

Sediment Dating Effectiveness Using Pb210 Dating Technique at Changshou Lake in Three Gorges Reservoir Region, China

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Abstract : Reconstruction of the historic natural and anthropogenic effects on lake ecology has been of increasing concern to protect and improve degrading ecosystems. The dates of the Changshou Lake sediment core were estimated using Lead-210 (^{210}Pb) Constant rate of supply (CRS) and Constant Initial Concentration (CIC) models. While historic records such as Cesium-137 (^{137}Cs), C/N signals and rainfall erosivity are used as multiple proxies of the reality of the sediment profile dates. The results showed that the combined use of ^{137}Cs and ^{210}Pb chronologies using the CIC model at Changshou Lake is an effective way to address the average sedimentation rate of (1.65 cm y-1) and consistency between the estimated dates. Whereas, the CRS model estimated relatively older ages for the Changshou Lake native river bed and a misleading average sedimentation rate of (0.09 cm y-1) due to possible turbidity flows or preferential association of ^{210}Pb with organic matter. Alternate dating index logically reconstructed the lake ecological variations for total organic carbon, total nitrogen and carbon to nitrogen ratio with respect to historic natural and anthropogenic activities in the catchment. It can be concluded that the CIC dating model provided reliable sedimentation rate and age estimates as compared to ^{137}Cs and multiple proxies proposed dating index, whereas the CRS model was not suitable for dating sediment from Changshou Lake. There is a need to investigate advanced techniques for sediment dating problems at Changshou Lake.

Keywords : radiochronology, lead dating, CIC, CRS, rainfall erosivity, alternate dating

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