

Monitoring of Wind Turbines Around a Proposed Einstein Telescope Site

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Wind turbines emit vibrations due to the rotation of the blades and the movement of the tower. Vibrations radiated from wind turbines are known to interfere with operational seismoacoustic monitoring of natural and induced seismicity. Additionally, the contribution of such vibrations to the ambient seismoacoustic noise field can significantly hinder the performance of sensitive optical systems. One such example is the Einstein Telescope, a subsurface gravitational-wave detector, currently under development. The sensitivity of the Einstein Telescope is strongly affected by the ambient seismoacoustic noise field. To characterize the noise generated by wind turbines in the region of interest, we deployed five seismic mini-arrays west of the Aachen wind park and recorded the ambient seismic field over the course of 35 days. In addition to analysing the power spectral density at each station, we employ array-processing techniques to identify and characterize various sources in the region. Our analysis indicates that the amplitude of distinct spectral peaks decreases as a function of distance from the wind park. Additionally, we found that the amplitude, of the entire spectrum, but specifically of these spectral peaks is in correlation with wind speed.

E-mail

shahar.shani.kadmiel@knmi.nl

Promotional text

Wind turbines emit vibrations due to the rotation of the blades and the movement of the tower. We deploy seismoacoustic mini-arrays along a line of increasing distance from the wind park to monitor the contribution of wind turbines to the ambient seismoacoustic noise field.

Oral preference format

in-person

Primary authors: SHANI-KADMIEL, Shahar (Royal Netherlands Meteorological Institute (KNMI)); Mr VINK, Bjorn (Antea Group); Mr ASSINK, Jelle (Royal Netherlands Meteorological Institute (KNMI)); Mr EVERS, Láslo (Royal Netherlands Meteorological Institute (KNMI)); Prof. LINDE, Frank (Nikhef (National Institute of Subatomic Physics))

Presenter: SHANI-KADMIEL, Shahar (Royal Netherlands Meteorological Institute (KNMI))

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