# Radiocarbon analysis strategies for elucidation of carbon cycle processes

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As instrumental techniques for natural abundance radiocarbon analysis become increasingly more facile and flexible, there are growing opportunities to characterize the provenance, age and transformations of organic matter in the environment, shedding new light on processes underpinning the carbon cycle. It is now feasible to routinely determine radiocarbon characteristics of different organic components separated according to particle size and density, based on thermal, chemical and biological reactivity, as well as at the molecular level. Dissection of organic matter from different environmental matrices (soils, water, sediments) in this manner frequently reveals marked isotopic heterogeneity, which can serve as a rich source of information on carbon sources and processing.

In this presentation, examples will be shown to illustrate the advances in understanding that may arise through application of different radiocarbon analysis strategies, ranging from high-throughput analyses of bulk organic carbon phases to in-depth measurements on discrete sub-components. Comprehensive radiocarbon analysis is particularly powerful when applied in conjunction with, and at the same measurement density as, complementary geochemical approaches (e.g., stable carbon isotopes). On-going analytical advances are paving the way for further advances in the breadth and depth of radiocarbon measurement capabilities, with concomitant expansion of scope of biogeochemical questions that are amenable to radiocarbon-based investigation.