[R1.1] Line 53, please add the focal depth information. And why this earthquake?

The focal depth of 9.9km has been added. In the original manuscript, we mentioned in lines 59-61 that "*we retrieve and interpret the same data set as was analysed by Wang et al. (2018), and so we build upon the conclusions drawn from this previous study*", which motivates the choice for this earthquake.

[R1.2] Section 2.2, Any further explanation why chooses MUSIC. It's confusing that you describe a lot about classical beamforming approaches and then say you used MUSIC, with very less details to follow. Could you elaborate the MUSIC method here and why this is the choice here over classical beamforming.

In the original manuscript, we motivate the choice for MUSIC as: "*[MUSIC] is an extension of classical beamforming approaches that acknowledges sparsity in the number of signals arriving at the array, resulting in higher-resolution estimates of the back-azimuth and slowness of the seismic waves*" (lines 82-84). To clarify the distinction from delay-and-sum beamforming, we have now added to lines 93-95:

"*The procedure of estimating C^2 is as described above, and so the sole difference between MUSIC and traditional beamforming lies in the projection of the steering vectors onto the noise space (and taking the reciprocal), rather than projecting onto the full space of C^2*"

For a derivation of the MUSIC method, we refer to the original work of Schmidt (1986).

[R1.3] Fig 3 shows P wave but why there are two arrivals (17.5s and 22.5s)? What's the phase of second arrival if it is not S wave? And please add a line to help show the arrival time difference across the array.

Given the similarity with the first arriving phase (strong N and Z component), it is likely that the second phase at around 21s is a second P-arrival. One could speculate that this is a scattered wave originating from a scattering site close to the seismic source or a depth phase (a reflection from the Earth's surface), but we have no direct evidence for that.

A line to show the move-out across the array has been added to each panel.

[R1.4] Followed by comment 3, From figure 3 the waveforms from Z-component are strong. Please add explanation why the beamforming results from Z component in the frequency band 0.5-1 Hz is not good. Is this because the wavelength is close to the scale of array?

The wavelength at 1Hz is of the order of 5 km, while the span of the array is only 1.5 km, so it would seem plausible that the limit of the array resolution is observed in Fig. 4. However, the source for a 1-2 Hz frequency band is very well resolved, while the wavelength (> 2.5 km) still exceeds the span of the array. We therefore speculate in lines 128-130 that:

"*Only in the 0.5-1.0 Hz frequency band does the beamforming of this component lead to a relatively poorly resolved location, which may be due to the influence of the corner frequency (typically around 1-3 Hz for an ML 4.3 event; see e.g. Scholz (2019)).*"

[R1.5] Please clarify the time window length of data sections used for beamforming. Since you mention many scattered P waves, will different time windows improve the results, shorter window with fewer phases? For example, just choose a few seconds (4s maybe?) of recordings around the P-arrivals that only include the first arrivals.

We now mention in lines 118-119 that:

"*We take a time window from 2s before to 8s after the first arrival of each respective phase (i.e. 10s in total).*"

We have experimented extensively with various time windows, and found that the DAS beamforming results did not improve when choosing a window tightly centred around the first arrival. This is also seen in the newly added Figure 13.

[R1.6] figure 6 is hard to read (where is P and S?) and possibly misleading. According to the geometry of fiber, DAS data is strain rate recordings of many directions. Figure 6 shows horizontal seismic data from all azimuths. The polarity of S-wave could be flipped at each fibre corner. Could you try the image display instead of wiggles?

With Fig. 6 we aimed to offer a similar representation as for the nodal array (Fig. 3), i.e. wiggles ordered by distance from the seismic source. These wiggles are separately plotted for the P- and S-waves, so there is no question as to which phases are represented. We fully agree that DAS records a mixture of horizontal components, and showing the overall incoherence of the signals is precisely the point of this figure. When the waveforms are plotted as an image display, this incoherence is not so clearly observed.

[R1.7] Line 134, "polarity flips are anticipated", I want to remind that this is true for shear waves, but may not true for other phases. This could be very important to correct for S wave before doing beamforming. This may be the reason of the diffusion of the focus in Figure 7.

We have now specified in this line that the polarity flips are anticipated only for S-waves. The diffuse spread is equally large when beamforming the P- and S-phases, so we do not attribute the spread at the lower frequency bands to changes in S-wave polarity.

[R1.8] I am curious whether a short "L" shape segment can be demonstrated.

Owing to the layout of the cable at Brady Hot Springs, there are few perpendicular segments, all of which are relatively small in extent (of the order of 100m), and thus exhibit poor beamforming resolution. Moreover, these small segments or subarrays likely receive energy from a single scattering location, dominating the beamforming results. When mentioning L-shaped arrays in Section 4.2, we had in mind that these "sparse" arrays can be of much larger extent (of the order of tens of kilometres), and so the local scattering can be better distinguished from the direct arrivals that are common to the entire array.

[R1.9] Regarding to using long DAS array to locate the source, “the source localisation results will greatly benefit from the large lateral extent of the DAS arrays”, I refer you to look at recent publication by Zhu and Stensrud, 2019 to backpropagate full waveform DAS data to locate the source.

We thank the reviewer for bringing this interesting study to our attention for future work. We now also include this reference in Section 4.2, line 399.