

Estimating distribution of soil thickness in doline from electrical resistivity tomography: A case study in the Akiyoshi-dai Karst Plateau, Japan

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Distribution of soil thickness in doline was estimated based on 2-D electrical resistivity tomography in ten dolines on Akiyoshi-dai Karst Plateau in Yamaguchi Prefecture, western Japan. Relationship between topographic parameters and soil thickness was examined based on topographic analysis using GIS software. The 2-D electrical resistivity tomography revealed a clear transition zone of resistivity in subsurface doline. The resistivity ranging from 280 $\Omega \cdot m$ to 400 $\Omega \cdot m$ represents transition layer of soil and bedrock. The layers above (< 280 $\Omega \cdot m$) and below (> 400 $\Omega \cdot m$) the transition layer were identified as soil and bedrock, respectively. Electrical resistivity survey for each doline revealed that (1) soil at the upper slope of doline (max. 6.5 m) was thinner than that at the lower slope (max. 9 m), and (2) soil at doline bottom (max. 11 m) was thicker than that of slope (max. 9 m). For doline bottom, mean soil thickness increased with increasing catchment area, and catchment area is one of the main factors determining soil thickness on doline bottom.

Keywords: Karst landform, GIS, Bottom diameter, Slope, Catchment area