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New Interpretation of Old Geophysical Data for Planning and Interpretation of New Ground Water Investigations in Lolland, Denmark

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Industrial seismic data from Western Geophysical (1979-1981) and gravity data from Danish National Space Center (formerly Kort & Matrikelstyrelsen, KMS) were used to construct a subsurface model down to a depth of 4 km and, subsequently, to remove its gravitational effect from the surface gravity data (geological stripping). The residual gravity signal is interpreted as the contribution to the gravity signal from shallow depths (i.e. less than 200 m) and from depths of more than 4000 km. Deep structures contribute to surface gravity only with low frequency signal. Thus, a subsequent high pass filtering of the residual gravity data reveals, in principle, the location of shallow structures. New shallow seismic surveys (vibroseis) were planned and conducted following the results of geological stripping. Also, detailed along-profile microgravity surveys were conducted. The results show excellent correlation between the gravity and seismics to detect buried valleys. In fact, some of the buried valleys, which evidence is seen on new seismics, were not known before. We have attempted to model the geometry of the buried valleys in 3D based on seismic cross-sections and gravimetry. It is believed that the buried valleys play an important role for ground water reservoirs on Lolland. Depending on the detailed structure of the aquifers (e.g. the clay content, porosity,etc.) the buried valleys can either play a role as an aquifer or as a barrier between aquifers.