Description of Additional Supplementary Files

File Name: Suppl_Data_1_Grain_Size.xlsx
Description: Grain size distribution from discrete samples

File Name: Suppl_Data_2_MS.xlsx
Description: Magnetic susceptibility
Notes: The data are measured with a Bartington device and are normalized by volume (adimensional)

File Name: Suppl_Data_3_Pmag_Table.xlsx
Description: Palaeomagnetic results for the characteristic components

File Name: Suppl_Data_4_samples_rawdata_U_Pb.xlsx
Description: Measured uranium, thorium and lead isotopes of pedogenic carbonates and tooth enamel from Charyn Canyon profiles and of reference materials

[a]Within run background-corrected mean ^{207}Pb signal in cps (counts per second). [b]U and Pb concentrations and Th/U ratio were calculated relative to the primary reference material (RM). [c]Corrected for background, within-run Pb/U fractionation (in case of $^{206}Pb/^{238}U$), subsequently normalized to the primary reference material (ID-TIMS value/measured value). $^{206}Pb/^{238}U$ error is the quadratic addition of the within-run precision (2 SE) and the external reproducibility (2 SD) of the primary reference material. $^{207}Pb/^{206}Pb$ error propagation (^{207}Pb signal dependent) following Gerdes & Zeh (2009). $^{207}Pb/^{235}U$ error is the quadratic addition of $^{207}Pb/^{206}Pb$ and $^{206}Pb/^{238}U$ uncertainties.Accuracy and reproducibility were checked by repeated analyses of secondary reference materials; data given as mean with two standard deviation uncertainties.
RM: reference materials, D: sample depth (m).

File Name: Suppl_Data_5_data_report_U_Pb.xlsx
Description: Uranium, thorium and lead isotopes data reports from carbonate and phosphate samples

File Name: Suppl_Data_6_Stable_Isotope.xlsx
Description: Measured $\delta^{13}C$ and $\delta^{18}O$ values of pedogenic carbonate. Both stable isotopes are reported relative to ‰ VPDB. Three replicates were analysed for each pedogenic carbonate sample. Each value represents the mean of the three replicates and uncertainties are calculated as the standard deviation of the three replicates.

File Name: Suppl_Data_7_equilibrium_Gas.xlsx
Description: Measured δ^{47} and Δ_{47} values (‰) of CO_2 equilibrium gases HG: CO_2 gas equilibrated at 1000°C and 25G: CO_2 gas equilibrated at 25°C and the empirical transfer function (ETF) applied during this study.