



## Public summary of WP3.01-D07-D09:

# Framework of clastic reservoirs and seals in the West Netherlands Basin

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## 1 Executive Summary

WP3.01 contributes to the CATO-2 program by making available 3D static reservoir-geological models of the storage sites to other work packages for further study and coordinating data exchange with the site owners. Focus of WP3.01 activities in the year 2011 has been among things on a 'sweet spot' study of the offshore part of the West Netherlands Basin with the aim to pin-point optimum reservoir locations for CO<sub>2</sub> storage.

PanTerra Geoconsultants BV, a highly regarded geoconsultant, joined WP3.01 as a partner in the beginning of 2011. During 2011 PanTerra has studied the Triassic and Upper Jurassic-Lower Cretaceous intervals of the West Netherlands Basin with the aim to outline "sweet spots" that are expected to be favourable and safe areas from a CO<sub>2</sub> retention point of view. This work was reported in December 2011. The studies provided an overview of subsurface geological properties (and their uncertainties) in the West Netherlands Basin. The work will be the basis for all further CATO-2 studies in the basin. With the results reservoir "sweet spots" as well as areas unsuitable for storage can be easily identified. In addition, top-seal thickness (a key property for underground CO<sub>2</sub> storage) of the different reservoirs can be easily mapped.

The work carried out by PanTerra for CATO was delivered in December 2011 in two regional reports, one on the Upper Jurassic-Lower Cretaceous (D07) and one on the Triassic (D08) of the West Netherlands Basin and a Petrel project (D09). Each of the reports have three main components: 1) a seismic interpretation, 2) a well correlation study and 3) a petrophysical study. Based on the results of the West Netherlands Basin study areas may be selected that are optimal for CCS.

### **D07 - Framework of Lower Cretaceous and Upper Jurassic clastic reservoirs and seals in the West Netherlands Basin**

For the seismic study seven Jurassic and Cretaceous horizons and the top Triassic were mapped basin-wide on 3D surveys (See D09). The Jurassic-Cretaceous horizons illustrate the complicated tectonic rift history of the basin. Generally the basin inversion during the Late Cretaceous and Tertiary followed the fault-trends that were formed during the rifting. In selected areas the interpretation can be further refined and improved were needed and used in follow-up studies.

### **D08 - Framework of Triassic clastic reservoirs in the West Netherlands Basin**

A network of over 80 wells in the basins was used to correlate 9 horizons in the "Main Buntsandstein" (= the Triassic reservoir section). These horizons allow a subdivision and a definition of the better reservoirs in the Triassic. In addition the Upper Triassic (the seal for the Triassic reservoirs) was subdivided. This is needed to understand the characteristics of the seal sections and illustrates (among others) the subtle unconformities in the Upper Triassic. One of the unconformities (the Solling unconformity) truncates the reservoir and is of profound importance for the reservoir distribution in the basin.

Using a network of over ninety wells, 19 horizons were correlated in the Upper Jurassic and Lower Cretaceous interval. This in combination with the seismic mapping allow sequence

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stratigraphic interpretations resulting in a robust subdivision. The stratigraphic distribution (and connectivity) of reservoir sands can now be understood and predicted.

The petrophysical analysis of key wells in all parts of the basins allows a first screening of reservoirs suitable for carbon storage. This combined with the seismic and well-based stratigraphy allows for clear sweet spot selection. This work is the basis for all further work in the basin on reservoirs and seals.

### **D09 - Petrel project West Netherlands Basin**

D09 comprises a 3D earth model incorporating wells, logs and seismic data of the West Netherlands basin. Data used in D07 and D08 can be found in this Petrel model.