

Interactive comment on “Voxel inversion of airborne electromagnetic data for improved groundwater model construction and prediction accuracy” by N. K. Christensen et al.

Anonymous Referee #2

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This paper presents an interesting work on constructing workflow for calibration of conductivity of large scale groundwater models. Besides the traditional data used for structural mapping such as lithological logs, hydrological data and so on, the model also include AEM data to provide additional information for the model parameter estimation to improve the accuracy. The whole calibration process includes two parts: Obtaining the resistivity field according to the AEM data; Estimating the empirical shape factor with assumption of power law relationship between electrical resistivity and hydraulic conductivity. Simulation results are both reasonable and meaningful. However, there are some questions and comments about this paper:

1. This paper uses geophysical “voxel inversion” to do resistivity field estimation, and

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linked the resistivity field with hydraulic conductivity field through power law. Those methods are already proposed and utilized in the past. Please highlight the new theoretical development and findings.

2. In the numerical part, all the simulations are done with pre-defined true/reference model without the realistic field data. It will be better to prove the idea with realistic field data than the synthetic model.

3. In the section 3.3, how do you get those values of constraint factors?

4. In the section 3.4, the choices of weights for head and discharge data are significantly different. Why it has such a big difference? In the reality, how could you get the weight based on “trial and error” method?

5. In the simulation part, the only case used Smooth regularization is Smooth-3. What is the simulation results looks like for other noise level?

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