# TABLE OF CONTENTS

## PLENARY SPEAKERS

PHYSICAL CONNECTIONS BETWEEN ATMOSPHERIC VISIBILITY AND REGIONAL

Eric Wilcox

## SESSION 1A – AEROSOL AND VISIBILITY FIELD STUDIES AND MONITORING NETWORKS

TEMPORAL TRENDS IN URBAN AND RURAL PARTICULATE SULFATE ION CONCENTRATIONS ACROSS THE UNITED STATES

Jenny L. Hand, William C. Malm, Bret A. Schichtel, Marc Pitchford

REANALYSIS OF A 15-YEAR ARCHIVE OF IMPROVE SAMPLES

Nicole Pauly Hyslop, Krystyna Trzepla, Warren White

AEROSOL DECADAL TRENDS: IN-SITU MEASUREMENTS OF NUMBER CONCENTRATION AND OPTICAL PROPERTIES

John A. Ogren, Patrick Sheridan

SOURCES OF AND TRENDS IN VISIBILITY REDUCING PARTICLES IN THE LAKE TAHOE BASIN, 1990-2009

Mark Green, Antony Chen, Dave Dubois, John Molenar

AEROSOL MEASUREMENTS FROM THE SOUTHEASTERN AEROSOL RESEARCH AND CHARACTERIZATION (SEARCH) STUDY: PM COMPOSITION AND TRENDS, 1999-2010

Charles Blanchard

AMS MEASUREMENTS IN NATIONAL PARKS OF AEROSOL MASS, SIZE AND COMPOSITION, COMPARISON WITH FILTER SAMPLES AND CORRELATION WITH PARTICLE HYGROSOPICITY

M. Lizabeth Alexander, Matthew Newburn, Douglas H Lowenthal, Barbara Zielinska

TEMPO-SPATIAL VARIATION OF ANTHROPOGENIC VOCS EMISSIONS IN CHINA, 1978-2008

Yu Bo, Changjiang Yu, Shaodong Xie

CHARACTERISTICS OF TYPICAL HAZE POLLUTION EVENTS IN YANGTZE RIVER DELTA: RESULTS FROM A REGIONAL JOINT CAMPAIGN

Zhen Cheng, Shuxiao Wang, Jingjun Jiang, Jiming Hao, Qingyan Fu, Changhong Chen

A NEW APPROACH FOR XRF ANALYSIS IN IMPROVE

Charles McDade, Nicole Hyslop, Krystyna Trzepla, Warren White

NATURAL EVENTS AFFECTING PHOENIX ARIZONA’S AIR QUALITY

Scott Cisomski, Joe Adlhoch, Frank Schreiner

IDENTIFYING SOURCES OF UNCERTAINTY USING COVARIANCE ANALYSIS

Nicole Pauly Hyslop, Warren White

ESTIMATES OF URBAN EXCESS IN PM2.5 SPECIATED AEROSOL CONCENTRATIONS USING THE CSN AND IMPROVE NETWORKS

Jenny L. Hand, William C. Malm

IMPACTS OF AEROSOL COMPOSITIONS ON VISIBILITY IMPAIRMENT IN XI’AM, CHINA

Jun-Ji Cao

PRELIMINARY ANALYSIS OF WINTER VISIBILITY VARIATION IN XI’AN, CHINA

Yichen Wang, Jun-Ji Cao

## SESSION 1B – AEROSOL AND VISIBILITY FIELD STUDIES AND MONITORING NETWORKS

CHARACTERIZING THE RELATIONSHIP BETWEEN ATMOSPHERIC VISIBILITY AND POLLUTANT SOURCES IN DIFFERENT WEATHER CONDITIONS IN CENTRAL TAIWAN

Yu-Chieh Chen, Shih-Yu Chang, Chung-Yih Kuo, Chun-Hung Chou, Chung-Hao Cheng

EMISSION INVENTORY AND SPECIATION OF PM IN THE YANGTZE RIVER DELTA REGION, CHINA

Xiao Fu, Shuxiao Wang, Bin Zhao, Jiming Hao
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>URBAN VISIBILITY MEASUREMENTS IN FORT COLLINS, COLORADO</td>
<td>95</td>
</tr>
<tr>
<td>Cassie Archuleta, Patrick Reddy, Gregory Harshfield, Gordon Pierce</td>
<td></td>
</tr>
<tr>
<td>PHOTOACOUSTIC MEASUREMENTS FOR THE IMPROVE PROGRAM</td>
<td>100</td>
</tr>
<tr>
<td>Hans Mossmüller, W. Patrick Arnott</td>
<td></td>
</tr>
<tr>
<td>AIRBORNE MEASUREMENTS OF BLACK CARBON AT REMOTE LOCATIONS USING</td>
<td>105</td>
</tr>
<tr>
<td>MINIATURE HIGH-PERFORMANCE AETHALOMETERS</td>
<td></td>
</tr>
<tr>
<td>Grisa Mocnik, Luka Drinovec, Anthony D. A. Hansen, Matevz Lenarcic</td>
<td></td>
</tr>
<tr>
<td>VISIBILITY AND REAL-TIME BLACK CARBON MEASUREMENT IN A COASTAL AREA</td>
<td>108</td>
</tr>
</tbody>
</table>

**SESSION 1C – AEROSOL AND VISIBILITY FIELD STUDIES AND MONITORING NETWORKS**

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEROSOL CHEMISTRY AND HYGROSCOPIC GROWTH IN U.S. NATIONAL PARKS</td>
<td>112</td>
</tr>
<tr>
<td>Douglas Lowenthal, Barbara Zielinska, Don Collins, Nathan Taylor, Lizabeth Alexander</td>
<td></td>
</tr>
<tr>
<td>AMBIENT AEROSOL HYDRATION STATE AT THREE U.S. NATIONAL PARKS</td>
<td>116</td>
</tr>
<tr>
<td>Nathan F. Taylor, Don R. Collins, Douglas Lowenthal, Naresh Kumar</td>
<td></td>
</tr>
</tbody>
</table>

**SESSION 2 – NEW AND CURRENT FIELD MONITORING TECHNIQUES FOR MEASURING BLACK CARBON AND AEROSOL ORGANIC MATERIAL**

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIURNAL BLACK CARBON AND VISIBILITY TRENDS IN LOS ANGELES AND MEXICO CITY: A TALE OF TWO CITIES</td>
<td>121</td>
</tr>
<tr>
<td>Darrel Baumgardner, Armando Retama, Bruce Gandrud, Gavin McMeeking</td>
<td></td>
</tr>
<tr>
<td>INFRARED SPECTROSCOPIC ORGANIC FUNCTIONAL GROUP ANALYSIS OF IMPROVE SAMPLES</td>
<td>127</td>
</tr>
<tr>
<td>Travis C. Ruthenburg, Ann M. Dillner</td>
<td></td>
</tr>
<tr>
<td>A FIELD INSTRUMENT FOR SEMI-CONTINUOUS MONITORING OF ORGANIC MARKER COMPOUNDS</td>
<td>132</td>
</tr>
<tr>
<td>Jaron C. Hansen, Paul Cropper, Edgar D. Lee, Bob Cary, Delbert J. Eatough</td>
<td></td>
</tr>
<tr>
<td>LIGHT ABSORPTION PROPERTIES OF BROWN CARBON IN FRESH AND PHOTO-CHEMICALLY AGED BIOMASS BURNING EMISSIONS</td>
<td>138</td>
</tr>
<tr>
<td>Allen L. Robinson, Rawad Saleh, Christopher J. Hennigan, Wayne K. Chuang</td>
<td></td>
</tr>
<tr>
<td>SPECIATION OF ATMOSPHERIC “BROWN” CARBON</td>
<td>143</td>
</tr>
<tr>
<td>Jeffrey L. Collett, Yuriy Desyaterik, Ye He Sun</td>
<td></td>
</tr>
<tr>
<td>DETERMINATION OF LONG TERM ATMOSPHERIC ELEMENTAL CARBON CONCENTRATIONS USING LAKE SEDIMENTS</td>
<td>148</td>
</tr>
<tr>
<td>Liaquat Husain, Tanveer Ahmed, Akhtar Sharief, Abdul Bari</td>
<td></td>
</tr>
<tr>
<td>IMPROVED INSTRUMENT FOR MEASUREMENT OF AEROSOL BLACK CARBON WITH REAL-TIME COMPENSATION FOR FILTER LOADING EFFECTS</td>
<td>153</td>
</tr>
<tr>
<td>Anthony D. A. Hansen, Luka Drinovec, Grisa Mocnik</td>
<td></td>
</tr>
<tr>
<td>DISCRIMINATION BETWEEN BIOMASS AND FOSSIL FUEL COMBUSTION USING THE “AETHALOMETER ANGSTROM MODEL”: INFLUENCE ON AIR QUALITY IN DIFFERENT ENVIRONMENTS</td>
<td>157</td>
</tr>
<tr>
<td>Grisa Mocnik, Luka Drinovec, Irena Jezek, Janja Tursic, Gregor Muri, Tanja Bolte, Jean-Eudes Petit, Jean Sciare, Christian Ruckstuhl</td>
<td></td>
</tr>
<tr>
<td>REVIEW OF AEROSOL LIGHT ABSORPTION MEASUREMENT</td>
<td>162</td>
</tr>
<tr>
<td>Hans Moosmüller, Rajan K. Chakraborty, W. Patrick Arnott</td>
<td></td>
</tr>
<tr>
<td>DEVELOPMENT OF A SUPERCONTINUUM PHOTOACOUSTIC AEROSOL ABSORPTION AND ALBEDO SPECTROMETER FOR THE CHARACTERIZATION OF AEROSOL OPTICS</td>
<td>167</td>
</tr>
<tr>
<td>Ian Arnold, Hans Moosmuller, Noopur Sharma, Claudia Mazzoleni, W. Patrick Arnott</td>
<td></td>
</tr>
<tr>
<td>UNCERTAINTY IN THE CARBON FRACTION DISTRIBUTION ON FILTERS USED FOR ARTIFACT CORRECTION IN THE IMPROVE NETWORK FILTERS</td>
<td>171</td>
</tr>
<tr>
<td>Ann M. Dillner, Hege Indresand</td>
<td></td>
</tr>
</tbody>
</table>
DATA PROCESSING TECHNIQUE FOR MULTIANGLE LIDAR SOUNDING OF POORLY STRATIFIED POLLUTED ATMOSPHERES. THEORY AND EXPERIMENT ................................................................. 251
Cyle E. Wold, Vladimir A. Kovalev, Alexander P. Petkov, Wei Min Hao

AEROSOLS DURING MOSCOW EXTREME SMOKE EVENT OF AUGUST 2010: PHYSICO-CHEMISTRY AND LONG RANGE TRANSPORT IN EUROPE .................................................. 257
Olga Popovicheva, Elena Kireeva, Natalia Persiantseva, Magdalena Kistler, Kostas Eleftheriadis

CARBONACEOUS AEROSOL DETERMINATION IN AN URBAN AND A RURAL SITE IN THE PHILIPPINES ........................................................................................................... 262
Angel T. Bautista, Preciosa Corazon B. Pabroa, Flora L. Santos, Joseph Michael D. Rucho, Leni L. Quirit

HIGH PARK FIRE 2012 SMOKE IMPACTS ON AIR QUALITY IN FORT COLLINS, COLORADO ......................................................................................................................... 267
Christian M. Carrico, Vincent R. Scheetz

PM$_2.5$ EMISSIONS FROM WOOD BURNING IN BUTTE, MONTANA ............................................................. 273
Kumar Ganesan, Peter Behrends, Cody Johnson, Dayna Moerkerke

SESSION 6A – INFORMATION AND TECHNOLOGY NEEDS FOR FUTURE REVISION OF THE SECONDARY PM NAAQS

EVOLUTION OF THOUGHT ON MONITORING METHODS TO SUPPORT A SECONDARY PM NATIONAL AMBIENT AIR QUALITY STANDARD TO PROTECT VISIBILITY ........................................... 276
Marc Pitchford

MEASUREMENT OF SCATTERING IN AN URBAN AREA USING A NEPHELOMETER AND PM$_{2.5}$ FDMS TEOM MONITOR: ACCOUNTING FOR THE EFFECT OF WATER ................................................. 281
Delbert J. Eatough, Paul Cropper, Jaron C. Hansen

SCIENTIFIC ISSUES REGARDING USING A PM$_{2.5}$ NAAQS TO PROTECT URBAN VISIBILITY .............................. 285
Ivar Tombach

ANALYSIS OF VISIBILITY AT CANADIAN SPECIATION MONITORING SITES .................................................... 290
Keith Jones, Joanna Zhao, Greg Evans, Cheol-Heon Jeong

VISIBILITY PERCEPTION IN THE LOWER FRASER VALLEY OF BRITISH COLUMBIA, CANADA: RESULTS FROM A PUBLIC SURVEY .................................................................................. 295
John P. Gallagher, Ian G. McKendry

SESSION 6B – INFORMATION AND TECHNOLOGY NEEDS FOR FUTURE REVISONS OF THE SECONDARY PM NAAQS

A TEST OF THE SCIENTIFIC VALIDITY OF THE VISUAL AIR QUALITY “PREFERENCE STUDY” METHOD .................................................................................................................. 301
Anne E. Smith

SESSION 7 – SATELLITE AND OTHER REMOTE SENSING APPLICATIONS TO HAZE/AEROSOL MONITORING

AN ITERATIVE FITTING ALGORITHM FOR MATCHING AEROSOL SIZE DISTRIBUTIONS TO SPECTRAL EXTINCTION DATA ............................................................................................ 306
Ratish Menon, Virendra Sethi, Rudolf B. Husar

DEVELOPING A HIGH SPATIAL RESOLUTION AEROSOL OPTICAL DEPTH PRODUCT USING MODIS DATA FOR EVALUATING AEROSOL DURING LARGE WILDFIRE EVENTS ................................. 312
Jennifer L. Dewinter, Sean M. Raffuse, Michael C. McCarthy, Kenneth J. Craig, Louyeh K. Jumbam, Fred W. Lurmann

UNDERSTANDING THE SPATIAL RESOLUTION OF SATELLITE OBSERVATIONS OF AEROSOLS: THE EXAMPLE OF MODIS .......................................................................................... 318
Edward J. Hyer, Cynthia C. Curtis, Jeffrey S. Reid, Douglas L. Westphal

AIRBORNE HIGH SPECTRAL RESOLUTION LIDAR MEASUREMENTS RELEVANT TO AIR QUALITY ................................................................................................................................. 324
REMOTE SENSING OF SURFACE VISIBILITY FROM SPACE: AN EAST COAST CASE STUDY ........................................... 329
Amy L. Kessner, Jun Wang, Robert C. Levy, Lorraine A. Remer

SESSION 8 – AEROSOL – OPTICAL RELATIONSHIPS

LONG-TERM TRENDS AND CHARACTERISTICS OF VISIBILITY IN TWO MEGACITIES OF SOUTHWEST CHINA: CHENGDU AND CHONGQING ................................................................. 335
Yuan Chen, Shao-Dong Xie

CHARACTERIZATIONS OF SECONDARY AEROSOL AND ITS EXTINCTION EFFECTS ON VISIBILITY OVER PEARL RIVER DELTA REGION, CHINA .............................................................. 341
Xuejiao Deng, Dui Wu, Fei Li, Haobo Tan, Tao Deng, Huanhuan Chen, Jianzhen Yu, Alexis K. H. Lau, Zibing Yuan, Wai Man Ng, Cheng Wu

ANALYSIS OF MEASUREMENTS OF ATMOSPHERIC AEROSOL COMPOSITION AND OPTICAL PROPERTIES IN THE SOUTHEASTERN US ................................................................. 346
Ivar Tombach

CHARACTERIZATIONS ANALYSIS OF SULFUR DIOXIDE AND SULFATE DURING LOW VISIBILITY PERIODS OVER PEARL RIVER .................................................................................................. 351
Fei Li, Haobo Tan, Xuejiao Deng, Dui Wu, Tao Deng

SINGLE SCATTERING ALBEDO OF FINE MINERAL DUST AEROSOLS CONTROLLED BY IRON CONCENTRATION ........................................................................................................... 356
Hans Moosmüller, Johann P. Engelbrecht, Micha Skiba, Garrett Frey, Rajan K. Chakrabarty

MOLECULAR STRUCTURE AND LIGHT ABSORPTION BY CARBONACEOUS PM ................................................................. 361
Brooke L. Hemming

STUDIES OF INFRARED AND VISIBLE OPTICAL PROPERTIES OF MINERAL DUST ................................................................................................................................. 368
Jennifer M. Alexander, Paul D. Kleiber, Olga Laskina, Vicki H. Grassian, Mark A. Young, Brian Meland

VISUALIZATION OF VISIBILITY CONDITIONS ASSOCIATED WITH TEMPORAL TRENDS IN LIGHT EXTINCTION COEFFICIENTS FOR REMOTE AND RURAL AEROSOLS SIMULATED USING WINHAZE ........................................................................................................... 373
Jenny L. Hand, Scott Copeland, William C. Malm

ORGANIC MATERIAL TO ORGANIC CARBON MASS RATIO INFERRED FROM SPECIATED PM$_{2.5}$ MEASUREMENTS IN THE SOUTHEASTERN UNITED STATES ..................................................... 375
Stephanie L. Shaw, D. Alan Hansen, Aparna Vemuri, Naresh Kumar, Justin Walters, Eric S. Edgerton

SESSION 9: PANEL DISCUSSION

APPROPRIATE METHODS TO MONITOR URBAN VISIBILITY FOR USE IN A SECONDARY PM STANDARD ................................................................................................................................. 379
Marc Pitchford

SESSION 10A – AEROSOL AND VISIBILITY MODELING AT GLOBAL, REGIONAL AND LOCAL SCALES

GLOBAL ANALYSES AND FORECASTS OF AEROSOL IMPACTS ON VISIBILITY ................................................................................................................................. 381
Douglas L. Westphal, Rudolf B. Husar, Shawn E. McClure, Jianglong Zhang

USING THE GEOS-CHEM ADJOINT MODEL TO DETERMINE THE SENSITIVITY OF TOP OF ATMOSPHERE POLARIZATIONS TO AEROSOL EMISSIONS ................................................................................................................................. 386
Brian S. Meland, Daven K. Henze

CALIFORNIA’S IMPACT ON GRAND CANYON VISIBILITY SINCE 1980 ................................................................................................................................. 391
Rob Farber, Kristi Gebhart, Jenny Hand, Jason Monroe

IMPACTS OF FUTURE CHANGES IN CLIMATE, EMISSIONS AND LAND COVER AND LAND USE ON PM$_{2.5}$ AND O$_3$ OVER THE U.S. ................................................................................................. 398
Maria Val Martin, Colette L. Heald, Jean-Francois Lamarque

ACCURACY OF VISIBILITY PROTOCOL MODELING IN BART EVALUATIONS ................................................................................................................................. 403
Gale F Hoffnagle

A RECOMMENDED METHOD TO DISCLOSE VISIBILITY IMPACTS FOR NEPA ANALYSES ................................................................................................................................. 408
Courtney A. Taylor, James Zapert
SESSION 10B – AEROSOL AND VISIBILITY MODELING AT GLOBAL, REGIONAL AND LOCAL SCALES

ESTIMATING SURFACE VISIBILITY AT HONG KONG FROM GROUND-BASED LIDAR, SUN PHOTOMETER AND OPERATIONAL MODIS PRODUCTS ........................................ 413
Muhammad I. Shahzad, Janet E. Nichol, Jun Wang, James R. Campbell, Simone Lolli, Pak W. Chan

EVALUATION OF CALPUFF WITH THE CAPTEX TRACER DATASET ........................................ 418
Jelena Popovic, Joseph S. Scire, David G. Strimaitis, Zhong-Xiang Wu

SESSION 11 – AEROSOL, OPTICAL AND RADIOMETRIC MONITORING METHODS

A LONG RECORD OF LIGHT ABSORPTION BY SAMPLED FINE PARTICULATE MATTER .................. 423
Warren H. White, Brian P. Perley, Krystyna Trzepla, Charles E. McDade, Nicole P. Hyslop

MEASUREMENT UNCERTAINTY IN IMPROVE ALUMINUM AND SILICON CONCENTRATIONS WHEN SULFUR CONCENTRATIONS ARE HIGH ........................................ 427
Ann M. Dillner, Hege Indresand

LPV-4 LED TRANSMISSOMETER ........................................................................................................ 432
John V. Molenar

SESSION 12 – HUMAN PERCEPTION OF VISIBILITY, INCLUDING NIGHT SKY VISIBILITY

A REVIEW OF OLD VISIBILITY METRICS AND A PROPOSAL OF A NEW METRIC .......................... 436
William C. Malm

EFFECT OF CLOUDS ON THE PERCEPTION OF REGIONAL AND URBAN HAZE ................................. 437
John V. Molenar, William C. Malm

TOWARDS A VISIBILITY MANAGEMENT PROGRAM IN BRITISH COLUMBIA: THE DEVELOPMENT OF A VISUAL AIR QUALITY INDEX FOR THE LOWER FRASER VALLEY .......... 441
Steven K Sakiyama, Markus O. B. Kellerhals

LINKING VISUAL RANGE, PM2.5 CONCENTRATIONS AND THE AIR QUALITY INDEX - WHAT DO WE TELL THE PUBLIC IN SMOKE-FILLED WILDFIRE SITUATIONS? .................................. 446
Susan M. O'Neill, Pete Lahn, Mark Fitch, Mike Broughton

SESSION 13 – PANEL DISCUSSION

IMPLEMENTING VISIBILITY REGULATIONS: POLICY & TECHNICAL ISSUES - A PANEL DISCUSSION .................................................................................................................... 451
Cv Mathai, Tom Moore, Patrick Cummins, Eric C. Massey, Frank Prager

SESSION 14 – CRITICAL LOADS AND ATMOSPHERIC DEPOSITION TECHNIQUES IN DEVELOPING AND IMPLEMENTING DEPOSITION BASED AIR QUALITY STANDARDS

TECHNICAL AND POLICY CHALLENGES IN DEVELOPING A SECONDARY AIR QUALITY STANDARD FOR AQUATIC ACIDIFICATION ........................................................................ 453
Richard Scheffe

NITROGEN RESEARCH CONTRIBUTIONS TO CRITICAL LOADS ..................................................... 458
Tamara F. Blett, Bret Schichtel

IMPROVEMENTS IN CRITICAL LOAD ESTIMATION: EFFECT OF NATURAL ORGANIC ACIDS AND BASE CATION SUPPLY RATE ........................................................................ 464
Eladio M. Knipping

STABLE NITROGEN ISOTOPIC SIGNATURES AS POTENTIAL SOURCE TRACERS FOR NITRATE DEPOSITION: THE SIGNATURE OF COAL-FIRED POWER PLANT NOX ........................................ 468
Stephanie L. Shaw, Naresh Kumar, J. David Felix, Emily Elliott

DEVELOPMENT OF THE NEXT GENERATION OF FLUX MEASUREMENT TOOLS ................................ 473
Berkeley B. Almand, Michael P. Hannigan, Gregory Miller, Nicolas Masson, Kevin Kinkel, Alex Demaria, Ricardo Piedrahita
SESSION 15 – HAZE RULE 2013 CHECK-IN AND 2018 PLANNING MILESTONES TO ACHIEVE THE U.S. NATIONAL VISIBILITY GOAL

CRITICAL REVIEW UPDATE: VISIBILITY SCIENCE AND REGULATION .......................................................... 479
John G. Watson, Judith C. Chow

THE REGIONAL HAZE RULE REASONABLE PROGRESS REPORT PROJECT FOR 116 WESTERN CLASS I AREAS .......................................................... 480
Cassie Archuleta, Joe Adlhoch, Emily Vanden Hoek, Tom Moore

COMPARATIVE ANALYSIS OF 2005-09 “1ST PROGRESS PERIOD” AND 2000-04 “BASELINE” REGIONAL HAZE RULE METRICS ............................................. 486
S. A. Copeland, Charles T. Moore

REGIONAL HAZE PROGRESS ASSESSMENT 2000-2010 ........................................................................ 491
Patricia Brewer, Tom Moore, Jenny Hand, Scott Copeland

USE OF SEARCH OAK GROVE DATA FOR ESTIMATING AMBIENT NH₃ CONCENTRATIONS OVER THE GOM ........................................................................ 496
John J. Jansen

BEST AVAILABLE RETROFIT TECHNOLOGY (BART) ANALYSES FOR THREE ARIZONA POWER PLANTS .......................................................... 507
Uma Shankar, Elizabeth A. Adams, Mohammed Omari, Brian F. Naess, Dongmei Yang, Saravanan Arunachalam

PREDICTED BART VISIBILITY BENEFITS – REAL OR ILLUSION? .......................................................... 512
Robert J. Paine, David W. Heinsel

SESSION 16 – ASSESSMENT OF HAZE FROM NATURAL SOURCES

LONG TERM DUST AEROSOL PRODUCTION FROM NATURAL SOURCES IN ICELAND ......................... 519
Pavla Dagsson-Waldhauserova, Olafur Arnalds, Haraldur Olafsson

VOLCANIC CONTRIBUTIONS TO HAZE AT HAWAII VOLCANOES AND HALEAKALA NATIONAL PARKS .......................................................... 524
Patricia F. Brewer, John D. Ray, Kristi Gebhart

SESSION 17 – AEROSOL EFFECTS ON HAZE, DIRECT AND INDIRECT FORCING

HYGROSCOPICITY OF FOSSIL FUEL COMBUSTION AEROSOLS: CHARACTERIZATION AND EFFECTS ON CLOUDS IN GLOBAL MODELING ................................. 529
Olga Popovicheva, Yuxing Yun, Joyce Penner

PHYSICAL RESPONSES OF CLOUDS TO THE DIRECT AND INDIRECT CLIMATE FORCING OF SOOT AND SMOKE AEROSOLS .......................................................... 534
Eric M. Wilcox

THE PHYSICAL PROPERTIES OF BLACK CARBON AND OTHER LIGHT- ABSORBING MATERIAL EMITTED FROM PRESCRIBED FIRES IN THE US .................................................. 539
Gavin R. McMeeking, Sonia M. Kreidenweis, Amy P. Sullivan, Taehyoung Lee, Robert J. Yokelson, Sheryl Akagi, Edward Fortner, Timothy Omasch

VIBRATIONAL SPECTROSCOPY AND QUANTUM MECHANICS CALCULATIONS OF NITRIC ACID CHEMISORBED ON γ-Al₂O₃ AND TiO₂ ................................................ 545
Rachel M. Welch, Ellen M. Coddens, Juan G. Na

SESSION 18 – POTENTIAL IMPACTS OF EMISSIONS FROM OIL AND GAS FIELDS ON VISIBILITY

WINTER PHOTOCHEMICAL OZONE EVENTS IN THE UPPER GREEN RIVER BASIN ......................... 550
John V. Molenar

IMPLICATIONS OF OIL AND GAS EMISSIONS INVENTORY METHODOLOGY DIFFERENCES .......................................................... 554
Courtney A. Taylor, Linsey Debell, Chris Driscoll, Caitlin Shaw

A COMPREHENSIVE EMISSIONS INVENTORY OF UPSTREAM OIL AND GAS ACTIVITIES IN THE ROCKY MOUNTAIN STATES .......................................................... 560
Amnon Bar-Ilan, John Grant, Rajashi Parikh, Ralph Morris, Kathleen Sgamma, Tom Moore, Lee Gribovicz
MEASUREMENTS OF WINTERTIME ORGANIC AEROSOL FORMATION IN UTAH’S UINTAH BASIN OIL AND GAS FIELDS ...................................................................................................................... 566
Shane M. Murphy, Joost Degouw, Carsten Warneke, Jessica Gilman

2012 UINTA BASIN WINTER OZONE STUDY ........................................................................................................... 571
Seth N. Lyman

UPPER GREEN RIVER BASIN WINTER OZONE STUDY ....................................................................................... 577
Till Stoeckenius

SESSION 19A – ATMOSPHERIC NITROGEN – A BRIDGE BETWEEN VISIBILITY, ECOLOGICAL AND AGRICULTURAL ISSUES

MEASUREMENTS OF REACTIVE NITROGEN IN GRAND TETON NATIONAL PARK .................................. 583
Anthony J. Prenni, Katherine B. Benedict, Ezra J. T. Levin, Amy P. Sullivan, Yi Li, Taehyoung Lee, Yury Desyaterik, Misha Schurman, Sonia M. Kreidenweis, Derek Day

NITROGEN DEPOSITION IN THE GRAND TETONS A TEMPORAL AND SPATIAL PERSPECTIVE .................................. 586
Derek E. Day, William C. Malm, Katherine B. Benedict, Anthony J. Prenni, Ezra J. T. Levin, Amy P. Sullivan, Yi Li

ORGANIC NITROGEN CONCENTRATIONS AND SPECIES IN AEROSOL AND PRECIPITATION SAMPLES FROM THE ROCKY MOUNTAINS ............................................................................................................................... .................................. 589
Katherine B. Benedict, Yury Desyaterik, Sonia M. Kreidenweis, Jeffrey L. Collett

SOURCE APPORTIONMENT OF AMMONIA AT ROCKY MOUNTAIN NATIONAL PARK USING MODELED CONSERVATIVE TRACER ................................................................................. 593
William C. Malm

SPATIAL AND TEMPORAL SENSITIVITIES IN RESULTS OF BACK-TRAJECTORY BASED RECEPTOR MODELS AS APPLIED TO THE ROCKY MOUNTAIN ATMOSPHERIC NITROGEN AND SULFUR STUDY PART II (ROMANS II) ........................................................................................................ 597
Kristi A. Gebhart, William C. Malm, Marco A. Rodriguez, Michael G. Barna, Bret A. Schichtel, Catherine Benedict, Jeffrey L. Collett

MODELING THE FATE OF ATMOSPHERIC REDUCED NITROGEN IN THE WESTERN UNITED STATES DURING THE ROCKY MOUNTAIN ATMOSPHERIC NITROGEN AND SULFUR STUDY PART II (ROMANS II) ........................................................................................................ 601
Marco A. Rodriguez, Michael G. Barna, Kristi A. Gebhart, Bret A. Schichtel, William C. Malm, Jennifer L. Hand, Derek Day, Catherine Benedict, Jeffrey L. Collett

SESSION 19B – ATMOSPHERIC NITROGEN – A BRIDGE BETWEEN VISIBILITY, ECOLOGICAL AND AGRICULTURAL ISSUES

A PILOT MONITORING STUDY OF ATMOSPHERIC NHX AT SELECTED IMPROVE SITES ..................... 605
Xi Chen, Derek Day, Bret Schichtel, William Malm, Jose Mojica, Chuck McDade, Sonia M. Kreidenweis

NITRATE IN THE SOUTHEASTERN U.S: HAVE CONCENTRATIONS INCREASED OVER TIME? ................................. 610
Eric S. Edgerton

THE EFFECT OF A LARGE SCALE POULTRY CULL ON AMBIENT AMMONIA, PM2.5 AND VISIBILITY IN THE LOWER FRASER VALLEY, B.C., CANADA ........................................................................................................ 615
Keith Jones, Roxanne Vingarzan, Joanna Zhao

SESSION 20 – SOURCE ATTRIBUTION OF AEROSOL AND HAZE

EFFECT OF CHANGE IN COOKSTOVE TYPES ON VISIBILITY - CASE STUDY OF THE BERKELEY-DARFUR STOVE AND THREE-STONE FIRE ............................................................................................................................... .................................. 620
Yuangang Wang, Ashok J. Gadgil, Thomas W. Kirchstetter

REGIONAL OZONE, PARTICULATE MATTER AND VISIBILITY SOURCE APPORTIONMENT MODELING OF THE WESTERN UNITED STATES ........................................................................................................ 625
Ralph Morris, Tom Moore

SOURCE APPORTIONMENT OF PRIMARY AND SECONDARY FINE PARTICLES; A HYBRID MODEL ............................................................................................................................... .................................. 632
Timothy M. Sturzt, Timothy V. Larson, Bret Schichtel
SOURCE APPORTIONMENT STUDIES FOCUSED ON WOOD SMOKE IN THE NORTHERN ROCKIES AND FAIRBANKS, ALASKA ................................................................. 637
Tony J. Ward

SUCCESS IN REDUCING PM$_{2.5}$ IN THE NEIGHBORHOOD NORTH OF THE HOUSTON SHIP CHANNEL – VOLUNTARY EFFORTS BASED ON FIELD STUDY RESULTS AND SOURCE ATTRIBUTION .......................................................................................................................... 642
James H. Price, Bryan Lambeth, Keith A. Sheedy, Kasey Savanich

EVALUATION OF PM$_{2.5}$ AND PM$_{10}$ MASS CLOSURE FORMULAE .......................................................................................................................... 649
Judith C. Chow, John G. Watson, Douglas H. Lowenthal

SOURCE SIGNATURES OF ATMOSPHERIC CARBONACEOUS MATTER IN URBAN-INDUSTRIAL ENVIRONMENT OF CENTRAL INDIA ............................................................. 650
Shams Pervez, Neha Dubey, Yasmeen F. Quraishi Pervez

Author Index