



Decoding sediments records of past fires with the help of dendrochronological data

Paleochronological reconstructions have been highly instrumental in understanding long-term history of boreal biome and, in particular, speed and amplitude of ecosystem responses to external forcing. Forest fires, a critical driver of ecosystem dynamics in the boreal zone, have been particularly well studied by such methods, with currently available reconstructions of fire activity often stretching over the whole Holocene. One of the challenges associated with reconstructions of fire activity, based on amount of charcoal in sediments, is insufficient temporal resolution. In many boreal forest types, site-level fire return interval is comparable with the time difference between two neighboring data points on the chronology, making it extremely challenging to separate single fires in the sedimentary record. Equally challenging is the conversion of charcoal amount into spatial estimates. In contrast, dendrochronological data allows the reconstructions to be developed at annual and even seasonal resolutions. Dendro records also allow for spatial reconstruction of past fires. There is a growing interest in understanding the value of dendro data as a calibration dataset for paleorecords to improve their interpretation.

The current project will develop high-resolution paleorecord of fires from the Norra Kvill National Park (Southern Sweden) and contrast these data with already available dendrochronological reconstruction of fire activity over the same area. Through comparisons of fire histories of Norra Kvill as captured by tree-ring and sediment records, we evaluate ability of paleo data to document (a) local fire frequency and (b) changes in the historical amounts of burned area.

The project includes field sampling (2-3 days) of sediment samples, work in the laboratory (2-3 months), development of R code for statistical analyses, and writing of the project report (= Master theses). We are looking for a hardworking and enthusiastic student interested in boreal disturbance ecology, paleochronology, and related fields.

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