



Presentation of a surface runoff susceptibility mapping method and its application to the Lezarde catchment

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Intense surface runoff is a hydrological process at the origin of intense phenomena such as erosion, flash floods, and mudslides and can generate major damage. In this paper, we present a mapping method to represent the susceptibility of surface runoff occurrence. The method, called IRIP (Indicator of Intense Pluvial Runoff, French acronym) produces 3 maps representing 3 steps of the surface runoff phenomena: generation, transfer and accumulation. The maps area created by combining surface runoff factors extracted from topography, soil properties and land use. Each map has a six level scale of susceptibility, from 0 (low susceptibility) to 5 (strong susceptibility). The method is applied in the Lézarde catchment (210 km², northern France) known to be prone to intense surface runoff. The relevance of the mapping method results is evaluated by comparing the susceptibility maps to data related to surface runoff: risk regulatory zonings of surface runoff and erosion, and surface runoff impacts on the transportation network (roads and railways). The relationship between the comparison data sets and the susceptibility maps can be indirect, so, a method of comparison is proposed. Similarity indexes are computed for the regulatory zonings and detection rates are computed for the damaged transportation network sections. The comparison shows good correlation between the surface runoff zoning map and the susceptibility map of accumulation, and between the soil erosion zoning and the susceptibility map of transfer. High detection rates are obtained when comparing the damaged network sections and the susceptibility maps of transfer and accumulation. The paper also opens interesting prospects to improve the the mapping method and method of evaluation.