A Preliminary Study of Komatiites in Anshan-Benxi-Fushun Region, Northeast China

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Abstract

Discovered for the first time in the Lower Anshan Group with a metamorphic grade from amphibolite to granulite facies, komatiites occur as bedded ultramafic volcanic rocks on the ocean-floor. The komatiites in the Anshan-Benxi-Fushun region occurring in the metamorphic rocks are some monomineralic rocks such as hornblendite, clinopyroxene and hypersthenite. Local komatiites are found retaining some typical pre-existing structures and textures of volcanic rocks, such as blastophanitic and blastoloslitic textures. The chemical composition of komatiites in this region is much similar to that of other well-known model komatiites in the world, and so are their geochemical characteristics.

The occurrence of komatiites in the Anshan-Benxi-Fushun region provides strong evidence showing that this region is an Archean greenstone belt. Studies on komatiites in this region will shed much light on the stratigraphic division of the Anshan Group and the paleo-structure of the greenstone belt as well as on the rules governing metallogenesis in the Anshan-Benxi-Fushun region.

Introduction

A wide variety of studies have been made on Archean metamorphic rocks in the Anshan-Benxi-Fushun region by previous geological workers, thus providing the basis for the investigation of the general geology of this region and the rules governing metallogenesis there. On this basis, the authors have carried out a series of field investigations and integrated studies in the Anshan-Benxi-Fushun region and have come to such a preliminary conclusion that the Anshan Group in the studied region is an Archean greenstone belt\(^1\). In the Lower Anshan Group strata which have undergone varying degrees of metamorphism with a grade from amphibolite to granulite facies are found komatiites which occur as bedded ultramafic and mafic volcanic rocks on the ocean floor. The metamorphic rocks are predominated by hornblendite, clinopyroxenite and hypersthenite. Local komatiites have retained some typical pre-existing structures and textures of volcanic rocks, such as variolitic, schiller and opacitic-edge structures. The komatiites in this region are petrochemically and geochemically similar to those model komatiites abroad. The original rocks are considered to be marine volcanic rocks in the eugeosyncline of an ancient trough. Compared with those in the typical greenstone belts elsewhere throughout the world, the komatiites in this region are characterized by relatively high-grade metamorphism, with dominating basaltic komatiites and poorly de-

\(^1\) Xu Guangrong and Chen Hongjiang, General geology of the Anshan-Benxi greenstone belt (1980)
The occurrence of komatiites in the Anshan-Benxi-Fushun region provides convincing evidence to show that this region is an Archean greenstone belt. Studies of the komatiites in this region will shed much light on the stratigraphic division of the Anshan Group and the paleo-structure of the greenstone belt as well as on the rules governing metallogenesis in this region.

**Distribution and Occurrence of Komatiites in the Anshan-Benxi-Fushun Region**

Komatiites are of extensive occurrence in Fushun, Qingyuan, Waitoushan, Nanfen, Gongchangling, Qidashan, Xiaolingzi and other localities. For the convenience of description, arguments for the stratigraphic division of the Anshan Group are presented as follows: (1) The Shanchengzi Formation in which komatiite-tholeiite association is recognized is taken as a key stratigraphical unit in terms of greenstone belt, (2) strata containing the Qidashan iron ore deposit, which were previously designated to the Yingtaoyuan Formation of the Upper Anshan Group, have been confirmed to belong to the Shanchengzi Formation of the Lower Anshan Group and the Yanlongshan Formation of the Middle Anshan Group, on the basis of petrographical correlation, metamorphic grade, characteristics of the metamorphic rock assemblages, features of the original rocks, and isotopic geological ages, (3) the structural framework of Archean basement in the Anshan-Benxi-Fushun region indicates an Archean greenstone basin centred around Liaoyang.

From the top to the bottom, the Anshan Group strata are divided into:

- **Lower Proterozoic Liaohe Group (PtL₁)**
- **Archean Upper Anshan Group (Ara₂)**
- **Guanmenshan Formation (Ara₃y)**
  (consisting of chlorite-sericite phyllite, quartzite, chlorite-serisite schist, biotite-quartz schist, intercalated with thick banded hematite (magnetite) quartzite; > 1,000 m in thickness)
- **Hongshanling Formation (PtL₁g)**
  (consisting of chlorite-biotite schist, biotite-quartz schist, quartzite, banded hematite (magnetite) quartzite, interlayered with iron ore beds)
- **Middle Anshan Group**
- **Dayugou Formation (Ara₂d)**
  (consisting mainly of biotite granulite, intercalated with minor leucogranulite and schist, and locally of minor epidote-plagioclase amphibolite; multi-layered banded magnetite quartzite occurring locally in the biotite granulite; 2,474 m thick)
- **Yanlongshan Formation (Ara₃y)**
  (consisting of four members) a total thickness of 3,032 m.

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