A Comparative Study of Triangle Zones of the Canadian Cordillera and the Dagestan Thrust Belt, NE Caucasus, Russia
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The Dagestan foreland thrust belt represents the structural transition zone between the Terek-Caspian Basin and the Caucasus. Surficial structure in the area is dominated by folding in Mesozoic carbonate-terrigenous deposits in the hinterland, and hinterland-verging thrusts faults in the overlying Tertiary molasse section of the foreland. The allochthonous assemblage of the belt is formed of stacked north-vergent thrust sheets made up primarily of Mesozoic carbonates and sandstones bounded at the top and bottom by conjugate detachment surfaces. These thrust sheets were inserted into the clastic section of the Terek-Caspian foredeep along the base of Oligocene-early Miocene mudstones of the Maykop Formation. The interpreted geometry of the thrust belt implies shortening of between 20 and 30 km. Present width of the thrust belt is 40-60 km. Stratigraphic relationships between sedimentary units in front of the thrust belt and present-day shallow seismicity within the belt suggest that deformation has been active from late Miocene through Recent. Fifteen oil and gas fields have been discovered, mostly within buried thrust-propagated anticlines. New data reveals untested structural traps in antiformal stacks concealed beneath the overlying molasse.

A comparison of the foreland thrust belts of the Canadian Cordillera and the northeastern Caucasus shows considerable differences as well as similarities. Both areas contain stacked triangle zones, with tectonic wedging/delamination at several horizons. The absence of basin-vergent thrusts in the Dagestan thrust belt contrasts markedly with the abundance of such structures in the southern Alberta foothills sector of the Canadian Cordillera, but closely resembles the northeastern British Columbia foothills. In that area, folds characterize the surface geology, but thrusts are commonly encountered by wells that drill through major detachment horizons in the section. These differences are thought to be related to the differences in ages of deformation, stratigraphic level of detachment horizons, and erosion levels. Hinterland-verging back-thrusts, common in the Dagestan foothills, are less common in the Alberta foothills and rare in northeastern British Columbia. Their occurrence may be related to the degree of syntectonic erosion, which could unroof the uppermost detachment, break the seal on the overpressured envelope of thrusting beneath it so that subsequent compression is accommodated by back-thrusting in the molasse section ahead of the thrusting. Thus, back-thrusts should be most common at the outer edges of thrust belts and rare in fold belts, where the upper seal on the underlying thrust belt is intact.

The structural pattern of the Dagestan Thrust belt can be viewed as the equivalent of an initial, uneroded phase of structural evolution of Alberta foothills triangle zones. Shallower levels of erosion within the Dagestan thrust belt may provide better structural conditions for accumulation of hydrocarbons in buried traps.

The role of the Maykop shale as host for the uppermost detachment in Dagestan is played by the Upper Cretaceous Edmonton-Bearpaw succession in southern Alberta. Northward through Alberta, the detachment follows progressively lower argillaceous units.