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Advanced survey of ancient Buddhist and Hindu temples in central Java for tracking their position within the history of Southeast Asian architecture

Abstract

During the last quarter of the first millennium CE, a considerable number of prominent Hindu and Buddhist temples were erected on the island of Java. Although they were constructed of a solid dry stone masonry of precisely-trimmed and tight-fitting blocks, frequent earthquakes and volcanic eruptions have since caused serious damages over time. For more than a century, intensive efforts have been made to restore or even reconstruct these monuments.

The research project consists of two parts: a holistic three-dimensional building survey, and an architectural classification of Javanese candis within the framework of South and Southeast Asia religious building traditions.

After a test phase in 2016, a team from the Department of Building History and Archaeological Research of the Vienna University of Technology, in cooperation with the Gadjah Mada University Yogyakarta, the Cultural Heritage Preservation Office Yogyakarta, and the Provincial Culture Office Yogyakarta, began the systematic documentation of 11 monuments using 3D laser scanning and photogrammetry. Thus, these monuments have now been recorded – for the first time – in a holistic three-dimensional representation. Such a holistic recording can provide new insights into the accuracy of past restorations, reveal modular units and concepts of proportions used by ancient builders, and would be of exceptional importance should further restoration and reconstruction work be necessary in the future, for example, following earthquake damage.

The second part of the project will analyze the architectural concepts of the ancient Javanese temples and place them in context with the religious architecture of continental Southeast Asia and South Asia. The aim of the research is to analyze and compare analogies and individualities in spatial concepts, in the concepts of external appearance, as well as in construction techniques. The research will comprise topics such as principles of symmetry and orientation; relationship to the symbol of the mandala, and tripartition of the structure, which is expressed by the different designs of the base zone, the middle zone and the roof zone; the various spatial situations provided for the ritual of circumambulation; and the specific use of symbols in the design of sacred architecture.

Keywords: Java, Southeast Asia, ancient temple architecture, Candi, Hindu architecture, Buddhist architecture, 3D surveying methods