



13 October 2018

WEATHER SUPPORTING
SMART AIRPORT
氣象服務@智能機場

Location Specific Weather Forecast 定點天氣預報

27° 97% 9:34

我的天文台

2017年 09月 02日 (星期六)
丁酉, 雞年七月十二日

09:33

尖沙咀

T1

↓26°C 31°C ?

27.5°C

81%

陣風: 14 公里/小時

一小時雨量: 0毫米

紫外線指數: 1(低)

2017-09-02 09:20

Home screen showing current weather for T1 at Tsing Yi. It displays the current temperature (27.5°C), humidity (81%), and wind speed (14 km/h). It also shows a forecast for the day with a high of 31°C and a low of 26°C.

27° 97% 9:34

我的天文台

2017年 09月 02日 (星期六)
丁酉, 雞年七月十二日

09:33

尖沙咀

本港地區今日天氣預測

大致多雲，有幾陣驟雨，稍後雨勢有時較大及有狂風雷暴。最高氣溫約31度。吹和緩偏北風，稍後風勢逐漸增強。

香港九天預報

02/09 (六)	03/09 (日)	04/09 (一)	05/09 (二)	06/09 (三)
☁	☁	☁	☀	☀
31°C	29°C	30°C	32°C	32°C
26°C	26°C	27°C	27°C	28°C

Detailed forecast for Tsing Yi. It includes a text description of the day's weather: "大致多雲，有幾陣驟雨，稍後雨勢有時較大及有狂風雷暴。最高氣溫約31度。吹和緩偏北風，稍後風勢逐漸增強。". Below this is a 9-day forecast table showing weather icons, high/low temperatures, and dates from 02/09 to 06/09.

27° 97% 9:34

我的天文台

2017年 09月 02日 (星期六)
丁酉, 雞年七月十二日

09:33

尖沙咀

電腦自動分區天氣 (尖沙咀)

30°C 31°C 30°C 28°C 28°C 28°C

11:00 14:00 17:00 20:00 23:00 02:00

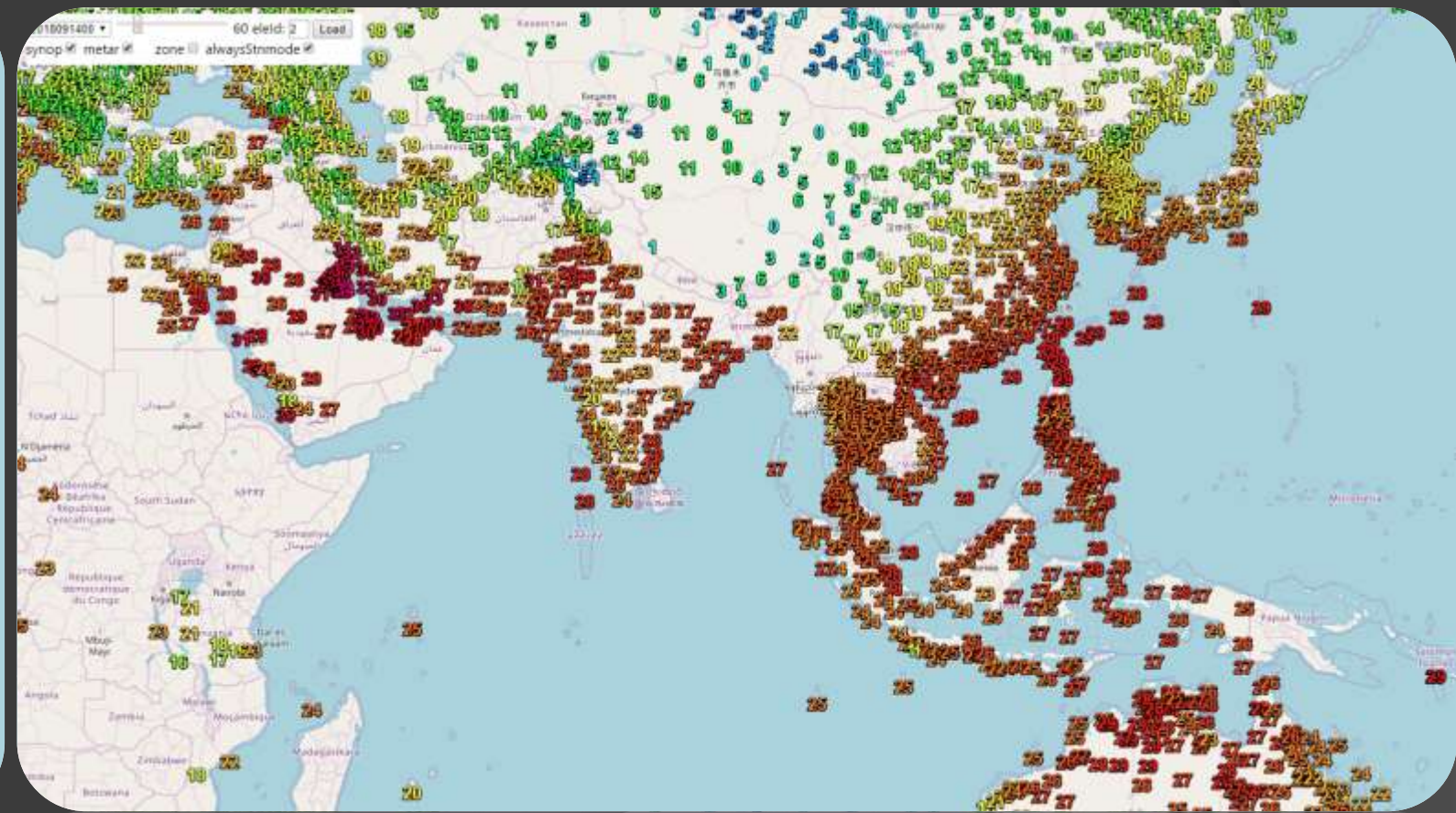
9月2日 (六) 9月2日 (六)

降雨概率: 60% 降雨概率: 60%

Hourly forecast for Tsing Yi. It features a line graph showing temperature fluctuations throughout the day. The temperature starts at 30°C at 11:00, peaks at 31°C at 14:00, and then gradually decreases to 28°C by 23:00. The forecast indicates a 60% chance of rain for both the 11:00-17:00 and 17:00-23:00 periods.

Extending Automatic Weather Forecast to Major Airports and Popular Destinations Worldwide

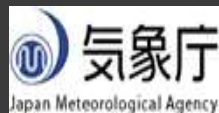
自動預報產品擴展至全球主要城市及機場



Principles 操作原理



Computer forecast model 1
電腦模式 1



Computer forecast model 2



Computer forecast model 3

⋮



Computer forecast model N

Post-process
Direct Model
Outputs
(remove bias,
capture local
features)

模式原始輸出
後處理
(減少系統偏差,
捕捉區地特徵)

combine &
verification
結合・驗證

Automatic
Forecast
自動預報

淺談天氣預報

<http://www.hko.gov.hk/blog/b5/archives/0000018>



上一篇: 「五星棋解, 賀新禧」 下一篇: 各種冬季降水現象有何不同?

淺談天氣預報

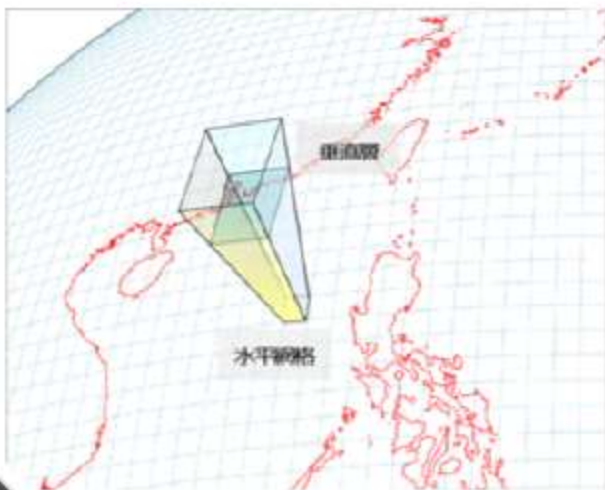
星期一, 2016年3月07日

[原創稿]



天氣與日常生活息息相關, 市民都留意天氣預報, 以安排各項活動, 隨著互聯網及智能手機的普及, 天氣預報變得很容易, 免費的天氣資訊唾手可得, 究竟天氣預報是怎樣得出來的呢?

現今做天氣預測, 實在倚靠電腦的幫忙, 進行「數值天氣預報模式」。把大氣的變化模擬出來, 由於用上電腦的關係, 數值天氣預報模式有時會簡單的被稱為電腦模式。大氣的變化是受物理定律支配, 理論上, 我們可以根據觀測到的氣象數據來描述大氣現時的状态, 即所謂初始状态, 然後利用物理方程來計算大氣未來的状态, 即計算出未來大氣的演變。然而, 電腦模式在實際計算過程中, 是將整個大氣劃分為很多步網格點(見圖一), 運用近似和假設來簡化物理方程, 以便電腦計算。因此, 電腦模式所計算出來的結果, 只是天天天氣變化的一個近似, 一般來說, 電腦模式的分辨率越高, 即上述網格點的大小越小, 則得出來的預報結果就越準確。



集合預報的概念

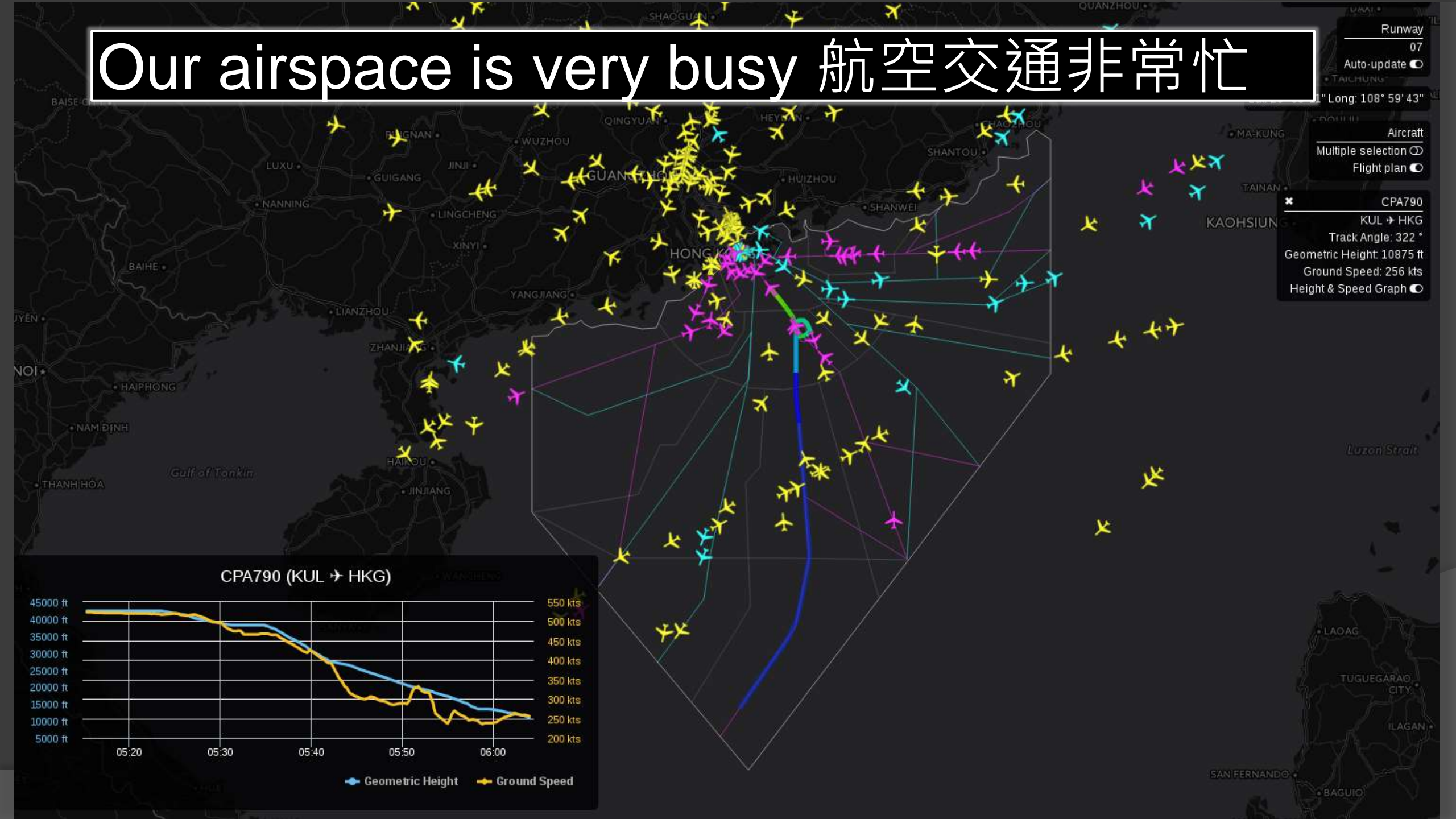




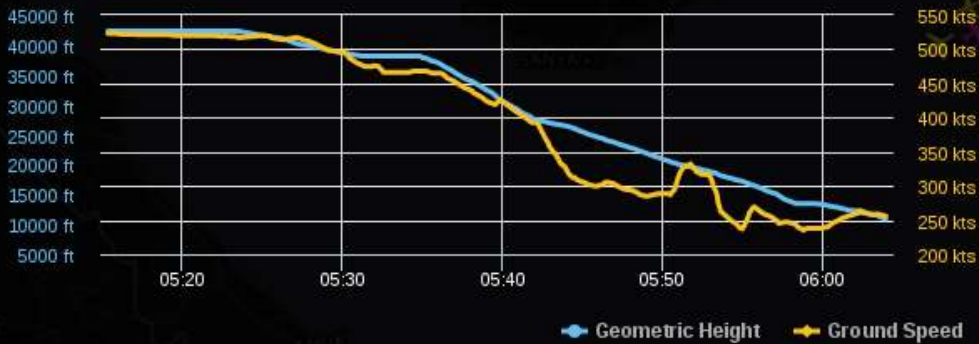


AIR TRAFFIC
FLOW CONTROL AND
MANAGEMENT
空中交通流量管理

Our airspace is very busy 航空交通非常忙

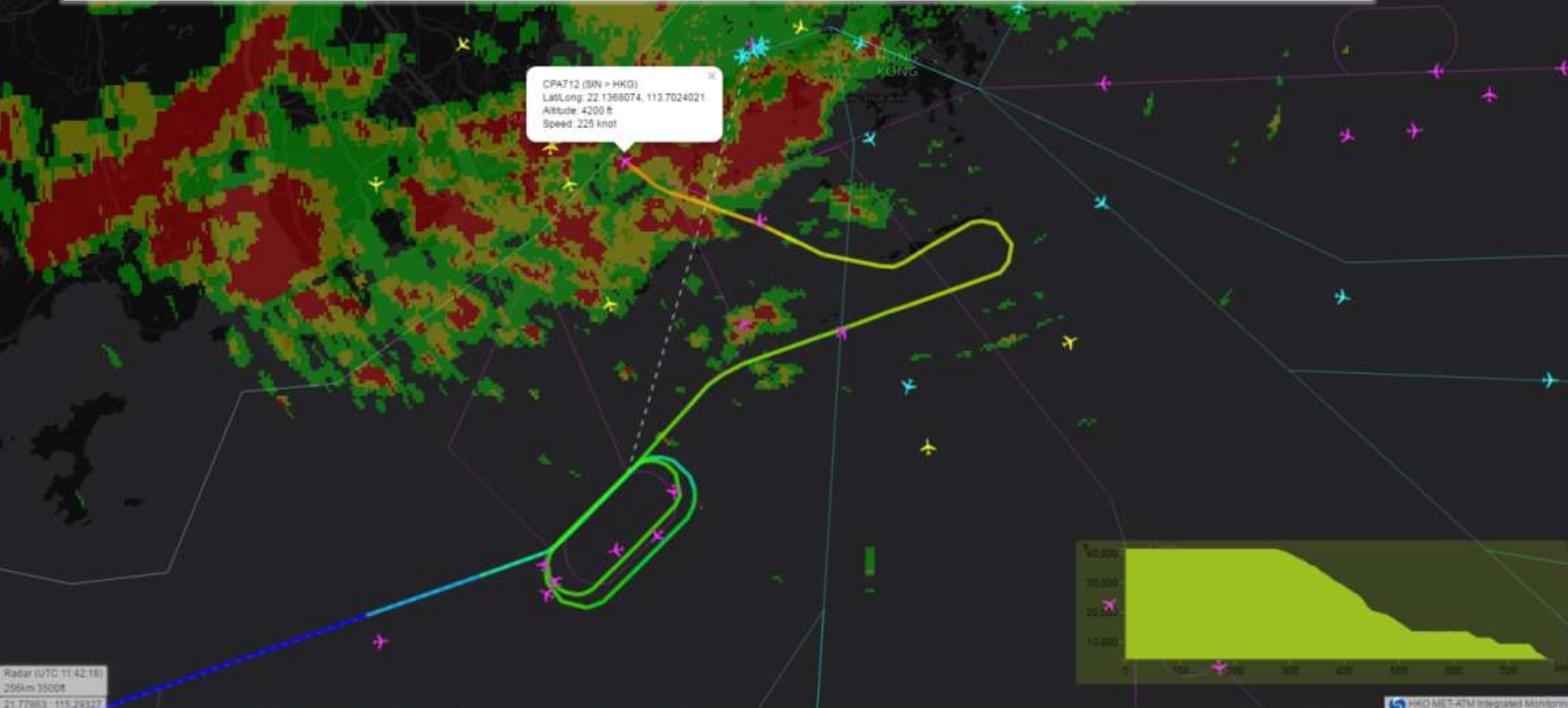


CPA790 (KUL → HKG)



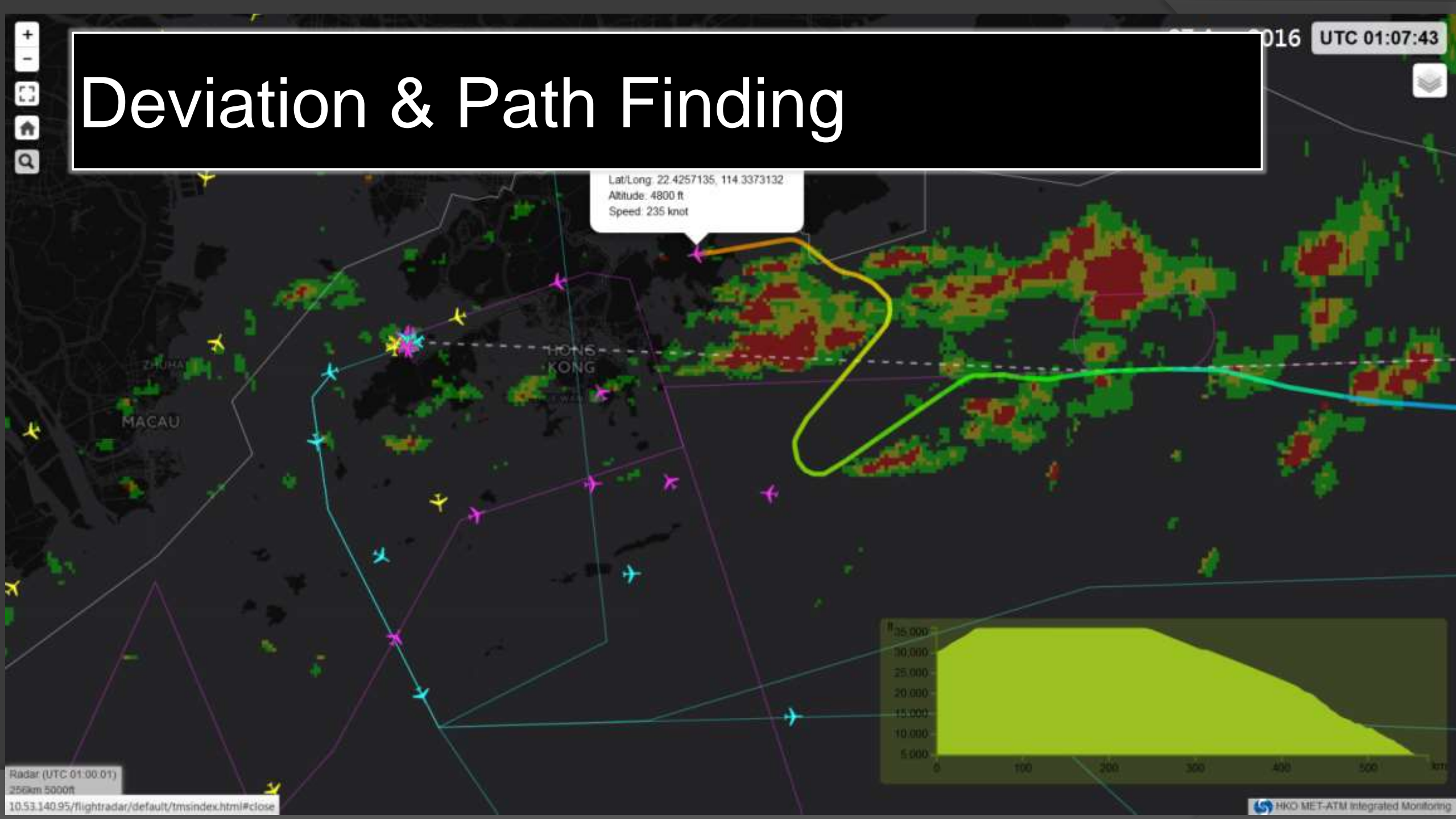
Holding due to weather

CPA712 (SIN > HKG)
Lat/Long: 22.1368074, 113.7024021
Altitude: 4200 ft
Speed: 225 knot

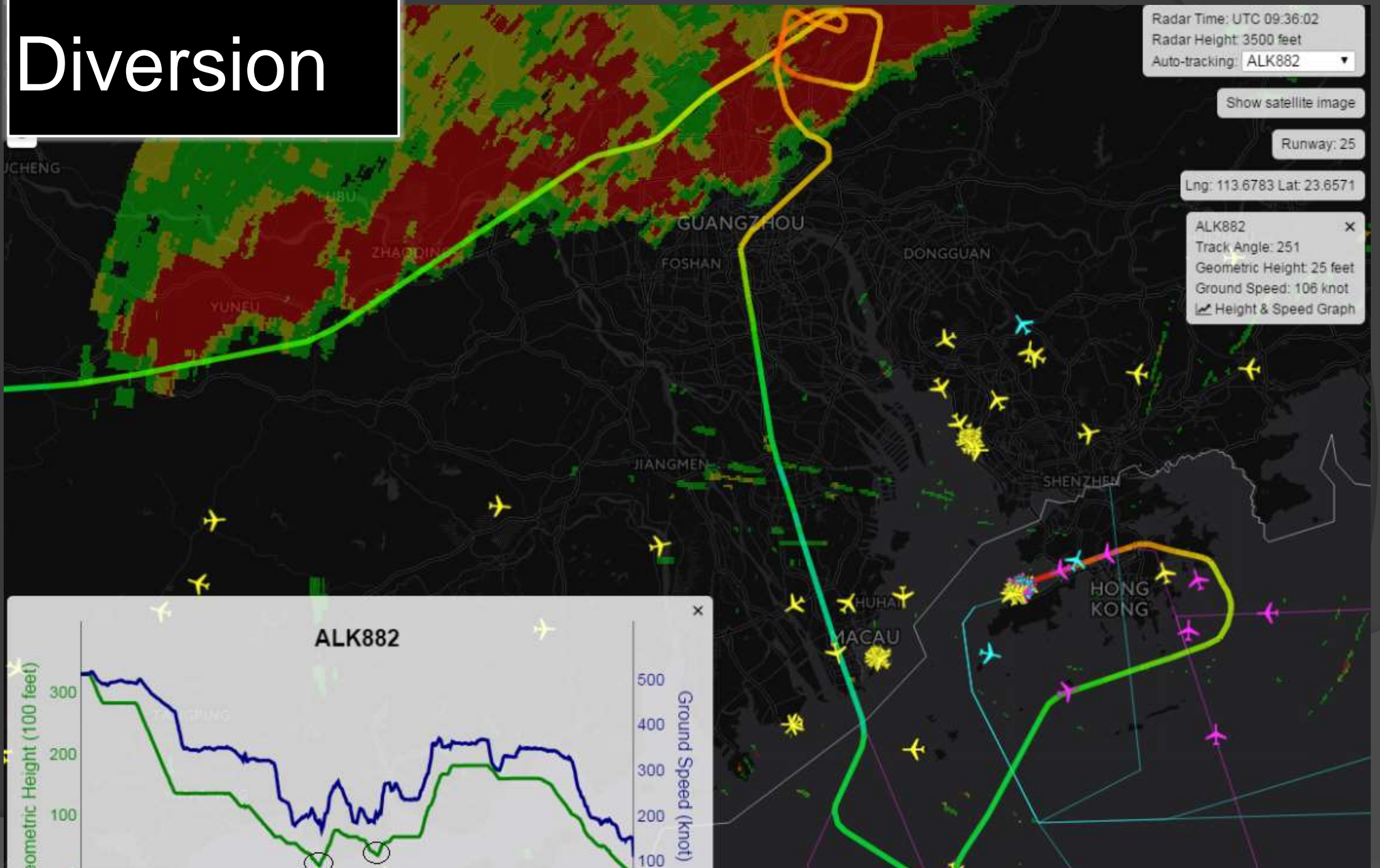


Deviation & Path Finding

Lat/Long: 22.4257135, 114.3373132
Altitude: 4800 ft
Speed: 235 knot



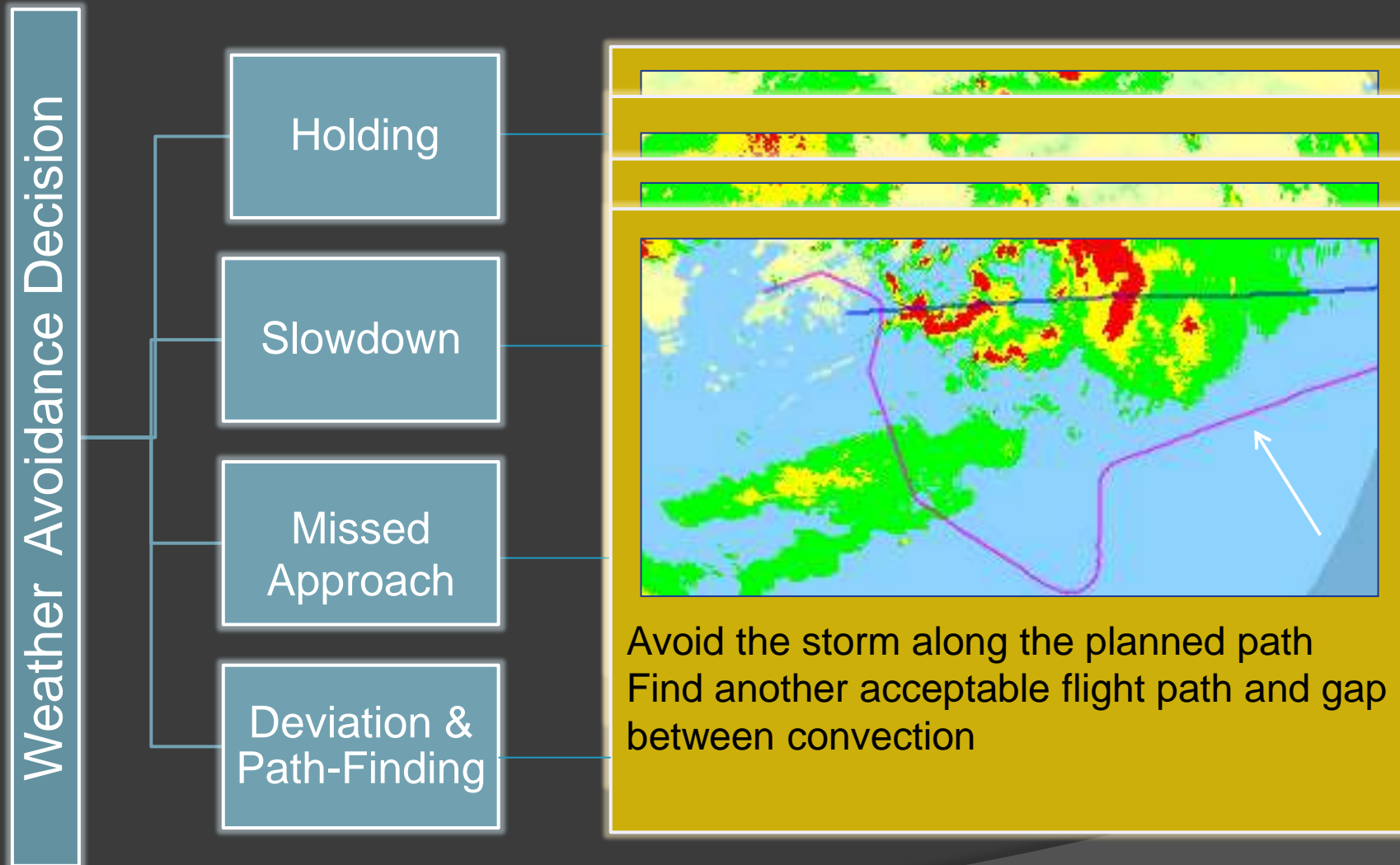
Diversion



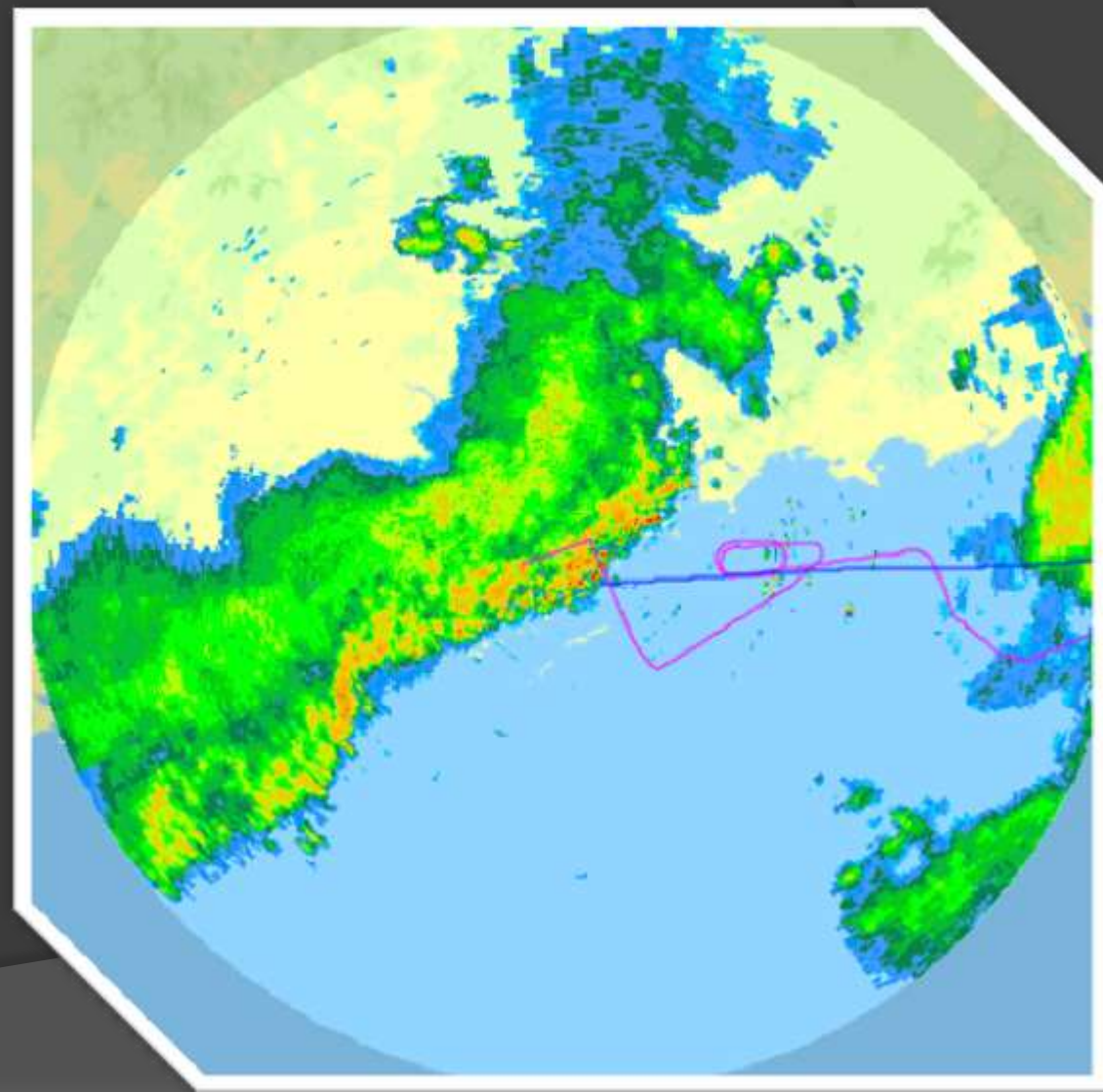
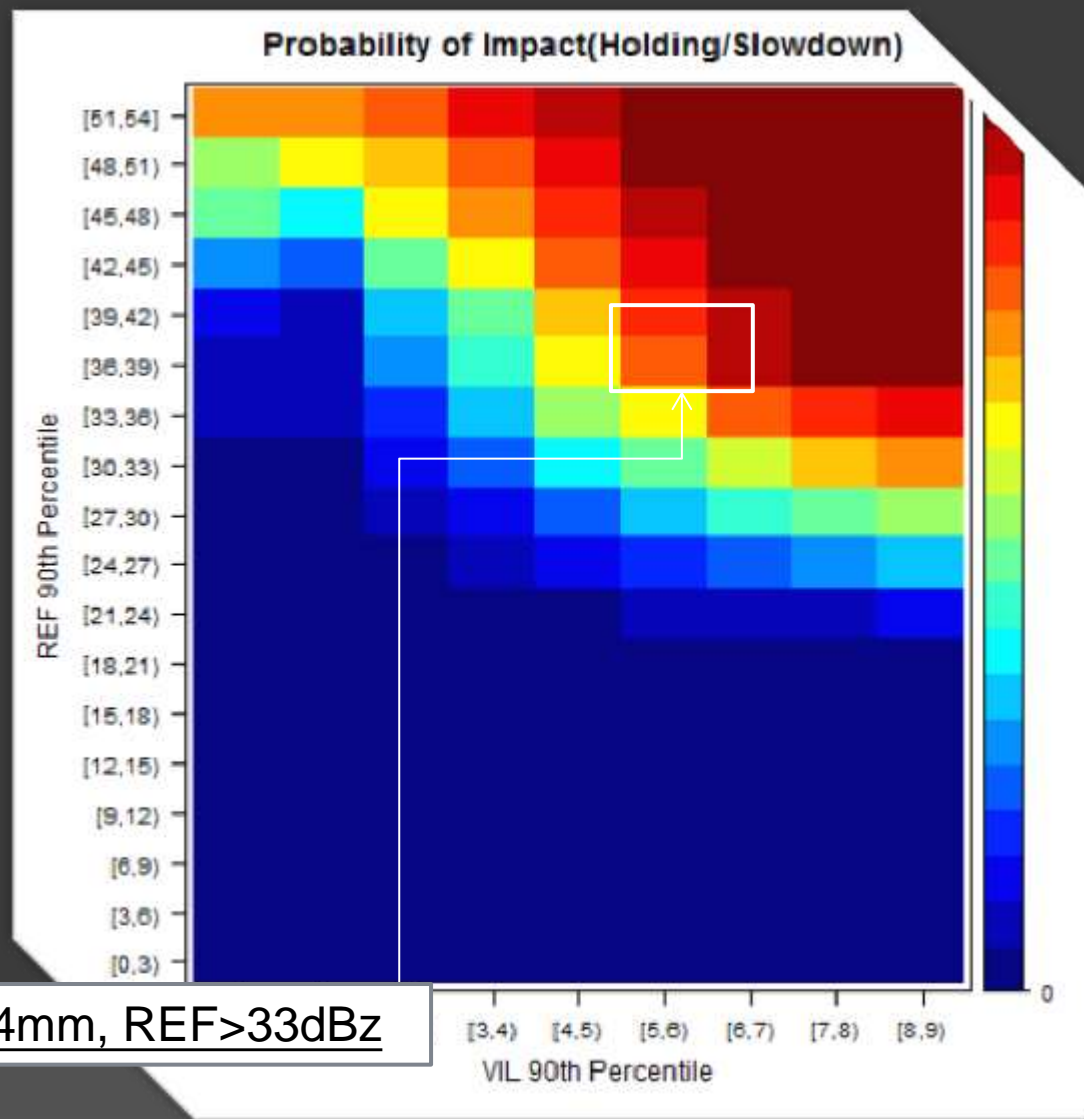
An aerial view from an airplane window showing a vast, dense field of white cumulonimbus clouds. The sky above is a clear, deep blue. The tail fin of the aircraft is visible in the upper right corner. The text "WEATHER AVOIDANCE" and "天氣繞避" is overlaid in the center of the image.

WEATHER AVOIDANCE
天氣繞避

Weather Avoidance Decision

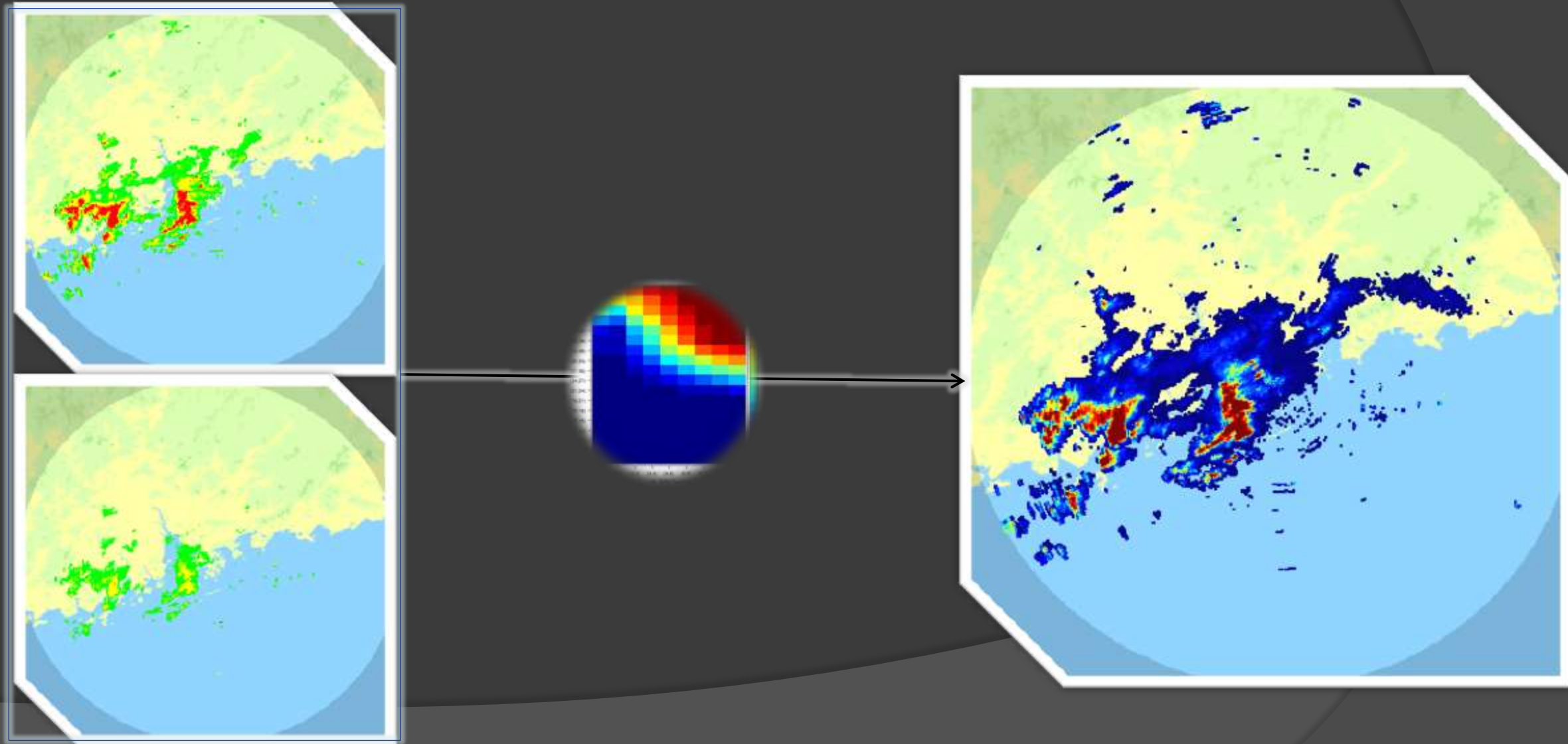


Probability of avoidance action 繞避天氣的機率



Impact to air space capacity

天氣對空域的影響



AIRPORT ACCEPTANCE RATE (AAR)

機場抵達率

3 Major Feeds 三個主要入口

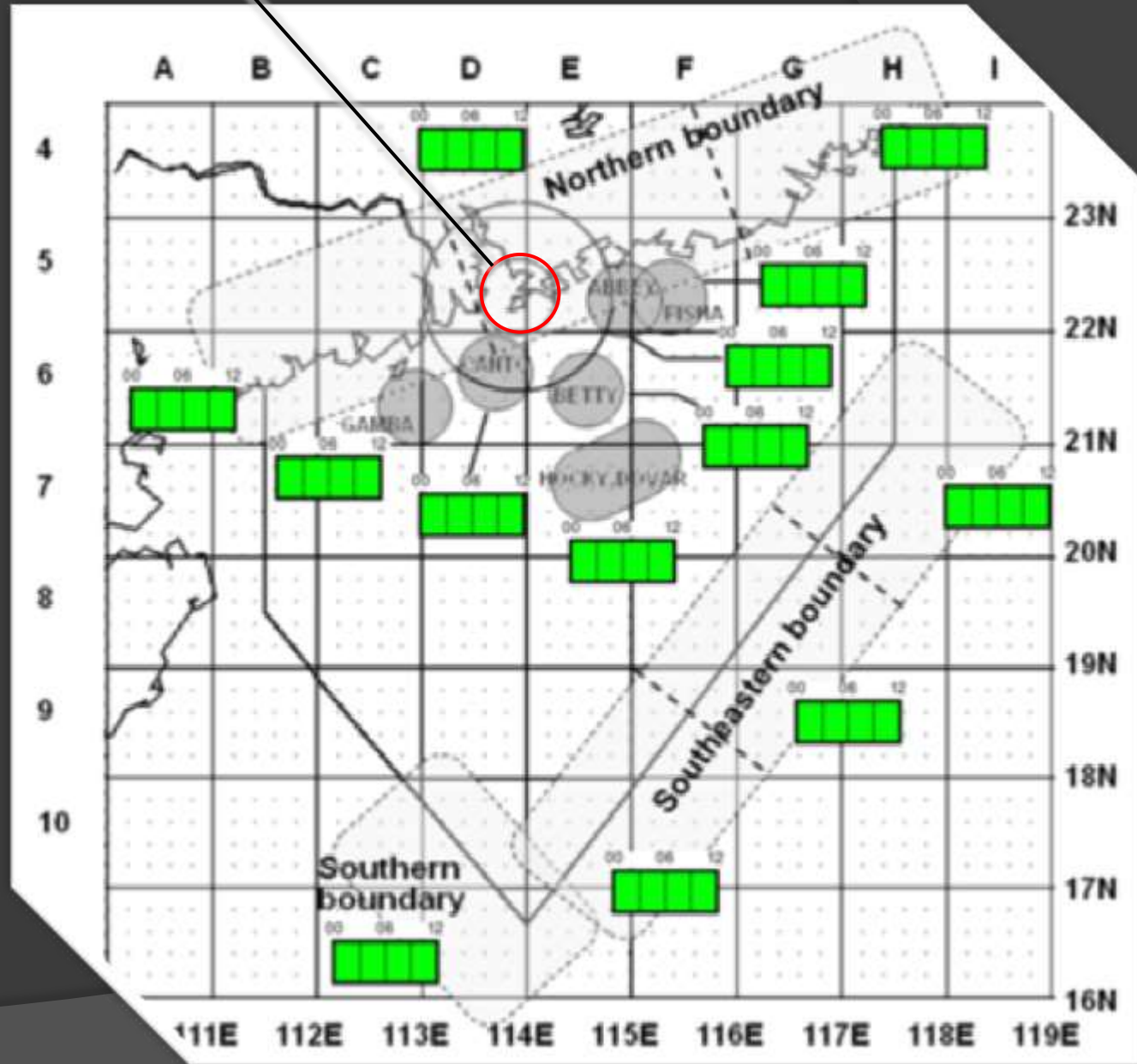


20nm of ARP

TS/CB forecast for adjacent areas

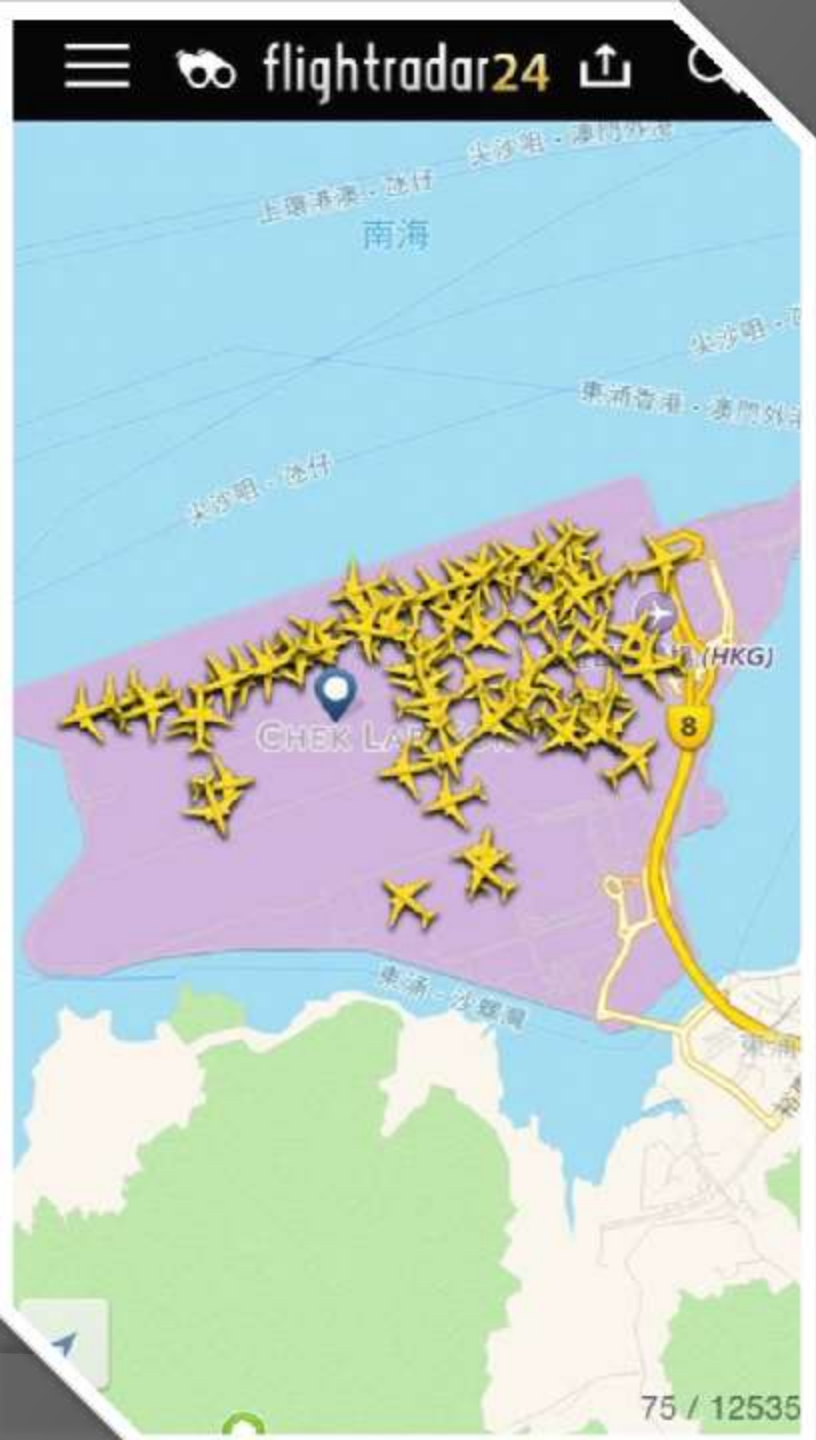
UTC	13	14	15	16-18
20nm of ARP	Yellow	Red	Red	Yellow
ABBEY	Green	Yellow	Red	Red
BETTY	Green	Green	Green	Yellow
CANTO	Green	Green	Yellow	Yellow

Prepared at 1300UTC



AIRPORT DEPARTURE RATE (ADR)

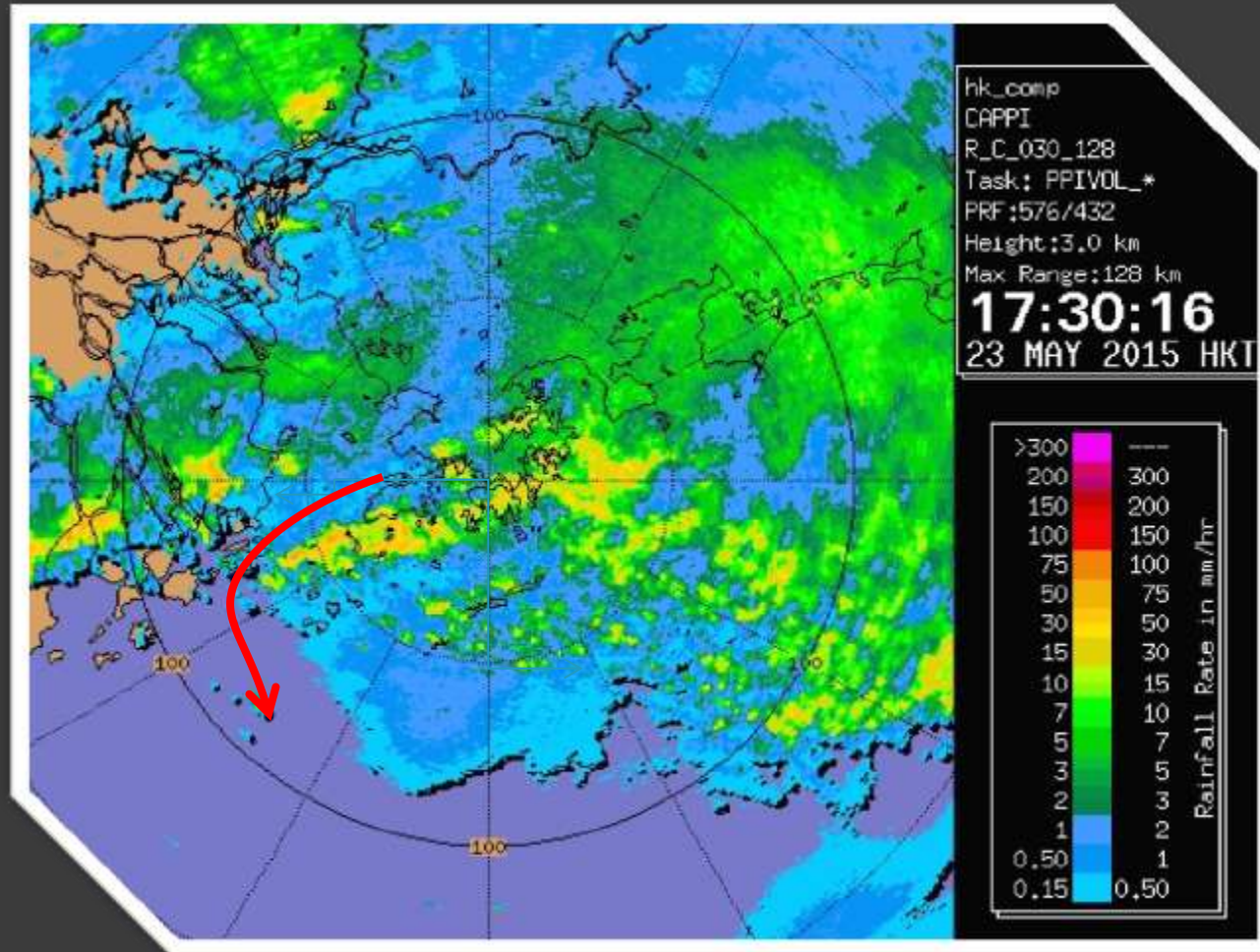
機場出發率



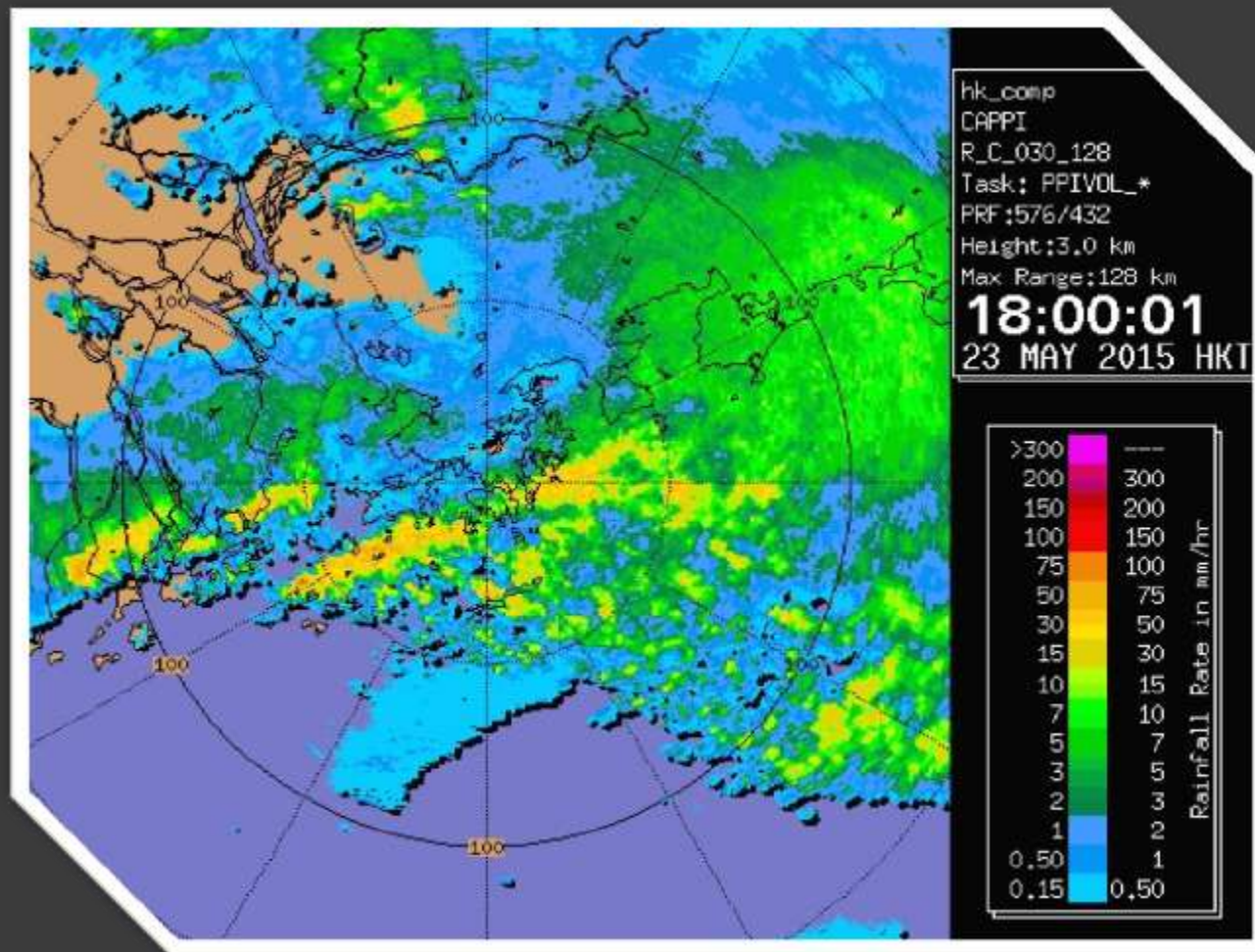
- Apron parking was full from 1800 to 0500 the next day.
- 178 arrived flights held on taxiway
- Waiting 2 hours and 32 minutes at most

A Major Disruption to airport
on
23 May 2015
機場大擠塞

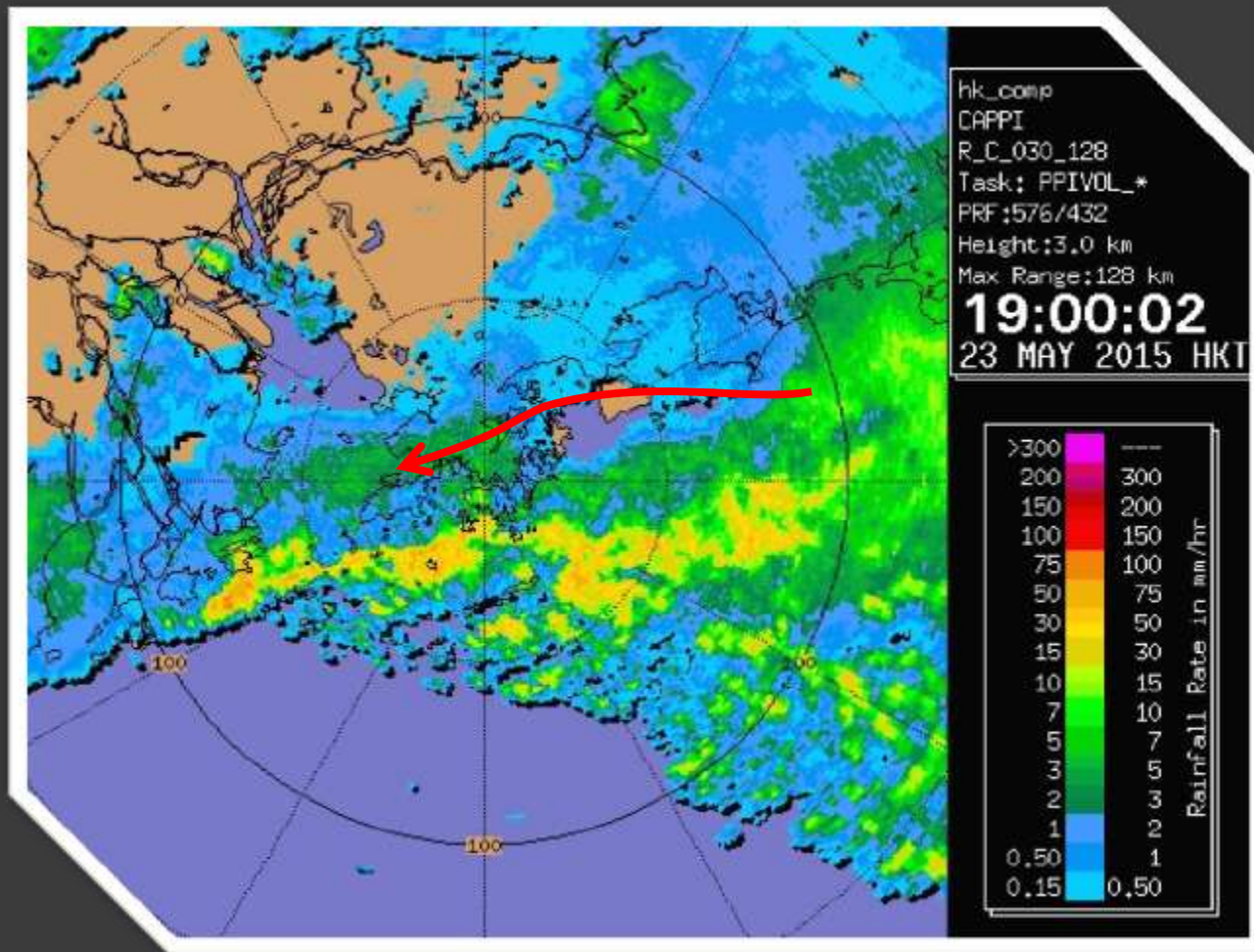
Trouble with Outgoing flights



18:00H



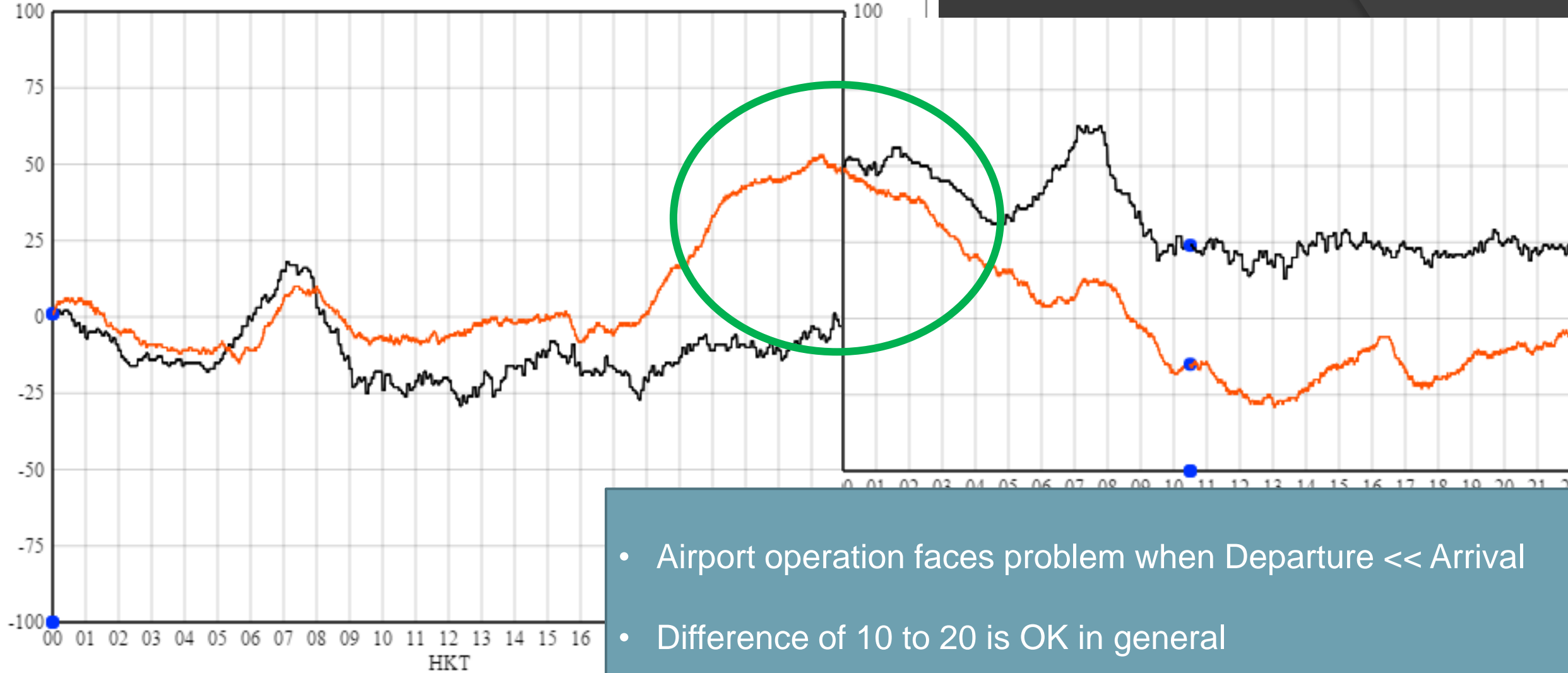
19:00H



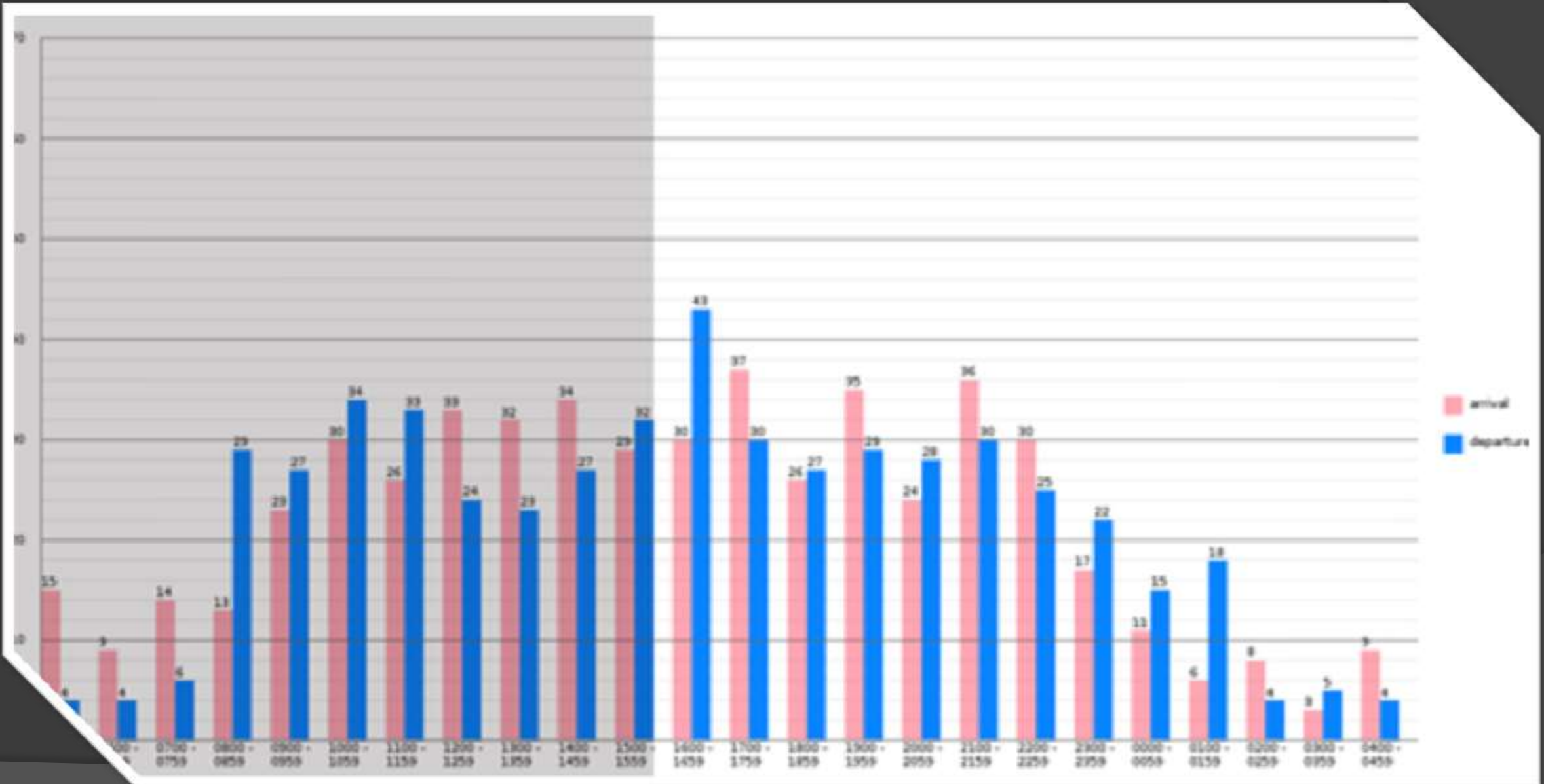
Accumulated number of flights

Arrival minus Departure 23 May 2015

— Estimated (at 00H)
— Actual

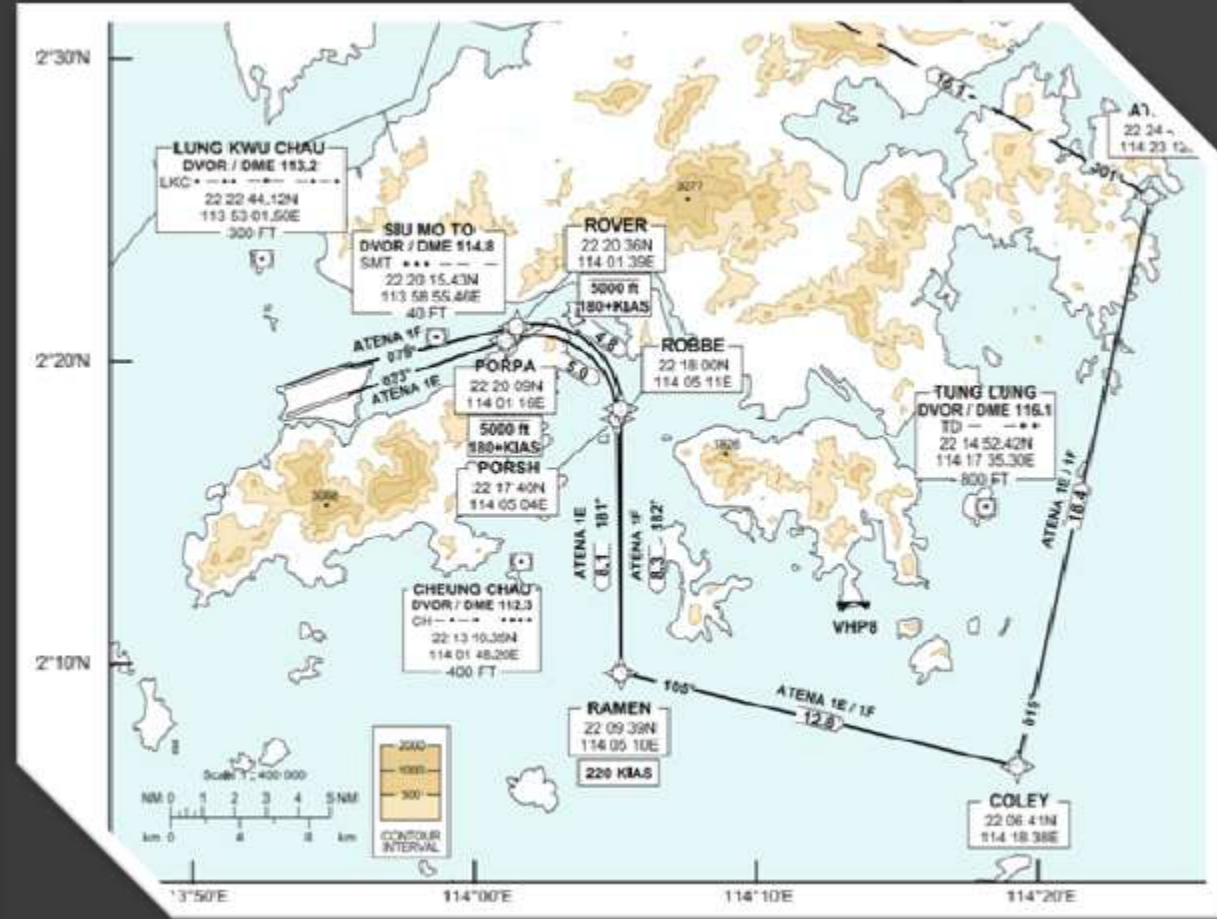
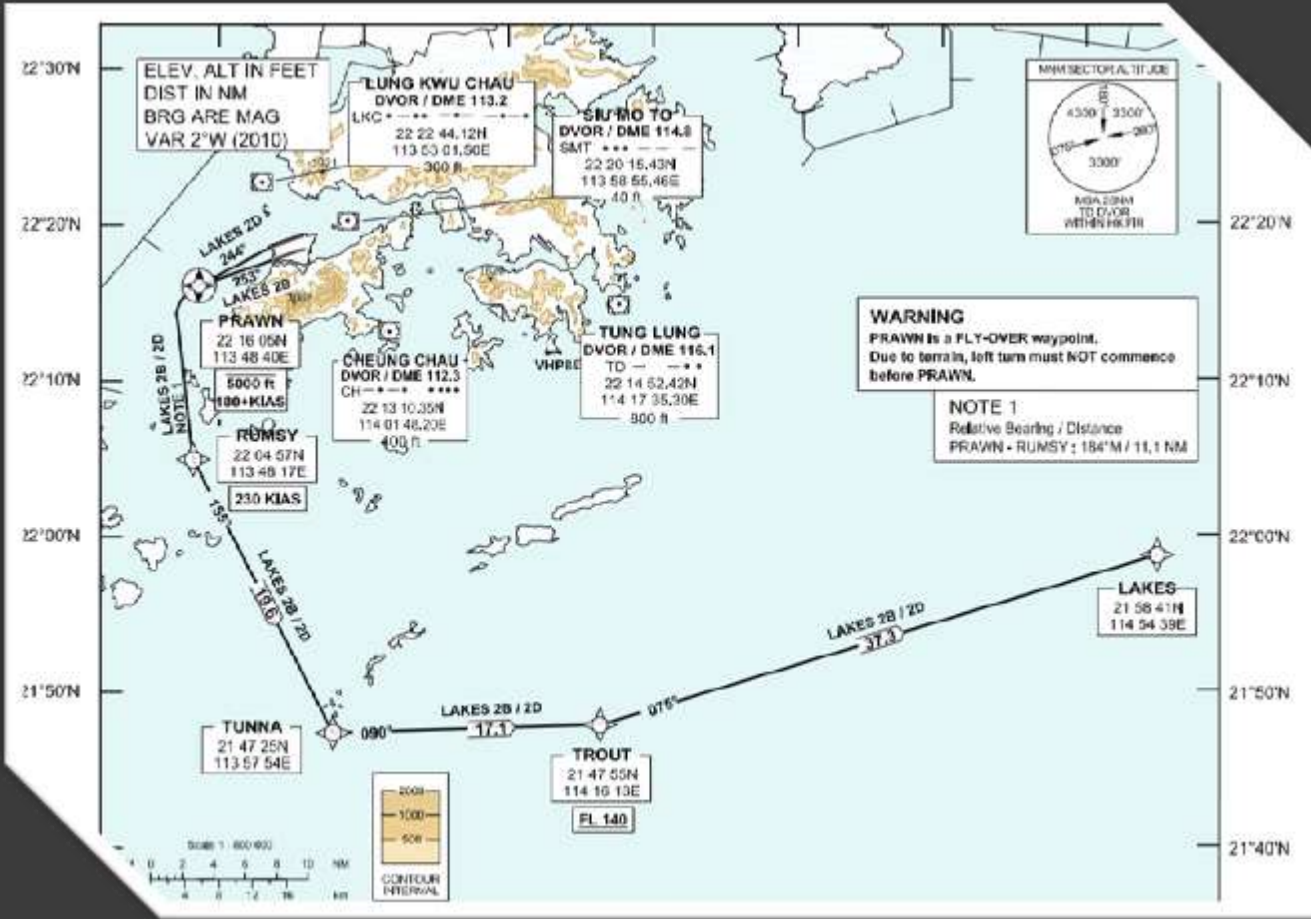


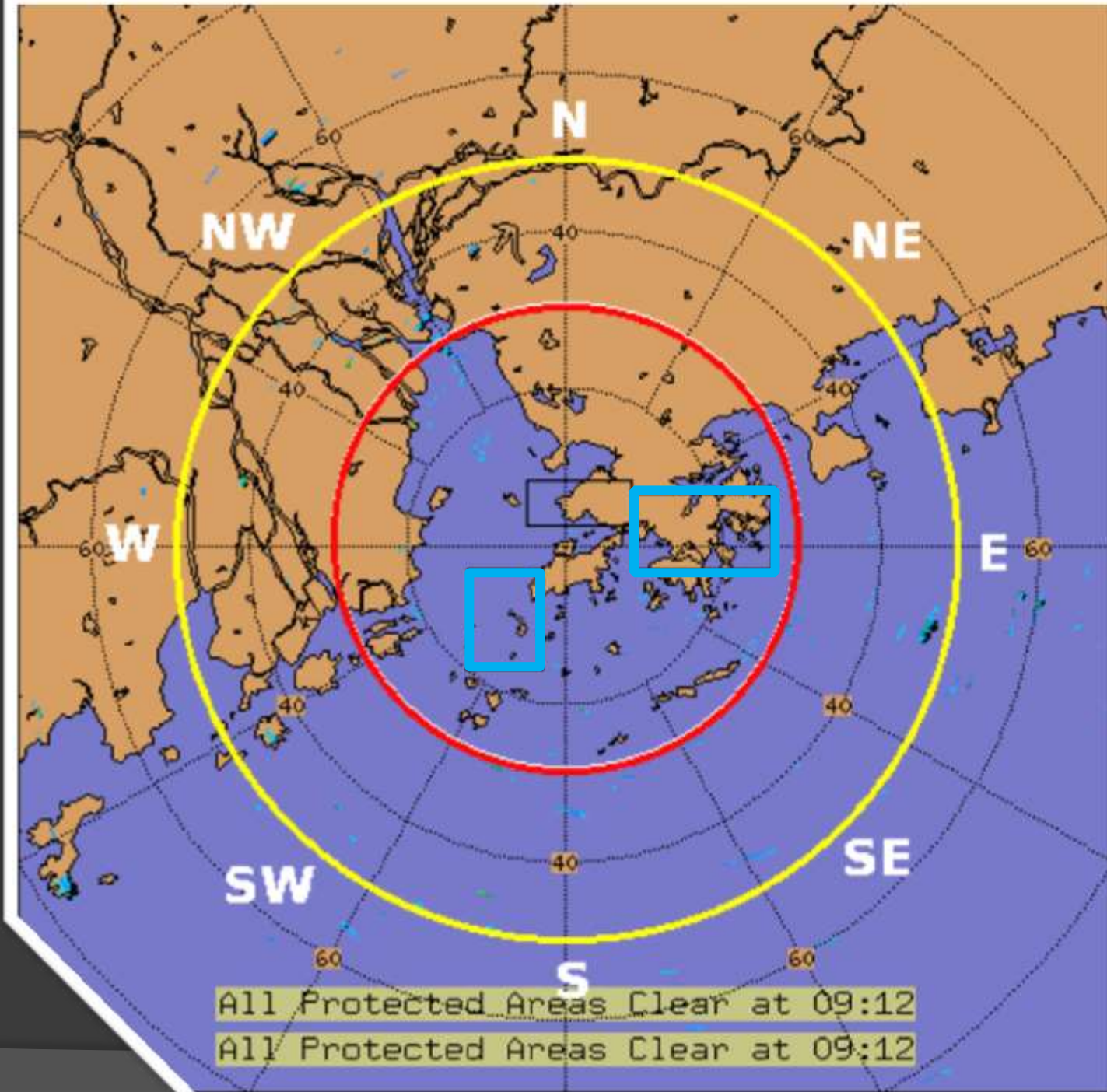
- Airport operation faces problem when Departure << Arrival
- Difference of 10 to 20 is OK in general
- On 23 May 2015, surplus was over 40 for consecutive hours



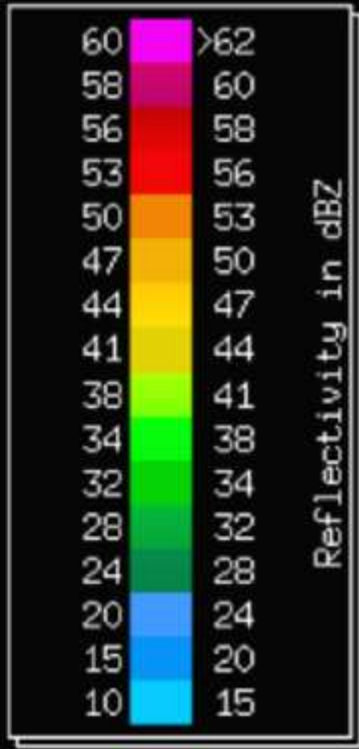
RWY 25 departure

RWY 07 departure





tms_rad1
 CAPPI
 TMZ_030_128
 Task: PPIVOL_A
 PRF:576/432
 Height:10 kft
 Max Range:69 nmi
09:18:19
 18 OCT 2017 HKT



All Protected Areas Clear at 09:12
 All Protected Areas Clear at 09:12

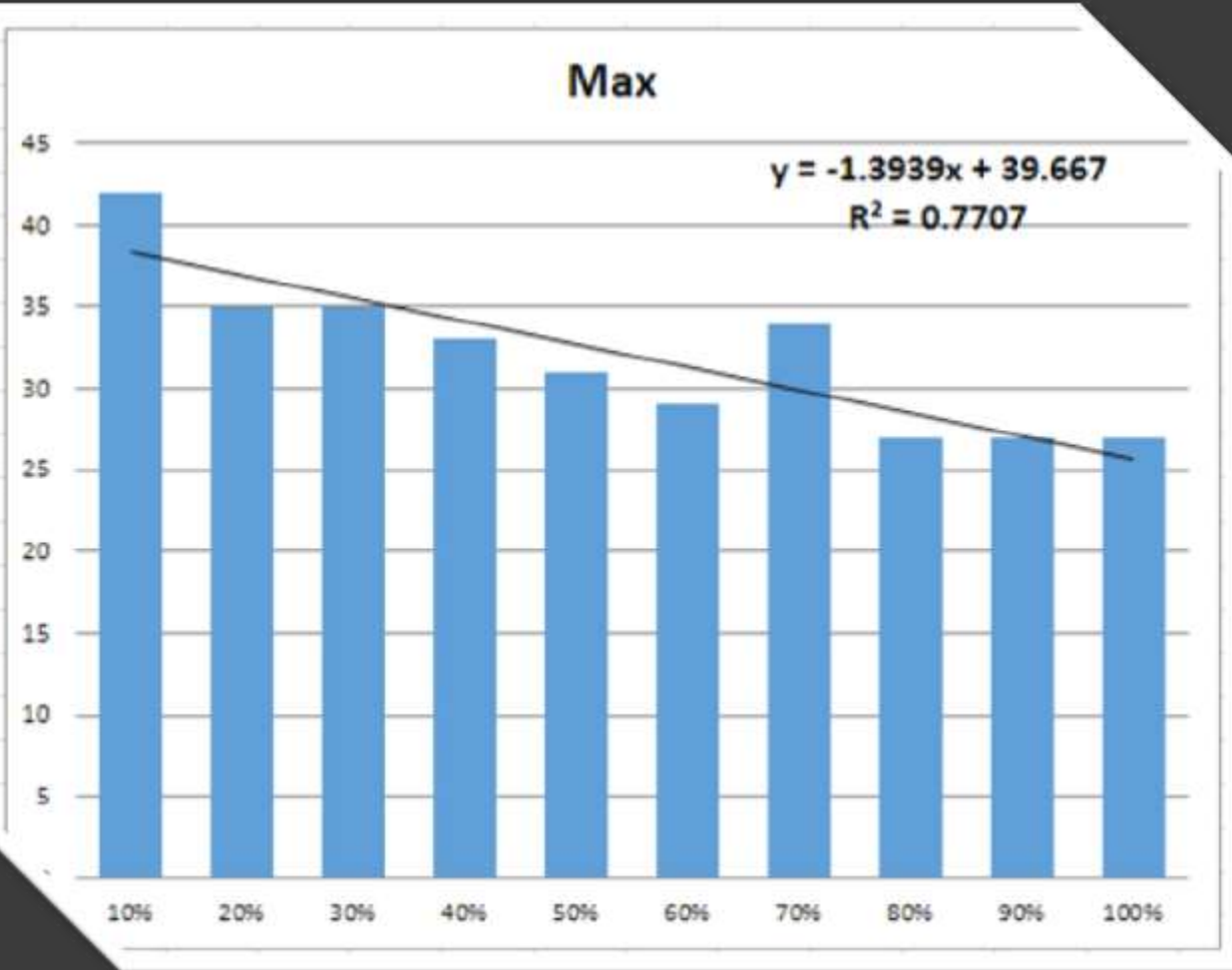
Maximum Departure Rate revealed some Dependence to Weather over Departure Corridors

Max ADR (East)

MAX ADR (EAST)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
90 - 100%										23		27					0						19	21	
80 - 90%	24										0	0				0	0						27		
70 - 80%						0	0	7	0	0	21						27	0	0				19	25	
60 - 70%	24	17		2		5	4	0	23	34	0	30	30	0	0	0						24		13	
50 - 60%		20	17		13	0		0	12	29	27	0	22	0	27								0		0
40 - 50%	15	23	14	0	9	11	3	11	21	11	26	21	31	0	0	28	26								15
30 - 40%	28	25	22	10	12	5	2	12	0	33	0	29	0	31	28	29	14	26	0				22	22	
20 - 30%	0	4	18	12	7	5	8	12	28	35	22	32	30	32	23	25	26	32	24				25	29	
10 - 20%	24	28	14	21	14	11	7	13	34	32	35	32	29	28	29	34	30	31	33	28	30	27	32	30	
0 - 10%	32	28	26	21	26	16	10	17	34	38	39	39	42	38	36	38	39	37	36	37	37	37	39	35	

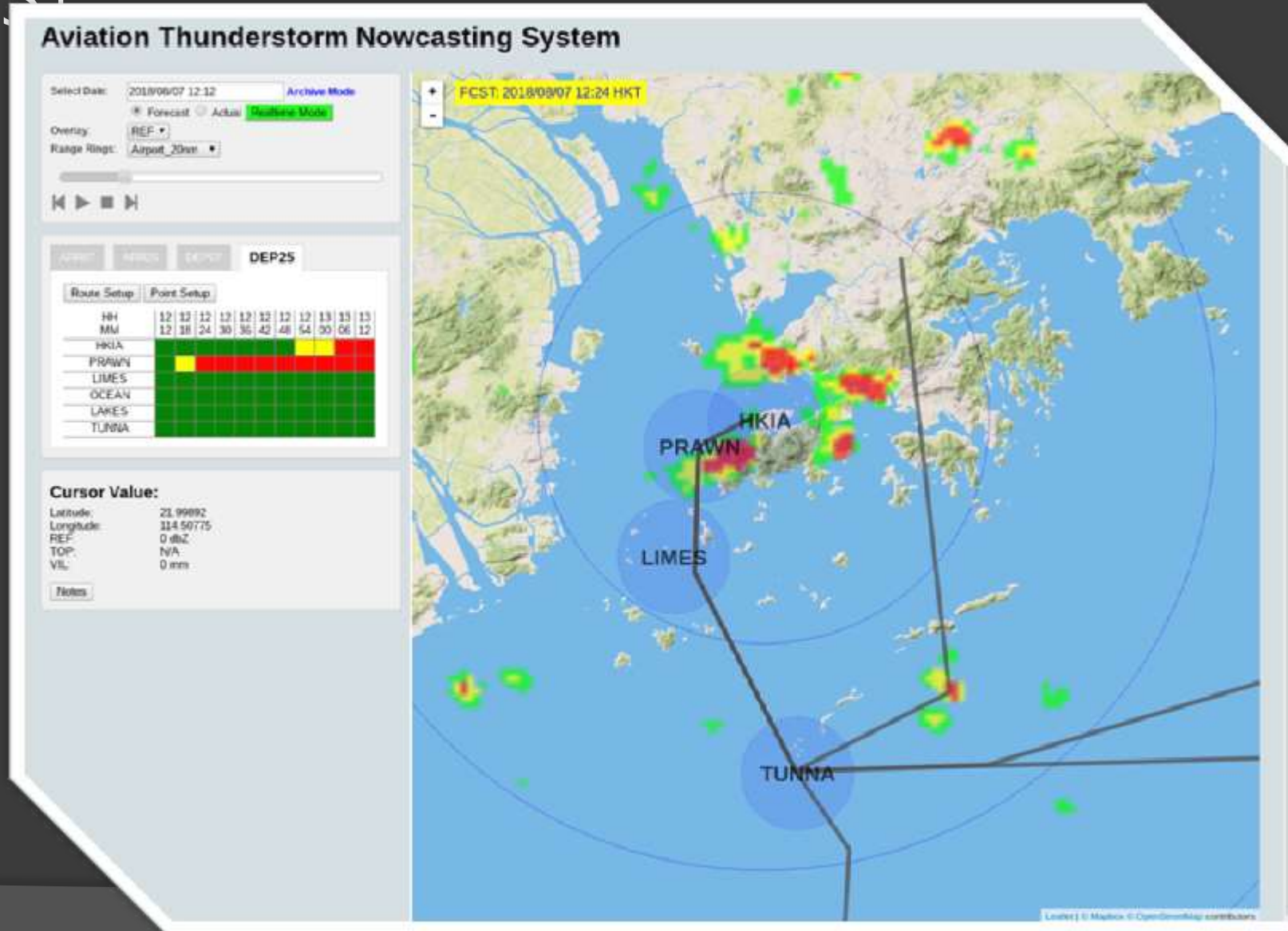
Note how it drops with weather

ADR Weather Constrain

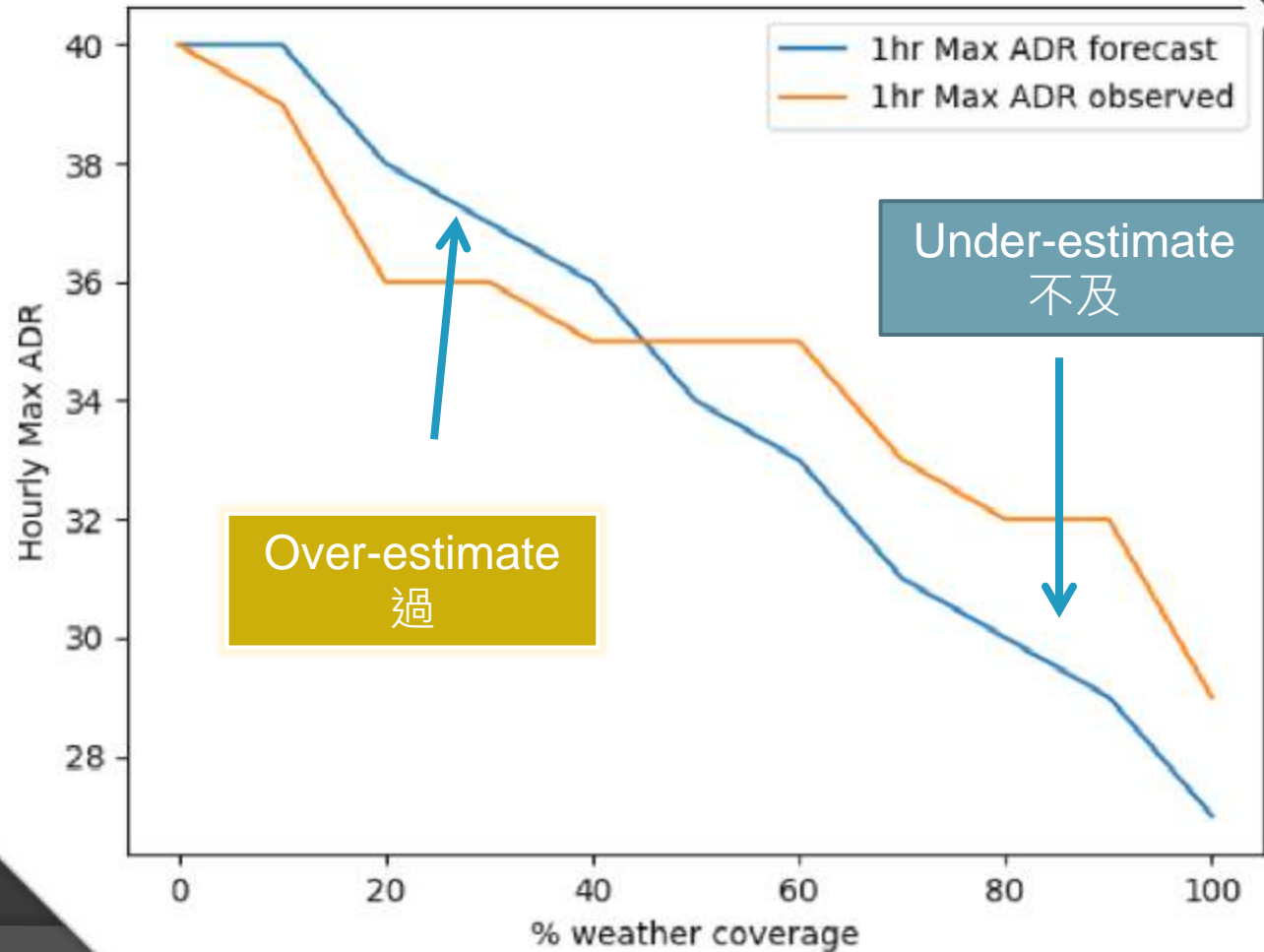


- Severity of weather in the “departure corridor” has a fair correlation to the maximum achievable ADR
- 天氣越差，最大出發率越低

Aviation Thunderstorm Nowcasting System (ATNS)



Departure and Forecast Weather of 2016



An aerial night view of an airport terminal with a lightning bolt striking the sky. The terminal is brightly lit, and the tarmac is wet, reflecting the lights. The text "LIGHTNING PROTECTION" and "閃電防護" is overlaid in the center.

LIGHTNING PROTECTION
閃電防護



Catering



Refuelling



Step Potential



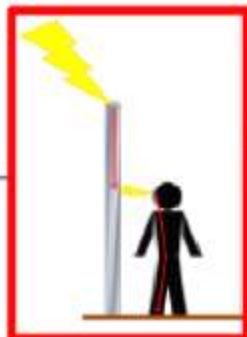
Direct Strike



High Mast



Baggage Loading



Side Flash



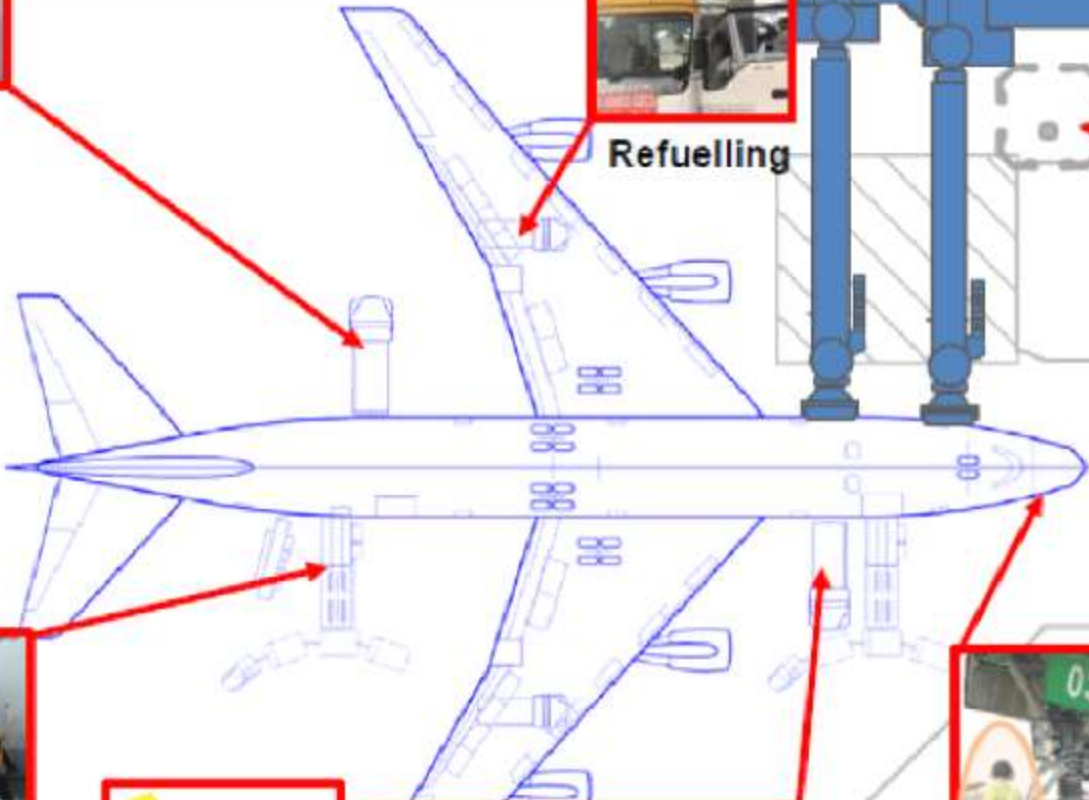
Cargo Loading



Headset Man



Touch Potential



紅色閃電警告 Red Lightning Warning



香港國際機場
HONG KONG INTERNATIONAL AIRPORT

本機場的閃電警告系統由香港機場管理局
設計及建造，旨在提高機場的安全水平，並
確保在閃電威脅下，機場運作能維持在
最高水平。

Any other languages made to comply with
the local laws and regulations.
For more information, please contact the
Airport Authority at the following telephone
numbers: (852) 2188 7111

香港國際機場致力確保旅客及機場員工的安全，
力求達至最高水平。

設計精密的機場閃電警告系統，在二零零三年正式
投入運作。

在二零零四年，機場閃電警告系統獲職業安全健康
局頒發安全科技成就大獎金獎。

Hong Kong International Airport (HKIA) is committed
to upholding the highest standards of safety to
passengers and airport staff.

The sophisticated Airport Lightning Warning System
was implemented in 2003.

The System won the Occupational Safety and Health
Council's Champion Award in Safety Technological
Achievement in 2004.

香港機場管理局

AIRPORT AUTHORITY HONG KONG

香港國際機場管理局

The Road, Hong Kong International Airport, Lantau, Hong Kong

電話: (852) 2188 7111

傳真: (852) 2624 8117

電郵: info@airport.gov.hk

網址: www.hongkongairport.com

傳呼: (852) 2181 8888



香港國際機場
HONG KONG INTERNATIONAL AIRPORT



RED Lightning Alert

AMBER Lightning Alert



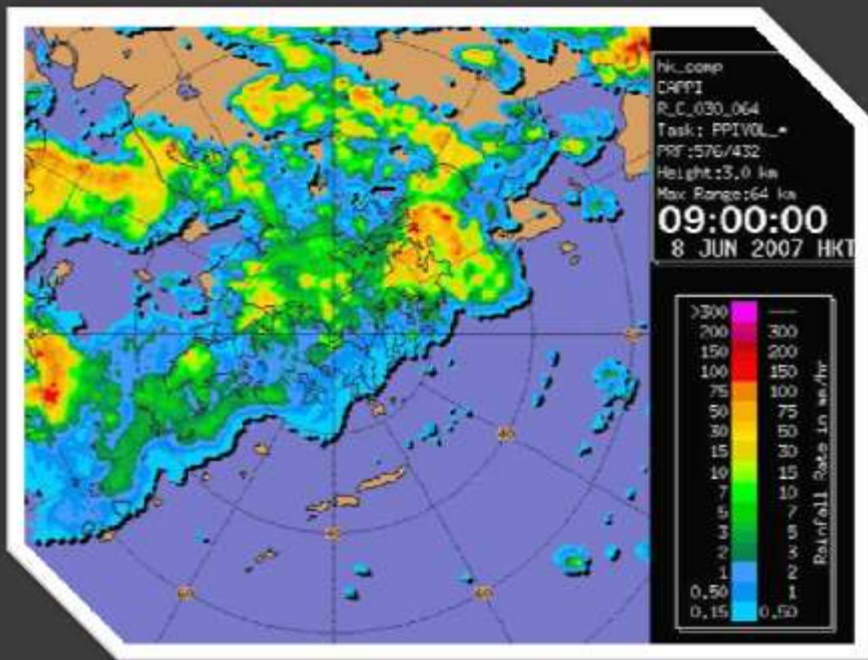
- All ground operations have to stop and take measures to protect against lightning threat
- Re-fueling, catering, embarkment /disembarkment, baggage/cargo handling, aircraft push would be delayed

HKO Airport Thunderstorm and Lightning Alerting System (ATLAS)

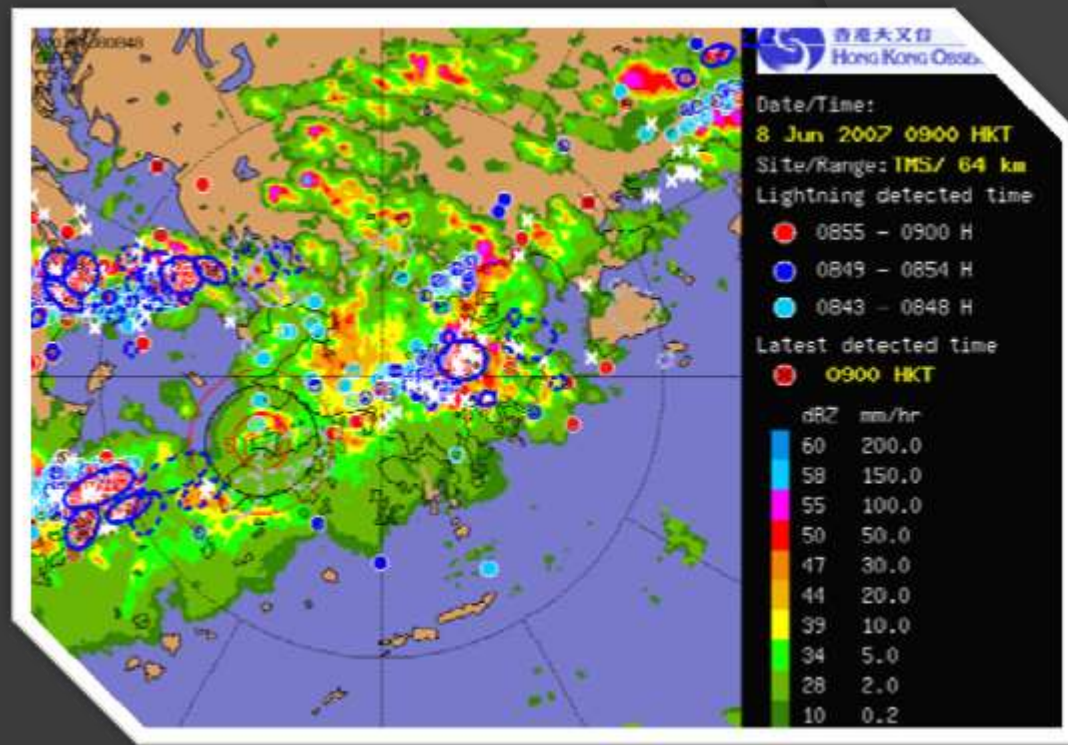
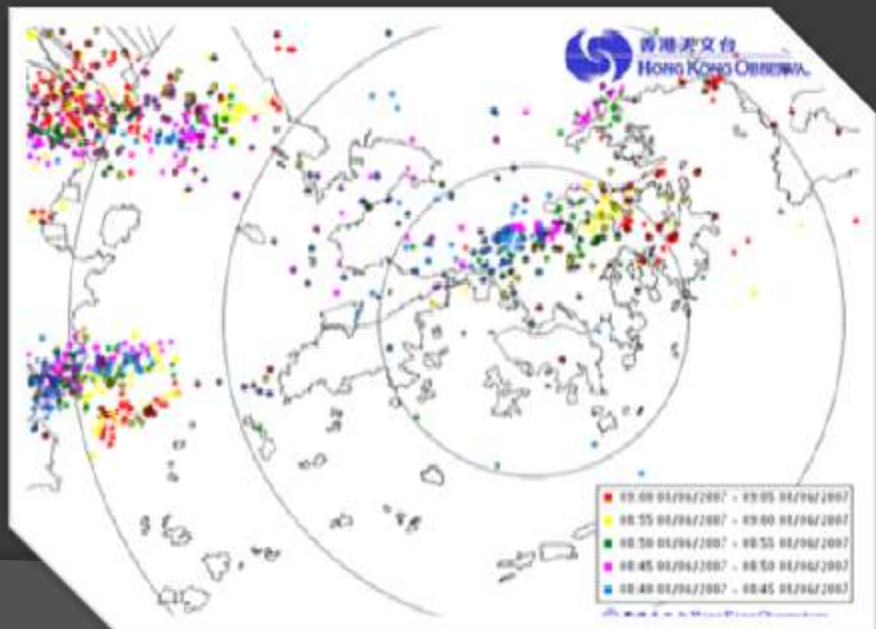
機場雷暴及閃電預告系統

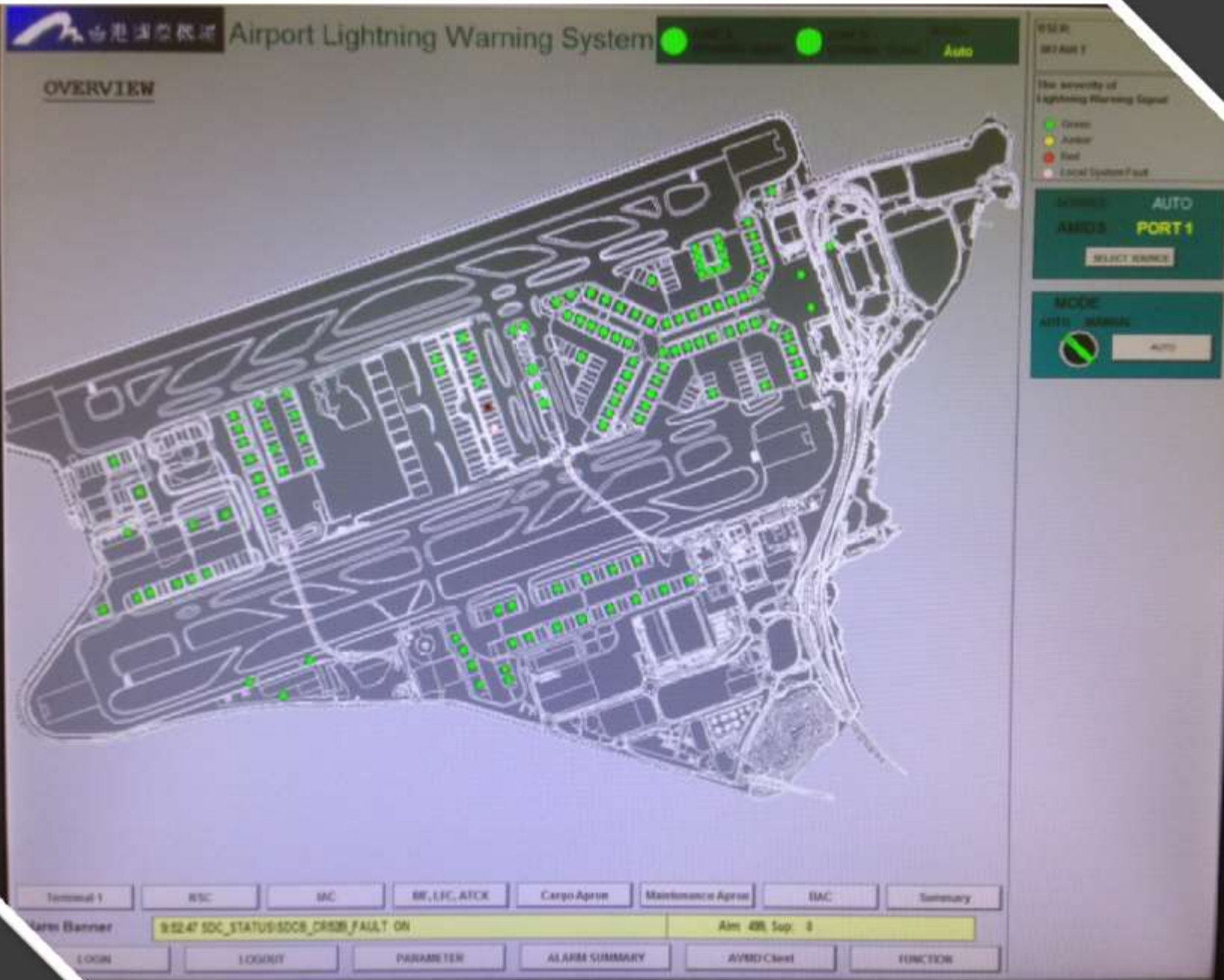


- HKO Lightning Location Information System (LLIS) Cloud-to-Ground (CG) lightning data
- HKO Weather Radar data



+





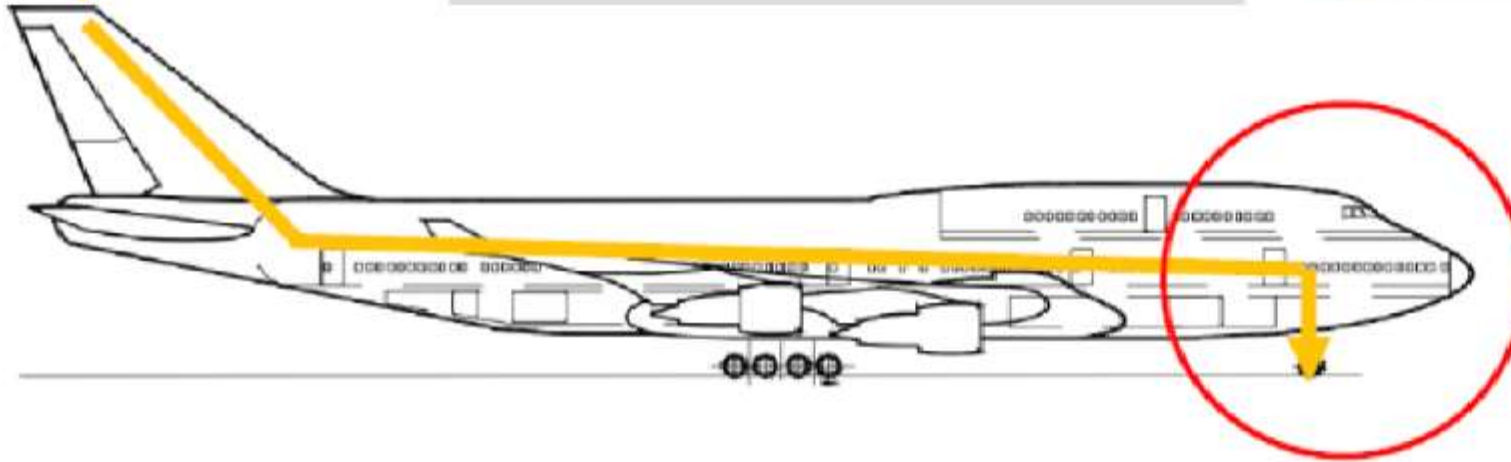
ALWS



ALWS



Lightning current
discharged through
aircraft, NLG // staff
(50 – 200kA)



User Groups

Flight Operation

Warnings in force

My Products

- Radar & Satellite
- Radar - 64km
- Extended take-off Forecast
- Latest ATIS
- TerrMet
- Weather Summary for HKIA
- Standard Flight Document Package
- Select / Print Flight Document
- HKO TC Information

Edit

Volcanic Ash

- Information on Volcanic Eruption / Ash Cloud
- Volcanic Ash Advisory (Graphical)

The information available on AMDIS is intended for flight-planning purpose only. Delay in the display of such information is due to technical or other problems. Please carefully read the text of the data, and warnings. Click here for contact and support.

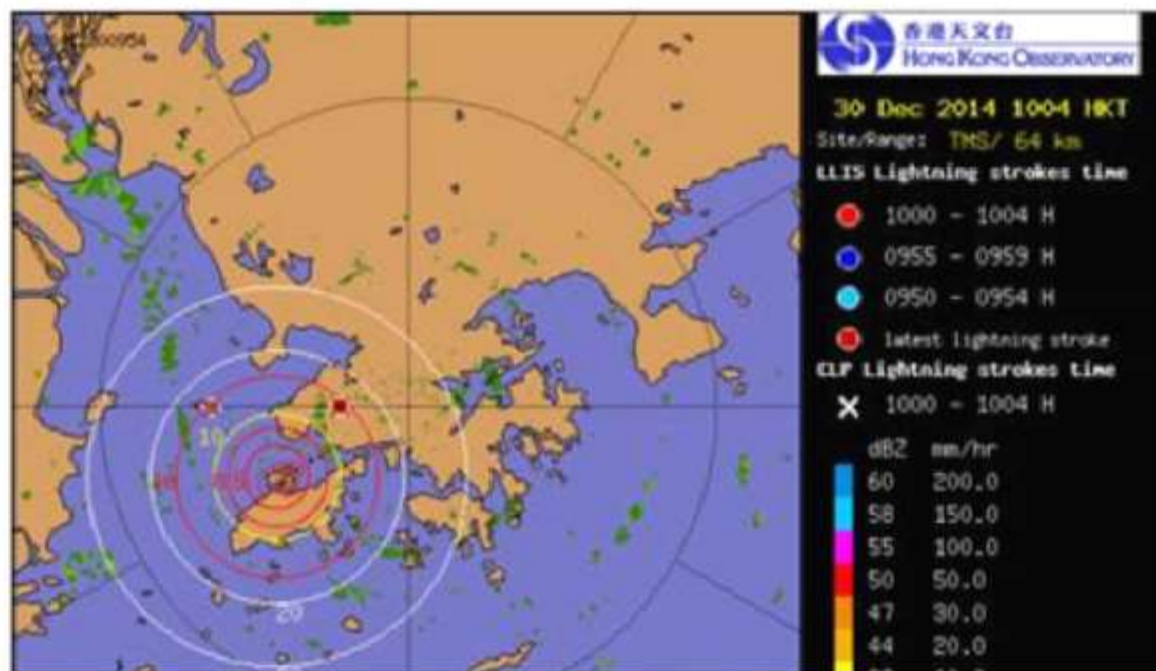
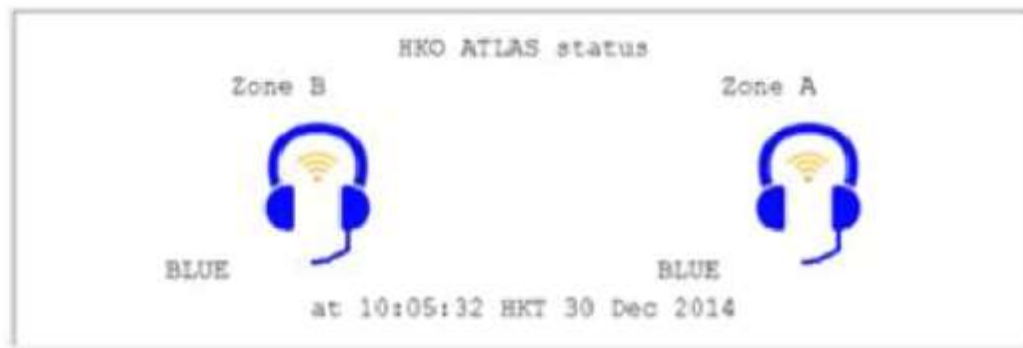
Thunderstorm and Significant Convection

- Significant Convection Monitoring and Forecast (trial)
- Airport Thunderstorm and Lightning Alerting System (ATLAS)
- Aviation Thunderstorm Nowcasting System
- Lightning Around HKIA
- Lightning Display With Advanced Features
- Lightning Overlaid Onto Radar

What's New

Previous Layout

Airport Thunderstorm and Lightning Alerting System (ATLAS)



Control:

- Latest
- Play
- Pause
- Next
- Prev
- Slow
- Normal
- Fast

WIND MEASUREMENTS

機場風力測量

Hong Kong
International
Airport

North Runway

South Runway

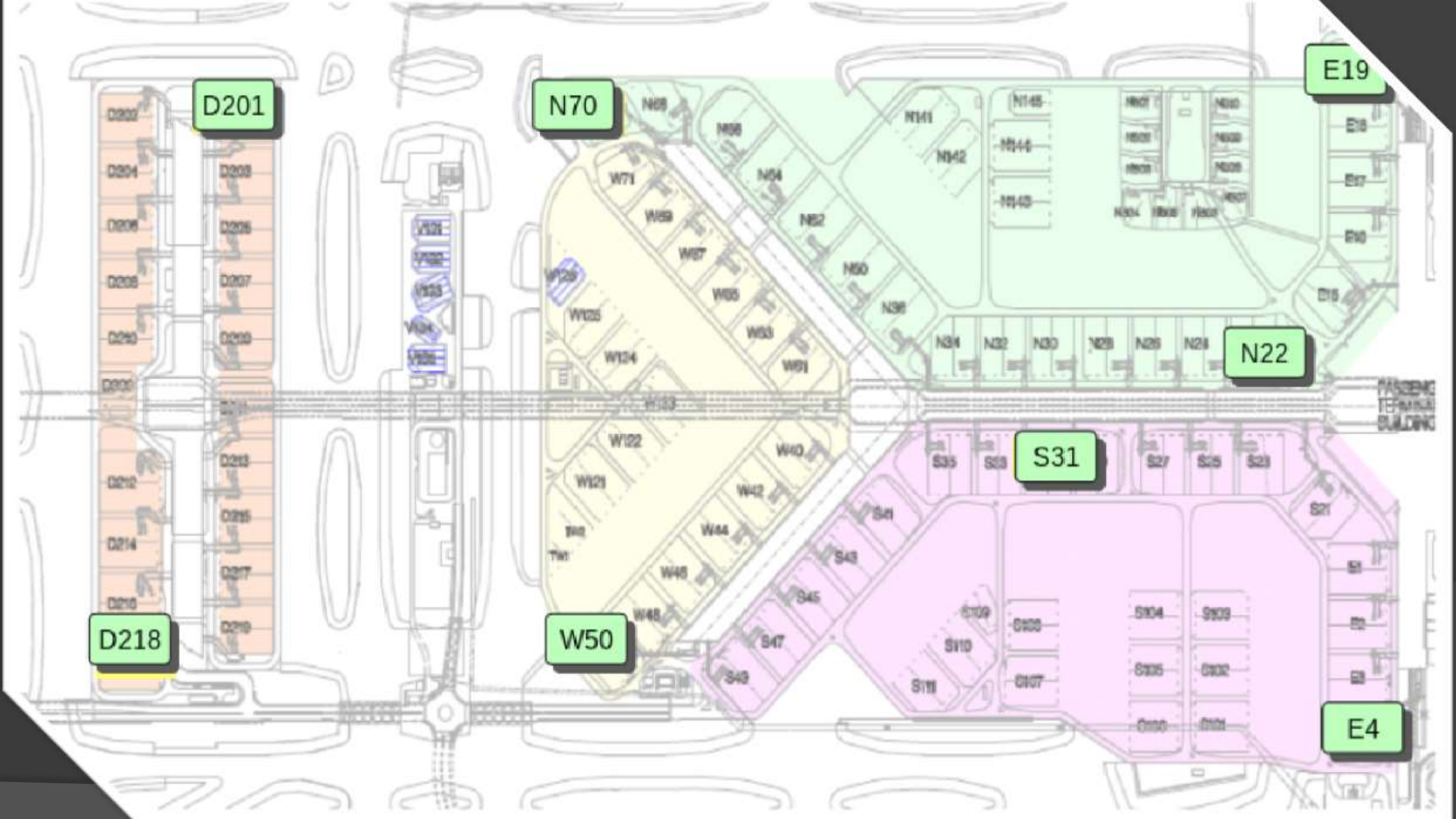
Tai Lam Chung

Brothers' Point

Lantau Island

香港天文台
HONG KONG OBSERVATORY

-  Airport Meteorological Office / Meteorological Enclosure
-  Microwave Radiometer
-  Anemometer / Runway Visual Range Transmissometer / Forward Scatterer
-  Ceilometer
-  Anemometer
-  Weather Buoy
-  LIDAR
-  Terminal Doppler Weather Radar
-  X-Band Weather Radar
-  Wind Profiler





Theme of World Met Day 2018

WEATHER READY CLIMATE SMART