

Delineation of karst depressions using different digital elevation models Delineation of karst depressions using different digital elevation models

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The objective of this study is to investigate the effectiveness of DEMs derived from ASTER images, SRTM data and topographic maps to detect and quantify natural depressions in a karst area of Zhijin County, southwest China. Two methodologies were implemented. The first method is a semi-automated approach for stepwise identification of the depressions using DEMs: 1) DEM acquisition or arrangement; 2) filling sinks; 3) sink depth calculation using the difference between the original and sink-free DEMs; and 4) removal of spurious depressions based on a threshold value of sink depth, morphometric parameters and TPI (Topographic Position Index). The second method is the traditional visual interpretation of depressions using high-resolution aerial photographs and topographic maps. The threshold values of the depression area, shape, depth and TPI appropriate for identifying true depressions were determined based on the comparison between the maps from the semi-automatic method and the visual interpretation. The results show that the best performance of the semi-automatic method was achieved when the DEM derived from the topographic maps was used along with the thresholds of area = 60 m², ellipticity = 0.2 and TPI = 0. The accuracy of the best method ranges from 0.78 to 0.95 when the DEM spatial resolution varies from 75 to 2.5 m.

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