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## Implementation of a new real time seismicity detector for the Mayotte crisis

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Seismology is one of the main techniques used to monitor volcanic activity worldwide. Seismicity analysis through several seismic sensor deployments has been used to monitor Mayotte volcano crisis since its beginning in May 2018. Because volcanic activity can evolve rapidly, efficient and accurate seismicity detectors are crucial to assess in real-time the activity level of the volcano and, if needed, to issue timely warnings.

Traditional real-time seismic processing software, such as EarthWorm or SeisComP, use phase onset pickers followed by a phase association algorithm to declare an event and proceed with its location. Real-time phase pickers usually cannot identify whether the detected phase is a P or S arrival and this decision or assumption is made by the associator. The lack of S arrival has an obvious impact on the hypocentral location quality. S-phases can also help detection on small earthquakes where weak P-phases can be missed.

We implemented the deep neural network-based method PhaseNet to identify in real-time seismic P and S waves on 3-component seismometers deployed on Mayotte island. We also built an interface to subsequently process PhaseNet results and send pick objects to EarthWorm. We use EarthWorm binder\_ew associator module specifically tuned for PhaseNet *a priori* phase identification to detect and locate the events, which are finally archived in a SeisComP database. We implemented this innovative real-time processing system for the REVOSIMA (Réseau de surveillance Volcanologique et Sismologique de Mayotte) hosted at OVPF (Observatoire Volcanologique du Piton de la Fournaise). We assess the robustness of the algorithm by comparing the results to existing automatic and manually detected seismicity catalogs.

We show that the existing SeisComP automatic system is outperformed by our new algorithm, both in number of earthquake detections and location reliability. Our implementation also detects more events than the daily manual data screening. While this promising new processing system was first applied to study the Mayotte seismicity, it can be used in any seismic active zone, of volcanic or tectonic origin. Indeed, it will be installed at Martinique volcanic and seismic observatory later this year.