

Malaquías Peña

University of Connecticut
School of Engineering
Department of Civil and Environmental Engineering
Eversource Energy Center
Storrs, CT
mpena@uconn.edu

Education

PHD IN METEOROLOGY University of Maryland, College Park Advisors: Eugenia Kalnay and Ming Cai Thesis title: <i>Locally Coupled Ocean-Atmosphere Anomalies their Duration and Predictability</i>	Jul. 2003
MSC IN METEOROLOGY University of Oklahoma, Norman Advisors: Frederick Carr and Michael W. Douglas Thesis title: <i>Wet and Dry Spells on the Pacific side of Central America</i>	May 1999
BSC IN PHYSICS UNAM, Mexico City, MEXICO Thesis title: <i>Dynamic Renormalization Group Analysis of Flow in Porous Media</i>	Mar. 1993

Present appointment

ASSOCIATE PROFESSOR, Department of Civil and Environmental Engineering University of Connecticut	Aug. 2017-
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Preceding appointments

ADJUNCT ASSOCIATE PROFESSOR, Department of Atmospheric and Oceanic Sciences, University of Maryland	2013-2017
ENGINEER TASK LEADER, IMSG at the Environmental Modeling Center NCEP/NWS/NOAA	2015-2017

TASK LEADER SCIENTIST, Ensemble Modeling and Probabilistic Forecasting IMSG at the EMC/NCEP/NWS/NOAA	2010 - 2015
CONSULTANT, World Meteorological Organization, Geneva, Switzerland Human resources and Numerical Capacity building in Mexico (2011-2013), Peru (2014-2015) and Argentina (2015)	2010 - 2015
RESEARCH SCIENTIST SAIC at EMC/NCEP/NWS/NOAA	2004 - 2010
RESEARCH ASSOCIATE Department of Meteorology, University of Maryland.	2003 - 2004
FACULTY ASSISTANT Department of Meteorology, University of Maryland.	2001 - 2002
RESEARCH ASSOCIATE National Severe Storms Lab, NOAA and School of Meteorology, University of Oklahoma	1999 - 2000
RESEARCH ASSISTANT National Severe Storms Lab, NOAA and School of Meteorology, University of Oklahoma	1995 - 1998
HYDROLOGY SPECIALIST National Meteorological Service, Mexico City, MEXICO	1993 - 1995

Current areas of research

Predictability and ensemble forecasting

Numerical climate modeling and data assimilation

Statistical methods for prediction

Teaching experience and upcoming courses

Ensemble forecasting

Climate dynamics and prediction

Environmental Modeling

Fluid Dynamics

Publications in refereed journals

33. Feng, J., Z Toth and **M. Peña**, 2017: Spatially extended estimates of analysis and short-range forecast error variances. *Tellus A*, 69, 1-14.
32. Barradas, A., E. Kalnay, **M. Peña**, A. Bozorg-Magham, S. Motesharrei, 2016: Driver of the locally coupled ocean-atmosphere anomalies. Accepted in *Climate Dynamics*.
31. S. Majumdar, E. Chang, **M. Peña**, R. Tatusko, Z. Toth, 2015: Planning the next decade of coordinated research on minutes-to-seasonal predictions of high-impact weather. *Bull. Amer. Meteor. Soc.* 96, 461-464.
30. A. Robertson, A. Kumar, **M. Peña**, F. Vitart, 2015: International Conference on Sub-seasonal to seasonal prediction. *Bull. Amer. Meteor. Soc.*, 96, ES49-ES53.
29. **Peña, M.** and Z. Toth, 2014: Estimating analysis and forecast error variances. *Tellus A*. 66, 21767.
28. B. Kirtman et al. **M. Peña**, 2014: The National Multi-Model Ensemble. *Bull. Amer. Meteor. Soc.*, 95, 585-601.
27. J. Ma, Y. Zhu, D. Hou, X. Zhou, **M. Peña**, 2014: Ensemble Transform with 3D Rescaling Initialization Method. To appear in *Mon. Wea. Rev.*, 142, 4053-4073.
26. S. Saha et al. **M. Peña**, 2014: The NCEP Climate Forecast System Version 2. *Journal of Climate*. 27, 2185-2208.
25. E. Chang, **M. Peña**, Z. Toth, 2013: International Research Collaboration in High-Impact Weather Prediction. *Bull. Amer. Meteor. Soc.*, 94, ES149-ES151.
24. D. Hou, et. al. **M. Pena**, Bo Cui, 2013: Climatology-Calibrated Precipitation Analysis at Fine Scales: Statistical Adjustment of Stage IV towards CPC Gauge Based Analysis. *Journal of Hydrometeorology* (<http://dx.doi.org/10.1175/JHM-D-11-0140.1>).
23. E. Becker, H. van den Dool, and **M. Peña**, 2013: Short-term climate extremes: prediction skill and predictability. *Journal of Climate* (<http://dx.doi.org/10.1175/JCLI-D-12-00177.1>)
22. **Peña, M.**, Toth, Z. and M. Wei, 2010: Controlling noise in ensemble data assimilation schemes. *Mon. Wea. Rev.*, **138**, 1502-1512.
21. **Peña, M.**, and H. van den Dool, 2008: Consolidation of Multi-Method Forecasts by Ridge Regression: Application to Pacific Sea Surface Temperature. *Journal of Climate*, American Meteorological Society.
20. Toth, Z., **M. Peña**, A. Vinzileos, 2007: Bridging the gap between weather and climate forecasting: Research priorities for intraseasonal prediction. *Bull. Amer. Meteor. Soc.*, 88, 1427-1429.
19. Toth, Z. and **M. Peña**, 2007: Data Assimilation and Numerical Forecasting with imperfect models: The mapping paradigm. *Physica D*, 230, 146-158.

18. Saha, S., **M. Peña**, et. al., 2006: The NCEP Climate Forecast System. *Journal of Climate*, **19**, 3483-3517. Manuscript available at <http://cfs.ncep.noaa.gov>

17. **Peña, M.** and E. Kalnay, 2004: Separating fast and slow modes in coupled chaotic systems. *Non-linear Processes in Geophysics*, **11**,319-327.

16. Evans, E., N. Bhatti, J. Kinney, L. Pann, **M. Peña**, S-C Yang, E. Kalnay and J. Hansen, 2004: Rise undergraduates find that regime changes in Lorenz's model are predictable. *Bulletin of the American Meteorological Society*, **85**, 520-524.

15. **Peña, M.**, M. Cai and E. Kalnay, 2004a: Lifespan of sub-seasonal locally coupled anomalies. *J. Climate*, **17**, 1597-1604.

14. **Peña, M.**, M. Cai and E. Kalnay, 2004b: Coupling Atmospheric Anomalies with the Ocean. *Bulletin of the American Meteorological Society*

13. **Peña, M.**, E. Kalnay and M. Cai, 2003: Statistics of locally coupled ocean-atmosphere anomalies. *Non-linear Processes in Geophysics*, **10**, 245-251. European Geophysical Union.

12. **Peña, M.** and M.W. Douglas, 2002: Characteristics of Central American wet and dry spells during the rainy season. *Monthly Weather Review*, **130**, 3054-3073.

11. **Peña, M.**, E. Kalnay and M. Cai, 2001: Coupled ocean and atmosphere intraseasonal anomalies in reanalysis and AMIP data. WMO Magazine.

10. Douglas, M., **M. Peña** and J.L. Santos, 1998: Special Meteorological observations during ENSO 1997/1998 in the Northern Part of South America. *Bull. Inst. Fr. Etudes Andines*, **27**, 493-500.

9. Carmona G. and **M. Peña**, 1992: The application of the renormalization group to diffusion in amorphous material. *Revista Mexicana de Física* **38** (Suplemento 1), 212-220.

Under review or accepted

8. **Peña, M.** and Z. Toth: Use of ensemble covariance matrix to modify forecast probability distributions. EMC internal review. *Weather and Forecasting*.

7. **Peña, M.**, Y. Zhu, D. Hou, R. Wobus: Tropical influence on the skill of GEFS in the Northern Hemisphere. EMC internal review. *Monthly Weather Review*.

6. **Peña, M.**, I. Jankov, S. Gregory, S. Ravela and Z. Toth: Displacement and Amplitude Forecast Error fields from a Field Alignment technique. EMC internal review. *Weather and Forecasting*.

4. Liu, Ping et al. and **M. Peña**, 2018: Tracking persistent maxima of 500hPa- Geopotential Height. Accepted in *Climate Dynamics*.

3. Zhu, Y. et. al. and **M. Peña**, 2018: Impact of Sea Surface Temperature Forcing on Weeks 3 & 4 Forecast Skill in the NCEP Global Ensemble Forecasting System. Under review in *Weather and Forecasting*.

Invited Book Chapters

2. **Peña, M.**, L-C Chen, H. van den Dool, 2018: Climate Variability and Long-Term Ensemble Predictions. Compendium on Ensemble Hydrometeorology. Springer Verlag. Under review.

1. Toth, M., H. Yang, and **M. Peña**, 2018: Overview of weather and climate systems. Compendium on Ensemble Hydrometeorology. Springer Verlag. Under review.

Selected International Reports

5. Penny et al., **M. Peña**, 2017: Coupled Data Assimilation for Integrated Earth System Analysis and Prediction: Goals, Challenges and Recommendations. WWRP, WMO. Available at: https://www.wmo.int/pages/prog/arep/wwrp/new/documents/Final_WWRP_2017_3_27_July.pdf

4. Buendia, J-C, et al., **M. Peña**, 2017: Identificación de cambios en la ciclogénesis del Atlántico Norte mediante un modelo de mezclas Gaussianas. *Tecnología y Ciencias del Agua*, 8, núm. 4, 2017.

3. **M. Peña** and B. Mills, 2011. WMO North American Regional Committee: Annual report of activities. Available at: WWRP-WMO website.
Doc4_4_North_American_Regional_Activities.pdf

2. **M. Peña** and E. Kalnay, 2002: The life span of intraseasonal atmospheric anomalies: dependence on the phase relationship with the ocean. In: Working Group on Numerical Experimentation (WGNE) Blue Book.

1. Douglas, M., **M. Peña**, R. Villarpando, 2000: Special observations of the low level flow over eastern Bolivia during the 1999 atmospheric mesoscale campaign. 6th Inter. Conf. on Southern Hemisphere Meteorology and Oceanography.

Invited Talks

“Estimating and sampling model uncertainty in coupled NWP systems”. Third RIKEN International Symposium on Data Assimilation and 7th Annual Japan Data Assimilation Workshop. Kobe, Japan, February, 2017.

“Routine Diagnostics to Monitor the Next –Generation Unified Global Coupled System (UGCS) model”. NOAA-Environmental Modeling System (NEMS) Workshop. College Park, MD. September, 2016d.

“Exploring ensemble generation approaches for monthly forecasts at NCEP”. NOAA ESRL, Boulder, Colorado, July, 2016c.

“NCEP seasonal ensemble forecasting: the NMME and IMME projects”. Seventh NCEP Ensemble User Workshop. College Park, MD., June 2016b.

“Global ensemble forecasts: Current research and developments”. Argentine’s National Meteorological Service, Buenos Aires, ARGENTINA, March 1st, 2016a.

“Development of a Monthly Global Ensemble Forecast System at NCEP”. Canadian Meteorological Center, Dorval, CANADA. May 5, 2015.

“Predicting anomalies in atmosphere-ocean coupled models.”_Symposium of Eugenia Kalnay, AMS. Phoenix, AZ, January 2015b.

“International Multi-Model Ensembles. Current research and developments” AGU, San Francisco, CA. December, 2014

“Global ensemble forecasts at NCEP: Current research and developments”. At the 20th Anniversary of the CPTEC- Sao Paulo, Brazil. October 11-14, 2014.

“The Multi-Model Ensemble Prediction projects at NCEP”. Technical Meeting of EUROSIP. Toulouse, France. February, 2012.

Selected conference papers

M. Peña: Ensemble generation approaches in the NCEP CFSv2. AMS Annual Conference, Seattle, WA, Jan 2017.

M. Peña: Monitoring the performance of the next Climate Forecast System version 3, throughout its development stage at EMC/NCEP, San Francisco, CA, Dec. 2016e.

M. Peña: Coupled perturbations in the CFSv2. S2S Extreme Events Workshop, Palisades, N.Y., Dec. 2016d.

M. Peña: Tropical influence on the forecast skill variability in the NH. Workshop on Teleconnections. International Center for Theoretical Physics. Trieste, ITALY, October, 2016c.

M. Peña: EnKF perturbations in coupled models for subseasonal predictions. International Workshop on Coupled Data Assimilation. Toulouse, FRANCE, October, 2016b.

M. Peña: The use of the ensemble covariance matrix to propagate forecast uncertainty across climate model components. Columbia, MD, May 2016a.

M. Peña: Monthly Ensemble Forecasts from the NCEP GEFS. AGU, Montreal Canada. May 4, 2015c.

M. Peña: The MJO signal in the NCEP GEFS prediction system. Symposium of Madden Julian Oscillation, AMS. Phoenix, AZ, January 2015a.

M. Peña: Ensemble generation methods and skill of subseasonal predictions in the NCEP GEFS. World Weather Open Science Conference, Montreal, Canada. August 16-21, 2014.

M. Peña and Z. Toth: An unbiased estimation of analysis and short-range forecast error variances. World Weather Open Science Conference, Montreal, Canada. August 16-21, 2014.

M. Peña: The Monthly GEFS. North American Ensemble Forecast System Workshop. Montreal, Canada. June 17-20, 2014.

M. Peña: A series of training courses on Ensemble Forecasting. Provided at the Meteorological Center in Peru. May 26-30, 2014.

M. Peña: The Extended Range Global Ensemble Forecast System at NCEP. Special Symposium on Advancing Weather and Climate Forecasts: Innovative Techniques and Applications. Jan, 2013. Austin, TX.

M. Tippet, et al. and M. Peña: Recalibrating and Combining Ensemble Predictions. 6th NOAA Annual Climate Diagnostics and Prediction Workshop. Fort Worth, TX, 3-6 October 2011.

M. Peña: Predictions beyond 2-weeks with the NCEP Global Ensemble Forecast System (GEFS). American Geophysical Union, The Meeting of the Americas. Iguazu, Brazil. May, 2010.

M. Peña, I. Jankov and Z. Toth 2010: Estimating analysis and forecast error variances for ensemble initialization. DTC, NCAR, Boulder, CO. U.S.A., 2010.

M. Peña, H. van den Dool: Evaluation of CCSM and CFS for monthly forecasts of precipitation and temperature over the Americas. Foz do Iguazu, Brasil, August, 2010.

M. Peña: Merging statistical and dynamical forecasts for hurricane prediction. 28th Conference on Hurricanes and Tropical Meteorology. May 2008. Orlando, FL.

M. Peña and Z. Toth: Dynamics of error growth in climate prediction systems. 18th Conference on Applied Climatology. American Meteorological Society. January 2008. New Orleans, Louisiana.

M. Peña and H. van den Dool: Consolidation of multi-method forecasts of Pacific SST. 18th Conference on Applied Climatology. American Meteorological Society. January 2007. San Antonio, Texas.

M. Peña: Verification of NCEP probabilistic climate forecasts. NATO Advance Study Institute. June 2005. Gallipoli, Italy.

M. Peña and Z. Toth: Initial and model related errors in climate numerical forecasts. NATO Advance Study Institute. June 2005. Gallipoli, Italy.

M. Peña, S-C. Yang, E. Kalnay and M. Cai: Initialization of unstable coupled systems by breeding ensembles. June 2004c. Baltimore, Maryland, U.S.A.

M. Peña, E. Kalnay, and Ming Cai: Prediction skill dependent on the forcing direction between ocean and atmospheric anomalies in the northern Pacific. June 2004b. Baltimore, Maryland, U.S.A.

M. Peña, H. Berbery and E. Collini: Impact of South Atlantic SST anomalies on the hydrologic cycle of the La Plata Basin in South America. June 2004a. Baltimore, Maryland, U.S.A.

M. Peña, E. Kalnay and Ming Cai: The duration of coupled subseasonal anomalies. EGS-AGU-EUG Joint Assembly. April 2003. Niece, France.

M. Peña and E. Kalnay: Separating fast and slow modes in a coupled system. EGS-AGU-EUG Joint Assembly. April 2003. Niece, France.

M. Peña, E. Kalnay and Ming Cai: Persistent locally coupled anomalies in the ocean-atmosphere. Extended abstracts of the Symposium on Observations, Data Assimilation, and Probabilistic Prediction. American Meteorological Society, January 2002, Orlando, FL.

M. Peña, E. Kalnay and Ming Cai: The phase relationship in locally coupled ocean-atmosphere anomalies in the NCEP/NCAR reanalysis data: Implications on predictability. 27th General Assembly

of the EGS. April 2002. Niece, France.

M. Peña, E. Kalnay and Ming Cai: One-way and two-way interactions in locally coupled ocean-atmosphere system. 2nd. Conference in the Atmosphere and the Sea interactions, San Diego, CA, May 2001.

M. Peña, E. Kalnay and Ming Cai: WCRP/SCOR Workshop on Intercomparison and Validation of Ocean-Atmosphere Flux Fields, Potomac, MD, May 2001.

Douglas M.W., M. Peña: Synoptic and spatial variability of the rainfall along the northern Peruvian coast during the 1997-8 El Niño event. Symposium on Meteorology of the Southern Hemisphere. Santiago, Chile, April 2000.

M. Peña, and M.W. Douglas: Characteristics of Central American wet and dry spells. Twenty Third Conference on Hurricanes and Tropical Meteorology. Dallas, Texas, January 10-15, 1999.

Douglas, M.W., W. Fernandez and M. Peña: Design and evolution of the PACS-SONET observing system in Latin America. Third Symposium on Integrated Observing Systems, Dallas, Texas, 1999.

Douglas, M.W., M. Peña, et al. El Niño 1997-1998 as seen from PACS-SONET Observations. Second Hayes Symposium on Seasonal to Interannual Variability. Dallas, Texas, 1999.

Peña, M., and M. Douglas, 1998: Meteorological Education in Latin America. Seventh Symposium on Education, Phoenix, Arizona, 1998.

Service

Referee Nature, Quarterly Journal of the Royal Meteorological Society, Journal of Climate, Weather and Forecasting, Monthly Weather Review, Atmosphere, Journal of Non-linear Processes in Geophysics, Journal of Geophysics Letters, Advances in Atmospheric Sciences, Atmosfera.

Reviewer NCEP internal reviewer, various NOAA Research Programs.

Conference Organization

- US THORPEX-Legacy Planning Meeting, Silver Spring, MD, June 2014
- Sixth NCEP Ensemble Users Workshop, College Park, MD, March 2014, http://www.emc.ncep.noaa.gov/gmb/ens/WkShopOct13/6th_User_workshop.shtml
- International Conference on Subseasonal forecasting, College Park, MD, October 2013 <http://www.emc.ncep.noaa.gov/gmb/ens/s2s>
- US THORPEX Workshop, College Park, MD, USA, 19 - 20 September 2012
- 5th NAEFS Workshop, 17-19 May and THORPEX NA Regional Committee Meeting, 19-20 May 2010, Jiutepec, Morelos, MEXICO.

Advisory Panels and Leadership

NOAA Subseasonal-to-Seasonal Task Force, Member	2016-2017
NOAA Climate Development Task Force, Member	2016-2017
Peer-Review Panel for NOAA MAPP funding, Member	2015
NOAA Drought Prediction Task Force, Member	2015-2016
U.S. Climate Prediction Task Force, Member	2013-2014
CO-CHAIR of the U.S. WMO-THORPEX Science Steering Committee	2012-2014
CO-CHAIR of the WWRP North American Regional Committee	2009-2012