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PREDICTING SEDIMENT CONNECTIVITY IN A MOUNTAIN BASIN: VALIDATING THE INDEX OF CONNECTIVITY FOR FUTURE APPLICATIONS

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Sediment connectivity underlies the relationships between sediment source areas and stream network and the use of topography-based indices, such as the index of connectivity (IC), has become a common approach to investigate these relationships. However, few studies have tested the potential of the IC as an independent variable for predicting observable processes. In this study, the aim is the validation of the IC as a semi-quantitative tool for depicting structural connectivity and predicting sediment dynamics linking sediment sources to the channel network in the Rio Cordon catchment (Italy). First, the assessment of lateral connectivity was carried out using a combination of remote sensing data and field observations. In this way, it was possible to classify the sediment sources into disconnected, connected or functionally connected. Second, logistic regression analyses were performed using IC as independent variable and connectivity status as dependent variable. Hence, the predictive capacity of the IC was tested and a threshold was derived to distinguish between low and high sediment connectivity. The results showed that 15% of sediment sources are connected to the stream network. Moreover, the IC proved to be a reliable tool for depicting structural but, it failed at predicting sediment dynamics as it did not classify correctly the functionally connected areas, so it cannot infer functional sediment connectivity in this case study. As a consequence, it was possible to obtain an IC threshold of -2.32, capable of differentiating between low and high structural sediment connectivity and useful for future management decisions.