天文台展覽館展品簡介

Displays in the Exhibition Hall of the Hong Kong Observatory

香港天文台

Hong Kong Observatory

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香港天文台網上展覽廳　Hong Kong Observatory Virtual Exhibition Hall

http://www.hko.gov.hk/education/cyber_exh_hall/index_cf.htm (中文)

http://www.hko.gov.hk/education/cyber_exh_hall/index_ef.htm (English)

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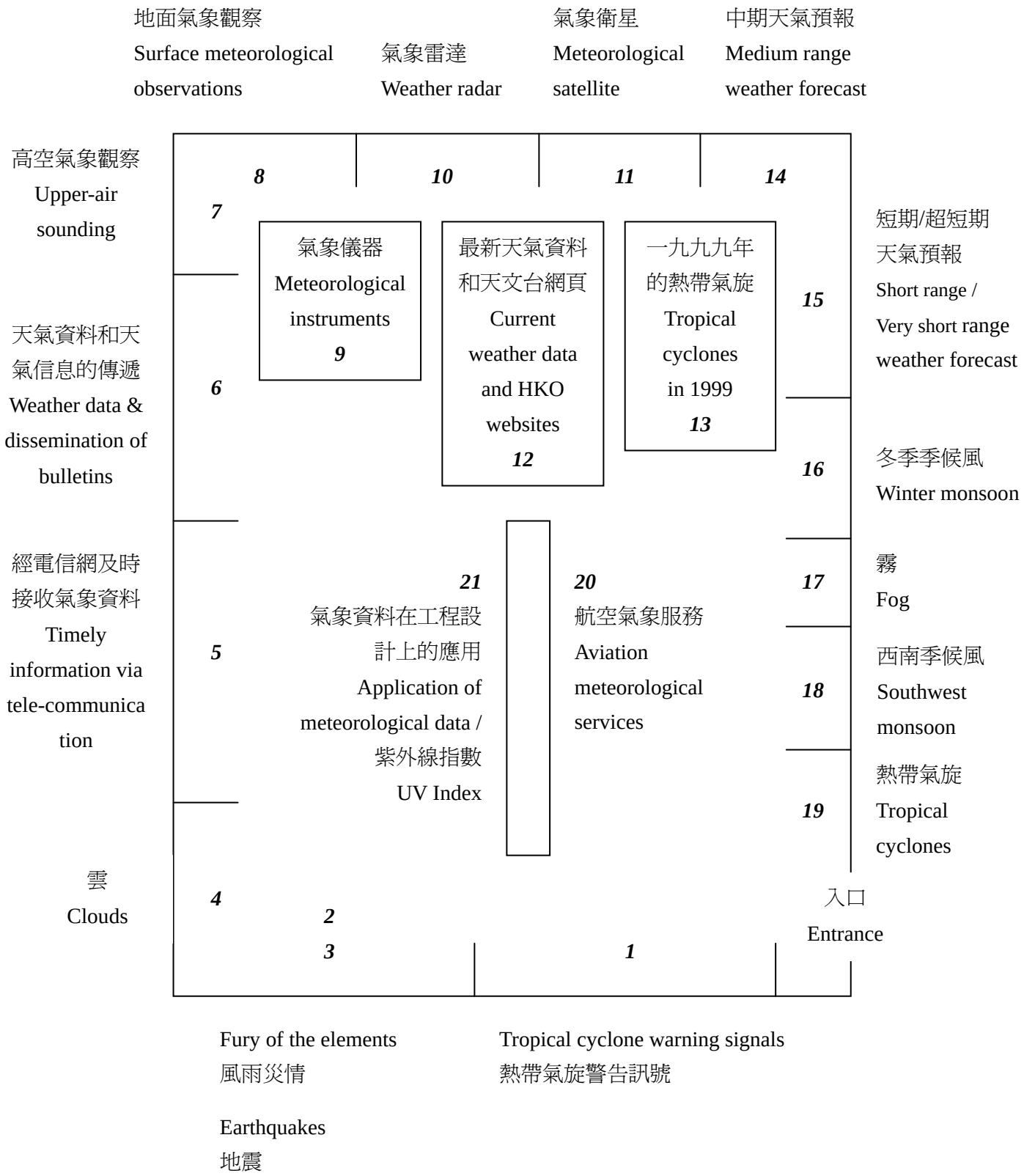
LOCATION OF DISPLAYS IN THE EXHIBITION HALL

天文台展覽廳展品位置示意圖



第一號展品　Display No. 1
熱帶氣旋警告信號　Tropical Cyclone Warning Signals

	警告信號的意義及應注意的事項	Meaning of Tropical Cyclone Warning Signals and What you should do
	這是戒備信號，表示有一熱帶氣旋集結於香港約 800 公里的範圍內，可能影響本港。 注意事項：如擬外出，應緊記有一熱帶氣旋正接近本港，可能影響你的計劃，並注意離岸海域可能有強風。留意電台或電視台廣播或瀏覽天文台網頁有關熱帶氣旋最新情況的報告。	This is a stand-by signal, indicating that a tropical cyclone is centred within about 800 km of Hong Kong and may affect the territory. Action - If you are planning an outing, remember that there is a tropical cyclone near Hong Kong which may affect your plans. Beware that strong winds may occur over offshore waters. Listen to radio and TV broadcasts or browse the Observatory's website on the progress of the tropical cyclone.
	香港近海平面處現正或預料會普遍吹強風，持續風力達每小時 41 至 62 公里，陣風更可能超過每小時 110 公里，且風勢可能持續。3 號熱帶氣旋警告信號發出後 12 小時之內，海港附近區域的風力普遍會加強。離岸海域及高地的風力更可能達烈風程度。 注意事項：應把一切容易被風吹倒的物件綁緊，特別是露台或屋頂上的物件。花盆及其他易於吹走的物件應搬往屋內。圍板、棚架和臨時搭建物應綁牢。溝渠應保持暢通，以免淤塞溢流。遠離岸邊及停止所有水上活動。漁船應立即就近找地方避風。留意電台或電視台廣播或瀏覽天文台網頁有關熱帶氣旋的進一步消息。	Strong wind is expected or blowing generally in Hong Kong near sea level, with a sustained speed of 41-62 km/h (kilometres per hour), and gusts which may exceed 110 km/h, and the wind condition is expected to persist. Winds are normally expected to become generally stronger in Hong Kong within 12 hours after the issue of this signal. Winds over offshore waters and on high ground may reach gale force. Action - Secure all loose objects, particularly those on balconies and rooftops. Flower pots and other objects likely to be blown away should be taken indoors. Secure hoardings, scaffoldings and temporary structures. Drains should be cleared to avoid blockage and overflows. Stay away from the shoreline and not to engage in water sports. Fishing vessels should seek shelter without delay. Listen to radio and TV announcements and browse the Observatory's website for further information about the tropical cyclone.

香港近海平面處現正或預料會普遍受烈風或暴風從信號所示方向吹襲，持續風力達每小時 63 至 117 公里，陣風更可能超過每小時 180 公里，且風勢可能持續。

注意事項：在烈風吹襲前，應先做妥一切防風措施。鎖緊門窗，把門閂閂好，窗板或大閘上牢。當風的大玻璃窗應加貼膠紙，減少玻璃破裂時所引致的損傷。

不要站近當風的窗隻。把家具及貴重物件搬離風口位。萬一窗隻被強風吹破，確保仍有一個安全地方暫避，故應早點決定萬一當風的窗隻破裂時，哪一個房間可作棲身之用。

光管招牌負責人須安排截斷招牌的電力供應。

車輛應停泊在最不容易遭受破壞的地方。

如情況許可，市民應盡早回家，避免逗留在街上。

Gale or storm force wind is expected or blowing generally in Hong Kong near sea level, with a sustained wind speed of 63-117 km/h from the quarter indicated and gusts which may exceed 180 km/h, and the wind condition is expected to persist.

Action - Complete all precautions now before gales commence. Lock all windows and doors. Fit bars into positions and insert reinforced shutters and gates if available. Adhesive tape fixed to large window panes in exposed positions will reduce damage by broken glass.

Do not stand near windows on the exposed side of your home. Move all furniture and valuables away from these areas. Make sure you have a safe place to shelter, should windows be broken. Now is the time to decide which rooms you will use to shelter if the windows on the exposed side of your home become broken.

Owners of neon signs should arrange for the electricity supply to their signs to be switched off.

Park your car where it is least likely to be damaged.

Avoid staying in the street. Return home as soon as possible if conditions so permit.

烈風或暴風的風力現正或預料會顯著加強。

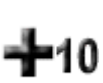
注意事項：切勿外出。遠離當風的門窗，以免被風中的碎片擊中。鎖緊屋內的門戶，並確保小童安置在家中最不當風的地方。切勿觸摸被風吹鬆的電纜。窗門如被風吹毀，應待情況安全時才修補。

如不在家中，應立即找一個安全地方暫避，直至颱風過後爲止。

Gale or storm force wind is increasing or expected to increase significantly in strength.

Action - Stay indoors. Stay away from exposed windows and doors to avoid flying debris. Close all interior doors and make sure children are confined to the least exposed part of your home. Do not touch electrical cables that have been blown loose. You should fix broken windows and doors only when there is no danger in doing so.

If you are away from home, find a safe place and remain there until the danger is over.



風力現正或預料會達到颶風程度，持續風力達每小時 118 公里或以上，陣風更可能超過每小時 220 公里。

注意事項：防風措施與上述相同。

切記當風眼正面掠過香港時，風勢可能會靜止一段時間。由數分鐘至數小時不等。市民應保持戒備，因爲強風可能會從另一個方向突然吹襲。如果所在地點安全，應繼續留在原處，以防強風隨時吹襲。

Hurricane force wind is expected or blowing with sustained wind speed reaching upwards from 118 km/h and gusts that may exceed 220 km/h.

Action - The same precautions as above apply.

Remember that if the eye of the typhoon passes directly over Hong Kong, there may be a temporary lull lasting a few minutes to several hours. Do not relax your guard, as there will be a sudden resumption of violent winds from a different direction. Remain where you are if protected and be prepared for destructive winds.

警告信號

自一八八四年開始，本港已經採用一套以圓柱形、球形和圓錐形爲信號的系統向港內船隻發佈關於熱帶氣旋之情況及大約位置的消息。當熱帶氣旋迫近香港的時候，則鳴砲警告居民烈風將會吹襲本港。一九零七年開始，用燃放炸藥的巨響代替鳴砲的方法。一九三七年，本港最後一次使用此方法。

一九一七年，本港初次使用 1 至 7 號信號代表風暴情況。其中 2 號至 5 號分別表示烈風將會由北、南、東或西四個方向吹襲本港。

一九三一年更改爲 1 至 10 號，其中 2 號及 3 號分別表示強風由西南及東南方向吹襲本港，4 號爲非本地信號，5 號至 8 號分別代表來自西北、西南、東北或東南四個方向之烈風，9 號則代表烈風風力增強，10 號代表颶風吹襲。此後 2、3、4 號信號時有時無，到一九三零年代後期被取消。

一九五六年在 1 號戒備信號及 5 號烈風信號之間加上 3 號強風信號。

爲了避免引起公眾之混淆，由一九七三年一月一日開始，5 號至 8 號風球分別由 8 號西北、8 號西南、8 號東北及 8 號東南四個信號代替。這信號系統一直沿用至現在。

熱帶氣旋警告信號最初之用意主要是爲了方便航海人士。然而經過多年之後，此信號亦廣爲大眾所採用。1987 年開始，天文台在發出 8 號風球之前的兩小時發出預警信息。

熱帶氣旋之分類

依照世界氣象組織之建議，熱帶氣旋是根據接近風暴中心之最高持續風力加以分類的。香港採用的分類定義以 10 分鐘平均風速爲根據，如右表所示：

熱帶氣旋類別	接近風暴中心之 10 分鐘最高平均風力
熱帶低氣壓	每小時 41 至 62 公里
熱帶風暴	每小時 63 至 87 公里
強烈熱帶風暴	每小時 88 至 117 公里
颱風	每小時 118 至 149 公里
強颱風	每小時 150 至 184 公里
超強颱風	每小時 185 公里或以上

附加資料

熱帶氣旋名稱

由 1947 年起，香港天文台一直採用關島美國軍方「聯合颱風警報中心」訂定的熱帶氣旋名字。初期，熱帶氣旋全部採用女性名字，由 1979 至 1999 年，則男性及女性的名字也同時獲得採用。

爲了加強人們對熱帶氣旋的警覺性，香港天文台台長在 1997 年舉行的颱風委員會第 30 屆年會中，建議採用具本地區色彩的熱帶氣旋名字，爲西北太平洋及中國南海的熱帶氣旋命名。颱風委員會在第 31 屆年會中通過了有關執行這個建議的細則，並議決於 2000 年正式運作。

由 2000 年開始，當日本的「東京颱風中心」確定一個熱帶氣旋達到熱帶風暴級別時，便會根據這一套新名字爲它命名及發出一個序號。這個名字除了用於爲國際航空及航海界發放的預測和警報之外，亦是向國際傳播媒介發放熱帶氣旋消息時採用的規範名字。颱風委員會的成員在各自的服務地區內也按當地情況使用這套新名字。

Hong Kong Tropical Cyclone Warning Signals

Starting from 1884, a system of drum, ball and cone was employed to give information to the mariners in the harbour on the existence and approximate location of a tropical cyclone. For the local public a typhoon gun was used to warn imminent gale force winds brought about by tropical cyclones. In 1907,

explosive bombs replaced the typhoon gun as they made louder sounds and were considered an improvement over the firing of a gun. The last typhoon boom was exploded in 1937.

In 1917, the first numbered signal system geared to the warning of wind conditions in Hong Kong was introduced. The numbers were from 1 to 7 with numbers 2 to 5 signifying gale force winds expected from the four quadrants, namely N, S, E and W.

In 1931, the signals were amended to 1 to 10 with signals 2 and 3 signifying strong winds from SW and SE respectively, signal 4 being a non-local signal, signals 5 to 8 signifying gales from the four quadrants, namely NW, SW, NE ad SE, signal 9 signifying increasing gales and signal 10 indicating the threat of hurricane force winds. Signals 2, 3 and 4 were used intermittently afterwards and were discontinued in the late 1930s.

In 1956, the No. 3 Strong Wind Signal was introduced between the No. 1 Stand-by Signal and the gale signals.

Starting from 1 January 1973, signals 5 to 8 were replaced by 8 NW, 8 SW, 8 NE and 8 SE respectively so as to avoid misunderstanding by the public. This system has been in use ever since.

Originally, the signals were intended mainly for the benefits of mariners but have over the years been also adopted for use by the public. Starting from 1987, the Observatory issued the Pre-No.8 Special Announcement to give a 2-hour advance notice to the public before the issue of the No.8 signal.

Classification of Tropical Cyclones

Tropical cyclones are classified in accordance with the World Meteorological Organization's recommendation by their maximum sustained wind speeds near the centre. In Hong Kong, the classification is defined in terms of wind speeds averaged over a period of 10 minutes:

Tropical Cyclone Classification	Maximum 10-minute mean wind near the centre
Tropical Depression	41 to 62 km/h
Tropical Storm	63 to 87 km/h
Severe Tropical Storm	88 to 117 km/h
Typhoon	118 to 149 km/h
Severe Typhoon	150 to 184 km/h
Super Typhoon	185 km/h or more

Additional information

Tropical Cyclone Names

Hong Kong used tropical cyclone names assigned by the US Armed Forces' Joint Typhoon Warning Centre at Guam since 1947. Only female names were assigned in the beginning. From 1979 to 1999, both male and female names were utilized.

At the 30th Session of the Typhoon Committee in 1997, the Director of the Hong Kong Observatory proposed to assign names with regional characteristics to tropical cyclones in the western North Pacific and the South China Sea in order to enhance the alertness of people to impending tropical cyclone hazard. The Typhoon Committee agreed on the details of implementing this proposal at its 31st Session and decided to put the names into operational use in the year 2000.

With effect from 2000, the Tokyo Typhoon Centre of Japan assigns a serial number and a name from the new list to every tropical cyclone attaining tropical storm strength. Apart from being used in forecasts and warnings issued to the international aviation and shipping communities, the name is used officially in information on tropical cyclones issued to the international press. Typhoon Committee Members also adopt these names in their respective regions subject to local circumstances.

第二號展品　Display No. 2

風雨災情　Fury of the Elements

1906 年 9 月的颱風
Typhoon of September 1906

1966 年 6 月暴雨後的明園西街
Ming Yuen Western Street after the rainstorm of June 1966

1972 年 6 月的暴雨
Rainstorm in June 1972

(a) 寶珊道山泥傾瀉
Landslip at Po Shan Road

(b) 秀茂坪山泥傾瀉
Landslip at Sau Mau Ping

1983 年 9 月颱風愛倫
Typhoon Ellen in September 1983

(a) 彌敦道的倒塌棚架
Fallen scaffolding at Nathan Road

(b) 在長洲擱淺的貨輪
A grounded cargo ship in Cheung Chau

1966 年 6 月暴雨後的明園西街

暴雨可以在年中任何時候出現，但主要發生在夏季。香港全年雨量近八成是在五月至九月錄得的。一九六六年發生的三場暴雨奪去 86 人的生命。

1972 年 6 月的暴雨

香港每年都會因大雨或持續降雨而引致山泥傾瀉。大部分山泥傾瀉影響範圍較少，但亦有不少屬較嚴重的山泥傾瀉，造成人命傷亡、建築物損毀及道路受阻等。在一九七二年六月發生的暴雨中，有 148 人因山泥傾瀉而喪生。

1983 年 9 月颱風愛倫

愛倫是八十年代唯一需要懸掛十號風球的颱風。她吹襲香港期間，共有 22 人死亡或失蹤，超過 300 人受傷，保險賠償估計高達 3 億元。

Ming Yuen Western Street after the rainstorm of June 1966

Although rainstorms are not uncommon in any time of the year in Hong Kong, most of them happen during the summer months. Indeed, close to 80% of the annual rainfall occurs between May and September. In 1966, three rainstorms resulted in the loss of 86 lives.

Rainstorm in June 1972

Every year heavy or prolonged rain causes landslip in Hong Kong. Most of these are small in scale, but many are large enough to cause injury to people, damage to property and blockage of roads. During the severe rainstorm in June 1972, 148 people died in landslips caused by heavy rain.

Typhoon Ellen in September 1983

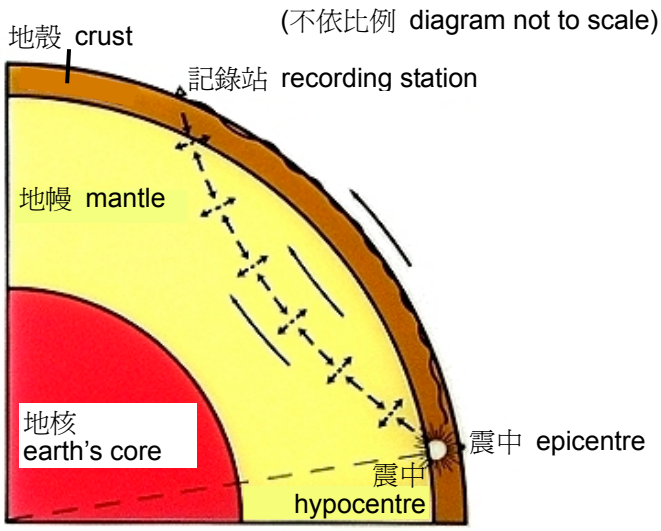
Typhoon Ellen was the most destructive storm for Hong Kong in the 1980s that necessitated the hoisting of the No. 10 signal. 22 people were reported dead or missing while over 300 people were injured. Insurance claims were estimated to be over HK$300 million.

第三號展品　Display No. 3
地震　Earthquakes

地殼內岩層間存在很多斷層，相鄰的岩層相對移動。沿著這些斷層突然釋放的彈性能量在地殼產生不同種類的地震波。地震波由源地向外傳播，由於特徵速度各異，各種波到達地面定點的時間也先後不一。地震波可由地震計記錄，但需要一個地震計網的記錄才能確定地震的準確位置及其震級。

In the earth's crust there are many faults between rock formations which move relative to each other. A sudden release of elastic energy along these faults gives rise to a variety of seismic waves in the earth's crust. These waves propagate outward from the source region and reach points on the earth's surface at different times depending on the characteristic speeds of the waves. These waves are recorded by seismometers. A whole network of seismometers is required to determine the precise location of an earthquake and its magnitude.

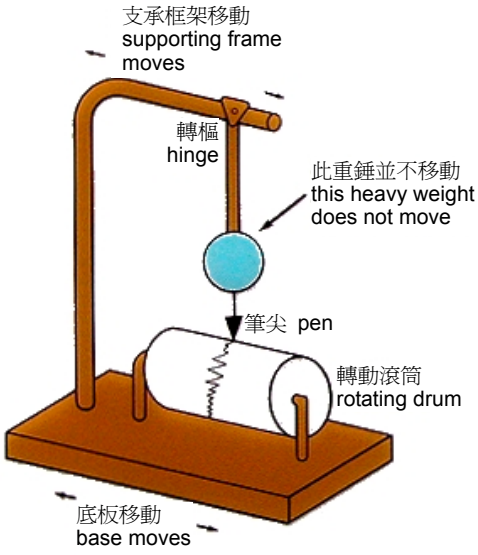
地震波的傳播
Seismic wave propagation

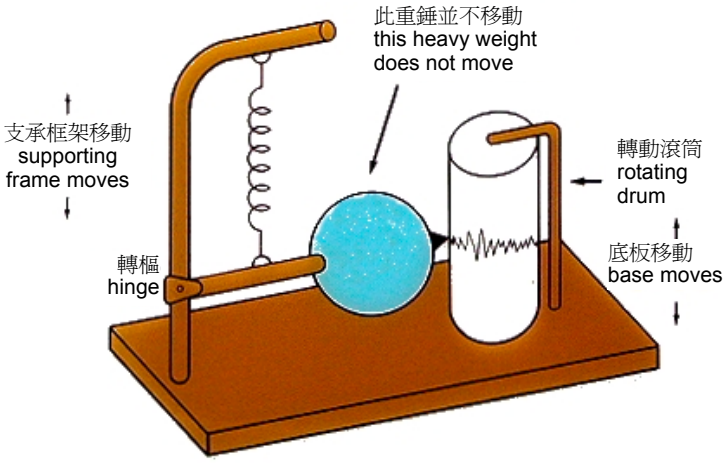


→ ← 壓縮波 compressional waves P
←- → 切變波 shear waves S
——— 表面波 surface waves L

地震計的原理
The principle of seismometer

水平運動可由左圖之機械裝置探測而垂直運動則可由右圖之裝置探測。
Horizontal motions are detected by the mechanical arrangement shown at the left, and vertical motions by the arrangement shown at the right.





鄰近地震的監測

由三副短週期地震儀組成的測量網於 1979 年設立，目的在更詳細地監測香港附近地震的位置及震級。台網在 1997 年提升爲設有八個地震測量站的先進 數字化網絡。測量站分別位於鶴咀、長洲、羌山、鉛礦凹、鹿頸、小欖、尖鼻咀及元五墳。測量站的位置分佈全港各地，因而有足夠長度的基線方便計算震中的位置。地震儀所在地的保安良好而本底地震噪聲亦很小。

八個地震站均採用壓電地震檢波器，可輸出速度及加速度。尖鼻咀與元五墳裝設的是三向檢波器而其餘的都是單向垂直。除尖鼻咀外，各站均設有地震井而檢波器都是藏於井內的一條塑膠管中。塑膠管儘可能會設置在基岩上及混凝土中。位於鉛礦凹與羌山的檢波器，分別放置於 24 及 33 公尺深的鑽孔內以改善信號與噪聲的比率。

檢波器收到的信號首先會在站內進行數字化，然後通過電話線傳送至天文台總部用作接收的電腦。電腦會收集及存取經由全球定位系統(GPS)同步時鐘作處理後的樣本。如果在某些特定的地震站收集得的信號振幅超過預設界限時，所有地震站錄得的地震信號會自動傳送至兩個電腦工作站作分析。透過工作站，震中參數及震級便能迅速地計算出來。由 1979 年至 2006 年止，天文台共錄得 53 次有感地震，即平均每年約二次。

Monitoring Local Earthquakes

In order to monitor in greater details the location and magnitude of earthquakes near Hong Kong, a network of three short-period seismographs was installed in 1979. It was upgraded to an advanced digital network with eight stations in 1997. These stations are located at Cape D'Aguilar, Cheung Chau, Keung Shan, Lead Mine Pass, Luk Keng, Siu Lam, Tsim Bei Tsui and Yuen Ng Fan. These sites are located in various parts of Hong Kong so that sufficiently long baselines are available for the computation of epicentral positions. These locations have to be relatively "quiet" in terms of background seismic noise and offer good security to the equipment.

The seismometers used in all eight stations are piezoelectric sensors which provide velocity and acceleration outputs. Three components sensors are deployed at Tsim Bei Tsui and Yuen Ng Fan, the rest have single vertical component only. Except Tsim Bei Tsui, the seismometer at each station is located within a seismic pit consisting of a plastic tube set into concrete on bedrock wherever possible. At Lead Mine Pass and Keung Shan, the seismometers are deployed in boreholes of depth 24 and 33 metres respectively to improve signal-to-noise conditions.

Signals from the seismometers are digitised at the stations and then transmitted to an acquisition computer at the Hong Kong Observatory Headquarters through telephone lines. The computer collects and archives samples which are time-stamped from a GPS-synchronised clock. Should the amplitude of the signals for certain selected stations exceed specific thresholds, the seismic signals of all the stations for the event would be automatically transferred to two computer workstations for further analysis. Epicentral parameters and magnitude of the tremor can then be readily calculated. From 1979 to 2006, a total of 53 felt earthquakes was detected averaging about two events a year.

第四號展品　Display No. 4

雲　Clouds

卷雲 Cirrus

積雲 Cumulus

彩虹 Rainbow

積雨雲 Cumulonimbus

雲的分類　Cloud classification

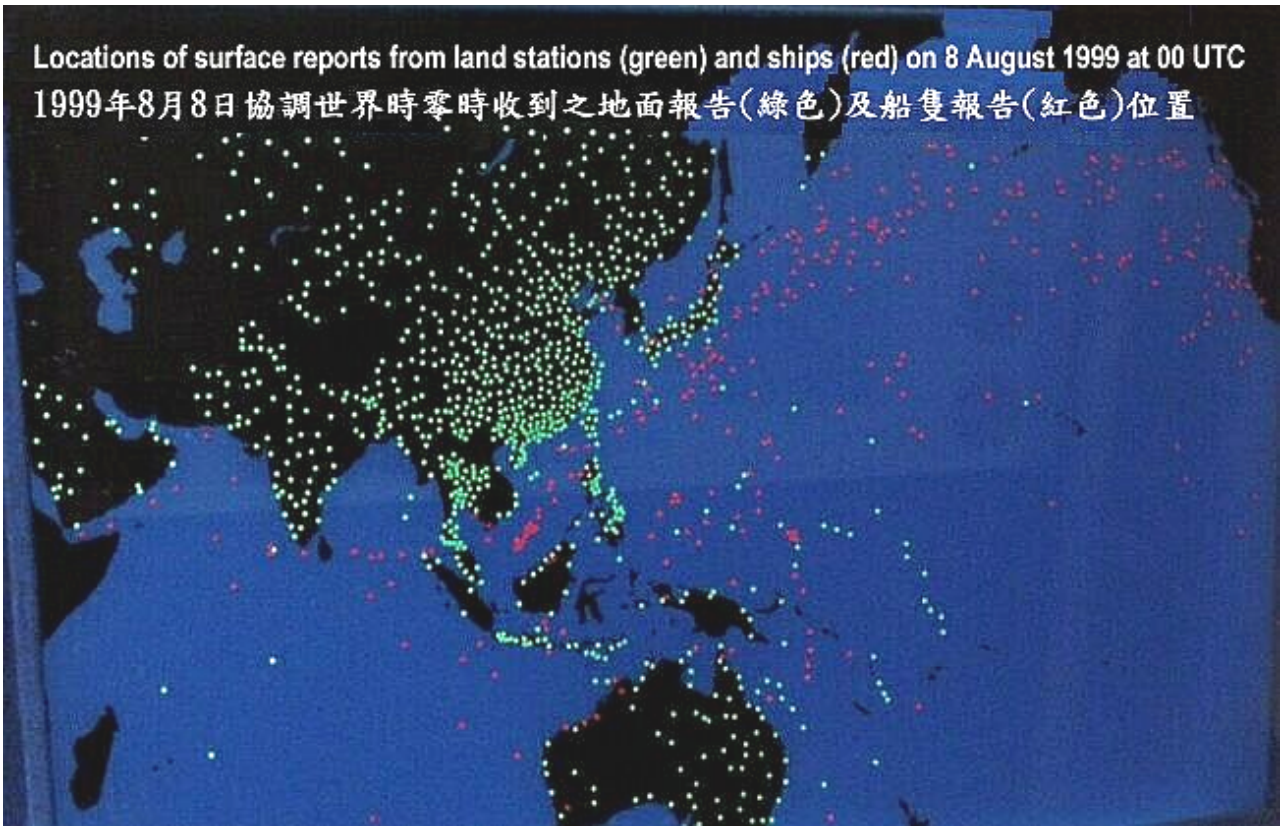
按雲狀的外形特徵，雲被劃分爲十類，稱爲雲屬。雲又以其在大氣層通常出現的高度，被分爲高、中、低三種。

Clouds are divided into 10 main groups, called genera, according to the distinguishing features of the cloud forms. These 10 genera are further grouped into three types: high, medium and low, according to that part of the atmosphere in which they are usually found.

	雲　屬	Cloud Genus	簡 寫 Abbreviation
高　雲　High clouds	卷　雲	Cirrus	Ci
	卷積雲	Cirrocumulus	Cc
	卷層雲	Cirrostratus	Cs
中　雲　Medium clouds	高積雲	Altocumulus	Ac
	高層雲	Altostratus	As
	雨層雲	*Nimbostratus	Ns
低　雲　Low clouds	層積雲	Stratocumulus	Sc
	層　雲	Stratus	St
	積　雲	Cumulus	Cu
	積雨雲	Cumulonimbus	Cb

* Remarks : Nimbostratus usually extends to other levels of the atmosphere.
註：雨層雲一般伸展到大氣層的較高層和較低層。

第五號展品　Display No. 5
經電信網及時接收氣象資料　Timely Information via Telecommunication



資料搜集及信息交換

香港天文台一如其他氣象機構，經世界氣象組織建立之全球電信網接收來自廣泛地區之天氣報告。香港與澳門、北京及東京之間相繼建立了地區專用通信電路。

各機場的天氣報告及預報則來自航空專用電信網。這些氣象電報經電腦系統處理並輸送至機場氣象所供預報員及航空公司人員使用。

圖中顯示之地面站及志願觀測船在1999年8月8日協調世界時零時發出之天氣觀測於該日稍後由天文台接收到。

Data Acquisition and Message Switching

Like meteorological services all over the world, the Hong Kong Observatory receives weather reports from a wide area through a global telecommunication network set up by the World Meteorological Organization. Point-to-point regional telecommunication circuits were established between Hong Kong, Macao, Beijing and Tokyo.

Aerodrome weather reports and forecasts are received from the Aeronautical Fixed Telecommunication Network (AFTN). These messages are processed by the Hong Kong Observatory computing system and transmitted to the Airport Meteorological Office (AMO) for use by forecasters and airline operators.

The map above shows the land stations and voluntary observing ships from which weather observations made at 00 UTC on 8 August 1999 were received by the Observatory later on that day.

第六號展品　Display No. 6

天氣資料和天氣信息的傳遞　Weather data and dissemination of bulletins

世界各地的氣象站，每天在固定的時間，觀測多個氣象要素。香港每天約收到二萬個地面氣象報告。這些觀測資料和數值模式運算結果的快速傳遞，是提供準確天氣預測的先決條件。

Weather is observed in a number of ways at many stations at the same time and at regular intervals all over the world. About 20,000 surface meteorological reports are received by Hong Kong every day.　For a well-considered weather forecast, the forecaster requires receipt of these measurements almost in real time, together with numerical model products compiled by the computer.

Weather forecasts, warnings and real-time meteorological information are disseminated to the public efficiently through many different channels.

天氣預測、警告和即時氣象資料可透過多種渠道有效地傳達給大眾。

高空氣象觀察
Upper-Air Sounding of the Atmosphere

無線電探空儀是用來量度大氣層內不同高度的氣溫、濕度、風速和風向。探空儀由一個氫氣球帶送到超越三十公里的高空。在長達個多小時的上升過程中，儀器不斷收集資料並即時由無線電傳送回地面站處理。探空工作每日兩次在京士柏氣象站執行。探空儀每週一次攜帶特別儀器來量度臭氧線。

Vertical profiles of temperature, humidity and wind in the atmosphere are measured with radiosonde soundings. The radiosonde is carried to altitudes of over 30 km by a hydrogen-filled balloon. Atmospheric parameters are continuously sampled during the hour-long ascent and measurements are transmitted to a ground station by radio signals. Radiosondes are launched two times a day at the King's Park Meteorological Station. Once every week, the radiosonde also carries a special sensor to measure the vertical profile of ozone.

第七號展品 Display No. 7
高空氣象觀察 Upper-air Sounding

附加資料

GPS 測風技術

天文台由一九九七年開始使用 GPS 測風技術。在探測過程中，無線電探空儀和地面站均裝有特別天線，接收 GPS 信號，再加入有關衛星軌道的數據，便可計算出高空風向和風速。這套 GPS 測風系統的準確度極高，兼且不易受閃電及雷暴等惡劣天氣影響。

Additional information

GPS wind finding technology

The Observatory began to employ GPS wind-finding technology in 1997. Both the radiosonde and the ground station are equipped with special antennae for receiving satellite-based GPS signals. These signals, combined with the relevant satellite orbital data, enable the wind to be computed. Apart from unprecedented accuracy, the GPS wind-finding system is less affected by adverse weather such as lightning and thunderstorms.

更新資料

香港天文台自 1921 年開始利用氣象氣球探測高空，所得的資料對預報員製訂公眾、航空及海洋天氣預測作用極大。在 2004 年 5 月，天文台正式開始使用「自動高空探測系統」進行探空工作。在此之前，雖然部分探空工序已自動化，但仍需一定程度的人手操作。新的自動系統基本上節省了人手操作的工序，令工作變得更爲安全及有效率。

香港天文台京士柏氣象站每天在早上及晚上 8 時進行高空探測。每次施放一個約一米直徑的氣象氣球，攜帶無線電探空儀升上高空，最高可達 30 公里（十萬英尺）的高度。上升過程中，無線電探空儀不斷測量大氣層不同高度的風向、風速、溫度、濕度及氣壓，並將數據傳送至地面。此外，探空儀每週一次攜帶特別儀器來量度臭氧線。

Updated information

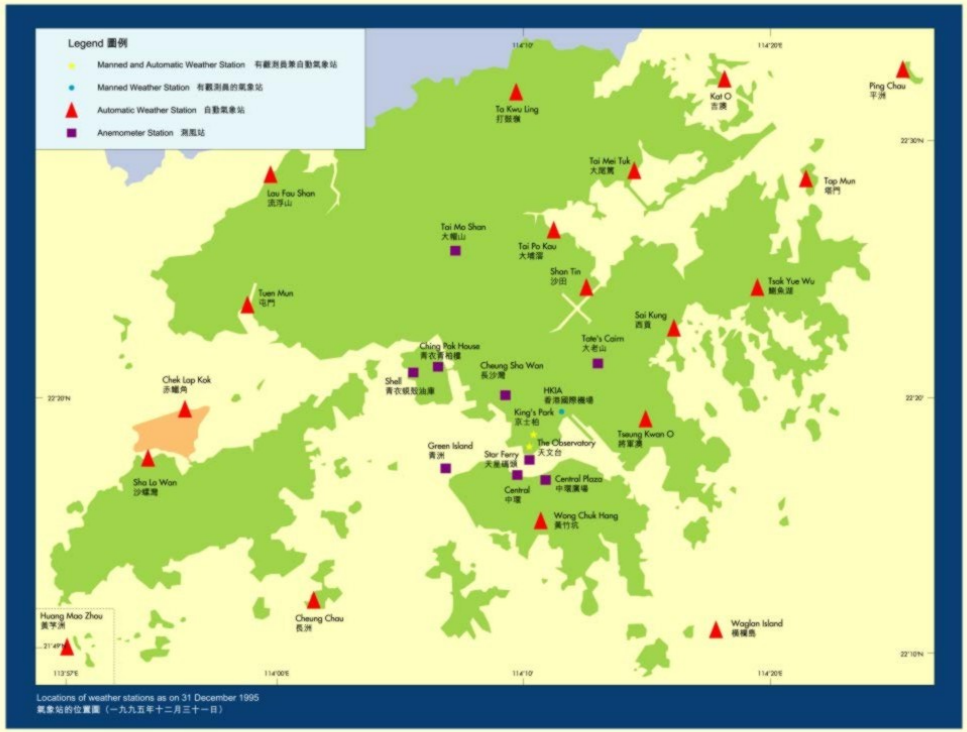
The Hong Kong Observatory has been using meteorological balloons for upper-air measurement since 1921. The weather information obtained is essential for the forecaster to prepare public, aviation and marine weather forecasts. An Automatic Upper-air Sounding System was put into operation in May 2004. Before the introduction of the new system, although some of the measurement procedures were automated, considerable manual operation was still required. The new automatic system obviates the need for manual operation, and enhances the safety and efficiency of our work.

The Observatory conducts upper-air measurements two times daily at 8 am and 8 pm at King's Park Meteorological Station. Each measurement involves the launch of a meteorological balloon about one-metre wide carrying a radiosonde. The radiosonde helps determine the wind direction, wind speed, temperature, humidity and pressure at various heights aloft, sometimes up to 30 000 metres (100 000 feet), and radios the weather information back to ground. Once every week, the radiosonde also carries a special sensor to measure the vertical profile of ozone.

地面氣象觀察
Surface Meteorological Observation

現時有超過二十個裝有氣壓表、溫度計、雨量器、風向及風速表的自動氣象站設置在香港不同地區收集天氣資料，這些資料即時傳送到天氣預測總部。香港、廣州及澳門的氣象組織合作在珠江三角州設置幾個用太陽能供電的自動氣象站來監察惡劣天氣。

The weather in various parts of Hong Kong is monitored by more than 20 Automatic Weather Stations (AWS) equipped with barometers, thermometers, rain-gauges, wind vanes and anemometers. Data are transmitted in real time to the Central Forecasting Office.
In collaboration with meteorological services of Guangdong and Macau, several solar-powered AWS are installed in the Pearl River Estuary to monitor in detail the approach of severe weather systems.



天文台由一九八四年起開始在香港建立自動氣象站，它們可分爲四大類：

（一）設有全套測量儀器的自動氣象站，不斷測量風速、風向、氣溫、濕度、氣壓和雨量；

（二）祇設置風速表的自動氣象站；

（三）分布於機場範圍內不同位置的風速表站，它們組成了一個網絡，專門爲一套「風分析系統」提供數據，以確保航空交通的安全；

（四）組成雨量站網的自動站。

這些自動氣象站所收集的數據，透過電話線或特高頻無線電傳送到天文台總部。爲了提高自動氣象站的效能，天文台於一九八九年在橫瀾島安裝了一副遙控電視攝影機，以觀測當地的天氣和能見度。

天文台自一九八五年開始與廣東省氣象局合作建立自動氣象站，這些自動氣象站所收集的數據，首先經無線電傳送至境內的中繼站，再透過電話線送返天文台總部。此外，天文台透過「全球電信系統」將這些數據傳送至廣東省氣象局。

Automatic weather stations were set up in Hong Kong since 1984. Among these stations, there are:

(i) "full" stations from which measurements of winds, temperature, humidity, pressure and rainfall are made continuously by the field systems;

(ii) stations equipped with anemometers only;

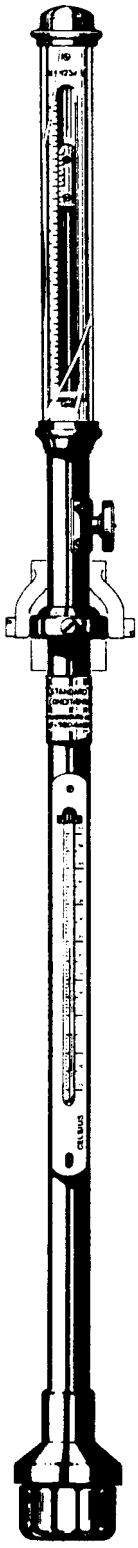
(iii) a network of anemometer stations located in the airport areas is dedicated for the Wind Analyzer System for aircraft safety;

(iv) and a network of rain gauge stations.

The data from these automatic weather stations are transmitted in real time to the Observatory Headquarters via telephone lines or UHF radio links. To enhance the capability of these automatic weather stations, a system utilizing a remotely controlled video camera was installed at Waglan in 1989 to provide observations of the weather and visibility.

In addition, co-operation between the Guangdong Meteorological Bureau and the Hong Kong Observatory to establish automatic weather stations started since 1985. Measurements at these stations are transmitted first via radio link to relay stations in Hong Kong then by telephone lines to the Observatory Headquarters. The data are then routed via the Global Telecommunications System to Guangdong Meteorological Bureau.

第九號展品　Display No. 9
氣象儀器　Meteorological instruments



水銀氣壓表
Mercury barometer

氣壓表
Barometers

大氣壓力是用氣壓表量度的。水銀氣壓表有一個盛著水銀的槽，槽內插入一垂直的玻璃管。槽內的水銀面與大氣接觸，而玻璃管內的空間則接近真空狀態。玻璃管內和外面的大氣壓力差令水銀柱在玻璃管內上升。大氣壓力可根據水銀密度、重力加速度和水銀柱高度計算出來。

Atmospheric pressure is measured by barometers. A mercury barometer consists of a column of mercury supported in a vertical glass tube. The lower end of the column is immersed in a cistern containing a reservoir of mercury. The space above the mercury in the tube is evacuated and sealed, while the surface of the mercury in the cistern is exposed to atmospheric pressure. The difference in pressures within the glass tube and the outside atmosphere forces the mercury column in the glass tube to rise. The atmospheric pressure is calculated from the density of mercury, the gravitational acceleration and the difference between the mercury levels in the column and the cistern.

數字式氣壓計
Digital pressure gage

這是一款準確度高的數字式氣壓計，一般用作調校其他準確度較低的氣壓計。

The digital pressure gage on display is another type of barometer of high accuracy. It is often used in calibrating other types of less accurate barometers.

乾球及濕球溫度　Dry-bulb and Wet-bulb Temperatures

百葉箱　**Stevenson Screen**

溫度表

溫度表是利用物質在不同熱能狀態下物理特性的變化來量度溫度的儀器。白金絲的電阻變化與溫度成正比。白金絲電阻溫度表就利用這種特性來量度溫度。電阻的變化由電橋量度，然後以模擬方式輸出，再經電子方法處理，將溫度數字呈現在顯示器上。

Thermometer

A thermometer is an instrument for measuring temperature by utilizing the variation of the physical properties of substances according to their thermal status. The resistance of a platinum wire varies linearly with temperature. This property is used in a platinum resistance thermometer to measure temperature. The change in resistance is measured by a bridge circuit which produces an analog output. This analog output is processed electronically and the temperature is displayed on a terminal.

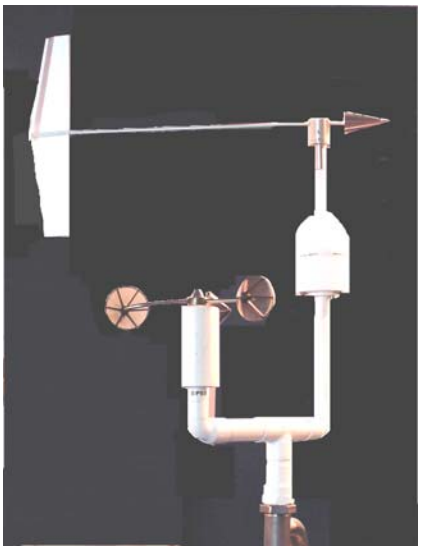
乾球及濕球溫度，相對濕度

自一九八二年開始，配備白金電阻感應元件的數字溫度表已用作量度乾、濕球溫度。水銀溫度表則用作後備。溫度感應元件置於百葉箱或溫度表棚（以棕櫚葉和竹蓆製成）內，離地 1.2 米高。露點溫度及相對濕度則自動由一部微型電腦從乾、濕球溫度計算出來。數字溫度表設有固態儲存器，可以記錄最高及最低氣溫，亦可提供模擬輸出以便於圖表上作連續記錄。

Dry-bulb and Wet-bulb Temperatures, Relative Humidity

Digital thermometers with platinum resistance sensors have been used for measuring dry- and wet-bulb temperatures since 1982. Mercury-in-glass thermometers are used for back-up purposes. The temperature sensors are placed at a height of about 1.2 metres above ground level either in a Stevenson Screen or a thermometer shed made of palm leaves and mattress. Values of dew-point temperature and relative humidity are calculated automatically from the dry- and wet-bulb temperatures by a microcomputer. The digital thermometer also has solid state memory to record the maximum and minimum temperatures. An analog output for continuous recording of the temperature on a chart recorder is also provided.

風　Wind



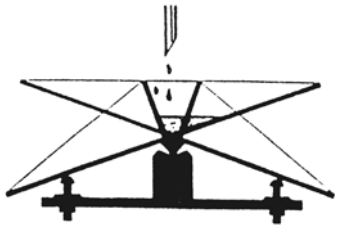
風速表　**Anemometer**

大多數台站都設置風向標及風杯風速表(附有刻度盤或圖表記錄器)來量度風。風速表一般安裝於高出週圍障礙物約 10 米的桅杆之上。

Most meteorological stations are equipped with combined vane and cup generator anemometers with dial indicator and/or chart recorder for wind speed and direction measurement. Generally the anemometers are mounted on masts a height of about 10 metres above the highest obstruction in the vicinity.

雨量　Rainfall

Tipping-bucket Rain-gauge
翻斗式雨量器



Principle of tripping-bucket Rain-gauge
翻斗式雨量器的原理

翻斗式雨量器

翻斗式雨量器利用承載雨水翻斗的傾側運動來記錄非連續性的雨水增量，每次 0.5 毫米。兩個翻斗並排於一條水平軸上，每次祇由其中一個承接雨水，當積聚於翻斗內的雨水達到預設之數量（0.5 毫米）時，翻斗便傾側並排出所盛載之雨水，另一個翻斗立刻向上翻，繼續承接雨水的工作，翻斗的傾側運動觸發電信號，輸送至遠處一個數字顯示記錄器。如果持續有雨，兩個翻斗便相繼傾側，產生一連串的信號，經記錄器加算後便可顯示出一段指定時間內的總雨量。

Tipping-bucket Rain-gauge

The tipping-bucket rain-gauge records the occurrence of discrete rainfall increments, say 0.5 mm, through the tilting motion of a bucket which collects the rain. The two buckets rest on a horizontal axis with one of them collecting rain at a time. When the amount of rainfall reaches the prescribed value (0.5 mm), the bucket tilts and discharges the rain water collected whilst the other bucket comes up to continue collecting rainfall. The tilting motion triggers an electric signal which is transmitted to a distant recorder with digital display. The tilting process continues as long as the rain falls and a sequence of signals is added up at the recorder to show the total rainfall amount of a chosen duration.

第十號展品　Display No. 10
天氣雷達　Weather Radar

天氣雷達的工作原理

天氣雷達經天線發出微波探測空氣中的雨點。雷達的天線兼備發送及接收的功能。當雷達微波遇上雨點時，部分微波能量被反射回天線上。從接收到回波的延遲時間可計算出雨點與雷達之間的距離。從回波的強弱及雨點與雷達之間的距離，亦可計算出降雨量。

Working principle of weather radar

A weather radar detects rain in the atmosphere by sending out pulses of microwave from its scanning antenna. The antenna acts both as a transmitter and a receiver. When a radar pulse encounters rain drops, part of its energy is reflected back to the antenna. The time delay in the returned signal, that is, the echo, gives information on the distance of the rain area from the radar. Rain intensity is calculated from this distance and the strength of the received signal.

大帽山天氣雷達

大帽山天氣雷達位於香港的第一高峰（底層位於海拔 950 米左右），雷達連輔助通訊設備約耗資港幣 2 千 7 百萬元。

由於大帽山雷達站屹立香港第一高峰，因此四面八方不受任何地形阻擋。大帽山雷達站亦可接收大老山雷達的數據，然後顯示綜合雷達圖像，並計算香港不同高度的風力和風向。大帽山雷達還可用立體圖像顯示風暴結構。這個雷達操作高度自動化，身處天文台總部的控制人員可以透過遙控方式，操控和監察雷達儀器的運作。

Tai Mo Shan Weather Radar

The Tai Mo Shan weather radar situates at the highest peak in Hong Kong (ground level at around 950 AMSL). The radar and its backup communication link cost about HK$27 million.

The Tai Mo Shan weather radar stands on the highest peak in Hong Kong and is unobstructed in all directions by local terrain. It takes in data from the radar on Tate's Cairn to form combined radar images and calculates winds at different heights above Hong Kong. It displays storm structures in three dimensions. This radar is highly automatic and allows remote control and monitoring of radar equipment as well as station facilities by the operator at the Observatory Headquarters.

颱風約克的雷達立體圖像

1999 年 9 月 16 日颱風約克掠過香港南部時，雷達立體圖像清楚顯示了他的風眼。

3D Radar Image of Typhoon York

Typhoon York skirted south of Hong Kong in the morning on 16 September 1999. The eye of York was well captured by the 3-D radar images.

從雷達觀測到強烈熱帶風暴瑪姬的環流

熱帶低氣壓瑪姬於 1999 年 6 月 2 日在西北太平洋形成，然後逐漸增強並向西北移動，更於 6 月 4 日成爲颱風，其後進入巴斯海峽，再向西移直趨華南沿岸。天文台於 6 月 7 日清晨懸掛九號風球後，瑪姬迅即在西貢登陸，並從東北向西南橫過香港，同時減弱成爲強烈熱帶風暴。

Circulation of STS Maggie observed by the radars

Maggie formed as a TD over the W N Pacific on 2 June. It intensified and tracked NW, and became a typhoon on 4 June before entering the Bashi Channel. It entered the south China Sea on 6 June, then turned westward heading towards the south China coast. Soon after the hoisting of the No.9 signal, Maggie landed over Sai Kung and traversed Hong Kong from northeast to southwest in the early morning on 7 June. In the mean time, it weakened into a STS.

大老山天氣雷達

天文台於 1994 年裝設第一部多普勒雷達。利用雷達的多普勒功能，我們便可以探測下雨地區的風場，這點對評估熱帶氣旋的風力及其分布情況有很大的幫助。

多普勒原理可利用救護車響號的聲調轉變來解釋：當救護車走近時，聲調會升高；遠離時，聲調會降低。救護車移近得越快，聲調越高。多普勒雷達利用同一原理：雨點移近雷達的速度越快，反射回來的微波頻率（即聲調）就越高。透過這個頻率轉變，可導出雨點移近雷達的速度，從而替乘載這些雨點的風力提供了很好的估算。

Tate’s Cairn Weather Radar

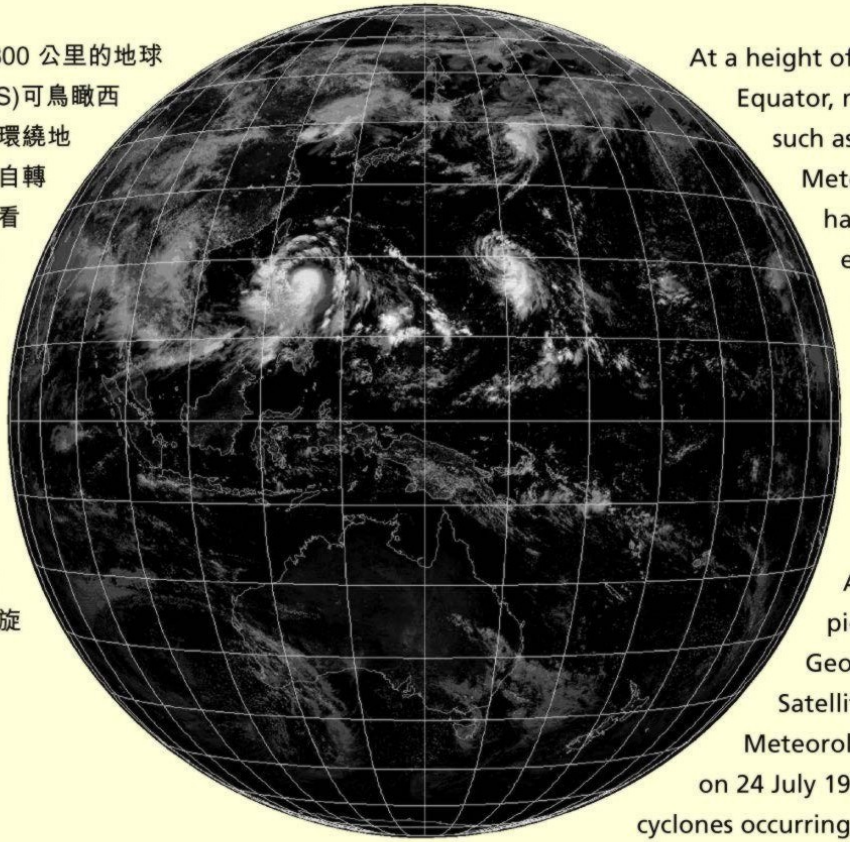
In 1994, the Observatory installed its first Doppler weather radar. With the Doppler function, the radar provides information on the wind pattern in areas with rain. This is helpful in assessing the wind strength and distribution in tropical cyclones.

The Doppler principle can be explained by noting the change in pitch of an ambulance siren. The pitch heightens as the ambulance approaches and lowers as it departs. In other words, the faster the ambulance approaches, the higher will be the pitch. For the case of a Doppler radar, the faster the raindrops move towards the radar, the higher will be the frequency (i.e. pitch) of the microwave reflected from raindrops. The raindrops' approach speed is determined by the frequency shift, and provides a good estimation of the winds, which carry the raindrops.

氣象衛星
Meteorological Satellites

位於赤道上空 35 800 公里的地球同步氣象衛星(GMS)可鳥瞰西太平洋區域。衛星環繞地球的速度與地球的自轉相同，所以從地面看來衛星好像靜止不動，監察著不斷變化的天氣。

右面的可見光圖片是1996年7月24日上午11時從日本氣象廳的氣象衛星（GMS-5）接收到的。圖上可見到有三個熱帶氣旋同時出現。



At a height of 35 800 km above the Equator, meteorological satellites such as the Geostationary Meteorological Satellite (GMS) have a bird's eye view of the entire western Pacific region. As the satellite orbits at the same speed as the Earth's rotation, its position appears fixed in space from which the ever-changing patterns of weather is monitored.

At the left is a visible picture captured with the Geostationary Meteorological Satellite (GMS-5) of Japan Meteorological Agency at 11a.m. on 24 July 1996, showing three tropical cyclones occurring at the same time .

第十一號展品 Display No.11
氣象衛星 Meteorological Satellite

氣象衛星資料的應用

- 衛星圖片是獲得全球範圍雲層及天氣系統圖像的唯一途徑，因而是一項重要資料來源，對海洋和其他天氣觀測資料稀少的地區尤其重要。有了衛星圖片的幫助，氣象工作者現時分析天氣能夠比以前祇靠常規天氣資料時更準確。

- 高分辨率圖片清楚顯示出中尺度天氣現象，而單憑常規天氣圖往往會忽視了這類現象。

- 熱帶氣旋在衛星雲圖上具有獨特的形狀，非常容易辨認，因此衛星圖片對追蹤氣旋中心有極大的幫助。利用特別增強函數來顯示雲圖亮度層次更能突出雲層的某種特徵及推算氣旋中心附近雲頂的氣溫。這些資料可幫助天氣預報員更準確地估計熱帶氣旋的強度。

- 對流性降雨與雲頂溫度及對流雲發展速率有良好的相關性，利用紅外光衛星圖片顯示的雲頂溫度可估計降雨量。

- 在沒有雲層遮擋的情況下，將加配色調的技術用於紅外光圖片上可以描繪出該地區的海面溫度圖。這些資料可幫助預報海霧及熱帶氣旋的演變過程。

Application of Meteorological satellite data

- Satellite pictures provide a unique global view of the distribution of cloud cover and weather systems and form an essential source of information particularly over oceans and other areas where weather observations are sparse. A meteorologist can now make more accurate weather analyses than using only conventional weather data.

- High resolution pictures reveal meso-scale weather phenomena which could easily go undetected on a conventional weather chart.

- The characteristic cloud features of tropical cyclones are easily recognizable on a satellite picture and can be of great assistance in tracking its centre. The intensity of the tropical cyclone can also be better estimated by using a special enhancement technique to reveal certain cloud features and the cloud top temperatures near the centre.

- Convective rainfall correlates with cloud top temperatures and the rate of growth of the convective clouds. Infra-red satellite pictures thus enable estimates of rainfall amounts to be made from the cloud top temperatures.

- Enhancement techniques enable the mapping of sea surface temperatures from infra-red pictures provided the area is not obscured by clouds. The information is used to forecast sea fog and the development of tropical cyclones.

第十二號展品　Display No.12

最新天氣資料和天文台網頁　Current Weather Data and HKO Websites

香　港　天　文　台
Hong Kong Observatory

網址 Home Page Address

http://www.hko.gov.hk
http://www.weather.gov.hk

電郵 Email

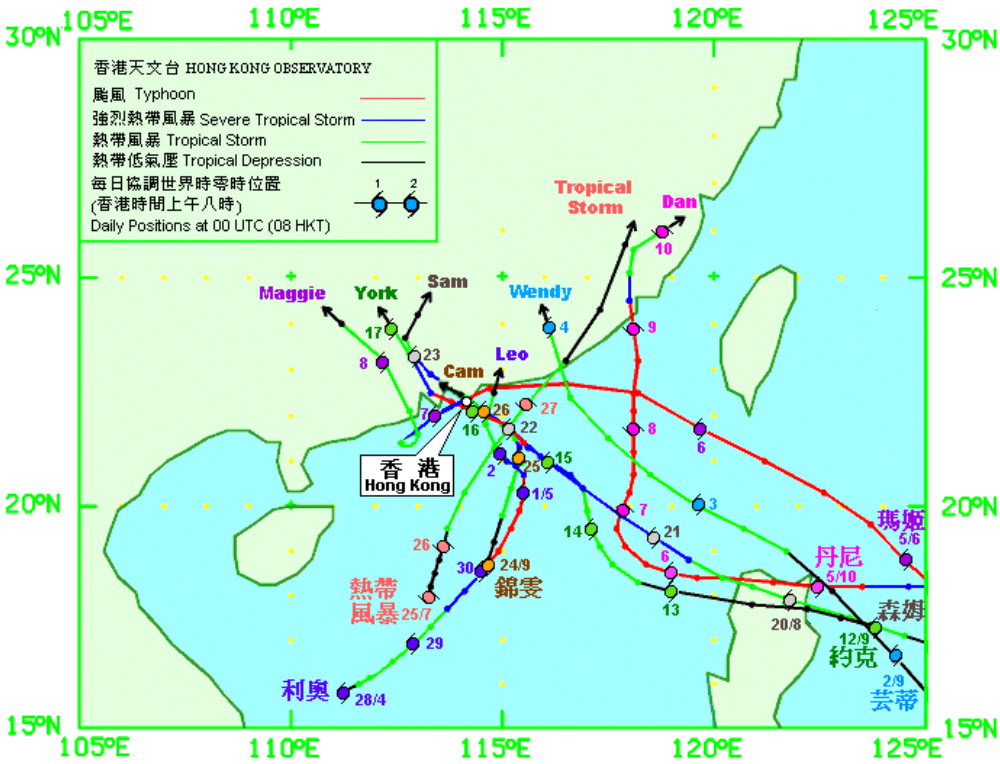
mailbox@hko.gov.hk

打電話問天氣　Dial-a-Weather

粵語	Cantonese
普通話	Putonghua
英語	English

187 8200

第十三號展品　Display No. 13
一九九九年的熱帶氣旋　Tropical Cyclones in 1999

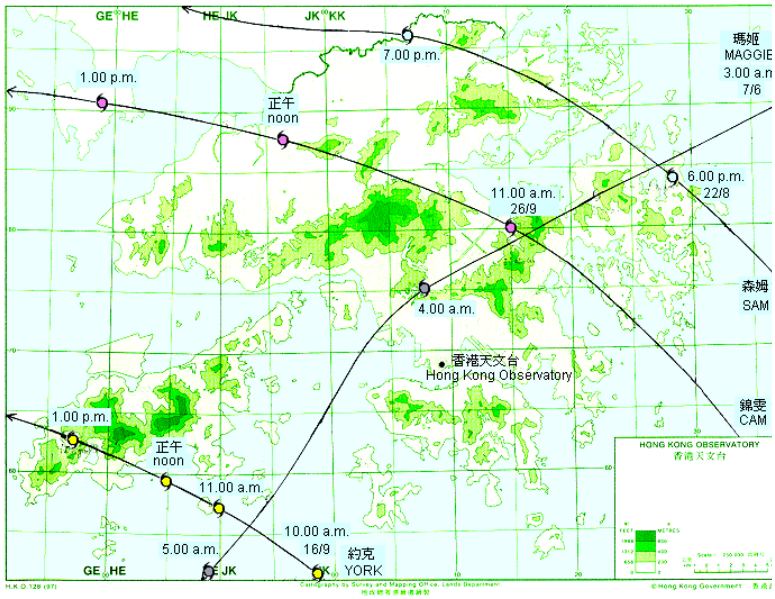


一九九九年影響香港的八個熱帶氣旋

Tracks of the eight tropical cyclones affecting Hong Kong in 1999

於一九九九年影響香港的八個熱帶氣旋中，有五個需要在香港發出 8 號或更高的熱帶氣旋警告信號。它們按次序分別爲：颱風利奧、颱風瑪姬、颱風森姆、颱風約克及強烈熱帶風暴錦雯。當中，瑪姬、森姆、約克及錦雯均橫過香港，這是近半個世紀以來的第一次。

Among the eight tropical cyclones affecting Hong Kong in 1999, five of them necessitated the issuing of No.8 or higher signals. They are, in chronological order, Typhoon Leo, Typhoon Maggie, Typhoon Sam, Typhoon York and Severe Tropical Storm Cam. Four of them, Maggie, Sam, York and Cam crossed Hong Kong. This was something without precedent in the past half a century.



一九九九年橫過香港的四個熱帶氣旋

Tracks of the four tropical cyclones over Hong Kong in 1999


香港天文台
HONG KONG OBSERVATORY
天氣個案
Weather Cases
請選擇
Please select
中 文
English


香港天文台
HONG KONG OBSERVATORY
請用滑鼠選擇以下個案：
颱風利奧
颱風瑪姬
颱風森姆
颱風約克
颱風錦雯
English


香港天文台
HONG KONG OBSERVATORY
Please click to choose a case :
Typhoon Leo
Typhoon Maggie
Typhoon Sam
Typhoon York
Typhoon Cam
中 文

颱風利奧　Typhoon Leo

(23/4/1999 - 2/5/1999)

Track of Leo (28 April - 2 May 1999)

leo - Netscape

File Edit View Go Communicator Help

Typoon Leo

Overview

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香港天文台
HONG KONG OBSERVATORY

Tropical Cyclone Warning Signals Hoisted during the passage of Leo :

Signal	Hoisting		Lowering	
	Time	Date	Time	Date
1	09:40	29/4/1999	16:15	30/4/1999
3	16:15	30/4/1999	13:30	02/5/1999
8 NE	13:30	02/5/1999	17:30	02/5/1999
3	17:30	02/5/1999	20:45	02/5/1999

Document: Done

開始 Paint Shop Pro leo - Netscape Microsoft Office 快捷列 PM 01:41

leo - Netscape

File Edit View Go Communicator Help

Typoon Leo

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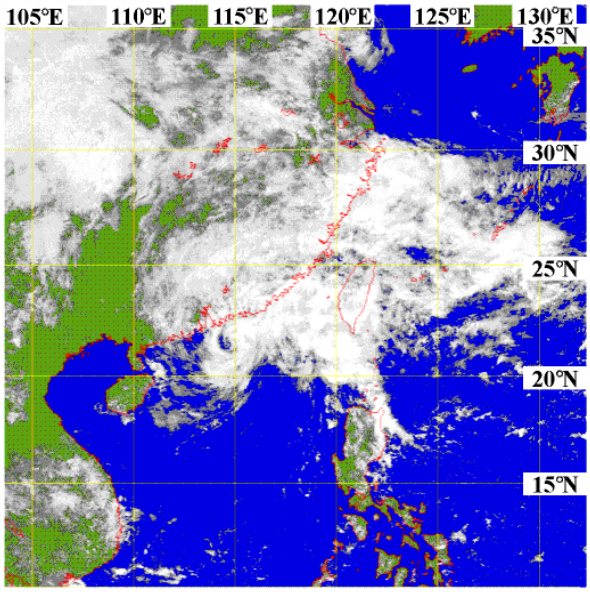
香港天文台
HONG KONG OBSERVATORY



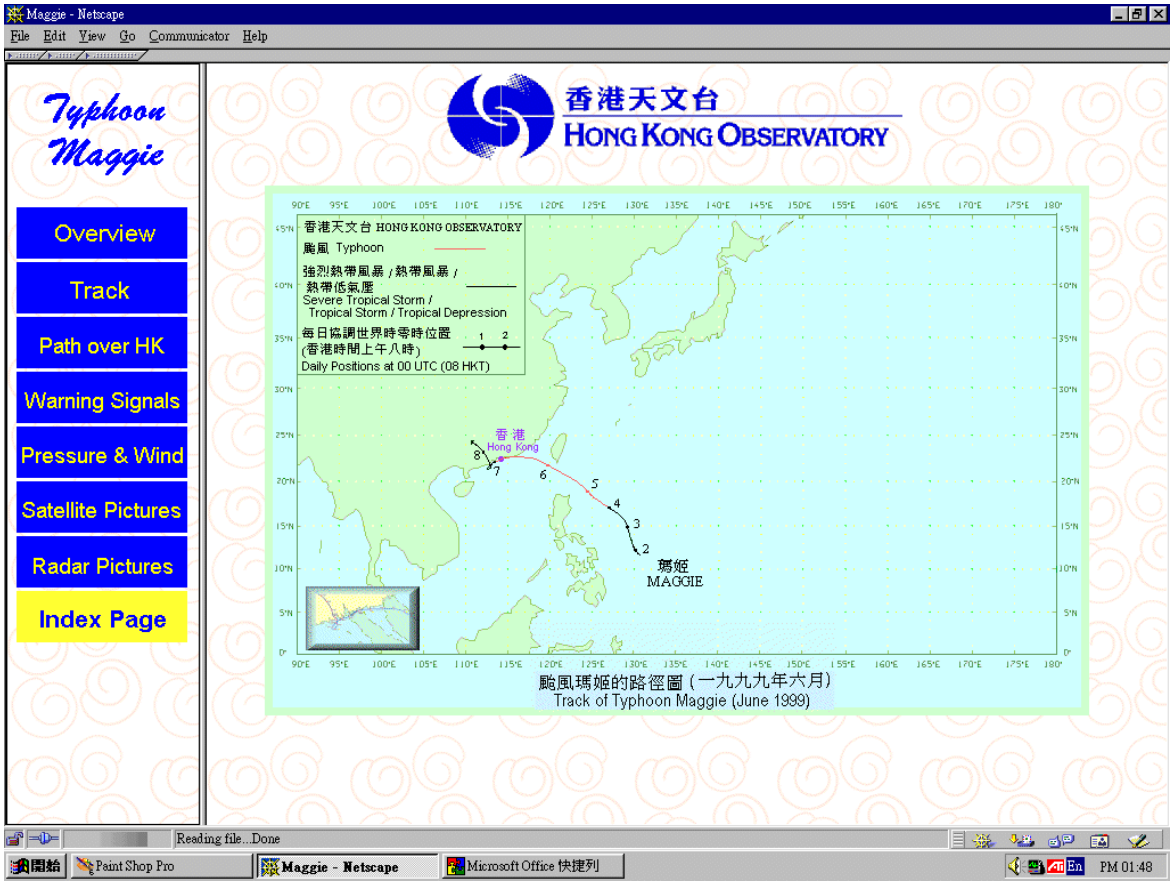
Visible imagery at around 11 a.m. on 2 May 1999 showing Leo

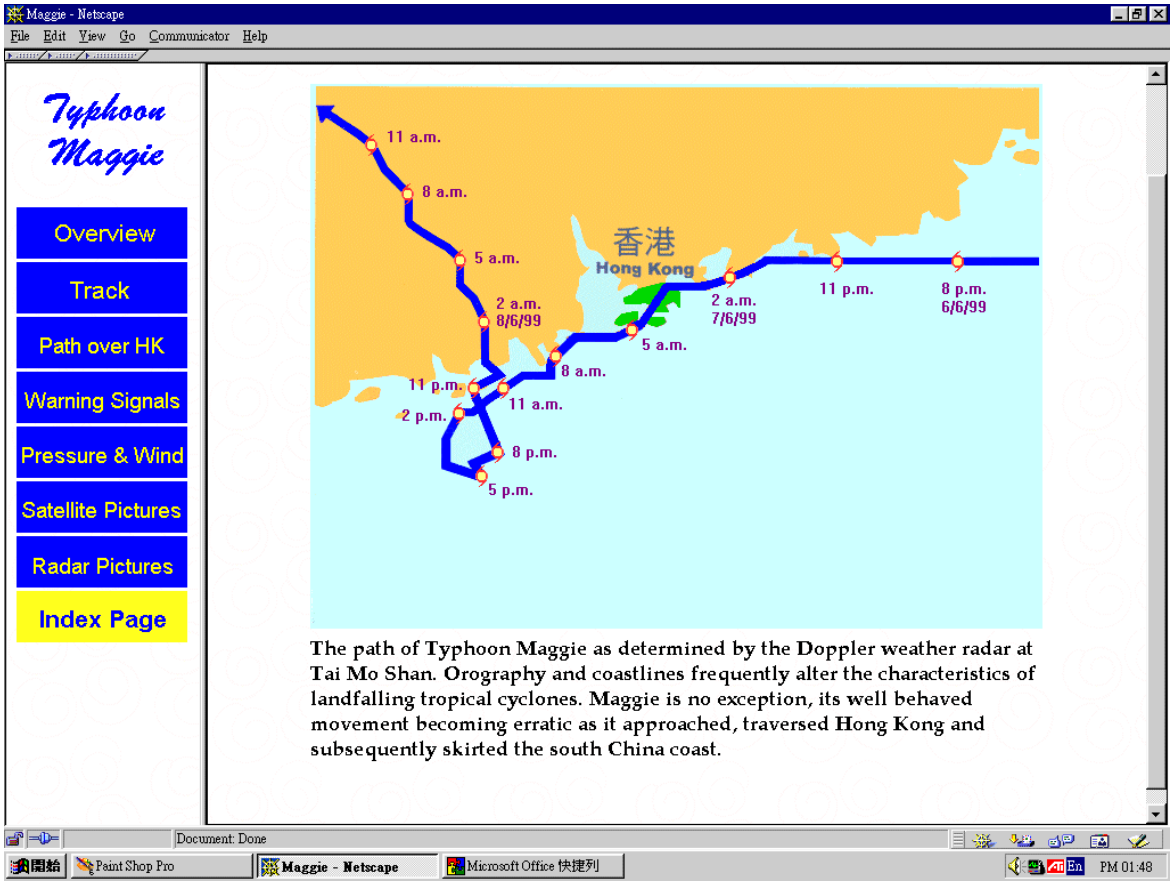
Document: Done

開始 Paint Shop Pro leo - Netscape Microsoft Office 快捷列 PM 01:43

颱風瑪姬　Typhoon Maggie

(2/6/1999 - 8/6/1999)





The path of Typhoon Maggie as determined by the Doppler weather radar at Tai Mo Shan. Orography and coastlines frequently alter the characteristics of landfalling tropical cyclones. Maggie is no exception, its well behaved movement becoming erratic as it approached, traversed Hong Kong and subsequently skirted the south China coast.

Path of Maggie over Hong Kong

Maggie - Netscape

File Edit View Go Communicator Help

Typhoon Maggie

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- Warning Signals
- Pressure & Wind
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香港天文台 HONG KONG OBSERVATORY

Tropical Cyclone Warning Signals Hoisted during the passage of Maggie :

Signal	Hoisting		Lowering	
	Time	Date	Time	Date
1	23:45	05/6/1999	14:15	06/6/1999
3	14:15	06/6/1999	00:30	07/6/1999
8 NW	00:30	07/6/1999	02:45	07/6/1999
9	02:45	07/6/1999	05:45	07/6/1999
8 NE	05:45	07/6/1999	10:30	07/6/1999
3	10:30	07/6/1999	14:45	07/6/1999
1	22:30	07/6/1999	00:45	08/6/1999
3	00:45	08/6/1999	13:45	08/6/1999

Document: Done

開始 Paint Shop Pro Maggie - Netscape Microsoft Office 快捷列 PM 01:49

Maggie - Netscape

File Edit View Go Communicator Help

Typhoon Maggie

- Overview
- Track
- Path over HK
- Warning Signals
- Pressure & Wind
- Satellite Pictures
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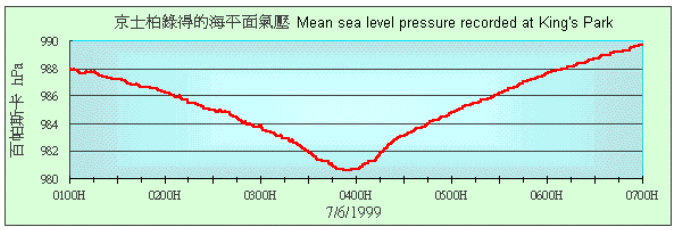
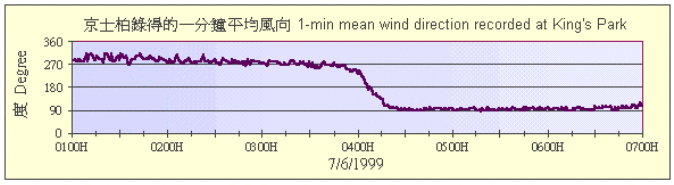
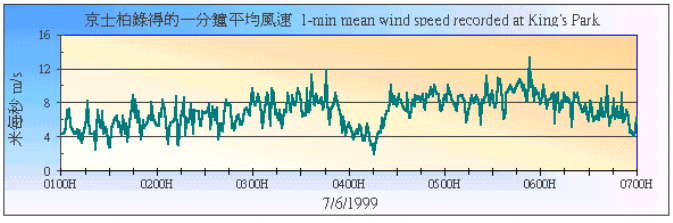
- Index Page



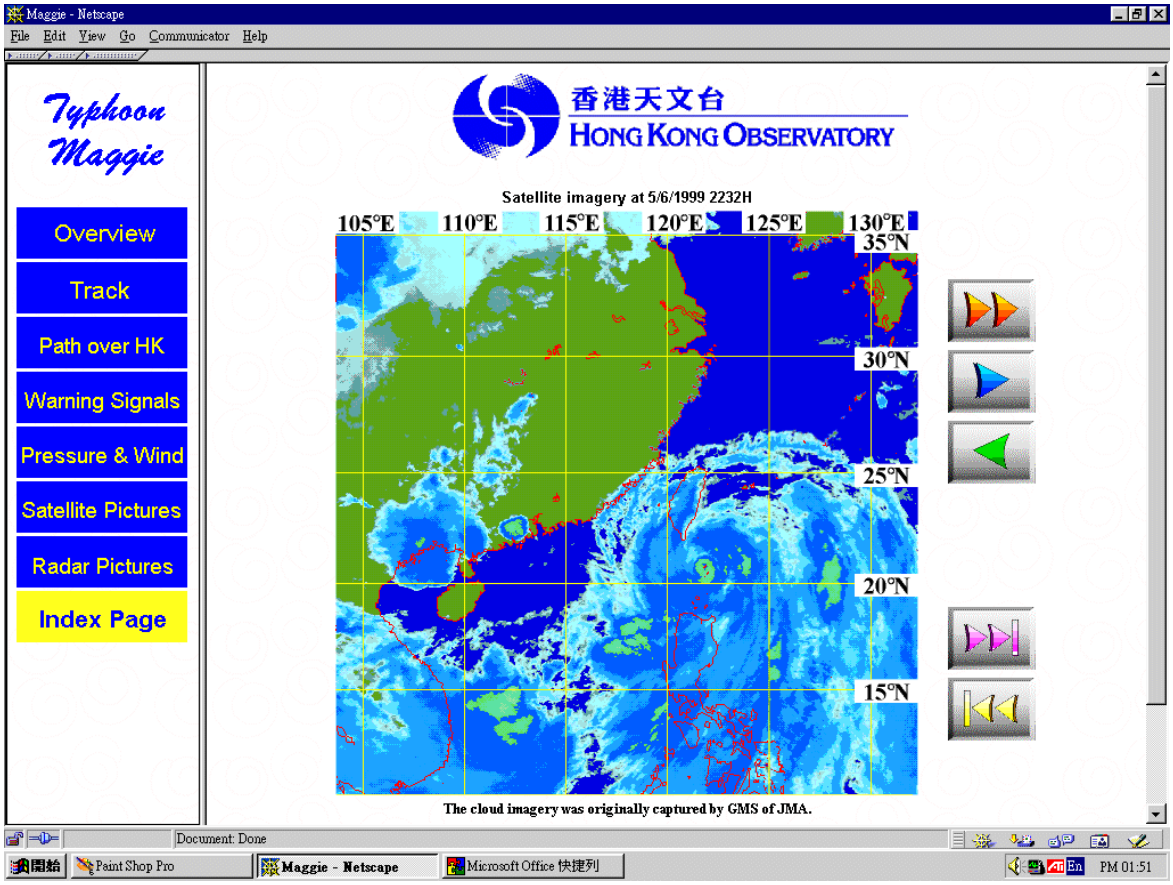


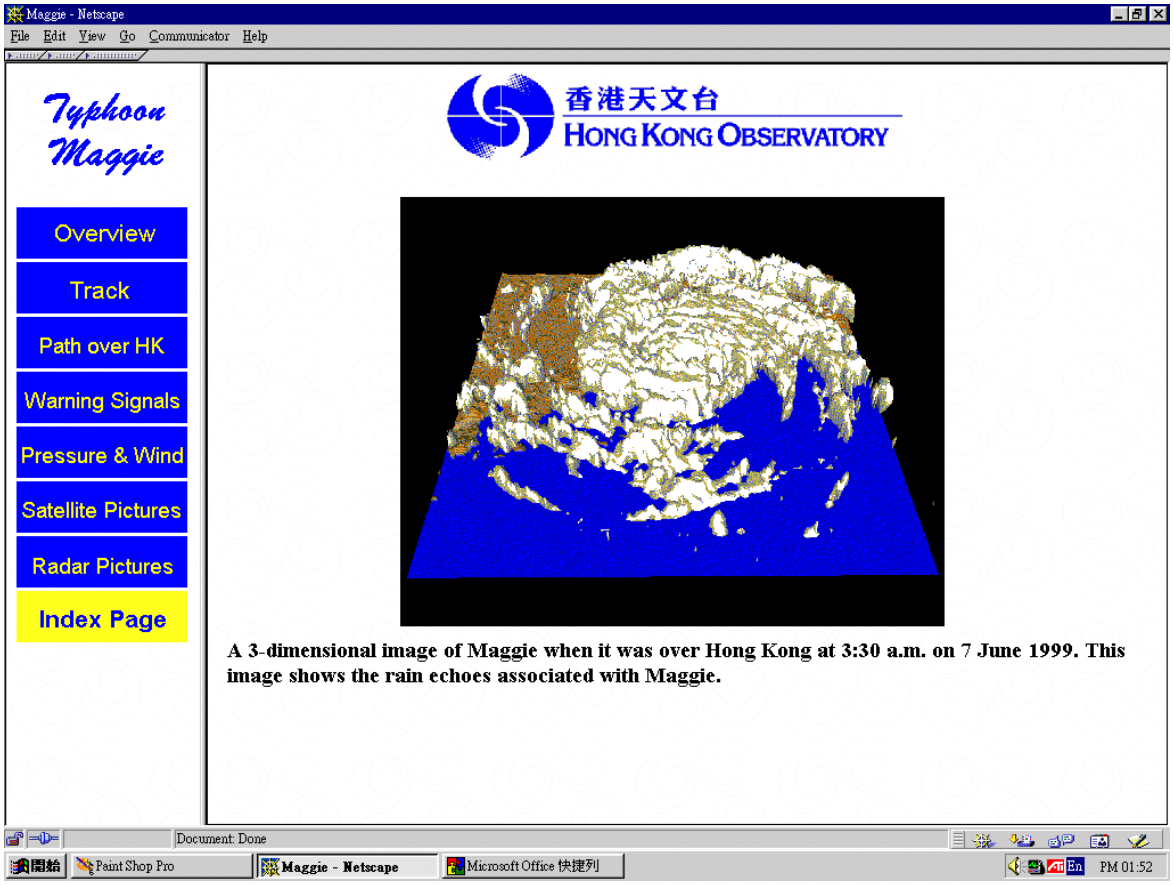


Traces of pressure, wind direction and wind speed recorded at King's Park during the passage of Maggie on 7 June

Document: Done

開始 Paint Shop Pro Maggie - Netscape Microsoft Office 快捷列 PM 01:51

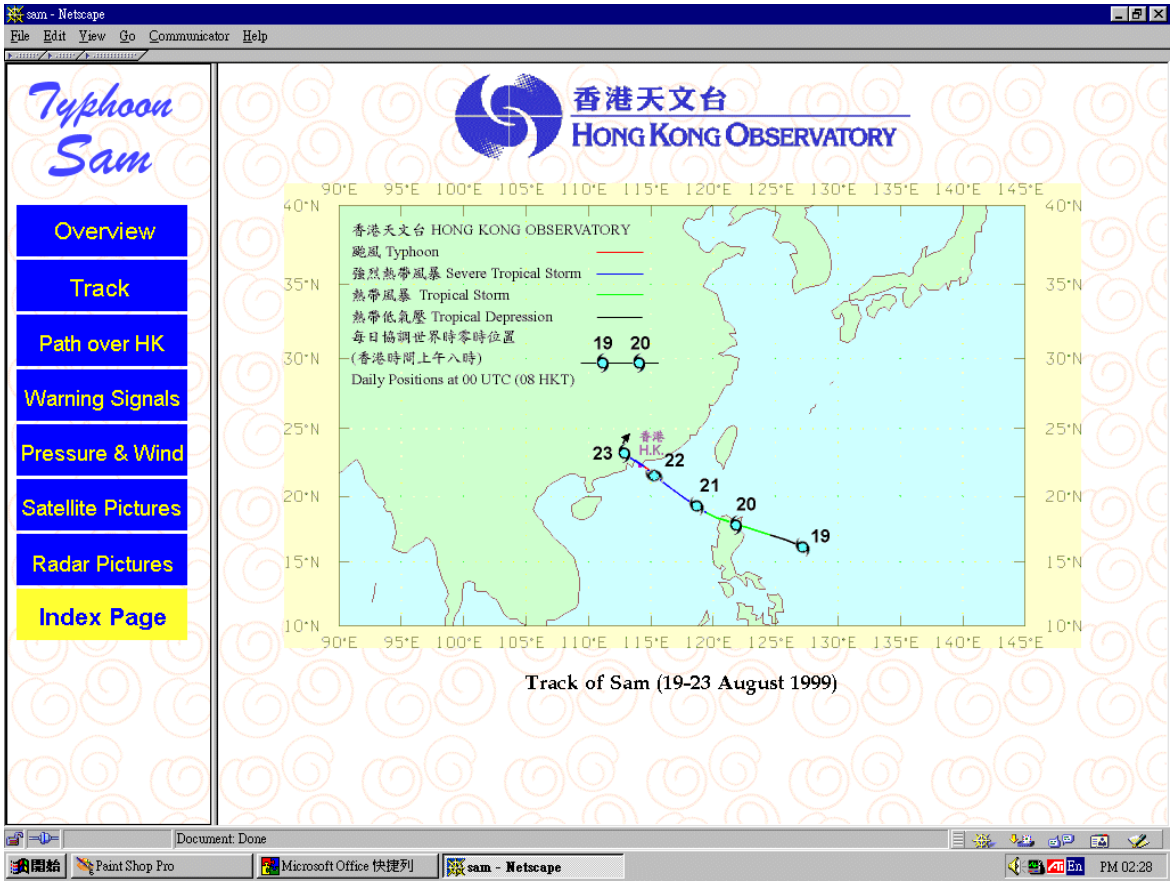




A 3-dimensional image of Maggie when it was over Hong Kong at 3:30 a.m. on 7 June 1999. This image shows the rain echoes associated with Maggie.

颱風森姆　Typhoon Sam

(19/8/1999 - 23/8/1999)



sam - Netscape

File Edit View Go Communicator Help

Typhoon Sam

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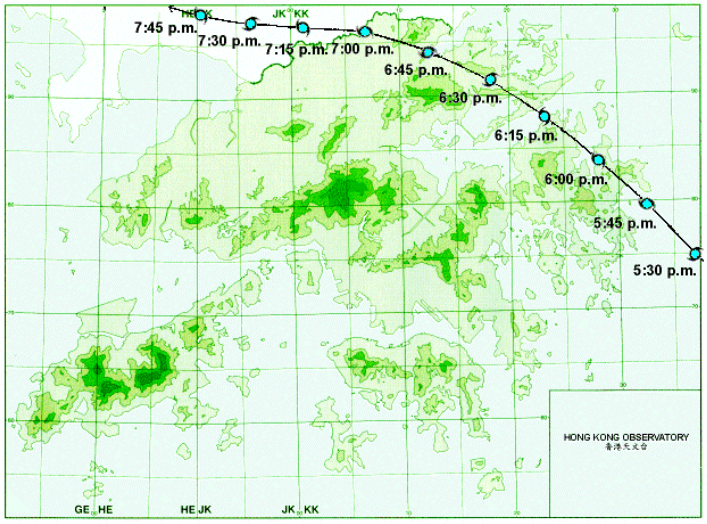
香港天文台
HONG KONG OBSERVATORY



Path of Sam over Hong Kong

Document: Done

開始 Paint Shop Pro Microsoft Office 快捷列 sam - Netscape PM 02:30

sam - Netscape

File Edit View Go Communicator Help

Typhoon Sam

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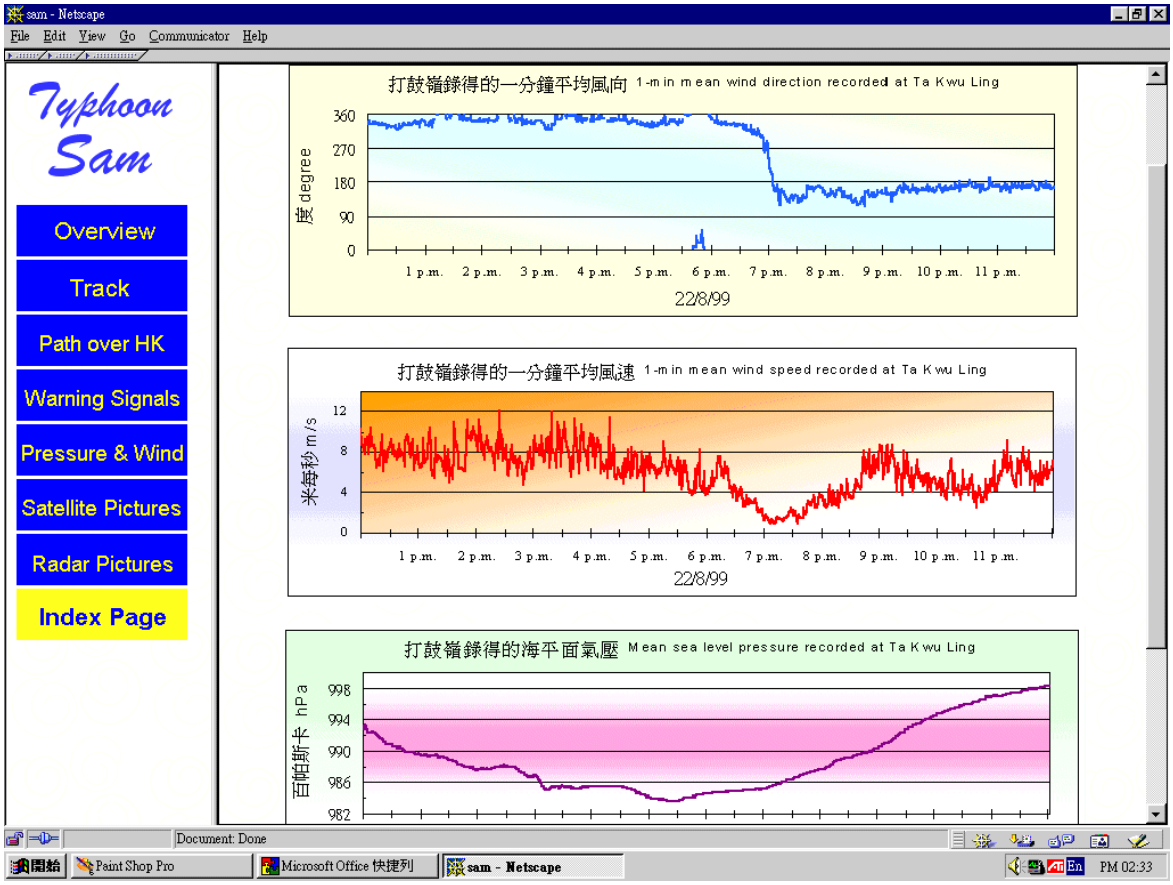
香港天文台
HONG KONG OBSERVATORY

Tropical Cyclone Warning Signals Hoisted during the passage of Sam :

Signal	Hoisting		Lowering	
	Time	Date	Time	Date
1	16:15	20/8/1999	02:30	22/8/1999
3	02:30	22/8/1999	12:30	22/8/1999
8 NW	12:30	22/8/1999	20:10	22/8/1999
8 SW	20:10	22/8/1999	03:50	23/8/1999
3	03:50	23/8/1999	21:00	23/8/1999

samsignal_e.htm

開始 Paint Shop Pro Microsoft Office 快捷列 sam - Netscape PM 02:32


sam - Netscape
File Edit View Go Communicator Help
Typhoon Sam
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Pressure & Wind
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Radar Pictures
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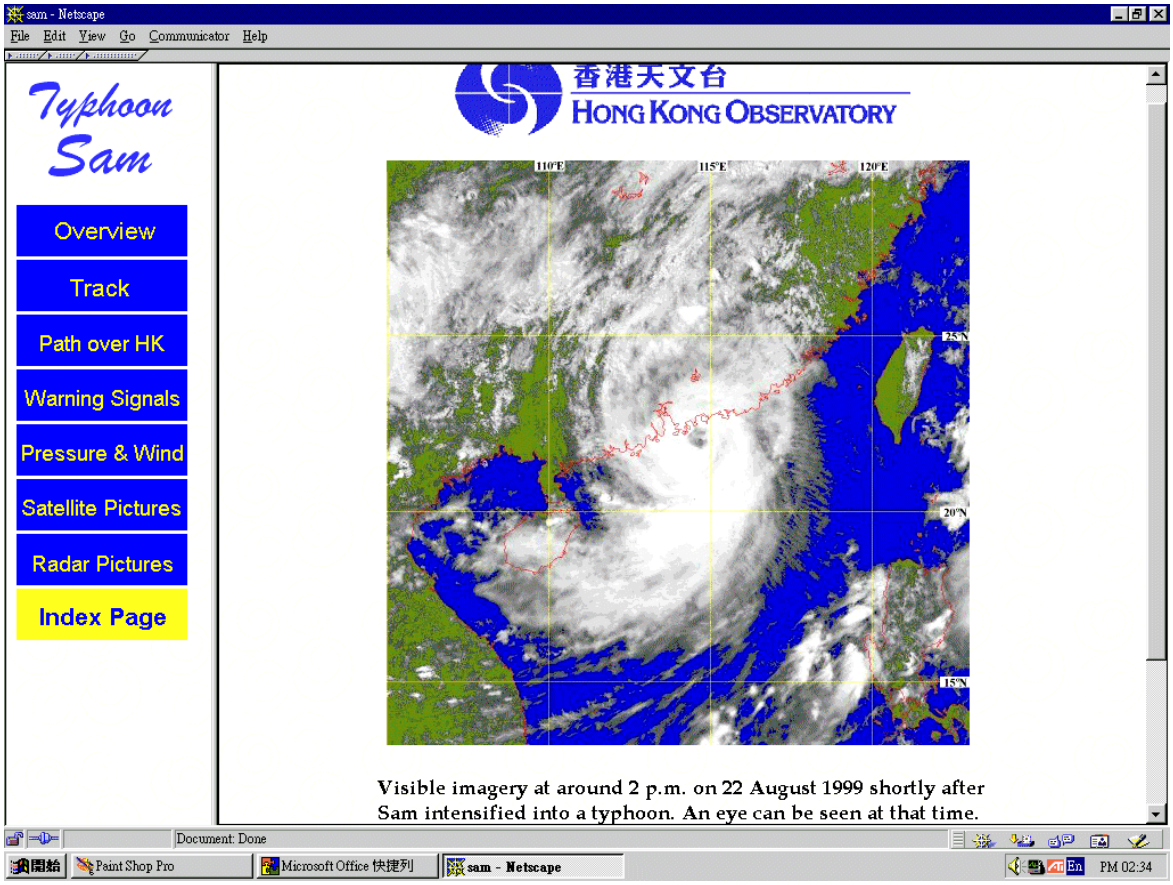
打鼓嶺錄得的一分鐘平均風向 1-min mean wind direction recorded at Ta Kwu Ling
度 degree
360
270
180
90
0
1 p.m. 2 p.m. 3 p.m. 4 p.m. 5 p.m. 6 p.m. 7 p.m. 8 p.m. 9 p.m. 10 p.m. 11 p.m.
22/8/99
打鼓嶺錄得的一分鐘平均風速 1-min mean wind speed recorded at Ta Kwu Ling
米每秒 m/s
12
8
4
0
1 p.m. 2 p.m. 3 p.m. 4 p.m. 5 p.m. 6 p.m. 7 p.m. 8 p.m. 9 p.m. 10 p.m. 11 p.m.
22/8/99
打鼓嶺錄得的海平面氣壓 Mean sea level pressure recorded at Ta Kwu Ling
百帕斯卡 hPa
998
994
990
986
982
Document: Done
開始
Paint Shop Pro
Microsoft Office 快捷列
sam - Netscape
PM 02:33


sam - Netscape
File Edit View Go Communicator Help
Typhoon Sam
Overview
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Path over HK
Warning Signals
Pressure & Wind
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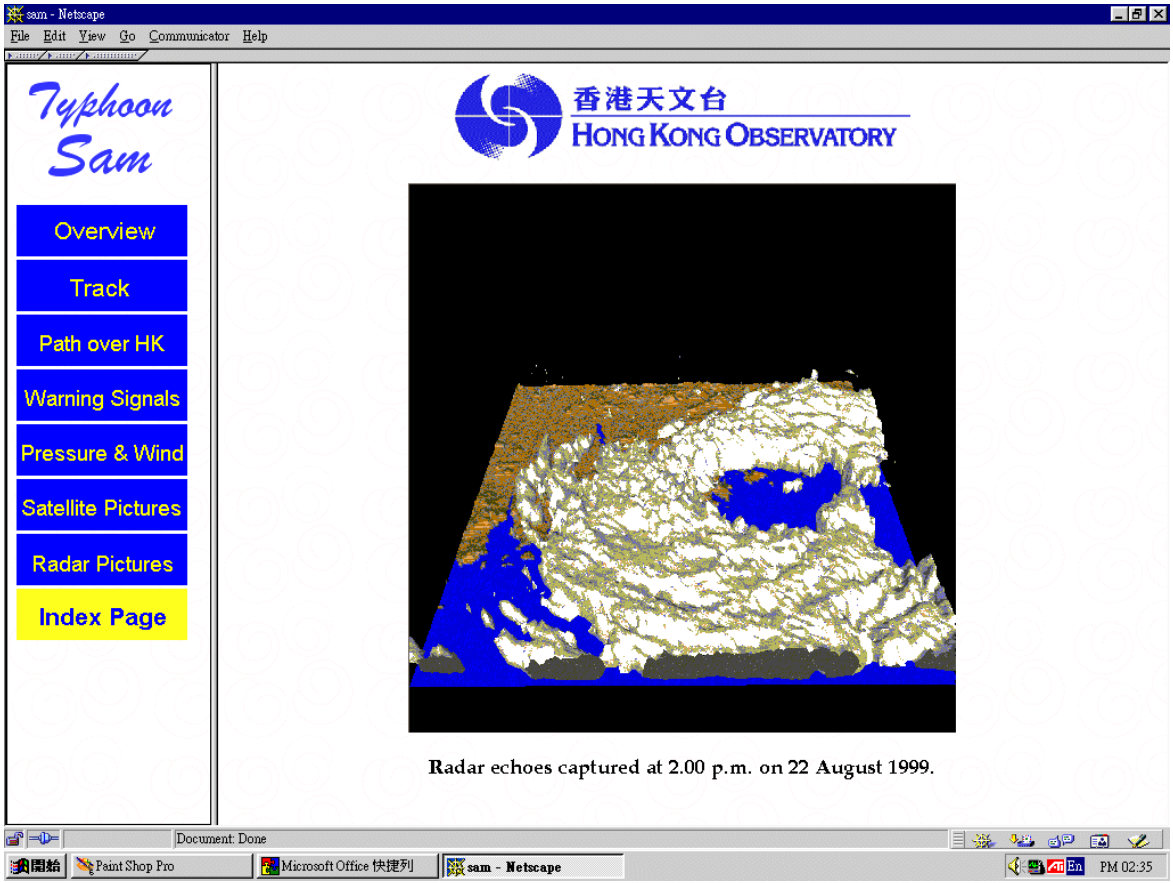
香港天文台
HONG KONG OBSERVATORY
110°E
115°E
120°E
25°N
20°N
15°N
Visible imagery at around 2 p.m. on 22 August 1999 shortly after Sam intensified into a typhoon. An eye can be seen at that time.
Document: Done
開始
Paint Shop Pro
Microsoft Office 快捷列
sam - Netscape
PM 02:34


sam - Netscape
File Edit View Go Communicator Help
Typhoon Sam
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香港天文台
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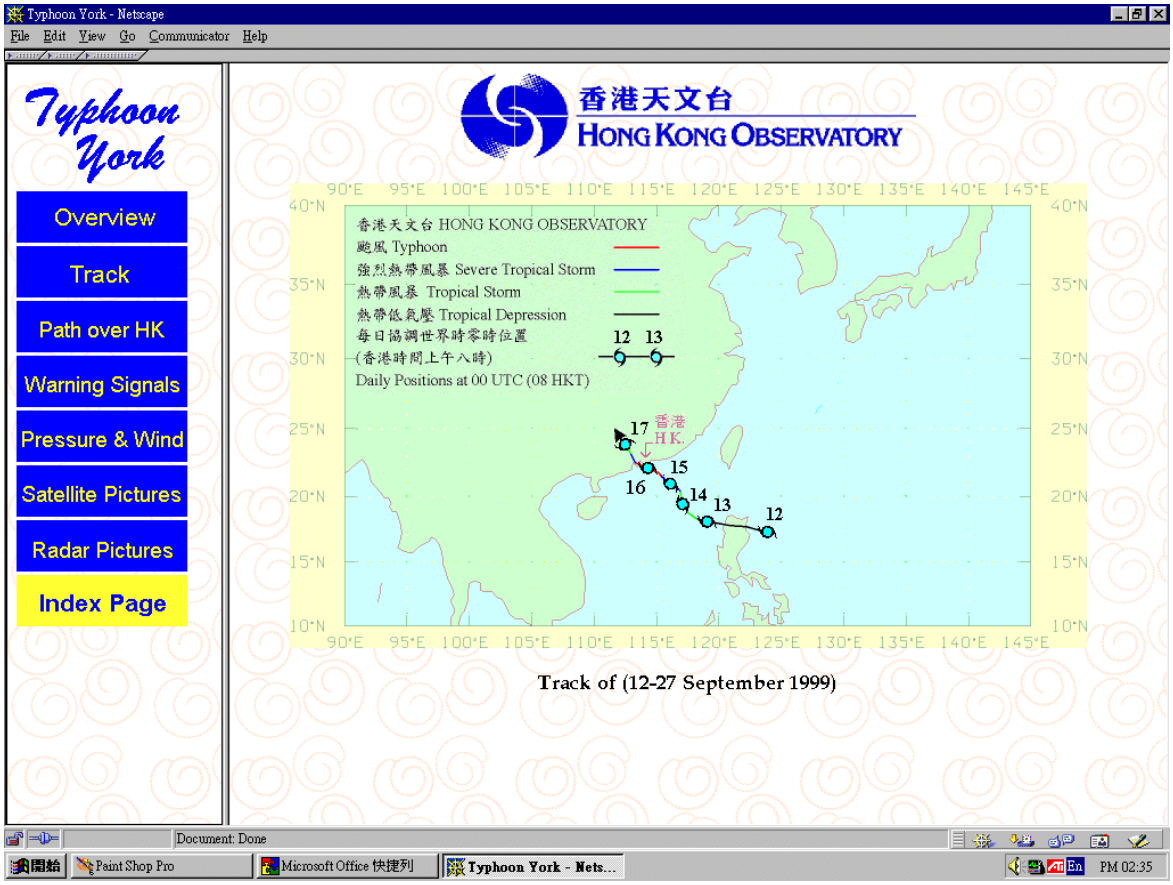
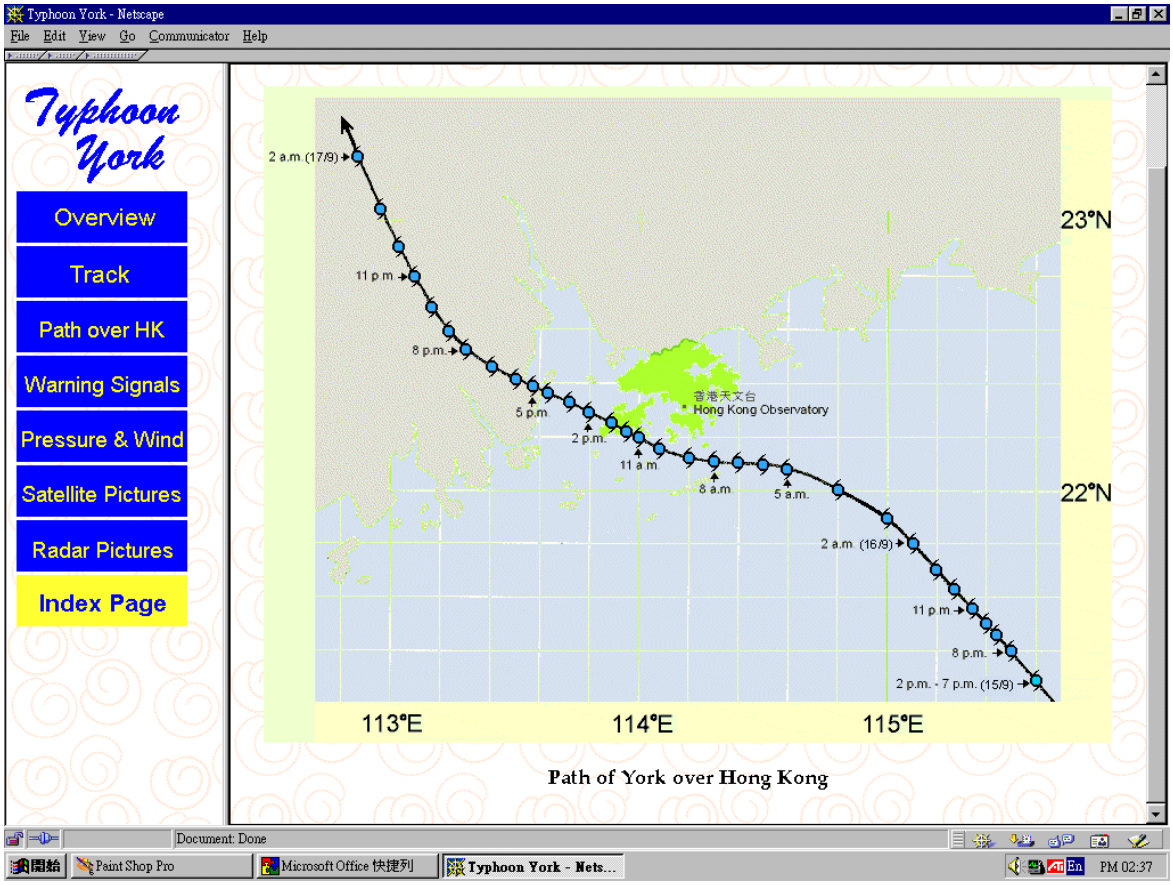
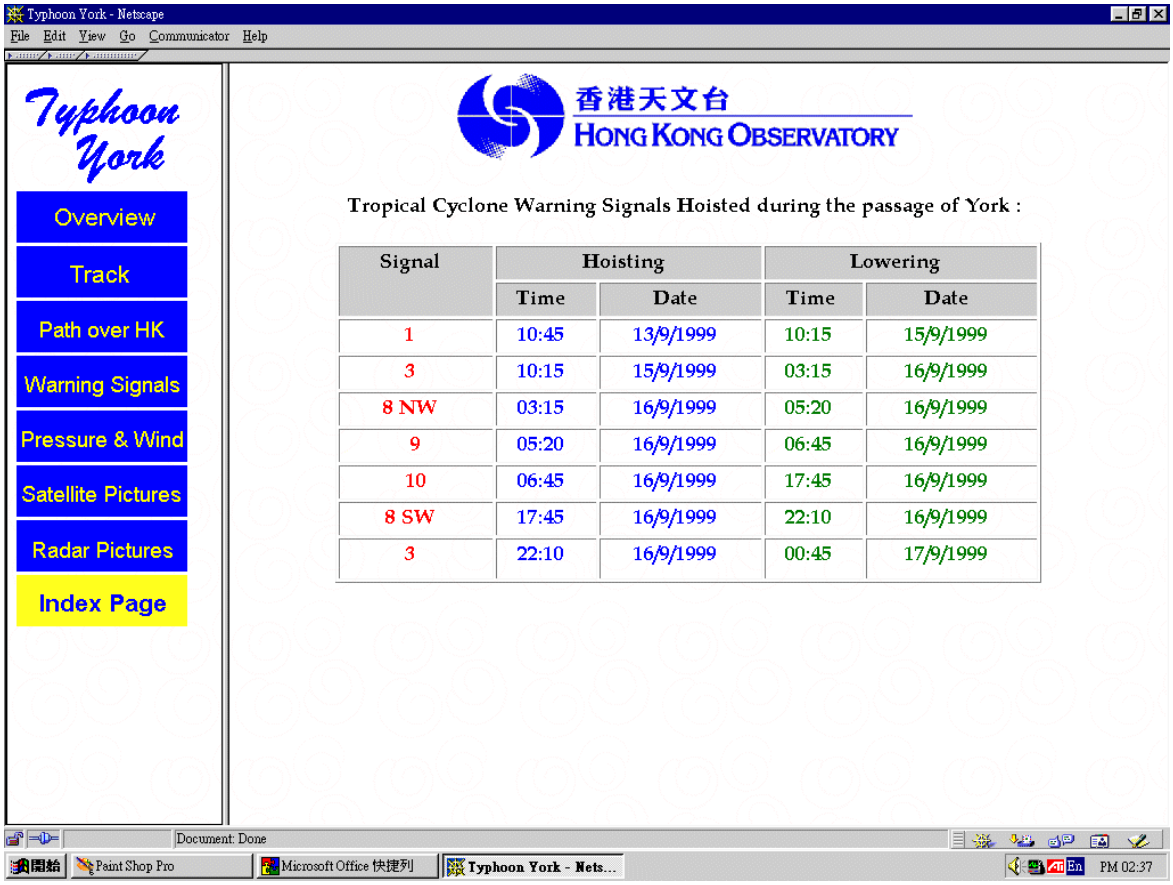
Radar echoes captured at 2.00 p.m. on 22 August 1999.
Document: Done
Paint Shop Pro
Microsoft Office 快捷列
sam - Netscape
PM 02:35

颱風約克　Typhoon York

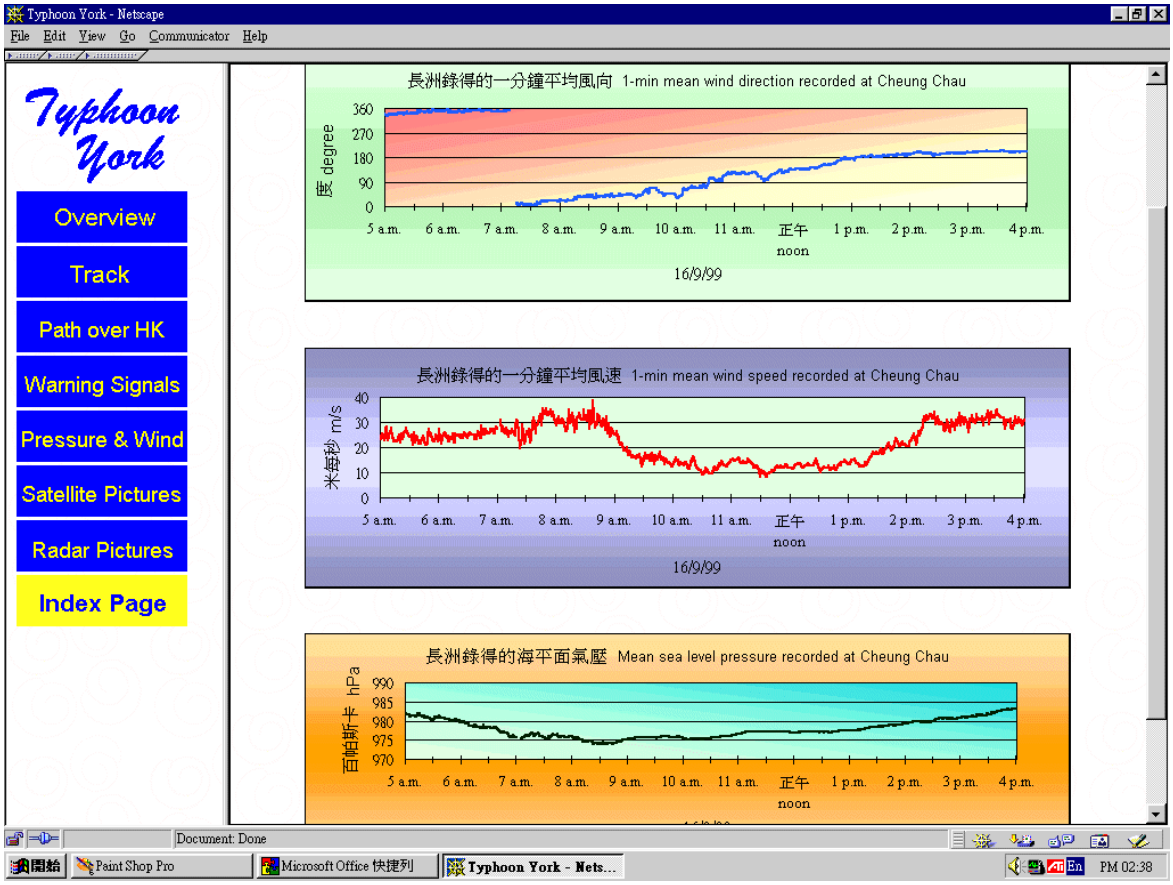
(12/9/1999 - 17/9/1999)

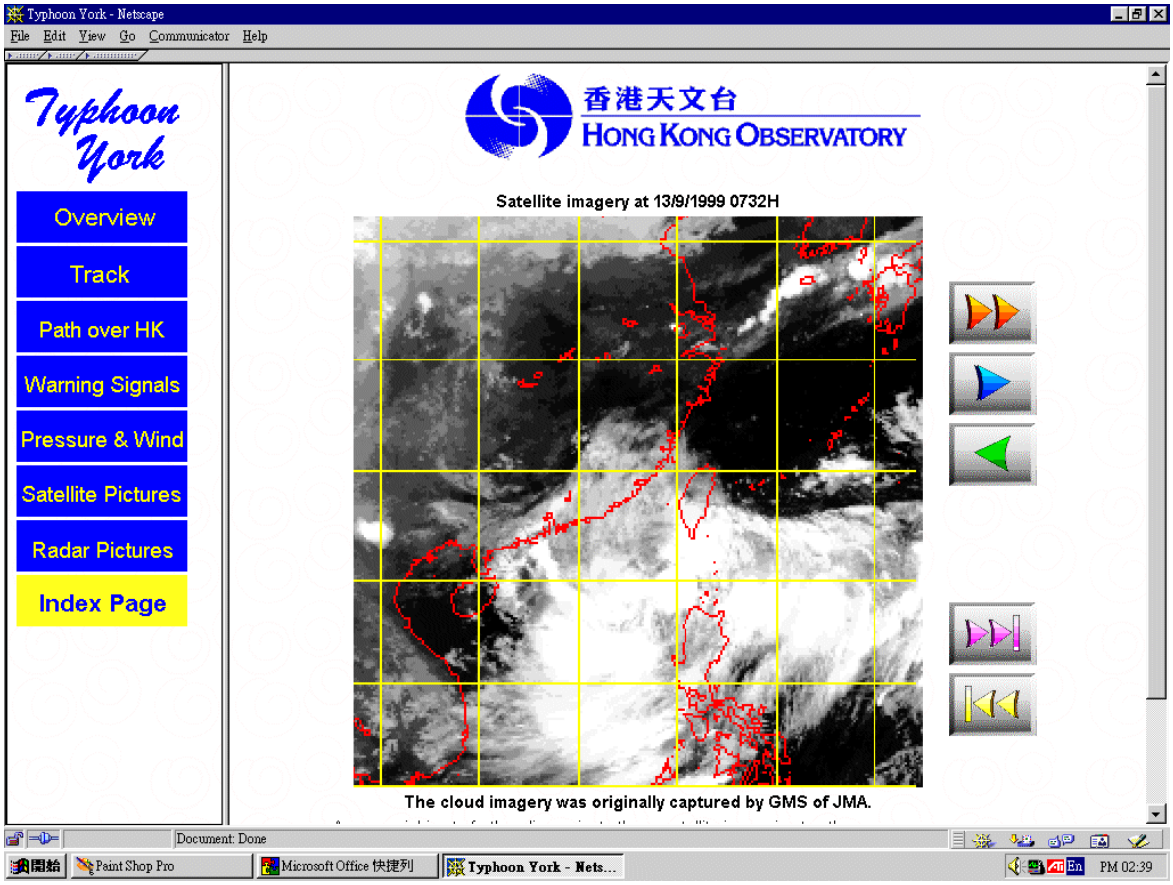






Signal	Hoisting		Lowering	
	Time	Date	Time	Date
1	10:45	13/9/1999	10:15	15/9/1999
3	10:15	15/9/1999	03:15	16/9/1999
8 NW	03:15	16/9/1999	05:20	16/9/1999
9	05:20	16/9/1999	06:45	16/9/1999
10	06:45	16/9/1999	17:45	16/9/1999
8 SW	17:45	16/9/1999	22:10	16/9/1999
3	22:10	16/9/1999	00:45	17/9/1999


Typhoon York - Netscape
File Edit View Go Communicator Help
Typhoon York
Overview
Track
Path over HK
Warning Signals
Pressure & Wind
Satellite Pictures
Radar Pictures
Index Page
長洲錄得的一分鐘平均風向 1-min mean wind direction recorded at Cheung Chau
度 degree
360
270
180
90
0
5 a.m. 6 a.m. 7 a.m. 8 a.m. 9 a.m. 10 a.m. 11 a.m. 正午 noon 1 p.m. 2 p.m. 3 p.m. 4 p.m.
16/9/99
長洲錄得的一分鐘平均風速 1-min mean wind speed recorded at Cheung Chau
米每秒 m/s
40
30
20
10
0
5 a.m. 6 a.m. 7 a.m. 8 a.m. 9 a.m. 10 a.m. 11 a.m. 正午 noon 1 p.m. 2 p.m. 3 p.m. 4 p.m.
16/9/99
長洲錄得的海平面氣壓 Mean sea level pressure recorded at Cheung Chau
百帕斯卡 hPa
990
985
980
975
970
5 a.m. 6 a.m. 7 a.m. 8 a.m. 9 a.m. 10 a.m. 11 a.m. 正午 noon 1 p.m. 2 p.m. 3 p.m. 4 p.m.
Document: Done
開始
Paint Shop Pro
Microsoft Office 快捷列
Typhoon York - Nets...
PM 02:38


Typhoon York - Netscape
File Edit View Go Communicator Help
Typhoon York
Overview
Track
Path over HK
Warning Signals
Pressure & Wind
Satellite Pictures
Radar Pictures
Index Page
香港天文台
HONG KONG OBSERVATORY
Satellite imagery at 13/9/1999 0732H
The cloud imagery was originally captured by GMS of JMA.
Document: Done
開始
Paint Shop Pro
Microsoft Office 快捷列
Typhoon York - Nets...
PM 02:39

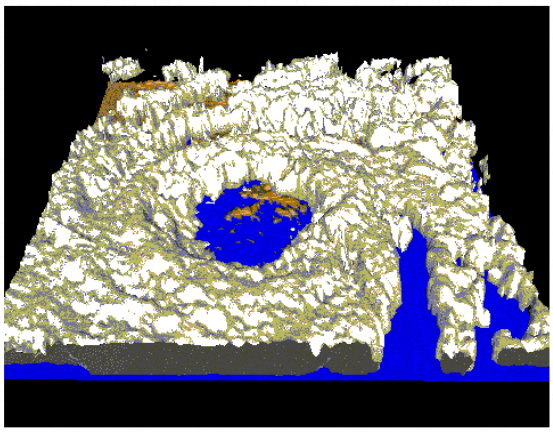
Typhoon York - Netscape

File Edit View Go Communicator Help

Typhoon York

- Overview
- Track
- Path over HK
- Warning Signals
- Pressure & Wind
- Satellite Pictures
- Radar Pictures
- Index Page

香港天文台
HONG KONG OBSERVATORY



3-D Radar echoes captured at 10.30 a.m. on 16 September 1999 when the eye of Typhoon York was affecting the southwestern part of Hong Kong.

Document: Done

開始 | Paint Shop Pro | Microsoft Office 快捷列 | Typhoon York - Nets... | PM 02:39

颱風錦雯　Typhoon Cam

(24/9/1999 - 26/9/1999)

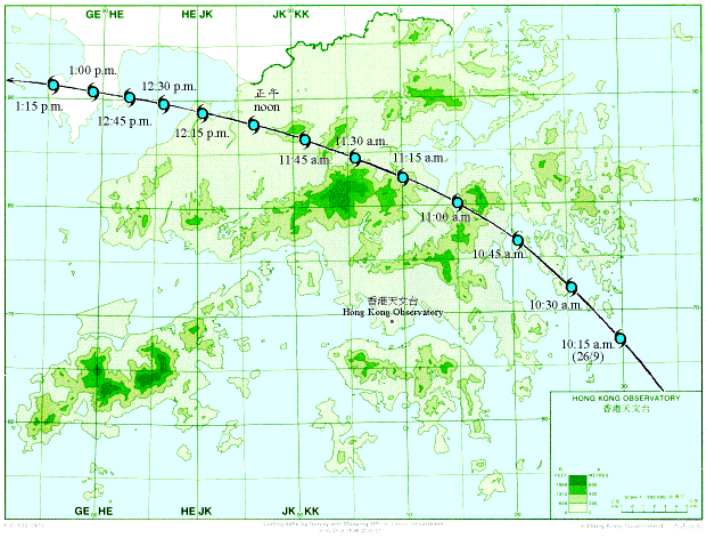
cam - Netscape

File Edit View Go Communicator Help

Typhoon Cam

- Overview
- Track
- Path over HK
- Warning Signals
- Satellite Pictures
- Radar Pictures
- Index Page

香港天文台
HONG KONG OBSERVATORY



Path of Cam over Hong Kong

Document: Done

開始 Paint Shop Pro Microsoft Office 快捷列 cam - Netscape PM 02:41

cam - Netscape

File Edit View Go Communicator Help

Typhoon Cam

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香港天文台
HONG KONG OBSERVATORY

Tropical Cyclone Warning Signals Hoisted during the passage of Cam :

Signal	Hoisting		Lowering	
	Time	Date	Time	Date
1	09:40	24/9/1999	15:40	25/9/1999
3	15:40	25/9/1999	05:20	26/9/1999
8 NW	05:20	26/9/1999	11:20	26/9/1999
8 SW	11:20	26/9/1999	14:10	26/9/1999
3	14:10	26/9/1999	15:20	26/9/1999

Document: Done

開始 Paint Shop Pro Microsoft Office 快捷列 cam - Netscape PM 02:42

cam - Netscape

File Edit View Go Communicator Help

Typhoon Cam

Overview

Track

Path over HK

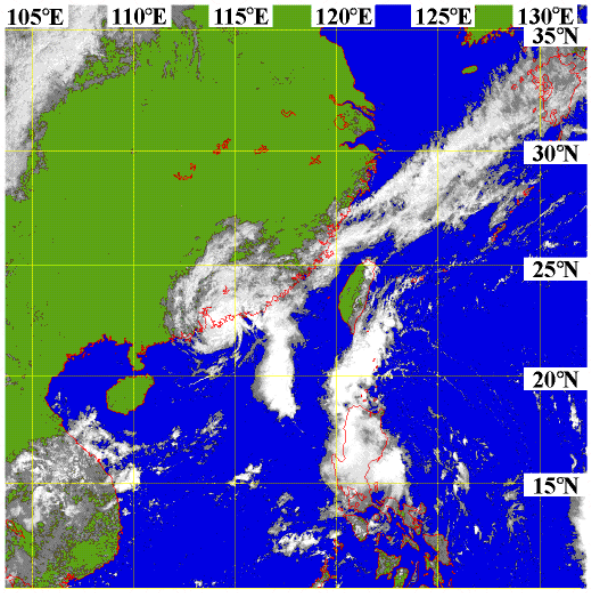
Warning Signals

Satellite Pictures

Radar Pictures

Index Page

香港天文台
HONG KONG OBSERVATORY



Visible imagery at around 11 a.m. on 26 September 1999

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開始 Paint Shop Pro Microsoft Office 快捷列 cam - Netscape PM 02:42

cam - Netscape

File Edit View Go Communicator Help

Typhoon Cam

Overview

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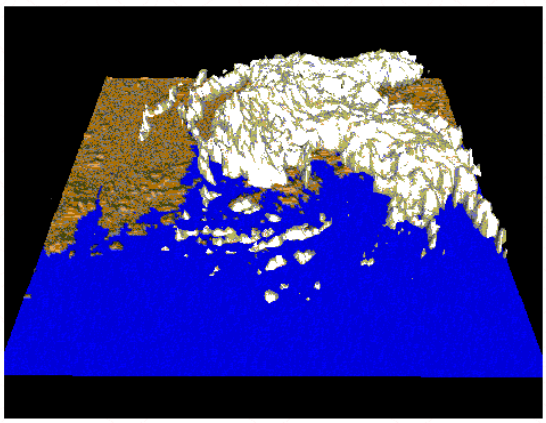
香港天文台
HONG KONG OBSERVATORY



3-D Radar echoes captured at 11 a.m. on 26 September 1999
when Cam was passing over Hong Kong.

Document: Done

開始 Paint Shop Pro Microsoft Office 快捷列 cam - Netscape PM 02:42

中期天氣預報
Medium Range Weather Forecast

中期數值天氣預報

數值模式天氣預報（簡稱數值預報）是非常重要的資料，因為數值模式包含了支配天氣的基本程式。這些程式需利用數值方法在高速電腦上演算。中期天氣預報利用覆蓋全球的數值模式。數值預報以及衛星、高空和地面氣象資料是天氣預測的基礎。

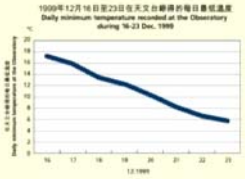
Medium Range Numerical Model Forecast

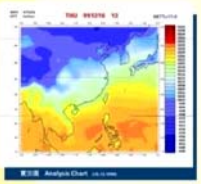
Numerical model forecasts are invaluable as they incorporate basic equations governing the atmosphere. Equations are solved by numerical methods using high-speed computers. For medium-range forecasts, numerical models covering the whole globe are used. Together with satellite, upper-air and surface data, they form the basis for subjective weather forecasts.

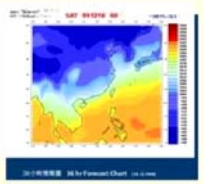
寒潮 — 地面溫度預測
Cold Surge – Surface Temperature Forecast

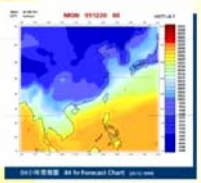
1999年12月16日，日本氣象廳（簡稱JMA）數值模式預測到一個寒潮會影響華南。由十二月十六日至二十三日期間，香港的每日最低溫度由 17.2 ℃ 下降至 5.8 ℃。

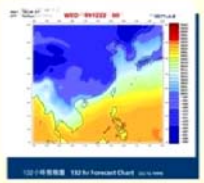
Forecast of cold surge in southern China made on 16 December 1999 using JMA (Japan Meteorological Agency) model. The daily minimum temperature in Hong Kong fell from 17.2°C on 16 December to 5.8°C on 23 December.



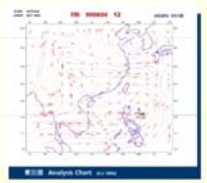


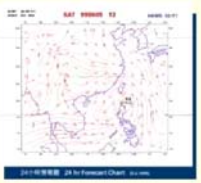


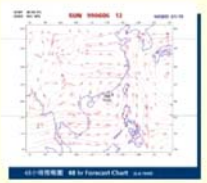


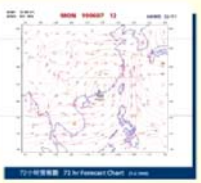


颱風瑪姬路徑 — 850百帕流場預測
Track of Typhoon Maggie – 850 hPa Streamline Forecast









1999年6月4日，歐洲中期天氣預報中心（簡稱ECMWF）數值模式預測的流場和颱風瑪姬的路徑。

Forecast of atmospheric flow and movement of Typhoon Maggie made on 4 June 1999 using ECMWF (European Centre for Medium-Range Weather Forecasts) model.

第十四號展品　Display No. 14
中期天氣預報　Medium Range Weather Forecast

中期天氣預報

全球模式提供未來大約 10 日的中期天氣預報產品。

圖 2-5 顯示日本氣象廳全球模式在 1999 年 12 月中預測冷空氣南下影響華南的六天天氣預報。本港方面，最低氣溫由 12 月 16 日的 17.2 度下跌至 23 日的 5.8 度，而期間的 22 日錄得最低 6.7 度，是天文台有記錄以來最寒冷的冬至。有了全球模式的預報，天文台就可以在大約一星期前提醒市民天氣轉冷。

圖 6-9 表示歐洲中期天氣預報中心在 1999 年 6 月 4 日國際時 12 時（即香港時間晚上 8 時）預測未來三天的 850 百帕（離地面約 1 500 米）風的流場。從圖中可以看到電腦模擬颱風瑪姬的移動路徑和環流。模式預測的路徑和實況的相差不遠。它在之前的數天就能夠預測瑪姬會直接影響香港，這無疑給預報員非常有用的資料作參考。

大氣數值模式

天氣源自大氣層的變化，這些變化受物理學各種定律制約。數值天氣預報技術利用高速電腦運算代表這些定律的繁複方程組，從而得知大氣層的演變，以及相連的天氣。方程式中的氣象變數包括風、溫度、氣壓及水汽含量。原則上，從已知的初始狀況和邊界條件便足以計算出各項氣象變數隨時間的變化，作爲天氣預報的依據，但是爲了減省計算量，模式往往採用某些近似和假設去簡化基本方程式，因此計算結果也就不是百分之一百真正大氣的寫照。

Medium Range Weather Forecast

Global models provide medium-range forecast up to about 10 days ahead.

Plates 2-5 illustrate the 6-day forecast of cold air marching southwards to affect southern China in mid-December 1999 by the JMA global model. Locally in Hong Kong, daily minimum temperatures dropped from 17.2 degrees on 16 December to 5.8 degrees on 23 December as shown in Plate 5. During the period, a minimum temperature of 6.7 degrees was recorded at the HKO on 22 December and it was the coldest winter solstice on record. With the availability of global model forecasts, the Observatory was able to alert the public of the cold weather nearly a week ahead.

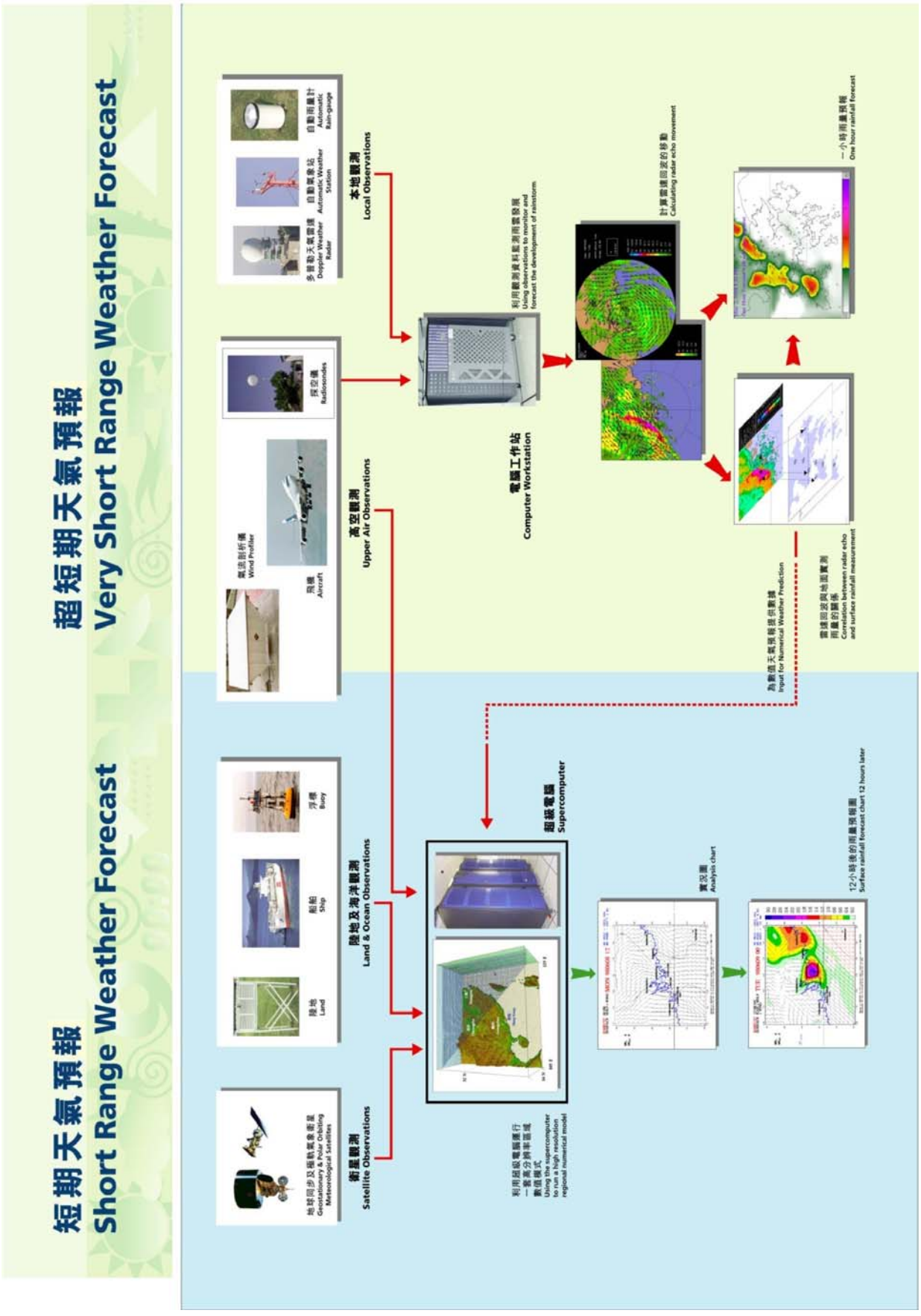
Plates 6-9 show the 3-day forecast of wind flow at 850 hPa (around 1 500 metres from the ground) based on the analysis at 12 UTC 4 June 1999 using the ECMWF global model. The charts depict the forecast location of Typhoon Maggie and the environmental flow during this period. The model forecast track compared favourably with the actual track as shown in Plate 10. The model was able to forecast Maggie giving a close hit to Hong Kong a few days in advance. It undoubtedly provided forecasters with a good piece of information for reference.

Atmospheric Numerical Modelling

Weather stems from the constant evolution of the atmosphere governed by physical laws. Using high-speed computers to solve a complex set of mathematical equations that represents the governing laws, numerical weather prediction (NWP) is a technique for simulating the atmospheric evolution in order to delineate the resultant weather changes. The variables involved in the equations include wind, temperature, pressure and moisture content. In principle, given the initial and boundary conditions, the atmospheric variables can be numerically solved as functions of time and form the basis of weather forecast. However approximations and assumptions are made to simplify the governing equations in order to reduce the computational demand. As such, the numerical simulation will never be a perfect representation of the real atmosphere.

第十五號展品　Display No. 15

短期/超短期天氣預報　Short Range / Very Short Range Weather Forecast



短期天氣預報

天文台利用高速電腦運行一套達 20 公里分辨率的區域數值模式（簡稱模式）來模擬天氣情況的變化，以作出短期（即未來一兩天）天氣預報。在整個模擬過程中，分析大氣狀況是首要的一環。除運用地面（例如氣象站、船隻、浮標）及高空（例如氣流剖析儀、飛機、無線電探空以及衛星）觀測資料之外，天文台更利用了建基於「雷達回波」與地面實測雨量的綜合分析，來改善模式的初始濕度場，以達至更佳的降雨預測。模式預測範圍涵蓋中國南部、南海北部及西太平洋部分地區。

超短期預報系統

香港天文台已開拓一套超短期預報系統（又名臨近預報系統）以監察及預測未來三小時內即將發生的暴雨。此系統透過 TREC（雷達回波相關追蹤）技術，分析從氣象雷達探測所得的訊號（稱爲「雷達回波」），追蹤及預測個別雨雲單體的移動路徑和強度變化。再利用香港境內密集的地面實測雨量數據，不斷訂正雷達回波與降雨量的關係。綜合上述各項分析及預測結果，此系統能每六分鐘爲我們提供香港境內最新的雨量分布及演變。

香港天文台的克雷電腦(SV1-1A)

克雷電腦是在 1999 年底購置，用來作業務運行一套區域譜模式。模式產品有助短期天氣預報。電腦具有 16 個中央處理器，最高速度可達每秒 192 億次浮點運算(19.2 GFLOPS)，或每秒理論運算達 210 億次(21,000 MTOPS)，速度比前快接近 10 倍。

香港天文台的業務區域譜模式

區域譜模式的水平分辨率分別有 60 公里和 20 公里兩套，垂直有 36 層。60 公里模式每 6 小時提供未來 48 小時的天氣預測，而較精細的 20 公里模式每 3 小時提供未來 24 小時預測。從資料收集到製成模式產品，20 公里及 60 公里模式分別需時約 3.5 及 4.5 小時。

Short Range Weather Forecast

For short range forecast up to 2 days ahead, the Hong Kong Observatory (HKO) operates a regional numerical weather prediction model (the Model) down to 20-km resolution on a high performance computer to simulate the evolution of weather events. For the simulation, analysis of the atmospheric state is the foremost important step. In addition to surface (e.g. station reports, ships, buoys) and upper-air observations (e.g. wind profilers, aircraft, radiosondes, as well as satellites), HKO also utilizes the integrated rainfall analyses based on radar observations and real-time raingauge measurements to set up the initial moisture field in the Model. This is desirable in order to achieve more accurate precipitation forecast. The Model produces forecasts for a domain covering southern China, the northern part of the South China Sea, as well as parts of the western Pacific.

Very Short Range Forecast

A very short range forecasting system (also known as nowcasting system) has been developed at the Hong Kong Observatory to monitor and predict approaching rainstorms within the next 3 hours. By using the TREC (Tracking Radar Echoes by Correlation) technique to analyze the signals detected by weather radar (i.e. radar echoes), movement and intensity changes of individual rain cell can be tracked and extrapolated. Moreover, the radar echo and rainfall relationship is adjusted in real time against the dense raingauge data collected over Hong Kong. By integrating the analyses and extrapolation results, the nowcasting system is able to update quantitatively changes in the rainfall pattern and distribution over Hong Kong every 6 minutes.

The CRAY computer at HKO (SV1-1A)

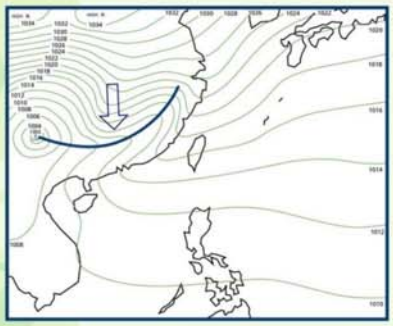
A CRAY computer was acquired near the end of 1999 for running the Regional Spectral Model operationally to provide guidance on short-range forecast. It consists of 16 CPUs and the theoretical peak performance is 19.2 GFLOPS (giga floating point operations per second) or 21,000 MTOPS (millions of theoretical operations per second), which is around 10 times than that of the computer previously used.

The operational regional model at HKO

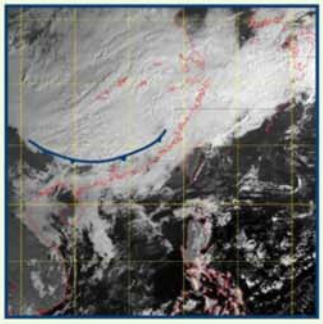
RSM runs at a horizontal resolution of 60 km to provide 48-hour forecasts every 6 hours and a horizontal resolution of 20 km to provide 24-hour forecasts every 3 hours. There are 36 model levels in the vertical. Prognostic charts and other post-processed products are made available around 3.5 hours and 4.5 hours after analysis time for 20-km and 60-km models respectively.

第十六號展品　**Display No. 16**
冬季季候風　**Winter Monsoon**

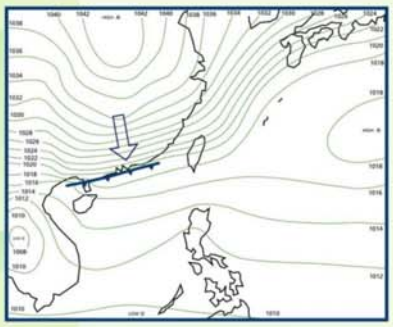
冬季季候風
Winter Monsoon



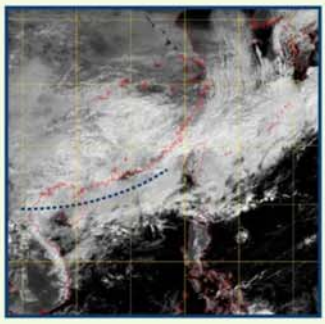
1996年2月16日晚上11時的天氣圖 — 中國北部氣壓上升，寒冷及乾燥的氣流移向華南地區。
Weather map at 11 p.m. on 16 February 1996 – Pressure rose over northern China, a cold and dry airstream moved towards southern China.



1996年2月17日上午，一道冷鋒向南逐漸移近華南沿岸。
A cold front moved south gradually towards the South China Coast in the morning of 17 February 1996.



1996年2月17日晚上11時的天氣圖 — 寒冷的氣流及其相關連的一道冷鋒南移至華南沿岸。
Weather map at 11 p.m. on 17 February 1996 – Cold air and the associated cold front moved southward to the South China Coast.



1996年2月18日上午，冷鋒在進入南海後消散。
The cold front dissipated in the morning of 18 February 1996 after entering the South China Sea.

來自北方的寒潮

香港冬天天氣主要受北面冷空氣所影響。位於中國的大陸反氣旋加強引致冬季季候性寒潮南下到達香港，並常伴有冷鋒。當寒潮到港時，氣壓上升，氣溫及露點下降。在衛星圖片上時常可觀察到與冷鋒相聯繫之雲帶向南移動。

以上一系列地面天氣圖、衛星圖片和氣壓、氣溫及露點的時間序列顯示出1996年2月一次寒潮襲港的過程。一道冷鋒在2月17日晚掠過本港，北風增強。氣溫由該晚之18.9度下降至2月18日早上的10.9度，而露點亦從16.8度跌至6.5度。這次寒潮揭開了一星期寒冷天氣的序幕，在2月18至24日期間的每日最低氣溫都在十度以下。

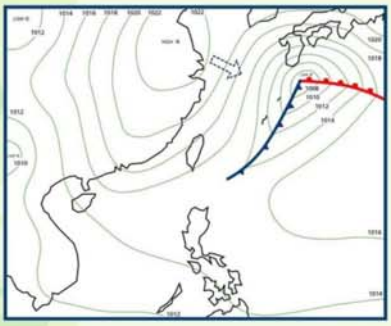
Cold surges from the north

The weather in Hong Kong during winter is dominated by cold air intrusions from the north. Surges of the winter monsoon arriving in Hong Kong result from the intensification of the continental anticyclone over China and are often accompanied by a cold front. When a cold surge arrives in Hong Kong, pressure rises while air temperature and dew point drop. Clouds associated with a cold front can often be seen moving south on satellite picture.

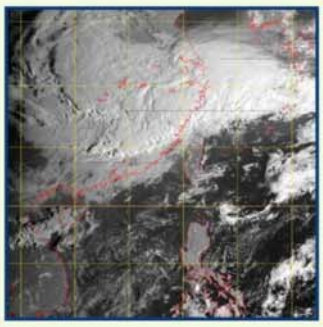
The sequence of surface charts, satellite pictures and time series of pressure, air temperature and dew point illustrate the sequence of event during a cold surge in February 1996. A cold front passed through Hong Kong at the night of 17 February and winds strengthened from the north. Temperature dropped from 18.9 degrees that night to 10.9 degrees in the morning of 18 February while dew point dropped from 16.8 degrees to 6.5 degrees. It also marked the beginning of a cold spell with minimum temperatures below 10 degrees from 18 to 24 February.

第十七號展品　Display No. 17
霧　Fog

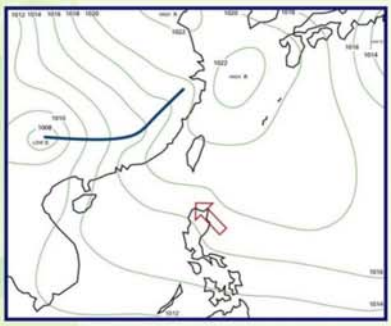
霧
Fog



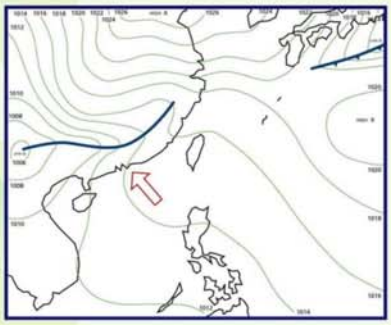
1998年3月5日上午8時的天氣圖 — 位於中國反氣旋東移向太平洋。
Weather map at 8 a.m. on 5 March 1998 — An anticyclone over China moved eastward towards the Pacific Ocean.



在1998年3月7日早上，華南沿岸部分地區有霧。
Fog affected part of the South China Coastal Areas in the morning of 7 March 1998.



1998年3月6日上午8時的天氣圖 — 溫暖及潮濕的東南氣流從太平洋移向華南沿岸。
Weather map at 8 a.m. on 6 March 1998 — A warm and moist southeasterly airstream moved towards the South China Coast from the Pacific Ocean.



1998年3月7日上午8時的天氣圖 — 當此氣流遇到華南沿岸較涼的海水，霧便形成。
Weather map at 8 a.m. on 7 March 1998 — Fog formed when the airstream encountered the relatively cool sea near the South China Coast.

霧

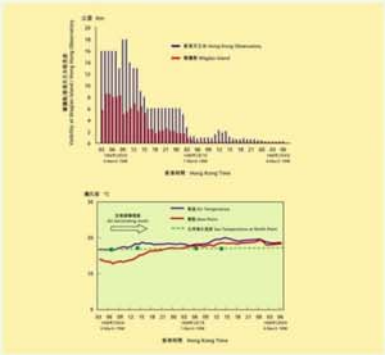
在香港，冬天後期和春天都是多霧的季節。當溫暖和潮濕的氣流沿太平洋高壓脊南端自東南方吹向本港時，在華南沿岸海域遇上較涼之海面，接近海面的空氣冷卻，含水氣量達到飽和狀態，霧即形成。

以下一系列天氣圖，衛星圖片及海面溫度、氣溫與露點的時間序列顯示出一次香港受霧影響的過程。1998年3月5日本港日間大致天晴，視野良好。當位於中國的反氣旋於3月6日東移至太平洋以及溫暖和潮濕的海洋氣流吹向華南沿岸，本港的空氣轉為潮濕，露點漸漸上升。3月7日，露點接近海面溫度，霧同時出現。橫瀾島能見度曾下降至100米。3月8日持續有霧。當氣溫顯著高於海面溫度時，霧在3月9日日間逐漸消散。

Fog

Late winter and spring are the favourable seasons for fog in Hong Kong. When warm and moist winds blow round the southern side of the Pacific ridge over cool sea near the South China Coast, fog forms when air near the sea surface is cooled and becomes saturated with water vapour.

The sequence of weather maps, satellite picture and the time series of sea surface temperature, air temperature and dew point illustrate a fog occasion in Hong Kong. On 5 March 1998, the weather was mainly fine and visibility was good during the day. As an anticyclone over China moved out to the Pacific and a warm and moist maritime airstream approached the South China Coast, the air over Hong Kong became moist on 6 March as indicated by the rising dew point trace. On 7 March the dew point approached the sea surface temperature and fog developed. The visibility had once dropped to 100 metres at Waglan Island. Fog persisted on 8 March and dissipated gradually during the day on 9 March when the air temperature rose well above the sea surface temperature.



冬季的寒潮

香港冬天天氣主要受北面冷空氣所影響。位於中國的大陸反氣旋加強引致冬季季候性寒潮南下到達香港，並常伴有冷鋒。當寒潮到港時，氣壓上升，氣溫及露點下降。在衛星圖片上時常可觀察到與冷鋒相聯繫之雲帶向南移動。

以上一系列地面天氣圖、衛星圖片和氣壓、氣溫及露點的時間序列顯示出 1996 年 2 月一次寒潮襲港的過程。一道冷鋒在 2 月 17 日晚掠過本港，北風增強。氣溫由該晚之 18.9 度下降至 2 月 18 日早上的 10.9 度，而露點亦從 16.8 度跌至 6.5 度。這次寒潮揭開了一星期寒冷天氣的序幕，在 2 月 18 至 24 日期間的每日最低氣溫都在十度以下。

Cold surges in winter

The weather in Hong Kong during winter is dominated by cold air intrusions from the north. Surges of the winter monsoon arriving in Hong Kong result from the intensification of the continental anticyclone over China and are often accompanied by a cold front. When a cold surge arrives in Hong Kong, pressure rises while air temperature and dew point drop. Clouds associated with a cold front can often be seen moving south on satellite picture.

The sequence of surface charts, satellite pictures and time series of pressure, air temperature and dew point illustrate the sequence of event during a cold surge in February 1996. A cold front passed through Hong Kong at the night of 17 February and winds strengthened from the north. Temperature dropped from 18.9 degrees that night to 10.9 degrees in the morning of 18 February while dew point dropped from 16.8 degrees to 6.5 degrees. It also marked the beginning of a cold spell with minimum temperature below 10 degrees from 18 to 24 February.

霧

在香港，冬天後期和春天都是多霧的季節。當溫暖和潮濕的氣流沿太平洋高壓脊南端自東南方吹向本港時，在華南沿岸海域遇上較涼之海面，接近海面的空氣冷卻，含水氣量達到飽和狀態，霧即形成。

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Fog

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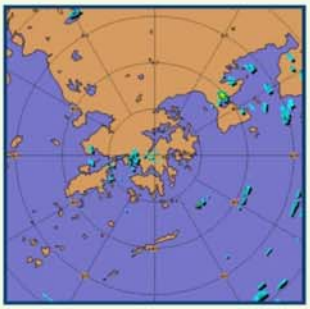
第十八號展品　**Display No. 18**

西南季候風　**Southwest Monsoon**

西南季候風
Southwest Monsoon

1997年7月1日上午8時的天氣圖
Weather map at 8 a.m. on 1 July 1997



1997年6月30日晚上11時的雷達圖像
Radar picture at 11 p.m. on 30 June 1997

香港的夏季季候風

夏季期間，華南地區常受到一道由東北至西南的低壓槽的影響。這低壓槽以南的潮濕西南風會為香港帶來暴雨。這些暴雨的發展速度很快但可能只影響香港小部分地區。

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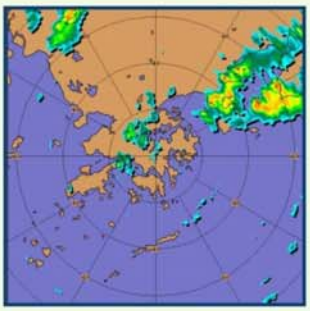
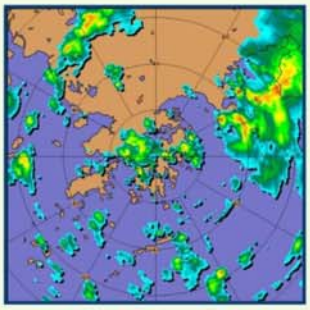
The Summer Monsoon in Hong Kong

In summer, there is often a trough lying northeast-southwest in the vicinity of South China. Moist southwesterlies to the south of the trough frequently bring severe rainstorms to Hong Kong. These rainstorms can occur very quickly but may only affect a small part of Hong Kong.

Such a development occurred on 1 July 1997 as illustrated by the sequence of radar pictures, the weather chart and the rainfall distribution map on that day. It was generally cloudy with one or two showers in the evening on 30 June 1997. Localized but severe rainstorms developed rapidly in the next few hours. The rainfall distribution on 1 July 1997 was highly uneven with most of the rain (>175 millimetres) affecting the Hong Kong Island and the east Kowloon areas.



1997年7月1日上午1時的雷達圖像
Radar picture at 1 a.m. on 1 July 1997



1997年7月1日上午3時的雷達圖像
Radar picture at 3 a.m. on 1 July 1997

1997年7月1日香港的雨量分佈（等雨量線單位為毫米）
Rainfall distribution (mm) over Hong Kong on 1 July 1997

第十九號展品　**Display No. 19**

熱帶氣旋　**Tropical Cyclones**

熱帶氣旋
Tropical Cyclones

颱風約克的路徑圖
Track of Typhoon York

颱風約克：一次近距離的接觸

颱風約克的風眼以偏西北路徑於1999年9月16日上午約10時在天文台西南偏南約20公里掠過。當約克經過本港時，十號颶風信號懸掛了共11小時。

氣象雷達顯示約克的風眼直徑約為70公里，覆蓋了整個香港西南部以及其鄰近海域。在橫瀾島，約克帶來的最高陣風為每小時234公里，是該站的最高紀錄。此外，當約克最接近時，長洲風勢明顯減弱，同時天文台錄得的降雨亦減少，這都是颱風風眼經過時典型的暫時性平靜天氣。

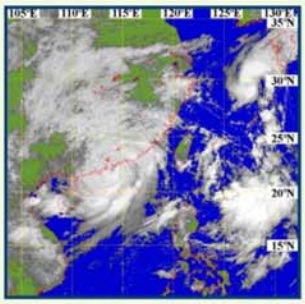
約克在本港造成很多破壞，其中灣仔稅務大樓、入境事務大樓及灣仔政府大樓共有400多塊玻璃被吹毀。與約克相關的大雨亦造成新界嚴重水浸，超過150公頃農田被淹沒。

Typhoon York - A Close Encounter

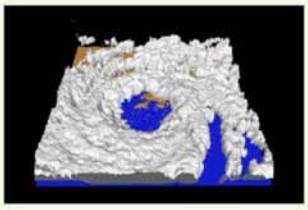
Moving generally northwestwards, York's eye passed about 20 km south-southwest of the Hong Kong Observatory at around 10 a.m. on 16 September 1999. The Hurricane Signal No. 10 was hoisted for 11 hours during its passage.

Radar pictures show that York's eye was some 70 km across in diameter, covering the southwestern half of Hong Kong and the adjacent waters. At Waglan Island, a maximum gust of 234 km/h was recorded which is the highest on record for that station. The temporary reduction of wind at Cheung Chau and rainfall at the Observatory during the closest approach of York was typical of the lull experienced in the eye of a typhoon.

York inflicted a good deal of damage on Hong Kong, including the smashing of more than 400 glass panes on the Revenue Tower, Immigration Tower and Wan Chai Tower in Wan Chai. Torrential rain associated with York caused severe flooding in the New Territories, inundating more than 150 hectares of farmland.

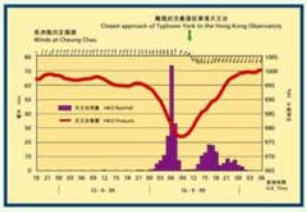


1999年9月16日上午約11時的可見光衛星圖片。圖中顯示與颱風約克相關連的廣闊雨帶。
Visible imagery at around 11 a.m. on 16 September 1999, showing the extensive rain-bands associated with Typhoon York.



1999年9月16日上午10時30分的立體雷達回波圖像。透過約克的風眼可見到大嶼山、港島、九龍及新界西部。
Three-dimensional radar echoes captured at 10.30 a.m. on 16 September 1999. Lantau, Hong Kong Island, Kowloon, and the western New Territories can be seen under the eye of York.

1999年9月16日正午12時約克經過香港時各站所錄得的風向和風速。當時橫瀾島風力最大。
Winds recorded at various stations in Hong Kong at noon on 16 September 1999 when York was passing over Hong Kong. Winds were the strongest at Waglan Island at the time.



颱風約克經過香港時長洲所錄得的風力以及天文台所觀測到的氣壓和雨量。
Winds observed at Cheung Chau as well as pressure and rainfall recorded at the Hong Kong Observatory during the passage of Typhoon York.

西南季候風

夏季期間，華南地區常受到一道由東北至西南的低壓槽的影響。這低壓槽以南的潮濕西南風會爲香港帶來暴雨。這些暴雨的發展速度很快但可能只影響香港小部分地區。

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熱帶氣旋

颱風約克的風眼以偏西北路徑於 1999 年 9 月 16 日上午約 10 時在天文台西南偏南約 20 公里掠過。當約克經過本港時，十號颶風信號發出了 11 小時。

氣象雷達顯示約克的風眼直徑約爲 70 公里，覆蓋了整個香港西南部以及其鄰近海域。在橫瀾島，約克帶來的最高陣風爲每小時 234 公里，是該站的最高紀錄。此外當約克接近時，長洲風勢明顯減弱，同時天文台錄得的降雨亦減少，這都是颱風風眼經過時典型的暫時性平靜天氣。

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Tropical Cyclones

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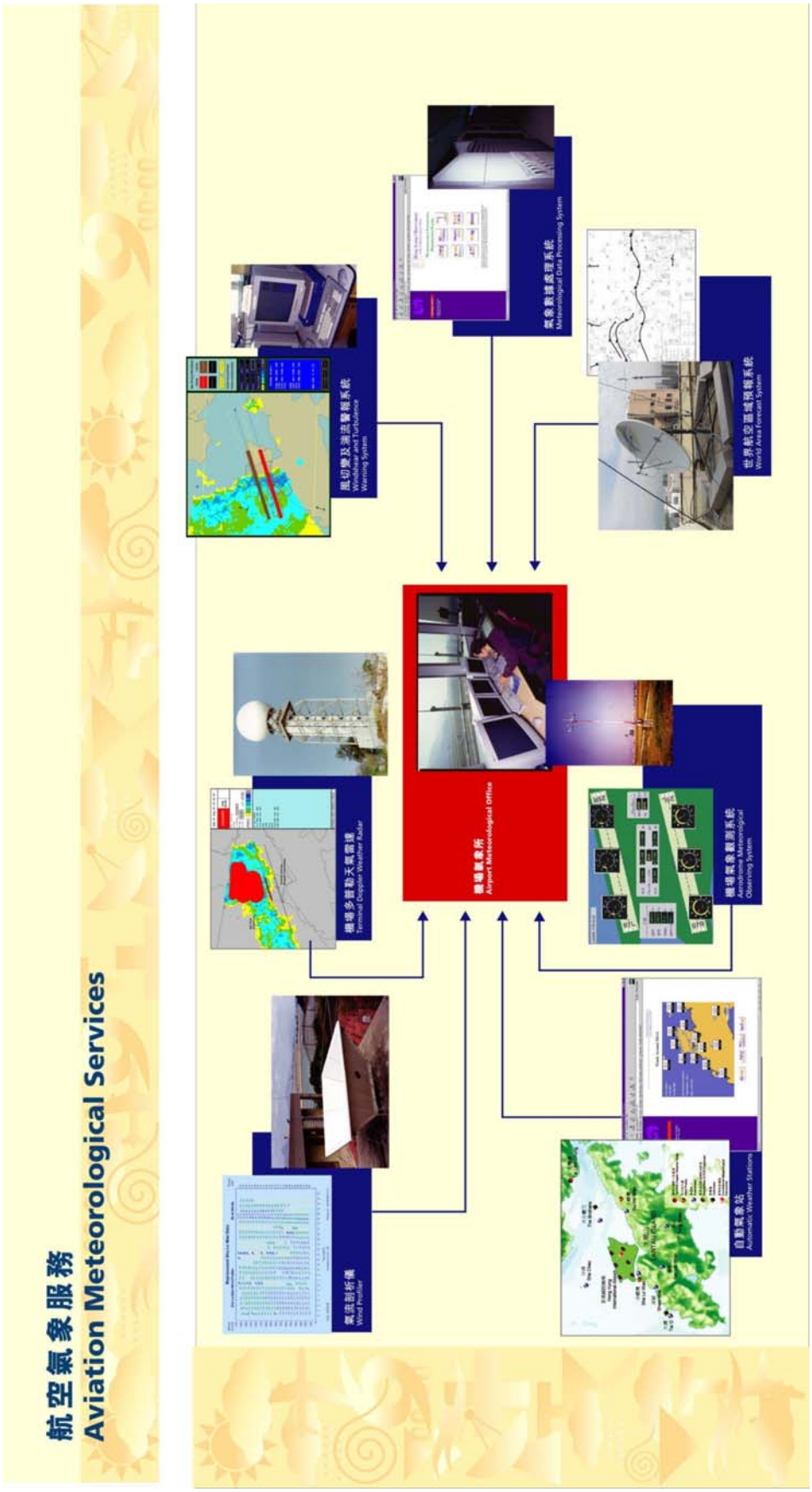
第二十號展品　Display No. 20
航空氣象服務　Aviation Meteorological Services



機場氣象所

香港天文台在香港國際機場設有一個機場氣象所，位於航空交通指揮塔，除了擔任航空氣象站和機場氣象所的角色外，還負責爲南海北部的一個空域對可能影響飛行安全的惡劣天氣發出有警告。航空天氣觀測員和預報員在機場氣象所 24 小時輪值，爲香港國際機場進行天氣觀測、發出天氣預報和警報。

Airport Meteorological Office

The HKO operates an Airport Meteorological Office (AMO) at the Hong Kong International Airport (HKIA). The AMO is located at the Air Traffic Control Tower and serves as an aeronautical weather station for Hong Kong and an aerodrome weather office for HKIA. The AMO is responsible for issuing warnings on hazardous weather which may affect the safety of aircraft operations within a designated airspace over the northern part of the South China Sea. Aviation weather observers and forecasters work round the clock at the AMO to make weather observations, and issue weather forecasts and warnings for the airport.

世界區域預報系統

世界區域預報系統 (WAFS)爲各氣象部門及認可機構提供國際航空所需的航空氣象資料，這些資料包括機場氣象觀測、警告、天氣圖及數值天氣預報模式產品。分別位於倫敦及華盛頓的兩個世界航空區域預報中心透過衛星廣播該系統的產品。天文台在尖沙咀總部及赤鱲角機場均設有天線，接收這些衛星廣播。

World Area Forecast System

World Area Forecast System (WAFS) provides meteorological authorities and authorized users with aeronautical meteorological information required for international navigation, such as aerodrome observations, warnings, weather charts and products from numerical weather prediction models. Two World Area Forecast Centres stationed in London and Washington broadcast the WAFS products via satellites. The HKO sets up receiving antenna at the headquarters at Tsim Sha Tsui and Chek Lap Kok airport to obtain the satellite broadcasts.

機場氣象觀測系統

機場氣象觀測系統監察機場兩條跑道及其周圍的天氣情況。該系統收集及處理由設於機場的風速表、跑道視程透射表、常規氣象儀器、雲幂儀及自動氣象站錄得的數據，將結果以文字及圖像形式顯示，供航空預報員及航空交通管制員使用。

Aerodrome Meteorological Observing System

An Aerodrome Meteorological Observing System monitors the weather conditions along the two airport runways and neighbouring areas. It collects and processes data from airfield anemometers, runway visual range transmissometers, conventional meteorological equipment, ceilometers and automatic weather stations around the airport. The data are presented in text and graphical displays for use by aviation forecasters and air traffic controllers.

設於機場周圍的自動氣象站

天文台在赤鱲角周圍設置了一個自動氣象站網，以量度機場範圍的風向及風速。設於離島及大嶼山各山頂的偏遠氣象站均以太陽能發電，並將數據透過無線電傳送回機場辦公室。

Automatic Weather Stations around the Airport

The HKO operates a network of automatic weather stations around Chek Lap Kok to measure the winds in the airport region. Remote stations such as those on outlying islands and mountain tops of Lantau are powered by solar energy and transmit the data back to the airport office by radio communication.

氣象數據處理系統

氣象數據處理系統(METPS)收集、處理及分發航空天氣資料，包括從海外接收的天氣報告、本港的氣象數據以及衛星和雷達圖像。透過該系統，航空預報員可監察天氣狀況及發出天氣報告和預報。

Meteorological Data Processing System

The Meteorological Data Processing System (METPS) collects, processes and distributes aviation weather information, including weather reports from overseas, data from local weather stations as well as satellite and radar pictures. Through the METPS, the aviation forecaster can monitor the weather situation and issue weather reports and forecasts.

風切變及湍流警報系統

風切變及湍流警報系統(WTWS)綜合由一個風速表網絡、機場多普勒天氣雷達及氣流剖析儀收集的數據，每分鐘提供距離跑道兩端 3 海浬以內的風切變及湍流警告。

Windshear and Turbulence Warning System

The Windshear and Turbulence Warning System (WTWS) integrates data from a network of anemometers, the TDWR and wind profiler to provide minute-to-minute alerts of windshear and turbulence within 3 nautical miles from the ends of the runways.

機場多普勒天氣雷達

機場多普勒天氣雷達安裝在大欖涌，環顧整個機場地區，探測由雷暴引起的風切變。雷暴有時會產生強烈的下沉冷空氣，在接觸地面時散開，可能引致飛機偏離預定航道。

Terminal Doppler Weather Radar

A terminal Doppler weather radar (TDWR) is installed at Tai Lam Chung for surveying the whole airport region. It detects windshear arising from thunderstorms. A thunderstorm sometimes produces an intense downdraught of cold air, which spreads out when hitting the ground. This may cause an aircraft to deviate from the original flight path.

氣流剖析儀

氣流剖析儀主要用於監測地面上空數公里的風向和風速，以保障飛行安全。它的操作原理與雷達相類似，兩者都是向天空發出電磁波脈沖探測大氣。不過雷達主要是探測雨點和飛機等目標物的移動情況，而氣流剖析儀則探測垂直上空大氣中帶有不規則折射性的湍渦。這些湍渦是由於地面受熱不平均再加上風的影響而形成。運用多普勒原理，低層大氣的風向和風速可從上述湍渦的移動方向和速度計算出來。

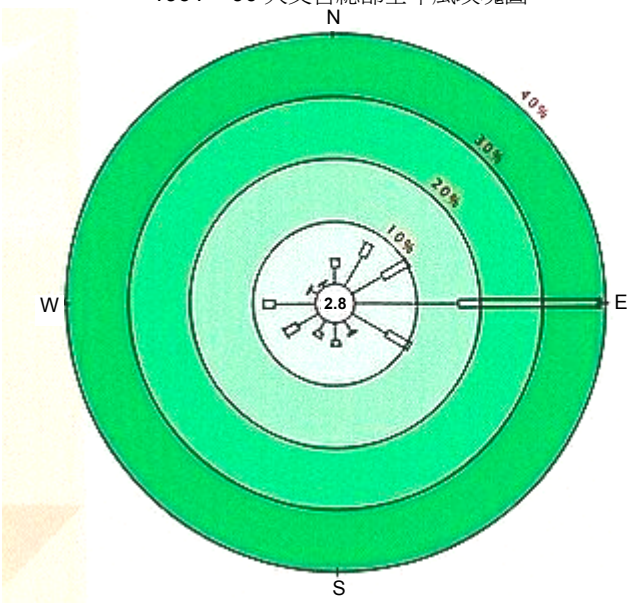
Wind Profiler

Wind profilers were used for aviation safety purposes to monitor low level winds in the first few kilometres above the ground. The wind profiler works on the principle similar to that of a radar by sending out pulses of electromagnetic waves vertically upward into the atmosphere. However, instead of detecting objects such as raindrops or aeroplanes, the electromagnetic wave is scattered by eddies of refractive irregularities resulting from uneven heating of the Earth's surface and effect of wind. Using the Doppler principle, low level winds are determined from the speed and direction of the movement of the eddies.

第二十一號展品　Display No. 21
氣象資料在工程設計上的應用及紫外線指數
Application of Meteorological Data and UV Index

天文台處理及儲存的氣象資料可供工程師及建築物師在設計各項工程計劃時參考和應用。
Meteorological data processed and archived by the Observatory are utilized by engineers and architects for the design of various engineering projects.

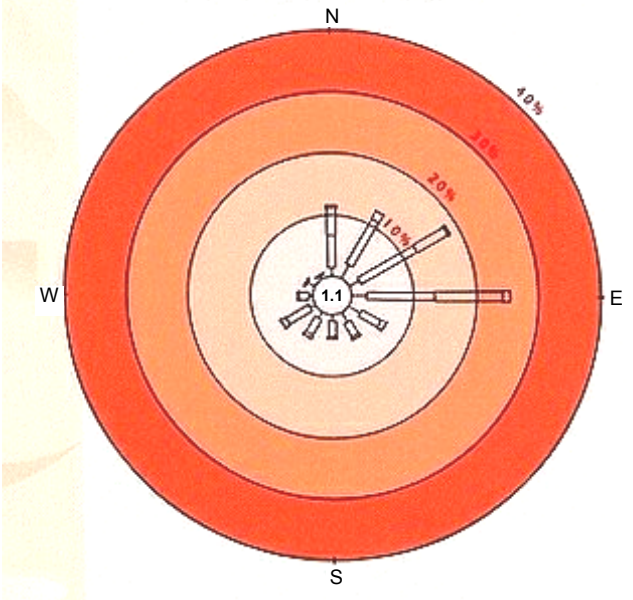
Annual wind rose for the Observatory Headquarters 1961 – 90
1961 – 90 天文台總部全年風玫瑰圖



高的建築物如大廈和架空電纜的設計必須足以承受颱風的風力，設計的準則要參考香港各處量得的風向和風速資料。

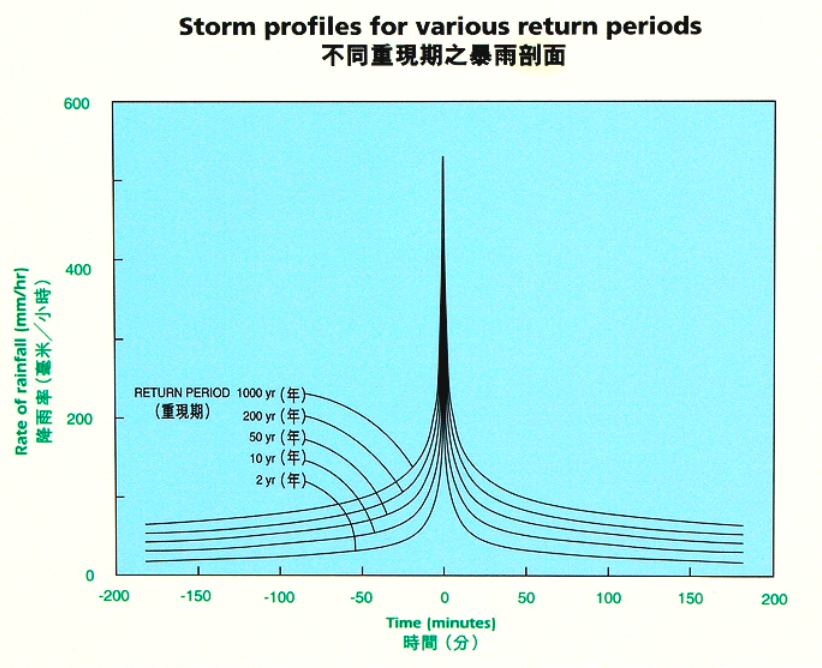
此外，考慮盛行風風向可以提高屋內的天然通風效果。

Annual wind rose for the Waglan Island 1975 – 95
1975 – 95 橫瀾島全年風玫瑰圖



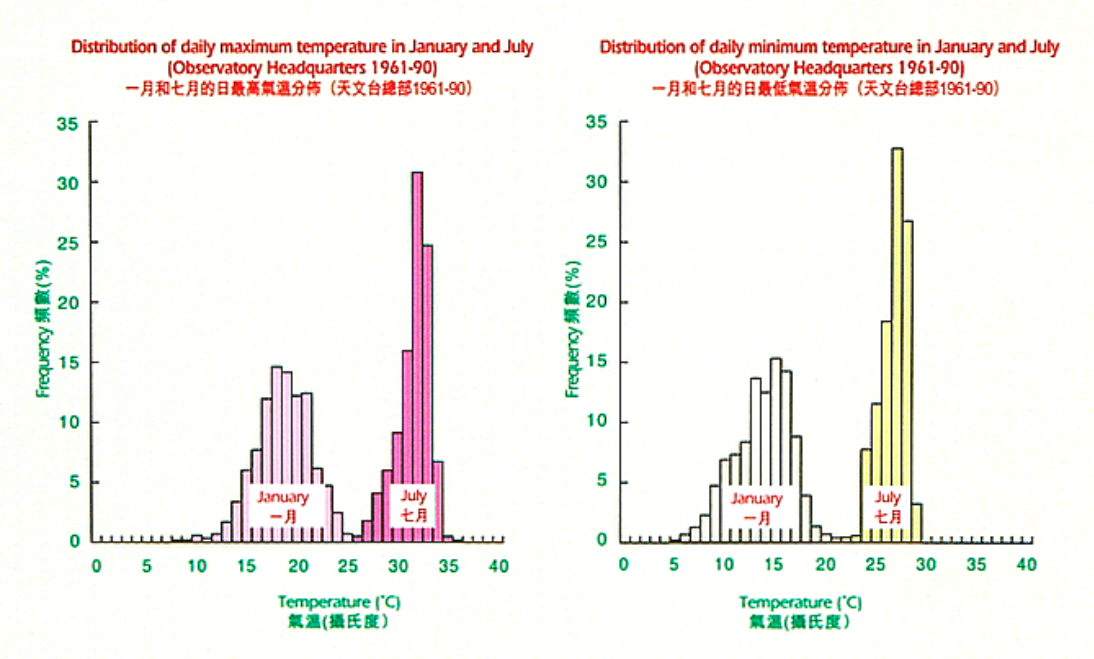
Tall structures such as high-rise buildings and overhead power transmission lines are designed to withstand typhoon strength winds. The design criteria are based on wind records obtained from various locations in Hong Kong.

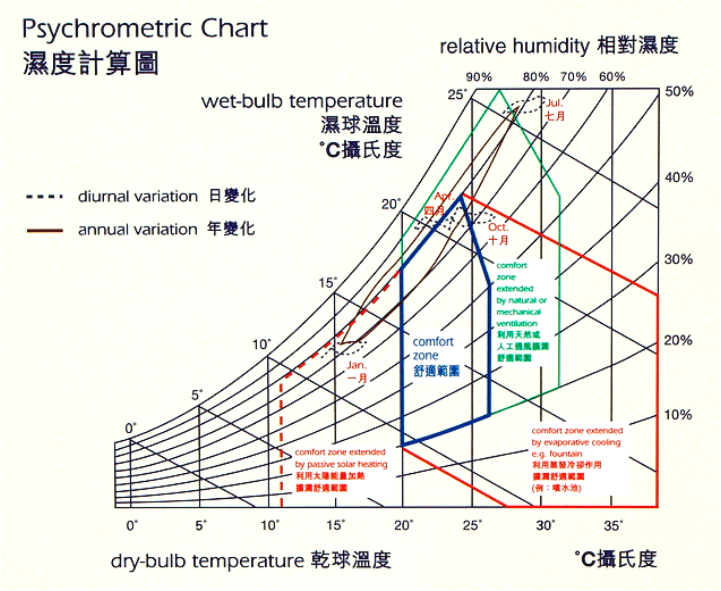
The natural ventilation of buildings may also be optimized by taking the prevailing wind directions into account.



在夏天的大雨情況下出現突發性水浸並非罕見。香港的排水系統在設計上必須能夠應付根據雨量記錄推算出來的基準暴雨。

Flash floods are not uncommon in summer during heavy rain occasions. Drainage systems in Hong Kong have to be designed to cope with reference rainstorms which are constructed using rainfall records.





設計建築物的自然通風和人工空氣調節系統時要參考氣溫和相對濕度的資料。

Information on air temperature and relative humidity has a bearing on the design of natural ventilation and artificial air conditioning in buildings.

紫外線指數
Ultraviolet (UV) Index

紫外線指數的量度及預測

紫外線指數是用來量度太陽紫外線對人類皮膚影響的程度。香港天文台自1999年開始量度和發布紫外線指數，更在2006年開始提供翌日的最高紫外線指數預測服務。當量度或預測的紫外線指數達到11或以上時，天文台更會提醒市民避免長時間在戶外曝曬。

Ultraviolet (UV) index measurement and forecast

The UV index is a measure of the effect of solar UV radiation on human skin. The Hong Kong Observatory has been measuring and disseminating UV index since 1999. In 2006, it started to provide forecast of the maximum UV index for the next day. When the index is measured or forecast to be 11 or above, the Observatory will also advise the public to avoid prolonged exposure under the sun.

紫外線指數的等級
UV index categories

紫外線指數 UV Index	曝曬級數 Exposure
0 - 2	低 Low
3 - 5	中等 Moderate
6 - 7	高 High
8 - 10	甚高 Very High
≧ 11	極高 Extreme

量度紫外線指數的儀器
Instrument for measuring UV index

慎防紫外線

紫外線可根據其波長分為紫外線A、B、C三類。由於所有紫外線C和大部分紫外線B會被大氣層所吸收，因此到達地面的紫外線大多是紫外線A和小部分紫外線B。紫外線A會導致皮膚老化和曬黑皮膚，亦有可能導致皮膚癌。而紫外線B會使皮膚慢慢變黑，亦是引致皮膚癌的主因之一。

Protect yourselves from UV radiation

UV radiation can be classified as UVA, UVB and UVC according to the wavelength. UV radiation reaching the earth's surface consists mostly of UVA and some UVB, as all UVC and most of the UVB are absorbed by the atmosphere. UVA is responsible for the ageing and immediate tanning effects and may also enhance the development of skin cancer, while UVB darkens our skin slowly but significantly promotes the development of skin cancer.

防曬措施
Protective measures against UV radiation

	選擇有遮蔭的地方 Seek shade.		戴闊邊帽 Wear a broad brim hat.
	利用傘子 Use an umbrella.		使用能阻隔紫外線的太陽眼鏡 Wear UV blocking sunglasses.
	穿長袖而寬鬆的衣物 Wear long-sleeved and loose-fitting clothing.		塗上可阻隔紫外線A及紫外線B的廣譜防曬液 (與紫外線B相關的防曬系數為15或以上)，並在出汗或泳後再塗上。 Use a broad-spectrum sunscreen lotion blocking both UVA and UVB (with a Sun Protection Factor (SPF) of 15 or above for UVB). Apply liberally and reapply after swimming or sweating.

紫外線

太陽放出不同波段的輻射。有些波長的輻射人眼可見，如彩虹裏的各種顏色。在可見光的波長以外，另有人眼看不到的紫外線和紅外線。紫外線最受關注，因爲在沒有防護的情況下，紫外線能傷害皮膚和眼睛。紫外線可分爲三類：紫外線 A、紫外線 B 和紫外線 C。它們的特徵如下：

	紫外線 A	**紫外線 B**	**紫外線 C**
波長（納米） *	315-400	280-315	100-280
被臭氧層的吸收程度	能穿透臭氧層	大部分被臭氧層所吸收	差不多全部被臭氧層所吸收
到達地面的輻射量	超過百分之九十八的紫外線是紫外線 A	不足百分之二的紫外線是紫外線 B	幾乎零
對環境和人的影響	可產生光化學煙霧	過量曝曬可引致皮膚癌及白內障	無

* 定義根據「國際光照委員會」 （1 納米=10^{-9} 米）

影響地面紫外線強度的因素

因素	**對到達地面紫外線強度的影響**
太陽的位置(這隨每日和每年不同的時間及緯度的高低而變化）	太陽的位置越高，紫外線的強度越高
大氣中的臭氧量	臭氧吸收紫外線，大氣中的臭氧越多，較少紫外線能到達地面
雲和煙霞	雲和煙霞吸收和散射紫外線
地面反射	自然界中大多表面如草地，泥地和水面反射不足百分之十的紫外線，但雪地會強烈反射（多達百分之八十）紫外線，而沙地也會反射百分之十至二十五的紫外線
海拔	海拔越高，紫外線強度越高。這是因爲大氣的厚度減少以致較少臭氧來吸收紫外線

怎樣量度紫外線的強度？

要計算紫外線指數需要量度不同波長的紫外線強度，進行這種量度的最標準儀器是掃描式光譜儀，但這是非常昂貴的儀器。比較便宜而且被廣泛使用來量度紫外線強度的儀器是寬波段紫外線儀，這種儀器的反應接近紅斑作用光譜曲線。只要將寬波段儀所量度的紫外線強度乘上一個變換常數，便可計算出紫外線指數。香港天文台在京士柏氣象站安裝了此類的寬波段紫外線儀。

紫外線指數

紫外線指數是量度在地球表面太陽紫外線影響人類皮膚的程度。 紫外線對人類皮膚的損害是根據「紅斑作用光譜曲線」。 這光譜曲線已被「國際光照委員會」採納來代表人類皮膚對太陽紫外線的平均反應。紫外線指數越高，對皮膚造成傷害的機會越高。在香港夏季陽光充沛的日子，紫外線指數通常上升超過 10。多雲和有雨的時候，紫外線指數便會減低。

UV Radiation

The sun emits radiation of different wavelengths. Some of the radiation, such as those making up the colours of rainbow, have wavelengths to which our eyes respond. Beyond these wavelengths are radiation in the ultraviolet (UV) and infrared which our eyes cannot see. UV radiation is of concern to us because unprotected exposure to it can cause skin and eye damage. UV radiation can be broadly subdivided into UV-A, UV-B and UV-C. Their main characteristics are shown below:

	UV-A	**UV-B**	**UV-C**
Wavelength (nanometer, nm) *	315-400	280-315	100-280
Absorption by the ozone (O3) layer	Penetrates the ozone layer	Mostly absorbed by the ozone layer	Almost all absorbed by the ozone layer
Amount reaching the Earth's surface	> 98% of UV radiation is UV-A	< 2% of UV radiation is UV-B	Negligible
Effects on humans and the environment	Generates photochemical smog	Overexposure induces skin cancer and eye cataracts	None

* Definition based on International Commission on Illumination (CIE). (1 nm=10^{-9} m)

Factors affecting the ground-level UV intensity

Factor	**Influence on UV intensity at the Earth's surface**
Position of the sun which varies with time of the year, time of the day and the latitude	The higher the sun's position, the higher the UV intensity
Amount of ozone in the atmosphere	Ozone absorbs UV radiation. The more abundant the ozone in the atmosphere, the less the amount of UV radiation reaching the Earth's surface
Clouds and haze	UV radiation is both absorbed and scattered by clouds and haze
Ground reflection	Most natural surfaces such as grass, soil and water reflect less than 10% of UV. However, fresh snow strongly reflects (80%) UV. Sand also reflects 10-25% of UV
Altitude above the sea level	The higher the altitude, the higher the UV intensity as the depth of the atmosphere and therefore the amount of ozone available to absorb UV radiation is reduced

How is UV Radiation measured?

The standard equipment for measuring the intensity of UV (ultraviolet) radiation at different wavelengths needed for calculating the UV Index is the spectrophotometer. This is very expensive. In its place, a widely used and inexpensive instrument for measuring the intensity of the UV radiation is the broadband UV sensor. This type of sensor has a response which approximates the erythemal action spectrum. The UV Index is obtained by multiplying the measured UV intensity by a conversion factor. The Hong Kong Observatory deploys such a broadband UV sensor at its King's Park Meteorological Station.

UV Index

The UV Index is a measure of the solar UV (ultraviolet) intensity at the Earth's surface relevant to the effect on human skin. The skin-damaging UV radiation is governed by the erythemal action spectrum. This spectrum has been adopted by the International Commission on Illumination (CIE) to represent the average skin response over the solar UV spectrum. The higher the UV Index, the more likely the damage to skin. For Hong Kong, UV Index can often exceed 10 on a sunny day in the summer. During the period with clouds and rain, the UV Index will be lower.

香港氣候

香港位於亞熱帶，差不多有半年時間氣候極爲溫和。許多人認爲十一月和十二月的天氣最好，風和日麗，氣溫適中。一月和二月則雲量較多，間中有冷鋒過境，帶來乾燥的北風；市區氣溫有時會降至攝氏 10 度以下。新界和高地的氣溫，有時亦會降至攝氏零度以下，並有結霜現象。

三月和四月的天氣也很好，但間中極爲潮濕。霧和毛毛雨使能見度降低，有時更令到航空和渡輪服務中斷。

五月至八月的天氣炎熱潮濕，間中有驟雨和雷暴，在上午尤爲常見，下午氣溫經常升逾攝氏 31 度，晚上則保持在攝氏 26 度左右。 七月通常會有一段維持約一至兩星期，有時甚至更長的晴朗天氣。

九月是本港最有可能受颱風影響的月份，但其實由五月至十一月期間都有可能受不同強度的熱帶氣旋吹襲。在北太平洋西部、東海及南海上，每年平均有 30 個熱帶氣旋形成，其中半數達到颱風強度，最高風速爲每小時 118 公里或以上。

當熱帶氣旋集結在本港東南約 700 至 1000 公里時，本港天氣通常晴朗酷熱，但黃昏時卻可能有局部地區性雷暴。若熱帶氣旋中心移近本港，風力便會增強，廣泛地區可能會有大雨。

熱帶氣旋帶來的豪雨可能持續數日，引致山泥傾瀉和水浸，造成的災害有時比烈風的破壞還甚。

本港各區的每年平均雨量差別頗大，石鼓洲約爲 1700 毫米，而大老山附近則超過 2800 毫米。大約 80% 的雨量是在五月至九月錄得。八月的雨量最多，大概每 7 天便有 4 天下雨，天文台錄得八月份的平均雨量爲 444.6 毫米。一月最少雨，平均雨量僅有 24.9 毫米，全月大約祇有 6 天下雨。

影響香港的惡劣天氣包括熱帶氣旋、強烈冬季及夏季季候風、季風槽及經常在四月至九月發生的狂風雷暴。水龍捲和冰雹偶有出現，降雪和陸龍捲則屬罕見。

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Climate of Hong Kong

Hong Kong's climate is sub-tropical, tending towards temperate for nearly half the year. During November and December there are pleasant breezes, plenty of sunshine and comfortable temperatures. Many people regard these as the best months of the year. January and February are cloudier, with occasional cold fronts followed by dry northerly winds. It is not uncommon for temperatures to drop below 10 °C in urban areas.

The lowest temperature recorded at the Observatory is 0 °C , although sub-zero temperatures and frost occur at times on high ground and in the New Territories.

March and April can also be very pleasant although there are occasional spells of high humidity. Fog and drizzle can be particularly troublesome on high ground which is exposed to the southeast, and air traffic and ferry services are occasionally disrupted because of reduced visibility.

May to August are hot and humid with occasional showers and thunderstorms, particularly during the mornings. Afternoon temperatures often exceed 31 °C whereas at night, temperatures generally remain around 26 °C with high humidity. There is usually a fine dry spell in July which may possibly last for one to two weeks, or for even longer in some years.

September is the month during which Hong Kong is most likely to be affected by tropical cyclones, although gales are not unusual at any time between May and November. On average, about 30 tropical cyclones form in the western North Pacific or China Seas every year, and about half of them reach typhoon strength (maximum winds of 118 kilometres per hour or more).

When a tropical cyclone is about 700 to 1000 kilometres southeast of Hong Kong, the weather is usually fine and exceptionally hot, but isolated thunderstorms sometimes occur in the evenings. If the centre comes closer to Hong Kong, winds will increase and rain can become heavy and widespread. Heavy rain from tropical cyclones may last for a few days and subsequent landslips and flooding sometimes cause considerably more damage than the winds.

The mean annual rainfall ranges from around 1700 millimetres at Shek Kwu Chau to more than 2800 millimetres in the vicinity of Tate's Cairn. About 80 percent of the rain falls between May and September. The wettest month is August, when rain occurs about four days out of seven and the average monthly rainfall at the Observatory is 444.6 millimetres. The driest month is January, when the monthly average is only 24.9 millimetres and rain falls only about six days a month.

Severe weather phenomena that can affect Hong Kong include tropical cyclones, strong winter and summer monsoon, monsoon troughs, and thunderstorms with associated squalls that are most frequent from April to September. Waterspouts and hailstorms occur infrequently, while snow and tornadoes are rare.

表21 香港氣象要素月平均值 (1971-2000) 及極端值 (1884-1939, 1947-2008)

Table 21 Monthly Normals of Meteorological Elements for the 30 Years 1971-2000 and Extreme Values between 1884-1939 and 1947-2008 for Hong Kong

月份 MONTH	氣壓 ATMOSPHERIC PRESSURE				氣溫 AIR TEMPERATURE					濕球溫度 WET-BULB TEMPERATURE	露點溫度 DEW POINT TEMPERATURE	水汽壓 VAPOUR PRESSURE	相對濕度 RELATIVE HUMIDITY				雲量 AMOUNT OF CLOUD	雨量 RAINFALL								日照 BRIGHT SUNSHINE		風 WIND		
	絕對最高 Absolute Maximum	平均 Mean	絕對最低 Absolute Minimum	平均日較差 Mean Diurnal Range	絕對最高 Absolute Maximum	平均日最高 Mean Daily Maximum	平均 Mean	平均日最低 Mean Daily Minimum	絕對最低 Absolute Minimum	濕球溫度 WET-BULB TEMPERATURE	露點溫度 DEW POINT TEMPERATURE	水汽壓 VAPOUR PRESSURE	平均 Mean	上午二時平均 Mean at 0200 hours	下午二時平均 Mean at 1400 hours	絕對最低 Absolute Minimum	雲量 AMOUNT OF CLOUD	總雨量 Total	降雨時間 Duration	降雨日數 Number of Days with 0.1 毫米或以上 0.1 mm or more	降雨日數 Number of Days with 25.0 毫米或以上 25.0 mm or more	降雨日數 Number of Days with 50.0 毫米或以上 50.0 mm or more	最高時雨量 Maximum Hourly	最高日雨量 Maximum Daily	最高月雨量 Maximum Monthly	日照時間 Duration	可能日照百分率 Percentage of Possible	盛行風向 Prevailing Direction	平均風速 Mean Speed	最高陣風 Maximum Gust *
	百帕斯卡 hPa	百帕斯卡 hPa	百帕斯卡 hPa	百帕斯卡 hPa	°C	°C	°C	°C	°C	°C	°C	百帕斯卡 hPa	%	%	%	%	%	毫米 mm	小時 hours				毫米 mm	毫米 mm	毫米 mm	小時 hours	%	度 degrees	公里/小時 km/h	公里/小時 km/h
JAN 一月	1035.4	1020.1	1003.1	4.1	26.9	18.6	16.1	14.1	0.0	13.5	11.0	13.7	73	78	65	10	60	24.9	43	5.60	0.20	0.00	21.8	99.8	214.3	141.7	42	070	25.4	103
FEB 二月	1032.7	1018.6	998.3	4.2	27.8	18.6	16.3	14.4	2.4	14.4	12.2	14.8	78	82	71	13	73	52.3	76	9.47	0.53	0.07	31.9	86.1	241.0	93.8	29	070	25.1	110
MAR 三月	1033.9	1016.1	1001.9	4.2	30.1	21.5	18.9	16.9	4.8	17.0	15.5	18.2	82	86	75	16	79	71.4	91	10.47	0.67	0.30	52.5	130.0	428.0	89.6	24	070	23.5	103
APR 四月	1028.4	1012.8	999.9	3.9	33.4	25.1	22.5	20.6	9.9	20.5	19.4	22.9	83	88	76	22	80	188.5	87	11.67	2.57	1.23	92.4	237.4	547.7	101.8	27	070	21.2	135
MAY 五月	1020.2	1009.4	981.1	3.4	35.5	28.4	25.8	23.9	15.4	23.7	22.7	27.8	84	88	77	23	77	329.5	101	15.47	3.77	2.00	109.9	520.6	1241.1	138.6	34	080	20.2	140
JUN 六月	1014.7	1006.2	973.8	3.2	35.6	30.4	27.9	26.1	19.2	25.6	24.5	30.9	82	86	76	29	76	388.1	95	18.77	4.17	2.13	145.5	411.3	1346.1	158.3	39	230	23.3	194
JUL 七月	1014.8	1005.5	975.8	3.4	35.7	31.3	28.7	26.7	21.7	26.1	25.0	31.7	81	85	74	43	68	374.4	80	17.77	4.67	2.40	115.1	534.1	1147.2	214.9	52	230	21.9	158
AUG 八月	1016.3	1005.1	961.6	3.5	36.1	31.1	28.4	26.4	21.6	25.9	24.9	31.5	82	86	75	41	69	444.6	87	17.43	5.40	2.40	82.1	334.2	1090.1	189.7	48	240	20.0	209
SEP 九月	1018.2	1009.2	953.2	3.5	35.2	30.2	27.6	25.6	18.4	24.7	23.4	28.9	79	83	72	26	65	287.5	68	14.80	3.47	1.60	84.0	325.5	844.2	171.8	47	090	22.8	234
OCT 十月	1024.5	1014.0	977.3	3.6	34.3	27.7	25.3	23.4	13.5	21.9	19.9	23.8	74	78	66	21	57	151.9	50	8.10	1.57	1.00	71.6	292.2	718.4	191.1	53	080	28.7	184
NOV 十一月	1033.2	1018.0	974.9	3.8	31.8	24.0	21.4	19.4	6.5	17.9	15.3	18.1	70	75	61	17	53	35.1	36	5.67	0.37	0.10	46.6	149.2	224.2	178.2	54	080	27.9	175
DEC 十二月	1033.5	1020.5	1004.6	4.0	28.7	20.3	17.8	15.7	4.3	14.5	11.6	14.4	69	74	60	14	51	34.5	36	4.27	0.30	0.13	51.7	177.3	206.9	173.3	52	070	26.5	108
YEAR 全年	1035.4	1013.0	953.2	3.7	36.1	25.6	23.1	21.1	0.0	20.5	18.8	23.1	78	82	71	10	67	2382.7	850	139.49	27.69	13.36	145.5	534.1	1346.1	1842.9	41	070	23.9	234
極端值 出現日期 Date on which the extreme value was recorded	6/1/1903		1/9/1962		19/8/1900 18/8/1990				18/1/1893							16/1/1959							7/6/2008	19/7/1926	6/2008					16/9/1999
觀測地點 Observed at	天文台 Hong Kong Observatory																									京士柏 King's Park		橫瀾島 Waglan Island		

* 1953 - 2008

表22 香港部分氣象參數的月平均值 (1971-2000)

Table 22 Monthly Means of Selected Meteorological Parameters for Hong Kong (1971-2000)

月份 MONTH	雷暴活動 THUNDERSTORM ACTIVITY		霧日數 (能見度低於一千米) NUMBER OF DAYS WITH FOG (Visibility < 1000 m)	風 WIND			土壤溫度 SOIL TEMPERATURE						平均每日太陽總輻射 MEAN DAILY GLOBAL SOLAR RADIATION	總蒸發量 TOTAL EVAPORATION	總可能蒸散量 TOTAL POTENTIAL EVAPOTRANSPIRATION	海面溫度 SEA SURFACE TEMPERATURE				熱帶氣旋警告信號生效日數 NUMBER OF DAYS WITH TROPICAL CYCLONE WARNING SIGNAL				強烈季候風信號生效日數 NUMBER OF DAYS WITH STRONG MONSOON SIGNAL
							0.5 米 0.5 m		1.0 米 1.0 m		1.5 米 1.5 m					觀測時間# Time of Observation #								
	閃電日數 Number of Days with Lightning	雷暴日數 Number of Days with Thunderstorm		盛行風向 Prevailing Direction	平均風速 Mean Speed	最高陣風 Maximum Gust	0700	1900	0700	1900	0700	1900				0700	1400	0700 or 或 1100	1400 or 或 1700	一號及更高 No. 1 and Higher	三號及更高 No. 3 and Higher	八號及更高 No. 8 and Higher	九號及十號 No. 9 and No. 10	
				度 degrees	公里/小時 km/h	公里/小時 km/h	°C	°C	°C	°C	°C	°C	兆焦耳/米² MJ/m²	毫米 mm	毫米 mm	°C	°C	°C	°C					
JAN 一月	0.13	0.10	0.23	090	11.0	96	18.8	18.8	20.3	20.4	21.6	21.6	10.55	80.7	57.9	17.5	17.7	17.5	17.7	-	-	-	-	4.33
FEB 二月	1.00	0.97	1.23	090	12.1	103	18.9	18.9	19.8	19.9	20.8	20.8	9.61	67.6	53.0	16.7	17.0	16.6	16.7	-	-	-	-	4.30
MAR 三月	1.77	1.63	2.30	090	12.6	108	20.6	20.7	20.8	20.8	21.1	21.1	10.18	78.1	63.5	17.9	18.2	17.6	17.8	-	-	-	-	3.83
APR 四月	4.77	4.20	1.13	090	11.7	106	23.4	23.5	22.8	22.8	22.5	22.5	11.83	93.2	80.0	20.9	21.3	20.7	20.9	0.17	0.03	-	-	3.00
MAY 五月	6.67	5.27	0.17	090	10.8	166	26.5	26.6	25.5	25.6	24.8	24.8	14.35	118.4	98.3	24.5	25.0	24.5	24.7	0.43	0.27	0.07	-	1.60
JUN 六月	7.70	5.60	-	090	11.0	191	28.5	28.5	27.5	27.5	26.7	26.8	15.31	129.0	112.7	26.5	26.9	26.6	26.9	2.23	1.23	0.20	0.03	1.17
JUL 七月	8.47	5.90	-	090	10.9	151	29.8	29.9	29.0	29.0	28.2	28.2	17.52	155.5	131.6	26.6	27.1	27.2	27.5	4.43	2.57	0.50	0.07	0.50
AUG 八月	11.00	8.10	-	090	10.2	224	30.0	30.0	29.4	29.4	29.0	29.0	16.07	143.2	120.9	26.5	27.0	27.1	27.4	3.93	1.67	0.67	0.13	0.17
SEP 九月	6.93	4.30	-	090	11.0	259	29.6	29.6	29.3	29.4	29.1	29.1	15.14	134.2	99.0	27.1	27.5	27.5	27.7	4.53	2.23	0.40	0.07	1.77
OCT 十月	1.13	0.80	-	090	12.4	175	27.7	27.7	28.1	28.1	28.2	28.2	14.46	136.4	92.8	26.3	26.6	26.4	26.6	3.17	2.03	0.20	0.07	5.30
NOV 十一月	0.23	0.23	-	090	10.9	155	24.4	24.3	25.6	25.5	26.3	26.3	12.64	112.5	74.0	23.4	23.6	23.3	23.5	0.50	0.17	0.07	-	4.83
DEC 十二月	-	-	0.03	090	10.3	104	20.5	20.5	22.4	22.4	23.6	23.6	11.13	94.5	60.8	19.8	20.0	19.7	19.9	0.07	0.07	-	-	5.23
YEAR 全年	49.80	37.10	5.09	090	11.2	259	24.9	25.0	24.9	25.0	25.0	25.1	13.23	1343.4	1044.5	22.8	23.2	22.9	23.1	19.46	10.27	2.11	0.37	36.03
記錄年期 Period of Record	1971 - 2000					*	1971 - 2000						1971 - 2000			1975 - 2004		1971 - 2000						
觀測地點 Observed at	天文台 Hong Kong Observatory												京士柏 King's Park			北角 North Point		橫瀾島 Waglan Island						

* 1911年 - 1939年 及 1947年4月 - 2008年間的極端值

\# 香港時間，即協調世界時 + 8 小時

* Extreme values for the period 1911-1939 and April 1947-2008

\# Times indicated refer to Hong Kong Time, i.e. Co-ordinated Universal Time + 8 hours

描述風力的常用術語
Descriptive Terms of Wind Speeds

描述風力術語 Description	蒲福氏風級 Beaufort Force	風速(公里每小時) Wind Speed (km/h)
輕微 Light	1-2	2-12
和緩 Moderate	3-4	13-30
清勁 Fresh	5	31-40
強風 Strong	6-7	41-62
烈風 Gale	8-9	63-87
暴風 Storm	10-11	88-117
颶風 Hurricane	12	≥ 118

根據最高持續風速而劃分的各類熱帶氣旋
Classification of Tropical Cyclones According to Maximum Sustained Winds

熱帶氣旋種類 Class of Tropical Cyclone	最高持續風速（公里每小時） Maximum Sustained Wind Speed (km/h)
熱帶低氣壓 Tropical Depression	41-62
熱帶風暴 Tropical Storm	63-87
強烈熱帶風暴 Severe Tropical Storm	88-117
颱風 Typhoon	118-149
強颱風 Severe Typhoon	150-184
超強颱風 Super Typhoon	≥ 185

- 強烈季候風信號用以警告源自冬季或夏季季候風而超過每小時 40 公里的風力。在十分空曠的地區，風力甚至會超過每小時 70 公里。

熱帶氣旋警告信號所表示的風力
Winds Associated with Tropical Cyclone Warning Signals

信號 Signal		預料會出現或已經出現的持續風速(公里每小時) Sustained Wind Speed Expected or Blowing (km/h)	陣風可能超過(公里每小時) Gust may Exceed (km/h)
戒備 Standby	1	—	—
強風 Strong Wind	3	41-62	110
西北烈風或暴風 NW'ly Gale or Storm	8 西北 NW	63-117	180
西南烈風或暴風 SW'ly Gale or Storm	8 西南 SW		
東北烈風或暴風 NE'ly Gale or Storm	8 東北 NE		
東南烈風或暴風 SE'ly Gale or Storm	8 東南 SE		
烈風或暴風風力增強 Increasing Gale or Storm	9	—	—
颶風 Hurricane	10	≥ 118	220

- Strong Monsoon Signal is used to warn winds in excess of 40 km/h due to the winter or summer monsoon. These winds may sometimes reach 70 km/h or more in very exposed places.

公眾氣象服務採用十進制單位

天氣報告中採用的單位如下：

1. 大氣壓力以百帕斯卡(hPa)為單位
   1 百帕斯卡 = 1 毫巴
2. 距離以公里(km)為單位
   1 公里 ≃ 0.54 海里
3. 速度以公里每小時(km/h) 為單位
   1 公里每小時 ≃ 0.54 海里每小時

PUBLIC WEATHER SERVICES IN METRIC UNITS

The units adopted are as follows:

1. Atmospheric pressure in hectopascals (hPa)
   1 hectopascal = 1 millibar
2. Distance in kilometres (km)
   1 kilometre ≃ 0.54 nautical mile
3. Speed in kilometres per hour (km/h)
   1 kilometre per hour ≃ 0.54 knot

描述風力的常用術語
Descriptive terms of wind speeds

描述風力術語 Description	蒲福氏風級 Beaufort Force	風速(公里每小時) Wind speed (km/h)
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和緩 Moderate	3-4	13-30
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強風 Strong	6-7	41-62
烈風 Gale	8-9	63-87
暴風 Storm	10-11	88-117
颶風 Hurricane	12	≥ 118

根據最高持續風速而劃分的各類熱帶氣旋
Classification of tropical cyclones according to maximum sustained winds

熱帶氣旋種類 Class of Tropical Cyclone	最高持續風速（公里每小時） Maximum Sustained Wind Speed (km/h)
熱帶低氣壓 Tropical Depression	41-62
熱帶風暴 Tropical Storm	63-87
強烈熱帶風暴 Severe Tropical Storm	88-117
颱風 Typhoon	118-149
強颱風 Severe Tropical Storm	150-184
超強颱風 Super Typhoon	≥ 185

- 強烈季候風信號用以警告源自冬季或夏季季候風而超過每小時40公里的風力。在十分空曠的地區，風力甚至會超過每小時70公里。

熱帶氣旋警告信號所表示的風力
Winds associated with Tropical Cyclone Warning Signals

信號 Signal		預料會出現或已經出現的持續風速 (公里每小時) Sustained wind speed expected or blowing (km/h)	陣風可能超過 (公里每小時) Gust may Exceed (km/h)
戒備 Stand By	1	___	___
強風 Strong Wind	3	41-62	110
西北烈風或暴風 NW'ly Gale or Storm	8 西北 NW	63-117	180
西南烈風或暴風 SW'ly Gale or Storm	8 西南 SW		
東北烈風或暴風 NE'ly Gale or Storm	8 東北 NE		
東南烈風或暴風 SE'ly Gale or Storm	8 東南 SE		
烈風或暴風風力增強 Increasing Gale or Storm	9	___	___
颶風 Hurricane	10	≥ 118	220

- Strong Monsoon Signal is used to warn of winds in excess of 40 km/h due to the winter or summer monsoon. These winds may sometimes reach 70 km/h or more in very exposed places.