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About the advantage of combining hydrological now-casting with a vulnerability analysis to improve risk alerts in flash flood prone area

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During the recent catastrophic and intense rain events occurred in the Mediterranean area, flash flood have led to tragic consequences in urban and industrial areas as well as on the road network. During these storm events, the emergency services need to have a clear overview of the riskiest zones of the region to program their interventions efficiently and to identify the safest access routes for instance.

Distributed hydro-meteorological models, that are able to take advantage of the available high spatial and temporal resolution rainfall now-casting using radar data, are promising tools for anticipating and quantifying the consequences at the ground of storm events all over a region. But because of the uncertainty of these models, they are not often sufficient to provide valuable data and need to be couple with additional information.

Databases on local vulnerabilities (road often submerged, data on embankment or bridge dimensions, maps elaborated for towns for the risk prevention plans) could be used as this additional information. The association between a vulnerability analysis and the hydro-meteorological now-casting should provide a more precise estimation of the risk location.

Through the examples of the Gard region (France) and the Cataluña region (Spain), frequently affected by severe [U+FB02]ash [U+FB02]oods, two applications combining hydro-meteorological now-casting using radar data and vulnerability analysis have been developed. In the first case, a road warning system for the now-casting of road submersions as been tested in a mainly rural area. It is used a qualitative inventory of the road sections submerged during a forty years period. The second example deals with a more urbanized and industrial area (the Besós River basin). Here the vulnerability analysis takes into account the more sensitive sites of the watershed (industrial plant, main bridge, ...) and evaluate the consequence of a submersion depending on the return period and the level of the flood.

The first results demonstrate that using a vulnerability analysis it is technically possible to provide distributed now-castings for a high number of sites in a region. This now-casting is useful despite the uncertainties linked to measured and forecasted distributed rainfalls and the limits of the rainfall runoff models.