3.2 熱帶風暴洛克 (1707)：二零一七年七月二十一日至二十三日

洛克是二零一七年第二個影響香港並導致香港天文台需要發出八號烈風或暴風信號的熱帶氣旋。

洛克是源自七月二十一日下午在呂宋北部以東海域生成的一個熱帶低氣壓。洛克於七月二十二日橫過呂宋海峽，進入南海東北部後採取西北偏西路徑穩定地移向珠三角一帶，傍晚增強為熱帶風暴並達到其最高強度，中心附近最高持續風速估計為每小時65公里。洛克於七月二十三日早上橫過香港東北部，日間減弱為熱帶低氣壓，傍晚在廣東內陸減弱為一個低壓區。

根據報章報導，洛克為廣東帶來狂風驟雨。一艘貨船在香港以東約70公里的水域沉沒，船上12名船員獲救。

香港天文台在七月二十二日下午3時40分發出一號戒備信號，當時洛克集結在香港之東南偏東約460公里。隨著洛克迅速移近珠三角一帶，天文台在七月二十三日上午3時40分發出三號強風信號，當時洛克位於香港之東南偏東約150公里。本港風勢逐漸增強，吹和緩至清勁偏北風，高地間中吹強風。洛克靠近香港時，在其路徑右方的氣象浮標、船隻以及大鵬半島的氣象站和其中心附近的石油平台均錄得烈風。由於洛克會在早上相當接近香港，對本港構成威脅，天文台在早上9時20分發出八號西北烈風或暴風信號，當時洛克集結在香港天文台之東北偏東約35公里。

洛克於早上9時40分左右在西貢附近登陸前採取較西北之路徑移動，香港絕大部分地區因而免受其環流右方的烈風吹襲，期間只有塔門和部分高地曾錄得達烈風程度的陣風。洛克約在早上10時最接近天文台總部，當時它位於天文台之東北約25公里。隨著洛克開始遠離並減弱，天文台在下午1時20分改發三號強風信號，並於當日下午3時10分改發一號戒備信號。天文台在晚上7時40分取消所有熱帶氣旋警告信號。在熱帶氣旋警告信號生效期間，本港八個參考測風站的持續風力均未有達到強風程度。

在洛克的影響下，尖鼻咀錄得最高潮位(海圖基準面以上) 3.18米及最大風暴潮(天文潮高度以上)0.28米。各站錄得的最低瞬時海平面氣壓如下：

站	最低瞬時海平面氣壓 (百帕斯卡)	日期/月份	時間
香港天文台總部	1004.0	23/7	上午 9 時 47 分
京士柏	1003.7	23/7	上午 9 時 49 分
打鼓嶺	1002.5	23/7	上午 10 時 25 分
大埔	1003.1	23/7	上午 9 時 53 分
沙田	1003.3	23/7	上午 9 時 21 分
上水	1003.1	23/7	上午 9 時 48 分
流浮山	1004.0	23/7	上午 10 時 05 分
長洲	1004.3	23/7	上午 8 時 18 分
橫瀾島	1003.3	23/7	上午 8 時 12 分

七月二十二日本港日間部分時間有陽光及天氣酷熱。受洛克相關的雨帶影響，七月二十三日及二十四日凌晨本港間中有狂風大驟雨及雷暴。天文台在七月二十三日晚上曾發出黃色暴雨警告。七月二十四日日間天氣好轉，部分時間有陽光。這三天期間，本港大部分地區錄得超過 40 毫米雨量。

洛克吹襲香港期間並沒有造成嚴重破壞。香港國際機場有超過550班航班取消或延誤。

表3.2.1 - 3.2.3分別是洛克影響香港期間各站錄得的最高風速、香港的日雨量及最高潮位資料。圖3.2.1 - 3.2.2分別為洛克的路徑圖和本港的雨量分佈圖。圖3.2.3顯示香港各站錄得的風向和風速。圖3.2.4為塔門及大美督錄得的風向及風速變化。圖3.2.5顯示塔門錄得的十分鐘平均風速。圖3.2.6顯示打鼓嶺錄得的海平面氣壓。圖3.2.7 - 3.2.8分別為洛克的衛星及雷達圖像。

3.2 Tropical Storm Roke (1707): 21 – 23 July 2017

Roke was the second tropical cyclone affecting Hong Kong in 2017 and necessitating issuance of the No. 8 Gale or Storm Signal by the Hong Kong Observatory.

Roke originated from a tropical depression that developed over the sea areas east of northern Luzon on the afternoon of 21 July. It moved across the Luzon Strait on 22 July and after entering the northeastern part of the South China Sea, took on a west-northwestward course and headed steadily towards the Pearl River Delta. It intensified into a tropical storm that evening, reaching its peak intensity with an estimated sustained wind of 65 km/h near its centre. Roke swept past the northeastern part of Hong Kong on the morning of 23 July and weakened into a tropical depression during the day. It finally degenerated into an area of low pressure over inland Guangdong in the evening.

According to press reports, Roke brought squally showers to Guangdong during its passage. A vessel sunk over the seas about 70 km east of Hong Kong and all 12 crew members on board were rescued.

In Hong Kong, the No. 1 Standby Signal was issued at 3:40 p.m. on 22 July when Roke was about 460 km east-southeast of the territory. As Roke moved rapidly towards the Pearl River Delta, the No. 3 Strong Wind Signal was issued at 3:40 a.m. on 23 July when Roke was about 150 km east-southeast of Hong Kong. Local wind strengthened gradually, becoming moderate to fresh northerlies and occasionally reaching strong force on high ground. As Roke approached Hong Kong, gale winds were recorded near its centre from oil rig and on the right side along its path from weather buoy, ship, as well as weather stations at the Dapeng Peninsula. With Roke coming very close to Hong Kong in the morning and posing a threat to the territory, the Observatory issued the No. 8 Northwest Gale or Storm Signal at 9:20 a.m. on 23 July when it was about 35 km east-northeast of the Hong Kong Observatory.

Roke turned slightly more to the northwest as it made landfall near Sai Kung around 9:40 a.m. and as a result, Hong Kong for the most part was not exposed to the gale on the right side of its circulation. Only Tap Mun and some places on high ground reported gust reaching gale force during its passage. Roke came closest to the Hong Kong Observatory Headquarters around 10 a.m. that morning with its centre located about 25 km to the northeast. With Roke moving away and weakening, the No. 3 Strong Wind Signal was issued at 1:20 p.m. on 23 July, followed by the No. 1 Standby Signal at 3:10 p.m. All tropical cyclone warning signals were cancelled at 7:40 p.m. that evening. Sustained wind speed of all eight reference anemometers did not reach strong force when the tropical cyclone warning signals for Roke were in force.

Under the influence of Roke, a maximum sea level (above chart datum) of 3.18 m and a maximum storm surge (above astronomical tide) of 0.28 m were recorded at Tsim Bei Tsui. The lowest instantaneous mean sea-level pressures recorded at some selected stations are as follows:

Station	Lowest instantaneous mean sea-level pressure (hPa)	Date/Month	Time
Hong Kong Observatory Headquarters	1004.0	23/7	9:47 a.m.
King's Park	1003.7	23/7	9:49 a.m.
Ta Kwu Ling	1002.5	23/7	10:25 a.m.
Tai Po	1003.1	23/7	9:53 a.m.
Shatin	1003.3	23/7	9:21 a.m.
Sheung Shui	1003.1	23/7	9:48 a.m.
Lau Fau Shan	1004.0	23/7	10:05 a.m.
Cheung Chau	1004.3	23/7	8:18 a.m.
Waglan Island	1003.3	23/7	8:12 a.m.

Locally, it was very hot with sunny periods during the day on 22 July. The rainbands associated with Roke brought occasional heavy squally showers and thunderstorms to Hong Kong on 23 July that lasted till the small hours of 24 July. Amber Rainstorm Warning was issued on the night of 23 July. The weather improved during the day on 24 July with sunny periods. More than 40 millimetres of rainfall were recorded over most parts of Hong Kong during these three days.

Roke did not cause any significant damage in Hong Kong. More than 550 flights were cancelled or delayed at the Hong Kong International Airport.

Information on the maximum wind, daily rainfall and maximum sea level reached in Hong Kong during the passage of Roke is given in Tables 3.2.1 - 3.2.3 respectively. Figures 3.2.1 - 3.2.2 show respectively the track of Roke and the rainfall distribution for Hong Kong. Figure 3.2.3 shows the winds recorded at various stations in Hong Kong. Figure 3.2.4 shows the wind direction and speed recorded at Tap Mun and Tai Mei Tuk. Figure 3.2.5 shows the trace of 10-minute wind speed recorded at Tap Mun. Figure 3.2.6 shows the trace of mean sea-level pressure recorded at Ta Kwu Ling. Figures 3.2.7 - 3.2.8 show respectively a satellite imagery and a radar imagery of Roke.

表 3.2.1　在洛克影響下，本港各站在熱帶氣旋警告信號生效時所錄得的最高陣風、最高每小時平均風速及風向

Table 3.2.1　Maximum gust peak speeds and maximum hourly mean winds with associated wind directions recorded at various stations when the tropical cyclone warning signals for Roke were in force

站 (參閱圖 1.1) Station (See Fig. 1.1)		最高陣風 Maximum Gust					最高每小時平均風速 Maximum Hourly Mean Wind				
		風向 Direction		風速(公里/時) Speed (km/h)	日期/月份 Date/Month	時間 Time	風向 Direction		風速(公里/時) Speed (km/h)	日期/月份 Date/Month	時間 Time
黃麻角(赤柱)	Bluff Head (Stanley)	東	E	38	23/7	15:23	東	E	20	23/7	16:00
中環碼頭	Central Pier	東南偏東	ESE	40	23/7	15:37	東	E	25	23/7	16:00
長洲	Cheung Chau	東南偏東	ESE	52	23/7	15:53	東南偏東	ESE	34	23/7	17:00
長洲泳灘	Cheung Chau Beach	東	E	49	23/7	15:55	東	E	36	23/7	17:00
青洲	Green Island	西北偏北	NNW	59	23/7	08:05	西北偏北	NNW	40	23/7	09:00
香港國際機場	Hong Kong International Airport	東南偏東	ESE	41	23/7	16:44	東南偏東	ESE	27	23/7	17:00
啟德	Kai Tak	東北偏東	ENE	45	23/7	15:37	西北偏西	WNW	22	23/7	09:00
京士柏	King's Park	北	N	41	23/7	07:13	東南偏東	ESE	13	23/7	15:00
							東南	SE	13	23/7	16:00
流浮山	Lau Fau Shan	西北偏北	NNW	45	23/7	09:32	西北偏北	NNW	31	23/7	10:00
昂坪	Ngong Ping	東	E	68	23/7	14:08	東	E	41	23/7	19:00
北角	North Point	西南偏西	WSW	40	23/7	09:42	西南偏西	WSW	30	23/7	10:00
		東	E	40	23/7	15:41					
坪洲	Peng Chau	東	E	45	23/7	15:53	東	E	25	23/7	17:00
平洲	Ping Chau	東北偏東	ENE	67	23/7	09:13	東	E	19	23/7	10:00
西貢	Sai Kung	北	N	54	23/7	07:50	北	N	23	23/7	08:00
							北	N	23	23/7	09:00
沙洲	Sha Chau	西北偏北	NNW	41	23/7	09:36	東南偏東	ESE	27	23/7	17:00
沙螺灣	Sha Lo Wan	東南	SE	38	23/7	14:29	東南	SE	14	22/7	20:00
沙田	Sha Tin	北	N	34	23/7	08:08	西南偏南	SSW	14	23/7	11:00
石崗	Shek Kong	東北偏東	ENE	41	23/7	15:20	東北偏東	ENE	19	23/7	16:00
九龍天星碼頭	Star Ferry (Kowloon)	東	E	40	23/7	15:51	西	W	27	23/7	10:00
打鼓嶺	Ta Kwu Ling	西北偏北	NNW	34	23/7	09:05	西北偏北	NNW	14	23/7	10:00
大美督	Tai Mei Tuk	東北偏北	NNE	62	23/7	08:37	東	E	31	23/7	15:00
大帽山	Tai Mo Shan	北	N	70	23/7	09:20	東南	SE	49	23/7	14:00
		東南	SE	70	23/7	13:21	東南偏東	ESE	49	23/7	17:00
		東南	SE	70	23/7	13:26					
大埔滘	Tai Po Kau	西	W	47	23/7	09:36	東	E	25	23/7	16:00
塔門*	Tap Mun*	北	N	72	23/7	09:18	東	E	36	23/7	15:00
大老山	Tate's Cairn	北	N	68	23/7	07:55	北	N	45	23/7	08:00
將軍澳	Tseung Kwan O	西北偏北	NNW	40	23/7	08:30	西北偏北	NNW	14	23/7	08:00
							西北偏北	NNW	14	23/7	09:00
青衣島蜆殼油庫	Tsing Yi Shell Oil Depot	西北	NW	38	23/7	06:58	東南	SE	19	22/7	16:00
		西北	NW	38	23/7	07:00	東南	SE	19	22/7	17:00
		西北	NW	38	23/7	07:10	西北	NW	19	23/7	08:00
屯門政府合署	Tuen Mun Government Offices	東南	SE	31	23/7	13:37	東南偏南	SSE	16	22/7	16:00
橫瀾島	Waglan Island	西北偏北	NNW	59	23/7	07:57	西北偏北	NNW	40	23/7	08:00
濕地公園	Wetland Park	北	N	30	23/7	08:54	西北偏北	NNW	12	23/7	10:00
		北	N	30	23/7	08:58					
		北	N	30	23/7	09:02					
黃竹坑	Wong Chuk Hang	東	E	34	23/7	16:05	東	E	12	23/7	16:00

*新塔門測風站在 2017 年 7 月 6 日取代在塔門警崗屋頂的舊測風站

*The old wind station on the rooftop of Tap Mun Police Post is replaced by the new Tap Mun station on 6 July 2017.

表 3.2.2　洛克掠過期間，香港天文台總部及其他各站所錄得的日雨量
Table 3.2.2　Daily rainfall amounts recorded at the Hong Kong Observatory Headquarters and other stations during the passage of Roke

站 (參閱圖 3.2.2) Station (See Fig. 3.2.2)			七月二十二日 22 July	七月二十三日 23 July	七月二十四日 24 July	總雨量 (毫米) Total (mm)
香港天文台 Hong Kong Observatory			3.3	46.5	3.3	53.1
香港國際機場 Hong Kong International Airport (HKA)			0.4	9.1	1.6	11.1
長洲 Cheung Chau (CCH)			1.0	9.0	0.5	10.5
H23	香港仔	Aberdeen	0.5	48.5	4.5	53.5
N05	粉嶺	Fanling	5.0	32.5	8.5	46.0
N13	糧船灣	High Island	14.5	36.0	21.5	72.0
K04	佐敦谷	Jordan Valley	0.0	19.0	17.5	36.5
N06	葵涌	Kwai Chung	0.0	14.5	8.0	22.5
H12	半山區	Mid Levels	4.5	70.5	11.0	86.0
N09	沙田	Sha Tin	5.5	31.0	9.0	45.5
H19	筲箕灣	Shau Kei Wan	2.0	29.5	7.5	39.0
SEK	石崗	Shek Kong	[0.5]	[17.5]	[5.0]	[23.0]
K06	蘇屋邨	So Uk Estate	1.0	17.5	6.5	25.0
R31	大美督	Tai Mei Tuk	[0.5]	[27.5]	[35.5]	[63.5]
R21	踏石角	Tap Shek Kok	[0.0]	[30.0]	[4.5]	[34.5]
TMR	屯門水庫	Tuen Mun Reservoir	[0.1]	46.0	16.4	[62.5]
N17	東涌	Tung Chung	0.0	17.0	2.5	19.5

註 : [ ] 基於不完整的每小時雨量數據。Note : [ ] based on incomplete hourly data.

表 3.2.3　洛克掠過期間，香港各潮汐站所錄得的最高潮位及最大風暴潮
Table 3.2.3　Times and heights of the maximum sea level and the maximum storm surge recorded at tide stations in Hong Kong during the passage of Roke

站 (參閱圖 1.1) Station (See Fig. 1.1)		最高潮位 (海圖基準面以上) Maximum sea level (above chart datum)			最大風暴潮 (天文潮高度以上) Maximum storm surge (above astronomical tide)		
		高度(米) Height (m)	日期/月份 Date/Month	時間 Time	高度(米) Height (m)	日期/月份 Date/Month	時間 Time
鰂魚涌	Quarry Bay	2.66	23/7	08:53	0.19	23/7	08:53
石壁	Shek Pik	2.75	23/7	08:04	0.22	23/7	08:03
大廟灣	Tai Miu Wan	2.61	23/7	09:06	0.26	23/7	09:07
尖鼻咀	Tsim Bei Tsui	3.18	23/7	09:04	0.28	23/7	09:04
橫瀾島	Waglan Island	2.71	23/7	08:58	0.22	23/7	18:33

大埔滘 - 沒有資料　Tai Po Kau - data not available

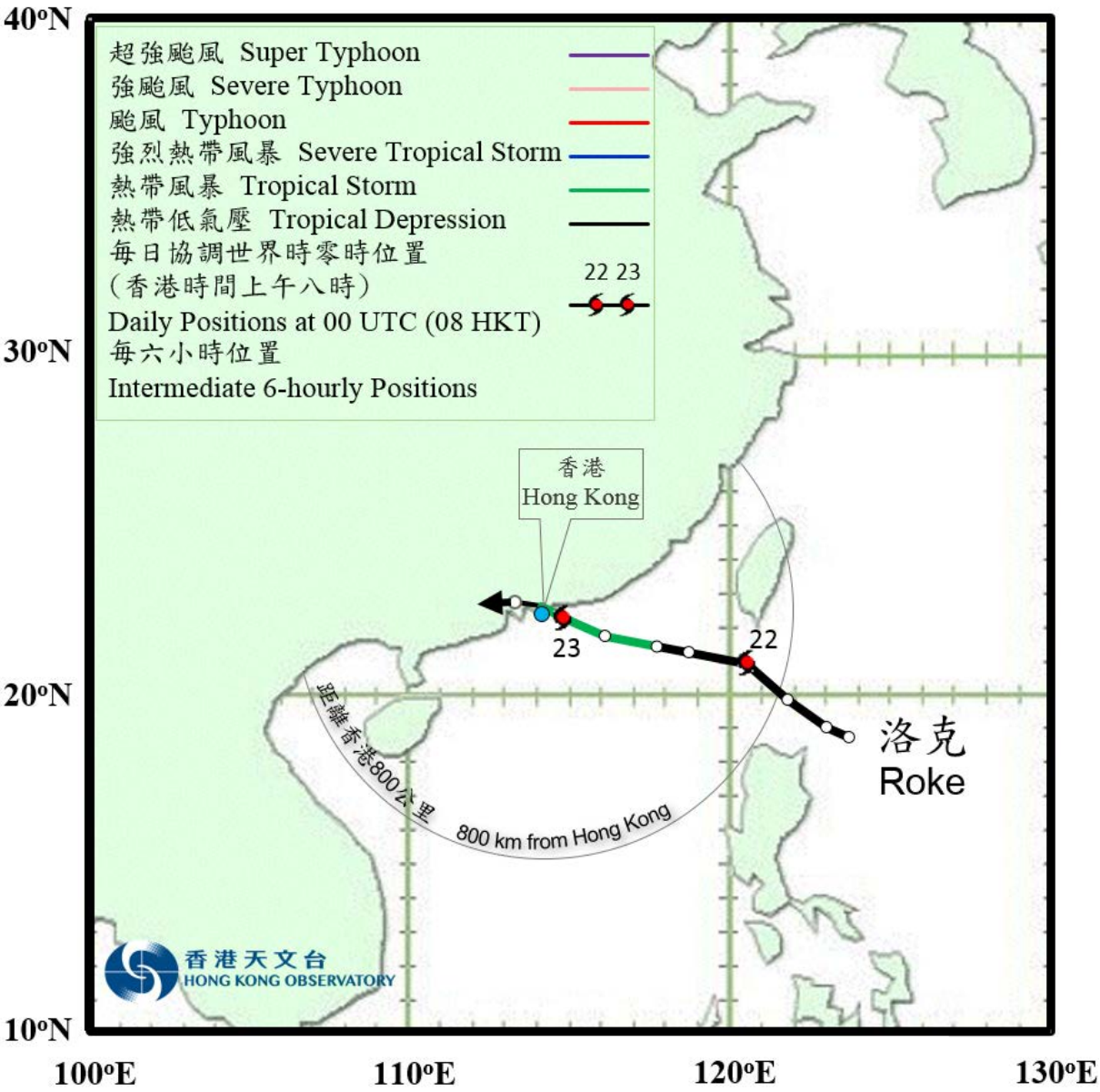

圖 3.2.1a　　二零一七年七月二十一日至二十三日洛克的路徑圖。

Figure 3.2.1a　　Track of Roke on 21 – 23 July 2017.

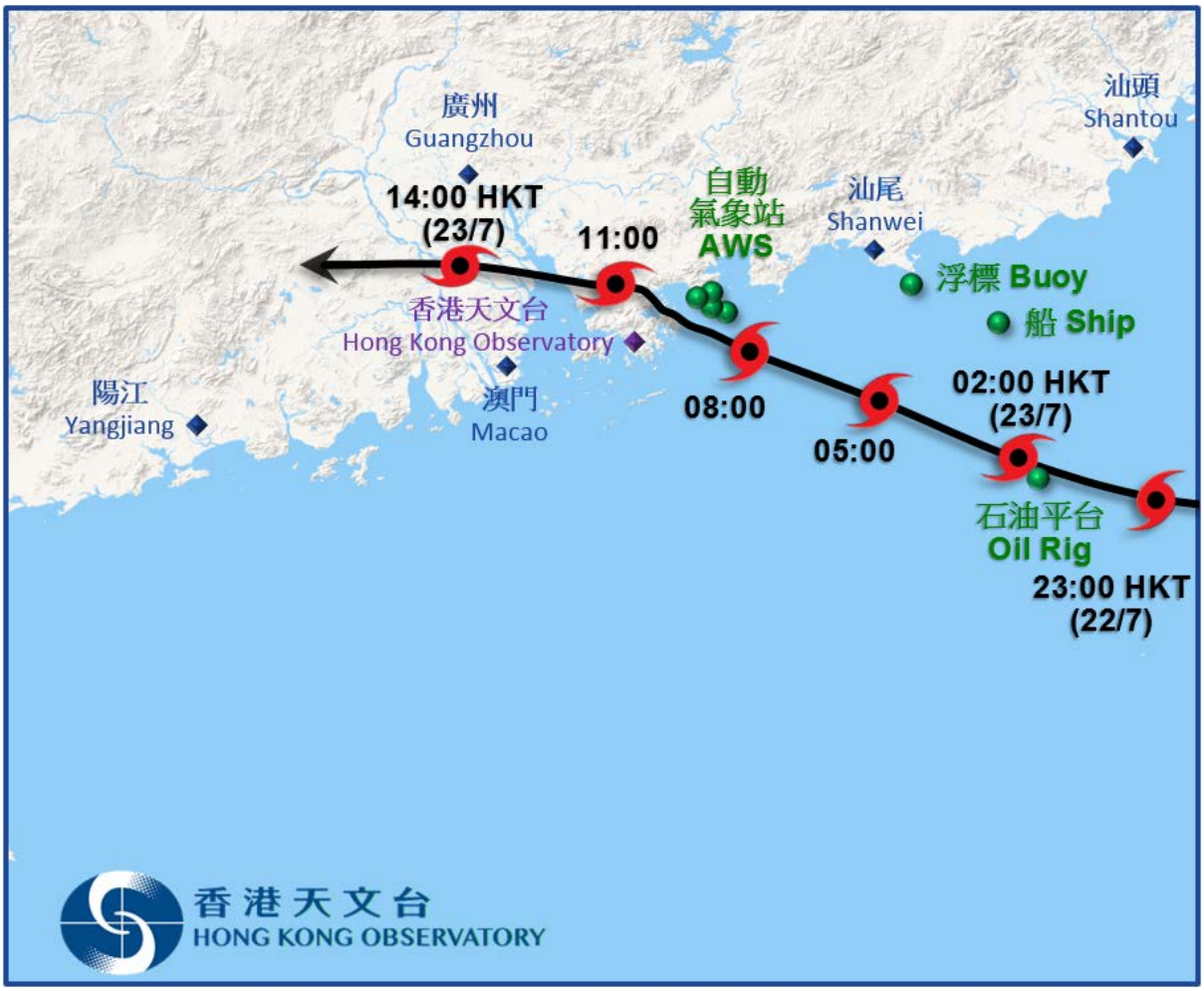

圖 3.2.1b　　洛克接近香港時的路徑圖。綠點顯示在洛克附近的烈風報告。

Figure 3.2.1b　　Track of Roke approaching Hong Kong. Green dots represent reports of gales near Roke.

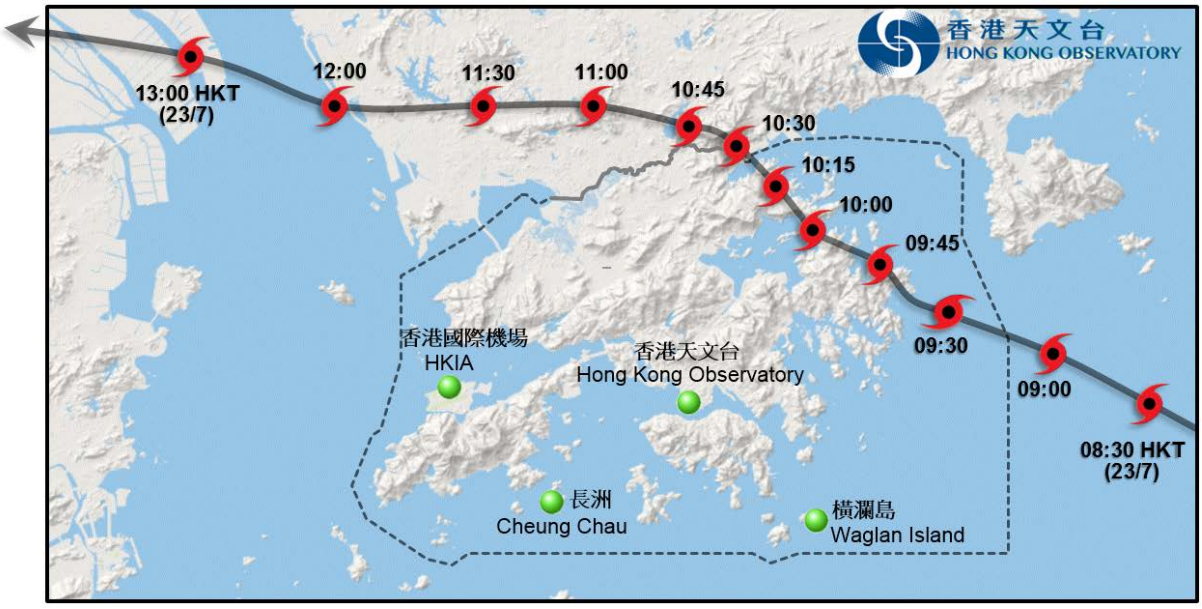

圖 3.2.1c　　洛克橫過香港時的路徑圖。

Figure 3.2.1c　　Track of Roke moving across Hong Kong.

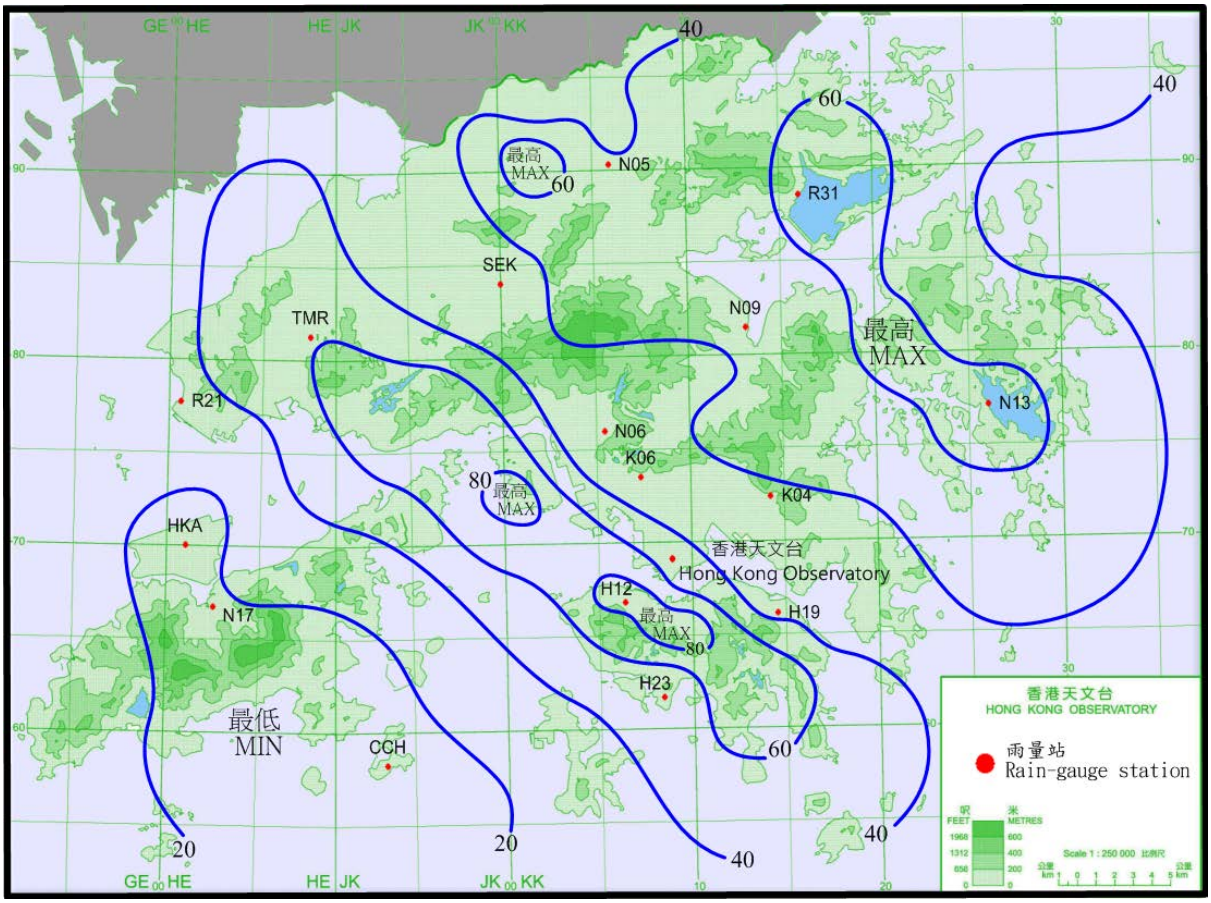

圖 3.2.2　　二零一七年七月二十二日至二十四日的雨量分佈(等雨量線單位為毫米)。

Figure 3.2.2　Rainfall distribution on 22 - 24 July 2017 (isohyets in millimetres).

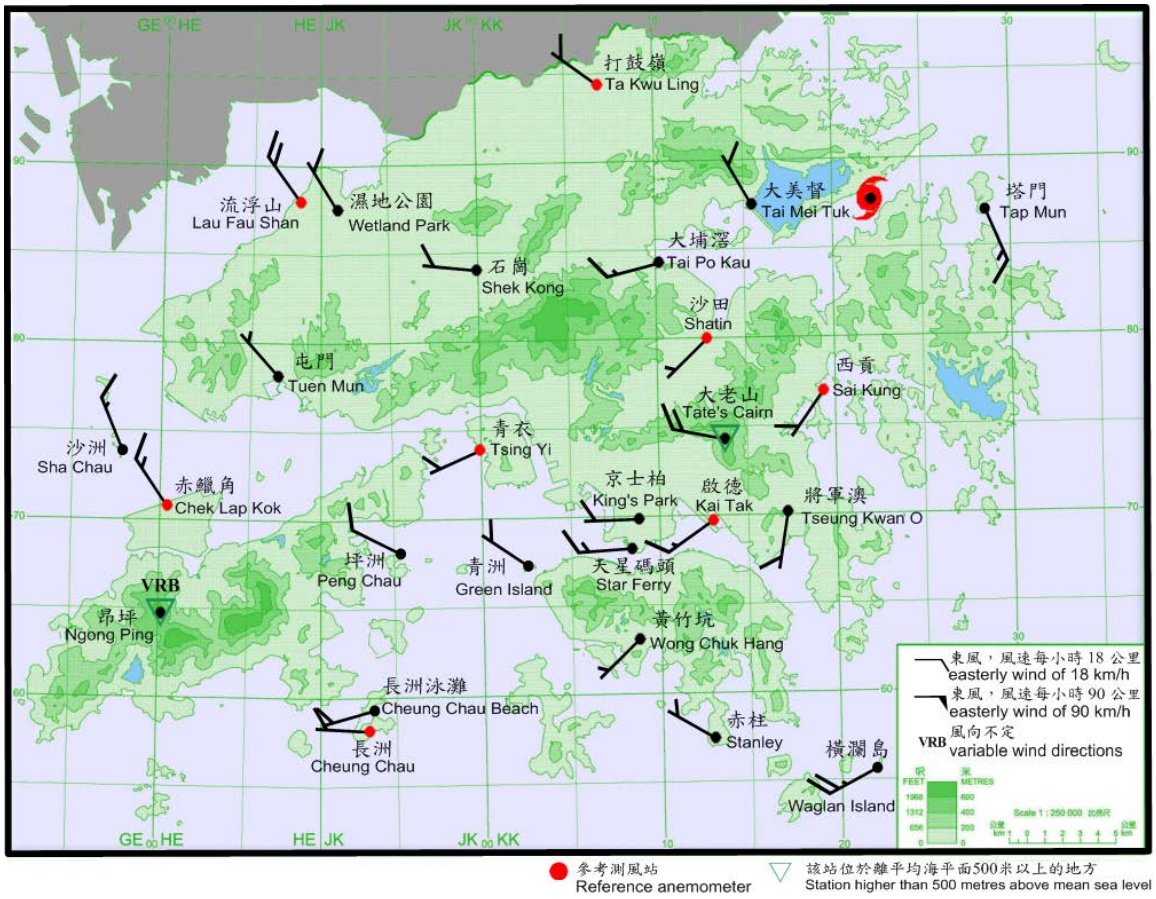

圖 3.2.3　　二零一七年七月二十三日上午 10 時正香港各站錄得的十分鐘平均風向和風速。當時洛克的中心在船灣淡水湖附近，並最接近天文台總部。

Figure 3.2.3　10-minute mean wind direction and speed recorded at various stations in Hong Kong at 10 a.m. on 23 July 2017 when the centre of Roke was near the Plover Cove Reservoir and closest to the Hong Kong Observatory Headquarters.

註：　昂坪當時錄得的十分鐘平均風速分別為每小時 9 公里。

Note:　The 10-minute mean wind speeds recorded at the time at Ngong Ping was 9 km/h.

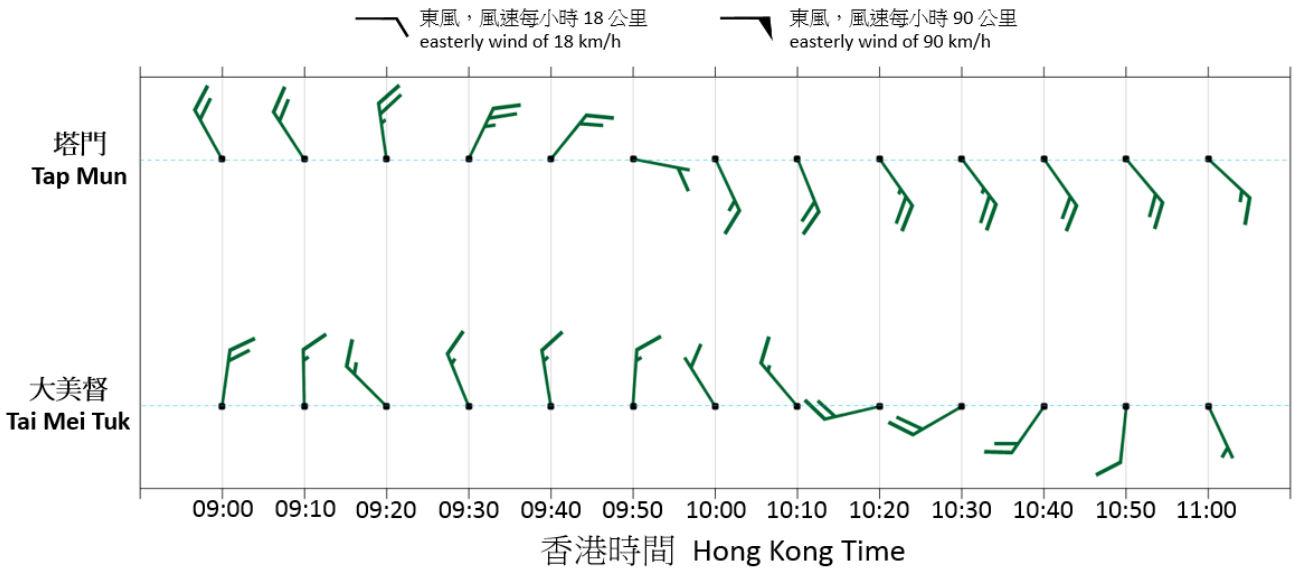

圖 3.2.4　二零一七年七月二十三日上午 9 時至 11 時在塔門及大美督錄得的十分鐘平均風向及風速變化。在洛克橫過本港東北部時，塔門的風向以順時針方向轉變，而大美督的風向則以逆時針方向轉變。

Figure 3.2.4　10-minute mean wind direction and speed recorded at Tap Mun and Tai Mei Tuk between 9 a.m. to 11 a.m. on 23 July 2017. When Roke moved across the northeastern part of Hong Kong, wind direction in Tap Mun shifted in a clockwise direction while that in Tai Mei Tuk turned anti-clockwise.

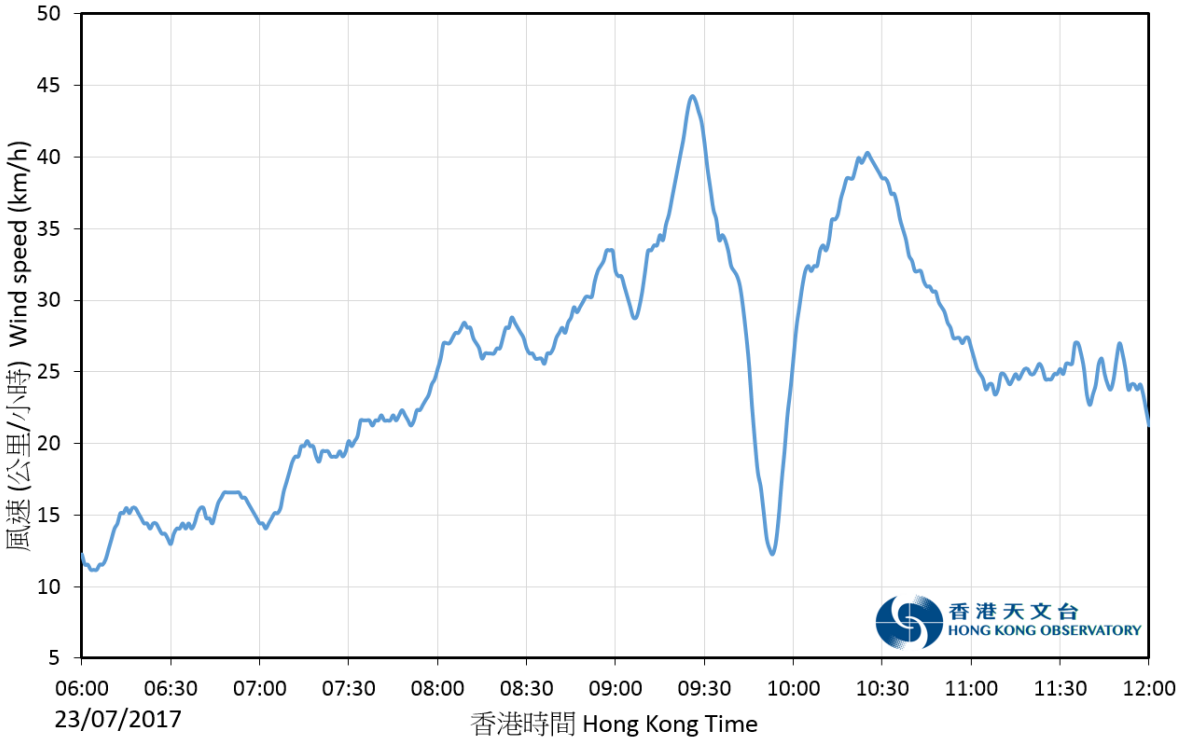

圖 3.2.5　　二零一七年七月二十三日早上在塔門錄得的十分鐘平均風速。

Figure 3.2.5　Trace of 10-minute wind speed at Tap Mun on the morning of 23 July 2017.

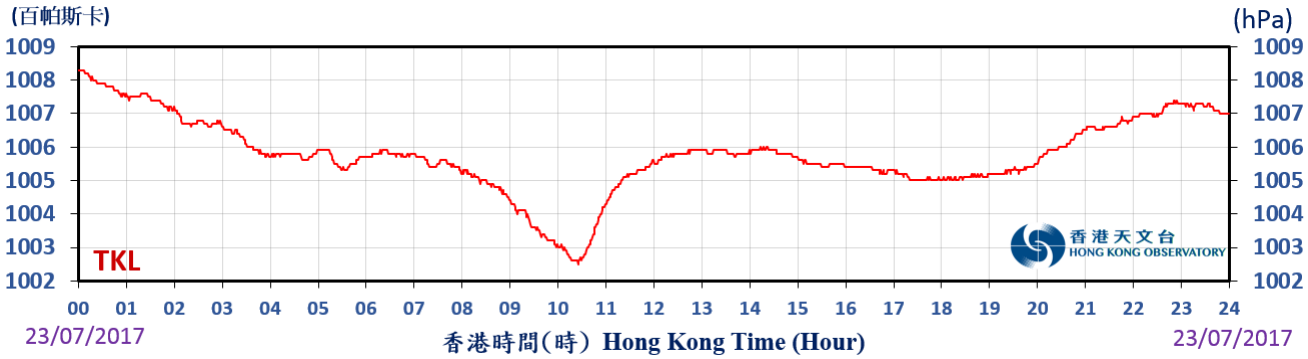

圖 3.2.6　　二零一七年七月二十三日打鼓嶺錄得的海平面氣壓。

Figure 3.2.6　Trace of mean sea-level pressure recorded at Ta Kwu Ling on 23 July 2017.

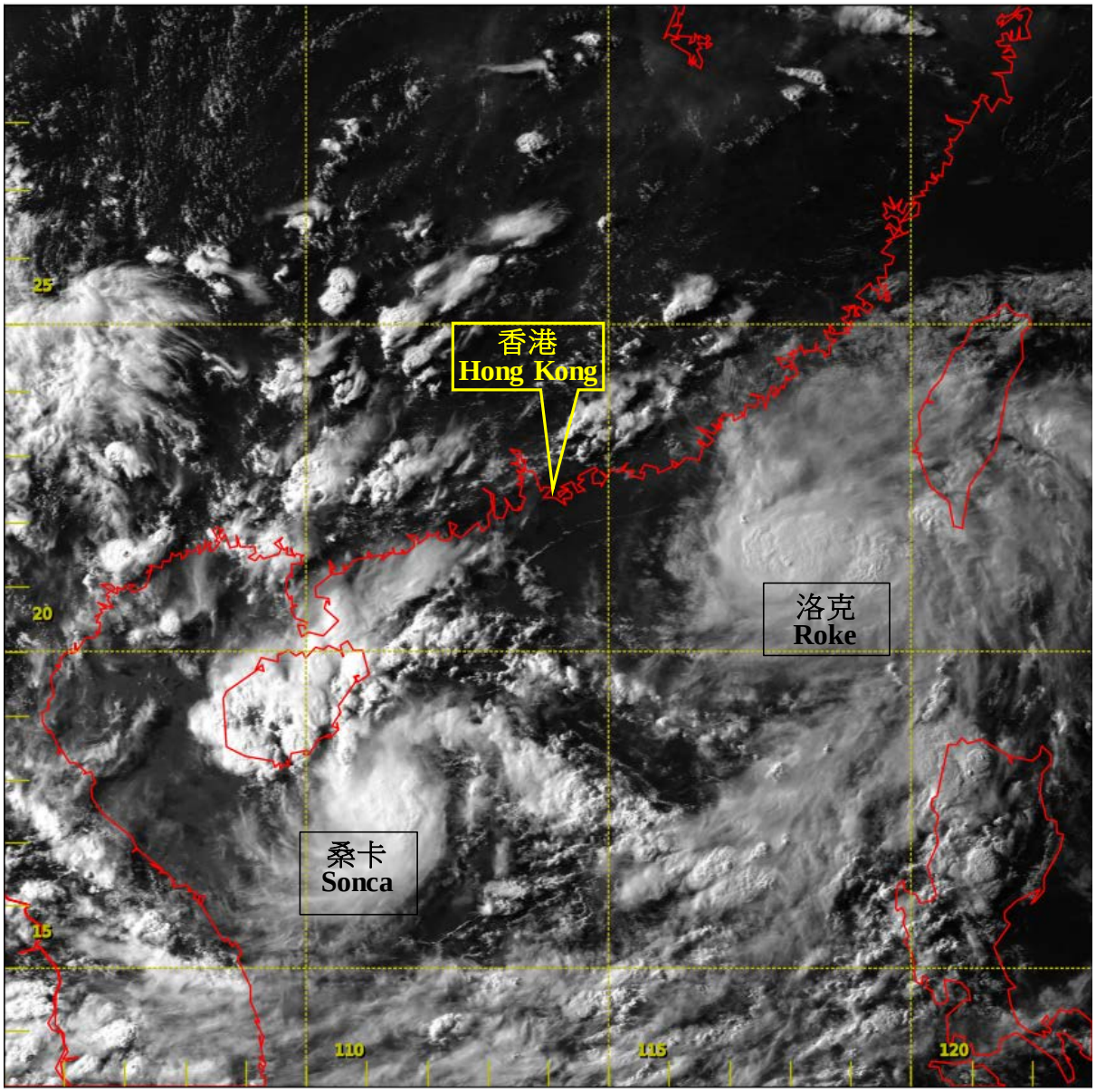

圖 3.2.7　二零一七年七月二十二日下午 5 時左右的可見光衛星圖片，當時洛克達到其最高強度，中心附近最高持續風速估計為每小時 65 公里。而在海南島附近的熱帶氣旋桑卡正向西緩慢移動。

Figure 3.2.7　Visible satellite imagery around 5 p.m. on 22 July 2017, when Roke was at peak intensity with estimated maximum sustained winds of 65 km/h near its centre. Meanwhile, tropical cyclone Sonca near Hainan Island was moving westwards slowly.

〔此衛星圖像接收自日本氣象廳的向日葵 8 號衛星。〕

[The satellite imagery was originally captured by the Himawari-8 (H-8) of Japan Meteorological Agency (JMA).]

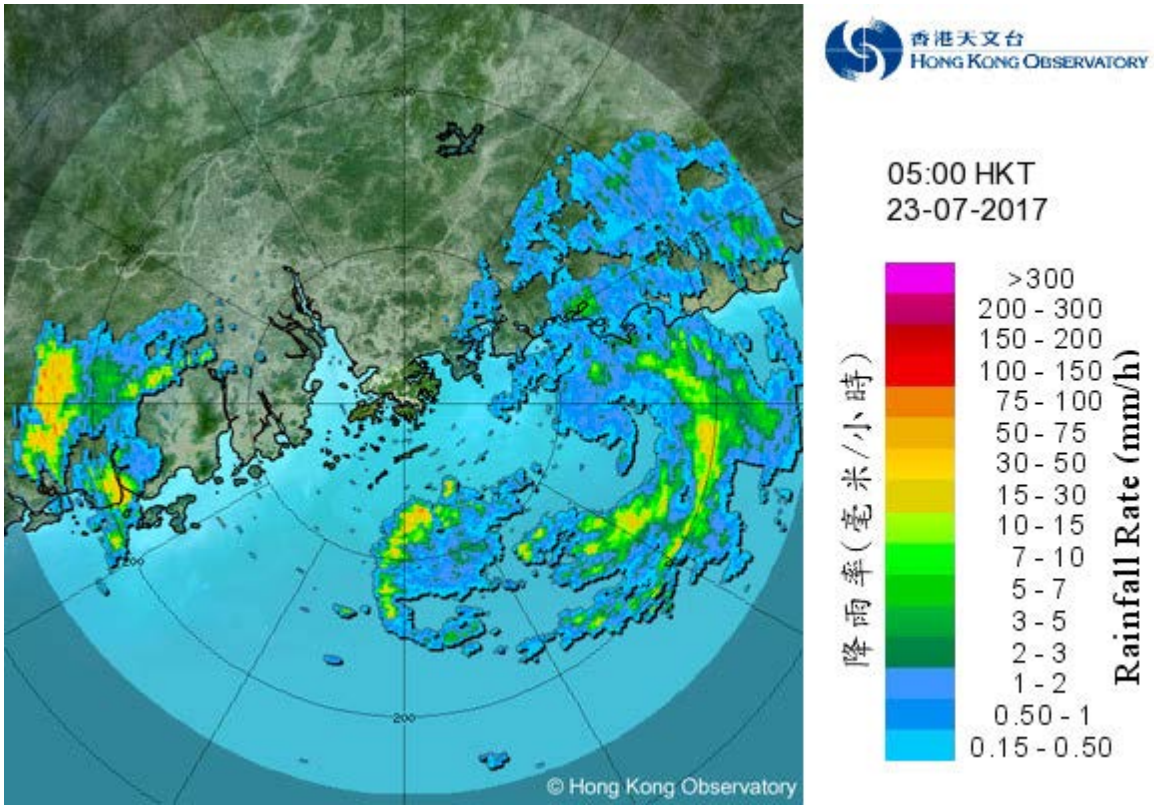

圖 3.2.8　　二零一七年七月二十三日上午 5 時的雷達回波圖像。

Figure 3.2.8　　Image of radar echoes at 5:00 a.m. on 23 July 2017.