**Hydrology and
Earth System
Sciences
Discussions**

Interactive
Comment

Interactive comment on "Groundwater fluctuations in heterogeneous coastal leaky aquifer systems" *by* M.-H. Chuang et al.

Anonymous Referee #1

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This manuscript presents an analytical solution to describe tide induced head fluctuations in a heterogeneous costal aquifer system. The proposed analytical solution is used to analyze real and hypothetical cases. Unfortunately the objectives of these tests are not clearly defined and are difficult to understand. The whole manuscript needs language revision.

Specific comments:

1) The expression (8) seems not to be correct. If (6) is replaced in (1) a different expression for λ is obtained.

2) It would we useful to include in Section 2.2 the system of equations to obtain coeffi-

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cients c1n and c2n in matrix form (Ax=b).

3) In Section 2.3 include a comparison of the proposed analytical solution and the solution derived by Guo et al (2010). This solution is a special case that can be obtained for N=2 and L1=L2=0.

4) Section 3.1: note that the solution of Jiao and Tang (1999) can be approached using values of d1 smaller than 850m. It is suggested to include in figures 2 and 3 the solution for d1=300m.

5) The objective of the test case presented in Section 3.2 is not clear. The proposed model has 3 regions (not 2). Please specify the parameters of region 3 and include in the text the definition of the tidal intrusion distance.

6) The description of Figure 7 is difficult to understand. Please define hide-tide and middle-tide conditions.

7) Section 3.4: the solution obtained with the proposed analytical solution is similar to the one obtained by Jiao and Tang (1999) because the value of d1 is large. If more regions are defined near the coast (e.g. d1=50m, d2=100m, d3=150m. . .) you may probably obtain a better fit to the observed data.

8) Parameter values used in Section 3.4 should be justified.

9) Section 3.5 should be eliminated because the effect of heterogeneity in the aquitard is analyzed in section 3.3.

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