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Investigating the Role of Sedimentary Facies

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RESERVOIR HETEROGENEITIES IN THE BUNTSANDSTEIN SUBGROUP: INVESTIGATING THE ROLE OF SEDIMENTARY FACIES

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The Lower Triassic Main Buntsandstein Subgroup represents one of the most promising deep geothermal plays in the Netherlands. Reservoir zones consist of sandstone units deposited in an arid to semi-arid alluvial plain reaching total thicknesses of over 200 m in the Roer Valley Graben. However, the lack of a comprehensive reservoir model integrating stratigraphy, sedimentology, and petrography makes the Buntsandstein a high-risk target. Here, we present a reservoir architecture model of the spatial and temporal variation of sedimentary facies and inherent permeability barriers and baffles, based on the integration of data from 33 wells from different stratigraphic levels and different areas of the Roer Valley Graben.

Core samples and thin sections analysis revealed two major reservoir facies that were interpreted as the products of transport and depositional processes in braided and sinuous river settings. The identified facies were then coupled to wireline logs to assess the spatial and temporal variation in sedimentary architecture. The lower part of the stratigraphy is dominated by braided-river reservoir facies with a high degree of connectivity, where regional lacustrine-playa lake sediments represent the main potential permeability barriers. By contrast, the upper part of the stratigraphy is characterized by an increase in the proportion of sinuous river complexes. These latter yield a lower degree of connectivity with different types of baffles such as intercalated fine-grained overbank sediments, abandonment plugs, bar-draping fines, and cemented dolocrete scour fills. These are much more localized compared to the braided complexes-related barriers, making the prediction of the upper stratigraphy architecture uncertain.