ID: **P3.5-423** Type: **E-poster**

and Evaluation of Deep learning Phase Pickers for Local Aftershock Monitoring

The use of Machine Learning (ML) methods in seismology has gained significant attention in recent years, driven by the availability of large, high-quality datasets. While ML is applied to various seismological tasks, it is most commonly used for seismic signal detection, phase picking, and classification. Recent studies show that deep learning models such as EQTransformer, PhaseNet, and Generalized Phase Detection (GPD) perform remarkably well in these areas, often rivaling waveform correlation methods, particularly in low-seismicity regions.
In this study, we applied EQTransformer, PhaseNet, and GPD pickers to aftershocks of two moderate earthquakes in Türkiye (Mw 5.7 Marmara Sea on 26.09.2019 and Mw 6.0 Düzce on 23.11.2022). Their performance was compared with the reviewed Kandilli Observatory catalogue, focusing on the correct identification of P and S phases and arrival time differences between analyst picks and ML outputs. An evaluation of metrics such as precision, recall, and F1-score reveals that EQT, PN, and GPD exhibit distinct strengths and weaknesses compared to each other and against the analyst reviewed picks when using their original weights and pre-trained models, underscoring the potential benefit of training models with local data.

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Session Classification: P3.5 Analysis of Seismic, Hydroacoustic and Infrasound Monitoring Data

Track Classification: Theme 3. Monitoring and On-Site Inspection Technologies and Techniques: T3.5 Analysis of Seismic, Hydroacoustic and Infrasound Monitoring Data