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Monitoring deformation offshore Mount Etna: First results from seafloor geodetic measurements

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The largest and most active volcano in Europe is Mount Etna located on the east coast of Sicily. Over the last decades, extensive geodetic surveys focusing on the onshore flanks of Mount Etna have revealed instability of its eastern flank, which continuously moves seawards with displacement rates of up to 50 mm/yr. Catastrophic failure of the volcanic edifice could trigger a devastating tsunami in adjacent regions. The mechanism that is driven flank deformation is still under debate. Information on the dynamics of the submerged offshore domain might give new insights into the deformation mechanism. During the FS Poseidon cruise POS496 an acoustic geodetic network of five autonomous seafloor transponders was deployed across a dextral oblique transpressive fault north of Catania Canyon. This fault is interpreted as the offshore extension of the Tremestieri Fault System and as the offshore southern margin of the sliding sector. The seafloor geodetic transponders measure acoustic distances across the fault, absolute pressure and tilt for a period of up to 3 years. In addition, we deployed six ocean bottom seismometers to record local seismicity and three tiltmeters to monitor movement offshore Mount Etna. We present first results based on 5 months of geodetic data recorded from April to August 2016. The geodetic network is capable of resolving a minimum strike-parallel displacement of 25 mm and a minimum vertical throw of 1 mm. The data shows that surface fault movement appears to be less than these resolution minima for an observation period of 5 months. To date, the instruments continue collecting data and a longer time series will either confirm this observation or depict a constant rate of motion and/or episodic acceleration.