

Correlation Detection of Uncertain Seismic Signals

Correlation detectors have become integral components of seismic monitoring pipelines, offering sensitive detection and simultaneous event classification and location in situations where the relevant signals are known accurately. Often, however, the target signals are not known with certainty, but may be known only to be members of a particular class of signals. For example, the signals may derive from events that occur not at a single source location, but rather over a slightly broader geographic region. In such instances, subspace detectors may improve detection by allowing a degree of variation in the signals. But subspace detectors raise the false alarm rate requiring a corresponding increase in the detection threshold relative to correlation detectors. In this study we examine a related detector, which we call the tangent space detector, which has some of the desirable attributes of the subspace detector, but may have reduced false alarm rates relative to subspace detectors. We contrast the performance of correlation, subspace and tangent space detectors in the context of detecting events at the North Korean test site.

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