

**Point by point reply to the comments of Referee #1**

## **Flow dynamics in hyper-saline aquifers: hydro-geophysical monitoring and modelling**

submitted to *Hydrology and Earth System Sciences*

by

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For the sake of clarity, the original comments are shown in *italic*, while our replies are **bold Arial**.

### **Anonymous Referee #1**

*This paper deals with the application of cross-hole ERT to monitor a freshwater injection experiment in a highly saline aquifer. A numerical model of plume migration and its comparison with the ERT results are also presented. The paper is well written and clear, although some figures could be enlarged and improved (see below) to help the reader.*

**We thank Referee #1 for his/her comments. We found the comments constructive and accepted nearly all of them. They helped to improve the manuscript.**

#### Minor comments

*Improve quality of figure 3*

**We improved the figure quality for the revised version of the manuscript. In particular we used different symbols for different curves.**

*Line 235 Cumulated sensitivitiy, how to choose the limit*

**An objective choice for a threshold, that identifies zones where “reliable” vs “unreliable” ERT imaging, is not feasible. In a more qualitative manner one can assume, empirically, that a cumulated sensitivity clearly below  $1e-3$  leads to weak imaging. We added a statement in this respect to the revised manuscript.**

*Figure 5 Especificy that is shown only after 5 m depth and why*

**We extended the figure to show also the unsaturated zone. Initially that part was not shown as the focus of the paper is entirely on the saturated zone.**

*Figure 6 show also the image for the plane 1-5-3 to see if there are 3D structures or anysotropy in the area*

**We added the image relevant to the other plane. As shown, the system is apparently fairly homogeneous in the lateral directions.**

*Figure 7 Show the position of injection chamber. Make the figure bigger It is clear from the figure that there should be some 3D effects or anisotropy.*

**The figure has been changed according to the referee's comments. Yet, we do not quite agree that there are important 3D effects to be considered. Most of the features of the injected water bulb are noticeable along the vertical direction.**

*Line 370. I do not understand which is the fine material. It is the clayey or the clay-silts and in figure 2 ? I think that you refer to the last one, but could you made this more clear in the test? There are not any evidences of this layer in the initial electrical model.*

**The clay-silt layer we refer to is between 10.5 and 11.5 m depth. We specify this in the text of the revised manuscript. Yet, the layer is not visible per se in the ERT images, as the electrical conductivity of the pore water overwhelms the lithology contrasts. However, the effect of the layer is visible in the time-lapse imaging due to its hydraulic effects.**

*Figures 10 and 11. Please make them bigger and mark the location of the injection chamber as well the fine material.*

**We enlarged the figures and inserted also the injection chamber in the revised version of the manuscript.**