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## 南海西南次海盆与南沙地块的OBS探测和地壳结构

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OBS survey and crustal structure of the Southwest Sub-basin and Nansha Block, South China Sea

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摘要

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**摘要** 跨越南海西南次海盆南部陆缘和南沙地块中部的OBS973-1测线是南海南部首次采集的海底地震仪(OBS)广角反射与折射深地震测线,本文通过震相分析和走时正演拟合,获得了沿测线的二维纵波速度结构模型。模拟结果显示表层沉积物速度2.5~4.5 km/s,厚度1000~3000 m,局部基底面起伏较大。结晶基底的速度从顶部的4.5~5.5 km/s增加到地壳底部的6.8~6.9 km/s,中地壳有一个小的速度不连续面(0.1~0.2 km/s),而地壳底部的莫霍面有较大的速度反差(1.2 km/s),上地幔顶部的速度为8.0~8.1 km/s。莫霍面埋深和地壳厚度在测线的北段和南段有很大的不同,在测线北段的海盆区,莫霍面埋深约11 km,结晶地壳的厚度仅为5~6 km,表现为典型洋壳的特征,而在测线南段的陆块区,莫霍面埋深最大达24 km,地壳厚度可达20 km,表现为减薄陆壳的特征,从海盆区到陆块区莫霍面埋深和地壳厚度迅速增加。陆块区上下地壳的厚度和变化趋势相似,下地壳没有看到高速层(HVL),可能说明地壳内部是以纯剪拉张的均匀减薄为主,地壳下部的岩浆底侵不发育。对比OBS973-2和OBS973-3测线的结构模型,可以推测南沙地块的中部和东部具有相似的构造性质,西南次海盆两侧是一对非火山型的不对称共轭陆缘。

**关键词:** 西南次海盆 南沙地块 海底地震仪 地壳结构 共轭陆缘

**Abstract:** OBS973-1 is a wide angle reflection and refraction deep seismic line using Ocean Bottom Seismometers (OBS), deployed for the first time in the southern part of South China Sea. The line crosses the southern margin of the Southwest Sub-basin and the middle part of Nansha Block. By seismic phase analysis and travel time fitting, a 2D P-wave velocity model along the line is constructed. The modeling results show that the surface sedimentary layer has a velocity of 2.5~4.5 km/s and a thickness of 1000~3000m, with locally rough basement interface. The crystalline basement has a velocity of 4.5~5.5 km/s on the top, increasing to 6.8~6.9 km/s near the bottom of the crust. In the middle crust there is a small velocity discontinuity (0.1~0.2 km/s), while the Moho at the bottom of crust has a large velocity contrast (1.2 km/s). On the top mantle the velocity is 8.0~8.1 km/s. The Moho depth and the crustal thickness have much difference between the northern and southern segments along the line. The northern segment is in the deep sea basin, where the Moho is 11 km deep and the crystalline crust is only 5~6 km thick, which are typical characteristics of oceanic crust. In contrast, the southern segment is on the continental block, where the Moho has a maximum depth of 24 km and the crust has a corresponding thickness of 20 km, which are representative characteristics of thinned continental crust. From the deep sea basin to the continental block, the Moho depth and the crustal thickness increase rapidly. In the continental area, the upper crust and lower crust have similar thickness and variation. No High Velocity Layer (HVL) is seen in the lower crust. These may imply that pure-shear extension and uniform thinning are dominating inside the crust, and magma underplating is not developed in the lower crust. Comparing with the structure models of OBS973-2 and OBS973-3, it is inferred that the middle and eastern parts of Nansha Block have similar tectonic characters, and the two sides of Southwest Sub-basin are a pair of non-volcanic asymmetric conjugate continental margins.

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