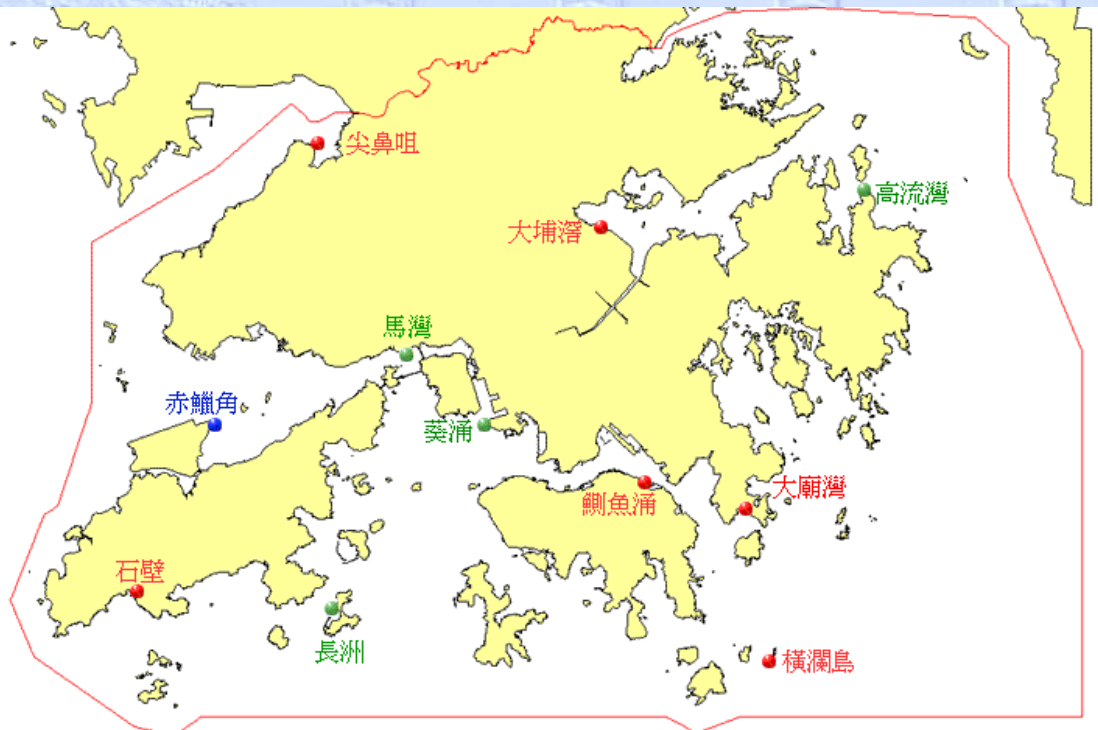


香港海平面監測
Sea Level Monitoring in Hong Kong

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Senior Scientific Officer

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香港驗潮站 Hong Kong Tide Gauge Stations



<http://www.hko.gov.hk/tide/marine/chko.htm>
<http://www.hko.gov.hk/tide/marine/hko.htm>

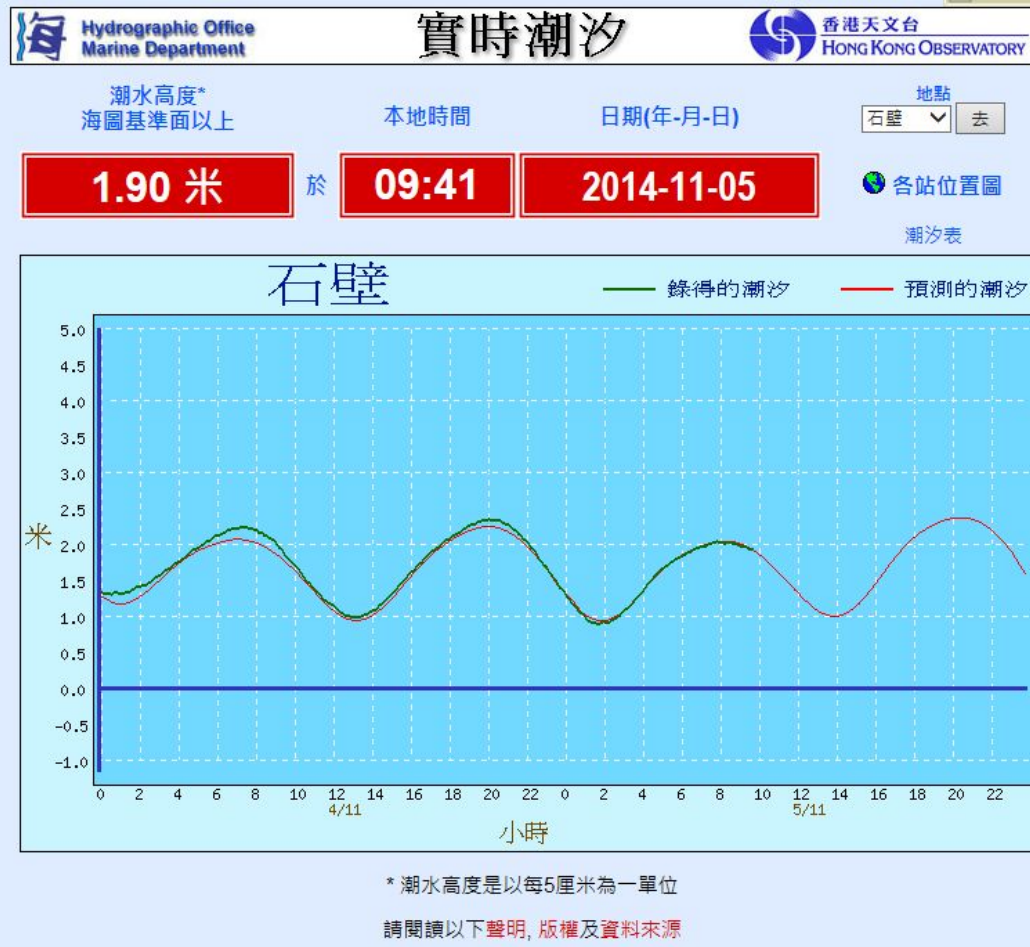
驗潮站的用途

- 監測天文潮
- 制定潮汐表
- 監測颱風引起的風暴潮
- 監測海嘯
- 研究海平面的長期變化

Uses of tide gauge stations

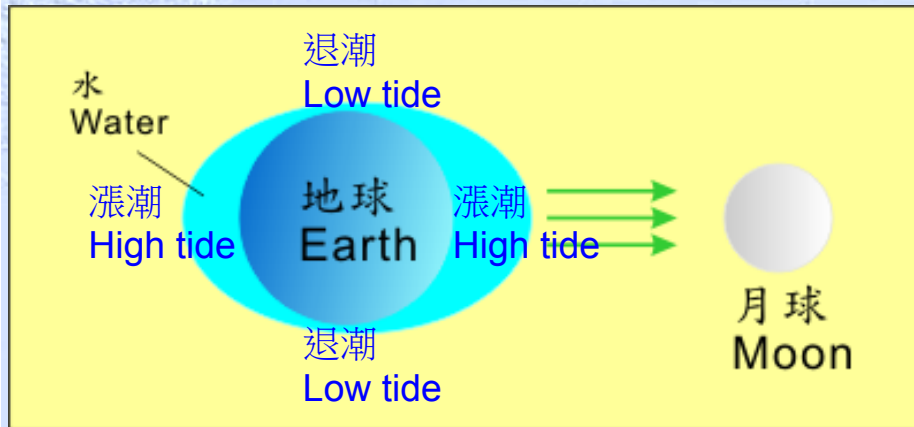
- Astronomical tide monitoring
- Tide table compilation
- Storm surge monitoring caused by typhoon
- Tsunami monitoring
- Research on long term sea level change

石壁驗潮站 Shek Pik Tide Gauge Station



石壁驗潮站
Shek Pik Tide Gauge Station

潮汐 Tide



每天有兩次漲潮和兩次退潮

- 月球對海洋的引力，形成兩處水位漲高的情況。面向月球的一面漲幅較大，遠離月球的一面漲幅較小。
- 由於地球自轉需時一天。地球上每處地方，如香港，均會經過大漲潮和小漲潮各一次，所以每天都有兩次漲潮。

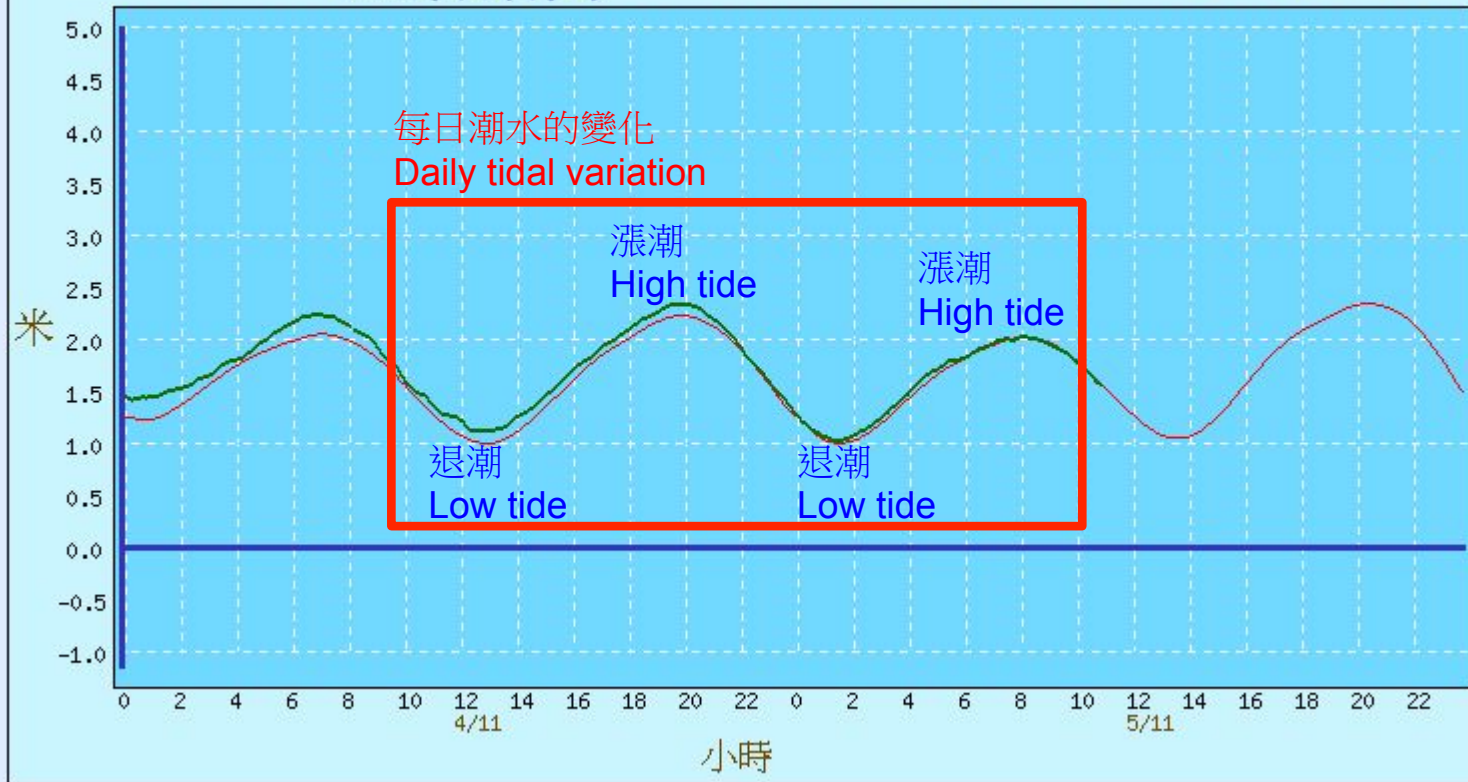
Two high tides and two low tides every day

- The moon exerts a larger attraction on the oceans on the side of the Earth closer to the moon than those on the far side. One higher bulge facing the moon and one lower bulge away from it
- Due to rotation of the Earth, which completes one rotation per day. Each location on Earth, e.g. Hong Kong, passes through the higher bulge and lower bulge every day. Thus we have two high tides per day.

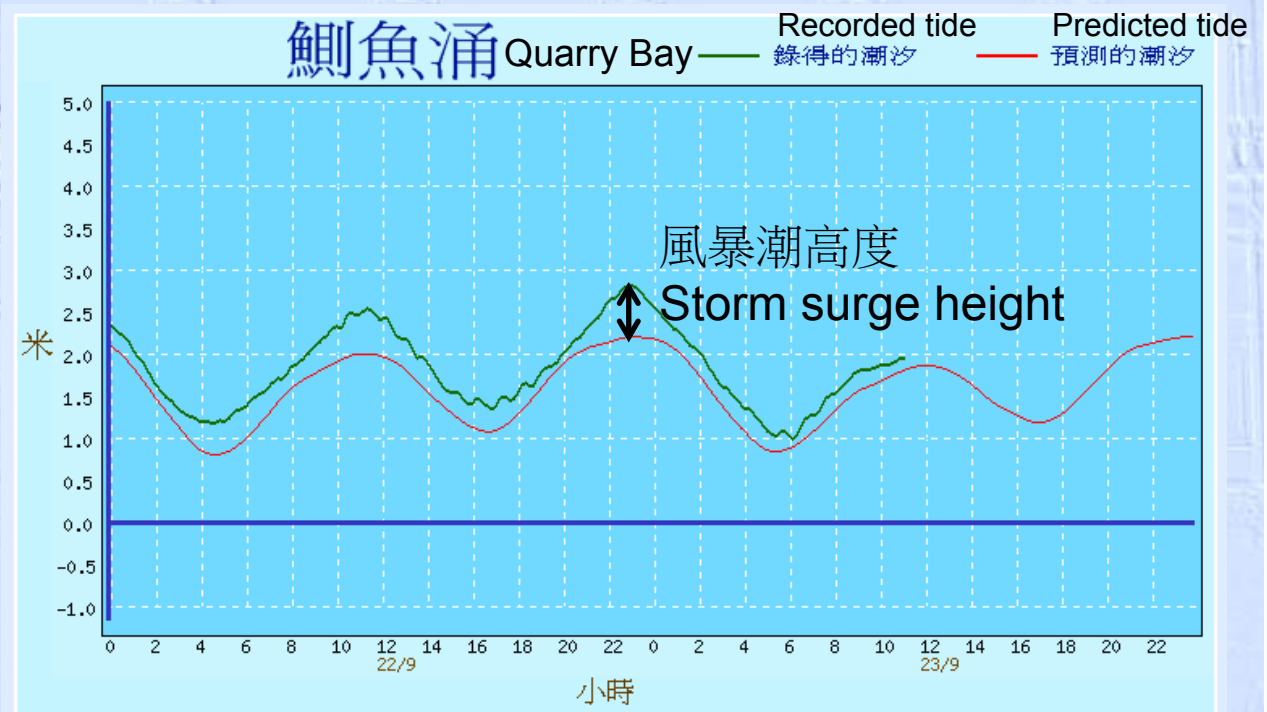
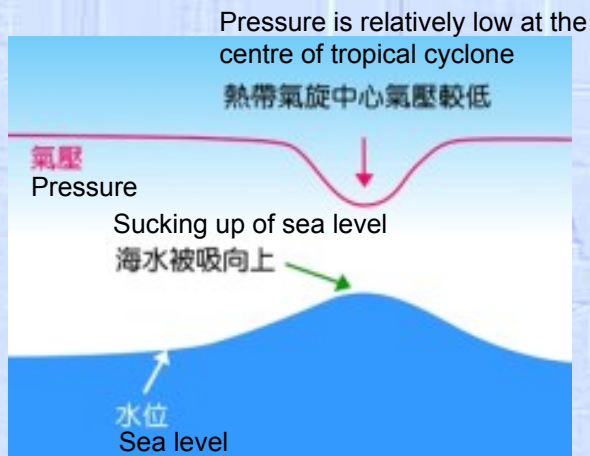
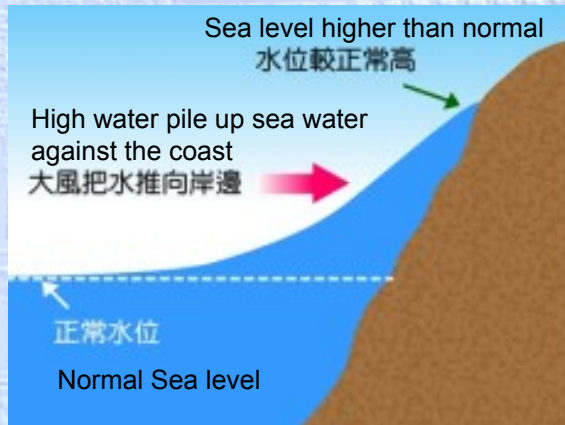
鯪魚涌 Quarry Bay

Recorded tide
錄得的潮汐

Predicted tide
預測的潮汐

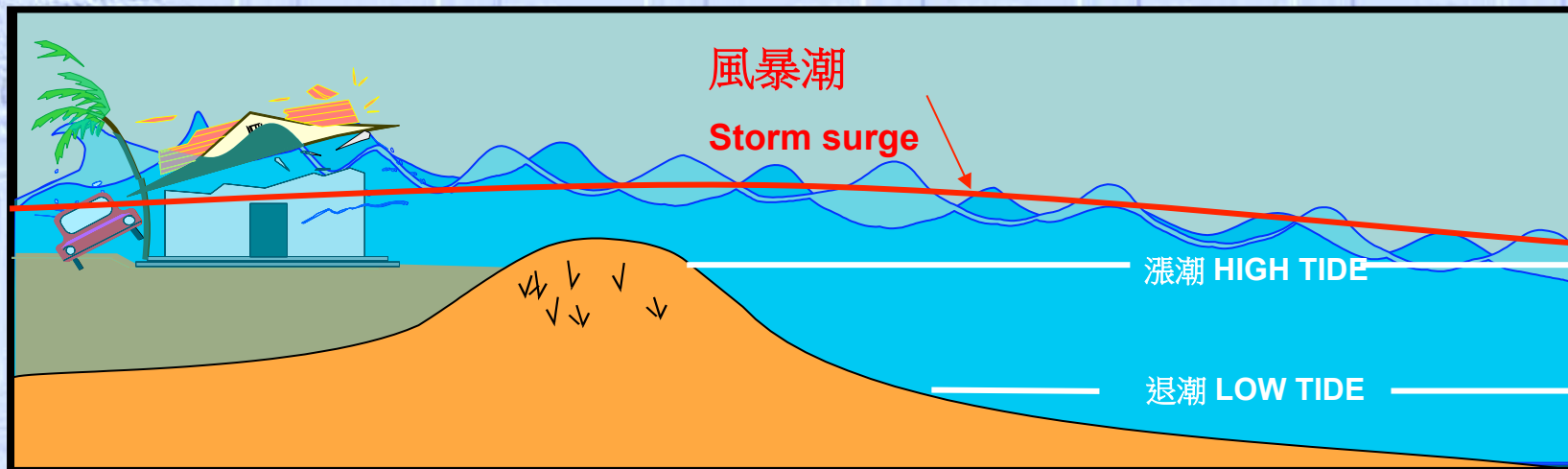


風暴潮 Storm surge

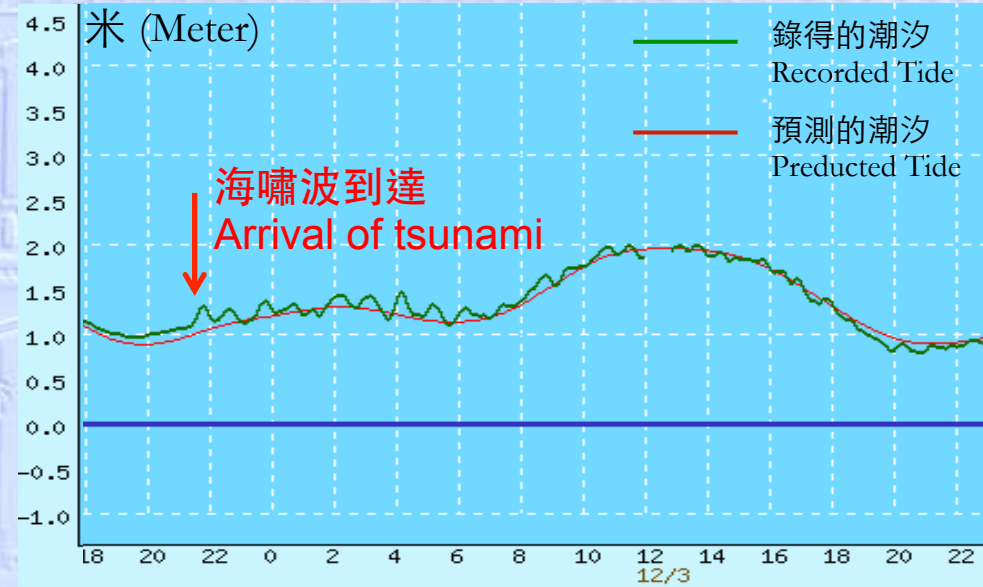
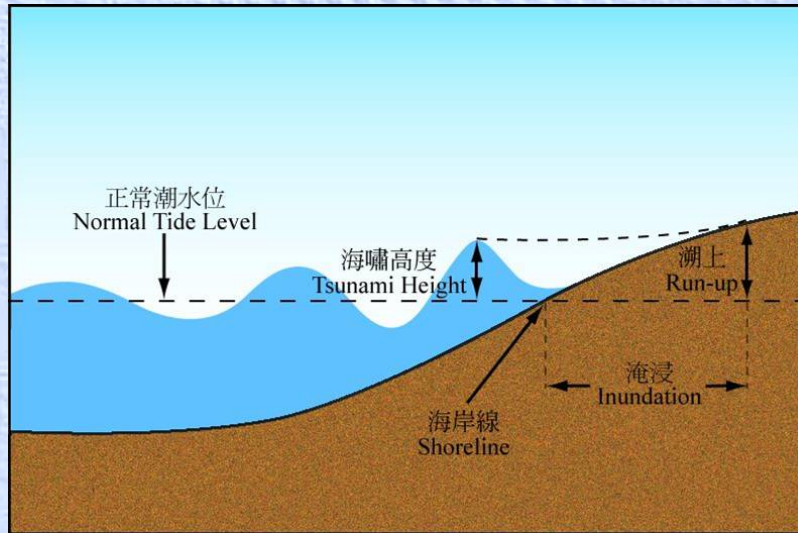


2013年9月22日超強颱風天兔影響香港期間在鯽魚涌錄得的風暴潮
Storm surge recorded in Quarry Bay during the influence of Super Typhoon Usagi to Hong Kong on 22 Sep 2013

風暴潮與潮汐 Tide with Storm Surge



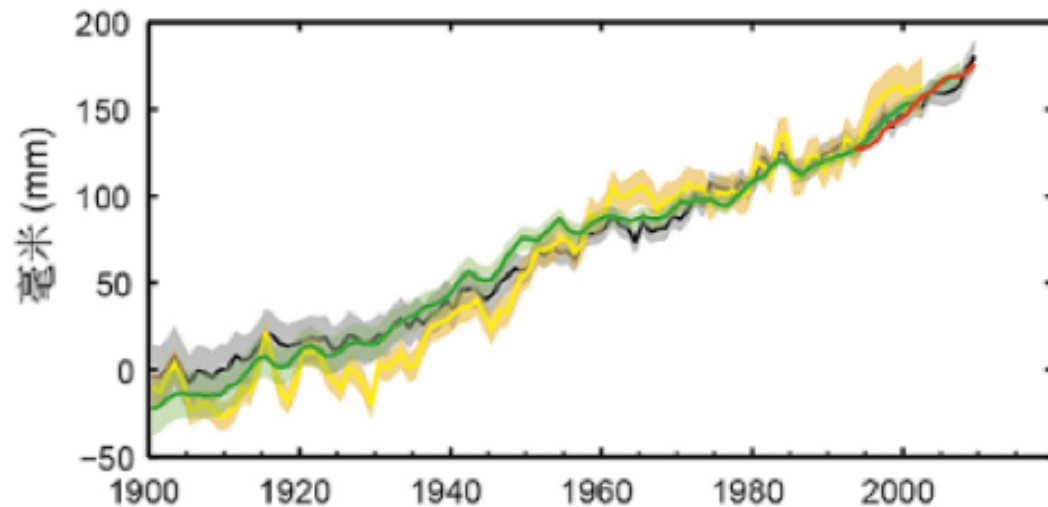
海嘯 Tsunami



日本311地震產生的海嘯到達香港的記錄

Tsunami generated by 311 Japan Earthquake recorded in Hong Kong

全球平均海平面變化
Global average sea level change

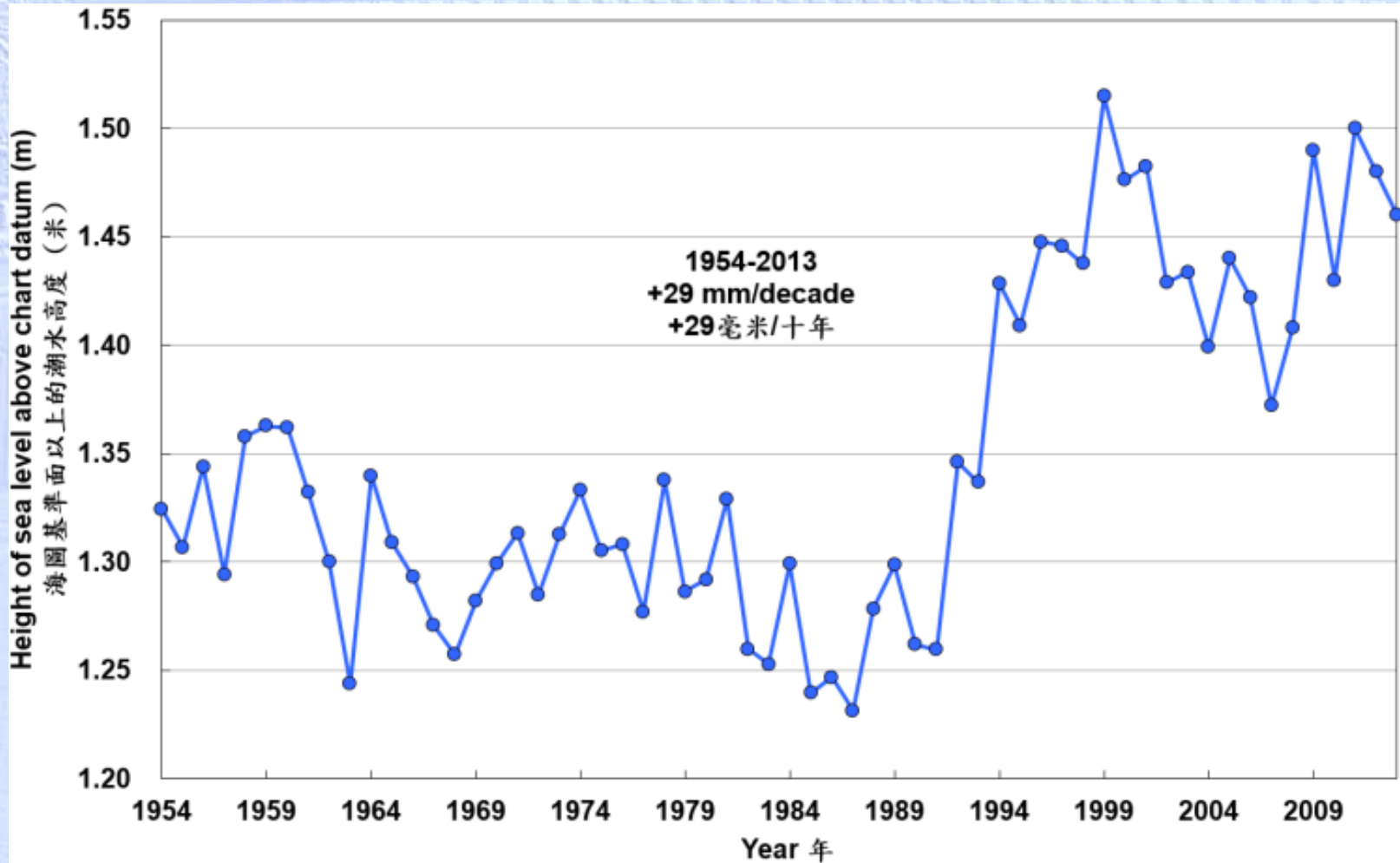


全球海平面在20世紀逐步升高，而上升的速度正在加快。自1961年以來，全球平均海平面上升的平均速率為每年1.8毫米，而從1993年以來平均速率為每年3.1毫米。

Global sea level gradually rose in the 20th century and is currently rising at an increased rate. Global average sea level has risen since 1961 at an average rate of 1.8 mm per year and since 1993 at 3.1 mm per year.

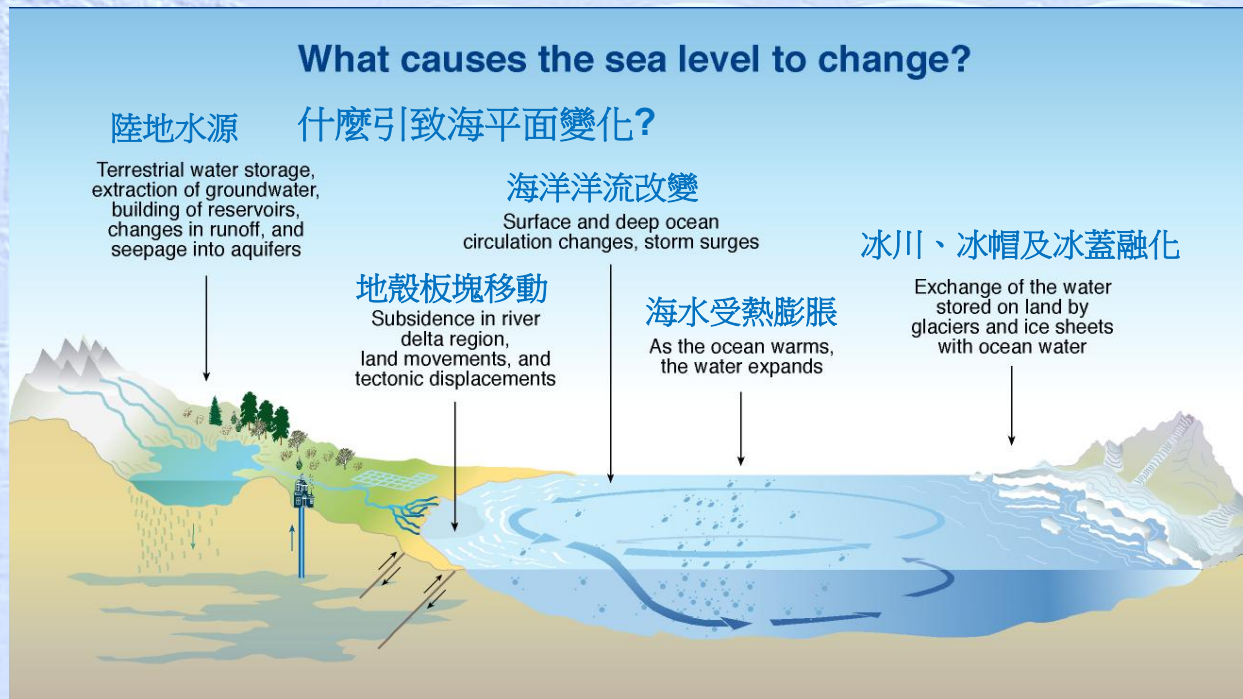
維多利亞港年平均海平面高度(1954-2013)

Annual mean sea level at Victoria Harbour (1954-2013)



海平面高度變化

Long term sea level change



海平面受全球變暖的影響而上升

- 海水受熱膨脹；
- 冰川、冰帽以及格陵蘭和南極洲上的冰蓋融化。

Sea level will rise under the effect of global warming

- Oceans warm and expand
- Melting of glaciers, ice caps and the Greenland and Antarctica ice sheets.

人類活動產生溫室氣體

Human activities produce greenhouse gases



生產能源、工業: 二氧化碳 (CO₂)
energy production, industry: carbon dioxide (CO₂)



廢物堆填: 一氧化二氮 (N₂O)
waste landfill: nitrous oxide (N₂O)



畜牧: 甲烷 (CH₄)
husbandry: methane (CH₄)

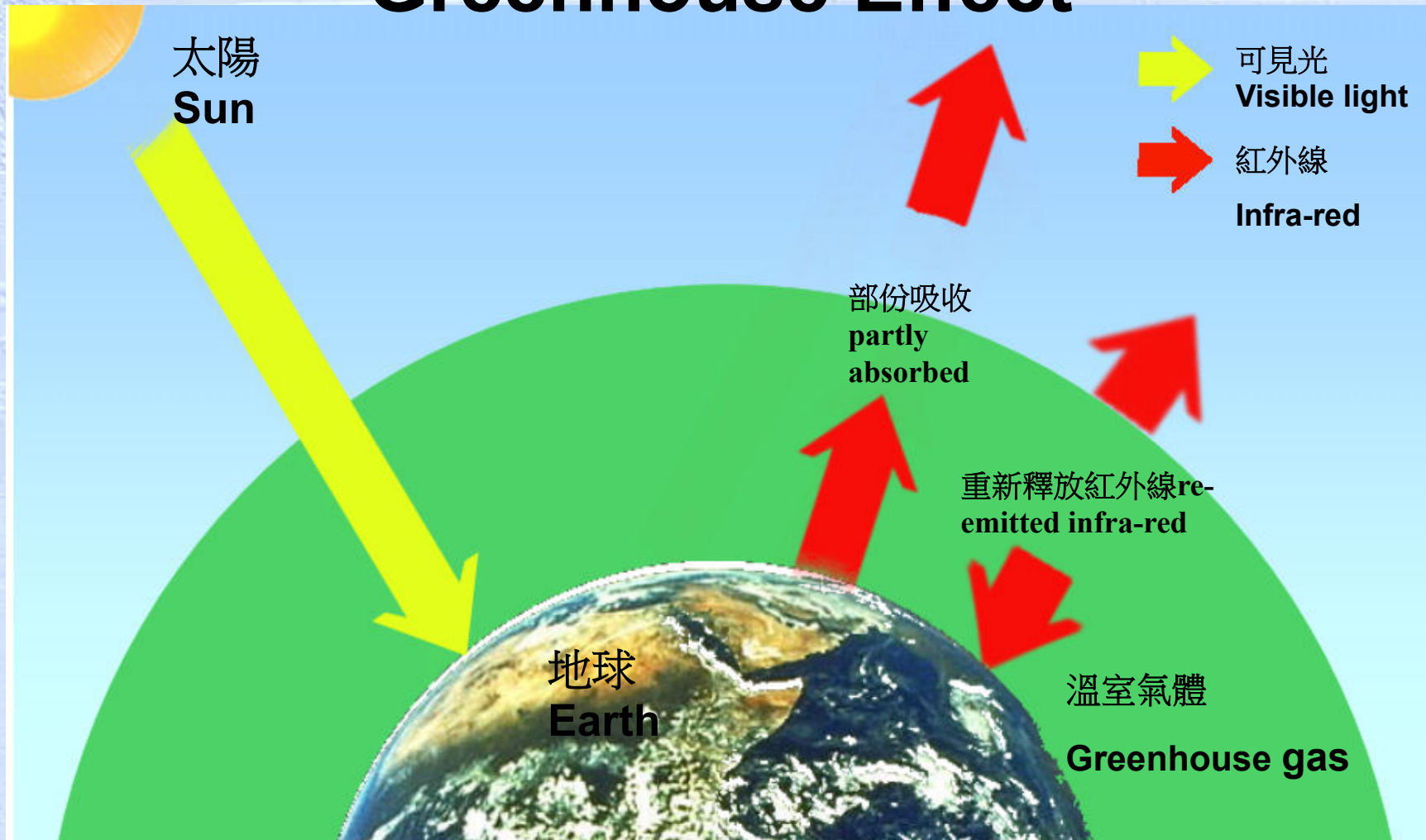


製冷、噴髮膠: 氯氟碳化物 (CFCs)
freezer, aerosol spray: chlorofluorocarbons (CFCs)



汽車廢氣: 臭氧 (O₃)
vehicle exhaust: ozone (O₃)

溫室效應 Greenhouse Effect

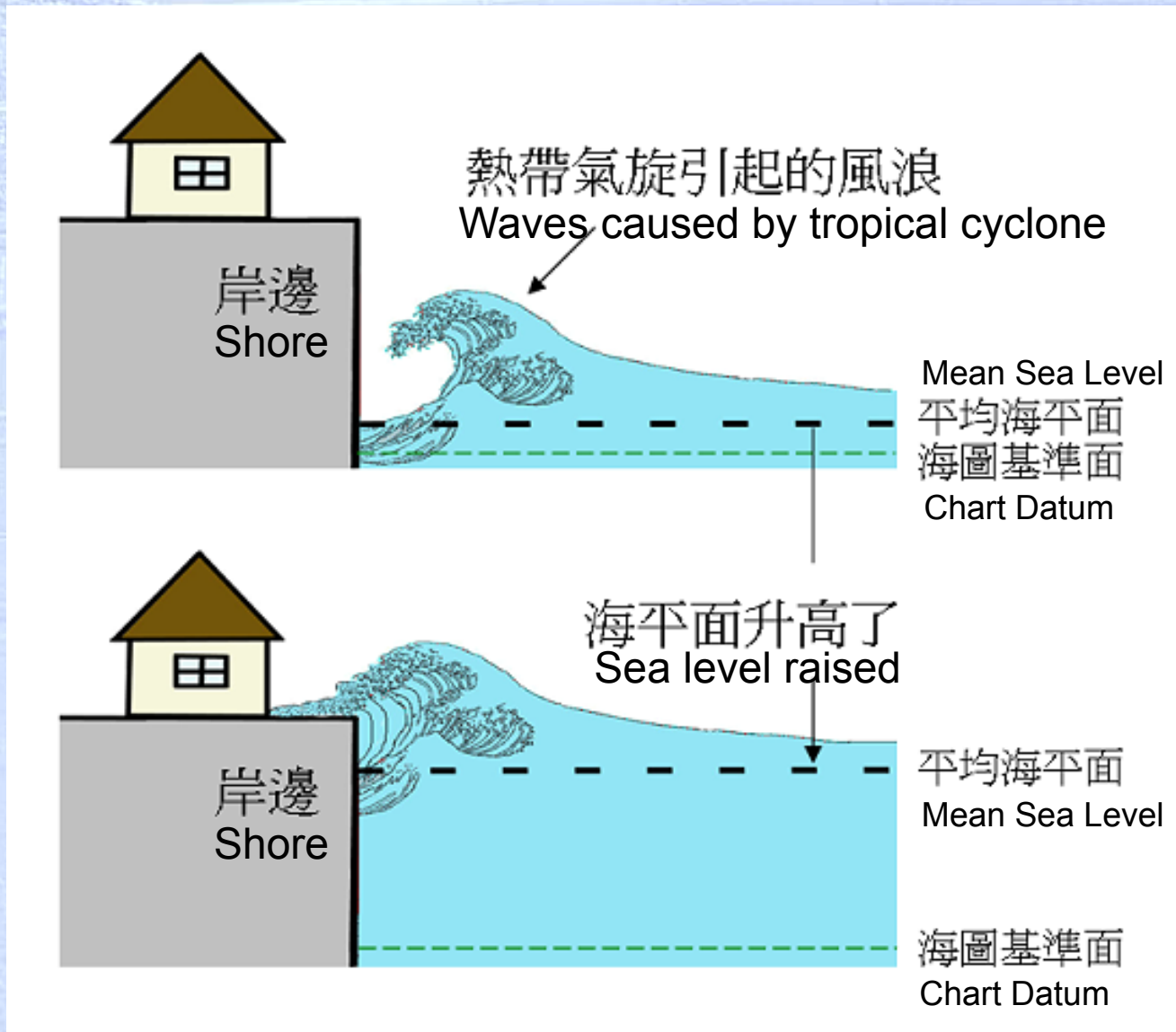


大氣層有溫室氣體的情況；溫室氣體包括 二氧化碳 (CO₂)、一氧化二氮 (N₂O)、甲烷 (CH₄)、氯氟碳化合物 (CFCs)、臭氧 (O₃) 及水汽 (H₂O)

Condition for greenhouse gases in the atmosphere; greenhouse gases include carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄), chlorofluorocarbons (CFCs), ozone (O₃) and water vapour (H₂O)

海平面上升對本港的主要影響

Major Impact in Hong Kong in connection with mean sea level rise



- 風暴潮引起低窪地區水浸的機會增加
- Increase chance of flooding on low lying area caused by storm surge

減緩大氣溫室效應的方法 (1)

Ways to reduce atmospheric greenhouse effect (1)

- 減少燃燒石化燃料

Reduce the burning of fossil fuels

節省能源
Save energy



多使用再生能源
More use of
renewable energy



- 盡可能使用集體運輸工具

Use mass transport system whenever possible



Ways to reduce atmospheric greenhouse effect (2)

- 減少廢物 **Reduce waste**
- 節約用紙 **Save paper**
- 種植樹木 **Plant trees**
- 防止山火 **Prevent hill fires**





減緩大氣溫室效應的方法 (3)

Ways to reduce atmospheric greenhouse effect (3)

- 減少耗費
Reduce expenditure



所有的商品生產都使用大量能源，製造二氧化碳

Large amount of energy is used in producing commercial products and releasing **carbon dioxide**

減緩全球暖化，生活要簡樸！



**Reduce global warming
with a simple life style !**

~ 謝謝 ~
Thank you