

Improve the representation of phosphorus availability and uptake in land surface models

Xiaojuan Yang, Peter Thornton, Dan Ricciuto, Richard Norby, and Forrest Hoffman
Oak Ridge National Lab, Oak Ridge, TN 37830

Phosphorus (P) has been shown to limit a number of fundamental ecosystem processes and is considered the nutrient most limiting to carbon cycling in lowland tropical forests. Despite the importance of P in terrestrial ecosystems, none of the models in the IPCC AR5 considered P as a limiting nutrient, and the modeling community only recently started to implement P dynamics and carbon-nitrogen-P interactions into land surface models (e.g. CASA-CNP, JSBACH-CNP and ACME-CNP). Still, some key processes controlling P availability and P uptake are either not well represented or not considered due to limited understanding and lack of readily available data. Here we try to improve the representation of soil P availability and uptake in ACME-CNP by introducing the effects of soil pH and root exudates on soil P dynamics. We also investigate how different representations of phosphatase biochemical mineralization affect simulated soil P availability.