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**Idea on how to study initialization vs model structural uncertainty (see Sierra et al., 2009; Sierra et al., 2015)**

Where



Where **T** is the transfer coefficient matrix and **K** is the decomposition rates matrix

* Matrix contains constant coefficients defining **model structure**

Under condition that:

and

These equations describe systems with different number of pools: in parallel, in series and with feedbacks.

To solve model equations, it is necessary to obtain a vector of initial conditions for the SOC stocks in each pool, , where .

Then, it is necessary to determine the initial conditions, i.e., the proportion of C in each pool at t=0 () and the transfer coefficients () to fit data.

We assume I(t) = 0 (e.g., bare fallows) (if I(t)=0 doesn’t hold, then you also need to optimize the transfer coefficients of I in the different pools, and set it to 0 when the pool j is removed)

Structural properties:

* When , pool i and j do not exchange C.
* When (with n=number of pools), then pool j is unconnected to all the other pools.
  + If, in addition, j=0, because I(t) is also 0, the pool is “removed” from the system

By optimizing j and , and allowing them to be 0, we can vary the structure of the model X times (X depending on the number of pools), where:

Then, we can separate, study and rank the effect of initialization and structure on the model predictions.

