# Improvised Explosive Devices and cosmic rays

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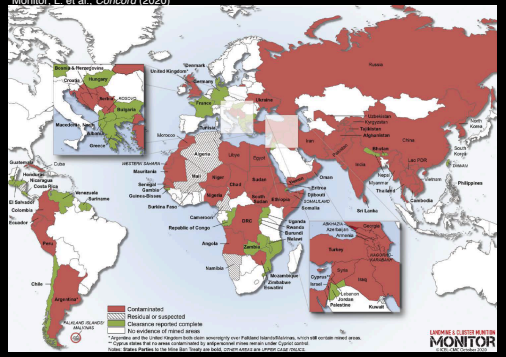
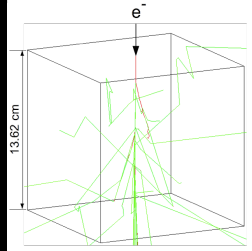
About **60 countries** and territories are still contaminated with Improvised Explosive Devices (IEDs)

Monitor, L. et al., *Concord* (2020)




**It is possible to use cosmic radiation for the detection of IEDs?**

## Simulation: interaction between an IED and cosmic radiation

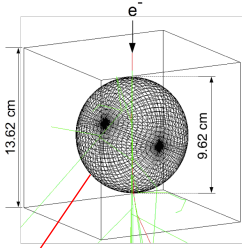



a) Dry soil model

**1 Dry soil model**
Juárez, M. et al., *U. de Alicante* (2006)

**2 Humid soils models**
90 wt.% Dry soil + 10 wt.% water
70 wt.% Dry soil + 30 wt.% water

**2 Fertilized soil models**
Dry soil + ammonium nitrate
(1 ppm and 2 ppm)




b) Dry soil + IED

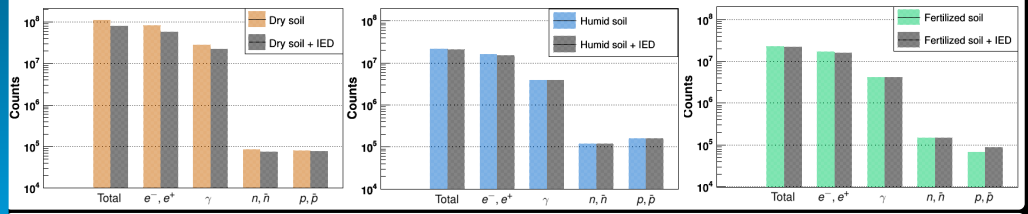
**ANFO = 94.3% + 5.7%**
Ammonium nitrate — Diesel oil No.2

A. contra minas, *Tech. Rep. Ejército Nacional* (2011)

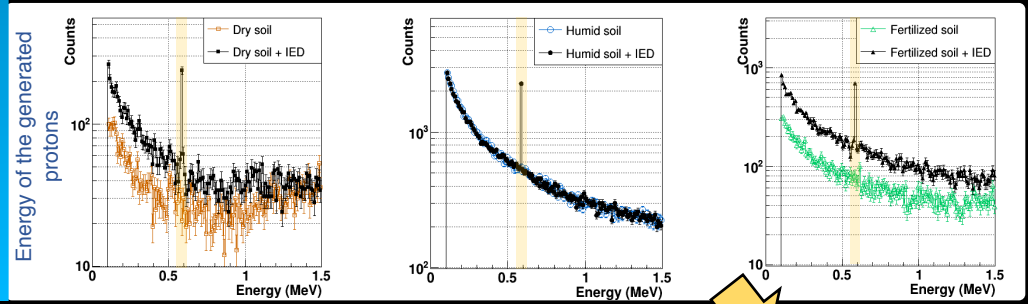
**Using the LAGO-ARTI framework**
(for WCDs simulation response)
Sarmiento-Cano, C. et al., *PoS ICRC2019* (2020).

## Results

### Particles generated from the interaction of soil models with the Bucaramanga secondary flux of 24 h




### Energy of the generated protons




## Conclusions

The interaction between the main chemical compounds of the most commonly IED found in Colombian soils with the background flux of cosmic rays at Bucaramanga level generates particles that can be detected, suggesting a possible IED detection criterion.

The number of protons with 0.58 MeV in mined soils is around 237% greater than protons in **dry soil** model, 2278% in **humid soil** (30wt.\%) and 688% for **fertilized soil** (2 ppm).

**There is an excess of protons around 0.58 MeV in the presence of the IED**