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Late Cenozoic Samtskhe-Javakheti Volcanic Highland, Georgia:The Result of Mantle Plumes Activity

Avtandil Okrostsvaridze

Institute of Earth Sciences, Ilia State University,Tbilisi,Georgia (okrostsvari@gmail.com)

Late Cenozoic Samtskhe-Javakheti continental volcanic highland (1500-2500 m a.s.l) is located in the SW part of the Lesser Caucasus. In Georgia the highland occupies more than 4500 km^2, however its large part spreads towards the South over the territories of Turkey and Armenia.

One can point out three stages of magmatic activity in this volcanic highland: 1. Early Pliocene activity (5.2-2.8 Ma; zircons U-Pb age) – when a large part of the highland was built up. It is formed from volcanic lava-breccias of andesite-dacitic composition, pyroclastic rocks and andesite-basalt lava flow. The evidences of this structure are: a large volume of volcanic material ($>$1500 km^3); big thickness (700-1100 m in average), large-scale of lava flows (length 35 km, width 2.5-3.5 km, thickness 30-80 m), big thickness of volcanic ash horizons (300 cm at some places) and big size of volcanic breccias (diameter $>$1 m). Based on this data we assume that a source of this structure was a supervolcano (Okrostsvaridze et al., 2016); 2. Early Pleistocene activity (2.4 -1.6 Ma; zircons U-Pb age) – when continental flood basalts of 100-300 m thickness were formed. The flow is fully crystalline, coarse-grained, which mainly consist of olivine and basic labradorite. There $^{143}Nd/^{144}Nd$ parameter varies in the range of +0.41703 - +0.52304, and $^{87}Sr/^{88}Sr$ – from 0.7034 to 0.7039; 3. Late Pleistocene activity (0.35-0.021 Ma; zircons U-Pb age) - when intraplate Abul-Samsari linear volcanic ridge of andesite composition was formed stretching to the S-N direction for 40 km with the 8-12 km width and contains more than 20 volcanic edifices. To the South of the Abul-Samsari ridge the oldest (0.35-0.30 Ma; zircons U-Pb age) volcano Didi Abuli (3305 m a.s.l.) is located. To the North ages of volcano edifices gradually increase. Farther North the youngest volcano Tavkvetili (0.021-0. 030 Ma) is located (2583 m a.s.l.). One can see from this description that the Abul-Samsari ridge has all signs characterizing intraplate volcanic ridge.

Based on our studies, we assume that the Samtskhe-Javakheti volcanic highland is a result of full cycle mantle plume activity and not of by adiabatic decompression melting of the asthenosphere, as it is considered at present (Keskin, 2007). Therefore, we assume that this volcanic highland is a Northern marginal manifestation of the Eastern Africa-Red Sea –Anatolia mantle plume flow. If we accept this idea, then the Pliocene-Pleistocene Samtskhe-Javakheti volcanic highland is the youngest continental mantle plume formation of the Earth.

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