Hydrology and Earth System Sciences Discussions

Interactive
Comment

Interactive comment on "A parameter identifiability study of two chalk tracer tests" *by* S. A. Mathias et al.

J. Vrugt

vrugt@lanl.gov

Received and published: 28 September 2006

The authors present an identifiability analysis of parameters in a subsurface tracer test model using observed breakthrough data from two convergent tracer tests in the Chalk aquifer. Results demonstrate that not all model parameters are identifiable given the experimental data at hand.

Evaluation: For several reasons, I find the paper unacceptable:

(1) The identifiability analysis is extremely simple and inadequate. The authors should consider stochastic optimization using appropriate likelihood functions to draw statistically correct conclusions; the current method is very weak, and lacks any statistical

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

EGU

basis.

(2) The authors state that (Page 2440, Line 1 - 2) "Generally modelers have not addressed this question because they have not used a formal methodology to investigate parameter identifiability". This statement is incorrect, and misleading. First of all, the authors methodology used in the paper to assess identifiability of model parameters lacks any formal statistical basis. Secondly, this statement effectively neglects a large majority of literature on the analyses of parameter identifiability and information content of data. Part of this literature goes all the way back to the Maximum likelihood approach presented in Carrera and Neuman, Water Resources Research, 22 (2), 1986. In addition, in recent years various papers have been published that discuss alternative ways to assess the identifiability of model parameters and information content of observational data (see Vrugt et al. 2001; Soil Science Society of America Journal; 2002 - Water Resources Research)

(3) The authors also neglect recent work by Vrugt et al (2005; Geophysical Research Letters) that provides a Bayesian framework for automatic parameter estimation and uncertainty estimation in subsurface flow and transport modeling (using also a tracer test for illustration), taking into account input, parameter, output and model structural error. This framework is far more advanced than the methods used here, and should at least be appropriate acknowledged.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

EGU