
Sedimentary Signature of Hurricanes and Exceptional Events in Cienfuegos Bay, Cuba, Inferred from ^{210}Pb and ^{137}Cs Vertical Profiles

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ABSTRACT

Dating techniques based on the natural and anthropogenic radionuclides ^{210}Pb and ^{137}Cs were applied to the study of the sedimentation regime in Cienfuegos Bay, Cuba. Core samples were collected from different locations in the bay and analyzed to evaluate the accumulation rate, through the ^{210}Pb dating technique. Results evidenced significant changes in the sedimentation rate during the last forty years: the recent sediment accumulation rates ($0.40\text{-}0.45\text{ g}\cdot\text{cm}^{-2}\cdot\text{yr}^{-1}$) are almost double those estimated before 1965 ($0.15\text{-}0.20\text{ g}\cdot\text{cm}^{-2}\cdot\text{yr}^{-1}$). The ^{210}Pb profiles show significant deviations from a simple exponential decline and abrupt variations between 1966-1970 and 1985-1990. These irregularities match closely periods of changes in land use (regimentation of the Arimao and Caonao rivers in the late 1960s and early 1970s) and exceptional natural events (Hurricane Camille in 1969 and the intense rainfall of 1988) which occurred in Cienfuegos. The ^{137}Cs and chlorite minerals profiles validate the results obtained from ^{210}Pb dating and confirm the effect of exceptional events and changes in the natural hydrological regime of the bay during the past forty years.