Geophysical Research Abstracts
Vol. 17, EGU2015-3372, 2015
EGU General Assembly 2015

Geomorphology of anthropogenic landscapes

Giulia Sofia and Paolo Tarolli

University of Padova, Department of Land, Environment, Agriculture and Forestry, Legnaro (PD), Italy (giulia.sofia@unipd.it)

The construction of urban areas and the development of road networks leave a significant signature on the Earth surface, providing a geomorphological evidence to support the idea that humans are nowadays a geomorphic agent having deep effects on the morphological organization of the landscape. The reconstruction or identification of anthropogenic topographies, therefore, provides a mechanism for quantifying anthropogenic changes to the landscape systems in the Anthropocene. Following this research line, the present study tests the effectiveness of a recently published topographic index, the Slope Local Length of Autocorrelation (SLLAC, Sofia et al. 2014) to portrait anthropogenic geomorphology, focusing in particular on road network density, and urban complexity (UCI). At first, the research considers the increasing of anthropic structures and the resulting changes in the SLLAC and in two derived parameters (mean SLLAC per km^2 and SLLAC roughness, or Surface Peak Curvature –*Spc*). As a second step, considering the SLLAC derived indices, the anthropogenic geomorphology is automatically depicted using a k-means clustering algorithm. In general, the increasing of road network density or of the UCI is positively correlated to the mean SLLAC per km^2, while the *Spc* is negatively correlated to the increasing of the anthropic structures. Areas presenting different road network organization are effectively captured considering multiple combinations of the defined parameters. Landscapes with small scattered towns, and a network with long roads in a dendritic shape (with hierarchical branching) are characterized simultaneously by high mean SLLAC and low *Spc*. Large and complex urban areas served by rectilinear networks with numerous short straight lines and right angles, have either a maximized mean SLLAC or a minimized *Spc* or both. In all cases, the anthropogenic landscape identified by the procedure is comparable to the ones identified manually from orthophoto, with the advantage of having a fast procedure that does not require the user input. A further analysis highlights that the procedure can correctly depict anthropogenic landscapes having a road network density greater than 0 km/ km^2. The effects of such road network on surface processes could be material for future research, opening new questions about differences due to human or landscape forcing on Earth surface processes.

References

Sofia G., Marinello F, Tarolli P. 2014. A new landscape metric for the identification of terraced sites: the Slope Local Length of Auto-Correlation (SLLAC). ISPRS Journal of Photogrammetry and Remote Sensing, doi:10.1016/j.isprsjprs.2014.06.018