



Society news



A report of Second Workshop of IGCP-662 project “Orogenic architecture and crustal growth from accretion to collision” and Field excursion “Gobi Altai accretionary orogen”, July 4-10, Mongolia

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The IGCP 662 (2018-2023) is a newly approved and supported project in March, 2018, by International Geoscience Programme (IGCP). The second workshop and field trip of the IGCP-662 project, hosted by the Institute of Geology, Chinese Academy of Geological Sciences and titled “Orogen architecture and crustal growths from accretion to collision”, were successfully held in Mongolia during July 4-10, 2019. About 100 participants from 14 countries such as China, Mongolia, Russia, Czech Republic, Australia, South Korea, Japan, Brazil, Pakistan, Canada, Holland, India, Indonesia and Vietnam attended the meeting, including three PhD students from developing countries supported by the IGCP-662 Project. The Mongolian University of Science and Technology (MUST), the Institute of Paleontology and Geology of the Mongolian Academy of Sciences (MAS), Institute of Astronomy and Geophysics of the MAS, the Czech Geological Survey and other institutions co-operated in organizing the workshop and field excursion. This workshop also contributes to the 60th anniversary of the establishment of the MUST, and to the 80th anniversary of the Mongolian Geological Survey. The meeting was held at the Mongolian University of Science and Technology in

Ulaanbaatar and chaired by Prof. Ochir Gerel, Director of Geoscience Center at the MUST. The meeting began with a moment of silence for Alfred Kröner, Professor of Geology at Johannes Gutenberg University of Mainz, Germany, Visiting Research Professor at the Beijing SHRIMP Center, and Academician Onongo Tomurtogoo of the Institute of Paleontology and Geology, MAS in memory of their outstanding contributions to geological research on the Central Asian Orogenic Belt (CAOB) and the education of young scientists. Subsequently, Prof. Baatar Ochirbat, President of the MUST, and Mr. Namsrai Munkhbileg, on behalf of the Ministry of Mining and Heavy Industry of Mongolia, delivered welcoming speeches. Prof. Tao Wang, the leader of the IGCP-662 project, introduced the project, its main research purpose, its implementation and the future work plan (for example, a session will be held at the International Geological Congress next year).

Forty-one oral and poster presentations discussed the geology, petrology, geochemistry, geophysics and mineral resources of Central and South Asia. Prof. Karel Schulman from the Czech Geological Survey and Professor of Strasbourg University, France gave an invited talk titled “Accretionary and collisional

processes forming Mongolian tract of the CAOB". He summarized several years' research done together with Mongolian colleagues and proposed a hypothesis that the Paleozoic CAOB shares features of "interior" collisional and "peripheral" accretionary types of orogens that was proved by Hf isotopic data.

Prof. Tao Wang and colleagues presented granitoid Nd isotope mapping of typical collisional Qinling-Dabie and accretionary CAOB, showing the difference in source for two orogens: deep old crustal for Qinling-Dabie, and juvenile for CAOB. Prof. Dmitry Gladkochub, one of the leaders of the IGCP-662 project, and colleagues presented research done in the Baikal collisional metamorphic belt with prolonged magmatism in the Olkhon terrane from 470 to 450 Ma that reflects the influence of the mantle plume on the collision tectonics at the stage of the collapse of the Early Paleozoic collision orogen. In their presentation Prof. Suzanne O'Reilly and William Griffin, the leaders of the IGCP-662 Project, discussed the Global Lithosphere Architecture Mapping project that worked over 15 years to integrate geophysical, geochronological, tectonic, microstructural, petrological and geochemical data in a GIS digital environment, and has illuminated the 4D structure and composition of the lithospheric mantle, and finally concluded that the subduction process does not give large volumes of new continental crust. Prof. Ochir Gerel with

co-authors presented new geochronological and geochemical data on the Orkhon-Selenge volcanic-plutonic belt of the Mongol-Okhotsk Orogen and concluded that arc-related volcanics and intrusions with associated Cu-Mo deposit were formed during subduction. Dr. Tatiana Donskya and co-authors presented geochemical data on post-collisional felsic and mafic rocks of the South Siberian magmatic belt related to subduction and collision events. In the presentation of Dr. Dmitry Konopelko and colleagues, new magmatic, metamorphic and detrital zircon ages for regionally metamorphosed in early Carboniferous the Baisun block of the western South Tien Shan have been presented. Prof. Yukio Isozaki from Tokyo University reviewed the early Paleozoic evolution of Japan and introduced several new aspects related to the timing of the major tectonic change. Dr. Bold Uyanga and Prof. Yukio Isozaki using zircon U-Pb geochronologic data from gneisses and overlying meta-sedimentary rocks proposed a Proterozoic to early Paleozoic tectonic evolution model of the Gargan block and confirmed the existence of Neoproterozoic-Neoproterozoic basement in the Tuva-Mongol terrane.

Researchers from Russian Geological Research Institute (VSEGEI) Dr. Oleg Petrov, Viktor Snezhko, Vladimir Khalenev and Alexander Larionov introduced comprehensive results on integration isotope data and geological map



Fig. 1. Second Workshop participants. July 4, 2019, Ulaanbaatar, Mongolia

resources for the Deep-time Digital Earth (DDE) International Project. A dictionary of about 500 terms was developed and includes 9 Asian languages.

Two presentations related to the Korean peninsula. Dr. Taehwan Kim from Seoul National University and colleagues introduced data of late Neoproterozoic rift-related rocks might provide the Pacific-Gondwana zircon in the Paleozoic Gondwana 'mid-pile'. Prof. Moonsoo Cho and co-authors from the Chungbuk National University using U-Pb detrital zircon ages of Cambrian-Ordovician sandstones of the Taebaeksan basin contributed to the paleogeography of the early Paleozoic. Dr. Bui Vinh Hau from Hanoi University of Mining and Geology presented together with colleagues from the Chungbuk National University the P-T evolution and monazite geochronology of metapelitic schists from the Nam Co accretionary complex, Vietnam.

Dr. Chunjing Wei from Peking University and colleagues presented the P-T condition of metamorphism in Inner Mongolia describing tectonic evolution from Early Paleozoic (500-420 Ma) to Early Triassic (~240 Ma).

Several interesting and well-prepared presentations and posters based on isotopic data done by researchers from the Institute of Geology, Chinese Academy of Geological Science. These are: Beishan Orogen crustal evolution and tectonic implication by Zhen-Yu He and Reiner Klemd, Hf isotopic mapping of Paleozoic granitoids in the Yili Block by Dr. He Huang and co-authors, Tectonic affinity of northern Longshouan-Beidashan based on zircon geochronology by Dr. Zhang Lei and co-authors, Deep crustal composition of the Altai and East Junggar orogen by Peng Song and colleagues, Early Cretaceous forearc extension in the Neo-Tethyan subduction zone an example of mafic dike swarms, by Dr. Lingsen Zeng with co-authors, Statistical analysis of deep ancient crustal components an example of Altai-East Junggar by Dr. Jainjun Zang and colleagues.

Poster of Jorgy de Vries and colleagues presented the origin of the Ordovician Gubaoquan eclogite in the Beishan Orogenic collage.

Presentations of researchers from the Institute of Mineral Resources, Chinese Academy of Geological Sciences include large-scale Late Triassic-Early Jurassic I type felsic rocks of the Great Xing'an Ranges a result of the final closure of the Mongol-Okhotsk Ocean Dr. Yinglei Li and Guang Wu, Genesis and tectonic setting of adakitic intrusive rocks in the Upper Hailongjiang Basin by Dr. Guang Wu and co-authors.

Young Mongolian researchers from the Institute of Geology, MAS and MUST presented the results of their PhD work and a project of the Mongolian Research Foundation. Dorjsuren Otgonbaatar and colleagues has made a comparative study of Western Pacific and CAOB accretionary systems, a PhD student of the Charles University in Prague Sukhbaatar Turbold and co-authors discussed new geochronological, structural and petrological data from the Tseel unit in the Chandman area. Baatar Gendenjamts and co-authors posted new geochemical and geochronological data of the Dulaankhan pluton from North Mongolia. Dr. Otgonkhuu Javkhlan and colleagues presented a study entitled Multiple metamorphic events recorded within eclogites of the Chandman district Mongolian Altai. Lkhagvasuren Dagva-Ochir and colleagues presented a study done on middle Paleozoic oceanic basalts of the Tsetserleg accretionary terrane in Central Mongolia.

Interesting and new data were presented by geophysicists, among them a crustal structure study in Mongolian Altai by Tsagaan Baasanbat and Tsermaa Baatarchuluun from the Institute of Astronomy and Geophysics MAS, Dr. Alexandra Guy and co-authors presented Multiscale geophysical characteristics of the CAOB to understand the crustal structure beneath southern Mongolia. Dr. Konstantin Seminsky and Sodnomsambuu Demberel presented a study of stress field and fault zones at the Ulaanbaatar city, and Dr. Zhanwu Lu and colleagues investigated Seismic Bright spot in Qiangtang terrane using deep seismic reflection profiling and proposed the presence of Precambrian crystalline basement in the study area. He Hou and co-authors reported the latest results of deep seismic reflection profiling in

eastern CAOB. Dr. Leo Guo posted results of joint Mongolian-Chinese research to determine the geochronology and isotopic study of Neoproterozoic granitoids in South Mongolia and Ulaan Badarkh pluton in South Mongolia by Huaimin Xue.

Yasir Shaheen Khalil from Pakistan has shown in his presentation geological and geophysical

data of the Mashki Chah porphyry Cu-Au-Mo deposit formed in magmatic arc. Gabriel Sombini dos Santos, a PhD student of Waterloo University in Canada and colleagues presented an ophiolite study from the Beishan Orogen.

After the workshop, more than 70 participants from 9 countries took part in a 5-day field trip to the southwest of Mongolia. Researchers



Fig. 2. Field excursion participants, July 5-10, 2019, Gobi Altai, Mongolia



Fig. 3. Field excursion in Gobi-Altai, July 5-10, 2019

investigated the Paleozoic rock assemblages and structures in the southwest of the Mongolian Lake Zone and Altai tectonic belts, including Erdene Uul ophiolite, Boomyn Khudag Cambrian molasses, Tsogt metamorphic complex with high-grade metamorphism, Khaya Khudag Cambrian arc gabbro, high-pressure mica schist, eclogite and Cambrian fossil-bearing limestone. During the field trip, Prof. Karel Schulmann and Dr. Pavel Hanžl gave a detailed introduction to the mapping results of the cooperation between the Czech Republic and Mongolia over the past 20 years, and conducted full exchanges and discussions with researchers from different countries in the field. The field trip helped all

participants to develop a deep understanding of the early evolution of the Central Asian Orogenic Belt, and expanded their knowledge of the composition and structural characteristics of the accretionary orogenic belt as well.

During the workshop and field excursion researchers from different countries conducted extensive exchanges on the cooperation among various research teams and related institutes, achieving significant outcomes. The IGCP-662 project is an excellent platform to collaborate and exchange knowledge, stimulate discussion and will contribute to understanding the origin and evolution of the largest orogenic belt in the world - the Central Asian Orogenic Belt.

Field Guide published and is available

https://www.researchgate.net/publication/334174351_IGCP-662_Project