Peat-based climate reconstructions run into murky waters?

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Peatlands are globally important ecosystems that serve as archives of past environmental change. Peatlands form over thousands of years from the accumulation of decaying plants and hold water, or in some cases purely rainwater. Hence, both external processes, such as climate, and internal processes, such as the rates of peat growth and decay, control the water table in peatlands. However, throughout the previous century and particularly over the past decade, paleoclimatologists have increasingly relied on reconstructions of the water table in rain-fed peatlands to infer changes in rainfall through the Holocene period (the past ~12,000 years), ignoring the potentially important role of internal processes.

But in a new study, Swindles et al. compare paleoecological data from a peatland in England with model simulations to show that the water table in the bogs may change independently of climate. Dynamics inherent in peatland development stabilize the internal environment of the bogs. As a result, the behavior of peatlands can become partially disconnected from external climate influences such as rainfall. The authors further show that water levels in peat bogs do not respond linearly to changes in rainfall. For example, a two-fold increase in rainfall does not result in a two-fold increase in height of water table in the bogs.

On the basis of these results, the authors caution against indiscriminate use of water table reconstructions in peatlands as indicators of past changes in rainfall. The authors suggest detailed investigation of internal dynamics of peatlands; they call for more studies that combine field observations, paleoenvironmental data, and model results to understand

the relative importance of both climate change and internal processes in regulating water tables in peatlands.

More information: "Ecohydrological feedbacks confound peat-based climate reconstructions" *Geophysical Research Letters*, doi:10.1029/2012GL051500 , 2012.

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