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Design and performance testing of a multi-sensor quick assimilation technique for tsunami early warning in the GITEWS simulation system

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The simulation system of the German-Indonesian Tsunami Early Warning System (GITEWS) relies on a large number of detailed pre-computed tsunami scenarios, indexed in a database for quick lookup and comparison to tsunami-related measurements. In this presentation, we introduce a new assimilation technique, which allows for quick and seamless evaluation of multiple sensor data, as they become available. Typical current warning systems rely on purely seismic information for the first warning and use additional data to correct the initial warning. However, this can be very misleading in the near-field tsunami warning set-up. Therefore, the GITEWS approach tries to evaluate all available data simultaneously. The question then is, how to incorporate such different data as seismic moments, locations, wave heights and GPS displacements in one simultaneous assimilation step. The presented method relies on a weighted two-norm approach with normalization. Tests with artificial and historic tsunami events show its performance and accuracy.