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Modelling soil CO_2 emissions after biochar application to evaluate the carbon sequestration

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One of the main objectives of preparation of biochar is to sequester carbon for a long term after its application to the soil as an option to mitigate the climate change. The potential carbon sequestration in soil after biochar application depends on the biochar stability, mainly on the ratio between labile and recalcitrant biochar fractions which depends on pyrolysis conditions, especially temperature. As the lab experiments are limited by time, it was interesting to model soil CO_2 emissions after biochar addition to evaluate the long term carbon sequestration.

The main objective of the present work is to study the soil carbon sequestration after the application of biochar prepared for sewage sludge at two different temperatures (400ºC and 600ºC). For this purpose, the soil CO_2 emissions were measured during 80 days in an incubation experiment after the soil amendment with the sewage sludge and the two biochar samples. After that, the CO_2 data were fit to a double first-order kinetic model and the CO_2 emissions were simulated at different times.