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Testing theories of organic matter accumulation in peatlands

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Studies of organic matter accumulation at Moor House in northern England have proposed that:
I) The peatland rapidly recycles P and accumulation of organic matter maybe limited by the availability of P;
ii) A molecular budget shows that polysaccharides are preferentially removed by humification and degradation with residual peat being dominated by lignin compositions.
iii) The DOM is derived from the degradation of lignin while the organic matter lost as gases (CO_2 and CH4) was estimated to be compromised of > 92% polysaccharide carbon.
iv) All the transformations considered, except for the production of litter from biomass, would have to occur through the loss or emissions of the high [U+3016]ΔG[U+3017]_fOMproducts such as CO_2, DOM or CH4.
v) Most of the CO_2 lost in the transfer of organic matter was lost in the production of biomass rather than the decay of litter or soil organic matter.
vi) The change Gibbs free energy of formation(ΔG)in of the peat soil would suggest that further reaction becomes thermodynamically inhibited within 40 cm of the surface and so explaining organic matter accumulation.
To test these theories this study considered organic matter accumulation at Pürgschachen Moor, a raised bog in Styria, Austria. Within the context of ongoing measurement of the carbon and greenhouse gas budget of the raised bog this study took samples of: aboveground (birch, dwarf pine, sphagnum and sedges), litter layer, peat cores, and dissolved organic matter. All collected samples were compared to standards of lignin, cellulose, humic acid and plant protein. All samples were analysed using: elemental analysis (CHNOS & P); thermogravimetric analysis (TGA); and bomb calorimetry. Results were analysed using principal component analysis (PCA) and by using analysis weighted within the context of the measured carbon budget as a means of testing the above hypothesis. This study will report on results relative to the theories proposed.