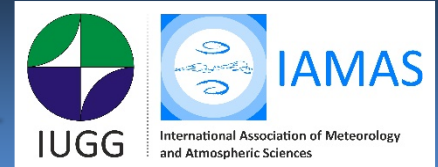


INFORMATION E-MAIL FROM THE IAMAS BUREAU



February 2019

Content:

IUGG2019 in Montreal Canada	1
ISARRA 2018 Conference Summary	2
8th GEWEX Summary	3
Feature articles -Early Career Scientists series	4 - 7
Obituary	8
Upcoming IAMAS-related Meetings	8

The XXVII IUGG General Assembly (IUGG2019) in Montreal, Canada

The 27th General Assembly of the International Union of Geodesy and Geophysics (IUGG) will take place from 8 to 18 July 2019 in Montréal, Québec, Canada. The important dates are below.

18 February 2019 - Deadline approaching soon!

- Abstract submission closing
<http://www.iugg2019montreal.com/abstract-submission.html>.
- Travel grant application closing
<http://iugg2019montreal.com/travel-grant.html>

20 March 2019

- Notification of Abstract Acceptance

5 April 2019

- Early-bird registration closing
<http://www.iugg2019montreal.com/register.html>

May 31 2019

- Complete scientific programme for presenters published

◇ IAMAS-lead symposia list

JM01	Adapting in the Anthropocene
JM02	Anthropogenic changes in chemistry and physics of the Atmosphere: evidence and attribution studies
JM03	Advances and Frontier Challenges in Global Monsoon Studies: Dynamics, Convection and Interactions with Hydrological and Land Surface Processes
JM04	Hydrometeorologic and coastal extremes in current and future climates
JM05	Ocean-atmosphere mechanisms of variability, change and predictability
JM06	Recent advances in regional climate modelling
JM07	Artificial Intelligence and Big data in weather and climate science
JM08	Earth System Models: Assessing the Earth System's State and Fate from Regional to Planetary Scales
JM09	Satellite Remote Sensing: Vital Information on the Health of our Planet
JM10	Atmospheric Water Generation



International Society for Atmospheric Research using Remotely-piloted Aircraft (ISARRA) 2018 Conference Summary

The 2018 ISARRA conference was held in Boulder, Colorado (USA) from 9-12 July, 2018. This annually-held conference brings together the world's experts in the use of unmanned aircraft systems (UAS) for atmospheric research. This year's conference was hosted by the University of Colorado Boulder and included 130 participants from 17 different countries. Included in the conference were several plenary oral sessions, during which researchers were able to provide presentations on the following topics:

- UAS to measure and understand turbulence
- UAS to measure and understand clouds, aerosols and trace gases
- UAS in development of numerical weather prediction capabilities
- UAS to measure and understand boundary layer processes
- Development of UAS capabilities and infrastructure for atmospheric science
- Use of UAS to understand high latitude processes
- UAS as a tool for observing severe weather phenomena

In addition, there was an introductory session, a poster session, time for exhibitors to present their UAS-centric equipment and a conference dinner. During the

introductory session, Dr. Joachim Reuder and Dr. Gregory Roberts gave keynote presentations on their ongoing work to develop and deploy UAS to study high latitude boundary layers and aerosol-cloud interactions (respectively). The poster session featured 38 different posters on a variety of topics, including the deployment of UAS to study the areas listed above for the oral sessions, development of instrumentation for deployment on UAS, recent and upcoming field campaigns, and aircraft development. The industry exhibit session provided opportunities for meeting participants to interact with vendors from several companies and learn about UAS-specific instrumentation, platforms and services related to the deployment of these systems for atmospheric research.

Travel support for early career and underrepresented participants was provided through a variety of channels. The International Union for Geodesy and Geophysics (IUGG) partially supported conference registration costs for 10 early career participants (4 female, 6 male) ranging in age from 21 to 37. These participants came from six different countries, including the USA, India, Norway, Germany, Cyprus and the UK. Additional travel support was made available by the US National Science Foundation and the US Department of Energy. More information on the conference can be found at the event's website: www.isarra.colorado.edu.



Summary and Highlights from the 8th GEWEX Open Science Conference

GEWEX, the Global Energy and Water cycle Exchanges project of the World Climate Research Programme (WCRP), held its 8th Open Science Conference from 6-11 May 2018 in Canmore, Alberta, Canada. More than 380 attendees hailing from 40 countries discussed and presented issues ranging from mountain and high latitude hydrology to atmospheric and land modeling research and observations. The conference covered both long-standing and emerging topics and featured the work of more than 200 Early Career Researchers (ECRs). Approximately 1/3 of the attendees were female, and about 75 attendees were from Asia. It left us very appreciative of the contributions from our community and the conference sponsors. A detailed overview of the conference can be found at:

<https://www.gewexevents.org/events/2018conference/>.

We would like to express our explicit appreciation to IUGG, IAMAS and WMO for their support of the Australasian attendees.

Themes of the Conference mirrored the diverse research of the GEWEX community. The program was also designed to reflect the science represented by the four core Panels of GEWEX and the two WCRP Grand Challenges on "Weather and Climate Extremes" and "Water for the Food Baskets of the World," both of which GEWEX leads.

The agenda, which had 7 themes and 26 sessions, was designed to cover an as wide a gamut as possible of topics on water and energy, climate and weather-related research. This also allowed us to showcase the science performed under the four GEWEX Panels as well the WCRP Grand Challenges. The GEWEX Global Atmospheric System Studies (GASS) Panel's focus on atmospheric models was shown through contributions in the session on "Energy and Water Budget Closure and Advances in Assessment Techniques." The Global Land/Atmosphere System Study (GLASS) Panel's concentration on land surface model development and evaluation was showcased in the session on "Satellite Observations for Climate Extremes, Water Cycle Processes, and Land-Atmosphere Interactions." The GEWEX Hydroclimatology Panel (GHP)'s emphasis on regional hydroclimates was particularly emphasized in the session on "Regional Hydroclimate Projects." The GEWEX Data and Analysis (GDAP) Panel's guidance of the production and evaluation of global data products as well as its newer direction of conducting analyses were well-represented in the session on "Global Energy and Water Cycles, Clouds, and Radiation."

Weather and climate extremes and the food-water-energy nexus, the topics of the two WCRP Grand Challenges, were explored in detail in various sessions. Clearly, research on extremes in weather and climate was well represented and its session well attended.

Given our location in the Canadian Rockies in the



beautiful town of Canmore, research on mountainous regions and their hydrology and climate was given particular attention, both in the main conference events as well as our excursions led by John Pomeroy and the excellent story teller and scientist Bob Sandford. High mountainous terrain, which is critical for things like regional water supply and access, is still a frontier due to the lack of research infrastructure and many unanswered questions on weather and climate-related processes in these regions. Significant steps were made during the event that may lead to a new GEWEX Mountain Initiative to bring together the latest scientific knowledge and models, such as convection-permitting models, and the relevant communities.

ECRs from the Young Earth System Scientists (YESS) (<http://www.yess-community.org/>) group and the Young Hydrologic Society (YHS) (<https://younghs.com/>) came together to hold the 2018 Joint YESS-YHS ECR Workshop for a three day span before the Conference. Participants discussed creating and disseminating regional information on different spatial and temporal scales, and you can read more about the Workshop in our August 2018 edition of GEWEX News (<https://www.gewex.org/gewex-content/uploads/2018/08/Aug2018.pdf>). A paper detailing outcomes of the workshop was published in *Frontiers of Environmental Science* (<https://doi.org/10.3389/fenvs.2019.00006>). A good portion of students and ECRs attending the conference also entered the ECR and Student Presentation Competition, and five outstanding researchers came away with prizes.

A conference is only as good as its attendees and their contributions. We thank all attendees for sharing their enthusiasm and great research and for their willingness to openly discuss and exchange ideas, which helped make the conference such a success.

I also thank the staff of the International GEWEX Project Office, Dawn, Shannon and Fernande for their tireless efforts before, during and after the conference. They were a crucial part in making it work smoothly.

Peter van Oevelen
IGPO Director

“Understanding variability and long-term trends in climate extremes”



Dr Markus Donat's research focuses on a range of topics related to understanding the variability and long-term changes in weather and climate extremes. For his research, he combines observational datasets and climate model simulations to identify robust signals of

climate variability and change, and to understand the processes and mechanisms in the climate system that drive or amplify extremes.

Markus' work has fundamentally revised the analysis of global climate extremes by providing the to-date most comprehensive assessments of how temperature and precipitation extremes have changed globally over the past century. As part of this work, Markus led a large international collaboration to develop quasi-global datasets of observed climate extremes. These datasets are now widely used by researchers and stakeholders world-wide including as the underpinning extremes data for the World Climate Research Programme Grand Challenge on Weather and Climate Extremes, and are freely available at www.climdex.org.

Markus further uses these observational datasets for model evaluation, and to identify robust features across real-world observations and climate model simulations. In recent work, published in *Nature Climate Change* (Donat et al., 2016, doi:10.1038/nclimate2941), he proposed a new way to compare models and observations accounting for possible spatial biases, by spatially aggregating according to climatological characteristics rather than by geographical regions.

This new approach addresses the issue that regional precipitation changes often show only little agreement across observations and models, and between different models. Furthermore, local precipitation time series often exhibit large variability, and spatial aggregation increases the signal-to-noise ratio. The issue of little agreement across models and observations is in part related to spatial biases in which climate models

simulate the relevant meteorological features. Due to these biases, models may not be expected to simulate temporal changes in agreement with real-world observations when compared for geographical locations.

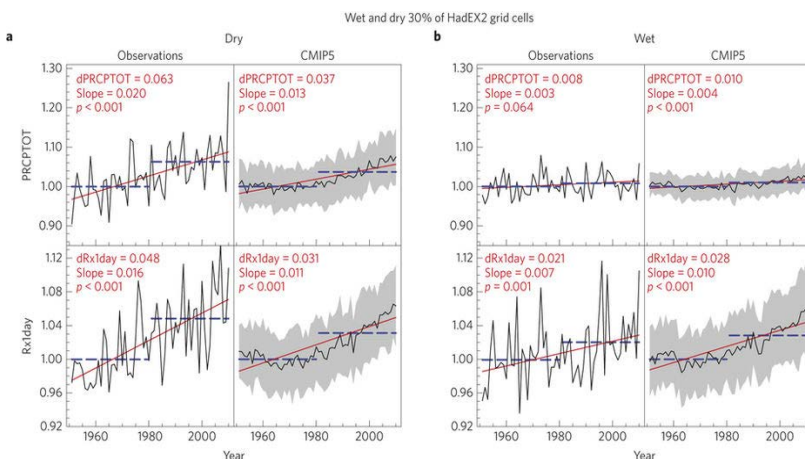
To circumvent these biases, his research identified the wettest and driest locations of the global land areas (measured in terms of climatological precipitation intensity), and then aggregated over all wet and dry regions separately. This approach, accounting for model-specific climatologies, has led to improved agreement between the different datasets. In particular, his research demonstrated robust increases in precipitation extremes across observations and climate models in the dry and wet regions of the world, while total precipitation amounts also increased in the dry regions but did not change in the wet regions.

Markus was awarded his PhD in 2010 from Freie Universität Berlin. Since 2011 he has been a Research Fellow at the Climate Change Research Centre at the University of New South Wales in Sydney, Australia. His research was instrumental in enabling the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report to assess past changes in climate extremes, for which Markus was a contributing author (Working Group I; Chapter 2: Observations: Atmosphere and Surface). He is an emerging leader having convened and co-convened sessions on extremes at the American Geophysical Union, European Geosciences Union and the Australian Meteorological and Oceanographic Society, in addition to mentoring numerous undergraduate and post-graduate students. The World Climate Research Program (WCRP) and the Global Climate Observing System (GCOS) have recently recognised the outstanding quality of his contribution to the development of climate data sets by awarding him the WCRP/GCOS International Data Prize 2017. He has over 50 peer-reviewed publications with >1700 citations and a h-index of 23. This is a remarkable achievement at his young career stage.

Author: Markus Donat

Introduced by ICCL MEMBER: Neil Holbrook

Figure: Time series of PRCPTOT (annual precipitation totals) and Rx1day (the annual-maximum daily precipitation) for dry (a) and wet (b) regions. Area-weighted average time series are shown for HadEX2 and the ensemble mean and spread of CMIP5 simulations. Precipitation indices were first normalized by calculating annual values as a fraction of the 1951-1980 local mean before calculating the dry- and wet-region averages. Black lines, annual values from observations and ensemble mean; red lines, linear trend; blue dashed lines, 30-yr averages for 1951-1980 and 1981-2010; grey shading, \pm one ensemble standard deviation. dPRCPTOT and dRx1day indicate the difference between the averages during 1981-2010 and 1951-1980; slope is the linear trend Sen-slope estimate (unit: decade⁻¹); and the p-value is the trend significance using a Mann-Kendall test. Figure from Donat et al (2016), *Nature Climate Change* (doi:10.1038/nclimate2941).



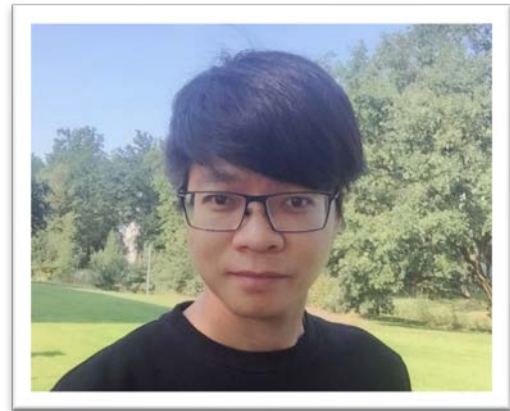
The Fourth Article of a series featuring Early Career Scientists

“Aerosols seen from space”

Climate aspects of a changing atmospheric composition and air quality aspects arising from aerosols, especially in undeveloped and developing countries, are key drivers for Linlu Mei’s scientific research. Political discussions concerning changes in the composition of the atmosphere in these regions caught his attention already years ago. One significant manifestation of these changes is the massively deteriorating air quality in urban conglomerations of undeveloped and developing countries. Aerosols affect climate directly and indirectly. Therefore, understanding their physical and chemical properties can help us improve our understanding of climate change.

These aspects led Linlu Mei to advance the research on aerosols and closely associated clouds. Because of the global nature of the phenomena (and partially transport processes), his research is mainly based on utilization of devices enabling global evaluation, thus he mostly works with satellite-based remote sensing techniques which he either personally develops or applies systematically.

In the course of his career, Linlu Mei has contributed significant research in developing new methods for global retrieval of atmospheric aerosol from satellites. This is an area of increasing priority for research, since the IPCC has identified anthropogenic aerosols as the climate forcing constituent with largest uncertainty. In particular he has innovated the modeling of surface and atmospheric spectral properties using the eXtensible Bremen AERosol Retrieval (XBAER). Based on this, he developed a unique retrieval method which can provide satellite estimate of aerosol over bright surfaces, including snow and cloud, as well as dark surfaces such as dense vegetation and ocean. In this context he has also published the first paper on spectral retrievals using the OLCI instrument on the recently launched



Sentinel-3 satellite. The papers from Linlu Mei have been well received within the community, evidenced by a high citation rate.

Through these developments he has taken a leading role in aerosol research within several national and international projects including the European Space Agency project “Aerosol Climate Change Initiative” and the German Research Foundation funded collaborative research center (AC)³. Linlu Mei’s work in those projects provides high quality satellite atmospheric products for a better understanding of the global climate change.

By holding lectures and supervising MSc and PhD students, he is, so to speak, “passing on his knowledge” so that younger generations may gain a better understanding of global climate change through the use of satellite-based aerosol observations.

Linlu Mei is currently a research scientist at the Institute of Environmental Physics, University of Bremen. He received his B.A in Geography and Computer Sciences from the China University of Geosciences (Wuhan) in 2008 and finished his Ph.D. in Atmospheric Science at the Chinese Academy of Sciences in 2013.

Author: Linlu Mei
 Introduced by iCACGP Member:
 John P. Burrows

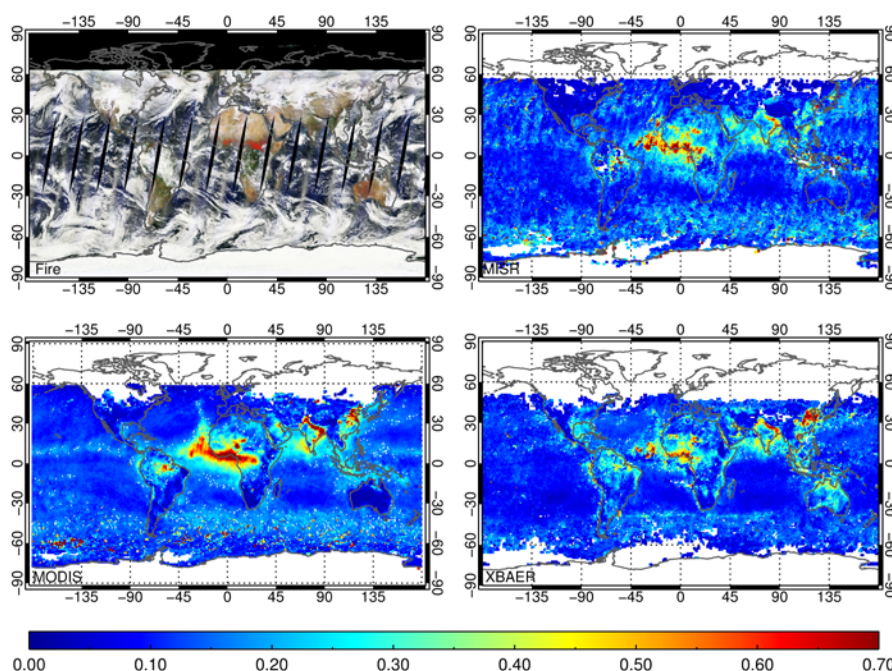


Fig. Comparison of the retrieved global monthly mean AOT at 0.55 μm for December 2016 using the OLCI instrument onboard Sentinel-3 satellite. Upper row: left - MODIS fire product, right-MISR. Lower row: left-MODIS (Dark-Target and DeepBlue combined), right- OLCI (XBAER) (Figure from Mei et al 2018 <https://doi.org/10.5194/acp-18-2511-2018>)

The Fifth Article of a series featuring Early Career Scientists

“Uncovering Cloud and Fog Mystery”

Dr. Chunsong Lu is a full professor in the Nanjing University of Information Science and Technology (NUIST) in China. In 2012, he received his Ph.D under the joint supervision of Prof. Shengjie Niu at NUIST and Dr. Yangang Liu at Brookhaven National Laboratory in the US. He has taken on the challenging but critical problems of turbulent entrainment-mixing processes and their interactions with cloud/fog microphysics. He has already published more than 40 peer-reviewed papers with 21 of them published in prestigious journals (e.g., *Geophysical Research Letters*) as the first/corresponding author. He has successfully led 4 research projects from National Natural Science Foundation of China, as the principal investigator. He is supervising 12 Master/Ph.D students. In recognition of his exceptional performance, NUIST endowed him a rare promotion from the rank of assistant professor to full professor in four years after Ph.D.

In 2015, Chunsong won the prestigious **American Geophysical Union (AGU) Holton Junior Scientist Award**, for the “original contributions in observational and modeling studies of cloud microphysics, turbulent mixing, and convective entrainment.” Prof. William K. M. Lau, who was then the President of Atmospheric Sciences section, described in the citation that “Chunsong has demonstrated exceptional purposefulness, creativity, and originality in the challenging and critical problems of convective entrainment, turbulent mixing processes, and their interactions with cloud/fog microphysics.” Furthermore, his outstanding accomplishments have been recognized by 20 other awards, including Yuxiang Young Scholar Award from Chinese American Oceanic and Atmospheric Association in the US, Exceptional Service Award from Brookhaven National Laboratory in the US, Junior Faculty Fellow Award from Ministry of Education in China, TU Changwang Youth Meteorological Science and Technology Award from Chinese Meteorological Society.

Chunsong’s scientific achievements are mainly in three related fields. First, he developed a new approach for estimating entrainment rate in cumulus clouds and developed a new parameterization of entrainment rate, and applied it to climate models. The paper on entrainment rate parameterization (Lu et al., *JAS*, 2016) was selected as an Essential Science Indicators (ESI) highly cited paper. Second, he proposed new dynamical and microphysical measures to quantify different entrainment-mixing mechanisms and determined the most appropriate microphysical time scales. A new parameterization of entrainment-mixing mechanisms developed by him is applied in the Weather Research and Forecasting (WRF) Model. The new parameterization is found to reduce the simulation errors in total precipitation and probability density function of precipitation. Third, he established a conceptual model that could describe fog formation/dissipation and dissected main dynamical



and thermodynamic factors. He proposed a new parameter that could be used to develop an approach for estimating ion concentrations in fog water.

Chunsong has contributed to various international scientific activities and cooperation. He was elected as a member of the International Commission on Clouds and Precipitation (ICCP) in 2016. Currently he serves as an editor of *Atmospheric and Oceanic Science Letters*. He also served as a reviewer for Natural Sciences and Engineering Research Council of Canada (NSERC), Israel Science Foundation (ISF), Outstanding Student Paper Award of AGU, and many international journals.

Author: Chunsong Lu
Introduced by ICCP Member: Seong Soo Yum

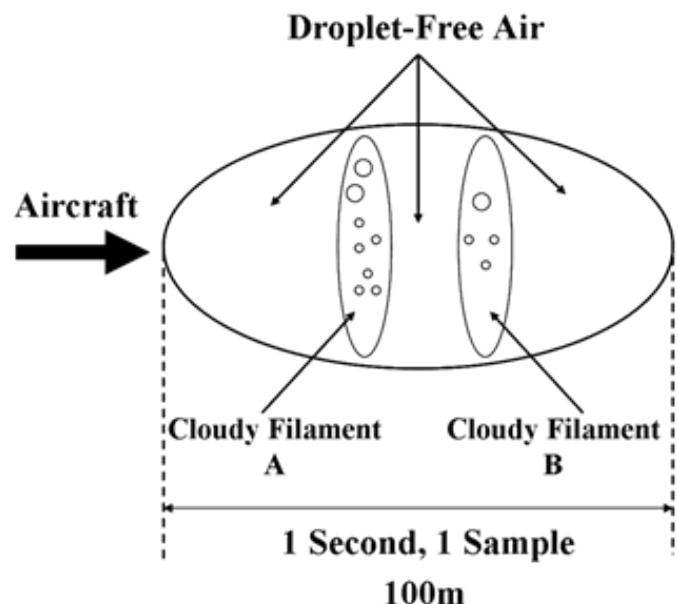


Figure 1 Schematic illustration of the filament structure of a sample as collected by the instrumented aircraft. The circles in the Filaments A and B represent cloud droplets. This filament structure is responsible for scale dependence of entrainment-mixing mechanisms (See Lu et al., *JGR*, 2011, 2014).

The Sixth Article of a series featuring Early Career Scientists

“One Laser Pulse at a Time”

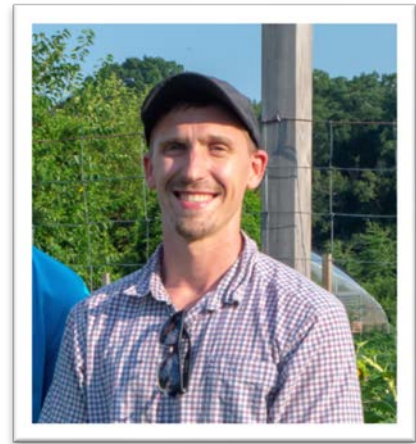
Dr. John T. Sullivan is fascinated by the atmosphere’s vertical structure. John has a B.A. in Physics from McDaniel College (2010) and an M.S./Ph.D. in Atmospheric Physics from the University of Maryland, Baltimore County (2012 and 2015). His dissertation included the construction, validation, and deployment of a mobile ground-based tropospheric ozone differential absorption lidar (DIAL) for use in air pollution transport, boundary layer dynamics, and exchanges of stratospheric and tropospheric air studies (Tropospheric Ozone DIAL or TropOz). This instrument was a collaboration with the lidar experts from NASA Goddard. His dissertation relied heavily on data from the 2014 NASA DISCOVER-AQ mission (see Fig 2). As part of a number of air quality studies, John began to understand and enjoy field deployments (particularly in areas where he wouldn’t develop high-altitude sickness). In 2015, he was awarded a NASA Postdoctoral Program Fellowship. In December 2017, he accepted a position at Goddard to continue developing instrumentation measuring troposphere and the stratosphere trace gases - increasing the Goddard 30-yr heritage of lidar measurements associated with the Network for the Detection of Atmospheric Composition Change (NDACC). John’s work has demonstrated TropOz data quality, and TropOz is now part of two major measurement networks: NASA’s Tropospheric Ozone Lidar Network (TOLNet) as a charter member, and NDACC.

John is now the Principal Investigator for the TropOz instrument. During deployments, John is usually found optimizing/troubleshooting the lidar or fixing surface chemical analyzers. He is also found preparing ozonesondes - he’s done ~200 launches since 2014. A notable deployment (and not just for the bibimbap or Korean BBQ) was when the TropOz trailer was sent to South Korea for the KORUS-AQ campaign. TropOz was deployed to a remote forest to better characterize Seoul pollution outflow. John’s also done campaigns to Mauna Loa, Hawaii (2014-2015), Haute de Provence, France (2017-2018), and Hohenpeissenberg, Germany (2018).



Figure 1 The NASA GSFC Tropospheric Ozone Lidar (TropOz) during the NASA DISCOVER-AQ 2014 field deployment to Ft. Collins, CO. (see Sullivan et al., AMT (2014) for instrument details)

John has garnered an appreciation for lidar’s nature, particularly the instrumentation quirks and how it can (subtly) impact signal processing and data



interpretation. However, he views lidar as a Swiss army knife-like for usage by intersecting communities, such as satellite teams and policy makers. John realized tropospheric ozone profiles could be used to better understand the photochemical and diurnal cycle of urban pollutants and their impacts on the outdoor environment - particularly in complex topography. This motivated his recent adventures to understand the physical and chemical processes that occur near coastal regions. In 2017, he was named as the Early Career Scientist associated with NASA’s Ozone Water-Land Environmental Transition Study (OWLETS). More recently, John was the PI of the follow-on OWLETS-2 deployment in Baltimore (2018). John brought together scientists and policy makers from the Maryland Department of the Environment. During the OWLETS campaigns, he coordinated deployments of TOLNet lidars, ceilometers, ozonesondes, aircraft (including drones), research vessels and surface analyzers to provide direct observations around the Chesapeake Bay. With this experience of leading a large-scale field campaign, John hopes to continue these motivated efforts and eventually transition to a position as the Coordinating PI of TOLNet and lead further large-scale campaigns.

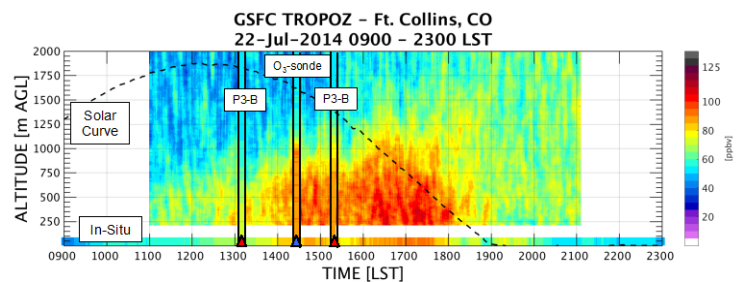


Figure 2: The GSFC TropOz showing a boundary layer enhancement of high ozone during DISCOVER-AQ. Overlaid in this figure are in-situ data, ozonesondes, and co-located aircraft spiral data. (Sullivan et al., JGR (2015; 2016)

John is an avid coffee drinker and beer-brewer. When he is not in the field, he enjoys the simple things in life: biking, camping, walking his dog, or doing whatever his 3-yr son old forces him to do.

Author: John T. Sullivan
Introduced by IO3C Member: Irina Petropavlovskikh

Obituary: Prof. Roland List (1929 - 2019)



IAMAS is sorry to announce the passing on 26 January 2019 of Prof. Roland List, the distinguished cloud physicist and former Secretary General of IAMAS. Roland had a long and highly successful career in the atmospheric sciences and also contributed to international cooperation and coordination of meteorology through his service to IAMAS and via the World

Meteorological Organisation, where he was Deputy Secretary General in the 1980s.

Roland was born in Frauenfeld, Switzerland in 1929 and graduated from ETH Zurich before working for the Swiss Federal Institute for Snow and Avalanche Research in Davos. In 1963 he moved to the University of Toronto where he established a world-leading cloud physics group that thrived under his leadership. During his time at the University of Toronto he supervised 44 Masters and 33 PhD students, many of whom have gone on to have distinguished careers of their own in the atmospheric sciences. Roland was Secretary General of IAMAS from 1995 to 2007, during which time he was the IUGG representative to the WMO and the World Climate Research Program. He had a long association with the IAMAS International Commission on Clouds and Precipitation, of which he was an honorary member.

On behalf of IAMAS and the atmospheric sciences community, we extend our condolences to his family.

John Turner, President of IAMAS (2015-2019)

Message from Michael MacCracken, Past President of IAMAS (2003-2007)

One of the IAMAS tasks that Roland took great pride in carrying through was offering funding and assistance for young scientists with limited funding to come to the IAMAS assemblies and IUGG congresses, building the global scientific community. He really enjoyed bringing people together and arranging times for the newly and long-graduated to mix and learn from each other.



The IAMAS Bureau members and incoming Officers at the 2007 IUGG General Assembly in Perugia, Italy
 <From Front Left> Roland List, the Secretary General (2003-2007)
 Michael MacCracken, the President (2003-2007)
 <From Behind Left> Guoxiong Wu, the incoming President (2007-2011)
 John Turner, the Deputy SG (2003-2007)
 Hans Volkert, the incoming SG (2007-2015)

Upcoming IAMAS-related meetings

✧ 4-5 April 2019

1st QuiESCENT (Quantifying the Indirect Effect: from Sources to Climate Effects of Natural and Transported aerosol in the Arctic) workshop
 Cambridge, United Kingdom

Web: <https://sites.google.com/view/quiescent-arctic/workshops/1st-quiescent-workshop>

✧ 24-28 June 2019

4th ACAM (Atmospheric Composition and Asian Monsoon) Workshop and 3rd ACAM Training School
 Bangi, Malaysia

Web: <http://www.ukm.my/acam/>

The IAMAS INFORMATION E-MAIL



We welcome short reports from the Commissions at any time.

IAMAS, General Secretariat

Assistant: Yoshi Sasaki, Nozomi Tomizawa, Miyuki Miyazaki

IAMAS_SG_office@jaxa.jp

