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The effect of particulate organic carbon deposition (POC) on the gaseous carbon budget of a floodplain in an actively eroding peatland.

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In actively eroding peatlands, particulate carbon losses can be very large, with the potential to shift peatland systems from carbon sinks to carbon sources. POC is potentially converted to gaseous forms by direct oxidation from depositional sites such as floodplains. Incorporation of these processes into carbon budgets is problematic as direct measurements are lacking.

This paper presents data from a field experiment designed to evaluate the importance of floodplain environments in 'processing' POC derived from eroded blanket peatlands. 24 gas collars were installed on a floodplain in the highly eroded Upper North Grain research catchment in the South Pennines, UK. Measurements were made at fortnightly intervals over a 12 month period to ascertain the CO_2 flux from an unmodified floodplain surface, a floodplain surface covered by a 20 mm particulate organic matter (POM) layer, and a 20 mm POM layer isolated from the soil surface.

Results show that POC deposition onto floodplains leads to CO_2 emission via oxidation of the deposited material, and suppresses photosynthesis due to burial of floodplain vegetation. POC deposited on the floodplains was oxidised at a rate of around 1.6–3.8 %/yr, implying that it will remain an active CO_2 source for around 30 years. An annual carbon loss budget of the system estimates carbon losses from the floodplain surface of 528-598 gC/m2/yr, which exceed typical carbon fixation by active blanket bogs by an order of magnitude.