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Strain Localization at the Brittle–Ductile Transition of the Earth's Continental Crust.

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Distributed midcrustal shear zones are characteristic of post-orogenic extension and lead to the formation of detachment planes. The objective of this talk is to show that these shear zones result from strain-localization. The destabilizing deformation mechanism is the transformation of fractured feldspar grains into mica. The model problem solved by numerical means combines simple shear and extension. The rheological model accounts for dislocation creep of quartz, feldspar and mica, the feldspar-to-mica reaction and the fracturing detected by the Mohr-Coulomb criterion. The 2D solution reveals a periodic system of extensional shear bands, dipping at 30o at the depth of 12 to 14 km. They do not propagate to greater depths because the pressure prevents the fracturing and thus the reaction. The periodic system of shear bands defines a mid-crustal flat weakened zone within which brittle fracture could occur explaining therefore the seismicity monitored at these depths in regions of active extension.

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