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Cataclasites-ultracataclasites in a major thrust zone: Gaissa Thrust, N. Norwegian Caledonides.

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Narrow fault zones of intense deformation imply strain localisation. This is superbly shown by the ∼horizontal Caledonian basal décollement in N. Norway, where ∼127 km of top E-to-ESE thrust displacement is concentrated in a ∼3 cm thick principle slip zone within lower strain hanging wall and footwall cataclasites less than a few centimetres thick. A scan of a transport-direction parallel 8.5x11.5cm thin-section of the fault is enlarged to 0.7x1.0m in the poster.
The Caledonian external imbricate zone here places anchizone pre-Marinoan quartzite/shales onto diagenetic-zone post-Gaskiers red/green shales, silts and fine sandstones. Carbonates are absent. The displacement was estimated from balanced cross-sections and branch-line restorations.
In the hangingwall cataclastic zone, a coarse qtz-rich/clay-rich cataclastic compositional layering dips at <30° towards the hinterland. Sedimentary features are nowhere seen in this pervasively, cyclically fractured rock. A cataclastic foliation is locally present parallel to the compositional layering. Close to the principle slip zone, an irregular fabric develops parallel to the detachment. The hangingwall cataclasites are cut by foreland-dipping (<70°) fractures at all scales, with offsets of up to a few mm, rarely with a reverse shear-sense, creating lozenge shaped clasts of earlier cataclasites. Fractures concentrate darker material, indicating pressure solution; similar layers lie parallel to the compositional layering.
The principle slip zone has at least 11 distinct bands, although these contain microstructural variations; not all persist across the sample. Three types of band can be distinguished, separated generally by principle slip surfaces. (1) layers containing abundant angular fragments of earlier cataclasite. A variably oriented cataclastic foliation is irregularly developed, dipping towards both foreland and hinterland and wrapping larger clasts. Some elongate clasts have an (oblique) earlier internal cataclastic foliation. (2) layers with a fine, essentially planar ultracataclastic foliation (0.05 mm thick layers visible on poster) parallel to the core-zone boundary. Clasts of cataclasite are rare but typically rounded. (3) ultracataclasite layers with no, or relatively coarse, banding and more abundant rounded clasts of cataclasite. These layers may be only 0.15 mm thick (seen in the enlarged thin-section), separating type 1 layers. Boundaries between the three types are generally sharp (principle slip surfaces). The excision of some layers and one markedly irregular boundary between type 2 and 3 layers indicates late movement oblique to the regional transport direction. No evidence of pseudotachylite has been seen.
The footwall cataclastic zone is more disturbed than in the hanging wall. Variations in cataclasites define an irregular, poor compositional layering. No sedimentary features are preserved. Foreland dipping fractures (<20° to detachment) cut the cataclasites with offsets of <1cm.
High angle (conjugate) thin fractures, some with very minor offsets, cut across the whole fault. Thicker, irregular detachment parallel fractures also occur in the principle slip zone. These very late fractures, as well as minor voids in the principle slip zone, are filled with carbonate.
Further work is in progress on the age, chemistry and textural evolution of the fault.