Geophysical Research Abstracts
Vol. 20, EGU2018-1208, 2018
EGU General Assembly 2018

Analyzing of microtremor array data measured in a geothermal field located in Manisa province, Turkey

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Microtremor array measurements have been widely used for site investigation studies in recent years. One of the advantages of surface wave analysis is to allow considerable deep investigation up to several hundreds of meters because of long period characters. The aperture of an array has an impact on minimum and maximum limits of the wavelength that can be measured by array. Moreover, the noise character and velocity structure of research field is crucial for the reachable investigation depth.
In this study, it is analyzed several microtremor array measurements acquired in a geothermal field located in Manisa, Turkey. Microtremor data were collected by semi-broadband seismometers of GURALP with a triangular array shape expanding from 50 m to 300 m. They were firstly examined in terms of noise characteristics because the field includes many geothermal activities producing abundantly ambient noise and industrial vibrations. It is seen that these activities cause generally industrial vibrations at frequencies higher than 5 Hz. Array data were analyzed by using SPAC and f-k methods to explore S-wave velocity structure of the geothermal field. It is important in this field to reach a reservoir depth hosting hot water and to explore velocity changes to be caused by geothermal. In the second step of the study, it is investigated the limitations of the arrays on the investigation depth and resolution in terms of array geometries, noise content and velocity structure. Our first results show that the dispersion curves range from 0.3 Hz to 6 Hz meaning approximately 1300 m investigation depth and 25 m resolution. In the next step of the study, it will be investigated velocity structure of the field by comparing with borehole log data and geologic structure.