Peat as Paleoclimate Indicator

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Peat is the *in-situ* remnant of organic materials, consisting dominantly of plant remains in various stages of decomposition. The composition of the peat material reflects the composition of the plant association in which they lived, although differential preservation must be taken into account. Peat sections usually contain layers of different plant composition, due to changes in local environmental conditions (mainly in hydrology or water quality), or due to regional changes in climate. Such regional climate changes can be manifested in the peat profile indirectly (local changes in water table or water quality), or directly (permafrost aggradation or degradation).

Changes in the development pattern of peatlands have been successfully related to major changes in climate.

(1) The lack of peat development prior to 6 ka BP in a wide belt north of the present Prairie border was attributed to drier and warmer conditions than at present (Zoltai and Vitt, 1990).

(2) The beginning of bog development in the continental climate of the Boreal region is in the 4-5 ka BP range (Zoltai and Vitt, 1990), possibly reflecting the onset of a moister/cooler climate.

(3) The earliest development of permafrost in NW Alberta peatlands is dated in the 3.5-4 ka BP range (Zoltai, 1990), possibly reflecting a sustained cool climate.

(4) Peat accumulation virtually ceased in the High Arctic 6-7 ka BP (Tarnocai and Zoltai, 1988), possibly due to the onset of colder climate.

However, this method of analysis is a blunt instrument, as peatlands are resilient and do not respond readily to small or short-term climatic changes.

A different, but very promising use of peat for indicating the paleoenvironment is the determination of response surfaces of common peatland bryophytes (Gignac et al. 1991). The abundance of these species in known environments (water table, water quality) is recorded and related to climatic parameters. This information can be used to indicate the paleoenvironment of moss assemblages identified in peat strata, including the broad climatic regime. By examining a number of peat profiles, persistent changes can be identified and major climatic trends can be established. This method of analysis could be applied to detect most climatic changes with a minimum of time lag.

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