

## **A cloud-based urban flood Early Warning System using radars**

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Urban pluvial floods are often caused by intense rainfall accumulations in short time periods that exceed the capacity of the sewer networks (if exist). Despite the efforts made worldwide in the last years to increase sewer's capacity and deploy other structural solutions, most cities are still exposed to the consequences of heavy rainfall events.

Here, we present a Cloud two-level Early Warning System [EWS] using radar precipitation measurements to issue local urban flood warnings and increase the leadtime in which potential risks are detected.

In a first level, quality controlled radar observations are used to obtain precipitation nowcasting for the following hours and to define an observation region surrounding an urban point of interest. This region changes dynamically according to the precipitation's direction and speed and represents the precipitation that might impact the point defined. Accumulation values are calculated on this observation region and simplified warnings issued.

In a second step, both radar observations and radar-nowcasting are used (together with sensors data integrated seamlessly in the system) to feed a hydraulic model obtaining simulations of sewer network's behaviour.

The solution is running in the Cloud (including the execution of the hydraulic model) and updated every time that new data is available (typically around 10 minutes). The web allows operators to configure critical points in the network and the actions to be triggered when the different warning levels on sensors, radar observations or model simulations are reached (SMSs, emails, etc.) under different profiles of users.

This rapid update, together with the possibility to configure critical points in the sewer network and define individually warning thresholds, makes the proposed EWS a valuable tool for urban flood management. The proposed system is currently running operationally in several cities.