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# Comparison of artificial drainage network detection rates in cultivated landscapes with LiDAR and high resolution IRC images

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Artificial drainage networks such as ditches are landscape features that control most of hydrological transfers (water, nutrients, sediments) in cultivated areas. When studying large catchments in hydrology, we usually face to the lack of data, in particular for ditches locations and descriptions. In order to extent and generalize hydrological studies at larger areas, it appears thus important to explore remote sensing methods that allow to represent these elements in space and time. The present study aims to assess ditches network detection rates that we can expect using LiDAR or high-resolution optical images. As ditches networks are almost exclusively located on plot boundaries, we developed a methodology based on classification of altimetrical or radiometrical profiles perpendicular to plot boundaries. The methods we used to classify profiles are classification trees on profiles wavelets transforms.

The application and results are concerning the artificial drainage network of the Roujan catchment, part of the Hérault river catchment, located in the south of France. This area is typical of the Mediterranean vineyard landscapes. On this test area, ditches are having high variability in sections, vegetation cover and topographic environment.

Binary classification results (Ditch/no ditch) were computed on about 6500 profiles. These results show that the best rate was obtained with LiDAR data. It provides good classification rate for ‘No ditch’ profiles mode (90 %) but high omission on ‘ditch profiles’ mode (45 %). Results using an image acquired during low vegetation period and with low sun elevation (winter) are not so far from LiDAR results. Results are farther worst with an image acquired during high vegetation period and with high

sun elevation (summer). Moreover, detection rates results are anisotropic regarding azimuth of profiles, even for altimetrical profiles, due to LiDAR spatial sampling.

According to these first results, LiDAR data appear the most suitable for partial artificial network detection in cultivated landscapes and it provides a good framework to condition the generation of a whole drainage network along plot boundaries.