

New Site Introduction for Hong Kong

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GRUAN ICM-12

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Site map

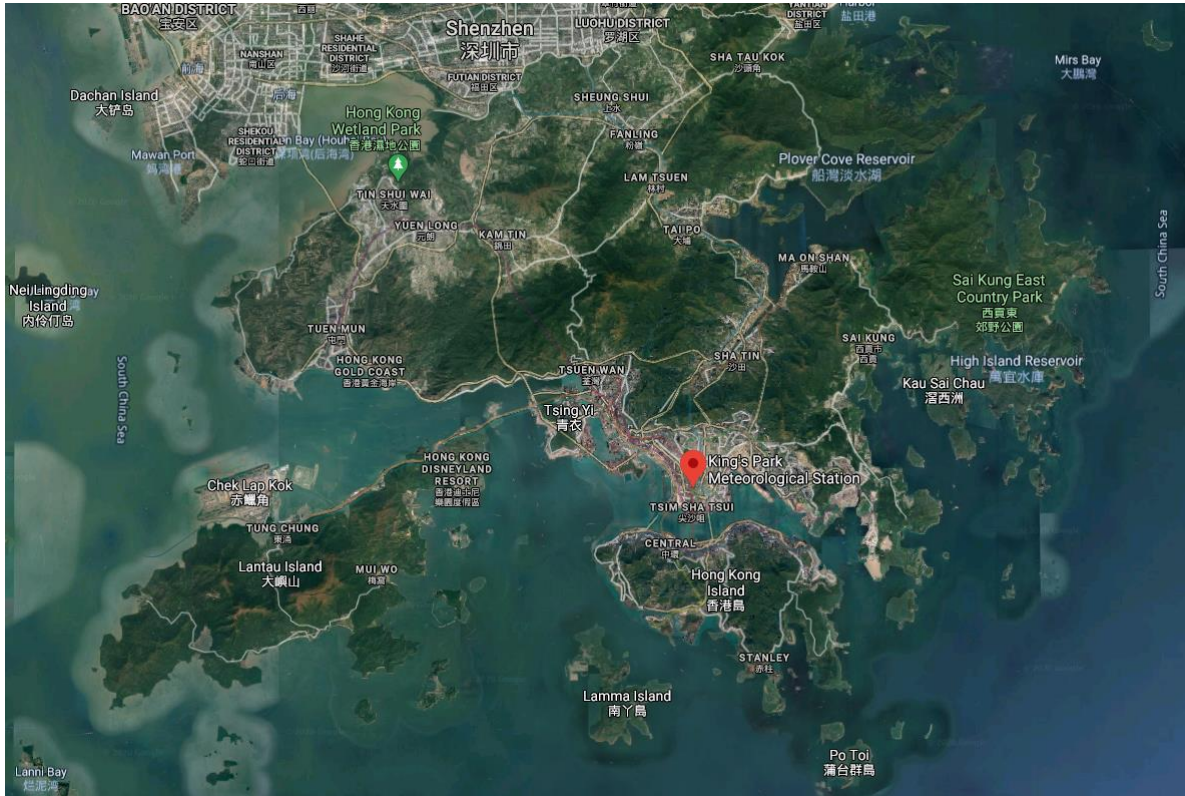
GCOS Reference Upper-Air Network



GRUAN Name “Hong Kong”
Code “HKO”
(WMO ID 45004)

- Hong Kong is a major, highly populated city at the southern coast of China.
- The upper-air meteorological station in Hong Kong is located at King's Park. It is on a small hill in Kowloon, an urban district of Hong Kong.
- King's Park is reasonably well exposed with a fairly typical outdoor setting of the city with short grass, trees and buildings in the vicinity.

GRUAN Name “Hong Kong”, Code “HKO” (WMO ID 45004)



- Hong Kong station is located at King's Park in Kowloon, an urban district of Hong Kong
- Station latitude, longitude and altitude:
22.31°N 114.17°E, 65 m (MSL)
- Time zone: UTC+8 (HKT)
- Warm temperate climate with hot summer and dry winter
- Accepted as a GRUAN candidate site in July 2020

Hong Kong's only upper-air meteorological station – King's Park Meteorological Station



Panorama view of Hong Kong site



Hong Kong – history of the station



- Station inaugurated in 1951
- Radiosonde launch since then
[Kew MK IIB → RS13 → RS18 → RS21 → RS80 → RS92 → RS41]
- History: Blog – Seeking ground truth at a height at King's Park
(<https://www.hko.gov.hk/en/Observatorys-Blog/103423/Seeking-ground-truth-at-a-height-at-King%E2%80%99s-Park>)
- Also a GAW Regional Station
(solar data to WRDC, CO₂ data to WDCGG, and ozonesonde data to WOUDC)

Hong Kong – sounding operations



- GUAN station
- At least twice daily radiosonde launch (00 and 12UTC) (Vaisala RS41-SG)
- Weekly ozonesonde launch (SPC 6A-ECC on Vaisala RS41-SG)
- Monthly moisture sonde launch (EN-SCI CFH) since Oct 2020
- Others: Quarterly radioactivity sonde launch (MEISEI)
- Ad-hoc launches when important weather systems are in the vicinity (e.g. tropical cyclone, intense cold front, pressure trough etc.)

Routine radiosonde sounding operation



- Vaisala Autosonde (daily 00 and 12UTC)
- System implemented in 2004 and upgraded in 2016
- High resolution BUFR (2 second data) released to GTS since Jan 2018
- Manual system MW41 as the backup
- Sonde RS41-SG + Totex TA600 balloon with internal parachute
- Helium inflated
- Manufacturer-dependent ground check by RI41-AS1 / activator board
- No manufacturer-independent ground check yet

香港(2s)

10 NOV 2020

00 UTC

45004 CAPE : 0
K Index : 21
SWEAT Index : 88
SHOVA Index : 12

CT05-CT70 : -20
CT05-CT50 : -10
24-hr 500HC : -10

Str.L Pressure (hPa) :
1012
Freezing Level (hPa) :
598 (4461 M)
Tropopause (hPa) :
103 (16469 M)
-82.4 °C

Lifted index :
14
Total Totals index :
28
Total Precipitable Water :
40
Convective Inhibition :
N.A
Bulk Richardson No. :
0

Pressure level at 1000

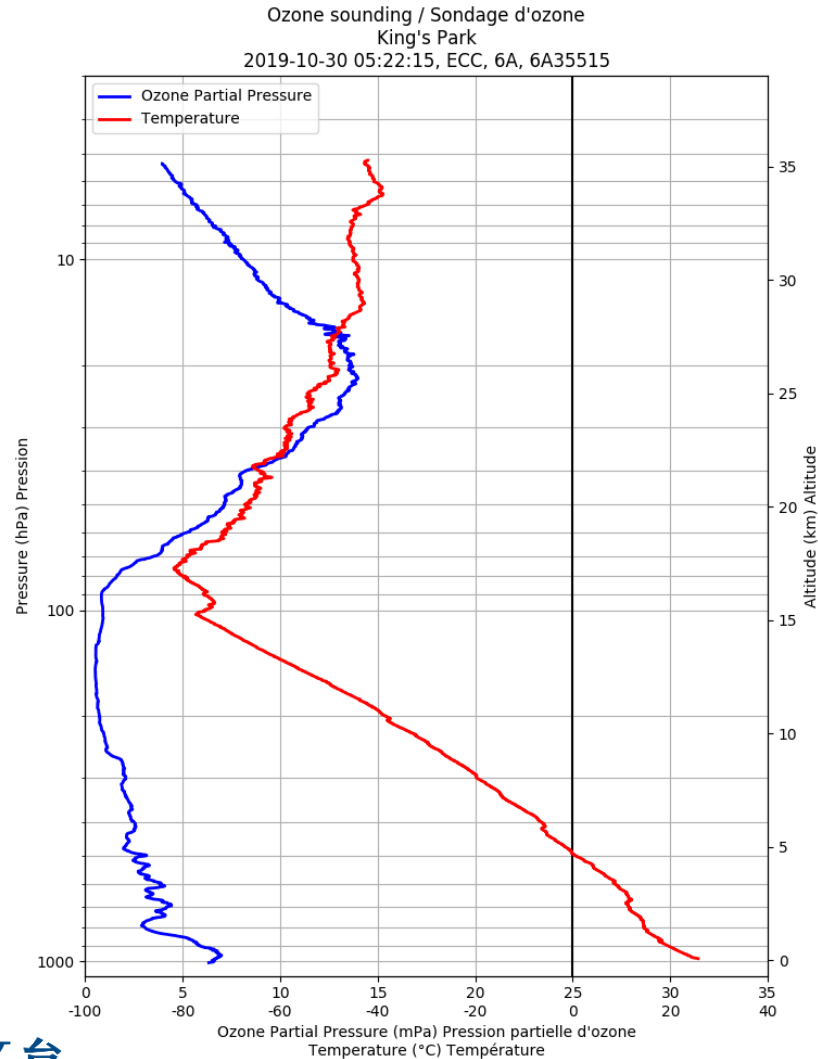
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HONG KONG OBSERVATORY

High-resolution BUFR (2-sec data)

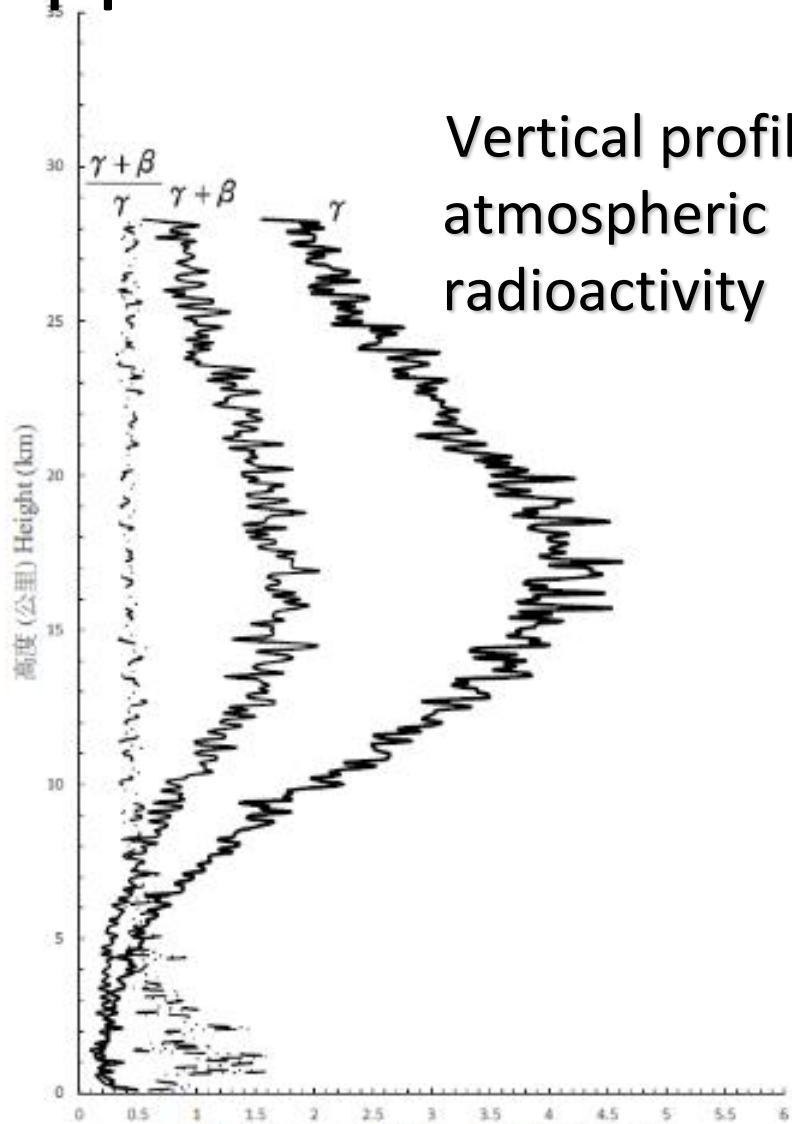
- Available in all routine launches (00 and 12 UTC)
- Available to GTS since December 2017 for consumption by meteorological community
- Plotted for internal use by forecasters
- Hi-res BUFR data being ingested into NWP (e.g. ECMWF)

Ozone sounding operation



- Vaisala manual system MW41 using ECC6A ozonesonde (once a week)
- Sonde RS41-SG + Totex TA1500 balloon + Totex No. 160V-05 external parachute
- Helium inflated
- Manufacturer-dependent ground check by RI41
- Manufacturer-independent humidity check by SHC1 and Fluke Pt100 temperature probe
- Data are sent to World Ozoneonde and Ultraviolet Data Centre (WOUDC) in Canada

Upper-air radioactivity soundings (not GRUAN related)



伽馬加貝他($\gamma+\beta$)及伽馬(γ)計數率(每秒計數),
和它們的比值($(\gamma+\beta)/\gamma$)
Count rate (counts per second) of gamma plus beta ($\gamma+\beta$)
and gamma (γ), and their ratio ($(\gamma+\beta)/\gamma$)

- To measure gamma radiation and also high-energy beta particles (>0.25 MeV) in the atmosphere
- Measurements made during different meteorological conditions, usually a few times a year

Radioactivity sensors

Gamma measurement

MEISEI



Vaisala (stopped production)



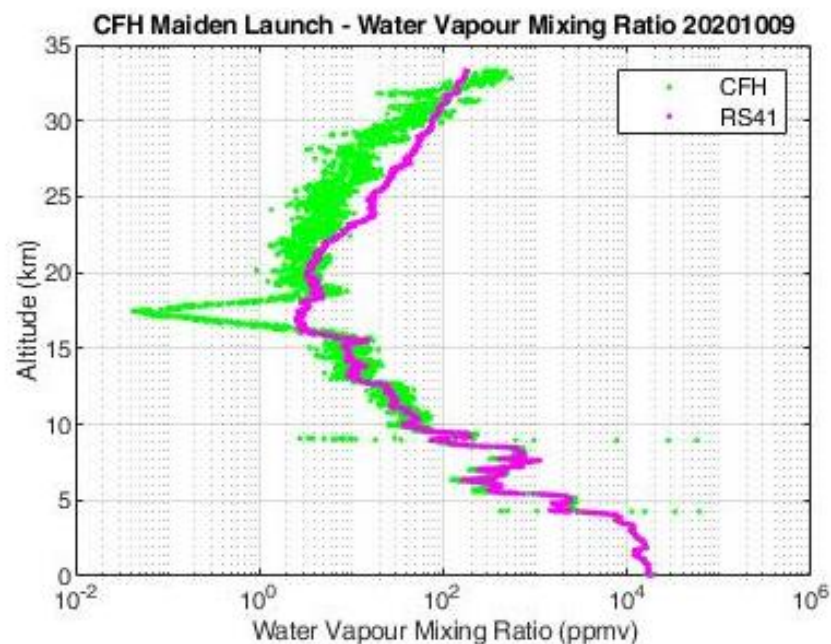
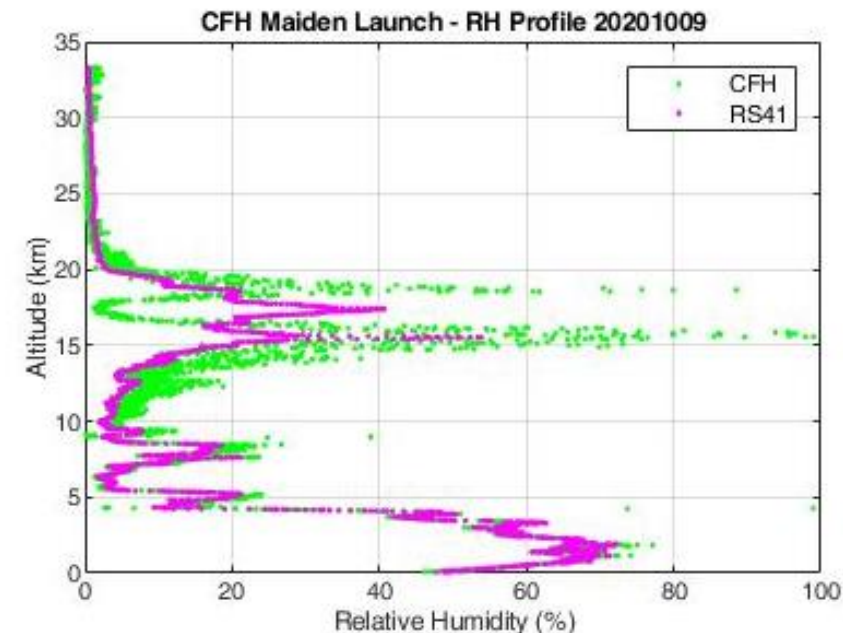
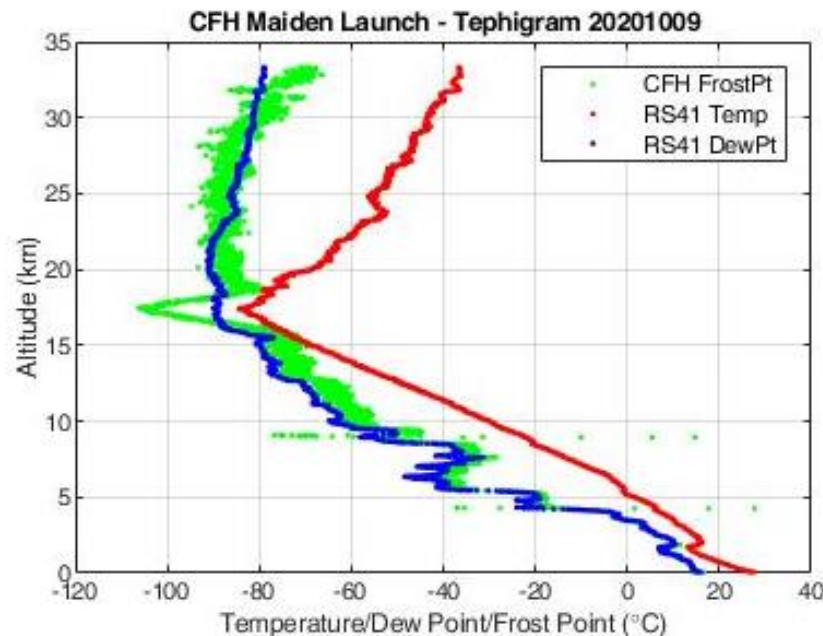
Gamma and beta measurements

Moisture sounding operation

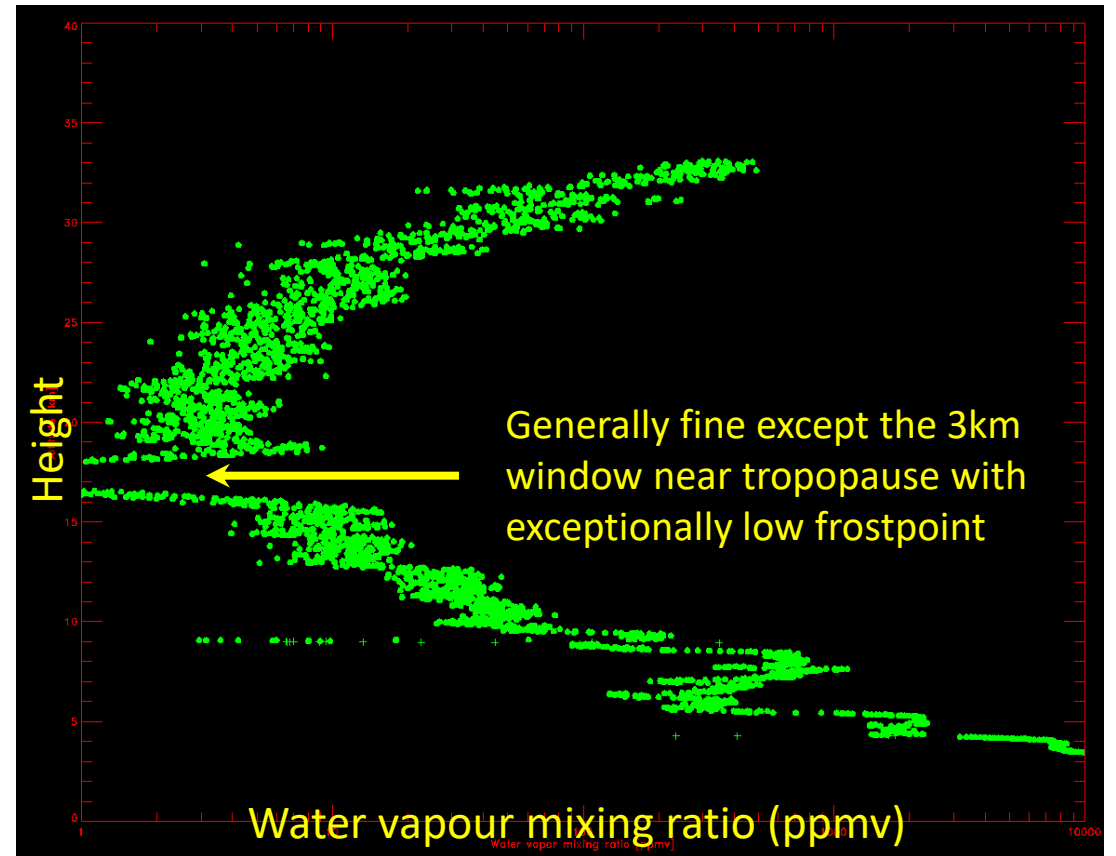
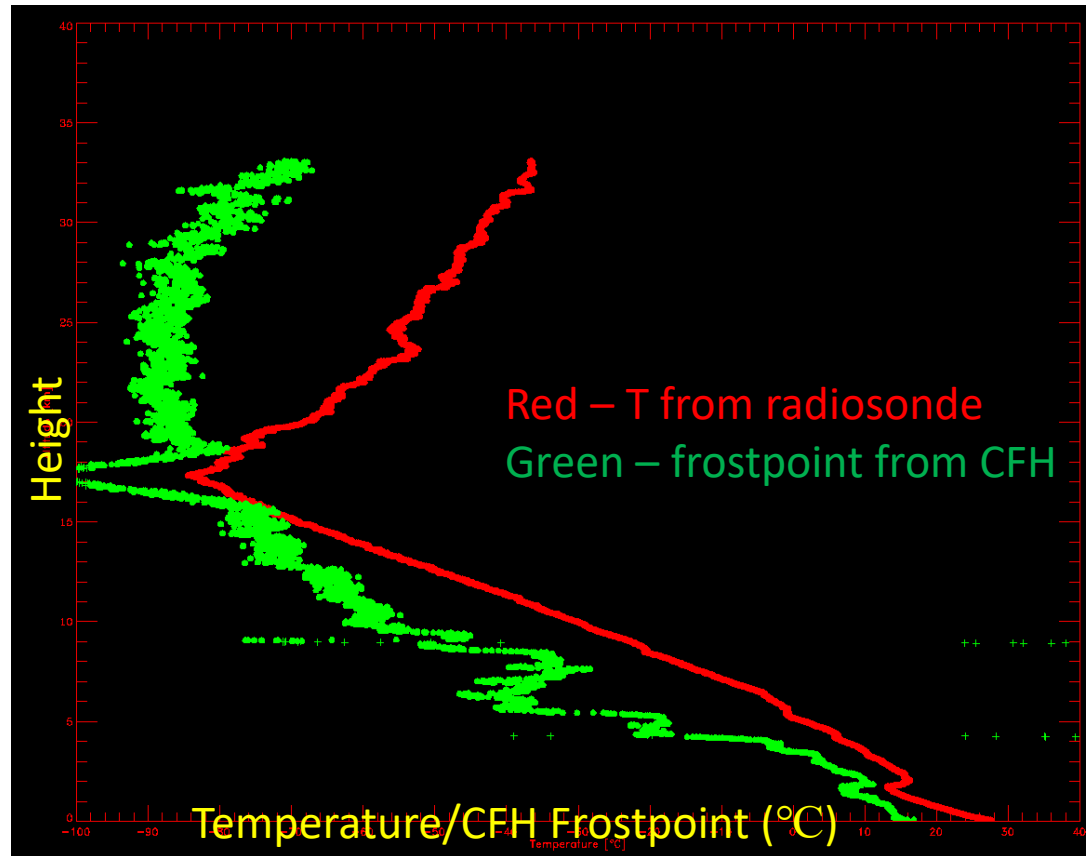


- Vaisala manual system MW41 using EN-SCI Cryogenic Frostpoint Hygrometer CFH (once a month)
- Sonde RS41-SG + Totex TA1500 balloon + Totex No. 160V-05 external parachute
- Helium inflated
- Manufacturer-dependent ground check by RI41
- Manufacturer-independent humidity check by SHC1 and Fluke Pt100 temperature probe

CFH Maiden Launch – 9 Oct 2020 (daytime)



CFH Maiden Launch – 9 October 2020





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Tephigram

Altitude (km)

Temperature/Dew Point/Frost Point ($^{\circ}\text{C}$)

Legend:

- CFH FrostPt
- RS41 Temp
- RS41 DewPt

Water Vapour Mixing Ratio

Altitude (km)

CFH

RS41

Exceptional low frostpoint near tropopause NOT observed

Water Vapour Mixing Ratio (ppmv)

Trace of CFH

Map showing the trace of CFH (red line) across Hong Kong. The map includes labels for New Territories, Kowloon, and Hong Kong Island. Numbered points (1-9) are marked along the trace. Key locations labeled include Tuen Mun, Tsing Yi, Kowloon, Kowloon Tong, Central, Hong Kong Island, Cheung Chau, Lamma Island, Stanley, and Po Toi. The map also shows the airport, Lantau Island, and the New Territories. A scale bar indicates 5 km and 5 mi. The map is titled "Trace of CFH".

Future plans



- Short term –
 - Finalize the data flow between HongKong and Lead Centre and start near real time data submission
 - Certification of the site within 1 to 2 years
- Short to medium term –
 - Try using dry ice and ethanol as coolant for CFH sonde
 - Try launching MEISEI SKYDEW moisture sonde if feasible

Thank you!