IGAC Seattle Core Project Office
NOAA-PMEL
7600 Sand Point Way NE
Seattle, WA 98115-6349 USA

Telephone: (206) 543-6674
Fax: (206) 543-0308
E-mail: igac.seattle@noaa.gov
http://www.igac.noaa.gov

To: Bruce Doddridge
From: Sarah Doherty
Date: December 2, 2005

Re: IGAC Report to NASA, 2004-5

In 2004-5, the International Global Atmospheric Chemistry Project achieved its goal of moving the field of atmospheric chemistry forward through its Tasks, through focused scientific workshops, and in holding its 8th biennial International Conference. Tasks endorsed by IGAC's Scientific Steering Committee (SSC) in 2003 have made good progress in 2004-2005 and, with one exception, appear to be on-track with meeting the goals outlined in their proposals. In addition, several new Tasks have been endorsed or are in the pipeline for endorsement. In this past year IGAC also co-sponsored several workshops and found them to be a very cost-effective "top-down" mechanism for focusing the community on important, open science questions. Progress on each of these fronts is discussed below, along with some changes to IGAC's organizational structure.

Organizational Structure

In 2004, IGAC's SSC was comprised of 17 members from 14 countries (see Table A), with three of the SSC acting as Chairs. Tim Bates (USA) was the lead Chair, and Sandro Fuzzi (Bologna, Italy) and Shaw Liu (China-Taipei) Co-Chairs. Ex-officio members include representatives from the World Meteorological Organization (WMO), the Committee on Atmospheric Chemistry and Global Pollution (CACGP), WCRP's Stratospheric Processes and their Role in Climate (SPARC), SOLAS, and iLEAPS.

As of January, 2005, three of the SSC members rotated off of the committee: Tim Bates (USA), Mary Scholes (S. Africa), and Martin Manning (USA). These seats were filled by Graciela Raga (Mexico), Stuart Piketh (S. Africa) and Randall Martin (Canada), who joined the SSC in January, 2005. Phil Rasch of NCAR in Boulder, Colorado replaced Tim Bates as the U.S. Chair on IGAC, and Sandro Fuzzi has assumed the role of Lead Chair.

In 2004, IGAC continued to operate with three International Project Offices: in Seattle, Washington, USA (Sarah Doherty, Executive Officer); in Rome, Italy (Gian Paolo Gobbi, Project Officer); and Taipei, Taiwan-China (Doris Chen, Project Officer). The Seattle office continues to be the central coordination and referral point for the project's activities. In addition, the Seattle office has taken over responsibility for determining the subject of, recruiting authors for, and editing articles for the *IGACtivities* Newsletter. The Taipei office will continue to print and distribute the Newsletter. It was

IGAC Seattle Core Project Office
NOAA-PMEL
7600 Sand Point Way NE
Seattle, WA 98115-6349 USA

Telephone: (206) 543-6674
Fax: (206) 543-0308
E-mail: igac.seattle@noaa.gov
http://www.igac.noaa.gov

decided that as of August, 2004 Sarah Doherty would increase from half- to full-time on IGAC, continuing to be based in Seattle. It had been our plan for the lead IGAC office to

rotate annually or biennially through the three IPO's, but at the 2004 IGAC SSC meeting it was decided that the Seattle IGAC office would remain as the lead IGAC IPO.

Tasks

An update on endorsed Tasks' progress and plans are reported on below (AICI, ITCT-2k4, Mega-cities: Asia, and GHOST). In addition, newly endorsed Task (AMMA, POLARCAT, and DEBITS) and Tasks that we anticipate adding to IGAC in 2005 (HitT and ABC-Asia) are discussed briefly.

Air-Ice Chemical Interactions (AICI)

AICI was jointly endorsed by the IGAC and SOLAS SSCs in 2003. AICI has the goal of coordinating the work of field, laboratory, remote sensing and modeling groups, with the aim of understanding the importance of air-ice chemical interactions within the Earth system. This will allow assessment of the effects of a changing cryosphere on atmospheric chemistry, composition and feedbacks to climate.

During 2004, AICI became fully established, with a working steering committee (on which 9 nations are represented). A web site has been set up and is under development. AICI has endorsed a number of ongoing and planned field campaigns that will contribute to its aims, with the intention that AICI will carry out the work of synthesizing their findings into an overall context.

Two major components contributing to AICI have made substantial progress during the year. ANTCI (Antarctic Tropospheric Chemistry Investigation), focusing mainly on studies at South Pole has started to report its findings, in particular at the AICI session at the IGAC meeting in Christchurch, and in a session co-organized with AICI at the Fall AGU meeting. Astonishingly high levels of NO_x (occasionally as high as 1 ppbv) were reported. Some aspects of the photochemistry contributing to these levels are now starting to be well-understood, but it is clear that in this phenomenon, as in others in the polar regions, meteorology plays a major role. In particular, very shallow mixing layers over polar surfaces can trap products in a thin layer above the surface. The results of recent campaigns at other sites, notably Summit in Greenland, have also been reported.

A campaign in a very different regime, in coastal Antarctica (Halley station), has been underway throughout 2004 (Chemistry of the Antarctic Boundary Layer and the Interaction with Snow – CHABLIS). This campaign was targeted at AICI issues. A large suite of instruments, studying the NO_y budget, springtime halogen chemistry, and oxidant chemistry is culminating with a summer intensive that is taking place at the time of writing. It is too early to present the results of this campaign, but it will contribute substantially to our understanding of the annual cycle of the different polar chemistry phenomena.

A workshop, co-sponsored by AICI, was held in Brno, Czech Republic, in November, 2004, and brought together field and laboratory scientists studying interactions at snow and ice surfaces. This contributed to AICI's goal to combine laboratory and field data; newly-stimulated modeling efforts are also starting to give a picture of the overall importance of polar phenomena to the global atmosphere.

In 2005, an IGAC-AICI proposed an activity for the International Polar Year, involving major land and ship based campaigns in both polar regions, an aircraft campaign, new networks of simple instrumentation, and synthesizing activities. There were 900 expressions of interest submitted for IPY, of which about 40 were mainly atmospheric chemistry-related. Six of these were asked to lead a cluster in the area "Clouds, aerosols and atmospheric chemistry", and one of the six was the "Air-Ice Chemical Interactions – IPY Coordinated campaigns (AICI-IPY)" proposal. One of the other six (POLARCAT) is also a new IGAC Task (see below).

Mega-cities: Asia

In 2004, the Mega-cities researchers continued on-going measurements in mega-cities and mega-city complexes in Japan, China, South Korea, The goals of Mega-cities are to:

- Characterize the temporal and spatial changes of aerosols, oxidants, and their precursors primarily by surface measurements near urban centers.
- Characterize the composition, mixing state, and physical properties of aerosols in urban air. Determine hygroscopic and radiative properties of aerosol in urban air.
- Validate emission inventories of trace gases (e.g., NO_x, SO_2, NH_3, and VOCs) through comparisons of ratios of concentrations of trace species observed in urban air.

The primary foci of the Task team in 2004-5 was 1) to try and ensure the disparate stations participating in the Task were making uniform, comparably measurements, and 2) to try and work out data access issues between the groups. As part of the first focus, they have been gathering data on each of the measurement suites and are close to releasing a web page with this information. Uncertainties of important aerosol measurements were assessed, including those for the Aerosol Mass Spectrometer; semi-continuous EC/OC measurements; water soluble organic carbon measurements; the CIMS-HNO_3 measurement; and black carbon measurements. In addition new instruments are being developed for BC to be used for other mega-city observations. Inter-instrument comparisons of measurement techniques (specifically O_3, CO, and aerosols) were made in March, 2005, at Gosan, Korea. The Korea, Japan, Hong-Kong groups participated in this campaign, which also included participants from the ABC-Asia Task (see below).

Many scientific results have also come out of the past years' measurements, though much data processing is still underway. These data are being used for source apportionment, for understanding the source of the variations, and for comparison of different mega-cities. Some scientific highlights are given below:

a) In order to validate and improve emission inventories of black carbon (BC), which are currently very uncertain, reliable BC-CO and CO_2-CO correlation data are useful. The Mega-cities data has demonstrated that the slopes of BC-CO and CO_2-CO correlations are rather stable in two mega-city areas in Japan; Tokyo and Nagoya. Comparisons of these data with existing estimates, suggest that the current inventories underestimate CO emissions for Japan by about a factor 2. Similar methods can be used to improve emission inventories of BC and CO in other mega-cities in Asia.

b) The task team has demonstrated a method for separating primary and secondary organic aerosol through combination of chemical information from aerosol mass spectrometer and organic aerosol-CO correlation. This allows estimation of

representative emissions of primary aerosols in study area. This method will also lead to reliable estimates of production of secondary aerosols, when combined with modeling. These methodologies will also be used for other mega-city areas.

c) Some mega-cities in Asia are close to coastlines and therefore influenced by sea-land breeze circulation, especially in summertime. Evidence of this effect is seen in Tokyo and Hong Kong, for example, in behaviors of aerosol and oxidants. Comparative studies in different mega-cities will lead to improved understanding levels of pollutants in relation with this transport.

3) Scientists from China, Korea, and Taiwan agreed to join in a joint research proposal led by University of Tokyo. They agreed to strengthen collaborations through mega-city task. In addition, collaborative works in China are being planned on international basis. These activities will be important part of IGAC in 2005 and afterwards.

Barriers to progress on the Mega-cities project include difficulties in getting some groups to release their data and difficulties in obtaining funding for continuation of measurements and for inter-instrument comparison campaigns. The IGAC SSC is attempting to assist on both of these fronts by providing letters of support for the team's work (which can be used to leverage local funding agencies) and by emphasizing with the Mega-cities participants that open access to data is a key aspect of being included in an IGAC Task.

Intercontinental Transport and Chemical Transformation (ITCT-Lagrangian-2k4)

The goal of the Intercontinental Transport and Chemical Transformation (ITCT) Task is to understand the chemical transformation and removal processes of aerosols, oxidants and their precursors during the intercontinental transport process. The ITCT-2k4 effort is utilizing overlapping field campaigns organized and funded by several agencies, including NOAA (U.S.), NASA (U.S.), and European agencies (a UK university consortium, funded by NERC; DLR of Germany; and CNRS of France). Each of these programs has its own regionally focused goals and deployments, but together they provide coverage from the source regions on North America, through the transport pathways over the North Atlantic, and over the receptor regions of Europe. The IGAC Task ITCT-Lagrangian-2K4 is an organizational and analysis effort to coordinate the disparate programs into a pseudo-Lagrangian framework.

Excellent progress was made in 2004-5 in achieving the goals of the ITCT-2k4 Task. Field campaigns took place in June-August, 2004 in the north Atlantic, and coordination of the disparate campaigns was assisted by two papers submitted by the ITCT-2k4 Task team as part of project planning. In late May and early June, the team ran through dry runs of flight-planning scenarios based on model meteorological and chemical field forecasts. During the campaign, the meteorological conditions were favorable for the ITCT study, thought pollutant concentrations were low. Through careful planning, forecasting, flight planning and platform coordination accomplished, resulting in 6 inter-aircraft comparisons in July and August.

Some early comparisons results from the campaign indicate that there were significant discrepancies between platforms, but results are still preliminary. Some side-by-side comparisons on the ground are being pursued in the post-campaign period. This is allowing the team to distinguish between inter-instrument differences and

discrepancies due to either sampling differences or spatial/temporal variability and imperfect co-location of platforms. While initial meteorological and model analyses indicate that the platforms were well-coordinated for intercepting common airmasses, further data analysis is needed to see if a "Lagrangian" experiment was indeed completed for transport from the U.S. to Europe and for the U.S. to the Azores, then to Europe.

In 2005, data from the campaign were submitted to a centralized data archive. An ITCT-2k4 workshop April 25-29, 2005 at European Geophysical Union (EGU) meeting in Vienna, Austria and in early August, 2005 a five day workshop for larger ICARTT Study was held at the Univ. of New Hampshire. At the December 5-9, 2005 AGU Meeting there will be special sessions on the Summer, 2004 field campaigns and the ITCT-2k4 effort. Through these meetings and the centralized data archive a number of fruitful collaborative efforts have emerged. In particular, five cases have been identified where airmasses measured in the western North Atlantic by U.S.-based platforms were then intercepted in the eastern North Atlantic by European-based aircraft. Analysis of these pseudo-Lagrangian case studies are underway, but already interesting results are emerging about the evolution of these airmasses. It appears that the project is likely to meet its goal of a Journal of Geophysical Research special section in late 2006.

Global HO Systematic Tests (GHOST)

The GHOST Task aims to address the problem of quantifying the global distribution of the hydroxyl radical OH, the main tropospheric cleansing agent. There are significant uncertainties to the existing approaches to measuring OH, and decreasing concentrations of one of the two key tracers currently being used will soon eliminate it as a viable proxy for OH concentrations. The GHOST Task Team therefore proposed a study addressing alternative tracers that could be used to measure global-average OH. Possibilities include using existing natural and industrial tracers or tailor-made dedicated tracers which would be released at key locations. The starting stages of the Task would be comprised of theoretical investigations of the feasibility of these tracers; assessment of the possibility of using multiple tracers; a study of the optimal release (for dedicated tracers) and sampling/measurement techniques; and an assessment of the uncertainties in retrieved OH.

Success of the GHOST Task requires the participation of multiple modeling groups and scientists with familiarity in tracer measurement techniques, as well as the careful coordination of these groups. It was hoped that the GHOST Task leaders would make progress over the past year in recruiting and organizing such a team of modelers and measurement experts. However, to date no one has taken the lead in moving the GHOST Task forward. While the group that proposed GHOST has done an excellent job of framing the problem and providing an implementation strategy, a scientist who is motivated to head up the Task execution still needs to be identified.

The IGAC SSC met with the team that proposed the GHOST Task during the September 4-9 Conference in Christchurch, New Zealand and advised them of the need for progress in order for GHOST to remain an IGAC Task. An open meeting was held during the week, where the GHOST proposal was introduced to the community studying at the atmospheric oxidation capacity. More recently, the IGAC Task team has established a web page (http://www.mpch-mainz.mpg.de/~joeckel/ghost/) and commenced an outreach effort that includes the attendees of the open meeting, as well as

other scientist who might be interested in participation. The concept of the GHOST project was presented at the August Gordon Research Conference on Atmospheric Chemistry, and the GHOST team participated in a workshop on OH Trends in Boulder, Colorado Nov. 28-30, 2005. Most significant, the team obtained funds to support a full-time person to organize and run the GHOST Task and have hired someone to fill this role, starting in February, 2006. The SSC will re-assess this Task in early 2006 and determine whether sufficient progress is being made.

African Monsoon Multidisciplinary Analysis (AMMA)

In November, 2004, the SSC granted endorsement to a new Task: the African Monsoon Multidisciplinary Analysis (AMMA). The IGAC AMMA Task will be comprised of the atmospheric chemistry component of the larger AMMA project, which is a joint endeavor of French, African, German, British, and U.S. scientists. In total, AMMA is a multidisciplinary project that aims at addressing both fundamental scientific questions related to the understanding of the West African Monsoon (WAM) variability and the impacts and practical issues related to prediction and decision-making activity.

The focus of the IGAC AMMA Task will be the Enhanced Operation Period of AMMA, 2005-2007. The science that will be addressed by the IGAC AMMA Task addresses the following questions:

~ What are the interactions between lightning, biomass burning, the biosphere, the ocean, human activity and growing urbanization which determine tropospheric ozone concentration over Western Africa?

~ What are the interactions between dust, biomass burning, the biosphere, the ocean, human activity and growing urbanization which determine aerosol production and properties over Western Africa?

~ What is the role of deep convection, the monsoon circulation and other flow patterns in the transport and processing of these emissions, and how do these emissions affect the dynamics of the WAM?

~ What factors control the outflow of ozone and aerosols (and their precursors) from West Africa to the tropical Atlantic troposphere and how do they impact atmospheric processes in this region?

While some of the AMMA measurements are underway, the project is still in the planning stages for the intensive field operations period. In an effort to enhance African scientists' involvement in the AMMA-AC Task, IGAC sponsored 5 African scientists' travel and attendance at a planning workshop in Dakar, Sengal 28 November – 2 December, 2005. Efforts were also made to connect the AMMA task to the IDAF (IGAC DEBITS; see below) project.

Deposition of Biologically Important Trace Species (DEBITS)

DEBITS was a highly successful activity under the first phase of IGAC, and a new Task proposal presented to the IGAC SSC in 2004 builds on the success and lessons of the initial activity. The scientific focus of the project is the study of the wet and dry deposition of chemical species to the earth's surface. These processes play an essential role in controlling the concentration of gases and aerosols in the troposphere and thus are key to addressing the second of IGAC's overall science questions: namely to provide a

fundamental understanding of the processes that control the distributions of chemical species in the atmosphere and their impact on global change and air quality.

The new Task is taking advantage of the three scientific programs established under the first phase of DEBITS: CAAP (Composition and Acidity of Asian Precipitation, 1990; 34 stations), IDAF (IGAC DEBITS Africa, 1994; 10 stations) and LBA in Amazonia (The Large Scale Biosphere Atmosphere Experiment in Amazonia, 1998; 5 stations). In addition, the DEBITS team is now coordinating with the WMO GAW Scientific Advisory Group for Precipitation Chemistry, who provided very helpful comments to the proposal. Coordination with the AMMA-AC Task is also underway.

Atmospheric Brown Cloud (ABC)

A proposal to make the atmospheric chemistry component of the Asian Brown Cloud project an IGAC Task is in preparation. ABC will be a follow-on project to the 1999 Indian Ocean Project (INDOEX), where the impact of pollution on the Indian Ocean region was studied. Of particular interest is the chemical composition and radiative impact of the high concentration of aerosols that cover the region during the northeast monsoon season. The ABC project aims to resolve questions raised by the INDOEX findings through the establishment of enhanced measurement stations that will operate year-round. Shaw Liu, Achuthan Jayaraman and Makoto Koike (see Appendix A) have been working closely with V. Ramanathan and Paul Crutzen on determining the components of the IGAC Task and in preparing the proposal. Final revisions are being made to the proposal and we anticipate having it in hand for review in January, 2006.

Halogens in the Troposphere (HitT)

In May, 2004 a workshop on Halogens in the Troposphere was held in Heidelberg, Germany. The output of this workshop is a white paper which the authors intend to use as the basis for an IGAC Task proposal in 2005. The goal of HitT is to facilitate international collaboration between laboratory, field, and model activities regarding tropospheric halogen chemistry especially in the following domains: polar regions, salt lakes, marine boundary layer (both remote and coastal), volcanoes, free troposphere, and urban areas. The authors have sought co-endorsement by IGAC and SOLAS, and we are currently working with them on defining the specifics of the IGAC Task.

Workshops

IGAC co-sponsored six workshops in 2004-5, on: Nitrogen; Organic Aerosols; Halogens in the Troposphere; the Aerosol Indirect Effect; the Chemical Composition of the mid-latitude upper-troposphere/lower stratosphere (UTLS); and New Aerosol Formation.

Brief descriptions of the workshops are given below. We note that most participants were able to fund their own way to the meetings, and that IGAC's contribution was largely organizational. Features of these workshops that have made them successful is that they are framed around a set of focused scientific questions; a sub-set of participants have taken the lead in facilitating the workshop discussions on these

questions; and an end-product of a white paper or other publication is a goal of the workshop. We anticipate that some of these workshops will lead to new IGAC Tasks.

Nitrogen Workshop May 3-5, 2004 Woods Hole, Massachusetts, USA
(http://www.iniforum.org/73.0.html)

During the last few decades, the introduction of reactive nitrogen (N) into the biosphere by food and energy production has been greater than rates of N fixation in native terrestrial ecosystems, and this anthropogenic input has been steadily increasing. By far the largest uncertainty about the human domination of the N cycle on all scales is the amount of reactive N that is converted back to N_2 during the last step of denitrification. Unfortunately, we have little knowledge about how much N is denitrified, when, and in what location. To address this deficiency the INI held a 3-day workshop in the spring of 2004, comprising approximately 30 participants, to focus on quantification of N_2 production via biological denitrification.

The meeting was co-sponsored by U.S. National Science Foundation, U.S. Environmental Protection Agency, U.S. NASA, and IGAC. There were 50 attendees, and the IGAC-Seattle contributed $8,000USD; IGAC-Rome supported the attendance of 3 scientists; and IGAC-Taipei supported the attendance of 2 scientists. A white paper from the workshop can be downloaded from the web page above. In addtion, the results of the workshop will be published as one or more synthesis papers in a peer reviewed journal in the next year.

Organic Aerosols Workshop May 10-12, 2004; Hyytiälä, Finland
(http://www.atm.helsinki.fi/ILEAPS/organic/index.php)

The goal of this workshop was to identify and discuss research activities that will lead to a better understanding of organic aerosols, for which sources, chemical composition and properties are very poorly known. At the meeting, the participants: 1) summarized the existing knowledge on organic aerosols (OA) sources, transformations and physical and chemical properties relevant for global change issues: climate, hydrological cycle, transport of pollutants; and 2) Identified the main knowledge gaps and develop a common strategy among the three IGBP projects (IGAC, iLEAPS and SOLAS) to address them.

The workshop was co-sponsored by IGAC, iLEAPS & SOLAS, had 39 attendees, including three IGAC SSC members. The IGAC Seattle and Rome Offices each paid the travel expenses of two attendees. A white paper manuscript was published in the June, 2005 *IGACtivities* Newsletter.

Halogens Workshop May 27-28th, 2004 Heidelberg, Germany

While halogen chemistry has been recognized as an important factor influencing the composition of the stratosphere it is only recently become clear that halogens can also have a decisive influence on trace gas cycles in the troposphere. A number of scientific questions need to be addressed with respect to the role of halogen species in tropospheric chemistry and the effects of halogens on climate, the oxidation capacity of the atmosphere, and possibly other properties of the atmosphere. The primary objectives of the meeting were to: 1) Provide a forum for exchanging information, knowledge, and expertise on the subject of halogens on the troposphere; 2) Define the priority scientific

questions related to halogen chemistry in the troposphere and identify interested research groups and scientists who are currently working on these questions; 3) Identify areas where coordinated research activities in the area of halogens in the troposphere are needed and, if needed, begin framing these activities; 4) Identify links to other projects, in particular to IGAC, SOLAS, AICI, IMBER, WCRP-CliC and iLEAPS, and resolve possible overlap in research topics; and 5) Identify potential Tasks that could be proposed to SOLAS, ICAC, iLEAPS, WCRP etc.

This workshop was co-sponsored by IGAC & SOLAS, and had 22 attendees. The IGAC Seattle office contributed ~$6,000USD to support workshop (~half the total cost). A white paper has been prepared and is being used as the basis for a new IGAC Task proposal.

Indirect Effect Workshop January 5-7, 2005 Manchester, England

The impacts of aerosols on cloud properties and precipitation remain highly uncertain and are a leading focus of the IPCC 2005 assessment. The goal of this workshop was to bring together the disparate communities doing work relevant to this issue – i.e. microphysicists, chemists, cloud modelers, people making in-situ and remote measurements, etc. – and synthesize the existing body of knowledge. Discussions were broken down into four sessions on: Small-scale Observations and Modeling; Large-scale Observations and Modeling; Meteorological Effects and Constraints; and Ice Clouds. Talks were held in a single plenary and were accompanied by poster sessions and extensive discussions sessions in both plenary and in break-out groups. The meeting discussions resulted in two peer-reviewed publications*, and a summary of the workshop was presented in an article for the *IGACtivities* Newsletter No. 32 which is currently in-press (November, 2005).

The IGAC Seattle Office contributed $30,000USD to the cost of the conference, and the IGAC Rome office provided ~$15,000USD for travel support via the ACCENT project. Additional meeting support was provided by NOAA and NASA.

* McFiggans, G, P. Artaxo, U. Baltensperger, H. Coe, M. C. Facchini, G. Feingold, S. Fuzzi, M. Gysel1, A. Laaksonen, U. Lohmann, T. F. Mentel, D. M. Murphy, C. D. O'Dowd, J. R. Snider, and E. Weingartner, The Effect of Physical & Chemical Aerosol Properties on Warm Cloud Droplet Activation, Atmos. Chem. Phys. Disc., 5, 8507-8646, 2005.

* Lohmann, U., Feichter, J., Kinne, S., and Quass, J., Approaches for constraining global climate models of the anthropogenic indirect aerosol effect, submitted to Bulletin of the American Meteorological Society, 2005.

Processes Controlling the Chemical Composition of the Extra-tropical Upper Troposphere/Lower Stratosphere May 18-20, 2005 Mainz, Germany

The links between atmospheric chemistry and climate are receiving increasing attention on several fronts. One region where the two are tightly coupled is the Upper Troposphere/Lower Stratosphere (UTLS). To date, most of the focus has been on the tropical UTLS, as this region is highly convective and therefore where much of the troposphere-to-stratosphere transport occurs. However, recent observational and modeling data have revealed the importance and complexity of the UTLS region at mid-latitudes. SPARC and IGAC therefore decided to co-sponsor a workshop with a specific focus on what chemical and meteorological processes control chemical transport and transformation in the mid-latitude UTLS. Plenary and breakout sessions were used to define the current state of knowledge; open questions; and means by which these

questions might be addressed. Sixty-six researchers participated, with travel support for 11 of them provided by SPARC (4), IGAC-Seattle (4), and IGAC-Bologna (3) via the European ACCENT project. A summary of the workshop discussions and output was written up by the workshop organizers and is being published in the issue of the *IGACtivities* Newsletter currently in press (November, 2005). Further discussions aimed at acting on some of what was learned in the workshop are planned for early 2006.

Formation and Growth of Secondary Atmospheric Aerosols August 15-17, 2005 Hyytiälä, Finland

Although formation of new atmospheric aerosol particles has been observed to occur worldwide, the exact mechanism is still an open question and the role of new particles formation at the global level still uncertain. While new aerosol nucleation is expected in pristine regions where there is little surface area (i.e. existing aerosol) on which gas species can condense, recent observations show that new particle formation also occurs with regularity in highly polluted regions. A workshop on this topic was co-sponsored by IGAC, iLEAPS, SOLAS, ACCENT and BACCI. The IGAC-Seattle office provided travel support for three attendees; local expenses were covered by the University of Helsinki. The workshop aimed to bring together data from these observations; summarize the current state of research; and propose future research needs. Written workgroup and individual contributions are in progress and a final report will be published in the *IGACtivities* Newsletter. The report will act as the basis for a new joint IGAC/iLEAPS Task proposal on the subject.

The 8th IGAC International Conference

IGAC held its 8th biennial International Conference September 4-9, 2004 in Christchurch, New Zealand. The latest findings in atmospheric chemistry were shared amongst the 409 attendees, coming from 38 countries. Because of the excellent meeting attendance and careful planning of the local organizing committee, conference registration fees covered the full cost of the meeting. Using generous contributions from the WMO, NASA, and NSF and funds from the three International Project Offices we were able to support the attendance of 62 young scientists from 23 countries. Talks were held in a single plenary and an emphasis was placed on poster presentations. Prizes were given for the top three posters. Participation of young scientists and their integration into the community was encouraged through a large and very successful set of "young scientist" events.

A number of science highlights emerged from the conference:

- There are increasing research activities on organic aerosols – composition, sources, radiative and cloud nucleating properties.
- Cloud-Aerosol interaction remains a very difficult issue, and appears to be a non-linear system.
- Continued advances in instrumentation have been made, improving the time resolution of measurements.

- A better understanding of the Earth System is being reached through integrating studies and by increasing pulling together individual research projects to better understand the global picture.
- The importance of the link between the gas and aerosol phases is increasingly being investigated and understood.
- Satellite measurements are taking on increasing importance for atmospheric chemistry.
- There is a growing emphasis on halogen chemistry and night-time nitrogen chemistry.
- Inter-continental transport and chemical transformation and mega-city emissions (both subjects of IGAC Tasks) are a growing concern. IGAC has moved from focusing on the regional atmosphere distant from sources to looking at large sources and their regional/global impact.

Capacity building and facilitation of multi-disciplinary & multi-national research

A priority of IGAC is to assist capacity building in under-represented countries and to facilitate multi-disciplinary and multi-national collaborations. This is being achieved through IGAC Tasks, our biennial conferences, and the composition of our SSC. In addition, in 2004-5 a much more concerted effort was made to communicate and collaborate with organizations whose science overlaps with IGAC's.

In particular, Sarah Doherty and Shaw Liu both attended the SPARC International Conference in August (Victoria, BC, Canada) in 2004 and Sarah attended SPARC's annual Steering Committee meeting the week following. Sarah Doherty and Kathy Law (IGAC SSC) also attended SPARC's 2005 Steering Committee meeting. This and ongoing conversations between SPARC and IGAC have resulted in several collaborative efforts and ongoing planning at both the SPARC/IGAC And WCRP/IGBP levels. We view this as part of the necessary eventual merging of the SPARC and IGAC projects.

As noted earlier, IGAC has also co-sponsored workshops and jointly endorsed Tasks with the newly-formed IGBP Core Projects that are working on the atmosphere-land interface (iLEAPS) and the atmosphere-ocean interface (SOLAS). Representatives from the three organizations have also, whenever possible, attended each other's SSC meetings and conferences. The Executive Officers of the three organizations are in regular communication and are working to facilitate collaborations amongst the growing number of researchers doing work relevant to atmospheric chemistry.

Table A
IGAC Steering Committee Members & areas of Expertise (2004):

	Name	Country	IGAC liaison to:	bio-atmo	aerosol	aero-cloud	photochem	air quality	trace gas	marine	terrestrial	modeling	remote sensig	UT/LS	Chemical kinetics	Paleo
1	Bates, Tim	USA	IGBP	x	x			x		x						
3	Fuzzi, Sandro	Italy	CACGP	x	x	x		x		x						
2	Liu, Shaw	CHN-Taipei	WCRP				x	x	x			x		x		
4	Burrows, John	Germany	IGACO/ IGOS				x	x	x				x	x	x	
5	Gallardo, Laura	Chile	START			x		x				x		x		
6	Ilyin, Ilia	Russia	FOOD					x				x				
7	Jayaraman, Achuthan	India	WATER		x											
8	Koike, Makoto	Japan	CARBON				x		x							
9	Law, Kathy	France	SPARC				x							x		
10	Lohmann, Ulrike	Switzerland	GAIM/ CACGP		x	x						x				
11	Lowe, Dave	New Zealand	CARBON				x		x							
12	Manning, Martin	USA	IPCC						x							
13	Parrish, David	USA	SPARC				x	x	x							
14	Rasch, Phil	USA	GAIM		x	x						x		x		
15	Scholes, Mary	S. Africa	ILEAPS	x					x		x					
16	Wolff, Eric	UK	PAGES		x		x									x
17	Xu, Yongfu	CHN-Beijing	SOLAS					x		x		x				
	EX-OFFICIO MEMBERS															
	Barrie, Len		WMO													
	Thompson, Ann		CACGP													
	Ravishankara , A.R.		SPARC													
	Platt, Ulrich		SOLAS													
	Mary Ann Carroll		iLEAPS													

***Note*: Mary Scholes & Ulrike Lohmann are also both on the IGBP Steering Committee**

New IGAC Steering Committee Members, as of 2005:
(replacing Tim Bates, Martin Manning and Mary Scholes)

	Name	Country	IGAC liaison to:	bio-atmo	aerosol	aero-cloud	photochem	air quality	trace gas	marine	terrestrial	modeling	remote sensig	UT/LS	Chemical kinetics	Paleo
1	Martin, Randall	Canada						x	x				x			
3	Piketh, Stuart	S. Africa			x				x			x				
2	Raga, Graciela	Mexico				x		x								