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THERMOLUMINESCENT DATING OF SEDIMENTS COLLECTED IN DIFFERENT DEPTHS OF SHELLMOUND SANTA MARTA II, SANTA CATARINA, BRAZIL

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Introduction: The dating of archaeological sites has significant importance for understanding the history and culture of the region. In this work, through physical methods, it will be possible to understand more about the history of shellmounds in Santa Catarina state region. This work aims to determine the age of sediments from different layers of the shellmound Santa Marta II, one of the largest shellmounds in the region, located in Laguna, Santa Catarina, Brazil. Samples of shells and sediments from layers with different depths were collected, from the surface to the point closest to the center of the shellmound. The results of 3 sediment samples collected at different depths will be presented. Thermoluminescence (TL) was the method used for sediment dating. For reconstruction of the accumulated dose, the additive method was used. The annual dose of the sediments of each layer was obtained through the gamma spectroscopy technique. To calculate the age, the residual TL of the sediments was considered.

Material and method: In a room with red lighting, the shells of each tube were separated from the sediment. The sediment samples were identified as S1, S2 and S3, sample S1 is closer to the surface, S3 is closer to the center of the shellmound and sample S2 was collected at a depth between samples S1 and S3.

The sediment samples were cleaned with chemical solutions in order to extract the quartz grains. The samples were left for 1 h in 40% H_2O_2 solutions to eliminate organic particles, 37% HCl, forming chlorides from metallic particles or compounds, and 28% HF to corrode the surface of the quartz grain. to eliminate the effect of alpha radiation. After cleaning, the samples were washed with distilled water. After drying, the samples were pulverized and sieved. Grains with diameters between 0.080 and 0.180 mm were used for analysis. The sediments were separated into 8 to 9 portions of approximately 500 mg. The sediment samples were irradiated with gamma radiation at doses from 5 to 100 Gy in a multipurpose irradiator with a ^{60}Co source.

Results: Age determination is calculated through the ratio of the accumulated dose (Gy) to the annual dose (mGy/year). To determine the accumulated dose of the sediments, thermoluminescence analyzes were performed. To plot the TL response intensity curve as a function of dose, the peak of 350 °C was chosen because it is more stable and increases as a function of dose. It is necessary to know the thermoluminescence acquired by the sample since it was buried, the last time it was exposed to light, this causes an overestimation of age, for this reason, correction of the accumulated dose was performed considering the residual TL. To estimate the annual dose, it is necessary to know the contents in ppm of ^{238}U, ^{232}Th and the percentage of ^{40}K present in the environment where the samples were collected through the gamma spectroscopy technique. Table 1 presents the values of accumulated dose, annual dose and age of each sample.

Sample	$D_{AN}\pm\sigma$ (mGy/a)	$D_{AC}\pm\sigma$ (Gy)	Idade±σ (ka)
S1	1,73±0,03	2,15±0,39	0,13±0,15
S2	1,61±0,03	6,27±0,45	2,09±0,18
S3	1,32±0,02	8,55±0,94	4,07±0,53

Figure 1: Table 1: Results of the annual dose rate, accumulated dose and age with their respective uncertainties for the sediment samples analyzed by thermoluminescence.

Conclusions: The location of the S1 sample, close to the edge of the shellmound, is one of the reasons why the value of the accumulated dose is low, it is possible that part of the top material of the shellmound has gone to the edge, or because it is located in a less deep layer, the solar radiation has reached this region of the shellmound. Samples S2 and S3 have ages between 2 and 4 thousand years, it is estimated that this is the period when the construction of the shellmound started.