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Carbon cycling in peat soils in the Australian Alps

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Carbon stored and released by peat soils, both natural and human-altered, plays a significant role in the global carbon cycle. Field and laboratory measurements of peat decomposition in the northern hemisphere abound and have improved models of global carbon cycling. However, there are comparatively little data on carbon cycling for peat soils in the tropics and southern hemisphere. To our knowledge, no previous studies have directly measured the decomposition of organic matter in Australian peats. Peat soils in the Australian Alps comprise a mosaic of intact bog peats and disturbed dried peats, which occur along valley bottoms and beneath springs and seepage zones. Damage by recent bushfires (1998 and 2003) and an end to cattle grazing in the Victorian Alpine National Park (2005) have lead to an upsurge in bog rehabilitation work. To realise their full potential, rehabilitation works need to be informed by an understanding of carbon cycling in peat soils.

Carbon dioxide emissions and the mass loss of peat incubated in situ were measured in peat soils in the Australian Alps. The carbon chemistry of incubated peats was characterised with 13C NMR. In situ decomposition decreased as a function of increasing alkyl carbon content of the initial organic matter, providing direct evidence of the oft-cited link between substrate quality and decomposition rates. More mass loss occurred in the bog peat samples than in the dried peat samples. However, at the peat surface, the amount of CO2 emitted was not significantly different between bog peat and dried peat. The apparently conflicting results from the two methods of measurement of decomposition could be due to recent carbon inputs from surface vegetation

and pressurised and occluded gases at depth. Carbon inputs, and therefore the sink or source status, of these peats are yet to be quantified.