

## **Morphological change on the River Towy, Wales assessed using aerial photogrammetry**

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The dynamic nature of meandering channels has fascinated geomorphologists for decades; with the onset of remote sensing, and technological advances in field equipment, scientists are able to capture high-resolution data from the Earth's surface using cost-effective techniques that require minimal manual labour. Here we present a morphological assessment of three meander bends on the River Towy, Wales, using aerial photography captured by the Welsh Assembly Government and supplemented by data captured by a UAV. Migration rates and changes in channel length were measured between 1969 and 2016 and compared to a coupled discharge record to quantify the effects of discharge variability on the morphological evolution of the channel. A short-term (seasonal) assessment of channel change was conducted by comparing sub-metre resolution 3D point cloud and digital elevation models, generated using a UAV and Structure-from-Motion (SfM) photogrammetry. Our results suggest that discharge variability plays a crucial role in controlling the evolution of meandering planforms and can be an effective means of excavating floodplain material over relatively short timescales, although erosion rates can be suppressed by bankline roughness, which effectively disrupts outwardly directed flow momentum. These findings have implications for land managers and those modelling the effects of climate change on hydrological regimes which are ultimately used to forecast channel planform changes. Additionally, our results demonstrate the potential of low-cost field surveying techniques in producing high resolution models of landscape change.