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The age of buried carbon changes the greenhouse gas budget of a dam

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Dams are a globally relevant source of greenhouse gases (GHG), which impair their function as a source of green energy. High burial rates of organic carbon (OC) in dam sediments may partly or fully offset the emissions. We argue that only the burial of carbon fixed in the timespan of dam operation changes the GHG balance. Here, we took sediment cores from a temperate dam. We analyzed radiocarbon age and OC molecular composition by laser desorption ionization mass spectrometry in the bulk OC and in four extract fractions. The bulk samples included modern OC, fixed after 1950. However, the extracted OC was of different ages (modern to 1900 years BP). Compounds with H/O ratios >2.5 predominated in ¹⁴C-old fractions, while compounds with ratios <2.5 were abundant in modern extracts. We conclude that only 43% of buried carbon originated from the contemporary atmosphere and can be offset against recent GHG emissions.