

## Carlie J. Coats, Jr., Ph.D.

### Education

<i>Institutions</i>	<i>Major</i>	<i>Degree.</i>	<i>Year</i>
Duke University	Mathematics	S.B.	1973
Massachusetts Institute of Technology	Mathematics	Ph.D.	1978

**Date of Birth:** February 16, 1953

### Appointments

2014-2017	Research Associate/Senior Software Engineer, UNC Institute for the Environment
2003-2014	Chief Software Architect, Baron Advanced Meteorological Systems
1992-2002	Member Technical Staff 3,4, MCNC
1987-1992	Senior Scientific Specialist/Senior Systems Analyst, Computer Sciences Corporation.

### Products and Publications

#### *Four Related Products*

**Coats, C.J.**, The EDSS/Models-3 I/O API: A very-high-level interface for environmental modeling data, together with utilities and tools: 144523 lines of Fortran, 18137 lines of C, and 69719 lines of documentation. <https://github.com/cjcoats/ioapi-3.2>  
[https://www.cmascenter.org/ioapi/documentation/all\\_versions/html/index.html](https://www.cmascenter.org/ioapi/documentation/all_versions/html/index.html)

**Coats, C.J.**, The MM5 MCPL Meteorology-Coupler I/O API Module :  
An I/O API interface for MM5: 271834 lines of Fortran, 10071 lines of documentation.  
<https://cjcoats.github.io/ioapi/MCPL.html>

**Coats, C.J.**, NCSC/BAMS Tools for Real-Time Forecasting: 240497 lines of Fortran, 15946 lines of C, 5855 lines of documentation. (*NCSC/BAMS proprietary*)

**Coats, C.J.**, NCSC/BAMS AHRMS/REFLEX: a Model for regional Hydrological Forecasting, at the hill-slope scale: 79837 lines of Fortran, 154 lines of C, 3434 lines of documentation. (*BAMS proprietary*)

#### *Eight Significant Publications*

**Coats, C. J. , Jr.**, A. Hanna, D. Hwang, and D. W.. Byun, 1993: Model Engineering Concepts for Air Quality Models in an Integrated Environmental Modeling System. *Transactions, Regional Photochemical Measurement and Modeling Studies*, Air and Waste Management Association, San Diego, CA. pp. 213-223.

**Coats, C. J. , Jr.**, and M. Houyoux, 1996: Fast Emissions Modeling with the Sparse Matrix Operator Kernel Emissions (SMOKE) Modeling System. *The Emissions Inventory, Air and Waste Management Association*, New Orleans LA. pp. 539-548

McHenry, J. N., **C. J. Coats**, B. Cameron, J. Vukovich, A. Trayanov, and T. Smith, 2001: High-Resolution Real-Time Ozone Forecasts for the August-September Texas AQS-2000 (Houston) Field Study: Forecast Process and Preliminary Evaluation. *A Millenium Symposium on Atmospheric Chemistry: Past, Present, and Future of Atmospheric Chemistry*. American Meteorological Society, Boston, 186-193.

**Coats, C. J.**, 2005. A Conservative Framework for Sub-Grid Scale Terrain Effects in Air Quality Forecast Models. *7th Conference on Atmospheric Chemistry, American Meteorology Society*, San Diego CA Jan. 2005.

McHenry, J. N., W. F. Ryan, N.L.Seaman, **C. J. Coats**, J. Pudykeiwicz, S. Arunachalan, and J. Vukovich, 2004: A Real-Time Eulerian Photochemical Model Forecast System: Overview and Initial Ozone Forecast Performance in the NE US corridor. *Bull Amer Meteor Soc.* April 2004, pp. 525-548.

**Coats, C. J.**, Sparse Matrix Techniques for Coupling Independent Hydrological and Meteorological Models, *18th Conference on Hydrology at the 84th Annual Meeting of the American Meteorological Society*, Seattle Washington, January 11-15, 2004.

**Coats, C. J.**, and J. N. McHenry, Results of Chemical Data Assimilation in the MCNC/BAMS Numerical Air Quality Prediction System, *20th Conference on Weather Analysis and Forecasting/16th Conference on Numerical Weather Prediction* at the 84th Annual Meeting of the American Meteorological Society, Seattle Washington, January 11-15,2004.

**Coats, C.J.**, J. N. McHenry, and E. Hayes, MM5 Optimization, and Numerical Sensitivities in Convective/Nonconvective Cloud Interactions *The Tenth PSU/NCAR Mesoscale Model Users' Workshop*. MMM Division, NCAR, Boulder, Co., 70-73.

### **Synergistic Activities**

Open Source Modeling Software Author: Models-3 I/O Applications Programming Interface, original Sparse Matrix Operator Kernel Emissions model; SMOKE-Real-Time model, Multiscale Air Quality Simulation Platform, MCPL output module for MM5, WRF External M3IO package.

Principal Investigator, EPA grants: Emissions Modeling Research with High Performance Computing (1993); Practical Parallel Computing Strategies, with Application to Air Quality and Cross Media Models (1996), Urban Watershed Decision Support Tools (2000); *US Air Force Weather Agency Contract:*, MM5 and WRF Optimization for AFWA Operational Platforms (2003-2004).

Real-Time Numerical Air Quality Prediction. Systems architect and author for real-time forecast system delivering four-times-daily meteorology and air quality forecasts to a variety of clients: author of highly optimized, parallelized MAQSIP-RT and SMOKE-RT, and high-performance MM5 and WRF modules.

EPA Models-3 Program. Original systems architect for EPA Models-3. Author/Maintainer of the Models-3 I/O API, together with related analysis tools.

### **Collaborators & Other Affiliations, past four years**

B.H. Baek, UNC Institute for the Environment

Sarav Arunachalam, UNC Institute for the Environment

**Graduate advisor:** Prof. V. W. Guillemin, Department of Mathematics, MIT, 1978

**Postdoctoral advising:** none

**Thesis Advising:** none