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Effect of 3D boundary conditions on rift propagation or failure to break.

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Oblique rift segments are generally modelled using two type of set-ups. The first one consist of off-set weak notches which are pulled in a cylindrical manner, the second one consist at pulling obliquely on wide weak zone inside which a system of en-echellon grabben can develop. These two set up produce diverging segments of constant age and younger oblique segments which localise after some delays which depends on the offset of the diverging segments and the rheology of the lithosphere.
In this study, we propose a different set-up which consist at seeding only one diverging weak segments and at letting the continental rupture propagate through the model in order to assess 1/ how 3D boundary conditions affect the speed on propagation of the continental break-up and 2/ how the structure that form at the front of the propagating break-up affect the propagation it-self.
We find that a cylindrical boundary condition or extension in the direction of propagation favour very rapid continental break-up propagation, narrow rift zones and extremely linear diverging segments. On the contrary, when a slight compression is applied in the direction of rift propagation. The propagation is slow and might even stop completely. This slow down in propagation results in an increase of pre-breakup structuration of the margins and can even cause segmentation of final spreading.
The numerical models are finally compared to natural examples from the Atlantic and the South China Sea.