# Post Doctoral Position Hyperspectral Image Analysis for bathymetry reconstruction and subtidal habitat identification

### IMS – Lab – Signal & Image Group CNRS - Bordeaux University – INP Bordeaux

### Location: Bordeaux

### Duration: 6 months (from spring 2016)

## Background

Multispectral imaging (Visible, Infrared) provides important data for ocean monitoring. However, the optical complexity of coastal water cannot be captured using only multispectral data, due to the lack of spectral accuracy. Some early studies have shown the strong potential of hyperspectral data to solve this issue.

This project brings together **COTE** and **CPU** “Excellence clusters” around the topic of “**remote sensing for environment**”, in cooperation with Vigo University, (Spain).

IMS Lab owns a compact hyperspectral camera able to map the spectral evolution of coastal waters. This sensor will be used on shallow coastal waters in order to characterize the nature and morphology of the ocean floor around the Arcachon bay.

Hyperspectral images will be acquired from an ultra light aircraft on which the hyperspectral camera will be installed. Additional measurements will be available from various spectral and biochemical sensors (ground truth). Researchers form COTE cluster will bring expertise regarding bathymetry estimation and subtidal habitat.

## Project

The Post-Doctoral fellow will develop non-Gaussian multivariate stochastic models [1][2] in order to characterize efficiently the spatial and spectral dependencies existing in the hyperspectral images. These models will then be implemented in classification algorithms. Since hyperspectral components are numerous and redundant, they usually entail computing and methodological issues. Therefore, we will also evaluate the benefit of preliminary dimensional reduction (Principal Component Analysis, Independent Component Analysis) [3]. The resulting classification will help to map accurately natural habitats and to provide better estimations of coastal bathymetry.

[1] Do M. N., and Vetterli M., “Wavelet-based texture retrieval using generalized Gaussian density and Kullback-Leibler distance,” IEEE Trans. Image Process., vol. 11, pp. 146-158, 2002.

[2] Regniers O., Bombrun L., Guyon D., Samalens J.-C., Germain C, 2014. Wavelet-based texture features for the classification of age classes in a maritime pine forest. IEEE Geoscience and Remote Sensing Letters, Vol.12 (3), pp.621-625, 2015.

[3] Xia J., Bombrun L., Adali T., Berthoumieu Y., Germain Ch., 2016. Classification of Hyperspectral Data with Ensemble of Subspace ICA and Edge-preserving Filtering, Proc. of ICASSP 2016.

## Contact:

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