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Characterizing drought-induced changes in active microbial communities and recently assimilated carbon transferred belowground in a forest understory

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Greenhouse gas induced global warming is expected to result in droughts of longer duration and higher intensity. Since droughts can disturb ecosystem interconnections, the investigation of ecosystem responses is crucial. Nonetheless, little is known about how changes in water availability affect ecosystem interconnections, e.g. the plant-microorganism response towards a drought event. We hypothesize that there is a shift in the microbial community structure and activity under drought when compared to a well-watered control. Moreover, we assume that changes seen at the microbial level are linked to plant carbon (C) assimilation and transport. We expect reduced C assimilation in plants under drought and a subsequent weakening in the coupling between the plant and belowground processes. How do microbial communities that depend on the rhizodeposited C provided by plants react to a reduction in exudate availability? To answer this question, three intact soil monoliths (70x70x20cm) with their natural understory vegetation were taken from a spruce forest in Hainich, Germany and transferred to a climate chamber. Half of the monoliths are exposed to drought whereas the other half is kept well-watered. The monoliths are pulse labeled with $13CO_2$ and the label is traced through the plant-soil system. Plants, roots and soil are sampled after labeling and analyzed for their isotopic composition. Pyrosequencing and PLFA-SIP (Phospholipid fatty acids stable isotope probing) are performed to detect changes in the microbial community structure and in the composition of the metabolically active microorganisms, respectively. We will discuss our first results concerning the effects of drought on understory carbon partitioning and the impact of drought on carbon availability to soil microorganisms.