

## **Paleo-environment and C-14 Dating : the Key to the Depositional age of the Tha Chang and related sand pits, Northeastern Thailand.**

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### **Extended Abstract**

Tha Chang sand pits, Nakhon 'Ratchasima Province and many other sand pits in the area adjacent to the Mun River are characterized by their fluvial environment in association with mass wasting deposits, along the paleo-river channel and the flood plain of the Mun River. Sediments of these deposits are characterized by clasts of various rock types especially the resistant ones with frequent big tree trunks, logs and wood fragments in different sizes and various stages of transformation from moldering stage to lignification and petrification. Widespread pyritization of the lower horizon suggests strongly reducing environment during burial. The Tha Chang deposits have been received much attention from geoscientists especially paleontologist communities, as they contain fragments of some distinct vertebrate species such as *Stegodon* sp., hominoid primate, rhinoceros *Aceratherium* and others. Based on the associated mammal fauna and hominoid fossils, the late Miocene ( 9 – 6 Ma) was given for the time of deposition of this sand and gravel unit (Chaimanee et al. 2006; Deng et al. 2011). Some other reports believed that sediments and materials of these sand and gravel quarries (pits) were deposited by high-energy flood pulses contemporaneous with the tektites forming event during mid-Pleistocene at c. 0.8 Ma (Howard et al. 2003; Haines et al. 2004). Interpretation from

Palynostratigraphical study suggested that the lower horizon of Tha Chang sand pit was deposited during Pliocene/Pleistocene period and the upper horizons are Pleistocene/Holocene (Bunchalee, P., 2005).

It is crystal clear that all the fluvial sediments including tektites and almost all fossil fragments being deposited in these sand pits were, likely a multiple times reworked materials. Only some old bamboo trees, some old crowing trees and fossils grasses observed on the old river bank are considered in situ. C-14 dating of 5 old wood specimens from Tha Chang Sand Pits, 15 old wood specimens from Chumpuang Sand Pits and one sample of old pottery from a Chumpuang Sand Pit were carried out in the NSF- Arizona AMS Laboratory. Although, there is no sharp boundary between the unconsolidated sedimentary horizons in the pits, C-14 ages obtained from the Tha Chang vary from 34,340 BP at the middle horizon (appx 10 m below ground zero) to >49,900 BP at the lower horizon with unknown basal formation (highly pyritized zone appx 20 - 25 m below ground zero). The ages for the Chumpuang vary from 41,700 BP, >45,900 BP and >49,900 BP from the upper most to the lower most of a broad horizon (appx 8 m to appx 12 m below ground zero). The C-14 age of the pottery collected from layer approximately 5 m below ground zero is 2,514 BP.

The nature of fluvial together with occasional mass wasting characteristics of all sand pits studies suggest the relatively faster depositional rate of the lower horizon which involved more flooding and mass wasting deposits than those of the upper horizons. The apparent of some mixing of the wood ages may indicate reworking and lag deposits nature of the area. The depositional rate of the upper most sand and soil horizon (5 m thick) is approximately 1 m per 500 years which mean both erosion and deposition had played a significant role during that time period. In term of the true age of the formation, we argue that since most of the materials deposited are reworked materials, all ages obtained from fossil fragments could not be the age of sand and gravel formation. Furthermore, the maximum age of all the tektite bearing horizons cannot be older than 0.8 Ma. The oldest C-14 age of 49,900 BP is interpreted as the minimum age of the Tha Chang and related sand pits formation

when geomorphology of the area was a lot more hilly and much higher gradient than that of the present day.

**Key words** : Paleo-environment, Tha Chang depositional age, reworked materials, C-14 Dating, fluvial, mass wasting, reducing, moldering stage

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