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Editorial

Carbon–Water Relationships of the Forest Ecosystem under a Changing Climate

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In the new era of carbon neutrality, forest carbon assimilation has reappeared as an important research area. With the aim of increasing global forest carbon assimilation, massive forest plantation has been suggested by scientists [1]. However, forest carbon assimilation has been strongly affected by climate change. While the fertilization of the increasing CO_2 concentration has been observed, enhanced ecosystem respiration and reduced carbon assimilation caused by warming-induced drought have also been emphasized in different parts of the world [2]. With more frequent drought, soil water is being lost in such regions as inner East Asia [3], threatening the productivity of forests and plantations. Climate-driven tree mortality has been widely reported around the world [4], challenging efforts of towards greening.

Carbon assimilation and water consumption are two fundamental processes for forests. An investigation of the relationships between these two processes is needed to understand the formation of ecosystem services that are indispensable for human living. Climate change can strongly alter the carbon–water relationships of forest ecosystems, which vary across ecosystems and are also dependent on regional climate and soil features. For general patterns of the carbon–water relationships of different forest ecosystems, we still have no clear picture.

In order to estimate the potential of forests in carbon neutrality, and to make feasible decisions on forest plantations, ecological models are required. The carbon–water relationship is related to the ecological level that is focused on—for example, individual trees, forest stands, and biome. Different methodologies are therefore applied, from in situ monitoring to remote sensing inversion. In addition, some palaeoecological works can provide evidence of forest carbon assimilation under different climate conditions. All these past and present works can help to elucidate the general patterns of carbon–water relationships for forests, which will undoubtedly benefit model parameterization, calibration, and validation.

With this Special Issue, we intend to collect research works on this topic, in order to shed light on the patterns and possible determinants of changing carbon–water relationships of forest ecosystems over the world. We warmly invite readers to submit their works on this topic, wherever conducted and from whichever point of view.

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