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Atmospheric Sciences

Newsletter

Contents

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News

台大大氣科學系所簡訊

Tribute to Prof. Wen-Shung Kau

On June 16, 2010 Prof. Wen-Shung Kau delivered his last lecture at NTU before his retirement on August 1, 2010. The department chairman gathered faculty, staff and students in the classroom to pay tribute and say farewell to him. Prof. Kau graduated from National Central University in 1972 and obtained his Ph.D degree from University of Utah in 1982. Then he returned to Taiwan and joined the faculty of NTUAS in 1988, and served as chairman during the period from 1993 through 1996. Throughout the past 26 years, he dedicated himself to teaching and inspiring students. His main area of instruction is in "Numerical Analysis" and "Advanced Numerical Prediction".

Prof. Kau's research interests cover a wide range of areas, such as numerical weather prediction, climate simulation and physical processes in the Atmosphere. He collaborated with Prof. Huang-Hsiung Hsu to develop a series of numerical models and an atmospheric general circulation model for simulation studies on the East Asian climate. The department wishes him the best and greatly appreciates the valuable contributions of Prof. Kau over the years.

柯文雄教授於 2010 年 7 月底退休。柯教授 1972 年自中央大學大氣物理系畢業，於 1982 年自美國猶他大學取得博士學位後，在美國伊利諾大學擔任副研究員，於 1985 年返回本系擔任副教授，1988 年升任教授，並於 1993 年至 1996 年擔任本系系主任。

在 26 年教學生涯中，柯教授貢獻所長，於大學部開設「數值分析」，研究所開設「高等數值天氣預報」等課程。柯教授的研究專長主要為數值天氣預報、氣候模擬及大氣物理的過程。和本系許晃雄教授合作在數值模擬方面，加入國際研究計劃，進行東亞氣候模擬工作。並利用台灣大學全球環流模式(NTUGCM)對影響亞洲季風的機制進行模擬與探討。

A group photo of the farewell for Prof. Wen-Shung Kau at Shinyeh on June 21, 2010. Three visitors also participated in the party, front row: Prof. Roger Smith of University of Munich, second from right; Prof. Michael Montgomery of NPS, third from right; Prof. Michael R. Hoffmann of Caltech, fourth from right.

Congratulations to…

Congratulations to I-I Lin and Yu-Heng Tseng on their promotion to Professor and Associate Professor.

恭喜林依依副教授升等為教授；曾于恒助理教授升等為副教授。

Prof. Chun-Chieh Wu received the Outstanding Research Award from the National Science Council in 2009. He also received the same award in 2007.

Prof I-I Lin received the NTU Outstanding Teaching Award in 2009.

吳俊傑教授於2009年獲得國科會傑出研究獎之殊榮。同年度，林依依教授獲頒台大教學傑出獎。

NTUAS students visited to National Central University

On 8 June 2010, the class of 'Introduction to Atmospheric Science Research' visited the Department of Atmospheric Physics and the Center for Space and Remote Sensing Research (CSRSR) of the National Central University (NCU) in Chung-li, Taiwan. The group, led by Prof. I-I Lin and two teaching assistants, were welcomed by the Chair of the Department of Atmospheric Sciences, Prof. Pei-Lian Lin and Prof. Tai-Chi Chen. Profs. Lin and Chen introduced the operation and research of dual-polarized radar as well as other observational equipments in NCU's observatory. The team were also received by the CSRSR team and learned about CSRSR's operation and research on satellite remote sensing, including watching a special 3D-stereoscopic film of Taiwan as viewed from the space.

大氣科學研究導論課程於 2010 年 6 月 8 日下午前往中央大學大氣系以及太遙中心參觀，參觀時間約三小時，一開始先參觀太空遙測及研究中心，之後到會議室聽取太遙中心近年來的研究成果以及相關工作，並欣賞由太遙中心自己製作的台灣環繞全島的 3D 立體電影，接著前往中大的氣象觀測園，由中大大氣的測計實驗室研究生替我們講解觀測儀器如地面風向塔等，隨後前往理學院大樓參訪中央大氣系著名的雙偏極化雷達等氣象雷達，不過碰巧其移動式雷達剛好因西南氣流實驗出任務而無法親眼目睹，最後到簡報室聽取由中大大氣系系主任林沛練老師的簡報，並作問題討論。

Prof. Chih-Pei Chang appointed Chair of Editorial Board of World Scientific Series on Asia-Pacific Weather and Climate

The World Scientific Publication Company of Singapore named Prof. Chih-Pei Chang the Chairman and Co-Chief Editor of the Editorial Board of World Scientific Series on Asia-Pacific Weather and Climate. Prof. Chang is currently Visiting Research Chair Professor of NTUAS and Distinguished Professor of Meteorology at Naval Postgraduate School. This book series is an expansion of the previous World Scientific Series on East Asian Meteorology and reflects the increasing priority placed on the weather and climate variability of all time scales over the entire Asia and Pacific region and surrounding areas, since they are often felt globally and their impacts on societies are often enormous. The other Co-Chief Editor is Prof. Congbin Fu of the Chinese Academy of Sciences and Nanjing University. Volume 4 of the book series, "Global Perspectives on Tropical Cyclones: From Science to Mitigation", edited by Johnny Chan of City University of Hong Kong and Jeff Kepert of Centre for Australian Weather and Climate Research, was published in April 2010. Volume 5, "The Global Monsoon System: Research and Forecast, 2nd edition", co-edited by Prof. Chang and five other leading international monsoon scientists, is scheduled for publication in early 2011.

張智北教授被任命為世界科學出版公司的編輯委員會主席以及世界科學系列關於亞太天氣和氣候的聯席編輯。

NTUAS has a large representation at AMS's 29th Conference on Hurricanes and Tropical Meteorology

Fifteen faculty and students attended the conference during May 10-14 2010, and at least fifteen other NTUAS alumni were among the participants. In addition to participation in the Conference and discussion of tropical meteorology and particularly tropical cyclones, it was also a great get-together time for so many alumni of NTUAS spanning across several generations to meet up.

2010 年 3 月 10-14 日，美國氣象學會於美國亞利桑那州土桑市舉行第 29 屆颶風與熱帶氣象國際研討會。此次會議約本系 30 位老師、學生及系友參與，會中並留下團體合影。

Members and associate of the department of 29th Conference on Hurricanes and Tropical Meteorology in Tucson, Arizona.
From left to right, front: Y-S Huang (NTU), C-H Lee (Miami Univ.), C-J Chen (GFDL), Y-T Yang (NTU), Y-C Liu (NTU), S-K Chan (NTU), S-L Sung (NTU), Y Lu (NTU), I-F Pun (NTU), K-H Chou (PCCU); back: L-Y Chang (TTFRI), Y-C Chen (NTU), I-I Lin (NTU), M-J Yang (NCU), H-C Kuo (NTU), H-H Hsu (NTU), C-S Lee (NTU), Y-H Kuo (NCAR), J-L Li (NASA), W-W Tung (Purdue Univ.), C-T Chen (NTNU), Tim Li (UH), C-C Wu (NTU), Ken Shih (NASA), S-J Lin (GFDL).

Prof. Michael R. Hoffmann delivered invited course on Environmental Organic Chemistry

Professor Michael R. Hoffmann of California Institute of Technology, a leading scientist in atmospheric and environmental chemistry, offered a course named Environmental Organic Chemistry at National Taiwan University from 2010 February 1 to July 31. The class attracted 20 undergraduate and 21 graduate students from atmospheric sciences, chemistry and environmental engineering.

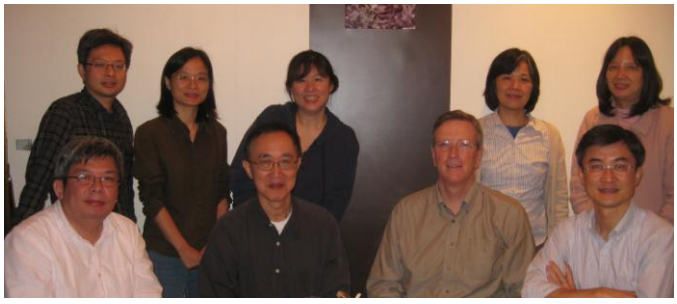
台大大氣系於2010年2月邀請Professor Michael Robert Hoffmann來台擔任一學期的講座教學，開設「環境有機化學」的課程。

A group photo of the farewell party for Prof. Michael R. Hoffmann. Front: Yu-Chen Lin of NTU Graduate Institute of Environmental Engineering (GIEE), first from left. Back: Shian-Chee Wu of GIEE, first from left; Ching-Hua Lo, Dean of College of Science, fourth from left.

Visit of Prof. Dennis Hartmann

Professor Dennis Hartmann of University of Washington, a leading climate scientist who previously served as the Chair of UW Department of Atmospheric Sciences and Interim Dean of College of Environment, visited the department on November 5 2010. He delivered a seminar entitled "Climate Feedback Processes and the Spatial Response to Climate Change," which attracted a full house of audience from both within NTU and other universities and institutions in Taiwan.

Professor Dennis Hartmann 於 2010 年 11 月 5 日來系參訪，並發表演講，吸引許多本校及外校同仁及學生參與。

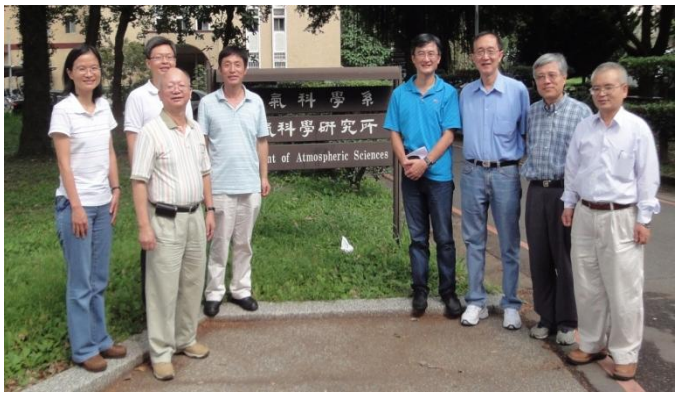


Prof. Dennis Hartmann, seated second from right, visited the department.

Visit of Prof. Ben-Kui Tan

Professor Ben-Kui Tan, former Chair of the Department of Atmospheric & Oceanic Sciences of Peking University, visited NTUAS on October 14 and delivered a seminar on the Interannual variation of eastern Pacific stationary waves and PNA. Both Prof. Tan and NTUAS hope to see enhanced academic exchange between Peking University and National Taiwan University.

北京大學大氣與海洋科學系譚本馗教授於今年 10 月 14 日來系參訪，並於 B105 發表演講，題目為「東太平洋靜止波列的年際變化及其與 PNA 的關係」，希望藉此機會拓展與強化兩系之間的學術交流。

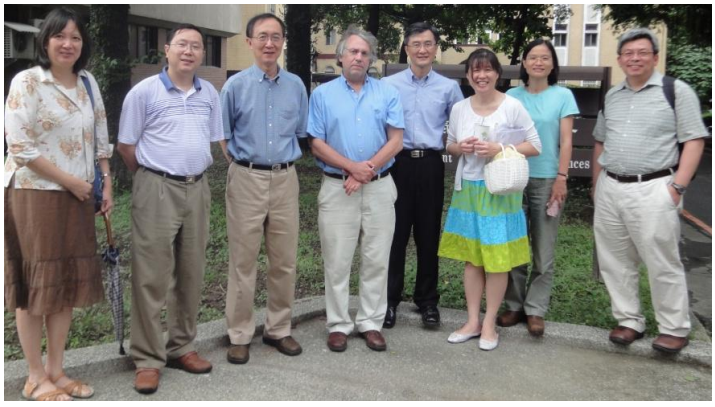


Prof. Ben-Kui Tan of Peking University, fourth from the left, visited the department.

Visits of Leading Tropical Cyclone Scientists

As typhoon research is one of the main thrusts of NTUAS, the department and Typhoon Research Center invited a number of international tropical cyclone researchers to visit the department in the spring and summer of 2010. In addition to those attending the International Workshop on Typhoon Morakot (IWTM), three leading tropical cyclone dynamists also visited the department during the Western Pacific Geophysics Meeting (WPGM) in June. They are Dr. Kerry Emanuel (MIT), Dr. Michael Montgomery (Naval Postgraduate School), and Dr. Roger Smith (University of Munich). The talks delivered by all these experts in the various venues are listed in the table in the next page.

本系於颱風相關領域之科學研究蓬勃發展，與台大颱風研究中心結合 2010 年各項國際會議，邀請多位國外頂尖颱風研究學者來台交流訪問。除了「莫拉克颱風國際研討會」的國外專家之外，六月間的「西太平洋地球物理會議」另外邀請了 Dr. Kerry Emanuel、Dr. Michael Montgomery 及 Dr. Roger Smith 三位到系所演講。所有來訪者的演講日期、會場及題目均列於下頁。



Prof. Kerry Emanuel of MIT, fourth from left, visited the department.

Opening Ceremony of APEC Research Center for Typhoon and Society

The Asia-Pacific Economic Cooperation (APEC) Research Center for Typhoon and Society (ACTS) was officially opened on November 22 2010 in Taipei with NTU as the host of its headquarters. A branch office is being set up in Manila, Philippines. The goal of ACTS is to promote scientific research and exchange among APEC member economies on typhoons and their socio-economic impacts in order to reduce and mitigate typhoon-related disasters.

NTUAS Prof. Ben Jou was appointed the Chief Executive Officer of ACTS, and Profs. George Tai-Jen Chen and Chih-Pei Chang were appointed to its 15-member Scientific Advisory Committee (SAC).

亞太經濟合作颱風與社會研究中心在國科會和菲律賓科技部支援下 2010 年 11 月 22 日於台北成立。此中心成立宗旨與任務，包括基礎氣象科技研發、資料資訊交換平台、推廣與人才培育搖籃。

Visit of Chinese Meteorological Society

The Chinese Meteorological Society visited the department on December 2 2010. The 16-member group was led by Dr. Xiao-feng Xu, Deputy Administrators of China Meteorological Administration.

中國氣象學會於2010年12月2日來系參訪，此次參訪由中國氣象局副局長許小峰率領共16位團員參與，希望藉此機會活絡兩岸氣象活動之交流。

The Chinese Meteorological Society visited the department.

Seminars from Leading Tropical Cyclone Scientists

Speaker	Date	Venue	Title
Yuqing Wang 王玉清 (University of Hawaii) (also delivered a graduate course "Tropical Cyclone Dynamics" in spring, 2010.)	2010.03.16	NTUAS	Sensitivity of Tropical Cyclone Inner-Core Size and Intensity to the Radial Distribution of Surface Entropy Flux
	2010.03.26	IWTM	What controls the Typhoon Inner-Core Size Change
	2010.06.25	WPGM	What controls the Inner-Core Size of Tropical Cyclones?
Eric Hendricks (Marine Meteorology Division, Naval Research Laboratory)	2010.03.23	NTUAS	Adiabatic Rearrangement of Hollow PV Towers
	2010.03.25	IWTM	Use of a Dynamic Initialization Procedure to Improve Typhoon Intensity Forecasts
Robert Rogers (Hurricane Research Division, AOML, NOAA)	2010.03.24	NTUAS	Inner-core Characteristics of Tropical Cyclone Rapid Intensification Events
	2010.03.25	IWTM	U.S. Operational Requirements for Improved Tropical Cyclone Predictions and Forecasting System of the Future
Sim Aberson (Hurricane Research Division, AOML, NOAA)	2010.03.24	NTUAS	Tropical cyclone-scale data and data assimilation at the Hurricane Research Division
	2010.03.26	IWTM	Global Impacts of Tropical Cyclone Observations on Numerical Models
Russell Elsberry (Naval Postgraduate School)	2010.03.25	IWTM	Tropical Cyclone-Related Precipitation and Flooding as a High Priority WMO Research Objective [keynote]
Tetsuo Nakazawa (MRI/JMA)	2010.03.25	IWTM	WMO/THORPEX Activities on Tropical Cyclone [keynote]
Johnny Chan 陳仲良 (City University of Hong Kong)	2010.03.25	IWTM	Structure and Track Changes Associated with Tropical Cyclone Landfall
Roger Smith (University of Munich)	2010.06.18	NTUAS	Tropical Cyclone Intensification - the Role of the Boundary Layer
	2010.06.24	WPGM	Tropical Cyclone Intensification
Michael Montgomery (Naval Postgraduate School)	2010.06.18	NTUAS	Do Tropical Cyclones Intensify by WISHE?
	2010.06.24	WPGM	Tropical Cyclogenesis within a Tropical Wave Critical Layer: Easterly Waves
Kerry Emanuel (MIT)	2010.06.24	WPGM	Tropical Cyclone Dressed Ensemble Forecasts Downscaled from ECMWF Ensembles
	2010.06.25	WPGM	Tropical Cyclones in a Warming World [Union lecture]
	2010.06.29	NTUAS	Tropical Cyclogenesis

NTUAS faculty attended Workshop on Cross Taiwan Strait Cooperative Research Project on Typhoon and Heavy Rain in Shanghai

Both sides of the Taiwan Strait are affected by global warming and climate change, and also suffer from severe weather events including typhoons and heavy rains. These events have attracted increasing attention on the efforts to improve forecasts and contingency planning. Scientists from both Taiwan and Mainland China, recognizing the importance of research in severe weather and disaster reduction, have engaged in exchanges and communications for some time and the pace has increased during the recent decade.

In recognition of this, in 2009 the National Science Council (NSC) and the National Natural Science Foundation of China (NFSC), primary research funding agencies on the two respective of the Taiwan Strait, , initiated a cooperative platform to facilitate cooperative projects between researchers in typhoon and heavy rain from both sides of the Strait. A joint workshop was held on September 6-7 2010 in Shanghai to exchange ideas and discuss preliminary research results.

The workshop was opened by Hui Yu, the Deputy Director of Shanghai Typhoon Institute. During the opening ceremony participants from both sides gave remarks reviewing the difficult period in the past when cross-strait meteorological interactions were obstructed by many artificial obstacles. They also expressed appreciation for that the newly-established cooperative platform between NSC and NFSC, which will be very valuable for carrying out typhoon and heavy rain research and effort of disaster reduction.

The two keynote talks were given by Lian-Shou Chen of the Chinese Academy of Meteorological Sciences and Chun-Chieh Wu, Chairman of NTUAS. Other NTUAS faculty members attending the workshop include George Tai-Jen Chen, huang-hsiung Hsu, Hung-Chi Kuo and Ben Jou.

國科會與大陸自然科學基金會共同舉辦的「兩岸颱風暴雨合作項目 2010 年學術交流研討會」，9 月 6-7 日於上海舉行。此次會議台大大氣系有陳泰然、周仲島、許晃雄、郭鴻基及吳俊傑等教授出席。此研討會開啟兩岸氣象學術正式交流的大門，並針對兩岸皆重視的颱風及豪雨侵襲的議題加以討論。會議特別安排邀請陳聯壽院士與台大大氣系吳俊傑主任進行特邀報告。台灣總共有 21 位學者出席，發表 14 篇論文，大陸方面則有 50 餘人出席，發表 16 篇論文。

A group photo of "Workshop on Cross Taiwan Strait Cooperative Research Project on Typhoon and Heavy Rain".

World Geography Overseas Fieldwork 2010 in Swaziland

In 2008 the Department of Geography of NTU initiated the "World Geography and International Development (WGIP)" project with the following goals: (1) To deepen knowledge on cross-cultural and cross-scale development issues in different research areas; (2) To enhance mutual understanding between Taiwanese people and people around the world; and (3) To develop a global vision of younger generations. In the summer break of 2008, the WGIP launched its first overseas fieldwork, called South Pacific Islands Research and Inquiry Team (SPIRIT), at Kiribati and Tuvalu. The following year, WGIP received funding through the 1st International Young Ambassador program of the Ministry of Foreign Affairs to run the second overseas fieldwork, called MERIT (Marshall Islands- Exchanges/Researches/Inquiries- Taiwan) in 2009 on the Marshall islands. Two of the MERIT members, Po-Hsiung Lin and Wei-ching Hsu, were from NTUAS and their work focused on the climate and oceanographic data analysis around the Marshall Islands.

In 2010, WGIP received funding support from TEX-RAY Corporation and the Ministry of Foreign Affairs to study the issue of rural development in Swaziland. Prof. Po-Hsiung Lin (NTUAS) and Prof. Shieh-Shen Chien (Department of Geography) and six students formed a team called START (Swaziland/Taiwan: Area Research Team), and ran the overseas fieldwork in Swaziland from August 15 to September 11, 2010 with two foci: rural development and the Umhlanga (Reed Dance Festival). For the former, START members gathered social information, such as land ownership, administrative systems, hydrological environments, crop conditions etc.. For the latter, START aimed to use perspectives of 'different generations' and 'different social backgrounds' to gain knowledge on how various people conceptualize the Umhlanga, which is the most important cultural festival in Swaziland. During a four-week stay at Swaziland, START members interviewed personnel at governmental offices (Statistics Bureau, Swaziland Meteorological Service and so on), TV and Radio stations, Taiwan Technical Mission and the University of Swaziland. They also made videos on 30 mini DV tapes on the Umhlanga which would be used to produce a documentary film for anthropological research. From December 6 to 14, 2010, a weekly exhibition at the library of NTU demonstrated the START fieldwork through oral presentations, posters, films and photos, and they will plan for the 4th WGIP in 2011.

由台灣大學地理資源學系所發起的 WGIP，自 2010 年已邁入第三年。2008 年 WGIP 組織調查團隊前往吉里巴斯與吐瓦魯進行一個月的調查。次年，本系林博雄副教授及人類學系童元昭副教授及地理資源學系簡旭伸助理教授率領名為 MERIT 的「知識志工、寰宇外交」團隊，帶領他們認識臺灣，互相交流，進而將馬紹爾介紹給臺灣社會。

今年，WGIP 組織「台大知識志工團」，同樣由簡旭伸及林博雄兩教授率領 6 位來自不同學系的學生於 8 月 16 日至 9 月 11 日造訪史瓦濟蘭，主要研討主題一為農村發展議題，一為史國傳統節慶活動－蘆葦節。台大圖書館將於 2010 年 12 月 6-14 日展示 START 成果展，同時並開始規劃第四屆 WGIP。

START members visited Swaziland Meteorological Service. (Sept. 1, 2010).

Department alumni reunion

On 26 June 2010, the NTUAS organized a large reunion as many overseas alumni returned to Taiwan to attend the American Geophysical Union (AGU)'s Western Pacific Geophysics Meeting and the Joint 2010 Central Weather Bureau Weather Analysis and Forecasting and Chinese-American Oceanic and Atmospheric Association (COAA) 5th International Ocean-Atmosphere Conference. It was also a celebration of the department's 55th anniversary. The attendees were first welcomed by the Department Chair (Prof. Chun-Chieh Wu) and the Alumni Committee Chair (Prof. I-I Lin). The opening speeches were delivered by Professor George T.-J Chen (Vice President of the National Taiwan University) and Professor Ching-Yen Tsay (incumbent Chairman of the Industrial Technology Research Institute of Taiwan). These were followed by talks by several alumni sharing their research and life experiences. A career-building discussion forum, led by 3 representative alumni members (Dr. Chun-Chieh Wu, Dr. Ming-Dien Cheng, and Ms. Shu-Fen Chen) was also held for fresh-graduates and students of the department. The gathering concluded with a cheerful tug of war contest between teams made up of alumni and current students.

For more details and photographs, please visit the newly-constructed alumni web page: http://www.as.ntu.edu.tw/Alumni/.

2010 年 6 月 26 日，台大大氣系舉辦了台大大氣系系友歡樂大團圓--精彩 55 活動。本次活動由主任吳俊傑及系友會主席林依依規劃一下午精采的活動。開場貴賓由兩位資深系友，陳泰然副校長及工研院院長蔡清彥擔任，之後並向天空施放 55 顆彩色氣球象徵台大大氣系成立 55 週年。隨後登場的生涯規劃座談會，邀請吳俊傑主任、前美林證券總裁程淑芬女士、中央氣象局預報中心鄭明典主任擔任主持人，和台下學生分享人生經驗，座談會結束後，舉辦一系列系友與學生競賽活動。

Professor Chung-Hsiung Sui joins the Department faculty

Professor Chung-Hsiung Sui graduated from NTUAS in 1976 and received Ph.D. in 1984 from UCLA. He then joined Goddard Space Flight Center of NASA where his main research is tropical convection and radiative processes, and the use of satellite remote sensing data in numerical models to analyze the effects of clouds on climate. He returned to Taiwan in 2001 as a funding member in the faculty of the Institute of Hydrology of the National Central University. In 2010 he returned to NTUAS as a Professor. While at National Central University his proposal entitled, "East Asian Hydrologic cycle and its response to climate change" was approved by the National Science Council under the Academic Summit Program. Please refer to the summary of this project on the page 11.

隋中興教授於 2010 年任教台大大氣系，所提「東亞區域水循環與其伴隨氣候暖化之反應」獲得國科會「學術攻頂」計劃補助，計劃內容請參閱第 11 頁之英文摘要。

Fifty five colourful balloons were released by the alumni members to celebrate the department's 55th anniversary.

International Workshop on Typhoon Morakot (2009), March 25-26, 2010

The International Workshop on Typhoon Morakot (2009) (IWTM) was held from March 25-26, 2010 at the GIS NTU Convention Center. The workshop was organized by NTUAS and the Taiwan Typhoon and Flood Research Institute (TTFRI) and sponsored by the National Science Council and National Applied Research Laboratories. The workshop provided a forum for scientists to discuss science questions and research challenges related to Typhoon Morakot, a tropical cyclones that slammed Taiwan in August 2009 and caused severe damage to southern Taiwan with a record-breaking accumulated rainfall in 3 days. The treacherous mudslides and flood brought by Morakot was the worst in fifty years.

The two-day workshop includes oral presentations and a student poster competition. The oral presentations were organized into six sessions:

1) Synoptic and large-scale environment
2) Wind & rainfall analyses
3) Numerical modeling
4) Observations (by satellite, radar, aircraft and other platforms)
5) Data Assimilations
6) Terrain effect

The workshop was co-chaired by NTUAS Prof. Cheng-Shagn Lee (Director of TTFRI) and Chun-Chieh Wu (Chair of NTUAS). A number of international scientists were invited to join the workshop, including by keynote speakers Professor Russell Elsberry (Naval Postgraduate School) and Dr. Tetsuo Nakazawa (MRI/JMA), Dr. Shian-Jiann Lin (GFDL/NOAA), Drs. Robert Rogersand Sim Aberson (Hurricane Research Division, AOML/NOAA), Dr. Eric Hendricks (Naval Research Laboratory), Dr. Frank Roux (University Paul Sabatier), Johnny Chan (City University of Hong Kong), Dr. Yuqing Wang (University of Hawaii), and Dr. Robert Fovell (UCLA).

Twenty-one students participated in the poster competition, which was intended to encourage students to share their research experience and practice their presentation skills. Five Ph.D. students and five M.S. students were judged winners.

莫拉克颱風國際研討會於 2010 年 3 月 25-26 日於台大集思會議中心舉行。本次研討會由颱風洪水研究中心籌備處及台大大氣科學系共同籌辦。研討會邀請國內外專家表最新研究成果，主要探討 2009 年 8 月重創台灣之莫拉克颱風，內容包含其綜觀及大尺度環境、風及降雨分析、數值模擬、衛星、雷達、載具之觀測、資料同化之分析及地形效應對莫拉克颱風造成之影響等。同時舉辦「莫拉克颱風國際研討會學生海報論文競賽」，計有 21 位研究生參與。

A group photo of "International Workshop on Typhoon Morakot (2009)".

Meeting Highlights

10th National Workshop on Atmospheric Science for graduate students, June 14, 2010

The NTUAS hosted the 10th National Workshop on Atmospheric Science for graduate students on June 14 2010. This is an annual event that provides a forum for graduate students to share their research ideas and results. Twenty-five graduated students from National Taiwan University, National Taiwan Normal University, National Central University, Chinese Culture University and National Defense University gathered to present their theses. The presentations were entered into a competition that was divided into two sections: master students, and doctoral students. The entries rated outstanding, excellent and honorary mention in each division received a cash award at the conclusion of the poster session.

The workshop was organized into six sessions:

1) Typhoon
2) Atmospheric Remote Sensing
3) Mesoscale Meteorology and Radar Meteorology
4) Weather Analysis and Forecast
5) Monsoon, Climate, and Hydrometeorology
6) Atmospheric Environment, and Other Topics

台大大氣科學系主辦第十屆全國大氣科學研究生學術研討會，並於 2010 年 6 月 14 日圓滿落幕。國內五所院校大氣科學相關系所研究生，分別發表 25 篇碩、博士論文。會後也頒獎表揚表現傑出之研究生，以鼓勵研究生們努力精進研究成果。

A group photo of "10th National Workshop on Atmospheric Science for graduate students".

Research Highlights

East Asian Hydrologic cycle and its response to climate change

Measuring and predicting rainfall is an important problem both scientifically and practically. The hydrologic processes determining rainfall involve cloud-radiative and surface-atmosphere exchange processes that are influenced by, and feedbacks onto, circulation. Such interactions are particularly important during the warm season in East Asia where monsoon surges and tropical cyclones are most active events produce heavy rain. Satellite observations since the 1990's and longer records of conventional observations suggest an increasing trend in frequency of heavier rain and a possible risk of increasing extreme weather events (like intense tropical cyclones) with global warming. The overarching goal of the project is to identify and understand changes of tropical clouds/rain and associated hydrologic processes in East Asia and neighboring warm oceans in response to climate warming. To accomplish the goal observational and modeling analyses are proposed with a working hypothesis that a warming climate leads to more frequent heavy rain events (i.e. higher precipitation efficiency for heavier rain) with strong updrafts that drive the compensating subsidence, through broad-scale overturning circulation. The broad-scale subsidence regulated by radiative cooling controls the intermediate and light raining events. The observational analyses are based on the new generation reanalysis data, satellite and surface rainfall measurements for the recent 30 years to carry out the following two tasks: to identify the broad scale features of hydrologic cycle as the climate background for the proposed study; and to perform a trend analysis of cloud/rainfall distribution in different climate regimes (like land vs. ocean) to identify rainfall spectral shifts in recent decades. For modeling analysis, we adopt a regional climate modeling (RCM) approach and a hydrologic process modeling (HPM) approach. The RCM simulations are constrained by observed or simulated broad scale variability through a spectral nudging. The HPM simulations will be based on a high-resolution version of the Weather Research and

Forecasting Model with convective-radiative and atmosphere-surface exchanges processes like those in cloud system resolving models. The simulated hydrologic cycles will be evaluated against satellite measurements through a "model to satellite approach", and the observed trends in cloud/rain identified in observational analysis. The overall results will be synthesized to reveal consistent changes in basic variables (temperature, humidity, circulation), cloud/rainfall/updraft spectral distributions in key climate regions, and corresponding water budget with climate warming.

Tropical intraseasonal oscillations and convection-coupled waves in the western North Pacific during boreal summer

The dominant tropical intraseasoal oscillation (TISO) encompasses mutli-scale convection-coupled wave activities. Such scale interactions are particularly prominent in Northwest Pacific where strong winter and summer monsoons modulate and interact with the ISO. In boreal summer, the seasonal transition from South China Sea monsoon in late May through mid-July to Northwest Pacific monsoon in the rest of the summer influences the ISO significantly. During the warm monsoon season, the principal ISOs have period range of 30-60 days and 10-20 days. The latter (quasi-biweekly oscillation, QBWO) occurs within the 10^o – 30^o band in both hemispheres. It is more evident in the tropical western Pacific and Indian Ocean where most observed QBWOs are westward moving. The QBWO is comparable with the 30-60 day oscillation in amplitude, and their evolution often coincides with the active and break phases of the Asian summer monsoon. The climatology of the QBWO in the tropical Western Pacific and Indian Ocean has been established by two studies based on tracking and composite methods. The observed features still awaits a systematic comparison with theoretical understanding of convectively coupled equatorial - Rossby (ER) waves in the presence of monsoon mean flow. Therefore, this study analyzes NCEP reanalysis for the years 2000–2007 to document the structure and three -dimensional energy balance of QBWO over the WNP during summertime, and to investigate the initiation and maintenance of QBWO.

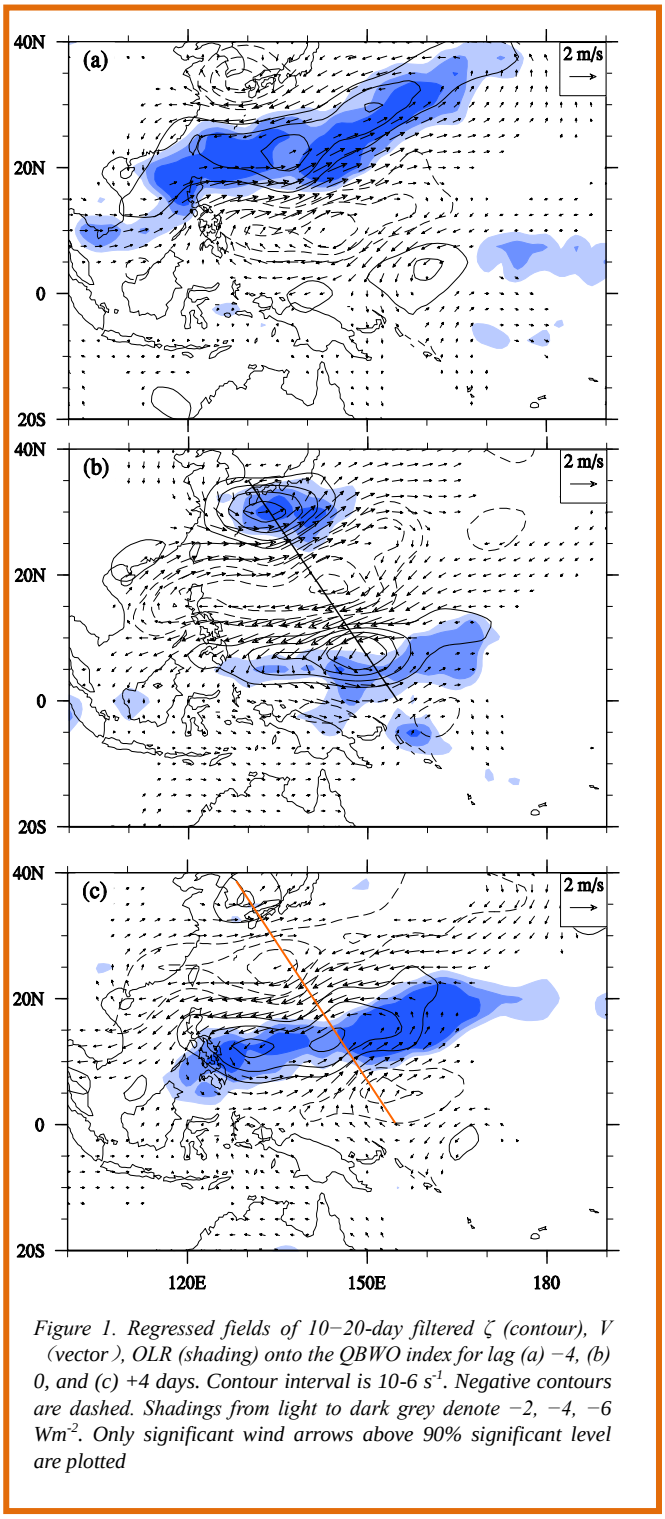


Figure 1. Regressed fields of 10−20-day filtered ζ (contour), V (vector), OLR (shading) onto the QBWO index for lag (a) −4, (b) 0, and (c) +4 days. Contour interval is 10-6 s^{-1}. Negative contours are dashed. Shadings from light to dark grey denote −2, −4, −6 Wm^{-2}. Only significant wind arrows above 90% significant level are plotted

The QBWO emerges from the equatorial region and propagates northwestward. Its horizontal structure exhibits a mainly longitudinal elongation with a slight southwest-northeast tilt (Fig. 1). In the vertical, the QBWO tilts northwest with height that gives rise to a structure of the first baroclinic mode. The centers of vorticity and vertical motion near the equator showed a phase lag of about one quarter wavelength, consistent with the characteristics of equatorial waves, whereas the cyclonic circulation is tightly coupled with anomalous convection as the wave moves away from the equator. Energetic analysis of QBWO revealed that diabatic heating in the tropics and baroclinic process in the subtropics play important roles in the generation of eddy available potential energy (EAPE). In turn, the conversion from EAPE to eddy kinetic energy (EKE) and the barotropic conversion are major sources for EKE to compensate the EKE loss by redistribution and dissipation (Fig. 2). Tracing the QBWO to equatorial disturbances shows features that are characteristic of equatorially trapped n=1 Rossby mode in terms of the phase speed and group velocity. This mode exhibits a horizontal structure with zonal planetary wavenumber around 6 and a nearly symmetric circulation about the equator.

Influences of the QBWO along with the 30-60 day TISO on synoptic wave events like tropical cyclones is further investigated through an analysis of tropical multiscale wave disturbances in June 2004 in the western North Pacific (WNP). This month was an unusual period in the developing stage of a warm (El Niño) episode and a strong convective phase of the Madden-Julian oscillation (MJO). Such climate background is shown to provide large-scale favorable circulations for TC formation.

These include the warm sea surface temperature anomalies (SSTAs) associated with a developing El Niño and the convective heating of the MJO to jointly induce weaker easterly trade winds and a large-scale cyclonic circulation anomaly in the WNP. Through a space-time filtering of the outgoing longwave radiation (OLR) and 850-hPa wind fields,the MJO, Rossby waves and mixed Rossby-gravity (MRG) waves (or tropical depression (TD)-type disturbances) are identified (Fig. 3). From the evolution and structure of these high-frequency waves in relation to that of the MJO and the climate background, the heating and enhanced low-level cyclonic flow in the WNP associated with the MJO and climate background can be attributed to the initiation, propagation and energy dispersion of tropical Rossby and MRG-TD waves as they interact with convection. The relative importance of these large-scale waves to the five TC formations (A-E) is further quantified by examining the normalized vorticity at 850-hPa and OLR at the genesis location of each TC. TC A and TC C (TCs B and TC D) were related to the Rossby wave (MJO), and the MRG-TD was mostly related to TC E.

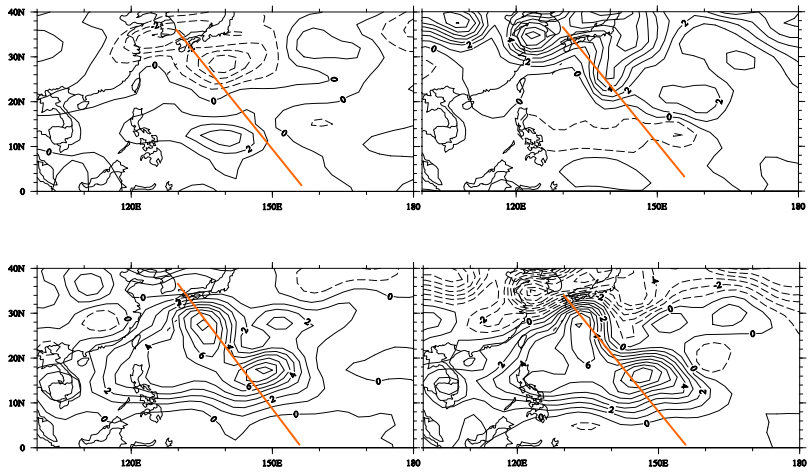


Figure 2. Vertically averaged distributions [Contour interval 10^{-6} m^2s^{-3}] of (a) the EKE barotropic conversion, $-V_h' \bullet (V' \bullet \nabla \bar{V}_h)$, (b) conversion from EAPE to EKE, $-(R/p)\,T'\omega'$, (c) EAPE generation by baroclinic conversion, $-(R/S_pP)[T'V_h' \bullet \nabla_h \bar{T}]$ (d) EAPE generation by diabatic heating, $(R/c_pS_pP)\bar{T}'J'$.

References

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Ching, L., **C.-H. Sui**, and M.-J. Yang, 2010: An analysis of multi-scale nature of tropical cyclone activities in June 2004. Part 1: climate background. *J. Geophys. Res*. (in revision).

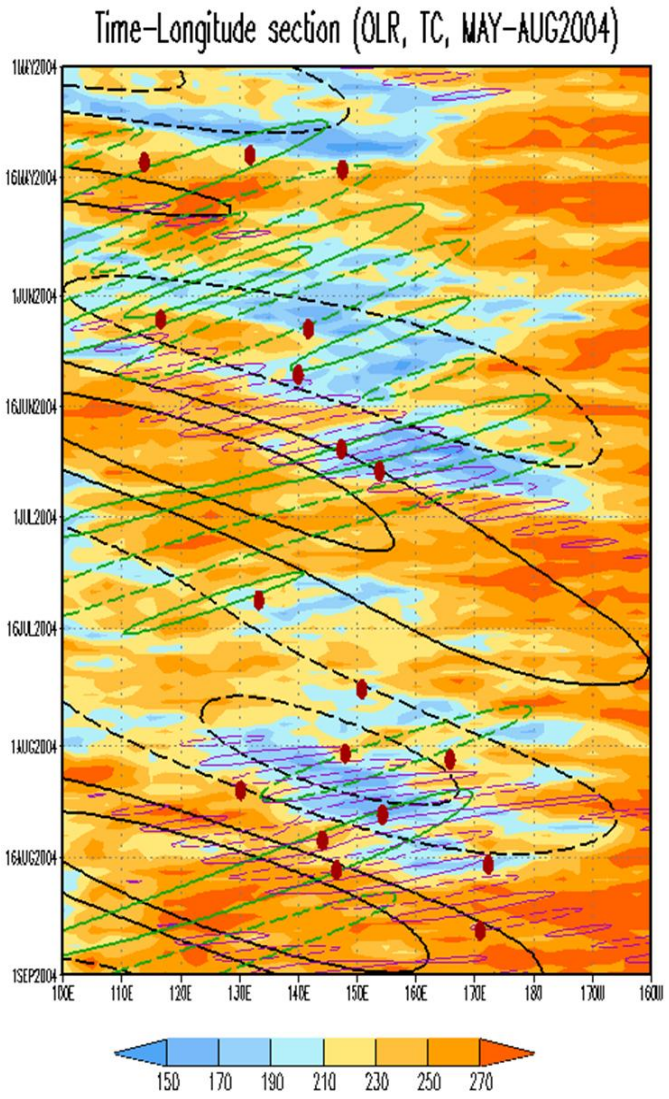

Figure 3. Hovmöller diagram (1 May to 1 Sept., 2004) of OLR (5S-5N) (color); OLR_{MJO} (5S-5N) (Black contour); ζ_{ER} (Green contours), v_{MRG} (purple contours) (5N-15N)

隋中興教授於 1976 年自本系大學部畢業，1979 年到美國加州大學洛杉磯分校大氣科學研究所研讀熱帶氣象，於 1984 年 9 月獲頒博士學位，畢業後至美國太空總署 Goddard 太空飛行中心工作，主要研究熱帶對流-輻射過程，以衛星遙測資料結合模式，分析雲影響氣候的機制。2001 年，返台至中央大學水文科學研究所任教，拓展東亞季風區的氣候與降雨變異的研究。2002 年獲頒傑出人才發展基金會「傑出人才講座」。2010 轉回母系擔任教授。隋教授主要研究興趣為水循環過程與氣候動力，這是大氣與熱帶海洋科學研究最具有挑戰性的領域，也是改進熱帶颱風、季風降雨預報的關鍵。

隋教授於中央大學所提「東亞區域水循環與其伴隨氣候暖化之反應」計畫目標在識別並了解東亞與臨近海域內，熱帶雲-降雨與伴隨的水循環過程隨氣候暖化的改變。決定降雨的水循環過程包含雲–輻射、大氣–海陸交換過程與環流的互動。在季風擾動與熱帶氣旋降雨最活躍的東亞暖季，此過程尤其重要。

2010 Doctors' Theses

Chi-Hua Wu	Upper-tropospheric forcing on the western North Pacific summer monsoon
Yin-Mao Wang	Study of the role of latent heating in upper-level cold-core low formation during meiyu season
Jyh-Huei Tai	Numerical Simulation of the Development of the Convective Boundary Layer over the Ocean adjacent of Taiwan in Winter
Yu-Ming Tsai	Filamentation Time Diagnosis
Cheng-Han Wu	Topographic Effects on the MJO in the Maritime Continent: Aspects of Dynamics, Heating Profiles, and Cloud Distribution
De-En LIN	Numerical simulation and diagnostic analysis of extreme rainfall events during the Mei-Yu season
Chih-Shin Liu	A diagnostic study of extratropical transition over East Asia

2010 博士論文

吳奇樺	對流層上層擾動影響西北太平洋夏季季風研究
王尹懋	梅雨季高層冷心低壓形成與潛熱釋放之角色研究
戴志輝	冬季台灣近海對流邊界層發展之數值模擬
蔡禹明*	帶狀化時間診斷
吳政翰	海洋大陸對季內震盪產生的地形效應：動力機制以及熱力與雲結構之研究
林得恩	梅雨季超大豪雨個案之模擬與診斷分析
劉志信	東亞颱風轉變為溫帶氣旋之個案診斷分析研究

2010 Masters' Theses

Yu-Ching Chen	A Study on the Occurrence of Looping Track for Typhoons Affecting Taiwan
Rong-Guang Hsiu	Mesoscale Boundaries and Storm Initiation During SoWMEX/TiMREX
Shou-Hung Chien	Modeling Air-Land-Sea Interaction using Regional Climate System Model (RCSM) in Monterey Bay, CA
Chien-Hsuen Wang	Modeling Oceanic Response to Idealized Typhoons
Kai-Yuan Cheng	The Simulation of Internal Gravity Waves Induced by Convective Systems and Its Application to Clear-air Turbulence Diagnostics
Pei-Yun Hsieh	Maintenance of the Philippine Sea Anticyclone
Hsiao-Ching Huang	Association of typhoon characteristics with large-scale environment over the western North Pacific
Chao-Yuan Yang	Rapid Intensification of Supertyphoons in the western North Pacific
Hsuan-Wei Wang	The Simulation and Diagnosis of Aircraft Icing
Shao-Liang Sung	Impact of the Upper-Ocean Thermal Structure on Typhoon Intensity Change - Synergy of EnKF Data Assimilation and a Coupled Atmosphere-Ocean Model
Yi Lu	Tropical Cyclone Variability Based on Regional Climate Model Simulation
Chu-Ying Kung	An analysis of quantitative precipitation forecast for Mei-Yu season based on a conceptual climatology model

2010 碩士論文

陳雨青	颱風侵台期間路徑發生打轉之研究
修榮光	西南氣流實驗期間中尺度邊界與對流激發
簡碩宏	模式耦合應用於海地氣交互作用
王建勛	理想颱風對海洋影響之數值模擬
鄭凱元	對流引發內重力波之模擬與晴空亂流個案診斷應用
謝佩芸*	菲律賓海反氣旋之維持機制
黃筱晴	西北太平洋上大尺度環境與颱風特性的關係
楊朝淵	西北太平洋超級颱風快速增強現象之原因探討
王璿瑋	飛機積冰模擬與診斷
宋紹良*	上層海洋熱力結構對颱風強度變化之影響—海氣耦合模式實驗研究
呂易	熱帶氣旋變異度的區域氣候模式模擬分析
龔楚嫕	氣候概念模式於梅雨定量降雨預報之評估與分析

Jui-Ling Kuo	Influence of Multiscale Circulation on Tropical Cyclone in the Western North Pacific Ocean: Typhoon Morakot (2009) as an Example	郭芮伶	西北太平洋地區多重尺度環流對熱帶氣旋的影響 — 莫拉克（2009）颱風個案研究
Fu-Chieh Tsao	A Barotropic Study on Concentric Structure Formation and Size Variability	曹富傑	雙眼牆結構生成與尺度大小變異：正壓動力探討
Yu-Chen Wang	The Impact of Land-Cover Conversion on the Regional Torrential Rain Events	王宇晨	土地利用改變對區域強降雨的影響
Ping-Yuan Hung	East Asian Monsoon Metrics for Model Evaluation	洪萍遠	海氣耦合模式東亞季節預報評估
Chia-Wei Hsu	A Study of Time Integration Techniques in Ooyama's Moist Convection Model	許家瑋	Ooyama 濕對流模式積分方法探討
Kuang-Yu Chang	Western Boundary Current Intensification Modeling with Chebyshev and Immerse Boundary Methods	張光宇	西方邊界流模擬—切比雪夫配置法與沉浸邊界法整合
Nan-Hsun Chi	Atmosphere and Ocean Pre-conditions of the Dual Supertyphoons, Ivan and Joan, 1997	紀南薰	1997 年艾凡和喬安雙超級颱風大氣海洋前置條件

*Recipients of the Dean's Award *院長獎得主

No.3 (October 2009)

- Professor Chun-Chieh Wu appointed as NTU Distinguished professor
- Professor George Tai-Jan Chen honored by State University of New York at Albany
- Professor I-I Lin's research on Tropical Cyclone Nargis 2008 Highlighted by NASA
- Professor Hung-Chi Kuo presented National Chair Professor Lectures at four National Universities
- Tribute to Prof. Wu-Ron Hsu
- Department Retreat
- Department Review
- T-PARC (THORPEX-PARC)
- Southwest Monsoon Experiment/Terrain-influenced Monsoon Rainfall Experiment (SoWMEX/TiMREX)
- International Workshop on Advanced Typhoon and Flood Research
- Severe Weather and Heavy Rain Research in Taiwan
- Structure and Dynamics of the Meiyu Frontal System
- 2009 Doctors' & Masters' Theses