



## **Belowground carbon trade among tall forest trees**

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Just imagine one tree could hand over large quantities of carbon to another tree. How would that change our thinking about carbon relations of forests, the single biggest biological C reservoir on earth? If such a tree-to-tree C shuttle would exist, it required a demand-supply gradient and a pipeline. Here we show that exactly this unthinkable does occur in overlapping root spheres of tall trees in a mixed temperate forest. Using canopy scale stable carbon isotope labelling applied from a construction crane, we demonstrate that carbon assimilated by spruce is traded over to neighbouring beech, larch, and pine in amounts so large that fine roots almost equilibrate the carbon source signature. The isotope mixing ratio indicated that the interspecific transfer accounted for 40% of the fine root carbon, which is ca. 280 kg ha<sup>-1</sup> a<sup>-1</sup>. This is the first forest scale evidence of a large flux of carbon among mature trees from evolutionary distant taxa. Carbon transfer most likely occurred through common ectomycorrhiza networks, which also exhibited the labelled carbon signal. These observations indicate that while competition for resources (e.g. light, water, nutrients) is often considered the dominant tree-tree interaction in a forest, trees actually interact in more complex pathways including a massive carbon exchange.