Smart use of Geographic Information System (GIS) platform for delivering weather information and nowcasting services C/K. Pan Hong Kong Observatory Hong Kong, China



It is a world of beauty

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



影像日期:12/14/2015 22°15′00.02" 北 114°10′00.01" 東 視角海拔高度 11000.81 公里 🔾

Google earth



It is also ...

2016/10/14 00:00 UTC



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

Europe

Floods and storms were the costliest disasters

Europe

The 2003 summer heatwave was reported in 15 countries and caused 72 210 deaths

Western Africa

Floods and storms caused

the majority of human losses,

notably in Nigeria

Morocco

Drought in 2000 cost US\$ 1.2 billion

Northern Africa Number of deaths mainly

related to droughts **East Africa**

Droughts in 1975 (Ethiopia, Somalia) and in 1983 and 1984 (Mozambique, Ethiopia, Sudan) caused more than 600 000 deaths

Eastern Europe

Economic losses were largely

caused by floods, while

heat and cold waves had

biggest impacts on

human lives lost

Russian Federation

100 - 200 Tool

Islamic Republic of Iran

Economic losses mainly

related to floods, notably

those of 1992 (US\$ 4.9 billion)

The 2010 heatwave led to over 55 700 deaths

Central Asia

Floods and wet mass movement had biggest effects on human lives lost

China Floods (notably in 1998, US\$ 42.3 billion), a cold wave in 2008 (US\$ 22.5 billion) and a drought in 1994 (US\$ 21.3 billion) were the costliest disasters

Thailand

Floods in 2011

cost US\$ 40.8 billion

Democratic People's Republic of Korea

Floods in 2007 caused over 600 deaths, and nearly US\$ 22.6 billion were attributed to flooding in 1995

Japan

A tropical cyclone in 1991 (US\$ 16.9 billion) was the costliest event on record

Philippines and Indonesia

Storms led to important human losses, especially a tropical cyclone in the Philippine in 1991 (5 956 deaths)

of nearly 450 000 deaths

Bangladesh

Cyclones in 1970 and

1991 caused a total

Myanmar Cyclone Nargis (2008): 138 366 deaths

Madagascar

A tropical cyclone in 1977 cost US\$ 1.3 billion and killed 10 people

South Africa Drought in 1991 cost

US\$ 1.7 billion

Australia

A drought in 1981 (US\$ 15.2 billion) was the costliest event, followed by the 2011 floods (US\$ 7.5 billion)

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

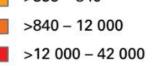


Map of reported disasters and their related deaths (1970-2012)

Indonesia and Philippines

More than half of South-West Pacific disasters were reported in these two countries; over 46 000 deaths were reported (93% of total people killed in the South-West Pacific), mainly due to tropical cyclones such as in the Philippines in 1991 (5 956 deaths) or in Indonesia in 1973 (1 650 deaths)

Total number of reported deaths (1970–2012) 0 – 55 >55 – 355 >355 – 840



No data or disputed countries/territories

The designations employed in WMO publications and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of WMO concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

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

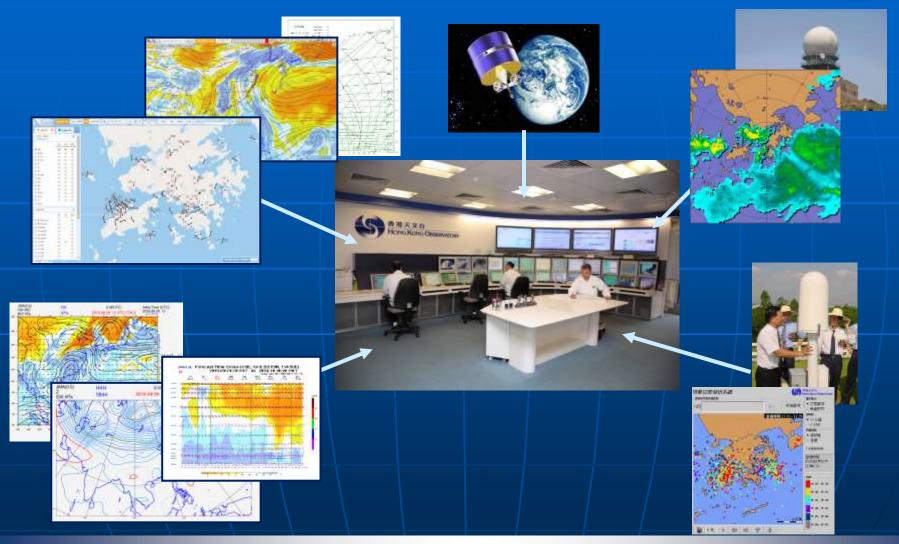


Geospatial Weather Information





Integrating and analysing Information





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







Rainstorm Warning



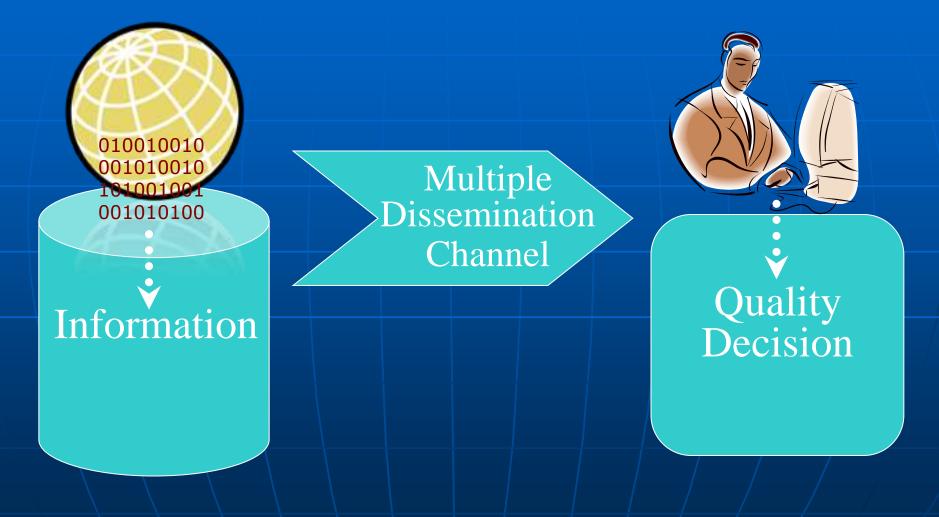
Landslide and Flooding







Efficient Dissemination of Information for Quality Decision



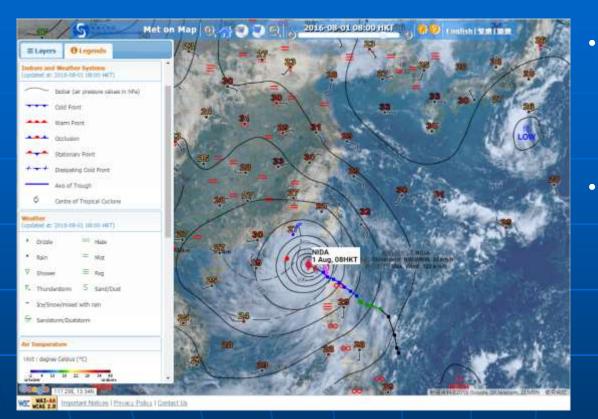


GIS - never be the same again !!

- 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

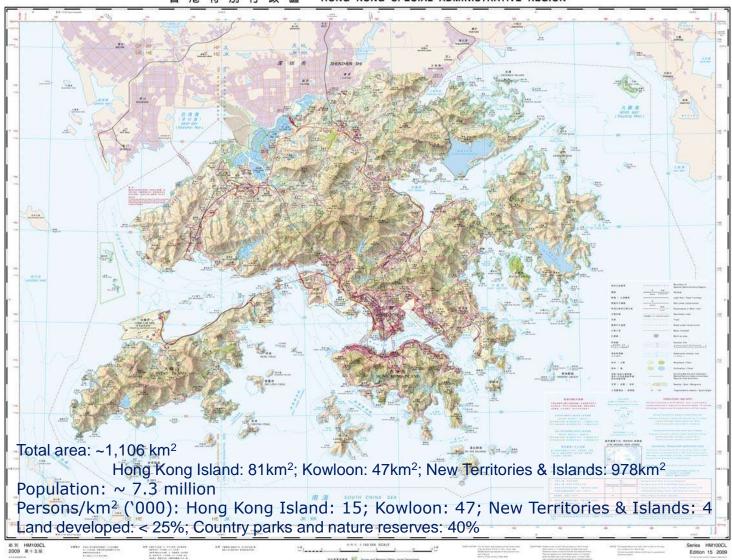


Seamless integration of essential global weather and geophysical information

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?



香 港 特 別 行 政 匾 HONG KONG SPECIAL ADMINISTRATIVE REGION



Location-specific Lightning Alert Webpage

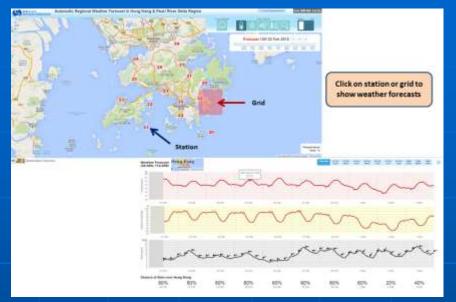
- Provide users with up-to-date spatial and temporal characteristics of lightning strokes in storms
- Allow GPS-enabled devices to locate user's position on the map
- Allow user to select an alert radius around the defined position. Audio and visual alerts will be triggered when there is lightning detected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

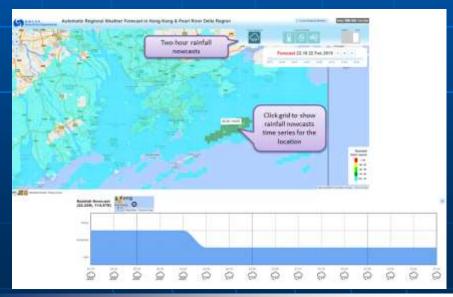
Provide early alerts of lightning associated with hazardous weather to people for their prompt protective actions and risk mitigation.





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 GISenabled websites to provide early alert to the public on the occurrence of rain and severe weather.





