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How the δ^{13}C of soil materials influence the isotopic signature of the soil CO_2 efflux in a beech temperate forest and a rain tropical forest

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Carbon isotopic signature has been measured at the different stages of the soil CO_2 efflux production in trenched and control plots to improve the knowledge about the physical and biochemical processes of the soil respiration. All the measurements of δ^{13}C have been performed using a mass-spectrometer. We have compared the isotopic signatures of the CO_2 going out of the soil, the CO_2 of the soil atmosphere, the organic carbon in the material that could be considered as the main soil respiration sources (live and dead roots, soil organic matter, aerial litter) and the CO_2 produced by these sources in incubation jars. The aims of this study were to evaluate the possibilities to combine these different data sets to estimate the partitioning of soil respiration between its autotrophic and heterotrophic components, and to get more insight into potential fractionation during biochemical or diffusion processes.

Measurements were conducted in a beech forest located at Hesse in the North East of France (site equipped with a flux tower and belonging to the CarboEurope network) and in a neotropical primary rainforest located at Paracou (French Guiana). Preliminary results show first a very tenuous difference between CO_2 isotopic signatures of efflux coming from the trenched and control plots and, secondly, δ^{13}C significant divergences between bulk organic material and CO_2 produced in the corresponding incubation jars. Our ability to use this kind of data for partitioning soil respiration into its main components will be discussed.