



Quantification of MTE in surface sediments of Morbihan Coast (South Brittany, France): A preliminary approach for determination of sources and dynamics

Joselyn Jimenez (1), Evelyne Goubert (1), Laurent Labeyrie (1), Alexandra Coynel (2), and David Menier (3)

(1) UMR CNRS 6538 LDO GMGL, Université Bretagne Sud, Vannes, France (joselyn.jimenez@univ-ubs.fr), (2) UMR CNRS 5805 EPOC, Université de Bordeaux, Talence, France (alexandra.coynel@u-bordeaux.fr), (3) Department of Petroleum Geoscience, Universiti Teknologi PETRONAS, Tonoh, Malaysia (david.menier@petronas.com.my)

The Morbihan Coast (South Brittany, France) has an intense coastal activity: farming, industry, urban habitation run-off, yachting and transportation. In the past centuries, tin mining industry was also developed. These different factors may introduce metal trace elements (MTE) into the marine environment at toxic concentration levels. This pollution can particularly affect the oyster production, widely developed in the area.

Monitoring MTE in surface sediments at high spatial resolution has been programmed to assess pollutants and their sources in two of the major Morbihan coastal systems concerned with oyster farming, and where available information on MTE impact and sediment quality is limited: the Bay of Quiberon, partly protected from the open ocean by the Quiberon Peninsula and several islands, mostly sandy (coarse to fine, with a significant shelly fraction), with water depths shallower than 25 m, and the Gulf of Morbihan, a shallow depth (less than 5 m, apart from the two paleoriver beds), semi-enclosed, estuarine system with very coarse sand to fine mud, mostly distributed by a strong tidal current system. Fifty two surface sediment samples were collected in April 2013 to characterize the MTE spatial distribution through the salinity and pollution gradients, from the small local rivers and harbor areas to the open marine environments. Analyses cover sedimentological and biogeochemical properties (particulate organic carbon using a LECO-CS-230; MTE using ICP-MS or DMA for Hg). Statistical analyses help to discriminate within the spatial variability the natural (e.g. grain-size effect) and anthropogenic factors. MTE concentrations were also compared to local geochemical background as measured at the bottom of three sediment cores collected in representative sites, for calculating the enrichment index of each MTE and evaluating the degree of sediment contamination.

The initial interpretation of the results would indicate a clear distinction between the geochemical gradients linked to natural processes: sediment sources and size fractionation (for example, the relationship between Sr and carbonate concentration in the sand fraction), and gradients linked to polluting factors, in particular in the harbors and protected areas, probably associated with boat maintenance (with Cu, Zn and Sn concentrations exceeding 100 ppm, up to 300 ppm in isolated places). More detailed statistical analyses and implications will be presented at the conference.