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Interactive Comment

Interactive comment on "Sulfur-containing particles emitted by concealed sulfide ore deposits: an unknown source of sulfur-containing particles in the atmosphere" *by* J. Cao et al.

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1. Per sample are not 1 or 2 particles. The number of particles mentioned on table 1 is the particle number on an area of 100 μm $\times$ 100 μm. The diameter of one TEM grid is 3 millimeter and its area is 7.065 square millimeter. Per sample has more than particles that were mentioned on table 1. If more particles are needed, the goal can be achieved through improving the adsorption performance of TEM grid. A protective device is a polyethyleneterephthalate bottle that was installed on the outside of the steel tube. The bottle is cylindrical shape. There is a small hole in the side of the bottle. The ascending geogas can outflow through the hole. But, outside particles can't enter

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Interactive Discussion

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the bottle, because the hole was filled with adsorption material. In one-third samples, we collected particles with carbon-coated nickel TEM grid and carbon-coated copper TEM grid. We can get analytical data of nickel and copper in a sample and compare characteristic of particles on nickel grid and copper grid. Moreover, most samples can collect particles. Samples that were not find a particle is rarely seen. 2. Up to present, we have studied particles carried by ascending geogas in 16 ore deposits. In each deposit, a large number of sulfur-containing and Pb, As-containing particles were found. Because of space constraints of the manuscript, 16 particles were only showed. There are oxidative ore bodies in many concealed sulfide ore deposits. As sulfide minerals changed into oxide minerals, sulfide were released from minerals. There are some data about sulfide concentration of ascending geogas.Yuan et al. (China University of Geosciences (beijing), China, 2014) analyzed sulfide concentrations of ascending geogas in the soil at the Sunit deposit in the Inner Mongolia Autonomous Region, China using plasma mass spectrographic analysis. Their sampling method is that the geogas flow in the soil moved and passed slowly through liquid collector using a pump. The particles carried by ascending geogas flow were adsorbed into the liquid collector. The volume of the geogas extracted in a hole is 5 liters. The geogas extracted in 3 holes were combined to make one sample. The volume of the geogas extracted in 3 holes is 15 liters. The liquid collector was made with high purity nitric acid and Mini-Q ultra pure water. They put the liquid collector in a 25 milliliter polyethylene bottle. The analysis results of 1054 samples showed that the average sulfur content of the liquid collector is 26.4571μg per milliliter. Their maximum value is 35.33 per milliliter and the minimum value is 16.89 per milliliter. 26.4571 μg per milliliter of liquid collector may be translated into 44.095 mg per cubic meter of geogas flow. We know that sulfur-containing substances carried by geogas flow may be not completely adsorbed into the liquid collector. The average sulfur content of the ascending geogas flow may be higher than 44.095 mg per cubic meter. We analyzed sulfide concentration of ascending geogas in the soil at the Kangjiawan deposit in the Hunan province, China. Our sampling method is similarly with the method used by Yuan et al. (2014). The difference is that our liquid collector was made with high purity aqua regia and tri-distilled water. The value of the liquid collector was 100 milliliter. The volume of the geogas extracted in a hole is 9 liters. The volume of the geogas extracted in 3 holes is 27 liters. The sulfide concentration of the liquid collector was analyzed by plasma spectrum method. We analyzed the samples along 3 sections (sample numbers were 31, 74, and 20 respectively). The results show that the average sulfur contents of the 3 sections were 0.27 per milliliter, 1.40 per milliliter, and 32.81 per milliliter respectively, which may be translated into 1.00 mg per cubic meter, 5.19 mg per cubic meter, and 121.50 mg per cubic meter of geogas flow respectively. The ascending gas flow rates were measured to be between $60 \times 10-4$ and 4 cm3 min-1 m-2 horizontally projected borehole area at three different sites by Malmqvist & Kristiansson (1984). The distribution areas of concealed sulfur ore deposits are different. The ore deposits with the distribution areas of 1-12 km2 may have more than deposits with other areas. Concealed sulfur ore deposits are widely distributed in nature. Concealed sulfur nonmetallic deposits, such as gypsum, barite, are also widely distributed. Especially, under the climate warming condition, oxidation of sulfur-containing minerals was accelerated. Therefore sulfur-containing particles emitted by concealed sulfide deposits should be considered. The above analysis data about the Kangjiawan deposit are unpublished. If our manuscript needs to be revised, detailed analysis results will add to the manuscript. 3. If our manuscript needs to be revised, the discussions about the composition of Co, As, Pb, etc, will add to the manuscript. 4. If our manuscript needs to be revised, the mineralogical phase of crystalline particles and the stability of particles during the TEM measurements will be discussed.

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