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A 2D flood inundation model based on an implicit parallelizable scheme

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The European Directive 2007/60 prescribes the definition of flood hazard maps and flood risk maps, along with the development of flood risk management plans. According to the directive, "assessments, maps and plans should be based on appropriate 'best practice' and 'best available technologies' not entailing excessive costs in the field of flood risk management". Therefore, to comply the directive, methods for modelling flood inundation should be reliable and capable of generating the required hydraulic information in an appropriate level of detail, but also practicable in terms of computational expense and input data requirement, since application over large territories is needed. Simplified 2D models may provide a good solution to this issues.

The present abstract describes an implicit 2D flood inundation model, based on 2D diffusive wave equations applied over an integrated finite difference scheme. The equations system is written using the Linear Theory method to reduce the number of iterations needed to solve. Moreover the model uses a Jacobi iterative type of solution which can be fully parallelised, allowing a dramatic increase in model computational speed.

The model was tested in a number of numerical cases, both 1D and 2D, and finally in a real flood event. Results were compared with theoretical and numerical solutions, and with results given by different hydraulic models. In all cases, the model provided very good results, offering a good compromise between computational speed and correct reproduction of the flood event.