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The use of normalized difference vegetation index (NDVI) in sediment connectivity analysis: insights for considering land cover changes in Sediment flow Connectivity Index (SfCI)

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Land cover plays a fundamental role in surface dynamics that involve sediment connectivity. The processes of sediment erosion, transport and deposition are strongly conditioned by land coverage types (classes) that physically can mitigate, prevent or increase sediment production and mobility on the surface. In fact, land cover and land use data are required for the computation of some indices and models of sediment connectivity. However, it should be considered that land cover changes can impact these processes, especially if they occur over a short period of time.

This work presents an assessment of land cover changes in three different hydrographic basins (river Severn basin in UK, river Vernazza basin in northwestern Italy and Lama Camaggi basin in southern Italy) in relation to their respective sediment connectivity patterns, described by Sediment flow Connectivity Index (SfCI) in previous works (Zingaro et al., 2019; Zingaro et al., 2020; Zingaro et al., 2023). The main aim is to evaluate the use of normalized difference vegetation index (NDVI) to consider land cover changes in sediment connectivity analysis. The NDVI is computed from satellite multi-spectral images (Sentinel-2) in time period between the reference year of the land cover used in previous SfCI calculation and the last year (2023) in each of study area. The results show that (1) NDVI highlights the occurrence of land cover changes over short time periods in many areas of the basins, (2) the introduction of NDVI in SfCI modifies sediment mobility values also affecting the definition of sediment connectivity pattern.

The use of NDVI can improve the analysis of sediment connectivity by providing more dynamism in the description of sediment pathways on both spatial and temporal scales. The present experimentation gives new insights to consider surface cover changes in SfCI contributing to update the algorithm and to investigate the possibility of its enhancement.

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