

Mapping and Monitoring the Belgian Coast using Kite Aerial Photogrammetry

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Mapping and monitoring coastal areas is an important aspect of the documentation of marine dynamics and the assessment of flooding risks. Airborne laser scanning is frequently used for this purpose, but next to this classic mapping technique, Kite Aerial Photogrammetry (KAP) is a promising alternative. In this research contribution, it is demonstrated that KAP can be used to create digital surface models in a fast and accurate manner to map and monitor sand dunes and particular areas of interest situated directly along the coastline. A case study was performed at the beach of Raversijde in Ostend, Belgium. The resulting models can be used after a storm surge, to assess the need of beach nourishment, to evaluate coastal erosion or when new constructions need to be placed along the coastline. The principle of KAP is similar to that of conventional airborne campaigns. An important factor are the weather conditions. The kite system can be used in conditions from 2 (light breeze) to 5 (fresh breeze) on the Beaufort scale. This in contrast to the use of UAVs, which need to be operated in windless conditions. The procedure involves the kite operator walking around on the beach, on which ground control points (GCPs) have been placed as black-and-white targets. To achieve the best positional accuracy, GCPs are surveyed with a total station. The kite has a working altitude of 10 to 20 meters above ground level. The kite carries a shock- and waterproof, non-metric camera of 12.1 megapixel. This camera makes it possible to acquire images with a ground resolution of less than 5 cm. Agisoft Photoscan is used to combine the photographs into a mosaic. The aerial triangulation with camera calibration and subsequent model generation is mostly an automated process. The photomosaic is georeferenced and orthorectified using the GCPs. In one day, an area of up to 10 ha can be surveyed and processed to produce digital height maps and orthorectified images. Kite systems can be used as an addition to classic topographic surveys and aircraft-based surveys, with considerable gains in the cost of the data acquisition.

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