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CURRICULUM VITAE - K. FRANKLIN EVANS

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RESEARCH INTERESTS:

Dr. Evans' research is centered on radiative transfer in and remote sensing of clouds. One major focus is developing techniques for remote sensing ice clouds using passive submillimeter-wave radiometers. Another focus is considering the effects of cloud inhomogeneities on radiative transfer and remote sensing.

EDUCATION:

B.S. with honors, Physics, California Institute of Technology, 1983

M.S., Astronomy, California Institute of Technology, 1986

M.S., Atmospheric Science, Colorado State University, 1990

Ph.D., Atmospheric Science, Colorado State University, 1993

EMPLOYMENT:

Graduate Research Assistant, California Institute of Technology, 1983-1984

Member of the Technical Staff, Jet Propulsion Laboratory, 1985-1987

Graduate Research Assistant, Colorado State University, 1987-1993

Assistant Professor, University of Colorado, 1994-2000

Associate Professor, University of Colorado, 2000-2002

Senior Research Associate, University of Colorado, August 2002-October 2015

Research Associate, University of Colorado, November 2015-January 2017

AWARDS:

AMS award for best student paper at the 8th Conference on Atmospheric Radiation, 1994

American Meteorological Society 2001 Henry G. Houghton award "for perceptive conceptual advances in theory, measurement, and three-dimensional modeling of radiative transfers in cloudy skies."

PROFESSIONAL SERVICE:

Member, AMS Committee on Atmospheric Radiation, 1998-2002

Chair, American Meteorological Society Committee on Atmospheric Radiation, 1999-2002

SELECTED INVITED TALKS:

"Three-Dimensional Radiative Transfer Modeling in Clouds: Modern Methods and Recent Results", Gordon conference on Solar Radiation and Climate, June 17, 1998.

"Submillimeter-Wave Remote Sensing of Cloud Ice Water Path and Particle Size", Gordon conference on Solar Radiation and Climate, June 28, 2000.

NUMERICAL MODELS DISTRIBUTED:

- Spherical Harmonic Discrete Ordinate Method (SHDOM) three-dimensional atmospheric radiative transfer model (`http://nit.coloradolinux.com/shdom.html`).
- Plane-parallel SHDOM for data assimilation (SHDOMPPDA) (`http://nit.coloradolinux.com/shdomppda/`).
- Polarized radiative transfer model (`http://nit.coloradolinux.com/polrad.html`).

REVIEWED PUBLICATIONS:

Cornwell, T. J., and K. F. Evans, 1985: A simple maximum entropy deconvolution algorithm. *Astron. & Astroph.,* **143,** 77–83.

Evans, K. F., and J. Vivekanandan, 1990: Multiparameter radar and microwave radiative transfer modeling of nonspherical atmospheric ice particles. *IEEE Trans. Geosci. Remote Sensing,* **28**, 423–437.

Evans, K. F., and G. L. Stephens, 1991: A new polarized atmospheric radiative transfer model. *J. Quant. Spectrosc. Radiat. Transfer,* **46,** 413–423.

Evans, K. F., 1993: Two-dimensional radiative transfer in cloudy atmospheres: The spherical harmonic spatial grid method. *J. Atmos. Sci.,* **50,** 3111–3124.

Evans, K. F., 1993: A general solution for stochastic radiative transfer. *Geophys. Research Letters,* **20,** 2075–2078.

Evans, K. F., J. Turk, T. Wong, G. L. Stephens, 1995: A Bayesian approach to microwave precipitation profile retrieval. *J. Appl. Meteor.*, **34,** 260–279.

Evans, K. F., and G. L. Stephens, 1995: Microwave radiative transfer through clouds composed of realistically shaped ice crystals. Part I: Single scattering properties. *J. Atmos. Sci.*, **52,** 2041–2057.

Evans, K. F., and G. L. Stephens, 1995: Microwave radiative transfer through clouds composed of realistically shaped ice crystals. Part II: Remote Sensing of Ice Clouds *J. Atmos. Sci.*, **52,** 2058–2072.

Gabriel, P. M., and Evans, K. F., 1996: Simple radiative transfer methods for calculating domain averaged solar fluxes in inhomogeneous clouds. *J. Atmos. Sci.*, **53,** 858–877.

Deeter, M. N., and Evans, K. F., 1997: Mesoscale Variations of Water Vapor Inferred from the Millimeter-wave Imaging Radiometer during TOGA/COARE. *J. Appl. Met.,* **36,** 183–188.

Chambers, L.H., B. A. Wielicki, K. F. Evans, 1997: Accuracy of the independent pixel approximation for satellite estimates of oceanic boundary layer cloud optical depth. *J. Geophys. Res.* **102,** 1779–1794.

Chambers, L.H., B. A. Wielicki, K. F. Evans, 1997: Independent pixel and two-dimensional estimates of Landsat-derived cloud field albedo. *J. Atmos. Sci.,* **54,** 1525–1532.

McKague, D., K. F. Evans, and S. Avery, 1998: Assessment of the effects of drop size distribution variations retrieved from UHF radar on passive microwave remote sensing of precipitation. *J. Appl. Met.,* **37,** 155–165.

Evans, K. F., S. J. Walter, A. J. Heymsfield and M. N. Deeter, 1998: Modeling of Submillimeter Passive Remote Sensing of Cirrus Clouds. *J. Appl. Met.,* **37,** 184–205.

Evans, K. F., 1998: The spherical harmonics discrete ordinate method for three-dimensional atmospheric radiative transfer. *J. Atmos. Sci.,* **55,** 429–446.

Zuidema, P. and K. F. Evans, 1998: On the Validity of the Independent Pixel Approximation for Boundary Layer Clouds Observed during ASTEX. *J. Geophys. Res.,* **103,** 6059-6074.

Wang, J. R., P. Racette, J. D. Spinhirne, K. F. Evans, and W. D. Hart, 1998: Observations of Cirrus Clouds with Airborne MIR, CLS, and MAS during SUCCESS. *Geophys. Res. Letters,* **25,** 1145–1148.

Deeter, M. N. and K. F. Evans, 1998: A hybrid Eddington-single scattering radiative transfer model for computing radiances from thermally emitting atmospheres. *J. Quant. Spectosc. Radiat. Transfer,* **60,** 635–648.

Evans, K. F., A. H. Evans, I. G. Nolt, and B. T. Marshall, 1999: The Prospect for Remote Sensing of Cirrus Clouds with a Submillimeter-wave Spectrometer. *J. Appl. Meteor.,* **38,** 514–525.

Deeter, M. N., and K. F. Evans, 2000: A Novel Ice-Cloud Retrieval Algorithm Based on the MIR 150 and 220 GHz Channels. *J. Appl. Met.,* **39,** 623–633.

Vanek, M. D., I. G. Nolt, N. D. Tappan, P. A. R. Ade, F. Gannaway, C. Lee, P. A. Hamilton, K. F. Evans, J. Davis, S. Predko, 2001: Far InfraRed Sensor for Cirrus (FIRSC): An Aircraft-based FTS to Measure the Earth Radiance Spectrum. *Appl. Optics*, **40,** 2169-2176

Benner, T. C., and K. F. Evans, 2001: Three-dimensional Solar Radiative Transfer in Small Tropical Cumulus Fields Derived from High-Resolution Imagery. *J. Geophys. Res.*, **106,** 14975–14984.

Evans, K. F., S. J. Walter, A. J. Heymsfield and G. M. McFarquhar, 2002: The Submillimeter-wave cloud ice radiometer: Simulations of retrieval algorithm performance. *J. Geophys. Res.*, 107(D3), doi: 10.1029/2001JD000709.

McKague, D. M, and K. F. Evans, 2002: Multichannel satellite retrieval of cloud parameter probability distribution functions. *J. Atmos. Sci.,* **59,**, 1371-1382.

McFarlane, S. A., K. F. Evans, A. S. Ackerman, 2002: A Bayesian Algorithm for the Retrieval of Liquid Water Cloud Properties from Microwave Radiometer and Millimeter Radar Data. *J. Geophys. Res.,* 107(D16), doi: 10.1029/2001JD001011

Barker, H. W., Stephens, G. L., Partain, P. T., Bergman, J. W., Bonnel, B., Campana, K., Clothiaux, E. E., Clough, S., Cusack, S., Delamere, J., Edwards, J., Evans, K. F., Fouquart, Y., Freidenreich, S., Galin, V., Hou, Y., Kato, S., Li, J., Mlawer, E., Morcrette, J.-J., O'Hirok, W., Raisanen, P., Ramaswamy, V., Ritter, B., Rozanov, E., Schlesinger, M., Shibata, K., Sporyshev, P., Sun, Z., Wendisch, M., Wood, N., Yang, F. 2003: Assessing 1D atmospheric solar radiative transfer models: Interpretation and handling of unresolved clouds. *J. Clim.,* **16,** 2676–2699.

Evans, K. F., R. P. Lawson, P. Zmarzly, D. O'Connor, and W. J. Wiscombe, 2003: In situ cloud sensing with multiple scattering lidar: Simulations and demonstration. *J. Atmos. Ocean Tech.,* **20,** 1505–1522.

McFarlane, S. A. and K. F. Evans, 2004: Clouds and shortwave fluxes at Nauru. Part I: Retrieved cloud properties. *J. Atmos. Sci.,* **61,** 733–744.

McFarlane, S. A. and K. F. Evans, 2004: Clouds and shortwave fluxes at Nauru. Part II: Shortwave flux closure. *J. Atmos. Sci.,* **61,** 2602–2615

Evans, K. F., and W. J. Wiscombe, 2004: An algorithm for generating stochastic cloud fields from radar profile statistics. *Atmos. Res.* **72,** 263–289.

Evans K. F. and A. Marshak, 2005: Numerical Methods in Three-Dimensional Radiative Transfer. In: Marshak, A., and A. B. Davis, [Eds], *Three-Dimensional Radiative Transfer in Cloudy Atmospheres,* Springer, pp. 243–282.

Hinkelman, L., B. Stevens, K. F. Evans, 2005: A large-eddy simulation study of anisotropy in fair-weather cumulus cloud fields. *J. Atmos. Sci.*, **62,** 2155–2171.

Pincus, R., C. Hannay, and K. F. Evans, 2005: The accuracy of determining three-dimensional radiative transfer effects in cumulus clouds using ground-based profiling instruments. *J. Atmos. Sci.,* **62,** 2284–2293.

Evans, K. F., J. R. Wang, P. E. Racette, G. Heymsfield, L. Li, 2005: Ice cloud retrievals and analysis with data from the Compact Scanning Submillimeter Imaging Radiometer and the Cloud Radar System during CRYSTAL-FACE. *J. Appl. Meteor.*, **44,** 839–859.

Cahalan, R. F., L. Oreopoulos, A. Marshak, K. F. Evans, A. Davis, R. Pincus, K. Yetzer, B. Mayer, R. Davies, T. Ackerman, H. Barker, E. Clothiaux, R. Ellingson, M. Garay, E. Kassianov, S. Kinne, A. Macke, W. OHirok, P. Partain, S. Prigarin, A. Rublev, G. Stephens, F. Szczap, E. Takara, T. Varnai, G. Wen, and T. Zhuravleva, 2005: The International Intercomparison of 3D Radiation Codes (I3RC): Bringing together the most advanced radiative transfer tools for cloudy atmospheres. *Bull. Amer. Meteor. Soc.,* **86,** 1275–1293.

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Buehler, S. A., C. Jimenez, K. F. Evans, P. Eriksson, B. Rydberg, A. J. Heymsfield, C. J. Stubenrauch, U. Lohmann, C. Emde, V. O. John, T.R. Sreerekha and C.P. Davis, 2007: A concept for a satellite mission to measure cloud ice water path, ice particle size, and cloud altitude. *Q. J. R. Meteorol. Soc.,* **133,** 109–128.

Jimenez, C., S. A. Buehler, B. Rydberg, P. Eriksson and K. F. Evans, 2007: Performance simulations for a submillimetre wave satellite instrument to measure cloud ice. *Q. J. R. Meteorol. Soc.,* **133,** 129–149.

Mechem, D. B., Y. L. Kogan, M. Ovtchinnikov, A. B. Davis, K. F. Evans, R. G. Ellingson, E. E. Takara, 2008: Multi-Dimensional Longwave Forcing of Boundary Layer Cloud Systems. *J. Atmos. Sci.*, **65,** 3963–3977. doi:10.1175/2008JAS2733.1.

Evans, K. F., A. Marshak, T. Várnai, 2008: The Potential for Improved Boundary Layer Cloud Optical Depth Retrievals from the Multiple Directions of MISR. *J. Atmos. Sci.*, **65,** 3179–3196.

Pincus, R., and K. F. Evans, 2009: Computational cost and accuracy in calculating three-dimensional radiative transfer: Results for new implementations of Monte Carlo and SHDOM. *J. Atmos. Sci.,* **66,** 3131–3146.

Polkinghorne, R., T. Vukicevic, and K. F. Evans, 2010: Validation of cloud-resolving model background data for cloud data assimilation. *Mon. Wea. Rev.,* **138,** 781–795.

Evans, K. F., and G. L. Stephens, 2010: Many polarized radiative transfer models. *J. Quant. Spectrosc. Radiat. Transfer,* **111,** 1686–1688.

Buehler, S. A., E. Defer, F. Evans, S. Eliasson, J. Mendrok, P. Eriksson, C. Lee, C. Jimenéz, C. Prigent, S. Crewell, Y. Kasai, R. Bennartz, and A. J. Gasiewski, 2012: Observing ice clouds in the submillimeter spectral range: the CloudIce mission proposal for ESA's Earth Explorer 8. *Atmos. Meas. Tech.,* **5,** 1529–1549.

Evans, K. F., J. R. Wang, D. O'C Starr, G. Heymsfield, L. Li, L. Tian, R. P. Lawson, A. J. Heymsfield, and A. Bansemer, 2012: Ice hydrometeor profile retrieval algorithm for high frequency microwave radiometers: Application to the CoSSIR instrument during TC4. *Atmos. Meas. Tech.,* **5,** 2277–2306. doi:10.5194/amt-5-2277-2012.

Marshak, A., K. F. Evans, T. Várnai, G. Wen, 2014: Extending 3D near-cloud corrections from shorter to longer wavelengths. *J. Quant. Spectrosc. Radiat. Transfer,* **147,** 79–85. doi: 10.1016/j.jqsrt.2014.05.022.

Emde, C., V. Barlakas, C. Cornet, F. Evans, S. Korkin, Y. Ota, L.C.-Labonnote, A. Lyapustin, A. Macke, B. Mayer, M. Wendisch, 2015: IPRT polarized radiative transfer model intercomparison project – Phase A. *J. Quant. Spectros. Radiat. Trans.,* **164,** 8–36. doi: 10.1016/j.jqsrt.2015.05.007

Emde, C., V. Barlakas, C. Cornet, F. Evans, Z. Wang, L.C.-Labonnote, A. Macke, B. Mayer, M. Wendisch, 2018: IPRT polarized radiative transfer model intercomparison project: Three-dimensional test cases (phase B). *J. Quant. Spectros. Radiat. Trans.,* **209,** 19–44. doi: 10.1016/j.jqsrt.2018.01.024

Pincus, R., S. A. Buehler, M. Brath, C. Crevoisier, O. Jamil, K. F. Evans, J. Manners, R. L. Menzel, E. J. Mlawer, D. Paynter, R. L. Pernak, Y. Tellier, 2020: Benchmark Calculations of Radiative Forcing by Greenhouse Gases. *J. Geophys. Res.: Atmos.,* **125,** e2020JD033483. doi: 10.1029/2020JD033483

Moradi, I., Evans, K.F., McCarty, W., Cordero-Fuentes, M., Gelaro, R. and Black, R.A., 2020: Assimilation of satellite microwave observations over the rainbands of tropical cyclones. *Monthly Weather Review,* **148**, 4729–4745. doi: 10.1175/MWR-D-19-0341.1

SELECTED CONFERENCE PAPERS AND REPORTS:

Evans, K. F. 1990: *Polarized Radiative Transfer Modeling: An Application to Microwave Remote Sensing of Precipitation.* M.S. thesis, Colorado State University, Fort Collins, 79 pp.

Evans, K. F. 1993: *Microwave Remote Sensing Algorithms for Cirrus Clouds and Precipitation* Ph.D. dissertation, Colorado State University, Fort Collins, 232 pp.

Evans, K.F., 1994: Monte Carlo stochastic radiative transfer, *Eighth Conference on Atmospheric Radiation,* American Meteorological Society, Nashville, TN, January 23–28.

Evans, K. F., 1997: The spherical harmonic discrete ordinate method: Application to 3D radiative transfer in boundary layer clouds. *IRS '96: Current Problems in Atmospheric Radiation,* Proceedings of the International Radiation Symposium, Fairbanks, Alaska, August 19-24, 1996, A. Deepak Publishing, Hampton, VA, p. 143–146.

Evans, K. F., S. A. McFarlane, and W. Wiscombe, 2001: The importance of three-dimensional solar radiative transfer in small cumulus cloud fields derived from the Nauru MMCR and MWR. *Eleventh Atmospheric Radiation Measurement ARM Science Team Meeting Proceedings,* Atlanta, Georgia, March 19-23, 2001.

Evans, K. F., L. M. Hinkelman, and W. J. Wiscombe, 2002: Determinating the characteristics of fair weather cumulus clouds that are important for three-dimensional solar radiative transfer. *11th Conference on Atmospheric Radiation.* American Meteorological Society, Ogden, UT, June 3 - 7.

Evans, K. F. and W. Wiscombe, 2003: Improvements to the SHDOM radiative transfer modeling package. *Thirteenth Atmospheric Radiation Measurement ARM Science Team Meeting Proceedings,* Broomfield, Colorado, March 31-April 4, 2003.