Transfer of sediment-derived carbon into blackworm (*Lumbriculus variegatus*) and crucian carp (*Carassius carassius*): Implications for ^{14}C biosphere assessment in freshwater ecosystems

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Radiocarbon (^{14}C) is known as one of the important radionuclides that can be released into the biosphere from nuclear fuel cycle and radioactive waste repositories. It has a long half-life (5730 years) and can distribute in forms of dissolved and gaseous species to aquatic environment. In the present work, we investigated the proportion of sediment-derived carbon in a food chain of benthic blackworms (*Lumbriculus variegatus*) and crucian carps (*Carassius carassius*) preying them in a microcosm. Natural abundance of ^{14}C was used to estimate the contribution of sediment-derived carbon. The ^{14}C/total carbon ratio in the sediment was highly depleted and thus ideal to partition the carbon sources between sediment and food. Isotope mixing model was used to estimate the proportion of sediment-derived carbon in the selected animals. The isotopic abundance of ^{15}N was also used to further identify the trophic levels in the animals. The findings revealed significant contribution of sediment-derived carbon in blackworms (ranging from 70-80%), while only a small fraction was observed in the carps (1-5%). The findings identified sediment and food as the primary sources of carbon for worms and fish, respectively. Notably, the relative contribution of sediment-derived carbon in these organisms was modulated by food availability. Specifically, the uptake of the sediment-derived carbon was somewhat higher in both species under conditions of limited food availability, and smaller in the fish in the absence of the blackworms. These results are important for understanding the transfer of ^{14}C through aquatic ecosystems, particularly from lower to higher trophic levels. Further laboratory and field studies, including predatory fish, are recommended to provide a more comprehensive understanding of ^{14}C transfer in higher trophic-level species.