



## More frequent dry and wet spells increase stochastic microbial community assembly in grassland soils

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Climate change is leading to an increased frequency and severity of alternating wet and dry spells. These fluctuations affect soil water availability and other soil properties which are crucial drivers of soil microbial communities. While soil microbial communities have a reasonable capacity to recover once a drought ceases, the expected alternation of strongly opposing regimes can pose a particular challenge in terms of their capacity to adapt. Here, we set up experimental grassland mesocosms where precipitation frequency was adjusted along a gradient while holding total precipitation constant. The gradients varied the duration of wet and dry "spells" from 1 to 60 days during a total of 120 days, where we hypothesized that especially intermediate durations would lead to stochastic community assembly due to frequent alternation of opposing environmental regimes. We examined bacterial and fungal community composition, diversity, co-occurrence patterns and assembly mechanisms across these different precipitation frequencies. Our results show that 1) intermediate frequencies of wet and dry spells increased the stochasticity of microbial community assembly whereas microbial communities at low and high regime persistence were subject to more deterministic assembly, and 2) more persistent precipitation regimes (> 6 days duration) reduced the fungal diversity and network connectivity but had a less strong effect on bacterial communities. Collectively, these findings indicate that recurring wet and dry events lead to a less predictable and connected soil microbial community. This study provides new insight into the likely mechanisms through which precipitation frequencies alter soil microbial communities and their predictability.