

新疆及邻区地质与矿产研究进展*

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关键词 金属成矿作用; 地质; 天山; 准噶尔; 新疆; 中亚成矿域; 古亚洲洋

中图法分类号 P611

1 Scientific papers about Xinjiang geology and ore deposits in last 20 years

Scientific research projects mainly supported by the Ministry of Science and Technology of the People's Republic of China (organized by the National 305 Project Office), National Natural Science Foundation of China, and China Geological Survey strongly promote the studies on geology and explorations for mineral resources in Xinjiang during last 20 years. With these accomplishments, Chinese geologists published 5153 scientific papers about Xinjiang geology and mineral deposits during 1987–2006 based on the *Database of Chinese Scientific Journals*. The number of papers increased from 162 (in 1987) to 439 (in 2006, see Fig. 1a). Studies relating with mineral deposits are the most-hot topics (774 papers), which is followed by Geochemistry, Volcanism, Granite, Tectonic, and Paleontology (Fig. 1b). 708 papers about geology and mineral resources in Tianshan were published during last 20 years. Tianshan is followed by Junggar, Tarim, Artay, Beishan, and Kunlun Mts.

(Fig. 1c). However, only 124 papers were published on the SCI-included Chinese Journals (86 papers were published on *Acta Petrologica Sinica*).

2 Brief outline of north Xinjiang geology

North Xinjiang, belonging to the east part of the Kazakhstan-Junggar plate, contains many different ophiolite melanges (or belts) formed during Early Paleozoic (Zhu B *et al.*, 1987; Kwon *et al.*, 1989; Zhang and Zhai, 1990; Zhang and Huang, 1992; Huang *et al.*, 1995; Liu and Pan, 2006; He *et al.*, 2005, 2007). The recently discovered Taerbahatai ophiolite melange in Tacheng formed at Early Ordovician (478 Ma, Zhu and Xu, 2006). During Late Paleozoic, Paleo-Asian Ocean (PAO) was limited only in Zaysan-erqisi and South Tianshan. The first divided Kazakhstan-Junggar plate from Siberian plate, and the south Tianshan Ocean separated Kazakhstan-Junggar plate from Tarim plate. Devonian-Carboniferous volcanic-sedimentary strata distribute around Kazakhstan-Junggar plate. For example, Devonian volcanic-

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sedimentary strata around Junggar basin (Xu *et al.*, 2001; Kurchavov *et al.*, 2002; Zhu *et al.*, 2002; Zhu and Ogasawara, 2004; Shan *et al.*, 2007; Yuan *et al.*, 2007), and Devonian-Carboniferous volcanic rocks along Tianshan Mts. (Zhao *et al.*, 2004; Zhu *et al.*, 2005, 2006; Wang *et al.*, 2006). Many gold deposits were found in these volcanic-sedimentary strata such as Axi and Jingxi-Yiermande in Tianshan (Dong and Sha, 2005; Xiao *et al.*, 2005), Hatu, Baobei, Saertuohai and Baogutu in western Junggar (Shen and Jin, 1993; Wang and Zhu, 2007; An and Zhu, 2007).

Permian period corresponds to the adjustment of Xinjiang tectonics recorded by wide distributions of mantle-derived magmatism (Li *et al.*, 2004; Yang *et al.*, 2006; Chen and Han, 2006) with bimodal volcanism locally. Copper-nickel deposits such as Kalatongke and Huangshan formed at this stage (Zhou *et al.*, 2004; Wang *et al.*, 2006; Mao *et al.*, 2006). Indosinian Movement in Xinjiang and its adjacent regions was recognized recently (Zhu, 2007), which is recorded by the intrusion of small felsic intrusive-pegmatite-mafic dyke (most of them contain rare metal ores, for example, Keketuohai pegmatite No. 3) and large shear zones (some of them relate with gold deposits, for example, Tianger-Wangfeng-Saridala, Sawayaerdun, Muruntau, and Dashankou, Wilde *et al.*, 2001; Yang *et al.*, 2006; Zhu *et al.*, 2007; Liu *et al.*, 2007). The pegmatite rim zone of Keketuohai pegmatite No. 3 was dated to be 218.4 ± 5.8 Ma by Rb-Sr isochron (Zhu *et al.*, 2006), consistent with zircon SHRIMP dating results (213 ~ 228 Ma, Wang T *et al.*, 2007). Similar geochemical characteristics, including $\varepsilon_{\text{Nd}}(T)$ values (ranging from -0.76 to -3.04) for apatites and for whole-rock samples of the related two-mica granites and pegmatite (ranged from -1.40 to -3.21), suggest that these rocks were derived from a common magma source (Zhu *et al.*, 2006). Sedimentary basins formed during Jurassic are the most important oil-preserving structures in Xinjiang. Coal is mined from Jurassic strata in Xinjiang. Jurassic magmatic rocks are very limited. The Jurassic olivine basalt occurring in west Junggar contains magmatic siderite (Xue and Zhu, 2007).

3 About this Special Issue

This special issue (I and II) is devoted to the International Workshop on Central Asian Metallogeny and Orogenesis. Herewith, 46 papers were finally selected from 72 submitted manuscripts via the review procedure of the Acta Petrologica Sinica. These papers generally could be grouped in following 4 sections:

3.1 Geology

13 papers of this group in the issue (II) show the new data and results on studying of geology in Xinjiang and adjacent regions. He *et al.* find microfossils in Keramay Ophiolitic m lunge, which suggest that the ophiolitic m lunge was formed during Early Paleozoic. This newly discovered Keramay ophiolitic m lunge (Xu *et al.*, 2006) with complex evolution history (Zhu and Xu, 2007) distribute along the west edge of Junggar basin. Xu *et al.* (2007) report a new outcrop of ophiolite m lunge, which belongs to the most western part of Kelameili ophiolite

belt. These authors studied the metagabbro and pyroxenite in Kamste ophiolite section. Li *et al.* (2007) report SHRIMP data of detrital zircons from sandstone of previous Devonian Kelameili Formation, which are significant for understanding the basement of Junggar basin. Liu X *et al.* (2007) provide new geochemical data of Kelameili ophiolite and suggest that ridge subduction happened. Niu *et al.* (2007) report $^{40}\text{Ar}/^{39}\text{Ar}$ dating of phengite in quartz-magnetite, and argued that the exhumation of the Zaheba-Almantai ophiolite took place during Early Permian. Yuan C *et al.* (2007) provide new zircon U-Pb data constraining the deposition time and tectonic background of the Habahe Group in Chinese Altay Mts. Lu *et al.* (2007) report metabasite exposed in graphite-bearing garnet-phengite-quartz schist along Habutengsu River in southwestern Tianshan, and study the petrology and P-T evolution of the well-preserved eclogites. He J *et al.* (2007) study the Neoproterozoic sequence stratigraphy and correlation in Tarim. Novikov and Sokol (this issue) show combustion metamorphic events as age markers of orogenic movements in Central Asia. Wu *et al.* (2007) provide multi-grain fraction analysis of clay minerals and discusses the geological significance of Jurassic sedimentary environment and diagenesis in Kuqia depression. Zhu W *et al.* (2007) provide new apatite fission track data showing the uplift and exhumation history of the Precambrian basement of Northern Tarim. Zhang Z *et al.* (2007) reveal the thermal history of the Jurassic strata in northern Tianshan by apatite fission-track and vitrinite-reflectance analysis.

3.2 Volcanism

Late Paleozoic volcanic rocks have been extremely focused by geologists (see Fig. 1b) due to not only the exploration for gold deposits (e.g., Axi, Jinxi-Yiermande, Hatu, and Baobei gold deposits), but also because of the significance for reconstruction of PAO. In this volume, Zhao *et al.* (2007) review the magnesian igneous rocks in northern Xinjiang, provide new data and idea to study the evolution of continental crust. Wang Y *et al.* (2007) provide new Sr-Nd-Pb isotope data of Late Carboniferous rhyolite in eastern Tianshan. Shan *et al.* (2007) describe geochemical characteristics of the Late Paleozoic high potassium and high silicon ignimbrite in the southern margin of Chinese Altay Mts. Chen *et al.* (2007) provide new zircon SHRIMP U-Pb data for igneous rocks from southern margin of the Alataw Mts. Zhang Y *et al.* describe geochemical characteristics of Cenozoic basalts in east Altay Mts. Jiang *et al.* (2007) study Liuyuan basalts and suggest that these rocks are the products of asthenosphere mantle decompressional melting. Zhu *et al.* (2007) report the discovery of Early Paleozoic OIB-type pillow basalts in west Junggar. Although the tectonic significance of this pillow-basalt occurring in Carboniferous volcanic-sedimentary strata is mysterious, the occurrence of Early Paleozoic ophiolite m lunge nearby (Xu *et al.*, 2006; He *et al.*, this volume) suggests that there should have a terrane related with the relics of Early PAO, which deserves further study.

3.3 Granite

Granite in Xinjiang has been extensively studied (Han *et al.*, 1997, 2006; Liu, 2002; Yuan *et al.*, 2007, and references therewith). In this volume II, Hu *et al.* (2007) provide new SHRIMP U-Pb age for zircons from east Tianhu

gneissic granite (eastern Tianshan) and discuss its tectonic significance. Tang *et al.* (2007) find that the Xianshuiquan gneissic granite in east Tianshan was formed through transformation of the parent granodiorite by fluid and melt. Similar to gneissic granite in Middle Tianshan (Zhu and Song, 2006), hydrothermal zircons were also found in Xianshuiquan gneissic granite. Zhang C *et al.* (2007) provide new geochronology and Sr-Nd isotopic data for Huangjianshishan granite in southern Tianshan. Wang C *et al.* (2007) report Late Paleozoic post-collisional Baleigong pluton in Kokshal region (Southwestern Tianshan). Wang B *et al.* (2007) provide geochronological and geochemical data on Late Paleozoic Borohoro plutons (north of Yili). Thus, the Late Carboniferous to Early Permian granites widely distributed in Junggar region as described by Han *et al.* (2006) also occur in Tianshan Mts. Zhao *et al.* show the geochronology and geochemical characteristics of the Silurian and Devonian granitoids in Liuyuan (Beishan). Zeng QS *et al.* (2007) describe the geochemical characteristics, zircon SHRIMP U-Pb dating and tectonic implication of granitoids in Chinese Altay Mts. Zhou *et al.* (2007) provide new data to confirm the occurrence of high-temperature peraluminous granites in the south margin of Altay Mts. These data provide new evidence to reach the conclusions made by He *et al.* (2005) and Wang *et al.* (2006) previously.

3.4 Ore deposit

The related studies still are hot topics in Central Asia (Веймарн, 1986; Генкин, 1994; Курчавов, 1995; Dzhenchuraeva, 2001; Chen *et al.*, 2003; Hong *et al.*, 2003; Mao *et al.*, 2004; Yakubuchuk, 2004; Seltnann and Porter, 2005; Chiaradi *et al.*, 2006; He and Zhu, 2006; Wang JB *et al.*, 2006; Zhu *et al.*, 2001, 2006, 2007; Yang *et al.*, 2006; Liu J. *et al.*, 2007, also see Fig. 1b). 10 papers collected here reflect the major progresses of the studies on metallogeny and ore-forming processes mainly in Xinjiang. Luo *et al.* (2007) discuss intraplate orogenesis and its implications in metallogenesis. These authors believe that metallogenesis in an intraplate orogen depends on sudden releasing of ore-bearing fluids from various depths of the lithosphere asthenosphere system, and the ore-formation occurs mainly at the initial stage and the post-orogenic extension stage. Berzina and Korobeinikov (2007) analysis Re, Pt, Pd, and Au abundances in several porphyry Cu-Mo deposits in Central Asia. Song and Huang (2007) report Sm-Nd isotopic age of Qieganbulak ultrabasic-

carbonatite complex. Wang YT *et al.* (2007) trace the sources of ore-forming fluids and materials of the Hongshi gold deposit in east Tianshan. Chen W *et al.* (2007) report new $^{40}\text{Ar}/^{39}\text{Ar}$ dating results on the shear zone-type gold deposits from east Tianshan, provide new evidences to support the Indonesian Movement and related ore-forming events in Xinjiang and adjacent regions as previously proposed by Zhu (2007). Tang *et al.* discuss the genetic connection of Sareshike tin deposit with alkaline A-type granites. Zeng Q D *et al.* (2007) describe the geochemical features of sulfur and lead isotopes for gold deposits in Buergen area (Chinese Altay). Xu J *et al.* (2007) study the $\text{CO}_2\text{-CH}_4$ fluids and their relations with gold mineralization in Chinese Altay and Murantau of Uzbekistan.

The discovery of Baogutu porphyry Cu-Au deposit in western Junggar has significant implications (Zhang R *et al.*, 2006; Zhang L *et al.*, 2006). In this volume, Song HX *et al.* (2007) describe the geological natures of Baogutu porphyry copper deposit and provide Re-Os data for molybdenite (Late Carboniferous). The Late Carboniferous porphyry quartz diorite intruded into Early Carboniferous volcanic-sedimentary rocks (SHRIMP age of zircons from tuff is $328.1 \pm 1.8\text{Ma}$, see Wang and Zhu, 2007). Similar to the porphyry Cu-Au deposits in Kyrgyzstan (Jenchuraeva, 1997) and eastern part of Kazakhstan (Seltnann and Porter, 2005), the identified porphyry Cu-Au ore-formation process during Late Carboniferous in western Junggar provides new idea for future geological explorations.

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1 最近 20 年发表的有关新疆地质与矿产的科学论文

国家 305 项目的实施大大地推动了新疆地质研究与矿产资源勘查的深入,为我国西部大开发提供了强有力的基础支撑。由中华人民共和国科学技术部资助的国家科技攻关项目、国家科技支撑计划重点项目和国家 973 项目(国家 305 项目办公室组织实施),由国家自然科学基金委员会资助的重点和面上科研项目、以及由国家地质调查局实施的地质大

调查项目造就了新疆地质科学研究前所未有的繁荣。在取得众多找矿勘探突破的同时,我国地质学家发表了大量科学研究成果。《中国期刊全文数据库》的数据表明,1987-2006 年间发表的有关新疆地质与矿产方面的学术论文 5153 篇(不包括地球物理),论文数逐年增加(图 1a),从 1987 年的 162 篇增加到 2006 年的 439 篇。按主要学科统计发现,涉及矿床学方面的论文最多(774 篇),依次为地球化学、火山岩岩石学、花岗岩岩石学、大地构造和古生物学(图 1b)。从主要研究地域看,有关天山地质的论文最多(708 篇),依次为准噶尔、塔里木、阿尔泰山、北山和昆仑山(图 1c)。需要说

明的是,上述统计数据来自所有公开发行的中文地质学期刊。然而,在地质学中文核心期刊上发表的文章数为1905篇(占37%),在SCI来源期刊上发表的论文仅124篇(其中86篇发表在《岩石学报》上)。

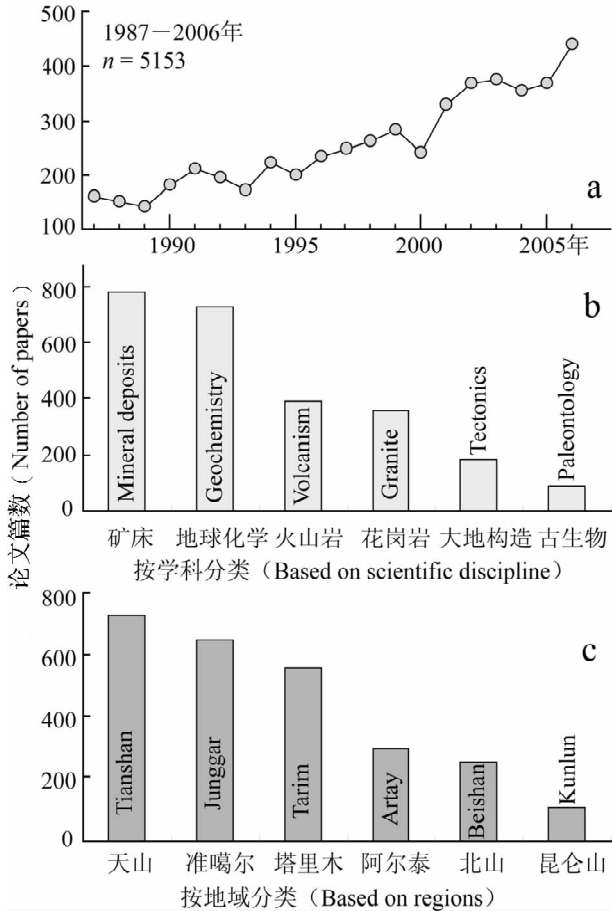


图1 有关新疆地质矿产的科学论文统计
仅限于中文期刊,数据来自中国期刊全文数据库
(<http://www.sy.cnki.net>)

Fig. 1 Scientific papers about geology and ore deposits of Xinjiang published in Chinese Scientific Journals during 1987~2006 (data from <http://www.sy.cnki.net>).

2 新疆北部地质简述

新疆北部处于哈萨克斯坦-准噶尔板块的东段,其中保留了众多古洋壳残片(蛇绿岩带),这些蛇绿混杂岩带主要形成于早古生代(朱宝清等,1987; Kwon *et al.*, 1989; 张驰和翟明国,1990; 张驰和黄莹,1992; 黄建华等,1995; 张立飞,1997; Liu and Pan, 2006; 何国琦等,2007)。最近发现的塔尔巴哈台山蛇绿岩形成于早奥陶世(478Ma,朱永峰和徐新,2006)。晚古生代的古亚洲洋已大大缩小并退缩到南北两侧,北侧为分隔西伯利亚板块的斋桑-额尔齐斯洋盆;南侧为分隔塔里木板块的南天山洋。在哈萨克斯坦东部和新疆北

部的广大地区,围绕着早古生代陆壳发育泥盆纪-石炭纪火山岩带。例如准噶尔周边的泥盆纪火山-沉积建造(许继峰等,2001; 何国琦等,2005; 单强等,2007; 袁超等,2007; Kurchavov *et al.*, 2002; Zhu *et al.*, 2002; Zhu and Ogasawara, 2004)和天山的泥盆-石炭纪火山岩(赵振华等,2003; 朱永峰等,2005,2006; 翟伟等,2006; 王强等,2006)。这些地层中产出众多金矿,如天山的阿希金矿和京希-伊尔曼德金矿(董连慧和沙德铭,2005; Xiao *et al.*, 2005),西准噶尔的哈图金矿、宝贝金矿、萨尔托海金矿和包古图金矿等(沈远超和金成伟,1993; 王瑞和朱永峰,2007; 安芳和朱永峰,2007)。

二叠纪是新疆北部大规模基性岩浆活动的时期,在各个地区见到二叠纪基性侵入体或岩脉(李辛子等,2004; 陈立辉和韩宝福,2006),局部见双峰式火山岩。这个时期的新疆及邻区处于板内均衡阶段,幔源岩浆活动频繁,并形成了一些大型矿床如喀拉通克、黄山等铜矿(Zhou *et al.*, 2004; 韩宝福等,2004; 毛景文等,2004; 吴华等,2005; 王京兵等,2006; 毛启贵等,2006)。印支期的地质事件最近被识别出来(朱永峰,2007)。新疆及其邻区在三叠纪主要表现为形成巨型韧性剪切带,其中产出一些重要金矿,如天格尔-望峰-萨日达拉-萨瓦亚而顿-穆龙套-大山口等, Wilde *et al.*, 2001; Yang *et al.*, 2006; Liu *et al.*, 2007; Zhu *et al.*, 2007)。在阿尔泰山广泛发育花岗伟晶岩脉(多与稀有金属矿床相关)。可可托海伟晶岩3号脉边缘相与其附近二云母花岗岩具有基本相同的地球化学特征表明,伟晶岩与二云母花岗岩同源(Zhu *et al.*, 2006)。伟晶岩边缘相的Rb-Sr内部等时线年龄为 218.4 ± 5.8 Ma (Zhu *et al.*, 2006),与该伟晶岩中锆石的SHRIMP定年结果(213~228 Ma, Wang T. *et al.*, 2007)完全一致。侏罗纪沉积盆地是新疆石油的主要储油构造,新疆的绝大多数煤矿也采自侏罗系地层。侏罗纪岩浆岩分布零星,在西准噶尔出露的橄榄玄武岩中发现了岩浆碳酸岩矿物-菱铁矿(薛云兴和朱永峰,2007)。

3 关于本专辑

为展示最近几年取得的科研成果并进一步促进新疆及邻区地质矿产研究的深入,国家305项目办公室主办“中亚型造山与成矿”国际学术研讨会。我们受国家305项目办公室委托,组织编辑本专辑。通过严格的《岩石学报》审稿程序,最终从72篇投稿中优选了46篇论文。收录的论文由以下四部分组成。

3.1 地质学

这方面在本专辑I中收录了13篇论文,从多个方面展示了有关蛇绿岩、变质岩、地层和构造地质学等方面的研究成果。何国琦等(2007)报道了克拉玛依蛇绿混杂岩中发现的早古生代微体古生物化石,为探讨西准噶尔地区的地质演化提供了重要新资料。该蛇绿混杂岩带不仅具有不同时代

的年龄记录(徐新等,2006),而且其中的地幔岩经历了复杂的动力学过程(朱永峰和徐新,2007)。徐新等(2007)在本专辑(I)中展示了东准噶尔新揭露的卡姆斯特蛇绿岩剖面,并对其中的变辉长岩和辉石岩开展了初步研究。这个新揭露的蛇绿岩剖面位于卡拉麦里蛇绿岩带的最西段。李亚萍(2007)等对卡拉麦里蛇绿岩带南侧出露的卡拉麦里组上部层位的砂岩进行了碎屑锆石 SHRIMP U-Pb 定年,结果表明,砂岩的沉积时代可能是早石炭世晚期,源区地质体主要由奥陶纪—石炭纪活动陆缘岩浆岩和寒武纪—元古代岩浆杂岩等组成。刘希军等(2007)获得的地球化学数据表明卡拉麦里蛇绿岩与洋脊俯冲密切相关。牛贺才等(2007)测定了扎河坝石英菱镁岩中白云母的 $^{40}\text{Ar}/^{39}\text{Ar}$ 同位素年龄。袁超等(2007)对哈巴河群的沉积时代及其构造背景提出了新认识。吕增等(2007)研究了西南天山榴辉岩的岩石学特征并给出了 P - T 演化轨迹。金有等研究了库鲁克塔格新元古代层序地层学的关键科学问题。Novikov and Sokol(2007)对中亚地区煤自燃引起的变质作用及其 $^{40}\text{Ar}/^{39}\text{Ar}$ 年代学开展了系统研究。吴朝东等(2007)报道了库车凹陷侏罗系黏土矿物的研究成果。朱文斌等(2007)研究了塔里木北缘前寒武基底隆升剥露史。张志诚等(2007)利用磷灰石裂变径迹方法反演了天山北缘侏罗系地层的热历史。

3.2 火山岩

新疆晚古生代火山岩的研究是目前的学术热点之一(见图 1b),这不仅是因为在这些火山岩中赋存着一些重要矿床(例如阿希金矿、京希-伊尔曼德金矿、哈图金矿和宝贝金矿等),还因为这些火山岩与古亚洲洋的闭合过程密切相关。在本专辑(I)中,赵振华等(2007)系统总结了新疆北部富镁火成岩的地球化学特征,为深入探讨北疆晚古生代地壳演化提供了新资料和新思路。王银喜等(2007)分析了东天山晚石炭世流纹岩的 Sr-Nd-Pb 同位素地球化学性质。单强等(2007)讨论了阿尔泰山南缘晚古生代高钾高硅熔结凝灰岩的地球化学及其成因。陈必河等(2007)对阿拉套山南缘岩浆岩开展了锆石 U-Pb 年代学研究。姜常义等研究了柳园粗面玄武岩,认为其属于软流圈地幔减压熔融的产物。张元元等(2007)报道了阿尔泰山新生代玄武岩的地球化学特征,为研究中亚地区新生代地幔性质提供了新数据。朱永峰等(2007)在克拉玛依识别出早古生代 OIB 型枕状玄武岩,这种与石炭系地层单元伴生的早古生代枕状玄武岩的地质意义还不清楚,但在其附近发现的早古生代蛇绿岩(徐新等,2006;何国琦等,2007)表明克拉玛依地区存在早古生代古亚洲洋的残余。

3.3 花岗岩

有关新疆花岗岩的研究成果很多(Han *et al.*, 1997; Liu, 2002; Yuan *et al.*, 2007; 金成伟和张秀琪,1993; 王世洸等,1994; 赵振华等,1996; 韩宝福等,1998,2006; 姜常义

等,1999; 宋彪等,2002; 毛景文等,2004; 李华芹等,2004; 王涛等,2005; 张遵忠等,2006; 杨天南等,2006; 朱永峰和宋彪,2006)。本专辑(II)中,胡霁琴等开展的锆石 SHRIMP 年代学研究表明,东天山星星峡地区广泛发育的一些片麻状花岗岩是早古生代岛弧环境的产物。唐俊华等(2007)的研究表明,东天山咸水泉片麻状花岗岩是晚泥盆世花岗闪长岩改造的产物。类似中天山被韧性剪切带改造的天格尔花岗岩中的锆石(朱永峰和宋彪,2006),变型花岗岩中锆石热液增生边的再次发现,说明利用锆石 SHRIMP 年代学方法测定花岗质岩石形成时代的复杂性。张成立等(2007)和王超等(2007)分别论述了西南天山古生代与俯冲有关的花岗岩和晚古生代后碰撞花岗岩。该花岗岩与准噶尔地区晚古生代花岗岩年龄基本相同。王博等(2007)研究了伊犁北部博罗霍努晚石炭世—早二叠世花岗岩。这些研究显示,在准噶尔地区大量发育的晚石炭世—早二叠世花岗岩(韩宝福等,2006)在西南天山也大量出现。郭召杰等(2007)研究了东天山出露的早石炭世浅色花岗岩。周刚等(2007)探讨了阿尔泰山南缘三叠纪强过铝质花岗岩的成因。林锦富等(2007)和范裕等(2007)报道了东西准噶尔晚古生代花岗岩锆石 U-Pb 年龄。赵泽辉等(2007)研究了柳园早志留世和早泥盆世花岗岩并讨论了其构造意义。童英等(2007)和曾乔松等(2007)研究了阿尔泰山泥盆纪同造山花岗岩,进一步证实早—中古生代发生过强烈造山事件(Wang *et al.*, 2006)。

3.4 矿床

有关成矿作用的研究是目前中亚成矿域最重要的热点(Веймарн, 1986; Генкин, 1994; Курчатов, 1995; 陈毓川等,2003; 何国琦和朱永峰,2006; 王京彬等,2006; 朱永峰等,2007; Dzhenchuraeva, 2001; Hong *et al.*, 2003; Mao *et al.*, 2004; Yakubchuk, 2004; Seltmann and Porter, 2005; Chiaradi *et al.*, 2006; Yang *et al.*, 2006; Zhu *et al.*, 2001, 2006, 2007; Liu J *et al.*, 2007,图 1b)。本专辑(II)收录的 10 篇论文反映了中亚成矿域有关成矿作用研究的最新进展。罗照华等(2007)系统论述了板内造山作用与成矿,强调地质过程与成矿作用的密切关系。Berzina and Korobeinikov 对中亚成矿域中一些斑岩铜钼矿中铼和铂族金属元素进行了系统分析。孙宝生和黄建华(2007)报道了且干布拉克超基性岩-碳酸岩杂岩体 Sm-Nd 同位素年龄并讨论了其地质意义。王义天等(2007)示踪了东天山红石金矿床成矿流体和成矿物质来源。陈文等(2007)报道了东天山剪切带型金矿的 $^{40}\text{Ar}/^{39}\text{Ar}$ 年代学研究成果,为新疆的印支运动及相关成矿作用(朱永峰,2007)提供了新的年代学依据。唐红峰等(2007)系统分析了萨惹什克锡矿与萨北碱性 A 型花岗岩的年代学及其地球化学特征。曾庆栋等(2007)分析了布尔根地区造山带型金矿床硫和铅同位素特征并探讨了其成矿意义。徐九华等(2007)研究了穆龙套金矿的 CO_2 - CH_4 流体包裹体。

包古图斑岩铜矿是最近几年新疆发现的典型斑岩型铜

金矿(张锐等,2006;张连昌等,2006),对该矿床进行的勘探工作必将为在新疆寻找类似矿床积累经验。宋会侠等(2007)研究了包古图斑岩铜矿的矿床地质并报道了辉钼矿的 Re-Os 同位素数据。他们提供的数据表明,辉钼矿形成于晚石炭世。晚石炭世含石英闪长斑岩侵入到早石炭世火山-沉积地层中(凝灰岩中锆石 SHRIMP 年龄为 328.1 (1.8Ma,王瑞和朱永峰,2007))。类似吉尔吉斯斯坦(Jenchuraeva, 1997)和哈萨克斯坦东部的斑岩铜金矿床(Seltmann and Porter, 2005),西准噶尔晚石炭世斑岩型成矿作用的确立为在该地区的找矿勘探提供了新思路。

总体看,本专辑(Ⅰ)和(Ⅱ)收录的46篇论文基本反映了当前新疆及邻区的最新研究进展,所报道的大量地质学新观察、岩石学研究、元素和同位素地球化学数据、高精度 $^{40}\text{Ar}/^{39}\text{Ar}$ 和锆石 U-Pb 年龄等对深入探讨古亚洲洋的闭合和中亚成矿域的形成与演化具有重要参考价值。多数文章不仅仅限于年龄数据的报导,而且进行了配套的岩石学和地球化学研究,从地质学、岩石学、地球化学及同位素年龄等多方面系统讨论了地质体(或矿床)的成因及大地构造意义。构造环境是大部分文章所热衷讨论的话题,一些文章注意到这一问题的复杂性,给出了客观和慎重的讨论意见,值得提倡。

致谢 本专辑的出版得到国家305项目办公室以及国家“十一五”科技支撑计划重点项目(2006BAB07B08)的资助。《岩石学报》编辑部对组织完成本专辑提供了大力支持。由于时间和本专辑厚度的限制,一些高质量的论文没有收录进来,我们感到非常遗憾,同时借此机会向所有投稿的专家学者表示衷心感谢。我们还要特别感谢独立审稿专家周新民、莫宣学、张旗、张长厚、张德全、喻学惠、徐学纯、储雪蕾、陈汉林、朱井泉、杨建军、宋彪、周洪瑞、赖少聪、胡圣标、韩宝福、魏春景、陈斌、李才、秦克章、闫升好、杨天南、王国灿、王河锦、王玉往和王彦斌,他们的辛勤劳动对保证本专辑的高质量有重要意义。

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