



Shallow high resolution reflection seismic survey within a factorial building using shear-waves

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A 3-d subsurface model has been developed for an industrial area near Wolfsburg (Lower Saxony, Germany) in a joint project of the GGA-Institute, the State Authority for Mining, Energy and Geology (LBEG), and Volkswagen AG who provided geological and geophysical data. The investigation area is 7.5 km x 10 km. Only Quaternary glacial and fluvial sediments and the underlying Mesozoic (Lias mudstone, Early Jurassic) are considered. Hence the maximum depth of investigation amounts up to ca. 100 m. Although data from previous geophysical surveys are available, it was necessary to perform additional seismic surveys due to the sparse density of drillings and geophysical measurements especially in the areas of factory buildings. The seismic SH body wave type has been chosen for this investigations because it is nearly unaffected by any kind of pore saturation. The up to ten times lower velocity in unconsolidated sediments, compared to P-waves, results in considerable shorter wavelengths for a detailed structure analysis. Furthermore, given a laterally isotropic layer sequence, this wave type is less affected for wave conversions. For the high resolution seismic purposes and fast data acquisition, a Land Streamer unit of 72 SH geophones in 1 m intervals has been combined with a small, electrodynamic driven SH shaker source system mounted on a wheel barrow unit, utilizing the shear-wave vibroseis method. Applications during previous surveys have shown the performance of this setup on different kinds of sealed soils and also on a concrete foundation of a building. However, the situation in this case is quite complex because the thickness and structure of the concrete foundation of the factory building (a pressing plant) is not known. A seismic profile of 230 m length has been acquired. The results show reliable seismic signals and detailed sedimentary structures of the subsurface. However, due to the lack of a VSP and only one deep drilling in the direct neighbourhood, the seismic interpretation of the complex glacial shaped subsurface is very challenging.