

Interactive comment on “The crossdip correction as a tool to improve imaging of crooked line seismic data: A case study from the post-glacial Burträsk fault, Sweden” by Ruth A. Beckel and Christopher Juhlin

Anonymous Referee #1

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This manuscript tackles the problem of obtaining reflector orientation from crooked line seismic data by so-called cross-dip correction. Standard method of cross-dip correction is revisited and implemented into a processing module. Subsequently, it is applied to the data from a post-glacial fault from N Sweden, improving significantly the stack quality and providing reflectors strikes and dips. It is a combination of the methodology and data application, which is well-written and easy to follow. There are only some minor issues that should be either supplemented or commented in the paper:

On Page 2, when discussing the attempts to extract 3D info from 2D crooked line

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profiles, you can add reference to Wu et al. 1995 JGR paper (cross-dip), as well as Nedimovic and West (2003) part 2 paper on 3D pre-stack migration of 2D data + White and Malinowski (2012) paper on 3D post-stack migration of 2D data.

Page 2 line 19: what is so special about the post-glacial fault, that none of the cross-dip correction methods is suited for its imaging? Please expand or reformulate

Page 4 line 8: a south side up dip-slip system – please reformulate (e.g. using hangingwall)

Page 4 line 31: what is “crossdip angle”; which velocity “v” you are referring to? I think it might be instructive to make a cartoon, illustrating a crooked line acquisition over a reflector with inline/crossline dip

Page 6 – section 3.2: it’s unclear what you are really implementing in your module; looks like it’s the Nedimovic and West method just being applied manually? The description of your method can not be easily followed – please make maybe some more explicit link to Fig. 3 + change the caption of Fig. 3 accordingly

Synthetic tests: since there is an interplay between cross dip and velocity analysis I suggest to make a test with the model similar to model 3, but with different velocities between the reflectors.

Page 11 line 3: reformulate the sentence about the acquisition

Page 12 line 5-9: your workflow is not very clear: consider adding a cartoon illustrating it; Also, there is an interplay between residual statics and cross-dip correction, which you don’t mention. Can you comment on that? Also, e.g. Wu et al. 1995 applied cross-dip correction first and then the residual statics.

Page 13 line 9-11: information on the refraction tomography is popping up here out of context; while I see your point later, when you show in Fig. 11 the low velocity zones close to the fault location, in my opinion this information could be omitted (and Fig. 11 as well). I’m sure that this velocity anomaly must be already present in your refraction

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statics model + be visible in the first-breaks. If so, just add a comment. I don't like the results of the first-arrival tomography to be shown without the proper discussion on how it was performed, what is the resolution, checkerboard tests, etc.

Figure 2: lines are too thin + colors not well visible (e.g. acquisition line in blue)

Figure 9: is it a DMO stack? Just a comment: it's hard to determine to what extent the new results are influenced by the new reprocessing scheme or by cross-dip correction only. Even though the statics and velocities are linked together and you revised both of them, it might be worth to show the new reprocessing data stacked with the old velocities (and possibly statics).

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2018-120>, 2018.