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Testate amoebae as proxy for floodplain palaeohydrology

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Sustainable management of floodplains requires fundamental insights into the long-term geoecohydrological dynamics of rivers and floodplains. To study these geomorphological, ecological and hydrological dynamics, a multi-proxy approach is needed. In this study, floodplain hydrology was reconstructed at timescales of centuries to millennia using testate amoebae for floodplains in Scotland and Flanders, and combined with existing proxies on floodplain geoecology. Two study sites in the mountainous Upper Dee catchment (Cairngorms, Scotland) and two study sites in the lowland Dijle and Mombeek catchments (Belgian Loess Belt) were selected.
Data on testate amoebae were combined with humification data, micro- and macrobotanical data, and geomorphological reconstructions. Preliminary results show how reconstructed variations in floodplain hydrology based on testate amoebae records extracted from alluvial peat can be linked to changes in floodplain geomorphology and ecology, for the Scottish study sites. Moreover, the changes in floodplain hydrology can be linked to the driving land use and climate changes in the Upper Dee catchment.
For the Belgian study sites, the situation is more complicated as testate amoebae counts are lower due to poor preservation in the peat. In addition, silt particles are hampering the testate amoebae analysis in mineral-dominated sediment units. This in turn, leads to less reliable water table depth reconstructions for Belgian alluvial peatlands and illustrates the limitations of this technique.
Overall, our study extensively discusses and illustrates the possibilities and limitations of testate amoebae as proxy for floodplain palaeohydrology in temperate regions. In a multi-proxy approach, combined with other proxies, testate amoebae can contribute to a detailed reconstruction of floodplain geoecohydrology, to provide more insights in its vulnerability to changes in the catchment.