

Interactive comment on “Formation of linear planform chimneys controlled by preferential hydrocarbon leakage and anisotropic stresses in faulted fine-grained sediments, Offshore Angola” by Sutieng Ho et al.

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To Anonymous Referee #2

1. Author's response to general comments

The authors would like to take this opportunity to thank the reviewer's for their extensive review and helpful insights into the readability of the paper. The reviewer's recommendation of revising the structure of figures has been taken on board. Whilst we do not agree with all changes we acknowledge that figures and clarity in explanations and

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reference to the figures is a common theme from all reviewers and detailed below are areas where we think a compromise can be met. We hope the response below meets the reviewer's requests and improves the overall manuscript. The grammar will be revised again by our British co-author and all other authors to ensure the overall quality.

2. Figures

Reviewer 2 - Fig 1: Simple map highlighting position of the two seismic surveys to the coastline and the wide geological environment described under “Regional Setting”

Authors – We take on board the reviewers comments and will make some changes to resolve the clarity issues. The main areas we will focus on is splitting and moving figures to convey single or a few points per figure to make the final message clearer.

The suggestion of showing the survey along the coastline will only double the volume of the figure number. Since we do not have the authorisation to show the exact location we have used a red star to indicate its approximate location. The details of the wider geological context is contained in the “Setting” section of the manuscript.

The purpose of Figure 1 is to show the distribution of fluid leakage structures, tectonic structures and the spatial relationship between both. As it does not affect the interpretation in this study, we regard it unnecessary to change Figure 1 or add an extra information pertaining to survey location.

Reviewer 2 - Fig 2: Sample seismic line on each dataset through a feature of interest, showing what this looks like on full, near, mid and far offset data, demonstrating the resolution of the data etc

Authors – We think that an image showing a feature of interest should be in the description section of the manuscript and should come after the geological setting.

For Figure 2 it is more appropriate to show a regional line across the survey in Figure 2, because it shows the main structures. Due to the image resolution of the regional line in Figure 2a, we have included an inset zoom-in to show the detailed stratigraphy

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in Fig 2b.

We do not have authorisation to use data other than the near offset survey for publication. The far-stack data has been examined internally and the authors are confident that the chimneys are not artefacts. On this basis we think the near-offset data is adequate.

We will add representative seismic figures after the Stratigraphy section to show studied chimneys, as suggested by Reviewer 3.

Appendix 2, 4, 5, 7 will be modified and move into key figures as suggestion in the note and as the partial suggestion by Reviewer 3.

GEOLOGICAL SETTING

Reviewer 2 - Fig 3: A super-regional seismic line (if possible), or as regional line as you can manage across the two datasets with penciled in interpretation if data confidential, showing the rift, sag and passive margin sequence and geometry. Include an inset zooming into the interval of interest, highlighting the different units.

Authors – The study is focused on the Neogene succession within the localised 3D seismic volume. Whilst regional context is important the data available for the study does not allow production of a super-regional line and we regard the deep intervals, especially the rift and sag sequence has having no bearing on the interpretations here other than that the fluids inevitably come from depth. All of the deformation (structures) shown in this paper are either compaction related or are detached at the base of the Early Cretaceous evaporites as shown in figure 2.

Reviewer 2 - Fig 4: A map highlighting the features of interest (perhaps after your existing figure 1) with: 1) a multi-segment seismic line going through each of the synclines and diapirs. Use this seismic line to support statements made about timing of syncline subsidence etc 2) a short seismic line or lines (two maximum) highlighting the other features described in section 3.2

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Authors – The intricate details pertaining to the timing of minibasin subsidence and salt diapirism are beyond the scope of this study however, in broader terms their timing is relevant to some of the interpretations. We feel the seismic line in Fig 2 is adequate to document the gross structural evolution of this part of the basin and we will look to add the necessary detail within the text. We will try to move Appendix 5 and put it before Figure 2b and 3.

OBSERVATIONS AND DISCUSSION

Reviewer 2 - Fig. 5: A seismic line highlighting a PHAA and NHAA. These should be clearly labeled and not covered by interpretation.

Authors – We will look to revise figures where this occurs. We are confused by this comment.

Reviewer 2 - Fig 6: A map and one seismic section through one of each of the three different types of chimney highlighting the properties of the chimney on seismic (again interpretation and labels should not obscure the raw data). For the chimneys with no clear base, show one with branching and the other with distortions.

Authors – An extra group image which shows different types of chimneys will be added after the figures into the Geological Setting section.

Reviewer 2 - Fig 7: Three different maps highlighting each of the three anisotropic PF array types you recognize in Tier 2 and one map of an isotropic PF array in Tier 2. Also show how the linear chimneys interact with each of the three anisotropic PF array types you describe in Tier 2 and one map showing how chimneys interact with isotropic PF array in Tier 2

Authors – We feel this is adequately shown on figure 1 and that the subsequent zoom in maps show the necessary detail in each geometry. Clear reference to each of the zoom in maps within the appropriate part of the text should be adequate for the reader to visualise these variations in more detail. A previous paper by the authors focuses

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purely on the geometric variation and the reader will be referred to this paper within this manuscript.

Reviewer 2 - Fig: 8: Three seismic lines showing the three different ways chimneys interact with polygonal fault planes
Reviewer 2 - Fig 9: Something similar to your Fig 7b

Authors – For the suggested organisation of Figure 8 and 9, we will split the Figure 7a and 7b into two.

Reviewer 2 - Fig 10: Figure containing one map and one section in support of observations in 4.1.3 The map for the section 4.1.3 (Figure 8), the dip map is showing the depressional geometry of the topmost termination of Linear Chimneys and the amplitude map is showing the PHAA developed along the strike of the depressional linear geometry.
Reviewer 2 - Fig 11: Maximum of two seismic lines illustrating the relationships described in section 5.1

Authors – We will try to look at the figures and try to accommodate the suggestion.

Fig 12: Your Fig 9 Fig 13: Your Fig 10 Fig 14: Your Fig 11 Fig 15: Your Fig 12

Reviewer 2 - Please bear in mind the following hints when reproducing these figures: (a) on amplitude maps, please ensure your color scale is centered on zero (so that it is clear that red/orange is negative and black/grey positive or vice versa) At the moment, for example on your existing figure 4C, it is impossible to tell what parts are anomalous (negative amplitude) and which are positive amplitude.

Authors – We will move the “0” into the right place on the scale bar. We will add in the Methodology that, the red-orange colour indicates positive polarity and black-grey negative. The “0” on some of the amplitude scale bar had been displaced by the image editor when the images were shrink to fit on the page size.

Reviewer 2 - (b) Please ensure labels do not obscure the features of interest, and if something is traced onto a feature of interest (for example your existing figure 2b),

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that there is an un-interpreted seismic line beside it. Once these figures have been made, please then check the text very carefully to ensure that figure references in the text match these new figure numbers.

Authors – We will look in to this matter and make sure it is not the case. Figure 2b is the unique case, all other figure's labels do not cover the area of interest. Symbols on the seismic line in Figure 2b are to represent stratigraphic positions of the studied features, because it is impossible to show all studied features on one single seismic section. We are going to improve Figure 2b as suggested by other reviewers as well.

3. TYPOS / NOTES READING THE PAPER

Reviewer 2 - Unless otherwise noted, replace the equivalent text with the text I give in "inverted commas"

Authors – The authors will ensure these corrections are made in the list of comments.

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2018-34>, 2018.