6C Recordings at Active Volcanoes

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Near field recordings and thus finite source inversions of volcano-induced events often suffer from unaccounted effects of local tilt, saturation of classical instrumentation, unknown shallow velocity structure and doubtful orientation of the instruments. In addition, if the station number is limited the results of moment tensor inversions are very often not well constrained. Recent advances in hardware development made it possible to install several very broadband, high sensitive rotational motion sensor, based on fibre optical gyroscope technology, in very close distance of an activate volcano, i.e. on Stromboli volcano in 2016 and 2018, respectively. Using this new instrument together with classical instrumentation (i.e., translational seismometer, infra sound and tilt meter) we were able to record four weeks of permanent strombolian activity at Stromboli during these two experiments. The resulting six axis measurements reveal clear rotations around all three coordinate axis. We are furthermore able to demonstrate how this six axis measurements can help to improve the location procedure due to the property of a fiver optic gyro to act as a physical wave polariser. We also demonstrate the application of a single site shallow velocity estimation using volcanic background noise only, which will further improve the reliability of the source mechanism estimate. As a concluding step we will demonstrate how the use of sparse 6C measurement might be able to reduce the ambiguity of moment tensor inversions of volcano related signals.