



Evolution of sub-parallel grabens: insights from analogue modelling

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The development of extensional structures such as rifts and grabens within the context of sedimentary basins has been studied through analogue modelling since it was first applied to understand structural traps by the oil industry. Several studies have been carried out since, to understand the evolution of sedimentary basins and some of the structures developed in this context. The development of two parallel grabens in the Parecis Basin, located in the center-west of Brazil, inspired the study of this type of structures through a series of analogue modelling experiments. Sub-parallel grabens usually occur by reactivation of inherited weaknesses from the basement, which proximity may affect their evolution and geometry. This series of experiments will help to understand these structures and the context in which they are formed.

This study is focused on understanding the effects of varying the spacing between two parallel grabens in their geometrical-kinematical evolution. In order to investigate this by analogue experiments, an extensional event corresponding to an absolute stretching of 3 cm was prescribed to affect a 3 cm quartz sand stratigraphic package. The materials were placed in a sandbox apparatus with two basal velocity discontinuities (VDs) attached to the lateral moving walls. The spacing between the VDs was set to vary in a systematic way.

Preliminary results show that by decreasing the space between the VDs both grabens tend to interfere with each other, and by increasing it the opposite occurs. With a spacing of 2 cm, two parallel grabens formed initially, but as extension increased structures interfered and a wide graben was formed with two distinct depocenters and a middle horst. When a 4 cm spacing was used, two separate grabens formed since the beginning of extension. In both cases, the grabens presented an asymmetric geometry that did not occur when the same type of extension was tested for a single graben. This may be explained by the fact that each moving wall affects only the closest graben. In addition, some numerical models will be developed for comparison with the analogue modelling results.