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Sarah Tindall, Andreas Eckert

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Geometric and Mechanical-Stiffness Controls on Jointing in Cataclastic Deformation Bands

*Sarah TINDALL[1] and Andreas ECKERT[2]

[1]Department of Physical Sciences, Kutztown University, Kutztown, PA 19530, USA, tindall@kutztown.edu, +1 610 683 4325

[2] Department of Geosciences & Geological & Petroleum Engineering, Missouri University of Science & Technology, Rolla, MO 65409, USA, eckertan@mst.edu

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Abstract

Cataclastic deformation bands on the Waterpocket Fold in southern Utah contain cross-cutting joints that terminate at the contacts between the deformation bands and surrounding sandstone. The mechanical contrast between sandstone host rock and stronger deformation bands is analogous to inter-bedded weak and strong layers in a sedimentary sequence, a situation known to result in joints preferentially forming in the stronger layers with joints perpendicular to layer boundaries. Deformation bands in the field area represent conjugate strike-slip shear zones, many with internal Riedel shear geometry, creating a three-dimensional network of mechanically strong zones in variable orientations. Joint attitudes were found to vary systematically as a function of deformation band strike, and the angle between each deformation