SAND2016-5079C

Dynamic Monitoring Network

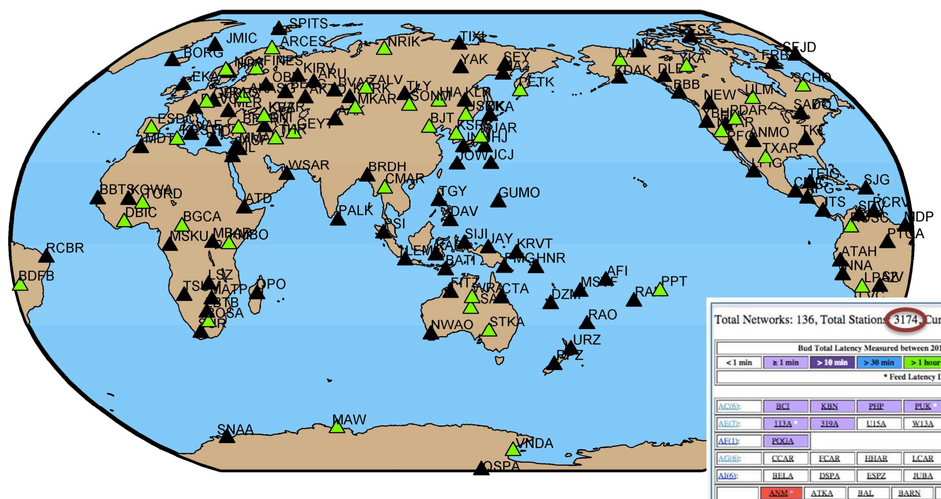
Exceptional service in the national interest

The U.S. has a long history of using ground-based monitoring technologies (seismic, infrasonic, hydroacoustic, radionuclide) to assess the compliance of other countries with nuclear testing treaties, a challenging task that will become significantly more difficult if the Comprehensive Test Ban Treaty (CTBT) goes into force. Currently, ground-based monitoring is done with a relatively sparse network of dedicated stations that are carefully installed and maintained. Station density is such that generally a few stations are within 1000 km of most areas of monitoring interest, but usually not closer. To significantly lower detection thresholds requires processing signals from a much denser network of sensors such that some sensors will always be within a few hundred kilometers of the source, i.e. local monitoring. Installing and maintaining the additional number of sensors needed to achieve this density is not practical, but there are many additional open sensors already available globally that could be used. Adding these sensors in with the traditional monitoring network would create a very large dynamic network, whose membership is constantly changing according to data availability. The Dynamic Monitoring Network program will conduct research to identify and solve the key scientific and technological challenges that must be met to incorporate open network sensor data into routine operational data processing and analysis for the purposes of lowering nuclear explosion monitoring detection thresholds around the world.

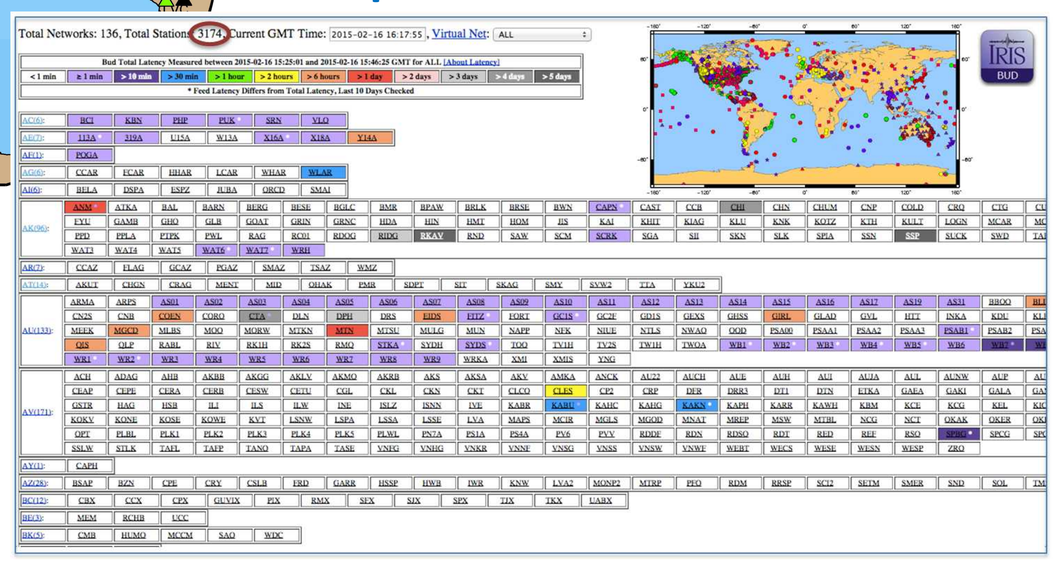
Key Research Topics:

- Discovery of new sources and types of data
- Mixing data of very different quality and veracity
- Fusion of data from different sensor phenomenologies
- Screening and prioritization of possible events of interest
- Efficient presentation of results to analysts for decision making

Current Dedicated Monitoring Network (IMS)



Open Network Sensors



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Dynamic Network is beginning a five year R&D program to define the data processing and analysis methodologies for the ground-based monitoring system of the future.

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