

## ***Interactive comment on “A “Mental Models” approach to the communication of subsurface hydrology and hazards” by H. Gibson et al.***

### **Anonymous Referee #2**

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Summary: The goal of this manuscript is to explore the power of “mental models” in revealing perceptions surrounding an issue, in this case study geological and hydrological hazards. The study has good motivations given the increasing cost of natural hazards or environmental change. The authors present a mental model of expert and non-expert perceptions of the subsurface the three communities in southwest England. Semi-structured interviews conducted with experts and non-experts in these communities revealed for the authors that non-experts exhibit a strong anthropocentric view in their perception of the environment and associated perceptions. The results and discussion section of the study is clear and very informative, however, I find the introduction and background section repetitive and not well structured. In the first part of the introduction the authors argue that communication of hazards is influenced by the heuristics and bias of how people perceive and interpret information and that without

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any social or psychological scientific inquiry it is impossible to predict how people will respond. I am somewhat surprised by this statement because people of the age of 60 or younger should have received basic education in earth sciences in middle or high school, thus, there is often some base level of knowledge that scientists can relate to.

The authors state that people often apply their own pre-existing ideas or concepts to scientific data. I would argue that many people use analogies to translate scientific information to their own life-situations. Yet the concept of analogy does not seem to be a part of the mental model nor is it mentioned in the study (e.g. lines 68-75).

I disagree that lay knowledge is generally dismissed as inappropriate by experts and would like to see an explanation for this statement. In applied sciences and outreach my experience is that lay knowledge is quite often used to produce connections and analogies between established or believed science knowledge that is often deep-rooted in the public and new/shifted conceptions of science that experts try to convey. Often it is the only avenue that scientists have and can relate to in people to cause a change of mind. I would argue that deductive reasoning does not always play a role in the decision making, in particular if decisions have to be made about high risk topics such as natural hazards (e.g. Evans 2003, Trends in cognitive science; Darlow & Sloman 2010 WIREs Cogn Sc). Intuition and deliberation that are directly tied to the perception of objects and events (e.g., fear) can be powerful mechanisms as well (e.g. lines 143-149).

Please provide more information on how qualitative semi-structured interviews and the quantitative questionnaires are designed. How and by whom are questions for these interviews designed. How do you ensure that the language of the participant is adequately captured.

Why did the authors decide that a 3D participatory model is a good way to explore the interviewee's perception of the subsurface. A white 3D box to me is a black box that does not provide much insight. Wouldn't an ordinary whiteboard have been suf-

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efficient? What about some transparent 3D-computer models? Minor comments: Line 37: Change “need to educated” to “need to be educated”. Figure 2: Increase font size. Figure 5: The grey filled area is hard to see. Why not use a classic pie chart?

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