

Yuan-Ming Cheng

Research Scientist

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EDUCATION

Ph.D., Atmospheric Sciences, University at Albany, State University of New York 2019

Advisor: Professor Chris D. Thorncroft

Thesis title: Variability of African easterly waves

M.S., Atmospheric Sciences, National Taiwan University 2011

Advisor: Professor Chun-Chieh Wu

Thesis title: The role of boundary layer dynamical processes in tropical cyclone intensity

B.S., Chemical Engineering, National Taiwan University 2009

Minor in Atmospheric Sciences

APPOINTMENTS

Research Scientist at NOAA PSL/CIRES 2023–present

- I develop a data-driven operational model (NOAA PSL-CPC linear inverse model) and provide real-time probabilistic and deterministic forecasts focusing on the hydroclimate over the U.S. at the subseasonal-to-seasonal (S2S) time scales.
- I evaluate predictability and identify environmental conditions contributing to forecasts of opportunity to help determine the confidence level of S2S predictions.
- I apply my background in tropical meteorology and investigate relevant physical mechanisms important to the S2S forecasts.

National Research Council Postdoctoral Research Associate at NOAA PSL 2019–2023

- I led projects funded by the NRC and NOAA to work with Dr. George Kiladis and his group. I investigated convectively coupled equatorial waves and their interactions with mid-latitude circulations and mesoscale convective systems.
- I developed process-level diagnostics to understand and visualize physical mechanisms using statistical analysis of observations and reanalysis data.

Graduate Research Assistant at University at Albany 2014–2019

- I characterized the variability of African easterly waves and documented their interactions with equatorial and mid-latitude circulations by utilizing statistical analyses, case studies, and idealized modeling.
- I investigated tropical cyclone genesis using WRF mechanism-denial experiments and verified them against observations. I also systematically tested model sensitivity and stability to parameterization.

Research Assistant at National Taiwan University 2013–2014

- I conducted WRF ensemble simulations and investigated the dynamics of secondary eyewall formation in tropical cyclones. I also explored various facets of tropical cyclones such as rapid intensification, boundary layer dynamics, and oceanic feedback.

Weather Officer as a Second Lieutenant, Taiwan Air Force

2011–2012

- I led daily weather discussions and issued daily forecasts to military personnel as an operational forecaster on a team for each shift. I provided flight-route nowcasts and recommended go-no go flight decisions.

HONORS AND AWARDS

National Research Council Research Associateship Award 2019–2022
Dean’s Award for the Best M.S. Thesis, College of Science, National Taiwan University 2011

REFEREED PUBLICATIONS

Cheng, Y.-M., J. Dias, G. Kiladis, Z. Feng, and L. R. Leung, 2023: Mesoscale convective systems modulated by convectively coupled equatorial waves. *Geophys. Res. Lett.*, **50**(10), doi.org/10.1029/2023gl103335.

Cheng, Y.-M., S. Tulich, G. N. Kiladis, and J. Dias, 2022: Two extratropical pathways to forcing tropical convective disturbances *J. Climate*, **35**, 2987–3009, doi.org/10.1175/JCLI-D-22-0171.1.

Laura A. Holt, François Lott, Rolando R. Garcia, George N. Kiladis, **Y.-M. Cheng** et al., 2020: An evaluation of tropical waves and wave forcing of the QBO in the QBOi models. *Quart. J. Roy. Met. Soc.*, **148**, 1541–1567, doi.org/10.1002/qj.3827.

Cheng, Y.-M., C. D. Thorncroft, and G. N. Kiladis, 2019: Two contrasting behaviors of African easterly waves. *J. Atmos. Sci.*, **76**, 1753–1768, doi.org/10.1175/JAS-D-18-0300.1.

BOOK CHAPTER

Antoine Venaille, Juliana Dias, **Yuan-Ming Cheng**: Large-scale Atmospheric Dynamics: Equatorial Waves in *Atmospheric Dynamics*, currently being edited by Caroline Muller, Riwal Plougonven, and Gwendal Rivière

FIELD EXPERIENCE

DOTSTAR–Dropwindsonde Observations for Typhoon Surveillance near TAIwan Region 2010

As a surveillance flight quality control specialist, I worked with flight crews and used the NCAR-Atmospheric Sounding Processing Environment program to collect data on research flights into typhoons.

ATOMIC–Atlantic Tradewind Ocean–Atmosphere Mesoscale Interaction Campaign 2020

I led daily weather briefings to inform observations for the field campaign.

PROFESSIONAL DEVELOPMENT

NOAA/NCAR Open Hackathon 2023

Selected to attend a NOAA/NCAR-NVIDIA Hackathon aimed at improving and optimizing scientific computation using GPU architectures.

Mind the Gap 2 Workshop 2022

Selected to participate in a National Science Foundation-sponsored workshop dedicated to educating the next generation of atmospheric scientists for careers in industry.

NASA Summer School at the Jet Propulsion Laboratory 2016

Selected to attend a NASA summer school where the next generation of scientists were brought together to focus on using satellite observations to improve and advance climate models.

SKILLS

Programming	NCL, Python, Fortran, GrADS, Shell script, GitHub, CDO, NCO
Modeling	WRF, MM5, Dynamical Research Empirical Atmospheric Model (from Univ. of Reading)
Languages	English (fluent), Mandarin (native) and Taiwanese (fluent)

SERVICES

Reviewer for JCLI, MWR, JAS, JAMC, JGR Atmospheres, and IPCC AR6	2019–present
Co-chair of the Tropical Waves Session at the 35th Conference on Hurricanes and Tropical Meteorology 2022	
Lead and coordinator of outreach programs at University at Albany	2015–2019

SELECTED CONFERENCE PRESENTATIONS

Cheng, Y.-M., J. Dias, and G. N. Kiladis, 2023: Impact of Convectively Coupled Equatorial Waves and the MJO on Extreme Precipitation Caused by MCSs. 103th AMS Annual Meeting, Denver, CO.

Cheng, Y.-M., J. Dias, and G. N. Kiladis, 2022: Probability of extreme MCS precipitation is increased by convectively coupled equatorial waves. 2022 AGU Fall Meeting, Chicago, IL.

Cheng, Y.-M., G. N. Kiladis, J. Dias, and S. Tulich, 2022: Impact of convectively coupled equatorial waves on the characteristics and organization of MCSs. 35th Conference on Hurricanes and Tropical Meteorology, New Orleans, LA.

Cheng, Y.-M., S. Tulich, and G. N. Kiladis, 2022: ENSO impacts on the extratropical forcing of convectively coupled Kelvin waves. 102th AMS Annual Meeting, online.

Cheng, Y.-M., S. Tulich, and G. Kiladis, 2021: Two extratropical pathways to forcing tropical convection. 34th Conference on Hurricanes and Tropical Meteorology, online.

Cheng, Y.-M., C. D. Thorncroft, and G. Kiladis, 2020: African easterly wave characteristics: climate variability and trends. 100th AMS Annual Meeting, Boston, MA.

Cheng, Y.-M., C. D. Thorncroft, and A. Brammer, 2018: Intraseasonal variability of African easterly waves. 2nd International Conference on Subseasonal to Seasonal Prediction, Boulder, CO.

Cheng, Y.-M., and C. D. Thorncroft, 2018: Variability of African easterly wave structures. 33rd Conference on Hurricanes and Tropical Meteorology, Ponte Vedra, FL.

Alland, J. J., and **Y.-M. Cheng**, 2018: The role of African easterly waves north of the African easterly jet on tropical cyclogenesis. 33rd Conference on Hurricanes and Tropical Meteorology, Ponte Vedra, FL.

Cheng, Y.-M., C. D. Thorncroft, and G. N. Kiladis, 2017: A survey of synoptic waves over West Africa. 8th Northeast Tropical Meteorology Workshop, Rensselaerville, NY.

Cheng, Y.-M., and C. D. Thorncroft, 2017: A survey of synoptic waves over West Africa. General Assembly 2017, European Geosciences Union, Vienna, Austria.

Cheng, Y.-M. and C. D. Thorncroft, 2016: Three-dimensional structure of synoptic waves over West Africa based on empirical orthogonal functions. NOAA's 41st Climate Diagnostics and Prediction Workshop, Orono, Maine.

Cheng, Y.-M., and C. D. Thorncroft, 2016: Three-dimensional structure of African easterly waves based on empirical orthogonal functions. 32nd Conference on Hurricanes and Tropical Meteorology, San Juan, PR.

Cheng, Y.-M., and C.-C. Wu, 2014: The role of boundary layer dynamics on tropical cyclone intensity. 31st Conference on Hurricanes and Tropical Meteorology, San Diego, CA.