



## **An iron-age cultural hiatus enigma: mega-flooding and human settlement abandonment over the last millennium in the Lanyang Drainage System, northeastern Taiwan**

Jyh-Jaan Huang (1), Kuo-Yen Wei (1), Ludvig Löwemark (1), Sheng-Rong Song (1), Chih-An Huh (2), Chih-Kai Chuang (1), Tien-Nan Yang (2), Meng-Yang Lee (3), Yu-Be Chen (4), and Teh-Quei Lee (2)

(1) Department of Geosciences, National Taiwan University, Taipei, Taiwan (huang.jyhjaan@gmail.com), (2) Institute of Earth Sciences, Academia Sinica, Taipei, Taiwan, (3) Department of Science, University of Taipei, Taipei, Taiwan, (4) Department of Anthropology, National Taiwan University, Taipei, Taiwan

Active tectonic activities and frequent typhoon landfalls make Taiwan unique in having very high rates of uplift, precipitation, denudation and sedimentation. Particularly, intense rainfall associated with typhoons often causes flooding, large-scale landslides, and debris flows in river systems. Such natural disasters have affected human societies both at present and in the past; the Typhoon Morakot in 2009 may serve as a modern example of such events.

Kiwulan is a newly discovered archaeological site from the Iron Age situated on the Lanyang Plain in NE Taiwan. In the deposits from this society, a cultural hiatus centered around 1200-1500 cal. yr AD is found, suggesting that the settlement was abandoned for a period of a few hundred years before being recolonized. Until now it has remained a mystery what caused this cultural hiatus.

This study assembles radiocarbon dates of upland river terraces, organic proxies in flood plain lake sediments, and content of wood shreds in nearby marine sediments from the continental slope off NE Taiwan. These records are synthesized to infer the frequency and magnitude of ancient flood events over the past 1250 years in the Lanyang Drainage System in northeastern Taiwan.

Alluvial fan terraces distributed along the banks of the upper Lanyang River are considered to be the results of ancient debris flow events, and their radiocarbon dates fall in two time ranges: 850-1100 and 1400-1600 cal. yr AD. Organic proxies which representing terrestrial organic input were measured from bulk sediments of Lake Dahu and Lake Meihua in the Lanyang Plain. Peak values of TOC, C/N ratio and organic indicator (inc/coh) from Itrax-XRF core scanner measurements are conspicuous during 900-950, and 1400-1500 cal. yr AD, implying frequent flood events. Moreover, abundance peaks of wood shreds and peaks in the C/N ratio in marine box core ORI-801-7A from the continental slope SE of the Lanyang Plain are dated to about 950-1050 and 1450-1550 cal. yr AD, thus generally coinciding with the input events recorded in lake sediments.

In summary, different lines of evidence collected from the Lanyang Drainage System suggest that flood events were more frequent during two particular periods: 900-950 cal. yr AD and 1400-1500 cal. yr AD. The later period corresponds to the cultural hiatus at Site Kiwulan, suggesting that the lost civilization may be related to severe and frequent flooding of the Lanyang Plain during that period.