Referencing guide for physical sciences (e.g., hydrology)

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This short document has been prepared to assist students taking upper year physical geography/science courses (e.g., Geog 303, 405) to help them reference correctly for this discipline. The following text has been taken directly from Whittington and Price (2006) with comments in the right column added for instruction purposes.

Introduction

Peatlands are estimated to store 220-460 Pg of carbon (Turenen *et al*., 2002), and hence can significantly influence atmospheric CO_2 concentrations (Hilbert *et al.*, 2000). Of all wetland types, northern wetlands are predicted to be the most affected by climate change (Roulet *et al*., 1992), although few models have tried to assess the effects of climate change on wetlands (Moore *et al*., 1998). It is well established that hydrology, particularly water table position, is one of the most important overall controls on the carbon budget of peatlands (Moore *et al*., 1998). However, in a warming climate there may be a change in the hydraulic parameters which govern the nature and magnitude of hydrological processes. These feedback mechanisms have received little or no study.

Hilbert *et al*. (2000) note that water table position is significant for plant species composition and hence rates of net ecosystem production. Furthermore, decomposition rate is strongly influenced by water table depth (Hilbert *et al.*, 2000) and water table fluctuation (Belyea and Clymo, 2001). Roulet *et al.* (1992) modeled the hydrological response of a 2 x CO_2 climate scenario (increase in temperature and precipitation of 3 C° and 1 mm d^{-1}, respectively (Mitchell, 1989)) and predicted ~14 – 22 cm decline in the water table. Therefore there is concern that the expected change in hydrological conditions will subsequently alter the biogeochemical role of peatland systems, and provide feedback into the global climate system (Strack *et al.*, 2004). Susceptibility of northern peatlands to climate change is not well understood, so it is useful to consider various hydrological responses to a range of related impacts and to carry out experiments that are a surrogate for climate change.

Peat is not a rigid soil because of its high water content and large compressibility (Price and Schlotzhauer, 1999); thus changes in water table position (either seasonal or long term) can alter water storage (Price, 2003; Price and Schlotzhauer, 1999; Schlotzhauer and Price, 1999) and flow processes by changing the volume of the peat. Subsidence (volume change) in peat may occur as a result of a change in water table position by compression and oxidation. Compression occurs as the weight of material overlying a point in a peat matrix is transferred from the fluid to the soil structure, which occurs when the water pressure decreases (e.g., water table decline). When the water table falls, the peat structure cannot support the overlying material and the pore structure collapses, resulting in compression of the peat matrix and surface lowering.

References:

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Turenen, J., Tomppo, E., Tolonen, K. and Reinikainen, A., 2002. Estimating carbon accumulation rates of undrained mires in Finland - applications to boreal and subarctic regions. The Holocene, 12(1): 69-80.

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