Kinematics of rifted margin formations in Morocco: The Tarfaya and Doukkala transects

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The rifted margin of Morocco formed in Triassic to Early Jurassic times when Africa separated from N America forming the Central Atlantic Ocean. Two important transects across the margin are the Doukkala and Tarfaya sections which are examined in detail in this contribution. We first provide a description of the kinematics of extension marked in both margins by a polyphase rifting, widely distributed deformation in the upper crust, and a localized substantial lithosphere thinning. We also quantify vertical movements experienced by the different domains of the margin. Numerical modeling techniques are then applied to (i) investigate vertical movements experienced along the margin, (ii) examine the processes that might have guided the observed vertical movements, and (iii) link the subsiding offshore domains in the NW to the exhumed basement outcropping in the SE domains. For both the Doukkala and Tarfaya transects we address the source-to-sink systems focusing in particular on the distribution and origin of Upper Jurassic to Lower Cretaceous terrigenous sediments found in the Moroccan offshore. These rocks represent potentially major reservoirs for hydrocarbons.