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Integration of Basin Modelling, Geochemistry and Petroleum Properties for the Constraint of Petroleum Migration and Overpressure Evolution in Sedimentary Basins. An Example from the Haltenbanken Area, Offshore Norway

Several years of investigations into the petroleum and overpressure distribution off Mid-Norway has lead us to consider the spatial and regional distribution of constrictors or restrictor/" barriers" to fluid flow - such as low permeable shales and cemented fault zones as prime causes for the development of overpressure. The intensively studied, structurally well constrained, and progressively buried Haltenbanken region is used as a database for reconstruction of burial patterns, HC genesis and migration in relation to the distribution of petroleum families. Data on when petroleum entered traps, available from petroleum inclusions in reservoirs, is integrated with the regional distribution of petroleum families and the time transgressive burial and progressive cementation of faults in the basin. Catastrophic dysmigration from "palaeo-traps" in the Halten West "dry hole" region was found to be caused by overpressure development. Dysmigration from Jurassic traps into shallower Cretaceous strata is linked to the time transgressive and very recent overpressure development, which we believe to be related to restricted pseudo-lateral fluid flow caused by recent and accelerated digenesis on faults which earlier were open to, and facilitated basin scale migration. Data and modeling from the Åsgard area and adjacent dry wells illustrate the importance of understanding local as well as regional features controlling fluid flow and thereby petroleum migration over time.