



Post-event wildfire monitoring with unmanned aerial system photogrammetry

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In March 2014 a forest fire broke out on a steep alpine slope (Absamer Vorberg), near the city Innsbruck in Tirol, destroying about 50 ha of forest. Shortly after the fire, the process extent and intensity were mapped with unmanned aerial system photogrammetry (UAS-P) and in-situ. Orthophotos (OP) with 0.05 m ground sampling distance (GSD) and digital surface models (DSM) with 0.2 m GSD were generated using photogrammetric software. The OP and DSM were used to interpret and map different vegetation and fire intensities. Three years after the fire (2017), the flights were repeated to map the current status of the affected area.

A TwinHex copter (company twins.nrn) with six rotors was used for the flight missions. The UAS was equipped with a twinRTK sensor module, allowing direct geo-referencing of the geodata and vitiating the laborious placement and surveying of ground control points. The area was mapped with two different sensors: i) a Sony QX1 daylight camera used to calculate high resolution OP (0.03 m GSD) and a multispectral camera (MicaSense RedEdge) to calculate vegetation indices (0.1 m GSD). OP, DSM and Indices were calculated using standard structure-from-motion photogrammetry software (AgiSoft PhotoScan Pro and Pix4D). Different vegetation units were mapped to delineate areas with various stages of succession. Special attention was given to areas with signs of erosion, which were observed the years after the fire. After an increase of eroded areas shortly after the fire, a reduction of the erosion areas could be shown up to now concomitant with increasing pasture. UAS-P results were cross-checked in-situ data. A normalized vegetation index (NDVI) was calculated from the multispectral data to quantify the development of the vegetation recovery. Comparative data will be created with a replicate flight mission.

The post-fire monitoring via UAS showed a great opportunity to monitor the succession of vegetation after the fire. The quantitative aspect with a comparison of an NDVI will be tested after a further flight mission. The development of erosion processes could be delineated but not calculated due to the uncertainty in height accuracy of the DSMs.