Time-average fluxes of lead and fallout radionuclides to sediments in Florida Bay, Florida, USA

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Recent, unmixed sediments from mud banks of central Florida Bay were dated using $^{210}Pb/^{226}Ra$, and chronologies were verified by comparing sediment lead temporal record with Pb/Ca ratios in annual layers of a coral (*Montastrea annularis).* Dates of sediment lead peaks (1978 ± 2) accord with prior observations of a six-year lag between occurrences of maximum atmospheric lead in 1972 and peak coral lead in 1978. Smaller lags of 1-2 years occur between the year of maximum fallout and the sediment record of ^{137}Cs and Pu. Such lags are consequences of system-time averaging (STA) in which atmospherically derived material accumulates and mix before removal to the sediments and coral. Using time-dependant atmospheric inputs, STA model calculations produced optimized profiles in excellent accord with measured sediment ^{137}Cs, Pu lead and corals distributions. Derived residence times of these particle tracers (16 ± 1, 15.7 ± 0.7, 19 ± 3, and 16 ± 2 years, respectively) are comparable despite differences in sampling locations, in accumulating media, and in element loading histories and geochemical properties. For a sixteen-year, weighed-mean residence time, STA generates the observed six-year lead peak lag. This study shows that, when transient tracers are used to verify ^{210}Pb chronologies, potential lag effects resulting from STA processes must be considered. Because of reservoir effects, significant levels or non-degrad-

able, particle-associated contaminants can persist in Florida Bay for many decades following elimination of external inputs. Present results, in combination with STA-models analysis of previously reported radionuclide profiles; indicate that decade- scale time averaging may occur widely in recent coastal marine environments.