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## 利用远震接收函数方法研究南海西沙群岛下方地壳结构

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Crustal structure beneath the Xisha Islands of the South China Sea simulated by the teleseismic receiver function method

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摘要

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**摘要** 利用西沙琛航岛流动地震台站和永兴岛固定地震台站的资料, 提取了远震P波接收函数, 结合正演和反演方法模拟了台站下方的地壳结构. 模拟结果显示: 西沙群岛地壳顶部存在2 km厚的新生代低速沉积层, 横波速度只有2.0~2.2 km/s; 上地壳为一速度梯度带, 横波速度由2 km处的3.4 km/s逐渐增加到12 km深度时的3.8 km/s; 下地壳存在明显低速层, 厚度达到12 km, 平均横波速度3.5 km/s; 莫霍面埋深26~28 km, 也表现为一速度梯度带, 横波速度从3.8 km/s变化到4.6 km/s左右, 并保持稳定; 该地区的地壳泊松比值大于0.3, 推测西沙群岛的壳内低速层和异常泊松比值与地幔热活动引起的韧性流变构造和岩石矿物的各向异性排列有关.

**关键词:** 西沙群岛 接收函数 速度反演 地壳结构 泊松比 韧性流变

**Abstract:** 1-D shear wave velocity models for the crust structure beneath the Xisha Islands of the South China Sea are constructed using the data from a temporary seismic station at Chenhang island (CHH) and a permanent seismic station at Yongxing island (YXN). Receiver functions for each station were obtained from teleseismic records with clear P waveforms and a combination of inversion and forward modeling was used to infer the crustal structure below each station. Modeling results show that a 2 km thick low-velocity layer with shear wave velocity of 2.0 km/s exists on the top of crust. It is attributed to carbonate sediments in this area. Upper crust is a velocity gradient zone in which the shear wave velocity gradually increases from 3.4 km/s at the depth of 2 km to 3.8 km/s at the depth of 12 km. Lower crust is 12 km thick and has a prominent low shear wave velocity of 3.5 km/s. The Moho lies at the depth of 26~28 km and also has a velocity gradient zone with shear wave velocity changing from 3.8 km/s to 4.6 km/s. The Poisson's ratio shows a higher value greater than 0.3. We suggest that the low-velocity layer in lower crust and the anomalous Poisson's ratio result from the presence of anisotropy of rocks and minerals which arises from the ductile rheological zone and hot mantle activity in the depth.

**Keywords:** Xisha Islands Receiver function Velocity inversion Crustal structure Poisson's ratio Ductile rheology

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