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Acoustic T-phases recorded by seafloor observatories at the Tyrrhenian and Ionian deep sites

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In recent years, seafloor observatories were deployed in two sites of the mediterranean area where important geophysical processes that have geohazard impact take place: offshore Eastern Sicily (Italy) in the Ionian Sea at 2100 m water depth and at the base of Marsili Seamount in the Tyrrhenian Sea at 3320 m water depth. The Ionian site, near Etna volcano, where the SN1 seafloor Observatory is deployed is a key point of the EMSO (European Multidisciplinary Seafloor and water-column Observatory Research Infrastructure, www.emsoeu.org). The second site, where the GEOSTAR seafloor Observatory was deployed during the ORION experiment, is the location of Europe's largest submarine volcano. In the present work we focus on seismically generated acoustic waves, called T-phases, that propagate within the ocean's low-velocity waveguide known as the SOund Fixing And Ranging or SOFAR channel. T-phases can propagate over great distances (thousands of kilometers) with little loss in signal strength. The study of T-phases are interesting to scientist for a number of reasons, one of them is that they might give information on the structure of subduction zones. T-phases were first studied on signals recorded at coastal seismic stations but thanks to the increased deployments of Ocean Bottom Seismometers worldwide, they also have been observed at the seafloor at depths greater than the SOFAR channel. The two seafloor observatories recorded high quality 3-component time series of acoustic signals that we identify with T-phases generated at nearby subduction zones. Thanks to accurate time reference of the data and knowledge of component direction for the seismometers on-board seafloor observatories it is possible to extract significant features on the T-phase signal. In particular, we show the efficient T-phase generation from earthquakes along the Hellenic and Calabrian subduction zones by computing of the maximum amplitude of the envelope of the T-phase emax(t) and the T-phase energy flux (TPEF) as function of the local Magnitude. Following, we performed a prelimary polarization analysis, on the three seismic components, at different frequencies, to investigate the conversion process that take place when body waves convert to acoustic waves at the seafloor-water interface.