INTERNATIONAL NUCLEAR ATLANTIC CONFERENCE
XXIII ENFIR XVI ENAN VIII ENIN X JR. POSTER XI ExpoINAC
Nuclear Energy:
Assuring Energy, Health and Food
May 06 - 10, 2024
Escola de Guerra Naval (EGN) | Rio de Janeiro - RJ

Determination of ^{210}Pb and ^{7}Be in Amazon Rainfall – site ATTO

M. A. Tamires[1], C. S. Paulo Sérigio[2], Z. S. Guilherme[3], and G. Antonio Frederico[4]

[1]tamires.mora@usp.br, [2]pscsilva@usp.br, [3]guilhermezahn@gmail.com, [4]pfredzini@ipen.br

Instituto de Pesquisas Energéticas e Nucleares (IPEN/USP-SP). Av. Professor Lineu Prestes 2242, 05508-000, São Paulo – Brasil

INTRODUCTION

The Amazon region is one of the largest direct sources of organic aerosols into the atmosphere. Aerosols are efficiently removed by precipitation [1], and radioactive isotopes can be used as atmospheric transport tracers and deposition processes. Among them stands out the ^{7}Be and the ^{210}Pb[2,3,4,5].

^{210}Pb
- $T_{1/2}$: 22,3 y
- γ: 46,5 keV
- ^{222}Rn decay product

^{7}Be
- $T_{1/2}$: 53,2 d
- γ: 477,6 keV
- Spallation process

- Emission sources;
- Temporal and seasonal variation;
- Deposition rates;
- Atmospheric distribution and removal

METHODOLOGY

RDSU – AMAZÔNIA
- Region of interest (FIG.1);
- Collection of Rainwater samples;
- Samples pre treatment with HCl.

IPEN
- Receipt the samples;
- Sample preparation;
- Samples measurements on a HPGe detector (^{7}Be and ^{210}Pb).

Samples collection occured in 2023 and 2024 at the ATTO site located in São Sebastião do Uatumã (FIG:1).

Figure 1: Sample collector in Campina region and Plateau region respectively

INSTITUTO DE PESQUISAS ENERGÉTICAS E NUCLEARES

Measurement procedure on the HPGe detector/Canberra-GX2528 with the spectro of the radionuclides (FIG 2).

Figure 2: Sample measurement procedure on the HPGe detector.

RESULTS AND DISCUSSION

The activity concentration values of the ^{210}Pb and ^{7}Be are on the following table:

TABLE 1: Activity concentration (mBq/L) of ^{210}Pb and ^{7}Be in rain water from the Amazon region – site ATTO.

Sample	M(L)	Sample period	^{7}Be (mBq/L)	^{210}Pb (mBq/L)
P1A -P	4,75	Dec.	468±32	221±68
P1B -P	4,75	Dec.	609±42	165±51
P2 -P	3,0	Jan.	381±26	<LID
C -C	5,0	Dec.	<LID	<LID
T -C	4,25	Jan.	356±25	308±96

CONCLUSIONS

Gamma specrometry was used for rainfall ^{210}Pb and ^{7}Be measurement. The preliminar results of the radionuclides activity concentration analized showed values almost uniform throught the rainwater analyzed and in good agrément with literature values measured in other rigions.

REFERENCES

[1] M. O. Andreae, AND P. J. Crutzen,"Atmospheric Aerosols: Biogeochemical Sources and Role in Atmospheric Chemistry", Science, vol. 276, pp. 1052-1058 (1997).
[2] M. I. Savva *et al*, "Applied Radiation and Isotopes", vol. 87, pp. 361 (2014).
[3] M.I. Savva , M.J. Anagnostakis, "Applied Radiation and Isotopes", vol. 109, pp. 555 (2015).
[4] D. E. Walling, Q. He, W. Blake, "Use of ^{7}Be and ^{137}Cs measurements to document short – and medium – term rates of water-induced soil erosion on agricultural land", Water Resources Research, vol. 35, pp. 3865-3874, (1999).
[5] I. Sykora, K. Froehlic, "Chapter 3 Radionuclides as Tracers of Atmospheric Processes", Radioactivity Environment, vol. 16, pp. 51 - 88, (2009).

Acknowledgements

Authors thanks the Institute of Energy and Nuclear Research (IPEN-CRPq)/USP for the study opportunity, the doctoral scholarship financed by CAPES, the INPA for the opportunity to visit ATTO in Amazon region and the ATTO resident employees.

ISBN: 978-65-594-1256-3