Geophysical Research Abstracts
Vol. 20, EGU2018-17749, 2018
EGU General Assembly 2018

Laboratory evidence of viscous heating-induced strain localization

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The aim of the study is to investigate the dynamics of thermally activated strain localization. We present preliminary results on coupled thermo-mechanical uniaxial compression experiments on polymer samples with cylindrical and prismatic shape at room temperature and at different strain rate. With an infrared camera we captured the spatial and temporal superficial temperature variation and with two-dimensional digital image correlation we quantify the in-plane deformation. The experimental observation are corroborated with numerical simulation reflecting the experimental setup. The experimental results show a drastic temperature increase due to viscous heating in the localized shear zone. This results are then extrapolated for geological relevant conditions where viscous heating can control large scale shear zones.