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## Deep Learning P and S wave phase picking of Ocean Bottom Seismometer (OBS) data

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Ocean Bottom Seismometers (OBS) are the primary instruments used in the study of marine seismicity. Due to the characteristics of their emplacement on the sea bottom, these instruments have a much lower signal-noise ratio than land seismometers. Therefore, difficulties arise on the analysis of the data, specially when using automatic methods.

During recent years the use of machine learning methods applied to seismic signal analysis has increased significantly. We have developed a neural network algorithm that allows to pick seismic body signals, allowing to correctly identify P and S waves with a precision higher than 98%. This network was trained using data of the Southern California Seismic Network and was applied satisfactorily in analysis of data from Large-N experiments in different regions from Europe and Asia.

One of the remarkable characteristics of the network is the ability to identify the noise, both in the case of seismic signals with low signal-noise ratio and in the case of large amplitude non-seismic signals, such as human-induced noise. This feature makes the network an optimal candidate to study data recorded using OBS.

We have modified this neural network in order to analyze OBS data from different deployments. Combined with the use of an associator, we have successfully located events with very low signal-noise ratio, achieving results with a precision comparable or superior to a human operator.