Paleosol-derived data used for the reconstruction of environmental conditions during the Holocene in the upper part of the Kali Gandaki valley, Central Nepal

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1. Licence

2. Citation

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3. Abstract

This data publication contains the data sets of a study aiming to reconstruct environmental conditions during the Holocene in the upper part of the Kali Gandaki valley, Nepal. The data are for samples taken from paleosol sections in the Upper Mustang region (Menges et al. 2019). On these samples we measured the grain size distribution to gain information about the depositional processes, pollen data to reconstruct past vegetation, 14C isotopes in the humin fraction of organic matter for soil formation ages, and hydrogen isotopic composition on n-alkanes to reconstruct past hydrological conditions. This is complemented with optically stimulated luminescence data for additional depositional age information, surface water samples and modern soil samples to constrain modern hydrological conditions, and sediment concentration data to gain insights into erosion processes. The data was generated between 2013-02 and 2018-12. The data files are provided in Excel and tab-delimited text versions.

4. List of files

4.1. Metadata

The file **Metadata** contains basic information of the sample set of recent vegetation, soils and paleosols from 2016 and 2017. Geographic coordinates are given in decimal degrees in WGS-84-N. TOC (%) stands for „Total organic carbon“ in percent, SD for standard deviation.

In the columns „grain size analysis“, „Biomarker analysis“, „^{14}C dated“ and „Pollen analysis“ samples analyzed are given the index „1“ and not analysed samples are indexed „0“.

The results of each analysis are given in separate excel files.

4.2. Grain size data

The file **grain_size_raw** (only available in tab-delimited text format) contains the grain size raw data (medium of ten measurements as detailed in method section of the paper) with the columns name giving the upper boundary of the size class in µm. For example X0.011 is the size class from 0 to 0.011 µm. The abundance of grains in each class is given in percent. The file **Rcode_EMMA.txt** provides the R script to reproduce robust EMMA analysis based on the EMMAgeo package (Dietze et al. 2012, 2016) and using the file grain_size_raw.txt as input.

4.3. Biomarker data

The file **Biomarker_data** contains

- the concentrations of the measured *n*-alkanes in ug/g dry weight [e.g. n-C21 (µg/g)] (column C to Q)
- δD for the uneven *n*-alkanes *n*-C25 to *n*-C31 in ‰ [e.g. δD *n*-C25 (‰)] and the 1-sigma standard deviation (SD) (columns R to Y)
- δ^{13}C for the uneven *n*-alkanes *n*-C25 to *n*-C31 in ‰ [e.g. δ^{13}C *n*-C25 (‰)] and the 1-sigma standard deviation (SD) (columns Z to AG)
- δ^{13}C for the uneven *n*-alkanes *n*-C25 to *n*-C31 in ‰ corrected for the Suess-Effect [e.g. $\delta^{13}C_{corr}$ *n*-C25 (‰)] and the 1-sigma standard deviation (SD) (columns AH to AO)

Empty cells are marked with NA (sample was not analysed). Abbreviation n.d. denotes not detected for biomarker concentrations and not determined for isotopic composition.

4.4. 14C data

14C_data provides raw ^{14}C data in the columns „uncalibrated ^{14}C age (BP)“ and „corrected error“ (columns D and E) as obtained from the Poznań AMS Radiocarbon Laboratory, Poland. The calibrated data are reported as output generated by Calib (Rev.7.0.4) based on the IntCal13 calibration curve (column F to V) and a median probability of the cal. BP age over all ranges (column W) with two sigma uncertainties (column X and Y). Empty cells are marked with NA.

4.5. Pollen data

Pollen_data gives the results of the pollen analysis in concentrations (pollen/g).

4.6. Surface Water

The file **Surface_water** contains the information obtained from surface water samples from tributaries along the Kali Gandaki. Geographic coordinates are given in decimal degrees in WGS-84-N, elevation and mean catchment elevation in m and catchment area in km². The hydrogen isotopic composition is reported as δD in ‰.

4.7. Luminescence dating

The file **luminescence_dating** contains

- Single-grain equivalent dose (De in Gray [Gy]) data with associated 1-sigma errors (De error in Gray [Gy]) of sample UM 16-01 (column D&E), UM 16-02 (column F&G), UM 16-03 (column H&I), UM 16-04 (column J&K) and UM 17-02 (column L&M). Only De values and uncertainties of accepted grains are listed. Rejection criteria and technical details are provided in the corresponding supplement (section 4 of Menges et al, 2019).
- Activity concentration in Becquerel per kilogram [Bq/kg] sediment of uranium (U, column F), thorium (Th, column G) and potasium-40 (K, column H) are listed with its corresponding 1-sigma error for all luminescence samples (column E). Activity concentrations were obtained by high-resolution gamma ray spectrometry and converted to beta and gamma dose rates using the conversion factors of Guerin et al. (2011). More details and underlying assumption of the dose rate determination are reported in the supplement section 4 Menges et al, 2019.

5. R Code: EMMA Protocol

The data are complemented by the Rcode_EMMA.txt file, an R code that allows the repetition of the End-member modeling analysis (EMMA) of grain size data in R based on the grain size data set of Menges et al. (2019) contained in this data set and the package EMMAgeo (needs to be installed, http://micha-dietze.de/pages/emmageo.html, Dietze et al. 2012, Dietze and Dietze 2016).

6. References

Dietze E, Hartmann K, Diekmann B, IJmker J, Lehmkuhl F, Opitz S, Stauch G, Wünnemann B, Borchers A. 2012. An end-member algorithm for deciphering modern detrital processes from lake sediments of Lake Donggi Cona, NE Tibetan Plateau, China. Sedimentary Geology 243-244: 169-180, https://doi.org/10.1016/j.sedgeo.2011.09.014

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