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Crustal architecture of the Ghana transform margin deduced from combined interpretation of MCS data and 2D gravity modelling

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We present a series of crustal transects to describe the variations in crustal architecture along the Ghana margin. The transects have been derived from a combined analysis of shallow crustal interpretations from multichannel seismic reflection (MCS) data and 2D gravity modelling, and constrained by available wide-angle seismic data. Current knowledge of the deep structure of the Ghana margin has been obtained from wide-angle experiments carried out in two separate areas of the margin covering the deep rifted basin, the Ivory Coast Basin (ICB), the prominent marginal high, the Ivory Coast-Ghana Marginal Ridge (ICGR), and the adjoining linear transform segment. Satellite gravity data and an available detailed grid of MCS data have afforded us greater flexibility in the selection of additional crustal transects, which are tied-in to the published wide-angle models along the margin, for 2D gravity modelling. This approach has allowed us to extend our crustal investigations of the margin farther to the east, and also into areas of the margin not covered by the wide-angle experiments. Along the transform segment, the Romanche Fracture Zone traces into the ICGR from where it extends eastward into the adjoining continental slope, which is especially steep. In the MCS data, the continent-ocean boundary (COB) is clearly defined at the foot of the slope. In the gravity models, the COB is associated with a peak in gravity anomaly as well as a rapid fall in the Moho gradient. However, farther to the east, the transform margin systematically steps out in a southerly direction associated with a number of relatively minor fracture zones, thus giving rise to another distinctive margin segment. Here, the continental crust is significantly stretched and the COB, which

lies within a broad transitional zone, appears less clearly defined. The MCS data show that this margin segment is characterised by thick undeformed post-rift sediment layers resting unconformably over tectonically deformed rift sediment sequences. Major half grabens, up to 12 km deep, and bounded by a system of major faults, are seen in the upper crust in the region lying from the outer shelf to the rise. At depth, these fault systems cut into thinned transitional crust, becoming less steep deeper down, and eventually sole out into the Moho as detachment faults. Our data interpretations and modelling results suggest that these major faults constitute the continental extensions of major fracture zones, including the Romanche Fracture Zone. That these faults prolongate into the adjacent land, further suggests that the transform margin development was probably inherited from major pre-existing intraplate strike-slip structural lineations.