

# Trigger effects in seismicity in Terek-Caspian trough

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There are areas of mantle seismicity in the Alpine-Himalayan seismically active belt, the sources of which are mainly located in the layer transitioning to the upper mantle. The zone of manifestation of deep foci ( $70 \text{ km} \leq h \leq 170 \text{ km}$ ) in the central part of the Terek-Caspian Trough is currently the subject of a detailed study at GS RAS. A distinctive feature of this zone from other zones of deep-focus earthquakes of the Alpine-Himalayan belt is the manifestation of relatively weak mantle earthquakes ( $M = 2-4.5$ ), the registration of which for a long time was at the limit of sensitivity of a rare network of seismic stations.

In tectonic terms, the region of the submerged foci in the Terek-Sunzhensk zone is located between the North and Vladikavkaz deep faults. The Tyrnyauzsko-Sunzhensky deep fault is the southern boundary of the block in which the “deepest” ones occur ( $h = 130-165 \text{ km}$ ). The Tskhinvalo-Kazbek deep fault divides the region of the deep foci diagonally into the deepest ones with  $h = 130-165 \text{ km}$  and less deep ones with  $h = 70-120 \text{ km}$ . The Terek-Sunzha seism-generating region is the most highly seismic. In 1976, the Chernogorskoye earthquake with shaking at the epicenter of VIII-IX at MSK-64 and  $M = 6.4$  occurred here, and from the end of the 19th century. More than 20 earthquakes known with a intensity  $I_0 \geq 6$  at MSK-64 are known before the beginning of the XXI century: the Terskoy (Eldarovsk) earthquake of 1912 with  $M = 5.7$  and VIII at MSK-64 and a source in the upper mantle belong to the strongest of them; Vedenovskoe 1933 with  $M = 5.2$  and VII-VIII at MSK-64. According to the available data on deep earthquakes [Godzikovskaya, Reisner, 1989], activation in the transition layer to the upper mantle in the area under study during the preparation of the Chernogorskoye earthquake on July 28, 1976 at 20h 17m with  $M = 6.2$  [Kondorskaya et al., 1980] is noted. Then, almost four years before it, earthquakes with  $K = 9.2-12.5$  and with depths  $h = 80-120 \text{ km}$  began to be registered, up to July 17, 1976. A similar fact was noted before the strong Kurchaloy earthquake on October 11, 2008.

According to recent studies along the diagonal Benoisk-Eldarov suture zone and its continuation under the structures of the Dagestan wedge, there is a “tandem” in time of the recessed ( $h \geq 70 \text{ km}$ ) and upper crustal foci with  $M \geq 3$ : up to several days, which in our opinion can be attributed to the trigger effect. This may be due to the rise of the mantle substance and its effect on the discharge of stresses in the blocks of the earth’s crust. In 2013, this phenomenon manifested itself most clearly, repeatedly, and, importantly, not only in the Terek-Caspian Trough, but also in the structures of Gorny Dagestan.