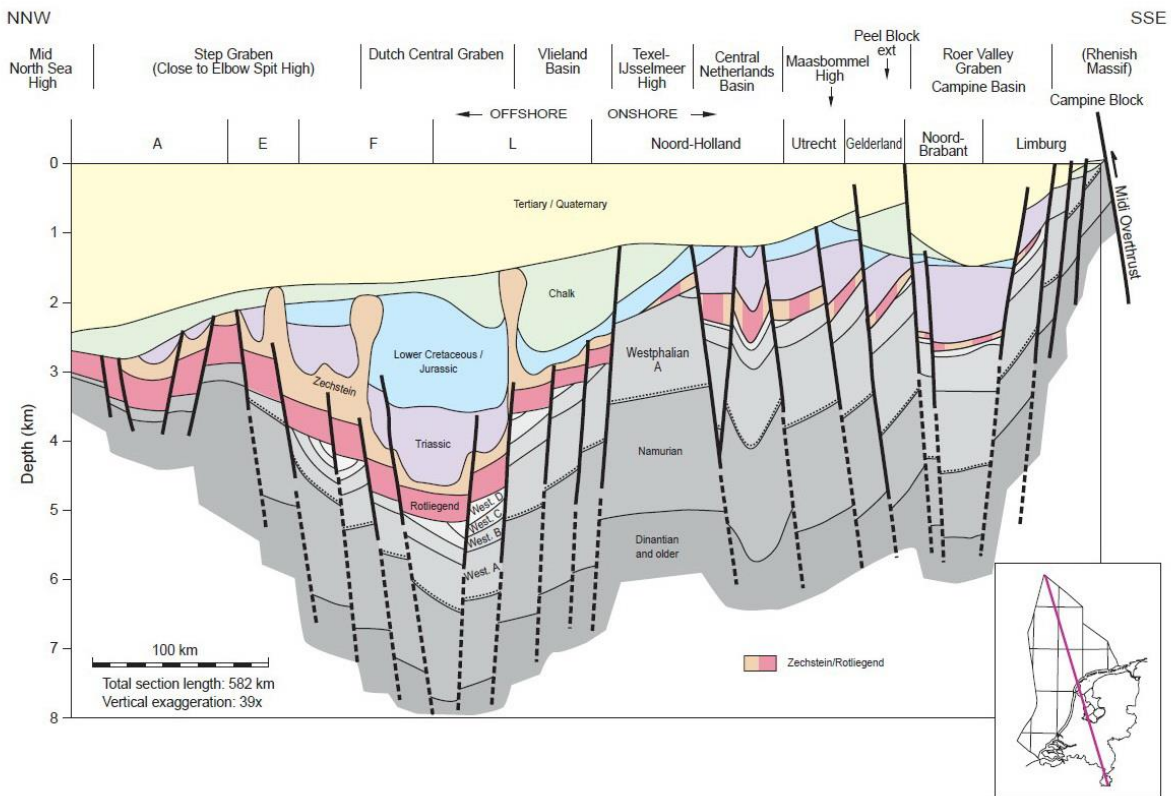


Exam AESB1230 April 15, 2020: Question 1

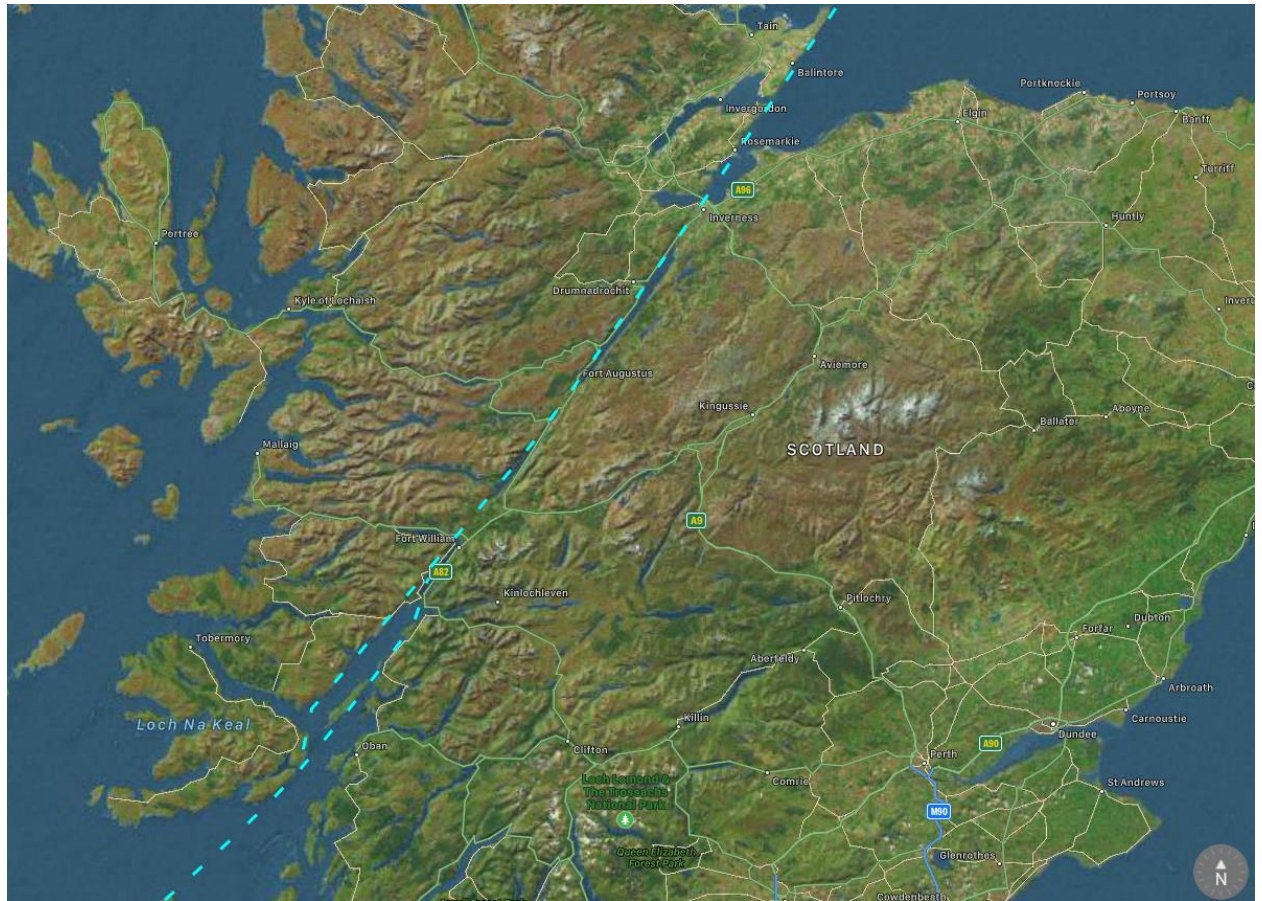


The cross section (Wong et al, 2007) above is the longest possible cross section through the Netherlands on- and offshore. Please note that the vertical exaggeration of this section is 39x. What is interesting in this section is the fact that the layers from the Carboniferous (Dinanlian, Namurian & Westphalian) are by far the thickest sequence present in this cross section.

- What is roughly the age of the start and the end of the Carboniferous?
- This means that in the relatively small period of the Carboniferous, more sediment was deposited than in all those millions of years that came after the Carboniferous. What kind of sediments are these Carboniferous rocks?
- How is it possible that so much sediment was deposited in such a relatively short time, in other words, what was the tectonic and sedimentary setting of the Netherlands in the Carboniferous that gave us so much sediment?
- Please sketch a schematic cross section of this setting.
- With James Hutton in mind, can you give an example of an area where these conditions can be found nowadays?

Reference: Geology of the Netherlands, Edited by Th.E. Wong, D.A.J. Batjes & J. de Jager. Royal Netherlands Academy of Arts and Sciences, 2007:

Exam AESB1230 April 15, 2020: Question 2



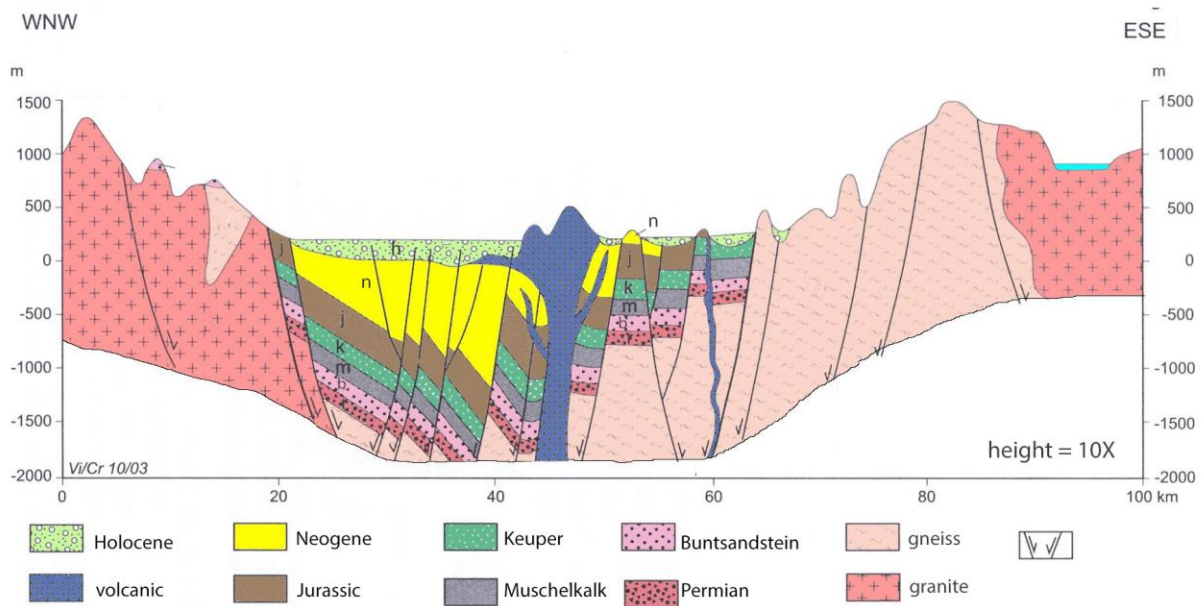
On this map of Scotland, you see the trace of one of the largest faults we can find anywhere in Europe. Its strike is about 035.

- What is the name of this fault?
- What kind of fault is it, and why do you think so?
- During which orogeny was this fault formed, and in which period did this happen?
- Which continents collided in this orogeny, and how far south did this deformation extend?

Towards the SW, you see that the fault momentarily splits in two, and then later merges again, leaving a small area between the faults that is now flooded.

- What would you call this area, and what does it tell you about the direction of displacement along the fault?
- Sketch a schematic cross section through this part of the fault, from NW to SE.
- What is the approximate direction of σ_1 that led to the formation of this large fault?
- If this same σ_1 would have led to the formation of extensional fractures elsewhere in Scotland, what direction would you expect their strike to be?
- If this fault would have led to the formation of Riedel faults along the main fault, what would their strike have been?

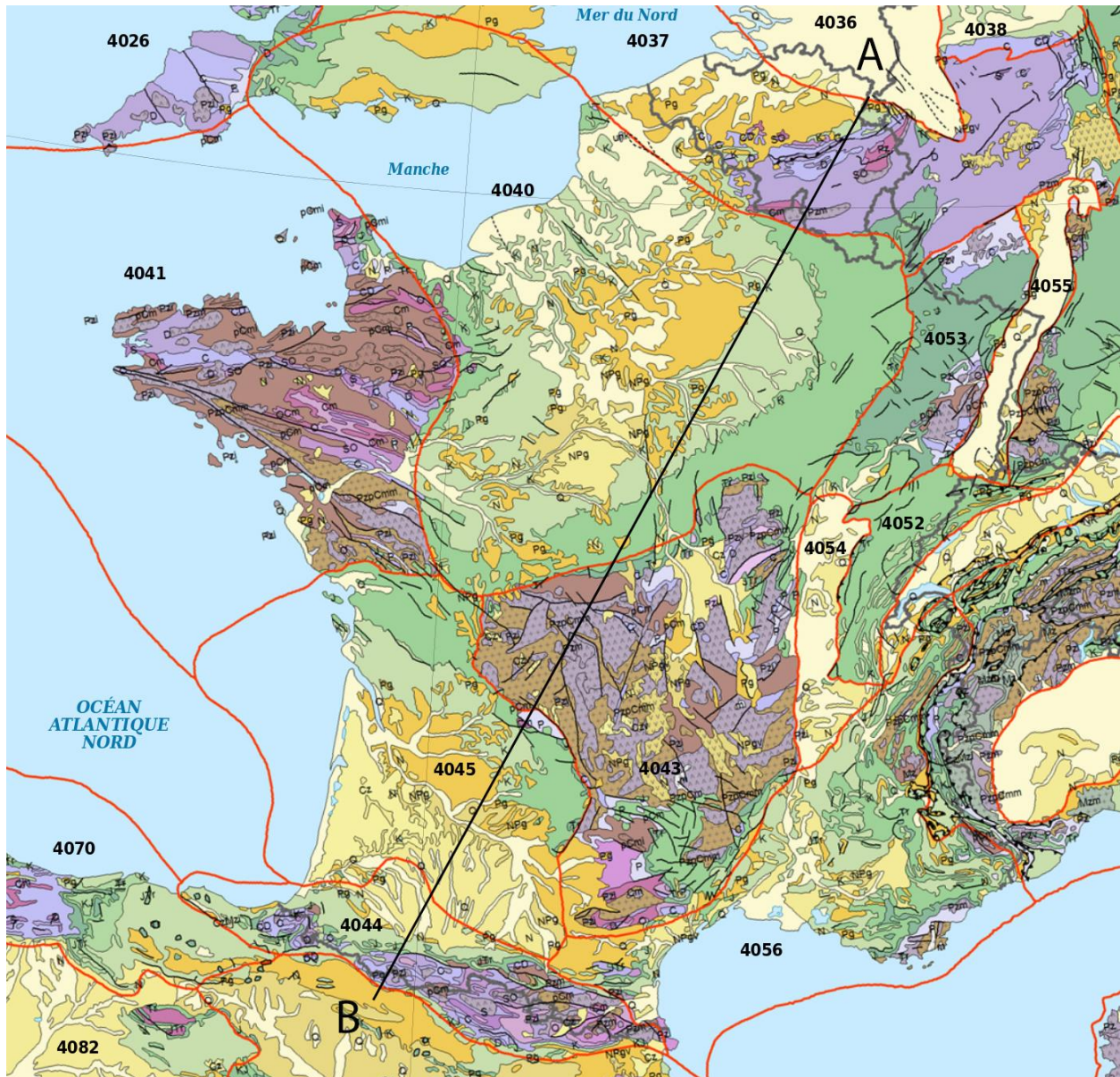
Exam AESB1230 April 15, 2020: Question 3



The figure shows a cross section of an area in NW Europe. Note that the vertical scale is 10 x the horizontal scale.

- What do you call this type of structure?
- Where is this structure located do you think?
- When did this structure start to form, and what do you base this on?
- There are a few layers missing from the stratigraphic sequence. Which are they, and can you explain why these are missing with respect to the formation of this structure?
- The blue material is volcanic rock. Why is volcanism often associated with these structures, and what kind of volcanism do you expect this to be?
- How much uplift do you think there has been for the granites/gneiss on either side of this structure?
- Can you make an estimated guess about the age of the granites and gneiss?

Exam AESB1230 April 15, 2020: Question 4



This is the geologic map of France and adjacent areas.

- a) Draw or sketch cross section AB. Make the relation between the different geologic domains (areas with numbers 4036, 4037, 4040, 4043, 4045 & 4044) on the map clear in your section.
- b) Give names to these domains.
- c) Based on your cross section, describe the geologic history of this part of NW Europe in chronological order