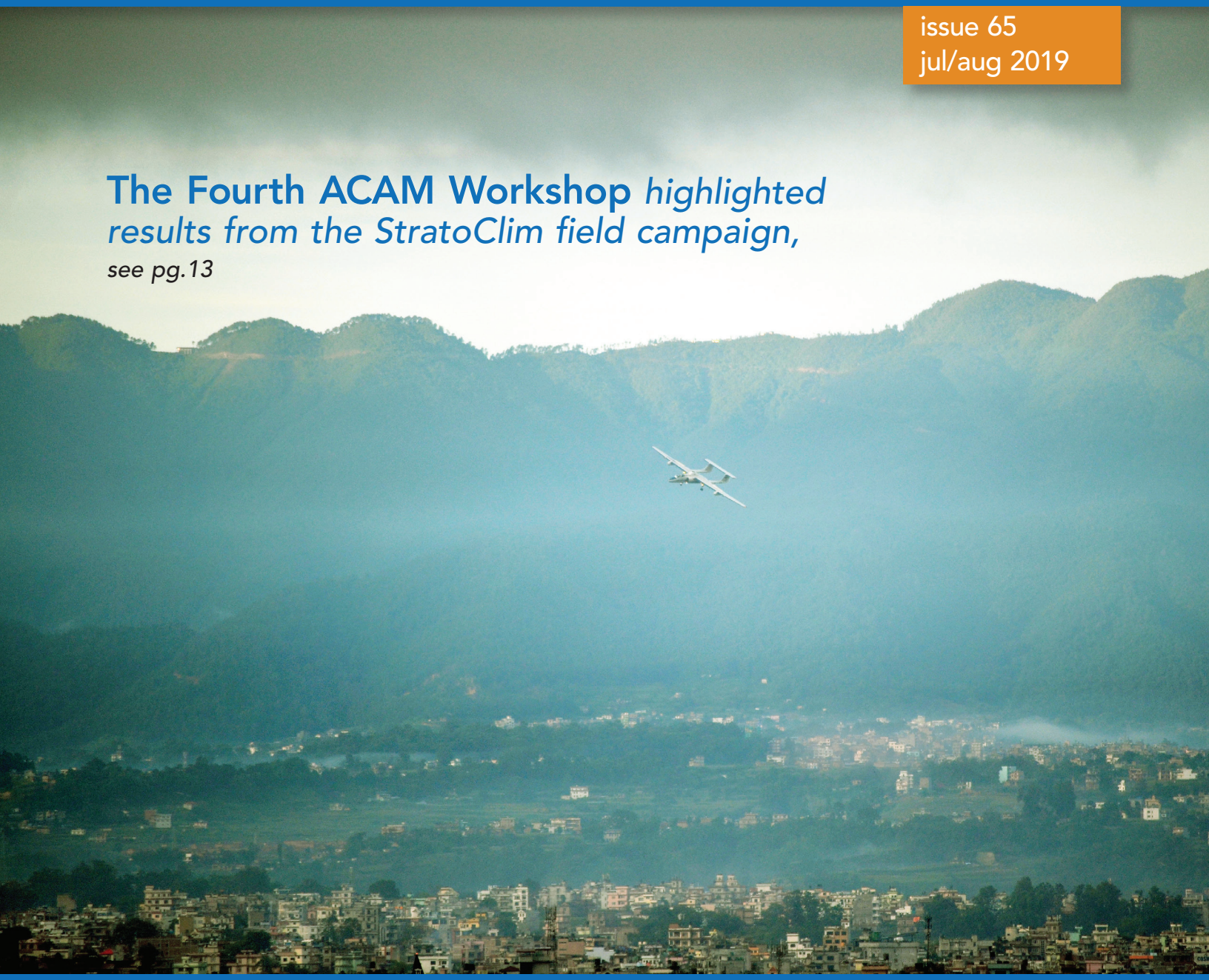
igacproject.org

IGACnews

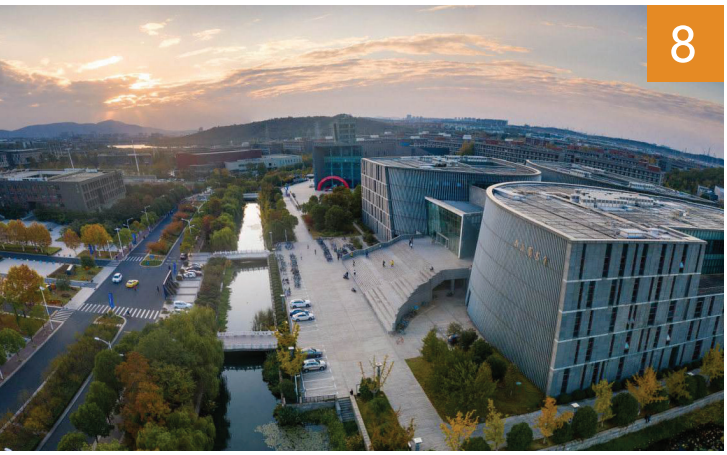
facilitating atmospheric chemistry research towards a sustainable world

issue 65
jul/aug 2019



The Fourth ACAM Workshop *highlighted results from the StratoClim field campaign,*
see pg.13

contents



departments

igac sponsored/endorsed event summaries

early career spotlight

open submissions

On the Cover

The M55-Gepphysica aircraft over the Kathmandu Valley, Nepal during the StratoClim field campaign July/August 2017. Collaborations fostered through ACAM helped for the field campaign to take place in Asia after several years of preparation. PHOTO COURTESY OF SIMONE BRUNAMONTI, ETH ZURICH.

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

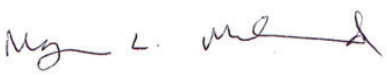
So many events, oh my!

As most of you know, the biennial IGAC Science Conference is the highlight of my job. I love seeing hundreds of scientists from all over the world come together to discuss atmospheric chemistry. However, it is during the non-IGAC Science Conference years when many of the IGAC sponsored/endorsed activities and working groups tend to have their workshops and meetings. These smaller gatherings are really where the work gets done to turn the cogs of IGAC and make it such an amazing organization.

This year is no exception to other non-IGAC Science Conference years. So far, there are twelve IGAC sponsored or endorsed events happening this year. All the events help IGAC achieve its mission to foster atmospheric chemistry research towards a sustainable world by fostering community, building capacity, and providing leadership. Each event fosters a smaller, closer community of scientists researching a specific atmospheric chemistry topic; builds capacity by including early career and developing country scientists in the events and/or holding an early career training course as part of the event; and provides leadership by identifying and addressing areas of atmospheric chemistry research that require collaborations across geographical boundaries and/or disciplines. The ability of these 12+ events to help IGAC achieve its mission is amazing.

Each of these events requires an incredible amount of work from the community. I am grateful to the local organizers and the IGAC Activity and Working Group steering committees that make these events happen. The leadership of, and devotion to helping, the international atmospheric chemistry community by these individuals is admirable.

This issue, and the subsequent two issues of IGACnews, have summaries of all the 2019 IGAC Sponsored/Endorsed Events. I encourage you to read them and learn more about the efforts by numerous community members that make IGAC successful.



2019 IGAC SPONSORED/ENDORSED EVENTS

Quantifying the Indirect Effect: from Sources to Climate Effects of Natural and Transported aerosol in the Arctic (QuIESCENT Arctic) Workshop, 4-5 April 2019, Cambridge, UK

2019 ACPC Workshop, 24-29 April 2019, Nanjing, China

Third ACAM Training School, 24-25 June 2019, Universiti Kebangsaan, Malaysia

Fourth ACAM Workshop, 26-28 June 2019, Universiti Kebangsaan, Malaysia

CCMI Summer School: Earth system modelling and observations to study Earth in a changing climate, 4-6 August 2019, Hong Kong

CCMI Science Workshop 2019, 7-9 August 2019, Hong Kong

Joint AMIGO/MAP-AQ Workshop, 9-10 September 2019, Boulder, CO

3rd PACES Open Science Meeting, 18-20 September 2019, Oslo, Norway

PAPILA Training School, 28 October – 3 November 2019, Santiago, Chile

19th GEIA Conference, 6-8 November 2019, Santiago, Chile

IGAC MANGO Meeting, Science Workshop, and Training Course, 28-30 November 2019, Nainital, India

CATCH Science Workshop, 7-8 December 2019, Berkeley, CA, USA

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.

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:

Mills G, Pleijel H, Malley CS, Sinha B, Cooper OR, Schultz MG, Neufeld HS, Simpson D, Sharps K, Feng Z, Gerosa G, Harmens H, Kobayashi K, Saxena P, Paoletti E, Sinha V, Xu X, Tropospheric Ozone Assessment Report: Present-day tropospheric ozone distribution and trends relevant to vegetation. *Elem Sci Anth., 2018*; 6(1):47. DOI: **http://doi.org/10.1525/elementa.302/**

Gaudel, A, et al. 2018. Tropospheric Ozone Assessment Report: Present-day distribution and trends of tropospheric ozone relevant to climate and global atmospheric chemistry model evaluation. *Elem Sci Anth,*, 6:39. DOI: **https://www.elementascience.org/articles/10.1525/elementa.291**

Lefohn AS, Malley CS, Smith L, Wells B, Hazucha M, Simon H, Naik V, Mills G, Schultz MG, Paoletti E, De Marco A, Xu X, Zhang L, Wang T, Neufeld HS, Musselman RC, Tarasick D, Brauer M, Feng Z, Tang H, Kobayashi K, Sicard P, Solberg S, Gerosa G. Tropospheric Ozone Assessment Report: Global ozone metrics for climate change, human health, and crop/ecosystem research. *Elem Sci Anth., 2018*; 6(1):28. DOI: **http://doi.org/10.1525/elementa.279**

Fleming*, Zoë. L., Ruth M. Doherty*, Erika von Schneidemesser, Christopher S. Malley, Owen R. Cooper, Joseph P. Pinto, Augustin Colette, Xiaobin Xu, David Simpson, Martin G. Schultz, Allen S. Lefohn, Samera Hamad, Raeesa Moolla, Sverre Solberg, Zhaozhong Feng (2018), Tropospheric Ozone Assessment Report: Present-day ozone distribution and trends relevant to human health, *Elem Sci Anth., 2018*; 6(1):12. DOI: **https://www.elementascience.org/article/10.1525/elementa.273/**

Young*, P. J., V. Naik*, A. M. Fiore, A. Gaudel, J. Guo, M. Y. Lin, J. L. Neu, D. D. Parrish, H. E. Rieder, J. L. Schnell, S. Tilmes, O. Wild, L. Zhang, J. R. Ziemke, J. Brandt, A. Delcloo, R. M. Doherty, C. Geels, M. I. Hegglin, L. Hu, U. Im, R. Kumar, A. Luhar, L. Murray, D. Plummer, J. Rodriguez, A. Saiz-Lopez, M. G. Schultz, M. T. Woodhouse and G. Zeng (2018), 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, M. G. and 96 co-authors (2017), Tropospheric Ozone Assessment Report: Database and metrics data of global surface ozone observations, *Elem Sci. Anth.*, 5, DOI: **http://doi.org/10.1525/elementa.244**

Chang, K-L, I. Petropavlovskikh, O. R. Cooper, M. G. Schultz and T. Wang (2017), Regional trend analysis of surface ozone observations from monitoring networks in eastern North America, Europe and East Asia, *Elem Sci Anth.*, 5:50, DOI: **http://doi.org/10.1525/elementa.243**

Save the Date!

4-5 APRIL 2019
BRITISH ANTARCTIC SURVEY, CAMBRIDGE, UK

IGAC Endorsed - PACES

Quantifying the Indirect Effect: from Sources to Climate Effects of Natural and Transported aerosol in the Arctic (QuIESCENT Arctic) Workshop

AUTHORS
Gillian Young, University of Leeds, UK
Jean-Christophe Raut, LATMOS, France
Jo Browse, University of Exeter, UK
Gijs de Boer, University of Colorado Boulder, USA

HOST INSTITUTION

British Antarctic Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

FUNDING

IASC IUGG IAMAS International Association of Meteorology and Atmospheric Sciences

PARTICIPANTS
United Kingdom, France, USA, Belgium, Sweden, the Netherlands, Germany, Canada, Finland, Switzerland, Spain

BACKGROUND

QuIESCENT Arctic — Quantifying the Indirect Effect: from Sources to Climate Effects of Natural and Transported aerosol in the Arctic

PACES air Pollution in the Arctic: Climate Environment and Societies

The QuIESCENT Arctic workshop was initiated by the IGAC sponsored PACES (air Pollution in the Arctic: Climate, Environment, and Societies) activity, with support of the International Arctic Science Committee (IASC) Atmosphere Working Group and endorsement by the International Association for Meteorology and Atmospheric Sciences (IAMAS, via both the International Commission on Polar Meteorology and the International Commission on Clouds and Precipitation). Both IASC and IAMAS financially supported the workshop.

Participant introductions at the QuIESCENT Arctic workshop
(courtesy of Ian Brooks, University of Leeds)

Globally, our limited understanding of how aerosol particles produced by natural and anthropogenic activities interact with clouds restricts our ability to represent these processes well in numerical models. In the Arctic, these poorly-constrained interactions hinder our attempts to make concrete predictions of the future surface energy balance. In particular, it is not well understood how increasing industrialisation within the Arctic circle and transport from the polluted mid-latitudes may affect how Arctic clouds interact with solar and terrestrial radiation.

For this reason, the PACES (air Pollution in the Arctic: Climate, Environment, and Societies) initiative proposed the **QuIESCENT Arctic** workshop (Quantifying the Indirect Effect: from Sources to Climate Effects of Natural and Transported aerosol in the Arctic). On 4-5 April 2019, 45 aerosol and cloud scientists from Europe (78%) and North America (22%) convened at the British Antarctic Survey (Cambridge, UK) to identify our key knowledge gaps and discuss our research

photos courtesy of Gillian Young, University of Leeds

(above) **Cambridge, United Kingdom;** (below) **British Antarctic Survey (Cambridge, United Kingdom)**

priorities going forward. 56% of attendees classed themselves as an early career researcher (of these, 17% were postgraduate students), and this mix was essential to the success of the workshop as early career researchers played a leading role in the scientific presentations and discussion. Our attendance was 50% more than anticipated when the workshop was proposed, and we owe the high turnout of the workshop to the popularity of this scientific area of research.

The two day workshop was split into three session blocks (oral presentations, discussions, and a poster session). Workshop participants contributed a wide range of expertise – ground-based, aircraft, and satellite observations and modelling across various scales – and many fruitful discussions took place as a result. A total of 20 oral presentations were given, split between both days, where presenters provided a background of knowledge advances that have been made in recent years in each represented discipline.

Discussion sessions were interspersed between oral presentations each day: on the first day we held a poster session (with 21 presenters) and on the second day we held a large designated discussion segment including all participants following the World Café method. Four overlapping topics lead the discussion: specifically, we covered key knowledge gaps for cloud or aerosol scientists, and priorities for observations or modelling. Outcomes of this discussion will be formulated into a position paper on the Arctic indirect effect in the near future; however, our key findings are summarised as follows:

- Arctic aerosol-cloud interactions are poorly understood, yet it is difficult to disentangle these processes and identify key drivers from others which influence clouds (e.g. boundary layer structure, moisture transport).
- We need more measurements of the vertical structure of the boundary layer, clouds, and aerosols, particularly during the winter, to improve our understanding of the Arctic indirect effect and quantify associated processes better in numerical models.
- Efforts are needed to improve communication and collaboration between the observing and modelling communities to facilitate better knowledge transfer to high-resolution atmospheric models and up-scaling parametrizations to general circulation models.

24-26 APRIL 2019
NANJING UNIVERSITY, NANJING, CHINA

IGAC Endorsed

Aerosols-Clouds-Precipitation and Climate (ACPC) Workshop

AUTHORS

Johannes Quaas, University of Leipzig, Germany
Minghuai Wang, Nanjing University, China
Danny Rosenfeld, Hebrew University of Jerusalem, Israel
Meinrat Andreae, Max Planck Institute for Chemistry, Mainz, Germany
Matthew Christensen, University of Oxford, UK
Michael P. Jensen, Brookhaven National Laboratory, Upton, USA
Philip Stier, University of Oxford, UK
Kentaroh Suzuki, University of Tokyo, Japan
Sue van den Heever, Colorado State University, Fort Collins, USA
Rob Wood, University of Washington, Seattle, USA

HOST INSTITUTION

FUNDING

中华人民共和国科学技术部
Ministry of Science and Technology of the People's Republic of China

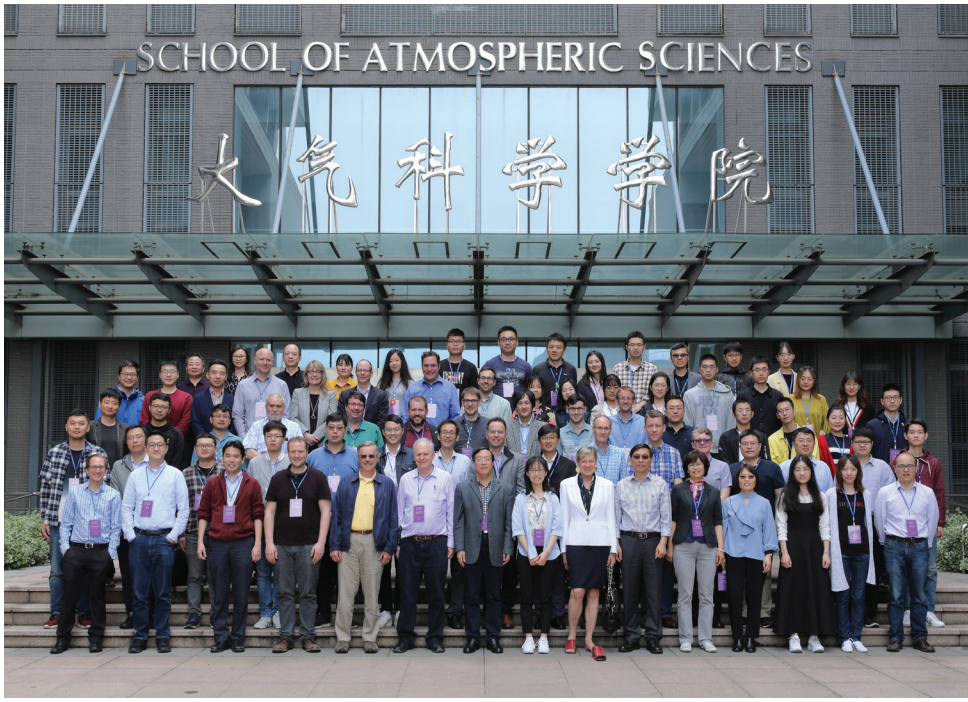
王寬誠教育基金會
K. C. WONG EDUCATION FOUNDATION

PARTICIPANTS

China, Germany, Israel, Japan, UK, USA

BACKGROUND

The Aerosols-Clouds-Precipitation-and-Climate (ACPC) initiative, which aims to better a scientific understanding of the interactions between aerosols, clouds, precipitation and climate, is an IGAC Endorsed Activity.



ACPC workshop participants

Participants to the Fifth Aerosols-Clouds-Precipitation-and-Climate (ACPC) workshop met in Nanjing, China to discuss progress in understanding the role of aerosol perturbations in clouds and precipitation. The primary aim of ACPC (**acpcinitiative.org**) is to achieve a better understanding of process-scale to regional-scale aerosol-cloud interactions, where most of the effort is invested in analysis of observational data from field campaigns and satellites, and of simulations from large eddy to cloud system-resolving scales. Current ACPC studies are guided by two roadmaps with a focus on shallow marine clouds and deep convective clouds (e.g., Quaas et al., 2018).

For shallow marine clouds, one primary focus is on recent field campaigns in the southeastern Atlantic Ocean (e.g., Zuidema et al., 2016) and several modeling groups are now using these field observations for interpretation. Lagrangian approaches applied to both large eddy simulations and satellite observations were shown to be advantageous for characterizing the lifecycle of stratocumulus clouds and the development of an observed Pocket of Open Cells (POC). New results were presented from a satellite-data analysis of ship tracks in the southeastern Atlantic Ocean region that supported earlier findings of analyses of volcanic aerosols and ship tracks (e.g., Toll et al., 2017). Much discussion was spent on the interpretation of statistical relationships between cloud droplet number concentration

Xianlin campus, Nanjing University

and cloud water amount, as recent studies have arrived at opposite conclusions (Michibata et al., 2016; Rosenfeld et al., 2019).

For deep convective clouds, the study of the clouds that was conducted in the vicinity of Houston, Texas produced several interesting outcomes. Previous ACPC discussions concluded that polarimetric radar is a key observational resource for assessing aerosol impacts on cloud microphysics and dynamics (Fridlind et al., 2019). In light of this, the ACPC group strongly contributed to the proposal for a deployment of the Atmospheric Radiation Measurement (ARM) mobile facility and additional instrument resources in the Houston region. The proposal, *TRacking Aerosol Convection Interactions ExpeRiment (TRACER)*, led by ACPC steering committee member Mike Jensen, was selected in 2018 and will see the deployment of the ARM facilities from April 2021 - April 2022.

ACPC modeling groups have performed cloud-system resolving simulations from the model intercomparison project that focus on simulating aerosol effects on deep convective clouds. A considerable response of deep convective clouds to the prescribed perturbation of the aerosols in the simulation pairs (with low and high aerosol concentrations) is found, despite the fact that simulated cloud fields are rather different between the models. The response of the average surface precipitation flux response differs substantially between the models and in some cases show opposite signs. However, the cloud microphysics respond systematically in different models. An example is the strong increase in upper tropospheric cloud ice mass. Large uncertainties remain regarding the magnitude and signal of effects and a thorough model evaluation and improvement is needed after the TRACER campaign.

During the meeting, the ACPC initiative acquired new impetus in its organization (Minghuai Wang took responsibility as a new co-chair, along with Dan Rosenfeld, and replaces Johannes Quaas), and in its science. Two new working groups were formed, one with a focus area on the analysis of cloud and precipitation

responses to volcanic and ship aerosols emissions and the other on the analysis of observations, models, and model-data synergy in the TRACER region of interest. The former group will be co-led by Matthew Christensen and Andrew Gettelman and the latter, by Mike Jensen, Scott Collis and Jiwen Fan.

The next APCP workshop is planned for April 2020 and will be held jointly with the TRACER campaign team. The ACPC group welcomes interested researchers to join their activities.

References

Fridlind, A.M., M. van Lier-Walqui, S. Collis, S.E. Giangrande, R.C. Jackson, X. Li, T. Matsui, R. Orville, M. Picel, D. Rosenfeld, A. Ryzhkov, R. Weitz and P. Zhang, 2019. Use of polarimetric radar measurements to constrain simulated convective cell evolution: A pilot study with Lagrangian tracking. *Atmos. Meas. Tech.*, 12, 2979-3000, **https://doi.org/10.5194/amt-12-2979-2019**, 2019.

Michibata, T., K. Suzuki, Y. Sato and T. Takemura, 2016. The source of discrepancies in aerosol-cloud-precipitation interactions between GCM and a-train retrievals. *Atmos. Chem. Phys.*, 16, 15,413–15,424, doi:10.5194/acp-16-15413-2016.

Quaas, J., D. Rosenfeld, M. Andreae, G. Feingold, A. Fridlind, M.P. Jensen, R. Kahn, P. Stier, K. Suzuki, S. van den Heever, M. Wang, B. White, and R. Wood, 2018. Aerosol-Cloud-Precipitation Interactions: Analysis of Satellite- and Ground-Based Data, and of Cloud-Resolving Modeling, in the ACPC Initiative. *GEWEX News*, 28, No. 3, 8-10.

Rosenfeld, D., Y. Zhu, M. Wang, Y. Zheng, T. Goren and S. Yu, 2019. Aerosol-driven droplet concentrations dominate coverage and water of oceanic low-level clouds. *Science*, 363, doi:10.1126/science.aav0566.

Toll, V., M. Christensen, S. Gassó and N. Bellouin, 2017. Volcano and ship tracks indicate excessive aerosol-induced cloud water increases in a climate model. *Geophys. Res. Lett.*, 44(24), 12,492–12,500, doi:10.1002/2017GL075280.

Zuidema, P., J. Redemann, J. Haywood, R. Wood, S. Piketh, M. Hipondoka and P. Formenti, 2016. Smoke and Clouds above the Southeast Atlantic: Upcoming Field Campaigns Probe Absorbing Aerosol's Impact on Climate. *Bull. Amer. Meteorol. Soc.*, 97, 1131–1135, doi:10.1175/BAMS-D-15-00082.1.

Submit articles to the next IGACnews

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 Nov/Dec issue of the IGACnew is 15 November 2019. 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**.

Third ACAM Training School

26-28 JUNE 2019

UNIVERSITI KEBANGSAN MALAYSIA (UKM), BANGI, SELANGOR, MALAYSIA

AUTHORS

Ritesh Gautam, EDF, USA
Federico Fierli, EUMETSAT, Italy
Bhupesh Adhikary, ICIMOD, Nepal

HOST INSTITUTION

Universiti Kebangsaan Malaysia
The National University of Malaysia

FUNDING

WCRP World Climate Research Programme, SPARC, ICACGP, IUGG, IAMAS International Association of Meteorology and Atmospheric Sciences, NASA, EGU European Geosciences Union, EUMETSAT, ICIMOD

PARTICIPANTS

Bangladesh, China, France, Germany, India, Indonesia, Iran, Malaysia, Nepal, Pakistan, Philippines, South Korea, Taiwan, Thailand, and Vietnam

BACKGROUND

A primary goal of the IGAC/SPARC ACAM activity is the sponsorship of training schools on observation and model use for ACAM regional early career scientists. This was the third ACAM training school and IGAC was a proud financial sponsor of this event.

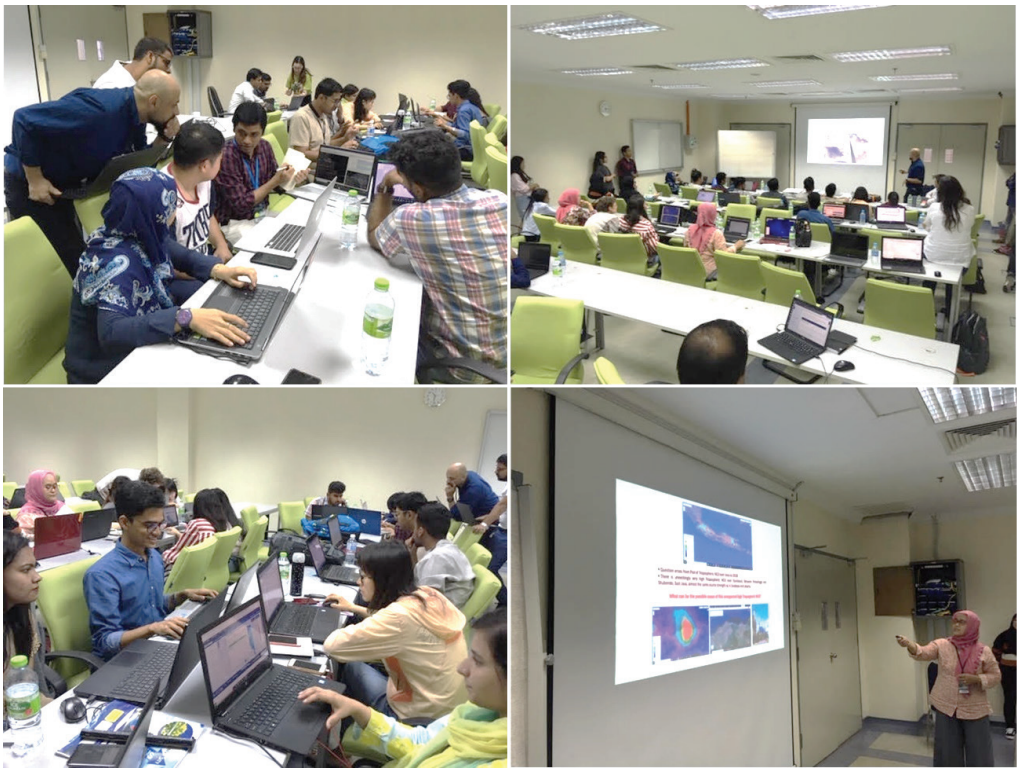
Third ACAM Training School Participants

The 3rd Atmospheric Composition and Asian Monsoon (ACAM) Training School (24-25 June 2019) was held at the Universiti Kebangsaan Malaysia (UKM), in conjunction with the 4th ACAM Workshop (26-28 June). The training school was organized as part of ACAM's working group on capacity building related to satellite observations and model data applications in Asia, specifically in the area of atmospheric composition data analysis. This year's theme at the school was "Satellite Observations and Analysis of Atmospheric Chemistry and Aerosols in the Asian Monsoon region".

The 2-day event included lectures, computer-based tutorials and mini-projects using latest and comprehensive global satellite and reanalysis datasets on atmospheric composition, focusing on research problems in Asia. The school was attended by 37 early career scientists including graduate students and postdocs from 15 countries, selected from a pool of ~140 applications. Participants represented not only wide geographic diversity but also multi-institutional and multi-disciplinary backgrounds. Each training school participant also attended the following ACAM workshop, which gave them a suitable opportunity to learn about ACAM related science and data prior to the workshop, in turn facilitating networking with peers and lecturers during the week.

A large focus of the school included live demonstration of satellite datasets and open source platforms/scripts to read, visualize and analyze multi-dimensional data. The various satellite and reanalysis datasets included TROPOMI (CO, NO_2 and SO_2 products), GOME (NO_2), MODIS (aerosol), CALIPSO (vertical aerosol profile) and Copernicus Atmospheric Monitoring Service (CAMS trace gas products). An introductory live

Third ACAM Training School



webinar was conducted prior to the event to provide overview about the format of the school and introduce the multi-sensor satellite data products. Specific information about the datasets and analysis platforms were uploaded on EUMETSAT's e-learning platform, prior to the training event; where participants actively engaged in gaining familiarity with the datasets and proposed candidate mini-projects based on their research interests.

Lecturers at the school included Ilse Aben (SRON, Netherlands), Bhupesh Adhikary (ICIMOD, Nepal), Silvia Bucci (LMD, France), Federico Fierli (EUMETSAT, EU), Ritesh Gautam (EDF, US), Laura Pan (NCAR, US), Amit Pandit (NASA Langley, US) and Mark Parrington (ECMWF, UK).

After the science lectures and computer-based tutorials on day 1, participants worked in groups to implement small-scale science projects focusing on NO_2 hotspot analysis linked to urban and fire emissions using TROPOMI and GOME data, dust and smoke characterization including transport and vertical distribution analysis using MODIS and CALIPSO data, respectively, and model-satellite intercomparison of trace gases distribution over Asia using the CAMS platform.

The training school concluded by group presentations with participants summarizing their scientific findings and their experience with data and tools. Some of the freely available open-source tools used were Google Earth Engine and Python scripts to read and analyze the aforementioned datasets. A separate breakout discussion centered on capacity building, after the school, highlighted increasing interest in the ACAM community to employ satellite and model data applications in Asia – with feedback for improved interpretation of satellite data including data uncertainties, statistical analysis as well as atmospheric instrumentation along with related measurement protocols in ensuring robustness and accuracy of field-collected data. This working group will strive to address and include these topics in future editions of ACAM training school and share related opportunities in other training networks with the ACAM community.

The organization of training school would not have been possible without the extensive logistics support from the local organizing team led by Prof. Talib Latif and Dr. Fatimah Ahamad from UKM. We would be remiss not to mention the generous financial support from various sponsoring organizations that enabled participation of the trainees and some lecturers at the school. These sponsors include IGAC, EUMETSAT, ICIMOD, EGU, SPARC, iCACGP, NASA. We thank the various sponsors and local organizers for their thoughtful support.

Information about previous ACAM Training Schools in Bangkok (2015) and Guangzhou (2017) can be found at the links below:

Guangzhou 2017 Training School
Bangkok 2015 Training School

26-28 JUNE 2019
UNIVERSITI KEBANGSAN MALAYSIA (UKM), BANGI, SELANGOR, MALAYSIA

IGAC Sponsored

Fourth Workshop on Atmospheric Composition and the Asian Monsoon (ACAM)

AUTHORS

Hans Schlager, German Aerospace Center (DLR), Institute of Atmospheric Physics, Oberpfaffenhofen, Germany

Mian Chin, NASA Goddard Space Flight Center, Greenbelt, Maryland, USA

Mohd Talib Latif, Universiti Kebangsan Malaysia (UKM) , Bangi, Malaysia

Fatimah Ahamad, Universiti Kebangsan Malaysia (UKM) , Bangi, Malaysia

HOST INSTITUTION

Universiti Kebangsaan Malaysia
The National University of Malaysia

FUNDING

WCRP World Climate Research Programme, SPARC, ICACGP, IUGG, IAMAS International Association of Meteorology and Atmospheric Sciences, NASA, EGU European Geosciences Union, EUMETSAT, ICIMOD, Asian Network on Climate Science and Technology (ANCST), ACAM, DLR

PARTICIPANTS

Bangladesh, Brunei, China, France, Germany, India, Indonesia, Iran, Japan, Malaysia, Myanmar, Nepal, Netherlands, Pakistan, Philippines, Singapore, South Korea, Taiwan, Thailand, United Kingdom, USA, Vietnam

BACKGROUND

IGAC sponsored this workshop to support the joint IGAC/SPARC activity ACAM (Atmospheric Composition and the Asian Monsoon), which aims to build strong international collaborations to obtain diverse expertise and resources for ACAM science, and access to the monsoon region for international research teams.

4th ACAM Workshop Participants – UMK Pusat Siwazah Lecture Hall

The 4th ACAM Workshop was held at the Universiti Kebangsaan Malaysia (UKM) in Bangi, Selangor, Malaysia, 26-28 June 2019, including 153 participants from 22 countries. The overall aim of the workshop was to exchange information on the latest results in the very interdisciplinary field of ACAM science and to foster international collaborations in the Asian region and worldwide. Scientific presentations and discussions covered a broad range of topics including air quality, monsoon convection coupled to surface emissions, transport pathways of pollutants into the stratosphere, Asian tropopause aerosol layer (ATAL), and monsoon-climate interactions. Emissions in the Asian monsoon region are still increasing due to rapid population and economic growth, thus, accurate representation of the monsoon system in global chemistry-climate models is critical to predicting climate change.

The workshop program was structured according to the four ACAM themes: 1) Emissions and air quality in the Asian monsoon region, 2) Aerosols, clouds, and their interactions with the Asian monsoon, 3) Impact of monsoon convection on chemistry, 4) Response of the upper troposphere and lower stratosphere to the Asian Monsoon. The workshop included 50 oral and 90 poster presentations. All posters were also introduced in rounds of 1-minute oral presentations. Each session began with scene setting invited talks. Results from recent aircraft and balloon campaigns were presented including StratoClim, BATAL, and SWOP.

Universiti Kebangsaan Malaysia (UKM)

Modelling results discussed covered processes coupling local emissions with regional and global composition and climate, and satellite retrievals of atmospheric composition over the Asian monsoon region were presented. In addition, plans for upcoming field campaigns related to ACAM were reported, e.g. the ACCLIP campaign in 2020. Most of the oral and poster presentations will be available on the ACAM website **https://www2.acom.ucar.edu/acam**.

The workshop included also break-out meetings of the three ACAM working groups 1) "Observations and Data Sharing" which aims to identify ACAM-relevant datasets, organize data sharing, and encourage future coordinated observations, 2) "Modeling and Analysis" with the objective to foster interactions between the global and regional modeling communities and to organize ACAM-related modeling and analysis, 3) "Training School" which is focusing on the development of future training opportunities for early career scientists on observations and modeling. In the working group meetings the focus of the discussions was on the best way to promote collaborations in the field of ACAM science, e.g. partnership with other modeling communities (e.g. CCMI, AEROCAM) and sharing of data from recent ACAM-related field campaigns. The outcome of the working group meetings were summarized in plenum presentations.

This was the fourth ACAM workshop following the workshops in Kathmandu, Nepal in 2013, Bangkok, Thailand in 2015, and Guangzhou, China in 2017, and provided again an excellent opportunity for ACAM scientists, in particular early career scientists, to highlight their research results. About 30 percent of the oral presentations were given by early career scientists. The discussions during the extended poster sessions and working group meetings allowed the scientists to initiate and strengthen collaborations with international partners.

If you are interested to join the ACAM activity or in receiving updates on ACAM, please send a subscription request to the **ACAM mailing list**.

Pravash Tiwari

Pravash Tiwari attended the Third ACAM Training School and the Fourth ACAM Workshop 24-28 June 2019 at the Universiti Kebangsan Malaysia (UKM), Bangi, Selangor, Malaysia.

Pravash Tiwari is from Nepal – the land of the Himalayas, land of myth and mountains, Yaks and Yetis, caste and culture, and festivals and fairy tales. Pravash earned his Bachelor's degree in physics from St. Xavier's College, an affiliated Tribhuvan University, in Kathmandu, Nepal. He went on to earn a Master's degree in meteorology from Banaras Hindu University (BHU), India. Currently, Pravash is a Research Assistant working from the field in Nepal for the Institute for Advanced Sustainability Studies (IASS) in Potsdam, Germany under the mentorship of post-doctoral fellow Dr. Ashish Singh and the supervision of scientific research group leader Dr. Maheswar Rupakheti and overall guidance from scientific director Prof. Dr. Mark Lawrence. Pravash's research focuses on the analysis of aerosol physical/optical properties and their radiative impacts in Pokhara Valley, a polluted valley and the second largest metropolitan area in Nepal located in the foothills of the Himalayas. He is also assisting in the development and deployment of low-cost PM sensors in highly polluted environments, such as Kathmandu Valley.

What was the most interesting thing you learned and who was the most interesting person you met during the Third ACAM Training School and Fourth ACAM Workshop?

Both the Third ACAM Training school and the Fourth ACAM workshop were a great personal, as well as professional, experience for me. It's actually hard to choose "the most interesting thing" of such a great training school and workshop.

The most rewarding part of the training school was working with different satellite and reanalysis datasets to create visualizations and do analysis. The most rewarding part of the workshop was connecting with various researchers and their work. Apart from this, I really liked the way the training course was structured and organized, especially the scientific interaction session with fellow trainees and experts. This interaction helped me a lot in developing networks and discuss scientific questions. Another specific skill I personally think I learned was working in a team. I felt the essence of teamwork during the mini-project where we all worked as a team to complete our objective and demonstrate our outputs.

I met many scientists and fellow researchers in the workshop and it was great connecting with all, but I have a lot of gratitude toward Dr. Ilse Aben, Dr. Federico Fierli, Dr. Mark Parrington, Dr. Ritesh Gautam, Dr. Amit Pandit and Dr. Bhupesh Adhikari for their seamless effort in training, supporting, sharing their knowledge, and clearing my doubts.

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?

I loved the subject of science when I was in high school. The scattering of light, the blue color of sky, the reflection and refractions, it was all so fascinating. For my Bachelor's degree, I pursued physics and I fell in love with classical mechanics. I used to spend time reading about atmospheric waves and other atmospheric phenomena, which developed my interest toward meteorology. Therefore, I pursued my Master's in geophysics, specializing in meteorology. I enjoyed studying meteorology, greenhouse gases, and aerosols, especially their properties. I enjoyed studying these topics because their importance in many areas, including climate change and environment change, was so compelling. So, I started working with a professor in my department, Dr. Manoj Kumar Srivastava, on understanding and interpreting the optical properties of aerosol and aerosol radiative forcing. I used to wonder and discuss with my professor about the state of this research back in Nepal and how I could contribute to advancing the understanding of atmospheric issues and mitigating the negative impacts in Nepal. I soon learned about the project Sustainable atmosphere for the Kathmandu Valley (SusKat) led by the Institute for Advanced Sustainability Studies (IASS) in Potsdam, Germany. After completing my Master's degree, I was fortunate to be given an opportunity to work in the SusKat project as a researcher. Since then, I have not looked back. This has been my journey so far and I now realize the rest of my career I will be an aerosol scientist.

In your opinion, what role do you think science plays or could play in society?

Science is one of the most vital channels of understanding, from specific roles to a variety of capabilities for the benefit of society. Look around us, every technology that has made our life better in a significant way is the product of amazing scientific research that was then translated into technology. Amazing advancements from health care to communication have been a gift of science to society.

But for efficient role playing, science and society must communicate. Scientific work should not just rest in scientific papers but should also be effectively communicated into societal aspects/implications and then feedback from society, I think, can help anchor and improve the direction of scientific research. Therefore, in my opinion, science is (and always will be) the backbone of societal development. However, I am also convinced that, given the negative impacts of any scientific or technological advance we have experienced now or had in the past, we need to mindfully make sure that we use scientific advancement for sustainable transformation of the societies.

As an early career scientist, you have an exciting future ahead of you. What type of career do you hope to have in 5 to 10 years? What issues related to atmospheric chemistry or broader sustainability issues do you hope to address in your career?

My primary goal now is to enroll in a PhD program and continue my research on aerosol and air pollution. The increasing severity of droughts/floods, aerosol direct impact on climate and agriculture, and worsening air quality and huge impacts on public health, I think, are the gravest threats a major percentage of the population living in Asian monsoon region face. My priority will obviously be to understand some of these issues through my doctoral research. I am still in the process of thinking about my career goals, but after a PhD, my aim will probably be to pursue a career in academic research, network with other scientific groups, support young scientists in developing countries, create new ideas together, and focus on the communication of science and scientific results so that our policies and actions are informed by sound science. In the long run, my aim will be to contribute to building up broader and more connected science in the South Asian region, working together to tackle the air pollution problems of South Asia.

What do you do for fun when you're not busy pushing the limits of the knowledge of mankind doing atmospheric chemistry research?

Might sound odd, but I enjoy taking long walks by myself with my headphones around my ears and listening to some really good soothing music. I also spend time relaxing with books or sometimes I watch movies. Above all this, when I take a break from work, occasionally, I sit down with family and friends to tell them why we should be concerned about the environment around us and its pollution, how small changes in our daily habits will have positive impact, and how air quality degradation is having an adverse effect. So I like to share whatever I know in easy-to-understand language.

International Workshop on Chemistry Climate Interaction (IWCCI)-2019

12-15 MARCH 2019
INDIAN INSTITUTE OF TROPICAL METEOROLOGY (IITM), PUNE, INDIA

AUTHORS

Sachin D Ghude, Indian Institute of Tropical Meteorology (IITM), India

Sreyashi Debnath, Indian Institute of Tropical Meteorology (IITM), India

Chinmay Jena, Indian Institute of Tropical Meteorology (IITM), India

Prakash Rao, Indian Institute of Tropical Meteorology (IITM), India

Narendra Dhangar, Indian Institute of Tropical Meteorology (IITM), India

Veeresh S. Sajjan, Indian Institute of Tropical Meteorology (IITM), India

Rajesh Kumar, National Center for Atmospheric Research (NCAR), USA

Vinayak Sinha, Indian Institute of Science Education and Research (IISER), Mohali, India

Sachin Gunthe, Indian Institute of Technology, (IIT), Madras, India

HOST INSTITUTION

FUNDING

ESSO

Ministry of Earth Sciences

PARTICIPANTS

3 international experts (USA), 17 national experts and 40 national students, young scientists, and researchers from different MoES (Ministry of Earth Sciences) institutes and various academia and other research organizations/centers of India.

IWCCI: Delegates and participants

Over the four days of March 12 to 15, 2019 DESK (Development of Skilled Manpower in Earth System Sciences), Indian Institute of Tropical Meteorology (IITM), Pune organized a 2 day workshop and 2 days of training program on atmospheric chemistry-climate interaction. The workshop combined series of lectures by eminent experts of this field with structured discussion sessions on the challenges and future scope of atmospheric chemistry-climate modeling. The international workshop was organized to bring together young talented scientists, international and national experts of this field as resource persons and discuss the processes bridging atmospheric chemistry and weather/climate interaction.

Following were the major objectives of the workshop:

- To foster discussion and strengthen connections between experts and students, young researchers and provide the participants (largely drawn from MoES institutions) a good exposure to the international scientific community.
- To train the participants on regional/global chemistry-climate models and Software-Visualization Tools/Data Assimilation.
- To provide the participants and resource persons a good platform for showcasing the advancements in Indian Science in this arena of research and pave the way for future international collaborations.

The four-day training workshop comprised a total of 6 lecture sessions and 1 training session, with 3-4 speakers per session. Each speaker was given 35-40 minutes to present, followed by 5-10 minutes for questions. There were SKYPE sessions where five international experts delivered their respective talks remotely. The training workshop helped the participants to develop a basic understanding about regional chemistry-climate models such as WRF-Chem and data assimilation. It was workshop was structured to foster discussion between participants around the core themes of chemistry-climate interactions, air quality, impact of atmospheric chemistry on the Indian monsoon system, etc., which was achieved by creating few groups of students who presented their projects in the concluding session of the last day. The best group project presentation was rewarded by iLEAPS. The presentation and discussion sessions addressed the observations and modeling of chemistry-climate-weather interactions over the Indian region, global as well as regional challenges. In addition to this, an iLEAPS Early Career Scientists Side meeting was arranged on the first day of the workshop, after the lecture sessions.

The lecture sessions were scheduled in a way so that there could be a proper synergy among the various talks related to the dynamics and chemistry and their impact on various weather/climate systems. The lectures provided a wonderful insight into the history of chemistry-climate interactions in Earth System models explaining the hierarchical evolution of chemistry modules in the models and how the inclusion have facilitated chemistry-climate interaction studies from regional to global scale. The workshop also brought into focus the growing importance of atmospheric composition in the predictions of air quality, weather and climate; the challenges of modelling Atmospheric Chemistry in the context of using observations to assess model representations of meteorology and chemistry, etc.

The training session was conducted to make the participants aware about the need of data assimilation in simulation studies and provide them an overview about various types of weather and climate models which special emphasis on the Weather Research and Forecasting Model with Chemistry (WRF and WRF-Chem) models: its architecture, development, various micro physics, chemistry, radiation schemes, best practices that should be adopted while using the models as well as the model shortcomings. The training lectures nicely explained how these two models should be wisely used while undertaking modelling studies related to air quality, aerosol-monsoon interaction, chemistry-climate interaction, and so on over different parts of the world based on the scale and domain of study area.

Indian Institute of Tropical Meteorology (IITM), Pune, India

The workshop concluded with a panel discussion with all the participants and resource persons/experts where people came up with valuable ideas and suggestions that addressed to mitigate the challenges in the observational as well as well as simulation studies of atmospheric chemistry-climate interaction using regional and global coupled chemistry-climate models and highlight the future scope and potential topics of research relevant to this field. Many experts were of the opinion that though dust plays quite important role in modulating the weather and climatic conditions over a region, there is a lack of studies involving its chemical characterization. Thus, studies should be conducted focusing on the chemical characterization of dust as well as its importance in clouds and climate interaction. Also, there were suggestions to incorporate chemical mechanisms in models for better predictability of fog formation and dissipation, aerosol-fog interaction studies and investigate the role of various short lived climate pollutants (SLCPs) in determination of air quality of a region. In addition to these, according to most of the experts and participants, there is a need of setting strong observational base over India and neighboring regions, which would consequently improve the representation of various chemical processes in models. Some researchers even highlighted the importance of estimating oceanic emissions and how it may aid the simulation studies of chemistry-climate interaction.

More details of the Conference findings are available at: **https://www.tropmet.res.in/184-event_details**

It may be concluded by stating that the workshop has been a successful one in meeting up its objectives and more such events should be organized in the future.

community

IGAC International Project Office
University of Colorado,
CIRES
Boulder, CO USA

Megan L. Melamed
IGAC Executive Officer
megan@igacproject.org

IGAC SSC Members

Hiroshi Tanimoto (Co-Chair)
National Institute for Environmental Studies
Center for Global Environmental Research
Tsukuba, Ibaraki Japan
tanimoto@nies.go.jp

James Crawford (Co-Chair)
NASA
Langley Research Center
Hampton, VA, USA
James.h.crawford@nasa.gov

Paul Beukes
North-West University
School of Physical and Chemical Sciences
Potchefstroom, South Africa
Paul.beukes@nwu.ac.za

Lisa Emberson
Stockholm Environment Institute at University of York
York, UK
l.emberson@york.ac.uk

Gregory Frost
NOAA
Earth System Research Laboratory, Chemical Sciences Division
Boulder, CO, USA
gregory.j.frost@noaa.gov

Christian George
CNRS
IRCELYON
Lyon, France
Christian.george@ircelyon.univ-lyon1.fr

Michel Grutter
UNAM
Center for Atmospheric Sciences
Mexico, D.F., Mexico
grutter@unam.edu

Judith Hoelzemann
UFRN
Natal, Brazil
judith.hoelzemann@ect.ufrn.br

Pieternel Levelt
KMNI
De Bilt, The Netherlands
Pieternel.levelt@kmni.nl

Clare (Paton-Walsh) Murphy
University of Wollongong
School of Chemistry
Wollongong, New South Wales, Australia
clarem@uow.edu.au

Jennifer Murphy
University of Toronto
Toronto, Ontario, Canada
jmurphy@chem.utoronto.ca

Manish Naja
ARIES
Nainital, Uttarakhand, India
manish@aries.res.in

Kim Oanh
Asian Institute of Technology
Environmental Engineering and Management
Pathumthani, Thailand
kim@ait.ac.th

Abdus Salam
University of Dhaka
Dhaka, Bangladesh
asalam@gmail.com

Mei Zheng
Peking University
China
mzheng@pku.edu.cn

Events
monthly in
IGAC eBulletins
and on
igacproject.org

Join the IGAC Community

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.

IGAC mailing list sign up form.

JUL/AUG 2019
ISSUE 65

futureearth
Research. Innovation. Sustainability.