

## **Priming alters soil carbon dynamics during forest succession**

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**The mechanisms underlying soil carbon (C) dynamics during forest succession remain challenged. We examined priming of soil organic matter (SOM) decomposition along a vegetation succession: grassland, young and old-growth forests. Soil C was primed much more strongly in young secondary forest than in grassland or old-growth forest. Priming resulted in large C losses (negative net C balance) in young-forest soil, whereas C stocks increased in grassland and old-growth forest. Microbial composition assessed by phospholipid fatty acids (PLFA) and utilization of easily available organics (<sup>13</sup>C-PLFA) indicate that fungi were responsible for priming in young-forest soils. Consequently, labile C inputs released by litter decomposition and root exudation determine microbial functional groups that decompose SOM during forest succession. These findings provide novel insights into connections between SOM dynamics and stabilization with microbial functioning during forest succession and show that priming is an important mechanism for contrasting soil C dynamics in young and old-growth forests.**