Geophysical Research Abstracts
Vol. 19, EGU2017-12467-1, 2017
EGU General Assembly 2017

Hydrography-driven coarsening of grid digital elevation models

Giovanni Moretti and Stefano Orlandini
Dipartimento di Ingegneria Enzo Ferrari, Università degli Studi di Modena e Reggio Emilia, Modena, Italy

Grid coarsening is commonly applied to high-resolution digital elevation models to obtain suitable meshes for distributed catchment models, which can meet the computational constrains inherent to large-scale and/or long-term simulations. The nearest neighbor coarsening strategy is the standard method for this task. However, depitting after the nearest neighbor coarsening can yield significant alterations of land surface topography and extracted channel network. It is therefore relevant to seek for coarsening strategies that can better distill the information content of high-resolution digital elevation models to ultimately allow coarsened digital elevation models to yield accurate channel networks. A new grid coarsening strategy, designated hydrography-driven coarsening, is developed in the present study. In the hydrography-driven coarsening, the high-resolution digital elevation model is depitted, the obtained topographic data are used to extract a reference grid network, and the Horton stream orders are assigned to each link of the extracted grid network. The elevation of the point lying along the highest Horton order stream within a coarse grid cell that displays the minimum distance to the coarse grid cell center is assigned to that coarse grid cell. The capabilities of the hydrography-driven coarsening with respect to the standard nearest neighbor coarsening are evaluated over a synthetic valley and two real drainage basins located in the Italian Alps and in the Italian Apennines. The hydrography-driven coarsening method developed yields more accurate depitted digital elevation models than nearest neighbors coarsening. In addition, channels extracted after the proposed coarsening method are closer to observed channels than those extracted after standard coarsening.