

Response to 'Review', Anonymous Referee #2, 2 Feb 2010

We appreciate your comments and will revise the manuscript according to your suggestions. The comments are replied in detail by blue lines in the following paragraphs.

1. In the part “2.3 Leakage of Heihe River”, the introduced method may be based on a suppose, which is that the model period is divided into many small periods by using one dimensional model, and in each small period, the flow in the open channel is under steady state. The authors should clarify it.

Accepted! We significantly appreciate this comment because it exactly captures the key of our method. The stream flow,  $Q$ , and the leakage,  $F$ , in the equations (1)-(12) is referred to the same period which is accounted for. So,  $dQ/dL$  is the change of streamflow with distance at the same period under an assumption that the flow is steady-state in the period. If time-dependent behavior is considered,  $\partial Q/\partial L$  should be applied instead of  $dQ/dL$  where  $Q(L, t)$  means a transient one-dimensional flow. In particular, if the river water is influenced by a flood event, our method is not valid because  $dQ/dL$  does not only depend on leakage but also depend on dynamical moving of the flood. In this situation, the solution of S-V equation is needed. However, if the change of streamflow with time is relatively slow in a period, the assumption of steady-state flow is efficient, especially when the period is much greater than the decay-time of flood events between two studied sections.

2. In the part “3.1 Equations of flow in the vadose zone”, the source and sink should be added in the mathematical equation.

Accepted! We will revise the manuscript accordingly.

3. In the part “4.1 Description of the triple-reservoir model”, the ms established a triple-reservoir model. For a reservoir model, the regulation for water use is an important section in the conjunctive use of surface water and groundwater. The authors should discuss it.

Accepted! We will revise the manuscript accordingly.

4. In the part “4.2 Estimation of the parameters”, I cannot find the change of the river stage. Are there some observations of river stage for the Heihe River? The values are critical for the model results.

It is a good suggestion to account for variation of river stage along the distance and its change with time. However, recently only streamflow data is available for Heihe River. In fact, the streamflow at Yingluo gorge is obtained from a hydrometric station where river stage is also observed and related to the streamflow with the h-Q curve.

But, this information is a repeat of the streamflow and is not enough to investigate the leakage patterns. We need the stage information at different locations along the river. We will try to undertake some observations of river stage to study this problem in the next program.