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Using pollen data to distinguish between climatic and anthropogenic driven landscape change in south-western Turkey, and its implications for understanding sediment dynamics.

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Sediment dynamics during the Holocene are mainly controlled by either climate change or human impact, as is evidenced by numerous field studies. In order to identify the relative importance of climate or human impact, it is foremost vital to have a good idea about the intensity of these driving forces. Within the territory of the ancient city of Sagalassos, located in the Taurus mountain range in SW Turkey, interdisciplinary research including geomorphology, palynology and archaeology, has shown that sediment dynamics were important during the Hellenistic-Roman period. During this period the region also underwent intensification in crop cultivation and arboriculture, resulting in the destruction of the natural forest ecosystem and an extensive spread of forest steppe in the highlands. Although minor climatic changes did occur during this period, human impact was more important for controlling geomorphic processes. Less is known about the period following the decline of Roman presence in the region and the extent of climatic and anthropogenic influences on the region during this period. Here we present the results of a study performed in the Gravgaz marsh, located at an elevation of 1215 m, near the archaeological site of Sagalassos. A numerical approach enabled the creation of a pollen-derived climatic proxy. With this proxy it is possible to determine whether shifts in local and regional vegetation may be attributed to changes in human presence or climatic changes. Additionally, it is possible to determine which factors influence the vegetation when changes in the climate and in human occupation coincide. Results show a succession of sudden vegetation changes that coincided with well-defined European climate shifts occurring from the end of the Hellenistic-Roman period to the present, including the medieval climate anomaly and the Little Ice age. The results also show the occurrence of two distinct periods without signs of agriculture in the region. The geomorphic response to these environmental changes is also reflected in the nearby Büğdüz river system, where along specific valley stretches increased sedimentation is observed during the last few centuries. While overall sedimentation was more important during the Hellenistic to late Roman periods marked by widespread landscape occupation by man, the more recent sedimentation changes may indeed reflect the climate variations distilled from pollen data collected in the immediate surroundings. The detailed analysis of the pollen-record from the Gravgaz march thus not only provides a high temporal resolution of vegetation changes, but also a high temporal resolution of climate change not attained before for the wider region.