Chemical forms of Fe in sediments of Ría de Vigo (NW Spain)

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Ría de Vigo (NW Spain) is a large submerged incised valley with high rates of sedimentation and high organic matter content. These peculiar characteristics favor the development of anoxic conditions in the sediment that determine the dynamics of elements such as Fe, conditioning their speciation. To evaluate speciation of iron in these complex environments, two gravity cores were colleted. A corer located at the inner zone (C8) with 220 cm deep and the other at the outer part (C11) with 320 cm depth.

Fe fractionation was performed following a sequential extraction according to Campanella *et al* (1995) modified method. The extraction consists of five steps including: Fe present in ion exchange form and bound to the carbonate (F1), Fe present in the reductive phase bound to manganese-iron oxides (F2), Fe weakly bound to organic matter (F3), Fe strongly bound to organic matter (F4), and Fe bound to the sulphide phase (F5). In each fraction, the concentration of Fe was determined by ICP-OES (Perkin Elmer Optima 4300 DV).

Total iron contents were higher in the outer zone (18.5 g kg^{-1} in C11 and 12.9 g kg^{-1} in C8 in average).

In both cores, the most abundant fractions were Fe bound to the sulphide phase (F5) and Fe present in the reductive phase bound to manganese-iron oxides (F2), accounting for 40% and 20% of total Fe. Futhermore, in C11, F2 decreased with depth while in C8 this fraction was quite homogenous.

Fractions of Fe bound to organic matter (F3 plus F4) were minority in both cases (0.94 g kg^{-1} in C8 and 1.26 g kg^{-1} in C11). These two fractions had different behaviour, while these fractions decreased with depth in C11, in the inner part of the ría (C8) both fractions followed an inverse behaviour, increasing F3 and decreasing F4 with depth.

In both cores, Fe present in ion-exchange form and bound to carbonate (F1) decreased up to 120 cm depth but increased below this depth. This fraction, that was minoritary in both cores with values of 1.31 ± 0.24 g kg^{-1} in C11 and 0.51 ± 0.21 g kg^{-1} in C8, is one of the most dangerous from an environmental point of view and indicate greater mobility and toxicity of Fe in the outer zone of the Ría.