Unexpected problems in AMS 14C dating of fen peat

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Four fen peat sequences in northern Finland were dated by the Accelerator Mass Spectrometry (AMS) 14C method in order to study past peatland dynamics and carbon accumulation patterns. Initially, plant macrofossils were used for dating. However, the dates were severely disordered, with marked inversions in all sequences. In one 140-cm peat core, for example, all ages fell within a ca. 1000-year time window. Following these unreliable results, a few bulk peat samples were dated to help assess if any of the plant macrofossil-derived dates were reliable. Bulk dates did not help to solve the problem. We evaluated the possible sources of error but were unable to single out one clear reason. It is probable that many factors related to the fen environment, such as flooding and root intrusion, may have contributed to the errors. Peat plant macrofossils and bulk peat samples are considered to be reliable dating materials but the examples given here highlight the difficulties that can be associated with AMS dating of peat samples.