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A multi-disciplinary management of flood risk based on rainfall interpolation, impact database and hydrological modeling

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The Greater Lyon (1.3 million inhabitants 650 km 2), located in south-east France, is subjected to recurring floods, with numerous consequences. From the perspective of prevention and management of this risk, the local authorities, in partnership with multidisciplinary researchers, have developed since 1988 a database built by the field teams, which specifically identifies all floods (places, date, impacts, damage, etc.). At first, this historical database is compared to two other databases, the emergency services and the local newspaper ones, in georeferencing these events using a GIS. It turns out that the historical database is more complete and precise, but the contribution of the other two bases is not negligible, and a useful complement to the knowledge of impacts. Thanks to the dense rain measurement network (30 rain gauges), the flood information is then compared to the distribution of rainfall for each episode (interpolation by ordinary kriging, fig. 1). The results are satisfactory and validate the accuracy of the information contained in the database, but also the accuracy of rainfall measurements. Thereafter, the number of flood on the study area is confronted with rainfall characteristics (intensity, duration and height of precipitated water). It does not appear here clear relationship between the number of floods and rainfall characteristics, because of the diversity of land uses, its permeability and the the types of local sewer network and urban water management. Finally, floods observed in the database are compared spatially with a GIS to flooding from the sewer network modeling (using the software Canoe). A strong spatial similarity between floods observed in the field and simulated flood is found in the majority of cases, despite the limitations of each tools. These encouraging results confirm the accuracy of the database and the reliability of the simulation software, and offer many operational perspectives to better understand the flood and learn to cope with the flooding risk.

キーワード: flood risk, rainfall interpolation, database, modeling, Lyon, France
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Spatial distribution of the 06/30/1997 rainfall event and consecutive floods