

EGU2020-10391

<https://doi.org/10.5194/egusphere-egu2020-10391>

EGU General Assembly 2020

© Author(s) 2023. This work is distributed under the Creative Commons Attribution 4.0 License.



A multi-temporal inventory for constraining earthflow source-to-sink pathways in the Sillaro River basin, Northern Apennines

Sharon Pittau¹, Matteo Berti¹, Giovanna Daniele², Marco Pizziolo², and Francesco Brardinoni¹

¹Department of Biological, Geological and Environmental Sciences, University of Bologna, Bologna, Italy

(sharon.pittau2@unibo.it)

²Servizio Geologico, Sismico e dei Suoli, Regione Emilia-Romagna, Bologna, Italy

In mountain environments, landslide sediment supply is one of the main factors that can affect fluvial morphodynamics. In settings underlain by clay-rich lithologies, where earthflows are the dominant agents of hillslope sediment transfer, limited quantitative information is available on the contribution of these processes to the sediment budget. This is a critical aspect both for addressing basic scientific questions on landscape evolution, as well for tackling more applied issues on river sediment management.

This study focuses on the mountain portion of the Sillaro River basin (138 km²), a fluvial system underlain by argillites and siltstones of the Ligurian domain, Northern Apennines (Italy). Here, earthflows are the most common landslide type. Through the compilation of a multi-temporal earthflow inventory (1954-2019), we aim to: (i) characterize earthflow source-to-sink sedimentary pathways, with special reference to sediment delivery to ephemeral and perennial streams; (ii) explore possible litho-topographic controls on earthflow size, frequency and recurrence; (iii) examine historical trend of earthflow activity in relation to rainfall variability and land use changes. Finally, the high and extended temporal resolution of the inventory, will offer the opportunity to test how relevant information could complement the existing inventory of the Emilia-Romagna region, for evaluating earthflow hazard and risk potential.

Data collection entailed inspection of 12 sequential aerial photo sets (1954, 1969, 1976, 1988, 1996, 2000, 2006, 2008, 2011, 2014, 2016, and 2018), through which earthflows were classified and mapped in GIS environment. This remotely-based activities were complemented by confirmatory field visits on a subset of most recent events. Overall, we have mapped a total of 506 earthflows, which collectively extend over an area of 4.1 km².

Preliminary results show that earthflow size (i.e., total disturbed area) ranges from 400 m² to 98000 m², with frequencies peaking around 10000 m². In terms of source-to-sink pathways, we find that earthflows chiefly tend to deliver sediment to ephemeral gully channels (61%) and perennial tributaries (25%). Whereas, 5% of the events remain on the slopes, and another 5% are buffered by roads and similar anthropogenic barriers. Only a very limited proportion of earthflows (4%) makes it directly to the Sillaro River main stem.

This work, as part of the projects BEDFLOW and BEFLOW PLUS, is partially funded by Fondazione Cassa di Risparmio in Bologna.