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-dimensional space analysis of radioxenon isotopic activity ratios for characterizing a nuclear event in comparison to civilian releases from fission and activation

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This study on the nuclear release timing aims analysing radioxenon isotopic activity ratios in three-dimensional space. The methodological approach and the characterization of the 3D usability threshold considered in this study were presented during SnT2019 and INGE2019. This presentation focuses on comparison to civilian sources from fission and activation.
Obviously three isotopes are less likely to be detected simultaneously than two isotopes are. However, if three isotopes are available, making use of all three together offers a much more powerful analysis mechanism than with only two isotopes. In the three-dimensional space the analysis of timing and event screening can be separated. A time-independent screening can be achieved through the projection along the decay axis and the time. In this projection, event characterization can be achieved without knowledge about the time of the release from the source. The time-independent screening is most useful for CTBT monitoring purposes since the time of origin of a remote detection is in general not known. In addition, under favourable conditions, the event origin time can also be determined irrespective of the source scenario by projecting the isotopic ratios on the decay axis and scale it in units of time.

Promotional text

The 3-dimensional analysis of radioxenon isotopes offers special opportunities for event screening and determining the event zero time. For the former, time is eliminated by projecting the data along the axis of decay, the latter by projecting the data onto this axis.

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