

Samuel Gerard Trahan, Ph.D.

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Objective: Position in atmospheric research, scientific support or software engineering

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I am an experienced software engineer and hurricane researcher with a strong background in physics and atmospheric modeling and automation of large tests. I have improved and optimized complex atmospheric models and other software and used multiple satellite and in-situ data sources to produce novel atmospheric model comparison techniques. I have developed ways to efficiently store and catalog data, and created low-overhead, real-time, interactive websites.

EDUCATION

2003 BS in Computer Science, University of Maryland, Baltimore County (UMBC)
2005 MS in Applied Physics, UMBC
2007 MS in Atmospheric Physics, UMBC
2011 Ph.D. in Atmospheric Physics, UMBC

EMPLOYMENT HISTORY

2009–Present – University Corporation for Atmospheric Research (UCAR)
Visiting Scientist at the NOAA Environmental Modeling Center (EMC)

Medium-term grant with a goal of putting a high-resolution hurricane model into operation at the National Weather Service (NWS). Developed a high-resolution version of the Hurricane Weather Research and Forecasting (HWRF) model, used by the NWS for hurricane track and intensity prediction. In 2012, this model will be the first high-resolution hurricane model in operations at the weather service. Developed a test suite to automate tests of thousands of HWRF simulations. Constructed and have extensive experience in scientifically-based model diagnostics techniques. Performed most of the large-scale software engineering changes needed by EMC in HWRF.

2003–2009 – University of Maryland Baltimore County
Research Assistant

Working in the field of atmospheric physics, built a trajectory model to determine the source and destination of passive tracers. Ported and ran WRF and HWRF on various clusters. Used remotely sensed and in-situ data sources to diagnose model problems. Installed and maintained unix multi-user server and desktop machines. Worked with several departments at UMBC to create its first campus-wide scientific computing cluster. Teaching assistant for upper-level classical and quantum mechanics courses for a year. Awarded the Goddard Earth Sciences and Technology Fellowship for two years.

1998–2004 – National Institute of Standards and Technology (NIST)
Software Engineer and Research Assistant

Worked in a research group responsible for evaluating the performance of biometrics algorithms, where my responsibility was to automate the tests and improve on them when possible. Developed a similarity score matrix renormalization technique that improved the skill of nearly all models. Constructed a loss-less gait video compression algorithm and developed various efficient mass data processing techniques. Attained valuable optimization and automation experience.

SKILLS

High-Resolution Hurricane Modeling - Lead developer of the high-resolution (3km) NOAA HWRF model and have extensive experience with near-convective scale hurricane forecasting models.

Optimization - Increasing the computational efficiency of code to allow more work to be done with less resources, through the use of improved algorithms, parallelization and other techniques.

Atmospheric Model Diagnostics - Statistical comparison of observational data and ground-truth values to model output to discern problems in the model and to quantize model skill.

Automation of Mass Data Processing - Automation of mass data processing to reduce or eliminate manpower required to perform large tests.

Multiscale Analysis of Observational Data - Analysis of in-situ and remotely sensed atmospheric data across many different scales to discern universal aspects of the flow and inter-scale interactions.

Low-Overhead Real-Time Websites - Development of interactive, low-overhead, real-time websites.

Experience with Multiple In-Situ and Remotely Sensed Data Sources - including TRMM, GOES, AIRS, NOAA P3, EDOP and others

REFEREED PUBLICATIONS

Trahan, S. and L. Sparling, 2011: “An analysis of NCEP tropical cyclone vitals and potential effects on forecasting models,” in press, Weather and Forecasting.

Trahan, S., 2011: “Multi-Scale Analysis of Observations of Tropical Cyclones with Applications to High-Resolution Hurricane Modeling.” Ph.D. thesis, Department of Physics, University of Maryland, Baltimore County, 2011.

Yang, K., et al., 2010: “Direct retrieval of sulfur dioxide amount and altitude from spaceborne hyperspectral UV measurements: theory and application.” Journal of Geophysical Research, 115.

CONFERENCE PROCEEDINGS

Bao, S., et al., 2010: “The community hurricane weather research and forecast (hwrp): System description, forecast skill and developmental testbed center support.” 29th Conference on Hurricanes and Tropical Meteorology.

Trahan, S., L. C. Sparling, V. Tallapragada, S. A. Braun, and J. Halverson, 2010a: “Statistical comparison of scales and spatial distributions of convection in observational data and simulated hurricanes.” 29th Conference on Hurricanes and Tropical Meteorology.

Trahan, S., V. Tallapragada, Z. Zhang, J. Oconnor, L. C. Sparling, and B. Lapenta, 2010b: “A high resolution

version of operational hwrf: forecast ability and computational challenges presented by an operational environment.” 29th Conference on Hurricanes and Tropical Meteorology.

Trahan, S., L. Sparling, and J. Halverson, 2008: “Scale analysis of spatial variability in observations of tropical cyclones.” 28th Conference on Hurricanes and Tropical Meteorology.

GRANTS

Sparling, L. and S. Trahan, 2008: “Impact of small-scale inner core dynamics on tropical cyclone intensity.” National Science Foundation, Teragrid allocation (supercomputer access grant) TG- ATM080003N.

OTHER SKILLS

I have an unusually good ability for learning new programming languages, even for someone in my field, so I know quite a few:

Extensive experience in: bash, C, C++, Fortran, Java, Javascript, ksh, Lex/Flex, IDL, Matlab, Perl, R, Ruby, Yacc/Bison

Some experience in: csh/tcsh, LISP, Lua, Python, many others.

I have also built and maintained multi-user unix machines at NIST and UMBC. I’m also a dessert chef, though without formal training, and I am especially well-known in some circles for my cheesecakes.

REFERENCES

- EMC -

George Vandenberghe - NOAA EMC, HPC Specialist
(301) 763-8000 x7119, george.vandenberghe@noaa.gov

Jordan Alpert - NOAA EMC, Global Model Developer
(301) 763-8000 x7205, jordan.alpert@noaa.gov

Vijay Tallapragada - NOAA EMC, Hurricane Team Leader
(301) 763-8000 x7232, vijay.tallapragada@noaa.gov

- UMBC -

Lynn Sparling - Associate Professor, UMBC Physics Department
(410) 455-6231, sparling@umbc.edu

Matthias Gobbert - Associate Professor, UMBC Mathematics and Statistics Department
(410) 455-2404, gobbert@umbc.edu

- NIST -

P. Jonathon Phillips - Project Manager, NIST Image Recognition Group
(301) 975-5348, jonathon.phillips@nist.gov

Patrick Grother - Staff Scientist, NIST Image and Technology Recognition Group
(301) 975-4157, patrick.grother@nist.gov

PROFESSIONAL MEMBERSHIPS

Institute of Electrical and Electronics Engineers (IEEE), American Geophysical Union (AGU), American Meteorological Society (AMS), American Physical Society (APS)