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南沙地块内破裂不整合与碰撞不整合的构造分析

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Tectonic analysis of the breakup and collision unconformities in the Nansha

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摘要 迁贾断裂以东的南沙地块与南海北部陆缘共轭,因此其构造过程研究对认识整个南海的构造演化具有重要意义.地震资料和区域构造背景分析揭示,破裂不整合面(BU)和碰撞不整合面(CU)是控制南沙地块内盆地演化的骨架界面;为了揭示南沙地块内的主要构造过程,本文利用地震剖面分析和数值模拟的方法,侧重对两个重要界面开展构造分析.结果显示:南沙地块内的破裂不整合面(BU)存在穿时现象,在地块东侧的礼乐盆地时代为T60(约23.8 Ma),而在地块西侧的北康和南薇西盆地内,BU时代为T40(约16 Ma),与碰撞不整合面重合.碰撞不整合面在南沙地块东部也为16 Ma左右.碰撞之后的几个构造界面时代比较一致,而之前的张裂事件界面可能也有穿时性.深度与空盆构造沉降速率一阶拟合结果显示,南沙地块中西部从Tg以后就表现出伴随前陆作用的岩石圈挠曲,90N09剖面和94N07剖面上,前隆的高度逐渐增高,并在16 Ma的层面上表现出最大的前隆高度,之后减弱;整体上挠曲程度西强东弱,且挠曲形态也存在很大差异,推测与岩石圈强度、俯冲的古南海洋壳宽度和陆陆接触的先后顺序等因素有关.

关键词: 南沙地块 破裂不整合(SCSU) 碰撞不整合(CU) 前隆 岩石圈强度

Abstract: Nansha block on the east of Tinjar fault (or called Baram Line) is the conjugate counterpart of the Northern continental margin. A research on Nansha block will contribute greatly to the study of the South China Sea evolution. Seismic profiles interpretation and regional tectonic analysis suggested that two unconformities as Breakup Unconformity (BU) and Collision Unconformity (CU) are two most important boundaries, which constitute the evolutionary frame of the Nansha area. In order to reveal the main tectonic process in Nansha block, seismic profiles constrained with drilling data and mathematical modeling were carried out, the main results are as follows. BU is revealed to be a diachronic boundary and dated early Miocene in Liyue basin to the east, while to the west the Beikang and Nanweixi basin is dated middle Miocene around 16 Ma, where B.U. is synchronous with CU. The CU in the east of Nansha block is around 16 Ma. The boundaries after CU are also synchronous, but the rifting boundaries before BU might also be diachronic. Compared the depth as well as the Empty Basin Subsiding Rate (EBSR) simulation, we found that Nansha block experienced deflection since Tg in the middle and west part accompanied with the subduction and the collision thereafter. On 90N09 and 94N07, the top of the forebulge rose to the highest around 16 Ma. The deflection is strong in the west and weak in the east, the position of the forebulge migrates differently. We conjecture that the deflection of the block might be controlled by factors as collision time, lithospheric strength, or oceanic width of the subducted proto South China Sea.

Keywords: Nansha block Breakup unconformity in Nansha(SCSU) Collision Unconformity(CU) Forebulge Lithospheric strength

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