Small drone – large impact:
Modelling a tower karst landscape with a pocket-sized UAV

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Abstract

Trang Àn is a UNESCO world heritage site in the Red River Delta, Ninh Binh province, northern Vietnam. The site comprises a unique ancient limestone karst massif covered by highly adapted tropical limestone forest. Comprising some 2500 hectare of karstic towers, cones and ridges that rise over 200m from the surrounding plains, which lie just above modern sea level, Trang Àn has been subject to at least three sea transgressions since the late Pleistocene. The transitions from inland to coastal environment challenged all ecological and human communities to adapt their survival strategies meet shifting conditions. The SUNDASIA project is seeking to trace these adaptations through archaeological excavation, landscape modelling, GIS analysis and palaeoenvironmental reconstructions. This paper focuses on the landscape modelling aspect of the SUNDASIA project. It outlines how cost-effective 'structure from motion' unmanned aerial vehicle (UAV) surveys can be used effectively in combination with Lidar to reconstruct current topography at a high resolution, and how the resulting data can be used to refine existing ancient sea level models and to predict how the movement of early foraging communities was influenced by fluctuating sea levels. The resulting landscape model provides a new perspective that challenges existing perceptions about this complex and sometimes deceptive landscape, and provides a powerful tool that can be incorporated readily into existing conservation and management frameworks. The creation of a workable model has also come with numerous practical and methodological challenges, some of which and their associated solutions and work-arounds are presented.