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Stimulation of r- vs. K- selected microorganisms by elevated atmospheric CO2 depends on soil aggregate size

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Increased root exudation under elevated atmospheric CO2 and the contrasting environments in soil macro- and microaggregates could affect microbial growth strategy. We investigated the effect of elevated CO2 on the contribution of fast- (r-strategists) and slow-growing microorganisms (K-strategists) in soil macro- and microaggregates. We fractionated the bulk soil from the ambient and elevated (for 5 years) CO2 treatments of FACE-Hohenheim (Stuttgart) into large macro- (>2 mm), small macro- (0.25-2.00 mm), and microaggregates (<0.25 mm) using an öptimal moistšieving. Microbial biomass (Cmic), the maximal specific growth rate (μ), growing microbial biomass (GMB) and lag-period (tlag) were estimated by the kinetics of CO2 emission from bulk soil and aggregates amended with glucose and nutrients. Although Corg and Cmic were unaffected by elevated CO2, μ values were significantly higher under elevated than ambient CO2 for bulk soil, small macroaggregates, and microaggregates. The substrate induced respiratory response increased with the decreasing of aggregates size under both CO2 treatments. Based on changes in μ, GMB, and lag-period, we conclude that elevated atmospheric CO2 stimulated the r-selected microorganisms, especially in soil microaggregates. Such an increase in r-selected microorganisms could increase C turnover in terrestrial ecosystems in a future elevated atmospheric CO2 environment.