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Results of the ongoing monitoring activities at the CTBTO station in Mauritania:
Be-7, K-40 and Pb-210 as atmospheric tracers in Nouakchott, Mauritania

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INTRODUCTION AND MAIN RESULTS

At RN43 in Nouakchott, we have just started monitoring air quality. PM10 often exceeds WHO and EU limits due to Saharan dust storms.

Every day, we measure PM10 with the Snow White sampler using the gravimetric method and log all results.

By comparing these with radionuclides (Be-7, K-40, Pb-210), we aim to better understand air movement and health impacts, with international cooperation

SnT 2025 CTBT: SCIENCE AND TECHNOLOGY CONFERENCE
8 SEPTEMBER ONLINE DAY
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INTRODUCTION

The IMS radionuclide stations were first set up to detect nuclear tests. But beyond that original purpose, they also provide valuable information for science and for society

In July 2024, we launched a small study at RN43 Nouakchott, together with the Ministry of Health and the University of Nouakchott. The idea is simple:

- Track natural radionuclides (Be-7, Pb-210, K-40) as tracers of how air masses move.
- At the same time, measure PM10 particles that affect the air we breathe

Nouakchott is a tough place for this kind of work: desert winds, sandstorms, and dust are part of everyday life. These conditions often push PM10 far above international health standards. For people here, this is more than an academic question , it's about breathing clean air.

We are still at an early stage, but the goal is to set up long-term monitoring and learn more by working with international partners. Sharing this work at SnT25 is a first step to open the door for collaboration.

Filter clogged after just one day due to heavy dust

Snow White sampler

volume collected (~24,548 m³)

Reference Criteria:
1. World Health Organization (WHO):

Recommended Annual Average	PM10 (µg/m³)	PM2.5 (µg/m³)	Observations
WHO Level 1	70	35	At these concentrations, there is an **estimated 15% increase in mortality** compared to the WHO guideline value.
WHO Level 2	50	25	At these concentrations, there is an **estimated 9% increase in mortality** compared to the WHO guideline value.
WHO Level 3	30	15	At these concentrations, there is an **estimated 3% increase in mortality** compared to the WHO guideline value.
WHO Guideline Value	20	10	These are the **lowest levels recorded** where mortality from **lung cancer and cardio-pulmonary diseases** does not show any increase (with 95% confidence).

2. European Community standards are established in Directive 1999/30/CE on April 22, 1999:

Daily limit value for the protection of human health: 50 µg/m3, which cannot be superimposed on more than 35 occasions per year. Annual limit value for human health protection: 40 µg/m3.

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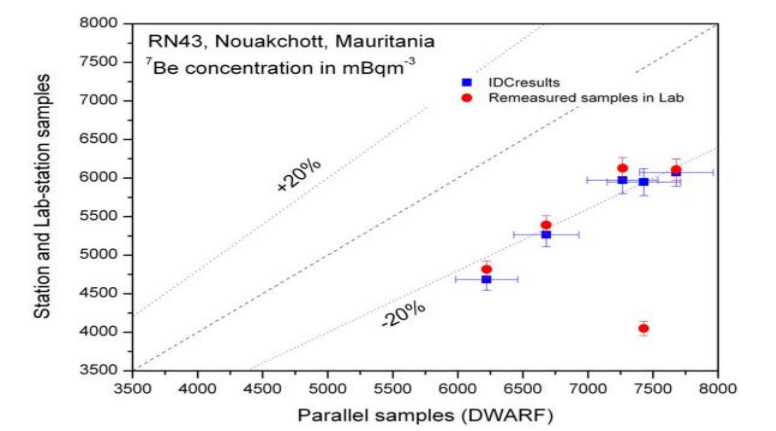
Methodology:

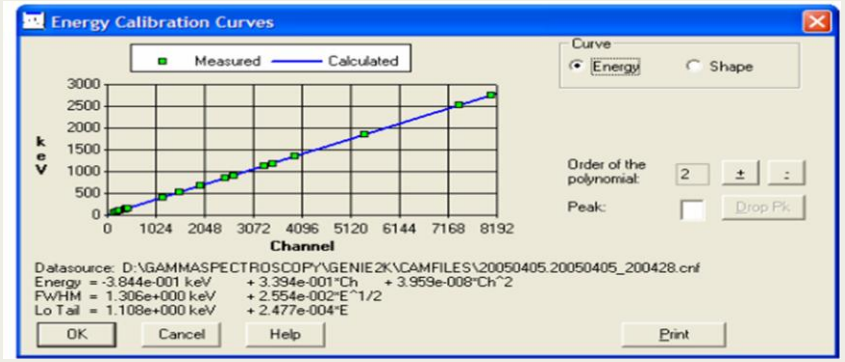
- We use the Snow White high-volume air sampler, running at about 950 m³ per hour.
- Each filter is large (53 × 42 cm²) and collects around 23,000 m³ of air per day.
- Sampling lasts about 24 hours.
- The site is in an urban area, exposed to Saharan winds and frequent dust events.
- For analysis, we rely on a Canberra HPGe gamma spectrometer with Genie 2000 software to identify Be-7, K-40 and Pb-210



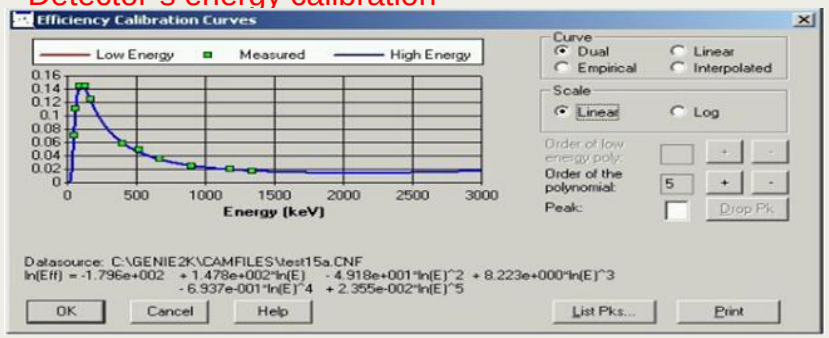
Comparison of ⁷Be concentrations measured at RN43 with DWARF reference values:

- Blue = IDC results,
- Red = laboratory remeasurements.

Most results fall within ±20% of the reference, confirming the reliability of RN43 data



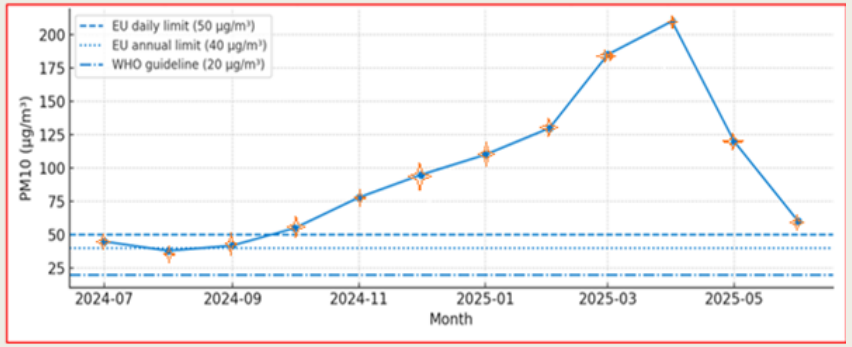
Detector´s energy calibration



Detector´s efficiency calibration

Detector shields and electronics in the lab

Monthly PM10 at RN43 (Jul 2024 – Jun 2025)



CONCLUSIONS:

- These first results confirm the daily reality in Nouakchott: PM10 often exceeds safe limits.
- Long-term monitoring and cooperation with international partners are essential to better understand and reduce these risks.

REFERENCES:

1. WHO Air Quality Guidelines, 2021.
2. Air Quality in Europe, European Parliament Study, 2018

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