



Establishment of Geography E-learning Package about Climate Change

《地理電子學習教材套：氣候變化》



Project Leader

Jessie LAU

Deputy Head of Geography

Ho Koon Nature Education cum Astronomical Centre (Sponsored by Sik Sik Yuen)

Geography E-learning Package about Climate Change



香港天文台
HONG KONG OBSERVATORY



優質教育基金
Quality Education Fund

Objectives:

1. Provide an educational package to **enhance the understanding of and clarify common myths about climate change** among students, teachers and the general public.
2. **Facilitate the teaching and learning** with a wide range of informative and interactive resources.
3. **Raise public awareness** on climate change and its impacts on Hong Kong.

Advisor: The Hong Kong Observatory

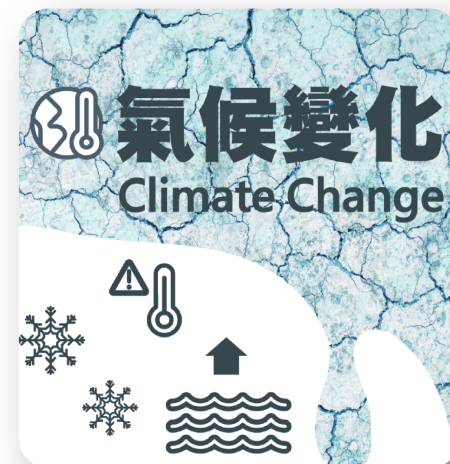
Sponsored by : The Quality Education Fund

Geography E-learning Package about Climate Change



Content:

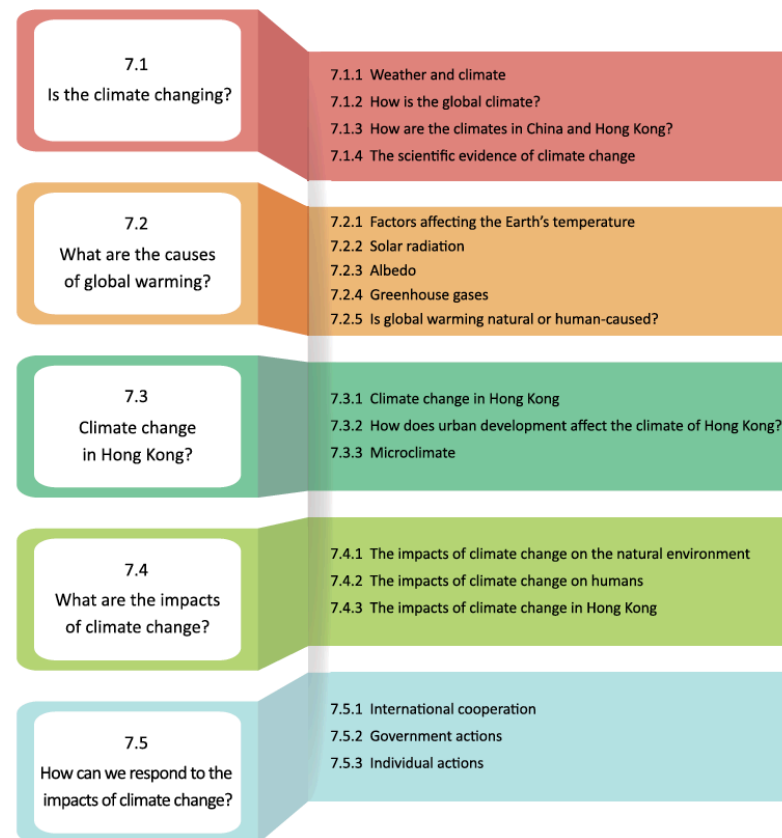
- (1) teaching kit;
- (2) board game learning set;
- (3) mobile application about climate change.





(1)Teaching Kit

- Designed according to the module of "Climate Change — Long-term fluctuation or irreversible trend?" in Geography Curriculum and Assessment Guide (Secondary 4-6)





(1)Teaching Kit

- The **content, vocabularies, graphics and meteorological data** in the teaching kit are formulated and simplified to match the standards of teachers and students.

7.1.1 Weather and climate

Weather describes the conditions of the atmosphere in a place within a short period of time (e.g. several hours, a few days). Climate on the other hand describes the average meteorological conditions in a place over a long period of time. Therefore, climate can be interpreted as the “average weather”. According to the definition given by the World Meteorological Organization (WMO), the reference period for compiling climate statistics should be at least 30 years.

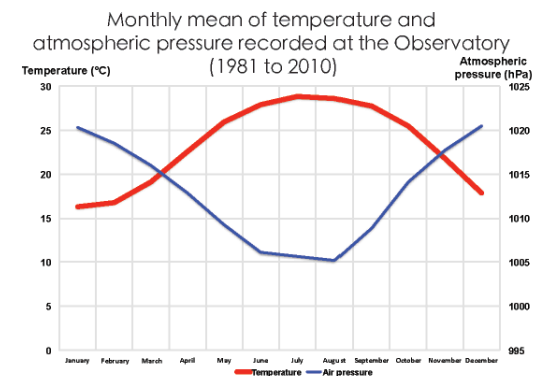


Fig 1.1d

Monthly mean temperature and monthly mean atmospheric pressure of Hong Kong

Data source: HKO



(1)Teaching Kit

- Professional scientific advices from the experts at the Hong Kong Observatory, as well as different parties from educational institutions around the world

7.3.2 How does urban development affect the climate of Hong Kong?

Both global warming and local urban development affect the climate of Hong Kong. According to researches from the HKO, urban development is one of the factors causing Hong Kong's warming trend and the contribution could be up to 50%.

Urban heat island effect

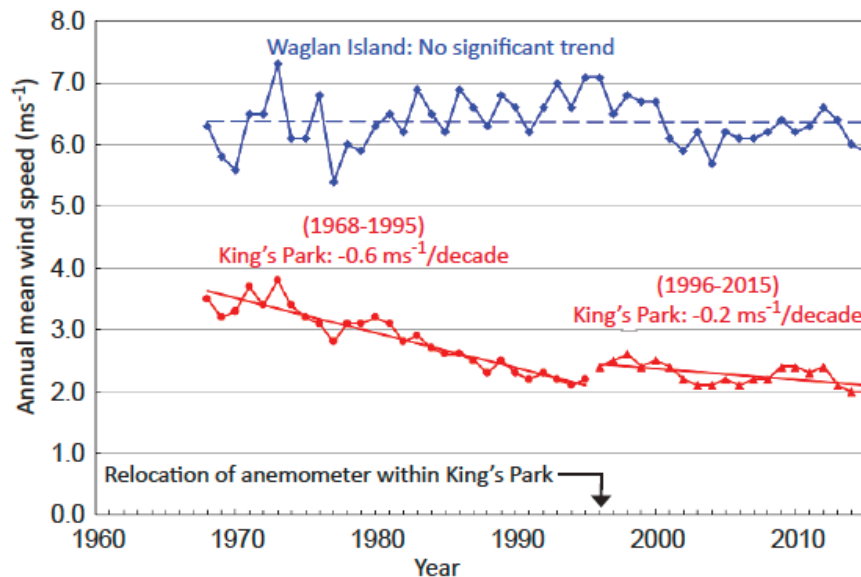
Owing to urban development, the cooling rate of the urban areas has gradually become lower than that of the rural areas, causing the average temperature in the urban areas to be generally higher than that in the rural areas. This phenomenon is called the urban heat island effect. Urban development includes land use changes, dense building development, heat emissions and human activities. Fig 3.5 shows the causes of the urban heat island effect.



Impact of urban development on the surface wind speed

The high-rise buildings and dense urban development in Hong Kong have increased land surface friction, obstructing air flow and **reducing wind speed in the urban areas**. Fig 3.7 shows that there is no obvious trend of the annual average wind speed at Waglan Island for 1968-2015, while the wind speed at King's Park in the urban areas exhibits a significant downward trend.

The annual average wind speed at King's Park and Waglan Island
(1968 to 2015)



Buildings creating
wall effect



More information

Fig 3.7 The annual average wind speed at King's Park and Waglan Island^{vii}

Geography E-learning Package about Climate Change



香港天文台
HONG KONG OBSERVATORY



優質教育基金
Quality Education Fund

Change in global surface temperatures
(1901 to 2016)

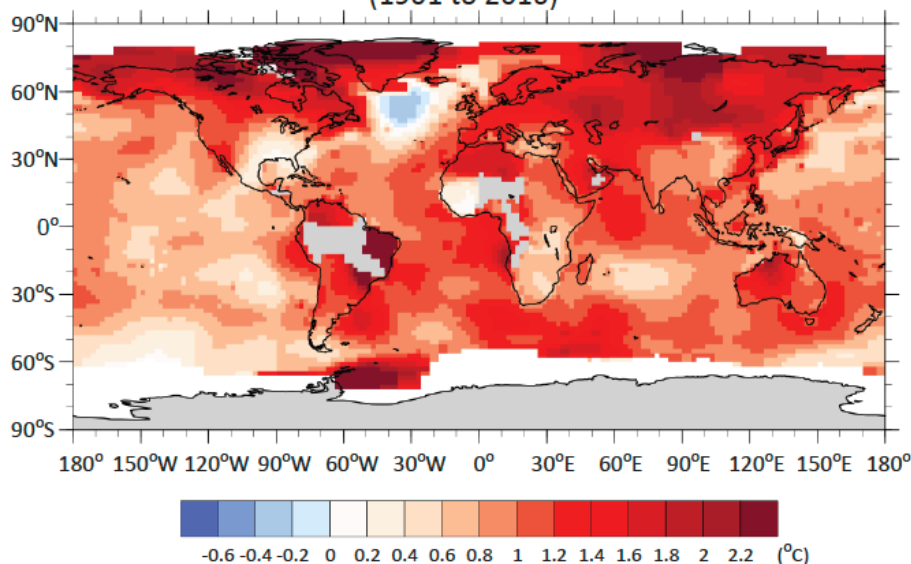


Fig 1.8 Change in global surface temperatures

Data source: NASA

Distribution of ice loss for Antarctica and Greenland
(2003 to 2012)

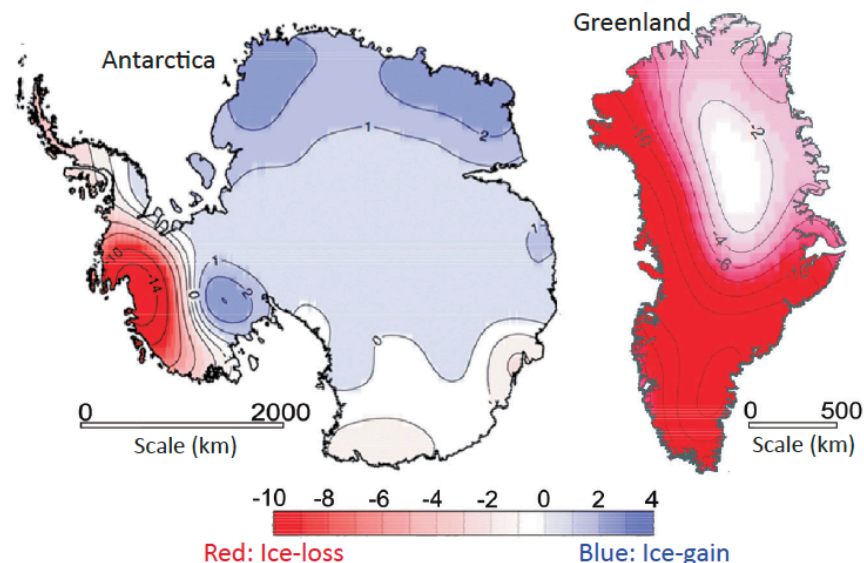


Fig 1.14 Distribution of ice loss for Antarctica and Greenland

Source: The Fifth Assessment Report of IPCC



(1) Teaching Kit

- Clarify **common myths** about climate change



Why snowstorms and extremely cold weather still occur in some regions under global warming?

Cold events in a certain place at a certain time are just weather, and say nothing about climate. Against the backdrop of natural climate variability, global warming refers to the increase in global average temperature since the 20th century as a result of human activities. Snowstorms and extremely cold weather are parts of the natural climate



Do volcanoes emit more carbon dioxide than human activities?

One of the natural factors affecting the climate is volcanic eruptions as large amount of gases and particles can be released to the atmosphere. However, various studies have shown that, in the last century, the annual amount of carbon dioxide released by human activities far exceeded that released by terrestrial and submarine volcanoes. Latest data shows human activities emit 60 times or more the amount of carbon dioxide released by volcanoes each year.





(1) Teaching Kit

- Up-to-date data, information and news

(d) Sea level rise

Tide gauge records in Victoria Harbour since 1954 indicated an obvious rise of the mean sea level. On average, the mean sea level in Victoria Harbour rose at a rate of about 31 mm per decade in the past 60 years or so.

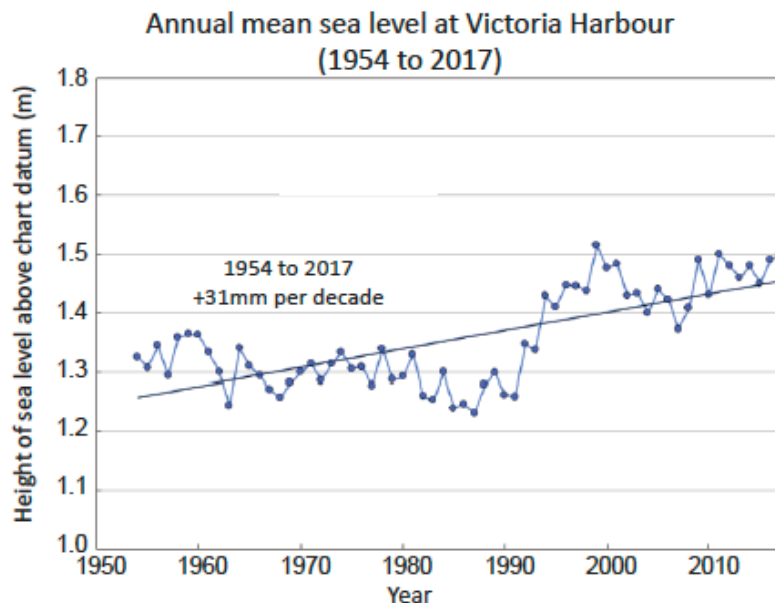


Fig 3.4 Annual mean sea level at Victoria Harbour^{iv}

Source: HKO

Latest mean
sea level trend



More information



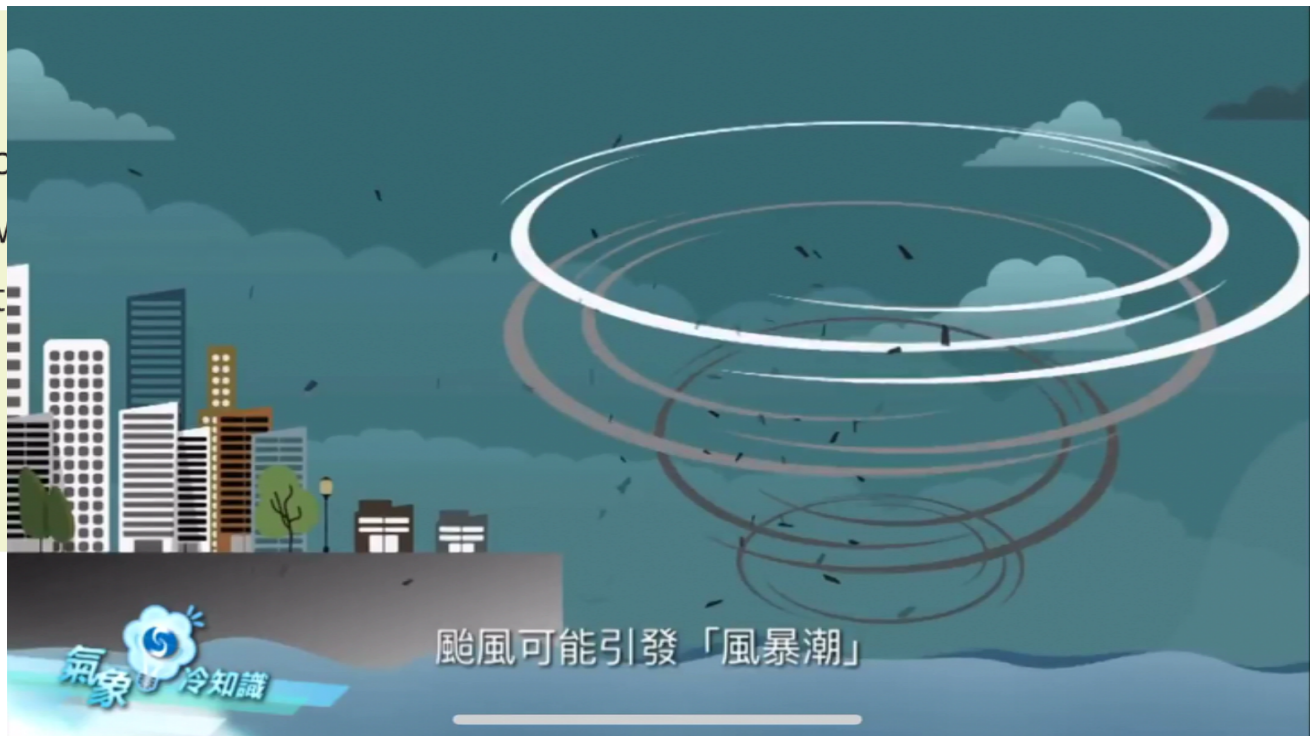
(1)Teaching Kit

- Multimedia support such as animations and videos



What is storm surge?

Storm surge is a rise of
combined effects of low
winds associated with t



Geography E-learning Package about Climate Change



香港天文台
HONG KONG OBSERVATORY



優質教育基金
Quality Education Fund

(1)Teaching Kit

- Various activities and extended readings catering for student diversity



Climate change: Ocean heat content

The ocean absorbs and stores energy from the Sun. If the ocean absorbs more heat than it releases, the heat content increases.



The latest ocean heat content




More information

Ocean heat as 'fuel' for tropical cyclones



More information

Part 1: Group discussion

-  Study Annex 1: Country file and Annex 2: Countries information table, then analyze and discuss the following:
1. Compare the economies and CO₂ emissions among countries (Hints: Rankings of GDP, CO₂ emissions per capita and total CO₂ emissions)
 2. According to the economy and impacts of climate change, suggest two response measures for your country (Hints: mitigation / adaptation / resilience)
- Response measure ① _____
- Response measure ② _____
3. To deal with climate change, does your country need support from other countries? Please explain (Hints: technology / knowledge / money...)
- _____
- _____



Geography E-learning Package about Climate Change



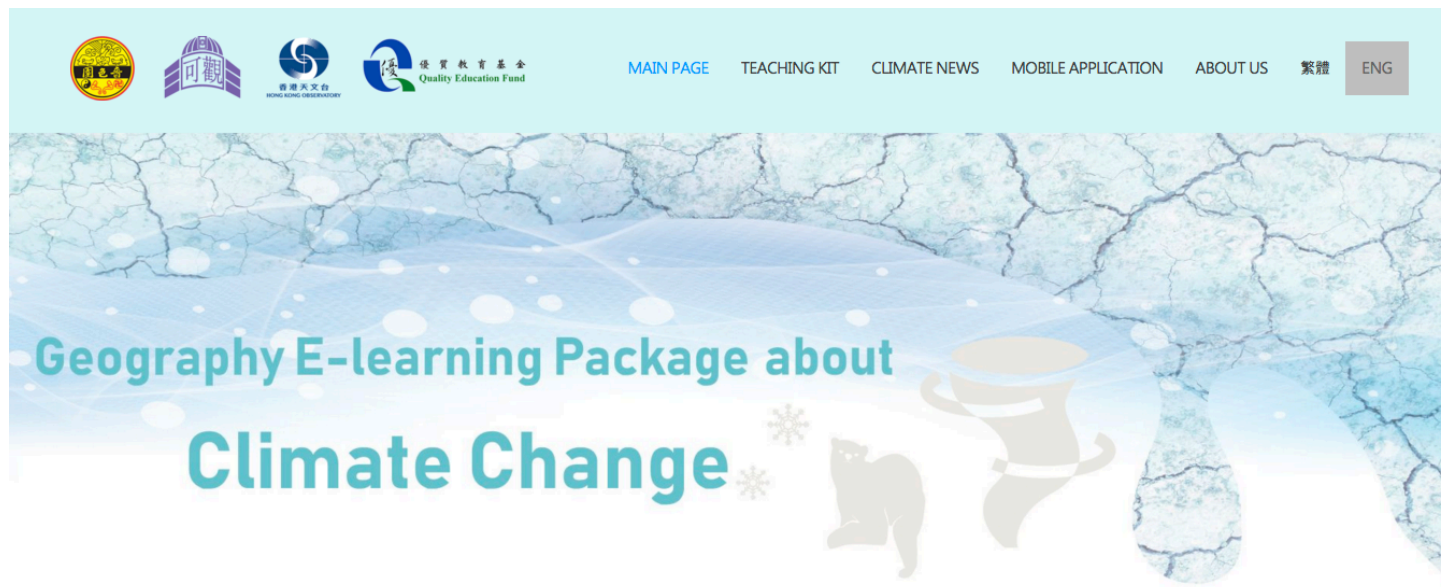
香港天文台
HONG KONG OBSERVATORY



優質教育基金
Quality Education Fund

(1)Teaching Kit

- Website: www.climatechange.edu.hk



UPDATES & NOTICES

Geography E-learning Package about Climate Change



香港天文台
HONG KONG OBSERVATORY



優質教育基金
Quality Education Fund

(2) Board game learning set



Geography E-learning Package about Climate Change



香港天文台
HONG KONG OBSERVATORY



優質教育基金
Quality Education Fund

(2) Board game learning set





(3) Mobile application

- iPad version only
- Free download from Apple App Store
- Four-in-one scheme including parts of
 - a) global climate change;
 - b) climate change in Hong Kong;
 - c) climate change quiz game;
 - d) weather data collection and analysis.
- Promotes self-learning of students
- The public can also acquire the basic understanding of climate change in the free all-in-one application





(3) Mobile application

- assisting data-logging and incorporating the functions of
 - i) user/group management;
 - ii) maps;
 - iii) geotagging;
 - iv) time logging;
 - v) input and export of data; and
 - vi) preview of diagrams
- All the collected data can be exported by the assigned accounts for further analysis in enquiry-based fieldwork.

Geography E-learning Package about Climate Change



香港天文台
HONG KONG OBSERVATORY



優質教育基金
Quality Education Fund



9275 4831

邀請加入「可觀地理科WhatsApp」

如欲及時接收本中心地理科的最新資訊，如報名消息、課程活動等，可加入本中心的地理科WhatsApp頻道。

加入方法：

1. 將「可觀地理科WhatsApp」電話號碼：**9275 4831**加到你的通訊錄內；
2. 將你的「姓名」及「任教學校名稱」 WhatsApp至 **9275 4831**。

*註：必須在通訊錄中儲存了「可觀地理科WhatsApp」電話號碼：**9275 4831**才會接收到我們的廣播訊息。

我們會隨即將你的姓名及電話號碼加入「地理科教師聯絡名單」，當有最新資訊時，我們將會透過WhatsApp中的**廣播功能(Broadcast)**傳送給你。