

## ***Interactive comment on “Mid/Late Devonian-Carboniferous collapse basins on the Finnmark Platform and in the southwesternmost Nordkapp basin, SW Barents Sea” by Jean-Baptiste Koehl et al.***

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Received and published: 31 January 2018

Dear David,

Thank you very much for your input on the manuscript; it is, as always, highly appreciated! Here is our response to your comments. We hope the changes we implemented improve the shortcomings of the manuscript highlighted by your comments and suggestions. Please do not hesitate to contact us shall this not be the case for some comments.

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### 1. Comments from Dr. Roberts

Comment 1: mix-ups of British and American spellings, even in the same paragraph (e.g. p.4 Archaean (Brit) vs Archean (Am)).

Comment 2: The spelling of the TKFZ by the way is Trollfjorden-Komagelva Fault Zone.

Comment 3: In Figs. 1 & 2 the positioning of the acronym TKFZ is quite wrong. Put it on the Varanger Peninsula (type locality) in Figure 1. It certainly isn't in Laksefjord. However, there are, as you know, very many TKFZ-parallel faults in this part of northern Finnmark (ref my 250K and 500K map-sheets, and the Lippard/Roberts papers); and I have walked across or along most of them in the late-70s, 80s, early-90s. They are mostly normal faults, with this component of movement likely to be Early Carboniferous (see the Nasuti/Rob/Gern mafic dykes paper).

Comment 4: In Fig. 1 the Nordkapp Basin is spelled incorrectly.

Comment 5: On p. 5 line 146 – there is no such thing as the Tanafjord-Varangerfjord Group.

Comment 6: On line 150 the Timanian foreland basin is in the pericratonic 'Gaissa Basin' realm, not the Barents Sea Group (see Zhang et al. 2015 – attached pdf).

Comment 7: On p.6 under 2.1.2, the idea (Kirkland) that the Kalak strata were exotic and originated on Laurentia, and now lie above an inter-continental suture zone (base of Middle Allochthon) has been shown to be groundless (see e.g. Zhang et al. 2016 – attached pdf). The Kalak rocks are most definitely Baltican (see also my NJG V.87 paper from 2007).

Comment 8: I have always been very sceptical about the notion of late-Caledonian orogenic collapse in Finnmark. This was really dramatic in western & central Norway, following c. 200 km of subduction with eclogites, coesite and microdiamonds, but diminishes in intensity northwards. In Finnmark we have inferred late-Scandian extensional microstructures only on the western flank of the Repparfjord window. In

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Porsangerfjord, there are late-Scandian, brittle, ESE-directed contractional structures dated to c. Mid Devonian time. So the sandstones beneath the Carboniferous strata in wellcores are likely to be Late Devonian in age (which fits with the evidence of rifting in Late Dev time in NE Varanger and in large areas of NW Russia).

## 2. Author's response

Comment 1: agreed, we noticed these inconsistencies and made changes where necessary.

Comment 2: agreed and updated.

Comment 3: agreed with and updated figure. We fully agree with you to say that there are many WNW-ESE trending faults and that they accommodated a presumably early Carboniferous component of normal/strike-slip faulting as shown by the dating of Lippard & Prestvik (1997).

Comment 4: agreed with and corrected.

Comment 5: agreed with and corrected.

Comment 6: agreed with and updated/modified using Siedlecka & Roberts (1992; excursion guidebook) as key reference instead of the suggested Zhang et al. 2015 reference.

Comment 7: we most definitely agree that the following references addressing the provenance of rocks of the Kalak Nappe Complex should be cited in the geological setting chapter of our paper: Roberts 2007, Zhang et al. 2016.

Comment 8: the conclusions of our paper is not incompatible with your comment, i.e. it may still have occurred to a lesser extent than in southern and mid-Norway. There are strong indications of Devonian inversion of basement-seated shear zones in Lofoten-Vesterålen (cf. Steltenpohl et al. 2011) and of Late Devonian-early Carboniferous faulting in Troms (Laksvatn and Vannareid faults; Davids et al., 2013) and Finnmark

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(Kvenklubben, Markopp and Talvik faults; Torgersen et al. 2014; Koehl et al. 2016). We are also aware of the Middle/Late Devonian extensional event in Russia (Pease et al., 2016), e.g. Kontozero Graben (Kramm et al. 1993) and dolerite dykes (Roberts & Onstott 1995).

## 3. Changes implemented

Comment 1: line 111, "Archaean" becomes "Archean".

Comment 2: lines 25, 27, 41, 42-43, 71, 1102, 1296 and 1706, "Trollfjord-Komagelva" was changed into "Trollfjorden-Komagelva".

Comment 3: location of "TKFZ" acronym changed to the Varanger Peninsula.

Comment 4: in figure 1, "Norkapp Basin" becomes "Nordkapp Basin".

Comment 5: the sentence erroneously referring to the "Tanafjord-Varangerfjord Group" was modified as follow: "A thin cover of Neoproterozoic to Cambrian (para-) autochthonous metasedimentary rocks occurs on top of Paleoproterozoic basement rocks in Finnmark (Siedlecki, 1980; Ramsay et al., 1985; Andresen et al. 2014; Corfu et al., 2014). Other Neoproterozoic-Ordovician units in eastern Finnmark include metasedimentary rocks of the Barents Sea and Tanafjorden-Varangerfjorden regions (Siedlecki, 1980; Siedlecka & Roberts, 1992) which are exposed on the Varanger Peninsula (Figure 1)." Comment 6: cf. comment 5 for implemented changes.

Comment 7: the sentence referring to the hypothesis of Kirkland et al. (2008) and addressing a potential exotic origin of the Kalak Nappe Complex was updated as follow: "The Kalak Nappe Complex was previously considered to represent an exotic terrane accreted on the Laurentian margin of Rodinia prior to the rifting of the Iapetus Ocean, and to have later been thrust over Baltica during the Caledonian Orogeny (Kirkland et al., 2008). However, paleocurrent and geochronological data suggest these rocks to be of Baltican origin (Roberts, 2007; Zhang et al., 2016)." In addition, the two references were added to the reference list.

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Comment 8: no changes.

Please also note the supplement to this comment:

<https://www.solid-earth-discuss.net/se-2017-124/se-2017-124-AC3-supplement.pdf>

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Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2017-124>, 2017.