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An effect of trait-dependent litter decomposition on the global carbon cycle

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Plant species traits predominantly control litter decomposition rates within biomes worldwide (Cornwell et al., 2008). We use the current version of Lund-Potsdam-Jena (LPJ) dynamic vegetation model to analyze an effect of species-dependent litter decomposition rates on the modeled carbon storages and their response to the simulated climate change. The original LPJ parameterization for the litter decomposition does not account either for litter separation into woody and leaf compartments or for dependence of the litter decomposition on the plant traits. Separation of litter into the woody and leaf components does lead to strong improvement in the regional distribution of the litter storage. Accounting for the decomposition dependency on plant traits further improves the model performance, in particular for woody litter. The effect of new litter decomposition parameterization on the atmospheric CO2 dynamics during the 21st century is visible but small due to dominant influence of fossil fuel CO2 emissions.

Cornwell, W.K. et al., 2008. The leaf economic spectrum drives litter decomposition within regional floras worldwide. Ecology Letters, 11 (10), 1065-1071.