

Frank McDonough

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Professional Preparation

Colorado State Univ., Fort Collins, CO	Atmospheric Science	M.Sci. 2010
Metropolitan State Univ., Denver, CO	Applied Math & Meteorology	B.Sci. 1996

Appointments

2014 – present	Assistant Research Scientist, Desert Research Institute, Division of Atmospheric Sciences, Reno, NV
2012 – 2015	Wind Turbine Winter Weather Analyst, O2X Vindkompaniet AB – Stockholm, Sweden
2008 – 2014	Cloud Physics expert/icing certification meteorologist, Leading Edge Atmospherics – Longmont, CO
1996 – 2012	Research Meteorologist, NCAR, Research Applications Laboratory, Boulder, CO.
2008 – 2012	Long-term weather/climate prediction specialist, Thompson Reuters/ Weather Insight, Houston, TX

Synergistic Activities

- 18 years experience working as a research and forecast meteorologist.
- Worked on projects relating to: aviation icing forecasting, weather modification research and operations, wind turbine icing, energy weather product development, and aircraft cloud instrumentation.
- Demonstrated expertise in supercooled cloud physics. Expert in identifying, analyzing, and differentiating clouds that contain supercooled liquid water, ice, and mixed phase.
- Expert knowledge working with research aircraft data sets that include cloud particle and aerosol measurements.
- Icing weather forecaster and data analyst for research aircraft.
- Demonstrated expertise working with climate data sets.
- Experience working with and verifying numerical weather data.
- Expert analyst of most observational data types, radar and satellite imagery, as well as high-resolution numerical model output. Using these data I co-developed operational diagnostic and forecast cloud models that detect supercooled liquid water and tropical clouds containing high mass concentrations of small ice crystals. These systems passed peer review and meet the needs of the general aviation community. Examples include CIP and FIP, which are used as guidance at the Aviation Weather Center. <http://www.aviationweather.gov/adds/icing/>
- Expert knowledge testing and verifying numerical model output.
- Extensive experience working with large programs using software tools and programming languages such as; UNIX, Matlab, C++, FORTRAN, and shell scripting.

Computer Skills

- Proficient: Linux/Unix, Matlab, FORTRAN, C++, MS office, Python
- Data formats: NetCDF, GRIB, GRIB2, binary formats, satellite and radar formats
- Data base: MySQL

Selected Professional Awards

- University Corporation for Atmospheric Research (UCAR) - Science and Technical Advancement Award (wind energy research and forecasting) – 2011
- NASA - Characterization of Arctic Sea Ice Experiment (CASIE), Ames Honor Award and the Group Achievement Award – 2009
- NASA - Turning Goals into Reality Aircraft Icing Project Team - 2001

Publications

- Rosenfeld, R. Chemke, P. DeMott, R. Sullivan, R.M. Rasmussen, F. McDonough, J. Comstock, B. Schmid, J. Tomlinson, H. Jonsson, K. Suski, A. Cazorla, and K. Prather (2013): The Common Occurrence of Highly Supercooled Drizzle and Rain Near the Coastal Region of the Western United States. *J. Geo. Res. Atmos.*, **118**(17), 9819- 9833.
- Ikeda, K., R.M. Rasmussen, E. Brandes, and F. McDonough (2009): Freezing Drizzle Detection with WSR 88D Radars. *J. Appl. Meteor. Clim.*, **48**, 41-60.
- Bernstein, B.C., C.A. Wolff, and F. McDonough (2007): An Inferred Climatology of Icing Conditions Aloft, Including Supercooled Large Drops. Part I: Canada and the Continental United States. *J. Appl. Clim.*, **46**, 1857-1878.
- Bernstein, B.C, F. McDonough, M.K. Politovich, B.G. Brown, T.P. Ratvasky, D.R. Miller, C.A. Wolff, and G. Cuning (2005): Current Icing Potential (CIP): Algorithm Description and Comparison with Aircraft Observations. *J. Appl. Meteor.* **44**, 969-986.

Reports

- McDonough, F., 2015: Cloud Seeding Operations and Research in the Walker River Basin to Increase Water Delivery to Walker Lake, Final Report for Water Year 2015: Prepared for DOI-Bureau of Reclamation, October 30, 2015, Award #R10AP20105.
- McDonough, F., 2015: Cloud Seeding Project for Tahoe and Truckee Basins for WY2015: Status Update for Oct 2014 -June 2015, Annual Report prepared for TMWA and WRWC, July 1, 2015, Award #PO 001885.
- McDonough, F., 2015: Cloud Seeding Operations and Research in the Walker River Basin to Increase Water Delivery to Walker Lake, Semi-Annual Report for Water Year 2015: Prepared for DOI-Bureau of Reclamation, April 1, 2015, Award # R10AP20105.
- McDonough, F., 2015: Report on the second quarter (Jan – Apr 2015) of remotely controlled cloud seeding operations for the WY2015 Winter Park – Denver Water Cloud Seeding Project, Quarterly Report: Prepared for CWCB and Winter Park Ski Area, March 1, 2015, Award #POGG1 PDAA 20160000000000000390.
- McDonough, F., 2015: Report on the first quarter (Oct – Dec 2014) of remotely controlled cloud seeding operations for the WY2015 Winter Park – Denver Water Cloud Seeding Project, Quarterly Report: Prepared for CWCB and Winter Park Ski Area, March 1, 2015, Award # POGG1 PDAA 20160000000000000390.

Conference Proceedings and Presentations

- McDonough, F., 2015: Winter orographic cloud seeding in the Sierra Nevada and Colorado: Summary of operations and selected case studies. *WMA Annual Meeting*, Fargo, ND, April 22, 2015.
- Nelson, M., McDonough, F., 2015: Profiling microwave radiometer measurements over the Vail/Beaver Creek, Colorado target areas. *WMA Annual Meeting*, Fargo, ND, April 22, 2015.
- Tilley, J., Huggins, A. W., Layman, L. R., Fearon, M. G., David, R. O., McDonough, F., 2015: Trace Chemical Analysis of Water and Soil during the WWMPP: Results and Implies Environmental Impacts. *20th Conference on Planned and Inadvertent Weather Modification*, Phoenix, AZ, January 4, 2015.
- Haggerty J.A., F. McDonough, J. Black, G. Cunning, G. McCabe, and C. Wolff (2012): A System for Nowcasting Atmospheric Conditions Associated with Jet Engine Power Loss and Damage Due to Ingestion of Ice Particles. *4th AIAA Atmospheric and Space Environments Conference*, New Orleans, LA, 25-28 June 2012.
- McDonough, F., and C.A. Wolff (2011): The Large and Small-Scale Structure and Evolution of a Mixed Phase Icing Cloud. *SAE 2011 International Conference on Aircraft and Engine Icing and Ground Deicing*. Chicago, IL, 12-16 June 2011.
- McDonough, F., C.A. Wolff, and M.K. Politovich (2010): A Regional Analysis of Clouds Containing Supercooled Liquid Water. *AMS 14th Conference on Aviation Range and Aerospace Meteorology*, Atlanta, GA, 17-21 January 2010 (available on line)
- Wolff, C.A., F. McDonough (2010): A Comparison of the WRF Rapid Refresh and Rapid Update Cycle Numerical Models to Aircraft Icing Conditions. *AMS 14th Conference on Aviation Range and Aerospace Meteorology*, Atlanta GA, 17-21 January 2010. (available online).
- McDonough, F. (2010): The Global Forecast Icing Product. AIAA-2010-08111, *AIAA Atmospheric and Space Environments Conference*, Toronto, Ontario, 2-5 August 2010.
- McDonough, F. (2008): Forecasting Supercooled Large Drop Icing Conditions. *13th Conference on Aviation Range and Aerospace Meteorology*, New Orleans, LA., 20-24 January 2008.