

## ***Interactive comment on “Variational assimilation of remotely sensed flood extents using a two-dimensional flood model” by X. Lai et al.***

### **Anonymous Referee #1**

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It is an interesting topic for the use of rich remote sensing data in hydrology. Within the 4D-Var algorithm framework, this manuscript proposes a new method for assimilating remote flood extent data extracted from satellite images into a 2D flood model. In this paper, a new cost function was first constructed in the 4D-Var algorithm. Then, the method was verified by two test cases under possible scenarios and applied in a real flood event using MODIS data. In general, the structure and the goal of the paper is well presented.

This study implemented the direct use of remotely-sensed flood extent in flood modeling. Although number of studies have investigated the assimilation of water level and/or discharge into hydraulic models using the 4D-Var algorithm, I found that this study provides its particular (original) solution for direct assimilation of flood extent data that was

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not resolved before. It makes remotely-sensed flood extent data become an important data sources that provide spatial information of flood routing with large coverage. This has its special meaning for the use of satellite data in flood modeling, particularly in study sites with limited observations.

I also notice that the old version was submitted to HESSD previously. After read the archived interactive discussion and this revised version, I agree with most responses from authors. Now, I think this manuscript has been improved significantly and can be accepted after minor revision.

Some Points: - In the introduction, there are 2 paragraphs for water stage retrieval from remote sensing data. I suggest simplify the text for indirect water level retrieval but state that the combination use of satellite data is still of great interest in near future.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 6923, 2014.

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