Dear authors,

I have read your manuscript on modeling smallholder farmers' drought adaptation under climate change and human (non-)interventions with great interest. As far as I understand, this manuscript used not only empirical data but also experimental data to build this ADOPT. The authors made great efforts to describe the model and scenarios in detail. However, when considering my own experience and interests, I still want to discuss the potential limitations or questions with you. I will formulate my concerns with a focus on limitations/comments on "Model and scenario description". At the end of my review, I also point to simple text mistakes.

Limitations/comments on "Model and scenario description"

1. Water Management

You mentioned Water Management practices in 3.1, however, I did not see any detailed explanations except for the irrigation method and the source of irrigation water. I would like to suggest to clarify the irrigation water (non-)sharing method – households have common water resources or each household has a separate well, as well as the stored water volumes in the well. If a couple of households share one common well, how do they distribute the water? These two factors are related to the interactions among farmers and the drought adaptation measures. If the model did not consider these two factors, I would like to suggest you add them to the model, then the model might be closer to reality and help you to make more accurate simulations. If the model already took these two factors into account, I would like to suggest you give a more detailed description, thus, the readers can easily know the water situation of the farmers and can better understand the water management practices.

2. Farmers' adaptation intention

In section 3.1, there is an explanation of four PMT factors. As far as I understand, the PMT you used in the model is to test the farmers' adaptive behaviors according to the weight between 0 and 1. However, the manuscript did not provide any equations/framework to explain the factors in detail. In my opinion, for readers, the manuscript should include: 1) the selection criteria of these four TMP factors; 2) the way of translating the factors into a value between 0 and 1 and how the value defines a farmer's intention to adopt; and 3) is there any meaning of a specific value, for instance, if the weight is 0.7, what does it refer to?

3. ODD+D protocol related concerns

Personally, I really appreciate the way how you formulate the ODD+D protocol. As far as I know, however, there are some details missing in the ODD+D protocol. Firstly, I would like to recommend the following articles:

Grimm, V., Berger, U., Bastiansen, F., Eliassen, S., Ginot, V., Giske, J., Goss-Custard, J., Grand, T., Heinz,
  S.K., Huse, G., Huth, A., Jepsen, J.U., Jørgensen, C., Mooij, W.M., Müller, B., Pe'er, G., Piou, C.,

Railsback, S.F., Robbins, A.M., Robbins, M.M., Rossmanith, E., Rüger, N., Strand, E., Souissi, S., Stillman, R.A., Vabø, R., Visser, U., DeAngelis, D.L., 2006. A standard protocol for describing individual-based and agent-based models. Ecol. Modell. 198, 115–126. https://doi.org/10.1016/j.ecolmodel.2006.04.023

Grimm, V., Berger, U., DeAngelis, D.L., Polhill, J.G., Giske, J., Railsback, S.F., 2010. The ODD protocol: A review and first update. Ecol. Modell. 221, 2760–2768. https://doi.org/10.1016/j.ecolmodel.2010.08.019

Grimm, V., Railsback, S.F., Vincenot, C.E., Berger, U., Gallagher, C., Deangelis, D.L., Edmonds, B., Ge, J., Giske, J., Groeneveld, J., Johnston, A.S.A., Milles, A., Nabe-Nielsen, J., Polhill, J.G., Radchuk, V., Rohwäder, M.S., Stillman, R.A., Thiele, J.C., Ayllón, D., 2020. The ODD protocol for describing agent-based and other simulation models: A second update to improve clarity, replication, and structural realism. Jasss 23. https://doi.org/10.18564/jasss.4259

Grimm et al. made great efforts to structure a full ODD protocol in the above articles. Their contribution may be helpful to frame a better ODD+D protocol.

(1) Entities, state variables, and scales

After I read the description, it is still unclear to me how the state variables of the entities are updated by steps, when, and how they update.

(2) Process overview and scheduling

As far as I see, there are only the names of processes mentioned in this section, but it is lacking a workflow chart. The detail of each process and how the processes connect should be included in this chart.

(3) Submodels

If there are submodels, more details of a model should be explained. The Submodels section should connect to the Process Overview and Scheduling section: the name of the submodels, their principles, used algorithms, equations, and etc. should have a clear description.

I really appreciate seeing the crop parameters used in AquaCropOS. I thought if the authors could provide a complete table that contains the lower bound and upper bound of parameters (or an overview of all parameters) used in NetLogo instead of only listing the initial parameters for farmer households would be better.

In order to correct simple text mistakes, lastly, I would like to suggest the authors to check the spelling and punctuation carefully before final submission. I will list some mistakes I have seen (partly):

27 'limate' to 'climate'

40 'it' to 'they'

44 'in limited' to 'is limited'

48 'explicitly' to 'explicit'

54 'decision making' to 'decision-making'

55 'theory' to 'Theory'

59 'measures' to 'measure'

60 delete colon after 'such as'

75 'countries' to 'country's'

86 'is' to 'are'; 'has' to 'have'

88 'stragegies' to 'strategies'

122 'send' to 'sent'

130 'Annual' to 'annual'

131 'producer' to 'producers'; 'consumer' to 'consumers'

134 the first 'there' to 'it'

153 'scenarios .' to 'scenarios.'; 'occurring ,' to 'occurring,'

160 '1 ,' to '1.'

175 '(Muyanga & Jayne, 2006).' to '(Muyanga & Jayne, 2006),'

182 'member' to 'members'

196 'year' to 'years'