

Provenance and Sedimentation in the Oligocene Deep-Water Molasse Basin, Upper Austria

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The Molasse Basin of Upper Austria is considered to be a “mature” basin, as conventional oil and gas exploration methods have been utilized for decades in the region. Some of the largest gas fields in the basin (discovered during exploration of deeper horizons for oil) are still unrecognizable within recently acquired, high-resolution 3-D seismic data. There is thus optimism that numerous gas fields lie undetected, and developing more detailed basin models is necessary for improving the predictability of these reservoirs. Provenance studies have never been undertaken in the study area, and represent the best possibility for achieving this objective.

The Oligocene Puchkirchen Formation is characterized by debris flow, and both high- and low-density turbidity current deposits. Traditional basin-scale sedimentological models call for a series of deep-sea fans feeding coarse sediment into the basin from the elongate Alpine thrust front to the south. However, recent seismic interpretations reveal that a channel complex distributed sediment sourced from the west-southwest along the east-west trending basin axis. The compositional, radiometric, and geochemical signatures of the potential source terranes surrounding the basin have been studied, and the source areas for the formation can thus be resolved through detailed analysis of conglomeratic material (composition), sandstone (petrofacies mapping and detrital zircon dating), and mudstone (geochemistry of major, trace and rare earth elements). Understanding paleo-sediment conduits into the basin will improve geological models and hence reservoir predictability across Upper Austria.