



## **Classification of mycosis in *Pinus nigra* stands with UAV-P**

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At lower elevations in Eastern Austria, many coniferous forests are dominated by Austrian pine (*Pinus nigra*). The utilization of this species – which has its most northern natural distribution in the neighbouring Northeastern Alps – in plantations, was facilitated from the 16th century until the early 20th century for resin production. At present, many of these managed forest stands are threatened by the mycosis *Diplodia sapinea*. In its beginning stages, this mycosis causes needles to be discolored brown. First infection signs appear on shoots and twigs, later spreading to whole branches and parts of the crown, causing discoloration and necrosis. The mycosis mainly spreads in wet spring seasons, and is exacerbated by following hot dry summers, which increase the stress level of the trees. To evaluate the stages of infection and monitor affected forests, we mapped a black pine stand near the city Wiener Neustadt (AT) with unmanned aerial system photogrammetry (UAS-P) in autumn 2016. Two different sensors were used: i) a Sony NEX5 to generate high-resolution RGB orthophotos (OP) and digital surface models (DSM) [0.05 m and 0.2 m ground sampling distance (GSD), respectively]; ii) 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). The crowns of the black pines were manually delineated and assigned to three categories: healthy, infected and dead. An NDVI-threshold was determined for the each category. The comparison between the visual classification (RGB-OP) and the NDVI classification shows very good accordance for dead trees, sufficient for healthy and inconclusive for infected trees. In further investigations the automatic detection (NDVI threshold) is attempted to be improved to identify spreading patterns of the mycosis and support mitigation measures. Very detailed field surveys were undertaken to control the infection stage; in a next step these data will be compared with the UAS-P results.