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Reconstructing the late-Holocene fluvial dynamics of the River Nile in central Egypt

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From 2004 on, geoarchaeological research is being carried out in the Nile floodplain near Dayr al Bershah, an important ancient Egyptian funeral site in central Egypt covering burial sites from the Old to the New Kingdom. The reconstruction of the ancient Nilotic landscape and human-environment interactions alongside the transition from the lower desert to the Nile floodplain was approached multidisciplinarily.

On the one hand, in the floodplain more than 300 detailed hand augerings up to 6 m depth were made, and compared with electrical resistivity imaging profiles with lengths up to 1200 m and depths from 20-45 m. These data were complemented with information obtained from historical map analysis, remote sensing imagery (ASTER, Quickbird, Corona) and digital elevation models (SRTM).

Preliminary results show good correspondence between the sedimentological analysis of the hand augerings and the electrical resistivity values: sandy paleochannel deposits show high resistivity values, whereas silty to clay-rich floodplain deposits show very low ER-values. All information sources show several Nile branches being active prior to the closure of the Aswan Dam in 1964, and most branches can also be traced applying topographical analysis, confirming the sedimentological and ER analyses. However, one major branch relatively close to the eastern edge of the floodplain and the current village of Dayr al Bershah could only be traced by coring and ER as it is no longer topographically visible. First dating results suggest this Nile branch being at least 600 years old and some parts being active up to 2000 years ago.

Moreover, several radiocarbon dates from the Nile floodplain show there is no clear age-depth relationship present within the floodplain sediments, as a strong negative exponential relationship between the sedimentation rate in mm.a-1 and the sediment age has been proven. This indicates large parts of the floodplain near Dayr al Bershah have been reworked over the last 2-3 ka, leading to the conclusion that the Nile floodplain cannot be seen as a steadily aggrading system over the course of the late-Holocene. Furthermore, the trend of the Nile shifting westwards, opposite to findings in most other regions in the Egyptian Nile valley, is clear. Both observations have important implications for the preservation of archaeological artefacts within this part of the Nile floodplain.

Sediment augerings and ER-measurements also show the current-day gradual transition from the lower desert towards the Nile floodplain being more pronounced in historic times. The 4-5m steep rise of the lower desert nowadays buried under Nile silts led to a fundamentally different outlook of the landscape in the past, possible influencing the location of settlements.

Finally, the integration of both methodologies with archaeological data provided evidence for strong human-environment interactions along the floodplain edge near the site of Sheikh Said, a small embayment of the Nile valley in the eastern desert between Dayr al Bershah and Tell el Amarna. Here, first results indicate ancient economic activities alongside a harbour of at least 3000 years old.