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► **To cite this version:**

Mélissa Cadet, Viengkeo Souksavatdy, Thonglith Luangkhoth, Nigel Chang, Paolo Piccardo, et al.. A late prehistoric copper production in central Laos: The Vilabouly complex -technological reconstruction and exchanges. *Archaeometallurgy in Europe 2019*, Jun 2019, Miskolc, Hungary. cea-02328253

**HAL Id: cea-02328253**

**<https://hal-cea.archives-ouvertes.fr/cea-02328253>**

Submitted on 23 Oct 2019

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# A LATE PREHISTORIC COPPER PRODUCTION IN CENTRAL LAOS: THE VILABOULY COMPLEX – TECHNOLOGICAL RECONSTRUCTION AND EXCHANGES

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Evolving from purely 'origins'-based research, significant advances have been made in our understanding of early Southeast Asian metallurgy in the last decade, partly through new excavations of metal production sites, and partly through the application of established provenance methodologies to assemblages covering almost two millennia. On the fieldwork front, ancient copper mining and smelting sites at the Vilabouly Complex (VC, formerly known as Sepon) in Savannakhet Province, Central Laos, have been excavated by a Lao-Australian team led by Dr. Nigel Chang and Viengkeo Souksavatdy since 2008, in conjunction with the owners of the LXML concession. The VC, with a radiocarbon sequence from the early Bronze Age (c. 1000 BC) to the late Iron Age (c. 500 AD), is one of only three prehistoric copper production sites physically known in Southeast Asia, the other two being in Thailand. The VC lead isotope signature has been identified in the copper exchange networks across Southeast Asia, involving metal consumers from Myanmar, Thailand, Cambodia, and potentially as far as Indonesia.

The Vilabouly Complex displayed evidence of a copper production with artefacts linked to the smelting of copper (ores, slags, crucibles, molds, and scorched clay) along with copper and copper-alloyed artefacts (ingots, drums, axes etc.). In conjunction with ongoing studies of production materials, analyses of the different types of metal artefacts (OM, SEM-EDS, Raman Spectroscopy, pXRF) permit the reconstitution of the copper production techniques involved at the VC. One of the main questions to resolve is the type of ore used during smelting. According to local geological evidence, oxidic ores are to be mainly expected but recent results have shown the presence of matte in some types of artefacts. Ergo, based upon the metal artefacts, do we have real matte smelting or an intentional/unintentional co-smelting? These observations can then be compared to those previously proposed for early Thai copper production to see if any correspondences can be deduced. A second main objective is to understand VC copper production at the scale of regional and inter-regional metal exchange networks, with the lead isotope analysis of 59 VC metal artefacts within the scope of the Southeast Asian Lead Isotope Project. This is the first ever study of prehistoric Lao copper-alloy artefacts, and will play a significant role in developing our understanding of material and technological transmissions around Southeast Asia, and beyond.