

The Subsoil Solution Features and Distribution of Soil CO₂ in Stone Forest Region, Lunan, Yunnan, China

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Abstract

The stone forest in Lunan is one of there unique karst landscape in China, Also in the world, that is Lunan stone forest, tower karst presented by Guilin karst and fengcong depression especially in Dahua county, Guangx. It is obviously that the stone forest is composed by the features formed by subsoil solution and reformed by the rainwater after the subsoil features exposed. The subsoil solutional features may occur in any part on the stone columns. Some features such as solutional troughs and through caves appear near the top of columnes. The subsoil solution features of limestone, are the main components of Lunan stone forest landscape. The study results show that the CO₂ concentration distribution of soil and weathering materials is strongly influenced by the different vegetation, geomorphologic structure and soil properties in the directions of the vertical and horizontal and. Also the CO₂ concentration in the contact zone between soil and weathered materials and limestone has been studied. The relation of depth of subsoil solution features with subsoil air CO₂ has been discussed. Also the CO₂ seasonal variations in different soil and weathered basalts have been measured in the different ecological system and geo-environment. Some conclusions may be drew: (1) the soil CO₂ content is increased with soil depth from 0-80cm below the surface and decreased with depth below 100 cm generally, the maximum concentration appears in the section of 40-80 cm depth of soil in the karst blocks, but in the weathered basalt, the CO₂ content peak occurs from the depth of 80 cm to 120 cm; the high CO₂ concentration were recorded in the late Spring and Summer, lower in the Winter. (2) the subsoil solution features mainly developed in the depth of 0.4—0.7 m below the ground surface, it is well coincided with the soil air CO₂ distribution; (3) the order of influence intensity of vegetation on the soil CO₂ concentration are: vigorous lawn > cypress forest > scattered grassland > pine forest > shrub > the cultivated land without vegetation; (4) solution capacity of soil water in the dissolutional gully system is 80% higher than the water in solutional gully without soil; (5) the potential solution capacity of soil water in the dynamic equilibrium with soil CO₂ against limestone is estimated in the range of from 73.242 mg/l to 202.275 mg/l in the period from April to June, 1999, estimated with the means of carbonate dynamic equivalence. At the same time, the solution capacity of ground water in basal weathered materials is higher than that of soil water according to the CO₂ concentration measurenent.