

Curriculum Vitae

Joseph A. Zehnder, Ph.D
Southwest Weather Consulting
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Education

University of Illinois, Chicago	Physics	B.S. 1980 (College Honors and High Distinction in Physics)
University of Illinois, Chicago	Physics	M.S. 1982
University of Chicago	Geophysical Sciences	Ph.D. 1986

Fields of Interest

Meso- and Synoptic Scale Dynamic Meteorology, Tropical Cyclone Genesis and Movement, North American Monsoon, Observations and Modeling of Moist Convection, Numerical Weather Prediction, Urban Meteorology

Professional Appointments

August 2007 – May 2014: Professor and Chair: Department of Atmospheric Sciences, Creighton University, Omaha NE.

Aug 2000-July 2007, Professor: Department of Geography and Department of Mathematics, Arizona State University, Tempe.

Aug 2005-July 2007, Director: Southwest Consortium for Environmental Research and Policy, Arizona State University, Tempe.

Jun 1994-Jul 2000, Associate Professor: Department of Atmospheric Sciences and Department of Applied Mathematics, University of Arizona, Tucson.

Jun 1988-May 1994, Assistant Professor: Department of Atmospheric Sciences and Department of Applied Mathematics, University of Arizona, Tucson.

Jan/87 – Jun/88 Visiting Scientist, NASA Goddard Space Flight Center

Service, Memberships, Awards and Honors

University Corporation for Atmospheric Research, Membership Committee (2012-2014)
University Corporation for Atmospheric Research, Creighton University Member Representative (2008-2014)

Scientific Working Group, North American Monsoon Experiment (NOAA)

University Corporation for Atmospheric Research, ASU Member Representative (2001-2007).

Member of the American Meteorological Society

Member of the American Geophysical Union

University of Arizona College of Science, Distinguished Teaching Award, 1995

National Research Council Resident Research Associate, 1/87 - 6/88 NASA/Goddard
Space Flight Center

Member Phi Kappa Phi Honor Society

Refereed Publications

S. Grossman-Clarke, W. L. Stefanov and J. A. Zehnder, 2011: Urban weather, climate and air quality modeling: increasing resolution and accuracy using improved landscape characterization. *in Urban Remote Sensing "Monitoring, Synthesis and Modeling in the Urban Environment"*. Wiley.

Grossman-Clarke, S., J.A. Zehnder, T. Loridan and S. B. Grimmond, 2010: Contribution of Land Use Changes to Near Surface Air Temperatures during recent Summer Extreme Heat Events in the Phoenix Metropolitan Area. *J.Appl. Met.Clim.* **49 (8)**, 1649–1664.

Hu, J., A. Razdan, and J.A. Zehnder, 2009: Geometric Calibration of Digital Cameras for 3D Cumulus Cloud Measurements. *J. Atmos. Oceanic Technol.*, **26**, 200–214.

Zehnder, J.A., J. Hu and A Razdan, 2009: Evolution of the vertical thermodynamic profile during the transition from shallow to deep convection during CuPIDO 2006. *Mon. Wea. Rev.*, **137**, 937–953.

Demko, J.C. B. Geerts, Q. Miao and J. A. Zehnder, 2009: Boundary layer energy transport and cumulus development over a heated mountain: An observational study. *Mon. Wea.Rev.*, **137**, 447-468.

- Grossman-Clarke, S. Y. Liu, J.A. Zehnder and J.D. Fast , 2008: Simulations of the Urban Planetary Boundary Layer in an Arid Metropolitan Area. *J. Appl. Met. Clim.* **47**, 752-768.
- Damiani, R., J. Zehnder, B. Geerts, J. Demko, S. Haimov, J. Petti, G.S. Poulos, A. Razdan, J. Hu , M. Leuthold, and J. French, 2008: Cumulus Photogrammetric, In-situ and Doppler Observations: The CuPIDO 2006 Experiment. *Bull.Amer.Met.Soc.*, **89**, 57-73.
- Zehnder, J.A., J. Hu and A. Razdan, 2007: A Stereo Photogrammetric Technique Applied to Orographic Convection. *Mon.Wea.Rev.* **135**, 2265 – 2277.
- Brazel, A, Gober, P, Lee, SJ, Grossman-Clarke, S, Zehnder, JA, Hedquist, B, Comparri, E, 2007. Dynamics and determinants of regional urban heat island change (1990-2004) within Metropolitan Phoenix, Arizona, USA. *Climate Research*, **33**, 171-182.
- Zehnder, J.A. L. Zhang, D.Hansford, A. Radzan, N. Selover and C. M. Brown, 2006: Using Digital Cloud Photogrammetry to Characterize the Onset and Transition from Shallow to Deep Convection Over Orography. *Mon.Wea.Rev.*, **134**, 2527-2546.
- Grossman Clarke, S., J. A. Zehnder, W. Stefanov, Y. Liu, M. Zoldak (2005), Urban Modifications in a Mesoscale Meteorological Model and the Effects on Near Surface Variables in an Arid Metropolitan Region *J.Appl.Met.*, **44 (9)**, 1281–1297.
- Zehnder, J. A. (2004), Dynamic mechanisms of the gulf surge, *J. Geophys. Res.*, **109**, **D10107**, doi:10.1029/2004JD004616.
- Zehnder, J.A. and M.J. Reeder, 2003: The Time Dependent Response of the Tropical Atmosphere to a Fixed Sea Surface Temperature Anomaly. *J.Geophys.Res.* **108 (20)**, 4629-4648.
- Zehnder, J.A. 2002: Simple modifications to improve fifth-generation Pennsylvania State University-National Center for Atmospheric Research mesoscale model performance for the Phoenix, Arizona metropolitan area. *J.Appl.Met.*, **41**, 971-979.
- Zehnder, J.A., 2001: A comparison of convergence based and flux based convective parameterizations in the context of tropical cyclogenesis. *J.Atmos.Sci.* **58**, 283-301.
- Farfan, L.M. and J.A. Zehnder, 2001: An analysis of the landfall of Hurricane Nora, *Mon.Wea.Rev.*, **129**, 2073-2088.

- Geiszler, D. A. and J.A. Zehnder, 2000: Barotropic vortex motion near large-scale mountain ranges: Case studies of Hurricane Gilbert (1988) and Tropical Storm Hermine (1980). *Met.Atmos.Phys.* **73**, 61-76.
- Zehnder, J.A., G. Velazquez and L.M. Farfan, 2000: The modulation of deep convection over the Gulf of Tehuantepec by easterly waves. *Atmosfera.* **13**, 185-195.
- Zehnder, J.A., D. Powell and D. Ropp, 1999: The interaction of easterly waves, orography and the Inter-tropical Convergence Zone in the genesis of eastern Pacific tropical cyclones. *Mon.Wea.Rev.*, **127**, 1566-1585..
- Zehnder, J.A. and M.J. Reeder, 1997: A numerical study of barotropic vortex motion near large scale mountain ranges with application to the motion of tropical cyclones approaching the Sierra Madre. *Met.Atmos.Phys.* **64**, 1-19.
- Farfan, L.M. and J. A. Zehnder, 1997: Orographic influence on the synoptic-scale circulations associated with the genesis of hurricane Guillermo (1991). *Mon.Wea.Rev.*, **125**, 2683-2698.
- Mozer, J.B. and J.A. Zehnder, 1996: Lee Vorticity Production by Large-Scale Tropical Mountain Ranges. Part I: Eastern North Pacific Tropical Cyclogenesis. *J.Atmos.Sci*, **53**, 521-538.
- Mozer, J.B. and J.A. Zehnder, 1996: Lee Vorticity Production by Large-Scale Tropical Mountain Ranges. Part II: A Mechanism for the Production of African Waves. *J.Atmos.Sci*, **53**, 539-549.
- Farfan, L.M. and J.A. Zehnder, 1994: Propagating and stationary mesoscale convective systems over northwest Mexico during the Southwest Area Monsoon Project. *Weather and Forecasting.* **9**, 630-639.
- Mozer, J.B. and J.A. Zehnder, 1994: Cluster analysis of Eastern North Pacific tropical cyclogenesis precursors. *J.Geophys.Res.* **99, D4**, 8085-8093.
- Zehnder, J.A., 1993: The influence of large scale topography on barotropic vortex motion. *J.Atmos.Sci.*, **50**, 2519-2532.
- Zhong, W., R.L. Gall and J.A. Zehnder, 1993: Interannual variability of tropospheric waves in the tropics: A possible link with tropical cyclogenesis. *J.Atmos.Sci.*, **50**, 333-341.
- Zehnder, J.A., 1991: The interaction of planetary scale tropical easterly waves with topography: A mechanism for the initiation of tropical cyclones. *J.Atmos.Sci.*, **43A**, 1217-1230.

Zehnder, J.A., and R.L. Gall, 1991: Observational studies of tropical cyclone initiation in the eastern North Pacific. *Atmosfera*, **4**, 37-51.

Zehnder, J.A. and R.L. Gall, 1991: On a mechanism for orographic triggering of tropical cyclones in the eastern North Pacific. *Tellus*, **43A**, 25-36.

Zehnder, J.A., and D. Keyser, 1991: The influence of interior gradients of potential vorticity on rapid cyclogenesis. *Tellus*, **43A**, 198-212.

Bannon, P.R. and J.A. Zehnder, 1989: Baroclinic flow over a mountain ridge. *J.Atmos.Sci.*, **46**, 704-714.

Zehnder, J.A., and P.R. Bannon, 1988: Frontogenesis over a mountain ridge. *J.Atmos.Sci.*, **45**, 628-644.

Bannon, P.R. and J.A. Zehnder, 1985: Surface pressure and mountain drag for transient airflow over a mountain ridge. *J.Atmos.Sci.*, **42**, 2454-2462.

Proposals Funded (Past 10 years)

NASA/EPSCoR Mini-grant. Observations of cumulus development during the CuPIDO experiment. (research support for Tim Nendick) \$5000. Spring 2010.

Influence of urbanization on weather in the arid Phoenix metropolitan area. NSF. \$447,808. 9/1/07-8/31/10. (50% recognition)

Observations And Modeling Of Orographic Cumulus Development Using Data Collected During CuPIDO 2006, NSF, \$360,000. 2/1/07-12/31/10. (50% recognition)

EPA AMI Bid - Subcontract With San Diego State University Research Foundation, 6/30/06 – 5/31/07 \$50,872. (50% recognition)

Southwest Consortium For Environmental Research And Policy (SCERP) At ASU Cooperative Agreement (FY 06-07) EPA, \$1,258,000.00 (6/1/06- 8/31/08) (100% recognition)

Supplement to Observations and modeling of orographic cumulus development using digital imaging and data cataloguing, National Science Foundation, \$111,806 (6/15/04-05/31/07) (50% recognition)

Southwest Consortium For Environmental Research And Policy (SCERP) At ASU Cooperative Agreement (FY 06-07) EPA, \$2,107,748.00 6/1/05- 8/31/07 (100% recognition)

Observations and modeling of orographic cumulus development using digital imaging and data cataloguing , National Science Foundation, \$319,206 (6/15/04-9/30/06) (50% recognition)

Mesoscale Modeling of the Urban Heat Island. Salt River Project, \$150,000, 01/01/04 – 12/31/06 (50% recognition)

Decision Center for a Desert City: The Science and Policy of Climate Uncertainty, NSF, \$ 6,900,000 11/04/04-12/31/09 (5% recognition)

Investigation of Rapid Urbanization Processes Using ASTER, MODIS, and Landsat Data, NASA, \$587,856 (10% recognition)

Colloquia, Seminars and Non-refereed Publications

J. A. Zehnder: *Fine scale environmental modeling and its applications*. Seminar at the Water Resources Research Center, University of Arizona. Sept. 2, 2011.

J.A. Zehnder: *Observations of the transition from shallow to deep orographic convection*. Seminar at the Department of Atmospheric Science, South Dakota School of Mines and Technology. Rapid City, SD. Dec. 13 2011.

J. Zehnder and T. Nendick, 2010: Observations of the transition from shallow to deep convection during CuPIDO 2006. *American Meteorological Society, 13th Conference on Cloud Physics. 28 June – 2 July 2010, Portland OR*

J. Zehnder and S. Grossman-Clarke, 2009: Urban Meteorological Modeling. In *“Visualizing Sustainable Planning”*. Eds H. Hagen, S. Guhathakurta and G. Steinebach. Springer Berlin Heidelberg. DOI 10.1007/978-3-540-88203-9_6

J. Zehnder, J. Hu and A. Razdan, 2008: Stereo Photogrammetric Analysis of Orographic Convection During the North American Monsoon. (12D3) *American Meteorological Society, 28th Conference on Hurricanes and Tropical Meteorology. 28 April – 2 May, 2008. Orlando FL.*

J. Hu, A. Razdan and J. Zehnder, 2008: An Algorithm to Calibrate Field Cameras for Stereo Clouds. *2008 IEEE International Geoscience & Remote Sensing Symposium, July 6-11, 2008. Boston, Massachusetts, U.S.A.*

J. Zehnder, 2007: Monsoon thunderstorms in Southern Arizona. *Western National Parks Association, Tucson AZ. Dec 29, 2007.*

J. Zehnder, 2007: Tropical Cyclogenesis and Motion in the Eastern North Pacific. *American Geophysical Union, Joint Assemblies, Acapulco, MX. May 21- 26, 2007. Invited Talk.*

- J. Zehnder, A. Razdan, J Hu, 2007: Observations of the Transition from Shallow to Deep Convection During the North American Monsoon. *American Geophysical Union, Joint Assemblies, Acapulco, MX. May 21- 26, 2007.*
- Grossman-Clarke, S., and J.A. Zehnder. 2006. "Urban induced mesoscale circulations in an arid region. Preprints 6th International Conference on Urban Climate". Goeteborg, Sweden, June12-16, p. 140-143.
- Zehnder, J., : Modeling the Urban Heat Island in Phoenix. Arizona Planning Association Meeting Sept. 29 2005
- Zehnder, J., : Observations of the transition from shallow to deep convection University of Arizona. November 3, 2005
- Zehnder, J., S. Grossman-Clarke, S. Guhathakurta. Implications of Urban Growth Patterns for Heat Island Effects and Water Use: A Case Study of Metropolitan Phoenix. Arizona Water Summit. Northern Arizona University. August 3-5, 2005.
- Kuby, L., C. Redman, J. Buizer, P. Gober, J. Zehnder, S. Grossman-Clarke, and B. Shears. *Arizona State University's International Institute for Sustainability: Research with a Purpose.* Poster Presented at the 5th National Conference on Science Policy and the Environment: Forecasting Environmental Change. National Council for Science and the Environment, Washington DC. 5 February, 2005.
- The Urban Heat Island in Phoenix, Observations and Modeling. DCDC Water/Climate Briefing, Nov 8, 2004.
- Grossman-Clarke, S., Zehnder, J.A., Stefanov, W.L. (2004) Urban modifications in a mesoscale meteorological model and the effects on surface energetics in an arid metropolitan region. *Proceedings of the 5th Urban Environment Symposium, AMS, Vancouver, Canada, Paper 2.3.*
- Mesoscale meteorological modeling for the Phoenix metropolitan area. Presentation at the Salt River Project (May 8, 2004).
- Observations and modeling of the transition from shallow to deep convection, Seminar at the National Center for Atmospheric Research, Mesoscale and Microscale Meteorology Division. Feb. 26, 2004.
- Observations and modeling of the transition from shallow to deep convection. Seminar at the University of Wyoming, Department of Atmospheric Science. Feb 27, 2004.
- Grossman-Clarke, S., Zehnder, J.A., Stefanov, W.L., Hope, D., Fernando, H.J.S. (2004). Effects of land cover modifications in mesoscale

- meteorological and air quality models in the Phoenix metropolitan region.
Central Arizona – Phoenix Long-Term Ecological Research (CAP LTER) Project
Sixth Annual Poster Symposium, February 23, 2004.
- Dynamic Mechanisms of the Gulf Surge, Annual Meeting of the Mexican Geophysical Union, Puerto Vallarta, Mexico 3-7 November, 2003.
- Grossman-Clarke, S., J.A. Zehnder, W. L. Stefanov, 2003: Effects of urban land cover modifications in a mesoscale meteorological model on planetary boundary layer characteristics in a semi-arid metropolitan area, Proceedings of the Fifth International Conference on Urban Climate, Lodz, Poland September 1-5, 2003.
- Brazel, A., S. Grossman-Clarke, J. A. Zehnder, B.C. Hedquist, 2003: Observations and MM5 simulations of the urban heat island in Phoenix, Arizona, USA with a modified land cover scheme. , Proceedings of the Fifth International Conference on Urban Climate, Lodz, Poland September 1-5, 2003.
- The Madden-Julian Oscillation and Tropical Cyclogenesis. 3rd Southwest Weather Symposium, Las Vegas, NV, 5 Sept 2002.
- Insights on Convective Development from Time Lapse Photography. 3rd Southwest Weather Symposium, Las Vegas, NV, 5 Sept 2002.
- Urban Scale Meteorology and Air Quality Modeling. Instituto Mexicano de Tecnologia del Agua, Cuernavaca Mexico. 21 June 2002.
- Easterly Waves and Tropical Cyclogenesis during the EPIC 2001 Field Program. Universidad Nacional Autonoma de Mexico. Mexico City, Mexico. 18 June, 2002.
- Zehnder, J.A. 2002: Numerical Forecasts of the Diurnal Temperature Cycle in an Arid Urban Environment with MM5. 4th Symposium on the Urban Environment, , American Meteorological Society, 20 -24 May, 2002. Norfolk Virginia
- Zehnder, J.A. and D.J. Raymond, 2002: The Genesis of Tropical Storm Lorena. 25th Conference on Hurricanes and Tropical Meteorology, American Meteorological Society, 29 April - 3 May 2002, San Diego California.
- Zehnder, J.A and M. J. Reeder, 2000: The Dynamics of the Madden-Julian Oscillation. 24th Conference on Hurricanes and Tropical Meteorology, American Meteorological Society, 29 May—2 June 2000, Ft. Lauderdale, Florida.
- Farfan, L.M. and J.A. Zehnder, 2000: The Role of Easterly Waves in the Formation of East Pacific Tropical Cyclone Precursors. 24th Conference on Hurricanes and Tropical Meteorology, American Meteorological Society, 29 May—2 June 2000, Ft. Lauderdale, Florida.

- An Overview of Tropical Cyclogenesis in the Eastern North Pacific. Bureau of Meteorology Research Center, Melbourne, Vic. Australia. 29 March, 1999.
- Tropical Cyclogenesis in a Three-Layer Numerical Model With a Boundary Layer Quasi-Equilibrium Convective Parameterization. Twenty-Third Conference on Hurricanes and Tropical Meteorology, American Meteorological Society, 11-15 January, 1999, Dallas, Tx.
- Farfan, L.M., D.R. Bright and J.A. Zehnder, 1998: Numerical simulation of mesoscale pweather systems in Arizona. Twelfth Conference on Numerical Weather Prediction, American Meteorological Society, January 11-16, Phoenix, AZ.
- The Influence of Orography on Tropical Cyclone Motion (Invited Talk). Australasian Atmospheres and Oceans '98, Wellington, New Zealand, 9-12 February, 1998.
- The Interaction of Easterly Waves, Orography and the ITCZ in the Generation of Eastern Pacific Tropical Cyclones. Twenty-second Conference on Hurricane and Tropical Meteorology. American Meteorological Society. 19-23 May, 1997. Ft. Collins, CO.
- Tropical Cyclogenesis in a Three-Layer Numerical Model with a Quasi-Equilibrium Convective Parameterization. IAMAS/IAPSO Joint Assemblies. 1-9 July 1997. Melbourne, Australia.
- Barotropic Vortex Motion. National Center for Atmospheric Research (May 1996)
- Structure and Energetics of Tropical Cyclones. Physics Colloquium. University of Arizona. (Fall 1995)
- Barotropic Vortex Motion near Large Scale Topography and Numerical Track Forecasts. Applied Mathematics Colloquium. University of Arizona. (Fall 1995)
- Barotropic Vortex Motion. University of Oklahoma (Fall 1995)
- Rossby Waves and Easterly Waves. Applied Mathematics Case Study Seminar, University of Arizona. (Spring 1995).
- Barotropic Vortex Motion near Large Scale Topography. Seminar at Monash University, Dept of Mathematics. May. 1995
- Farfan, L.M. and J.A. Zehnder, 1995: Mechanisms of the initial circulation in tropical cyclone Guillermo. Twenty-first Conference on Hurricane and Tropical Meteorology. American Meteorological Society. 24-28 April, Miami, FL.

- Farfan, L.M. and J.A. Zehnder, 1994: Synoptic and mesoscale wind fields during the genesis of hurricane Guillermo. Sixth Conference on Mesoscale Processes. American Meteorological Society. July 18-22. Portland, OR
- Mozer, J.B. and J.A. Zehnder, 1994: Lee vorticity production by large scale mountain ranges. Sixth Conference on Mesoscale Processes. American Meteorological Society. July 18-22. Portland, OR
- Tropical Cyclogenesis in the Eastern North Pacific: NASA/Goddard Space Flight Center. 16 December 1993.
- The effect of topography on tropical cyclone landfall in Mexico. Seminar at the Servicio Nacional Meteorologia, Mexico City. 20 October 1993.
- The effect of topography on tropical cyclone landfall in Mexico. Seminar at the Mexican Institute of Water Technology (IMTA), Cuernavaca, Mexico. 18 October 1993.
- Zehnder, J.A., 1993: The effect of topography on tropical cyclone landfall in Mexico. Twentieth Conference on Hurricane and Tropical Meteorology. American Meteorological Society. 10-14 May. San Antonio TX.
- Farfan, L.M. and J.A. Zehnder, 1993: Synoptic scale circulations during the formation of hurricane Guillermo. TEXMEX Workshop, San Antonio TX, 8 May 1993.
- The Influence of Large Scale Topography on Barotropic Vortex Motion. Seminar at the New Mexico Institute of Mining and Technology. 2 October 1992.
- Zehnder, J.A., 1992: Tropical cyclogenesis in the eastern north Pacific. Seminar at the Centre for Dynamic Meteorology, Monash University, Melbourne Australia. 2 June 1992.
- Zehnder, J.A., 1990: Alternative mechanisms of tropical cyclogenesis in the Eastern Pacific. Seminar presented at the Centro de Ciencias de la Atmosfera of the Universidad Nacional Autonoma de Mexico, Mexico City 23 September 1990.
- Farfan, L.M. and J.A. Zehnder, 1992: Mesoscale Convective Systems over Northwest Mexico. Annual Meeting of the Mexican Geophysical Union. 9 November 1992.
- Farfan, L.M. and J.A. Zehnder, 1992: A seasonal climatology of propagating and stationary mesoscale convective systems in northwest Mexico. Fourth Annual Southwest Weather Symposium.
- The Influence of Large Scale Topography on Barotropic Vortex Motion. Presented at the 1991 Meeting of the Mexican Geophysical Union as part of the TRAVASON/SWAMP Symposium.

Zehnder, J.A., and R.L. Gall, 1989: Orographically induced tropical cyclones in the Eastern North Pacific. Fourth National Congress of Meteorology, Chihuahua, Chih. Mexico. 4-6 October, 1989.

Bannon, P.R. and J.A. Zehnder, 1989: Baroclinic flow over a mountain ridge. International Conference on Mountain Meteorology and ALPEX. American Meteorological Society, 5 June - 9 June 1989.

Zehnder, J.A., and D. Keyser, 1988: A theoretical study of the role of interior gradients of potential vorticity on rapid cyclogenesis. Palmén Symposium on Extratropical Cyclones, American Meteorological Society and the Geophysical Society of Finland, 29 August - 2 September, 1988.