

Lead content, fractionation and ratios of stable isotopes in marine sediments from Saronikos Gulf, Greece

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Saronikos Gulf is one of the most polluted marine regions in Greece as it is located next to a heavily industrialized region and to one of the greatest ports of Mediterranean Sea. In this study, sediment cores from three different areas of Saronikos Gulf were analyzed for a) total concentration of Pb, b) distribution of Pb into the sediments' labile, reducible, oxidizable and residual fraction and c) $^{206}\text{Pb}/^{207}\text{Pb}$ and $^{208}\text{Pb}/^{207}\text{Pb}$ isotopic ratios. The two sampling stations are mostly impacted by the coastal industrial zone while the third is near to Peiraias Port and the WWTP of Metropolitan area of Athens, thus mainly impacted by urban pollution. The vertical distribution of the total Pb content showed clear enrichment during the past decades comparing to Pb natural background concentrations. Fractionation analysis demonstrated a high Pb fraction (up to 40%) that is bonded with organic compounds and sulfides while the three bio-available forms (labile, reducible and oxidizable fraction) exceeded the 60% of the total Pb content. Lead partitioning indicated the anthropogenic origin of Pb which was also confirmed by the Pb isotopic ratios. The vertical distribution of the $^{206}\text{Pb}/^{207}\text{Pb}$ ratio showed a clear shift to higher values for the stations close to the industrial zone. Isotopic ratios determination also revealed a different pattern for the station which is mainly impacted by urban pollution in which the $^{208}\text{Pb}/^{207}\text{Pb}$ ratio was shifted to higher values for the upper 2cm of the sediment core.