

# YI-YING CHEN 陳奕穎

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## A. Full CV

### Education

- **National Central University**, Graduate Institute of Hydrological and Oceanic Sciences, Taiwan

**Ph.D. in Hydrology** (Summer 2006-Summer 2012). Advisor: Ming-Hsu Li

### Appointments

- **Assistant Research Fellow**, RCEC, Academia Sinica (Aug. 2016 – present)
- **Adjunct Assistant Professor**, TIGP-ESS, National Taiwan University (Aug. 2021 – present)
- **Adjunct Assistant Professor**, TIGP/IHOS, National Central University (Aug. 2021 – present)
- **Adjunct Assistant Professor**, Department of Land Economics, NCCU, Taiwan (Feb. 2022 – Jul 2022; Feb. 2023 – Jul. 2023)
- **Post-Doctoral Researcher**, NCU, Chung-Li, Taiwan (Apr–Jul 2016)
- **Post-Doctoral Researcher**, NUS, Singapore (Aug 2015– Mar 2016)
- **Post-Doctoral Researcher**, LSCE/IPSL, Paris, France (Jan 2014– Jul 2015)
- **Post-Doctoral Researcher**, NCU, Chung-Li, Taiwan (Aug 2012– Dec 2013)

### Honors & Awards

- Best Reviewer Award, TAO, 2019-2021
- Invited Speaker, Conference for the 10<sup>th</sup> anniversary of NCAM, Seoul, South Korea, 2020
- TWAS Young Affiliates Nominations, 2020
- Annual Research Highlight, RCEC, AS, 2019
- Outstanding Review, Journal of Hydrology, 2018
- The Phi Tau Phi Scholastic Honor, R.O.C., 2012
- Dean List, College of Earth Science, National Central University, 2012

### Publications (▲: google citations, \*: corresponding, # representative paper: #5, #11, #18, #19, #20)

#### Manuscripts

1. **Yi-Ying Chen**, Zeng, Z.-L., Huang, W., and S.-Y. Lin\*, “Down-scaling the Global Land Cover and Land Use Data-set (LUH2) for Taiwan: Challenges and Opportunities” (to be submitted).
2. Yang, S.-W., Tsai, I-C.\*, Shiu, C.-J., **Chen, Yi-Ying**, Lee, W.-L., and H.-H. Hsu, “Impacts of Aerosols on the East Asia Winter Monsoon in TaiESM model” (to be re-submitted).

### Peer-reviewed papers

3. Wu, C.-H.\* , Lee, S.-Y., Tsai, I.-C., Shiu, C.-J., and **Yi-Ying Chen**, 2023: “Volcanic Contribution to the 1990s North Pacific Climate shift in Winter”, *Scientific Reports*, (under revisions) ▲:0
4. Wu, C.-H.\* , Shiu, C.-J., **Chen, Yi-Ying**, Tsai, I.-C., and S.-Y. Lee, 2023: “Climatological Changes in East Asian Winter Monsoon Circulation in a Warmer Future”, *Atmospheric Research*. ▲:0
5. #**Chen, Yi-Ying\*** and Sebastiaan Luyssaert, 2023, “Tropical cyclones facilitate recovery of forest leaf area from dry spells in East Asia”, *Biogeosciences (BG Letters)*, **Highlight Paper**, ▲:0 [link](#)
6. Gardiner, B.\* , **Chen, Yi-Ying**, Ruel, J.-C., and K. Kamimura, 2022, “Editorial: Living with Tropical Storms in a Changing Climate”, *Frontiers in Forests and Global Change*, ▲:0
7. Liu, H.-H., Chang\*, Ronald Y., **Chen, Yi-Ying**, Fu, I.-K., and H. Vincent Poor. 2022, “Sensor Deployment and Link Analysis in Satellite IoT Systems for Wildfire Detection”, *IEEE GLOBECOM 2022*, ▲:0
8. Yang, T.-Y., Huang, C.-Y., Juang, J.-Y., **Chen, Yi-Ying**, Cheng, C.-T. and Min-Hui Lo\*, 2022, “Responses of Surface Evaporative Fluxes in Montane Cloud Forests to the Climate Change Scenario”, *Journal of Hydrometeorology*, ▲:0
9. Jhang, S.-R., **Chen, Yi-Ying**, Shiau, Yo-Jin, Lee, Chia-Wei, Chen, Wei-Nai, Chang, C.-C., Chiang, C.-F., Guo, Horng-Yuh, Wang, P-K, and Charles Chou\*, 2022, “Composition of Denitrifiers and High Nitrous Oxide Emissions from a Typical Subtropical Vegetable Cropland”, *ACS Earth and Space Chemistry*, **Cover Story**, ▲:0
10. Chuang, M.-T.\* , Chou, Charles C.-K., Lin, C.-Y., Lee, J.-H., Lin, W.-C., **Chen, Yi-Ying**, Chang, C.-C., Lee, C.-T., Kong, Steven S-K, and Lin, Tang-Huang, 2022, “A numerical study of reducing O3 and PM2.5 simultaneously in Taiwan”, *Journal of Environmental Management*, ▲:1
11. #**Chen, Yi-Ying\***, Huang, W., Cheng, C-T, Hong, J-S, Yeh, F-L, and Luyssaert, S., 2022, “Simulation of the Impact of Environmental Disturbances on Forest Biomass in Taiwan”, *JGR Biogeosciences*, ▲:0 [link](#)
12. Liu, H.-H., Chang\*, Ronald Y., **Chen, Yi-Ying**, and Fu, I.-K., 2021, “Sensor Deployment and Link Analysis in Satellite IoT Systems for Wildfire Detection”, *IEEE GLOBECOM 2021*, ▲:2
13. Gu, R.-Y., Lo, Min-Hui\*, Liao, Chi-Ya, Jang, Yi-Shin, Juang, Jehn-Yih, Huang, Cho-Ying, Chang, Shih-Chieh, Hsieh, Cheng-I, **Chen, Yi-Ying**, Chu, Housen, Chang, Kuang-Yu, 2021, “Early peak of latent heat fluxes regulates diurnal temperature range in montane cloud forests“. *Journal of Hydrometeorology*, ▲:4
14. Wu, C.\* , Yeh, PJF **Chen, Yi-Ying**, Lv, W, Hu, BX, and Huang, G, 2021, “Copula-based risk evaluation of global meteorological drought in the 21st century based on CMIP5 multi-model ensemble projections”. *Journal of Hydrology*, 126256, ▲:11
15. Wu, C.\* , Yeh, Pat J-F, Ju, Jiali, **Chen, Yi-Ying**, Xu, Kai, Dai, Heng, Niu Jie, Hu, Bill, Huang, Guoru, 2021, “Assessing the Spatiotemporal Uncertainties in Future Meteorological Droughts from CMIP5 Models, Emission Scenarios, and Bias Corrections”, *Journal of Climate*, 1903-1922. ▲:11
16. Wu, C.\* , Yeh, Pat J.-F., **Chen, Yi-Ying**, Hu Bill X., Huang, G., 2020, “Future precipitation-driven meteorological drought changes in the CMIP5 multi-model ensembles under 1.5 °C and 2 °C global warming”, *Journal of Hydrometeorology*, 2177-2196. ▲:17
17. Forzieri, G.\* , Pecchi, M., Girardello, M., Mauri, A., Klaus, M., Nikolov, C., Rüetschi C., Gardiner, B., Tomaščík, J., Small, D., Nistor, C., Jonikavicius, D., Spinoni, J., Feyen, L., Giannetti, F., Comino, F., Wolynski, A., Pirotti, F., Maistrelli, F., Ionut, S., Wurpillot-Lucas, S., Stefan, K., Zieba-Kulawik, K., Strejczek-Jazwinska, P., Mokroš, M., Franz, S., Krejci, L., Haidu, I., Nilsson, M., Wezyk, P., Catani, F., **Chen, Yi-Ying**, Luyssaert, S., Chirici, G., Cescatti, A., S.A.Beck, P, 2020, “A spatially-explicit database of wind disturbances in European forests over the period 2000-2018”, *Earth System Science Data*, 12, 257–276. ▲: 47

18. #Chen, Yi-Ying\*, Huang, W., Wang, W.-H., Juang, J.-Y., Hong, J.-S., Kato, T., Luysaert, S., 2019, "Reconstructing Taiwan's land cover changes between 1904 and 2015 from historical maps and SPOT images", *Scientific Reports*, 3643. ▲:36 [link](#)
19. #Chen, Yi-Ying\*, Gardiner, B., Pasztor, F., Blennow, K., Ryder, J., Valade, A., Naudts, K., Otto, J., McGrath, J. M., Planque, C., Luysaert, S., 2018, "Simulating damage for wind storms in the land surface model ORCHIDEE-CAN (revision 4262)", *Geoscientific Model Development*, 11, 771-791. ▲:15 [link](#)
20. #Luysaert, S.\*, Marie, G., Valade, A., Chen, Yi-Ying, Djomo, S.N., Ryder, J., Otto, J., Naudts, A., Lansø, A.S., Ghattas, J., McGrath, J. M. 2018, "Trade-offs in using European forests to meet climate objectives", *Nature*, 562, 259-262. ▲:155 [link](#)
21. Chen, Yi-Ying\*, Ryder, J., Bastrikov, V., McGrath, M. J., Naudts, K., Otto, J., Ottlé, C., Peylin, P., Polcher, J., Valade, A., Black, A., Elbers, J. A., Moors, E., Foken, T., van Gorsel, E., Haverd, V., Heinesch, B., Tiedemann, F., Knohl, A., Launiainen, S., Loustau, D., Ogée, J., Vesala, T., Luysaert, S., 2016, "Evaluating the performance of the land surface model ORCHIDEE-CAN v1.0 on water and energy fluxes estimation with a single- and multi-layer energy budget scheme", *Geoscientific Model Development*, 9, 2951-2972. ▲:22
22. McGrath, J. M.\*, Ryder, J., Pinty, B., Otto, J., Naudts, K., Valade, A., Chen, Yi-Ying, Weedon, J., Luysaert, S., 2016, "A multi-level canopy radiative transfer scheme for ORCHIDEE (SVN r2566), based on a domain-averaged structure factor", *Geoscientific Model Development Discussions*, 249-2016. ▲:9
23. Naudts, K.\*, Chen, Yi-Ying, McGrath, M., Ryder, J., Aude, V., Juliane, O., Luysaert, S., 2016, "Europe's forest management did not mitigate climate warming", *Science*, 351(6273), 597-600. ▲:358
24. Ryder, J.\*, Polcher, J., Peylin, P., Ottlé, C., Chen, Yi-Ying, van Gorsel, E., Haverd, V., McGrath, M. J., Naudts, K., Otto, J., Valade, A., Luysaert, S., 2016, "A multi-layer land surface energy budget model for implicit coupling with global atmospheric simulations", *Geoscientific Model Development*, 9, 223-245. ▲:43
25. Chen, Yi-Ying\* and Ming-Hsu Li, 2016, "Quantifying rainfall interception loss of a subtropical broadleaved forest in central Taiwan", *Water*, 8(1), 14, 1-19 (IF: 2.7) ▲:21
26. Naudts, K.\*, Ryder, J., J. McGrath, M., Otto, J., Chen, Yi-Ying, Valade, A., Bellasen, V., Berhongaray, G., Bönisch, G., Campioli, M., Ghattas, J., De Groote, T., Haverd, V., Kattge, J., MacBean, N., Maignan, F., Merilä, P., Penuelas, J., Peylin, P., Pinty, B., Pretzsch, H., Schulze, E. D., Solyga, D., Vuichard, N., Yan, Y., Luysaert, S., 2015, "A vertically discretized canopy description for ORCHIDEE (SVN r2290) and the modifications to the energy, water and carbon fluxes", *Geoscientific Model Development*, 8, 2035-2065. ▲:76
27. McGrath, J. M.\*, Luysaert, S., Meyfroidt, P., Kaplan, J. O., Buergi, M., Chen, Yi-Ying, Erb, K., Gimmi, U., McInerney, D., Naudts, K., Otto, J., Pasztor, F., Ryder, J., Schelhaas, M.-J., Valade, A., 2015, "Reconstructing European forest management from 1600 to 2010", *Biogeosciences*, 12, 4291-4316. ▲:175
28. Chen, Yi-Ying and M.-H. Li\*, 2012, "Determining adequate averaging periods and reference coordinates for eddy covariance measurements of surface heat and water vapor fluxes over mountainous terrain", *Terrestrial Atmospheric and Oceanic Sciences*, 23(6), 685-701. ▲:8
29. Chen, Yi-Ying, Chu, C.-R., Li, M.-H.\*, 2012, "A gap-filling model for eddy covariance latent heat flux: Estimating evapotranspiration of a subtropical seasonal evergreen broad-leaved forest as an example", *Journal of Hydrology*, 468-269, 101-110. ▲:25
30. Chu, C.-R.\*, Li, M.-H., Chang, Y.-F., Liu, T.-C., Chen, Yi-Ying, 2012, "Wind-induced splash in class A evaporation pan", *Journal of Geophysical Research*, 117(D11), 2156-2202. ▲:11
31. Chu, C.-R.\*, Li, M.-H., Chen, Yi-Ying, Kuo, Y.-H., 2010, "A wind tunnel experiment on the evaporation rate of Class A pan", *Journal of Hydrology*, 381(3-4), 221-224. ▲:38

### **Book Chapter/Dissertation/Thesis/Others:**

32. Matthew, J. M.\*, Lansø, A.S., Marie, G., **Chen, Yi-Ying**, Kalliofski, T., Luysaert, S., Naudts, K., Peylin, P., Valade, A., 2019, “Advances in understanding forestry ecosystem services: role in carbon capture (CH<sub>6</sub>)”, editor(s): John Stanturf, *Achieving sustainable management of boreal and temperate forests*. ▲:1
33. **Chen, Yi-Ying\***, *Investigating the Seasonal Variability of Surface Heat and Water Vapor Fluxes with Eddy Covariance Techniques: A Subtropical Evergreen Forest as an example*, 2012, Dissertation (Doctoral), Advisor: Prof. Min-Hsu Li. ▲:2
34. **Chen, Yi-Ying\***, *The Research of Developing the Retrieval Algorithm of Sensible and Latent Heat Fluxes from Remote Sensing Dataset*, 2004, Thesis (Master), Advisor: Prof. Yuei-An Liou. ▲:18
35. 陳奕穎，看不見的漩渦：地表與大氣之間的使者，中研院訊 1750, 16. ▲:0

### **Other Activities**

- **Guest Editor**, Special Topic: *Living with Tropical Storms in a Changing Climate, Frontiers in Forests, and Global Change*
- **Reviewer**, *Frontiers in Water, Water and Climate, Frontiers in Forests and Global Change, Forest disturbance, Geoscientific Model Development · Biogeoscience · Journal of Geophysical Research-Atmos · Water · Forests · Terrestrial, Atmospheric and Oceanic Sciences · Nature Communication · Journal of Hydrology · Theoretical and Applied Climatology · Forest Ecology and Management*
- **Ph.D. Thesis Committee**, International degree Program in Climate Change and Sustainable Development (IPCS), NTU
- **Ph.D. Thesis Committee**, TIGP, NCU-AS-NTU

## **B. Major Achievements and Contributions (2018-present)**

During the period starting from year 2018 to the present, I have been involved in several research projects including NSTC thematic research projects and AS sustainable research projects. These research projects are listed in **Table 1**. Several interesting findings and achievements are summarized below:

- ✓ **Land surface model development:** This pioneering study included wind disturbance in an Earth system model to study the interactions between humans, ecosystem productivity, and climate. The implementation of this new module allowed the abrupt increases in wind-induced tree mortality due to strong wind. The new model can capture the dynamics of changes in forest structures due to wind disturbance.
- ✓ **Taiwan land cover reconstruction:** A new land cover reconstruction method and dataset were provided. This new land cover reconstruction is expected to contribute to future revisions of global land cover reconstructions as well as to the study of (gross) land cover changes, changes in the carbon budget, regional climate, urban heat islands, and air and water pollution at the national and sub-national level.

- ✓ **Taiwan's forests response to environmental disturbances:** We found that typhoon disturbances have large impact on Taiwan forests, contributing to an average loss of about 0.8 m<sup>3</sup>/ha/yr. The spatial distribution of damage was explicitly simulated.
- ✓ **Typhoon activities and forests:** We found that typhoons bring destructions as well as the environmental conditions for new plant growth in East Asia. The environmental recovery can be fast or slow depending on the prior conditions and intensity of the disturbance.
- ✓ **Climatic responses to European forest management:** We improved on a complex Earth system model to calculate the amount of carbon, energy, and water that is trapped or released by managing a forest. Forest management with a focus on minimizing CO<sub>2</sub> has the potential to remove seven gigatons of carbon from the atmosphere by the year 2100. Alternatively, climate-based management could be practiced by focusing on converting evergreen forests to deciduous forests. This would result in a cooling of about 0.3° C in the spring in Scandinavia and the Alps.

### **Table 1: List of research projects (from 2018 to present)**

*Aug 2021 – Jul 2024 PI Coupling a new generation land surface model to a High-Resolution Atmospheric Model (CAN-HiRAM) (ongoing, NSTC)*

*Jan 2023 – Dec 2025 Co-PI Fighting climate change with bamboo (FB2C): feasibility assessment for Taiwan. Subproject #1: Assessing the Carbon Sink and Stock of Bamboo Ecosystem under Historical Climate Conditions (ongoing, AS)*

*Aug 2022 – Jul 2025 Co-PI/Impacts of global land use and climate changes on local ecology system service-based Water-Food-Energy nexus (ongoing, NSTC)*

*Aug 2022 – Jul 2023 Co-PI/Development of Taiwan Earth System Model Version 2 (ongoing, NSTC)*

Aug 2021-Jul 2022 PI/Integrating Taiwan and global land-use/cover changes information for the future/sustainable development (finished, NSTC)

Jan 2019 – Dec 2021 Co-PI/Emissions of reactive nitrogen species due to fertilization and its impacts to air quality, Subproject #1: Flux of reactive N-species from N-fertilized soil to the atmosphere (finished, AS)

Aug 2019 – Jul 2020 Co-PI/Studying effects of evapotranspiration and precipitation on hydrological cycles of forest and grassland. (finished, NSTC)

Aug 2018–Jul 2019 Co-PI/On the complementary theory to estimate actual evapotranspiration over grass and forest with different temporal scales. (finished, NSTC)

## **C. Future Plan**

As one of the group members of the AC3 (Anthropogenic Climate Change Center) at RCEC, developing an advanced land surface model for better representation of environmental disturbances such as land-use changes, land management, fires, droughts, floods, insect outbreaks, and wind damage, is an important direction of my future research. I also joined in ERSRG (Environmental Resilience &

Sustainability Research Group) to work on model application studies. In the next phase of my career, I proposed two research projects to support aforementioned researches. One is the NSTC thematic research which aims to couple a new generation of land surface models with a high-resolution atmospheric model, which can provide a useful tool for studying the atmospheric feedback due to typhoon disturbances and assessing their impact on regional climate. Another research project is focused on assessing the capacity of regional carbon stock with a special focus on the bamboo forests where the change of water supply and management strategies are critical environmental drivers for evaluating its carbon stock. Two research projects are summarized below:

✓ **Incorporating environmental disturbances into a land surface model**

Tipping points are those points at which an ecosystem can no longer cope with environmental changes. Most terrestrial tipping points are the result of complex mechanisms and interactions that cannot be accounted for in the current models. The key issue is to incorporate two-way interactions between the disturbing agent and vegetation growth into a model. Currently, the state-of-the-art land surface model ORCHIDEE has already incorporated natural disturbance agents such as fires, droughts, floods, wind damage, and insect outbreaks, to overcome the difficulty of representing the interaction between these extreme events and vegetation. Along with this research direction (having a model to explicitly express environmental disturbances), I plan to collaborate with a senior research specialist, Dr. Chia-Ying Tu to carry out my next NSTC thematic research project ([ref. Table1](#)), which couples a new generation land surface model to a high-resolution atmospheric, which allows us to study the atmospheric feedback of typhoon disturbances on the regional climate and carbon cycle. The modeling results can not only provide first-order quantification of the wind damage but also reflect changes in the physical properties such as albedo, roughness, and wood loss directly after extreme weather events such as typhoons or storms. These results are essential for making informed decisions for mitigation and adaptation commitments.

✓ **Evaluating the regional carbon and water budget for the future**

This research direction aims to provide information on the net carbon sequestration rate of Taiwanese forests, which is an important reference to support our national climate actions/commitments. I proposed using a modeling approach to determine the potential carbon sequestration rate of bamboo forests in Taiwan. Experience in using numerical models to understand the dynamics of Taiwan's forest carbon stock from 1980 to 2015 allows my research team to provide a long-term average carbon sequestration rate for the forest ecosystem in Taiwan, and this advanced information can help the government to establish a legal avenue for a gradual reduction in emissions to net-zero emissions by 2050.

To achieve this goal, it might be necessary to have further collaborative efforts within the framework of RCEC to gather scientists from various fields such as the social, geophysical, geochemical, and atmospheric sciences to meet the net-zero climate objective. Within the FB2C ([ref. Table1](#)) project, my research team will apply the land surface model to quantify the potential carbon

sink and stock of the bamboo ecosystem in Taiwan, which allows other scientists/research teams to evaluate the ecosystem service of bamboo forests.