Triassic reservoir sands in the Dutch northern offshore

New results from seismic and cutting analyses

Northern sand provenance in the North German Basin – also possible in Dutch northern offshore?

This poster presents a follow-up of previous work by EBN on the Triassic prospectivity in the Dutch northern offshore. Additional seismic interpretation indicates early Triassic local depocentre development, while analyses on cutting and core material suggest an alternative sediment provenance in the northwestern part of the Step Graben.

The Main Buntsandstein play is established in the Southern North Sea. Aeolian/fluvial Volpriehausen sandstone forms the main reservoir rock. It is generally perceived that reservoir presence and abundance decrease towards the north. Consequently, few wells have tested Triassic reservoir in the Dutch northern offshore . However, fluvial sands with northern provenance may have developed in the Dutch northern offshore.

Probabilistic volumetrics are calculated for 44 identified structures: P50 GIIP ranges from 0.5-7 BCM. The total P50 GIIP amounts to 85 BCM (unrisked).

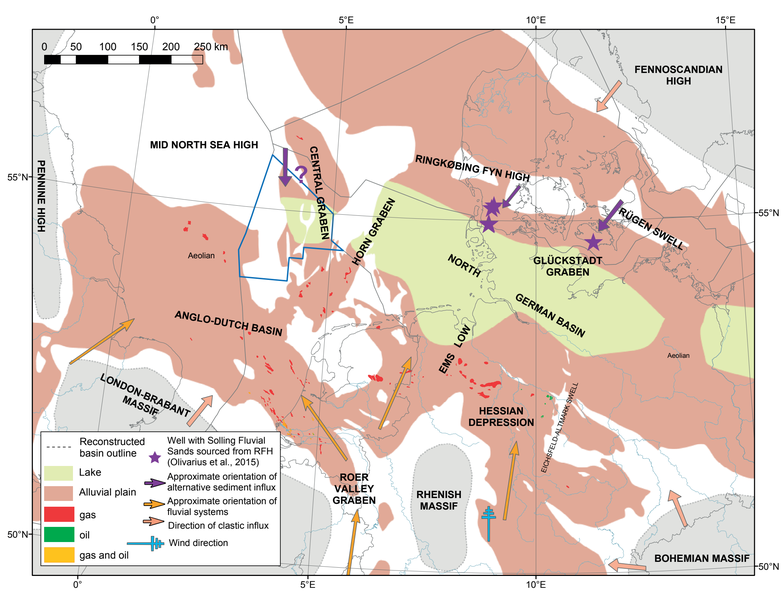


Fig. 1: Paleogeographical map of the Southern Permian Basin at early Triassic times showing the well locations with northern sediment provenance indicated by purple stars (Olivarius et al., 2015). The study area is outlined in blue. (adapted from Fig. 9.11 Southern Permian Basin Atlas).

Fluvial sands with local/northern provenance may have developed as reservoir in the northwestern Step Graben

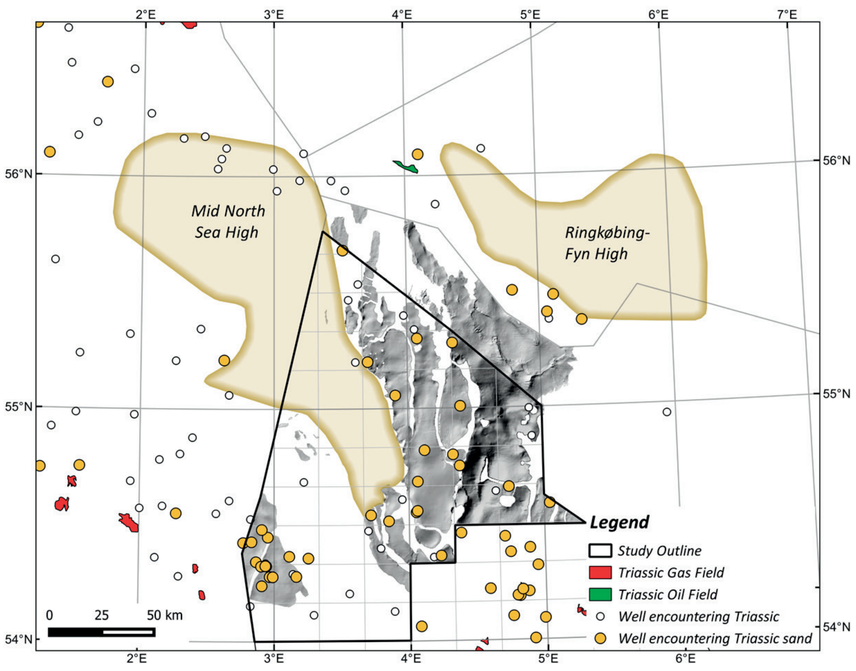


Fig. 2: Regional map showing all wells that drilled Triassic strata (white dots) and the wells encountering Triassic sands (yellow dots). The map shows that Triassic sands are present north of the main fairway. Local highs could have provided sediments to these locations analogous to the Solling Fluvial sst in the North German Basin, described by Olivarius et al., 2015.

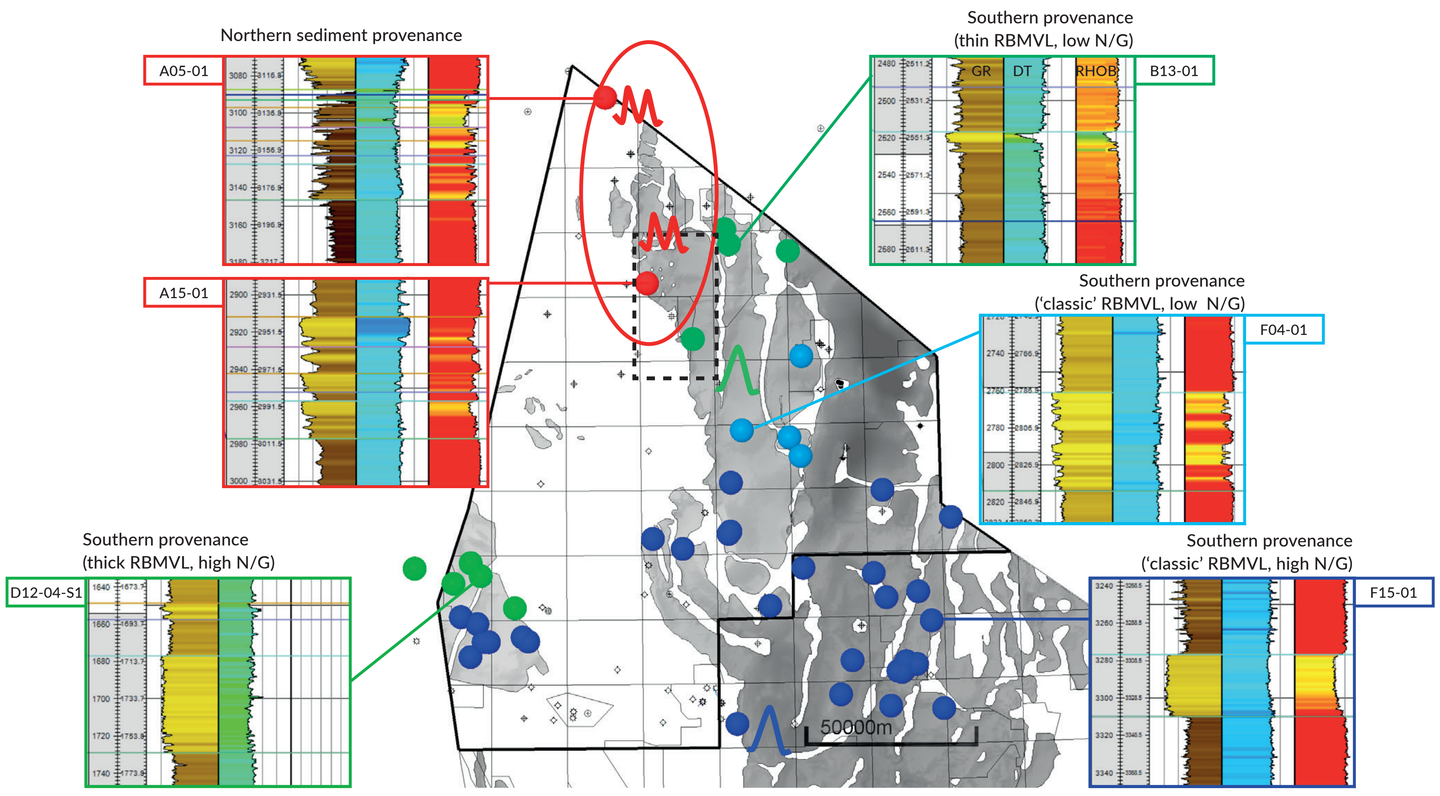


Fig. 3: Regional reservoir architecture – typical well log response for different types of L. Volpriehausen sandstone (RBMVL). Study area is outlined in solid black. RBMVL reservoir rocks are present in most of the study area. Abundance and thickness of RBMVL decrease from south to north while fluvial sands with local/northern provenance may have developed as reservoir in the northwestern area. Grainsize distributions suggest a different transport mechanism or sediment source in A05-01 and A15-01. Bimodal grainsize distributions are present in a number of samples in these two wells, in contrast to the unimodal grainsize distributions of all samples in A18-01, F16-04 and L09-8 (Bezemer, 2016).

Schilfsandstein in Dutch northern offshore?

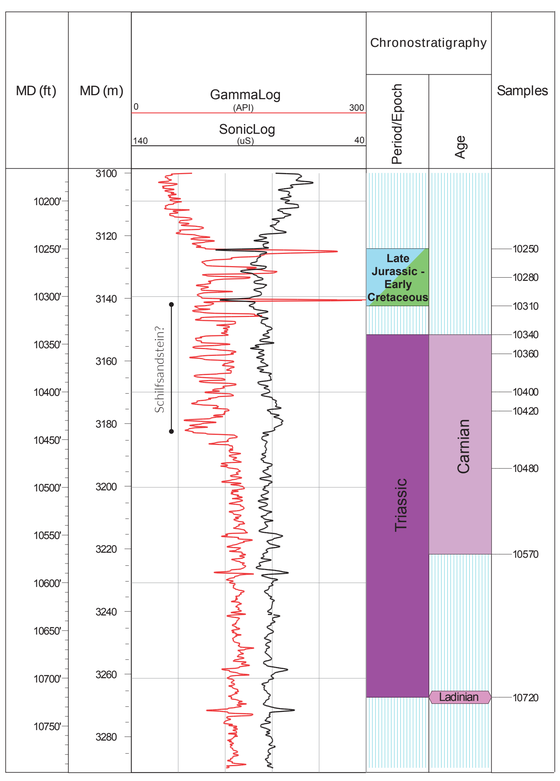


Fig. 4: Well A05-01; GR, Sonic and chronostratigraphy. Biostratigraphic analyses (TNO, 2016) indicate the presence of Late Jurassic and Early Cretaceous strata. The underlying Triassic section was poor in palynomorphs but suggests deposits of Carnian (Late Triassic) age in A05-01.

Local depocentre at A15-01?

Time isochore maps of the Lower and Middle Triassic intervals in Fig. 5 show early Triassic thickening on the western margin of the Step Graben in A15 (area of interest indicated with dashed boundary in Fig. 3). This thickening could indicate the presence of a local depocentre and accommodation space for sediments in A15 at early Triassic times – explaining the high N/G L. Volpriehausen sst in A15-01 well. No early Triassic thickening is seen in A18. The L. Volpriehausen sst in A18-01 has low N/G values.

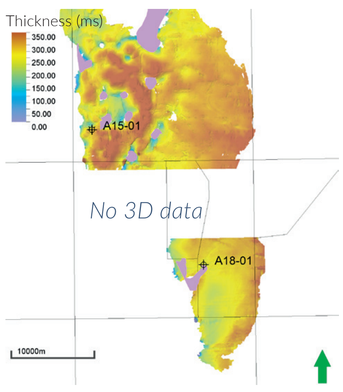


Fig. 5a: Time-isochore map of the Early Triassic interval (Top Volpriehausen to Top Zechtstein).

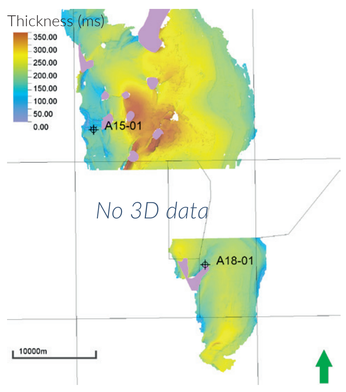
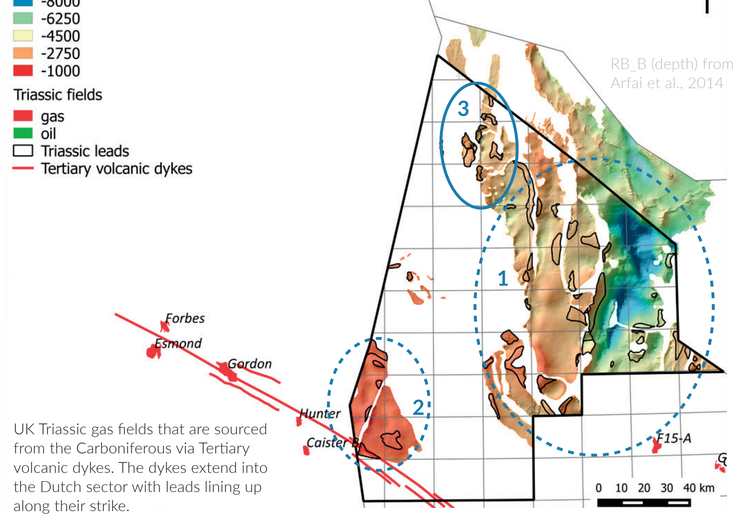


Fig. 5b: Time-isochore map of the Middle Triassic interval (Top Muschelkalk Evaporite to Top Volpriehausen).

Triassic leads in the Dutch northern offshore



UK Triassic gas fields that are sourced from the Carboniferous via Tertiary volcanic dykes. The dykes extend into the Dutch sector with leads lining up along their strike.

Fig. 6: Top L. Volpriehausen sst depth map indicating the three types of leads identified: 1) Classic leads with proven types of trap, source, seal and reservoir, 2) Leads which may be sourced with HC's via Tertiary volcanic dykes, 3) Leads with alternative reservoir provenance in the northwestern Step Graben.

For questions contact exploration@ebn.nl