# Sinks to sources: Soil carbon dynamics with warming in elevated $CO_2$ experiments

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Current predictions suggest the future of soil carbon stocks depends on the balance between increased inputs due to $CO_2$ fertilization, and increased decomposition due to global warming. To test this hypothesis, we examined the effect of warming on soil carbon fluxes in three long-term Free Air $CO_2$ Enrichment (FACE) experiments in North America, encompassing temperate evergreen and deciduous forest, and native prairie. We took advantage of the depleted carbon isotope label added to soils during FACE to distinguish between carbon newly added to soil, and carbon stabilized in soil prior to the experiment. This age tracer allowed us to investigate the vulnerability of stabilized soil carbon to warming and changing substrate availability belowground. We found that laboratory warming increased respiratory loss of stabilized soil carbon at all three sites, regardless of substrate depletion after extended periods of no new inputs. Warming accelerated the positive priming response to elevated $CO_2$ observed in soils from the temperate deciduous site. These findings suggest that the majority of soil carbon at these sites is vulnerable to faster decomposition with climate change, and that some soils are likely to switch from a net carbon sink to source with the combined effects of warming and elevated $CO_2$.