Malaquías Peña

Associate Professor
Department of Civil and Environmental Engineering
School of Engineering
and Manager
Eversource Energy Center
University of Connecticut

Education

PhD in Meteorology — Jul. 2003
University of Maryland, College Park
Advisors: Eugenia Kalnay and Ming Cai
Thesis title: *Locally Coupled Ocean-Atmosphere Anomalies their Duration and Predictability*

MSc in Meteorology — May 1999
University of Oklahoma, Norman
Advisors: Michael W. Douglas and Frederick Carr
Thesis title: *Wet and Dry Spells on the Pacific side of Central America*

BSc in Physics — Mar. 1993
UNAM, Mexico City, Mexico
Thesis title: *Dynamic Renormalization Group Analysis of Flow in Porous Media*

Teaching experience

Environmental Modeling for Engineers
Fluid Mechanics for Engineers
Ensemble Prediction Methods for Scientists
Introduction to Numerical Weather Prediction for Meteorologists

Research interest

My interest ranges from the very fundamental to the rather applied in environmental modeling and predictability. I apply methods of estimation theory to dynamical systems of various degrees of complexity. Specifically, I focus on problems in data assimilation, ensemble perturbation, parameter optimization, and signal detection in coupled global NWP systems, or Earth-system models in predictive mode, with multiple time scales of evolution. The phenomena I study are often the precursors of environmental and weather hazards including organized convection, anomalous large-scale circulation, blockings, MJO and ENSO. These precursors may be sources of atmospheric predictability so I strive to detect them in the observed data, and represent them both conceptually in low-hierarchy models and realistically in comprehensive numerical weather-climate prediction systems.

Recent peer-reviewed publications

Zhu, Y., et al. **, M. Peña**, 2017: Design and Evaluation of Sea Surface Temperature Forcing on Weeks 3 and 4 Forecast Skill using the NCEP Global Ensemble Forecasting System. DOI: 10.1175/WAF-D-17-0093.1. To appear in Weather and Forecasting.

Liu, P. et al. and **M. Peña**, 2017: Tracking persistent maxima of 500hPa-Geopotential Height. CLDY-D-17-00400R1. To appear in Climate Dynamics.

Buendia, J. et al, **M. Peña**, 2017: Decadal change detection of North Atlantic cyclogenesis distribution using a Gaussian mixture model. Tecnologia y ciencia del agua, **4**, 5-18.

Feng, J., Z Toth and **M. Peña**, 2017: 3D Estimates of Analysis and Short-Range Forecast Error Variance. Accepted in Tellus.

Ruiz-Barradas, A., E. Kalnay, **M. Peña**, A. Bozorg-Magham, S. Motesharrei, 2017: Driver of the locally coupled ocean-atmosphere anomalies. Accepted in Climate Dynamics.

Majumdar, S., 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.

Robertson, A., A. Kumar, **M. Peña,** F. Vitart, 2015: International Conference on Sub-seasonal to seasonal prediction. Bull. Amer. Meteor. Soc., 96, ES49-ES53.

Peña, M. and Z. Toth, 2014: Estimating analysis and forecast error variances. Tellus A. 66, 21767.

Kirtman B. et al. **M. Peña**, 2014: The National Multi-Model Ensemble. Bull. Amer. Meteor. Soc., 95, 585-601.

Ma, J, Y. Zhu, D. Hou, X. Zhou, **M. Peña**, 2014: Ensemble Transform with 3D Rescaling Initialization. Mon. Wea Rev., 142, 4053-4073.

Saha S., et al. **M. Peña**, 2014: The NCEP Climate Forecast System Version 2. Journal of Climate. 27, 2185-2208.

Book Chapters, Booklets and Reports

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.

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

M. Peña, et. al., 2017: The NCEP UGCSv1.0.0 for subseasonal to seasonal prediction. 42nd CDPW Digest. Available at http://www.cpc.ncep.noaa.gov/products/outreach/CDPW42/12-Pena.pdf

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

M. Peña, 2017. Development and use of numerical seasonal prediction systems. Instituto de Geofísica del Perú. Technical Bulleting, June issue. Available at: http://www.met.igp.gob.pe/publicaciones/Divulgacion_PPR_El_Nino_IGP_201706.pdf

Invited Talks

"Data assimilation in comprehensive Earth system model prediction systems". Third RIKEN International Symposium on Data Assimilation and 7th Annual Japan Data Assimilation Workshop. Kobe, Japan, February, 2017.

"Challenges and opportunities of environmental numerical modeling". Department of Civil and Environmental Engineering; University of Wisconsin, Madison, Nov. 2017.

"Numerical Seasonal Prediction products for El Niño". Training seminar. SENAMHI; Lima, Perú, Nov, 2017.

"Retos y oportunidades de la modelación numérica del clima". Master Conference. Autonmous University of Cd. Juarez. México, Sep. 2017.

"Tropical influence on the forecast skill variability in the NH". International Center for Theoretical Physics. Trieste, ITALY, October, 2016.

"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 Paolo, 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. 2016*e*.

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

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

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

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

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 Oscilation, 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. Iguazzu, 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 Iguassu, Brasil, August, 2010.

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.

Expert Reviewer NOAA Air-Sea Flux and Biogeochemical Moorings; NCEP internal reviewer.

Grant Reviewer NOAA Program for Climate Research.

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