Otolith identification of *Merluccius* populations and sympatric species with Local Discriminant Bases

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The species of the genus *Merluccius*, denominated commonly as hakes, contributes to significant catches from the Gadiformes order that represent a quarter of the world catch of commercial marine fish. Fisheries management of the *Merluccius* spp. requires determination of population units or precise species identification in the case of close sympatric poulations.

Over the last years, otolith contour images have been used as indicators in taxon and geographical populations. The selection of objective features from otolith images has been one of the main concerns in the last decades in order to enhance the performance of classification methods and, subsequently, to improve identification results.

For these tasks, the Local Discriminant Bases (LDB) and a standard classification procedure scheme is used in this work to determine intra-especific variability and differences between some sympatric species of *Merluccius* populations. First wavelets coefficients are selected by means of a class separability measure and then, the accuracy of the classifier is determined in a cross-validation process of test and training. Since LDB is based on discrimination of the Wavelet coefficients among populations, affinities and differences among fish groups can be determined in terms of contour irregularities and their position.

Its suitability has been tested developing pairwise intra-specific and inter-specific identifications using different *Merluccius* species from the AFORO database (http://aforo.cmima.csic.es). Simulations have been carried out achieving an average estimation of expected accuracy of 85% in four sympatric comparisons (*M. gayi* vs *M. australis, M. albidus* vs*. M. bilinearis, M. capensis* vs *M. paradoxus and M. polli* vs. *M. senegalensis*), and 77% in four intra-specific comparison (North American Pacific *M. bilinearis* and Atlantic *M. productus*, iberian *M. merluccius* and South American Pacific *M. gayi*).

Although the selection of suitable class separability measures, the performance with more than two species and the accuracy estimation method still needs to be studied in detail to achieve figures according to 'realistic' fish sampling settings, results are promising and may justify the use of discrimination methods based on LDB as future tools in otolith identification based in new descriptors as wavelets.