



## **Early diagenesis of magnetic minerals as a characteristic feature of ria environments. A conceptual model.**

**K. Mohamed** (1), D. Rey (1), B. Rubio (1) and F. Vilas (1)

(1) Dept. of Marine Geosciences and L. M. Faculty of Marine Sciences, University of Vigo. Lagoas-Marcosende, 36310. Vigo, Spain. (kmohamed@uvigo.es / +34 986812556)

Magnetic studies carried out in the Galician Rias of Vigo, Pontevedra and Arousa, NW Spain, in the last years have revealed that early diagenesis is the key factor controlling magnetic properties with depth. The variations with depth of the magnetic properties of the sediments in these environments showed a clear three-layer zonation, based on their distinct magnetic properties. This zonation was characterized by an upper layer dominated by magnetite. In the intermediate layer, the iron oxides underwent rapid dissolution, increasing the relative influence of high coercivity magnetic minerals in the magnetic properties of this zone, given their higher resistance to reductive dissolution. Framboidal iron sulfides in this zone are ubiquitous. Their composition is mainly pyritic, although framboidal ferrimagnetic greigite is frequently associated to pyrites. The lowermost layer was characterized by the almost complete depletion of magnetic minerals, due to the progressive increment of reducing conditions with depth.

The thickness and depth of each zone varied longitudinally along the central axis of the rias. Water depth and wave-energy were identified as the main factors controlling this zonation. Greater water depth and wave-induced water agitation in the external areas forced the resuspension of the sediments. This resulted in a more effective and longer oxidation of organic matter in the water column, which delayed the onset and controlled the extent of early diagenetic reduction in these areas.

The comparative analysis of the three rias showed a similar pattern in all of them, and allowed for the definition of a conceptual model of magnetic mineral early diagenesis common to the studied rias. The definition of this model could then be applied to the identification of areas under a high anthropogenic influence, which were easily

recognised by the deviation from this common pattern.

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