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Fault kinematics and localised inversion within the Troms-Finnmark Fault Complex, SW Barents Sea

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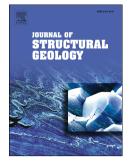
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- 7
- 8 Abstract

The areas bounding the Troms-Finnmark Fault Complex are affected by complex tectonic 9 evolution. In this work, the history of fault growth, reactivation, and inversion of major faults 10 in the Troms-Finnmark Fault Complex and the Ringvassøy Loppa Fault Complex is 11 interpreted from three-dimensional seismic data, structural maps and fault displacement plots. 12 Our results reveal eight normal faults bounding rotated fault blocks in the Troms-Finnmark 13 Fault Complex. Both the throw-depth and displacement-distance plots show that the faults 14 exhibit complex configurations of lateral and vertical segmentation with varied profiles. Some 15 of the faults were reactivated by dip-linkages during the Late Jurassic and exhibit polycyclic 16 fault growth, including radial, syn-sedimentary, and hybrid propagation. Localised positive 17 inversion is the main mechanism of fault reactivation occurring at the Troms-Finnmark Fault 18 Complex. The observed structural styles include folds associated with extensional faults, 19 folded growth wedges and inverted depocentres. Localised inversion was intermittent with 20 rifting during the Middle Jurassic–Early Cretaceous at the boundaries of the Troms-Finnmark 21 Fault Complex to the Finnmark Platform. Additionally, tectonic inversion was more intense at 22 the boundaries of the two fault complexes, affecting Middle Triassic to Early Cretaceous 23 strata. Our study shows that localised folding is either a product of compressional forces or of 24 lateral movements in the Troms-Finnmark Fault Complex. Regional stresses due to the uplift 25 in the Loppa High and halokinesis in the Tromsø Basin are likely additional causes of 26 inversion in the Troms-Finnmark Fault Complex. 27

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29 Keywords: Barents Sea, TFFC, Extension, Localised inversion, displacement plots

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