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The Palaeoclimate of Wadi Shati, Libyan Sahara: the last 130 ka

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The Fezzan region of Libya forms a large closed basin that contains a wealth of ancient palaeolake and riverine sediments indicative of past humidity in the central Sahara. We have used remote sensing, DEM analysis and Ultra Ground Penetrating Radar to map these features and have dated them using OSL and radiocarbon methods. Results suggest humid conditions during both MIS 5 and the Holocene with larger lakes and more extensive river systems being present during MIS 5 suggestive of greater humidity at this time. A 4m core was collected from Holocene sediments of the largest lake found in the region (1200 km^2 during MIS5 and 660 km^2 during the Holocene). Core sediments were dated using OSL and analysed using XRF, Ion Chromatography, Laser Granulometry and chemical extractions for ostracods, diatoms, pollen and phytoliths. The base of the core is dominated by clays deposited in a perennial lake environment from 7.75 ka to 6.6 ka. Gypsum deposition started at about 6.5 ka indicating a more arid environment. Four clay layers are found amongst the gypsum from 6.3 to 6.25 ka, 6.2 to 6.1, 6.0 to 5.8 and 5.7-5.6 ka suggests that aridification was not a sudden event, but consisted of a series of arid/humid oscillations before the lake finally desiccated just before 5 ka. No pollen, diatoms or ostracods are preserved in the sediments but phytoliths were present. Both tree and grass phytoliths were found in lower parts of the core, suggesting a wooded savannah environment from 7.75 to about 7 ka. Trees decline and grass increases up the core, signifying an increasingly arid environment. By the time the first gypsum bed is deposited at about 6.5 ka trees have disappeared and grass dominates. These results do not support the hypothesis of a sudden aridification of the Sahara at 4.9 ka and instead suggest that in the Fezzan region a gradual aridification had started by 7.75 ka and that the climate oscillated during the lake desiccation that started at 6.5 ka and was complete by 5 ka.