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Discussion

Tectonic and deformation history of the Gyeonggi Massif in and around the Hongcheon area, and its implications in the tectonic evolution of the North China Craton: Comment

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ABSTRACT

A careful literature review reveals that the Gyeonggi Massif in Korea extensively undergoes the collision-related metamorphism during the Triassic and thus represents a subduction complex with the South China affinity. The Triassic subduction complex is bounded by the Imjingang belt to the north and the Hongseong–Odesan belt to the south and can be well correlated with the Sulu–Dabie belts of China in the P–T–t paths. Therefore, the Gyeonggi Massif is a part of the South China Block, and the boundary between the North China Craton and the South China Block lies on the Imjingang belt. The Paleoproterozoic tectonic events in and around the Hongcheon area of the Gyeonggi Massif can be attributed to the accretion of the South China Block onto the Columbia supercontinent during the Paleoproterozoic. Such Paleoproterozoic tectonothermal events are well documented in the South China Block, in particular along its northern margin.

1. Introduction

Where the tectonic boundary between the North China Craton and the South China Block in the Korean territory is located is an unsolved, critical question that not only is essential, not only to understand how the North China Craton collided with the South China Block during the Triassic, which created the Sulu–Dabie ultrahigh-pressure terrane in China, the largest ultrahigh-pressure metamorphic terrane on Earth (e.g., Zhang, 1997, 1999, 2000, 2004, 2012, and references therein), but also to illustrate the reconstruction of the Columbia supercontinent during the Paleoproterozoic, because the North China and the South China Block are parts of the supercontinent (e.g., Zhao and Cawood, 2012). Several models have been presented so far regarding the boundary between the North China Craton and the South China Block within the Korean territory. For example, Yin and Nie (1993) proposed that the North China Craton is divided from the South China Block by the Imjingang–Honam zones in Korea; in contrast, Zhang (1997) suggested that the North China Craton is separated from the South China Block by the Tanlu–Sulu–Imjingang zones, and the whole of South Korea tectonically belongs to the South China Block (also see Zhang, 1997, 1999, 2000, 2002, 2004, 2012; Zhang et al., 2006, 2007). Notably, in the above-mentioned two models, the Gyeonggi Massif of South Korea is a part of the South China Block, although, among these various authors, the opinions about the tectonic affinity of other South Korean terranes are divergent.

Recently, however, Yengkhom et al. (2014) attributed the Paleoproterozoic tectonic events occurring in the Gyeonggi Massif to those related to assembly of the Eastern Block of the North China Craton along the Jiao-Liao-Ji belt in the North China Craton on the basis of investigation of the Paleoproterozoic and Triassic deformation and metamorphic history in and around the Hongcheon area of the Gyeonggi Massif. Their conclusions are based on a presupposition that the Gyeonggi Massif is part of the North China Craton and is separated from the South China Block by the so-called Triassic Hongseong–Odesan collision belt within the Gyeonggi Massif. It will be an important improvement to understand the North China–South China collision, if their opinion is correct.

However, a careful literature review indicates that the North China–South China collision belt within the Korean territory,

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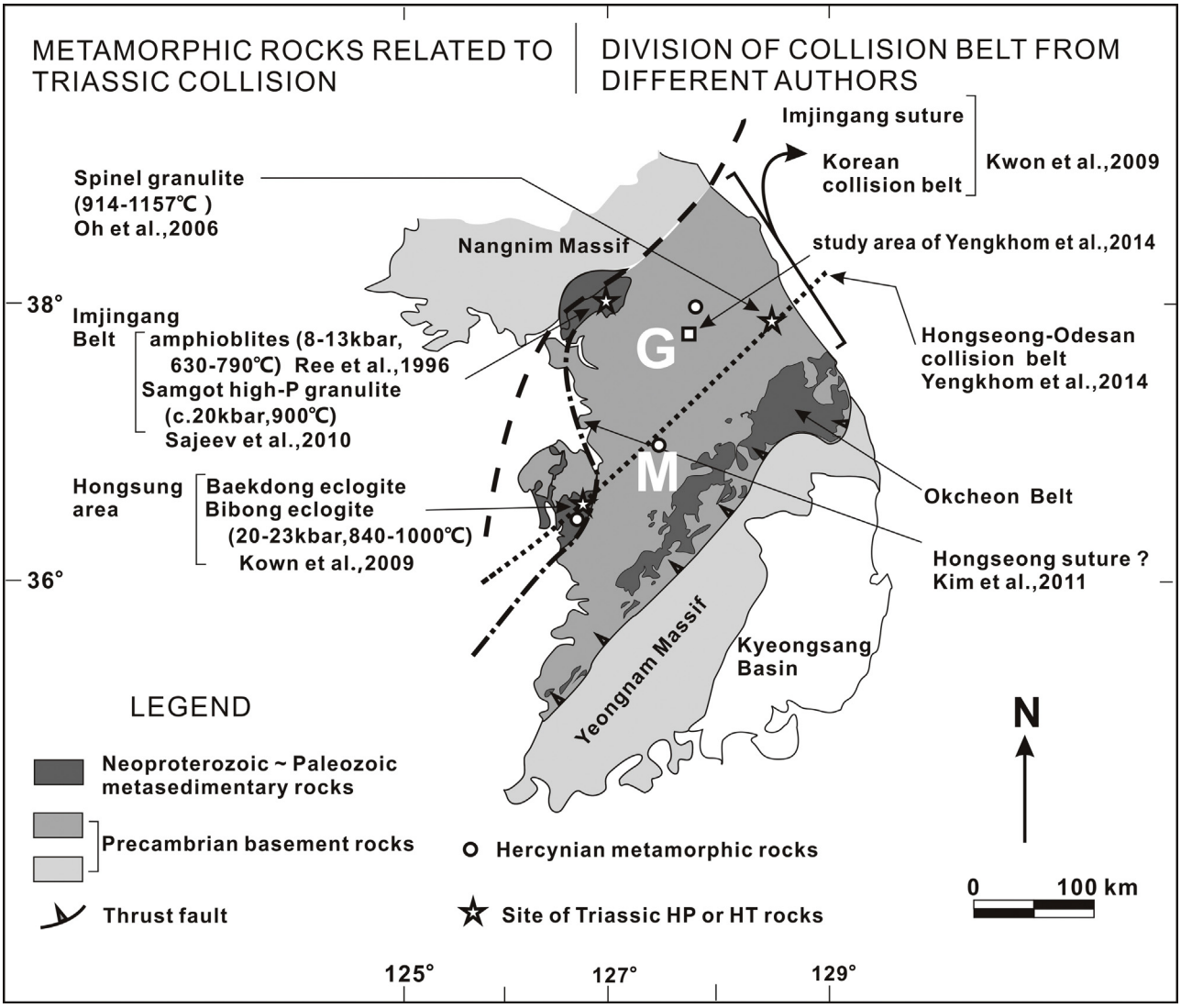

Fig. 1. Simplified geologic map of Korea for the distribution of the Triassic collision-related metamorphic rocks and the division of the tectonic belts (revised after Ree et al., 1996; Oh et al., 2005, 2006; Kim et al., 2006, 2011; Kwon et al., 2009).

corresponding to the Sulu–Dabie collision belts within eastern China, could cover the regime of the Gyeonggi that was surrounded by the Triassic Imjingang belt to the North and the Hongseong–Odesan belt to the South. Generally, the Sulu–Dabie collision belts represent the exhumed part of the subducted South China (Yangtze) continental margin (e.g., Wang and Liou, 1992; Yin and Nie, 1993; Zhang, 1997, 2000; Bryant et al., 2004; Zheng et al., 2005; Zhang et al., 2007, 2009); therefore, we believe that the Gyeonggi Massif is a part of the South China Block, and the Paleoproterozoic tectonic events documented in the Gyeonngi Massif can be corresponded to the coeval tectonic events in the South China Block that was related to the assembly and accretion of the Columbia Supercontinent (e.g., Yu et al., 2012; Zhao and Cawood, 2012; Chen et al., 2013; Yin et al., 2013; Zhao et al., 2014).

2. An overview of the Gyeonggi Massif as a part of the Triassic collision belt between the North China Craton and the South China Block

Ree et al. (1996) first reported a Triassic high-pressure amphibolite-facies metamorphic rock from the western Imjingang belt on the north of the Gyeonggi Massif (isochron date of 249 ± 31 Ma; 8–13 kbar and 630–790 °C), possibly evolving from eclogite facies conditions along a clockwise P–T path. Oh et al. (2005) and Kim et al. (2006) found Triassic eclogite-facies high-pressure metamorphic rock at Bibong (in the so-called Hongseong–Odesan belt) in the southwestern part of the Gyeonggi Massif (231 Ma; 17.0–20.9 kbar and 835–860 °C). The Triassic high-pressure metamorphism in both Imjingang and Bibong is consistent in the P–T–t paths (Oh et al., 2005). Furthermore, Oh et al. (2006) documented a spinel granulite in the Odesan area of the eastern Gyeonggi Massif, South Korea, and the granulite contains the ultrahigh-temperature (UHT) assemblage spinel + cordierite + corundum, indicative of peak metamorphic conditions of 914–1157 °C that was related to the Triassic North China and South China collision (245–248 Ma).

According to Kim et al. (2011) and Park et al. (2013), the collision belt within the Korean territory between the North China Craton and the South China Block covers an area bounded by the Imjingang belt to the north and the Okcheon belt to the south. It is likely more reasonable to claim that the collision belt within the Korean territory is located in the area that is bounded by the Imjingang belt and the Hongseong–Odesan belt, based on the occurrence of the high-pressure metamorphic rocks (Fig. 1). This collision belt, containing fragments of arc magmas, metavolcanics and hydrated