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MULTITEMPORAL CHARACTERIZATION OF A SLOPE CHARACTERIZED BY DENUDATION PROCESSES IN THE UPPER ORCIA VALLEY (SOUTHERN TUSCANY, ITALY) BY MEANS OF DENDROGEOMORPHOLOGY AND GEOMORPHOLOGY MONITORING TECHNIQUES

Irene BOLLATI¹, Francesca VERGARI², Maurizio DEL MONTE², Manuela PELFINI¹

¹ *Università degli Studi di Milano, irene.bollati@unimi.it, manuela.pelfini@unimi.it*

² *Università degli Studi La Sapienza di Roma, francesca.vergari@uniroma1.it; maurizio.delmonte@uniroma1.it*

The Upper Orcia Valley (Southern Tuscany, Italy) is a key site for the comprehension of denudation processes typically acting in Mediterranean badland areas, thanks to the availability of long-lasting erosion monitoring datasets and the rapidity of development of erosion processes, that makes it suitable as an open air laboratory for the study of badland dynamics.

Decadal multitemporal investigations on the erosion rates and the geomorphological dynamics of the study area allowed to highlight a decrease in the average water erosion rates during the last 60 years, with a reduction of bare land and, consequently, of erosion processes effectiveness, but contemporarily a parallel increase in the frequency of mass wasting events. These trends can be partly related to the land cover changes occurred in the study area from the 1950s onwards, which consist of the significant increase of reforestation practices and important other forms of human impacts on the slopes, mainly land levelling for agricultural exploitation.

In order to better identify the most significant phases of geomorphological instability occurred in this area during the last decades, an integrated approach was used, which is based on dendrogeomorphology analysis and geomorphological monitoring techniques. At this scope, trees colonizing a “calanchi” area located in the surrounding of Radicofani and characterized by shallow mass movements were analyzed for the 1985-2012 time period. Anomaly Index and reaction wood analysis results allowed to determine a spatio-temporal differentiation along the slope. More in detail the negative anomaly index is more pronounced in the trees of the investigated slope with respect to that measured for non-stressed trees located in a non-disturbed area. Reaction wood characterized the sectors of the slope interested by prevailing runoff or mass movements with a different persistence. Moreover, the erosion rates measured through trees roots exposure are in accordance with those derived with photogrammetric and geomorphologic monitoring techniques for both the area in which prevail runoff (0,31-3 cm/y) or the mass movements (5,86-27,5 cm/y).

