

AGENDA

9th Annual George Mason University Conference on “Atmospheric Transport and Dispersion Modeling”

July 18-20, 2005

Prepared by Zafer Boybeyi
(June, 17 2005)

All Sessions will be held at Room 80, Enterprise Hall
George Mason University
Fairfax, Virginia, U.S.A.

THEMES: 1) Improve understanding of atmospheric transport and dispersion processes, 2) Support homeland security requirements, and 3) Share experience across different sectors.

DAY 1 - MONDAY, JULY 18, 2005

(7:00 – ALL DAY) REGISTRATION

(7:00 – 9:00) CONTINENTAL BREAKFAST

(7:45 – 8:00) INTRODUCTIONS

Session 1 – Urban Scale CFD Model Applications

Session Chair – Steven R. Hanna (Harvard School of Public Health)

(8:00 – 8:15) Overview of Madison Square Garden 2005 (MSG05) Field Experiment
S. R. Hanna

Harvard School of Public Health, Boston, MA

(8:15 – 8:30) Very Large Eddy Simulation (VLES) Study of Flow and Dispersion Patterns in Midtown Manhattan

F. E. Camelli*, S. R. Hanna & R. Löhner

*George Mason University, Fairfax, VA

(8:30 – 8:45) Recent Developments and Applications of the CFD-Urban Transport and Dispersion Model

W. J. Coirier* & S. X. Kim

*CFD Research Corporation, Huntsville, AL

(8:45 – 9:00) A Verification of FEM3MP Predictions against Field Data from Two Releases of the Joint URBAN 2003 Experiment

S. T. Chan* & J. K. Lundquist

*Lawrence Livermore National Laboratory, Livermore, CA

(9:00 – 9:15) Flow and Exchange Processes in Simple Canopy Geometries

D. Hamlyn* & R. Britter

*University of Cambridge, Cambridge, United Kingdom

(9:15 – 9:30) Modeling Wind Flow and Turbulence in Complex Urban Canopies

F.-S. Lien*, E. Yee & H. Ji

*University of Waterloo, Waterloo, ON, Canada

(9:30 – 9:45) A Comparison of Eulerian CFD with Gaussian Plume simulations of Prairie Grass Dispersion Experiments

E. Demael* & B. Carissimo

*CEREA, France

(9:45 – 10:15) COFFEE BREAK

Session 2 – Urban Scale CFD Model Applications (Con't)

Session Chair – Ted Yamada (Yamada Science & Art Corporation)

(10:15 – 10:30) Fine-Scale CFD of Building Flows with Diurnal Heating/Cooling

L. J. Peltier*, S. E. Haupt, R. F. Kunz & J. J. Dreyer

*The Pennsylvania State University, State College, PA

(10:30 – 10:45) Flow Past the Pentagon: Building Resolving Large-Eddy Simulations and Comparison with Wind Tunnel Experiments

P. Smolarkiewicz & R. Sharman

National Center for Atmospheric Research, Boulder, CO

(10:45 – 11:00) Large Eddy Simulation of Drop-Laden Flows with Transport and Dispersion Models Evaluated Using Direct Numerical Simulation

J. Bellan*, N. Okong'o & A. Leboissetier

*Jet Propulsion Laboratory, Pasadena, CA

(11:00 – 11:15) Solution-Adaptation Applied to Eulerian Transport

N. Ahmad* & Z. Boybeyi

*George Mason University, Fairfax, VA

(11:15 – 11:30) Analysis of Joint URBAN 2003 Wind and Turbulence Profiles and Comparison with FEM3MP Simulations

J. K. Lundquist* & S. T. Chan

*Lawrence Livermore National Laboratory, Livermore, CA

(11:30 – 11:45) Modeling the Influence of Vegetation on Aerosol Transport in the Urban Environment

J. W. Leggoe*, E. D. Eastep, J. N. Rendon & J. L. Williams

*Texas Tech University, Lubbock, TX

(11:45 – 12:00) Large-Eddy Simulations of CO₂ Transport Over Complex Terrain

S. Iizuka* & H. Kondo

*National Institute of Advanced Industrial Science and Technology, Japan

(12:00 – 12:15) Numerical Simulations of an Urban Heat Island Taking Thermal Effects of Buildings on Airflows into Consideration

T. Yamada

Yamada Science & Art Corporation, Santa Fe, NM

(12:15 – 1:30) LUNCH BREAK (on your own expense)

Session 3 – Coupled Mesoscale & Local-Scale Model Applications

Session Chair – Julie Pullen (Naval Research Laboratory)

(1:30 – 1:45) Linked Mesoscale-LES Contaminant Prediction for Manhattan

J. Pullen*, J. Boris, G. Patnaik, T. Young & T. Holt

*Naval Research Laboratory, Monterey, CA

(1:45 – 2:00) Application and Evaluation of the Coupled WRF-Noah-Urban Model for the Complex Salt Lake City Urban Region

M. Tewari*, F. Chen, T. Warner, W. J. Coirier & S. Kim

*National Center of Atmospheric Research, Boulder, CO

(2:00 – 2:15) Demonstration and Evaluation of Coupled Mesoscale (WRF) and Urban-scale (CFD-Urban) Models

W. J. Coirier*, S. X. Kim, F. Chen & M. Tewari

*CFD Research Corporation, Huntsville, AL

(2:15 – 2:30) Urban Canopy and Dynamic Sea Surface Temperature Effects on Plume Transport in the New York City Metropolitan Area

T. Holt* & J. Pullen

*Naval Research Laboratory, Monterey, CA

(2:30 – 2:45) Verification of High-Resolution Mesoscale Model Forecasts for use as Dispersion Model Input

J. E. Nachamkin*, J. Cook, M. Frost, D. Martinez & G. Sprung

*Naval Research Laboratory, Monterey, CA

(2:45 – 3:00) A Prospectus for Bridging Mesoscale to Building Scale Meteorological and Dispersion Modeling

J. Ching*, D. Williams, R. Fry, R. Kolbe & S. Burian

NOAA/ARL, NERL/AMD, USEPA, RTP, NC

(3:00 – 3:15) Modeling Effects of Land Use/Land Cover Modifications on the Urban Heat Island Phenomenon and Air Quality in Houston, Texas

D. Byun*, S.-T. Kim, B. Czader, B. Cheng, S. Stetson, D. Nowak, R. Bornstein,

M. Estes, D. Hitchcock, M. Merritt & P. Smith

*University of Houston, Houston, TX

(3:15 – 3:45) COFFEE BREAK

Session 4 – Mesoscale Transport & Dispersion Studies

Session Chair – David P. Bacon (Science Applications International Corporation)

(3:45 – 4:00) In-line Particulate Transport and Dispersion Modeling Using the Regional Atmospheric Modeling System (RAMS)

J. W. Englert

Defense Threat Reduction Agency, Fort Belvoir, VA

(4:00 – 4:15) The Nested, NMM-WRF Modeling System

S. G. Gopalakrishnan

SAIC and NOAA/NCEP/EMC, Camp Spring, MD

(4:15 – 4:30) Adaptive Satellite Data Assimilation in Mesoscale Models

Z. Boybeyi*, E. Novakovskaia, D. P. Bacon, M. Kaplan & R. MacCracken

*George Mason University, Fairfax, VA

(4:30 – 4:45) A Statistical Evaluation of COAMPS® in the Arabian Gulf Region

R. E. Eager*, S. Raman, T. R. Holt, D. L. Westphal, J. S. Reid & A. A. Mangoosh

*North Carolina State University, Raleigh, NC

(4:45 – 5:00) Modeling Pollution Transport over the Arabian Sea During INDOEX 1999

M. Simpson*, M. Puryear & S. Raman

*North Carolina State University, Raleigh, NC

(5:00 – 5:15) Incorporating a Reactive Chemistry Capability in SCIPUFF

R. I. Sykes* & B. Chowdhury

*Titan Corporation, Princeton, NJ

(5:15 – 5:30) An Atmospheric Chemistry Module for Modeling Toxic Industrial Chemicals in SCIPUFF

V. Chynwat*, K. Tavares, F. Wiseman, J. Piotrowski & D. Burns

*ENSCO, Inc., Melbourne, FL

(5:30 – 5:45) The Prediction of Space and Ground Debris for Hit-to-Kill Missile Intercepts

C. A. Lind* & B. Sommers

*Missile Defense Agency, Washington, DC

(5:45 – 6:00) Use of the Martilli-Dupont Urbanized MM5 to Simulate Houston Urban Heat Islands for Air Quality Applications

H. Taha*, R. Bornstein & R. Balmori

*San Jose State University, San Jose, CA

6:00 ADJOURN (End of the First Day)

DAY 2, TUESDAY, JULY 19, 2005

(7:00 – ALL DAY) REGISTRATION (CON'T)

(7:00 – 9:00) CONTINENTAL BREAKFAST

Session 5 – Sensor Data Fusion & Source Detection

Session Chair – Deborah Fish (Defence Science and Technology Laboratory, UK)

(8:00 – 8:15) Stochastic Source Inversion Methodology and Optimal Sensor Network Design

B. Kosovic*, G. Sugiyama, T. K. Chow, K. Dyer, W. Hanley, G. Johannesson, S. Larsen, G. Loosmore, J. K. Lundquist, A. Mirin, J. Nitao, R. Serban & C. Tong

*Lawrence Livermore National Laboratory, Livermore, CA

(8:15 – 8:30) Event Reconstruction using BioWatch Collector Measurements

M. Brown*, M. Williams & S. Linger

*Los Alamos National Laboratory, Los Alamos, NM

(8:30 – 8:45) Optimal Solution to the Direct and Inverse Problem of Contaminant Dispersion

P. Mokhasi* & **D. Rempfer**

*Illinois Institute of Technology, Chicago, IL

(8:45 – 9:00) Source Term Estimation and Probabilistic Sensor Modelling

V. E. Rapley*, **P. Robins** & **P. A. Thomas**

*Defence Science and Technology Laboratory, United Kingdom

(9:00 – 9:15) Source Inversion for Contaminant Plume Dispersion in Urban Environments Using Building-Resolving Simulations

F. K. Chow*, **B. Kosovic** & **S. Chan**

*University of California, Berkeley, CA

(9:15 – 9:30) Scalar Dispersion and Inferred Source Location in an Urban Canopy

K.-J. Hsieh*, **A. Keats**, **F.-S. Lien** & **E. Yee**

*University of Waterloo, Waterloo, ON, Canada

(9:30 – 9:45) The CBR Virtual Battlespace: A Synthetic Environment for Operations Research

D. Fish*, **I. Griffiths**, **A. Solman** & **N. Bowman**

*Defence Science and Technology Laboratory, United Kingdom

(9:45 – 10:15) COFFEE BREAK

Session 6 – Model Uncertainty Studies & Data Gap Analysis

Session Chair – Zafer Boybeyi (George Mason University)

(10:15 – 10:30) Quantifying Uncertainty in Concentration Output Generated by Atmospheric and Diffusion Models

M. Atchison*, **J. Piotrowski**, **A. Vanderzanden** & **B. Provoncha**

*ENSCO, Inc., Melbourne, FL

(10:30 – 10:45) Analytical Methods for the Propagation of Uncertainty in Hazard Prediction Models

O. J. Lanning*, S. H. Cheung & P. A. Thomas
Defence Science and Technology Laboratory, United Kingdom

(10:45 – 11:00) Assessment of Meteorological Uncertainty Effects on Atmospheric Transport and Dispersion Modeling

J. Peltier*, S. E. Haupt, J. Wyngaard, D. Stauffer, A. Deng, F. Kredensor, S. Hamilton & P. Hayes

*The Pennsylvania State University, State College, PA

(11:00 – 11:15) Predictability of Boundary Layer Wind Predictions from a Four-Dimensional Variational Data Assimilation System

J. H. Copeland*, R.-S. Sheu, J. Sun & T. T. Warner

*National Center for Atmospheric Research, Boulder, CO

(11:15 – 11:30) New Methods to Discriminate Forecast Skill in Mesoscale Weather Predictions

J. Titlow* & **J. Copeland**

*WeatherFlow Inc., Poquoson, VA

(11:30 – 11:45) High Resolution Modeling and Probabilistic Weather for Improved Transport and Dispersion Predictions

D. Stauffer*, S. R. Hanna, I. Sykes, J. McQueen, M. Roulston, G. Hunter, A. Deng, A. Gibbs, S. Rohrbach, T. Shirley, H.-Y. Chuang, D. Jovic, P. Hayes & S. Hamilton

* The Pennsylvania State University, State College, PA

(11:45 – 12:00) A Relocatable Regional Climatological Analysis Tool for CBR Hazards Assessment

F. Vandenberghe*, T. Warner, S. Swerdlin & R. Babarsky

*National Center for Atmospheric Research, Boulder CO

(12:00 – 12:15) Gap Analysis of Atmospheric Transport and Dispersion Datasets

J. C. Chang*, S. R. Hanna, Z. Boybeyi & J. F. Bowers

*George Mason University, Fairfax, VA

(12:15 – 1:30) LUNCH BREAK (on your own expense)

Special OFCM Session 7 - Uncertainty in AT&D Models

Session Cochair – Bruce Hicks (National Oceanic and Atmospheric Administration)

Session Cochair – Mark W. Miller (National Oceanic and Atmospheric Administration)

(1:30 – 1:45) Opening Remarks

Session Cochairs

(1:45 – 2:00) Welcoming Remarks

Federal Coordinator for Meteorology

(2:00 – 2:45) Keynote Presentation – JAG/ATD(R&DP) Findings on Uncertainty
Walter D. Bach, Jr.,

Cochair of the Joint Action Group for Atmospheric Transport and Diffusion Modeling (Research and Development Plan) and Program Manager, Environmental Sciences

Division, Army Research Office, United States Army

(2:45 – 3:15) COFFEE BREAK

(3:15 – 5:45) Panel Session: Uncertainty in Atmospheric Transport & Dispersion (AT&D) Models

Moderator: Steven R. Hanna

Moderator's Remarks (15 mins)

Panelists (12 mins each):

1. Accounting for Uncertainties in NWP's using the Ensemble Approach for Inputs to AT&D Models (Dr. Dave Stauffer, PSU)
2. Overview of Uncertainty in AT&D Models (Dr. John Wyngaard, PSU)
3. An AT&D Model that Incorporates Uncertainty (Dr. Ian Sykes, Titan/ARAP)
4. Uncertainty in Urban-scale AT&D (Dr. Michael Brown, LANL)
5. Recovery and Use of Existing AT&D and Associated Meteorological Data (Dr. Joseph Chang, HSI)

Questions for panel session members to consider:

1. In regards to AT&D modeling in complex environments, such as urban areas, what are the limitations of the current suite of sub-grid-scale parameterizations used in mesoscale meteorological models?
2. How large are the errors from the current suite of sub-grid-scale parameterizations? How can these errors be reduced without interfering with the accurate representation of real processes of energy transfer from one scale to another?
3. What features of mesoscale meteorological models determine the limits of predictability of the model? How can these limits of predictability be extended or enhanced? Through improved data assimilation? Through improved sub-grid-scale parameterizations?
4. When designing a mesoscale ensemble system to support AT&D modeling what design features, such as optimal number and types of ensemble members, should be considered?
5. What future meteorological model ensemble techniques show promise for linking ensemble mesoscale meteorological models with ensemble AT&D predictions? How could these techniques be used to evaluate the overall uncertainty of the probabilistic results?
6. What are some of the bottom-up and top-down approaches to solving the modeling gap?
7. How could improvements in measurement and tracer technologies help to quantify uncertainties in AT&D predictions?

General Discussions

(5:45 – 6:00) Wrap up:
Session Cochairs

(6:00 – 7:00) HAPPY HOUR

DAY 3, WEDNESDAY, JULY 20, 2005

(7:00 – ALL DAY) REGISTRATION (CON'T)

(7:00 – 9:00) CONTINENTAL BREAKFAST

Session 8 – Urban Environment Monitoring & Data Analysis

Session Chair – Jeffrey Copeland (National Center for Atmospheric Research)

(8:00 – 8:15) Dispersion and the Use of Local Data –Lessons from DCNet

B. B. Hicks*, W. R. Pendergrass & K. L. Clawson

*Air Resources Laboratory, NOAA, Silver Spring, MD

(8:15 – 8:30) Trade-offs Between Stationary and Moving Aerosol Collectors for Detecting a Bio-Agent Release

P. N. Price*, M. D. Sohn & A. J. Gadgil

*Lawrence Berkeley National Laboratory, Berkeley, CA

(8:30 – 8:45) MAPIT: Update on Airborne System for Urban-scale Environmental Monitoring

R. J. Evans*, J. Manobianco, M. Adams & J. Dreher

*ENSCO, Inc., Melbourne, FL

(8:45 – 9:00) A Two-Dimensional Lagrangian Model for Non-Gaussian Inhomogeneous Turbulence Within a Plant Canopy

L. Mortarini*, E. Ferrero & P. Franzese

*University of Turin, Turin, Italy

(9:00 – 9:15) Predicting Surface Heat Fluxes with Routine Meteorology

S. Diehl

ITT Industries, Colorado Springs, CO

(9:15 – 9:30) Large Domain Boundary Layer Wind Analysis System

P. E. Bieringer*, J. P. Morgan, S. Winkler & B. Martin

*Massachusetts Institute of Technology, Lexington, MA

(9:30 – 9:45) Spatial and Temporal Scale Analysis of the Wind Field over the Washington D.C. Metropolitan Area

R.-S. Sheu*, T. T. Warner & J. Sun

*National Center for Atmospheric Research, Boulder, CO

(9:45 – 10:15) COFFEE BREAK

Session 9 – Urban Environment Monitoring & Data Analysis (Con't)

Session Chair – James F. Bowers (Dugway Proving Ground)

(10:15 – 10:30) Comparisons of Mock Urban Setting Test (MUST) Observations and Urban HPAC Predictions Paired in Space and Time

S. Warner*, N. Platt, J. F. Heagy, J. E. Jordan & G. Bieberbach

*Institute for Defense Analyses, Alexandria, VA

(10:30 – 10:45) Overview of Results of Analysis of Joint Urban 2003 (JU2003) Wind and SF6 Tracer Data

S. R. Hanna* & J. White

*Hanna Consultants, Kennebunkport, ME

(10:45 – 11:00) Turbulence Intensities Observed During Joint Urban 2003

G. Huynh*, S. Chang, C. Klipp, C. Williamson, D. Garvey & Y. Wang

*U.S. Army Research Laboratory, Adelphi, MD

(11:00 – 11:15) Effect of Large Scale Eddies on Turbulence Measurements

C. Klipp*, Y. Wang, G. Huynh, S. Chang, C. Williamson & D. Garvey

*U.S. Army Research Laboratory, Adelphi, MD

(11:15 – 11:30) Measurements of Boundary Layer Properties in an Urban Environment Near the Pentagon

R. Frehlich*, R. Sharman, Y. Meillier, M. L. Jensen & B. Balsley

*National Center for Atmospheric Research, Boulder, CO

(11:30 – 11:45) Detecting Corner Vortices and Flow Reversal Downwind of a Building

R. M. Cionco*, G. T. Vaucher, M. Bustillos, S. D'Arcy, R. Dumais & R. Brice

*US Army Research Laboratory, White Sands Missile Range, NM

(11:45 – 12:00) Concentration Fluctuation Intensities and Time Scales within Simulated Urban Obstacle Arrays in a Water Channel

T. Hilderman* & E. Yee

*Coanda Research & Development Corp., Burnaby, BC, Canada

(12:00 – 12:15) Extension of a Fluctuating Plume Model to Urban Areas Using Water Channel Experiments

A. Hill* & R. Gailis

*506 Lorimer Street, Fishermans Bend, Victoria, Australia

(12:15 – 1:30) LUNCH BREAK (on your own expense)

Session 10 – Local-Scale Transport & Dispersion Studies

Session Chair – Jason Ching (NOAA/ARL, NERL/AMD, USEPA)

(1:30 – 1:45) Operational Use of HPAC to Support DPG Field Test Operations

J. M. White*, B. J. Aronian, J. E. Rafferty & J. F. Bowers

*Dugway Proving Ground, Dugway, UT

(1:45 – 2:00) Using Doppler LIDAR Retrieved Wind Profiles as Input for Hazard Prediction Assessment Capability (HPAC)

C. C. Williamson*, Y. Wang, M. A. Felton & D. A. Ligon

*US Army Research Laboratory, Adelphi, MD

(2:00 – 2:15) Determining the Effectiveness of Aerosol LIDAR for Biological Attack Characterization and Verification

G. Bieberbach*, N. Oien, S. Mayor, S. Spuler, R. Frehlich & R.-S. Sheu

*National Center for Atmospheric Research, Boulder, CO

(2:15 – 2:30) Dispersion During Nighttime Light-Wind Conditions Near the Pentagon

J. C. Weil*, R.-S. Sheu, R. Frehlich & M. L. Jensen

*University of Colorado, Boulder, CO

(2:30 – 2:45) Integrating Atmospheric Dispersion Model with GIS to Perform Exposure Analysis

D. W. Wong* & Z. Boybeyi

*George Mason University, Fairfax, VA

(2:45 – 3:00) HVAC-Driven Infiltration and Dispersion in Complex Buildings

R. Babarsky*, R. Newell & B. Sanchez

*National Ground Intelligence Center, Charlottesville, VA

(3:00 – 3:15) Effect of Shelter-in-Place Termination-Time for a Community following a Large-Scale Outdoor Toxic Release

W. R. Chan*, P. N. Price, A. J. Gadgil & W. W. Nazaroff

*Lawrence Berkeley National Laboratory, Berkeley, CA

(3:15 – 3:45) COFFEE BREAK

Session 11 – Local-Scale Transport & Dispersion Studies (Con't)

Session Chair – Mike Brown (Los Alamos National Laboratory)

(3:45 – 4:00) Development and Testing of the Army Research Laboratory's 3D Wind Field Model (3DWF)

Y. Wang*, C. Williamson, C. Klipp, R. Dumais, J. Cogan, D. Ligon, D. Garvey, S. Chang & G. Huynh

*US Army Research Laboratory, Adelphi, MD

(4:00 – 4:15) A Comparison of Terrain Wind Adjustment Models For use in the Joint Effects Model (JEM)

S. A. Stage

Innovative Emergency Management, Baton Rouge, LA

(4:15 – 4:30) Precision Airdrop System

R. Wright* & D. Velea

*Planning Systems Inc., Reston, VA

(4:30 – 4:45) Stochastic Transport of Aerosol Particles

S. S. Kousoum

SRS Technologies at DTRA DMAC, Alexandria, VA

(4:45 – 5:00) Predicting CBRNE Effects for Nominally Deployed and Intercepted Cruise and Ballistic Missiles, Including the Effects of Complex Urban Environments

C. A. Lind

Missile Defense Agency, Washington, DC

(5:00 – 5:15) High Altitude Missile Intercept Software Library Development

D. Gregory*, Z. Liu & C. Smith

*Naval Surface Warfare Center, Dahlgren, VA

(5:15 – 5:30) Measurements of Diurnal and Nocturnal Temperature Fluctuations for Passive Standoff Detection

D. F. Flanigan*, F. D'Amico & R. K. Miyashiro

*SymSpec, MD

(5:30 – 5:45) Validation of a Genetic Algorithm-Coupled Receptor/Dispersion Model Incorporating SCIPUFF

C. T. Allen*, S. E. Haupt & G. Young

*The Pennsylvania State University, State College, PA

5:45 ADJOURN (End of the Conference)

Poster Session

Planned Evaluations of Urban HPAC Using Joint Urban 2003 Field Trials

N. Platt*, S. Warner & J. F. Heagy

*Institute for Defense Analyses, Alexandria, VA

Study on Passive Gas Dispersions over a Complex Terrain Using Wind Tunnel and Computational Fluid Dynamics Model

W.-S. Shim* & M. Park

*Agency for Defense Development, Korea

Detailed Transport and Dispersion Calculations in Support of the MSG05 Field Test

W. J. Coirier* & S. X. Kim

*CFD Research Corporation, Huntsville, AL

The Role of Consequence Management in the Ballistic Missile Defense System (BMDS)

C. A. Lind

Missile Defense Agency, Washington, DC

Mechanisms of Rapid Vertical Dispersion in/over Cities

P. Huq*, A. Carrillo, L. White, S. Dharmavaram & S. Hanna

University of Delaware, Newark, DE