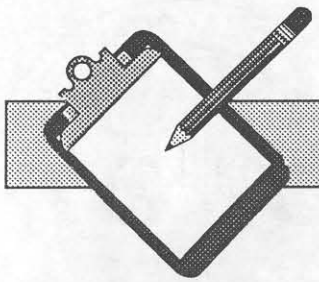
DEADLINE FOR RECEIPT OF ABSTRACTS IS 20 OCTOBER 1995



Announcements (Continued)

CALL FOR PAPERS
INTERNATIONAL WORKSHOP ON NO_X EMISSION FROM SOILS AND ITS INFLUENCE ON ATMOSPHERIC CHEMISTRY

National Institute of Agro-Environmental Sciences
Tsukuba, Japan
March 4-6, 1996

Under the auspices of IGAC, the Science and Technological Agency of Japan and the National Institute of Agro-Environmental Sciences are sponsoring an International NOx Workshop. The purpose of this Workshop is to integrate existing field and laboratory studies on NO and N_2O emission from soils in the world, and to make clear what we know about NO production and consumption processes and their controls. We also want to clarify what is known about the ratio of NO to N_2O emissions in different ecosystems and the quantity of NO_X emitted regionally and globally. Using the current understanding of NO_X emissions from soils can we evaluate the impact of soil NO_X emissions on regional and global atmospheric chemistry?

We invite papers, to be presented as posters, from scientists who are conducting research concerning soil NO_X emissions and their interaction with the biosphere, or on other topics directly related to the purpose of the Workshop. If you are interested in participating please contact either:

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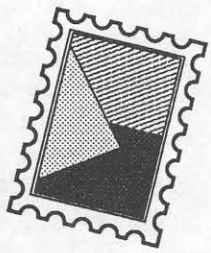

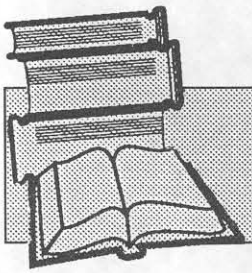

Publications of Interest to the IGAC Community

Matson, P.A., and R.C. Harriss (eds.), Biogenic Trace Gases: Measuring Emissions from Soil and Water, Blackwell Science, Oxford, 394 pp., ISBN 0-632-03641-9, 1995.

Prinn, R.G. (ed.), Global Atmospheric-Biospheric Chemistry, Plenum Press, New York, 261pp., ISBN 0-306-44884-X, 1994.

Schwartz, S.E., and P. Warneck, Units for use in atmospheric chemistry (IUPAC recommendations 1995), *Pure & Appl. Chem.*, **67(8/9)**, 1307-1406, 1995.

Singh, H.B. (ed.), Composition, Chemistry, and Climate of the Atmosphere, Van Nostrand Reinhold, New York, 592 pp., ISBN 0-442-01264-0, 1995.