Wei-Liang Lee (李威良)

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Education

Ph.D.: Atmospheric Sciences, University of California, Los Angeles, USA (2008)
M.S.: Atmospheric Sciences, National Taiwan University, Taiwan (1999)
B.S.: Atmospheric Sciences, National Taiwan University, Taiwan (1997)

Research Interests

- 3-D Topographic effect on surface radiation budget
- Development of general circulation models (GCM)
- Radiation–cloud/aerosol/hydrometeor/snow interactions
- 3-D radiative transfer program and parameterization
- Radiative transfer in the coupled atmosphere-ocean system

Experiences

Assistant research fellow, *Academia Sinica*, Taiwan **(2014/08-2020/07)**
Assistant research specialist, *Academia Sinica*, Taiwan **(2012/01–2014/07)**
Post doctoral researcher, *Academia Sinica*, Taiwan **(2008/04–2011/12)**
Research assistant, *University of California, Los Angeles*, USA **(2001/09–2008/03)**

- Radiative transfer in a coupled atmosphere-ocean system, Monte Carlo simulation on 3-D radiative transfer in mountains (2003-2008)
  Advisor: Dr. K. N. Liou
- Development of coupled GCM consisting of UCLA AGCM and POP OGCM; ENSO and Indian Ocean dipole mode simulation and analysis (2001-2003)
  Advisor: Dr. Jin-Yi Yu

Teaching assistant, *University of California, Los Angeles*, USA **(2006)**
Research assistant, *National Taiwan University*, Taiwan **(1997/09–1999/06)**

- Typhoon and vortex dynamics
  Advisor: Dr. Hung-Chi Kuo

Research assistant, *National Taiwan University*, Taiwan **(1995/09–1997/06)**

- Field observation and data analysis of aerosol concentration and size distribution
  Advisor: Dr. Jen-Ping Chen

Honors

- Career Development Award, Academia Sinica, Taiwan (2021)
- Distinguished Postdoctoral Fellow, Academia Sinica, Taiwan (2008)
- Dissertation Year Fellowship, UCLA, USA (2007)
- Intelligent Student Fellowship in Math and Nature Sciences, Ministry of Education, Taiwan (1993)

Journal Papers

Li, J.-L. F., K.-M. Xu, M. Richardson, **W.-L. Lee**, J. H. Jiang, J.-Y. Yu, Y.-H. Wang, E. Fetzer, L.-C. Wang, and G. Stephens (2020). Annual and seasonal mean tropical and subtropical bias in CMIP5 and CMIP6 models. *Environmental Research Letters*, 15, 124068, https://doi.org/10.1088/1748-9326/abc7dd.

Li, J.-L. F., **W.-L. Lee**, K.-M. Xu, J. H. Jiang, E. Fetzer, C.-A. Chen, P.-C. Hsu, H.-H. Hsu, J.-Y. Yu, and Y.-H. Wang (2020). Impact of falling ice radiative effects on projections of Southern Ocean sea ice change under global warming. *Terrestrial, Atmospheric, and Oceanic Sciences*, 31, https://doi.org/10.3319/TAO.2020.10.15.01.

Li, J.-L. F., K.-M. Xu, **W.-L. Lee**, J. H. Jiang, Y.-H. Wang, E. Fetzer, J.-Y. Yu, and L.-C. Wang (2020). Comparisons of radiation-circulation precipitation coupling over the tropical and subtropical ocean between AMIP6 and CMIP6. *Terrestrial, Atmospheric, and Oceanic Sciences*, 31, https://doi.org/10.3319/TAO.2020.09.17.01.

Lee, W.-L., Y.-C. Wang, C.-J. Shiu, I-C. Tsai, Chia-Ying Tu, Yung-Yao Lan, J.-P. Chen, H.-L. Pan, and H.-H. Hsu (2020). Taiwan Earth System Model version 1: Description and evaluation of mean state. *Geoscientific Model Development*, 13, 3887-3904, https://doi.org/10.5194/gmd-13-3887-2020.

Li, J.-L. F., **W.-L. Lee**, K.-M. Xu, J. H. Jiang, E. Fetzer, C.-A. Chen, Y.-H. Wang, J.-Y. Yu, P.-C. Hsu, and H.-H. Hsu (2020). The role of falling ice radiative effects on climate projections over Arctic under global warming. *Terrestrial, Atmospheric, and Oceanic Sciences*, 31, 1-16, https://doi.org/10.3319/TAO.2020.04.29.01.

Li, J.-L. F., K.-M. Xu, J. H. Jiang, **W.-L. Lee**, L.-C. Wang, J.-Y. Yu, G. Stephens, E. Fetzer, and Y.-H. Wang (2020). An overview of CMIP5 and CMIP6 simulated cloud ice, radiation fields, surface wind stress, sea surface temperatures, and precipitation over tropical and subtropical oceans. *Journal of Geophysical Research Atmospheres*,

125, https://doi.org/10.1029/2020JD032848.

Chou, M.-D., J. C.-C. Yu, **W.-L. Lee***, C.-J. Shiu, K.-T. Lee, I.-S. Zo, J.-B. Jee, and B.-Y. Kim (2020). A new *k*-distribution scheme for clear-sky radiative transfer calculations in the Earth atmosphere. Part I: Thermal infrared (longwave) radiation. *Journal of the Atmospheric Sciences*, 77, 2237-2256, https://doi.org/10.1175/JAS-D-19-0088.1.

Chen, Y.-C., J.-L. F. Li, **W.-L. Lee**, D. J. Diner, M. J. Garay, J. H. Jiang, Y.-H. Wang, J.-Y. Yu, and O. V. Kalashnikova (2020). Evaluation of sea salt aerosols in climate systems: global climate modeling and observation-based analyses. *Environmental Research Letters*, 15(3), 034047, https://doi.org/10.1088/1748-9326/ab751c.

Lee, W.-L., J.-L. F. Li, K.-M. Xu, E. Suhas, J. H. Jiang, Y.-H. Wang, G. Stephens, E. Fetzer, and J.-Y. Yu (2019). Relating precipitating ice radiative effects to surface energy balance and temperature biases over the Tibetan Plateau in winter. *Journal of Geophysical Research Atmospheres*, *124*, https://doi.org/10.1029/2018JD030204.

Fan, X., Y. Gu, K. N. Liou, **W.-L. Lee**, B. Zhao, H. Chen, and D. Lu (2019). Modeling study of the impact of the complex terrain on surface energy and hydrology over the Tibetan Plateau. *Climate Dynamics*, 53, 6919-6932, https://doi.org/10.1007/s00382-019-04966-z.

Wang, C.-c., **W.-L. Lee**, and C. Chou (2019). Climate effects of anthropogenic aerosol forcing on tropical precipitation and circulations. *Journal of Climate*, 32, https://doi.org/10.1175/JCLI-D-18-0641.1.

Li, J.-L. F., M. Richardson, **W.-L. Lee**, Y. Hong, J. Jiang, E. Fetzer, G. Stephens, Y.-H. Wang, J.-Y. Yu, and Y. Liu (2019). Potential faster Arctic sea ice retreat triggered by snowflakes' greenhouse effect. *The Cryosphere*, 13, 969-980. https://doi.org/10.5194/tc-13-969-2019.

Lee, W.-L., K. N. Liou, C.-c. Wang, Y. Gu, H.-H. Hsu, and J.-L. F. Li (2019). Impact of 3-D radiation-topography interactions on surface temperature and energy budget over the Tibetan Plateau in winter. *Journal of Geophysical Research Atmospheres*, *124*, https://doi.org/10.1029/2018JD029592.

Chen, C.-A., J.-L. F. Li, M. Richardson, **W.-L. Lee**, E. Fetzer, G. Stephens, H.-H. Hsu, Y.-C. Wang, and J.-Y. Yu (2018). Falling snow radiative effects enhance the global warming response of the topical Pacific atmosphere. *Journal of Geophysical Research Atmospheres*, *123*, https://doi.org/10.1029/2018JD028655.

Li, J.-L. F., E. Suhas, **W.-L. Lee**, M. Richardson, Y.-H. Wang, J.-Y. Yu, T. Lee, E. Fetzer, and G. Stephens (2018). The impacts of bias in cloud-radiation-dynamics interactions on Central-Pacific El Nino simulations in contemporary GCMs. *Earth*

and Space Science, *5*, 50-60, https://doi.org/ 10.1002/2017EA000304.

Li, J.-L. F., M. Richardson, Y. Hong, **W.-L. Lee**, Y.-H. Wang, J.-Y. Yu, E. Fetzer, G. Stephens, and Y. Liu (2017). Improved simulation of Antarctic sea ice due to the radiative effects of falling snow. *Environmental Research Letters*, *12*, 084010, https://doi.org/ 10.1088/1748-9326/aa7a17.

Zhao, B., K. N. Liou, Y. Gu, Q. Li, J. H. Jiang, H. Su, C. He, H.-L. R. Tseng, S. Wang, R. Liu, L. Qi, **W.-L. Lee**, and J. Hao (2017). Enhanced PM2.5 pollution in China due to aerosol-cloud interactions. *Scientific Reports*, *7*, https://doi.org/ 10.1038/s41598-017-04096-8.

Lee, W.-L., K. N. Liou, C. He, H.-C. Liang, Q. Li, T.-C. Wang, Z. Liu, and Q. Yue (2017). Impact of absorbing aerosol deposition on snow albedo reduction over the southern Tibetan Plateau based on satellite observation. *Theoretical and Applied Climatology*, *129*, 1373-1382, https://doi.org/10.1007/s00704-016-1860-4.

Tsai, I.-C., W.-C. Wang, H.-H. Hsu, and **W.-L. Lee** (2016). Aerosol effects on summer monsoon over Asia during 1980s and 1990s. *Journal of Geophysical Research Atmospheres*, *121*, https://doi.org/ 10.1002/2016JD025388.

Li, J.-L. F., **W.-L. Lee**, Y.-H. Wang, M. Richardson, J.-Y. Yu, E. Suhas, E. Fetzer, M.-H. Lo, and Q. Yue (2016). Assessing the radiative impacts of precipitating clouds on winter surface air temperatures and land surface properties in GCMs using observations. *Journal of Geophysical Research Atmospheres*, *121*, https://doi.org/ 10.1002/2016JD025175.

Zhao, B., K. N. Liou, Y. Gu, C. He, **W.-L. Lee**, X. Chang, Q. Li, S. Wang, H. R. Tseng, L. R. Leung, and J. Hao (2016). Impact of buildings on surface solar radiation over urban Beijing. *Atmospheric Chemistry and Physics*, *16*, 5841-5852, https://doi.org/10.5194/acp-16-5841-2016.

Li, J.-L. F., Y.-H. Wang, T. Lee, D. Waliser, **W.-L. Lee**, J.-Y. Yu, Y.-C. Chen, and E. Fetzer (2016). The impacts of precipitating cloud radiative effects on ocean surface evaporation, precipitation, and ocean salinity in coupled GCM simulations. *Journal of Geophysical Research Atmospheres*, *121*, https://doi.org/ 10.1002/2016JD024911.

Li, J.-L. F., **W.-L. Lee**, J.-Y. Yu, G. Hulley, E. Fetzer, Y.-C. Chen, and Y.-H. Wang (2016). The impacts of precipitating hydrometeors radiative effects on land surface temperature in contemporary GCMs using satellite observations. *Journal of Geophysical Research Atmospheres*, *121*, https://doi.org/10.1002/2015JD023776.

Li, J.-L. F., **W.-L. Lee**, D. Waliser, Y.-H. Wang, J.-Y. Yu, X. Jiang, T. L'Ecuyer, Y.-C. Chen, T. Kubar, E. Fetzer, and M. Mahakur (2016). Considering the radiative effects of snow on tropical Pacific Ocean radiative heating profiles in contemporary GCMs

using A-Train observations. *Journal of Geophysical Research Atmospheres*, *121*, https://doi.org/ 10.1002/2015JD023587.

Lee, W.-L., Y. Gu, K. N. Liou, L. R. Leung, and H.-H. Hsu (2015). A global model simulation for 3-D radiative transfer impact on surface hydrology over Sierra Nevada and Rocky Mountains. *Atmospheric Chemistry and Physics*, *15*, 5405-5413, https://doi.org/10.5194/acp-15-5405-2015.

Wang, C.-c., **W.-L. Lee**, Y.-L. Chen, and H.-H. Hsu (2015). Processes leading to double intertropical convergence zone bias in CESM1/CAM5. *Journal of Climate*, *28*, 2900-2915, https://doi.org/10.1175/JCLI-D-14-00622.1.

Li, J.-L. F., **W.-L. Lee**, T. Lee, E. Fetzer, J.-Y. Yu, T. L. Kubar, and C. Boening (2015). The impacts of cloud snow radiative effects on Pacific Ocean surface heat fluxes, surface wind stress, and ocean temperatures in coupled GCM simulations. *Journal of Geophysical Research Atmospheres*, *120*, https://doi.org/10.1002/2014JD022538.

Liou, K. N., Y, Takano, C. He, P. Yang, L. R. Leung, Y. Gu, and **W.-L. Lee** (2014). Stochastic parameterization for light absorption by internally mixed BC/dust in snow grains for application to climate models, *Journal of Geophysical Research Atmospheres*, *119*, 7616-7632, https://doi.org/10.1002/2014JD021665.

Li, J.-L. F., **W.-L. Lee**, D. E. Waliser, J. P. Stachnik, E. Fetzer, S. Wong, and Q. Yue (2014). Characterizing tropical Pacific water vapor and radiative biases in CMIP5 GCMs: Observation-based analyses and a snow and radiation interaction sensitivity experiment, *Journal of Geophysical Research Atmospheres*, *119*, https://doi.org/10.1002/2014JD021924.

Li, J.-L. F., **W.-L. Lee**, D. E. Waliser, J. D. Neelin, J. P. Stachnik, and T. Lee (2014). Cloud-precipitation-radiation-dynamics interaction in global climate models: A snow and radiation interaction sensitivity experiment, *Journal of Geophysical Research Atmospheres*, *119*, https://doi.org/10.1002/2013JD021038.

Liou, K. N., Y. Gu, L. R. Leung, **W.-L. Lee**, and R. G. Fovell (2013). A WRF simulation of the impact of 3-D radiative transfer on surface hydrology over the Rocky-Sierra Mountains. *Atmospheric Chemistry and Physics 13*, 11709-11721, https://doi.org/10.5194/acp-13-11709-2013.

Lee, W.-L., K. N. Liou, and C.-c. Wang (2013). Impact of 3-D topography on surface radiation budget over the Tibetan Plateau. *Theoretical and Applied Climatology*, *113*, 95-103, https://doi.org/10.1007/s00704-012-0767-y.

Gu, Y., K. N. Liou, **W.-L. Lee**, and L. R. Leung (2012). Simulating 3-D radiative transfer effects over the Sierra Nevada Mountains using WRF. *Atmospheric Chemistry and Physics*, *12*, 9965-9976, https://doi.org/10.5194/acp-12-9965-9976.

Lee, W.-L., and K. N. Liou (2012). Effect of absorbing aerosols on snow albedo reduction in the Sierra Nevada. *Atmospheric Environment*, *55*, 425–430.

Lee, W.-L., K. N. Liou, and A. Hall (2011). Parameterization of solar fluxes over mountain surfaces for application to climate models. *Journal of Geophysical Research*, *116*, D01101, https://doi.org/10.1029/2010JD014722.

Wang, C.-c., C. Chou, and **W.-L. Lee** (2010). Breakdown and reformation of the Intertropical Convergence Zone in a moist atmosphere. *Journal of the Atmospheric Sciences*, *67*, 1247–1260.

Liou, K. N., **W.-L. Lee***, and A. Hall (2007). Radiative transfer in mountains: Application to the Tibetan Plateau. *Geophysical Research Letters*, *34*, L23809, https://doi.org/10.1029/2007GL031762.

Lee, W.-L., and K. N. Liou (2007). A coupled atmosphere–ocean radiative transfer system using the analytic four-stream approximation. *Journal of the Atmospheric Sciences*, *64*, 3681–3694, https://doi.org/10.1175/JAS4044.1.

Book Chapter

Chou, C., W.-T. Chen, M.-H. Lo, **W.-L. Lee**, S.-Y. Lee, C.-A. Chen, H. H. Hsu, C.-W. Lan, H.-C. Hwang, C.-Y. Wang, C.-Y. Liu, and S.-H. Su (2017). Chapter 1: Global climate changes. In "*Scientific Report for Climate Changes in Taiwan*". (in Chinese)

Liou, K. N., Y. Gu, **W.-L. Lee**, Y. Chen, and P. Yang (2008). Some unsolved problems in atmospheric radiative transfer: Implication on climate research in the Asia-Pacific Region. In "*Recent Progress in Atmospheric Sciences: Applications to the Asia-Pacific region*", World Scientific Publishing Co., Singapore, Chapter 15, 307-325.

Dissertation and Thesis

Lee, W.-L. (2008). Radiative transfer in atmosphere–ocean and atmosphere–mountain systems: application and parameterization. Ph.D. dissertation, University of California, Los Angeles. Los Angeles, California, U.S.A.110 pp.

Lee, W.-L. (1999). Dynamical properties of tripolar vortices. Master's Thesis, National Taiwan University, Taipei, Taiwan. 95pp. (in Chinese).