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Abstract title:

Structure and subsidence of the Congo Basin: the key for unravelling the evolution of the cratonic lithosphere

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The imprint of the interaction between shallow and deep Earth processes controlling the evolution of the cratoinc lithosphere is left in their sedimentary record. We focused our study on the Congo Basin (CB) which occupies a large part of the Congo Craton and contains up to 9 km of sedimentary rocks from Mesoproterozoic until Quaternary age. The formation of the CB started with a rifting phase during the amalgamation of the Rodinia supercontinent (~1.2 Gyr) and evolved through the following post-rift phases and successive phases of compression.

We reconstructed the stratigraphy and tectonic evolution of the Congo basin by interpreting the seismic reflection profiles and well logs data located inside the central area of the CB. The results obtained are successively validated by analysing the relationship between topography and Bouguer anomalies. In this way, we could localize the mafic intrusions at the base and through the sedimentary sequence and thus dentify the rift shape. Afterwards, we performed 3D numerical simulations using I3ELVIS code to simulate the initial rift phases. We considered the Congo craton as composed of four cratonic blocks and applied extensional stress in two orthogonal directions to test the hypothesis of the formation of a multi extensional rift in a cratonic area. We repeated the numerical simulations changing the geometries and thicknesses of the cratonic blocks, as well as their physical parameters (e.g., temperature and rheology), in order to get the best agreement with the results obtained from the previous analysis of the geological and geophysical data.