INTERNATIONAL GLOBAL ATMOSPHERIC CHEMISTRY

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of the International Global Atmospheric Chemistry Project

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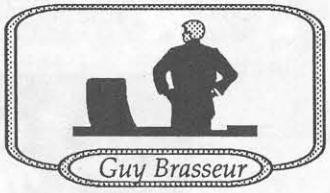
In this issue



A Note From the IGAC Chair

In mid-April of 1996, the IGBP held its first Congress in Bad Münstereifel, Germany. This was a unique opportunity for members of all IGBP Program Elements to discuss scientific issues of common interest, and to foster new and exciting interdisciplinary research.

The Congress was also an opportunity for the IGAC Scientific Steering Committee (SSC) to review progress and to discuss future plans. The SSC decided that, after several busy years devoted to the planning and implementation of a large number of Activities, it is time to review our accomplishments and to better prioritize IGAC research under three major themes: (1) biosphere/atmosphere interactions, (2) oxidizing capacity of the atmosphere, and (3) atmospheric aerosols. This prioritization exercise will be conducted in close consultation with the international scientific community, and will involve the program managers of key funding agencies. As a result of this review, and in order to address scientific issues more efficiently, the structure of IGAC will probably be modified somewhat.

The SSC also made other decisions regarding more immediate issues. For example, a new initiative was begun to address the "Biological Impacts of Atmospheric Oxidants" (BIOX). This new Activity (which replaces MILOX) will be led by Dr. W.L. Chameides (USA) with a newly appointed Coordinating Committee, who will define detailed scientific objectives for this project. The GLOCARB and CARBICE Activities, which deal with the global carbon cycle, will now be led by Drs. Philippe Ciais (France) and Neil Trivett (Canada). They will involve the community that monitors atmospheric CO_2 and models the carbon cycle so that cooperative research can be better defined within the IGAC framework. Finally, Dr. Maria Kanakidou (France) has been appointed as one of the new Conveners for the Global Integration and Modeling (GIM) Activity.

In this issue of IGAC*tivities* we are pleased to have two contributed feature articles on tropospheric ozone research conducted within the IGAC framework. One summarizes ozone findings from field campaigns carried out as part of our *East Asia-North Pacific Regional Experiment* (APARE) Activity. The other describes the preliminary results of a laboratory intercomparison and calibration of ozone sondes that was completed just this past February under the auspices of our *Global Tropospheric Ozone Network* (GLONET) Activity. We also provide early announcements of upcoming IGAC Scientific Conferences and some information about IGAC's support offices, most notably the new South Asian office which was established in April of this year.

GLOBAL CHANGE IGBP

Science Feature

An Evaluation of the Budget of Tropospheric Ozone Over the Western North Pacific - APARE : PEM-West A and Related Field Experiments

Contributed by H. Akimoto, University of Tokyo, Japan, and S.C. Liu, Georgia Institute of Technology, USA*

The Pacific Rim region of East Asia is characterized by high and rapidly growing anthropogenic emissions resulting from the high population and rapidly growing energy consumption. The main objective of IGAC's *East Asian-North Pacific Regional Experiment* (APARE) is to study the impact of human activity in this peculiar region on the marine air over the Pacific. One of the targets of APARE is tropospheric ozone (O_3) and this report focuses on this aspect among other themes.

Increase of tropospheric O_3 as observed in various regions of the Northern Hemisphere is of particular concern in regard to East Asia. Firstly, still rapidly growing emissions of O_3 precursors (nitrogen oxides, carbon monoxide and non-methane hydrocarbons (NMHC)) from this region would be a major contributor to the expected O_3 increase on a hemispheric scale in the coming decades. Because it is a greenhouse gas, the resulting O_3 could affect the global climate. Secondly, increase of near-surface O_3, together with acid deposition, could be a potential threat to terrestrial ecosystems and to agricultural productivity, which may affect food supply adversely.

In order to study chemical processes and long range transport of trace species in the Western Pacific, the NASA PEM-West (Pacific Exploratory Mission-West), the Japanese PEACAMPOT (Perturbation by East Asian Continental Air Mass to Pacific Oceanic Troposphere), CATS (Climate and Air Quality Taiwan Station) in Taiwan, and the Hong Kong Monitoring Station (Phase B) were coordinated under APARE. The major scientific objective was to evaluate the budget of O_3 in the Western Pacific and to characterize long range transport of O_3 in the East Asian Pacific Rim region. The first phase of these missions, Phase A, was conducted during September-October, 1991, when the region was under the influence of relatively clean Pacific air. The second phase, B, was conducted during February-March, 1994, when the influence of continental outflow was near its annual maximum. The PEM-West mission included intensive airborne measurements of trace species from the NASA DC-8 aircraft (see Figure 1) coordinated with flights of the Japanese Cessna-404 aircraft and ground based stations (see Figure 2) operated in simultaneously with the above three campaigns. This article reports some major findings of Phase A.

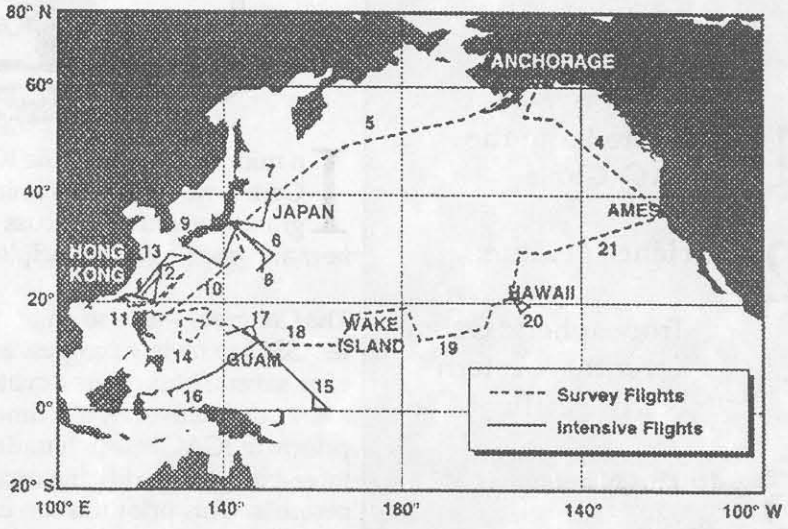


Figure 1: Flight tracks for the DC-8 aircraft during the PEM-West A mission.

The PEM-West A data set is best described in terms of two geographical domains: the Western North Pacific Rim (WNPR) and the Western Tropical North Pacific (WTNP) when examined in terms of photochemical O_3 precursors such as NO_X (=NO+NO_2) distributions. The WNPR region is one that was influenced by both natural and anthropogenic continental sources. High-altitude outflow from Asia as well as from other Northern Hemisphere continents appears to have been involved. By contrast, the WTNP regime can be viewed as a region whose chemical fingerprint reflected either relatively clean tropical/equatorial Pacific air masses or aged, well-processed continental air. In all cases the photochemical destruction of O_3, $D(O_3)$, was found to decrease more rapidly with altitude than photochemical formation, $F(O_3)$. Thus the O_3 tendency, $P(O_3)$ as defined by $F(O_3)$ - $D(O_3)$, typically was negative at low-altitudes (e.g., < 6 km) but positive for altitudes >6 to 8 km. The most important chemical factor controlling the altitude trend in $D(O_3)$ was the H_2O mixing ratio. The trend in $F(O_3)$ with altitude showed very modest decreases, reflecting the fact that decreases in HO_X (=OH+HO_2) radical levels with altitude were substantially offset by increases in the mixing ratio of NO. For

(* On behalf of the PEM-West A Science Team)

altitudes <4 km the two most important O_3 formation processes were identified as reactions of NO with HO_2 and CH_3O_2; whereas for altitudes >4 km reaction of NO with HO_2 was the dominant process. This observation indicates that NMHC emissions were typically of minor importance as O_3 precursor species during the time period of PEM-West A.

Diurnal-averaged, column-integrated photochemical formation and destruction fluxes for the WNPR region were shown to exceed those for NH dry deposition and NH stratospheric injection by a factor of nearly 6. For this same region a near balance was found between photochemical O_3 production and destruction, suggesting that this region was near steady state. Ozone column lifetime arguments, together with small seasonal changes in total column O_3, suggest that the WTNP should also have been near steady state. In fact, the column-integrated fluxes show that photochemical destruction exceeded production by nearly 80%. Two hypotheses were put forward in an effort to explain this deficit. The first involves the possibility that O_3-rich air could have been transported from mid-latitudes into the tropics; the second proposes that the unsampled atmospheric column from 10 to 17 km might have provided the additionally needed photochemical $F(O_3)$. The latter hypothesis requires relatively high levels of NO (e.g., 150 pptv); however, these do not appear to be totally out of line with those estimated to be produced by tropical lightning. In this context, results from the present study indicate that NO_X would have an extended lifetime of 3 to 9 days at altitudes of 8-12 km and even longer for still higher altitudes. This suggests that for some seasons of the year, NO_X produced from the deep convection over regions of Asia and Malaysia/Indonesia could lead to significant enhancements in high-altitude O_3 formation that might extend well out into the North Pacific.

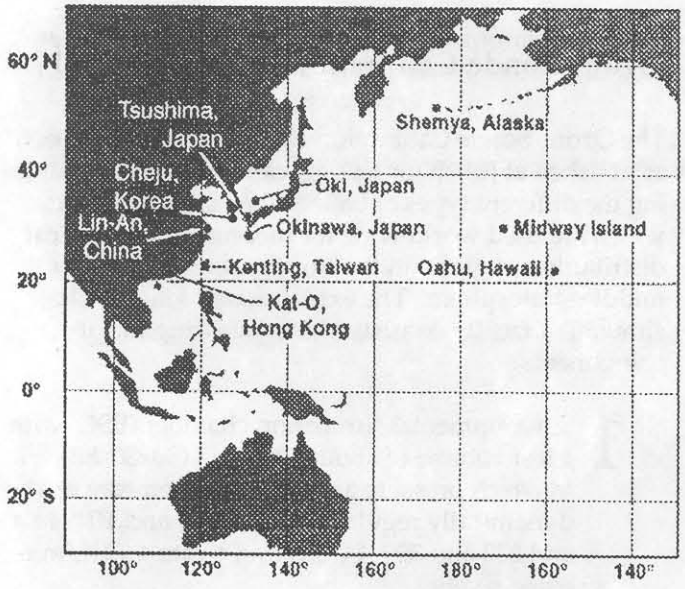
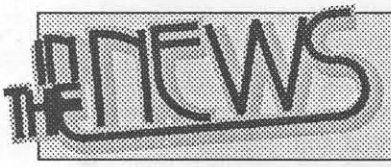


Figure 2: Locations of collaborating ground-based sites during Pacific Exploratory Mission-West (PEM-West A).

A synoptic analysis of the PEM-West A database by several different investigating groups resulted in five different air mass classification schemes. These were examined in terms of their respective values of $P(O_3)$. The general trend that emerged showed that the largest positive values occurred for continental boundary layer air, within 2 days of mainland Asia or Japan and for high-altitude air parcels (e.g., >7 km) influenced by deep convection/lightning. Significant negative values of $P(O_3)$ were found when encountering clean marine boundary layer air or relatively clean lower free-tropospheric air parcels.

The ground based observations at selected remote sites near the East Asian Pacific Rim, including Oki Island (Japan), Okinawa (Japan) and Kenting (Taiwan), revealed that surface O_3 can be characterized essentially by four types of air masses. One is a continental clean air mass (CCAM) coming down directly through the area with relatively low anthropogenic emission intensity over far eastern Siberia. The CCAM is thought to be of representative of air unperturbed by strong anthropogenic emissions in East Asia. The second is a continental polluted air mass (CPAM) which passes through high anthropogenic emission areas of either coastal China, the southern part of the Korean Peninsula, and/or a part of Japan. The average mixing ratio of O_3 in the CPAM was higher than that in the CCAM by about 7 ppbv during the campaign period. The difference is thought to be due to O_3 buildup in the boundary layer air after passing through the area of strong anthropogenic emissions, which is in accord with data based on aircraft measurements described above. The third is a marine Pacific air mass (MPAM) which contained the lowest concentration of O_3, typically about 10 ppbv but often less than a few ppbv. The fourth is a marine South China Sea air mass (MSAM) which contained typically about 20 ppbv of O_3 during the observed period. The CCAM was sampled only at the northern-most station, Oki Island, while CPAM often covered all the sites from Japan to Taiwan in this season. The MPAM was a common air mass at Okinawa and Taiwan and the MSAM reached only to the southern-most station at Kenting. In summary, the photochemistry and O_3 budget in western North Pacific were studied in detail for the first time during the APARE campaigns. The findings will provide a scientific base for evaluating the influence of future increase of anthropogenic emissions on the O_3 budget and its concentrations from the upper troposphere to the boundary layer in

this region. The scientific papers and the names of science team members who made the measurements and developed the findings summarized in this article can be found in a special section of the January 1996 issue of the *Journal of Geophysical Research - Atmospheres* (Vol. 101, No. D1).



The Jülich Ozone Sonde Intercomparison Experiment (JOSIE)

Contributed by H.G.J. Smit and D. Kley, Forschungszentrum Jülich, Germany

Introduction

As reported in the IGAC*tivities* Newsletter of January 1996, an international intercomparison experiment of ozone sondes, JOSIE (=Jülich Ozone Sonde Intercomparison Experiment) was conducted from 5 February to 8 March 1996 in the environmental simulation chamber of the Ozone Sonde Calibration Facility (OCSF) at the Forschungszentrum Jülich, Germany. The purpose of JOSIE was to assess the performance of the different types of ozone sondes used within GAW (=Global Atmosphere Watch) and IGAC's GLONET (=Global Tropospheric Ozone Network) Activity. The intercomparison was sponsored by the WMO (=World Meteorological Organization) as part of the QA/SAC (=Quality Assurance/Science Activity Centers) program of GAW and was participated in by scientists from eight ozone sounding laboratories from seven countries. The performance of the four different ozone sonde types (ECC, Brewer/Mast, Indian, and Japanese KC79) that are in routine operation in GAW/GLONET was assessed. This was the first time that all major types of ozone sondes were compared under controlled conditions. Special attention was paid to the influence of pre-launch procedures on post-launch performance, and to how data analysis was affected by procedures such as background signal correction and total ozone column normalization.

Why JOSIE ?

The state of knowledge regarding long term trends of (free) tropospheric as well as stratospheric ozone is still very limited due to the sparse global distribution of ozone sounding stations, poor continuity of data at some stations, and bad data quality (homogeneity). There is urgent need for improved data quality, much of which can be achieved by intercalibration and intercomparison of existing ozone sondes as well as by agreement on procedures for data processing and analysis.

Although previous field intercomparisons have been conducted, where several different kinds of ozone sondes were launched simultaneously, many questions with regard to the observed performance of the different sondes were left unanswered. A key shortcoming was that in most of these earlier intercomparisons no ozone reference standard instrument was flown simultaneously. The Ozone Sonde Calibration Facility at the Forschungszentrum Jülich has the advantage that the environmental simulation chamber can simulate vertical profiles of pressure, temperature, and ozone concentration under controlled, quasi-flight conditions of ozone soundings and reference the sonde measurements to an accurate UV photometer.

The major goal of JOSIE was to investigate the instrumental performance of the different ozone sonde types under controlled laboratory conditions with regard to precision, accuracy and response as a function of sonde type, altitude, and ozone level. An important objective was also to develop and update individual Standard Operating Procedures (SOP's) for both pre-flight operations and post-flight data reduction of the different types of ozone sondes.

Ozone Sonde Calibration Facility (OSCF)

The Ozone Sonde Calibration Facility (OSCF) has been established at Jülich for testing, calibrating and comparing the different types of balloon-borne ozone sondes which are used world wide for measuring the vertical distribution of ozone in the troposphere and lower/middle stratosphere. The experimental setup of the simulation facility consists of the following major components:

1 Environmental simulation chamber (ESC) with a test volume of about 500 liters (80x80x80 cm) in which pressure as well as temperature can be dynamically regulated between 5 and 1000 hPa and 200 and 300 K (-2K/min ≤ rate ≤ +2K/min), respectively.

2 Fast response dual beam UV photometer as ozone reference, developed by Proffitt and coworkers for use on stratospheric balloons. The overal accuracy of the ozone measurements made by the UV photometer is better than ±2% for simulated altitudes up to 25 km and declines slightly to ±3.5% at 30-35 km altitude.

3 Ozone profile simulator: a gas flow system to provide ozone simultaneously to four ozone sondes plus UV photometer with ozone pressures varying between 0.1 and 30 mPa according simulated vertical ozone profiles.

4 Computer controlled data acquisition system for automatic control of the simulation process for reproducible conditions of pressure, temperature and ozone versus time, as well as synchronization of all measured parameters.

Four ozone sondes can be "flown" simultaneously and compared to the UV photometer under varying conditions of pressure, temperature, and ozone concentrations to simulate vertical soundings with ascent velocities of about 5 m/s.

Participating Ozone Sounding Stations

The eight participating groups (see Table 1) were split into two groups of four teams. Each of these groups attended a two week period of the intercomparison. All major types of operational ozone sondes used within the sounding programs of GAW/GLONET were included. Four different ozone sonde types were evaluated: Electrochemical Concentration Cells (ECC), Brewer-Mast, Indian, and Japanese sondes. Three different model types of ECC-ozone sondes were tested: the SPC-5 and SPC-6 Models of Science Pump Corporation and the 1ZECC-Model of EN-SCI-Corporation. Brewer-Mast types of ozone sondes were represented by the original model of the Mast-Company as well as a hybrid of an ozone sensor of the Mast Company with a teflon pump of EN-SCI Corporation. The Indian sonde is a Brewer-Mast-like ozone sensor which is manufactured by the Indian Meteorological Department.

Participating Organization	Ozone Sonde Type
Meteorological Observatory Hohenpeissenberg, Germany	Brewer-Mast (original of Mast Company)
NOAA-Climate Monitoring & Diagnostics Laboratory, Boulder, CO, USA	ECC-1ZECC (EN-SCI Corporation)
Forschungszentrum Jülich/ICG-2, Germany	ECC-SPC6A (Science Pump Corporation)
Indian Meteorological Department, Pune, India	Indian (Brewer-Mast type)
Swiss Meteorological Institute/ Aerological Station Payerne, Switzerland	Ozone Sensor: Brewer-Mast (original of Mast-Company) Pump: Teflon (EN-SCI Corporation)
Atmospheric Environmental Service, Ontario, Canada	ECC-SPC5A (Science Pump Corporation)
Centre Nationale de la Recherche Scientifique, Paris, France	ECC-SPC5A (Science Pump Corporation)
Japan Meteorology Agency, Tokyo, Japan	Japanese RSII-KC79 (MEISEI-Company)

Experimental Design

The experiment was designed to evaluate the sensitivity, precision and accuracy of each sonde type at different pressures, altitudes and ozone levels. Questions addressed by the experiment include:

1. How do pre-launch procedures influence post-launch sonde performance?
2. What are the time responses of the different sondes?
3. How is the data analysis affected by such procedures as background signal correction and total ozone column normalization.

Two different types of vertical profiles of pressure, temperature, and ozone concentrations were simulated as shown in Figure 3.

The first type of profile was a typical mid-latitude profile taken from the US Standard Atmosphere (1976) for 40-50° N with a tropopause height of 12 km. The second type of profile was for typical tropical conditions of a high tropopause at 18 km, a low tropopause temperature, and extremely low ozone values in the middle and upper troposphere. These extreme tropospheric conditions, particularly the very low ozone pressures of 1 mPa down to 0.1 mPa, made the second type of profile very suitable for investigating and comparing the performance of the different ozone sondes.

The pressure and temperature in the simulation chamber were changed to mimic an ascent velocity of 5 m/s up to a burst altitude corresponding to 35 km. A total of six simulation experiments of vertical ozone soundings were performed: 4 simulation runs with typical mid-latitude profiles and 2 runs with typical tropical profiles. During the simulation runs several tests with different types of ozone step functions or zero ozone were included in order to investigate the response time and background characteristics of the different ozone sondes in the troposphere as well as in the stratosphere. The pre-launch procedures of each ozone sonde were performed by the field operator of the participating sounding station using his or her own groundcheck equipment.

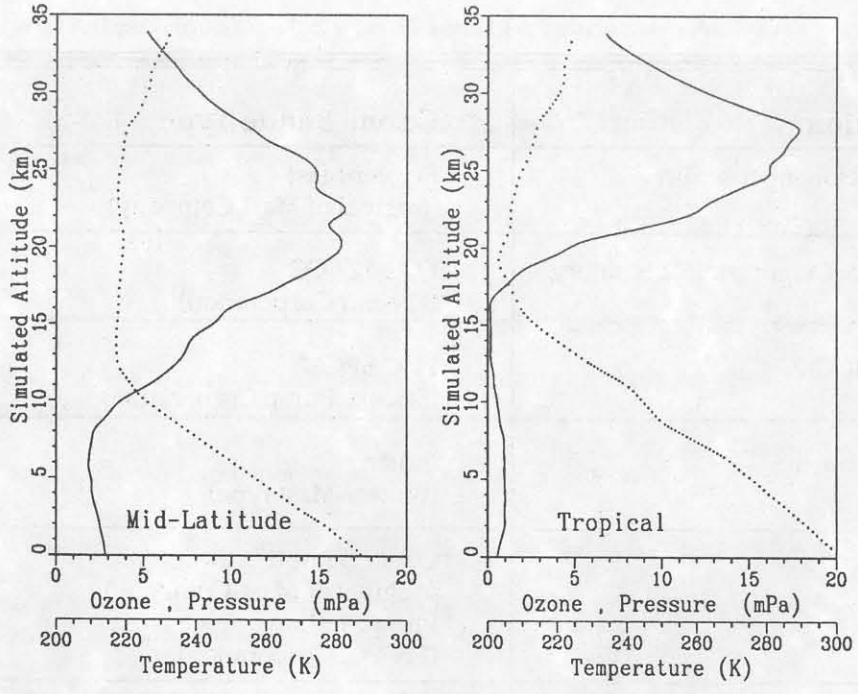


Figure 3: Mid-latitudinal and tropical vertical profiles of ozone pressure and air temperature as simulated in the environmental simulation chamber at the Forschungszentrum Jülich during JOSIE.

Data Processing, Validation, and Evaluation

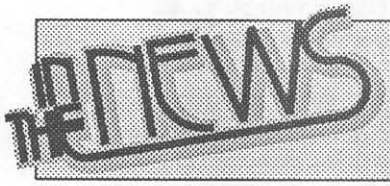
During the simulation experiments the signals from each ozone sonde were acquired on line by the data acquisition system, which resulted in a measured set of raw sounding simulation data. After each simulation run the ozone data of all "flown" sondes were processed following the individual normal operational procedures of the respective laboratories. Post-flight data reduction procedures were submitted to the intercomparison organizers prior to the JOSIE-campaign. The post-flight data

reduction resulted in a set of normal corrected sounding data for each sonde.

At present we are just finishing the validation of the data and preparing a definitive set of JOSIE data which will be distributed to the different participants. Each participant will check that all post-flight data processing, including specific correction procedures of each laboratory, was performed properly by the JOSIE organizers. Once this confirmation process is complete (end of June 1996) all JOSIE data will become accessible to the participants. The set of raw data in combination with the reduced, post-flight corrected data will serve as the basis for investigating and evaluating the performance of the different types of tested ozone sondes and, particularly, how the data analysis is affected by such procedures as background signal correction and total ozone column normalization for each individual type of ozone sonde.

Because we are in the middle of the data validation process, it is too early to report any final results or conclusions of the JOSIE campaign. Preliminary results show in general that all sondes were mostly in good agreement with the ozone reference, particularly in the tropospheric/lower stratospheric part of the profile. Above an altitude of 25 km several sondes deviated from the reference with increasing altitude. With some exceptions, most of the sondes tracked the vertical ozone profile measured by the UV photometer quite well. The simulation experiments showed that there are some disagreements with regard to the conventional methods of data processing. For example it appears that applying a total ozone correction for the tropospheric part of the ozone profile may be incorrect and can even lead to larger deviations from the "true" value. However, a more detailed analysis of the data is necessary to evaluate the different correction methods and their implications for investigations of stratospheric and tropospheric ozone.

A first overview of the results obtained from JOSIE will be presented at the XVIII Quadrennial Ozone Symposium-96 at L'Aquila, Italy, 12-21 September 1996.



IGAC Establishes New South Asian Regional Office

Contributed by D.C. Parashar, National Physical Laboratory, India, and A. Pszenny, IGAC Core Project Office, USA

During its meeting in Bad Münstereifel, Germany, in April 1996, the IGAC Scientific Steering Committee (SSC) approved a proposal by Dr. A.P. Mitra and colleagues to establish a "South Asian IGAC Project Office" (SAIPO). The purposes of SAIPO are: i) to coordinate participation of South Asian scientists in IGAC, focusing on selected activities to be mutually agreed upon by the SSC and the SAIPO Scientific Advisory Committee (see next paragraph), particularly in relation to multi-national efforts within the South Asian region; ii) to help in initiating new South Asian contributions to IGAC Activities or new Activities within the existing IGAC framework, and iii) to establish the necessary links with national and regional advisory bodies in the South Asian region to promote the development and implementation of IGAC Activities.

SAIPO is located at the National Physical Laboratory (NPL) in New Delhi, India. It is managed by the NPL under the general direction of a Scientific Advisory Committee (SAC) whose initial members are: A.P. Mitra (India, Chair), F.A. Chughtai (Pakistan), D. Jhurry (Mauritius), A.H. Khan (Bangladesh), D.C. Parashar (India), B.P. Upadhyay (Nepal), and A.B.S.S. Wijetilleka (Sri Lanka).

Some past efforts by Dr. Mitra and his colleagues which helped to lay the groundwork for the establishment of SAIPO were:

- An IGBP National Workshop on IGAC held at the Physical Research Laboratory, Ahmedabad, India, in August of 1995. Twenty five scientists from different institutes made presentations of their achievements and plans for future work relating to IGAC Activities. The discussions covered IGAC Activities in general but mainly emphasized Natural Variability and Anthropogenic Perturbations of Tropical Atmospheric Chemistry (IGAC Focus 2) and Global Distributions, Transformations, Trends and Modeling (IGAC Focus 6).

- Asian Workshop and Training Course on "Measurement Techniques and Inventories of Greenhouse Gases" held at the National Physical Laboratory, New Delhi, in early November 1995. This Workshop was sponsored by START/SASCOM and the Indian National Committee for IGBP with substantial support from the Indian

Departments of Science & Technology and Environment & Space. The participating countries included Bangladesh, India, Nepal, Sri Lanka, Hong Kong, Korea, Malaysia, Mauritius, Thailand and Taiwan. The two main purposes of this workshop were (1) to estimate greenhouse gas (GHG) inventories, particularly in relation to carbon dioxide, methane and nitrous oxide, for various important sectors, and (2) to train the participants on IPCC methodology for adoption by various countries as a reference approach for estimation of GHG emissions. IPCC methodology was discussed in detail through presentations made by several experts. The workshop also provided information of value about the manner in which dependable national inventories can be prepared. The participating countries presented their own national reports particularly with regard to carbon dioxide, methane and nitrous oxide. This workshop was a follow-up to the "Asian Workshop and Training Course on Methane Emission Studies" held at NPL in September 1993.

- Immediately following this workshop and training course, an "ALGAS Regional Training Workshop on Greenhouse Gas Inventory Preparation" was held at National Physical Laboratory, New Delhi under the auspices of the Asian Development Bank. Participants included several international experts and representatives from 12 member countries of the ALGAS project. Dr. A.P. Mitra played a leading role in this workshop as an international expert as well as the host. International experts also included Dr. Craig D. Ebert, Ms. Barbara Braatz, Dr. Matthew Mendis, Dr. Isabelle Mamaty, and several senior officials from ADB and UN-ESCAP. The workshop was broadly divided into three themes: (1) Energy/Transport and Industry, (2) Agriculture, Livestock, Landfills, Waste and Agriculture Residue, and (3) Forestry, Land Use Changes, and Open Biomass Burning. The experts made detailed presentations of IPCC methodology with regard to calculation of inventories by the top-down approach. Three volumes of IPCC methodology were circulated amongst participants who went through the detailed exercise of completing worksheets and calculating inventories for various sectors based on the sample data. Most of the participants presented their own country's data, related their experiences with regard to preparation of inventories and approaches towards strategies. The general experience was that IPCC methodology normally gave higher values of emissions and the countries were encouraged to reconcile the difference between the IPCC reference approach and their own bottom-up approaches. Experts also drew attention to the fact that detailed preparation of inventories would require a great deal of information such as consumer classification for energy to appropriately project emissions resulting from forestry and land use change. A majority of countries need to mount intense efforts to compile the relevant raw data needed for emissions calculations. Approaches to achieve this in a short time frame were discussed.

- A "School on Atmospheric Chemistry" funded by the Science & Engineering Research Council of the Department of Science & Technology was organized at NPL in April of 1996. This school was designed to impart basic knowledge and current understanding of the various processes involved in atmospheric chemistry. It was attended by 36 trainees selected on the basis of their expertise and academic qualifications from various Indian research organizations and universities. Leading scientists from India made up the faculty.

- In May of 1996, a "Workshop on Precipitation and Dry Deposition Studies in the Indian Subcontinent" was organized in cooperation with scientists from IMI Stockholm. Scientists from NPL as well as from the Indian Institute of Tropical Meteorology (Pune) and the Regional Research Laboratory (Bhubaneswar) participated in this workshop. Results of field studies on dry, wet, and bulk deposition conducted under a joint agreement on Indo-Swedish research in atmospheric chemistry were discussed.

SAC member Dr. Parashar is the principal contact person at SAIPO. Inquiries concerning current and future IGAC efforts in the South Asian region should be communicated to him at:

Dr. D.C. Parashar
South Asian IGAC Project Office
National Physical Laboratory
Dr. K.S. Krishnan Road
New Delhi 110012
India
Tel: (+91-11) 578-7162
Fax: (+91-11) 575-2678
Email: npl@sirnetd.ernet.in

About the European IGAC Project Office

Contributed by S. Cieslik, European IGAC Project Office, Italy

This brief article introduces the role, tasks, and achievements of the first regional IGAC office: the European IGAC Project Office (EIPO). EIPO was established in 1993 and is now entering its fourth year of activity. It is operated and funded by the European Commission (EC). The office is located at the EC's Joint Research Center in Ispra (Varese), Italy, and works in close collaboration with Directorate General XII (Science, Research, and Development) in Brussels, Belgium.

A well established atmospheric research community exists in Europe; a number of projects are underway, nationally funded and/or supported by the EC. The role of EIPO is to promote the participation of European scientists in IGAC and, potentially, to establish links between the EC-funded projects and IGAC Activities.

When workshops are organized in the frame of any IGAC Activity, EIPO, after making the necessary contacts, provides financial support for the participation of European scientists. The total funding available may be as high as 150,000 ECU per year (about US$190,000).

EIPO is managed by a Scientific Steering Group (SSG), whose members are the European members of the IGAC Scientific Council. The SSG meets twice a year to decide on the allocation of funds and to discuss more general issues.

Important actions have been taken, either by the EIPO secretariat or by SSG members, to strengthen links between European research in atmospheric chemistry and IGAC. Two examples of achievements are:

1 The Second Aerosol Characterization Experiment ACE-2) is a major field campaign within the new IGAC Focus on Atmospheric Aerosols. The participation of European groups is significant. Partly due to efforts by EIPO, five projects within ACE-2 have been approved for funding by the EC, for a total sum of 5,000,000 ECU (about US$6,400,000). The EC Joint Research Center (Environment Institute) is participating directly in the experiment, whose coordination is being led by one of its scientists, Dr. Frank Raes.

2 Since 1993, the EIPO SSG has drawn attention to the need for Europe to develop aircraft platforms for atmospheric chemistry observations. A task force was created for this and, after several meetings, it issued a report describing the present state and needs of European aircraft research in atmospheric chemistry (European Atmospheric Research Aircraft: Meeting the Requirement, Brussels, December 30, 1994). This document was distributed among interested persons and finally led to the approval by the EC of a proposal which supports the use of aircraft for atmospheric research for a total sum of about 2,000,000 ECU (US$2,500,000), to be spent over three years.

Whereas EIPO helps to promote European participation in IGAC Activities, the European Commission supports atmospheric research within its Research Program on Environment and Climate, linked to the EC Fourth Framework Program for Research and Technological Development (1994-1998). In the field of "Tropospheric Physics and Chemistry and Measurement Techniques for Tropospheric Components", 30 projects, each of them including several European laboratories, have been approved for funding and are starting this year. Table 1 (see next page) lists these projects and indicates the IGAC Activities to which these projects could be relevant. For some of them, links with IGAC already exist (e.g., ACE-2). For others, it is desirable to establish contacts and these are being pursued.

The goal of EIPO is to foster a major involvement of the EC-funded projects in IGAC. If you are a scientist participating in either IGAC or European atmospheric-biospheric chemistry research, and if you are willing to link your efforts within a cooperative IGAC-Europe framework, do not hesitate to contact us. The EIPO will do its best to help you, either by facilitating contacts, or by providing financial support for workshops and meetings. Inquiries should be directed to:

Dr. Stanislaw Cieslik
European IGAC Project Office
Environment Institute
CEC Joint Research Center
I-21020 Ispra (Varese)
Italy
Tel: (+39) 332 78 95 67
Fax: (+39) 332 78 50 22
Email: stanislaw.cieslik@jrc.it

Table 1. Tropospheric Physics & Chemistry and Measurement Techniques for Tropospheric Components Research Projects Funded by the EC

Topic 1: Oxidizing capacity of the atmosphere and transport of photooxidants

• The contribution of reactive halogen species to the oxidation capacity of the troposphere, *Coordinator: U. Platt*	MILOX
• Formation and occurrence of nitrous acid in the atmosphere, *Coordinator: A. Febo*	MILOX
• Sea-salt aerosols: laboratory investigations of heterogeneous halogen activation in the troposphere, *Coordinator: C. Zetzsch*	Aerosol Focus
• Vertical ozone transport in the Alps, *Coordinator: H. Kromp-Kolb*	MILOX
• Testing atmospheric chemistry in anticyclones, *Coordinator: O. Hov*	MILOX
• Regional differences in tropospheric ozone in Europe, *Coordinator: P. Builtjes*	MILOX
• Marine atmospheric oxidation capacity experiment, *Coordinator: Dorn*	NARE

Topic 2: Aerosols and clouds in the troposphere

• Use of hill cap clouds to study cloud aerosol interactions in ACE-2, *Coordinator: T. Choularton*	Aerosol Focus
• Free tropospheric aerosols and their mixing with the marine boundary layer (ACE-2), *Coordinator: H. Hansson*	Aerosol Focus
• North Atlantic Regional Aerosols Characterization Experiment (ACE-2), *Coordinator: D. Johnson*	Aerosol Focus

Topic 3: Multiphase processes in clouds

• Speciation of the organic fraction of atmospheric aerosols particles related to cloud formation, *Coordinator: S. Fuzzi*	Aerosol Focus
• Cloud ice mountain experiment, *Coordinator: A. Flossman*	Aerosol Focus

Topic 4: Anthropogenic emissions and deposition of nitrogen and volatile organic compounds

• Influence of fuel formulation on atmospheric reactivity of exhaust gases, *Coordinator: K.H. Becker*	—
• Degradation mechanism for biogenic VOC, *Coordinator: J. Hjorth*	Various
• Structure-activity relationships for reactions in the degradation of biogenic volatile organic compounds, *Coordinator: P. Seakins*	Various
• Control strategies for European air quality based on the tropospheric oxidation characteristics of volatile organic compounds, Coordinator: *H. Sidebottom*	MILOX

(continued on next page)

Table 1. continued

• Removal and interconversion of oxidants in the atmospheric aqueous phase, *Coordinator: H. Herrman*	MILOX
• Aerosol formation from biogenic organic carbon, *Coordinator: B. Bonsang*	Aerosol Focus
Topic 5: VOC, NO_X, and greenhouse gases from different sources	
• Biogenic VOC emissions and photochemistry in the boreal regions of Europe, *Coordinator: T. Laurila*	TRAGEX
• Biogenic emissions in the Mediterranean area, *Coordinator: P. Ciccioli*	MILOX
• Greenhouse gas emissions from farmed organic soil, *Coordinator: L. Klemedtsson*	TRAGEX
• European forest as a source of atmospheric nitrogen oxides, *Coordinator: J. Duyzer*	MILOX
• Quantification of pollutant dry deposition fluxes over Mediterranean ecosystems, *Coordinator: C. Pio*	MILOX
• Biogenic and anthropogenic contribution to ambient volatile organic compounds, Coordinator: *A. Veltkamp*	MILOX
Topic 6: Measurements techniques	
• In-situ Euphore radical measurements, *Coordinator: K.H. Becker*	Various
• Monitoring and prediction of the atmospheric transport and deposition of desert dust in the Mediterranean region, Coordinator: *J.K. Soderman*	Aerosol Focus
• Peroxy radical intercomparison exercise, Coordinator: *A. Volz-Thomas*	Various
• Development of a compact transportable instrument for the measurement of tropospheric OH and HO_2 on remote and airborne platforms, *Coordinator: A. Hofzumahaus*	Various
• High resolution diode laser carbon dioxide environmental monitor, *Coordinator: A. Lancia*	CARBICE

IGAC NEWS

A Brief History of IGAC Core Project Office Funding

Contributed by A. Pszenny and R. Prinn, IGAC Core Project Office, USA

One discovery of the evaluation of IGAC that was conducted in 1995 as part of the larger review and evaluation of the IGBP was that few people outside the IGAC Scientific Council know what funds are available to the Core Project Office (CPO), and to what extent the CPO has resources to apply to research activities. We endeavor here to explain this.

The CPO has had three sources of funding since its establishment in late 1990: the IGBP, U.S. Government agencies, and the Massachusetts Institute of Technology (MIT). Through 1995, the IGBP contributed a total of US$43,811 for meetings of the IGAC Scientific Steering Committee (SSC), plus one-time awards of US$20,000 as partial support for the First IGAC Scientific Conference in 1993, US$4,789 for printing and distribution of the IGAC Operational Plan (IGBP Report No. 32) in 1994, and US$5,028 for an open planning workshop for IGAC's Focus on Atmospheric Aerosols in 1995. The IGBP also supported several planning meetings and workshops involving representatives of IGAC and other IGBP Program Elements. The total amount of funds awarded for these "inter-Element activities" is US$114,665 through 1995, although the fraction assignable to IGAC versus the various other Program Elements involved is difficult to specify.

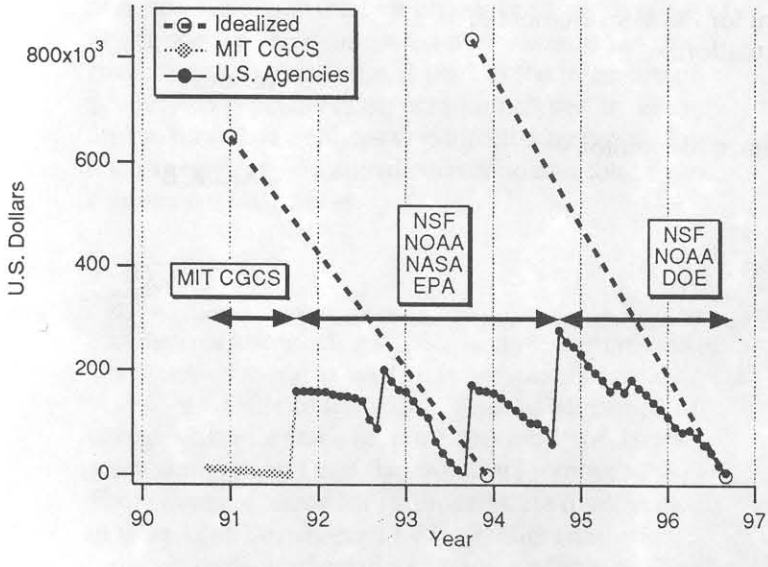


Figure 4. IGAC CPO funding history

What we call "base" support for the CPO itself has come primarily from several U.S. Government agencies in the form of grants from NSF. NSF and NOAA have contributed each year since the beginning. NASA contributed for the first 3 years and DOE since then. EPA made a one-time contribution in 1993 towards publication of the proceedings of the First IGAC Scientific Conference. The total amount awarded over the period September 1991 to present (May 23, 1996) is US$790,695, or US$158,139 per year on average. In the current budget year, approximately 55% has been allocated to salaries and fringe benefits for CPO staff (currently the Core Project Officer and a half-time secretary), 31% to MIT indirect costs, and 5% to other "essential" direct costs (phone, fax, supplies, etc.). This has left 9% or about US$15,000 for travel and for printing and distribution costs. To put this last amount in perspective, we note that the previous issue of this quarterly newsletter cost us about US$4,000 to print and distribute to our >2,100-name mailing list.

Lastly with regard to early seed funding, MIT's Center for Global Change Science played a crucial role during the CPO's first year, prior to the initial award from U.S. agencies. This contribution consisted of secondment of a part-time (15%) Acting Core Project Officer, part-time (10%) secretarial support, and a few thousand dollars for communication and reproduction services.

For further perspective, consider Figure 4 which compares the actual monthly balance in the CPO account at MIT (solid circles and lines) with an "idealized" account history (open circles and dashed lines). The idealized history assumes constant expenditure rates starting with the originally requested 3-year amount beginning in January of 1991 followed by a second 3-year cycle beginning in September of 1994. Obviously the "reality" of available funding has prevented the CPO from fulfilling its intended role to the extent desired.

Finally, the answer is probably evident by now to the question of what funds the CPO has available for research activities. In fact, the conditions of our current NSF grant specify that these funds can not be used for research.

Announcements

Planning Underway for Fourth and Fifth IGAC Scientific Conferences

The **Fourth IGAC Scientific Conference** will consist of three CACGP co-sponsored symopsia at the 1997 Joint Assemblies of the International Association of Meteorology and Atmospheric Sciences (IAMAS) and the International Association for Physical Sciences of the Ocean (IAPSO) to be held in Melbourne, Australia, during the period 1-9 July 1997. The three symposia and their lead Conveners are:

- Chemical Processes and Climate (Symposium JMP3), Convener: *Barry J. Huebert, University of Hawaii, USA; Fax: (+1-808) 956-9225; Email: huebert@soest.hawaii.edu*
- Tropospheric Chemistry and Related Air/Surface Exchange in Polar Regions (Symposium IM7), Convener: *Gregory P. Ayers, CSIRO Division of Atmospheric Research, Australia; Fax: (+61-3) 9239 4688; Email: greg.ayers@dar.csiro.au*
- Closing the Budgets of CO_2, CH_4, and N_2O (Symposium IM22), Convener: *Paul J. Fraser, CSIRO Division of Atmospheric Research, Australia; Fax: (+61-3) 9239 4444; Email: paul.fraser@dar.csiro.au*

Official information for the 1997 IAMAS-IAPSO Assemblies is available on the World Wide Web at http://www.dar.csiro.au/pub/events/assemblies/index.html.

The **Joint 5th IGAC Scientific Conference and 9th CACGP Symposium on Global Atmospheric Chemistry** will be held in Seattle, Washington (USA) from 19-25 August 1998. Proposals for sessions and other suggestions should be communicated to the Chair of the International Program Committee for the Conference: Dr. Anne M. Thompson, NASA Goddard Space Flight Center, USA; Fax: (+1-301) 286-1754; Email: thompson@gator1.gsfc.nasa.gov. Further information on this Conference will appear in future issues of IGAC*tivities*.

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
WWW: http://web.mit.edu/igac/www/

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