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穿越东沙隆起和潮汕坳陷的OBS广角地震剖面

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A wide-angle OBS profile across Dongsha Uplift and Chaoshan Depression in the mid-northern South China Sea

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摘要

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摘要 为了探明南海中北部陆缘深部地壳结构,使用2D射线追踪正演和反演方法,拟合了一条南海中北部陆缘的OBS广角地震剖面(OBS2006-3)。该剖面穿越东沙隆起和潮汕坳陷,长319 km,NNW-SSE走向,共投放海底地震仪14台。速度结构模型表明:潮汕坳陷存在巨厚的中生代沉积,最大厚度达到8 km,速度从顶部的4.4 km/s向下增加到底部的5.3 km/s。莫霍面埋藏深度由陆向海方向减小,其埋深从东沙隆起下方的24~25 km减小到南部隆起带的17 km。东沙隆起下方的上地壳中存在一向上突起的高速异常,速度达到6.9 km/s,可能与地幔物质上涌和岩浆活动有关。在整个剖面的下地壳底部存在厚3~12 km,速度为7.1~7.4 km/s的高速层。根据各个时期岩浆活动特征,推测下地壳高速层是由海底扩张停止之后的岩浆底侵作用形成的。

关键词: 地壳结构 东沙隆起 潮汕坳陷 高速层 南海中北部陆缘

Abstract: In order to investigate the deep crustal structure across the mid-northern continental margin of the South China Sea (SCS), a wide-angle OBS profile (OBS2006-3) was simulated by using forward and inversion methods. This profile, 319 km in length and NNW-SSE oriented crosses Dongsha Uplift, Chaoshan Depression, and deep oceanic basin. Fourteen Ocean Bottom Seismometers (OBS) was used in this survey. The velocity model reveals that the Mesozoic sediment in Chaoshan Depression is remarkably thick with maximum 8 km; and whose velocity increases downward from 4.4 km/s at top to 5.3 km/s at the bottom. The depth of the Moho interface in the velocity model decreases gradually seaward from 24~25 km beneath Dongsha Uplift to 17 km in the south uplift zone. An obvious high velocity anomaly was detected in the upper crust of the Dongsha Uplift whose velocity arrives at 6.9 km/s, which would be due to the mantle underplating and magma activities. A high velocity layer (HVL) in the lower crust was found with a thickness of 3~12 km and a velocity of 7.1~7.4 km/s along the profile. Based on the properties of magma activities in different geological periods, we suggest that the HVL may originate from underplating of the igneous rocks after the cessation of seafloor spreading.

Keywords: Crustal structure Dongsha Uplift Chaoshan Depression High velocity layer Mid-northern continental margin of the South China Sea

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