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Comparing data of terrestrial LiDAR and UAV (photogrammetric) in the context of the project "SedAlp"

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The project „SedAlp" (Sediment management in Alpine basins: integrating sediment continuum, risk mitigation and hydropower) concentrates on problems and approaches related to sediment transfer in the alpine region and is embedded in the European transnational cooperation program "Alpine Space". The catholic University Eichstätt-Ingolstadt contributes the German part to this project on behalf of the Bavarian Environment Agency and in collaboration with the Authority of Water Resources Weilheim.
The area of interest is the river Isar between the Sylvenstein reservoir and the city of Bad Tölz, Bavaria, Germany. The main aim of the activities is to quantify the transfer of sediments from the tributary catchments to the river Isar, specifically in light of the fact that the construction of the Sylvenstein reservoir in the mid 1950ies has created a barrier to longitudinal sediment transfer, thus heavily impacting the sediment budget and morphodynamics of the Isar reaches downstream. Moreover, the further development of artificially inserted gravel deposits and the effect of dismantling reinforcement structures at the river banks need investigation. Therefore, the dynamics of alluvial fans and gravel bars in the areas of confluence of tributary torrents are monitored using multitemporal surveys with terrestrial laserscanners and drone-based imagery. The latter is used both for the generation of high-resolution digital elevation models and for the mapping of changes in comparison to historical aerial photos.
This study focuses on a comparison of TLS and UAV-based photogrammetric digital elevation models in order to highlight advantages and disadvantages of the two methods in relation to the SedAlp-specific research problems. It is shown that UAV-based elevation models are highly accurate alternatives to TLS-based models; due to their favourable acquisition geometry with respect to the topography in floodplain areas, and their large areal coverage, their use is seen as advantageous.