IGACtivities NewsLetter
of the International Global Atmospheric Chemistry Project

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In this Issue

A Note from the IGAC Chair

Guy Brasseur

An Overview of Past and Future Activities

Among the most visible perturbations to the Earth system as a result of human activities (change in land-use, industrial and domestic activities) are the well documented changes in the chemical composition of the atmosphere (i.e., the ozone hole, increasing concentrations of greenhouse gases, tropospheric pollution, acid precipitation, etc.). The abundance and the global budget of chemically active gases depends not only on complex *in situ* photochemical and transport processes, but also on surface exchanges, and especially emission and deposition processes. The goal of IGAC is to study and quantify these processes, and specifically to assess the role played by biological processes such as photosynthesis and respiration, and microbial activities in soils and wetlands.

Several approaches are possible to address these questions. In the past, IGAC has sponsored a large number of field campaigns which contributed to a better understanding of key Earth system processes. For example, the 1992 *Southern Africa Fire-Atmosphere Research Initiative* (SAFARI-92) conducted jointly with the NASA-sponsored *Transport and Atmospheric Chemistry near the Equator - Atlantic* (TRACE-A) experiment, as well as the recently completed *Experiment for Regional Sources and Sinks of Oxidants* (EXPRESSO) campaign provided unique information about the prominent role played by vegetation fires in the tropics as a source of atmospheric pollutants. (A brief "field report" on EXPRESSO appears later in this issue of IGAC*tivities*.) Missions such as the IGAC-sponsored *North Atlantic Regional Experiment* (NARE) campaigns were able to analyze the chemical fate over the North Atlantic of anthropogenic gases (including ozone precursors) which are emitted in North America. Similarly, the *Pacific Exploratory Mission - West* (PEM-West) and the *Mauna Loa Observatory Photochemical Experiment* (MLOPEX) examined the influence of photochemical processes on the ozone distribution in the Pacific region. The *Southern Hemisphere Aerosol Characterization Experiment* (ACE-1) as well as the *Atlantic Stratocumulus Transition Experiment-Marine Aerosol and Gas Exchange* (ASTEX-MAGE) campaigns investigated air-sea exchanges and the

interactions between clouds and aerosols. Radiative effects of aerosols were investigated through the *Tropospheric Aerosol Radiative Forcing Observational Experiment* (TARFOX) off the east coast of North America. The *Polar Sunrise Experiment* (PSE) was aimed at better understanding the role of marine halogens and chemical destruction of tropospheric ozone at sunrise.

Field campaigns will continue to be supported by IGAC in the future. For example, the *North Atlantic Regional Aerosol Characterization Experiment* (ACE-2), which will take place this coming summer in the eastern subtropical North Atlantic, will extend the studies performed during ACE-1 and TARFOX with emphasis on the anthropogenic perturbations from the European continent in combination with dust from the African Sahara. Other campaigns are currently being discussed or planned, including a new ACE study in the region of the western North Pacific (influence of Asian emissions) and another in eastern Europe. Strong IGAC participation in the *Large-Scale Biosphere-Atmosphere Experiment in Amazonia* (LBA) is also anticipated.

Among other activities being developed are several networks that have been initiated or are being supported by IGAC. This is the case of the *U.S. Trace Gas Network* (TRAGNET), which is designed to document contemporary surface fluxes of CO_2, CH_4, and N_2O between regionally important ecosystems and the atmosphere. Other surface flux studies are being planned as part of the *IGBP Terrestrial Transects*. Plans for some Transects are already advancing (see, e.g., the item on SCANTRAN later in this issue), while plans for others are just being initiated (see *Announcements* section). In close cooperation with the WMO *Global Atmospheric Watch* (GAW), we are also working towards beginning a two-year intensive survey of the distribution of tropospheric ozone, the *International Tropospheric Ozone Years* (ITOY), at the turn of the century.

A very important aspect of IGAC is the building of capacity for atmospheric-biospheric chemistry research, especially in developing countries. Implementation of our *Atmospheric Chemistry and Environmental Education in Global Change* (ACE^{ED}) Activity began in 1995 with a series of Short Courses to address specific needs in Latin America. The "lead" feature in this issue of IGAC*tivities* describes the outcome of this beginning effort.

Finally, IGAC is cosponsoring and helping to organize several important scientific meetings around the world during 1997. One of them is an international conference on *Global Measurement Systems for Atmospheric Composition*. This meeting, sponsored by IGAC in cooperation with the World Climate Research Program's *Stratospheric Processes and Their Role in Climate* (SPARC) Project and WMO/GAW, will be held in Toronto, Canada in May. The purpose of the conference will be to discuss the best approaches to monitor the chemical composition of the atmosphere on the global scale, with emphasis on space-based techniques which will play an increasingly important role in our scientific disciplines. The *Fourth IGAC Scientific Conference* will take place in Melbourne, Australia, in July as part of the IAMAS/IAPSO Joint Assemblies on "Earth-Ocean-Atmosphere: Forces for Change". And our Japanese colleagues are organizing an IGAC-sponsored international symposium on *Atmospheric Chemistry and Future Global Environment*, to be held in Nagoya in November. Details on these and other meetings are provided later in this issue.

Features

Capacity Building in Atmospheric Chemistry

Contributed by E.W. Bierly and C.J. Gilman, American Geophysical Union, USA; E. San Roman, Universidad de Buenos Aires, Argentina; R. Morales, Universidad de Chile; and T. Tavares, Universidade Federal da Bahia, Brazil

Some years ago it was recognized by several international research programs that there was great need for people who understood atmospheric chemistry. Simultaneously, there was a recognition within the Global Atmosphere Watch (GAW) program of the World Meteorological Organization (WMO) that atmospheric chemists would be needed to assure that the measurement and observational activities at its newly constructed baseline stations were carried out correctly. In addition, there was recognition that in order to carry out the various analyses that are needed, well trained and educated atmospheric chemists would be required in the countries where these new stations were located. All six of the stations except the station built on the Tibetan plateau were in

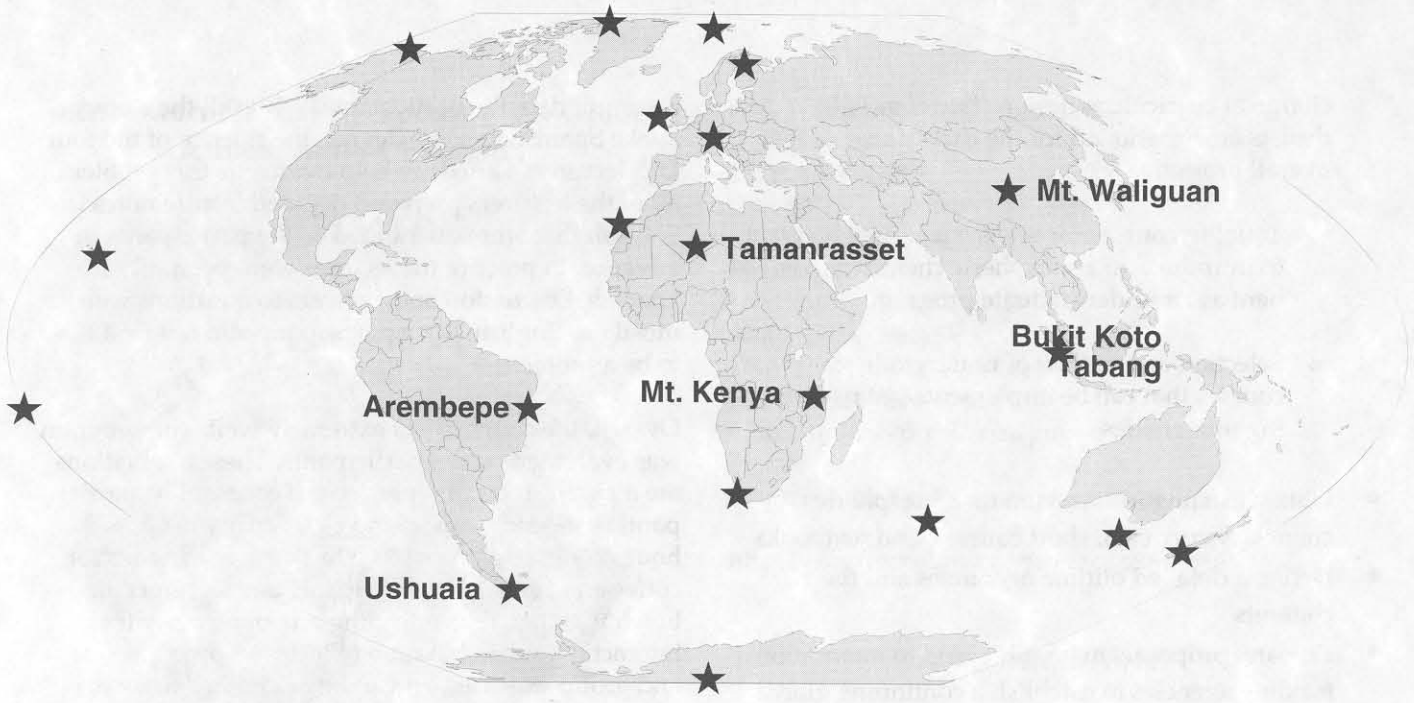

Figure 1. Map showing locations of WMO/GAW baseline stations. The six new stations are labelled.

countries where there was little, if any, capability to carry out the required program. See Figure 1 for the location of the stations.

The American Geophysical Union (AGU) decided after consultation with personnel from the International Geosphere-Biosphere Program's (IGBP) START (SysTem for Analysis, Research, and Training) Secretariat, IGAC and IGAC's Atmospheric Chemistry and Environmental Educational in Global Change (ACE^{ED}) Activity, WMO's GAW, and the International Union of Pure and Applied Chemistry (IUPAC), to request funds from the U.S. National Science Foundation (NSF) to run an experiment in Latin America where two of the new GAW baseline stations were being built. The experiment was to give short courses in subjects that were of great need for operators and managers of the stations in an effort to entice personnel into the system and then try to keep them involved through graduate and undergraduate education. The proposal was funded by the Atmospheric Chemistry Program in the Atmospheric Sciences Division and the Inter-American Institute (IAI) for Global Change Research. At the first meeting of the Steering Committee, when scientists from South America came to talk about courses and their content, it became apparent that any such course would draw many university students and faculty who wanted to add atmospheric chemistry to their knowledge base or to courses already being taught in environmental sciences, chemistry, physics, materials science, etc. It also became clear that such courses would attract personnel who had regulatory and management responsibilities. Finally, it was decided to provide courses that were needed not only in support of the GAW, but in support of the many and varied needs of programs in atmospheric chemistry. Thus ACE^{ED} could play a much greater role than had been previously thought.

The general formats for the courses were developed by experts in the U.S. with help from scientists in South America. The AGU and IUPAC advertised for atmospheric chemists who would be willing to travel and teach for several days or even up to a month or more. This *Volunteer Teaching Corps* has grown to 182 scientists. The concept was to use these volunteers to teach the courses, pay them for their travel and per diem, and provide travel and per diem support for the participants of the courses also. This was what did occur.

The continuing goal of this effort is to develop an integrated approach to academic capacity building in atmospheric chemistry in cooperation with multinational research, monitoring, and assessment programs with the participation of an international cadre of volunteer scientists. Its specific objectives are to:

- Coordinate international recruitment efforts
- Establish and maintain a Steering Committee in

charge of curriculum design. Two closely linked thrusts are envisioned for the early phase of the overall project:

⇒ Training courses for science faculty who want to introduce an atmospheric chemistry component as an undergraduate program

⇒ Selection and outline of undergraduate courses that can be implemented at participating universities

- Obtain existing information on atmospheric chemistry curricula, short courses, and textbooks
- Define a detailed outline of courses and their contents
- Prepare proposals to be submitted to international funding agencies to establish a continuing global education and training program in atmospheric chemistry

This capacity building effort was first implemented in Latin America as an experiment to see if it were feasible to carry out such an endeavor. To date there have been three short courses given under the auspices of this program. Summaries of the three follow.

Buenos Aires, Argentina

The first IGAC ACE^{ED}/GAW short course was held at the Instituto de Quimica Fisica de los Materiales, Medio Ambiente y Energia (INQUIMAE) at the Universidad de Buenos Aires, from 30 October to 10 November 1995. The course, organized and taught by atmospheric chemists, physicists and meteorologists from Argentina and the United States, focused primarily on atmospheric chemistry measurements and instrumentation. The organizers included some background study of atmospheric chemistry to help students understand why such measurements are needed and useful. The syllabus covered topics related to basic atmospheric chemistry processes, instrumentation, and interpretation of atmospheric chemistry data. The course outline is shown in Table 1.

There were 35 participants from Argentina, Brazil, Chile, Costa Rica, Peru, Uruguay, and Venezuela. The group included graduate students, technicians, postdocs, and university teachers all of whom wanted to know or had a need to know more about atmospheric chemistry. Differences in the participants' background knowledge made teaching the course a challenge.

In planning the course, there were some concerns about language. The ACE^{ED}/GAW Steering Committee decided that the course should be taught in Spanish to accommodate the participants. While all the lecturers spoke Spanish to some degree, the fluency of the four U.S. lecturers varied. To help overcome this problem, all of the lecturers prepared detailed lecture notes in Spanish that were distributed to the participants in advance. In practice the lectures were primarily in Spanish. Discussion and answers to questions were mostly in English. Most participants did not find this to be a problem.

Overall, the course went extremely well. The program was evaluated by the participants. These evaluations are a part of the full report on the course. The participants were enthusiastic and eager to learn. Class hours were long, from 09.00 to 17.00 with breaks for coffee and lunch. All participants and lecturers ate lunch together, thus affording an opportunity for interaction. A combination of lectures, problem sets and group exercises, and some laboratory work was used in the course.

Of special interest to the participants were the segments in which course participants with some experience in atmospheric chemistry made presentations. Those participants were asked to present a short overview of their work. Hearing and knowing about ongoing activities in South America was extremely beneficial to the class. More time should have been scheduled for such presentations. The participants also enjoyed problem solving exercises, especially those involving group participation. The laboratory/instrumentation work was restricted due to the availability of a limited number of instruments.

A supplemental grant from the IAI and the grant from NSF provided support for the participants' travel and per diem expenses. The NSF grant also paid travel and expenses for the lecturers.

Santiago, Chile

The second ACE^{ED}/GAW short course was held at the Center of Environmental Chemistry of the Universidad de Chile in Santiago, Chile, 3-14 June 1996. The course focused primarily on "Photochemical Air Quality Modeling". The organizers and lecturers were physical and atmospheric chemists, mathematicians, and statisticians. The syllabus covered topics related to photochemistry and modeling, air quality assessment, and atmospheric chemistry. The course outline is shown in Table 2.

The 31 course participants came from Argentina, Brazil, Chile, Costa Rica, Cuba, Mexico, Peru, Uruguay, and Venezuela. This group was similar to that in the first short course in its variation of professional levels. It included graduate students, technicians,

Table 1. Outline for the Buenos Aires Short Course

I. Introduction and descriptive atmospheric chemistry
   A. Statement of the "problem" - Local, regional and global influences on the atmosphere by human activities: Examples - urban air pollution, global CH_4, CO_2, and CFC increases, stratospheric O_3 loss
   B. Atmospheric fundamentals, thermal and pressure structure, the natural atmosphere, role of OH, units
   C. Know your pollutants: Sources, sinks and lifetimes for some of the most important species (e.g. CO, CH_4, NMHCs, NO_X, O_3, SO_2, PM-10, Pb)
   D. Global biogeochemical cycles (e.g. C, O, N, S)
   E. Rationale for measuring pollutants: Developing scientific hypotheses, monitoring for trends, human health effects, and ecosystem damage as input to environmental decision-making

II. Overview of the measurement system
   A. Sampling
   B. Measurements

III. Spectroscopic measurement techniques
   A. Absorption spectroscopy, Beer-Lambert law, applications and limitations
   B. Emission spectroscopy

IV. Aerosol and precipitation chemistry
   A. Importance of aerosol and precipitation chemistry: human health issues and ecosystem impacts
   B. Aerosol chemistry
   C. Precipitation chemistry: All of the above techniques plus pH and conductivity

V. Important meteorological concepts to interpret chemical measurements
   A. The atmospheric boundary layer
   B. Synoptic patterns
   C. Local and regional flow
   D. Back-trajectory calculations

VI. Data assessment I - answering scientific questions with atmospheric chemical data

VII. Gas chromatography
   A. General principles
   B. Sampling
   C. Specific detectors:
   D. *In-situ* continuous measurements vs. collection methods Examples - contribution of natural NMHCs to urban smog and/or quantifying natural emissions of NMHCs; measurements of tailpipe CO with GC-TCD and the typical distribution of automotive CO emissions (10% of the cars put out more than 50% of the CO) .

VIII. Computerized data acquisition
   A. Advantages, sampling rates, common problems
   B. Specific equipment

IX. Fundamentals of QA/QC
   A. Data quality objectives (accuracy, precision, completeness, comparability and representativeness)
   B. Calibration principles
   C. Reference methods
   D. Intercomparisons (examples)

X. Data assessment II - Using atmospheric chemistry measurements to answer specific questions

post-docs, and advanced scientists. Some of the participants have regulatory responsibilities in their countries and a real need for operational knowledge on the subject.

The second course was taught in English with time set aside for question and answer sessions to aid in communications and understanding. Participants without a good understanding of English worked with others. This stimulated exchange and actually enhanced participation. Nevertheless, it is clear that these courses need to have lecturers who have dual or multiple language capability since the details of a subject often are only truly understood when presentations and answers to questions are made in the participants' native tongue.

Each participant returned to his/her home country with over a thousand pages of lecture notes and related materials plus documentation/user's guides

Table 2. Outline for the Santiago Short Course

I. Photochemical aspects of air quality modeling
   A. Photochemistry of atmospheric species
   B. Theoretical and experimental determination of solar actinic flux and of photolytic rate constants
   C. Principals of chemical kinetics and laboratory studies of atmospheric reactions
   D. Smog chamber experimentation and its role in chemical mechanism development
   E. Chemistry of nitrogen oxides
   F. Chemistry of volatile organic compounds and natural hydrocarbons
   G. Reactivity scales and characterization of ozone production capacity in the atmosphere
   H. Explicit and condensed mechanisms of the chemistry of polluted atmospheres
II. Emission inventories and air quality modeling
   A. Overview of the distribution of precursor emissions
   B. Basic principals in emission inventory development
III. Air quality observations and their role in urban AQ modeling
   A. Initial and boundary conditions
   B. Performance testing and evaluation
IV. Meteorological observations and their role in urban AQ modeling
   A. Meteorological observations: Surface and upper air
   B. Objective wind field analysis approaches
   C. Mixed layer heights
V. Fundamental process components of air quality simulation models
   A. Carbon Bond IV vs. RADM2 chemical modules
   B. Photolytic and temperature dependent rate constants
   C. Dry deposition
   D. PBL dynamics
VI. An overview of operational approaches used in ozone AQ management
   A. EKMA
   B. Urban Airshed Model
   C. Regional oxidant models
VII. Description and application of a photochemical box model (PBM)
   A. PBM formulation and process modules
   B. Preparation of meteorological and air quality/emissions data files for the PBM
   C. Example applications of the PBM
   D. Analysis of results and performance evaluation techniques
VIII. PBM applications laboratory
   A. Hands on application of the PBM
   B. Sample applications developed from data sets provided by participants
   C. Analysis of results
IX. Fundamentals of observational based modeling approaches
   A. Blanchard and Roth approach
   B. Chang and Suzio approach
   C. Correlation analysis techniques
X. Description and application of an observational based modeling approach with laboratory

for computer codes and ten floppy disks containing copies of all codes used in the course. These materials reflect research and development efforts that have evolved over more than a ten year period. It is expected that these materials will be integrated into course offerings to be developed by the participants at their home institutions. The course was designed as a prerequisite to a follow-on course envisioned to be given on 3-D urban/regional scale photochemical air quality simulation modeling systems. Several course participants inquired about the possibility of presenting the present course and the proposed follow-on course in their respective countries. This course also was evaluated by the participants and, again, the details are a part of the full report on the course.

The NSF grant provided funds for this course that included participants' and lecturers' travel and per diem expenses. The WMO contributed funds to assist with local expenses. The Universidad de Chile provided computer laboratory and lecture space, computers, and logistical support.

Table 3. Outline for the Salvador Short Course

I. Introduction and descriptive atmospheric chemistry
   A. Statement of the "problem" - Local, regional and global influences on the atmosphere by human activities: Examples - urban air pollution, global CO_2, CH_4, and CFC increases, stratospheric O_3 loss
   B. Know your pollutants: sources, sinks and lifetimes for some of the most important species, e.g., CO, CH_4, NNMCs, NO_X, O_3, SO_2, PM-10, Metals)
   C. Atmospheric fundamentals, thermal and pressure structure, the natural atmosphere, role of OH, units
   D. Global biochemical cycles (e.g. C, O, N, S)
   E. Rationale for measuring pollutants: Developing scientific hypotheses
   F. Setting up atmospheric monitoring networks: For trends, human effects, ecosystem damage and as input to environmental decision making

II. Sampling atmospheric components
   A. The heterogeneous atmospheric system (gas, particles and liquid)
   B. *In situ* measurements vs. collection techniques (time vs. spatial resolution; preconcentration, filters, adsorption tubes, cryotraps, continuous measurements, etc.)
   C. Calibration and awarding errors in operation of gas monitors
   D. Errors in sampling and chemical analysis
   E. Quality assurance / quality control

III. Measurements
   A. Spectroscopic measurement techniques
   B. Chromatographic measurement techniques
   C. HPLC
   D. Ion chromatography

IV. Important meteorological concepts in interpreting chemical measurements
   A. The atmospheric boundary layer
   B. Synoptic patterns
   C. Local and regional flow
   D. Back-trajectory calculations

V. Data assessment: Answering scientific questions with atmospheric chemical data

Salvador, Bahia, Brazil

The third ACE^{ED}/GAW short course was held at the Universidade Federal da Bahia (UFBa) in Salvador, Bahia, Brazil, 4-15 November 1996. This course was a refinement of the first course on "Instrumentation and Measurement Methodologies in Atmospheric Chemistry." The syllabus followed closely the Buenos Aires course of 1995, but provided a great deal more laboratory and experimental opportunities. About two thirds of the course consisted of laboratory and field work, a significant part of which was taught by local university staff and graduate students. The course outline is shown in Table 3.

The participants were very enthusiastic about the course and did not mind the long hours. Course evaluation substantiates that attitude. The lecturers were atmospheric chemists (analytical or physical chemists) and meteorologists. The 26 course participants came from Argentina, Brazil, Chile, Costa Rica, Mexico, Indonesia, Kenya, and Puerto Rico. Once again, there was a wide variety of professional levels ranging from technicians to university professors. Three of the participants are working at GAW stations in Kenya, Indonesia, and Argentina. Three local participants are working on their Ph.D. theses connected with the Brazilian GAW Station at Arembepe. The third course was conducted totally in English.

The NSF grant and a new Inter-American Institute grant to the AGU provided support for the participants. The WMO contributed funds to assist with local expenses. IUPAC and the NSF grant paid for travel and per diem expenses of the teachers.

Future Courses

Both participants and teachers want more of these courses to be taught. There is a great need to provide similar courses near the recently built GAW stations in Indonesia, Algeria, and Kenya. Continuation is, of

course, subject to the availability of funds. The AGU and ACE[ED] and their cooperating participants are exploring mechanisms to provide necessary funding.

Acknowledgments

The authors acknowledge the support of the National Science Foundation, the Inter-American Institute, the World Meteorological Organization, and the many persons who are unnamed who have given their time and energy to the successful completion of these courses. Special thanks go to K. Demerjian, Chair of ACE[ED]; V. Mohnen and J. Calvert the driving forces who saw that this activity was put together and made to work; J. Miller, who helped greatly with funding from the WMO and who aided in making the interface with GAW real; and the lecturers who truly made the courses happen.

The EXPeriment for REgional Sources and Sinks of Oxidants (EXPRESSO)

Contributed by A. Guenther, National Center for Atmospheric Research, USA and R.A. Delmas, URA/CNRS Laboratoire d'Aerologie, France

EXPRESSO is designed to investigate processes controlling chemical composition of the tropical troposphere above Central Africa and consider the impact on the global atmosphere. The *Dynamique et Chimie Atmosphérique en Forêt Equatoriale* (DECAFE) studies in the 1980's established that this region exhibits some of the most dynamic, yet poorly understood biosphere-atmosphere interactions on Earth. Biomass burning, ubiquitous in African savanna, exerts a dominant influence on ecology and atmospheric chemistry. Fluxes of reactive biogenic trace gases are concentrated in tropical land areas. The high surface fluxes observed in the tropics are likely to influence the global atmosphere due to strong vertical mixing. The impact of human activities on trace gas fluxes in the tropics is significant (e.g., biomass burning, deforestation) and is expected to increase due to the current high rates of population growth. EXPRESSO is an international and multidisciplinary effort to quantify and better understand the processes controlling surface fluxes of photochemical precursors along a tropical forest-to-savanna gradient. EXPRESSO is expected to result in improved surface trace gas emission sub-models for Central Africa that can be incorporated into global Earth system models. In addition, EXPRESSO measurements will be used to evaluate and improve our understanding of the production and loss of tropospheric oxidants within this region.

Preliminary experiments were completed in March 1996, the major field intensive was conducted in November and December 1996 and additional measurements are planned for 1997. Because the experiment is still in progress, a detailed description of the results is not yet available. Additional information and future updates are available on the WWW site: http://www.insu.cnrs-dir.fr/Documentation/Insu_doc/expresso.html

The EXPRESSO domain extends from the savannas of the Central African Republic (CAR) in the north (8° N) to the tropical forests of the Republic of Congo (2° N) in the south. The French ARAT research aircraft (Fokker 27) flew 10 missions out of Bangui, CAR, that covered a gradient from tropical forest to savanna. ARAT measurements were focused on one forest and one savanna region (50 X 50 km) with flight plans designed to the study surface fluxes above the canopy and entrainment fluxes at the top of the boundary layer (monsoon layer). Winds, radiation (UV, visible, red, IR), J(NO_2), temperature, H_2O vapor, O_3, CCN, CO, NO, NO_X and NO_Y were measured at a high frequency (1 s to 32 s). Additional filter and cartridge samples were collected for detailed analysis of volatile organic compounds (VOC; C_3 to C_{12}), and aerosols (organic, inorganic). A relaxed eddy accumulation (REA) system was deployed on the aircraft to measure isoprene and CO_2 fluxes. Ozone fluxes were measured by an eddy covariance system onboard the ARAT. A meteorological radar was used in Bangui to follow convection cells over a radius of about 300 km.

A detailed database of the extent of biomass burning in Central Africa during the EXPRESSO experiment was compiled using NOAA-AVHRR data (3 acquisitions per day). In addition to the active fires database, the 3 AVHRR acquisitions per day will be used to quantify the temporal evolution of burned areas and thus to calculate the area burned every day. These data will be used to determine day-to-day variations in biomass burning emissions which will be used to interpret the measured profiles of trace gases.

A landscape VOC emission potential database is being developed based on NOAA-AVHRR data, ground surveys of vegetation type, and a vegetation emission rate database. The vegetation emission rate database contains the major VOC emissions from over 200 dominant vegetation species along the forest-to-savanna gradient. Fluxes estimated with the landscape VOC emission potential database will be compared with the isoprene fluxes measured by the ARAT.

A 60 m walk-up tower was installed at a nearly undisturbed tropical forest site on the edge of the Nouabale-Ndoki National Park in the Republic of Congo in March 1996. The tower provides access to the 45 m high forest canopy and the surface layer above the canopy. The Nouabale-Ndoki National Park and

adjacent forest reserves cover about a million hectares of primary tropical forest, making this region one of the largest protected areas in central Africa. After arriving in the capital of the Congo (Brazzaville), scientists and their equipment had to take a flight on the local airline (900 km), a pirogue (dugout canoe) trip on the Sangha river (90 km), and drive along a dirt track into the jungle (35 km). VOC concentrations and fluxes were measured in March and in November/December field studies. Isoprene was a dominant VOC during both periods. Preliminary results of relaxed eddy accumulation measurements during March indicate that isoprene fluxes from this forest are lower than the fluxes reported for a tropical forest in the Amazon basin. The eddy covariance measurement technique was used to measure isoprene, CO_2, H_2O and sensible heat fluxes. Additional filter and cartridge samples were collected for detailed analysis of VOC (C_3 to C_{12}) and aerosols (organic, inorganic, anion/cation, sulfate).

Foliar mass and species composition were measured in eight transects radiating out from the tower site. Over 130 different tree species were identified. Enclosures were used to measure VOC, H_2O and CO_2 fluxes from a large number of the more important species so that leaf and canopy scale flux measurements could be compared. A temperature and light controlled leaf enclosure was used to study the response of biogenic VOC emissions to changes in environmental parameters. A detailed study of the canopy microclimate was conducted in order to improve canopy environment models needed to scale from individual leaves to entire canopies.

The EXPRESSO field campaigns will be followed by modeling efforts in which model components will be evaluated using the experimental results. Based on the understanding gained from this work, improved sub-models will be developed and implemented in regional and global scale chemistry and transport models.

SCANTRAN: A New IGBP Transect for Scandinavia and Northern Europe

Contributed by J. McConnell, University of Edinburgh, UK

Shifts in the carbon, nutrient and water pools and related trace gas fluxes may have profound implications for both terrestrial resources and atmospheric chemistry in the face of global environmental change. These shifts are currently forecast to be more pronounced at higher latitudes and were reflected in the initiation of SCANTRAN, the IGBP Terrestrial Transect in Scandinavia / Northern Europe, (Koch *et al.*, 1995) at a meeting in Trondheim, Norway sponsored by the Norwegian IGBP Committee, the EU Arctic-Alpine Terrestrial Ecosystem Research Initiative (ARTERI) and the IGBP. SCANTRAN is an important addition to the existing high latitude IGBP Transects in north America and Siberia. The new Transect will extend from the high Arctic into boreal and nemoral forests of southern Scandinavia. SCANTRAN uniquely comprises major east-west gradients in seasonality and precipitation and a wide range of topography, landscapes and land-use patterns. The high density of long established field stations and research institutes in the region will ensure that an integrated research initiative at such a scale can be successfully implemented.

Environmental and biological controls on the spatial and temporal responses of trace gas fluxes to global change are a central theme in SCANTRAN. The ecosystems covered by SCANTRAN are derived from a range of environmental vectors, such as snow cover, permafrost, seasonal temperature and light regimes, with potentially important influences of CO_2 and UV-B enhancement. The climatically induced dynamics are overlain by potentially interacting changes in land use and pollution. The system responses to change are forecast to be apparent in the distribution, performance and dynamics of terrestrial biology and in the resultant effects on carbon balance, trace gas flux and hydrology. These responses are likely to be more pronounced at the interfaces between biomes - the ecotones - as these are climatically determined in the region. The ecotone approach can also be applied at landscape and plot levels as well as regional level. Three main ecotones, continuous-discontinuous vegetation, tundra-boreal forest and boreal-nemoral forest were identified at the Trondheim meeting. Each of these has a series of implications of interest to IGAC.

The change from continuous to discontinuous vegetation and the associated pattern of discontinuous permafrost represent important gradients which are affected by soil characteristics, topography and snow cover as well as the climatic regime. The influence of permafrost on the hydrology and water budget interacts with the vegetation cover and soil texture to determine the depth of the active layer, with feedbacks on trace gas flux, particularly the CO_2 and CH_4 balance. Fine spatial scale responses, methane transfers from different bog types and SAT modelling of soil-atmosphere gas flux at this ecotone could be suitable for inclusion in SCANTRAN.

At both the tundra-boreal forest ecotone and the boreal-nemoral forest ecotone larger scale carbon flux changes could be particularly significant. Potential areas for collaborative research at these two ecotones within SCANTRAN could include:

- CO_2 and CH_4 flux modelling in relation to climate change and the northwards migration of these ecotones.
- Interaction between substrate quality, nutrient

cycles and CO_2 /CH_4 flux.
- N deposition and loss, both gaseous and aqueous.
- Catchment hydrology and N dynamics, especially N_2 and N_2O emissions and feedbacks to climate change.
- Production and volatilization of isoprenes and terpenes from terrestrial systems.

Interactions between climate change and pollution can be important because of the potential changes in permafrost and hydrological conditions in the region. Its proximity to large urban and industrial centers, with potentially high nitrogen and sulfur emissions makes SCANTRAN ideally suited to address pollution issues.

Collaboration between scientific disciplines is essential in order to develop an integrated program which addresses ecosystems in terms of their key biological, hydrological and trace gas dynamics. An open meeting is proposed to be held in Scandinavia before the end of 1997 to discuss the development and implementation of SCANTRAN. The agenda will reflect the priorities identified at the Trondheim meeting:

a) review current research to identify potential models and hypotheses and initiate funding proposals,
b) consider options for development of a Data and Information Centre or System for synthesis of past data on long-term regional changes in climate and cryosphere, vegetation (including palaeoecology), hydrology and atmospheric chemistry and provision of baseline information on geology, topography, soils and vegetation,
c) review existing protocols of methods for potential production of a SCANTRAN manual,
d) develop the social, economic and policy implications, land use, pollution and vertebrate ecology aspects of SCANTRAN.

Further information and copies of the report from the Trondheim meeting can be obtained from Nils Roar Saelthun, NIVA, Box 173, Kjelsas, D411 Oslo, Norway (Fax: +47 22 18 51 21; Email nils.saelthun@niva.no).

Reference

Koch, G.W., Scholes, R.J., Steffen, W.L., Vitousek, P.M. & Walker, B.H. 1995. *The IGBP Terrestrial Transects; Science Plan.* IGBP Report No.36, The International Geosphere-Biosphere Programme, Stockholm, 61pp.

Announcements

IGAC Directory of Atmospheric-Biospheric Chemistry Data

Dear Colleague,

As you are aware, a considerable wealth of data on the chemical composition of the atmosphere has been obtained in recent years (field campaigns, observing stations), which will be very useful to the scientific community. These data are scattered in many places and are often not easily accessible to scientists. For these reasons, IGAC has planned to produce a "Directory of Atmospheric-Biospheric Chemistry and Related Data" which are available to the international scientific community. The focus will be on chemical data relevant to global change issues, but data related to regional problems will also be included.

We recognize the existence of the World Data Centers and other archives operated under WMO, NASA, and other institutional arrangements. Our activity is intended to complement these global efforts by providing a ready source of locator information for datasets. The Directory will be accessible on the Internet and, in limited numbers, in hardcopy.

At this time, we regard this initiative as a pilot project to demonstrate that the effort is worthwhile and useful to the community. If this proves out, we will endeavor to produce a more comprehensive Directory in the future. For this pilot phase, we are fortunate to have the help of Dr. Zaichun Hu, a Chinese colleague who is currently visiting at NCAR for several months.

We would be grateful if you could provide information about any data sets that you have and would like listed in the Directory. An electronic form is available from the web page:

http://acd.ucar.edu/~zchu/datainfo.html

Please submit your response through the web if possible. Otherwise, please complete a copy of the form on the following pages for each data set and send it back to Dr. Hu at NCAR. Questions about responding should be directed to Dr. Hu.

We thank you in advance for your kind cooperation.

Sincerely yours,

Guy Brasseur, Chair
IGAC Scientific Steering Committee

Alex Pszenny,
IGAC Core Project Officer

Data on the Chemical Composition of the Atmosphere

Please complete this form and return it to:

Dr. Zaichun Hu
Atmospheric Chemistry Division
National Center for Atmospheric Research
P.O. Box 3000
Boulder, CO 80307-3000
USA

Tel: (+1-303) 497-1874
Fax: (+1-303) 497-1400
Email: zchu@acd.ucar.edu

1. Institute or laboratory: _____

2. Name of contact person for negotiating data access and transfer: _____

3. Address: _____ Phone: _____

   _____ Fax: _____

   _____ Email: _____

4. Data available to the scientific community:

(1) Gas Concentrations:

__ Ozone (O_3)
__ Carbon Monoxide (CO)
__ Methane (CH_4)
__ Non-Methane Hydrocarbons (NMHCs)
__ Hydroxyl (OH)
__ Peroxy Radicals (HO_2, RO_2)
__ Hydrogen Peroxide (H_2O_2)
__ Organic Peroxides (ROOH)
__ Formaldehyde (HCHO)
__ Nitrogen Oxides (NO_x)
__ Nitric Acid (HNO_3)
__ PAN
__ Total Reactive Nitrogen (NO_y)
__ Water Vapor
__ Dimethyl Sulfide (DMS)
__ Sulfur Dioxide (SO_2)
__ Dimethyl Sulfoxide (DMSO)
__ Dimethyl Sulfone ($DMSO_2$)
__ Carbon Dioxide (CO_2)
__ Nitrous Oxide (N_2O)
__ Halocarbons
__ Other (please specify)

(2) Surface Fluxes (Emission or Deposition):

__ Ozone (O_3)
__ Carbon Monoxide (CO)
__ Methane (CH_4)
__ Non-Methane Hydrocarbons (NMHCs)
__ Hydrogen Peroxide (H_2O_2)
__ Organic Peroxides (ROOH)
__ Formaldehyde (HCHO)
__ Nitrogen Oxides (NO_x)
__ Nitric Acid (HNO_3)
__ PAN
__ Total Reactive Nitrogen (NO_y)
__ Dimethyl Sulfide (DMS)
__ Sulfur Dioxide (SO_2)
__ Nitrous Oxide (N_2O)
__ Halocarbons
__ Other (please specify)

(3) Aerosols:

__ Aerosol Chemical Composition, Inorganic (please specify size range) _____
__ Aerosol Chemical Composition, Organic (please specify size range) _____
__ Aerosol Size Distribution (please specify size range) _____
__ Aerosol Optical Properties (please specify) _____
_____
__ Other (please specify) _____

(4) Related Data:

__ UV Flux or Photolysis Coefficients (J)
__ Meteorological Data
__ Other (please specify) _____

(continued)

Data on the Chemical Composition of the Atmosphere

(continued)

5. Data collection area and time:

   Longitude range: _____

   Latitude range: _____

   (or city, country, regions, etc.): _____

   Time period: _____

6. Type of measurement:

   __ In situ __ Long Path (Remote)

7. Type of platform:

   __ Surface Station
   __ Ship
   __ Aircraft
   __ Balloon
   __ Spacecraft

   Surface measurements: __ Yes __ No

   Atmospheric distributions: __ Yes __ No

   If Yes, altitude or altitude range: _____

8. Computer access:

   __ Yes __ No

   If Yes, computer address or web page:

   _____

9. Are the data available on CD ROM?

   __ Yes __ No

10. Have the data been sent to a Data Center?

    __ Yes __ No

    If Yes, computer address or web page of Data Center:

    _____

11. Name of scientific project under which the data were obtained:

    _____

12. Remarks: _____

    _____

    _____

    _____

IGAC/SPARC/GAW Conference on Global Measurement Systems for Atmospheric Composition
Toronto, Ontario, Canada - May 20-22, 1997

The realization that the chemical composition of the atmosphere is changing on a global scale has far reaching implications for the health of the environment and the future of human society. This leads to a requirement that many nations participate in assessing the current state and trends of the chemical state of the atmosphere. This requires in turn the assembly of global measurement systems for atmospheric composition.

The aim of this conference is to bring together managers, scientists and policy makers to discuss current knowledge of and predictive capabilities for atmospheric composition, to define the near-term requirements for global measurement systems, and to begin developing a framework for more comprehensive systems in the future.

Background for the discussions will be provided by invited papers from leaders in the field from around the world as well as contributed papers on all of the associated topics.

This conference is intended to stimulate interaction between three groups of people: those who plan and conduct large space-based experiments, those who are involved in other large scale measurement programs both as planners and experimenters, and modelers. The conference format will be designed to facilitate discussion and exploration of synergistic opportunities through invited presentations, contributed papers, and opportunities for discussion and feedback.

Topics

- Space-based Measurements
- Aircraft and Ground-based Systems
- Upper Atmosphere Measurements
- Lower Atmosphere Measurements
- Calibration and Validation
- Modeling
- Data Assimilation
- Policy Issues
- Future Requirements and Possibilities

Abstract Deadline

- The deadline for abstracts has now passed, but late submissions will be considered.

- Submittal should be by electronic means wherever possible. Request instructions via Email to gomac_abstracts@atmosp.physics.utoronto.ca. Where electronic submission is impossible, authors are requested to prepare a one-page abstract on 8.5" by 11" or A4 paper using 12 point or larger type. Further instructions for non-electronic submission can be obtained by faxing or Emailing to the address below.

- Abstracts will be published on the World-Wide Web as well as being presented in an abstract volume.

Proceedings

The conference proceedings will be published as a special issue of *Journal of Atmospheric Sciences*

Language

Conference language will be English

Registration Information

http://www.atmosp.physics.utoronto.ca

or request from:

IGAC-GOMAC
Department of Physics
University of Toronto
60 St. George Street
Toronto, Ontario M5S 1A7
Canada
Fax: (+1-416) 978-8905
Email: gomac@atmosp.physics.utoronto.ca

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IGAC, SPARC, WMO, Canadian Space Agency, Atmospheric Environment Service Canada

Endorsing Organizations

NASA, INPE, ESA, NASDA, NERC and other national Space Agencies

Fourth IGAC Scientific Conference *UPDATE*

The **Fourth IGAC Scientific Conference** will consist of three CACGP co-sponsored symposia at the 1997 joint Assemblies of the International Association of Meteorology and Atmospheric Sciences (IAMAS) and International Association for Physical Sciences of the Ocean (IAPSO) to be held in Melbourne, Australia, from 1-9 July 1997. Outlines of the symposia were published in the previous issue of IGAC*tivities* and are available on the IGAC web page (http://eb.mit.edu/igac/www/). Here we repeat their titles and Convener contact information and provide some additional information on Symposium IM22 which is also being co-sponsored by the IGBP's Global Change and Terrestrial Ecosystems (GCTE) Core Project.

Symposium JMP3: Chemical Processes and Climate

1. Aerosol Controls on Climate. *Convener: Barry Huebert, Department of Oceanography, University of Hawaii, Honolulu, HI, USA (email: huebert@soest.hawaii.edu); Co-Convener: John Gras, CSIRO Division of Atmospheric Research, Aspendale, Vic., Australia (email: john.gras@dar.csiro.au).*
2. Air/sea Exchange of Particles and Gases. *Co-Conveners: Peter Liss, School of Environmental Sciences, University of East Anglia, Norwich, UK (email: p.liss@uea.ac.uk) and Robert Duce, Dean, College of Geosciences & Maritime Studies, Texas A&M University, College Station, TX, USA (email: rduce@ocean.tamu.edu).*
3. Ozone as a Greenhouse Gas. *Convener: Roseanne Diab, University of Natal, Dalbridge, South Africa (email: diab@mtb.und.ac.za); Co-Convener: Ian Galbally, CSIRO Division of Atmospheric Research, Aspendale, Vic., Australia (email: ian.galbally@dar.csiro.au).*

Symposium IM7: Tropospheric Chemistry and Related Air/Surface Exchange in Polar Regions

Convener: Greg Ayers, Division of Atmospheric Research, CSIRO, Aspendale, Vic., Australia (email: greg.ayers@dar.csiro.au. Co-Conveners: Martin Manning, National Institute of Water and Atmospheric Research, Lower Hutt, New Zealand (email: manning@gaia.grace.cri.nz); Leonard Barrie, Atmospheric Environment Service, Downsview, ON, Canada (email: lbarrie@dow.on.doe.ca) and Robert Delmas, Lab. de Glaciologie et Geophysique de l'Environnement, St. Martin d'Heres, France (email: delmas@glaciog.grenet.fr).

Symposium IM22: Closing the Budgets of CO_2, CH_4 and N_2O

Convener: Paul Fraser, CSIRO Division of Atmospheric Research, Aspendale, Vic., Australia (email: paul.fraser@dar.csiro.au); Co-Conveners: Mary Scholes (IGAC), University of the Witwatersrand, South Africa (email: mary@gecko.biol.wits.ac.za), and Robert Scholes (GCTE), CSIR Forest Science and Technology, Pretoria, South Africa (email: bob@csir.co.za).

The topics that will be examined during this symposium include: (1) The ocean and the terrestrial biosphere as sinks for CO_2, (2) Natural sources of CH_4 from wetlands, and (3) N_2O emissions from terrestrial systems. Special emphases will be on: (a) Determination of regional source and sink strengths by direct measurement or by inverse methods using atmospheric and oceanic observations; (b) Ecological controls on production, sequestration, and destruction of these long-lived radiatively active species within terrestrial ecosystems; and (c) Decade-to-century time scale changes in ecosystems due to climate and other changes, and the influences of these changes on trace gas emissions.

This Symposium will be of particular interest to GCTE and IGAC collaborators. The objective of the Symposium is to bring together terrestrial, oceanic and atmospheric trace gas scientists to synthesize the current state of knowledge regarding missing sources and sinks of the major long-lived greenhouse gases: CO_2, CH_4 and N_2O. The global budgets for all the gases are imperfectly balanced, meaning that the sum of the known sinks is not equal to the known sources plus the change in atmospheric concentrations. The approaches to "closing the budgets" which will be discussed include inverse modelling of atmospheric concentrations, isotopes, and detailed budgetary exercises. The evidence for and against various proposed missing sources and sinks will be presented and discussed.

GCTE/PAGES/IGAC/BAHC Workshop on Spatial-temporal Dimensions of High-Latitude Ecosystem Change (Siberian IGBP Transect)

24-31 August 1997

V.N. Sukachev Institute of Forestry
Krasnoyarsk, Russia

Invitation and Call for Abstracts

Workshop Foci:

- Evaluation of the effects of global change on cycling of carbon and other important elements, such as nitrogen, in the Northern Eurasian forest/tundra and boreal ecosystems
- Studies on the effects of global change on the composition and structure of the Northern Eurasian forest/tundra and boreal ecosystems, and the interaction with ecosystem function
- Historical direct and indirect data on the long-term dynamics of the Northern Eurasian boreal forests in relation to global climate and environment changes
- Studies on the effects of global change on the land-atmosphere exchange of water and energy and on ground water hydrology in the Northern Eurasian forest/tundra and boreal ecosystems
- The effects of large human-driven land-use change and disturbance regimes (fire, melting permafrost, insect outbreaks, etc.) on biogeochemical cycles and function, structure, and composition of ecosystems
- Organization of network studies along the Transect in relation to combined spatial-temporal analysis and modeling

Abstracts:

Single-page abstracts are due April 15, 1997, by Email to dndr@ifor.krasnoyarsk.su. Abstracts should include the paper title, author(s), affiliation(s), address, fax, phone, and Email. Contact person is Elena Muratova.

Chairman of Workshop:

Prof. Eugene Vaganov, V.N. Sukachev Institute of Forestry, Russian Academy of Sciences, Siberian Branch, Academgorodok, Krasnoyarsk 660036, Russia; Phone: +7-39-12-43-36-86 Fax: +7-39-12-43-36-86; E-mail: dndr@ifor.krasnoyarsk.su

International Symposium on Atmospheric Chemistry and Future Global Environment

Nagoya, Japan - November 11-13, 1997

Organized by the Science Council of Japan and the National Space Development Agency

Objectives

According to human activity, chemical composition of the atmosphere has been changing rapidly. Increase of the concentrations of greenhouse gases, oxidants and aerosols is a direct cause of global environmental change. Atmospheric chemistry which aims to study the global change of the atmosphere is a rapidly growing research field and better communication of scientists worldwide is essential for successful achievement of IGAC and IGBP. The purpose of this IGAC/IGBP symposium is to summarize and enhance our knowledge of current acidity of atmospheric chemistry and future global change, and to enhance communication between scientists in Asia and the rest of the world in this field.

General Information

The Symposium will be held at Nagoya Congress Center. The registration fee is 10,000 Japanese Yen (approx. US$90) including extended abstracts of the Symposium and reception. Full information (Second Circular) will be sent to those who complete preliminary registration (deadline: 15 April 1997).

Special Guest Speaker: Dr. Paul Crutzen
Max-Planck-Institut für Chemie, Germany

Call for Papers and Symposium Publications

Deadline for short abstracts is 30 June, 1997. An extended abstract (four page) will be required for an accepted paper. A volume of extended abstracts will be distributed at the Symposium.

Discussion Themes

Session 1: Material Cycles of Greenhouse Gases (Convener: T. Nakazawa, Touhouku University)
Session 2: Tropospheric Photochemistry and Ozone Budget (Convener: Y. Kondo, Nagoya University)
Session 3: Aerosols and Their Climate Impact (Convener: K. Kawamura, Hokkaido University)

Important Deadlines

15 April 1997	Preliminary registration
30 June 1997	Short abstracts
15 September 1997	Extended abstracts

Executive Committee Officers

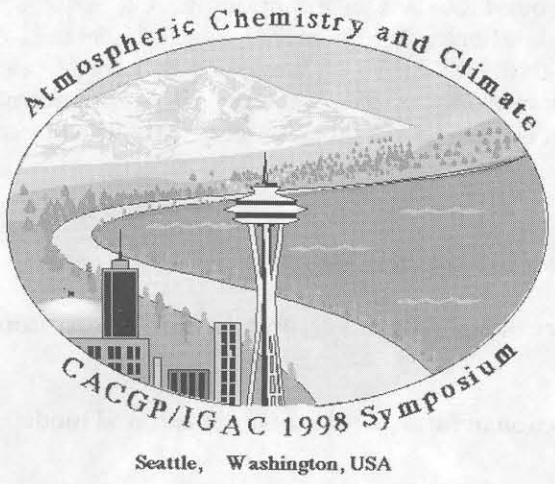
H. Akimoto (University of Tokyo) Chair
T. Ogawa (University of Tokyo) Vice Chair
Y. Kajii (University of Tokyo) Secretary

For registration information, please contact:

Dr. Yoshizumi Kajii
RCAST, University of Tokyo
4-6-1 Komaba, Meguro-ku, Tokyo 153, Japan
Tel: (+81-3) 3481-4563
Fax: (+81-3) 3481-4562
Email: kajii@atmchem.rcast.u-tokyo.ac.jp

Joint International Symposium on Global Atmospheric Chemistry

UPDATE



Ninth Symposium of the IAMAS Commission on Atmospheric Chemistry & Global Pollution (CACGP)

and

Fifth Scientific Conference of the International Global Atmospheric Chemistry Project (IGAC)

Seattle, Washington, USA
19-25 August 1998

For further information, contact:

Dr. Patricia Quinn
CACGP/IGAC Meeting - 1998
NOAA/PMEL/OCRD
Building 3
7600 Sand Point Way NE
Seattle, WA 98115
USA
Fax: (+1-206) 526-6744
Email: quinn@pmel.noaa.gov

Or access the Symposium web site at

http://saga.pmel.noaa.gov/cacgp98/

Important Note:

The 1998 American Meteorological Society Conference on Cloud Physics is currently planned for the Seattle area from August 17-21, 1998. The conference is timed to partially overlap the CACGP-IGAC Symposium on Global Atmospheric Chemistry. Cloud and Precipitation chemistry sessions at the Cloud Physics Conference will be scheduled on 17-18 August so that scientists interested in these disciplines can attend both the AMS and CACGP-IGAC conferences. Information about the Cloud Physics conference can be obtained from the Program Chairman, Dr. Bob Rauber (r-rauber@uiuc.edu), or by accessing the conference web site at:

http://www.atmos.uiuc.edu/cloud_phys_conf/

Please return to the IGAC Core Project Office by mail or email (erobbins@mit.edu)

Please help us keep our mailing list up to date:

____ Please note my new address:
____ Please also send IGAC*tivities* to my colleague:
____ Please remove me from your mailing address:

Name: _____
Organization: _____
Mailing address: _____
_____
City: _____ State: _____ Zip: _____ Country: _____
Telephone: _____ Fax: _____
E-mail Adress: _____

1998 WMO-IGAC International Cloud Chemistry Modeling Meeting

It is well recognized that the accurate simulation of the physical and chemical processes in clouds is critical to our understanding and representation of atmospheric chemistry and global climate. The 1996 WMO Cloud Modeling Workshop in Clermont-Ferrand, France, included a focus on cloud chemistry for the first time. A full report on the details of the workshop and its findings will be available from WMO in 1997. In short, the cloud chemistry group was successful in developing the process and found it to be worth continuing. Consequently, a follow-up meeting of the cloud chemistry group will be held in late September or early October of 1998 in Nova Scotia, Canada. The meeting will be conducted in sequence with the WCRP-IGAC Workshop on Large -Scale Models Simulating Atmospheric Sulfate Aerosols Intercomparison Workshop (see accompanying announcement). Details of the large-scale model workshop can be obtained from Len Barrie at len.barrie@ec.gc.ca). The objectives of the cloud chemistry meeting are as follows:

- To bring together cloud chemistry modelers and data collectors in a common forum
- To examine model intercomparisons based on common observational data inputs, and perform comparisons of simulations with observations
- To highlight current cloud chemistry issues to aid in the direction of future field measurements and modeling efforts

Modeling Scales

The WMO cloud modeling workshops have traditionally focused on simulations of the mesoscale and smaller, and the 1998 meeting will focus on regional scales down to the microscale. It is hoped that this focus will provide a good complement to the Large -Scale Model Intercomparison Workshop that will address issues related to aerosols.

Datasets

The datasets to be used were obtained during the 1993 intensive measurement period of the North Atlantic Regional Experiment (NARE). Many of the datasets are described in the NARE special section of the *Journal of Geophysical Research - Atmospheres* (**101(D22)**, Dec., 1996). Two cases will be considered for intercomparison. Case One will deal with the influence of cloud-top reflectance on photochemistry above low marine stratus. Data from the NCAR King Air are used for initialization, and the Canadian IAR Twin Otter data are used to examine the evolution of O_3 and H_2O_2. Case Two will examine the role of S(IV) oxidation in the low stratus on changes in the size distribution of the atmospheric aerosol. Airborne and ground-based data collected just prior to the development of low marine stratus are used for initialization. Data from the same platforms collected at later times will be used to examine the evolution. The initialization and evolution data for both cases, in addition to the complete Twin Otter dataset, are available at http://www.on.doe.ca/armp/NARE/NARE.html under WMO9854.

To participate or for further information, please contact either Andrea Flossman (flossman @opgc.univbpclermont.fr) or Richard Leaitch (leaitch@armph3.tor.ec.gc.ca).

1998 WCRP-IGAC Workshop on: A Comparison of the Performance of Large Scale Models in Simulating Atmospheric Sulfate Aerosols

Three-dimensional models of atmospheric trace constituents currently abound since they are important tools in understanding climate, stratospheric ozone depletion, tropospheric oxidants and acidification of ecosystems. An indication of the level of interest in this area is that 13 groups ran the CFC-11 test problem for the WCRP Scientific Symposium on Global Tracer Transport Models in 1990 which was the first workshop in a series. The second workshop in 1993 on Parameterization of Sub-grid Scale Tracer Transport involved 22 models running a ^{222}Rn experiment. In 1995, 15 models were run for a third workshop on the Transport and Scavenging of Trace Constituents by Clouds in Global Atmospheric Models. Current interest in the role of aerosols and in climate makes the processes of chemical transformation in clear air and in clouds, precipitation scavenging, dry deposition and stratospheric-tropospheric exchange especially important. Sulfates are generally believed to be major aerosol constituents that are radiatively important. Significant quantitative uncertainties persist in our understanding of their distribution and of the factors that control it.

The community of modelers currently interested in these processes are divisible roughly into two groups, namely, modelers who are attempting to include aerosols as interactive constituents in climate models and atmospheric chemical transport modelers who are trying to understand the chemical formation, physical transformation and scavenging pathways of these constituents using models driven off-line by climate-model-generated or observed winds (analyzed winds). Although there are exceptions, the former move in WCRP Working Group on Numerical Experimentation (WGNE) circles while the latter are generally concentrated in the Global Integration and Modeling (GIM) Activity of IGAC. In both modeling approaches, the processes of trace constituent transport, transformation and removal are parameterized with varying degrees of sophistication. There is a need to bring the two groups together to utilize the expertise of each to the advantage of all.

It is proposed that a joint WGNE-GIM workshop of about 40 people be held in late September or early October of 1998 in Nova Scotia, Canada. The meeting will be conducted in sequence with the 1998 WMO-IGAC International Cloud Chemistry Modeling Meeting. The objectives are as follows:

1. Compare model-predicted distributions of atmospheric sulfate aerosols and associated precursors (e.g. DMS, SO_2) with regional sulfur budgets, observations at ground level and in the vertical.

2. To understand which processes are contributing to differences in the models and observations (i.e., boundary layer mixing, vertical convection, chemical/physical transformation and precipitation scavenging).

To participate or for further information, please contact the chair of the organizing group L.A. Barrie (len.barrie@ec.gc.ca).

IGACtivities Newsletter

Editor, Alex Pszenny; Layout and Proofing, Elaine Robbins; Logos by Linda Kubrick

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