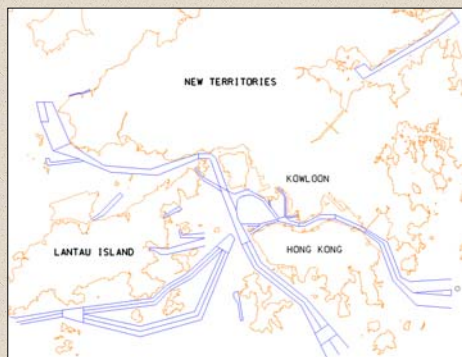


## Test on Retrieving Tide with Network-RTK System in Hong Kong

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## Principal Fairways of Hong Kong



## Objective

- To assess the feasibility of using RTK technique to retrieve tide with the network-RTK system in Hong Kong for hydrographic survey and fairway dredging applications

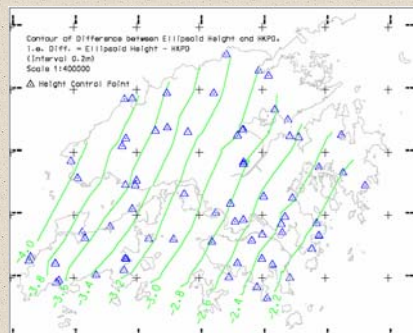
## What's for?

1. Mobile Tide Gauge
2. How well does the Network-RTK System work for this purpose?

## Methodology

1. Creation of Ellipsoid-Chart Datum Correction Surface Model
2. Field Data Collection and Data Processing & Analysis

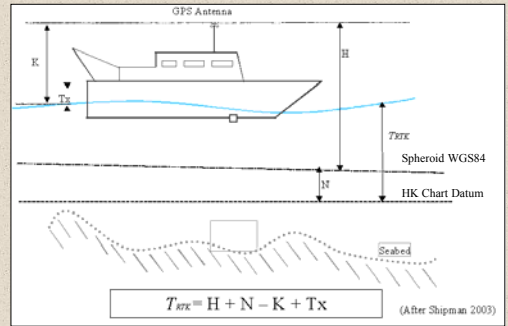
## Ellipsoid - HKCD Correction Surface Model



### Field Test Procedure

- Measuring Ellipsoidal Height of Sea Surface with Shipboard GPS Receiver
- Applying RTK Corrections (Real-time by GSM or Post Processing by OTF) to the Ellipsoidal Height Measured in order to Retrieve Tidal Data
- Comparing the RTK-Retrieved Tide with that Measured at Tide Gauge

### RTK Tide Retrieval Method ( $T_{RTK}$ )



### Survey Launch – Port Woks 5



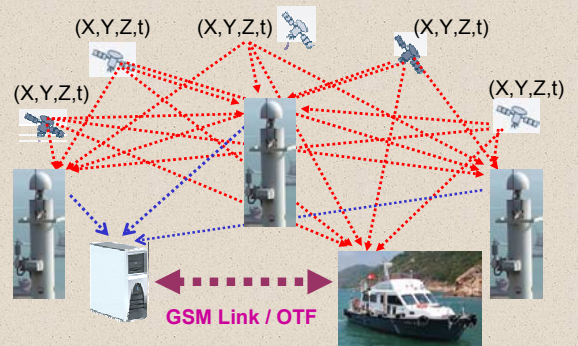
### Survey Launch – Port Woks 5



### Survey Launch – Port Woks 5



### Corrections by Network-RTK



## 12 CORS of the Network RTK in Hong Kong



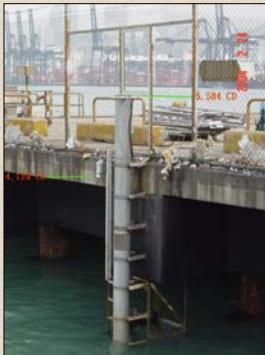
<http://www.geodetic.gov.hk/smo/gsi/data/pp/satref2.ppt>

## CORS at Siu Lang Shui (HKSL)

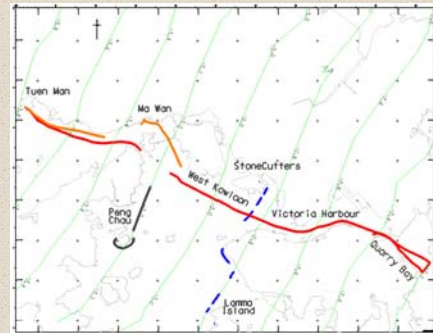


<http://www.geodetic.gov.hk/smo/gsi/data/pp/satref2.ppt>

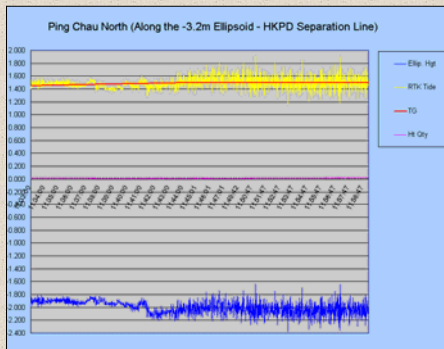
## Automatic Tide Gauge at Container Terminal 8



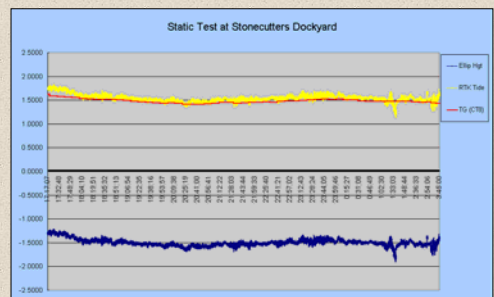
## Field Data Collection Vessel's Tracks



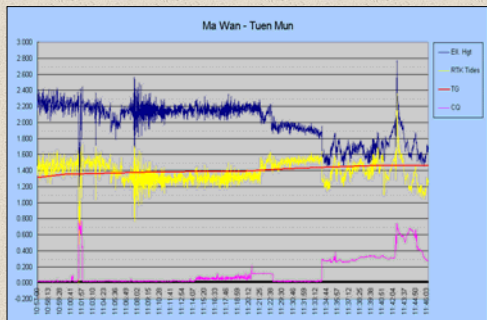
## Test Results at Ping Chau



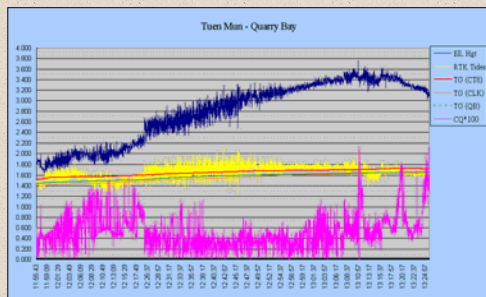
## Test Results at Stonecutters Dockyard



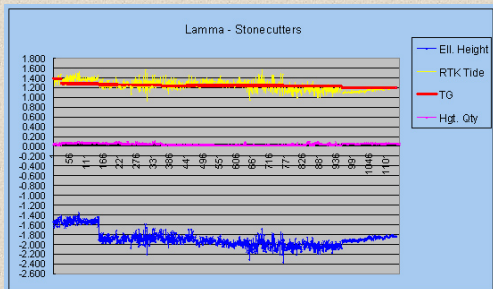
### Test Results at Ma Wan – Tuen Mun



### Test Results of Tuen Mun – Quarry Bay

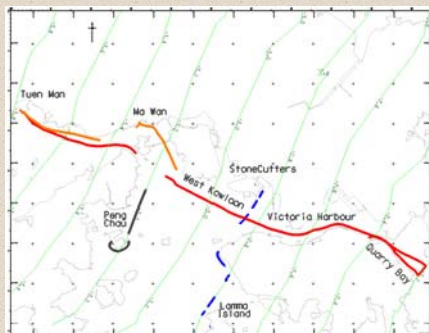


### Test Results of Lamma – Stonecutters Dockyard



Location	Duration	Speed (Kt)	Mean Diff (m)	Stdev (m)
Ping Chau Pier	0:04:38	0	0.02	0.04
Ping Chau North	0:10:25	10	0.01	0.11
Stonecutters	17:00:00	0	0.05	0.04
Ma Wan	0:08:11	14	0.12	0.08
Ma Wan	0:14:03	0	-0.08	0.08
Ma Wan	0:04:00	14	0.09	0.04
Ma Wan	0:05:47	14	-0.06	0.09
Ma Wan	0:11:00	14	0.02	0.11
Tuen Mun	0:03:16	0	-0.17	0.15
Tuen Mun	0:20:49	14	0.09	0.10
West Kowloon	0:19:02	14	0.05	0.12
Victoria Harbour	0:40:35	14	0.09	0.09
Lamma (by GSM)	0:02:30	0	-0.01	0.05
	0:01:59	0	0.09	0.05
	0:01:00	10	0.00	0.06
	0:02:30	10	0.02	0.09
	0:01:40	10	0.03	0.07
	0:02:54	14	0.05	0.05
Stonecutters (by GSM)	0:02:00	14	0.00	0.11
	0:01:55	10	-0.07	0.07
	0:01:29	10	-0.08	0.06
	0:01:57	0	-0.05	0.04

### Field Data Collection Vessel's Tracks



### Discussions

- GSM vs. OTF
- Static vs. Dynamic
- Observation Period
- Distance from the Reference Station

### **Conclusions**

- In general, the network-RTK system in Hong Kong could be used to retrieve tide to cm-level
- GSM Real-time correction was practical for stationary vessel but undesirable for mobile vessel due to the limitation of the GSM data link
- OTF was practical for both stationary and mobile vessels

***Thank You***