**Archaeological Investigation by Ground-Penetrating Radar Imaging of Wiang Kaew Palace Wall in Chiang Mai City Moat, Northern Thailand:**

**Curvelet Analysis and Attributes**

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Wiang Kaew palace was established in the northern part of Chiang Mai City Moat as the dwellings for the rulers of Lanna kingdom. According to McCarthy’s 1893 map, Wiang Kaew palace can be divided into three parts delineated by walls: front palace; north rear palace; south rear palace. The front palace wall is the oldest, probably constructed in the early 14th century. The two rear parts were constructed mid-17th century. In 2018, Thai archaeologists excavated and found two W-E walls that align with the south rear palace walls. They also found a wall junction where three sections of the wall meet. The results of this excavation together with McCarthy’s map overlain on a present-day satellite image help to determine the location of other sections of the Wiang Kaew wall. However, the N-S rear palace wall has not yet been found. Moreover, the north rear palace and front palace walls which are buried in an urban environment have also not been discovered. Therefore, 250- and 500- MHz Ground–Penetrating Radar (GPR) acquisition was used on the accessible areas at locations suggested by the 2018 excavations. The pulseEKKO® GPR system is used for obtaining radar data. Standard GPR data processing is applied to the data using Ekko\_ProjectTM software and GPR anomaly maps were generated by attribute analysis. However, continuity of archaeological anomalies is significantly disturbed by metal signals or clutter of soil layers due to the urban environment. Therefore, curvelet analysis is explored as a means to mitigate the aforementioned noise. The principle of curvelet analysis is based on 2D discrete Fourier transformation. Practically, curvelet analysis decomposes a radargram image based on two main variables, scale and orientation. A high-angle mask highlights low-angle features such as planar reflections, while a low-angle mask highlights high-angle features such as diffractions. Curvelet analysis helps separate non-archaeological sources from archaeological sources for easier interpretation. Curvelet analysis also enhances groups of planar reflections that probably correspond to well-preserved archaeological structures of Wiang Kaew palace wall. Additionally, attribute analysis such as envelope, RMS amplitude, envelope edge, instantaneous phase, instantaneous bandwidth, instantaneous frequency, and dominant frequency, generated by Hilbert transformation can help reveal additional radar facies details for refined interpretation when combined with results from curvelet analysis.