

EXCESS ^{210}Pb ACTIVITY CONCENTRATION IN BOTTOM SEDIMENTS FROM ARAXÁ REGION, MINAS GERAIS STATE, BRAZIL

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ABSTRACT: This paper focuses a geochemical and excess ^{210}Pb survey held in bottom sediments from Araxá region, Minas Gerais State, Brazil. Araxá city is located at 19°35'33"S and 46°56'26"W, possessing an altitude of 973 m and a mild weather throughout the year. In 1944, the Brazilian President Getúlio Vargas inaugurated the "Grand Hotel Hydrothermal Complex" in a place known as Barreiro that is situated about 8 km from Araxá city center. It is a well-known site due to the occurrence of Dona Beija springs, whose waters are highly radioactive, also containing dissolved bicarbonates, calcium and magnesium. Sediments profiles (6) provided from the lake (Grand Hotel) and streams (Sal 1, Sal 2, Areia, Fundo, and Feio). The local municipality uses some waters (Areia, Fundo, and Feio streams) in water-supply systems. The device for cores collection was a stainless steel sampler with acrylic internal tube of 5-cm diameter, reaching the testimonies depths between 25 and 40 cm. The slices were 2.5-3.0 cm thick, each one sieved to 2 mm for removing roots, leaves and other coarse materials. Then, they were crushed to $<74\ \mu\text{m}$ size, mixed with wax (~1.5 g) as binding agent and boric acid (~3.5 g) for standing the mixture that was pressed in order to yield 40-mm diameter powder pellets appropriate to analysis in a Bruker S8 Tiger wavelength dispersive X-ray fluorescence (WDXRF) spectrometer. Digestion of homogeneous dried sediments aliquots (0.5 g) from each core section with *aqua regia* (1:3 $\text{HNO}_3\text{-HCl}$) at $\sim 60^\circ\text{C}$ allowed measuring ^{210}Pb in the sediments by the quantification of its granddaughter ^{210}Po . ^{210}Po deposition and measurement happened, respectively, in a copper disc (2.5-cm diameter) and by conventional alpha spectroscopy. The ^{210}Po activity concentration provided the total ^{210}Pb activity, $^{210}\text{Pb}_T$. Another digestion of different aliquots (0.6-1.6 g) with *aqua regia* allowed obtain information about the parent-supported (*in-situ* produced) ^{210}Pb , $^{210}\text{Pb}_s$, in the sediments. The supported ^{210}Pb , $^{210}\text{Pb}_s$, was calculated from the equation $^{210}\text{Pb}_s = 0.16 [\text{U}]$, where [U] is the U activity concentration determined by α -spectrometry. The excess ^{210}Pb activity, $^{210}\text{Pb}_{xs}$, corresponded to the difference between total and supported activities: $^{210}\text{Pb}_{xs} = ^{210}\text{Pb}_T - ^{210}\text{Pb}_s$. These excess ^{210}Pb activities are needed for applying the CF:CS and CRS ^{210}Pb chronological models, which are also used to provide sedimentation rates. Fe_2O_3 was the major oxide of all sediments sections from Grand Hotel lake, reaching a mean concentration value of 47%. However, SiO_2 was the dominant oxide of all sediments sections from other cores, reaching values between 29% and 90%. The excess ^{210}Pb activity concentration range found in the sediments profiles was: Grand Hotel lake- 15.6 to 37.9 dpm/g; Sal 1 stream- 5.5 to 12.9 dpm/g; Sal 2 stream- 5.0 to 8.4 dpm/g; Areia stream- 0.2 to 0.8 dpm/g; Fundo stream- 0.2 to 60.4 dpm/g; Feio stream- 0.3 to 2.8 dpm/g. Appropriate data treatment will allow decide the most reliable ^{210}Pb chronological model for each drainage in order to yield ages and sedimentation rates.

KEYWORDS: BOTTOM SEDIMENTS, LEAD-210, RADIOACTIVITY.