AIR QUALITY MODELING

Theories, Methodologies, Computational Techniques, and Available Databases and Software

Volume IV - Advances and Updates

Editor
Paolo Zannetti

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Chapter Authors

Charisios Achillas
Roberto Bellasio
Roberto Bianconi
Peter Builtjes
Luca Delle Monache
John Douros
Evangelia Fragkou
Emilia Georgieva
Michael Johnson
Stephen L. Kerrin
Bryan Matthews
Paul C.H. Miller
Nicolas Moussiopoulos
Robert Paine
Thomas J. Rappolt
Steven D. Reynolds
Zbigniew Sorbjan
Milton E. Teske
Cristiane Thé
Jesse Thé
Harold W. Thistle
Silvia Trini Castelli
Christos Vlachokostas
Robert J. Yamartino
Paolo Zannetti

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Chapter 27

Air Quality Modeling Resources on the Web – An Update[1]

Paolo Zannetti [(2)]

[(2)] *The EnviroComp Institute, Fremont, CA (USA)*
zannetti@envirocomp.org

Abstract: This chapter presents a list of web addresses of useful sites for scientists, engineers, and managers using or developing air quality models.

Key Words: Air quality modeling, Internet sites, regulatory models, available software, courses online.

1 Introduction

The Internet revolution during the last 15 years has caused enormous progress in sharing data and information worldwide. The resources available on the Web today are enormous, and it is practically unthinkable, for a scientist, to work without this tool. However, some problems still remain. For example, 1) it is not always easy to identify the best and most reliable sources of information; 2) important sites often change address; and 3) the enormous amount of information on the web sometimes provides a distraction more than a solid scientific support.

Nevertheless, the Internet revolution has changed scientists' lives - ways of operating, performing research and development studies. This has been particularly true for environmental sciences, in general, and air quality modeling, in particular.

[1] This chapter is an update of Chapter 27 in Volume III.

This chapter presents an update of a similar chapter presented in Volume III of this book series. It contains a semi-organized list of topics and Internet addresses that may be particularly useful to scientists, engineers, and managers using or developing air quality models. The list is certainly incomplete and should be regarded like a collection of examples, more than a comprehensive catalog; but in spite of its limitation, it represents a good starting point, especially for a researcher at the beginning or intermediate stage of his exploration of the world of air quality modeling.

Readers are encouraged to provide new Hyperlinks by contacting the author via email. All valuable suggestions will be included in possible future publications.

2 Regulatory Issues

Title: Air Dispersion Modeling
Owner: Minnesota Pollution Control Agency (MPCA)
Summary: Air quality dispersion modeling is a computer simulation that predicts air quality concentrations from various types of emission sources. For pollutants emitted through a stack, it considers the emission rate, stack height, stack diameter, and stack gas temperature and velocity, as well as the effect of nearby buildings and terrain. Other emission sources like vehicle traffic or wind erosion from storage piles are represented as 2-dimensional area sources or 3-dimensional volume sources.
Hyperlink:
http://www.pca.state.mn.us/index.php/air/air-monitoring-and-reporting/air-emissions-and-monitoring/air-dispersion-modeling/air-dispersion-modeling.html?menuid=&missing=0&redirect=1

Title: Dispersion Modeling
Owner: The Virginia Department of Environmental Quality
Summary: Dispersion modeling is generally associated with the construction permit application process and is used to predict the air quality impact of new or modified emission sources. Other uses of dispersion modeling include: analysis of monitored violations of the National Ambient Air Quality Standards (NAAQS), assistance in planning and the development of rules. The following information is provided as general guidance to help you through the air quality modeling process.
Hyperlink:
http://www.deq.state.va.us/air/assessments/dispersion.html

Title: Air Quality Modeling Guidelines
Owner: Utah Division of Air Quality (UDAQ)
Summary: Industry and control agencies have long expressed a need for consistency in the application of air quality models for regulatory purposes. This Utah Division of Air Quality (UDAQ) guideline document provides a common

basis for estimating the air quality concentrations used in assessing control strategies and developing emission limits.
Hyperlink:
http://www.airquality.utah.gov/Planning/Modeling/NSR_Permit_Modeling/Modguint.htm

Title: State of Montana Modeling Guideline for Air Quality Permit Applications
Owner: State of Montana
Summary: This Montana Modeling Guideline for Air Quality Permits (Guideline) presents current MDEQ modeling guidance for estimating impacts from stationary sources of air pollution. This document addresses modeling requirements for all sources requiring an Montana Air Quality Permit including: minor sources, major sources subject to the Prevention of Significant Deterioration (PSD) regulations, and sources located in non-attainment areas.
Hyperlink:
http://deq.mt.gov/AirQuality/docs/MontanaModelingGuidelineForAirQualityPermits(3).pdf

3 Books

Title: List of available books in Air Quality Modeling
Author(s): Several
Summary: Book list
Hyperlink:
http://www.environmental-expert.com/publications.aspx?word=air%20quality%20modeling

Title: Atmospheric dispersion modeling
Author(s): Several
Summary: Book list (bottom of web page)
Hyperlink:
http://en.wikipedia.org/wiki/Atmospheric_dispersion_modeling

4 Available Software

Title: BREEZE Software
Owner: Trinity Consultants
Summary: Environmental professionals use BREEZE software products worldwide to analyze the effects of air pollutant emissions and explosions. BREEZE is easy to learn and use because it adheres to Microsoft® standards for intuitive, uniform graphical user interfaces, and features standardized toolbars, views, menus, commands, and dialog boxes.
Hyperlink:
http://www.breeze-software.com/default.aspx

Title: Lakes Environmental Software
Owner: Lakes Environmental

Summary: Lakes Environmental is committed to supplying robust and easy-to-use software, training, and services to consulting companies, industry, governmental agencies, and academia. Since 1995, Lakes Environmental has been recognized internationally for its technologically advanced software and its exceptional expertise in the area of environmental science.
Hyperlink:
http://www.weblakes.com/

5 Dispersion Models

Title: Atmospheric dispersion modeling
Owner: Wikipedia
Summary: Atmospheric dispersion modeling is the mathematical simulation of how air pollutants disperse in the ambient atmosphere. It is performed with computer programs that solve the mathematical equations and algorithms, which simulate the pollutant dispersion. The dispersion models are used to estimate or to predict the downwind concentration of air pollutants or toxins emitted from sources such as industrial plants, vehicular traffic or accidental chemical releases.

Such models are important to governmental agencies tasked with protecting and managing the ambient air quality. The models are typically employed to determine whether existing or proposed new industrial facilities are or will be in compliance with the National Ambient Air Quality Standards (NAAQS) in the United States and other nations. The models also serve to assist in the design of effective control strategies to reduce emissions of harmful air pollutants.
Hyperlink:
http://en.wikipedia.org/wiki/Atmospheric_dispersion_modeling

Title: Air Dispersion Modeling
Owner: Google Directory
Summary: Directory
Hyperlink:
http://www.google.com/Top/Science/Environment/Air_Quality/Air_Dispersion_Modeling/

6 Photochemical Models

Title: CMAQ Science Documentation
Owner: US Environmental Protection Agency
Summary: Science Algorithms of the EPA Models-3 Community Multiscale Air Quality (CMAQ) Modeling System
Hyperlink:
http://www.epa.gov/AMD/CMAQ/CMAQscienceDoc.html

7 Receptor Models

Title: Receptor Modeling
Owner: US Environmental Protection Agency
Summary: Receptor models are mathematical or statistical procedures for identifying and quantifying the sources of air pollutants at a receptor location. Unlike photochemical and dispersion air quality models, receptor models do not use pollutant emissions, meteorological data and chemical transformation mechanisms to estimate the contribution of sources to receptor concentrations. Instead, receptor models use the chemical and physical characteristics of gases and particles measured at source and receptor to both identify the presence of and to quantify source contributions to receptor concentrations. These models are therefore a natural complement to other air quality models and are used as part of State Implementation Plans (SIPs) for identifying sources contributing to air quality problems. The EPA has developed the Chemical Mass Balance (CMB) and UNMIX models as well as the Positive Matrix Factorization (PMF) method for use in air quality management. CMB fully apportions receptor concentrations to chemically distinct source-types depending upon the source profile database, while UNMIX and PMF internally generate source profiles from the ambient data.
Hyperlink:
http://www.epa.gov/scram001/receptorindex.htm

8 Air Quality Forecast and Resources

Title: NOAA's National Weather Service Air Quality Forecast Guidance
Owner: National Oceanic and Atmospheric Administration
Summary: Maps show NOAA's National Weather Service Air Quality Forecast Guidance. Ozone is shown as 1-hour and 8-hour concentrations (in parts per billion or ppb), updated twice daily. Official Air Quality point forecasts, issued by state and local air quality forecasters, along with additional information on air quality can be found under EPA's AIRNow site. Surface and column-average concentrations of predicted smoke for large fires are displayed as 1-hour averages (in micrograms per cubic meter), updated each day. Fire locations are provided by NOAA / NESDIS' Hazard Mapping System. For further information, please visit NOAA's Air Resources Laboratory web site.
Hyperlink:
http://www.nws.noaa.gov/aq/

Title: Air Quality & Pollution by The Weather Channel
Owner: The Weather Channel
Summary: Your daily forecast for better health
Hyperlink:
http://www.weather.com/activities/health/airquality/

9 Visibility Modeling

Title: WRAP Regional Haze Air Quality and Visibility Modeling Results
Owner: WRAP Regional Modeling Center
Summary: Air quality and visibility modeling results are organized into 3 tables. Table 1 includes CMAQ results for the 2002 model performance evaluation (MPE) case and results for the 2002 Planning Case and the 2018 Base Case. Table 2 includes results for the CAMx MPE case and the PSAT source apportionment simulations. Table 3 includes other model sensitivity studies. Older model results (e.g., preliminary evaluation and test cases) are listed in the archive section.
Hyperlink:
http://pah.cert.ucr.edu/aqm/308/cmaq.shtml

Title: CALPUFF Visibility Modeling Protocol: MDU Heskett Unit 2 BART Analysis
Owner: Montana-Dakota Utilities Co. AECOM, Bismarck, North Dakota
Summary: The North Dakota Department of Health (NDDH) has conducted CALPUFF modeling for emission sources for all BART-eligible facilities in North Dakota. This study updates and refines the CALPUFF modeling for one of these facilities, Heskett Unit 2, which is owned and operated by Montana-Dakota Utilities Co. (MDU). Heskett Unit 1, operational in 1954, has a capacity of 40 MW and is not BART eligible since it was put into service before 1962. Unit 2, operational in 1963, has a capacity of 75 MW. Unit 2 was retrofitted to a fluidized-bed combustor in 1987, thus making it BART eligible.
Hyperlink:
http://www.ndhealth.gov/AQ/RegionalHaze/Regional%20Haze%20Link%20Documents/Appendix%20A/MDU%20BART%20Modeling%20Protocol_AECOM.PDF

10 Courses Online

Title: Lecture Series on Environmental Air Pollution by Prof. Mukesh Sharma, Department of Civil Engineering IIT Kanpur. (For more details on NPTEL visit http://nptel.iitm.ac.in)
Author(s): Prof. Mukesh Sharma
Summary: Several lessons available on YouTube, e.g.:
Hyperlink:
http://www.youtube.com/watch?v=UyG4EL0BBJ0