

Interactive comment on “Investigation of the Effects of Surrounding Media on the Distributed Acoustic Sensing of Helically-Wound Fiber-Optic Cable with Application to the New Afton Deposit, British Columbia” by Sepidehalsadat Hendi et al.

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Response to Referee #1

We would like to thank the reviewer for his/her insightful comments on the manuscript. Bellow is our response to the issues raised in the review:

Analytical methods still play an important role in geophysics and are often used to assess the response to specific geological situations for a variety of geophysical methods. However, it has long been recognized that analytical methods cannot handle

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the complexity of many realistic geological situations. This is why numerical modeling methods including Finite-element (FE) have been developed and used widely for several decades. In our paper, we chose three-dimensional FE modeling as the primary method to model near-borehole effects on distributed acoustic sensing data acquired with helically-wound fibre-optic cable. The three-dimensional FE modeling approach used in our paper is state-of-the-art and provides all the accuracy required to model effects on such cable for complex and realistic geological situations. FE modeling has no geometry restrictions (i.e., planar or cylindrical) and further allows analyzing the strain around the cable (Figures 12-17), something not easy to achieve with analytical methods. As clearly stated in our paper, the analytical method introduced in Appendix is only used to validate the choice of boundary conditions of finite-element modeling and is by no means the primary method that we are advocating for in our work. The method is indeed not new and is a simple adaptation of Kennett's method. This is something that we will clarify in the revised manuscript. Despite its inherent approximation, the comparison of results obtained with 3D FE modeling and the simple analytical method shown in the paper are quite acceptable and sufficient to confirm the choice of the boundary conditions. The analytical method in the appendix is simpler to implement than the approach of Kuvshinov (2016) especially when a larger number of layers are surrounding the fibre-optic cable. This is why we chose it over other methods. Again, we would like to re-emphasize that the main results of our paper are those obtained with 3D FE modeling and that the analytical was used to confirm the choice of boundary conditions for the FE modeling.

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