

**RUSSIAN COMMITTEE OF THE UNESCO INTERNATIONAL  
GEOSCIENCES (IGCP) AND GEOPARKS PROGRAMME**

**ANNUAL REPORT ON IGCP ACTIVITIES FOR 2020**

This report informs on the Russia's activities in the IGCP projects in  
2020

Co-Chairman of the Committee:

Acad. Mikhail A. Fedonkin

GIN RAS, Pyzhevsky,

7, 119017

Tel: + 7 495 951-75-00/ 8 495 953 37 91

Fax: +7 495 953 37 64

E- mail: igcpcrus@ginras.ru

**Projects with Russian co-leaders**

**Project 653- The Onset of the Great Ordovician Biodiversification  
Event (2016-2020)**, Dr. Obut O.T., Institute of Petroleum Geology and  
Geophysics, Siberian Branch, RAS, Novosibirsk

**Project 662 Orogenic architectures and crustal growth from accretion  
to collision (2018-2022)**, Dr. Gladkochub D.P. , Institute of Earth Crust , SB  
RAS, Irkutsk; Dr. Safonova I. Yu, Institute of Geology and Mineralogy, SB  
RAS, Novosibirsk.

**Project 675 Sandstone-type Uranium Deposits (2019-2023)**, Dr. Petrov  
V.A., Institute of Geology of Ore Deposits , Petrography, Mineralogy, and  
Geochemistry ( IGEM) RAS, Moscow

Russian geoscientists are members of 11 IGCP projects, including 1 project  
started in 2020: Nos.: 648, 652, 653, 655, 662, 667, 668, 673, 675, 679, and  
**709**. This report has been prepared on the basis of the information submitted  
by Russian members IGCP projects in response to the Committee's request  
for information on significant developments in 2020.

**Project 648 Supercontinent Cycles and Global Geodynamics, (2015-  
2019, OET)**

The report was presented by Dr. Gladkochub D.P. and Donskaya T.V.,  
Institute of Earth Crust, Siberian Branch RAS, Irkutsk

The main results of the research activities in 2020:

- we present a geological, geochronological, geochemical and Nd isotopic data on the latest Paleoproterozoic dolerite sills, exposed in the Biryusa inlier of the southern Siberian craton. One dolerite sill yielded U-Pb (ID-TIMS) baddeleyite age of  $1613 \pm 5$  Ma. New geochronological data allow reconsider previously reported Neoproterozoic age of sedimentary sequence hosting dolerite sills studied and suggest for them at least Paleoproterozoic age. Geological, geochemical and Nd isotopic data suggest that mafic melts responsible for genesis of the dolerites were generated in an intracontinental extensional setting from homogeneous mantle source produced by interaction between OIB and ACR-like magmas. Geochemical features of the studied dolerites together with geological observations, namely – a presence of coeval rift-related sedimentary strata in the neighboring Urik-Iya graben, suggest overall extensional tectonic environments in the southern part of the Siberian Craton at the latest Paleoproterozoic. Synthesis of data on ca. 1.65 – 1.58 Ga magmatism around the world as well as intracontinental basins within Nuna supercontinent suggest the overall extensional tectonic environments, probably related to the retreat of subduction slabs surrounded the supercontinent,

- we present 26 reliable Precambrian paleomagnetic poles for Siberian Craton. Their analysis together with geological data implies low-to middle latitudinal positions of the craton at 1870 – 760 Ma. Geological data suggest that the craton has been completely assembled at ca. 1860 Ma and that at 1800-1100 Ma the western, northern and eastern margins of the craton faced oceans, but the southern margin has been in close proximity or connection with another continent, most likely with Laurentia.

### **Publications**

1. Gladkochub D.P., Donskaya T.V., Pisarevsky S.A., Salnikova E.B., Vazukabzov A.M., Kotov A.V., Motova Z.L., Stepanova A.V., Kovach V.P. Evidence of the latest Paleoproterozoic (-1615 Ma) mafic magmatism the southern Siberia: extensional environments in Nuna supercontinent// Precambrian Research, 2021, accepted.

2. Pisarevsky S.A., D.P. Donskaya T.V. Precambrian paleogeography of Siberia. In: Pesonen L.J., Salminen J., Evans D.A.D. Elming S.-A., Veikkolainen T. Eds.), Ancient Supercontinents and the Paleogeography of the Earth. Elsevier, 2021, accepted.

### **Project 652 Reading Geologic Time in Paleozoic Sedimentary Rocks (2017 -2021)**

The report was presented by Dr.N.G. Izokh, Institute of Petroleum geology and geophysics, SB RAS, Novosibirsk.

The main results of activities in 2020:

- for the first time the Late Devonian conodonts from the siliceous and carbonate rocks of the Akbasay Formation on the left side of the Kule

Gorge, Zeravshan-Gissar mountainous area (Uzbekistan) were studied. (Izokh et al., 2020). Seven conodont zones were defined for the Frasnian-Famennian interval (from the *guanwushanensis* Zone up to *expansa* Zone). The studied collection of Late Devonian conodonts from the upper Akbasay Fm. is represented by cosmopolite taxa of the genera *Zieglerina*, *Palmatolepis* and *Polygnathus*, among which *palmatolepids* are predominant.

## **PUBLICATIONS**

IZOKH, N.G., ERINA, M.V., OBUT, O.T., ABDIEV, N.KH., KIM, A.I. & RAKHMONOV, U.D. 2020. Late Devonian Conodonts from the Zeravshan-Gissar Mountainous Area, Uzbekistan // *Paleontological Journal*. 54(2): 149–156. DOI: 10.1134/S0031030120020057

### **Project 653 The Onset of the Great Ordovician Biodiversification Event (2016-2020)**

The report was presented by Drs. Obut O.T., Institute of Petroleum Geology and Geophysics, SB RAS, Novosibirsk and Dronov A.V., Geological Institute RAS, Moscow.

#### **The main results in 2020:**

- due to the COVID-19 pandemic in the year 2020 all international meetings connected with IGCP Project 653 have been postponed or abandoned. However investigations on the Project continue. In the beginning of the year during the Paleostrat-2020 meeting and LII Annual Tectonic Conference the reports have been presented on results of the recent investigations of the Ordovician of the Omulev Mountains and Siberian platform. The main conclusions were as follows: 1) Caledonian orogenic movements in these two regions were not simultaneous; 2) Omulev microcontinent seems to be connected to the North China platform but not the Siberian.

In June 2020 during the field work in Pskov region the magnetostratigraphic investigations of the unique Ordovician section in the old quarry near the former village Mishina Gora were carried out for the first time. Results of this investigation support hypothesis on existence of the Moyero Superchron of the reverse polarity. In August 2020 during the field work on the north of Siberian platform the reference section of the Ordovician along the Moyero River valley has been investigated. The main result was that the thickness of the Lower Ordovician part of the section turns out to be about 470 m, but not around 60 m like it was suggested by our predecessors.

## **Publications**

1. Dronov, A.V., Mozoleva I.N. 2020. Preliminary results of the studies of the Upper Ordovician sedimentary sequences, depositional environments and facies in the “Mirny Creek section” (Omulev Mountains, North East of Russia. In: Alekseev A.C. and Nazarova V.M. (eds.) PALEOSTRAT-2020. Annual Meeting (Scientific Conference) of the Palaeontological Section of the MOIP and Moscow branch Of the Palaeontological Society. Moscow, 27-29 of January 2020. Program and Abstracts. Moscow, Palaeontological Institute of RAS. P. 17-18
2. Lindskog, A., Eriksson, M.E., Rasmussen, J.A., Dronov, A., Rasmussen, Ch.M.Ø. 2020. Middle Ordovician carbonate facies development, conodonts biostratigraphy and faunal diversity patterns at the Lynna River, northwestern Russia. *Estonian Journal of Earth Sciences*, 69, 1, pp. 37-61, doi.org./10.3176/earth.2020.03
3. Dronov A.V. 2020. Reflection of the Caledonian tectonic events in the sedimentary cover of the Siberian platform. In: Degtyarev K.E. (ed.) *Fundamental problems of tectonics and geodynamics*. V.1. Proceedings of the LII Annual Tectonic Conference. Moscow, GEOS, p. 210-213.
4. Ainsaar, L., Tinn, O., Dronov, A., Kiipli, E., Radzevičius, S., Meidla, T. 2020. Stratigraphy and facies differences of the Middle Darriwilian Isotopic Carbon Excursion (MDICE) in Baltoscandia. *Estonian Journal of Earth Sciences*, 69, 4, pp. 214-222, doi.org./10.3176/earth.2020.16

### **Field work activities**

In June of 2020 the field activities were carried out in Pskov region and in August of 2000 the field activities were performed the North-East of the Siberian Platform.

### **Project 662 Orogenic architecture and Crustal Growth from Accretion to Collision (2018-2022).**

The report was presented by Dr. Gladkochub D.P. and Donskaya T.V.,  
Institute of Earth Crust, SB RAS, Irkutsk

The main results of the project activities in 2020:

-in 2020 D.P. Gladkochub and T.V. Donskaya, as part of a large international team, made a major generalization on the granitoids responsible for the assembly of the Asian continent. Granitoid respond to assembly of continents, particularly microcontinents, is an interesting but disputed issue. The Asian continent consists of many

microcontinents/blocks and is an ideal natural laboratory to approach this issue. We present a series of digital maps of granitoids from Neoproterozoic to Cenozoic, firstly summary spatial-temporal evolution of granitoids in Asia, and demonstrate their record of assembly of the Asian continent. This study also highlights two ways or mechanisms for continental assembly: accretion and collision. The former (e.g., the Central Asian Orogenic Belt) is characterized by mainly voluminous metaluminous granitoids dominated by juvenile source, whereas, the latter (e.g., the Central China Orogenic System and Himalaya Tethys) by peraluminous granitoids recycled from ancient continent.

### **Publications**

1. Wang T., Tong Y., Wang X., Guo L., Zhang H., Huang H., Zhang J., Li Z., B. Eglinton, Donskaya T.V., Gladkochub D.P., Petrov O., Li S., Zhang L., Wang C., Song P., Wang Y. Granitoid record of the assembly of the Asia continent // *Earth-Science Reviews*, submitted.
2. Wang T., Seltmann R., Huang H., Tong Y., Gladkochub D., O'Reilly S.Y., van Staal C., Hou Z., Safonova I., Xiao W. Orogen architecture and crustal growth from accretion to collision (IGCP#662): *Scientific Activities 2018-2019 // Episodes*, 2020, in press.

### **Project 673 The End of a Supereon – Winners and Losers at the Precambrian-Phanerozoic Transition (2019-2020)**

The report was presented by Acad. Fedonkin M.A., Geological Institute RAS, and Dr. Ivantsov A. Yu., Paleontological Institute, RAS, Moscow

The main results of research activities in 2020:

Secular variation of  $^{87}\text{Sr}/^{86}\text{Sr}$  in carbonate strata has been widely used in regional and global chemostratigraphic correlations. Typically, diagenesis results in higher  $^{87}\text{Sr}/^{86}\text{Sr}$  signals relative to their primary composition due to the alteration by Rb-rich fluids and radiogenic decay of  $^{87}\text{Rb}$  to  $^{87}\text{Sr}$ . Surprisingly,  $^{87}\text{Sr}/^{86}\text{Sr}$  values in the Ediacaran limestones from Saudi Arabia (from 0.7029 to 0.7059) are significantly lower than typical Ediacaran seawater values (mostly from 0.7080 to 0.7090) based on a global compilation. Understanding the origin of these anomalies is important insofar as early microfossils are preserved in these strata. Two hypotheses have been independently evaluated in this study. The first hypothesis shows a low temperature scenario with isolated oceans or lakes in proximity to a mafic source. The second hypothesis is characterized by a high temperature scenario with profound overprints by juvenile hydrothermal fluids. Integrated Sr and Nd isotope data reveal that the  $^{87}\text{Sr}/^{86}\text{Sr}$  anomalies are closely coupled with positive  $\epsilon\text{Nd}(t = 560 \text{ Ma})$

values (up to +4.1). Covariations between  $^{87}\text{Sr}/^{86}\text{Sr}$ ,  $\epsilon\text{Nd}$ , TOC,  $\delta^{13}\text{C}_{\text{carb}}$ ,  $\delta^{13}\text{C}_{\text{org}}$ , and  $\delta^{18}\text{O}_{\text{carb}}$  were found. Based on multiple lines of petrographic, field, and geochemical evidence, the second hypothesis (i.e., hydrothermal alteration by juvenile fluids) is preferred in this study. We argue that the concept that the Ediacaran biotic radiation took place in an isolated lake environment should be treated with caution. These remarkably low  $^{87}\text{Sr}/^{86}\text{Sr}$  signals have neither temporal nor biogeochemical significance. Sr isotope chemostratigraphy in this particular region may not be a reliable tool for stratigraphic correlations.

### **Publications**

1. Huan Cui, Alan J. Kaufman, Haibo Zou, Fayek H. Kattan, Peter Trusler, Jeff Smith, Andrey Yu. Ivantsov, Thomas H. Rich, Ashraf Al Qubsani, Abdullah Yazed, Xiao-Ming Liu, Peter Johnson, Steven Goderis, Philippe Claeys, Patricia Vickers-Rich. Primary or secondary? A dichotomy of the strontium isotope anomalies in the Ediacaran carbonates of Saudi Arabia // *Precambrian Research*, Vol. 343, 2020, 105720, <https://doi.org/10.1016/j.precamres.2020.105720>.

2. Huan Cui, Alan J. Kaufman, Haibo Zou, Fayek H. Kattan, Peter Trusler, Jeff Smith, Andrey Yu. Ivantsov, Thomas H. Rich, Ashraf Al Qubsani, Abdullah Yazed, Xiao-Ming Liu, Peter Johnson, Steven Goderis, Philippe Claeys, Patricia Vickers-Rich. A hydrothermal origin of the strontium isotope anomalies in Ediacaran carbonates of Saudi Arabia / Abstract for the Geological Society of America Annual Meeting 2020

### **Project 675 Sandstone-Type Uranium Deposits (2019-2023)**

The report was presented by Dr. Petrov V.A. IGEM RAS, Moscow.

The main results of research activities in 2020:

- the direction of work was defined for the period of 2019-2024 years within the Project № IGCP 675 “Sandstone-Type Uranium Deposits in Russia” (Chief Executive V.A. Petrov, Professor, Corresponding member of RAS) framework. Together with IGEM RAS a counterpart office FSBI “VIMS” takes part in it. According to the previously approved plan during 2020 year a group of Russian specialists continued accumulation and processing information on Vitim uranium-ore district, as well as analysis of rock samples, metasomatites and ore material from area’s deposits. Results of analytical works on the major deposits and ore manifestation were consolidated in a united tables. We began to identify patterns of

localization of the uranium metallogenic process depending on the type of maternal granites. Our main organization Tianjin Centre of China Geological Survey (Dr. Ruoshi Jin) proposed to hold the 2nd workshop of IGCP 675 in Russia, and not in the USA as it was planned earlier. That proposal was considered either. The Russian team viewed the matter and proposed to use the XIII all-Russian Petrographic conference “Petrology and geodynamics of geological processes” planned for September 2020, from 7 to 14, in Irkutsk city, in Russia, on the base of A.P. Vinogradov Geochemistry Institute of Russian Academy of Science and the Institute of the Earth’s crust of Russian Academy of Science located in Irkutsk. But unfortunately those plans were ruined by pandemic situation of COVID-19 and the conference was postponed. The Russian team also suggested to hold the workshop via videoconference in November 2020, from 23 to 27 as part of the Conference dedicated to the 90th anniversary of IGEM RAS. That invitation was accepted but failed to be implemented because of pandemia. In 2020 we carried out field works in the Southeastern Transbaikalia where volcanic type uranium deposits are localized within Streltsovka caldera. The research goal was to understand the correlation between processes of forming vein-stockwork deposits in the structure and volcanic-sedimentary cover with interbedding deposits in the caldera’s periphery sediments. Unusual geo-structural and mineralogical petrographic data was received. And now the samples are in the preparation stage. Preliminary information was collected about igneous-tectonic structure that located 80 km northeast from Streltsovka caldera, in Kuytun district and characterised for its metallogenic specialization. Fieldwork results and sampling locations were registered in GIS-project with geo referencing and narrative description that can be found in attribute tables which form a unified base of spatial data. We continue our work studying phosphates’ impact on uranium mineralization at Khiagda ore deposit that is of sandstone type (Vitim uranium ore district). Our information summarizing is accompanied by manuscripts’ preparation for articles

- **Publications**

1. Babkin N.Y., Grebyonkin N.A., Koryavko A.I., Kuzmenko P.S., Ledeneva N.V. Evolutionary and deep-geological factors of comprehensive gold-uranium ore formation of Tonodskoyepodnatiye (North Zabaikaliye) // KNTS. M., FSBI “VIMS”, 2020.

2. Doynikova O.A., Tarasov N.N., Kartashov P.M., Petrov V.A. Chernievye phosphate uranium ores of the Vitim plateau (Buryatia) // Radiochemistry. 2020. Vol. 62(4). P. 349-358.

3. Grebenkin N.A., Rogozhina M.A., Rhevskaya A.K., Chistyakova I.E. Uranium deposits of unconformity type – new

discoveries in the Atabaska depression (province Saskatchewan, Canada) // KNTS. M., FSBI “VIMS”, 2020.

4. Kailachakov P.E., Doinikova O.A., Belousov P.E., Vikentiev I.V. Rhenium unique deposit in coal-bearing sands of Carbon of the Russian plate. Report 2. Mineralogy // Lithology and mineral deposits. 2020. № 4. P. 337-370.

5. Prohorov D.A., Starodubov A.V., Ovsyannikova T.M., Grebenkin N.A., Dzyadok S.A., Sredenkov P.L. Experimental and methodological works results of geophysical, isotope-geochemical and biogeochemical methods using at Vitim uranium ore district // KNTS. Edition 161. M., FSBI “VIMS”, 2020. P. 97.

6. Titov N.O., Vasilishina V.V., Prohorov D.A., Rassulov V.A., Karmanov E.N. Petrophysical models for prospecting goals and interpretation results of field geophysics”. KNTS. Edition 161. M., FSBI “VIMS”, 2020. P. 83.

7. Vikentiev I.V., Kaylachikov P.E. Rhenium unique deposit in coal-bearing sands of the Carbon of the Russian Plate. Report 1. Geological structure // Lithology and mineral deposits. 2020. № 3. P. 209-226.

### **Field work activities**

In 2020 we carried out field works in the Southeastern Transbaikalia, where volcanic type uranium deposits are localized within Streltsovka caldera.

### **Project 679 Cretaceous Earth Dynamics and Climate in Asia (2019-2023)**

The report was presented by Dr. Shurygin B.N., Institute of Petroleum Geology and Geophysics SB RAS, Novosibirsk.

The main results of research activities in 2020:

- during 2020, the Siberian (Russian) group of IGCP679 worked on the Cretaceous sections in Russian Far East: Khabarovsk region, the lower reaches of the Amgun river, July 1–31, 2020, I.N. Kosenko. As a result of the work, the Upper Jurassic and Lower Cretaceous were studied, a collection of macrofauna and ichnofossils was collected, and samples for micropaleontological analysis were taken.

In the reference section of the Upper Jurassic and Lower Cretaceous of the lower reaches of the Olenek River (northern Siberia), according to the materials of organic geochemistry, two



levels are distinguished: the Volgian - lower Ryazanian (diasterenic) as the lower level, and the Ryazanian-Valanginian (hopanic) as the upper level. Sedimentological, biofacies, and paleoecological analyzes indicate that these high-carbon layers of the Buolkalakh Formation were formed under conditions of oxygen deficiency.

The uppermost Bathonian-lowermost Berriasian clay horizons (Gol'chikha Formation) of the Yenisei-Khatanga regional depression (northern Siberia) are regarded as probable oil source strata. A detailed biostratigraphic zonation of the sections of the Gol'chikha Formation based on microfossils has been carried out. Comparison of delta C-13(org) variations in the Volgian and in the lower beds of the Ryazanian with those in the Barents Sea shelf and in the northeast of East Siberia provided the basis for more accurate definition of the boundaries of stages and substages in the intervals free of fossils.

Well logs and core analyses of Berriasian-Aptian petroliferous sediments from the western Gydan Peninsula (Western Siberia) are used to model their biofacies and lithofacies and to reconstruct the respective sequence stratigraphy. The sedimentological and palynological data, along with logging results, provide constraints on the history of transgressive and regressive events and make a basis for paleogeographic reconstructions for the Lower Cretaceous deposition of reservoir sand beds.

The possibilities for the selection of a GSSP for the Berriasian Stage of the Cretaceous System are discussed in the paper published by members (including O.S. Dzyuba) of the Berriasian Working Group of ICS's International Subcommittee on the Cretaceous System.

Based on the study of a representative collection of Berriasian-Barremian oysters from Mangyshlak, their taxonomic composition, stratigraphic and paleobiogeographical distribution are clarified.

### **Publications**

1. Kashirtsev V.A., Nikitenko B.L., Pestchevitskaya E.B., Fursenko E.A., Shevchenko N.P. Organic geochemistry and microfossils of the Upper Jurassic and Lower Cretaceous of the lower reaches of the Olenek (northeastern framing of the Siberian platform, Arctic Siberia) // Russian Geology and Geophysics. 2020. V. 61. № 12.

2. Kosenko I.N., Metelkin E.K. Early Cretaceous Oysters from Mangyshlak: Taxonomic Composition, Stratigraphic and

3. Nikitenko B.L., Devyatov V.P., Rodchenko A.P., Levchuk L.K., Pestchevitskaya E.B., Fursenko E.A. The Gol'chikha Formation (Upper Bathonian-Lower Boreal Berriasian) of the Yenisei-Khatanga Depression (West of the North Siberian Lowland) // Russian Geology and Geophysics. 2020. V. 61. № 4. P. 412-427.

4. Vakulenko L.G., Ershov S.V., Nikolenko O.D., Pestchevitskaya E.B., Popov A.Y., Yan P.A. The Berriasian-Aptian of the Western Gydan Peninsula (West Siberia): Biofacies and Lithofacies Models // Russian Geology and Geophysics. 2020. V. 61. № 7. P. 756-766.

5. Wimbledon W.A.P., Rehakova D., Schnyder J., Galbrun B., Kostak M., Vankova L., Copestake Ph., Hunt Ch. Svobodova A., Elbra T., Schnabl P., Pruner P., Sifnerova K., Kdyr S., Dzyuba O., O., Riccardi A., Poulton T., Bulot L.G., Frau C., Lena L. The proposal of a GSSP for the Berriasian Stage (Cretaceous System): Part 1 // Volumina Jurassica. 2020. V. 18. № 1. P. 53-106.

### **Participation in the conferences**

**10th All-Russia Meeting «Cretaceous system of Russia and neighboring countries: problems of stratigraphy and paleogeography», September 20–25, 2020, Magadan, Russia.**

The following reports were presented:

1. Dzyuba O.S. Biogeography of the Early Cretaceous belemnites in boreal seas: current studies Efremenko V.D. New data on the Lower Cretaceous belemnites of Nordvik Peninsula (North Siberia)

2. Kosenko I.N., Sha J., Shurygin B.N. Revisiting correlation of marine and non-marine sequences of Cretaceous of Sikhote-Alin and North-East China

3. Metelkin E.K., Kosenko I.N. New data on taxonomy and stratigraphy of Aptian-Albian oysters in the southwestern Gissar Ridge.

4. Urman O.S., Kosenko I.N., Shurygin B.N. Bivalve assemblages from the Ryazanian and Valanginian of the lower reaches of the Lena River

### **Field work activities**

During 2020, the Siberian (Russian) group of IGCP 679 worked on the Cretaceous sections in Russian Far East: Khabarovsk region, the lower reaches of the Amgun River, July 1-31, 2020.

### **IGCP Committee's Activities in 2020**

During 2020 the Russian Committee maintained contacts with the Commission of the Russian Federation for UNESCO. There were also close interactions with Russian members of IGCP projects.

Co-chairman of the Russian National Committee for the International Geosciences and Geoparks Program

Academician RAS Mikhail A. Fedonkin



### **IGCP Projects, in which Russian scientists participated in 2020**

**Project 648** Supercontinent Cycles and Global Geodynamics (2015-2019, OET)

**Project 652** Reading Geologic Time in Paleozoic Sedimentary Rocks (2017-2021)

**Project 653** The Onset of the Great Ordovician Biodiversification Event (2016-2020)

**Project 655** Toarcian Oceanic Anoxic Event Impact on Marine Carbon Cycle and Ecosystems (2017-2019, OET)

**Project 662** Orogenic Architecture and Crustal Growth from Accretion to Collision (2018-2022)

**Project 667** World Map of the Orogens (2018-2020)

**Project 668** Equatorial Gondwana History and Early Palaeozoic Evolutionary Dynamics (2018-2022)

**Project 673** The End of a Supereon – Winners and Losers at the Precambrian-Phanerozoic Transition (2019-2020)

**Project 675** Sandstone-type Uranium Deposits (2019-2023)

**Project 679** Cretaceous Earth Dynamics and Climate in Asia (2019-2023)

**Project 709** High Pressure Ultrahigh Pressure Metamorphism and Geochemical Cycles in Subduction zones (2020-2024)