

# Storm Surge

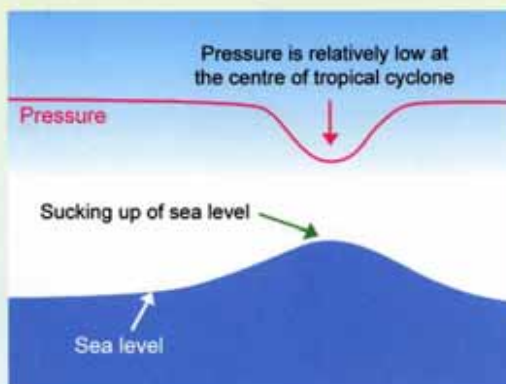


## Sea Level Rise due to Tropical Cyclones

Storm surge is a rise of sea level due to the combined effects of low pressure and high winds associated with a tropical cyclone.

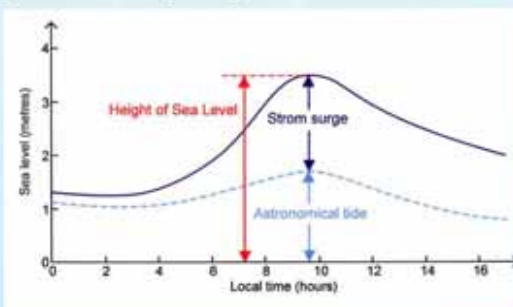


Effect of high winds



Effect of low pressure

When storm surge occurs during astronomical high tide, the resultant sea level can be very high giving rise to flooding to low-lying areas. In general, if the resultant sea level at Victoria Harbour is 3 metres or higher, flooding may occur in the low-lying areas in Hong Kong.

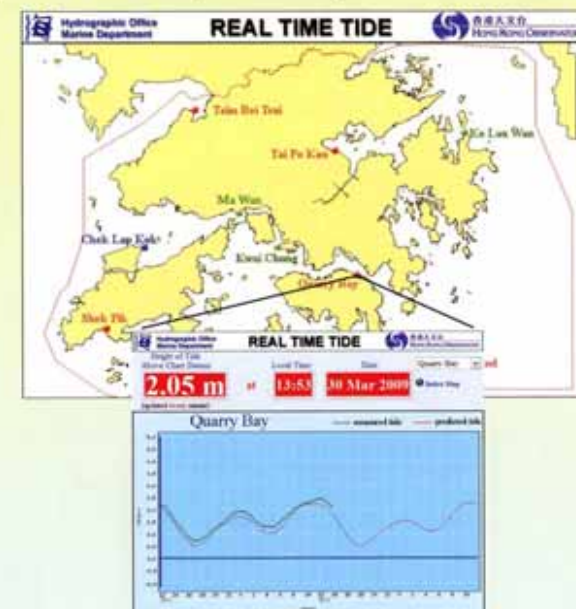


$$\text{Height of Sea Level} = \text{Astronomical Tide} + \text{Storm Surge}$$

## Storm Surge Monitoring and Prediction

### Monitoring

The Observatory monitors the real-time water level in Hong Kong by a network of tide gauges, in collaboration with the Marine Department and the Airport Authority.



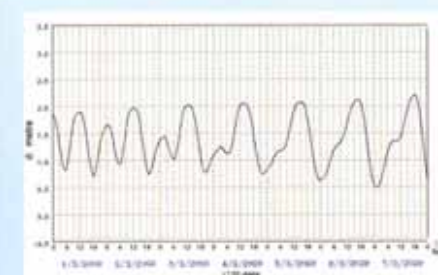
Real-time tide data on the Observatory website  
(<http://www.weather.gov.hk/tide/marine/chko.htm> or  
<http://www.hko.gov.hk/tide/marine/chko.htm>)

### Astronomical Tide Prediction

The Observatory predicts the astronomical tide in Hong Kong. In the autumn of every year, the Observatory publishes the "Tide Tables for Hong Kong" for the next year. The tidal predictions are also made available on the web for public's reference ([http://www.weather.gov.hk/tide/estation\\_select.htm](http://www.weather.gov.hk/tide/estation_select.htm) or [http://www.hko.gov.hk/tide/estation\\_select.htm](http://www.hko.gov.hk/tide/estation_select.htm)).



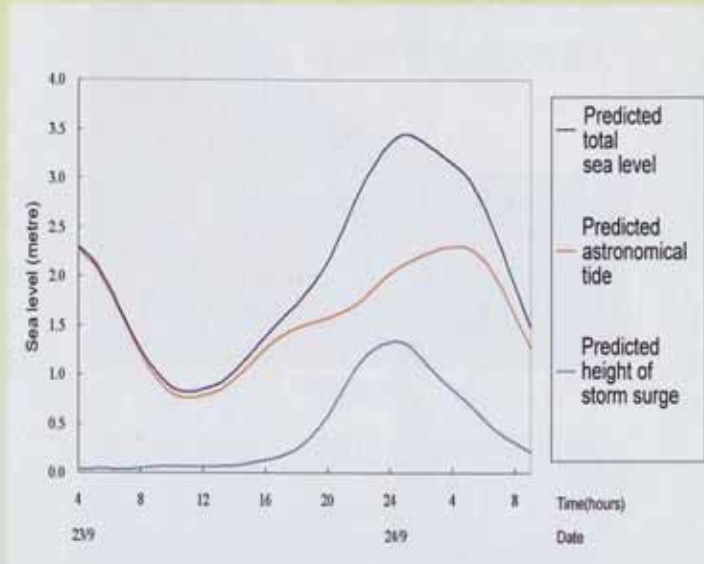
Tide Tables for Hong Kong



Predicted astronomical tide chart for Quarry Bay

## Storm Surge Prediction

When a tropical cyclone approaches Hong Kong, the Observatory will predict the height of storm surge by numerical modelling based on the forecast track and intensity of the tropical cyclone. If the resultant sea level (storm surge + astronomical tides) exceeds the threshold value, the Observatory will include storm surge flood information in the Tropical Cyclone Bulletins, to alert members of the public that flooding may occur in the low-lying areas.



*Predicted storm surge during the passage of Typhoon Hagupit in 2008*

In 2008, under the combined effects of the storm surge associated with Typhoon Hagupit and high tide, a maximum sea level of 3.53 metres was recorded at Quarry Bay, the highest since Typhoon Wanda in September 1962.

## The Threat of Storm Surge

Historically, storm surge caused serious casualties and damages in Hong Kong by destroying embankment and flooding coastal villages, notably in 1906, 1937 and 1962.



*Streets and houses in Sha Tin were flooded during the passage of Typhoon Wanda in 1962.*

*(Courtesy of HK Information Services Department)*



*The beach at Cheung Chau was eroded by the storm surge associated with Typhoon Hagupit in 2008.*

The five highest sea levels due to storm surge at Victoria Harbour during 1947-2008:

| Rank | Tropical Cyclone Name | Maximum Sea level | Maximum Storm Surge | Year | Month |
|------|-----------------------|-------------------|---------------------|------|-------|
| 1    | Typhoon Wanda         | 3.96 m            | 1.77 m              | 1962 | 9     |
| 2    | Typhoon Hagupit       | 3.53 m            | 1.43 m              | 2008 | 9     |
| 3    | Typhoon Utor          | 3.38 m            | 1.12 m              | 2001 | 7     |
| 4    | Typhoon Bess          | 3.32 m            | 1.23 m              | 1974 | 10    |
| 5    | Typhoon Gordon        | 3.27 m            | 1.20 m              | 1989 | 7     |

## What should I do in case of storm surge?

Obtain the latest information from the Observatory on storm surge flooding in the hourly Tropical Cyclone Warning Bulletin in the following ways:

- Dial-a-weather:  
[1878200](tel:1878200)
- HKO website:  
<http://www.weather.gov.hk>  
<http://www.hko.gov.hk>
- Radio and TV broadcast
- Personal digital assistant:  
<http://pda.weather.gov.hk>  
<http://pda.hko.gov.hk>

## Precautions against storm surge.

- Stay away from the coast and reach for high ground during the approach of tropical cyclones.
- If you live or work in coastal areas, listen to radio or TV broadcast for warning of high sea levels. Contact your nearest police station in emergencies.

## Cover Photograph

The railway between Sha Tin and Tai Po was damaged during a typhoon in 1937.

*(Courtesy of HK Public Records Office)*