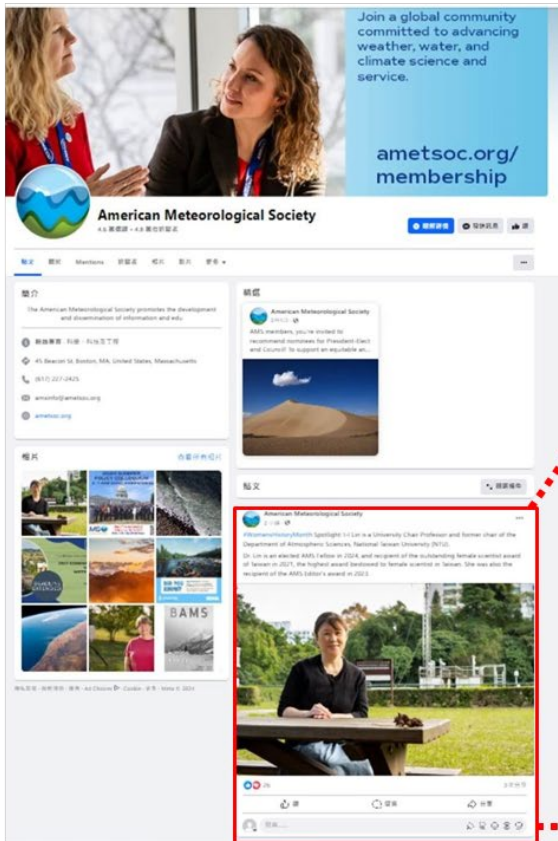
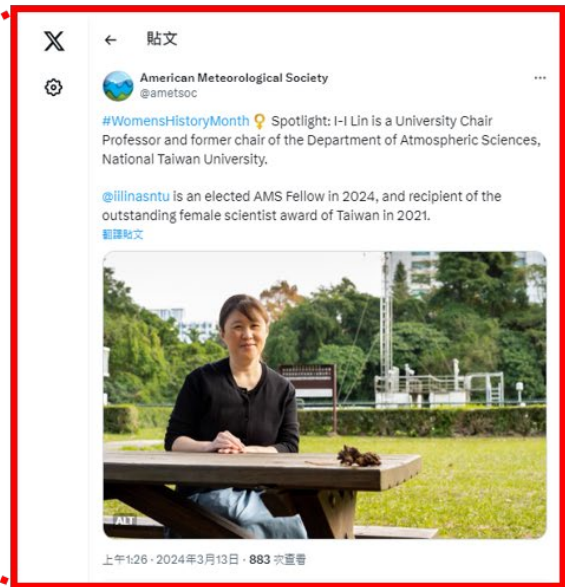
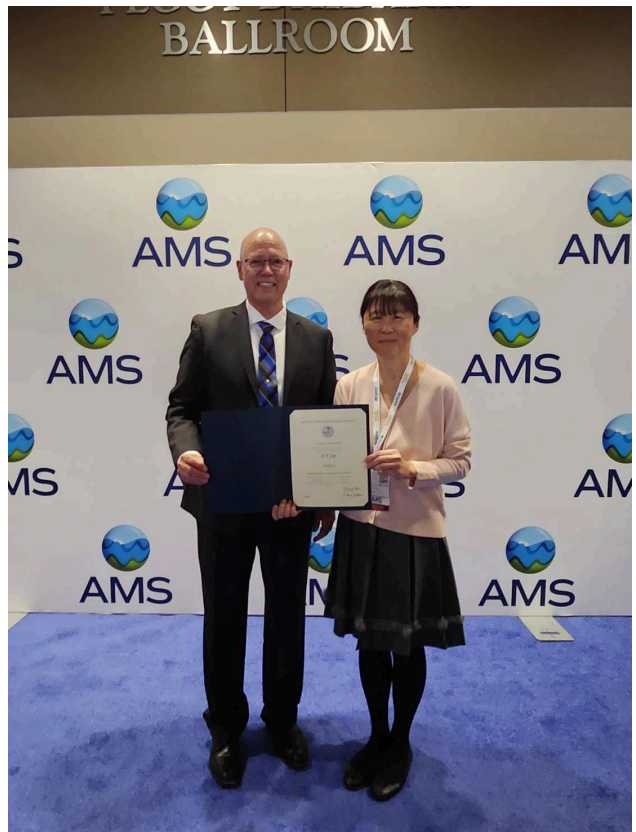


Related figures



Spotlighted by American Meteorological Society (AMS) – Women’s History Month (2024) [[Facebook](#)] [[X \(Twitter\)](#)]



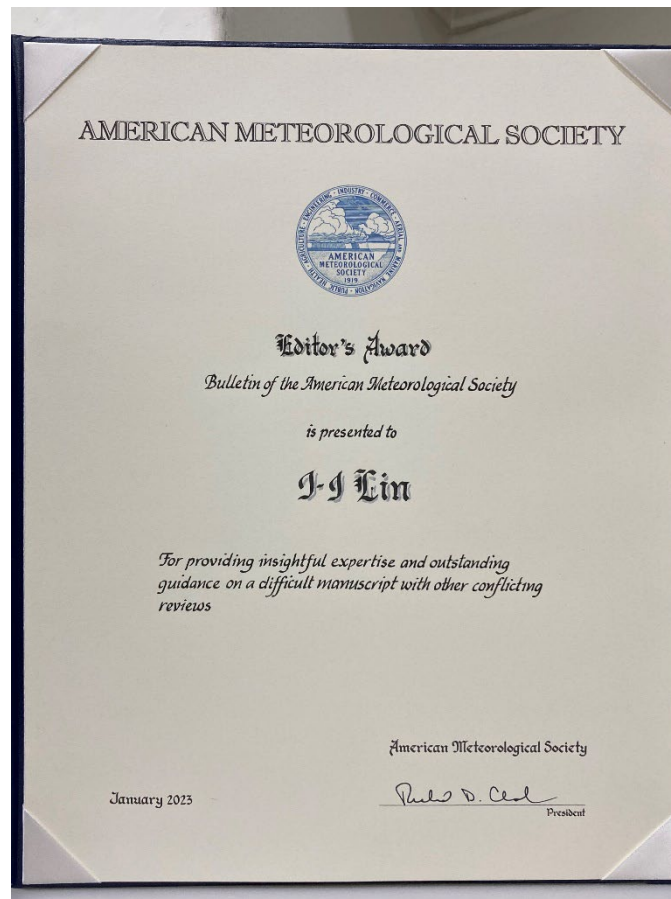
Fellow of American Meteorological Society (AMS, 2024) [\[Link\]](#) [\[YouTube\]](#)

Editor's Award - Bulletin of the American Meteorological Society



I-I Lin

For insightful and detailed comments that have been instrumental in reaching publication decisions on challenging manuscripts



The AMS Editor's Award - Bulletin of the American Meteorological Society. The award citation reads "For insightful and detailed comments that have been instrumental in reaching publication decisions on challenging manuscripts" (2023). [\[link\]](#)



台大教授林依依獲選國家講座主持人 替「媽媽科學家」請命

教育部下午舉辦第25屆國家講座主持人人選、第4屆國家產學大師獎與第65屆學術獎、第65屆學術獎頒獎典禮，台灣大學大氣科學系特聘教授林依依帶領團隊破解超級颱風成因，研究成果廣泛應用在颱風強度預報，獲選國家講座主持人；屏東科技大學獸醫系特聘教授陳信柱，專長為魚類免疫學、水產動物細菌學，他客製化建置「生產醫學平台」，獲選國家產學大師獎。

今年共有7人獲得國家講座主持人獎、4位獲選國家產學大師獎及10位獲得學術獎。行政

https://udn.com/news/story/6885/6180913?from=udn-catalistnews_ch2



獲選國家講座主持人，是學術界最高榮譽之一。林依依在學術界有極高聲望，她所帶領的團隊在超級颱風成因的研究上，取得許多重要發現。此外，她的研究成果也廣泛應用在氣象預報上，對防災减灾有重要貢獻。

<https://www.ner.gov.tw/news/623947cac75f3d0007ff8e10>

為「媽媽科學家」請命 林依依：讓她們有在工作的選項

林依依獲選為國家講座主持人，她希望透過這個平台，讓更多女性科學家能有在工作的選項。她認為，女性科學家往往需要平衡家庭和工作，這需要社會提供更多的支持。

林依依說，她希望透過這個平台，讓更多女性科學家能有在工作的選項。她認為，女性科學家往往需要平衡家庭和工作，這需要社會提供更多的支持。她希望透過這個平台，讓更多女性科學家能有在工作的選項。

<https://www.chinatimes.com/realtimenews/20220321003028-260405?chdtv>

The Ministry of Education's 25th Annual National Chair Professorship Award (2022)



TAIPEI TIMES

Female scientists win awards, urge better conditions

By Yang Chien-shan and Hsuan Hsiang-jung / *that science, with full effort*

Female scientists are often required to juggle their research and family responsibilities, researchers told an awards ceremony on Saturday, urging institutions to implement better work conditions for women.

Female researchers have been known to quickly return home to children from overseas events and work on their thesis in a postpartum care center, National Taiwan University (NTU) distinguished professor Lin Yi-yi (林依依) said.

Lin, who won Most Outstanding Researcher at the 14th annual Taiwan Outstanding Women in Science awards ceremony, said that improving work conditions for female scientists would allow them to excel at their research, which in turn would benefit the nation.

TAIPEI TIMES

From left, National Yang Ming Chiao Tung University assistant professor Wu Han-chen, National Taiwan University (NTU) distinguished professor Lin Yi-yi, NTU assistant professor Chen Yu-ming and NTU post-doctoral researcher Chuang Tsao-chi hold up their awards at the Taiwan Outstanding Women in Science award ceremony in Taipei on Saturday.

Photo: Yang Man-chan, Taipei Times

The awards ceremony — held jointly by L'Oréal and the Wu Chien-shung Education Foundation — recognizes female scientists for outstanding achievements in their field.

The Young Scientist of Excellence award was won by National Yang Ming Chiao Tung University assistant professor Wu Han-chen (吳漢辰) and NTU assistant professor Chen Yu-ming (陳毓暘).

NTU post-doctoral researcher Chuang Tsao-chi (莊保真) won a scholarship named for Meng Tsui-chi (莊淑真), a woman who researched and taught at National Yang Ming University.

Lin's research, which includes satellite telemetry, the Earth's atmosphere and the oceans, analyzes data from light-sounder aircraft and advanced satellite telemetry to study the interaction between ocean waters and typhoons, as well as the effects of global warming on El Niño and La Niña weather phenomena.

Her work was recognized for its contributions to forecasting typhoons, the foundation said.

"Doing research makes me feel like I'm Alice in Wonderland. Every day, there are fascinating discoveries," she said.

However, institutions must create better environments for female researchers with children, such as allowing meetings to be conducted online, she added.

Wu's research studies green energy development and applications, including thermodynamics and pyroelectric materials. Her work has been subsidized by the Ministry of Science and Technology.

Wu said that she has had to overcome many obstacles, including being told that women "should not read too many books."

However, her love of science pushed her to forget such comments and move ahead, she said.

Chen's research studies natural languages and dialogue systems, and has been used to help artificial intelligence (AI) systems understand and analyze human languages.

She said that she was drawn to her research by a dream of developing speech-analysis systems that could be used in robots and smart home appliances.

There are disproportionately few women in AI research, Chen said, adding that more women should join the field.



第14屆台灣傑出女科學家獎得獎名單出爐！

泛科學

本文譯自「台灣傑出女科學家獎」新聞稿

從今年第一屆起——為表彰傑出女科學家卓越貢獻，「台灣傑出女科學家獎」已連續舉辦4年。2021年獲獎者為國立中央研究院副院長陳毓暘、聯合基礎科學基金會共同發起的「台灣傑出女科學家獎」，多位獲獎者有台灣「女性服務領導」之稱，展現傑出的學術成就與領導力。

第14屆「台灣傑出女科學家獎」最高榮譽之「傑出獎」由國立臺灣大學教授、神經科學特聘教授、為臺灣青年女科學家樹立典範的「林依依」，則由國立交通大學材料科學工程學系、與沈家榮教授、以及國立中央研究院副院長陳毓暘、聯合基礎科學基金會共同發起的「泛科學獎」，則由國立臺灣大學物理研究所特聘教授、後援研究員莊保真。

林依依特聘教授：用跨領域思維解密氣候現象

今年最高榮譽的傑出獎由臺灣大學大氣科學系特聘教授林依依獲獎。

林依依博士的研究專長是氣候變遷、大氣、高海洋和第三大領域，利用先進的衛星遙測和地面觀測數據的集成所得的數據資料，探討氣候變遷與海洋之間的交互作用，以及全球暖化下對氣候、生態和社會的影響。她與全球科學家合作，與海島島上地殼運動密切合作，以及與全球科學家密切合作。她一直致力於科學的普及教育，對推廣科學教育有廣泛的影響。她先後在Nature、Science等國際頂尖科學期刊發表論文，也曾獲得世界級科學會議如美國太空協會NASA、美國天體物理學家協會AAS和國際地球物理學聯合會IAGLR、日本地球物理學會、泛科學獎等。

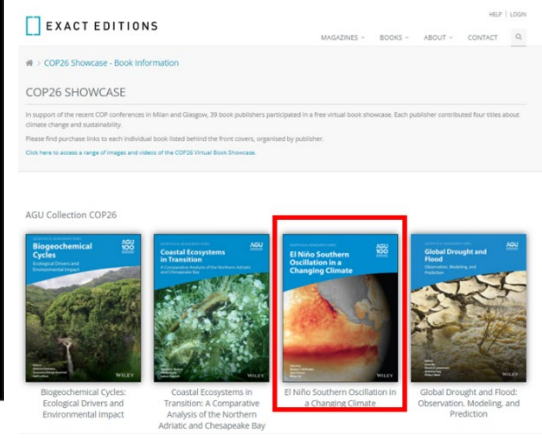
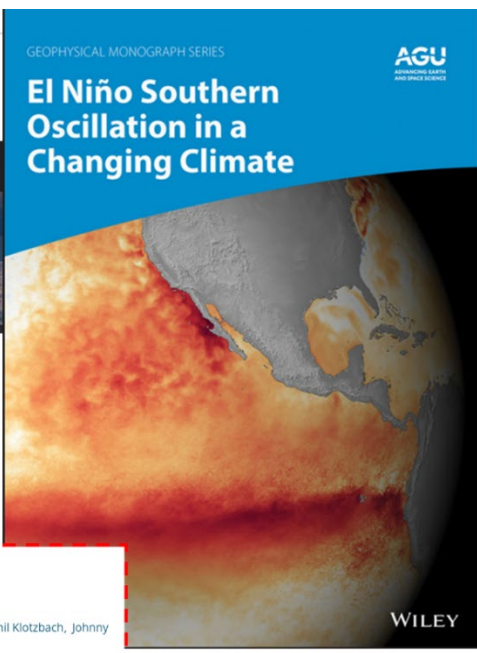
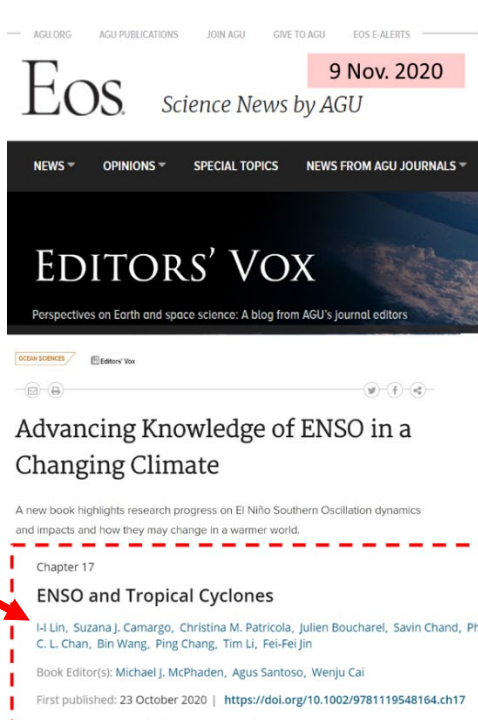


林依依研究氣候現象 獲傑出女科學家獎

【本報記者林依依報導】由L'Oréal和沈家榮教授、聯合基礎科學基金會共同發起的「台灣傑出女科學家獎」頒獎典禮，於3月20日在國父紀念館舉行。今年最高榮譽的傑出獎由國立臺灣大學大氣科學系特聘教授林依依獲獎。林依依博士的研究專長是氣候變遷、大氣、高海洋和第三大領域，利用先進的衛星遙測和地面觀測數據的集成所得的數據資料，探討氣候變遷與海洋之間的交互作用，以及全球暖化下對氣候、生態和社會的影響。她與全球科學家合作，與海島島上地殼運動密切合作，以及與全球科學家密切合作。她一直致力於科學的普及教育，對推廣科學教育有廣泛的影響。她先後在Nature、Science等國際頂尖科學期刊發表論文，也曾獲得世界級科學會議如美國太空協會NASA、美國天體物理學家協會AAS和國際地球物理學聯合會IAGLR、日本地球物理學會、泛科學獎等。

國語日報

The 14th Taiwan Outstanding Women in Science Award, held jointly by L'Oréal Taiwan and the Wu Chien-shung Education Foundation (2021)



<https://institutions.exacteditions.com/cop26>

Invited book chapter contribution in American Geophysical Union (AGU)’s centennial celebration monograph, El Niño Southern Oscillation (ENSO) in a Changing Climate, on ‘Tropical Cyclone, ENSO, and Global Warming’. This is the only invited chapter in Taiwan. This book was successfully published with press release in USA in Nov. 2020. (2020)

One of the 4 Books from AGU Collected as special COP26 (the 26th United Nations Climate Change conference, 31 Oct. - 13 Nov. 2021, Glasgow, Scotland) Virtual Book Showcase.



Public outreach talk on ‘Tropical Cyclone, Ocean and Climate’ in Ministry of Science and Technology’s Prospect Series in October 2020.



Ocean Observations in Support of Studies and Forecasts of Tropical and Extratropical Cyclones

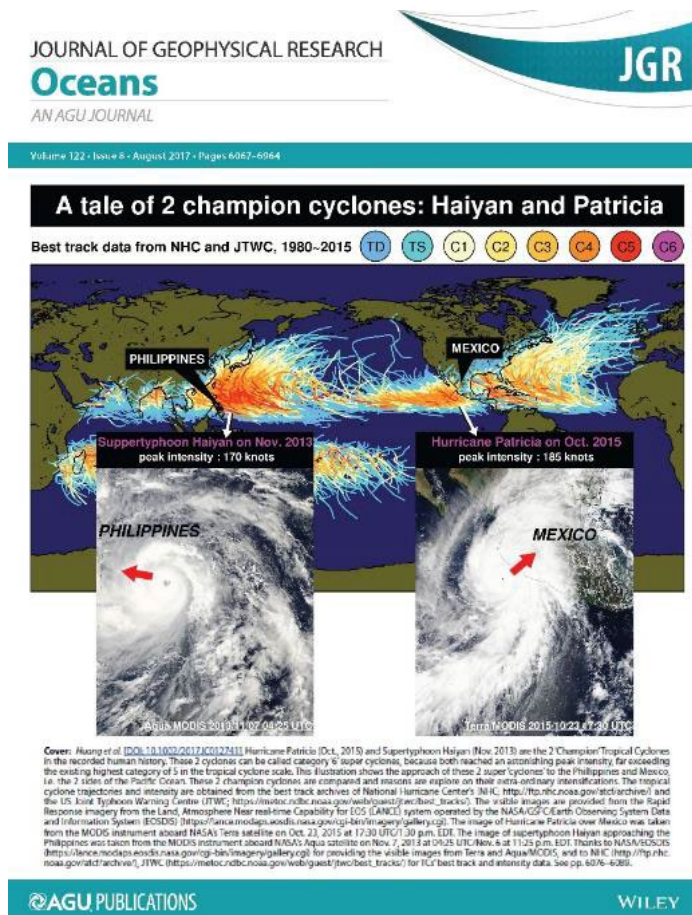
OPEN ACCESS

Edited by:
John Siddorn,
Met Office, United Kingdom

Reviewed by:

Ricardo Domingues^{1,2*}, Akira Kuwano-Yoshida³, Patricia Chardon-Maldonado^{4,5}, Robert E. Todd⁶, George Halliwell⁷, Hyun-Sook Kim^{2,7}, I.-I. Lin⁸, Katsufumi Sato⁹, Tomoko Narazaki⁹, Lynn K. Shay¹⁰, Travis Miles¹¹, Scott Glenn¹¹, Jun A. Zhang^{1,2}, Steven R. Jayne², Luca Centurioni¹², Matthieu Le Hénaff^{1,2}, Gregory R. Foltz², Francis Bringas², M. M. Ali¹³, Steven F. DiMarco¹⁴, Shigeki Hosoda¹⁵, Takuya Fukuoka⁹, Benjamin LaCour², Avichal Mehra², Elizabeth R. Sanabia¹⁶, John R. Gyakum¹⁷, Jili Dong², John A. Knaff² and Gustavo Goni²

Invited to join the international expert team to write recommendations in future ocean observations for tropical and extra tropical cyclones in the ‘Frontiers in Marine Science’, the only invited scientist in Taiwan.(2019)



Paper featured as journal cover ((Hurricane Patricia and supertyphoon Haiyan) in the renown international scientific journal, Journal of Geophysical Research: Oceans (Hurricane Patricia and Typhoon Haiyan)(2017)



Academic Award, Ministry of Education, Taiwan.(2017)

EOS Earth & Space Science News

NEWS - NEWS FROM AGU JOURNALS - TOPICS & DISCIPLINES - OPINIONS - BLOGS - JOBS & RESOURCES

NATURAL HAZARDS News

Probing the Power of Pacific Supertyphoons

Despite higher than normal surface temperatures and heat contents of ocean waters where the storms developed, evidence is lacking that global warming is revving them up.

Supertyphoon Meranti had sustained wind speeds of 155–165 knots (287–306 km/h) as it approached Taiwan. This image was taken by the Moderate Resolution Imaging Spectroradiometer aboard NASA's Aqua satellite on 13 September 2016. Credit: NASA image by Jeff Schmaltz, LANCE-EOSDIS

By Tim Horvath © 10 July 2017

Typhoon Meranti blasted the western Pacific in 2016, wreaking havoc in the Philippines, Taiwan, and mainland China, leaving dozens dead or missing and doing billions of dollars' worth of damage. Meranti is among some unusually ferocious Pacific storms in the past few years that seem to be in a category of their own, according to researchers who recently presented data quantifying such storms' extraordinary power and conditions of formation.

On top of bringing heavy rainfall and storm surges, the intensity of these recent tempests goes so far beyond what was previously thought to be the peak range of cyclone power that the researchers argued that they require a new level, a category 6, on a widely used rating scale for hurricanes and typhoons.

"I think it is fair to give the public more accurate information, and it's not fair to equate these two storms of the same category because the kinetic energy is doubling," I-I Lin, a professor in National Taiwan University's Department of Atmospheric Sciences, told attendees at a joint conference of the Japan Geoscience Union and the American Geophysical Union (JpGU-AGU 2017) in Chiba, outside Tokyo, in May.

Research on record-breaking Category '6' tropical cyclones featured by American Geophysical Union's Earth & Space Science News.(2017)



The joint research with her PhD student (Hsiao-Ching Huang) on the super-hurricane Patricia and relationship with super-El Niño won the best student poster award “(1000 participants and the only recipients from Taiwan for the 27 awards) in Beijing, China in the AOGS international symposium.(2016)



Outstanding College Youth of National Taiwan University (2016) & Young College Elite of 2017

ARTICLE

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DOI: 10.1038/ncomms8182

OPEN

Recent decrease in typhoon destructive potential and global warming implications

I-I Lin¹ & Johnny C.L. Chan²

Typhoons (tropical cyclones) severely impact the half-billion population of the Asian Pacific. Intriguingly, during the recent decade, typhoon destructive potential (Power Dissipation Index, PDI) has decreased considerably (by ~35%). This decrease, paradoxically, has occurred despite the increase in typhoon intensity and ocean warming. Using the method proposed by Emanuel (in 2007), we show that the stronger negative contributions from typhoon frequency and duration, decrease to cancel the positive contribution from the increasing intensity, controlling the PDI. Examining the typhoons' environmental conditions, we find that although the ocean condition became more favourable (warming) in the recent decade, the atmospheric condition 'worsened' at the same time. The 'worsened' atmospheric condition appears to effectively overpower the 'better' ocean conditions to suppress PDI. This stronger negative contribution from reduced typhoon frequency over the increased intensity is also present under the global warming scenario, based on analysis of the simulated typhoon data from high-resolution modelling.



海洋變暖不一定導致颱風破壞潛力增加 臺大及香港城市大學合作成果榮登《Nature Communications》

在一般的認知裡，人們常常認為海洋變暖會導致颱風破壞潛力增加，但是在最近20年中，西北太平洋觀察的結果卻與此恰恰相反。雖然近年海洋變暖，但颱風破壞潛力卻逐年下降。此篇由臺灣大學大氣科學系林俊宏教授及香港城市大學陳仲偉教授發表在自然通訊期刊的最新研究，深入探索其原因。由於颱風的破壞潛力並不是只受到海洋的影響，雖然近年海洋變暖，颱風強度增加，但是影響颱風破壞潛力還有另外兩個重要因子，即颱風個數及颱風生命期。林俊宏的研究發現，近20年來颱風形成個數顯著下降，同時生命期顯著縮短。由於颱風破壞潛力是由三個因素共同影響，而颱風個數下降及生命期縮短產生的負貢獻遠超過颱風強度變強的正貢獻，因此造成近20年來的颱風破壞潛力逐年降低。至於為何颱風生命期縮短和颱風個數下降，研究發現該現象與不利的大氣環境有關。雖然海洋條件變得較有利颱風強度增加，但是大氣環境變得不利颱風的生命期及個數增加，所以近20年來的颱風破壞潛力逐年降低。同時，在全球暖化的情境下，他們也發現類似的現象。透過分析NOAA高解析度氣候模式所模擬simulated的全球暖化情境下之颱風資料，他們發現全球暖化之下，西北太平洋的颱風破壞潛力降低了15%，其主要原因也與近20年來的分析結果類似，即雖然在全球暖化之下，颱風強度增加，但是颱風個數顯著的減少，使其負貢獻遠大於颱風強度增加的正貢獻，因此在西北太平洋的破壞潛力於全球暖化情境下降低了15%。

引用I-I Lin* and Johnny Chan, Recent Decrease in Typhoon Destructive Potential and Global Warming Implications, Nature Communications, in press, 2015* corresponding email: iilin@as.ntu.edu.tw

¹ Department of Atmospheric Sciences, National Taiwan University, No.1, Sec. 4, Roosevelt Rd, Taipei 106, Taiwan; ² Impact Centre, School of Energy and Environment, City University of Hong Kong, Hong Kong. Correspondence: I-I Lin (email: iilin@as.ntu.edu.tw).

Paper published in Nature communications, with highlighted in the NTU web and newsletter(2015)

ARTICLE

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OPEN

Change in ocean subsurface environment to suppress tropical cyclone intensification under global warming

Ping Huang^{1,2}, I-I Lin³, Chia Chou⁴ & Rong-Hui Huang¹

Tropical cyclones (TCs) are hazardous natural disasters. Because TC intensification is significantly controlled by atmosphere and ocean environments, changes in these environments may cause changes in TC intensity. Changes in surface and subsurface ocean conditions can both influence a TC's intensification. Regarding global warming, minimal exploration of the subsurface ocean has been undertaken. Here we investigate future subsurface ocean environment changes projected by 22 state-of-the-art climate models and suggest a suppressive effect of subsurface oceans on the intensification of future TCs. Under global warming, the subsurface vertical temperature profile can be sharpened in important TC regions, which may contribute to a stronger ocean coupling (cooling) effect during the intensification of future TCs. Regarding a TC, future subsurface ocean environments may be more suppressive than the existing subsurface ocean environments. This suppressive effect is not spatially uniform and may be weak in certain local areas.



全球暖化不利熱帶氣旋發展 臺大與中國大陸中國科學院、臺灣中央研究院合作成果榮登《Nature Communications》

全球暖化之下海洋水下環境改變不利熱帶氣旋發展，臺大與中國大陸中國科學院、臺灣中央研究院合作成果榮登《Nature Communications》。

熱帶氣旋，在北大西洋稱之颶風，在西北太平洋稱之颱風，為最大的自然災害之一，發且是相當重要的天然災害。由於這些熱帶氣旋的發展受其所處的大氣和海洋環境有極大的影響，在全球暖化下，地球環境的改變亦有可能影響其發展。一篇最新的研究由臺灣大學、中國大陸中國科學院、臺灣中央研究院合作共同發表在自然通訊期刊上，發現未來全球暖化情況下，海洋的水下環境可能變得不利熱帶氣旋發展。主要原因雖然全球暖化發生於海表的水溫變暖較快，但是海表下深水層水溫增加速率不如海表高。換言之，即海表水溫變暖較快，水下溫度變暖較慢。如此的水溫變化將造成海洋深水層溫度垂直梯度變大，即溫度垂直分佈更顯陡峭。此種溫度增加將造成熱帶氣旋和海洋之間的耦合作用，該耦合作用的增強造成海洋深水層溫度較低的水更容易被帶到海表面，因而抑制熱帶氣旋的發展。而文章最後這樣的結果同時存在於世界上最重要的兩熱帶氣旋好發區：西北太平洋颱風好發區，及西北大西洋颶風好發區。因此雖然過去普遍認為全球暖化之下，只會造成海表溫度變暖，將有利熱帶氣旋發展，但此一研究顯示海洋水下環境的改變，水下溫度垂直變化的情形將抑制熱帶氣旋發展。總的來說，文章指出熱帶氣旋在全球暖化下的增強程度，不僅要考慮海表溫度變暖而產生的增強作用，還必須考慮另一類的控制因子，即考慮水下溫度垂直變化對熱帶氣旋發展的抑制作用。

引用 Ping Huang, I-I Lin, Chia Chou, and Rong-Hui Huang, Change in Ocean Subsurface Environment to Suppress Tropical Cyclone Intensification under Global Warming, Nature Communications, accepted, 2015* corresponding email: iilin@as.ntu.edu.tw

¹ Center for Monsoon System Research, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100875, China. ² Center for Change Studies (JCGCS), Beijing 100875, China. ³ Department of Atmospheric and Oceanic Sciences, Academia Sinica, Taipei 11529, Taiwan. Correspondence: iilin@as.ntu.edu.tw

Center for
Research
L. (e)

Paper published in Nature communications, with highlighted in the NTU web and newsletter(2015)

SCIENTIFIC REPORTS

OPEN

A Long Neglected Damper in the El Niño—Typhoon Relationship: a 'Gaia-Like' Process

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Zhe-Wen Zheng¹, I.-I. Lin², Bin Wang³, Hsiao-Ching Huang² & Chi-Hong Chen²

Proposed in the early 1970's, the Gaia hypothesis suggests that our planet earth has a self-regulating ability to maintain a stable condition for life. Tropical cyclone (TC) is one of the earth's most hazardous disasters; it is intriguing to explore whether 'Gaia-like' processes may exist in nature to regulate TC activities. El Niño can shift the forming position of the Western Pacific typhoons away from land. This shift enables typhoons to travel longer distances over ocean and is known to be a positive process to promote TCs to achieve higher intensity. What is neglected, however, is that there co-exists a negative process. Here we show that during El Niño, typhoons intensify over region undergoing strong ocean subsurface shoaling where upper ocean heat content can drop by 20–50%. This 'worsen' ocean pre-condition can effectively reduce ocean's energy supply for typhoon intensification during typhoon-ocean interaction. We find this an elegant, 'Gaia-like' process demonstrating nature's self-regulating ability. Though during El Niño, typhoons can take advantage of the longer travelling distance over ocean to achieve higher intensity, nature is also providing a damper to partially cancel this positive impact. Without the damper, the situation could be even worse.

With 20–30 tropical cyclones (TCs) formed and intensified each year in the Western North Pacific Ocean (WNPO) is the most energetic and hazardous TC basin in the world. These TCs impose threats to a billion population and mega volcano activities in Asia^{1,2}. During El Niño years, typhoon activities (e.g. fall position, and forming position) can be greatly altered and damage and impacts^{3–18}. It is thus important to understand the El Niño climate projections have suggested a possible El Niño-like future¹⁶. Though many aspects have been studied, there is one aspect in the relationship between ocean's subsurface thermal condition,

In the current research framework, it is generally understood of TC's forming (genesis) position to the southeast (Fig. 1), TCs before encountering the Asia Pacific continents to achieve higher genesis position and the averaged life-time peak intensity of the recent El Niño events, see Methods) was $\sim 171.01^\circ\text{E}$, 8.94°N (154 comparison, the long-term climatological genesis position and the (i.e. closer to land), and 43 ms^{-1} (not as intense), respectively (d

However, for long the above framework neglects the fact that different under El Niño. In El Niño years, strong shoaling takes place. As a result, ocean thermocline is not as deep and upper ocean temperature is lower. These are negative factors for TC intensification^{19–24}. In other words,

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國家自然科學委員會 期刊, 刊名 (Nature Scientific Reports)

【國家自然科學委員會 期刊, 刊名 (Nature Scientific Reports)】

國家自然科學委員會 期刊, 刊名 (Nature Scientific Reports) 是國際科學界最受矚目的期刊之一。本刊自創刊以來，一直秉持著「科學、誠實、公正」的原則，致力於報導全球最新的科學發現。本刊的出版，不僅是科學界交流的重要平台，也是公眾了解科學進步的窗口。

本刊的出版，不僅是科學界交流的重要平台，也是公眾了解科學進步的窗口。本刊的出版，不僅是科學界交流的重要平台，也是公眾了解科學進步的窗口。

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SCIENTIFIC REPORTS | 5:11103 | DOI: 10.1038/srep11103

Paper published in Scientific Reports (Nature series), with joint press conference with the National Taiwan Normal University and highlighted in the NTU web and newsletter(2015)



英特爾科展 我獲雙首獎

12學生9件作品參賽 得獎率逾5成 歷年最佳成績

林志成/台北—洛杉磯電訪採訪

我國參加今年在美國洛杉磯舉行的「英特爾國際科技展覽會」，囊括2項大會歐洲參訪研習獎、2項聯科首獎、5項大會獎、3項特別獎等12個獎，是35年以來最佳成績。建中黃亦軒及北一女陳郁欣兩人均獲首獎，他們感到意外，但也很高興。

英特爾科展素有「科學奧林匹亞」之稱，今年是5月12日至16日在洛杉磯舉行，有來自國家、1700位學生、1300件作品參賽。我國有12位學生9件作品參賽，最後得獎率是55.6%，為各國之冠，是大會平均得獎率24%的2.2倍。

黃亦軒找到開花基因

我國有6位學生獲獎，除了黃亦軒及陳郁欣獲首獎最高榮譽外，建中陳培鳴及陳紹廷、北一女沈玉宜及高陽市三瓦崗中學生王廷高等4人獲大會二等獎。此外

，這次獲台灣和中國大陸各獲2項首獎。

帶領前往洛杉磯比賽的中央研究院院士林榮耀表示，我國參加英特爾科學展35年，這次是成績最好的一次，我學生對科學有興趣，願意投入時間及感到好奇老師，是他們表現出色的原因。

黃亦軒以「轉錄因子ZIP16參與阿拉伯芥開花基因的分子機制研究」作品，獲得大會植物學科首獎。他表示，之前沒想到會得這麼大獎，因此很興奮，也很開心。

黃亦軒說，他從小就喜歡種植

物（如綠豆苗），每次看到它們開花，就很好奇，因此他在4年時間進行研究，發現植物中的ZIP16基因可以促進開花，這項成果，這個發現和實際應用，可以讓植物在多個季節開花，譬如草莓就下一定冬天才吃得到，夏天也可以。

陳郁欣研究颱風強度

陳郁欣以「西北太平洋颱風強度與上層海溫動力結構關係之長期變化」作品，獲大會地球行星科學科首獎。她表示，得這個獎很驚喜，也很意外。

「我在小學地球科學有興趣，想瞭解西北太平洋產生的颱風是否強度有增加？」陳郁欣指出，她的研究顯示，因為海平面上升愈來愈多，21年來這個區域生成的熱帶氣旋平均強度增加26%，登陸時的強度增加34%，因此獲獎。

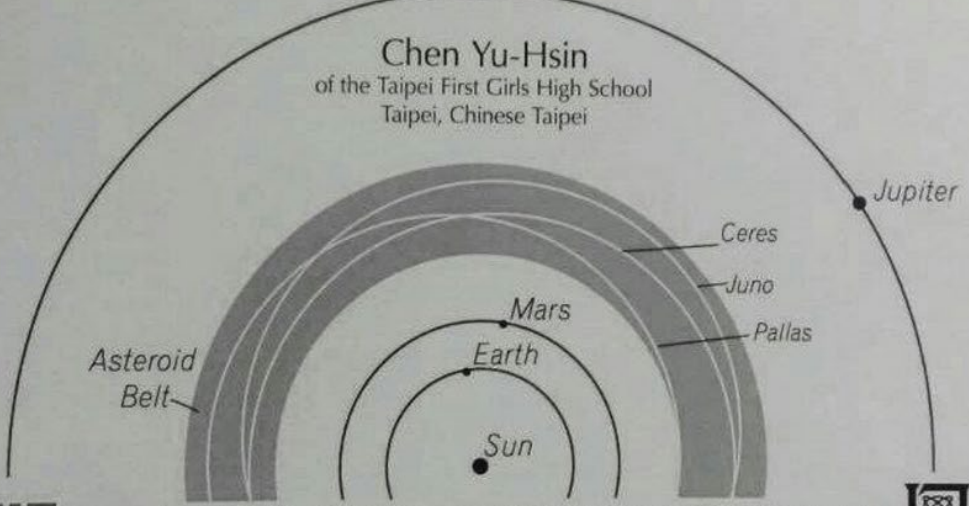


今年英特爾科展獲獎者：陳郁欣（左起）、邱紹廷、黃亦軒、陳紹廷、沈玉宜及王廷高。（科教組提供）

學生	就讀學校	獲獎獎項	校禮和獎狀價值
黃亦軒	建國中學	1. 大會動物學科首獎 2. 大會植物學科首獎(US\$5000) 3. 大會動物學科一等獎(US\$3000) 4. Monsanto公司特別獎一等獎(US\$2500)	1. 新台幣20萬元 2. 審查後保送大學 3. 出國留學獎學金
陳郁欣	北一女	1. 大會地球行星科學科首獎 2. 大會地球行星科學科一等獎(US\$5000) 3. 大會地球行星科學科一等獎(US\$3000) 4. 德國數學學會特別獎三等獎(US\$500)	1. 新台幣20萬元 2. 審查後保送大學 3. 出國留學獎學金
陳培鳴 陳紹廷	建國中學	1. 大會生物學科首獎(US\$500) 2. 美國微生物學會特別獎(US\$2500)	1. 新台幣5萬元 2. 審查後保送大學
沈玉宜	北一女	大會化學科四等獎(US\$500)	1. 新台幣5萬元 2. 審查後保送大學
王廷高	高雄市立三民國中	大會數學科四等獎(US\$500)	1. 新台幣5萬元 2. 審查後保送高中

In recognition of achievement as a top award winner in the 2014 Intel International Science and Engineering Fair, a high school science competition of Society for Science & the Public and Intel Foundation,

Minor Planet (31336) Chenyuhsin
discovered by the LINEAR Program of MIT Lincoln Laboratory is named for



MIT Massachusetts Institute of Technology • Lincoln Laboratory

Minor planet (31336) Chenyuhsin is named for Chen Yu-Hsin - Chen Yu-Hsin was awarded best of category and first place in the 2014 Intel International Science and Engineering Fair for her earth science project, and also received the European Union Contest for Young Scientists Award.(October 2015)

NATURE | LETTER

日本語要約

Eastern Pacific tropical cyclones intensified by El Niño delivery of subsurface ocean heat

F.-F. Jin, J. Boucharel & I.-I. Lin

Affiliations | Contributions | Corresponding authors

Nature 516, 82–85 (04 December 2014) | doi:10.1038/nature13958

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Brief Communication Arising (October, 2015)

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The El Niño Southern Oscillation (ENSO) creates strong variations in sea surface temperature in the eastern equatorial Pacific, leading to major climatic and societal impacts^{1, 2}. In particular, ENSO influences the yearly variations of tropical cyclone (TC) activities in both the Pacific and Atlantic basins through atmospheric dynamical factors such as vertical wind shear and stability^{3, 4, 5, 6}. Until recently, however, the direct ocean thermal control of ENSO on TCs has not been taken into consideration because of an apparent mismatch in both timing and location: ocean warming occurs mostly along the Equator, while TC activity in the North Pacific basin two to three seasons later. This basin is characterized by abundant TCs. This basin is characterized by abundant TCs. This basin is characterized by abundant TCs. This basin is characterized by abundant TCs.

Subject terms: Physical oceanography

臺灣大學卓越研究發表新聞稿
東太平洋颶風與聖嬰現象的秘魯能量庫站
美國和臺大學者跨領域合作成果榮登《自然》(Nature)雜誌

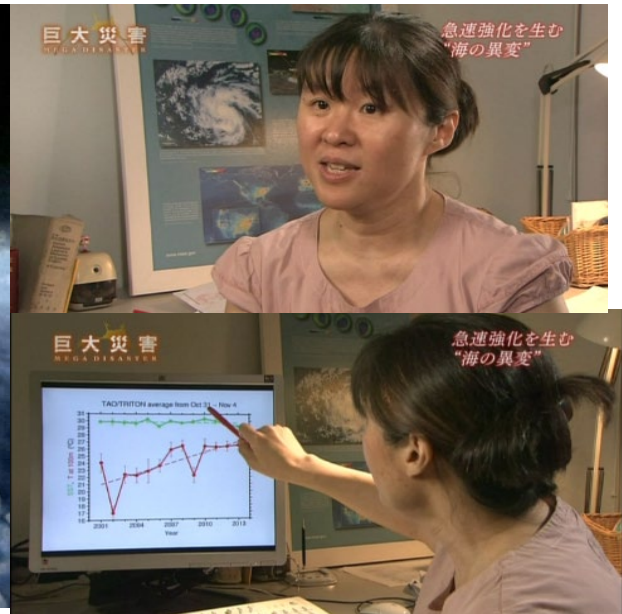
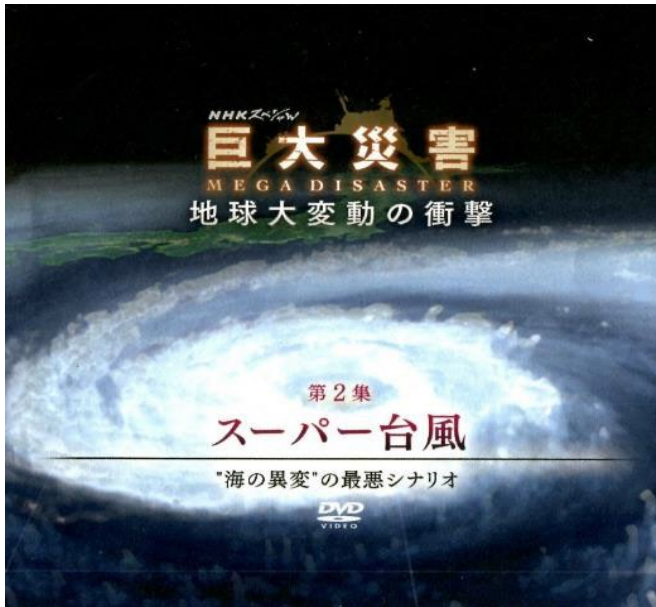
2013 年颶風肆虐的超級颶風海基，為全球有紀錄以來最強的熱帶氣旋，是颶風聖嬰現象的第六個「真凶」。和同於今年聖嬰現象等各種氣候現象的關聯，對全球各地的颶風造成威脅，但是其形成原因為何？能否預測？是氣象研究領域重要研究目標。

臺灣大學大氣海洋科學系特聘教授林俊傑與美國海洋局合作發表了關於東太平洋颶風形成的地下熱能庫作用，研究成果刊登在12月4日的《自然》(Nature)期刊雜誌，將貢獻於未來預測此類極端颶風之強度變化改善。

此研究指出，該現象與聖嬰現象有關，但是，大家很難以理解的是，聖嬰現象最大值出現在冬天，為什麼能在夏季(也就是沒有熱帶氣旋、颶風等發生的季節)；然而東北太平洋颶風發生在夏季，並且在赤道以外區域活動(大約緯度 20 度)，兩者發生的時間和空間並不吻合，會有什麼關係呢？

臺灣大學的益為颶風的聖嬰現象提供補給的熱能，在二十年前就已發現聖嬰的熱能累積和釋放 (recharge-discharge) 機制，也就是在冬季 12、1、2 月颶風聚集熱能，然後在 6 到 9 個月以內，熱能會由赤道往北方向，向較南緯度輸送，並且釋放反聖嬰 (La Nina) 現象。臺灣大學的林俊傑教授與美國海洋局和海洋交互作用，透過此跨領域合作，團隊發現了透過 recharge-discharge 的機制，在 6 到 9 個月以後，聖嬰現象的熱能剛好可以輸送到東太平洋的颶風發展區 (hurricane main development region)，因此一來便提供了這個區域的額外的「熱能」能量，而在釋放熱能即符合之下，有助於形成東太平洋的颶風。因此此項發現是在海表底下進行，就像是聖嬰現象給颶風能量的「秘密」能量庫。這些秘密的熱能，隨後再有機會影響到颶風的強度、聖嬰、夏威夷颶風等。Dr. Boucharel 也指出，颶風強度預報本身有難度，但是聖嬰現象在某種程度上是有跡可循的，因此本研究也許能幫助未來對於預測中長期颶風風能有所助益。

Paper published in Nature, with highlighted in the NTU web and newsletter(2014)



Featured in Japan NHK's special documentary 'Mega Disasters' (31 August 2014) with focus on the importance of ocean subsurface warming and supertyphoons.(2014)

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Home » News & Features » State of the Climate in 2013: Spotlight on authors

State of the Climate in 2013: Spotlight on authors
Author: Deke Arndt
Tuesday, July 15, 2014

As the assessment now known as the BAMS State of the Climate report pushes well into its third decade, the level of international participation is at an all-time high. More than 420 authors from institutions in 57 countries contributed to this year's report. This kind of diversity ensures that a range of scientific disciplines, including atmospheric scientists, tropical meteorologists, oceanographers, and glacier experts, examine the climate system.

It also helps strengthen international data sharing and showcases a number of innovative ways to analyze and display data. Most importantly, it underscores that the climate we live in is not only shared around the world, but also that it affects different people in different places in different ways. Here is a snapshot of some of the contributors to the *State of the Climate in 2013*.

Contributors:

- Martin Sharp, University of Alberta, Edmonton, Alberta, Canada. Chapter 5i: Arctic (Glaciers and Ice Caps). Sixth year with SoC.
- Ryan Fogt, Ohio University, Athens, Ohio. Chapter 6: Antarctica. Seventh year with SoC. Fifth as editor.
- Jose A. Marengo, Brazil's National Institute for Space Research INPE, Cachoeira Paulista, Sao Paulo/Brazil. Chapter 7d: Regional Climates (South America). Ninth year with SoC.
- Khadija Kabidi, Morocco's National Meteorological Direction / North Region, Rabat City, Morocco. Chapter 7e: Regional Climates (Africa). Eighth year with SoC.
- Dr. Ladislavus Chang'a, Tanzania Meteorological Agency, Dar es Salaam, Tanzania. Chapter 7e: Regional Climates (Africa). Third year with SoC.
- Serhat Sensoy, MSc, Engineer, Turkish State Meteorological Service, Ankara, Turkey. Chapter 7f: Regional Climates (Europe & the Middle East). Eighth year with SoC.
- I-Lin Lin, National Taiwan University, Taipei, Taiwan. Chapter 4: The Tropics (Tropical Cyclone Heat Potential). Fourth year with SoC.
- Skie Tobin, Australian Bureau of Meteorology, Melbourne, Australia. Chapter 7h: Regional Climates (Oceania). Fourth year with SoC.

BAMS paper State of the Climate in 2013: spotlighted for the Tropics chapter by NOAA in July 2014.(2014)

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Home > Science Magazine > 29 November 2013 > Normile, 342 (6162): 1027

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Science 29 November 2013:
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 DOI: 10.1126/science.342.6162.1027

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NEWS & ANALYSIS
CLIMATOLOGY
Clues to Supertyphoon's Ferocity Found in the Western Pacific
 Dennis Normile

Tropical storm watchers agree that Haiyan was probably the strongest typhoon to make landfall when it slammed into the Philippines on 8 November, packing winds of up to 314 kilometers per hour. What gave Haiyan, which killed thousands and displaced millions, its deadly wallop?

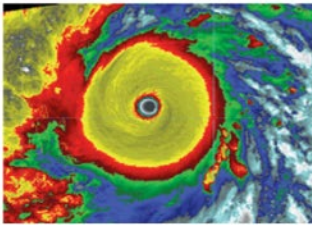
Researchers think they have at least a partial answer to that question: unusually warm subsurface Pacific waters east of the Philippines. A related phenomenon—rising sea levels in the western Pacific—likely abetted Haiyan's devastating storm surge, which caused more deaths than the winds themselves.

Typhoons draw heat from the ocean for the energy that generates their winds. Typically, as a storm's winds increase, they stir up deeper, cooler ocean waters that temper its strength. This cooling effect "is nature's brake to stop typhoons from intensifying," says I-I Lin, a specialist in typhoon-ocean interactions at National Taiwan University in Taipei.

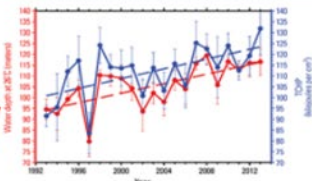
Drawing on data from satellite observations and Argo floats—thousands of instrumented, subsurface probes that measure ocean temperature, salinity, and current speeds—Lin and others have documented a steady 2-decade rise in subsurface temperatures in the western North Pacific and a bulging warm water layer. The warmer and thicker water is available to feed a measure called the

Feeding the monster.
 Unusually warm Pacific waters supercharged Haiyan.

CREDIT: JOHN KNAFF, NOAA/NESDIS/RAMMB, CSU/CIRA



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From Pun, Lin et al. 2013

Pun, Lin and Lo GRL 2013 paper highlighted by Science in Nov. 2013.(2013)

Pun, Lin et al. 2013
was highlighted by the AVISO CNES
(French Space Agency) as
Image of the Month in Aug. 2013

NEWS
Front-page news
Image of the month
2014
2013
Dec. 2013: Mediterranean tides on the move
Nov. 2013: Typhoon Haiyan seen by Saral
Oct. 2013: salt and temperature vs altimetry
Sep. 2013: Icebergs on the move
Aug. 2013: 20 years of typhoons
Jul. 2013: Ob bogs and wetlands
Jun. 2013: Is the ground rising or the sea decreasing?
May 2013: Drifting buoy
Apr. 2013: Surface currents, a pinch of winds with altimetry
Mar. 2013: Saral: 6 days old, and already measuring
Feb. 2013: Alboran Sea eddies
Jan. 2013: Salinity gets finer with altimetry
2012
2011
2010

20 YEARS OF ALTIMETRY FOR TYPHOONS
Image of the Month - August 2013

Sea trends (global trend removed) over the North-West Pacific: the Main Development Region (MDR) where most typhoons are formed and intensified is indicated by the black box.

Depth of the 26°C isotherm (D26, red, left axis) and Tropical Cyclonic Heat Potential (TCHP, blue, right axis) averaged over the main development region, calculated using dynamic steric heights (mass-corrected sea level anomalies) during the typhoon season (July-October) from 1993 to 2011. A clear increase can be seen (Credits National Taiwan University/WHO).

Tropical cyclones are known to be intensified by the heat of the upper ocean. The North-West Pacific is the most active area on earth for tropical cyclone (typhoon) formation and intensification, and one of the most densely populated coastal regions, thus making typhoon

Pun, Lin and Lo GRL 2013 paper highlighted by the International AVISO Altimetry Organization under CNES (French Space Agency) as "Image of the Month" for August 2013.(2013)

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AN OCEAN COUPLING POTENTIAL INTENSITY INDEX FOR TROPICAL CYCLONES.
I.-I. Lin, P. Black, J. F. Price, C.-Y. Yang, S. S. Chen, C.-C. Lien, P. Harr, N.-H. Chi, C.-C. Wu, E. A. D'Asaro
Geophysical Research Letters, Volume 40, Issue 9, pages 1878–1882, 16 May 2013.
Department of Atmospheric Sciences, National Taiwan University, Taipei, Taiwan and
Research Center for Environmental Changes, Academia Sinica, Taipei, Taiwan and
Science Application International Corporation, Inc and Naval Research Laboratory, Monterey, California, USA and
Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, USA and
Rosenstiel School of Marine and Atmospheric Sciences, University of Miami, Miami, Florida, USA and
Naval Postgraduate School, Monterey, California, USA and

GENERAL ENGINEERING

Temperature dependant dielectric breakdown of sputter-deposited AlN thin films using a time-zero approach
August 1, 2014

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August 1, 2014

Contribution to BWR stability analysis Part I: Analytical approach using a reduced order model
July 24, 2014

Alternative algebraic approach to stabilization for linear parabolic boundary control systems
July 24, 2014

Helical structure of complementary colors' relative spectral distribution function

GRL 2013 paper was highlighted by Advance in Engineering.(2013)



National Taiwan University Outstanding Teaching Award in Sep. 2009

PASADENA, Calif. - A "pre-existing condition" in the North Indian Ocean stoked the sudden intensification of last year's Tropical Cyclone Nargis just before its devastating landfall in Burma, according to a new NASA/university study. The cyclone became Burma's worst natural disaster ever and one of the deadliest cyclones of all time.

Scientists at the National Taiwan University, Taipei, and NASA's Jet Propulsion Laboratory, Pasadena, Calif., used data from satellite altimeters, measurements of ocean depth and temperature and an ocean model to analyze the ocean conditions present at the time of the catastrophic storm. Nargis intensified from a relatively weak category 1 storm to a category 4 monster during its final 24 hours before making landfall on May 2, 2008.

Lead author I-I Lin of National Taiwan University and her team found the ocean conditions Nargis encountered created the perfect recipe for disaster. Cyclones thrive on warm layers of ocean water that are at least 26 degrees Celsius (79 degrees Fahrenheit). As they traverse the ocean, they typically draw deep, cold water up to the ocean surface, a process that limits their ability to strengthen, and even weakens them as they evolve. However, Nargis passed over a pre-existing warm ocean feature in the Bay of Bengal where upper ocean warm waters extended deeper than normal, from 73 to 101 meters (240 to 331 feet).

"This abnormally thick, warm water layer, which formed about a month earlier, kept deeper, colder waters from being drawn to the surface, increasing the energy available to fuel Nargis' growth by 300 percent," said Lin. "Combined with other atmospheric conditions conducive to strengthening, this warm ocean feature allowed Nargis to reach speeds of 115 knots (213 kilometers, or 132 miles) per hour at landfall. Had Nargis not encountered this warm ocean feature, it would likely not have had sufficient

Twice featured by NASA with official press release and reported by USA Today, Science Daily, NTU news and other media.(February and March, 2009)
 (http://www.jpl.nasa.gov/news/news.cfm?release=2009-031)
 (http://climate.jpl.nasa.gov/news/index.cfm?FuseAction=ShowNews&NewsID=53)

Front cover: Weybourne Atmospheric Observatory, UK

Weybourne Atmospheric Observatory, officially opened by Sir William Waldegrave in 1994, experiences an uninterrupted, "clean air" seaward aspect to the North. We are also able to measure plumes from many differing origins including London and the Arctic.

Ozone, oxides of nitrogen and sulphur, carbon monoxide, carbon dioxide, oxygen, hydrogen, and condensation nuclei are routinely measured. New instrumentation is also available to determine GHG's and VOC's utilising Gas chromatography and PTRMS.

A SODAR RASS and Sonic system is run providing meteorological information about the atmospheric column above the site.

The facility also has ample room to house temporary external applications; with the ability to provide 32amp, 16amp and three-phase electrical supply. Accommodation in the area is both plentiful and high quality. Norwich International airport is forty minutes drive away ensuring that mainland Europe is easily accessible.

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national report



H-Lin obtained her Ph.D. degree in Remote Sensing from the University of Cambridge, England in 1995. From 1995-1999, she worked as a Research Scientist in the Centre for Remote Imaging, Sensing, and Processing of the National University of Singapore. In 2000 she returned to her home country, Taiwan, and is currently an Associate Professor in the Department of Atmospheric Sciences, National Taiwan University. Her research interest is in using synergy of multiple remote sensing data to study air-sea interaction problems, including typhoon-ocean interaction, dust storm-ocean interaction, and the role of surfactants in air-sea gas exchange.

Multiple remote sensing for air-sea biogeochemical interaction research in the western north Pacific and neighbouring seas

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Air-sea biogeochemical interaction related processes are a critical component in the Earth's ecological and climate system. However, due to the complex and dynamic nature of these processes, many of the processes are poorly-observed and little understood. This is especially true in the vast western North Pacific Ocean and the neighbouring seas as this vast oceanic region is subject to frequent atmospheric episodic forcing from events like typhoons and dust storms. It has been difficult to use discrete ship-borne point measurements with irregular time and spatial intervals to observe these highly episodic processes. With the

advancement in space-borne remote sensing offering frequent and systematic observations, it has become more feasible to take a glimpse at these complex dynamic processes. In this research, multiple remote sensors are used as it is necessary to have observations of a suite of physical and biogeochemical parameters for both atmosphere and ocean. In this research, five types of remote sensing data are used and they are: (a) ocean colour data (chlorophyll-a concentration and ocean colour spectra) from the NASA's SeaWiFS (Sea-viewing Wide Field-of-view Sensor) and MODIS satellites (O'Reilly et al., 1998); (b) aerosol optical thickness and fine mode fraction data from the NASA

Featured by the by the international SCOR (Scientific Committee on Ocean Research) in the SOLAS (Surface Ocean Lower Atmosphere Study) newsletter.(2008)



10 Outstanding Young Women Award of the Republic of China(2007)

Scientists had long suspected that strong winds cause entrainment, or vertical mixing, in tropical and subtropical oceans, explained Lin and colleagues in a paper published in the October 2003 issue of *Geophysical Research Letters*. But it took measurements from the three satellite sensors to prove it.

"This research is important because it confirms that the impact of cyclones on ocean primary production is significant, at least in the South China Sea," Lin said. "It also points to the potential impact tropical cyclones have on climate change, since primary production is critical to global climate."

The new technology has also illuminated future research options for the scientists. "We've now established a method to quantify the cyclone-induced phytoplankton growth using a combination of remote-sensing data and models," Lin said. "This method can be applied to other typhoon cases and in different oceanic regions, too. Previously, it was impossible to do such work due to the lack of observations by traditional means."

For more information, visit the following web sites:

Tropical Rainfall Measuring Mission (TRMM)

<http://trmm.gsfc.nasa.gov/>

SeaWiFS Project

<http://seawifs.gsfc.nasa.gov/SEAWIFS.html>

NASA Quick Scatterometer (QuikSCAT)

<http://www.jpl.nasa.gov/misn/scatter/quikscat.html>

Air-Sea Interaction & Climate

<http://www.nasa.gov/jpl>

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<http://www.cnn.com/2004/WEATHER/07/25/bc.asia.typhoons.rpt>

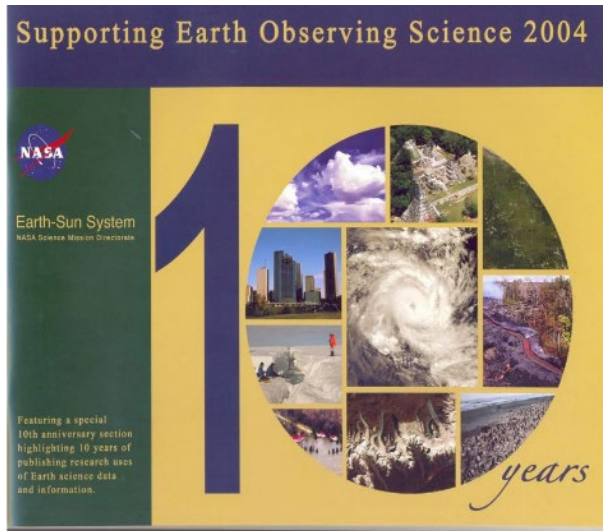


Ocean Research in Taiwan. Lin holds a PhD in remote sensing from the University of Cambridge, England.

I-Lin Lin is an assistant professor in the Department of Atmospheric Sciences at the National Taiwan University in Taiwan. From 1995 to 1996, she worked as a research scientist at the Centre for Remote Imaging, Sensing, and Processing (CRISP) at the National University of Singapore. She also served as principal investigator at the Remote Sensing Laboratory at the National Center for Remote Sensing from the University of Cambridge, England.



W. Timothy Liu is a senior research scientist at the Jet Propulsion Laboratory, California Institute of Technology. His research focuses on ocean-atmosphere interactions and satellite oceanography. Liu is leader of the Air-Sea Interaction and Climate Team and principal investigator for both the NASA Scatterometer (NSCAT) and TOPEX/Poseidon projects. He holds a MS and PhD in atmospheric sciences from the University of Washington.



Reported in NASA's 10-years anniversary of earth observation highlights.(2004)

nature

news and views in brief

7 August 2003

Vol 425 No 6949 PP 630

Oceanography :

Bloom in Cyclone



By Tim Lincoln,
NATURE Magazine



Citation in *Nature: News and Views in Brief*, 7 August, 2003, vol. 425, no. 6949, pp. 630, 'Oceanography: Bloom in Cyclone' (original paper see Lin I-I *et al.*, 2003c, *Geophysical Research Letters*).(2003)

Oceanography

Bloom in cyclone

Geophys. Res. Lett. doi: 10.1029/2003GL017141 (2003)

For three days in July 2000, cyclone Kai-Tak whipped across the South China Sea. I. Lin and colleagues have made the most of a combination of satellite views of this tropical storm and its effects, and in their latest paper have documented the resulting bloom of phytoplankton. They calculate that the bloom constituted a 10-fold increase in growth, or primary production, over normal conditions.

This is not unexpected, as storms are known to stir marine waters from depth and bring nutrients to the sunlit upper zone where phytoplankton can use them in photosynthesis. But tropical cyclones are especially unpredictable beasts, and making measurements from ships or moored arrays would be an ineffective and hazardous business. Hence the virtue of satellite data — in this case from three different sensors, which the authors have used to inform models of physical ocean mixing and primary production.

The further calculations of Lin *et al.* produce a bigger picture. Kai-Tak was of only moderate force, but they estimate that this storm alone was responsible for 2–4% of new annual production in the South China Sea. Given cyclone incidence, they believe that the overall figure could amount to 20–30%.

Tim Lincoln

13 March 2003

Vol 422 No 6928 pp 132

Atmospheric Science:

**Quick,
quick,
slow**



By Tim Lincoln, **NATURE** Magazine

Atmospheric science

Quick, quick, slow

Geophys. Res. Lett. doi:10.1029/2002GL015674 (2003)

In July and August 2000, remote-sensing instruments tracked the consequences of two typhoons, Kai-Tak and Bilis, during their passage over oceans in Southeast Asia. Analyses of the data have produced a refined picture of the relationship between sea-surface temperature and wind speed.

Typhoons are driven by the energy from a warm sea-surface, and in turn drag up water from depth as they pass, leaving surface patches that can be up to 6 °C cooler than the surrounding ocean. As I.-I. Lin and co-workers point out, this situation provides a natural experiment. Taking advantage of this, they find that the speed of surface winds drops dramatically over such patches compared with wind speed over neighbouring ocean. This agrees with a previously proposed mechanism of wind-speed modulation at the sea surface. In Lin and colleagues' data, every 1 °C drop in sea temperature typically corresponds to a decrease of about 1 m s⁻¹ in wind speed. The cold patches don't take long to warm up again, however, and — most notably — the authors find that events can be played out on comparatively small scales (100–400 km), and quite fast (within a day). **Tim Lincoln**

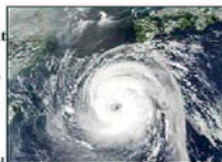
Citation in *Nature: News and Views in Brief*, 13 March, 2003, vol. 422, no. 6928, pp. 132, 'Atmospheric Science: Quick, quick, slow' (original paper see Lin I-I *et al.*, 2003a, *Geophysical Research Letters*).(2003)

December 8, 2002

CNN Europe	CNN Asia	Languages	On CNN TV	Transcripts	Headline News	CNN International
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Typhoons a boon for ocean life

SAN FRANCISCO (AP) — Typhoons, the violent storms that are the bane of life across much of Asia, are a boon for life at sea, where the cyclones stir up the nutrients that microscopic algae crave, according to scientists.



Scientists in Taiwan and the United States recently used a trio of NASA satellites to observe how the passage of even moderate typhoons over the South China Sea can generate upwellings of nutrient-rich water from deeper in the ocean and spark massive blooms of phytoplankton.

"It's a natural hazard, it destroys life, but what I am showing is it also enhances life," said Timothy Liu, a senior research scientist at the National Aeronautics and Space Administration's Jet Propulsion Laboratory in Pasadena, California, on Saturday.

Through photosynthesis, the algae absorb carbon dioxide from the atmosphere and convert it to oxygen, offsetting emissions of carbon dioxide from the burning of fossil fuels. The algae are also an important food source for marine life.

Scientists tracked the typhoons to see what kind of effect they had on the sea life

Liu, working with research scientist I-I Lin of Taiwan's National Center for Ocean Research in Taipei, combined data culled from three satellites to show the positive effects of storms on marine life. They presented their results Saturday at the fall meeting of the American Geophysical Union.

"Typhoons were completely neglected before, because it was impossible to quantify" their effect on the algae, Lin said.



The violent storms are seen as the bane of life across much of Asia

Typhoon Kai-Tak passed over the South China Sea on July 5, 2000, lingering for four days before traveling northward over Taiwan, based on data acquired from NASA's Quikscat, a satellite that measures wind speeds over water.

In its aftermath, sea surface temperature measurements made by the joint U.S.-Japanese Tropical Rainfall Measuring Mission satellite showed a 16-degree

Fahrenheit drop in the area where the counterclockwise-spinning storm had been parked. Colder water, drawn upward by the typhoon, caused the drop, Lin said.

By July 12, 2000, four days after the typhoon had moved on, a third satellite, the Sea Viewing Wide-Field-of-View Sensor, began to measure a dramatic change in the ocean color that matched in extent the previously observed cold spot.

A 300-fold increase in ocean chlorophyll, contained in the algae, accounted for the color change, Liu said.

The bloom persisted for a month.

Liu and Lin said they tracked about 20 typhoons that swept the South China Sea over the course of 2000 using the novel three-satellite method.

"The hypothesis was there, but there was no evidence to tie it together," Liu said of the typhoon-phytoplankton connection.

CNN reported the finding on the impressive ocean biogeochemical responses induced by typhoon Kai-Tak (i.e. Lin et al. GRL 2003b).