

Dating of the late Quaternary volcanic events using Uranium-series technique on travertine deposit: A case study in Ihlara, Central Anatolia Volcanic Province

Volkan Karabacak (1), İ. Tonguç Uysal (2), and Ezgi Ünal-İmer (3)

(1) Department of Geological Engineering, Eskisehir Osmangazi University, TR 26480, Turkey, (2) Department of Geological Engineering, Hacettepe University, TR 06800, Turkey, (3) School of Geography, Planning & Environmental Management, The University of Queensland, QLD 4072, Australia

Dating of late Quaternary volcanism is crucial to understanding of the recent mechanism of crustal deformation and future volcanic explosivity risk of the region. However, radiometric dating of volcanic products has been a major challenge because of high methodological error rate. In most cases, there are difficulties on discrimination of the volcanic lava flow relations in the field. Furthermore, there would be unrecorded and unpreserved volcanoclastic layers by depositional and erosional processes. We present a new method that allows precise dating of late Quaternary volcanic events (in the time range of 0-500,000 years before present) using the Uranium-series technique on travertine mass, which is thought to be controlled by the young volcanism. Since the high pressure CO₂ in the spring waters are mobilized during crustal strain cycles and the carbonates are precipitated in the fissures act as conduit for hot springs, thus, travertine deposits provide important information about crustal deformation.

In this study we studied Ihlara fissure ridge travertines in the Central Anatolia Volcanic Province. This region is surrounded by many eruption centers (i.e. Hasandağı, Acıgöl and Göllüdağı) known as the late Quaternary and their widespread volcanoclastic products. Recent studies have suggested at least 11 events at around Acıgöl Caldera for the last 180 ka and 2 events at Hasandağı Stratovolcano for the last 30 ka. Active travertine masses around Ihlara deposited from hotwaters, which rise up through deep-penetrated fissures in volcanoclastic products of surrounding volcanoes. Analyses of the joint systems indicate that these vein structures are controlled by the crustal deformation due to young volcanism in the vicinity. Thus, the geological history of Ihlara travertine mass is regarded as a record of surrounding young volcanism. We dated 9 samples from 5 ridge-type travertine masses around Ihlara region. The age distribution indicates that the crustal deformation intensified during 5 different periods in the last 150 ka. Preliminary data reveal that the travertine masses were in the region precipitated during short-term strain cycles and this periods corresponding to previously dated events on Hasandağı and Acıgöl eruption centers.