# Interactive comment on "Systematic Identification of External Influences in Multi-Year Micro-Seismic Recordings Using Convolutional Neural Networks" by Matthias Meyer et al.

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*EC: Editor Comment*
AC: Author Comment

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## 1  Response to EC1

AC: Dear Jens Turowski
thank you very much for your feedback. We addressed your comments in the following and responded to each referee individually. Attached to this response you find a preliminary version of the revised manuscript highlighting all modifications.

*EC: Dear authors,*
*I agree with the reviewers that the papers presents a potentially very useful contribution, however, currently there are weaknesses and the presentation (language and structure).*
*EC: When revising the paper, I ask you specifically to think from the perspective of a potential user. Is all the information available to reproduce the analysis? Can the reasoning be followed easily? Can the necessary information be clearly accessed in the manuscript? Is the approach described separately from specific features of the case study? Is the evaluation of the method objective?*

AC: We provided additional information by clarifying parameters, such as the impact of STA/LTA settings, learning rate, training iterations. We updated the structure of the manuscript, especially in the introduction and concept sections, to make it simpler to follow and access the presented information. To take especially the concerns of reviewer one into account we defined precisely what belongs to our method and what to the case study. In addition, we are more precise in the terminology we use and the geoscientific field we consider. In the evaluation we objectively demonstrate the benefits our method and detach evaluation of the case study from the evaluation of our method. We purposely leave out any geophysical interpretation of the results we

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obtain after applying our method to the case study.

*EC: The comments of the reviewers largely speak for themselves; although they assess the paper from different angles, the common feature of their assessment is that there is a lack of clarity.*

AC: We addressed this issue by defining precise terminology at the beginning of the revised manuscript which is used persistently throughout the manuscript. Moreover we avoid misleading formulations. Moreover, we condensed significant parts of the introduction and reorganized the structure of the paper.

*EC: Reviewer #1 focuses more on the language and structure problems. In addition, he asks to evaluate your work in a broader context in the discussion/conclusion.*

AC: In addition to restructuring the first part of the manuscript, including updates to figures, we changed the discussion to include a broader . Specifically we introduced two new subsections ("Feature Extraction" and "Overfitting") and extended the existing subsections. Additionally, we added more literature to the discussion. Moreover, we gave hints to possible future works in the evaluation, discussion and outlook.

*EC: Similarly, reviewer #2 asks for a more detailed description of the method and a*

*better acknowledgment of previous work. I largely agree with that.*

AC: We added a more concise method description and introduced a new subsection "Convolutional neural networks" to explain the concepts of convolutional neural networks. Moreover, in addition to new geoscientific literature we acknowledge additional literature from the machine learning for seismology field.

*EC: In addition, I want to highlight a few specific stylistic points, which may help you to revise the paper and achieve the aims outlined above. I will do this quoting specific example (page.line). 2.11 ' ... very unattractive overall solution ... ': please avoid subjective judgements such at this. It is better to list the pros and cons, and then explain your priorities and your reasoning. 5.3 'Care is taken ... '; 6.12 'But the meticulous care does pay off.'; 7.8 'Care has been taken to prevent significant data gaps ... ': Such statements are not helpful to the reader. The phrasing is meant to convey some particularly high standards of scientific rigour. However, it is unclear what you have actually done, and thus your 'care' is not reproducible. It would be better if you describe your actual measures (e.g., for preventing significant data gaps) and then describe how well they worked, and if they failed, why they failed. Again, here it is important to keep the reproducability of the work in mind.*

AC: We have worked through the paper to remove any subjective judgment, imprecise wording or not well-documented phrases. For example we have updated the example you mention to "Significant data gaps are prevented by using solar panels, durable batteries and field-tested sensors..."

*EC: 8.6 'It becomes apparent in Fig. 5 (b)-(c) that anthropogenic noise, such as mountaineers walking by or helicopters, can have a strong influence on seismic recordings.': This sentence is an example of how results are mixed into the method description. There are multiple other instances. I ask you to separate this and present the methodology in the methods section and the results in the results section.*

AC: We corrected your example and reformulated the sentence. In addition, we have restructured certain parts of the manuscript to avoid a mix-up of methods and results. For example we have placed all of our findings of the statistical evaluation into the results section.

*EC: 18.2 'The results of the classifier experiments from Sect. 3.2 are listed in Table 3.': Such sentences contain little information. It would be better to state the main result or feature (that is important in the current context) and then cite the table in parentheses. Looking forward to seeing your revised paper, best wishes, Jens Turowski*

AC: We have reformulated the presented example and have worked through the paper to address similar issues. For example we updated the example you mention to "The results of the classifier experiments (Table 2) show that ..."