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Quantification and Modelling of the Distortion of the Stratigraphic Architecture of the Syn-Sedimentary Infill of a Normal Fault (Offshore Congo)

We characterized the influence of a normal growth fault upon the stratigraphic architecture of the syn-sedimentary infill, in the case of a structure located along the West African margin, in terms of (1) variations in time and space of the accommodation (space available for sedimentation) and (2) distorsion of the geometry of depositional sequences. To achieve this with a dataset made up of a 3-D seismic survey and well logs, we used sequence stratigraphy to (i) define a detailed stratigraphic framework, (ii) quantify the rates of vertical displacements from accommodation variations measurements, and, (iii) characterize the geometry of depositional sequences across the fault. We determined 2 orders of depositional sequences: the genetic units sets (0.5-2 Ma) resulting from the vertical stacking of genetic units. Correlation of time lines is established from the vertical stacking of genetic units. We measured accommodation variations for time steps corresponding to half cycles of genetic units sets (0.2 to 1 Ma). The difference of accommodation across the fault measures the subsidence rate (few tens to few hundreds m/Ma). Genetic unit sets are thicker in the subsiding area and the inversion of trend of the genetic unit sets from progradation to retrogradation (Flooding Surface) or from retrogradation to progradation (Maximum Flooding Surface) may be delayed or advanced. We show, based on a stratigraphic simulation, that the observed distortion of genetic units sets can be numerically reproduced using subsidence rates and cycle of sea level variations similar to the ones measured in the studied area.