

# Deformation and exhumation processes in the metamorphic rocks of Thailand.

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## Project Description

A long and complex history of deformation and exhumation is recorded in the metamorphic rocks of Thailand. Although they were previously considered to be Precambrian because they are overlain by Cambrian sedimentary rocks, the first major gneiss-forming metamorphic event in Thailand is now considered to have occurred during the Indosinian Orogeny, ending in the latest Triassic (Hansen and Wemmer, 2011). At this time, two Palaeozoic Gondwana-derived continental fragments – Sibumasu and Indochina – collided after subduction of Paleao-Tethys (e.g., Ridd, 1971; Metcalfe, 1996, Sevastjanova et al., 2011).

Deformation of the metamorphic rocks in Thailand continued throughout the rest of the Mesozoic while subduction occurred along the western Andean-type margin of Sundaland (Searle and Morley, 2011). Translation of a continental fragment (Ridd, in Prep), subduction of an oceanic transform (Watkinson et al., 2008) or strain partitioning at the oblique margin may have caused renewed deformation and partial melting in old Indosinian metamorphic rocks during the latest Cretaceous-Palaeocene. During the Cenozoic the northwards indentation of India into Asia caused further deformation, including Eocene-Oligocene collapse of a thickened plateau (Searle and Morley, 2011).

Some of Thailand's exposed metamorphic rocks are limited to major strike-slip fault zones, such as gneisses within the Ranong Fault, and the Lansang Gneiss within the Mae Ping Fault, and have been sheared and exhumed during Eocene-Oligocene strike-slip (e.g. Lacassin et al., 1997; Watkinson et al., 2011). Others, for example in the Doi Inthanon area, form part of a north-south trending belt of gneisses that record thermal metamorphism during the Late Cretaceous (Dunning et al., 1995) and mylonitization during Eocene-Oligocene metamorphic core complex development (Barr et al., 2002). In the Omkoi area of northern Thailand, gneisses separated from overlying phyllites by a fault breccia have been explained by two opposite models: Oligocene nappe tectonics (Hansen and Wemmer, 2011), and an extensional metamorphic core complex (Morley et al., 2011). Other possible Cenozoic metamorphic core complexes exist near Rayong (Morley et al. 2011), on the opposite side of the Gulf of Thailand at Hua Hin, and near Nakhon Si Thammarat (P. Charusiri, pers. comm 2008).

Although good structural and thermochronological data is now available from some parts of Thailand, the deformation and exhumation history of many metamorphic rocks remains unclear. This project aims to produce a coherent structural history of the metamorphic rocks to help understand the tectonic evolution of this exciting and complex area. The project will involve a synthesis of existing work, together with substantial fieldwork, structural and microstructural analysis, and thermochronology.

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