Triassic Prospectivity

Lower Triassic reservoir development in the Dutch northern offshore

The Main Buntsandstein play is well established in the Southern North Sea. Aeolian/fluvial Lower Volpriehausen and Detfurth sandstones form 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.

Regional well analysis suggests the presence of reservoir sands north of the main fairway. Fluvial sands with alternative provenance may have been preserved in the NW area of the Step Graben system as seismic interpretation indicates development of local depocentres during the Early Triassic. Several untested Triassic structures have been identified.

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

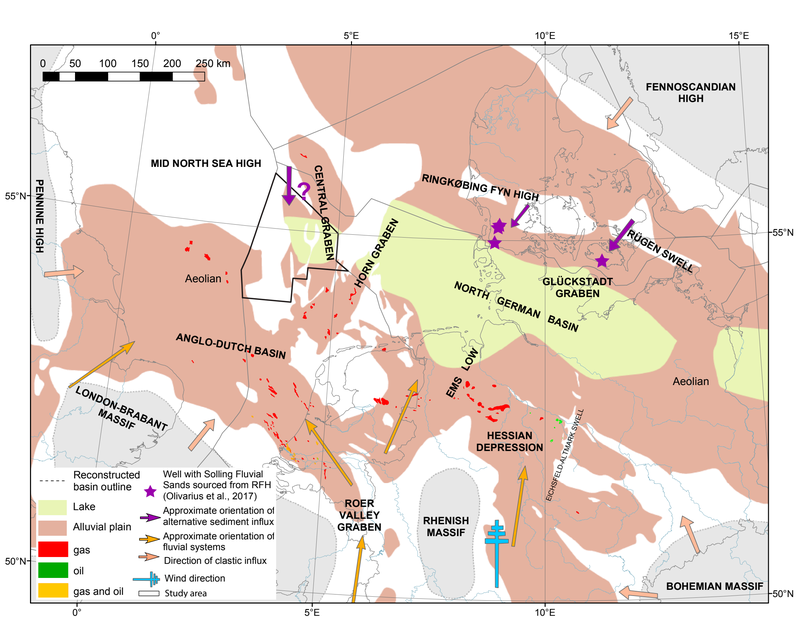


Figure 1. Paleogeographical map of the Southern Permian Basin at Early Triassic times showing the well locations with northern sediment provenance indicated by purple stars. Adapted from Fig. 9.11 Southern Permian Basin Atlas. (SPBA, 2010)

Fluvial sands with local provenance north of the main fairway

- Fluvial sands with local provenance may have developed as reservoir in the northwestern Step Graben.
- 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., 2017).
- L.Volpriehausen sandstone (RBMVL) is present in most of the study area (fig. 3).
- Abundance and thickness of RBMVL decrease from south to north while fluvial sands with local provenance may have developed as reservoir in the northwestern area.

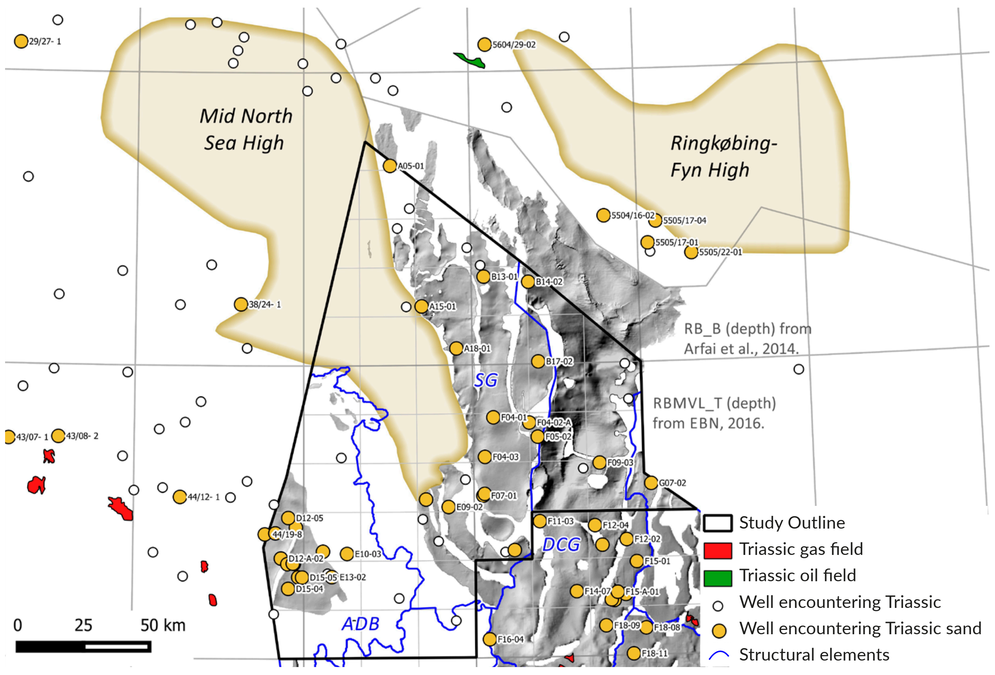


Figure 2. Regional map showing all wells that drilled Triassic strata (white dots) and the wells encountering Triassic sands (yellow dots).

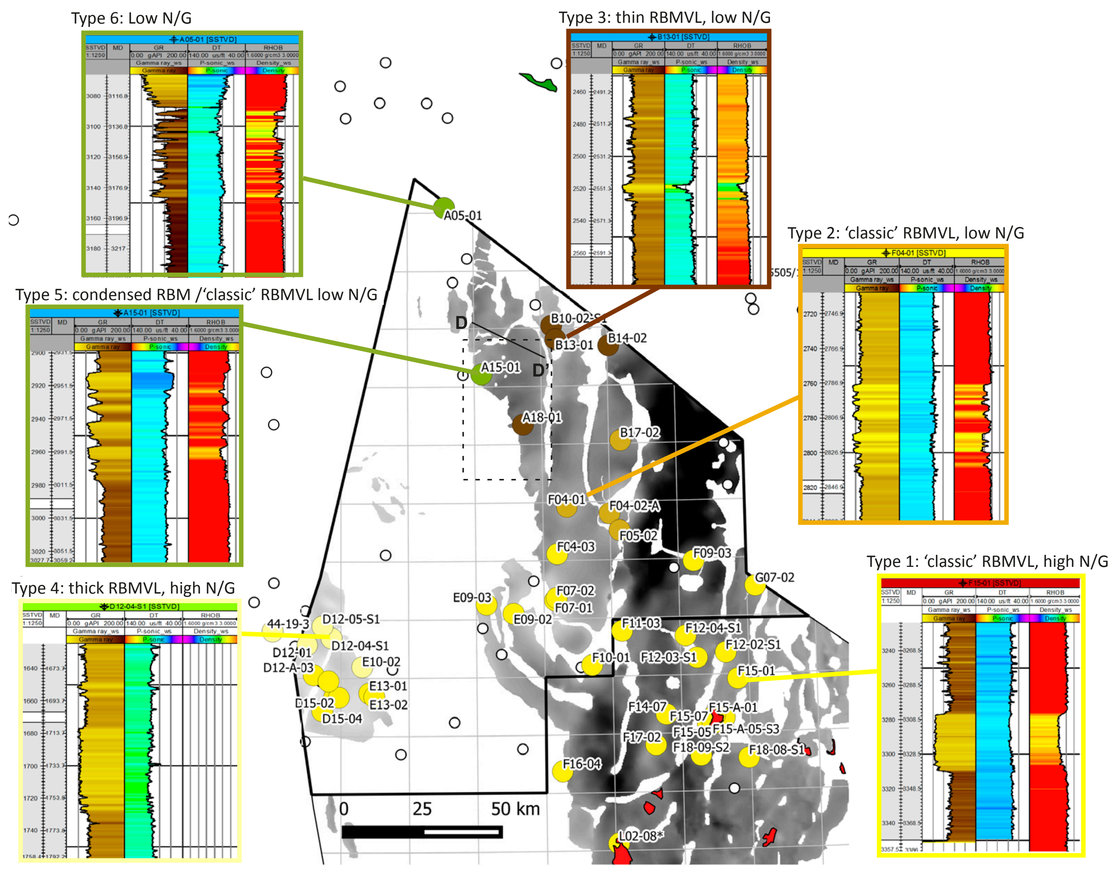


Figure 3. Regional reservoir architecture – typical well log response for different types of RBMVL. Grainsize distributions suggest a different transport mechanism (fluvial) or sediment source in A05-01 and A15-01.

Multiple Triassic leads are identified

Three types of leads have been identified in the Dutch northern offshore (fig. 4):
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.

Some UK Triassic gas fields (fig. 4) are sourced from the Carboniferous via Tertiary volcanic dykes. The dykes extend into the Dutch sector with leads lining up along their strike direction.

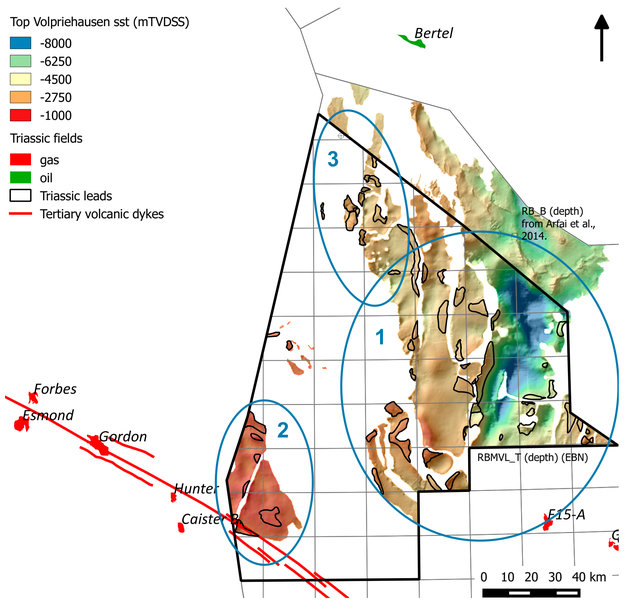
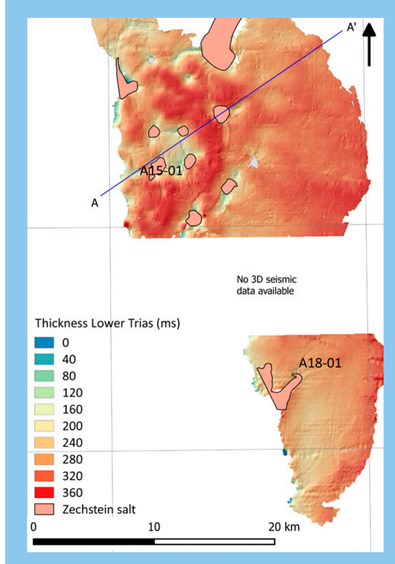


Figure 4. Top L. Volpriehausen sst depth map indicating the three types of leads identified.

An example of local depocentre development



Time isochron map of the Lower Triassic intervals (fig. 5) shows early Triassic thickening on the western margin of the Step Graben in A15. This thickening could indicate the presence of a local depocentre and accommodation space for sediments in A15 at early Triassic times – explaining the relatively high N/G Lower Volpriehausen sst in the A15-01 well (fig. 6). No early Triassic thickening is seen in A18. The Lower Volpriehausen sst in A18-01 has low N/G values.

Figure 5. Lower Triassic isochron map.

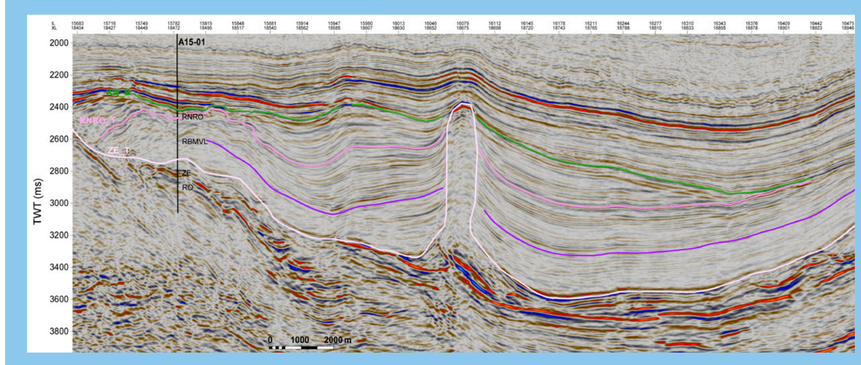


Figure 6. Seismic section (time) showing relative thickening of Lower Triassic strata in A15.

For questions contact info@nlog.nl or exploration@ebn.nl