Weighted RAndom sampling in Seismic Event Detection/Location (WRASED): Applications to Local, Regional and Global Seismic Networks

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Traditional seismology primarily focuses on seismic events with relatively high signal-to-noise ratio (SNR). This is mainly because reliable picks cannot be made for events with low SNRs, so a relatively high threshold is set to avoid false picks. A recent study in the 5200-station Long Beach array shows that random sampling [Zhu et al., 2016] is able to rapidly distinguish the true picks from false ones, which makes reliable detection/location of bad SNR events possible [Li et al., 2016]. However, that study did not consider different confidence levels of the picks, which can be quantified by short-term-average/long-term-average ratio (STA/LTA). In this study, we incorporate this information into our event detection and location method, which leads to a weighted random sampling algorithm. We plan to apply this algorithm to the Long Beach dense array to examine the improvement in event detection/location. In addition, this algorithm can be customized into a new global seismic detection and location framework. In this new framework, the picking threshold can be lowered significantly to include more picks, both true and false, and weighted random sampling is applied to select those weak true picks that were previously below noise threshold and then are used for event location. We plan to apply this algorithm to both regional and global seismic networks, and systematically evaluate event detection results compared to those from standard processing procedure. Updated results will be presented in the meeting.