**Hydrology and
Earth System
Sciences
Discussions**

Interactive comment on "Application of time domain induced polarization to the mapping of lithotypes in a landfill site" *by* A. Gazoty et al.

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General comments First I would like to congratulate Mrs Gazoty and collaborators for this excellent work, well documented and constructed. The paper is pleasant for reading. This is an educational and didactic case study for landfill delineation, and lithology discrimination using TDIP and DC resistivity in sandy / clayey soils. Also we can see how gamma ray and conductivity well logging dramatically improve results quality and interpretation. This paper addresses relevant scientific questions within the scope of HESS. The paper presents interesting TDIP and DC resistivity data from and below landfill material. All data are processed, and interpreted in a clear form. Conclusions propose a new approach for characterizing complex environments, such as landfills.

Specifics comments But I have some remarks: - No analysis on contaminant con-

centrations - No discussion on plume localization: in the abstract, introduction, and at fig.11, authors mention a contaminant plume (drawn on fig 11 sketch) but we don't know how this plume was found (what kind of anomaly is created by the plume ?) - I suggest to calculate and represent the normalized chargeability (see Lesmes and Frye, 2001) when working in high conductive environment, - There is an introduction on Cole-Cole model in time domain, multi-windows IP measurements, also a chapter on inversion of DC-IP data (pp989-990). But finally there is just an analysis of M0 chargeability (is it calculated after inversion of chargeability curves ?). Give more explanations why tau and c are not relevant. Nevertheless, I have seen recent communications from the same authors explaining that tau and c improve lithology discrimination, data interpretation (e.g. at the Second International Workshop on Induced Polarization). - If tau and c add no information, maybe the Cole-Cole model is not appropriate. Make a discussion. - You have to reformulate the sentence lines 19-21 where you explain that physical models such as Leroy and Titov models can be compared to empirical models such as Cole-Cole models. Leroy or Titov try to give physical explanations of IP phenomenon's, where Cole-Cole model is useful for classifying IP measurements based on their parameters (tau, M0, c and rho). - I didn't understand why loggings from 151-1477 well are so noisy. If you have no confidence with this logging, don't show it!

Nevertheless, once again, TDIP data and all geophysical measurements are of good quality. This is an excellent work.

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Lesmes D.P. and K.M. Frye, 2001, Influence of pore fluid chemistry on the complex conductivity and induced polarization responses of Berea sandstone, JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 106, NO. B3, PAGES 4079-4090, MARCH 10, 2001