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Petrological evidence for the existence of the late Mesozoic subduction zone in the South China Sea (SCS): I-type granites from the Nansha micro-block

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Majority of the existing models to explain the formation and evolution of the South China Sea (SCS) focus mainly on the Cenozoic tectonic evolution of the SCS (e.g. Karig 1971; Taylor and Hayes 1980, 1983; Holloway 1982; Tapponnier 1986; Hall et al. 2008), and studies regarding pre-Cenozoic tectonic evolution (e.g., Metcalfe, 2010) of it are lacking. There are several micro-blocks dispersed within the SCS, e.g., Zhongsha block (Macclesfield Bank), Xisha block (Paracel Islands), Dongsha block (Pratas Reef), Nansha block (Spratly Islands), and Reed Bank-Northeastern Palawan block, and petrologic data show that they belong to continental blocks (Yan et al., 2010). Many scientists agreed that the far-field effect of the collision at 56 Ma between Indian Ocean plate and Eurasian plate resulted in the following geologic events, i.e. these micro-blocks started to split from the Indochina-south China ancient continent southeastwards and southwards in the Cretaceous, and ceased drifting as a result of the subduction of Australian plate beneath Sundaland from mid-Miocene onwards. As a word, the key to the pre-Cenozoic tectonic evolution of the SCS and its adjacent areas should be some direct geologic evidences from those micro-blocks dispersed in the SCS.
In this study, granitic rocks with the zircon U-Pb ages (analyzed by LA-ICPMS) of 159 to 127 Ma, which dredged from two localities near the northern margin of the Nansha micro-block, are reported. The petrographic characteristics, major- and trace elements, and Sr-Nd-O isotopic studies of these granitic rocks show that all of them belong to I-type granites and underwent a complex petrogenetic process, and may be related to arc setting. Pb isotopic data, combined with data from granites of adjacent areas show that Nansha micro- continental block has a tectonic affinity with the South China block, and differs from the dalat zone which belongs to the Indo-china block (Nguyen et al., 2004). This study provides some direct petrological evidences for the existence of the late Mesozoic subduction zone in the South China Sea (SCS) (e.g., Taylor and Hayes, 1980, 1983; Holloway, 1982) and is helpful to understand the late Mesozoic tectonic evolution of the SCS and the southeast Asia.

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