RESEARCH ON THE RULE OF SOIL MOISTURE CONTENT DYNAMICS IN ZHALONG WETLAND

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Wetland ecosystems are complex, evolving structures whose characteristics and dynamic properties depend on many interrelated links between climate, soil, and vegetation. On the one hand, climate and soil control vegetation dynamics (e.g. 1, 2, 3, 4, 7, and 20); on the other hand, vegetation exerts important control on the entire water balance and is responsible for many feedbacks to the atmosphere (e.g. 7, 8, 9, 10, 11, 18, and 19). Many important issues depend on the quantitative understanding of this dynamics, including environmental preservation and proper management of resources (e.g. 5, 6, 7, 12, 13, 14, 15, 16, and 17).

Zhalong wetland in north China is a typical reed marsh, and has obviously functions of retaining water and flood control. The soil layers are the base material of the water movement and storage in the wetland. Soil moisture content is the key variable which synthesizes the action of climate, soil, and vegetation on the water balance and the dynamic impact of the water balance on plants. Although other sources of stress (fire, grazing, nutrient availability, etc.) are certainly also present, in the whole wetland ecosystem soil moisture content is the most important resource affecting vegetation structure and organization. Otherwise, in this area, the seasonal frozen soils distribute extensively, which changing the physical appearance of soil moisture content delivers, resulting in the instability of runoff generation and accordant junction making it difficult to simulate the runoff.

The research results show that the soil moisture content, in locations with difference topographty, vegetation, and the soil depths, is difference.

Soil moisture content in reed marsh is obviously larger than in farmland and grassland in the same period, and soil moisture content in farmland is slightly larger than in grassland; soil moisture content in reed marsh drastically changes and remarkably undulates with time, while in farmland and grassland, soil moisture content changes gently, especially in farmland; soil moisture content in all locations decreases with the increase of soil depth, besides, decreases at 5-30 cm depth are very sharp, from 30 cm depth, decreases are gently, and stable in grassland.

Soil moisture content heightens with reducing topography, soil moisture content in flat ground is obviously larger than in sloping field and hillock in the same period, and soil moisture content in sloping field is slightly larger than in hillock; besides, with the increase of soil depth, soil moisture content both in sloping field and hillock tends to be stable, while in flat ground it still changes drastically.

Because of effects due to temperature gradient difference in soils, soil water moves upwards and congregates in freezing interface, as a result, soil moisture content in frozen zones currently increases as much as 20%~40% than in the unfrozen zones in the whole freezing period, as well as, in the low and flat locations, frozen soil moisture content often exceeds field capacity, or even becomes saturation and supersaturation.

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