The Swedish National Seismic Network

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The Swedish National Seismic Network (SNSN) is operating 69 broadband stations in a latitude range from about N55.5 to N68.5 deg. The southern and northern parts of Sweden are covered more or less evenly with stations having about 100km interstation distances. In the center, between latitudes N61 - N65 deg the stations are situated in a band of about 100 km width following the coast of the Bothnian Sea. The maintenance of this large and distributed network - parts of it in Arctic environment - is challenging. All stations are recording at 100 samples per second and are sending continuous data in near real-time to the SNSN centre at Uppsala University. Seismic data are shared via seedlink directly with seismological institutes in the neighbouring countries, and a subset of the network is made available at ORFEUS. The density, spatial distribution and data availability of the network allow the production of a reviewed seismic bulletin with a magnitude completeness down to 0.5. We are currently running several independent automatic processing systems at SNSN: Seiscomp3, Earthworm, SIL/MSIL and an in-house developed waveform-backpropagation algorithm. The SIL system was put in operation 1990 and was originally designed to work decentralized (i.e. phase detection processing at each station computer) and to work with segmented data, suitable for a network with narrow communication bandwidth. SIL was further developed into a version called MSIL, which now performs all steps (detection, association and localization) centrally. This not only facilitates station and software maintenance, but also reduces the number of potential points of failure, thereby increasing the data acquisition and processing performance. All the automatic systems are set up for regional and local monitoring. Solutions obtained by the Seiscomp3 and Earthworm system are consistent in location and magnitude for more than 90% of the detected events. The SIL/MSIL and the backpropagation system are targeted to weaker events and they provide additional seismic event locations, but also more spurious events. The current setup of several automatic systems provides operational redundancy and it increases the confidence in the automatic solutions (when detected by more than one system). Eventually we are going to merge the automatic solutions of all systems into one automatic bulletin in order to decrease the workload for analyst review.