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APPLICATION OF THE DORA 2D MODEL TO SOME SICILIAN CATCHMENTS

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In flood models the shallow water equations are often solved neglecting the inertial terms in the momentum equation (Todini and Venutelli, 1988; Gottardi and Venutelli, 1993; Guymon et al., 1994, Cappalaere, 1997). This simplification has little practical effects and important advantages. These advantages are the lack of discontinuities in the computed water surface and the a-priori knowledge of the type of boundary condition to apply to the model. A further simplification of the momentum equation is obtained by neglecting the water depth gradient, to obtain the so-called kinematic model (Goodrich et al., 1991). The kinematic model can be easily solved in the case of steep slope or initially dry areas, where the diffusive model fails. On the other hand, the kinematic model is not able to compute backwater effects and provides physically inconsistent results when local minima are present in the topographic surface. A small initial water depth can be more easily treated if the local inertia term is maintained in the momentum equation (Defina et al., 1994), but this increases the error given by neglecting the remaining convective inertia term (Renjie, 1994). To overcome these limitations most of the practitioners couple different type of models to obtain the final computation of the inundated areas: a kinematic model to compute the flow rates that feed the dynamic model; a 1D parabolic (or even complete) model in the main course of the river and a 2D model of the floodplains including the area not yet inundated.

The drawback of this procedure is the need of manipulating the topographic data, with a high cost of human resources and a high degree of subjective decisions.

An innovative distributed 2D diffusive wave model, called DORA 2D, has been recently developed. The model couples a 2D diffusive formulation for flow field resolution to a conceptual rainfall-runoff approach. The model solves the diffusive shallow water equations splitting the momentum and continuity equations in one kinematic component, easily solved even in the case of steep slope or initially dry areas, and one parabolic component. The splitting procedure makes the model unconditionally stable and applicable to domains with complex geometry and steep, initially dry areas. The excess rainfall over the whole catchment is determined by considering an Hortonian mechanism for overland flow computation.

The proposed coupled model is applied to five Sicilian catchments: Oreto, Imera - Licata, Imera - Capodarso, Torto, Platani. For each application, the mesh generation, the input data acquisition and the post-processing of the output data are performed with the help of some commercial codes. All the different tools are monitored and controlled in a specific informatic environment.