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Applying radioxenon isotopic ratios for nuclear explosion monitoring

For nuclear explosion monitoring isotopic ratios of xenon are used for characterizing an event. Civilian sources of radioxenon have an isotopic signature that may appear different from the one resulting from a nuclear test. This becomes most evident in the four-isotope plot where the nuclear reactor and nuclear test domains are clearly separated from each other. If only one pair of isotope is detected it may still be able to draw conclusions about the relevance of an observation for nuclear explosion monitoring. For certain isotopic ratios screening flags are defined and applied in the IDC products. Another approach is to show the isotopic ratios in scatter plots and look for outliers and clusters. More generally, isotopic ratios can be compared to the history of background observations at a given station to determine whether it is anomalous or not. It may also be used for event origin time determination to test the hypothesis whether the observation of interest may indicate a prompt or delayed release that is associated with a seismic event at a certain time and location. This presentation will demonstrate selected visualizations and statistical tests that have the potential to be applied for CTBT monitoring purposes.

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