

BEFORE THE
LOUISIANA PUBLIC SERVICE COMMISSION

IN RE: APPLICATION OF ENTERGY)
LOUISIANA, LLC FOR RECOVERY)
IN RATES OF COSTS RELATED TO)
HURRICANES LAURA, DELTA,)
ZETA, AND WINTER STORM URI)
AND FOR RELATED RELIEF)

DOCKET NO. U-_____

DIRECT TESTIMONY

OF

BARRY D. KEIM, Ph.D.

ON BEHALF OF

ENTERGY LOUISIANA, LLC

APRIL 2021

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EXHIBIT LIST

Exhibit BDK-1	CV of Dr. Barry D. Keim
Exhibit BDK-2	Report entitled, "Assessment of Sustained Winds and Wind Gusts During Hurricane Laura Across the Greater Lake Charles Region"
Exhibit BDK-3	Track and Intensity of Hurricane Laura
Exhibit BDK-4	Track and Intensity of Hurricane Delta
Exhibit BDK-5	Track and Intensity of Hurricane Zeta

1 Professor in Geography (1997-1999), and later an Associate Professor in Geography with
2 Tenure (1998-2003). Concurrently, I served as Adjunct Research Assistant Professor
3 (1996-1999) and then a Research Associate Professor (1999-2003) in the Institute for the
4 Study of Earth, Oceans, and Space – Climate Change Research Center. I also served as
5 an Adjunct Assistant/Associate Professor in Earth Science (1997-2003). And I was the
6 New Hampshire State Climatologist from 1994 to 2002. Finally, beginning in 2002 and
7 continuing to present day, I have served on the faculty at Louisiana State University in
8 Baton Rouge, Louisiana.

9 My career at Louisiana State University has progressed as follows: Assistant
10 Professor – Research in Geography and Anthropology (2002-2005); Regional
11 Climatologist with the Southern Regional Climate Center (2002-2003); Associate
12 Professor in Geography and Anthropology (2005-2009); Associate Professor with Tenure
13 (2006-2009); Professor (2009-present). I became Chair of the Department of Geography
14 and Anthropology in 2020. I also have served as the Louisiana State Climatologist since
15 2003. My research centers on climate extremes, including heavy rainfall and hurricanes.
16 I teach courses in Climatology of Extreme Events, Global Environmental Change,
17 Physical Geography of the Atmosphere, Meteorology, and Climatology.

18 I have co-authored 3 books, including *Hurricanes of the Gulf of Mexico*
19 (Louisiana State University Press, 2009), and 13 book and encyclopedia chapters, as well
20 as over 100 journal articles and other publications. I am a member of the American
21 Association of State Climatologists, the Association of American Geographers, and the
22 American Meteorological Society – Central Louisiana Chapter. I have written on and

1 given numerous presentations concerning hurricanes and the risks that they pose to
2 Louisiana. My complete CV is attached as Exhibit BDK-1.

3
4 **II. PURPOSE OF TESTIMONY**

5 Q6. WHAT WERE YOU ENGAGED TO DO?

6 A. Through Keim Consulting, LLC, I was engaged by ELL to study and provide a report on
7 sustained winds and wind gusts during Hurricane Laura with respect to certain locations
8 across the Lake Charles region at or near where ELL sustained damage to its electric-
9 utility infrastructure. I prepared a report entitled "Assessment of Sustained Winds and
10 Wind Gusts During Hurricane Laura Across the Greater Lake Charles Region" (the
11 "Report"). An original copy of that Report is attached as Exhibit BDK-2 to my
12 testimony. I also was asked to provide summary information about Hurricane Delta and
13 Hurricane Zeta, which I address later in my testimony.

14
15 Q7. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

16 A. My testimony introduces, summarizes, and incorporates by reference the Report attached
17 as Exhibit BDK-2 and provides information about Hurricanes Laura, Delta, and Zeta and
18 the 2020 Atlantic hurricane season.

1 III. TESTIMONY

2 Q8. PLEASE SUMMARIZE THE FINDINGS OF YOUR REPORT ABOUT HURRICANE
3 LAURA AND ITS PLACE IN HISTORY.

4 A. As I explain in my Report, Hurricane Laura was the strongest hurricane on record to
5 affect Southwest Louisiana. It came ashore near Cameron, Louisiana, in Cameron Parish
6 on August 27, 2020, as a strong Category 4 hurricane with sustained winds speeds of 150
7 mph. This ties Hurricane Laura with the Last Island Hurricane of 1856 as the as the
8 strongest hurricane to make landfall in Louisiana. Unlike Hurricane Rita, which made
9 landfall in western Cameron Parish in 2005 as a Category 3 hurricane but weakened
10 rapidly once inland, Hurricane Laura maintained major hurricane status through
11 Cameron, Calcasieu, and southern Beauregard Parishes and maintained hurricane
12 strength until just before it crossed I-20 near Shreveport. Hurricane Laura also produced
13 an estimated storm surge of 20.7 feet (NAVD88) at Rutherford Beach near Creole,
14 Louisiana, which is the largest surge on record for Louisiana, and it is the fourth largest
15 surge event on record for the Gulf of Mexico, with data going back to 1880. I attach as
16 Exhibit BDK-3 to my testimony graphics from the National Hurricane Center that show
17 the track and intensity of Hurricane Laura and radar images at landfall.

18
19 Q9. HOW DID YOU ESTIMATE SUSTAINED WINDS AND WIND GUSTS AT
20 LOCATIONS OF ENTERGY INFRASTRUCTURE IN THE LAKE CHARLES
21 REGION?

22 A. My Report sets forth my approach and methodology in examining and estimating
23 sustained winds and wind gusts associated with Hurricane Laura at certain locations, but I

1 am happy to provide a brief summary. I received from ELL information on 26 sites of
2 interest throughout the Lake Charles area.¹ Relevant to my work, ELL provided latitude
3 and longitude coordinates for the sites, above ground heights for structures/poles at or
4 near the sites, and, for sites 1 through 15, the average height of structures on the line
5 section for each identified structure/pole. (Note, ELL provided these heights in feet,
6 which I converted to meters for purposes of estimating sustained winds and gusts at
7 elevations higher than 10 meters). Through a commercial weather analytics platform
8 with which I am familiar, I was able to obtain data corresponding to the latitude and
9 longitude coordinates for the 26 sites that formed the foundation of estimates of the 10-
10 meter, 1-minute maximum sustained wind speeds at those sites during Hurricane Laura.
11 When the National Hurricane Center refers to maximum sustained winds in its advisories,
12 it likewise is using a 1-minute averaging time for winds measured at the standard
13 meteorological height of 10 meters (about 33 feet) in an open or unobstructed exposure
14 (*i.e.*, not blocked by trees or buildings). These are considered “surface” winds.

15 Examining surface-level sustained winds does not provide a complete picture of
16 the maximum winds that electric-utility infrastructure experiences during a hurricane.
17 Winds are composed of a series of gusts and lulls that quickly increase and decrease the
18 wind speed. And sustained winds and gusts during a hurricane increase with elevation.
19 Accordingly, I proceeded to estimate 1-minute sustained winds, 3-second (or “peak”)
20 gusts, and instantaneous gusts at the elevations of the utility infrastructure at the 26 sites.
21 I explain in my Report the methodology for my estimates and calculations, and the
22 resulting wind estimates are set forth in Table 1 and Table 2 of the Report.

¹ The information I received is set forth in Exhibit MPB-5 to the Direct Testimony of Michelle Bourg.

1 Q10. PLEASE SUMMARIZE THE WIND SPEED ESTIMATES THAT RESULTED FROM
2 YOUR ANALYSIS AND CALCULATIONS.

3 A. As set forth in Table 1 and Table 2 of my Report, among the 26 sites, the estimated
4 maximum wind speeds during Hurricane Laura vary by location and elevation, ranging
5 from 76 to 132 mph for 1-minute sustained winds at top-of-structure elevation, and, at
6 that same elevation, from 98 to 171 mph for 3-second gusts, and 110 to 191 mph for
7 instantaneous gusts.

8
9 Q11. YOU MENTION IN YOUR REPORT THAT LOUISIANA HAD FIVE
10 LANDFALLING STORMS IN 2020. PLEASE IDENTIFY THOSE STORMS.

11 A. The storms and date of landfall were Cristobal (June 7), Marco (August 24), Laura
12 (August 27), Delta (October 9), and Zeta (October 28). I note that Marco, which became
13 a hurricane for a few hours over the Gulf of Mexico and later dissipated over water south
14 of the Louisiana coast, was thought to have made landfall at the mouth of the Mississippi
15 River, but, as the National Hurricane Center recently reported, data from weather stations
16 at Southwest Pass suggest that the actual wind and pressure center stayed just south of
17 those stations and that landfall did not occur. Three of the storms – Laura, Delta, and
18 Zeta – made landfall as hurricanes.

19
20 Q12. PLEASE DESCRIBE BRIEFLY HURRICANES DELTA AND ZETA.

21 A. At 6 p.m. CDT on Friday, October 9, 2020, Hurricane Delta made landfall near Creole,
22 Louisiana, as a Category 2 hurricane with sustained winds approaching 100 mph. The

1 storm's landfall location was only about 12 miles east of where Hurricane Laura had
2 come ashore six weeks earlier. Particularly in comparison to Laura, Delta weakened
3 rapidly after landfall, and it was a Category 1 hurricane within the first hour after
4 landfall. But Delta had a large circulation and rain shield, and it resulted in widespread
5 flooding, especially across the central portions of Louisiana. The heaviest rainfall
6 produced by Delta fell primarily across southwest and central Louisiana, where totals
7 ranged from 15 to 20 inches between Lake Charles and Alexandria. Baton Rouge
8 received nearly 10 inches of rain, which resulted in flooding in some areas of the city. I
9 attach as Exhibit BDK-4 to my testimony graphics from the National Hurricane Center
10 that show the track and intensity of Hurricane Delta and a radar image at landfall.

11 At 4 p.m. CDT on Wednesday, October 28, 2020, Hurricane Zeta made landfall
12 near Cocodrie, Louisiana, as a strong Category 2 hurricane with sustained winds of 110
13 mph, just one mph shy of Category 3 strength. This was the latest in the season that a
14 Category 2 hurricane made landfall in Louisiana, and it was the strongest hurricane to
15 make landfall in the United States that late in the calendar year since the Halloween
16 Hurricane of 1899. Zeta's intensity surprised forecasters; the storm's winds increased by
17 45 mph in the last 26 hours before landfall. A weather system to the west that brought
18 rare October ice storms to Oklahoma and Texas may have contributed to Zeta's rapid
19 intensification and powerful thunderstorm activity. The storm's center passed directly
20 over Orleans Parish, and its damaging winds brought down trees, limbs, utility poles, and
21 lines throughout the metropolitan New Orleans area. Damage to infrastructure in the
22 coastal parishes of southeast Louisiana, including Jefferson, Lafourche, Plaquemines, St.
23 Bernard, and Terrebonne, was extensive. I attach as Exhibit BDK-5 to my testimony

1 graphics from the National Hurricane Center that show the track and intensity of
2 Hurricane Zeta and a radar image at landfall.

3

4

IV. CONCLUSION

5 Q13. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

6 A. Yes, at this time.

AFFIDAVIT

STATE OF LOUISIANA

PARISH OF EAST BATON ROUGE


NOW BEFORE ME, the undersigned authority, personally came and appeared, **Barry D. Keim, Ph.D**, who after being duly sworn by me, did depose and say:

That the above and foregoing is his sworn testimony in this proceeding and that he knows the contents thereof, that the same are true as stated, except as to matters and things, if any, stated on information and belief, and that as to those matters and things, he verily believes them to be true.



Barry D. Keim, Ph.D

SWORN TO AND SUBSCRIBED BEFORE ME
THIS 25th DAY OF APRIL, 2021



NOTARY PUBLIC LA BAR # 26836

My commission expires: AT DEATH

Barry D. Keim - CV
Professor and Louisiana State Climatologist
Department of Geography and Anthropology

Louisiana State University

Education

Ph.D. Geography (1994) Louisiana State University
Dissertation: *Temporal and Synoptic Analyses of Heavy Rainfall in the Southeastern United States*

M.S. Geography (1990) Louisiana State University
Thesis: *Synoptic Weather, Frequency, and Magnitude Analyses of Heavy Rainfall in New Orleans, Louisiana: 1871-1989*

B.A. Geography (1987) University of New Orleans

Employment History

Louisiana State University:

2020-	Chair of Department
2009-	Professor
2006-2009	Associate Professor with Tenure
2005-2009	Associate Professor in Geography and Anthropology
2003-	Louisiana State Climatologist
2002-2005	Assistant Professor – Research in Geography and Anthropology
2002-2003	Regional Climatologist, Southern Regional Climate Center

University of New Hampshire:

1999-2003	Associate Professor in Geography with Tenure
1999- 2003	Research Associate Professor in the Institute for the Study of Earth, Oceans, and Space - Climate Change Research Center
1997-1999	Assistant Professor in Geography
1997-2003	Adjunct Assistant/Associate Professor in Earth Science
1996-1999	Adjunct Research Assistant Professor in the Institute for the Study of Earth, Oceans, and Space - Climate Change Research Center
1994- 2002	New Hampshire State Climatologist

1994-1997

Lecturer in Geography

Publications - Books

Keim, B.D., and R.A. Muller. 2009. *Hurricanes of the Gulf of Mexico*. Louisiana State University Press: Baton Rouge, Louisiana, 232 pp.

Zielinski, G.A., and B.D. Keim. 2003. *New England Weather, New England Climate*. University Press of New England: Hanover, New Hampshire, 296 pp.

Faiers, G.E., B.D. Keim, and R.A. Muller. 1997. *Rainfall Frequency/Magnitude Atlas for the South-Central United States*. Geoscience Publications: Baton Rouge, Louisiana, 40 pp.

Publications - Book Chapters

Konrad, C.E. C.W. Fuhrmann, A. Billiot, B.D. Keim, M.C. Kruk, K.E. Kunkel, H.Needham, M. Shafer, L. Stevens. 2013. Climate of the Southeast USA: Past, Present, and Future. Chapter 2 in *Climate of the Southeast United States: Variability, Change, Impacts, and Vulnerability* (Ingram, K, K. Dow, L.Carter, and J. Anderson eds), pp. 8-42. Island Press: Washington, D.C.

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Nogueira, R., B.D. Keim, and D. Brown. 2010. Variability of Rainfall from Tropical Cyclones in the Eastern United States and its Relation to AMO and ENSO. Association of American Geographers Conference, Washington, DC, April.

Piazza, B.P., M.K. La Peyre, B.D. Keim. 2009. Relating Large-scale Climate Variability to Local Species Abundance: ENSO forcing and Brown Shrimp (*Farfantepenaeus aztecus*) in Breton Sound, Louisiana, USA. Coastal and Estuarine Research Federation Biennial Conference, Portland, OR, November.

Keim, B.D., and K.R. Robbins. 2009. Intraseasonal Occurrence Dates of North Atlantic Tropical Storms and Hurricanes. Association of American Geographers Conference, Las Vegas, NV, April.

Eosco, G.M. M.A. Shafer, and B.D. Keim. 2009. Lessons Learned: Evacuations Management of Hurricane Gustav. Fourth Symposium on Policy and Socio-Economic Research, American Meteorological Society, Phoenix, AZ, January.

Keim, B.D., and G.E. Faiers. 2008. Three-hour and Twenty-Four hour Rainstorm Ratios from Coast to Coast Across the Southern United States. Association of American Geographers Conference, Boston, MA, April.

Brown, D.P., and B. D Keim. 2008. Record Rainfall Associated with the 12-16 May 2006 New England Storm. Association of American Geographers Conference, Boston, MA, April.

Shankman, D. B.D. Keim, and C.W. Lafon. 2008. Forest-grassland transition in the southeastern United States: physiographic, soil, and climatic influences. Association of American Geographers Conference, Boston, MA, April.

Faiers, G.E. and B.D. Keim. 2007. Analysis of Three-hour and Twenty-Four hour Rainstorm Ratios from Coast to Coast Across the Southern United States. Southeastern Division of the Association of American Geographers Conference, Morgantown, WV, November.

Keim, B.D., R. Fontenot, C. Tebaldi, and J. Couret. 2007 Hydroclimatology of the U.S. Gulf Coast Region Under Global Warming Scenarios. Association of American Geographers Conference, San Francisco, April.

Shankman, D. , B.D. Keim, and J. Song. 2006. Flood prediction in China's Poyang Lake Region. Association of American Geographers Conference, Chicago, IL, March.

Allard, J., B.D. Keim. 2006 Spuriously Induced Temperature Trends in the Southeast United States. Association of American Geographers Conference, Chicago, IL, March.

Shankman, D. , B.D. Keim, and J. Song. 2005. Flood prediction in China's Poyang Lake Region. Southeast Division of the Association of American Geographers, West Palm Beach, FL, November.

Shankman, D., B.D. Keim, and J. Song. 2005. Flood Control in China's Poyang Lake Region: Trends and Teleconnections. International Conference on Poyang Lake Complex Environment System, Nanchang, China. June.

Muller, R.A., B.D. Keim, G.W. Stone. 2005. Return Periods of Tropical Storm and Hurricane Strikes Along the Gulf and Atlantic Coasts." Southeastern Section of the Geological Society of America, Biloxi, MS, March.

Keim, B.D., R.A. Muller, G.W. Stone. 2004. Spatial and Temporal Patterns of Hurricane Strikes on the Gulf of Mexico and Atlantic Coasts. Southeast Division of the Association of American Geographers, Biloxi, MS, November.

Keim, B.D., A. Wilson, C.P. Wake, and T. Huntington. 2004. Are there Spurious Temperature Trends in the United States Climate Division Database? American Association of State Climatologists Conference, Ithaca, NY, August.

Keim, B.D., L.C. Hamilton, D.E. Rohall, B.C. Brown, and G. Hayward. 2004. Warming Winters and New Hampshire's Lost Ski Areas. Association of American Geographers Conference, Philadelphia, PA, March.

Muller, R.A., B.D. Keim, and G.W. Stone. 2004. A 100-year Geographical and Temporal Index of Tropical Storm and Hurricane Strikes Along the Atlantic Ocean Coastline of the

United States from Maine to Texas. Association of American Geographers Conference, Philadelphia, PA, March.

Mons, E.L., and B.D. Keim. 2003. Ethical Dilemmas and Client Data Services at the U.S. Regional Climate Centers. Association of American Geographers Conference, New Orleans, Louisiana, March.

Keim, B.D. 2003. Are there Spurious Temperature Trends in the United States Climate Division Database. Association of American Geographers Conference, New Orleans, Louisiana, March.

Shankman, D., and B.D. Keim. 2003. Floods in China's Poyang Lake Region: Trends and Teleconnections. Association of American Geographers Conference, New Orleans, Louisiana, March.

Fujimoto-Strait, A.R., and B.D. Keim. 2002. Using GIS to Analyze World-Wide Trends in Extreme/Heavy Precipitation Events. Southeast Division of the Association of American Geographers, Richmond, VA, November.

Shankman, D. and B. D. Keim. 2002. Floods in China's Poyang Lake Region: Trends and Teleconnections. Southeast Division of the Association of American Geographers, Richmond, VA, November.

Bradbury, J.A., C.P. Wake, and B.D. Keim. 2002. Selecting Suitable Variables for Numerical Prediction Models of New England Winter Hydroclimate. Climate Prediction Assessments Workshop, Alexandria, VA, October.

Harper, G.A., B.D. Keim, J. Gomez. 2002. The Role of a Board of Consultants in Site Specific PMP and PMF Studies. Association of State Dam Safety Officials Conference, Tampa, FL, September.

Keim, B.D. 2002. The AIRMAP Research Initiative: Mapping New England's Weather and Air Quality. Association of American Geographers Conference, Los Angeles, March.

Gillman, J.H., B.J. D'Agostino, T.O. Markle, N.C. Witcraft, J.P. Koermer, and B.D. Keim, 2002. Regional Synoptic Climatology Study of the Mt. Washington Area. Presented at the 13th Symposium on Global Change and Climate Variations, American Meteorological Society, Orlando, Florida, January.

Bradbury, J.A., B.D. Keim, and C.P. Wake. 2001. East Coast Pressure Trough Indices and Winter Climate Variability. Poster presented at the Fall Meeting of the American Geophysical Society Meeting, San Francisco, December.

Keim, B.D., and G.E. Faiers. 2001. Interpretation of Extreme Precipitation at a Construction Site: An Applied Test Case in Northern New Hampshire. Southeast Division of the Association of American Geographers, Lexington, Kentucky, November.

Keim, B.D. 2001. Temperature and Precipitation Trends in New England and New York Since 1895. New England - St. Lawrence Valley Division of the Association of American Geographers Conference, New Bedford, Massachusetts, October.

Bradbury, J.A., S.L. Dingman, L.D. Meeker, and B.D. Keim. 2001. Relations of Large-Scale Atmospheric Circulation Patterns to Streamflow Variability in New England. Poster presented at the Spring Meeting of the American Geophysical Society Meeting, Boston, May.

Keim, B.D., and L.D. Meeker. 2001. Transitions and Seasonal Variations of Boston, Massachusetts Synoptic Weather Patterns. Association of American Geographers Conference, New York, February.

Lee, J., and 15 co-authors including B.D. Keim. 2001. The New England Observation Network: A 21st Century Vision for Environmental Monitoring and Science Education in the New England States. American Meteorological Society Symposium, Albuquerque, New Mexico, January.

Markle, T.O., N.C. Witcraft, J.P. Koerner, B.D. Keim, M.K. Politovitch. 2001. A Detailed Study of the April Observational Data for the Mt. Washington Area over the Past 45 Years. American Meteorological Society Symposium, Albuquerque, New Mexico, January.

Keim, B.D., and S. Miller. 2000. A Comparison of Two Climatologically Unique New England Summers, 1999 and 2000. Southeastern Division of the Association of American Geographers Conference, Chapel Hill, North Carolina, November.

Slater, J.F., J.E. Dibb, B.D. Keim, R.W. Talbot. 2000. Light Extinction by Fine Atmospheric Particles in the White Mountain Region of New Hampshire and its Relationship to Air Mass Transport. Poster presented at the North American Research Strategy for Tropospheric Ozone (NARSTO) Conference, Mexico City, Mexico, October

Keim, B.D., and S. Miller. 2000. A Comparison of Two Climatologically Unique New England Summers, 1999 and 2000. New England - St. Lawrence Valley Division of the Association of American Geographers Conference, Providence, Rhode Island, October.

Keim, B.D. 2000. A Manual Synoptic Climate Classification for the East Coast of New England. Association of American Geographers Conference, Pittsburgh, Pennsylvania, April.

Zielinski, G.A., and B.D. Keim. 2000. A Dual-Classification Scheme for Snow-Producing Nor'easters of New England. Presented at the Northeastern Storm Conference, Saratoga Springs, New York, March.

Keim, B.D. 1999. New England Weather Types. New England - St. Lawrence Valley Division of the Association of American Geographers Conference, Farmington, Maine, October.

Keim, B.D. and G.E. Faiers. 1999. A Comparison of Quantile Estimation Techniques in Arid and Mountainous Environments. Association of American Geographers Conference, Honolulu, Hawaii, March.

Keim, B.D., G.E. Faiers, and R.V. Rohli. 1998. Toward Understanding the Severity of Tropical Cyclone Rainfall in the Eastern United States. Association of American Geographers Conference, Boston, Massachusetts, March.

Keim, B.D., and T. Bakey. 1997. The Coastal New England Rainstorm of October 20-21, 1996 in Perspective. Southeastern Division of the Association of American Geographers Conference, Birmingham, Alabama, November.

Faiers, G.E., and B.D. Keim. 1997. Alternative Approaches to the Huff-Angel and SRCC Extreme Rainfall Frequency/Magnitude Methods. Southeastern Division of the Association of American Geographers Conference, Birmingham, Alabama, November.

Keim, B.D. 1997. Climates of New England: A Resource for Educators. New England - St. Lawrence Valley Division of the Association of American Geographers Conference, Salem, Massachusetts, November.

Keim, B.D., and J.F. Cruise. 1997. A Parametric Technique for Measuring Trends in Extreme Events. Association of American Geographers Conference, Ft. Worth, Texas, April.

Faiers, G.E., and B.D. Keim. 1997. Selecting Probability Distributions for Extreme 2-, 5-, and 10-day Rainstorms in Louisiana. Association of American Geographers Conference, Ft. Worth, Texas, April.

Keim, B.D., and G.E. Faiers. 1996. Decision-Making in the Derivation of Extreme Rainfall Probabilities. Southeastern Division of the Association of American Geographers Conference, Athens, GA, November.

Faiers, G.E., and B.D. Keim. 1996. A Re-Evaluation of Extreme 3-Hour and 24-Hour Rainfall in Mississippi. Southeastern Division of the Association of American Geographers Conference, Athens, GA, November.

Keim, B.D. 1996. Use of the Poisson Distribution in Geographic Research. New England - St. Lawrence Valley Division of the Association of American Geographers Conference, Worcester, MA, November.

Faiers, G.E., and B.D. Keim. 1996. Topographic Influences on Extreme Rain Events in the South-Central United States. Pennsylvania Geographic Society Conference, Carlisle, PA, October.

Faiers, G.E., B.D. Keim, and R.A. Muller. 1996. Methodological Problems in Extreme

Rainfall Frequency-Magnitude Studies. Poster presented at the Association of American Geographers Conference, Charlotte, North Carolina, April.

Keim, B.D. 1996. Temporal Analysis of Heavy Rainfall in the Southeastern United States. Association of American Geographers Conference, Charlotte, North Carolina, April.

Keim, B.D. 1995. A Technique to Measure Temporal Trends in Extreme Events. Southeastern Division of the Association of American Geographers Conference, Knoxville, Tennessee, November.

Keim, B.D., and G.E. Faiers. 1995. Use of Recurrence Intervals in Climatological Analysis. New England - St. Lawrence Valley Division of the Association of American Geographers Conference, Burlington, Vermont, November.

Keim, B.D. 1995. Long-Term Trends of Storm Magnitudes in the Southeastern U.S. Association of American Geographers Conference, Chicago, Illinois, March.

Rohli, R.V., and B.D. Keim. 1995. Extreme High Temperature Events in the South Central U.S. Association of American Geographers Conference, Chicago, Illinois, March.

Faiers, G.E., B.D. Keim, and R.A. Muller. 1995. Summary of the Rainfall Frequency Atlas of the South Central United States. Association of American Geographers Conference, Chicago, Illinois, March.

Keim, B.D., and G.E. Faiers. 1994. Recurrence Intervals of Heavy Rainfall by Season: A Test Case from Louisiana. Southeastern Division of the Association of American Geographers Conference, Virginia Beach, Virginia, November.

Faiers, G.E., and B.D. Keim. 1994. Two-, Five-, and Ten-Day Precipitation for Return Periods of 2 to 100 Years. Southeastern Division of the Association of American Geographers Conference, Virginia Beach, Virginia, November.

Keim, B.D. 1994. Spatial and Temporal Trends in Storm Frequencies in the Southeastern United States. Southwest Division of the Association of American Geographers Conference, Hot Springs, Arkansas, October.

Keim, B.D. 1994. Temporal and Spatial Interpretations of Storm Frequencies: Southeastern U.S. Association of American Geographers Conference, San Francisco, California, April.

Faiers, G.E., and B.D. Keim. 1994. Synoptic Climatology of Extreme Rainfall in the South Central United States. Association of American Geographers Conference, San Francisco, California, April.

Mosher, A.E., and B.D. Keim. 1994. Changing Face of New Orleans: Canal Street, 1887 - 1994. Association of American Geographers Conference, San Francisco, California, April.

Keim, B.D. 1993. Synoptic and Seasonality Interpretations of Heavy Rainfall in the Southeastern United States. Southeastern Division of the Association of American Geographers Conference, Greensboro, North Carolina, November.

Faiers, G. E., and B. D. Keim. 1993. Extreme 24-Hour Rainfall Frequency-Magnitude Relationships in West Texas. Southeastern Division of the Association of American Geographers Conference, Greensboro, North Carolina, November.

Keim, B.D., G.E. Faiers, R.A. Muller, and J.M. Grymes III. 1993. Long-Term Trends in Rainfall and Runoff in Louisiana. Southwest Division of the Association of American Geographers Conference, Fayetteville, Arkansas, October.

Faiers, G.E., and B.D. Keim. 1993. An Alternative Approach to the Use of Parametric Distributions in the Estimation of Storm Exceedence Probabilities in West Texas. Southwest Division of the Association of American Geographers Conference, Fayetteville, Arkansas, October.

Keim, B.D. 1993. Temporal Analysis of Heavy Rainfall in the Southeastern United States. Association of American Geographers Conference, Atlanta, Georgia, April.

Faiers, G.E., and B.D. Keim. 1993. An Analysis of Synoptically-Defined Distributions in the Louisiana Seasonal Extreme 24-hour Rainfall Record. Association of American Geographers Conference, Atlanta, Georgia, April.

Keim, B.D. 1993. Potential Impacts of Global Warming on Flood Hazards in New Orleans, Louisiana. Southwest Division of the Association of American Geographers Conference, New Orleans, Louisiana, March.

Mosher, A.E., and B.D. Keim. 1993. Changing Face of Canal Street in New Orleans, Louisiana: 1887-1993. Southwest Division of the Association of American Geographers Conference, New Orleans, Louisiana, March.

Faiers, G.E., B.D. Keim, and K.K. Hirschboeck. 1992. A Synoptic Evaluation of Extreme Three and Twenty-Four Hour Rainfall in Louisiana. Southeastern Division of the Association of American Geographers, Louisville, Kentucky, November.

Faiers, G.E., and B.D. Keim. 1992. Synoptically-Defined Mixed Distributions in Partial Duration Rainfall Series in Louisiana. Poster presented at the 1992 Southeast Climate Symposium Sponsored by the Southeastern Regional Climate Center and the South Carolina Water Resources Commission, Charleston, South Carolina, October.

Keim, B.D. 1992. Storm Frequencies and Storm Runoff into Lake Pontchartrain. Basics of the Basin Research Symposium Sponsored by the University of New Orleans and the Lake Pontchartrain Basin Foundation, New Orleans, Louisiana, May.

Keim, B.D. 1992. Design Storms and Recent Heavy Rainfall in the U.S. South. Association

of American Geographers Conference, San Diego, California, April.

Muller, R.A., and B.D. Keim. 1991. Monitoring the Status of Climate: Some Difficulties Associated with Sensors and Networks. Southern Weather Data Management Workshop, Atlanta, Georgia, June.

Keim, B.D. 1991. New Orleans Rainstorms: Does One Site Represent the Entire City? Association of American Geographers Conference, Miami, Florida, April.

Keim, B.D. 1990. Frequency and Magnitude of Immense Rainstorms in New Orleans. Association of American Geographers Conference, Toronto, Ontario, Canada, April.

Brooks, J.S., and B.D. Keim. 1987. Downtown Design and Retailing Patterns: The Changing Face of Canal Street, New Orleans, Louisiana 1887-1987. Association of Collegiate Schools of Planning Conference, Los Angeles, California, November.

Invited Lectures/Panels

“2020 Hurricane Season.” Presented to the Lion’s Club of Baton Rouge, October 19, 2020.

“Hurricanes, Storm Surge, Heavy Rainfall, and Freezes in a Changing Climate.” Presented virtually to the National Academy of Sciences Gulf Research Program, September 27, 2020.

“Hurricane Signatures.” Presented virtually to the LSU Science Café, August 25, 2020.

“Hurricanes and Storm Surge in a Changing Climate and other SCIPP Projects.” Presented virtually to the Southern Plains Science Seminar, August 12, 2020.

“A Freeze Climatology for Southeast Louisiana.” Presented at the American Society of Sugar Cane Technologists – Louisiana Division Annual Meeting, Baton Rouge, LA, February 4, 2020.

“Heavy Rainfall and Thunderstorms.” Presented to the National Association of State Radio Networks Annual Meeting, Las Vegas, NV, December 10, 2019.

“A Freeze Climatology for Southeast Louisiana.” Presented at the Southeast Climate Adaptation Science Center Annual Meeting, New Orleans, November 14, 2019.

“Southern Climate Impacts Planning Program: A NOAA RISA Team.” Presented at the 2019 NOAA Water Meeting, College Park, Maryland, October 16, 2019.

“Thunder and Lightning.” Presented to the Baton Rouge Chapter of the Lions Club, Baton Rouge, Louisiana, October 7, 2019.

“Hurricane Vulnerability and Precipitation Change in the Southeast US.” Presented to the New Orleans Sewerage and Water Board. New Orleans, Louisiana. September 5, 2019.

“Coastal Vulnerability in a Changing Climate.” Presented to the New Orleans Office of Homeland Security and Emergency Preparedness. New Orleans, Louisiana. August 8, 2019.

“Hurricane History of the Gulf of Mexico.” Presented to the Plaquemines Parish Historical Society, Belle Chasse, Louisiana, August 6, 2019.

“Hurricanes in a Changing Climate.” Presented to the Greater New Orleans (GNO) Clear Air Coalition Meeting, New Orleans, Louisiana, April 30, 2019.

“Coastal Vulnerability in a Changing Climate.” Presented at the Louisiana Ag Leadership Conference, New Iberia, Louisiana, December 4, 2018.

“Overview of Sea Level Rise and Coastal Flood Risk.” Presented at the NAACP Experience, Environmental Climate Justice, Sea Level Rise, Coastal Flood Risk, and Social Vulnerability Training, Southern University, Baton Rouge, Louisiana, October 13, 2018.

“South-Central Louisiana Flooding Event: August 2016.” Presented at the Louisiana Geological Survey Symposium called The Baton Rouge Flood of 2016: What Happened, What We Did, What We Lost, and What We Learned. Baton Rouge, Louisiana August 13, 2018.

“Media Relations Panel.” Served on Panel for the Early Career Researcher Professional Development Training Workshop. South Central Climate Adaptation Science Center, Baton Rouge, Louisiana, August 10, 2018.

“Baton Rouge Flood August 2016” Presented to the Early Career Researcher Professional Development Training Workshop. South Central Climate Adaptation Science Center, Baton Rouge, Louisiana, August 8, 2018.

“Louisiana Weather and Climate.” Presented to the Annual Meeting of the Coasts, Oceans, Ports, and Rivers Institute, Baton Rouge, Louisiana, April 5, 2018.

“Hurricane Climatology.” Presented to the Louisiana Agricultural Industries Association Annual Meeting, Marksville, Louisiana, October 25, 2017.

“Extreme Events in a Changing Climate.” Presented to the Baton Rouge-Sunrise Rotary Club, Baton Rouge, LA, October 19, 2017.

“Weather Trends – Flooding and Inland Marine Exposures.” Presented to the Inland Marine Underwriters Association Annual Meeting, Braselton, Georgia, May 23, 2017.

“August 2016 Louisiana Rainstorm.” Presented to the Ascension Parish Council, February 23, 2017.

“Hurricanes in a Changing Climate and the August 2016 Louisiana Flood Event.” Presented to the Baton Rouge Roundtable, Baton Rouge, December 8, 2016.

“Louisiana Hurricanes and the August 2016 Louisiana Flood Event.” Presented at the Louisiana Ag Leadership Conference, New Iberia, Louisiana, December 6, 2016.

“Hurricane Climatology and the August 2016 Louisiana Rainstorm.” Presented at the Intercultural Dialogue of Weather, Water, and Climate (LSU), Baton Rouge, Louisiana, November 16, 2016.

“August 2016 Louisiana Flood Event.” Presented at the Workshop entitled Improving Amite River Basin Flood Forecasting and Hazard Analysis, Baton Rouge, Louisiana, October 5, 2016.

“Climate of the South-Central United States: Hot Spot for Extreme Events.” Webinar presented nationally on the CoCoRaHS WxTalk Webinar Series, September 29, 2016.

“The August 11-13, 2016 Storm Event in Louisiana.” Presented to the Baton Rouge Press Club, Baton Rouge, LA, August 29, 2016.

“Hurricanes in Louisiana and Impacts of ENSO.” Presented to the Sugar Research Station Field Day, St. Gabriel, Louisiana, July 20, 2016.

“LSU Climate Center: Hurricanes and El Nino Update.” Presented to the NWS-Integrated Warning Team: Gulf Coast Meeting, New Orleans, LA, July 13, 2016.

“Climate Research and Public Service at LSU.” Presented to the USAID Delegation (Argentina, Brazil, and Chile), Baton Rouge, LA, June 24, 2016.

“Climate Tools and Data Sources: Finding and Viewing Climate Information.” Presented at the **South Central Climate Science Center - Climate 101 Workshop for Louisiana Indian Nations, Elton, Louisiana, May 4, 2016.**

“Climate of the Gulf Coast.” Presented at the NOAA Digital Coast-Climate Adaptation for Coastal Communities Workshop, Mobile, AL, January 26, 2016.

“GoExtreme at AMS 2016.” Invited Panel Member at the American Meteorological Society Conference, New Orleans, LA, January 14, 2016.

“El Niño.” Presented to the NWS-Integrated Warning Team: Gulf Coast Meeting, New Orleans, LA, October 22, 2015.

“A Climatological Perspective on Hurricane Katrina.” **Plenary Presentation** at the American Society of Dam Safety Officials, New Orleans, LA, September 15, 2015.

“Hurricanes in a Changing Climate.” Presented to the Amite Rotary Club, Amite, LA, August 25, 2015.

“Hurricane Climatology and 2015 Seasonal Forecast” Presented to the Pontchartrain-Maurepas Surge Consortium and Lake Pontchartrain Basin Foundation, Mandeville, LA, June 12, 2015.

“Climate Sector Introduction” Presented to the NWS-Integrated Warning Team: Gulf Coast Kick-Off Meeting, New Orleans, LA, April 21, 2015.

“Hurricanes in a Changing Climate” Presented to the Friday Speakers Forum, Department of Geography at Texas A&M, February 20, 2015.

“Hurricanes and Climate Change.” Presented to the St. Bernard Parish Rotary Club, February 19, 2015.

“Hurricanes in a Changing Climate.” Presented to the Louisiana Ag Leadership Conference, LSU, Baton Rouge, LA, January 6, 2015.

“Hurricane History of the Gulf and East Coast of the United States.” Presented to the Southeast Climate Consortium Fall Planning Meeting 2014, Auburn University, Auburn, AL, November 19, 2014.

“Hurricanes of the Gulf of Mexico.” Presented to the Poydras House Retirement Community, New Orleans, LA, November 18, 2014.

“Spatial and Temporal Analysis of Hurricane Strikes along the Gulf and Atlantic Coasts.” Presented to the NWS-Shreveport Louisiana Regional Climate Conference, Shreveport, LA, August 26, 2014.

“Dangers of Heat Stress and Lightning to Athletes.” Presented to the Louisiana High School Officials Association Annual Meeting, Thibodeaux, LA, August 15, 2014.

“Temporal and Spatial Patterns of U.S. Hurricane Activity,” Presented at the LSU Science Café, Baton Rouge, LA, May 27, 2014.

“Hurricanes in a Changing Climate,” Presented to the local chapter of the International Facilities Managers Association Monthly Meeting, Baton Rouge, LA, May 20, 2014.

“Coastal Hazards, Risks and Disasters: Enhancing Safety in an Era of Global Change” Invited Panel Member at the Association of American Geographers Conference, Tampa, Florida, April 8, 2014.

“Extreme Events in a Changing Climate.” Presented to the Western Gulf Silvicultural Technology Exchange, Shreveport, LA. December 12, 2013.