Accepted Manuscript

The role of gravitational collapse in controlling the evolution of crestal fault systems (Espírito Santo Basin, SE Brazil)

Tao Ze, Tiago M. Alves

PII: S0191-8141(16)30141-9

DOI: 10.1016/j.jsg.2016.09.011

Reference: SG 3391

To appear in: *Journal of Structural Geology*

Received Date: 3 May 2016

Revised Date: 6 September 2016

Accepted Date: 19 September 2016

Please cite this article as: Ze, T., Alves, T.M., The role of gravitational collapse in controlling the evolution of crestal fault systems (Espírito Santo Basin, SE Brazil), *Journal of Structural Geology* (2016), doi: 10.1016/j.jsg.2016.09.011.

The role of gravitational collapse in controlling the evolution of crestal fault systems (Espírito Santo Basin, SE Brazil)

Tao Ze[1*], Tiago M. Alves[1]

[1]3D Seismic Lab, School of Earth and Ocean Sciences, Cardiff University, Main Building, Park Place, Cardiff, CF10 3AT, United Kingdom

Corresponding author: Tel: (+44)07421148109; E-mail: taoz@cardiff.ac.uk

Abstract

A high-quality 3D seismic volume from offshore Espírito Santo Basin (SE Brazil) is used to assess the importance of gravitational collapse in the formation of crestal faults above salt structures. A crestal fault system is imaged in detail using seismic attributes such as curvature and variance, which are later complemented by analyses of throw vs. distance (T-D) and throw vs. depth (T-Z). In the study area, crestal faults comprise closely spaced arrays and are bounded by large listric faults, herein called *border faults*. Two episodes of growth are identified in two opposite-dipping fault families separated by a transverse accommodation zone. Statistical analyses for eighty-four (84) faults show that fault spacing is < 250 m, with border faults showing the larger throw values. Fault throw varies between 8 ms and 90 ms for crestal faults, and 60-90 ms for border faults. Fault length varies between ~410 m and 1750 m, with border faults ranging from 1250 m to 1750 m. This work shows that border faults accommodated most of the strain associated with salt growth and collapse. The growth history of crestal faults favours an isolated fault propagation model with fault segment linkage associated with the lateral propagation of discrete fault segments. Importantly, two episodes of fault growth are identified as synchronous to two phases of seafloor erosion, rendering local unconformities as competent markers of fault reactivation at a local scale.