Geophysical Research Abstracts
Vol. 16, EGU2014-14893, 2014
EGU General Assembly 2014

Along-dip variations of structural style in the Somali Basin deep-water fold and thrust belt (East Africa)

Francesco Cruciani and Massimiliano Rinaldo Barchi
Dipartimento di Fisica e Geologia, University of Perugia, Perugia, Italy

Continental passive margins are place of extended slope-failure phenomena, which can lead to the formation of gravity-driven deep-water fold and thrust belts (DW-FTBs), in regions where no far-field compressional stress is active. These giant geological features, which are confined to the sedimentary section, consist of extensional-compressional linked systems detached over a common décollement, generally salt or shales. The continental passive margin of northern Kenya and southern Somalia is an excellent and relatively unexplored site for recognizing and understanding the DW-FTBs originated over a regional shale décollement. In this study we have interpreted a 2D seismic data-set of the 1980s, hosted by Marine Geoscience Data System at Lamont-Doherty Earth Observatory of Columbia University (http://www.marine-geo.org), and recently reprocessed by ENI, in order to investigate the structural style of a DW-FTB developed offshore of northern Kenya and southern Somalia (Somali Basin). This region records the oldest sedimentary section of the Indian Ocean since the breakup of Gondwana began in the Middle-Lower Jurassic separating Madagascar from Africa. From the Upper Cretaceous to at least the Lower Miocene, the margin has been characterized by gravitational collapse leading to the formation of a DW-FTB extending more than 400 km along-strike. The northern portion of the DW-FTB is about 150 km wide, whilst in the southern portion is few tens of km wide. We analysed the northern portion along a regional seismic section. Our study represents the first detailed structural interpretation of this DW-FTB since its discovery in the 1980s. The good quality of the available reprocessed seismic data has allowed us to identify remarkable along-dip variations in the structural style. The basal detachment constantly deepens landward, in agreement with a prevailing gravity-spreading deformation process (as in the case of the Niger Delta). On the seismic data are not visible, as expected, relevant extensional growth faults and normal faults, which can balance the significant amount of shortening of the compressional domain. We recognised four sectors, characterized by different structural styles and amount of shortening. Moving from the ocean towards the land, they are: i) a series of imbricate thrusts with basinward vergence, forming a critical taper; ii) basinward stacked horses forming a duplex-like system; iii) double verging, out-of syncline thrusts, transporting bowl-shaped syn-kinematic basins; and iv) symmetric, diapir-like detachment folds, likely cored by poorly compacted mobile shales. We hypothesise that these strong and often abrupt variations could be related to: i) lateral differences in the stratigraphy of the sedimentary successions involved in the deformation; ii) time and space variations of the sediment supply along the continental slope.