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HD Hydrological modelling at catchment scale using rainfall radar observations

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Hydrological simulations at catchment scale repose on the quality and data availability both for soil and rainfall data. Soil data are quite easy to be collected, although their quality depends on the resources devoted to this task, rainfall data observations, instead, need further effort because of their spatiotemporal variability.
Rainfalls are normally recorded with rain gauges located in the catchment, they can provide detailed temporal data, but, the representativeness is limited to the point where the data are collected. Combining different gauges in space can provide a better representation of the rainfall event but the spatialization is often the main obstacle to obtain data close to the reality.
Since several years, radar observations overcome this gap providing continuous data registration, that, when properly calibrated, can offer an adequate, continuous, cover in space and time for medium-wide catchments.

Here, we use radar records for the south of the France on the La Peyne catchment with the protocol there adopted by the national meteo agency, with resolution of 1 km space and 5' time scale observations.
We present here the realisation of a model able to perform from rainfall radar observations, continuous hydrological and soil erosion simulations. The model is semi-theoretically based, once it simulates water fluxes (infiltration-excess overland flow, saturation overland flow, infiltration and channel routing) with a cinematic wave using the St. Venant equation on a simplified "bucket" conceptual model for ground water, and, an empirical representation of sediment load as adopted in models such as STREAM-LANDSOIL (Cerdan et al., 2002, Ciampalini et al., 2012).
The advantage of this approach is to furnish a dynamic representation – simulation of the rainfall-runoff events more easily than using spatialized rainfalls from meteo stations and to offer a new look on the spatial component of the events.