Implementation of root architecture and functions into the reactive transport model MIN3P: Method and capabilities

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The dynamics of chemical species in soils is usually altered by a range of biotic processes, especially those related to the activity of plant roots (e.g. uptake, exudation, microbiologically-mediated reactions). Several models can simulate the development in space (3D) and time of root systems for most plant species but they are very limited regarding reactive transport processes. Conversely, several comprehensive reactive transport models exist for the vadose zone but none of them can readily include root growth.

This communication is aimed at presenting results of the coupling of the soil version of the reactive transport model MIN3P [1] with the root system model ArchiSimple [2]. The scientific and technical approaches used to perform this coupling will be briefly presented. Results of two example applications will be shown in order to illustrate the new capabilities. These applications will concern problems of pesticide and phosphate dynamics in the soil plant system.

[1] Mayer et al. (2012) Reactive transport modeling in variably saturated media with MIN3P: Basic model formulation and model enhancements. In *Groundwater reactive transport models*), pp. 187-212. Bentham Science Publishers Ltd. [2] Pagès L. et al. (2014) Calibration and evaluation of ArchiSimple, a simple model of root system architecture. *Ecological Modelling* **290**, 76-84.