

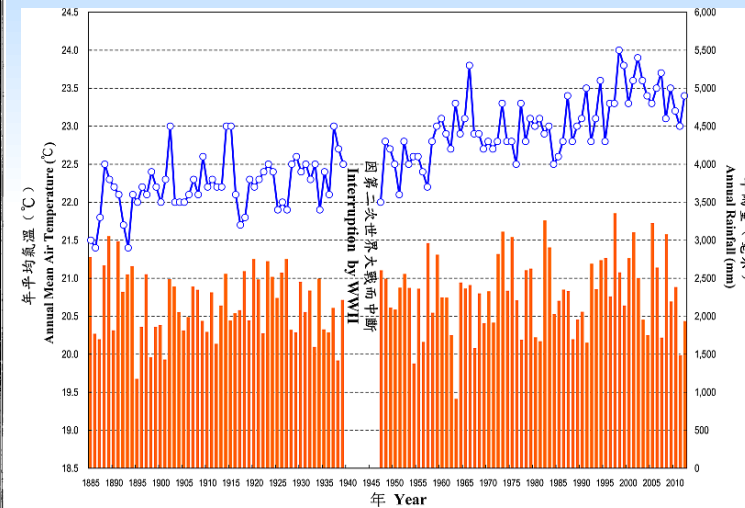
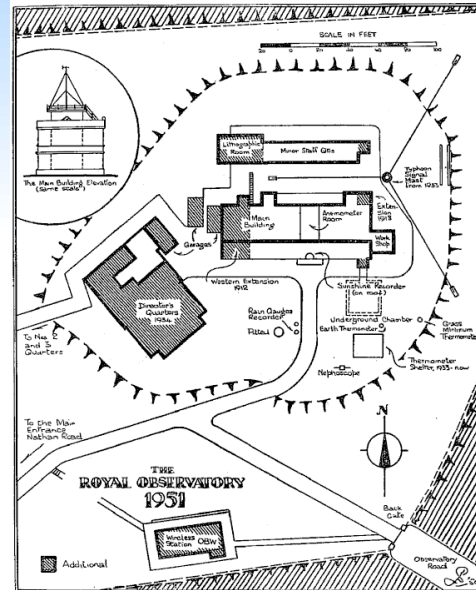
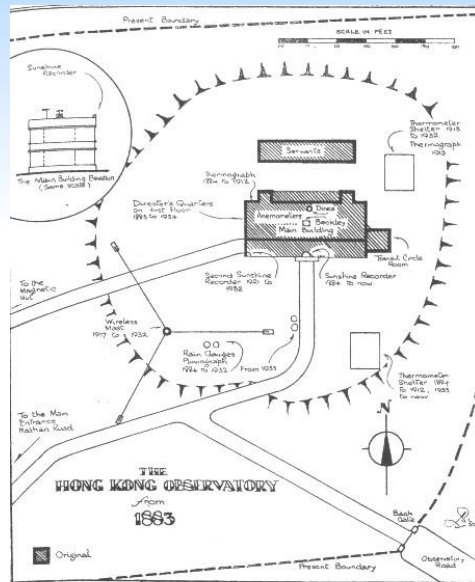
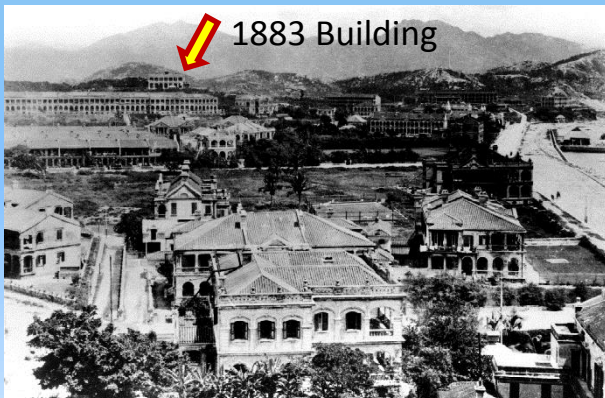
# Climate Information Services in Hong Kong and Their Applications in Urban Living

T C Lee  
Hong Kong Observatory



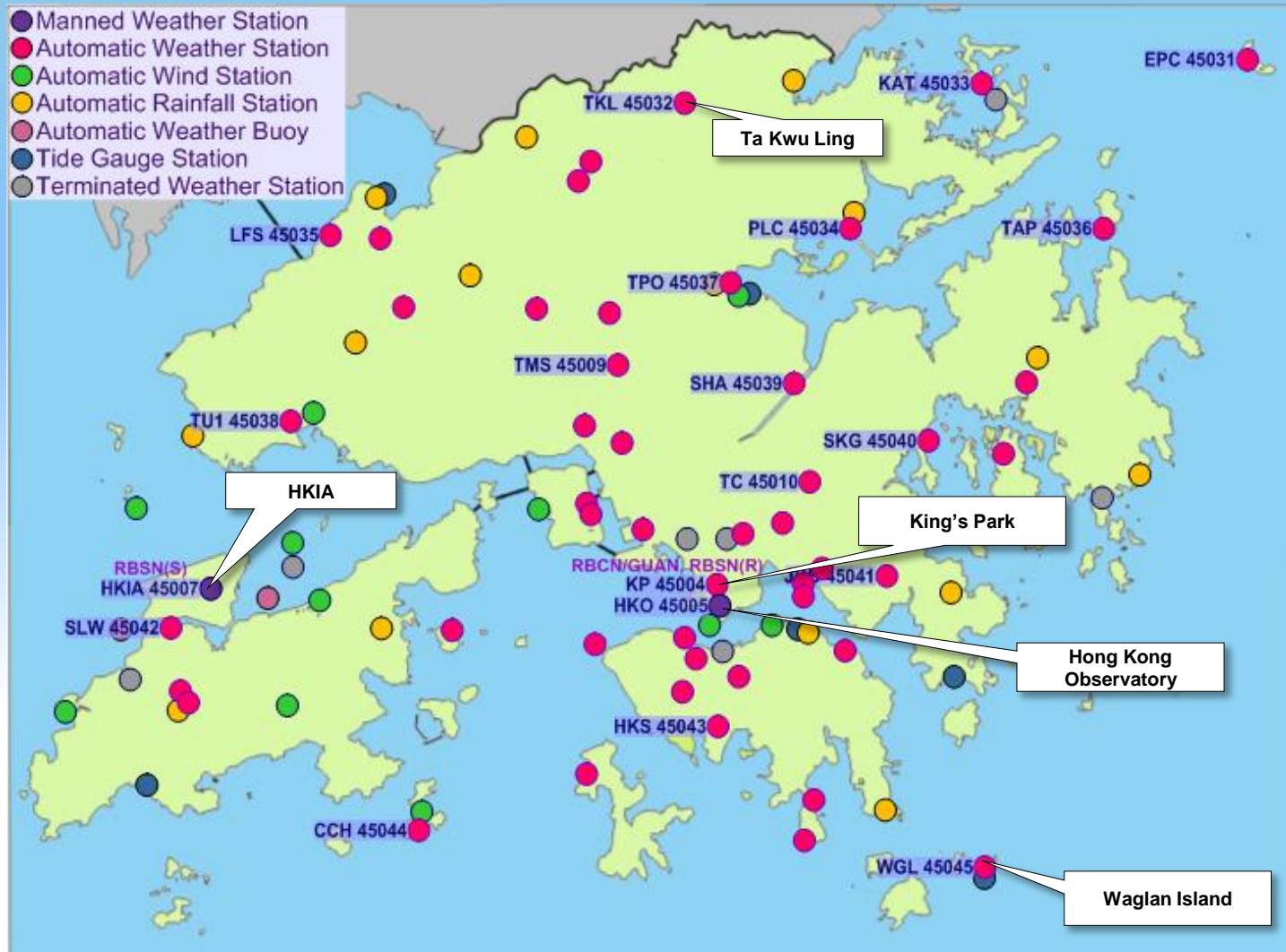
# Meteorological observations at the Hong Kong Observatory (HKO) Headquarters

- HKO Headquarters is one of the WMO stations in Asia with over a century of regular observations of essential surface meteorological observations since 1884, apart from a break during 1941-1946 due to World War II



# Coverage of Monitoring Network

The meteorological coverage of Hong Kong was further enhanced with the establishment of an automatic weather station network since the mid-1980s.



# Climate Information Dissemination & Accessibility

- HKO has been regularly publishing meteorological observations at its headquarters since 1884, apart from a break from 1940 to 1946 due to World War II
- To enhance climate service, HKO's Climatological Information Service webpage was recently upgraded to provide one-stop-shop online access to more than 130 years of climate data and relevant statistics of Hong Kong



**Hong Kong Observatory**  
The Government of the Hong Kong Special Administrative Region  
Innovate with Science, Serve with Heart

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SEARCH [Enter search keywords] | SITE MAP

## Climatological Information Services

### Highlight of Hong Kong Climate

Mar 2015	Apr 2015	So Far This Year
Mean Max Temp 22.0°C	Mean Max Temp 25.5°C	Absolute Max Temp 30.6°C (5 Apr)
Mean Temp 19.9°C	Mean Temp 22.5°C	Absolute Min Temp 10.3°C (14 Jan)
Mean Min Temp 18.5°C	Mean Min Temp 20.2°C	Max Daily Rainfall 52.0mm (11 Apr)
Monthly Rainfall 28.4mm	Monthly Rainfall 64.3mm	Accumulative Rainfall 166.4mm
		So Far This Year (up to 10 Apr)
		Mean Max Temp 22.0°C
		Mean Temp 19.9°C
		Mean Min Temp 18.5°C
		Monthly Rainfall 28.4mm

Daily Extract - Mar 2015  
Monthly Weather Summary - Mar 2015

Climate Watch  
Climate Statistics  
Climate Prediction  
Climate Knowledge  
Need More Information?  
Global Climate Services  
Other Useful Links

Climate Forecast  
Climate Change  
El Niño and La Niña  
Earthquakes and Tsunamis  
Astronomy, Space Weather and Geomagnetism  
Time and Calendar  
Radiation Monitoring, Assessment and Protection  
Educational Resources  
Publications  
Media and Information Services  
Audio/Video Webpage  
Electronic services  
World Meteorological Day  
World Meteorological Organization  
World Meteorological Organization Official City Weather Forecasts  
World Meteorological Organization-Global Severe Weather  
Public forms  
Contact & Support  
Access to information  
Tender notices  
Links  
Important notices  
Personalized Website  
Mobile Version  
RSS Feeds  
Text Only Version  
Back

W3C WAI-AA WCAG 2.0

([http://www.weather.gov.hk/cis/climat\\_e.htm](http://www.weather.gov.hk/cis/climat_e.htm))



GLOBAL FRAMEWORK FOR  
CLIMATE SERVICES

全球氣候服務框架

<http://gfcs.wmo.int/>

Agriculture and food security



Water



Energy



Health



Disaster risk reduction

**GFCS** of the World Meteorological Organization (WMO) provides a worldwide mechanism for coordinated actions to enhance the quality, quantity and application of climate services. The five priority areas of GFCS include agriculture and food security, water, health, energy and disaster risk reduction.

# Applications of century-long climate information in Hong Kong

## Infrastructure design and city planning

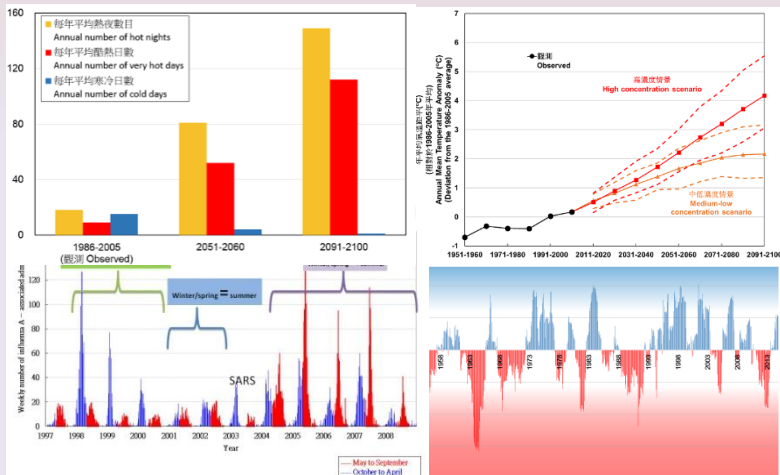


(Sea Wall Design, Port Work, Drainage Design, Water Resource Management, etc.)

Climate Information



## Climate research



(Climate Change, Climate Projection, Climate and Health, Water Resource, etc.)

## Climate partnership

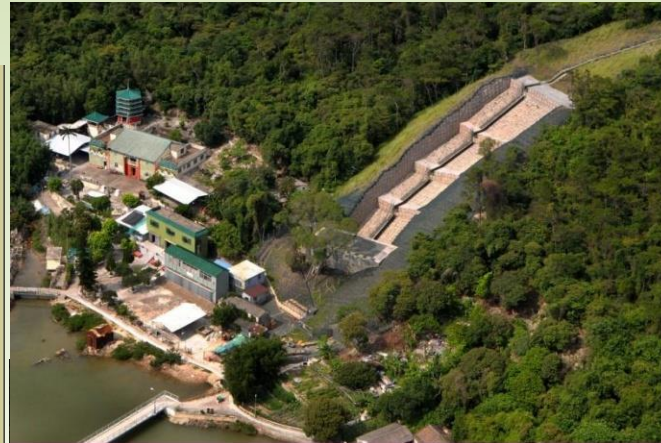
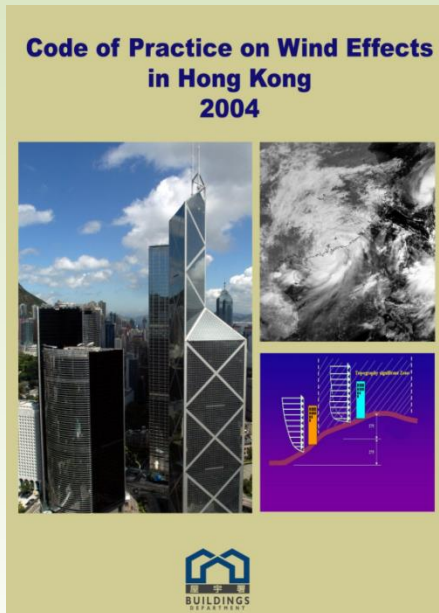


(Health sector, Academia, Farming Community, Energy Sector, etc.)

# Climate Information for Infrastructure Design

Climate information, statistics and relevant future projections of Hong Kong as well as expert advice, in particular on extreme weather events, were provided for the establishment and regular review of the engineering design standards and codes of practices appropriate to local conditions for protecting public safety. Examples :

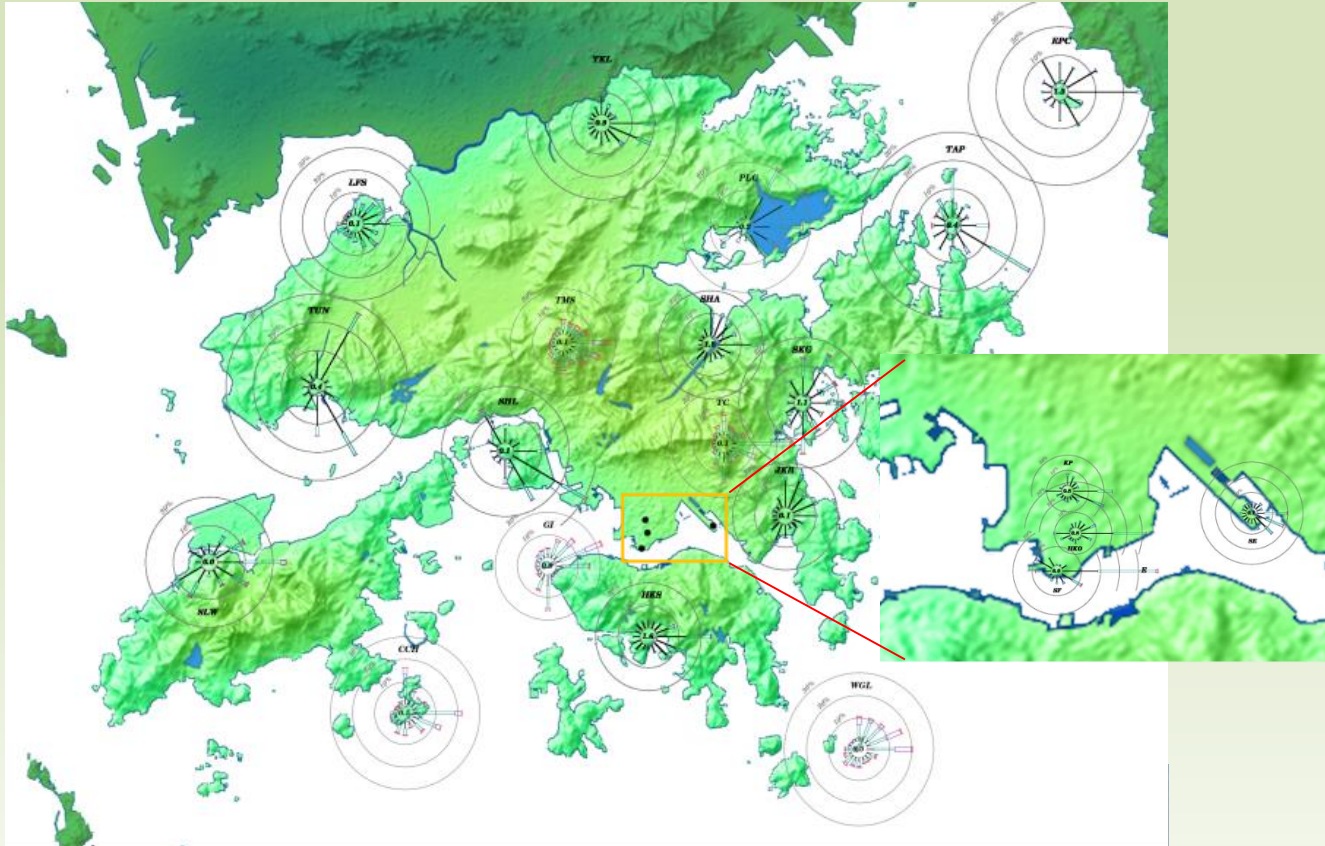
- Code of Practice on Wind Effects for buildings
- Drainage design and flood control
- Port Work Design Manual
- Slope Safety



Cavenatin, Lee © 2016 <http://www.photos.com/cavenatin/lee>

# The Wind Climate of Hong Kong

Urbanization is a great challenge to the air ventilation in a city. Wind observations in the past decades provide useful information of the wind climate of different parts of Hong Kong and the long term changes



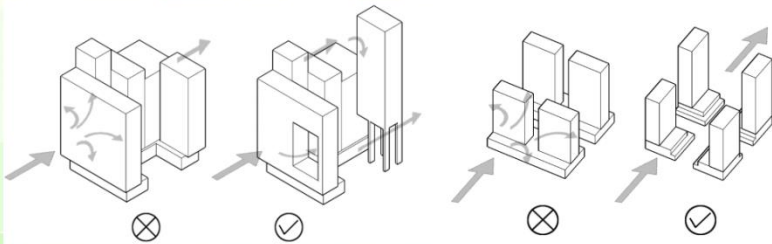


# Air Ventilation and Urban Planning

## Planning and Design Measures to Improve Urban Climate

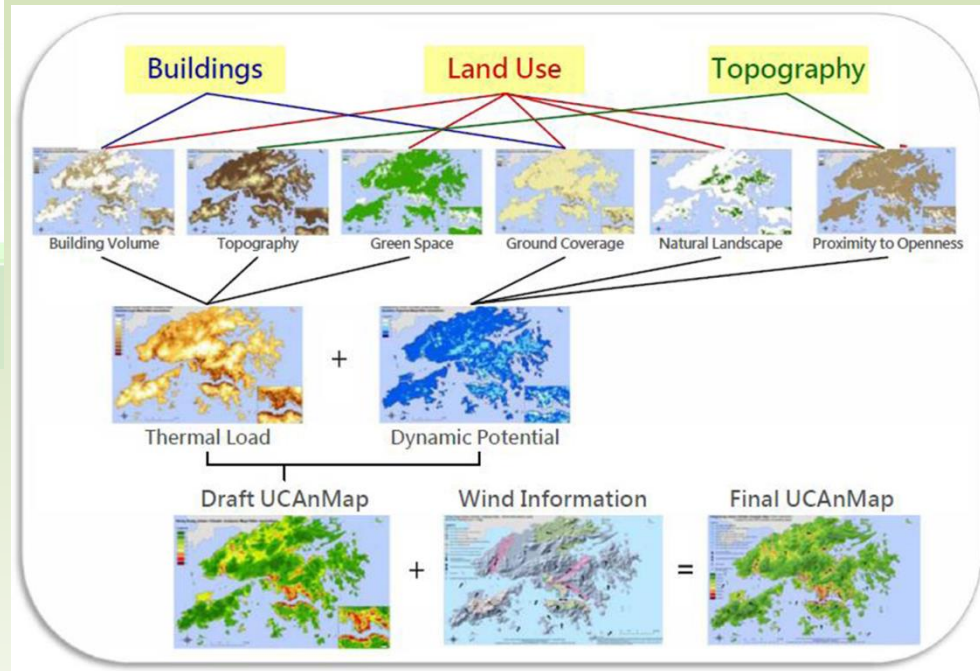
### Building Permeability – for wind penetration

- Closely packed buildings impede **air flow**
- **Provide building gaps and separations**



By analysing and evaluating climate wind data together with different geometric and urban development data (e.g. land use, greening, building density, topography), “**Urban Climatic Maps**” by the CUHK divides the territory into different urban climate zones, each with recommended planning and development actions

Help assess and regulate the impact of potential city, community and building developments on local air ventilation



# Climate and Health Studies

The Observatory has been collaborating with tertiary institutions and relevant government departments to study the impacts of climate/weather on human health in Hong Kong in recent years, including thermal stress, infectious disease and vector-borne disease

## Thermal Stress

- The impact of cold and hot weather on senior citizens in Hong Kong (HKO and Senior Citizen Home Safety Association)
- Development of Hong Kong Heat Index (HKO and JC School of Public Health and Primary Care, Chinese University of Hong Kong (CUHK))

## Infectious Disease (HKO and Department of Microbiology, CUHK)

- Seasonal influenza activity in Hong Kong and its association with meteorological variations
- Rotavirus Activity and Meteorological Variations
- Seasonality of Common Respiratory Viruses in Hong Kong

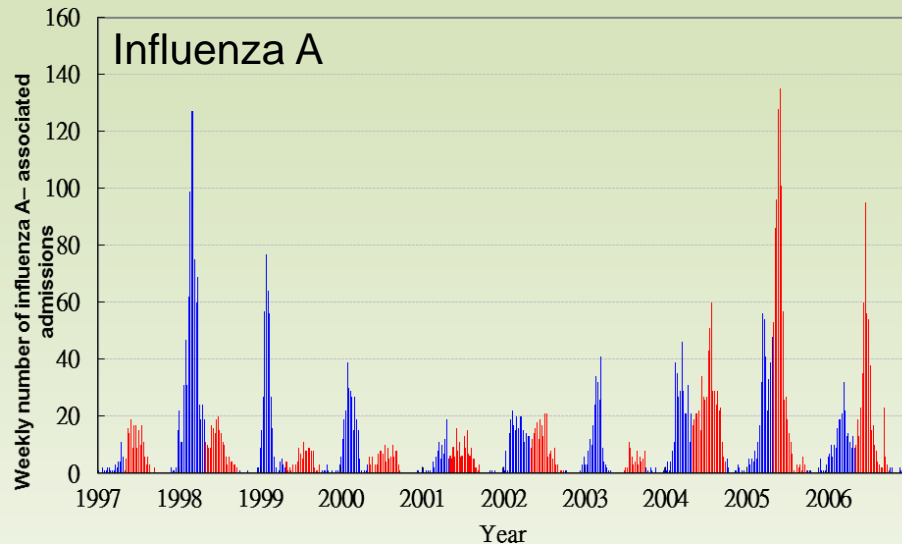
## Vector-borne Disease (HKO and Food and Environmental Hygiene Department)

- A climate model for predicting the abundance of Aedes mosquitoes in Hong Kong

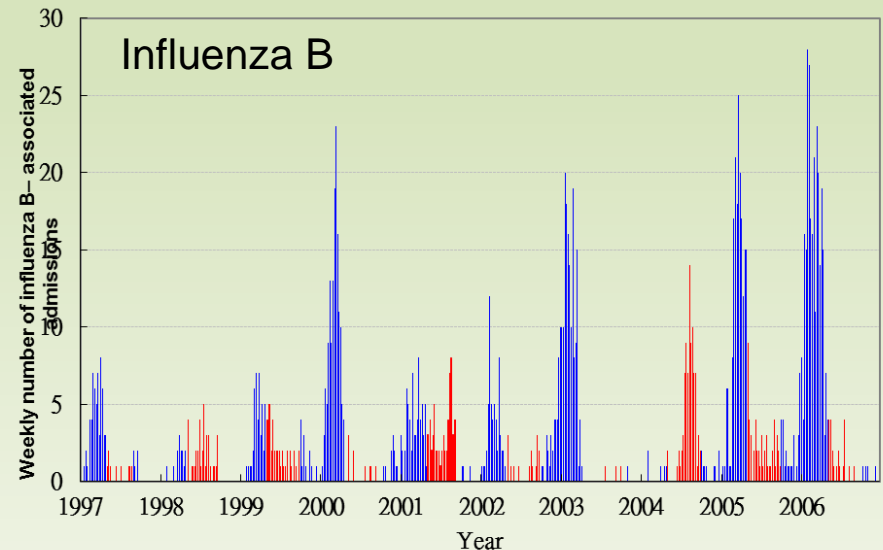
# HKO + Microbiology Department of CUHK

## Seasonal variations of Influenza in Hong Kong

- jointly conducted a study on influenza and climate in Hong Kong.
- The daily number of laboratory-confirmed influenza A and B cases admitted to the Prince of Wales Hospital and the weather data recorded at the Observatory's automatic weather station at Shatin from 1997 to 2006 were used for the study.

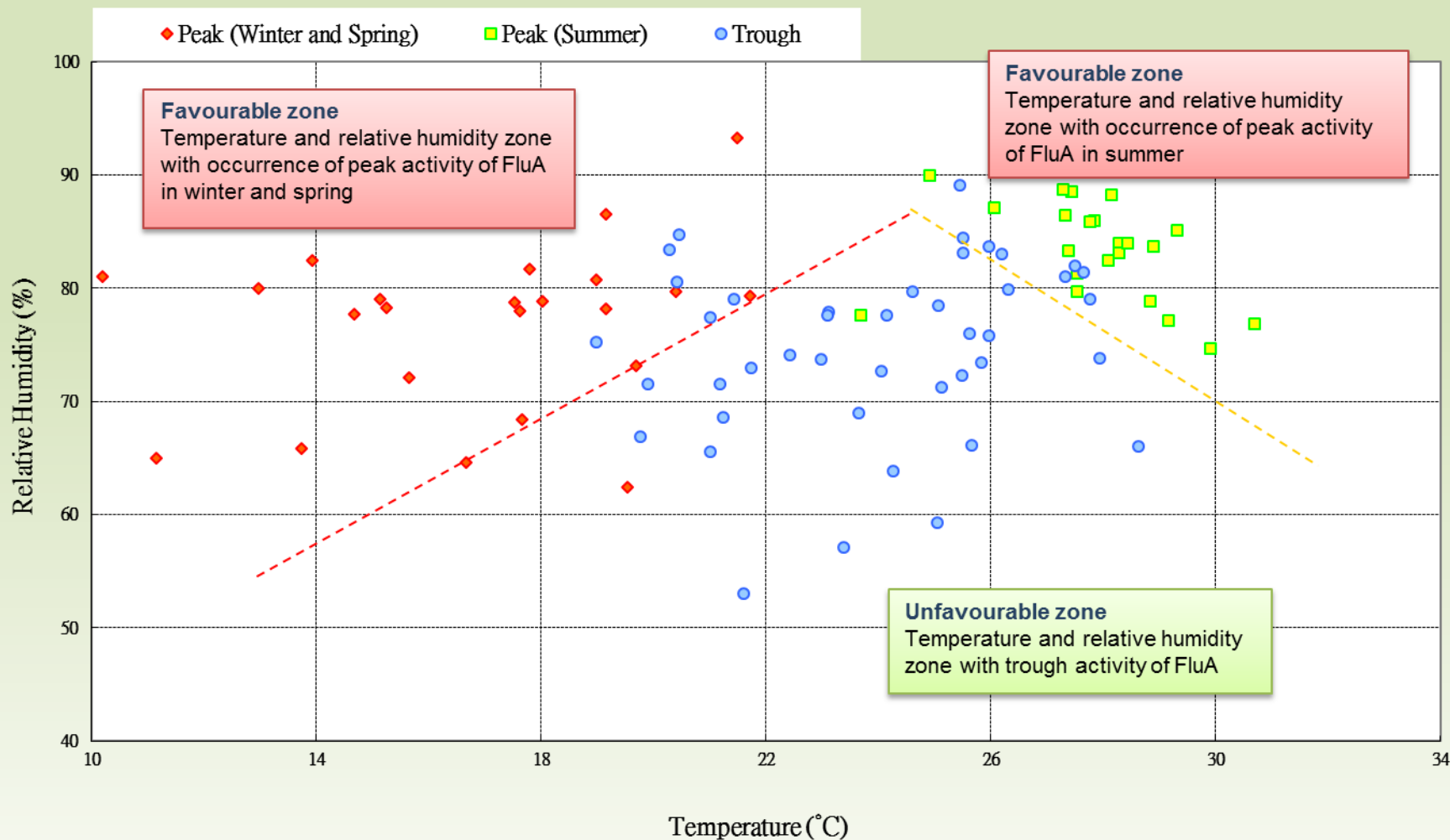


- 2 peaks for influenza A
- Winter/spring peak - Feb / Mar
- Summer peak – Jun / July



- 1 (2 in some yrs) peak for influenza B
- Major: Winter/spring peak - Feb / Mar
- Minor, less consistent: Summer peak – 4 out of 10 yr

# Favourable climatic zones for influenza A

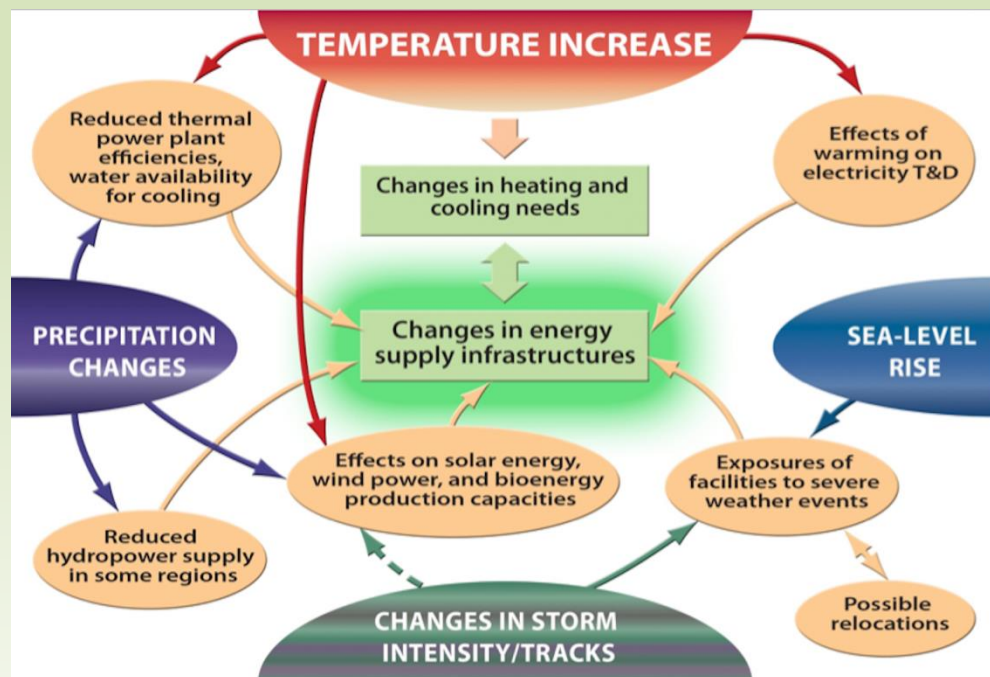


(Ref : Chan, Paul K.S., H.Y. Mok, T.C. Lee, Ida M.T. Chu, W.Y. Lam and Joseph J.Y. Sung, 2009 : Seasonal Influenza Activity in Hong Kong and its Association With Meteorological Variation, Journal of Medical Virology 81:1797–1806)

# Climate Services for the Energy Sector

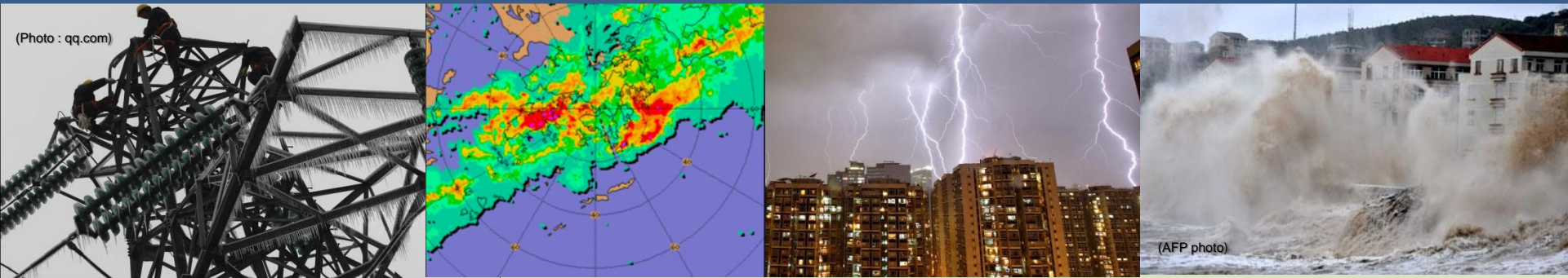
Development and application of targeted climate products and services through the GFCS can help improve efficiency and reduce risk associated with hydro-meteorological hazards affecting energy systems, in particular to support:

- Greater climate resilience and adaptation across the sector;
- Efficiency and reduction of energy consumption; and
- The growing renewables sub-sector.



(Reference : <http://public.wmo.int/en/resources/bulletin/climate-services-energy-sector-new-priority-area-gfcs>)

# Historical climate information and weather warnings of extreme weather events concerning the energy sector



- Typhoon & Storm Surge
- Rainstorm, Severe thunderstorm & Squall line
- Extremely hot
- Extremely cold and icing weather
- Drought



# HKO + CLP Power

## Saving Energy through Weather Watch

Climate data and user energy consumption data >> CLP's energy consumption forecast model for each high consumption client

9-day weather forecast >> consumption forecast model >> 9-day "Energy Consumption Forecast" in CLP's Meter Online Services\*

Timely energy-saving measures could be taken in response to early alerts of high consumption days under hot weather situations for high energy consumption clients.

Date	05.10.2015	06.10.2015	07.10.2015	08.10.2015	09.10.2015	10.10.2015	11.10.2015	12.10.2015	13.10.2015
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday
<b>Weather Outlook</b>									
<b>Forecast Temperature</b>	28 °C	27 °C	28 °C	28 °C	27 °C	26 °C	24 °C	24 °C	25 °C
<b>Forecast Humidity</b>	81 %	81 %	79 %	76 %	72 %	67 %	60 %	63 %	65 %
<b>Forecast Max. kVA</b>	6,221 @ 13h 6,119 @ 12h 6,083 @ 15h	6,162 @ 13h 6,052 @ 15h 6,048 @ 12h	6,070 @ 13h 5,958 @ 14h 5,947 @ 15h	6,014 @ 13h 5,926 @ 14h 5,915 @ 15h	5,721 @ 13h 5,634 @ 14h 5,615 @ 15h	4,616 @ 11h 4,578 @ 13h 4,568 @ 12h	3,160 @ 15h 3,151 @ 16h 3,151 @ 14h	4,871 @ 13h 4,837 @ 14h 4,768 @ 12h	5,022 @ 13h 4,968 @ 14h 4,919 @ 12h
<b>Forecast Consumption (kWh)</b>	84,502	83,401	82,176	81,029	77,611	64,031	52,607	65,447	67,644
<b>Forecast - Historical Average Consumption (Same month last year) (kWh)</b>	8,340	7,239	6,014	4,867	1,449	-3,437	-12,043	-10,715	-8,518

\*Figures highlighted in red are higher than the historical average of same month last year. You may want to implement your energy saving measures.

Peak loading

Forecast daily consumption

(Photo courtesy of CLP Power)

\* CLP Meter Online services.

[https://www.clponline.com.hk/MyBusiness/CustomerService/MeterOnline/Documents/CLP\\_MeterOnlineLeaflet.pdf](https://www.clponline.com.hk/MyBusiness/CustomerService/MeterOnline/Documents/CLP_MeterOnlineLeaflet.pdf)

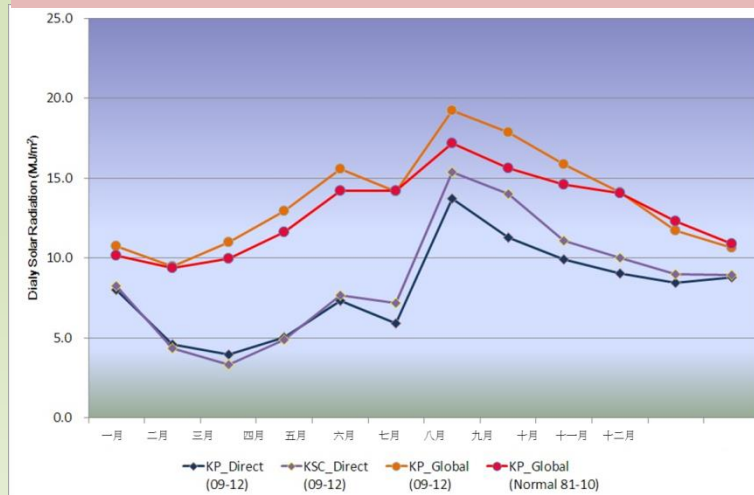
# Assessing the Renewable Energy Potential

Analyses of the long term climate data measured by the Observatory provide information on the potential of renewable energy resources in Hong Kong. Such information has been found useful for relevant feasibility and site selection studies

Distribution of mean wind power density in Hong Kong



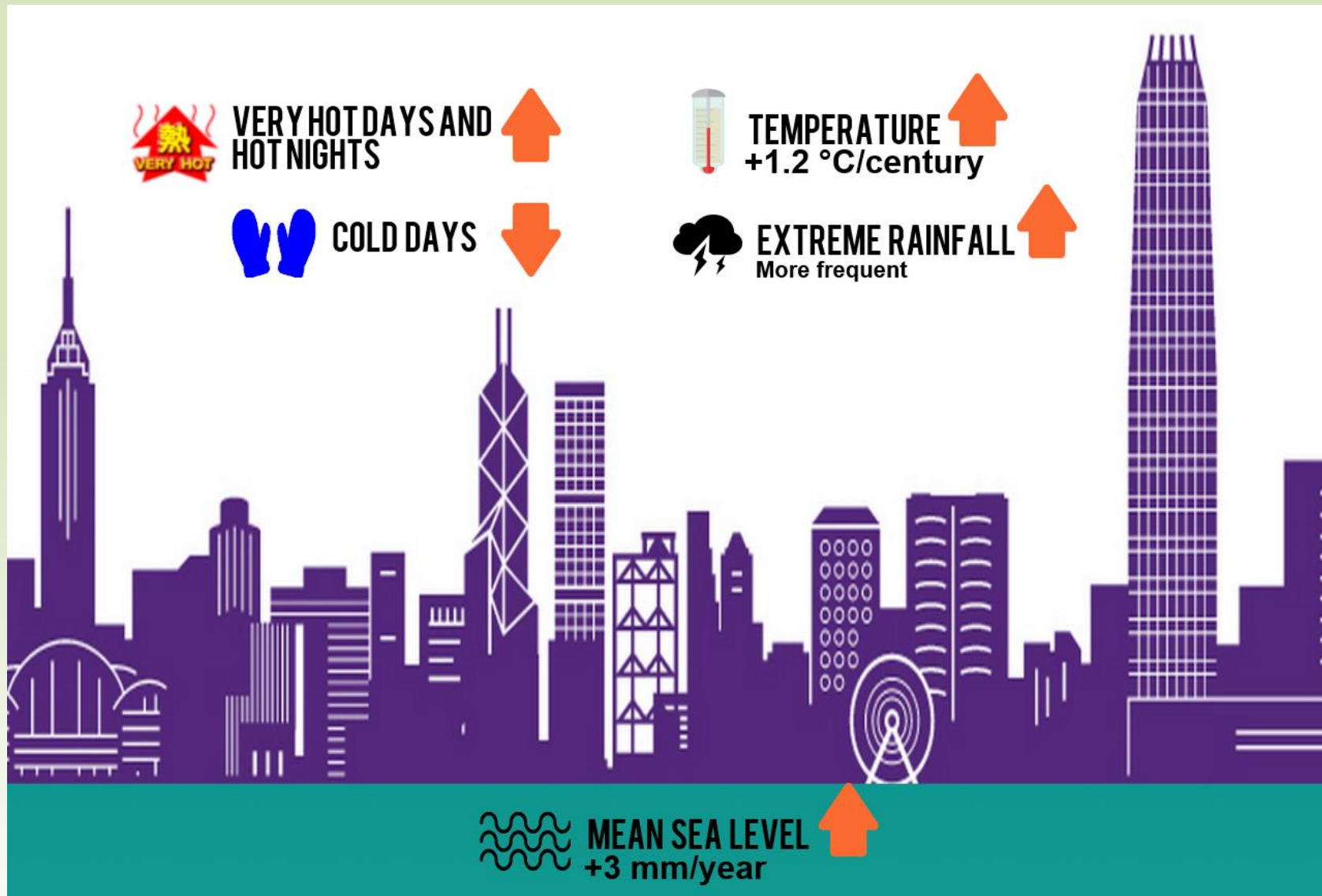
Solar radiation monitoring in Hong Kong





# Climate Change Monitoring and Research

Observed climate change in Hong Kong over the last century

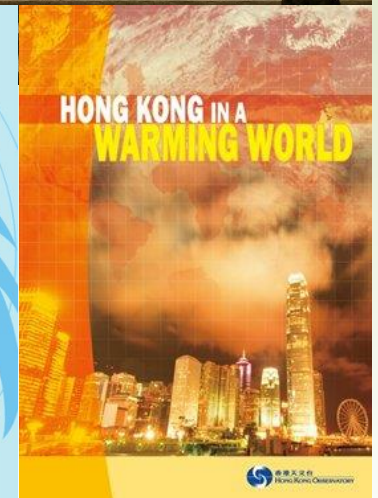
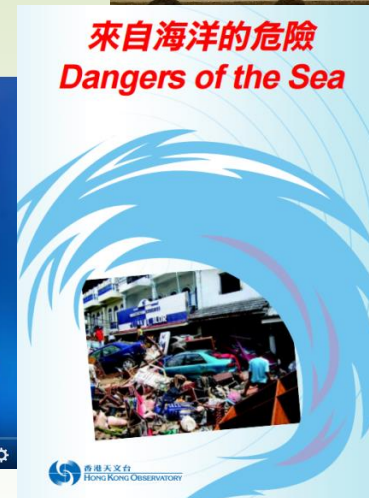


HKO Climate Change Webpage

[http://www.hko.gov.hk/climate\\_change/climate\\_change\\_e.htm](http://www.hko.gov.hk/climate_change/climate_change_e.htm)

# Promoting Awareness on Climate Change and Extreme Weather

- Educational TV programme
- Cool Met Stuff (regular TV programme)
- Pamphlet
- Open day
- Blogs
- School and public talks  
(with partners from the engineering sector and other gov. depts)



# Climate services for a sustainable future

Looking ahead :

- building partnership with various stakeholders to promote better use of climate information in different sectors and research studies
- enhancing the variety of climate services and the accuracy of forecast products, especially for extreme climate events
- providing support for climate related decision and planning
- promoting awareness on climate change and extreme weather
- embracing the opportunities of “Big Data” and “Smart City”



**THANK YOU**