



A new semi-quantitative approach for process-based assessment of erosion dynamics. An Example from Upper Orcia Valley (Tuscany, Italy)

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The aim of this work is to test a procedure for erosion rate prediction at catchment scale, and it is pursued by integrating two well-established methods for erosion evaluation. Denudation rates have been indirectly estimated for a small catchment of the Upper Orcia River Basin (Tuscany, Central Italy). In this area, drainage patterns and catchment shape are structurally controlled by the regional morphostructures and denudation processes are among the most important in the recent morphoevolution, as long-period field monitoring has confirmed. The first erosion rate estimator (Tu index) has been traditionally used to predict the suspended sediment yield ($t \text{ km}^{-2} \text{ a}^{-1}$) at catchment outlets and consists in quite simple equations obtained by regression analyses using geomorphic parameters of the drainage network and suspended sediment yield data available. The application of Tu method for this work was performed in order to obtain soil loss estimation (cm a^{-1}) within unit areas of 1 km^2 , by using a specific empirical equation taking into account the distribution of drainage density values. Furthermore, the Erosion Response Units (ERUs) were used to identify heterogeneously distributed areas within a river catchment characterized by specific homogeneous hydrological and erosion process dynamics and features. A significant contribution for a geomorphological process assessment is the integration of both concepts. This allows a semi-quantitative evaluation of single dominant erosion processes within small to medium size catchments. The paper will illustrate the new integrative concept in a small catchment in Upper Orcia Valley (Tuscany, Italy) characterized by gully erosion, landslides, sheet erosion and badlands.