Solid Earth Discuss., 5, C316–C319, 2013
www.solid-earth-discuss.net/5/C316/2013/

Solid Earth
Discussions
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Interactive comment on "Indications for different types of brittle failure due to active coal mining using waveform similarities of induced seismic events" *by* S. Wehling-Benatelli et al.

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Received and published: 15 July 2013

This manuscript entitled ": Indications for different types of brittle failure due to active coal mining using waveform similarities of induced seismic events" by S. Wehling-Benatelli et al. is an interesting paper, and two reviewers have posted comments on this. The manuscript is suitable for publication in Solid Earth if the authors can address the questions and concerns from the comments of the two reviewers below. I therefore suggest a minor revision and please indicate your changes/improvements in the revised manuscript, including responses to all the questions and comments below.

Reviewer #1: The manuscript entitled ": Indications for different types of brittle failure

due to active coal mining using waveform similarities of induced seismic events", written by S. Wehling-Benatelli et al., is a research article proposed to special issue : Rheology of the Earth – observations, laboratory experiments and numerical modelling from the micro- to the macro-scale – is in the scope of this SE issue.

No doubt it is a very interesting and valuable article. The article concern the identiïňĄcation of mining seismic events clusters. For this purpose the method ttesting the waveform similarity – similarity matrix SM –was used. There we can ïňĄnd a new sorting and visualizing algorithm.

The SM algorithm was compared with the well-known algorithm of single-linakage (SL) clustering. The results were comparable. This means that new one SM algorithm is correct. The new SM algorithm may be widely use in mines, to divide mining seismic events to a few clusters. Each cluster characterizes a different mechanism of seismic source and probably different distances of the seismic sources from the excavations. If so, this method may be used to seismic risk assessment and stability of underground excavations under seismic load. When the seismic sources or clusters are closer to the excavations, the rock-bursts hazard are higher. Authors found three main types of clusters from HAMNET dataset and correlated these clusters with different failure mechanisms (different types of brittle failure), as well as with location of seismic hypocenters and "b" values of the Gutenberg-Richter relation. Because the clusters with large magnitude events up to ML 1.8, which tend to locate slightly above or below the two largest clusters, do not follow G-R low, it would be important to describe in more details how the authors calculated "b" value and what was the errors of speciïňĄed values of "b" ?

The next important question is: what was the accuracy of the seismic events location (especially vertical component – you used surface stations network, so as to proof location quality is enough for the purpose of the study presented)? And the last one question: What methodology was used to calculate the seismic moment tensors. Did the Authors use full moment tensor inversion or allowed only for shearing type of focal mechanism ? In my opinion lack of cross-section and lithological proïňĄle and the

location of major faults, left edges and remnants makes difïňĄcult to read the source mechanisms analysis and individual clusters characteristics in relation to real mining and geology conditions.

Reviewer #2: The ability of mining seismologists, to recognize the location of mining tremors from their waveform similarity, is well known. In the paper entitled “Indications for different types of brittle failure due to active coal mining using waveform similarities of induced seismic events”, the above mentioned ability is turned into an algorithm and computer program. A three-component similarity matrix and station matrix are constructed on the base of the correlation coefiňĄcient between seismic data recorded in a seismological network. The structure of the matrices can be used for identiïňĄcation of seismic event clusters based on waveform similarity. Seismic records from the Hamm-Herringen region, occurring in the vicinity of a moving long-wall, were used for testing the program. Several large clusters of similar waveforms, temporary and space consistent, have been identiïňĄed and three different types of seismic source mechanisms have been recognized. The obtained results are original, interesting and can be applied in many mining seismic centers. The results should be published. However in my opinion some additional information can improve the paper. Description of similarity matrices P663 line 4 The similarity of two rows is presented along with the question What next? The further procedures isn’t following The main element of the paper should be described preciously. This remark is also relevant in description of station matrix.

Spectra The similarity of waveform should be visible also in the similarity of waveform spectra. The interpretation of spectra similarity is simpler and could strengthen the ïňĄnal conclusions of the paper. Geology The important missing information is geological structure in the region of investigations. The geological and mining situation in the vicinity of the long-wall is the main factor determining the level of seismicity. Strata, mechanical properties of the rocks, tectonics, and edges in seams over the exploited long-wall are all important elements in determining the differences in the seismic emis-

sion. Without this information the conclusions in the paper are not convincing. Network The method used for installing the sensors, accuracy of the hypocenter locations and the energy estimations, would be helpful in assessing the differentiation of the similarity catalogues. Velocity The differences between the catalogues can also be due to local velocity changes as a result of an increase in stresses. The velocity and attenuation of seismic waves can change markedly as a result of changes in stress levels

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Interactive comment on Solid Earth Discuss., 5, 655, 2013.