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High resolution flood simulations on the middle-lower portion of the Po River, Italy

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The increasing availability of high-resolution topographic data and the ever growing computational potential of workstations enable us to simulate inundation events with a high level of hazard parameters details (i.e. water depth, inundation extent, flow velocity, etc.). The EU Flood Directive requires the Member States to update their flood hazard and risk maps every 5 years, and this requires high resolution simulations over large areas for successful flood management solutions. In this study, we demonstrate the ability of recently developed two-dimensional hydraulic models to address this problem. In particular, we simulate the flood which occurred in October, 2000 in the Po River (Northern Italy) and which produced significant damages in the area. The Po River has the largest river basin in the country and the floodplain (the Po Valley) around it is intensively used for agriculture and industrial activities, which makes it one of the most economically developed areas in Italy. Specifically, we focus on the middle-lower stretch of the river (c.a. 400 km), which is of particular interest for the responsible authorities. Due to its peculiar flood protection system, which consists of a complex network of minor and main embankments, flood management in this region is a great challenge. In order to represent the complexity of the floodplain we simulate the event along the study reach using a LISFLOOD-FP model in fully 2D and coupled 1D/2D modes. The model is run using high-resolution digital elevation data (from 30m to 100m) in order to reproduce the inundation patterns of the event. The main objective of this study is to investigate how high resolution data together with the 2D hydraulic model may contribute to the large-scale hazard assessment in comparison with the simplified 1D/2D model. Furthermore, the current work advances the previous studies performed for the flood simulations on the Po River which employed only quasi-2D schemes.