觀天、應變、謀未來
From Cloud Watching to Emergency Readiness : Towards a Safer Future

LEUNG WING MO (梁榮武)

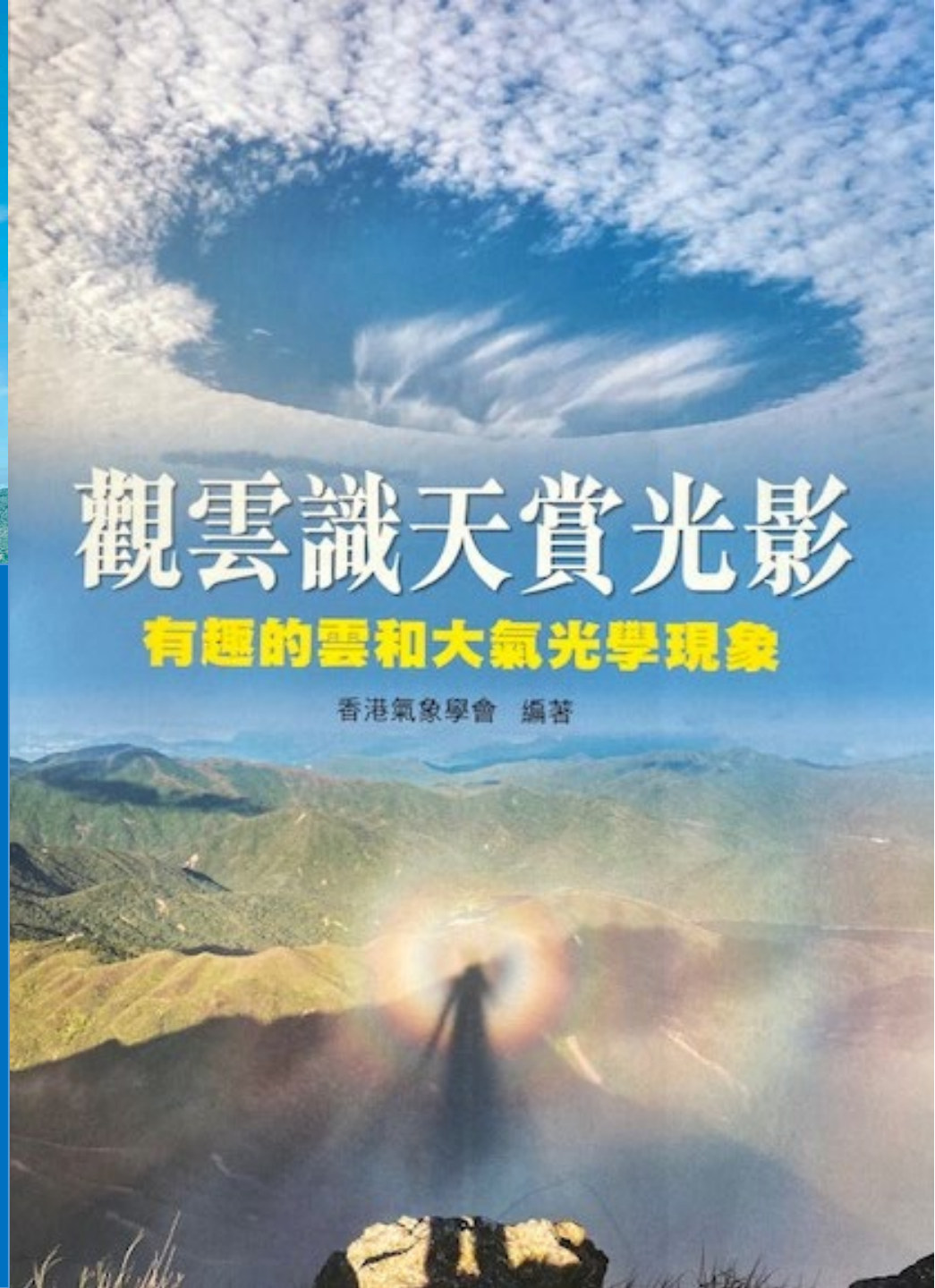
The HKIE Veneree Club Monthly Talk

April 8, 2026

多少個下午，我會坐在家門前的一個小平臺上，入神地看著那些天空中的表演者，輕攏慢涌的從東山飄到西嶺。

有時候，我又會對它背後的蒼穹產生興趣，甚至幾乎肯定那是神仙遊息之處，說不定神仙們也是在賞雲，只是看的角度和我的不同而已。

想著看著，不知不覺的又是日落時分；日落看多了，得出的結論是有雲的黃昏總是特別美麗。大概我是從那時候愛上了雲。



Head in the clouds

Bertrand Russell's "In Praise of Idleness"

"The wise use of **leisure**, it must be conceded, is a product of civilization and education."

"Ordinary men and women, having the opportunity of a happy life, will become more kindly and less persecuting and less inclined to view others with suspicion. **The taste for war will die out**, …"

"Good nature is, of all moral qualities, the one that the world needs most, and good nature is the result of ease and security, not of a life of arduous struggle."

Walt Whitman:

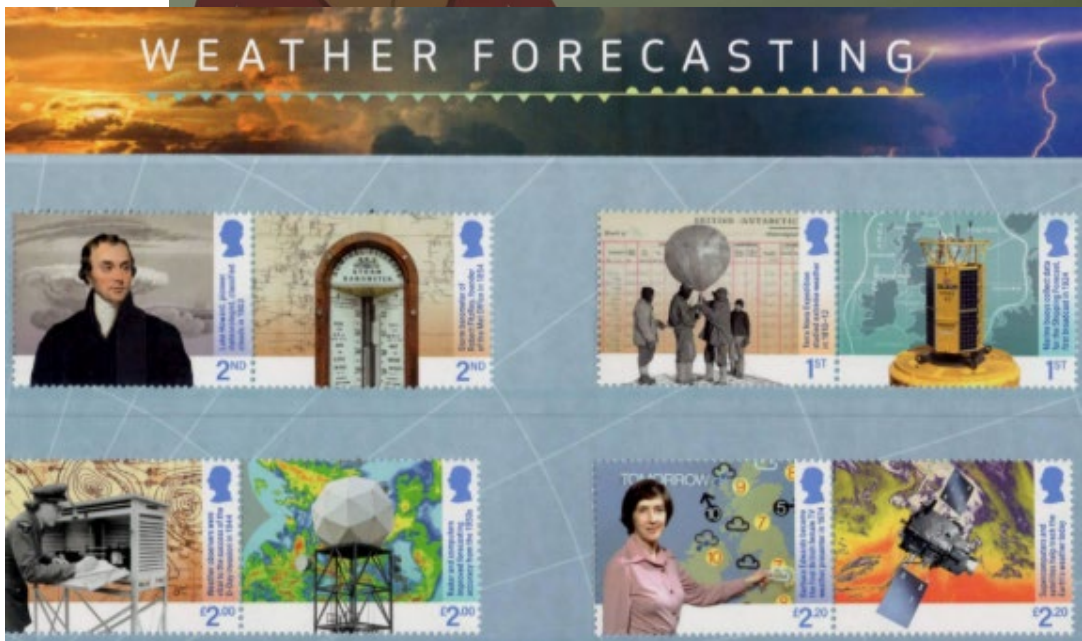
"Do anything, but let it produce joy."

Luke Howard (1772 – 1864)

Father of meteorology (father of cloud type, rather)

Howard's Core Cloud Types:

- **Cirrus (Hair/Tendril):** high, parallel, or diverging fibers, often called "mare's tails".
- **Cumulus (Heap/Pile):** convex or conical heaps, increasing upward from a horizontal base; cotton-like clouds.
- **Stratus (Layer/Sheet):** widely extended horizontal sheet, increasing from below.
- **Nimbus (Rain):** rain cloud; a cloud or system of clouds from which rain is falling.



雲中見性

More about clouds 社區天氣觀測計劃
Community Weather Observing Scheme

Altocumulus clouds (高積雲)

Photo: Fook Kei Lai, at Shatin, Dec 2020

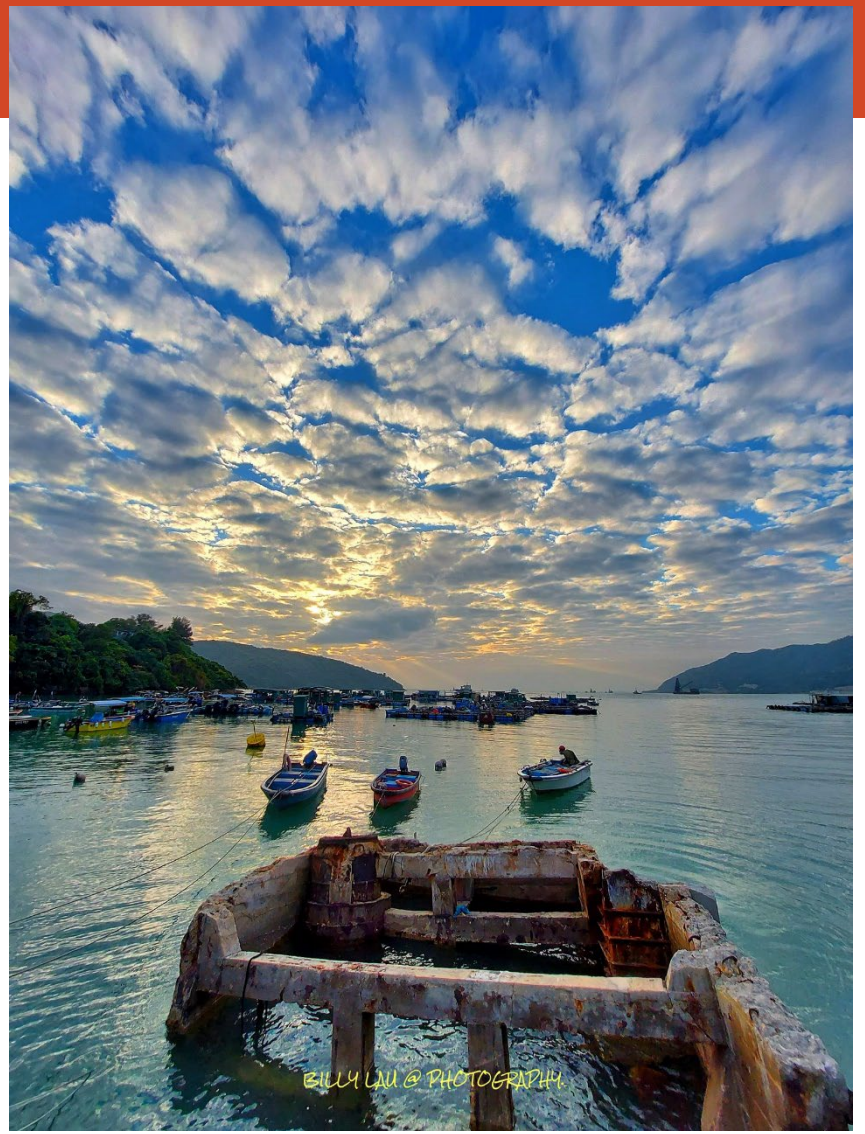


Photo: Billy Lau, Ma Wan, Dec 2020

Altocumulus stratiformis perlucidus translucidus cavum 雨幡洞,

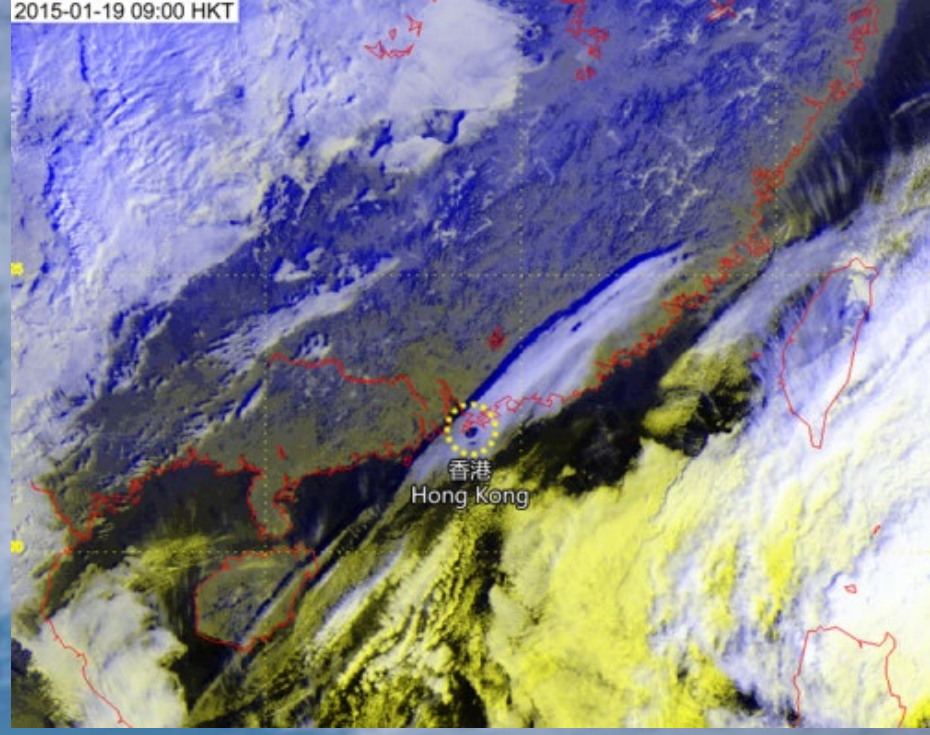


Photo: LEE Tsz Cheung

Polar stratospheric clouds, nacreous, or mother of pearl
珠母雲

Polar stratospheric clouds over Sweden
December, 2019

Credit: Goran Strand

“Both sides now” – Joni Mitchell

“Rows and floes of angel hair
And ice cream castles in the air
And feather canyons everywhere
I’ve looked at clouds that way

But now they only block the sun
They rain and they snow on everyone
So many things I would have done
But clouds got in my way

I've looked at clouds from both sides now
From up and down and still somehow
It's cloud illusions I recall
I really don't know clouds at all…”

Sky watching – identifying imminent/emerging risks

"Red sky at night, sailor's delight."

"Red sky in the morning, sailor take warning."

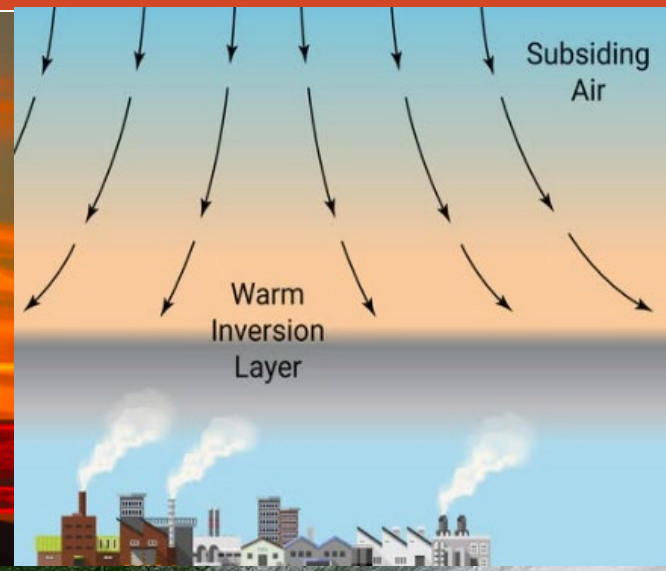
朝霞不出門，晚霞行千里。

"Clear moon, frost soon."

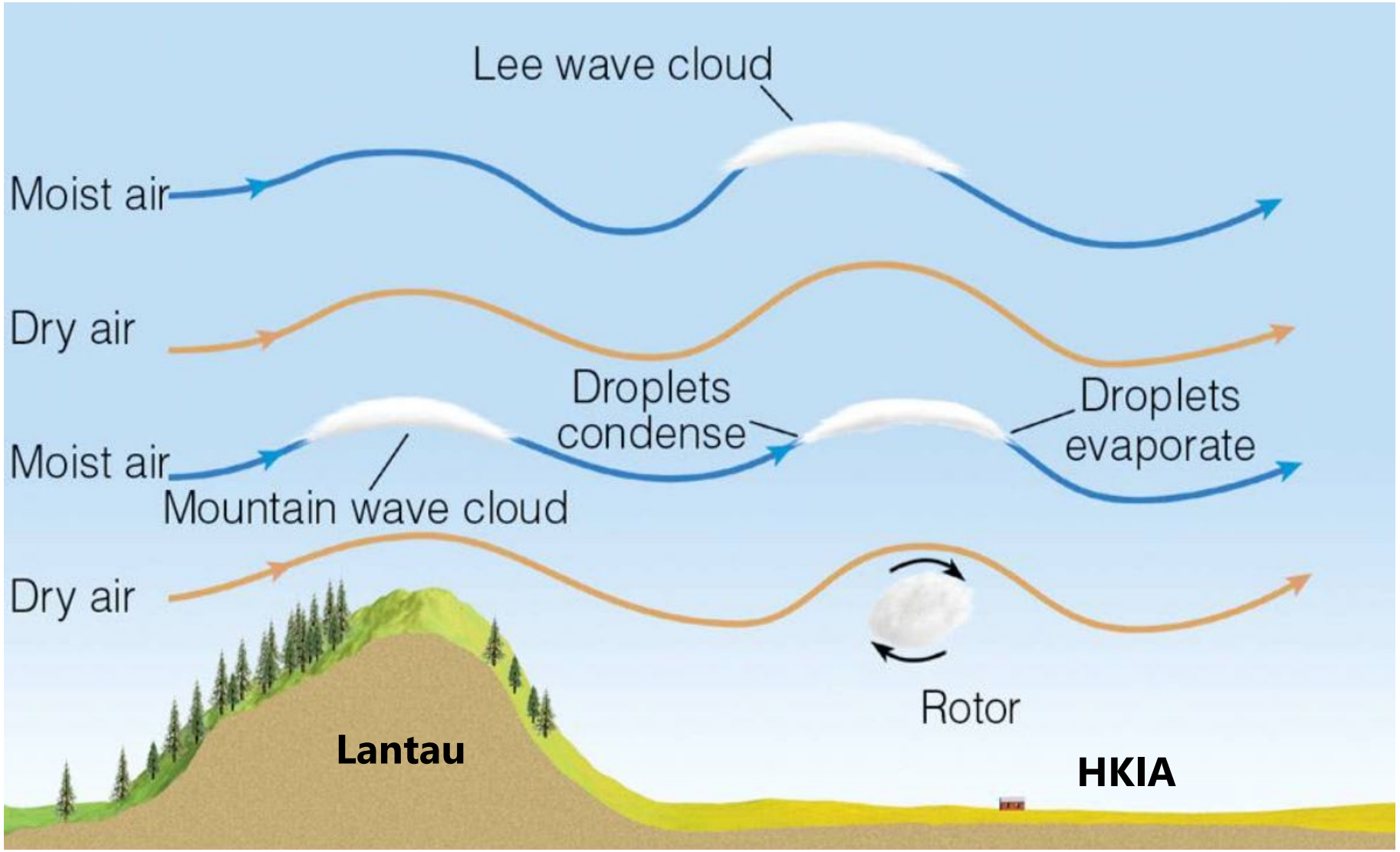
風大夜無露，陰天夜無霜。

"Halo around the sun or moon, rain or snow soon."

日暈三更雨， 月暈午時風。



Identifying turbulence – Lenticularis 荚状雲

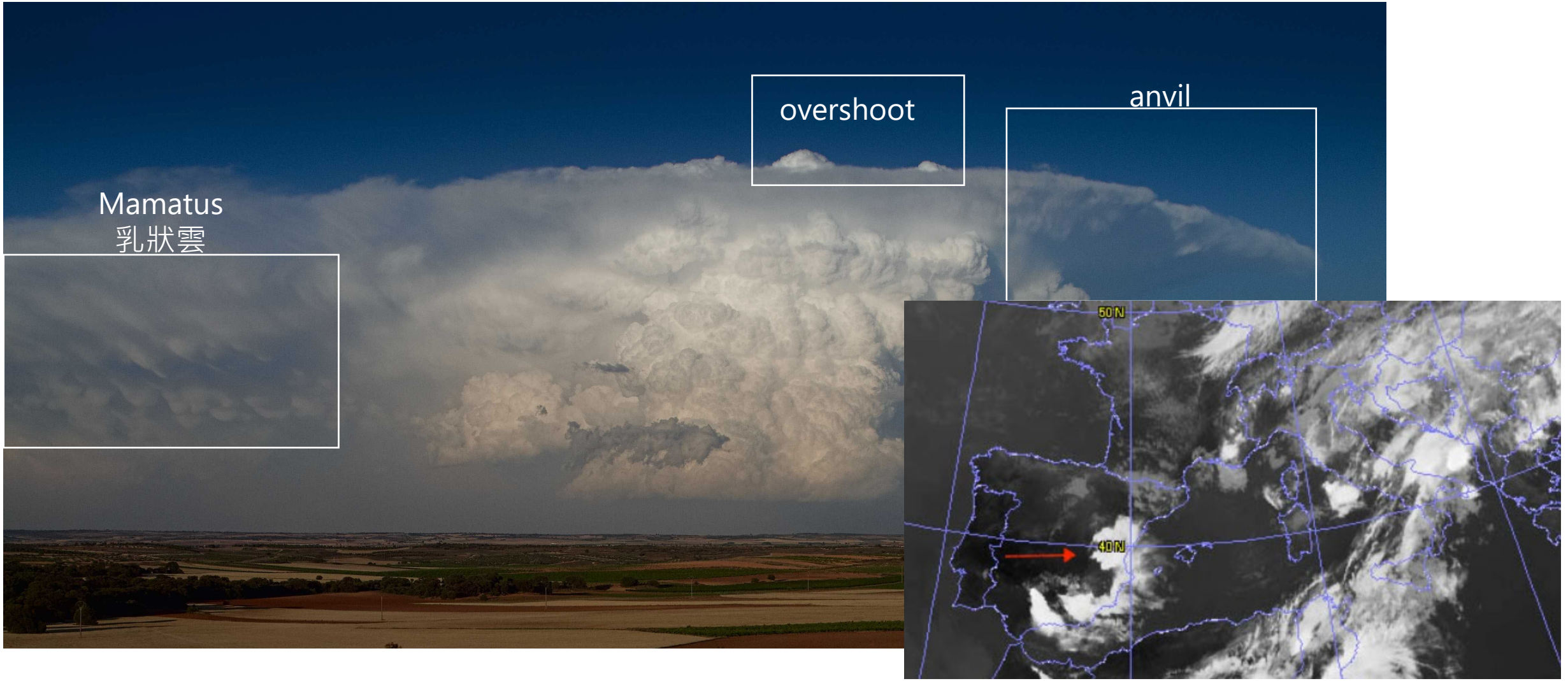


Lenticularis in Hong Kong

Kenneth Ma, 15/12/2020, 7 a.m., 鰂魚涌公園

岑智明 , 2004 半山區

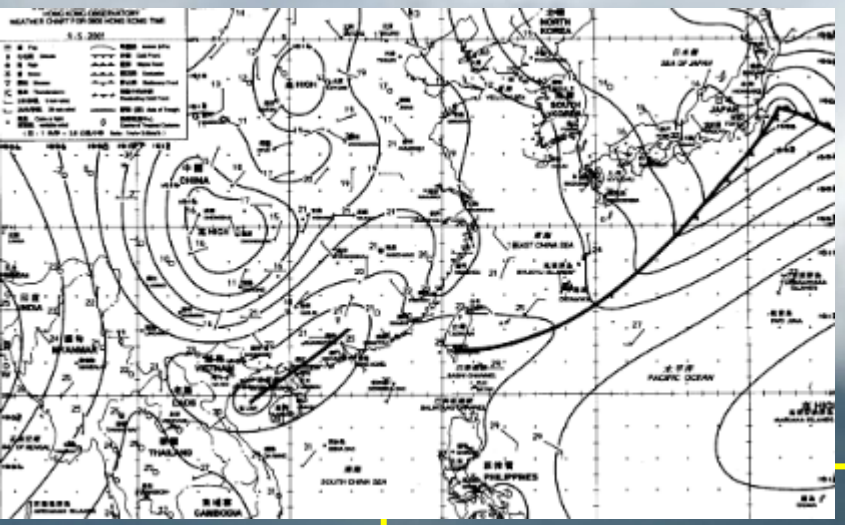
Identifying thunderstorms – Cumulonimbus 積雨雲

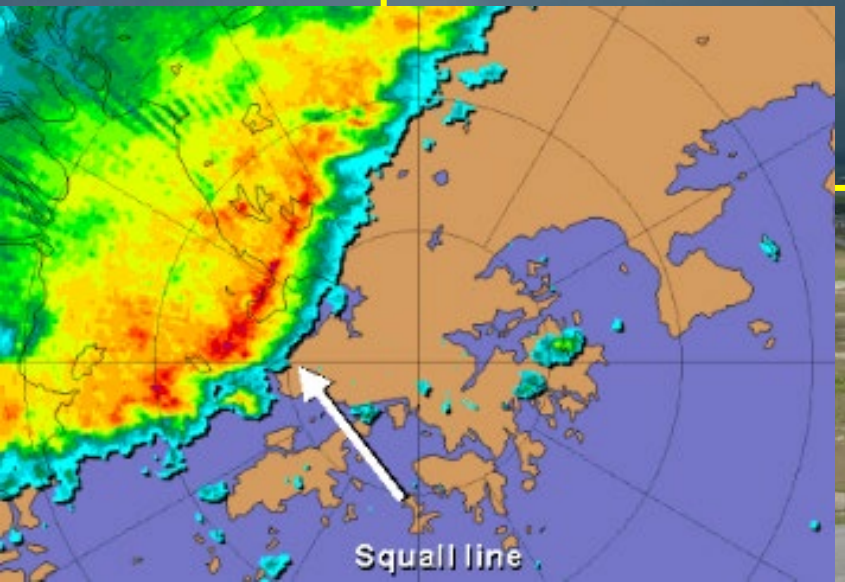


乳狀雲
Mamatus

Sung Lok Cheung

Identifying strong gusts - Arcus clouds, shelf clouds or roll clouds





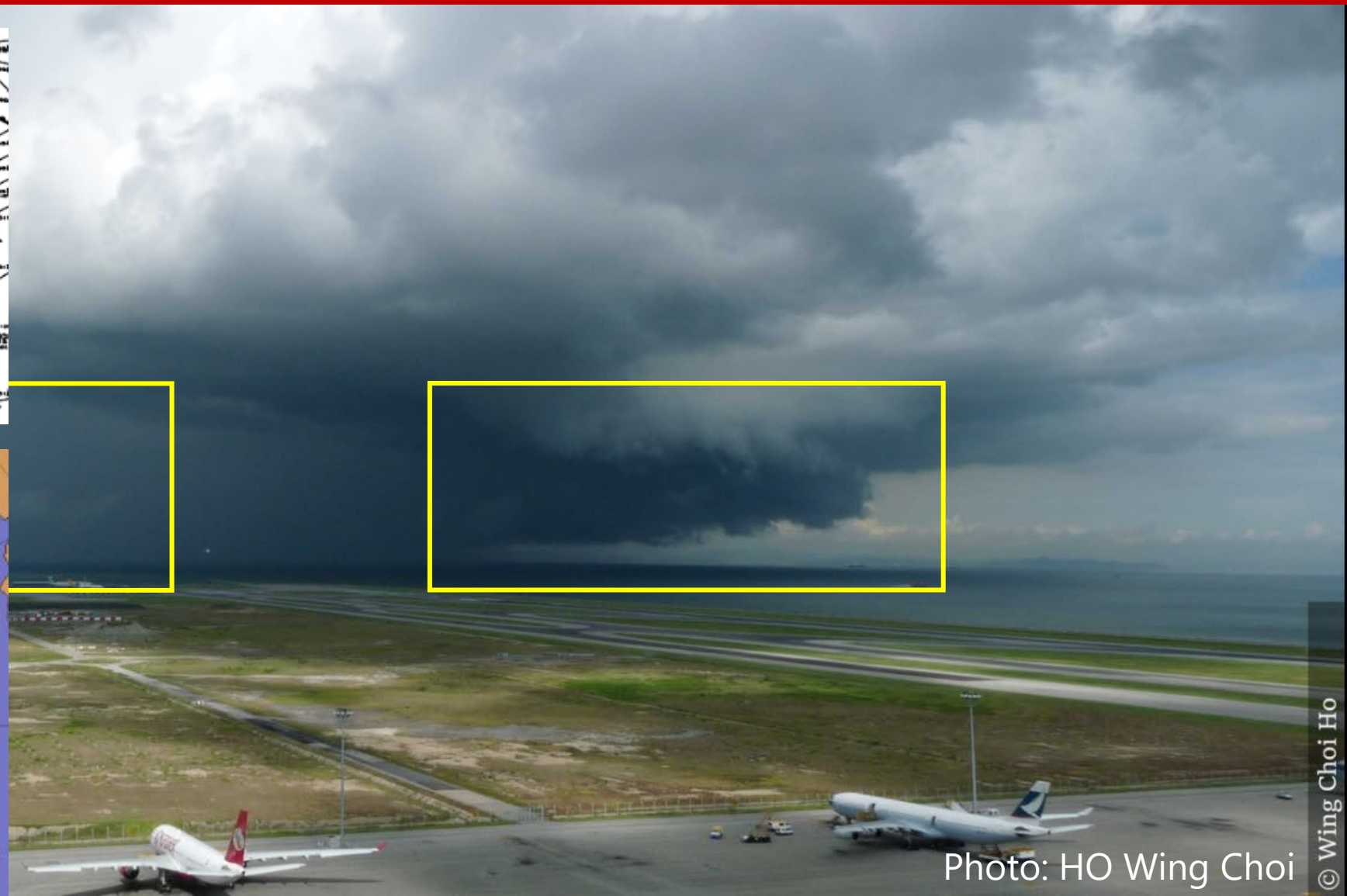
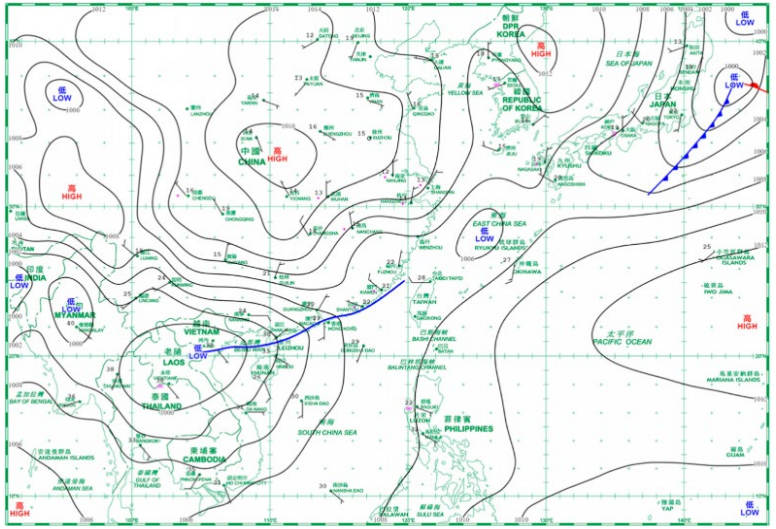


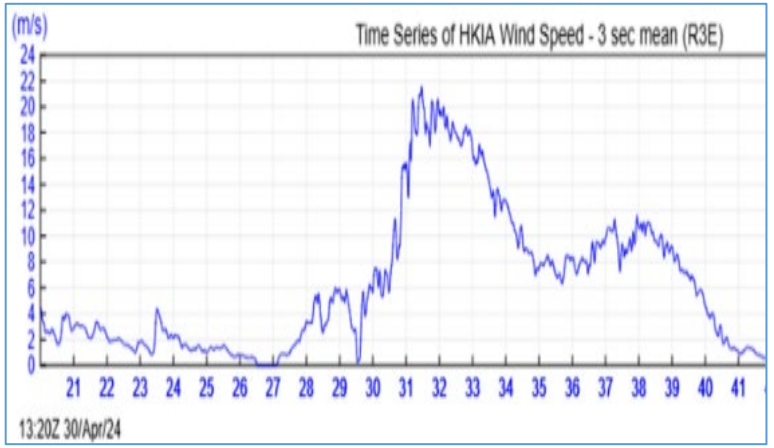
Photo: HO Wing Choi

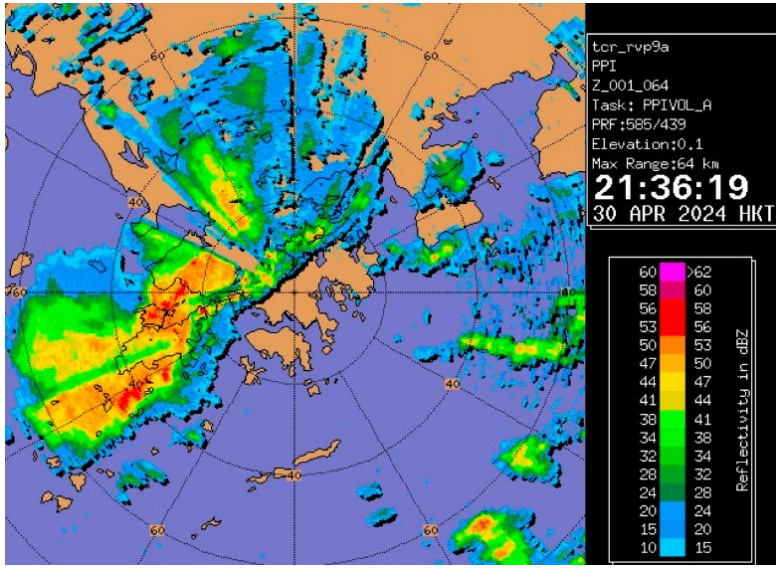
Intense Thunderstorms at Hong Kong International Airport, Apr 2024

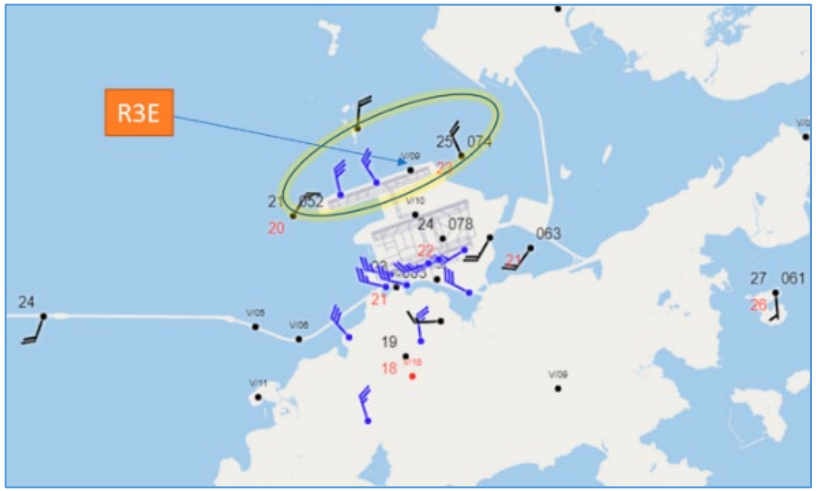
Synoptic background:

The confluence of cooler continental air and more humid and warmer air from the south led to the occurrence of heavy rain over the south China coast. In Hong Kong, heavy rain and thunderstorms first developed to the west and then travelled eastwards, following the mid-level westerly flow to affect HKIA and then the urban areas of the city. Severe gusts were associated with the thunderstorms. Downdrafts and downbursts are also rather common in such situations.

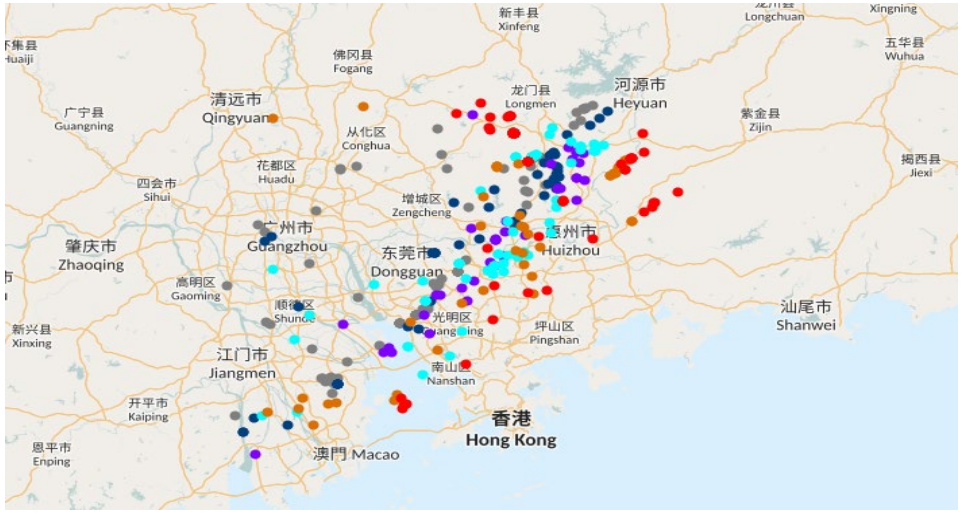


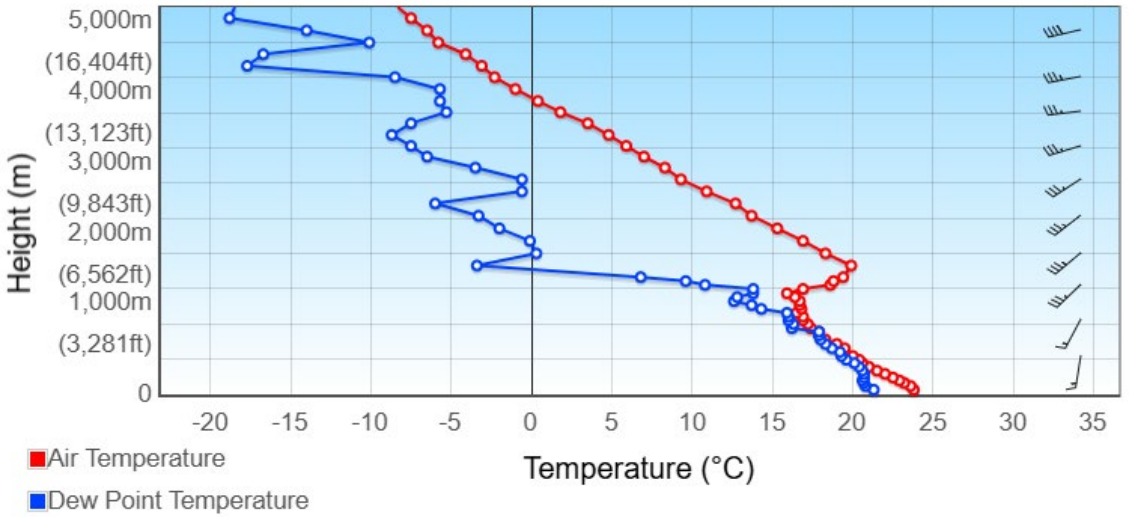




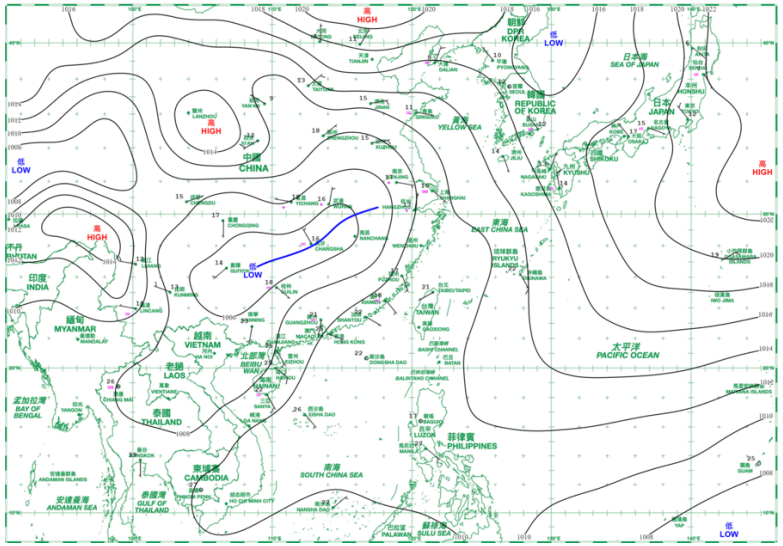


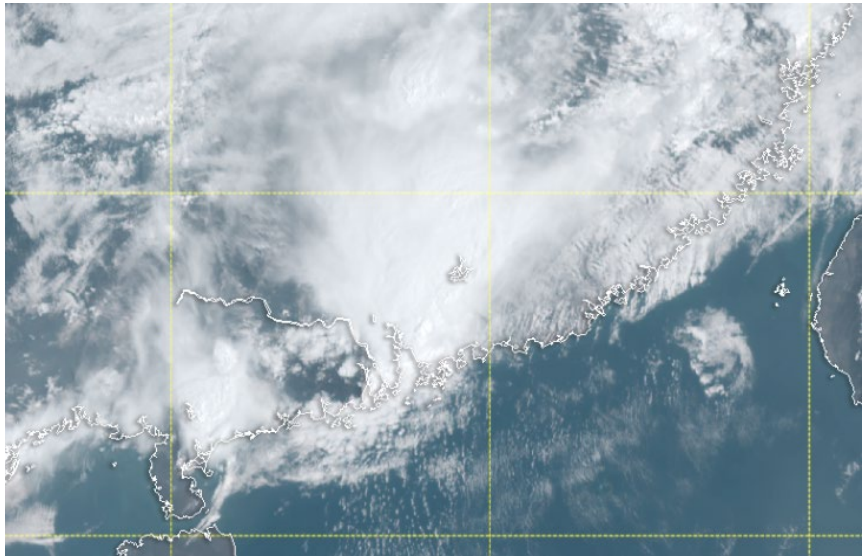
Squall line on 30.3.2026 (Amber rainstorm + thunderstorm)

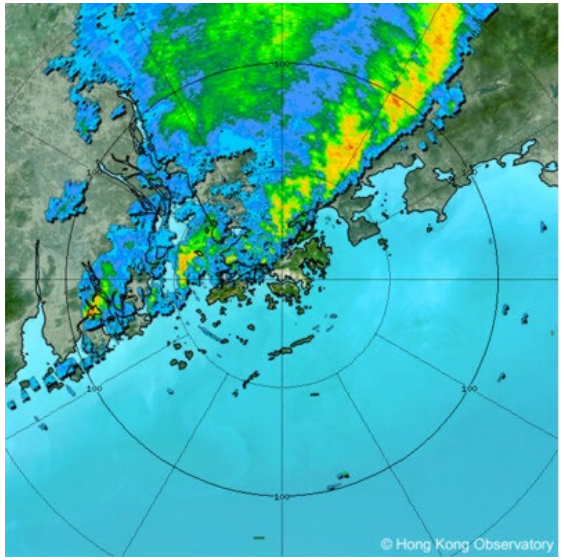


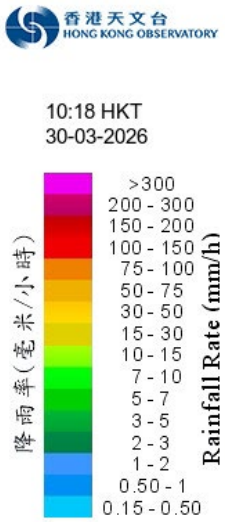


日期/Date: 30.03.2026 香港時間/HK Time: 02:00 香港天文台 Hong Kong Observatory







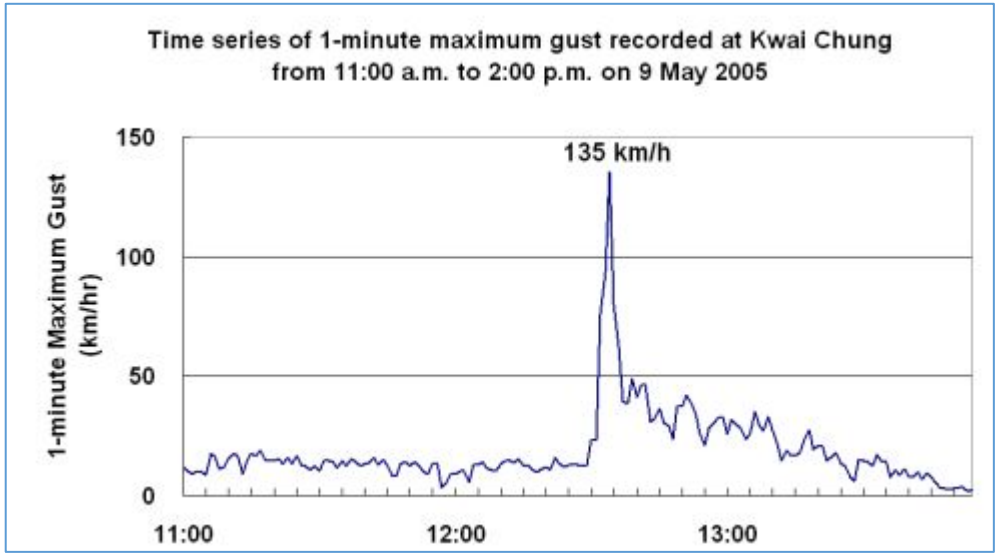


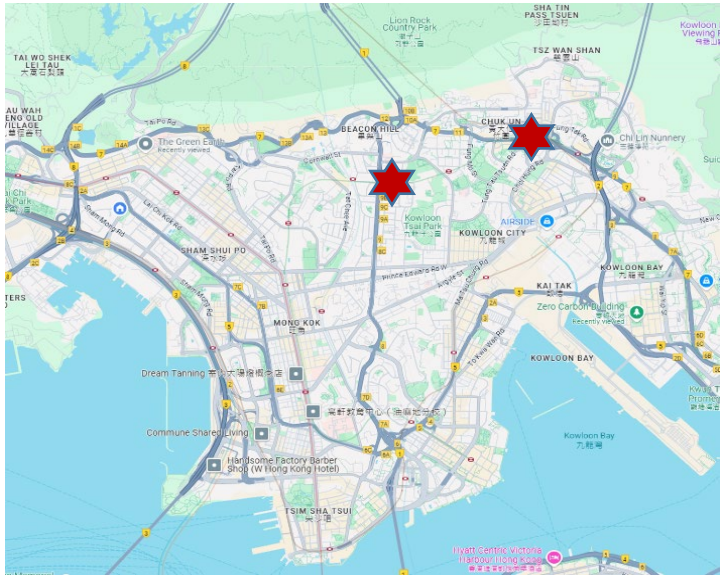
Squall line on 30.3.2026 (cont.)

Recorded gusts at various stations at 10:00 and 10:10 respectively

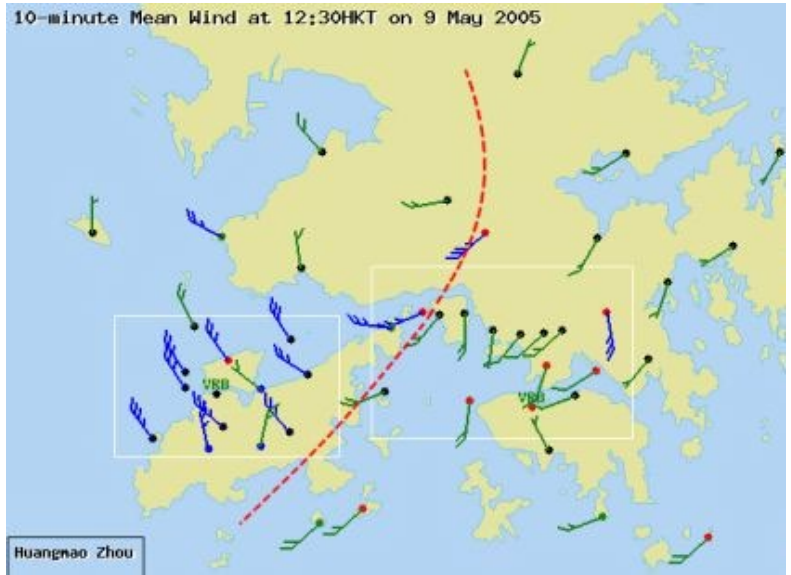
Transport chief apologises for Kowloon chaos, 2005

廖秀冬率港府六部门高官解释大塞车并向市民致歉





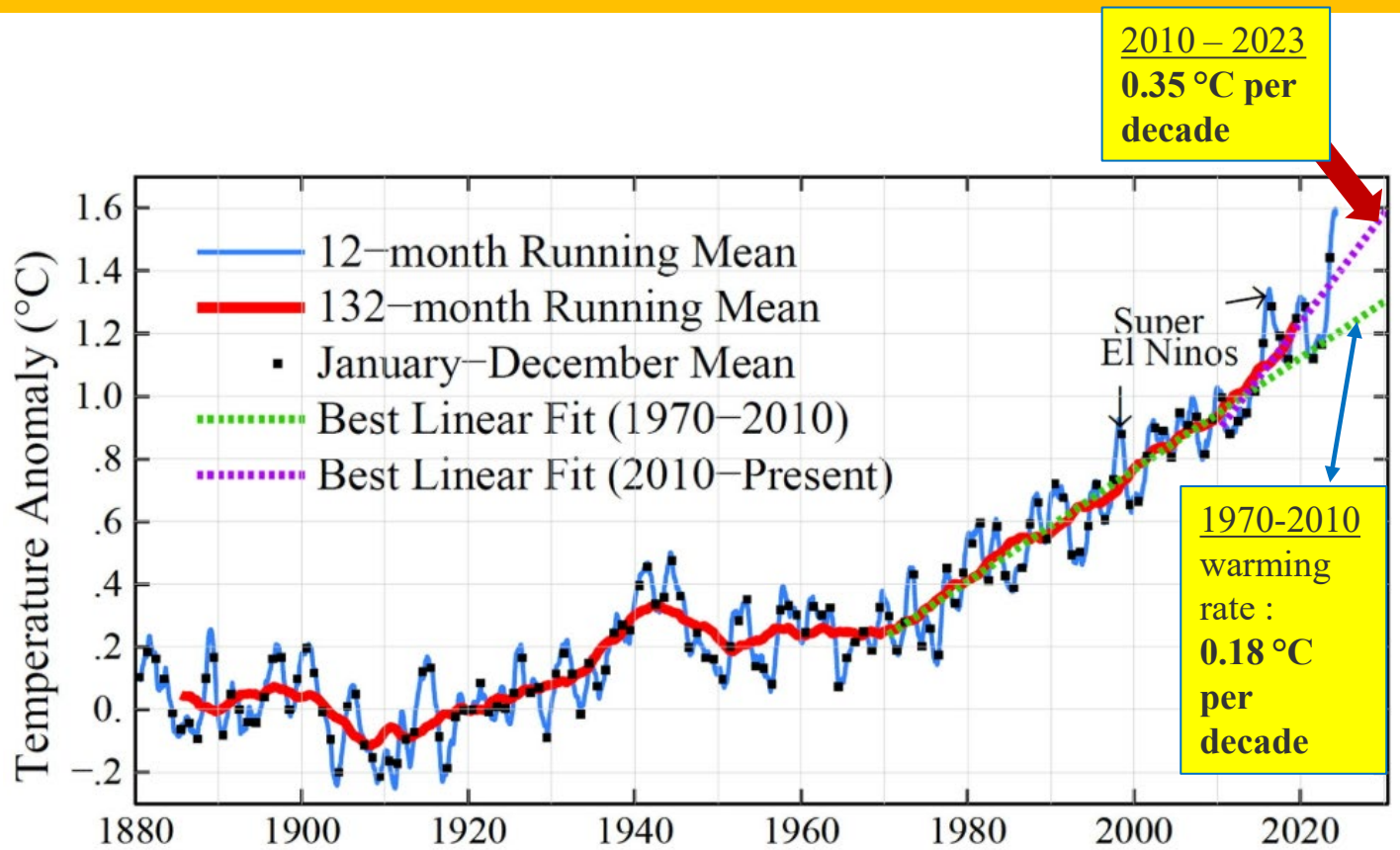
Collapse of trees and scaffolding



Greatest risk of all :

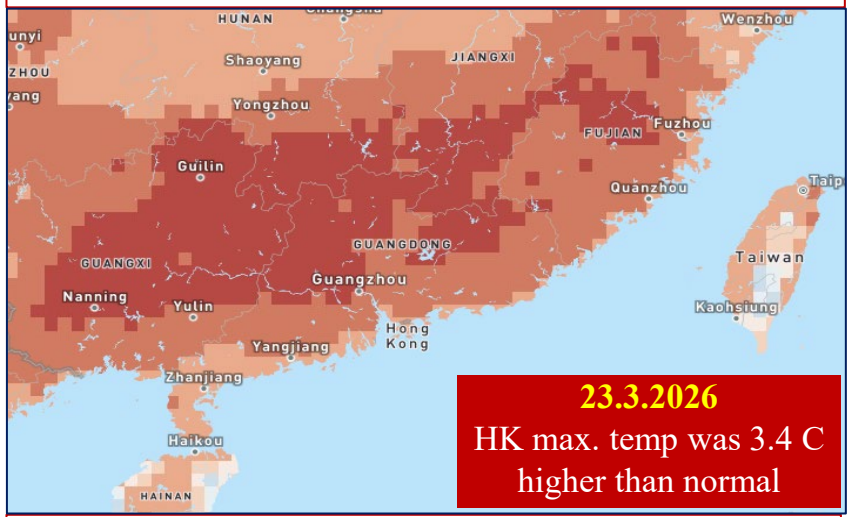
"Global warming has accelerated, James Hansen", Feb 2025

The world is already committed to 2 ^{0}C of warming



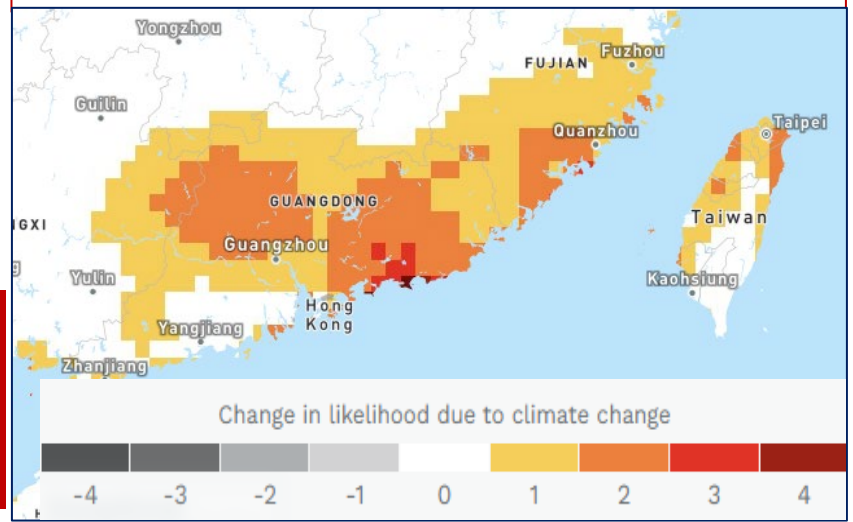
23.3.2026
Climate Shift Index:
HK's warm weather is made **2 - 3 times** more likely by global warming

Temperature anomaly, 23.3.2026

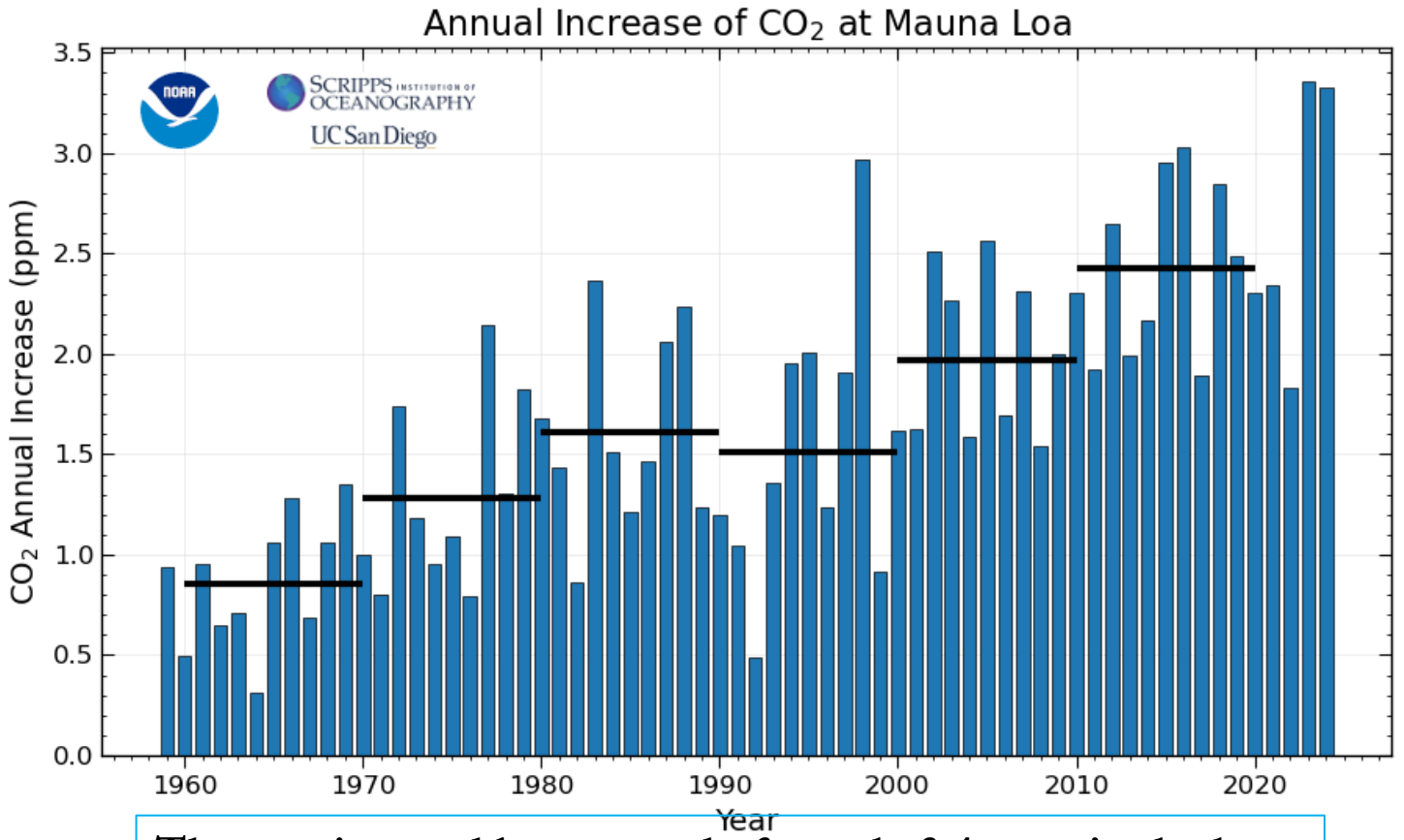


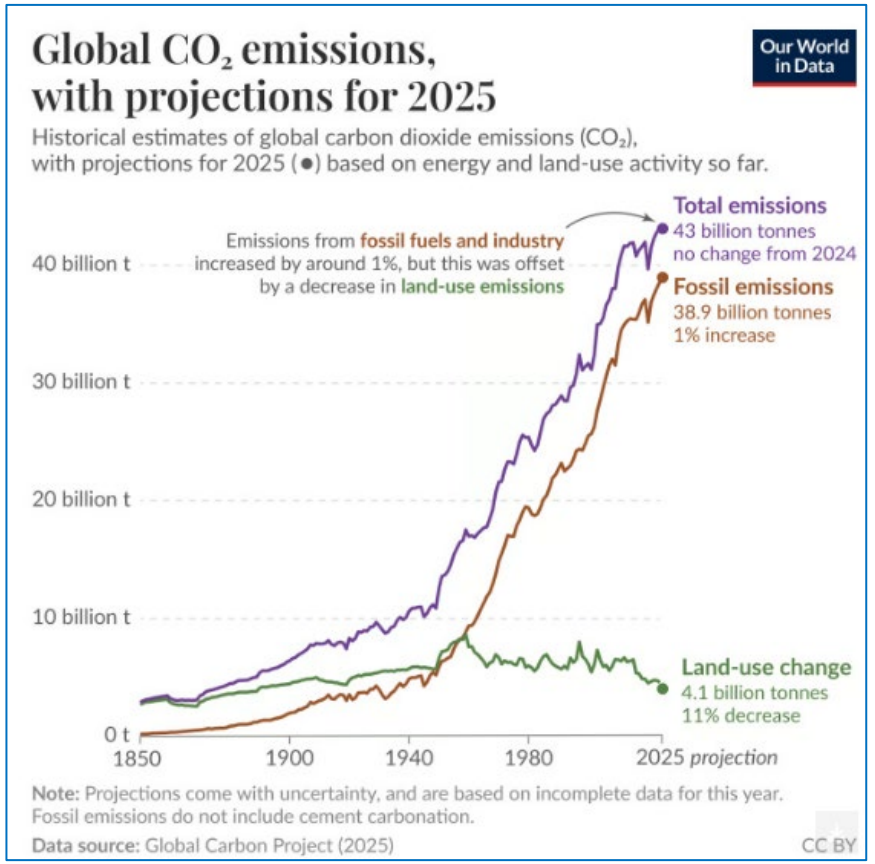
23.3.2026
HK max. temp was 3.4 C higher than normal

Climate Shift Index / Climate Central



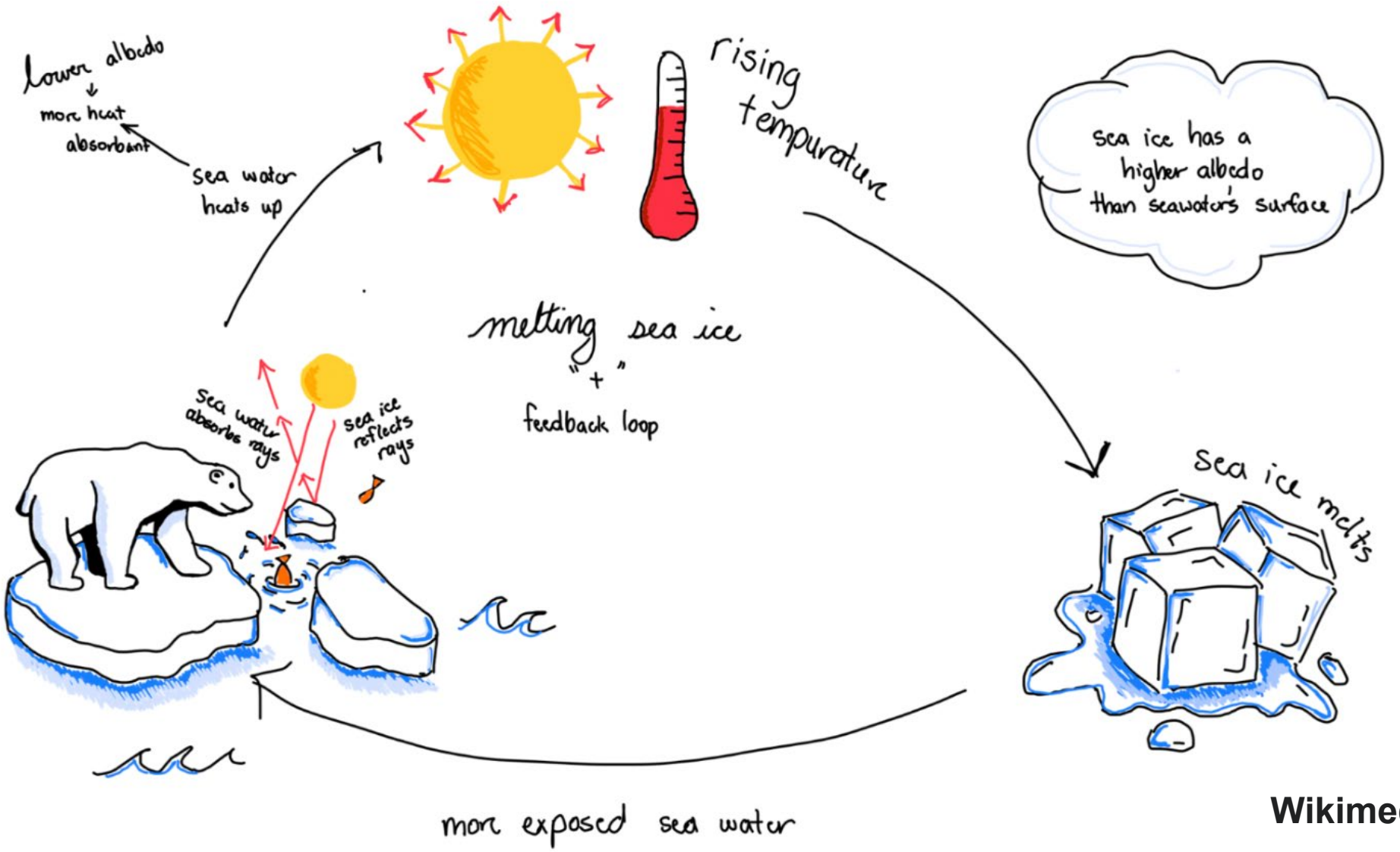
Why is global warming accelerating? More CO_2 emission?





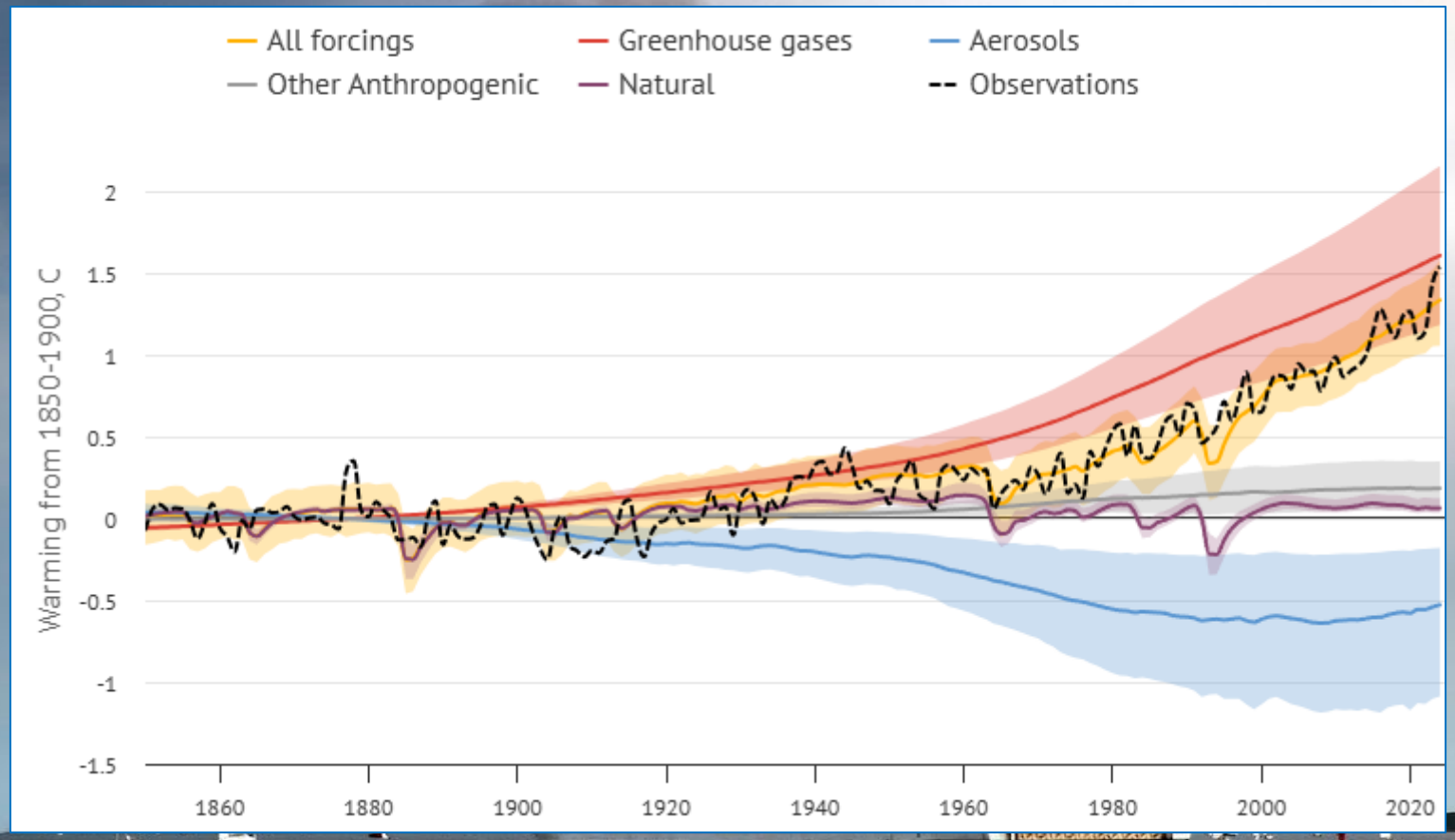
The rate jumped by a record of nearly 3.4 ppm in the last 2 years – the largest increase since monitoring began about 70 years ago.
The 10-year average rate (2011-2020) was 2.4 ppm.

Ice albedo feedback (+ve) ?



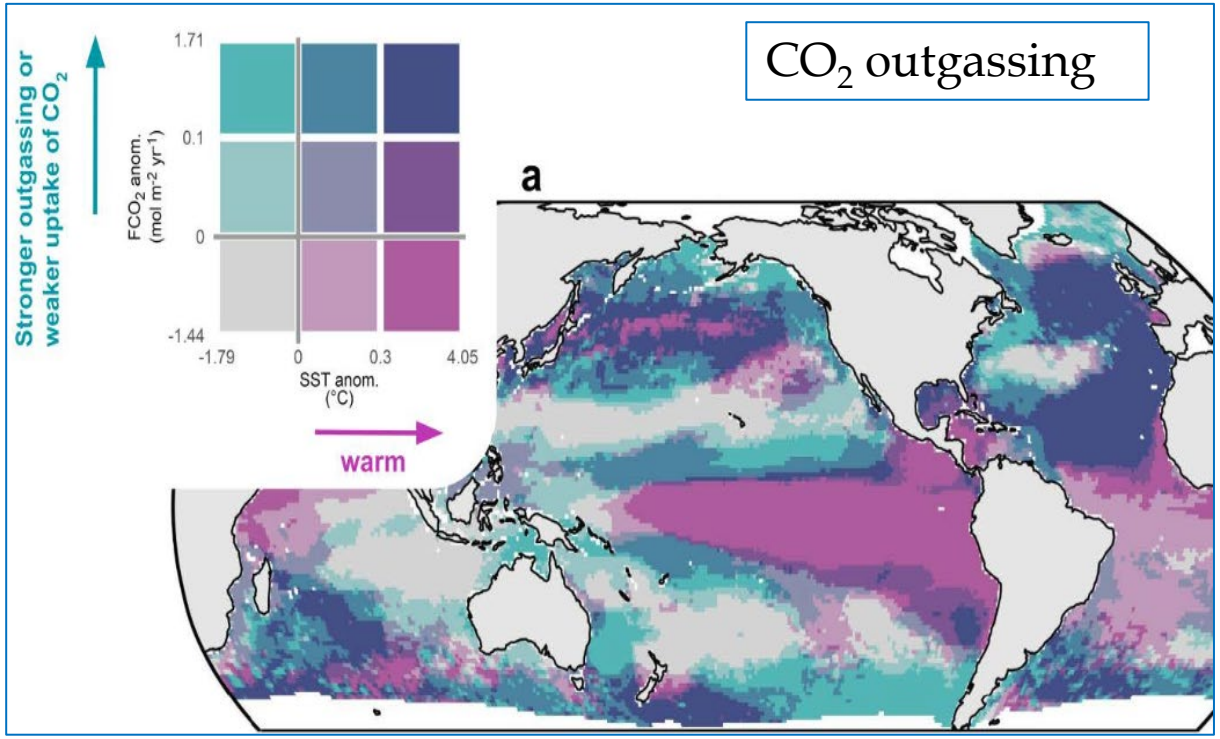
Wikimedia Commons

Weakened global dimming ?



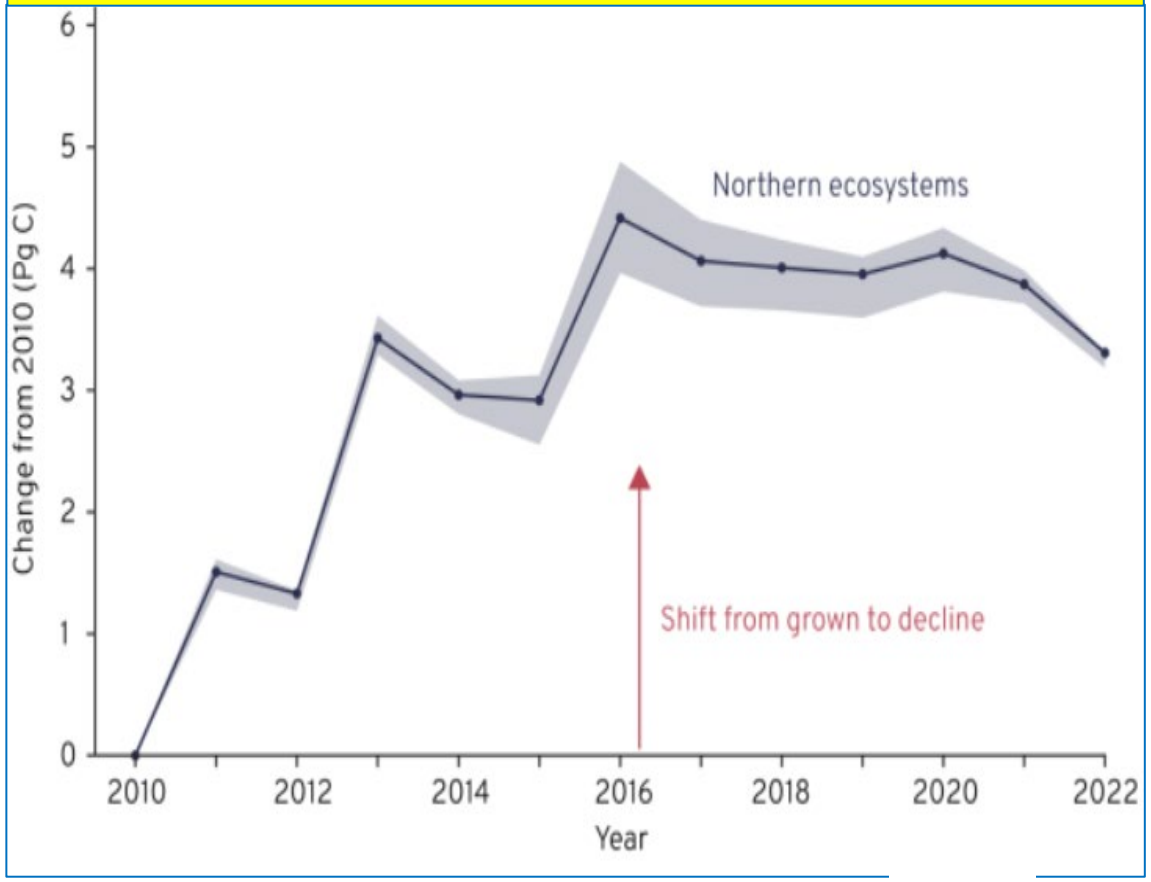
Weakening land/ocean carbon sink?

In 2023, the ocean absorbs **one billion tonnes** (10%) less CO_2 than previous years

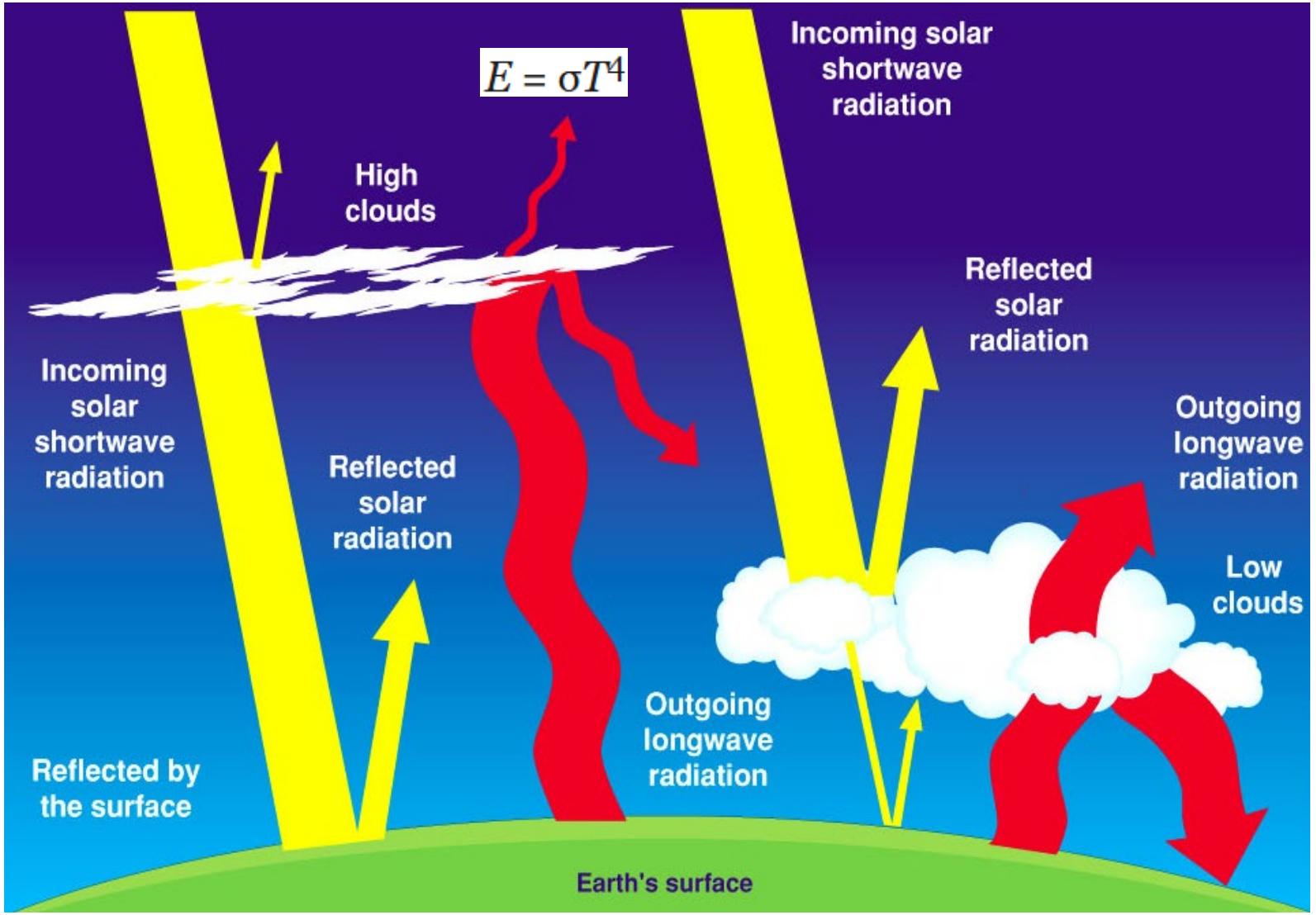


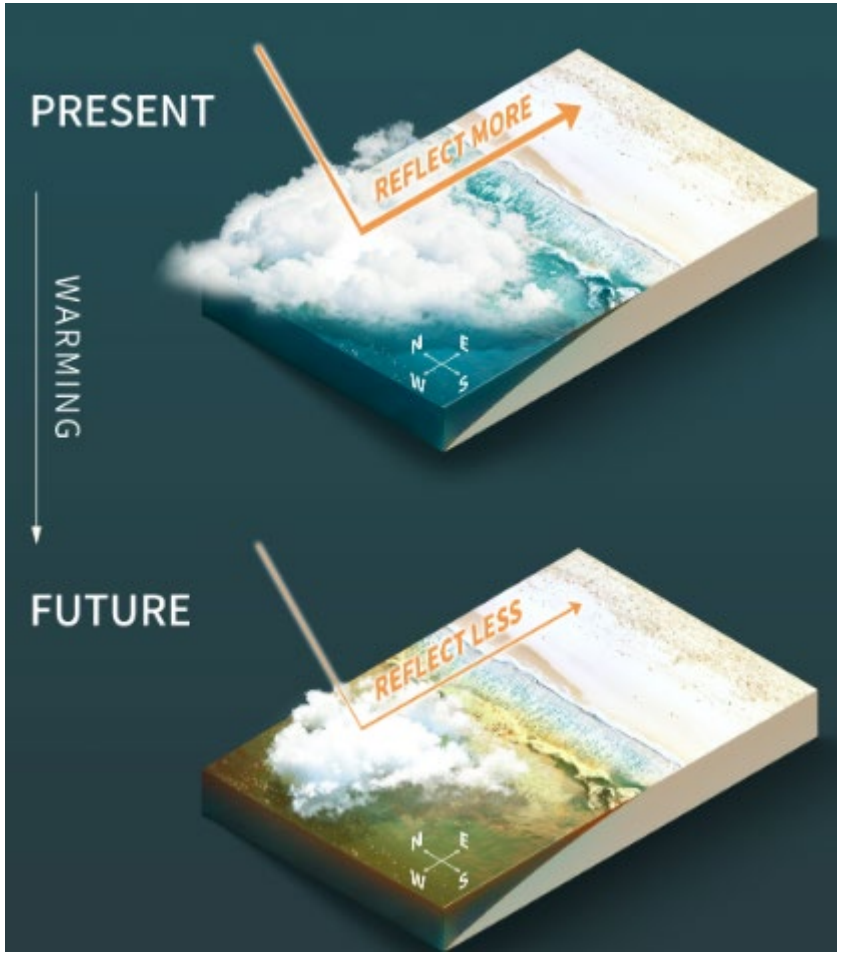
CO_2 outgassing

Annual variations in **terrestrial live biomass carbon stocks** in northern hemisphere –
A declining, but not collapsing, land sink



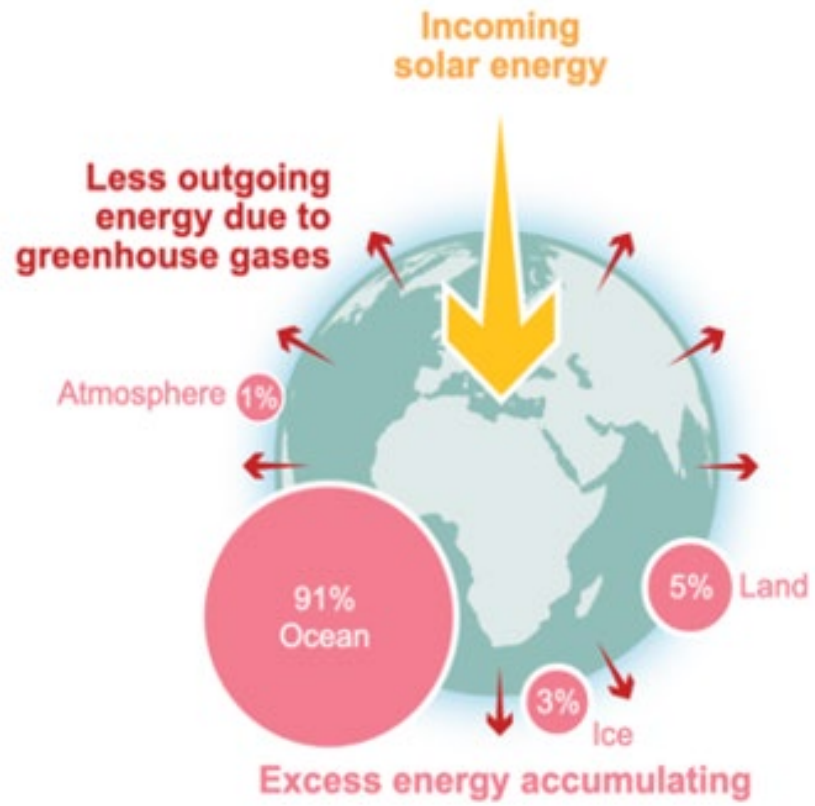
The missing puzzle –
clouds are global warming's double agents

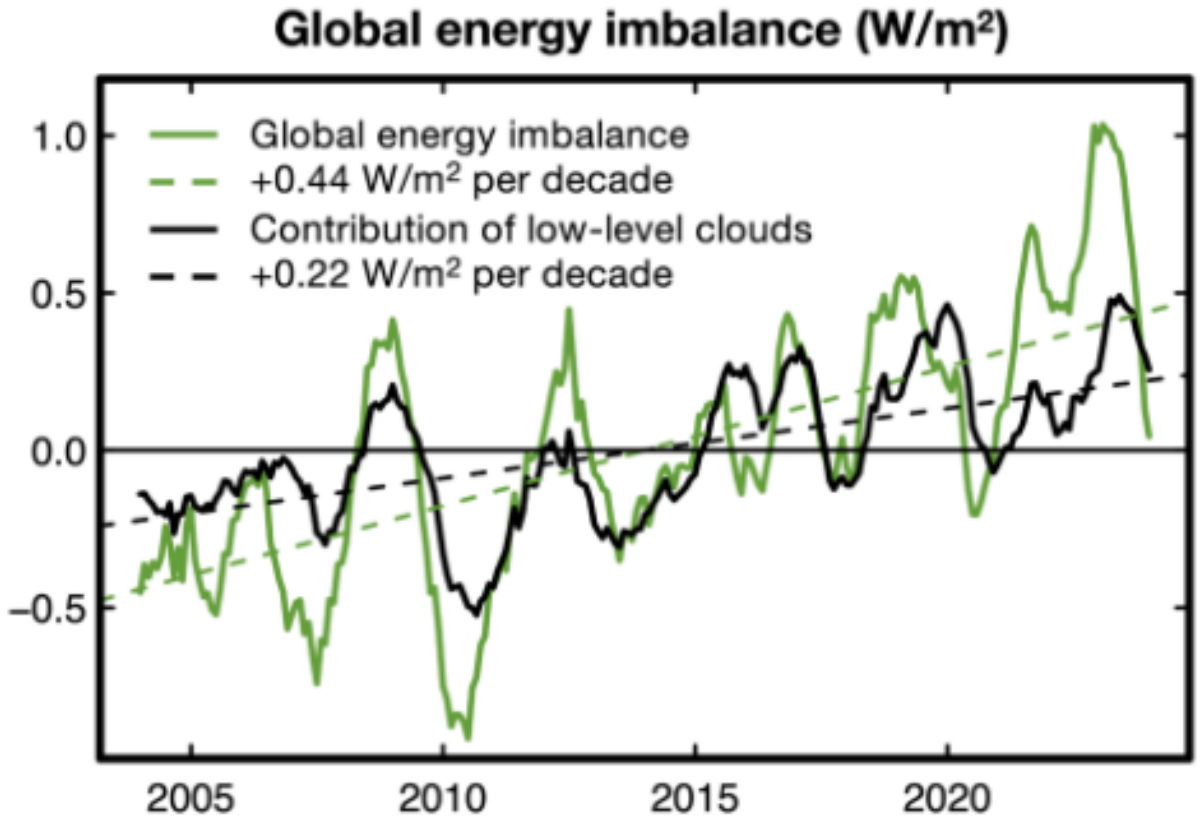




Cloud feedback – the way clouds respond to and influence warming – may be 71% stronger than previously estimated.

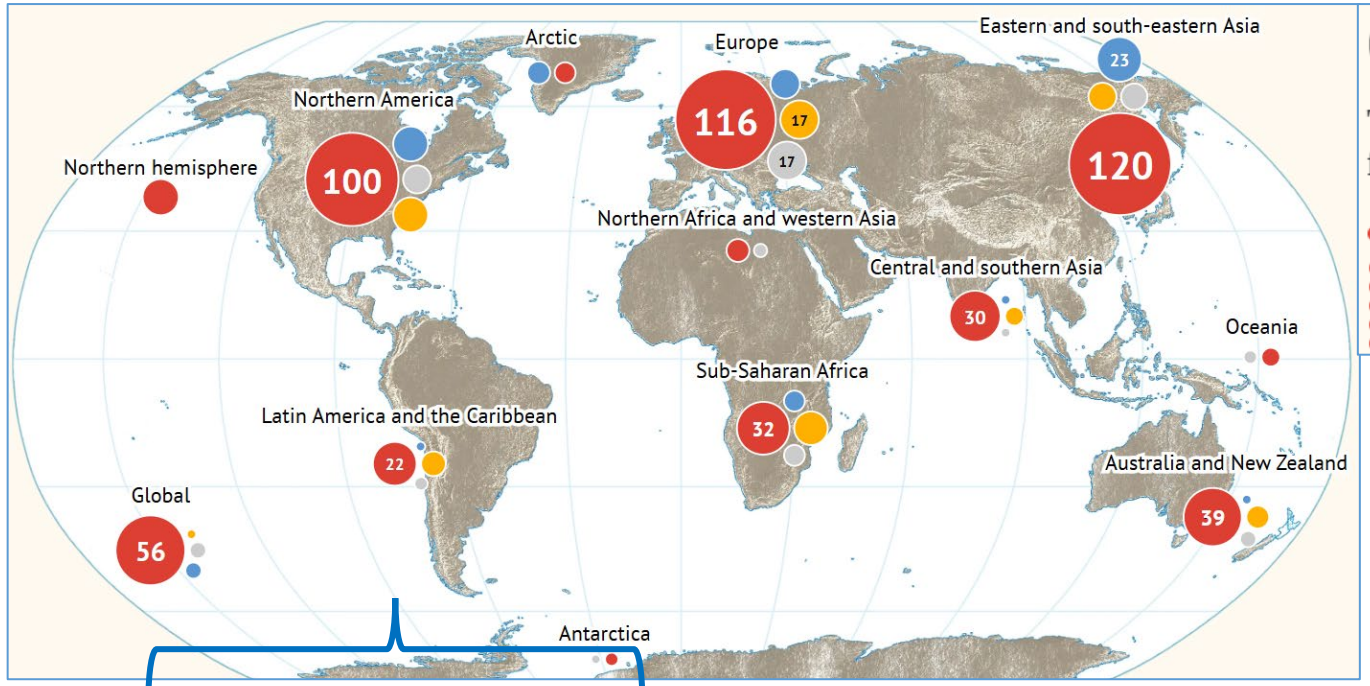
“Low cloud feedback” and Earth’s Energy Imbalance





Extreme weather events

Attribution of climate change to extreme weather events



- Drought
- Heat wave
- Wildfire
- Typhoons
- Rainstorms/flood
- Cold, snow
- …

How did climate change influence the weather event:

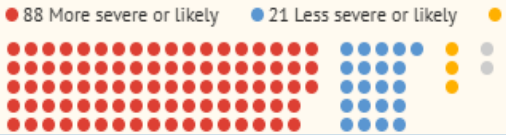
More severe or likely	547
Had no influence	71
Less severe or likely	64
Inconclusive	53

74%

China

There are more than 114 attribution studies focusing on events in China. 88 studies found that climate change increased the severity or likelihood of the event.

88 More severe or likely · 21 Less severe or likely · 3 Had no influence · 2 Inconclusive



Yangtze River Valley extreme summer drought, 2022

Case 561

DROUGHT

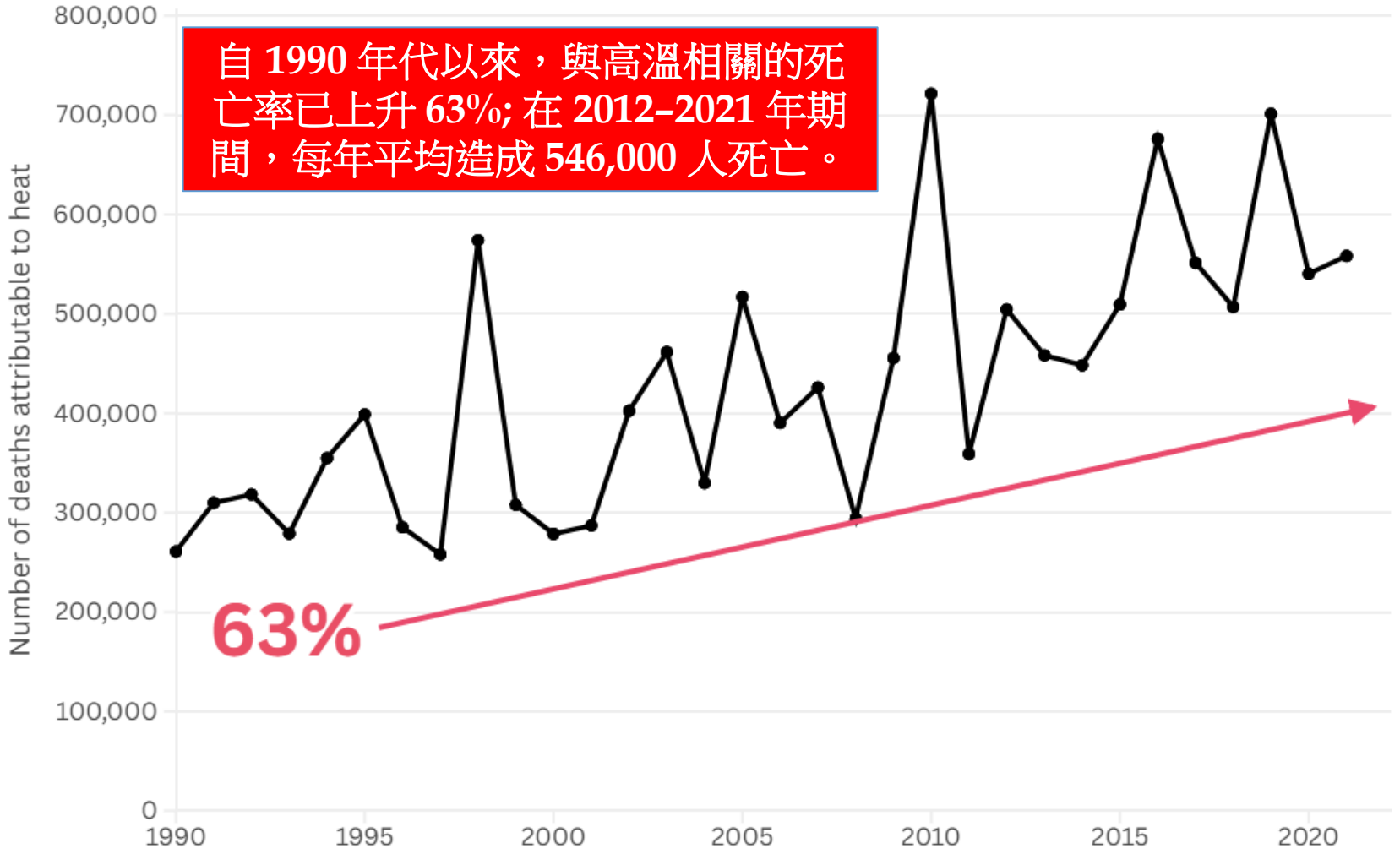
Event type
Drought

Finding
More severe or more likely to occur

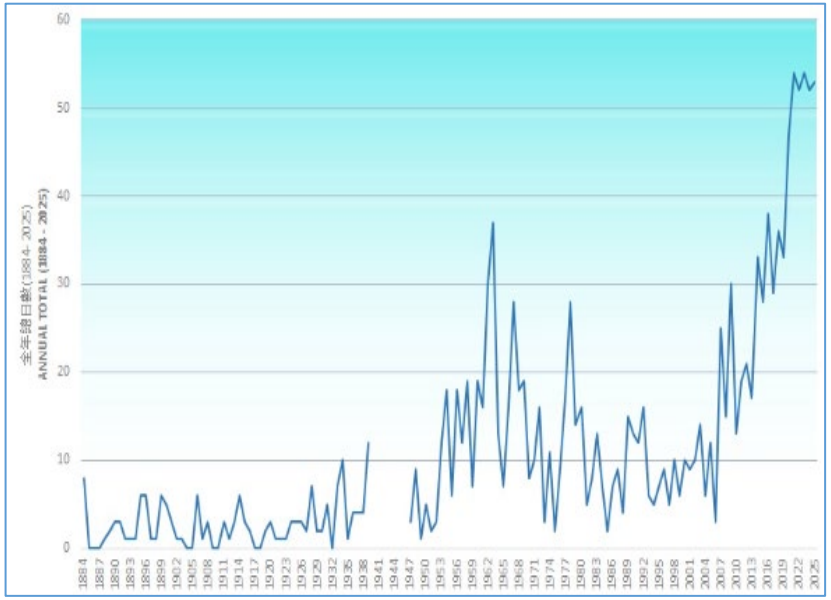
"Human forcing has increased the likelihood of drought such as in 2022 by 65 (1–90) times for [rainfall] and 1300 (90–3000) times for [temperature], respectively."

Bulletin of the American Meteorological Society (2024)) Zhang L. et al., 2024: Attribution of the Extreme 2022 Summer Drought along the Yangtze River Valley in China Based on Detection and Attribution System of Chinese Academy of Sciences, Bulletin of the American Meteorological Society, doi:10.1175/BAMS-D-23-0258.1

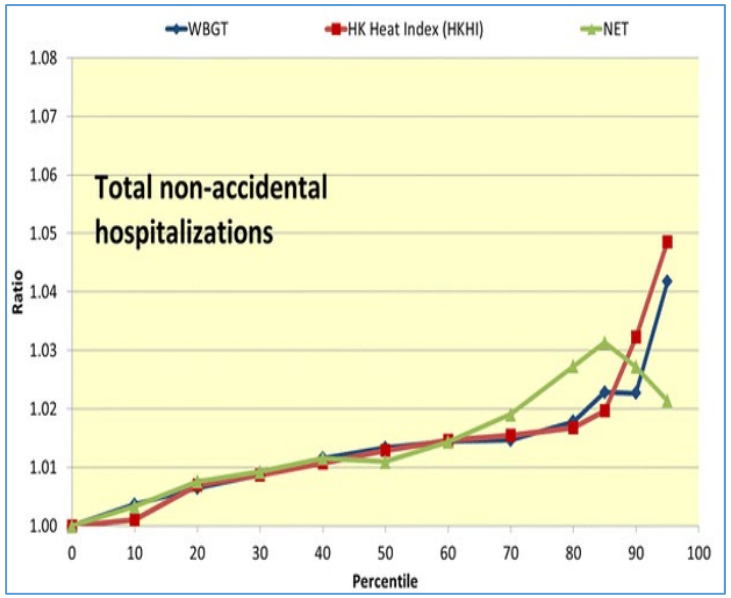
(I) Heat waves : the silent killer

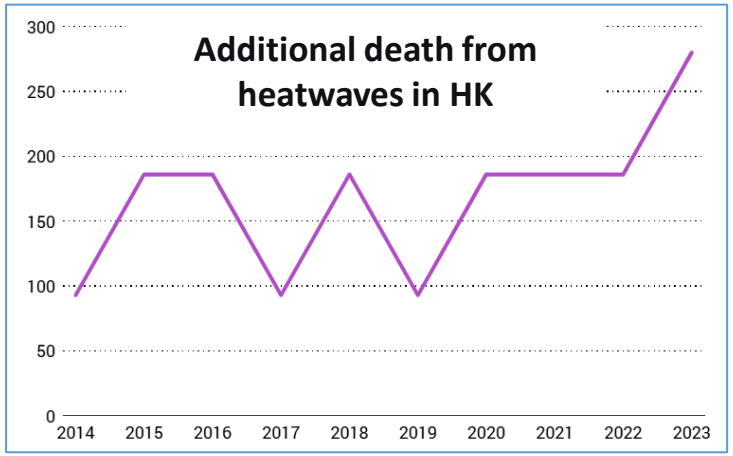


Heatwaves in HK

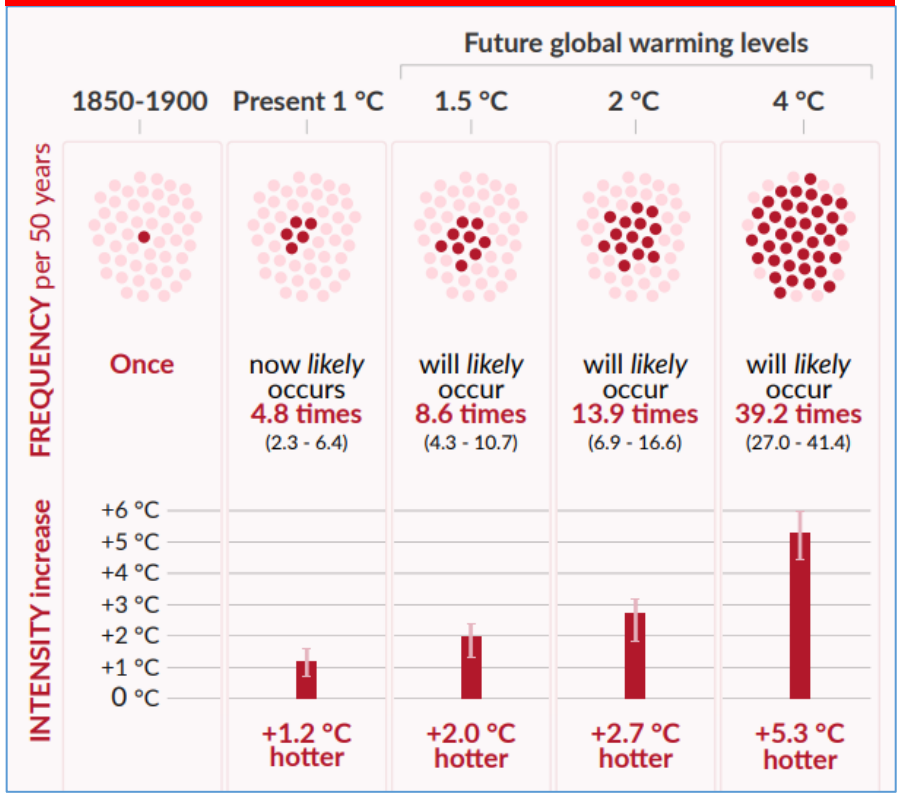


Very hot days in HK





Heatwaves projected to increase in frequency and intensity



Climate justice/equality

•**Unequal Risk**: The **urban heat island** (UHI) effect does not impact all areas or populations equally. People living in the most heat-intense parts of the city are significantly more vulnerable

.

•**Nighttime Heat is Critical**: Studies consistently point to the dangers of hot nights, which can disrupt sleep and prevent the body from recovering from daytime heat.

•**Compound Effects**: Heat does not act in isolation. Its impact is worsened by other factors like urban density, high humidity, and air pollution.

•**Vulnerable Groups**: The elderly consistently appear as a group at very high risk, underscoring the need for targeted public health interventions.

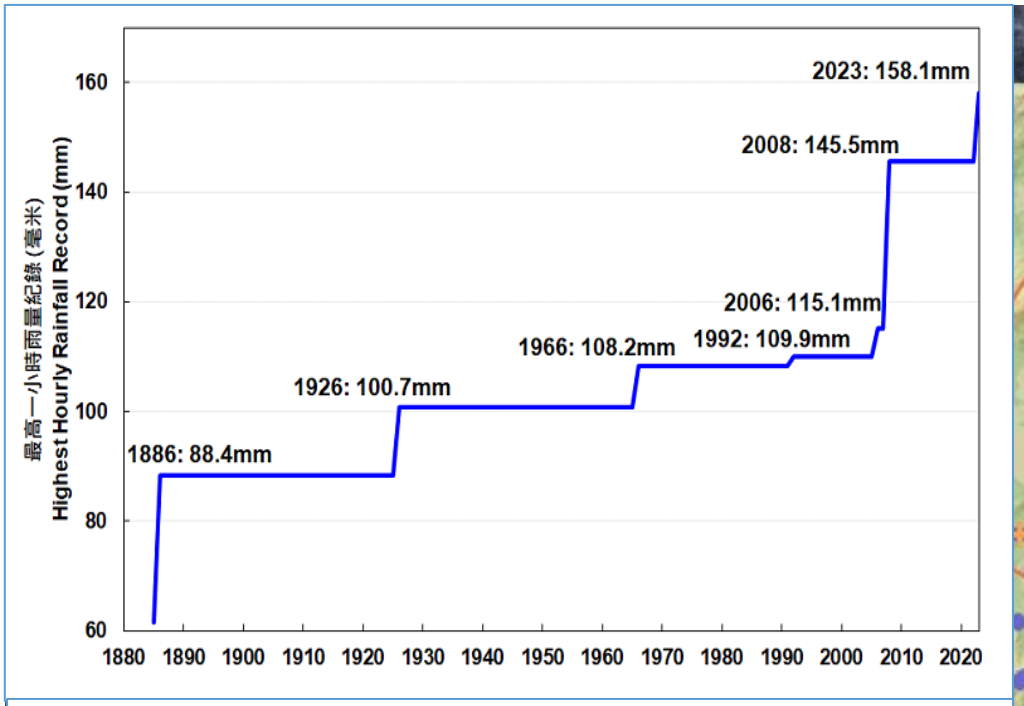
VAWG

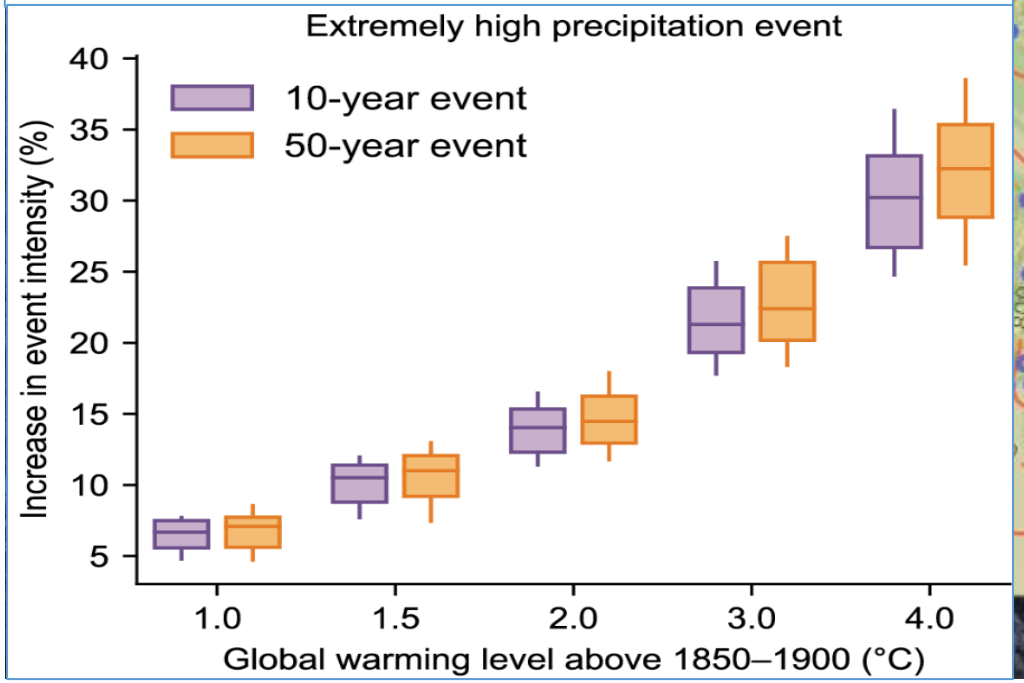
Mural painted by Harriet Wood @ Leeds, UK

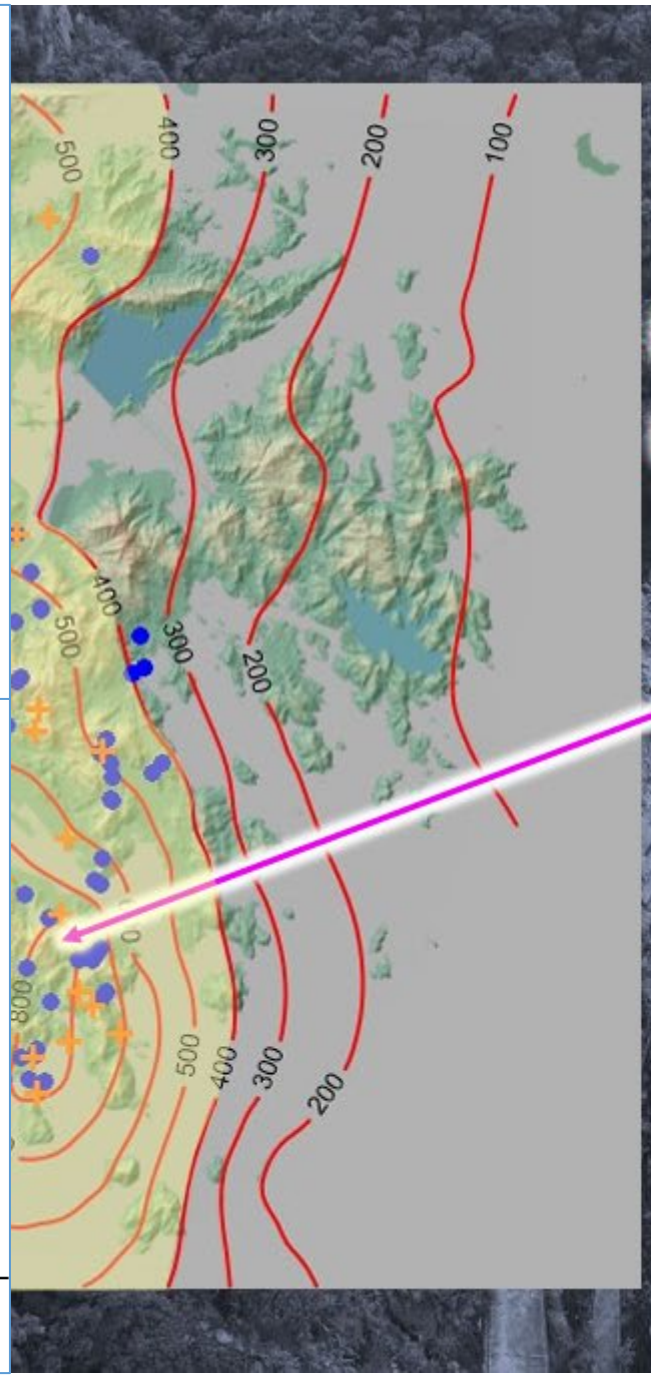
A striking new art mural, designed to spark conversations about the "Violence Against Women and Girls" agenda, was installed in the city centre of Leeds, 2023.

As temperatures climb, so too does the rate of gender-based violence.

(II) Extreme rainstorms







>158 毫米的1小時雨量

港島東區及南區

>800 毫米的24小時雨量

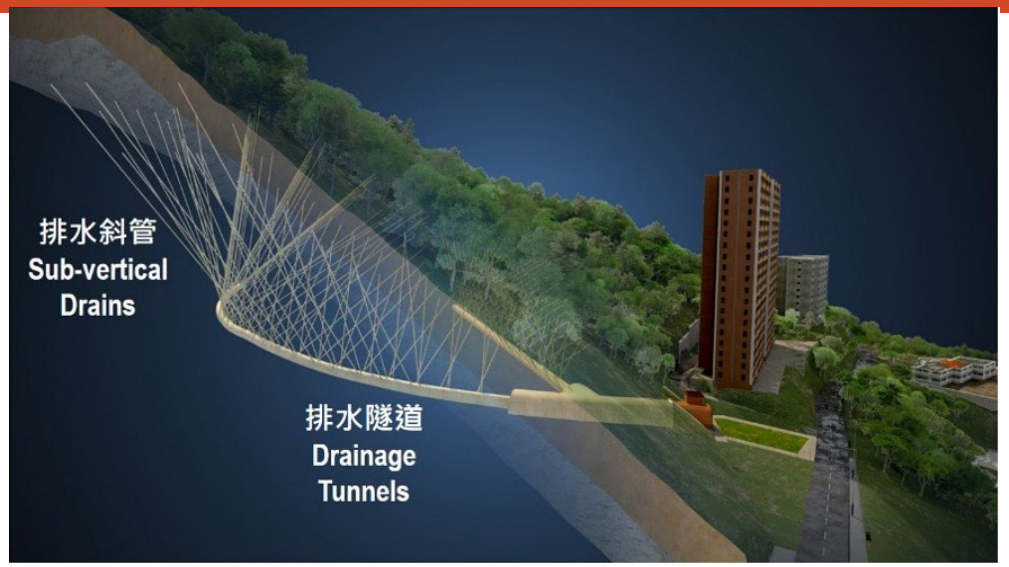
圖例:

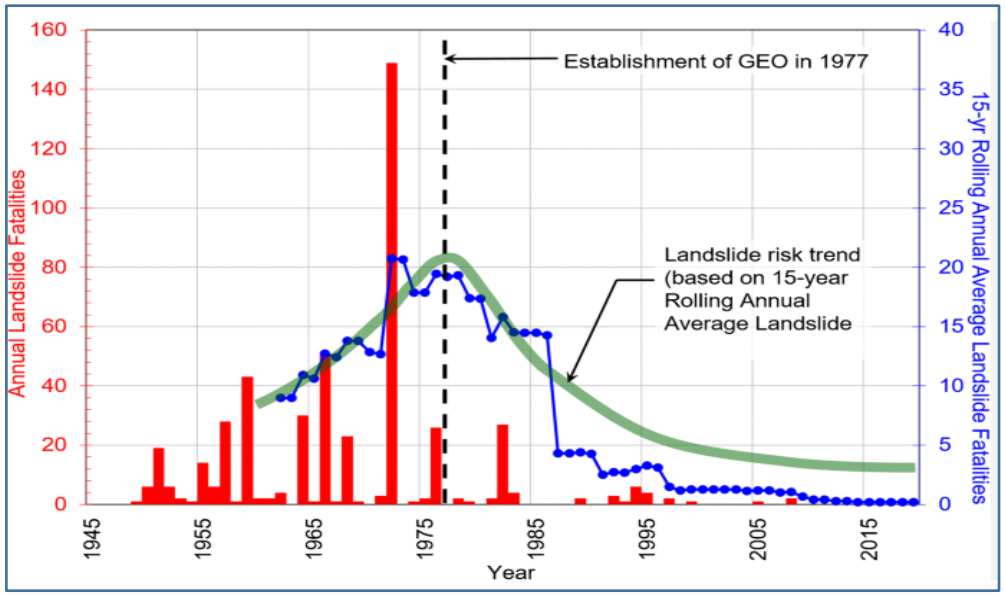
Sept 2023

- Minor landslide
- Major landslide

Landslides 2023

Uphill battle - increasingly intense rainstorms could undo our efforts to prevent landslide

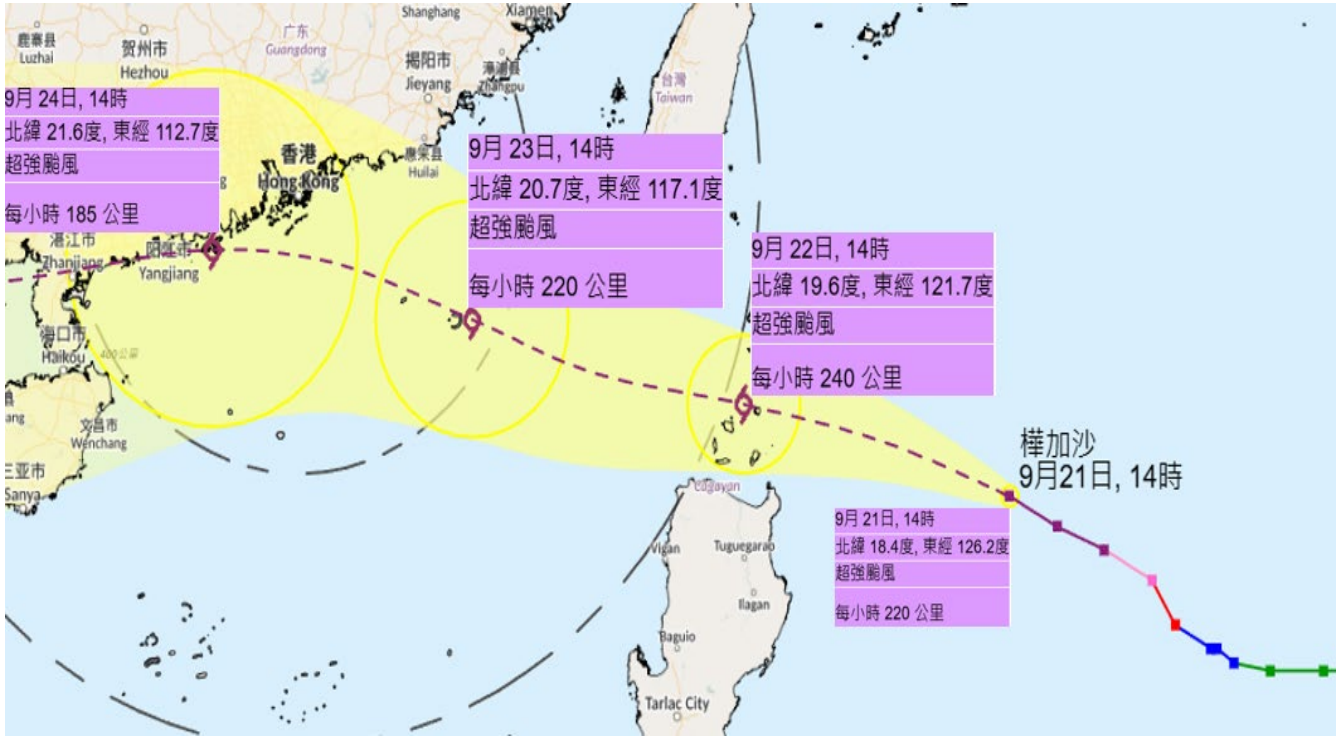


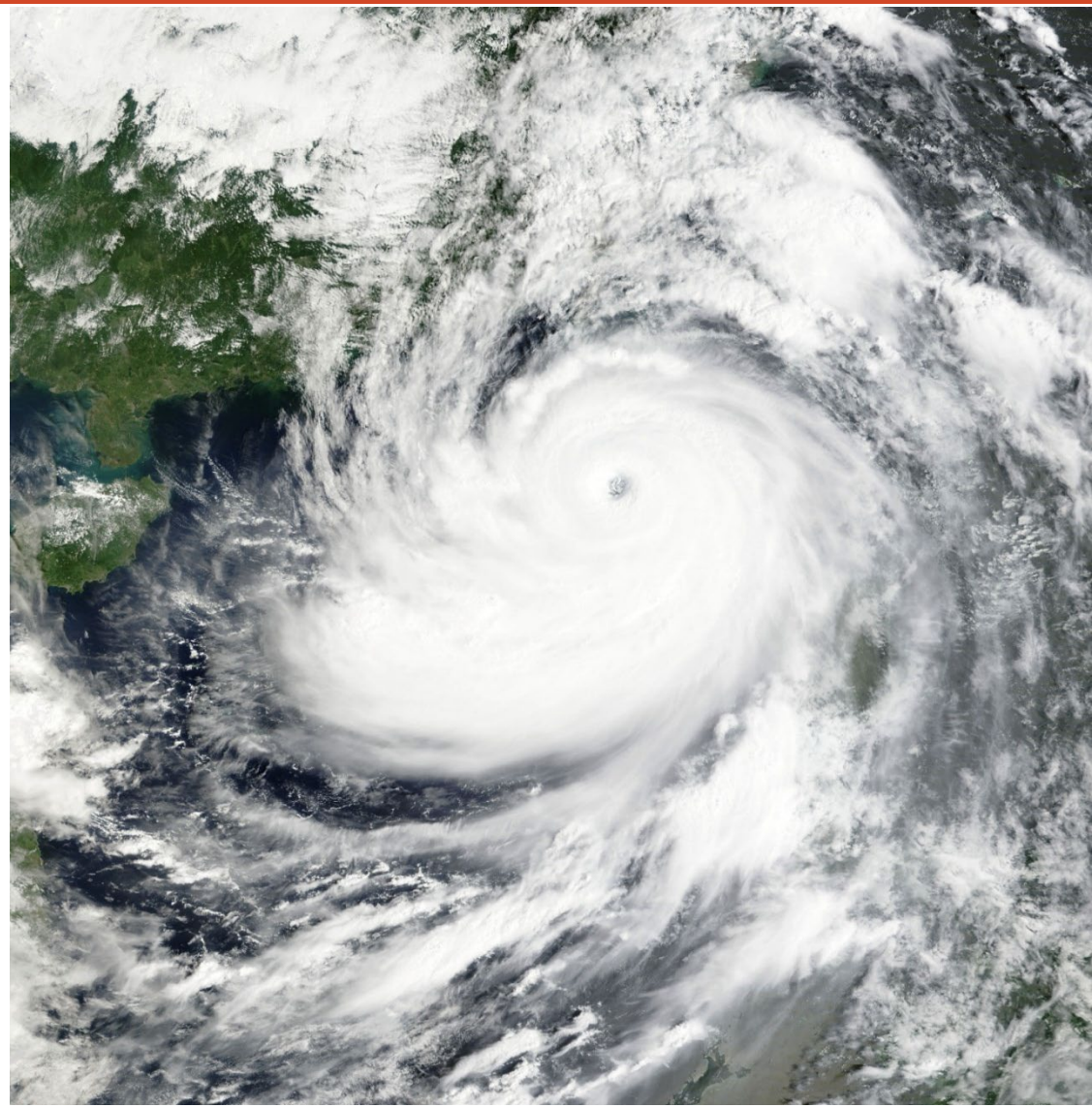


And flood mitigation

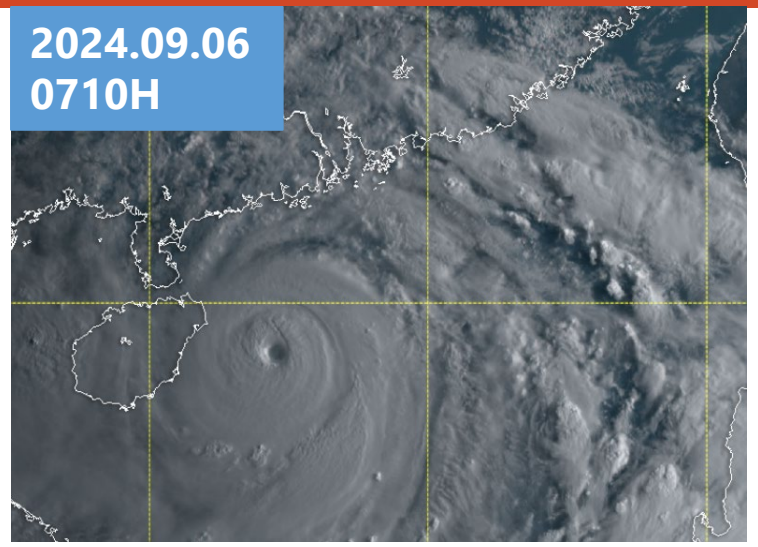
Storm water storage

(III) Super Typhoons - a beauty and a beast

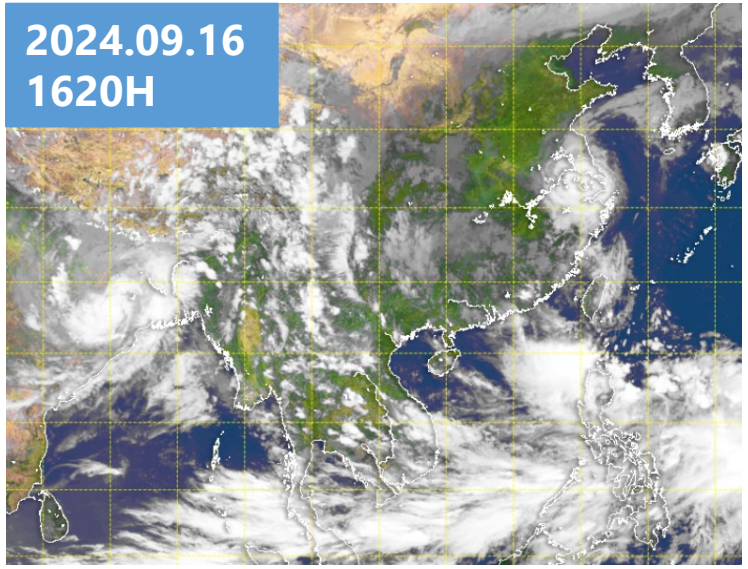




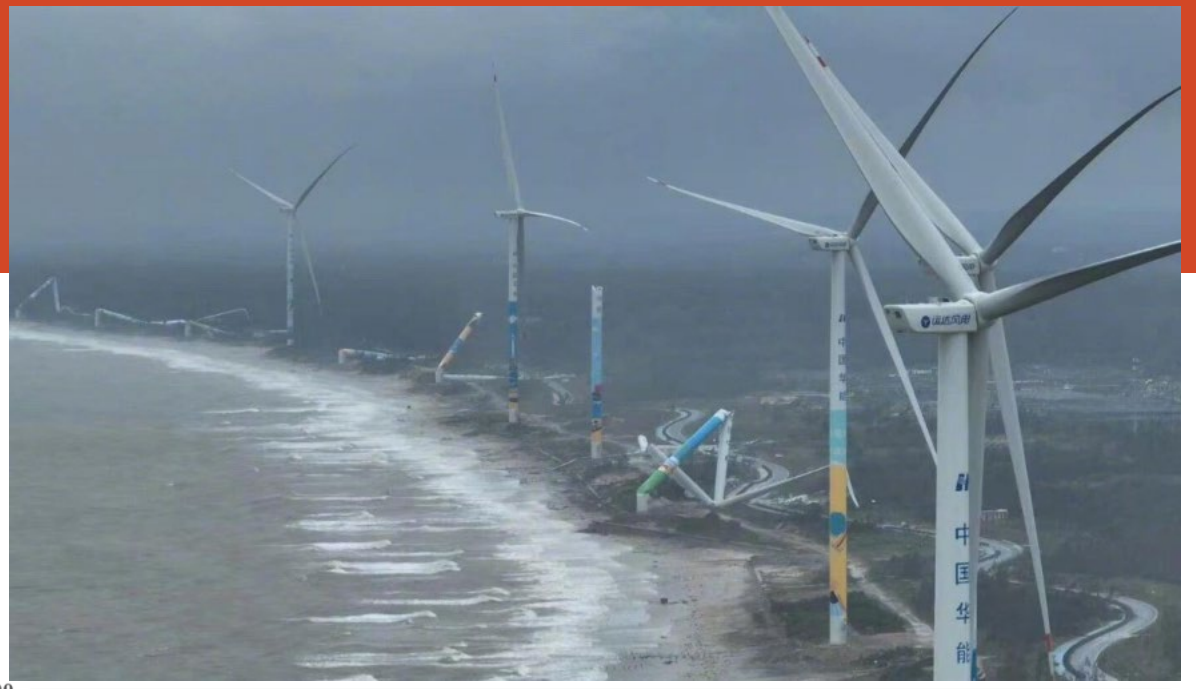
Rapid intensification : Super Typhoon Yagi (摩羯)

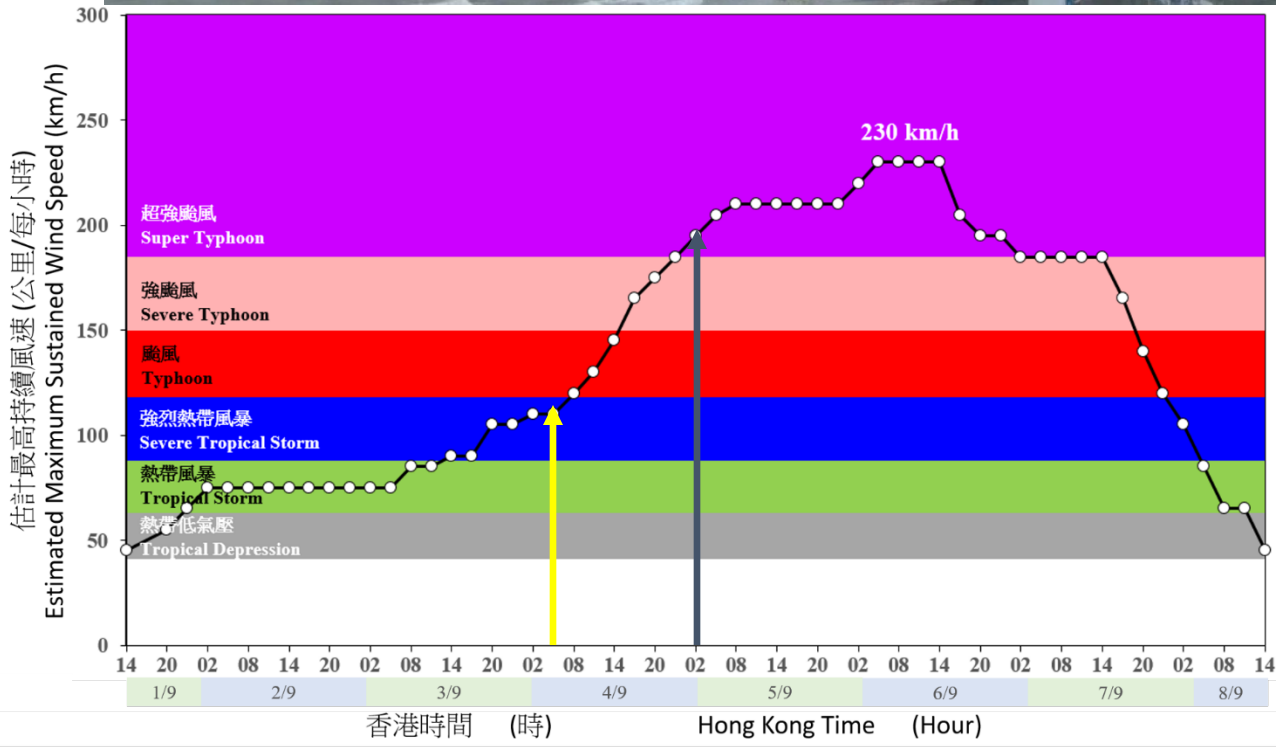


https://www.scmp.com/news/china/science/article/3277996/why-super-typhoon-yagi-wrecked-one-wind-farm-china-rest-stood-their-ground

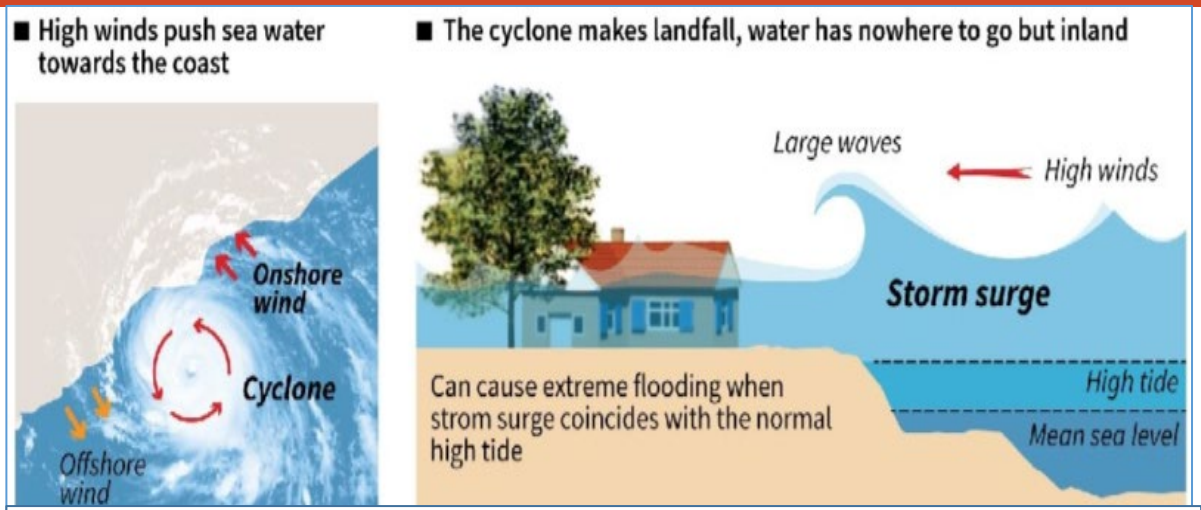


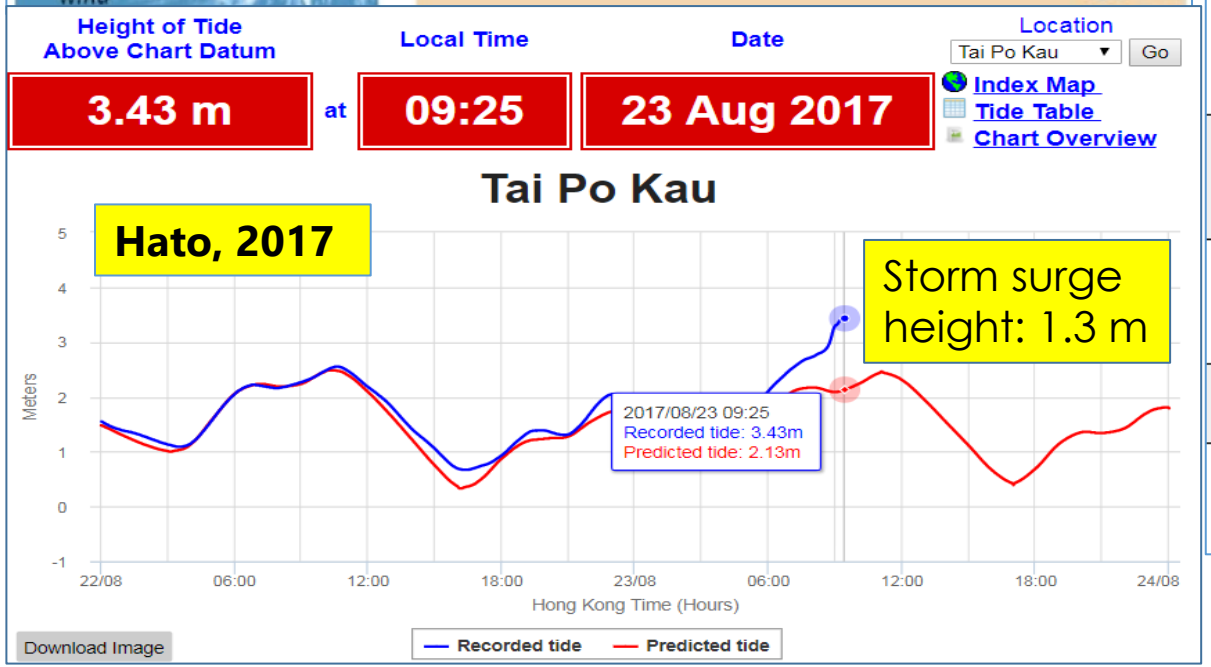
https://x.com/i/status/1832373833489060187





Storm surge

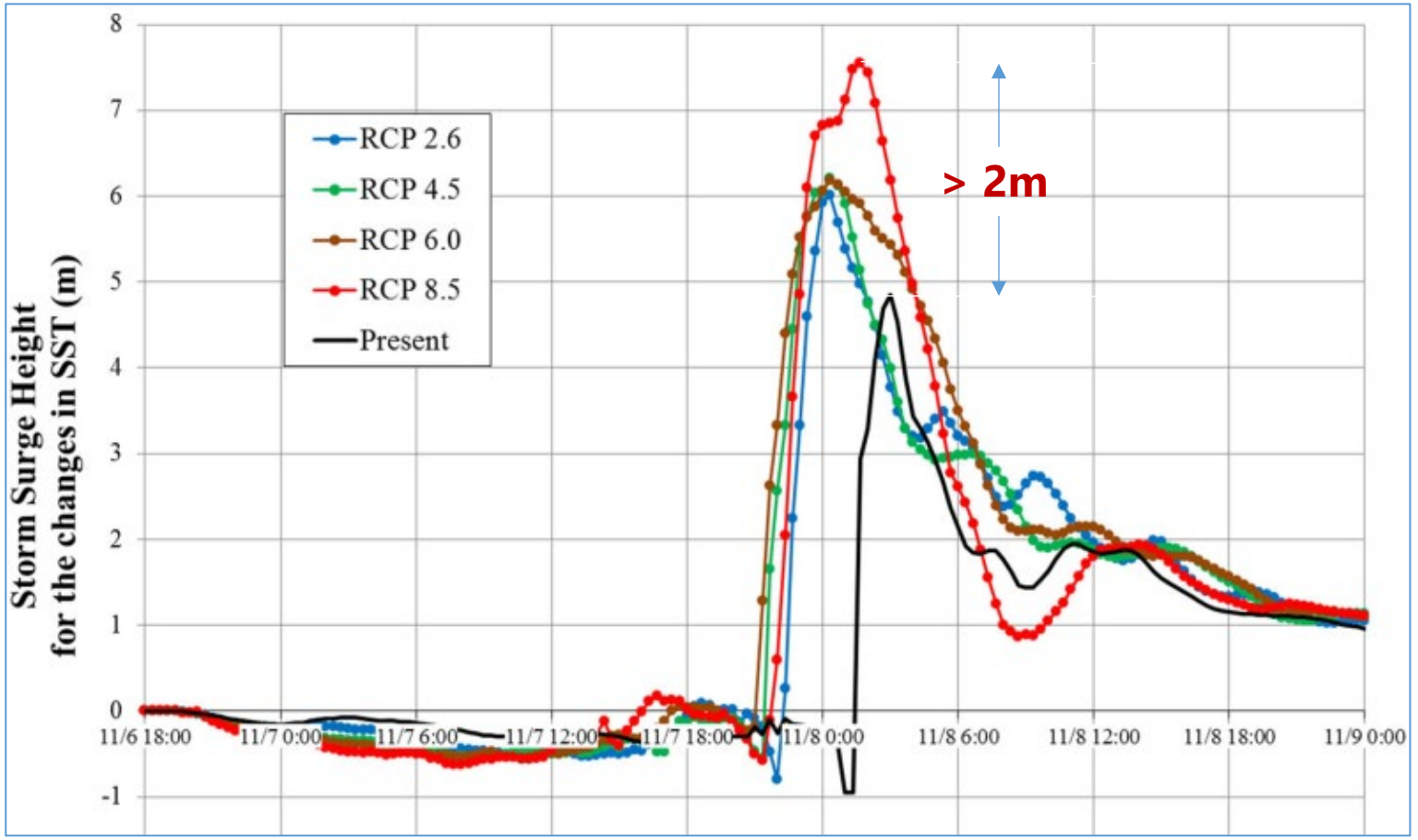


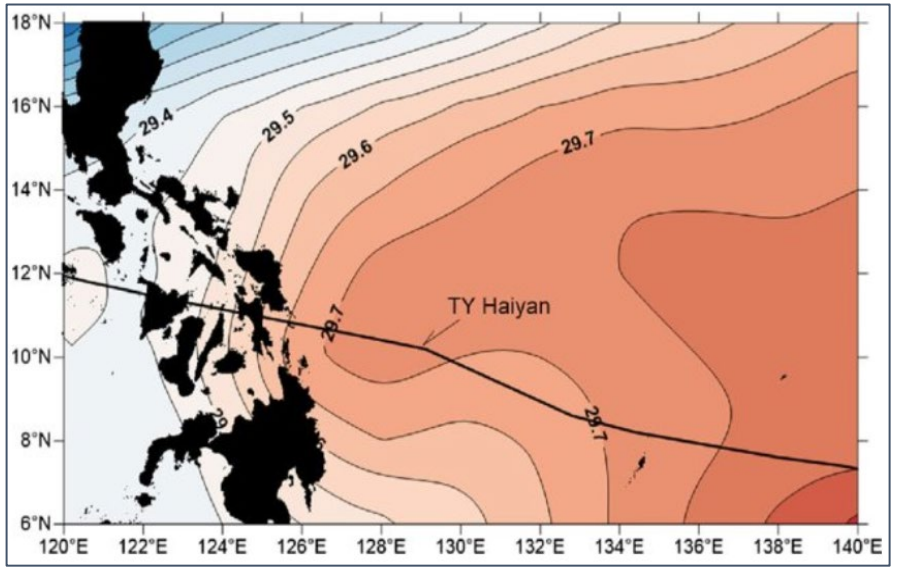


Station	Maximum sea level (above chart datum)		Maximum storm surge (above astronomical tide)	
	Height(m)	Date Time	Height(m)	Date Time
Quarry Bay	3.40	2025-09-24 10:32	1.59	2025-09-24 08:39
Shek Pik	3.60	2025-09-24 10:46	1.55	2025-09-24 10:46
Tai Miu Wan	3.46	2025-09-24 09:01	1.74	2025-09-24 05:14
Tai Po Kau	3.75	2025-09-24 09:37	2.10	2025-09-24 03:46
Tsim Bei Tsui	3.77	2025-09-24 12:12	1.48	2025-09-24 12:12
Waglan Island	---	---	---	---
Tai O	3.65	2025-09-24 11:43	1.56	2025-09-24 13:26

Ragasa, 2025

Storm surge of 2013 Super Typhoon Haiyan - Version 2100
(a result of rising SST)





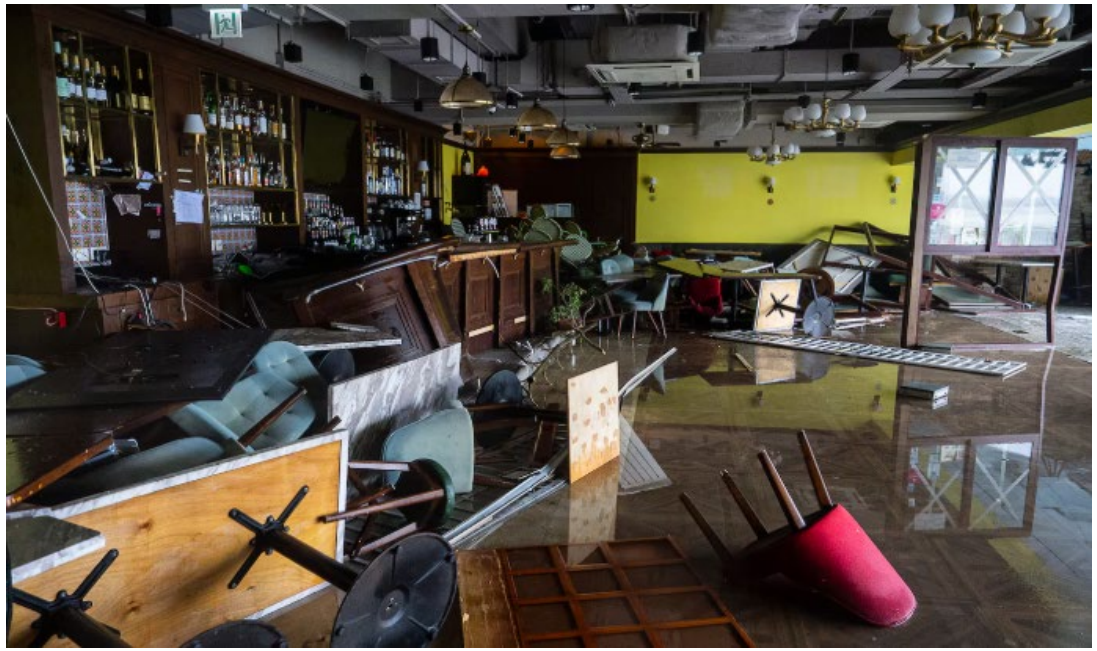
Future typhoon and storm surges under different global warming scenarios: case study of typhoon Haiyan (2013)

Ryota Nakamura • Tomoya Shibayama • Miguel Esteban • Takumu Iwamoto

Overtopping waves of Ragasa, 24 September, 2025

Overtopping waves at Cheung Chau Tung Wan (東灣) more than 10m high

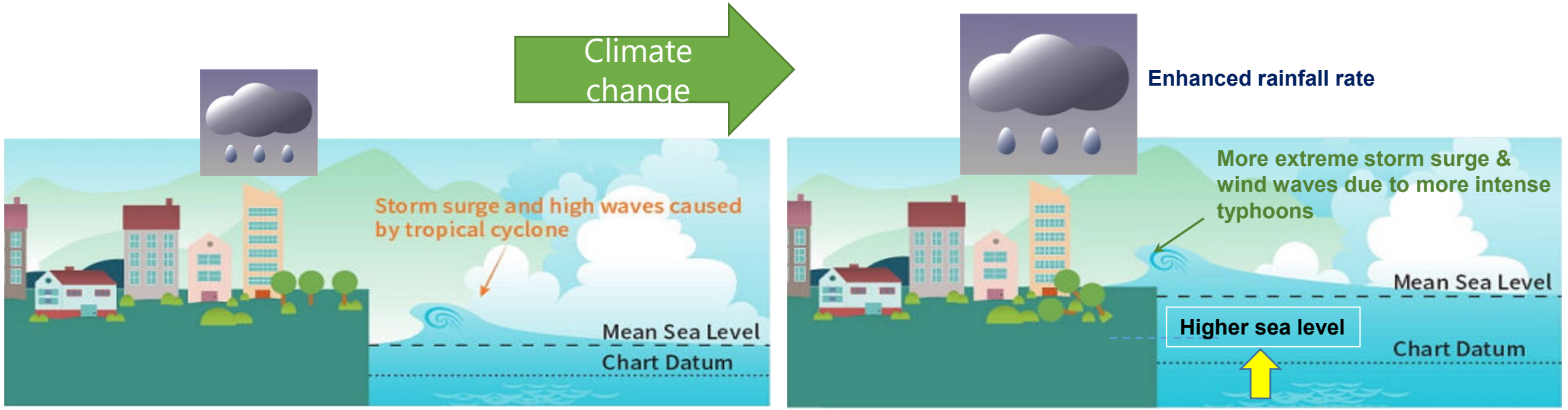
Overtopping waves –
HK$ 5M Damage to a restaurant at TKO



Multi-hazard Impacts to Coastal Areas under Climate Change

Heavy Rain + Storm Surge (super typhoons) + Wind Waves (overtopping waves) + Sea level Rise

With rising sea level, storm surges and wind waves can bring more frequent sea flooding to coastal low-lying areas. It may also compromise storm water drainage capacity and increase the chance of "backwater" (海水倒灌) during extreme high tide or typhoons.



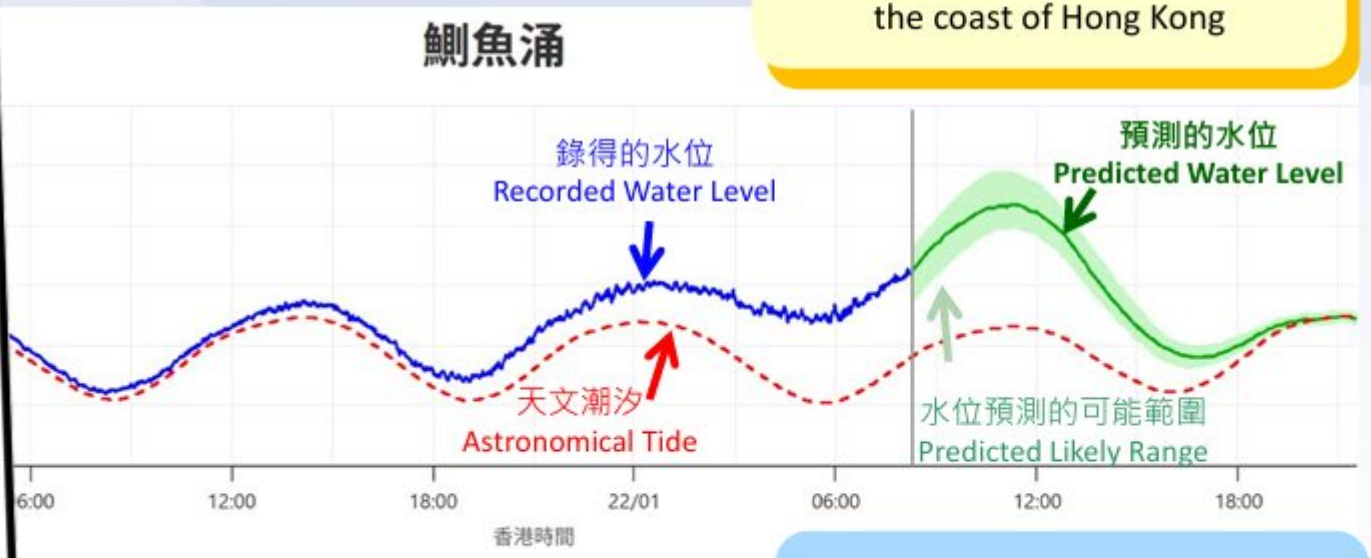
(For illustration purpose only, not to scale)

New 2026

「沿岸海面高度」新網頁（試驗版）

New webpage for Coastal Sea Level (Trial)

涵蓋全港14個潮汐站
Includes 14 tide stations along the coast of Hong Kong



提供未來12小時總水位預測
Provides total water level forecast up to 12 hours ahead

於天文台網頁及
「我的天文台」手機應用程式推出
Launched on HKO's webpage and "MyObservatory" Mobile App


A safer future?
This is where you engineers can contribute the most!