Seismic anisotropy in the southeastern China and its tectonic implications from teleseismic shear wave splitting measurements

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Abstract

The tectonics of southeastern China and its surrounding regions are very complex, which involve two active subduction systems (the Manila and Ryukyu subductions) and one collision system (the Taiwan orogen). In this study, we use SKS/SKKS splitting as a tool for investigating seismic anisotropy and the results of the splitting parameters, fast-polarization azimuth (φ) and delay time (δt), will provide us a new understanding of the geodynamic process in this region. Measurements of δt and φ can be used as indicators for the information of the product of deformed layer thickness and strain directions. Teleseismic events recorded in the temporary seismic network in Fujian (17 stations) are used to obtain the splitting parameters from shear wave. Two methods (Transverse minimization and Splitting intensity method) are applied to obtain the splitting parameters for testing the reliability of the results.

From transverse minimization method (SC), the average delay time is 2.4 s, which is greater than the average result (1.3 s) observed from Taiwan and also indicates stronger seismic anisotropy beneath Fujian coastline, but the fast directions are disorder. From splitting intensity method (SI), each station can observe a pair of splitting parameter (φf, δt) by sinusoidal curve fitting. The average split time delay is 1.04 s, which is lower than the result (2.4 s) observed from transverse minimization method. The fast directions can be discussed in two parts. The northern part shows NE direction, which is parallel to the coastline, and the southern part is NW direction, which is perpendicular to the coastline. As a result, along the Fujian coastline, compared with the global P-wave tomography, it can be explained that the variations of fast direction could relate to the EW mantle flow created by NS collision between the India and Eurasian Plate, influenced by the Taiwan orogen (the collision between Eurasian and Philippine sea plate) and two subduction systems (the Manila and Ryukyu subduction).

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