



Continental and regional variation in microbial carbon use efficiency in soils

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Carbon use efficiency (CUE) describes the relative partitioning of carbon (C) between anabolic and catabolic processes within the soil microbial community. Further, it represents a major factor regulating the amount of C cascading through the trophic levels of the soil food web. How CUE relates to C supply, however, remains poorly understood. The primary aim of this study was to determine how CUE varies across a range of spatial scales as a function of C substrate supply. Using 16 different ^{14}C -labelled substrates (including amino acids, sugars, organic acids and amino sugars) and soils collected at the field, regional and continental scale, we measured the rate of substrate uptake and mineralization from which we calculated CUE. Across all soils ($n = 114$) and substrates ($n = 16$), the average CUE for the microbial community was 0.568 ± 0.004 (range 0.492 to 0.794). While the partitioning of substrate-C within the biomass (immobilization/mineralization) over 72 h was highly conserved for some substrates (e.g. glucose), others showed a wide variability in CUE across the samples (e.g. valine). In conclusion, we present new mechanistic evidence to support the paradigm that variation in ecosystem CUE may in part reflect differences in the types of C supplied to the microbial biomass.