

Geostatistical Elastic Seismic Inversion

Adam Cherrett –Lead Research Geophysicist at Maersk Oil

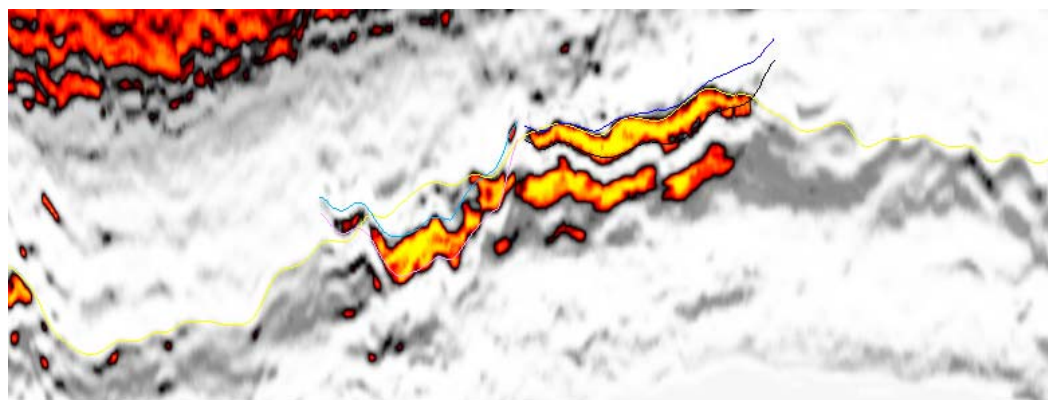
Seismic inversion techniques aim to estimate geologically interesting subsurface properties from seismic data. Within this broad category, many constraining methods and algorithms have been proposed. However, industrial quantitative interpretation (QI) applications typically make use of prestack migrated seismic reflection data and simple modeling schemes to yield results at realistic computational expense.

Seismic inversion is an underdetermined problem, and requires the data to be integrated with geological prior information. Geostatistics is a particularly powerful tool to describe realistic geological behaviour, and its inclusion in an inversion scheme can significantly constrain the solution and improve its robustness in the presence of noise.

This talk will briefly introduce the concepts behind Bayesian inversion and simple geostatistics, and give an overview of the methods that exist in the literature and commercially-available inversion software, including a new algorithm, employed in Maersk Oil's proprietary seismic inversion code.

A number of real data examples will be presented, including data from the Danish and UK sectors of the North Sea, to illustrate the wide applicability of elastic seismic inversion techniques. The examples cover clastic and carbonate fields, and contexts of exploration, field development and geosteering (drilling).

This talk will be of interest to all geoscientists and reservoir engineers, and does not assume specialised knowledge of geophysics.



Vertical section through a sand injectite field, showing the position of hydrocarbon-saturated sands in orange, computed by geostatistical elastic seismic inversion.