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## Application of Radioactive and Stable Isotopes to Trace Anthropogenic Pollution in the Baltic Sea

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The Baltic Sea is one of the seas most contaminated by various pollutants including the chemical munitions dumped after the Second World War. Pu isotopes,  $\Delta^{14}\text{C}$  and  $\delta^{13}\text{C}$  of total organic carbon (TOC) as well as lipid and phospholipids (PL) fractions of the sediments were applied to study sources of pollutants including chemical warfare agents (CWA). The compound-specific  $\delta^{13}\text{C}$  analysis, PL-derived fatty acid biomarkers and an end-member mixing model were used to estimate a relative contribution of the marine, terrestrial and fossil as well as petroleum hydrocarbons (measured directly) sources to organic carbon in the sediments, to assess a possible effect of petroleum hydrocarbon contamination on radiocarbon signatures and to elucidate a possible leakage of CWA at the Gotland Deep dumpsite. Data on spatial distribution of As, Zn, Ni, Cr, Hg, Cd, Cu and Pb concentrations as well as  $^{206}\text{Pb}/^{207}\text{Pb}$  and  $^{208}\text{Pb}/^{207}\text{Pb}$  ratios in the surface sediments indicated the highest concentrations of Pb with their different pattern of distribution and insignificant variations of  $^{206}\text{Pb}/^{207}\text{Pb}$  and  $^{208}\text{Pb}/^{207}\text{Pb}$  ratios. The obtained data revealed the possible application of the Chernobyl-derived Pu to trace the pollutants of the terrestrial origin. Wide TOC variations with the strong impact of the terrestrial and fresh waters in the coastal areas were observed. Variations of  $\Delta^{14}\text{C}$  and  $\delta^{13}\text{C}$  values with the most depleted values of the  $\Delta^{14}\text{CTOC}$  ( $-453\text{‰}$ ) and  $\Delta^{14}\text{C}$  of total lipid extracts ( $-812.4\text{‰}$ ) at the CWA dumpsite were found. An excess (after subtracting the petroleum hydrocarbon) of fossil sources at the CWA dumpsite as compared to those at other stations in the Baltic Sea was detected. The obtained results indicated a possible effect of CWA on depleted  $\Delta^{14}\text{C}$  and  $\delta^{13}\text{C}$  values. This study was supported by the Research Council of Lithuania (contract No. MIP-080/2012).

### Country or International Organization

Lithuania

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