Microbial model:

Tendencies for microbial biomass (M) and DOC (C)

Where epsilon is the carbon use efficiency (unitless), Umax the maximum specific uptake rate for microbes (time-1), KC (mass/volume) the half saturation constant, lambda (time-1) the microbial mortality, V the maximum depolimerization rate (mass/volume/time), Km the enzymatic half saturation constant (mass/volume) and a the fraction of microbial necromass to become DOC.

Parameter estimations:

We solve for equilibrium first. In addition, we estimate that the rate of depolymerization is the rate of CO2 production in the control. We assume we have a good handle on microbial mortality, carbon use efficiency, fraction of necromass becoming DOC.

This gives us:

Where B is the base depolimerization.

In addition we also assume to have a good estimate on DOC turnover, lambda\_C. We further estimate maximum uptake rate with maximum microbial growth rate, in form of a doubling time. We obtain this from exponential growth:

Where tau\_2 is the doubling time, and therefore obtain

DOC turnover, lambda\_C, is used as follows to gauge K\_C:

So

Because M > C and U\_max >> \lambda\_C, K\_C is probably very close to

In the depolymerization equation, K\_M is tough to estimate. Here, we assume that it is a multiple of M, so

An estimate of V from solving can be derived from (note that M cancels out in the depolymerization)