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The South China – Indochina collision: a perspective from sedimentary basins analysis

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Sedimentary basins, through the sedimentary successions and the nature of the deposits, reflect the geology of the area from which the sediments were derived and thus provide valuable record of hinterland tectonism. As the collision between the South China and the Indochina blocks (i.e. the Indosinian orogeny) is still the object of a number of controversies regarding, for instance, its timing and the polarity of the subduction, the sedimentary basins associated with this mountain belt are likely to provide clues to reconstruct its geodynamic evolution. However, both the Sam Nua Basin (located to the south of the inner zones of the Indosinian orogeny and the Song Ma ophiolites) and the Song Da Basin (located to the north of the inner zones), northern Vietnam, are still lacking important information regarding the depositional environments and the ages of the main formations that they contain.
Using sedimentological and dating analyses (foraminifers biostratigraphy and U-Pb dating on detrital zircon), we provide a new stratigraphic framework for these basins and propose a geodynamic evolution of the present-day northern Vietnam.
During the Early Triassic, the Sam Nua Basin was mainly supplied by volcaniclastic sediments originating from an active volcanic activity. Geochemical investigations, combined with sedimentological and structural analyses, support an arc-related setting for this magmatism. This magmatic arc resulted from the subduction of a south dipping oceanic slab that once separated the South China from the Indochina blocks. During the Middle to the Late Triassic, the Sam Nua Basin underwent erosion that lead to the formation of a major unconformity, termed the Indosinian unconformity. This unconformity is interpreted to result from the erosion of the Indosinian mountain belt, built after the continental collision between the South China and the Indochina blocks. Later, during the Late Triassic, the Sam Nua Basin experienced the deposition of very coarse material, emplaced under continental setting and representing the product of the erosion of the Indosinian mountain belt.
To the North, the Song Da Basin is characterized by strongly diachronous deposits over a basal unconformity developed at the expense of volcanic and volcaniclastic deposits related to the Emeishan Large Igneous Province. The sedimentary succession indicates a foreland setting during the Early to the Middle Triassic, which contrasts with the commonly assumed rift setting for these sediments. Thus, the Song Da Basin documents the formation of the Indosinian thrust belt, located immediately to the South of the basin.