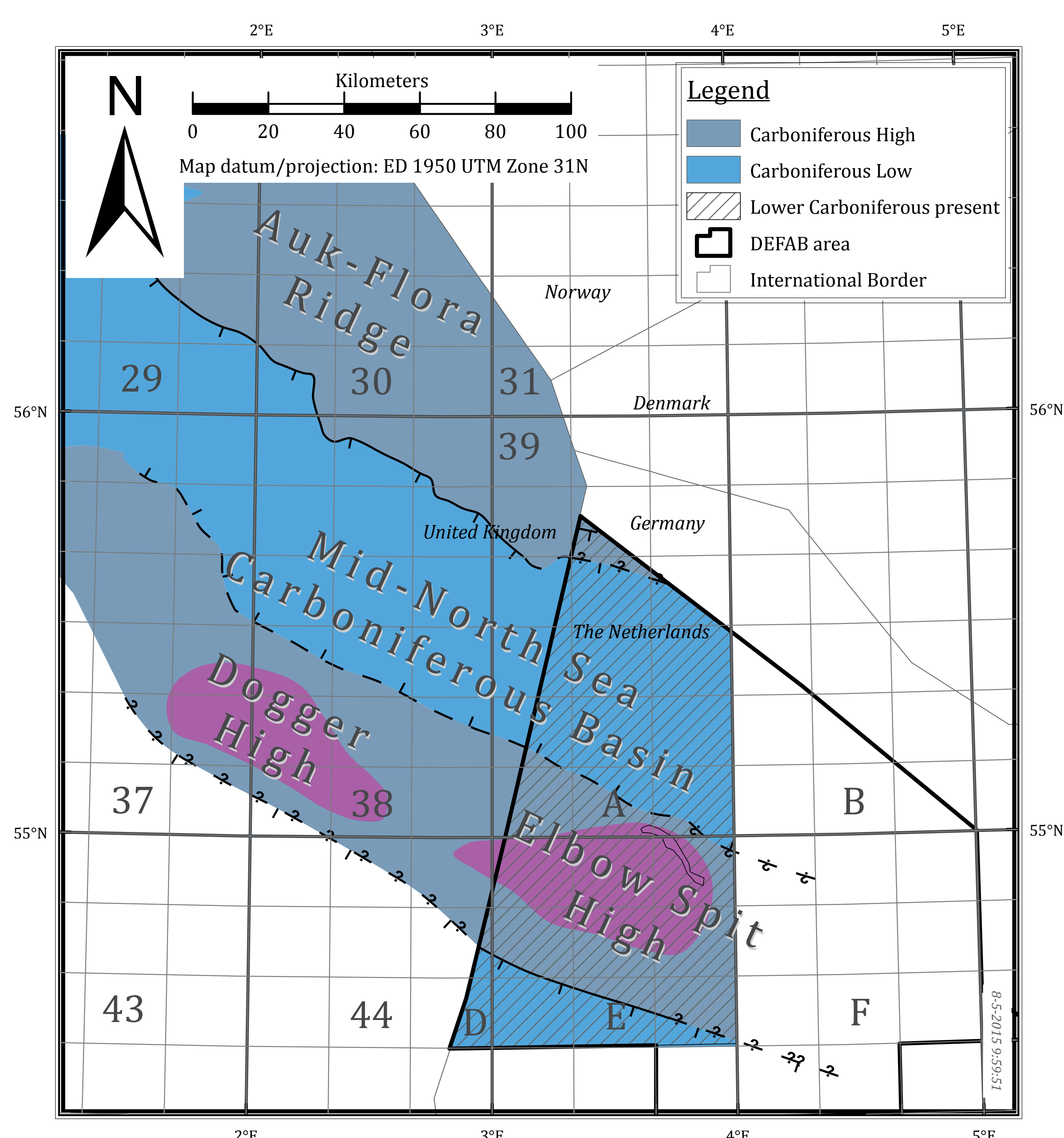
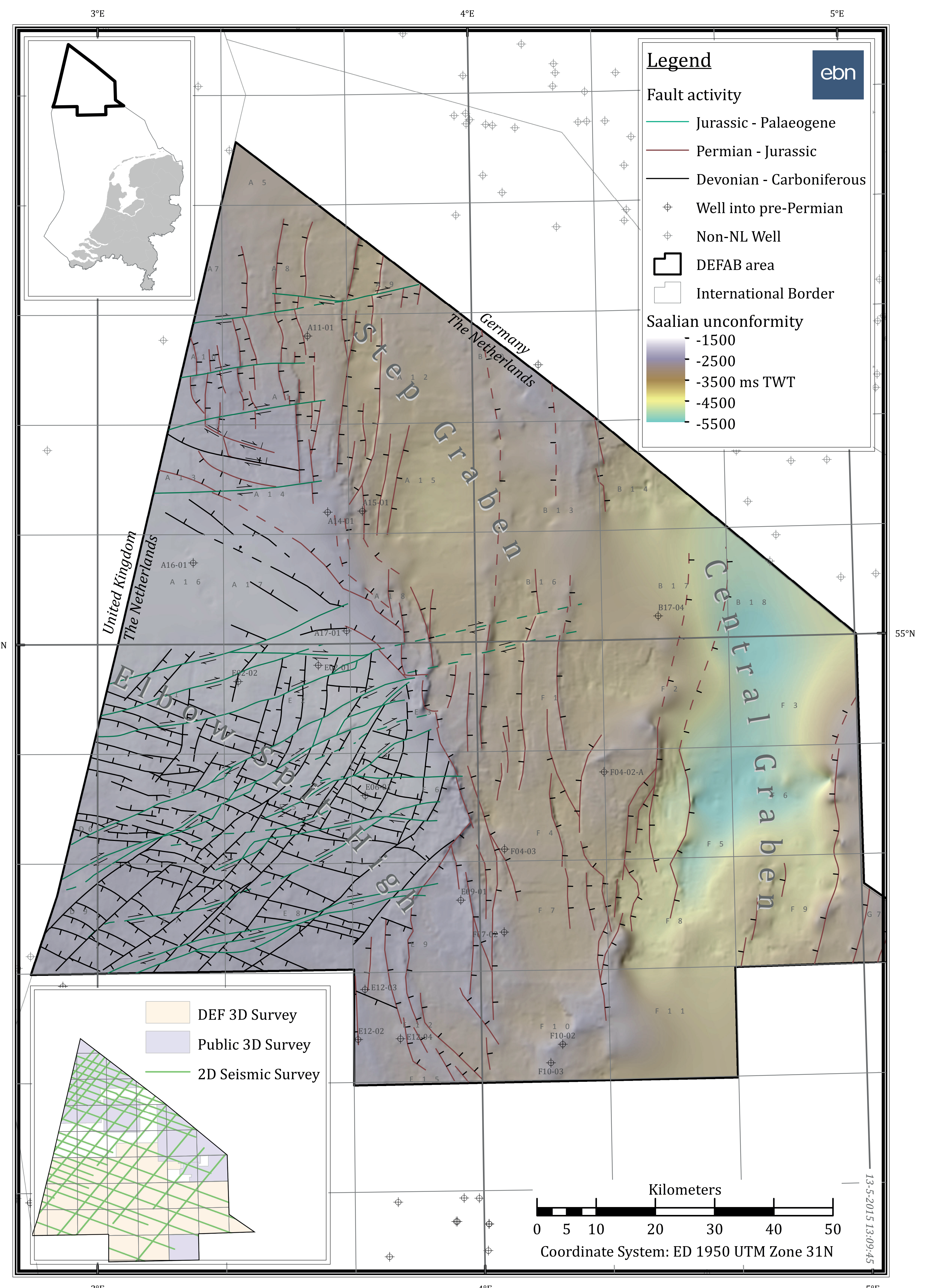


Paleozoic structural framework in the northern Dutch offshore

- Recent 2D and 3D seismic data allow for a more detailed interpretation of Paleozoic strata.
- This has led to a new structural framework which is used to assess the hydrocarbon potential at Paleozoic levels.

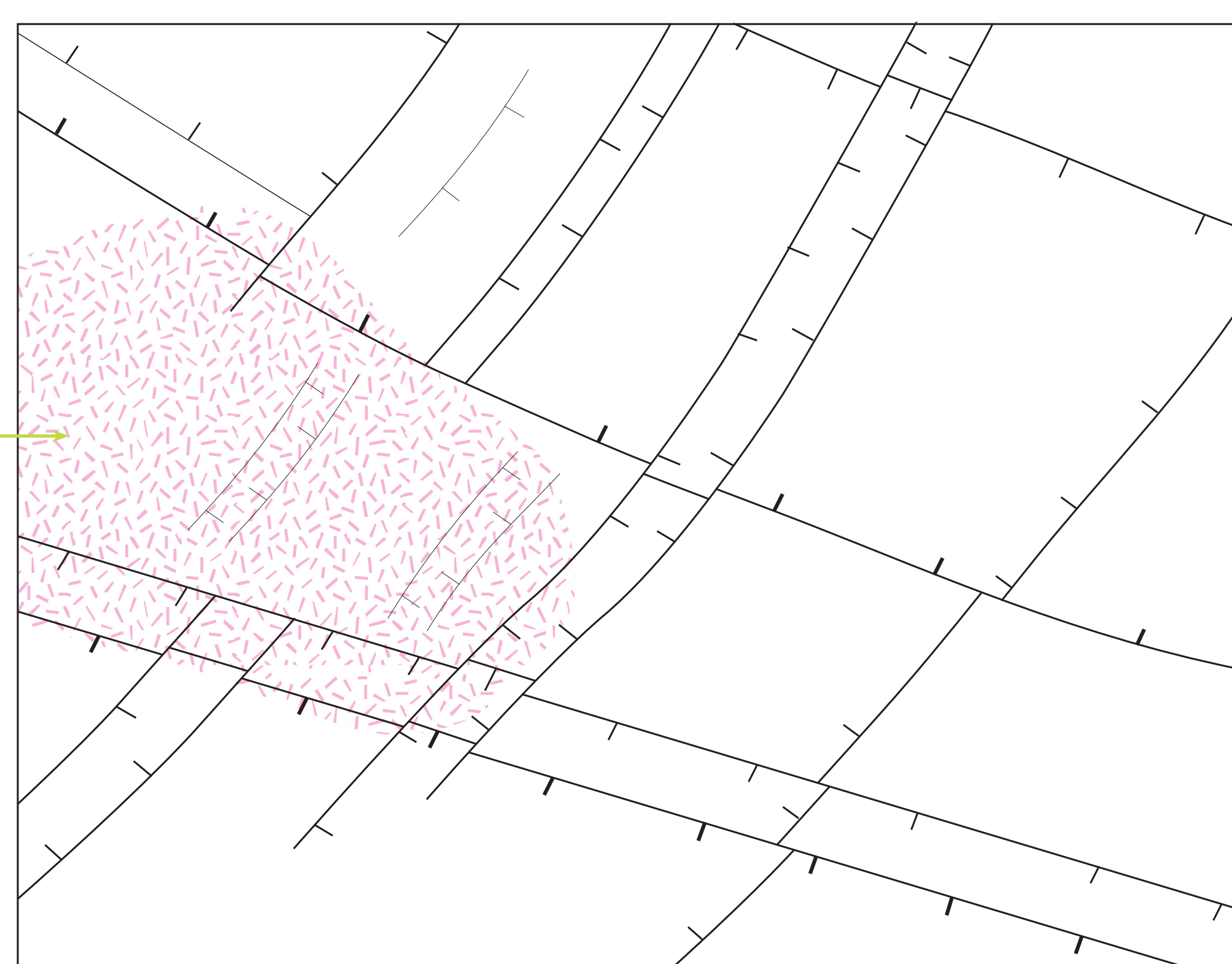


Basin configuration of the Mid North Sea High area during the Dinantian (Early Carboniferous), with selected Paleozoic structural elements (UK interpretation after Milton-Worsell et al., 2010). During the Dinantian sediment influx was from the north, and the Mid-North Sea Carboniferous Basin was the main sediment sink. The transition to deeper water environments occurred south of the Elbow Spit High. Deposition occurred both on the highs and in the lows, and Lower Carboniferous deposits have since been preserved in a significant part of the Dutch northern offshore.



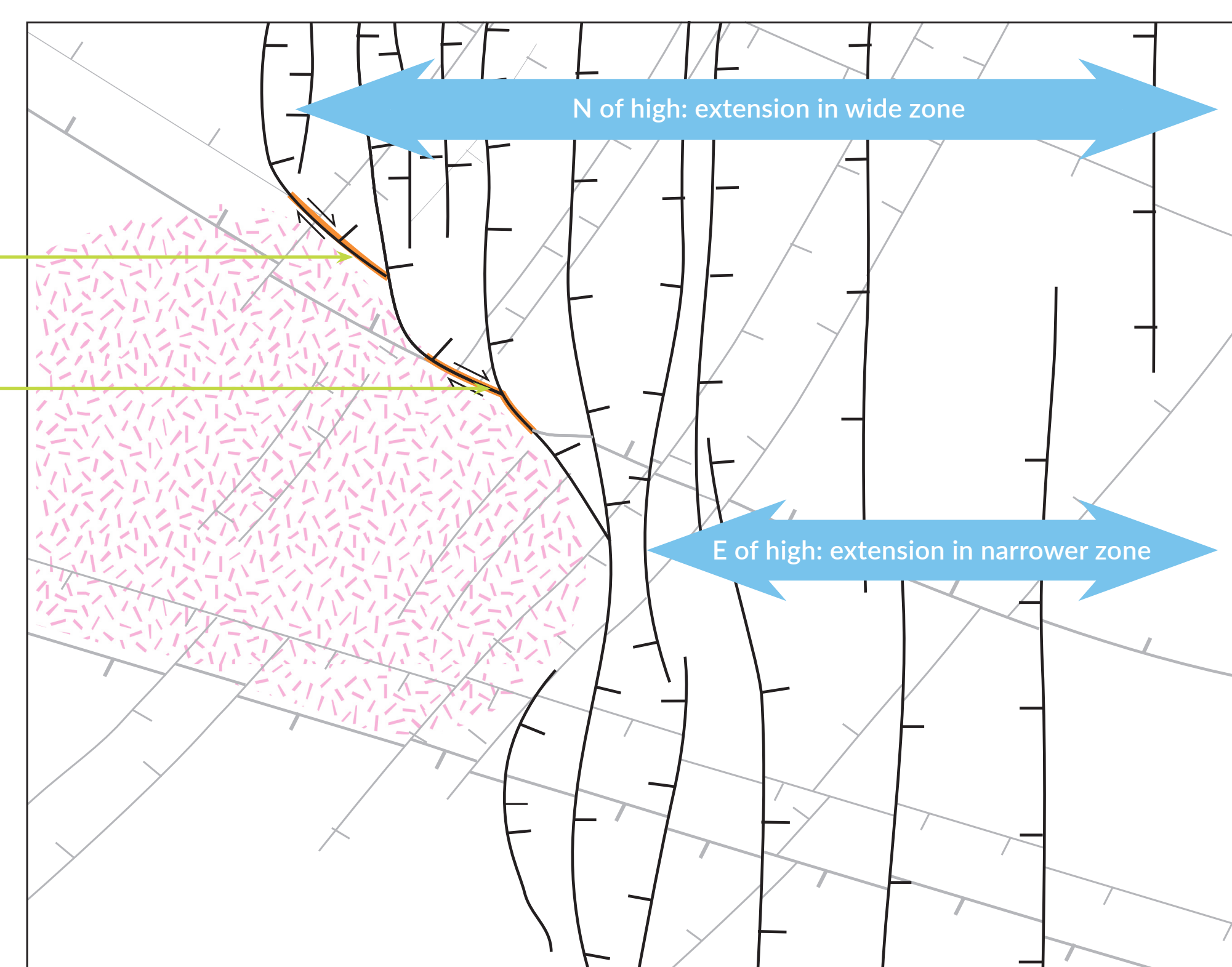
Structural map of the Dutch northern offshore. Shown are faults that affect pre-Permian strata, on top of a surface that shows the two way travel time to the Saalian unconformity (~Base Permian). Where the Permian is absent the base of the oldest post-Carboniferous deposits is shown.

Devonian – Carboniferous



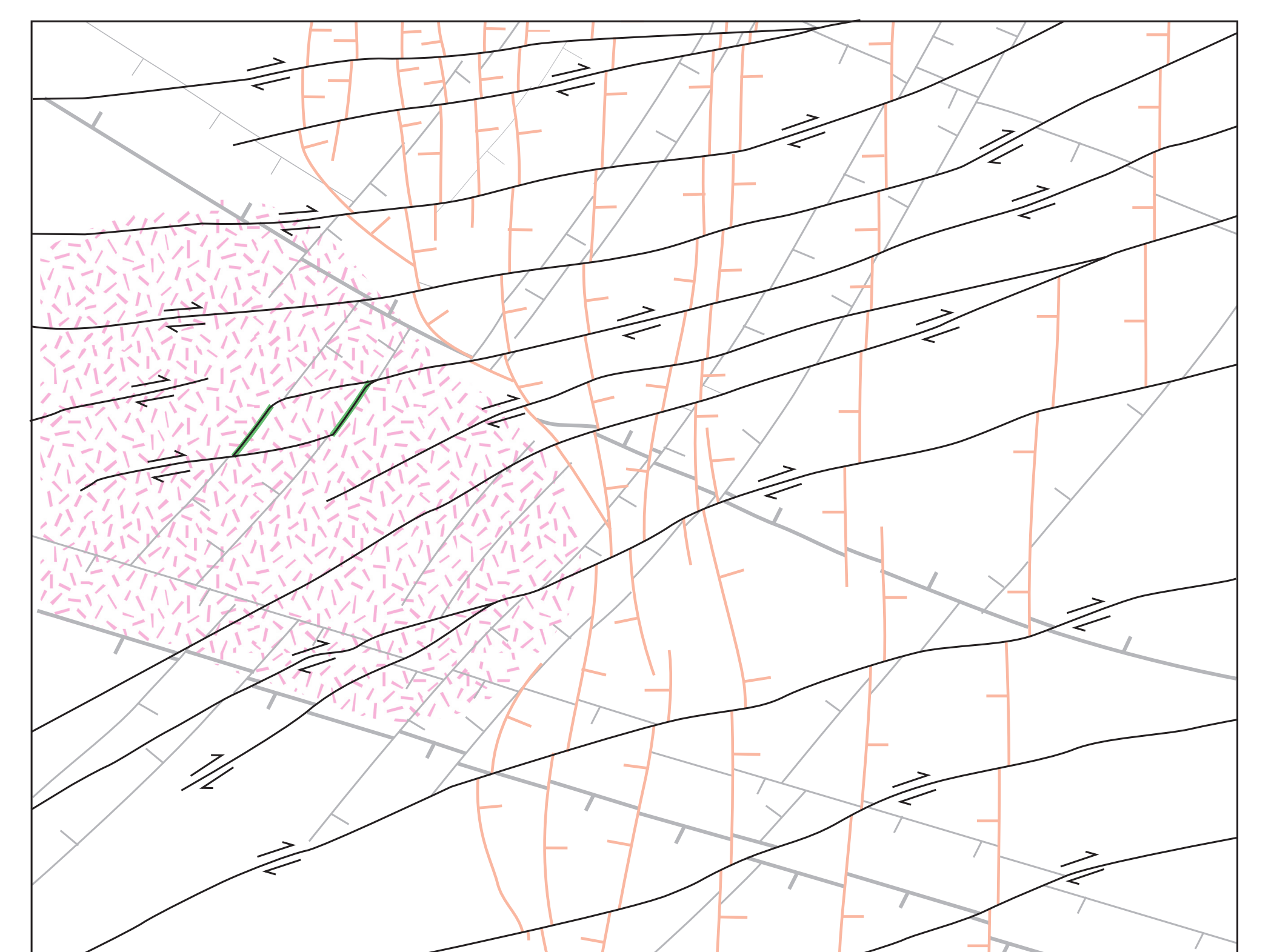
- Two clear fault trends; N120E and N040E
- Extension less intensive above basement highs (e.g., Elbow Spit High).
- North and South of the high: significant basins.
- The two trends seem to have been activated during multiple phases, prior to the Permian. The N120E-trending faults were predominantly active during the Devonian and Dinantian, the N040E-trending afterwards.
- Most of these faults show no offset in post-Carboniferous strata.

(Permian) Triassic – Jurassic



- Again, Paleozoic basement highs (e.g., Elbow Spit High) are less strongly affected by extension.
- Deformation 'avoids' the Elbow Spit High. This results in the 'stepping' of the Step Graben.
- Stepping is accommodated along pre-existing (Devonian-Carboniferous) faults, now reactivated as oblique slip (transfer) faults.

Jurassic – Palaeogene



- Predominantly dextral strike-slip faulting along N060-N080 trending faults.
- Timing: **Jurassic-Cretaceous**. Minor activity during the Upper Cretaceous, and possibly the Paleogene.
- Clearly expressed only below Zechstein salt, or where salt is absent.
- Locally, Carboniferous faults were reactivated, resulting in the formation of pop-up structures/pull-apart basins.