Exogenous initiation of deformation processes in various types of a focal mechanism of earthquakes

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Long-term studies have shown that the influence of variability of atmospheric processes on seismicity is manifested in all ranges of a temporal variability. Consequently, changes in atmospheric processes should initiate the focal mechanism of the earthquakes origin. Studies to identify the mechanism of occurrence of earthquakes have been going on for more than a dozen years. Basically, these studies are based on the theory of continuum and fracture mechanics, which in general allows us to estimate the mechanism of rock destruction at the time of the occurrence of earthquakes. However, only tectonic and endogenous processes are considered as physical phenomena causing the preparation of earthquakes. The role of exogenous processes is studied very poorly. The report presents preliminary results of the influence of exogenous processes (changes in the atmospheric circulation) on the initiation of the earthquakes focal mechanism.

Analysis of changes in the atmospheric circulation allows us to determine the emergence of a "primary" disjunction for one or another type of mechanism at the epicenter of the earthquakes focal. This process occurs as a result of alternation in time (1–2 days) and a shift (2 days) in the position space of cyclones and anticyclones with their subsequent replacement. Baric loads quickly change to the opposite. Positive loads change to negative ones and vice versa. Since areas of a crustal compression correspond to areas of a high atmospheric pressure, and areas of a crust stretching correspond to areas of a low atmospheric pressure, the changing of the spatial location of cyclones and anticyclones for 2-3 days allows us to confidently identify the focal mechanism — a fault or an overlap fold. Also, the studies have shown that, depending on the location of the anticyclone and the cyclone with respect to faults, there are right-sided or left-sided offsets.