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Fluvial response to Holocene volcanic damming and breaching in the Gediz and Geren rivers, Western Turkey

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This study discusses the complex late Holocene evolution of the Gediz River North of Kula, Western Turkey, when a basaltic lava flow dammed and filled this river valley. Age control was obtained using established and novel feldspar luminescence techniques on sands below and on top of the flow. This constrained the age of the lava flow to 3.0 – 2.1 ka. In addition, 40Ar/39Ar dating was attempted but due a combination of the young age and low potassium content of the basalt this technique was unsuitable. Two damming locations caused by the lava flow have been investigated. The upstream dam caused lake formation and silting of the upstream Gediz. The downstream dam blocked both the Gediz and its tributary, the Geren. The associated lake was not silted up because the upstream dam already trapped all the Gediz sediments. Backfillings of the downstream lake are found 1.5 km upstream into the Geren valley. The downstream dam breached first, after which the upstream dam breached creating an outburst flood that imbricated boulders of approx. 10 m3 size and created an epigenetic gorge. The Gediz lowered its floodplain level with at least 15 m in a short time, triggering landslides, some of which are active until present. The lower reach of the Geren has experienced fast base level lowering and changed regime from meandering to a straight channel. Complex response to base level change is still on-going in both Geren and Gediz catchments. These findings are summarized in a diagram conceptualizing lava damming and breaching events. It is concluded that one lava flow filling a valley floor can block a river several times, leading to different, but interrelated fluvial responses of the same river system to the same lava flow.