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The role of photo-degradation in litter decomposition

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Several field experiments have concluded that photo-degradation contributes to the carbon cycle. However, it is not known how large its global role is. It is also not known to what extent photo-degradation acts on its own and to what extent it acts by making the litter more degradable.

We analysed the potential global importance of photo-degradation in the carbon cycle. Radiation reaching ground level was calculated based on total incident radiation and leaf area index and published values for weight loss per radiation energy. Results indicate that photo-degradation is of great importance in the carbon cycle in semi-arid and dry grassland areas, but also in some arctic regions. Photo-degradation needs to be taken into account when modelling the carbon cycle in these areas. However, the role of photo-degradation in the total global carbon cycle is rather small, estimated at 1.4 % of global NPP.

In the experimental part dry litter was exposed to light including UV light for almost 10 months, and then incubated with soil and moisture. The results show that the light exposure leads to a small, but significant weight loss and significantly larger CO_2 production during the following incubation. We conclude that photo-degradation acts in tandem with microbial degradation. The pattern of nitrogen release was not intensively studied in this experiment, but the data suggests that nitrogen may be released quickly from the exposed litter.