

CURRICULUM VITAE

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EDUCATIONAL BACKGROUND

- 2002 **Ph.D. in Physics**; Thesis: ‘Determination of three-dimensional wind-vector fields using bistatic Doppler radar’ for the Department of Physics at the Ludwig-Maximilians University in Munich, under Professors Dr. Ulrich Schumann and Dr. Roger Smith.
- 1999 **Diploma (equivalent to a Master’s Degree) in Meteorology**; Thesis: ‘Numerical investigation on the sensitivity of the Bowen-ratio’ for the Department of Meteorology at Leipzig University, under Professors Dr. Nicole Mölders and Dr. Gerd Tetzlaff.
- 1996 **Pre-diploma (equivalent to a Bachelor’s Degree) in Physics** for the Department of Physics at Leipzig University.

EMPLOYMENT HISTORY

- 2018 – present **Associate Chair** at the Department of Atmospheric and Oceanic Sciences, University of Colorado at Boulder, USA.
- 2015 – present **Associate Professor** at the Department of Atmospheric and Oceanic Sciences, University of Colorado at Boulder, USA.
- 2008 – 2015 **Assistant Professor** at the Department of Atmospheric and Oceanic Sciences, University of Colorado at Boulder, USA.
- 2005 – 2007 **Research Scientist** at the Swiss Weather Service, MeteoSwiss, Locarno, Switzerland.
- 2004 – 2005 **Postdoctoral Researcher** at the Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado at Boulder and National Oceanic and Atmospheric Administration’s (NOAA) Physical Sciences Division (formally Environmental Technology Laboratory), Boulder, USA.
- 2002 – 2004 **Research Scientist** at the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt, DLR, Oberpfaffenhofen, Germany), Institute of Atmospheric Physics, Dept. of Cloud Physics and Air-Traffic Meteorology, Oberpfaffenhofen, Germany.
- 1999 – 2002 **Graduate Student Research Associate** employed by above-named Institute.
- 1995 – 1996 **Research Assistant** to Dr. Banzaff at the Center for Environmental Research Leipzig, Germany.
- 1993 – 1999 **Research Assistant** to Dr. Nicole Mölders, Institute of Meteorology, Leipzig University, Leipzig, Germany.

PUBLICATIONS

1. McCaffey, K., J. M. Wilczak, L. Bianco, E. Gruit, J. Sharp, R. Banta, **K. Friedrich**, H. J. S. Fernando, R. Krishnamurthy, L. Leo. P. Muradyan, 2020: Identification and characterization of persistent cold pool events from temperature and wind profilers in the Columbia River Basin. *J. Appl. Meteor. Climatol.*, (in press)
2. Rauber, B., B. Geerts, L. Xue, J. French, **K. Friedrich**, R. Rasmussen, S. Tessendorf, D. Blestrud, M. Kunkel, S. Parkinson, 2019: Wintertime Orographic Cloud Seeding-A Review. *J. Appl. Meteor. Climatol.*, **58**, 2117-2140.
3. Saltikoff, E., **K. Friedrich**, J. Soderholm, K. Lengfeld, B. Nelson, A. Becker, R. Hollmann, B. Urban, M. Heistermann, C. Tasson: An overview of using weather radar for climatological studies: Successes, challenges and potential. *Bull. Amer. Meteor. Soc.*, **100**, 1739–1752.
4. Wilczak, J. and co-authors (**K. Friedrich**), 2019: The Second Wind Forecast Improvement Project (WFIP2): Observational Field Campaign. *Bull. Amer. Meteor. Soc.*, **100**, 1701–1723.
5. Wallace*, R., K. Friedrich, E.A. Kalina, and P. Schlatter, 2019: Using operational radar to identify deep hail accumulations from thunderstorms. *Wea. Forecasting*, **34**, 133-150.
6. **Friedrich**, K., R. Wallace, B. Meier, N. Rydell, W. Deierling, E. Kalina, B. Motta, P. Schlatter, T. Schlatter, and N. Doesken, 2019: CHAT – the Colorado Hail Accumulation from Thunderstorms project. *Bull. Amer. Meteor. Soc.*, **100**, 459-471.
7. Tessendorf, S. A., J. R. French, **K. Friedrich**, B. Geerts, R. M. Rauber, R. M. Rasmussen, L. Xue, K. Ikeda, D. R. Blestrud, M. L. Kinkel, S. Parkinson, J. S. Snider, J. Aikins, S. Faber, A. Majewski, C. Grasmick, P. T. Bergmaier, A. Janiszski, A. Springer, C. Weeks, D. J. Serke, R. Brintjes, 2018: A transformational approach to winter orographic weather modification research: The SNOWIE Project. *Bull. Meteor. Soc.*, **100**, 71-92.
8. **Friedrich**, K., R. L. Grossman, J. Huntington, P. D. Blanken, J. Lenters, K. D. Holman, D. Gochis, B. Livneh, J. Prairie, E. Skeie, N. C. Healey, K. Dahm, C. Pearson, T. Finnessey, S. J. Hook, T. Kowalski, 2018: Reservoir Evaporation in the Western United States: Current Science, Challenges, and Future Needs. *Bull. Meteor. Soc.* 10.1175/BAMS-D-15-00224.1.
9. French, J. R., **K. Friedrich**, S. Tessendorf, R. Rauber, B. Geerts, R. Rasmussen, L. Xue, M. Kinkel, and D. Blestrud, 2018: Precipitation formation from orographic cloud seeding. *Proceedings of the National Academy of Sciences of the United States of America*. 201716995; DOI: 10.1073/pnas.171699511.
10. Edwin, S. G., N. Mölders, **K. Friedrich**, S. Schmidt, and R. Thoman, 2017: Conditions supporting funnel cloud development in Alaska. *Atmospheric and Climate Sciences*, **7**, 223-245. doi: 10.4236/acs.2017.72016.
11. Bianco, L., **K. Friedrich**, J. Wilczak, D. Hazen, D. Wolfe, R. Delgado, S. Oncley, and J. K. Lundquist, 2017: Assessing the accuracy of microwave radiometers and radio acoustic sounding systems for wind energy applications. *Atmos. Meas. Tech.*, **10**, 1707-1721, doi:10.5194/amt-10-1707-2017.
12. Lundquist, J. K., J. M. Wilczak, R. Ashton, L. Bianco, W. A. Brewer, A. Choukulkar, A. J. Clifton, M. Debnath, R. Delgado, **K. Friedrich** and co-authors 2017: Assessing state-of-the-art capabilities for probing the atmospheric boundary layer: the XPIA field campaign. *Bull. Meteor. Soc. Bull. Meteor. Soc.*, **98**, 290-314.

13. Pokharel B., B. Geerts, X. Jing, **K. Friedrich**, K. Ikeda, R. Rasmussen, 2017: A Multi-sensor Study of the Impact of Ground-based Glaciogenic Seeding on Clouds and Precipitation over Mountains in Wyoming. Part II: Seeding Impact Analysis. *Atmospheric Research*, **138**, 42–57.
14. Aikins*, J., **K. Friedrich**, B. Geerts, and B. Pokharel, 2016: Role of a Low-Level Jet and Turbulence on Winter Orographic Snowfall. *Mon. Wea. Rev.*, **144**.
15. Livneh, B., **K. Friedrich**, and P. Blanken, 2016: New Interest in Reservoir Evaporation for Western U.S. Water Resource Management. *Eos*, 97, doi:10.1029/2016EO048679.
16. Kalina*, E. A., **K. Friedrich**, B. C. Motta, W. Deierling, G. T. Stano, N. N. Rydell, 2016: Colorado plowable hail storms: Synoptic weather, radar and lighting characteristics. *Weather and Forecasting*, **31**, 663-693.
17. **Friedrich, K.**, E. A. Kalina*, J. Aikins*, D. Gochis, and R. Rasmussen, 2016: Precipitation and cloud structures of intense rain during the 2013 Great Colorado Flood. *J. Hydromet.*, **17**, 27-52.
18. **Friedrich, K.**, E. A. Kalina*, J. Aikins*, J. Sun, D. Gochis, P. Kucera, K. Ikeda, and M. Steiner, 2016: Raindrop size distribution and rain characteristics during the 2013 Great Colorado Flood. *J. Hydromet.*, **17**, 53-72.
19. Jing, X., B. Geerts, B. Pokharel, and **K. Friedrich**, 2015: Dual-polarization radar data analysis of the impact of ground-based glaciogenic seeding on winter orographic clouds. Part I: Mostly stratiform clouds. *J. Appl. Meteor. Climatol.*, **54**, 1944-1969.
20. Gochis, D., R. Schumacher, **K. Friedrich**, N. Doesken, M. Kelch, J. Sun, K. Ikeda, D. Lindsey, A. Wood, B. Dolan and others (26 authors), 2015: The great Colorado flood of September 2013. *Bull. Meteor. Soc.*, **96**, 1461–1487.
21. Bluestein, H. B., R. M. Rauber, D. W. Burgess, A. Albrecht, S. M. Ellis, Y. P. Richardson, D. P. Jorgensen, S. J. Frasier, P. Chilson, R. D. Palmer, S. E. Yuter, W.-C. Lee, D. C. Dowell, P. L. Smith, P. M. Markowski, **K. Friedrich**, and T. Weckwerth, 2014: Summary of the 2012 National Science Foundation community workshop on radar technologies. *Bull. Amer. Meteor. Soc.*, **95**, 1850–1861.
22. Kalina*, E. A., **K. Friedrich**, H. Morrison, and G. Bryan, 2014: Aerosol effects on simulated supercell thunderstorms in different environments. *J. Atmos. Sci.*, **71**, 4558-4580.
23. Kalina*, E. A., **K. Friedrich**, S. M. Ellis, and D. W. Burgess, 2014: Comparison of disdrometer and X-band mobile radar observations in convective precipitation. *Mon. Wea. Rev.*, **142**, 2414-2435.
24. Rudolph[#], J. V., and K. Friedrich, 2014: Atmospheric and surface conditions as predictors for precipitation characteristics. *J. Clim.*, **27**, 2143-2158.
25. Pokharel, B., B. Geerts, X. Jing, K. Friedrich, J. Aikins*, D. Breed, R. Rasmussen, and A. Huggins, 2014: The impact of ground-based glaciogenic seeding on clouds and precipitation over mountains: a multi-sensor case study of shallow precipitating orographic cumuli. *Atmos. Res.*, **147-148**, 162-182.
26. **Friedrich, K.**, S. Higgins*, F. J. Masters, and C. R. Lopez, 2013: Articulating and stationary PARSIVEL disdrometer measurements in severe weather conditions. *J. Atmos. Oceanic Technol.*, **30**, 2063-2080.
27. Geerts, B., B. Pokharel, **K. Friedrich**, D. Breed, R. Rasmussen, Y. Yang, Q. Miao, S. Haimov, B. Boe, and B. Lawrence, 2013: The AgI Seeding Cloud Impact Investigation (ASCI) campaign 2012: overview and preliminary results. *J. Wea. Mod.*, **45**, 24-43.

28. Rudolph*, J. V., and **K. Friedrich**, 2013: Seasonality of vertical structure in radar-observed precipitation over southern Switzerland, *J. Hydromet.*, **14**, 318-330.
29. **Friedrich, K.**, E. A. Kalina*, F. J. Masters and C. R. Lopez, 2013: Drop-size distributions in thunderstorms measured by optical disdrometers during VORTEX2. *Mon. Wea. Rev.*, **141**, 1182-1203.
30. **Friedrich, K.**, J. K. Lundquist, M. Aitken, E. A. Kalina*, and R. F. Marshall, 2012: Stability and turbulence in the atmospheric boundary layer: A comparison of remote sensing and tower observations. *Geophys. Res. Lett.*, Vol. 39, No. 3, L03801, doi:10.1029/2011GL050413. (6 pages + 8 pages auxiliary material)
31. Rudolph*, J. V., **K. Friedrich**, and U. Germann, 2012: Model-based estimation of dynamic effect on 21st century precipitation for Swiss river basins. *J. Climate*, **25**, 2897-2913.
32. Rudolph*, J. V., **K. Friedrich**, and U. Germann, 2011: Relationship between radar-estimated precipitation and synoptic weather patterns in the European Alps. *J. Appl. Meteor. Climatol.*, **50**, 944–957.
33. Dotzek, N., and **K. Friedrich**, 2009: Downburst-producing thunderstorms in southern Germany: Radar analysis and predictability. *Atmos. Res.*, **93**, 457–473.
34. **Friedrich, K.**, U. Germann, and P. Tabary, 2009: Influence of ground clutter contamination on the accuracy of polarimetric quantities and rainfall rate. *J. Atmos. Oceanic Technol.*, **26**, 251-269.
35. **Friedrich, K.**, D. E. Kingsmill, C. Flamant, H. V. Murphey, and R. M. Wakimoto, 2008: Kinematic and moisture characteristics of a nonprecipitating cold front observed during IHOP. Part II: Along-front structures. *Mon. Wea. Rev.*, **136**, 3796-3821.
36. **Friedrich, K.**, D. E. Kingsmill, C. Flamant, H. V. Murphey, and R. M. Wakimoto, 2008: Kinematic and moisture characteristics of a nonprecipitating cold front observed during IHOP. Part I: Across-front structures. *Mon. Wea. Rev.*, **136**, 147-172.
37. **Friedrich, K.**, U. Germann, J. J. Gourley, and P. Tabary, 2007: Effects of radar beam shielding on rainfall estimation for polarimetric C-band radar. *J. Atmos. Oceanic Technol.*, **24**, 1839-1859.
38. **Friedrich, K.**, M. Hagen, and T. Einfalt, 2006: A quality control concept for radar reflectivity, polarimetric parameters, and Doppler velocity. *J. Atmos. Oceanic Technol.*, **23**, 865-887.
39. **Friedrich, K.**, D. E. Kingsmill, and C. R. Young, 2005: Mesocyclone characteristics along Florida gust fronts during CaPE. *Mon. Wea. Rev.*, **133**, 3345-3367.
40. **Friedrich, K.**, and M. Hagen, 2004: Evaluation of wind vectors measured by a bistatic Doppler radar network. *J. Atmos. Oceanic Technol.*, **21**, 1840-1854.
41. **Friedrich, K.**, and M. Hagen, 2004: On the use of advanced Doppler radar techniques to determine horizontal wind-fields for operational weather surveillance. *Meteor. Appl.*, **11**, 155-171.
42. **Friedrich, K.**, and O. Caumont*, 2004: Dealiasing Doppler velocities measured by a bistatic radar network during a downburst-producing thunderstorm. *J. Atmos. Oceanic Technol.*, **21**, 717-729.
43. **Friedrich, K.**, and M. Hagen, 2004: Wind synthesis and quality control of dual-Doppler derived horizontal wind-fields. *J. Appl. Meteor.*, **43**, 38-57.
44. Tetzlaff, G., R. Dlugi, **K. Friedrich**, G. Gross, D. Hinneburg, N. Mölders, U. Pahl, and M. Zelger, 2002: On modeling dry deposition of long-lived and chemically reactive species over heterogeneous terrain: *J. Atmos. Chem.* **42**, 123-155.

45. **Friedrich, K.**, M. Hagen, and P. Meischner, 2000: Vector wind field determination by bistatic multiple-Doppler radar. *Phys. Chem. Earth (B)*, **25**, 1205-1208.
46. **Friedrich, K.**, and N. Mölders, 2000: On the influence of surface heterogeneity on latent heat fluxes and stratus properties. *Atmos. Res.* **54**, 59-85.
47. **Friedrich, K.**, N. Mölders, and G. Tetzlaff, 2000: On the influence of surface heterogeneity on the Bowen-ratio: A theoretical case study. *Theor. Appl. Climatol.* **65**, 181-196.

INVITED TALKS

1. Friedrich, K. 2019: “Making Snow – New Insights from Orographic Cloud Seeding” November 2019, CU Boulder, CO, as part of the *CU Saturday Physics Series*.
2. Friedrich, K. 2018: CHAT – Colorado Hail Accumulation from Thunderstorm project. University of Northern Colorado, September 2018, Greeley, CO.
3. Friedrich, K. 2018: Radar Analyses. Course to train forecasters from the *Korean Meteorological Agency (KMA) and The COMET Program*. May 2018, Boulder, CO.
4. Friedrich, K. 2018: Radar Analyses. Course to train forecasters from the *Chinees Weather Service and The COMET Program*. November 2018, Boulder, CO.
5. Friedrich, K., 2018: An Overview of the SNOWIE field campaign. *Hydrological Symposium*. CU Boulder.
6. Friedrich, K. 2017: Radar Analyses. Course to train forecasters from the *Korean Meteorological Agency (KMA) and The COMET Program*. December 2017, Boulder, CO.
7. Friedrich, K. 2017: Study of Convective and Orographic Precipitation (SCOOP). *NCAR Advanced Study Program’s summer colloquium on “The Interaction of Precipitation with Orography”* (June 5-16) in Boulder.
8. Friedrich, K. 2017: Radar Analyses of Mountain Winter Precipitation. Course to train the next Winter Olympic Games forecasters organized by the *Korean Meteorological Agency (KMA) and The COMET Program*. July 2017, Boulder, CO.
9. Friedrich, K. 2017: Radar Analyses. Course to train forecasters from the *Korean Meteorological Agency (KMA) and The COMET Program*. July 2017, Boulder, CO.
10. Friedrich, K., 2017: The Future of Skiing: The Science Behind Snow. Panel discussion at the Arapahoe Basin Ski Resort, April.
11. Friedrich, K., 2017: Diurnal winds and dynamically-driven winds. REI Sports, January, Boulder, CO.
12. Friedrich, K. 2016: Radar Analyses of Winter Weather. Course to train weather service forecasters organized by the *Korean Meteorological Agency (KMA) and The COMET Program*. November 2016, Boulder, CO.
13. Friedrich, K. 2016: Rasante Hagelbildung in Gewittern. *University of Leipzig, Germany*. January 2016, Leipzig, Germany.
14. Friedrich, K. 2015: Radar Analyses of Mountain Winter Precipitation. Course to train the next Winter Olympic Games forecasters organized by the *Korean Meteorological Agency (KMA) and The COMET Program*. September 2015, Boulder, CO.
15. Friedrich, K. 2014: Radar Analyses of Mountain Winter Precipitation. Course to train the next Winter Olympic Games forecasters organized by the *Korean Meteorological Agency (KMA) and The COMET Program*. October 2014, Boulder, CO.
16. Friedrich, K. 2014: Series of four 2-hr seminar talks on radar applications given at the *Korean Meteorological Administration*, May 2014, Seoul, South Korea. Seminar titles:
 - The art of using weather radars

- The art of using dual-polarization weather radars
 - Effects of orographic convection on cloud and precipitation development in winter storms
 - Studying microphysical characteristics in supercell thunderstorms using mobile dual-polarization radars and mobile disdrometers during VORTEX2
17. Friedrich, K. 2013: Developing joint efforts in research and teaching between the atmospheric science departments at the U. of Colorado and U. of Cologne. *Global Partner Network Conference*, October 2013, Cologne, Germany.
 18. Friedrich, K., 2013: Microphysical processes in supercell thunderstorms. October 2013, *Dept. of Meteorology and Geophysics, University of Cologne*, October 2013, Cologne, Germany.
 19. Friedrich, K., 2013: 100 Jahre Gewitterforschung: Wolkenphysik in Superzellengewitter. Colloquium celebrating the *100th Anniversary of the Leipzig Institute of Meteorology at the University of Leipzig, Germany*, July 2013, Leipzig, Germany
 20. Friedrich, K., 2013: Measurements of Drop-Size Distributions in Thunderstorms during VORTEX2. *Seminar at the Colorado State University*, February 2013, Fort Collins, CO.
 21. Friedrich, K., J. Lundquist, M. Aitkin, E. Kalina*, and R. Marshall, 2012: Stability and turbulence in the atmospheric boundary layer: A comparison of remote sensing and tower observations. *Fourth Annual Center for Research and Education in Wind (CREW) symposium*, August 2012, Fort Collins, CO.
 22. Friedrich, K., J. Lundquist, M. Aitkin, E. Kalina*, and R. Marshall, 2012: Stability and turbulence in the atmospheric boundary layer: A comparison of remote sensing and tower observations. *Summer School in Remote Sensing for Wind Energy*, June 2012, Boulder, CO.
 23. Friedrich K, J. Wurman, and K. Kosiba, 2010: Radar and Drop-Size Distribution Measurements in Hurricane Ike. *Seminar at NOAA's Atlantic and Oceanographic and Meteorological Laboratory, Hurricane Research Division*. January 2010, Miami, FL, USA.
 24. Friedrich K., 2008: Kinematische und thermodynamische Strukturen entlang einer stationaeren Kaltfront. *Seminar at Deutsches Zentrum fuer Luft- und Raumfahrt*, June 2008, Oberpfaffenhofen, Germany.
 25. Friedrich K., 2008: Innovations in monitoring and nowcasting orographic precipitation by weather radars. *Alaska Weather Symposium at University of Alaska*, May 2008, Fairbanks, Alaska.
 26. Friedrich K., 2007: Investigating processes controlling the formation and enhancement of precipitation using radar technology. *Seminar at the University of Colorado at Boulder*, March 2007, Boulder, USA.
 27. Friedrich, K., 2007: Polarimetrisches Radar im Alpenraum. *Invited talk at the general management of MeteoSwiss*, May 2007, Zurich, Switzerland.
 28. Friedrich, K., 2007: Weather radars in the Alps: Future trends and technology. *Invited talk at the scientific colloquium at MeteoSwiss*, May 2007, Zuerich, Switzerland.
 29. Friedrich, K., 2007: Investigating processes controlling the formation and enhancement of precipitation using radar technology. *Invited talk at University of Colorado, Boulder*, March 2007, Boulder, CO, USA.
 30. Friedrich, K., 2006: From research to operational usage – POLDIRAD's contribution to wind and precipitation measurements. *Invited talk as part of the celebrations to the 20th*

anniversary of the Polarimetric Diversity Doppler Radar at the German Aerospace Center, October 2006, Oberpfaffenhofen, Germany.

31. Friedrich, K., U. Germann, G. Galli, J. J. Gourley, P. Tabary, J. Parent du Chatelet, 2006: The effect of beam shielding on polarimetric rainfall estimates – Do phase-based quantitative precipitation estimates at C-band really increase the accuracy? *General Assembly of the European Geophysical Union*, April 2006, Vienna, Austria.

Boulder, 29 December 2020

Katja Friedrich, Ph.D.