Comparing operational performance of the Virtual Seismologist and FinDer for earthquake early warning

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Comparing operational performance of the Virtual Seismologist and FinDer for earthquake early warning.

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An earthquake early warning (EEW) system can provide fast and accurate parameter estimations across wide ranges of source dimensions, event types and epicentral distances by integrating event or ground motion parameter estimations from different EEW algorithms, each of them optimized for specific tasks. We have integrated two such independent EEW algorithms, Virtual Seismologist (VS) and FinDer in the popular open-source seismic monitoring framework, SeisComP3 (SC3). VS(SC3) provides rapid magnitude estimates for network-based point-source origins using conventional triggering and association, while FinDer matches evolving patterns of ground motion to track on-going rupture extent, and hence can provide accurate ground motion predictions for finite fault ruptures. SC3 is operated by a large number of regional seismic network across the world, many of which have a long term interest to develop EEW capabilities. By combining real-time performance with playbacks from significant events, we report on the configuration and performance of VS and FinDer in various different tectonic and monitoring environments - Switzerland, Nicaragua and Southern California. We discuss how real-time EEW reports from these complimentary algorithms can be combined in practice to provide a single EEW from the SC3 system.