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Evaluation of Bridge Multi-Hazard Performance by Monitoring Morphodynamic Properties of River Basin via UAS

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Unmanned Aerial Systems (UASs) are widely implemented for terrestrial scanning applications such as large-scale mapping of flood plains or river basins. As UASs provide an alternative to temporal and spatial resolution to the satellite imagery while bridging satellite images and the field measurements, a direct link can be defined between UAS derived data and terrestrial measurements. Since the evaluation of morphodynamic properties of flood plains provides information for decision-making regarding bridge substructure design, continuous assessment of bridges located on river basins is essential in order to prevent unnecessary loses. For the Boğaçayı Bridge in Antalya Province, Turkey, that was considered as the case study, the reinforced concrete bridge design plans and HEC-RAS modeling of the river basin were used for monitoring the morphodynamic properties of the flood plain. Preliminary results verified that the flood induced scour was responsible for the bridge collapse in 2003 that induced substantial amount of scour around bridge piles. After, a drastic alteration of streambed was observed under the influence of fluvial scour in another flood occurred in 2009. The scour-induced reduction in pile lateral displacement capacities was detected to deteriorate the seismic performance of the bridges that was determined by nonlinear static pushover methods. Consequently, the morphodynamic properties of the river basin were determined to have the utmost influence on the bridge multi-hazard performance