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Flood Exposure through a Geomorphologic Approach

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The availability of new technologies for the measurement of surface elevation (e.g., GPS, SAR interferometry, radar and laser altimetry) has partially redressed the lack of high resolution elevation data, and led to an increase in the attraction of DEM-based models. As a result, more scientists are focusing on DEM-based automated procedures in the delineation of floodplains. The objective of the present research was to evaluate the exposure of the Italian territory to flooding by exploiting the potential of morphological indices (drainage area, local slope, curvature, topographic index, etc.). In particular, it was found that the flooding areas may be delineated quite well by adopting a modified topographic index computed from DEMs. Since the modified topographic index is sensitive to the spatial resolution of the elevation model adopted, the optimal scale of representation was investigated with the aim of defining the best grid cell resolution for the performances of the method in the description of floodplains. The procedure proposed was tested over the Arno river basin using, for calibration, the existing cartographic and technical documentation on flood exposure produced by the local Environmental Agencies of recent institution in line with current legislation. The validation of the procedure was performed similarly over the Calabria Region. The use of the proposed modified index may represent a useful and rapid tool in delineating the flooding areas in ungauged basins and in developing areas where expensive and time consuming hydrological-hydraulic simulations are not possible.