Geophysical Research Abstracts
Vol. 16, EGU2014-5939, 2014
EGU General Assembly 2014

Erosion in vineyards and LiDAR: new opportunities for anthropogenic terraced landscapes

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Vineyard landscapes are a relevant part of the European cultivated land, and several authors concluded that they are the agricultural practice that causes the highest soil loss. Since grape quality depends on the availability of water for the vineyards, and since soil erosion is an important parameter dictating the sustainability of vineyards, soil and water conservation are often implemented. The most widely used measure for soil conservation for vineyards in hilly/mountainous landscapes is terracing. However, while improving vineyards stability, the same changes in hillslope hydrology caused by these anthropogenic structures to favor agricultural activities, often result in situations that may lead to local instabilities. Terraces, in fact, when not properly maintained can create hazards for people and settlements, but also for cultivations and for the related economy. Agricultural roads also serve terraced lands, and the construction of these types of anthropogenic features can have deep effects on water flows, in a way similar to the one already registered for forest roads. The goal of this research is to use LiDAR data for the high-resolution hydro-geomorphological analysis of vineyards, underlining the capability of high-resolution topography to provide new tools for a correct management of vineyards terraced landscapes. The work focus on terraced- and road-induced erosion, and it considers a methodology successfully applied to a different environmental context (the RPII index, Tarolli et al. 2013). The index is applied to two study areas, located in the center of Italy, where soil erosion and terrace failures represent a critical issue. The results highlight the effectiveness of high-resolution topography in the analysis of surface erosion, thus providing useful tool to schedule a suitable environmental planning for a sustainable development, and so, to mitigate the consequences of the anthropogenic alterations induced by the terraces structures and agricultural roads.

References

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