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Flash floods as geomorphic crisis: lessons from recent events in the Paris Basin (France)

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Flash floods characterized by a sudden triggering, rapid rising times and important specific discharges are flow phenomena currently observed in the Paris Basin (in the north of France) affecting small dry valleys of forty square kilometres or less and with response times of a few hours or less. In many cases, such basins respond rapidly to intense rainfall (50-150 mm) because of steep slopes, even if topography seems to be relevant in these areas of plateaux, and because of saturated loamy soils, impermeable surfaces and anthropogenic actions. Observations on 269 events affecting 189 watersheds show that the relationships between form basin, organisation of drainage network and slopes system, are among the most important controlling factors on these flash floods dynamics, while percentage of cultivated areas and land use play a second role aggravating or decreasing runoff quantities. Two morphologic configurations types have been distinguished and opposition between sensitive basins is possible according to the spatial distribution of relief, associated to the geological structure, their size, their position in fluvial systems, with or not a gap in the Strahler classification, and their average slopes. Assessment of the susceptibility to flash flood, by taking morphological configurations into account, is a critical step to anticipate the locations of areas which may be hit by the flood in this region.