Department of Atmospheric Sciences
National Taiwan University

Newsletter

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Honors and Awards

- Chair Professor Chun-Chieh Wu received the 113th NTSC Academic Summit Project in 2024.
- Distinguished Chair Professor Chih-Pei Chang received the AOGS Wing Ip Medal Award in 2024.
- Prof. Min-Hui Lo received the title of Distinguished Professor from 2024.
- Prof. Min-Hui Lo received the Academia Sinica Scholars Program for the year 2025.
- Prof. Yen-Ting Huang received the 2024 Academia Sinica Early-Career Investigator Research Achievement Award.
- Prof. Yen-Ting Huang received the Excelsior Scholar Fellowship (2024/8-2027/7).
- Prof. Chien-Ming Wu was promoted to Professor on August 1, 2024.
- Prof. Min-Hui Lo received the NTU Outstanding Teaching Award for the 2023 Academic Year.
- Prof. Yu-Chiao Liang received the NTU Outstanding Teaching Award for the 2023 Academic Year.
- 吳俊傑講座教授榮獲 113 年度國科會學術研究攻頂計畫。
- 張智北特聘講座教授榮獲 113 年 AOGS Wing Ip Medal Award。
- 羅敏輝教授榮聘臺灣大學特聘教授 (自 113 起)。
- 羅敏輝教授榮獲 114 年度中央研究院中研學者計畫。
- 黃彥婷副教授榮獲 113 年中央研究院年輕學者研究成果獎。
- 黃彥婷副教授獲聘學術勵進青年講座 (113/8-116/7)
- 吳健銘副教授自 113 年 8 月起升等教授。
- 羅敏輝教授獲 112 學年度教學優良獎。
- 梁禹喬助理教授獲 112 學年度教學優良獎

Personnel Changes

- Associate technician Li-Jia Wang joined the department faculty since January 31st, 2024.
- 王理甲副技師自 113 年 1 月 31 日起到系服務。

Retirement of Prof. Mong-Ming Lu

Prof. Mong-Ming Lu retired on August 1, 2024, and a retirement party for her was held in Ming-Da Hall restaurant on May 30, 2024. During the party, the Dean of the College of Science Chun-Chieh Wu and Department Chair Chen-Ku Yu sent gifts to her and wished her a happy retirement life.

盧孟明教授於今年 8 月 1 日退休，本系於今年 5 月 30 日於台大明達館餐廳舉辦退休餐會，會中院長及系主任致贈禮物給盧老師並期許老師有個愉快的退休生活。

Prof. Chun-Chieh Wu, Dean of the College of Science & Prof. Mong-Ming Lu

Prof. Cheng-Ku Yu, Department Chair & Prof. Mong-Ming Lu

Group Photo taken during Retirement Party of Prof. Mong-Ming Lu

Department Retreat

The Department Retreat was held at the Dayuanzi Restaurant on February 16th, 2024, and all the faculty joined together to discuss and share opinions about the future development of the department including the curriculum integration, research collaboration, and faculty recruitment.

本系於今年 2 月 16 日假大苑子餐廳舉辦教師靜修會，針對系未來的發展包含教學(課程整合)、研究合作、教師聘任等方面進行深入討論並交換彼此意見。

Group Photo taken during the department retreat (Front row: Prof. Mong-Ming Lu, Prof. Cheng-Ku Yu, Prof. Chung-Hsiung Sui, Prof. Chun-Chieh Wu, Prof. Hung-Chi Kuo, Prof. Jen-Ping Chen, Prof. Po-Hsiung Lin. Back row: Prof. Yu-Chiao Liang, Prof. Ming-Jen Yang, Prof. Hui-Ming Hung, Prof. Wei-Ting Chen, Prof. Yen-Ting Huang, Prof. Kai-Chih Tseng, Prof. Min-Hui Lo, Prof. Chien-Ming Wu.

Department Assessment

The Department Assessment was held in our department on May 2-3, 2024. We invited five scholars to serve as committee members including Professor Shaw-Chen Liu of the Institute of Environmental and Climate Research, Jinan University (Commissioner), Professor Fei-Fei Jin of the University of Hawaii at Manoa, Professor Jin-Yi Yu of the University of California Irvine, Professor Shang-Ping Xie of the University of California San Diego, and Professor Jui-Yuan Chiu of Colorado State University. Their aim was to understand the current status and future prospects of the department's research and teaching. On the first morning, the Dean of the College of Science welcomed the evaluation committee, followed by a presentation from the Department Chair, who invited the committee members to visit our research facilities as well as its hardware and software resources. In the afternoon, discussions were held separately with department faculty, staff, postdoctoral researchers, and representatives of both undergraduate and graduate students. On the second day, a comprehensive discussion was held between all faculty and committee members; we also invited Prof. Hung-Jen Wang, the Vice President of Academic Affairs to join the meeting to gain a deeper understanding of the department's teaching and research operations and planning.

本系於5月2至3日舉辦5年一次的教學研究單位實地訪評。此次評鑑邀請五位國外著名學者擔任委員，包括暨南大學環境與氣候研究院劉紹臣教授(召集人)、夏威夷大學馬諾阿分校金飛飛教授、美國爾灣加州大學余進義教授、美國聖地牙哥加利福尼亞大學謝尚平教授及美國科羅拉多州立大學邱瑞媛教授，了解本系研究及教學現況與展望。首先第一天早上由本校理學院吳俊傑院長致詞歡迎評鑑委員蒞臨，接著由系主任進行系所簡報並邀請各評鑑委員參觀本系教學研究空間及各軟硬體設備，下午分別與系上教師、職員、博士後研究員和大學部及研究所學生代表進行座談。第二天由本系全體專任教師與委員們進行綜合座談並且邀請本校王泓仁教務長參與討論，深入了解系上教學及研究的運作及規畫。

Group Photo taken during the Department Assessment (Front row: Prof. Cheng-Ku Yu, Prof. Hung-Chi Kuo, Prof. Shang-Ping Hsieh, Prof. Hung-Jen Wang, Prof. Shaw-Chen Liu, Prof. Chun-Chieh Wu, Prof. Fei-Fei Jin, Prof. Jin-Yi Yu, Prof. Christine Chiu. Back row: Prof. Ming-Jen Yang, Prof. Wei-Ting Chen, Prof. Chien-Ming Wu, Prof. Kai-Chih Tseng, Prof. Min-Hui Lo, Prof. Jen-Ping Chen, Prof. Hui-Ming Hung, Prof. Yu-Chiao Liang, Prof. Stephen M. Griffith, Prof. Mong-Ming

Group Photo taken in the Observatory Courtyard during the department assessment (Prof. Jin-Yi Yu, Prof. Cheng-Ku Yu, Prof. Shaw-Chen Liu, Prof. Fei-Fei Jin, Prof. Christine Chiu, Prof. Shang-Ping Hsieh, Gwo-Feng Lee, and Chi-Bao Fu)

NTU Azalea Festival

In 2024, our school held the Azalea Festival on March 9th and 10th. On the first day, the opening ceremony took place in front of the NTU Sports Center. There were department fairs inside the hall which provided comprehensive information on admissions, scholarships, and detailed introductions to various departments and degree programs, and many booths for the Student Club Expo around the campus. Our department also set up an exhibition booth, offering brief explanations about the department and hosting small activities for students interested in atmospheric sciences as a reference for their further studies.

本校於今年 3 月 9-10 日舉辦杜鵑花節活動，首先於綜合體育館前舉行開幕典禮，並在綜合體育館內舉行學系博覽會，提供完整的招生資訊及各學系及學位學程的詳細介紹，校園內亦有學生社團博覽會攤位供學生參觀了解。本系亦於館內設置展覽攤位，提供系所簡介說明以及舉辦小活動供對大氣系有興趣的同學作為升學之參考。

Photo of the Exhibition Booth of our department taken during NTU Azalea Festival

Commencement Ceremony

The NTU Commencement Ceremony was held on the morning of May 25th for the academic year 112. Following the university ceremony, the undergraduate and graduate ceremonies were held concurrently. Parents were arranged in the same classroom to join the ceremonies together. The ceremony began with speeches by the Dean of the College of Science, the Department Chair and student advisors, and then a video of a speech given by the teachers of our department to the graduates was played during the ceremony. Next, a representative of the graduating class delivered a graduation speech. The Department Chair turned the tassel from the right to the left for each graduate and gave graduation gifts to them. Everyone was very happy and cherished the opportunity to participate in this graduation ceremony. This year, the department had a total of 28 bachelor's degree graduates, 12 master's degree graduates, and 5 doctoral graduates.

Group Photo taken outdoor during the ceremony (undergraduate students and faculty)

Group Photo taken outdoor during the ceremony (graduate students and faculty)

STUDENTS ACTIVITIES

本校於今年 5 月 25 日舉行 112 學年畢業典禮，本系亦於同日下午於系館實體舉行撥穗典禮，此次採大學部與研究所分開舉行，並邀請家長們一同在教室觀禮。典禮首先由吳俊傑院長、游政谷系主任及學生導師們輪流致詞，並於現場撥放系上老師們預先提供給畢業生的一段話的影片，氣氛溫馨感人。接著請畢業班同學代表分享畢業感言,再由系主任為每個畢業生撥穗並提供畢業小禮物給每一位畢業生。今年系上共有 28 名學士，12 名碩士及 5 名博士畢業。

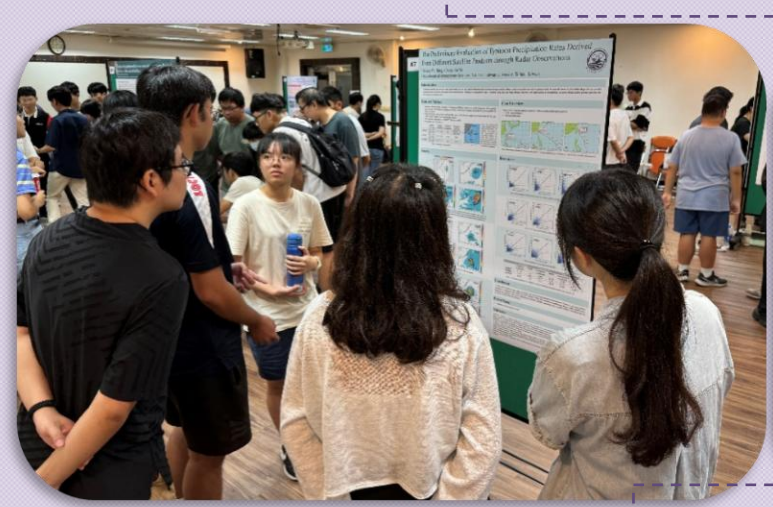
Group Photo taken during the ceremony (graduate students and faculty)

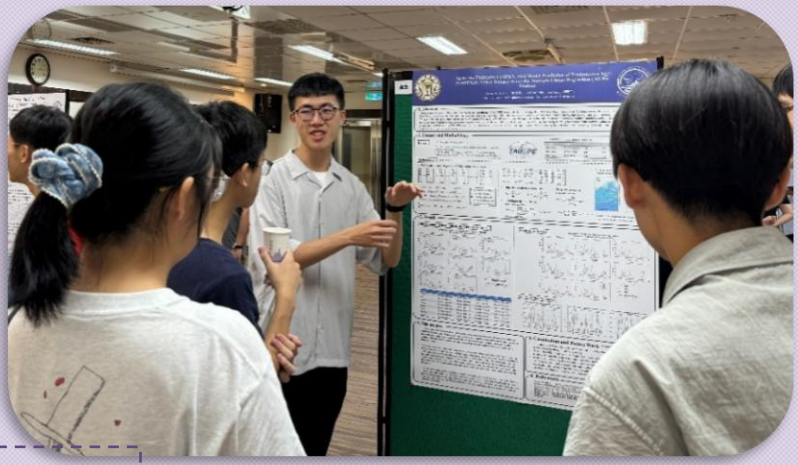
Group Photo taken during the ceremony (undergraduate students and faculty)

2024 Undergraduate Summer Research Program Poster Presentation and Awards

To encourage undergraduate students to participate in research activities, the Summer Research Program was implemented during the summer vacation. This activity included a total of 30 students who were guided by 13 teachers to conduct research. The participation lists are shown in the table below. Additionally, on the afternoon of August 30, a Summer Research Program Poster Presentation and Awards was held in the Lecture Hall of College of Management Building, NTU, and this event was co-organized with the International Degree Program in Climate Change and Sustainable Development of the College of Science. Undergraduate and graduate students were actively participating in discussions. We really thank many faculty members from our department for their guidance, and everyone in engaging in enthusiastic exchanges and learning. These students shared their results from their research and the best 13 poster winners were awarded, as judged by their research advisors, research assistants, and graduate students.

Group Photo taken during the Poster Presentation





Poster Presentation

STUDENTS ACTIVITIES

為促進大學部學生研究能量，本系於暑假期間推行「大專生暑期研究計畫」，本次活動共計 30 位二、三年級學生分別接受 13 位系上教師指導並進行研究，分組名單如下表。另本系於 8 月 30 日下午假台大管理學院國學講堂舉行研究計畫成果發表暨海報競賽活動，本次與理學院氣候變遷發展學程合辦此活動，大學部學生與研究生非常踴躍參與討論，感謝系上多位老師蒞臨指導，大家交流學習熱烈。

恭喜參與本屆暑期計畫的學生如期完成研究工作並分享有趣成果，也恭喜本次活動獲獎學生如下: 學術獎(優等):王英馳、許欣怡、蔡知諺、魏孜勤，學術獎(佳作): 詹喬勛、吳柏慶、葉奕廷、吳昀臻 人氣獎: 林之然、蘇心吾、張榮芃、賴安柔，創意獎: 紀皓凱

Group Photo for the Winners and Prof. Cheng-Ku Yu, Department Chair and Prof. Min-Hui Lo

編號	姓名	指導教授	題目
A1	朱映霏	洪惠敏老師	Diurnal Variability of CO_2 in Urban and Rural Areas of Chiayi
A3	黃以寬	吳俊傑老師	The Influence of Environmental Background on Tropical Cyclone ---Case Study of Typhoon Hinnamnor (2022)
A4	王英馳	吳健銘老師	The characteristics of diurnal convection over an idealized sea-land-mountain simulation
A5	楊弘宇	陳維婷老師	The Characteristics of Potential Vorticity during the Convection Organization Period before Cyclogenesis in VVM Simulation
A6	黃一惠	曾開治老師	Probing atmospheric predictable components with S2S reforecast experiment and data-driven methods
A7	洪翔郁	游政谷老師	The Preliminary Analysis of Typhoon Precipitation Rate Derived from Different Satellite Products

A8	林之然	黃彥婷老師	Tropical Precipitation Responses to Antarctic Ozone Depletion: the Role of Mid-latitude Eddies
A9	詹喬勛	楊明仁老師	Verify the TAHOPE/TAHPEX2022 Model Prediction of Precipitation by TAHPEX2019-2021 Dataset Using the Multiple Linear Regression (MLR) Method
A10	游杰庭	羅敏輝老師	Microclimate Differences in the Alishan Tea Plantation under Varying Fog Conditions
A11	蔡知諺	梁禹喬老師	Separation of anthropogenic variabilities through deep learning lens.
A12	廖韋翰	郭鴻基老師	Simulating vortex motion in the boundary layer by using a numerical model
B1	薛如桓	洪惠敏老師	Analysis of Ozone Pollution Outbreak over Northern Taiwan Using GIS and Backward Trajectory Modeling
B2	紀皓凱	林博雄老師	Instrumentation Development for Atmospheric Electric Field
B3	陳詠菖	吳俊傑老師	A Comparative Study of Tropical Cyclogenesis: Case Analysis of Typhoon Chan-hom (2015) and Typhoon Soudelor (2015)
B4	許欣怡	吳健銘老師	Numerical simulations of flow over topography and associated vortex structure changes
B5	蘇心吾	陳維婷老師	Using satellite data to investigate the characteristics of the surrounding circulation and water vapor distribution prior to consecutive typhoon formations during the cold season in the Northwestern Pacific
B6	任柏翰	曾開治老師	軸對稱Hadley cell和非軸對稱Hadley cell比較
B7	張榮芃	游政谷老師	Contrasting characteristic of low-level wind shear between squall-line-like and non-squall-line outer tropical cyclone rainbands
B8	賴安柔	黃彥婷老師	Contrasting Fast and Slow Tropical Circulation Responses under Global Warming
B9	蔡易達	楊明仁老師	Analysis of Dual-Polarization Radar Signatures for Afternoon Thunderstorms in Northern Taiwan Using TAHOPE S-POL RHI Data
B10	陳冠豪	羅敏輝老師	Utilize TReADData to Analyze the Long-Term Characteristics of Cloud Forests and Non-Cloud Forests
B11	李艾耘	梁禹喬老師	Investigating the Physical drivers of Polar Amplification in idealized Energy Balance Model
B12	吳柏慶	郭鴻基老師	A Deep Learning Model to Estimate Precipitation from Satellite Observations
B13	葉盈秀	梁禹喬老師	The Role of Cloud Radiative Effects in Polar Amplification: An Aquaplanet Simulation with Varying Climate Forcings
B14	張瑋倫	吳健銘老師	Analyses of radiation budget distribution before South Asian Summer Monsoon Onset
B15	葉奕廷	黃彥婷老師	Long-term Trend of Atmospheric Energy Budget Distribution during the Satellite Era
B16	吳昀臻	羅敏輝老師	Analyzing Microclimate Characteristics of Cloud and Non-Cloud Forests Based on On-Site Observational Data: A Case Study of Xitou and Lienhuachih
B18	魏孜勤	陳正平老師	Assessing the Impact of Ozone Exposure on VOCs Emissions and Chemical Composition in Bidens alba Using OTC Experiments

Parents Day

Every September before the new semester starts, NTU holds a series of Opening Ceremony activities to help new students to understand the unique characteristics of the university. Our Department Chair, Prof. Cheng-Ku Yu, also held a meeting for the freshman and their parents in the morning of September 1st, 2024, and introduced the environment and the information of the curriculum to them. This meeting provided the opportunity for them to interact with our faculty and staff and helped them to know the department well.

每年 9 月開學前學校會舉辦新生入門書院活動及開學典禮，幫助學生了解台大校園並迅速適應大學生活。本系亦於 9 月 1 日早上於系館舉行新生家長日，由系主任游政谷老師主持介紹大氣系系況、課程及環境讓家長們及新生充分了解本系，現場互動熱烈，增進新生及家長們與系上的交流。

Group Photo of Freshman and Prof. Cheng-Ku Yu, Department Chair taken during the freshman seminar

Students Awards

- PhD Student Tsubaki Hosokawa received the Outstanding Presentation Award at the 21st Conference on Mountain Meteorology in July, 2024.
  博士班研究生 Tsubaki Hosokawa 榮獲美國氣象學會山地氣象研討會傑出論文報告獎。

- Tsung-Hsun Lin received the Bachelor Paper Award for the 2023 academic year.
  林宗勳同學榮獲台灣大學第八屆學士班學生論文獎-傅斯年獎。

- Tsung-Hsun Lin received the MOST College Student Research Creation Award in the 2023 academic year and received helpful guidance from his advisor, Prof. Mong-Ming Lu.
  林宗勳同學獲得科技部 112 年度大專學生研究計畫研究創作獎，其指導教授盧孟明老師也獲頒指導有方的獎牌。

- Kuan-Hao Chen received the NTU Altruism Award for the 2023 academic year.
  陳冠豪同學獲得 112 學年利他獎。

2024 NTU-KU-UHH Trilateral Symposium - Parallel Session (Flood/Disaster Prevention)

The International Office of National Taiwan University (NTU) hosted the NTU-Kyoto University-Hamburg University Trilateral Conference on November 18, 2024 for the first time. A Parallel Session on Flood/Disaster Prevention was held at our department on November 19, 2024. This session was jointly organized by our Department Chair Cheng-Ku Yu, Professor Kosei Yamaguchi from Kyoto University, and Professor Shabeh ul Hasson from the University of Hamburg. Approximately 30 participants attended the session, with 11 academic speakers, including from Kyoto University: Prof. Kenji Kawaike, Prof. Kosei Yamaguchi, Prof. Yoshiya Touge, and Prof. Yoshito Sugawara, and Ph.D. candidate Megumi Okazaki, from the University of Hamburg: Prof. Juergen Boehner and Prof. Shabeh ul Hasson, as well as from our department: Prof. Cheng-Ku Yu, Professor I-I Lin, Professor Min-Hui Lo, and a doctoral student Tsubaki Hosokawa.

First, the Chairman Yu welcomed the guests and invited Dean Wu to deliver the opening remarks. Subsequently, we exchanged gifts with each other and took a group photo before the presentations. All the participants shared academic research and promoted the interaction and potential future collaboration through the presentations and Q&A sessions. After the presentations, Chairman Yu guided the guests to visit the Hydraulic Research Institute of NTU. This visit had a particular significance since Professor Kenji Kawaike from Kyoto University is the head of the Hydrology Laboratory, and will create a potential collaboration in the future. Following the event, our department arranged a dinner party, and invited all the participants and faculty members to join, where everyone shared daily life experiences, and discussed subsequent collaborative efforts. The meeting was very meaningful and ended successfully.

Group photo taken during NTU-KU-UHH Trilateral Symposium-Parallel Session (Flood/Disaster Prevention)

臺大國際處今年度首次主辦 2024 臺大-京大-漢堡三邊會議，大氣系於 113 年 11 月 19 日在系館舉辦此會議之豪雨防災分項會議（Flood/Disaster Prevention Parallel Session）。此分項會議由本系游政谷主任、日本京都大學 Kosei Yamaguchi 教授及德國漢堡大學 Shabeh ul Hasson 教授共同安排籌畫。分項會議的與會人員約為 30 人，發表學術演講者共 11 位，包含日本京都大學 Kenji Kawaike 、Kosei Yamaguchi、Yoshiya Touge、Yoshito Sugawara 等 4 位教授及 1 位博士生 Megumi Okazaki、德國漢堡大學 Juergen Boehner 及 Shabeh ul Hasson 等 2 位教授以及本系游政谷主任、林依依教授及羅敏輝教授等 3 位老師及 1 位博士生 Tsubaki Hosokawa。

分項會議首先由本系游政谷主任歡迎外賓，並邀請理學院吳俊傑院長開場致詞，接著三方互贈禮品並進行團體合照，隨後開始進行各主題演講。藉由三所大學於會議中進行演講及 Q&A，分享學術研究，促進彼此交流與未來可能的合作。演講結束後，游主任引導外賓至台大水工所參訪。由於京都大學 Kenji Kawaike 教授為京大水文實驗室負責人，因此這次水工所交流參訪別具意義，開啟日後合作的可能性。會後，本系安排於曉鹿鳴樓舉辦晚宴，並邀請參與分項會議人員與本系老師一同參與，分享日常與討論後續交流合作相關事宜，會議進行得非常圓滿成功。

Group photo taken during the NTU-KU-UHH Trilateral Symposium (Prof. Po-Hsiung Lin(NTU), Prof. Cheng-Ku Yu(NTU), Prof. Shabeh ul Hasson(UHH), Prof. Juergen Boehner(UHH), Prof. Chun-Chieh Wu(NTU), Prof. Kosei Yamaguchi(KU), Prof. I-I Lin(NTU)

Group photo in HRI taken during the NTU-KU-UHH Trilateral Symposium

VISITORS

Group photo of seminar on January 9th, 2024 for the visitor: Kuan-Yu Lu

Group photo of seminar on January 11th, 2024 for the visitor: Chun-Han Lin

Group photo of seminar on January 16th, 024 for the visitor: Chi-Ming Shun

Group photo of seminar on February 20th, 2024 for the visitor: Chiung-Yin Chang

Group photo of seminar on February 27th, 2024 for the visitor: Chuan-Chieh Chang

Group photo of seminar on March 4th, 2024 for the visitor: Why-Jay Zheng

Group photo of seminar on March 5th, 2024 for the visitor: Hsin-Hsu

Group photo of seminar on March 7th, 2024 for the visitor: Jung-Eun Chu

Group photo of seminar on March 14th, 2024 for the visitor: Jin-Soo Kim

Group photo of seminar on March 14th, 2024 for the visitor: Buo-Fu Chen

Group photo of seminar on March 21th, 2024 for the visitor: Gyuwon Lee

Group photo of seminar on March 26th, 2024 for the visitor: Yue-Liang Kuo

VISITORS

Group photo of seminar on April 1th, 2024
for the visitor: Nobuhiro Takahashi

Group photo of seminar on May 7th, 2024
for the visitor: Shunya Koseki

Group photo of seminar on May 14th, 2024
for the visitor: Wei-Ting Hsiao

Group photo of seminar on June 17th, 2024
for the visitor: Seon-Ki Park

Group photo of seminar on July 11th, 2024
for the visitor: Scott Braun

Group photo of seminar on August 5th, 2024
for the visitor: Yi-Xian Li

Group photo of seminar on August 26th, 2024 for the visitor: Nathaniel Johnson

Group photo of seminar on August 30th, 2024 for the visitor: Po-Lun Ma

Group photo of seminar on September 2th, 2024 for the visitor: Matthew Luongo

Group photo of seminar on September 3th, 2024 for the visitor: Buo-Fu Chen

Group photo of seminar on September 10th, 2024 for the visitor: Jin-Yi Yu

Group photo of seminar on September 11th, 2024 for the visitor: Justin Lien

VISITORS

Group photo of seminar on October 1th, 2024 for the visitor: Liren Peng

Group photo of seminar on October 4th, 2024 for the visitor: Johnny Chan

Group photo of seminar on October 8th, 2024 for the visitor: Renyi Zhang

Group photo of seminar on October 29th, 2024 for the visitor: Edmund Chang

Group photo of seminar on November 6th, 2024 for the visitor: Nir Y. Krakauer

Group photo of seminar on November 12th, 2024 for the visitor: Michael M. Bell

Group photo of seminar on November 14th, 2024 for the visitor: Michael Foster

Group photo of seminar on November 19th, 2024 for the visitor: Michael Montgomery

Group photo of seminar on December 23rd, 2024 for the visitor: Johnny Luo

Group photo of seminar on December 24th, 2024 for the visitor: Yi-Hung Kuo

Group photo of seminar on December 26th, 2024 for the visitor: Chuan-Chieh Chang

VISITORS

Date	Speaker	Unit	Title
113/1/9	Dr. Kuan-Yu Lu	Department of Earth, Atmospheric, and Planetary Sciences, Purdue University	Impact of Planetary Rossby Wave Drag on the Structure of Tropical Vortices
113/1/11	Prof. Chun-Han Lin	Department of Atmospheric Sciences, University of Utah	Climate change, wildfires, and air quality in the Western U.S.
113/1/16	Dr. Chi-Ming Shun	Former Director of the Hong Kong Observatory	低空風切監測及預警
113/2/20	Dr. Chiung-Yin (Jenny) Chang	Postdoctoral Research Associate, Geophysical Fluid Dynamics Laboratory, NOAA	The roles of baroclinic eddies in the spatial pattern of surface warming
113/2/27	Dr. Chuan-Chieh (Jay) Chang	Pacific Northwest National Laboratory	Reconciling Tropical and Extratropical Influences on the Variability of Tropical Cyclone Activity
113/3/4	Prof. Why-Jay Zheng	Center for Space and Remote Sensing Research, National Central University	What makes a Canadian glacier lower its surface by twenty stories high within a year?
113/3/5	Dr. Hsin Hsu	Postdoctoral Research Associate, Atmospheric & Oceanic Sciences, Princeton University	Soil Moisture－Temperature Hypersensitive Coupling Regime
113/3/7	Prof. Jung-Eun Chu	School of Energy and Environment, City University of Hong Kong	Effect of Global Warming on Genesis and Dissipation of Tropical Cyclones using High-Resolution CESM Simulations
113/3/14	Prof. Jin-Soo Kim	School of Energy and Environment, City University of Hong Kong	How do large-scale atmospheric circulation changes drive fire activity?
113/3/14	Dr. Buo-Fu Chen	Center for Weather Climate and Disaster Research, NTU	Revealing the Climate Trends of Tropical Cyclone Structure Extremes by Deep Learning
113/3/21	Prof. Gyuwon Lee	Kyungpook National University	Dual-polarimetric radar: A new frontier in precipitation microphysics studies
113/3/26	Prof. Yue-Liang Kuo	Department of Environmental and Occupational Medicine, NTU	氣候與健康
113/4/1	Prof. Nobuhiro Takahashi	Institute for Space-Earth Environmental Research, Nagoya University	Development of ground-based and spaceborne phased array radar and applications
113/5/7	Dr. Shunya Koseki	Geophysical Institute, University of Bergen, NORWAY	Evaluating fine-scale ESMs for Southeast Asian Climate and Extreme
113/5/14	Dr. Wei-Ting Hsiao	Department of Atmospheric Science, Colorado State University	Radiative moistening feedback observed in tropical organized convective systems
113/6/17	Prof. Seon-Ki Park	Department of Climate and Energy Systems Engineering, Ewha Womans University, Republic of Korea	Opti-parameterization: Intelligent Combinational Optimization of Parameters and Parameterization Schemes
113/7/11	Dr. Scott A. Braun	NASA/GSFC	Space-Based Precipitation Measurements in Tropical Cyclones: Past, Present, and Future
113/8/5	Dr. Yi-Xian Li	Research Fellow, School of Earth, Atmosphere and Environment, Monash University, Australia	When, Where and to What Extent Do Temperature Perturbations Near Tropical Deep Convection Follow Convective Quasi Equilibrium?

113/8/26	Dr. Nathaniel Johnson	Geophysical Fluid Dynamics Laboratory, Princeton, NJ, USA	Advancing the seasonal prediction of extreme weather in the GFDL Seamless System for Earth System Research (SPEAR)
113/8/30	Dr. Ma, Po-Lun	Pacific Northwest National Laboratory	Toward credible simulations of aerosol and aerosol-cloud interactions in Earth system models
113/9/2	Dr. Matthew T. Luongo	Postdoctoral Research Scientist, Scripps Institution of Oceanography, UCSD	Subsurface Adjustment and Heat Transport Response of the Tropical Pacific to Hemispheric Energy Forcing
113/9/3	Dr. Buo-Fu Chen	Center for Weather Climate and Disaster Research, NTU	Expecting the Data-driven Limited Area Mesoscale Prediction Model in Taiwan
113/9/10	Prof. Jin-Yi Yu	Department of Earth System Science, University of California, Irvine	2023-24: A Year of Distinctive El Niño, Marine Heatwave, and Pacific Meridional Mode
113/9/11	Justin Lien	Mathematical Institute, Tohoku University, Japan	Linear Inverse Modeling for Dynamical Systems with Temporally Correlated Stochasticity: Applications to Atmospheric and Climate Science
113/10/1	Dr. Liran Peng	Dept. of Earth System Science, UCI	Innovative High-Resolution MMF Approaches to Understanding Low Cloud Feedback Mechanisms
113/10/4	Prof. Johnny Chan	City University of Hong Kong	Interdecadal Variations and Projections of Landfalling Tropical Cyclone Activity in East Asia
113/10/8	Prof. Renyi Zhang	Department of Chemistry and Department of Atmospheric Sciences, Texas A&M University	Assessing the Impacts of anthropogenic and natural aerosols on tropical cyclones
113/10/29	Prof. Edmund Chang	School of Marine and Atmospheric Sciences, SoMAS, Stony Brook University	MJO influence on stormtrack and precipitation over the U.S.
113/11/6	Prof. Nir Y. Krakauer	Department of Civil Engineering, City College of New York	Land surface feedbacks and humid heat
113/11/12	Prof. Michael M. Bell	Department of Atmospheric Science, Colorado State University, USA	New Insights into the Dynamics and Microphysics of Heavy Rainfall
113/11/14	Prof. Michael Foster	the Space Science and Engineering Center at the University of Wisconsin – Madison	Studying Cloud Feedback Sensitivity Using Multi-Decadal Satellite Data Records
113/11/19	Prof. Michael Montgomery	Naval Postgraduate School	Towards understanding the tropical cyclone life cycle
113/12/23	Prof. Johnny Luo	Dept. of Earth and Atmospheric Sciences, City University of New York	Revisiting the Riehl-Malkus (Simpson) Hot Tower Hypothesis Using A Geostationary Satellite-Based Estimate of Convective Mass Flux
113/12/24	Dr. Yi-Hung Kuo	Department of Atmospheric and Oceanic Sciences, UCLA	A few implications of including anelastic perturbation pressure in convective process models
113/12/26	Dr. Chuan-Chieh Chang	Pacific Northwest National Laboratory	Modulation of North Atlantic Tropical Cyclones by the Madden-Julian Oscillation: Physical Mechanisms, Model Evaluation, and Future Projection

Meteorology-driven $PM_{2.5}$ interannual variability over East Asia

Atmospheric fine particulate matter ($PM_{2.5}$) is a human health risk factor, but its ambient concentration depends on both precursor emissions and meteorology. While emission reductions are used to set $PM_{2.5}$-related health policies, the effect of meteorology is often overlooked. To explore this aspect, we examined $PM_{2.5}$ interannual variability (IAV) associated with meteorological parameters using the long-term simulation from the Community Earth System Model (CESM1), a global climate-chemistry model, with fixed emissions. The results are subsequently contrasted with the MERRA-2 reanalysis dataset, which inherently considers emission and meteorology effects.

Over continental East Asia, the CESM1 domain-average $PM_{2.5}$ IAV is 6.7%, mainly attributed to humidity, precipitation, and ventilation variation. The grid-cell $PM_{2.5}$ IAVs over southern East China are larger, up to 12% due to the more substantial influence of El Niño-induced meteorological anomalies. Under such climate extreme, sub-regional $PM_{2.5}$ concentration may occasionally exceed WHO air quality guideline levels despite the compliance of the long-term mean. The simulated $PM_{2.5}$ IAV over continental East Asia is ~25% of that derived from the MERRA-2 data, which highlights the influence of both emission and meteorology-driven variations and trends inherent in the latter. Although emission-driven variability is significant to $PM_{2.5}$ IAV, in remote areas downwind of major source regions in East Asia, North America, and Western Europe, the MERRA-2 data revealed that meteorological variations contributed more to $PM_{2.5}$ IAV than emission variations (points below the identity line in Fig. 1). Thus, when setting policies for complying with the WHO $PM_{2.5}$-related air quality guideline levels, the highest annual $PM_{2.5}$ associated with climate extremes (Fig. 2) should be considered instead of that based on average climate conditions.
[contents from: Wang, C.-Y., J.-P. Chen, and W.-C. Wang, 2023: Meteorology-driven PM2.5 interannual variability over East Asia. Sci. Total Environ., 904, 166911.]

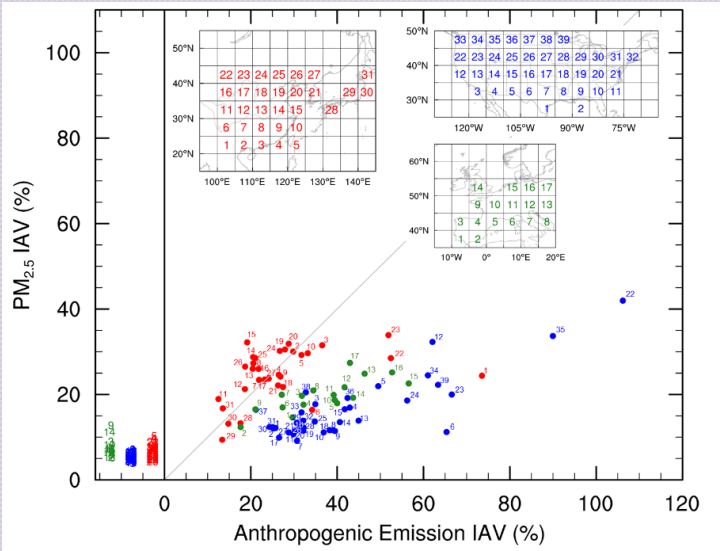


Fig. 1: The relationship between PM2.5 and emission IAV in the sub-regions of EA (red), NA (blue), and WE (green). The numbers in the right graph were calculated from the 1980–2008 MERRA2 data, and the numbers on the left are the CESM1 simulation results with fixed emission (emission IAV=0). The regional maps with corresponding block numbers are given in insets at the top. The solid grey line is the identity line.

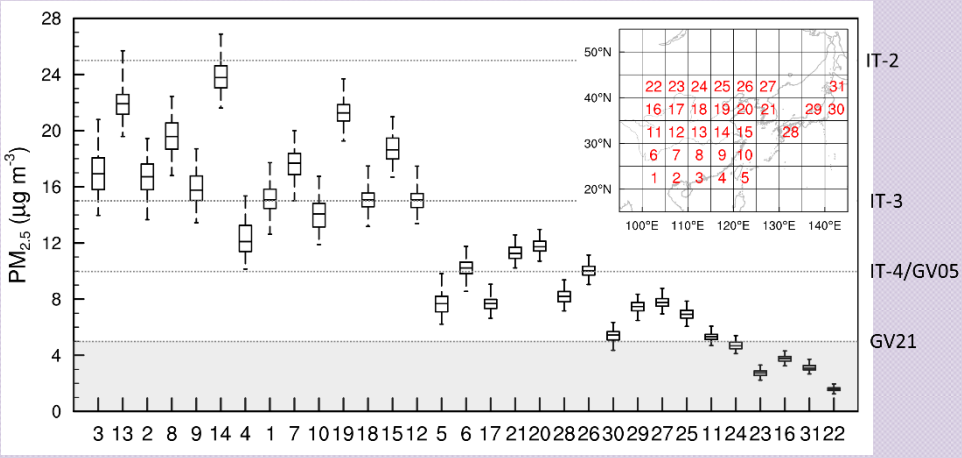


Fig. 2: Sub-regional surface PM2.5 concentration over East Asia. The data are permutated in decreasing order of the PM2.5 range, with corresponding block numbers shown in the inset on the upper right. The horizontal dashed lines indicate the WHO air quality guideline values (GV) and different interim targets (IT). The PM2.5 concentration of guideline values GV05 and GV21 are 10 and 5 μg m^{-3} set in 2005 and 2021, respectively. IT-2, IT-3, and IT-4 are 25, 15, and 10 μg m^{-3}.

東亞地區氣象驅動的 PM2.5 年際變化

大氣細懸浮微粒（PM2.5）是人類健康的危險因子，其濃度取決於前驅物排放量和氣象影響。PM2.5 相關的健康政策的制訂一般是透過排放量的控制，而氣象的影響常常被忽略。為了探索後者的重要性，我們使用社區地球系統模式 CESM1 以固定年排放量的方式進行純粹氣象驅動的 PM2.5 年際變化（IAV）的長期模擬。隨後將結果與 MERRA-2 再分析資料集進行對比，後者本質上同時考慮了排放和氣象影響。

在東亞大陸，CESM1 的 PM2.5 區域平均 IAV 為 6.7%，主要歸因於濕度、降水和通風變化。華東南部地區網格單元 PM2.5 IAV 高達 12%，主要受厄爾尼諾引發的氣象異常影響。某些區域儘管 PM2.5 濃度長期平均值符合世界衛生組織空氣品質指南的濃度水準，但在極端氣候狀況下卻可能會超標。在東亞地區，CESM 模擬的 PM2.5 IAV 約為 MERRA-2 數據的 25%，這突顯了排放和氣象驅動的共同作用，以及後者長期趨勢的重要性。儘管 MERRA-2 數據顯示，排放的變異對 PM2.5 IAV 影響很大，但處於東亞、北美和西歐主要排放源區下風處的偏遠地區，氣象變化對 PM2.5 IAV 的貢獻卻是大於排放變化(圖 1 對角線下方)。因此，在製定符合世界衛生組織 PM2.5 目標濃度的政策時，應考慮與極端氣候相關的最高年度 PM2.5（圖 2），而不是基於平均氣候條件的濃度值。

Arctic Amplification

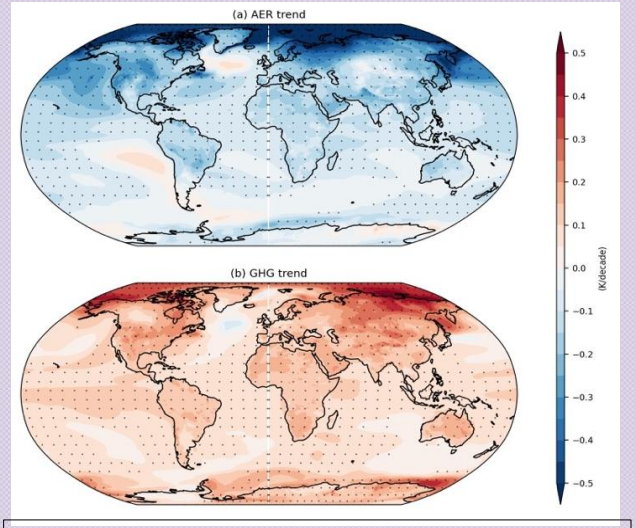


Figure 1 (a) Arctic amplification under cooling scenario.

Over the past 40 years, observational records have revealed that near-surface air temperatures in the Arctic have risen 2–4 times faster than the global average. This phenomenon, known as Arctic amplification (AA), is widely attributed to the increasing atmospheric concentrations of carbon dioxide (CO_2 Figure 1b). Future projections using climate models under warming scenarios consistently indicate that AA will not only persist but intensify in the coming decades. Importantly, this amplified Arctic warming has profound impacts on local weather, ecosystems, and socio-economic activities within the Arctic Circle. An ongoing and vigorous debate exists regarding its potential influence on weather extremes and climate variability in the mid-latitudes. Advancing our understanding of AA and its driving mechanisms is therefore crucial - not only for addressing regional impacts but also for understanding its broader global implications.

On the other hand, while most studies have focused on AA driven by increasing atmospheric CO_2 concentrations, relatively little attention has been given to understanding the mechanisms that link cooling scenario to AA. Under such scenarios, one might anticipate amplified Arctic cooling relative to the cooling in the rest of the globe. Recent research on the effects of aerosol emissions on global and Arctic climates has highlighted the potential for AA to occur even in cooling scenarios (Figure 1b).

The Polar Climate Change Research Group is dedicated to investigating the underlying mechanisms of AA through a combination of observational data and climate model simulations of varying complexity. Observational efforts include vertical profiles of atmospheric temperature, moisture, and winds measured by radiosondes released in the Arctic, alongside routine satellite observations. Simpler climate model simulations provide valuable mathematical and theoretical insights into the driving factors of AA, while intermediate models enable the inclusion of key coupling processes essential to understanding AA. For example, an energy balance model coupled with a thermodynamic sea-ice model offers a platform to explore interactions between atmospheric energy transport and sea-ice variability, both of which contribute to AA. At the highest level of complexity, global climate models incorporate the full range of interactions among Earth system components, allowing for a realistic simulation of their contributions to AA. This hierarchical modeling framework enables our group to comprehensively understand the drivers of the fast-changing Arctic climate. Our findings contribute to the Polar Amplification Model Intercomparison Project, and we actively engage with the broader scientific communities by participating in numerous polar research conferences and workshops.

Group members: Yu-Chiao Liang; You-Ting Wu; Man-Ning Chiu; Yi-Jhen Zeng; Shih-Ni Zhou; Yih Wang; Yan-Chi Wu; Ya-Fan Chung; Siou-Min Tsou; Ai-Yun Lee; Ying-Hsiu Yen, Chih-Yen Tsai

北極放大效應

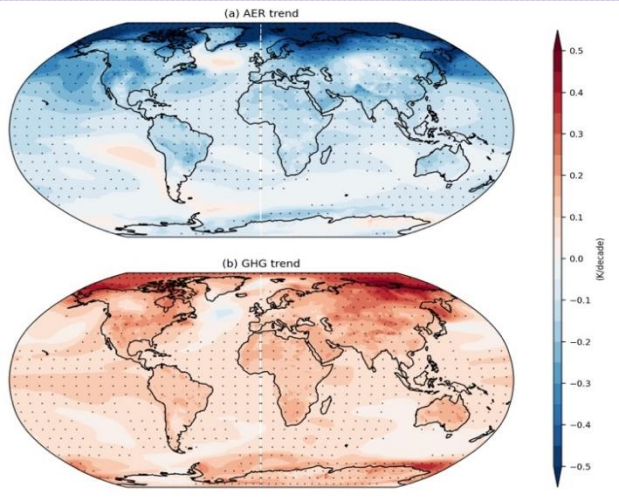


圖 1（a）冷卻情境下的北極放大效應.（b）暖化情境下的北極放大效應。

過去 40 年的觀測記錄顯示，北極近地表空氣溫度的上升速度是全球平均的 2 至 4 倍。這一現象被稱為北極放大效應（Arctic Amplification，簡稱 AA），主要歸因於大氣中二氧化碳（CO_2，圖 1b）濃度的增加。在全球暖化情境下，使用氣候模式的未來預測一致顯示，AA 不僅會持續存在，且在未來幾十年內會進一步加劇。值得注意的是，北極暖化的加劇對北極圈內的當地天氣、生態系統及社會經濟活動產生深遠影響。關於 AA 對中緯度地區天氣極端事件和氣候變遷的潛在影響，激烈辯論仍在進行中。因此，加強對 AA 及其驅動機制的理解至關重要，不僅是為了解決區域影響，亦是為了洞悉其更廣泛的全球影響。

另一方面，雖然大多數研究集中於由大氣中二氧化碳（CO_2）濃度增加所驅動的北極放大效應（AA），但對於在冷卻情境下與 AA 相關聯的機制，卻相對較少受到關注。在這類情境下，人們可能會預期北極的冷卻程度相較於全球其他地區的冷卻會更加顯著。最近關於氣溶膠排放對全球和北極氣候影響的研究強調了即使在冷卻情境下，AA 也可能發生（圖 1a）。

台大大氣系極地氣候變遷研究團隊致力於透過結合觀測數據和不同複雜程度的氣候模式模擬，探討北極放大效應（AA）的基本機制。觀測工作包括利用無線電探空儀在北極測量的大氣溫度、濕度和風速的垂直剖面，以及衛星觀測。簡單的氣候模型模擬提供了對 AA 驅動因素的數學和理論基礎，而中等複雜度的模型則使我們能夠納入理解 AA 所需的關鍵耦合過程。例如，能量平衡模型與熱力學海冰模型的耦合提供了一個平台，用於探索大氣能量傳輸與海冰變化之間的相互作用，這兩者均對 AA 有所貢獻。在最高複雜度的全球氣候模型中，地球系統各組成部分之間的全面交互作用可以被深入地研究，從而能夠真實模擬這些交互過程對 AA 的貢獻。這種分層的建模框架使我們的研究小組能夠全面了解快速變化的北極氣候。我們的研究成果對北極放大效應模型比較計畫（**Polar Amplification Model Intercomparison Project**）有所貢獻，並透過參與多場極地研究會議與工作坊，積極與更廣泛的科學社群進行交流。

2024 Doctoral Dissertations and Master Theses

Doctoral Theses

■ Min-Ken Hsieh 謝旻耕	Development of an Explainable Machine Learning Framework: Application to Local Circulation Associated with Lee Vortex in Taiwan 發展可解釋機器學習框架: 臺灣背風渦漩局地環流之應用
■ Kuan-Tzu Huang 黃冠慈	Effects of anthropogenic aerosols on the Indian Summer Monsoon from pre-onset to withdrawal 人為氣膠對印度夏季季風自肇始前至消退之影響
■ He-Ming Xiao 肖鶴鳴	Impacts of Natural and Anthropogenic and their Interactions on the Maritime Continent's Hydroclimate 自然和人爲因素及其交互作用對海洋大陸水文氣候之影響
■ Chung-Wei Lee 李崇瑋	Mechanisms Causing El Niño's Diverse Phase Transition 造成聖嬰現象相位轉換多變化性的機制
■ Wei-Ting Feng 方偉庭	A Study on the Mesoscale Flows Induced by Taiwan Terrain and Their Impacts on the Rapid Intensification of Typhoon Chanthu (2021) 地形引發中尺度環流對燦樹颱風(2021)快速增強之影響

Master Theses

■ Hong-Yu Su 蘇弘煜	Impacts of Southeastern Pacific Low Cloud on Tropical Sea Surface Temperature Pattern under Global Warming 全球暖化下東南太平洋低雲對熱帶海溫分布之影響
■ Po-Chia Chen 陳柏嘉	Characteristics of the South Asian High variability revealed by 200hPa geopotential height 用 200 百帕位勢高度來探討南亞高壓的變化特徵

■ Shang-En Li 李尚恩	Maintenance Mechanisms of the Long-Lived Concentric Eyewall Structure of Typhoon Lekima (2019): Axisymmetric Perspective 2019 年利奇馬颱風之長生命期雙眼牆結構維持機制： 軸對稱觀點
■ Yun-Ting Jhu 朱芸霆	Spring to Summer Transition of the East Asian Monsoon and the Climatological Intraseasonal Oscillation over the South China Sea 東亞季風春夏轉換期降雨和環流特徵及南海與周圍區域氣候季內震盪之辨識
■ Chen-Wei Chung 鍾晨瑋	In Situ Airborne Turbulence Observation in Taipei FIR 臺北飛航情報區現地空載亂流觀測
■ Sheng-Fong Huang 黃聖丰	The East-Asian Spring to Summer Monsoon Weather Calendar Constructed by Self-Organizing Maps of Atmospheric Low-level Winds and Applied to ENSO and Taiwan-Philippine Tropical Cyclone and Extreme Rainfall Case Analysis 運用自組織映射圖分類法建構之春夏轉換期東亞季風區低層風場天氣曆分析聖嬰現象與台灣及菲律賓區域的颱風和極端降雨特徵
■ Jun-Yu Chen 陳俊宇	Exploring the causes of difference in moat width in concentric eyewalls -Ensemble simulation of Typhoon Haiyan (2013) 以系集模擬方法探討不同寬度 moat 雙眼牆之成因-以海燕颱風(2013)為例
■ Shian-Rong Liao 廖先嶸	Torrential Remote Precipitation of Typhoon Nesat（2022）over Greater Taipei Area: Dual-polarization Radar Analysis, Ensemble Simulations and Sensitivity Experiments 尼莎颱風（2022）之大台北地區遠距降水事件探討：雷達雙偏極參數分析、系集模擬與敏感性實驗
■ Yen-Chi Wu 吳彥祺	Exploring the Role of Wind Stress Variability and Subsequent Oceanic Heat Transport in Cooling the Arctic Ocean 探討風應力變異與海洋熱傳輸變化在北極海冷卻中之作用