

## 5.4 ELASTIC REVERSE TIME MIGRATION FOR IMAGING THROUGH GAS CLOUDS

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### ABSTRACT

The presence of complex gas clouds in the subsurface poses significant challenges in seismic imaging. One approach to tackle this longstanding problem is to exploit shear (S)-wave energy as such seismic data tend to be less sensitive to the gas clouds in comparison with pressure (P) waves. In this study, our primary goal is to accurately image beneath the gas clouds through elastic reverse time migration (E-RTM). Our E-RTM procedure includes the normalized energy-norm imaging condition that allows one to conveniently combine P and S wavefield energy leading to improved illumination of sub gas clouds. We illustrate the effectiveness of the proposed elastic imaging method using a realistic synthetic model that mimics the geology of Valhall field in the North Sea. By leveraging the capability of S waves, our secondary goal is to identify commercial- and fizz-gas reservoirs where imaging with P waves alone fails to do so. We similarly employ the aforementioned elastic imaging concept on a relatively simple synthetic model to distinguish whether a gas accumulation is commercial or non-commercial.

**KEY WORDS:** Elastic seismic imaging, shear wave, gas clouds