

# ***Interactive comment on “In situ hydromechanical responses during well drilling recorded by distributed fiber-optic strain sensing” by Yi Zhang et al.***

## **Anonymous Referee #2**

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Overall Comments: This manuscript presents the strain variation along two observation boreholes as a response to borehole drilling. For such a purpose, a distributed strain measurement along the two observation boreholes was conducted. The results present the effect of drilling via inducing hydromechanical deformations on the observation boreholes. Moreover, a simple hydraulic diffusion model was implemented to interpret the strain evolution in the observation boreholes. In general, this manuscript is reasonably well organized and English language errors are minor. Although the experimental part of the manuscript is innovative and nicely described especially the application of the Rayleigh spectrum for strain measurement, the numerical part of the manuscript is trivial. The authors had tried to explain the hydromechanical responses

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in the observation boreholes using a simple diffusion model without considering the mechanical effect induced by drilling and rather considering only pressure propagation as the driving force for the strain variation. Overall, the reviewer considers this paper has to be extended with a hydromechanical model to describe the strain variation as well as adding more physics to the model such as skin effect. For all these reasons, I suggest this paper be accepted with major revisions and give the authors a time to consider the raised problems and enhance the scientific level of the paper. Detailed Comments: "Some authors like Kritesch et al. (2018) had used DSS for subsurface monitoring which could be addressed in L34. Here is the publication: Krietsch, Hannes, Valentin Gischig, M. R. Jalali, Joseph Doetsch, Benoît Valley, and Florian Amann. "A comparison of FBG-and Brillouin-strain sensing in the framework of a decameter-scale hydraulic stimulation experiment." In 52nd US Rock Mechanics/Geomechanics Symposium. American Rock Mechanics Association, 2018.

It is beneficial that the authors elaborate briefly on the geology and formations of the field site. I suggest adding the drilling progress plot to Fig. 2 and Fig. S3. L143: I believe the authors mean Figure 2 rather than Figure 1a. L146: I believe the authors mean Figure 2 rather than Figure S3. Check again the cross-referencing to the figures and tables as well as citations. There are a couple of more typos. L 173: The sentence about unstable addition of drilling fluid is not clear. Can you elaborate more on this? To support the statement in L178, I suggest to present the temperature data in the supplementary material. As it was mentioned above, the skin effect did not considered in the diffusion model which will affect considerably the result of the inversion model. Moreover, the direct transformation of estimated pressure into strain in trivial.

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