Geophysical Research Abstracts
Vol. 18, EGU2016-3456, 2016
EGU General Assembly 2016

Spatial variations of effective elastic thickness of the Lithosphere in the Southeast Asia regions

Xiaobin Shi (1), Jon Kirby (2), Chuanhai Yu (1), Chris Swain (2), and Junfeng Zhao (1)

(1) Key Laboratory of the Marginal Sea Geology, South China Sea Institute of Oceanology, Chinese Academy of Sciences, China (xbshi@scsio.ac.cn), (2) Department of Spatial Sciences, Curtin University,Australia (j.kirby@exchange.curtin.edu.au)

The effective elastic thickness Te corresponds to the thickness of an idealized elastic beam that would bend similarly to the actual lithosphere under the same applied loads, and could provide important insight into rheology and state of stress. Thus, it is helpful to improve our understanding of the relationship between tectonic styles, distribution of earthquakes and lithospheric rheology in various tectonic settings. The Southeast Asia, located in the southeastern part of the Eurasian Plate, comprises a complex collage of continental fragments, volcanic arcs, and suture zones and marginal oceanic basins, and is surrounded by tectonically active margins which exhibit intense seismicity and volcanism. The Cenozoic southeastward extrusion of the rigid Indochina Block due to the Indo-Asian collision resulted in the drastic surface deformation in the western area. Therefore, a high resolution spatial variation map of Te might be a useful tool for the complex Southeast Asia area to examine the relationships between surface deformation, earthquakes, lithospheric structure and mantle dynamics. In this study, we present a high-resolution map of spatial variations of Te in the Southeast Asia area using the wavelet method, which convolves a range of scaled wavelets with the two data sets of Bouguer gravity anomaly and topography. The topography and bathymetry grid data was extracted from the GEBCO_08 Grid of GEBCO digital atlas. The pattern of Te variations agrees well with the tectonic provinces in the study area. On the whole, low lithosphere strength characterizes the oceanic basins, such as the South China Sea, the Banda sea area, the Celebes Sea, the Sulu Sea and the Andaman Sea. Unlike the oceanic basins, the continental fragments show a complex pattern of Te variations. The Khorat plateau and its adjacent area show strong lithosphere characteristics with a Te range of 20-50 km, suggesting that the Khorat plateau is the strong core of the Indochina Block. The West Burma block also has a strong lithosphere. To the west of the Indochina Block, there is a significant nearly NS-trending weak zone (Te < 20 km) extending from the Red River fault Zone to Malay Peninsula, where lies the suture zones and the Thai-Malay Tin Granite Belt due to convergence and post-collisional magmatism of the Indochina and the Sibumasu blocks. The result shows that the northern Australia is of very high strength with Te > 70 km. The ongoing subduction systems, such as the Sumatra and Java subduction systems show moderate to high Te values. The results also show that the negative gravity anomaly caused by slender thick sediment could affect the Te results derived from Spectral method, and should be corrected during data preparation.