



## **Microbially-driven soil aggregate structure formation**

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We propose a novel approach to mathematical modelling of soil aggregate structure formation. The model is self-consistent and describes physical process of soil particles aggregation/fragmentation as a result of organic matter micro-biochemical cycle. The model consists of two parts, first part describes biochemical cycle and is formulated as a system of chemical kinetic equations. The second part describes soil particles aggregation and fragmentation and is formulated as Smoluchowski equation, with coefficients dependent on the chemical composition, obtained by solving the first part of the model. The presented model allows observation of a complex aggregate structure development starting from a simple system of homogeneous mineral particles, organic matter solution and inoculant of microorganisms. With the help of numerical simulations we study fundamental mechanisms leading to multimodality of soil micro-aggregates size distributions and how it is affected by soil organic matter content. As an example, the model allows further consideration of soil physical occlusion effect on organic matter decomposition rates in soil aggregates.