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Improving age-depth models using sediment accumulation rates

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For the correlation of records, precise dating of events is imperative. This requires often a large numbers of accurate dates and/or age models that give age estimates for the events between the dated horizons.

In this poster we present a simple method for the construction of a non-linear age model that takes the different sedimentation rate of siliciclastic and organic material into account in lake deposits. Since deposition of siliciclastic material in a quiet environment such as a lake basin is usually event-based, changes in sedimentation rate will be reflected in the organic matter content. Influx events, therefore, have a higher sedimentation rate than organic material, which is assumed to be deposited at a more or less constant rate. If a normal linear age interpolation or spline is used, it will result in incorrect age-depth results.

The age-depth relation presented here incorporates the LOI results where low LOI values are ascribed to higher sedimentation rates then high LOI values.
The following inputs were used for applying the model on depositional sequences:

1) a dated timespan e.g. an age estimate at known events in the sequence;
2) intermediate age estimates for model calibration, and;
3) a sediment analysis (e.g. LOI).

We present some first results from pingo remnants that started to register when they became an isolated circular lake basin at the onset of the Weichselian Lateglacial due melting permafrost. The lake fills show a clear sedimentary sequence with increasing organic matter content, directly related to the developing (GI-1) interstadial vegetation cover. This vegetation development was interrupted by the colder Younger Dryas, which is characterized in this region by an increase of sandy material in the fill. This changing influx of aeolian material is likely to be reflected in the age-depth curve. For the age estimate, calibrated dates of known events based on biostratigrapical correlation are used.