EGU22-7742
https://doi.org/10.5194/egusphere-egu22-7742
EGU General Assembly 2022

Strain evolution on a submarine cable during the 2020-2021 Etna eruption

Shane Murphy[1], Pierre Garreau[2], Mimmo Palano[3], Stephan Ker[1], Lionel Quetel[4], Philippe Jousset[5], Giorgio Riccobene[6], Salvatore Aurnia[6], Gilda Currenti[3], and Marc-Andre Gutscher[1]

[1]Geo-Ocean, Plouzané, France
[2]LOPS, Ifremer, Plouzane, France
[3]INGV, Catania, Italy
[4]IDIL Fiberoptics, Lannion , France
[5]GeoForschungsZentrum (GFZ) Potsdam, Germany
[6]INFN-LNS, Catania, Italy

On the 13th December 2020, a Strombolian eruption occurred on Mount Etna. We present a study of the temporal and spatial variation of strain measured at the underwater base of volcano during this event.

As part of the FOCUS project, a BOTDR (Brillouin Optical Time Domain Reflectometry) interrogator has been connected to the INFN-LNS (Istituto Nazionale di Fisica Nucleare - Laboratori Nazionali del Sud) fibre optic cable that extends from the port of Catania 25km offshore to TTS (Test Site South) in a water depth of 2km. This interrogator has been continuously recording the relative strain changes at 2m spacing along the length of the cable every 2 hrs since May 2020.

On preliminary analysis, a change in strain is observed at the around the time of the eruption, however this variation occurs close to the shore where seasonal variations in water temperatures are in the order of 5°C. As Brillouin frequency shifts are caused by both temperature and strain variations, it is necessary to remove this effect. To do so, numerical simulations of seasonal sea temperature specific to offshore Catania have used to estimate the change in temperature along the cable. This temperature change is then converted to a Brillouin frequency shift and removed from the frequency shift recorded by the interrogator before being converted to relative strain measurements. This processing produces a strain signature that is consistent with deformation observed by nearby geodetic stations on land.