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Editorial

Editorial for Special Issue "Composition, Geochronology and Geodynamic Implications of Igneous Rock"

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Magmatism is a very important manifestation of the deep activity of the Earth. Magmatism plays a pivotal role in the formation and evolution of the Earth's crust. Thermodynamic and composition properties of magmas are caused by many factors, including temperature, the pressure of generation, substrates, and fluid composition. Investigations in recent decades have allowed us to determine the magmatic series and magmatic formations related to different geodynamic settings. Nevertheless, the study of magmatic formations in orogenic belts has shown that they often have geochemical features of various geodynamic settings. Thus, it becomes obvious that the detailed study of magmatism history and evolution in a particular region is necessary to identify the patterns of endogenous activity and to reach comprehensive geodynamic conclusions. Such studies must be based on sufficient data about the geological position, composition, and age of igneous rocks. The presentation of the results of such studies was the main goal of the Special Issue.

The issue includes 10 articles devoted to the results of the study of various aspects of magmatism and the role of igneous rocks in the evolution of the Earth's lithosphere. Articles in the issue dealt with such topics as the features of the petrogenesis of magmas of various compositions, establishing the patterns of the mantle–crustal interaction, and contributing to the problems of the evolution of the main accretion–collision fold systems within Eurasia.

Four articles are devoted to the patterns of development of the lithosphere of the Central Asian orogenic belt in the Paleozoic. The paper by Wu et al. [1] presents the results of studying the Early Paleozoic rocks of the Zalantun Group in the Da Hinggan Mountains (NE China). The Late Cambrian-Late Silurian volcanic rocks are quasi-aluminous–peraluminous, belonging to calc-alkaline–shoshonite series, which is rich in HREE but has insignificant europium anomalies. There are abundant large ion lithophile elements (LILE) in the rock, and remarkable Nb, Ta, and Ti negative anomalies. The previous data and the current study indicate that a continental margin arc tectonic setting existed in the region during the Early Paleozoic, which is inferred to be the product of the subduction-accretion-amalgamation of the plates along the eastern margin of the Ergun Massif during the Early Paleozoic. The paper by Li et al. [2] contains the results of studying the Early Permian intrusions in Inner Mongolia (North China). The geochronology and geochemistry of the Zhaojinggou monzogranite pluton indicate that magmas were derived from the late Paleoproterozoic to Mesoproterozoic lower crustal mafic materials. By discussing the genesis and tectonic implications of the pluton it was proposed that the Zhaojinggou monzogranite represents a magmatic event caused by the crustal–mantle interaction during the southward subduction of the eastern Paleo-Asian Ocean in the northern margin of the North China Craton during the Early Permian. The paper by Lu et al. [3] is devoted to petrogenesis and tectonic implication of the Permian high-Mg diorite in the Wangqing Area, NE China. The magma was generated by the moderate degree partial melting (20%–30%) of a garnet lherzolite source. Combined with previous studies, this shows that the high-Mg diorite was formed by the northward subduction of the Paleo-Asian oceanic plate during the Middle Permian. The paper by Khromykh et al. [4] contains the results of the study of

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Early Triassic monzonite–granite intrusions in Eastern Kazakhstan. Analysis of the geological position, age, and composition of the rocks of two large monzonite–granite–leucogranite Semeitau and Delbegetei intrusions allows us to conclude that they were formed at the Permian–Triassic boundary (249–248 Ma) in an intraplate geodynamic setting and that the activity of the Siberian mantle plume is the most probable reason for their formation.

Three articles are devoted to the patterns of development of the lithosphere of folded belts in Eurasia in the Mesozoic time. The paper by Pan et al. [5] is devoted to petrogenesis and tectonic implications of the triassic granitoids in the East Kunlun Orogenic Belt. Based on the results of this paper and previous data, the chronology framework of Late Permian–Triassic magmatic rocks in the eastern part of the East Kunlun Orogenic Belt was constructed, and the magmatic activities in this area were divided into three peak periods, with each peak representing an extensional event in a particular tectonic setting, for example, P_1 (slab roll-back in subduction period; 254–246 Ma), P_2 (slab break-off in the transition period of subduction and collision; 244–232 Ma), P_3 (delamination after collision; 230–218 Ma). The paper by Zhang et al. [6] is devoted to the petrogenesis and geological significance of the quartz monzonites in the Mesozoic magmatic belt in the eastern North China Craton. Geochemical and isotopic features indicate that the quartz monzonites derived from the subcontinental lithospheric mantle probably assimilated ancient upper crust materials (~15%–20%) during the magma ascent in a lithospheric extension setting. The paper by Xiao et al. [7] contains the results of the study of Early Cretaceous High-Mg Adakitic Pluton in the North Lhasa Block, Tibet Plateau. This study suggests that, with the closure of the Bangonghu–Nujiang Tethys Ocean Basin, the post-collisional extension of the north Lhasa block will have started no later than ca. 114–116 Ma. Combined with the previous studies, our new data demonstrates that the partial melting of the delaminated lower crust, in a post-collisional setting, may be the main mechanism responsible for the ca. 116–82 Ma adakitic magmatism in the north Lhasa block.

Two articles contain the results of a detailed study of the composition of minerals and their significance for the genesis and evolution of magmas in different tectonic settings. The paper of Chen et al. [8] contains geochemical insights from clinopyroxene phenocrysts into the magma evolution of an alkaline magmatic system from South China. While fractional crystallization is the dominant process, magma mixing, recharge, and crystal settling were also found to influence magma evolution. Thermobarometric calculations showed that clinopyroxene crystallized several structural levels in the crust during magma ascent. It was established a magma plumbing system that provides new constraints for magma evolution. The paper by Mellado et al. [9] contains the results of a detailed study of allanite from Variscan lamprophyre dykes (NE Iberia). The allanite U-Pb-Th- weighted mean age of 265 $\pm$ 15 M is roughly similar to the age of emplacement of the lamprophyres in the upper crust in the mid–late Permian, and coincides with the period following the main tectonometamorphic and magmatic events of the post-collisional evolution in the Catalan Coastal Range. Th/U and La/Sm ratios suggest a metamorphic origin for most allanite grains, but a combination of metamorphic processes prior to partial melting, early–late magmatic crystallization, and/or post-magmatic hydrothermal processes is the most plausible explanation to account for the diversity of allanite grains in lamprophyres.

The issue is completed by the paper by Zhao et al., [10]. It presents important results of the study of Cenozoic volcanism in Northeast China. Based on detailed stratigraphy analysis, ^{14}C geochronology, grain-size distribution, and scanning electron microscopy (SEM) analysis, the eruptive sequence of two volcanic craters was constructed. The whole sequence was formed after four eruptive phases, including a wet phreatomagmatic eruption, an explosive magmatic eruption, a dry and hot phreatomagmatic eruption, and a small explosive magmatic eruption. ^{14}C geochronology indicates that the formation age is 15,900 $\pm$ 70 years. Topographic and stratigraphic characteristics show that the landforms of two craters were damaged and buried because of the destruction of lava flows and agricultural modification.

All of these examples show that the knowledge about the geological position, composition, and age of igneous is an important factor in the research on Earth's lithosphere history. Therefore, it is my hope that this Special Issue is a valuable and substantive resource for anyone who is interested in studies of Composition, Geochronology, and Geodynamic Implications of Igneous rocks and that it will serve as a basis for further research.

Conflicts of Interest: The author declares no conflict of interest.

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