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ESA WorldCover 2017 Symposium

Frascati, Italy, 14-16 March

Title: Ultra-high resolution sampling with UAVs for optimising fractional woody cover characterisations in dryland savannahs

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Dryland savannahs are crucial for understanding carbon cycling and storage and for their provision of ecosystem services. Globally, the accurate mapping of the woody savannah component and its characteristics is especially important as it provides input to carbon emissions models. Moreover, in the southern African region, the encroachment of unpalatable woody species over large expanses of palatable grasses has received a lot of attention as it directly affects the livelihoods of local populations. Over these scales, Earth observation technologies are seen as the only viable means for mapping and monitoring the characteristics of woody vegetation. However, the commonly applied sampling and validation approach incorporating point woody samples identified over aerial photography or very-high resolution data (e.g. via Google Earth) is problematic as the satellite data used for the mapping, with a pixel size of 10 – 30 m, rarely consists of pure woody vegetation. To bridge this spatial gap between what is identified in the point-based samples and what is included in the 10-30m pixel, we employ a UAV-based 2D and 3D sampling strategy. We incorporate point samples collected from Google Earth in a 400km^2 area of the Northwest Province of South Africa together with UAV-collected RGB and 3D mosaics, in order to optimise the mapping of fractional woody cover. We test the approach using both Landsat-8 and Sentinel-2 data in order to assess the applicability at both 10 and 30m scales. We also test the accuracy of two different machine learning classification approaches: random forests and support vector machines. Our 2D/3D UAV-based sampling approach provides higher fractional woody cover classification results than simply incorporating the 'traditional' point samples from aerial photography or Google Earth. Our suggested methodology can provide much needed assistance to fractional woody vegetation monitoring efforts in Southern African savannahs where the process is partly related with bush encroachment and land degradation.