

Uncertainties in breakup markers along the Iberia-Newfoundland margins illustrated by new seismic data

Annabel Causer¹, Lucía Pérez-Díaz^{1,2}, Jürgen Adam¹ and Graeme Eagles³

¹Earth Sciences Department, Royal Holloway University of London, Egham, TW20 0EX, United Kingdom

²Department of Earth Sciences, Oxford University, Oxford, OX1 3AN, United Kingdom

³Alfred Wegener Institut, Helmholtz Zentrum für Polar und Meeresforschung, Bremerhaven, Germany

Correspondence to: Annabel Causer (annabel.causer.2017@live.rhul.ac.uk)

Response to reviews

Anonymous Referee #3

The aim of the manuscript submitted by Causer et al. is to discuss breakup markers along the Iberia-Newfoundland margins based on new seismic data. The theme of the manuscript is of major scientific interest, since neither the nature, not the timing and location of breakup are well constrained along the Iberia-Newfoundland margins. Many papers, some of which are very recent, have been dedicated to this problem. I have to admit that I did not find new ideas, or new, well constrained observations that add something new to the subject. Indeed, the interpretation of the new seismic data lack a rigorous interpretation and observations and interpretations are mixed and difficult to follow (for some further comments see comments below). The manuscript reads more like a report referring to old studies and only very few new observations are added. Most disturbing is that some of the latest studies, that come to almost the same conclusions, are only marginally referred or partly not discussed. This omission weighs heavily and discredit the authors. Apart from these points, there are several other points (see comments below) that makes that this manuscript can not be accepted in its present version.

Specific comments:

l.30: here and elsewhere in the paper the authors make statements that are similar to the papers of Nirrengarten et al, without citing their work. Actually, most of the conclusions reached in this paper are similar to those by Nirrengarten et al. 2017 and 2018, thus, referring to these results is necessary. I would propose that the authors should discuss how their results are different from those of Nirrengarten et al. 2017 and 2018. I do not really see a big difference. Moreover, the papers of Stanton et al. 2015 and Nirrengarten et al. 2018 that deal with the same subject are not referred to.

Action: We disagree with the reviewer's statement that our work lacks referencing to that of Nirrengarten on the J-anomaly, although acknowledge our oversight of Nirrengarten et al. 2018, and have now included it.

Regarding similarity – both our work and that of Nirrengarten focus on a similar study area and discuss the J-anomaly and its significance for kinematic modelling. However, our work differs from previous studies in that 1) presents and discusses previously unpublished seismic

data and 2) illustrates and discusses in detail the impact of “breakup markers” as the basis for plate kinematic modelling.

1. 25: the SDR packages need to be better described; what is the origin (magmatic) and the significance of the SDR package? I can not find them in the figures

Action: SDR packages are labelled in figure 5 and described in the text (Section 4).

1.130 to 150: the tectonic setting part is completely outdated. A lot of work has been done in the last years that need to be referred to.

No Action: Were this comment to have been more detailed, it would have been difficult to weigh against reviewer 1’s suggestion to reduce the level of detail in lines 130-150. As it stands, however, we cannot act on this comment because it lacks any citations to work completed over ‘the last few years’ that the reviewer thinks we might have missed. With the help of the more detailed and helpful comments made by reviewers 1 and 2, we are confident that this section of the manuscript is both up to date and fit for its purpose.

1.218 Dataset and methods section need to be rewritten and more details about the data presented in the paper need to be presented.

No Action: this comment is also too vague as a basis for us to improve our manuscript. The reviewer should have supported their statements with examples and concrete suggestions or advice.

1.265 to 345 The description of the seismic lines mixes observations with interpretations. Many questions remain open, such as how syn-rift 1 and 2 have been defined, where are possible limits, how were different types of basement defined and what are the evidence for magmatic additions (there are many more questions that arise by looking the seismic interpretations).

No Action: As no examples are given by the reviewer (and neither of the other two reviewers have highlighted this issue) we are unsure as to where, in the text, the reviewer finds we are mixing observations and interpretations.

The rationale for our identification of syn-rift packages, basement and magmatic additions is given in sections 3 and 4.

The presentation of the data needs to include the presentation of the seismic section (without interpretation), a line drawing and the presentation. As presented here, I cannot follow the interpretations and many of the assumption are not back up by observations. The presentation of the seismic data is insufficient and does not corresponds to the standard of scientific papers.

No Action: This comment is simply baffling. What figures was the reviewer looking at? Our figures 5 to 7 do in fact include, on separate panels, the seismic section (without interpretation), a line drawing and detail panels, exactly as the reviewer complains they don’t.

1.360 to 400: this section does not really discuss new ideas and does not built on the observations neither. Most of what is said here is old and outdated (the authors seem to have missed the research on the Iberia-Newfoundland margins of the last 5 years??)

No Action: This section puts our findings (previously presented in section 4) in the context of previously published research. This is the definition of a scientific manuscript's discussion. Regarding referencing, we are unsure as to what research the reviewer is referring to as missing, or out-dated, as yet again no examples are given.

We have made changes to this section in response to concrete comments from reviewers 1 and 2.

1.405 to 460: This section reads more as a report than a discussion chapter.

No Action: Yet again, a comment that is too vague on its own and too weakly supported by any of the other reviewers' comments to form any no basis on which we can make justifiable changes.