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Discussions

Interactive comment on "Dynamic mapping of flood boundaries: current possibilities offered by Earth Observation System and Cellular Automata" *by* A. Gerardi et al.

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Dear Prof. De Rosa,

I would like to thank You for showing your interest in my article. I will try to answer to your question points in order to make it easier to understand.

Q1 - The Chapter 3 describe the CAESAR model but refers to the old version of code as now it implements the lisflood (Bates et al.,. 2010; Neal et al., 2011) for the hydraulic rules. Such update was performed as the old approach gave poor results when comparisons were carried out with real data.

A1 - Definitely CAESAR-LISFLOOD (Bates et al.,. 2010; Neal et al., 2011) introduces improvements from the computational point of view, and this leads to using a more powerful hardware structure suitable for the simulation, from which the possibility of being able to precisely parallelize calculation instructions.

Actually, the objective to be pursued with this research is mainly to realize a good (qualitatively closest to the real mapping of flooding boundaries) prediction of areas with an high flooding risk that could cause heavy inconvenience for daily activities. CAESAR was rightly choosen to:

1. Perform the simulation even if the morphological properties change due to human intervention.

2. Reproduce the effects of the most common climate changes (heavy rains, melting snow, flooding) over the affected area according to the dynamic changes of the hydrological characteristics of the soil.

3. Use a common low-resources workstation to get rapidly an overview of the possible scenario reliable due to catastrophic events. Despite the advanced computational performances, CAESAR-Lisflood doesn't add any new visual information regarding the mapping of flooding boundaries.

In order to to realize a dynamic mapping of the wavefront due to flooding and to ensure the achievement of the objectives of this research, an effort has been undertaken to integrate and visually compare two very different approaches in terms of methodological and conceptual basis:

- Remote Sensing Analysis through RADARSAT-2 Image Processing which allow to distinguish sharply from flooded areas and human settlements by showing variations in the backscatter values;

- Numerical Morphodynamics Modeling through CAESAR (Cellular Automation Evolutionary Slope And River model), belonging to the Reduced Complexity Models (RCM).

Q2 - page 838 row 15 "directed to the three cells": CAESAR allows to route the water flow also to more than 3 cells

A2- As clearly introduced (page 838, line 12), it can be noticed the reference to CAESAR used as "reach mode" for which the rules defined by Murray and Paola (1994) shall be valid if it is considered as an appropriate input data, an hydrological flow and sediments. The propagation of the hydrological flow take place according to the "flow-sweeping" rule for which an array of four scanning procedures is realized and the distribution of flow occurs between adjacent cells: bottom-up, up-down, right-left and left-right. For each scanning procedure, the values of flow relative to the active cell are distributed in the direction of scanning those immediately adjacent. In this case, therefore, the hydraulic flow is propagated to the 3 cells immediately below, otherwise it should be involved an adapted version of the Mannings's equations.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 833, 2014.