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The influence of structural control in erosion-sedimentation dynamics and morphology of a badland topography

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Development of erosive landscapes leading to Quaternary badland formation (i.e. recognised with highly erodible, poorly consolidated, clay-size sediments and deep gully systems) is commonly associated with various controls such climate change and Anthropocene influence. However, structural control (e.g. in tectonically active areas) plays an essential role in erosional and morphological evolution of badland landscapes as well.

There is a paucity of combining thorough field mapping (e.g. structural mapping) and morphometric analysis (e.g. normalised *SL*-index calculations) to study the interaction between structural control and Quaternary erosion-sedimentation dynamics in badland landscapes. This multidisciplinary approach, applied in a badland landscape in an extensional tectonic regime in western Turkey, may provide a good understanding to study the influence of structural control on badland development.

Field data analysis supported with the quantitative assessment of longitudinal gully profiles in this study demonstrates that the fault geometry and rock structure play an essential role in net erosion-sedimentation cycles and development of deepened gully networks, influenced by the local adjustments of an asymmetric mini horst-graben system with extension-related faulting. Overall, the development of badlands in our study area is likely to be conditioned by the rock structure and controlled by Quaternary fault activity and its geometry. Further work with age control might provide further insights in understanding the development of this badland topography in future work.