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Application of an elastic 2D tube-waveform tomography to estimate the shear modulus in the vicinity of the $FINO_3$ offshore platform

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The $FINO_3$ project is aimed at the construction of an offshore research platform in the north-sea, hosting research projects dealing with offshore wind energy topics. As part of $FINO_3$ our sub-project deals with the development of new seismic acquisition and inversion concepts for offshore-building foundation soil analysis. We are focussed on the determination of seismic parameters and structural information of the building plot of the platform. Possible changes of the shear modulus of the sediments in the vicinity of the $FINO_3$ monopile due to mechanic loads on the platform are estimated by a tube-waveform tomography. The tube-waves are excited by a hammer blow at the internal wall of the $FINO_3$ monopile above the water line. The tube-waves are propagating through the water column and the sediments and are measured in situ by hydrophones at the external wall of the monopile. Homogenous long wavelength starting models for the waveform tomography are estimated using simple 2D finite difference models. Possible shear-wave velocity starting models range from 150-300 m/s. The resolution of the tube-waveform tomography is estimated by simple chequerboard and random media models. Additionally first results of the data application in the vicinity of the monopile are presented.