# Soil water infiltration on a stony hillslope in karst regions of northwest Guangxi, China[a]

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The karst region is ecologically fragile with scarce soil-water resources and low vegetation coverage. Variation of rock fragments (>2 mm) contents and their size distribution in surface soils has significant effects on water infiltration, hydraulic conductivity, and related soil physical properties. The objective of this study was to investigate the relationship between water infiltration and rock fragments on a stony hillslope in karst regions of northwest Guangxi, China.

A typical transect (108°19′27.9″E and 24°44′38.2″N) was selected in Huanjiang Observation and Research Station for Karst Ecosystems, Chinese Academy of Sciences. This transect was divided into seven segments according to the gradient and vegetation condition along the hillslope. In each segment, the excavation method was used to determine soil bulk density from four corners and the center of a 10 × 10 m square, and water infiltration was measured with five repeats by tension infiltrometer on May 10-24, 2007. The base of infiltrometer was 15 and 20 cm in diameter, and the pressure head was -20 mm. The excavated samples were sieved to determine rock fragments contents and their size distribution (250-75, 75-20, 20-5, and 5-2 mm) by weighing, and soil texture by pipette method. Soil depth was directly obtained from the profile under each measurement site.

The content and size of rock fragments had obvious heterogeneity, which resulted in a high spatial variability of soil hydraulic properties. From bottom to top of the hillslope, slope gradient increased from 20° to 40°, soil depth changed from 50-80 cm to 10-20 cm, and the dominant size of rock fragments varied from 20-5 mm to 75-20 mm. Correspondingly, the volumetric ratio of fine soil (<2 mm) to rock fragments increased from 7.7 to 36.2 (in the third segment), and then decreased to 1.7. The near-saturated hydraulic conductivity, steady infiltration rate and sorptivity had an increasing trend, and they were more than three times higher at the top (the sixth segment) than those at the bottom. Rock fragments of 75-20 mm had a very significant positive correlation with soil water infiltration. Tension infiltrometer with bigger base was less sensitive to soil composition and structure because there were fewer factors significantly influencing water infiltration.

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