

Atmospheric Optics: Aerosols, Visibility, and the Radiative Balance Conference 2021

Bryce Canyon, Utah, USA
5 – 8 October 2021

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FINAL PROGRAM

SESSION SCHEDULE - Tuesday, October 5

TRACK A Red Canyon A

SESSION 1: VISIBILITY AS AN INDICATOR OF HUMAN HEALTH

Session Chairs: Delbert Eatough, Brigham Young University, Jay Turner, Washington University in St. Louis

1:40 pm

AV#15: **Wildfire Smoke Exposure: Is it Safe to Go Outside?**
Patricia A. Brush, Viki Young, Atena Lunsford, WSP USA, US Energy (virtual) 1

2:00 pm

AV#130 **Distributed Air Quality Sensing for Wildfire Detection and Monitoring 2**
Julien Caubel, Troy Cados, Distributed Sensing Technology

2:20 pm

AV #37 : **Bay Area Wildfire Particulate Matter (PM) and Public Health 3**
Jack P. Broadbent, Bay Area Air Quality Management District

2:40 pm

AV #92 **Wildfires in the Wildland Urban Interface: What Can We Learn from the 2018 Camp Fire? 5**
Michael Benjamin, California Air Resources Board (virtual)

3:00 pm

AV #85: **Health Effects of Air Pollution and use of Remote Sensing to Estimate PM2.5 Exposures 6**
Michael Jerrett, UCLA

3:20 pm

AV #79: **Could We Be Underestimating the Health Effects of Particulate Air Pollution? 7**
William Wilson

TRACK B Manzanita, Pinion, Sage, Bristle Cone

SESSION 2: ATMOSPHERIC NITROGEN: A BRIDGE BETWEEN VISIBILITY, ECOLOGY, AND AIR QUALITY

Session Chairs: Bret Schichtel, National Park Service, Ralph Morris, Ramboll

1:40 pm

AV #91: **Evaluating Ecological Responses of Lichens, Trees, and Herbaceous Plants from Atmospheric Nitrogen and Sulfur Deposition to Federal Lands 8**
Michael D. Bell (virtual), Emmi Felker-Quinn, US National Park Service Air Resources Division; Christopher M. Clark Jason A. Lynch, US EPA; Linda H. Pardo, Linda H. Geiser, Jeffrey D. Herrick, USDA Forest Service; Jennifer N. Phelan, Research Triangle Institute

2:00 pm

AV #69: **The Nitrogen Story: Emissions, Visibility, Deposition, Ecosystems in Western Class I Areas 10**
Mike Barna, National Park Service (virtual)

2:20 pm

AV #119: **Assessing the Impact of Agricultural NH3 Emissions on the Excess Nitrogen Deposition in U.S. National Parks 12**
Gustavo Cuchiara, J.L. Hand, Cooperative Institute for Research in the Atmosphere, Colorado State University; Barna, M.G., Schichtel, B. A., National Park Service, Air Resources Division

2:40 pm

AV #123 **The Composition and Sources of Organic Nitrogen in Aerosol and Precipitation 13**
Jeff Collett, Katherine Benedict, Amy Sullivan, Yury Desyaterik, Evelyn Bangs, Colorado State University, Atmospheric Science; Bret Schichtel, National Park Service, Air Resources Division

3:00 pm

AV #124 **A Paradigm Shift in Sulfate-Nitrate-Ammonium Aerosol Formation in the US and its Implications for Air Quality and Reactive Nitrogen Deposition 14**
Da Pan, Jeffrey L. Collett Jr, Colorado State University, Atmospheric Science; Denise L. Mauzerall, Rui Wang, Xuehui Guo, Mark A. Zondlo, Princeton University, Civil and Environmental Engineering; Melissa Puchalski, Environmental Protection Agency, Office of Air Programs, Atmospheric Science; Bret A. Schichtel, National Park Services Air Resources Division

3:40 pm - 4:00 pm

Networking Break and Exhibition Viewing
Red Canyon B

FINAL PROGRAM

SESSION SCHEDULE - Tuesday, October 5

TRACK A Red Canyon A

SESSION 3: WILDFIRES AND IMPACTS ON VISIBILITY

Session Chairs: Kip Carrico, New Mexico Institute of Mining and Technology, Rebecca Washenfelder, NOAA

4:00 pm

AV #86 Examining Smoke Impacts from Major California Wildfires in 2017 and 2018 using Modeled Smoke based on BlueSky Framework and Observed Smoke Data from Ground Monitors and Satellites 15

Anondo D. Mukherjee, ShihMing Huang, Hilary Hafner, Sonoma Technology; Daniel J. Gorham, Insurance Institute for Business and Home Safety

4:20 pm

AV#94 Trends in PM and O3 in Response to Recent Increases in Fires in the Western U.S. 16

Dan Jaffe, (virtual) School of STEM and Department of Atmospheric Sciences, University of Washington; Udaysankar Nair, Aaron Kaulfus, Department of Atmospheric Sciences, University of Alabama Huntsville

4:40 pm

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Charles Ichoku, Howard University, Xiaohua Pan, Mian Chin, Huisheng Bian, Anton Darmenov, Peter R. Colarco, Luke Ellison, Tom L. Kucsera, Arlindo daSilva, Tomohiro Oda, NASA Goddard Space Flight Center; Jun Wang, Ge Cui, College of Engineering, University of Iowa

5:00 pm

AV #01 The Formation of Secondary Organic Material from Gaseous Precursors in Wood Smoke 19

Delbert Eatough, Jaron C. Hansen, Brigham Young University; Robert A. Carey, Sunset Laboratory, Inc.

5:20 pm

AV #107 Emission and Evolution of Submicron Organic Aerosol in Wildfire Smoke: Aerosol Mass, Chemical Composition, and Optical Properties 20

Lauren Garofalo, Department of Chemistry, Colorado State University, Brett B Palm, Joel A Thornton, Univ. of Washington, Seattle; Teresa L Campos, Xuan Zhang, National Center for Atmospheric Research; Rudra P Pokhrel, Shane M Murphy, Univ. of Wyoming; Sonia M Kreidenweis, Dephine K Farmer, Colorado State University

TRACK B Manzanita, Pinion, Sage, Bristle Cone

SESSION 4: MINERAL DUST AEROSOLS: IMPACTS ON AIR QUALITY AND VISIBILITY

Session Chairs: Jenny Hand, Colorado State, Rob Farber, Atmospheric Clarity

4:00 pm

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Xuan Liu, R. Turner, Randall V. Martin, Department of Energy, Environmental & Chemical Engineering, Washington University in St. Louis; Bret A. Schichtel, Air Resources Division, National Park Service, Jenny L. Hand, Colorado State University

4:20 pm

AV# 22 Spatial and Seasonal Variability in Urban and Remote Coarse Aerosol Mass Across the United States 22

Jenny Hand, Cooperative Institute for Research in the Atmosphere, Colorado State University, B. A. Schichtel, National Park Service, Air Resources Division, T. E. Gill, Geological Sciences, University of Texas at El Paso

4:40 pm

AV # 27 Restoration of a Buried Desert Community from Wind Blown Dust and Sand 23

Rob Farber, Atmospheric Clarity

5:00 pm

AV # 80 Owens Lake Dust Control 2021 Update: Lessons Learned and Future Challenges 24

Phillip Kiddoo, Great Basin Unified Air Pollution Control District

5:20 pm

AV #93 USDA Dust Mitigation Handbook - A Resource for Addressing Windblown Dust 25

Greg Zwicke, (virtual) Steve Smarik, Mike Wilson, USDA-NRCS, National Air Quality and Atmospheric Change Team; Emile Elias, USDA Southwestern Climate Hub; Dave DuBois, Skye Aney, Brandon Edwards, Nick Webb, New Mexico State University; David Brown, Udall Foundation

5:45 – 7:00 pm

Exhibitor Networking Reception

Red Canyon B

Explore our exhibits, learn about their services, and make connections with all conference attendees!

FINAL PROGRAM

SESSION SCHEDULE - Wednesday, October 6

7:00 am – 12:00 pm

Registration
Lobby

TRACK A Red Canyon A

SESSION 5: PANEL: NASA EARTH SCIENCE CAPABILITIES FOR INVESTIGATING AEROSOL IMPACTS

8:00 am -10:00 am

Session Chairs: Laura Judd, NASA, Helena Chapman, NASA/
Booz Allen Hamilton

NASA's Earth Science Research and Applications Programs have promoted the development and use of observations and tools to enhance decision-making capabilities that affect the health of our planet. This panel will highlight current and future NASA programs and observational systems that assist in better understanding the impact of aerosols in relation to wildfires, air quality, and health. We aim to promote discussion between attendees and our panelist experts to promote the use of current and future NASA capabilities in the broader community.

Panelists include:

- **John Haynes**, Program Manager for NASA's Applied Sciences Health and Air Quality Applications Program
- **Sean Raffuse**, Associate Director – Software and Data, Air Quality Research Center, UC Davis (virtual)
- **Michael Cheeseman**, Dept. of Atmospheric Science, Colorado State University (virtual)
- **Ali Omar**, Lidar Science Branch Head, NASA Langley Research Center
- **Abigail Nastan**, Systems Software Engineer, MAIA Deputy Program Applications Lead, NASA Jet Propulsion Lab

10:00 am – 10:20 am

Networking Break and Exhibition Viewing
Red Canyon B

7:00 am

Presenters' Meeting
Red Canyon A

TRACK B Manzanita, Pinion, Sage, Bristle Cone

SESSION 6: ORGANIC AND LIGHT-ABSORBING CARBON

Session Chairs: Judy Chow, Desert Research Institute and
Julien Caubel, Distributed Sensing Technologies

8:00 am

AV #56 **Brownness of Organic Aerosols: Seasonal Variation and Urban-Rural Contrast** 26

Lung-Wen Antony Chen, University of Nevada, Las Vegas; Xiaoliang Wang, Judith C. Chow, John G. Watson, Desert Research Institute

8:20 am

AV #05 **The Total Carbon Analyzer – A New Instrument for the Characterization of Carbonaceous Aerosols** 27

Martin Rigler, Aerosol Co., Ljubljana, Slovenia; Anthony D. Hansen, Magee Scientific

8:40 am

AV#78 **In-situ Evaluation of IMPROVE Light Absorption 28 Measurements with Photoacoustic Instruments in Reno, NV**

Bret A. Schichtel, National Park Service, Air Resources Division; W. Patrick Arnott, Palina Bahdanovich, John W. Walker, Sean Colgan, and Heather A. Holmes, University of Nevada Reno; William Malm, Colorado State University; Warren White, Jason Giacomo, Xiaolu Zhang, Josh Grant, and Nicole Hyslop, UC Davis

9:00 am

#AV 129 **Novel Approaches to Correcting for Biases in Filter-based Aerosol Absorption Measurements at a Rural Site** 30

Joshin Kumar, Theo Paik, Nishit J. Shetty, Rajan K. Chakrabarty, Washington University in St. Louis; Patrick Sheridan, NOAA Global Monitoring Laboratory, Allison Aiken, Manvendra Dubey, Los Alamos National Laboratory

9:20 am

AV#43 **Trends in OM/OC and Organic Composition in IMPROVE and SEARCH networks** 31

Ann M. Dillner, (virtual) Air Quality Research Center, University of California Davis, Alexandra J. Boris, Satoshi Takahama, Charlotte Burki, Swiss Federal Institute of Technology, Jenny Hand, Colorado State University, Stephanie L. Shaw, EPRI, Eric S. Edgerton, Atmospheric Research & Analysis, Inc., Joann Rice, Melinda Beaver, US EPA

9:40 am

AV #42 **Towards a Single Filter, Single Analytical Method Speciated PM Monitoring Network** 32

Ann M. Dillner, (virtual) Bruno Debus, Andrew T. Weakley, Air Quality Research Center, University of California, Davis, California Satoshi Takahama, Swiss Federal Institute of Technology

FINAL PROGRAM

SESSION SCHEDULE - Wednesday, October 6

TRACK A Red Canyon A

SESSION 7: AEROSOL AND VISIBILITY TRENDS

Session Chairs: Philip Hopke, Clarkson University, Jay Turner, Washington University in St. Louis

10:20 am

AV#46 **The Changing Composition of Fine Particulate Matter in the Rural United States** 33

Bret A. Schichtel, A. J. Prenni, K. A. Gebhart, J. C. Vimont, National Park Service, Air Resources Division; J. L. Hand, W. C. Malm, S. Copeland, Cooperative Institute for Research in the Atmosphere, Colorado State University; C. T. Moore, WESTAR-WRAP

10:40 am

AV #38 **Impact of Emissions Reductions on Visibility at Grand Canyon National Park** 35

Kristi A. Gebhart, National Park Service, Robert J. Farber, Atmospheric Clarity, Warren White, Univ. of CA Davis; Delbert Eatough, Brigham Young University; Mark Green, Desert Research Institute; Jenny Hand, William C. Malm, Colorado State University; Bret A. Schichtel, National Park Service, Air Resources Division

11:00 am

AV #24 **Long-term Trends in Haze in Remote Regions of the United States from 1990 through 2018** 36

Jenny L. Hand, S. Copeland, W.C. Malm, Cooperative Institute for Research in the Atmosphere, Colorado State University; B. A. Schichtel, A. J. Prenni, National Park Service, Air Resources Division

11:20 am

AV #18 **Strategy for Setting an Urban Visibility Standard** 37

William C. Malm, Cooperative Institute for Research in the Atmosphere, Colorado State University, A.J. Prenni, M.V. Peters, National Park Service, Air Resources Division

TRACK B Manzanita, Pinion, Sage, Bristle Cone

SESSION 8: US FIELD STUDIES

Session Chairs: Joe Adlhoch, Air Resource Specialists, Rebecca Washenfelder, NOAA

10:20 am

AV#71 **Monitoring Short-term Visibility Impacts at Bryce Canyon National Park for Adaptive Management of the Alton Federal Coal Lease Tract** 38

Erik Vernon, BLM Utah State Office, Leonard Herr, BLM National Operations Center; Bret Schichtel, Debra Miller, National Park Service, Air Resources Division

10:40 am

AV#127 **Visibility Monitoring to Meet Requirements in the Alton Coal Tract EIS** 39

Christian Kirk, Mark Tigges, Jonathan Furst, Max Abrahamson Air Resource Specialists, Inc.

11:00 am

AV #97 **Attribution of Light Extinction Adjacent to the I-710 Freeway** 40

Nitish Bhardwaj, Paul M. Cropper, Delbert J. Eatough, Jaron C. Hansen, Brigham Young University

11:20 am

AV #122 **Current Skill and Challenges of the Multi-scale Prediction of Extreme Weather Events in a Rapidly Changing Global Climate** 41

John Zack, MESO, Inc.

11:40 am

AV #121 **Why is the Weather Extreme— Droughts, Floods, Heat, Cold?** 42

Rob Farber, Atmospheric Clarity, John Zack, MESO, Inc.

12:00 pm - 7:30 pm

Bryce Canyon National Park Excursion

Busses depart from the Lobby entrance at 12:10, 12:25, and 12:30 pm. Wear your hike gear, grab your lunch and trail map, and head to the amphitheater. Shuttles for the IMPROVE site and Hike 4 (Bryce Amphitheater Traverse) will leave at 1:00 pm. (The IMPROVE shuttle will be dedicated to that group only.)

Dr. Tara. A Olstad, Physical Scientist, Bryce Canyon National Park and Dr. Tom Moore, WESTAR-WRAP will provide an overview at the IMPROVE site.

Those going on Hikes 2 or 3 can stay for the Ranger Chat on Wildfire in Bryce from 1:15 –1:45 pm by Paula Eastman, NPS Interpretive Ranger and then go directly to the trails from the amphitheater.

FINAL PROGRAM

SESSION SCHEDULE - Thursday, October 7

7:00 am – 5:00 pm

Registration
Lobby

TRACK A Red Canyon A

SESSION 9: REGIONAL HAZE RULE PANEL

Session Chairs: Tom Moore, WESTAR, Bret Schichtel, National Park Service

8:00 am - 9:40 am

In this panel, planners and analysts from state air quality control programs have been assembled to share their experience with implementation of the RHR and development of SIPs. The focus is on the use of the monitoring data trends and representations of the revised tracking metric, modeling assessment tools and the distribution of emissions source types – how have these changed since the program tracking and planning formally started in the year 2000 and how they will be used to predict visibility for the 2028 milestone in the second round of planning due in 2021.

Panelists include:

- **Michael Abraczinskas**, Director, Air Quality Division, North Carolina Dept. of Environmental Quality
- **Rhonda Payne**, Air Quality Planner, Regional Haze Project Manager, Montana Dept. of Environmental Quality, Air Quality Bureau (virtual)
- **David Stroh**, North Dakota Dept. of Environmental Quality, Air Quality Division (virtual)
- **Rebekka Fine**, Air Pollution Specialist, California Air Resources Board (virtual)
- **Molly Birnbaum**, Program Manager, Alaska Dept. of Environmental Conservation, Air Quality Division (virtual)

9:40 am – 10:00 am

Networking Break and Exhibition Viewing
Red Canyon B

7:00 am

Presenters' Meeting
Red Canyon A

TRACK B Manzanita, Pinion, Sage, Bristle Cone

SESSION 10: RADIATIVE BALANCE AND MODELING

Session Chairs: John Weston, Desert Research Institute, Kostas Tsigaridis, Columbia University, NASA GISS

8:00 am

AV #83 Role of Biomass Burning Organic Aerosols on Radiative Balance in the Amazon 43

Manish Shrivastava, (virtual) Quasi Rasool, Bin Zhao, Ying Liu, John Shilling, Northwest National Laboratory, Atmospheric Sciences and Global Change Division

8:20 am

AV #40 Contributions to Visibility Impairment in the Mega-Region of China's Guanzhong Basin 44

John G. Watson, Jungi Cao, Judith C. Chow, Xioliang Wang, Desert Research Institute

8:40 am

AV #84 Characterization of Black Carbon Aerosol in Palangka Raya 45

Muhayatun Santoso, (virtual) Endah Damastuti, Diah Dwiana Lestiani, Syukria Kurniawati, Indah Kusmartini, Djoko Prakoso, Dyah Kumala Sari, National Nuclear Energy Agency of Indonesia (BATAN); Philip K. Hopke, University of Rochester Medical Center; Ahmad Riadi, The Environmental Protection Agency of Palangka Indonesia

9:00 am

AV #108 Emissions from Fires at the Wildland Urban Interface: Laboratory Measurement of Formaldehyde and Aerosol Properties emitted from Building Materials 46

Katherine B. Benedict, James Lee, Kyle Gorkowski, Manvendra Dubey, Los Alamos National Laboratory

FINAL PROGRAM

SESSION SCHEDULE - Thursday, October 7

TRACK A Red Canyon A

SESSION 11: REGIONAL HAZE RULE 1

Session Chairs: Pat Brewer, Consultant, Joe Adlhoch, Air Resource Specialists

10:00 am

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Brett Gantt, Office of Air and Radiation, US EPA (virtual)

10:20 am

AV#26 Update on Regional Haze Metrics in MANE-VU Region for 2nd Planning Phase 48
Sharon Davis, New Jersey Dept. of Environmental Protection (virtual)

10:40 am

AV#59 WRAP Regional Haze Modeling Overview 49
Tom Moore, WESTAR Gail Tonnesen, US EPA, Region 8; Mike Barna, National Park Service, Air Resources Division; Kevin Briggs, Colorado Department Public Health and Environment

11:00 am

AV#60
Source Contributions to Visibility at Western Class I Areas
Pat Brewer, Consultant; Ralph Morris, Ramboll; Tom Moore, WESTAR; Gail Tonnesen, US EPA Region 8; Mike Barna, National Park Service, Air Resources Division 50

11:20

AV#66 Historic and Projected Fire Emissions in the Western United States 51
Matt Mavko, Air Sciences, Inc.; Tom Moore, WESTAR

11:40

AV#61 Assessing Progress Toward Regional Haze Visibility Goals Using a US Anthropogenic Emissions Rate of Progress 53
Ralph Morris, Ramboll

12:10 pm – 1:30 pm Lunch
Ebenezer's Barn and Grill

Presentation on Bryce Canyon Night Skies
Ben Taylor, National Park Service Interpretive Ranger (virtual)

Announcement of Photo Contest Winners
Kristi Gebhart

TRACK B Manzanita, Pinion, Sage, Bristle Cone

SESSION 12: LIGHT ABSORBING CARBON 1

Session Chair: Philip Hopke, Clarkson University, Rajan Chakrabarty, Washington University in St. Louis

10:00am

AV #74 Brown Carbon Aerosol Absorption Measured Downwind of Wildfires in the Western U.S. 54
Rebecca Washenfelder, (virtual) A. M. Middlebrook, NOAA Chemical Sciences Laboratory; L. Azzarello, York University; A Franchin, National Center for Atmospheric Research

10:20 am

AV #07 Light Absorption Properties of Organic Aerosol from Wood Pyrolysis: Measurement Method Comparison and Radiative Implications 55
Philip K. Hopke, University of Rochester School of Medicine and Clarkson University; Xinghua Li, Maodong Xiao, Kaiqiang Yang, Zihao Wang, Beihang University; Xuezhe Xu, Jiacheng Zhou, Weijun Zhang, Weixiong Zhao, Chinese Academy of Sciences

10:40 am

AV#39 Black and Brown Carbon Emissions from Peat Combustion and Their Effects on Light Absorption 56
Judith C. Chow, John G. Watson, Mark C. Green, Xiaoliang Wang, L.-W. Antony Chen, Junji Cao, Desert Research Institute

11:00 am

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William C. Malm, J. L. Hand, Cooperative Institute for Research in the Atmosphere, Colorado State University; Brett A. Schichtel, National Park Service, Air Resources Division

11:20 am

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B.A. Schichtel, A.J. Prenni, National Park Service, Air Resources Division; William C. Malm, J.L. Hand, Cooperative Institute for Research in the Atmosphere, Colorado State University

11:40 am

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Kyle Gorkowski, Los Alamos National Laboratory; K.B. Benedict, J. Lee, A.C. Aiken, C. M. Carrico, M. Dubey

FINAL PROGRAM

SESSION SCHEDULE - Thursday, October 7

TRACK A Red Canyon A

SESSION 13: REGIONAL HAZE RULE 2

Session Chairs: Tom Moore, WESTAR, Pat Brewer, Consultant

1:50 pm

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Gail Tonnesen, (virtual) U.S. EPA Region 8; Ralph Morris, Ramboll; Tom Moore, WESTAR; Pat Brewer, Consultant

2:10 pm

AV#63 **WRAP Regional, State, and Sector Source Apportionment 61**

Mike Barna, (virtual) National Park Service, Air Resources Division; Patricia Brewer, Consultant; Tom Moore, WESTAR; Ralph Morris, Ramboll; Gail Tonnesen, US EPA Region 8

2:30 pm

AV #65 **Colorado Case Study: Applying WRAP Modeling Products to Support Colorado Air Emissions Control Decisions N/A**

Gordon Pierce, Colorado Department of Health and the Environment

2:50 pm

AV #67 **Estimating Fire contributions to Haze at Western Class I Areas 62**

Tom Moore, WESTAR; Matt Mavko, Air Sciences, Inc.; Ralph Morris, Ramboll; Pat Brewer, Consultant

3:10 pm

AV #68 **Implications of Approaching Goal No US Anthropogenic Visibility Impairment N/A**

Tom Moore, WESTAR

TRACK B Manzanita, Pinion, Sage, Bristle Cone

SESSION 14: LIGHT ABSORBING CARBON 2

Session Chairs: Jenny Hand, Colorado State, Kostas Tsigaridis, Columbia University, NASA GISS

1:50 pm

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Nishit Shetty, Apoorva Pandey, Stephen Baker, Wei Min Hao, Rajan Chakrabarty, Department of Energy, Environmental and Chemical Engineering, Washington University in St. Louis

2:10 pm

AV #88 **Phase Shift Parameter Controls Light Absorption Enhancement for Coated Fractal Aggregates 64**

Payton Beeler, (virtual) Rajan Chakrabarty, Washington University in St. Louis; William Heinson, NASA Goddard Space Flight Center

2:30 pm

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Mark C. Green, Judith C. Chow, John Watson, Xioliang Wang, Desert Research Institute; L.-W. Antony Chen, University of Nevada, Las Vegas

2:50 pm

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Nicholas Bellouin, University of Reading, U.K. (virtual)

3:10 pm

AV #110 **Cloud Processing of Black Carbon Particles 67**

Claudio Mazzoleni, Michigan Technological University

JOURNAL SPECIAL ISSUE

A special Issue of the *Journal of the Air & Waste Management Association (JA&WMA)* dedicated to the material presented at this conference will be published. Anyone who presented at the conference may submit a manuscript for consideration. All submissions will undergo the usual peer review process before being accepted. If anyone would like to submit please send an email to Delbert Eatough (delbert@eatough.net) indicating the intended material for the manuscript, e.g. the conference presentation number (AV#) related to the manuscript. Submissions to the *Journal* should indicate they are for the Special Issue and should be received by December 15, 2021 to ensure inclusion in the special issue. Publication of the Special Issue is anticipated about a year from the conference.

FINAL PROGRAM

Thursday, October 7

Technical Poster Session 3:40 pm - 5:00 pm Red Canyon A

Session Chair: Delbert Eatough, Brigham Young University

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Indian Institute of Science Education and Research*

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Sabina B. Gulick and Christian M. Carrico, New Mexico Institute of Mining and Technology

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J. L. Hand, William C. Malm, Cooperative Institute for Research in the Atmosphere, Colorado State University, A. J. Prenni, B.A. Schichtel, National Park Service, Air Resources Division; J. C. Chow, Desert Research Institute

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Timothy Sharac, US Environmental Protection Agency

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J. L. Hand, D. E. Day, Colorado State University; B. Checkoway, Department of Atmospheric Science, Texas Tech University, A. J. Prenni, B.A. Schichtel, National Park Service, Air Resources Division, M. Tigges, Air Resource Specialists

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Rachael Dal Porto, Christopher Cappa, Ningxin Wang, University of California, Davis

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Richard Medina Calderon, Western Texas College; Renato Soca Flores, Christian Cuba Quispe, Universidad Nacional de San Cristobal de Huamanga, Peru

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*J.L. Hand, W.C. Malm, S. Copeland, Colorado State University
Anthony J. Prenni, B. A. Schichtel, National Park Services, Air Resources Division*

AV #126 Quantifying Black Carbon Particles in Human Placentae 104

Philip K. Hopke, Thomas G. O'Connor, Jessica Brunner, Univ. of Rochester School of Medicine; Amanda Sanko, Yurong Gao, Victoria Dahm, Bhargava Chinni, Tanzy Love, David Q. Rich, Emily Barrett, Richard K. Miller, Carolyn M. Salafia, Ruchit Shah, Placental Analytics, NY Dept. of Health; Jim Zhang, Duke Global Health Institute; Hyagriv Simhan, Magee Women's Hospital

7:30 pm – 10:00 pm Night Sky Program

Don't miss this unique opportunity to see the night skies through powerful telescopes!

Shuttles will depart from the lobby on a rotation of every 20 minutes from 7:30 pm to 9:30 pm. Limit 20 people per trip.

NPS Interpretive Ranger Ben Taylor will provide rotating visual constellation tours.

Thank you to Joe Adlhoch and Mark Tigges, Air Resource Specialists, Bryce Bird, Utah DAQ, and Cameron Pace, Southern Utah University for providing the telescopes.

FINAL PROGRAM

SESSION SCHEDULE — Friday, October 8

7:30 am - 10:30 am

Registration
Lobby

7:00 am

Presenters' Meeting
Red Canyon A

TRACK A Red Canyon A

SESSION 16: SATELLITE AND REMOTE SENSING APPLICATIONS

Session Chairs: Delbert Eatough, Brigham Young University, Brett Gantt, US EPA

8:00 am

AV #25 **The Dark-Target Aerosol Optical Depth Product: Global Aerosol from MODIS, VIIRS and Geostationary Satellite Imagers 105**

Robert C. Levy, Shana Mattoo, Yingxi Shi, Virginia R. Sawyer, NASA Goddard Space Flight Center, Pawan Gupta, NASA Marshall Space Flight Center; Lorraine A. Remer, Univ. of Maryland, Baltimore County

8:20 am

AV#128 **Developing a High Resolution Low-cost Sensor Network to Better Understand Local Particulate Matter (PM) Concentrations and Refine Satellite-based Measurements of PM in SC 106**

Francine Abigail Roberts, Clemson University

8:40 am

AV #29 **Integration of Satellite Observations with Low-Cost Air Quality Monitor: A Data Science Approach to Monitor Air Quality 107**

Robert C. Levy, NASA Goddard Space Flight Center; P. Gupta, STI, NASA Marshall Space Flight Center; P. Doraiswamy, K. Mills, RTI International; B. Feenstra, O. Pikel'naya, South Coast Air Quality Management District

9:00 am

AV #87 **Future space-based monitoring of aerosol and precursor emissions with TEMPO 108**

Laura M. Judd, NASA Langley Research Center; Omar Torres, NASA Goddard Space Flight Center; Kelly Chance, Xiong Liu, Harvard-Smithsonian Center for Astrophysics

9:20 am

AV #100 **Measuring and Modeling the Relation of Aerosol Optical Depth with Aerosol Scatter, Mass, and Composition to Understand PM_{2.5} across Multiple Scales 109**

Randall Martin, Washington University in St. Louis

TRACK B Manzanita, Pinion, Sage, Bristle Cone

SESSION 17: LOW COST SENSORS

Session Chairs: Philip Hopke, Clarkson University, Jay Turner, Washington University in St. Louis

8:00 am

AV#36 **Low-Cost Particulate Matter Sensors for Measuring Wildfire Smoke 110**

Amara L. Holder, (virtual) Office of Research and Development, U.S. EPA; Lauren Maghran, Anna Mebust, Dena Vallano, Region 9, U.S. EPA; Michael McGown, Robert Elleman, Region 10, U.S. EPA; Kirk Baker, Office of Air Quality Planning and Standards, U.S. EPA

8:20 am

AV #101 **AirNow Fire and Smoke Map Sensor Data Pilot Ron Evans, (virtual) Office of Air Quality Planning and Standards, U.S. EPA; Amara Holder, Karoline Barkjohn, Andrea Clements, Office of Research and Development, U.S. EPA; Sim Larkin, U.S. Forest Service, Stuart Illson, University of Washington**

8:40 am

AV #03 **Validating Wildfire Smoke Transport Models with a Highly Resolved, Low-Cost Sensor Network 112**

Kerry Kelly, University of Utah, Chemical Engineering; Wei Xing, Derek Malia, Adam Kochanski, Steve Krueger, Ross Whitaker

9:00 am

AV #35 **Evaluating the PurpleAir Monitor as an Aerosol Light Scattering Instrument 113**

W. C. Malm, Cooperative Institute for Research in the Atmosphere, Colorado State University; B.A. Schichtel, National Park Service Air Resource Division; P. Sheridan, E. Andrews, J. Ogren, NOAA/ESRL, Global Monitoring Division; W. P. Arnott Department of Physics, University of Nevada

9:20 am

AV #47 **Low-Cost Sensors for Measuring Light Scattering and PM_{2.5} in National Parks 115**

W. C. Malm, Colorado State University; Bret A. Schichtel, A. J. Prenni, B. C. Sive, National Park Service Air Resource Division; D. E. Day, P. Sheridan, E. Andrews, NOAA/ESRL, Global Monitoring Division; J. Ouimette, Sonoma Ecology Center

9:40 am – 10:00 am
Networking Break
Red Canyon B

FINAL PROGRAM

TECHNICAL SESSION SCHEDULE - Friday, October 8

TRACK A Red Canyon A

SESSION 18: NEW INSTRUMENTS AND MEASUREMENT TECHNIQUES

Session Chairs: Judy Chow, Desert Research Institute, and Kip Carrico, New Mexico Institute of Mining and Technology

10:00 am

AV #45 Development of a Humidity-Controlled Single Scattering Albedometer 116

Christian M. Carrico, Jared Lam, Sabina Gulick, Jaimy Karacaoglu, New Mexico Institute of Mining and Technology; Tyler Capek, Claudio Mazzoleni, Michigan Technological University; Kyle Gorkowski, James Lee, Allison C. Aiken, Manvendra K. Dubey, Los Alamos National Laboratory; Timothy Onasch and Andrew Freedman, Aerodyne, Inc.

10:20 am

AV #81 Dispersion Normalized PMF Provides Insights into the Significant Changes in Source Contributions to Atmospheric Particulate Matter after the COVID-19 Outbreak 117

Philip K. Hopke, University of Rochester School of Medicine and Dentistry, Qili Dai, Yinchang Feng

10:40 am

AV #51 Measuring Humidification Effects on Ammonium Sulfate – Nigrosin Mixtures with a Novel Humidity Controlled Albedometer 118

Tyler Capek, (virtual) Claudio Mazzoleni, Michigan Technological University; Christian M. Carrico, Jared Lam, New Mexico Institute of Mining and Technology; Kyle Gorkowski, Allison C. Aiken, Manvendra Dubey, Los Alamos National Laboratory; Tim Onasch, Andrew Freedman, Aerodyne, Inc.

11:00 am

AV #52 High Precision Remote Air Temperature 119 Measurement Using Roto-Vibrational Raman Scattering

Tyler Capek, (virtual) Jacek Borysow, Claudio Mazzoleni, Michigan Technological University; Massimo Moraldi, Dipartimento di Fisica e Astronomia, Universita' degli Studi di Firenze

1:30 – 5:30 pm

Rainbow Point Bus Tour

Shuttle loads from the lobby at 1:15 pm. Tickets still available!

TRACK B Manzanita, Pinion, Sage, Bristle Cone

SESSION 19: OIL AND GAS FIELD IMPACTS ON OZONE AND PM

Session Chairs: Tom Moore, WESTAR and Naresh Kumar, Desert Research Institute

10:00 am

AV #33 Wintertime Haze at Dinosaur National Monument

A.J. Prenni, (virtual) K.A. Gebhart, B.C. Sive, B. A. Schichtel, 120 National Park Service, Air Resources Division; D.E. Day, L. Naimie, J. L. Collett Jr, K.B. Benedict, Department of Atmospheric Science, Colorado State University; Q.M. Chew, E.L. Spencer, Dinosaur National Monument; T. Dombek, RTI International

10:20 am

AV #49 Visibility Assessment Analysis: The Impacts of Oil and Gas Emissions on Visibility in Class I Areas in the State of Utah 121

Trang Tran, Desert Research Institute

10:40 am

Control #53 Volatile Organic Compound and Ozone Measurements at Carlsbad Caverns National Park: Impacts of Oil and Natural Gas Operation Emissions on Park Air Quality 122

Katherine Benedict, Los Alamos National Laboratory; Yong Zhou, Lillian Naimie, Ilana Pollack, Julieta Juncosa Calahorrano, Elana Cope, Emily Fischer, Amy Sullivan, Colorado State University; Barkley C. Sive, Anthony Prenni, Kristi Gebhart, Bret Schichtel, Jeffrey Collett, National Park Service, Air Resources Division

11:10 am

AV #20 Composition and Concentration of Aerosol in Carlsbad Caverns National Park 123

Lillian Naimie, Katherine Benedict, Amy Sullivan, Jeff Collett, Colorado State University, Atmospheric Science; Anthony Prenni, Bret Schichtel, National Park Services Air Resources Division

11:30 am

#AV 125 Western U.S. Oil and Gas Emissions Quantification for Regional Haze Planning 124

John Grant, Amnon Bar-Ilan, Ramboll; Tom Moore, WESTAR

Thank you for attending!

