Review of

A New Seismicity Catalogue of the Eastern Alps Using the Temporary Swath-D Network

by *Laurens Jan Hofman, Jörn Kummerow, Simone Cesca, and the AlpArray-Swath-D Working Group*

In this study, the authors take advantage of a temporary, dense and relatively large seismic array (Swath-D Network) to build a new earthquake catalog and improve the current knowledge of the seismicity in the eastern and southern Alps. The authors present the results of a thorough analysis mixing automated and manual methods with which they detected and located 4 times more events than existing catalogs. The manuscript is well organized and written. I enjoyed reading about sophisticated methodology that doesn't involve machine learning. I only have minor comments about the methodology and some surprising results.

Comments

- Did the INGV and SED agencies use the same data set when building their catalogs? I find quite surprising that after the energy-based detection there are only 286 new events.

- Lines 104 and 296, you mention the correlation coefficient but don't give details about how many stations are involved in its computation. I think this information is important to understand what the value means.

- Line 140 "Additionally, the number of I/O operations is reduced to a minimum by loading each continuous data trace only once." I don't really understand the meaning of this statement because I don't see why one would load the data several times?

- The detection threshold is set in a very arbitrary way: How much is 0.5 in terms of standard deviations? CC detection thresholds are usually defined upon the root mean square or median absolute deviation of the CCs so that they correspond to a given p-value of false detections assuming a gaussian distribution. Based on my personal experience, 0.5 can also be very conservative. What is the motivation for not summing the CCs and applying the threshold on the summed CCs? Array techniques are all based on the idea that signal-to-noise ratio of a sum increases as $\sqrt{N}$ where N is the number of traces. But by applying the detection threshold on single stations, one loses the full benefits of network information.

- Lines 166-167: For phase picking, the authors use higher frequencies for S waves than for P waves. What motivated this decision? It is unexpected since P waves carry higher frequency energy (the P-wave corner frequency is about 50% higher than that of the S wave).

- Lines 178: I got a bit lost in these explanations. We start reading about picking on the template events, then on the newly detected events, and in this paragraph the authors go back to hand picks, which I thought were only for template events? I found this paragraph hard to understand so perhaps it is worth editing it.

- Magnitude estimation. Figure A5 shows some surprising observations. The lack of knowledge of what the CC means exactly (see comment above) might partly feed this comment. For event pairs with CC > 0.9, even within the reduced frequency band of 2-8 Hz, I don't see how the magnitude difference

can be up to 2 units. Could it be caused by errors in the magnitude computation?

- Line 291: A mean location uncertainty of only 300m? Most earthquakes are located outside the network (Figure 4) so I would expect a much higher number.

- Line 297: "upper bound" on location uncertainty. I would avoid making a quantitative statement from a hand wavy argument. Is the idea that events with CC>0.9 are more-or-less exactly co-located? In this case, shouldn't it be a lower bound (true uncertainty = within-family dispersion + NLLoc uncertainties)?

- It would have been nice to have the catalog as a supplementary file. The authors do say that they are willing to share the file upon request, but this seems incompatible with anonymity.