Geophysical Research Abstracts
Vol. 18, EGU2016-10305-4, 2016
EGU General Assembly 2016

Contribution of an exposure indicator to better anticipate damages with the AIGA flood warning method: a case study in the South of France

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On the 3rd October 2015, heavy localized precipitations have occurred in South Eastern France leading to major flash floods on the Mediterranean coast. The severity of those floods has caused 20 fatalities and important damage in almost 50 municipalities in the French administrative area of Alpes-Maritimes. The local recording rain gauges have shown how fast the event has happened: 156 mm of rain were recorded in Mandelieu-la-Napoule and 145 mm in Cannes within 2 hours.

As the affected rivers are not monitored, no anticipation was possible from the authorities in charge of risk management. In this case, forecasting floods is indeed complex because of the small size of the watersheds which implies a reduced catchment response time. In order to cope with the need of issuing flood warnings on un-monitored small catchments, Irstea and Météo-France have developed an alternative warning system for ungauged basins called the AIGA method.

AIGA is a flood warning system based on a simple distributed hydrological model run at a 1 km^2 resolution using real time radar rainfall information (Javelle, Demargne, Defrance, Pansu, & Arnaud, 2014). The flood warnings, produced every 15 minutes, result of the comparison of the real time runoff data produced by the model with statistical runoff values. AIGA is running in real time in the South of France, within the RHYTMME project (https://rhytmme.irstea.fr/). Work is on-going in order to offer a similar service for the whole French territory.

More than 200 impacts of the 3rd October floods have been located using media, social networks and fieldwork. The first comparisons between these impacts and the AIGA warning levels computed for this event show several discrepancies. However, these latter discrepancies appear to be explained by the land-use. An indicator of the exposure of territories to flooding has thus been created to weight the levels of the AIGA hydrological warnings with the land-use of the area surrounding the streams for which the warnings are issued. This paper aims to explain how this indicator has been created and to assess its relevance with the example of the 3rd October 2015 flood. By completing this approach, the AIGA warnings may characterize not only the flood hazard but more inclusively the risk of flooding, allowing to forecast this type of event.

Javelle, P., Demargne, J., Defrance, D., Pansu, J., & Arnaud, P. (2014). Evaluating flash-flood warnings at ungauged locations using post-event surveys: a case study with the AIGA warning system. Hydrological Sciences Journal-Journal Des Sciences Hydrologiques, 59(7), 1390-1402. doi: 10.1080/02626667.2014.923970