Isotopic constraints (^{228}Th, ^{210}Pb) on the age of resuspension episodes of contaminated sediments in a coastal lagoon from Northwestern Mexico

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In order to document anthropogenic fluxes of trace metal contamination in the coastal lagoon system of Altata Ensenada del Pabellon, on the Pacific coast of Mexico, sediment push-cores up to ~ 70 cm-long were raised at the inner lagoons of Chiricahueto (CHI) and Caimanero (CAI) and at Culiacan estuary (ERC). The cores were subsampled at one-centimeter intervals for measurements of: ^{228}Th, ^{230}Th, ^{232}Th and ^{210}Pb (^{210}Po) through alpha-counting, ^{226}Ra by thermal ionization mass spectrometry and ^{137}Cs by gamma counting using a well-detector device. ^{137}Cs activity measurements were at background level for all samples. Based on ^{226}Ra data, the supported ^{210}Pb fraction was estimated to be ~ 1.1 dpm.g^{-1}, which corresponds to the minimum ^{210}Pb activities measured in the study cores; and this value was subtracted to total ^{210}Pb-measurements in order to calculate ^{210}Pb-excesses ($^{210}Pb_{xs}$). Core CHI shows a flat, ~ 0, $^{210}Pb_{xs}$ profile indicating the absence of recent sedimentation (i.e., less than ~ 100 yrs) and possibly erosion at the site. In opposition, core ERC shows an almost constant $^{210}Pb_{xs}$ of ~ 2 dpm.g^{-1} in the top 70 cm, overlying a section with a $^{210}Pb_{xs}$ ~ 0; this suggests the presence of relatively old sediment on top of a rather thick layer of recent material likely (re-)deposited during one single resuspension event, possibly triggered by high storminess conditions. Core CAI also shows flat but significantly lower $^{210}Pb_{xs}$, in its upper section, suggesting a

more older resuspension event at the origin of the corresponding layer, or the resuspension of sediment with a lesser $^{210}Pb_{xs}$. At site ERC, large ^{228}Th-excesses over ^{232}Th are observed, suggesting that the resuspension event, at the origin of the deposition of the upper high-$^{210}Pb_{xs}$ layer, occurred less than 10 years ago (i.e., less than 5 half-lives of ^{228}Th). It is concluded that the contaminated sediment of the lagoon are likely to be frequently resuspended, re-oxygenated, and therefore that the contaminating trace metal will continue to be easily remobilized in the food chain.