

Interactive comment on “Basin inversion and structural architecture as constraints on fluid flow and Pb-Zn mineralisation in the Paleo-Mesoproterozoic sedimentary sequences of northern Australia” by George M. Gibson and Sally Edwards

George M. Gibson and Sally Edwards

george.gibson@anu.edu.au

Received and published: 27 April 2020

Reply to Professor Alan Collins Alan has provided an insightful and comprehensive review and commentary on our paper and we greatly appreciate the time he has taken to do this. Among his more general comments, he points out that the timing of tectonic events across large tracts of northern Australia is strikingly similar and not confined to the Mount Isa and southern McArthur basin with which we are more familiar. As such,

C1

this would seem to reinforce our view that area covered by our seismic interpretation is more representative of northern Australia than we might have originally envisaged. We are therefore encouraged to think we may be on safe ground with our ideas on basin inversion and its links to sediment-hosted Pb-Zn mineralisation although these will need to be further tested, as does our claim that the petroleum and mineralisation overlapped and were driven by a common tectonic driver. Differences raised in the timing of specific depositional and/or tectonic events are not easily addressed as, unlike in the Paleozoic, the rocks investigated by us are unfossiliferous, and tectonic interpretations and models such as ours are probably still over-reliant on detrital zircon ages or indirect dating of magmatic rocks either intruded into the sedimentary rocks or are intercalated with them. Currently available geochronological data are largely maximum depositional ages without clear evidence that the dated rocks are first cycle sediments. His suggestion that one or more tectonic events identified by us may be diachronous across the region may therefore prove correct but has yet to be properly tested and is beyond the scope of our paper. Nevertheless we are not blind to this possibility and welcome the suggestion as should it prove correct then a temporal trend of this type might help resolve long-standing questions about whether tectonism from 1800-1600 Ma in northern Australia was driven by processes along a convergent plate margin that lay to the south or east of Proterozoic eastern Australia. In going through the annotated pdf, we have noted where typographic errors or further clarification of the text was deemed necessary and have made the recommended changes. This involved some re-writing of text which we have now completed. It was further suggested that some of our figures (e.g. Fig. 8b) but more especially the ones showing seismic images needed to be revised to increase their readability. In reducing the size of the figures to fit the prescribed journal pdf format and size limits (all pages be in portrait format), some of their detail and resolution was lost (file sizes are inevitably large even where reproduced as jpegs or png files). In the event that our MS is accepted for publication, the offending figures will be submitted at a larger scale and size by breaking up the longer interpreted seismic images into two panels and placing them one above the

C2

other. Detail down to the level of individual reflectors should then be legible without the aid of the zoom button.

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2020-31>, 2020.