Using stable isotopes of mercury and methylmercury to discriminate contamination profiles between sea bass, *Dicentrarchus labrax*, populations

Cransveld Alice[1], David Amouroux[2], Emmanuil Koutrakis[3], Sylvain Bérail[2], Caiyan Feng[2], Julien Barre[2], Joseph Schnitzler[1] and Krishna Das[1]

[1] Oceanology, Sciences Faculty, University of Liège (B6c), B-4000 Sart Tilman, Belgium
E-mail: Alice.cransveld@ulg.ac.be

[2] Fisheries Research Institute, Hellenic Agricultural Organisation, G-640 07 Nea Peramos, Kavala, Greece

[3] LCABIE-IPREM, UMR 5254 CNRS, Université de Pau et des Pays de l'Adour, F-64053 Pau Cedex 09, France

Despite many efforts consented in the last decades, Mercury (Hg) emissions have kept rising worldwide. Currently, anthropogenic inputs dominate Hg emissions to the atmosphere by far, natural releases accounting only for a 4th of the total. Because Hg has a stable gaseous form (Hg^0) with a long residence time in the atmosphere (~1year), both natural and industrially produced Hg can be transported far from point sources. Therefore, many uncertainties remain in our knowledge about Hg biogeochemistry.

Our study aims at identifying the different Hg forms found in marine predators in order to discriminate different polluted areas and potential pollution sources. More specifically, we seek to discriminate contaminations of local origins versus contamination of global origins. To achieve this, we are currently studying different sea bass, *Dicentrarchus labrax*, populations from the Atlantic Ocean and Mediterranean. In muscle, liver, kidney and brain tissues, we analyze total Mercury (THg) and methylmercury (MeHg). We are also testing the discrimination power of Hg's stable isotopes (^{199}Hg, ^{201}Hg and ^{202}Hg). Indeed, recent findings show that Hg isotopes can exhibit both mass-dependent (MDF) and mass-independent fractionation (MIF). This means that Hg isotopes provide two different types of information at once, both on biological cycling of Hg, including bioaccumulation (MDF), and on chemical pathways such as photochemical transformations (MIF). Eventually, we are planning to extend our results with compound specific isotope analysis (CSIA) on the carbon of methylmercury.

Preliminary analysis performed on 14 juvenile specimens from the North Sea and the Aegean Sea indicate that THg concentrations are higher in individuals from the North Sea than from Greece. The lack of correlation with size and weight indicates that it is likely linked to a difference in contamination levels between the two areas. MeHg is the predominant form of Hg in muscle, while the same cannot be asserted for liver. Mass dependent isotopic values ($\delta^{202}Hg$), were always higher in muscle than in liver and, for each tissue, values were similar between the two areas. This is probably related to the species distribution and to some internal Hg metabolism. For mass independent isotopic signature (MIF), sea bass from the Aegean Sea had a systematically higher $\Delta 201Hg$ value than individuals from the North Sea. Thus, mass independent values seem definitely site dependent and might be in agreement with differences in both mercury sources and cycling in the North and Aegean Seas. These preliminary results consequently indicate that Hg isotopes may help to discriminate fish from different areas. This promising outcome must be further confirmed by extending our sampling and will be coupled to other results obtained through CSIA.