

Active normal faulting along the compressional margin of the Santa Elena Peninsula region (Ecuador) : inheritance processes of extensional settings related to active orogens

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Over the last 23 Myr, the roughly east-oriented subduction of the Nazca Plate beneath South America led to the collage of several mountain ranges linked to the global Andes tectonics. Along southwestern Ecuador, this compressional setting involves the Cretaceous-Miocene Chongón-Colonche / Santa Elena terranes, overlain by recent sedimentary basins. The overall is generally interpreted as an onshore-offshore forearc system. Herein, we specifically explore the offshore shelf and the littoral area of the Santa Elena Peninsula, where active tectonics generates few moderate subduction-related earthquakes poorly located at depth and rather widespread extensional deformation in the upper plate. A trench-parallel fault network, composed of >20km-long normal faults, is mapped through an extensive academic and industrial 2D seismic volume. Normal faulting takes place on top of former Chongón-Colonche tectonic nappes and progressively controls deposition within rotated fault-blocks. Onshore studies show a set of marine terraces developing since the Pleistocene across the littoral area. Additional poorly-faulted 'floating basins' of circular shape are forming both offshore and onshore ahead of the Chongón-Colonche Cordillera. Thus, our observations document a peculiar dismantlement of the present-day accretionary wedge, mainly affected by tectonic erosion and involving reactivation of former orogenic structures.

Extension is interpreted as a regional syn-orogenic collapse developing aside the Chongón-Colonche Cordillera. Such an extensional setting may result from transecting subducting ridges, fracture zones and seamounts that control, at least partially, the geometry and the nature of the deformation along the Ecuador margin. This deformation pattern is likely to relate to a weak interseismic coupling along the subduction interface.