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Regional network performance estimation based on ambient noise amplitudes

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Seismic network performance plays an important role in the operation of seismological observatories and temporary network deployments. The event detection magnitude threshold of a network is frequently derived from the observed magnitude of completeness or from measured noise amplitudes in conjunction with theoretically derived ground displacements. We present a tool to calculate detection thresholds based on ambient noise levels at the network stations and theoretical ground displacements based on the Richter local magnitude relationship. We show that this simple approach can produce realistic magnitude threshold maps that can be used to characterize temporal and spatial variations of network performance. These variations can be very significant for example during stormy weather periods or when station failures occur. The method can be employed to derive network performance in near real-time if according station data streams are available. In addition the presented method is useful for assessing network performance when drafting new network geometries or adding new stations to an existing network. We show examples from the Irish National Seismic Network which is exposed to large variations in seismic noise levels and a low seismicity rate.