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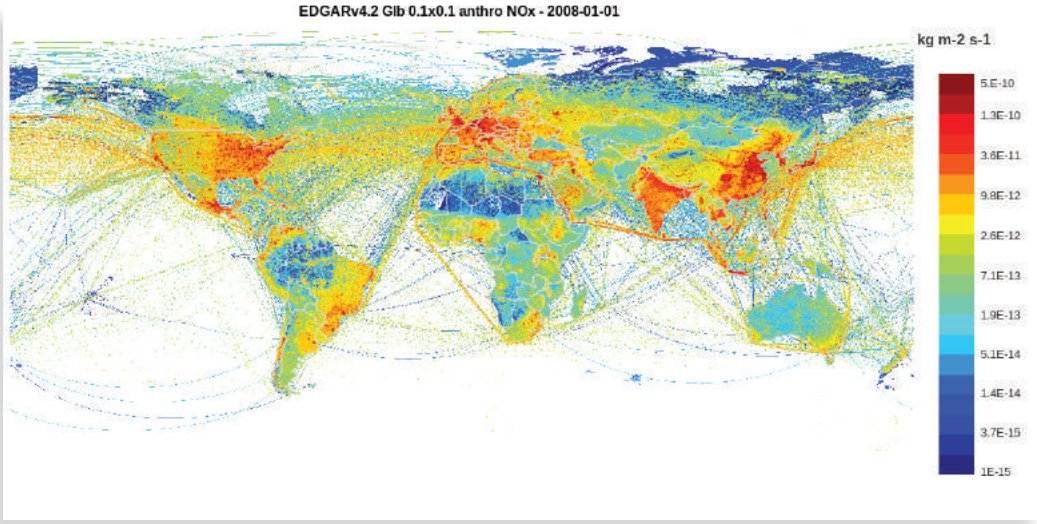
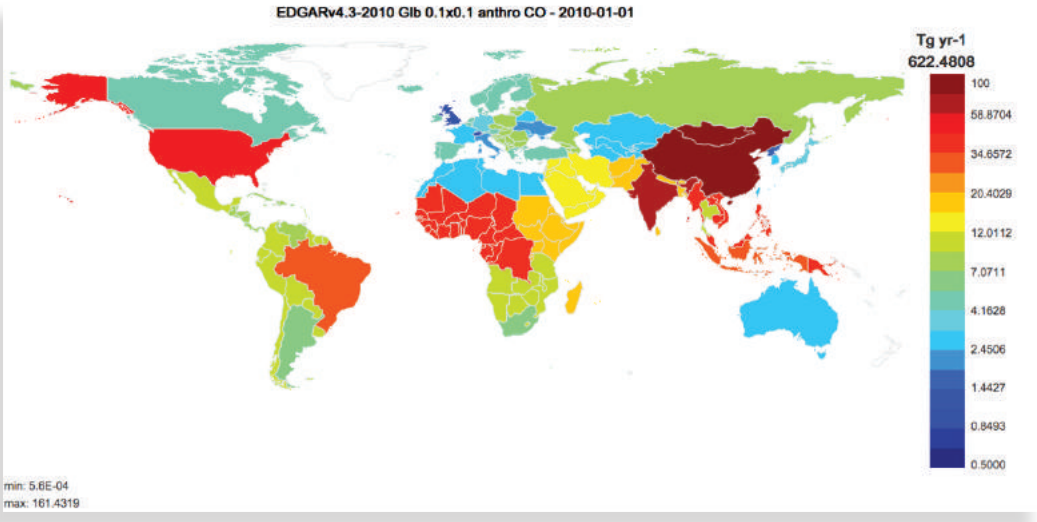
IGACnews

facilitating atmospheric chemistry research towards a sustainable world

issue 61
feb/mar 2018

The Emissions of Atmospheric Compounds and Compilation on Ancillary Data (ECCAD) provides a new suite of analysis and visualization tools. *See page 19.*





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On the Cover

Examples of the ECCAD visualization tools, spatial distribution of the emissions (top), totals emitted for different regions (bottom).
Source: **http://eccad.aeris-data.fr/**

Editor: Megan L. Melamed
Design: Allison Gray

IGAC was formed in 1990 to address growing international concern over rapid changes observed in Earth's atmosphere. IGAC operates under the umbrella of Future Earth and is jointly sponsored by the international Commission on Atmospheric Chemistry and Global Pollution (iCACGP). The IGAC International Project Office is hosted by the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado and is sponsored by the US National Science Foundation (NSF), National Oceanic and Atmospheric Association (NOAA), and National Aeronautics and Space Administration (NASA). Any opinions, findings, and conclusions or recommendations expressed in this newsletter are those of the individual author(s) and do not necessarily reflect the views of the responsible funding agencies.

editor's note

2018 IPCC Cities and Climate Change Conference (CitiesIPCC)

For the past year, I served as a member of the scientific steering committee (SSC) for the 2018 IPCC Cities and Climate Change Conference (**CitiesIPCC**) that took place 5-7 March 2018 in Edmonton, Canada. The aim of the conference was to inspire the next frontier of research focused on the science of cities and climate change by bringing together the science, policy, and practice communities to develop a new global research agenda.

Since a primary goal of the conference was to bridge these three communities, the SSC included physical and social scientists as well as representatives from the policy and practice communities. The practice community, a term relatively new to me, is NGO's, foundations, consulting firms, and the like that often work, "practice", in cities on climate change.

Likewise, a goal for the conference was to have a good diversity of scientists, policy makers, and practioners attend. The conference had 701 participants, 46%, 20%, and 21%, from the science, policy, and practice communities, respectively, and 14% from "other" communities. The experience of working with the 18 member SSC and attending the conference showed me the opportunities and challenges we still face in not only working across physical and social science disciplines, but also with the policy and practice communities.

The opportunities are the potential impacts research on cities and climate change could have if it was done in an integrated manner across the three communities. It seemed during the conference there were times when great science was being produced, but it was not necessarily about the areas a city government or a NGO could take action on. It is not to say the science is not useful for other reasons, scientific knowledge being one of them, but that if the scientists knew what "levers" could be pulled by policy makers and NGOs it might help determine what should be studied more closely. It was also apparent policy makers and practioners could be reaching out to scientists more frequently to learn what the current state of knowledge is on a topic before implementing policies or projects on the topic. These types of conversations could lead to a more integrated approach to research on cities and climate change.

Of course, these opportunities are not without their challenges. Whether it is working across different scientific disciplines or scientists working with policy makers and practioners, it is often a challenge to find a common language, timeframe, and scale that works across all the communities. The absence of a common language often can hinder a conversation from starting. For example, a "proposal" is defined differently by each the scientific, policy, and practice communities. Each community often believes the other one must know what a proposal means and encompasses in their community. Policy makers and practioners often work on a shorter timeframe to develop a policy or implement a project than the time is takes to produce robust scientific knowledge about a specific topic. Scale is also important, a city government only has jurisdiction over its boundaries, yet science continually crosses political boundaries to understand a topic.

The CitiesIPCC Conference demonstrated that although challenges exist, the potential opportunities far outweigh them. It will take all sides to acknowledge they could work with other communities better for progress to continue. It is with respect and humility the science, policy, and practioner communities are coming together to inspire the next frontier of research focused on the science of cities and climate change.

Happy reading!

MEGAN L. MELAMED
IGAC Executive Officer
megan@igacproject.org

Megan Melamed received her PhD in 2006 in Environmental Engineering from the University of Colorado. She then received the National Science Foundation International Research Fellowship to work at the Universidad Nacional Autónoma de México (UNAM) in Mexico City for two years. Upon completion of the NSF Fellowship, Megan became an American Association for the Advancement of Science (AAAS) Science & Technology Policy Fellow at the U.S. Environmental Protection Agency. She has been the IGAC Executive Officer since January 2011.

IGAC Welcomes One New Member to its SSC

At the end of 2017, two members of the IGAC Scientific Steering Committee completed their service. IGAC is very grateful for the years Tao Wang (Hong Kong Polytechnic University, China) and Spyros Pandis (University of Patras, Greece) served on the SSC. They will be greatly missed.

Mei Zheng
Peking University

At the start of 2018, the IGAC SSC welcomed one new member, Mei Zheng of Peking University in China.

Mei Zheng is a professor in the Department of Environmental Sciences and Engineering, and an adjunct professor of Marine Research Institute at Peking University in Beijing, China. She received her Ph.D. from Graduate School of Oceanography, University of Rhode Island in 2000 and worked at School of Earth and Atmospheric Sciences at Georgia Institute of Technology from 2000-2010. She joined Peking University since 2010. Her research interests include sources and formation mechanisms of PM2.5 and transport of anthropogenic aerosol to marine environment using chemical tracers and modeling tools.

Recent IGAC Fostered Publications

TOAR tropospheric ozone assessment report

The assessment report is being published as a series of papers in the peer-reviewed journal, *Elementa – Science of the Anthropocene*. Papers published so far are available through a **Special Feature** of Elementa:

- Fleming ZL, Doherty RM, von Schneidemesser E, Malley CS, Cooper OR, Pinto JP, et al.. Tropospheric Ozone Assessment Report: Present-day ozone distribution and trends relevant to human health. Elem Sci Anth. 2018;6(1):12. DOI: **http://doi.org/10.1525/elementa.273**
- Young PJ, Naik V, Fiore AM, Gaudel A, Guo J, Lin MY, et al. Tropospheric Ozone Assessment Report: Assessment of global-scale model performance for global and regional ozone distributions, variability, and trends. Elem Sci Anth. 2018;6(1):10. DOI: **http://doi.org/10.1525/elementa.265**
- Schultz MG, Schröder S, Lyapina O, Cooper O, Galbally I, Petropavlovskikh I, et al.. Tropospheric Ozone Assessment Report: Database and Metrics Data of Global Surface Ozone Observations. Elem Sci Anth. 2017;5:58. DOI: **http://doi.org/10.1525/elementa.244**
- Chang K-L, Petropavlovskikh I, Cooper OR, Schultz MG, Wang T. Regional trend analysis of surface ozone observations from monitoring networks in eastern North America, Europe and East Asia. Elem Sci Anth. 2017;5:50. DOI: **http://doi.org/10.1525/elementa.243**

Submit articles to the next IGAC News

IGAC is now accepting article submissions for the next IGACnews. Workshop Summaries, Science Features, Activity News, and Editorials are all acceptable and desired. Science Features should have an approximate length of 1500 words with 1-2 images. All other submissions should be approximately 500 words and have 1-2 images. Please provide high-resolution image files. The deadline for submissions for the Jul/Aug 2018 issue of IGACnews is 13 July 2018. Send all submissions to **info@igacproject.org**.

IGAC ON SOCIAL MEDIA

IGAC is on LinkedIn, Twitter and Facebook in an effort to further advance international scientific cooperation and serve as a resource to the public, especially you. Please join us to stay apprised of the most current news on conferences, workshops and publications. Let us hear from you on how to improve the international conversation, **@IGACProject**.

25-29 September 2018

ABSTRACT SUBMISSIONS ARE DUE 11 APRIL 2018

KEYNOTE SPEAKERS

- **Hakime Akimoto**, NIES, Japan
- **Ian Galbally**, CSIRO, Australia
- **Margaret Tolbert**, University of Colorado, USA

INVITED SPEAKERS

SESSION 1: Atmospheric Chemistry and People

- **Cathy Liousse**, CNRS/University of Toulouse, France
- **Rajesh Kumar**, NCAR, USA

SESSION 2: Atmospheric Chemistry and Fundamentals

- **Luc Vereecken**, IEK, Germany
- **Nonne Prisle**, University of Oulu, Finland

SESSION 3: Atmospheric Chemistry and Ecosystems

- **Toshinobu Machida**, NIES, Japan
- **Kathryn Emmerson**, CSIRO, Australia

SESSION 4: Atmospheric Chemistry & Climate/Weather

- **Sachin Ghude**, IITM, India
- **Bill Collins**, University of Reading, UK

SESSION 5: Challenging the Future

- **Guy Brasseur**, MPIMET, Germany
- **Jhoon Kim**, Yonsei University, Korea
- **Kim Prather**, University of California, USA

Early Career Scientists Opportunities

- **2018 iCACGP/IGAC Early Career Short Course** (application required)
- **iCACGP-IGAC 2018 Early Career Travel Grants** (application required)
- **iCACGP-IGAC 2018 Early Career Program** (ALL early career scientists are welcome)

22 September - 24 September 2018

Join the 2018 iCACGP/IGAC Early Career Short Course and be part of a group of 40 promising early career atmospheric scientists from across the globe. The course aims to foster professional friendship and collaboration among the future leaders of atmospheric chemistry research. Investing in future leaders is a vital part of both iCACGP and IGAC's mission to foster international atmospheric chemistry research towards a sustainable world.

The iCACGP/IGAC Early Career Short Course will provide a platform for early career scientists from around the world to come together and create an international network amongst peers that will foster international scientific collaborations for years to come. The course will build on your strong scientific education and research received during your PhD and/or postdoc by introducing you to new ideas, concepts, and skills.

Lectures and workshops will be given by leaders within their field, including IGAC and iCACGP scientific steering committee members.

Sessions will focus on:

1. Connecting modelling, observations and laboratory studies
2. The future of atmospheric chemistry
3. Engaging in the science-policy system
4. Summarising, collaborating and communicating

The short course will also include a dinner with IGAC and iCACGP scientific steering committee members. Practice networking skills and talk to the established scientists who play a key role in shaping the current objectives of IGAC.

There are only 40 positions in the 2018 iCACGP/IGAC Early Career Short Course, so if you are a current student or within three years of completing your PhD, make sure to apply!

For more information on the course and how to apply, visit 2018 **iCACGP/IGAC Early Career Short Course** for more information

25 September - 29 September 2018

The joint 14th iCACGP Quadrennial Symposium/15th IGAC Science Conference (iCACGP-IGAC 2018) offers a program for Early Career Scientists aimed at fostering professional relationships and collaboration among the next generation of researchers. *All* students and scientists within three years of completing their PhD are invited to participate in the events.

Early Career Scientists will have the opportunity to attend multiple events throughout the week of iCACGP-IGAC 2018:

- Early Career mixer
- Talks focused on a variety of career skills
- Lunch with established scientists
- Early Career meet-up room
- Excursion
- Poster and oral presentation competition

Make the most out of iCACGP-IGAC 2018 and participate in the Early Career Program! Visit **2018 iCACGP-IGAC Early Career Program** for more information.

CALL FOR NOMINATIONS

for the

PAUL J. CRUTZEN AWARD FOR EARLY CAREER SCIENTISTS - 2018

INTERNATIONAL COMMISSION ON ATMOSPHERIC CHEMISTRY AND GLOBAL POLLUTION (ICACGP)

The "Paul J. Crutzen Award for Early Career Scientists of the International Commissions on Atmospheric Chemistry and Global Pollution" is granted for an outstanding research contribution in atmospheric sciences by an early career scientist.

The purpose of the award is to promote scientific innovation in atmospheric sciences for the protection of the environment.

For more information, see the full call for nominations or visit **icacgp.org**.

Nomination deadline is 10 June 2018.

4-6 SEPTEMBER 2017
YOKOHAMA, JAPAN

IGAC Endorsed

The 8th International DOAS Workshop

AUTHORS
Yugo Kanaya, Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Japan

HOST INSTITUTIONS

JAMSTEC
CHIBA UNIVERSITY
福岡大學
FUKUOKA UNIVERSITY

FUNDING

名古屋大学
NAGOYA UNIVERSITY
JAMSTEC

PARTICIPANTS
Australia, Austria, Belgium, Canada, China, Germany, India, Japan, Korea, Mexico, Netherlands, New Zealand, United States

BACKGROUND
IGAC endorsed this workshop as part of its effort to support fundamental scientific research. The workshop focused on the exchange of the state-of-the-science information on the DOAS measurement/analysis technologies relevant to harmonization of the measurement networks, including ground-based and satellite observations. Communications and interactions between atmospheric chemist and geochemist were also facilitated.

Participants of the 8th International DOAS Workshop in Yokohama, Japan.

Since its invention in the 1970s, differential optical absorption spectroscopy (DOAS) has evolved into a key core technology used for satellite observations of atmospheric gas molecules (e.g., NO_2 or HCHO), aerosols, and clouds. With passive and active variations, DOAS is also widely used for in situ and remote observations from land-, sea-, and air-based platforms. The international DOAS workshop series, held about once every 2 years since 2001, has provided opportunities to discuss recent advances and exchange new ideas and information related to all aspects of DOAS-related research. From 4 to 6 September 2017, the 8th International DOAS Workshop was held at the Yokohama Port Opening Memorial Hall in Yokohama, Japan. Endorsement from IGAC improved recognition of the event; therefore, we had 100 participants from 13 countries, making 42 oral and 68 poster presentations.

Professor Urlich Platt (Heidelberg University) gave an invited presentation highlighting recent key developments, including the Fabry–Perot interferometer-based camera. Another invited talk was given by Dr. Ryunosuke Kazahaya (AIST, Japan) regarding the application of DOAS in volcanology, in which recent unmanned air vehicle-based SO_2 measurements over Japanese volcanoes were introduced. General session topics ranged from instrumental and algorithmic developments to applications in various fields of atmospheric research. Specifically, the topics included imaging DOAS, preparation for upcoming satellite observation missions (e.g., S5P/TROPOMI, GEMS, or EMI/GF-5),

Venue of the workshop (Yokohama Port Opening Memorial Hall, Yokohama, Japan).

ongoing satellite observations and their validation, networks of ground-based observations (e.g., Pandonia, MADRAS, SKYNET etc.) and their harmonization (e.g., CINDI-2), halogen chemistry, flux, and environmental observations.

Considering the new results presented during the three days, we discussed the future of DOAS during the last hours of the workshop. Discussion on hardware included notes on usage of small spectrometers and possible observations of extraterrestrial solar spectrum at high resolution from satellite to obtain a "perfect" solar atlas. Discussion on spectral analysis and algorithms covered revised absorption cross sections of molecules (e.g., O_4 or H_2O) and profile inversion algorithms to better explore maximum information content and to take three dimensional radiative transfer effects. For future

General session topics ranged from instrumental and algorithmic developments to applications in various fields of atmospheric research.

applications, we discussed DOAS use in air quality monitoring and control, and in studies on pollutant emissions, wildfires, marine photochemistry, volcanic emissions, aerosols, clouds, and greenhouse gases. The importance of its application to explore Arctic science was also mentioned. For future satellite observations and harmonization, the focus was on improving spatial resolution and time sampling (e.g., for geostationary satellites). Discussion on harmonization showed possible use of common sensor design and processing (e.g., retrieval algorithms, surface albedo database, or data formats), particularly for satellite constellations. Discussions also covered central processing of spectra from existing ground-based networks or those under development, in order to exploit interlinks between them. The importance of studies combining DOAS measurements and chemical transport modeling was also highlighted, for interpretation of the measurements in terms of emission strength, transport, and transformation, and also for accurate determination of the state of the atmospheric composition.

Throughout the workshop, experts were able to engage in energetic discussion and friendly communication. We hope that the workshop in the harbor city of Yokohama will put wind in the sails of the participants, to facilitate atmospheric chemistry research and to work towards a sustainable future.

More information is available on the **workshop website**.

13-15 SEPTEMBER 2017

UNIVERSITY OF HAMBURG, HAMBURG, GERMANY

IGAC Sponsored

AUTHORS

Gregory Frost, National Oceanic and Atmospheric Administration (NOAA), USA

Paulette Middleton, Panorama Pathways, USA

Leonor Tarrason, Norwegian Institute for Air Research (NILU), Norway

Claire Granier, Laboratoire d'Aerologie, France; NOAA & University of Colorado Cooperative Institute for Research in Environmental Sciences (CIRES), USA

HOST INSTITUTIONS

FUNDING

PARTICIPATING NATIONS

Argentina, Austria, Belgium, Canada, Chile, China, Cuba, Czech Republic, Finland, France, Germany, Greece, Hong Kong, Italy, Ivory Coast, Japan, Kuwait, Mexico, The Netherlands, Nigeria, Norway, Poland, Portugal, Russia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, United Kingdom, United States

BACKGROUND

IGAC financially sponsored this workshop to support the jointly sponsored IGAC/iLEAPS Global Emissions Initiative (GEIA). This activity seeks to enhance access to emissions data, facilitate analysis to improve the scientific basis for emissions information, and strengthen the emissions community.

18th GEIA Conference -

Emissions Science for a Healthy Environment: The interplay of human versus natural influences on climate and air quality

18th GEIA Conference Participants

The Global Emissions InitiAtive (**GEIA**), a vibrant IGAC-sponsored international scientific activity that began in 1990, has three goals:

1. promoting broad and consistent access to global and regional emissions data;
2. improving the scientific basis of emissions information by enhancing analysis of emissions processes; and
3. strengthening the global community of emissions stakeholders.

111 scientists representing 34 countries recently gathered at the University of Hamburg in Germany for the 18th GEIA Conference on *Emissions Science for a Healthy Environment: The interplay of human versus natural influences on climate and air quality*. The 3-day Conference included 95 presentations organized around 3 themes: Inventories & Emissions Trends; Top-Down Emissions Analyses; and Environmental, Climate, Health & Societal Impacts. These themes were discussed and elaborated in oral sessions combining 5-minute talks on similar issues, along with poster sessions that expanded information on each theme. Each oral session was followed by a speaker panel guided by questions meant to stimulate discussions that

were a highlight of the Conference. Emerging capabilities for displaying and analyzing emissions data (**ECCAD**) and for building global emissions inventories (**CEDS**) were also demonstrated at the Conference. A Town Hall discussion engaged Conference participants in a robust exchange of ideas about the priorities for future emissions research and how the GEIA community can address these issues in order to better inform its stakeholders. The Conference program and presentations are available at **geiacenter.org**.

The scientific presentations and the discussions throughout the Conference highlighted recent advancements and continuing challenges to improved emissions understanding:

Extended emissions data. There is a continuing need to gather and improve additional data that are fundamental to emissions inventory development and the representation of emissions in atmospheric models. Data on temporal variations of emissions and the heights of sources are necessary for modelling studies, yet are not always easily accessible. Geospatial data and their associated proxies used to assemble inventories and allocate emissions to model grids, such as land use/land cover and the extent of urbanization, need to be known with higher accuracy and to have their temporal changes quantified. The quality of such data is not always well documented, nor are they sufficiently validated. The community urged GEIA to promote transparency and documentation of emissions inventories and their auxiliary data and recommended top-down validation of inventories with models and observations. GEIA is planning to form a working group to gather and harmonize emissions auxiliary data for use by modeling groups around the world. Similarly, GEIA's Volatile Organic Compound (VOC) Working Group is working to evaluate the speciation of VOC emissions using ambient observations in the world's largest cities.

There continues to be a need to improve near-real-time estimates of emissions as well as longer term emissions scenarios. A potential future direction for the community is finding ways to link current robust static inventories with datasets that account for the dynamical nature of emissions, which constantly change in response to anthropogenic and natural drivers. This effort also involves improving the capabilities for near-real-time observations of emissions. There is a growing demand for higher resolution emissions datasets, both to enhance atmospheric science analyses and to facilitate collaborations with stakeholders, such as the human health community.

Top-down emissions analyses. In contrast to "bottom-up" methods employing a process-level understanding of emissions, "top-down" analyses combine ambient observations with atmospheric modeling to estimate emissions at local to global scales. Top-down methods, including a variety of inverse modelling approaches, have proliferated in recent years and were well represented at the Conference. Atmospheric inversions of greenhouse gases measured by networks of ground stations and tall towers are now part of European national reporting to international agencies. When made consistently over time, measurement networks like these can be used to constrain emissions from different sources.

GEIA is planning to form a working group to gather and harmonize emissions auxiliary data for use by modeling groups around the world. Similarly, GEIA's Volatile Organic Compound (VOC) Working Group is working to evaluate the speciation of VOC emissions using ambient observations in the world's largest cities.

Satellite measurements continue to evolve as important constraints on emissions, and can help to identify missing or inadequately quantified sources in bottom-up inventories. Evidence from top-down analyses using data from a variety of measurement platforms can indicate pollutants of emerging importance, lead to improved inventory development, and suggest areas where control actions may be needed. Multi-component emissions analysis, i.e., deriving emissions information for multiple pollutants simultaneously, is important to understand emissions sources and changes in emissions drivers. With this bounty of research findings comes an increasing need to synthesize information derived from top-down emissions and trends, both in areas with existing robust bottom-up inventories and in developing regions where inventories are relatively new and where previously unidentified pollutants and sources are emerging.

Evaluating uncertainties. The Conference highlighted efforts to increase transparency in emissions estimates through systematic uncertainty analysis. Uncertainties are still not reported for many bottom-up inventories.

Uncertainty estimates are needed for inventory emissions' temporal evolution and spatial distributions, and also for inventory auxiliary data such as land use. Top-down methods likewise require better documentation of their errors, not only for their final derived emissions values but also for the datasets that are used to produce a top-down estimate. For example, satellite retrievals rely on various assumptions about atmospheric vertical composition and the physical properties of the absorbing species.

Conference highlighted strengthening links between data providers in the regulatory and industrial communities and between researchers and policy makers engaged in air quality, climate and human health. Data from the GEIA community is increasingly being used to understand environmental and health impacts in developing regions, while existing data was largely collected in more developed nations. GEIA could play a larger role in raising awareness of environmental and health impacts of emissions.

Hamburg, Germany

Inverse methods require error covariance estimates that need better documentation and assessment. Top-down methods that make use of atmospheric models employ a variety of chemistry and transport schemes that introduce unquantified or poorly understood errors into derived emissions estimates. Sensitivity analyses and multi-component evaluations may show promise for quantifying uncertainties in top-down estimates.

Engagement. Improved engagement through enhanced dialog and stronger linkages, both among emissions experts and between these experts and their user communities, is vital to understanding emissions and their applications around the world. The Conference demonstrated that emissions are dynamic, with new pollutants and sectors emerging all the time in different regions of the globe. The best emissions products result from strong connections between local and international experts, as exemplified by the efforts of GEIA's China and Latin America/Caribbean Working Groups. The

This 18th Conference demonstrated that GEIA has evolved from providing *input* to science to providing *science* to serve society and to support environmental policies. GEIA looks forward to seeing the progress made on these issues when the community reconvenes in Santiago, Chile, in November 2019.

2-4 OCTOBER 2017
SUNPORT TAKAMATSU CONVENTION CENTER, TAKAMATSU, KAGAWA, JAPAN

IGAC Sponsored

AUTHORS

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HOST INSTITUTIONS

Japan National Committee JpSAC

FUNDING

National Institute for Environmental Studies

名古屋大学 宇宙地球環境研究所

PARTICIPANTS

Japan

BACKGROUND

Japan Society of Atmospheric Chemistry (JpSAC) was officially established in 1999, following the community-making process that began right after the inauguration of IGAC in 1990, and was boosted by the 8th CACGP Symposium / 2nd IGAC Scientific Conference held in Fuji Yoshida in September 1994. Today JpSAC has approximately 260 members, including 40 student members, and has good collaboration with IGAC through the IGAC-Japan National Committee.

JpSAC Annual Meeting 2017/IGAC Japan National Committee Annual Meeting

One hundred and seventeen scientists, including 34 students, representing more than 70 universities and institutes from different regions in Japan recently gathered at Sunport Takamatsu Convention Center, Takamatsu, Kagawa, Japan, for the 23rd Japan Society of Atmospheric Chemistry (JpSAC) Annual Meeting 2017, which provided opportunities to present new scientific and technological results, exchange information and ideas, and explore possible collaborations. JpSAC is the "home" for atmospheric chemists based in Japan, where the scientists and students can share their passion for atmospheric chemistry. We have a tradition to hold this annual fall meeting at or nearby a nice "onsen" (hot spring) lodge in Japanese style, so that participants can stay together day and night, to facilitate communications and interactions, just like Gordon Research Conferences.

JpSAC Annual Meeting 2017 Participants

JpSAC was officially established in 1999, greatly contributing to the development of the atmospheric chemistry community in Japan. Today JpSAC has approximately 260 members, including 40 student members. The main area of research is tropospheric and stratospheric chemistry, but also includes the interactions of the atmosphere with terrestrial ecosystems and surface ocean. JpSAC holds two meetings per year, provides a mailing list, publishes a journal/newsletter, and offers awards for students and early career scientists.

Takamatsu, Japan

The 3-day meeting included presentations organized around multiple topics from tropospheric chemistry, biogeochemical cycles, regional air pollution in Asia, with a variety of approaches and tools of ground, aircraft, and satellite observations, modeling, and laboratory studies.

In the oral sessions, there were 29 selected presentations with active Q&A after each talk. Each slot was relatively long (20-min), allowing in-depth and extensive discussions with a number of audiences. There were two invited talks by professors locally based at Kagawa University on the response of the upper troposphere/lower stratosphere to the Asian monsoon, and the mechanisms of yellow sand building in arid areas. Poster sessions with 57 posters were held throughout the 3 days, and enthusiastic conversations and discussions among the participants were seen and heard everywhere not only during the time of the poster sessions but also during breaks. A Town Hall-like "evening" session was held, to introduce the activities of the new JpSAC Steering Committee and to encourage the participants to discuss and exchange the new ideas. The JpSAC sub-committees and working groups reported on their activities and plans. At night, thanks to a fabulous onsen lodge, the participants had active interactions, witnessing that many people were looking forward to **iCACGP-IGAC 2018** this September. The meeting was closed by a ceremony to give the "JpSAC Excellent Student Presentation Award" to three prominent students, and "JpSAC Young Scientist Award" to one early career scientist.

The meeting highlighted the successes of the ongoing development of the atmospheric chemistry community in Japan, promising the strong engagement of the Japanese atmospheric chemistry scientists for iCACGP-IGAC 2018.

The meeting is not only for Japanese and international scientists based in Japan but open for scientists from all over the world. The JpSAC has strong hope to enhance the involvement and commitment of international scientists in a more seamless and coherent community at grass-roots level.

More information of JpSAC and its annual meetings can be found at **https://jpsac.org/foreign-scientists/**. Why don't you join us and become a member?

IGAC Japan National Committee Career Development Short Course for Early Career Scientists in Atmospheric Chemistry

4-6 OCTOBER 2017
FURUSATO-MURA VILLAGE, SHODOSHIMA ISLAND, KAGAWA, JAPAN

IGAC Sponsored

AUTHORS

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HOST INSTITUTIONS

Japan National Committee

FUNDING

National Institute for Environmental Studies

ISEE 名古屋大学 宇宙地球環境研究所

JpSAC

PARTICIPANTS

Japan

BACKGROUND

IGAC Japan National Committee is a national committee under the Science Council of Japan. It oversees IGAC-related scientific activities in Japan and works closely with IGAC to contribute to the mission of IGAC. The IGAC Japan National Committee hosted the first short course for early career scientists in 2017, contributing to IGAC's focus on building capacity by fostering the next generation of atmospheric scientists.

1st Career Development Short Course for Early Career Scientists in Atmospheric Chemistry Participants

Twenty five scientists including 13 early career scientists (PhD students and postdocs) from a variety of universities and institutes in different regions of Japan recently gathered at Furusato-mura Village in Shodoshima Island, Kagawa, Japan, for the 1st Career Development Short Course for Early Career Scientists in Atmospheric Chemistry, co-organized by **IGAC Japan National Committee, Japan Society of Atmospheric Chemistry (JpSAC)**, Institute for Space-Earth Environmental Research (ISEE) of Nagoya University, and National Institute for Environmental Studies (NIES). In Japan fostering the next generation of scientists is an urgent issue, facing the decreasing number of PhD students due to very few tenured positions that can be offered for new PhDs. Right after the JpSAC Annual Meeting 2017, which took place in Takamatsu, Kagawa, the participants took a ferry and moved to Shodoshima Island, surrounded by the beautiful Seto

Shodoshima Island, Kagawa, Japan

Inland Sea. The objective of this Short Course was to provide early career scientists with an opportunity to learn international scientific activities, scientists' career and life, and some skills and tips to be successful.

The 3-day Short Course included three sessions: lectures, practices, and presentations. Lectures included "Overview of IGAC, iCACGP, and the 2018 joint iCACGP QS/IGAC SC", "Importance of oral presentations for scientific career", "Why is joining early career program important for a scientific career?", and "How to write CV and short statement of interest (letter of interest)", given by Hiroshi Tanimoto, and "The philosophy of a scientist: 50 years of research career" given by Prof. Hajime Akimoto (NIES guest scientist and AGU Fellow), a 78-year old, still active scientist as well as a pioneer of atmospheric chemistry research in Japan. In his speech, he looked back upon his life and talked about what he regarded as important for living as a researcher and being a scientist by profession, thus, providing inspiring perspectives to be good guidelines for the future generation of the atmospheric chemists.

"Improving oral presentation skills" was moderated by Nobuyuki Takegawa, being comprised of short (5-min) talks on individual PhD student or postdoctoral research, followed by Q&A, and then critical comments on the presentations, leading to extensive discussions on presentation skills and tips. The participants presented their research and then discussed how to apply their work more effectively.

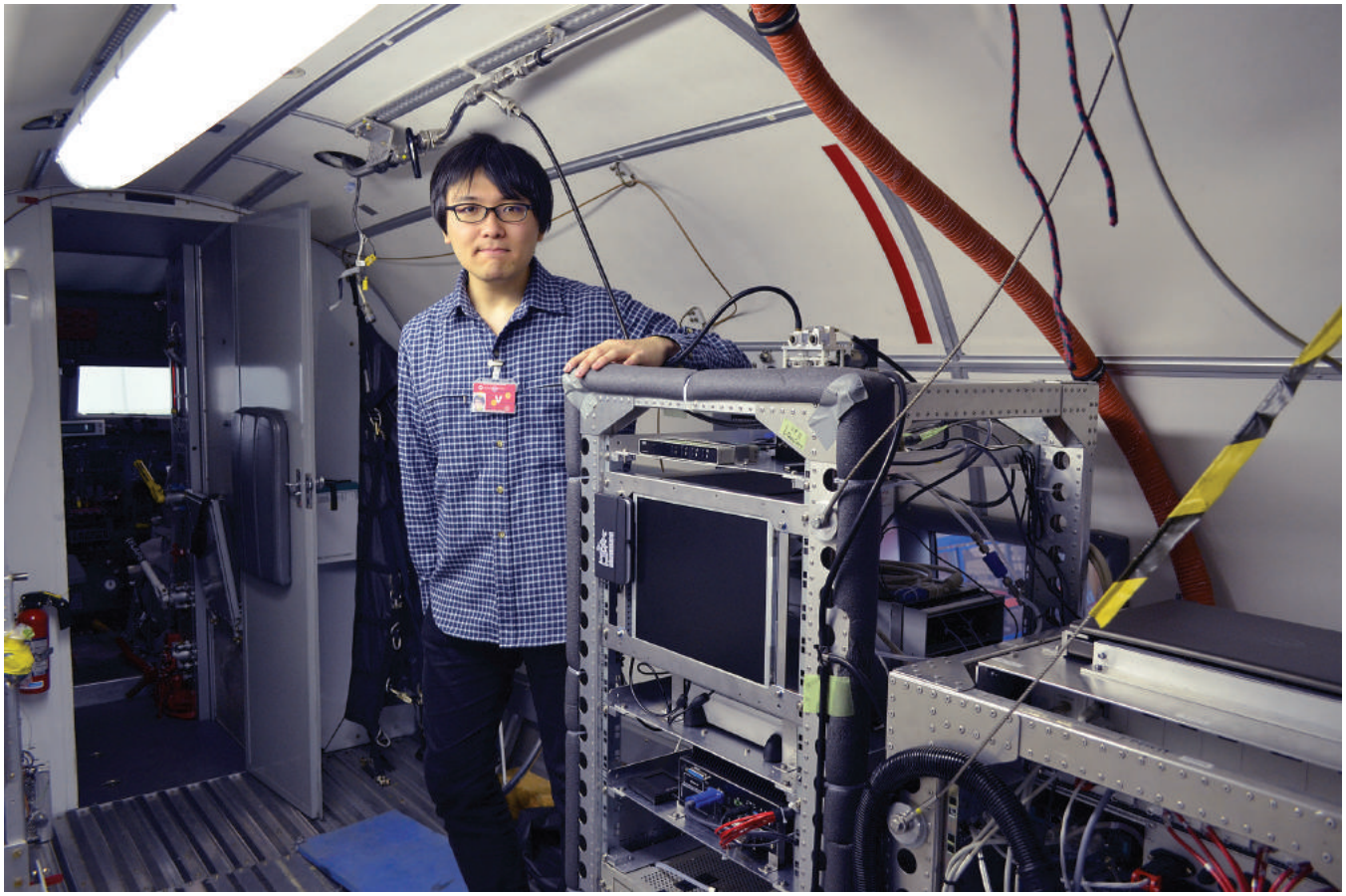
Over the 3-day Short Course, which included meals and social events, the participants enjoyed opportunities to talk and share the ideas and experiences with each other, between early career and senior scientists. We hope these experiences inspired the early career scientists and broadened their view points. After the Short Course, we received some very positive comments such as "I was able to have active discussions on my research", "I could interact in all directions", and "I've learned a lot about the importance of research" from a broad range of participants from the PhD student to postdoc levels.

We hope we were able to help the early career scientists develop their careers by providing an international outlook, an opportunity to improve their writing and presentation skills, as well as to think about a future life career as a researcher. We also hope the early career scientists make friends with each other, for possible collaborations in future work and events. The Short Course was inspiring to the senior organizers, as well.

More details of the Short Course can be found at **https://jpsac.org/**, and we will continue our effort in encouraging career development for the early career scientists in Atmospheric Chemistry in Japan.

Atsushi Yoshida

Atsushi Yoshida attended the IGAC Japan National Committee Career Development Short Course for Early Career Scientists in Atmospheric Chemistry 4-6 October 2017 in Shodoshima Island, Kagawa, Japan.



Atsushi Yoshisa is from Tokyo, Japan. He received an undergraduate (BSc.) at The University of Tokyo in Earth and Planetary Environmental Science. Currently, Atsushi is studying his PhD at The University of Tokyo in Earth and Planetary Science under the supervision of Makoto Koike. His research focus is aerosol, in particular iron oxide. Atsushi is developing a new method for measuring micro-physicochemical properties of iron oxide aerosols and has been part of ground observations in East Asia and aircraft observations in the Arctic using this new method. The aim of his research is to understand the sources and abundance of anthropogenic iron oxide aerosols and their impacts on the Earth's system and human.

You attended the Japan Career Development Short Course for Early Career Scientists in Atmospheric Chemistry, what was the highlight of this course for you?

This short course focused on learning how to survive and enjoy life as a scientist, and I feel this aim was successful. I enhanced my presentation skills in the session "Improving skills of oral presentations" where participants presented their research and then discussed how to make their presentation more effective and attractive. Through the whole short course, which included meals and a social event, I had many enjoyable opportunities to talk with early career and established scientists and share worthwhile and tough experiences they had gained through their work, which inspired me and broadened my perspective of research. I was really glad I had joined the short course in Shodoshima Island surrounded by the beautiful Seto Inland Sea, where I learned many things that will improve my career as a scientist.

What are you most looking forward to with the upcoming 2018 joint 14th iCACGP Quadrennial Symposium/15th IGAC Science Conference that will take place in Japan?

In iCACGP-IGAC 2018, I am looking forward to seeing the frontiers of science and how people are working through unique problems. In particular, I expect to learn how experimental and observational researchers try to measure the complex properties of atmospheric constituents including trace gasses and aerosols, which would provide insights into my current and future studies. I also hope to make friends with early career scientists in atmospheric chemistry around the world to inspire each other and collaborate in future studies and events.

When I was a child, looking up the sky, I always wondered why it showed diverse and beautiful colors with different brightness. In bachelor's course, I enjoyed studying atmospheric science and knew that various factors, such as solar radiation, gasses, and aerosols, played important roles in drawing the scene of the sky.

Is there an element or aspect of your research you believe to be particularly important? Why is it important?

My research focuses on iron oxide aerosols, which affect atmospheric radiation, ocean biogeochemistry, and human health. In particular, I have been working hard on developing a new measuring method for iron oxide aerosols to obtain their size-resolved concentration in both real-time and high-time resolutions. I strongly believe that this new technique is important in atmospheric chemistry because it can provide a more detailed dataset of iron oxide aerosols and improve our understanding of their emission, ambient abundance, and impacts on the Earth's system and humans.

Was there an event, influential individual or childhood dream that lead you to become a scientist? If not, what lead you to pursue a career in science?

When I was a child, looking up the sky, I always wondered why it showed diverse and beautiful colors with different brightness. In bachelor's course, I enjoyed studying atmospheric science and knew that various factors, such as solar radiation, gasses, and aerosols, played important roles in drawing the scene of the sky. In particular, I became fascinated by aerosols because of their importance in many areas including climate and environment. In the last year of my bachelor's course, I started my research on measurement of iron oxide aerosols under Nobuhiro Moteki and Yutaka Kondo. Through my study and discussions, I came to realize that we do not completely understand aerosols, which motivated me to become a scientist and to broaden our knowledge of aerosols and their impacts on the world.

Outside of science, what are some of your other interests/hobbies?

In warmer months, I enjoy cycling and taking photos of the sky. In colder months, I stop going outside and have fun playing music on the clarinet, saxophone, and shakuhachi (Japanese flute). IGAC

THE ECCAD DATABASE, VERSION 2: Emissions of Atmospheric Compounds & Compilation of Ancillary Data

AUTHORS

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BACKGROUND

For the past decade, ECCAD (Emissions of Atmospheric Compounds and Compilation on Ancillary Data) has been the emissions database for the IGAC/iLEAPS sponsored Global Emissions IniAtive (GEIA).

1. INTRODUCTION

THE ANALYSIS OF THE COMPOSITION OF the atmosphere, and its changes within space and time, requires an accurate quantification of surface emissions, as well as their spatial and temporal distribution. Since 1990, the GEIA (Global Emissions IniAtive) has brought together groups working on the development of emission datasets with the diverse users of these data, helping to create and distribute large amounts of information on emissions.

For the past decade, ECCAD (Emissions of Atmospheric Compounds and Compilation on Ancillary Data) has been the emissions database for the GEIA project (See **IGACnews issue 46, March 2012**). ECCAD was initially developed in order to provide easy access to a large number of emission data, together with analysis tools, to the scientific community and users. Recently, a new version of the database has been developed, which is detailed in this paper: the first version of the database will soon be disconnected, and all providers and users of ECCAD are invited to obtain an account on the new ECCAD version (see section 3 for details).

2. THE FIRST ECCAD DATABASE

The first version of the ECCAD database started in 2005 with the goal of providing easy access to emission data at both the global and regional scale, for anthropogenic, biomass burning and natural emissions. When available, the emission data were provided for different sectors related to fossil fuel and biofuel consumption, industry and agricultural sources, wildfires, deforestation and savannah fires. Natural emissions were also available, including emissions from the vegetation, soils and oceans. The compounds considered in the portal were ozone precursors, greenhouse gases, aerosols and their precursors, organo-halogens, and a few heavy metals. For each of the global and regional inventories, ECCAD provided an access to the emission data files in the NetCDF format, total annual emission data, pre-calculated emission maps for all the species, metadata and documentation on the inventory, and a visualization tool for comparing pre-calculated maps.

This first version of ECCAD had several issues: it could only accommodate datasets at a 0.5x0.5 or 1x1 degree spatial resolution. In addition, as the number of users has increased steadily over the past

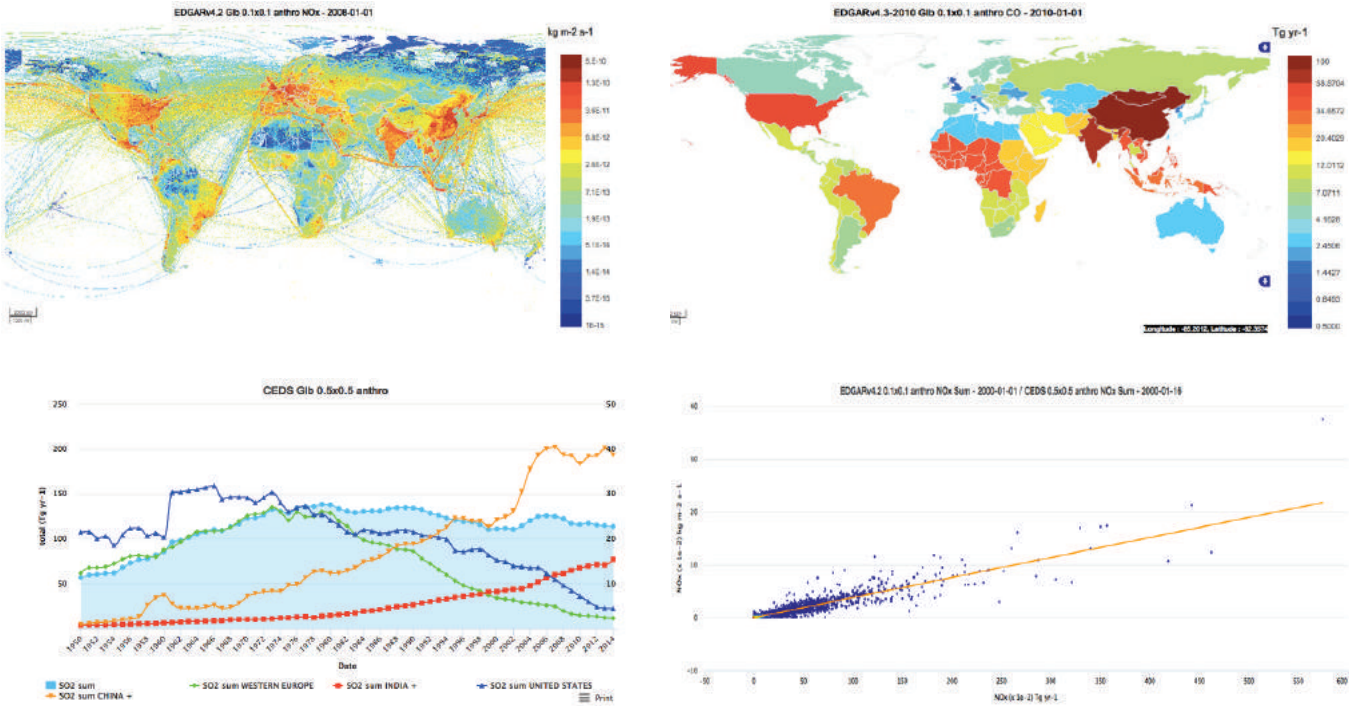


FIGURE 1. Examples of the ECCAD visualization tools, spatial distribution of the emissions (top left), totals emitted for different regions (top right), time series of total emitted (global and for several regions, bottom left), and scatter plot (correlation between NOx emissions from EDGAR4.3 and CEDS for 2010).

few years, reaching more than 2,800 users to date, the technical and computational demands has also increased considerably. In order to make the database more adapted to current gridded emissions data, and to make ECCAD more efficient while many users are connected at the same time, it was decided to start the development of a new version of the database. This database is now fully operational and is described in the following sections.

This first version of ECCAD, located at **http://eccad.sedoo.fr**, will be disconnected in the Spring of 2018. All users are therefore invited to obtain an account to the new version of ECCAD, as indicated in the next section.

3. THE NEW VERSION OF THE ECCAD DATABASE

ECCAD is developed as part of the French AERIS portal (Data and Service for the Atmosphere: **http://www.aeris-data.fr**), which offers access to various products related to atmospheric sciences, such as surface, in-situ and satellite observations, laboratory and spectroscopic information, modeling tools and surface emissions.

Within AERIS, and with the support of the French National Institute for Earth Sciences and Astronomy (CNRS-INSU), the French National Center for Space Studies (CNES), the Copernicus Atmosphere Monitoring Service (CAMS), the French Environment and Energy Management Agency (ADEME) and the United States Environment Protection Agency (US EPA), the new version of the ECCAD database has been developed.

The application can now handle datasets of any resolution, and includes several new data analysis tools, a new download system and a detailed documentation on the features of the database. The ECCAD website has a new graphical chart, with a responsive web design, improved ergonomics and navigation. The URL of the ECCAD database is **http://eccad.aeris-data.fr**.

The ECCAD portal relies on a postgreSql database where all the metadata and the parameters for the application are stored. ECCAD uses Thredds map server, which offers friendly visualization options: zoom, color tables, scale ranges (logarithm or linear). Totals and regional statistics are pre-calculated allowing data quality assessment and on-line quick interactive data analysis.

4. DATA AVAILABLE IN ECCAD

The current list of surface emissions data available in ECCAD is shown in Table 1. It includes emissions from different regions and time periods, as well as emissions optimized using inverse modeling techniques. In ECCAD,

Acronym	Dates	Resolution	Acronym	Dates	Resolution
GLOBAL INVENTORIES					
MACCity (ANT)	1960 - 2020	0.5x0.5	PKU (ANT)	2002-2013	0.1x0.1
ACCMIP (ANT,BB)	1850 - 2000	0.5x0.5	HYDE1.3 (ANT)	1890-1990	1x1
RCPs (ANT)	2005 – 2100	0.5x0.5	POET (ANT,BB,NAT)	1990-2000	1x1
HTAPv2 (ANT)	2008, 2010	0.1x0.1	GFAS1.3 (BB)	2003-2016	0.1x0.1
CAMS (ANT)	*2000-2018*	*0.1x0.1*	GFAS1.2 (BB)	2003-2015	0.1x0.1
EDGARv4.3 (ANT)	1970-2010	0.1x0.1	GFED4 (BB)	1997-2015	0.25x0.25
EDGARv4.2 (ANT,BB)	1970-2008	0.1x0.1	GFED3 (BB)	1997-2010	0.5x0.5
EDGARv4tox1 (ANT)	1970-2008	0.1x0.1	IS4FIRES (BB)	2000-2011	0.5x0.5
CEDS (ANT)	1950-2014	0.5x0.5	GICC (BB)	1900-2005	1x1
ECLIPSEv5 (ANT)	1990-2050	0.5x0.5	GUESS-ES (BB,NAT)	1970-2009	1x1
ECLIPSEv4 (ANT)	2005-2050	0.5x0.5	*CAMS (NAT)*	*2000-2018*	*0.5x0.5*
RETRO (ANT, BB)	1960-2000	0.5x0.5	MEGAN-MACC (NAT)	1980-2010	0.5x0.5
J&Liousse (ANT)	1860-2003	1x1	MEGANv2 (NAT)	2000	0.5x0.5
Andres-CO2 (ANT)	1950-2011	1x1	IASB-TD-OMI (BB,NAT)	2005-2014	0.5x0.5
REGIONAL INVENTORIES - EUROPE					
TNO-MACC (ANT)	2003-2007	7x7 km	EMEP (ANT)	1980-2020	0.5x0.5
TNO-MACCII (ANT)	2003-2009	7x7 km	APIFLAME (BB)	2012-2014	0.25x0.25
CAMS-Europe (ANT)	*2000-2015*	*7x7km*			
REGIONAL INVENTORIES - ASIA					
REASv2 (ANT)	2000-2008	0.25x0.25	*MarcoPoloKNMI (ANT)*	*2007-2013*	*0.25x0.25*
REASV1 (ANT)	1980-2020	0.5x0.5	SAFAR-India (ANT)	2005	1x1
IASB-TD-OMI (ANT)	*2007-2012*	*0.25x0.25*			
AFRICA					
L14 -Africa (ANT)	2005-2030	0.25x0.25	*DACCIWA (ANT)*	*1990-2015*	*0.125x0.125*

TABLE 1. List of emission inventories currently available in ECCAD, for anthropogenic (ANT), biomass burning (BB) and natural (NAT) emissions. Datasets in italics currently have restricted access.

In order to avoid errors when using the emissions data and to allow meaningful comparisons between the datasets, all emissions are provided with the same unit, i.e. kg/m2/s. The values of the mass of each species has been harmonized, and are indicated in the item "species" of the ECCAD catalogue. In order to avoid errors in the conversion from the standard unit to molecules/cm2/s, as commonly used in models, the molar masses of the compounds are given in the files downloaded from the system.

In order to make the database more adapted to current gridded emissions data, and to make ECCAD more efficient while many users are connected at the same time, it was decided to start the development of a new version of the database. This database is now fully operational.

the access to the emission data can be made either public, or restricted to a subset of users. The latter can be useful, for example, during on-going projects when users can ask the ECCAD team to include their data and restrict the access, so that they can use all the ECCAD tools for evaluating and analyzing their data. It is expected that all data with restricted access will eventually become public, after the publications on the datasets are completed.

5. EMISSION ANALYSIS TOOLS

Several analysis tools are available within ECCAD, including visualization tools, and calculations of totals emitted at the global scale, per continent, region or country. Totals can be calculated for a specific period of time, for a specific sector and for different regions. Tools to compare datasets, such as scatter plots, are also available. Examples are given in Figure 1.

6. DOWNLOAD AND FORMAT OF THE DATA

Most data are downloadable and different options are given to the users: emissions for a single species or a group of species can be downloaded, and download restricted to a specific region will be available soon.

The format of the data is Netcdf-CF compliant format, version 4, which provides a native compressed format. Emissions statistics for each species and sector (when available) are now provided as csv files, which can be downloaded together with the Netcdf files.

7. HOW TO CITE AND CONTRIBUTE

All the datasets are provided with metadata, providing information on the dataset (spatial and temporal coverage and resolution, the methodology used to generate the data), as well as information on the acknowledgements that all users are required to use in publication, i.e. the citation of the dataset used in the work reported in the publication, as well as an acknowledgment of the ECCAD database.

The current users of ECCAD are very diverse, which allows ECCAD to continuously expand the number of datasets available to the community. All colleagues interested in increasing the visibility of their data are invited to contact the ECCAD team: the ECCAD team will work on the formatting of the data for their inclusion in ECCAD, so providers are encouraged to submit their data, even if they are in a non-classic format. The ECCAD team will work with the providers for the development of the metadata.

Further improvements will be made to the ECCAD database in the forthcoming months, such as the inclusion of non-gridded data and the development of tools to compare gridded and non-gridded data, the development of more efficient download tools including a regridding system to different grids defined by the users, and continuous improvements to the visualization and analysis tools. IGAC

3rd International Workshop on *Heterogeneous Kinetics Related to Atmospheric Aerosols*

10-12 OCTOBER 2017
HENGSHAN HOTEL, SHANGHAI, CHINA

IGAC Endorsed

AUTHORS

Tong Zhu, Peking University, Beijing, China

Hajime Akimoto, National Institute for Environmental Studies, Japan

HOST INSTITUTIONS

FUNDING

PARTICIPANTS

China, Japan, French, Israel, Germany, and Singapore

BACKGROUND

This workshop was endorsed by IGAC as part of both the IGAC Japan National Committee and the IGAC China Working Group. The workshop is part of IGAC's effort to foster fundamental scientific research.

3rd International Workshop on Heterogeneous Kinetics Related to Atmospheric Aerosols Participants

Following the two previous workshops on this topic, which were held in 2015 in Beijing, China and 2016 in Tsukuba, Japan, the third International Workshop on Heterogeneous Kinetics Related to Atmospheric Aerosols was held in Shanghai on October 10-12, 2017, in conjunction with the NSFC-funded project workshop on chemical processes in formation of air pollution complex in China.

Atmospheric aerosols play critical roles in air pollution and climate change. There are growing evidences that heterogeneous reactions on the surface of aerosol particles and the reactions in the liquid phase could have significant implications in the impacts of aerosols on air quality and climate change. However, the evidences about the heterogeneous kinetics related to atmospheric aerosols based on field observation, laboratory studies, and model simulation are not yet fully consistent. With the initiation of Hajime Akimoto and Tong Zhu, the objectives of this series of the workshops are to exchange the most recent findings in the areas of the heterogeneous kinetics related to atmospheric aerosols, to identify the gaps in the understanding of the roles of atmospheric aerosols on air pollution and climate change, and to discuss future research priorities and collaborations.

Shanghai, China

The topic of the workshop is very timely, because the recent reports about possible chemical processes in winter severe air pollution in China has led to the debate about the role of surface reactions in the fast increase of sulfate concentrations, especially the pH value of aerosol particles.

About 90 participants from China, Japan, French, Israel, Germany, and Singapore attend the workshop. After a brief opening remarks by Tong Zhu, Hajime Akimoto, and Jianmin Chen, the first keynote presentation of the workshop was delivered by Yinon Rudich of the Weizmann Institute of Science, on "Optical properties of organic and biomass burning aerosols and effects of organic aerosol aging". On the second day, Christian George of IRCELYON, CNRS, delivered the second keynote presentation of the workshop "Photochemistry at interfaces - a journey from the surface of oceans to tropospheric aerosols". Hajime Akimoto also made a presentation on "Suggested field studies related to SOA formation based on laboratory experiments for multiphase chemical processes".

During the two day workshop, 27 oral presentations were given covering the topics:

- Formation of highly oxygenated molecules and dimers during alpha-pinene ozonolysis
- The heterogeneous reactions of N_2O_5 on/with solid NaCl", "Ozonolysis of unsaturated organic aerosols: A key role of particulate Criegee Intermediates
- Explosive growth of fine particles: hot points and difficulties to recognize the formation mechanisms

- Field measurements of terrestrial and marine biogenic organic aerosols
- 1-Octanol Water Partition Coefficient as a Predictor of Liquid-Liquid Phase Separation in Mixed Organic/Inorganic Particles
- Aqueous-phase formation and processing of secondary organic aerosols: insights from stable isotope studies
- Heterogeneous sulfate formation promoted by mineral particles and the effect of soluble transition metals
- Structure and reactivity of aqueous interfaces
- Atmospheric Heterogeneous Process and the Formation of Secondary Aerosol
- Kinetics study of OH radical uptake onto aerosols by laser techniques
- Formation of aqueous-phase SOA and its impacts on air quality in China
- Heterogeneous chemistry of reactive nitrogen oxides and its impacts on atmospheric oxidative capacity and regional air pollution over North China
- Molecular structure of acid surfaces probed by sum-frequency generation spectroscopy
- Non ideal mixing of SOA
- Influence of organic surfactant structure on aerosol-water interactions
- Heterogeneous mechanisms for sulfate and nitrate in Beijing Haze revealed by Δ17O
- Insight into the in-cloud formation of oxalate based on in situ measurement by single particle mass spectrometry
- Elucidating the mechanism of cationic oligomerization of isoprene at the air/water interface
- Heterogenous formation of HONO at the gas-liquid interface and field-measurements
- Interfacial reactions of Criegee intermediates with water, acids, alcohols and sugars
- Surface reactions and interactions of secondary organic aerosol
- Direct observation of new particle formation during ozonolysis of small alkenes competing against the growth of preexisting particles

The topic of the workshop is very timely, because the recent reports about possible chemical processes in winter severe air pollution in China has led to the debate about the role of surface reactions in the fast increase of sulfate concentrations, especially the pH value of aerosol particles.

- Possible solution of photocatalytic technology towards polluted gases control
- Modelling evaporative behaviour of secondary organic aerosol from α-pinene
- Multiphase reactive nitrogen chemistry as a source of sulfate during haze events in China and kinetic studies under real atmospheric conditions

At the end of the workshop, it is suggested that the Fourth International Workshop on Heterogeneous Kinetics Related to Atmospheric Aerosols to be held in 2018 in Japan, right before or after 2018 joint 14th Quadrennial iCACGP Symposium/15th IGAC Science Conference.

The Nature Science Foundation of China's Atmospheric Pollution Major Research Program and College of Environmental Sciences and Engineering, Peking University, sponsored the workshop, Department of Environmental Sciences and Engineering, Fudan University is the organizer and the Guangzhou Institute of Geochemistry, CAS is the co-organizer of the workshop. The workshop is endorsed by International Global Atmospheric Chemistry (IGAC).

23-25 OCTOBER 2017
COLUMBIA UNIVERSITY,
NEW YORK, NY, USA

IGAC Endorsed - IBBI

2017 Conference on Fire Prediction Across Scales

AUTHORS

Robert Field, NASA Goddard Institute for Space Studies

Kátia Fernandes, International Research Institute for Climate and Society, Columbia University

Park Williams, Lamont-Doherty Earth Observatory, Columbia University

Jaclyn Rabinowitz, Earth Institute, Columbia University

HOST INSTITUTIONS

Columbia University in the City of New York

FUNDING

NSF PAGES Past Global Changes

Columbia Climate Center
Earth Institute | Columbia University

Center for Climate and Life
Columbia University

PARTICIPANTS

Australia, Brazil, Canada, China, Germany, Indonesia, Portugal, Singapore, Spain, Switzerland, United Kingdom, United States

BACKGROUND

IBBI Interdisciplinary Biomass Burning Initiative

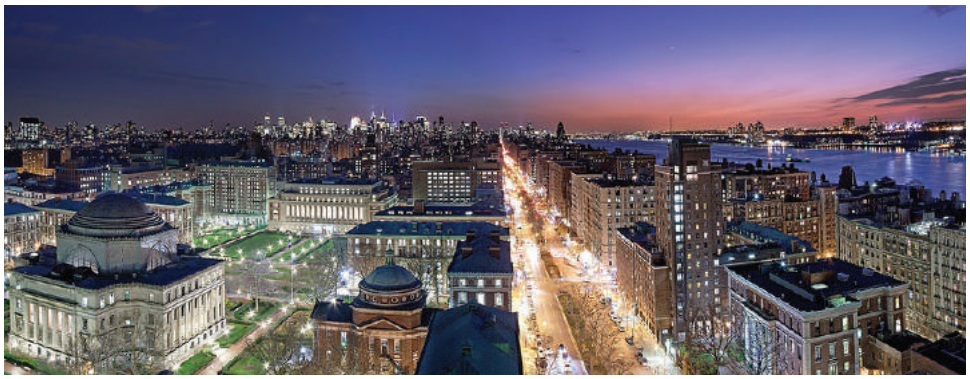
This conference was endorsed by IGAC as part of the jointly sponsored IGAC/iLEAPS/WMO Interdisciplinary Biomass Burning Initiative (IBBI). The primary goal of IBBI is to improve scientific understanding of the various processes associated with open biomass burning in order to make atmospheric composition prediction and air quality monitoring and forecasting better.

2017 Conference on Fire Prediction Across Scales participants

The 2017 Conference on Fire Prediction Across Scales was held on October 23-25, 2017 at Columbia University in New York, drawing over 120 attendees from academia, government and the private sector. The goals of the conference were to synthesize the state-of-the art in fire prediction and to identify areas where important advances can be made over the next decade.

The meeting was unique in connecting researchers studying fire prediction at all scales, from the behavior of a flame, to a single wildfire, to fire season severity, to changes in global fire patterns from year to year and century to century, drawing on the focus areas of the **IGAC Interdisciplinary Biomass Burning Initiative (IBBI)**. The conference began with fire managers describing operational needs for fire prediction, reminding researchers of the real-world importance of better understanding the drivers of changes in fire activity for safety, land, and smoke management.

Predicting the amount and effects of smoke was a central, cross-cutting theme of the conference. Researchers from the NASA Goddard Space Flight Center reviewed progress on estimating biomass burning emissions globally, emphasizing that while different satellite products agree reasonably well in their spatial and temporal patterns of fire activity, large discrepancies remain in their magnitudes, varying by up to a factor of 3 depending on whether based on area burned or fire radiative power, and whether aerosol or trace gas retrievals are used as a top-down constraint. This provided context for updates on efforts of the **Fire Modeling Intercomparison Project (FireMIP)** to coordinate evaluation of global-scale, prognostic fire models. FireMIP leaders reviewed the range of human,



Columbia University, New York, NY

biophysical and climatic factors included in the FireMIP models, emphasizing that challenges in modeling human activity contributes strongly to current discrepancies between models in simulating 20th century trends in burned area.

Cutting-edge work on smoke measurements was also discussed. Researchers from Brown University, for example, presented recent lab results from **FIREX** using isotopic constraints to distinguish between direct emissions and secondary formation of nitrogen oxides (NO_x) and nitrous acid (HONO). In a similar vein, researchers from the University of California Irvine described recent radiocarbon measurements of smoke in Singapore to conclude that biomass burning emissions in Indonesia are likely dominated by the burning of peat soil, rather than the burning of surface vegetation.

The smoke modeling community was also well-represented. Researchers from the University of Utah described efforts to model single smoke plumes sampled during **RxCADRE** using the cutting-edge in high-resolution smoke plume modeling, noting that an outstanding challenge – particularly in a coupled fire-atmosphere mode – is in capturing plume rise to determine the initial vertical distribution of smoke. Recent work from Wollongong University over southeastern Australia showed that the cumulative emissions of smaller, but more numerous prescribed fires, had impacts on atmospheric composition comparable to large wildfires, due to lower injection heights, less plume dispersion and stronger localized effects.

Groups from the US and Europe described significant progress over the past five years in including biomass burning emissions in chemical weather forecasting at synoptic scales, alongside other sources such as dust. A current limitation identified by all groups is the use of 'persistent' fire emissions from satellite active fires as input into chemical weather forecasts. Several groups presented new work showing that fire weather forecasts could improve emissions forecasts by constraining both future fire occurrence and future behavior of existing fires down to an hourly scale. Conversely, researchers from the European Centre for Medium Range Weather Forecasts explained that the inclusion of better smoke emissions in fact improved extended-range weather forecasts by more accurately capturing the radiative effects of aerosols.

There was also new work presented on predicting fire and smoke seasonally, making use of large-scale climatic controls on local fire weather, and consequently, on fire activity and emissions. Work from NCAR showed that large-scale climate indices, particularly when used in combination, had skill several months ahead in predicting either the area burned or the atmospheric CO signature over large regions in the tropics, providing a starting point for long-range predictions of major smoke emissions and air quality episodes. Fire and smoke over the Maritime Continent were shown to be uniquely predictable because of the direct influence of El Niño. In that regard, using fire weather forecasts from a fully-coupled seasonal climate forecasts, researchers from NASA and government agencies in Indonesia showed that the predictive skill within different smoke-emitting regions of the Maritime Continent varied according to the skill of the underlying model in forecasting these different modes of variability, such as El Niño and the Indian Ocean Dipole.

Presentations on work from Harvard and Columbia Universities brought these issues full circle, describing the contributions of land use, climate, atmospheric transport and population exposure to negative smoke impacts on human health. Work to better understand the sources of seasonally poor air quality in Delhi, for example, showed that significant contributions of agricultural burning in northwest India were limited to the winter burning season due to a confluence of strong emissions and atmospheric transport patterns.

Broadly, the conference was encouraging in connecting researchers working on smoke with those working on basic issues of fire prediction and effects at all scales. The full program and presentation abstracts can be found at the **Columbia University Initiative on Extreme Weather and Climate website.**

32nd Annual IGAC SSC Meeting

6–8 NOV 2017
MURRAMARANG BEACHFRONT NATURE RESORT, SOUTH DURRAS, NSW, AUSTRALIA

IGAC Sponsored

AUTHORS

Mark Lawrence, Institute for Advanced Sustainability Studies, Germany

Hiroshi Tanimoto, National Institute for Environmental Studies, Japan

HOST AND FUNDING INSTITUTION

UNIVERSITY OF WOLLONGONG AUSTRALIA

FUNDING

PARTICIPANTS

Australia, Brazil, Canada, China, France, Germany, Greece, India, Japan, Mexico, South Africa, Switzerland, Thailand, United Kingdom, and United States.

BACKGROUND

IGAC's priorities and activities are guided and, in many cases, implemented by an international Scientific Steering Committee (SSC). Currently the IGAC SSC consists of 18 members from around the world (current membership list at **igacproject.org/SSC**).

Participants of the 2017 IGAC SSC Meeting

Sixteen SSC members, along with liaisons from several partner organizations, gathered in Murramarang in southeast Australia, among the kangaroos and lorikeets, to discuss the ongoing activities, recent successes, and future plans of the highly-active international IGAC community. IGAC's mission, "facilitating atmospheric chemistry research toward a sustainable world," is realized by working in three main categories – "Fostering Community", "Building Capacity", and "Providing Leadership"

One of the most important contributions of IGAC to the community is its biennial Science Conference, which every other time is held jointly with the Quadrennial iCACGP Symposium. An update was given to the plans for the 2018 joint 14th Quadrennial iCACGP Symposium/15th IGAC Science Conference in Takamatsu, Kagawa, Japan (**icacgp-igac2018.org**). The scientific program committee and the local organizing committee have been hard at work and have already put together an exciting program, highlighting key aspects of atmospheric chemistry focusing on the core theme "from molecules to global impacts", and providing for a venue conducive to scientific discussions. An active program for early career scientists is also being developed by the Early Career Program Organizing Committee.

Activities are a core aspect of IGAC (see **igacproject.org/Activities**), as are several national/regional working groups (see **igacproject.org/**

Working-Groups). Updates were presented for all of IGAC's activities and working groups. The SSC also conducts more in-depth reviews of selected activities and working groups each year, with generally a 3-year rotation cycle among the activities and working groups. This year, ACAM, CCMI, GEIA, and the Americas Working Group were reviewed. The progress within all of the reviewed projects and working groups was seen positively, in some cases very positively and exemplary for other activities and working groups (especially the Americas Working Group was noted as a role model for the formation of MANGO and the efforts towards forming an Africa Working Group). World Café sessions focusing on the individual projects and working groups were used to gather feedback, which was then provided to the activity and working group leaders to help guide them in their future developments.

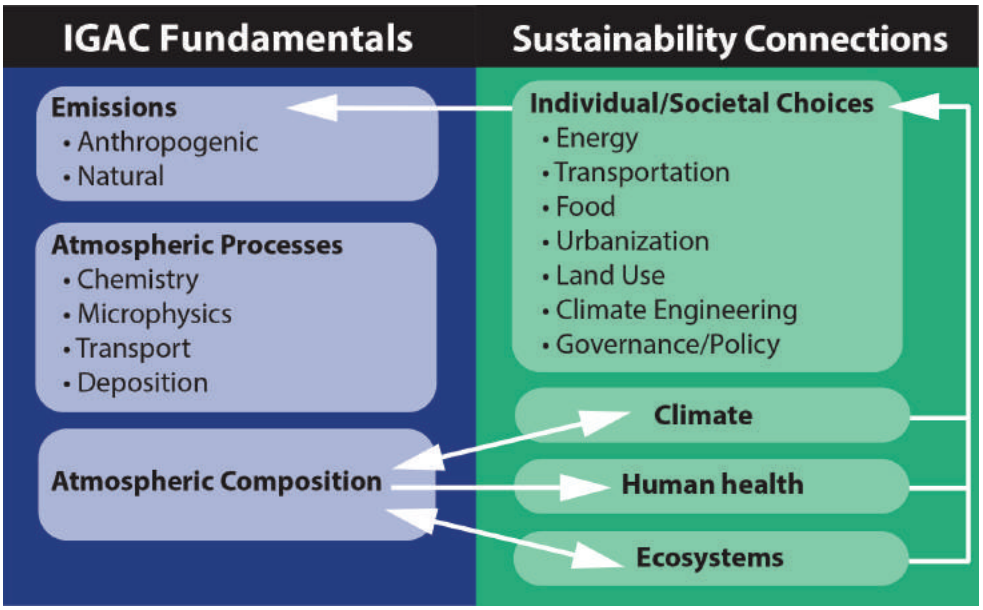
The SSC then had very fruitful discussions with liaisons from our sponsors, namely iCACGP and Future Earth. We see this joint sponsorship as fitting well to our IGAC vision, with iCACGP particularly partnering on our IGAC Fundamentals, while Future Earth is particularly partnering on our Sustainability Connections. We appreciate the long-term collaboration and support from iCACGP, and we are making efforts to capitalize on the partnerships within Future Earth as an opportunity for the international atmospheric chemistry community to enhance connections between our fundamental research on atmospheric chemistry and the larger research community focusing on related Grand Challenges of the Anthropocene.

This was followed up by very positive discussions about collaborations with other projects, including Integrated Land Ecosystem-Atmosphere Process Study (iLEAPS), Surface Ocean Lower Atmosphere Study (SOLAS), the World Climate Research Program (WCRP) Stratospheric-tropospheric Processes And their Role In Climate (SPARC), and the World Meteorological Organization (WMO) Global Atmosphere Watch (GAW) program.

Looking to the future, we also discussed proposals for new IGAC Activities/Working Groups:

- CATCH – The Cryosphere and Atmospheric Chemistry
- Monitoring, Analysis and Prediction of Air Quality (MAP-AQ)
- An Inverse Modeling Assessment under development, in close interaction with GEIA
- Steps towards the development of an IGAC Africa Working Group

The meeting closed with a discussion of future developments in the SSC composition, including rotations and liaisons.



IGAC Vision Diagram

Some of the IGAC SSC members then stayed on for the Australian Atmospheric Composition & Chemistry Observations & Modelling Conference, as an opportunity to learn more about the current activities and highlights of the Australian atmospheric chemistry research community. The SSC would like to thank Clare Murphy for the wonderful local organization of a very memorable SSC meeting.

The next SSC meeting will be held immediately before the 2018 joint 14th iCACGP Quadrennial Symposium/15th IGAC Science Conference 25-29 2018 in Takamatsu, Kagawa, Japan. We look forward to seeing many of you there as we come together again to hear about the latest and greatest in the field of Atmospheric Chemistry.

8-10 NOVEMBER 2017
MURRAMARANG BEACHFRONT NATURE RESORT, SOUTH DURRAS, NSW, AUSTRALIA

IGAC Endorsed

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HOST INSTITUTIONS

UNIVERSITY OF WOLLONGONG AUSTRALIA

CSIRO

Australian Government Bureau of Meteorology

FUNDING

UNIVERSITY OF WOLLONGONG AUSTRALIA

PARTICIPANTS
Australia, Brazil, Canada, China, France, Germany, India, Japan, Mexico, New Zealand, South Africa, United Kingdom, USA

BACKGROUND
In an effort to foster the international atmospheric chemistry community in Australia and New Zealand, the 2017 IGAC SSC Meeting was held in back to back with the Atmospheric Composition and Chemistry Observations and Modelling Conference (ACCOMC) and included a joint session between the IGAC SSC and ACCOMC participants.

Atmospheric Composition and Chemistry Observations and Modelling Conference

The Atmospheric Composition and Chemistry Observations and Modelling Conference (ACCOMC), which incorporates the Cape Grim Annual Science Meeting was held at Murramarang Beachfront Nature Resort, in South Durras on the NSW south coast in Australia from Wednesday 8th November to Friday 10th November 2017.

The Aims of this Meeting, which is held annually somewhere in Australia are:

- To understand the role of atmospheric chemistry and composition in global atmospheric change as expressed in the Australasian region and internationally.
- To provide a forum for Australian atmospheric composition and chemistry researchers from different disciplines (in situ observations, remote sensing observations, modelling) to share ideas, enhance collaboration and develop a coordinated regional approach to characterising atmospheric processes in Australasia.

This year the first session was held in collaboration with the International Global Atmospheric Chemistry (IGAC) Project's Scientific Steering Committee meeting to present research of interest to the global scientific community but with a strong focus on the Southern hemisphere. There were approximately 60 delegates from seven different countries as well as the representative from the IGAC scientific steering committee.

The conference started with an introduction to IGAC and the IGAC Monsoon Asia and Oceania Networking Group (MANGO) by IGAC co-chair Hiroshi Tanimoto. The joint session then continued with the following themes discussed:

- The 2017 Antarctic ozone hole
- Biogenic emissions from Australian canopies and grasses
- Understanding the chemistry of alkyl nitrates
- Lidar measurements of Saharan dust and biomass burning particles
- Plans for a Southern Hemisphere observation data network - SHACCQ

2018 ACCOMC Participants

- The session following this had several talks about baseline measurements particularly in the Southern Ocean as well as descriptions of work being undertaken in South Africa and opportunities to collaborate with Australian scientists.

Out of these discussions (and those held previously at the IGAC SSC meeting) it was decided to establish a new IGAC Southern Hemisphere Working Group. Those interested in joining should contact Clare Paton-Walsh (Clare Murphy **clarem@uow.edu.au**), Judith Hoelzemann (**judith.hoelzemann@ccet.ufrn.br**) or Paul Beukes (**Paul.Beukes@nwu.ac.za**).

On Thursday morning, the subject matter switched more to industrial emissions and measurements and modelling of urban air pollution with some talks on biogenic and fire emissions. The afternoon session saw a very welcome extension of the usual research presented to include some exploration of fundamental atmospheric chemistry both via quantum calculations and laboratory experiments. In addition, there were two talks about mercury in the Australasian region. Thursday concluded with a lively poster session with 2 minute introductions to the posters by each of the presenters. The posters covered the same myriad of subject matters as the oral presentations with a slightly greater emphasis on the technical side of ongoing research in Australia. Ian Galbally kicked off the Friday talks with an update on Tropospheric Ozone Assessment Report (TOAR), which was then followed by a number of talks with a focus on Cape Grim and/or greenhouse gases. The meeting wrapped up with lively discussions over lunch: another excellent and thought-provoking meeting at the lovely Murramarang Beach Resort. The complete set of abstracts can be found at: **https://cloudstor.aarnet.edu.au/plus/s/MCZ0trl4iern2mD**.

community

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Events
monthly in IGAC eBulletins and on **igacproject.org**

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Don't forget to join the IGAC community to stay appraised of the most current news on conferences, workshops, and publications, as well as receive IGACnews by email.

FEBRUARY/MARCH 2018
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