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Reconstruction of the Holocene Fluvial Morphodynamic of Tsauchab River, Namib Desert

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Geoarchives store important information about past climate and ecosystem changes. One kind of terrestrial geoarchives are sediment accumulations transported and deposited by glacial, fluvial or aeolian processes. Analysing these sediments concerning the time since deposition and sedimentological characteristics can provide information about the environmental conditions at the time of deposition. Although it is not possible to reconstruct exact values of temperature or precipitation, geoarchives can serve as indicators for former climate conditions and can help to predict the consequences of recent and future climate changes to the landscape. As in the Namib Desert only few geoarchives exist, sedimentological analysis and dating of fluvial depositions of the existent ephemeral rivers can provide important information about the past fluvial morphodynamic.

We analysed slopes, fans and terraces at the Tsauchab River, which is one of twelve major ephemeral rivers in the Namib Desert. Most of them have their headwaters at the Great Escarpment in the east of the Namib Desert, where in the past the precipitations were either driven by the westerlies (winter rainfall) or summer monsoon. Several stratigraphic profiles were analysed concerning sedimentological parameters like grain size, gravel content, soil colour, bulk density, contents of carbonate, carbon, nitrogen and sulphur. These parameters allow drawing conclusions regarding the river morphodynamic during deposition as well as regarding other environmental parameters. Furthermore, sediment layers of the accumulated fluvial material were dated by Optically Stimulated Luminescence (OSL) and radiocarbon dating. The age determinations show high accumulation rates of fine fluvial depositions from the 1st century A.D. on and especially from A.D. 1300 to 1850 (Little Ice Age). However, single layers of the fluvial depositions have been dated to the young Pleistocene.

The results are interpreted regarding the past fluvial morphodynamic and palaeoclimate. Furthermore, for putting the results into a broader context they are compared with results of other studies about river morphodynamic and palaeoclimate in the Namib Desert.