SPONSORED BY CERCAMS:

International Conference
"Large Igneous Province of Asia, Mantle Plumes and Metallogeny"
Novosibirsk, Russia, 6-9 August 2009

The second International Conference "Large Igneous Province of Asia, Mantle Plumes and Metallogeny" was held in Novosibirsk from 6-9 August, 2009 (http://lip-asia.igm.nsc.ru/). The Conference was organized by the Institute of Geology and Mineralogy SB RAS, sponsored by the International Association Geology of Ore Deposits (IAGOD) and by CERCAMS.

The main focus of the Conference was on problems of genesis of large igneous provinces (LIPs). Issues on the origin of LIPs have attracted considerable international interest from many geoscientists specializing in magmatic geology, geodynamics, metallogeny of sedimentary and igneous rocks and paleoclimate. This is due to the fact that these large scale magmatic processes are responsible not only for the formation of large volumes of igneous rocks, but also for the development of world-class orthomagmatic Cu-Ni-PGE sulfide deposits. Furthermore there is good evidence that a number of continental porphyry Cu-Mo systems, Ni-Co-As, Au, and Sb-Hg hydrothermal vein deposits, are genetically linked with intraplate magmatism. LIPs, generally thought to be related to the activity of deep mantle plumes, constitute the main energy source and are a major factor of heat-mass transfer from the deep Earth's levels to the subcontinental lithosphere and the lower crust. The Asia continent provides a prime example of such phenomena, because processes related to the manifestation of deep mantle plumes (or superplumes) of various ages are well represented by the ~250 Ma Siberian (P_2-T_1), ~260 Ma Emeishan (P_2-T_1) and ~280 Ma Tarim (P_2-T_1) LIPs. This time span corresponds to the period of crucial evolution of the lithosphere accompanied by extensive trap magmatism (LIP) on the Siberian, Tarim, and southern Chinese platforms, while post-collisional and intraplate granitoids with elevated rare metal abundances were emplaced together with mafic-ultramafic intrusions in the surrounding orogenic belts. Magmatism of this period was accompanied by the formation of two contrasting types of ore systems. One is related to mafic-ultramafic complexes and alkaline mafic intrusions (Cu-Ni-PGE; Mg-Fe, Ni-Co-As, Hg) and the other to granitoid complexes (porphyry Cu-Mo, Li-Ta-Nb, and Au-Hg). These systems are responsible for the formation of world-class and/or unique Cu-Ni-PGE (Noril'sk, Talnakh), Ni-Co-Bi-Ag-U (Khovu-Aksy in Tuva, Aktepe in Kyrgyzstan), porphyry Cu-Mo (Erdenet in Mongolia, Kalmakyr in Uzbekistan), Sb-Hg (Altai, Khaidarkan, Chonkoi, Kadamzhai in Kyrgyzstan), and Ag-Sb, Li-Ta-Nb deposits. There appears to be a regional metallogenic zoning in the distribution of the Permian and Triassic mineral deposits, relative to the centers of the most intense mafic-ultramafic and granitoid magmatic activity. Moreover, the problem of origin of large igneous provinces, their metallogeny and their link with mantle plumes is still a matter of considerable debate and is currently discussed by many professionals in all spheres of the Earth sciences. The

Prof. Franco Pirajno (Co-chairman of conference) and Prof. Nikolaiy Sobolev (editor-in-chief of "Russian Geology and Geophysics")

International Conference "Large Igneous provinces of Asia: mantle plumes and metallogeny" aimed to discuss topical issues on magmatic and metallogenic problems of Asia related to the manifestations of LIPs. One hundred and twenty four papers were submitted to the conference. Approximately 93 geologists crowded into the workshop, including 14 from China (4), Canada (2), Australia (2), UK (2), USA (2), Germany (1), and Japan (1). There were 37 oral and 35 poster presentations which were divided into 6 groups: (1) Nature, age boundaries, and the period of formation of large igneous provinces of Asia (LIP). (2) Modeling on the origin and development of mantle plumes, mantle-crust interaction and ore-magmatic systems. (3) Petrologic-geochemical aspects of formation of local magmatic complexes within the framework of large igneous provinces of Asia of various ages. (4) Metallogenic specialization of large igneous provinces (LIP), the role of mantle plumes in the formation of large and unique Cu-Ni-PGE, Ni-Co-As, porphyry Cu-Mo, Au-sulfide, Hg, Au-Hg and rare metal deposits of Asia. (5) Correlation of magmatic complexes and ore systems of Asia, the main age boundaries in the formation and specific features of the occurrence of large and unique deposits in the areas influenced by mantle plumes of various ages. (6) The relationship between natural disasters, global climatic changes, and large magmatic events.

Dr. Richard Ernst, invited speaker, co-sponsored by IAGOD

To stimulate discussions on the topic, the chairmen of the Organizing Committee Prof. N. L. Dobretsov (Russia) and Prof. F. Pirajno (Australia), supported by IAGOD (the main sponsor of the plenary session), invited speakers to give arguments “for” or "against" a plume origin and its effect on magmatism and metallogeny of Asia. The discussion turned out to be very “hot”. The first talks of the workshop by Prof. N. L. Dobretsov (Russia), Prof. F. Pirajno (Australia), and Prof. R. Ernst (Canada) gave evidence in support of plume origin, while Prof. J. Foulger (UK) and Dr A. Ivanov gave arguments against a plume origin. A key note address by Prof. D. Zhao (Japan) showed the results of seismic tomographic studies in support of the plume theory. Prof Zhao was able to construct a three-dimensional model of the internal structure of the Earth's on the basis of seismic tomographic data, which showed the presence of plume-like anomalies over the main hot spots regions (Hawaii, Iceland, Kerguelen, South Pacific, Africa). This model was supported by Prof N. Sharapov in "Dynamics of mantle crust asthenosphere ore-magma systems under Siberian platform and craton”. Significant attention was paid to the Siberian, Emeishan, and Tarim provinces of Permian-Triassic magmatism, generally ascribed to the activity of mantle plumes. The speakers F. Pirajno, Ch. Zhang, A. Borisenko presented new data on the Tarim large igneous province and specific features of its metallogeny. It is worthy of note that the Tarim large igneous province was first recognized by the Russian geologists and this fact was confirmed by R. Ernst and F. Pirajno. The results of study of the Permian-Triassic magmatism and metallogeny of Vietnam and its relation to the Emeishan plume were reported by A. Izokh and P. Balykin, with co-authors from Vietnam. (Tran Trong Hoa, and Tran Tuan Anh). Presentations were given on the Siberian superplume, related magmatism and ore

Final discussion: Prof. R. Seltmann

deposits by M. Kuzmin. M. Fiorentini, A. Arzamastsev, N. Goryachev, V. Kulikov, E. Spiridonov, V. Ryabov, A. Ivanov, I. Safonova.

A new aspect in the study of large igneous provinces was to reveal specific features of their metallogeny and to distinguish typical types of endogenic mineralization which are the indicators of the processes associated with mantle plumes. The talks by T. Seifert, R. Seltmann, M. Fiorentini, R. Genchuraeva, G. Pavlova, V. Khomich covered topics related to the links of metallogeny with mantle plumes. The most significant results of the conference were the data on correlation of magmatic processes and ore formation, which were based on evidence obtained from isotope-geochronological studies (U-Pb – SHRIMP, Ar-Ar, Re-Os) which brought the problem of the relationship of magmatism with mineralization on a new level and helped to constrain the age boundaries for the high-productive ore formations (A. Izokh, I. Safonova, A. Nozhkin, I. Tretjakova, .V. Vrublevskiy). The International field trip "Magmatism and metallogeny of the Tuva trough and surrounding orogenic belts" took place from 25 June to 5 August, 2009. More than 15 participants of the conference took part in this field trip. Moreover, sponsors of the conference gave 10 undergraduate and post-graduate students from Novosibirsk and Kyzyl the opportunity to take part in this field trip. The participants visited such unique iron ore in Abakan, vein Ni-Co arsenide (Khovu-Aksy), and Cu-Co sulfoarsenide (Chergak, Uzun-Oi), polymetalic volcanogenic-hydrothermal (Kyzyl-Tashtyg), porphyry Cu-Mo (Kyzyk-Chadr), gold-ore in magnesian skarns (Tardan) deposits. During this field trip, discussions among students and professional participants touched not only the essential geologic aspects of this region but also highlighted many important issues of the Conference.

Participants of field trip in Tuva

Proceedings of the Conference were published as a book and are also available on CD-ROM. If you wish to purchase the proceedings of the Conference, please contact <cercams@nhm.ac.uk>. A special issue of the journal *Russian Geology and Geophysics* dedicated to this conference is planned to be published. The conference was a success also because it helped to convince some participants to join the IAGOD. Among them were six Russian geologists form Novosibirsk who have applied to become members of IAGOD.

E. Naumov, F. Pirajno, A. Borisenko