

Curriculum Vitae

Chien-Ming Wu

Department of Atmospheric Sciences, National Taiwan University
E-mail:mog@as.ntu.edu.tw, Phone:886-2-33663905

Education

- Ph.D.* Atmospheric and Oceanic Sciences, 2004-2008, University of California, Los Angeles, USA
Dissertation: "A study of the diurnal cycle of moist convection over land using a cloud-system resolving model"
Advisor: Bjorn Stevens
- M.S.* Atmospheric and Oceanic Sciences, 2002-2004, University of California, Los Angeles, USA
- M.S.* Atmospheric Sciences, 1998-2000, National Taiwan University, Taiwan
Thesis: "The interannual variability of the north western Pacific monsoon"
Advisor: LinHo
- B.S.* Atmospheric Sciences, 1994-1998, National Taiwan University, Taiwan

Research interests

- Boundary layers, cloud dynamics, moist convection, and their role in climate
- Representation of cloud-scale interactions in the large-scale models
- Numerical modeling of the atmosphere
- Land-atmosphere interactions

Research Experience

Department of atmospheric Sciences, National Taiwan University, 2011-present

Associate Professor: 2018-now.
Assistant Professor: 2011-2018.

Center for Multiscale Modeling of Atmospheric Processes (CMMAP), 2009-2011

Postdoctoral Scholar: 2009-2011.

Dep't of Atmospheric and Oceanic Sciences, University of California, Los Angeles, 2002-2008

Postdoctoral Scholar, 2008.

Graduate Student Research assistant, 2002-2008.

Dep't of Atmospheric Sciences, National Taiwan University, 1998-2000

Graduate Student Research assistant.

Associate Editor of Journal of Meteorology Society Japan 2020-now

Associate Editor of Atmospheric Research 2022-now

Awards

2018: Ta-You Wu Memorial Award, MOST, Taiwan

Invited Talks

2022: UTokyo-NTU Workshop on Atmospheric Convection: " Learning patterns in atmospheric sciences: from convection aggregation, stratosphere sudden warming to orographic lee vortices", University of Tokyo, Tokyo, Japan

2022: Arakawa Symposium: "Unified representation of deep moist convection in a global convection-permitting model." UCLA, Los Angeles, CA, USA

2021: Online International Workshop 2021: Storyline Approach on Regional Extreme Weather and Their Future Change for Better Adaptations to the Climate Change, Tokyo Japan: "Unified Parameterization in Central Weather Bureau Global Forecast System (CWBGFS)"

2020: JPGU session on Large-scale moisture and organized cloud systems, Tokyo Japan: " Effects of Microphysical Processes on the Precipitation Spectrum in a Strongly Forced Environment"

2020: UCLA seminar, Los Angeles, CA, USA: "Convective Aggregation in idealized VVM simulations"

2019: JPGU session on Large-scale moisture and organized cloud systems, Tokyo Japan: "The role of interactive SST on the aggregated convection"

2018: JPGU session on Large-scale moisture and organized cloud systems, Tokyo Japan: "Idealized simulations of convective organization and moisture buildup during South China Sea monsoon onset"

2018: The 2nd International Workshop on “ Climate Change and Precipitation in the East Asia”, Tokyo Japan: “The Impact of Land–atmosphere Interactions on the Diurnal Intensity of Precipitation over Tropical Islands”

2017: Department of Bioenvironmental Systems Engineering, NTU, Taiwan: “The Precipitation Hotspots of Afternoon Thunderstorms over Taipei Basin: Idealized Numerical Simulations.”

2017: RCEC, Academia, Taiwan: “The Environment of Aggregated Deep convection.”

2017: Department of Earth Sciences, NTNU, Taiwan: “Critical transitions of moist convective systems in the atmosphere.”

2017: The 2nd International Workshop on “Climate Change and Precipitation in the East Asia, Japan: “Evaluating the bias of East Asia summer monsoon precipitation in a global climate model using the hindcast approach.”

2017: Lawrence Livermore National Lab. (LLNL), USA: “Unified deep cumulus parameterization for numerical modeling of the atmosphere.”

2016: National Oceanic and Atmospheric Administration (NOAA), USA: “Unified parameterization of deep convection in atmospheric models.”

2016: Department of Earth and Planetary Science, U. Tokyo, Japan: “Understanding moist convective systems using a cloud resolving model.”

2014: CWB, Taiwan: “Development of a Taiwan unified atmospheric model with a unified cumulus parameterization.”

2014: Institute of Oceanography, Taiwan: “Numerical simulations of orographic locking of precipitation in an idealized typhoon environment.”

2013: Department of Atmospheric Sciences, NCU, Taiwan: “A Unified Representation of Deep Moist Convection in Numerical Modeling of the Atmosphere.”

Student Advising

Graduate Ph.D.

Su, Chun-Yian

Ph.D. students

Hsieh, Min-Ken (4th year)

Huang, Jin-De; Kuo, Kuan-Ting; Chen, Yi-Chan (3rd year)

Chen, Po-Yen (2nd year)
Chiao-Wei Chang (1st year)

Master students:

Fan, Yu-Hsuan 2022: Physical and Chemical Effects of Diurnal Evolution of NO_x Concentration in Idealized Simulations

Tsai, Tzung-Yu 2022: The Role of Convection in a Minimal Model of QBO-like Oscillation

Tsai, Min-Lin 2021: Idealized Simulations of Afternoon Thunderstorms Initiation Over Taipei Basin: The Roles of Southwesterly Background Wind

Chu, Hsin-Yu, 2019: The Study on the Impact of Mesoscale Convective Vortices on Tropical Cyclogenesis using a Cloud Resolving Model

Hsieh, Min-Ken, 2019: Effects of orographically induced low-level moisture convergence and inversion strength on upslope fog: a case study at Xitou.

Tsao, Shih-Wen, 2019: The representation of moist convection using 3D Convolutional Neural Networks.

Chen, Yan-Ting, 2018: Aggregation or No Aggregation and Beyond: from a Cloud-Resolving Model Perspective.

Chen, Bo-Yen, 2017: The Impact of land-atmosphere interactions on the diurnal intensity of precipitation over tropical islands.

Wu, Wei-Lin, 2017: The characteristics of convective aggregation in rotating radiative convective equilibrium simulated by a cloud-resolving model.

Chen, Yi-Chang, 2016: The impact of aggregated shallow convection in MJO suppressed phase.

Kuo, Wei-Chen, 2016: On the convective updraft fraction dependency of subgrid-scale vertical transport in Zhang-McFarlane convection parameterization.

Tsai, Jia-Ying, 2015: Critical transitions of stratocumulus dynamical systems.

Kuo, Guan-Ting, 2015: What causes the precipitation hotspots of afternoon thunderstorms over Taipei Basin?

Tsai, Wei-Ming, 2014: The responses of extreme precipitation to the organized convections using a cloud resolving model.

Publications

Su, C. Y., Chen, W. T., & Wu, C. M. (2022). Object-based evaluation of tropical precipitation systems in DYAMOND simulations over the Maritime Continent. *Journal of the Meteorological Society of Japan. Ser. II*, 100(4), 647-659.

Su, S. H., Chang, Y. H., Liu, C. H., Chen, W. T., Chang, W. Y., Chen, J. P., ... & Yang, M. J. Observing Severe Precipitation near Complex Topography during the Yilan Experiment of Severe Rainfall in 2020 (YESR2020) (2022). *Quarterly Journal of the Royal Meteorological Society*.

Hsieh, M. K., Y. W. Chen, Y. C. Chen, & C.-M. Wu* (2022). The Roles of Local Circulation and Boundary Layer Development in Tracer Transport over Complex Topography in Central Taiwan. *Journal of the Meteorological Society of Japan. Ser. II*.

Huang, J. D., & Wu, C. M.* (2022). A Framework to Evaluate Convective Aggregation: Examples With Different Microphysics Schemes. *Journal of Geophysical Research: Atmospheres*, 127(5), e2021JD035886.

Chang, Y. H., Chen, W. T., Wu, C. M., Moseley, C., & Wu, C. C. (2021). Tracking the influence of cloud condensation nuclei on summer diurnal precipitating systems over complex topography in Taiwan. *Atmospheric Chemistry and Physics*, 21(22), 16709-16725.

Su, C. Y., Wu, C. M.*, Chen, W. T., & Chen, J. H. (2021). Implementation of the Unified Representation of Deep Moist Convection in the CWBGFS. *Monthly Weather Review*, 149(10), 3525-3539.

Su, C. Y., Wu, C. M.*, Chen, W. T., & Chen, J. H. (2022). The effects of the unified parameterization in the CWBGFS: the diurnal cycle of precipitation over land in the Maritime Continent. *Climate Dynamics*, 58(1), 223-233.

Wu, C. M.*, & Chen, P. Y. (2021). Idealized cloud-resolving simulations of land-atmosphere coupling over tropical islands. *Terrestrial, Atmospheric & Oceanic Sciences*, 32(2).

Ma, H. Y., Zhou, C., Zhang, Y., Klein, S. A., Zelinka, M. D., Zheng, X., ... & Wu, C. M. (2021). A multi-year short-range hindcast experiment with CESM1 for evaluating climate model moist processes from diurnal to interannual timescales. *Geoscientific Model Development*, 14(1), 73-90.

Chen, P. J., Chen, W. T., Wu, C. M., & Yo, T. S. (2021). Convective Cloud Regimes From a Classification of Object-Based CloudSat Observations Over Asian-Australian Monsoon Areas. *Geophysical Research Letters*, 48(10), e2021GL092733.

Jian, H. W., Chen, W. T., Chen, P. J., Wu, C. M., & Rasmussen, K. L. (2021). The Synoptically-Influenced Extreme Precipitation Systems over Asian-Australian Monsoon Regio Observed by TRMM Precipitation Radar. *Journal of the Meteorological Society of Japan. Ser. II*.

Hung, M. P., Chen, W. T., Wu, C. M., Chen, P. J., & Feng, P. N. (2020). Intraseasonal vertical cloud regimes based on CloudSat observations over the tropics. *Remote Sensing*, 12(14), 2273.

Huang, J. D., & Wu, C. M.* (2020). Effects of microphysical processes on the precipitation Spectrum in a strongly forced environment. *Earth and Space Science*, 7(6), e2020EA001190.

Chang, Y. P., Yang, S. C., Lin, K. J., Lien, G. Y., & Wu, C. M. (2020). Impact of tropical cyclone initialization on its convection development and intensity: A case study of Typhoon Megi (2010). *Journal of the Atmospheric Sciences*, 77(2), 443-464.

Chen, Y. T., & Wu, C. M.* (2019). The role of interactive SST in the cloud-resolving simulations of aggregated convection. *Journal of Advances in Modeling Earth Systems*, 11(10), 3321-3340.

Tsou, S.-W., C.-Y. Su, and C.-M. Wu* 2019: Learning the Representations of Moist Convection with Convolutional Neural Networks. arXiv:1905.09614

Kuo, K. T., Chen, W. T., & Wu, C. M. (2020). Effects of convection-SST interactions on the South China Sea summer monsoon onset in a multiscale modeling framework model. *Terr. Atmos. Ocean. Sci*, 31, 211-225.

Chen, W. T., Wu, C. M., Tsai, W. M., Chen, P. J., & Chen, P. Y. (2019). Role of coastal convection to moisture buildup during the South China Sea summer monsoon onset. *Journal of the Meteorological Society of Japan. Ser. II*.

Chen, W. T., Wu, C. M., & Ma, H. Y. (2019). Evaluating the bias of South China Sea summer monsoon precipitation associated with fast physical processes using a climate model hindcast approach. *Journal of Climate*, 32(14), 4491-4507.

Wu, C. M.*, Lin, H. C., Cheng, F. Y., & Chien, M. H. (2019). Implementation of the land surface processes into a vector vorticity equation model (VVM) to study its impact on afternoon thunderstorms over complex topography in Taiwan. *Asia-Pacific Journal of Atmospheric Sciences*, 55(4), 701-717.

Kuo, K. T., & Wu, C. M.* (2019). The precipitation hotspots of afternoon thunderstorms over the Taipei Basin: Idealized numerical simulations. *Journal of the Meteorological Society of Japan*. Ser. II.

Su, C. Y., Wu, C. M.*, Chen, W. T., & Chen, J. H. (2019). Object-based precipitation system bias in grey zone simulation: the 2016 South China Sea summer monsoon onset. *Climate dynamics*, 53(1), 617-630.

Ong, H., Wu, C. M., & Kuo, H. C. (2017). Effects of artificial local compensation of convective mass flux in the cumulus parameterization. *Journal of Advances in Modeling Earth Systems*, 9(4), 1811-1827.

Tsai, W. M., & Wu, C. M.* (2017). The environment of aggregated deep convection. *Journal of Advances in Modeling Earth Systems*, 9(5), 2061-2078.

Arakawa, A., Jung, J. H., & Wu, C. M. (2016). Multiscale modeling of the moist-convective atmosphere. *Meteorological monographs*, 56, 16-1.

Tsai, J. Y., & Wu, C. M.* (2016). Critical transitions of stratocumulus dynamical systems due to perturbation in free-atmosphere moisture. *Dynamics of Atmospheres and Oceans*, 76, 1-13.

Chien, M. H., & Wu, C. M.* (2016). Representation of topography by partial steps using the immersed boundary method in a vector vorticity equation model (VVM). *Journal of Advances in Modeling Earth Systems*, 8(1), 212-223.

Arakawa, A., & Wu, C. M. (2015). Reply to "Comments on 'A unified representation of deep moist convection in numerical modeling of the atmosphere. Part I'". *Journal of the Atmospheric Sciences*, 72(6), 2566-2567.

Wu, C. M.*, Lo, M. H., Chen, W. T., & Lu, C. T. (2015). The impacts of heterogeneous land surface fluxes on the diurnal cycle precipitation: A framework for improving the GCM representation of land-atmosphere interactions. *Journal of Geophysical Research: Atmospheres*, 120(9), 3714-3727.

Xiao, H., Gustafson Jr, W. I., Hagos, S. M., Wu, C. M., & Wan, H. (2015). Resolution-dependent behavior of subgrid-scale vertical transport in the Zhang-McFarlane convection parameterization. *Journal of Advances in Modeling Earth Systems*, 7(2), 537-550.

Wu, C. M., & Arakawa, A. (2014). A unified representation of deep moist convection in numerical modeling of the atmosphere. Part II. *Journal of the Atmospheric Sciences*, 71(6), 2089-2103.

Arakawa, A., & Wu, C. M. (2013). A unified representation of deep moist convection in numerical modeling of the atmosphere. Part I. *Journal of the Atmospheric Sciences*, 70(7), 1977-1992.

Lo, M. H., Wu, C. M., Ma, H. Y., & Famiglietti, J. S. (2013). The response of coastal stratocumulus clouds to agricultural irrigation in California. *Journal of Geophysical Research: Atmospheres*, 118(12), 6044-6051.

Xiao, H., Wu, C. M.*, Mechoso, C. R., & Ma, H. Y. (2012). A treatment for the stratocumulus-to-cumulus transition in GCMs. *Climate dynamics*, 39(12), 3075-3089.

Wu, C. M.*, & Arakawa, A. (2011). Inclusion of surface topography into the vector vorticity equation model (VVM). *Journal of Advances in Modeling Earth Systems*, 3(2).

Arakawa, A., Jung, J. H., & Wu, C. M. (2011). Toward unification of the multiscale modeling of the atmosphere. *Atmospheric Chemistry and Physics*, 11(8), 3731-3742.

Arakawa, A., Jung, J. H., & Wu, C. M. (2010, November). Toward Unification of General Circulation and Cloud-Resolving Models. In *Workshop on Non-hydrostatic Modelling* (Vol. 8, p. 17).

Xiao, H., Wu, C. M., & Mechoso, C. R. (2011). Buoyancy reversal, decoupling and the transition from stratocumulus to shallow cumulus topped marine boundary layers. *Climate dynamics*, 37(5), 971-984.

Ma, H. Y., Mechoso, C. R., Xue, Y., Xiao, H., Wu, C. M., Li, J. L., & De Sales, F. (2011). Impact of land surface processes on the South American warm season climate. *Climate dynamics*, 37(1), 187-203.

Wu, C. M., Stevens, B., & Arakawa, A. (2009). What controls the transition from shallow to deep convection? *Journal of the Atmospheric Sciences*, 66(6), 1793-1806.

Wu, C.-M. 2008: A study of the diurnal cycle of moist convection over land using a cloud-system resolving model. Ph. D dissertation, UCLA, Department of Atmospheric and Oceanic sciences.

Wu, C.-M. 2000: The interannual variability of western north Pacific monsoon. Master thesis, National Taiwan University, Department of Atmospheric Sciences.