



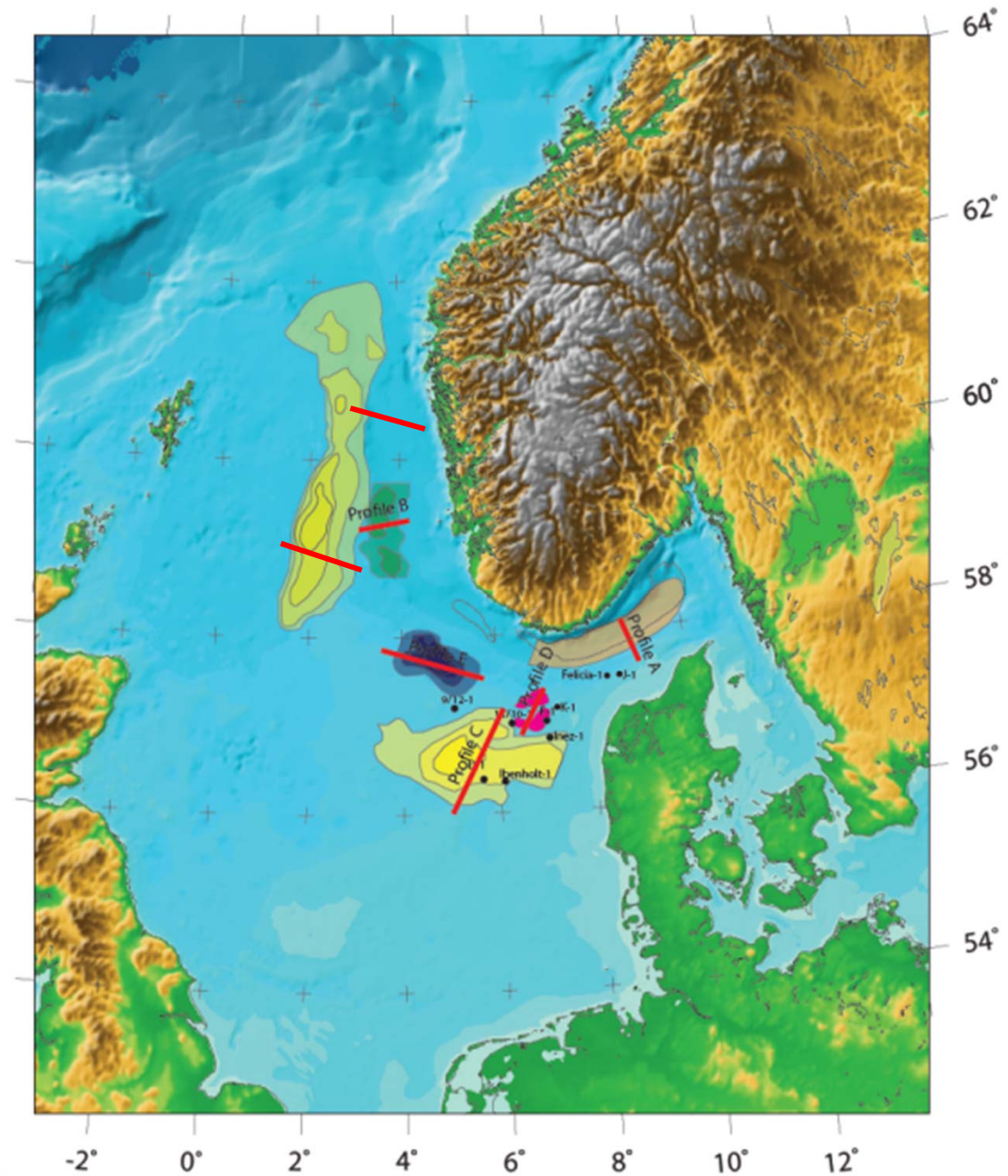
Ongoing research activities in the North Sea and Skagerrak area

Niels Poulsen - GEUS



Project cooperation between GEUS and the University of Oslo

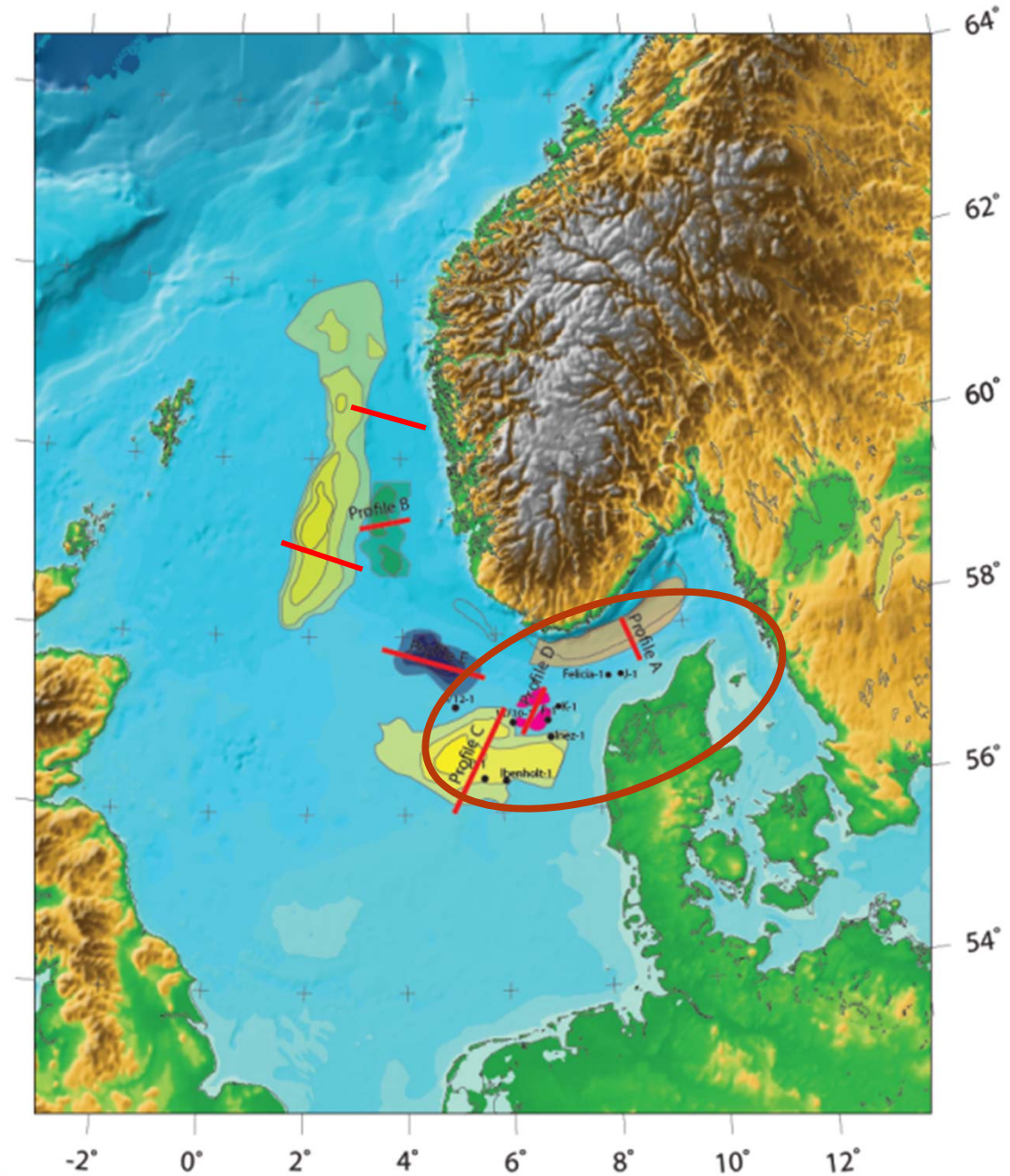
Mapping the possibilities of storing CO₂ in the eastern North Sea and Skagerrak area



Project cooperation between GEUS and the University of Oslo

Mapping the possibilities of storing CO₂ in the eastern North Sea and Skagerrak area

Potential reservoirs and seals in the eastern part of the Danish-Norwegian Basin



Partners - colleagues

GEUS

- Karen Lyng Anthonsen
- Lars Henrik Nielsen
- Lars Kristensen
- Niels Schovsbo
- Rikke Weibel Hansen
- Torben Bidstrup

University of Oslo

- Jan Inge Faleide
- Jens Jahren
- Per Aagaard
- Roy Gabrielsen
- Caroline Sassier
- Gudmund Dalsbø
- Manzar Fawad

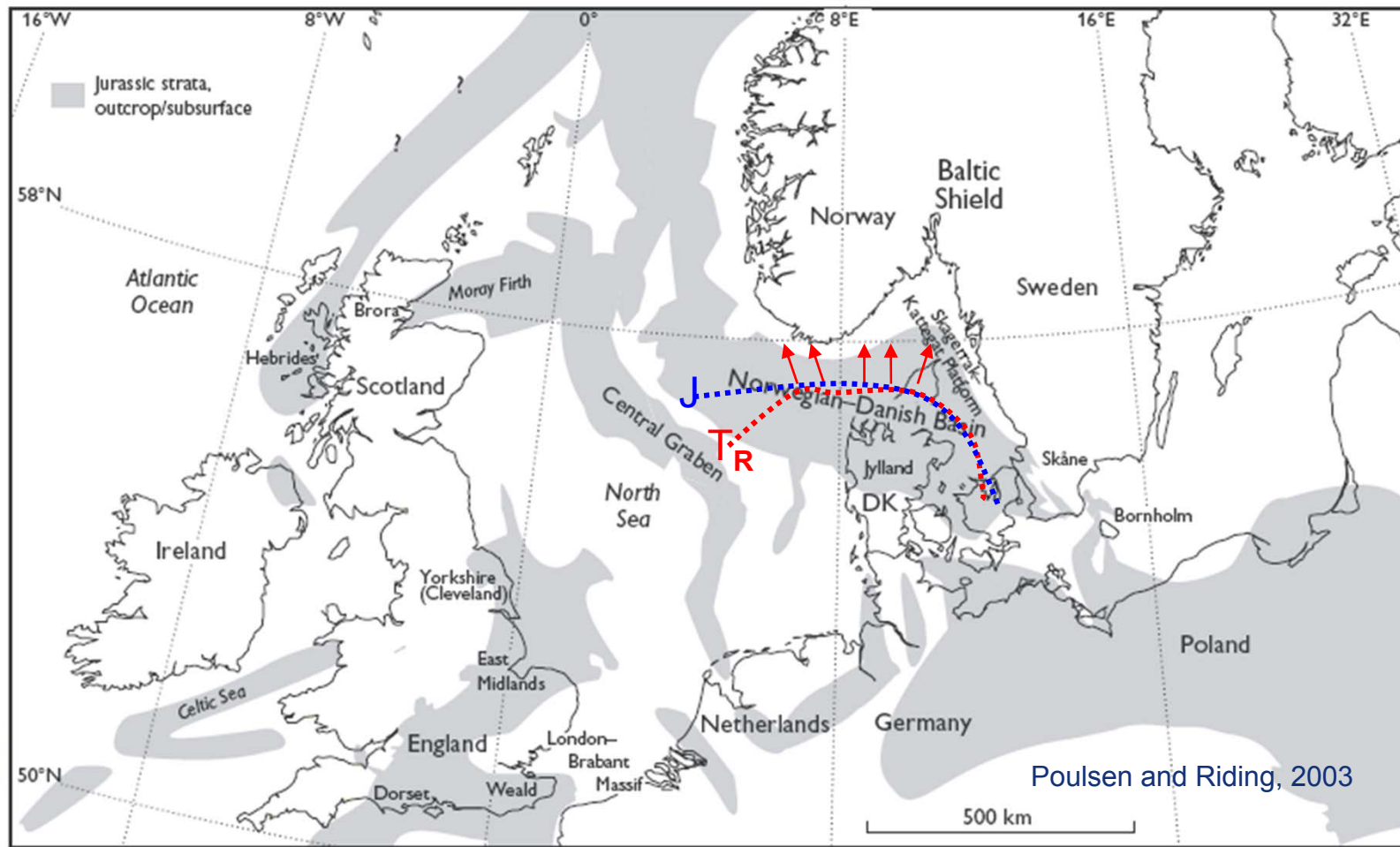


Mapping the possibilities of storing CO₂ in the eastern North Sea and Skagerrak area

- GEUS are mapping and describing the conditions in Danish on and off shore areas
- University of Oslo are mapping and describing the conditions on the Norwegian continental shelf
- Common understanding of depositional environment, elevation, erosion and, reservoirs, sealing and pockmarks



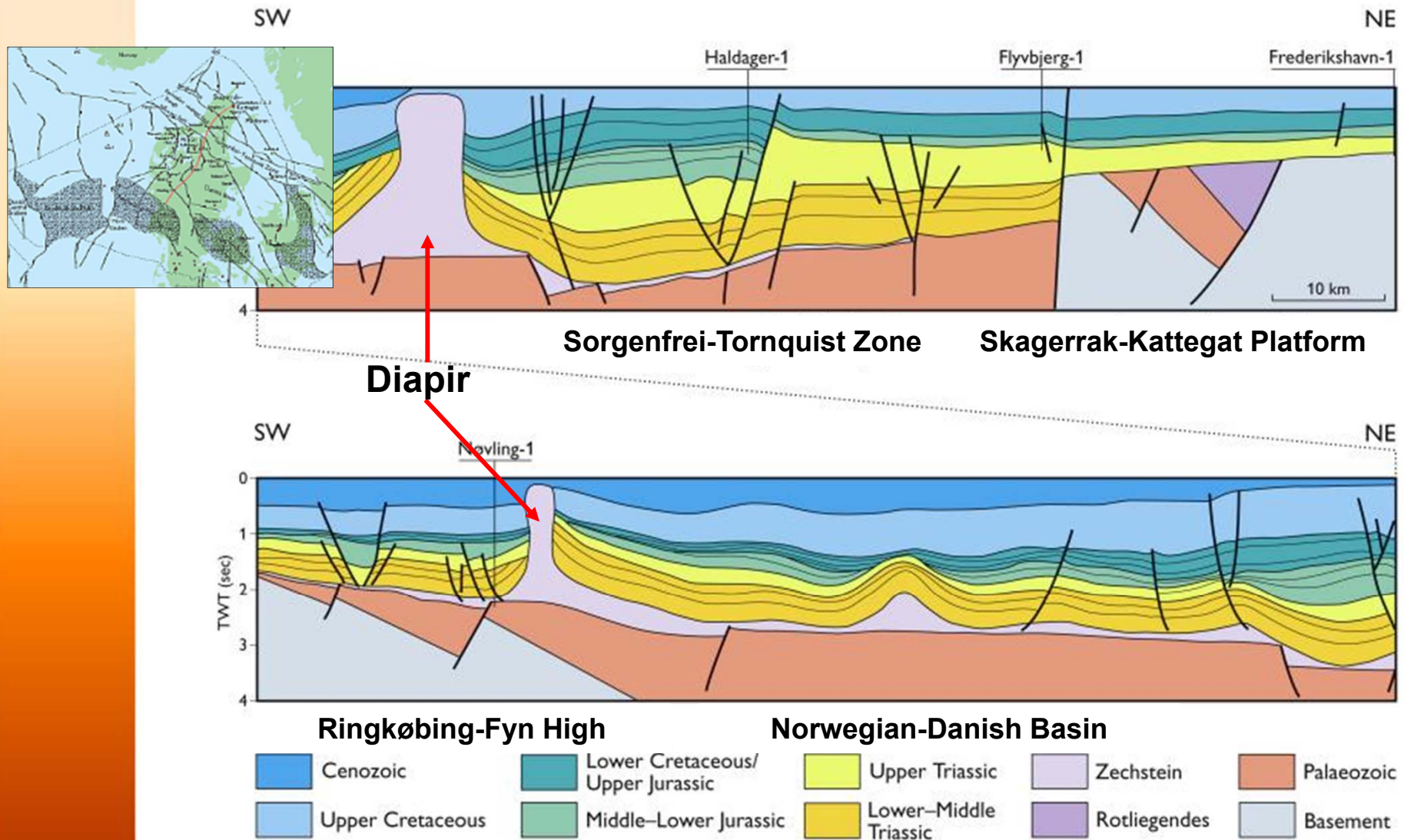
Mapping the possibilities of storing CO₂ in the eastern North Sea and Skagerrak area



Mapping the possibilities of storing CO₂ in the eastern North Sea and Skagerrak area

<ul style="list-style-type: none">• UiO<ul style="list-style-type: none">– Mapping– Compaction (burial – uplift history, trends)– Seismic lines parallel to section	<ul style="list-style-type: none">• GEUS<ul style="list-style-type: none">– Stratigraphy, sedimentology, log correlations, focus on reservoir and seal– W-E section<ul style="list-style-type: none">• Triassic and Jurassic: relevant wells from North Seas to within Sorgenfrei-Tornquist Zone– Petrophysical log evaluation
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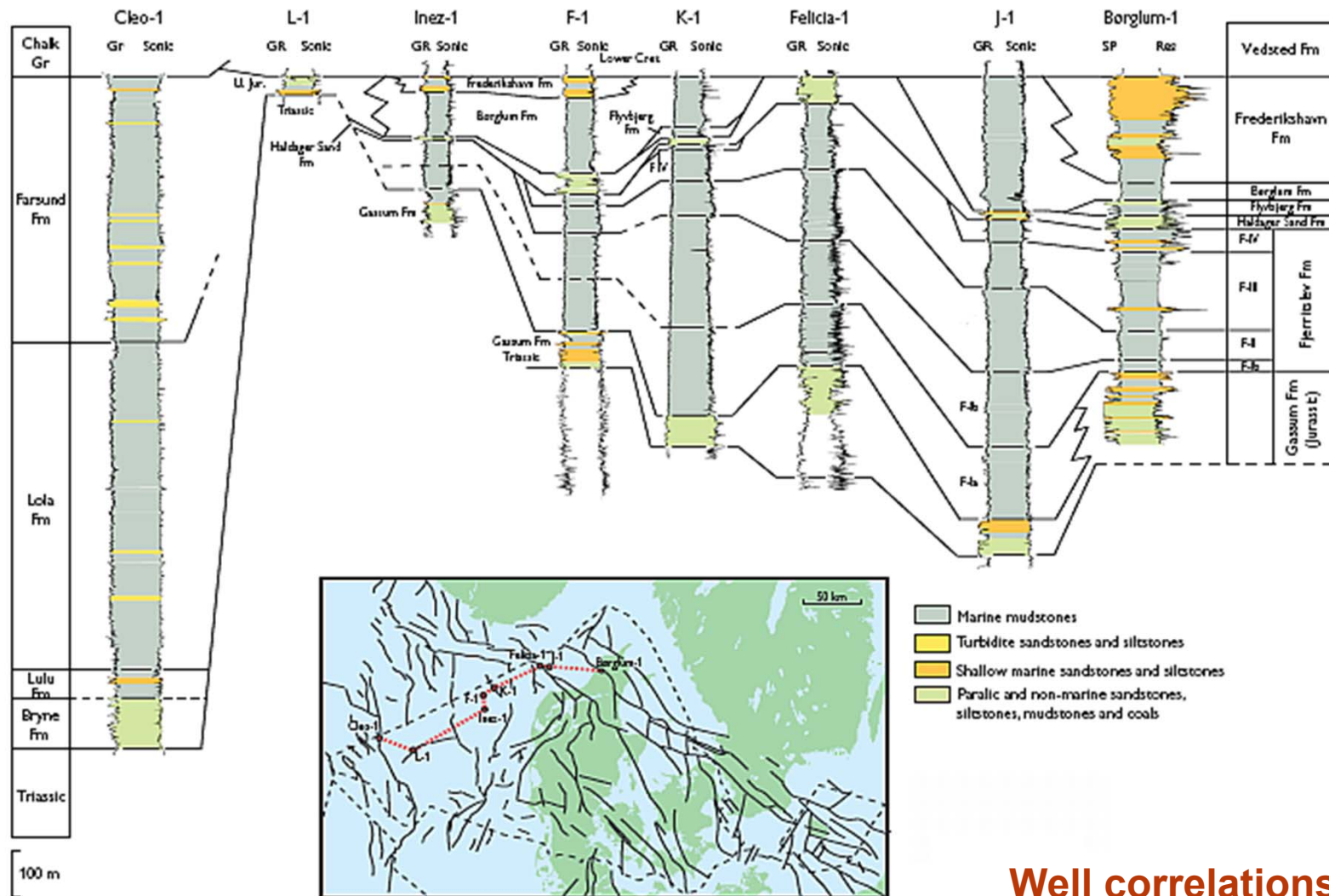




Nielsen 2003



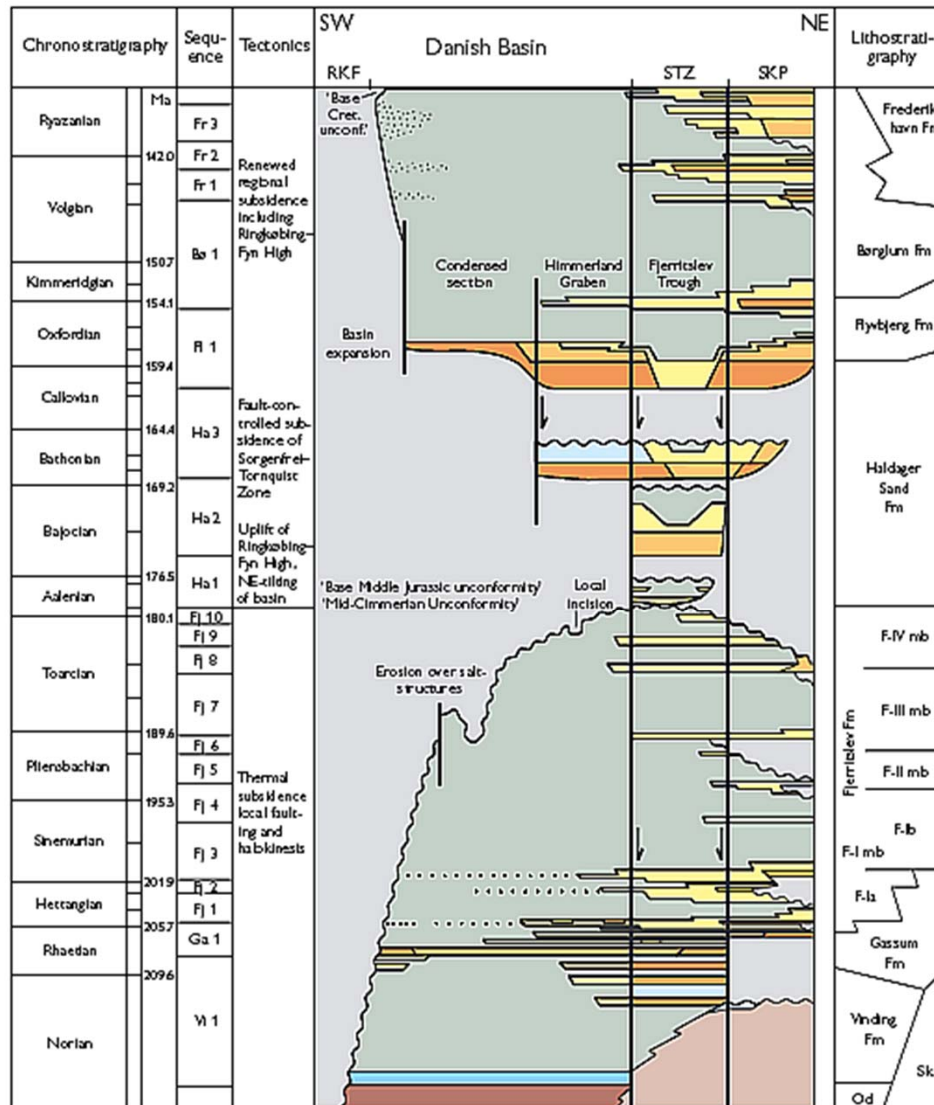
Central Graben | Ringkøbing-Fyn High | Norwegian-Danish Basin | Sorgenfrei-Tornquist Zone



Well correlations

Michelsen et al., 2003





Børglum and
Flyvbjerg
Formations:
Seal

Haldager
Sand
Formation:
Reservoir

Fjerritslev
Formation:
Seal

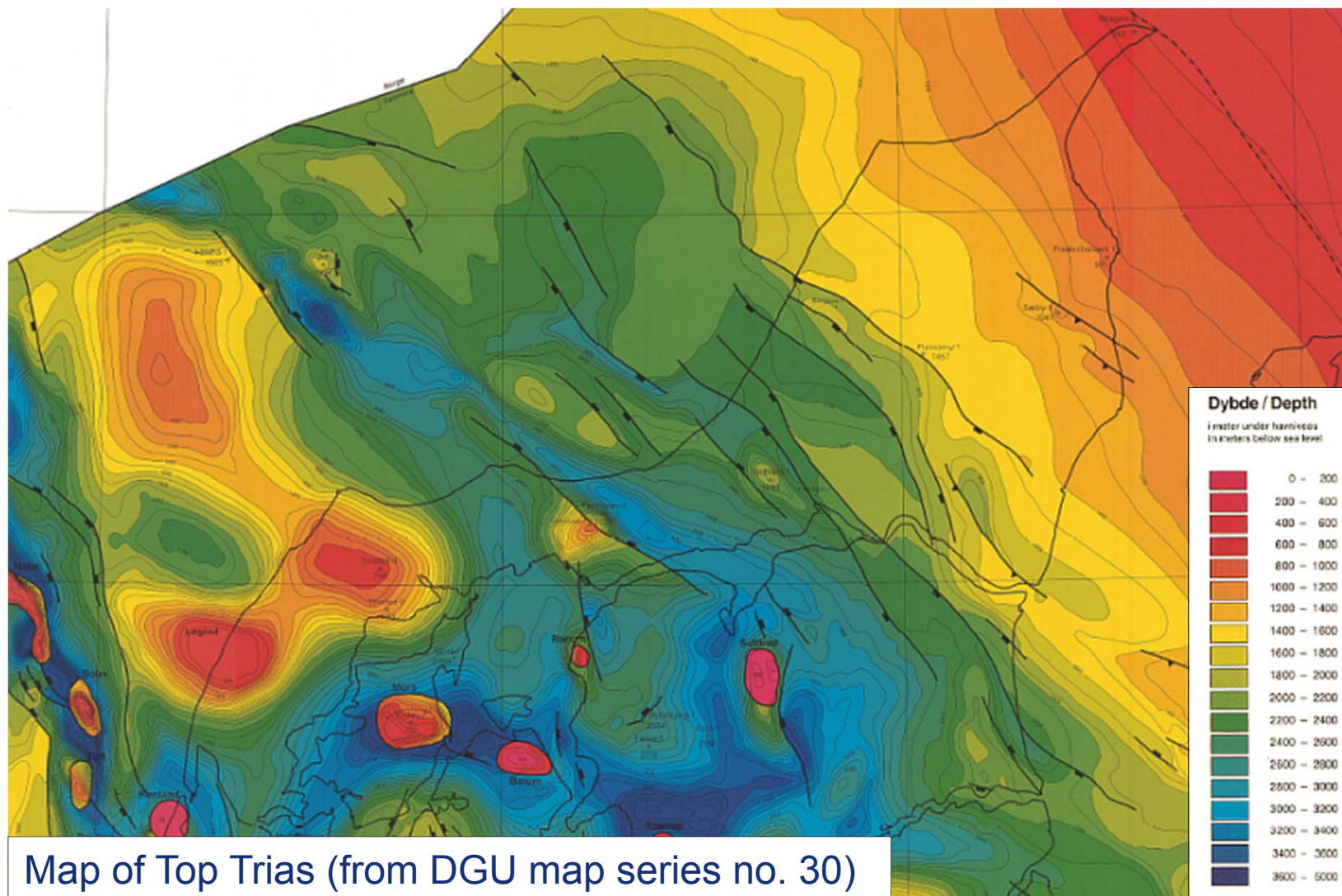
Gassum
Formation:
Reservoir

Nielsen 2003:
Sequence stratigraphic
framework, to provide a
scheme for correlations in the
Danish-Norwegian Basin

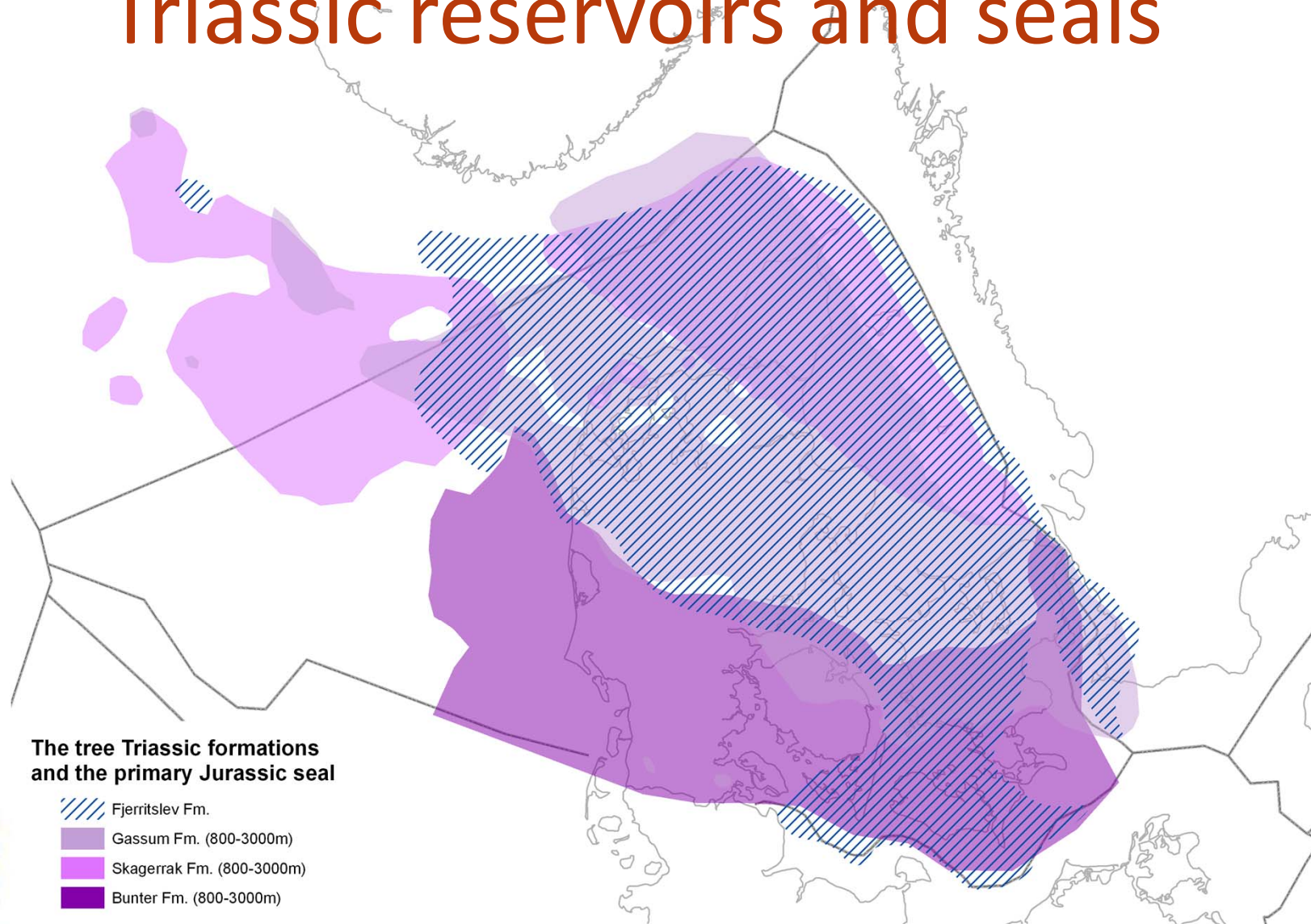
Triassic reservoirs: Bunter Sandstone Formation
and Skagerrak Formation



Top Trias \Leftrightarrow top Gassum Formation



Triassic reservoirs and seals

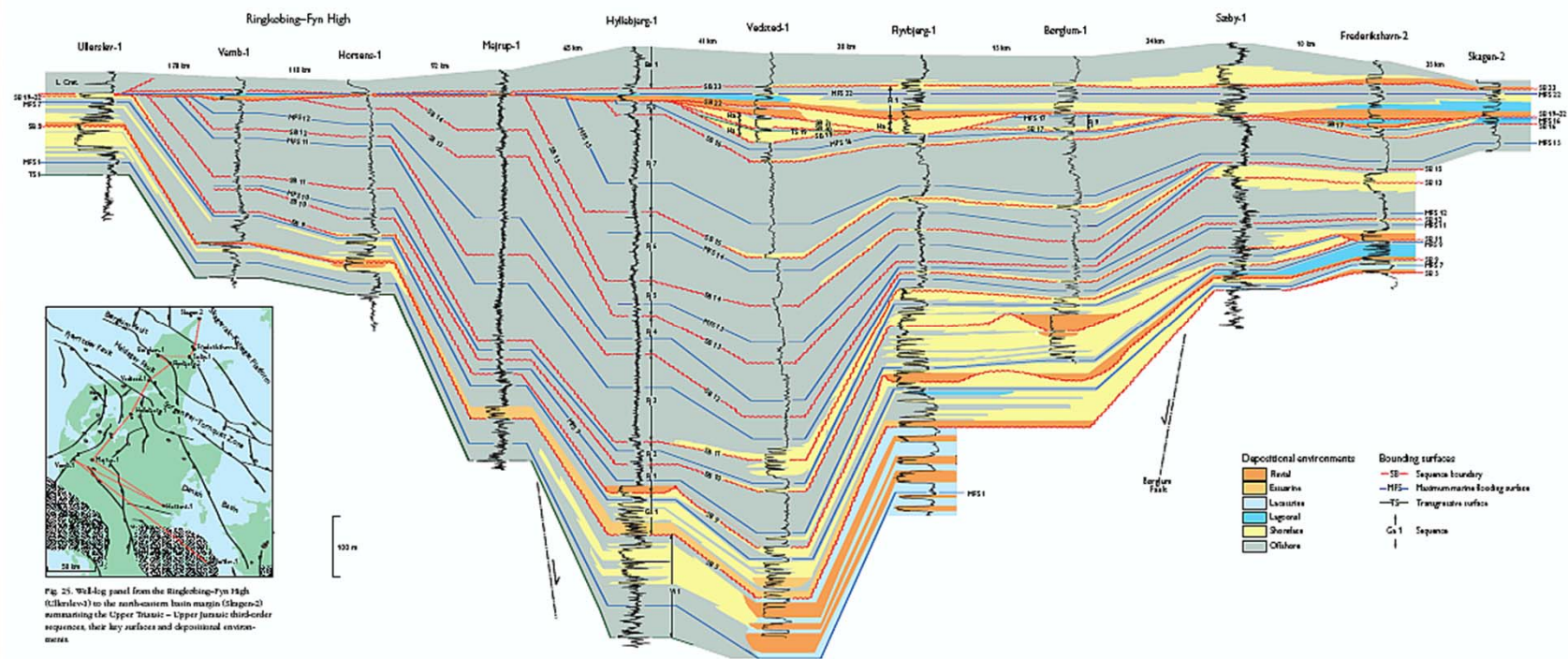


**The tree Triassic formations
and the primary Jurassic seal**

-  Fjerritslev Fm.
-  Gassum Fm. (800-3000m)
-  Skagerrak Fm. (800-3000m)
-  Bunter Fm. (800-3000m)



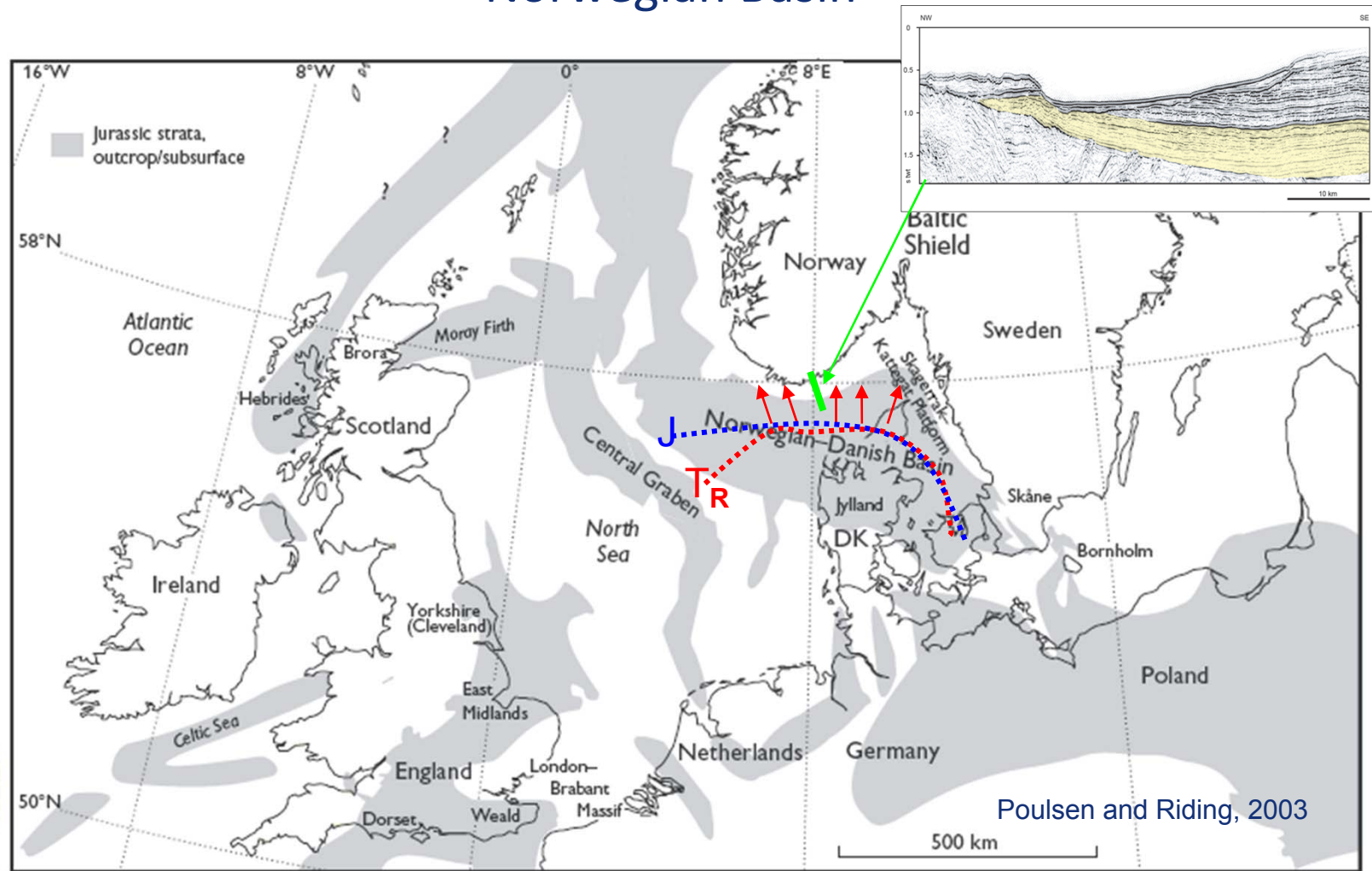
Jurassic reservoirs and seals



Sequence stratigraphic framework
Nielsen 2003:

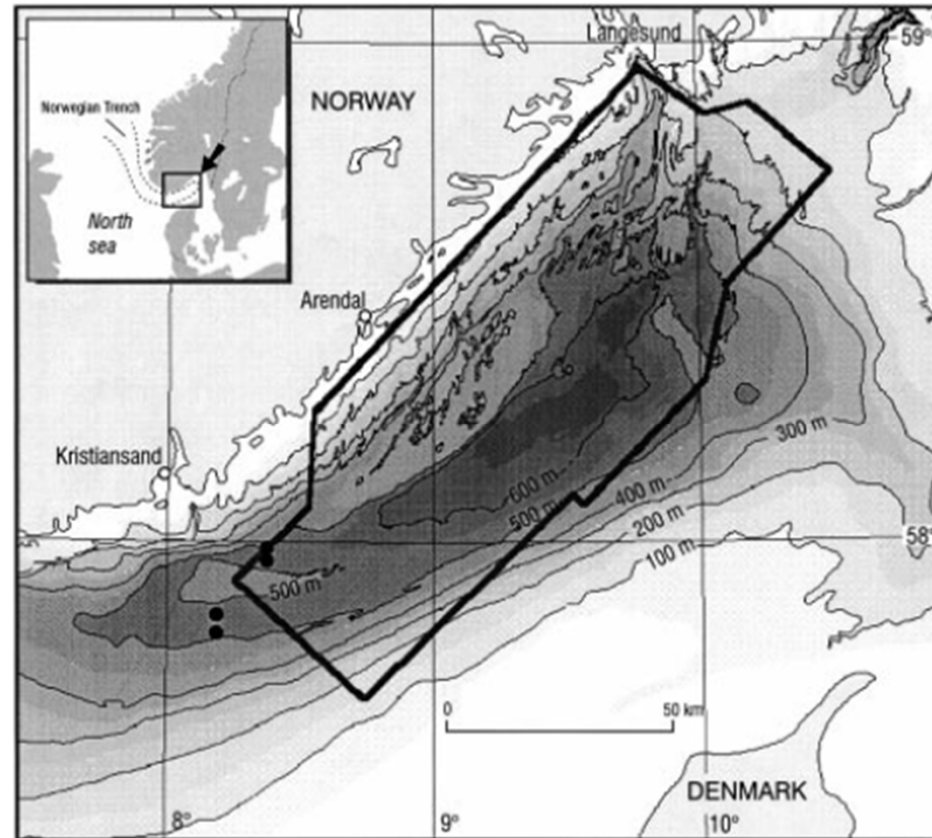
Sequence stratigraphic framework

to provide a scheme for correlations in the Danish-Norwegian Basin



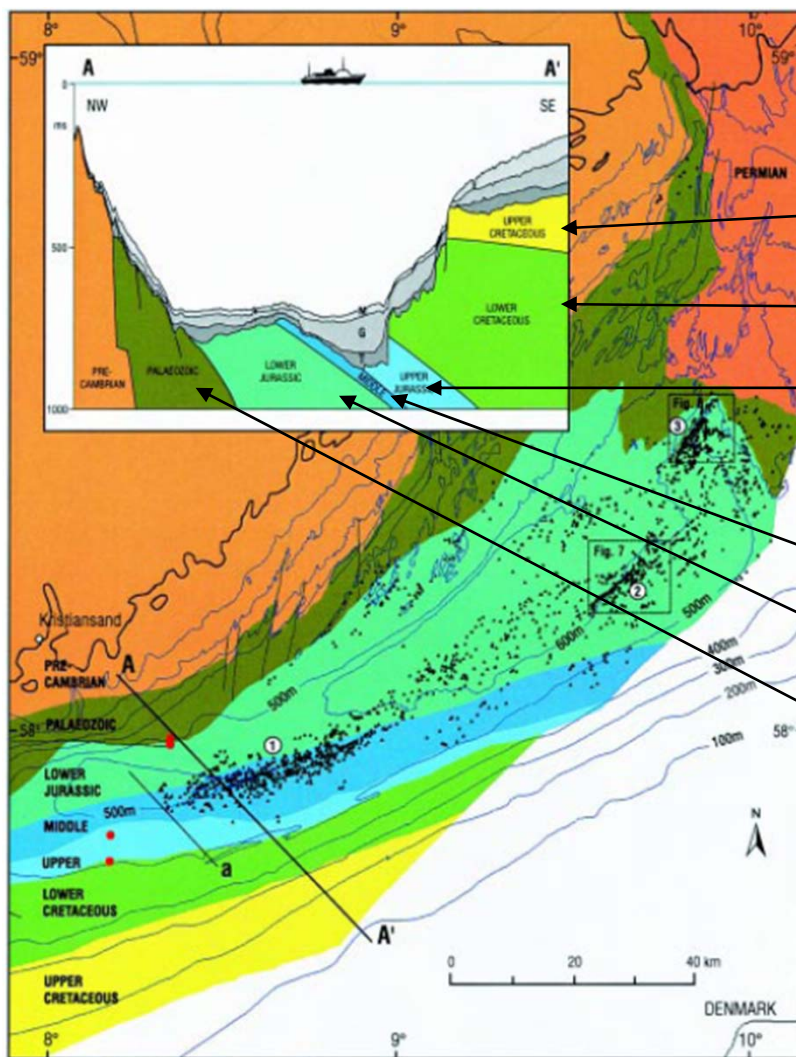
Bathymetry in metres of the Skagerrak

Norwegian Trench



Rise et al., 1999

Bedrock map and geological profile across the Norwegian Trench



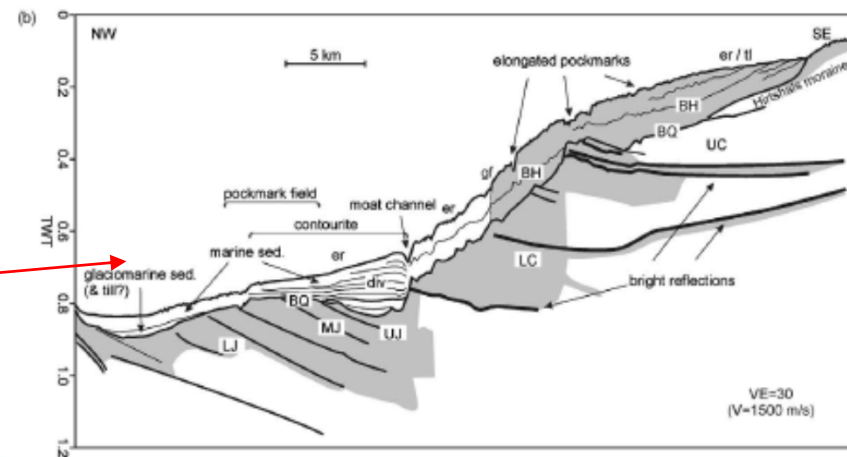
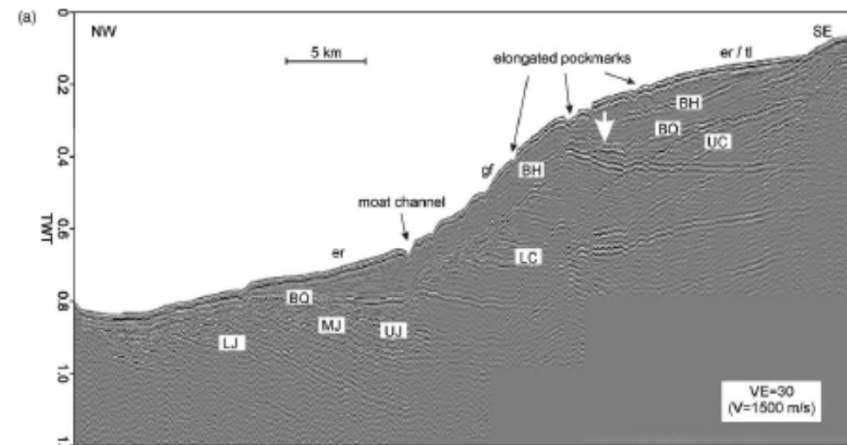
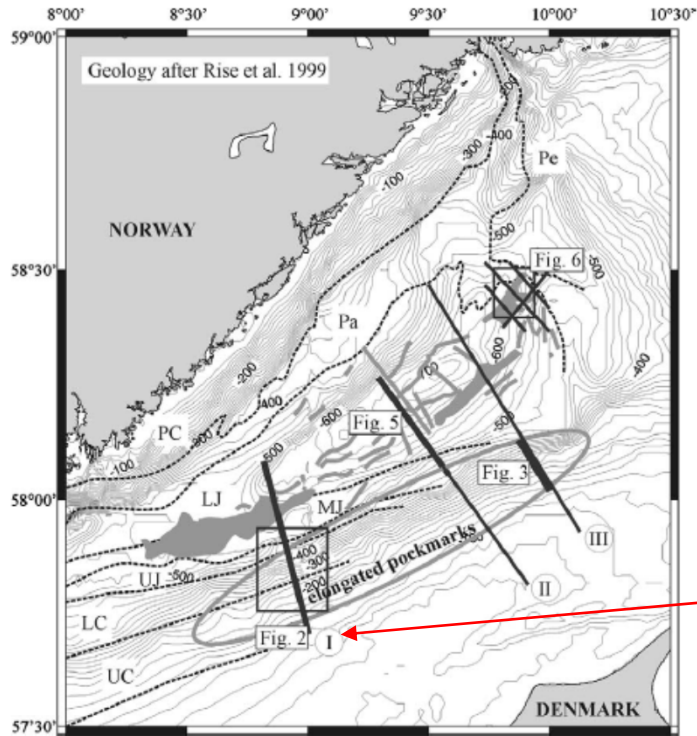
- Upper Cretaceous
- Lower Cretaceous
- Upper Jurassic
- Middle Jurassic
- Early Jurassic
- Palaeozoic

Rise et al., 1999



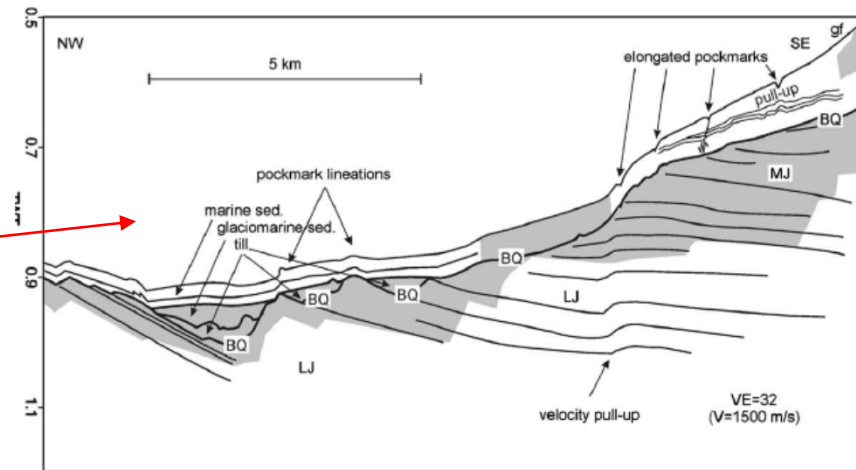
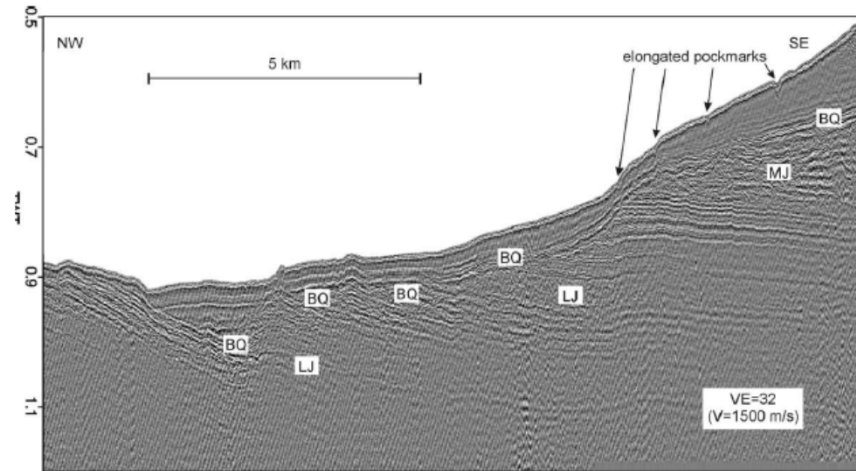
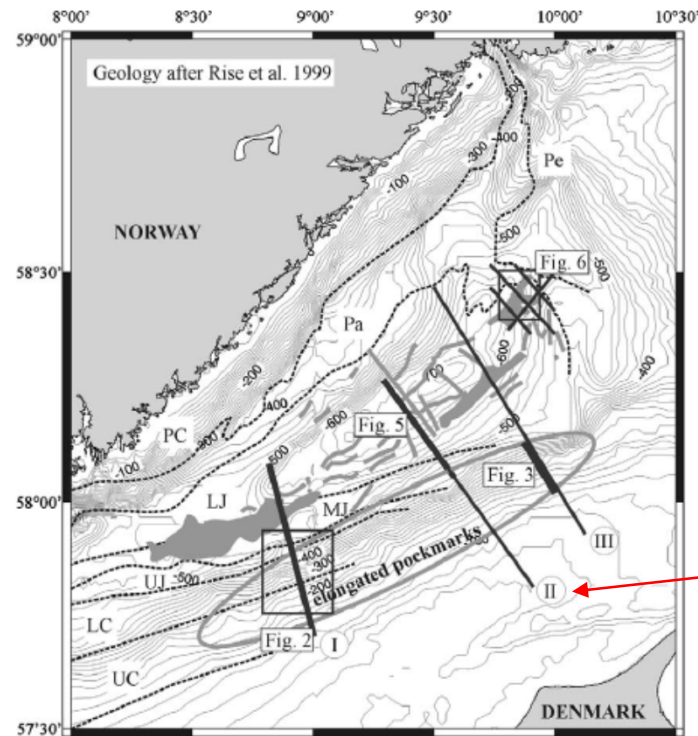
Bathymetry, geology and seismic profiles

Hübscher & Borowski 2006



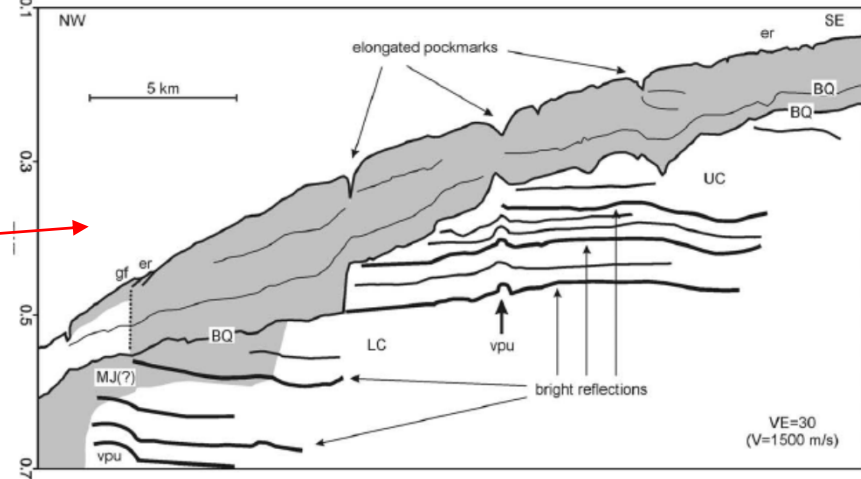
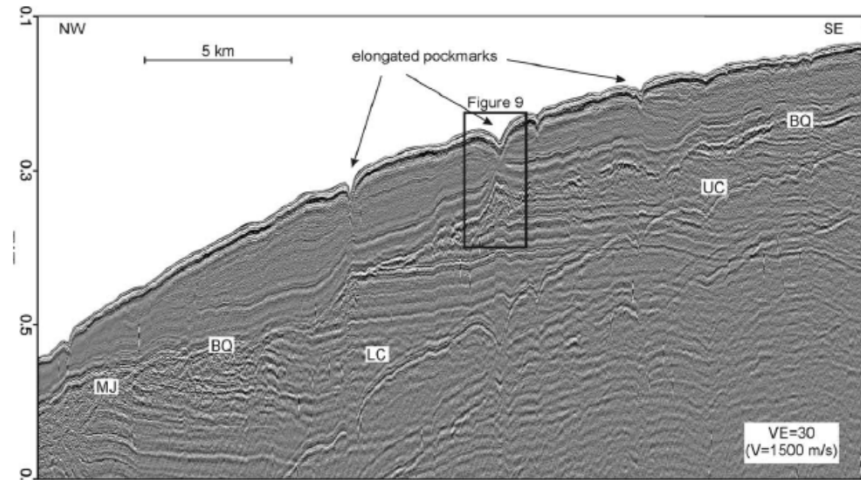
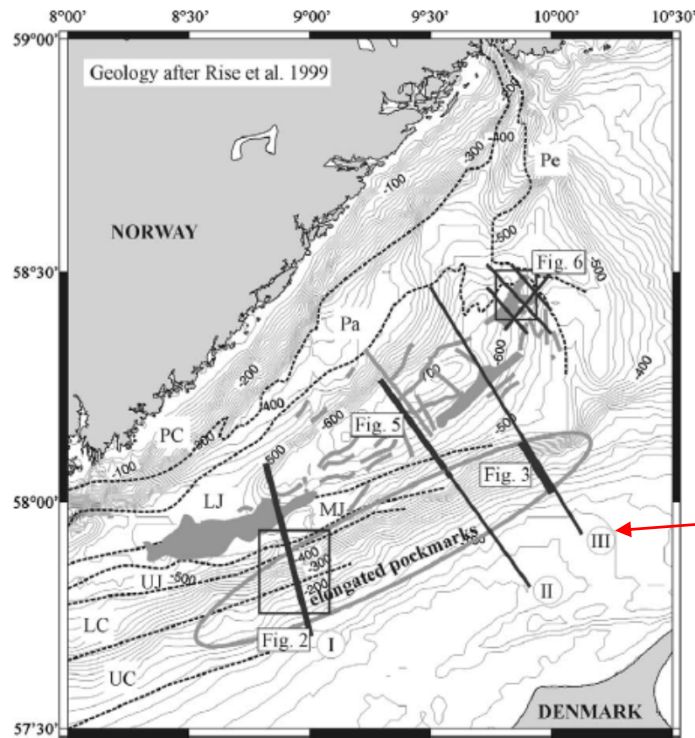
Bathymetry, geology and seismic profiles

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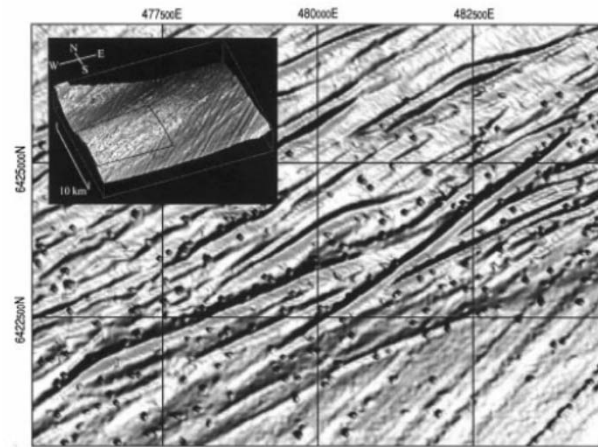
Bathymetry, geology and seismic profiles

Hübscher & Borowski 2006

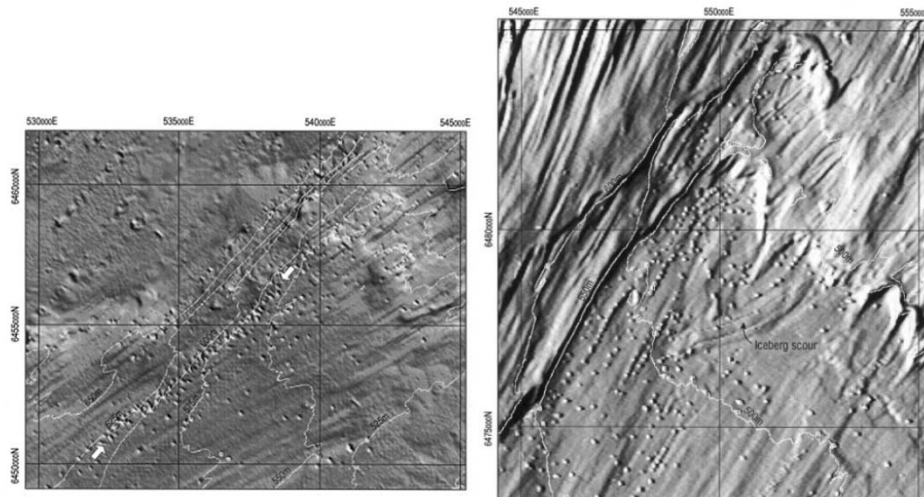


Pockmarks in the Norwegian Trench

- Pockmarks mapped by multibeam echo sounder
- Pockmark density is high in the Norwegian Trench
- All pockmarks are in Holocene sediments
- Majority above subcropping Mesozoic sandy strata
- Pockmarks mainly occur where the Quaternary succession is thin (<50 m).



Rise et al. 1999



Workshop

- **Copenhagen, at GEUS**
- **Autumn 2011**
- **Duration: 1½ days**
- Storage capacity, seal problematic, site selection, safety and risk analyses exemplified by ongoing research
- **Organisers :**
 - GEUS
 - Geology department at University of Oslo
 - IRIS
 - NIVA
 - Sintef



Thank you for your
attention

