Solid Earth Discussions

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Comment on se-2021-63

Anonymous Referee #2

Referee comment on "Dynamic motion monitoring of a 3.6□km long steel rod in a borehole during cold-water injection with distributed fiber-optic sensing" by Martin Peter Lipus et al., Solid Earth Discuss., https://doi.org/10.5194/se-2021-63-RC2, 2021

This manuscript reports interesting observations in a borehole with DTS and DAS, which includes sucker rod contraction and sudden contraction events. The sudden contraction events on the DAS records during the first 72 minutes of cold-water fluid injection are reported. A friction force model was proposed to explain the mechanism of vibration events instead of the microseismic event. General speaking, it provides very useful information. The following is my comments.

Section 2.

Eq 1 should be in "2.1 derivation of strain from Distributed Temperature Sensing" rather than "2.3 Deformation balance …".

"2.2 Direct measurement of strain via DAS". iDAS measures the strain rate instead of strain. Was any high pass filtered applied to the raw data?

“2.3 Deformation balance from DTS and DAS measurements”. This section includes how to compute strain from DTS and obtain strain from strain rate records, which is not strongly related to the “balance”. It may be better to merge with section 2.1 & 2.2.

Eq. 5, the applied force Fapp is used in this study instead of the stress.

“2.4 Event detection and picking” looks not related to the other sections.

Section 3.

Line 290-295, the difference between strain_DTS and strain_DAS looks relative to the inclination angle. It may be worth to make a figure showing this difference and inclination angle. Adding some discussions about this phenomenon is also useful. Another interesting observation is that difference at 01:18 is larger than the one at 02:08, especially between ~700m and 2800m.

On the 2nd subplot of the Figure 4, the differences between strain_DTS and strain_DAS below the 3100m MD are quite different at 01:18 and 02:08. At 02:08, the strain_DTS is

positive while the strain_DAS is close to zero. Such difference is not observed on the data at 01:48. Any clue?

Since both section 3.2 and 3.3 reported sudden contraction events, it is possible to merge together.

Line 320. It is not easy to see precursors and successors on the Figure 6. Add marks on the Figure 6 ?

As shown in Figure 8, some STA/LTA detections are outliers. How to determinate the origin time of each event and the origin depth? Another interesting parameter is the strength of event. Does the stronger event have stronger spatial extend?