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Cyclic patterns within Quaternary vega formation on the eastern Canary Islands

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On the eastern Canary Islands, several valleys exist that were dammed later on by volcanic activity. Since that damming, these valleys (locally called "vegas") have acted as sediment traps. The deposited materials include volcanic material, redeposited (soil-)sediments from the surrounding slopes, and dust originating from the northern African continent. Hence, these vega sequences store information about local and overregional palaeo-environmental conditions.

To elicit the stored information and to use vega sediments as terrestrial dust archives, a deep understanding of the archive formation is required. With this study, we aim to contribute to the understanding of vega formation using grain size analyses, geochemical (XRF) and mineralogical analyses (XRD), as well as luminescence dating.

The vega sediments are characterised by an alternation of pale-coloured, calcified layers (PCL) and reddish, clay-enriched layers (RCL). This alternation shows a recurring pattern within the profile. We interpret one PCL and one RCL above (in combination as one vega sequence) as follows:

We assume a massive deposition of silt-dominated dust at the beginning of the formation of such a sequence. That massive dust event is indicated by silt, quartz, and Zr maxima in the bottom of a PCL. Increasingly humid conditions lead to de- and recalcification, resulting in increased CaCO₃ contents up to 45%, and to soil formation on the slopes in the catchment area. Due to the onset of aridisation, clay-rich material (>80%) formed on the slopes is eroded, which, in combination with a simultaneous increase in dust accumulation, completes the formation of an RCL. The aridisation culminates in another massive aggradation of silt-dominated dust at the beginning of the next PCL formation. The recurring pattern indicates a climate-controlled sediment cyclicality, which is possibly linked to African Humid Periods.

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