Essential elements and processes of the oil and gas systems in the Netherlands

Databases, maps and integrated basin modelling

Introduction
TNO applies two approaches to increase the knowledge on essential elements and processes of the petroleum systems in the Netherlands:
1. Regional mapping;
2. Detailed mapping and 3D basin modelling.

Regional mapping
The TNO thematic mapping programme of the deep subsurface of Netherlands onshore and offshore aims to compile, analyse and map temperatures and rock and fluid properties (fluid = oil, gas, water) derived from released data from oil and gas wells.
In 2007 focus was on analysing and mapping:
- Temperature and geothermal gradients (Figure 2)
- Maturity of Carboniferous source rocks (Figure 3)
- Geochemical composition of natural gas accumulations (Figure 4).

Detailed mapping and 3D modelling
As part of the TNO detailed mapping programme of sub-areas, special attention is paid to analysing and interpreting rock and fluid parameters. We use 3D basin modelling for the integrated interpretation of the wealth of data obtained in the detailed mapping project with the aim to increase the understanding and knowledge of the petroleum systems. The deliverables for the Terschelling Basin and the southern part of the Dutch Central Graben include:
- Visualisation and analysis of rock and fluid parameters
- 3D burial histories
- Petroleum system analysis.

Figures 5 and 6 present examples of the pressure versus depth plots and cross-sections used to characterise the fluid pressure conditions in the area. Figures 7, 8 and 9 show selected results of the 3D basin modelling.

Regional seal: Cretaceous Chalk and shales hold equilibration of pressures
L.Triassic and Jurassic units -> Topseal breach allows hydraulic

Note the influence of salt diapirs on the temperature distribution

Temperature in wells at 2500m depth

Figure 6 W-E cross-section through the southern part of the Dutch Central Graben and the Terschelling Basin showing the distribution of pore fluid overpressures.