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中国主要水蚀典型区侵蚀地形特征分析

Analysis on erosional terrain characteristics of typical samples in main water erosion region of China

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中文摘要:

地形是影响地表水文和土壤侵蚀的主要环境因素,坡度、坡长和LS因子是土壤侵蚀模型的重要参数。该文以第四次全国土壤侵蚀普查项目为依托,在ANUDEM软件环境中建立25m分辨率地貌关系正确的DEM(Hydrologically Correct Digital Elevation Model, Hc-DEM),提取了坡度、坡长并计算了LS因子,对中国主要水蚀地区的土壤侵蚀地形因子的空间及统计特征进行了分析,并将该数据与目前应用较为广泛的2种遥感高程数据进行了对比。结果表明,25m分辨率Hc-DEM可用以表达各典型样区地形特征,其上提取的坡度和坡长,符合一般地貌学原理和常规认识;坡度在东北地区最为平缓(0.8°),而在黄土丘陵区最陡(22.3°);坡长则在东北地区最长而黄土丘陵区最短(479m和69m);在地势比较低的河谷和地势较高的分水地带坡度比较平缓,而在分水岭到河谷冲积平原之间坡度较陡;在地形起伏较大的陡坡丘陵或坡度平缓的丘陵,坡长均比较大;LS因子的空间分布格局与坡度基本一致;该文得到的数据与ASTER和SRTM遥感高程数据对比具有明显优势,全国土壤侵蚀普查项目建立的DEM,在全国、省区和大流域尺度上的土壤侵蚀评价制图中具有不可替代性。该文阐明了中国主要水蚀区的侵蚀地形特征,为土壤侵蚀学、水文学中地形因子的提取提供了参考。

英文摘要:

Abstract: Terrain is one of the main environmental factors that influence ground water and soil erosion. Slope gradient, Slope length, and LS factor are important in soil erosion models. In this paper, DEM with a resolution of 25m was built in the software ANUDEM and slope, slope length, and LS factor were calculated with support from the fourth national soil erosion survey. Spatial and statistical characteristics for terrain factors that influence soil erosion were analyzed, and the result was contrasted with two kinds of remote sensing based elevation data that were used widely. The result showed that the typical terrain characters could be expressed by Hc-DEM with a resolution of 25m. Slope gradient and a slope length based on 25m Hc-DEM in accordance with the conventional understanding. Slope gradient was gentlest in the northeast region and steepest in the Loess Hilly region. Slope length was longest in the northeast region and shortest in the Loess Hilly region. Slope gradient was gentle in the bottom of valleys and ridge areas with higher elevation, and was steep in areas between the ridge and deposition areas. In areas with great relief steep hilly areas or gentle hilly areas, slope length was longer. The spatial distributions of LS factor were similar with that of the slope gradient. The data of this research was proven to be better than ASTER and SRTM elevation data. Moreover, the DEM data built in the fourth national soil erosion survey was irreplaceable in the field of soil erosion mapping at the national, province, and large watershed scales. This paper showed the characteristics of erosional terrain in the main water erosion region in China, and the result provided a basis for the calculation of terrain factors in research of soil erosion and hydrology.

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