

Darko Koracin

Research Professor

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Education

1989	Ph.D.	Physics-Atmospheric Physics, University of Nevada, Reno (UNR)
1983	M.S.	Atmospheric Physics, University of Zagreb, Croatia
1979	B.S.	Geophysics and Meteorology, University of Zagreb, Croatia

Professional Experience

2006	Director, Atmospheric Sciences Graduate Program, University of Nevada, Reno
2002-present	Research Professor, Desert Research Institute (DRI)
1997-2002	Associate Research Professor, Desert Research Institute (DRI)
1994-present	Graduate faculty member, UNR
1990-1997	Assistant Research Professor, DRI, UNR
1989-1990	Postdoctoral Research Associate, Atmospheric Physics, DRI, UNR
1987-1989	Graduate Research Assistant, Atmospheric Physics, DRI, UNR
1984-present	Affiliated Research Scientist, University of Zagreb, Croatia
1984-1986	Sabbatical research, Danish National Agency for Environmental Protection (now the National Environmental Research Institute of Denmark)
1983-present	Member of the Scientific Research Committee of the Hydro-Meteorological Institute (HMIZ), Zagreb, Croatia
1980-1986	Research Scientist, HMIZ, Zagreb, Croatia (microscale and mesoscale meteorological measurements and research)

Research Interests

Dr. Koracin investigates the properties and evolution of atmospheric flows over both complex terrain and the ocean through the development and application of high-resolution mesoscale meteorological models (MM5, RAMS, ARPS, COAMPS). His expertise includes assessing the emission, transport, and dispersion of environmental pollutants using the US Environmental Protection Agency's regulatory and advanced air quality models for complex terrain (ISC3ST, AERMOD, CALPUFF, CAMx) as well as applying principles of artificial intelligence (neural networks). His research includes development of a higher-order turbulence closure atmospheric model, a cloud-resolving model, and a large-eddy simulation model, as well as turbulence and radiation parameterizations of existing models. Dr. Koracin also develops models for the transport and dispersion of atmospheric pollutants (modified Gaussian, higher-order closure plume model and Lagrangian random particle model) and integrates these with meteorological models. Applications include investigation of ozone concentrations; offshore emissions, atmospheric dynamics, and cloudiness in coastal regions; real time weather forecasting; atmospheric flow over complex terrain; and evaluation methods applied to atmospheric models. Analysis of data from aircraft measurements is used for model verification.

Dr. Koracin has published peer-reviewed articles in recognized US and international journals and has presented over 60 conference papers at domestic and international conferences. He has been invited to visit many institutions and participate in and design environmental research in the US, Denmark, Sweden, Croatia, Brazil, and Turkey. He is actively involved in the Atmospheric Sciences graduate program at the University of Nevada, Reno. He is teaching graduate level classes and mentoring students in the M.S. and Ph.D. programs.

Awards

- 2001 - Senior Scientist Specialist Award – Environmental Modeling, Fulbright Program.
- 2003 - Senior Scientist Specialist Award – Environmental Modeling, Fulbright Program.
- 2005 - Senior Scientist Specialist Award – Environmental Modeling, Fulbright Program.

Recent Research Activity

Dr. Koracin is investigating the diurnal effects of local circulations and their impact on the transport and dispersion of atmospheric pollutants and tracers in coastal regions as well as the formation of offshore fog, regional vs. local transport of pollutants in complex terrain, pollution exposure estimates, the effects of the curl of wind stress on the upwelling of coastal waters, and the coupling between atmospheric and ocean models as well as coupling between atmospheric and hydrological models. Several of his recent projects led to the development of a real time mesoscale forecasting system using the MM5 model coupled with a Lagrangian random particle dispersion model and implementing data assimilation schemes. He has also been developing a novel method of evaluating mesoscale and regional-scale dispersion models in complex terrain.

Professional Activities

- American Meteorological Society, member
- American Geophysical Union, member
- National Geographical Society, member

Service on Advisory Panels

- *Journal of the Geophysical Research - Atmospheres*, Associate Editor
- *Geofizika*, Associate Editor
- American Meteorological Society, Committee on *Coastal Environment*, member.
- California Air Resources Board Committee on: “Community Health Modeling”, member
- California Air Resources Board –California Energy Commission Committee on “Urban scale dispersion”, member
- California and Nevada Smoke and Air Committee (CANSAC) – Technical Advisory Subcommittee, member
- Desert Research Institute, Faculty Senate, member

Significant Publications

- Koracin, D. and R. Berkowicz, 1988: Nocturnal boundary-layer height: Observations by acoustic sounders and predictions in terms of surface-layer parameters. *Boundary-Layer Meteorol.*, **43**, 65-83.
- Koracin, D. and D. P. Rogers, 1990: Numerical simulations of the response of the marine atmosphere to ocean forcing. *J. Atmos. Sci.*, **47**, 592-611.
- Rogers, D. P. and D. Koracin, 1992: Radiative transfer and turbulence in the cloud-topped marine atmospheric boundary layer. *J. Atmos. Sci.*, **49**, 1473-1486.
- Enger, L., D. Koracin and X. Yang, 1993: A numerical study of the boundary layer dynamics in a mountain valley. Part 1: Model validation and sensitivity experiments. *Bound.-Layer Meteorol.*, **66**, 357-394.

- Koracin, D. and L. Enger, 1994: A numerical study of boundary layer dynamics in a mountain valley. Part 2: Observed and simulated characteristics of atmospheric stability and local flows. *Bound.-Layer Meteorol.*, **69**, 249-283.
- Enger, L. and D. Koracin, 1995: Simulations of dispersion in complex terrain using a higher-order closure model. *Atmos. Environ.*, **29**, 2449-2466.
- Tjernström, M. and D. Koracin, 1995: Modeling the impact of marine stratocumulus on the boundary-layer structure. *J. Atmos. Sci.*, **52**, 863-878.
- Switzer, P., L. Enger, T.E. Hoffer, D. Koracin, and W.H. White, 1996: Ambient sulfate concentrations near Grand Canyon as a function of fluctuating loads at the Mohave Power Project: An atmospheric experiment. *Atmos. Environ.*, **30**, 2551-2564.
- Cohn, S.A., J. Hallett, and D. Koracin, 1997: Blending education and research in atmospheric science - a case study. *Physics Today*, **50**, 34-39.
- Koracin, D., V. Isakov, and L. Mendez-Núñez, 1998: A cloud-resolving model with the radiation scheme based on the Monte Carlo method. *Atmos. Res.*, **47-48**, 437-459.
- Koracin, D., J. Frye, and V. Isakov, 2000: A method of evaluating atmospheric models using tracer measurements. *J. Appl. Meteor.*, **39**, 201-221.
- Koracin, D., D. Podnar, V. Isakov, J. Chow, Y. Dong, A. Miller, and M. McGown, 2000: PM₁₀ dispersion modeling for Treasure Valley, Idaho. *J. Air Waste Manage. Assoc.*, **50**, 174-185.
- Svensson, G., M. Tjernstrom, and D. Koracin, 2000: The sensitivity of a stratocumulus transition: Model simulations of the ASTEX First Lagrangian. *Boundary-Layer Meteorol.* **95**, 57-90.
- Koracin, D., V. Isakov, and J. Frye, 2000: A method of evaluating atmospheric models using tracer measurements: Main algorithms. *Int. J. Environment and Pollution*, **14**, Nos. 1-6, 89-97.
- Koracin, D., J. Lewis, W. T. Thompson, C. E. Dorman, and J. A. Businger, 2001: Transition of stratus into fog along the California coast: Observations and modeling. *J. Atmos. Sci.*, **58**, 1714-1731.
- Koracin, D., and C. Dorman, 2001: Marine atmospheric boundary layer divergence and clouds along California in June 1996. *Mon. Wea. Rev.*, **129**, 2040-2055.
- Beg Paklar, G., V. Isakov, D. Koracin, V. Kourafalou, and M. Orlic, 2001: A case study of bora-driven flow and density changes on the Adriatic shelf (January 1987). *Cont. Shelf Res.*, **21**, 1751-1783.
- Podnar, D., D. Koracin, and A. Panorska, 2002: Application of artificial neural networks to modeling the transport and dispersion of tracers in complex terrain. *Atmos. Environ.*, **36**, 561-570.
- Lewis, J., D. Koracin, R. Rabin, and J. Businger, 2003: Sea fog off the California coast: Viewed in the context of transient weather systems. *J. Geoph. Res. (Atmos.)*, **108**, No. D15, 4457, 10.1029/2002JD002833.
- Lewis, J., D. Koracin, and K. Redmond, 2004: Sea fog research in the UK and USA: Historical essay including outlook. *Bull. Amer. Met. Soc.*, **85**, 395-408.
- Koracin, D., C. E. Dorman, and E. P. Dever, 2004: Coastal perturbations of marine layer winds, wind stress, and wind stress curl along California and Baja California in June 1999. *J. Phys. Ocean.*, **34**, 1152-1173.
- Koracin, D., A. Kochanski, C. E. Dorman, and E. P. Dever, 2005: Wind stress curl and upwelling along the California coast. *Bull. Amer. Met. Soc.*, **86**, 629-630.
- Luria, M., R.L. Tanner, R.J. Valente, S. T. Bairai, D. Koracin, and A. W. Gertler, 2005: Local and transported pollution over San Diego California. *Atmospheric Environment*, **39**, 6765-6776.
- Koracin, D., D. F. Leipper, and John M. Lewis, 2005: Modeling sea fog on the U.S. California coast during a hot spell event. *Geofizika*, **22**, 59-82.
- Koracin, D., J. A. Businger, C. E. Dorman, and J. M. Lewis, 2005: Formation, evolution, and dissipation of coastal sea fog. *Bound.-Layer Meteorol.*, **117**, 447-478.
- Bebis, G., R. Boyle, D. Koracin, and B. Parvin, Eds, 2005: *Advances in Visual Computing*. Lecture Notes in Computer Science, **3804**, Springer, 755pp.
- Dorman, C. E., E. P. Dever, J. Largier, and D. Koracin, 2006: Buoy measured wind, wind stress, and wind stress curl over the shelf off Bodega Bay, California. *Deep Sea Res. (in print)*.

- Chow, J. C., John G. Watson, Lung-Wen Antony Chen, Darko Koracin, Barbara Zielenska, Deliang Tang, Frederica Perera, Junji Cao, and S.C. Lee, 2006: Exposure to PM_{2.5} and PAHs from the Tong Liang, China - Epidemiological Study. *J. Environ. Sci. Health Part A*, **41**, 517-542.
- Kochanski, A., D. Koracin, and C. E. Dorman, 2006: Comparison of wind stress algorithms and their influence on the wind stress curl using buoy measurements over the shelf of Bodega Bay, California. *Deep Sea Res.* (in print).
- Bebis, G., R. Boyle, B. Parvin, D. Koracin, P. Remagnino, A. Nefian, G. Meenakshisundaram, V. Pascucci, J. Zara, J. Molineros, H. Thiesel, and T. Malzbender, Eds., 2006: Advances in Visual Computing. *Lecture Notes in Computer Science, LNCS 4291*, Vol. I, 916pp, Springer, Berlin.
- Bebis, G., R. Boyle, B. Parvin, D. Koracin, P. Remagnino, A. Nefian, G. Meenakshisundaram, V. Pascucci, J. Zara, J. Molineros, H. Thiesel, and T. Malzbender, Eds., 2006: Advances in Visual Computing. *Lecture Notes in Computer Science, LNCS 4292*, Vol. II, 906pp, Springer, Berlin.
- Vellore, R., D. Koracin, and M. Wetzel, 2006: Improvements in cloud predictions through modeling and visualization of the satellite imagery. *Lectures in Computer Science, LNCS 4292*, Vol. II, 544-553.
- Largier, J. L., C. A. Lawrence, M. Roughan, D. M. Kaplan, E. P. Dever, C. E. Dorman, R. M. Kudela, S. M. Bollens, F. P. Wilkerson, R. C. Dugdale, L. W. Botsford, N. Garfield, B. Kuebel-Cervantes, D. Koracin, 2006: WEST: a northern California study of the role of wind-driven transport in the productivity of coastal plankton communities. *Deep Sea Research* (in print).
- Koracin, D., A. Panorska, V. Isakov, J. S. Touma, J. Swall, 2006: A statistical approach for estimating uncertainty in dispersion modeling: an example of application in southwestern U.S. *Atmos. Environ.* (in print).
- Isakov, V., A. Venkatram, J. Touma, D. Koracin, and T. L. Otte, 2006: Evaluating the use of outputs from comprehensive meteorological models in air quality applications: A case study in Wilmington, CA. *Atmos. Environ.* (in print).

Graduate Teaching (University of Nevada, Reno)

- “Boundary-Layer Modeling” (Spring 1994, Spring 1996)
- “Regional and Mesoscale Dynamics” (Fall 1995, Spring 1998, Spring 2000, Spring 2002, Spring 2004)
- “Atmospheric Radiation” (Spring 1997, Spring 1999, Spring 2001, Spring 2004)
- “Atmospheric Modeling” (Fall 1997, Fall 1999, Fall 2001, Fall 2003, Spring 2006)

Graduate Advisees

- Nash’at Ahmad, M.A. - Atmospheric Science (Thesis defended 11/96)
- Current affiliation: SAIC, Washington
- John Lukas, Ph. D. - Atmospheric Science (Dissertation defended 1/97)
- Current affiliation: University of Washington, Seattle
- Vlad Isakov, Ph.D. - Atmospheric Science (Dissertation defended 1/98)
- Current affiliation: California Air Resources Board, Sacramento
- Pinaki Saha, M.A. - Atmospheric Science (Thesis defended 5/98)
 - Current affiliation: Compuware, Chicago, Illinois.
- Domagoj Podnar, M.A. - Atmospheric Science (Thesis defended 5/99)
- Current affiliation: Desert Research Institute, Reno, Nevada
- Sherri del Soldato, M.A. - Atmospheric Science (Thesis defended 11/99)
- Current affiliation: Fleischman Planetarium, Reno, Nevada
- Domagoj Podnar, Ph.D. - Atmospheric Science (study in progress)
 - Current affiliation: Desert Research Institute, Reno, Nevada
- Narendra Adhikari, M.A.- Atmospheric Science (Thesis defended 12/03)
 - Current affiliation: Desert Research Institute, Reno, Nevada

- Adam Kochanski, M.S. – Atmospheric Science (Thesis defended 12/29/04)
 - Current affiliation: Desert Research Institute, Reno, Nevada
- Ramesh Vellore, Ph.D. – Atmospheric Science (study in progress)
 - Current affiliation: Desert Research Institute, Reno, Nevada
- Adam Kochanski, Ph.D. – Atmospheric Science (study in progress)
 - Current affiliation: Desert Research Institute, Reno, Nevada

Post-graduate Advisees

- Vlad Isakov, Ph.D. (1998/99)
- Yi Mi, Ph.D (1998)
- Ragothaman Sundararajan, Ph.D. (2001/2002)

Collaborators (in last four years)

- Gordana Beg-Paklar, Institute of Oceanography and Fisheries, Split, Croatia
- Joost Businger, University of Washington, Seattle, WA
- Ed Dever, Scripps Institution of Oceanography, San Diego, CA
- Clive Dorman, Scripps Institution of Oceanography, San Diego, CA
- Eric Fujita, DRI
- Alan Gertler, DRI
- Arlen Huggins, DRI
- Vlad Isakov, California Air Resources Board, Sacramento, CA
- S. Lakshmivarahan, University of Oklahoma, Norman, OK
- Dale Leipper, Reno, Nevada
- John Lewis, NOAA and DRI
- Menehem Luria, TVA
- Mirko Orlic, University of Zagreb, Croatia
- Anna Panorska, University of Nevada, Reno
- Darrell Pepper, UNLV, Las Vegas
- Jordan Powers, National Center for Atmospheric Research, Boulder, CO
- Robert Rabin, NOAA/NSSL, Norman, OK
- Richard Reinhardt, DRI
- Melanie Wetzel, DRI