

# ***Interactive comment on “Oblique reactivation of lithosphere-scale lineaments controls rift physiography – The upper crustal expression of the Sorgenfrei-Tornquist Zone, offshore southern Norway” by Thomas B. Phillips et al.***

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This paper presents a thorough analysis of seismic reflection data offshore southern Norway in order to investigate the role of pre-existing structures in the development of the region. Overall, I found the paper to be very well written, organised and insightful. The methods used are suitable for this investigation and the conclusions appear to be supported by the results. The figures depicting seismic lines are well presented, particularly when both the interpreted and uninterpreted sections are shown. The conclusion that a new phase of deformation across the North Sea occurred is arguably this con-

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tributions most significant finding. I would therefore like to recommend publication in Solid Earth if the relatively minor points suggested here are considered. These minor points should not be too onerous on the authors, but I believe that they will improve the manuscript, and in particular the legibility of the figures.

First, the fault profiles are very informative and should be commended. However, they have been constructed for throw rather than offset (or heave), and thus do not account for any horizontal displacement. This seems both reasonable and inevitable, given the nature of the data. However, if there are any caveats associated with this approach then they should be stated or discussed in the manuscript potentially by expanding section 3.2. For example would the same conclusions have be drawn from analysis of fault heave, rather than throw? Furthermore, given that some spatial variation in velocity will be inevitable within the basin and that throw is measured in time, rather than depth, is a throw measured in time on one section of a fault comparable to a throw measured in time elsewhere on the fault (which could be  $> 40$  km away)? Essentially, it would be beneficial to add a few lines to the methodology clarifying why the approach is reasonable.

My final points relate to the figures, which on the whole compliment the text very well but could undergo some minor amendments that would significantly improve the overall quality of the manuscript. First, the text on most of the figures is very small. For example the labels on Figs. 1 and 10, in addition to all the annotations on the interpreted seismic lines will be difficult to read at publication size. On Figs. 2, 4, 5, 9, 11 and 14, the insert of the location map that includes the seismic line location is too small and the white line is difficult to see against the grey background. Also a colour bar is missing from Fig. 13 and the colour bars on Fig. 6 are too small to read. A horizontal scale is missing from Fig. 2 and it would also be helpful to include the approximate location of the schematic cross section shown in Fig. 1D on one of the location maps.

