Curriculum Vitae

Chien-Ming Wu

Department of Atmospheric Sciences, National Taiwan University
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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.

Awards

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

Invited Talks

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

Ph.D. students:
Su, Chun-Yian (3rd year)
Hsieh, Min-Ken (2nd year)
Huang, Jin-De; Kuo, Kuan-Ting; Chen, Yi-Chan (1st year)
Chen, Po-Yen (0th year)

Master students:

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

Wu, C.-M.*, & Chen, P.-Y. (2021). Idealized cloud-resolving simulations of land-atmosphere coupling over tropical islands. Terrestrial, Atmospheric and Oceanic sciences journal, in press. https://doi.org/ 10.3319/TAO.2020.12.16.01

Ma, H.-Y., Zhou, C., Zhang, Y., Klein, S. A., Zelinka, M. D., Zheng, X., Xie, S., Chen, W.-T., and Wu, C.-M.: A multi-year short-range hindcast experiment with CESM1 for evaluating climate model moist processes from diurnal to interannual timescales, Geosci. Model Dev., 14, 73–90, https://doi.org/10.5194/gmd-14-73-2021, 2021.

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, e2021GL092733. https://doi.org/10.1029/2021GL092733

Jian, H.-W., W.-T. Chen, P.-J. Chen, C.-M. Wu, and K. I. Rasmussen, 2021: The synoptically-influenced extreme preipitation systems over Asian-Australian monsoon region observed by TRMM Precipitation Radar. J. Meteor. Soc. Japan, 99,

Special Edition on Global Precipitation Measurement (GPM): 5th Anniversary, https://doi.org/10.2151/jmsj.2021-013

Hung, M.-P.; Chen, W.-T.; Wu, C.-M.; Chen, P.-J.; Feng, P.-N. Intraseasonal Vertical Cloud Regimes Based on CloudSat Observations over the Tropics. Remote Sens. 2020, 12, 2273.

Huang J.-D. and C.-M. Wu* 2020: Effects of Microphysical Processes on the Precipitation Spectrum in a Strongly Forced Environment. Earth and Space Science. DOI: 10.1029/2020ea001190

Kuo Y.-H., C.-M. Wu and co-authors 2020: Convective transition statistics over tropical oceans for climate model diagnostics: GCM evaluation. J. Atmos. Sci. DOI: 10.1175/JAS-D-19-0132.1

Chang Y.-P., S.-C. Yang K.-J. Lin, G.-Y. Lien and C.-M. Wu 2019: Impact of Tropical Cyclone Initialization on its Convection Development and Intensity: A Case Study of Typhoon Megi (2010) J. Atmos. Sci. DOI: 10.1175/JAS-D-19-0058.1

Chen, Y.-T. and C.-M. Wu* 2019: The role of interactive SST in the cloud-resolving simulations of aggregated convection. J. Adv. Model. Earth Syst. DOI: 10.1029/2019MS001762

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., W.-T. Chen* and C.-M. Wu 2019: Effects of convection-SST interactions on South China Sea Summer Monsoon Onset in a Multiscale Modeling Framework Model. Terr. Atmos. Ocean. Sci. DOI: 10.3319/TAO.2019.08.16.01

Chen, W.-T.*, C.-M. Wu, W.-M. Tsai, P.-J. Chen and P.-Y. Chen 2019: Role of coastal convection to moisture buildup during the South China Sea summer monsoon onset. J. Meteor. Soc. Japan. DOI:10.2151/jmsj.2019-065

Chen, W.-T.*, C.-M. Wu and H.-Y. Ma 2019: Evaluating the bias of South China Sea summer monsoon precipitation associated with fast physical processes using climate model hindcast approach. J. Climate. DOI: 10.1175/JCLI-D-18-0660.1

Wu, C.-M.*, H.-C. Lin, F.-Y. Cheng, and M.-H. Chien, 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 J. Atmos. Sci., https://doi.org/10.1007/s13143-019-00116-x

Kuo, K.-T., and C.-M. Wu*, 2019: The precipitation hotspots of afternoon thunderstorms over the Taipei Basin: Idealized numerical simulations. J. Meteor. Soc. Japan, 97, 501-517 https://doi.org/10.2151/jmsj.2019-031.

Su, C.-Y., C.-M. Wu*, W.-T. Chen and J.-H. Chen 2019: Object-Based Precipitation System Bias in Grey Zone Simulation: the 2016 South China Sea Summer Monsoon Onset. Clim Dyn. https://doi.org/10.1007/s00382-018-04607-x.

Ong, H., C.-M. Wu, and H.-C. Kuo 2017: Effects of artificial local compensation of convective mass flux in the cumulus parameterization, J. Adv. Model. Earth Syst., 9, 1811–1827, doi:10.1002/2017MS000926.

Tsai, W.-M., and C.-M. Wu* 2017: The environment of aggregated deep convection, J. Adv. Model. Earth Syst., 9, doi:10.1002/2017MS000967.

Arakawa A., J.-H. Jung and C.-M. Wu 2016: Multiscale Modeling of the Moist-Convective AtmosphereMeteorological Monographs

Tsai, J.-Y. and C.-M. Wu* 2016: Critical Transitions of Stratocumulus Dynamical Systems due to perturbation in free atmosphere moisture. Dynamics of Atmospheres and Oceans, Vol. 76, Part 1, Pages 1-13.

Chien, M.-H., and C.-M. Wu* 2016: Representation of topography by partial steps using the immersed boundary method in a vector vorticity equation model (VVM), J. Adv. Model. Earth Syst., 8, 212–223.

Arakawa A. and C.-M. Wu, 2015: Reply to "Comments on 'A Unified Representation of Deep Moist Convection in Numerical Modeling of the Atmosphere. Part I'". J. Atmos. Sci., 72, 2566–2567.

Wu, C.-M*., M.-H. Lo, W.-T. Chen and C.T. Lu, 2015: The impacts of Heterogeneous Land Surface Fluxes on the Diurnal Cycle Precipitation – A Framework for Improving the GCM Representation of Land-Atmosphere Interactions. J. Geophys. Res. Atmos.

Xiao, H., W. I. Gustafson Jr., S. M. Hagos, C.-M. Wu, and H. Wan (2015), Resolution-dependent behavior of subgrid-scale vertical transport in the Zhang-McFarlane convection parameterization, J. Adv. Model. Earth Syst., 7, 537–550

Wu, C.-M., and A. Arakawa, 2014: A Unified Representation of Deep Moist Convection in Numerical Modeling of the Atmosphere. Part II. J. Atmos. Sci., 71, 2089–2103.

Arakawa, A., C.-M. Wu, 2013: A Unified Representation of Deep Moist Convection in Numerical Modeling of the Atmosphere. Part I. J. Atmos. Sci., 70, 1977–1992.

Lo, M.-H., C.-M. Wu, H.-Y. Ma, and J. S. Famiglietti, 2013: The response of coastal stratocumulus clouds to agricultural irrigation in California, J. Geophys. Res. Atmos., 118, doi:10.1002/jgrd.50516.

Xiao, H., C.-M. Wu*, R. Mechoso, and H.-Y. Ma, 2012: A treatment for the stratocumulus-to-cumulus transition in GCMs. Climate Dynamics. Published online. DOI: 10.1007/s00382-012-1342-z

Wu, C.-M. and A. Arakawa, 2011: Inclusion of surface topography into the vector vorticity equation model (VVM). *J. Adv. Model. Earth Syst*. Vol. 3, Art. M06002, 13 pp.

Arakawa A., J.-H. Jung and C.-M. Wu, 2011: Toward unification of the multiscale modeling of the atmosphere. *Atmos. Chem. Phys*. **11**, 3731-3742.

Arakawa A., J.-H. Jung and C.-M. Wu, 2010: Toward unification of general circulation and cloud-resolving models. In proceedings of ECMWF workshop on non-hydrostatic modelling, 8-10 November, 2010, 18pp.

Xiao, H., C.-M. Wu and C. R. Mechoso, 2010: Buoyancy reversal, decoupling and the transition from stratocumulus-topped to trade cumulus-topped marine boundary layers. *Climate Dynamics*, pages 1–14, 10.1007/s00382-010-0882-3.

Ma, H.-Y., C. R. Mechoso, Y. Xue, H. Xiao, C.-M. Wu, J.-L. Li, and F. De Sales, 2010: Impact of land surface processes on the South American warm season climate. *Climate Dynamics*, pages 1–17, 10.1007/s00382- 010-0813-3.

Wu, C.-M., B. Stevens and A. Arakawa, 2009: What controls the transition from shallow to deep convection? *J. Atmos. Sci.*, 66, 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.