

## **Crustal underthrusting in the Crimea - Northern Black Sea area**

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The southern Crimean Mountains and the Greater Caucasus form a fold and thrust belt located on the northern margin of the Black Sea, south of Precambrian East European Craton. It is limited to the south by the Main Caucasus Thrust that runs along the whole of the northern margin of the Black Sea and is related to a zone of present day seismicity along the southern Crimea-Caucasus coast of the Sea (Crimean Seismogenic Zone). Strong seismic activity in the region indicates active on-going tectonic processes caused by collision of Eurasian and Arabian plates. In the vicinity of the seismogenic zone there is a transition from thick continental crust on the north to thin suboceanic one on the south in the sea. However, type and structural relations between them are known poorly. To understand better geodynamic processes, there were collected data on the earthquakes that were analyzed together with focal mechanisms of strong earthquakes, new results of geological structural analysis and paleostress reconstructions by kinematic method. These allowed drawing the following conclusions.

Seismic activity in the study region, evidenced of active tectonic processes under compression and transpression at the transition from the southern margin of the East European Craton (Scythian Platform) to the Black Sea, is confirmed by predominance of reverse mechanisms among 31 focal mechanisms. In the seismogenic zone, much of which is located along the continental slope, there are three subzones (from east to west): 1) Kerch-Taman one dipping northwards at angle 30 degrees to the depth of 90 km; 2) South-Coast subzone gently dipping to the southeast at angle of 18 degrees with foci depth range 10-45 km, and 3) orthogonal to the latter and confining it from the west the Sevastopol one, characterized by scattered seismicity. The earthquake foci are located in the gradient zone that separates intense Crimea gravity high and positive anomaly of Northern Caucasus from negative gravity field of the Black Sea. The north-south tight band of the South-Coast subzone epicenters relates with highest gravity gradient offshore and is traced northward onshore on transition zone between the Western and Eastern Crimean Mountains. In the eastern part the reverse and strike-slip faulting prevail, while in the western part - the strike-slip and normal faults occur. The Kerch-Taman subzone is characterized by underthrusting the East Black Sea microplate with thin suboceanic (or strongly extended continental) crust below the Scythian Platform with thick continental crust. In the South-Coast subzone this process is complicated by wedging the frontal part of suboceanic crust into the mid-crust of Crimea. Sevastopol branch of the earthquakes is interpreted as zone of strike-slip deformations. The wedging of the East Black Sea microplate into the Scythian Plate crust in Crimea causes intense gravity anomaly of Crimean Mountains and strong present-day uplift of the latter. The analogue of described wedging mechanism seems to be geodynamic processes in the Ivrea area in Western Alps, characterized by similar crust structure and intense gravity anomaly.