

Mercury (Hg) is one of the most toxic elements in natural and urbanised environments and monomethylmercury (MeHg) is the most health concern due to its bioaccumulation and biomagnification along the food chain. Coastal and estuarine zones are often the specific sites of high Hg contamination due to the anthropogenic. The BPNS (Belgian Part of the North Sea) has suffered a long-term, recurrent metallic pollution by atmospheric deposition, direct wastewater discharge from coastal industries and input of the Scheldt Estuary which is enriched in trace metals originating from its watershed and especially from the industrial site of Antwerp. Sediment functions both as a sink of Hg accumulation and a source of Hg release to surface water. In addition, sediment can also record both historical and current Hg contamination in aquatic systems if the vertical profile of Hg in sediment available (solid phase). More research has been done on Hg contamination in sediment solid phase, however the Hg and MeHg concentrations in sediment porewater are normally low (at ng/L level) and the conventional methodology (centrifugation and filtration, or Rhizon extraction) to sample Hg and MeHg in porewater cannot always produce accurate results especially for MeHg. The passive sampling technique of Diffusive Gradients in Thin-films (DGT) is a suitable technique preconcentrating labile Hg and MeHg from porewater and then be analyzed by Advance Mercury Analyzer (AMA) for total Hg concentrations and Gas Chromatography coupled with Atomic Fluorescence Spectrometry (GC-AFS) for MeHg concentrations. The total Hg concentration in porewater samples (from classic sampling method) can be analysed with Cold Vapor-Atomic Fluorescence Spectrometry (CV-AFS) after oxidation and reduction of samples. In addition, different from porewater extraction, DGT is a powerful tool to measure labile fractions of Hg and MeHg due to the pore size of the diffusive gel (10-20 nm) in sediment porewater and the labile fraction of Hg and MeHg measured by DGT is potentially bioavailable in aquatic systems. While the exchange of Hg between solid and dissolved phases can affect the labile Hg concentration both in water and sediment. Mercury and MeHg distribution between different phases in sediment systems can be also studied in this way. In the two Belgica campaigns in March 2020 and March 2021 in the Scheldt estuary and the BPNS, both classic porewater and DGT sampling were carried out and Hg and MeHg concentration profiles were obtained by these two sampling methodologies. Relatively high total Hg concentrations were observed both in sediment porewater (10 to 90 ng/L) and solid phase (93 to 406 µg/kg) at sampling station S15 (upper Scheldt estuary and close to the industrial zone of Antwerp, salinity was around 5). The labile Hg concentrations (DGT measured) were ranged from 2 to 35 ng/L in the porewater at S15. However, lower total Hg concentrations were found in sediment porewater (3 to 43 ng/L) and solid phase (31 to 147 µg/kg) at sampling station SV (Close to Zeebrugge harbor in the BPNS, salinity was around 29). In SV, labile Hg concentrations were fluctuated around 11 ng/L. The range of MeHg is from 0.5 to 3.6 ng/L at S15 and from 0 to 1.0 ng/L at SV. High MeHg concentrations are related to the sediment environment and the concentration of total Hg in porewater.

Key words: Hg and MeHg concentrations, sediment porewater and solid phase, DGT, bioavailable