

## ***Interactive comment on “Regional-scale brine migration along vertical pathways due to CO<sub>2</sub> injection – Part 1: the participatory modeling approach” by Dirk Scheer et al.***

### **Anonymous Referee #1**

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The manuscript addresses an important topic, i.e. the involvement of a wider community in modeling efforts. A novel approach is reported in the manuscript, i.e. inclusion of selected expert into the modelling process via interviews and a workshop. It is thus a novel approach and describes an experiment involving people. I do think this topic is relevant for this journal, and may help in the longer run to come to improved model scenarios and set-ups. The paper is clearly written, well structured and understandable. However, I do have suggestions and a number of issues with this paper, concerning the methods used as well as describing the experiment and the outcome more clearly, which I outline below. In the current version, no clear conclusions are formulated, just stated that this is a success. If it is a success, the authors should more clearly de-

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scribe it. Just performing the interviews and the workshop is – to me – not enough, and clearer conclusions should be drawn. Also, the results should be better described, so that this work can become helpful for others. As stated above, the approach is novel and very interesting, so I would like to see this work reported.

The authors describe a so-called participatory approach to model setup in the context of brine migration driven potentially by carbon dioxide injection into a saline aquifer. The authors used two methods, i.e. eye-to-eye interviews and a workshop with discussion groups in varying composition to discuss and obtain opinions of the participants on certain model features and their importance.

This approach could contribute to a better model derivation, as the important features and effects to include in the model are discussed before and during the first modelling stages. I agree with the basic assumption that a wider participation would benefit here and may lead to answers that are more general from the modelling process. I thus think that this is a valuable research, which may in future help us solve geoscience-related questions in a more comprehensive way. However, I have suggestions to improve the manuscript quality. Firstly, this first part is basically a social-science approach, however published in a natural science journal. The manuscript would clearly benefit

- from a clearer description of the methods used. I am not familiar with these concepts
- a more open and wide literature review of approaches similar and used maybe in different fields. Discussions with stakeholders of certain topics are nothing new, they happen frequently i.e. between regulators, consultants and site owners. Also interesting here could be approaches used for finding disposal sites for hazardous wastes. It is difficult for me now to believe that this is the wider status of research on this field. Just think of the discussion groups in Germany initiated by the fracking discussion, I think there is something to learn here.
- a discussion of other possible methods not used. Why were they not used? Why did the authors use the interviews and the workshop, and why the “world café” format?

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This would be a lot more informative, and help better understand the approach.

- Describe and discuss much clearer the choice of invited expert. At the end of the paper, there are a few sentences on this, but this of course is crucial. Inviting only natural scientists from regulators or science does not give the full spectrum of possible questions to be answered by the model. A wider participation could have shifted the model focus.

- a clear description of the questionnaire used and the questions asked. Why were they asked? What was the intention, and did that work out? Could the interviewees answer the questions asked by social scientists? Did they think them relevant? Generally, this questionnaire is probably very important, as it sets the whole scope. So why and how was this devised?

- How and why were the set of questions for the workshop devised? Why not other questions or other combinations of those?

I find the conclusions and results rather vague, very descriptive and repetitive. The manuscript does not allow a reproduction of the methods used, as they are not described. This requires more description of the results in the manuscript, and I suggest adding i.e. the questionnaire etc. in an appendix. In the current for, at least I could not transfer the approach used here to a similar topic, because not enough information and background is given. Especially concerning the background, a more general introduction into existing methods from social sciences would be helpful, as most Readers will be like me not familiar with the Terms used.

Also in the discussion section, a clear statement of the achievements would be helpful. Maybe this is also due to me being a natural scientist, but what are really the findings others could use? What are the individual lessons ? It just states that this was successful, but the success does not become very clear to me.

The abstract should be more concise and reflect the findings of the work.

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