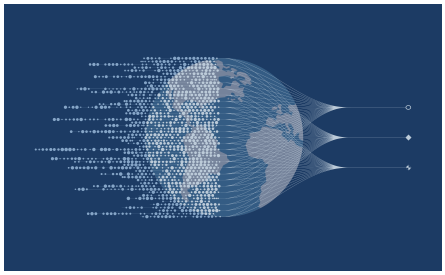

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-physics Analysis of Nuclear Events at FOI: the Example of the 2024 CTBTO National Preparedness Exercise

An accurate discrimination between nuclear and conventional explosions requires a systematic analysis of signals in a wide range of physical domains, including waveforms (seismic, atmospheric infrasound and hydroacoustic waves) and radionuclides (particulates, noble-gases), as well as other potential sources of information. The final joint-fusion analysis is crucial and presents several challenges, including effective communication between researchers from different scientific disciplines, accurate estimation of biases and uncertainties and their integration into the analysis, and ensuring the completeness of the event scenario space, to mention a few. In this contribution we outline the approach to fusion analysis of suspected nuclear events currently used at the Swedish Defence Research Agency (FOI). The methodology is applied to the most recent National Data Centre (NDC) Preparedness Exercise (NPE 2024), which provided an excellent opportunity for NDCs to evaluate their techniques and tools. Several scenarios were evaluated to either reinforce or dismiss, with the goal to differentiate between natural and anthropogenic sources for the various observations. Finally, we discuss challenges, potential improvements and future directions for the Swedish NDC.

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