

The geomorphology of humanity

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For millennia, natural processes such as tectonic uplift, volcanic, climate, erosion, sediment transport and deposition have shaped the Earth surface. The Earth science community also started to consider biota as a geomorphological agent that has a role in shaping the Earth surface, even if at a different scale and magnitude than that of other major forcings [1]. In the recent history, a different global force of geomorphic change has risen: humanity [2, 3, 4, 5, 6]. Human activities ranging from agriculture to mining, road networks, and urbanization are leaving their fingerprints on the landscapes as evident topographic signatures [4, 7] (Fig.1). These signatures have the capability to affect Earth surface processes. In this work, different landscapes, significantly characterized by such anthropogenic signatures, are analyzed.

At the end of this century, anthropogenic geomorphology will cover a large part of the Earth. The consequences on Earth surface processes (e.g. soil erosion and landslide related to surface water flow interception by roads, soil erosion and mass movements related to mining activities, runoff and soil erosion associated with land use changes and issues related to anthropogenic drainage systems) will be significant [4]. Our Society should find solutions to minimize such environmental criticalities providing a global inventory of the human topographic signatures [5] through a constant monitoring of the landscapes, and rethinking the land use planning.

REFERENCES

- [1] W.E. Dietrich and J.T. Perron, "The search for a topographic signature of life", *Nature*, vol. 439, pp. 411–418, 2006.
- [2] S.J. Price, J.R. Ford, A.H. Cooper, and C. Neal, "Humans as major geological and geomorphological agents in the Anthropocene: the significance of artificial ground in Great Britain". *Phil. Trans. R. Soc. A*, vol. 369, pp. 1056–1084, 2011.
- [3] R.L. Hooke and J.F. Martin-Duque, "Land transformation by humans: A review", *GSA Today*, vol. 22, pp. 4–10, 2012.
- [4] P. Tarolli and G. Sofia, "Human topographic signatures and derived geomorphic processes across landscapes", *Geomorphology*, vol. 255, pp. 140–161, 2016.
- [5] P. Tarolli, G. Sofia, and E.C. Ellis, "Mapping the topographic fingerprints of humanity across Earth", *Eos*, vol. 98, 2017. doi:10.1029/2017EO069637
- [6] A.G. Brown, S. Tooth, J.E. Bullard, D.S.G. Thomas, R.C. Chiverrell, A.J. Plater, J. Murton, V.R. Thorndycraft, P. Tarolli, J. Rose, J. Wainwright, P. Downs, and R. Aalto, "The Geomorphology of the Anthropocene: emergence, status and implications", *Earth Surface Processes and Landforms*, vol. 42, pp. 71–90, 2017.
- [7] P. Tarolli, G. Sofia, and C. Wenfang, "The Geomorphology of the Human Age", *Encyclopedia of the Anthropocene*, 2017. doi:10.1016/B978-0-12-409548-9.10501-9
- [8] P. Tarolli, F. Preti, and N. Romano, "Terraced landscapes: from an old best practice to a potential hazard for soil degradation due to land abandonment", *Anthropocene*, vol. 6, pp. 10–25, 2014.



Fig. 1. Terraces near Amalfi Coast (Salerno, Italy) (photo by P. Tarolli). Agricultural terraces are among the most evident and extensive anthropogenic signatures on Earth [8].