



## **Forest soil CO<sub>2</sub> efflux correlates with nitrogen content of decomposing litter layers**

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A changing terrestrial carbon balance through the alteration of soil CO<sub>2</sub> efflux rates is a potentially important feedback mechanism to climate change. The knowledge of the controls on soil respiration helps to understand its response to changes in environmental conditions. The availability of nitrogen in the soil could influence soil CO<sub>2</sub> efflux because it influences the decomposition of soil organic matter (SOM) as well as root respiration for nutrient uptake. Furthermore, productivity and therefore plant respiration increase with increasing availability of nitrogen. In this study we found a positive correlation between total annual soil CO<sub>2</sub> efflux and the nitrogen content of decomposing litter for eleven forest sites located along an elevation gradient in Southern Italian Alps. Nitrogen content of the decomposing litter explained 70% of the variation in the total soil CO<sub>2</sub> efflux however, the decomposing litter quality, expressed as C:N ratio, was not significantly correlated with total annual soil CO<sub>2</sub> efflux. Moreover previously determined components of total soil CO<sub>2</sub> efflux i.e. both litter-derived and respiration from recently fixed carbon (the latter including root respiration) tended to increase with increasing nitrogen content of the decomposing litter.

Our results suggest that (1) the activity of SOM decomposers and roots is for a large part located in and near the litter layers; (2) plants may maintain a high availability of nitrogen in the soil by producing litter with high nitrogen content; (3) canopy nitrogen content obtained from hyperspectral remote sensing data might be useful for up-scaling of soil CO<sub>2</sub> efflux to the landscape level, if higher availability of nitrogen in litter is also detectable from the canopy.