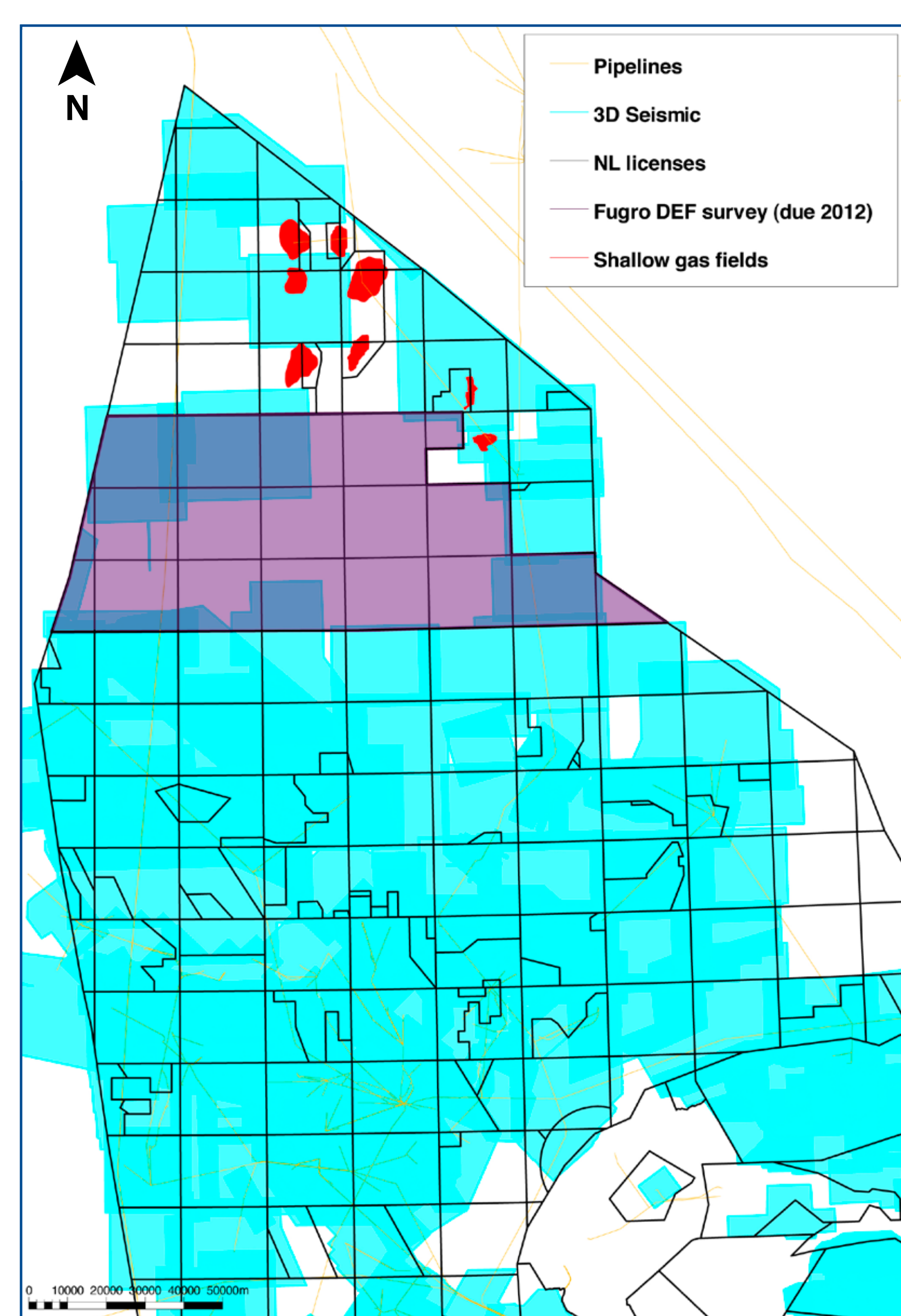
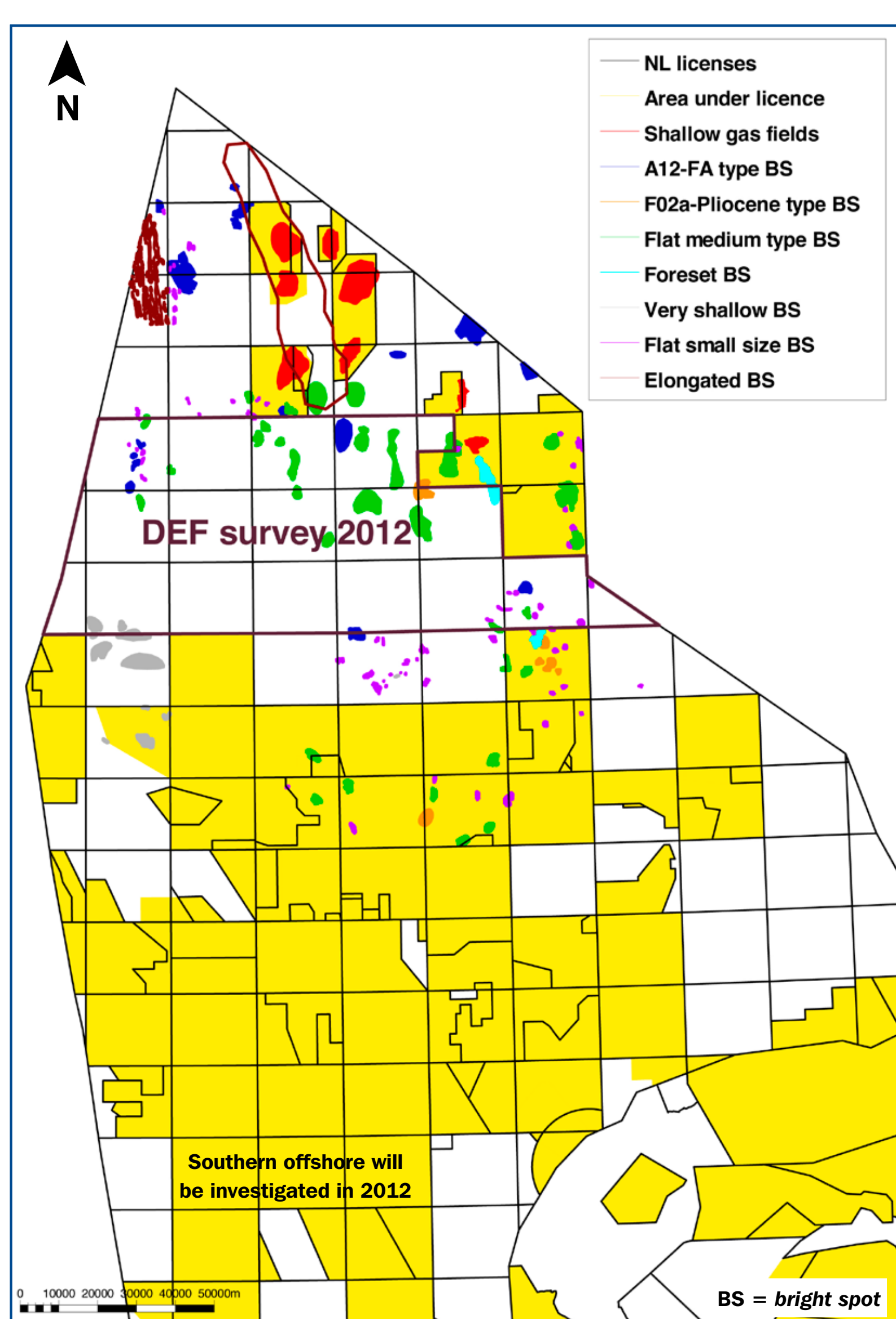


# Deepened Knowledge Shallow Gas in the Netherlands

## Introduction

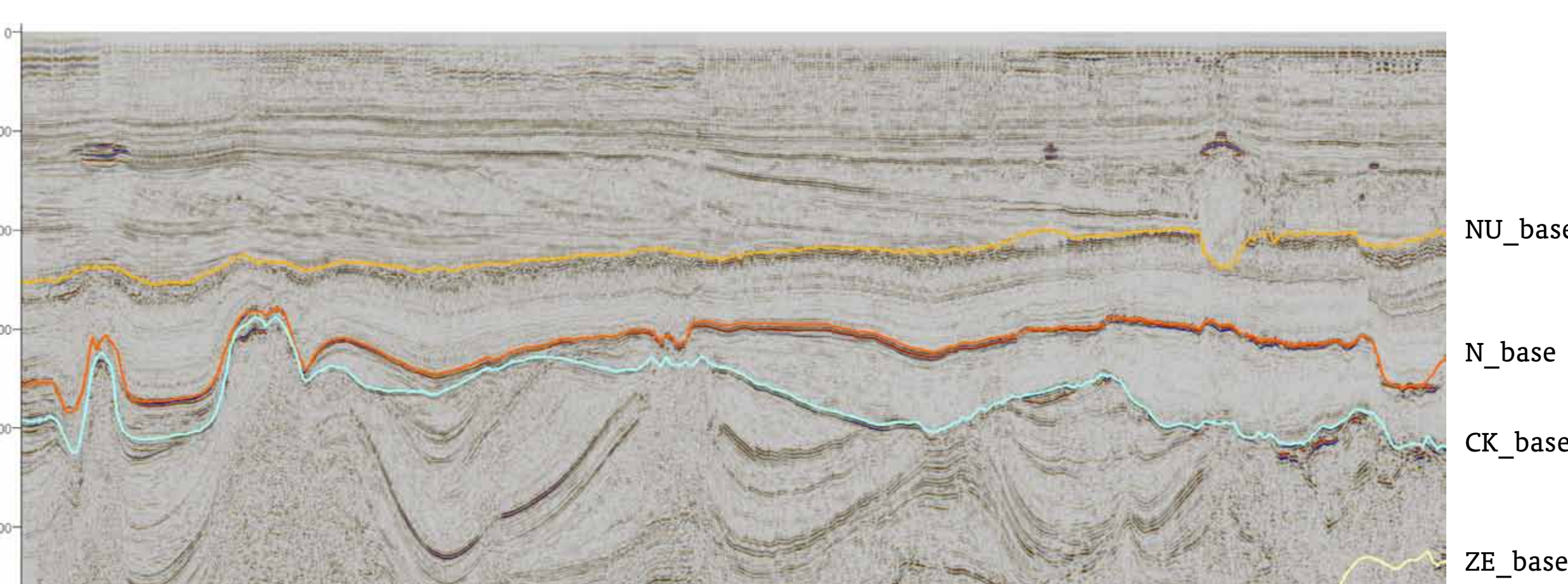


Shallow gas is defined as gas in unconsolidated, low pressure Tertiary sandstone formations. Depths typically range from 400 to 1000 ms. Sourcing can be thermogenic, biogenic or a mixture of the two.

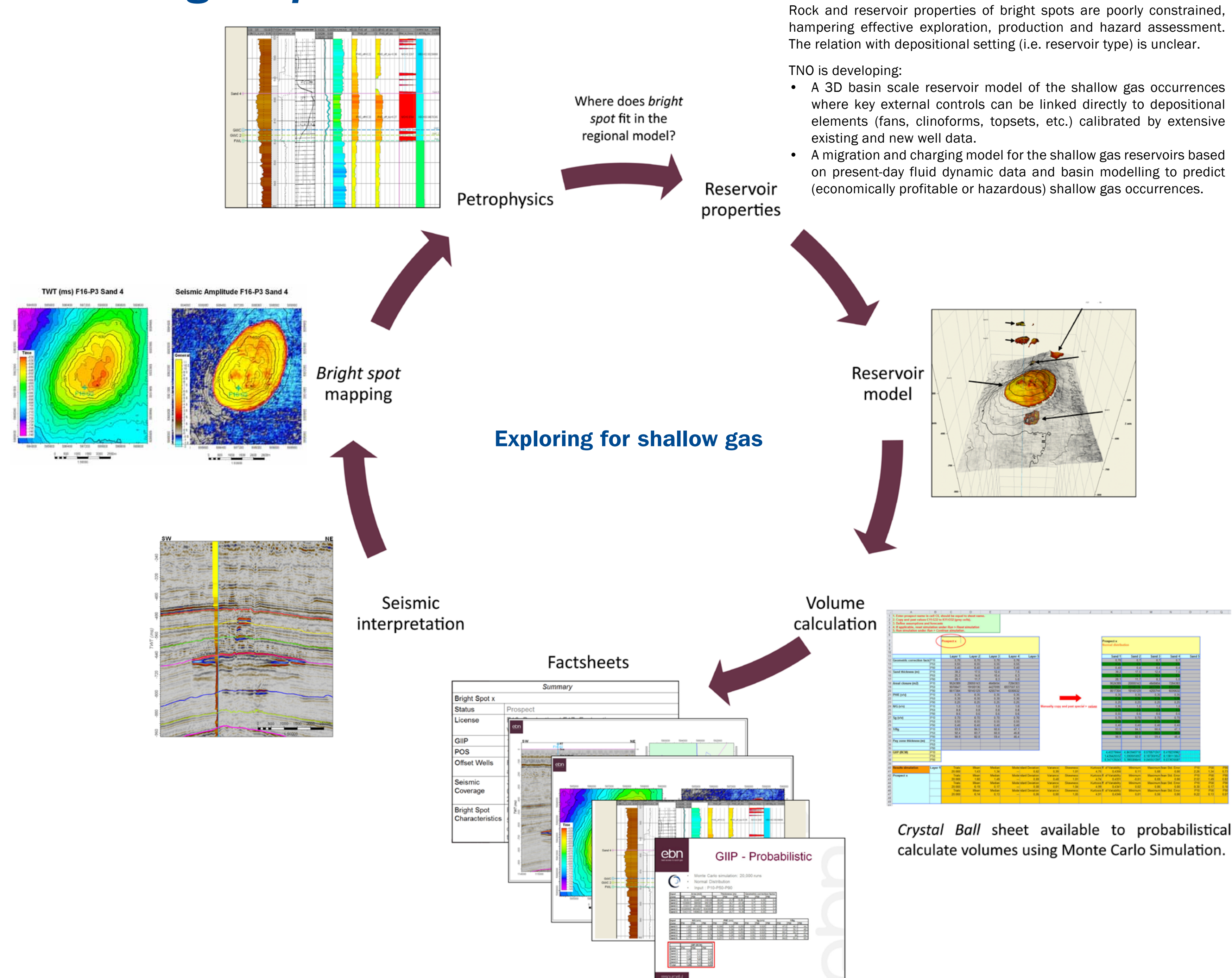


In the northern part of the Dutch offshore, many amplitude anomalies can be identified on seismic. These so-called *bright spots* indicate the presence of shallow gas.

The traps are generally low relief anticlines related to salt domes. Shales act as partial seal; only limited gas columns can exist. Venting to shallower units often creates a stacked pattern of *bright spots* containing separate gas columns.



## From Bright Spot to Volume



## Why exploring for shallow gas now?

### 1. First shallow gas fields in production

The occurrence of shallow gas in the Dutch offshore sector has been known for a long time. However, only recently we have started producing shallow gas (2009).

There are 8 proven shallow gas fields in the Netherlands of which 3 are currently producing, accounting for ~8.5 BCM recoverable. The earlier identified risk of sand and water production, given the unconsolidated reservoir, has been shown to be no problem.



### 2. New 3D seismic

The northern Dutch offshore is largely covered by 3D seismic data and in 2012 a new 3D seismic survey will become available in the DEF blocks (Fugro).

### 3. Marginal field tax incentive applicable

For details, see poster "Fallow acreage incentive in the Netherlands and marginal E&P projects".

### 4. Significant shallow gas potential

Currently, 59 shallow prospects of interest have been identified (classification type 1-3) in the northern Dutch offshore (A-H blocks). A significant number of these prospects are situated in open acreage.

### Bright spot classification

Different types of *bright spots* have been identified. The classification is a measure of potential (ranking):

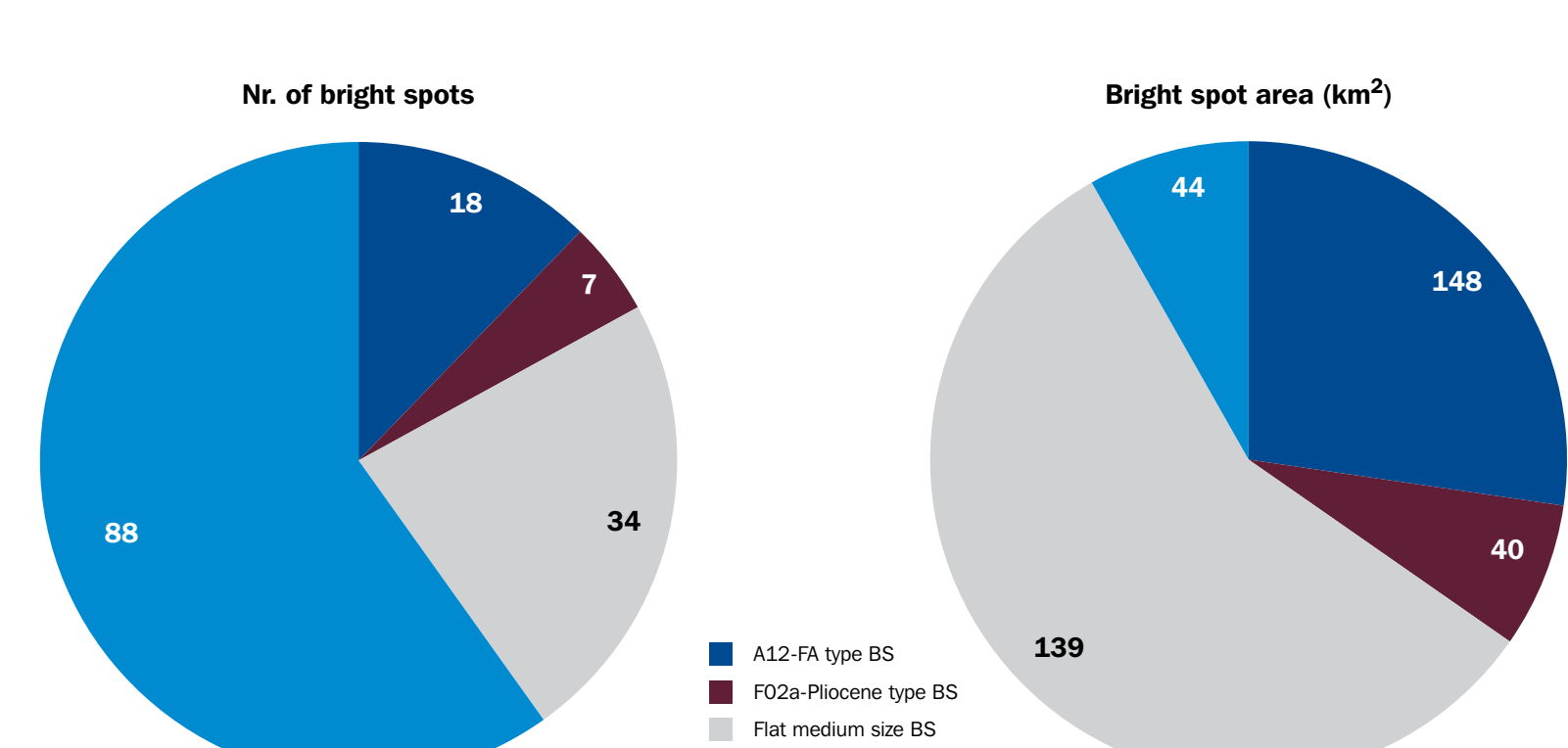
- 1 A12-FA type BS
- 2 F02a-Pliocene type BS
- 3 Flat medium size BS
- 4 Foreset BS
- 5 Elongated BS
- 6 Very shallow BS
- 7 Flat small size BS

- 1 A12-FA type bright spot
  - Relatively flat
  - Stacked levels
  - Depth 300-800 m

- 2 F02a-Pliocene type bright spot
  - Relatively large column in anticlinal structure
  - Additional minor stacked bright levels
  - Depth 550-800 m

- 3 Flat medium size bright spot
  - Relatively flat
  - Partly fault bound
  - Few stacked bright levels
  - Area > 2 km<sup>2</sup>

### Northern Dutch offshore



For information on Exploration and Production issues and E&P data see the Netherlands Oil and Gas Portal [www.nlog.nl](http://www.nlog.nl) & [www.ebn.nl](http://www.ebn.nl)

