

NOAA ESRL GLOBAL MONITORING ANNUAL CONFERENCE 2015

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

Tuesday Morning, May 19, 2015 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 James Butler
- 08:15 - 08:30 Welcome and Conference Overview -
 James H. Butler (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)
- 08:30 - 08:35 Introduction of Keynote Speaker -
 James H. Butler (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)
- 08:35 - 09:05 The Importance and Challenges of Communicating Climate Science 1
 Jeffrey T. Kiehl (National Center for Atmospheric Research (NCAR), Boulder, CO)
- 09:05 - 09:25 Toward the Atmospheric Greenhouse Gas Observing System We Need 2
 Pieter P. Tans (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)
- 09:25 - 09:45 Cost-competitive Reduction of Carbon Emissions of Up to 80% from the U.S. Electric Sector by 2030 3
 Alexander E. MacDonald (NOAA Earth System Research Laboratory, Boulder, CO)
- 9:45 - 10:15 **Morning Break**
- **Session 2** **Carbon Cycle & Greenhouse Gases - Large Scale Atmospheric Patterns** — Chaired by Arlyn Andrews
- 10:15 - 10:30 Constraints on Air-sea Fluxes of Carbon and Heat From Measurements of Atmospheric Potential Oxygen 4
 Laure Resplandy (University of California at San Diego, Scripps Institution of Oceanography, La Jolla, CA)
- 10:30 - 10:45 An Update on the Atmospheric Methane Growth Rate: Growth Surges During 2014 5
 Edward J. Dlugokencky (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)
- 10:45 - 11:00 Carbon Monoxide Concentration and Isotope Measurements in New Zealand 6
 Rowena Moss (National Institute of Water and Atmospheric Research (NIWA), Wellington, New Zealand)
- 11:00 - 11:15 Global Methane Budget and Natural Gas Leakage Based on Long-term $\delta^{13}\text{C}\text{H}_4$ Measurements and Updated Isotopic Source Signatures 7
 Stefan Schwietzke (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)
- 11:15 - 11:30 Measurement of Volatile Organic Compounds Using Trigger Sampling in Southeast Asia During Biomass Burning Season 8
 Chang-Feng Ou-Yang (National Central University, Department of Atmospheric Sciences, Chung-Li, Taiwan)
- 11:30 - 11:45 Quantitative Laser Spectroscopy for SI-Traceable Measurements of Greenhouse Gases 9
 Joseph T. Hodges (National Institute of Standards and Technology, Gaithersburg, MD)
- 11:45 - 12:00 Arctic Methane: Can the Top-down and Bottom-up Views of Its Budget Be Reconciled? 10
 Lori Bruhwiler (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)
- 12:00 - 13:00 **Catered Lunch - Outreach Classroom GB-124 (pre-payment of \$12.00 at registration)**

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• Session 3	Carbon Cycle & Greenhouse Gases - Global Observing Systems — Chaired by Andrew Jacobson	
13:00 - 13:15	Early XCO ₂ Estimates from the NASA Orbiting Carbon Observatory-2 (OCO-2) <i>David Crisp (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA)</i>	11
13:15 - 13:30	Climatology of Spatiotemporal Variations of Tropospheric CO ₂ Observed by CONTRAIL-CME <i>Taku Umezawa (Max Planck Institute for Chemistry, Mainz, Germany)</i>	12
13:30 - 13:45	GOSAT Data Products Generated in Collaborative Effort with ESRL/GMD <i>T. Yokota (National Institute for Environmental Studies, Tsukuba-City, Ibaraki, Japan)</i>	13
13:45 - 14:00	Long-Term Observations of NMHCs from the IAGOS-CARIBIC Flying Observatory <i>Angela K. Baker (Max Planck Institute for Chemistry, Mainz, Germany)</i>	14
14:00 - 14:15	The Potential of ¹⁴ CO ₂ Measurements to Constrain the North American Fossil Fuel CO ₂ Flux <i>Sourish Basu (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)</i>	15
14:15 - 14:30	The Global Atmosphere Watch Reactive Gases Measurement Network <i>Detlev Helmig (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)</i>	16
• 14:30 - 15:00	Afternoon Break	
• Session 4	Radiation — Chaired by Allison McComiskey	
15:00 - 15:15	The Baseline Surface Radiation Network: Surface Radiation Observations for Climate Research <i>Chuck Long (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	17
15:15 - 15:30	Near Real-time Solar Irradiance and Aerosol Optical Depth from NOAA ISIS and SURFRAD Stations for Verification of Solar Forecasts for the Solar Forecast Improvement Project (SFIP) <i>Kathy O. Lantz (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	18
15:30 - 15:45	Modification of VIIRS Sensor Data Record Operational Code for Consistency of Data Product Limits <i>Gabriel Moy (The Aerospace Corporation, El Segundo, CA)</i>	19
15:45 - 16:00	Use of Solar Irradiance Measurements to Improve the Physical Parameterizations in the Rapid Refresh and High-Resolution Rapid Refresh Models <i>Jaymes Kenyon (NOAA/ESRL/GSD Earth Modeling Branch, Boulder, CO)</i>	20
16:00 - 16:15	Surface-based Cloud Radiative Properties for Improved Understanding of Aerosol-cloud Interactions <i>Allison McComiskey (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)</i>	21
16:15 - 16:30	Aerosol Effects on Cloud Cover as Determined by Ground- and Space-based Sensors <i>John A. Augustine (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)</i>	22
16:30 - 16:45	Evidence of Clear-Sky Daylight Whitening: Are We Already Conducting Geoengineering? <i>Chuck Long (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	23
• 17:00 - 20:00	Poster Session (DSRC Cafeteria) with appetizers and refreshments	

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- **07:00** **Registration Opens in GC-402 - lunch orders collected at registration table**
- **07:30 - 08:15** **Morning Snacks - coffee, tea, fruit, bagels and donuts served**

- **Session 5** **Carbon Cycle & Greenhouse Gases - Regional Emissions Quantification** — Chaired by Ed Dlugokencky

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08:15 - 08:30	24
Detectability and Quantification of Atmospheric Boundary Layer Greenhouse Gas Dry Mole Fraction Enhancements from Urban Emissions: Results from INFLUX <i>Natasha Miles (The Pennsylvania State University, University Park, PA)</i>	
08:30 - 08:45	25
Initial Atmospheric Fossil-fuel CO ₂ Estimates from the Los Angeles Megacity Project <i>John B. Miller (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	
08:45 - 09:00	26
Estimating Urban Carbon Dioxide Fluxes at High Spatial Resolution from <i>In Situ</i> Observations: First Results from the Berkeley Atmospheric CO ₂ Observation Network <i>Alexis A. Shusterman (University of California at Berkeley, Berkeley, CA)</i>	
09:00 - 09:15	27
Preliminary Estimates of Global Gas Flaring for 2012 And 2014 <i>Feng-Chi Hsu (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	
09:15 - 09:30	28
Measuring Methane Emissions from Oil and Natural Gas Well Pads in the Barnett Shale Using the Mobile Flux Plane Technique <i>Chris Rella (Picarro Inc, Santa Clara, CA)</i>	
09:30 - 09:45	29
North American CO ₂ Fluxes, Inflow, and Uncertainties Estimated Using Atmospheric Measurements from the North American Carbon Program <i>Arlyn E. Andrews (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)</i>	
09:45 - 10:00	30
Update on Earth Networks Greenhouse Gas (GHG) Monitoring Network <i>Chris Sloop (Earth Networks, Inc., Germantown, MD)</i>	

- **10:00 - 10:30** **Morning Break**

- **Session 6** **Ozone & Water Vapor** — Chaired by Irina Petropavlovskikh

10:30 - 10:45	31
Is There Evidence of Convectively Injected Water Vapor in the Lowermost Stratosphere Over Boulder, Colorado? <i>Dale Hurst (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	
10:45 - 11:00	32
10 Years of Water Vapor and Ozone Soundings at Costa Rica <i>Holger Vömel (National Center for Atmospheric Research (NCAR), Boulder, CO)</i>	
11:00 - 11:15	33
Low Ozone in the Tropical Tropopause Layer (TTL) Over the Western Pacific <i>Eric J. Hintsä (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	
11:15 - 11:30	34
Comparison of Seasonal Cycles of Tropospheric Ozone from Three Chemistry-Climate Models (CCMs) with Measurements <i>David Parrish (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	
11:30 - 11:45	35
Sensitivity of Northern Hemispheric Tropospheric Ozone to Anthropogenic Emissions as Observed by Satellite Observations <i>John Worden (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA)</i>	
11:45 - 12:00	36
Comparison of Global Tropospheric Ozone Precursors from Measurements and the MACCity Global Emissions Inventory <i>Birgit Hassler (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	

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Aerosols — Chaired by John Ogren	
13:00 - 13:15 Characterizing Carbonaceous Aerosols Transported to the Canadian Arctic: Attribution of Emission Sources/Regions of the Black Carbon at Alert <i>Lin Huang (Environment Canada, Toronto, Ontario, Canada)</i>	37
13:15 - 13:30 Multiyear Measurements of Aerosols at Storm Peak Laboratory, a Colorado Mountain-Top Site <i>A. Gannet Hallar (Storm Peak Laboratory, Desert Research Institute, Steamboat Springs, CO)</i>	38
13:30 - 13:45 Relative Humidity Effects on Aerosol Light Scattering in the Yangtze River Delta of China <i>Sun Junying (Key Laboratory of Atmospheric Chemistry of CMA, Institute of Atmospheric Composition, Chinese Academy of Meteorological Sciences, Beijing, China)</i>	39
13:45 - 14:00 Southern Ocean Atmospheric Chemistry and Aerosols - from Cape Grim to the RV Investigator <i>Melita Keywood (Commonwealth Scientific Industrial Research Organization (CSIRO), Aspendale, Australia)</i>	40
14:00 - 14:15 Aerosol Measurements at South Pole: Impact of Local Contamination <i>Patrick Sheridan (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)</i>	41
14:15 - 14:30 A New and Inexpensive Tool for Ozone, Aerosol, and AOD Vertical Profiling <i>Ru-Shan Gao (NOAA Earth System Research Laboratory, Chemical Sciences Division, Boulder, CO)</i>	42
• 14:30 - 15:00 Afternoon Break	
• Session 8	
Halocarbons & Other Trace Gases — Chaired by Brad Hall	
15:00 - 15:15 Fourth Generation Anthropogenic Halogenated Greenhouse Gases <i>Martin K. Vollmer (Empa, Swiss Federal Laboratories for Materials Science and Technology, Dübendorf, Switzerland)</i>	43
15:15 - 15:30 Increases in Tropospheric Chlorine from Dichloromethane, a Gas Not Controlled by the Montreal Protocol <i>Steve Montzka (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)</i>	44
15:30 - 15:45 Is the Growth Rate of Nitrous Oxide Increasing? <i>Brad D. Hall (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)</i>	45
15:45 - 16:00 Satellite Observations of Peroxyacetyl Nitrate (PAN) in the Tropical Troposphere: New Insights Into the Seasonal and Inter-annual Variability of the Reactive Nitrogen Budget <i>Vivienne Payne (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA)</i>	46
16:00 - 16:15 NO _x Time Series and NO _y Speciation in the Tropical Marine Boundary Layer at the Cape Verde Atmospheric Observatory <i>Chris Reed (University of York, York, United Kingdom)</i>	47
16:15 - 16:30 Ticosounding Turrialba – Profiles of Volcanic Sulfur Dioxide (SO ₂) in Costa Rica and Validation for OMI and OMPS <i>Henry B. Selkirk (Goddard Earth Science Technology and Research, Greenbelt, MD)</i>	48
16:30 - 16:45 Highlights: Four Corners Methane Emissions Verification Study <i>Colm Sweeney (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)</i>	49
• 16:45 Closing Remarks - Dr. James Butler, Director (NOAA/ESRL Global Monitoring Division)	

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• **Carbon Cycle & Greenhouse Gases - Global Observing Systems**

- P-1 Initial Validation and Bias Correction of OCO-2 Carbon Dioxide Retrievals
Chris O'Dell (Colorado State University, Fort Collins, CO)
- P-2 Aerosol First Guess Sensitivity in the Atmospheric CO₂ Observations from Space (ACOS) XCO₂ Retrieval Algorithm
Robert R. Nelson (Colorado State University, Department of Atmospheric Science, Fort Collins, CO)
- P-3 Surface CO₂ Fluxes Implied by 5 Years of ACOS V3.5 GOSAT X_{CO2} Retrievals, 2009-2014
David F. Baker (Cooperative Institute for Research in the Atmosphere (CIRA), Colorado State University, Fort Collins, CO)
- P-4 Uncertainties in Preliminary Estimates of CO₂ and CH₄ Trends
Molly Crotwell (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-5 Atmospheric Carbon and Transport – America: An Earth Venture Mission Dedicated to Improving the Accuracy, Precision and Resolution of Atmospheric Inverse Estimates of CO₂ and CH₄ Sources and Sinks
Kenneth J. Davis (The Pennsylvania State University, University Park, PA)
- P-6 Influence of CO₂ Observations on the Optimized CO₂ Flux in the CarbonTracker Framework
Jinwoong Kim (Yonsei University, Department of Atmospheric Sciences, Seoul, South Korea)
- P-7 Evaluating Planetary Boundary Layer Depths in CarbonTracker for a Region Around the Moody Tall Tower in Texas
Stephan F.J. De Wekker (University of Virginia, Charlottesville, VA)
- P-8 GEOS-Chem-CarbonTracker
Andrew E. Schuh (Cooperative Institute for Research in the Atmosphere (CIRA), Colorado State University, Fort Collins, CO)

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• Carbon Cycle & Greenhouse Gases - Regional Emissions Quantification

- P-9 Results from the Multi-species Analysis of Discrete Air Samples Collected in the Denver-Julesburg Oil and Natural Gas Basin Between 2008 and 2014
Gabrielle Petron (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-10 Fugitive Emissions from Unconventional Wells in Northeastern Pennsylvania: Tower Network Design
Zachary Barkley (The Pennsylvania State University, University Park, PA)
- P-11 Wintertime Airborne Measurements of Greenhouse Gases and Criteria Pollutants in Washington D.C.
Olivia Salmon (Purdue University, Department of Chemistry, West Lafayette, IN)
- P-12 Methane Observations in Alberta and Saskatchewan (Canada): Distinct Signals from Oil and Gas Activities.
M. Lopez (Environment Canada, Toronto, Ontario, Canada)
- P-13 In-Situ Greenhouse Gas Measurements from Boreal Alaska
Anna Karion (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-14 Sensitivity of Flux Accuracy to Setup of Fossil Fuel and Biogenic CO₂ Inverse System in an Urban Environment
Kai Wu (The Pennsylvania State University, University Park, PA)
- P-15 A Study of Carbon Monoxide Stable Isotopes at the Indianapolis Flux Project (INFLUX)
Isaac Vimont (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)
- P-16 Urban Inversion of CO₂ Emissions at High Resolution Over Indianapolis
Thomas Lauvaux (The Pennsylvania State University, University Park, PA)
- P-17 Improving and Assessing Aircraft-based Greenhouse Gas Emission Rate Measurements for the City of Indianapolis (INFLUX Project)
Alexie Heimburger (Purdue University, Department of Chemistry, West Lafayette, IN)
- P-18 Exploring Spatial and Temporal Gradients in Atmospheric CO₂ and CO Using in situ Observations in the Los Angeles Megacity
Kristal R. Verhulst (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA)
- P-19 Long Term Trends in Carbon Dioxide Enhancements in an Urban Region
Logan Mitchell (University of Utah, Salt Lake City, UT)
- P-20 Spatial and Temporal Observation of Urban Trace Gases and Pollutants from a Light Rail Vehicle Platform
Logan Mitchell (University of Utah, Salt Lake City, UT)
- P-21 An Emerging Greenhouse Gas Observational Network in the Intermountain West: Observing Greenhouse Gas Mixing Ratios and Isotopes Across Rural to Urban Gradients
John C. Lin (University of Utah, Salt Lake City, UT)
- P-22 Bayesian Optimization of NEE and NEP in Oregon Using a Dense CO₂ Observation Tower Network and the Community Land Model (CLM4.5)
Andres Schmidt (Oregon State University, Corvallis, OR)
- P-23 Atmospheric Inversions and Satellite Data Reveal Recent Amazon Carbon Balance Variability Driven by Climate Anomalies
Caroline Alden (Stanford University, Stanford, CA)
- P-24 Preliminary Studies of Carbon Isotopic Composition of Methane in the Marine Atmosphere Over the Arabian Coast.
D.K. Rao (Physical Research Laboratory, Ahmedabad, India)

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• Halocarbons

- P-25 Large and Small Unmanned Aircraft Systems (UAS) for Trace Gas Measurements in Climate Change Studies
Fred L. Moore (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-26 A Prototype Instrument for Measuring SO₂ Using Laser Induced Fluorescence
Andrew Rollins (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-27 Recently Detected CFCs: UV Absorption Spectra, Atmospheric Lifetimes, Global Warming and Ozone Depletion Potentials
Francois Bernard (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-28 Assessing the Atmospheric Impact of CF₃CClH₂ (HCFC-133a): Laboratory Measurements of OH Kinetics and UV and Infrared Absorption Spectra
Max R. McGillen (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-29 The Very Short-lived Ozone Depleting Substance, CHBr₃ (bromoform): Revised UV Absorption Spectrum, Atmospheric Lifetime and Ozone Depletion Potential
Dimitrios K. Papanastasiou (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-30 Carbon Tetrachloride Emissions from the U.S. During 2008 – 2012
Lei Hu (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-31 Methyl Chloride as a Tracer of Tropical Tropospheric Air in the Lowermost Stratosphere Inferred from CARIBIC Passenger Aircraft Measurements
Taku Umezawa (Max Planck Institute for Chemistry, Mainz, Germany)
- P-32 Characterizing the Niwot Ridge, Colorado C1 Site: Local and Regional Pollution
Geoffrey S. Dutton (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)

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• **Ozone & Water Vapor**

- P-33 Three Years of Stable Water Isotope Data at the Boulder Atmospheric Observatory Site: Insights Into Boundary Layer Moisture Dynamics and Atmosphere-land Surface Water Fluxes
Aleya Kaushik (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-34 Water Vapor Isotope Ratio Measurements at NOAA/GMD Sites to Constrain the Isotope-enabled Community Earth System Model.
Jesse Nusbaumer (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-35 Observations of TTL Water Vapor and Cirrus Properties from the NASA Global Hawk During the Airborne Tropical TRopopause EXperiment
Troy Thornberry (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-36 Techniques for Analyzing a Long-Term Observational Dataset Using Global Water Vapor Data from the NVAP-M Blended TPW Dataset
Heather Q. Cronk (Cooperative Institute for Research in the Atmosphere (CIRA), Colorado State University, Fort Collins, CO)
- P-37 NOAA FPH Vs APicT During the AquaVIT-2 Water Vapor Intercomparison
Emrys Hall (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-38 Ozone Soundings Restarted at NOAA/SHODOZ Site in Suva, Fiji
Patrick Cullis (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)
- P-39 Southern Hemisphere Additional Ozonesondes (SHADOZ) Updates: 2014-2015
Patrick Cullis (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)
- P-40 Homogenization of the Boulder, Colorado Ozonesonde Record: 1986-2014
Bryan J. Johnson (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)
- P-41 Retrieving Vertical Ozone Profiles from Measurements of Spectral Global Irradiance
Germar Bernhard (Biospherical Instruments Inc, San Diego, CA)
- P-42 Boulder Ozone Sonde Data Analyses for Multiple Tropopause Origins
Irina Petropavlovskikh (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-43 Ozone Vertical Profiles Measured During The Front Range Air Pollution and Photochemistry Experiment (FRAPPE) from Tethered Ozonesondes in July-August 2014.
Chance W. Sterling (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)
- P-44 Colorado Front Range Ozone Analysis
Audra McClure-Begley (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-45 First Tropospheric Ozone Measurements at the Observatory of Huancayo, Peru
Luis Suarez-Salas (Laboratory of Atmospheric Microphysics and Radiation, Observatory of Huancayo, Instituto Geofisico del Peru, Huancayo, Peru)
- P-46 Recent Stratospheric Water Vapor Variability as Revealed by SWOOSH, a New Merged Satellite Data Set
Sean Davis (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)

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• **Aerosols**

- P-47 Measuring Aerosol Optical Depth (AOD) and Aerosol Profiles Simultaneously with a Camera Lidar
John Barnes (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)
- P-48 Volcanic Aerosol Forcing of the Global Climate Derived from Lunar Eclipse Observations, 1979-2014
Richard A. Keen (University of Colorado, Emeritus, Department of Atmospheric and Oceanic Sciences, Boulder, CO)
- P-49 A High-Efficiency Condensation Growth Sampler for Collecting Concentrated Aerosol Particles on a Solid Substrate and in Liquids
Pat Keady (Aerosol Devices Inc., Fort Collins, CO)

• **Radiation**

- P-50 Pan-Arctic Surface Radiation Measurements for Analysis of Arctic Climate Change
Christopher J. Cox (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)
- P-51 The Infrared Sky Imager: A New Instrument at the ARM Southern Great Plains Site
Dimitri Klebe (Denver Museum of Nature and Science, Denver, CO)
- P-52 Update on the Calibration and System Upgrades of the NOAA GRAD UV Monitoring Networks
Patrick Disterhoft (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)

• **Science, Service, & Stewardship - Special Section**

- P-53 The Tricks of the Climate Politicians – Translated
James H. Butler (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)
- P-54 Global Monitoring Division Education
Kelsey Tayne (NOAA Earth System Research Laboratory, Global Monitoring Division, Boulder, CO)
- P-55 Enabling Data Discovery and Data Re-use by Improving Software Usability
Antonia Rosati (National Snow and Ice Data Center (NSIDC), Boulder, CO)
- P-56 GEIA'S Vision for Improved Emissions Information
Gregory Frost (NOAA Earth System Research Laboratory, Chemical Sciences Division, Boulder, CO)

• **International Stations & Partners**

- P-57 Observations of Trace Gases and Methane at the Cape Verde Atmospheric Observatory: Evaluation of Methane "Trend"
Chris Reed (University of York, York, United Kingdom)
- P-58 Temperature Variability of AWS Sensors Operating at the Greenland Summit (2008–13)
Christopher A. Shuman (Joint Center for Earth Systems Technology (JCET), University of Maryland, Baltimore County (UMBC), Baltimore, MD)
- P-59 Observation and Analysis of the Zero-curtain Effect in Tiksi (Siberia).
Elena Konopleva (NOAA Earth System Research Laboratory, Physical Sciences Division, Boulder, CO)
- P-60 Inhomogeneity of Conductive Heat Fluxes Around the Tiksi Meteorological Tower
Sara Crepinsek (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO)