Geophysical Research Abstracts, Vol. 8, 02052, 2006
SRef-ID: 1607-7962/gra/EGU06-A-02052


# An unstable relationship between dissolved organic carbon concentration and water colour in peatlands

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Peatlands are an important terrestrial carbon store. However, an increasing loss of dissolved organic carbon from rivers draining peatlands has been observed. A strong linear relationship between water colour, measured by absorbance at 400 nm, and dissolved organic carbon concentration is often reported from peatland waters. Water colour can be measured easily and at minimal expense, therefore a colour-carbon relationship is often used to predict dissolved organic carbon flux based solely on water colour measurement. Here we show that the colour-carbon relationship changes over time in peatlands, and is spatially highly variable dependent on site characteristics and water flowpath depth. Subsequently, the colour per carbon unit ratio is unstable and we demonstrate that the use of colour results in average errors as high as one third of the true dissolved organic carbon concentration, with some errors even exceeding 100 %. This is an extremely important finding because a substantial amount of peatland carbon budget research has relied upon the use of water colour as a proxy for the true determination of dissolved organic carbon, and will therefore be subject to a large degree of error.