

# Guo-Yuan Lien (連國淵)

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## Professional Experience

**2018–present Associate Researcher**

Research and Development Center, Central Weather Bureau, Taipei, Taiwan

**2019–present Adjunct Assistant Professor**

Department of Atmospheric Sciences, National Taiwan University, Taipei, Taiwan

**2014–2018 Postdoctoral Researcher**

Data Assimilation Research Team, RIKEN Center for Computational Science, Kobe, Japan

**2011–2014 Graduate Research Assistant**

Department of Atmospheric and Oceanic Science, University of Maryland, College Park, Maryland, USA

**2010–2011 Research Assistant**

Department of Atmospheric Sciences, National Taiwan University, Taipei, Taiwan

**2007–2009 Graduate Research Assistant, Teaching Assistant**

Department of Atmospheric Sciences, National Taiwan University, Taipei, Taiwan

## Education

**2014 Ph.D. Atmospheric and Oceanic Science**

University of Maryland, College Park, Maryland, USA

Advisors: Eugenia Kalnay and Takemasa Miyoshi

Thesis: “Ensemble Assimilation of Global Large-scale Precipitation”

**2009 M.S. Atmospheric Sciences**

National Taiwan University, Taipei, Taiwan

Advisor: Chun-Chieh Wu

Thesis: “Assimilation of Tropical Cyclone Track and Structure Based on the Ensemble Kalman Filter”

**2007 B.S. Physics, minor in Atmospheric Sciences**

National Taiwan University, Taipei, Taiwan

## **Research Interests**

- 1) Data assimilation
- 2) Numerical weather prediction
- 3) Tropical cyclones

## **Publications (Peer-reviewed Journal Articles)**

- [19]. Ruiz, J., **G.-Y. Lien**, K. Kondo, S. Otsuka, and T. Miyoshi, 2021: Reduced non-Gaussianity by 30-second rapid update in convective-scale numerical weather prediction. *Nonlin. Processes Geophys.* (Accepted)
- [18]. **Lien, G.-Y.**, C.-H. Lin, Z.-M. Huang, W.-H. Teng, J.-H. Chen, C.-C. Lin, H.-H. Ho, J.-Y. Huang, J.-S. Hong, C.-P. Cheng, and C.-Y. Huang, 2021: Assimilation impact of early FORMOSAT-7/COSMIC-2 GNSS radio occultation data with Taiwan's CWB Global Forecast System. *Mon. Wea. Rev.*, **149**, 2171–2191. doi: [10.1175/MWR-D-20-0267.1](https://doi.org/10.1175/MWR-D-20-0267.1)
- [17]. Lin, Y.-F., C.-C. Wu, T.-H. Yen, Y.-H. Huang, and **G.-Y. Lien**, 2020: Typhoon Fanapi (2010) and its interaction with Taiwan terrain - Evaluation of the uncertainty in track, intensity and rainfall simulations. *J. Meteor. Soc. Japan*, **98**, 93–113. doi: [10.2151/jmsj.2020-006](https://doi.org/10.2151/jmsj.2020-006)
- [16]. Necker, T., S. Geiss, M. Weissmann, J. Ruiz, T. Miyoshi, and **G.-Y. Lien**, 2020: A convective-scale 1000-member ensemble simulation and potential applications. *Q. J. R. Meteorol. Soc.*, **146**, 1423–1442. doi: [10.1002/qj.3744](https://doi.org/10.1002/qj.3744)
- [15]. Chang, Y.-P., S.-C. Yang, K.-J. Lin, **G.-Y. Lien**, and C.-M. Wu, 2020: Impact of tropical cyclone initialization on its convection development and intensity: A case study of Typhoon Megi (2010). *J. Atmos. Sci.*, **77**, 443–464. doi: [10.1175/JAS-D-19-0058.1](https://doi.org/10.1175/JAS-D-19-0058.1)
- [14]. **Lien, G.-Y.**, D. Hotta, E. Kalnay, T. Miyoshi, and T.-C. Chen, 2018: Accelerating assimilation development for new observing systems using EFSO. *Nonlin. Processes Geophys.*, **25**, 129–143. doi: [10.5194/npg-25-129-2018](https://doi.org/10.5194/npg-25-129-2018)
- [13]. Honda, T., S. Kotsuki, **G.-Y. Lien**, Y. Maejima, K. Okamoto, and T. Miyoshi, 2018: Assimilation of Himawari-8 all-sky radiances every 10 minutes: Impact on precipitation and flood risk prediction. *J. Geophys. Res. Atmos.*, **123**, 965–976. doi: [10.1002/2017JD027096](https://doi.org/10.1002/2017JD027096)
- [12]. Honda, T., T. Miyoshi, **G.-Y. Lien**, S. Nishizawa, R. Yoshida, S. A. Adachi, K. Terasaki, K. Okamoto, H. Tomita, and K. Bessho, 2018: Assimilating all-sky Himawari-8 satellite infrared radiances: A case of Typhoon Soudelor (2015). *Mon. Wea. Rev.*, **146**, 213–229. doi: [10.1175/MWR-D-16-0357.1](https://doi.org/10.1175/MWR-D-16-0357.1)
- [11]. Liao, J., B. Gerofi, **G.-Y. Lien**, T. Miyoshi, S. Nishizawa, H. Tomita, W.-K. Liao, A. Choudhary, and Y. Ishikawa, 2017: A flexible I/O arbitration framework for netCDF-based big data processing workflows on high-end supercomputers. *Concurrency Computat.: Pract. Exper.*, **29**, e4161. doi: [10.1002/cpe.4161](https://doi.org/10.1002/cpe.4161)
- [10]. Kotsuki, S., T. Miyoshi, K. Terasaki, **G.-Y. Lien**, and E. Kalnay, 2017: Assimilating the Global Satellite Mapping of Precipitation data with the Nonhydrostatic Icosahedral Atmospheric Model NICAM. *J. Geophys. Res. Atmos.*, **122**, 631–650. doi: [10.1002/2016JD025355](https://doi.org/10.1002/2016JD025355)
- [9]. **Lien, G.-Y.**, T. Miyoshi, S. Nishizawa, R. Yoshida, H. Yashiro, S. A. Adachi, T. Yamaura, and H. Tomita, 2017: The near-real-time SCALE-LETKF system: A case of the September 2015 Kanto-Tohoku heavy rainfall. *SOLA*, **13**, 1–6. doi: [10.2151/sola.2017-001](https://doi.org/10.2151/sola.2017-001)

- [8]. Miyoshi, T., **G.-Y. Lien**, and Coauthors, 2016b: “Big Data Assimilation” toward post-peta-scale severe weather prediction. *P. IEEE*, **104**, 2155–2179. doi: [10.1109/JPROC.2016.2602560](https://doi.org/10.1109/JPROC.2016.2602560)
- [7]. Miyoshi, T., M. Kunii, J. Ruiz, **G.-Y. Lien**, S. Satoh, T. Ushio, K. Bessho, H. Seko, H. Tomita, and Y. Ishikawa, 2016a: “Big Data Assimilation” revolutionizing severe weather prediction. *Bull. Amer. Meteor. Soc.*, **97**, 1347–1354. doi: [10.1175/BAMS-D-15-00144.1](https://doi.org/10.1175/BAMS-D-15-00144.1)
- [6]. **Lien, G.-Y.**, T. Miyoshi, and E. Kalnay, 2016b: Assimilation of TRMM Multisatellite Precipitation Analysis with a low-resolution NCEP Global Forecast System. *Mon. Wea. Rev.*, **144**, 643–661. doi: [10.1175/MWR-D-15-0149.1](https://doi.org/10.1175/MWR-D-15-0149.1)
- [5]. **Lien, G.-Y.**, E. Kalnay, T. Miyoshi, and G. J. Huffman, 2016a: Statistical properties of global precipitation in the NCEP GFS model and TMPA observations for data assimilation. *Mon. Wea. Rev.*, **144**, 663–679. doi: [10.1175/MWR-D-15-0150.1](https://doi.org/10.1175/MWR-D-15-0150.1)
- [4]. **Lien, G.-Y.**, E. Kalnay, and T. Miyoshi, 2013: Effective Assimilation of Global Precipitation: Simulation Experiments. *Tellus A*, **65**, 19915. doi: [10.3402/tellusa.v65i0.19915](https://doi.org/10.3402/tellusa.v65i0.19915)
- [3]. Wu, C.-C., Y.-H. Huang, and **G.-Y. Lien**, 2012: Concentric eyewall formation in Typhoon Sinlaku (2008). Part I: Assimilation of T-PARC data based on the ensemble Kalman filter (EnKF). *Mon. Wea. Rev.*, **140**, 506–527. doi: [10.1175/MWR-D-11-00057.1](https://doi.org/10.1175/MWR-D-11-00057.1)
- [2]. Yen, T.-H., C.-C. Wu, and **G.-Y. Lien**, 2011: Rainfall simulations of Typhoon Morakot with controlled translation speed based on EnKF data assimilation. *Terr. Atmos. Ocean. Sci.*, **22**, 647–660. doi: [10.3319/TAO.2011.07.05.01\(TM\)](https://doi.org/10.3319/TAO.2011.07.05.01(TM))
- [1]. Wu, C.-C., **G.-Y. Lien**, J.-H. Chen, and F. Zhang, 2010: Assimilation of tropical cyclone track and structure based on the Ensemble Kalman Filter (EnKF). *J. Atmos. Sci.*, **67**, 3806–3822. doi: [10.1175/2010JAS3444.1](https://doi.org/10.1175/2010JAS3444.1)

### **Presentations (Selected)**

- [19]. **Lien, G.-Y.**, C.-H. Lin, Z.-M. Huang, W.-H. Teng, J.-H. Chen, C.-C. Lin, H.-H. Ho, J.-Y. Huang, 2020: Assimilation of FORMOSAT-7/COSMIC-2 GNSS radio occultation data with the global NWP system at Central Weather Bureau. *5th Intl. Conf. on GPS Radio Occultation*, Hsinchu, Taiwan, AB033. [Available online at <https://w3.nspo.narl.org.tw/ICGPSRO2020/download/PDF/AB033.pdf>]
- [18]. **Lien, G.-Y.**, C.-H. Lin, Z.-M. Huang, W.-H. Teng, T.-Y. Lin, J.-H. Chen, and Taiwan Analysis Center for COSMIC (TACC), 2019: Assimilation of early FORMOSAT-7/COSMIC-2 GNSS radio occultation data with the global NWP system at Central Weather Bureau (CWB). *AGU Fall Meeting 2019*, San Francisco, LA, USA, Amer. Geophys. Union, G21B-0727. [Available online at <https://agu.confex.com/agu/fm19/meetingapp.cgi/Paper/527822>]
- [17]. **Lien, G.-Y.**, S. Nishizawa, and Coauthors, 2018: The computational aspect of the SCLAE-LETKF data assimilation system for rapid-update-cycle, high-resolution radar data assimilation. *Japan Geosci. Union Meeting 2018*, Makuhari, Japan. [Available online at <https://confit.atlas.jp/guide/event/jpgu2018/subject/AAS01-P06/advanced>]
- [16]. **Lien, G.-Y.** and T. Miyoshi, 2018: Issues regarding maintaining ensemble spreads, balance, and high-resolution information in rapid-update-cycle radar data assimilation with the LETKF. *Japan Geosci. Union Meeting 2018*, Makuhari, Japan. [Available online at <https://confit.atlas.jp/guide/event/jpgu2018/subject/MGI22-05/advanced>]

- [15]. **Lien, G.-Y.**, J. Ruiz, and T. Miyoshi, 2017: 30-second-cycle LETKF assimilation of phased array weather radar data. *Seventh WMO Symp. on Data Assimilation*, Florianopolis, Brazil, World Meteor. Organization. [Available online at <http://www.cptec.inpe.br/das2017/#program>]
- [14]. **Lien, G.-Y.**, T. Miyoshi, and J. Ruiz, 2017: 30-second-cycle LETKF assimilation of phased array weather radar data. *JpGU-AGU Joint Meeting 2017*, Makuhari, Japan. [Available online at <https://confit.atlas.jp/guide/event/jpguagu2017/subject/AAS12-03/advanced>]
- [13]. **Lien, G.-Y.** and T. Miyoshi, 2017: Implicit thinning and localization of dense observation data in the LETKF: A case of phased array weather radar. *RIKEN Intl. Symp. on Data Assimilation 2017*, Kobe, Japan. [Available online at <http://www.data-assimilation.riken.jp/risda2017/program/abstracts/16-2.html>]
- [12]. **Lien G.-Y.**, T. Miyoshi, S. Nishizawa, R. Yoshida, H. Yashiro, and H. Tomita, 2016: Radar data assimilation at sub-kilometer scales. *The 7th EnKF Data Assimilation Workshop*, State College, PA, USA. [Available online at [http://www.adapt.psu.edu/2016EnKFWorkshop/ABSTRACTS/Guo-Yuan\\_Lien\\_oral.html](http://www.adapt.psu.edu/2016EnKFWorkshop/ABSTRACTS/Guo-Yuan_Lien_oral.html)]
- [11]. **Lien G.-Y.**, T. Miyoshi, S. Nishizawa, R. Yoshida, H. Yashiro, T. Honda, and H. Tomita, 2016: Issues regarding the high-performance computing associated with the rapid-update-cycle ensemble data assimilation. *Japan Geosci. Union Meeting 2016*, Makuhari, Japan. [Available online at <https://confit.atlas.jp/guide/event/jpgu2016/subject/AAS02-10/advanced>]
- [10]. **Lien, G.-Y.**, T. Miyoshi, S. Nishizawa, R. Yoshida, H. Yashiro, S. Adachi, and H. Tomita, 2015: The SCALE-LETKF system and its early applications. *RIKEN-UMD Data Assimilation Conf. 2015*, College Park, MD, USA.
- [9]. **Lien, G.-Y.**, T. Miyoshi, S. Nishizawa, H. Yashiro, R. Yoshida, and H. Tomita, 2015: Ensemble data assimilation for a large parallel numerical weather prediction model: Development of the SCALE-LETKF system. *The 5th AICS Intl. Symp.*, Kobe, Japan.
- [8]. **Lien, G.-Y.**, E. Kalnay, and T. Miyoshi, 2014: Ensemble assimilation of global large-scale precipitation. *AOGS 11th Annual Meeting*, Sapporo, Japan, Asia Oceania Geosciences Society, AS29-A024.
- [7]. **Lien, G.-Y.**, E. Kalnay, and T. Miyoshi, 2014: The statistical characteristics of the precipitation variable in a global model and satellite observations from the point of view of ensemble data assimilation. *18th Conf. on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface*, Atlanta, GA, USA, Amer. Meteor. Soc., 11.2. [Available online at <https://ams.confex.com/ams/94Annual/webprogram/Paper237457.html>]
- [6]. **Lien, G.-Y.**, E. Kalnay, and T. Miyoshi, 2013: Local ensemble transform kalman filter assimilation of precipitation with the NCEP Global Forecasting System. *Sixth WMO Symp. on Data Assimilation*, College Park, MD, USA, World Meteor. Organization, G-p24. [Available online at [http://das6.umd.edu/program/Posters/abs/Gp24-Lien\\_Guo-Yuan.pdf](http://das6.umd.edu/program/Posters/abs/Gp24-Lien_Guo-Yuan.pdf)]
- [5]. **Lien, G.-Y.**, E. Kalnay, and T. Miyoshi, 2013: Local ensemble transform Kalman filter experiments with the NCEP global numerical weather prediction model. *The 3rd AICS Intl. Symp.*, Kobe, Japan.
- [4]. **Lien, G.-Y.**, E. Kalnay, and T. Miyoshi, 2013: Effective assimilation of global precipitation: Simulation experiments. Extended Abstracts, *17th Conf. on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface*, Austin, TX, USA, Amer. Meteor. Soc., 9.2. [Available online at <https://ams.confex.com/ams/93Annual/webprogram/Paper221682.html>]

- [3]. **Lien, G.-Y.**, E. Kalnay, and T. Miyoshi, 2012: Ensemble Kalman filter assimilation of precipitation with a simplified AGCM. *The 5th EnKF Workshop*, Rensselaerville, NY, USA.
- [2]. Wu, C.-C., **G.-Y. Lien**, J.-H. Chen, and Y.-H. Huang, 2010: Concentric eyewall formation in Typhoon Sinlaku (2008)—Part I: Assimilation of T-PARC data based on the ensemble Kalman filter (EnKF). *29th Conf. on Hurricanes and Tropical Meteorology*, Tucson, AZ, USA, Amer. Meteor. Soc., 10B.2. [Available online at [http://ams.confex.com/ams/29Hurricanes/techprogram/paper\\_167963.htm](http://ams.confex.com/ams/29Hurricanes/techprogram/paper_167963.htm)]
- [1]. **Lien, G.-Y.**, C.-C. Wu, J.-H. Chen, and F. Zhang, 2010: Assimilation of tropical cyclone track and structure based on the ensemble Kalman filter (EnKF). *29th Conf. on Hurricanes and Tropical Meteorology*, Tucson, AZ, USA, Amer. Meteor. Soc., 11C.5. [Available online at [http://ams.confex.com/ams/29Hurricanes/techprogram/paper\\_167966.htm](http://ams.confex.com/ams/29Hurricanes/techprogram/paper_167966.htm)]

## **Courses Taught**

- 2020 Fall**      **Data Assimilation for Numerical Modeling**  
Department of Atmospheric Sciences, National Taiwan University, Taipei, Taiwan  
[[Course Link](#)]
- 2019 Fall**      **Data Assimilation for Numerical Modeling**  
Department of Atmospheric Sciences, National Taiwan University, Taipei, Taiwan  
[[Course Link](#)]

## **Funded Projects**

- 2021**            **Ministry of Science and Technology (MOST, Taiwan)**  
**Research Project for Junior Researchers**  
“Strategy for integrating global and regional model systems targeted for numerical weather prediction in the Taiwan area”
- 2020**            **Ministry of Science and Technology (MOST, Taiwan)**  
**Research Project for Junior Researchers**  
“Assimilation of dense surface observation data in the Taiwan area with a regional NWP system”
- 2019**            **Ministry of Science and Technology (MOST, Taiwan)**  
**Research Project for Junior Researchers**  
“Assimilation of dense surface observation data in the Taiwan area with a regional NWP system”
- 2018–2020**    **Ministry of Science and Technology (MOST, Taiwan)**  
**Research Project for Junior Researchers**  
“Research and development of the data assimilation system for the FV3GFS global NWP model”
- 2017–2018**    **Japan Society for the Promotion of Science (JSPS)**  
**Grants-in-Aid for Scientific Research - Young Scientists (B)**  
“Developing 2-way feedback nested-domain LETKF data assimilation system and application to high-resolution typhoon analyses and forecasts”

## **Awards**

**2016**                    **RIKEN Researcher Incentive Award**  
“Development of Precipitation Data Assimilation Method using Ensemble Kalman Filter”

## **Referee of Scientific Journals**

- 1) Journal of Atmospheric Sciences
- 2) Monthly Weather Review
- 3) Journal of Hydrometeorology
- 4) Weather and Forecasting
- 5) Quarterly Journal of the Royal Meteorological Society
- 6) Journal of the Meteorological Society of Japan
- 7) Scientific Online Letters on the Atmosphere (SOLA)
- 8) Asia-Pacific Journal of Atmospheric Sciences
- 9) Ocean Modelling
- 10) Progress in Earth and Planetary Science
- 11) Atmospheric Research
- 12) Terrestrial, Atmospheric and Oceanic Sciences
- 13) Atmosphere