feature extraction. Eventually, the accuracy for each method was reported and compared. The results showed that, employing appropriate optimization tools (such as Q-learning) and hybrid system can prepare intelligent analyzing radioxenon spectra hence accuracy of 97% and 99% for prediction of presence of radioxenon isotopes and determination of activity concentration were achieved, respectively.

T3.5-P14 Automatic Systems for Accurate Tracking of Aftershock Sequences

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Aftershocks from very large earthquakes cause significant difficulties and delays in producing seismic event bulletins. Not only are there many more events to process in a given time, the cost function of generating a reviewed bulletin increases greatly due to poorer automatic event lists. The phase-association algorithms which form the automatic bulletins operate best under normal background conditions. The aftershock scenario generates rapid sequences of arrivals which are often misassociated, increasing human analyst effort significantly. We propose an advanced, iterative, processing pipeline in which arrivals associated with well-defined events in one iteration are removed from the parametric data-streams, prior to being processed by the phase-associator in the next iteration. The intention is to generate a robust and accurate automatic event bulletin which adapts according to the context of current seismicity. This will provide a far better starting point for human analyst review. For any given aftershock sequence, we demonstrate how most of the seismic events in a target region encompassing the likely extent of aftershocks can be detected and located by a focused region-optimized algorithm. Removing all phases associated with these events from the detection lists provides phase-association algorithms with the near-normal background state in which they are optimal.

T3.5-P15 Bayesian Approach to Localization of Atmospheric Release with Demonstration on the Case of Ruthenium-106 Release in 2017

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Localization of an unintended atmospheric release is crucial in atmospheric monitoring as well as in verification strategy of organizations such as CTBTO or national authorities. To find the location is, however, complex task with many involved uncertainties composed in measured data and technique, usage of an atmospheric transport model, selected weather reanalysis, and used inversion technique. In continental scale, the localization can be formulated as the linear inverse problem on a grid and solved as an optimization problem. We study the Bayesian formulation where the uncertainties can be incorporated directly into the model and thus can be estimated together with all other parameters. It is shown that the quality of the resulting estimates strongly depends on quality of measurements and their spatial and temporal distributions. These findings will be demonstrated on the case of the ruthenium-106 observation in the fall of 2017 over the Europe and Asia.

T3.5-P16 Can artificial Intelligence Help Detect Nuclear Explosions? Y

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The field of artificial intelligence has had an exponential growth in its application in recent years. In particular, machine learning is an effective tool to solve problems that seek to find patterns of behavior from large databases. This boom was largely due to the new and increasingly powerful computing capabilities and a large amount of data available. The IMS has 306 stations installed, 6 under construction and 25 planned. This represents a large volume of data that is published daily. The application of machine learning can improve the search of patterns in this data to optimize the processing and improve the automatic response to a possible nuclear explosion. A review of the applications of machine learning techniques for improving the processing of data from different types of IMS stations is presented.