

# Christina M. Patricola

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## Research Scientist

### Climate and Ecosystem Sciences Division, Lawrence Berkeley National Laboratory

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## Research Interests

Climate dynamics, climate variability and change, atmosphere-ocean interactions, tropical cyclones, extreme climate events, hydrologic cycle, land-atmosphere interactions, paleoclimate, high-resolution climate modeling

## Education

- Ph.D. 5/2010 Atmospheric Science, minor in Quaternary Geology  
Cornell University, Ithaca, NY
- M.S. 1/2007 Atmospheric Science  
Cornell University, Ithaca, NY
- B.S. 5/2005 Geological Sciences, cum laude  
College of Engineering, Cornell University, Ithaca, NY

## Professional Experience

- 1/2019 – present Program Domain Lead Climate and Atmosphere Processes Program  
Lawrence Berkeley National Laboratory (LBNL)  
Berkeley, CA
- 8/2016 – present Research Scientist Climate and Ecosystem Sciences Division  
LBNL, Berkeley, CA
- 9/2013 – 8/2016 Associate Research Scientist Department of Atmospheric Sciences  
Texas A&M University, College Station, TX
- 8/2013 – 8/2016 Affiliate Computational Research Division  
LBNL, Berkeley, CA
- 3/2012 – 9/2013 Assistant Research Scientist Department of Atmospheric Sciences  
Texas A&M University, College Station, TX
- 8/2010 – 3/2012 Postdoctoral Research Associate Department of Atmospheric Sciences  
Texas A&M University, College Station, TX
- 5/2005 – 5/2010 Graduate Research Assistant Department of Earth and Atmospheric Sciences  
Cornell University, Ithaca, NY
- 5/2003 – 5/2005 Undergraduate Researcher Department of Earth and Atmospheric Sciences  
Cornell University, Ithaca, NY

## **Awarded Grants**

Title: Anthropogenic Influences on Extreme Precipitation in the San Francisco Bay Area  
Sponsor: San Francisco Public Utilities Commission (SFPUC)  
PI: **CM Patricola**  
Co-I: MF Wehner  
Period: 10/17/2018 – 1/16/2020  
Amount: \$250,000

Title: **Weather Effects on the Lifecycle of DoD Equipment Replacement (WELDER): A Plug-in for the BUILDER Sustainment Management System**  
Sponsor: Department of Defense (DoD)  
PI: PH Larsen  
Co-PI: **CM Patricola**  
Period: 3/1/2019 – 1/31/2022  
Amount: \$2,500,000

Title: Land-Atmosphere Coupling and Convection in the Water Cycle  
Sponsor: U.S. Department of Energy (DOE)  
PI: IN Williams  
Co-PI: M Torn  
Co-I: SC Biraud, TA O'Brien, **CM Patricola**  
Period: 2/1/2018 – 1/31/2021  
Amount: \$1,995,000

[Title:](#) The Impact of Canonical and Non-canonical El Niño and the Atlantic Meridional Mode on Atlantic Tropical Cyclones  
Sponsor: National Science Foundation (NSF)  
PI: **CM Patricola**  
Co-PI: P Chang and R Saravanan  
Period: 2/1/2014 – 1/31/2017  
Amount: \$220,314

[Title:](#) Understanding Causes of Climate Model Biases in the Southeastern Tropical Atlantic  
Sponsor: National Science Foundation (NSF)  
PI: P Chang  
Co-PI: **CM Patricola**  
Period: 9/1/2013 – 8/31/2016  
Amount: \$796,305

## **Subcontracts**

Title: Conditional Probabilistic Event Attribution  
Subcontractor: Regents of the University of California and Lawrence Berkeley National Laboratory  
Subcontract PI: **CM Patricola**  
Period: 8/1/2014 – 7/31/2015

## **Computational Resource Awards**

Title: Anthropogenic Influences on Extreme Precipitation in Convection-Permitting Climate Models  
Sponsor: DOE Office of Science  
PI: **CM Patricola**  
Amount: 2 million NERSC hours  
Period: 1/8/2017 – 1/7/2019

Title: The Impact of Canonical and Non-canonical El Niño and the Atlantic Meridional Mode on Atlantic Tropical Cyclones  
Sponsor: NSF/Extreme Science and Engineering Discovery Environment (XSEDE)  
PI: **CM Patricola**  
Co-PI: P Chang and R Saravanan  
Amount: 10 million core hours (\$357,122 equivalent)  
Period: 7/1/2014 – 6/30/2017

## Peer-reviewed Publications

1. Foltz G and **Coauthors** (2019) The Tropical Atlantic Observing System. *Frontiers in Marine Science*, in revision.
2. O'Brien JP, O'Brien TA, **Patricola** CM, Wang S-Y (2019) Metrics for Understanding Large-scale Controls of Multivariate Temperature and Precipitation Variability. *Climate Dynamics*, in revision.
3. Hsu W-C, **Patricola** CM, Chang P (2018) The Impact of Climate Model Sea Surface Temperature Biases on Tropical Cyclone Simulations. *Climate Dynamics*.
4. **Patricola** CM, Wehner MF (2018) Anthropogenic Influences on Major Tropical Cyclone Events. *Nature*, 563, 339-346.
5. Williams IN, **Patricola** CM (2018) Diversity of ENSO Events Unified by Convective Threshold Sea Surface Temperature: A Nonlinear ENSO Index, *Geophysical Research Letters*, 45, 9236-9244.
6. Timmermans B., **Patricola** CM, Wehner MF (2018) Simulation and Analysis of Hurricane-Driven Extreme Wave Climate Under Two Ocean Warming Scenarios. *Oceanography*, 31(2), 88-99.
7. **Patricola** CM, Saravanan R, Chang P (2018) The Response of Atlantic Tropical Cyclones to Suppression of African Easterly Waves. *Geophysical Research Letters*, 45, 471-479.
8. **Patricola** CM, Camargo SJ, Klotzbach P, Saravanan R, Chang P (2018) The Influence of ENSO Flavors on Western North Pacific Tropical Cyclones. *Journal of Climate*, 31(14), 5395-5416.
9. **Patricola** CM, Saravanan R, Chang P (2017) A Teleconnection Between Atlantic Sea Surface Temperature and Eastern and Central North Pacific Tropical Cyclones. *Geophysical Research Letters*, 44, 1167-1174. [EOS research spotlight]
10. **Patricola** CM, Chang P (2017) Structure and Dynamics of the Benguela Low-Level Coastal Jet. *Climate Dynamics*, 49, 2765-2788.
11. Fu D, Chang P, **Patricola** CM (2017) Impact of Central American Gap-Winds on Intrabasin Variability of Eastern North Pacific Tropical Cyclones During ENSO. *Scientific Reports*, 7, 1658.
12. Pall P, **Patricola** CM, Wehner MF, Stone DA, Paciorek C, Collins WD (2017) Diagnosing Conditional Anthropogenic Contributions to Heavy Colorado Rainfall in September 2013. *Weather and Climate Extremes*, 17, 1-6.
13. **Patricola** CM, Chang P, Saravanan R (2016) Degree of simulated suppression of Atlantic tropical cyclones modulated by flavour of El Niño. *Nature Geoscience*, 9, 155–160.
14. Zuidema P and **Coauthors** (2016) Challenges and Prospects for Reducing Coupled Climate Model SST Biases in the Eastern Tropical Atlantic and Pacific Oceans: The U.S. CLIVAR Eastern Tropical Oceans Synthesis Working Group. *Bulletin of the American Meteorological Society*, 97, 2305–2328.
15. **Patricola** CM, Chang P, Saravanan R (2015) Impact of Atlantic SST and High Frequency Atmospheric Variability on the 1993 and 2008 Midwest Floods: Regional Climate Model Simulations of Extreme Climate Events. *Climatic Change*, 129, 397–411.
16. Walsh KJE and **Coauthors** (2015) Hurricanes and Climate: The U.S. CLIVAR Working Group on Hurricanes. *Bulletin of the American Meteorological Society*, 96, 997–1017.
17. Daloz AS and **Coauthors** (2015) Cluster Analysis of Downscaled and Explicitly Simulated North Atlantic Tropical Cyclone Tracks. *Journal of Climate*, 28, 1333–1361.
18. **Patricola** CM, Saravanan R, Chang P (2014) The Impact of the El Niño-Southern Oscillation and Atlantic Meridional Mode on Seasonal Atlantic Tropical Cyclone Activity. *Journal of Climate*, 27, 5311–5328.

19. Liu Y, Chiang JCH, Chou C, **Patricola** CM (2014) Atmospheric teleconnection mechanisms of extratropical North Atlantic SST influence on Sahel rainfall. *Climate Dynamics*, 43, 2797–2811
20. Xu Z, Li M, **Patricola** CM, Chang P (2014) Oceanic Origin of Southeast Tropical Atlantic Biases. *Climate Dynamics*, 43, 2915–2930.
21. **Patricola** CM, Cook KH (2013) Mid-twenty-first century climate change in the Central United States. Part II: Climate change processes. *Climate Dynamics*, 40, 569–583.
22. **Patricola** CM, Cook KH (2013) Mid-twenty-first century warm season climate change in the Central United States. Part I: Regional and global model predictions. *Climate Dynamics*, 40, 551–568.
23. **Patricola** CM, Li M, Xu Z, Chang P, Saravanan R, Hsieh J-S (2012) An Investigation of Tropical Atlantic Bias in a High-Resolution Coupled Regional Climate Model. *Climate Dynamics*, 39, 2443–2463.
24. **Patricola** CM, Cook KH (2011) Sub-Saharan Northern African climate at the end of the twenty-first century: Forcing factors and climate change processes. *Climate Dynamics*, 37, 1165–1188.
25. **Patricola** CM, Cook KH (2010) Northern African climate at the end of the twenty-first century: An integrated application of regional and global climate models. *Climate Dynamics*, 35, 193–212.
26. Cook KH, Vizy EK, Launer ZS, **Patricola** CM (2008) Springtime intensification of the Great Plains low-level jet and Midwest precipitation in GCM simulations of the twenty-first century. *Journal of Climate*, 21, 6321–6340.
27. **Patricola** CM, Cook KH (2008) Atmosphere/Vegetation Feedbacks: A mechanism for abrupt climate change over northern Africa. *Journal of Geophysical Research*, 113, D18102.
28. **Patricola** CM, Cook KH (2007) Dynamics of the West African Monsoon under Mid-Holocene precessional forcing: Regional climate model simulations. *Journal of Climate*, 20, 694–716.

## Other Publications

- Patricola** CM (2018) Tropical Cyclones Are Becoming Sluggish. *Nature News & Views*, 558, 36-37.
- Feng Y, Negron-Juarez RI, **Patricola** CM, Collins WD, Uriarte M, Hall JS, Clinton N, Chambers JQ (2018) Rapid remote sensing assessment of impacts from Hurricane Maria on forests of Puerto Rico. *PeerJ Preprints* 6:e26597v1.
- Contributing Author:** Collins M and Coauthors (2013) Long-term Climate Change: Projections, Commitments and Irreversibility. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- Patricola** CM, Chang P, Saravanan R, Li M, Hsieh J-S (2011) An Investigation of the Tropical Atlantic Bias Problem Using a High-Resolution Coupled Regional Climate Model, *U.S. CLIVAR Variations*, 9 (2), 9-12.
- Patricola** CM, Cook KH (2007) The African Humid Period: Evidence for abrupt climate change in northern Africa. *Climate Variability and Predictability (CLIVAR) Focus on Africa*, 2pp.

## Book Chapters

- Wehner MF, Zarzycki C, **Patricola** CM (2019) Estimating the human influence on tropical cyclone intensity as the climate changes. In *Hurricane Risk*. (eds Collins, J & Walsh, K) Springer, Cham, in press.
- Lin I-I, Camargo SJ, **Patricola** CM, Boucharel J, Chang S, Klotzbach P, Chan J, Wang B, Chang P, Li T, Jin F-F (2019) Chapter 17: ENSO and Tropical Cyclones. In *ENSO in a Changing Climate*. (eds McPhaden M, Santoso A, Cai W) AGU Monograph Series. In revision.

## Scholarly Service

2019 – Editor, *Geophysical Research Letters*

## Synergistic Activities

2018 – Member, Scientific Steering Group, Prediction and Research Moored Array in the Tropical Atlantic (PIRATA)  
2018 Working Group member, 9th International Workshop on Tropical Cyclones ([IWTC-9](#))  
2011 – 2014 U.S. CLIVAR Hurricane Working Group ([HWG](#))

## Awards

2013 Outstanding Research Staff Award, Dept. Atmospheric Sciences, Texas A&M  
1/2006 AMS Global Change & Climate Variation Travel Scholarship  
6/2005 – 5/2006 Cornell University Fellowship  
5/2004 – 9/2004 NASA/NY Space Grant, awarded by Cornell University

## Graduate Advisees

Dan Fu, *Texas A&M University* (2014-2018)  
Wei-Ching Hsu, *Texas A&M University* (2014-2018; now post-doc at University of Hawaii)  
John P. O'Brien, *University of California, Santa Cruz/LBNL* (2016-present)

## Reviewer

- **Funding agencies:** Department of Energy; National Science Foundation; Natural Environment Research Council of the UK
- **Journals:** Nature; Nature Geoscience; Nature Communications; Geophysical Research Letters; Journal of Climate; Climate Dynamics; PNAS: Climatic Change; Journal of Geophysical Research; Earth and Planetary Science Letters; International Journal of Climatology; International Journal of Geophysics; WIREs Climate Change; Advances in Meteorology; Earth Interactions
- **Reports:** California's Fourth Climate Change Assessment

## Volunteer Experience

2018 Mentor, Earth and Environmental Sciences Area Mentoring Program, LBNL  
5/2017 Volunteer at California State University STEM Career Awareness Day  
2017 – 2018 Seminar coordinator, LBNL, Climate and Ecosystem Sciences Division  
4/2016 Judge for Student Poster Competition, AMS 32<sup>nd</sup> Conference on Hurricanes and Tropical Meteorology  
2004 – 2008 Seminar coordinator, Cornell University, Dept. of Earth & Atmospheric Sciences

## Professional Affiliations

2006 – present American Geophysical Union ([AGU](#))  
2005 – present American Meteorological Society ([AMS](#))

## Invited Talks

### 2019

- Natural and Anthropogenic Influences on Tropical Cyclones. The University of Texas Institute for Geophysics (UTIG) Seminar Series, **The University of Texas at Austin**, Austin TX.

## 2018

- Oceanic and Atmospheric Controls on Tropical Cyclone Activity. Atmosphere, Ocean, and Climate Dynamics Brown Bag Seminar, **Stanford University**, Stanford, CA.
- Oceanic and Atmospheric Controls on Tropical Cyclone Activity. **AGU Fall Meeting**, Washington DC.

## 2017

- Oceanic and Atmospheric Sources of Tropical Cyclone Predictability. [Workshop](#) on Atlantic Climate Variability – Dynamics, Prediction and Hurricane Risk, **Columbia University**, New York City, NY.
- Anthropogenic Influences on Tropical Cyclone Intensity and Rainfall. [Workshop](#) for Typhoon, Cloud and Climate Study, **National Taiwan University**, Taipei, Taiwan.
- Oceanic and Atmospheric Controls on Tropical Cyclone Activity. Department of Atmospheric Sciences, **National Taiwan University**, Taipei, Taiwan.
- Oceanic and Atmospheric Controls on Tropical Cyclone Activity. Department of Applied Mathematics and Theoretical Physics, **University of Cambridge**, Cambridge, UK.
- Oceanic and Atmospheric Controls on Tropical Cyclone Activity. Department of Civil and Environmental Engineering, **Northeastern University**, Boston, MA.

## 2016

- Large-scale climate controls on extreme climate events. Climate and Ecosystem Sciences Division, **Lawrence Berkeley National Laboratory**, Berkeley, CA.
- The Benguela Low-Level Coastal Jet and Ocean Model Biases in the Benguela Coastal Upwelling Region. **U.S. CLIVAR Process Study and Model Improvement (PSMI) Panel Meeting**, Woods Hole, MA.
- Oceanic and Atmospheric Controls on Tropical Cyclone Activity. Department of Marine Sciences, **University of North Carolina at Chapel Hill**, Chapel Hill, NC.
- Large-scale climate controls on extreme climate events. Department of Geography and Atmospheric Science, **University of Kansas**, Lawrence, KS.
- Large-scale climate controls on extreme climate events in the past, present, and future. Department of Geological and Mining Engineering and Sciences, **Michigan Technological University**, Houghton, MI.
- Large-scale climate controls on extreme climate events. Department of Environmental Sciences, **University of California, Riverside**, Riverside, CA.
- The Influence of El Niño Flavors on Atlantic and North Pacific Tropical Cyclone Activity. **AIR Worldwide**, Boston, MA.

## 2011

- An Investigation of the Tropical Atlantic Bias Problem Using a High-Resolution Coupled Regional Climate Model. **International Symposium on Regional Earth System Modeling and Analysis (RESMA)**, Beijing, China.
- An Investigation of the Tropical Atlantic Bias Problem Using a High-Resolution Coupled Regional Climate Model. **Ocean University of China**, Qingdao, China.

Google Scholar: <https://scholar.google.com/citations?user=DNDud0IAAAAJ>