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A TEMPORAL AND SPATIAL ANALYSIS OF EROSION PROCESSES IN CALANCHI BADLANDS. A CASE STUDY FROM THE UPPER ORCIA VALLEY WITH STATE-OF-THE-ART METHODOLOGIES

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Calanchi badlands show high geomorphic dynamics and a great variety of gravitational and denudational processes (slides, mud flows, etc.). Several studies focussed on quantifying soil/substrate loss and erosion rates have been measured with traditional geomorphological techniques, such as erosion pins. For the study presented here, high resolution multitemporal digital elevation models (DEM) were acquired using a terrestrial laser scanner (TLS) and an unmanned airborne vehicle (UAV).

The research area is situated near the town Radicofani (Province Siena) in the Upper Orcia Valley, Tuscany (Italy). It spans an altitude from ~ 500 - ~ 600 m and drains an area of approximately 125 000 m². Outcropping clays and sandy clays from the Lower Pliocene are very prone to erosion processes. Slope wash, rill erosion, debris/mud flows, superficial and rotational slides are the dominating erosional processes in the research area.

The aerial images acquired with an UAV in combination with extensive on-site campaigns were used to produce a vegetation cover and a geomorphological process map. The multitemporal TLS DEMs were analysed in order to differentiate erosional processes and their temporal distribution throughout the year and additionally erosion rates were analysed with respect to their spatial distribution (geomorphometric features).

