

# UAV-based imagery for intertidal zone mapping: potential synergy between local high-resolution information and lower-resolution satellite EO data

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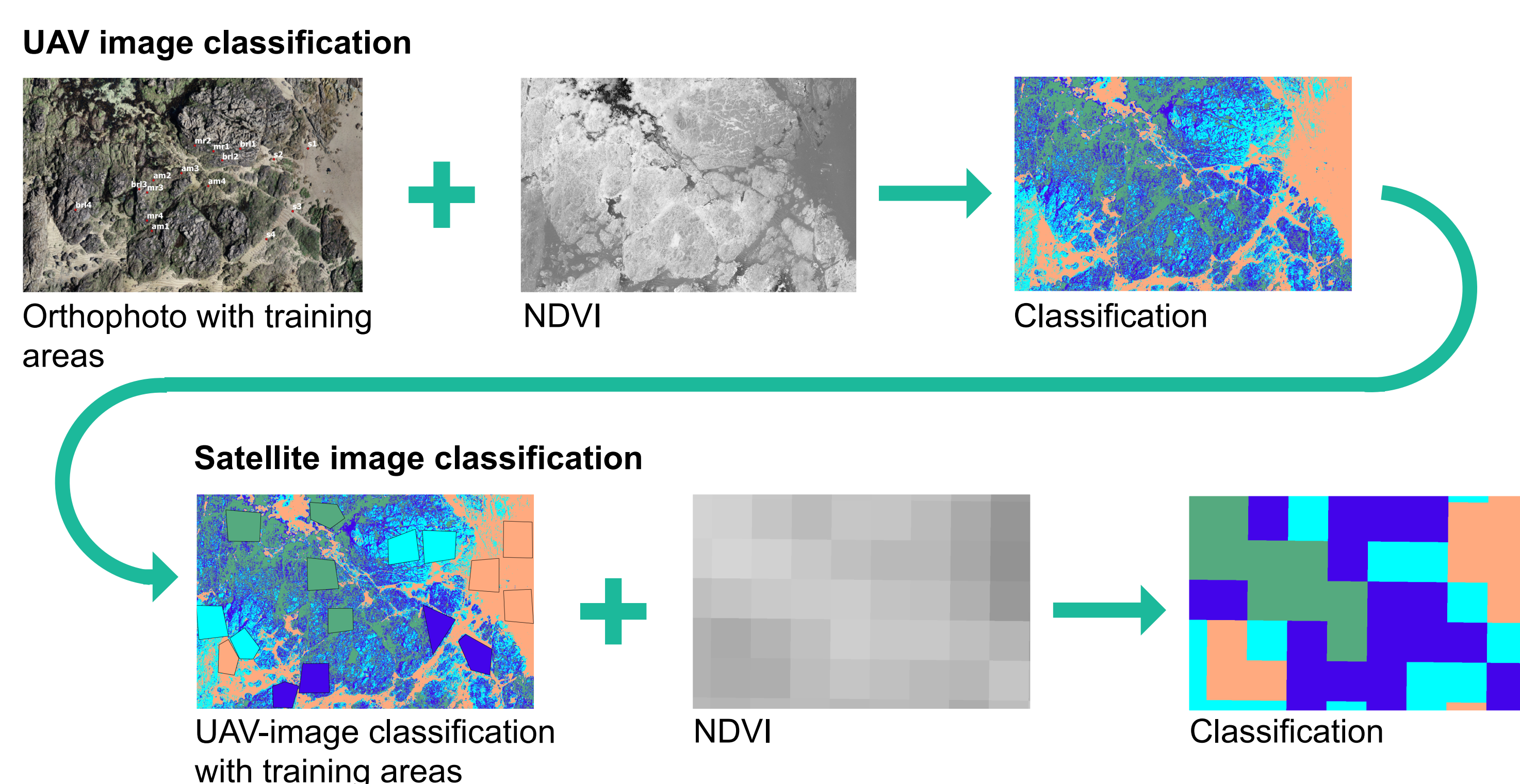
## Background

Coastal zones are important yet increasingly stressed and threatened land-ocean interfaces of high ecological and socio-economic importance. Their current status and dynamics have to be monitored for a sustainable use and management. The project SWUAV aims to map a N-Portuguese intertidal zone, combining RGB data with semi-automatic classification of multispectral imagery.



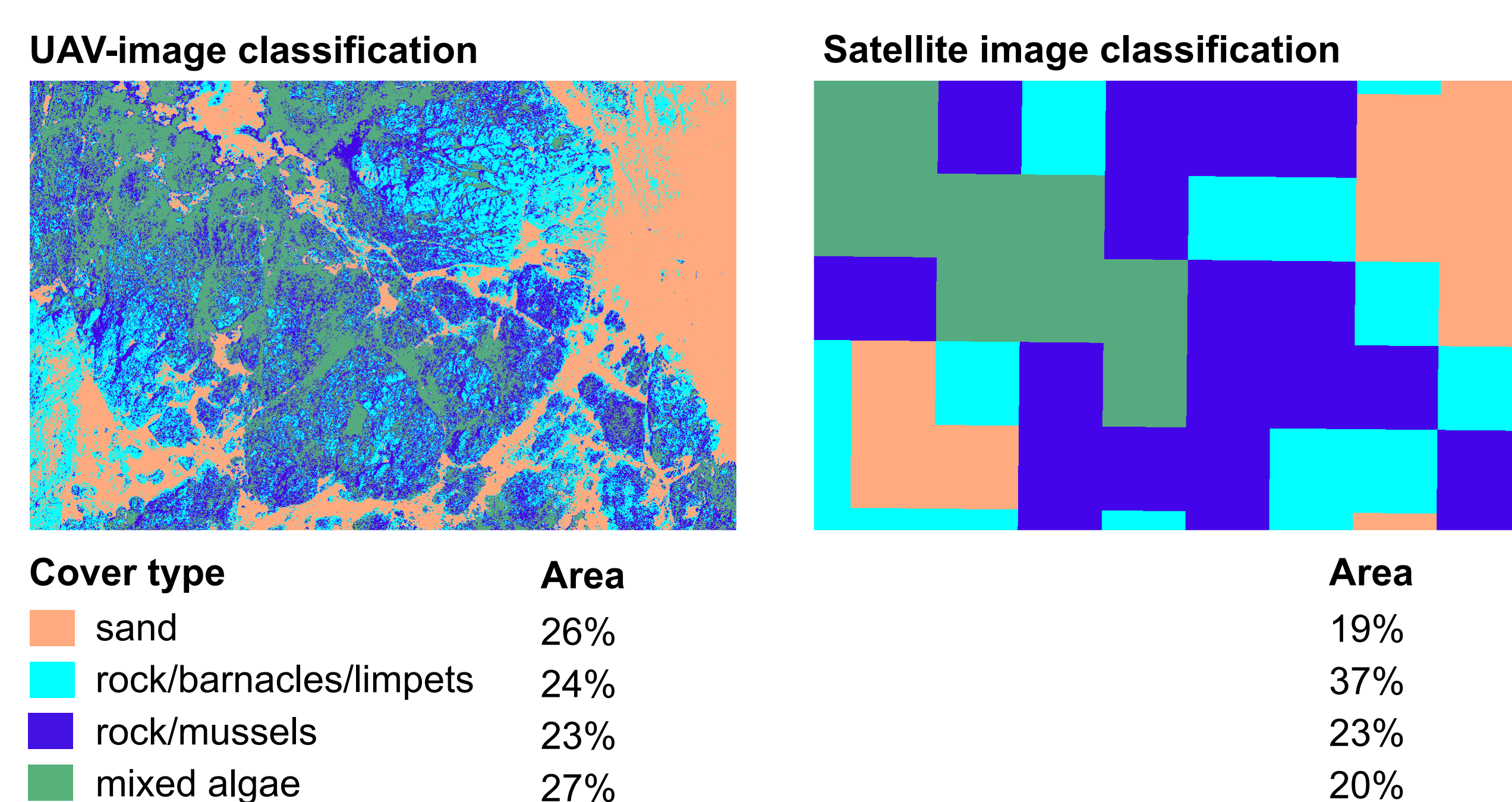
## Methodology

In a pilot study at Vila Chã (41.29554° N /8.73701° W), information on intertidal land cover was obtained from UAV and satellite images and classified. The NDVI from UAV images was classified using in-situ observations (50×50cm squares) as training areas. The NDVI from a Sentinel 2 image (taken a few days later but also at low-tide) was classified using training areas extracted from the UAV-based classification and the QGIS Semiautomatic Classification Plugin.



## Results

In spite of the comparatively low resolution of the satellite data (10 m), the adopted approach allowed discrimination of 4 classes of predominantly sand, rock/barnacles/limpets, rock/mussels and mixed algae cover. As expected, satellite images provide only a rough image of cover classes and their areas, whereas UAV imagery provides very detailed information about the cover, which allows quantification of its area and in the future even biomass.



## Impact/Conclusions

In-situ observations are expensive and time consuming, and therefore generally restricted to a limited number of sampling sites and times, i.e. point-observations. Recent developments in Unmanned Aerial Vehicles (UAVs) and miniaturized high-precision GNSS allow local high-resolution georeferenced airborne surveys that can cover areas of up to a few kilometres at relatively low cost.

Earth Observation (EO) satellite data, cover vast areas in regular intervals. They have high temporal though low spatial resolution. Working at different scales, in a way that the information is upscaled from in-situ observations, to high-resolution UAV and satellite imagery, intertidal land/species cover can be assessed at different scales, exploring the synergies between the observation methods.