**Castle Investigation Using UAV LiDAR Surveying**

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***ABSTRACT***

Yatsushiro Castle was built in Kumamoto Prefecture, Japan, about 400 years ago. Over the years, it suffered various damages such as fires and the collapse of stone walls, and by the time of the Meiji Restoration, only the stone walls of the main keep and the inner moat remained. The existing stone walls also suffered damage, including collapse, during the earthquake that occurred on April 16, 2016.　During an inspection after the earthquake, it was pointed out that there might be a distortion in the northern stone wall of the main keep. However, traditional ground surveys could not accurately capture the three-dimensional shape of the stone wall, making it impossible to confirm the presence of any distortion. Therefore, in this project, a high-performance LiDAR scanner was mounted on a UAV to acquire high-density, high-precision 3D point cloud data from the air, with the aim of three-dimensionally capturing the shape of the stone wall. As a result of detailed analysis of the acquired data, the detailed shape of the stone wall, which could not be understood from ground surveys, became clear. This achievement is significantly beneficial in the protection and repair of cultural properties.

**Keywords:** UAV, LiDAR, 3D point cloud, Stone wall, Archaeological Survey