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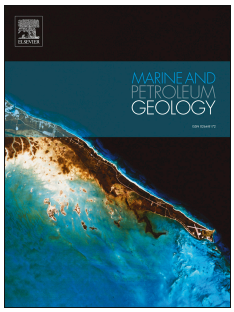

Disequilibrium compaction overpressure in shales of the Bavarian Foreland Molasse Basin: Results and geographical distribution from velocity-based analyses

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Disequilibrium compaction overpressure in shales of the Bavarian Foreland Molasse Basin: Results and geographical distribution from velocity-based analyses

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Abstract

Shale velocity data from sonic logs and vertical seismic profiles, drilling data and *in situ* pressure measurements from a total of 116 wells have been analyzed to gain an improved understanding of the lateral and vertical distribution and formation of overpressure in the Bavarian Foreland Molasse Basin. Pore pressure from sonic and vertical seismic profile velocities has been analyzed by establishing a normal compaction trend for Cenozoic and Mesozoic shales combined with a classical Eaton approach. The study demonstrates that a single shale normal compaction trend for the Bavarian Foreland Molasse Basin is sufficient to estimate pore pressure and thus overpressure from sonic and vertical seismic profile velocity. Maximum overpressure develops at depths between 1500-2500 m and increases with depth at a constant effective stress of 20 MPa. The strong dependency of overpressure on burial depth, constant effective stress and restriction to shale units that are overlain by sequences with very high sedimentation rates indicates that disequilibrium compaction is the main cause for overpressure. Also, variable presence of Cretaceous shales is a key control of overpressure occurrence in Oligocene shales in the Bavarian Foreland Molasse Basin, since Cretaceous shales likely act as a “pressure buffer” to underpressured Mesozoic carbonates.