**Hydrology and
Earth System
Sciences
Discussions**

Interactive comment on "Characterization of deep aquifer dynamics using principle component analysis of sequential multilevel data" *by* D. Kurtzman et al.

Anonymous Referee #2

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In this paper, two sequential multilevel profiles for a contaminated aquifer were analyzed using principle component analysis of data on major ions and trace elements. Additionally, electric conductivity in a packed off section of the observation well and hydraulic heads for two sub aquifers divided by clay lenses were measured during the multilevel sampling campaign. The authors infer from their data analysis that distinct water bodies of 10-100m vertical and horizontal dimensions laterally flow under this contaminated site.

General comment:

This well written paper uses innovative methods to analyze an interesting and practically relevant data set. However, implications of their findings for monitoring and remediation remain unclear. What do exactly mean their findings for monitoring and remediation?

Specific comments:

1. P9486, L17: MLS1 had 17 cases but 23 variables were used for PCA. Number of variables cannot be greater than number of cases.

2. P9486, L25: Why was no rotation used for PCA? Better interpretation may be achieved through rotation of components.

3. P9486, L25: Did variables depart significantly from normal distribution. If yes, Box-Cox transformation may be used. Non-normality can significantly influence correlation matrix and thus results of PCA.

4. P9490, L9: How did 3 water bodies vary in terms of VOCs?

5. Black vertical lines (observation well) are inconsistent for Figures 7 (a) and (b).

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 9481, 2011.