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Holistic study of catchment response to human impact in a Mediterranean mountain ecosystem

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In order to establish the human impact on the Mediterranean landscape over historical time periods, the study of sediment dynamics on intermediate scales is often a missed link in literature, as mostly very detailed local studies, or very generalizing regional studies have been made. Therefore, this study concerns the 264 km^2 Büğdüz catchment, part of the territory of the classical city of Sagalassos in the Western Taurus Mountains, 100 km north of Antalya, SW Turkey. Within the catchment, 94 drill cores have been taken along 28 cross-valley profiles, from which 22 radiocarbon dates on organic matter have been retrieved.

Illustrating the spatial variability in sediment deposition, and hence the importance of a holistic catchment approach, is the marked difference in sedimentation rates between the depocenters in the upper part of the valley and the central part of the valley. While in distinct geomorphic settings, the sediment deposition rates vary between 0.4 mm a-1 since 2860 BP upstream and 1.5 mm a-1 since 2600 BP to 7.6 mm a-1 since 760 BP in the central part. Consequently, very little sediment is being transported from upstream to the central part of the valley, indicating slopes adjacent to the valley must have been producing significant amounts of sediment. Moreover, since Roman times the Büğdüz river has changed from a wide gravel-bed river, to merely a ditch in some sections. Large parts of the ancient river bed has been filled up with fine sediment, decoupling the river from the nearby slopes and dry valleys.

Human impact on the central valley depocenter is evident, not only from land use changes affecting the valley-adjacent slopes, but also from technical interventions in the floodplain, such as damming, irrigation practice and channel dredging, further complicating the historical picture. Our results also clearly illustrate that reconstruction of sediment dynamics requires a spatially distributed dataset of sediment archives instead of a limited number of cores taken from idealized sediment archival environments such as wetlands or lakes.