



Newsletter

News

臺大大氣科學系所簡訊

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2012 Doctors' & Masters' Theses Faculty Position Announcement

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The Department Retreat

The department retreat was held at Wulai on February 13th, 2012. All faculty members participated in planning for the recruiting of new faculty members and the nurture of outstanding students. For new faculty members, the department keeps improving the practices for new faculty members to receive full support in administration, teaching and student guidance. As for student training, the department encourages outstanding Master's students to continue their education and pursue PhD degrees, to create an ideal environment for research and to train students on a long-term basis.

本系靜修會於2012年2月13日在烏來舉行。全系教授共同參加，針對新聘教師規劃及人才培育等進行充分討論。新聘教師方面，系上建立良好制度使新進老師在行政、教學、指導學生等各方面都能得到充分的支持。人才培育方面，鼓勵優秀學生碩士班直升博士班，提升學術研究風氣，建立良好的學術環境與氛圍，希冀長期培育優秀人才。



A group photo of the department retreat on Feb. 13th, 2012.

Awards

Academician Kuo-Nan Liou, an NTUAS alumnus, and currently a distinguished professor at UCLA, received the 2012 Gold Medal from the International Radiation Commission under the auspices of the International Union of Geodesy and Geophysics.

Prof. Shaw-Chen Liu, Director of the Research Center for Environmental Changes, Academia Sinica, and a Distinguished Chair Professor of NTUAS, was elected Academician of the Academia Sinica.

Prof. Tai-Jen Chen remains appointed as Chair Professor of NTU for 2012-2015.

Prof. Chun-Chieh Wu remains appointed as Distinguished Professor of NTU for 2012-2015.

Prof. Jen-Ping Chen received the NTU Teaching Award.

Assistant Prof. Hui-Ming Hung received the NTU Teaching Award.

系友廖國男院士榮獲國際輻射委員會金質獎章。

劉紹臣合聘特聘講座教授當選中央研究院院士。

陳泰然教授續獲台大講座教授殊榮。

吳俊傑教授續獲台大特聘教授殊榮。

陳正平教授獲 100 學年度教學優良獎。

洪惠敏教授獲 100 學年度教學優良獎。

Parent-Teacher Conference Day

NTU held the Parent-Teacher Conference Day on September 8th. In the afternoon, NTUAS invited parents and freshmen to visit the department and to attend the department orientation.

台灣大學在 9 月 8 日上午舉辦新生家長日。大氣系於下午舉辦新生家長日，邀請家長們了解大氣系系況、課程及環境。



Prof. Chun-Chieh Wu made a presentation on Parent-Teacher Conference Day.

2012 Commencement

The 2012 Commencement of NTU took place in the morning of June 9th, along with dean's award ceremony. In the afternoon, a hooding ceremony for all new graduates of NTUAS was held in the department, with family and friends sharing this cheerful moment. The students graduating from NTUAS this year include 24 Bachelors, 15 Masters and 2 Ph.Ds.

台灣大學 2012 年畢業典禮在 6 月 9 日上午於台大體育館舉辦。當天下午系上進行畢業典禮，由吳俊傑主任撥穗，並邀請畢業班導師及畢業生親友共同參與。今年總共有 24 名學士、15 名碩士及 2 名博士從台大大氣系所畢業。



Group photos of graduating students and mentoring professors for the class of 2012.

Class of "Paleoclimatology: millennial-scale climatic changes and warming ice age"

During the second semester of the 2011 school year, NTUAS invited Prof. Chun-Hung John Chiang from UC Berkeley and Dr. Shih-Yu Lee from the Research Center for Environmental Changes, Academia Sinica to jointly deliver the course "Paleoclimatology: millennial-scale climatic changes and warming ice age", which attracted a good number of students from Atmospheric Sciences and Geosciences. Prof. Chiang also held a seminar on May 1st, entitled "Hypothesis for a global atmospheric reorganization during abrupt climate changes of the last glacial period".

100 學年度第 2 學期，大氣科學系邀請加州大學柏克萊分校江俊宏教授和中研院環境變遷中心李時雨博士一同開設「古氣候：千年尺度氣候變遷與冰期暖化」課程，計有大氣科學系及地質科學系十數位學生修習。江教授並於 5 月 1 日在大氣科學系發表專題演講，講題為「Hypothesis for a Global Atmospheric Reorganization during Abrupt Climate Changes of the Last Glacial Period」。

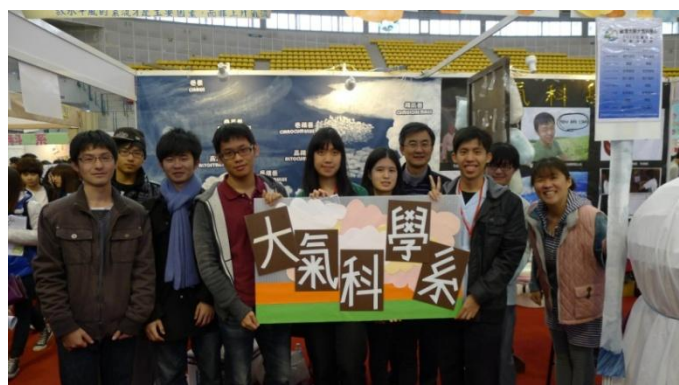


Prof. C.-H. Chiang and Dr. S.-Y. Lee with students at the class "Paleoclimatology: millennial-scale climatic changes and warming ice age".

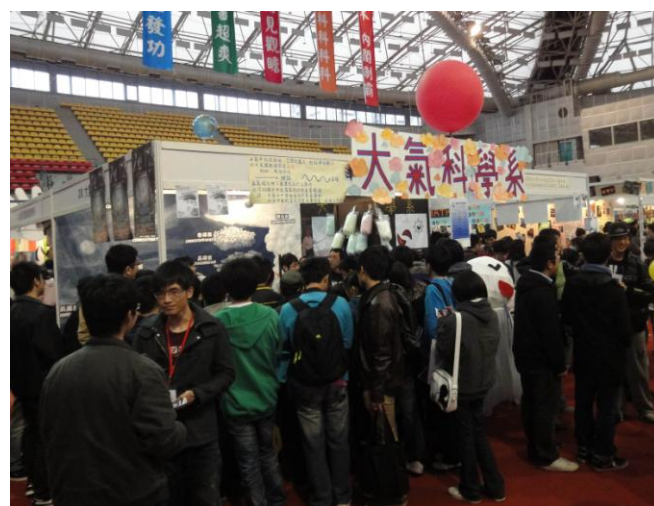
The NTU Azalea Festival

The NTU Azalea Festival kicked off on March 10th, with activities including department exhibitions, student club exhibitions and performances that attracted high school students from all over Taiwan. NTUAS also set up a booth, providing introduction to our department, courses and some fundamental knowledge of atmospheric sciences, to give high school students a better picture of the department at a time when they are planning their college majors.

台灣大學杜鵑花節於 3 月 10 日舉行開幕儀式，內容包括學系博覽會、社團聯展以及表演活動，吸引台灣各地高中生前來參觀，認識台大各個科系，作為升學時的參考。



A group photo of the NTUAS students with Profs. C.-C. Wu and I-I Lin who participated in this festival posing in front of the NTUAS booth.



A photo of the NTUAS booth.

Study-Abroad Program

Through the study-abroad program of NTU College of Science, the Atmospheric Sciences department encourages undergraduate students to participate in collaborative activities with overseas academic institutions.

One of our undergraduate students, Chiung-Yin Chang, took the opportunity and visited the NOAA Geophysical Fluid Dynamics Laboratory with Drs. Shian-Jiann Lin and Jan-Huey Chen to learn more about high-resolution global modeling. She focused on the simulations of boreal summer tropical precipitation intensity distribution. The comparison between the 3-hour precipitation prediction of the Geophysical Fluid Dynamics Laboratory High-Resolution Atmospheric Model (GFDL HiRAM), conducted with observed sea surface temperature at 25-km resolution, while the Tropical Rainfall Measuring Mission (TRMM) satellite observations was examined for model validation. Sensitivity tests by altering a parameter controlling the cumulus entrainment rate in the convective scheme were further constructed to study the relationship between resolved convections and parameterized convections as well as their effects on precipitation intensity distribution and average climate state.

Another student, Kuan-Ting Ou, visited the Earth and Planetary Science department at Massachusetts Institute of Technology (MIT) for 90 days throughout June and July as a visiting student. During this period, he took part in Prof. Daniel Cziczo's Cloud and Aerosol Lab, where they carried out an experimental study of ice nucleation chamber. His main study was on the construction between lab instruments and computer communication interface, the testing of the chamber's instrumental environments and arranging theories on ice nucleation.

Furthermore, throughout the summer, students Ssu-Yu Chi and Shiu-Hui Tseng visited the Atmospheric Science Research Center (ASRC) of the State University of New York at Albany for a short-term research on

"Atmospheric Ozone Properties, Its Climate Impacts and Measurements". Advisor Prof. Wei-Chiang Wang is interested in studying how human behaviors impact global and regional climate. The students were required to participate in the research by reading research papers (Climate Chemistry Interaction: Future Tropospheric Ozone and Aerosols, Wang, et al., 2012) and finding new research materials accordingly. They also learned how to write a thesis and draw up the title and summary.

Aside from the programs in the United States, we also collaborated with institutes from Japan. The Nagoya University short-term numerical model training courses ran from August 20th to 26th, 2012. Our undergraduate students Chuan-Chieh Chang, Chin-An Lin, Yi-Chang Chen, Yu-Yu Lin, and Kuan-Ting Kuo visited the Laboratory of Meteorology, Hydrospheric Atmospheric Research Center of Nagoya University. Under the instructions led by Prof. Uyeda and Prof. Tsuboki specializing in micro cloud-physics, weather radar and mesoscale weather simulation, and by Prof. Shinoda specializing in boundary layer, weather radar, and mesoscale weather system simulation, the students learned to use the CReSS model built by the laboratory. (CReSS: Cloud-Resolving Storm Simulator, Tsuboki and Sakakibara, 2002; 2007) This model represents the non-hydrostatic equilibrium and compressible fluid, and is used to simulate clouds and precipitation systems, especially in designing numerical model experiments and sensitivity test experiments on severe weather. The students read related files, made physical calculations, modified computer codes, and ran models during the courses. The focus of the internship was to diagnose past storms and weather events in the convective scale, which were then compared to and analyzed with related data.

在理學院海外教育計畫，本系積極鼓勵學士班學生參加海外教育研究。2012年6月初張瓊尹同學前往

位在普林斯頓大學的美國海洋大氣總署地球流體力學實驗室(NOAA Geophysical Fluid Dynamics Laboratory)，由林先建博士和陳占慧博士的指導進行兩個月的短期研究。

歐冠廷於6月23日前往美國麻省理工學院地球與行星科學系(Cloud and Aerosol Lab at Massachusetts Institute of Technology)進行為期90天的短期研究。在這段時間中，參與由Professor Daniel Cziczo所主持雲與氣膠實驗室的Contact Freezing Chamber計畫。

2012年6月25日~9月5日由本系紀思羽和曾琇

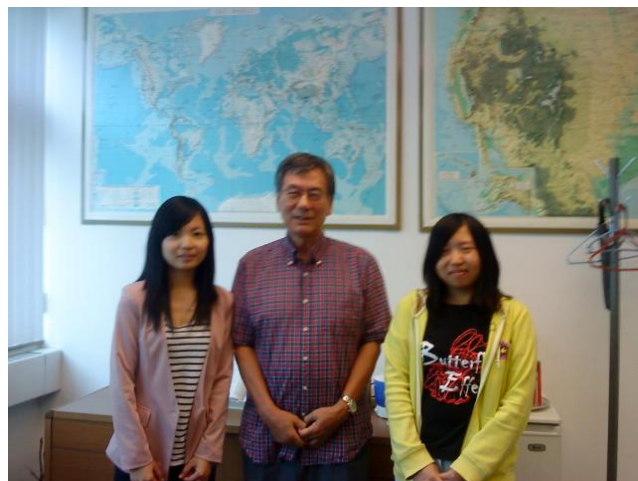
蒼同學到紐約州立大學阿爾巴尼分校-大氣科學研究中心(Atmospheric Science Research Center, Albany)，跟隨王維強教授進行短期研究-學習大氣臭氧性質：氣候影響和測量。

8月20~26日由本系大學部張傳杰、林晉安、陳逸昌、林佑宇和郭冠廷等同學在吳俊傑主任帶領下拜訪日本名古屋大學由Hiroshi Uyeda教授和Kazuhisa Tsuboki教授所主持的地球水循環研究中心氣象學研究室(Laboratory of Meteor, Hydrospheric Atmospheric Research Center)修習數值模式訓練課程。



← Prof. Dan Cziczo (third from right) and Kuan-Ting Ou (first from right) from the Cloud and Aerosol Lab at Massachusetts Institute of Technology.

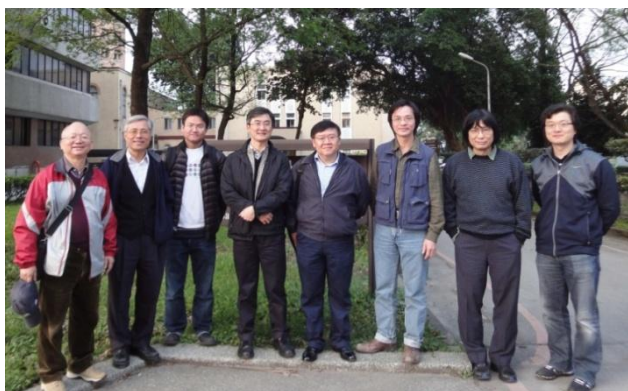
Prof. Wei-Chiang Wang (middle), Ssu-Yu Chi (first from right) and Shiu-Hui Tseng (first from left) at the Atmospheric Science Research Center of the State University of New York at Albany.



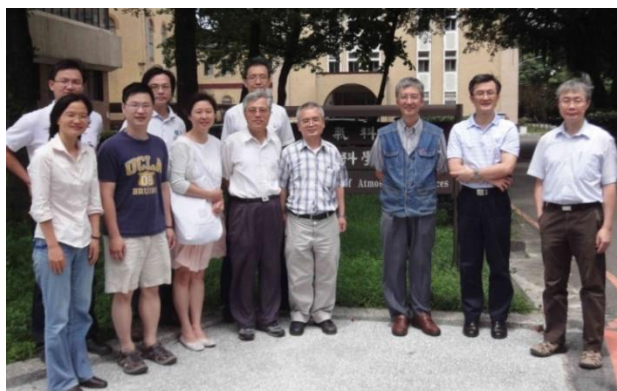
A Group photo during the visit of Laboratory of Meteorology, Hydrospheric Atmospheric Research Center in Nagoya University. First row (from left to right): Dr. Masaya Kato, Prof. Kazuhisa Tsuboki, Prof. Chun-Chieh Wu, Prof. Hiroshi Uyeda and Prof. Taro Shinada. Second row (from right to left): Kuan-Ting Kuo, Chin-An Lin, Yu-Yu Lin, Yi-Chang Chen and Chuan-Chieh Chang.

List of Visitors and Presentations

Date	Visitors	Seminar titles
Feb. 8 th	Dr. Wei-Kuo Tao Goddard Space Flight Center NASA, USA	The Impact of the Microphysics and Aerosol on Convective Systems
Feb. 17 th	Prof. Songyou Hong Department of Atmospheric Sciences Yonsei University, South Korea	Interaction of PBL and Precipitating Convection
Feb. 23 th	Prof. Hiroyuki KuSaKa University of Tsukuba, Japan	Climate Modeling and Simulation Across the Scale by the LES, WRF, and GCM: Turbulence, Urban Climate, and Tropical Cyclone
Mar. 13 th	Dr. Kosuke ITO Kyoto University, Japan	Optimal Metric and Control Variables for Improving Tropical Cyclone Forecasts
Mar. 21 th	Prof. Jin-Yi Yu Department of Earth System Science University of California, Irvine, USA	Central-Pacific El Nino: Dynamics, Impacts, and Modeling
Mar. 23 th	Prof. Hsu-Kuang Wang School of Meteorology University of Oklahoma, USA	Hybrid Variational-Ensemble Data Assimilation
Mar. 30 th	Dr. Peter Black Naval Research Laboratory, USA	Small Scale Structures in the Eye-Wall of Super Typhoons

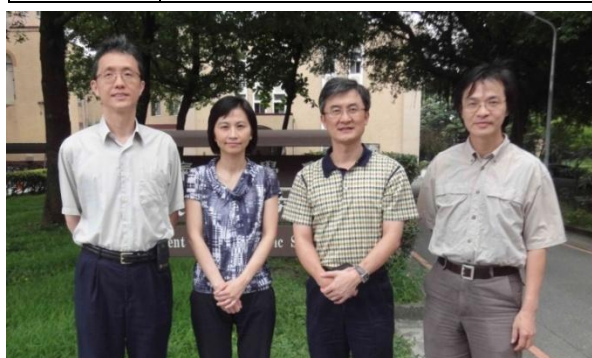


Prof. Jin-Yi Yu (second from right) from the University of California visited the department on March 21th, 2012.

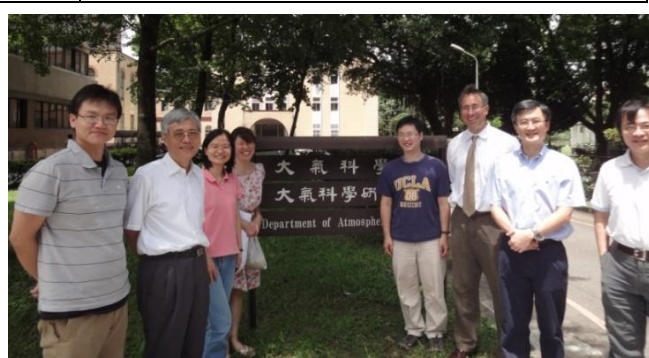


Prof. Kon-Kee Liu (third from right) of National Central University and Dr. Kuo-Sen Kuo (third from left in second-row) of NASA Goddard Space Flight Center visited the department on May 22th, 2012.

Date	Visitors	Seminar titles
Mar. 30 th	Prof. Shuyi Chen Rosenstiel School of Marine and Atmospheric Sciences University USA	DYNAMO Field Campaign and Some Preliminary Results from P-3 Aircraft Data and Satellite Cloud Cluster Tracking
Apr. 10 th	Dr. William K. M. Lau Goddard Space Flight Center NASA, USA	The Aerosol-Monsoon Climate System – a New Paradigm
May 1 st	Prof. John C. H. Chiang Department of Geography and Berkeley Atmospheric Sciences Center University of California, Berkeley USA	Hypothesis for a Global Atmospheric Reorganization during Abrupt Climate Changes of the Last Glacial Period
May 22 th	Prof. Kon-Kee Liu Institute of Hydrological Sciences National Central University, Taiwan	The Influence of Climate Oscillation on the Biogeochemistry of the northern South China Sea
May 23 th	Dr. Kwo-Sen Kuo Goddard Space Flight Center NASA, USA	Morphological Properties Derived from Simulated Ice Particles and Implications to Cold-Precipitation Remote Sensing
May 24 th	Dr. Jui-Yuan Chiu University of Reading, UK	A New Paradigm for Observing Earth's Energy Imbalance and Aerosol-Cloud Interactions
May 31 th	Prof. Yuh-Lang Lin Department of Physics North Carolina A&T State University USA	Effects of Landfall Location and Approach Angle of a Typhoon Vortex Encountering a Mesoscale Mountain Range
Jun. 5 th	Dr. Christopher Landsea Science and Operations Officer National Hurricane Center, USA	Hurricanes and Global Warming: Expectations Versus Observations



Dr. Jui-Yuan Chiu (second from left) of University of Reading, UK visited the department on May 24th, 2012.

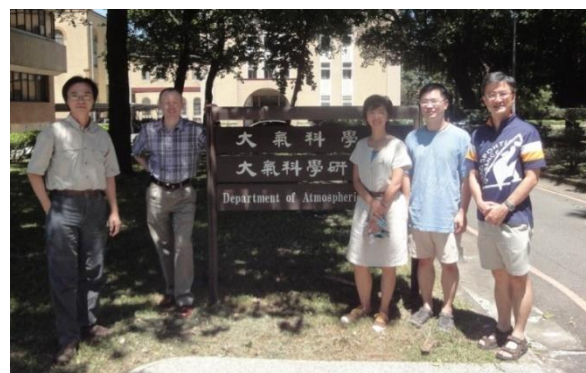


Dr. Christopher Landsea (third from right) of Science and Operations Officer, National Hurricane Center visited the department on June 5th, 2012.

Date	Visitors	Seminar titles
Jun. 7 th	Dr. Scott Braun Goddard Space Flight Center NASA, USA	The Impact of Dry Saharan Air on the Intensification of Hurricane Helene (2006)
Jun. 12 th	Prof. Fuqing Zhang Department of Meteorology Pennsylvania State University, USA	Predictability of Tropical Cyclones and Severe Weather
Jun. 14 th	Prof. Hai-Chun Yang Department of Atmospheric Sciences Peking University, China	Compensation of Changes in Meridional Heat Transport: Testing the Bjerknes Hypothesis in a Varying Climate
Jun. 19 th	Prof. Tim Li IPRC and Department of Meteorology University of Hawaii, USA	MJO Eastward Propagation and Initiation
Jun. 20 th	Prof. Bin Wang IPRC and Department of Meteorology University of Hawaii, USA	Why Has Arabian Sea Tropical Storms Intensified since 1998?
Jun. 22 th	Prof. Christopher C. Moeller Space Science and Engineering Center Univ. of Wisconsin-Madison, USA	Introduction to the Suomi NPP Visible Infrared Imager Radiometer Suite (VIIRS) -- The Next Generation of Climate Observing Radiometers
Jul. 16 th	Dr. Jesse Meng Environmental Modeling Center NOAA, USA	Land Surface Modeling and Assimilation in the NCEP Global Climate and Weather Forecast and Data Assimilation Systems
Jul. 17 th	Dr. Michael Fiorino Earth System Research Laboratory NOAA, USA	A Short History of Tropical Cyclone Numerical Weather Prediction -- Is there a Role for Limited-Area Models in the Era of High-Resolution Global Models?

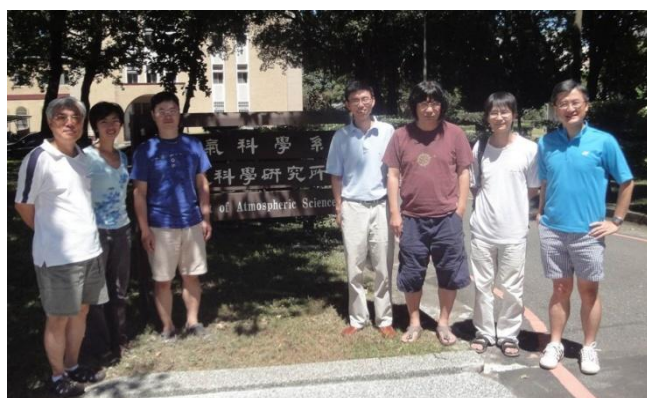


Prof. Fuqing Zhang (third from right) of Pennsylvania State University visited the department on June 12th, 2012.

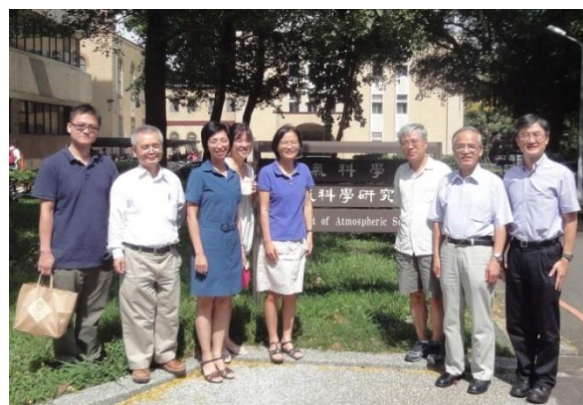


Prof. Robert Black (second from left) of Georgia Institute of Technology visited the department on August 20th, 2012.

Date	Visitors	Seminar titles
Jul. 18 th	Prof. Yuk Yung California Institute of Technology USA	Global Trends in the Earth's Climate from Recent Observations
Jul. 19 th	Prof. Shu-Hua Chen University of California, Davis USA	The Influence of Vortex Merger and Dust on Tropical Cyclone Activities over the Atlantic Ocean
Aug. 20 th	Prof. Robert Black Georgia Institute of Technology USA	Low Frequency Modes and Extreme Temperature Regimes in CMIP5
Aug. 21 th	Prof. Zhiming Kuang Harvard University, USA	Special Short Course : Cumulus Convection
Sep. 20 th	Prof. Michael Wallace University of Washington, USA	Global Climatologies of Lightning Based on TRMM and WLLN Data
Sep. 21 th	Prof. Sumant Nigam Department of Atmospheric and Oceanic Science Earth System Science Interdisciplinary Center University of Maryland, USA	On the Summertime Strengthening of the Northern Hemisphere Pacific Sea-Level Pressure Anticyclone: A Paradoxical Evolution?
Sep. 25 th	Prof. Mu Mu Chinese Academy of Sciences PRC	A Similarity Problem between Signals and Noises in the Predictability Studies of ENSO 、Blocking and Kuroshio Current
Oct. 2 nd	Prof. Shu-Chih Yang Department of Atmospheric Sciences National Central University, Taiwan	An Outer-Loop for the WRF-Local Ensemble Transform Kalman Filter System: Application to Typhoon Assimilation and Prediction

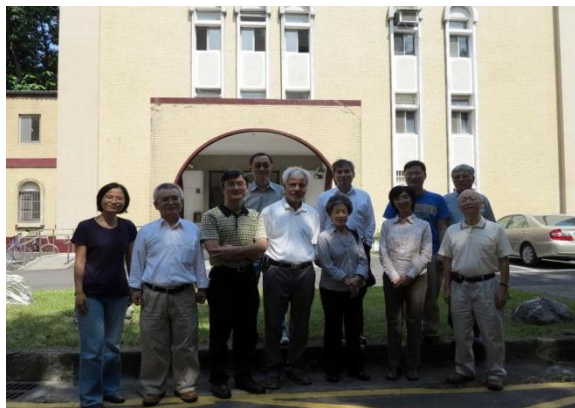


Prof. Zhiming Kuang (fourth from right) of Harvard University visited the department on August 21th, 2012.



Prof. Mu Mu (second from right) of Chinese Academy of Sciences visited the department on September 25th, 2012.

Date	Visitors	Seminar titles
Oct. 9 th	Prof. Mankin Mak University of Illinois at Urbana Champaign, USA	Dynamics of the Life-Cycle of Atmospheric Fronts: Part I: Origin of Generic Fronts Part II: Origin of Surface Front and Upper-Level Front
Oct. 11 th		Part III: Development & Demise of Fronts
Oct. 18 th	Prof. Prabhat Kumar Department of Core Engineering and Engineering Sciences MAEER's MIT College of Engineering Pune, India	Hailstorms: Prediction, Control and Damage Assessment
Oct. 18 th	Dr. Yuejian Zhu Environmental Modeling Center NOAA, USA	The NCEP Global Ensemble Forecast System (GEFS) : Review and Current Operation
Nov. 7 th	Dr. Phil Rasch Atmospheric Sciences and Global Change Division Laboratory Fellow Pacific Northwest National Laboratory, USA	Geoengineering the Climate System
Nov. 7 th	Dr. Lai-yung Ruby Leung Climate Physics Laboratory Fellow Pacific Northwest National Laboratory, USA	Development of Frameworks for Robust Regional Climate Modeling
Nov. 16 th	Prof. Eugenia Kalnay University of Maryland College Park, USA	Recent Advances in Data Assimilation with Ensemble Kalman Filter



Prof. Mankin Mak (fourth from right of first-row) of University of Illinois at Urbana Champaign visited the department on October 9th, 2012.

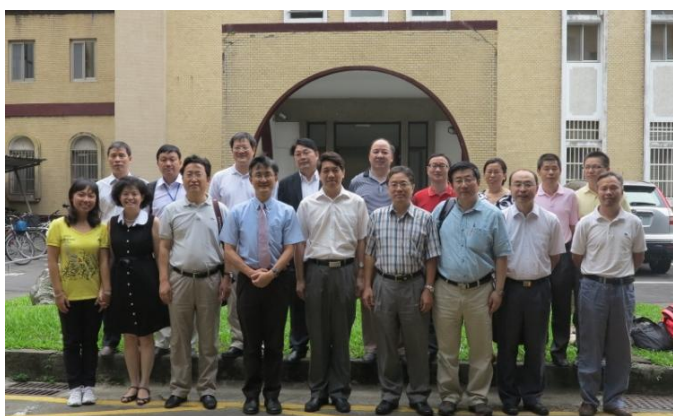


Prof. Eugenia Kalnay (second from left) of University of Maryland and Prof. Shu-Chih Yang (first from left) of National Central University visited the department on November 16th, 2012.

Visit of Chinese Meteorological Society

The Chinese Meteorological Society visited the department on September 19th, 2012. The 16-member group was headed by Dr. Zheng Guoguang, Administrator, China Meteorological Administration.

中國氣象學會於2012年9月19日來系參訪，此次參訪由中國氣象局局長鄭國光率領共16位團員參與。



A group photo of the Chinese Meteorological Society.

Visit of Participants from NTU International Science Conference on Climate Change

The NTU International Science Conference on Climate Change: Multidecadal and Beyond was held from September 17th to 21th, 2012. This conference was sponsored by the Center for Advanced Studies in Theoretical Science of National Taiwan University and cosponsored by the Department of Atmospheric Sciences of National Taiwan University and the National Science Council. The conference were organized by Prof.

Chang-Shou Lin (Committee Chair; Taida Institute for Mathematical Sciences, NTU), Prof. C.-P. Chang (NTUAS), Prof. Michael Ghil (UCLA), Prof. Mojib Latif (U. Kiel), Prof. H.-C. Kuo (NTUAS), Prof. C.-H. Sui (NTUAS), Prof. Michael Wallace (U. Washington) and Prof. Shouhong Wang (U. Indiana). A number of distinguished scientists were invited to attend this conference: Prof. Johnny Chan (City U. of Hong Kong), Prof. John Chiang (UC Berkeley), Dr. H.-H. Hsu (Academia Sinica), Prof. Norden Huang (NCU), Prof. I-I Lin (NTUAS), Prof. Noel Keenlyside (U. of Bergen), Dr. Bill Lau (GSFC/NASA), Prof. Mu Mu (CAS), Prof. Sumant Nigam (U. Maryland), Prof. K.-K. Tung (U. Washington), Prof. J.-Y. Yu (UC Irvine) and Dr. Rong Zhang (GFDL).

國立臺灣大學於2012年9月17-21日舉辦臺大氣候變遷國際科學研討會：多年代及更長期的變化 (NTU International Science Conference on Climate Change: Multidecadal and Beyond)，共發表24場演講和18篇論文。本次研討會由臺大數學科學中心主辦，臺大大氣科學系及國科會協辦。



Participants from "NTU International Science Conference on Climate Change: Multidecadal and Beyond" visited the department on September 20th, 2012.

30th Conference on Hurricanes and Tropical Meteorology

The American Meteorological Society held its 30th Conference on Hurricanes and Tropical Meteorology from April 15th to 20th, 2012, in Jacksonville, Florida. This conference is held once every two years and is the most important conference with the largest number of experts and scholars on tropical cyclones involved. This year's meeting was attended by around 600 researchers specializing in the study of typhoons and tropical meteorology, and yielded over 500 oral presentations and 150 posters. Five professors from NTUAS also attended this meeting: department chairman Prof. Chun-Chieh Wu, Prof. Jong-Dao Jou, Prof. Cheng-Shang Lee, Prof. Hung-Chi Kuo and Prof. I-I Lin, as did more than ten graduate students and research assistants who, through oral reports and posters, demonstrated the department's latest findings in typhoon research. Alumni of NTUAS who are now living abroad, including Dr. Ying-Hwa Kuo (NCAR), Dr. Wei-Cheng Chang (NRL), Prof. Wen-Wen Tung (Purdue University), Dr. Chan-Hui Chen (Princeton University GFDL), Prof. Tim Li (University of Hawaii), and Prof. Yuqing Wang (University of Hawaii), also attended this meeting.

2012年4月15-20日，美國氣象學會於美國佛羅里達州傑克遜維(Jacksonville)舉行第30屆颶風與熱帶氣象國際研討會(30th Conference on Hurricanes and Tropical Meteorology)。颶風與熱帶氣象國際研討會是國際間最重要、也是參與人員最多的颶風研討會，每兩年舉辦一次。此次會議共有近600多位研究颶風之專家學者參與，發表超過500篇的口頭報告及150篇的海報。大氣科學系共有五位教授參與本次會議，分別為吳俊傑主任、周仲島教授、李清勝教授、郭鴻基教授及林依依教授，另有十多位研究生及研究助理共同參與，透過口頭報告與海報交流，分享臺大大氣科學系在颶風相關領域的最新研究成果。旅居國外系友，包括郭英華博士(美國國家大氣研究中心)、張偉正博士(美國海軍研究實驗室)、董文文教授(普渡大學)、陳占慧博士(普林斯頓大學 GFDL)及曾於本系開設課程的李天明教授(夏威夷大學)及王玉清教授(夏威夷大學)，皆出席本次會議，會中並留下團體合影。



A group photo at the 30th Conference on Hurricanes and Tropical Meteorology.

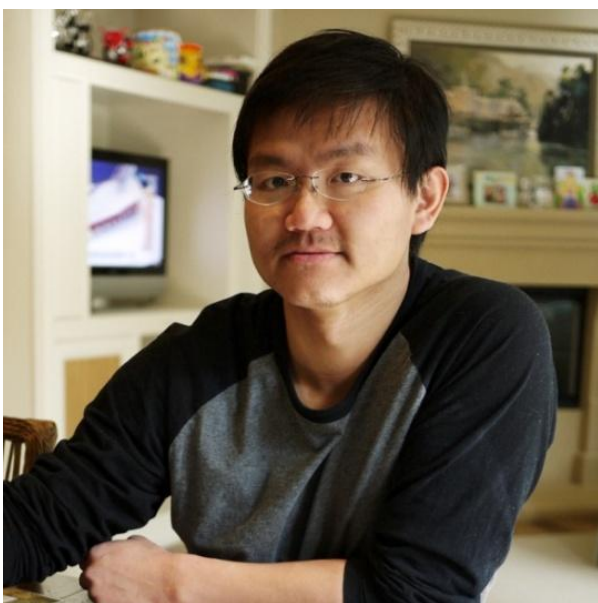
Presentations at the 30th Conference on Hurricanes and Tropical Meteorology

Date	Titles	Authors
Apr. 16 th	Concentric Eyewall Formation in Typhoon Sinlaku (2008) – Part I: Axisymmetric Processes	Y.-H. Huang, M. T. Montgomery and C.-C. Wu
	Concentric Eyewall Formation in Typhoon Sinlaku (2008) – Part II: Further Examination of Axisymmetric and Asymmetric Processes	C.-C. Wu, Y.-H. Huang and M. T. Montgomery
	Concentric Eyewall Typhoon characteristics at Western North Pacific	Y.-T. Yang, H.-C. Kuo, Eric A. Hendricks, Melinda S. Peng and C.-Y. Lee
	Mesoscale Features and The Lightning Distribution in Typhoon Morakot after it Passed Taiwan	J.-D. Jou and B. Leon
	On the Slowdown of Landfall Typhoon by Topography Phase Locked Convections	L.-H. Hsu, H.-C. Kuo, Robert G. Fovell, Y.-H. Chen and T.-C. Chen
	Influence of Topography on Tropical Cyclone Track - Idealized Simulations	T.-H. Li and C.-C. Wu
	The Role of Convective Heating in Tropical Cyclone Vortex Evolution - Idealized Three-Dimensional Full-Physics Model Simulations	H.-H. Wei and C.-C. Wu
Apr. 17 th	A Study on the Typhoon Precipitation Forecast in Taiwan	C.-S. Lee, L.-R. Huang, L.-F. Hsiao, D. Y.-C. Chen and L.-Y. Chang
	Internal Variability of the Dynamically Downscaled Tropical Cyclone Activity over the Western North Pacific by the IPRC Regional Climate Model	Y. Lu, C.-C. Wu and Y. Wang
Apr. 18 th	A Study on Tropical Cyclone (TC) Structure Changes and Organized Convections associated with TC-Environment Interactions	B.-F. Chen, C.-S. Lee
Apr. 19 th	Ocean's Impact on the Intensity of Three Recent Typhoons (Fanapi, Malakas, and Megi) – Results from the ITOP Field Experiment	I.-I. Lin
	Tropical Cyclone – Ocean Interaction in Typhoon Fanapi (2010) during ITOP	C.-C. Wu, S.-L. Sung and P.-S. Wang
Apr. 20 th	Incremental Typhoon-Position-Oriented Sensitivity Analysis for Targeted Observation	Kosuke Ito and C.-C. Wu

Professor Min-Hui Lo joins the Department Faculty

Prof. Min-Hui Lo received his B.S. in 1999 and M.S. in 2001, both from NTUAS. He received his Ph.D. from UC-Irvine in 2010, and conducted postdoctoral research at the UC Center for Hydrologic Modeling (UCCHM). He returned to Taiwan in January 2012 and joined NTUAS as an Assistant Professor. His research interests include the global hydrological cycle and its interactions with the Earth's climate system. Specifically, his primary research focuses on three major topics: (1) applications of remote sensing on land surface model and global hydrological cycle, (2) land-atmosphere interactions, regional and global climate modeling, (3) anthropogenic effects on the water cycle. Prof. Lo typically uses the general circulation model, land surface model and remote sensing observations as his research tools.

羅敏輝助理教授於 1999 年自本系大學部畢業，2001 年自本系研究所畢業，2010 年 8 月獲美國加州大學爾灣分校博士學位，之後在 UC Center for Hydrologic Modeling (UCCHM) 擔任博士後研究，並於 2012 年 2 月返系任職。研究目標為了解人類行為與地球系統之交互作用。研究領域包括陸氣交互作用、人為活動對氣候的影響、衛星遙測在水文上的應用。



Impacts of California Irrigation on the Southwestern U. S. Hydroclimatology

Characterizing climatological and hydrological responses to agricultural irrigation continues to be an important challenge to understanding the full impact of water management on the Earth's environment and hydrological cycle. Previous simulation studies have used either regional models with prescribed lateral boundary conditions, which are unable to provide insight into the remote impacts of irrigation from individual, large aquifers; or global models, to simulate the effect of global-scale irrigated land simultaneously, masking the contributions of individual aquifers to regional and global climate change. Similarly, observational studies are limited in their ability to provide important mechanistic understanding.

Agricultural irrigation in the California's Central Valley has always depended on surface water reservoirs and groundwater pumping. This anthropogenic redistribution of water modifies the land hydrological cycle significantly, especially by increasing evapotranspiration. In this study, we use the global, NCAR Community Atmosphere Model, with realistic estimates of irrigation applied to the NCAR Community Land Model. In simulations with irrigation, averaged total evapotranspiration over the Central Valley increases significantly during the summer as indicated in Figure 1, which shows the climatology of evapotranspiration for the Control and Irrigation runs. Most of the increase in evapotranspiration occurs between May and October, the months during which a total of 350 mm of irrigation water was applied.

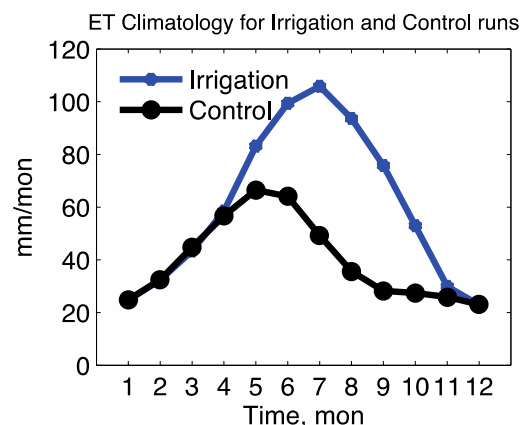


Figure1. Climatology (45-year average) of evapotranspiration [mm/month] averaged over the Central Valley for the Control and Irrigation runs.

Because of the prevailing atmospheric circulation in the lower troposphere during the summer, water vapor in the Central Valley is partially transported to the southwestern United States. Figure 2(a) shows the changes in the spatial distribution of low-level (the first three atmospheric layers in the sigma vertical coordinate, which varies from 975 mb to 850 mb) water vapor due to irrigation for the 45-year average for June, July, and August. Low-level water vapor increases the most over California, where the irrigation occurs.

Although atmospheric water vapor increases due to enhanced evapotranspiration during the summer, the Central Valley lies beneath the descending branch of the large-scale circulation, which inhibits the occurrence of precipitation there, as shown in Figure 2(b). Consequently, Central Valley irrigation has negligible effects on local precipitation. However, precipitation in the downwind region of California, i.e., in the southwestern United States, increases, enhancing the North American Monsoon, while forming a regional, anthropogenic recycling loop in the hydrologic cycle which returns water to California. This study has implications for the importance of human-driven impacts on the hydrological cycle and local and regional climate, and for water resources management in California and the Western United States.

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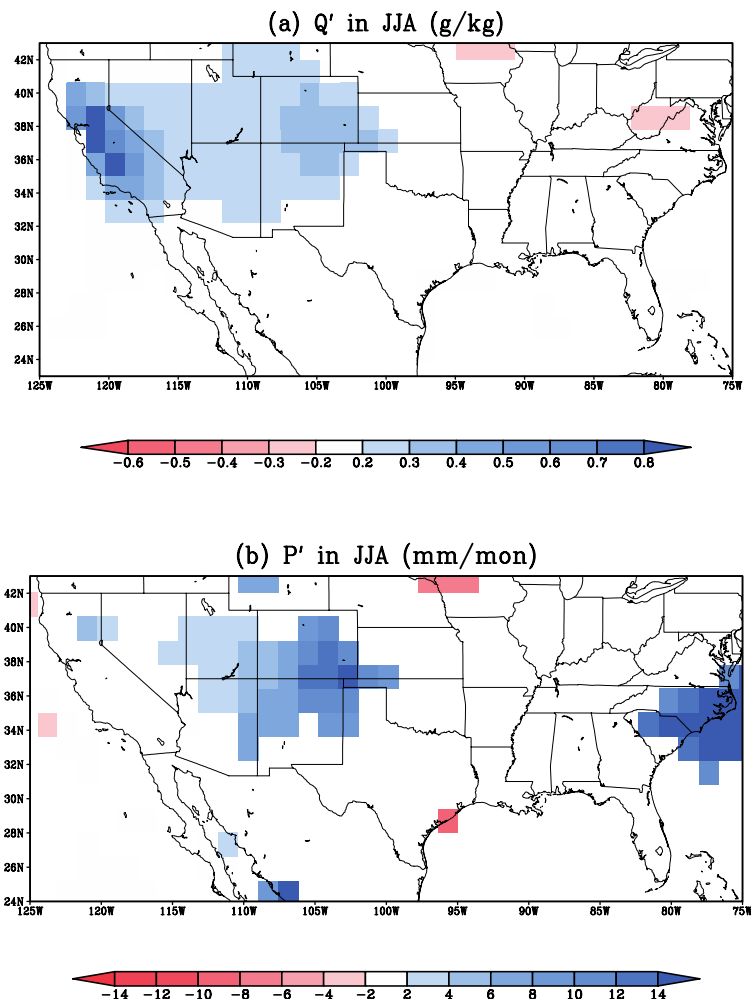


Figure 2. Irrigation-induced changes in the spatial distribution of (a) low-level water vapor [g/kg], (b) precipitation [mm/month] during the summer. Only differences greater than the 90% significance level are shown.

Professor Wei-Ting Chen joins the Department Faculty

Prof. Wei-Ting Chen received her BS degree from NTUAS in 2001. She received her Master degree in 2004, and Ph.D. degree in 2009, both from California Institute of Technology, in Environmental Science and Engineering. From 2009 to 2012, she worked as a postdoctoral researcher at NASA Jet Propulsion Laboratory, and joined the faculty of NTUAS as an Assistant Professor in August, 2012. Prof. Chen's research is focused on the theoretical simulations of aerosol-climate interactions using global climate models. She also analyzes and applies the global satellite measurements to evaluate and improve the representation of aerosol, cloud, and precipitation in climate models.

陳維婷助理教授 2001 年自本系獲得學士學位，2004 年、2009 年分別獲得美國加州理工環境科學與工程碩士、博士學位。2009 年至 2012 年間，於美國噴射推進實驗室擔任博士後研究員，並在 2012 年 8 月返回本系任教。主要研究方向為利用全球氣候模式進行氣懸膠與氣候變化交互作用之理論模擬，以及分析運用全球衛星觀測資料，驗證並改進氣候模式對氣懸膠、雲與降水的模擬能力。



Research Highlight I -- Analyzing CloudSat ice water content retrievals to evaluate representations of cloud and precipitating hydrometeors in the global models

In our previous study [Chen *et al.*, 2011; Waliser *et al.*, 2011], the atmospheric ice water content (IWC) retrievals from the CloudSat Cloud Profiling Radar have been analyzed and applied to evaluate the IWC estimates from global models. When performing model-data comparisons of IWC, one of the critical issues is which component(s) of the frozen water mass are represented by the retrieval and model estimates. Ice particles that tend to be quasi-suspended or “floating” will be referred to as “cloud ice” to distinguish them from truly precipitating particles such as snow and graupel. The technique we developed in [Chen *et al.*, 2011] uses the ice particle size distribution parameters (PSD) provided by the retrieval algorithm to categorize the CloudSat total ice mass retrievals into portions of suspended, small particles (cloud ice) and precipitating, large particles (snow and graupel), which allows for relevant comparisons between retrieval estimates and global models with different types of ice representation, as the example shown in Figure 1. The partitioned CloudSat IWC estimates are compared with model estimates from the European Centre for Medium-Range Weather Forecasts (ECMWF) Integrated Forecast System (IFS CY31R1; a model with a simple ice representation of pure ice and snow) and the Goddard finite-volume multi-scale modeling framework (fvMMF; a model with a multi-species microphysics scheme). The ECMWF monthly mean total cloud ice analyses showed a close agreement to CloudSat estimates for small ice species in the upper troposphere. The fvMMF overestimates the mass of the large ice species in areas of high IWC, subsequently underestimating the contribution from the small particles to the total ice mass. The altitude of maximum IWC in the tropical upper troposphere is also different between the fvMMF and CloudSat estimates. Given the variety of remote-sensing instruments, algorithm sensitivities, and model parameterization techniques, careful sub-sampling method, such as the one developed in [Chen *et al.*, 2011], is necessary and imperative to deal with the significant complexities when carrying out model-data comparisons.

The investigation in [Chen *et al.*, 2011] also demonstrated the value of co-locating multiple parameters/products from satellite and model analysis data to the study of cloud and precipitation, which motivates the development of the new co-located data set described in Section 2.1 and the study we proposed

here. For example, the CloudSat ice PSD retrievals were analyzed with the co-located temperature data from the ECMWF interim operational analysis to determine the size separation for suspended and precipitating hydrometeors, as shown in Figure 2. The mean ice PSD for suspended ice (estimated from the non-precipitating and non-convective cases) and precipitating ice (estimated from the cases with either surface precipitation or the convective clouds) exhibits different dependences on temperature. On a global mean basis, the size separation of the cloud ice and precipitating ice was identified to fall between 100 μm and 200 μm , a range encompassing the values commonly adopted in GCM cloud parameterization. Regionally and seasonally, this size threshold can depend strongly on many variables such as cloud type, updraft velocity, moisture, and ice microphysics. Detailed investigation like this will require more co-located information from other remotely sensed measurements and model analysis. If such co-located data is readily available, they will provide unprecedented opportunity to the study of convection and precipitation, especially to the evaluation and development of atmospheric models.

Research Highlight II -- Using a general circulation model to investigate the interactions between aerosols and climate

Aerosols, suspended fine solid and liquid particles in the atmosphere, are one of the most critical factors controlling Earth's climate system. Advances in understanding the role of aerosols in the climate system and the interactions between aerosols and climate are imperative in the assessment and prediction of climate change. We changed the radiation, and cloud schemes in the Goddard Institute of Space Study (GISS) general circulation model (GCM) to include the aerosol direct radiative effects and aerosol-cloud-precipitation interaction. By systematically carrying out equilibrium simulations, the modified GCM was applied to investigate the climate responses to future aerosol changes, including direct effects [Chen *et al.*, 2007] and indirect effects [Chen *et al.*, 2010a; 2010b]. The results suggest that the direct radiative perturbations of aerosols and the modification of clouds by aerosols can potentially change the temperature distribution, the hydrological cycle, and the atmospheric circulation; the pattern of climatic impacts from aerosols were identified to be different from those from anthropogenic greenhouse gases.

The study in [Chen *et al.*, 2010b] was focused specially on estimating the indirect forcing induced by microphysical perturbation owing to black carbon (BC)

emission reduction with GCM simulations. The BC aerosols have long been considered one of the major agents, besides greenhouse gases, that are responsible for anthropogenic climate warming. BC aerosols are also a serious concern for public health. Important policies were proposed for black carbon emission reduction to mitigate climate warming and improve air quality. However, the effects of BC aerosols on cloud microphysics have not been extensively investigated. We carried out global simulations with detailed aerosol chemistry, microphysics, and aerosol-cloud interactions, and published the first study on the indirect effects of BC aerosols [Chen *et al.*, 2010b]. We identified that the chemical mixing and ageing with other aerosol/gas-phase species can change the hygroscopicity of the BC aerosols, making them effective cloud condensation nuclei. Although the reduction of BC emissions decreases the direct radiative warming, it can also decrease the number of cloud droplets, leading to reduced cloudiness and lower cloud albedo. The estimated forcings from the BC direct and indirect effects have comparable magnitudes but with opposite signs, indicating that the policies for BC mitigation also need to take into account the perturbations related to the indirect effects of the BC aerosols.

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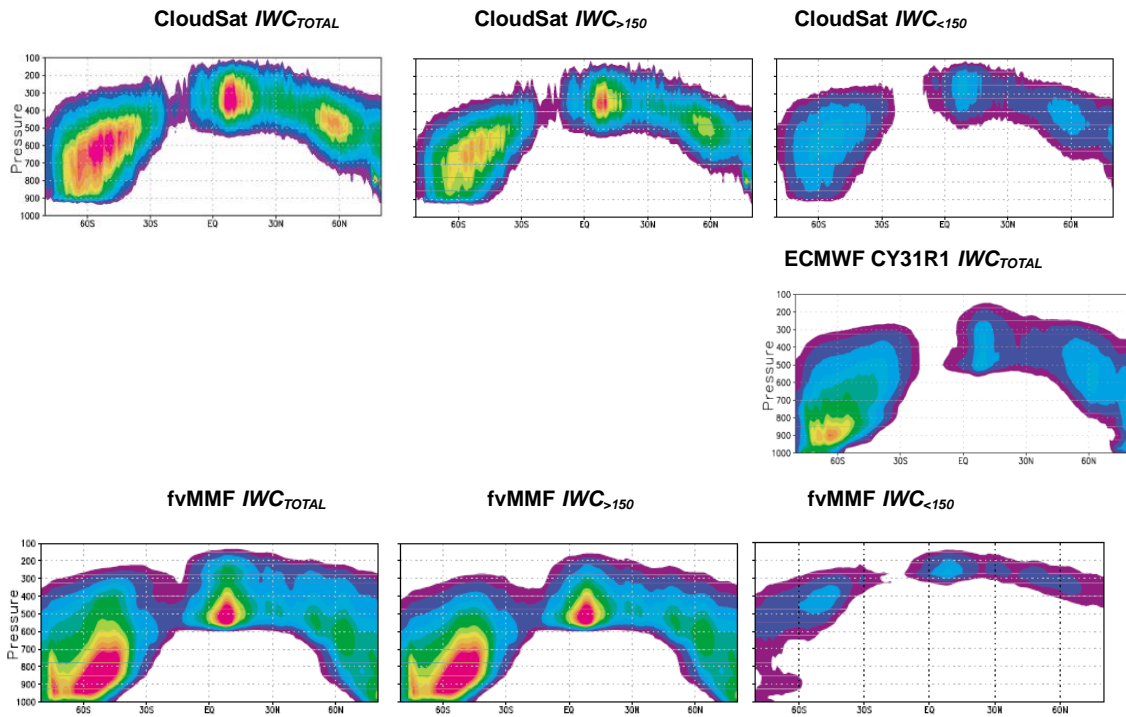


Figure 1 Monthly mean IWC zonal-altitude profile from CloudSat RVOD retrievals, ECMWF IFS, and the fvMMF in August 2006 (in mg m^{-3}). The total IWC (IWC_{TOTAL}) is shown for the three estimates, while the partitioned IWC for ice particle larger and smaller than a cutoff diameter of 150 μm is shown for CloudSat and fvMMF ($IWC_{>150}$ and $IWC_{<150}$) based on the same PSD partitioning method in [Chen *et al.*, 2011].

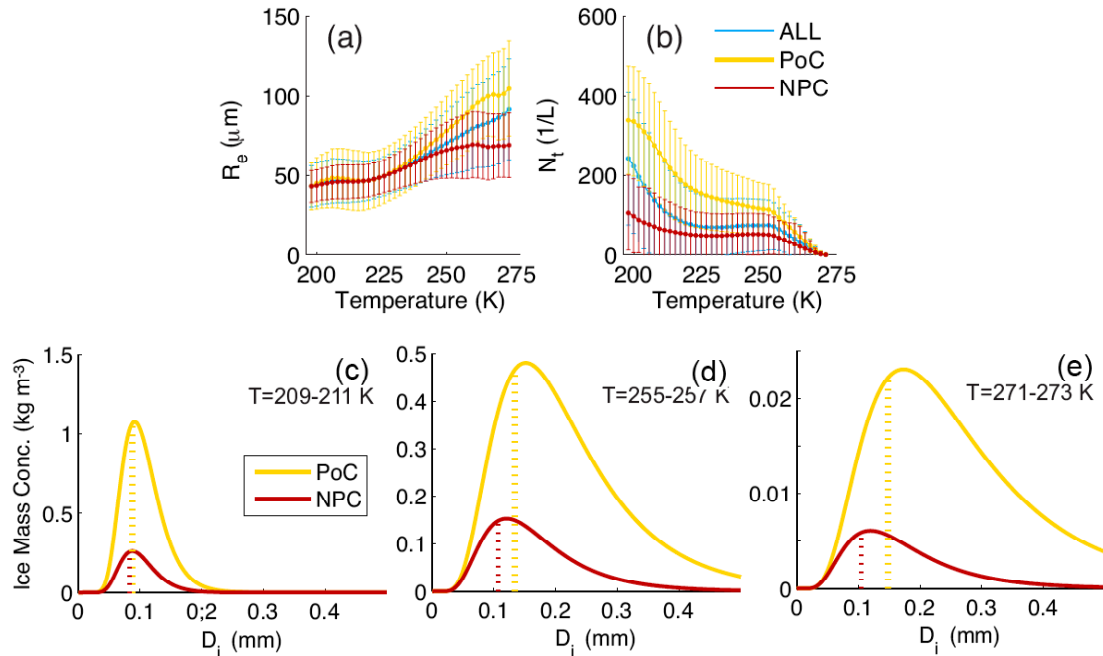


Figure 2. Temperature dependence of the CloudSat ice PSD retrievals for precipitating and convective cases (yellow solid line) and non-precipitating, non-convective cases (red solid line) derived from the co-located ECMWF interim temperature analysis. The statistics are based on global data collected in August 2006. In (a) and (b), the means and the standard deviations of effective radius and ice number concentration as a function of co-located temperature are calculated in 2K temperature bins for all in-cloud cases. In (c)-(e), the solid line shows the lognormal ice mass distribution for the selected temperature bin, while the dashed line shows the volume mean diameter of each distribution. Note the difference in the vertical axes. [Chen *et al.*, 2011]

2012 Doctor's Theses

Yi-Hsuan Huang*	Secondary Eyewall Formation in Tropical Cyclones - Unbalanced Dynamics in the Boundary Layer
Iam-Fei Pun	Upper Ocean Thermal Structure in the Western North Pacific from Satellite Altimetry

2012 博士論文

黃怡萱*	颱風雙眼牆形成之邊界層非平衡動力機制
潘任飛	利用衛星測高觀測西北太平洋的上層海洋溫度結構

2012 Master's Theses

Wei-Ting Lin	A study of the cloud condensation nuclei (CCN) activity for urban ambient aerosols
Pin-Shiang Wang	Typhoon-Ocean Interaction in Typhoon FANAPI (2010) - Influence of Ocean Warm and Cold Eddies
Tsuang-Han Li	Influence of Topography on Tropical Cyclone Tracks - Idealized Simulations
Ho-Hsuang Wei*	The Role of Convective Heating in Tropical Cyclone Vortex Evolution - Idealized Three-Dimensional Full-Physics Model Simulations
Jen-Chieh Wu	The simulation of decadal variability in CMIP5
Li-Wei Kuo*	Effective Diffusivity as a Diagnostic of Synoptic Scale Events
Yi-Shin Chang	Micro-scale Meteorological Observation and Simulation During Snow Season at Taiwan
Yuan-Tung Chang	The Relation between Water Vapor in Typhoon and Atmospheric Temperature over Western North Pacific
Li-Chiang Chiang	The Interaction between the MJO and Topographic: Using High Resolution Data
Pei-Ning Feng	Modeling North Pacific Decadal Variations and Their Teleconnection Patterns
Kuang-Hao Cheng	The Reorganization of Rainband after Typhoon Moved Over the Central Mountain Range of Taiwan
Chu-Chun Huang	Simulation of Aerosol Impact on Typhoon Nari (2001)
Ko-Chung Mei	Micro-scale urban meteorological observation and simulation in Taipei basin
Yi-Hsuan Chen	An Improved Precipitation Scheme in Cumulus Parameterization

2012 碩士論文

林偉婷	都市氣膠成為雲凝結核之特性探討
王品翔	凡那比颱風之海氣交互作用模擬分析 — 海洋冷暖渦影響探討
李宗翰	地形影響颱風路徑偏折之理想數值模擬及動力機制探討
魏閻萱*	潛熱釋放對颱風渦旋演變影響之理想數值模擬與動力機制分析
吳仁傑	CMIP5 年代氣候變化模擬
郭力瑋*	利用有效擴散率診斷綜觀尺度天氣系統
張譯心	台灣高山地區雪季微氣象觀測與模擬
張原通	西北太平洋颱風水氣與大氣溫度的關係
姜禮強	季內震盪與地形之間的交互作用 — 利用高解析資料
馮培寧	模擬北太平洋年代際振盪與其遙相關
鄭光浩	侵台颱風過山期間雨帶重建之研究
黃竹君	氣膠衝擊颱風之模擬 — 納莉颱風 (2001)
梅可忠	臺北盆地都市微氣候觀測與模擬
陳毅軒	積雲參數化中降水方案之改進

Faculty Position Announcement

The Department of Atmospheric Sciences is seeking applicants for one to two faculty positions at the assistant, associate, or full professor levels to begin **in August 2013**. Applicants with Ph.D. and research expertise in the field of atmospheric sciences and other related areas are welcomed. Candidates with post-doctoral experience are preferred.

Applicants should send their curriculum vitae, statement of research and teaching interests before **December 31st, 2012**, to:

Prof. Chun-Chieh Wu, Chair
Faculty Search Committee
Department of Atmospheric Sciences,
National Taiwan University,
No. 1, Section 4, Roosevelt Road,
Taipei 106, Taiwan
Tel: +886-2-3366-3913
Fax: +886-2-2363-3642
E-mail: cwu@as.ntu.edu.tw

Both regular and electronic mails are acceptable. Please also arrange for three recommendation letters to be sent directly to the Chair of the Faculty Search Committee. Upon receipt of the application, an acknowledgement email will be sent to the applicant within a week. Applicants who do not receive the acknowledgement email please contact the Chair of the Faculty Search Committee via fax or telephone for confirmation.

本系擬聘請一至二位具備大氣科學及其他相關專長之教授、副教授、或助理教授。應徵者需具備博士學位及相關研究經驗，具博士後經驗者尤佳。自 **2013 年 8 月**起聘。申請者請將個人資料、研究與授課興趣於 **2012 年 12 月 31 日前**以一般信函或電子郵件寄至：

台北市羅斯福路四段一號
國立台灣大學理學院大氣科學系
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另請安排三封推薦信寄至本系新聘教師甄選委員會召集人收，本系將於收件後一週內送出回條，逾期未收到回條者可透過電話或傳真與召集人聯繫確認。

NO. 5 (December 2011)

News

- The Department Retreat
- Professor Chun-Chieh Wu Started Second Term as NTUAS Chairman
- Faculty Awards
- Faculty Services
- Jade Scholarship
- Retirements of Professor Chung-Ming Liu, Professor Ching-Chi Wu, and Ms. Mei-Li Chang
- Professor Huang-Hsiung Hsu Accepted a New Position at Research Center for Environmental Change of Academia Sinica
- The Departmental Library to close
- Exhibition on "Aiming High for a Low-Carbon Taiwan"
- Study-Abroad Program
- The Global Monsoon System Book
- Visit of Fujian Meteorological Bureau
- Visit of Long-An Elementary School
- Visit of Taipei Cheng-gong High School
- Visit of Geoscience Research Club from Four High Schools
- Visit from Nature Note Program of National Education Radio
- Visits of Leading Scientists
- Alumni Reunion of the 1986 Class
- Professor Chien-Ming Wu joins the Department faculty

Meeting Highlight

- AOGS 8th Annual Meeting, August 8-12, 2011

Research Highlight

- What Controls the Transition from Shallow to Deep Convection?