A Practical Approach to Utilize Deep-Learning Algorithms for Earthquake Catalog Compilation in Local OBS Networks

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In land-based seismology, modern automatic earthquake detection and phase picking algorithms have proven to outperform classic methods, resulting in more comprehensive catalogs with significantly reduced manual workload. However, similar advancements in marine-based seismology have been more challenging, particularly with Ocean Bottom Seismometer (OBS) data, which typically show lower signal-to-noise ratio and have limited labeled datasets available for training deep-learning models. In this study, we apply modern event detection and land-based phase picking algorithms to a ~12-month local OBS dataset, comparing resulting earthquake catalogs and location accuracy. We compare manually detected events and visually revised picks to their automatic counterparts, revealing that seismicity patterns from automatic catalogs are comparable to manually revised catalogs after applying strict location quality control. We find PhaseNet more suitable for local OBS networks and suggest a pick-independent event detection approach like Lassie for initial catalog compilation. Furthermore, we find that catalog completeness cannot be reliably determined using automatic approaches. As automatic picks are not yet reliable enough for developing velocity models or interpreting small-scale seismicity patterns, we suggest to apply different manual re-picking schemes depending on the aim of the study.