

Interactive comment on “AGRIDE-c, a conceptual model for the estimation of flood damage to crops: development and implementation” by Daniela Molinari et al.

Anonymous Referee #2

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The authors present a conceptual model for the assessment of flood damage to crops, offering a novel systematic and consistent approach that can be universally applied. They demonstrate the use of the model through a case application in the Po Valley, northern Italy, focusing on flood damage to the maize crop. The paper is generally well written and argued. There is scope to improve the structure of the paper by separating the introduction of context and rationale, including statement of research objectives, and statement of methods to cover literature search, review of knowledge and construction of the analytical framework. There should be a critique of the approach. The case study then becomes results (reordering some results that currently occur in discussion). Discussion can then follow on both the case and the validity or otherwise of

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generic framework. Some items currently in the conclusion, particularly on gaps/further development, can go in discussion (they appear to be recommendations). Conclusion on what has gone before can focus whether the objectives (regarding the tool, its application and its prospects) have been met, rather than introducing new elements into discussion. The work has merit in its approach and application. However, it probably would be best to be more cautious and modest about the claims made about the comprehensiveness and novelty of the approach, and its suitability to all circumstances and contexts. The grassland /livestock and flooding complex is not referred to, nor is land drainage (see below). Further clarity on its potential application, either in cost benefit analysis of (publically funded) investments at the landscape scale in flood risk management, or in guiding individual farm-scale responses would be appropriate. The two applications are different in purpose and detail of approach. There is a difference between, for example, economic and financial appraisals. There is also a difference between ex ante appraisal and ex post evaluation, which is implied. This will support the important point made that insufficient ex post evaluation is undertaken to provide sound ex ante decisions. One particular issue requires attention, namely the importance, especially in temperate climates, of agricultural land drainage. The control of water levels in the soil, and particularly the removal of excess water and below surface 'flooding' , including during the post flood phase before field return to 'normal' is an important aspect of agricultural flood risk management and assessment . Impacts and land management responses are often driven by seasonal waterlogging and drainage problems as much as they are by surface flooding. This is certainly the case in northern Europe and North America. There should be coverage of this aspect, and the implications of not explicitly allowing for it in this model framework. Many areas of strategic importance are pump drained. Water quality, notably associated with saline flooding, a major issue in coastal and tidal areas, should be referred to with implications for costs, especially regarding remediation and subsequent year impacts. Surprising the authors do not mention climate change as a driver of concern or a factor affecting damage costs and responses. This seems an omission given the topic. Further clarity is re-

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quired regarding the definition of measurements of damage. A more detailed listing, upfront, of the revenue and cost related parameters would help: these emerge in the case application later on. A table would be good to summarise the main elements of cost estimation processes /assumptions/ algorithms and where they come from. In the main, the methods draws on published data from Sub-sector models of crop damage or additional costs, such as Agenias et al. What other ones are used to transfers changes in yield, revenue and cost responses? Further clarity would help regarding the use of the terms 'turnover' and 'gross profit', ie exactly what is in these terms? They are not universally applied in farm business accounting, where the terms gross output (or gross revenue), gross margin and net margin are often used. (Turnover can for example include sales from previous production periods – just to be clear). And the definition of gross profit may or may not include elements of farm level fixed costs, such as machinery and buildings costs (again to be clear, so that the methods can be generally applied). The use of 'relative' Gross profit measured at negative % values is difficult to interpret and doesn't mean a lot. On flood scenarios, the treatment presumably here is for one-off relatively infrequent flooding on a land use that is not hitherto constrained by flood exposure. An increase in flood frequency, associated with climate change for example, or withdrawal of flood defences, could lead to increased flooding with a range of outcomes, permanent abandonment, repeat annual losses or a switch to more flood tolerant land use. How are these to be handled by the model? The paper refers to spreadsheets and supplementary data containing both data and estimation methods. I had difficulty locating the spreadsheets and understanding them when I did. This is probably my fault. It would however be good to explain what is in them and how they can be reliably accessed. There is a need to strengthen the treatment of inherent variation and uncertainty in the estimates. Most are given as single values. There is some passing reference to variation in yields in the case. How is variation modelled and reported? Linked to the last point, there is a need to provide a more systematic critique of the model and the resultant damage estimates, and implications for use and improvements . At the moment this is mainly confined to the last paragraph on page

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19. The authors report that their work draws on systematic review of multiple sources, including expert judgement. This aspect, especially the latter, is under reported. Did the research approach follow a particular methodology that can be supported by literature, especially engaging experts? I think the paper can make a useful contribution and the authors should be encouraged to further develop the paper in the light of review and discussion, especially regarding the following .:

Some reordering of contents
Greater clarity on context and purpose of the model,
Some extensions to the literature reviewed
Explicit reference to agricultural land drainage as its association with flood risk management (where drainage addresses below surface flooding),
Critical review of the approach and its advantages and limitations as the basis for improving decision support in this important area (and hence holding back on some of the claims made)

Detailed comments are provided in the attached supplement

Please also note the supplement to this comment:

<https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2019-61/nhess-2019-61-RC2-supplement.pdf>

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2019-61>, 2019.

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