

Interactive comment on “An explanation of large-scale coal and gas outbursts in underground coal mines: the effect of low-permeability zones on abnormally abundant gas” by F. H. An and Y. P. Cheng

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Received and published: 31 March 2014

An explanation of large-scale coal and gas outbursts in underground coal mines: the effect of low-permeability zones on abnormally abundant gas

The authors would like to appreciate the anonymous Reviewer #2 for his helpful and useful comments. The authors will take into account the recommendations of the Reviewer and try to improve the overall redaction of the paper. This is a point-to-point response to the Reviewer.

C2913

Comment: The paper is well written and in rather clear way describes the analysis of the effect of low-permeability zones on abnormally abundant gas. The structure of the article is fine. Firstly the general conditions of coal and gas outbursts process are presented and presence of coal gas in geological structures is discussed. Then the chosen modeling parameters and obtain results are described, firstly for preservation conditions of abundant gas and annular zone of low permeability and secondly for effect of lowpermeability zone on the likelihood of outburst. Presented results lead to clear conclusions. However, in my opinion, the description of the results should be fulfill by the specific values from the graphs used in figures 4, 5, 7, 8, 9. The results are simplified to sentences like: “. . . we found that the gas lost through the coal seam is clearly reduced by the low-permeability zone” or “The concentration of coal gas outside the zone is less than that of a normal coal seam”. Section 3.2 and 4.2 should be fulfilled by detail characteristic of the results, justified by the values of gas pressure in terms of position obtain for the graphs in figures 4, 5, 7. Maybe useful would be a table with chosen values.

Answer: We added the detail characteristic of the results considering the Reviewer's suggestion.

Specific comments Specific comments: -section 3.2: Authors use different percent of the permeability of a normal coal seam. What is a value of permeability of normal coal seam?

Answer: Permeability of normal coal seam refers to the normal permeability without the negative effects of local geologic structures. In this paper the permeability of normal coal seam is 0.025mD shown in Table 2.

-figure 1. In the description of the figure the letters a-d should be described. Also there is no legend.

Answer: It was modified as the suggestion.

C2914

-figure 2. In my opinion instead of indicating lines on the figure, there should be a legend.

Answer: It was modified.

-figure 3. There should be a mark for 100 and 300 m as this are the numbers used for the model.

Answer: The mark for 100 m was added in figure 3. Because the length of zone "a" was assigned for several values in the following part, the mark for 300 m was not added. Besides, the legend was also added.

-figure 4. In the description of the figure the position of each zone should be indicated (100, 300m). Also it would be useful to place vertical lines for different zones in the graph.

Answer: Considering the Reviewer's suggestion, the figure was modified with different color for each zone.

-figure 5. The description should be "Gas distribution with various lengths of the low-permeability zone with permeability 0.1% of the normal coal seam permeability".

Answer: It was modified as the suggestion.

-figure 6. There is no legend.

Answer: The legend was added.

-figure 7. The vertical lines for different zones would be useful (100, 120m).

Answer: It was modified.

Note: A figure showing the locations of recent large-scale outbursts in China was added in the revised paper. Therefore the serial number of the original figures was extended.

C2915

Please also note the supplement to this comment:

<http://www.nat-hazards-earth-syst-sci-discuss.net/1/C2913/2014/nhessd-1-C2913-2014-supplement.pdf>

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 4751, 2013.

C2916