RUSSIAN NATIONAL COMMITTEE FOR IGCP

ANNUAL REPORT ON IGCP ACTIVITIES FOR 2012

This report is on Russian activities in the IGCP projects in which Russia is participating.

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The current Committee’s membership comprises twenty four members including the following Bureau members:
Mikhail A. Fedonkin (Chairman, Geological Institute, GIN RAS); Igor D. Ryabchikov (Vice Chairman, Institute of Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry, IGEM RAS); Oleg A. Bogatikov (Institute of Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry , IGEM RAS); Eric M. Galimov (Vernadsky Institute of Geochemistry and Analytical Chemistry, GEOKHI RAS ); Alexander O. Giko (Institute of Physics of the Earth, RAS); Yury G. Leonov (Geological Institute, GIN RAS); Felix P. Mitrofanov (Institute of Geology Kola SC RAS).

Projects with Russian co-leaders:

Project 587 Entity, Facies and Time – the Ediacarian (Vendian) Puzzle (2010-2014), Leaders: Mikhail Fedonkin (Russia), Patricia Vickers-Rich (Australia), Jim Gehling (Australia), Guy Narbonne (Canada)

Project 540 Gold-bearing hydrothermal fluids of orogenic deposits (2007-2011, OET) Leaders: P.S.Garofão (Italy); J.R.Ridley (USA); Vsevolod Prokofiev (Russia).

Project 592 Continental construction in Central Asia (2012-2015), Leaders: Inna Safonova (Russia), Reimar Seltmann (UK), Min Sun (China)

Project 596 Climate Change and Biodiversity Patterns in the Mid-Paleozoic (2011-2015). Leaders: Peter Konigshof (Germany), Thomas G. Suttner (Austria),
Russian geoscientists are members of 13 IGCP projects, including 3 started in 2012: Nos.: 540, 559, 572, 574, 580, 587, 589, 591, 592, 596, 597, 598, and 619.

This report has been prepared from statements submitted by Russian IGCP members in response to Committee’s request for information on ‘significant’ developments in 2012.

No reports were received from the national correspondents of the following projects: 574, 580, 597, 598. Projects 589 and 619 (the first year) indicated that there had been no significant developments in 2011.

**Project 540 Gold-bearing hydrothermal fluids of orogenic deposits**

The report was prepared by V.Yu. Prokof’ev (Institute of Geology of Ore Deposits, Petrography, Mineralogy, and Geochemistry RAS, Moscow), co-leader of the Project.

Studies of the fluid regime in gold deposits of the Darasun ore field, represented by fragments of a single fluid-magmatic ore-forming system, have shown that early ore assemblages of the studied deposits in the ore field had been formed from a heterogeneous fluid. Hystograms of the distribution of the fluid salinity values differ: the ore forming fluid in the Darasum and Teremkin deposits are characterized by unimodal distribution of concentrations, whereas in fluids of the Talatuy deposit, the distribution of concentrations is clearly bimodal. The bimodal distribution of the fluid salinity values may be due to phase separation of the initially homogeneous fluid into low mineralized water vapor and brine at boiling. The unimodal character of the distribution of the fluid salinity values in the Darasun and Teremkin deposits may be explained by the passage of vapor through the water fluid at the ore deposition values situated far from the magmatic source.

**Publications:**


The following 3 contributions on the project were presented at the 34th International Geological Congress:


**Project 559 Crustal Architecture and Landscape Evolution**

The report was prepared by M.V.Mints (Geological Institute RAS, Moscow).

The project aims to bridge the gap between scientific effort and the interest of the society, and to give a real insight into nature of the major geological processes in the outer 50-70 km of the Earth that directly affect our lives. Through the project’s web site development phase, it will link and archive images and sources of information on crustal architecture from world-wide seismic imaging programs. Through the sponsorship of key international symposia the project will foster international cooperation and knowledge transfer.

The project has widespread relevance to decision making in the areas of natural resource development, urban and national infrastructure planning, university teaching, groundwater management and natural hazard assessment on all continents.

The work on further development and improvement of the website (http://www.earthscrust.org/news.html) continued. The site contains materials of deep research in the key areas in Antarctica, Africa, North and South Americas, Central and South Asia, and North Eurasia.

The 15th International Symposium on SEISMIX 2012 “Deep Seismic Profiling of Continents and their Margins” was held in the frame of the project in September, 2012 (Beijing, China).

**At the 34th IGC M.V.Mints presented the following 2 contributions:**


**Project 572 Permian-Triassic ecosystems**

The report was prepared by Yu.D. Zakharov (Far East Geological Institute, Far East Branch RAS, Vladivostok)

1. The Upper Permian of the Iran-Transcaucasia area is characterised by 32 ammonoid genera. The main body of the Late Permian ammonoid assemblage was formed by the order Ceratitida (75%). Among Dzhulfian ceratitid ammonoids representatives of the family Araxoceratidae (Otoceratoidea) are most abundant. The assemblage structure changed radically during latest Permian (Dorashamian) time, characterised by domination of the family Dzhulfitidae. In the Verkhoyansk area a few Palaeozoic type ammonoid groups has been discovered in the Induan: families Episageceratidae (*Episageceras*) and Dzhulfitidae (*Tompophiceras*) and superfamily Otoceratoidea (*Otoceras* and *Vavilovites*). It demonstrates the survival of the mentioned groups during the Permian-Triassic (P-T) boundary extinction and the very quick migration of their representatives to higher latitude ecological niches (together with some representatives of the Mesozoic type families). Induan-Olenekian ammonoid successions in South Primorye, Mangyshlak and Arctic Siberia illustrate the high rate of Early Triassic ammonoid recovery in both the Tethys and the Boreal realm(Zakharov and Mousavi Abnavi, 2012; Zakharov and Popov, 2012). New ammonoid taxa are described: Proptychitina subordo nov., Ussuritina subordo nov., *Subbalhaeceras shigetai* gen. and sp. nov. (Flemingitidae), *Mesohedenstroemia olgae* sp. nov., and *Inyoites sedini* sp. nov. (Zakharov and Mousavi Abnavi, 2012)

2. A new ammonoid genus, *Ussurijuvenites* (Melagathiceratidae), is described from the lower Olenekian of South Primorye, represented by two new species (*U. popovi* and *U. artyomensis*); data on the inner shell structure of melagathiceratid ammonoids (based on *U. artyomensis*) are presented for the first time (Smyshlyaeva and Zakharov, 2012).

3. High-resolution carbon isotope records of organic carbon across the PTB from Siberia (Setorym) were obtained for the first time (Horacek et al., 2012). The delta$^{13}$C$_{org}$ curve obtained shows a shape almost identical to conformable C-isotope curves from basic sections of Eurasia and North America: also the 3 minima can be identified in the PTB interval. In correlation with $^{13}$C$_{carb}$-isotope curves the P-T Event Boundary can be tentatively set at the first steep drop (located in the lower *Otoceras concavum* beds in the Setorym). The PTB should be likely around the first delta$^{13}$C minimum at the base of the upper *Otoceras concavum* beds (= the base of the *Tompophiceras pascoeii*-bearing sediments) due to correlation with reference isotope curves. In Siberia (Boreal realm), in contrast to the Himalayan sections, the PTB thus locates within the *Otoceras-
bearing sequences. It demonstrates the latest Permian age of the lower Otoceras concavum beds of the Boreale Zone, which seems to be in accordance with the palaeontological data from the Fiskegrav section (Greenland). The new palaeontological and isotopic data suggest that only the two ammonoid lineages at the generic level (Episageceras and Otoceras) survived the end-Permian mass extinction. The Setorym section has been deposited close to the Siberian Trapp Basalts, the most cited suspect for the end-Permian extinction. However, no influence on the isotope curve of a regional $^{13}$C-depleted carbon source can be detected. The research was carried out with the financial support of RFBR grants.

4. One new ammonoid genus (Ussuriaspenites) of the family Aspenitidae and 10 new ammonoid species (Ussuriaspenites evlanovi, Monneticeras kalinkini, Brayardites involutus, Anasibirites simanenki, Prionites subtuberculatus, P. markevichi, Anawasatchites specious, Kashmirites shevyrevi, Xenoceltites? subvariocostatus, and Mianwaliites zimini) were described. The Anasibirites nevolini Zone corresponds to late Smithian sequences of the Central Himalayas and Salt Range such as the Wasatchites distractus, Subvishnuites posterus, and Glyptophiceras sinuatum beds (Zakharov et al., 2012).

5. The Late Smithian (Olenekian) Anasibirites nevolini Zone yields abundant conodonts in the SMID Quarry section at Artyom, South Primorye, Russian Far East. Twenty species are described: Discretella dicreta (Müller), Ellisonia nevadensis Müller, Ellisonia triassica Müller, Furnishius triserratus Clark, Hadrodontina sp., Neospathodus ex gr. waageni Sweet, N. novaehollandiae McTavish, Scythogondolella milleri (Müller), S. mosheri (Kozur & Mostler) and S. sp., including Neogondolellid elements. The Olenekian (late Smithian) Scythogondolella milleri Zone represents the 18 m thick lower member A of the Anasibirites nevolini Zone. Member A yields at its base: Neospathodus ex gr. waageni Sweet, Ellisonia nevadensis Müller, E. triassica Müller, Furnishius triserratus Clark, Scythogondolella milleri (Müller) and S. mosheri (Kozur & Mostler), with S. milleri (Müller) occurring also at top and Neogondolellid P2, S3-4/S0 Group B elements. Furnishius triserratus Clark, and Ellisonia triassica Müller further occur at the top of the 10 m thick member B, “Hindeodella” Group B Beds with Neospathodus novaehollandiae McTavish, Discretella discreta (Müller), Hadrodontina sp., and Neogondolellid S3-4/S0 Group A, B elements (Bondarenko et al., 2012).

**Publications**


At the 34th International Geological Congress 2012 (5-10 August 2012. Brisbane, Australia) Zakharov Yu.D. et al. presented the following contribution on the project:


Project 587. Entity, Facies and Time the Ediacaran (Vendian) Puzzle.
The report was submitted by acad. M.A.Fedonkin (Geological Institute RAS, Moscow)

1. Some aspects of biomineralization of Early Cambrian multicellular animals were investigated in laboratory conditions in keeping to the agreement between the Paleontological Institute RAS and Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences. Coverings of trilobites and trilobite-like arthropods from Sink lagershtete (Yakutia) were studied. The obtained data suggest the primary phosphate composition of the cuticle of a large arthropod Phytophilaspis. The secondary phosphatization of blanket formations is common for arthropods, though their initial phosphate enrichment might present a special tendency not developed in post Cambrian arthropods.

2. Field work was conducted on locations of Vendian macrofossils in Podolia (Ukraine) together with the National Research Museum of Ukraine and the Institute of Geological Sciences of Ukraine. These activities included the reconnaissance survey of deposits of the Mogilev-Podol’sk and Kanilov Late Vendian groups at the left bank of the Dnestr R.; type locations of Metazoa remains were explored; certain rare fossils, not available in Russian collections, or lost, were gathered.
3. Organic residues in Late Precambrian deposits in Namibia, Saudi Arabia, and India were explored (geological setting, taphonomy of Vendian macrofossils, reconstruction of the anatomical structure of certain ancient multicellular organisms). The obtained data confirmed the allochthonous nature of buried residues of Late Vendian macrofossils of the so-called Namibian assemblage (Pteridinium, Rangea, Ernietta), that denies the major argument in favor of the vendobionts hypothesis, that refers them to a special group of multicellular organisms, that lived inside the sediment. Overprints of our collection are enclosed in weakly cemented sandstone, which makes it easy to dissect their residues. They study helped to discover previously unknown details of the Petalonamae inner structure, including the 6-ray organization of the fossil residue and lack of attachment formation in Rangea schneiderhoehni Gurich.

4. Reconnaissance survey was carried out on outcrops of Late Precambrian terrigenous rocks belonging to the Sonia and Nagaur formations and to the Jodhpur and Nagaur groups. A significant collection of biogenic macroformations has been assembled. Ten groups of overprints have been found; among them typical Vendian forms have been identified. However, most obtained fossils are represented by special forms, not having analogues in other locations of the world. It suggests the opening of a new Vendian fossil biota.

5. The research of the small collection of Late Precambrian macrofossils, collected during field work in 2008 and 2009 in Saudi Arabia have been completed. Late Vendian fossils were found and described and were referred to the new genus Harlaniella Sokolov.

Publications


The following 2 contributions were presented at the 34th International Geological Congress:


**Project 591. Early to Middle Paleozoic Revolution.**
The report was prepared by Dr. A.V. Dronov (Geological Institute RAS, Moscow)

2012 is a second year of the International IGCP project 591 “Early to Middle Paleozoic Revolution: Bridging the Gap between the Great Ordovician Biodiversification Event and the Devonian Terrestrial Revolution”. The theme of the year was: Global sea level and sequence stratigraphy. In a framework of this theme Russian participants of the project organized a field work on classical Ordovician sections of North-west Russia (St. Petersburg region). They also took part in the study of cores from the Ordovician boreholes in central and southern Estonia. Based on this work a refined sequence stratigraphic scheme of the Ordovician basin of Baltoscandia was elaborated. The previously obtained material on sequence stratigraphy and sea-level changes in the Ordovician of Siberian Platform were summarized and analyzed. It turns out that sea-level curve for the Ordovician of Siberian Platform share much more similarities with the one for the North American Platform, than with that for the Russian Platform or any other Platform rifted from Gondwana. All the Gondwana Platforms, on the other hand, have similar sea level curves for the Ordovician.

Investigations of the climatic changes during the Ordovician and their reflections in the Ordovician successions of the Siberian and Russian Platforms have been continued. Discovery of wide distribution of cool-water carbonates in the Upper and partly Middle Ordovician of the Siberian Platform greatly improve our knowledge about timing and character of the Late Ordovician Global cooling event which ended up with the Hirnantian glaciation at the end of the Ordovician period.

**Participation in conferences**

Besides the Annual Meeting of the IGCP 591 project which was held this year in Cincinnati, Ohio, USA in July 22-28, 2012 there were also two other important International Conferences organized in the year 2012 within a framework of the project.

The first one was held 22-27 of April 2012 in Vienna, Austria during the General Assembly of the European Geosciences Union and was devoted to sea-level changes in the Paleozoic. It was session SSP2.2 Paleozoic global sea-level: linking stratigraphy, bioevents and stable isotope record. **Andrei V. Dronov (Russia)** made a presentation:”**Ordovician of the Siberian Platform: sea-level and long-term lithological changes**”. The article based on this presentation in “Gondwana Research” is in preparation.
The second Conference was organized as a special Symposium at the 34th International Geological Congress which was held in Brisbane, Australia in August 6-10, 2012. It was subtheme 3.7 Pre-Mesozoic climates and global change [IGCP 591] within a theme 3. Climate Change: Lessons from the Past; Implications for the Future. Andrei V. Dronov (Russia) made a presentation: “Late Ordovician cooling event: evidence from the Siberian Platform”. The article based on this material has been prepared for the Proceedings of the Symposium to be published in the special issue of the International journal “Palaeogeography, Palaeoclimatology, Palaeoecology”. It was submitted for publication.

Activities planned for 2013

According to the general plan of the IGCP project 591 the theme of the next year 2013 will be: Biological and chemical indicators of climatic events. In the framework of the project two major International conferences have been planned for the year 2013:

1. Annual Meeting of the IGCP project 591 will be held in Lund, Sweden in June 09-19, 2013. Scientific session: June 10-12, 2013; Geological excursion on the Cambrian, Ordovician and Silurian outcrops of Sweden and Norway: 13-19 June, 2013. The meeting will be organized jointly with the International Subcommission on Cambrian Stratigraphy (ISCS), International Subcommission on Ordovician Stratigraphy (ISOS) and International Subcommission on Silurian Stratigraphy (ISSS).

2. 3rd International Conodont Symposium and IGCP 591 regional field meeting will be held in Mendoza, Argentina in July 15-19, 2013.

Project 592 Continental construction of the Altaids (Central Asian Orogenic Belt) compared to actualistic examples from the Western Pacific

The report was prepared by I.Yu. Safonova, co-leader of the project (Institute of Geology and Mineralogy SB RAS, Novosibirsk)

During the first year of the Project, the research activities were concentrated on three main issues:

1) Geochronological dating of granitoids and evaluation of juvenile and recycled crust in the CAOB (Central Asian Orogenic Belt) based on geochemical and isotopic studies;

2) Contribution of accretionary processes and intra-plate magmatism to continental construction;

3) Environmental impact on CAOB tectonics;

4) Mineral deposits related to CAOB continental construction.

Scientific achievements
a) The multi-disciplinary and comprehensive study of CAOB must be based on comparison of its composing tectono-lithostratigraphic units with those of the present-day Western Pacific;

b) It was showed: i) the usefulness of combining zircon dating with Nd and Hf isotopes to elucidate the source characteristics of dated samples; ii) although many CAOB terranes include much juvenile crust, the Kyrgyz North Tien Shan consists predominantly of reworked Precambrian crustal material;

c) the Early-Middle Paleozoic stage of eastern CAOB evolution was dominated by double subduction–collision accretionary process as evidenced by the southern and northern orogenic belts of Inner Mongolia;

d) Beishan orogenic collage in the southern CAOB is a long-lived accretionary belt progressively active during Late Precambrian-Paleozoic which sheds light on its accretionary versus microcontinent architecture;

e) formation of PGE-Ni mineral deposits should be reconstructed based on detailed geological studies and up-to-date petrologic modelling;

f) Oceanic island/plateau basalts contribute to continental construction because the volume/area of accreted seamounts/plateaus may reach that of modern Europe and their accretion, due to topographic high, may enhance accretion and accumulation of fore-arc sedimentary prisms.

Problems related to the project and its future activities were discussed at the following conferences and symposia:

2. 6th Siberian Conference for Early Career Geoscientists, Novosibirsk, June 9-23, 2012; about 200 participants from 19 countries;
3. 34th IGC, Symposium 9.7 “Mineral deposits: episodes, accumulation of metals and related geodynamic processes in China and adjacent regions”, Brisbane, Australia, August 5-10, 2012; 100 participants from 15 countries;
4. IV International Conference and III Early Career Geoscientists Workshop “Ultramafic-mafic complexes of folded regions and their mineral resources”, Ulan-Ude, Baikal, August 27-30, 2012; about 50 participants from 6 countries;
5. The 2012 IAGR and IGCP 592 Symposium on “Gondwana to Asia”, Adelaide, Australia, November 18-21, 2012; about 100 participants from 14 countries.

Publications


**Proceedings of the conferences carried out in the framework of IGCP Project 592 in 2012**


**Activities planned for 2013**


Project 596 Climate Change and Biodiversity Patterns in the Mid-Paleozoic

The report was prepared by N.G. Izokh, co-leader of the project (Institute of Petroleum Geology and Geophysics, Siberian Branch RAS, Novosibirsk)

The main results of the project research activities

1. Biodiversity of Upper Devonian radiolarian associations from carbonate-siliceous Akbasai Formation, Kule Gorge section, south-western part of Zeravshan-Gissar mountainous area, South Tien Shan, was established. Abundant and well-preserved radiolarians belong to 9 genera *Trilonche, Astroentactinia, Haplentactinia, Radiobisphaera, Palaeoscenidium, Nazarovites, Moskovistella, Polyentactinia* and *Spongoentactinella* were found together with middle Frasnian conodonts of the *punctata* Zone, the uppermost Frasnian and F/F *linguiformis-*?*lowermost triangularis* zones, the lower Famennian *crepida* Zone and middle Famennian *marginifera* Zone. The studied radiolarian associations are characterized mainly by spherical forms dominated by diverse spumellarians: abundant entactiniids, few haplentactiniids and rare polyentactiniids, as well as spiny palacantholithids and palaeoscenidiids. However lack characteristic for Upper Devonian ceratoikiscids.

2. Phylogeny of Devonian brachiopods from the western part of the Altai-Sayan Folded Area was analyzed. It was found that evolutionary trends could be explained by the saltation theory of speciation that proves the following: 1) for phylogenetically closely related adaptively radiating complexes of species chromosomally monomorphic species usually are initial and polymorphic - the final link; 2) species with an inversion polymorphism of the adaptive rank (ie, providing a broad ecological and climate adaptation) has a much lower potential for speciation than adaptative monomorphic species.

For the first position can only add that the appearance of the polymorphic descendant in the first stage leads to the disappearance of species ancestor, while the second - to the extinction of entire lineage.
3. Brachiopods, conodonts, ostracods and fish remains were studied from the reference section of Izyly and lower part of Vassino horizons of the Kuznetsk Basin. Age of the Izyly Horizon was specified to be early Frasnian.

**The following contributions were presented on the project at international conferences:**


**Activities planned for 2013**

In 2013 we plan to participate at the International Field symposium “The Devonian and Lower Carboniferous of Northern Gondwana”, March 25 to April 1, NE Anti-Atlas, southern Morocco

**IGCP Committee’s Activities**

In February 2012, the 40th anniversary of the International Geoscience Programme (IGCP) was marked at UNESCO Headquarters in Paris and in August at the 34th International Geological Congress in Brisbane.

Throughout the period from 1974 to 2011, 335 projects worked within the IGCP Program. During this period Soviet and later Russian scientists were and are at present leaders and co-leaders of 33 IGCP Projects, or participated as members of the working groups of more than one third of IGCP projects.

After the collapse of the Soviet Union, Russian scientists continued to participate in the implementation of the program. In the period from 2005 to 2011, Russian scientists worked in 36 IGCP projects, in 10 among them as leaders and
co-leaders.

The article “Participation of Russia in IGCP projects” by the Chairman of IGCP Committee academician M.A. Fedonkin is presented at the IGCP Committee site.

At the 34th IGC in Brisbane delegates from Russia presented 244 contributions (101 oral and 143 posters), including those on results of IGCP projects activities.

Mikhail A. Fedonkin
Academician
Chairman of the Russian National Committee for IGCP
IGCP Projects, in which Russian scientists participated in 2012

**Project 540** Gold-bearing Hydrothermal Fluids of Orogenic Deposits (2007-2011, OET)

**Project 559** Crustal Architecture and Landscape Evolution (2008-2012)

**Project 572** Permian-Triassic Ecosystems (2008-2012)

**Project 574** Bending, and Bent Orogens, and Continental Ribbons (2009-2013);

**Project 580** Application of Magnetic Susceptibility on Paleozoic Sedimentary Rocks (2009-2013);

**Project 587** Entity, Facies, and Time – the Ediacaran (Vendian) Puzzle (2010-2014);

**Project 589** Development of the Asian Tethyan Realm (2012-2016);

**Project 591** The Early to Middle Paleozoic Revolution (2011-2015);

**Project 592** Continental construction in Central Asia (2012-2015);

**Project 596** Climate Change and Biodiversity Patterns in the Mid-Paleozoic (2011-2015);

**Project 597** Amalgamation and Breakup Pangea: the Type Example of the Supercontinent Cycle (2011-2015);

**Project 598** Environmental Change and Sustainability in Karst Systems (2011-2014).

**Project 619** Contourites: processes and products (2012-2016).