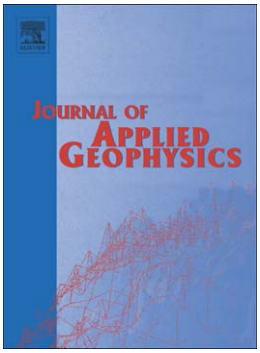

Inversion of marine gravity anomalies over southeastern China seas from multi-satellite altimeter vertical deflections

Shengjun Zhang, David T. Sandwell, Taoyong Jin, Dawei Li

PII: S0926-9851(16)30648-6
DOI: doi:10.1016/j.jappgeo.2016.12.014
Reference: APPGEO 3165

To appear in: *Journal of Applied Geophysics*

Received date: 4 August 2016
Revised date: 4 December 2016
Accepted date: 12 December 2016

Please cite this article as: Zhang, Shengjun, Sandwell, David T., Jin, Taoyong, Li, Dawei, Inversion of marine gravity anomalies over southeastern China seas from multi-satellite altimeter vertical deflections, *Journal of Applied Geophysics* (2016), doi:10.1016/j.jappgeo.2016.12.014

Inversion of Marine Gravity Anomalies over Southeastern China Seas from Multi-satellite Altimeter Vertical Deflections

Shengjun Zhang[1] David T.Sandwell[2] Taoyong Jin[1,3*] Dawei Li[1,3]

1 School of Geodesy and Geomatic, Wuhan University, Wuhan, China

2 Scripps Institution of Oceanography, La Jolla, CA, United States

3 Key Laboratory of Geospace Environment and Geodesy, Ministry of Education, Wuhan, China

Abstract: The accuracy and resolution of marine gravity field derived from satellite altimetry mainly depends on the range precision and dense spatial distribution. This paper aims at modeling a regional marine gravity field with improved accuracy and higher resolution (1′×1′) over Southeastern China Seas using additional data from CryoSat-2 as well as new data from AltiKa. Three approaches are used to enhance the precision level of satellite-derived gravity anomalies. Firstly we evaluate a suite of published retracking algorithms and find the two-step retracker is optimal for open ocean waveforms. Secondly, we evaluate the filtering and resampling procedure used to reduce the full 20 or 40 Hz data to a lower rate having lower noise. We adopt a uniform low-pass filter for all altimeter missions and resample at 5 Hz and then perform a second editing based on sea surface slope estimates from previous models. Thirdly, we selected WHU12 model to update the corrections provided in geophysical data record. We finally calculated the 1'×1' marine gravity field model by using EGM2008 model as reference field during the remove/restore procedure. The root mean squares of the discrepancies between the new result and DTU10, DTU13, V23.1, EGM2008 are within the range of 1.8~3.9mGal, while the verification with respect to shipboard gravity data shows that the accuracy of the new result reached a comparable level with DTU13 and was slightly superior to V23.1, DTU10 and EGM2008 models. Moreover, the new result has a 2mGal better accuracy over open seas than coastal areas with shallow water depth.

Keywords: satellite altimetry; waveform retracking; vertical deflection; gravity anomaly

1. Introduction

Marine gravity anomalies are important data sources to construct Earth's gravity model and investigate global tectonics and continental margin structure, which can be derived from radar