



### **Monsoon References**

There are numerous references available on the North American Monsoon, ranging from broad overviews to detailed and highly technical material.

The National Weather Service in Tucson is greatly indebted to Dr. Chris Castro, Physics and Atmospheric Sciences Department, University of Arizona, for his academic review of this monsoon website.

### **General Interest:**

\_\_\_\_\_, 2004: The North American Monsoon. Reports to the Nation on our Changing Planet. NOAA/National Weather Service. [Available on line at: [http://www.cpc.noaa.gov/products/outreach/Report-to-the-Nation-Monsoon\\_aug04.pdf](http://www.cpc.noaa.gov/products/outreach/Report-to-the-Nation-Monsoon_aug04.pdf) ]

Glueck, J.R., 1997: Climate of Tucson, Arizona. *NOAA Technical Memorandum*, NWS-WR-249. Available upon request from NOAA/NWS Tucson, AZ.

Shoemaker, C. and J.T. Davis, 2008: Hazardous Weather Climatology for Arizona. *NOAA Technical Memorandum*, NWS-WR 282. 47 pp. [Available on line at: <http://www.wrh.noaa.gov/wrh/techMemos/TM-282.pdf> ]

### **Academic Research Cited on This Page:**

Adams, D.K., and A.C. Comrie, 1997: The North American Monsoon. *Bull. Amer. Meteor. Soc.*, **78**, 2197-2213.

Bieda, S.W., C.L. Castro, S.L. Mullen, A.C. Comrie, and E. Pytlak, 2008: The relationship of transient upper-level troughs to intraseasonal and interannual variability of the North American Monsoon System. M.S. research paper, University of Arizona, Tucson, AZ. 35 pp. In review for *J. Climate*.

Bosart, L.F., and coauthors, 2007: A Study of Southwestern US Warm Season Convection Associated with Westward- and Southwestward-Propagating Upper-Level Disturbances. Research Proposal for the Cooperative Project for Operational Meteorology Education and Training (COMET), Award Number: S07-66811. [Abstract available on line at: [http://www.comet.ucar.edu/outreach/abstract\\_final/0766811.htm](http://www.comet.ucar.edu/outreach/abstract_final/0766811.htm)].

Carleton, A.M., D.A. Carpenter, and P. J. Weser, 1990: Mechanisms of Interannual Variability of the Southwest United States Summer Rainfall Maximum. *J. Climate*, **3**, 999-1015.

- Castro, C.L., T.B. McKee, and R.A. Pielke, 2001: The Relationship of the North American Monsoon to Tropical and North Pacific Sea Surface Temperatures as Revealed by Observational Analyses. *J. Climate*, **14**, 4449-4473.
- Castro, C.L., R.A. Pielke, and J.O. Adegoke, 2007: Investigation of the Summer Climate of the Contiguous United States and Mexico Using the Regional Atmospheric Modeling System (RAMS). Part I: Model Climatology (1950-2002). *J. Climate*, **20**, 3844-3865.
- Castro, C.L., R.A. Pielke, and J.O. Adegoke, 2007: Investigation of the Summer Climate of the Contiguous United States and Mexico Using the Regional Atmospheric Modeling System (RAMS). Part II: Model Climate Variability. *J. Climate*, **20**, 3866-3887.
- Douglas, A.V., and P.J. Englehart, 2007: A climatological perspective of transient synoptic features during NAME 2004. *J. Climate*, **20**, 1947-1954.
- Douglas, M.W., 1995: The summertime low level jet over the Gulf of California. *Mon. Wea. Rev.*, **123**, 2334-2347.
- Douglas, M.W., and S. Li, 1996: Diurnal variation of the lower tropospheric flow over the Arizona low desert from SWAMP-1993 observations. *Mon. Wea. Rev.*, **124**, 1211-1224.
- Douglas, M.W., R.A. Maddox, K Howard, and S. Reyes, 1993: The Mexican monsoon. *J. Climate*, **6**, 1665-1667.
- Englehart, P.J., and A.V. Douglas, 2006: Defining intraseasonal rainfall variability within the North American Monsoon. *J. Climate*, **19**, 4243-4253.
- Fuller, R.D., and D.J. Stensrud, 2000: The relationship between tropical easterly waves and surges over the Gulf of California during the North American Monsoon. *Mon. Wea. Rev.*, **128**, 2983-2989.
- Gutzler, D.S., 2000: Covariability of Spring Snowpack and Summer Rainfall across the Southwest United States. *J. Climate*, **13**, 4018-4027.
- Gutzler, D.S., and J. Preston, 1997: Evidence for a relationship between spring snow cover in North America and summer rainfall in New Mexico. *Geophysical Research Letters*, **24**, 2207-2210.
- Higgins, R.W., Y. Chen, Y. and A.V. Douglas, 1999: Interannual Variability of the North American Warm Season Precipitation Regime. *J. Climate*, **12**, 653-679.
- Higgins, R.W., K.C. Mo, and Y. Yao, 1998: Interannual Variability of the U.S. Summer Regime with Emphasis on the Southwestern Monsoon. *J. Climate*, **11**, 2583-2606.

- Higgins, R.W., and W. Shi, 2000: Dominant Factors Responsible for Interannual Variability of the Summer Monsoon in the Southwestern United States. *J. Climate*, **13**, 759-776.
- Higgins, R.W., and W. Shi, 2001: Intercomparison of the Principal Modes of Interannual and Intraseasonal Variability of the North American Monsoon System. *J. Climate*, **14**, 403-417.
- Holton, J.R., J.A. Curry, and J. A. Pyle (eds.), 2003: *Monsoons*. Encyclopedia of the Atmospheric Sciences. Elsevier Science Ltd., Oxford, UK, **3**, 1365-1400.
- Johnson, R.H., P.E. Ciesielski, B.D. McNulty, P.J. Rogers, and R.K. Taft, 2007: Multiscale variability of the flow during the North American Monsoon Experiment. *J. Climate*, **20**, 1628-1648.
- Kalnay, E., M. Kanamitsu, R. Kistler, W. Collins, D. Deaven, L. Gandin, M. Iredell, S. Saha, G. White, J. Woollen, Y. Zhu, A. Leetmaa, B. Reynolds, M. Chelliah, W. Ebisuzaki, W. Higgins, J. Janowiak, K.C. Mo, C. Ropelewski, J. Wang, R. Jenne, and D. Joseph, 1996: The NCEP/NCAR 40-year reanalysis project, *Bull. Amer. Meteor. Soc.*, **77**, 437-470.
- Keenan, T.D., and L.R. Brody, 1988: Synoptic-scale modulation of convection during the Australian summer monsoon. *Mon. Weat. Rev.*, **116**, 71-85.
- Kelley, W.E., and D.R. Mock, 1982: A diagnostic study of upper tropospheric cold lows over the western North Pacific. *Mon. Wea. Rev.*, **110**, 471-480.
- Mo, K.C., and J.N. Paegle, 2000: Influence of Sea Surface Temperature Anomalies on the Precipitation Regimes over the Southwest United States. *J. Climate*, **13**, 3588-3598.
- Maddox, R.A. McCollum, D., and Howard, K., 1995: Large-scale patterns associated with severe summertime thunderstorms over Central Arizona. *Wea. Forecasting*, **10**, 763-778.
- McCollum, D.M., 1993: Synoptic-scale patterns associated with severe thunderstorms in Arizona during the summer monsoon. M.S. thesis, School of Meteorology, University of Oklahoma, 166 pp.
- McCollum, D., D. Bright, J. Meyer, and J. Glueck, 1996: Operational Applications of the Real-time National Lightning Detection Network Data at the NWSO Tucson, AZ. *NOAA Technical Memorandum*, NWS-WR-241 (PB97-108450)

- North American Monsoon Experiment: Science Implementation Plan, 2004: NAME Science Working Group. [Available on line at <http://www.cpc.ncep.noaa.gov/products/precip/monsoon/NAME.html>.]
- Pytlak, E., M. Goering, and A. Bennett, 2005: Upper tropospheric lows and their interaction with the North American Monsoon. Preprint CD-ROM, Living with a Limited Water Supply, Symposium, 85<sup>th</sup> Annual Meeting of the American Meteorological Society, San Diego, CA. J.P. 2.3
- Pytlak, E. 2006: Revisiting upper tropospheric lows and their interaction with the North American Monsoon: What is next in hypothesis formulation and testing? Oral presentation at the 31<sup>st</sup> Annual Meeting, National Weather Association, Cleveland, OH. [Available on line at <http://www.nwas.org/meetings/nwa2006/index.php>.]
- Rogers, P. J., and R.H. Johnson, 2007: Analysis of the 13-14 July gulf surge event during the 2004 North American Monsoon Experiment. *Mon. Wea. Rev.*, **135**, 3098-3117.
- Tang, M., and E.R. Reiter, 1984: Plateau monsoons of the Northern Hemisphere: a comparison between North America and Tibet. *Mon Wea Rev.*, **112**, 617-637.
- Vera, C., W. Higgins, J. Amador, T. Ambrizzi, R. Garreaud, D. Gochis, D. Gutzler, D. Lettenmaier, J. Marengo, C.R. Mechoso, J. Nogues-Paegle, P.L. Silva Dias, and C. Zhang, 2006: Toward a Unified View of the American Monsoon Systems. *J. Climate*, **19**, 4977-5000.
- Whitfield, M.B., and S.W. Lyons, 1992: An upper-tropospheric low over Texas during summer. *Wea. Forecasting*, **7**, 89-106.
- NCEP Reanalysis Derived data provided by the NOAA/OAR/ESRL PSD, Boulder, Colorado, USA, from their Web site at <http://www.cdc.noaa.gov>

#### **Other Monsoon-Related References:**

- Adang, T. C., and R. L. Gall, 1989: Structure and dynamics of the Arizona Monsoon Boundary. *Mon. Wea. Rev.*, **117**, 1423-1438.
- Andrade, E. R., W. D. Sellers, 1988: El Nino and its effect on precipitation in Arizona and western New Mexico. *J. Climato.*, **8**, 403-410.
- Badan-Dangon, A. C. E. Dorman, M. A. Merrifield, and C. D. Winant, 1991: The lower atmosphere over the Gulf of California. *J. Geophys. Res.*, **96**, 877-896.
- Balling, R. C., Jr., and S. W. Brazel, 1987: Diurnal variations in Arizona monsoon precipitation frequencies. *Mon. Wea. Rev.*, **115**, 342-346.

- Bartels, D. L., D. P. Jorgensen and B. F. Smull: Airborne Doppler analysis of a mesoscale convective system observed during the southwest area monsoon project. Preprints, 25th Intl. Conf. On Radar Meteorology, June 24-28, Paris. 486-489.
- Blake, D., 1923: Sonora storms. *Mon Wea. Rev.*, **51**, 585-588.
- Brazel, A. J., and W. G. Nickling, 1986: The relationship of weather types to dust storm generation in Arizona (1965-1980). *J. Climato.*, **6**, 255-275.
- Brenner, I. S., 1974: A surge of maritime tropical air-Gulf of California to the southwestern United States. *Mon. Wea. Rev.*, **102**, 375-389.
- Bright, D.R., and S.L. Mullen, 2002a: The sensitivity of the numerical simulation of the Southwest monsoon boundary layer and choice of PBL turbulence parameterization in MM5. *Wea. Forecasting*, **17**, 99-114.
- Bright, D.R. and S.L. Mullen, 2002b: Short-range ensemble forecasts of precipitation during the southwest monsoon. *Wea. Forecasting*, **17**, 1080-1100.
- Carleton, A. M., 1985: Synoptic and satellite aspects of the southwestern U.S. summer "monsoon." *J. Climato.*, **5**, 389-402.
- Carleton, A.M., 1986: Synoptic-dynamic character of 'bursts' and 'breaks' in the southwest U.S. summer precipitation singularity. *J. Climato.*, **6**, 605-622.
- Carleton, A.M., 1987: Summer circulation climate of the American southwest. *Annals of the Association of American Geographers*, **77**, 619-634.
- Douglas, M.W., 1992: Structure and fluctuations of the summertime low-level jet over the Gulf of California and environs. Preprints, Fifth Conference on Mesoscale Processes, Jan. 5-10, Atlanta, GA.
- Fosdick, E.K., A.I. Watson, 1996: Cloud-to-ground lightning patterns in New Mexico during the summer. *Natl. Weather Digest*, **19**, 17-24.
- Gao., X., J. Li, and S. Sorooshian, 2007: Modeling intraseasonal features of 2004 North American Monsoon Precipitation, *J. Climate*, **20**, 1882-1896.
- M. Gebremichael, E.R. Vivoni, C.J. Watts, and J.C. Rodriguez, 2007: Submesoscale spatiotemporal variability of North American Monsoon rainfall over complex terrain. *J. Climate*, **20**, 1751-1773.
- Gochis, D.J., W.J. Shuttleworth, and Z. Yang, 2002a: Sensitivity of the modeled North American Monsoon regional climate to convective parameterization. *Mon. Wea. Rev.*, **130**, 1282-1298.

- Gochis, D.J., W.J. Shuttleworth, and Z. Yang, 2002b: Hydrometeorological response of the modeled North American Monsoon to convective parameterization. *J. Hydrometeor.* **4**, 235-250.
- Gochis, D.J., C.J. Watts, J. Garatuza-Payan, and J. Cesar-Rodriguez, 2007: Spacial and temporal patterns of precipitation intensity as observed by the NAME event rain gage network from 2002 to 2004. *J. Climate*, **20**, 1734-1750.
- Grantz, K., B. Rajagopalan, M. Clark, and E. Zagana, 2007: Seasonal shifts in the North American Monsoon. *J. Climate*, **20**, 1923-1935.
- Green, C.R., and W.D. Sellers, Eds., 1964: *Arizona Climate*. University of Arizona Press, 503 pp.
- Green, G.D., D. Mitchell, and J.A. Haro, 1996: Mini supercell interaction: The February 13, 1995 Mesa tornado. *NWS WR Tech. Attach.*, 96-32, 15pp.
- Green, G.D. and E. Pytlak, 2004: Severe weather outbreak over Phoenix, Arizona, on 14 July 2002. Preprints, 20<sup>th</sup> Conference on Weather Analysis and Forecasting, Amer. Meteor. Soc., Seattle, WA., P1.2.
- Hagemeyer, B.C., 1991: A lower-tropospheric thermodynamic climatology for March through September: some implications for thunderstorm forecasting. *Wea. Forecasting*, **6**, 254-270.
- Higgins, R.W., Y. Yao, and X.L. Wang, 1997: Influence of the North American monsoon system on the U.S. summer precipitation regime. *J. Climate*, **10**, 2600-2622.
- Holle, R.L., and S.P. Bennett, 1997: Lightning ground flashes associated with summer 1990 flash floods and stream flow in Tucson, Arizona: An exploratory study. *Mon. Wea. Rev.*, **125**, 1526-1536.
- Holle, R.L., and E.P. Krider, 2005: Suspension of an intercollegiate football game due to lightning. Preprints, International Conference on Lightning and Static Electricity, Seattle, WA, KMG-30.
- Janowiak, J.E., V.J. Dagostaro, V.E. Kousky, and R.J. Joyce, 2007: An examination of precipitation in observations and model forecasts during NAME with emphasis on the diurnal cycle. *J. Climate*, **20**, 1680-1692.
- King, T.S., and R.C. Balling, 1995: Diurnal variations in Arizona monsoon lightning data. *Mon. Wea. Rev.*, **122**, 1659-1664.
- Lang, T.J., D.A. Ahijevych, S. W. Nesbitt, R.E. Carbone, S. Rutledge, and R. Cifelli, 2007: Radar-observed characteristics of precipitating systems during NAME 2004. *J. Climate*, **20**, 1713-1733.

- Lopez, R.E., R.L. Holle, A.I. Watson, and J. Skindlov, 1997: Spatial and temporal distributions of lightning over Arizona from a power utility perspective. *J. Appl. Meteor.*, **36**, 825-831.
- Lorenz, D.J. and D.L. Hartmann, 2005: The effect of the MJO on the North American Monsoon. *J. Climate*, **19**, 333-343.
- Maddox, R.A., C.F. Chappell, and L.R. Hoxit, 1979: Synoptic and meso-alpha scale aspects of flash flood events. *Bull. Amer. Meteor. Soc.*, **60**, 115-123.
- Maddox, R.A., C.F. Canova, and L.R. Hoxit, 1980: Meteorological characteristics of flash flood events over the western United States. *Mon. Wea. Rev.*, **108**, 1866-1877.
- Maddox, R.A., M. Douglas, and K.W. Howard, 1991: Mesoscale precipitation systems over southwestern North America: A warm season overview. Preprints, Int. Conf. on Mesoscale Meteor. and TAMEX. Taipei, Taiwan. Amer. Meteor. Soc., 393-402.
- Maddox, R.A., K.W. Howard, and A.J. Negri, 1991: Analysis of GOES Infrared convective cloud-top temperatures for extended periods: An overview of the 1990 warm season for a subtropical region. Sixth Conf. on Satellite Meteorology and Oceanography, Atlanta, GA, Amer. Meteor. Soc., 205-208.
- Maddox, R.A., D.M. McCollum, and K.W. Howard, 1993: Case study of an isolated severe thunderstorm over central Arizona: supercell in the desert? Preprint, 17th Conference of Severe Local Storms/Conference on Atmospheric Electricity, Amer. Meteor. Soc., St. Louis, MO.
- Maddox, R.A., K.W. Howard, C.L. Dempsey, 1997: Intense convective storms with little or no lightning over central Arizona - A case of inadvertent weather modification? *J. Appl. Meteor.*, **36**, 302-314.
- Magril, C.S., R.H. Webb., M. Schaffner, S.W. Lyon, P.G. Griffiths, C. Shoemaker, C.L. Unkrich, S. Yatheendradas, P.A. Troch, E. Pytlak, D.C. Goodrich, S.L. Desilets, A. Youberg, and P.A. Peathtree, 2007: Impact of recent extreme Arizona storms. *Eos Transactions, American Geophysical Union*, **88**, 191-193.
- McCollum, D.M., R.A. Maddox, and K.W. Howard, 1995: Case study of a severe Mesoscale convective system in central Arizona. *Wea. Forecasting*, **10**, 643-665.
- Mestas-Nuñez, A.M., D. Ensfield, and C. Zhang, 2007: Water vapor fluxes over the intra-Americas Sea: seasonal and interannual variability and associations with rainfall. *J. Climate*, **20**, 1910-1922.

- Mitchell, D.L., D. Ivanova, R. Rabin, T.J. Brown, and K. Redmond, 2002: Gulf of California sea surface temperatures and the North American Monsoon: mechanistic implications from observations. *J. Climate*, **15**, 2261-2281.
- Mo, K.C., E. Rogers, W. Ebisuzaki, and R.W. Higgins, 2007: Influence of the North American Monsoon Experiment (NAME) 2004 enhanced soundings on NCEP operational analyses. *J. Climate*, **20**, 1821-1842.
- Moore, T.J., R.L. Gall, and T.C. Adang, 1989: Disturbances along the Arizona monsoon boundary. *Mon. Wea. Rev.*, **117**, 932-941.
- Murphy, M.J., and R.L. Holle, 2005: Where is the real cloud-to-ground lightning maximum in North America? *Wea. Forecasting*, **20**, 125-133.
- Negri, A.J., R.F. Adler, R.A. Maddox, K.W. Howard, and P.R. Keehn, 1993: A regional rainfall climatology over Mexico and the southwest United States derived from passive microwave and geosynchronous data. *J. Climate*, **6**, 2144-2161.
- Pytlak, E., M. Murphy, N. Demetriades, R. Holle, 2008: Total lightning, radar and satellite observations of two monsoon thunderstorm events in the Tucson area in summer 2007. Preprints, 2<sup>nd</sup> International Lightning Meteorology Conference, Tucson, AZ.
- Ramage, C.S., 1971: *Monsoon Meteorology*. Academic Press, 295 pp.
- Ray, A.J., G.M. Garfin, M. Wilder, M. Vásquez-León, M. Lenart, and A.C. Comrie, 2007: Applications of monsoon research: opportunities to inform decision making and reduce regional vulnerability. *J. Climate*, **20**, 1608-1626.
- Sellers, W.D., and R.H. Hill, 1974: *Arizona Climate. 1931-1972*. University of Arizona Press, 616 pp.
- Smith, W.P., and R.L. Gall, 1989: Tropical squall lines of the Arizona monsoon. *Mon. Wea. Rev.*, **117**, 1553-1569.
- Smith, W.P., 1986: The effects of eastern North Pacific tropical cyclones on the southwestern United States. NOAA Tech. Memo. NWS WR-197, 229 pp. [Available from NOAA National Weather Service, Western Region Headquarters, Scientific Services Division, P.O. Box 11188, Federal Bldg., Salt Lake City, UT 84147.]
- Stensrud, D.J., 1993: Elevated residual layers and their influence on surface boundary-layer evolution. *J. Atmos. Sci.*, **50**, 2284-2293.
- Stensrud, D.J., R.L. Gall, S.L. Mullen, and K.W. Howard, 1995: Model climatology of the Mexican Monsoon. *J. Climate*, **8**, 1775-1794.



- Stensrud D.J., R.L. Gall, and M.K. Nordquist, 1997: Surges over the Gulf of California during the Mexican Monsoon. *Mon. Wea. Rev.*, **125**, 417-436.
- Vasquez, H., 1993: Weak upper level divergence and its role in organizing Mesoscale convective storms along the Arizona monsoon moisture boundary. NOAA/NWS Western Region Technical Attachment, **93**-26.
- Wallace, C.E., R.A. Maddox, and K. Howard, 1999: Summertime Convective Storm Environments in Central Arizona: Local Observations. *Wea. Forecasting*, **14**, 994-1006
- Watson, A.I., R.E. Lopez, and R.L. Holle, 1994a: Cloud to ground lightning and upper-air patterns during bursts and breaks in the Southwest monsoon. *Mon. Wea. Rev.*, **122**, 1726-1739.
- Watson, A.I., R.E. Lopez, and R.L. Holle, 1994b: Diurnal cloud to ground lightning patterns in Arizona during the Southwest monsoon. *Mon. Wea. Rev.*, **122**, 1716-1725.
- Watts, C.J., R.L. Scott, J. Garatuza-Payan, J.C. Rodriguez, J.H. Prueger, W.P. Kustas and M. Douglas, 2007: Changes in vegetation condition and surface moisture fluxes during NAME 2004. *J. Climate*, **20**, 1810-1820.
- Zhu, C., T. Cavazos, and D.P. Lettenmaier, 2007: Role of antecedent land surface conditions in warm season precipitation over northwestern Mexico. *J. Climate*, **20**, 1774-1791.
- Zuidema, P. C. Fairall, L.H. Hartten, J.E. Hare, and D. Wolfe, 2007: On air-sea interaction at the mouth of the Gulf of California. *J. Climate*, **20**, 1649-1661.



**National Weather Service**

