



A conceptual framework to advance Earth's critical zone science: water matters

Ruzhou Yi (1,2) and Xianli Xu (1)

(1) Institute of Subtropical Agriculture, Chinese Academy of Sciences, Key Laboratory of Agro-ecological Processes in Subtropical Region, Changsha, China (15623537996@163.com), (2) University of Chinese Academy of Sciences, Beijing 100049, China

Earth's critical zone, which spans from the top of the vegetation canopy to bottom of the aquifer, provides a systematic framework for integrated studies of air, biota, soil, rocks, and water. However, the complex structure and interactive processes make many challenges to research this zone. Recently, the booming of hydrology, which interacts with other disciplines in the form of subdisciplines such as hydrogeology, hydrogeology, and ecohydrology, has greatly promoted the development of critical zone research. Therefore, this study focuses on the role of water playing in the Earth's critical zone: water shapes the three-dimensional network of critical zone structure; water cycle coupled with biogeochemical process maintains the critical zone function and service; and the hydrology-extended model helps to simulate the critical zone evolution. Overall, this study proposes a conceptual framework that integrates the above three topics, and try to reveal the fundamental issues to be addressed for further advancing Earth's critical zone science.