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High- to low-angle normal faulting and sag basin evolution in analogue modeling of orthogonal rifting

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Despite the abundance of geological, geophysical and experimental studies, significant uncertainty still characterizes the evolution of rifting in passive margins. Open problems like the geometry of master fault systems and their evolution through time, the partitioning of lithosphere stretching with depth, the timing and development of sag basins, are still a matter of debate. Scaled analogue modeling has been traditionally used as an effective tool to investigate geodynamical processes, including rifting. In this work we report on results from a sandbox experimental programme specifically designed to address the progression of fault geometry during rift evolution and its control on sag basin growth. We show that the discrepancy between crustal and lithospheric stretching, as inferred from seismic data, can be reconciled by the activity of low-angle normal faults detached at the brittle-ductile crustal transition.