

Interactive comment on “Challenges in modeling ice floods on the Ningxia-Inner Mongolia reach of the Yellow River, China” by C. Fu et al.

Anonymous Referee #2

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The paper presents results of river ice regime research of Yellow River Ning-Meng reach. The authors chose for this study method of one dimensional modeling, this choice looks adequate to data availability. The paper has logical structure, contains good review of ice floods modeling, case study description. Authors described in details model set-up and model sensitivity and uncertainty analysis. Calibration of model YRIDM was carried out for winter season 2008/2009 and showed reasonable water level, discharge, water temperature, and ice cover thickness simulated results.

General Comments

There are some changes and remarks I suggest to take into account by the authors:

1. Authors studied ice processes during cold season from November till April, and
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obtained and analysed results of water level, discharge, water temperature, and ice cover thickness modeling from freezing to break up of Ning-Meng reach. It seems, that name of the paper is better to change partly: change "modeling ice flood" on something like "modeling ice processes" or "modeling river flow and ice regime". Though ice floods took place in the studied area, and this research is important for further ice floods study, but the most part of this article devoted to ice processes and river flow modelling throughout all period with ice on the river, ice flooding is not described in details.

2. Paper doesn't contain results of model verification, "the model verification cannot be conducted because the model cannot work when the water level exceeds the height of embankments". After detailed sensitivity and uncertainty analysis, which is showed, that some parameters are sensitive to water levels and ice cover thickness, it is very important to check the model behaviour on the data, which were not used for calibration. Is it possible to simulate part of the season 2007/2008 (till dike breach, which probably take place in spring time) or choose other season without such high flood for model verification?

3. Model doesn't show good correspondence between observed and simulated ice thickness in the beginning and especially in the end of ice cover period (fig. 6 and 10). Because ice cover thickness in the spring is important characteristic for planning preventive measures against ice floods, some explanation of such results of modelling is necessary. It would be useful to add on one of the graph (with water temperature or with ice thickness) data about air temperature.

4. It is not clear, calibrated bed roughness for different cross sections (N1, N2...N4, table 3) is varied in big range, are these values reflected different type of channel bed, or it is only calibration effect? For such case it is also very important to verify the model.

5. It would be nice to add in the part about past floods (p. 12302) information about observed range, maximum and mean characteristics of water levels, discharges for

Ning-Meng reach.

Technical Corrections

1. p.12310, line 12-13 -"ice cover thickness is 0,5786 m". I think, it is better to round off this value -"ice cover thickness is 0,58 m", and say, that simulated and observed ice cover thickness have the same values, because it is not possible to measure this characteristic in the field or calculate such precisely.
2. The same for axis X marks on the fig. 11, fig. 12 - it is better to round of the values of ice cover thickness.
3. p.12310, line 9-10. "number of cases designed for the uncertainty analysis is 400, which is not sufficient". Which quantity would be sufficient?
4. Table 1-3. Necessary to check, bed roughness in tables 1, 2 has range 0,019-0,045 and in table 3 has values out of this range - 0,004 - 0,017

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