

Interactive comment on “The INSIEME seismic network: a research infrastructure for studying induced seismicity in the High AgriValley (southern Italy)” by Tony Alfredo Stabile et al.

Anonymous Referee #1

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The aim of this paper is to describe a local seismic network for the observation of induced seismicity at the High Agri Valley in S. Italy. The waveform data that is recorded from the associated stations is open and induced seismicity is an interesting topic with serious implications for the local communities. The paper covers topics such as the installation process and technical characteristics of the associated seismic stations, as well as the site effect characteristics. My main points are (i) the addition of a new figure showing an example of a station's response (amplitude/phase) even though the data-less station files are available in the supplementary material, and (ii) that the discrimination of induced events and local earthquakes is being done based on the hypocentre depth only. I think that the paper would benefit from a brief source mechanism study

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for the discussed (or a sample) seismic events. I have made other minor comments (see below) which have to do mainly with the English language syntax throughout the manuscript. Overall the scientific content is good and useful and I recommend moderate/major revisions of the paper. I suggest the authors to proof read the manuscript very carefully upon submission of the revised manuscript.

p.2 - l.2-6 Induced seismicity is commonly accepted to be anthropogenic. I think McGarr(2002) discusses whether different cases are induced or not and in which degree, but in general he accepts induced seismicity as anthropogenic - please rephrase.

p.2 - l.19 and the discrimination between natural and induced seismicity. I think this should go to b) from a pure scientific point of view.. I don't think this has to do much with social and economic impacts.

p.3 -l.14 remove instead.

p.3 -l.20 with the highest seismogenic potential... I think this term is described better in terms of energy accumulation ..or motion rate mm/year? The expected maximum acceleration has to do also with local site conditions - maybe rephrase.

p.4 - l.10 regular azimuthal coverage and distribution as regular as possible.. I believe the authors mean uniform azimuthal distribution - please clarify and rephrase.

p.4 l.15 - 20 - the average distance between stations.. I think the same point is repeated twice here, please correct this. Moreover, it is better to give the depth range on the second point where you first discuss the importance of depth and epicentral distance (l.13).

p.5 - l.1 remove Afterwards

p.5 - l.3 ...as more constraints as possible... correct to ..as many constraints as possible

p.5 - Subsection 2.2 I think the first part of the first paragraph does not read very well in my opinion. Please replace by: Considering that the main target of the INSIEME

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network is to detect and locate the anthropogenic microseismicity in the HAV ($MI \leq 2.7$), the seismic stations were equipped with triaxial weak-motion broadband sensors: six 0.05-100 Hz and two 0.0083-100 Hz Trillium Compact Posthole (TCPH) seismometers which provide a flat response to ground velocity up to 100 Hz. The data-loggers are Centaur Digital Recorders with a dynamic range of 140 dB. All seismometers and data-loggers are manufactured by Nanometrics Inc. (see Table 1). Continuous acquisition of digital waveforms is provided by the INSIEME network at 250 Hz sampling rate.

p.5 - l.15 Even though the Nyquist frequency is well beyond the instrument's flat response high end I am wondering what is the phase response especially in the high frequencies from the instruments' sensitivity frequency to 125 Hz. What is the target frequency range in this study? There are a few broadband instruments currently in the IRIS data services showing strange phase responses even close to 1Hz. I believe a figure showing the amplitude and phase response of one station would be a good addition.

p.5 - l.22 ...the Winter season (see Figure 2a), then the solar.. start new sentence: ...the winter season (see Figure 2a). The solar...

p.5 - l.30 what is this system? please give a brief description.

p.6 -l.1 is highly deviated over 20 m depth - not very clear, please rephrase

p.6 - l.3 ..seismometers model, which operates.. change to: ..seismometers which operate..

p.6 - l.15 remove Afterwards

p.6 -l.27 was only 70 m distance from the borehole sensor.. change to: was only 70 m away from the borehole sensor..

p.6 - l. 28 ..and acquired simultaneously with station INS1 from 2016-10-12 to 2017-01-24 I think the authors mean that these stations were in operation during the same period of time - please rephrase

p.6 -l.30 please provide a numerical description of you calculations

p.7 -l.4 see similar comment at p.6 - l.28

p.7 - l. 5-6 teleseisms - please change to: teleseismic events

p.7 -l.21 Nanometric Centaur digital recorder... correct to: The Nanometrics Centaur digital recorder..

p.7 - l.25 ..that prevent the internet connection - please rephrase

p.7 -l.26 disconnects for few seconds.. for a few seconds

p.8 - section 2.3 (last paragraph) use collect instead of gather Why some events cannot be located? please explain briefly

p. 9 l. 22 ..compared to each other

p.9 l. 22-23 ..the noise level is more regular at 50 m depth - what does regular noise level mean? please rephrase

p.10 l.8 ..when both the stations - remove "the", remove "respective"

p.10 l.32-33 ..In that way, we guaranteed... please rephrase

p.11 - l.1 why is date time seismic noise is being used? please explain

p.11 eq. 2 should be HVSR =

p.11 - l.28 ..that the most.. remove "the"

p.11 - l.32 did the authors calculate NS and EW HVSRs separately to investigate any directivity and azimuthal effects? If yes, were they found negligible?

p.12 -l.11 competent rocks - Is there a better term to describe this?

p.12 - l.18 ..located in the 1-D velocity model by Improta et al. (2017) by adopting Hypo71.. change to ..using the 1-D velocity model by Improta et al. (2017) and

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Hypo71..

p.12 -l.20 To this purpose, and particularly to better locate.. change to In order to better locate local events outside the...

p.12 - l.20 what is the distance between stations of the virtual network? Maybe a new figure showing the distribution of the "virtual network" and the INSIEME network together could be shown at the supplementary material.

p.12 -l.33 ..related to an earthquake occurred on 2018-01-29.. I think the authors mean that this is an induced event. Maybe it would have been more appropriate not to use the term earthquake and simply refer to it as an induced seismic event, similar to the line above (l.32) ..from preliminary event location..

p.13 -l.11 similar as in my previous comment (replace earthquake with event)

p.13 - paragraph 2. The authors discriminate the induced events from local earthquakes using the depth as their main criterion. Did the authors attempt to determine the focal mechanisms of any of these events, by means of first motion polarities and/or amplitude ratios for example? Is there a high signal-to-noise ratio on the INSIEME stations and the virtual seismic network recordings to do so? please add an example, if not please justify your answer.

p.13 l-32 replace Dziewonsky with Dziewonski.

p.14 - l.5 ..we have decided to do not uninstall the network.. change to ..we have decided not to uninstall the network..

p.14 - l.11 the begin of data.. change to ..the beginning of data..

p.14 - l.11 very attractive area.. attractive in which manner? maybe change to very interesting area

p.14 - l.15 ..consisting in.. change to consisting of..

p.14 -l.16 and two 120s-100Hz Trillium Compact Posthole sensors,

p.14 l.18-19 ..started to have troubles.. please rephrase (e.g. presented an intermittent fault)

p.14 - l.24-25 ..with negligible site amplification..

Fig. 1 I am not sure if the last sentence in the caption is necessary, maybe move it to the Acknowledgements.

Fig.5 caption: Below each actual... I think the authors could rephrase the caption beyond that point. It is not very clear to me.

Fig.8 caption: The solid coloured lines...

Fig. 9 caption: replace earthquake with event

Fig. 10 caption: ..from top to the bottom,

As a general rule when the authors refer to the number of objects (e.g., stations) which is less than ten, please write this as a word. If this number is higher than ten, you can write it as a number.

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