Geological and geochemical characteristics of Middle Jurassic granites in Bengbu uplift, Southeast of North China craton

Kang Congxuan1,2*, Yang Xianzhong1, Cai Yitao1, Zong Wen3 and Zhu Xiaoting1

1. Nanjing Institute of Geology and Mineral Resources, Nanjing 210016, China;
2. School of Earth Sciences and Engineering, Hohai University, Nanjing 211100, China;
3. Geological Survey of Jiangsu Province, Nanjing 210049, China

1 Introduction

The early formation and evolution of the North China craton has been widely concerned by scientists. The Bengbu uplift belt is located in the southeast of the craton, the research degree of the belt is relatively low and received increasing attention from many scholars in recent years. Through the author's practical work and combined with previous research results (Li et al., 2010; Song et al., 2016; Xu et al., 2004, 2006; Yang et al., 2005, 2006, 2007, 2009), a systematic discussion was carried out for the geological and geochemical characteristics of the Middle Jurassic granitic intrusions of this area in this article (Table 1).

2. Regional geological setting

The eastern part of the Bengbu uplift approach the Tan-Lu fault zone, and the Dabie orogenic belt is close to the south, the granites are widespread. With the development of granite geochronology in recent years, the intrusive rocks in this area are identified as two diagenetic periods of Paleoproterozoic and Mesozoic. (Qiu et al., 1999; Jin et al., 2003; Yang et al., 2005; Xu et al., 2004). The Middle Jurassic intrusions mainly exposed in Huaiyuan, Bengbu and Fengyang area, most intrusions in east-west direction, nodular tumor.

3. Rock geology

The Middle Jurassic intrusion in this area are composed of Tushan, Jingshan and Laoshan granites etc, mainly distributed in Huaiyuan-Bengbu-Laoshan area.

Jingshan and Tushan intrusions are exposed separately on the surface which may branched from same intrusive body in deep area. The intrusions distribute along the east-west extension of the Bengbu anticlinorium covering an area of 17km². Marginal facies of intrusions show the medium to fine grained texture and interior facies show the medium to coarse grained texture. The wall rock belongs to Wuhe group Xigudui formation and Zhuangzili formation which composed of plagioclase amphibolite and biotite plagiogneiss interbedded with marble, respectively. Intrusions have residual equal tabular, porphyritic and porphyroid textures, appearing micro crystal texture and gneissic-like structure in matrix. All the minerals are arranged in one direction from phenocrysts to matrix which displays a gneissic structure.

The outcrop of Laoshan intrusion covers an area of 7.4km². The stock is of monzonitic granite and extends northwestward. The wall rocks are of Zhuangzili formation and Fengshanli formation. The skarn occurs on the contact zone of intrusion and upper part of Zhuangzili formation. Intrusive rock shows porphyry texture with micro crystal texture in matrix. Quartz phenocrysts generally appear in round and irregular shape according to erosion. Felsic matrix appears micro crystal texture and shows gneissic structure with phenocrysts.

4. Geochemical characteristics of intrusive rock

The Middle Jurassic intrusive rock chemical composition changes of SiO₂ content in 72.34-74.02%; Total alkali (Na₂O+K₂O) is 8.12-8.88%, indicate that the magmatic evolution alkali siliceous differentiation more completely, reflects the magma evolution in the direction of alkali silicone. Projection points all fall on the alkaline rhyolite area in TAS diagram, rittmann index δ="
Table 1 Intrusion age statistical chart of middle Jurassic intrusion, Bengbu uplift belt

<table>
<thead>
<tr>
<th>sample</th>
<th>sampling point location</th>
<th>lithologies</th>
<th>U-Pb age (this text)</th>
<th>previous data</th>
</tr>
</thead>
<tbody>
<tr>
<td>JS-1</td>
<td>Jingshan south slope of</td>
<td>Monzonite</td>
<td>162.8 ± 1.8 Ma</td>
<td>167±5.8Ma(SHRIMP U-Pb), Guo S S et al.,2005;</td>
</tr>
<tr>
<td></td>
<td>huayuan in Bengbu</td>
<td>granite-porphyry</td>
<td></td>
<td>163±2.3Ma(Rb-Sr), Xu X et al.,2005;</td>
</tr>
<tr>
<td>JS-2</td>
<td>Jingshan western slope of</td>
<td>Gneissic porphyritic</td>
<td>160.4 ± 1.3 Ma</td>
<td>160±2±1.3Ma(SHRIMP U-Pb),Xu W L et al.,2004;</td>
</tr>
<tr>
<td></td>
<td>huayuan in Bengbu</td>
<td>monzonitic granite</td>
<td></td>
<td>165±1±1.5Ma(IA-ICP-MS U-Pb),Li Y et al.,2010;</td>
</tr>
<tr>
<td>TS-1</td>
<td>Northern tushan of huayuan</td>
<td>Gneissic adamellite</td>
<td>162.6 ± 2.3 Ma</td>
<td>163Ma(birotic 40Ar/39Ar),Qiu R L et al.,1999</td>
</tr>
<tr>
<td>LS-1</td>
<td>Northeast of laoshan in</td>
<td>Monzonite</td>
<td>161.1 ± 4.6 Ma</td>
<td>159Ma(SHRIMP Zircon U-Pb)Wang A D et al.,2009;</td>
</tr>
<tr>
<td></td>
<td>Bengbu</td>
<td>granite-porphyry</td>
<td></td>
<td>148Ma(SHRIMP Zircon U-Pb)Li Shuguang et al.,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2014;162±2Ma,160±2Ma(IA-ICP-MS U-Pb)Song L H et al.2016</td>
</tr>
</tbody>
</table>

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References


