



## **Are landscapes buffered to high-frequency climate change? A comparison of sediment fluxes and depositional volumes in the Corinth rift, central Greece, over the past 130 kyrs**

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Sediment supply is a fundamental control on the stratigraphic record. However, a key question is the extent to which tectonics and climate affect sediment fluxes in time and space. To address this question, estimates of sediment fluxes must be compared with measured sediment volumes within a closed basin, for which the tectonic and climatic boundary conditions are constrained.

The Corinth rift, Greece is one of the most actively extending basins on Earth, with modern day extension rates of up to 15 mm/yr. The Gulf of Corinth is a closed system and has periodically become a lake during marine lowstands over the late Pleistocene. We estimated suspended sediment fluxes through time for rivers draining into the Gulf of Corinth using an empirically-derived BQART method. WorldClim climate data, palaeoclimate models and palaeoclimate proxies were used to estimate discharges and temperatures over the last 130 ky. We used high-resolution 2D seismic surveys to interpret three seismic units over this period and we used this data to derive independent time series of basin sedimentary volumes to compare with our sediment input flux estimates.

Our results predict total Holocene sediment fluxes into the Corinth Gulf of 20 km<sup>3</sup>, within a factor of 2 of the measured sediment volume in the central depocentres over this timescale. Sediment fluxes vary spatially around the Gulf, but imply catchment-averaged erosion rates of 0.2 to 0.4 mm/yr. Moreover, BQART predicted sediment fluxes and sedimentation rate measurements both indicate a 25% reduction during the last glacial period compared to the Holocene. At the last glacial maximum mean annual temperatures were lower by 5 degrees, although precipitation was similar, or lower, than present. Consequently, our results demonstrate that sediment export to the basin is sensitive to glacial-interglacial cycles. However, precipitation constraints alone are insufficient to understand sediment flux sensitivity to climate change.