Speech by Mr SHUN Chi-ming, Director of the Hong Kong Observatory 21 March 2019

It is my pleasure to meet all of you again in the annual press briefing today. Before reporting on the latest developments in the Hong Kong Observatory, let me first introduce my Assistant Directors. They are:

- (1) Dr CHENG Cho-ming, responsible for public weather services,
- (2) Miss LAU Sum-yee, responsible for aviation weather services,
- (3) Mr TSUI Kit-chi, responsible for radiation monitoring and instruments, and
- (4) Mr Chan Pak-wai, Acting Assistant Director responsible for climate and geophysical services.

You may notice that our conference hall has already been decorated for the upcoming Open Day event this weekend (23 and 24 March). The theme of the Open Day matches with that of the World Meteorological Day this year, i.e. "The Sun, the Earth and the Weather". The Sun drives atmospheric circulation on the Earth, and also brings about various atmospheric phenomena and even space weather. This theme surely also reminds us of the extreme weather brought by climate change and the need to respond to these challenges actively in a way similar to coping with Super Typhoon Mangkhut last year.

2015 to 2018 were the four warmest years on record globally as confirmed by the World Meteorological Organization (WMO). 2018 was also the fourth warmest year on record. Global carbon dioxide concentration reached a new record high of close to 410 parts per million (ppm). Such concentration was unprecedented in the past 800,000 years. Arctic seaice extent was well below average throughout 2018 with record-low levels in the first two months of 2018. Arctic warming will lead to wavier westerly flow aloft and easier southward incursion of cold Arctic air, and hence the development of "warm Arctic, cold continents" phenomenon. This situation is worrying, and it may also lead to misguided belief by people living in areas with extreme cold surges that global warming does not exist. Various extreme weather events, including heatwaves, cold spells and severe drought continued to wreak havoc in different parts of the world in 2018. Extreme rainfall triggered severe flooding and landslides. High winds, storm surges and torrential rain induced by tropical cyclones brought about severe damages and casualties.

Locally, the passage of tropical cyclone Mangkhut in September last year was believed to be the most unforgettable to many of us. Hong Kong was severely battered by the extreme high winds and record-breaking storm surge brought by Mangkhut. Fortunately, there was

no fatality. In terms of temperature, mainly attributing to the exceptionally warm spring, the weather in Hong Kong was warmer than usual in 2018 with an annual mean temperature of 23.9 degrees, the third warmest on record. In fact, 11 high-temperature related records had been broken, including the monthly mean temperature of 28.3 degrees for May, the number of very hot days for May reaching 16 days respectively, and the earliest issuance of Very Hot Weather Warning at 3 May, etc. All ranked the highest since records began in 1884. There were 36 Very Hot Days in 2018, ranking the third highest on record. Hong Kong experienced the warmest winter on record in 2018/2019 (December to February) with the mean temperature reaching 19.1 degrees. There were only 3 cold days this winter (minimum temperature recorded at the Observatory's Headquarters at or below 12.0 degrees), the fewest on record. I would like to emphasise that the trend of climate change has continued and the situation requires everyone's great attention.

Regarding the annual weather outlook of Hong Kong for 2019, after considering a number of factors including the future evolution of the already-established El Niño, climate model predictions and other objective guidance, it is expected that four to seven tropical cyclones will come within 500 kilometres of Hong Kong, which is normal. The tropical cyclone season will probably start in or after June. Under the effect of global warming and El Niño, the annual mean temperature in 2019 is expected to be above normal, with a high chance of reaching the warmest top 10 in records. The annual rainfall is expected to be normal to above normal, i.e. between 2300 and 2900 mm. Hong Kong would likely be affected by heavy rain. Members of the public are reminded of preparing for severe weather.

For weather monitoring, the Observatory further enhances its regional weather information service on its website today — real-time wind direction and wind speed information from the automatic weather stations at North Point, Central Pier and Lamma Island will be launched. Such information will allow the public to grasp the latest wind situation near the Victoria Harbour and offshore areas. Real-time information of these new locations will be included in the "MyObservatory" app during the upcoming updates. In 2018, the Observatory established two new lightning detection stations located at Chek Lap Kok and Dongao Island in Zhuhai respectively. The two stations were installed with the latest model of lightning sensors. In addition, the sensors at the four existing stations, namely, Chung Hom Kok, Tsim Bei Tsui, Sha Tau Kok and Taipa in Macau, had also been updated with the latest model. After trial run and optimisation, the new lightning sensors had been put into full operation in January this year to provide more accurate and bigger coverage of lightning information. We will also install the latest model of lightning sensors for the rest of the lightning detection stations in Guangdong later.

The Observatory also launches a new interactive webpage "Earth Weather" today, featuring forecast weather charts from computer models, including wind direction, wind speed and temperature. The webpage will be enhanced with tropical cyclone forecast track

later. The "MyObservatory" app will also be updated later to include this product. To further enhance the marine meteorological services, the Observatory plans to launch a new "Automatic Sea State Forecast" webpage in the coming typhoon season to provide 96-hour prediction of sea wave and swell in the South China Sea, western North Pacific Ocean and North Indian Ocean. This service is particularly useful to those people engaged in maritime operations or water sports in the above sea areas. Animated display of wind flow and movement of wave will be shown on the above webpages respectively. The map can also be easily moved around and zooming in and out.

On public communication, the Observatory launched its Facebook page and Instagram account last year with the numbers of followers exceeding 130,000 and 15,000 respectively. Such growth is fast in Asia. The Observatory will further collaborate with various Government departments and organisations to produce short videos and posts so as to let the public understand the close relationship between weather, climate change, and their daily lives, thereby raising the public awareness and knowledge in this regard. In addition, the Observatory will collaborate with tertiary institutes and local artists to enhance public's interests in meteorological knowledge through the crossover of art and science. Further details will be available later. For Instagram account, we will promote weather related information to the young users by enhancing the interactive posts and animations on the platform. "1-Minute Weather" Time-lapse Video Competition, organised by the Observatory and supported by Facebook between November last year and January this year, has completed. The winning entries will be displayed in HKO's Open Day this year. Besides, the Observatory will co-organise a photo competition with the Photographic Society of Hong Kong later this year, with people's stories or damages relating to extreme weather as the theme. Details of the competition will be announced later.

Before and during the passage of Super Typhoon Manghkut last year, the Hong Kong Observatory utilised its Facebook Page to disseminate early warning messages to the public, so that people can get well prepared, reducing losses and impacts. After the passage of the storm, the Observatory made use of Facebook to collect photos and videos taken by the public for research and educational use. Selected photos and videos have been put on a GIS-based webpage "Interactive Map of Storm Damage by Mangkhut" for public viewing. We would like to express our sincere gratitude to all who have contributed their photos and videos to the Observatory. As the public has become increasingly active in sharing weather photos and videos, the Observatory plans to launch a new function in the mobile application "MyObservatory" in 2019 progressively, facilitating the public in reporting weather phenomena. These reports crowdsourced from the public will enhance coverage and content of weather monitoring, assisting the weather services and supporting the development of smart city initiatives. Besides, the public can use the mobile application to browse the shared photos and videos of weather phenomena for better understanding of the weather situation around.

For the provision of aviation weather services, the Observatory soft launched 'MyFlightWx', an Electronic Flight Bag weather mobile application in end of 2017. Since then, it has gone through operational trials for several months. Pending the official approval from the Civil Aviation Department, 'MyFlightWx' will be officially operated on about five hundred Cathay Pacific and Cathay Dragon flights daily. Moreover, the Observatory is collaborating with Cathay Pacific Airways to expand the Hong Kong Aircraft Meteorological Data Relay (AMDAR) programme. Seventy Boeing 777 aircraft will be installed progressively with a new software to provide invaluable meteorological data, including wind speed, wind direction, temperature and the newly enabled turbulence measurements. Currently, not many aircraft in Asia-Pacific provide such real-time measurements. These measurements will be useful in enhancing aviation safety and the accuracy of the global numerical weather prediction models.

After being appointed by WMO as the Regional Specialised Meteorological Centre (RSMC) for Nowcasting last year, the Observatory was again designated by WMO as a Testbed for Doppler Light Detection and Ranging (LIDAR) systems for aviation application. This helps promote the collaboration between meteorological services around the world in testing and development of standardised meteorological instruments. It is also a recognition from the international meteorological community of the Observatory's application of LIDARs in the detection of windshear, building wake and wake turbulence from aircraft. At the same time, the Observatory is also collaborating with the Hong Kong Airport Authority to provide weather information for more than 300 destination airports to travellers through the mobile app of the Hong Kong International Airport in mid-2019. The relevant weather information will be extended progressively to the display screens at the boarding gates later.

On regional collaboration, the Observatory is collaborating with the Guangdong Meteorological Services, and the Macao Meteorological and Geophysical Bureau to support the development of Guangdong-Hong Kong-Macao Greater Bay Area. The Greater Pearl River Delta Weather website currently operated by the Observatory to provide weather forecast and warning information will be upgraded to provide weather forecast with longer period and greater details for this Area. The new website provides 7-day weather forecast, weather warning, and real-time weather information for over 60 districts of 11 cities in the Greater Bay Area. This website is expected to be launched soon.

On public education, the Observatory collaborated with the Ho Koon Nature Education cum Astronomical Centre to compile "Geography E-learning Package about Climate Change" with a view to enhancing teachers and students' awareness on climate change and its impacts and debunking some common climate myths as well. Consolidating the latest scientific information, the education package is compiled based on the latest version of Geography Curriculum and Assessment Guide (Secondary 4-6) published by the Curriculum Development Institute of the Education Bureau. The package comprises a teaching kit, a

mobile application about climate change and a board game learning set. We expect students can understand climate change in greater depth make an effort to response to the change in the future.

To promote the theme of this year's World Meteorological Day – "The Sun, the Earth and the Weather", the Observatory launches a new version of "Space Weather" webpage to enhance the knowledge of the members of the public's on space weather. In addition, a kid version of the "Space Weather" webpage was also added to the "My Little Observatory" website raising kids' interest in Space. Meanwhile, to promote the understanding of radiation by the general public, the Observatory plans to launch an e-book on radiation in the second quarter of this year.

Lastly, I would like to take this opportunity to remind everyone that the Open Day of the Observatory will take place on March 23 and 24. We take this opportunity to mark the local meridian at the Observatory's Headquarters to enable the public to step on the longitude of Hong Kong and visit the associated meridian mark and trig station. Built in 1884 and 1929 respectively, these markers have significant historical values. Several partner organisations will join the Open Day this year. They include the Hong Kong Jockey Club Disaster Preparedness and Response Institute introducing their survival kit, also known as "Bug-out Bag" in the event of a disaster; China Light and Power promoting energy saving tips; and students from School of Creative Media of the City University of Hong Kong introducing their works which combine science and art. On March 23 morning, we have invited over 600 members of the public, including uniform groups and underprivileged communities, to participate in the session a talk show on extreme weather and the prize presentation ceremony of the "1-Minute Weather" Time-lapse Video Competition. Besides, there will also be a series of performances combining elements of weather and art, including a sand painting performance to highlight information related to extreme weather, and the debut of a theme song on climate change. The theme song is written and performed by a well-known local singer. It is meaningful to premiere this theme song on the World Meteorological Day on March 23 this year, wishing that the song relating climate change to life can inspire everyone to take response actions.

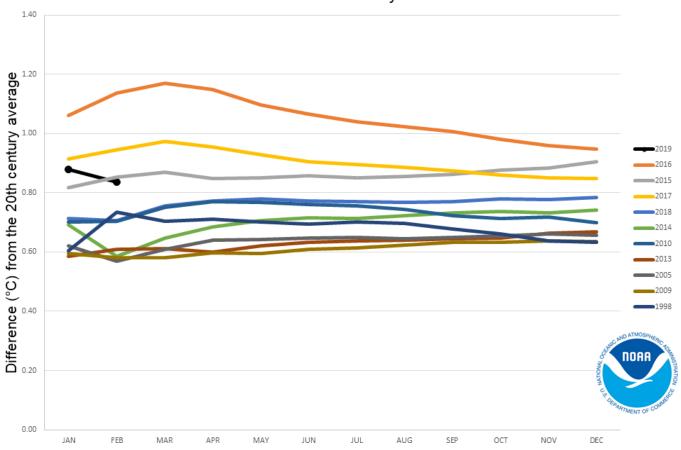
Let me stop here. If you have questions, my Assistant Directors and I will try our best to answer them. Thank you!



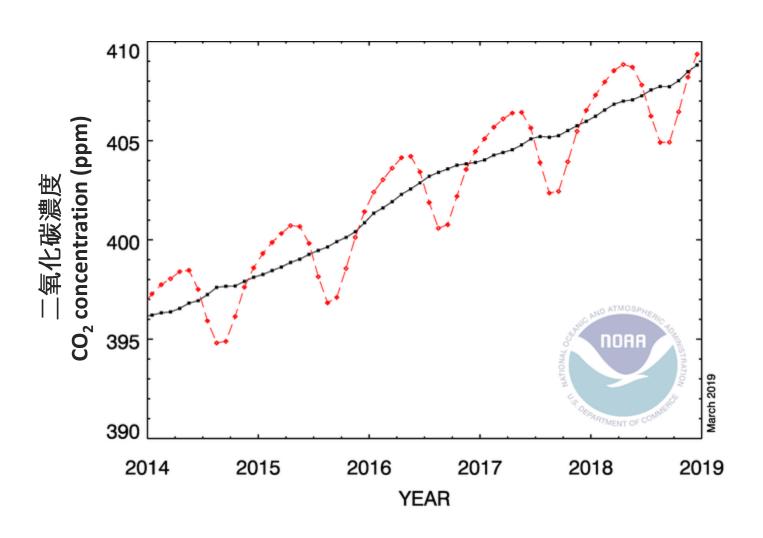
2019年全球平均温度與最熱年份的比較 Comparison of 2019 global mean temperature with hottest years

Year-to-Date Global Temperatures

for 2019 and the ten warmest years on record



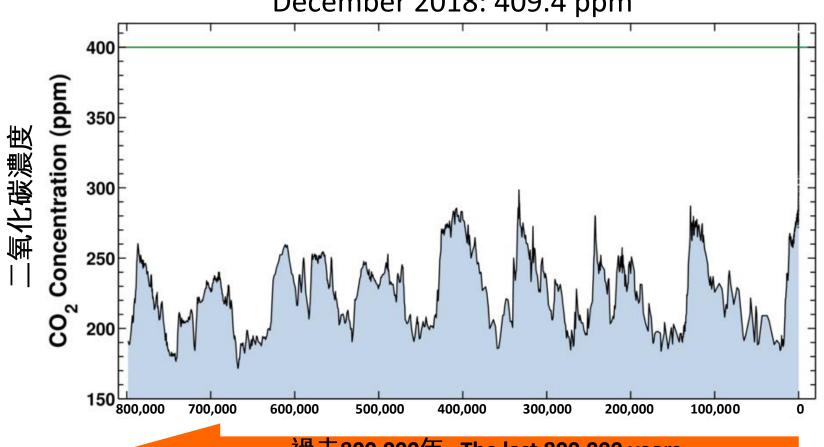
全球近年CO₂濃度 Global CO₂ concentration in recent years



全球CO,濃度過去80萬年前所未見 Unprecedented Global CO₂ concentration in 800,000 years

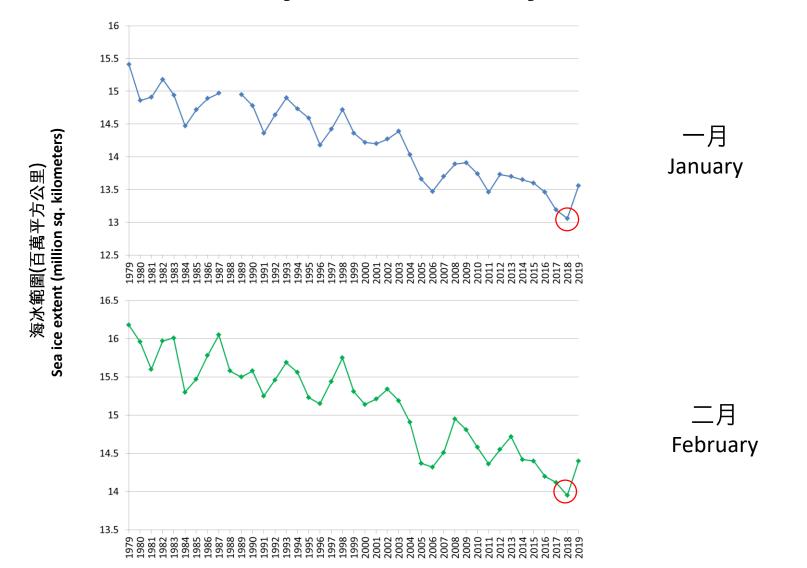
2018年12月: 409.4 ppm

December 2018: 409.4 ppm



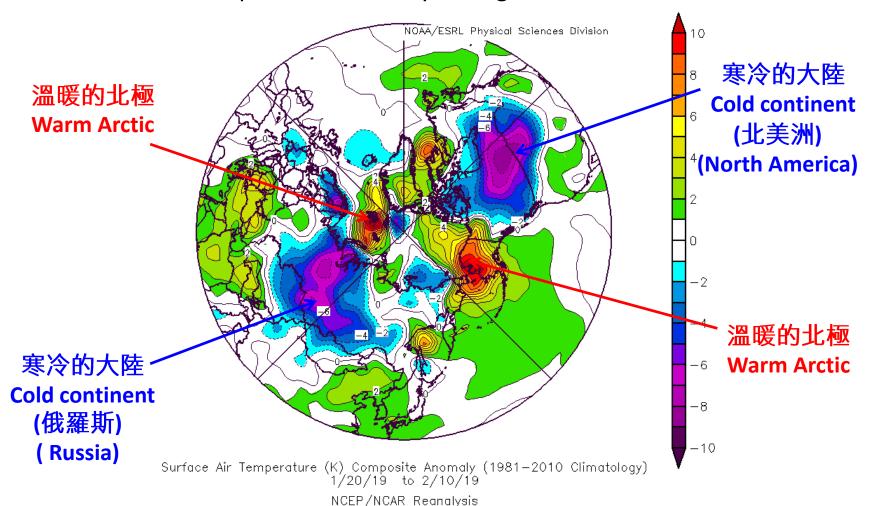
過去800,000年 The last 800,000 years

2018年1、2月北極海冰達到最低紀錄水平 Arctic sea-ice extent reached record low levels in January and February 2018



溫暖的北極寒冷的大陸 Warm Arctic Cold Continents

2019年1月20日至2月10日表面溫度距平 Surface temperature anomaly during 20 Jan – 10 Feb 2019



香港天文台全年平均氣溫最高前10名紀錄(1885-2018) Records of 10 highest annual Mean Temp at HKO (1885-2018)

排名 Ranking	年份 Year	平均氣溫 Mean Temp (°C)
1	2015	24.2
2	1998	24.0
3	2018	23.9
3	2017	23.9
3	2002	23.9
6	1999	23.8
6	1966	23.8
8	2007	23.7
9	2016	23.6
9	2003	23.6
9	2001	23.6
9	1994	23.6

2018年破紀錄高溫天氣事件摘要(一) Summary of record-breaking high temperature events in 2018 (1)

破紀錄事件 (自1884年有記錄以來) Record-breaking Events (since records began in 1884)	日期/週期Date/Period	新紀錄 New Record
最高5月平均氣溫 (℃) Highest mean temp for May	2018年5月 May 2018	28.3
最高5月平均最低氣溫 (℃) Highest mean min temp for May	2018年5月 May 2018	26.1
最高5月日平均氣溫 (℃) Highest daily mean temp for May	2018年5月30日 30 May 2018	31.2
最高春季平均最高氣溫* (℃) Highest seasonal mean max temp for Spring	2018年3月至5月 Mar 2018 to May 2018	27.7
最高上半年平均最高氣溫 (℃) Highest mean max temp for the 1 st Half Year	2018年1月至6月 Jan 2018 to Jun 2018	25.3

^{*}自1885年有記錄以來 since records began in 1885

2018年破紀錄高溫天氣事件摘要 (二)

Summary of record-breaking high temperature events in 2018 (2)

破紀錄事件 (自1884年有記錄以來) Record-breaking Events (since records began in 1884)	日期/週期 Date/Period	新紀錄 New Record
最多5月酷熱天氣日數 (天) Highest number of very hot days in May	2018年5月 May 2018	16
最多5月熱夜數目 (天) Highest number of hot nights in May	2018年5月 May 2018	6
最長5月酷熱天氣連續日數 (天) Highest number of consecutive very hot days in May	2018年5月 May 2018	15
每年最早發出酷熱天氣警告# Earliest date for the issuance of Very Hot Weather Warning#	2018年5月3日 3 May 2018	5月3日 3 May
最長酷熱天氣警告生效時間#(小時) Longest duration of Very Hot Weather Warning# (hours)	18-05-2018 06:45 -> 01-06-2018 18:45	348
最高12月日平均氣溫 (℃) Highest daily mean temp for Dec	2018年12月4日 4 Dec 2018	24.8

#自2000年推出酷熱天氣警告以來 #Since Very Hot Weather Warning introduced in 2000

香港天文台全年酷熱天氣日數最多前10名紀錄(1884-2018) Records of 10 highest annual number of very hot days at HKO (1884-2018)

排名 Ranking	年份 Year	酷熱天氣日數(天) Number of very hot days
1	2016	38
2	1963	37
3	2018	36
4	2014	33
5	2009	30
5	1962	30
7	2017	29
8	2015	28
8	1978	28
8	1967	28

香港天文台冬季平均氣溫最高前10名紀錄(1884/85-2018/19) Records of 10 highest Winter mean temp at HKO (1884/85-2018/19)

排名 Ranking	冬季年份 Winter Year	平均氣溫 Mean Temp (°C)
1	2018/19	19.1
2	2016/17	18.4
2	1998/99	18.4
4	1978/79	18.3
5	2008/09	18.1
6	2006/07	18.0
7	2012/13	17.9
7	2001/02	17.9
7	2000/01	17.9
7	1965/66	17.9

香港天文台冬季寒冷天氣日數最少前10名紀錄(1884/85-2018/19) Records of 10 lowest number of Winter cold days at HKO (1884/85-2018/19)

排名 Ranking	冬季年份 Winter Year	寒冷天氣日數(天) Number of cold days
1	2018/19	3
2	1998/99	4
3	2000/01	5
3	1990/91	5
3	1978/79	5
6	1986/87	6
6	1974/75	6
8	2016/17	7
8	1996/97	7
10	2012/13	8
10	2006/07	8
10	1980/81	8
10	1964/65	8

2019年全年展望 Annual outlook for 2019

進入香港500公里範圍 內的熱帶氣旋數目 Number of tropical cyclones entering 500 km of Hong Kong 接近正常 (4至7個) Near normal (4 to 7)

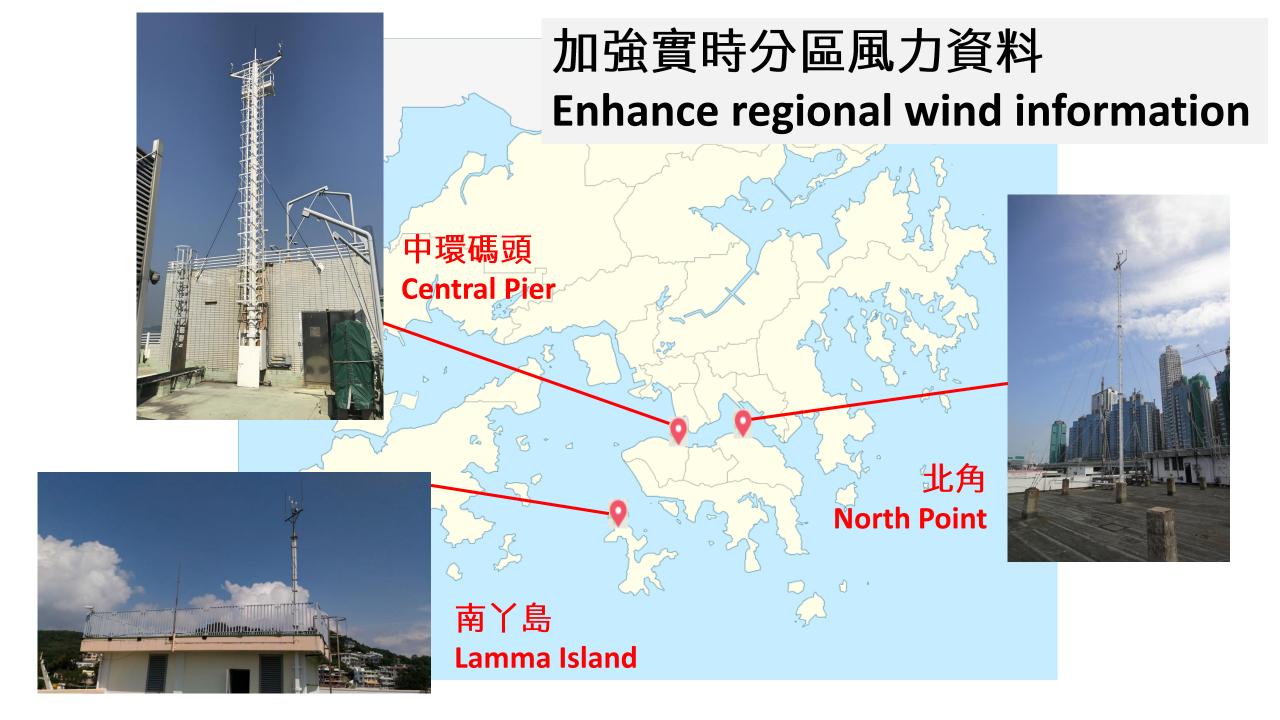
風季開始 Onset of tropical cyclone season

6月或之後 June or after

2019年全年展望 Annual outlook for 2019

全年平均溫度 Annual mean temperature 偏高,進入頭十名的機會為高 Above normal with high chance of reaching the top 10 positions

香港全年總雨量 Annual rainfall in Hong Kong 正常至偏多 (介乎2300至2900毫米) Normal to above normal (between 2300 and 2900 mm)



加強實時分區風力資料,新增三個自動氣象站的風向及風速資料,包括北角、中環碼頭及南丫島
Enhancement of real-time regional wind information – adding wind direction and wind speed at North Point,

Central Pier & Lamma Island



天文台新閃電儀投入業務運作

The Observatory's New Lightning Sensors become operational

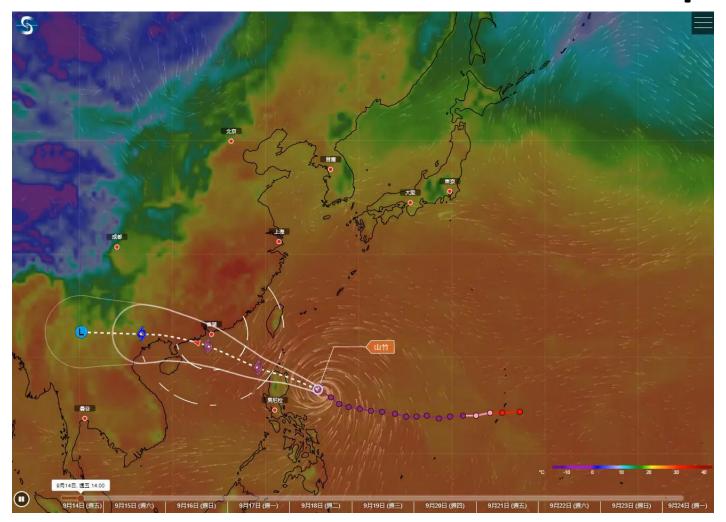


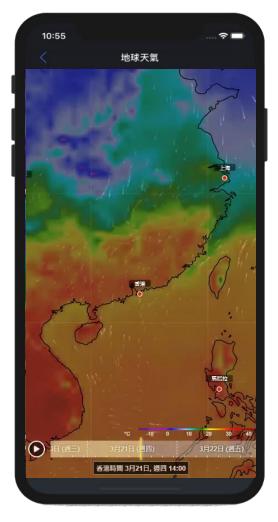
	雲對地閃電 Cloud-to-Ground Lightning	雲間閃電 Cloud-to-Cloud Lightning
舊網絡 Old network	位置準確度 Lightning location accuracy: 500 m 探測效率 Lightning detection efficiency: ~ 90%	探測效率 Lightning detection efficiency: 10-50%
新網絡 New network	位置準確度 Lightning location accuracy: 250 m 探測效率 Lightning detection efficiency: 達 reaching 95%	探測效率 Lightning detection efficiency: > 50%

天文台新閃電儀投入業務運作



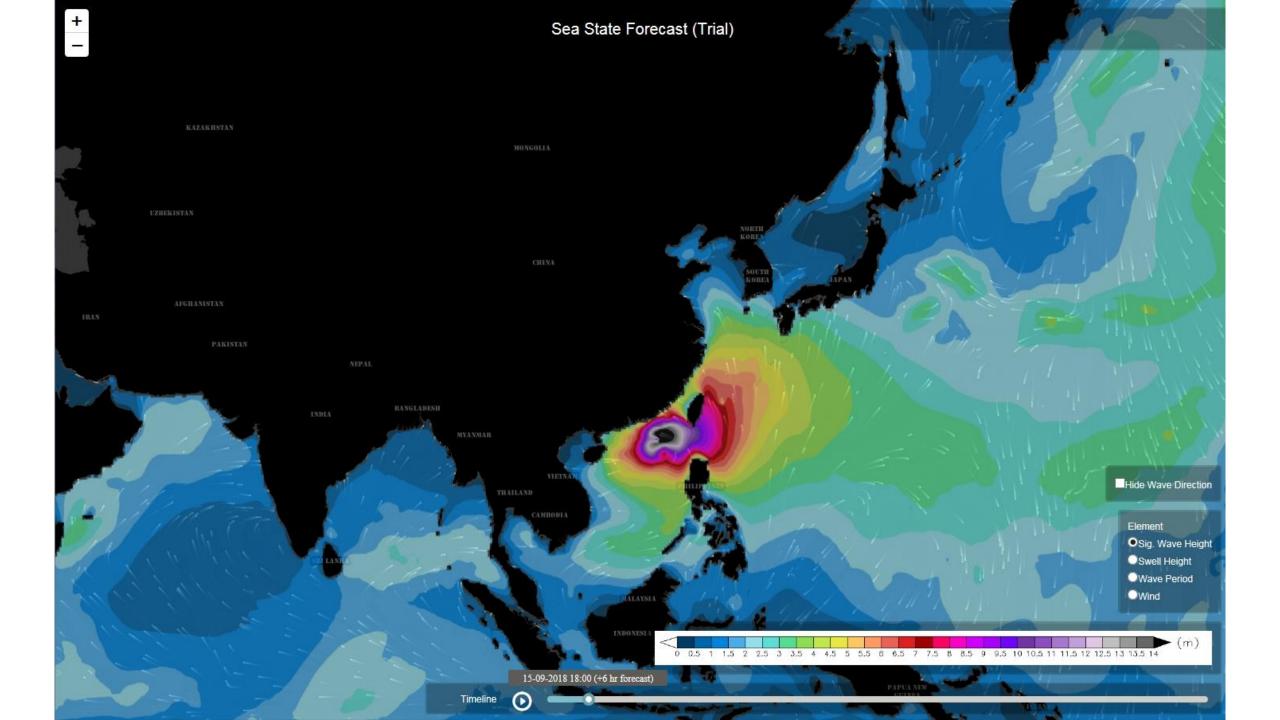
「地球天氣」網頁 "Earth Weather" Webpage





以互動形式顯示電腦預報產品(包括風向、風速及溫度)

Displays computer model forecast products (including wind direction, wind speed and temperature) in an interactive way



Facebook / Instagram







「天氣一分鐘」縮時攝影比賽 "1-Minute Weather" Time-lapse Video Competition

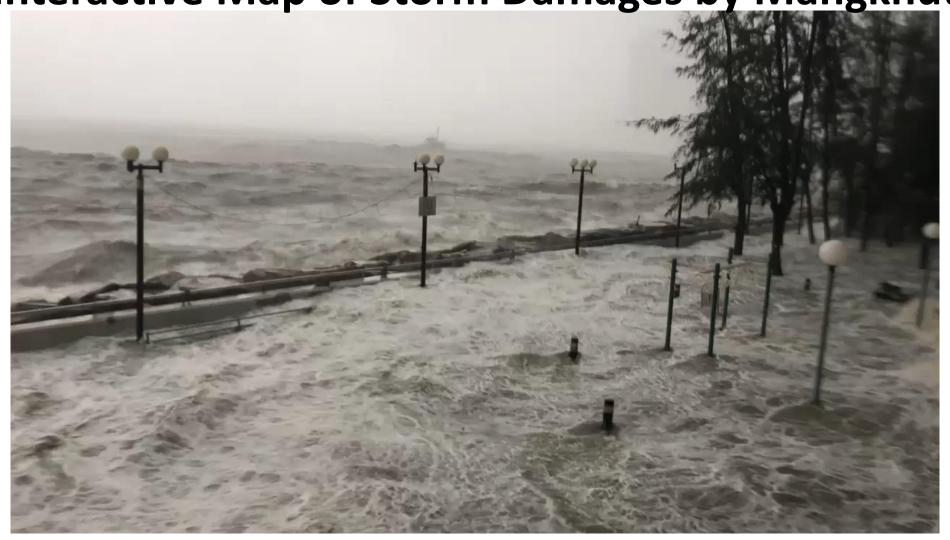


山竹風暴破壞互動地圖 Interactive Map of Storm Damages by Mangkhut



山竹風暴破壞互動地圖

Interactive Map of Storm Damages by Mangkhut



山竹風暴破壞互動地圖 Interactive Map of Storm Damages by Mangkhut

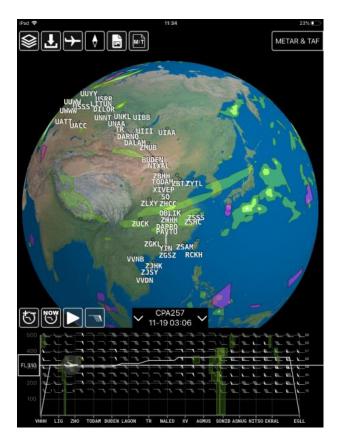




沙頭角公衆碼頭(Helen Tang)

西流崗 (尹文亮)

「我的航班天氣」將在全線國泰及國泰港龍航班上正式使用 MyFlightWx to be officially used on all flights of Cathay Pacific and Cathay Dragon





湍流資料實時下傳 Real-time downlinking of turbulence information

• 國泰航空將會在**70架B777航機安裝新軟件**,提供實時**顛簸**資料 Cathay Pacific Airways will install new software on 70 of their B777 aircraft to provide real-time turbulence data



國泰航空在亞洲區的覆蓋範圍 Network coverage of Cathay Pacific over Asia

天文台獲世界氣象組織指定為「多普勒激光雷達的試驗平台」 Observatory designated as WMO Testbed for Doppler LIDAR



● 長程激光雷達 2 台 低空風切變探測和預警

Two long-range LIDARs for low-level windshear detection and alerting



● 短程激光雷達1台 建築物相關湍流探 測

One short-range LIDAR for building-induced turbulence detection



● 短程激光雷達 4 台 飛機尾流/尾渦探測

Four short-range LIDARs for aircraft wake vortex detection

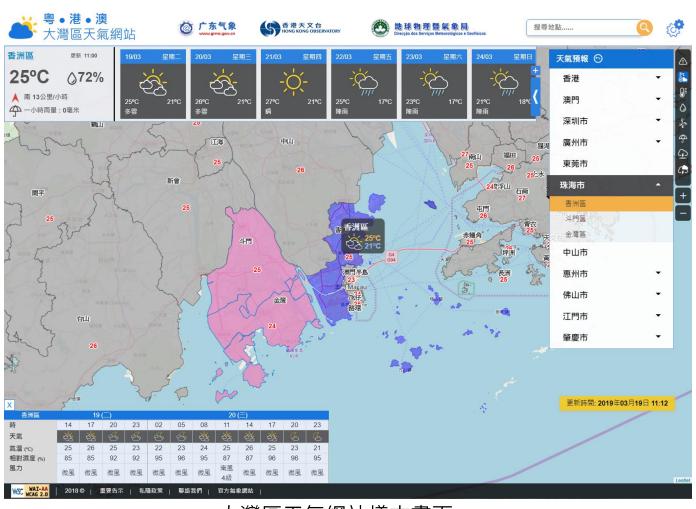


大灣區天氣網站 Greater Bay Area Weather Website



大灣區天氣網站樣本畫面 Sample Screen of the Greater Bay Area Weather Website

更長時效、更詳細 Longer Forecast Range, More Details



大灣區天氣網站樣本畫面

Sample Screen of the Greater Bay Area Weather Website

製作《地理電子學習教材套:氣候變化》 Compile "Geography E-learning Package about Climate Change"











氣候變化教材套拆解氣候謬誤 Climate Change Education Package Debunking Climate Myths



在全球氣候變暖的背景下,為甚麼在某些地區間中仍出現暴風雪 和嚴寒天氣?

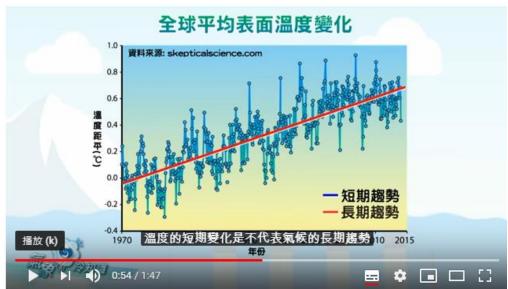


Why snowstorms and extremely cold weather still occur in some regions under global warming?

氣候變化否定者常以天氣事件 混淆視聽

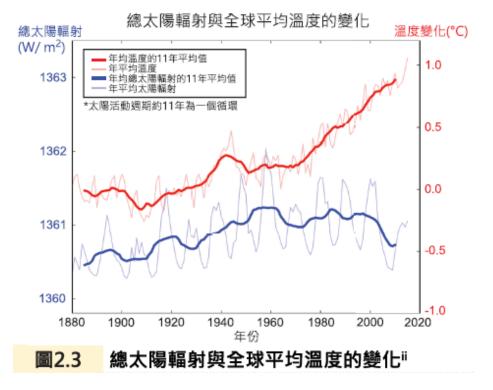
Climate change deniers make use of weather events to confuse the public





氣候變化教材套拆解氣候謬誤 Climate Change Education Package Debunking Climate Myths

鐹 太陽活動是全球暖化的主要原因嗎?



Is solar activity responsible for global warming?

氣候變化教材套拆解氣候謬誤 Climate Change Education Package Debunking Climate Myths



火山比人類活動釋放更多二氧化碳嗎?





Do volcanoes emit more carbon dioxide than human activities?

新版本太空天氣網頁 New Version of Space Weather website



新增歷史事件 Newly Added Historical Events



加強太空天氣現象內容 More Space Weather Phenomena Added

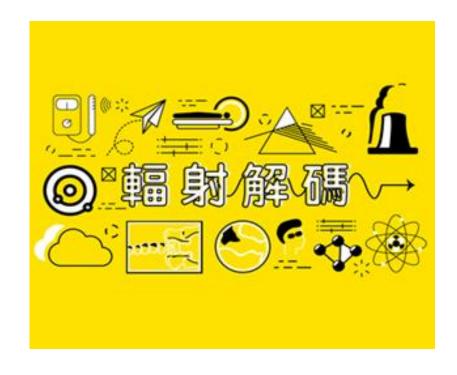


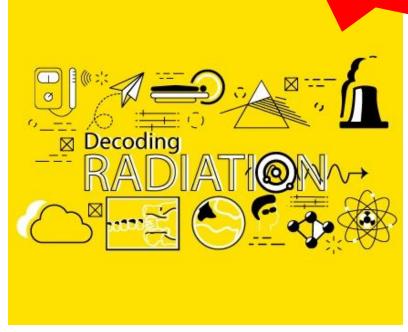
小小天文台 - 新增兒童版太空天氣網頁 My Little Observatory – New Kids Space Weather Webpage



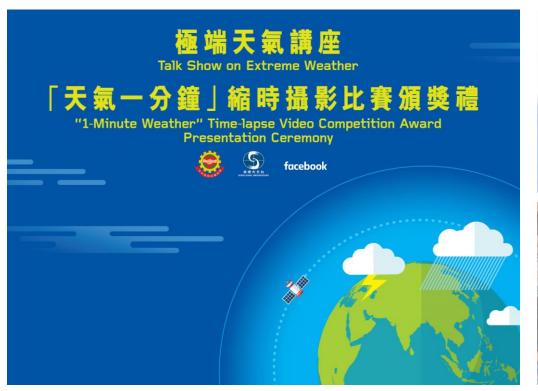
「輻射解碼」電子書 E-Book on "Decoding Radiation"







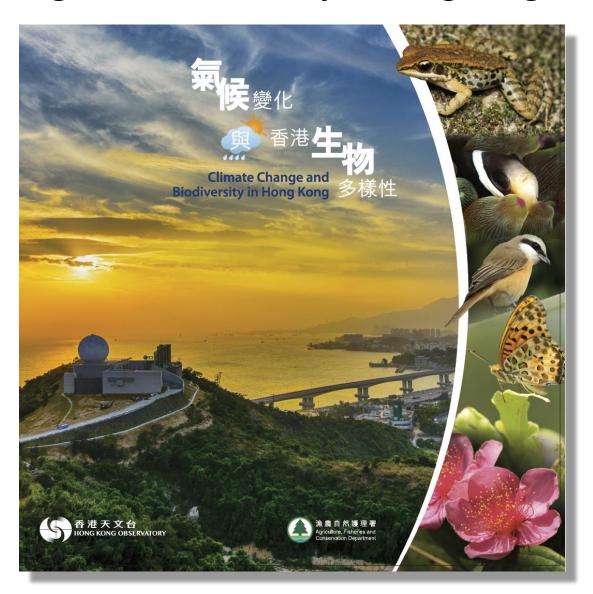
天文台開放日 The Observatory Open Day







「氣候變化與香港生物多樣性」相集 "Climate Change and Biodiversity in Hong Kong" Photo Album



遠足路徑天氣資訊

MET Information for hiking trails

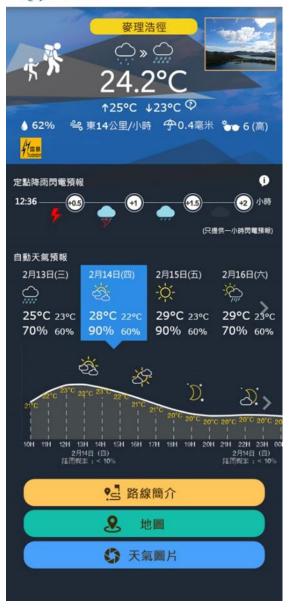
香港天文台與漁農自然護理署合作,在本港郊野公園的遠足路徑上105個位置提供二維碼 (QR code),方便遠足人士獲得天文台的最新天氣資訊。

With the collaboration of HKO and AFCD, QR codes are installed at 105 spots along the country park hiking trails. Hikers can access the latest weather information from HKO through scanning the QR codes.









遠足路徑天氣資訊(網頁版) MET Information for hiking trails (Web version)

