Christina E Bonfanti

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RESEARCH SCIENTIST

Strengths in applying mathematical analyses and computational approaches in several different computer languages to scientific research in a variety of earth-science related fields

Having an applied mathematics background paired with meteorology and physical oceanography discipline has led to several successful projects including the following highlighted below:

- Specialized in the collection and examination of solar irradiance site data in matlab programs written to calculate specific means, plots, and perform statistical analysis over years of data
- Investigated a new approach to forecast deep convection in weather models with a bin-sorting fortran model routine by collecting, merging, visualizing, and comparing raw GOES satellite, HRRR model, and composite radar data over the 48 continental states
- Documentation of the NOAA's Nonhydrostatic Icosahedral Model (NIM) global weather model

Education

UNIVERSITY OF MIAMI -- Miami, FL

MPS- Meteorology and Physical Oceanography – Computational Meteorology and Oceanography Emphasis, 2015

UNIVERSITY OF COLORADO -- Boulder, CO

BS - Applied Mathematics - Minor in Atmospheric and Oceanic Sciences- International Engineering Certificate in German, 2013
Engineering Honors Program and BOLD program

DOUGLAS COUNTY HIGH SCHOOL – Castle Rock, CO

High School Diploma – Valedictorian, 2009

Professional Experience

CIRES/NOAA *(Cooperative Institute for Research in Environmental Sciences)* -- Boulder, CO

Associate Scientist I, August 2014 to Jan 2016

Associate Scientist II, 2016 to current

Work closely in collaboration with senior colleagues on models, data collection and interpretation, development and use of software, formulation of education and outreach products for public, and technical and scientific publications. *Research Projects Highlights:*

- Solar Irradiance and Solar PV: Specialized on the solar irradiance data and solar PV power output from the Surface Radiation Budget (SURFRAD) and Integrated Surface Irradiance Study (ISIS) sites to be used in a linear multiple multivariate regression. Data means over 15 minutes, 1- hourly, 3-hourly, and 6-hourly were calculated to interpolate site means to representative grid-point means. Further analysis showed the conclusion that longer mean interval times severely miss measured irradiance values, proving there's issue in modeling irradiance values past a certain mean-time.
- A Bin-Classifier Model to Diagnose and Forecast Deep Convection: Investigated a new approach to forecast deep convection by collecting, merging, visualizing, and comparing

GOES raw satellite and composite radar data files over the 48 continental states. Various software tools were utilized such as matlab, BASH, fortran, and NCL. This data and model were developed in the competitive and emerging science field of improving global weather model forecasts for use of improving deep convection forecasts. The developed model can read non-radar data sources and produce a radar forecast on the HRRR grid resolution.

- Documentation of the NIM: Dissected NIM's structure, unique computational advances, nonhydrostatic approach, and state-of-the-art modeling aspects of the model while working closely with Dr. MacDonald and Dr. Lee on engineering the much needed documentation for the model. A first-of-its-kind documentation was developed and published with specific modeler, user, and public interfaces that each utilized diverse software packages to fully explain the model to the targeted audiences.
- Global Earth Observing Satellite Database: Created a database document that collected and listed inactive, active, and planned earth-observing satellites details. The information provided by the database included many things such as but not limited to: country origin, date launched, expected end date, and variables measured. This document was used in the Science on a Sphere project.

NASA *(The National Aeronautics and Space Administration)* – Mountain View, CA

Research Intern, summer 2014

Accepted to the Intensive Summer School for Computing in Environmental Sciences (ISSCENS)
Research Projects Highlights:

- Accepted into competitive Intensive Summer School for Computing in Environmental Sciences (ISSCENS) at University of Virginia. Three weeks were spent learning computations in python, Fortran, BASH, and parallel programming and applying these methods in daily labs to environmental sciences.
- Further selected from the ISSCENS program to research at NASA Ames on the assimilation of MODIS data into the Noah land surface model. Collaborated with a fellow NASA intern and a senior NASA climate scientist to incorporate MODIS satellite data into the WRF model during a case study of the Midwest drought with grid interpolation into modified Fortran code. After merging satellite data into the model, statistical analysis performed in NCL and matlab was done to compare observed and new model fluxes. Finally, NCL was used to visualize simulated precipitation values and results were published and presented NASA poster symposium at end of summer.

NCAR *(National Center for Atmospheric Research)* Earth Observing Laboratory -- Boulder, CO

Student Data Assistant, May 2011 to July 2013

Worked in the computing, data, and software facility (CDS) within the data management group (DMG) to handle the collection, processing, quality control, and long-term data storage of incoming data for certain NCAR research projects. *Research Projects Highlights:*

- Contributed in updating their data management services for national and international field research projects, in particular with Arctic projects, in addition to organizing, loading, and quality checking incoming data. Served as a bridge between earth-science and computer science in the data ingest stages.
- Assisted in html web development of particular science project home pages
- Over the span of time, would also become involved in little side projects such as internal clean-up projects, suggesting innovative ways to handle and organize giant old datasets, and attended many of the science seminars.

The Denver Channel Seven News -- Boulder, CO

Student Meteorologist Intern, January 2011 to May 2011

Joined the meteorology team under chief meteorologist Mike Nelson and his team of meteorologists to work as a broadcast assistant. This unique internship taught skills both in forecasting as well as in communication importance to the public. *Research Projects Highlights:*

- Under the eye of chief and other meteorologists, would learn to forecast from a variety of tools such as model outputs from the GFS and EURO, the Model Output Statistics (MOS), and older methods such as old-school isoplething.
- Wrote out the forecasts on thedenverchannel.com's weather section while learning broadcasting terms and advice.
- Interpolated temperatures from forecasting tools for areas around the Denver-Metro area as was well as the rest of the state.
- At the end of May, learned about fire meteorology and its importance to populous metro areas. This skill required strengths in wind and moisture forecasts as well as serious communication skills so not to raise panic or lose validity in forecasts.

The Bookstore in the Grove -- Miami, FL

Sales Associate, September 2013 to May 2014

Balanced part-time job during graduate school as a local bookstore's sales associate. *Job Highlights:*

- Was responsible for weekly children programs such as story-time, science hour, and holiday-themed events.
- Had to be flexible and work the café during peak hours and spoke Spanish and occasionally German to local and foreign store visitors.

MESA (Mathematics, Engineering, Science Achievement) Mentoring – Boulder/Denver, CO

Mentor, December 2009 to June 2011

Taught in Science, Technology, Engineering and Mathematics (STEM) fields weekly in low-income and at-risk districts around the Denver Metro area. In addition, volunteered at larger events hosted around the state on weekends. *Job Highlights:*

- Created weekly lesson plans taught at after school programs to elementary school children as well as worked one-on-one to mentor children on homework problems.
- Worked with other mentors on larger projects, such as computer build projects or science exploration days, on select weekends that were typically hosted at university campuses.

University of Colorado -- Boulder, CO

Mentor, August 2010 to August 2012

Mentored undergraduates in the BOLD (Broadening Leadership through Opportunity and Diversity) program, in particular women in engineering, and represented the program in the Andrew's Hall Leadership Council. The council was responsible for planning events, allocating funds to residence hall improvements, and collaborating with other represented programs: engineering honors and gold shirt. *Job Highlights:*

- Served as an academic and personal mentor to the BOLD students residing in Andrew's Hall often meeting with students in the program to discuss their personal academic progress in the college and personal "life" progress. Engineering programs are demanding but it was a goal to make sure each student felt well balanced between school work and the "them"-ness and excellence that was encouraged in the program.
- Was in charge of creating, managing, and hosting dorm-wide events that included but were not limited to: Soul Food night with Whitehouse Chef Adriane Miller, Mardi Gras Party and History Night, weekly Study Hall Cupcake Wednesdays, Senior Appreciation Dinner, and the Andrew's Hall Fall Banquet.

- Purchased diverse artwork to be placed around the building as well worked to build the Andrew's Hall Orrery that is proudly on display in the Andrew's Hall common room, serving as inspiration to the engineers-in-training. Purchased many kitchen materials like pots, pans, and mixers to encourage community excellence and inclusion where people tended to come together naturally; around the food.

Publications

- **Documentation of the Nonhydrostatic Icosahedral Model (NIM) -** Technical Paper- Thesis paper published in the University of Miami library for the completion of the MPS degree. *May 2015*.
- **Assimilation of MODIS data into the Noah land surface model: A case study of the 2012 Midwest drought -** Poster/Presentation - Published and presented in NASA Ames Summer Student Research Symposium. *August 2014*.

Conferences

- **AMS 2016 – American Meteorological Society - The National Oceanic and Atmospheric Administration's Documentation of the Nonhydrostatic Icosahedral Model (NIM)**
  Presented in the poster session for the 20th Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS)
- **UVIG Forecasting Workshop – Utility Variable-Generation Integration Group**
  2016 Attendee

Specialized Training

AMS 2016 – New Orleans, LA

Geostationary Operational Environmental Satellite (GOES-R) and Join Polar Satellite System (JPSS) course - *AMS short course on the utilization of GOES-R and JPSS data and tools.*

NOAA 2015 – Boulder, CO

Plain Science Communication Course - *Course on clear scientific communication and simple language.*

University of Virginia – Charlottesville, VA

Intensive Summer School for Computing in Environmental Sciences (ISSCENS) – A *Fortran, Python, NCL, and Parallelization Computing class with classwork in morning and labs in afternoon to apply these methods specifically to environmental sciences.*

University of Miami – Miami, FL

Presentation Boot Camp – *Multiday class that taught valuable PowerPoint and presentation skills specific to scientific presentations.*

Outreach

- **Regional Science fair judge in Environmental Science) -** *2016* – Was a member of the Environmental Sciences judges for middle school regional science fair competitors.

- **State Science fair judge in Mathematics and Computer Science -** *2016* - Was a member of the Mathematics and Computer Sciences judges for high school state science fair competitors.

- **NCAR Science Booth -** *2013* – Volunteered at a booth specializing in air pressure when children visited NCAR Mesa to learn about weather phenomena.

Technology Tools *(complete list on request)*

Matlab, NCL, fortran, HTML, R, basic BASH, Linux, LaTeX, Microsoft Word and Excel

References Available Upon Request