AOGS 2006

Forearc Sliver of Philippine Sea Plate, Hengchun Accretionary Prism and the Incipient Taiwan Orogency

CHENGSUNG WANG[1], MAO-CHIA CHAO[2], SHU-KUN HSU[3]

[1] *General Education Center, Chin Min Institute of Technology, Toufen, Maoli County 351, Taiwan*

[2] *Institute of Applied Geosciences, National Taiwan Ocean University, Keelung, Taiwan*

[3] *Institute of Geophysics, National Central University, Chung-Li, Taiwan*

Situated at the northwestern corner of the Philippine Sea plate, the Taiwan island is geologically and seismologically very interesting because of its complicated and unique nature. It can be considered as the crest of a tectonic solitary wave propagating southwestward along the Eurasian continental plate margin, caused by the shifting oblique convergence of the north-south trending western boundary of the Philippine Sea plate to the Eurasian continental plate margin. Under such circumstances, the southern offshore area of Taiwan shall rise to become new part of the Taiwan island. Morphology indicates that this phenomenon involves the growing Hengchun accretionary prism which extends even down to the latitude 20oN, where the Luzon arc is far from the continental shelf margin off China and the prevailing arc-continent collision model of the Taiwan orogeny is inapplicable. In order to understand the cause of this phenomenon, we studied the lithospheric structure in the southern Taiwan area based on the profiles of good quality earthquake hypocenters determined with seismic waves recorded by the seismic network on Taiwan. We found that the behavior of the lithospheric forearc sliver of the Philippine Sea plate in northern Manila subduction zone plays an important role in the growing of the Hengchun accretionary prism and in the incipient Taiwan orogeny. The sliver consists of two layers about 20km thick each, with the upper layer having high seismicity, which is the crust, and the lower layer low seismicity, which may correspond to the uppermost mantle. The whole lithosphere of he Philippine Sea plate underthrusts westward beneath the Luzon arc, and then the forearc sliver warps up and separates from the underlying lower part of the lithosphere, which may still underthrust further west and then sinks together with the eastward-subducting South China Sea lithosphere beneath Taiwan. The forearc sliver then overthrusts along the upside of the South China Sea lithosphere, and pushes up the accretion prism on the plate boundary. This situation develops gradually northward from near latitude 20oN to enlarge the Hengchun accretionary prism up to southern Taiwan, and then intensifies to build the backborne of the Taiwan island.