TEXTURAL ANALYSIS OF VERY HIGH RESOLUTION PLEIADES DATA AS A TOOL FOR THE MONITORING OF OYSTER FARMS

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Shell farming and oyster farming in particular is an important economic activity in France with several growing areas located along the Atlantic coast. Because of various sources of ecological and economic pressures, the oyster production in those areas underwent in the past decades a constant evolution of the areas occupied by cultivated oysters, some production sites being abandoned and others re-cultivated. In abandoned fields, wild oysters tend to grow rapidly and become an increasing source of competition for nutrients to the detriment of cultivated oysters. It becomes therefore necessary to develop new approaches designed to provide local authorities with the right tools to monitor this evolution and to take necessary actions.

Some recent studies demonstrate the interest of the international community to detect and map oyster habitat in tidal flats using high resolution satellite data [1-3]. In these studies, the detection of oyster reefs is mainly achieved by exploiting the radar backscattering properties specific to these land covers in SAR remote sensing data (C- and X-band). Unfortunately, the spatial resolution of these data does not always enable a fine detection of oyster beds contours and prevents the distinction between abandoned and cultivated fields.

In previous studies [4-5], we proposed two distinct processing chains to detect oyster fields in very high resolution optical data through texture analysis. The first method is an unsupervised segmentation approach relying on the extraction of Haralick texture descriptors to detect oyster beds contours (Fig. 1A). The second one is a supervised classification approach based on the use of multivariate probabilistic models to represent the distribution of wavelet coefficients obtained by an orthogonal wavelet decomposition of the image. This second approach enables to separate oyster beds in two classes, i.e. cultivated oyster fields (in blue) and abandoned fields (in yellow) (Fig. 1B).

In this paper, we propose to combine the results obtained with both abovementioned approaches with a very high resolution panchromatic Pléiades data in order to enhance the mapping accuracy of cultivated and abandoned oyster fields. Both approaches have indeed complementary advantages, the first bringing fine contours of oyster beds and the second producing coarser contours but with an efficient distinction between cultivated and abandoned fields. This fused result is then further post-processed to derive two by-products: a map of abandoned fields (Fig. 1C) and a map of cultivated oyster tables including table lengths (Fig. 1D). This second by-product can be useful to local land managers as table lengths are directly related to the oyster production. In the full version of this paper, the accuracy of the fused result will also be compared with accuracies of both previous approaches by including ground-truth data in the analysis.
REFERENCES


