

THE CUBING OF GULLIES USING 'GIS' METHODOLOGY, APPLIED TO A BADLAND IN SOUTH-EAST SPAIN.

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SUMMARY

The analysis of three-dimensional forms constitutes one of the most simple and important techniques within the raster systems of geographical information in present use. In this way operations can be carried out relating to the calculation of volumes, which are very useful in geomorphology: the definition of polygons of different elevations to estimate their volumetric relationships, the determination of the volume included between the surfaces of two DTMs of identical references x, y, operations with the field factor (exploration law) and interpolation of topographical profiles. In the case of gullied areas or badlands, they offer a methodological solution suitable to the problem of quantifying the amount of material lost through hydric erosion, since the high concentration of sediment and the frequent mudslides make it difficult to obtain this data by the classic procedures (samplers of sediments in suspension, and bed material load, sediments boxes, erosion pins, metal rods, etc.). In this work a methodology is put forward, using the IDRISI software, for the cubing of gullies in a south-eastern Spain). Over the present DTM of this area a second one which has been deduced from the former is superimposed, representing the morphology previous to the start of gullying. With the resulting meshes and by means of "overlay" and "scalar" modules, maps of isodepths and degrees of excavation are drawn, at the same time as files of values of partial cubing are created. Finally, the geometry of the forms of incision is analysed, trying to establish correspondences between the types of profile and the geomorphic processes.

Key words: badlands, gully, semiarid, GIS, ephemeral channel.

ZUSAMMENFASSUNG

Die Analyse dreidimensionaler Oberflächenformen stellt eine der einfachsten, zugleich aber auch eine der wichtigsten Techniken dar, die im Rahmen systematischer, rasterbasierter Systeme geographischer Informationsgewinnung derzeit genutzt wird. Damit können für die Geomorphologie sehr nützliche Operationen zur Erfassung von Volumina durchgeführt werden. Dazu gehört die Bestimmung von Polygonen unterschiedlicher Höhenlagen zur Abschätzung ihrer Volumina, die Erfassung des Raum-inhalts zwischen den Oberflächen von zwei DTM's mit identischen x,y-Werten, Operationen mit dem Feldfaktor (exploration-law) und die Interpolation topographischer Profile. In gullydurchsetzten Oberflächen oder Badlands eröffnen diese Methoden Lösungen zur Bilanzierung von Materialverlusten

CONCLUSIONS

Without being a GIS 3D, IDRISI, like the majority of the raster-based microcomputer GIS, which allow the analysis of DTM images, provides a very useful tool for the calculation of volumes, by means of its *analytical ring modules*. Its application to strongly eroded areas like badlands, to find the degree of excavation and cube the total soil loss corresponding to its gullies, constitutes a satisfactory solution in the morphological study of these areas of high erodibility where it might be complicated to carry out an experimental evaluation.

Again, the great detail found in DTM obtained from the digitalized cartographical basis (scale 1/100) allows a correct estimation of the volume of terrain dismantled, in each gully, from the beginning of the incision phase to be made, to know precisely the distribution of the excavation depths and to establish possible conjectures about the geometry of the badlands.

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