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## THE PROBLEM OF SCALE-SPECIFIC AND SCALE-FREE APPROACHES IN GEOMORPHOMETRY

**ABSTRACT:** SHARY P.A., SHARAYA L.S. & MITUSOV A.V., *The problem of scale-specific and scale-free approaches in geomorphometry*. (IT ISSN 1724-4757, 2005).

An extended system of 18 basic land surface attributes, or morphometric variables (MVs), is presented, together with formulae and computation algorithms. MVs and related methods, including those relevant to oil spills and natural hazards, are described. All MVs, both discovered and not, are classified into six non-overlapping classes, with the general properties of each class elucidated. The problem of MV precision is studied on the basis of the concept that MVs are scale-free if tended to some finite limit as grid mesh approaches to zero (with enlarging map scale), and they are scale-specific in the opposite case.

MV plots against grid mesh are studied experimentally. Due to roughness in natural landscapes, some scale-specific land form types, such as those of Gaussian or Troeh's classifications, occupy predicted areas for any terrain, as described by Shary's

statistical hypothesis [Shary, 1995]. This is validated experimentally for 17 terrains. The Evans' phenomenon [Evans, 1980] is explained as a consequence of natural landscape roughness. Some natural terrain specific deviations from values predicted by MV methods are described.

An example of scale-free land form classification is presented, in which some terrain-specific hydrologically important geomorphologic features are described directly. A new concept of distribution areas for studying hydrological phenomena generalizes the concept of flow-lines for the case of the real (non-smooth) land surface, and is applied to oil spills.

Future prospects and forthcoming trends in geomorphometry are discussed.

KEY WORDS: Geomorphometry, Digital Elevation Model, Scale, Geological structure, Land form classification, Oil spill.

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