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Professional Experience

2025–present **Researcher**
Technology Development Division, Central Weather Administration, Taipei, Taiwan

2019–present **Adjunct Assistant Professor**
Department of Atmospheric Sciences, National Taiwan University, Taipei, Taiwan

2023–2025 **Associate Researcher**
Technology Development Division, Central Weather Administration, Taipei, Taiwan

2018–2023 **Associate Researcher**
Research and Development Center, Central Weather Bureau, 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

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)

[23]. Tsai, C.-C., **G.-Y. Lien**, C. S. Schwartz, S.-Y. Jiang, P.-L. Chang, J.-S. Hong, and C.-C. Wu, 2025: Impact of RTPS and radar observation-based covariance inflation schemes on an operational convective-scale data assimilation system over Taiwan. *Wea. Forecasting*, **40**, 2159–2177. doi: 10.1175/WAF-D-24-0214.1

[22]. Wu, T.-C., C.-H. Li, **G.-Y. Lien**, C.-H. Hsieh, and Y.-J. Su, 2025: Initializing regional ensemble forecasts with an ensemble partial cycling strategy. *Wea. Forecasting*, **40**, 1383–1403. doi: 10.1175/WAF-D-24-0218.1

[21]. Hong, T.-X., C.-Y. Huang, C.-Y. Lin, **G.-Y. Lien**, Z.-M. Huang, and S.-Y. Chen, 2023: Impacts of GNSS RO data on typhoon forecasts using global FV3GFS with GSI 4DEnVar. *Atmosphere*, **14**, 735. doi: 10.3390/atmos14040735

[20]. Honda, T., A. Amemiya, S. Otsuka, **G.-Y. Lien**, J. Taylor, Y. Maejima, S. Nishizawa, T. Yamaura, K. Sueki, H. Tomita, S. Satoh, Y. Ishikawa, and T. Miyoshi, 2022: Development of the real-time 30-s-update Big Data Assimilation system for convective rainfall prediction with a phased array weather radar: Description and preliminary evaluation. *J. Adv. Model. Earth Syst.*, **14**, e2021MS002823. doi: 10.1029/2021MS002823

[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.*, **28**, 615–626. doi: 10.5194/npg-28-615-2021

[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

[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

[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

[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

[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

[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

[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

[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

[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

[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

[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

[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

[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

[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

[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

[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

[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)

[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

Publications (Other Articles)

[2]. **連國淵**、劉正欽、張保亮，2024：生成式 AI 與傳統數值天氣預報的結合–NVIDIA CorrDiff 天氣降尺度模型。*科技報導*，**511**，2–8。https://www.scimonth.com.tw/archives/10997

[1]. **連國淵**、李志昕、鄧雯心，2023：中央氣象局區域系集預報系統採「系集片段循環同化」新架構之評估。*氣象學報*，**58**，1–18。

Presentations (Selected)

[12]. **Lien, G.-Y.**, Y.-C. Shen, Y.-H. Lin, T.-Y. Chao, C.-C. Liu, and S.-C. Yang, 2025: Training datasets for high-resolution machine learning weather model in Taiwan: Compilation of historical operational regional model analysis and development of regional reanalysis. *Asia Oceania Geosciences Society (AOGS) 2025 Annual Meeting*, Singapore, AS38-A009.

[11]. **Lien, G.-Y.**, Z.-M. Huang, and C.-C. Lin, 2024: Early results of TRITON sea surface wind speed assimilation with the global numerical weather prediction system in CWA. *Asia-Pacific Remote Sensing (APRS) 2024*, Kaohsiung, Taiwan, Taiwan Space Agency.

[10]. **Lien, G.-Y.**, Z.-M. Huang, C.-C. Lin, and W.-H. Teng, 2024: ROMEX results at the Central Weather Administration of Taiwan. *COSMIC/JCSDA Workshop and IROWG-10 Meeting*, Boulder, Colorado, USA. [Available online at https://www.cosmic.ucar.edu/events/cosmic-jcsda-workshop-irowg-10/agenda#monday]

[9]. **Lien, G.-Y.**, Z.-M. Huang, and C.-C. Lin, 2023: A Statistically Consistent Approach to Use the Local Spectral Width Information to Improve the Radio Occultation Observation Error Specification. *Taiwan International Assembly of Space Science, Technology, and Industry (TASTI) 2023*, Taipei, Taiwan, Taiwan Space Agency.

[8]. **Lien, G.-Y.**, L.-F. Hsiao, C.-H. Lin, F.-J. Wang, Y.-H. Chen, J.-H. Chen, J.-S. Hong, D. Kleist, F. Yang, and V. Tallapragada, 2023: The Operational Use and Local Development of UFS MRW-GSI System at Central Weather Bureau of Taiwan. *Unifying Innovations in Forecasting Capabilities Workshop (UIFCW) 2023*, Boulder, CO, USA & Virtual Meeting. [Available online at https://epic.noaa.gov/eventsposts/uifcw-2023/]

[7]. **Lien, G.-Y.**, Y.-C. Lo, Y.-C. Shen, and S.-C. Yang, 2023: Applying variational bias correction for dense surface data in a convective-scale data assimilation system of Taiwan. *27th Conf. on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface*, Denver, CO, USA and Virtual Meeting, Amer. Meteor. Soc., 3.4. [Available online at https://ams.confex.com/ams/103ANNUAL/meetingapp.cgi/Paper/421080]

[6]. **Lien, G.-Y.**, C.-H. Lin, Z.-M. Huang, W.-H. Teng, J.-H. Chen, C.-C. Lin, H.-H. Ho, and 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.

[5]. **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]

[4]. **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]

[3]. **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]

[2]. **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]

[1]. **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]

Courses Taught

2024 Fall **Data Assimilation for Numerical Modeling**
Department of Atmospheric Sciences, National Taiwan University, Taipei, Taiwan

2023 Spring **Data Assimilation for Numerical Modeling**
Department of Atmospheric Sciences, National Taiwan University, Taipei, Taiwan

2021 Fall **Data Assimilation for Numerical Modeling**
Department of Atmospheric Sciences, National Taiwan University, Taipei, Taiwan

2020 Fall **Data Assimilation for Numerical Modeling**
Department of Atmospheric Sciences, National Taiwan University, Taipei, Taiwan

2019 Fall **Data Assimilation for Numerical Modeling**
Department of Atmospheric Sciences, National Taiwan University, Taipei, Taiwan

Funded Projects

2021-2023 **Ministry of Science and Technology (NSTC, Taiwan)**
Research Project for Junior Researchers; General Research Project
"Strategy for integrating global and regional model systems targeted for numerical weather prediction in the Taiwan area (I)-(III)"

2019-2020 **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"

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

2023 **Outstanding Employees of Central Weather Bureau, MOTC**

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) Journal of Geophysical Research: Atmospheres
6) Quarterly Journal of the Royal Meteorological Society
7) Geoscientific Model Development
8) Journal of the Meteorological Society of Japan
9) Scientific Online Letters on the Atmosphere (SOLA)
10) Asia-Pacific Journal of Atmospheric Sciences
11) Ocean Modelling
12) Progress in Earth and Planetary Science
13) Atmospheric Research
14) Geoscience Letters
15) Terrestrial, Atmospheric and Oceanic Sciences
16) Atmosphere