CASE STUDY
Seismic Reservoir Characterization: Facies-Control Geostatistical Inversion

OVERVIEW

The Neogene layers in Bohai Bay are mainly fluvial facies reservoirs with thin shaley interbeds (average 2 m) that vary rapidly vertically and laterally.

Traditional methods such as seismic attributes and seismic inversion have been widely and successfully used in reservoir prediction during the exploration phase, but they are effectively limited in such development phase due to a lack of resolution.

CHALLENGES

- Delineate thin shaley interbeds to reduce risk and satisfy the engineering requirements of field development.

- The shale interbeds within the reservoir zone vary spatially from west to east: the eastern reservoir contains many thin shale interbeds compared to the western area.

Inversion results and 1D facies-control of the Western area
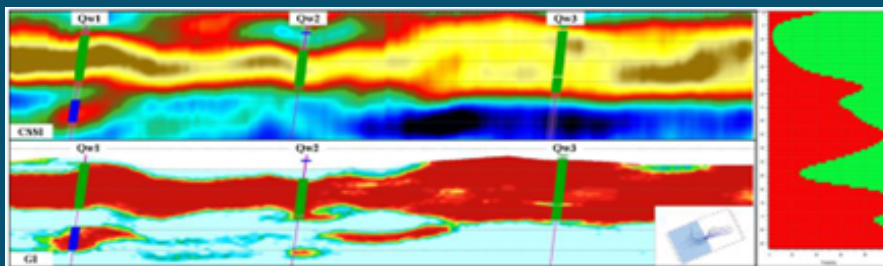
Inversion results and 1D facies-control of the Eastern area

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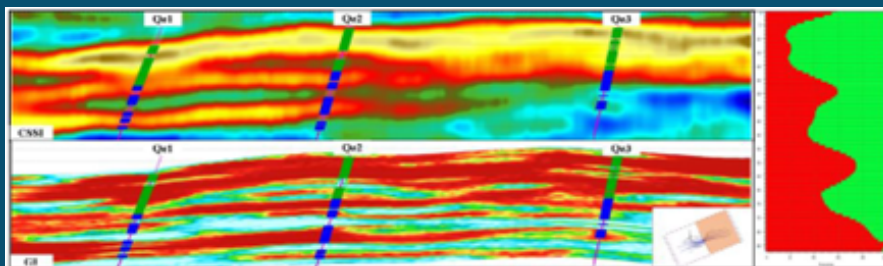
CASE STUDY

Attribute map of inversion from Deterministic (left) vs. Geostatistical (right)
Qe5 & Qe6 are water injection wells – Qe7 & Qe8 are horizontal development wells
Production improved at Qe8 after flooding while well Qe7 was little affected… Check out why!!
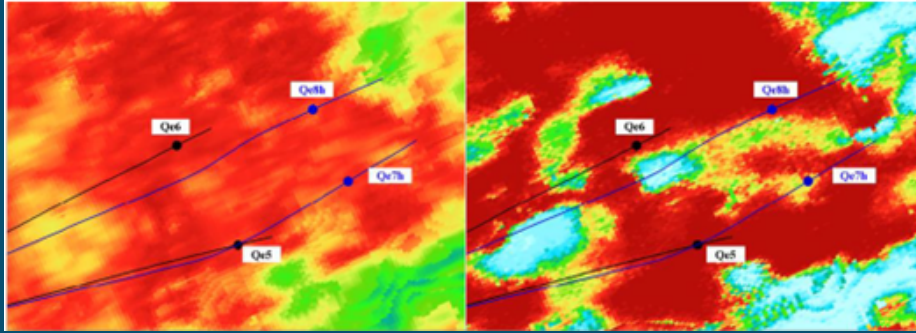
Application of Facies-control Geostatistical Inversion Method Based on Strata Structure Analysis: Duan et al. 2018 – EAGE 80th meeting

SOLUTION

Using GeoSoftware technology, 1D facies-control of statistical analysis was used on sedimentary cycle and well logs. A total of 24 exploration and development wells were used to create two profiles of facies-control one for the East area and another one for the West area. The 1D facies-control profile is then used to constrain the geostatistical seismic inversion process to delineate thin interbedded shale.

RESULTS

✓ This approach is an effective method to delineate thin shaly interbeds in areas of incomplete prior information and/or complex sedimentary environments.

✓ It improved production efficiency and successfully reduced drilling risk in the development phase.

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