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Ductile shear zones in Precambrian basement of Lithuania

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Few ductile shear zones are recognized in the Precambrian crystalline basement of Lithuania in course of geological mapping and oil exploration.

E-W trending Telšiai Deformation Zone (TDZ) in West Lithuania, up to15 km wide, is identified on the distance of about 100 km by drilling and few hundred kilometres by geophysical methods. The crystalline basement along the TDZ is composed mainly by intrusive charnockitoids (1,845-1,815 Ga), transformed in to mylonites and cataclasites. Biotite, garnet, often preserved hypersthen, absence of muscovite indicate high grade metamorphic conditions. Petrologic data, granite veins, cutting mylonites suggest formation of TDZ in the Svecofennian orogenic period ($\sim$1800 Ma) and reactivation several times in ductile and brittle conditions. Few smaller shear zones run parallel to TDZ implying system of ductile-brittle shear zones.

E-W trending Drukšiai and Polock shear zones (or one integral zone) are located in Eastern Lithuania nearly on same latitude as TDZ. Based on drilling and potential field data they extend to the east on rather long distance across Belarus. Predominant fault rocks are high grade mylonites with biotite and hornblende. This indicates formation in amphibolite facies conditions most probably in Proterozoic time and in relation to orogenic events?

In Southern Lithuania principal ductile shear zones – Vilnius-Eišiškes and Lazdijai run in NE-SW direction. The principal fault rocks are phylonites, mylonites and ultramylonites. Changes in chemical composition are fixed - content of K_2O is in places increasing at the expense of CaO and Na_2O, due to disintegration of plagioclase. Muscovite, epidot and chlorite are often observed in tectonites indicating greenschist or low amphibolite facies conditions. Shear zones are up to 1-2 km wide and not always clearly manifested on geophysical maps. Formation of ductile shear zones in South-

ern Lithuania might be related to block movement in accretionary prism formed in convergence zone between East Lithuanian and West Lithuanian plates. Some shear zones might be reactivated or formed newly in course of Sarmatian-Fennoscandian collision, when system of thrusts have been formed striking NE-SW.

Characterised ductile shear zones in Lithuania have been formed in different tectonic domains and by different tectonic factors. Thus they reflect different stages of crustal deformation in different tectonic environment. Many of shear zones have been repeatedly reactivated in brittle condition influencing structure of sedimentary cover. Thus Telšiai thrust with the amplitude up to 300 m - most prominent tectonic feature in the Phanerozoic sedimentary cover was formed in Early Devonian along TDZ and is place of location of main oil deposits in Lithuania.