

Submarine Large Scale Mass Movements in the Deepwater Foreland Basin of the Alps - Implications to Hydrocarbon Generation and Distribution of Source and Reservoir Rocks

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The deepwater foreland basin of the Alps evolved from Late Eocene to Early Miocene north of the Alpine thrust front in the Bavarian/Upper Austrian part of the basin. The mass movement structures are illuminated by regional 3D seismic surveys.

Lower Oligocene source rocks were deposited during a rapid deepening of the basin on Late Eocene shallow marine sequences, which are superimposed on the basal foreland unconformity. In the central part of the basin slope instabilities are indicated by slumps and extensive submarine mass movements. The up to 70 meters thick sequences of the Lower Oligocene source rocks were redeposited partly at the slope, but large parts of that mass flow were moved to the base of the slope. These immature source rocks with high organic contents from the northern slope were moved basin wards towards the hydrocarbon kitchen which is now situated below the Alps. This process was increasing the total amount of generated hydrocarbons significantly.

In the Late Oligocene the toe thrust of a 5 km wide and at least 15 km long mass flow from the southern active thrust margin is illuminated in the 3D-area. This elongated mass flow was ponding the axial channel system until parts of it were eroded by the current along the central axis of the basin and redeposited to the east. Thin gas layers were encountered by a well within the mass flow unit which prove gas charge of the complex deformed units of the mass flow. The axial channel system of the foreland basin was undercutting parts of the northern slope and inducing mass movements in the channel system. Large scale (200 meters) blocks were floated in a muddy matrix along the main channel. One block incidentally drilled encountered gas, an indication of late gas charge. Early Miocene orogenic conversion caused steepening of the southern slope and triggered slope stability failure. In head scarps areas of mass movements accommodation space was generated for sand and debris-flow deposits in which now a major gas field is situated.