

Geotectonic evolution and metallogeny of the Hercynides in southern marginal folded belt of the North Afghan Platform —

A brief review

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With 2 Figures

Zusammenfassung

Die variszische Faltungszone des südlichen Tien-Shan und des Nord-Pamir liegt am Südrand der Eurasischen Platte. Die Zone entwickelte sich von einer Karellischen Protogeosynklinale über ein Plattformstadium zur Variscischen Geosynklinale mit einer carbonischen Diabas-Porphyritformation, die auch Gabbro-Granitintrusionen enthält. Die Molasse führt jungpermische Evaporite und Kupfersandsteine. Das Neogen war mit magmatischer Aktivierung verbunden, die Pb-Zn-, F- und Hg-Vererzungen bewirkte. Die axiale Karakul-Zone führt Pegmatite mit seltenen Metallen.

The folded zone of Hercynides in the Southern Tien-Shan and the North Pamir is situated on the Eurasian plate, along its southern border with the Alpine Mediterranean belt. The Hercynides form a comparatively narrow zone in Western Hindukush, North Pamir and Kunlun mountains (Fig. 1); in the west, they are overlain by the cover of the North Afghan platform.

The zone of Hercynides in the North Pamir has been the best studied. Fig. 2 shows the geological map of the North Pamir area.

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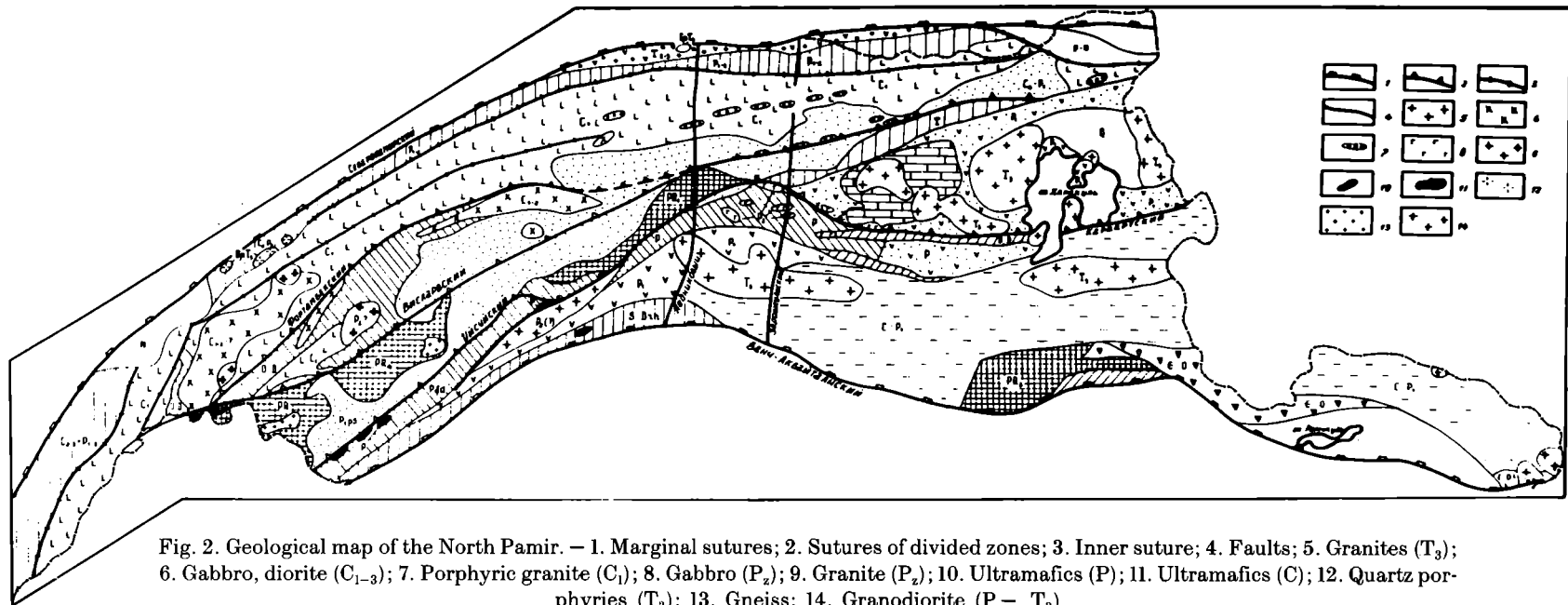


Fig. 2. Geological map of the North Pamir. — 1. Marginal sutures; 2. Sutures of divided zones; 3. Inner suture; 4. Faults; 5. Granites (T_3); 6. Gabbro, diorite (C_{1-3}); 7. Porphyric granite (C_1); 8. Gabbro (P_2); 9. Granite (P_2); 10. Ultramafics (P); 11. Ultramafics (C); 12. Quartz porphyries (T_3); 13. Gneiss; 14. Granodiorite ($P - T_3$)

Main features of geotectonic evolution

The zone of the Hercynides is bounded in the North Pamir area from the north by the North Pamir fault, and from the south by the Central Pamir fault. BARATOV, FINOGENOVA and VOLYNOV (1981) recognised five geotectonic cycles of the geotectonic evolution of this zone:

1. Karelian proto-geosyncline consists of a thick metamorphic rock sequence intruded by layered gabbro-anorthosite and peridotite complex.

2. The epi-Karelian platform cycle is characterized by the Vend terrigenous and the Ordovician-Devonian carbonate sequence.

3. The Hercynian geosyncline was superimposed on the platform basement in Early Carboniferous time; it is restricted to a narrow strip in the northern part of Pamir (the Kalaihumb-Sauksay — the Karakul zone). Scattered Carboniferous terrigenous troughs and carbonate-terrigenous sequences are developed. In the southern part of the North Pamir (the Darvaz-Sarycol zone) carbonate-volcanogenic sequences and terrigenous sediments are found. The Carboniferous-Permian spilite diabase and porphyritic formations, accompanied by gabbro-granitoid intrusives, are known (the Kalaihumb-Sansay zone which extends into Afghanistan — the Darvas-Zaalay zone).

In the final stage of development, the molasse sediments several kilometers thick were deposited; their upper part consists of Late Permian salt-bearing sediments. Late Permian sandstones contain stratiform copper mineralization.

4. The Mesozoic-Cenozoic carbonate — terrigenous platform sediments were deposited.

5. The neogen is characterized by Late Alpine activation. Some ore deposits are associated with magmatic complexes resulted in the process of activation (hydrothermal lead-zinc, fluorite and celestine — ROMANENKO and MOGAROVSKY, 1984). Locally, mercury mineralization was found in diagonal faults.

Similar geo-tectonic development was observed in the southwestern sector of the Hercynides — in the western Hindukush and NW Badakhshan (DRONOV, 1983).

Principal ore deposits and major metallogenic zones

The common metallogenic feature of the Afghan-North Pamir Hercynian belt is the development of Cu—Zn—Pb ± Au mineralization, characterized by multiple introduction of copper mineralization, starting from the Proterozoic until Late Permian. The copper deposits occur as massive nickel-copper sulphides and stratiform copper-bearing sandstones.

Several major metallogenic zones are distinguished in the Northern Pamir — West Hindukush — NW Badakhshan (CHMYRIOV and STASHILO-ALEKSEEV, 1980):

1. The Kalaihumb-Sayksay/Darvas-Zaalay zone contains numerous occurrences and small deposits of Ni-Cu sulphides, massive sulphides and skarn (VALKOV et al., 1979).

Locally, lead-zinc, copper, tin and bismuth as well as porphyry copper mineralization (the Obiningou river) are found.

2. The axial Kurgovoz-Karakul zone of the North Pamir contains rare-metal, pegmatite and skarn mineralization associated with orogenic granites.

3. The southern metallogenic zone of the North Pamir is characterized by the predominance of hydrothermal veins of polymetallic composition.

References

- BARATOV, R. B., AFINOGENOVA, L. N., and SALNIKOV, R. N. (1981): Osobenosti metallogenii skladchatykh oblastey Tsentralnogo Tadjikistana i Pamira. — Zakon. razm. pol. iskop., v. V, 13, Nauka, Moskow (in Russian).
- CHMYRIOV, V. M., and STASHILO-ALEKSEEV, K. F. (1980): Geologia i poleznie iskopaemie Afganistana. — Vol. 1 and Vol. 2, Nedra, Moscow (in Russian).
- ROMANKO, E. F., and MOGAROVSKIY, V. V. (1984): Pozdealpiskaya metallogenia Juzhnogo Tadjikistana i Tsentralnogo Irana. — Sov. geol., 5 (in Russian).
- VOLNOV, B. A., STEBLOVA, V. M., NARIYNEV, V. V. (1979): Osnovnie cherti metallogenii Darvaza. — DAN Tadj. SSR, T. 22, Vol. 7 (in Russian).