Combination of isotopic composition and speciation in rice grains from chinese mining area to elucitade Hg biogeochemcial pathways

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Mercury is a pollutant of major concern that can be bioaccumulated on the throphic web, resulting on a biomagnification of its negative effects on human health. Rice, the dominant global crop, is recognised to be an important source of Hg in human diet considering the soil uptake and transport to the edible part. It constitutes a potential risk in Hg polluted areas, as mining regions in China, where the most important monomethyl mercury (MeHg) exposure source is not fish consuption, but rice [1].

In this work Hg speciation (GC-ICPMS) and isotoic composition (CVG-MC-ICPMS) in 14 rice grain samples from different locations in Whanshan Hg-mining area (Guizhou Province, China) were investigated. A large variation of MeHg %, from 10 to 90%, is observed. Mass dependent fractionation (MDF) of Hg differed by up to ~4.0 ‰ in δ202 Hg values, depending on the sampling site, meanwhile mass independent fractionation (MIF) of Hg isotopes remain constant (close to 0).

The combination of Hg isotopic composition and MeHg extent shows that this Hg organic species is much easily transported than Hg(II), what can be attributhed to the retention of inorganic forms by phytochelatins [2]. The identification of MeHg binding cysteine in enzymatic extracts of rice grains [3] suggests the implication of proteins and biomolecules on the processes of uptake and transport of such neurotoxic species. The elucidation of such unknown processes claim for a different Hg speciation approach, based on liquid chromatography. It allows the investigation of Hg-containg biomolecules, not being limited to Hg inorganic and MeHg species, as has been done until the moment. This work deal also with such a challenge: advantages, drawbacks and perspectives of Hg speciation by HPLC and its combination to isotopic analyses will also be presented.

[1] X. Feng *et al Environ. Sci. Technol.* 2008, **42**, 326 [2] Krupp *et al Chem Comm* 2009, 4257. [3] Li *et al Environ. Poll.* 2010, **58**, 3103.