



High Quality 3D data capture from UAV imagery

Norbert Haala, Michael Cramer, and Mathias Rothermel

Stuttgart University, Institute for Photogrammetry, Stuttgart, Germany (Norbert.Haala@ifp.uni-stuttgart.de)

The flexible use of unmanned airborne systems is especially beneficial while aiming at data capture for geodetic-photogrammetric applications within areas of limited extent. This can include tasks like topographical mapping in the context of land management and consolidation or natural hazard mapping for the documentation of landslide areas. Our presentation discusses the suitability of UAV-systems for such tasks based on a pilot project for the Landesamt für Geoinformation und Landentwicklung Baden-Württemberg (LGL BW). This study evaluated the efficiency and accuracy of photogrammetric image collection by UAV-systems for demands of national mapping authorities. For this purpose the use of different UAV platforms and cameras for the generation of photogrammetric standard products like ortho images and digital surface models were evaluated. However, main focus of the presentation is the investigation of the quality potential of UAV-based 3D data capture at high resolution and accuracies. This is exemplarily evaluated by the documentation of a small size (700x350m²) landslide area by a UAV flight. For this purpose the UAV images were used to generate 3D point clouds at a resolution of 5-8cm, which corresponds to the ground sampling distance GSD of the original images. This was realized by dense, pixel-wise matching algorithms both available in off-the-shelf and research software tools. Suitable results can especially be derived if large redundancy is available from highly overlapping image blocks. Since UAV images can be collected easily at a high overlap due to their low cruising speed. Thus, our investigations clearly demonstrated the feasibility of relatively simple UAV-platforms and cameras for 3D point determination close to the sub-pixel level.