



The effect of bend shape on the fluvial and morphological processes in natural meander bends

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Previous studies have shown that meander bends follow certain developmental phases from a straight reach towards a neck cut-off. The meander planform types are classified into simple symmetric, simple asymmetric, compound symmetric and compound asymmetric. The curved channel shape and the transverse bed slope induce distinctive three-dimensional flow field and an unevenly distributed sediment transport patterns, intensifying the sinuosity by time. The spatial patterns of the fluvial and geomorphological processes, however, vary according to the planform type. Thus far, the newest technology has not been used to investigate the meandering river processes over various planform types to a large extend.

In this study, we collect othoimages over a clear watered, highly dynamic river reach containing 14 meander bends, which all differ from each other's by shape and size, at two occasions using a remotely controlled drone. Based on the images, we form topographical models over the area using Structure-from-Motion, and bathymetric models using optical-empirical methods, for both occasions. We combine the models to seamless river geometries. We map the morphological changes occurring between the drone-flights by subtracting the two geometries from each others. We measure the flow field cross-sectionally using Acoustic Doppler Current Profiler during different discharges, concurrently with the photogrammetric surveys. We also collect data on sediment characteristics, and water level changes and slopes. We analyse the effects of planform type and bend geometry on the flow characteristics and morphological development of meander bends.