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High resolution measurements of dune movement in a scale model of the River Oder

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The paper presents the analysis of three dimensional river bed topographies of high spatial and temporal resolution, obtained from scale model experiments with movable bed. The use of a stereo photogrammetric system allowed for measuring the submerged river bed during the laboratory experiments. The system is based on three synchronized cameras and a bar code system for orientation and can be used in both dry and wet conditions. For bed surface elevation measurements, a grid is projected onto the channel bed, defining the bed surface via slide projection. When applied to subaqueous problems, the system provides reliable data and insight in the distribution and migration of bed forms and the impact of steady and unsteady discharges on bed topography. The presented data has been obtained from a hydraulic scale model with moveable bed, concerning an 8km long reach of the River Oder at the German-Polish border. The model has been set up in order to investigate the influence of river training measures on accessible water depths and on the development of river bed forms. To determine the movement of the dunes, a 3 x 3 m^2 area of the model, representing 90,000 m^2 in field scale, has been recorded over a time of 11 h, providing 4000 topographic data sets of about 10,000 data points each. To simulate nature like transport conditions, the natural bedload material was substituted by synthetic granules (polystyrene) with lesser density and coarser diameter. Due to the small density of polystyrene the dune migration was considerably faster than it would have been for the use of sand as bed load material. In theory, flow is often assumed to be steady and uniform. However, during sediment transport, bed topography changes continuously. The presented analysis of the data shows the wide spatial and temporal variety of occurring dunes and the correlation between dune dimen-sions and dune migration speed. Possible future analysis of the three-dimensional data will be discussed and an outlook on the prospective application of the measurement system in a newly built flume, specially designed for morphological investigations will be presented.