1 Introduction

The Luanchuan ore district located in the southern margin of the North China Craton is one of the most important polymetallic ore district of China, many porphyry-skarn molybdenum deposits, skarn polymetallic pyrite deposits and hydrothermal silver-lead-zinc vein deposits have been discovered. In recent years, with the Geological Survey Work, the Huoshenmiao skarn molybdenum deposit was discovered in the west of the ore district showing that it has a huge potential for prospecting. However the degree of study of Huoshenmiao molybdenum deposit is very low, the previous studies mainly focused on deposit geology and the Huoshenmiao intrusion (Xu et al., 1989; He et al., 2013), and some problems are still lack of research including the mineralization age and the relationships with Nannihu-Sandaozhuang and Shangfanggou molybdenum deposits. In this paper, based on the deposit geology, six molybdenite samples were selected for precise Re-Os dating, aims to determine the mineralization age and clarify the relationships with Nannihu-Sandaozhuang and Shangfanggou molybdenum deposits. This paper, based on the deposit geology, six molybdenite samples were selected for precise Re-Os dating, aims to determine the mineralization age and clarify the relationships with Nannihu-Sandaozhuang and Shangfanggou molybdenum deposits, providing the theoretical basis for searching for mineral resources in the west of the ore district.

2 Deposit Geology

The Huoshenmiao molybdenum deposit is located in the southern margin of the North China Craton. It is covered by Mesoproterozoic Luanchuan Formation clastic, carbonate and alkaline volcanic rocks. The main structure in the deposit is fault, including 7 major faults, which can be divided into 2 groups (NWW and NE) based on their strike, and the F1 fault host the southern boundary of the ore body. The Huoshenmiao intrusion located in the west of the deposit mainly consist of tonalite and granite porphyry, which invaded into Sanchuan marble, is closely related to molybdenite mineralization. Geochemical studies show that it characterized of high K and alkaline, belong to weak peraluminous I-type granite (Xu et al., 1989).

The molybdenum body is hosted by the skarn which is located in southeast of the contact zone of the Huoshenmiao intrusion and Sanchuan marble. It lenticular output, 500 meters long and 50~150 meters thick. The main ore-forming types include disseminated, lumpish, veinlet-stockwork and film-like molybdenite mineralization, and the major alteration types of wall rock comprise skarnization, potassic alteration, silicification, sericitization, pyritization, phyllic alteration, epidotization, chloritization and carbonation.

3 Molybdenite Samples Tested

The Re-Os isotope analyses were performed in the Re-Os Laboratory, National Research Center of Geoanalysis, the Chinese Academy of Geological Sciences in Beijing, using the Thermo Electron TJA X-series ICP-MS and the results are listed in Table 1. Whether the HSM-B10 defines a distinctly different mineralization age or not needs further study. Nevertheless, the five other samples give Re-Os model ages of 146.1±2.0 to 148.1±2.1Ma and a weighted mean age of 147.01±0.95Ma, MSWD=0.49. The data, processed using the Isoplot program, yield an isochron age of 145.7±3.9Ma, MSWD=0.83.

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4 Mineralization Age and its Significance

In this study, five molybdenite samples (except HSM-B10) have similar mode ages, the weighted mean age (147.01 ± 0.95Ma) consistent with the isochron age (145.7 ± 3.9Ma), and consistent with mineralization ages of other molybdenum deposits (Nannihu-Sandaozhuang (146.1±1.1Ma, Xiang et al.,2012); Shangfanggou (144.8±2.1Ma, Mao et al.,2005)) in Luanchuan ore district, showing that the Huoshenmiao molybdenum deposit formed in Late Jurassic.

By comparing the existing mineralization ages and diagenetic ages (Mao et al.,2005; Yang et al.,2012; Xiang et al.,2012) considered that there were two large-scale magmatisms (158Ma and 145Ma) in Late Jurassic in Luanchuan ore district, and the Huoshenmiao, Nannihu-Sandaozhuang and Shangfanggou molybdenum deposits were the products of the second one. Currently many porphyry-skarn molybdenum deposits (Nannihu-Sandaozhuang, Shangfanggou, Dawanggou and Majuan), skarn polymetallic pyrite deposits (Luotuoshan, Yinhegou and Yuku) and hydrothermal silver-lead-znic vein deposits (Lengshuibeigou, Yindonggou and Yangshu’ao) have been discovered exhibiting zoning outward the granites (Nannihu, Shangfanggou, Shibaoogou and Majuan) in the east of the ore district, forming many metallogenic series. The Huoshenmiao molybdenum deposit is located in the west of the ore district where has similar metallogenic conditions, so there may be molybdenum deposits, polymetallic pyrite deposits and silver-lead-znic deposits surrounding the Huoshenmiao intrusion in the west of the ore district.

Acknowledgments

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References


Table 1 Re-Os isotope data for molybdenite from the Huoshenmiao Mo deposit

<table>
<thead>
<tr>
<th>Sample</th>
<th>Weight(g)</th>
<th>Value</th>
<th>2σ</th>
<th>Value</th>
<th>2σ</th>
<th>Value</th>
<th>2σ</th>
<th>Value</th>
<th>2σ</th>
<th>Value</th>
<th>2σ</th>
<th>Mode age/(Ma)</th>
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<tr>
<td>HSM-B9</td>
<td>0.05041</td>
<td>65.40</td>
<td>0.94</td>
<td>41.10</td>
<td>0.59</td>
<td>100.7</td>
<td>0.8</td>
<td>146.9</td>
<td>2.7</td>
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<tr>
<td>HSM-B1</td>
<td>0.02012</td>
<td>64.95</td>
<td>0.48</td>
<td>40.82</td>
<td>0.30</td>
<td>99.49</td>
<td>0.81</td>
<td>146.1</td>
<td>2.0</td>
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<tr>
<td>HSM-B2</td>
<td>0.02084</td>
<td>47.89</td>
<td>0.39</td>
<td>30.10</td>
<td>0.25</td>
<td>74.35</td>
<td>0.61</td>
<td>148.1</td>
<td>2.1</td>
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<tr>
<td>HSM-B7</td>
<td>0.02028</td>
<td>39.00</td>
<td>0.31</td>
<td>24.51</td>
<td>0.20</td>
<td>60.03</td>
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<td>146.8</td>
<td>2.1</td>
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<tr>
<td>HSM-B10</td>
<td>0.00388</td>
<td>164.5</td>
<td>1.4</td>
<td>103.4</td>
<td>0.9</td>
<td>279.5</td>
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<td>162.0</td>
<td>2.5</td>
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<tr>
<td>HSM-B11</td>
<td>0.02118</td>
<td>41.15</td>
<td>0.36</td>
<td>25.86</td>
<td>0.22</td>
<td>63.52</td>
<td>0.54</td>
<td>147.2</td>
<td>2.2</td>
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