



Facilitating atmospheric  
chemistry research towards  
a sustainable world

One Atmosphere: Building a Collective Knowledge



# IGAC Conference Program

Breckenridge  
2016

26-30 September  
Colorado USA

## Conference Schedule at a Glance

Monday	Tuesday	Wednesday	Thursday	Friday
	8:00-11:00 Poster Session Session 1 posters in Imperial Ballroom	8:00-9:00 New Technology Special Session	8:00-11:00 Poster Session Session 2 posters in Summit Gallery	
9:00-10:15 Opening Ceremonies/ Guest Speaker	Session 3 posters in Coppertop II Session 6 posters in Summit Gallery (Breakfast provided)	9:00-9:30 Keynote Speaker	Session 4 posters in Imperial Ballroom Session 5 posters in Coppertop II (Breakfast provided)	9:00-9:30 Keynote Speaker
10:15-10:45 Coffee Break		9:30-10:25 Session 2 Plenary Talks		9:30-10:35 Session 6 Plenary Talks
10:45-11:30 Opening Ceremonies/ Guest Speaker	11:00-12:40 Session 5 Plenary Talks	10:25-10:55 Coffee Break		10:35-11:05 Coffee Break
11:30-12:00 Keynote Speaker		10:55-12:30 Session 2 Plenary Talks	11:00-12:20 Session 4 Plenary Talks	11:05-11:55 Session 6 Plenary Talks
12:00-12:35 Session 1 Plenary Talks				
12:35-14:05 Lunch	12:40-14:05 Lunch	12:30-18:30 Free Afternoon	12:20-14:00 Lunch	11:55-12:30 Closing Ceremonies
14:05-15:40 Session 1 Plenary Talks	14:05-15:30 Session 5 and 3 Plenary Talks		14:00-15:30 Session 4 and 6 Plenary Talks	
15:40-16:10 Coffee Break	15:30-16:00 Break Coffee Break		15:30-16:00 Coffee Break	
16:10-17:40 Session 1 and 5 Plenary Talks	16:00-17:35 Session 5 Plenary Talks	17:30-18:30 Pre-Dinner Cocktail Hour	16:00-17:30 Session 6 Plenary Talks	
17:40-19:00 UCAR/NCAR Welcome Reception Coppertop III & Floor 3 Foyer	17:35-19:00 Networking/ Social Hour Coppertop III & Floor 3 Foyer	18:30-21:00 Conference Banquet (Colorado Ballroom)		
	19:00-21:00 Early Career Scientists Mixer	21:00-Midnight After Party (Breckenridge Ballroom)		

**Note: All Coffee Breaks are held in Coppertop III and Floor 3 Foyer and all Lunches are held in the Breckenridge Ballroom and the Summer Event Tent.**

**Poster presenters should be at their poster from 9am-11am on the day of their poster presentation. (See more information about posters on page 15.)**

## Side Meetings

Chemistry Climate Model Initiative (CCMI)	Monday	17:30-18:30	Colorado Ballroom
GEIA Town Hall	Monday	18:30-19:30	Colorado Ballroom
Air Pollution in the Arctic: Climate, Environment and Societies (PACES) Town Hall Discussion	Tuesday	17:30-19:00	Colorado Ballroom
Atmospheric Science in Africa	Tuesday	17:30-18:30	Mercury Ballroom
Missing Sinks in the Lifecycle of Organic Aerosols: Discussion on improving current representation of removal processes in atmospheric models and collaborative laboratory and field studies to provide constraints	Tuesday	18:30-19:30	Peak 15
Monitoring, Analysis and Prediction of Air Quality (MAP-AQ)	Tuesday	19:00-20:00	Colorado Ballroom
ECS Workshop: An introduction to modelling canopy-atmosphere exchange	Wednesday	13:30-16:30	Peak 15
Hemispheric Transport (HTAP2) Analysis Discussion	Wednesday	13:30-15:00	Peak 14
CATCH: Cryospheric Atmospheric Chemistry	Thursday	17:30-18:30	Colorado Ballroom
COALA: Characterizing Organics and Aerosol Loading over Australia	Thursday	17:30-18:30	Peak 14
Atmospheric Composition and the Asian Monsoon	Thursday	18:30-19:30	Colorado Ballroom
Involvement in the SPARTAN Global Particulate Matter Network	Friday	12:30-14:00	Colorado Ballroom
Inverse Modeling Assessment	Friday	14:00-18:00	Colorado Ballroom

## Welcome from the Program Scientific Community

Welcome to the 2016 IGAC Science Conference!

On behalf of the IGAC2016 Local Organizing Committee (LOC), IGAC2016 Scientific Program Committee (SPC), the IGAC Scientific Steering Committee (SSC), and the IGAC International Project Office (IPO), we welcome all of you to the 14th International Global Atmospheric Chemistry (IGAC) Project Science Conference with the theme “One Atmosphere: Building a Collective Knowledge”. The conference will provide a great platform for exchanging information and new ideas on the current scientific knowledge on atmospheric chemistry and its connections to climate change, policy and other important interdisciplinary work.

The scientific sessions of the conference have been designed to foster discussions and inspire participants on future endeavors. The various session themes will showcase important fundamental atmospheric chemistry advances as well as highlight impacts and connections with other components of the Earth system. The themes include: the impact of urbanization on atmospheric chemistry and on the role of ecosystems; agriculture on the composition of the atmosphere; the impact of different energy systems on atmospheric chemistry; and the relationships between atmospheric chemistry and climate change at different scales. Fundamental studies that lead to a greater understanding of the interactions between atmospheric compounds, and advances in the observations of atmospheric composition and its variability will also be emphasized throughout the presentations.

We welcome all of you to the plenary oral presentations and invite you to interact with the conference participants during the two breakfast-time poster sessions and social hours. The posters are a key part of the conference allowing you to be able to discuss in detail about all the topics of the conference throughout the week.

We hope you enjoy the science while taking advantage of this beautiful location and all that Colorado has to offer. We thank the local organizing and scientific program committee members, session co-conveners, keynote and invited speakers for helping design a very exciting scientific program for the conference.

We look forward to meeting all of you in Breckenridge,



Hiroshi Tanimoto  
Co-Chair of the SPC



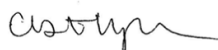
Claire Granier  
Co-Chair of the SPC



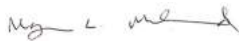
Mark Lawrence  
IGAC Co-Chair



Allen Goldstein  
IGAC Co-Chair



Christine Wiedinmyer  
Chair of the LOC



Megan L. Melamed  
IGAC Executive Officer

## This conference will:

- ◇ *Highlight cutting edge scientific research on atmospheric chemistry.*
- ◇ *Foster international collaborations to address the most pressing global change and sustainability issues through scientific research.*
- ◇ *Engage early career scientists to cultivate the next generation of international researchers.*
- ◇ *Highlight scientists and scientific research from developing and emerging economies.*
- ◇ *Promote networking between scientists, policy makers and industry leaders.*

The printed materials for this conference were provided thanks to a generous contribution from Ball Aerospace.



## Scientific Program Committee and Sessions Chairs

### **Claire Granier (co-chair)**

Laboratoire d'Aérodynamique  
Toulouse, France

### **Hiroshi Tanimoto (co-chair)**

National Institute for Environmental Studies  
Tsukuba, Ibaraki, Japan

### **James Crawford**

NASA Langley Research Center  
Hampton, VA, USA

### **Kim Oanh**

Asian Institute of Technology  
Pathumthani, Thailand

### **Gabrielle Petron**

NOAA/ESRL/GMD and CIRES/University of  
Colorado  
Boulder, Colorado, USA

### **Andrew Rickard**

University of York  
Heslington, York, UK

## 2016 IGAC SSC Members

### **Allen Goldstein (Co-Chair)**

University of California, Berkeley  
Berkeley, California, USA

### **Mark Lawrence (Co-Chair)**

Institute for Advanced Sustainability  
Studies  
Potsdam, Germany

### **J.P. (Paul) Beukes**

North-West University  
Potchefstroom, South Africa

### **Colette Heald**

Massachusetts Institute of Technology  
Boston, Massachusetts, USA

### **Judith Hoelzemann**

Federal University of Rio Grande do  
Norte  
Natal, Brazil

### **Melita Keywood**

CSIRO and Bureau of Meteorology  
Melbourne, Australia

### **Kim Oanh**

Asian Institute of Technology  
Pathumthani, Thailand

### **Spyros Pandis**

University of Patras  
Patras, Greece

### **Yinon Rudich**

Weizmann Institute  
Rehovot, Israel

## Local Organizing Committee

### **Christine Wiedinmyer**

National Center for Atmospheric  
Research  
Boulder, CO, USA

### **Delphine Farmer**

Colorado State University  
Fort Collins, CO, USA

### **Jill Reisdorf**

UCAR/JOSS (University Corporation for  
Atmospheric Research)  
Boulder, CO, USA

### **Jose Jimenez**

University of Colorado  
Boulder, CO, USA

### **Claire Granier**

NOAA  
Boulder, CO, USA

**Michel Grutter**

National Autonomous University of Mexico  
Mexico, D.F., Mexico

**Terry Keating**

US Environmental Protection Agency  
Washington, D.C., USA

**Jennifer Murphy**

University of Toronto  
Toronto, Ontario, Canada

**Amos Tai**

The Chinese University of Hong Kong  
Hong Kong, China

**Noureddine Yassaa**

Centre de Développement des  
Energies Renouvelables  
Algiers, Algeria

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**Alastair Lewis**

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Heslington, York, UK

**Jennifer Murphy**

University of Toronto  
Toronto, Ontario, Canada

**Manish Naja**

Aryabhata Research Institute of  
Observational Sciences  
Nainital, Uttarakhand, India

**Hiroshi Tanimoto**

National Institute for Environmental  
Studies  
Tsukuba, Ibaraki, Japan

**Tao Wang**

Hong Kong Polytechnic University  
Hong Kong, China

**Noureddine Yassaa**

Centre de Développement des  
Energies  
Renouvelables  
Algiers, Algeria

**Keynote Speakers**

**Robert Duce**

Atmospheric Sciences  
Texas A&M  
USA



**Monday, September 26, 11:30**  
**Keynote:**

*The Future of Atmospheric Chemistry*  
*-- A Report by the U.S. National*  
*Academies*

**Maria Kanakidou**

Department of Chemistry,  
University of Crete  
Greece



**Wednesday, September 28, 9:00**  
**Keynote:**

*Aerosols in atmospheric chemistry*  
*and biogeochemical cycles*

**David Fahey**

NOAA ESRL Chemical Sciences  
Division  
USA



**Friday, September 30, 9:00**  
**Keynote:**

*Earth Observations & Modeling for*  
*Decision Making*



## Special Events

### Welcome Reception — Sponsored by UCAR/NCAR and IGAC Local Organizing Committee

Kick off an exciting week of science at the Colorado themed Welcome Reception Food and drink sponsored by the IGAC Local Organizing Committee and UCAR/NCAR.

**Day:** Monday  
**Location:** Coppertop III  
**Time:** 17:30 -19:00



### Networking and Social Hour – Sponsored by Cooperative Institute for Research in Environmental Sciences (CIRES)

Get to know your future colleagues as we host our Student & Early Career participants from across the globe. Light food and drinks will be provided and poster rooms will be open. Make sure to take time to visit all three poster areas.

**Day:** Tuesday  
**Location:** Coppertop III  
**Time:** 17:30 - 19:00



### Pre-Dinner Cocktail Hour – Sponsored by IGAC Local Organizing Committee

Chat with colleagues or take time to visit the exhibit tables and a few posters while enjoying a pre-dinner beverage courtesy of the Local Organizing Committee.

**Day:** Wednesday  
**Location:** Floor 3 Foyer  
**Time:** 17:30 - 18:30



### Conference Banquet and After Party – Sponsored by New Belgium Brewery and UCAR/NCAR



Enjoy a talk by Jenn Vervier, Director of Sustainability & Strategy at New Belgium Brewing Company, while sampling beer donated by this 100% employee-owned, 4th largest craft brewer in the US.

After dinner head downstairs for coffee and dessert at the IGAC after-party with renowned Denver radio personality DJ Staxx spinning dance tunes from every decade.

**Day:** Wednesday  
**Dinner Location:** Colorado Ballroom  
**Time:** 18:30 - 21:00

**After Party Location:** Breckenridge Ballroom  
**Time:** 21:00 - Midnight



# Monday, September 26

	Title	Abstract ID	Presenting Author/Location
9:00	<b>Opening Ceremonies</b>		<b>Colorado Ballroom</b>
10:15-10:45	Coffee Break		Coppertop III & Floor 3 Foyer
10:45	<b>Special Guest Speaker:</b> Marcello Mena, Vice Minister of Environment, Chile		Colorado Ballroom
11:30	<b>(KEYNOTE)</b> The Future of Atmospheric Chemistry Research: Remembering Yesterday, Understanding Today, Anticipating Tomorrow - A Report from the US National Academies		Robert Duce, Texas A&M University, Texas, USA
<b>12:00-17:05</b>	<b>Plenary Talks Session 1: Atmospheric Chemistry and Urbanization</b>		
12:05	Source apportionment modelling of OC and NMVOCs in the Berlin urban area	1.048	Erika von Schneidmesser, Institute for Advanced Sustainability Studies, Potsdam, Germany
12:20	Evaluating the spatial heterogeneity of anthropogenic VOC in São Paulo with other urban worldwide observations: a global comparison of source emission composition	1.116	Pamela Dominutti (Early Career Scientist), Institute of Astronomy, Geophysics and Atmospheric Sciences, University of São Paulo (IAG-USP), São Paulo, Brazil
12:35	Lunch		Breckenridge Ballroom & Summer Event Tent
14:05	<b>(INVITED)</b> Urban pollution to the Andean cryosphere	1.064	Nicolas Huneeus, Centre for Climate and Resilience Research (CR2), Universidad de Chile, Chile
14:25	Pollution over Megacity Regions from the Tropospheric Emission Spectrometer (TES)	1.154	Karen Cady-Pereira, AER, USA
14:40	Analyses of the main sources of PM2.5 using bottom up and top down data in two metropolitan cities in Mexico: Mexico City Metropolitan Area and Toluca Metropolitan Area	1.148	Beatriz Cardenas, Centro Mario Molina, Air Quality, Mexico City, Mexico
14:55	Inverse modeling and satellite data analysis for improving emission inventories	1.132	Benjamin de Foy, Saint Louis University, Department of Earth & Atmospheric Sciences, St. Louis, MO, USA
15:10	The MUMBA Campaign: Measurements of Urban, Marine and Biogenic Air	1.018	Clare Murphy (Paton-Walsh), University of Wollongong, Australia
15:25	Towards an International Network for Monitoring, Analyzing and Forecasting Regional Air Quality	1.041	Guy Brasseur, Max Planck Institute for Meteorology, Germany
15:40	Coffee Break		Coppertop III & Floor 3 Foyer
16:10	<b>(INVITED)</b> Energy, Air Quality, and Urbanization	1.113	Tracey Holloway, University of Wisconsin-Madison, Madison, Wisconsin, USA
16:30	Sources and Heterogeneous Production of Nitrous Acid and Impacts on Air Quality: Overview of Results from Integrated Field, Lab and Modeling Studies in Hong Kong	1.126	Zhe Wang (Early Career Scientist), The Hong Kong Polytechnic University, Hong Kong
16:45	Equatorward Redistribution of Emissions Dominates the Tropospheric Ozone Change, 1980-2010	1.057	J. Jason West, Environmental Sciences & Engineering, University of North Carolina, Chapel Hill, NC, USA
<b>17:05-17:40</b>	<b>Plenary Talks Session 5: Atmospheric Chemistry and Climate Change</b>		
17:05	<b>(INVITED)</b> On quantification of hydroxyl in chemistry-climate models	5.043	Prabir Kumar Patra, JAMSTEC, Yokohama, Japan
17:25	Impact of tropospheric halogen chemistry on tropospheric composition	5.112	Mathew Evans, University of York / National Centre for Atmospheric Science, UK
<b>17:40-19:00</b>	<b>UCAR/NCAR Welcome Reception</b>		<b>Coppertop III and Floor 3 Foyer</b>

# Tuesday, September 27

Time	Title	Abstract ID	Presenting Author/Location
8:00	Poster Session for Scientific Sessions 1, 3, and 6 Breakfast provided		Session 1 in Imperial Ballroom Session 3 in Coppertop II Session 6 in Summit Gallery
<b>11:00-3:10</b>	<b>Plenary Talks</b> <b>Session 5: Atmospheric Chemistry and Climate Change (continued)</b>		
11:00	<b>(INVITED)</b> Quantifying and Reducing Uncertainty in Model Studies of Tropospheric Composition	5.058	Oliver Wild, Lancaster Environment Centre, Lancaster University, Lancaster, UK
11:20	The Stratospheric Contribution to Tropospheric Ozone Variability and Trends	5.07	Jessica Neu, NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, USA
11:35	Diagnosing changes in free tropospheric ozone over Europe: A model study of past and future changes	5.02	Fiona Tummon, ETH Zürich, Switzerland
11:50	Secondary Ozone Peaks over Northern India	5.136	Narendra Ojha (Early Career Scientist), Atmospheric Chemistry Department, Max Planck Institute for Chemistry, Mainz, Germany
12:05	Climate drivers of Southern Hemisphere carbon monoxide	5.106	Rebecca Buchholz (Early Career Scientist), NCAR, Atmospheric Chemistry Observations & Modeling Laboratory, Boulder, CO, USA
12:20	Quantifying the frequency and duration of U.S. regional pollution episodes with EOF analysis: Model evaluation and projected 21st century changes	5.042	Arlene Fiore, LDEO/Columbia University, USA
12:40	Lunch		Breckenridge Ballroom & Summer Event Tent
14:05	Sensitivity of climate to modelled aerosol particles and their transport patterns in southern Africa	5.104	Rebecca Garland, Natural Resources and the Environment Unit, Council for Scientific and Industrial Research, Pretoria, South Africa and Climatology Research Group, North West University, Potchefstroom, South Africa
14:20	Evaluating natural aerosol - climate interactions using long-term observations and an aerosol model	5.13	Dominick Spracklen, University of Leeds, UK
14:35	Climate impact of emissions of short-lived climate forcers	5.081	Maria Sand (Early Career Scientist), CICERO Center for Climate Research, Norway
14:50	Evaluating the Atmospheric Chemistry Implications of Climate Policies for Human Health in the U.S. and China	5.063	Noelle Selin, MIT, USA
<b>15:10- 17:35</b>	<b>Plenary Talks</b> <b>Session 3: Atmospheric Chemistry and Energy</b>		
15:10	<b>(INVITED)</b> Field studies quantifying atmospheric emissions from energy production and consumption in the U.S.	3.009	Thomas Ryerson, NOAA, USA
15:30	Coffee Break		Coppertop III & Floor 3 Foyer
16:00	Contrasting winter- and summertime ozone and organic aerosol contributions from the oil/gas sector emissions in the western US	3.058	Ravan Ahmadov, Earth System Research Laboratory, National Oceanic and Atmospheric Administration, Boulder, CO, USA
16:15	Coal seam gas and air quality in the Surat Basin, Australia: monitoring and modelling the impacts	3.02	Sarah Lawson (Early Career Scientist), CSIRO Oceans and Atmosphere, Aspendale, Victoria, Australia



16:30	Assessment of Satellite Capabilities to Detect Impacts of Gas and Natural Oil Activity, from Analysis of SONGNEX 2015 Aircraft Measurements	3.027	Mitchell Thayer (Early Career Scientist), University of Wisconsin - Madison, USA
16:45	Empirical characterization of residential solid fuel burning in South Africa's low-income urban areas	3.063	Roelof Burger (Early Career Scientist), North-West University, Potchefstroom, South Africa
17:00	Effect of shipping emissions on atmospheric composition over the Barents Sea	3.067	Nikolaos (Nikos) Daskalakis (Early Career Scientist), LATMOS/IPSL, UPMC, CNRS, Paris, France
17:15	<b>(INVITED)</b> "Smart" control of emissions from power generation in China and policy implications	3.047	Yuxuan Wang, Tsinghua University and Texas A&M University, USA
<b>17:35-19:00</b>	<b>Networking &amp; Social Hour/Posters</b>		<b>Coppertop III and Floor 3 Foyer</b>
<b>19:00-21:00</b>	<b>Early Career Scientist Mixer</b>		<b>Quandry Grille (<a href="http://www.quandarygrille.com/">http://www.quandarygrille.com/</a>)</b>

## Wednesday, September 28

	Title	Abstract ID	Presenting Author/Location
<b>8:00-9:00</b>	<b>Special Session: New Technology</b>		<b>Colorado Ballroom</b>
9:00	<b>(KEYNOTE)</b> Aerosols in atmospheric chemistry and biogeochemical cycles		Maria Kanakidou, Environmental Chemical Processes Laboratory, Chemistry Department, University of Crete, Heraklion, Greece
<b>9:35-12:30</b>	<b>Plenary Talks Session 2: Atmospheric Chemistry, Ecosystems and Agriculture</b>		
9:35	<b>(INVITED)</b> The development of modelling methods to assess the combined threat of climate extremes and ozone on ecosystems	2.057	Lisa Emberson, SEI York, Environment Dept., University of York, York, UK
9:55	Temperature and burning history affect emissions of greenhouse gasses and aerosol particles from tropical peatland fire	2.027	Mikinori Kuwata, Nanyang Technological University, Singapore
10:10	Properties and impacts of biomass burning aerosol over the Amazon region – a summary of the South American Biomass Burning Analyses (SAMBBA) project	2.043	Hugh Coe, University of Manchester, UK
10:25	Coffee Break		Coppertop III & Floor 3 Foyer
10:55	<b>(INVITED)</b> Modulation of nitrogen deposition by natural and anthropogenic land surface heterogeneities	2.076	Fabien Paulot, NOAA, Princeton University, USA
11:15	Drought impacts on high ozone in California	2.03	Sally Pusede (Early Career Scientist), Department of Environmental Sciences, University of Virginia, Charlottesville, VA, USA
11:30	Aerosol indirect effect on the land carbon uptake	2.01	Nadine Unger, Yale University, USA
11:45	New understanding on sources and impacts of marine VOCs from the Oceanic Reactive Carbon: chemistry-climate impacts (ORC3) project	2.096	Steve Arnold, Institute for Climate and Atmospheric Science, School of Earth & Environment, University of Leeds, Leeds, UK
12:00	Monoterpene chemical speciation at Amazonian Tall Tower Observatory (ATTO) tropical rainforest	2.095	Ana Maria Yáñez-Serrano (Early Career Scientist), MPIC, Department of Biogeoscience, Mainz, Germany

12:15	CANEXMIP: Intercomparison of models for simulating canopy-atmosphere exchange and chemistry of reactive compounds and aerosols	2.029	Alex Guenther, University of California, Irvine, USA
12:30	Free Afternoon		
17:30-18:30	Pre-Dinner Cocktail Hour		Colorado Ballroom & Floor 3 Foyer
18:30-21:00	Conference Banquet		Colorado Ballroom
21:00-Midnight	After Party		Breckenridge Ballroom

## Thursday, September 29

	Title	Abstract ID	Presenting Author/Location
8:00-11:00	Poster Session for Scientific Sessions 2, 4, and 5 Breakfast provided		Session 2 in Summit Gallery Session 4 in Imperial Ballroom Session 5 in Coppertop II
11:00-5:10	<b>Plenary Talks</b> <b>Session 4: Atmospheric Chemistry and Fundamental Studies</b>		
11:00	<b>(INVITED)</b> Tropospheric multiphase chemistry - from the lab to the field	4.056	Hartmut Herrmann, Leibniz-Institute for Tropospheric Research (TROPOS), Atmospheric Chemistry Dept. (ACD), Germany
11:20	Can viscous liquids provide flexible templates for atmospheric ice nucleation?	4.035	Sarah Brooks, Texas A&M University, USA
11:35	Diffusivity measurements of volatile organics in levitated viscous aerosol particles	4.025	Sandra Bastelberger (Early Career Scientist), ETH Zurich, Switzerland
11:50	Online measurements and modeling of SOA formation from isoprene photooxidation: insights from multiple chamber experiments and field campaigns	4.075	Joel Thornton, Department of Atmospheric Sciences, University of Washington, Seattle, WA, USA
12:05	Oxidation flow reactors (OFRs) to study secondary aerosol formation: overview of recent field and modeling studies	4.048	Jose-Luis Jimenez, University of Colorado-Boulder, USA
12:20	Lunch		Breckenridge Ballroom & Summer Event Tent
14:00	<b>(INVITED)</b> Towards a complete picture of the atmospheric radical cycles: the speciated detection of gas-phase organic radicals by proton transfer mass spectrometry	4.076	Barbara Nozière, CNRS, France
14:20	Tracking the evolution of all carbon in the multigenerational oxidation of biogenic organic compounds	4.034	Gabriel Isaacman-VanWertz (Early Career Scientist), MIT, USA
14:35	Importance of reactive halogens in the tropical marine atmosphere	4.055	Alba Badia Moragas (Early Career Scientist), Centre for Ocean and Atmospheric Sciences, School of Environmental Sciences, University of East Anglia, Norwich, UK
14:50	Improved analyzer for biogenic volatile organic compounds as total ozone reactivity and its application to kinetics of gas-phase reactions	4.05	Jun Matsumoto, Waseda University, Tokyo, Japan
5:10-7:30	<b>Plenary Talks</b> <b>Session 6: Atmospheric Chemistry: Observing Composition and Variability</b>		
15:10	<b>(INVITED)</b> Measuring Atmospheric CO <sub>2</sub> with the NASA Orbiting Carbon Observatory-2 (OCO-2)	6.069	David Crisp, JPL/Caltech, USA

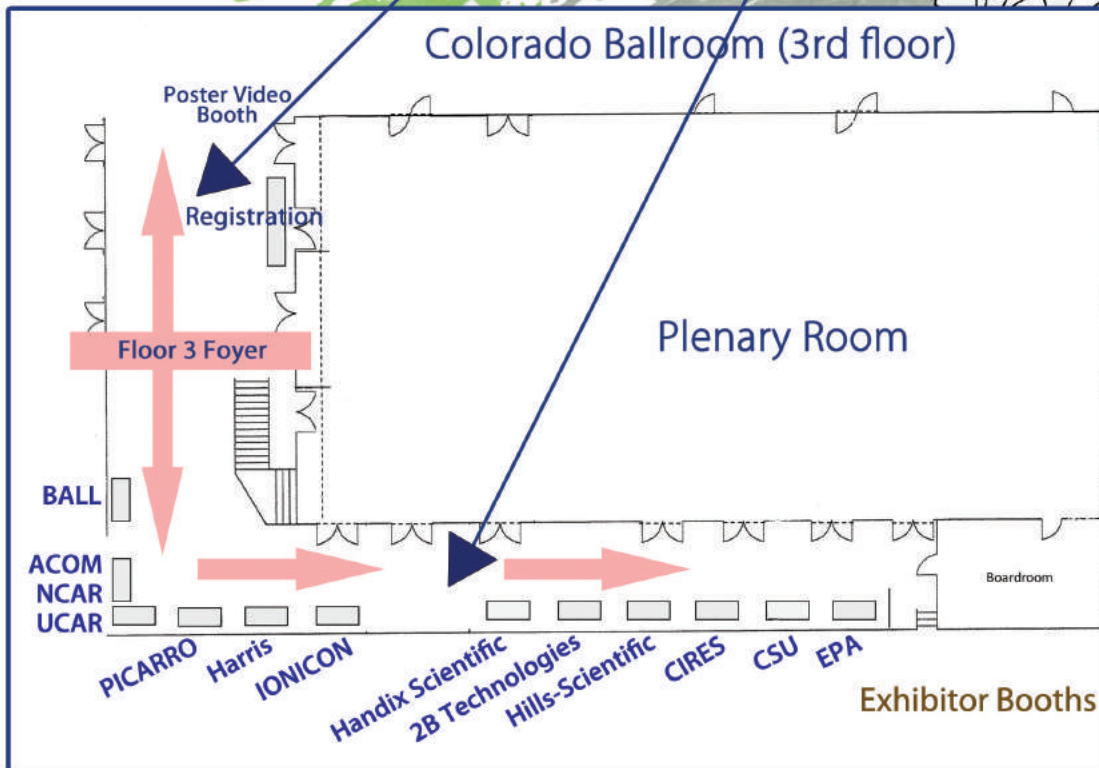
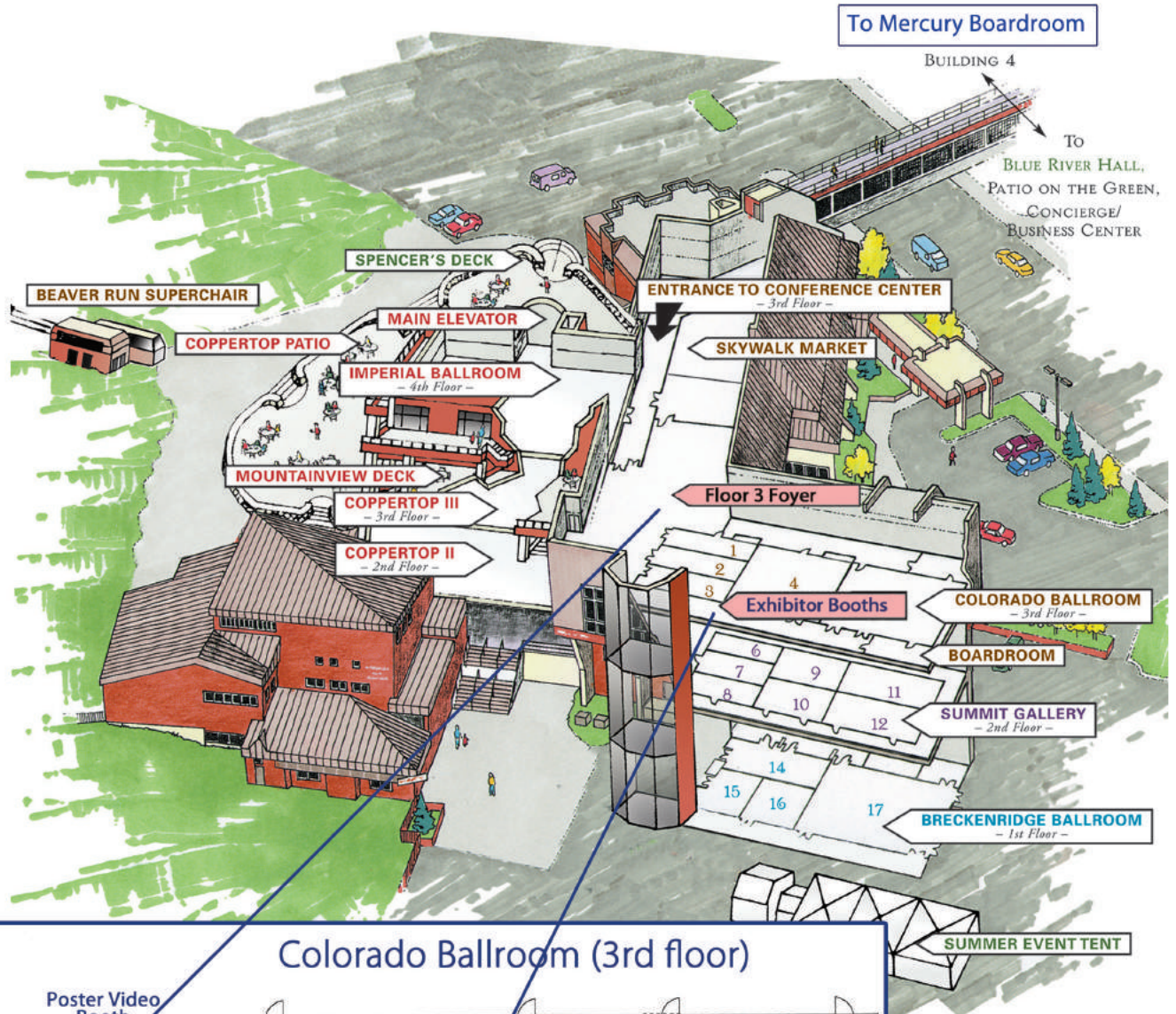
15:30	Coffee Break			Coppertop III & Floor 3 Foyer
16:00	Estimation of global methane fluxes using satellites, moving from GOSAT to TROPOMI	6.197		Sander Houweling, SRON Netherlands Institute for Space Research, Earth Division, Utrecht, The Netherlands
16:15	Tracking pollutants from space: 10 years of IASI satellite observation	6.107		Cathy Clerbaux, LATMOS/IPSL, UPMC Univ. Paris, France
16:30	Vertical distributions of NO <sub>2</sub> , SO <sub>2</sub> , HCHO and aerosols derived from MAX-DOAS observations from 2011 to 2014 in Wuxi, China, and application to the validation of satellite and model data	6.031		Yang Wang (Early Career Scientist), Satellite group, Max Planck Institute for Chemistry, Mainz, Germany
16:45	Transport and transformation of trace species in a deep convective cloud – results of the ACRIDICON tracer experiment	6.114		Hans Schlager, DLR - Institute of Atmospheric Physics, Oberpfaffenhofen, Germany
17:00	Role of Thunderstorms on Upper Troposphere Ozone – What We Have Learned from DC3	6.05		Mary Barth, NCAR, Boulder, Colorado, USA
17:15	Multiplatform Observations of Air Quality in Korea: An International Cooperative Air Quality Field Study KORUS-AQ 2016	6.047		Joon-Young Ahn, National Institute of Environmental Research (NIER), Korea
17:30-19:00	<b>Networking &amp; Social Hour/Posters</b>			<b>Coppertop III and Floor 3 Foyer</b>

## Friday, September 30

	Title	Abstract ID	Presenting Author/Location
9:00	<b>(Keynote)</b> Earth Observations & Modeling for Decision Making		David Fahey, NOAA ESRL, USA
9:35-11:55	<b>Plenary Talks Session 6: Atmospheric Chemistry: Observing Composition and Variability (continued)</b>		
9:35	Influence of anthropogenic emissions on the mass concentration and composition of organic PM <sub>1</sub> in the Amazonian wet season (GoAmazon2014/5)	6.035	Suzane de Sá (Early Career Scientist), Harvard University, USA
9:50	Insight into the Global Distribution of Ground-level Fine Particulate Matter from Satellite Remote Sensing and from the SPARTAN Aerosol Network	6.014	Randall V Martin, Dalhousie University, Halifax, Canada
10:05	Global synthesis of multi-year cloud condensation nuclei observations	6.172	Julia Schmale, Paul Scherrer Institute, Switzerland
10:20	Intra-seasonal variability in wintertime aerosols at middle Indo Gangetic Plain	6.176	Manish Kumar (Early Career Scientist), Institute of Environment and Sustainable Development, Banaras Hindu University, Varanasi, India
10:35	Coffee Break		Coppertop III & Floor 3 Foyer
11:05	<b>(INVITED)</b> In-service Aircraft for Global Monitoring : 20 Years of MOZAIC-IAGOS measurements	6.053	Valerie Thouret, Laboratoire d'Aérodologie, Université de Toulouse, CNRS, UPS, France
11:25	Observations of atmospheric black carbon mass concentrations from East Asia to the open oceans: Constraining emission strengths and wet deposition rates	6.145	Yugo Kanaya, Japan Agency for Marine–Earth Science and Technology (JAMSTEC), Yokohama, Kanagawa, Japan
11:40	Quantifying wildfire emissions and associated aerosols species using assimilation of satellite carbon monoxide retrievals	6.074	David Edwards, NCAR, Boulder, Colorado, USA
11:55	<b>Closing Ceremonies</b>		<b>Colorado Ballroom</b>



# Conference Center Diagram

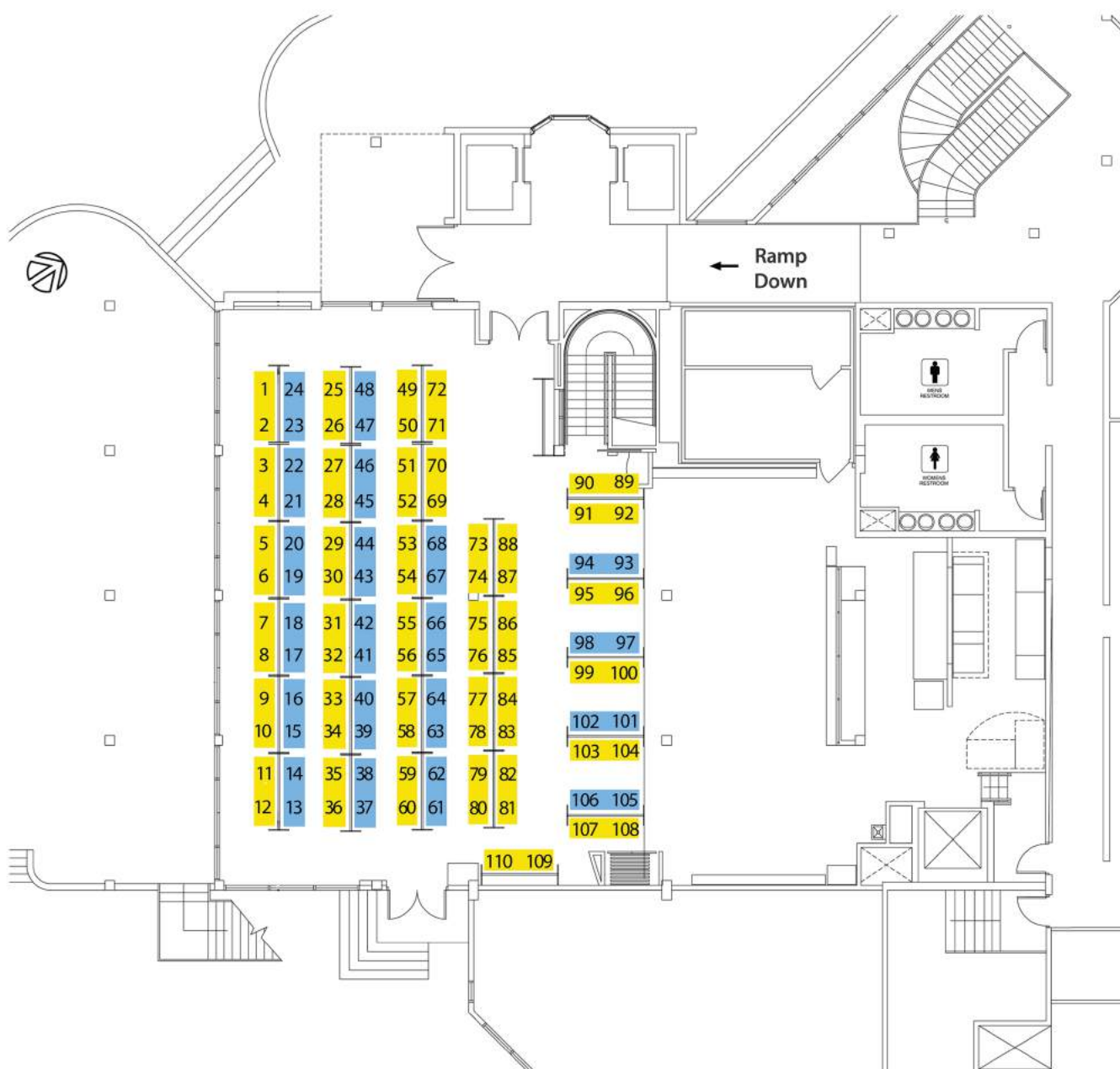


*Visit table top exhibits adjacent to the Plenary room.*

# Coppertop II Poster Session Layout

= Session 5: Atmospheric Chemistry and Climate Change

= Session 3: Atmospheric Chemistry and Energy

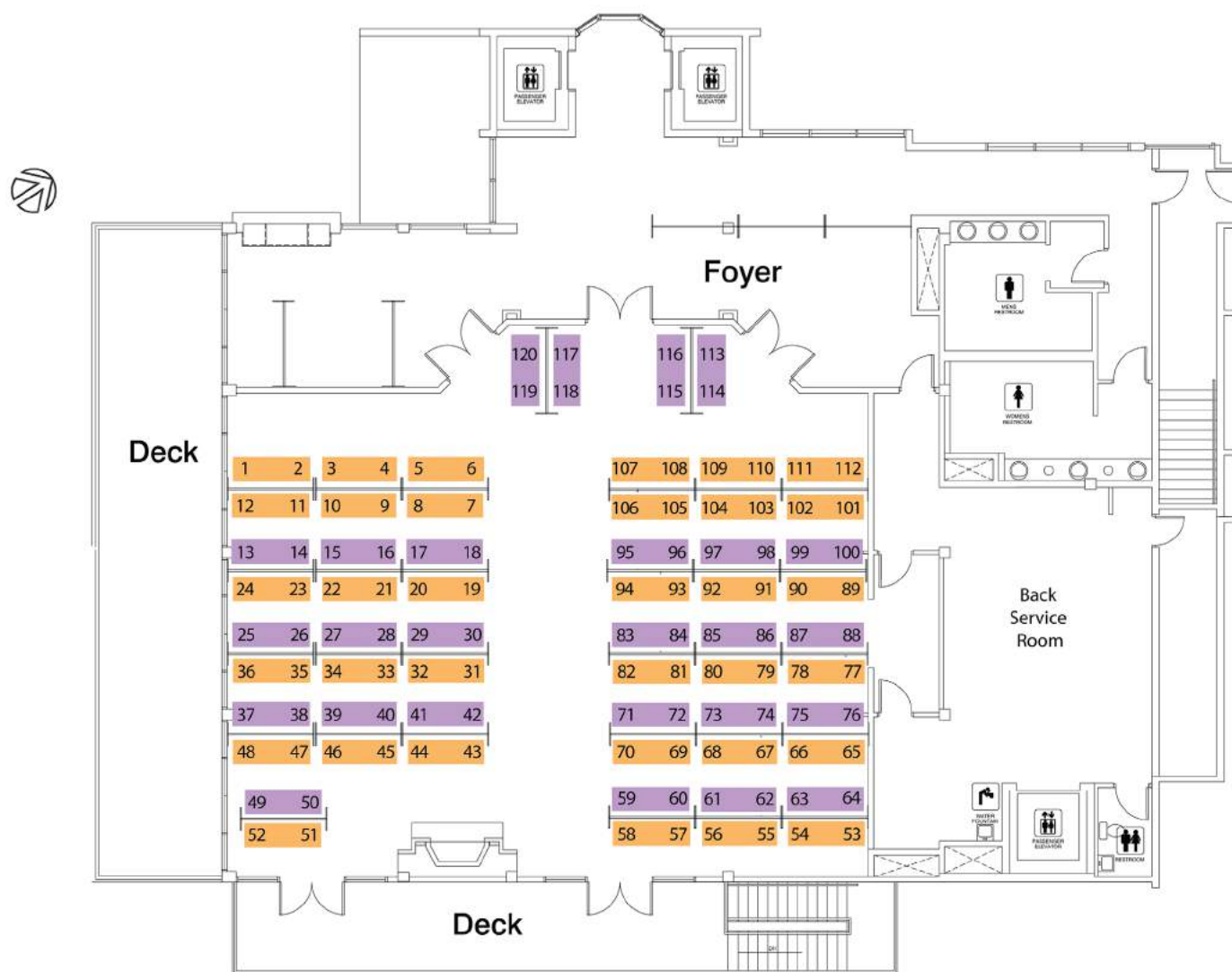





# Imperial Ballroom Poster Session Layout

= Session 4: Atmospheric Chemistry and Fundamental Studies

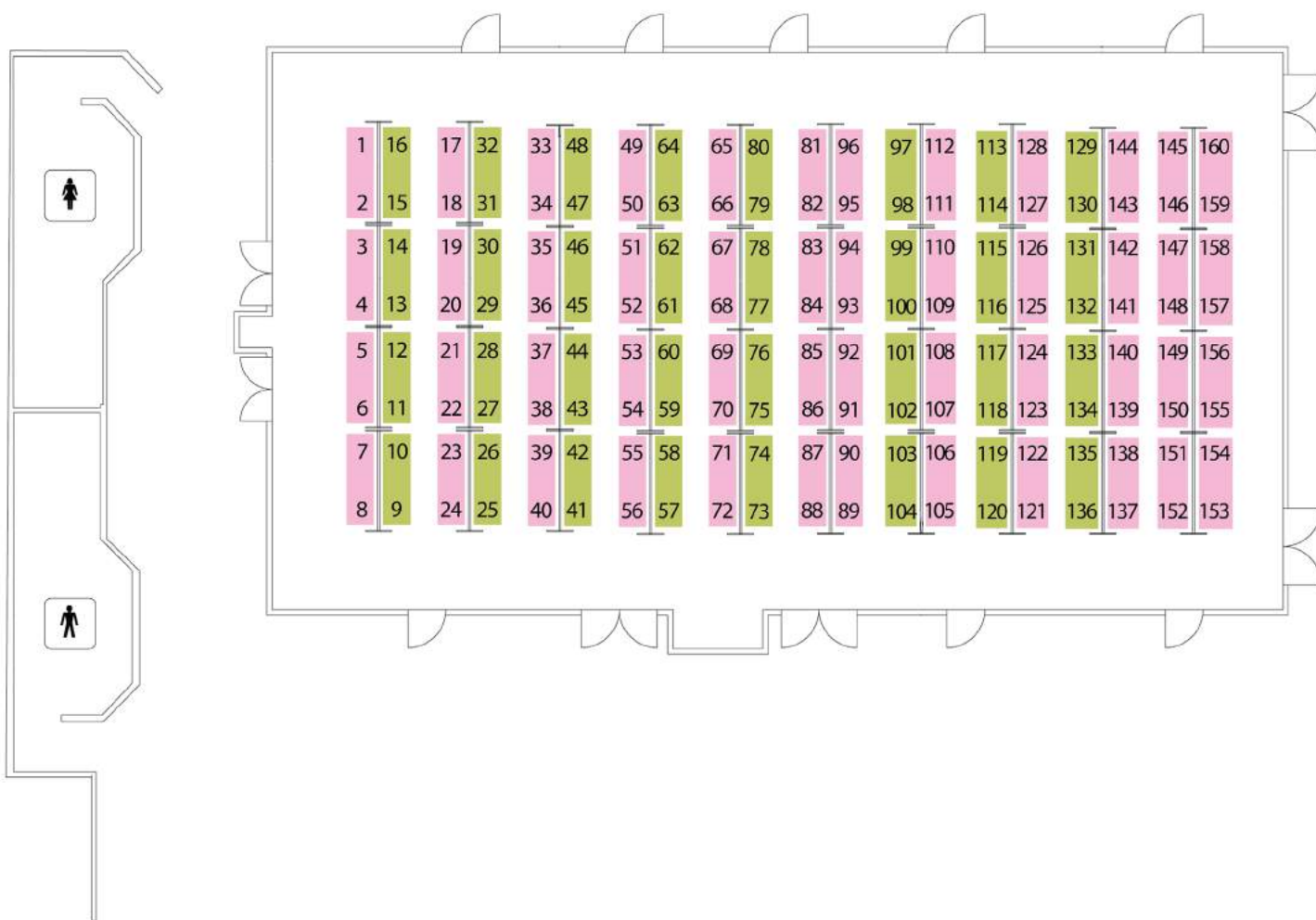
= Session 1: Atmospheric Chemistry and Urbanization



# Summit Gallery Poster Session Layout

 = Session 6: Atmospheric Chemistry: Observing Composition and Variability

 = Session 2: Atmospheric Chemistry, Ecosystems and Agriculture



# General Conference Information

## Conference Badge

Please wear your conference badge at all times.

Your registration fee includes access to all conference meals and reception. Your conference badge is your official pass to all group activities. If a badge is lost, please inquire at the main registration desk outside the Colorado Ballroom.

## General Questions/Information Resources

Visit the IGAC Conference registration/information table located outside the Colorado Ballroom. This table will be staffed through most of the conference.

## Technology & Wifi

Charging stations are available throughout Beaver Run Resort. Free limited WiFi is available in the conference area but may become overwhelmed with high usage. Please be patient and considerate of other users.

Wifi passcode for use in the conference area: IGAC2016

## Speaker ready room

The speaker ready room is located adjacent to the Colorado Ballroom. All speakers should plan to test and upload their talk by 8:00, the morning of their presentation. The speaker ready room will be open, and staffed, one hour before and after each plenary session.

## Poster Session Set Up and Tear Down

Poster sessions are an integral component of every IGAC conference. To maximize viewing time all posters will be left in place for the entire conference. Detailed maps of the poster areas along with a list of poster location assignments will be available in each poster area along with pins to attach posters to the boards.

Presenters should hang their poster as early in the week as possible and leave it in place until noon on Friday.

The posters may be hung beginning Sunday evening when IGAC conference staff will be available to assist with poster placement from 18:00 – 20:00, Sunday night. Staff will also be available Monday morning from 8:00 – 9:00 and during the first morning break. Any posters not removed before the noon deadline on Friday will be recycled.

## Virtual Poster Booth

Bring your poster to the IGAC video booth to the Floor 3 Foyer, and make your own video presentation of your poster. All you need is a cell phone, everything else is provided to make a professional video poster presentation.

Poster videos may be uploaded and viewed on the IGAC YouTube channel, "IGAC Project."

The Virtual Poster Booth is sponsored by the NCAR Atmospheric Chemistry Observations & Modeling (ACOM) Lab.

## Conference Meals

Lunch will be served in the Summer Event Tent and in the Breckenridge Ballroom. The same meal will be available in both venues.

Dinner will be served in the Colorado Ballroom with a dance party to follow in the Breckenridge Ballroom.

## Conference Receptions/Social hours

The welcome reception, afternoon social hours and the poster breakfasts will take place in the Coppertop III and Floor 3 Foyer Event space.

## Accompanying Persons

An accompanying person is a spouse, friend or adult child (18 years or older) who is not working in a science related occupation or field. A colleague or associate working in a related science field or a student in a chemistry related program may not attend the conference as an accompanying person.

- Accompanying persons may not attend the oral or poster scientific sessions.
- There is no registration fee for accompanying persons. However, accompanying persons are required to purchase tickets to meal events at the advertised guest rates.
- All accompanying persons will be required to wear a name badge at the meals they attend.
- Conference attendees will be given preference for available seating at meal event.
- Meal tickets may be purchased onsite prior to each meal event.
- Children 17 and under are not allowed in the plenary or poster sessions or at the conference banquet.
- Children may attend meals, except the conference banquet, with their parent(s) at no additional cost.

## Childcare & Lactation room

See the conference website childcare tab for information on childcare options. For the convenience of nursing mothers a lactation room is available adjacent to the Beaver Run front desk.

## Lost and Found

Found items may be returned to the resort front desk or to the IGAC registration desk. If you are missing an item after you return home from Breckenridge please contact the Beaver Run Resort at (1-970-453-6000). All lost and found items will be held at Beaver Run Resort until they are claimed.

## Sustainable Conference Information

Beaver Run Resort and the IGAC Conference Local Organizing Committee are committed to reducing the environmental impact of the event wherever possible.

## Smoking

Beaver Run is a **non-smoking resort** and smoking is not allowed in guestrooms, guestroom balconies, or public spaces. You may only smoke in designated outdoor areas marked with black 'smoker poles' near resort entrances.

## Marijuana

Recreational marijuana is legal in Colorado. Be advised that you may not take any marijuana out of the state, and that there is an active drug detection effort at Denver International Airport. Please be aware that all smoking restrictions listed above apply to both cigarettes and marijuana. Altitude may impact the effects of the drug, so indulge with care.

## Health and Safety

### First Aid/Medical Emergency

In case of medical or safety emergency, dial 911 from a house or cell phone and notify the Beaver Run Security team by dialing '0' on a house phone, contacting a resort staff member, or a member of the IGAC conference staff.

### Non-Emergency Medical Services

#### High Country Healthcare

Urgent care – open seven days a week  
400 N. Park Ave., Suite 1A  
(970) 547-9200

### Pharmacy & Prescriptions

#### City Market Pharmacy

400 N Park Ave  
(970) 453-0818

## Personal Security

Breckenridge is small town with a relatively low crime rate. Participants should take general precautions to avoid theft or personal injury. Make sure to walk around town with others from the conference, especially after dark. Keep a business card from your hotel in your pocket in case you need assistance finding your way back to your room after an evening out.

## Altitude and your Health

Beaver Run resort is at a high elevation (9600 feet/2926 meters above sea level) in an environment with low humidity and strong ultraviolet rays from the sun that combine to create a situation that requires special attention to your health.

## High Altitude Precautions:

- Drink plenty of water
- Consume alcohol moderately
- Wear sunscreen, sunglasses and hat
- Dress in layers

## Disclaimer of Liability

The Local Organizing Committee members, including the IGAC Directorate, will not accept liability for damages of any nature sustained by participants of loss or damage of personal property during the conference.

## Around Town

### Transportation

Plan to make use of the Free Ride ([www.breckfreeride.com](http://www.breckfreeride.com)) shuttle service to all the shops and restaurants in downtown Breckenridge. If you are traveling farther afield there are many public transportation options. See the resort concierge for more transportation information.

### Dining

Spencer's Lounge, located in the Beaver Run Resort, is open for breakfast starting at 7:00 A.M.

Spencer's will offer a daily special \$14 breakfast buffet for IGAC conference attendees. This price includes a full hot breakfast buffet, beverages tax and gratuity.

The Skywalk Market just down the hall from the plenary room, is open 8:00 A.M.-4:00 P.M. daily for groceries, coffee as well as quick grab and go breakfast and lunch items.

### Groceries

Two grocery stores can help you stock up on items to prepare in your condo kitchen.

#### Breckenridge Market and Liquor (15 minute walk)

311 S. Ridge St.  
(970) 453-2398

#### City Market (1.2 miles)

400 North Parkway  
(970) 453-0818

## Don't miss your return flight from Denver International Airport

Remember to confirm your return arrangements with either Colorado Mountain Express (1-800-525-6363) or Summit Express (1-855-686-8267).

# Conference Sponsors

## Silver Sponsors



### University Corporation for Atmospheric Research (UCAR)

UCAR is a consortium of more than 100 universities that manages and operates the National Center for Atmospheric Research on behalf of the National Science Foundation. UCAR supports international science and is pleased to support this conference.



### National Center for Atmospheric Research (NCAR)

The National Center for Atmospheric Research (NCAR) is a federally funded research and development center devoted to service, research and education in the atmospheric and related sciences. NCAR's mission is to understand the behavior of the atmosphere and related Earth and geospace systems; to support, enhance, and extend the capabilities of the university community and the broader scientific community, nationally and internationally; to foster the transfer of knowledge and technology for the betterment of life on Earth.



### New Belgium Brewing Company

New Belgium is an employee owned craft brewery located in Fort Collins, Colorado and is a recognized leader in sustainable business practices. It was opened in 1991 by Jeff Lebesch and Kim Jordan. In 2011, it produced 712,800 barrels of its various labels. As of 2012, it was the third-largest craft brewery and eighth-largest overall brewery in the United States.



### National Centre for Atmospheric Science

The National Centre for Atmospheric Science (NCAS) is one of the long-term research centres of the UK Natural Environment Research Council. The Centre increases knowledge of key environmental issues including: climate change, weather processes and atmospheric composition including air quality.

## Bronze Sponsors



### Ball Aerospace

Ball Aerospace has played a key role in a long list of scientific "firsts". From confirming the ozone hole, to discovering the first Earth-sized planet in the habitable zone of another star, Ball technology makes the most challenging science missions possible.



### Cooperative Institute for Research in Environmental Sciences (CIRES)

At CIRES, hundreds of environmental scientists work to understand the dynamic Earth system, including people's relationship with the planet. CIRES is a partnership of NOAA and the University of Colorado Boulder, and our areas of expertise include weather and climate, changes at Earth's poles, air quality and atmospheric chemistry, water resources, and solid Earth sciences.



### NCAR Atmospheric Chemistry Observations and Modeling (ACOM) Laboratory

NCAR's ACOM Laboratory develops predictive capability for atmospheric composition, through advances in understanding of chemistry and related processes. ACOM research emphasizes the quantitative integration of atmospheric chemistry observations and modeling across scales to identify impacts on climate and air quality, and to assess the role of chemistry within the coupled Earth system.

## Contributing Sponsors



### Elementa: Science of the Anthropocene

A mission-driven, nonprofit collaborative, Elementa: Science of the Anthropocene is a trans-disciplinary, open-access journal committed to the facilitation of collaborative, peer-reviewed research. With the ultimate objective of accelerating scientific solutions to the challenges presented by this era of human impact, it is uniquely structured into six distinct knowledge domains, and gives authors the opportunity to publish in one or multiple domains, helping them to present their research and commentary to interested readers from disciplines related to their own.



### Handix Scientific LLC

Handix Scientific is a research firm and a manufacturer of atmospheric instruments, including the Portable Optical Particle Spectrometer (POPS) and the Open-Path Cavity Ringdown Spectrometer (OPCRDS). The POPS is a light-weight, high-performance, and low-cost particle counter that is the ideal tool for measuring aerosol size distributions from tethered and free balloons, unmanned aerial vehicles (UAV) and ground-based ambient environmental monitoring networks. The OPCRDS is the first in-situ instrument capable of measuring true ambient aerosol-induced light extinction.



### Droplet Measurement Technologies

Droplet Measurement Technologies is the most diversified provider of instrumentation in the world for measuring atmospheric aerosol and cloud particles. Our sensors measure refractory and equivalent black carbon, cloud condensation nuclei, and ice nuclei, bioaerosols, cloud droplets and ice crystals on ground-based or airborne platforms.



### 2B Technologies, Inc.

2B Technologies, invents, designs, manufactures, markets and sells portable instruments for measurements of ozone, NO, NO<sub>2</sub>, NO<sub>x</sub>, mercury and other air pollutants. 2B Tech is the principal sponsor of the non-profit Global Ozone Project or "GO3 Project" where students around the world measure air pollutants and share their data online.



### Picarro, Inc.

Picarro is a leading provider of solutions to measure greenhouse gas (GHG) concentrations, trace gases, and stable isotopes across many scientific applications, as well as in the energy and utilities markets. Our patented Cavity Ring-Down Spectroscopy (CRDS) is the core of all Picarro instruments and solutions, enabling fast, highly sensitive, and ultra-precise measurements. Our instruments offer unparalleled performance in a variety of field conditions and are deployed by scientists around the world to measure GHGs, trace gases and stable isotopes found in the air we breathe, water we drink and land we harvest.



### IONICON

We are the world's leading producer of real-time trace gas analyzers based on Proton Transfer Reaction – Mass Spectrometry (PTR-MS) technology, offering a market-leading detection limit < 1 pptv for VOCs and a mass resolution of > 10,000. Our PTR-TOFMS instruments are used for VOC monitoring in environmental research, atmospheric chemistry, vehicle emissions testing, food & flavor science, breath analysis and many other applications. We also manufacture industrial VOC monitoring solutions and OEM time-of-flight mass spectrometers.





## Harris Corporation

Harris Corporation is a leading technology innovator, solving customers' toughest mission-critical challenges by providing solutions that connect, inform and protect. Our scientist and engineers develop the world's most advanced atmospheric sensors technologies and analytic tools to identify, capture, and enhance data to support global weather forecasting, climate monitoring, and Earth observations.



## Aerodyne Research, Inc.

Aerodyne Research produces state of the art instruments for measuring gases or aerosol particles with fast time response and great sensitivity. This includes aerosol and chemical ionization mass spectrometers, laser trace gas and isotope analyzers, aerosol chemical speciation monitors, particle optical extinction monitors, and ultrasensitive NO<sub>2</sub> monitors.



## Colorado State University Department of Atmospheric Science

The top-rated Colorado State University Department of Atmospheric Science focuses on graduate education, cutting-edge research, and public service. Our diverse areas of research include Cloud Microphysics, Severe Storms and Mesoscale Meteorology, Atmospheric Chemistry and Air Quality, Radiation and Remote Sensing, Climate and Atmosphere-Ocean Dynamics, and Global Biogeochemical Cycles and Ecosystems.



## Colorado State University Department of Chemistry

The Department of Chemistry at Colorado State University has an international reputation for excellence in research across a broad array of disciplines, including analytical, biological, inorganic, organic, materials and physical chemistry. Ph.D. graduates receive world-class training, participate in cutting-edge (and often interdisciplinary) research projects, and are employed at all levels of academia and industry around the globe. The faculty also enjoy an award-winning reputation for teaching excellence. Undergraduate students benefit both from access to this classroom expertise and from a long tradition of substantive undergraduate participation in research. The Department's research efforts are supported by a state-of-the-art Central Instrument Facility that provides 24/7 student access to shared instrumentation.



## Hills-Scientific

The Fast Isoprene Sensor (FIS) is in use worldwide for the monitoring of isoprene in air. It provides continuous measurement of isoprene with an 0.4-second response to 200-ppbv and is suitable for ambient, tower (eddy covariance), enclosure, chamber, and cuvette studies.

## Early Career Program Sponsors



## The American Geophysical Union (AGU)

AGU is an international scientific society that is home to nearly 60,000 scientists from 139 countries, AGU provides a dynamic forum for Earth and space scientists to advance research and collaboration with colleagues across disciplines. Through top-ranked scientific journals such as JGR: Atmospheres and Geophysical Research Letters, award-winning books, scientific meetings and conferences, and other programs and initiatives. AGU offers opportunities to spark innovation and freely exchange knowledge.



## U.S. Department of Energy

The U.S. Energy Department ensures America's security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions. This is achieved by building the new clean energy economy, reducing nuclear dangers & environmental risks, and expanding the frontiers of knowledge via scientific research.



## U.S. National Science Foundation (NSF)

NSF's goals—discovery, learning, research infrastructure and stewardship—provide an integrated strategy to advance the frontiers of knowledge, cultivate a world-class, broadly inclusive science and engineering workforce and expand the scientific literacy of all citizens, build the nation's research capability through investments in advanced instrumentation and facilities, and support excellence in science and engineering research and education through a capable and responsive organization.



## U.S. National Aeronautics Space Administration (NASA)

NASA's mission is to pioneer the future in space exploration, scientific discovery and aeronautics research. To do that, thousands of people have been working around the world and in space for more than 50 years, trying to answer some basic questions. What's out there in space? How do we get there? What will we find? What can we learn there -- or learn just by trying to get there -- that will make life better here on Earth?



## U.S. National Oceanic and Atmospheric Administration (NOAA)

NOAA is an agency that enriches life through science. NOAA's reach goes from the surface of the sun to the depths of the ocean floor as they work to keep citizens informed of the changing environment around them. From daily weather forecasts, severe storm warnings, and climate monitoring to fisheries management, coastal restoration and supporting marine commerce, NOAA's products and services support economic vitality and affect more than one-third of America's gross domestic product. NOAA's dedicated scientists use cutting-edge research and high-tech instrumentation to provide citizens, planners, emergency managers and other decision makers with reliable information they need when they need it.



## European Space Agency

The ESA is Europe's gateway to space. Its mission is to shape the development of Europe's space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe and the world. ESA is an international organization with 22 Member States. By coordinating the financial and intellectual resources of its members, it can undertake programs and activities far beyond the scope of any single European country.



## World Meteorological Organization (WMO) Global Atmosphere Watch (GAW)

The Global Atmosphere Watch (GAW) programme of WMO is a partnership involving 80 countries, which provides reliable scientific data and information on the chemical composition of the atmosphere, its natural and anthropogenic change, and helps to improve the understanding of interactions between the atmosphere, the oceans and the biosphere. GAW focal areas are GHGs, ozone, UV, aerosols, selected reactive gases, and precipitation chemistry.

## IGAC SSC Sponsor



## Science Council of Japan

Science Council of Japan is the representative organization of Japanese scientist community ranging over all fields of sciences subsuming humanities, social sciences, natural sciences, and engineering.



AERODYNE RESEARCH, Inc.

