

8 International symposium on NORMs  
18-22 October 2016, Rio de Janeiro, Brasil

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# **Primordial and Anthropogenic Radionuclides in soil samples of bauxite ore deposits site in Western Region of Cameroon**

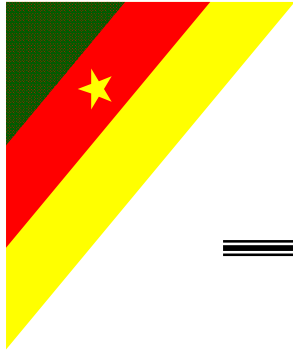
Presented by:

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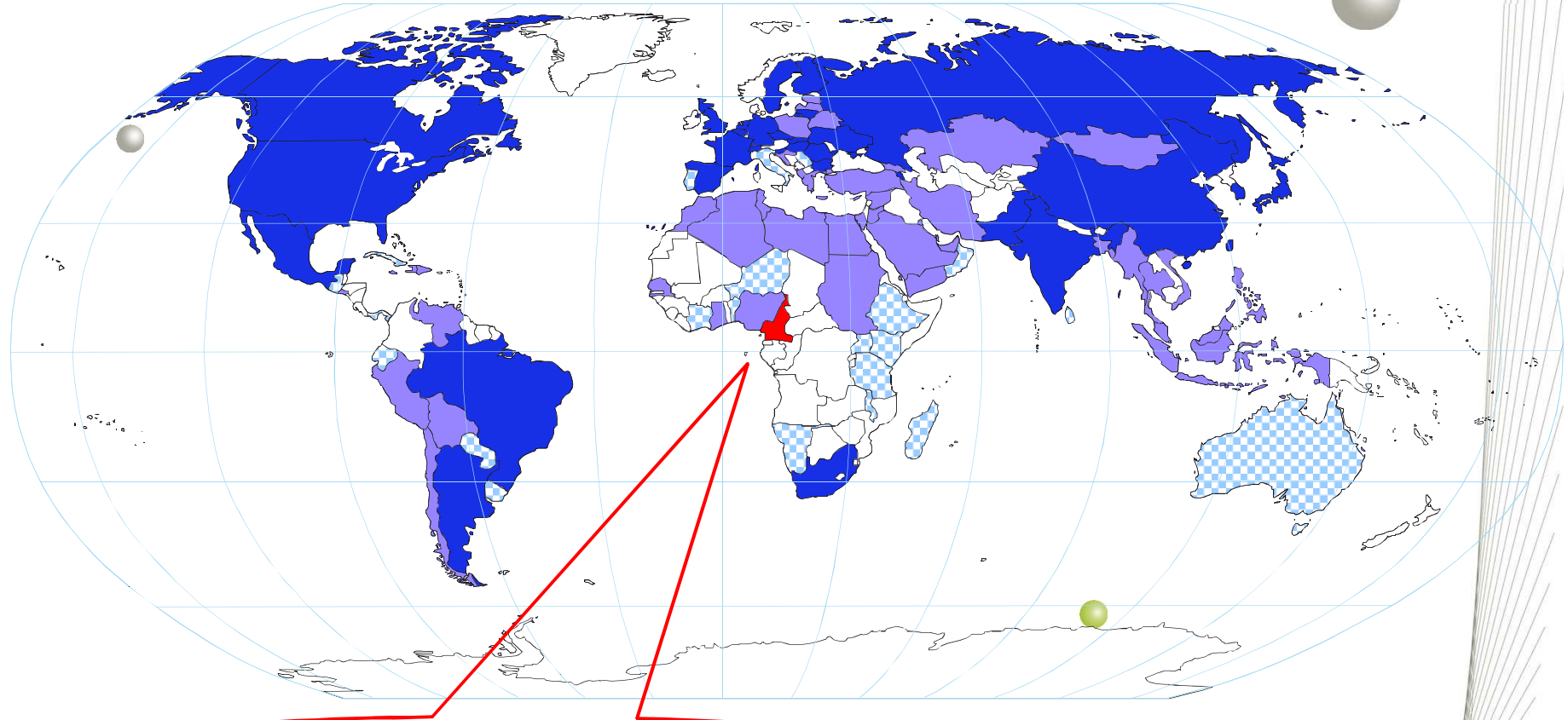
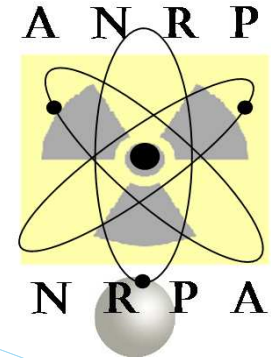
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# CAMEROON



My name is CAMEROON

**ANRP**



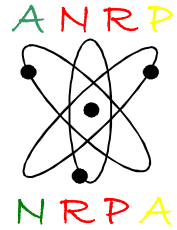
# OUTLINES

**1. Introduction**

**2. Material and Method**

**3. Results and discussion**

**4. Conclusion**



## 7 International symposium on NORMs 22-26 April 2013, Beijing, China

### Objectif

The primary goal of this study is to determine the level of natural radioactivity in the bauxite ore deposits site in Western Region of Cameroon

# Introduction

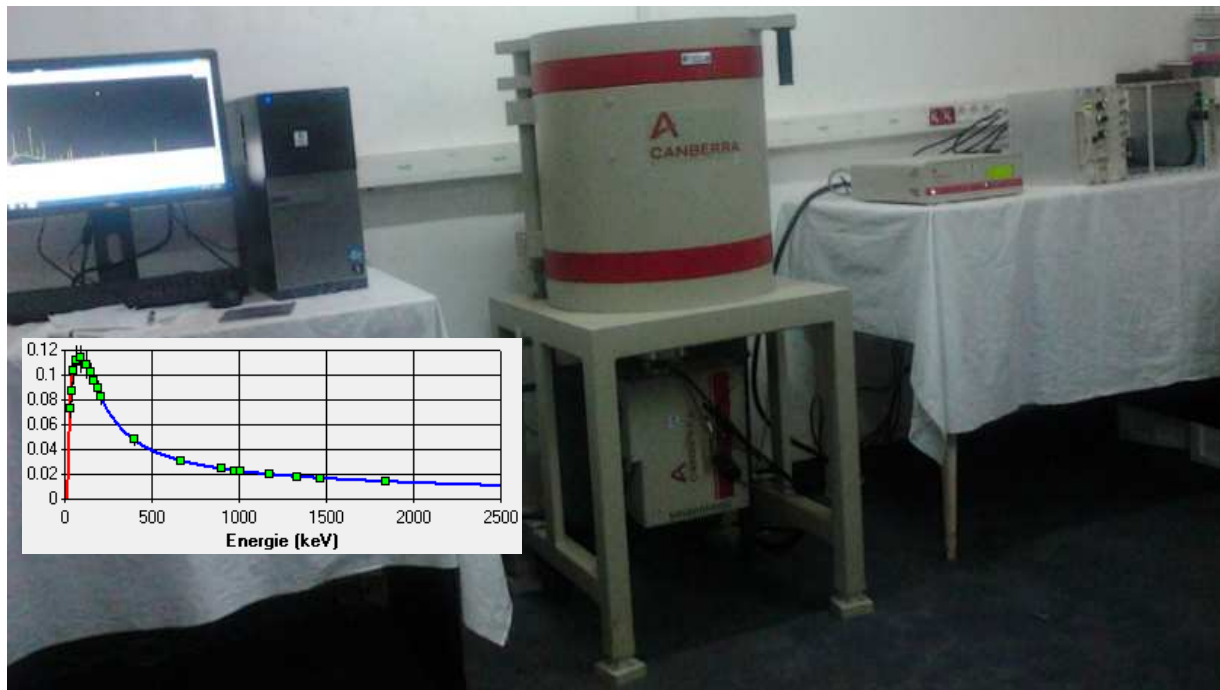
- The radiological impact analysis and radioecological significance of bauxite and red mud industry in the environment studied have revealed potential increase and changes of terrestrial gamma radiation.
- Mini-martap, located in the Menoua Subdivision of Western Region, Cameroon is suspected to be the largest bauxite ores deposit in Cameroon.
- The aims of this study were to measure and assess the baseline radioactivity levels before the mine starts processing the bauxite ore in the area.

## Experimental procedures (1/3)

- 25 soil samples were randomly collected at a typical depth of about 10 cm from the top surface layer.
- the samples were air dried in an oven for 24 h at a temperature of 105° C. The dried samples were grinded into powder and sieved through a 2 mm wire mesh to obtain a uniform particles size..
- A dried residue of each soil sample was transferred into a thoroughly washed and dried 120 ml cylindrical container;
- Each container was hermetical sealed, labelled and stored for 30 days to establish secular equilibrium.

## Experimental procedures (2/ 3)

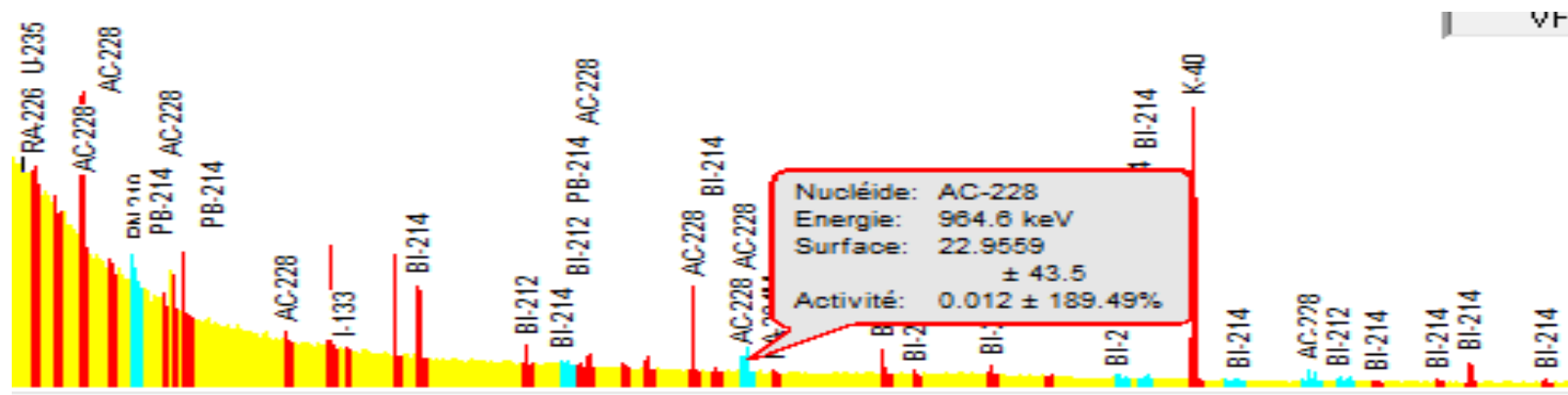
- After the in-growth period, each sample was counted for 24 hrs on the characterised low-background gamma-ray spectrometry BEGe6530.





## Experimental procedures (2/ 3)

- The analysis of the spectrums was done using Genie 2000 version 3.2 with integrated efficiency calibration LabSOCS software;
- The 48 hrs counted background was taken to consideration during the analysis of the spectrum,.





## Experimental procedures (3/3)

- The Radiological parameters were evaluated according to the following formulas:

$$AD \text{ (nGy / h)} = \sum_{i,j=1}^3 F_i \times C_j$$

$$AOED / AIED(mSv / y) = AD \times DCF \times OF \times T$$

$$H_{ex} = \frac{A_{Ra}}{370} + \frac{A_{Th}}{259} + \frac{A_K}{4810} \leq 1$$

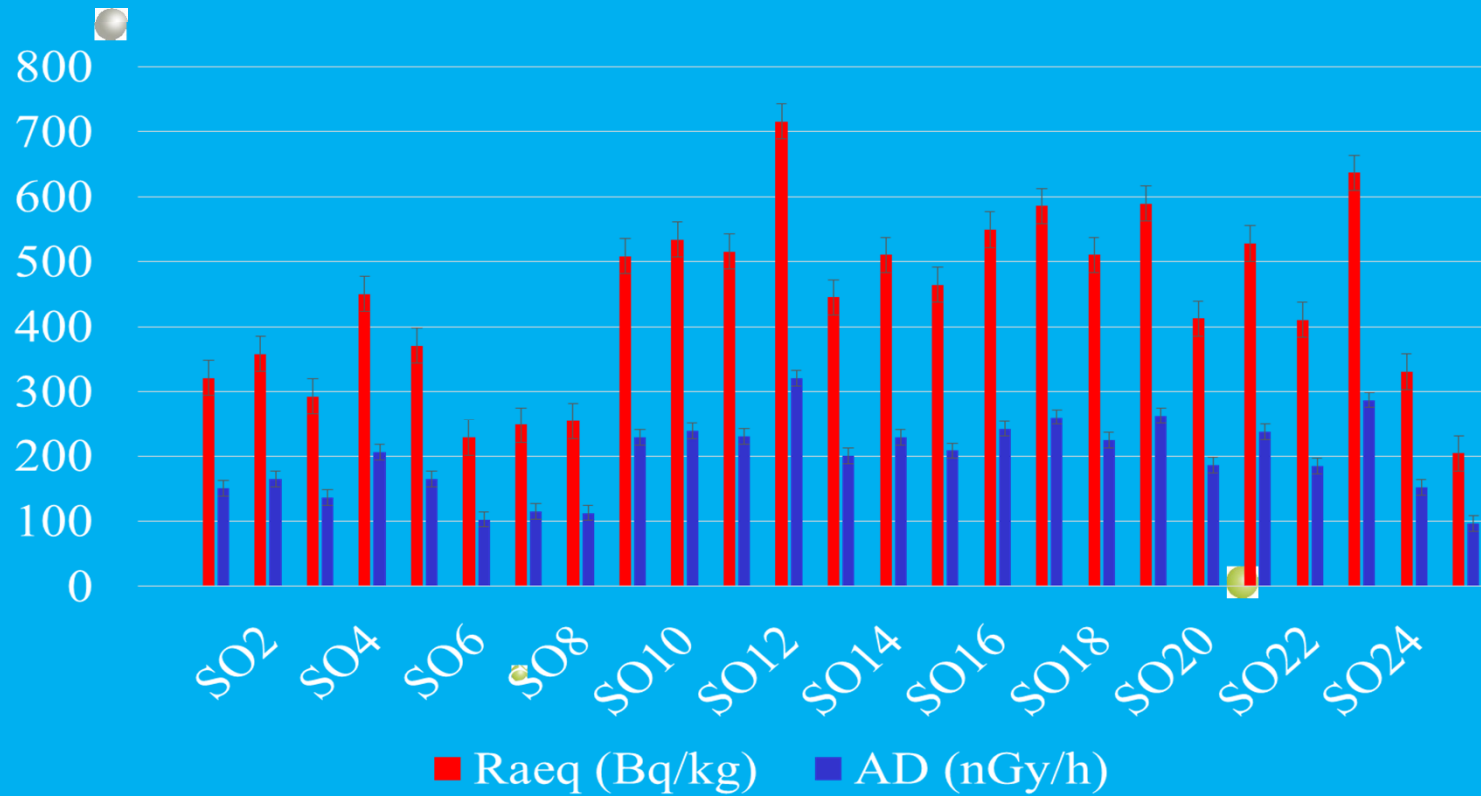
# Results and discussion (1/3)

**Table 1:** The mean Activity concentration of terrestrial Radionuclides were compared to other studies

Location	Specific Activity (Bq/kg)			Références
	<sup>226</sup> Ra	<sup>232</sup> Th	<sup>40</sup> K	
Australian (bauxite ores deposit)	120-350	400-1050	30-70	Malcolm[20]
Cameroon (South western)	130	390	850	Ele et al[9]
South Cameroon	134	177	1482	Beyala et al[8]
UpperEgypt	31-40	52-61	3149-3210	Amin and Uosif [13]
China	1-360	2-690	9-1800	UNSCEAR[1]
Camroon (volcanic area)	14.00	30	103	M. Ngachin et al. [18]
Portugal (Uranium mining)	200.00	91	----	Carvalho et al.[6]
Eastern Germany(Ronneburg)	370.00	45	620	Winkelmann et al[5]
IAEA (bauxite ores deposit)	10-900	35-1400	10-600	IAEA[2]
Cameroon (Fongo-Tongo)	121.2	141.7	751.9	present study
<b>World average</b>	<b>33</b>	<b>45</b>	<b>412</b>	<b>UNSCEAR [16]</b>

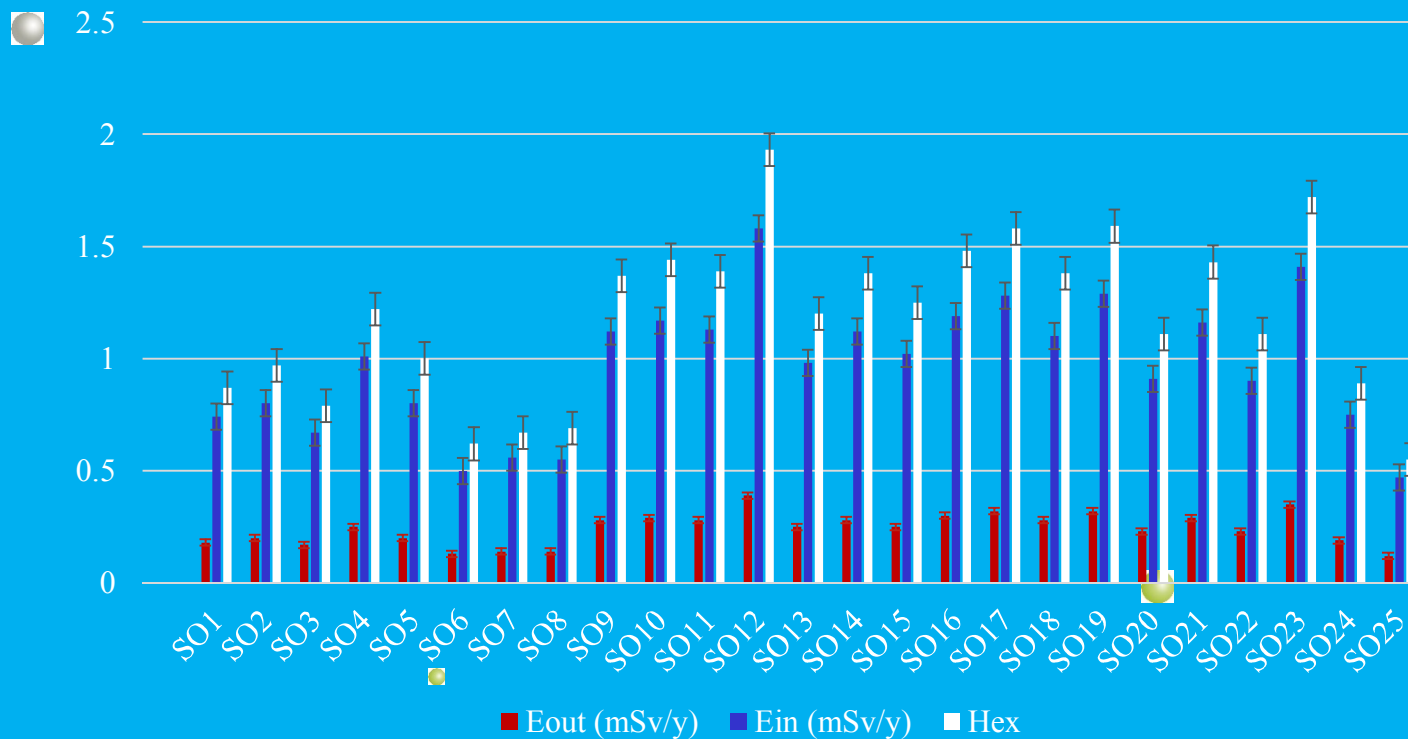
# Results and discussion (3/3)

**Figure 1:** Radium Equivalent concentration and Absorbed dose rate



## Results and discussion (2/3)

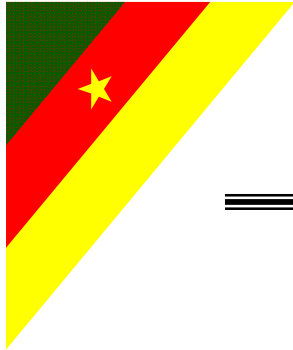
**Figure 2:** the Annual Outdoor Effective Dose values and Indoor for each sample



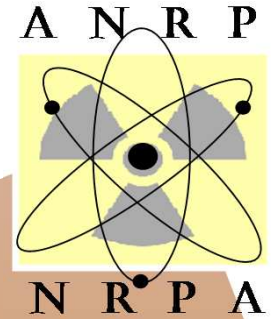
## Conclusion

- The observed average values of  $^{226}\text{Ra}$ ,  $^{232}\text{Th}$  and  $^{40}\text{K}$  are comparable high than the recommended limit of normal areas by UNSCEAR;
- The outdoor gamma dose rate for the soil samples in this study is higher than the world average value of 60 nGy/ h;
- The average outdoor and indoor effective annual doses due to the natural radioactivity of the soil samples are lower than the recommended value of 1 mSv /y.

➔ The radiological hazard indices ( $\text{Ra}_{\text{Eq}}$ ,  $\text{H}_{\text{ext}}$ ) are slightly higher than the world average values. This implies that gamma radiation from soil in this area might increase the radiological threat when used as a building material.



# CAMEROON



Drink small mineral water from Cameroon

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