

Effect of Digital Elevation Model Spatial Resolution on Depression Storage

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Abstract

Surface water storage—including wetlands and other small waterbodies—has largely been disregarded in traditional hydrological models. In this paper, the grid resampling method is adopted to study the influence of the digital elevation model (DEM) grid resolution on depression storage (DS) considering different rainfall return periods. It is observed that the DEM grid size highly affects DS, and the higher the grid resolution is, the larger the DS value. However, when the grid resolution reaches a certain value, the maximum DS value decreases. This suggests that a critical grid resolution value exists at which the water storage capacity of depressions is maximized, namely, 20 m in this work. This phenomenon is further verified in two test cases with and without the infiltration process, i.e., calculations of the local area and without infiltration area, respectively. This research may facilitate the accurate computation of the DS process, which is greatly affected by the grid resolution, thereby improving the reliability of hydrological models.

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