We thank the reviewer for their detailed review to improve the manuscript and text flow.

Summary

The authors compare the estimations of backazimuths and phase velocities from array data as well as a rotational sensor (6C) with reference results from the permanent INGV network deriving implications for the dominant wavetype of the recorded LP- and tremor events. Due to the significant complexity of the involved wavefields the authors point out that conventional array recordings often do not allow for a detailed wavefield composition regarding tremor and LP events and this lack of information forms the motivation for this study introducing rotational sensor data.

Reference localisation of tremor and LP-events (INGV) are explained in great detail as well as the derived backazimuth values that are ultimately used for comparison. High-quality figures contain a very high amount of information in very good detail. The authors reveal an interesting discrepancy between backazimuths derived from rotational sensor data compared to traditional array or network methods. The systematic offset observed for the rotational sensor is likely attributed to site effects which are substantial in the heavily scattering medium on Mt Etna's edifice to which the single rotational sensor would be particularly susceptible. The possibility of wave type mixing is pointed out due to deeper tremor sources and simultaneous surface strombolian activity. Love-wave dominated wave fields are expected for the LP events according to the rotational sensor data. The authors conclude that while the single rotational sensor can not provide reliable information in terms of direction of arrival of tremor or LP signals it is a useful addition to traditional array or network-based analysis as it offers wave field separation. Multiple arrays would improve results significantly as source locations rather than direction of arrival may be obtained while also multiple rotational sensors would reduce effect of heterogeneities.

Some comments/suggestions below

general comments on sections or figures

section 2.2 --- how do different window lengths for calculation of RMS of tremor affect results? The tremor sliding window is relatively long, potentially obscuring shorter time variations. A shorter time window might be an interesting test or alternatively a larger overlap of adjacent windows for better time resolution. As for LP events, would a different 5 second noise window (say 15 seconds before event window instead of 25) affect SNR in a meaningful way or would the distribution of SNR across all events remain roughly the same?

XX We tested two smaller sliding time windows which are presented in Figure S3. The results of our manuscript are not affected by the window length, smaller time windows lead to a broader range of back azimuth and slowness, but they show similar trends as the 30-min window results. We thus don't expect shorter time variations. We tested noise windows for the SNR calculation defined 10 s prior to the event time and compared those to the results of 30 s prior the event time. The observed SNR differences show no systematic offset, with positive and negative deviations distributed randomly and canceling out on average. Based on these findings, we chose to stick with the 30 s noise window, as for about one-third of all LP events, smaller amplitude peaks were observed around 5 s prior to the event start time (Section 4.2.3)

section 2.5 --- the detailed explanation of the array processing may be condensed a little more. Array processing is quite routine and since a reference to more detail is given anyway (line 207) this section could be kept shorter.

XX We understand the remark. For the purpose of methodological comparison, we do however want to include a brief description of the array processing too. Including equations requires describing parameters, which limits the possibility of shortening the text.

Section 3 --- the estimated uncertainty of derived backazimuths is on the same order as reported variations between the 3 methods or some of their changes over time, therefore observed temporal variations or between methods need to be checked in terms of statistical relevance as they may not be significant

XX We modified the text according to the (new enhanced) uncertainties. During certain times variations are indeed not significant considering the uncertainties. We thank the reviewer for this remark.

Figure 1 --- include reference to fault locations in figure caption

XX We added the reference to the fault locations in the caption of the figure.

Figure 2 --- colours for tremor locations of P2 and P4 are too similar | in the caption the array center is referred to as "yellow dot" when it is a green square according to legend. "Array centre" could be removed entirely as it covers the symbol for the rotational sensor in plot

XX The colours of P2 and P4 have been modified accordingly. The array centre, as suggested, is not displayed in the figure anymore.

Figure 3 --- move legend in panels b, d to respective top left corners to avoid overlap with data | in panels b-d uncertainty bars could be added to legend as well for quicker overview

XX Legends of Figure 3b and 3d have been moved, - the uncertainty bars have been added to the legends too.

Figure 4 --- slowness in panel c could be colour-coded according to event altitude as well to better track corresponding data points in panels b and c | in caption remove "The" in last sentence

XX We thank the reviewer for this suggestion. The slowness displayed in Figure 4c is now colour-coded, but according to hypocentral distance, as the event altitude can easierly be compared by colours of b) as x-axes are shared. We do not notice a unique change of slowness with decreasing distance. "The" was removed in the last sentence of the caption.

Figure 6 --- if the subplots could be re-arranged in such a way that the entire figure does not have to be tilted but fits onto the page normally this would improve readability

XX The entire Figure 6 has been split up in two as suggested by Reviewer 1.

section 3 --- the listing of all results could be condensed a little to increase overall flow or reading as some parts are a little drawn-out

XX We shortened this section where possible.

for all figures (including supplementary material) fontsizes of axes or colorbar labels, ticks and legends could be increased a bit for better readability

XX We enlarged fontsizes where it was possible.

suggestions regarding text flow

lines 74-77 --- The aim of this study is to test, for the first time in a volcanic environment, whether the 6C approach provides reliable estimates of back azimuths and velocities compared with those obtained from a conventional seismic array, and whether these results are consistent with reference locations from the Istituto Nazionale di Geofisica e Vulcanologia–Osservatorio Etneo (INGV-OE) network.

line 102 --- Using a rotational sensor Eibl et al. (2022a) have shown, that

lines 114-115 --- For each LP event, we calculated the RMS within a 5-second time window containing the signal as well as the RMS within a 5-second noise window that

line 249 --- just use NEC instead of North East crater as acronym was introduced earlier

line 290 --- 1.6 km altitude, a trend which is statistically significant despite the uncertainties.

line 308 --- remove "the"

line 321 --- the BAz is consistent with

line 348-349 --- to a direction in between the northern and southern craters about 10°-15° further south compared to the INGV reference

line 351 --- but also deviate

line 363 --- remove “furthermore”

line 433 --- However, in this case the distance changes by 0.8 km

line 449 --- In previous studies, LP events at Mt. Etna have been mentioned

line 476 --- which is possibly related to local scattering

line 484 --- The 6C Baz, however, point back in a direction 20° further south, which

XX We modified all suggestions accordingly and thank the reviewer for enhancing the text flow.