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Extremely high ^{137}Cs and $^{210}Pb_{ex}$ contents of two layers of reservoir deposit in response to abrupt destruction of vegetation in the Jiulongdian Watershed, Yunnan, China

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The Jiulongdian Reservoir, located in the Yunnan Plateau of China, has a drainage area of 257.6 km^2, a maximum water surface area of 5.24 km^2 and a storage capacity of 63 million m^3, respectively. Except for the two layers with extremely high ^{137}Cs and $^{210}Pb_{ex}$ concentrations, a collected deposit profile with a depth of 3.95 m from the reservoir has generally normal ^{137}Cs and $^{210}Pbex$ depth distribution shapes. The layer of 230.5-236.8 cm in depth, related to 1963, has a quite high ^{137}Cs concentration of 4.26 +/-0.35 $Bqkg^{-1}$. From the layer, ^{137}Cs concentration decreases rapidly downward and the nuclide is nearly undetected below the depth of 250.0 cm and decreases gently upward. The top layer of 0-5.0cm in depth has a quite high $^{210}Pb_{ex}$ concentration of 17.87 +/-1.17 $Bqkg^{-1}$ and the concentration decreases gradually downward due to natural radio decay. The upper special layer of 15-21 cm has extremely high ^{137}Cs concentration of 10.90 +/-0.49 $Bqkg^{-1}$ and $^{210}Pb_{ex}$ concentration of 59.20 +/-3.44 $Bqkg^{-1}$. The lower special layer of 330.5-336.8 cm in depth has only an extremely high $^{210}Pb_{ex}$ concentration of 43.40 +/-6.40 $Bqkg^{-1}$ and no ^{137}Cs was detected in the layer. By investigation of environmental changes in the drainage basin of the reservoir since 1950s, the lower special layer with only extremely high $^{210}Pb_{ex}$ concentration is related to the severe deforestation during the period of “Great Leap Forward ” from 1958 to 1960 before the peak ^{137}Cs deposition in the world, however, the upper special layer with both extremely high ^{137}Cs and $^{210}Pbex$ concentrations is related to the 1998’s forest fire with an area of 0.18 km^2, which occurred in a small tributary basin just above the sampling profile site.

Keywords: forest fire, forest clear, sedimentation, soil erosion, Cs-137Cs, Pb_{ex}-210