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Significance of Saharan dust deposits on La Palma (Canary Islands, Spain)

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The significance of Saharan dust deposits for ecosystems has been shown in many studies. Allochthonous dust input can contribute to pedogenesis and alter soil chemical parameters. Nutrient input via dust deposition plays an important role especially for poor volcanic soils. The aim of this study is to characterize and interpret the spatial distribution of Saharan dust and to determine its influence on soil properties on the volcanic island of La Palma (Canary Islands, Spain). For that purpose, its distribution was determined quantitatively. As silt-sized quartz is not autochthonously formed on the island, it was expected to be a reliable indicator for the presence of Saharan dust deposits. Its identification and quantification was conducted via X-ray diffractometry. Observed patterns were explained by geomorphology. In addition, the influence of dust deposits on soil properties was assessed directly by texture analyses and analyses of phosphorous content, an element strongly limited on the island due to its retention by amorphous volcanic clay. Eastern and western slopes of the island revealed a clear diffence in the amount of deposited dust, whereas smaller geomorphic structures hardly showed any influence on the dust distribution pattern. A significant correlation of quartz content with the proportion of the grain size fraction 2 - 14.2 µm makes an influence on soil physical properties obvious, thus influencing available water capacity. Furthermore, it could be shown that the contents of available phosphorous increase with a rising amount of Saharan dust in the soils. Thus, the input of Saharan dust strongly influences soil fertility of La Palma.