Structure of the Gare Kakheti foothills using seismic reflection profiles: implications for kinematic evolution of the Georgian part of Kura foreland fold-and-thrust belt

Alexander Razmadze

Tbilisi State University, Institute of Geophysics, Georgia (alrazmadze@gmail.com)

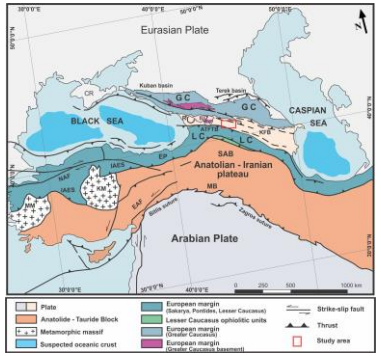

Figure 1. Tectonic map of the Arabia - Eurasia collision zone (modified from Sosson et al. 2016). Abbreviations: CR-Crimea; GC-Greater Caucasus; LC-Lesser Caucasus; R-Rioni; IUZ-Imereti uplift zone; Dz-Dzirula; KFB-Kura Foreland Basin; ATFTB-Achara-Trialeti fold-and-thrust belt; SAB-South Armenian Block; MB-Mus Basin; EP-Eastern Pontides; KM-Kirsehir Massif; EAF-Eastern Anatolian Fault; NAF-North Anatolian Fault; IAES-Izmir-Ankara-Erzincan Suture; MM-Menderes Massif.

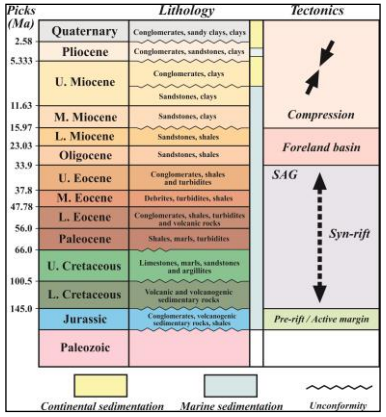

Figure 4. Tectono-stratigraphic chart of the study area (modified from Adamia et al. 2002, 2010; Alania et al. 2017).

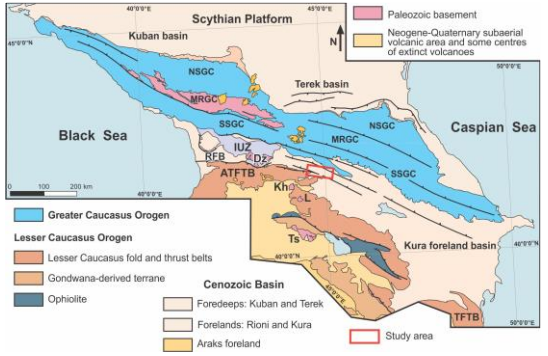

Figure 2. Simplified tectonic map of the Caucasus (Modified from Adamia et al. 2011; Mosar et al. 2010; Sosson et al. 2016). Abbreviations: SSGC- Southern Slope of Greater Caucasus, MRGC-Main Range of Greater Caucasus, NSGC-Northern Slope of Greater Caucasus; RFB-Rioni foreland basin; IUZ-Imereti uplift zone; ATFTB-Achara-Trialeti fold-and-thrust belt; TFTB-Talysh fold-and-thrust belt; DZ-Dzirula; Kh-Khrami; L-Loki; Ts-Tsakhkuniats.

Gare Kakheti foothills is located between Lesser Caucasus and Kakheti Ridge and is mainly represented by the series of NEN dipping thrust faults, most of which are associated with fault-related folds. Gare Kakheti foothills as a part of the Kura foreland fold-and-thrust belt developed formerly as a foreland basin (Oligocene-Lower Miocene) (e.g. Alania et al., 2017).

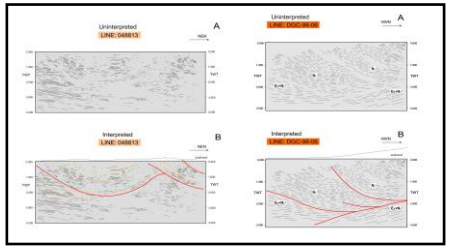

Figure 5. Interpreted seismic profiles. Location is shown in Figure 3.

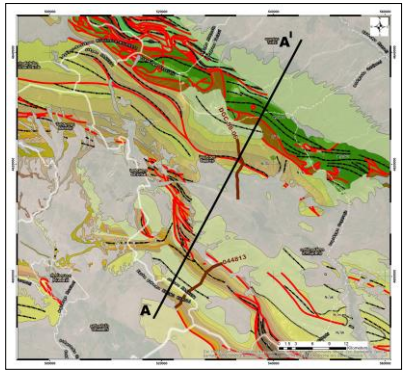

Figure 3. Geological map of study area (modified from Sepashvili, 1976).

The Kura basin which developed formerly as a foreland basin (Oligocene-Lower Miocene) continued its evolution as a fold-and-thrust belt during Middle Miocene-Pleistocene (Alania et al. 2008, 2017). Neogene shallow marine and continental sediments in the Gare Kakheti foothills keep the record on the stratigraphy and structural evolution of the study area during the compressive deformation. Interpreted seismic profiles and structural cross-sections across the Udabno, Tsitsmatiani, and Berebisseri synclines show that they are thrust-top basins. Seismic reflection data reveal the presence of growth fault-propagation folds and some structural wedges (or duplex). The evolution of the Udabno, Tsitsmatiani, and Berebisseri basins is compared with simple models of thrust-top basins whose development is controlled by the kinematics of competing growth anticlines. Growth anticlines are mainly represented by fault-propagation folds. The geometry of growth strata in associated footwall synclines and the sedimentary infill of thrust-top basins provide information on the thrusting activity in terms of location, geometry, and age.

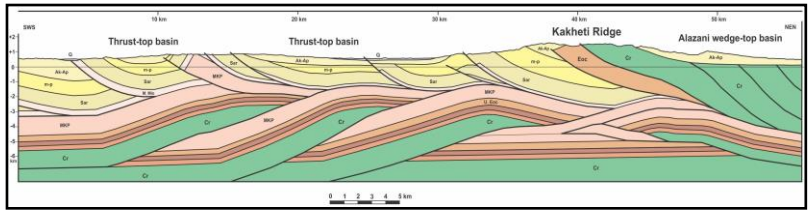

Figure 6. Structural cross-section A-A^1. Location is shown in Figure 3.

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