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Hydrology and Earth System Sciences Discussions

Interactive comment on "Uncertainty in geological and hydrogeological data" *by* B. Nilsson et al.

Anonymous Referee #1

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The paper "Uncertainty in geological and hydrological data" by Nilsson, Højberg, Refsgaard, and Troldborg is interesting and presents important discussion on relative uncertainty from model structure, model parameters, and field data. I especially appreciated the discussion on model structure uncertainty and techniques being used to quantify and respond to this uncertainty on pages 11-12. The literature review; however, is quite long and prevents the authors from emphasizing the major contribution of the paper as stated in the abstract and conclusions.

Most of the paper, sections 1 through 4, is a literature review of various aspects of uncertainty for hydrogeologic problems. Section 5 presents a classification scheme for hydrogeologic parameters. The classification is interesting, but a more complete description of the classification scheme and how it may be used in a water management plan would greatly strengthen the paper.

Specific Comments:

1. The authors cite the paper by Loon et al. (2006) for a description of the HarmoniRiB framework. In its current form, the paper by Nilsson et al. does not give enough detail on this framework to be a stand-alone paper. Some discussion of the framework and terminology beyond Table 5 should be given to help the reader understand the aim of the framework. The application of the HarmoniRiB framework is stated to be a major contribution of this paper in the abstract and conclusions, and this framework needs to be described better.

2. The authors should describe how Table 7 could be used in the development of a water management plan as suggested in the conclusion.

3. In Table 7, instruments are classified as irrelevant for Model Calibration Tests of hydrogeologic parameters. Model calibration, however, will depend on observations and the errors associated with the observations. I wonder too if the techniques used for model calibration are the instruments for these tests. Advanced techniques to assess parameter and estimation uncertainty, the effects of non-linearity, and correlation between parameters seem to provide more information regarding the estimate of hydrogeologic parameters than trial-and-error calibration or inverse calibration without advanced analysis.

4. If the application of the HarmoniRiB framework is the major contribution of the paper, some of the literature review in the first four sections could be condensed or removed. For example, the discussion on pages 8-11 could be replaced by a much shorter section than provided the important citations but did not discuss the results of each of the studies. These results do not seem to be directly relevant to the HarmoniRiB classification presented in section 5. Section 3 and 4 also could be combined and condensed.

Technical corrections:

1. Page 2, line 3, should read “it is”, not “is it”

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2. Page 3, please define or provide a reference for the Water Framework Directive (WFD).

3. Page 3, last paragraph, replace first sentence with “Structural uncertainty has long been recognized to be a dominating factor (CarreraĚ

4. Page 4, second paragraph, “In the international literature, significant attention has been given to estimation of parameter uncertainty for parameter values that may vary over many decades, and, for that reason, may not be measured directly but are derived from model calibration.

5. Page 4, third paragraph, “Secondly, based on published information, to giveĚ”

6. Pages 5 through 17, I suggest condensing as much as possible to emphasize the HarmoniRiB framework application as stated in the abstract and conclusion.

7. Page 20, last paragraph, “In this paper, examples from the most current scientific literature that deal with uncertainty on model structure and uncertainty in parameter variables are given.

8. Page 21, new paragraph beginning with “Uncertainty in the hydrogological dataĚ”

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 2675, 2006.