

# JASON WELSH, Ph.D.

## CONTACT



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## EXPERIENCE

### **NASA Langley Postdoctoral Researcher**

**Hampton, VA**  
July 2019

Accessed and developed code on the HEC super computer resources at NASA Langley Research Center. I helped with editing and revising papers and powerpoint presentations for several colleagues in our group. I retrieved data from the NOAA CLASS and Earth Explorer website. I specifically retrieved the ATMS Remapped to CrIS SDR (SATMR), ATMS SDR Ellipsoid (SATMR), and ATMS SDR Ellipsoid Geolocation (GATMO) data. Retrieved the MERRA-2 data from the Earthdata system website. Used Github to download and install PCRTM code on HEC supercomputer system. Presented poster at NASA Langley's annual NPP program (2019) and presented an online NPP talk about research work (2020). Analyzed cloud free areas using GOES imagery data. In addition, I analyzed water vapor, carbon monoxide and ozone vertical profiled data from NUCAPS, PCRTM and MERRA-2 data sources. Used the NASA Langley Research Center K-cluster resource in code preparation and execution. Used a script developed in my team to process the above mentioned SATMR and GATMO datasets. Also, I attended the NASA Sounder Team Fall Meeting(s) in 2019/2020. Worked on running and validating the Principal Component Radiative Transfer Model (PCRTM) using Fortran and MATLAB code. Also, worked as a Foreign National Escort to a foreign national on center.

Publications in progress:

1.) Validation of PCRTM with a Stratospheric Intrusion Event; Date to be published: TBD  
Authors: Jason Welsh, Xu Liu, and Wan Wu.

2.) Ozone Trends in St. Louis: Analysis Showing that Dirty Air is Getting Cleaner whereas Clean Air is Getting Dirtier; Date to be published: TBD Authors: Jack Fishman, Jason Welsh, Nichole Gosselin, and Ann Podleski.

### **Wentworth Institute of Technology (WIT)**

*Part time faculty*

**Boston, MA**

August 2018

Taught Principles of Chemistry and Technical Physics to about 24 different students. Delivered lectures and proctored exams. Supervised laboratory class time and laboratory setup for each class. Supervised 60 different students in three labs each week. Gave individualized student help to many students both inside and outside the classroom.

### **Becker College**

*Adjunct Faculty*

**Worcester, MA**

August 2018

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Taught Introductory Physics class to about 17 different students. Delivered lectures and proctored exams. Gave individualized student help to many students both inside and outside the classroom.

**Lakes Region Community College**  
*Adjunct Faculty*

**Laconia, NH**  
January 2018 -August 2018

Taught Principles of Chemistry and Technical Physics to about 23 different students. Delivered lectures and proctored exams. Supervised laboratory class time and prepared lab with appropriate chemicals and materials needed. Gave individualized student help to many students both inside and outside the classroom.

**St. Louis University**  
*Graduate Research Assistant*

**St. Louis, MO**  
Jan. 2012 - May 2017

### ***Earth and Atmospheric Sciences Department:***

Performed data analysis using Python, setup and performed runs on the Weather Forecasting Model (WRF), Motor Vehicles Emission Modeling Simulator (MOVES2014), and Community Air Quality Model System with Extensions (CAMx)

**East west Gateway Council of Governments; Air Quality Department**  
*Air Quality Internship*

**St. Louis, MO**  
Jan. 2015 - Dec. 2015

Setup and performed multiple MOVES2014 runs, used MySQL to analyze large datasets, developed python program: Small Area Greenhouse Gas Estimation Tool (SAGGET) to take MOVES2014 emissions data and process it for visualization.

**Welsh, J., (2016) SAGGET (Small Area Greenhouse Gas Estimation Tool): Converting MOVES2014 emissions model data into emissions estimates for user defined geographies.** [Saint Louis Metropolitan Area or any other user defined area]

### ***St. Louis Science Center (NASA):***

Was involved in the ozone balloon launches for Southeast American Consortium for Intensive Ozonesonde Network Study (SEACIONS), Ozone Garden research assistance – ozone damage to plants in St. Louis

**NASA; Langley Research Center, LARSS Program, Science Directorate Department**  
*Research Assistant Internship*

**Hampton, VA**  
July 2010 - Aug. 2011

Performed HYSPLIT trajectories, retrieved and performed analysis MOZAIC data using RSIG (Remote Sensing Information Gateway), Analyzed atmospheric pollution using MODIS and CALIPSO imagery

**Worcester State College; Academic Success Center**  
*Certified Academic Tutor*

**Worcester, MA**  
Jan. 2009 - June 2010

Tutored undergraduates in General Chemistry, Organic Chemistry I & II

**Worcester Polytechnic Institute**  
*Research Assistant Volunteer*

**Worcester, MA**  
Spring 2006

Crystallization Lab: Prepared media, mixed chemicals, ran tests, analyzed methods

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### EDUCATION

#### **Saint Louis University**

*Doctor of Philosophy – Meteorology*

*GPA: 3.8*

**St. Louis, MO**

May, 2018

Title: The Development of a High-Resolution Chemical-Transport Model for Investigating Urban-Scale Processes: A Tool for Assessing Future Satellite Capabilities and Anomalous Localized Air Pollution Events (Python and MATLAB)

-Details on PhD research: While completing my PhD work, I used python to post process MOtor Vehicle Emissions Simulation Model (MOVES2014) model. Our group at East West Gateway, helped develop python code to post process the data using SQLite python library package. We developed this unique software package that allows us to visualize the MOVES2014 emission data for the St. Louis, MO metropolitan area. Once the data has been visualized we had hoped to place this data within our WRF model but due to time restraints we didn't proceed with this process. Instead, we used the standard emissions that came with our air quality model (CAMx). Once, we ran the WRF model, I used python to post process the netCDF files and visualize the vector wind fields and temperature data onto a map of the St. Louis, MO metropolitan area. After completing the atmospheric chemical model runs (with CAMx), I then translated MATLAB code that was written to compute the total column ozone and nitrogen dioxide concentrations into a script written in Python. Something to note about the calculations of total column values is that I had to read in at least 4 to 6 different files and compute the atmospheric ozone concentration at that particular level. The script I used was much shorter in length than in MATLAB and more efficiently calculated the total column values. All my resultant total column concentrations, I converted into netCDF format and visualized those files within a single script.

#### **Saint Louis University**

*Master of Science – (Research) Meteorology*

*GPA: 3.76*

**St. Louis, MO**

May, 2014

Title: The Paradoxical analysis of St. Louis ozone data between 1980-2012: Dirty Air is Getting Cleaner and Clean Air is Getting Dirtier

-Details on Master's research: used Python to analyze Air Quality Site (AQS) data that was obtained from Environmental Protection Agency's (EPA) website. Before analyzing the data, I used the Remote Sensing Information Gateway (RSIG) to obtain spatially dependent surface ozone datasets from local (St. Louis, MO) monitoring sites. Then I used Python and libraries within python such as numpy, scipy, and others to post process the downloaded text files. In this process, I had to read and write files that were in text file format in the post processing part of the research. I've been able to make linear graphs with trend lines to fit the data within python.

#### **Worcester State College**

*Bachelor of Science – Chemistry*

*GPA: 3.4*

**Worcester, MA**

May, 2010

#### **Center for Sustainability, Saint Louis University**

*Graduate Certificate in Advanced Remote Sensing and Geographic Information Systems (GIS)*

**St. Louis, MO**

May, 2017

### AWARDS & HONORS

Sigma Xi Award - Saint Louis University Chapter of Sigma Xi, The Scientific Research Honor Society; Presented at the Sigma Xi Research Symposium – “An Analysis of Ozone Data in St. Louis: dirty air is getting cleaner and clean air is getting dirtier” (Thesis, 05/2014)

## JASON WELSH, Ph.D.

Alpha Sigma Nu Member – The Honorary Society of Jesuit Colleges and Universities, Highest honor in a Jesuit College or University; was inducted Spring 2017

Gamma Sigma Epsilon Chemistry Honor Society – National Honor Society; was inducted in April 2010

### LICENSES & CERTIFICATIONS

College Reading and Learning Association (CRLA) Certificate

Fall 2010

### PUBLICATIONS

Ghulam, A., Fishman, J., Maimaitiyiming, M., Wilkins, J. L., Maimaitijiang, M., **Welsh, J.**, ... & Grzovic, M. (2015). Characterizing crop responses to background ozone in open-air agricultural field by using reflectance spectroscopy. *IEEE Geoscience and Remote Sensing Letters*, 12(6), 1307-1311.

Wohlstadter, M., Shoaib, L., Posey, J., **Welsh, J.**, & Fishman, J. (2016). A Python toolkit for visualizing greenhouse gas emissions at sub-county scales. *Environmental Modelling & Software*, 83, 237-244.

### PRESENTATIONS/CONFERENCES

Ozone 101, Ozone: A protectant and pollutant, Climate Science & Stewardship Educator Workshop, July 21, 2016, 9:30 a.m., Missouri Botanical Garden

Identification and Simulation of Urban-Scale Pollution Vortices: Can they be identified using TEMPO?, NASA Air Quality Advisory Science Team (AQAST), June 3, 2015, Saint Louis University

An Analysis of Ozone Data in St. Louis: Dirty Air is Getting Cleaner and Clean Air is Getting Dirtier, Air Quality Advisory Committee (AQAC) meeting, March 24, 2015, East West Gateway Council of Governments (EWG)

### PROFESSIONAL AFFILIATIONS

American Chemical Society – 2010-

American Meteorological Society –2017-

American Geophysical Union –2017-

**List of Skills:** R, Python, MySQL, Java scripting. Also, I converted a piece of MATLAB code to the Python programming language.

**\*I have software programming experience and data analysis skills in Python, Java, MySQL, R, scripting, MATLAB, etc. I've successfully been able to visualize a multitude of different datasets using scipy, numpy, etc. in Python. Also, I've taken a program written in MATLAB and converted a section of it to Python code.**