

第二節

二零零二年熱帶氣旋概述

Section 2

TROPICAL CYCLONE OVERVIEW FOR 2002

2.1 二零零二年的熱帶氣旋回顧

2.1.1 北太平洋西部（包括南海區域）的熱帶氣旋

二零零二年共有28*個熱帶氣旋影響北太平洋西部及南海區域（即由赤道至北緯45度、東經100至180度所包括的範圍），這數目比1961-1990的30年平均數少三個，當中有16個熱帶氣旋達到颱風強度，跟正常數目一樣。

本年首個熱帶氣旋在一月形成。圖2.1是二零零二年在北太平洋西部及南海區域的熱帶氣旋及颱風出現次數之每月分佈。

於二零零二年，共有九個熱帶氣旋影響日本（包括琉球群島），南韓及菲律賓各受兩個熱帶氣旋吹襲，另有一個熱帶氣旋橫越台灣，六個登陸中國內地。

二零零二年風力最強的熱帶氣旋是風神（0209），最高風速估計約為每小時205公里，而最低中心氣壓則約為925百帕斯卡。另外，今年有兩個熱帶氣旋在北太平洋中部形成後向西移動，橫過國際換日線進入北太平洋西部。它們分別是艾利（0217）和胡高（0224）。

於二零零二年，所有在西北太平洋上形成的熱帶氣旋都沒有移入南海。在過去30年內，類似情形只會在一九九七年出現。太平洋上的副熱帶高壓脊通常會在七月份向西伸延至華南，這有利西北太平洋上的熱帶氣旋向西移動進入南海（圖2.3.a）。但今年同期副熱帶高壓脊並沒有西伸至華南，使西北太平洋上引導氣流的方向比正常偏北，在該區的熱帶氣旋因此偏向北移，而不向西進入南海（圖2.3.b），這個情況相信跟厄爾尼諾現象有關。

2.1.2 香港責任範圍內的熱帶氣旋

在二零零二年的28個熱帶氣旋中，有10個影響香港責任範圍（即北緯10至30度、東經105至125度所包括的地區），比1961-1990的30年平均16.4個少百分之39（表2.1）。這10個熱帶氣旋中，有七個在香港責任範圍內形成。在二零零二年，香港天文台總共發出227個供船舶使用的熱帶氣旋警告（表4.2）。

2.1.3 南海區域內的熱帶氣旋

二零零二年共有七個熱帶氣旋影響南海區域（即北緯10至25度、東經105至120度所包括的地區），當中有六個在南海形成，其餘一個則在菲律賓中部形成。

2.1.4 影響香港的熱帶氣旋

全年只有三個熱帶氣旋影響香港（圖2.2），比正常數目少約一半（表2.2）。這三個熱帶氣旋是北冕（0212）、黃蜂（0214）及黑格比（0218），它們均在南海形成。

本年九月黑格比影響香港期間，天文台發出了八號烈風或暴風信號，這亦是今年發出的最高信號。而八月的北冕和黃蜂則只需發出一號戒備信號。

2.1.5 熱帶氣旋的雨量

二零零二年各熱帶氣旋為香港帶來的雨量（即該熱帶氣旋在出現於香港600公里範圍內至其消散或離開香港600公里範圍之後72小時期間，天文台錄得的雨量）共為520.8毫米，佔該年總雨量2 490.0毫米的百分之21，比正常的737.9毫米少百分之29。

* 包括艾利(0217)和胡高(0224)這兩個在北太平洋中部形成後橫過國際換日線進入北太平洋西部的熱帶氣旋。

2.2 每月概述

這一節逐月介紹二零零二年北太平洋西部及南海區域的熱帶氣旋概況。影響香港的各熱帶氣旋則詳述於第三節。

一月

塔巴(0201)在一月十一日晚上於馬尼拉東南偏東約1 050公里處發展為一個熱帶低氣壓，它向西北移動，並於次日增強為一個熱帶風暴。一月十三日晚上，塔巴減弱為一個熱帶低氣壓並轉向北移，掠過呂宋東北部。塔巴在一月十四日早上於呂宋海峽消散。

二月及三月

米娜(0202)在二月二十七日於關島東南約1 350公里的太平洋上發展成一個熱帶低氣壓。它向西移動，於次日增強為一個熱帶風暴。米娜在三月一日發展為一個強烈熱帶風暴後，翌日進一步增強為一個颱風及轉向西北偏西推進，在三月三日掠過雅蒲島。隨後數天，它逐步轉向東北移動，風力亦加強至約每小時175公里。到了三月七日，米娜減弱為一個強烈熱帶風暴及向東移動。受到東北季候風的影響，它在三月八日迅速減弱成一個熱帶低氣壓，並改為向南移動，稍後於呂宋以東的太平洋上消散。

四月

二零零二年四月並無熱帶氣旋影響北太平洋西部及南海區域。

五月

海貝思(0203)在五月十五日於關島東南偏南約750公里的太平洋上發展成一個熱帶低氣壓。它向西北移動，於次日增強為一個熱帶風暴，並在五月十七日進一步增強為一個強烈熱帶風暴。其後它減速及轉向北移，於五月十八日達至颱風強度。海貝思在五月十九日開始向東北加速前進，而其風力亦到達頂點，估計約為每小時165公里。到了五月二十一日早上，海貝思減弱為一個強烈熱帶風暴，並在同日變為一個溫帶氣旋。

六月

浣熊(0204)在六月六日於南海北部東沙島西南偏西約200公里處發展成一個熱帶低氣壓。它向東移動，於六月八日在呂宋海峽增強為一個熱帶風暴。六月九日，浣熊轉向東北偏北移動，並迅速增強成一個颱風。同日晚上，它減弱為一個強烈熱帶風暴，接着轉向東北加速前進。六月十一日，浣熊進一步減弱為一個熱帶低氣壓，同日登陸日本並隨即消散。

威馬遜(0205)於六月二十九日在雅蒲島西北面約250公里處發展成一個熱帶低氣壓，同日增強為一個熱帶風暴。它在太平洋上向西北推進並逐漸增強，於七月一日變為一個颱風後，直趨台灣以東海域。與威馬遜相關的暴雨在台灣北部造成水浸和山泥傾瀉，航空交通亦一度受阻。七月四日，威馬遜轉向北移，橫過東海，期間上海一間在建築地盤內的臨時房屋被吹倒，造成五人死亡，44人受傷。七月五日，威馬遜減弱為一個強烈熱帶風暴，然後改向東北移動。它於七月六日減弱為一個熱帶風暴後在南韓西岸登陸，強風和大雨令當地很多道路和橋樑受損，共導致四人死亡。同日，威馬遜在日本海變為一個溫帶氣旋。

查特安(0206)於六月二十九日清晨在關島東南約1 500公里的太平洋上形成為一個熱帶低氣壓，並在同日增強為一個熱帶風暴。查特安在往後數天大致向西北移動，並於七月五日達至颱風強度。它在七月八日改向北移，次日轉向東北，直趨日本。七月十日，它減弱為一個強烈熱帶風暴，並在東京以南掠過，隨後沿著日本東岸移動，在七月十一日變成一個溫帶氣旋。查特安在日本引發廣泛的水浸，導致最少四人死亡及兩人失蹤。

七月

夏浪(0207)於七月七日在關島東南偏東約1 500公里的太平洋上形成爲一個熱帶低氣壓。它向西北偏西移動並於七月九日增強爲一個強烈熱帶風暴，在七月十一日夏浪進一步增強爲一個颱風及改向西北推進。七月十四日，夏浪轉向北移，橫過琉球群島。一日後，它減弱爲一個強烈熱帶風暴及轉向東北加速移動，直趨日本。夏浪在七月十六日橫掃東京，強風和暴雨令一些飛機航班被逼取消。同日晚上，夏浪在日本以東的太平洋上變爲一個溫帶氣旋。

在南海北部，**娜基莉(0208)**於七月八日在東沙島東北面約150公里處形成爲一個熱帶低氣壓。它向東北緩慢移動，並於次日增強爲一個熱帶風暴。它沿著台灣西岸推進，於七月十日台北附近登陸。其後娜基莉向東移離台灣，並於七月十二日在琉球群島附近轉向北移，次日在東海變爲一個溫帶氣旋。娜基莉在台灣一共導致兩死11傷。

風神(0209)於七月十四日在威克島東南偏南約1 000公里處發展成一個熱帶低氣壓，並於次日迅速增強爲一個颱風。它在往後十天維持向西北方移動。風神是一個強勁的颱風，估計其中心風力爲每小時200公里以上。七月二十五日，風神在接近日本九州時減弱爲一個強烈熱帶風暴，期間令當地的海上及航空交通受阻。七月二十六日，風神掠過濟州並減弱爲一個熱帶風暴。風神於七月二十七日橫過黃海後在中國青島附近登陸，於次日在陸上消散，並爲北京帶來大雨。

七月二十一日清晨，**海鷗(0210)**在國際換日線附近，即威克島以東約1 300公里處發展成一個熱帶低氣壓。它向西北移動，同日下午在海上消散，壽命維持不到一天。

鳳凰(0211)在七月二十一日於硫黃島西南面約150公里處形成爲一個熱帶低氣壓。它向西移動並在七月二十三日增強爲一個颱風。同日，鳳凰和風神相互作用，在藤原效應影響下，鳳凰以反時針方向環繞著風神移動。鳳凰於七月二十四日減弱爲一個強烈熱帶風暴及於次日轉向北移。七月二十六日，它進一步減弱爲一個熱帶風暴，並向西北移動。鳳凰最終於七月二十七日晚上在日本九州以西的海面上消散。

七月二十日，一個**熱帶低氣壓**在菲律賓中部形成，當時它位於馬尼拉東南面約250公里。在其後兩天，它向西北推進，橫過呂宋。七月二十二日，該熱帶低氣壓在進入南海後減弱爲一個低壓區。

八月

北冕(0212)於八月三日在南海北部發展成一個熱帶低氣壓，當時它的位置是在香港東南偏東約400公里，天文台隨即發出一號戒備信號。北冕初時向西移動，並於次日增強爲一個熱帶風暴。其後它減速及突然轉向東北偏北推進，直趨廣東東岸。北冕於八月五日進一步增強爲一個強烈熱帶風暴並在汕尾附近登陸。其後北冕繼續向北移動，於當晚在江西省逐漸減弱爲一個低壓區。

一個**熱帶低氣壓**於八月十一日在馬尼拉東南偏東約1 100公里處形成並向西北移動。八月十三日它在菲律賓以東的太平洋上減弱爲一個低壓區。

巴蓬(0213)於八月十一日在關島東南偏東約1 500公里處發展成一個熱帶低氣壓及向西北偏北移動，並於次日增強爲一個熱帶風暴。巴蓬在八月十三日進一步增強爲一個強烈熱帶風暴，翌日更達至颱風強度。它於隨後四天繼續在太平洋上向西北推進，在八月十八日突然轉向東北，在八月二十日減弱爲一個強烈熱帶風暴，同日晚上轉變爲一個溫帶氣旋。巴蓬在接近日本期間爲本州帶來大雨，令當地的火車及飛機服務受阻，它引起的大浪亦在東京以西海面導致四人失蹤。

黃蜂(0214)於八月十五日在西沙島東南偏南約280公里處發展爲一個熱帶低氣壓。最初兩天它向東北緩慢移動，在八月十七日轉向西北偏西推進，天文台亦於當晚發出一號戒備信號。黃蜂在八月十八日增強爲一個熱帶風暴後再轉向西北偏北移動。黃蜂在八月十九日加速移向廣東西部

海岸。當日下午黃蜂增強為一個強烈熱帶風暴，隨後掠過海南島東北岸，於同日晚上在湛江附近登陸。登陸後黃蜂迅速減弱，於八月二十日在廣西消散。

八月二十三日，**鹿莎(0215)**在威克島西南面約600公里的太平洋上形成為一個熱帶低氣壓。它向西北偏西移動，同日增強為一個熱帶風暴，鹿莎於八月二十四日繼續增強為一個強烈熱帶風暴，並於八月二十六日達到颱風強度。它在八月二十九日轉向西北移動，經過琉球群島，次日轉向北移，在八月三十一日登陸南韓。鹿莎在登陸後迅速減弱，並於九月一日在日本海變為一個溫帶氣旋。鹿莎在南韓共導致151人死亡及33人失蹤，約17 000間房屋被毀，數以千計的汽車被洪水沖走，另有超過20 000公頃農田受淹，經濟損失估計逾40億美元。

森拉克(0216)於八月二十九日在關島東北偏東約1 200公里處發展成一個熱帶低氣壓後向西北偏北移動，並於同日增強為一個熱帶風暴。森拉克在八月三十日增強為一個強烈熱帶風暴及改向西北移動，於八月三十一日進一步增強為一個颱風，並在隨後數日以偏西方向移動。森拉克在九月四日晚上橫過沖繩島，其後兩天在東海緩慢移動。它在九月七日加速趨向浙江省，同日傍晚在溫州以南約100公里處登陸。森拉克在登陸後迅速減弱為一個強烈熱帶風暴，於次日在江西省減弱為一個低壓區。在森拉克吹襲期間，浙江省共有26人死亡及5人失蹤，7 900間房屋倒塌，超過七百萬人及170 000公頃農作物受到影響。

颱風**艾利(0217)**是在北太平洋中部形成的颶風，它向西北移動越過國際換日線，於八月三十日進入西北太平洋。在其後十天，艾利蜿蜒地向西北偏北移動。它於九月七日減弱為一個強烈熱帶風暴，並於九月八日進一步減弱為一個熱帶風暴。艾利最後在九月九日變為一個溫帶氣旋。

九月

黑格比(0218)於九月十日在東沙島東南約140公里處發展為一個熱帶低氣壓，並穩定地在南海北部向西北偏西移動。它於當晚增強為一個熱帶風暴，並在九月十一日進一步增強為一個強烈熱帶風暴。黑格比於九月十二日在廣東西部的陽江附近登陸，之後減弱為一個熱帶風暴及轉向西移，晚上進一步減弱為一個熱帶低氣壓。九月十三日清晨，黑格比在廣西沿岸減弱為一個低壓區。在黑格比吹襲期間，廣東沿岸海域有一艘船沉沒，另一艘船則與救援中心失去聯絡，最少20人在這兩次意外中失蹤。在廣東西部，與黑格比相關的強風和大雨亦對一些房屋和農田造成破壞。

薔薇(0219)在九月二十一日清晨於琉黃島西北約600公里處形成為一個熱帶低氣壓，它向東北移動，於同日增強為一個熱帶風暴。薔薇於九月二十三日加速移動，其後變為一個溫帶氣旋。

米克拉(0220)於九月二十三日在南海西沙島以南約200公里處形成為一個熱帶低氣壓，並向西北移動，它於九月二十五日增強為一個熱帶風暴。米克拉在越過海南島西部後，於九月二十六日進入北部灣。一日後，它改向東移。米克拉於九月二十八日在雷州減弱為一個熱帶低氣壓，隨後在廣東西岸消散。在海南島附近，有二十多艘漁船在大風中沉沒或擱淺。

海高斯(0221)於九月二十七日在關島東北偏東約1 000公里處形成為一個熱帶低氣壓。它向西北偏西移動，於同日增強為一個熱帶風暴。海高斯於九月二十八日清晨增強為一個強烈熱帶風暴，並在該晚達至颱風強度。九月三十日，它轉向東北偏北移動，加速趨向日本。海高斯於十月一日在東京附近登陸後向北推進，越過日本本州北部，於十月二日清晨減弱為一個強烈熱帶風暴，隨後在北海道西北對開海面變為一個溫帶氣旋。海高斯在日本引致四人死亡、一人失蹤及60多人受傷，另有超過300間房屋被毀或受浸。

十月

巴威(0222)於十月九日在關島東南偏東約1 100公里處發展成一個熱帶低氣壓。它向西北偏西移動，並於同日增強為一個熱帶風暴。其後它改向西北偏北移動，於十月十一日增強為一個強烈熱帶風暴，一日後再轉向北移。巴威在十月十三日下午減弱為一個熱帶風暴，並於該晚在太平洋上變為一個溫帶氣旋。

美莎克(0223)於十月二十七日在威克島以西約550公里處形成為一個熱帶低氣壓。它向西北偏北移動，於次日增強為一個熱帶風暴及轉向東北加速移動，於十月二十九日進一步增強為一個強烈熱帶風暴。十月三十日，美莎克在太平洋上變為一個溫帶氣旋。

十一月

颱風**胡高(0224)**是早前在北太平洋中部形成的颶風，但它於十一月三日越過國際換日線後進入西北太平洋。胡高初時向西北偏西移動，一日後轉向西北，於十一月五日減弱為一個強烈熱帶風暴後再轉向北移。十一月六日，它改向東北偏東加速推進，並於當晚減弱為一個熱帶風暴。胡高於十一月七日在太平洋上變為一個溫帶氣旋。

十一月第二個熱帶氣旋名為**海神(0225)**，於二十日在關島東南偏南約400公里處形成為一個熱帶低氣壓。它向西北偏西移動，並於次日增強為一個熱帶風暴。十一月二十二日，海神進一步增強為一個強烈熱帶風暴及逐漸轉向北移。海神於十一月二十三日達至颱風強度後加速移向東北，並於二十五日清晨變為一個溫帶氣旋。

十二月

鳳仙(0226)於十二月三日在威克島西南偏南約1 300公里處形成為一個熱帶低氣壓。它大致向西移動，於當晚增強為一個熱帶風暴。鳳仙於十二月五日進一步增強為一個強烈熱帶風暴，並於次日達至颱風強度。它於十二月七日轉向西北移動，一日後掠過關島。十二月九日，鳳仙改向北移，其後轉向東北加速推進。鳳仙於十二月十一日減弱為一個強烈熱帶風暴，隨後變為一個溫帶氣旋。

備註：人命傷亡及財物損毀數據是根據報章報導輯錄而成。

2.1 Review of tropical cyclones in 2002

2.1.1 Tropical cyclones over the western North Pacific (including the South China Sea)

In 2002, 28* tropical cyclones occurred over the western North Pacific and the South China Sea (i.e. the area bounded by the Equator, 45°N, 100°E and 180°), three less than the 30-year (1961-1990) average. Throughout the year, 16 tropical cyclones attained typhoon strength, which is the same as the normal figure.

The first tropical cyclone of the year formed in January. The monthly frequencies of the occurrence of tropical cyclones and typhoons in the western North Pacific and the South China Sea in 2002 are shown in Figure 2.1.

During the year, nine tropical cyclones affected Japan (including Ryukyu Islands), two traversed South Korea, one moved over Taiwan, two hit the Philippines and six made landfall over the mainland of China.

The most intense tropical cyclone in 2002 was Fengseng (0209). Fengseng had a maximum wind speed of about 205 km/h and a minimum sea-level pressure about 925 hPa. Moreover, two tropical cyclones, Ele (0217) and Huko (0224), forming over the central North Pacific moved westwards across the International Date Line and entered the western North Pacific.

In 2002, none of the tropical cyclones forming over the northwest Pacific moved into the South China Sea. The only similar case during the last three decades occurred in 1997. Usually, the subtropical ridge over the Pacific extends westwards to southern China in July, steering the tropical cyclones over the northwest Pacific to move westwards and enter the South China Sea (Figure 2.3.a). However, in July 2002, the subtropical ridge did not extend to southern China and the steering flow over the northwest Pacific had a more northerly direction than usual. As a result, the tropical cyclones in the region were carried northwards and did not enter the South China Sea (Figure 2.3.b). This situation is believed to be related to the occurrence of El Niño.

2.1.2 Tropical cyclones in Hong Kong's area of responsibility

Amongst those 28 tropical cyclones in 2002, 10 occurred inside Hong Kong's area of responsibility (i.e. the area bounded by 10°N, 30°N, 105°E and 125°E). This was 39 % less than the 30-year (1961-90) annual average of 16.4 (Table 2.1). Seven of these 10 tropical cyclones developed within Hong Kong's area of responsibility. Altogether, 227 tropical cyclone warnings to ships and vessels were issued by the Hong Kong Observatory in 2002 (Table 4.2).

2.1.3 Tropical cyclones over the South China Sea

There were seven tropical cyclones affecting the South China Sea (i.e. the area bounded by 10°N, 25°N, 105°E and 120°E) in 2002. Six of them formed over the area and one developed over the central part of the Philippines.

2.1.4 Tropical cyclones affecting Hong Kong

Only three tropical cyclones affected Hong Kong in 2002 (Figure 2.2), about half of the normal number (Table 2.2). These three tropical cyclones were Kammuri (0212), Vongfong (0214) and Hagupit (0218). All of them formed in the South China Sea.

The highest signal issued this year was the Gale or Storm Signal No. 8 when Hagupit affected Hong Kong in September. Kammuri and Vongfong in August only necessitated the issuance of the Standby Signal No. 1 in Hong Kong.

* two of them, namely Ele (0217) and Huko (0224), formed over the central North Pacific and moved across the International Date Line into the western North Pacific.

2.1.5 Tropical cyclone rainfall

Tropical cyclone rainfall (the total rainfall recorded at the Hong Kong Observatory from the time when a tropical cyclone is centred within 600 km of Hong Kong to 72 hours after it has dissipated or moved farther than 600 km away from Hong Kong) in 2002 was 520.8 mm. This is 29 % below the normal of 737.9 mm and accounts for some 21 % of the year's total rainfall of 2 490.0 mm.

2.2 Monthly overview

A monthly overview of tropical cyclones is given in this Section. Detailed reports on tropical cyclones affecting Hong Kong are presented in Section 3.

JANUARY

Tapah (0201) developed as a tropical depression about 1 050 km east-southeast of Manila on the night of 11 January. Tracking northwestwards, Tapah intensified into a tropical storm the next day. On the night of 13 January, it weakened into a tropical depression and turned north. After skirting the northeastern part of Luzon, Tapah dissipated over Luzon Strait on the morning of 14 January.

FEBRUARY – MARCH

Mitag (0202) developed as a tropical depression over the Pacific, about 1 350 km southeast of Guam on 27 February. Tracking mainly to the west, it intensified into a tropical storm the next day. It became a severe tropical storm on 1 March and intensified further into a typhoon one day later. Mitag then turned to west-northwest, skirting Yap on 3 March. In the next few days, Mitag gradually changed its course towards northeast and intensified to attaining a maximum sustained wind speed of about 175 km/h. On 7 March, it weakened into a severe tropical storm and moved to the east. Under the influence of northeast monsoon, Mitag weakened rapidly and became a tropical depression on 8 March. Heading south, Mitag soon dissipated over the Pacific east of Luzon.

APRIL

No tropical cyclone occurred over the western North Pacific and the South China Sea in April.

MAY

On 15 May, **Hagibis (0203)** developed as a tropical depression over the Pacific, about 750 km south-southeast of Guam. Tracking to the northwest, it intensified into a tropical storm the next day and strengthened further into a severe tropical storm on 17 May. Hagibis then slowed down and turned north. It attained typhoon intensity on 18 May. Hagibis began to accelerate towards the northeast on 19 May with its intensity reaching a maximum of about 165 km/h. On the morning of 21 May, it weakened into a severe tropical storm and became an extratropical cyclone the same day.

JUNE

On 6 June, **Noguri (0204)** developed as a tropical depression over the northern part of the South China Sea, about 200 km west-southwest of Dongsha Dao. Tracking to the east, it intensified into a tropical storm over the Luzon Strait on 8 June. On 9 June, Noguri changed its course to the north-northeast and intensified rapidly into a typhoon. Noguri weakened into a severe tropical storm that night and then accelerated towards the northeast. On 11 June, Noguri weakened further into a tropical depression and then dissipated over Japan after landfall.

On 29 June, **Rammasun (0205)** developed as a tropical depression at about 250 km northwest of Yap and intensified into a tropical storm on the same day. It moved northwestwards over the Pacific and

strengthened gradually into a typhoon on 1 July. It then headed towards the seas east of Taiwan. The torrential rain associated with Rammasun caused flooding and landslides in northern Taiwan. The air traffic was also temporarily affected. On 4 July, Rammasun turned north and moved across the East China Sea. In Shanghai, five persons were killed and 44 others were injured when a temporary house was blown down at a construction site. Rammasun weakened into a severe tropical storm on 5 July and changed its course to the northeast. It weakened into a tropical storm on 6 July and made landfall over the west coast of South Korea. Strong winds and heavy rain associated with Rammasun damaged many roads and bridges and left four men dead in South Korea. Rammasun became an extratropical cyclone in Sea of Japan on the same day.

On the early morning of 29 June, [Chataan \(0206\)](#) formed as a tropical depression over the Pacific, about 1 500 km southeast of Guam. It strengthened into a tropical storm later on the same day. Chataan moved generally to the northwest in the next few days and attained typhoon strength on 5 July. Chataan turned north on 8 July and then moved northeast towards Japan in the following day. On 10 July, it weakened into a severe tropical storm and skirted to the south of Tokyo. Chataan then moved along the east coast of Japan and became an extratropical cyclone on 11 July. In Japan, widespread flooding caused by Chataan resulted in at least four deaths and two missing.

JULY

[Halong \(0207\)](#) formed as a tropical depression over the Pacific, about 1 500 km east-southeast of Guam on 7 July. While tracking to the west-northwest, it intensified into a severe tropical storm on 9 July. It strengthened further into a typhoon on 11 July and headed northwest. On 14 July, it turned north and crossed Ryukyu Islands. One day later, it weakened into a severe tropical storm and accelerated to the northeast towards Japan. Halong swept over Tokyo with strong winds and heavy rain on 16 July. A number of flights were forced to cancel. Halong became an extratropical cyclone over the Pacific east of Japan that night.

Over the northern part of the South China Sea, [Nakri \(0208\)](#) formed at about 150 km northeast of Dongsha Dao on 8 July. It moved slowly northeastwards and strengthened into a tropical storm the next day. After traversing the west coast of Taiwan, it made landfall near Taipei on 10 July. Nakri then moved east away from Taiwan. It changed its course towards north near the Ryukyu Islands on 12 July and became an extratropical cyclone over the East China Sea the following day. In Taiwan, Nakri claimed two lives and injured 11 people.

[Fengshen \(0209\)](#) developed as a tropical depression at about 1 000 km south-southeast of Wake Island on 14 July. It intensified rapidly into a typhoon on 15 July, and maintained a northwest movement in the next ten days. Fengshen was an intense typhoon with maximum winds estimated to be over 200 km/h. On 25 July, Fengshen weakened into a severe tropical storm when it approached Kyushu of Japan, disrupting air and sea traffic there. On 26 July, Fengshen skirted Cheju and weakened into a tropical storm. Fengshen traversed the Yellow Sea on 27 July and then made landfall near Qingdao of China. It dissipated overland the next day and brought heavy rain to Beijing.

On the early morning of 21 July, [Kalmaegi \(0210\)](#) developed as a tropical depression near the International Date-line, about 1 300 km east of Wake Island. It moved northwestwards and dissipated over water in the afternoon, lasting for less than a day.

[Fung-wong \(0211\)](#) formed as a tropical depression about 150 km southwest of Iwo Jima on 21 July. It tracked westwards and intensified gradually into a typhoon on 23 July. On the same day, Fung-wong interacted with Fengshen. Under the Fujiwhara effect, Fung-wong began to move in anti-clockwise direction around Fengshen. Fung-wong weakened into a severe tropical storm on 24 July and turned north the following day. On 26 July, it weakened further into a tropical storm and moved northwestwards. Fung-wong finally dissipated over the seas west of Kyushu on the night of 27 July.

On 20 July, a [tropical depression](#) formed over the central part of the Philippines, about 250 km southeast of Manila. It tracked northwestwards across Luzon in the next two days. After entering the South China Sea, it weakened into an area of low pressure on 22 July.

AUGUST

[Kammuri \(0212\)](#) developed as a tropical depression over the northern part of the South China Sea, about 400 km east-southeast of Hong Kong on 3 August. The Standby Signal No. 1 was issued shortly after its formation. Kammuri tracked westwards and strengthened into a tropical storm the next day. It then slowed down and abruptly turned to the north-northeast towards the east coast of Guangdong. On 5 August, Kammuri intensified further into a severe tropical storm. After making landfall near Shanwei, Kammuri moved northwards and weakened gradually into an area of low pressure over Jiangxi Province that night.

A [tropical depression](#) formed at about 1 100 km east-southeast of Manila on 11 August. It moved northwestwards over the Pacific and weakened into an area of low pressure to the east of the Philippines on 13 August.

[Phanfone \(0213\)](#) developed as a tropical depression at about 1 500 km east-southeast of Guam on 11 August and moved to the north-northwest. It intensified into a tropical storm the next day, further into a severe tropical storm on 13 August and attained typhoon intensity on 14 August. In the next four days, Phanfone kept moving northwestwards over the Pacific. On 18 August, Phanfone turned abruptly to the northeast. It weakened into a severe tropical storm on 20 August and became an extratropical cyclone the same night. While approaching Japan, Phanfone brought heavy rain to Honshu where some train services and flights were disrupted. There were also four people missing in the rough seas west of Tokyo.

[Vongfong \(0214\)](#) developed as a tropical depression at about 280 km south-southeast of Xisha Dao on 15 August. It moved slowly to the northeast in the first two days and turned to the west-northwest on 17 August. The Standby Signal No. 1 was issued by the Hong Kong Observatory that night. Vongfong intensified into a tropical storm and moved towards the north-northwest on 18 August. It accelerated towards the west coast of Guangdong on 19 August and intensified into a severe tropical storm that afternoon. Vongfong skirted the northeastern coast of Hainan and then made landfall near Zhangjiang the same night. After landfall, it weakened rapidly and dissipated over Guangxi on 20 August.

On 23 August, [Rusa \(0215\)](#) formed as a tropical depression over the Pacific, about 600 km southwest of Wake Island. It tracked towards the west-northwest and strengthened into a tropical storm the same day. Rusa strengthened further to a severe tropical storm on 24 August, and to a typhoon on 26 August. It turned to the northwest on 29 August and moved across the Ryukyu Islands. Rusa turned north the next day and made landfall over South Korea on 31 August. Rusa weakened rapidly after landfall and became an extratropical cyclone over the Sea of Japan on the first day of September. During the passage of Rusa in South Korea, 151 people were killed and 33 others were found missing. About 17 000 houses were destroyed and thousands of cars were washed away by floods. More than 20 000 hectares of farmland were also inundated. The economic loss was estimated to be over USD 4 billion.

[Sinlaku \(0216\)](#) developed as a tropical depression about 1 200 km east-northeast of Guam on 29 August. It moved to the north-northwest and intensified into a tropical storm the same day. On 30 August, Sinlaku intensified further into a severe tropical storm and changed its course towards the northwest. It attained typhoon strength on 31 August and moved to the west in the next few days. It moved across Okinawa on the night of 4 September and then slowed down over the East China Sea in the next two days. Sinlaku speeded up on 7 September and headed towards Zhejiang. It made landfall in the same evening about 100 km south of Wenzhou. Sinlaku weakened into a severe tropical storm after making landfall and became an area of low pressure over Jiangxi Province on 8 September. In the fury of Sinlaku, 26 people were killed and 5 were reported missing in Zhejiang. 7 900 houses collapsed, and more than 7 million people and 170 000 hectares of crops were affected.

Typhoon [Ele \(0217\)](#) was a hurricane which formed over the central North Pacific. It moved northwestwards across the International Date Line and entered the western North Pacific on 30 August. While meandering towards the north-northwest in the next ten days, Ele weakened into a severe tropical storm on 7 September and became a tropical storm on 8 September. Ele eventually transformed into an extratropical cyclone on 9 September.

SEPTEMBER

[Hagupit \(0218\)](#) developed as a tropical depression about 140 km southeast of Dongsha Dao on 10 September and moved steadily west-northwest over the northern part of the South China Sea. It intensified rapidly into a tropical storm the same night and became a severe tropical storm on 11 September. On 12 September, Hagupit made landfall near Yangjiang in western Guangdong and weakened into a tropical storm. It then turned west and weakened further into a tropical depression that night. On the early morning of 13 September, Hagupit weakened into an area of low pressure over the coastal areas of Guangxi. Off the coast of Guangdong, one ship sank and another lost contact with the rescue centre during the passage of Hagupit, with at least 20 persons missing. The high winds and heavy rain associated with Hagupit also damaged some houses and farmlands over western Guangdong.

[Changmi \(0219\)](#) formed as a tropical depression about 600 km northwest of Iwo Jima on the early morning of 22 September. Tracking northeastwards, it intensified into a tropical storm the same day. Changmi accelerated and became an extratropical cyclone on 23 September.

Over the South China Sea, [Mekkhala \(0220\)](#) formed as a tropical depression about 200 km south of Xisha Dao on 23 September. It moved to the northwest and deepened into a tropical storm on 25 September. After traversing the western part of Hainan, Mekkhala turned north and entered Beibu Wan on 26 September. One day later, it changed course towards the east. Mekkhala weakened into a tropical depression over Leizhou on 28 September and dissipated over the coast of western Guangdong later. Around Hainan, more than 20 fishing boats sank or ran aground in high winds.

[Higos \(0221\)](#) formed as a tropical depression about 1 000 km east-northeast of Guam on 27 September. Tracking towards the west-northwest, Higos intensified into a tropical storm the same day. Higos strengthened into a severe tropical storm on the early morning of 28 September and attained typhoon intensity that night. It turned to the north-northeast on 30 September and then accelerated towards Japan. On 1 October, it made landfall near Tokyo and moved northwards across the northern part of Honshu. Higos weakened into a severe tropical storm on the early morning of 2 October and soon became an extratropical cyclone off the northwest coast of Hokkaido. In Japan, Higos left behind four deaths, one person missing and over 60 others injured. In addition, more than 300 houses were destroyed or inundated.

OCTOBER

[Bavi \(0222\)](#) developed as a tropical depression about 1 100 km east-southeast of Guam on 9 October. It moved to the west-northwest and intensified into a tropical storm the same day. Bavi then headed north-northwest and intensified into a severe tropical storm on 11 October. It turned to the north one day later. On 13 October, Bavi weakened into a tropical storm in the afternoon and eventually transformed into an extratropical cyclone over the Pacific that night.

[Maysak \(0223\)](#) formed as a tropical depression over the Pacific about 550 km west of Wake Island on 27 October and tracked north-northwestwards. Maysak strengthened into a tropical storm and accelerated towards the northeast the next day. It intensified further into a severe tropical storm on 29 October. Maysak became an extratropical cyclone over the Pacific on 30 October.

NOVEMBER

Typhoon [Huko \(0224\)](#) was originally a hurricane which formed over the central North Pacific. It moved west-northwestwards across the International Date Line and entered the western North Pacific on 3 November. One day later, it turned to the northwest. On 5 November, Huko weakened into a severe tropical storm and headed north. It accelerated towards the east-northeast on 6 November and weakened into a tropical storm the same night. Huko became an extratropical cyclone over the Pacific on 7 November.

The second tropical cyclone in November, [Haishen \(0225\)](#), formed as a tropical depression about 400 km south-southeast of Guam on 20 November. Tracking towards the west-northwest, Haishen intensified into a tropical storm the following day. On 22 November, it strengthened further into a severe tropical storm and turned gradually to the north. After attaining typhoon intensity on 23 November, it headed towards the northeast and speeded up. Haishen transformed into an extratropical cyclone on the early morning of 25 November.

DECEMBER

[Pongsona \(0226\)](#) formed as a tropical depression about 1 300 km south-southwest of Wake Island on 3 December. While tracking to the west, it intensified into a tropical storm that night. Pongsona intensified further into a severe tropical storm on 5 December and attained typhoon intensity the next day. It turned to the northwest on 7 December and skirted Guam one day later. Pongsona moved northwards on 9 December and then accelerated towards the northeast. On 11 December, Pongsona weakened into a severe tropical storm and then became an extratropical cyclone.

Note: Casualties and damage figures were compiled from press reports.

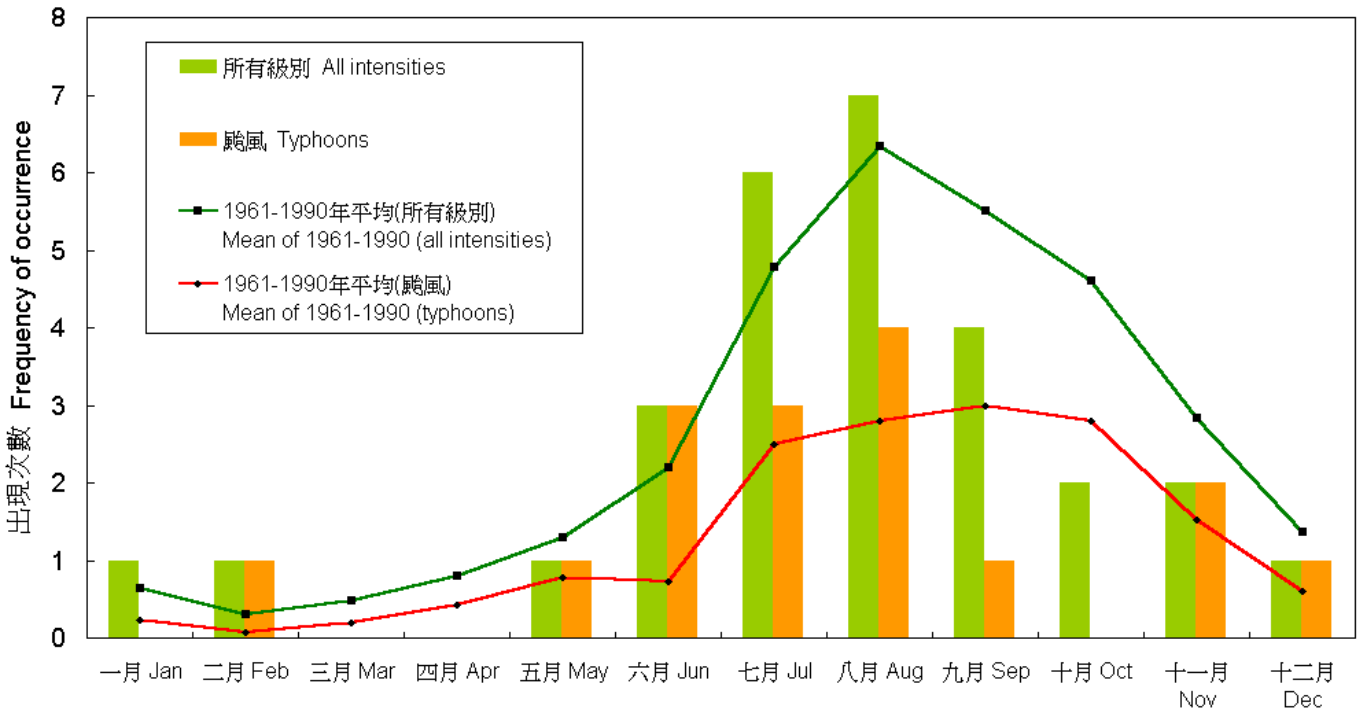


圖 2.1 二零零二年在北太平洋西部及南海區域的熱帶氣旋出現次數之每月分佈 (以熱帶氣旋在該月初次出現為準)。

Figure 2.1 Monthly frequencies of the occurrence of tropical cyclones in the western North Pacific and the South China Sea in 2002 (based on the first occurrence of the tropical cyclone in the month).

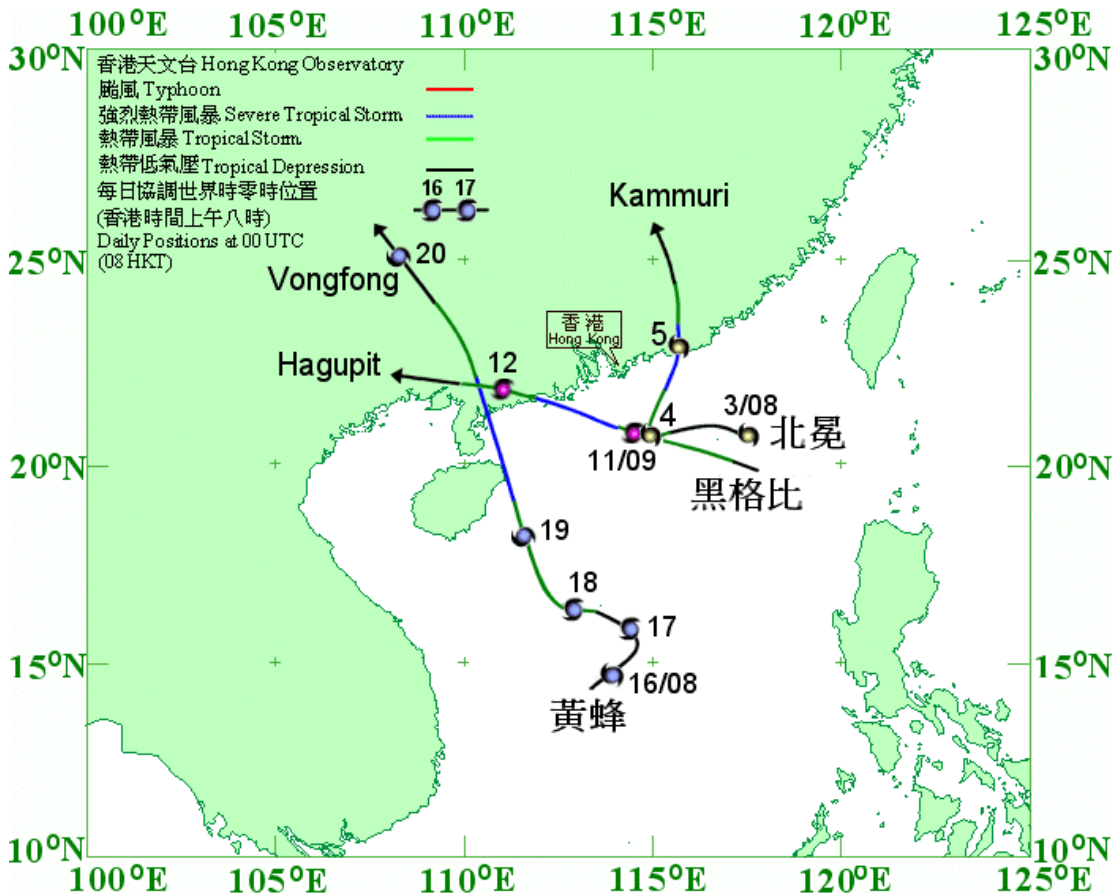


圖 2.2 二零零二年三個影響香港的熱帶氣旋的路徑圖。

Figure 2.2 Tracks of the three tropical cyclones affecting Hong Kong in 2002.

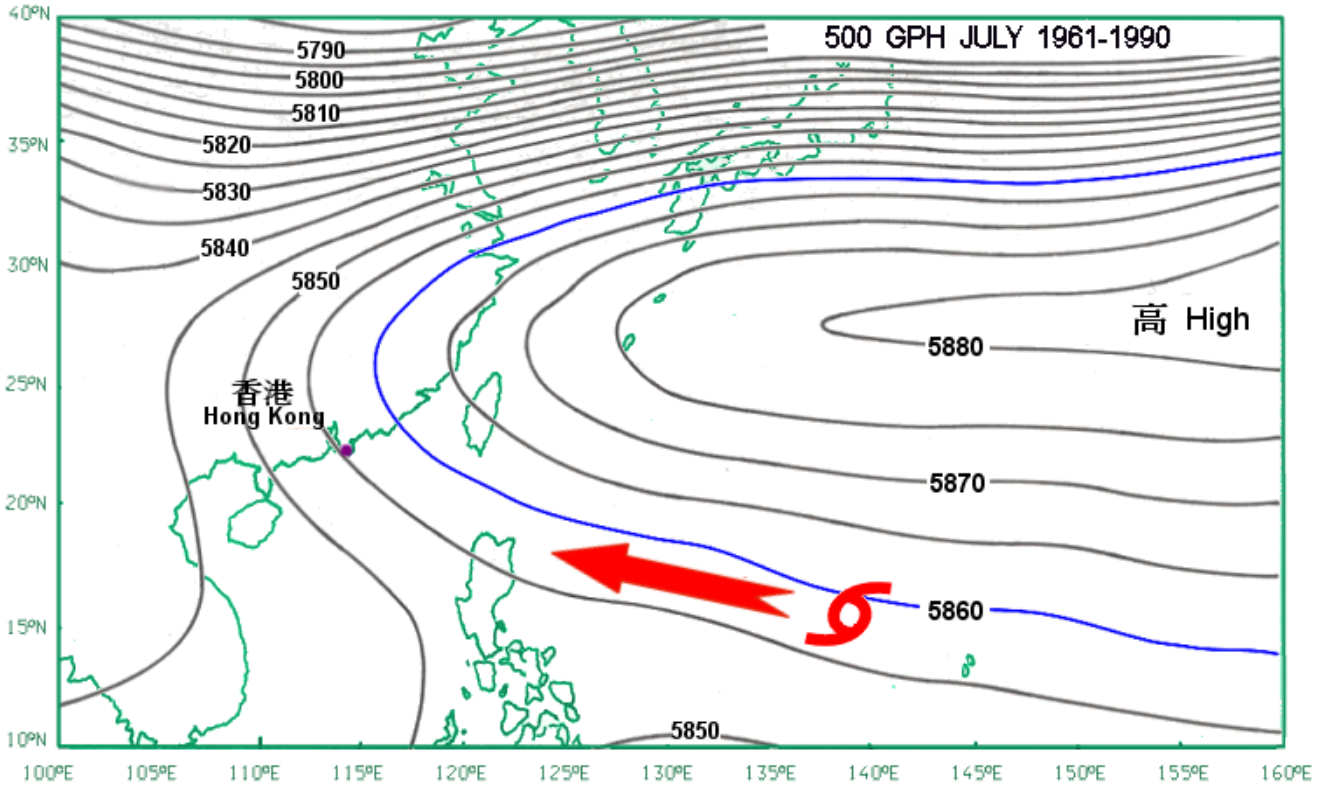


圖 2.3.a 一九六一至一九九零年七月份500百帕斯卡的平均位勢高度，紅色箭咀為熱帶氣旋引導氣流的方向。(資料來源：美國國家海洋大氣局)

Figure 2.3.a Mean 500 hPa geopotential height for the months of July from 1961 to 1990. The red arrow shows the direction of the steering flow for tropical cyclones. (Source: National Oceanic and Atmospheric Administration, USA)

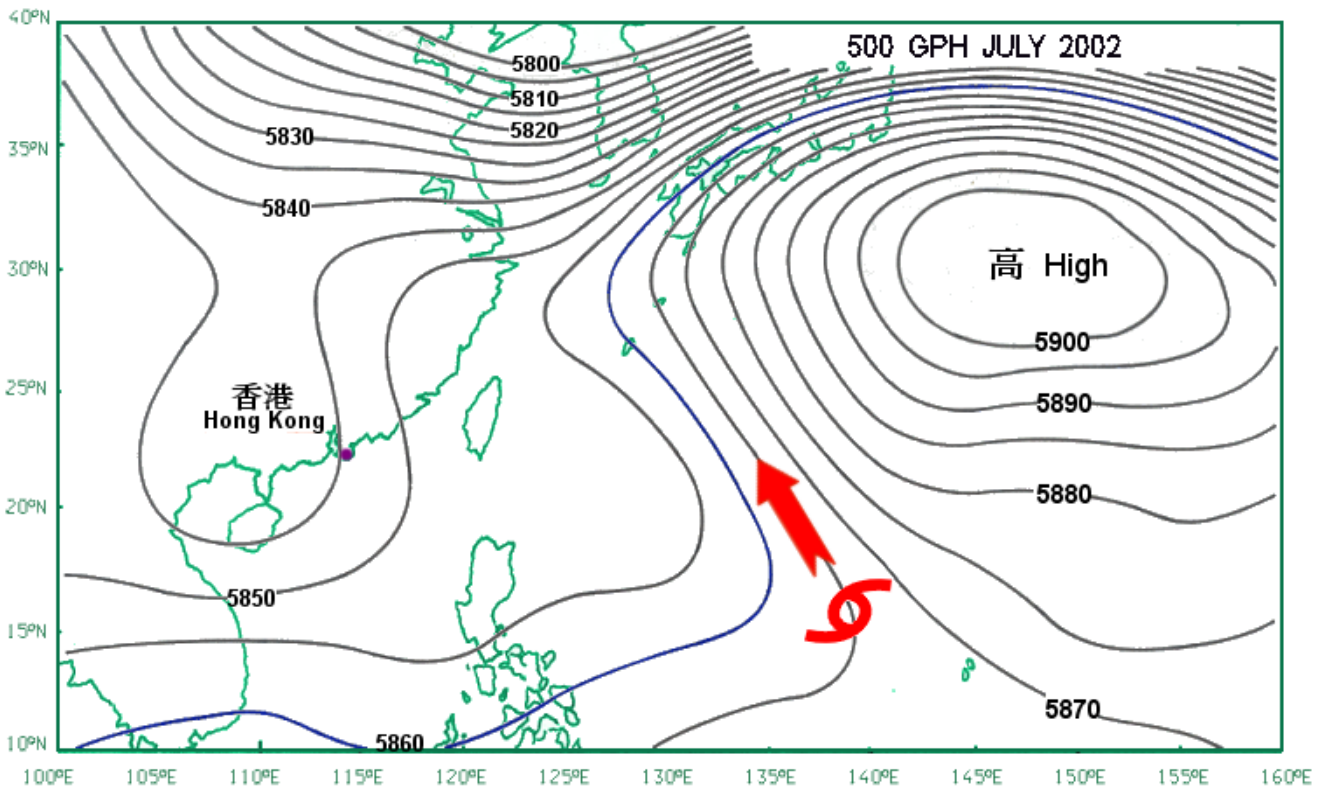


圖 2.3.b 二零零二年七月500百帕斯卡的平均位勢高度，紅色箭咀為熱帶氣旋引導氣流的方向。(資料來源：美國國家海洋大氣局)

Figure 2.3.b Mean 500 hPa geopotential height for July 2002. The red arrow shows the direction of the steering flow for tropical cyclones. (Source: National Oceanic and Atmospheric Administration, USA)

表 2.1 在香港責任範圍內 (10°-30°N, 105°-125°E), 熱帶氣旋出現之每月分佈 (以熱帶氣旋在該月初次出現為準)

TABLE 2.1 MONTHLY DISTRIBUTION OF THE OCCURRENCE OF TROPICAL CYCLONES IN HONG KONG'S AREA OF RESPONSIBILITY (10° - 30°N, 105° - 125°E), BASED ON THE FIRST OCCURRENCE OF THE TROPICAL CYCLONE IN THE MONTH

年份 Year	月份 Month												共 Total
	一月	二月	三月	四月	五月	六月	七月	八月	九月	十月	十一月	十二月	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1961					3	5	2	5	4	3	1	1	24
1962					3		4	5	4	1	3		20
1963						3	3	3	2			2	13
1964					1	1	5	3	6	3	6	1	26
1965	1				2	3	4	3	2		1		16
1966					2		5	2	3	2	2	1	17
1967			1	1		1	2	6	1	2	3		17
1968							2	4	2	1	3		12
1969							3	3	4	1			11
1970		1				2	2	3	4	5	3		20
1971				1	2	2	5	3	3	4			20
1972	1					3	2	4	2	1	1	1	15
1973							4	4	2	4	3		17
1974						3	2	4	2	4	4	2	21
1975	1					1		3	2	3	1	1	12
1976					1	1	1	4	1		1	1	10
1977						1	4	1	3		1		10
1978	1			1		2	2	4	5	4	1		20
1979				1	2	1	3	5	2	2	1	1	18
1980			1		3	1	5	2	3	1	1		17
1981						3	3	3	1	1	3	1	15
1982			2		1	1	3	3	3	1		2	16
1983						1	3	1	3	5	2		15
1984						2	2	4	2	2	2		14
1985						2	2	2	4	4	1		15
1986					1	1	1	4	1	3	3	2	16
1987						1	3	2	1	1	3	1	12
1988	1				1	3	1	1	2	5	2	1	17
1989					2	1	4	2	4	3	1		17
1990					1	4	2	3	3	3	2		18
1991				1	1	1	3	2	2	1	3		14
1992						2	3	2	2	2			11
1993						1	1	2	3	2	2	3	14
1994				1	1	2	6	5	2	2		1	20
1995						1	1	5	5	3	1	1	17
1996		1		1	2		3	3	2	1	2		15
1997					1		1	4	1	2	1		10
1998							1	3	4	3	3	1	15
1999				1		1	1	2	3	2	1	1	12
2000					2	1	3	5	3	3	2	1	20
2001					1	2	4	2	2	1	1	1	14
2002	1					1	3	2	3				10
正常 Normal	0.2	0.0	0.1	0.1	0.8	1.6	2.8	3.2	2.7	2.3	1.8	0.6	16.4

表 2.2 影響香港的熱帶氣旋之每月分佈

TABLE 2.2 MONTHLY DISTRIBUTION OF TROPICAL CYCLONES AFFECTING HONG KONG









年份 Year	月份 # Month #												共 Total
	一月	二月	三月	四月	五月	六月	七月	八月	九月	十月	十一月	十二月	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1961					1		3		2				6
1962							2	1		1			4
1963						1	1	1	1				4
1964					1	1		1	4	3			10
1965						1	2		2		1		6
1966					1		3	1	1				6
1967				1		1	1	3		1	1		8
1968							1	3	2				6
1969							1		2	1			4
1970							1	2	1	2			6
1971					1	2	3	1	1	1			9
1972						2	1	1			1		5
1973							2	3	2	2			9
1974						2	1		2	4	1	1	11
1975						1		1	2	3			7
1976						1	1	2	1				5
1977						1	3	1	3				8
1978				1			1	2	2	2			8
1979							2	2	2				6
1980					1	1	4	1	2	1			10
1981						1	2	1	1				5
1982						1	2		1	1			5
1983							3		2	2			7
1984						1	1	2	1				5
1985						1	1		2	1			5
1986							1	2		1			4
1987						1		2	1	1			5
1988					1	1	1		1	2			6
1989					1	1	2		1	2			7
1990					1	2	1	1	1				6
1991							3	1	2				6
1992						1	3	1					5
1993						1	1	2	3	1	1		9
1994						2		1	1				4
1995							1	4	2	1			8
1996							2	2	2	1			7
1997							1	1					2
1998								2	1	2			5
1999				1		1	1	1	3	1			8
2000						1	2	2	1		1		7
2001						2	2	1	1				6
2002								2	1				3
正常 Normal	0.0	0.0	0.0	0.1	0.3	0.8	1.6	1.1	1.4	1.0	0.1	0.0	6.4

熱帶氣旋警告信號首次發出的月份。

The month that the tropical cyclone warning signal was first issued.

表 2.3 香港各熱帶氣旋警告信號之意義

TABLE 2.3 MEANING OF ALL TROPICAL CYCLONE WARNING SIGNALS IN HONG KONG

信號 Signal		顯示符號 Symbol Display	信號之意義 Meaning of the Signal
戒備 Standby	1		有一熱帶氣旋集結於香港約800公里之範圍內，稍後可能影響香港。 A tropical cyclone is centred within about 800 kilometres (km) of Hong Kong and may later affect Hong Kong.
強風 Strong Wind	3		維多利亞港內吹強風或將有強風，持續風力每小時41-62公里，陣風可能超過每小時110公里。 Strong wind is expected or blowing in the Victoria harbour, with a sustained speed of 41-62 kilometres per hour (km/h), and gusts which may exceed 110 km/h.
西北 烈風或暴風 NW'LY Gale or Storm	8 西北 NW		維多利亞港內風力已達或將達每小時63-117公里之烈風或暴風程度，由所指之方向吹襲，而陣風可能超過每小時180公里。 Gale or storm force wind is expected or blowing in the Victoria harbour, with a sustained wind speed of 63-117 km/h from the quarter indicated and gusts which may exceed 180 km/h.
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		風力已達或將達颶風程度。即持續風力每小時118公里或以上，而陣風可能超過每小時220公里。 Hurricane force wind is expected or blowing, with sustained speed reaching upwards from 118 km/h and with gusts that may exceed 220 km/h.