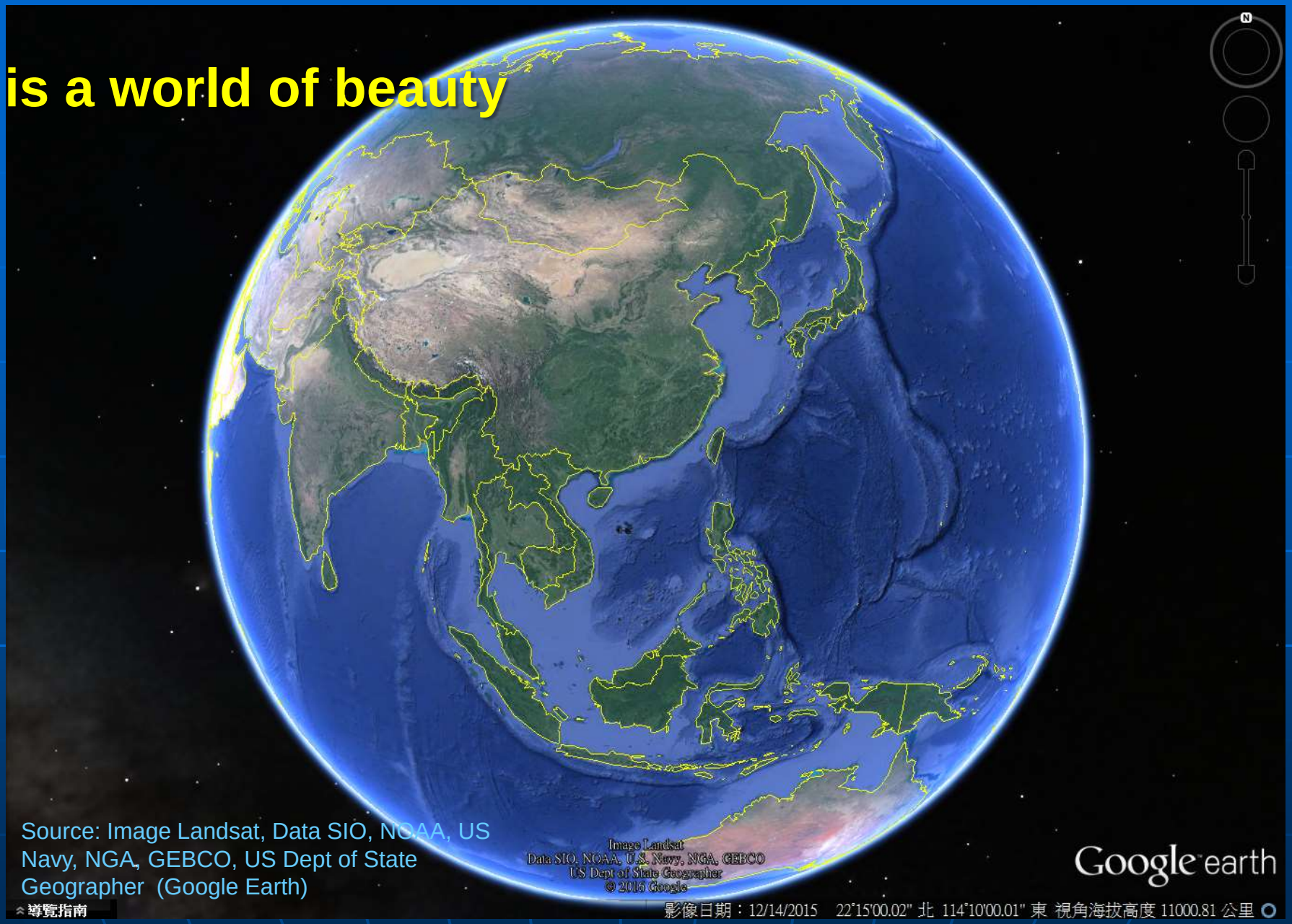
Smart use of Geographic Information System (GIS) platform for delivering weather information and nowcasting services

C. K. Pan
Hong Kong Observatory
Hong Kong, China

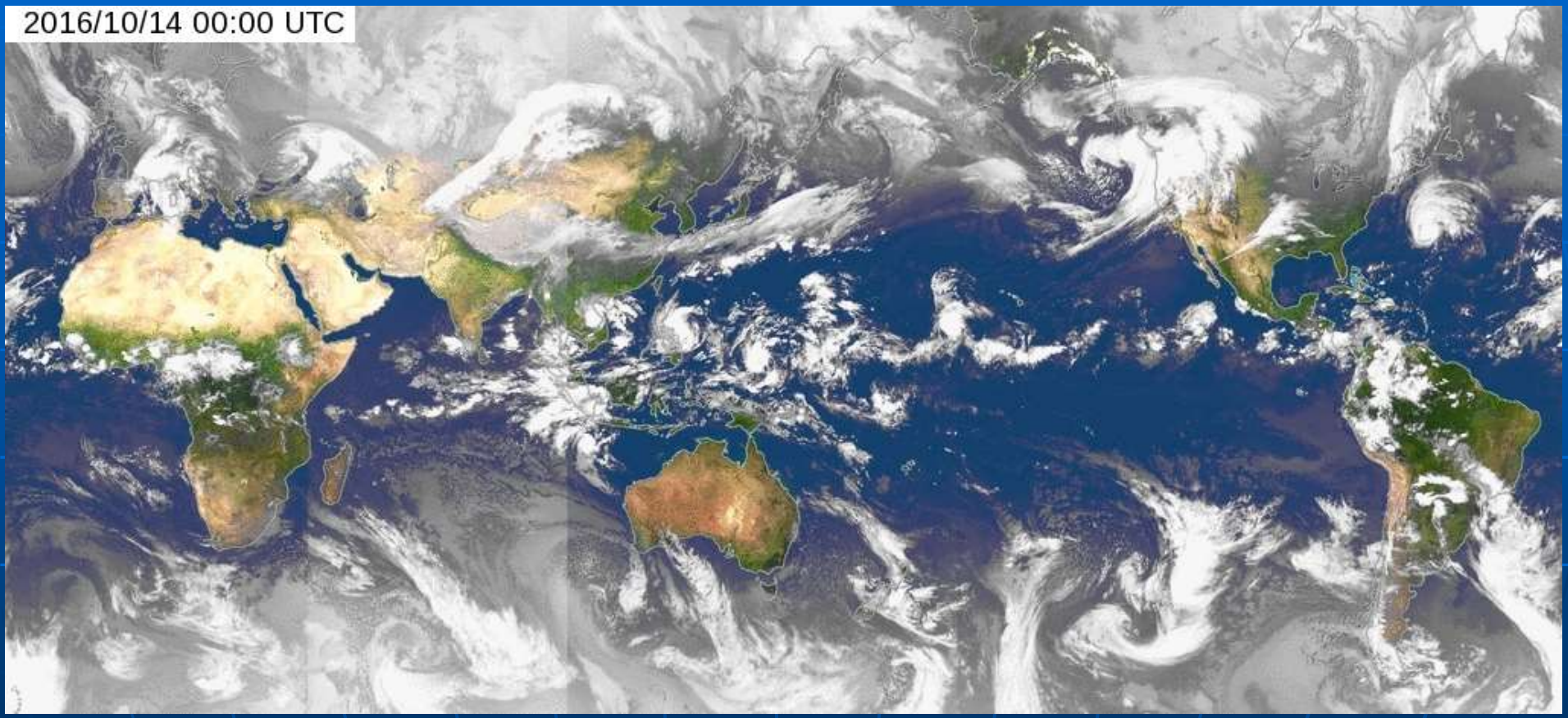
香港天文台
HONG KONG OBSERVATORY

It is a world of beauty



Source: Image Landsat, Data SIO, NOAA, US Navy, NGA, GEBCO, US Dept of State Geographer (Google Earth)

It is also …



a world of hazards

Source: CMA, JMA, EUMETSAT, NOAA

From Time To Time …

We Feel The Wrath Of Nature

Weather-Related Disasters

Weather phenomena with direct impact to the community

- Strong winds (tropical cyclones, severe storms etc,)
- Rainstorms
- Extreme temperatures (heatwaves and cold snaps)

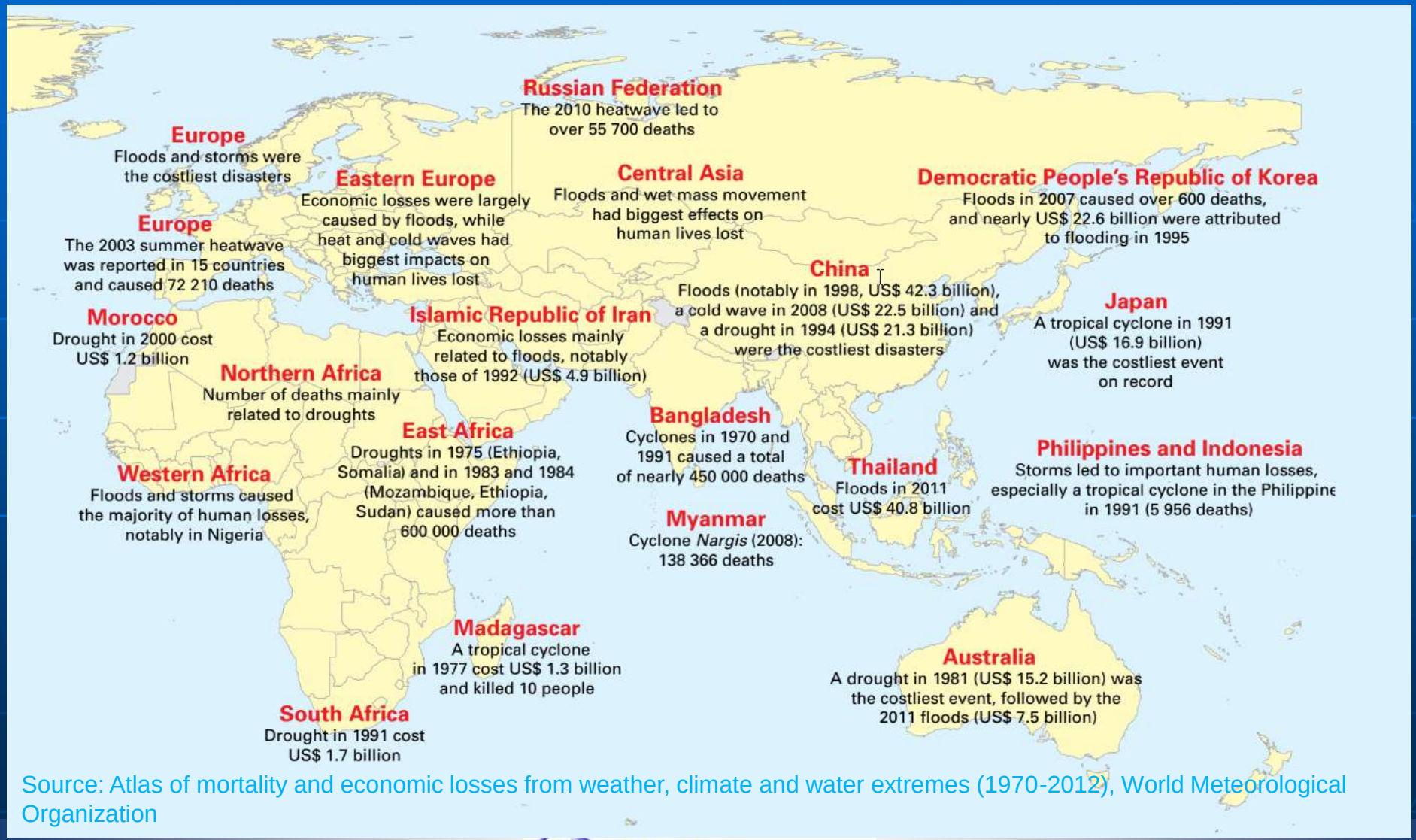
Weather induced phenomena

- Floods (including both riverine and flash flooding)
- Landslides
- Avalanches
- Ocean waves
- Storm surges
- Bushfires

Climate related/induced phenomena

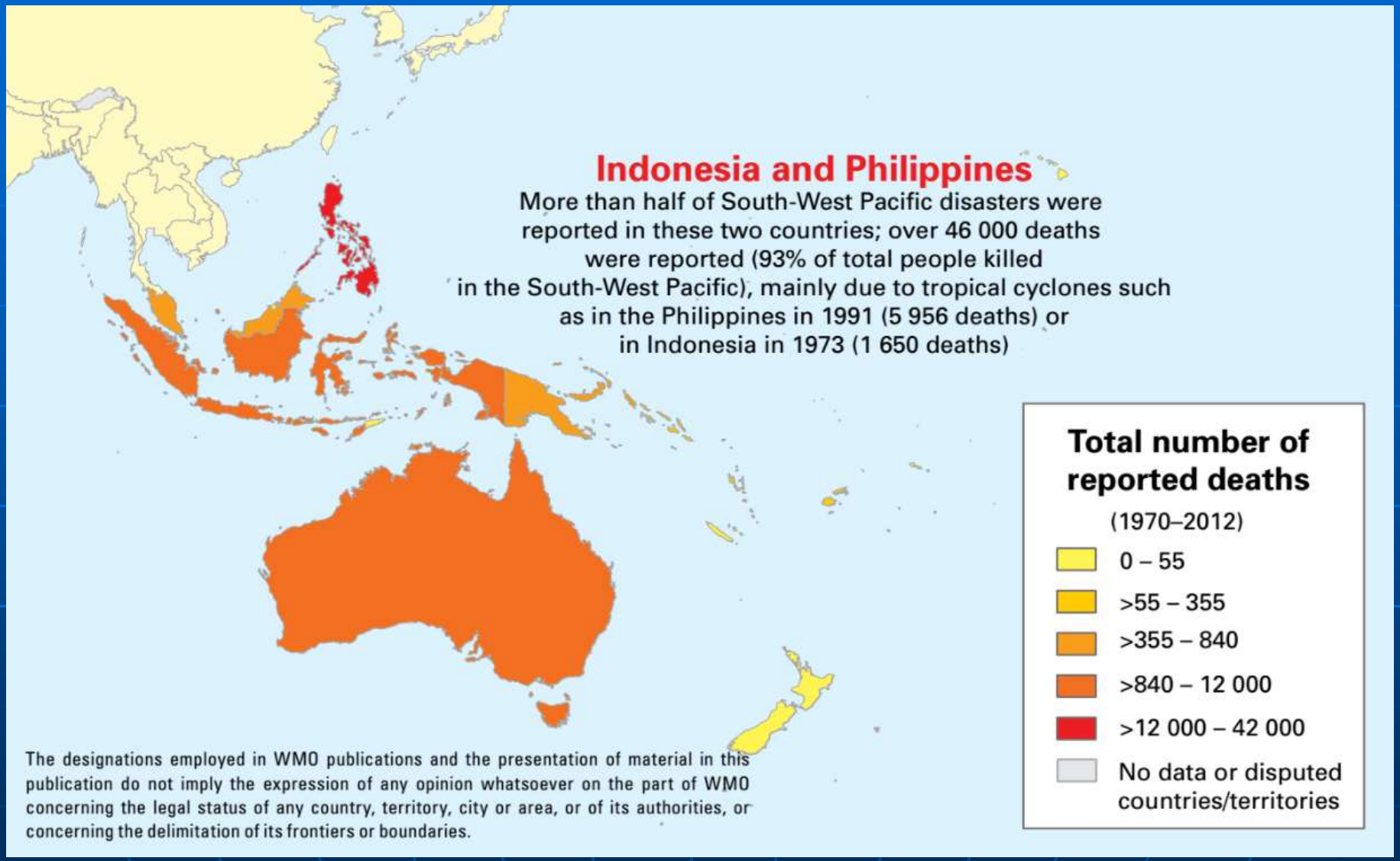
- Drought / famine
- Sea-level rise and other long-term climate changes

Map highlighting major reported disasters linked to weather, climate and water extremes



Source: Atlas of mortality and economic losses from weather, climate and water extremes (1970-2012), World Meteorological Organization

Map of reported disasters and their related deaths (1970-2012)



Source: Atlas of mortality and economic losses from weather, climate and water extremes (1970-2012), World Meteorological Organization

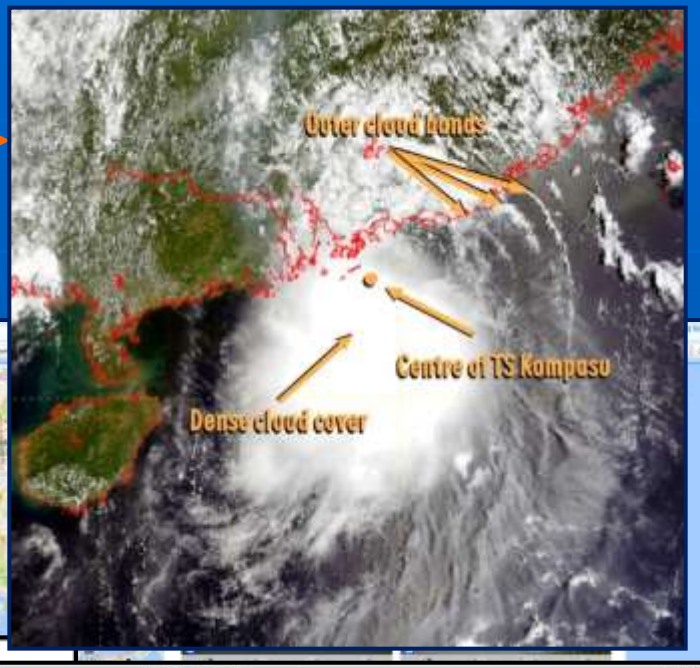
Severe Weather Warnings

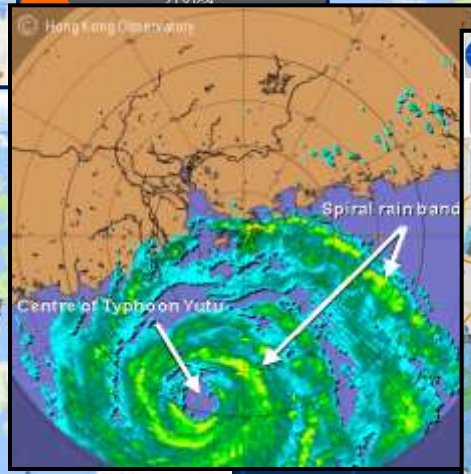
- Issue by the national meteorological centre;
- Help reduce the vulnerability;
- Trigger actions by relevant authorities and the public to minimize losses;
- Promote awareness; and
- Require early alerts to be effective

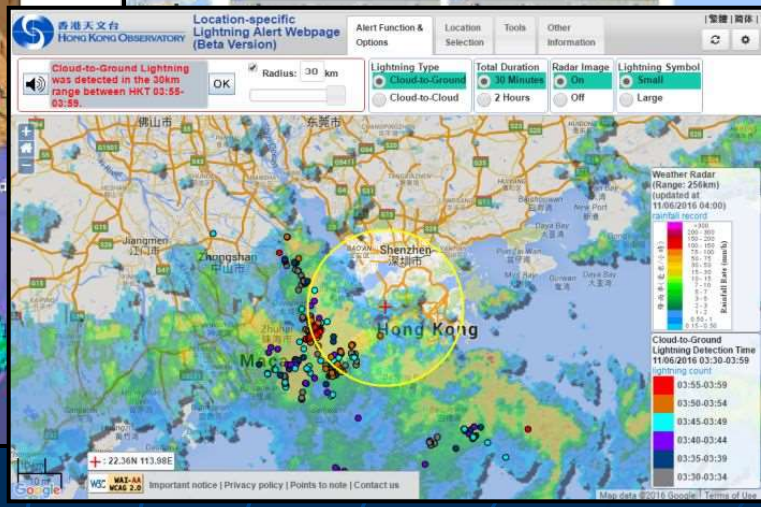
Information ! Information ! Information !

- Identify, assess and monitor disaster risks and enhance early warning;
- One authoritative voice of information;
- Credibility of local knowledge; and
- Frequent updates

Geospatial Weather Information

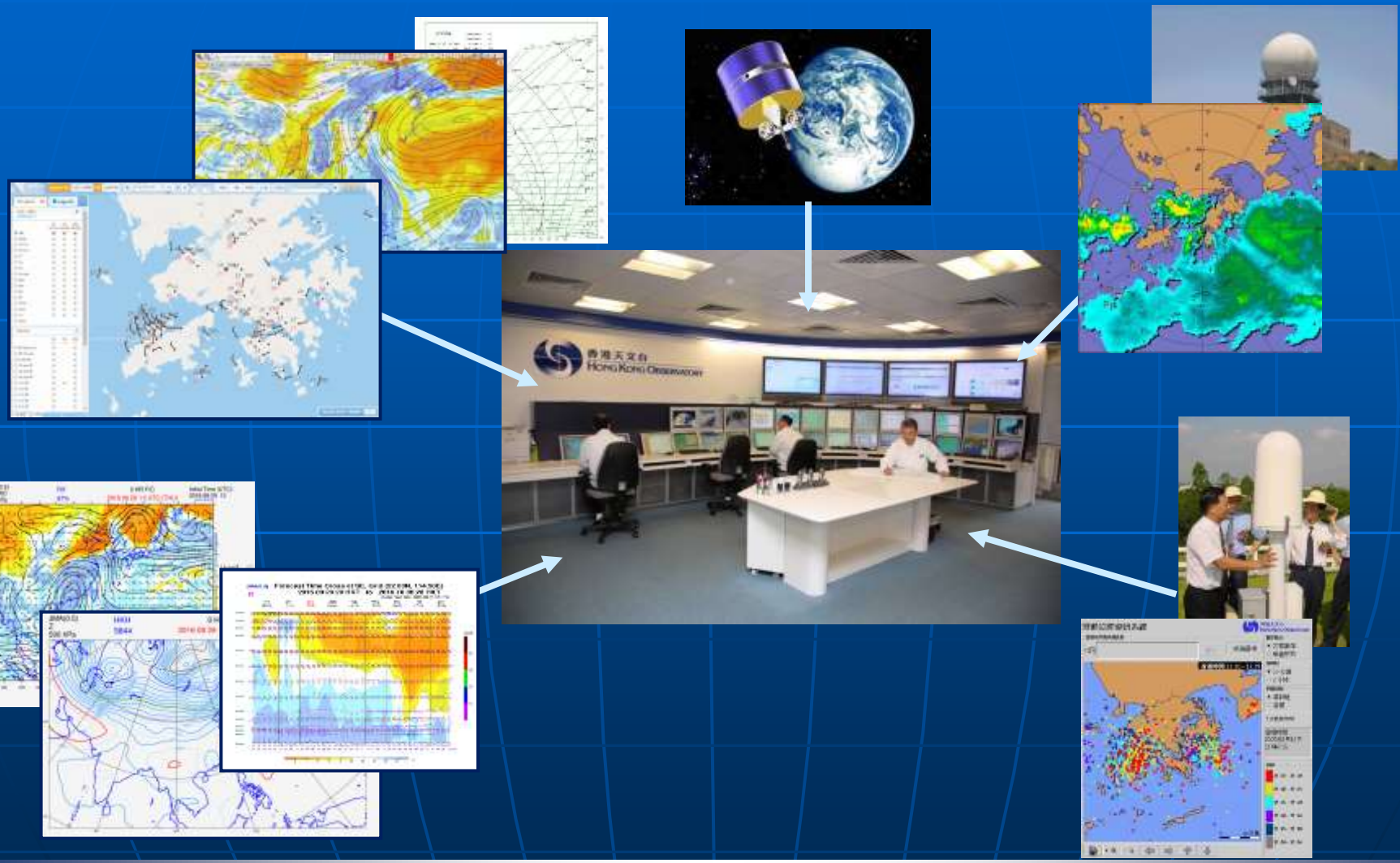




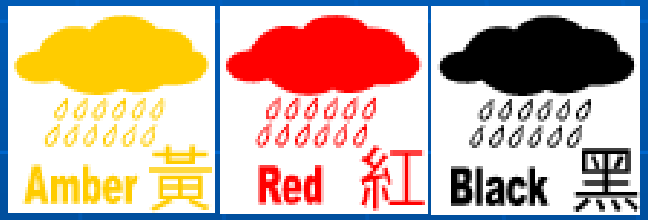


香港天文台
HONG KONG OBSERVATORY

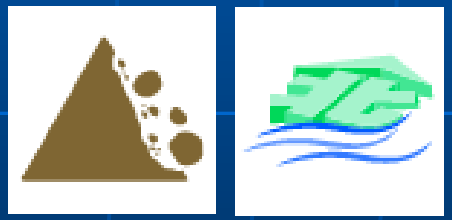
Integrating and analysing Information



Hong Kong Observatory (HKO)
The official meteorological (MET) service in Hong Kong



Rainstorm Warning

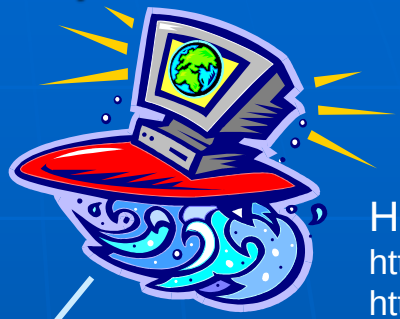


Landslide and Flooding

香港天文台
HONG KONG OBSERVATORY

Hong Kong Observatory (HKO)
The official meteorological (MET) service in Hong Kong

eXtensible Markup Language (XML)
(at cost)

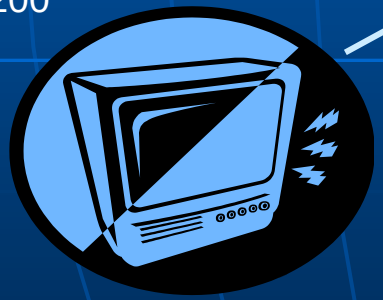


HKO Website
http://www.weather.gov.hk
http://www.hko.gov.hk

Dial-a-Weather
Tel: 187 8200

Public

Mobile APP
MyObservatory (App Store & Google Play)



Mass media (newspaper, radio and television)

Mobile website
http://www.hko.gov.hk/m/home.htm

PC (Weather Widget) and Mobiles (SMS)

香港天文台
HONG KONG OBSERVATORY

Efficient Dissemination of Information for Quality Decision

Information

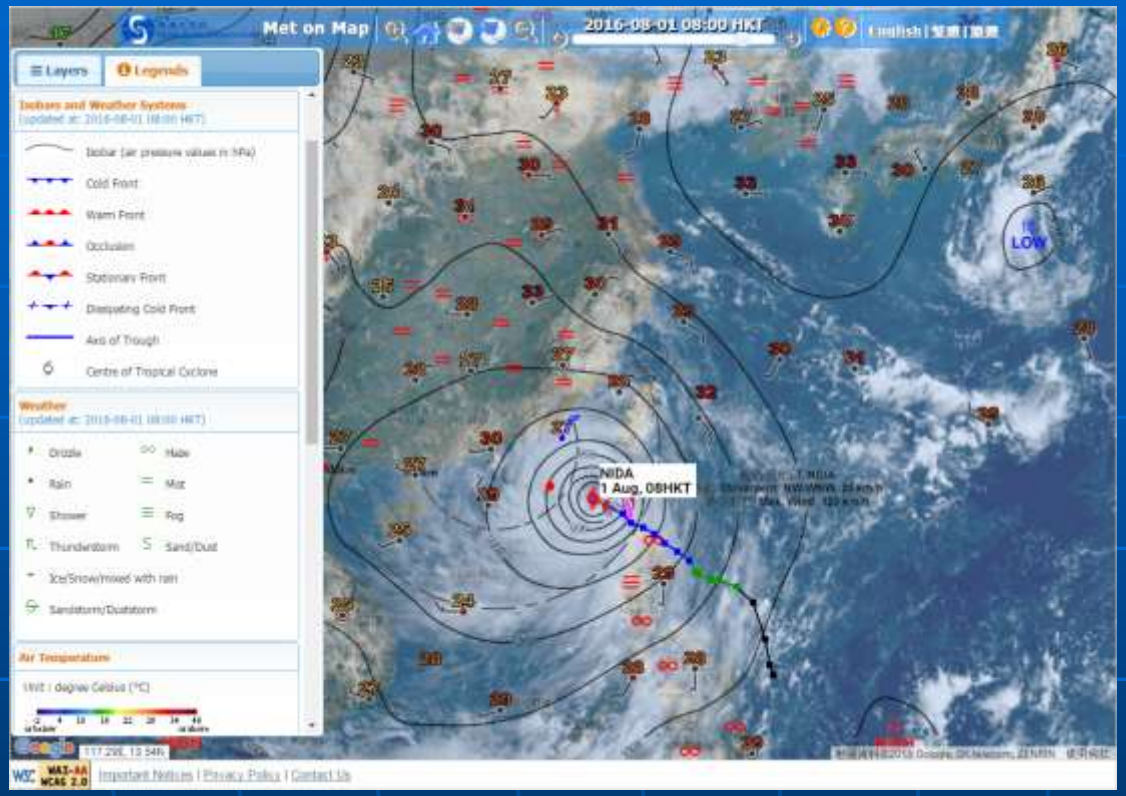
Multiple Dissemination Channel

Quality Decision

GIS - never be the same again !!

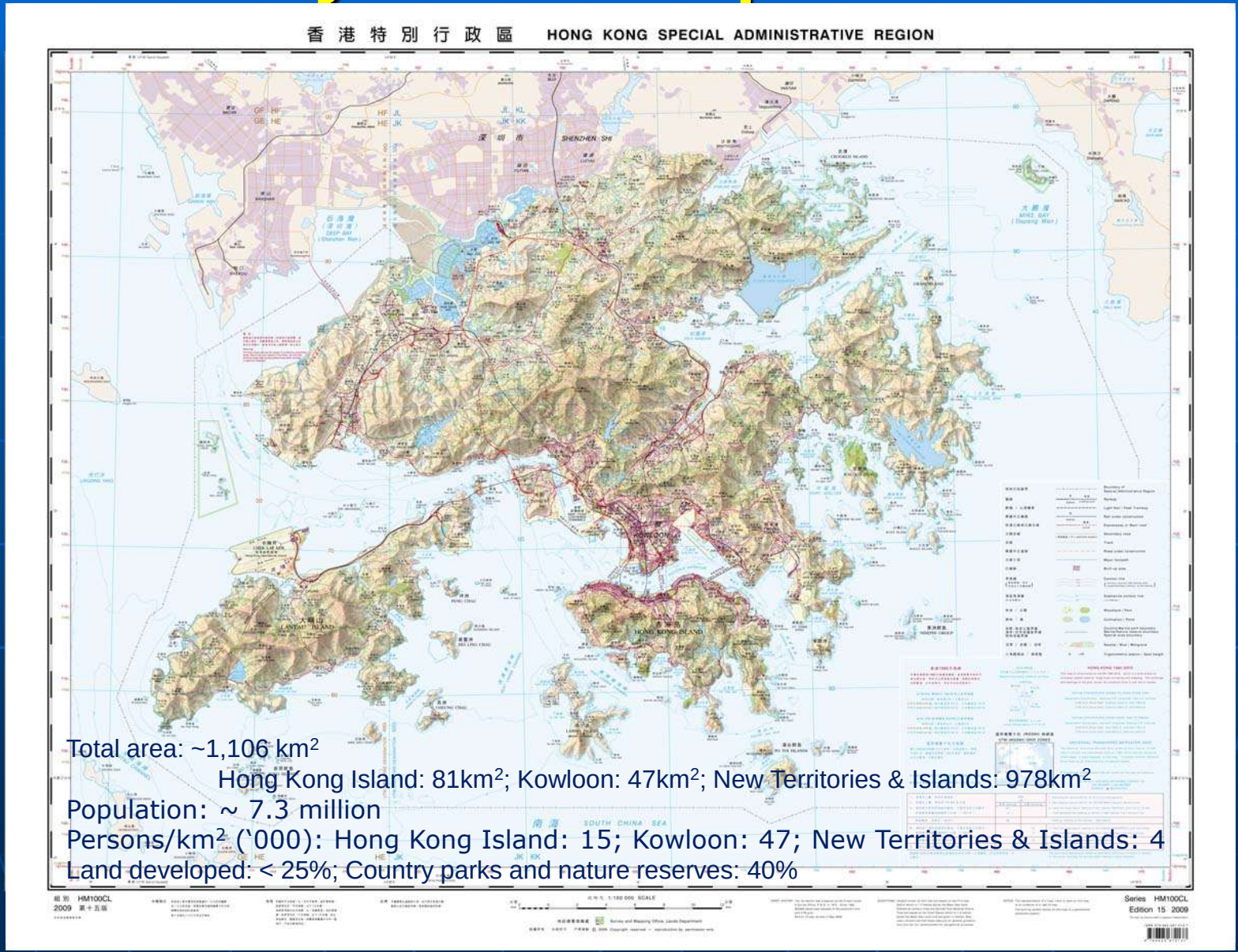
- Visualize datasets on beautiful cartography available in any standard browser;
- Easy to learn and use; and
- Strongly user-centred geospatial applications easily available to the public

Met on Map



- Seamless integration of essential global weather and geophysical information
- A one-stop platform for viewing various types of information in one go to enhance situational awareness, particularly in case of multi-hazardous situation

Why location-specific?



Total area: ~1,106 km^2

Hong Kong Island: 81km^2; Kowloon: 47km^2; New Territories & Islands: 978km^2

Population: ~ 7.3 million

Persons/km^2 ('000): Hong Kong Island: 15; Kowloon: 47; New Territories & Islands: 4

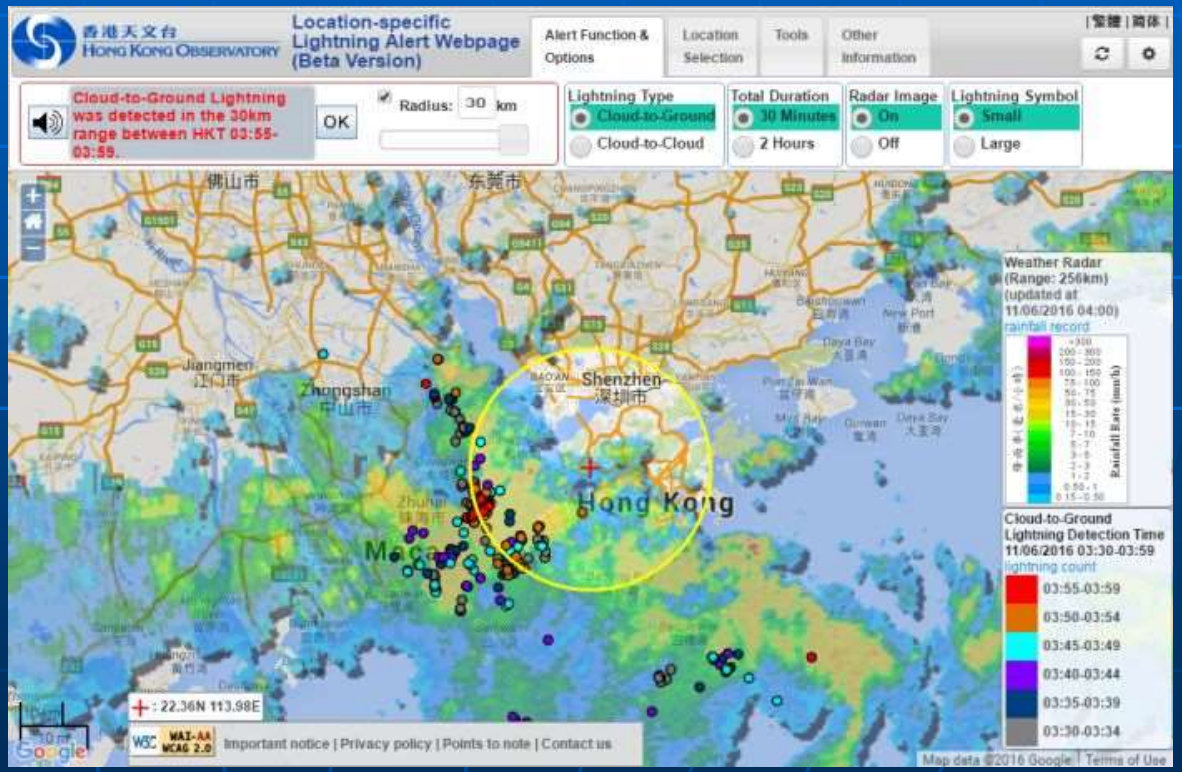
Land developed: < 25%; Country parks and nature reserves: 40%

香港天文台
HONG KONG OBSERVATORY

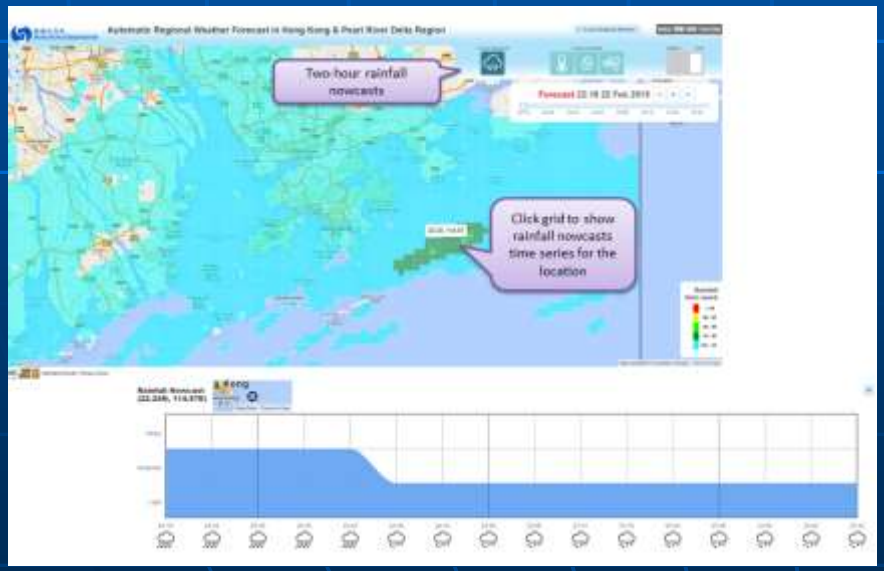
Location-specific Lightning Alert Webpage

- Provide users with up-to-date spatial and temporal characteristics of lightning strokes in storms
- Allow GPS-enabled devices to locate user's position on the map
- Allow user to select an alert radius around the defined position. Audio and visual alerts will be triggered when there is lightning detected within the specified alert region

Provide early alerts of lightning associated with hazardous weather to people for their prompt protective actions and risk mitigation.



Automatic Regional Weather Forecast



- Location-specific 9-day forecasts of air-temperature, relative humidity, wind, state of sky and probability of rainfall on a GIS platform
- Rainfall nowcast for the next 2 hours generated from the Observatory's nowcasting system called the SWIRLS ("Short-range Warning of Intense Rainstorms in Localized Systems")
- Both rainfall nowcast and lightning products are displayed on GIS-enabled websites to provide early alert to the public on the occurrence of rain and severe weather.

香港天文台
HONG KONG OBSERVATORY