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Triassic tectonics of the southern margin of the South China Block

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ABSTRACT

Middle Triassic orogens are widespread around and inside the South China Block (SCB). The southern peripheral belts that develop from northwest to southeast, namely Jinshajiang, Ailaoshan, NW Vietnam, NE Vietnam, Yunkai and Hainan exhibit striking similarities, with Permian–Early Triassic magmatic arc, ophiolitic mélange, northeast- to north-directed synmetamorphic ductile nappes, and fold-and-thrust belt. These collisional belts result from oceanic, then continental subduction of the SCB below Indochina. Eastward of Hainan Island, a Triassic suture is hypothesized offshore of the SCB. Within the SCB, the Xuefengshan is a Middle Triassic intracontinental orogen with northwest-directed folds and thrusts, and an intracrustal ductile *décollement*. This orogen accommodated the Middle Triassic continental subduction of the western part of the SCB below the eastern part. At variance to the generally accepted models, the inter- and intracontinental Triassic orogens of the SCB are interpreted here as the result of south-directed subductions of the SCB.

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1. Introduction

It is well acknowledged that the architecture of Asia results of the amalgamation of large continents such as Siberia, northern China, southern China, Tarim, Indochina, India, and several microcontinents: Lhasa, Qiangtang, Qaidam, etc. (e.g., Metcalfe, 2013; Fig. 1). The South China Block (SCB) is one of the most complex ones, as it underwent a long Phanerozoic evolution after its Neoproterozoic formation before 850 Ma during a collisional event that welded the Yangtze and Cathaysia Blocks (e.g.,

Charvet et al., 1996; Li et al., 2007a; Fig. 2). During the Early Paleozoic, the SCB was welded to the North China block along the Qinling–Dabie belt (e.g., Dong et al., 2011; Faure et al., 2008; Li et al., 2007b; Liu et al., 2013; Mattauer et al., 1985). Between the Late Ordovician and the Early Silurian, the closure of a Neoproterozoic Nanhua rift was responsible for the building of an intracontinental belt (e.g., Charvet et al., 2010; Faure et al., 2009; Wang and Li, 2003; Wang et al., 2013). From the Devonian to the Early Triassic, during ca. 170 Myr, the SCB behaved as a stable continent covered by a carbonate platform. However, in the Late Permian, the southwestern part of the SCB, in Yunnan and Guangxi, experienced a huge intraplate magmatism coeval with rifting, known as the Emeishan Large Igneous Province (Ali et al., 2005; Fig. 2).

The Triassic appears as the most important period for the tectonic development of the SCB. Since the recognition

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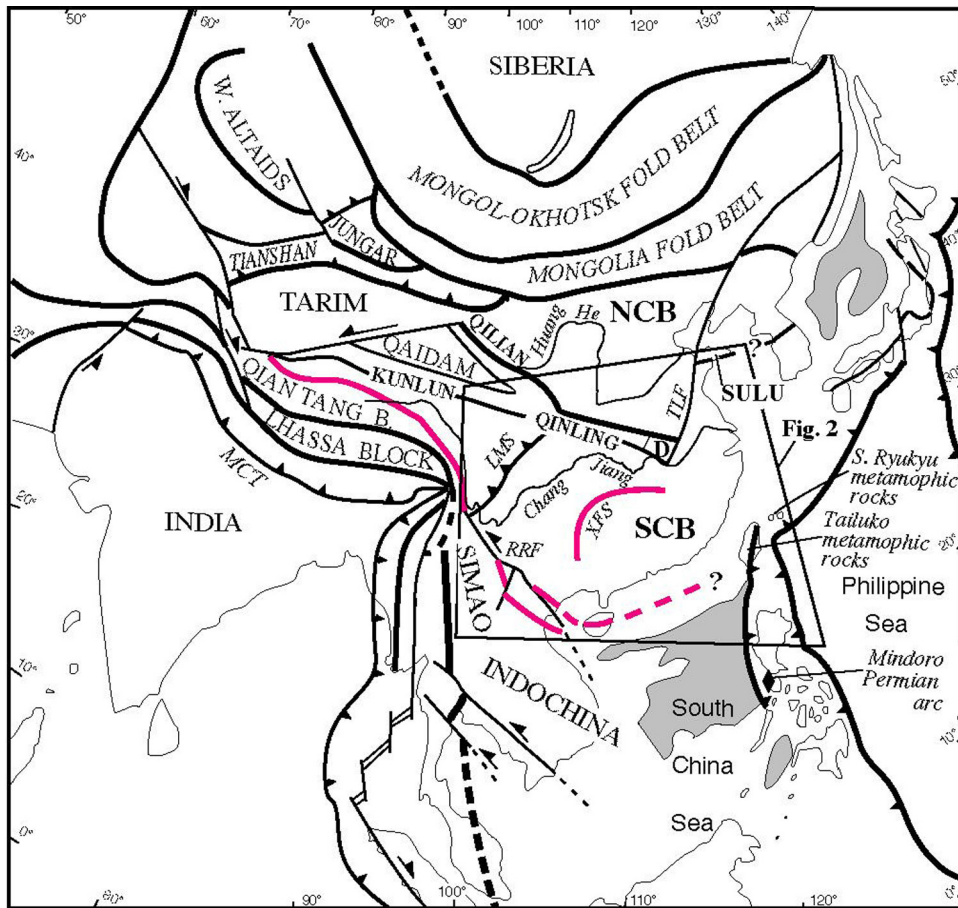


Fig. 1. (Color online.) Schematic map of Central–Eastern Asia showing the main continental blocks, ophiolitic sutures, and faults. SCB: South China Block; D: Dabieshan; XFS: Xuefengshan; RRF: Red River Fault; LMS: Longmenshan. Pink lines denote the Triassic belts discussed in this paper. The diamond in Mindoro Island locates the Permian magmatic arc.

of a Norian unconformity and the definition of “Indosinian” movements in central Vietnam (Deprat, 1915; Fromaget, 1941), the term “Indosinian” has been ascribed to all Triassic tectonic and magmatic events throughout Asia, even if these features were geodynamically unrelated to Vietnamese ones. As numerous dates are now available, the Middle Triassic stratigraphic age will be preferred to “Indosinian”.

Triassic events are widespread all around the SCB (Fig. 2). South of the Early Paleozoic Qinling belt, Triassic top-to-the-south ductile shearing, HP and UHP metamorphism, and plutonism are documented (e.g., Faure et al., 2003, 2008; Hacker et al., 1998; Li et al., 2007b; Lin et al., 2000; Liu et al., 2013; Ratschbacher et al., 2003). To the northwest, in spite of an intense Cenozoic reworking, a southeast-directed Triassic thrusting is recognized in the Longmenshan belt (e.g., Burchfiel et al., 1995; Robert et al., 2010; Roger et al., 2008). The Jinshajiang, Ailaoshan, and North Vietnam belts represent the western and south-western boundaries of the SCB. Furthermore, Middle Triassic events are responsible for the development of the Xuefengshan belt in the internal part of the SCB (Chu et al., 2012a,b; Wang et al., 2013; Fig. 2). The architecture

and geodynamic evolution of these belts are still controversial, but it is widely accepted that the SCB belonged to the upper plate above a north (northeast or northwest)-dipping subduction zone (e.g., Li and Li, 2007; Wang et al., 2013).

The aim of this paper is to synthesize the Triassic tectonic features that develop along the southern margin of the SCB, and in its interior as well. Then a possible geodynamic interpretation, at variance to the present paradigm, will be discussed. The Triassic events of the northern part of the SCB, and the Jurassic and Cretaceous ones of the interior of the SCB will not be addressed here.

2. Triassic orogens of northern Vietnam

It is sometimes proposed that the Red River Fault (RRF) is the boundary between the SCB and Indochina. The RRF is a polyphase fault with Miocene sinistral ductile strike-slip (also referred to as the Ailaoshan–Red River shear zone), and a Plio-Quaternary dextral motion. The left-lateral ductile displacement that developed in response to the Indian collision was variously estimated from a few tens to

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