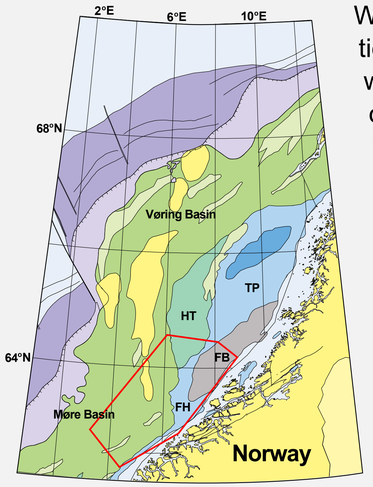
Detachment Faulting, Successive Incision and Controls on Supradetachment Basin Formation at the Mid-Norwegian Rifted Margin

GRESSETH, J. L. S. [1], OSMUNDSEN, P. T. [1, 2] & PÉRON-PINVIDIC, G. [2, 3]

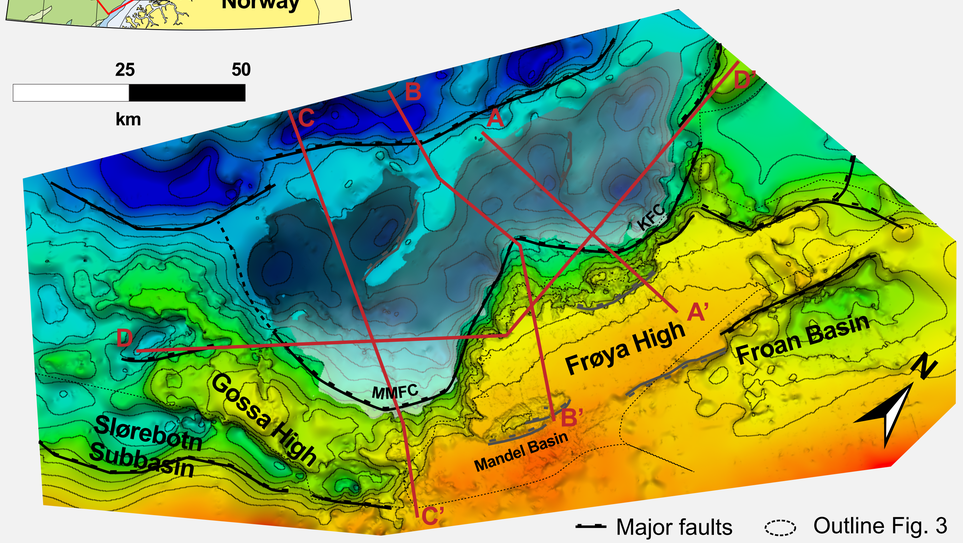
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Our research

Detachment fault systems and the associated supradetachment basins are still poorly understood compared to extensional half-graben basins.



We use interpretation of 3D- and 2D seismic reflection data from the necking domain[i] of the Mid-Norwegian Rifted Margin to study several generations of successively incising large-magnitude faults, e.g. the Late Jurassic - Early Cretaceous Klakk Fault Complex (KFC)[ii]. The 4D evolution of these faults has resulted in complex fault geometries, basement highs and basins in different structural positions as deformation migrated westward. The supradetachment basin flanking the 'Frøya High Turtleback' exhibit significant along-strike variations, reflecting the complex tectonic evolution of the area.



Top metamorphic basement TWT s: -0.5 to -8.5

Top supradetachment basin TWT s: -4.0 to -7.5

Major faults

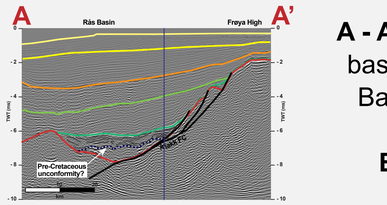
Minor faults

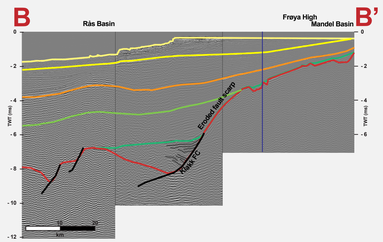
Outline Fig. 3

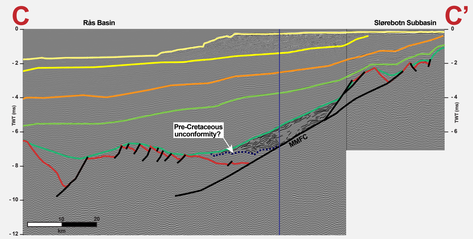
2D seismic

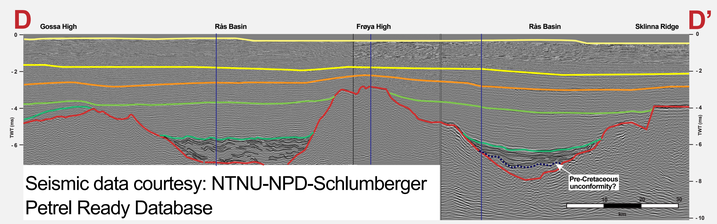
KCF: Klakk Fault Complex
MMFC: Main Møre Boundary Fault

Seismic sections









Seismic data courtesy: NTNU-NPD-Schlumberger Petrel Ready Database

A - A' : The northern supradetachment basin rests on rider blocks and Top Basement separated by the KFC.

B - B' : The fault scarp defined as the KFC in the turtleback area has a convex upwards geometry hinting towards a footwall rollback and a 'rolling hinge' type model. This must be validated by depth conversion.

C - C' : The southern supradetachment basin rests on rider blocks and Top Basement separated by the MMFC.

D - D': The main supradetachment depocenters flank the turtleback structure of the Frøya High.

Seabed

Base Pleistocene

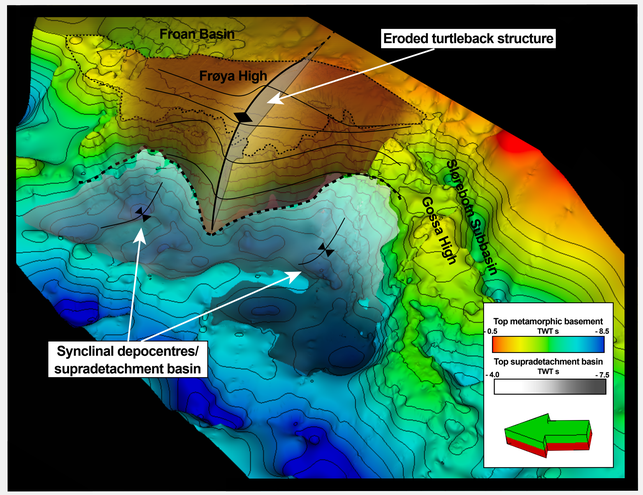
Base Cenozoic

intra-Cretaceous

Base Cretaceous

Top Basement

Preliminary conclusions



— The 'Frøya High Turtleback' is flanked by recess depocentres accommodating a supradetachment basin

— Supradetachment basin configuration was likely controlled by localized isostatic uplift, lateral linkage and/or successive incision of large-magnitude normal faults. We are currently investigating the relative importance of these processes

— The pre-rift structural template and crustal heterogeneity facilitated differential supradetachment basin configuration during and after Late Jurassic - Early Cretaceous rifting

References

[i] Osmundsen, P. T & Péron-Pinvidic, G. (2018) Crustal-Scale Fault Interaction at Rifted Margins and the Formation of Domain-Bounding Breakaway Complexes: Insights from Offshore Norway. Tectonics, 37, 935-964.

[ii] Muñoz-Barrera, J. M., Rotevatn, A., Gawthorpe, R. L., Henstra, G. A. & Kristiansen, T. B. (2020) The role of structural inheritance in the development of high-displacement crustal faults in the necking domain of rifted margins: The Klakk Fault Complex, Frøya High, offshore mid-Norway. Journal of Structural Geology, 140

Supra basins

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