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#### ABSTRACT

The Valhall Field in the central graben area of the North Sea is a chalk reservoir field. The reservoir units have high porosities that vary between 35% and 50%, but the matrix permeability only reaches 10 mD at maximum. Particularly at the crest of the anticlinal structure the flow is significantly enhanced by the presence of natural fractures. Due to the geomechanical properties of the chalk the reservoir rock is compacting considerably during production. This in turn leads to subsidence of the seafloor that currently amounts to 25 cm per year. The geomechanical effects have a strong impact on the anisotropy both in the overburden and the reservoir, as well as on observed time-lapse changes from seismic data (Olofsson et al., 2003; Herwanger and Horne, 2005; Hatchell et al., 2005; Barkved and Kristiansen, 2005). In 2003 the 'Life of Field Seismic' project (LoFS) began at Valhall with the installation of 120 km of OBCs over an area of 45 km<sup>2</sup>. Multi-component seismic surveys are acquired every 3 to 6 months. The shot locations form a 50 x 50 m grid; the data available for this study had been decimated to a receiver grid spacing of 300 x 300 m. Time-lapse analysis has so far been concentrated on the P-wave data of the LoFS surveys. However, the P-wave image is obscured by a gas cloud in the central part of the field. In this study we therefore investigate whether time-lapse changes can also be observed in the converted-wave data. Furthermore, we use the converted waves to analyse azimuthal anisotropy both in the overburden and the reservoir. We focus our study on a 4 x 4 km grid of ACCP locations covering the southern flank of the field where strong time-lapse anomalies had been observed on the P-wave data. We analyse data from the first and the third LoFS surveys, which are seven months apart.