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琼东南盆地区的地壳密度与岩石结构

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Crustal density and composition models beneath Qiongdongnan basin

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摘要

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摘要 地壳岩石组成是理解地壳岩石圈演化的重要约束. 我们以琼东南盆地区地壳速度结构模型为约束, 正演拟合布格重力异常分布, 获得了琼东南盆地区地壳密度结构模型. 然后, 对地壳密度模型进行温压校正, 结合地壳速度模型以及全球常见地壳组成岩石的高温高压实验成果, 推断了琼东南盆地区5个凹陷上地壳岩石组成. 研究表明: 琼东南盆地区地壳岩石密度具有强烈的纵横向非均匀性, 岩石密度空间变化与凹陷、隆起相间构造格局密切相关. 琼东南盆地区中部呈现分层高密度结构特征. 其中, 10 km深处存在3个孤立的高密度异常区; 16 km深处形成北东走向的高密度异常带; 22 km深处存在2个独立的高密度异常区. 琼东南盆地区内乐水—陵水、松南—宝岛凹陷上地壳岩石组成与其他凹陷具有明显差异, 但均存在玄武岩或玄武岩质岩石. 支持琼东南盆地形成演化受控于低角度拆离断层作用与地幔挤出构造同时发生的简单剪切岩石圈伸展模型.

关键词: 地壳密度结构 岩石组分 布格重力异常 温压校正

Abstract: Taking the crustal velocity structure model as constraints, we acquired the crustal density structure model of Qiongdongnan basin by forward fitting the Bouguer anomaly distribution. Then, after temperature-pressure correction of crustal density model, we combine the crustal velocity model and high temperature and pressure experiment results of the most common rock composition, to infer rock composition of the upper crust of five depressions in Qiongdongnan basin. The results show that crustal rock density exhibits strong vertical and horizontal heterogeneity in Qiongdongnan basin; the spatial variation of rock density is closely related to the structure pattern of alternate depressions and uplifts. The central part of the basin presents layered high density structures; there are three isolated high-density zones at the depth of 10 km, a uniform high density center at the depth of 16 km, and two separate high-density zones at 22 km. Our results support the simple shear model with simultaneous occurrence of lithosphere extension and mantle exhumation controlled by low-angle thrust fault (s).

Keywords: Crustal density structure Rock composition Bouguer anomaly Temperature-pressure correction

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