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# Uncertainties of water flow-pathes in digital cultivated landscape : consequences on overland flows and channel run-off

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Artificial drainage networks are of great importance in hydrology of little cultivated catchments. However, artificial drainage networks mapping is very time-consuming. Thus, these networks are usually unknown. In this context, this study aims to assess hydrological consequences caused by uncertainties in the artificial drainage network mapping. In order to carry it out, a network generation method is used to simulate equi-probable artificial drainage networks on a 6.4 $km^2$ Mediterranean cultivated catchment. This method consists in a stochastic drainage algorithm within the map of field boundaries directed by a DTM and assimilating sampled observations on the network. A few hundreds simulations are used to represent the uncertainty of the ditch network spatial organization and of its density. Network simulations obtained in this way present some geometrical, topological and topographical differences which can be computed. This uncertainty of drainage networks also modifies sub-catchments boundaries and areas for each simulation. Finally, in addition to changes in channelized flow-pathes, uncertainties in drainage network mapping lead to changes in diffusive flow-pathes too, due to the modification of the fields topology. So, both overland flow and channel run-off will vary. Next, uncertainties on the water flow-pathes are propagated through the hydrological model MHYDAS. The induced hydrological responses are studied at different scales : a method is defined to compute field overland flow at different aggregation level while channelized flow is analysed from sources to the outlet. The observed hydrological uncertainty depends of scale and can be linked to networks metrics. In the end, this study (i) proposes a way to map hydrological uncertainty at different scales when the actual network is unknown, (ii) allows to evaluate the relative importance of the artificial drainage network representation in hydrological simulations and (iii) assesses on a catchment the impact of varying the drainage density and the network spatial organization.