

Interactive comment on “3D Inverse modeling of EM-LIN data to investigate coastal sinkholes in Quintana Roo Mexico” by Luis Eduardo Ochoa-Tinajero et al.

Anonymous Referee #1

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Dear editor and authors, I have reviewed manuscript NHES_2018_180 submitted by Luis E. Ochoa-Tinajero et al., to Natural Hazards and Earth System Sciences and entitled “3D Inverse modeling of EM-LIN data to investigate coastal sinkholes in Quintana Roo Mexico”. Manuscript deals about the application of 3d EM-Lin in order to evaluate near to the surface underground structure in the Chac-Mool sinkhole system at Mexico. Authors employ geophysics in order to evaluate preferential flowpaths in the underground and its potential relation with the karstified net in the subsoil by means geophysical data. Manuscript show interesting results but there are some subjects that require to be evaluated in the manuscript in order to allow data evaluation and interpretation by a reader of the manuscript. I include some subjects that can be of interest

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to improve manuscript. Authors indicate that there are previous works in the area carried out by the Speleological Survey; It should be interesting to be able to compare the obtained data from geophysics and the available data from direct study. It should be of interest to include a geological map in order to evaluate the geological characteristics from the area, its context but also, if available, hidrogeological information at the regional-local scale previous to the geophysical analysis. Moreover it can be also of interest to include a geomorphological map about the surficial indicators of karst activity and some photographs from the study area. This photographs will permit the evaluation of the survey conditions but also the karst characteristics from the study area. There are not units in the representation from figure 4 (color scale), at figure 5 the scale color requires an inset (log 10 (r) means, r at logartimic scale but it lacks units and the figure caption requires to be rewritten as I am not sure that I am able to understand what is described. Information related to the referenced small sinkholes from the area (2.1 chapter) requires to be included in the geological preliminary map but also in the geophysical models to be compared with the geophysical data. Also at chapter 2.1 there is not an evaluation of the expected values for bedrock and the way to choose or discuss the origin of obtained values. If the analyzed units are rocks it can be difficult that they are complete saturated, that it is the explanation for such data. This requires to be more detailed interpreted and discussed. At 2.1 authors describe how they interpret the presence of sinkholes in the area, however there is not reference to surficial-geomorphological data to be compare with or about the presence of sinkholes in the area to be compared with the geophysical data.. What criteria has been used to select the 160 ohm/m for the separation of units in the geophysical model? Do authors indicate that the “bottom topography of the limestone roof” but what they are referencing is “the topography of the limestone roof”? About the interpretation and description, roof cannot be thick, this is a contact, then it is needed to correct “the roof appears to be very thick”, or “the roof is very thin”. After in the same paragraph authors indicate that the, what I interpret, the thickness of the level is thick, then the susceptibility to collapse is lower, does author have information

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about the fracturation nets from the unit? Not necessarily from the local area, but the state of the massive can be evaluated in a regional scale to know if stability can be related to the fracturation state of the unit if authors want to evaluate collapse susceptibility or hazard. At Figure 6. I suppose that this is a 3d view of the topography of the contact, but it is not clear to see it, Can authors include the isolines of topography, or two maps with the topography and by the other hand of the resistivity values?. In this sense, as previously pointed out, the selection of the resistivity values requires to be discussed in order to define if other values can be better to evaluate the 3D underground structure. In order to evaluate data from the area, where the water level is expected to be? are there any change related to the water salinity in the geophysical data?.

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