Coastal Application of Retracking: Determine Height of Islands in Chinese Height System (Introduction of Project)

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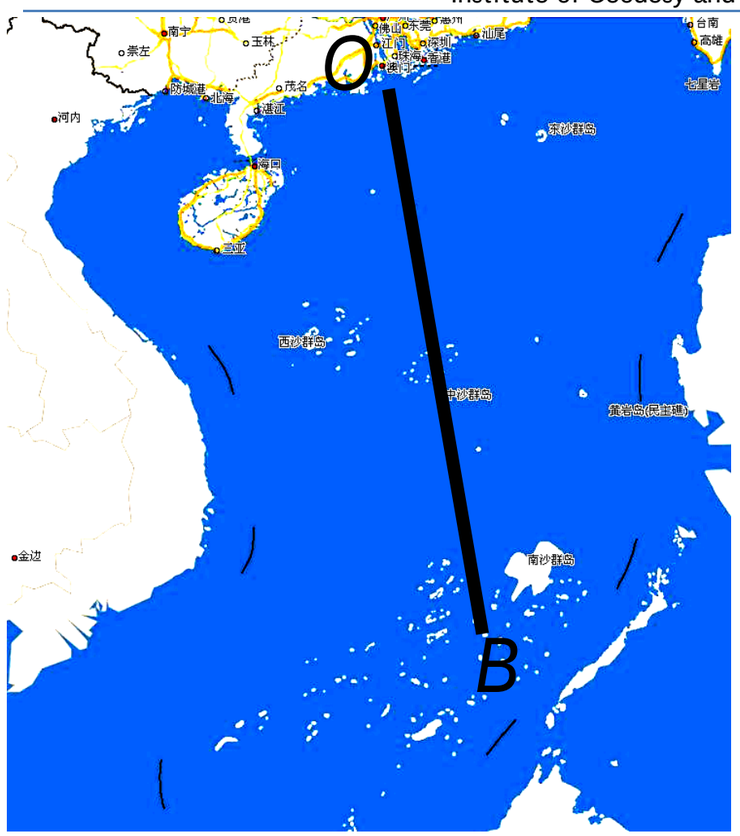

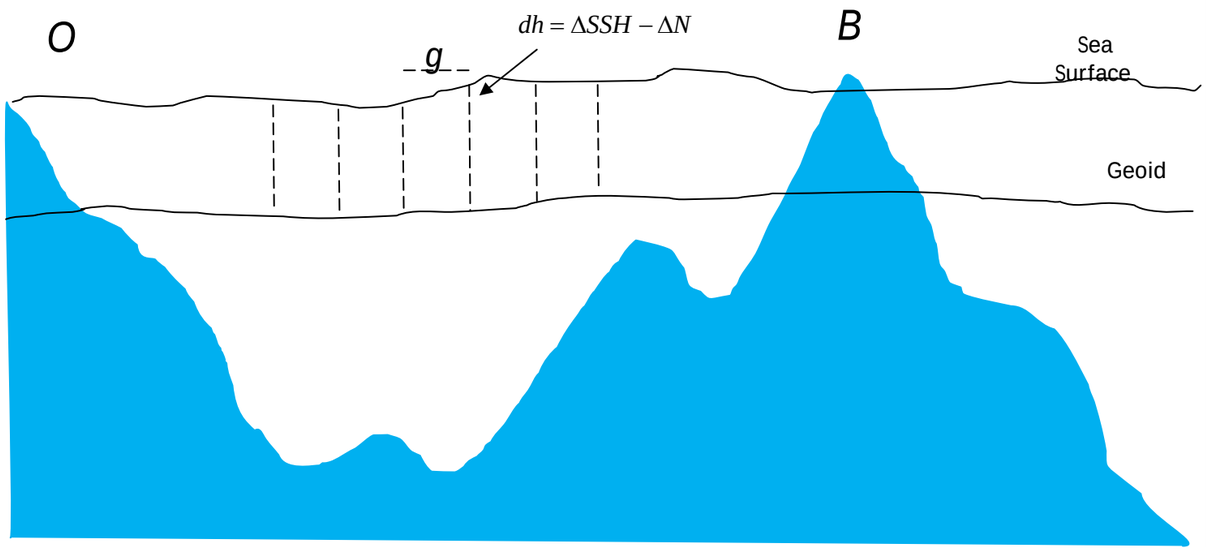

Abstract of Project (Supported by National Natural Science Foundation of China, Grant: 40874013)

Height datum is an important part of national geodetic. Establishment of a unified national land and sea elevation benchmarks, and implementation of tranfering height datum between Chinese mainland and offshore islands is one of the main issues needed to be resolved in surveying and marine sciences.With the development in physical oceanography, as well as various improvement in geodetic observing technology, accurate determination of Chinese offshore island of relative elevation has gradually become possible. This research projects targeting at Chinese islands (reefs) surveying, marine resources survey and other major environmental needs, employing the latest satellite altimetry and satellite gravity and the ship measured gravity observations, breaking away the key technology in determining the elevation of the island (Reef) elevation, will provide optional programme, effcetive methods and models in transfering height datum across sea.By this study, we will achieve long-distance cross-sea elevation of precision delivery, and provide technical support for the establishment of Chinese land and islands (reefs) surveying system.

Theory:

$$\Delta W_{OB} = \int_{OB} g dh = \sum_{OB} g(\Delta SSH - \Delta N)$$

$$H_B = \frac{W_O + \Delta W_{OB}}{g_B}$$

where,

- ΔW_{OB} : difference of gravity potential between Land *O* (height and gravity are known) and Island *B* (heigt is unknown and gravity is known)
- g : gravity observation along OB
- dh : difference of height between two observations along OB
- ΔSSH : differnce of Sea Surface Height between two observations along OB, which is known
- ΔN : differnce of Geoid between two observations along OB, can be estimated from altimetry gravity field
- W_O : gravity potential of *O* in Chinese Height System, which is known
- g_B : average gravity value of *B* from surface to Geoid, generally, which can be accurately estimated by altimetry gravity or by gravity observation. Because the distance from surface and geoid at B is only several meter for Chinese islands.

Problem:

ΔN can be well estimated in deep oceans, how about in the co regions?