



## Review of the Permian platform, slope and basin in the Indochina Terrane, Central Thailand

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### ABSTRACT

The area studied was originally mapped by Chonglakmani and Sattayarak (1979, 1984) and further south by Nakonsri (1976), is close to the western edge of the unconformably overlying Mesozoic siliciclastics of the Khorat Plateau and consists of Carboniferous to Permian sedimentary and volcanic rocks. The recently re-opened Chatree gold mine is nearby (Diemar et al., 2020; Salam et al., 2014) where episodic igneous activity has been well dated using zircons. The Carboniferous to Permian limestones and associated siliciclastics and volcanoclastics of the Khao Kwang Platform were separated to the east from the Pha Nok Khao Platform by deeper water basins such as the Nam Duk Basin (Wielchowsky & Young, 1985). However, this palaeogeographic scenario is probably in need of revision as it is likely that these long elongate carbonate platforms consist of many, sometimes structurally superimposed, smaller carbonate platforms separated by sometimes wide, deep-water basins (Burrett et al., 2016; Morley & Jitmahantakul, 2020; Vattanasak et al., 2020).

The oldest sedimentary-volcanic sequence known so far in the Khao Kwang Platform area is gently dipping to 75° 'early' Carboniferous probably early Viséan in age (Chonglakmani et al., 1983; Chonglakmani, & Fontaine, 1992). These oldest rocks consist of unfossiliferous (so far), thinly bedded, chert and volcanoclastics and, although outcrops are scattered, appear to be overlain by a succession of limestones from early Viséan to middle Permian containing dateable foraminiferans and corals (Chonglakmani & Fontaine, 1992; Ueno & Charoentitirat, 2011; Udchachon et al., 2014).

Some of this Viséan limestone appears to be deposited as mud mounds. Potentially economically important deposits of 45 m of gypsum/anhydrite is probably interbedded in the Carboniferous sequence, appears to be coeval with reddish siliciclastics and, on the basis of seawater isotope composition and overlying fusuline-bearing carbonates, was deposited by "hypersaline seawater on a shallow lagoon or shelf on the Khao Khwang Platform during the Serpukhovian" (or late Mississippian) (Kuroda et al., 2017).

Early to middle Permian carbonate sequences are well exposed in the central part of the Phetchabun-Lamnarai to Saraburi area. Biostromes and coral reefs are well exposed in some intervals with obvious massive and fasciculate rugose corals and other associated faunas. Allodapic limestone sequences -the evidence of slope facies - are often observed between this platform facies and the basin deposits which is

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mainly characterised by successions of shale-chert. Conodonts are observed in the turbidite successions and indicate a late early Permian (Kungurian) age for at least parts of the slope deposits. Late middle Permian carbonates were eroded and unconformably overlain by carbonate breccias and polymictic conglomerates. These breccias and conglomerates are pronounced at the Khao Somphot and Khao Paeng Ma sections in Lopburi. This rock assemblage is also observed at Khao Amon Rat and Phu Nam Yot as well as the sequences in the Phra Phutthabat and other areas along the Loei-Phetchabun terrane. This might be correlative to a major subaerial exposure event and the consequent demise of the Upper Palaeozoic platform in this region related to an early phase of the Indosinian Orogeny (Udchachon et al., 2014; Burrett et al., 2021).