

An importance of use of multiple indices for real-time waveform comparison

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For real-time tsunami inundation forecast, Yamamoto et al. (2016, EPS) proposed the multi-index method which uses a combination of a correlation coefficient and two kinds of variance reductions normalized by the L2-norm of either the observation or calculation to select appropriate tsunami scenarios, which represent observed tsunami waveforms, from a tsunami scenario bank (TSB). They concluded that the combination of three indices rather than a single index allows us to achieve a more accurate tsunami forecast because the variance reduction normalized by observation, which is usually used for comparing observed waveforms and calculated waveforms, has only sensitive for overestimation. Hence, fairly underestimated scenarios could be selected with large variance reduction that is close to 1 if waveform shapes are very similar (e.g., high correlation coefficient). For an automatic forecast system driven by comparing observed waveforms and calculated waveforms in real-time, it is important that underestimated scenarios should not be selected for disaster reduction purpose. As well as they and Ktenidou et al. (2011, BSSA) pointed out that variance reduction is used for discriminating between larger and smaller data. However, they also reported variance reductions are defined in different ways according to different authors.

In this presentation, the author summarizes many definitions of variance reductions and an importance of use of multiple indices for real-time waveform comparison with some example cases not only for tsunami waveform comparison.

Keywords: realtime forecast, Multi-index method, correlation coefficient, variance reduction