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# KEVIN M. MCGRATH

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148 Clubhouse Ln.  
Madison, AL 35757

[kevin@mcgrathimages.com](mailto:kevin@mcgrathimages.com)  
<https://www.linkedin.com/in/kevmcgrath/>

Cell: 256-724-2929

## TECHNICAL SUMMARY

- Degreed Meteorologist, Electrical Engineer, and GIS professional specializing in the processing and visualization of real-time remote sensing and forecast model data
- Extensive software engineering experience supporting operational forecasters by maintaining real-time acquisition of meteorological data and the generation, dissemination, and archiving of derived products
- Programming Languages: Python, JavaScript, PHP, Perl, C, HTML/CSS, SQL
- Technologies: AWS, jQuery, Bootstrap, MapServer, GeoServer, GDAL, OpenLayers, VirtualBox, Docker, Apache HTTP Server, XML, JSON, Elasticsearch, Logstash, Kibana, LDM, NOAAPort, AWIPS II, McIDAS
- Developer Tools: Visual Studio Code, Eclipse, Git/GitHub, Redmine, Jenkins, Gerrit
- Meteorological Data Formats: GRIB, NetCDF, GeoTIFF, GeoJSON, HDF, Shapefile, McIDAS Area, KMZ

## PROFESSIONAL EXPERIENCE

**Research Associate IV** at Colorado State University, CIRA - Teleworking from Madison, AL  
May 2019 - Present

- Employee of CSU's Cooperative Institute for Research in the Atmosphere (CIRA) supporting the National Weather Service's Meteorological Development Laboratory (MDL)
- Lead software developer of the AWS-based Whole Story Uncertainty & Probabilities (WSUP) Viewer web application (<https://vlab.noaa.gov/web/wsup>)
  - This responsive GIS tool provides forecasters with over 700 National Blend of Models (NBM), Global Ensemble Forecast System (GEFS), National Digital Forecast Database (NDFD), Real-Time Mesoscale Analysis (RTMA), and Unrestricted Mesoscale Analysis (URMA) elements in real-time utilizing various technologies including MapServer, OpenLayers, Bootstrap, jQuery, Python, PHP, JavaScript, and AWS cloud technologies (EC2, S3, load balancers, Lambda, etc.). Features include displaying how forecasts have evolved over time (dProg/dt mode), comparing forecast values with min/max station records, an animation download tool, user-selectable color tables, cursor sampling, and an auto-updating mode to always display the latest data.
  - Architect and manage real-time processing of NBM, GEFS, NDFD, RTMA, and URMA data on the Linux-based NWS supercomputer (WCOSS) with output disseminated by the WSUP Viewer and NOAA Open Data Dissemination S3 buckets in various formats (GRIB, TIF, GeoJSON, etc.). The processing uses a combination of Python, Bash, and the PBS HPC job scheduler. A Rocoto-based workflow management solution defines, launches, and tracks over 500 hourly tasks and their associated dependencies.
  - All code for this project is under Git version control with Jenkins and Gerrit used for code review and merging and Redmine used for task tracking
- Experienced installing and configuring the ELK stack (Elasticsearch, Logstash, and Kibana) for ingesting and displaying data from real-time Apache and web app logs

**Software Engineer and Research Meteorologist** at Jacobs Technology - Huntsville, AL  
March 2009 - April 2019

- Member of the Short-term Prediction Research and Transition (SPoRT) Center at the NASA Marshall Space Flight Center (MSFC)
- Sub-Task Lead: "Scientific Disciplines Design, Analysis & Test for Science and Technology" task order
- As leader of the SPoRT IT team, responsible for tracking, assigning, prioritizing, and reporting IT tasks

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- Utilized Git and agile principles to engineer and maintain Linux-based production scripts and programs to generate large sets of real-time meteorological data products and disseminate them to the operational weather community (NWS, The Weather Channel, FEMA, etc.) via Local Data Manger (LDM)
- Managed two GOES-R receiving stations and associated data processing and product generation software
- Integrated data products into end-user's decision support systems (AWIPS II, N-AWIPS, GIS, etc.)
- Developed Java-based code to ingest and display unique products in AWIPS II, including the capability to generate client-side, multi-spectral Red-Green-Blue (RGB) satellite products; served as co-lead of the Experimental Products Development Team
- Managed SPoRT's NOAAPort receiver and LDM server to provide feeds of real-time data to downstream government, private industry, and academic partners
- Transitioned research forecast products to operations via the GOES-R and JPSS Proving Grounds
- Used Python and GDAL to generate and deliver high-resolution satellite analysis products (Landsat, Worldview, ASTER, MODIS, VIIRS, etc.) to the NWS via Web Mapping Service (WMS) to aid post-disaster damage assessments with the Damage Assessment Toolkit
- Maintained a Geoserver WMS server to provide real-time satellite imagery; developed a Linux-based Esri Arc Enterprise ecosystem for serving time-based raster datasets
- Administered the SPoRT web site
- Engineered a system to monitor the health of hundreds of local data products and deliver real-time metrics via dynamically-updating web pages and email alerts
- Managed the Cooperative Huntsville Area Rainfall Measurements (CHARM) program, a network of over 100 volunteers reporting daily precipitation values
- Maintained a network of 11 mesonet stations at MSFC; responsible for software engineering, hardware, and data acquisition, archiving (SQL), and distribution
- Social media manager responsible for generating and posting content to Twitter and Facebook

### **Terrestrial Environments Engineer** at Jacobs Technology - Huntsville, AL

January 2008 - November 2010

- Member of the Natural Environments branch at the NASA MSFC supporting human spaceflight activities
- Created an analysis and display tool using McIDAS, FORTRAN, and Tcl/tk, to provide Space Shuttle and Ares Day-of-Launch I-Loads Update (DOLILU) upper-level wind data analysis and validation to ensure wind profiles were within vehicle design limits; as a DOLILU team member, delivered go/no-go calls for launch availability
- Architect of an IDL-based vertical temperature profile adaptive weather radar scan strategy program for the Cape Canaveral Air Force Weather Station to calculate situation-dependent, mission-optimized radar scan angles, allowing users to best evaluate Launch Commit Criteria
- Assisted in the generation of Ares Weather and Flight Rules Launch Commit Criteria documents

### **Linux / Network Engineer** at 3D Research Corp. - Huntsville, AL

April 2007 - January 2008

- Supported the installation, integration, and testing of a distributed computing environment, comprised of over 1,300 IBM Intellistations and Blade Servers at the White Sands Missile Range under the Army's Future Combat Systems program; implemented a large Storage Area Network (SAN)
- Generated and maintained standard operating procedures and engineering and network drawings

**IT Manager** at 3D Research Corp. - US Army Kwajalein Atoll Weather Station, Marshall Islands

July 2004 - March 2007

- Red Hat Certified Technician who managed all IT-related operations at Kwajalein Atoll Missile Range and Wake Island weather stations
- Administered expanding multi-platform, mission-critical network comprised of Red Hat, SGI IRIX, Sun Solaris, and Windows workstations and servers; ported all in-house SGI software to Red Hat
- Maintained McIDAS-based geostationary and polar orbiting weather satellite receiving stations and data networks
- Extensive experience writing shell scripts and programs to support operational forecasters and maintain automated ingestion and archiving of meteorological data (radar, satellite, surface observations, etc.)
- Responsible for managing the KPOL dual-polarized weather radar data control processor (Sigmet RVP8) and network of client workstations running Sigmet IRIS; assisted with radar calibrations
- Designed and maintained station web site including custom suite of scripts and programs to provide real-time data feeds
- Managed campus LAN that included Cisco firewalls, routers, and switches
- Engineered, implemented, and maintained a digital signage television weather information channel that was broadcast to the island residents

**Forecast Meteorologist** at 3D Research Corp. - US Army Kwajalein Atoll Weather Station, Marshall Islands

June 2003 - July 2004

- Responsible for performing meteorological functions in support of day-to-day operations and missions for the Kwajalein Atoll Missile Range Weather Station; certified NOAA Weather Observer
- Collected, analyzed, and formulated forecasts in support of the aviation, marine, and public communities and mission-specific sensors; issued weather watches, warnings, and advisories
- Secondary responsibilities: Systems Engineer Focal Point, Assistant IT System Admin Focal Point, Web Master

**Electronics Technician**, Doppler on Wheels (DOW) Program at the University of Oklahoma - Norman, OK

April 2001 - June 2003

- Provided mechanical and electrical support for the mobile radars; assisted in equipment start-up and testing
- Responsible for training students in DOW field operations and data collection
- Field projects included Radar Observation of Tornadoes and Thunderstorms Experiment (ROTATE) 2001 and 2003 and International H<sub>2</sub>O Project (IHOP) 2002

**Graduate Research Assistant**, School of Meteorology at the University of Oklahoma - Norman, OK

July 2000 - May 2003

- Research involved processing Level II WSR-88D radar data to produce a mesocyclone climatology using the National Severe Storms Laboratory's Mesocyclone Detection Algorithm
- Authored a suite of C and Perl programs to filter and analyze radar data; managed Linux workstation
- Teaching Assistant for graduate-level radar class

**Student Intern** at the National Weather Service, Detroit Forecast Office - White Lake, MI

May 1999 - September 1999

- Gained operational forecasting experience using AWIPS and operation of the WSR-88D radar  
Wrote a C-shell script that continuously updated a NWS web page containing severe weather warnings

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### EDUCATION

**Masters in Meteorology**, University of Oklahoma - Norman, OK  
**BSE in Electrical Engineering**, University of Michigan - Dearborn, MI

July 2000 - May 2003  
September 1995 - May 2000

### AFFILIATIONS

- Vice President of the Madison City Community Orchestra (2022 - current)
- Past NASA representative on the American Meteorological Society Board for Operational Government Meteorologists (2018 - 2020)
- Past Board Member, AMS/National Weather Association Local Chapter - Huntsville, AL (2019 – 2021)
- Eagle Scout, Boy Scouts of America
- Eta Kappa Nu (HKN) Electrical Engineering Honor Society

### AWARDS AND RECOGNITION

- NASA MSFC Group Achievement Award for outstanding technical support in disaster monitoring and response for Hurricane Harvey (August 2018)
- NASA MSFC Group Achievement Honor Award for outstanding contributions to the disaster response efforts for the 2015 Nepal earthquake through the acquisition, analysis, and distribution of satellite observations (July 2016)
- NASA Headquarters Group Achievement Award to the SPoRT Disaster Response Team for exemplary support of the Agency and to the Nation during the 2012 Hurricane Sandy super-storm and 2013 Oklahoma tornado outbreak (August 2014)
- Jacobs Technical Accomplishment Award for the production of imagery from NASA satellites in a very short time that allowed a completely new vision of the areas affected by Hurricane Sandy, which allowed very specific information regarding where power had been lost along the Eastern Seaboard of the United States (February 2013)
- NASA MSFC Certificate of appreciation for significant and timely contributions to the relief efforts of Hurricane Sandy by effectively providing space-based observations to decision makers regarding power outages (November 2012)
- NASA Space Flight Awareness Team Award in recognition of sustained superior performance in support of the Space Shuttle DOLILU Operations (May 2011)
- NASA Johnson Space Center Group Achievement Award as a member of the STS-130 DOLILU Team for excellent in pre-flight analysis and integration, including support with launch I-Load generation, to assure safe vehicle loads and performance margin during ascent (June 2010)
- NASA Missions Manager's Flight Commendation for dedicated support of the successful Ares I-X test flight (October 2009)

### RECENT PUBLICATIONS

- Molthan, A. L., L. A. Schultz, K. M. McGrath, J. E. Burks, J. P. Camp, K. Angle, J. R. Bell, and G. J. Jedlovec, 2020: Incorporation and Use of Earth Remote Sensing Imagery within the NOAA/NWS Damage Assessment Toolkit. *Bull. Amer. Meteor. Soc.*, **101**, E323–E340, <https://doi.org/10.1175/BAMS-D-19-0097.1>.

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- Shrestha, S., K. M. McGrath, G. T. Stano, C. J. Schultz, P. J. Meyer, 2019: Real-Time Data Management and Visualization for Geostationary Lightning Mapper (GLM) in ArcGIS Platform. *99<sup>th</sup> Annual Meeting, Amer. Meteor. Soc.*, Phoenix, Arizona.
- McGrath, K. M., P. J. Meyer, G. J. Jedlovec, E. B. Berndt, 2018: NASA MSFC GOES-16 Receiving Station and Data Visualization. *98<sup>th</sup> Annual Meeting, Amer. Meteor. Soc.*, Austin, Texas.
- McGrath, K. M., E. B. Berndt, C. M. Gravelle, L. A. Byerle, A. L. Molthan, M. R. Smith, 2018: AWIPS II Client-side RGB Product Generation in the GOES-R Era. *98<sup>th</sup> Annual Meeting, Amer. Meteor. Soc.*, Austin, Texas.
- Stano, G. T., P. J. Meyer, K. M. McGrath, C. J. Schultz, 2018: Early Assessment of Geostationary Lightning Mapper Observations. *98<sup>th</sup> Annual Meeting, Amer. Meteor. Soc.*, Austin, Texas.
- Schultz, L. A., A. L. Molthan, K. M. McGrath, J. E. Burks, T. A. Cole, 2017: Inclusion of Satellite Remote Sensing Imagery in the NOAA/NWS Damage Assessment Toolkit (DAT). *97<sup>th</sup> Annual Meeting, Amer. Meteor. Soc.*, Seattle, Washington.
- Naeger, A. R., P. Gupta, B. Zavodsky, and K. M. McGrath, 2015: Monitoring and Tracking the Trans-Pacific Transport of Aerosols Using Multi-Satellite Aerosol Optical Depth Retrievals. *Atmos. Meas. Tech. Discuss.*, 8, 10319-10360. (<http://www.atmos-meas-tech-discuss.net/8/10319/2015/amtd-8-10319-2015.html>)
- McGrath, K. M., A. L. Molthan, and J. E. Burks, 2014: Use of NASA Near Real-Time and Archived Satellite Data to Support Disaster Assessment. *94<sup>th</sup> Annual Meeting, Amer. Meteor. Soc.*, Atlanta, Georgia.
- Burks, J. E., M. R. Smith, and K. M. McGrath, 2014: AWIPS II Application Development, a SPoRT Perspective. *94<sup>th</sup> Annual Meeting, Amer. Meteor. Soc.*, Atlanta, Georgia.