

Fold belts (orogens): characterization, origin, development and types

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Fold belts are those parts of the continent where mountains were formed in the Phanerozoic Eon. That is why they have another name – „orogens“. These are structure of considerable width (up to 1000 km) running between cratons, stretching for many thousands of kilometers, and in some places even joining each other. Five main fold belts are known today: 1. Pacific; 2. Ural-okhotsk; 3. Mediterranean same alpine-Himalayan; 4. North-Atlantic and 5. Arctic.

All of the above-mentioned fold belts originated, for the most part, within or on the periphery of ancient ocean basins. The predecessor of the Ural-Okhotsk belt was the Paleo-Asian Ocean, of the Mediterranean belt - the Tethys Ocean, of the North Atlantic belt - the Iapetus Ocean, of the Arctic belt - the Borean Ocean. Evidence of the oceanic origin of fold belts is the presence of numerous outcrops of ophiolites - relics of the oceanic crust of the lithosphere.

Since their inception in the Late Proterozoic, fold belts have undergone a complex and long history of development. One can distinguish certain epochs of the formation of basins with oceanic crust and the completion of their development with the origin of continental crust - the epochs of orogenesis. The Caledonian era marked the end of the North Atlantic fold belt, the Hercynian era marked the end of most of the Ural-Okhotsk belt, and the Cimmerian era marked the end of the Arctic belt. The Pacific and Mediterranean belts have maintained high mobility to this day.

The complete cycle of the evolution of a fold belt, from the origin of the ocean to its closure, is called the Wilson cycle. It distinguishes six stages: 1) continental riftogenesis; a modern example is the East African rift system; 2) early; examples are the Red Sea, Gulf of Aden; 3) Maturity; example - Atlantic Ocean; 4) Extinction; example - Western Pacific Ocean; 5) Final; example - Mediterranean Sea; 6) Relict (geosuture); Example - Indus Line in the Himalayas. Each stage is characterized by a certain type of movement (uplift, extension, compression, uplift again), type of sediments and magmatites.

Despite their diversity, all orogens have the following initial and final conditions in common: A deep-water basin with thin oceanic crust eventually transforms into a fold-thrust structure - an orogen, with thick, up to 60-70 km, mature continental crust. The environment of predominant extension and subsidence changes to an environment of predominant compression and inversion at the end of the cycle.

There are two main types of fold belts: One is the intercontinental belts, which include all of the above-mentioned folded belts, except for the Pacific ones. The latter constitute the second type of folded belts - the marginal-continental type. Intercontinental belts complete their development with the complete absorption of oceanic crust and the collision of their surrounding continents. The marginal-continental belts have not yet completed their development, and the Pacific crust continues to subduct beneath these belts. That is why the first type of belts are also called collisional, and the second type is called subduction.