

浅海および沿岸域における衛星高度計重力異常の精度推定について

A Study of accuracy estimation of satellite altimeter derived gravity anomaly around the coastal and shallow areas

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浅海や沿岸域における衛星高度計重力異常の精度をみつめるために、Topex/Poseidon海面高データを用いて海洋変動の重力値への影響を調べた。インドネシア周辺海域の38cycles分のデータについてSSHの変動を求めたところ、rmsは、海域によって3～99 cmの範囲で変化することが判明した。特に、沿岸域で非常に高いrmsを示すが、これは、海洋潮汐モデルの不正確さに起因しているものと推定される。そこで、潮汐モデルとして従来のモデルにかえ、ORI96とAUS98を用いたところrms errorは2～67 cmまでに減少した。さらに、数値実験で求めたSSHのrmsと重力異常のrmsの関係から、インドネシア海域での重力図のSSHの変動による誤差を1-35 mgal と見積った。

The 10 Hz sampling data of Topex/Poseidon has been tested to investigate the capability of the data around the coastal area and shallow waters. The test has been carried out in several places which have different conditions. Processing of 38 cycles of the Topex/Poseidon data for the case study of Indonesian waters, the rms values of 3 to 99 cm were achieved. Where the rms values increase around the coastal area and very high values occurred in the northwest coast of Australia and some part of east Indonesian. Such condition could be due to the lack of the utilized tide model, in this case CSR 3.0. In order to assess the possibility of the lack of the tide model, ORI 96 and AUS 98 were applied. The rms values decreased substantially become 2 to 67 cm. However high rms value still occurred in the northwest coast of Australia. Further the results are used as a basic of deriving gravity map and estimating the accuracy of the derived gravity map.

On the application of the results, we derived the gravity anomaly map of the Indonesian waters using Geosat-GM JGM-3 data. The derived gravity map reveals almost all major tectonic and topographical features. The accuracy of the derived gravity was estimated basing on the distribution of the Topex/Poseidon rms values. For this purpose, we first estimated coefficients of the fitting function of the rms SSH and standard deviation of the gravity anomaly. The coefficients obtained from the simulation process, where a certain level of random noise was added to the SSH and then the gravity map was re-computed. These process was done in several places which have different conditions and several times for each noise level. Refer to the original gravity map, the standard deviation of those gravity map were computed and finally fitted using the polynomial function.

The accuracy of the derived gravity map was estimated to be about 1 - 35 mgal. This value shows the influence of the SSH time variation to the accuracy of the gravity. We also compared the derived gravity map with the V9.1 global gravity and shipboard gravity data.