



FLORENCE model to assess long-term basin sediment yield in Italy

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In Italy the assessment of sediment yield from river basins is important to predict sedimentation that can occur on floodplains in reservoirs and lakes. The risk of sediment yield is also important to classify basins in terms of flood hazard for civil protection purposes. On the other hand, sediment has also ecological value as a part of the aquatic ecosystem and a social and economic value as fertiliser and source of minerals and construction material. To predict sediment yield from river basins the Florence model was developed. The estimated quantity is the volume of humid sediment per basin area unit ($\text{m}^3\text{km}^{-2}\text{year}^{-1}$). The model derives from the analysis of 59 Italian basin-reservoir systems distributed on the Italian territory. The model was developed as back-error propagation multi-layer neural model by using 10 basin variables to predict sediments volumes accumulated in reservoirs located at the basin outlets. The FLORENCE model variables were determined in GIS environment. To test the FLORENCE model, we produced 59 neural trial sub-models, each of which considered 58 watershed-reservoir systems, excluding one at a time. The sedimentation values observed in the excluded reservoirs were compared with the sub-model's forecasts. Observed versus sub-model predictions gave a good determination coefficient $R^2=0.73$. The FLORENCE model resulted positively validated also by comparing the predicted values of sediment yield with the values of erosion risk estimated by the PESERA model. FLORENCE model can be considered more suitable than other distributed models in predicting sediment yield at watershed scale in Italy. In fact, sediment trapped by reservoirs derives from all sediment sources in the tributary watersheds (soil erosion, mass movements, bank erosion etc.) and not only from sheet and rill erosion.