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Morphodynamical geodiversity of the Earth's crust, relief, and landscapes

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Morphodynamical geodiversity of the Earth's crust is determined by tectonic flows, which create various folded, faulted and injective dislocations. Folded dislocations (plicatives) correspond in plan to the eight types of conic cross-sections and in profile – to variation of the amplitudes. Faulted dislocations (disjunctives) are reflected in the angles of fault planes and the amplitudes of displacements. Injective dislocations vary in size and amplitudes of their vertical penetrations inside sedimentary layers and on the Earth's surface.

In turn, surface and above-the-surface material and energy flows, or geoflows, create geotops – elementary landscapes that are tied up to corresponding elementary surfaces. Geotops are responsible for the morphodynamical geodiversity of relief and landscapes.

Within the three-dimensional space of the geotop each geoflow can be divided into currents and links. The first of which are transverse to the front of the geoflow, the second – the longitudinal. Geotops and geoflows, mainly descending and lateral, influence each other according to their specifics: lithological, biological, hydrological, thermobaric features, etc. This interaction determines the geodiversity as a whole.

By their altitude, gradient and dip azimuth, geotops can be classified as initial (upper), transit (slope) and terminal (lower) – with respect to descending geoflows. By their functional role, geotops can also be divided into: 1) flat-topped and flat-bottomed geotops that are out of the descending geoflows; 2) upper disintegrating geotops (apices, ridges); 3) translators (geotops of faces and feet); 4) vertical barriers (cliffs); 5) intermediate accumulators (terraces); 6) lower accumulators (basins) and conductors (valleys).

Geotops and their elementary surfaces influence also the geometry of geoflows, performing the function of disintegrators (centrifugal and bilateral ones), concentrators (centripetal and bilateral ones) or just conductors (straight ones). They can to a certain extent change the velocity and acceleration of geoflows: high-velocity (cliffs) and accelerating (faces) surfaces; low-velocity (terraces) and decelerating (feet) ones.

The lateral geoflows are also being influenced by altitude, gradient and shape in plan of the geotops as well as by the angle of interaction. The frontal geotops play the role of barriers that decelerate flow, increase its density and concentration of transporting components. The rear geotops have the opposite functional characteristics. The side geotops can influence differently: the convex ones narrow and accelerate flows while the concave ones – expand and decelerate them.

All abovementioned fundamentals in a much more detailed way can be easily found in the monograph by Alexander Lastochkin "General theory of geosystems" (St. Petersburg, 2011, in Russian) while their applications - in the "Geomorphologic Atlas of the Antarctic" (St. Petersburg, 2012 - in Russian; 2013 – in English) produced by the team of authors.