

***Interactive comment on* “Numerical understanding of regional scale water table behavior in the Guadalupe Valley aquifer, Baja California, Mexico” by J. R. Campos-Gaytan and T. Kretzschmar**

Anonymous Referee #1

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The authors present the results of a ground-water flow model of the Guadalupe Valley aquifer located in Baja California, Mexico. The model is based on a two-dimensional, areal ground-water flow model developed by the first author. Results for a steady-state simulation are presented where measured 1983 water levels were assumed to represent steady-state conditions. The authors calibrated the model by varying hydraulic conductivity and natural recharge. The model results indicated that natural recharge may be far less than other reseachers have reported.

It is noted that english is not the authors’ first language; however, an english-language technical editor must review the manuscript before publication. On a technical level,

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the 1st author states that a basic assumption of the model is that the coordinate axes are aligned with the principal directions of the hydraulic conductivity tensor. It seems that the orientation of the model grid should be rotated such that the principal direction of flow is aligned with the grid. Currently, the direction of ground-water flow is diagonal across the grid requiring the cross derivatives of head (and off-diagonal hydraulic conductivities) be addressed in the governing equation. The fact that natural recharge may be far less than previously reported is an important result and should be highlighted and discussed in greater detail.

Other comments follow in no particular order of importance:

- p. 708: The abstract must be re-written
- p. 708: Why is the Guadalupe Valley so important?
- p. 708: What about the other 350 out of 800 wells?
- p. 709: Use a hydrograph(s) to show cyclic variations and declines in water levels.
- p. 709: No components of the conceptual hydrogeologic model were tested.
- p. 709: The Guadalupe River drains the valley.
- p. 710: Show Ojos Negros, Guadalupe, and Los Mision Valleys on a figure.
- p. 710: Show outline of aquifer without model grid on a figure.
- p. 710: Too early to talk about model grid.
- p. 710: Delete K's and refs regarding igneous bedrock.
- p. 711: Need figure showing SS water levels
- p. 711: Faults and fractures are not mapped.
- p. 712: Talk about impermeable bottom after line 10. What about other BC's?
- p. 712: Change "+W" to "+/- W" in eqn 1.

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p. 713: Need hydrographs to show 1983 is SS.

p. 713: What about drains?

p. 714: Move lines 13-15 to after line 19.

p. 714: Discuss initial values of K and not only final values.

p. 715: Did Freyberg do a model of Guadalupe Valley? If so, the reference is OK. If not, remove reference.

p. 715: Move lines 13-19 to p. 714 after line 19.

p. 715: No discussion of discharge.

p. 715: Give natural recharge numbers reported by Andrade and Beltran. Compare their numbers with total average annual pumpage and present hydrographs. If their numbers are greater than total pumpage then hydrographs should be increasing with time. If hydrographs are declining, this is further verification that their numbers are too high.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 707, 2006.

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