

### Research Interests

- Tornado vortex structure, tornadogenesis, kinematics of convective systems, hurricane boundary layer kinematics, single- and multi-Doppler radar and integrated observational analysis of high impact mesoscale phenomena

### Appointments

- Adjunct Research Professor, Manager DOW facility, University of Illinois, Urbana, IL (October 2020 – current)
  - *Conducts scientific research; Manages the DOW mobile radar and instrument facility*
- Research Scientist and DOW Facility Project Scientist, Center for Severe Weather Research, Boulder, CO (2008 – October 2020)
  - *Conducts research; Supervises and assists in DOW facility readiness for scientific and education projects, including planning, instrument testing, deployments, and management*
- Visiting Scientist, National Center for Atmospheric Research, Boulder, CO (2009-current)
- Visiting Scientist, University of Colorado, Boulder, CO (2009-2010)

### Education

- Ph.D., Atmospheric Science, Purdue University, West Lafayette, Indiana, 2009
  - *Dissertation: A comparison of radar observations to real data simulations of axisymmetric tornadoes*
- M.A.T., Teacher Education, Miami University, Oxford, Ohio, 2003
  - *Thesis: A study on the effects of inquiry-based instruction on the attitudes of future science teachers*
- M.S., Physics, Miami University, Oxford, Ohio, 2002
  - *Thesis: A laboratory investigation of the vertical velocities in and the effects of surface roughness on tornado-like vortices*
- B.S., Physics, Loyola University, Chicago, Illinois, 1999

### Grants Awarded

- PI: *RAPID: RAPID: Dual-Doppler Analysis of the Boundary Layer in Category-4 Hurricane Laura*, NSF Grant (2/2021 – 1/2022).
- PI: *RAPID: Collection and Analysis of Data in Major Landfalling Hurricanes (2017)*, NSF Grant (9/14/2017 – 8/31/2018).
- PI: *Collaborative Research: An Integrated Understanding of the Initiation and Subsequent Dynamical and Microphysical Characteristics of Deep Convective Storms during RELAMPAGO*, NSF Grant (2017-2021).
- Co-PI: VORTEX-SE: Characterization of environmental influences on downdraft processes occurring in potentially tornadic storms in the Southeast United States. NOAA grant (10/1/16 – 9/30/18)
- Co-PI: VORTEX-SE: Improving radar wind retrievals and understanding local environmental influences on downdraft processes in potentially tornadic storms in the southeastern United States. NOAA grant. (10/1/17 – 9/30/19)
- Co-PI: VORTEX-SE Type 1: Characterization of storm structure and storm environments through the integration, improvement and analysis of multi-platform radar data (current proposal). NOAA Grant. (2018 –2020).
- Co-PI: *Construction of Mobile C-band, Narrow-Beam, Dual-Frequency, Dual-Polarization, High-Power Radar*. NSF Grant (2017-2018).

- Co-Principle Investigator: *Relating Overshooting Cloud Tops, Lightning, and Cloud Microphysics to Tornadogenesis: A Design Study for a NASA-led Field Campaign*, NASA Grant. (07/01/2015 – 6/30/2016)
- Principle Investigator: *Mechanisms for severe wind production in nocturnal and transitioning convection*, NSF Grant (09/01/2015 – 08/31/2018)
- Co-Principle Investigator: *Doppler On Wheels National Mobile Doppler Radar Facility*, NSF Grant (01/2014 – 12/19).
- Principle Investigator: *Collaborative Research: OWLeS*, NSF Grant AGS-0910737. (09/01/2013 – 08/31/2016)
- Principle Investigator: *Modeling and analysis of the landfalling hurricane boundary layer*, NSF grant AGS-0910737. (09/15/2009 – 08/31/2013)
- Co-Principle Investigator: *A Multi-platform Kinematic and Thermodynamic Study of Tornado Genesis, Structure, and Evolution*, NSF grant AGS-1211132. (08/15/2012 – 07/31/2015)
- Co-Principle Investigator: *Collaborative research: VORTEX2--multi-scale and multi-platform study of tornadoes, supercell thunderstorms, and their environments*, NSF grant AGS-0801041. (06/01/2008 – 05/31/2013)

### Field Activities

- Hurricanes at Landfall (HAL), 2004, 2008, 2012, 2017, 2019, 2020
  - Principle Investigator (2012, 2017, 2020)
  - Navigator, Radar operator, DOW Facility Project Scientist (2012, 2017, 2020)
- Radar Observations of Fire Weather, 2016, 2020
  - DOW Facility Project Scientist, Radar operator
- Tornadic Winds: In situ and Radar observations at Low-levels (TWIRL), 2016, 2017, 2019, 2020
  - Principle Investigator
  - DOW Facility Project Scientist, Radar operator
- Remote sensing of Electrification, Lightning, And Mesoscale/Microscale Processes with Adaptive Ground Observations (RELAMPAGO), 2018
  - Principle Investigator
  - DOW Facility Project Scientist
- Great Plains Irrigation Experiment (GRAINEX), 2018
  - DOW Facility Project Scientist
- Seeded and Natural Orographic Wintertime clouds - the Idaho Experiment (SNOWIE), 2017
  - DOW Facility Project Scientist
- The Olympic Mountains Experiment (OLYPMEX), 2015
  - DOW Facility Project Scientist
- Plains Elevated Convection at Night (PECAN), 2015
  - Principle Investigator, Project-wide Radar Coordinator (July)
  - DOW Facility Project Scientist
- Ontario Winter Lake-effect Systems (OWLeS), 2013-14
  - Principle Investigator, Executive Committee Member
  - DOW Facility Project Scientist
- Radar Observations of Tornadoes and Thunderstorms (ROTATE), 2004-08, 2011-14
  - Navigator, driver, forecaster, radar operator, data manager
  - DOW Facility Project Scientist (2011 – 2014)
- AgI Seeding Cloud Impact Investigation (ASCII), 2012
  - DOW Facility Project Scientist, Radar Operator
- Long-Lake Axis-Parallel lake-effect storms project (LLAP), 2010-11
  - DOW Facility Project Scientist, Radar Operator

- The Second Verification of the Origins in Tornadoes Experiment (VORTEX2), 2009-10
  - Principle Investigator
  - DOW Facility Project Scientist, Radar Operator, in situ Tornado Pod coordinator
- Convective and Orographically-Induced Precipitation Study (COPS), 2007
  - Radar operator, driver, data manager

### **Professional Activities**

- Committee Member, AMS Radar Scientific and Technological Activities Commission (2019 - current)
- Editor, Weather and Forecasting (2017 - current)
- Co-Chair, Physical Sciences, Vortex Southeast (2018 - current)
- Steering Committee Member, Vortex Southeast (2016 - current)
- Co-Chair, Organized Convection and Severe Phenomena, AMS 39<sup>th</sup> International Conference on Radar Meteorology (2019)
- Chief Scientist, RELAMPAGO Project (December 2018)
- Subcommittee Member, Organized Convection and Severe Phenomena, AMS 38<sup>th</sup> Conference on Radar Meteorology (2017)
- Committee Member, AMS 28<sup>th</sup> Conference on Severe Local Storms (2016)
- Conference Planning Committee Member, Vortex Southeast (2016)
- Associate Editor, Weather and Forecasting (2014 - 2016)
- Executive Committee Member, OWLeS Project (2013-14)
- Co-Chair, AMS 27<sup>th</sup> Conference on Severe Local Storms (2014)
- Committee Member, AMS Severe Local Storms Scientific and Technological Activities Commission (2013 - 2018)
- Reviewer of manuscripts for Monthly Weather Review (2009 - current), Bulletin of the American Meteorological Society (2010 - current), Journal of Atmospheric and Oceanic Technology (2011), and Journal of Applied Meteorology and Climatology (2011)
- Reviewer of proposals for the Physical and Dynamical Meteorology Division of the National Science Foundation (2011 - current)
- Session Chair (35<sup>th</sup> Conference in Radar Meteorology, 25<sup>th</sup> Conference on Severe Local Storms, 6<sup>th</sup> European Conference on Radar Meteorology and Hydrology, 5<sup>th</sup> European Conference on Severe Local Storms)

### **Outreach Activities**

- Mid-Atlantic ChaserCon Webinar (November 2020)
- Wild Weather, Denver Museum of Nature and Science (April 2020)
- Girls & Science, Denver Museum of Nature and Science (March 2020)
- AMS on the Air, Podcast (January 2020)
- Weather Geeks, Podcast (May 2019)
- Invited Speaker, Benson Lecture, Miami University (March 2019)
- CoCoRaHS WxTalk Webinar (March, October 2019)
- Invited Speaker, X-STEM, Travis AFB (March 2019)
- Facilitated Advance Studies Institutes (ASI) Student Participation in DOW facility activities during RELAMPAGO (Fall 2018)
- Invited Speaker, University of North Dakota, Grand Forks, ND (April 2018)
- Invited Speaker, Wind Related Disasters and Mitigation, Sendai, Japan (March 2018)
- Invited Speaker, University of Arizona, Tucson, AZ (October 2017)
- Invited Speaker, 19<sup>th</sup> High Plains Conference (August 2017)
- Invited Speaker, Central Michigan University and Local AMS Chapter (2017)
- Invited Speaker, AMS Symposium on Severe Local Storms, Seattle, WA (2017)
- Invited Speaker, ChaserCon, Denver, CO (2011, 2013, 2017, 2018)

- Role Model, Girls and Science, Denver Museum of Nature and Science, Denver CO (5 March 2016)
- Invited Speaker, The Sixth Annual Great Lakes Atmospheric Science Symposium, Oswego, NY (17 October 2015)
- Invited Speaker, NWA Severe Storm and Doppler Radar Conference, Ankeny, IA (26 March 2015)
- Invited Speaker, 24<sup>th</sup> Annual DuPage Advanced Severe Weather Seminar, Wheaton, IL (14 March 2015)
- Invited Speaker, Severe Weather Symposium, Lawrence, KS (7 March 2015)
- Invited Speaker, TEDx, Phoenix, AZ (26 April 2015)
- Invited Speaker at the 16<sup>th</sup> Annual High Plains AMS/NWS Conference, Hastings, NE (Aug. 5, 2014)
- Guest Lecture and DOW data collection, SOARS Academy, Boulder, CO (June 17-19, 2014)
- Invited Speaker, Meteorology Club's Colloquia Series, California University of Pennsylvania (March 25, 2014)
- Invited speaker at X-Stem, Washington, D. C. (April 2014)
- Organized and presented at OWLeS Open House, Penn Yan Airport, NY (Dec. 5, 2013)
- Invited speaker at TEDYouth, New Orleans, LA (November 16, 2013)
- Lead teacher workshops (both remotely and onsite) on integrating weather observations and technology in the K-12 classroom (2012-2013)
- Participated in Denver Museum of Science and Nature's nationwide education program entitled "Scientists in Action" (2012, 2014)
- Participated in an iTwixie discussion of Storm Chasing for tween girls (May 2012)
- Invited speaker at the USA Science and Engineering Festival (April 2012, 2014)
- Interviewed for Washington Post article that highlighted VORTEX2 research (April 2012)
- Speaker at the Radar Meteorology Student Discussion at the 35<sup>th</sup> Conference on Radar Meteorology
- Participated in nationwide public and grade school education and outreach associated with the Tornado Alley IMAX film by visiting schools, museums, and local media to discuss tornado science and severe weather research (2011-13)
- Participated in the USA Science and Engineering Festival, Washington D.C., which involved 2 days of public outreach with the DOWs (October 2010, 2012, 2016)
- Traveled to community and technical colleges (IL, WY, CO) as part of the UCAR Careers in Science to discuss career options for students interested in weather (2010, 2011)
- Blogger, National Science Foundation VORTEX2 blog (2010)

### **Media Activities**

- Interviewed by various local and national media outlets regarding severe weather and severe weather research (e.g., Washington Post, National Geographic, National Geographic Kids, The Weather Channel, BBC, Discovery Channel, Mashable, The Verge)

### **Service on Graduate Committees**

- Kyle Pennington (M.S.) (2017)
- Mallie Toth (M.S.) (2012)

### **Teaching Experience**

- Instructor, University of Colorado (Fall 2015)
- Teaching Assistant, Purdue University, Department of Earth and Atmospheric Sciences (2006-2008)
- Teaching Assistant, Miami University, Department of Physics (1999-2003)
- Laboratory Assistant, Loyola University, Department of Physics (1998-99)

### **Honors and Awards**

- Recipient of the Purdue University Graduate Student Award for Outstanding Teaching (2007)
- Selected participant, NCAR colloquium (2006): "The Challenges of Convective Forecasting."

- Best Poster Presentation, Student Research Expo (2006), Dept. of EAS, Purdue University
- Purdue Research Foundation (PRF) Research Grant (2005-2006)
- Best Oral Presentation, Student Research Expo (2004), Dept. of EAS, Purdue University
- Recipient of the Frederick N. Andrews Fellowship (2003-2005), Purdue University
- Recipient of the College of Arts and Sciences Graduate Student Teaching Award (2002-03), Miami University
- Recipient of the Outstanding Graduate Student Researcher Award (2001-02), Dept. of Physics, Miami University
- Recipient of the American Association of Physics Teachers Outstanding Graduate Assistant Award (2001-02)
- Recipient of the Outstanding Graduate Student Teacher Award (2000-01), Dept. of Physics, Miami University
- Sigma Pi Sigma (Physics Honors Society)
- Phi Kappa Phi

### Peer-Reviewed Publications

- Nesbitt, S. W., Salio, P. V., Ávila, E., Bitzer, P., Carey, L., Chandrasekar, V., Deierling, W., Dominguez, F., Dillon, M. E., Garcia, C. M., Gochis, D., Goodman, S., Hence, D. A., **Kosiba, K. A.**, Kumjian, M. R., Lang, T., Luna, L. M., Marquis, J., Marshall, R., McMurdie, L. A., Nascimento, E. L., Rasmussen, K. L., Roberts, R., Rowe, A. K., Ruiz, J. J., São Sabbas, E. F., Saulo, A. C., Schumacher, R. S., Skabar, Y. G., Machado, L. A. T., Trapp, R. J., Varble, A., Wilson, J., Wurman, J., Zipser, E. J., Arias, I., Bechis, H., & Grover, M. A. (2021). A storm safari in Subtropical South America: proyecto RELAMPAGO, *Bull. Amer. Meteor. Soc.*, <https://doi.org/10.1175/BAMS-D-20-0029.1>.
- Wurman, J., **Kosiba, K. A.**, Pereira, B., Robinson, P., Frambach, A., Gilliland, A., White, T., Aikins, J., Trapp, R. J., Nesbitt, S., Hanshaw, M. N., and J. Lutz, 2021: The FARM (Flexible Array of Radars and Mesonets). *Bull. Amer. Meteor. Soc.*, <https://doi.org/10.1175/BAMS-D-20-0285.1>
- Wurman, J., **Kosiba, K. A.**, White, T., and P. Robinson, 2021: Supercell Tornadoes are Much Stronger and Wider than Damage-Based Ratings Indicate. *PNAS*, <https://doi.org/10.1073/pnas.2021535118>
- Rappin, E., R. Mahmood, U. Nair, R. A. Pielke Sr., W. Brown, S. Oncley, J. Wurman, **K. Kosiba**, A. Kaulfus, C. Phillips, E. Lachenmeier, J. Santanello Jr., E. Kim, and P. Lawston-Parker, 2020: The Great Plains Irrigation Experiment (GRAINEX), *Bull. Amer. Meteor. Soc.*, <https://doi.org/10.1175/BAMS-D-20-0041.1>
- Schumacher, R., D. A. Hence, S. W. Nesbitt, R. J. Trapp, **K. A. Kosiba**, J. Wurman, P. Salio, M. Runga, A. Varble, N. R. Kelly, 2020: Convective-storm environments in subtropical South America from high-frequency soundings during RELAMPAGO-CACTI. *Mon. Wea. Rev.*, <https://doi.org/10.1175/MWR-D-20-0293.1>.
- Trapp, J., Hence, D., **Kosiba, K.**, Kumjian, M., Marquis, J., Nesbitt, S., P. Salio, and J. Wurman, 2020: Multiple-platform, and multiple-Doppler radar observations of a supercell thunderstorm in South America during RELAMPAGO. *Mon. Wea. Rev.*, **148**, 3225 – 3241.
- **Kosiba, K. A.**, J. Wurman, K. Knupp, K. Pennington, and P. Robinson, 2020: Ontario Winter Lake-effect Systems (OWLeS): Bulk characteristics and kinematic evolution of misovortices in long-lake-axis-parallel snowbands. *Mon. Wea. Rev.*, **148**, 131-157.
- Fernández Cabán, P. L., Alford, A. A., Bell, M., Biggerstaff, M. I., Carrie, G. D., Hirth, B., **Kosiba, K.**, Phillips, B. M., Schroeder, J. L., Waugh, S. M., Williford, C. E., Wurman, J., Masters, F. J., 2019: Observing Hurricane Harvey's Eyewall at Landfall. *Bull. Amer. Meteor. Soc.*, **100**, 759 - 775
- Wurman, J., and **K. Kosiba**, 2018: The role of small-scale vortices in enhancing surface winds and damage in Hurricane Harvey (2017). *Mon. Wea. Rev.*, **146**, 713–722.
- Refan, M., H. Hangan, J. Wurman, and **K. Kosiba**, 2017: Doppler radar-derived wind field of five tornado events with application to engineering simulations. *Engineering Structures*, **148**. 509-521.

- Mulholland, J. P., J. Frame, S. Nesbitt, S. Steiger, **K. Kosiba**, J. Wurman, 2017: Observations of Misovortices Within A Long Lake-Axis-Parallel Lake-Effect Snow Band During The OWLeS Project. *Mon. Wea. Rev.* **145**, 265–3291.
- Geerts, B., D. Parsons, C. Ziegler, T. Weckworth, D. Turner, J. Wurman, **K. Kosiba**, R. Rauber, M. Parker, R. Schumacher, M. Coniglio, K. Haghi, M. Biggerstaff, P. Klein, W. Gallus, B. Demoz, K. Knupp, R. Ferrare, X. Wang, J. Hanesiak, J. Pinto, J. Moore, 2017: The 2015 Plains Elevated Convection At Night (PECAN) field project. *Bull. Amer. Meteor. Soc.*, **98**, 767–786.
- Kristovich, D. A. R., R. D. Clark, J. Frame, B. Geerts, K. R. Knupp, **K. A. Kosiba**, N. F. Laird, N. D. Metz, J. Minder, T. D. Sikora, W. J. Steenburgh, S. M. Steiger, J. Wurman, G. S. Young; 2017: "The Ontario Winter Lake-effect Systems (OWLeS) Field Project. *Bull. Amer. Meteor. Soc.*, **98**, 315–332.
- Wakimoto, R.M., N.T. Atkins, K.M. Butler, H.B. Bluestein, K. Thiem, J.C. Snyder, J. Houser, **K. Kosiba**, J. Wurman, 2016: Aerial Damage Survey of the 2013 El Reno Tornado Combined with Mobile Radar Data. *Mon. Wea. Rev.*, **144**, 1749-1776.
- Klees, A.M., Y.P. Richardson, P.M. Markowski, J. Wurman, and **K. Kosiba**, 2016: Comparison of the Tornadoic and Nontornadoic Supercells Intercepted by VORTEX2 on 10 June 2010. *Mon. Wea. Rev.*, **144**, 3201–3231.
- Marquis, J., Y. Richardson, P. Markowski, J. Wurman, and **K. Kosiba**, 2016: An Investigation of the Goshen County, Wyoming, Tornadoic Supercell of 5 June 2009 Using EnKF Assimilation of Mobile Mesonet and Radar Observations. Part II: mesocyclone-scale processes affecting tornado formation, maintenance, and decay. *Mon. Wea. Rev.*, **144**, 3441-3463.
- Bell, M. M., R. A. Ballard, M. Bauman, A. M. Foerster, A. Frambach, **K. A. Kosiba**, W.-C. Lee, S. L. Rees, and J. Wurman, 2015: The Hawaiian Educational Radar Opportunity (HERO).
- Wurman, J., **K. Kosiba**, P. Robinson, T. Marshall, 2014: The Role of Multiple-Vortex Tornado Structure in Causing Storm Researcher Fatalities. *Bull. Amer. Meteor. Soc.*, **95**, 31–45.
- **Kosiba, K. A.**, and J. Wurman, 2014: Fine-scale dual-Doppler analysis of hurricane boundary layer structures in Hurricane Frances (2004) at landfall. *Mon. Wea. Rev.*, **142**, 1874-1891.
- **Kosiba, K. A.**, P. Robinson, P. W. Chan, J. Wurman, 2014: Wind Field of A Non-Mesocyclone Anticyclonic Tornado Crossing the Hong Kong International Airport. Accepted to *Advances in Meteorology*.
- Marquis, J., Y. Richardson, P. Markowski, D. Dowell, J. Wurman, **K. Kosiba**, P. Robinson, and G. Romine, 2014: An investigation of the Goshen County, Wyoming, tornadoic supercell of 5 June 2009 using EnKF assimilation of mobile radar and mobile mesonet observations collected during VORTEX2. Part I: Experiment design and verification of the EnKF analyses. *Mon. Wea. Rev.*, **142**, 530–554.
- **Kosiba, K. A.**, and J. Wurman, 2013: The three-dimensional structure and evolution of a tornado boundary layer. *Wea. Forecasting*. **28**, 1552-1561.
- **Kosiba, K. A.**, J. Wurman, F. Masters, and P. Robinson, 2013: Mapping of near-surface winds in Hurricane Rita using fine-scale radar, anemometer, and land-use data. *Mon. Wea. Rev.* **141**, 4337-4349.
- **Kosiba, K. A.**, J. Wurman, P. Markowski, Y. Richardson, P. Robinson, and J. Marquis, 2013: Genesis of the Goshen County, Wyoming Tornado on 05 June 2009 during VORTEX2. *Mon. Wea. Rev.*, **141**, 1157-1181.
- Wurman, J. and **K. A. Kosiba**, 2013: Fine-scale radar observations of tornado and mesocyclone structures. *Wea. And Forecasting*. doi: <http://dx.doi.org/10.1175/WAF-D-12-00127.1>
- Wurman, J., **K. Kosiba**, and P. Robinson, 2013: In Situ, Doppler radar, and video observations of the interior structure of a tornado and the wind–damage relationship. *Bull. Amer. Meteor. Soc.*, **94**, 835–846.
- Steiger, S. M., A. Stamm, D. Ruth, K. Jaszka, T. Kress, B. Rathbun, R. Schrom, J. Frame, J. Wurman, **K. Kosiba**, 2013: Circulations, bounded weak echo regions, and horizontal vortices observed within long lake-axis-parallel lake-effect storms by the Doppler on Wheels. *Mon. Wea. Rev.*,

141, 2821-2840.

- Toth, M., R. J. Trapp, J. Wurman, **K. A. Kosiba**, 2013: Comparison of mobile-radar measurements of tornado Intensity with corresponding WSR-88D measurements. *Wea. Forecasting*, **28**, 418–426.
- Markowski, P., Y. Richardson, J. Marquis, J. Wurman, **K. Kosiba**, P. Robinson, D. Dowell, E. Rasmussen, and R. Davies-Jones, 2012a: The pretornadic phase of the Goshen County, Wyoming, supercell of 5 June 2009 intercepted by VORTEX2. Part I: Evolution of kinematic and surface thermodynamic fields. *Mon. Wea. Rev.*, **140**, 2887-2915.
- Markowski, P., Y. Richardson, J. Marquis, R. Davies-Jones, J. Wurman, **K. Kosiba**, P. Robinson, E. Rasmussen, and D. Dowell, 2012b: The pretornadic phase of the Goshen County, Wyoming, supercell of 5 June 2009 intercepted by VORTEX2. Part II: Intensification of low-level rotation. *Mon. Wea. Rev.*, **140**, 2916-2938.
- Chan, P. W., J. Wurman, C. M. Shun, P. Robinson, and **K. Kosiba**, 2011: An application of a method for the automatic detection and Ground-Based Velocity Track Display (GBVTD) analysis of a tornado crossing the Hong Kong International Airport., *Atmos. Res.*, **106**, 18-29.
- **Kosiba, K. A.** and J. Wurman, 2010: The three-dimensional axisymmetric wind field structure of the Spencer, South Dakota (1998) tornado. *J. Atmos. Sci.*, **67**, 3074-3083.
- Wurman, J., **K. A. Kosiba**, P. Markowski, Y. Richardson, D. Dowell, and P. Robinson, 2010: Fine-scale and dual-Doppler analysis of tornado intensification, maintenance, and dissipation in the Orleans, Nebraska, tornadic supercell. *Mon. Wea. Rev.*, **138**, 4439–4455.
- **Kosiba, K. A.**, R. J. Trapp, and J. Wurman, 2008: An analysis of the axisymmetric three-dimensional wind field in a tornado using mobile radar observations. *Geophys. Res. Lett.*, **35**, L05805, doi:10.1029/2007GL031851.