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Deformation bands in gravels: influence of grain size on displacement/length scaling

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We analyse deformation bands in middle Miocene deltaic gravels, which can be characterized as disaggregation bands formed by predominate grain rotation without cataclasis of the individual pebbles. The bands are restricted to individual gravel beds, and only few developed to faults with larger displacement by propagation into over- and underlying finer-grained layers. The deformation bands record a strain gradient from the undeformed host sediment to the core, perpendicular to the shear vector, evidenced by a sigmoidal deflection of markers. Additionally, a strain gradient parallel to the shear vector of the bands is documented by displacement-distance distributions. The resulting heterogeneous displacement in the surrounding host sediment causes a rotation of marker horizons (reverse drag). Between closely spaced deformation bands, the geometries can be explained by the soft domino model, where fault block rotation is accompanied by ductile deformation adjacent to the faults. The maximum displacement/length ratio of the observed deformation bands lies in the range between 0.01 and 0.1, which seems to be favourable for the development of reverse drag, adjacent to faults as well as deformation bands.