

My interest in droughts dates back to the late 1990s – to Mathew Barlow’s doctoral research. The related papers were among the first to observationally document the influence of Pacific decadal SST variability on North American hydroclimate, making the case for a significant SST role in generation of North American droughts. Subsequent work with colleague, Alfredo Ruiz-Barradas, showed that atmospheric and terrestrial water cycles over the Great Plains were often misrepresented in the leading atmospheric-land surface general circulation models on account of a greater role for evapotranspiration (and heightened land-atmosphere interactions) in the models, limiting the models’ utility in analysis of drought mechanisms. More recent work with Bin Guan shows the striking role of the Atlantic basin, especially Atlantic Multidecadal Oscillation, in generation of North American droughts, particularly during spring and fall. The analysis with Guan leads to remarkable reconstruction of most (but not all) droughts, enabling evaluation of the basin roles and influence mechanisms.

My group’s observationally-rooted efforts indicate a prominent role for large-scale circulation (and related moisture transports) in regional hydroclimate variability, including North American droughts. Model-based analyses have, interestingly, advocated a greater role for local land-atmosphere interaction (and related evapotranspiration), perhaps, on account of overrepresentation of land-atmosphere interactions.

Book Chapter

- Nigam, S., and A. Ruiz-Barradas**, 2016: [Key Role of the Atlantic Multidecadal Oscillation in 20th Century Drought and Wet Periods over the US Great Plains and the Sahel](#). Invited book chapter (pgs. 255-270) in *Dynamics and Predictability of Large-scale High-Impact Weather and Climate Events*. Cambridge University Press; ISBN: 9781316468746.

GRL Drought Paper

- Nigam, S., B. Guan, and A. Ruiz-Barradas, 2011: [Key role of the Atlantic Multidecadal Oscillation in 20th century drought and wet periods over the Great Plains](#). *Geophys. Res. Lett.*, 38, L16713, doi:10.1029/2011GL048650.

Drought Publications

- Nigam, S., M. Barlow, and E.H. Berbery, 1999: [Pacific decadal SST variability: Impact on U.S. drought and streamflow](#). *Eos, Transactions, AGU*, Vol. 80, 51 (Dec. 21), 621-625.
- Barlow, M., S. Nigam, and E.H. Berbery, 2001: [ENSO, Pacific decadal variability and U.S. summertime precipitation, drought, and streamflow](#). *J. Climate*, 14, 2105-2128.
- Ruiz-Barradas, A., and S. Nigam, 2005: [Warm-season rainfall variability over the US Great Plains in Observations, NCEP and ERA-40 Reanalyses, and NCAR and NASA Atmospheric Model Simulations](#). *J. Climate*, 18, 1808-1830.
- Guan, B., 2008: Pacific sea surface temperatures in the 20th Century: Variability, trend, and connections to long-term hydroclimate variations over the Great Plains. *Doctoral Dissertation* submitted to the University of Maryland Graduate School, November 2008. 116 pp.
- Karnauskas, K. B., A. Ruiz-Barradas, S. Nigam, and A. J. Busalacchi, 2008: [North American droughts in ERA-40 global and North American Regional Reanalysis: A Palmer Drought Severity Index perspective](#). *J. Climate*, 21, 2102-2123.
- Weaver, S.J., and S. Nigam, 2008: [Variability of the Great Plains Low-Level Jet: Large-scale circulation context and hydroclimate impacts](#). *J. Climate*, 20, 1532-1551.
- Weaver, S., A. Ruiz-Barradas, and S. Nigam, 2009: [Pentad evolution of the 1988 drought and 1993 flood over the Great Plains: A NARR Perspective on the atmospheric and terrestrial water balance](#). *J. Climate*, 22, 5366-5384.
- Schubert, S., et al. (including S. Nigam and A. Ruiz-Barradas), 2009: [A USCLIVAR project to assess and compare the responses of global climate models to drought-related SST forcing patterns: Overview and results](#). *J. Climate*, 22, 5251-5272.

- Ruiz-Barradas, A., and S. Nigam 2010: [SST - North American hydroclimate links in AMIP simulations of the Drought Working Group models: A proxy for the idealized drought modeling experiments](#). *J. Climate*, 23, 2585-2598.
- Ruiz-Barradas, A., and S. Nigam 2010: [Great Plains Precipitation and its SST Links in 20th Century Climate Simulations, and 21st and 22nd Century Climate Projections](#). *J. Climate*, 23, 6409-6429.
- Weaver*, S.J., and S. Nigam, 2011: [Recurrent Supersynoptic Evolution of the Great Plains Low-Level Jet](#). *J. Climate*, 24, 575-582.
- Sheffield, J., et al. (including S. Nigam), 2013: [North American Climate in CMIP5 Experiments. Part I: Evaluation of Historical Simulations of Continental and Regional Climatology](#). *J. Climate*, 26, 9209-9245.
- Sheffield, J., et al. (including S. Nigam), 2013: [North American Climate in CMIP5 Experiments. Part II: Evaluation of Historical Simulations of Intra-Seasonal to Decadal Variability](#). *J. Climate*, 26, 9247-9290.
- Sheffield, J., et al. (including S. Nigam), 2014: [Regional Climate Processes and Projections for North America: CMIP3/CMIP5 Differences, Attribution and Outstanding issues](#). NOAA Technical Report OAR CPO-2. Climate Program Office, Silver Spring, MD; DOI:10.7289/V5DB7ZRC.
- Ruiz-Barradas**, A., and S. Nigam, 2013: [Atmosphere-Land-surface Interactions over the Southern Great Plains: Characterization from Pentad Analysis of ARM Observations and NARR](#). *J. Climate*, 26, 875-886.
- Kavvada*, A., A. Ruiz-Barradas**, and S. Nigam, 2013: [AMO's Structure and Climate Footprint in Observations and IPCC AR5 Climate Simulations](#). *Climate Dynamics*, DOI 10.1007/s00382-013-1712-1.

Supporting Publications

- Ruiz-Barradas, A., and S. Nigam, 2006: [Great Plains hydroclimate variability: The view from North American Regional Reanalysis](#). *J. Climate*, 19, 3004-3010.
- Nigam, S., and A. Ruiz-Barradas, 2006: [Seasonal hydroclimate variability over North America in Global and Regional Reanalyses and AMIP Simulations: Varied representation](#). *J. Climate*, 19, 815-837.
- Ruiz-Barradas, A., and S. Nigam, 2006: [IPCC's Twentieth-Century climate simulations: Varied representations of North American hydroclimate variability](#). *J. Climate*, 19, 4041-4058.
- Guan, B., and S. Nigam, 2008: [Pacific Sea Surface Temperatures in the Twentieth Century: An evolution-centric analysis of variability and trend](#). *J. Climate*, 21, 2790-2809.
- Guan, B., and S. Nigam, 2009: [Analysis of Atlantic SST variability factoring inter-basin links and the secular trend: Clarified structure of the Atlantic Multidecadal Oscillation](#). *J. Climate*, 22, 4228-4240.