Geophysical Research Abstracts,
Vol. 10, EGU2008-A-06459, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-06459
EGU General Assembly 2008

A simple method based on GIS to estimate the hydrological risk along a road network

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During the recent catastrophic and intense rain events which occurred in the South of France, the flooding of roads as appeared as a major issue for two reasons: i) it is a significant source of danger for car passengers ii) emergency services need to have at each moment a clear overview of the road conditions to be efficient. Then it would be important to determine the points of a road network liable to be submerged during flash floods. This communication presents a simple approach to identify the points of a road network which might prove sensitive to flooding. The Gard region is taken as the reference case study to develop and to test the proposed method, thanks to the qualitative inventory of the road points flooded during a forty years period.

The approach consists in determining the characteristics of a contact point between a road and a river significant of the existence of a flooding hazard at this point. To face up to these unknowns, every information available on the catchments drained at the concerned points has been analysed into a GIS: DEM(used to define some topographic index), land cover, pedology and geology, eventually critical flow of the hydraulic woark or bridge crossing the road. The analysis of all the points of roads in connection with a river makes it possible to compare the characteristics of road points which have yet been flooded (sensitive points) to the points not yet flooded (not sensitive), and to determine criteria allowing to distinguish the two samples.

At least, four indexes have been conserved: catchment altitude and slope, watershed area and ratio between the ten year return flow and the critical flow. Some combinations of these four indexes have allowed to classify the sensitivity of the roads to

flooding. The classification remains informative but its validation indicates that it allows to gain some useful indications.