

MESO AND MICROSTRUCTURAL EVOLUTION OF LOCALISED FAILURE IN THE ACTIVE COSTA RICA DÉCOLLEMENT ZONE: SHEAR AND FLUID INTERACTION

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ABSTRACT

The meso- and microstructural features preserved in cores from ODP Leg 170 and 205 Sites 1040, 1043, 1254 and 1255 are described with the purpose of defining the geometry of the sedimentary prism and the strain/fluid interaction in the décollement. Site 1254 cores from the décollement zone show localised failure with a range of geometrical patterns from disaggregation to intense cataclastic grain breakage, from semi-penetrative secondary fabric to mud veins, which may relate to the strain rate history involved in their evolution and the sediment characters. Variable bedding dips record heterogeneous deformation, with areas of steep bedding dips correlating with areas of major deforma-

tion. Disaggregation and grain boundary sliding (particulate flow) are the most important processes involved in the décollement zone. The percentage of broken grains occurring in zone of coarse grain size is very low and they rather show compaction and mineral coatings. This suggests low stress concentration and modest loading of grain boundaries. The microstructures associated with the secondary fabric and veins are complex and indicative of a range of strain paths. In fact, although there is evidence for a high fluid pressure, which would have supported the initiation of veins, alternative mechanisms of failure, including brittle to creep, with cataclasis and deformation bands, are also possible.

