Imaging the Colombian Flat Slab The MUSICA Seismic Deployment

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Flat-slab subduction has been invoked to explain a wide range of geological observables such as thick-skinned deformation, changes/reductions in arc volcanism, the emplacement of ore deposits, and the generation of widespread ignimbritic volcanism after the flat slab is removed. The northernmost flat slab in South America lies in northern and central Colombia. Unlike other flat slabs, the Colombian flat slab has few constraints and little consensus on its temporal and geometrical evolution – indeed there is ongoing debate about which plate(s) are responsible for the flat slab and the Wadati-Benioff zone located ~300 – 400 km from the nearest trench.

The MUSICA project is a multidisciplinary experiment funded by the NSF– Frontier Research in Earth Science program to study the evolution, structure, and tectonic consequences of the Colombian flat slab. As part of this project, we are deploying 75 broadband seismometers in five transects and several interspersed stations across the southern margin of the Colombian flat slab (often referred to as the Caldas Tear). The goal is to obtain high resolution images of the horizontally subducting plate, the two active Wadati Benioff zones that straddle the Caldas Tear,



and the transition from flat to normal subduction along the Central and Eastern Cordilleras.

For this deployment, we are using new direct burial systems owned by both the Carnegie Institution for Science and the EarthScope Consortium's PASSCAL program. Due to the COVID pandemic, the deployment has been progressing in phases and is on schedule to be fully deployed by Summer 2023. The new seismic instrumentation has allowed for the rapid installation of stations with greatly reduced logistical challenges that would otherwise be prominent in regions where road travel is difficult. We look forward to using this novel dataset to provide new constraints on the many questions outstanding regarding the Colombian flat slab.