GEO4240: 3D Seismic Interpretation Project

STRUCTURAL GEOLOGY PROJECT: Jura reservoir in the Troll Field (block 31/2)

Phase 1:

- Geological framework (study key literature).
- Interpret 2D seismic line SG8043-402 over the Horda-platform (through 3D).
- Stratigraphic calibration in well 31/2-4 (SP 4070).

Phase 2:

- Interpret a series of chosen reflectors in vertical sections (a limited number of inlines and crosslines and the 2D line):
    - o With well 31/2-4 as a starting point you have to identify and interpret:

        Base Eocene

        Base Tertiary

        Base Cretaceous

        Top Sognefjord Formation

        Top Brent Group

        It is difficult to discriminate between these horizons at the shoulders of the rotated fault blocks

- Focus on the interpretation of the fault pattern in the fault block. It is not required to interpret faults on all In- and Cross-lines, but you should show in one or two figures the main fault patterns (vertical, horizontal, horizon slices).
- Generate a random line along the 2D seismic line SG8043-402 and compare the 3D and 2D data. Discuss (observed) differences in resolution.
- Correlate reflectors over the main faults and discuss when these faults were active.
- Make time-structure maps of:
    - o Top Brent Group - horizon.
    - o Base Eocene – horizon

        (Most of the interpretation can be down using Automatic Seismic Area Picking (ASAP).

- Study anomalies in the seismic response on the presence of gas and the lateral extent of the gas-reservoir. Use vertical and horizontal sections.
- Check other seismic attributes than amplitude.
- Use different tools for visualization of the interpretation (Geocube/GeoViz).
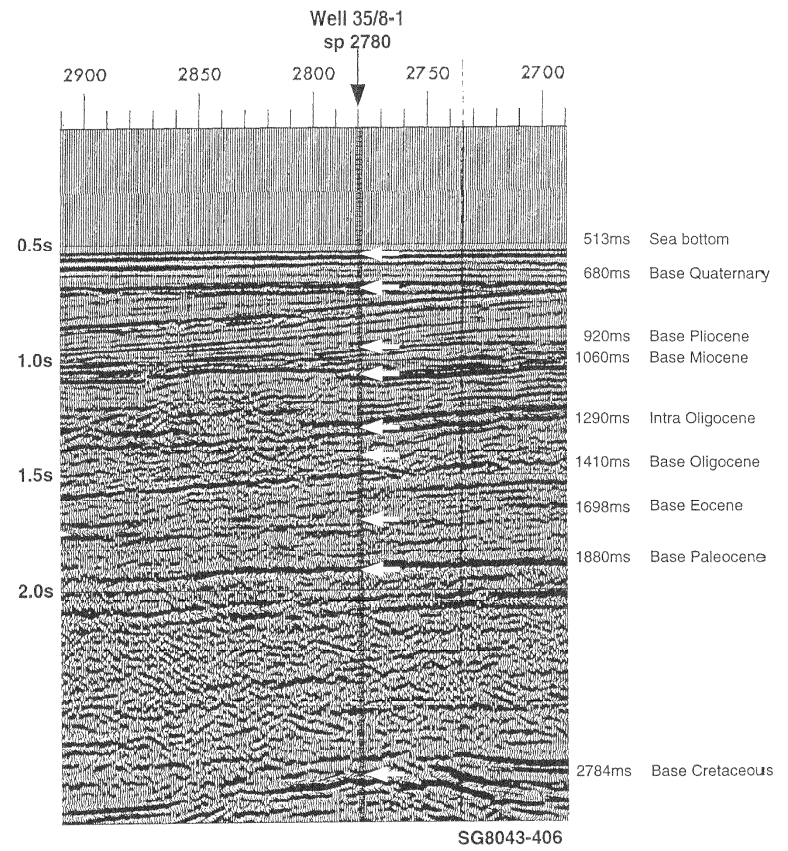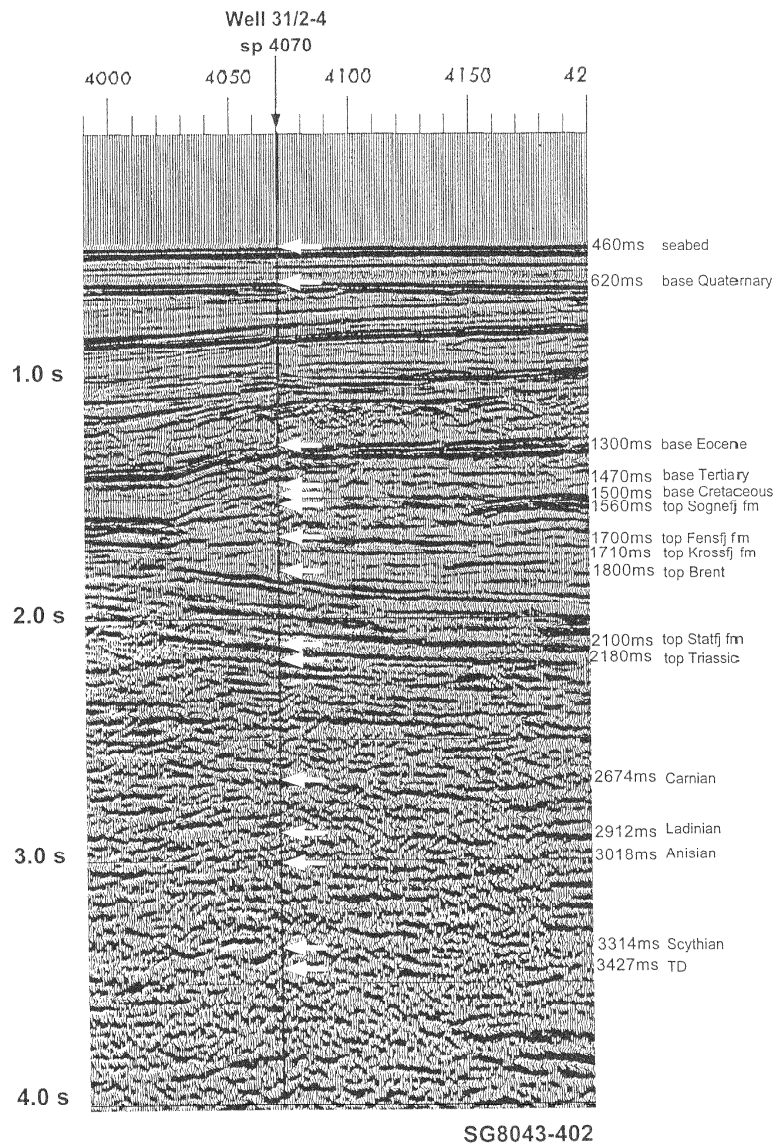
STRATIGRAPHY/SEDIMENTLOGY PROJECT: Miocene channels in block 35/8

Phase 1:

- Geological framework (study key literature).
- Interpret 2D seismic line SG8043-406 over the Horda Platform (through 3D).
- Stratigraphic calibration of well 35/8-1 (SP 2780)

Phase 2:

- Interpret a series of chosen reflectors in vertical sections (a limited number of inlines and crosslines and the 2D line).
  - With well 35/8-1 as a starting point you have to identify and interpret
    Base Quaternary
    Base Pliocene
    Base Miocene
    Intra Oligocene
- Focus on the interpretation of Miocene channels and Oligocene mud-diapirs.
- Generate a random line along 2D seismic line SG8043-406 and compare the 3D and 2D data. Discuss (observed) differences in resolution.
- Make a time-structure map of the base Miocene horizon.
- Make a map that shows the thickness of the Miocene sequence (requires interpretation of base Pliocene).
- Study the seismic response and the lateral extent of the Miocene channels and Oligocene mud-diapirs. Use vertical and horizontal sections and horizon slices.
- Check other seismic attributes than amplitude.
- Use different tools for visualization of your interpretation (GeoCube).

Well 31/2-4
sp 4070

4000   4050   4100   4150   42

1.0 s

2.0 s

3.0 s

4.0 s

460ms   seabed
620ms   base Quaternary

1300ms   base Eocene
1470ms   base Tertiary
1500ms   base Cretaceous
1560ms   top Sognefj fm
1700ms   top Fensfj fm
1710ms   top Krossfj fm
1800ms   top Brent
2100ms   top Statfj fm
2180ms   top Triassic

2674ms   Carnian

2912ms   Ladinian
3018ms   Anisian

3314ms   Scythian
3427ms   TD

SG8043-402

Well 35/8-1
sp 2780

2900   2850   2800   2750   2700

0.5s

1.0s

1.5s

2.0s

513ms   Sea bottom
680ms   Base Quaternary

920ms   Base Pliocene
1060ms   Base Miocene

1290ms   Intra Oligocene
1410ms   Base Oligocene

1698ms   Base Eocene

1880ms   Base Paleocene

2784ms   Base Cretaceous

SG8043-406

General guidelines for the interpretation report, course GEO4240

You will write one report per group containing the results of both projects. Each of you should take the responsibility for one project.

I advice you to read the literature before you start the interpretation. The literature provides you with a lot of information that directly can help you with your interpretation. Do not wait to long before you start writing your report. When finished something, write it down!

A typical structure/outline for the report is as follows:

Introduction

Text: Shortly about the objective of and approach to the project

Figures: Location of the research area

Geological setting

Text: Short introduction to the geology (structure, stratigraphy, development) in the
               northern North Sea with special emphasis on the main approach to the problem
               (see literature list)

Figures: Map + type profile(s) from the key literature

Seismic interpretation

Text: Seismic-well correlation
               Interpretation strategy/procedure
               Use of different interpretation techniques (Time slice, horizon slice, attributes)

Figures: Seismic section through the well
               Seismic examples (different lines, slices)

Results/discussion

2D vs 3D comparisin

Text: Comparison/discussion of seismic resolution

Figures: Random line based on 3D seismic compared with the 2D seismic line present in
               the project

Structural or stratigraphic interpretation

Text: Main results and important observations

Figures: Seismic examples (vertical sections, horizontal sections, composed sections,

horizon slices)

Time-structure map on key-horizons (with and without interpolation)

Eventually time-isopach (time-thickness) maps

Attribute maps (dip, azimuth, etc.)

Detailed interpretation

Text: Special phenomena (channels, diapirs, faults, flat spots, etc.)

Figures: Seismic examples

Visualization (3D)

Conclusion

Text: Main results – what have you learnt….?

References