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Shallow gas in Cenozoic sediments of the Southern North Sea

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Shallow petroleum systems in the southern North Sea are known for several decades but they were not actively explored for a long time. In recent years these unconventional shallow petroleum systems are studied in greater detail and one shallow gas field (A-12) is in production in the Netherlands. Additionally, oil was encountered in Miocene sandstones in the southern Danish North Sea (Lille John well) just north of the Danish-German border.
Seismic amplitude anomalies are an indication for hydrocarbons in sediments. Therefore we have mapped the occurrence of seismic amplitude anomalies in the German North Sea based on more than 25.000 km of 2D seismic data and around 4.000 km^2 of 3D seismic data. Amplitude anomalies are ubiquitous phenomena in the study area. These anomalies are not only caused by hydrocarbons but also by changing lithologies e.g. peat or fluid migration. Therefore several classes of seismic anomalies, e.g. bright spots, chimneys, blanking areas and velocity pull-down were mapped. Examples for these classes were studied with AVO (amplitude variation with offset) analyses to verify the existence or non-existence of gas in the sediments.
Shallow gas can be produced and transported through the dense pipeline grid of the southern and central North Sea or it could be burned offshore close to wind parks in small power plants and the electric energy then transported through the existing power connections of the wind parks. Thus enabling a continuous energy supply during calm wind periods.
This study is carried out within the framework of the project "Geoscientific Potential of the German North Sea (GPDN)" in which the Cenozoic sedimentary system was mapped in great detail. A detailed model of delta evolution (Baltic river system) was developed which serves as a structural framework. The studied interval is time equivalent to the Utsira formation which is used offshore Norway for sequestration of CO_2. These different possibilities of using or exploiting the underground emphasize the need for detailed knowledge on the underground for sound decisions on the future use of this area.