MATTHEW D. TURNER

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PROFILE: SYSTEMS ENGINEER / DATA SCIENTIST

Driven professional seeking to combine advanced education, hands-on research experience, and innate technical abilities to support high-technology product development. Specializes in dynamic modeling and simulation techniques, incorporating numerous defined reference models into simulations, modifying and incorporating software into simulations, developing code to simulate interfaces and subsystems, and performing statistical analysis of simulation results. Excels in anticipating potential issues and independently solving problems. Advanced communicator who readily translates technical information for business and non-technical users, stakeholders, and senior management.

AREAS OF EXPERTISE

Data Analysis – Programming – Model Development – Software Engineering – Environmental Engineering
Computer Simulation – High Performance Computing – Research & Development (R&D)
Compiling Data – System Engineering – Reporting/Documentation – Geographic Information Systems (GIS)

TECHNICAL SKILLS

Operating Systems: Mac OS X, Mac OS X Server, Ubuntu Linux, Windows, CentOS, Rocks Linux
Languages: Fortran, Python, Matlab, MPI, HTML, CSS, Perl, OpenMP, Java, C
Modeling Software: Community Multi-Scale Air Quality Model (CMAQ), SMOKE Emission Processor, CMAQ Adjoint Model
Other Software: Microsoft Office, $L^{A}T_{E}X$, Matlab, Mathematica, PRO/E, ANSYS, IDEAS

SKILLS & CAPABILITIES

- Defining, analyzing, and reviewing results from model simulations and using that information to update and develop models to ultimately predict possible outcomes.
- Designing analysis methods, developing new algorithms, and implementing software code to add analysis capabilities to large MATLAB-based simulations.
- Developing computer applications that will execute mathematical algorithms, problem simulations/models, linear algebraic equations, and engineering packages on high performance computer platforms.
- Successfully executing environmental database-related projects, including experimenting with large environmental data management systems, developing and executing data management plans, and enabling application and adoption of technology tools.
- Experience with multiple phases of software implementation, i.e. design, data discovery, configuration, training, testing, deployment, and sustainment.
- Analyzing potential changes in system design for impacts to system performance and resulting system errors.
- Identifying and correcting program errors, preparing operating instruction manuals for user applications and codes, compiling documentation of program development, and analyzing system capabilities to resolve user and customer challenges and problems.

PROFESSIONAL EXPERIENCE

COLORADO UNIVERSITY ~ RESEARCH ASSISTANT ~ 2010-Present

Independently conceptualize, plan, and conduct original research on air quality modeling, effectively coordinating as many as 4 simultaneous projects at different stages of completion. Extensive work analyzing large datasets from simulations, with levels on the order of 63 x 10^9 data points. Developed and continue to follow process for determining which aspects of the data were relevant to the scientific community, how best to present data, and methods for visualizing data in Matlab. Create various ways of testing sources of problems related to model development, debugging code, and post-processing data.

- *CMAQ Adjoint Development*: Collaborated with multi-disciplinary team of researchers, personally creating the adjoint of the Community Multi-scale Air Quality (CMAQ) aerosol module that allowed researchers to explicitly quantify effects of individual emissions on any desired metric for the modeled domain.
  - Allowed for high-resolution source attribution studies to efficiently determine the impacts of individual emission sources and locations on national health.
- Gave numerous technical presentations at industry conferences, submitted 1 publication with 2 more in writing, and successfully defended thesis.

COLORADO UNIVERSITY ~ SYSTEM ADMINISTRATOR ~ 2010-Present

Hold authority for maintaining, upgrading, and repairing research group's high-performance technology, including both hardware and software. Maintain 32-node server running CentOS and ensure all library/software packages are correctly distributed across nodes. Work with vendors to optimize performance as the sole person responsible for resolving frequently occurring problems. Assist users with problems, providing step-by-step instructions that are simple to understand for users at all levels. Maintain thorough documentation of all system changes/upgrades.

- Repeatedly solved problems quickly despite having little experience with high-performance computers and system administration by proactively researching and leveraging resources, manuals, and online forums.
- Independently gained proficiency in scripting languages (bash, c-shell, and python).
- Significantly reduced maintenance time/requirements by developing scripts to perform daily tasks, monitor for common problems, and automatically fix those problems.
- Created a User Guide and Administrator Guide that allowed new personnel to use server without extensive support.

COLORADO UNIVERSITY ~ TEACHING ASSISTANT ~ 2009

Assisted professor with undergraduate-level fluid dynamics class, focusing primarily on administering tests, grading/providing feedback, and tutoring students. Led review sessions before every test, often presenting key materials to groups of as many as 100 students.

- Promoted student success with written feedback on all assignments and explanations about correct/incorrect answers.
- Supported students struggling with coursework by using review sessions and office hours to present information in different ways so each student could understand.

ALLIANT TECHSYSTEMS, INC. ~ INTERN, TOOLING ENGINEERING DEPARTMENT ~ 2006-2007

Focused primarily on designing hardware for testing solid-propellant rockets, ensuring hardware was not only structurally stable but could also withstand extra forces during testing. Daily activities revolved around using computer-aided design software to propose and draft components in support of the testing process.

- Assisted with quality control by analyzing data from failure events to determine cause of the failure.
- Successfully closed out Missile Defense Agency (MDA) Audit, including writing responses to every point of concern, meeting all deadlines, and working with manufacturing facilities to ensure points of concern were properly addressed.

ALLIANT TECHSYSTEMS, INC. ~ STUDENT INTERN, PROCESS ENGINEERING DEPARTMENT ~ 2005-2006

Charged with creating, updating, and revising technical documents that thoroughly detailed step-by-step instructions for the manufacturing of rocket parts. Extensive collaboration with manufacturers to identify processes that needed to be documented and processes that were incorrect or not relevant. Once documentation was complete, assisted with ensuring workers correctly followed documentation.

- Contributed to continuous improvement by analyzing data for failure evaluation.
- Ensured new/existing processes were detailed in the documentation, matched the process, and was easily understood.

EDUCATION & PROFESSIONAL DEVELOPMENT

Doctor of Philosophy in Mechanical Engineering, Focus: Air Quality Modeling ~ UNIVERSITY OF COLORADO, BOULDER
Dissertation: "The CMAQ Adjoint Model and its Application to Source Attribution Studies of Particulate Health Impacts"
Master of Science in Mechanical Engineering ~ DREXEL UNIVERSITY
Bachelor of Science in Mechanical Engineering ~ DREXEL UNIVERSITY

SUBMITTED MANUSCRIPTS

Turner, M.; Henze, D.; Hakami, A.; Zhao, S.; Resler, J.; Carmichael, G.; Stanier, C.; Baek, J.; Saide, P.; Sandu, A.; Russel, A.; Jeong, G.; Nenes, A.; Capps, S.; Percell, P.; Pinder, R.;Napelenok, S.; Pye, H.; Bash, J.; Chai, T.; Byun, D. (2014) Differences Between Magnitudes and Health Impacts of BC Emissions Across the US Using 12km Scale Seasonal Source Attribution.

MANUSCRIPTS IN PREPARATION

Turner, M.; Henze, D.; Hakami, A.; Zhao, S.; Resler, J.; Carmichael, G.; Stanier, C.; Baek, J.; Saide, P.; Sandu, A.; Russel, A.; Jeong, G.; Nenes, A.; Capps, S.; Percell, P.; Pinder, R.;Napelenok, S.; Pye, H.; Bash, J.; Chai, T.; Byun, D. (2014) The Importance of Transport in Source Attribution Studies of US BC Health Impacts for Six Regions.

CONFERENCE PRESENTATIONS

Turner, M.; Henze, D.; Hakami, A.; Zhao, S.; Resler, J.; Carmichael, G.; Stanier, C.; Baek, J.; Saide, P.; Sandu, A.; Russel, A.; Jeong, G.; Nenes, A.; Capps, S.; Percell, P.; Pinder, R.;Napelenok, S.; Pye, H.; Bash, J.; Chai, T.; Byun, D. (2014) Determining the Effects of Grid Resolution on Marginal Damages of BC Emissions as Quantified by Adjoint Sensitivities. Thirteenth Annual CMAS Conference, Chapel Hill, NC. October, 2014.

Turner, M.; Henze, D.; Zhu, L. (2014) Constraining Aerosol Health Impacts with Sensitivity Analysis Using the CMAQ Adjoint. A&WMA's 107th Annual Conference, Long Beach, CA. June, 2014

Turner, M.; Henze, D.; Hakami, A.; Zhao, S.; Resler, J.; Carmichael, G.; Stanier, C.; Baek, J.; Saide, P.; Sandu, A.; Russel, A.; Jeong, G.; Nenes, A.; Capps, S.; Percell, P.; Pinder, R.;Napelenok, S.; Pye, H.; Bash, J.; Chai, T.; Byun, D. (2014) Adjoint-Based Source Attribution of BC Health Impacts. 16th GEIA Conference, Boulder, CO. June, 2014

Turner, M.; Henze, D.; Hakami, A.; Zhao, S.; Resler, J.; Carmichael, G.; Stanier, C.; Baek, J.; Saide, P.; Sandu, A.; Russel, A.; Jeong, G.; Nenes, A.; Capps, S.; Percell, P.; Pinder, R.;Napelenok, S.; Pye, H.; Bash, J.; Chai, T.; Byun, D. (2012) Adjoint-Based Source Attribution of PM Health Impacts. Eleventh Annual CMAS Conference, Chapel Hill, NC. October, 2012.

Turner, M.; Henze, D.; Hakami, A.; Zhao, S.; Resler, J.; Carmichael, G.; Stanier, C.; Baek, J.; Saide, P.; Sandu, A.; Russel, A.; Jeong, G.; Nenes, A.; Capps, S.; Percell, P.; Pinder, R.;Napelenok, S.; Pye, H.; Bash, J.; Chai, T.; Byun, D. (2011) Aerosol Processes in the CMAQ Adjoint. Third Annual IAMA Conference, Davis, CO. December, 2011.

Turner, M.; Henze, D.; Hakami, A.; Zhao, S.; Resler, J.; Carmichael, G.; Stanier, C.; Baek, J.; Saide, P.; Sandu, A.; Russel, A.; Jeong, G.; Nenes, A.; Capps, S.; Percell, P.; Pinder, R.;Napelenok, S.; Pye, H.; Bash, J.; Chai, T.; Byun, D. (2011) High Resolution Source Attribution of PM Health Impacts with the CMAQ Adjoint Model. Tenth Annual CMAS Conference, Chapel Hill, NC. September, 2011.

Turner, M.; Henze, D.; Hakami, A.; Zhao, S.; Resler, J.; Carmichael, G.; Stanier, C.; Baek, J.; Saide, P.; Sandu, A.; Russel, A.; Jeong, G.; Nenes, A.; Capps, S.; Percell, P.; Pinder, R.;Napelenok, S.; Pye, H.; Bash, J.; Chai, T.; Byun, D. (2011) Aerosol Processes in the CMAQ Adjoint. Second GEO-CAPE Community Workshop, Boulder, CO. May, 2011.

Turner, M.; Henze, D. (2010) Inverse Modeling of NH3 Precursor Emissions Using the Adjoint of CMAQ. Ninth Annual CMAS Conference, Chapel Hill, NC. September, 2010.

Turner, M.; Ma, Y.; Pearlman, H.; and Krchnavek, R. (2009) Catalytic Combustion of Small Alcohols on Suspended Sub-Micron and Nano-Size Platinum Particles. Sixth U.S. National Combustion Meeting, Center States Section, Ann Arbor, Michigan, May, 2009.