

# Determination of femtomolar levels of methylmercury in sea-water by isotopic dilution gas chromatography sector field inductively coupled plasma mass spectrometry

Christelle Lagane<sup>1,@</sup>, Lars-Eric Heimbürger<sup>2,@</sup>, David Point<sup>1,@</sup>,  
Laure Laffont<sup>2,@</sup>, Jérémy Masbou<sup>2,@</sup>, Frédéric Candaudap<sup>2,@</sup>,  
Bastien Thomas<sup>3,@</sup>, Daniel Cossa<sup>4,@</sup>, Joël Knoery<sup>3,@</sup>, Jeroen  
Sonke<sup>2,@</sup>

**1** : Geosciences Environment Toulouse (GET), IRD, 14 avenue Edouard Belin, 31400, Toulouse - France

**2** : Geosciences Environment Toulouse (GET), CNRS : UMR5563, 14 avenue Edouard Belin, 31400, Toulouse - France

**3** : Laboratoire Biogéochimie des contaminants métalliques (LBCM) - **Website**

IFREMER - Laboratoire Biogéochimie des Contaminants Métalliques rue de l'Île d'Yeu 44311 NANTES Cedex 3 - France

**4** : Laboratoire Biogéochimie des contaminants métallique (LBCM) - **Website**

IFREMER - Centre de Méditerranée LBCM Zone Portuaire de Brégaillon CS 20330 83507 La Seyne sur Mer cedex - France

Monomethylmercury (MMHg) accumulates to harmful levels along the marine food chain. Determinations of MMHg in sea-water are still scarce mainly due to analytical limitations that did not allow detecting ultratrace concentration levels, in the femtomolar range. Three techniques are used today to measure MMHg in sea-water and of which all imply a derivatization step: cryofocussing hydrate generation [1], ethylation [2] and propylation [3]. Determination of MMHg in sea-water by species-specific isotope dilution, derivatization by propylation, and detection via gas chromatography–inductively coupled plasma mass spectrometry (ID-GC-ICP-MS) was shown to be most promising [3]. We improved the performance of this method by optimizing the coupling between a gas chromatograph and a high resolution sector field inductively coupled plasma mass spectrometry (Element XR). Participation on recent international intercalibration exercises confirmed the performance of this method in terms of detection limits, accuracy and precision. We applied this method to samples from the recent Polarstern cruise ARK XVI/3 TranArk to the central Arctic Ocean (09/2011). A vertical profile was measured in parallel at the GET laboratory via ID-GC-SF-ICP-MS and at the IFREMER laboratory in Nantes via cryofocussing hydrate generation and detection via atomic fluorescence spectroscopy [4]. We will discuss the results of this comparison as well as precision, detection limit and blank levels.

[1] Stoichev et al. 2002. J Environ Mon **4**: 517-521

[2] Bloom 1989. Can Jour of Fish Aqua Sci **46**(7): 1131-1140

[3] Monperrus et al. 2005. Anal Bioanal Chem **381**(4): 854-862

[4] Cossa et al. 2003. IFREMER eds Quae