Traceability for mercury isotopic measurements

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Mercury in its many chemical forms is highly toxic to human, animal and environmental health, therefore accurate measurements to assess concentrations and trends are essential. In fact, one of the objectives of European Directives is to ensure the reliability and comparability of measurement results, as is the case for similar toxic elements covered by legislation. It was in this framework that the European Project JRP ENV51 *MeTra – Traceability for Mercury Measurements* has emerged.

Mercury stable isotope analysis has been recently used to help explain Hg sources and biogeochemical transformations and pathways. Stable isotopes fractionate during many biogeochemical processes, imprinting specific isotope compositions in end products, and allowing us to trace potential sources and pathways of Hg. However, these fractionation phenomena can also occur during the analysis, or more precisely, in each stage of the analytical chain, from sampling, storage, sample preparation (digestion, derivatization, ...) and sample introduction into the MC-ICP-MS and it is therefore crucial to control them.

In this work, a metrological approach was adopted in order to evaluate how sample storage, sample preparation, sample introduction and mass bias correction could influence Hg isotopic measurements and assess the impact of each stage of the analytical chain on the traceability of Hg measurements. In oder to do so, samples were stored up to 6 months, digestions performed with high pressure asher and hotblocks were compared as well as different digestion mixtures, matrix effects were studied and different approaches on mass bias correction (sample-standard bracketing, internal standard and double spike) were evaluated.