

# NOAA ESRL GLOBAL MONITORING ANNUAL CONFERENCE 2016

David Skaggs Research Center, Room GC-402  
325 Broadway, Boulder, Colorado 80305 USA

## Tuesday Morning, May 17, 2016 AGENDA

(Only presenter's name is given; please refer to abstract for complete author listing.)

- **07:00**      **Registration Opens in GC-402 - lunch orders and posters collected at registration table**
- **07:30 - 08:15**      **Morning Snacks - coffee, tea, fruit, bagels and donuts served**
- Page No.
- **Session 1**      **Welcome, Keynote Address & Highlights** — Chaired by Russ Schnell
- 08:15 - 08:30      Welcome and Conference Overview      -  
                                 *James H. Butler (NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO)*
- 08:30 - 09:00      Keynote Address - Keeping Up the Standards: Building and Maintaining a Global Atmospheric Measurement Network      1  
                                 *Ray F. Weiss (Scripps Institution of Oceanography, University of California at San Diego, La Jolla, CA)*
- 09:00 - 09:15      In-service Aircraft for Global Monitoring: Status and Perspectives      2  
                                 *Andreas Volz-Thomas (IAGOS-AISBL Forschungszentrum Jülich, Jülich, Germany)*
- 09:15 - 09:30      Traceability of Measurements Within the Global Atmosphere Watch Programme: Results from the World Calibration Centre WCC-Empa      3  
                                 *Christoph Zellweger (Swiss Federal Laboratories for Materials Science and Technology, Empa, Dübendorf, Switzerland)*
- 09:30 - 09:45      Multiple Immediate Benefits of Emissions Mitigation      4  
                                 *Pieter P. Tans (NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO)*
- **9:45 - 10:15**      **Morning Break**
- **Session 2**      **Carbon Cycle & Greenhouse Gases - Global Observations** — Chaired by Ed Dlugokencky
- 10:15 - 10:30      Global Reconciliation of Land, Ocean, and River Carbon Fluxes      5  
                                 *Laure Resplandy (Scripps Institution of Oceanography, University of California at San Diego, La Jolla, CA)*
- 10:30 - 10:45      The Carbon Cycle Response to the 2015 El Niño      6  
                                 *Andrew R. Jacobson (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- 10:45 - 11:00      Space-based Observations of CO<sub>2</sub> with the NASA Orbiting Carbon Observatory-2 (OCO-2)      7  
                                 *David Crisp (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA)*
- 11:00 - 11:15      Sensitivity of CO<sub>2</sub> Flux Inversions to the Temporal and Spatial Distribution of Observations      8  
                                 *Brendan Byrne (University of Toronto, Toronto, Ontario, Canada)*
- 11:15 - 11:30      The Impact of Meteorological Analysis Uncertainties on the Spatial Scales Resolvable in CO<sub>2</sub> Model Simulations      9  
                                 *Saroja Polavarapu (Environment and Climate Change Canada, Toronto, Ontario, Canada)*
- 11:30 - 11:45      Evidence that Palmer Station Antarctica Seasonal O<sub>2</sub> and CO<sub>2</sub> Cycles Understate Regional Marine Boundary Layer Means      10  
                                 *Jonathan Bent (National Center for Atmospheric Research (NCAR), Earth Observing Laboratory, Boulder, CO)*
- 11:45 - 12:00      Adventures with CO<sub>2</sub> at the Mt. Bachelor Observatory      11  
                                 *Daniel Jaffe (University of Washington, Seattle, WA)*
- **12:00 - 13:00**      **Catered Lunch - Outreach Classroom GB-124 (pre-payment of \$12.00 at registration)**

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		Page No.
• <b>Session 3</b>	<b>Carbon Cycle &amp; Greenhouse Gases - Methane</b> — Chaired by John Miller	
13:00 - 13:15	A Comprehensive Approach to Understanding Renewed Increase in Atmospheric CH <sub>4</sub> <i>Ed Dlugokencky (NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO)</i>	12
13:15 - 13:30	Speculation on the Origin of Sub-baseline Excursions of CH <sub>4</sub> at Cape Grim <i>Zoe M. Loh (Commonwealth Scientific Industrial Research Organisation (CSIRO), Aspendale, VIC 3195, Australia)</i>	13
13:30 - 13:45	Cold Season Emissions Dominate the Arctic Tundra Methane Budget on the North Slope of Alaska <i>Walter Oechel (San Diego State University, Global Change Research Group, San Diego, California)</i>	14
13:45 - 14:00	No Significant Increase in Long-term CH <sub>4</sub> Emissions on North Slope of Alaska Despite Significant Increase in Air Temperature <i>Colm Sweeney (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	15
14:00 - 14:15	Studies of Carbon Isotopic Ratios ( $\delta^{13}\text{C}$ ) of Methane in Atmospheric Air Samples from Different Locations in India <i>D. Kameswara Rao (Physical Research Laboratory, Navarangpura, Ahmedabad, India)</i>	16
14:15 - 14:30	Top-down Estimate of Methane Emissions in California Using Aircraft Measurements During the CalNex 2010 Field Campaign <i>Yuyan Cui (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	17
• <b>14:30 - 15:00</b>	<b>Afternoon Break</b>	
• <b>Session 4</b>	<b>Carbon Cycle &amp; Greenhouse Gases - Regional Observations</b> — Chaired by Arlyn Andrews	
15:00 - 15:15	Amazonian Atmospheric CO <sub>2</sub> Data Suggest Missing Moisture Sensitivity in Carbon-climate Models <i>Caroline Alden (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	18
15:15 - 15:30	A Different View of Atmospheric Carbon Monitoring <i>Jeremy Dobler (Exelis, Inc., Boulder, CO)</i>	19
15:30 - 15:45	High-accuracy, High-precision, High-resolution, Source-specific Monitoring of Urban Greenhouse Gas Emissions? 20 Results to Date from INFLUX <i>Jocelyn Turnbull (GNS Science, National Isotope Centre, Lower Hutt, New Zealand)</i>	20
15:45 - 16:00	Gradients of Column CO <sub>2</sub> Across North America from Aircraft and Tall Tower Measurements in the NOAA/ESRL Global Greenhouse Gas Reference Network <i>Xin Lan (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	21
16:00 - 16:15	Gross Uptake of Carbon in the U.S. Is Largest in the Midwest Region <i>Timothy W. Hilton (University of California at Merced, Merced, CA)</i>	22
16:15 - 16:30	Meteorological and Greenhouse Gas Measurements for the Characterization of Errors in Mesoscale Carbon Inversions <i>Thomas Lauvaux (The Pennsylvania State University, University Park, PA)</i>	23
16:30 - 16:45	Diurnal and Seasonal Variations in the Sources of Anthropogenic CO <sub>2</sub> Emissions Over Two Years in the Los Angeles Megacity from Atmospheric Measurements <i>Sally Newman (California Institute of Technology, Pasadena, CA)</i>	24
• <b>17:00 - 20:00</b>	<b>Poster Session (DSRC Cafeteria) with appetizers and refreshments</b>	

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- Page No.**
- **Session 5**      **Global Radiation & Aerosols** — Chaired by Allison McComiskey
- 08:15 - 08:30      Relationships Amongst Lower Tropospheric and Column-averaged Aerosol Properties and Composition Measured at the Co-located Appalachian State University NOAA and NASA Monitoring Sites - What Do They Tell Us? 25  
*James Patrick Sherman (Appalachian State University, Department of Physics and Astronomy, Boone, NC)*
- 08:30 - 08:45      A Comprehensive Climatology of Arctic Aerosol Properties on the North Slope of Alaska 26  
*Jessie Creamean (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- 08:45 - 09:00      Gaseous Elemental Mercury Measurements at GMD Barrow and the 2015 Arctic GEOTRACES Cruise to the North Pole 27  
*Steve Brooks (University of Tennessee Space Institute, Tullahoma, TN)*
- 09:00 - 09:15      Observations, Ray-tracing, and Data Assimilation in the Assessment of Aerosols 28  
*Steven Albers (Cooperative Institute for Research in the Atmosphere (CIRA), Colorado State University, Fort Collins, CO)*
- 09:15 - 09:30      Analysis of the Diurnal Cycle of Cloud Effects on the Surface Radiation Budget of the SURFRAD Network 29  
*Charles N. Long (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- 09:30 - 09:45      A Long-term Study of Aerosol-Cloud Interactions and Their Radiative Effect at a Mid-latitude Continental Site Using Ground-based Measurements 30  
*Elisa T. Sena (Institute of Physics, University of São Paulo, São Paulo, Brazil)*
- **9:45 - 10:15**      **Morning Break**
- **Session 6**      **Halocarbons & Other Trace Gases** — Chaired by Jim Elkins
- 10:15 - 10:30      On the Uneven Decline of Atmospheric CFC-11: Bumps in the Road to Ozone Recovery or Variations in Atmospheric Transport and/or Loss? 31  
*Stephen A. Montzka (NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO)*
- 10:30 - 10:45      Sulfur Hexafluoride Lifetime Adjustment Based on Measured Loss in the Stratospheric Polar Vortex 32  
*Eric Ray (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- 10:45 - 11:00      Variabilities of Atmospheric HCFCs and HFCs Over the United States and Their Implied Emissions for the Years of 2008 – 2014 33  
*Lei Hu (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- 11:00 - 11:15      Tropospheric Observations of CFC-114 and CFC-114a 34  
*Johannes C. Laube (University of East Anglia, School of Environmental Sciences, Norwich, United Kingdom)*
- 11:15 - 11:30      Histories of Halogenated Strong Greenhouse Gases from Ice Cores, Deep Firn and Air Archive Records 35  
*William T Sturges (University of East Anglia, School of Environmental Sciences, Norwich, United Kingdom)*
- 11:30 - 11:45      Sources and Abundance of Inorganic Bromine and Iodine in the Tropical Transition Layer: Constraints from Recent DOAS Aircraft Observations of Bromine Oxide (BrO) and Iodine Oxide (IO) 36  
*Rainer Volkamer (University of Colorado, Department of Chemistry and Biochemistry, Boulder, CO)*
- 11:45 - 12:00      N<sub>2</sub>O Emissions Estimated with the Carbon Tracker Lagrange North American Regional Inversion Framework 37  
*Cynthia Nevison (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)*
- **12:00 - 13:00**      **Catered Lunch - Outreach Classroom GB-124 (pre-payment of \$12.00 at registration)**

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• <b>Session 7</b>	
<b>Ozone &amp; Water Vapor</b> — Chaired by Sam Oltmans	
13:00 - 13:15	38
SPARC Water Vapour Assessment II <i>Karen H. Rosenlof (NOAA Earth System Research Laboratory, Chemical Sciences Division (CSD), Boulder, CO)</i>	
13:15 - 13:30	39
Recent Divergences in Stratospheric Water Vapor Measurements by Aura MLS and Frost Point Hygrometers <i>Dale F. Hurst (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	
13:30 - 13:45	40
Do Stratospheric Ozone Measurements Show Large Tropical Width Changes? <i>Sean Davis (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	
13:45 - 14:00	41
Origins of Filaments in Boulder Ozonesonde Data <i>Irina Petropavlovskikh (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	
14:00 - 14:15	42
Balloon-borne Ozonesonde Profile Measurements at South Pole Station, Antarctica During the 2015 Ozone Hole <i>Bryan J. Johnson (NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO)</i>	
14:15 - 14:30	43
Long-term Trends of Tropospheric Ozone Over North America and Southeast Asia <i>Audrey Gaudel (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	
• <b>14:30 - 15:00</b>	
<b>Afternoon Break</b>	
• <b>Session 8</b>	
<b>Carbon Cycle &amp; Greenhouse Gases - Oil &amp; Gas</b> — Chaired by Gabrielle Petron	
15:00 - 15:15	44
Methane Emissions from the 2015 Aliso Canyon Blowout in Los Angeles, CA <i>Thomas B. Ryerson (NOAA Earth System Research Laboratory, Chemical Sciences Division (CSD), Boulder, CO)</i>	
15:15 - 15:30	45
Methane Emissions from the Denver-Julesburg Basin of Colorado Estimated by Bayesian Inversion with Five Datasets <i>Wayne M. Angevine (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	
15:30 - 15:45	46
Have We Detected Large Increases in U.S. Emissions of CH <sub>4</sub> From Oil and Gas Production? <i>Lori Bruhwiler (NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO)</i>	
15:45 - 16:00	47
Results from a Survey of Global Natural Gas Flaring from Visible Infrared Imaging Radiometer Suite Data <i>Christopher D. Elvidge (NOAA National Centers for Environmental Information (NCEI), Boulder, CO)</i>	
16:00 - 16:15	48
Methane Emissions from Natural Gas Production in Pennsylvania: Aircraft Model Comparison <i>Zachary Barkley (The Pennsylvania State University, University Park, PA)</i>	
16:15 - 16:30	49
A Reversal of Long-term Global Trends in Atmospheric Ethane and Propane from North American Oil and Natural Gas Emissions <i>Detlev Helmig (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)</i>	
16:30 - 16:45	50
A Quantification of Methane Emissions from Oil and Natural Gas Extraction Regions in the U.S. and a Comparison to Previous Studies <i>Jeff Peischl (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	
• <b>16:45</b>	
<b>Closing Remarks - Dr. James Butler, Director (NOAA/ESRL Global Monitoring Division)</b>	

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### • Carbon Cycle & Greenhouse Gases

- P-1 Separating Methane Emissions From Biogenic Sources And Natural Gas by Vertical Column Enhancements of Ammonia, Ethane, and Methane Along the Colorado Front Range  
*Randall Chiu (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-2 Tower-based Measurements of CH<sub>4</sub> Dry Mole Fraction and Isotopic Ratio (<sup>13</sup>CH<sub>4</sub>, <sup>12</sup>CH<sub>4</sub>) in the Northeastern Pennsylvania Marcellus Shale Gas Region  
*Natasha Miles (The Pennsylvania State University, University Park, PA)*
- P-3 Aircraft-based Quantification of Individual Oil and Gas Facilities' Methane Emissions  
*Stefan Schwietzke (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-4 Global Inventory of Natural Gas Molecular and Isotopic Compositions  
*Owen A. Sherwood (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)*
- P-5 Methane and Nonmethane Hydrocarbons in the Denver-Julesburg Basin of Colorado: from Source Signatures to Regional Impacts  
*Gabrielle Petron (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-6 CO<sub>2</sub>, CO, and CH<sub>4</sub> Surface *In Situ* Measurement Network in Support of the Indianapolis FLUX (INFLUX) Experiment  
*Scott Richardson (The Pennsylvania State University, University Park, PA)*
- P-7 Stable Isotopic Analysis of Carbon Monoxide During Two Summers at Indianapolis, Indiana  
*Isaac Vimont (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)*
- P-8 Spatiotemporal Patterns of Urban Trace Gases and Pollutants Observed with a Light Rail Vehicle Platform in Salt Lake City, UT  
*Logan Mitchell (University of Utah, Salt Lake City, UT)*
- P-9 Imprint of Urban CO<sub>2</sub> Emissions Detected by OCO-2 Observations of Total Column CO<sub>2</sub>  
*Xinxin Ye (The Pennsylvania State University, University Park, PA)*
- P-10 Atmospheric Carbon and Transport – America: A NASA Earth Venture Mission Dedicated to Improving the Accuracy, Precision and Resolution of Atmospheric Inverse Estimates of CO<sub>2</sub> and CH<sub>4</sub> Sources and Sinks  
*Scott Richardson (The Pennsylvania State University, University Park, PA)*
- P-11 Using *In Situ* CO<sub>2</sub> Measurements to Help Understand GOSAT and OCO-2 Column CO<sub>2</sub> Retrievals  
*David F. Baker (Cooperative Institute for Research in the Atmosphere (CIRA), Colorado State University, Fort Collins, CO)*
- P-12 A Multi-sensor Approach to Cloud and Aerosol Detection in Support of OCO-2 XCO<sub>2</sub> Retrieval Validation  
*Heather Q. Cronk (Cooperative Institute for Research in the Atmosphere (CIRA), Colorado State University, Fort Collins, CO)*
- P-13 Toward Continuous Monitoring of Climate Pollutant Emissions at Site- to Regional- Scales  
*Caroline Alden (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-14 Reconstructing Urban Fossil Fuel Carbon Dioxide Emissions Utilizing the Radiocarbon Composition of Tree Rings from the Wellington Region, New Zealand  
*Bella Ansell (GNS Science, National Isotope Centre, Lower Hutt, New Zealand)*
- P-15 Influence of Subgrid Terrain Variability on Simulated Planetary Boundary Layer Depths in Large-scale Transport Models  
*Gert-Jan Duine (University of Virginia, Charlottesville, VA)*
- P-16 Sensitivity and Uncertainty Analysis of Physical Parameterization and Initial Conditions on Meteorological Variables and CO<sub>2</sub> Mole Fractions  
*Liza Diaz-Isaac (The Pennsylvania State University, University Park, PA)*
- P-17 Assimilation of GOSAT XCO<sub>2</sub> Retrievals in CarbonTracker  
*Jinwoong Kim (Yonsei University, Department of Atmospheric Sciences, Seoul, South Korea)*
- P-18 A Re-examination of the WMO X2007 CO<sub>2</sub> Calibration Scale  
*Brad D. Hall (NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO)*

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### • **Carbon Cycle & Greenhouse Gases (continued)**

- P-19 Ensuring High-quality Data from NOAA'S Cooperative Global Air Sampling Network  
*Molly J. Crotwell (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-20 Comparison of CH<sub>4</sub> Monitoring Methods at GEOSummit  
*Dominique Colegrove (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)*
- P-21 Characteristics of Atmospheric CO<sub>2</sub> and CH<sub>4</sub> at the Shangdianzi Regional Background Station in China  
*Miao Liang (China Meteorological Administration, Centre for Atmosphere Watch and Services, Meteorological Observation Centre, Beijing, China)*
- P-22 A Compact Cavity Ring-down Spectroscopy Analyzer for *In Situ* Measurements of Carbon Dioxide, Methane, and Water Vapor  
*Milos Markovic (Picarro Inc, Santa Clara, CA)*
- P-23 Integrated Path Differential Absorption (IPDA) LIDAR Measurement of CO<sub>2</sub>, CH<sub>4</sub>, and H<sub>2</sub>O  
*Gerd A. Wagner (National Institute of Standards and Technology (NIST), Physical Measurement Laboratory, Quantum Electromagnetics Division, Boulder, CO)*
- P-24 An Ultra-stable and High-precision N<sub>2</sub>O/CO Analyzer for Continuous Ambient Monitoring  
*Graham Leggett (Picarro Inc, Santa Clara, CA)*
- P-25 Atmospheric Measurements of Methane, Isotopic Methane, and Ethane Using a Cavity Ring-down Spectrometer  
*Iain Green (Picarro Inc, Santa Clara, CA)*
- P-26 Adaptation of a Commercial Greenhouse Gas Analyzer for Expanded Altitude Range  
*Kathryn McKain (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-27 Characterization of a Quantum Cascade-Tunable Infrared Laser Differential Absorption Spectrometer (QC-TILDAS) for Atmospheric Ethane and Methane Field Measurements  
*Ingrid Mielke-Maday (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-28 Global Warming Is Real - Highlights of the Data  
*Phil Morris (Retired Molecular Biologist and High School Science Teacher, Edmond, OK)*

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### • **Ozone & Water Vapor**

- P-29 Uncertainties in Total Ozone Retrievals from Dobson Zenith Sky Observations  
*Koji Miyagawa (Science and Technology Corporation, Boulder, CO)*
- P-30 Centuries of Data: the U.S. Dobson Station Network Reevaluated  
*Robert D. Evans (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-31 Long-lived Stratospheric Ozone Depletion Over The South Pole During Spring 2015  
*Glen McConville (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-32 Total Column Water Vapor from OCO-2  
*Robert R. Nelson (Colorado State University, Department of Atmospheric Science, Fort Collins, CO)*
- P-33 Introducing the EXC<sup>3</sup>ITE Project: EXploring Stratospheric Composition, Chemistry and Circulation with Innovative TEchniques  
*Emma Leedham Elvidge (University of East Anglia, School of Environmental Sciences, Norwich, United Kingdom)*
- P-34 Intercomparison of Total Ozone Column Observed by Pandora and Brewer Spectrophotometers at Taipei  
*Kun-Wei Lin (Central Weather Bureau, Observation Division, Taipei, Taiwan)*
- P-35 First Look at the NOAA Aircraft-based Tropospheric Ozone Climatology in Colorado  
*Mark Leonard (Science and Technology Corporation, Boulder, CO)*
- P-36 Analysis, Determination and Reprocessing Methods Used For Homogenization of the NOAA Long-term ECC Ozonesonde Time Series  
*Chance W. Sterling (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-37 The First Reprocessing of SHADOZ (Southern Hemisphere ADditional OZonesondes) Data Records  
*Jacquelyn Witte (Science Systems and Applications, Inc. (SSAI), Lanham, MD)*
- P-38 Results from Balloon Launches at the MaiDo Observatory On RéUnion Island  
*Karen H. Rosenlof (NOAA Earth System Research Laboratory, Chemical Sciences Division (CSD), Boulder, CO)*
- P-39 Ozone and Other Trace Gases in the Tropical Tropopause Layer Over the Pacific Ocean  
*Eric Hintsa (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-40 Investigating Below-cloud Rain Evaporation and Boundary Layer Moisture Recycling by Coupling Stable Water Isotopes in Vapor and Precipitation to Raindrop Size Distributions at the Boulder Atmospheric Observatory Site  
*Aleya Kaushik (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-41 Geographical and Temporal Differences in NOAA Observed Surface Ozone in the Arctic  
*Audra McClure-Begley (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*

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### • Halocarbons

- P-42 Using Box Models to Quantify Zonal Distributions and Surface Emissions of Halocarbons in the Background Atmosphere  
*James W. Elkins (NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO)*
- P-43 Halogenated Trace Gases and Volatile Organic Compounds at the Global Atmospheric Watch Observatory  
Schneefernerhaus/Zugspitze, Germany  
*Wei Wang (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)*
- P-44 GMD'S GC/MS Analytical System for Preconcentration of Environmentally Relevant Species (PERSEUS)  
*Benjamin R. Miller (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-45 Infrared Spectra and Radiative Efficiencies of Atmospherically Persistent Perfluoroamines  
*François Bernard (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*

### • Radiation

- P-46 Evaluation of Environmental and Logistic Conditions at Yushan Station In Taiwan for an Outdoor Radiation Calibration Facility  
*Cheng-Chien Huang (Central Weather Bureau, Observation Division, Taipei, Taiwan)*
- P-47 The NOAA Global Monitoring Division'S UV Monitoring Networks: Update on Antarctica and NEUBrew  
*Scott Stierle (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-48 Synthesis of Aerosol Physical, Chemical, and Radiative Properties from Various Sources: Consistency and Closure  
*Hagen Telg (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-49 Pioneering Detector Technology and Architecture Used in a Next Generation Pyranometer Yielding Negligible Thermal Offsets and Sub-second Response  
*Will Beuttell (EKO Instruments USA Inc, San Jose, CA)*
- P-50 Annual Evolution of Surface Energy Flux at Summit, Greenland  
*Nathaniel Miller (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-51 A Method to Correct Longwave Radiation Measurements Corrupted by a Bad Thermistor  
*John Augustine (NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO)*



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### • Aerosols

- P-52 Aerosol Climatology at Mt. Lulin: AERONET and *In Situ* Measurements  
*Sheng-Hsiang Wang (National Central University, Department of Atmospheric Sciences, Chung-Li, Taiwan)*
- P-53 Multi-year Measurements of Aerosols at Jaipur, a Site in Northwestern India  
*Sunita Verma (Birla Institute of Technology Mesra, Ranchi, India)*
- P-54 Mitigation of Particulate Matter Problem Caused by Vegetation Fires in Thailand  
*Sirirat Yensong (Faculty of Engineering and Environment, University of Southampton, Southampton, United Kingdom)*
- P-55 Source Influences on the Aerosol Size Distribution and Cloud Condensation Nucleus (CCN) Activity at the Resolute Bay Ground Site in Canada  
*Sangeeta Sharma (Environment and Climate Change Canada, Toronto, Ontario, Canada)*
- P-56 A Comparison of Inlet Setups at Storm Peak Laboratory  
*Andrew Kumler (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-57 Design of a Novel Aircraft Open-path Cavity Ring-down Spectrometer  
*Gabriela Adler (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-58 A "MAGIC" Water Condensation Particle Counter  
*Patricia B. Keady (Aerosol Devices Inc., Fort Collins, CO)*
- P-59 Boundary Layer Observations at Mauna Loa Observatory, Hawaii  
*John E. Barnes (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-60 The Calbuco Chronicle: Volcanic Aerosols in the Post-Pinatubo Stratosphere  
*Richard A. Keen (University of Colorado, Emeritus, Department of Atmospheric and Oceanic Sciences, Boulder, CO)*

### • Meteorology and Partner Stations

- P-61 Environmental Change in Barrow, Alaska Resulting from a 2015 Record Heat Wave  
*Diane Stanitski (NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO)*
- P-62 Seasonal and Latitudinal Variations of Surface Fluxes and Meteorological Variables at Arctic Terrestrial Sites  
*Andrey A. Grachev (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-63 Definition of Summer Monsoon Index for Vietnam Region  
*Mau Nguyen-Dang (Vietnam Institute of Meteorology, Hydrology, and Climate Change, Hanoi, Vietnam)*
- P-64 ARM North Slope of Alaska Research Facilities  
*Jasper Hardesty (Sandia National Laboratories, Albuquerque, NM)*
- P-65 The Pikes Peak Observatory  
*Mark Miesch (National Center for Atmospheric Research (NCAR), High Altitude Observatory, Boulder, CO)*
- P-66 Wind Sensor Comparison – Lufft Ventus-UMB Vs. RM Young 5103, Summit Station Greenland – July 2015 to April 2016  
*Michael O'Neill (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)*
- P-67 Normalized Distribution Function: A Statistical Analysis of Surface Temperature for the Investigations for Seismic Precursor During the Large Ferndale, California Earthquake (M=6.8)  
*Rahul Shrivastava (Space Science Laboratory, Department of Physics and Electronics, Barkatullah University, Bhopal, India)*

### • Technology

- P-68 SOS Explorer™: Interactive Visualizations for Museums and Classrooms  
*Eric Hackathorn (NOAA Earth System Research Laboratory, Global Systems Division (GSD), Boulder, CO)*

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