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Multidisciplinary project in Kalimantan Timur (Indonesia) : first results and perspectives

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Introduction

Island Southeast Asia has been the location of important archaeological discoveries regarding human evolution and recent human population history. Since 2003, a French-Indonesian archaeological research project has been developed in the karstic area of East Kalimantan (Indonesia) (fig. 1), which has notably led to the discovery of caves with unique rock art paintings, dating back to at least the early Holocene (9900 years BP; [1] [2]). A new multidisciplinary project was initiated in 2010, involving archaeological, anthropobiological and ethno-linguistic approaches, in order to document the past human occupations in this area.

Material and Methods

The project includes 4 scientific work packages

1 - Archaeology. Two rock shelters were selected for test-pit excavations, both are located 130 km northwest of the shore of the Makassar Strait, near the remote Lebbo' village of Merabu (East Kalimantan, Indonesia): Liang Abu, excavated in 2009-2012 (fig. 2) and Liang Pemalawan, excavation planned from 2013 (fig. 3)

2 - Anthropobiology. Analyses was based on morphometric analyses and DNA polymorphisms from ancient human remains and current human populations (Lebbo'). Unrelated individuals were sampled and information collected included languages spoken, current residence, familial birthplace, and a genealogy of four generations to establish regional ancestry. All samples were obtained with informed consent. The study was approved by the appropriate ethical committees.

3 - Prehistoric Rock Art. On-going analyses focus on several sites and should determine the pigments used (portable XRF system), the date of the prehistoric rock art (Th/U dating), characteristics of the rock art « population » (forensic approach: sex, height), the link between Lebbo' myths and rock art paintings (fig. 4) and make a correlation between the rock art and the archaeological material.

4 - Ethno-archaeology/history/linguistic. The Lebbo' are an isolated autochthonous population and have lived in this inner region for a long time. Ethno-linguistic studies of their oral traditions and cultural practices are on-going to determine their former uses of the caves. Some of their representations could be related to the prehistoric rock art found in nearby caves.

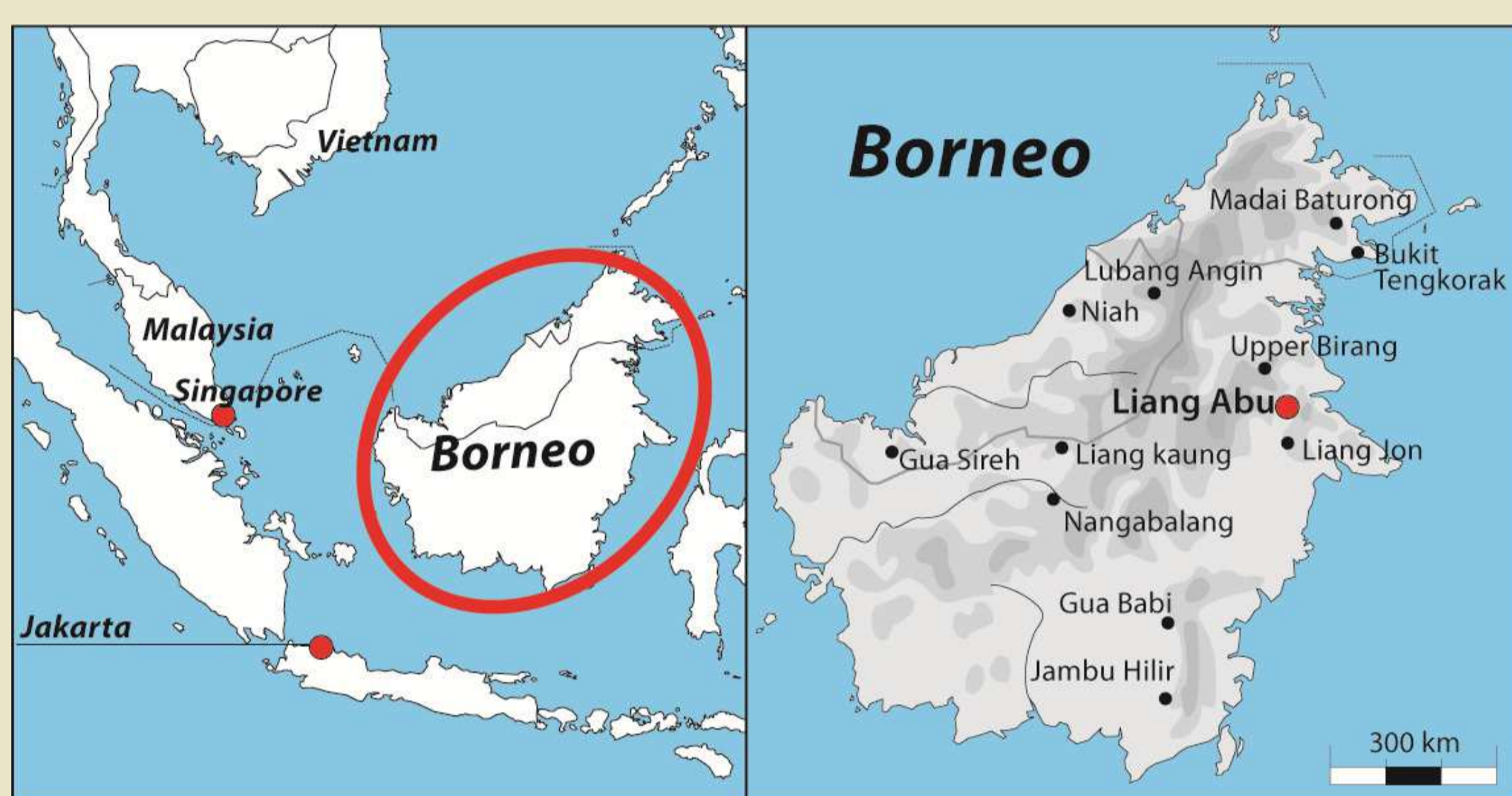


Figure 1. Location of Liang Abu and other sites in Borneo.



Figure 2. Liang Abu

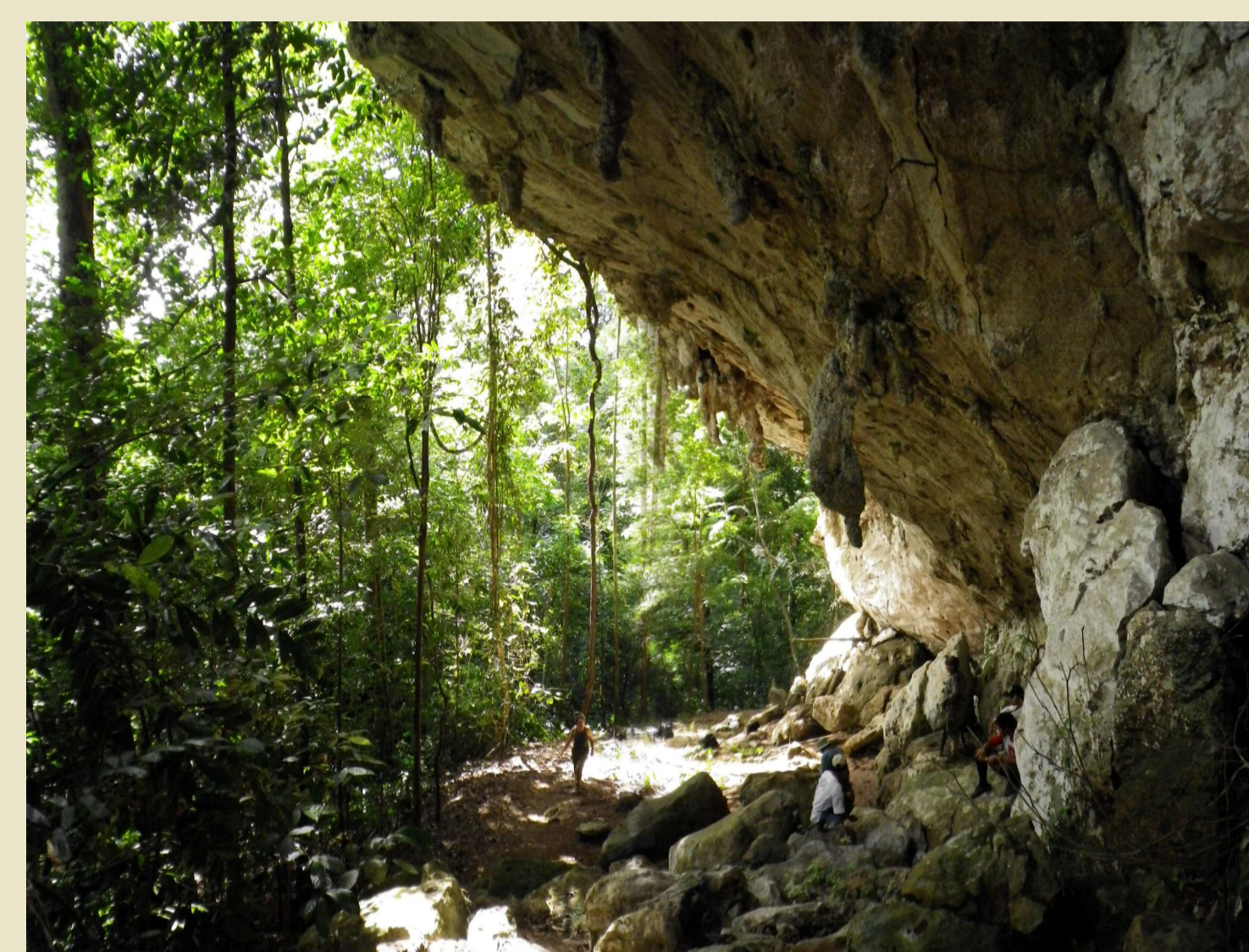


Figure 3. Liang Pemalawan



Figure 4. Rock art in Gua Belayot Atas, near Liang Abu

Results and Discussion

Archaeological excavation. The test-pit conducted in Liang Abu in 2012 revealed a stratigraphic sequence with 14 sedimentary units (fig. 5). The bedrock was reached at approximately 160cm below the surface. Evidence of human presence were observed throughout the stratigraphy, except perhaps for the deepest level (US16). More than 70 kg of archaeological material were discovered and are currently under study. The AMS radiocarbon datings already performed were consistent with the stratigraphy. The layer 2 has been dated at 1672 ± 21 BP (1686-1528 cal BP ; [3]) and 1524 ± 22 BP (1515-1349 cal BP) from charcoals ; the layer 10 at 10222 ± 38 BP (12082-11768 cal BP) from charcoal ; the layer 12 at 12660 ± 58 BP (15453-14570 cal BP) from bone.

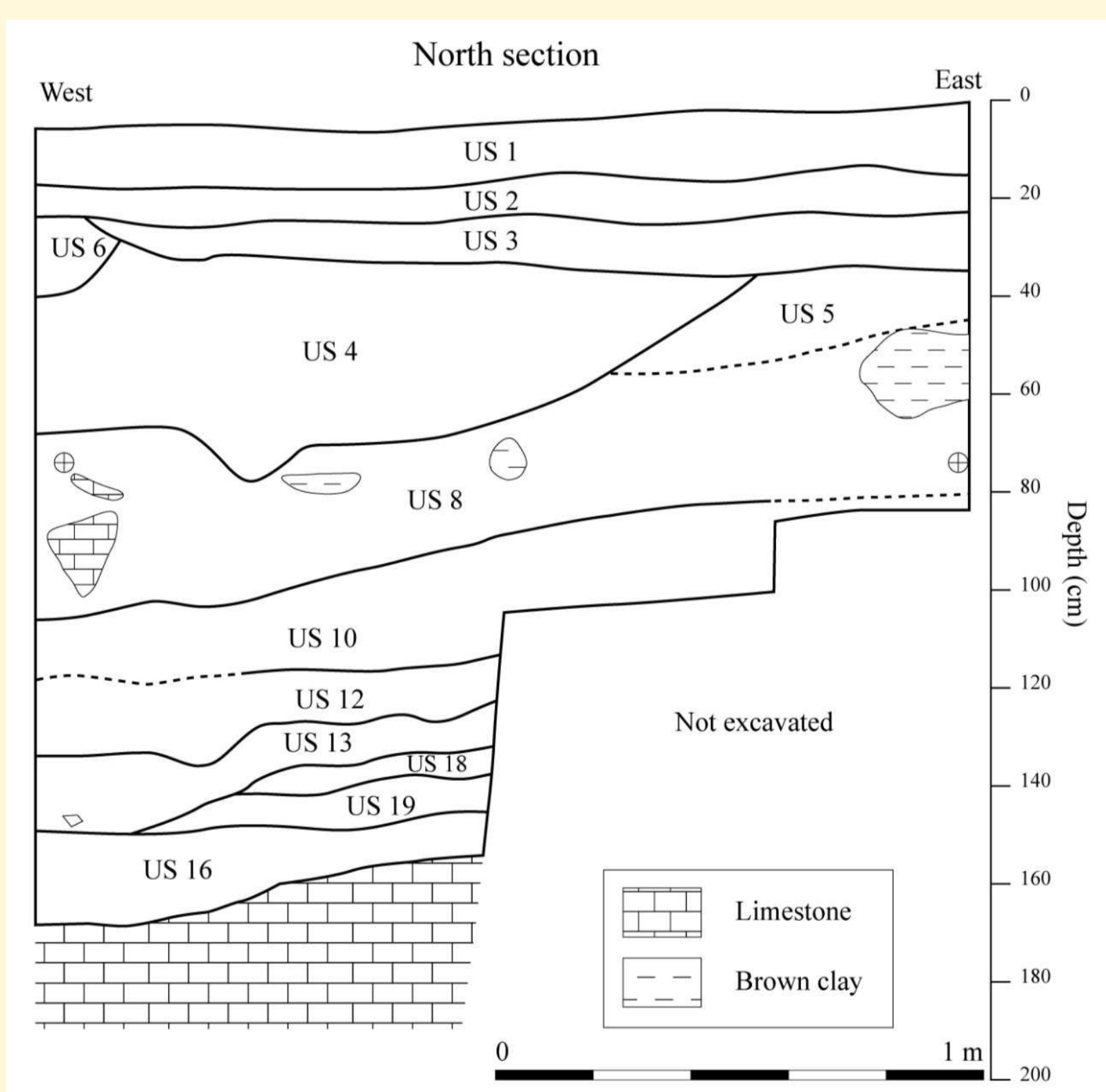


Figure 5. Stratigraphic sequence from Liang Abu

Pottery. Pottery is concentrated inside the layer 1 and 2. In total, there were 1102 sherds (94 rims, 86 carination, 922 body) among which 52% are decorated (impressed or incised). The typological analysis identified the presence of 5 shape classes. Interestingly the occurrence of red-slipped (3 sherds) and cord-marked pottery (7 sherds) was documented (fig. 6).

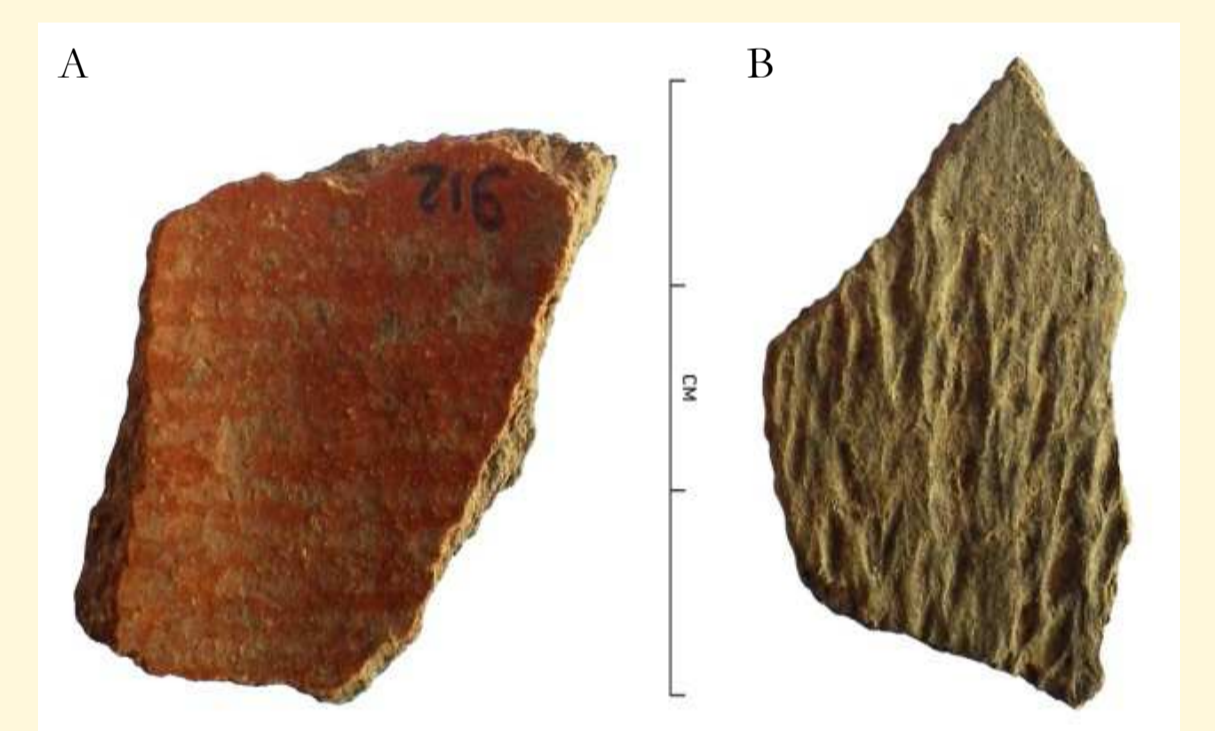


Figure 6. Red-slipped (A) and cord-marked pottery (B)

Lithic. Lithic material is present through all the stratigraphy with a relative homogeneity. There are more than 2000 artefacts. The raw material used is rather varied (limestone, jasper, andesite, flint, chert). There is any standardisation of products and the knapping is oriented towards the production of flake blanks of varied morphologies and dimensions. Few tools have been uncovered (~1% denticulate, retouch pieces and burin). Preliminary use-wear analysis has shown that some elements may have been use on meat and vegetal matter.

Faunal remains. The faunal remains are very abundant and present throughout the stratigraphy. Analysis is on-going to determine the taphonomic history of the assemblages. In each level, mammals and reptiles (mainly turtles) are the main taxonomic groups identified, the birds and fishes being rare. Among the mammals, Suids remains are the most abundant. The presence of a bone industry was also documented.

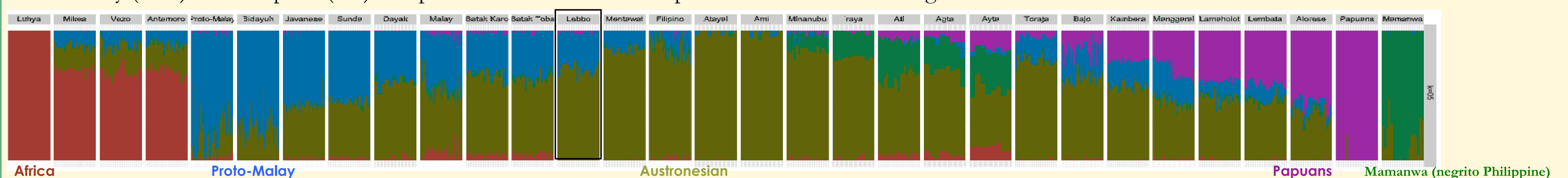
Prehistoric rock art. The site of Gua Belayot Atas near Liang Abu is under study, with more than 80 paintings identified, mostly hand stencils and animal representations (fig. 4). Preliminary analysis with XRF of red pigments from the rock art show the presence of iron, sulphur and phosphorus, implying the possible use of animal bones during the preparation of pigments.

Ethno-linguistic investigation recorded some unique shamanic myths (fig. 7), linguistic data and determined post-marital residence (uxorilocality strategy), in agreement with the higher genetic diversity of the maternal lineages than paternal lineages. An interesting myth is *Belian Danyam* describing how the 8 wives of a mythic hero put their hands on cave walls to take control of a territory.



Figure 7. Pak Lempar (Epic song 2011)

Genetic analysis using Illumina 700k DNA chip are preliminary (fig. 8) but suggests that the Lebbo' population is homogenous, with a main Austronesian (65%), a Proto-Malay (30%) and a Papuan (5%) component. The level of DNA preservation did not allow genetic information to be retrieved from the human remains.



Conclusion

This pluridisciplinary project is providing new information on the past human occupations in East Borneo. The ongoing studies of the material and the next excavations should contribute to improving our knowledge of the rich human history in Island Southeast Asia.

References [1] Plagnes V. et al. 2003. Cross dating (Th/U-14C) of calcite covering prehistoric paintings in Borneo. *Quaternary Research* 60(2): 172-179 [2] Chazine JM. et al. 2010. Borneo: The Memory of the Caves. Fage Editions [3] Reimer PJ et al. 2009. *IntCal09 and Marine09 radiocarbon age calibration curves, 0-50,000 years cal BP*, *Radiocarbon*, 51, 4, p. 1111-1150.